COLORADO
Department of Transportation

I-70 East Final Environmental Impact Statement
and Section 4(f) Evaluation

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I-70 East
I-70 East from I-25 to Tower Road
Denver, Colorado

FINAL ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

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The Federal Highway Administration may publish a notice in the *Federal Register*, pursuant to 23 United States Code (USC) Section 139(l), when the Record of Decision 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 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.

Abstract

This Interstate 70 (I-70) East Final Environmental Impact Statement (EIS) and Section 4(f) Evaluation documents the anticipated effects associated with transportation improvements planned along the I-70 corridor between I-25 and Tower Road.

The Draft EIS was released for public review in 2008. When it was determined that a consensus on a preferred alternative would not be reached, the Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA) decided to review prior decisions in the process, including the previously eliminated alternatives. As a result, the Supplemental Draft EIS was released for public review in 2014 and introduced a new alternative for consideration.

This Final EIS updates the analysis for the Supplemental Draft EIS alternatives, and identifies a preferred alternative. This document also responds to the stakeholder comments received during the Supplemental Draft EIS public review period. The Preferred Alternative is identified as the Partial Cover Lowered Alternative with Managed Lanes Option.

Any direct, indirect, cumulative, and construction effects of the revised alternatives are identified in a broad range of categories, including transportation, social and economic conditions, environmental justice, land use, relocations and displacements, historic preservation, paleontological resources, visual resources and aesthetic qualities, parks and recreational resources, air quality, energy, noise, biological resources, floodplains and drainage/hydrology, wetlands and other waters of the U.S., water quality, geology and soils, hazardous materials, utilities, and Section 4(f) resources. Mitigation measures are identified to address impacts to all resources.

Visit the project website at www.i-70east.com for an electronic version of the Final EIS and attachments, including technical reports. Attachment Q of the Final EIS provides responses to all comments received on the Supplemental Draft EIS released in August 2014. The project website lists locations where hard copies of the Final EIS and associated materials are available for public review. Information on dates, times, and locations of public meetings that will be held during the public review period also are included on the project website.

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The Executive Summary and Frequently Received Comments and Responses on the Supplemental Draft EIS are provided in Spanish in this document and on the website, www.i-70east.com.

For additional Spanish assistance, please call 303-757-9413.

El Resumen Ejecutivo y los Comentarios Frecuentes Recibidos así como sus Respuestas sobre el Anteproyecto del EIS Suplementario los puede encontrar en español en este documento y en el sitio web www.i-70east.com.

Para obtener ayuda adicional en español favor de llamar al 303-757-9413

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Attachment A, Alternative Maps, is a standalone 11-inch by 17-inch booklet

Attachment B – Agency Consultation
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Attachment C – Alternative Analysis
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Attachment E – Traffic
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(The Supplemental Draft EIS attachment required no modifications or updating, no addendum or new Technical Report has been prepared as part of the Final EIS)

Attachment G – Relocations and Displacements
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Part 1 of 3: Frequently Received Comments and Responses (also included in Spanish)
Agencies and Elected Officials
Businesses
Special Interest Groups

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Part 3 of 3: Citizens K through Z

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ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this document. Each acronym or abbreviation is only spelled out when it is first used in Volume 1 (Final EIS document), while subsequent instances use only the acronym or abbreviation. In Volume 2, acronyms and abbreviations are spelled out at the first use in each Attachment. Volume 3 references this list of acronyms and abbreviations, and does not spell them out.

A

ACC	Agency Coordination Committee
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos-containing materials
ACS	American Community Survey
ADA	Americans with Disabilities Act of 1990
AERMOD	EPA's air quality dispersion model used in PM_{10} hotspot analysis
AMI30	30 Percent Area Median Income
APCD	Air Pollution Control Division of CDPHE
APE	Area of Potential Effect
APEN	Air Pollutant Emission Notice
AQCC	Air Quality Compliance Committee
AST	Above-ground storage tank
ASTM	American Society for Testing and Materials
Aurora	City of Aurora

B

BMP	Best management practice
BNSF	Burlington Northern Santa Fe Railway
BOD	Biological oxygen demand
Btu	British thermal unit

C

CAA	Clean Air Act
CAFE	Corporate average fuel economy

CAL3QHC	EPA's air quality dispersion model used in carbon monoxide hotspot analysis
CAMP	Denver Continuous Air Monitoring Program
CD	Connector-distributor
CDOA	Colorado Department of Agriculture
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CMAQ	Congestion Mitigation/Air Quality
CO	Carbon monoxide
Commerce City	City of Commerce City
CORRACTS	RCRA Corrective Action List
CPW	Colorado Parks and Wildlife
CRHDC	Community Resources and Housing Development Corporation
CRS	Colorado Revised Statutes
CWA	Clean Water Act

D

dB	Decibel
DB	Design Build
dBA	Decibel (A-weighted scale)
DBOM	Design Build Operate Maintain
DBFOM	Design Build Finance Operate Maintain
DEH	Denver Department of Environmental Health
Denver	City and County of Denver
DIA	Denver International Airport
DOLA	Colorado Department of Local Affairs
DRCOG	Denver Regional Council of Governments

DRIR	Denver Rock Island Railroad
DSS	Decent, safe, and sanitary
DynusT	Dynamic Urban Systems for Transportation modeling software

E

EIS	Environmental impact statement
EJCC	Environmental Justice Compliance Committee
EOC	Executive Oversight Committee
EPA	U.S. Environmental Protection Agency
ERS	Economic Research Service
ESA	Endangered Species Act

F

FACWet	Functional Assessment of Colorado Wetlands
FASTER	Funding Advancement for Surface Transportation and Economic Recovery
FDA	Food and Drug Administration
FDCP	Fugitive Dust Control Program
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood insurance rate map
FR	Federal Register
FTA	Federal Transit Administration

H

HAP	Hazardous air pollutants
HIA	Health impact assessment
HOT	High-occupancy toll
HOV	High-occupancy vehicle
HPTE	High Performance Transportation Enterprise
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, ventilation, and air conditioning

I

I-25	Interstate 25
I-225	Interstate 225

I-270	Interstate 270
I-70	Interstate 70
ICCC	Intergovernmental Coordination and Compliance Committee
IF	Intergovernmental Forum
iPAC	USFWS Information, Planning, and Conservation System
ITS	Intelligent transportation systems

K

kv	kilovolt

L

L_{eq}	Equivalent sound level
LEP	Limited English proficiency
LOS	Level of service
LUST	Leaking underground storage tank
LWCF	Land and Water Conservation Fund

M

MATT	Multi-Agency Technical Team
Metro District	Denver Metro Wastewater Reclamation District
MOVES	Motor Vehicle Emissions Simulator modeling software
MPH	Miles per hour
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MSA	Metropolitan Statistical Area
MSAT	Mobile source air toxics
MVRTP	Metro Vision Regional Transportation Plan

N

NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
n.d.	No date
NDIS	Natural Diversity Information Source
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program

NFRAP	No further remedial action planned
NHPA	National Historic Preservation Act
NO2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

O

O_3	Ozone
OHWM	Ordinary high water mark
OPENPIT	Modeling process used to model depressed sections of roadway
OTAQ	EPA Office of Transportation Air Quality

P

PACT	Preferred Alternative Collaborative Team
PB	Lead
PBA	Programmatic biological assessment
PCE	Tetrachloroethylene
PM_{10}	Particulate matter less than 10 microns in size
$PM_{2.5}$	Particulate matter less than 2.5 microns in size
PMC	Project Management Committee
PMT	Project Management Team
PPM	Parts per million
PSI	Preliminary subsurface investigation

Q

QR	Quick response

R

RCRA	Resource Conservation and Recovery Act
Refuge	Rocky Mountain Arsenal National Wildlife Refuge
REIMHS	Regional Economic Impact Model for Highway Systems
RiNo	River North

ROD	Record of Decision
RTD	Regional Transportation District
RTP	Regional Transportation Plan

S

SB 09-228	Colorado Senate Bill 09-228
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur dioxide
STIP	Statewide Transportation Improvement Plan
STP-Metro	Surface Transportation Program-Metropolitan Areas
SVOC	Semi-volatile organic compound
SWAP	Colorado Source Water Assessment and Protection program
SWL	Solid waste landfills
SWMP	Stormwater Management Plan
SWP	Statewide Transportation Plan

T

TCE	Trichloroethylene
TDM	Transportation demand management
TIP	Transportation Improvement Plan
TNM	Traffic Noise Model, FHWA's approved noise modeling software
TSM	Transportation system management
TSS	Total suspended solids

U

Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

UST	Underground storage tank

V

VCUP	Voluntary Cleanup Program
VHT	Vehicle hours of travel
VMT	Vehicle miles of travel
VOC	Volatile organic compound
VPD	Vehicles per day

W

WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division

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EXECUTIVE SUMMARY

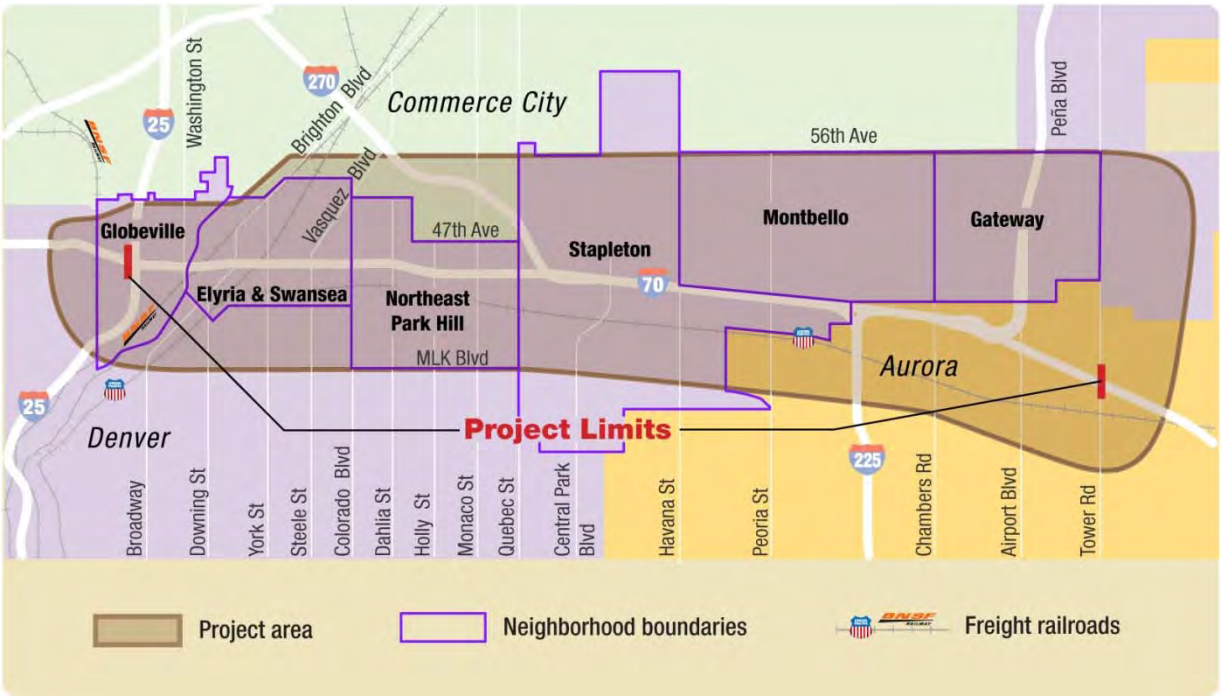
The Executive Summary of the Final Environmental Impact Statement (EIS) provides an overview of the project, including the project purpose and need, project description, evaluated alternatives, project benefits, and major findings. For further details on the information provided in this Executive Summary, please refer to the corresponding chapter.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS.

ES.1 What is the I-70 East EIS project and where is it located?

The Interstate 70 (I-70) East EIS is a joint effort between the Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT). This document identifies potential highway improvements along I-70 in the Denver metropolitan area, between Interstate 25 (I-25) and Tower Road (see **Exhibit ES-1**), and assesses their potential effects on the human and natural environment.

Exhibit ES-1 I-70 East Project Area and Limits



The project area extends almost 12 miles along I-70 covering portions of the City and County of Denver (Denver), the City of Commerce City (Commerce City), and the City of Aurora (Aurora); and it includes the neighborhoods of Globeville, Elyria and Swansea, Northeast Park Hill, Stapleton, Montbello, Gateway, and a portion of Aurora.

Each resource evaluated in this document has a specific study area that may be the same as the project area or construction limits of the evaluated alternatives, depending on the resource. Study areas are discussed under each resource section in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation.

ES.2 What is the background of the I-70 East project?

The I-70 East project began in 2003 as part of the I-70 East Corridor EIS, which looked at both highway and transit solutions. In 2006, the transit and highway components of the project were separated because it was determined that they addressed different corridors, travel markets, and funding sources. The Regional Transportation District (RTD) and the Federal Transit Administration (FTA) completed the EIS for the transit elements (East Corridor EIS) in 2009. Completion of construction on the commuter rail transit line is anticipated in 2016.

The *I-70 East Draft Environmental Impact Statement, Section 4(f) Evaluation* for highway improvements was published in 2008. None of the alternatives analyzed in the 2008 Draft EIS received overwhelming support from the public and stakeholders because of associated impacts to the built, natural, and social environment.

Due to the lack of support, CDOT and FHWA decided not to identify a preferred alternative at that time and initiated a rigorous collaboration process to recommend a preferred alternative. This collaboration process, subsequently named the Preferred Alternative Collaborative Team (PACT), consisted of federal, state, and local agencies; advocacy groups; and stakeholders, including neighborhood representatives from Adams County, Aurora, Commerce City, and Denver.

After approximately one year of collaboration and additional analysis, the PACT members were not able to reach consensus on a preferred alternative. However, the PACT members did agree that I-70 should remain on its existing alignment. Consequently, CDOT and FHWA decided to review prior decisions in the process, including the previously eliminated alternatives. As a result, a new alternative was developed that addressed the public and stakeholder concerns while satisfying the project's purpose and need.

In August 2014, a Supplemental Draft EIS was published that updated the analysis in the 2008 Draft EIS and included additional analysis for the newly developed alternative.

What is the PACT?

PACT is the Preferred Alternative Collaborative Team, which was comprised of state and federal agencies, advocacy groups, and stakeholders—including neighborhood representatives from Adams County, Aurora, Commerce City, and Denver. It was formed in July 2010 to help decision makers identify a preferred alternative.

The National Environmental Policy Act of 1969 (NEPA), which governs this project, allows lead agencies to preliminarily identify a preferred alternative at the Draft EIS stage. Although no preferred alternative was identified in the 2008 Draft EIS, FHWA and CDOT preliminarily identified a preferred alternative in the Supplemental Draft EIS. The preliminarily identified Preferred Alternative was refined and is identified as the Preferred Alternative in this document. Chapter 3, Summary of Project Alternatives, includes details on the preferred alternative.

ES.3 Why prepare an EIS for the I-70 East project?

NEPA requires projects that have a federal nexus and 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. An EIS is prepared when a proposed action may significantly affect the quality of the human environment. The purpose of an EIS is to "serve as an action-forcing device to ensure that the policies and goals defined in NEPA are infused into the on-going programs and actions of the federal government" (CEQ, 1978). An EIS details the process through which a transportation project is developed, including consideration of a range of reasonable alternatives and detailed analysis of the potential impacts resulting from each. It documents compliance with other applicable environmental laws, regulations, and executive orders.

What is a federal nexus?

Under federal law, NEPA applies to any proposed action or transportation project that has a federal nexus, including, but not limited to, instances where:

- Federal funds are involved
- Federal permits or approvals are required
- New or revised access to the interstate system is included

ES.3.1 What is the purpose of the Final EIS?

NEPA requires that FHWA and CDOT prepare a Final EIS to:

- Respond to comments received on the Supplemental Draft EIS from agencies, stakeholders, and the public
- Further evaluate the Preferred Alternative that was preliminarily identified in the Supplemental Draft EIS
- Update and modify previous analyses, as appropriate
- Make updates to previous environmental documentation

ES.4 What is the project's purpose and need?

Currently, I-70 between I-25 and Tower Road is one of the most heavily traveled and congested highway corridors in the state. The corridor provides a number of important transportation functions, including interstate and intrastate passenger vehicle travel along I-70; interstate and intrastate truck travel for business purposes; regional access from downtown Denver and the metropolitan area to Denver International Airport (DIA); linkage as an inner beltway between Interstate 225 (I-225) and Interstate 2710 (I-270); and access to adjacent employment areas, neighborhoods, and new development centers.

Using input from scoping, data gathering, and technical analysis, the project purpose and need was developed as part of the 2008 Draft EIS process. The project purpose has not changed since the 2008 Draft EIS, although some of the data used to describe the need for the project have been updated.

The purpose of the I-70 East EIS project is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area.

The need for this project results from the following issues:

- **Transportation infrastructure deficiencies**
  I-70 was constructed in the early 1960s with bridge and drainage structures designed to last for 30 years. Nine structures on the corridor are now past their anticipated life spans and are classified as either structurally deficient or functionally obsolete. This means they are in need of repair, rehabilitation, or replacement.

What qualifies a bridge as "structurally deficient"?

Federal guidelines classify bridges as "structurally deficient" if the components are rated at poor or worse on inspection. This means that engineers have identified a major defect in the bridge's support structure or deck. If a bridge is rated "structurally deficient," the bridge needs substantial maintenance or rehabilitation, or it needs to be replaced.

When is a bridge "functionally obsolete"?

A bridge is functionally obsolete when it cannot properly accommodate traffic due to poor roadway alignment or out-of-date design standards.

Falling pieces of concrete show a structurally deficient viaduct. The photo was taken on 46th Avenue under the viaduct.

- **Increased transportation demand**
  The project area is experiencing rapid growth and development. This includes areas of new development and redevelopment, with substantial residential populations and business activity. Population growth estimates show a 42-percent increase and employment is expected to increase 58 percent from 2010 to 2035. The land use and development trends within the corridor will result in additional demands on the transportation system. Providing access and maximizing travel to, through, and within the corridor are critical to maintaining the economy. This includes maintaining and enhancing connections between major activity centers near the corridor.

- **Limited transportation capacity**
  I-70 serves a growing number of users, ranging from travelers and tourists from outlying areas and DIA to regional trucking, commuters, and local traffic. The demand from these users is exceeding the existing design capacity of I-70 and associated interchanges.

  Within the project area, I-70 currently carries between 52,000 and 220,000 vehicles per day (average daily traffic), depending on the location along the corridor. Forecasts for the year 2035 (with or without improvements) show that traffic volume on I-70 will increase substantially. The forecast ranges from 95,000 to 270,000 vehicles per day depending on the location in the corridor. This increase in traffic will result in more hours of congestion, longer delays, and increased potential for crashes.

- **Safety concerns**
  Based on CDOT's safety evaluation conducted in 2013, some sections of I-70 have higher-than-average crash rates. Higher-than-average crash rates often can be attributed to roadway conditions that do not meet current design standards. Crashes on I-70 cause unpredictable and unavoidable traffic congestion, which adds to or worsens the already existing congestion from travel demand that exceeds the normal roadway capacity. The unpredictable nature of traffic congestion on I-70 increases safety concerns for freight carriers, employers, manufacturers, and business interests in the region, as well as commuters and residents who depend on reliability for their daily travel.

Additional detail on these issues is included in Chapter 2, Purpose and Need.

ES.5 Which alternatives are fully analyzed in this Final EIS?

Nearly 90 different alternatives were considered and evaluated during the screening process conducted for the Draft EIS and Supplemental Draft EIS—including re-routing I-70 north of Denver. For a variety of reasons, all but three of the alternatives were eliminated. The remaining three alternatives, which are fully analyzed in this document, result from extensive agency involvement and public outreach combined with detailed environmental and technical analyses.

The three alternatives in this Final EIS include the No-Action Alternative and two Build Alternatives: the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. In addition, there are several expansion and operational design options associated with the alternatives. The alternatives and their associated options are discussed briefly in the following subsections and summarized with their key features in **Exhibit ES-2**

As a result of the comments received on the Supplemental Draft EIS and additional stakeholder outreach and agency coordination, the Partial Cover Lowered Alternative as presented and analyzed in the Supplemental Draft EIS has been refined to include elements of both the Basic Option and the Modified Option. This document includes updated analysis of the refined Partial Cover Lowered Alternative and does not include separate Basic and Modified Options.

Additional details on all of the alternatives and design options evaluated in this Final EIS are included in Chapter 3, Summary of Project Alternatives.

Exhibit ES-2 Summary of Project Alternatives and Options

ES.5.1 No-Action Alternative

The No-Action Alternative includes planned and programmed roadway and transit improvements in the project area.

The No-Action Alternative also includes the replacement of the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard. Due to its age and deteriorating condition, replacement of the viaduct is necessary to maintain the safety and operation of I-70.

As part of the No-Action Alternative, the width of the viaduct structure will be increased to meet current highway standards. However, additional capacity or lanes will not be added to the highway configuration.

Reconstruction of the existing viaduct with the No-Action Alternative includes two Expansion Options, North and South. Each option would widen the highway to the north or to the south, respectively. Both options require additional right-of-way acquisition to allow for phased construction and to rebuild the viaduct using current highway design standards (standard lane and shoulder widths).

What is a viaduct?

A viaduct is a long, elevated roadway consisting of a series of shorter bridge spans supported on arches, piers, or columns.

ES.5.2 Build Alternatives

There are two Build Alternatives proposed for improvements between Brighton Boulevard and Tower Road: the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. Both of the Build Alternatives add capacity to I-70 between I-25 and Tower Road by restriping I-70 from I-25 to Brighton Boulevard (to accommodate additional lanes) and widening I-70 from Brighton Boulevard to Tower Road.

To address safety issues associated with the aging viaduct between Brighton Boulevard and Colorado Boulevard, the Build Alternatives will replace the existing viaduct or remove it completely.

The Build Alternatives will reconstruct bridges and interchanges affected by the widening improvements between Brighton Boulevard and Tower Road. The I-70 bridge over Sand Creek and the interchanges at Central Park Boulevard, I-225, I-270, Chambers Road, Peña Boulevard, Airport Road, and Tower Road will remain and be modified as needed.

Safety concerns caused by deficient geometries will necessitate elimination of the York Street interchange. Additionally, access at Steele Street/Vasquez Boulevard and Colorado Boulevard will be provided through a split-diamond interchange (eastbound off ramp and westbound on ramp at Steele Street/Vasquez Boulevard, and eastbound on ramp and westbound off ramp at Colorado Boulevard). In addition, slip ramps are included to provide an eastbound off-ramp and westbound on-ramp at Colorado Boulevard.

The Build Alternatives include Operational Options to manage the added capacity of the highway. This is important for better mobility and reliability between I-25 and Tower Road. The General-Purpose Lanes Option will allow all vehicles to use all the lanes on the highway, while the Managed Lanes Option implements operational strategies using tolls or vehicle occupancy restrictions on the additional lanes, leaving the existing three lanes as general-purpose lanes.

The Managed Lanes Option allows for a reliable travel-time option for the users of the managed lanes because vehicles can travel at higher speeds than in the adjacent general-purpose lanes when they are congested.

Revised Viaduct Alternative

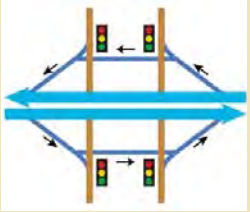
The Revised Viaduct Alternative replaces the viaduct between Brighton Boulevard and Colorado Boulevard. The Revised Viaduct Alternative, North Option expands the north edge of the highway up to 160 feet north from the existing highway edge in some areas. The Revised Viaduct Alternative, South Option extends the south edge of the highway up to 140 feet south of the existing highway edge. Local east-west access is available along 46th Avenue, a four-lane road located underneath the south side of I-70.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative as it is presented in the Final EIS removes the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard, lowering the highway below grade in this area. It adds additional lane(s) in each direction from Brighton Boulevard to Tower Road. It also adds capacity from I-25 to Brighton Boulevard by restriping. This alternative includes a cover over the highway in the vicinity of Clayton Street and Columbine

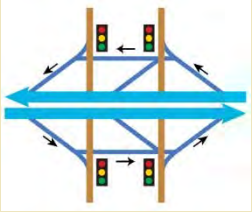
Split-diamond interchange

A split-diamond interchange is used where local streets are too close to each other to allow for safe operations of the entrance and exit ramps. Ramps are combined and a one-way frontage road is used between the local streets.



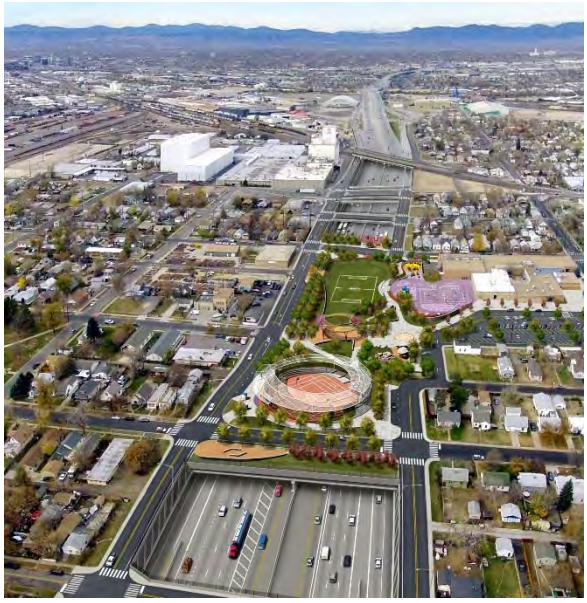
Slip ramps

A slip ramp is generally located between a freeway mainline and an adjacent frontage road. These ramps allow motorists to "slip" from one roadway to the adjacent parallel roadway. The connection of the slip ramp and the parallel roadway are typically not intersections, but just merging zones.



Street that is approximately, but not more than, 1,000 feet in length. More details on the cover are included in Chapter 3, Summary of Project Alternatives.

As part of this alternative, 46th Avenue will be located on both the north and south sides of the highway. It will be a two-way street between Josephine Street and Milwaukee Street on both sides of the highway and one way in the other locations. This alternative eliminates the portion of 46th Avenue north of I-70 between Columbine Street and Clayton Street to allow for a seamless connection between the Swansea Elementary School and the highway cover. As part of this alternative, access to and from I-70 at the Steele Street/Vasquez Boulevard interchange is maintained.



Bird's-eye view simulation of Partial Cover Lowered Alternative looking west from above Fillmore Street
(Note: Preliminary design, will be revised during the public input process.)

Additional details on all of the alternatives evaluated in this Final EIS are included in Chapter 3, Summary of Project Alternatives.

ES.5.3 What is the capital cost of construction?

Capital cost estimates for the proposed alternatives are based on conceptual design engineering and represent the complete project cost, including design, construction management, construction engineering, indirect costs, and construction costs. The construction costs include earthwork, utility relocation, roadway and structure construction, and right of way.

Exhibit ES-3 summarizes the preliminary capital cost estimates for the alternatives fully evaluated in this document.

Exhibit ES-3 Project Alternatives Capital Cost Summary

Alternatives/Options	Capital Cost, I-25 to Tower (in millions of 2016 dollars)	
	General-Purpose Lanes Option	Managed Lanes Option
No-Action Alternative, North Option	$510	N/A
No-Action Alternative, South Option	$600	N/A
Revised Viaduct Alternative, North Option	$1,330	$1,450
Revised Viaduct Alternative, South Option	$1,450	$1,570
Partial Cover Lowered Alternative	$1,580	$1,700

ES.6 What is the project's identified Preferred Alternative and why was it selected?

FHWA and CDOT identified the Partial Cover Lowered Alternative with Managed Lanes Option as the Preferred Alternative for I-70 East. This alternative, as refined since the Supplemental Draft EIS, is identified as the Preferred Alternative because it meets the project purpose and need, best addresses community concerns, has the most community and agency support, and—with the proposed mitigations—will cause the least overall impact.

The Managed Lanes Option is identified as the Operational Option of the Preferred Alternative because of its long-term operational flexibility and mobility. Managed lanes provide drivers with flexibility by allowing them to pay a fee to bypass congestion on general-purpose lanes. This can improve reliability in travel times. It also allows CDOT to manage congestion over the long term, thereby reducing the need for future expansion. The Managed Lanes Option also has a higher through-put potential in terms of accommodating more people at a given time. This option accommodates express buses, vanpools, and other high-occupancy vehicles, and, therefore, it can provide increased service to those riders. This option also promotes the use of carpools to avoid congestion.

FHWA and CDOT considered feedback provided during the Supplemental Draft EIS public review process before identifying the Preferred Alternative in this document. The identified Preferred Alternative is fully evaluated in this document, along with the other reasonable alternatives, and is compared to the No-Action Alternative.

A summary of impacts and mitigations for the Preferred Alternative is included in Section 5.23, Mitigation Summary.

ES.7 How will the Preferred Alternative be funded and how will project phasing be used to construct the project?

The full construction of the Preferred Alternative would cost approximately $1.7 billion. Revenue sources for the I-70 East project include allocations from various state and local sources, but there remains a gap between the estimated cost of the project and the revenue available to build it. Because of these funding limitations, the project will be constructed in phases over time. Chapter 8, Phased Project Implementation, discusses the proposed phases.

At this time, Phase 1 is the only funded phase for the project. Phase 1 construction costs total approximately $1.1 billion. Funding is available from the following sources:

- $850 million—Colorado Bridge Enterprise Safety Surcharge
- $50 million—Denver Regional Council of Governments (DRCOG):
  Surface Treatment Program-Metro and
  Surface Treatment Program-Congestion Mitigation/Air Quality (CMAQ)
- $180 million—Senate Bill 09-228 Transfers
- $37 million—Denver

Taxes would not be raised to pay for this project. CDOT is not looking at managed lanes as a way to finance the construction of the I-70 East project.

ES.8 What are the project's transportation impacts?

Transportation modeling is used to help make decisions about the future development of transportation systems. It is used as part of an overall transportation planning process that incorporates forecasting travel patterns 15 to 25 years into the future. These forecasts are used to develop a transportation network that will work effectively in the future.

The 2008 Draft EIS and 2014 Supplemental Draft EIS used the 2035 Denver Regional Council of Governments (DRCOG) Compass Travel Demand Model. Since the Supplemental Draft EIS was released in August 2014, DRCOG has released its 2040 DRCOG Focus Travel Demand Model. A sensitivity analysis was performed comparing the 2035 DRCOG Compass Travel Demand Model to the 2040 DRCOG Focus Travel Demand Model to determine whether the 2035 assumptions were comparable to the 2040 assumptions. As a result, it was concluded that the difference between the two models was minimal (approximately 5 percent difference along the I-70 corridor). Therefore, the 2035 horizon year was maintained for the Final EIS. However, DRCOG updated the 2035 forecasts since the Supplemental Draft EIS was published, and this Final EIS document has been revised to reflect the updated numbers. See Attachment E, *Traffic Technical Report*, for more information about the travel demand modeling.

Based on the population and employment projections for 2035, access to activity centers, economic centers, residential areas, and employment will become more difficult without improvements. The benefit of increased connectivity and mobility will be most important for people who use I-70 regularly.

Daily traffic volumes on I-70 in 2035 are forecasted to increase between 30 percent and 50 percent for the Build Alternatives compared to the No-Action Alternative. The peak-period volumes display similar growth trends as the daily volumes. Overall, both of the Build Alternatives would have similar volumes throughout the day.

The evaluation of impacts to mobility and access within the project area considers:

- Effectiveness of improvements on traffic operations and safety on I-70
- Impact to access and circulation needs on local streets in the vicinity of I-70
- Impact on other transportation facilities in the project area (transit, freight, and bicycle/pedestrian)

A detailed discussion of this evaluation is included in Chapter 4, Transportation Impacts and Mitigation Measures, of this document.

Both of the Build Alternatives will improve I-70 operations compared to the No-Action Alternative. This is due to the

Future I-70 traffic

I-70 has very limited reserve capacity based on the current number of lanes on the highway. Improving I-70 through the addition of more lanes (general purpose or managed) results in more drivers using I-70 instead of the local roadways to travel through the study area.

Both of the Build Alternatives show the ability to process an equal amount of traffic on I-70. As a performance measure, traffic volumes on I-70 are not a distinguishing factor between the alternatives.

addition of new lanes, improvement to ramps, addition of auxiliary lanes, and modification of interchanges to better facilitate traffic movements. Implementation of managed lanes will provide additional benefits to operations of I-70 as a whole, will preserve capacity on I-70, and will achieve reliable travel times. The general-purpose lanes in these alternatives will operate slightly less efficiently than the managed lanes.

The removal of the York Street interchange in both Build Alternatives and changes to the Steele Street/Vasquez Boulevard and Colorado Boulevard interchanges will have an impact on circulation and an increase in truck traffic on some of the local streets in the vicinity of these changes.

Freight service within and through the study area via rail will not be adversely affected, as none of the existing rail lines will be severed by I-70 improvements. Truck freight access will be improved by the added capacity and improved safety of both Build Alternatives. Local truck traffic along surface streets will increase slightly due to changes at the York Street, Steele Street/Vasquez Boulevard, and Colorado Boulevard interchanges.

Neither of the Build Alternatives will adversely affect any of the existing or planned bus or rail transit or bicycle/pedestrian facilities in the study area. Both of the Build Alternatives would improve pedestrian/bicycle facilities and connectivity by adding or replacing sidewalks within the limits of construction. The addition of a cover over I-70 in the Partial Cover Lowered Alternative improves pedestrian/bicycle facilities and connectivity. Access to the managed lanes could improve bus transit operations and reliability.

ES.9 What resources are evaluated for impacts and benefits in the project area?

Chapter 5, Affected Environment, Environmental Consequences, and Mitigation of this document includes summaries of detailed studies conducted to determine the effects of the project alternatives on the following built, natural, and social environmental resources:

- Social and economic conditions
- Environmental justice
- Land use
- Relocations and displacements
- Historic preservation
- Paleontological resources
- Visual resources and aesthetic qualities
- Parks and recreation
- Air quality
- Energy
- Noise
- Biological resources
- Floodplains and drainage/hydrology
- Wetlands and other waters of the U.S.
- Water quality
- Geology and soils
- Hazardous materials
- Utilities
- Human health conditions
- Irreversible and irretrievable commitment of resources
- Short-term use and long-term productivity

The project alternatives and design options benefit or impact each environmental resource differently. For example, while all the design options for the Build Alternatives improve transportation conditions, individual design options impact more properties than others or benefit visual resources more than others.

ES.9.1 What types of environmental impacts are causing the greatest concern to the public and stakeholders?

Of the environmental resources listed above, those shown to be of greatest concern to the public and stakeholders include social and economic conditions, environmental justice, relocations and displacements, historic preservation, visual resources and aesthetic qualities, air quality, noise, and hazardous materials. The following subsections summarize impacts to these resources.

How will social and economic conditions be affected?

The social and economic conditions of an area is the combination of various social and economic resources. Social resources generally are qualitative, dynamic, and intangible, while economic resources tend to be quantitative and tangible. All alternatives affect the local economies and social conditions of the area. Many social and economic effects relate to property acquisition, which results in the relocation of residential units and businesses serving either the local neighborhood or regional interests. Property acquisition also reduces property tax revenue for local taxing authorities. All of the residential relocations due to the project alternatives occur in the Elyria and Swansea Neighborhood. Northeast Park Hill also will experience effects to social resources resulting from business relocations.

In general, the improved mobility on I-70 from the Build Alternatives will bolster the economic and social success of developing urban centers in the Stapleton and Gateway Neighborhoods, as well as redevelopment opportunities in existing neighborhoods, such as the Elyria and Swansea Neighborhood. This is in contrast to the No-Action Alternative, which will not add capacity and, therefore, does not have the beneficial effect of improved travel time on I-70.

A variety of mitigation measures, such as providing additional relocation assistance and maintaining connectivity throughout construction, are available for potential impacts to social and economic resources.

How will low-income and minority populations (environmental justice considerations) be impacted?

The majority of the neighborhoods along the project corridor have notable concentrations of low-income and minority populations. The total population of the study area is 48.0 percent Hispanic or Latino and 23.0 percent Black or African-American. The total low-income population of the study area is 22.8 percent. These percentages are considerably higher than the Denver and Adams Counties averages.

Without mitigation, construction of the project alternatives has disproportionately high and adverse impacts that are predominantly borne by the low-income or minority populations of the Elyria and Swansea Neighborhood

Impacts to low-income and minority populations

The discussion of impacts to low-income and minority populations focuses on the Elyria and Swansea Neighborhood since it is the only area with a low-income and minority concentration where the impacts between alternatives differ from one another.

because all of the residences and most of the businesses impacted by the project are located within this neighborhood.

When all of the mitigation measures are implemented and benefits realized, there will be no disproportionately high and adverse impacts to the low-income and minority populations. For more information regarding impacts and mitigations on low-income and minority populations, refer to Section 5.3, Environmental Justice.

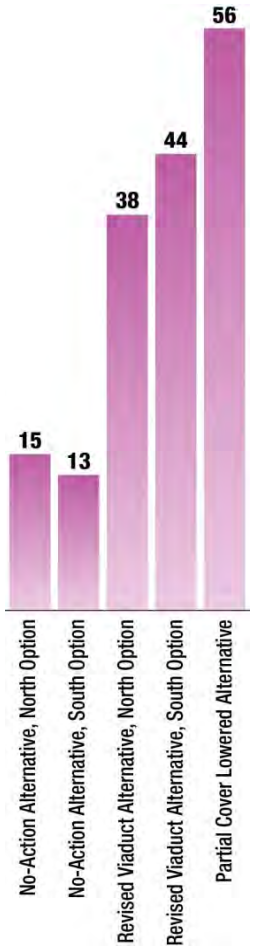
What type of relocations will be required?

Property acquisition is an important element in all of the project alternatives because additional right of way is required for each of them. In the case of occupied buildings, it is necessary to "relocate" or "displace" individuals from those properties (residential, business, or non-profit) to a replacement site.

The total number of residential relocations estimated for each alternative ranges from 13 residences (No-Action Alternative, South Option) to 56 residences (Partial Cover Lowered Alternative). More than half of the residential relocations are tenant occupied instead of owner occupied. All of the residential relocations are located in the Elyria and Swansea Neighborhood. Market conditions in Denver, as of July 2015, indicate that an adequate supply of decent, safe, and sanitary replacement housing is available to support the residential displacements that result from any of the project alternatives.

The project alternatives will relocate between six (No-Action Alternative, North Option) and 27 businesses (Revised Viaduct Alternative, South Option). All of the alternatives and options—except the No-Action Alternative, South Option—require the relocation of the Ministry Outreach Center, which is part of the Denver Rescue Mission, a 501(c)3 non-profit organization.

Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform 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 (CDOT, 2011).



Number of residential relocations by alternative and option for the Elyria and Swansea Neighborhood (out of 1,844 existing housing units in the neighborhood)

How will historic resources be affected?

An Area of Potential Effect (APE) was defined for the project to assist in identifying historic resources near the corridor. A survey determined that 66 historic resources within the APE are either officially eligible for listing on the National Register of Historic Places (NRHP) as individual properties (51), districts (six), or as supporting segments of eligible linear resources (nine railroads, canals, and sewers).

The Section 106 Regulations of the National Historic Preservation Act define an effect on a historic resource as an "… alteration to the characteristics of a historic resource qualifying it for inclusion in or eligibility for the National Register" (36 CFR §800.16[i]). Effects are discussed as "no effect," "no adverse effect," or "adverse effect" (36 CFR §800.5). **Exhibit ES-4**, below, presents a summary of effects by alternative for historic resources in the APE.

What is an APE?

An APE (Area of Potential Effect) is a geographic area or areas within which a project may directly or indirectly cause alterations in the character or use of historic resources (36 CFR 800.16(d)).

Exhibit ES-4 Summary of Effects for Historic Resources in the APE

Effect	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Adverse Effect[1]	7	1	8	8	13
No Adverse Effect	50	56	54	54	50
No Effect	9	9	4	4	3

1. *Total includes adverse effect to entire historic district and does not include individual contributing resources*

FHWA and CDOT are working on a Programmatic Agreement, currently in draft form, that has identified mitigation measures for the Preferred Alternative through consultation with the Colorado State Historic Preservation Office (SHPO) and consulting parties. As an early mitigation measure, CDOT has provided funding for and participated in creating a documentary covering the history of I-70 East and its relationship to the neighborhoods of Elyria and Swansea and Globeville. This film can be viewed on the I-70 East website at www.i-70east.com.

How will visual resources and aesthetic qualities be affected?

FHWA defines visual resources in the memorandum, "Esthetics and Visual Quality Guidance Information" as, "those physical features that make up the visible landscape, including land, water, and vegetative and man-made

elements. These elements are the stimuli upon which actual visual experience is based." (FHWA, 1986, page 5)

NEPA and Council on Environmental Quality (CEQ) regulations identify aesthetics as one of the elements in the human environment that must be considered in determining the effects of a proposed project. Visual resources make up the aesthetic qualities of an area. They are important to this project, especially between Brighton Boulevard and Colorado Boulevard, because the existing viaduct has had a dominant visual presence in the area for decades and any changes to it will result in changes in the surrounding environment.

There are minor impacts to visual resources and aesthetic qualities in the study area. The project alternatives will improve the aesthetic quality of the area either by replacing the viaduct with a newer structure that can be designed to complement neighborhood architecture or by removing the viaduct and locating the highway below grade. Any additional improvements to enhance the visual effects of the proposed highway alternatives will be developed through a collaborative process to reflect the needs of individual neighborhoods and local aesthetic context.

How will air quality be affected?

Following guidelines established by the U.S. Environmental Protection Agency (EPA) for conducting analysis of air quality impacts, the air quality effects of the No-Action Alternative and Build Alternatives for I-70 East have been evaluated. With regard to carbon monoxide for all project alternatives, the project is not expected to cause any new violations of any standard, increase frequency or severity of any existing violation, or delay timely attainment of the National Ambient Air Quality Standards (NAAQS). The modeled values are below the NAAQS and suggest that there is no exceedance or impact from the project based on the standards.

Results of the particulate matter 10 microns or less in size (PM_{10}) analysis indicate 24-hour PM_{10} concentrations do not exceed the NAAQS for any of the project alternatives, including the Partial Cover Lowered Alternative. A comparison of air quality conditions for all pollutants demonstrates the effects of minor differences in traffic volume and roadway configuration between the alternatives; air pollution impacts for all design alternatives are similar.

Several factors are evident at the conclusion of this analysis:

- Air quality conditions for the Build Alternatives are similar to the No-Action Alternative;
- Traffic volume and traffic speed are the primary drivers of project-level air quality impacts; and
- Fugitive dust emissions from road sanding, as well as brake and tire wear, are the primary indicators of future particulate matter emissions.

However, significant changes in any of these factors could impact pollutant emissions at the project level.

How will noise levels be affected?

Due to the expected increase in traffic volumes by 2035 and the changes proposed by the design alternatives, traffic noise will increase.

Noise levels vary between A-weighted decibels (dBA) in the high 50s to low 70s depending on how close the noise receptor is to the highway. CDOT considers a noise impact to occur when the loudest hour of noise is at or above 66 dBA (for residential dwelling units) or when there is an increase of 10 dBA or more affecting a noise receptor. Noise levels above the loudest hour, as well as substantial noise increases of 10 dBA or greater, are expected without the construction of noise walls.

Results of the analysis show that all of the alternatives without mitigation will cause noise to exceed the Noise Abatement Criteria (NAC) of 66 dBA at various locations, including Swansea Elementary School. **Exhibit ES-5** summarizes by alternative, the number of noise receptors that exceed the NAC threshold without and with mitigation.

Exhibit ES-5 Noise Receptors Exceeding NAC Threshold by Alternative

Alternative/Option	Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold		Number of Noise Receptors with a Substantial Noise Increase	
		Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Existing	940	91		N/A	
No-Action Alternative, North Option	890	362	59	40	0
No-Action Alternative, South Option	857	360	54	34	0
Revised Viaduct Alternative, North Option	896	453	114	97	0
Revised Viaduct Alternative, South Option	873	431	83	86	2
Partial Cover Lowered Alternative	873	155	108	11	0

CDOT must consider noise mitigation measures if the noise level at a sensitive site, such as a residence, meets or exceeds the NAC threshold for the specific land use. To alleviate noise impacts, noise walls are recommended when feasible and reasonable. For more information regarding location of the noise walls, refer to Section 5.12, Noise.

How will hazardous materials sites be affected?

Hazardous materials are solids, liquids, or gases that are harmful to human health or to the environment. Construction of the proposed alternatives will likely affect sites contaminated by hazardous materials. Construction activities associated with the alternatives have the potential to release hazardous materials at these sites into soil or groundwater, or lead to hazardous materials exposure of workers or the public if proper health, safety, and remediation efforts are not applied.

Common contaminants

Common contaminants identified in soil and/or groundwater include:

- Petroleum products (i.e., fuels, oils)
- Chlorinated solvents
- Metals
- Asbestos

The No-Action Alternative will potentially affect seven hazardous material sites and disturb approximately 41 acres of land assumed to be contaminated. The Build Alternatives have the potential to affect 21 to 25 hazardous material sites and disturb 575 acres to 703 acres of land assumed to be contaminated. Compared to the Revised Viaduct Alternative, the Partial Cover Lowered Alternative impacts approximately 14 percent to 20 percent more sites, increasing the construction that will occur on land assumed to be contaminated by approximately eight percent. Lowering the highway below street level impacts soil and/or groundwater at greater depths than the No-Action Alternative and Revised Viaduct Alternative. Disturbing greater volumes of soil and/or groundwater increases the

potential to affect hazardous materials. The Managed Lanes Option increases ground disturbance by an additional 83 acres; however, it does not increase the potential to impact hazardous material sites.

Any contamination encountered during the construction of the project will be cleaned up in compliance with applicable state and federal regulations, which will benefit the area in the future.

ES.10 How are the public and stakeholders involved in the I-70 East EIS project?

The I-70 East EIS has followed an extensive community and agency involvement process since the project began in 2003. After the separation of the highway and transit elements of the project in June 2006, the enhanced public involvement techniques continued as part of the I-70 East EIS. The overall goal of the community outreach and agency involvement process has been to solicit input through a transparent, open, and dynamic process that includes community members; businesses; federal, state, and local agencies; stakeholders; and community groups within the project area. This process helped the project team identify and document issues and incorporate them in the planning and decision-making process.

After publishing the Draft EIS in 2008, CDOT and FHWA started a more focused outreach process to better understand some of the issues that were brought up during the public comment period and develop solutions to address the public concerns and eventually select a preferred alternative. The project team used innovative public outreach techniques along with traditional methods to reach out to the community and stakeholders for their input. Some of these outreach techniques were corridor-wide meetings, one-on-one meetings, website updates, email notifications, monthly community meetings, and telephone town-hall meetings.

After the Supplemental Draft EIS was published, the focus of the agency involvement and community outreach process was to gather input on the Partial Cover Lowered Alternative. Agency involvement and community outreach methods used during the preparation of this document were comprised of ongoing agency coordination and community outreach, including a community planning workshop to explore possibilities for outdoor uses for the cover that will

be located over I-70 near Swansea Elementary School. Detailed information on community and agency involvement is in Chapter 10, Community Outreach and Agency Involvement.

Public meetings and other engagement strategies will be used to keep the public informed about the project's progress through the Record of Decision (ROD) and, after that, through project final design and construction phases. In addition, the project team will continue to participate in neighborhood-related activities, such as festivals and picnics, to interact with community members, inform them about the upcoming project activities, and answer questions.

ES.11 What are the project impacts to Section 4(f) properties?

Section 4(f) of the Department of Transportation Act of 1966 stipulates that the FHWA and other U.S. Department of Transportation agencies cannot approve the use of land from publicly owned parks or recreational areas, wildlife or waterfowl refuges, or public or private historic sites unless the following conditions apply:

a) the Administration determines that:

   There is no feasible and prudent avoidance alternative, as defined in § 774.17, to the use of land from the property; and

   The action includes all possible planning, as defined in § 774.17, to minimize harm to the property resulting from such use; or

b) The Administration determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact, as defined in § 774.17, on the property.

De minimis finding

A *de minimis* finding can be applied if the use does not in an adverse effect to the activities, features, and/or attributes of the Section 4(f) resource. A *de minimis* finding does not require further analysis for avoidance or impact minimization.

The project area contains historic resources and publicly owned parks and recreation areas. Within the Section 106 APE, there are 66 historic resources. This includes six historic districts, each with multiple contributing elements that are protected by Section 4(f).

In addition, there are 45 parks and 43 other recreational areas (such as recreation centers, golf courses, open space/nature areas, special events centers, trails, and school

playgrounds/ball fields) that are publicly owned and publicly accessible. Each of these parks and recreation areas are considered Section 4(f) properties.

Most of the properties mentioned above are so far removed from the project that there will be no physical or proximity impacts; however, the project alternatives will result in uses of Section 4(f) properties in the project area. **Exhibit ES-6** summarizes the uses of Section 4(f) properties for each of the project alternatives.

Exhibit ES-6 Summary of Section 4(f) Property Uses

Alternative / Option	Section 4(f) Uses[1]					
	Historic resources[2]		Parks and recreation areas		Total	
	Use	*De minimis*	Use	*De minimis*	Use	*De minimis*
No-Action Alternative, North Option	7	3	1	0	8	3
No-Action Alternative, South Option	1	3	0	0	1	3
Revised Viaduct Alternative, North Option	8	6	1	0	9	6
Revised Viaduct Alternative, South Option	8	6	0	0	8	6
Partial Cover Lowered Alternative	13	5	2	0	15	5

1. *The number in the Use column does not include de minimis impact determinations*
2. *Historic districts are presented as one Section 4(f) resource; individual contributing properties to historic districts are not included in this total*

Because there are no feasible or prudent alternatives that avoid the use of all Section 4(f) resources, an analysis is required to determine which alternative causes the least overall harm.

The Partial Cover Lowered Alternative causes less overall harm to all resources compared to the Revised Viaduct Alternative. Although it has greater impacts to some resources, it provides significant benefit by removing the dominant visual impact of the viaduct. It provides the cover over the highway, which serves to reduce noise impacts and protects air quality. Mitigation provided to environmental justice neighborhoods provides more public open space.

After extensive coordination with local officials and/or agencies having jurisdiction over the Section 4(f) resources, as well as public review, FHWA has determined that there are no feasible and prudent avoidance alternatives and, that the Partial Cover Lowered Alternative causes the least overall harm.

ES.12 What happens after publication of the Final EIS?

After publishing the Final EIS and holding a 30-day public review period, the final step in the NEPA process is the preparation of a ROD, which will document FHWA's final decision for the project, explain why it has taken a particular action, and present the mitigation measures and commitments to be incorporated into project construction and operation. The ROD will identify funding for the approved action consistent with the fiscally constrained section (2040 Fiscally Constrained Regional Transportation Plan [RTP]) of the DRCOG *2035 Metro Vision Regional Transportation Plan* (MVRTP) (DRCOG, 2015).

RESUMEN EJECUTIVO

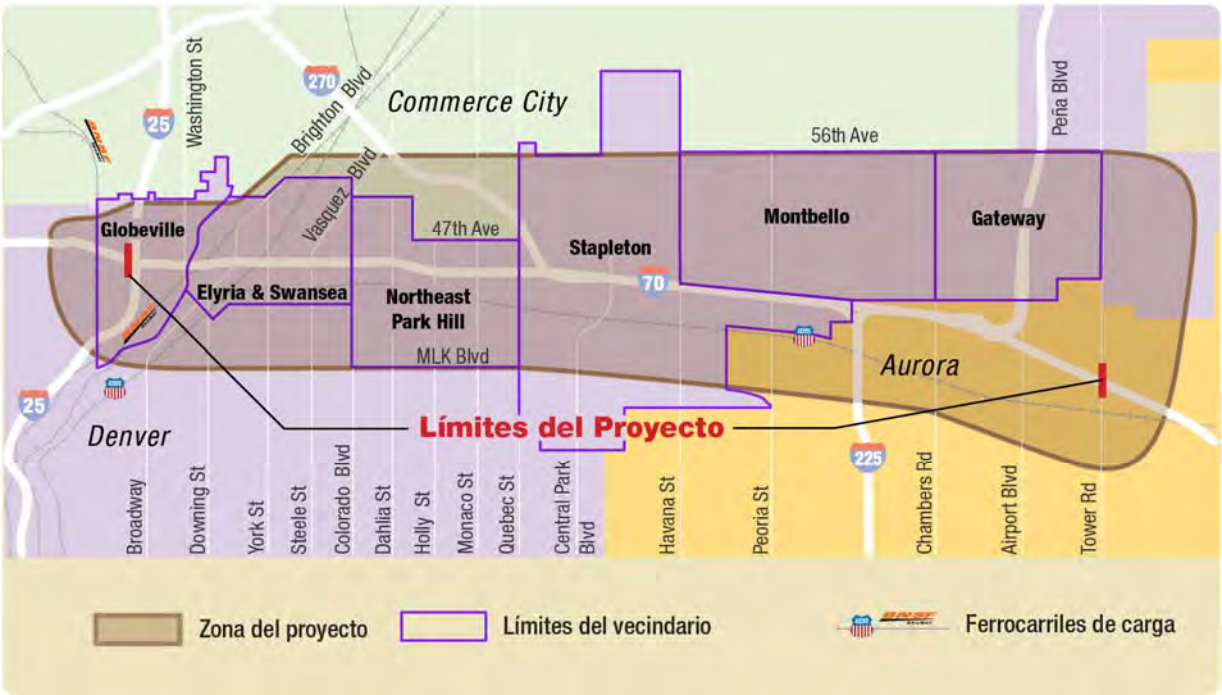
El Resumen Ejecutivo del Informe de Impacto Ambiental Final (EIS Final) proporciona una perspectiva general del proyecto, incluyendo el propósito y necesidad, la descripción del proyecto, las alternativas evaluadas, los beneficios del proyecto, y conclusiones principales. Para más detalles sobre la información proporcionada en este Resumen Ejecutivo, favor de consultar el capítulo correspondiente.

Desde que se publicó el Anteproyecto del EIS Suplementario en agosto del 2014, se realizaron análisis adicionales así como la revisión del contenido de muchos de los recursos que se discuten en este documento. Estas actualizaciones, junto con los cambios resultantes de los comentarios recibidos sobre le Anteproyecto del EIS Suplementario, se han incorporado en este EIS Final.

RE.1 ¿Qué es el proyecto del EIS de la I-70 Este y dónde está localizado?

El EIS de la Interestatal 70 (I-70) Este es un esfuerzo conjunto entre la Administración Federal de Autopistas (FHWA abreviación en inglés) y el Departamento de Transporte de Colorado (CDOT abreviación en inglés). Este documento identifica posibles mejoras a la autopista a lo largo de la I-70 en el área metropolitana de Denver, entre la Interestatal 25 (I-25) y la Tower Road (vea la **Gráfica RE- 1**), y evalúa sus posibles efectos sobre el medioambiente humano y natural.

Gráfica RE- 1. Zona y Límites del Proyecto de la I-70 Este



La zona del proyecto se extiende casi 12 millas a lo largo de la I-70 cubriendo partes de la Ciudad y Condado de Denver (Denver), la Ciudad de Commerce City (Commerce City), y la Ciudad de Aurora (Aurora); e incluye las comunidades de Globeville, Elyria y Swansea, Northeast Park Hill, Stapleton, Montbello, Gateway, y una parte de Aurora.

Cada recurso evaluado en este documento tiene un área de estudio específica que pudiera ser la misma que la zona del proyecto o los límites de la construcción de las alternativas evaluadas, según el recurso. Las áreas de estudio se discuten bajo cada sección de los recursos en el Capítulo 5, Medioambiente Afectado, Consecuencias Ambientales y Atenuantes.

RE.2 ¿Cuáles son los antecedentes del proyecto de la I-70 Este?

El proyecto de la I-70 Este empezó en el 2003 como parte del EIS del Corredor de la I-70 Este, el cual se enfocó tanto en soluciones para la autopista como para el transporte público. En el 2006, los componentes de transporte público y la autopista se separaron debido a que se determinó que servían a diferentes corredores, mercados de viajeros, y fuentes de financiamiento. El Distrito Regional de Transporte (RTD abreviación en inglés) y la Administración Federal de Transporte Público (FTA abreviación en inglés) completaron el EIS para los elementos del transporte público (EIS del Corredor Este) en el 2009. Se anticipa que la construcción de la línea del tren urbano termine en el 2016.

La sección 4(f), Evaluación, del Anteproyecto del Informe de Impacto Ambiental de la I-70 Este para las mejoras de la autopista fue publicado en el 2008. Ninguna de las alternativas analizadas en el Anteproyecto del EIS del 2008 recibieron un apoyo abrumador del público y partes interesadas debido a los impactos asociados al entorno artificial, natural y social.

Debido a la falta de apoyo, el CDOT y la FHWA decidieron no identificar la alternativa preferida en aquel momento e iniciar un proceso riguroso de colaboración para hacer la recomendación. Este proceso de colaboración, posteriormente se denominó el Equipo de Colaboración para la Alternativa Preferida (PACT abreviación en inglés), el cual consistió de organismos federales, estatales y locales; grupos de apoyo; y partes interesadas, incluso representantes de las comunidades del Condado de Adams, Aurora, Commerce City y Denver.

¿Qué es el PACT?

El PACT es el Equipo de Colaboración para la Alternativa Preferida, el cual estuvo compuesto por agencias estatales y federales, grupos de apoyo y partes interesadas—incluso representantes del vecindario del Condado de Adams, Aurora, Commerce City, y Denver. Se formó en julio del 2010 para ayudar a los responsables a identificar una Alternativa Preferida.

Después de casi un año de colaboración y análisis adicional, los integrantes del PACT no llegaron a un consenso sobre la alternativa preferida. Sin embargo los integrantes del PACT estuvieron de acuerdo que la I-70 debe permanecer en su alineamiento actual. Por consecuencia, el CDOT y la FHWA decidieron evaluar decisiones previas en el proceso, incluso las alternativas previamente eliminadas. Como resultado, se desarrolló una nueva alternativa que resuelve las preocupaciones del público y partes interesadas y al mismo tiempo satisface el propósito y necesidad del proyecto.

En agosto del 2014, se publicó el Anteproyecto del EIS Suplementario que actualiza el análisis del Anteproyecto del

EIS del 2008 e incluye análisis adicionales de la alternativa desarrollada recientemente.

La Ley de Política Ambiental Nacional de 1969 (NEPA abreviación en inglés), que rige este proyecto, permite que las agencias que lideran puedan identificar preliminarmente una alternativa preferida durante la etapa del Anteproyecto del EIS. Aunque no se identificó ninguna alternativa preferida en el Anteproyecto del EIS del 2008, la FHWA y el CDOT identificaron una alternativa preferida en el Anteproyecto del EIS Suplementario. Esta alternativa identificada preliminarmente fue modificada y se identifica en este documento como la Alterativa Preferida. El Capítulo 3, Resumen de las Alternativas del Proyecto, tiene los detalles al respecto.

RE.3 ¿Por qué debemos preparar un EIS para el proyecto de la I-70 Este?

La NEPA requiere que los proyectos que tienen conexión federal y que puedan tener un impacto en el medioambiente sean analizados a través de un proceso riguroso que permita al público entender y comentar sobre los beneficios e impactos del proyecto. Se debe preparar un EIS cuando una acción propuesta puede afectar significativamente la calidad del medioambiente humano. El propósito de un EIS es para "servir como un mecanismo de acción de fuerza que asegure que las políticas y metas definidas en la NEPA influyan en los programas y acciones en curso del gobierno federal" (CEQ,1978). Un EIS detalla el proceso a través del cual se desarrolla un proyecto de transporte, incluso la consideración de una gama de alternativas razonables y análisis detallado de los posibles impactos que resulten de cada una de ellas. También documenta el cumplimiento de otras leyes medioambientales aplicables, regulaciones y órdenes ejecutivas.

Qué es un vínculo federal?

Bajo la ley federal, la NEPA se aplica a cualquier acción propuesta o proyecto de transporte que tiene un vínculo federal, incluido casos donde:

- Se utilizan fondos federales
- Se requieren permisos o aprobación federal
- Hay acceso a sistemas interestatales nuevos o modificados

RE.3.1 ¿Cuál es el propósito del EIS Final?

La NEPA requiere que la FHWA y el CDOT preparen un EIS final para:

- Responder a los comentarios recibidos sobre el Anteproyecto del EIS Suplementario de agencias, partes interesadas, y el público

- Evaluar más a fondo la Alternativa Preferida que fue preliminarmente identificada en el Anteproyecto del EIS Suplementario
- Actualizar y modificar análisis previos, como sea apropiado
- Realizar actualizaciones a la documentación ambiental previa

RE.4 ¿Cuál es el propósito y necesidad del proyecto?

Actualmente, la I-70 en el tramo de la I-25 y la Tower Road es uno de los corredores de autopistas más transitados y congestionados del estado. El corredor proporciona un número importante de funciones de transporte importantes tales como: el viaje interestatal y estatal de vehículos de pasajeros a lo largo de la I-70; el viaje interestatal y estatal de camiones con propósitos de negocios; acceso regional del centro de Denver y el área metropolitana de Denver al Aeropuerto Internacional de Denver (DIA abreviación en inglés); una conexión como circunvalación interior entre la I-225 y la I-270; y acceso a zonas de empleo adyacentes, comunidades y nuevos centros de desarrollo.

Utilizando aportes de las investigaciones, colección de datos y análisis técnicos, se desarrolló el propósito y necesidad del proyecto como parte del proceso del Anteproyecto del EIS del 2008, aunque el propósito del proyecto no ha cambiado desde esa fecha, algunos datos utilizados para describir la necesidad del proyecto han sido actualizados.

El propósito del proyecto del EIS de la I-70 Este es implementar una solución de transporte que mejore la seguridad, el acceso, y movilidad y resuelva el congestionamiento de la I-70 en la zona del proyecto.

¿Qué hace que se clasifique a un puente como "estructuralmente deficiente"?

Las pautas federales clasifican a los puentes como "estructuralmente deficientes" si los componentes se han clasificado como precario o peor durante la inspección. Esto quiere decir que los ingenieros han identificado un defecto significativo en la estructura de soporte del puente o cubierta. Si el puente es clasificado como "estructuralmente deficiente," dicho puente necesita un buen mantenimiento, rehabilitación o necesita reemplazarse.

¿Cuándo se considera un puente "funcionalmente obsoleto"?

Un puente es "funcionalmente obsoleto" si no puede dar cabida apropiada al tráfico debido a alineamiento deficiente o estándares de diseño anticuados.

Pedazos de concreto caído muestran un viaducto estructuralmente deficiente. La foto fue tomada en la 46th Avenue debajo del viaducto.

La necesidad de este proyecto resulta de las siguientes cuestiones:

- **Deficiencias en la infraestructura del Transporte**
  La I-70 fue construida a principios de los sesentas con estructuras de puentes y drenajes diseñadas para durar 30 años. Nueve estructuras en el corredor se encuentran hoy sobrepasando el periodo de vida útil anticipada y están clasificadas como estructuralmente deficientes o funcionalmente obsoletas. Esto quiere decir que están en la necesidad de reparación, rehabilitación o reemplazo.

- **Incremento en la demanda de transporte**
  La zona del proyecto está experimentando un crecimiento y desarrollo rápido. Esto incluye zonas nuevas de urbanización y reurbanización, con poblaciones residenciales y actividad empresarial sustanciales. Las estimaciones del crecimiento poblacional muestran un 42 por ciento de aumento y se espera que el empleo incremente en un 58 por ciento entre el 2010 y el 2035. Las tendencias del uso de tierras y urbanización dentro del corredor resultarán en demandas adicionales en el sistema de transporte. Proporcionando acceso y maximizando los viajes hacia el corredor, a través del corredor, y dentro del mismo son críticos para mantener la economía. Esto incluye el mantenimiento y mejoras a las conexiones entre los centros de mayor actividad cerca del corredor.

- **Capacidad de Transporte Limitada**
  La I-70 sirve a un número creciente de usuarios, que varían de viajeros y turistas de zonas periféricas y del DIA a transporte de carga regionales, viajeros suburbanos y tráfico local. La demanda de los usuarios está excediendo la capacidad de diseño existente de la I-70 y sus empalmes asociados.

  Dentro de la zona del proyecto, en la I-70 actualmente transitan entre 52,000 y 220,000 vehículos diarios (tráfico promedio diario), dependiendo de la ubicación a lo largo del corredor. Las proyecciones para el año 2035 (con o sin mejoras) muestran que el volumen de tráfico en la I-70 incrementará sustancialmente. Las proyecciones varían de 95,000 a 270,000 vehículos diarios dependiendo de la ubicación en el corredor. Este incremento en tráfico resultará en más horas de congestionamiento, demoras más prolongadas y un aumento en las posibilidades de accidentes.

- **Preocupaciones sobre Seguridad**
  En base a la evaluación de seguridad del CDOT realizada en el 2013, algunos de los tramos de la I-70 tienen tasas de accidentes más elevadas que el promedio. Estas tasas a menudo se atribuyen a las condiciones de la carretera que no cumplen con los estándares de diseño actual. Los accidentes en la I-70 ocasionan congestionamiento de tráfico imprevisible e inevitable, que se suma o empeora el congestionamiento ya existente de demandas de viaje que exceden la capacidad normal de la carretera. La naturaleza impredecible de la congestión del tráfico en la I-70 aumenta las preocupaciones de los transportistas de carga, fabricantes e intereses empresariales de la región, así como de los viajeros y residentes que dependen de la confiabilidad para sus viajes diarios.

  Detalles adicionales sobre estos temas se encuentran en el Capítulo 2, Propósito y necesidad.

RE.5 ¿Qué alternativas se han analizado en su totalidad en el EIS Final?

Cerca de 90 diferentes alternativas fueron consideradas y evaluadas durante el proceso de selección realizado para el Anteproyecto del EIS y el Anteproyecto del EIS Suplementario—incluso el desvío de la I-70 al norte de Denver. Debido a una variedad de razones, de todas las alternativas solo quedaron tres y el resto fueron eliminadas. Estas tres alternativas restantes, las cuales se analizan en su totalidad en este documento, fueron el resultado de la combinación de participación amplia de la agencia y del público y un análisis técnico ambiental detallado.

Las tres alternativas en el EIS Final incluye la Alternativa de No Tomar Ninguna Acción y dos Alternativas de Construcción: la Alternativa del Viaducto Modificado y la Alternativa de Paso a Desnivel Parcialmente Cubierto. Además, hay varias expansiones y opciones de diseño operativo asociado con las alternativas. Las alternativas y sus opciones asociadas se discuten brevemente en las siguientes subsecciones y están sintetizadas con sus características principales en la **Gráfica RE- 2**.

Como resultado de los comentarios recibidos sobre el Anteproyecto del EIS Suplementario y participación adicional de las partes interesadas y coordinación de la agencia, la Alternativa de Paso a Desnivel Parcialmente Cubierto como se

presenta y analiza en el Anteproyecto del EIS Suplementario se ha modificado para incluir elementos de la Opción Básica y la Opción Modificada. En este documento incluimos un análisis actualizado de la Alternativa de Paso a Desnivel Parcialmente Cubierto modificada pero no se incluye las Opciones Básica y Modificada por separado.

Información adicional de todas las alternativas y opciones de diseño evaluadas en el EIS Final se incluyen en el Capítulo 3, Resumen de las Alternativas del Proyecto.

Gráfica RE- 2. Resumen de las Alternativas y Opciones del Proyecto

RE.5.1 La Alternativa de No Tomar Ninguna Acción

La alternativa de No Tomar Ninguna Acción incluye mejoras planificadas y programadas para las carreteras y el transporte público en la zona del proyecto.

La Alternativa de No Tomar Ninguna Acción también incluye el reemplazo del viaducto de la I-70 existente entre la Brighton Boulevard y Colorado Boulevard. Debido a su antigüedad y estado de deterioro, el reemplazo del viaducto es necesario para mantener la seguridad y funcionamiento de la I-70.

Como parte de la Alternativa de No Tomar Ninguna Acción, el ancho de la estructura del viaducto incrementará para cumplir con los estándares actuales de autopistas, sin embargo, no se añadirá capacidad o carriles en su configuración.

La reconstrucción del viaducto existente con la Alternativa de No Tomar Ninguna Acción incluye dos opciones de expansión, Norte y Sur. Cada opción ampliará la autopista al Norte o al Sur, respectivamente. Ambas opciones requieren adquisiciones de derecho de paso adicional para permitir la construcción por fases y reconstruir el viaducto utilizando los estándares de diseño actual de autopistas (carriles estándares y anchos de acotamiento).

¿Qué es un viaducto?

Un viaducto es una carretera larga y elevada que consiste de una serie de puentes cortos que atraviesan y están sostenidos por arcos, pilares o columnas.

RE.5.2 Alternativas de Construcción

Hay dos Alternativas de Construcción propuestas para las mejoras entre la Brighton Boulevard y la Tower Road: la Alternativa del Viaducto Modificado y la Alternativa de Paso a Desnivel Parcialmente Cubierto. Ambas alternativas de construcción añaden capacidad a la I-70 entre la I-25 y la Tower Road al volver a pintar la señalización sobre la I-70 desde la I-25 a Brighton Boulevard (para acondicionar carriles adicionales) y al ensanchar la I-70 desde la Brighton Boulevard a la Tower Road.

Para resolver los problemas de seguridad asociados con el deterioro del viaducto entre la Brighton Boulevard y la Colorado Boulevard, las Alternativas de Construcción reemplazarán el viaducto existente o lo eliminarán completamente.

Las Alternativas de Construcción reconstruirán puentes y empalmes afectados por las mejoras de ampliación entre la Brighton Boulevard y la Tower Road. El puente de la I-70

sobre Sand Creek y los empalmes en el Central Park Boulevard, la I-225, la I-270, la Chambers Road, el Peña Boulevard, la Airport Road y la Tower Road permanecerán y serán modificadas según sea necesario.

Las preocupaciones de seguridad ocasionadas por las geometrías deficientes requerirá la eliminación del empalme de la York Street. Además, el acceso a la Steele Street/Vásquez Boulevard y Colorado Boulevard se proporcionarán mediante un empalme en forma de diamante dividido (rampa de salida en dirección Este y rampa de entrada en dirección Oeste en la Steele Street/Vásquez Boulevard, y la rampa de entrada en dirección Este y rampa de salida en dirección Oeste en Colorado Boulevard). Además, se incluyen rampas auxiliares para proporcionar una rampa de salida en dirección Este y una rampa de entrada en dirección Oeste en la Colorado Boulevard.

Las Alternativas de Construcción incluyen Opciones Operativas para manejar la capacidad adicional de la autopista. Esto es importante para una mejor movilidad y confiabilidad entre la I-25 y la Tower Road. La Opción de Carriles de Uso General permitirá que todos los vehículos utilicen todos los carriles en la autopista, mientras que la Opción de Carriles Administrados implementan estrategias operativas utilizando peajes o restricciones en el número de pasajeros de los vehículos en los carriles adicionales, dejando los tres carriles existentes como carriles de uso general.

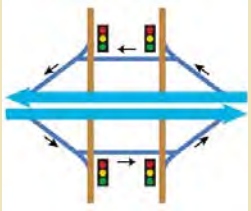
La Opción de Carriles Administrados permite una opción de transporte con tiempos de viaje confiable para los usuarios de los carriles administrados debido a que los vehículos pueden viajar a velocidades más altas que en los carriles de uso general adyacentes cuando estos están congestionados.

Alternativa del Viaducto Modificado

La Alternativa del Viaducto Modificado reemplaza el viaducto en el tramo de la Brighton Boulevard y la Colorado Boulevard. La Alternativa del Viaducto Modificado, Opción Norte, expande el extremo norte de la autopista hasta un máximo de 160 pies al Norte del extremo de la autopista existente, en algunas zonas. La Alternativa del Viaducto Modificado, Opción Sur, extiende el extremo Sur de la autopista hasta un máximo de 140 pies al Sur del extremo de la autopista existente. El acceso local de Este a Oeste estará disponible a lo largo de la 46th Avenue, la cual será una carretera de cuatro carriles ubicada debajo del lado Sur de la I-70.

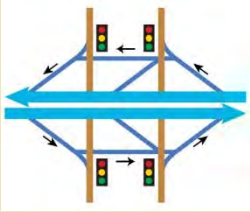
Empalme en forma de diamante dividido

Se utiliza un empalme en forma de diamante dividido cuando las calles locales se encuentran muy cerca entre sí para permitir la operatividad segura en las rampas de entrada y salida. Se combinan las rampas y se usa una vía auxiliar de un solo sentido entre las calles locales.



Rampa Auxiliar

Una rampa auxiliar está ubicada generalmente en una autovía troncal y una vía auxiliar adyacente. Estas rampas permiten que los automovilistas se “desplacen” de una carretera a otra paralela y adyacente. La conexión de la rampa auxiliar y la carretera paralela generalmente no son intersecciones, sino zonas de fusión.



Alternativa de Paso a Desnivel Parcialmente Cubierto

La Alternativa de Paso a Desnivel Parcialmente Cubierto como se presenta en el EIS Final elimina el viaducto de la I-70 existente en el tramo de la Brighton Boulevard y Colorado Boulevard, bajando la autopista a desnivel en esta zona. Esta alternativa añade carril(es) en cada dirección desde la Brighton Boulevard a la Tower Road. También aumenta la capacidad desde la I-25 a la Brighton Boulevard al momento de volver a pintar la señalización sobre la autopista. Esta alternativa cuenta con una cubierta sobre la autopista cerca de la Clayton Street y la Columbine Street que tiene aproximadamente no más de 1,000 pies de longitud. Más detalles sobre la cubierta se encuentran en el Capítulo 3, Resumen de las Alternativas del Proyecto.

Como parte de esta alternativa, la 46th Avenue se colocará al lado Norte y Sur de la autopista. Será una vía de doble sentido entre la York Street y la Milwaukee Street en ambos lados de la autopista y de un solo sentido en las otras ubicaciones. Esta alternativa elimina la porción de la 46th Avenue al Norte de la I-70 entre la Columbine Street y Clayton Street para dar cabida a una conexión sin interrupciones entre la Escuela Primaria Swansea y la cubierta de la autopista. Como parte de esta alternativa, se mantendrá el acceso y salida de la I-70 a la altura del empalme de la Steele Street/Vásquez Boulevard.

Simulación de una vista aérea de la Alternativa de Paso a Desnivel Parcialmente Cubierto, mirando hacia el este de la Fillmore Street

Información adicional sobre todas las alternativas evaluadas en este EIS Final se encuentran en el Capítulo 3, Resumen de las Alternativas del Proyecto.

RE.5.3 ¿Cuál es el costo de capital de construcción?

Las estimaciones del costo de capital para las alternativas propuestas se basan en la ingeniería de diseño conceptual y representan el costo total del proyecto, incluido el diseño, la construcción, manejo de la construcción, ingeniería de construcción, costos indirectos y costos de construcción. Los costos de construcción incluyen las excavaciones de tierra,

reubicación de los servicios públicos, construcción de carreteras y estructuras, y derecho de paso.

La **Gráfica RE- 3** resume los estimados del costo de capital preliminar para las alternativas evaluadas en su totalidad en este documento.

Gráfica RE- 3. Resumen del Costo de Capital para las Alternativas del EIS Final

Alternativas/Opciones	Costo de Capital, de la I-25 a la Tower (en millones de dólares del 2016)	
	Opción de Carriles de Uso General	Opción de Carriles Administrados
Alternativa de No Tomar Ninguna Acción, Opción Norte	$510	N/A
Alternativa de No Tomar Ninguna Acción, Opción Sur	$600	N/A
Alternativa del Viaducto Modificado, Opción Norte	$1,330	$1,450
Alternativa del Viaducto Modificado, Opción Sur	$1,450	$1,570
Alternativa de Paso a Desnivel Parcialmente Cubierto	$1,580	$1,700

RE.6 ¿Cuál es la Alternativa Preferida identificada por el proyecto y por qué fue seleccionada?

La FHWA y el CDOT identificaron a la Alternativa de Paso a Desnivel Parcialmente Cubierto con la Opción de Carriles Administrados como la Alternativa Preferida para la I-70 Este. Esta alternativa, modificada desde la publicación del Anteproyecto del EIS Suplementario, se ha identificado como la Alternativa Preferida debido a que cumple con el propósito y necesidad del proyecto, resuelve mejor las preocupaciones de la comunidad, tiene el mayor apoyo de la comunidad y la agencia, y—con las atenuantes propuestas—ocasionará en general el menor impacto.

La Opción de los Carriles Administrados está identificada como la Opción Operativa de la Alternativa Preferida debido a su flexibilidad y movilidad operativa a largo plazo. Los Carriles Administrados les da a los conductores flexibilidad al permitirles pagar una cuota para evitar el congestionamiento de los carriles de uso general. Esto puede mejorar la confiabilidad en los tiempos de viaje. También le permite al

CDOT a manejar la congestión a largo plazo, reduciendo de este modo la necesidad de expansiones futuras. La Opción de Carriles Administrados tiene el potencial de un mayor rendimiento en términos de acomodar a más personas en un momento dado. Esta opción tiene la capacidad para autobuses expresos, camionetas y otros vehículos de mayor capacidad, y, por lo tanto, puede ofrecer mayor servicio a dichos pasajeros. Esta opción también promueve el uso de vehículos para compartir y evitar la congestión.

La FHWA y el CDOT consideraron los comentarios proporcionados durante el proceso de evaluación del público del Anteproyecto del EIS Suplementario antes de identificar la Alternativa Preferida en este documento. En este documento se ha evaluado en su totalidad La Alternativa Preferida identificada, junto con las otras alternativas razonables, y se han comparado con la Alternativa de No Tomar Ninguna Acción.

Un resumen de los impactos y atenuantes de la Alternativa Preferida se incluye en la Sección 5.23, Resumen de Atenuantes.

RE.7 ¿Cómo se financiará la Alternativa Preferida y cómo se utilizarán las fases para construir el proyecto?

La construcción completa del la Alternativa Preferida costará aproximadamente $1.7 mil millones. Las fuentes de ingresos para el proyecto de la I-70 Este incluyen asignaciones de varias fuentes estatales y locales, pero sigue existiendo una brecha entre el costo estimado del proyecto y los ingresos disponibles para construirlo. Debido a estas limitaciones de financiamiento, el proyecto se construirá en fases conforme avanza el tiempo. El Capítulo 8, Implementación de las Fases del Proyecto, discute las fases propuestas.

En este momento, la Fase 1 es la única fase financiada para el proyecto. El costo de construcción de la Fase 1 totaliza aproximadamente $1.1 mil millones. El financiamiento está disponible de las siguientes fuentes:

- $850 millones—Recargo del Colorado Bridge Enterprise Safety Surcharge
- $50 millones—DRCOG Surface Treatment Program, Metro and Surface Treatment Program, Congestion Mitigation/Air Quality

- $180 millones—Transferencias del Proyecto de Ley 09-228
- $37 millones—Ciudad de Denver

No se incrementarán los impuestos para pagar por este proyecto. El CDOT no está considerando a los carriles administrados como una forma de financiar la construcción del proyecto de la I-70 Este.

RE.8 ¿Cuáles son los impactos del proyecto sobre el transporte?

Se han utilizado modelos de transporte para ayudar a tomar decisiones sobre el desarrollo futuro de los sistemas de transporte. Estos modelos se utilizan como parte de un proceso de planificación general de transporte que incorpora proyecciones de patrones de viaje de 15 a 25 años en el futuro, estas proyecciones se utilizan para desarrollar un sistema que funcione con eficacia en el futuro.

El Anteproyecto del EIS del 2008 y el Anteproyecto del EIS Suplementario utilizaron el Modelo de Demanda de Viajes Compass del 2035 de DRCOG. Desde que se publicó el Anteproyecto del EIS Suplementario en agosto del 2014, el DRCOG lanzó su Modelo de Demanda de Viajes Focus del 2040 de DRCOG. Se realizó un análisis de sensibilidad comparando el Modelo de Demanda de Viajes Compass del 2035 de DRCOG y el Modelo de Demanda de Viajes Focus del 2040 de DRCOG para determinar si las suposiciones del 2035 eran comparables a las del 2040. Como resultado, se concluyó que la diferencia entre los dos modelos eran mínimas (aproximadamente un 5 por ciento de diferencia a lo largo del corredor de la I-70). Por lo tanto, el año horizonte del 2035 se mantuvo para el EIS Final. Sin embargo, el DRCOG actualizó las proyecciones del 2035 desde la fecha en que se publicó el Anteproyecto del EIS Suplementario, y el documento del EIS Final ha sido revisado para reflejar las cifras actualizadas. Consulte el Anexo E, Informe Técnico del Tráfico, para mayor información sobre el modelo de demanda de viajes.

Basado en las proyecciones poblacionales y de empleo para el 2035, el acceso a los centros de actividad, centros económicos, zonas residenciales y empleo será mucho más difícil sin las mejoras. Los beneficios de una mayor conectividad y movilidad será mucho más importante para las personas que utilizan la I-70 con regularidad.

Tráfico Futuro de la I-70

En base al número de carriles actuales de la autopista, la I-70 tiene muy poca capacidad de reserva. Mejorar la I-70 mediante la adición de más carriles (de uso general o administrados) propiciará que más conductores hagan uso la I-70 en lugar de carreteras locales para viajar por la zona de estudio.

Las dos Alternativas de Construcción muestran la capacidad de procesar el mismo volumen de tráfico en la I-70. Como una medida de rendimiento, los volúmenes de tráfico en la I-70 no son un factor característico entre las alternativas.

El volumen de tráfico diario en la I-70 en el 2035 se prevé que aumentará entre un 30 a 50 por ciento para las Alternativas de Construcción comparada a la Alternativa de No Tomar Ninguna Acción. Los volúmenes de horas pico muestran tendencias de crecimiento similares a los volúmenes diarios. En general, las dos Alternativas de Construcción tendrían volúmenes similares durante todo el día.

La evaluación de impactos a la movilidad y al acceso dentro de la zona del proyecto considera:

- La efectividad de las mejoras en las operaciones del tráfico y la seguridad en la I-70
- Impacto a la necesidad de acceso y circulación en las calles locales en las inmediaciones de la I-70
- Impactos a las instalaciones de transporte en la zona del proyecto (transporte público, de carga, y de bicicleta/peatones)

Una discusión detallada de esta evaluación se incluye en el Capítulo 4, Impactos al Transporte y Medidas Atenuantes, de este documento.

Las dos Alternativas de Construcción mejorarán el funcionamiento de la I-70 comparada con la Alternativa de No Tomar Ninguna Acción. Esto es debido a la adición de nuevos carriles, mejoras a las rampas, adición de carriles auxiliares, y modificación a los empalmes para facilitar el movimiento del tráfico. La implementación de carriles administrados proporcionará beneficios adicionales al funcionamiento de la I-70 en conjunto, preservará su capacidad, y logrará tiempos de viaje confiables. Los carriles de uso general en estas alternativas funcionarán menos eficientemente que los carriles administrados.

La eliminación del empalme de la York Street en las dos Alternativas de Construcción y cambios a los empalmes de la Steele Street/Vásquez Boulevard y Colorado Boulevard tendrán un impacto en la circulación y un aumento en el tránsito de camiones en algunas de las calles locales en las inmediaciones de estos cambios.

Los servicios de transporte de carga dentro y a través de la zona de estudio vía ferroviaria no serán afectadas negativamente, y ninguna de las líneas ferroviarias existentes se verán descontinuadas por las mejoras de la I-70. El acceso de los camiones de carga mejorará debido a la capacidad adicional y mayor seguridad de las dos Alternativas de

Construcción. El tráfico local de camiones en las calles locales se incrementarán ligeramente debido a los cambios en los empalmes de la York Street, Steele Street/Vásquez Boulevard y Colorado Boulevard.

Ninguna de las Alternativas de Construcción afectarán negativamente las instalaciones de autobuses, ferroviarias, transporte público, o para peatones/ciclistas existentes o planificadas en la zona de estudio. Las dos Alternativas de Construcción mejorarán las instalaciones para peatones/ciclistas y la conectividad al añadir o reemplazar las banquetas dentro de los límites de la construcción. La adición de una cubierta sobre la I-70 en la Alternativa de Paso a Desnivel Parcialmente Cubierto mejorará las instalaciones para peatones/ciclistas y la conectividad. El acceso a los carriles administrados podrían mejorar el funcionamiento y confiabilidad del transporte público.

RE.9 ¿Qué recursos se están evaluando para determinar los impactos y beneficios en la zona del proyecto?

El Capítulo 5 de este documento denominado Medioambiente Afectado, Consecuencias Ambientales y Atenuantes, incluye resúmenes de estudios detallados que se realizaron con el fin de determinar los efectos de las alternativas del proyecto en los siguientes recursos ambientales artificiales, naturales y sociales:

- Condiciones sociales y económicas
- Justicia ambiental
- Uso de tierras
- Reubicaciones y desplazamientos
- Preservación histórica
- Recursos paleontológicos
- Recursos visuales y cualidades estéticas
- Parques y recreación
- Calidad del aire
- Energía
- Ruido
- Recursos biológicos
- Planicie aluvial y drenaje/hidrología
- Humedales y otros tipos de agua de los EE.UU.
- Calidad del agua
- Geología y suelos
- Materiales peligrosos
- Servicios públicos
- Condiciones para la salud humana
- Compromiso irreversible e irrecuperable de recursos
- Uso a corto plazo y productividad a largo plazo

Las alternativas del proyecto y las opciones de diseño pueden beneficiar o afectar cada recurso ambiental de formas diferentes. Por ejemplo, aunque todas las opciones de diseño para las Alternativas de Construcción mejoran las condiciones del transporte, las opciones de diseño individual afectan más propiedades que otras, o benefician los recursos visuales más que las demás.

RE.9.1 ¿Qué tipos de impactos ambientales están causando mayor preocupación entre el público y las partes interesadas?

De los recursos ambientales antes mencionados, aquellos que muestran ser de mayor preocupación para el público y las partes interesadas son: las condiciones sociales y económicas, la justicia ambiental, reubicaciones y desplazamientos, preservación histórica, recursos visuales y cualidades estéticas, calidad del aire, ruido y materiales peligrosos. Las siguientes subsecciones resumen los impactos en estos recursos.

¿Cómo resultarán afectadas las condiciones sociales y económicas?

Las condiciones sociales y económicas de un zona son la combinación de varios recursos sociales y económicos. Los recursos sociales son, por lo general, cualitativos, dinámicos e intangibles, mientras que los recursos económicos tienden a ser cuantitativos y tangibles. Todas las alternativas afectan las economías locales y condiciones sociales de la zona. Muchos efectos sociales y económicos se relacionan a la adquisición de propiedades, que resultan en la reubicación de unidades residenciales y negocios que sirven al vecindario local o atienden intereses regionales. Además, la adquisición de propiedades reducen los ingresos provenientes del impuesto a la propiedad para las autoridades fiscales locales. Todas las reubicaciones residenciales debido a las alternativas del proyecto se dan en el vecindario de Elyria y Swansea. Northeast Park Hill también experimentará efectos en los recursos sociales debido a la reubicación de negocios.

En general, una mayor movilidad en la I-70 generada por las Alternativas de Construcción impulsarán el éxito económico y social de los centros urbanos en proceso de desarrollo en las comunidades de Stapleton y Gateway, así como oportunidades de reurbanización en comunidades existentes, como Elyria y Swansea. Esto contrasta con la Alternativa de No Tomar

Ninguna Acción, la cual no aumenta capacidad y, por lo tanto, no tiene el efecto benéfico de mejorar el tiempo de viaje sobre la I-70.

Hay varias medidas atenuantes disponibles para los posibles impactos a los recursos económicos y sociales, tales como ofrecer asistencia adicional de reubicación y mantener la conectividad durante la construcción.

¿Cómo se verán afectadas las poblaciones minoritarias y de bajos recursos (consideraciones de justicia ambiental)?

La mayor parte de las comunidades a lo largo del corredor del proyecto tienen concentraciones notables de población minoritaria y de bajos recursos. La población total en la zona de estudio es de 48 por ciento de hispanos o latinos y 23 por ciento de raza negra o afroamericanos. La población total de bajos recursos en la zona de estudio es de 22.8 por ciento. Estos porcentajes son considerablemente más elevados que los promedios en los condados de Denver y Adams.

Sin atenuantes, la construcción de las alternativas del proyecto tendrían impactos desproporcionadamente elevados y adversos que afectarían predominantemente a las poblaciones de bajos recursos o minoritarias de las comunidades de Elyria y Swansea debido a que todas las viviendas y la mayor parte de los negocios afectados por el proyecto están ubicados dentro de este vecindario.

Una vez que todas las medidas atenuantes se hayan implementado y hayan logrado los beneficios, no habrá impactos altamente desproporcionados y adversos en las poblaciones minoritarias y de bajos recursos. Para obtener más información sobre los impactos y medidas atenuantes en estas poblaciones, consulte la Sección 5.3, Justicia ambiental.

Impactos en las poblaciones minoritarias y de bajos recursos

La Discusión de los impactos en las poblaciones minoritarias y de bajos recursos se centra en el vecindario de Elyria y Swansea, puesto que esa es la única zona con concentración minoritaria y de bajos recursos y donde los impactos entre alternativas difieren entre sí.

¿Qué tipo de reubicaciones serán necesarias?

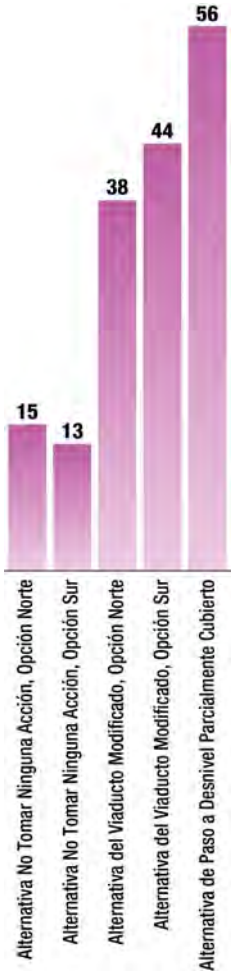
La adquisición de propiedades es un elemento importante en todas las alternativas del proyecto debido a que se requiere derecho de paso adicional para la construcción de cada una de ellas. En el caso de edificios ocupados, es necesario “reubicar” o “desplazar” a las personas de dichas propiedades (residenciales, comerciales, o de organizaciones sin fines de lucro) a una propiedad de reemplazo.

El número total estimado de reubicaciones residenciales para cada alternativa varía de 13 viviendas (alternativa de No Tomar Ninguna Acción, Opción Sur) a 53 (en la Alternativa de

Paso a Desnivel Parcialmente Cubierto). Más de la mitad de las residencias que deberán reubicarse están ocupadas por inquilinos. Todas estas reubicaciones residenciales están localizadas en el vecindario de Elyria y Swansea. Las condiciones del mercado en Denver, hasta julio de 2015, indican que hay disponible una cantidad suficiente de viviendas de remplazo decentes, seguras y sanitarias para asistir con los desplazamientos residenciales que resulten de cualquiera de las alternativas del proyecto.

Las alternativas del proyecto reubicarán entre seis (Alternativa de No Tomar Ninguna Acción, Opción Norte) y 27 negocios (Alternativa del Viaducto Modificado, Opción Sur). Todas las alternativas y sus opciones —con excepción de la Alternativa de No Tomar Ninguna Acción, Opción Sur— requieren la reubicación del Ministry Outreach Center, el cual forma parte de la Denver Rescue Mission, una organización sin fines de lucro 501(c)3.

Todas las personas elegibles recibirán los beneficios de reubicación independientemente de cuál sea su raza, color, religión, sexo o nacionalidad. Los beneficios que otorga la Ley Uniforme de Asistencia en la Reubicación y Política de Adquisición de Bienes Inmuebles (Ley Uniforme) de 1970 —al cual cada propietario o inquilino elegible tiene derecho— se determinarán individualmente y un especialista en derecho de paso asignado les explicará detalladamente el proceso (CDOT, 2011).



Número de reubicaciones residenciales por alternativa y opción para el vecindario de Elyria y Swansea (de 1,844 unidades habitacionales existentes en el vecindario)

¿Cómo se verán afectados los recursos históricos?

Se definió una Zona de Posibles Efectos (APE, abreviación en inglés) para el proyecto con el propósito de identificar los recursos históricos cerca del corredor. Un estudio determinó que 66 recursos históricos dentro de la APE o son oficialmente elegibles para incluirlos en la lista del National Register of Historic Places (NRHP abreviación en inglés) como propiedades individuales (60) y distritales (seis), o son segmentos de apoyo de recursos lineales elegibles (nueve vías ferroviarias, canales y alcantarillado).

La Sección 106 de las regulaciones de la Ley Nacional de Preservación Histórica (NHPA abreviación en inglés) define a un efecto sobre un recurso histórico como una "… alteración a las características de un recurso histórico que reúne los requisitos de inclusión o elegibilidad para el Registro Nacional" (36 CFR §800.16[i]). Los efectos se discuten como "sin efecto", "sin efecto adverso" o "efecto adverso" (36 CFR

¿Qué es una APE?

Una APE (siglas en inglés de Zona de posibles efectos) es un área o áreas geográficas en las que un proyecto puede causar alteraciones, ya sea de manera directa o indirecta, en el carácter o uso de los recursos históricos (36 CFR 800.16(d)).

§800.5). La **Gráfica RE- 4,** a continuación, presenta un resumen de los efectos de cada alternativa en los recursos históricos de la APE.

Gráfica RE- 4. Resumen de efectos en los recursos históricos de la APE

Efecto	Alternativa No Tomar Ninguna Acción		Alternativa del Viaducto Modificado		Alternativa de Paso a Desnivel Parcialmente Cubierto
	Opción Norte	Opción Sur	Opción Norte	Opción Sur	
Efecto adverso[1]	7	1	8	8	13
Sin efecto adverso	50	56	54	54	50
Sin efecto	9	9	4	4	3

Nota: No hay ninguna diferencia en los efectos entre las Opciones de Carriles de Uso General y Carriles Administrados debido a que el área de terreno utilizado para el proyecto es la misma en ambas opciones en el tramo de la Brighton Boulevard y la Colorado Boulevard, que es donde se encuentra la mayor parte de los recursos históricos.

1. El total incluye el efecto adverso en todo el distrito histórico y no incluye los recursos contribuyentes individuales que serán demolidos o las adquisiciones parciales que no requieren demolición.

La FHWA y el CDOT han identificado medidas atenuantes para la Alternativa Preferida con la colaboración de la Oficina de Preservación Histórica de Colorado (SHPO abreviación en inglés) y grupos de asesoramiento, como se indica en el Acuerdo Programático incluido en el Anexo I. Como medida atenuante temprana, el CDOT ha proporcionado financiamiento y ha participado en la creación de un documental que cubre la historia de la I-70 Este y su relación con las comunidades de Elyria, Swansea y Globeville. Este documental se puede ver en el sitio web de la I-70 Este en www.i-70east.com.

¿Cómo se verán afectados los recursos visuales y las cualidades estéticas?

La FHWA define los recursos visuales en el memorándum "Esthetics and Visual Quality Guidance Information" como "aquellas características físicas que componen el paisaje visible, el cual incluye tierra, agua, vegetación y elementos creados por el hombre. Estos elementos son los estímulos en los que se basa la experiencia visual actual". (FHWA, 1986, página 5)

Las regulaciones de la NEPA y del Consejo sobre la Calidad Ambiental (CEQ abreviación en inglés) identifican la estética como uno de los elementos del entorno humano que debe tomarse en consideración al determinar los efectos de un proyecto propuesto. Los recursos visuales conforman las

cualidades estéticas de una zona y son importantes para este proyecto, en especial entre Brighton Boulevard y Colorado Boulevard, debido a que el viaducto existente ha tenido presencia visual dominante en la zona durante décadas y cualquier cambio que se realice en él, producirán a su vez, cambios en el medio ambiente circundante.

Hay impactos menores en los recursos visuales y cualidades estéticas en la zona de estudio. Las alternativas del proyecto mejorarán la cualidad estética de la zona, ya sea para sustituir el viaducto con una nueva estructura que se pueda diseñar para complementar la arquitectura del vecindario o para eliminar el viaducto y ubicar la autopista a desnivel. Las medidas adicionales para mejorar los efectos visuales de las alternativas propuestas para la autopista se establecerán por medio de un proceso colaborativo para reflejar las necesidades individuales de cada vecindario y del contexto estético local.

¿Cómo se verá afectada la calidad del aire?

Siguiendo las normas establecidas por la Agencia de Protección Ambiental de los Estados Unidos (EPA abreviación en inglés) para realizar análisis de los impactos en la calidad del aire, se han evaluado los efectos en la calidad del aire de la Alternativa de No Tomar Ninguna Acción y de las Alternativas de Construcción para la I-70 Este. En relación al monóxido de carbono, en todas las alternativas, no se espera que este proyecto ocasione ninguna nueva violación de alguna norma, aumente la frecuencia o gravedad de alguna violación existente, o retrase el logro oportuno de los Estándares Nacionales de Calidad de Aire del Ambiente (NAAQS, abreviación en inglés). Los valores de los modelos están por debajo de los NAAQS e indican que no existe extralimitación o impactos del proyecto en base a estas normas.

Los resultados de los análisis de las partículas de materia de 10 micrones o menos en tamaño (PM_{10}) indican que las concentraciones de PM_{10} en un periodo de 24 horas no exceden los NAAQS en ninguna de las alternativas del proyecto, incluida la Alternativa de Paso a Desnivel Parcialmente Cubierto. Una comparación de las condiciones de la calidad del aire para todos los contaminantes muestran los efectos de pequeñas diferencias en el volumen de tráfico y la configuración de la autopista entre las alternativas y los impactos de contaminación del aire para todas las alternativas de diseño son similares.

En la conclusión de este análisis, varios factores se hacen evidentes:

- Las condiciones de la calidad del aire en las Alternativas de Construcción son similares a las de la Alternativa de No Tomar Ninguna Acción;
- El volumen y la velocidad del tráfico son los principales factores en los impactos de la calidad del aire a nivel del proyecto; y
- Las emisiones de fuga del polvo provocadas por el arenado de carreteras, así como el desgaste de frenos y llantas, son los principales indicadores de futuras emisiones de partículas.

Sin embargo, cambios significativos en cualquiera de estos factores podría impactar las emisiones de contaminantes a nivel del proyecto.

¿Cómo se verán afectados los niveles del ruido?

Debido al incremento previsto en los volúmenes de tráfico para el 2035 y los cambios propuestos por las alternativas de diseño, el ruido ocasionado por el tráfico incrementará.

Los niveles de ruido varían entre los decibelios ponderados en A (dBA) que van del rango de valores más altos de los 50 al rango de valores más bajos de los 70 dependiendo que tan cerca se encuentre el receptor del ruido a la autopista. El CDOT considera que un ruido se convierte en impacto cuando a la hora pico de ruido éste se encuentra al nivel o por encima de los 66 dBA (para viviendas residenciales) o cuando hay un incremento de 10 dBA o más en el receptor de ruido. Se esperan niveles de ruido más elevados que los que se generan durante la hora pico de ruido, así como incrementos sustanciales de ruido de 10 dBA ó más, si no se construyen muros contra ruido.

Los resultados del análisis muestran que todas las alternativas sin medidas atenuantes producirán ruidos que superen los Criterios para la Reducción del Ruido (NAC abreviación en inglés) de 66 dBA en varios puntos, incluida la Escuela Primaria Swansea. La **Gráfica RE- 5** resume el número de receptores de ruido que rebasan el límite establecido por los NAC con y sin atenuantes de cada alternativa.

Gráfica RE- 5. Receptores de ruido que rebasan el límite establecido por los NAC, por alternativa

Alternativa/ Opción	Número de Receptores de Ruido	Número de Receptores de Ruido que Rebasan el Límite de los NAC sin Atenuantes y (Con Atenuantes)	Número de Receptores de Ruido con un Incremento Sustancial de Ruido sin atenuantes y (con Atenuantes)
Existente	940	91	N/A
Alternativa No Tomar Ninguna Acción			
Opción norte	890	362 (59)	40 (0)
Opción sur	857	360 (54)	34 (0)
Alternativa del Viaducto Modificado			
Opción norte	896	453 (114)	97 (0)
Opción sur	873	432 (83)	68 (2)
Alternativa de Paso a Desnivel Parcialmente Cubierto			
	873	155 (108)	11 (0)

El CDOT debe considerar medidas atenuantes del ruido si el nivel de ruido en un zona sensible, como una vivienda residencial, alcanza o excede el límite establecido por los NAC para uso específico de tierras. Para aliviar los impactos del ruido, se recomienda construir muros contra el ruido siempre que sea factible y razonable. Para obtener más información sobre la ubicación de los muros contra el ruido, consulte la Sección 5.12, Ruido.

¿Cómo se verán afectadas las zonas con materiales peligrosos?

Los materiales peligrosos son sólidos, líquidos o gases que son nocivos para la salud humana o para el medio ambiente. Es probable que la construcción de las alternativas propuestas afecte sitios contaminados por dichos materiales. Las actividades de construcción asociadas con las alternativas tienen las posibilidades de soltar materiales peligrosos en los suelos o en los mantos freáticos en estas zonas, o exponer a los trabajadores o al público a estos materiales peligrosos si no se realizan esfuerzos apropiados de salubridad, seguridad y descontaminación.

La Alternativa de No Tomar Ninguna Acción tiene probabilidades de afectar siete zonas con materiales peligrosos y alterar aproximadamente 41 acres de terreno que se presume contaminado. Las Alternativas de Construcción tienen probabilidades de afectar entre 24 y 28 zonas con materiales peligrosos y alterar entre 3 y 4 de terreno que se

Contaminantes comunes

Los contaminantes comunes identificados en los suelos y/o los mantos freáticos son entre otros:

- Derivados del petróleo (p. ej., combustibles, aceites)
- Solventes clorados
- Metales
- Asbesto

presume contaminado. Comparada con la Alternativa del Viaducto Modificado, la Alternativa de Paso a Desnivel Parcialmente Cubierto afectará aproximadamente entre un 14 y un 20 por ciento más de zonas, incrementando de esta manera el trabajo de construcción que se realizará dentro del terreno que se supone contaminado aproximadamente en un ocho por ciento. La construcción de la autopista por debajo del nivel de la calle afectaría el suelo y/o los mantos freáticos a profundidades mayores que la Alternativas de No Tomar Ninguna Acción y la Alternativa del Viaducto Modificado. Alterar volúmenes mayores de suelo y/o mantos freáticos incrementará las posibilidades de encontrar materiales peligrosos. La Opción de Carriles Administrados aumentarán las alteraciones en 83 acres de terreno adicionales; sin embargo, no aumenta las posibilidades de afectar sitios con materiales peligrosos.

Toda contaminación que se encuentre durante la construcción del proyecto se limpiará de conformidad con lo dispuesto por las regulaciones estatales y federales aplicables, lo cual beneficiará la zona en el futuro.

RE.10 ¿Cómo participan el público y las partes interesadas en el proyecto del EIS de la I-70 Este?

El EIS de la I-70 Este ha seguido un proceso amplio de participación de la comunidad y la agencia desde que el proyecto empezó en el 2003. Luego de la separación de los elementos de autopista y transporte público del proyecto en junio de 2006, las técnicas mejoradas de participación pública continuaron siendo parte del EIS de la I-70 Este. El objetivo general del proceso de participación pública y de la agencia ha sido solicitar opiniones mediante un proceso transparente, abierto y dinámico que incluye a miembros de la comunidad; empresas; agencias federales, estatales, y locales; partes interesadas; y grupos comunitarios de la zona del proyecto. Este proceso ayudó al equipo del proyecto a identificar y documentar problemas y a incorporarlos en el proceso de planificación y decisiones.

Luego de publicar el Anteproyecto del EIS en el 2008, el CDOT y la FHWA iniciaron un proceso de participación pública más enfocado para entender mejor los temas que se plantearon durante el periodo de comentarios públicos y desarrollar soluciones para resolver las preocupaciones del

público y, finalmente, seleccionar la Alternativa Preferida. El equipo del proyecto utilizó técnicas innovadoras de participación pública así como métodos tradicionales para obtener las opiniones de la comunidad y partes interesadas. Algunas de estas técnicas de participación fueron las reuniones en todo el corredor, reuniones individuales, actualizaciones del sitio web, notificaciones por correo electrónico, reuniones mensuales con la comunidad y reuniones del ayuntamiento vía telefónica.

Después que se publicó el Anteproyecto del EIS Suplementario, el enfoque de participación de la agencia y el proceso de participación pública fue para obtener opiniones sobre la Alternativa de Paso a Desnivel Parcialmente Cubierto. La participación de la agencia y los métodos de participación pública que se emplearon durante la preparación de este documento constan de coordinación continua de la agencias y participación pública, incluido un taller comunitario de planificación para explorar las posibilidades de usos de espacios al aire libre sobre la cubierta que se ubicará sobre la I-70 cerca de la Escuela Primaria Swansea. Información detallada sobre la participación de la agencia y la comunidad se encuentra en el Capítulo 10, Participación Pública y de la Agencia.

Se utilizarán reuniones públicas y otras estrategias de participación para mantener informado al público sobre el progreso del proyecto hasta el ROD y, luego de eso, a través de las fases del diseño final y construcción del proyecto. Además, el equipo del proyecto continuará participando en actividades relacionadas con la comunidad, tales como festivales y picnics, para interactuar con los miembros de la comunidad, informarles sobre las próximas actividades del proyecto y responder preguntas.

RE.11 ¿Cuáles son los impactos del proyecto a las propiedades estipuladas en la Sección 4(f)?

La Sección 4(f) de la Ley del Departamento de Transporte de 1966 estipula que la FHWA y otras agencias del Departamento de Transporte de los Estados Unidos no pueden aprobar el uso de tierras de parques o áreas recreativas de propiedad pública, refugios para fauna y aves acuáticas, o lugares históricos públicos o privados, a menos que se cumplan las siguientes condiciones:

a) que la Administración determine que:

No hay una alternativa factible y prudente que evite, según se define en § 774.17, el uso de tierras de la propiedad, y

la acción incluye todos los planes posibles, según se definen en § 774.17, para reducir al mínimo los daños a la propiedad que resulten de dicho uso; o

b) La Administración determina que el uso de la propiedad, incluyendo cualquiera de las medidas para reducir al mínimo los daños (tales como medidas de evitación, minimización, atenuantes o mejoramiento) que el solicitante se comprometa a tomar, tendrá un impacto *de mínimis*, según se define en § 774.17, sobre la propiedad.

Determinación *de mínimis*

Una determinación *de mínimis* puede aplicarse si el uso no tiene efecto adverso sobre las actividades, características y/o atributos del recurso de la Sección 4(f). Una determinación *de mínimis* no requiere mayor análisis para evitar o reducir al mínimo el impacto.

La zona del proyecto tiene recursos históricos, parques y áreas de recreo públicos. Dentro de la Zona de Posibles Efectos de la Sección 106, hay 66 recursos históricos. Esto incluye seis distritos históricos, cada uno con múltiples elementos contribuyentes que están protegidos por la Sección 4(f).

Además, hay 45 parques y otras 43 áreas de recreo (tales como centros recreativos, campos de golf, espacios abiertos y áreas naturales, centros para eventos especiales, caminos y patios de recreo de escuelas/canchas de pelota) que son de propiedad pública y accesibles al público. Cada uno de estos parques y áreas de recreo se consideran propiedades protegidas por la Sección 4(f).

La mayor parte de las propiedades antes mencionadas se encuentran lejos del proyecto y no habrá impactos físicos o de proximidad; sin embargo, las alternativas del proyecto tendrán como resultado el uso de propiedades de la Sección 4(f) en la zona del proyecto. La **Gráfica RE- 6** resume los usos de propiedades protegidas por la Sección 4(f) para cada una de las alternativas del proyecto.

Gráfica RE- 6. Resumen de Usos de las Propiedades Protegidas por la Sección 4(f)

Alternativa/ Opción	Usos Sección 4(f)[1]					
	Recursos históricos[2]		Parques y Áreas de Recreo		Total	
	Uso	*De mínimis*	Uso	*De mínimis*	Uso	*De mínimis*
Alternativa de No Tomar Ninguna Acción, Opción Norte	7	3	1	0	8	3
Alternativa de No Tomar Ninguna Acción, Opción Sur	1	3	0	0	1	3
Alternativa del Viaducto Modificado, Opción Norte	8	6	1	0	9	6
Alternativa del Viaducto Modificado, Opción Sur	8	6	0	0	8	6
Alternativa de Paso a Desnivel Parcialmente Cubierto (alternativa Preferida)	13	5	2	0	15	5

1. El número que aparece en la columna Uso no incluye las determinaciones del impacto *de mínimis*.
2. Los distritos históricos se presentan como un recurso protegido por la Sección 4(f); las propiedades individuales que contribuyen a los distritos históricos no se incluyen en este total.

Debido a que no hay alternativas factibles o prudentes que eviten el uso de todos los recursos protegidos por la Sección 4(f), es necesario realizar un análisis para determinar cuál de las alternativas ocasionará el menor daño posible en general.

La Alternativa de Paso a Desnivel Parcialmente Cubierto ocasiona en general el menor daño a todos los recursos comparado con la Alternativa del Viaducto Modificado. Aunque tiene mayores impactos en algunos recursos, ofrece beneficios significativos al eliminar el impacto visual dominante del viaducto. También proporciona la cubierta sobre la autopista, la cual sirve para reducir los impactos del ruido y protege la calidad del aire. Las medidas atenuantes proporcionadas para las comunidades de justicia ambiental proporcionan más espacios públicos abiertos.

Después de una amplia coordinación con funcionarios y/o agencias locales que tienen jurisdicción sobre los recursos de la Sección 4(f), así como la evaluación del público, la FHWA ha determinado que no existen alternativas de evasión factibles o prudentes y que la Alternativa de Paso a Desnivel Parcialmente Cubierto es la que causa el menor daño en general.

RE.12 ¿Qué sucederá después de la publicación del EIS final?

Después de publicar el EIS final y realizar un período de 30 días de evaluación pública, el último paso en el proceso de la NEPA es la preparación de un Registro de Decisiones (ROD abreviación en inglés), el cual documentará la decisión final de la FHWA para el proyecto, explicará por qué se adoptó un curso de acción en particular y presentará las medidas atenuantes y los compromisos que se incorporarán en la construcción y operación del proyecto. El ROD identificará el financiamiento para la acción aprobada de acuerdo con lo que se señala en la sección de restricciones fiscales (Plan de transporte regional fiscalmente restringido del 2040 [RTP]) del *Plan de Transporte Regional Metro Visión del 2035* de DRCOG (MVRTP) (DRCOG, 2015).

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CHAPTER 1: INTRODUCTION

This chapter presents a brief description of the NEPA process and how the I-70 East project started. It also summarizes the project's progress to date, including the publication of the 2008 Draft EIS and the 2014 Supplemental Draft EIS. Public involvement has significantly influenced the project thus far, so additional information about how the public can maintain involvement through the remainder of the process is included. Lastly, this chapter includes a list of all the chapters in this document and associated technical reports, which are attached to this document as Volume 2 and 3.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, no content-related updates were made.

History and purpose of NEPA

Congress enacted NEPA in December 1969, and President Nixon signed it into law on January 1, 1970. NEPA was the first major environmental law in the United States. NEPA established this country's national environmental policies.

1.1 What is the NEPA process?

NEPA requires analysis of projects with a federal nexus, such as federal funding, that may impact the environment. This is done through a rigorous process that allows the public to understand and comment on the benefits and impacts of the project. Federal agencies are required by NEPA to prepare an EIS for major federal actions that could significantly affect the quality of the human and natural environment. EISs are intended to disclose the effects of a project at a stage in the project where decision making can still be shaped by the environmental analysis and agency and public comments. This process allows decision makers to consider effects on the environment with other important considerations, such as need, feasibility, cost, and the safety of the traveling public.

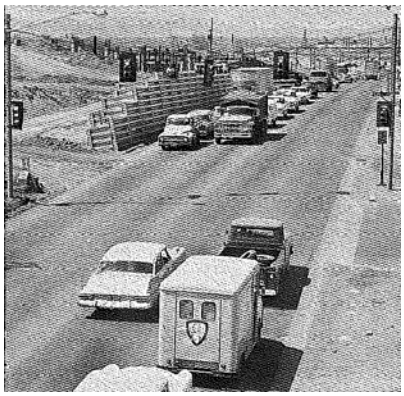
What is a federal nexus?

Under federal law, NEPA applies to any proposed action or transportation project that has a federal nexus, including, but not limited to, instances where:

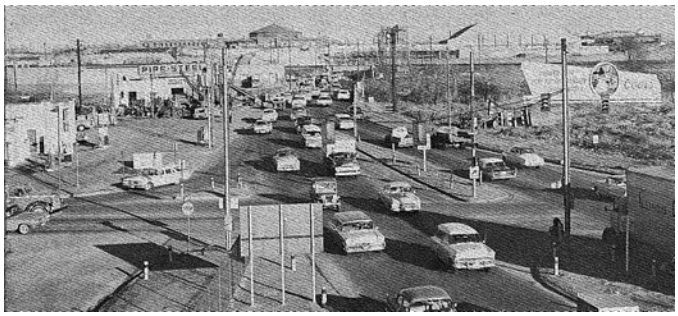
- Federal funds are involved
- Federal permits or approvals are required
- New or revised access to the interstate highway system is included

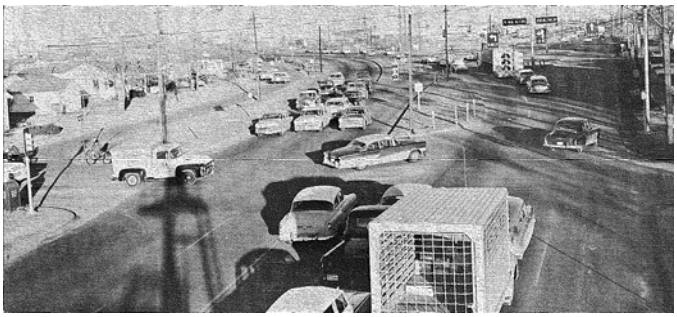
1.2 What is the history of I-70?

Planning for I-70 started nearly 60 years ago. As part of the recommendation for the "Valley Highway" (I-25), it was determined that Denver's major east-west thoroughfare should be located along 46th Avenue to the east of the Valley Highway and along 48th Avenue to the west.



In 1947, Denver formally requested that the 46th Avenue/48th Avenue corridor be designated as a state highway between Sheridan Boulevard and Colorado Boulevard. Detailed studies and design efforts continued in the 1950s and 1960s, and I-70 construction was completed in 1964. The elevated section of I-70 East from Brighton Boulevard to Colorado Boulevard, known as the I-70 Viaduct, now carries approximately 145,000 vehicles per day, providing east-west access for commuters, freight, transit, and general-purpose traffic.





CDOT and FHWA propose improvements to the I-70 corridor where it crosses northeast Denver, Colorado, from I-25 on the west to Tower Road on the east.

Historic photos of 46th Avenue from Commemorating the Opening of the East 46th Avenue Freeway (I-70), *1964*

The intent of the I-70 East EIS is to identify highway improvements along I-70 by:

- Analyzing alternatives that are intended to meet the project's purpose and need, and detailing the highway improvement alternatives development process;
- Evaluating the social, economic, and environmental effects (positive and negative) of the alternatives; and
- Identifying measures to avoid, minimize, or mitigate negative effects.

The aging viaduct is vulnerable to failure within the next 10 to 15 years, even with recent maintenance activities that were completed in 2011. In addition, by 2035, the corridor is projected to carry nearly twice as many vehicles as it was originally designed for, resulting in extended congestion and impaired mobility. The uninterrupted and safe movement of people and goods across I-70 through the Denver metropolitan area is essential to the region's economic vitality and quality of life.

1.3 What is the I-70 East EIS project?

This EIS process began in 2003 as part of the I-70 East Corridor EIS, which looked at both highway and transit solutions. The process was a joint effort among several agencies initially, including CDOT, FHWA, RTD, FTA, and Denver.

In June 2006, it was determined that the highway and transit elements of the I-70 East Corridor EIS process serve different travel markets, are located in different corridors, and have different funding sources. At this point, the highway and transit components of the analysis were separated.

The I-70 East EIS focuses on needed highway improvements between I-25 and Tower Road and is being conducted by CDOT and FHWA. The EIS for the transit elements in this area (East Corridor EIS) were completed by RTD and FTA in 2009; construction of the commuter rail transit line is anticipated for completion in 2016. The East Corridor EIS evaluated more than 100 alternatives (alignment, station locations, and technologies including bus rapid transit, light rail, and commuter rail). More information on the transit elements of this corridor is available at www.rtd-fastracks.com.

In November 2008, a Draft EIS was issued that evaluated the impacts of multiple alternatives. Following issuance of the Draft EIS, CDOT began a collaborative process with formation of the PACT in July 2010 to help decision makers with identifying a preferred alternative.

After many discussions, open dialogues, and public input, the PACT recommended the Current Alignment as the preferred alignment, but did not choose an alternative from those presented in the 2008 Draft EIS as the preferred alternative.

Following the PACT process, CDOT re-examined previously eliminated alternatives and developed a new alternative.

In August 2014, a Supplemental Draft EIS was released that updated the analysis in the Draft EIS and included additional analysis for the newly developed alternative.

NEPA allows lead agencies to preliminarily identify a preferred alternative at the Draft EIS stage. Although no preferred alternative was identified in the Draft EIS, FHWA and CDOT preliminarily identified a preferred alternative in the Supplemental Draft EIS. That alternative was refined and is identified as the Preferred Alternative in the Final EIS. Chapter 3, Summary of Project Alternatives, includes additional details on the Preferred Alternative.

Preparing this document provides an opportunity to respond to comments from agencies, stakeholders, and the public; further evaluate the Preferred Alternative that was preliminarily identified in the Supplemental Draft EIS; improve and modify previous analyses, as appropriate; and make updates to previous environmental documentation.

What is the PACT?

The PACT is the Preferred Alternative Collaborative Team, which was comprised of state and federal agencies, advocacy groups, and stakeholders—including neighborhood representatives from Adams County, Aurora, Commerce City, and Denver. It was formed in July 2010 to help decision makers with identifying a preferred alternative.

1.4 Who has been involved in the I-70 East NEPA process?

NEPA requires that one or more lead agencies take responsibility for the environmental review process. For this project, FHWA is the federal lead agency and CDOT is the state lead agency. FHWA is providing highway design guidance and environmental oversight. CDOT is leading the highway design efforts and development of the EIS. The lead agencies also closely consider public comments on the project.

Staff from the affected jurisdictions and representatives of state and federal resource agencies provide advice and recommendations to the lead agencies about the scope and content of environmental analysis. These "cooperating agencies" are defined under NEPA as other agencies with jurisdiction by law or special expertise over evaluated resources (42 United States Code [USC] §§ 4331[a] and 4332[2]).

1.5 How were comments on the Supplemental Draft EIS addressed?

During the comment period, nearly 900 individual submissions—many containing multiple comments—were received from the public, stakeholders, and agencies on the Supplemental Draft EIS during the public review period from August 2014 to October 2014. Every comment was reviewed individually for response development. The comments and responses are provided in Attachment Q of this document. CDOT modified and revised the content of the document where appropriate in response to these comments.

1.6 What happens after the Final EIS?

After publishing the Final EIS and holding a public review period, the final step in the NEPA process is the preparation of a ROD that will select the preferred alternative, document FHWA's final decision for the project, explain why it has taken a particular action, and present the mitigation measures and commitments to be incorporated into project construction and operation. The ROD will identify funding for the approved action consistent with the fiscally constrained section (Fiscally Constrained RTP) of the DRCOG 2040 MVRTP (DRCOG, 2015b).

1.7 When will the project be built?

Funding constraints limit the ability to fully construct the Preferred Alternative at one time. Therefore, the project will be built in phases. For more information regarding the phasing of the Preferred Alternative, refer to Chapter 8, Phased Project Implementation. Pending the completion of the NEPA process, construction of the first phase of the project is anticipated to begin in 2017.

1.8 How to stay involved and how CDOT will communicate with the public

The best way to stay involved and receive project updates is to join the project mailing list. To do this, visit the project website at: www.i-70east.com or call the project hotline at 303-757-9413. CDOT will continue to keep the public informed about decision making and opportunities for input. Chapter 10, Community Outreach and Agency Involvement, summarizes all the techniques that CDOT practices to engage the public in the NEPA process.

To learn more about this document or to voice your comments and concerns, three public hearings are scheduled during the public review period and are listed below:

- Aurora: February 1, 2016
  North Middle School
- Commerce City: February 2, 2016
  Adams City High School
- Denver: February 3, 2016
  Bruce Randolph Middle School

1.9 How is this document organized?

This document is designed to provide readers with a complete record of the environmental analysis performed and the decision-making process that resulted in the identification of the Preferred Alternative. Accordingly, it includes the full analysis of the alternatives evaluated in the Supplemental Draft EIS, the No-Action Alternative and the Revised Viaduct Alternative, as well as updated analysis of the Preferred Alternative, the Partial Cover Lowered Alternative.

This document includes 10 chapters (Volume 1) and 15 attachments (Volumes 2 and 3) that support the analysis and information presented. It has the same chapter

arrangement as the Supplemental Draft EIS, but adds two new chapters (Chapter 8, Phased Project Implementation, and Chapter 9, Preferred Alternative Mitigation Commitments) and moves Community Outreach and Agency Involvement to Chapter 10. Each chapter includes multiple sections and subsections to make it easier for the reader to find the information they are looking for.

Volume 1 of the Final EIS includes the following chapters:

- Executive Summary (also included in Spanish)
- Chapter 1—Introduction
- Chapter 2—Purpose and Need
- Chapter 3—Summary of Project Alternatives
- Chapter 4—Transportation Impacts and Mitigation Measures
- Chapter 5—Affected Environment, Environmental Consequences, and Mitigation
- Chapter 6—Cumulative Impacts
- Chapter 7—Section 4(f) Evaluation
- Chapter 8—Phased Project Implementation
- Chapter 9—Preferred Alternative Mitigation Commitments
- Chapter 10—Community Outreach and Agency Involvement

A list of references and a list of preparers are included as a part of this volume to source the data and identify the authors of the document.

The 15 attachments provided in Volumes 2 and 3 present technical data and detailed analysis supporting the results provided in this document. Some of these technical reports include an addendum, which updates the analysis that was previously performed in preparing the Supplemental Draft EIS. There are three new attachments, presented as Attachments O, P, and Q.

Attachment A, *Alternative Maps*, is a standalone 11-inch by 17-inch booklet providing detailed maps for the project. Attachments B through P are provided in Volume 2. Attachment Q, *Supplemental Draft EIS Comments and Responses*, is provided in three parts in Volume 3 (also 11-inch by 17-inch). Attachments E, F, I, J, K, O, and P are new documents, while Attachments B, C, D, G, H, L, M, and N are addenda. The Supplemental Draft EIS Technical Reports for these addenda are included on the DVD attached to this document.

The attachments to this document are as follows:

- Attachment A—Alternative Maps
- Attachment B—Agency Consultation
  Agency Consultation Addendum
- Attachment C—Alternative Analysis
  Alternative Analysis Technical Report Addendum
- Attachment D—Community Outreach and Agency Involvement
  Community Outreach and Agency Involvement Technical Report Addendum
- Attachment E—Traffic
  Traffic Technical Report
- Attachment F—Environmental Justice
  Environmental Justice Technical Report
  (The Supplemental Draft EIS attachment required no modifications or updating, no addendum or new Technical Report has been prepared as part of the Final EIS)
- Attachment G—Relocations and Displacements
  Conceptual Stage Relocation Technical Report Addendum
- Attachment H—Hazardous Materials
  Hazardous Materials Technical Report Addendum
- Attachment I—Historic Preservation (Section 106)
  Section 106 Determinations of Eligibility and Effects
  Documentation for Finding of Adverse Effect
- Attachment J—Air Quality
  Air Quality Technical Report
- Attachment K—Noise
  Noise Technical Report
- Attachment L—Biological Assessment
  Biological Assessment Addendum
- Attachment M—Hydrology and Hydraulics
  Hydrology and Hydraulics Technical Report Addendum
- Attachment N—Wetlands and Other Waters of the U.S.
  Wetland Finding
  Wetlands and Other Waters of the U.S. Technical Report Addendum
- Attachment O—Aesthetic and Design Guidelines (new)
- Attachment P—Cover Planning (new)
- Attachment Q—Supplemental Draft EIS Comments and Responses (new)

CHAPTER 2: PURPOSE AND NEED

This chapter describes the project purpose and why it is needed. It also details why the project was started, the horizon years of analysis, the project limits, and the project area.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- The travel demand analysis was revised to include the most recent land use scenarios in the DRCOG 2035 regional plan (DRCOG Compass model, Version 5.0).
- Reference to regional and local planning documents published since August 2014 were updated in the text.

2.1 Why was the I-70 East project initiated?

As discussed in the DRCOG MVRTP (DRCOG, 2015b), the transportation system is integral to the growth and development of the region. One of the policies within this plan is system preservation, to assure existing and future transportation facilities are maintained and preserved.

The transportation vision for the I-70 East corridor is to serve as a multi-modal interstate freeway and rapid transit corridor serving regional and statewide trips. Improvements are needed on I-70 East to increase mobility as well as maintain system quality and enhance safety.

Currently, I-70 between I-25 and Tower Road is one of the most heavily traveled and congested highway corridors in the region and state. The corridor provides a number of important transportation functions, including interstate and intrastate passenger vehicle travel along I-70; interstate and intrastate truck travel for business purposes; regional access to DIA from downtown Denver and the metropolitan area; linkage as an inner beltway between I-225 and I-270; and access to adjacent employment areas, neighborhoods, and new development centers. I-70 serves as a key east-west transportation and freight corridor through the American Midwest, Denver, and Colorado's Rocky Mountains, and it is the primary access to DIA.

A parallel rapid transit line—the East Corridor line, opening in 2016—is planned to connect to DIA, and the Union Pacific Railroad (UPRR) line also runs parallel to I-70. A large number of industrial activities also are situated all along this corridor (DRCOG, 2011, Appendix 1).

In addition, the viaduct between Brighton Boulevard and Colorado Boulevard, which was constructed in 1964, is one of the largest and most notable bridges in deteriorating condition across the state. The viaduct requires replacement within the next 10 to 15 years.

What is a viaduct?

A viaduct is a long, elevated roadway consisting of a series of shorter bridge spans supported on arches, piers, or columns.

2.2 What is the horizon year of analysis for this project?

Transportation modeling is used to help make decisions about the future development of transportation systems. It is used as part of an overall transportation planning process that incorporates forecasting travel patterns 15 to 25 years into the future. These forecasts are used to develop a transportation network that will work effectively in the future.

The 2008 Draft EIS used a horizon year of 2030, which was updated to 2035 for the 2014 Supplemental Draft EIS. The 2008 Draft EIS and 2014 Supplemental Draft EIS used the 2035 DRCOG Compass Travel Demand Model. Since the Supplemental Draft EIS was released in August 2014, DRCOG has released its 2040 DRCOG Focus Travel Demand Model. A sensitivity analysis was performed comparing the 2035 DRCOG Compass Travel Demand Model to the 2040 DRCOG Focus Travel Demand Model to determine whether the 2035 assumptions were comparable to the 2040 assumptions. As a result, it was concluded that the difference between the two models was minimal (approximately 5 percent difference along the I-70 corridor). Therefore, the 2035 horizon year was maintained for the Final EIS. However, DRCOG updated the 2035 forecasts since the Supplemental Draft EIS was published, and this Final EIS document has been revised to reflect the updated numbers.

See Attachment E, *Traffic Technical Report*, for more information about the travel demand modeling.

2.3 What are the project limits and where is the project area?

As shown in **Exhibit 2-1**, the project limits extend almost 12 miles along I-70 between I-25 and Tower Road. The project area covers locations within Denver, Commerce City, and Aurora. This document focuses on the neighborhoods of Globeville, Elyria and Swansea, Northeast Park Hill, Stapleton, Montbello, Gateway, and a portion of Aurora.

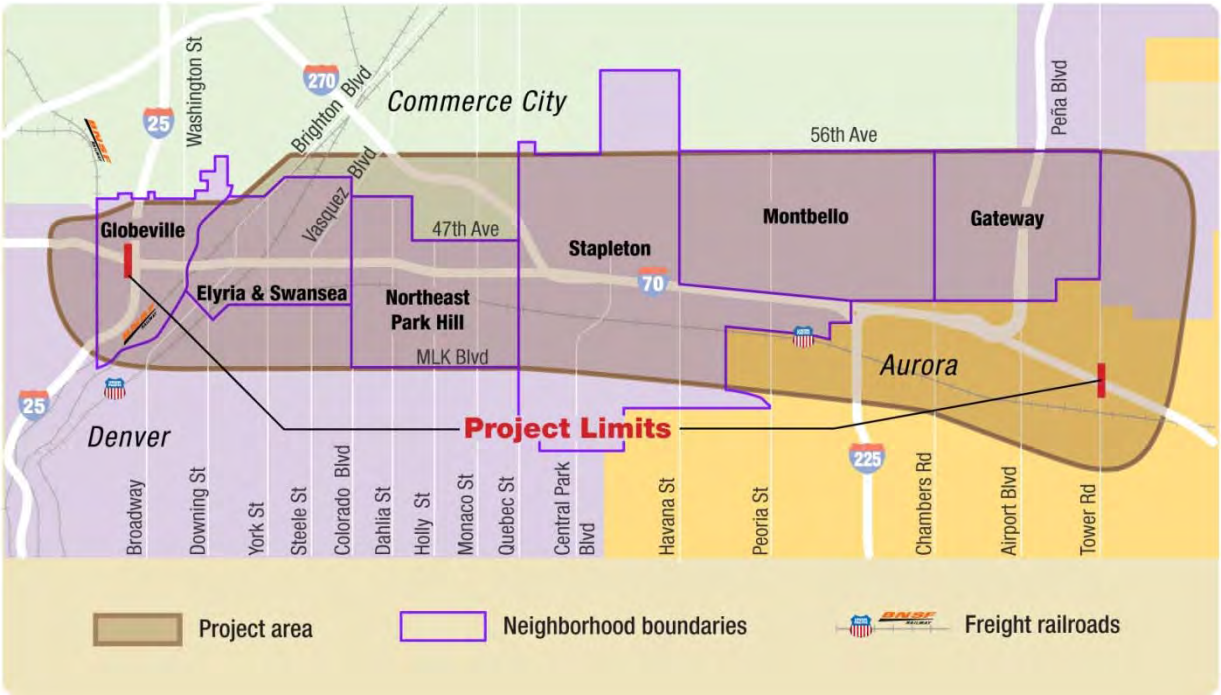
Existing and forecasted traffic volumes were the main factor in determining the project limits on I-70. Forecasted traffic volumes for the year 2035 range from 95,000 to 270,000 vehicles per day between I-25 and Peña Boulevard, declining east of there. The western limit is I-25 because of the high

Logical termini

Using NEPA terminology, project limits are the same as logical termini. Logical termini for project development are defined as rational end points for both transportation improvement and review of the environmental impacts.

diversion of traffic from I-70 to both northbound and southbound I-25. Between 40 percent and 50 percent of traffic traveling westbound on I-70 diverts onto I-25. Tower Road is the eastern limit because the traffic volumes drop substantially east of Peña Boulevard. These limits do not preclude other NEPA transportation improvement studies outside the corridor (DRCOG, 2013).

Exhibit 2-1 Project Area and Limits



An approximate one-mile buffer was created around the project limits to establish the project area. The project area was used to frame the range of transportation solutions and examine existing resource conditions.

The project area is a blend of older, established neighborhoods and communities to the west of Quebec Street and newer, expanding communities to the east. These communities are diverse in their character and history, providing a wide variety of residential, commercial, public facility, and institutional land uses. Adding to the complexity of the project area is the presence of major travel destinations, such as the National Western Complex, and the redevelopment of areas, such as the former Stapleton International Airport, into major mixed-use residential and commercial centers.

2.4 What is the purpose of the project?

The project purpose and need was developed using input from scoping, data gathering, and technical analysis.

The purpose of the project is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area.

2.5 Why is this project needed now?

The need for this project results from the following issues:

- Transportation infrastructure deficiencies
- Increased transportation demand
- Limited transportation capacity
- Safety concerns

2.5.1 Transportation infrastructure deficiencies

I-70 was built in the early 1960s with bridge and drainage structures designed to last for 30 years. Nine structures on the corridor are now past their anticipated lifespan and are classified as either structurally deficient or functionally obsolete and in need of repair, rehabilitation, or replacement.

The viaduct between Brighton Boulevard and Colorado Boulevard was constructed in 1964. The sufficiency rating of the viaduct was 44 out of a possible 100, which is considered structurally deficient, functionally obsolete, and in need of replacement as described in the 2008 Draft EIS. Following two rehabilitation projects completed on the viaduct in 2011, this rating has increased to 62, which extends the useable lifespan of the structure an additional 10 to 15 years. The sufficiency rating remains 62 since the last inspection in September 2014.

Safety, access, and mobility

One element of the I-70 East project purpose is to implement a transportation solution that improves safety, access, and mobility in the project area. These terms are used in this document as follows:

Safety: Reliable and secure travel along I-70 (addressing the high crash rate, deteriorating facility and infrastructure deficiencies).

Access: The ability to provide reasonable access to and from transportation facilities and local destinations.

Mobility: How well the available transportation choices (highway, local roads, sidewalks, and transit) move people and goods.

What qualifies a bridge as "structurally deficient"?

Federal guidelines classify bridges as "structurally deficient" if the components are rated at poor or worse on inspection. This means that engineers have identified a major defect in the bridge's support structure or deck. If a bridge is rated "structurally deficient," the bridge needs substantial maintenance or rehabilitation, or it needs to be replaced.

When is a bridge "functionally obsolete"?

A bridge is functionally obsolete when it cannot properly accommodate traffic due to poor roadway alignment or out-of-date design standards.

Falling pieces of concrete show a structurally deficient viaduct. This photo was taken on 46th Avenue under the viaduct.

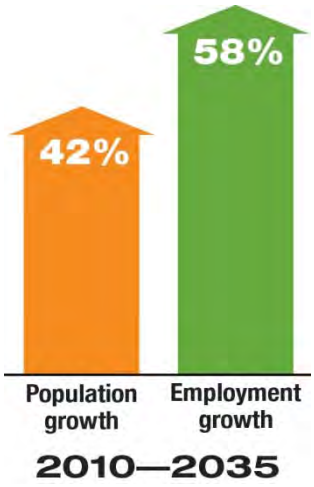
2.5.2 Increased transportation demand

The project area is experiencing rapid growth and development. This includes both areas of new development and redevelopment, with substantial residential populations and business activity. In addition to the established neighborhoods on the western end of the corridor, the following substantial new residential and business growth is occurring:

- **Downtown Denver.** According to *Blueprint Denver* (Denver, 2002) (a supplement to *Comprehensive Plan 2000)*, downtown Denver will add more than 21,000 new housing units and 47,000 new jobs by 2020.
- **Stapleton, Gateway, Lowry.** According to *Blueprint Denver* (Denver, 2002), 17,000 additional jobs and 16,000 new housing units will be created in these areas by 2020.
- **Denver International Airport.** DIA is expected to add an additional 13,500 jobs by 2030 as it continues to grow and expand.
- **National Western Complex.** With a combined 130 acres of redeveloped land, the National Western Complex will support Denver's global standing as a world-class hub for the Western way of life. A currently planned redevelopment effort of the Center is designed to bring about 101 new tourist events and 960,500 new visitors each year, bringing the total number of annual visitors to over 2 million.

The land use and development trends within the corridor will result in additional demands on the transportation system. Providing access and maximizing the ability to travel to, through, and within the corridor are critical to maintain the economy. This includes maintaining and enhancing connections between major activity centers and economic centers near the corridor.

The 2010 and 2035 DRCOG travel demand models have shown recent population and employment growth within the Denver region, which has resulted in increased travel demand in the corridor. Population and employment growth in the project area has been heavily influenced by the development of DIA and other areas. Development in the project area is projected to continue in the future. Population is expected to increase 42 percent and employment is expected to increase 58 percent from 2010 to 2035, with annual growth rates of 1.4 percent and 1.9 percent, respectively. Most of the developable land in the central and eastern parts of the project area will be built out by 2035.

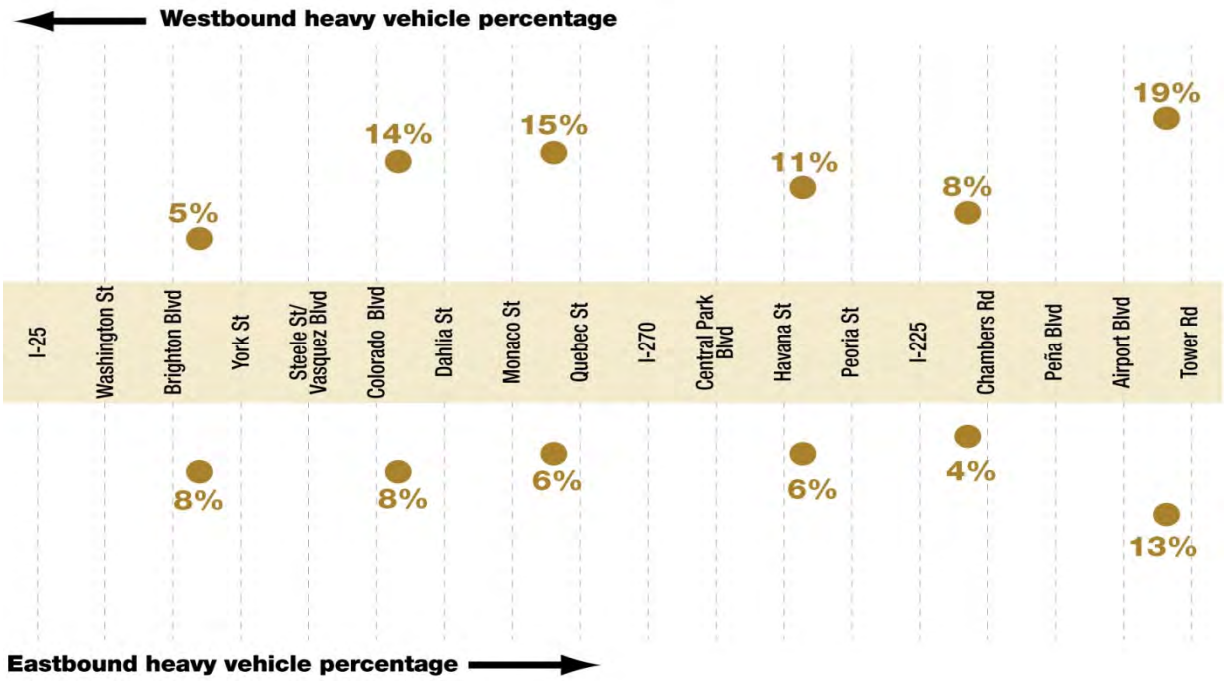


Source: 2010 and 2035 DRCOG travel demand models

Based on the population and employment projections for 2035, access to activity centers, residential areas, and employment will become more difficult. Access to and from I-70 is provided through the existing interchanges. The interchanges at Steele Street/Vasquez Boulevard, Peoria Street, and Chambers Road currently experience traffic and congestion issues, which will continue to grow and worsen with time. A substantial number of the people traveling on I-70 (50 percent to 70 percent) begin or end their trips within the project area (DRCOG, 2013). I-70 also serves as a gateway to Aurora and Commerce City, provides regional access to the Stapleton redevelopment area and the developing northeast portion of the project area, and is a critical link for travel to DIA.

In addition to accommodating airport and inter-city travel, the I-70 corridor is home to many industrial and warehousing businesses. These businesses account for much of the trucking and freight operations in the corridor. The percentage of heavy vehicles that travel along a roadway affects traffic operations. As the percentage of heavy vehicles in the traffic stream increases, passenger vehicle movement becomes restricted and traffic operations deteriorate. Between 5 percent and 19 percent of the traffic on I-70 is truck traffic, as shown in **Exhibit 2-2**. Truck access to the established businesses in the neighborhoods and future industrial and warehousing centers is important for economic development.

Exhibit 2-2 Heavy Vehicle Percentage of Traffic



Source: Heavy vehicle percentage was calculated based on the available 2012 peak traffic counts.

2.5.3 Limited transportation capacity

I-70 serves a growing number of users, ranging from travelers and tourists from outlying areas and DIA to regional trucking to commuters or local traffic. The demand from these users is exceeding the existing design capacity of I-70 and associated interchanges.

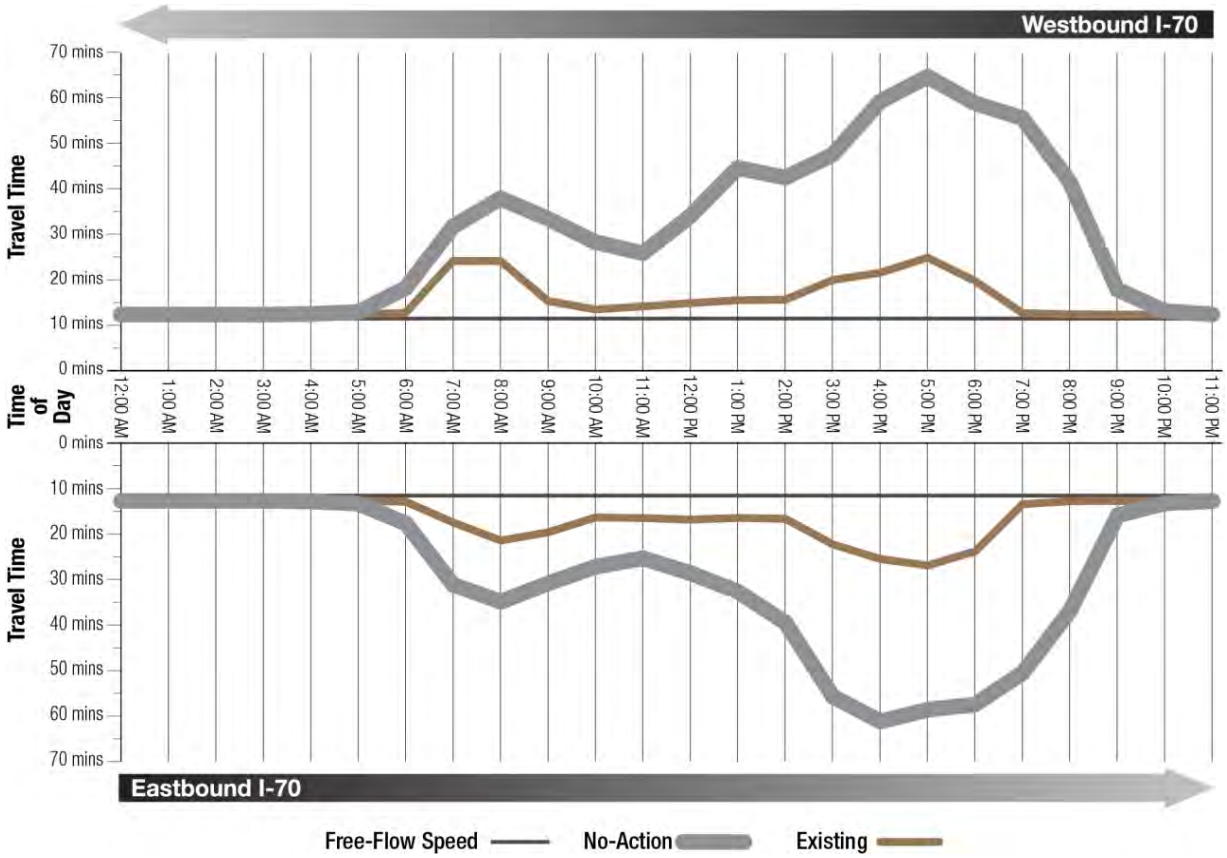
Within the project area, I-70 currently serves close to or more than the capacity of vehicle traffic for which it was designed. Depending on the location along the corridor, between 52,000 and 220,000 vehicles per day travel through the project area. Forecasted traffic volumes for the year 2035 (with or without improvements) show that traffic on I-70 even without improvements will increase substantially, carrying between 95,000 and 270,000 vehicles per day (DRCOG, 2013). This increase in traffic will result in more hours of congestion, longer delays, and increased potential for crashes. Existing and future traffic travel times are shown in **Exhibit 2-3**. Comparative free-flow travel time also is shown for those same sections. The increase in traffic volumes, as well as substandard geometric features (i.e., inadequate shoulders in some highway segments), will result in longer travel times for the corridor. In addition to longer

Free-flow travel time

Free-flow travel time is the amount of time it takes a driver to pass through the study area while traveling at the posted speed limit of 55 miles per hour.

travel times, the peak periods also will extend into several more hours of the day.

Exhibit 2-3 Travel Time



Source: Existing daily traffic volumes were calculated based on the available 2012 peak traffic counts.

The increasing traffic is expected to lead to similar increases in the percentage of the day that I-70 will be congested as demand exceeds the available roadway capacity on an hour-by-hour basis. Without improvements, hours of congestion experienced by travelers on I-70 in the corridor will continue to increase. Currently, some portions of the highway are congested for as many as 10 hours of the day. Without improvements, by 2035, I-70 will be congested for up to 12.5 hours—more than half of the day. This means that the number of hours during which peak traffic volumes are experienced is increasing and, over time, morning and evening peak hours will change to one long congested period instead of two separate peaks. More detailed discussions of existing and future traffic conditions can be found in Chapter 4, Transportation Impacts and Mitigation Measures.

Congestion

A roadway is considered congested when the demand, or the number of cars wanting to use the roadway, exceeds the capacity, or the number of cars for which the road is designed.

2.5.4 Safety concerns

Within the limits of the project, I-70 generally experiences more crashes than the state average for urban freeways. These crashes cause unpredictable and unavoidable traffic congestion, which adds to or worsens the already existing congestion from travel demand that exceeds the normal roadway capacity. The unpredictable nature of traffic congestion on I-70 increases safety concerns for freight carriers, employers, manufacturers, and business interests in the region, as well as commuters and residents who depend on reliability for their daily travel.

According to the *I-70 East Corridor EIS Safety Evaluation Addendum* (CDOT, 2013a), from 2009 to 2012, there were 2,872 crashes on I-70 within the project area. Of these crashes, 1,068 occurred on the I-70 interchange ramps and crossroads and 1,804 occurred on mainline I-70. Over the three-year period, there were seven fatalities on this portion of I-70.

Impacted crash barrels at I-70 and York Street off-ramp resulting from inadequate deceleration lane length

Higher-than-average crash rates often can be attributed to roadway conditions that do not meet current design standards, such as those found on sections of I-70. The following deficiencies contribute to higher crash rates on I-70:

- Inadequate acceleration and/or deceleration lane lengths
- Insufficient sight distance at entrance and exit ramps
- Ramp design speeds that are too low
- Insufficient shoulder width of only two feet in some sections
- Interchange spacing of less than one mile, which creates weaving issues for traffic entering and exiting the highway
- Inadequate roadway drainage
- Other geometric deficiencies

Many of these deficiencies occur in the western half of the corridor, contributing to the highest crash rates. Additionally, numerous safety concerns are associated with the aging viaduct between Brighton Boulevard and Colorado Boulevard. These issues are described further in Chapter 3, Summary of Project Alternatives.

2.6 How is the project purpose and need used to evaluate potential alternatives?

The project purpose and need is the basis for the development and evaluation of alternatives to address the projected transportation problems. Addressing the needs of the project is an important outcome of the alternatives evaluation process. To illustrate the extent of the transportation problems that must be addressed, specific factors are used to measure how well alternatives meet these needs in the future. Chapter 3, Summary of Project Alternatives, discusses the alternatives analysis and the methods used to measure their performance.

Addressing transportation needs on I-70 requires careful consideration of the physical, environmental, and community constraints and requirements. Chapter 3 provides a more detailed description of how the purpose and need have been used to develop, evaluate, and compare alternatives and identify the Preferred Alternative.

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CHAPTER 3: SUMMARY OF PROJECT ALTERNATIVES

The alternatives considered for the I-70 East EIS resulted from extensive agency involvement and public outreach, combined with detailed environmental and technical analyses. Information on alternative development since the beginning of the project is discussed in this chapter, starting with the most recent information.

This chapter provides a detailed description of alternatives and options that are evaluated in the Final EIS and identifies the project's Preferred Alternative. It also discusses the design variations that were included in the Supplemental Draft EIS.

The chapter then reviews the initial alternatives that were developed. The goals and objectives are discussed, followed by the screening process that developed the alternatives evaluated in the 2008 Draft EIS and 2014 Supplemental Draft EIS. It also describes the reasons for elimination of the Reroute and Realignment Alternatives.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- The Partial Cover Lowered Alternative design was updated and multiple connectivity options for this alternative were eliminated.
- The design variations for the Partial Cover Lowered Alternative were incorporated or eliminated.
- Capital and maintenance cost estimates were updated.
- Information on the state and regional transportation planning process was moved to Section 5.4, Land Use.
- Information from the 2008 Draft EIS was included to provide a more inclusive description of the initial alternatives and screening process.

3.1 What alternatives are fully evaluated in this document?

A range of reasonable alternatives has been considered during the development of this project, and they are discussed later in this chapter. The alternatives that are fully evaluated in this document include the No-Action Alternative and two Build Alternatives (the Revised Viaduct Alternative and the Partial Cover Lowered Alternative). Detailed descriptions of these alternatives are included in the following subsections.

Definition of a "reasonable" alternative

The term "reasonable" is defined by the CEQ as those alternatives that are "practical or feasible from the technical and economic standpoint and using common sense." (CEQ's "Forty Questions")

3.1.1 No-Action Alternative

The No-Action Alternative includes existing, planned, and programmed roadway and transit improvements in the project area. These improvements also are part of all Build Alternatives considered and are defined by the DRCOG 2035 MVRTP (DRCOG, 2015b). Chapter 4, Transportation Impacts and Mitigation Measures, lists and explains existing and programmed roadway and transit improvements in more detail.

No-Action Alternative

While the No-Action Alternative is not a true no-build scenario, this document generally refers to the Build Alternatives (the Revised Viaduct Alternative and the Partial Cover Lowered Alternative) as those with additional capacity.

The No-Action Alternative does not meet the project's purpose and need, but it provides a baseline against which the Build Alternatives can be compared, so it is analyzed in this document.

A no-action alternative for highway projects normally includes short-term safety and maintenance improvements that continue the operation of the roadway while avoiding substantial capital investment. Because of the deteriorating

condition of the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard, the No-Action Alternative for this project includes a total replacement of the viaduct. This replacement is necessary to maintain safe operations of I-70. The No-Action Alternative does not include additional travel lanes, so the lane configuration is the same as the existing conditions and I-70 will remain three lanes in each direction. There are no improvements proposed between I-25 and Brighton Boulevard or Colorado Boulevard and Tower Road. **Exhibit 3-1** illustrates the number of lanes for this alternative and shows which interchanges will be reconstructed or remain the same.

Exhibit 3-1 No-Action Alternative Lane Configuration and Interchange Reconstruction

The existing width of the highway bridge from Brighton Boulevard to Colorado Boulevard (three lanes in each direction, six lanes total) is approximately 85 feet.

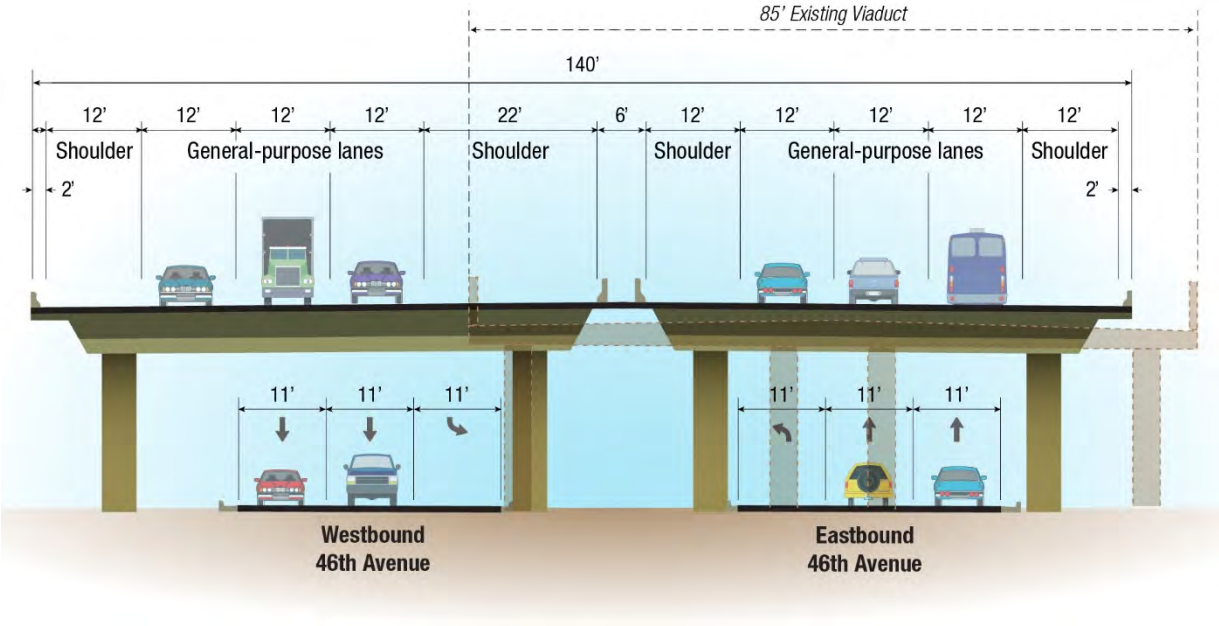
There are two Expansion Options (see **Exhibit 3-2**) for reconstructing the viaduct with the No-Action Alternative: the North Option and the South Option.

The North Option pushes the north edge of the highway approximately 70 feet north of the existing viaduct, while the South Option pushes the south edge of the highway 60 feet south. To allow for phasing of construction by accommodating the traffic flow during construction, a 22-foot inside shoulder is included in the design for westbound I-70 for the North Option and eastbound I-70 for the South Option.

Exhibit 3-2 No-Action Alternative Expansion Options

Reconstruction of the existing viaduct in the No-Action Alternative requires additional right of way to maintain traffic flow on I-70 during construction and to rebuild the viaduct in line with current highway design standards. The existing width of the highway bridge from Brighton Boulevard to Colorado Boulevard (three lanes in each direction, six lanes total) is approximately 85 feet. The reconstructed bridge increases the width by more than 50 feet to 140 feet, as shown in **Exhibit 3-3**. This increase in width is due to construction phasing, which will be required to maintain the traffic flow during construction, and the standard shoulder and lane widths, which are larger than the existing widths.

Exhibit 3-3 No-Action Alternative Typical Section



This alternative includes a drainage system north of I-70 to capture onsite water runoff from the viaduct through an underground storm drain pipe. The alignment for this drainage system is shown in Section 5.14, Floodplains and Drainage/Hydrology.

The No-Action Alternative also reconstructs 46th Avenue to existing conditions under the viaduct with no additional changes.

3.1.2 Build Alternatives

In addition to the No-Action Alternative, two Build Alternatives with options are evaluated.

Revised Viaduct Alternative

- **Expansion Options:** North or South
- **Operational Options:** General-Purpose Lanes or Managed Lanes

Partial Cover Lowered Alternative

- **Operational Options:** General-Purpose Lanes or Managed Lanes

The Build Alternatives include existing, planned, and programmed roadway and transit improvements in the project area, as defined by the DRCOG 2035 MVRTP. They add capacity to I-70 from I-25 to Tower Road. Capacity is increased by restriping I-70 from I-25 to Brighton Boulevard and widening I-70 from Brighton Boulevard to Tower Road to accommodate additional lanes. The Build Alternatives range from a total of six lanes to 12 lanes, depending on the capacity needs along the corridor.

To address safety issues associated with the aging viaduct between Brighton Boulevard and Colorado Boulevard, the Build Alternatives will replace the existing viaduct or remove it completely (as discussed in the following subsections). The Build Alternatives also will modify all bridges and interchanges along the corridor between Brighton Boulevard and Tower Road. Because of safety issues related to existing substandard conditions, the Build Alternatives eliminate the York Street interchange.

Elimination of York Street interchange

Because of safety issues related to existing substandard conditions, the Build Alternatives eliminate the York Street interchange.

As part of the Build Alternatives, 46th Avenue is redesigned and will continue to serve local traffic in the area. More details on 46th Avenue and local and regional connectivity are discussed in the following subsections for each alternative.

With both of the Build Alternatives, the proposed highway ranges from approximately 25 feet to 105 feet wider than the existing highway between Colorado Boulevard and Tower Road. Widening occurs equally to the north and south in this section.

East of Colorado Boulevard, the Build Alternatives include the following improvements:

- The existing slip ramps west of Dahlia Street and east of Monaco Street will be relocated to an improved Holly Street full interchange to avoid conflicts with the geometry of proposed ramp locations at Colorado Boulevard and Quebec Street, as well as to avoid traffic weaving issues.
- North-south connections are maintained at Dahlia Street, Holly Street, Monaco Street, Quebec Street, Central Park Boulevard, Havana Street, Peoria Street, Chambers Road, Airport Road, and Tower Road.
- I-270 southbound to I-70 eastbound flyover structure will be replaced to accommodate the widened highway.
- Existing interchange accesses at Quebec Street, Havana Street, Peoria Street, Chambers Road, Airport Road, and Tower Road will remain.
- Existing highway crossing over the Denver Rock Island Railroad (DRIR) west of Quebec Street will be maintained.

Traffic weaving

Weaving is an undesirable situation in which traffic veering right and traffic veering left must cross paths within a limited distance to merge with traffic in the through-lane.

Because the Central Park Boulevard overpass was recently reconstructed with sufficient width for the widened highway, it will not be disturbed or modified.

Two Operational Options to help handle the added capacity are considered for the Build Alternatives from I-25 to Tower Road: General-Purpose Lanes and Managed Lanes. Attachment A, *Alternative Maps*, shows details about the lane configurations of the General-Purpose Lanes and Managed Lanes Options.

Operational Options: General-Purpose Lanes or Managed Lanes

General-purpose lanes are traffic lanes that do not apply any restrictions to the vehicles using them. Managed lanes implement pricing strategies that will be adjusted based on

real-time traffic demand on the highway facility. This is accomplished by providing a specially managed travel lane for vehicles to avoid congestion and travel at a higher speed than the general-purpose lanes. The purpose is to provide a reliable, congestion-free option along the highway and provide a way to manage congestion over the long term to reduce the need for future expansion.

The Managed Lanes Option only includes operational strategies for the additional lanes while keeping the rest as general purpose lanes. The Managed Lanes Option and the General-Purpose Lanes Option are designed with the same width of approximately 197 feet between Brighton Boulevard and Colorado Boulevard. However, the shoulder widths will be decreased for managed lanes, compared to general-purpose lanes, because of the need for a four-foot buffer between managed and general-purpose lanes in each direction.

There are no additional impacts to the surrounding neighborhoods or environments between the two options except at the locations of direct connections. The construction limits for the Managed Lanes Option increases where there are direct connections from the managed lanes to interchanges. Three proposed direct connections are planned from the managed lanes to I-270, I-225, and Peña Boulevard to accommodate regional and airport traffic. These direct connections result in a shift of eastbound I-70 to create room for the connections.

Revised Viaduct Alternative

The Revised Viaduct Alternative replaces the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard. It adds one to two additional lane(s) in each direction from Brighton Boulevard to Tower Road. It also adds capacity from I-25 to Brighton Boulevard by restriping.

The Revised Viaduct Alternative includes two Expansion Options from Brighton Boulevard to Colorado Boulevard: the North Option or the South Option. Each Expansion Option moves the centerline of the highway approximately 70 feet north or south of the existing centerline. The North Option pushes the north edge of the highway up to 160 feet north from the existing highway edge in some areas. The South Option pushes the south edge of the highway up to 140 feet south of the existing highway edge. This is needed to accommodate the larger footprint resulting from additional

Expansion Options

Expansion Options refer to the North or South Options of the No-Action Alternative and the Revised Viaduct Alternative. These move the north edge of the highway north or the south edge of the highway south of the existing facility from Brighton Boulevard to Colorado Boulevard.

lanes, wider lanes, and shoulders. The Revised Viaduct Alternative also includes two Operational Options from I-25 to Tower Road: General-Purpose Lanes or Managed Lanes (shown in **Exhibit 3-4**). These are described in detail in the previous subsection.

Exhibit 3-4 Revised Viaduct Alternative and Options

The Revised Viaduct Alternative does not provide direct access from westbound I-70 to Steele Street/Vasquez Boulevard or from Steele Street/Vasquez Boulevard to eastbound I-70. Access at Steele Street/Vasquez Boulevard and Colorado Boulevard is provided by a split-diamond interchange.

An acceleration/deceleration lane is provided in each direction at the ramp junctions between Brighton Boulevard and Steele Street/Vasquez Boulevard to make it easier for vehicles to safely enter or exit between two facilities with different operating speeds. These additional lanes result in a viaduct width of 197 feet for both the General-Purpose Lanes Option and the Managed Lanes Option, more than two times wider than the existing width.

Exhibit 3-5 illustrates the number of lanes for this alternative and shows which interchanges will be reconstructed or remain the same.

Exhibit 3-6 shows a typical section for the General-Purpose Lanes Option and Managed Lanes Option for the Revised Viaduct Alternative between Brighton Boulevard and Colorado Boulevard.

Split-diamond interchange

A split-diamond interchange is used where local streets are too close to each other to allow for safe operations of the entrance and exit ramps. Ramps are combined and a one-way frontage road is used between the local streets.

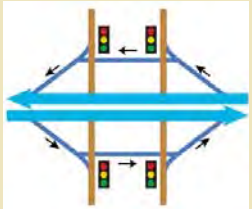
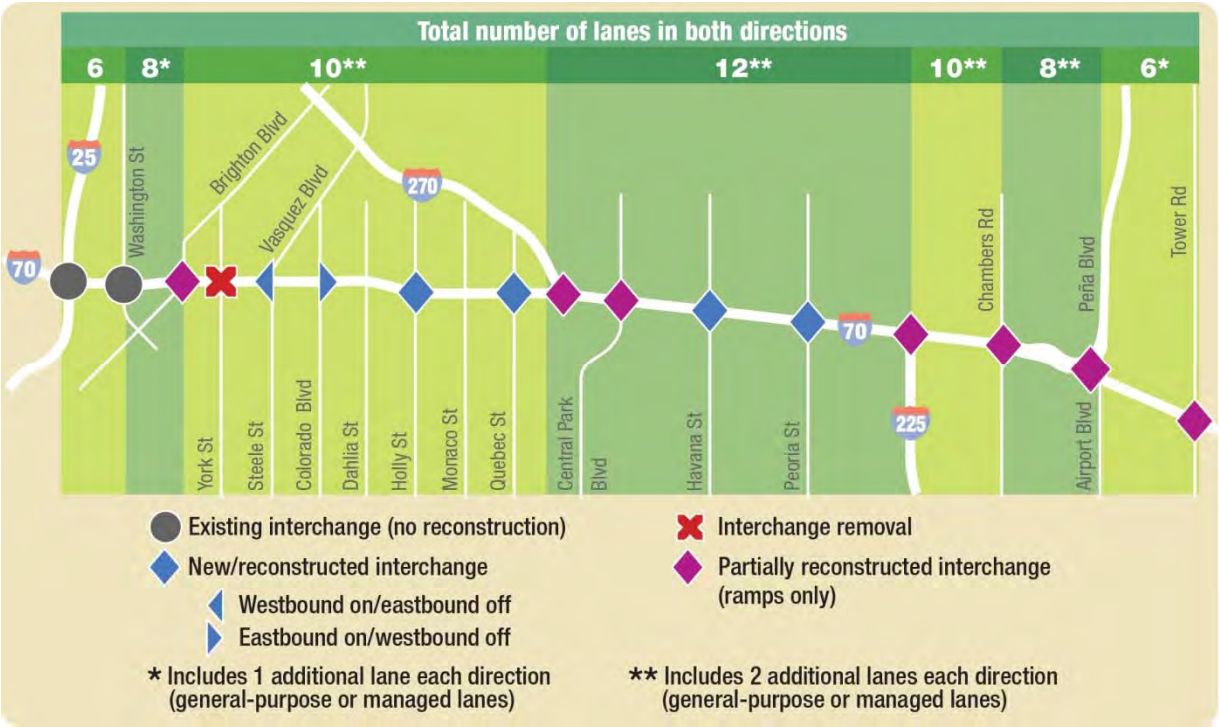
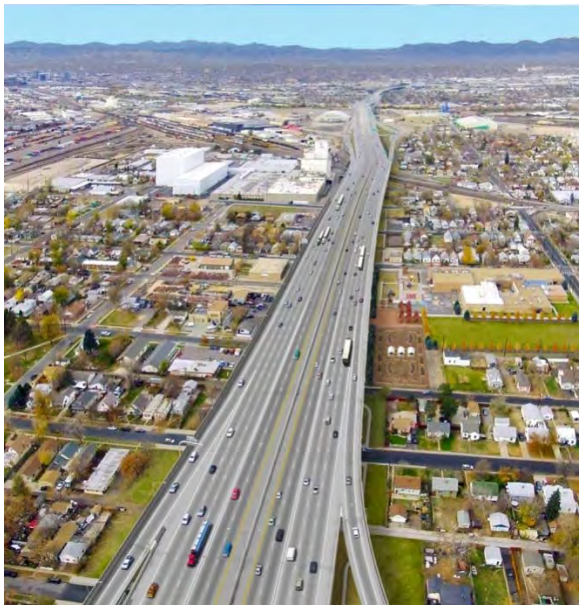


Exhibit 3-5 Revised Viaduct Alternative Lane Configuration and Interchange Reconstruction



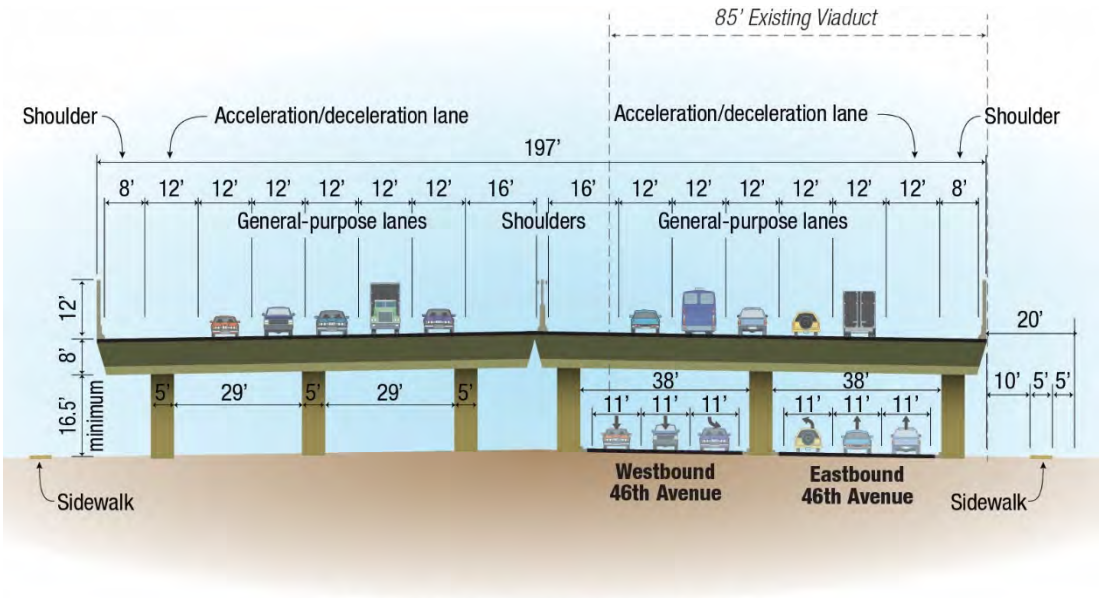
The Revised Viaduct Alternative provides local north-south connectivity across I-70 at York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, Milwaukee Street, Steele Street/Vasquez Boulevard, and Monroe Street, as shown in **Exhibit 4-22** in Chapter 4, Transportation Impacts and Mitigation Measures. Access to Elizabeth Street will be available from 46th Avenue; however, Elizabeth Street will not connect across I-70.

As part of this alternative, 46th Avenue will run underneath the highway as a two-lane road with turn lanes to provide local east-west connectivity. The minimum height under the viaduct is 16.5 feet, which provides sufficient clearance for large vehicles. There are five-foot sidewalks located 10 feet from the north and south edges of the viaduct to move pedestrians away from the viaduct structure.

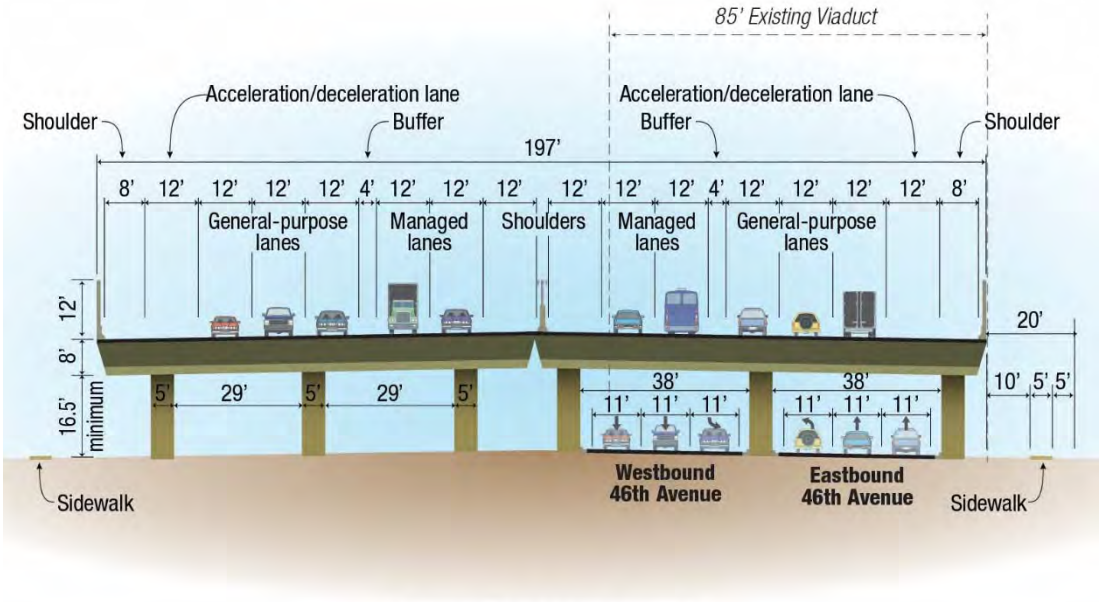


Bird's-eye view simulation of Revised Viaduct Alternative looking west from Fillmore Street (North Option)

Exhibit 3-6 Revised Viaduct Alternative Typical Section (between Brighton Boulevard and Colorado Boulevard)



General-Purpose Lanes Option



Managed Lanes Option

To keep 46th Avenue farther away from the Swansea Elementary School property, it is located under the viaduct below the eastbound direction of I-70. The additional space under the viaduct below the westbound lanes of I-70 adjacent to 46th Avenue could be used as a space for community and neighborhood activities.

This alternative includes a drainage system north of I-70 to capture onsite water runoff from the viaduct through an underground storm drain pipe. The alignment for this drainage system is shown in Section 5.14, Floodplains and Drainage/Hydrology.

The Revised Viaduct Alternative east of Colorado Boulevard includes the improvements discussed earlier.

Partial Cover Lowered Alternative

As a result of the comments received on the Supplemental Draft EIS and additional stakeholder outreach and agency coordination, the Partial Cover Lowered Alternative has been refined to include elements of both the Basic Option and the Modified Option of the Partial Cover Lowered Alternative as they were analyzed in the Supplemental Draft EIS. This document includes updated analysis of the refined Partial Cover Lowered Alternative and does not include Basic and Modified Options.

Generally, the refined Partial Cover Lowered Alternative maintains interchange access to I-70 at Steele Street/ Vasquez Boulevard, as included in the Basic Option, in addition to including the 46th Avenue and local street connectivity improvements and access to I-70 at Colorado Boulevard from the Modified Option.

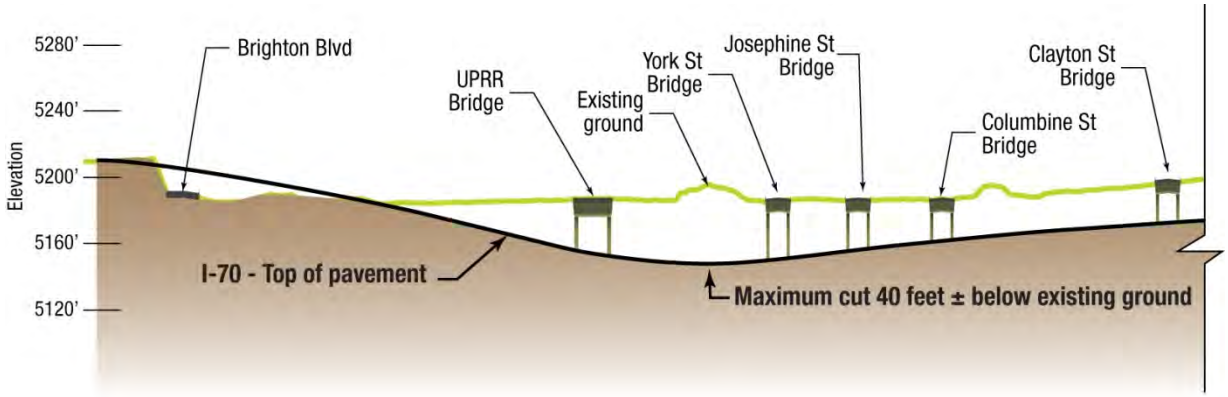
The Partial Cover Lowered Alternative removes the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard and lowers the highway below grade in this area. It includes one to two additional lane(s) in each direction from Brighton Boulevard to Tower Road by restriping the existing highway from I-25 to Brighton Boulevard to provide transitions between existing and new construction. The Partial Cover Lowered Alternative also includes two Operational Options from I-25 to Tower Road: the General-Purpose Lanes Option or the Managed Lanes Option (shown in **Exhibit 3-7**).

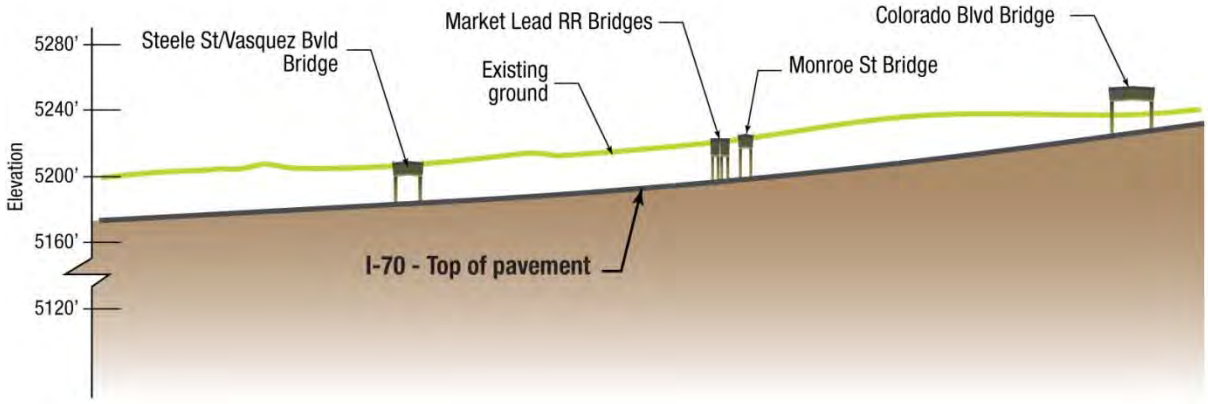
Exhibit 3-7 Partial Cover Lowered Alternative and Options

The highway starts descending west of Brighton Boulevard to a maximum depth of approximately 40 feet below existing ground surface just east of the UPRR. This depth is necessary to allow the lowered highway to cross below the existing UPRR railroad crossing. The remaining portion of the lowered section has an average depth of approximately 25 feet below grade. The lowered highway ascends just east of the Burlington Northern Santa Fe (BNSF) Denver Market Lead Railroad to reach the existing grade east of the Colorado Boulevard interchange.

Exhibit 3-8 shows a profile view of the Partial Cover Lowered Alternative from Brighton Boulevard to Colorado Boulevard.

Exhibit 3-8 Partial Cover Lowered Alternative Profile View of the Lowered Section





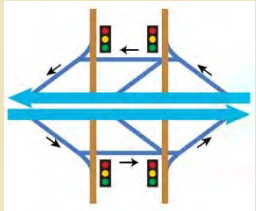
The Partial Cover Lowered Alternative does not provide direct access from westbound I-70 to Steele Street/Vasquez Boulevard or from Steele Street/Vasquez Boulevard to eastbound I-70. Access at Steele Street/Vasquez Boulevard and Colorado Boulevard is provided by a split-diamond interchange. In addition, slip ramps are included to provide an eastbound off-ramp and westbound on-ramp at Colorado Boulevard.

An acceleration/deceleration lane is provided in each direction at the ramp junctions between Brighton Boulevard and Steele Street/Vasquez Boulevard to make it easier for vehicles to safely enter or exit between two facilities with different operation speeds.

These additional lanes—and space needed for 46th Avenue from Brighton Boulevard to Colorado Boulevard—result in a total width that is approximately three times greater than the existing highway width for both the General-Purpose Lanes Option and the Managed Lanes Option. **Exhibit 3-9**

Slip ramps

A slip ramp is generally located between a freeway mainline and an adjacent frontage road. These ramps allow motorists to "slip" from one roadway to the adjacent parallel roadway. The connection of the slip ramp and the parallel roadway are typically not intersections, but just merging zones.



shows total number of lanes and interchange reconstruction as part of the Partial Cover Lowered Alternative.

Exhibit 3-9 Partial Cover Lowered Alternative Lane Configuration and Interchange Reconstruction

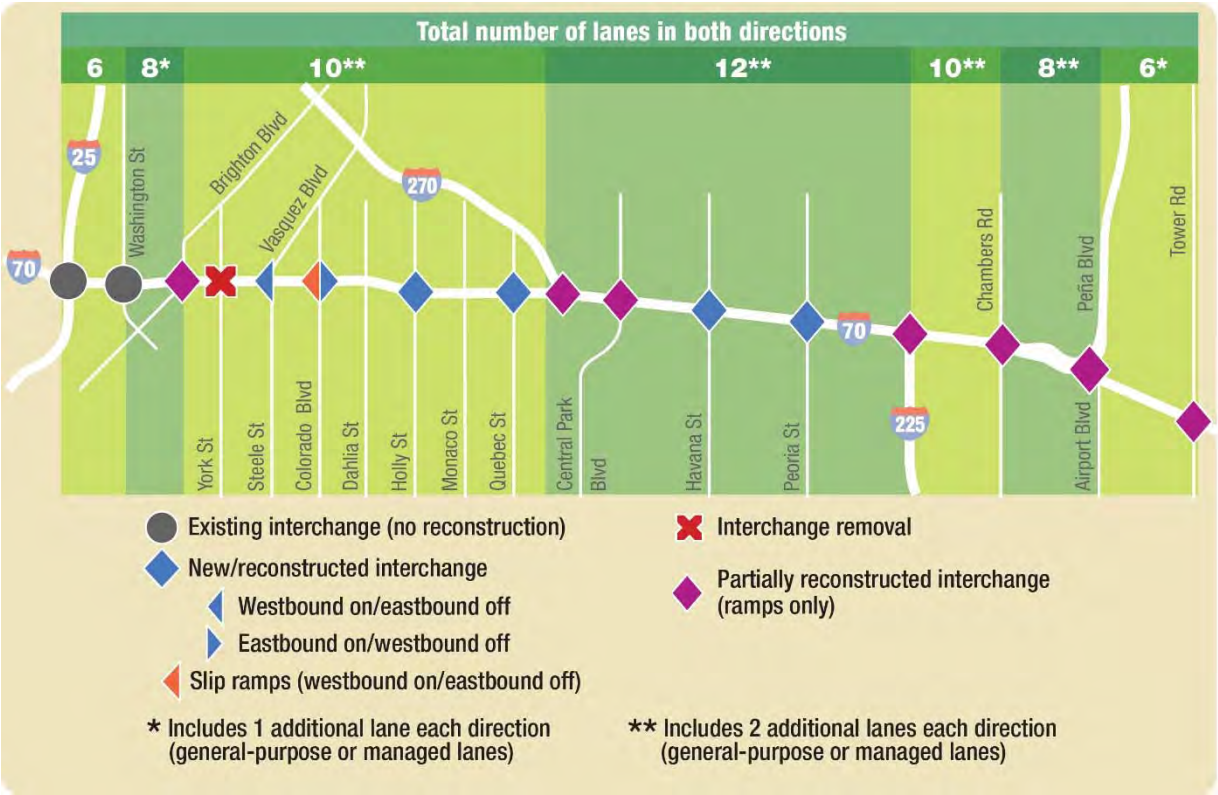
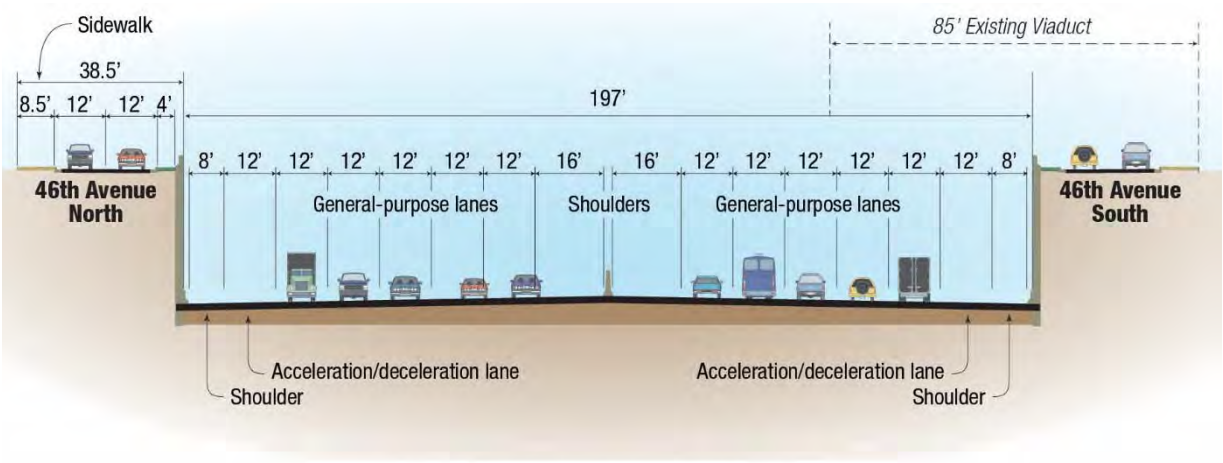


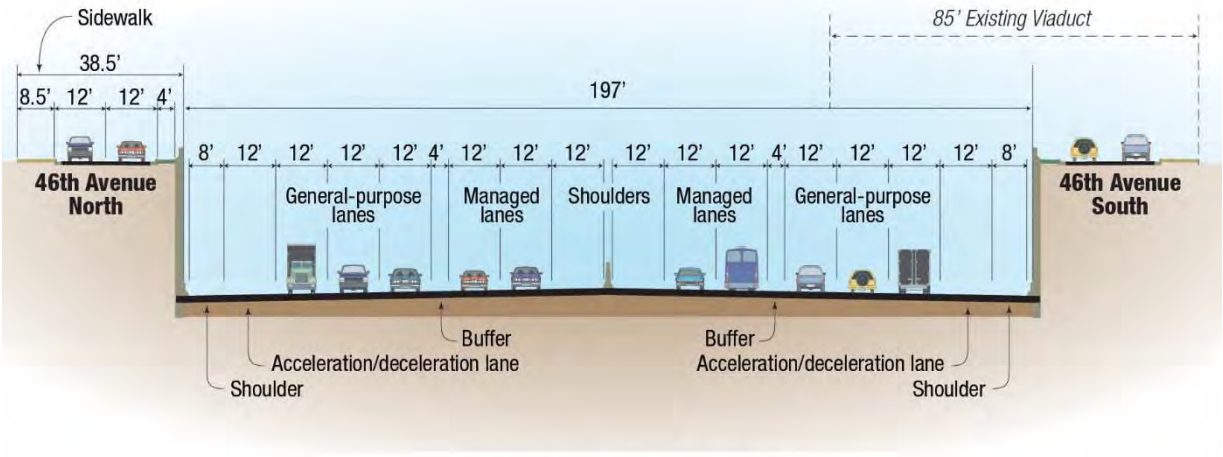
Exhibit 3-10 shows a typical section for the General-Purpose Lanes Option and Managed Lanes Option for the Partial Cover Lowered Alternative between Brighton Boulevard and Colorado Boulevard. The typical sections shown in these exhibits do not represent the configuration in the covered area of the highway.

The Partial Cover Lowered Alternative continues to provide north-south connectivity at York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, and Steele Street/Vasquez Boulevard. It also provides additional north-south connectivity over I-70 at Cook Street and Monroe Street over the lowered, reconstructed highway as shown in **Exhibit 4-23** in Chapter 4, Transportation Impacts and Mitigation Measures.

Exhibit 3-10 Partial Cover Lowered Alternative Typical Section (between Brighton Boulevard and Colorado Boulevard)



General-Purpose Lanes Option



Managed Lanes Option

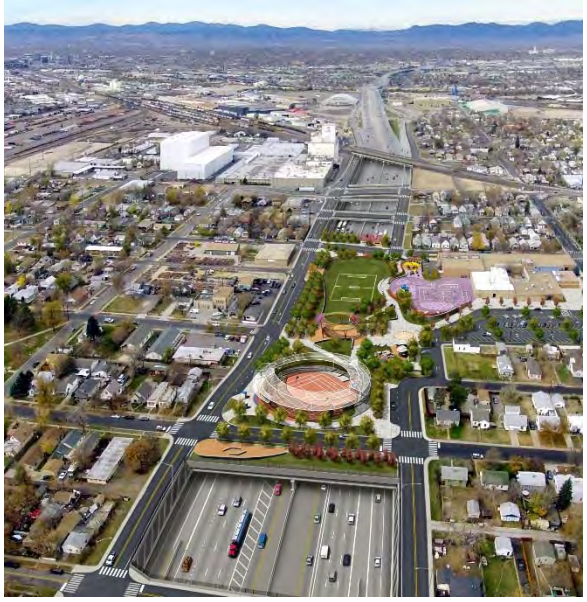
46th Avenue is no longer located underneath I-70, but is a one-way couplet between Brighton Boulevard and Josephine Street and between Milwaukee Street and Colorado Boulevard, with eastbound travel on the south side of I-70 and westbound travel on the north side of I-70. Between Josephine Street and Milwaukee Street, 46th Avenue has two-way operations on both sides of I-70.

Additionally, on the north side of I-70, 46th Avenue will be discontinued between Clayton Street and Columbine Street to allow for a seamless connection between the school and the cover facility. This alternative eliminates the portion of

Elizabeth Street north of 46th Avenue and south of 47th Avenue. All other north-south streets within this area end at either eastbound or westbound 46th Avenue.

As part of the Partial Cover Lowered Alternative, the existing UPRR bridge structure that currently passes under the existing viaduct and over 46th Avenue will be reconstructed to allow both I-70 and 46th Avenue to cross below the UPRR. For the BNSF Market Lead railroad, a new bridge crossing over I-70 and at-grade crossings at 46th Avenue will be provided.

46th Avenue extends across Colorado Boulevard and connects with the existing one-way couplet of Stapleton Drive North and Stapleton Drive South. These streets are extended to the east and connect to the Quebec Street ramps to allow for connectivity between Colorado Boulevard and Quebec Street.



Bird's-eye view simulation of Partial Cover Lowered Alternative looking west from above Fillmore Street. Note: Preliminary design, will be revised during the public input process. (Note: Preliminary design, will be revised during the public input process.)

Lowering I-70 requires capturing offsite surface runoff that currently flows south to north. The offsite drainage system included in this alternative is designed to prevent the lowered section of I-70 from flooding. This storm drain system will be conveyed south of I-70 through Globeville Landing Park and discharge to the South Platte River. Additionally, an onsite drainage system is designed north of I-70 to capture runoff from the highway. The alignment for this drainage system is shown in Section 5.14, Floodplains and Drainage/Hydrology.

Denver is in the planning stages of their Two Basin Drainage Project which will provide redundant drainage capacity in the project area. Depending on the timing of Denver's construction of the Two Basin Drainage Project it could allow for the outflow of I-70 East Offsite system to be modified, eliminating the need to construct the offsite system through Globeville Landing Park and reducing I-70 East impacts for the Partial Cover Lowered Alternative.

The Partial Cover Lowered Alternative east of Colorado Boulevard includes the improvements discussed earlier.

Highway Cover (Partial Cover Lowered Alternative only)

The Partial Cover Lowered Alternative provides a cover over the highway, located generally between Clayton Street and Columbine Street in the proximity of Swansea Elementary School. The length of the cover is designed to be less than 1,000 feet due to fire and safety restrictions. A preliminary design for the highway cover is shown on **Exhibit 3-11**.

Exhibit 3-11 Partial Cover Lowered Alternative Preliminary Cover Design

Note: Preliminary design, will be revised during the public input process

The cover is intended to be a shared, active space between the surrounding community and Swansea Elementary School. Maintaining the status of the school as a community center in the neighborhood, it is important to provide an active and safe space on the highway cover. The communal design of the highway cover will have a direct impact on the perception of safety and can influence an individual's willingness to use the space. Designing for safety includes meeting the needs of its users, providing diverse and interesting features, and connecting people with place.

The FHWA Livability and Sustainability principles were utilized on this project during the development of the Partial Cover Lowered Alternative and the design of the cover.

Incorporation of the highway cover will reconnect the surrounding areas and provide easy and safe connections between these communities for all users, especially pedestrians and bicyclists. The inclusion of the highway cover helps achieve some broader community goals of livability, quality schools, and safe streets, along with supporting the existing communities along the corridor.

In addition, the highway cover reduces noise impacts in adjacent areas. The cover also will directly contribute to improved air quality, resulting in PM_{10} concentrations that are lower at Swansea Elementary School than future conditions without the cover (No-Action Alternative) and indirectly by encouraging more walking and bicycling for short trips to local destinations. Please see Chapter 5, Affected Environment, Environmental Consequences, and Mitigation, for more information.

As part of the Partial Cover Lowered Alternative, Elizabeth Street between 46th Avenue and 47th Avenue will be closed to accommodate the proposed redesign of the Swansea Elementary School site to use adjacent parcels.

The landscaped highway cover also supports social connections in the Elyria and Swansea Neighborhood by creating a place where residents and visitors can gather and interact. Based on community input and area needs, the amenities and design in these spaces—such as playgrounds or sports fields (to be determined by the community)—will encourage users to stay and interact. Additional information about the cover planning efforts is available in Attachment P, *Cover Planning*.

Maintenance of the features and landscaping on the cover has not been determined at this time. CDOT is working with Denver and Denver Public Schools to develop agreements for shared use on the cover and long-term operations and maintenance of the cover. These agreements will be finalized before construction begins.

Highway cover

The cover is intended to be a shared, active space between the surrounding community and Swansea Elementary School. CDOT has worked with the community and the school to identify what works best for the space.

Negotiations are ongoing between Denver and Denver Public Schools to determine the boundaries of the school playground (school use only areas) and the potential use of the shared space (shared school and community use) on the highway cover.

3.2 What is the capital cost and maintenance cost of the project alternatives?

Capital cost estimates for the proposed alternatives are based on conceptual design engineering and are complete project costs, including design, construction management, construction engineering, indirect costs, and construction costs. The construction costs include earthwork, utility relocation, roadway and structure construction, and right of way. **Exhibit 3-12** summarizes the preliminary capital cost estimates for the project alternatives.

Exhibit 3-12 Project Alternatives Capital Cost Summary

Alternatives/Options	Capital Cost, I-25 to Tower Road (in millions of 2016 dollars)	
	General-Purpose Lanes Option	Managed Lanes Option
No-Action Alternative, North Option	$510	N/A
No-Action Alternative, South Option	$600	N/A
Revised Viaduct Alternative, North Option	$1,330	$1,450
Revised Viaduct Alternative, South Option	$1,450	$1,570
Partial Cover Lowered Alternative	$1,580	$1,700

The maintenance costs were estimated for each alternative using an annual unit cost for bridge, retaining walls, and pavement. For the Partial Cover Lowered Alternative, additional costs for the cover associated with the potential urban landscape, ventilation, fire, and life safety features were included. The annual anticipated maintenance costs for the project's alternatives are listed in **Exhibit 3-13**.

Maintenance cost

The maintenance cost is the ongoing cost to keep the facility in good condition and operational.

For the Managed Lanes Option, the total costs for the operations and maintenance of the managed lanes are estimated to be approximately $1.7 million a year in addition to the costs listed in **Exhibit 3-13**. This cost includes equipment replacement, CDOT/HPTE staff, and back office support associated with the toll collection.

Exhibit 3-13 Project Alternatives Maintenance Cost Summary

Alternatives/Options	Annual Maintenance Cost (in millions of 2016 dollars per year)
No-Action Alternative	$9.3
Revised Viaduct Alternative	$16.0
Partial Cover Lowered Alternative	$11.3

3.3 Which alternative has been identified as the Preferred Alternative and why?

FHWA and CDOT have identified the Partial Cover Lowered Alternative with Managed Lanes Option as the Preferred Alternative for the I-70 East project. This alternative and associated option is identified as the Preferred Alternative because it meets the project purpose and need, addresses community and stakeholder concerns in the most comprehensive manner, has the most community and agency support as compared to the other alternatives under consideration, and—with the proposed mitigations—causes the least overall impact.

3.3.1 Factors involved in the decision

Many factors were considered in identifying the Preferred Alternative. The deciding factors are listed below and are described in the following subsections.

- Support from the community
- Environmental justice mitigation measures
- Neighborhood cohesion
- Support from local officials
- Swansea Elementary School location
- Visual and aesthetic qualities
- Drainage

Support from the community

The project team used an extensive public involvement approach leading up to and following the release of the 2008 Draft EIS and the 2014 Supplemental Draft EIS. Throughout the many opportunities to provide input, the majority of the public who are directly impacted by the project and live within the project area have consistently expressed a preference for the Partial Cover Lowered Alternative. For additional information regarding the project's extensive community involvement see Chapter 10, Community Outreach and Agency Involvement.

Environmental justice mitigation measures

All evaluated alternatives include environmental justice mitigation measures. However, the Partial Cover Lowered Alternative includes additional mitigation measures to alleviate the highway impacts to the low-income and minority populations living in the project area.

The Preferred Alternative will include a highway cover with urban landscaping adjacent to Swansea Elementary School. The cover was developed as mitigation to reconnect the communities that were divided by the viaduct. The school property will be redesigned to reconstruct the school playground in a configuration to utilize the additional space from the cover and the closed Elizabeth Street.

The mitigation measures and benefits unique to the Partial Cover Lowered Alternative are:

- Greatest visual benefit, by removing the viaduct's visual barrier between Brighton Boulevard and Colorado Boulevard
- Minimizing the presence of the highway in this area since it is below grade and is covered
- Reducing highway noise and air quality impacts to the school and adjacent properties by placing a cover over the highway
- Construct a cover over the highway to mitigate community impacts and design an urban area on top of the highway cover adjacent to Swansea Elementary School. This will provide for greater community cohesion than other alternatives
- Provide two million dollars to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs.

Neighborhood cohesion

All evaluated alternatives will maintain connectivity in the project area with minor modifications. The Partial Cover Lowered Alternative also maintains the existing local north-south street network and it provides a greater sense of neighborhood cohesion by removing the dominant visual barrier created by the highway structure in this neighborhood. The cover connects the Elyria and Swansea Neighborhood back together.

Support from local officials

A letter supporting the Partial Cover Lowered Alternative was received on June 6, 2013, from Commissioner Eva Henry of Adams County, Mayor Michael Hancock of Denver, and Mayor Sean Ford of Commerce City. Their preference for this alternative is based on improved pedestrian connections and facilities assimilated with the highway cover, as well as overall improvement to north-south and east-west movement in the corridor. A proclamation also was signed by all of the Denver City Council members in support of the Partial Cover Lowered Alternative on April 7, 2014. Additionally, Mayor Michael Hancock submitted a letter after publication of the Supplemental Draft EIS reiterating Denver's support of the Partial Cover Lowered Alternative.

Swansea Elementary School location

The Swansea Elementary School has been identified as an important and valuable resource in the Elyria and Swansea Neighborhood. The Partial Cover Lowered Alternative provides the best solution compared to the other alternatives to keep the school in the neighborhood at its current location. The Partial Cover Lowered Alternative also redesigns and expands the school grounds and provides upgrades to the school building.

Visual and aesthetic qualities

The Partial Cover Lowered Alternative includes noise walls or safety barriers of 10 feet to 20 feet in height, which will provide an opportunity for inclusion of meaningful artwork in the neighborhood. Noise walls or safety barriers will not be required in the area where the cover is located, providing a clear north/south view across the highway. The dominating visual presence of the highway will greatly decrease with this alternative.

Drainage

With the Partial Cover Lowered Alternative, an extensive drainage system is required on the north and south sides of I-70. Although the Revised Viaduct Alternative also improves the drainage system, the Partial Cover Lowered Alternative greatly improves drainage in the surrounding neighborhoods. The drainage system south of I-70 with the Partial Cover Lowered Alternative will capture the water flow and eliminate water from running into the proposed

below-grade highway, while also alleviating flooding in the neighborhood north of it.

3.3.2 Why is the Managed Lanes Option identified as part of the Preferred Alternative?

The Managed Lanes Option is identified as the Operational Option of the Preferred Alternative because of its long-term operational flexibility and mobility. Managed lanes provide drivers with flexibility by allowing them to pay a fee to bypass congestion on general-purpose lanes. This can improve reliability in travel times. It also allows CDOT to manage congestion over the long term, thereby reducing the need for future expansion. The Managed Lanes Option also has a higher through-put potential in terms of accommodating more people at a given time. This option accommodates express buses, vanpools, and other high-occupancy vehicles and, therefore, it can provide increased service to those riders. This option also promotes the use of carpools to avoid congestion.

3.4 What happened to the design variations that were introduced in the Supplemental Draft EIS?

Design variations were considered for the preliminarily identified Preferred Alternative, the Partial Cover Lowered Alternative. They were not fully evaluated in the Supplemental Draft EIS, but CDOT and FHWA continued to seek feedback from the community, stakeholders, and public agencies on these variations.

The variations that were considered relate to the following elements:

- Access to I-70 at Steele Street/Vasquez Boulevard
- Highway cover
- Frontage roads
- North-south connectivity

These variations were developed to respond to community concerns and to balance community, business, and transportation needs.

Design variations

Design variations are possible changes to the original design of a transportation facility element that do not pose major additional impacts to the environment and stay within the project's construction limits.

The following goals helped to develop these variations:

- Maintain the Steele Street/Vasquez Boulevard access to I-70 as an important local and regional access point for businesses needing access to the interstate for commerce
- Maximize north-south and east-west connectivity across and adjacent to I-70 for all modes of transportation
- Minimize the impact of the Steele Street/Vasquez Boulevard interchange on adjoining properties and the neighborhoods
- Consider traffic operations, including access to potentially developable properties in and around the highway interchanges
- Explore the expansion of the Swansea cover to the east and west as far as technically and financially feasible; and understand the technical and financial feasibility of a cover east of Steele Street/Vasquez Boulevard
- Consider the possibility of shifting connectivity from Monroe Street to Jackson Street

These variations do not substantially change the impacts to most resources and do not increase the project's construction limits. Traffic, noise, and air quality analysis may change slightly if these variations are implemented.

Further analysis of these variations was conducted after publication of the Supplemental Draft EIS and were eliminated or moved forward as part of the Partial Cover Lowered Alternative, as discussed in the following subsections.

3.4.1 Access to I-70 at Steele Street/Vasquez Boulevard

Recognizing that a full closure of the interchange at Steele Street/Vasquez Boulevard presented significant concerns to Commerce City, Adams County, the Colorado Motor Carriers Association, and the business community at large, access to I-70 at Steele Street/Vasquez Boulevard is included as part of the Partial Cover Lowered Alternative, as discussed in this document.

The design variations for this interchange included a split diamond configuration with Colorado Boulevard that incorporates roundabouts or a signalized intersection at the ramp junction, as well as differences in ramp and frontage road locations and connections. After publication of the Supplemental Draft EIS, the project team analyzed and evaluated these variations.

The analysis considered both one-way and two-way frontage roads between Steele Street/Vasquez Boulevard and Colorado Boulevard. Based on the analysis, the roundabout variation did not perform as well as the signalized intersection. The roundabout resulted in excessive queuing and a potential to create a gridlock in the surrounding roadway network while the signalized intersection minimizes such issues. As a result of this analysis and due to additional opportunities to improve the design with the signalized intersection, the roundabout variation was eliminated from further consideration. Based on the additional analysis, a split diamond interchange with slip ramps was designed to fulfill the traffic needs at Colorado Boulevard, while maintaining access at Steele Street/ Vasquez Boulevard.

The analysis also identified the need to have one-way frontage roads between Steele Street/Vasquez Boulevard and Colorado Boulevard to improve operations and allow for maximum flexibility in the future design of the interchanges and frontage road system during the next phases of the project.

3.4.2 Highway cover

Variations to the highway cover in front of Swansea Elementary School included differences in the length of the cover. The cover can be substantially extended eastward to Fillmore Street, or minimally extended beyond Clayton Street and Columbine Street.

To minimize requirements related to fire, ventilation, and life safety, the cover's length is designed to be less than 1,000 feet. Additional cover length is proposed both easterly from the edge of Columbine Street and westerly from the edge of Clayton Street, but not to exceed 1,000 feet. This space is intended to serve as a transition area that would decrease noise levels from the highway in the cover area and

Second cover

To accommodate Denver's interest in constructing a second cover in the future, the Partial Cover Lowered Alternative includes an overall approach to design and construction that would not preclude the construction of a second cover over the highway from west of the Steele Street/Vasquez Boulevard highway crossing to east of Cook Street.

This second cover is not included as a part of the alternative.

at the school. It also allows for the inclusion of certain aesthetic treatments.

Although a second cover is not included as part of the Preferred Alternative, the design of the highway does not preclude construction of a second cover at a later date.

3.4.3 Frontage roads

Several different frontage road systems were evaluated between Brighton Boulevard and Quebec Street on both sides of I-70, including two-way frontage roads for the entire length, a combination of one-way and two-way roads, and one-way the entire length.

In an effort to maximize local connectivity, the analysis indicated the best option was to use a combination of one-way and two-way frontage roads. The final solution was to have one-way frontage roads between Brighton Boulevard and Josephine Street, two-way between Josephine Street and Milwaukee Street, and one-way between Milwaukee Street and Quebec Street.

Further analysis indicated the potential to improve safety around Swansea Elementary School and to promote better accessibility to the cover would be achieved through the elimination of the frontage road between Columbine Street and Clayton Street on the north side of I-70.

3.4.4 North-south connectivity

Design variations included additional connections across the highway for all transportation modes, including vehicles, bicycles, and pedestrians. Design variations for north-south crossings included a new multimodal crossing at Fillmore Street, and moving the Monroe Street crossing to Jackson Street.

The following north/south connections from Brighton Boulevard to Quebec Street are included, maintained, modified, or eliminated based on the analysis and continued coordination:

- Brighton Boulevard: vehicular connection under I-70 remains
- York Street: vehicular connection across I-70 is maintained as a one-way street

- Josephine Street: vehicular connection across I-70 is maintained as a one-way street
- Columbine Street: vehicular connection across I-70 is maintained as a two-way street
- Elizabeth Street: direct vehicular connection south of I-70 does not currently exist; Elizabeth Street between 47th Avenue and 46th Avenue North will be vacated to accommodate the school improvements
- Thompson Court: vehicular connection to 46th Avenue is maintained; access across I-70 does not currently exist
- Clayton Street: vehicular connection across I-70 is maintained as a two-way street
- Fillmore Street: vehicular connection across I-70 is added as a two-way street
- Milwaukee Street: vehicular connection to 46th Avenue is maintained; access across I-70 does not currently exist
- Steele Street/Vasquez Boulevard: vehicular connection across I-70 is maintained as a two-way street
- Cook Street: two-way vehicular connection across I-70 is added
- Madison Street: vehicular connection to 46th Avenue South is maintained; access to 46th Avenue must be made via the new Monroe Street connection one block east; access across I-70 does not currently exist
- Monroe Street: two-way vehicular connection across I-70 is added; new roadway is extended north and south to replace the eliminated Garfield Street connection
- Garfield Street: connection across I-70 is eliminated and replaced by the new Monroe Street connection
- Colorado Boulevard: vehicular connection over I-70 remains
- Dahlia Street: vehicular connection under I-70 remains
- Holly Street: vehicular connection under I-70 remains
- Monaco Street: vehicular connection under I-70 remains
- Quebec Street: vehicular connection under I-70 remains

3.5 How were the initial alternatives developed and what did they include?

Alternatives were developed based on input from the community at corridor-wide meetings in December 2003 and February 2004 and through involvement with impacted agencies at scoping and committee meetings in late 2003 and early 2004. Alternatives also were obtained from previous studies and new concepts were developed by the project team.

Nearly 90 different transportation elements were evaluated during the screening process. Alternative elements were initially developed within categories: alignments, interchanges, lane types, and local system improvements. Later on in the evaluation process, these elements were combined to form corridor alternatives. Alternative elements are listed by category in the following subsections.

3.5.1 Alignments

Alignments include improvements to the existing I-70 and possible relocation of the highway. In addition, different horizontal and vertical shifts and cross sections were considered.

- Existing I-70 vertical and/or horizontal alignment
- Lower I-70 below existing ground
- Add a level to the viaduct
- Enclose I-70
- Put I-70 at-grade
- Triple level section of I-70 (below ground)
- I-70 tunnel
- I-70 above and below with 46th Avenue at ground level
- Improve I-270 and reclassify I-70
- Realign the I-70 westbound lanes north
- Realign the I-70 eastbound lanes to Smith Road
- Move I-70 to the north of Elyria and Swansea neighborhood

3.5.2 Interchanges

During the development and screening of alternatives, consideration was given to adding new interchanges. Locations for providing new access to I-70 and other interchange modifications that were considered include:

- Picadilly Road (new interchange)
- Central Park Boulevard (new interchange)
- Additional access to Globeville area
- I-270/Quebec Street improvements
- Eliminate or combine accesses/existing interchanges

Improvements or other changes to existing interchanges and interchange ramps may be required for many different reasons, including geometric deficiencies, safety concerns, and excessive traffic volumes. In addition, access needs, I-70 operations, or other considerations may call for other access or interchange modifications.

3.5.3 Lane types

Lane types are defined by the use allowed in the lane; they range from general-purpose lanes—where anyone can use the lane—to special-purpose lanes—where only certain users (e.g., buses, high-occupancy vehicles [HOV], toll payers, or special trips) would be allowed. The following lane types were considered:

- Dedicated lane for commuters, for DIA travelers, for buses, or for trucks
- Reversible expressway lane
- HOV lane
- Toll lane or high occupancy toll lanes
- General-purpose lane
- Connector-distributor (CD) roads
- Emergency lane
- Frontage roads
- Auxiliary lanes
- Truck-only ramps at Steele Street/Vasquez Boulevard
- Braided ramps
- Dual-divided highway

3.5.4 Local system improvements

Local system improvements would serve as an alternate to improving I-70 and would divert trips from I-70, thereby reducing the need for additional capacity on the highway. Local system improvements in the study area include:

- Connect I-76 to DIA
- Improve 56th Avenue, Smith Road, and/or 6th Avenue
- Improve intersections where the railroad crosses
- Extend Smith Road
- Connect tolling options to E-470
- Remove through trucks from I-70
- At-grade crossings
- Outer loop
- Improve I-270

3.5.5 Transportation demand management/transportation system management strategies

Transportation demand management/transportation system management (TDM/TSM) strategies are programs designed to reduce travel demand and improve the use of the current transportation system, while reducing the need for major capital investment. TDM strategies would address traffic congestion by reducing travel demand rather than increasing transportation capacity. TSM strategies would help improve traffic flow on the existing transportation system. TDM/TSM strategies include:

- Improved pedestrian and bicycle facilities
- Enhanced bus service
- Ride sharing
- Vary business work schedules (flex time)
- Intelligent Transportation Systems (ITS)
- Freight transport management
- Road pricing/congestion pricing

TDM/TSM strategies were not evaluated as stand-alone alternatives since they do not individually address the project purpose and need, but could be combined with other alternatives as necessary to improve overall operations. TDM/TSM strategies represent operating policies applicable to any highway alternative to better address project goals and objectives.

3.6 What are the project's goals and objectives?

The results of the public and agency scoping process helped define the corridor purpose and need, as well as the values expressed by residents and employees within the corridor. These values, plus the project purpose and need, then were used to create the goals and objectives shown in **Exhibit 3-14**.

These goals and objectives were discussed at project committee meetings and corridor-wide public meetings to incorporate public and agency comments and ensure that the project area concerns were factors in determining the alternatives evaluated in detail. Relative to the needs identified in Chapter 2, Purpose and Need, and in combination with public and agency scoping comments, nine major goals were established: access, capacity, community, environment, implementation, infrastructure, mobility, safety, and security.

Exhibit 3-14 Project Goals and Objectives

Goal	Objective	Responsive to[1]
Access *Provide for reasonable access to transportation facilities*	• Balance the need for access with adverse effects on system performance. • Provide access to transportation facilities for a variety of users. • Facilitate connections between residential and business activity centers.	Increased transportation demand
Capacity *Provide for realistic capacity expansion and minimize future congestion*	• Provide sufficient transportation system capacity to ensure the efficient movement of people. • Provide sufficient transportation system capacity to ensure the efficient movement of goods. • Minimize transportation system delay.	Limited transportation capacity
Community *Support community plans and avoid, minimize, and mitigate adverse effects to neighborhoods*	• Maximize consistency with existing local, regional, and state plans. • Minimize adverse effects to residential, business, and institutional properties. • Minimize adverse economic effects to local businesses. • Minimize adverse effects to community cohesiveness. • Address transportation-related community effects associated with air quality, water quality, hazardous materials, and noise.	Values: community concerns that may offset defined transportation needs
Environment *Avoid, minimize, and mitigate adverse effects to the natural, social, and cultural environment*	• Minimize adverse effects to historic resources. • Ensure consistency with regional air quality model to help achieve federal and state air quality standards. • Minimize adverse effects on minority and low-income populations. • Minimize adverse effects to wetlands and other waters of the U.S. • Minimize adverse effects to recreational and open space resources. • Minimize public exposure to highway noise. • Minimize adverse effects associated with hazardous materials. • Incorporate design standards that minimize visual effects and enhance aesthetics.	Values: community concerns that may offset defined transportation needs
Implementation *Provide a cost-effective transportation solution that can be implemented*	• Provide a cost-effective, long-term transportation solution. • Provide flexibility for future expansion and modification. • Provide technologies that are practical and implementable. • Maximize the opportunity that federal, state, local, and/or private funding will be available to fund improvements.	Limited transportation capacity
Infrastructure *Address deteriorating transportation infrastructure*	• Address problems with maintenance and structural deficiencies on the I- 70 viaduct and other structures. • Provide a transportation solution that addresses drainage and flooding effects.	Transportation infrastructure deficiencies
Mobility *Enhance mobility by providing transportation choices*	• Enhance system reliability. • Balance the transportation needs of local, regional, and national users.	Increased transportation demand
Safety *Address safety needs and upgrade facilities to current standards*	• Optimize safety and minimize crashes. • Conform with engineering design and safety standards and with standard practices for construction, maintenance, and operations. • Provide access for emergency response and evacuation situations.	Safety concerns
Security *Provide a secure transportation system*	• Minimize potential security threats to the National Interstate System. • Develop and maintain a transportation system that supports national homeland security objectives.	Safety concerns

1. Refers to project needs defined in Chapter 2, Purpose and Need

3.7 What was the screening process that developed the alternatives evaluated in the Draft EIS?

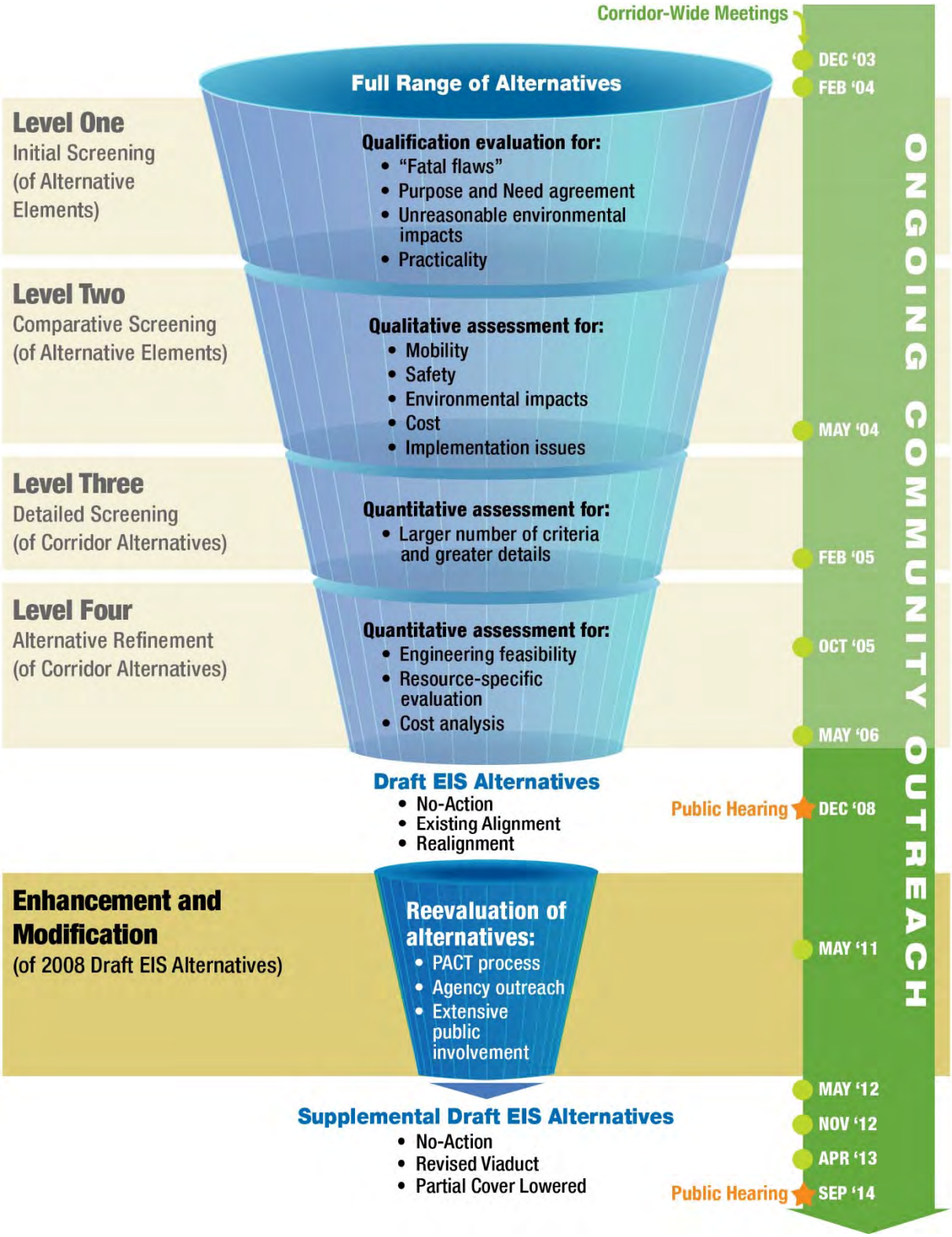
The project purpose, need, goals, and objectives were used to develop screening criteria to evaluate alternatives. A four-level screening process, shown in **Exhibit 3-15**, was used to screen down the full range of potential alternatives considered to the set of reasonable alternatives that received full evaluation in the 2008 Draft EIS, as listed below:

- No-Action
- Alternative 1—Existing Alignment with general-purpose lanes
- Alternative 3—Existing Alignment with tolled-express lanes
- Alternative 4—Realignment with general-purpose lanes
- Alternative 6—Realignment with tolled-express lanes

Alternatives were evaluated with increasing levels of detailed analysis at each screening level: initial screening, comparative screening, detailed screening, and alternative refinement. This process included extensive public and agency scrutiny through corridor-wide meetings, project committees, and community working groups, as described in Chapter 10, Community Outreach and Agency Involvement.

The following subsections briefly describe the screening process. For more detail on the screening process, refer to the *Alternative Analysis Technical Report* in the 2008 Draft EIS and the 2014 Supplemental Draft EIS.

Exhibit 3-15 Alternative Screening Process through the Supplemental Draft EIS



3.7.1 Initial screening (Level One)

Alignments, interchanges, lane types, and local system improvements were evaluated as independent elements during initial and comparative screening. The first level of evaluation, initial screening, eliminated unreasonable alignments and local system improvements that did not meet the project's purpose and need; would result in adverse environmental and community effects; were not located in the project area; or would not provide the necessary access, capacity, safety, or mobility benefits. A series of yes or no questions based on the project purpose, need, goals, and objectives were used to evaluate alternative elements during initial screening.

3.7.2 Comparative screening (Level Two)

The second level of analysis, comparative screening, evaluated the alignments, lane types, and local system improvements that were not eliminated during initial screening. The evaluation was conducted within the same alternative categories using a qualitative approach to decide which elements were more effective at meeting the purpose, need, goals, and objectives. No further refinements or screening of interchange forms were conducted in comparative screening.

During initial and comparative screening, a substantial number of the alternative elements were eliminated from further consideration because they represented unreasonable alternatives that would not adequately address purpose, need, goals, and objectives.

3.7.3 Detailed screening (Level Three)

As a result of the first two screening levels, the remaining alternative elements were combined to form six corridor alternatives that included different alignments, interchanges, and lane types. In addition to these build alternatives, the No-Action Alternative was developed as well. Six alternatives were evaluated in detailed screening using quantitative analysis. These alternatives include:

- Alternative 1—Add general-purpose lanes on the existing alignment
- Alternative 2—Add HOV lanes on the existing alignment

- Alternative 3—Add tolled express lanes on the existing alignment
- Alternative 4—Realignment with general-purpose lanes
- Alternative 5—Realignment with HOV lanes
- Alternative 6—Realignment with toll lanes

While the detailed screening analysis only led to the elimination of two total alternatives (Alternative 2 and Alternative 5), it also resulted in recommendations to refine or eliminate several components of alternatives and several of the alignment options when compared to other alternative components or alignment options. These refinements included changes in laneage, tolling, realignment location, and 46th Avenue reconfiguration.

3.7.4 Alternative refinement (Level Four)

Alternatives that remained following detailed screening were developed in more detail and were further analyzed as part of alternative refinement. The evaluation was more in depth than the detailed screening analysis and was used to determine the alternatives most responsive to the project purpose, need, goals, and objectives. This fourth level of screening considered engineering feasibility; potential effects on social, environmental, and economic resources; and an analysis of capital, operation, and maintenance costs. The four alternatives with design options included:

- Alternative 1—Add general-purpose lanes on the existing alignment
- Alternative 3—Add tolled express (managed) lanes on the existing alignment
- Alternative 4—Realignment with general-purpose lanes
- Alternative 6—Realignment with tolled express (managed) lanes

Design options for Alternatives 1 and 3 included one or two general-purpose lanes in each direction between I-25 and I-225, below grade or existing grade between Brighton Boulevard and Colorado Boulevard, and shifting the alignment to the north or to the south between Brighton Boulevard and I-270.

Design options for Alternatives 4 and 6 included an eastern or western connection back to existing I-70 near Brighton Boulevard.

The process of alternative refinement included analysis that resulted in additional alternative options being eliminated because they did not meet the project purpose, need, goals and objectives, or because they were considered unreasonable in comparison to other alternatives. Two of these design options that were eliminated included adding one general-purpose lane in each direction and the below-grade design option between Brighton Boulevard and Colorado Boulevard.

3.8 How were alternatives modified after the Draft EIS and what alternatives were evaluated in the Supplemental Draft EIS?

CDOT and FHWA released the Draft EIS for public review in November 2008. During the public hearings for the 2008 Draft EIS, CDOT committed to select a preferred alternative during the next phases of the EIS process in partnership with the corridor communities and stakeholders.

After the comment period for the 2008 Draft EIS ended, none of the evaluated alternatives had received overwhelming support. This prompted CDOT and FHWA to undertake a more aggressive public involvement process to better identify the needs of the local communities.

A collaborative process involving the public, businesses, and agency stakeholders was initiated. Many one-on-one meetings with the impacted community members and elected officials were included in this collaborative process. CDOT and FHWA revisited and re-examined the 2008 Draft EIS analysis to modify and enhance the alternatives while addressing public comments and continuing to meet the project's purpose and need. **Exhibit 3-15** also shows how this enhancement and modification process relates to the overall development and screening of alternatives.

3.8.1 Enhancement and modification process

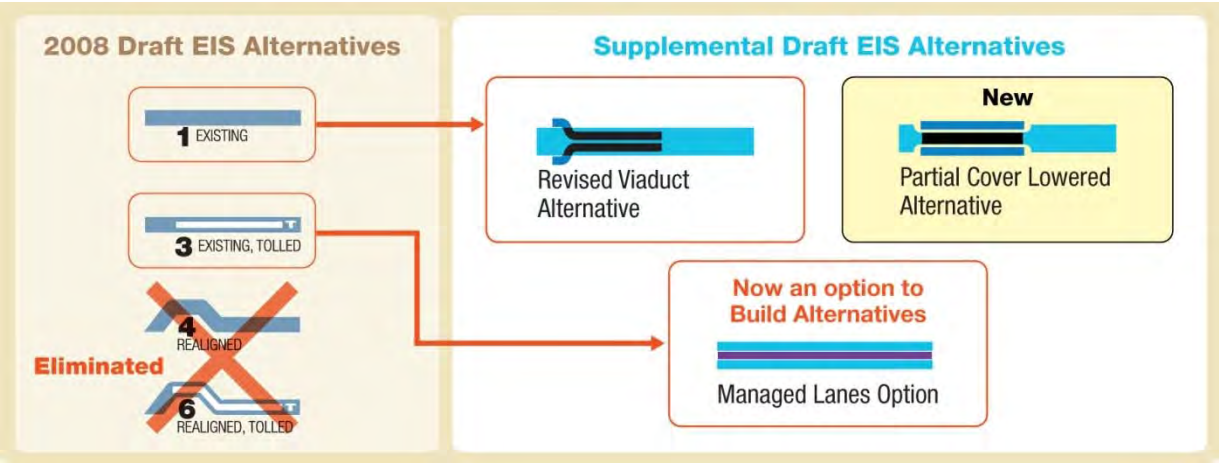
The alternatives enhancement and modification process started when the 2008 Draft EIS received more than 300 comments from the public and affected agencies. As a part of

this process, the PACT was formed, which included representatives from CDOT, FHWA, Adams County, Aurora, Commerce City, Denver, impacted communities, and business associations. More details about the PACT process and outcomes are discussed in Chapter 10, Community Outreach and Agency Involvement.

Because there was no strong support for any of the alternatives evaluated in the 2008 Draft EIS, the project team reviewed the alternatives in more detail. As a result of this review, the 2008 Draft EIS alternatives were modified to create the Supplemental Draft EIS alternatives. Additionally, a new alternative was developed to meet the project's purpose, need, goals, and objectives while also addressing the public and agency comments and expectations.

Based on the 2008 Draft EIS public comments, the PACT process, and additional outreach, numerous changes were made to the alternatives. The Existing Alignment Alternatives (Alternatives 1 and 3) were revised to reduce impacts, the Realignment Alternatives (Alternatives 4 and 6) were eliminated from further consideration, and a new alternative (the Partial Cover Lowered Alternative) was introduced. During this process, the name of the Existing Alignment Alternative was changed to the Revised Viaduct Alternative for clarity. **Exhibit 3-16** shows the changes to the alternatives from the 2008 Draft EIS to the Supplemental Draft EIS.

Exhibit 3-16 Alternative Modification from the 2008 Draft EIS to the Supplemental Draft EIS



3.8.2 Supplemental Draft EIS alternatives

In addition to the No-Action Alternative, two Build Alternatives with options were evaluated in the Supplemental Draft EIS.

Revised Viaduct Alternative

- **Expansion Options:** North or South
- **Operational Options:** General-Purpose Lanes or Managed Lanes

Partial Cover Lowered Alternative

- **Connectivity Options:** Basic or Modified
- **Operational Options:** General-Purpose Lanes or Managed Lanes

These alternatives, with the exception of the Connectivity Options evaluated for the Partial Cover Lowered Alternative, also are evaluated in this document.

3.9 What alternatives off of the existing alignment were considered and why were they eliminated?

The I-70 East project team initially considered multiple alternatives off of the existing alignment to minimize impact to the Elyria and Swansea Neighborhood. However, after evaluating these alternatives in detail, they were found not to be reasonable. The I-270/I-76 Reroute Alternative and the Realignment Alternative, which are the two main alternatives off of the existing alignment, and the reasons why they were eliminated are discussed in more detail in the following subsections.

3.9.1 I-270/I-76 Reroute

The I-270/I-76 Reroute Alternative was eliminated in the early stages of the 2008 Draft EIS alternatives analysis process because it did not meet the project's purpose and need. The I-270/I-76 Reroute Alternative realigned I-70 around Denver using I-270 and I-76, as shown in **Exhibit 3-17**. After publication of the 2008 Draft EIS, some residents and stakeholders questioned the elimination of the I-270/ I-76 Reroute Alternative. As a result, the project team performed additional analysis on this concept to confirm the validity of its elimination from further consideration.

Exhibit 3-17 I-270/I-76 Reroute Alternative

After this additional analysis, elimination of the alternative was reaffirmed because it does not meet the project's purpose to implement a transportation solution that improves safety, access, and mobility and it does not address congestion on I-70. It is not a reasonable alternative because:

- Rerouting I-70 while leaving 46th Avenue at its current location encourages highway users needing to access these locations to use 46th Avenue to reach their destinations rather than staying on I-70. Because of this, there would be a substantial increase in traffic volumes on 46th Avenue, which introduces safety, access, and mobility issues in the surrounding neighborhoods and also creates a barrier for bicyclists and pedestrians moving through the community.
- Based on the traffic analysis, the average daily traffic on 46th Avenue with the I-270/I-76 Reroute will increase to 30,000 to 60,000 vehicles a day if 46th Avenue is a four-lane arterial and 40,000 to 75,000 vehicles a day if 46th Avenue is a six-lane arterial in 2035, resulting in congested conditions. Rerouting I-70 also would force delivery trucks and other large vehicles to use 46th Avenue frequently to reach the industrial areas and businesses located near the existing I-70.

- There would be an increase in out-of-direction travel, causing mobility issues. Of the traffic heading west on I-70, approximately 50 percent continues past I-25, staying on I-70. The Reroute Alternative adds two miles of out-of-direction travel for these vehicles. Thirty-five percent of the traffic heading west on I-70 exits to southbound I-25. This alternative adds four miles of out-of-direction travel for these vehicles, resulting in additional travel times.
- There will no longer be multiple east-west highway route choices in the area. The multiple route choices are beneficial for emergency access.
- This alternative requires more than 12 miles of major highway widening along I-270 and I-76. This increases the project construction cost to approximately $4 billion, which is twice as much as existing alignment alternatives.
- Many stakeholders, including Commerce City, Adams County, North Area Transportation Alliance, and the Colorado Motor Carriers Association, have expressed continued opposition to this alternative for a number of reasons including the impacts to National Western Stock Show Complex and planned economic growth for surrounding areas.

Appendix A of Attachment C, *Alternative Analysis Technical Report Addendum*, included in the Final EIS document, presents a technical memorandum explaining the reasons, in more detail, why the I-270/I-76 Reroute Alternative was eliminated.

3.9.2 Realignment Alternative

The 2008 Draft EIS fully analyzed the Realignment Alternatives (shown in **Exhibit 3-18**). Additional analysis was performed following the 2008 Draft EIS, during the alternatives enhancement and modification process. Using additional data and community input, the analysis ultimately concluded that the Realignment Alternatives were not reasonable. Consequently, they are not analyzed further in this document.

Exhibit 3-18 Realignment Alternatives

During the alternative enhancement and modification process, there was major support from the public and stakeholders to eliminate the Realignment Alternatives. The community comments and input resulted in additional analysis by the project team, which showed the Realignment Alternatives were not reasonable.

The main reason for the elimination of the Realignment Alternatives is that they do not meet the project's purpose and need, which is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area. Although the Realignment Alternatives improved mobility on the highway, they diverted some of the highway traffic onto local streets, introducing safety, access, and mobility issues at the local street level, and, therefore, failing to meet the mobility purpose of the project. The Realignment Alternatives diverted a high volume of vehicles from the highway to 46th Avenue, increasing the forecasted daily traffic to 50,000 vehicles per day, which is 10 to 20 times higher than the current volume. Adding more traffic on 46th Avenue will cause congestion concerns in the surrounding neighborhoods.

Safety would not be improved with the Realignment Alternatives. Delivery trucks and other large vehicles would need to use local streets frequently to reach the future highway location from the industrial and warehousing

businesses located near the existing highway. The high traffic volumes on 46th Avenue and the truck traffic could degrade the quality of the area neighborhoods and cause safety concerns for neighborhoods, pedestrians, bicyclists, and motorists.

Additional reasons these alternatives are not reasonable include:

- They do not minimize the impacts to the Sand Creek Regional Greenway or the South Platte River. The Realignment Alternatives create a permanent loss of 1.06 acres of wetlands compared to 0.31 acre for the Revised Viaduct Alternative. Because the greenway is an essential natural resource for the community, the Realignment Alternatives are not reasonable due to greater impacts to the greenway.
- They do not allow the National Western Stock Show to continue to operate in its current location with its current programs. This facility is identified as a major historic resource in the community. It has been at its current location for 106 years and its mission is to serve producers and consumers throughout the world with a premier stock show, rodeo, and horse show in January of each year.
- They do not maintain the current location/plan for the FasTracks National Western Stock Show Station on the North Metro Line and limit the potential for transit-oriented development in the area. Based on Denver's *Transit-Oriented Development Strategic Plan*, published in August 2006 and updated in 2014, this area offers a great opportunity for transit-oriented development as an urban center in the long term. While there is little immediate demand for housing or even higher density employment uses in this area, Denver has performed some preliminary planning around the station area. Denver's main focus in the area is to prevent interim development uses in the surrounding area that reduce the future transit-oriented development potential.

- They do not maintain two major east-west highways in the area (I-70 and I-270) for safety, multiple route choices, and emergency access. With the Realignment Alternatives, the redundancy of the highway network, which is important for emergency response in the area, is limited. If I-70 was realigned to combine with I-270, there would be no alternate east-west highway connecting the Denver neighborhoods to the rest of the region.
- They add visual barriers and do not maintain access to the South Platte River and the Riverside Cemetery. Riverside Cemetery is listed in the National Register of Historic Places. Although there will be no right of way needed from the Riverside Cemetery property, there would be noise, visual, and historic setting changes in the area. The construction of the realigned, elevated freeway and noise barriers would introduce a major highway facility between the cemetery and community, approximately 150 feet southeast of the cemetery property, where none currently exists. As a result, the highway would be placed on fill on either side of the bridge that would go over the cemetery driveway and it would push the driveway under the bridge at existing grade.
- They create additional curves and lane miles on I-70. The Realignment Alternatives require additional maneuvers approaching the new curves, which may limit safety in hazardous conditions, especially during the winter months. There will be one mile added to I-70 with the Realignment Alternatives. The extra mile with the Realignment Alternatives will result in unnecessary additional cost and travel time for all motorists.

Attachment C of the 2014 Supplemental Draft EIS, *Alternative Analysis Technical Report*, includes more details on the reasons for eliminating the Realignment Alternatives. CDOT and FHWA presented the recommendation to eliminate the Realignment Alternatives during the corridor-wide meetings held on May 2 and 3, 2012, and November 13 and 14, 2012, and asked for comments on the recommendation. Over 650 individuals collectively attended these meetings, and comments from attendees overwhelmingly agreed that the Realignment Alternatives should be eliminated.

CHAPTER 4: TRANSPORTATION IMPACTS AND MITIGATION MEASURES

This chapter examines the effects of the alternatives evaluated on transportation facilities within the transportation impacts study area. This includes roadways, transit systems and services, pedestrian and bicycle facilities, and truck and rail freight services.

The analysis for this document uses 2012 traffic data, DRCOG's 2035 travel demand model origin-destination trip data, and the Dynamic Urban Systems for Transportation (DynusT) modeling software to evaluate transportation impacts and mitigation measures.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- The travel demand analysis was revised to include the most recent land use scenarios in the DRCOG 2035 regional plan (DRCOG Compass model Version 5.0 with the 2013 cycle 2 updates).
- The updated socioeconomic and land use data resulted in changes to traffic volumes. All traffic analysis was updated based on the revised data.
- Roadway geometries have changed and analysis was completed to reflect these changes.

4.1 What are the existing transportation facilities in the study area?

Exhibit 4-1 shows the transportation impacts study area, which is the same as the project area that was identified earlier in this document.

The existing transportation system in the study area is multi-modal and includes roadways, transit systems, pedestrian and bicycle facilities, and truck and rail freight service. The study area is at a critical location in the transportation system, serving national, regional, and local transportation needs for human and freight mobility within the Denver region, the state of Colorado, and the western United States.

In the study area, I-70 is a mature, fully access-controlled freeway. I-70 serves as a gateway to Aurora and Commerce City, provides regional access to the Stapleton Redevelopment Area and the developing northeast portion of Aurora, and is a critical link for travel to DIA. A substantial number of the people traveling on I-70 (nearly 50 percent) begin or end their trip within the study area.

In addition to accommodating airport and inter-city travel, the I-70 corridor is home to many industrial and warehousing businesses. These businesses account for much of the trucking and freight operations in the corridor.

Transportation Impacts study area

In this document, each resource has a specific study area. Those study areas may be the same as the project area or construction limits of the evaluated alternatives, depending on the resource.

For transportation impacts, the study area is the same as the project area.

Exhibit 4-1 Transportation Impacts Study Area

4.1.1 Existing local connectivity

I-70 travels east and west within the study area. Several major roadways—shown in **Exhibit 4-2** and **Exhibit 4-3**—provide north-south connectivity across I-70. In addition, there are 18 major roadways within the study area between Washington Street and Tower Road with some form of access to I-70, either by direct ramps or slip ramps from collector-distributor roads or frontage roads. Fifteen of these roadways provide north-south connectivity across I-70. Because I-70 is an elevated viaduct between Washington Street and Colorado Boulevard, several more minor roadways provide continuous connectivity beneath I-70 or intersect with 46th Avenue, as shown in **Exhibit 4-3**.

Exhibit 4-2 Existing North-South Connectivity Across I-70

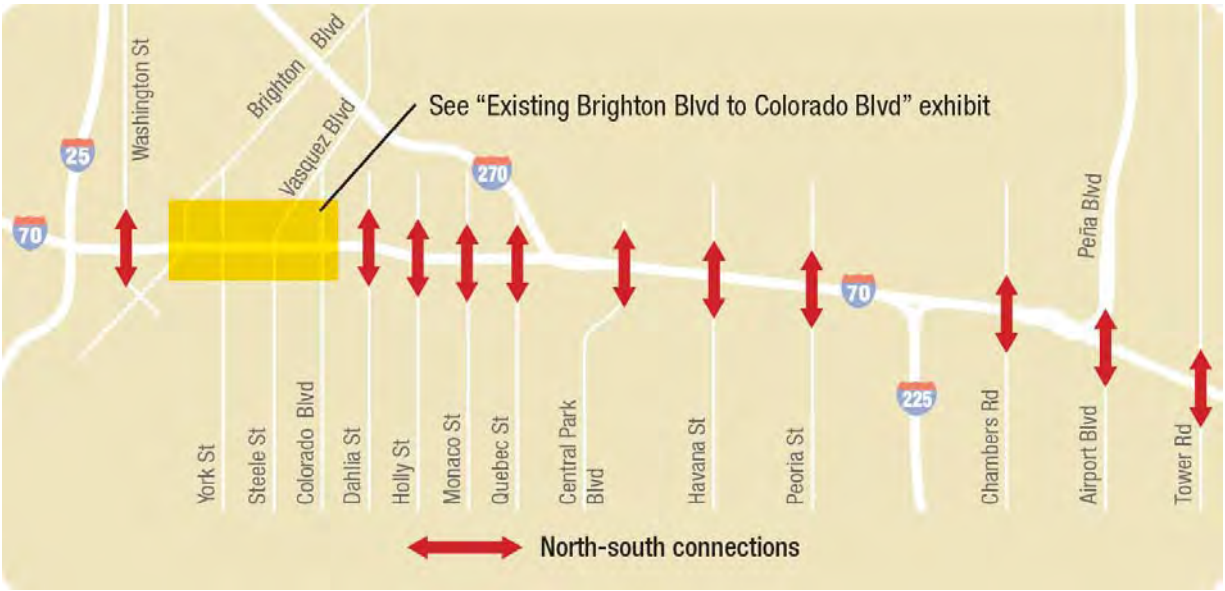


Exhibit 4-3 Existing North-South Connectivity from Brighton Boulevard to Colorado Boulevard

A large number of minor arterials, collectors, and residential streets provide east-west connectivity between the major north-south arterials. Specific to the study area, 46th Avenue provides for local east-west connectivity directly under I-70 between Washington Street and Colorado Boulevard (see **Exhibit 4-4**). 46th Avenue ends just west of Colorado Boulevard. Frontage roads on either side of I-70—Stapleton Drive North and Stapleton Drive South—begin on the east side of Colorado Boulevard. These roadways provide local connectivity between Colorado Boulevard and Monaco

Street. Stapleton Drive North is a two-lane roadway for westbound traffic and Stapleton Drive South is a two-lane roadway for eastbound traffic. Similar to 46th Avenue, these roadways provide a route for local travelers to circulate without using I-70, as well as a parallel route to bypass some of the congestion on I-70.

Exhibit 4-4 46th Avenue and Stapleton Drive North / South Existing Conditions

Colfax Avenue is the only roadway south of I-70 and in the vicinity of the study area that provides continuous east-west connectivity from I-25 to Tower Road. This continuous connectivity provides drivers with an alternative route choice to I-70. Thus, even though Colfax Avenue is not in the study area it is included within the modeling boundaries used in the analysis. Various other roadways provide parallel route choices for shorter distances within the study area, including 56th Avenue, 48th Avenue, 40th Avenue, 17th Avenue, 35th Avenue, 23rd Avenue, Montview Boulevard, Smith Road, and Martin Luther King Jr. Boulevard.

4.1.2 Existing transit services

Existing transit service in the study area consists of local, limited, express, regional, and Sky Ride bus routes, as shown in **Exhibit 4-5**. Some of the bus services currently use I-70 for a portion of their route, and others cross I-70, using the surface street network. Traffic congestion can impact travel times for transit both on the surface streets and along I-70. Bus service with associated Park-N-Ride lots is provided throughout the corridor. **Exhibit 4-7** further highlights the bus routes in the Elyria and Swansea Neighborhood.

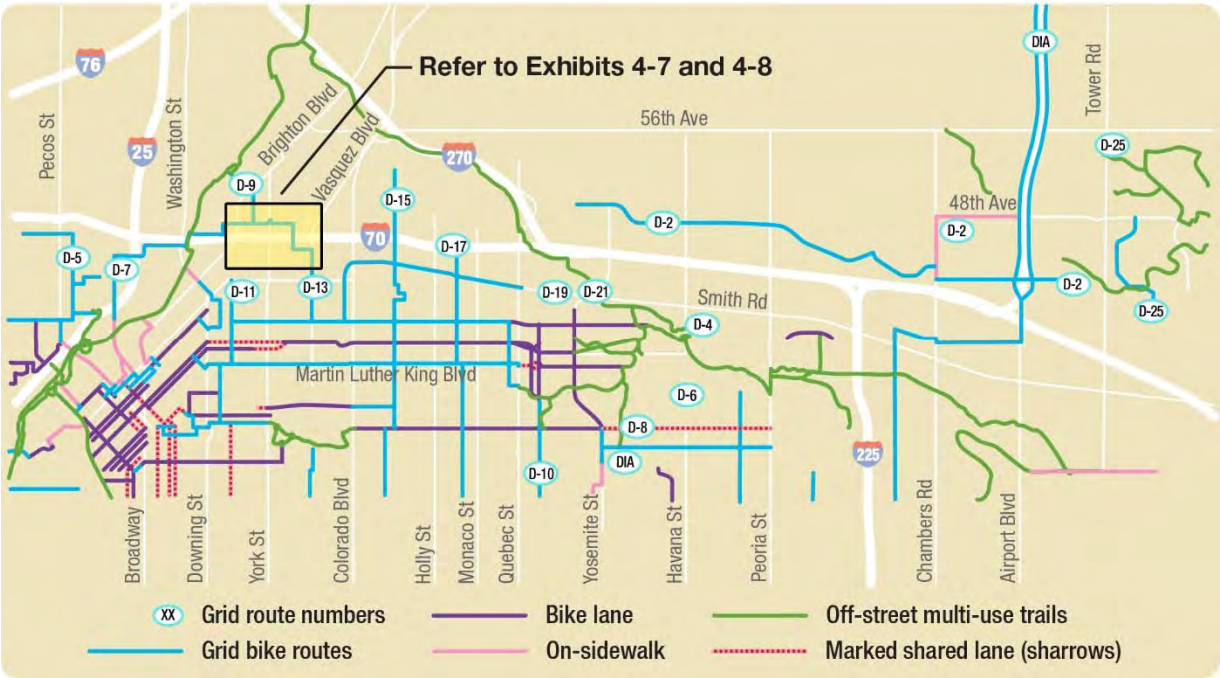
Exhibit 4-5 Existing Transit Service

Source: RTD, 2014

4.1.3 Existing pedestrian and bicycle facilities

Pedestrian and bicycle accommodations within the study area are primarily provided by sidewalks. In addition, there are several designated bicycle routes and off-street trail facilities in the study area. **Exhibit 4-6** illustrates the existing pedestrian and bicycle route system within the study area, and **Exhibit 4-7** further highlights the bicycle routes in the Elyria and Swansea Neighborhood. Route D-13 is currently a signed bicycle route that provides a north-south connection via Clayton Street.

Exhibit 4-6 Existing Bicycle and Pedestrian Network



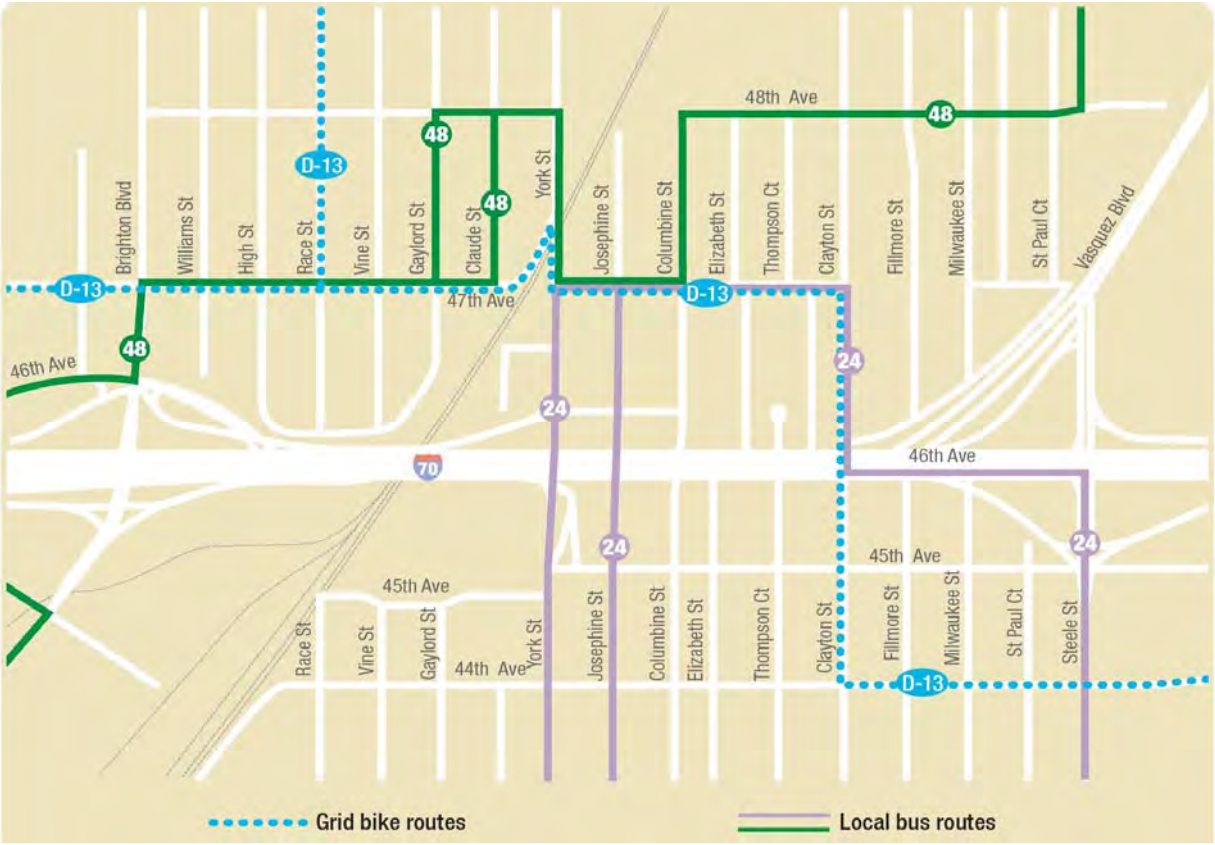
Source: Denver

Sidewalks are widely available within the study area, as shown on **Exhibit 4-8**. However, walking conditions on these sidewalks are not necessarily safe or comfortable. Sidewalks typically range from three feet to five feet wide, which can be too narrow for pedestrians to walk comfortably or pass each other. Additionally, per Denver's sidewalk policy, property owners are responsible for installation, repair, and maintenance of all sidewalks within the public right of way that adjoin their property, leading to uneven or broken sidewalk surfaces. The existing I-70 viaduct and 46th Avenue form a barrier and create additional gaps in the pedestrian network. Insufficient lighting, difficult street crossings, and poor guidance to destinations also lead to pedestrian concerns.

What is Denver's sidewalk policy?

Section 49-551.1 of the Revised Municipal Code of Denver establishes that abutting property owners are responsible for the installation, repair, and maintenance of all sidewalks within the public right of way. The city will inspect sidewalks and—if they are found to be in need of maintenance or repair—notify property owners of their responsibility to arrange for repairs.

Exhibit 4-7 Elyria and Swansea Bicycle and Bus Routes



Source: Denver and RTD

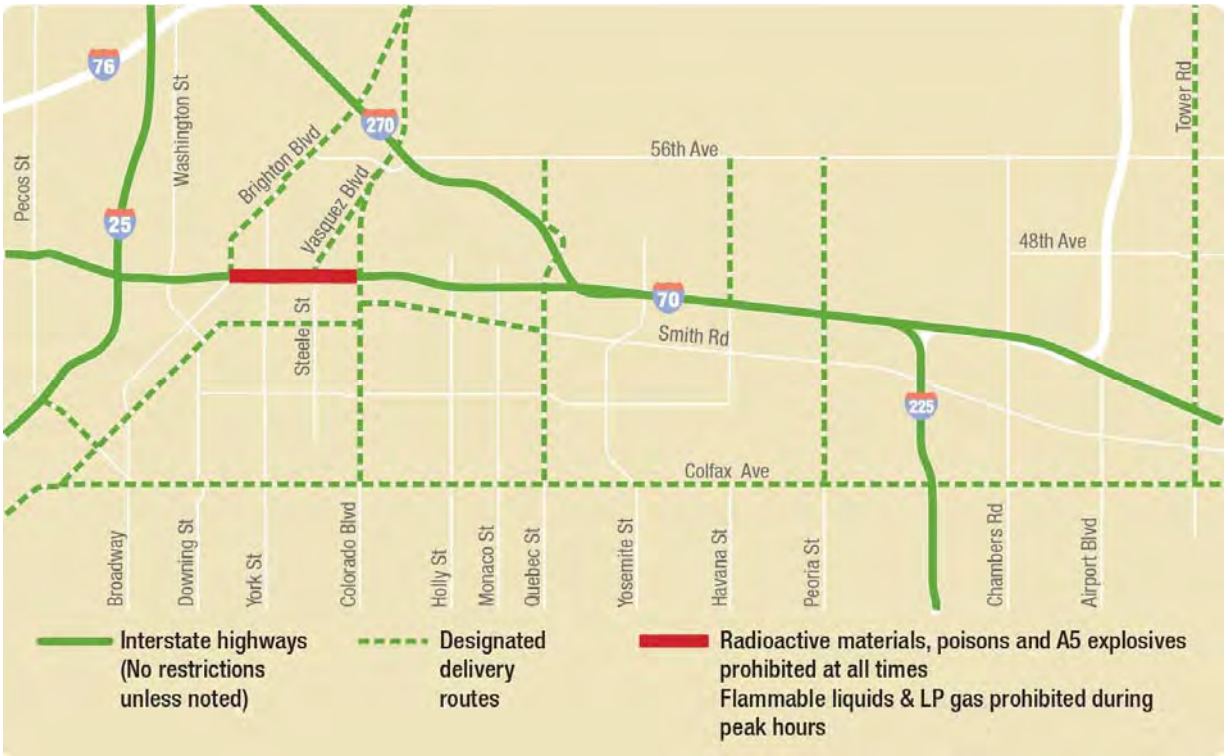
Exhibit 4-8 Elyria and Swansea Sidewalks

Source: Denver

4.1.4 Existing trucking facilities

Motor freight uses I-70 extensively for east-west travel through the Denver region and for pick-up and delivery to businesses and distribution centers within the study area. Trucks make up approximately 9 percent to 11 percent of traffic on I-70 west of Peña Boulevard and 13 percent of traffic east of Peña Boulevard. Trucks are required to stay on designated truck routes when driving through Denver. They also are required to use designated delivery routes when making pick-ups and deliveries. **Exhibit 4-9** highlights the truck routes and delivery routes within the study area, along with specific restrictions for transport of hazardous materials along these routes.

Exhibit 4-9 Existing Truck Routes



Source: CDOT and Denver

4.1.5 Existing freight rail facilities

Currently, the UPR, BNSF Railway, and DRIR operate within the study area, providing through-service, train consolidation operations, and intermodal transfers—or switching—to local businesses. Each railroad company owns and operates its own system of tracks within the study area. The BNSF operates service on the Front Range Subdivision, the UPRR operates on the Limon and Greeley Subdivision, and the DRIR operates an industrial switching yard (Silver Yard) on the north side of I-70 between Monaco Street and Quebec Street.

Several rail storage and transfer facilities, lead tracks, and industry spur tracks are located in the study area. These rail lines generally either cross the study area in a north-south direction or run parallel to I-70 south of its alignment, as shown in **Exhibit 4-10**.

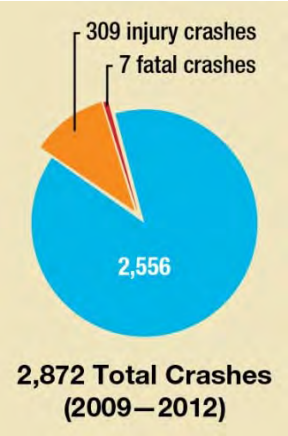
Exhibit 4-10 Existing Freight Rail Facilities

Source: CDOT

4.2 What are the existing safety concerns?

CDOT documented existing traffic safety concerns within the study area in the *I-70 East Corridor EIS Safety Evaluation* (CDOT, 2004) and *Safety Evaluation Addendum: I-70 Corridor Plan* (CDOT, 2013a). The study analyzed crash history for a three-year period (July 1, 2009, through June 30, 2012). During this time, 2,872 reported crashes occurred between I-25 and Tower Road, with 309 causing injuries, and seven resulting in fatalities. Rear-end collisions and sideswipes are the predominant crash types, which indicate corridor-wide congestion and/or inadequate auxiliary lanes.

This study provides a detailed analysis of areas where the number of crashes was higher than expected, including segments at York Street, Steele Street/Vasquez Boulevard, and Colorado Boulevard. The closely spaced on- and off-ramps in these segments—combined with short auxiliary lanes—requires drivers to make speed changes within a short distance. These factors contribute to the high crash rate along these portions of I-70. Refer to Attachment E, *Traffic Technical Report*, for more information.



Auxiliary lanes

An auxiliary lane is the portion of the roadway next to the travel lanes that help drivers merge on to and exit off of the freeway. They balance the traffic load and maintain through-traffic movements.

4.3 What are the existing traffic conditions?

DynusT software was used to evaluate the existing conditions for the study area. More information about DynusT can be found in Attachment E, *Traffic Technical Report*, and a flowchart of the process to create the calibrated sub-area DynusT model is shown in **Exhibit 4-11**. To start the analysis, a regional 2010 DynusT model was built to replicate the 2010 DRCOG regional travel demand model. For analysis purposes, a sub-area—or a portion of the regional model capturing a vast majority of trips into, out of, and through the study area—provided the basis for evaluating existing and future conditions. **Exhibit 4-12** shows the DynusT sub-area limits in comparison to the study area. Daily traffic data—such as volumes for numerous links on I-70, 46th Avenue, and various local roadways, intersection turning movement counts, interstate travel speeds, and interstate travel time—ensured full calibration of the sub-area network that best replicated 2012 conditions.

Regional travel demand model

The regional model includes the following counties:

- Adams
- Arapahoe
- Boulder
- Broomfield
- Clear Creek
- Denver
- Douglas
- Gilpin
- Jefferson
- Weld (southwest)

Exhibit 4-11 Traffic Modeling Process

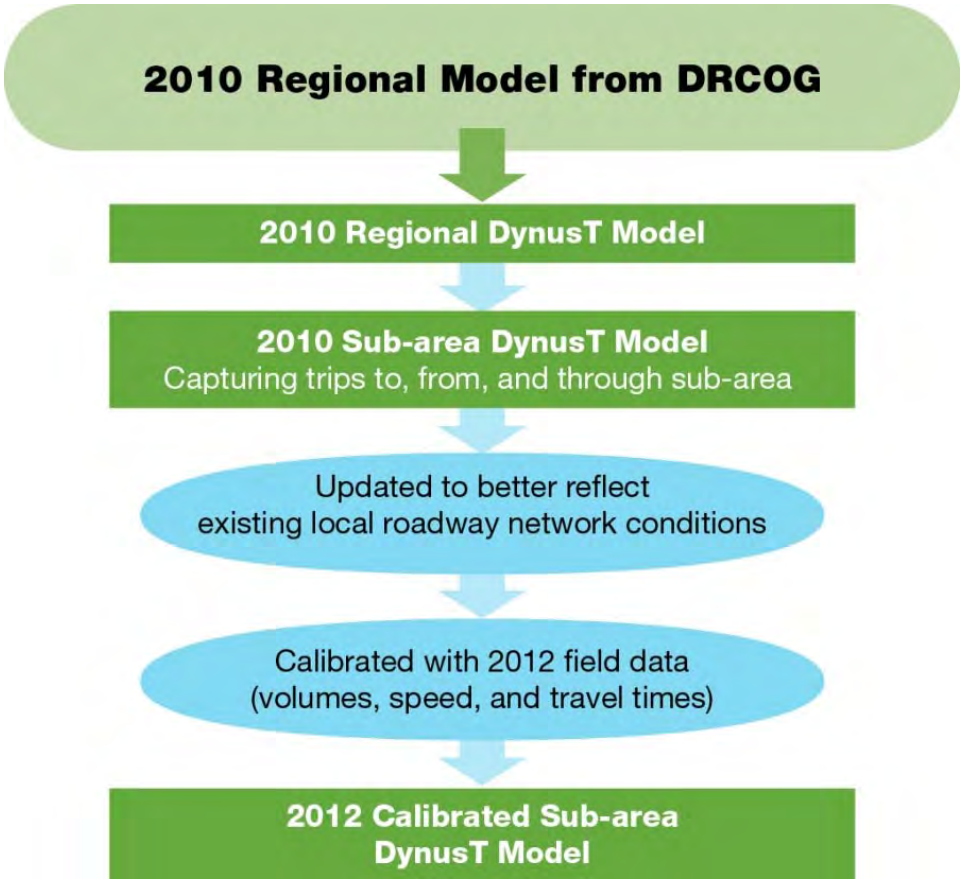


Exhibit 4-12 DynusT Sub-Area Model Limits

The calibrated DynusT sub-area model's existing roadway network provided the baseline for evaluating the following performance measures, as defined in more detail in the subsequent discussions.

- Daily and peak-period volumes
- I-70 average speeds (level of congestion)
- Vehicle miles of travel (VMT) and vehicle hours of travel (VHT)
- Travel times
- East-west local street volumes (diversion from highway)

4.3.1 Existing traffic volumes

Daily and peak-period volumes provide a picture of how well a particular roadway is able to process vehicles. I-70 between I-25 and Tower Road, 46th Avenue between Washington Street and Colorado Boulevard, and Stapleton Drive North/South between Colorado Boulevard and Quebec Street are the primary roads of interest for this document. Changes to the roadway geometry, such as adding capacity or improving regional connectivity, may result in changes to the volume of traffic using any particular roadway. Maximizing the through-put on a freeway such as I-70 will result in lower volumes on the local streets. 46th Avenue passes directly through many of the residential areas near I-70. Increases in traffic on 46th Avenue may result in an increase in crashes and safety issues, reducing the overall quality of life for the neighborhood residents.

Peak periods

Peak periods are the parts of the day during which traffic congestion on roads is at its highest. They normally happen twice a day—once in the morning and once in the evening—typically during the times when most people commute.

Peak periods include the time when traffic volumes are building up to the worst congestion and the period when the highway volumes decrease, also known as the shoulder periods.

For this document, the peak periods have been identified as a six-hour time frame during the morning and evening hours. The morning or AM peak period is between 5:00 a.m. and 11:00 a.m., while the evening or PM peak period is between 2:00 p.m. and 8:00 p.m.

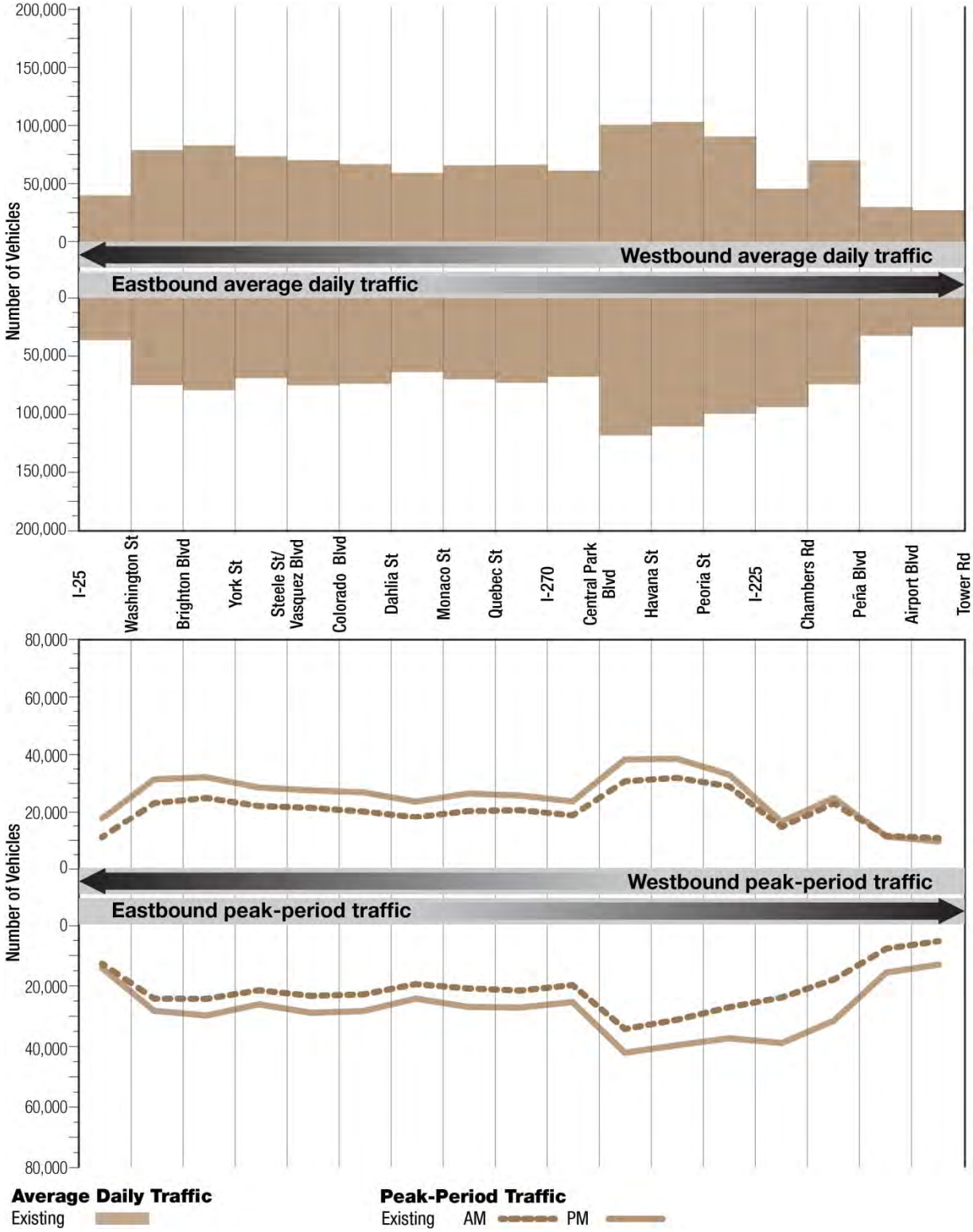
4.3.2 Existing I-70 traffic volumes

Exhibit 4-13 displays the existing directional daily traffic volumes and peak-period traffic volumes. Bi-directional daily volumes are lowest—less than 75,000 vehicles per day (vpd)—at the east and west ends of the study area. Volumes peak in the area between I-270 and I-225, with 220,000 vpd (100,000 vpd westbound and 120,000 vpd eastbound) just east of the Central Park Boulevard interchange. The segments between Washington Street and Central Park Boulevard generally carry between 130,000 vpd and 150,000 vpd. The merges and diverges for I-25, I-270, I-225, and Peña Boulevard result in large-volume increases/decreases (between 40,000 vpd and 80,000 vpd) at each location. As much as 75 percent of the traffic on I-70 occurs during the peak periods of the day.

4.3.3 Existing 46th Avenue and Stapleton Drive North/South traffic volumes

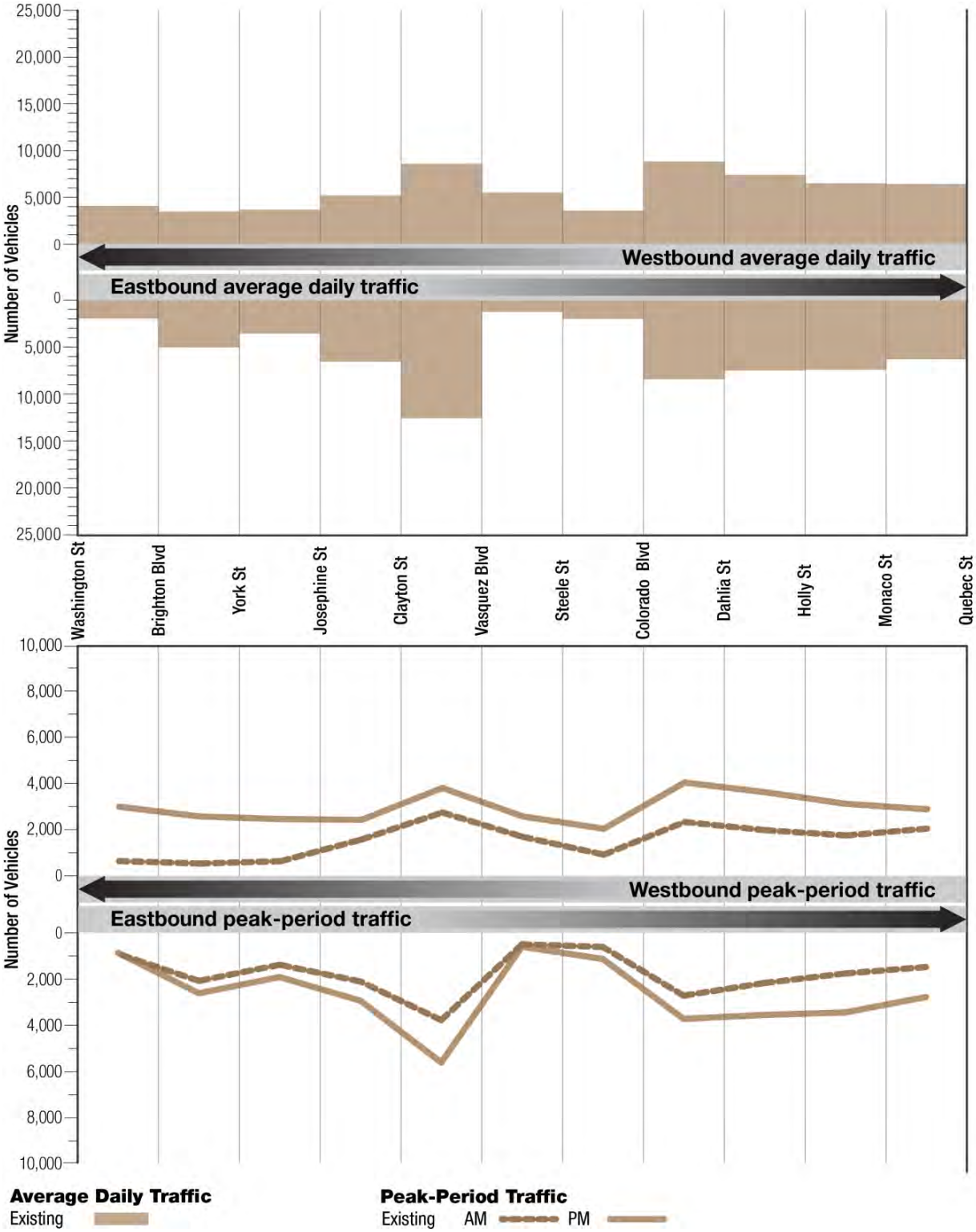
The current volumes on 46th Avenue and Stapleton Drive North/South, displayed in **Exhibit 4-14**, indicate that the morning and evening peak periods tend to be very similar for both eastbound and westbound directions. Daily traffic volumes peak at approximately 21,000 vpd just west of Steele Street/ Vasquez Boulevard. Typical daily volumes on the remaining segments of 46th Avenue tend to be less than 15,000 vpd. During the peak periods, 75 percent to 80 percent of the traffic volumes occur.

Exhibit 4-13 Existing I-70 Traffic Volumes



Source: Existing (2012) calibrated DynusT model

Exhibit 4-14 Existing 46th Avenue and Stapleton Drive Traffic Volumes



Source: Existing (2012) calibrated DynusT model

Volumes on Stapleton Drive North/South (see **Exhibit 4-14**) range between 12,000 vpd and 15,000 vpd. The I-70 slip ramps located west of Dahlia Street and east of Monaco Street provide for access to and from the large industrial area between Colorado Boulevard and Quebec Street.

4.3.4 Existing I-70 average speeds

Average speeds, which represent the level of congestion on I-70, affect two performance measures of the highway system: mobility and safety. Higher speeds, or lower levels of congestion, result in shorter travel times, or better mobility. Speed also can reduce safety on a facility, especially if there is a large speed differential or stop-and-go conditions typically associated with congestion.

Congestion along I-70 results in delays for motorists and can result in an increase in crashes. Congestion is related to average travel speeds—as the travel speeds go down, the level of congestion goes up. DynusT produces figures known as "heat diagrams" based on the average travel speeds on a particular route (see **Exhibit 4-15**). The diagrams use colors to visually depict the travel speeds expected for a given time of day by location. Dark blue (cool temperatures) represents free-flow speeds (no congestion) and dark red (hot temperatures) depict locations with low travel speeds (heavy congestion). The top of the figure shows the travel direction, and the map at the bottom of the figures shows the location on I-70. The time scale on the left vertical axis represents trip starting times and the color (or heat) scale legend on the right side indicates the average speed of the vehicles.

The existing average speeds for eastbound and westbound I-70 are shown in **Exhibit 4-16**. The figure shows eastbound congestion between Brighton Boulevard and York Street during the morning and evening peak periods. This congestion is due to the closely spaced merge/diverge areas for I-25, Washington Street, Brighton Boulevard, and York Street. Slowing speeds and congestion also are present during the evening peak period on the segments near I-270 and I-225. This is consistent with the heavy amount of traffic entering and exiting at these freeway-to-freeway connections. Overall, there is more eastbound congestion during the evening peak period than the rest of the day. Between the hours of 7:00 a.m. and 7:00 p.m., eastbound speeds typically remain at 45 miles per hour (mph) or lower.

Heat diagrams

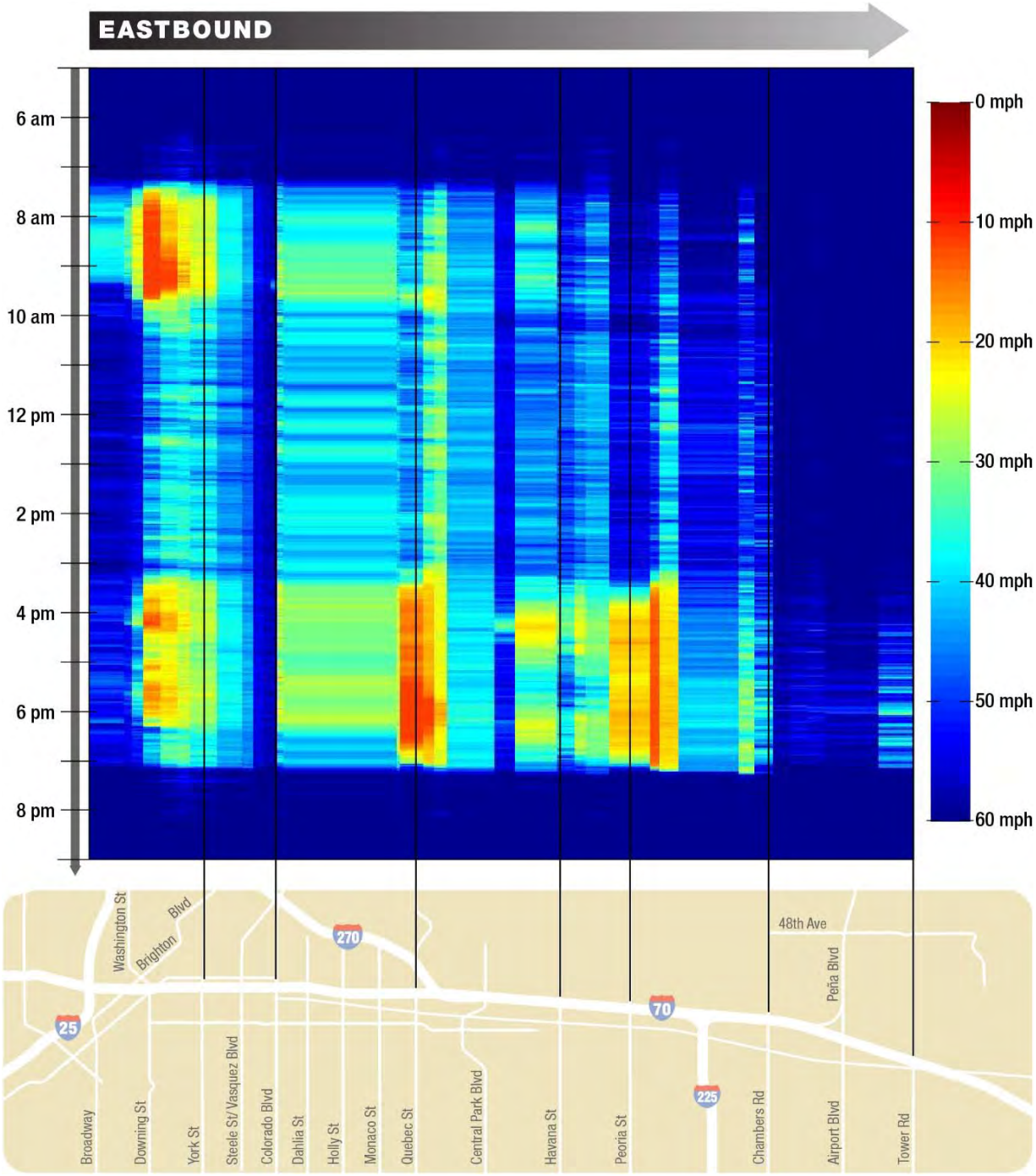
The purpose of heat diagrams is to identify overall trends in vehicle speeds or congestion levels on I-70. The areas that have warmer colors (yellow/orange/red) identify locations of reduced speeds or higher congestion.

It is more important first to focus on where the congestion occurs and the pattern of the congestion (recurring or isolated), and then to look at the length or duration of the congestion.

Free-flow speeds

Free-flow speeds assume that drivers travel the speed limit with no congestion present.

Exhibit 4-15 Example Heat Diagram Showing Average Speeds on I-70

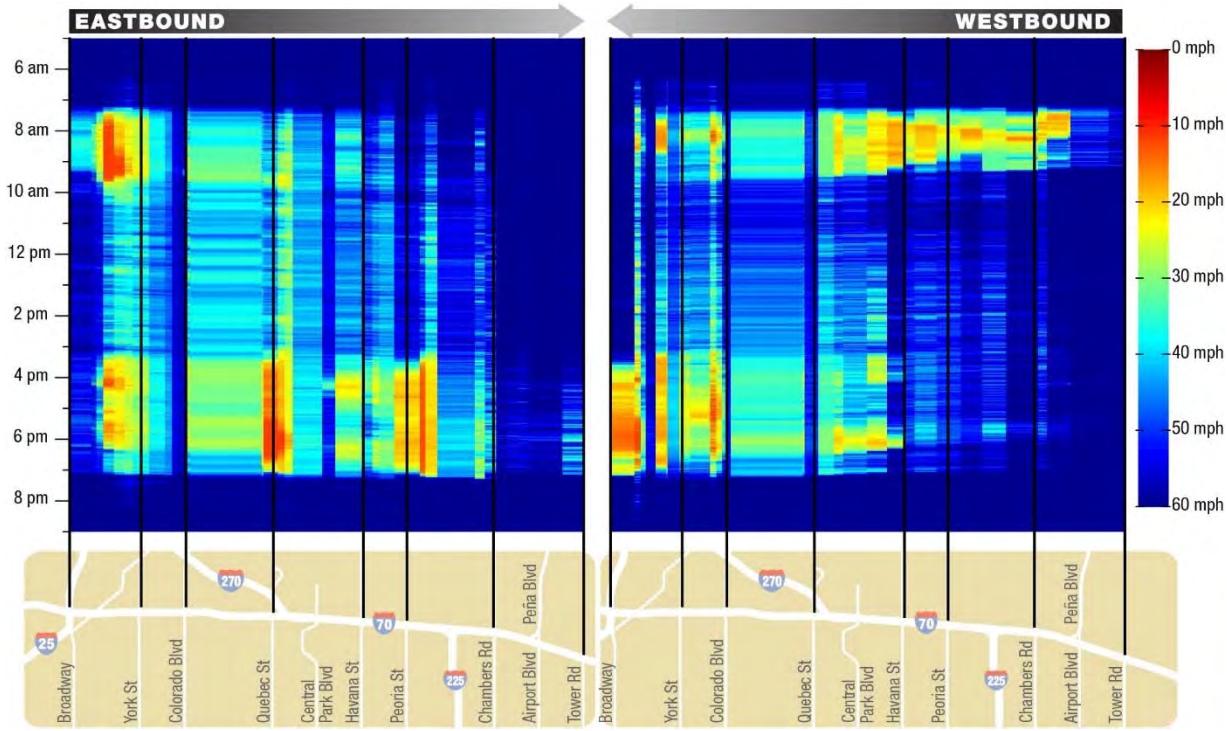


Source: DynusT model

Exhibit 4-16 also shows westbound congestion between Peña Boulevard and the I-270 interchanges during the morning peak period. This area also has pockets of speeds below 50 mph for a majority of the day. Again, this congestion is consistent with the heavy amount of merging and diverging traffic associated with these freeway-to-freeway connections. Westbound I-70 shows congestion

between Colorado Boulevard and York Street during the peak periods of the day due to the close spacing of the interchanges in this area.

Exhibit 4-16 Existing I-70 Average Speeds



Source: Existing (2012) calibrated DynusT model

There are more than 15.8 million vehicle miles traveled each day within the sub-area, with a little more than 10 percent of this occurring on the I-70 corridor between I-25 and Tower Road.

All of the trips in the sub-area total approximately 0.5 million hours of travel each day, with the trips on I-70 (between I-25 and Tower Road) making up about 8 percent of this total.

It takes slightly longer than 12 minutes to travel eastbound or westbound between I-25 and Tower Road at free-flow speeds (the posted speed limit). Under existing conditions, eastbound trips take approximately 21 minutes during the morning peak and almost 27 minutes during the evening peak (75 percent to 125 percent longer than free-flow travel). During the morning and evening peaks, the westbound trips take nearly 25 minutes (100 percent longer than the free-flow travel time) for the same stretch of highway.

Existing I-70 travel times

Travel time is the amount of time it will take a driver to travel from one point to another. This document focuses on evaluating the travel times on I-70 between I-25 and Tower Road, on 46th Avenue between Washington Street and Colorado Boulevard, and on Stapleton Drive North/South between Colorado Boulevard and Quebec Street. This measure will indicate the amount of delay drivers will experience when traveling on these roads.

4.3.5 Existing 46th Avenue and Stapleton Drive North/South travel times

Travel times for 46th Avenue from Brighton Boulevard to Colorado Boulevard (a distance of about 1.5 miles) generally take between three and five minutes for eastbound and westbound trips under existing conditions. Existing travel times on Stapleton Drive North/South between Colorado Boulevard and Quebec Street (a distance of about two miles) take about three to five minutes for eastbound and westbound trips. The travel times are consistent with low volumes and uncongested travel along roadways with lower speed limits (less than 35 mph) and several signalized intersections.

4.3.6 Existing east-west local street volumes

DynusT identifies the volume of traffic that will choose to use the freeway versus the volume of traffic that will use the local street facilities. This measure is important because it quantifies the amount of traffic that may divert to local roads when encountering congestion on I-70, based on congestion in the study area. This will help identify impacts to residents, pedestrians, and bicyclists along these local roadways resulting from changes in traffic patterns.

As I-70 becomes congested, motorists may decide to use parallel local streets to complete east-west trips within the sub-area. **Exhibit 4-17** shows a series of screenlines intended to capture the total east-west volumes on the parallel local streets to the north and south of I-70. These screenlines are for local streets only and do not include I-70 or 46th Avenue/Stapleton Drive as these volumes are discussed separately. The east-west volumes for the identified roadways north of I-70 were added together to provide a single value of vehicles using parallel routes to the north of I-70. A similar approach applies for the identified roads south of I-70. **Exhibit 4-18** shows the results of the existing (2012) conditions analysis.

Screenlines

A screenline is an imaginary line drawn on a map that represents a location where vehicles crossing the line in either direction of travel are counted over a defined period of time.

Exhibit 4-17 East-West Parallel Route Screenlines

Exhibit 4-18 Existing Screenline Volumes

Source: Existing (2012) calibrated DynusT model

4.4 How were future traffic and transportation evaluated?

Before conducting the analysis of the No-Action or Build Alternatives, future (2035) transportation system characteristics were identified. The development of future traffic projections for the No-Action Alternative, through the use of the 2035 DRCOG travel demand model, did not include improvements to I-70. The number of lanes and interchange configurations within the study area were assumed to remain similar to existing conditions. All I-70 project alternatives assume implementation of the transportation improvements identified in the DRCOG 2035 MVRTP. This includes both programmed projects (those budgeted in the six-year Transportation Improvement Plan [TIP]) and planned projects (those not in the TIP, but included in the adopted DRCOG 2035 MVRTP). The more significant planned and programmed improvements to the transportation system within the study area are shown in **Exhibit 4-19**. For a complete list of projects, refer to the DRCOG 2035 MVRTP. Although recent studies have pointed to national reductions in VMT following the recession of 2007-08, recent FHWA data has shown that VMT has been increasing again during the last 18 months and has reached pre-recession levels. For more information refer to Attachment E*, Traffic Technical Report*. If the current trend, as identified by FHWA, continues into the future, the traffic volumes in 2035 will most likely exceed the volumes being projected by the DRCOG travel demand model. It should be noted, that the Year 2013 Cycle 2 update travel demand model does incorporate the post-2008 recession updated data as provided by the State Demographer in its projection of growth and travel in the DRCOG region. As a result of these updates, all future traffic models used in the previous analyses for I-70 East were discarded and the traffic analysis was redone using new traffic projections as developed with the new travel demand model.

Following the release of the Supplemental Draft EIS, DRCOG provided the most up-to-date socioeconomic forecasts and land use scenarios for the 2035 Compass Model, also known as the Year 2013 Cycle 2 updates. The traffic models were updated to reflect these changes.

During the development of this Final EIS document, DRCOG released the 2040 Focus model. Because the traffic modeling was already underway at the time of this release, a

sensitivity analysis was performed to determine the changes in traffic volume in the design year. The sensitivity analysis concluded that although the traffic volumes projected by the 2040 Focus model were slightly lower than the 2035 Compass model, the Focus model volumes would not impact the capacity needed for the corridor, and, therefore, would not significantly change the design nor the environmental impacts of the project. Additionally, switching from the 2035 model to the 2040 model would result in significant expense and delays to the project schedule due to the significant effort required to update all traffic operations analyses and analysis of environmental resources that rely on traffic volumes such as noise and air quality which would only be warranted if significant changes were expected. Thus, the modeling was completed using the 2035 Compass model. Refer to Attachment E, *Traffic Technical Report*, for more information.

In addition to planned roadway improvements, the analysis assumed the implementation of major transit system improvements within the Denver region as part of RTD's FasTracks program. Of most relevance in the study area is the East Corridor commuter rail project, which will run from downtown Denver to DIA (see **Exhibit 4-19**).

Exhibit 4-19 2035 Transportation System Improvements

Source: DRCOG, 2014

Individual travel demand models and DynusT roadway networks consistent with future (2035) transportation system improvements were developed for the alternatives. A travel demand model estimates traffic demand based on where population and employment will grow in the region, and then predicts how the resulting travel demand distributes over the regional transportation network. The evaluation of the individual roadway networks within the travel demand models provided the future (2035) origin-destination data for the various alternatives. The origin-destination output from the travel demand models became the input to the individual roadway networks within DynusT.

4.5 How do the project alternatives affect the transportation facilities?

Consistent with federal regulations, this document fully evaluates potential effects to the transportation facilities that might result from the No-Action Alternative and the Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative and their design options) presented in **Exhibit 4-20**.

North or South Expansion Options: impacts on traffic patterns

The No-Action Alternative and Revised Viaduct Alternative both have options that shift I-70 north or south. These shifts have no impact on traffic circulation and are each considered a single alternative for the purpose of discussing transportation impacts.

Exhibit 4-20 Summary of Project Alternatives and Options

Alternative		Expansion Options	Operational Options
No-Action		• North • South	N/A
Build Alternatives	Revised Viaduct	• North • South	• General-Purpose Lanes • Managed Lanes
	Partial Cover Lowered	N/A	• General-Purpose Lanes • Managed Lanes

The following section briefly discusses the major changes to I-70, 46th Avenue, and Stapleton Drive North/South for the No-Action Alternative and the Build Alternatives. Attachment A, *Alternative Maps,* contains figures showing the roadway configurations within the study area for each of the future alternatives. For more detail on the alternatives and their options, see Attachment C of the Supplemental Draft EIS, *Alternative Analysis Technical Report.*

In the No-Action Alternative, the overall transportation facilities remain unchanged within the study area. This alternative does reconstruct the elevated portion of I-70 between Brighton Boulevard and Colorado Boulevard. The

reconstruction of the viaduct does not add any capacity to I-70. 46th Avenue and Stapleton Drive North/South remain in their current configuration and do not experience any capacity improvements.

The Build Alternatives add capacity to I-70 through the addition of one travel lane in each direction for the sections east of Chambers Road and west of Brighton Boulevard. The portion of I-70 between Brighton Boulevard and Chambers Road receives two lanes of added capacity in each direction. All of the added capacity will either be in the form of general-purpose (not priced) lanes or managed (priced) lanes.

46th Avenue has unique configurations for each of the Build Alternatives. In the Revised Viaduct Alternative, 46th Avenue continues to operate similarly to the existing conditions, traveling at grade underneath the elevated viaduct, with some modifications to the connectivity at Brighton Boulevard. In the Partial Cover Lowered Alternative, 46th Avenue is located on the north and south sides of the highway. It is a two-way street between York Street and Garfield Street on both sides of the highway. In all other locations, 46th Avenue is a one-way couplet with eastbound travel on the south side of I-70 and westbound travel on the north side of I-70. This alternative eliminates the portion of 46th Avenue north of I-70 between Columbine Street and Clayton Street to allow for a seamless connection between Swansea Elementary School and the highway cover, which will be added at this location as part of this alternative.

The Build Alternatives with the Managed Lanes Option will have several locations for ingress and egress to the managed lanes, some consisting of direct connections, as shown in **Exhibit 4-21** and described below. This will provide drivers several opportunities to make a choice to use the managed lanes or remain in the general-purpose lanes. The eastbound managed lanes decision points are as follows:

- Ingress opportunity just east of I-25 at the start of the managed lane
- Ingress/egress opportunity at Brighton Boulevard
- Ingress/egress opportunity at Holly Street
- Ingress opportunity from I-270 in the form of a direct connection between the freeways
- Ingress/egress opportunity at Peoria Street

Capacity

A travel lane on a roadway can serve a specific number of vehicles in an hour. This number of vehicles per hour per lane is called capacity. If a new lane is added to a road, the capacity of the road will increase.

One-way couplet

A one-way couplet is a pair of parallel streets with each street only allowing one-way travel, but in opposite directions. Together the two streets operate as a single street.

Cover

As part of the Partial Cover Lowered Alternative, a cover will be placed on top of I-70. The cover, located between Columbine Street on the west and Clayton Street on the east, reconnects the Swansea and Elyria Neighborhood north and south of I-70. The design details for the cover are being studied and will be coordinated with the local neighborhoods.

- Egress opportunity to I-225 by use of a direct connection between the freeways
- Egress opportunity to Peña Boulevard by use of a direct connection between the facilities
- Egress opportunity to Tower Road as the managed lane facility ends

In the westbound direction, the managed lanes decision points are as follows:

- Ingress opportunity at Tower Road at the start of the managed lane
- Ingress opportunity from Peña Boulevard by use of a direct connection between the facilities
- Ingress opportunity from I-225 by use of a direct connection between the freeways
- Ingress/egress opportunity at Peoria Street
- Ingress/egress opportunity at Holly Street
- Egress opportunity to I-270 in the form of a direct connection between the freeways
- Ingress/egress opportunity at Brighton Boulevard
- Egress opportunity near Washington Street as the managed lane facility ends

Exhibit 4-21 Managed Lanes Option Access Locations

4.5.1 Effects on local connectivity

The No-Action Alternative minimally affects the north-south and east-west roadway connections in the study area. The only significant change occurs at the York Street interchange for the South Expansion Option. This change affects the eastbound off-ramp configuration and will require some rerouting of local trips using the adjacent street network. All of the other existing interchange forms remain the same in the No-Action Alternative. Attachment A, *Alternative Maps,* contains figures showing the connectivity for the No-Action Alternative.

The Build Alternatives (see Attachment A, *Alternative Maps*) make the following changes to the interchanges:

- All of the Build Alternatives remove the York Street interchange, which will require drivers to use local streets to gain access to and from I-70 at adjacent interchanges.
- The Revised Viaduct Alternative and the Partial Cover Lowered Alternative create a split-diamond interchange configuration with collector-distributor roads between Steele Street/Vasquez Boulevard and Colorado Boulevard. In addition, slip ramps are included to provide an eastbound off-ramp and westbound on-ramp at Colorado Boulevard.
- All of the Build Alternatives alter the location of the Holly Street interchange ramps to form a more traditional diamond interchange. The slip ramps currently located east of Monaco Street and west of Dahlia Street move to the west of Monaco Street and east of Dahlia Street, respectively.
- All other interchanges within the study area continue to provide similar access as existing conditions with some modifications to the ramp types that do not affect the overall connectivity.

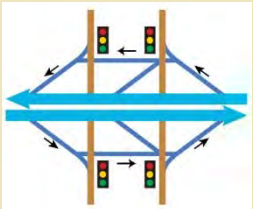
The Build Alternatives have the same north-south and east-west roadway connections as existing conditions, with the exception of the area between Brighton Boulevard and Colorado Boulevard. A discussion of the differences between the Build Alternatives for the Brighton Boulevard to Colorado Boulevard section is provided in the following paragraphs.

Exhibit 4-22 displays the local north-south roadway connections for the Revised Viaduct Alternative. Fillmore

Split-diamond interchange

A diamond interchange is formed when ramps are provided in each quadrant allowing for exit and entrance operations between the freeway and the local street. The local street is a grade-separated crossing over or under the freeway. A split diamond is used where local streets are too close to each other to allow for safe operations of the entrance and exit ramps. Ramps are combined and a one-way frontage road is used between the local streets.

The split-diamond interchange proposed between Steele Street/Vasquez Boulevard and Colorado Boulevard also includes slip ramps which will provide additional access to I-70.



Street and Milwaukee Street are extended under I-70 and across 46th Avenue. Similar to existing conditions, 46th Avenue continues to provide two-way connectivity under I-70.

Exhibit 4-22 North/South Connectivity with Revised Viaduct Alternative

The Partial Cover Lowered Alternative, shown in **Exhibit 4-23**, continues to provide north-south connectivity at York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, and Steele Street/Vasquez Boulevard. It also provides additional north-south connectivity over I-70 at Cook Street and Monroe Street. The portion of York Street north of I-70, between 46th Avenue North and 47th Street is converted to two-way operations. This is to prepare for the possibility of the full conversion of York Street to two-way operations from 40th Street to 47th Street by others in the future.

46th Avenue is no longer located underneath I-70, but is a one-way couplet between Brighton Boulevard and Josephine Street and between Milwaukee Street and Colorado Boulevard, with eastbound travel on the south side of I-70 and westbound travel on the north side of I-70. Between Josephine Street and Milwaukee Street, 46th Avenue has two-way operations on both sides of I-70. Additionally, on the north side of I-70, 46th Avenue will be discontinued between Clayton Street and Columbine Street. This alternative eliminates the portion of Elizabeth Street north of 46th Avenue and south of 47th Avenue. All other north-south streets within this area end at either eastbound or westbound 46th Avenue.

46th Avenue extends across Colorado Boulevard and connects with the existing one-way couplet of Stapleton Drive North and Stapleton Drive South. These streets are extended to the east and connect to the Quebec Street ramps to allow for connectivity between Colorado Boulevard and Quebec Street.

Exhibit 4-23 North/South Connectivity Over I-70 with the Partial Cover Lowered Alternative

4.5.2 Effects on transit service facilities

Transit service within the study area should not be substantially affected. Changes associated with the Build Alternatives within the study area, including modifications to the surface street network, will improve safety and reduce congestion, which will create an overall benefit for transit service.

Even with the implementation of the East Corridor transit line, bus routes in the area will stay the same (with the exception of SkyRide not using I-70 after the opening of the East Corridor line). CDOT and RTD will continue to coordinate on the proposed roadway network to be sure transit service is not affected.

During construction, proposed bus route closures, delays, or modifications must be coordinated with RTD more than 30 days in advance. Modifications or relocation of bus stops or signage along the affected routes must also be coordinated with RTD in the same timeframe since accessibility is required to be maintained.

4.5.3 Effects on pedestrian and bicycle facilities

Pedestrian and bicycle facility improvements associated with the Build Alternatives will enhance the safety of pedestrians and bicyclists within the study area. Intersections that are being improved will have countdown lights installed at signalized crosswalks to improve pedestrian safety. More opportunities to enhance the pedestrian environment include sidewalk connectivity, Americans with Disabilities Act improvements, greater sidewalk width, and improved lighting. All alternatives maintain connectivity of Denver Bike Route D-13 to provide north-south access via Clayton Street.

While the Partial Cover Lowered Alternative will limit the amount of pedestrian and bicycle north-south crossing locations, the cover provides connectivity between neighborhoods. This alternative also provides shorter pedestrian crossing distances over 46th Avenue, which will enhance safety. The design allows pedestrians to cross two lanes of traffic at a time, instead of four lanes.

4.5.4 Effects on trucking facilities

Overall, the Build Alternatives will improve highway freight transport through and into the study area by adding capacity on I-70, reducing delays, and improving safety. These improvements increase operating efficiency and reduce operating costs for the trucking industry. The changes associated with the Build Alternatives will not substantially alter the designated truck routes or the delivery routes. Potential changes to truck routes or delivery routes may be necessary due to changes in the roadway network or redevelopment that may occur in the study area. Future truck and delivery routes may require alteration or additions based on unknown future needs.

In some cases, interchanges will be reconfigured, but these changes will improve overall safety and traffic flow. The reconfigured interchanges include the removal of the York Street interchange, converting the existing Steele Street/ Vasquez Boulevard interchange to a split diamond interchange with Colorado Boulevard, and consolidation of the slip ramps at Dahlia Street and Monaco Street to a full movement interchange at Holly Street. Changes to the local street network may marginally increase the distance trucks have to travel off the designated truck routes or delivery routes to get to or from their destination. While existing

truck travel within the Elyria and Swansea Neighborhood is a concern of local residents, changes associated with the Build Alternatives should not significantly impact these streets because any potential changes to the designated truck routes and delivery routes could be coordinated with Denver to ensure impacts are minimized. This could be accomplished by setting up specific truck routes, prohibition on some roadways, and/or specific delivery times based on input from local citizen groups.

4.5.5 Effects on freight rail facilities

None of the Build Alternatives will permanently impact rail service within or through the study area. All existing rail crossings of the I-70 alignment are grade separated, with the railroad currently passing beneath I-70. Grade separation at all of these crossings will be maintained.

The Partial Cover Lowered Alternative will require the construction of a new bridge for the UPRR Greeley Subdivision just east of Brighton Boulevard and for the BNSF Market Lead just east of Steele Street/Vasquez Boulevard. This will result in temporary impacts to railroad operations for track relocations required to phase the construction of the new grade-separated structures. None of the other alternatives will require the building of new railroad structures. I-70 will be located above the railroad at all crossings, similar to existing conditions.

East of Colorado Boulevard, all of the Build Alternatives involve similar construction. Between Monaco Street and Quebec Street, the DRIR has switching yard tracks that are located below an I-70 bridge. The Build Alternative improvements will maintain current operations through construction of new bridges and/or relocate track operations to a similar condition. The UPRR spur track at Havana Street will be relocated to the east below bridges for the ramps and mainline I-70 highway.

4.6 How do the project alternatives affect safety?

The No-Action Alternative would increase shoulder width for the viaduct portion of I-70 through reconstruction but does not address current safety issues at other locations. Growth in traffic volume is likely to result in an overall increase in the number, frequency, and severity of crashes on I-70. The overall safety of the highway will degrade by 2035 without improvements or at least the implementation of some safety enhancements.

The Build Alternatives address the safety concerns and infrastructure deficiencies identified in CDOT's *I-70 East Corridor EIS Safety Evaluation* (CDOT, 2004) and *Safety Evaluation Addendum: I-70 Corridor Plan* (CDOT, 2013a). By relieving congestion and correcting identified deficiencies, the anticipated crash rates along I-70 decrease with the Build Alternatives. The safety evaluation included analysis of the interchanges. The evaluation identified specific improvements, such as the addition of turn lanes or turn signals, at specific locations to improve safety. The Build Alternatives include these improvements to enhance safety within the study area.

4.7 How will the project alternatives affect traffic conditions?

The following subsections provide a discussion of how the traffic conditions will change between 2012 and 2035 without any improvements to I-70, as well as how the Build Alternatives compare to the No-Action Alternative using the same performance measures previously described for existing conditions (2012). Attachment E, *Traffic Technical Report* provides a detailed description of the analyses, results, and comparisons of the performance measures between the existing conditions (2012), No-Action Alternative, and Build Alternatives.

To simplify the presentation of the analysis results in the exhibits, the following abbreviations are used for the Build Alternatives and their different design options:

- Revised Viaduct Alternative, General-Purpose Lanes Option: RV—GP
- Revised Viaduct Alternative, Managed Lanes Option: RV—ML

- Partial Cover Lowered Alternative, General-Purpose Lanes Option: PCL—GP
- Partial Cover Lowered Alternative, Managed Lanes Option: PCL—ML

4.7.1 Future I-70 volumes

Exhibit 4-24 provides a comparison of the No-Action Alternative (2035) to the existing mainline I-70 traffic volumes (2012). Daily and peak-period traffic increases on every highway segment. Typically, individual segments of I-70 will experience an increase in directional daily volumes of between 20 percent and 50 percent compared to existing conditions. This indicates the highway does have some limited reserve capacity with the current number of lanes.

Exhibit 4-25 displays the comparison of the I-70 daily and peak-period traffic volumes for the Build Alternatives compared to the No-Action Alternative. The data for the Managed Lanes Option represent the total volume serviced by all lanes of I-70 (general-purpose lanes plus managed lanes). In general, all segments of I-70 experience an increase of daily volumes between 20 percent and 50 percent compared to the No-Action Alternative. The peak-period volumes display similar growth trends as the daily volumes.

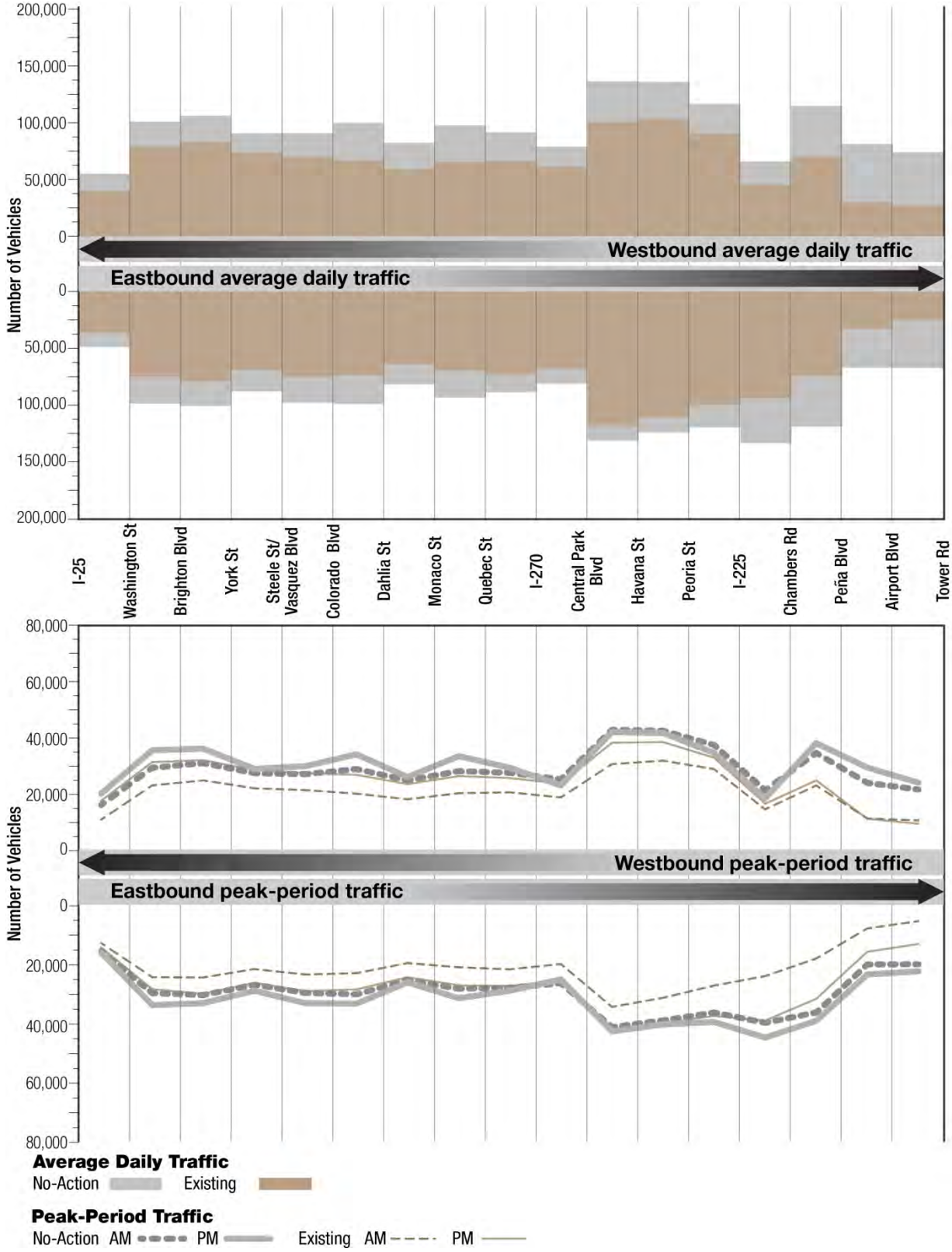
The model indicates the largest factor contributing to the increase in traffic on I-70 for the Build Alternatives is the increase of capacity which results in drivers that would use local streets to complete trips. Maximizing the capacity of I-70 will result in lower volumes on the local streets, including 46th Avenue, as drivers will choose to use the freeway for a faster trip. Conversely, not improving I-70 capacity increases the traffic on local streets like 46th Avenue and may result in an increase in crashes and safety issues along with reducing the overall quality of life for the neighborhood residents. The overall demand for I-70 will increase in the future, without the improved capacity more traffic will be diverted onto the local street network. However, with capacity improvements, even in the form of managed lanes, traffic that already wants to use I-70 will now have the ability to use the facility and not divert to the local streets. Overall, all of the Build Alternatives process similar volumes throughout the day. Improving traffic on I-70 results in drivers choosing to use I-70 instead of the local roadways to travel through the study area.

Future I-70 traffic

I-70 has very limited reserve capacity based on the current number of lanes on the highway. Improving I-70 through the addition of more lanes (general purpose or managed) results in more drivers using I-70 instead of the local roadways to travel through the study area.

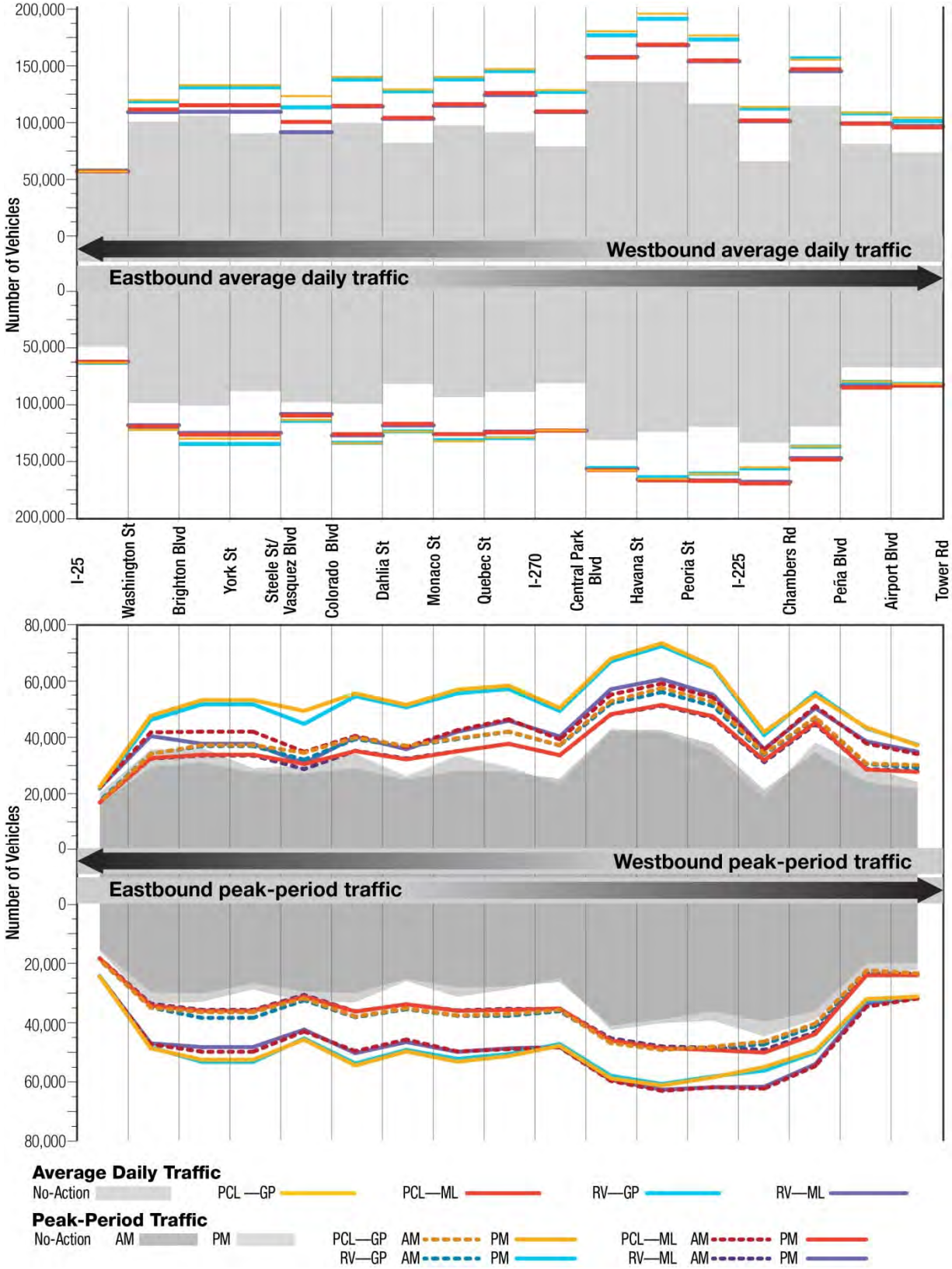
All of the Build Alternatives show the ability to process an equal amount of traffic on I-70. As a performance measure, traffic volume on I-70 is not a distinguishing factor between the alternatives.

Exhibit 4-24 No-Action Alternative, I-70 Volumes



Source: No-Action (2035) DynusT model

Exhibit 4-25 Build Alternatives, I-70 Volumes



Source: Build (2035) Alternatives DynusT models

4.7.2 Future 46th Avenue and Stapleton Drive North/South traffic volumes

Exhibit 4-26 displays the projected daily and peak-period volumes on 46th Avenue and Stapleton Drive North/South for the No-Action Alternative compared to the existing conditions. Without improvements to I-70, traffic volumes on all segments of these roadways nearly double compared to the existing conditions. Much of this increase is likely due to drivers trying to bypass the increased levels of congestion on I-70 by using the closest parallel alternate route. It is likely that short trips between adjacent interchanges are using local streets to avoid I-70 congestion. Increased traffic on the local roads will have a negative effect on neighborhood residents' quality of life and will expose pedestrians and bicyclists to more vehicular traffic at all crossing locations.

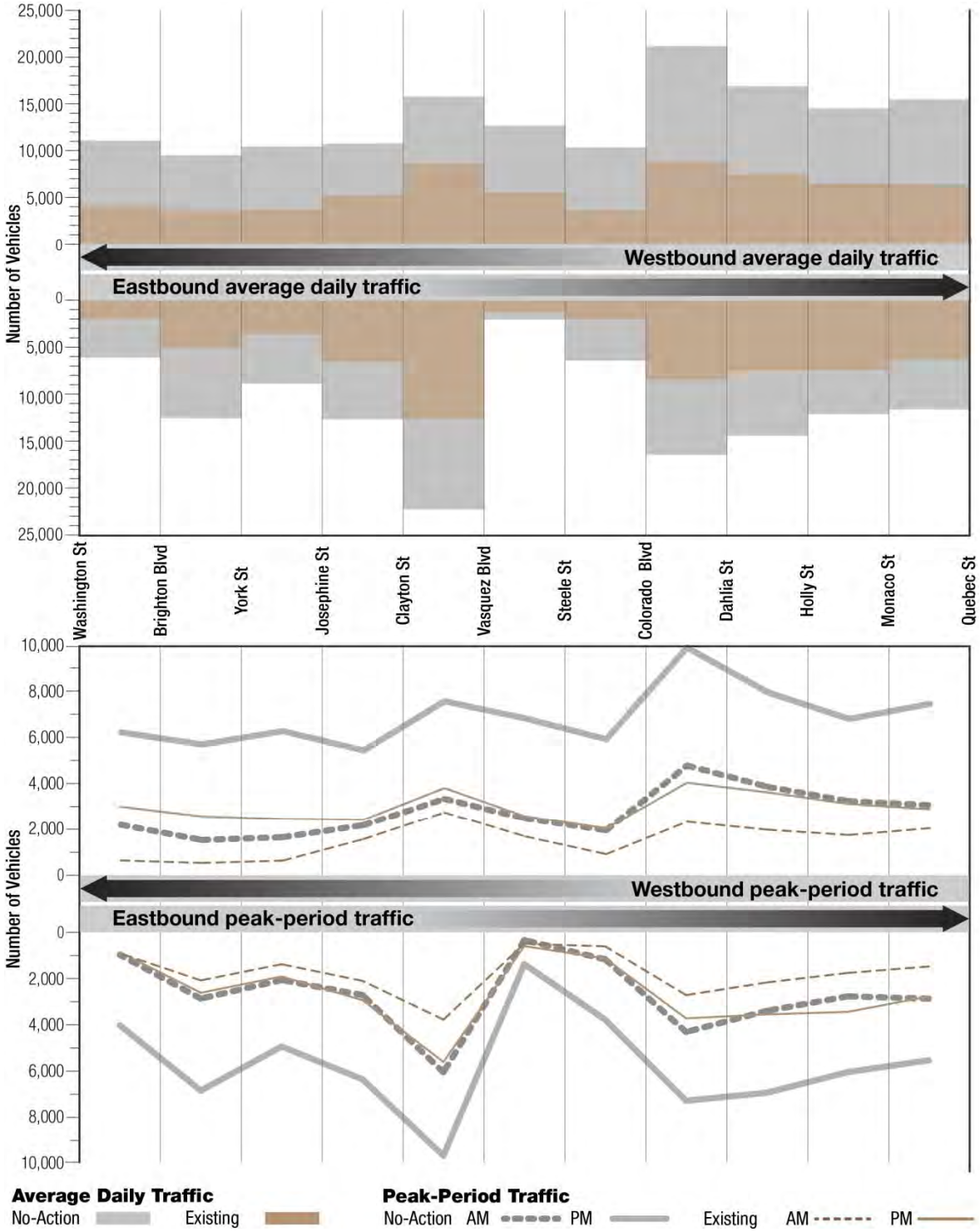
Exhibit 4-27 shows the daily and peak-period volumes projected to use 46th Avenue and Stapleton Drive North/South for the Build Alternatives compared to the No-Action Alternative. In general, most segments of the roadways experience a decrease in traffic compared to the No-Action Alternative. The segments around Steele Street/Vasquez Boulevard and Colorado Boulevard that experience increases are primarily due to the split-diamond ramp configuration at these interchanges. Similarly, the segments to the east and west of Holly Street also see an increase due to the interchange ramps being moved to this location. Overall, a reduction in congestion on I-70 results in drivers using I-70 for more trips, which reduces the traffic on the local streets.

46th Avenue future traffic

As congestion increases on I-70, more drivers choose to use the local streets, affecting residents' quality of life and exposing pedestrians and bicyclists to more vehicular traffic at crossing locations. An improved I-70 encourages drivers to use I-70 instead of the local streets.

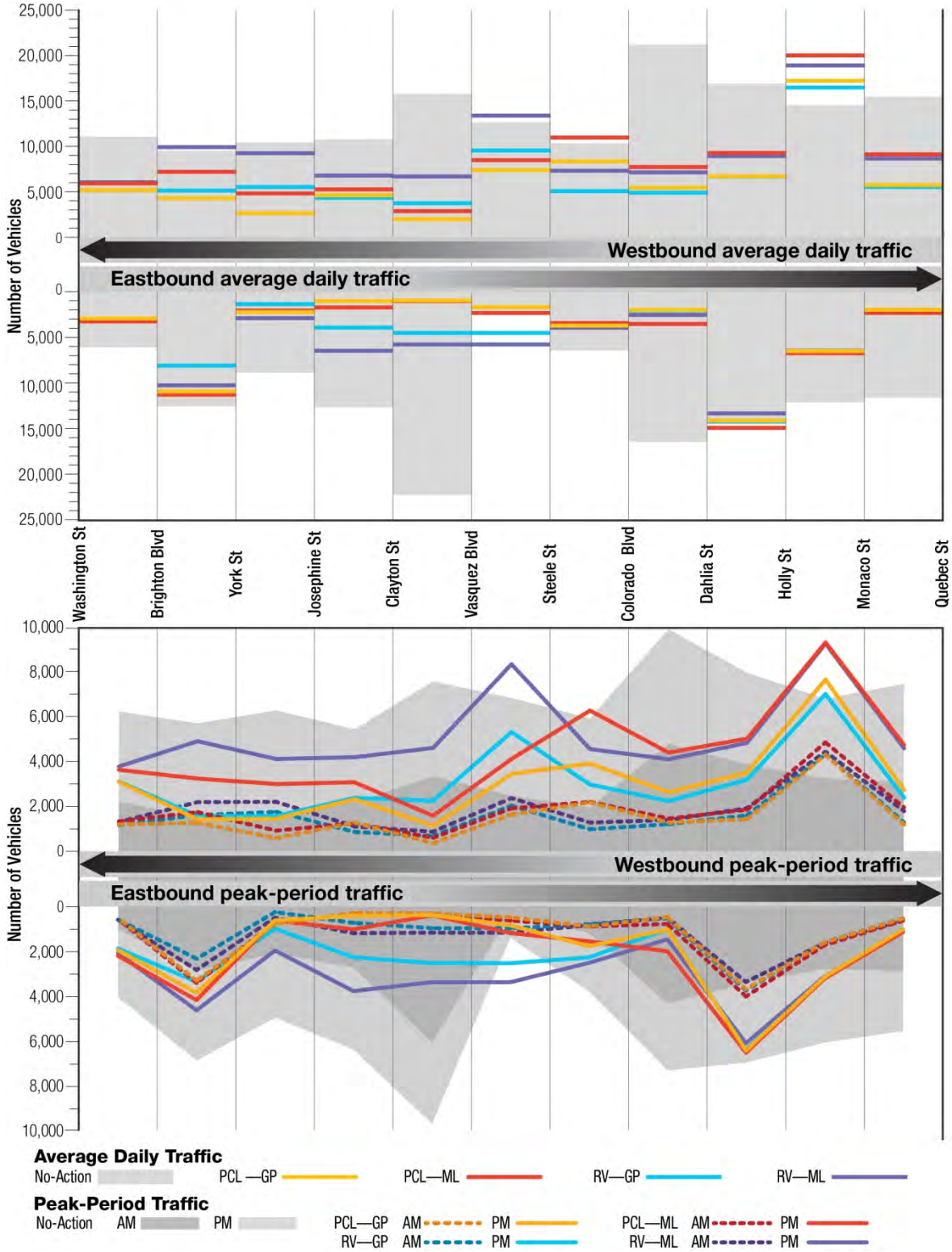
For the most part, all of the Build Alternatives show lower volumes on 46th Avenue and Stapleton Drive North/South. As a performance measure, traffic volume on these roadways is not a distinguishing factor between the alternatives.

Exhibit 4-26 No-Action Alternative, 46th Avenue and Stapleton Drive North/South Volumes



Source: No-Action (2035) DynusT model

Exhibit 4-27 Build Alternatives, 46th Avenue and Stapleton Drive North/South Volumes

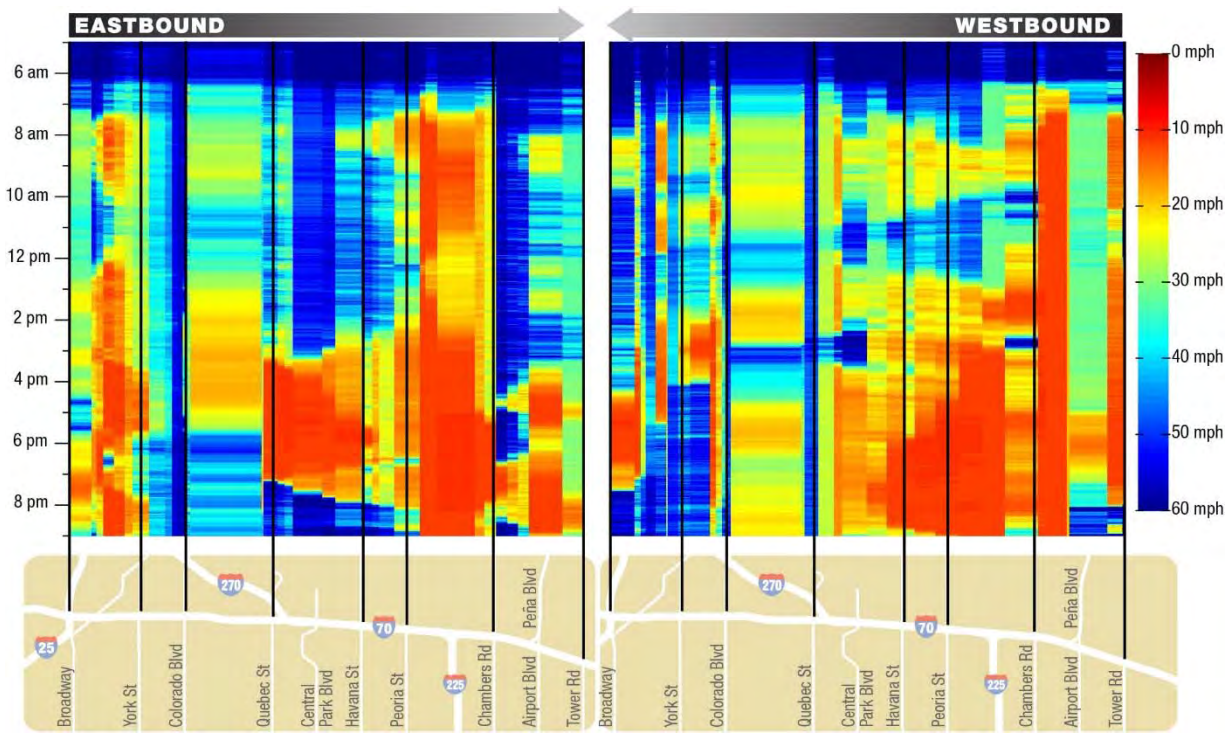


Source: Build (2035) Alternatives DynusT models

4.7.3 Future I-70 average speeds

Exhibit 4-28 displays the No-Action Alternative average speeds for eastbound and westbound I-70. Both directions of I-70 will experience longer periods of congestion and reduced speeds throughout the day. This will happen at locations of high merge/diverge movements, such as freeway-to-freeway interchanges or where several ramps occur in a short distance. Speeds as low as 10 mph will be common in both directions during the peak periods and speeds below 45 mph will be typical for most of the day for both directions. The increase in traffic volumes on I-70 will result in congestion for long periods of the day and on more segments of the highway compared to existing conditions. The increase in I-70 congestion will result in drivers using parallel local streets within the study area.

Exhibit 4-28 No-Action Alternative Average Speeds



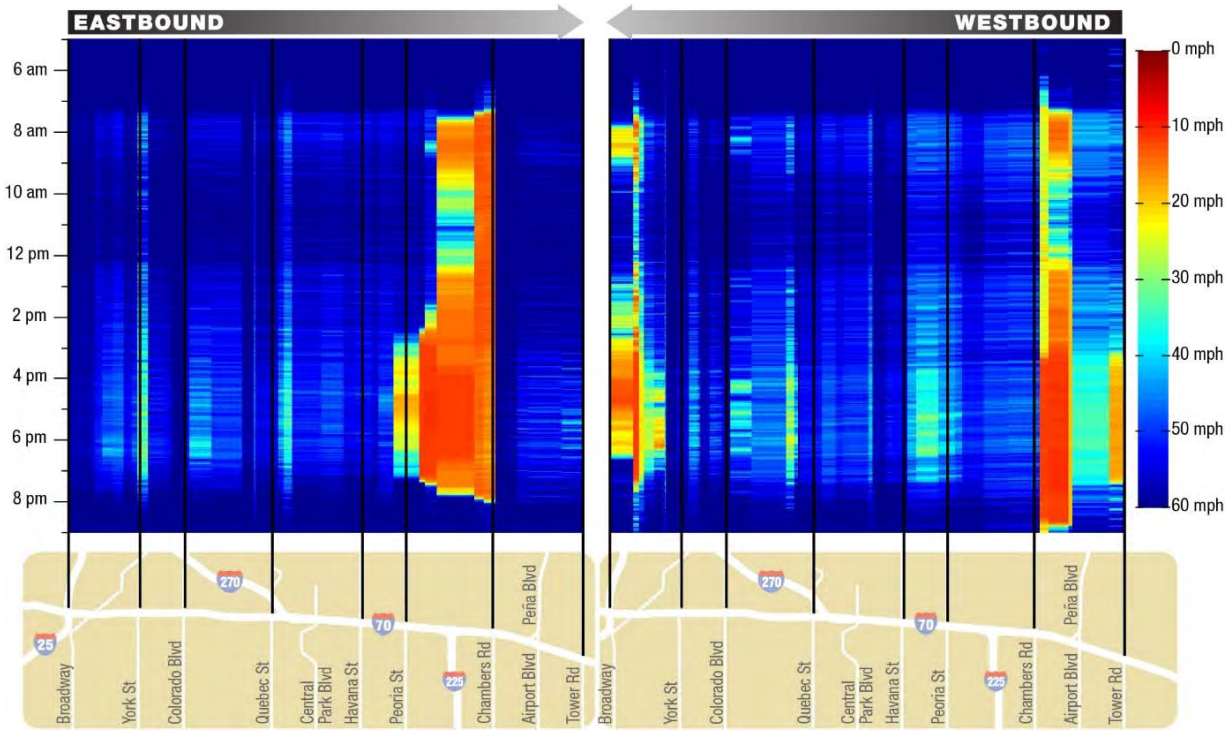
Source: No-Action (2035) DynusT model

Exhibit 4-29 to **Exhibit 4-32** display the average speeds on I-70 for the Build Alternatives and all of their design options. For the Managed Lanes Option, the figures display the average speeds for vehicles using the general-purpose lanes only. In general, all of the Build Alternatives show less congestion throughout the day compared to the No-Action Alternative. The following describes what will occur for the

General-Purpose Lanes Option, as shown in **Exhibit 4-29** to **Exhibit 4-30**:

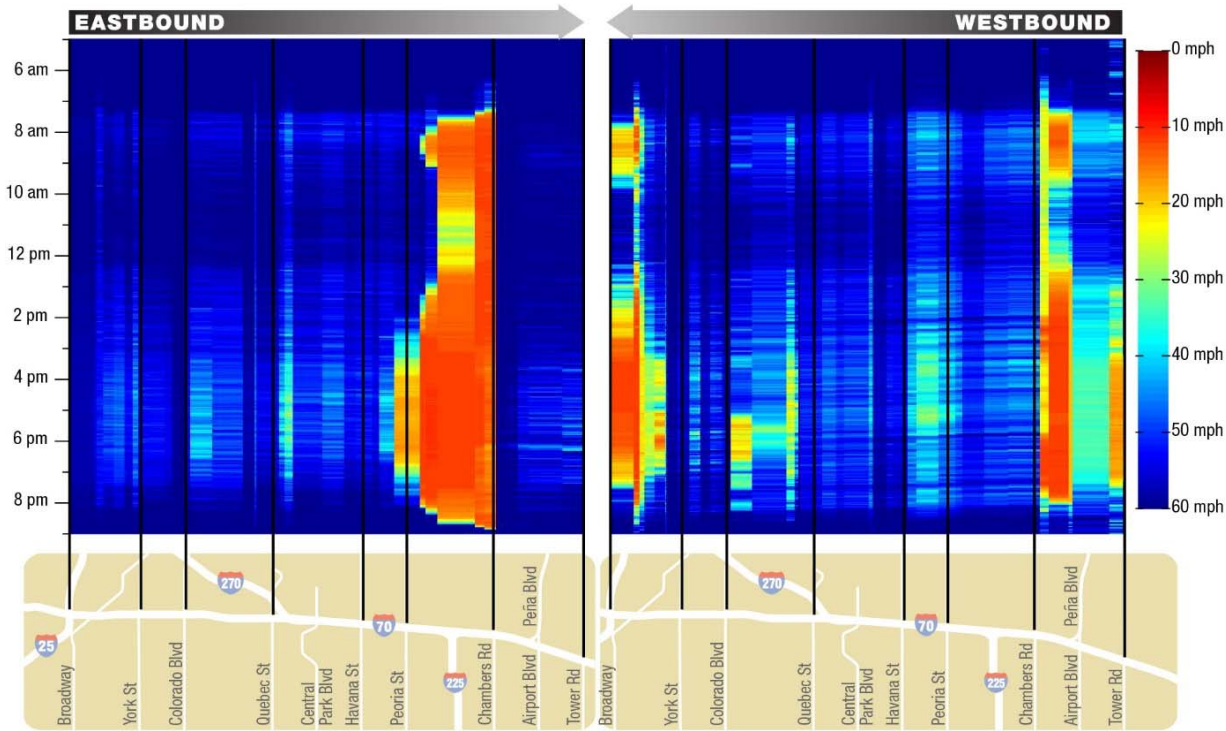
- Westbound congestion will continue to exist during the morning peak in the area between the Peña Boulevard on-ramp and the I-225 off-ramp. Congestion will persist around the I-270 diverge area, although it will be less intense than the No-Action Alternative, with speeds remaining above 40 mph for the most part. Congestion also will continue for most of the day near I-25 since I-70 only has two lanes through this interchange area. Overall, the westbound heat diagrams show similar characteristics to each other for the entire day.
- For eastbound trips, vehicles are encountering less overall congestion than with the No-Action Alternative. There is still congestion between I-270 and I-225 during the morning and evening peak periods, but the duration and intensity is reduced. Overall, the eastbound heat diagrams show similar characteristics in the morning and early afternoon hours.

Exhibit 4-29 I-70 Average Speeds for Revised Viaduct Alternative, General-Purpose Lanes



Source: Build (2035) Alternative DynusT models

Exhibit 4-30 I-70 Average Speeds for Partial Cover Lowered Alternative, General-Purpose Lanes



Source: Build (2035) Alternative DynusT models

The average speeds for the Managed Lanes Option depicted in the following figures are for the general-purpose lanes only. The managed lanes will be priced to operate at or above 45 mph for most of the day. The following describes what will occur for the Managed Lanes Option, as shown in **Exhibit 4-31** and **Exhibit 4-32**:

- The average speeds during the day are lower compared to the General-Purpose Lanes Option. This is because there are fewer general-purpose lanes in the Managed Lanes Option, so they become congested more easily.
- Overall, the westbound heat diagrams show similar characteristics to each other for the entire day. The peak spreading that occurs due to the addition of managed lanes results in shorter periods of congestion more frequently throughout the day as compared to the General-Purpose Lanes Option.

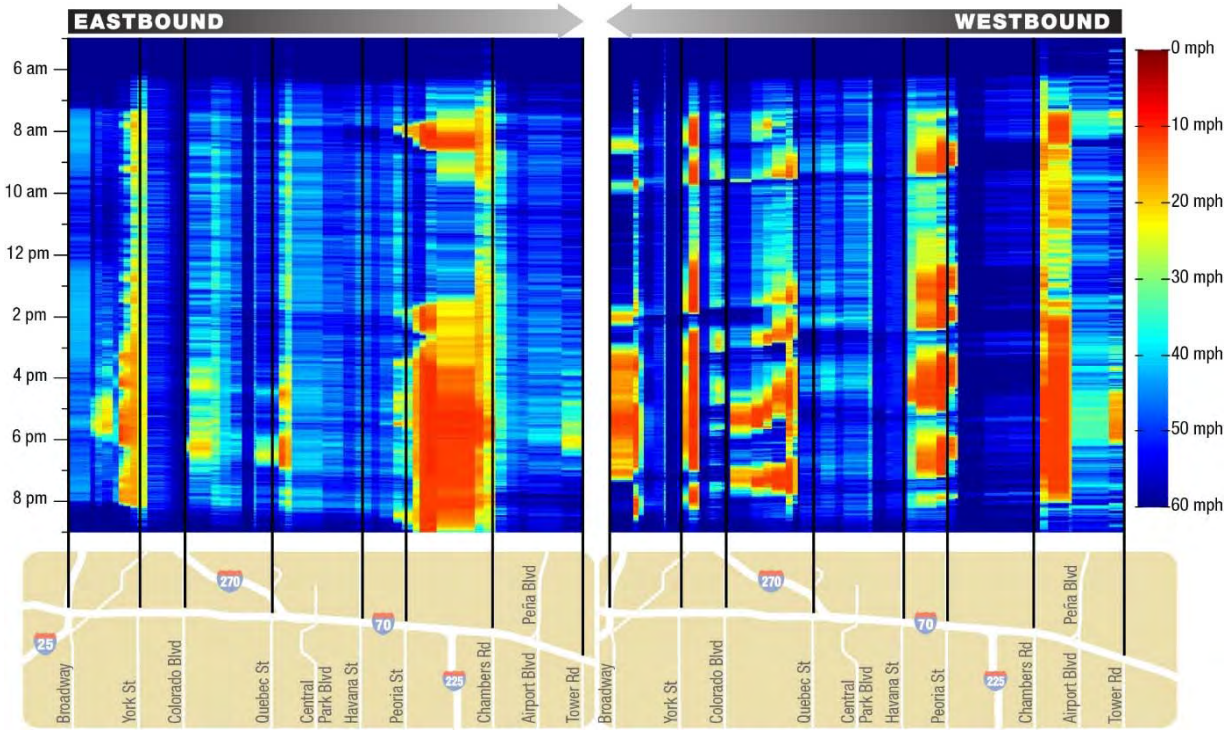
Peak spreading

The Managed Lanes Option has fewer general-purpose lanes. If drivers do not alter their departure times, the congestion in the general-purpose lanes will result in high demand for the managed lanes. The result will be higher prices in the managed lanes. As a result, managed lanes will impact driver travel behavior, resulting in a spreading out of demand over the day so that pricing can remain reasonable.

The managed lanes result in a cyclic pattern of drivers choosing to use the managed lanes to avoid congestion in the general-purpose lanes and drivers using the general-purpose lanes to avoid high prices in the managed lanes. This results in general-purpose lanes experiencing shorter periods of congestion that are less intense overall, but cyclic through-out the day.

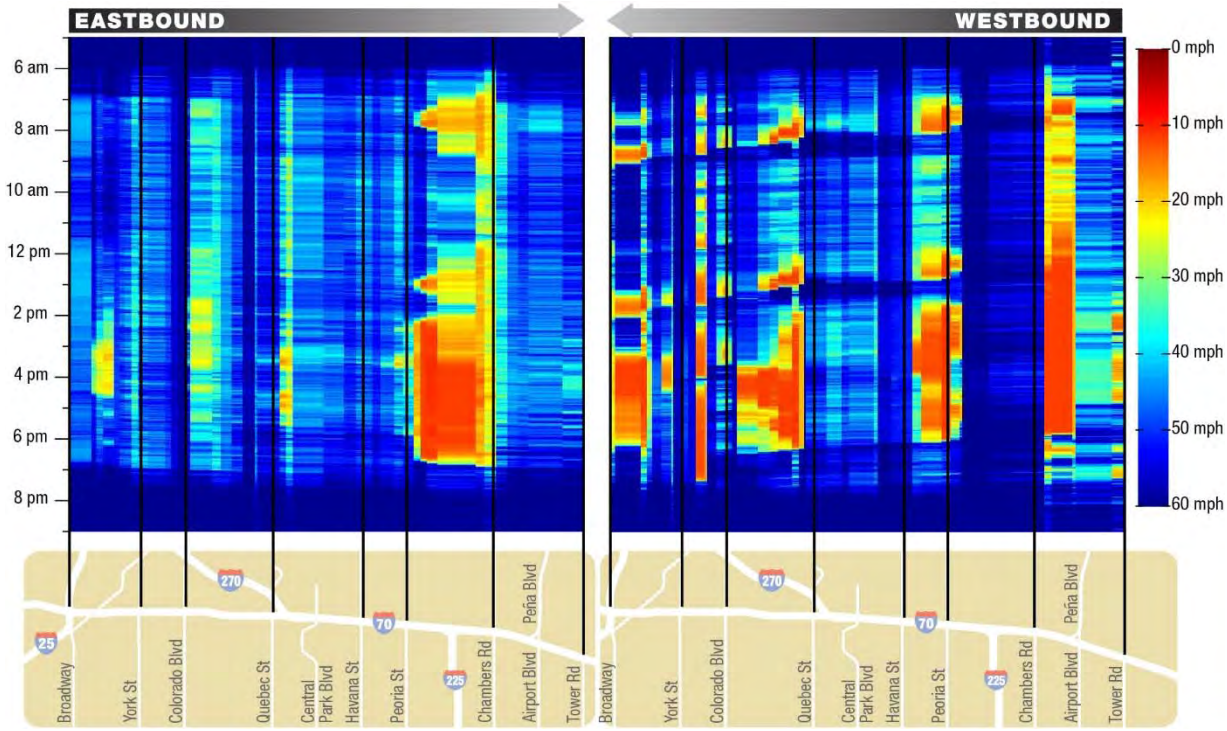
- For eastbound trips, the Managed Lanes Option continues to encounter congestion in the area between I-225 and Chambers Road, due to the high number of merge/diverge movements and the lack of additional general-purpose lanes in this area. Overall, the eastbound heat diagrams show similar traits to each other, exhibiting a cyclic pattern that is consistent with the prices in the managed lanes fluctuating up and down as demand for these lanes changes throughout the day.

Exhibit 4-31 I-70 Average Speeds for Revised Viaduct Alternative, Managed Lanes



Source: Build (2035) Alternative DynusT models

Exhibit 4-32 I-70 Average Speeds for Partial Cover Lowered Alternative, Managed Lanes



Source: Build (2035) Alternative DynusT models

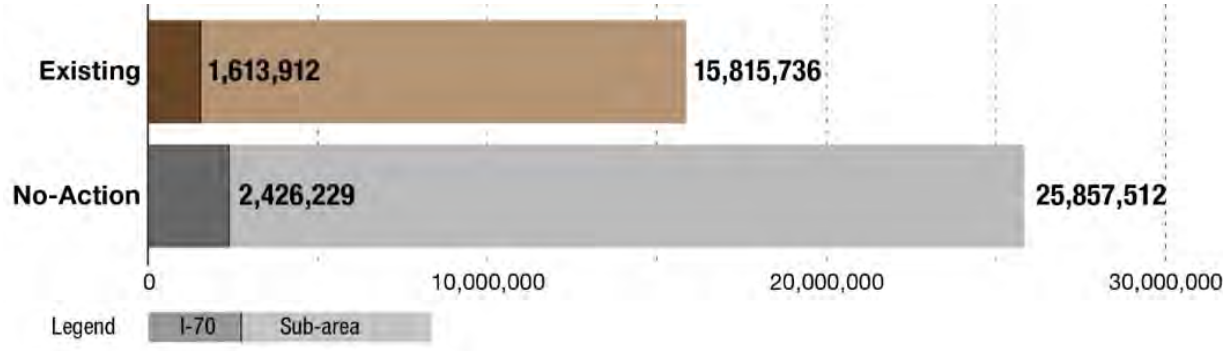
4.7.4 Future VMT

Exhibit 4-33 compares the No-Action Alternative daily VMT to existing conditions for vehicles using I-70, as well as all vehicles within the DynusT model sub-area. VMT in the No-Action Alternative increases by more than 60 percent for the DynusT model sub-area and by approximately 50 percent for I-70 when compared to existing conditions. In the No-Action Alternative, I-70 accounts for slightly more than nine percent of the DynusT model sub-area VMT—this is about one percent less than existing conditions. The figure demonstrates that more traffic will use local streets because of increased congestion on I-70.

VMT

VMT—calculated by multiplying the number of vehicles using an entire system or an individual roadway by the distance they travel—is a common measure of highway use. The transportation system as a whole will benefit based on how well I-70 is able to account for a larger share of the sub-area VMT.

Exhibit 4-33 VMT, No-Action Alternative



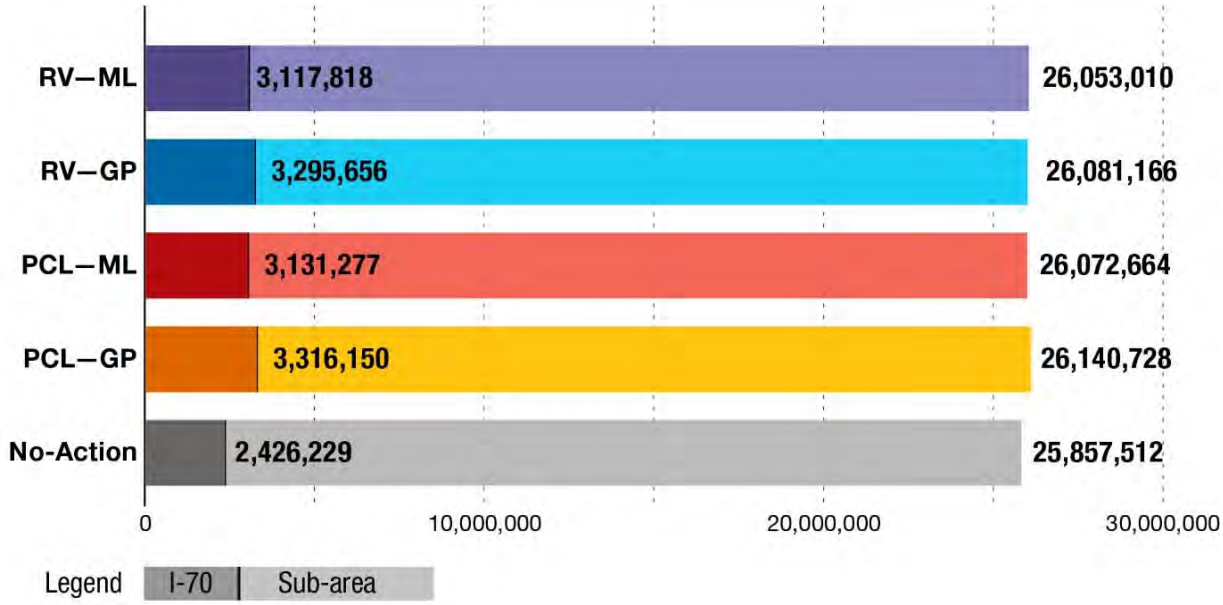
Source: No-Action (2035) DynusT model

Exhibit 4-34 compares the Build Alternatives' daily VMT for the DynusT model sub-area and I-70 to that of the No-Action Alternative. The VMT for the Managed Lanes Option includes the vehicles using the general-purpose and managed lanes on I-70. The General-Purpose Lanes Build Alternatives result in an approximate 35-percent increase in VMT on I-70 while the Managed Lanes Options increase VMT less than 30 percent on I-70.

The VMT for the entire sub-area changes by less than one percent for all Build Alternatives. This means that while overall traffic increases in the Build Alternatives, more traffic is accommodated on I-70 and less traffic uses local streets compared to the No-Action Alternative.

Much of the increase in VMT on I-70 for the Build Alternatives within the sub-area compared to No-Action is due to I-70 attracting trips off of the local street network. These trips are diverting from the local streets and traveling north or south to reach I-70, which results in longer trips increasing sub-area VMT. For example, a trip that was traveling north on Colorado Boulevard and then going east-west on Smith Road is now traveling the extra distance to reach I-70 and then complete the east-west trip. Also, I-270 in the future is extremely congested and this is resulting in some trips using I-70 instead (increasing I-70 VMT), which again results in longer trips to reach I-70 (increasing sub-area VMT) from the north (some using I-25 south to I-70) before going east-west.

Exhibit 4-34 VMT, Build Alternatives



Source: Build (2035) Alternatives DynusT models

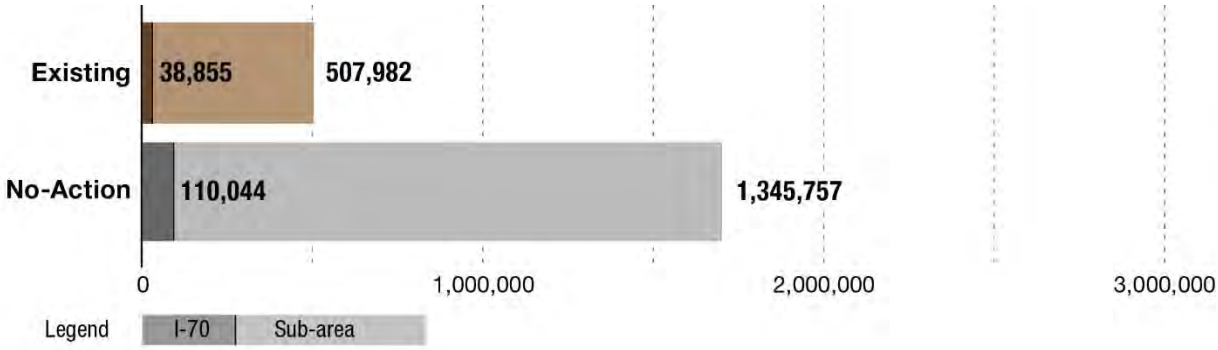
4.7.5 Future VHT

Exhibit 4-35 displays the daily DynusT model sub-area and I-70 VHT for the No-Action Alternative and existing conditions. Without any improvements to I-70, the No-Action Alternative daily VHT increases by more than 160 percent for the DynusT model sub-area, and I-70 will experience an increase of nearly 200 percent compared to the existing conditions. The increase in VHT indicates higher overall levels of congestion throughout the study area because of more traffic on I-70 and the local streets.

VHT

VHT represents the total vehicle hours expended traveling in a specified area during a defined period. As congestion increases, VHT will increase, since it will take drivers longer to travel to their destinations.

Exhibit 4-35 VHT, No-Action Alternative



Source: No-Action (2035) DynusT model

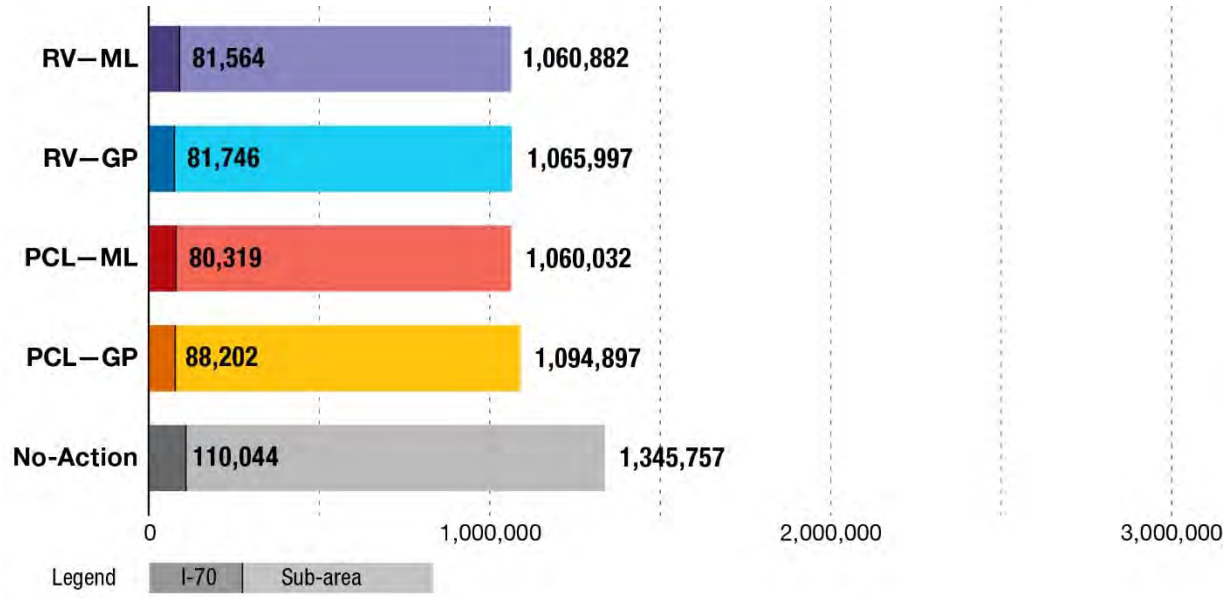
Exhibit 4-36 compares the Build Alternatives' daily VHT for the DynusT model sub-area and I-70 to that of the No-Action Alternative. The VHT for the Managed Lanes Option includes the drivers using the general-purpose and managed lanes on I-70. All of the Build Alternatives result in lower overall VHT for both the DynusT model sub-area and I-70. The General-Purpose Lanes Option reduces VHT on I-70 by 19 percent to 25 percent and by 18 percent to 21 percent across the entire DynusT model sub-area. The Managed Lanes Option has larger reductions in VHT of about 27 percent for I-70 and about 21 percent for the DynusT model sub-area.

VMT/VHT

The Build Alternatives result in more I-70 trips occurring in less time. This is an indication that more drivers are choosing to use I-70 for travel within the study area because of reduced congestion.

Overall, the reduction in congestion results in less time spent traveling within the study area and on I-70. Looking at both VMT and VHT together indicates that more trips occur in less time with the Build Alternatives.

Exhibit 4-36 VHT, Build Alternatives



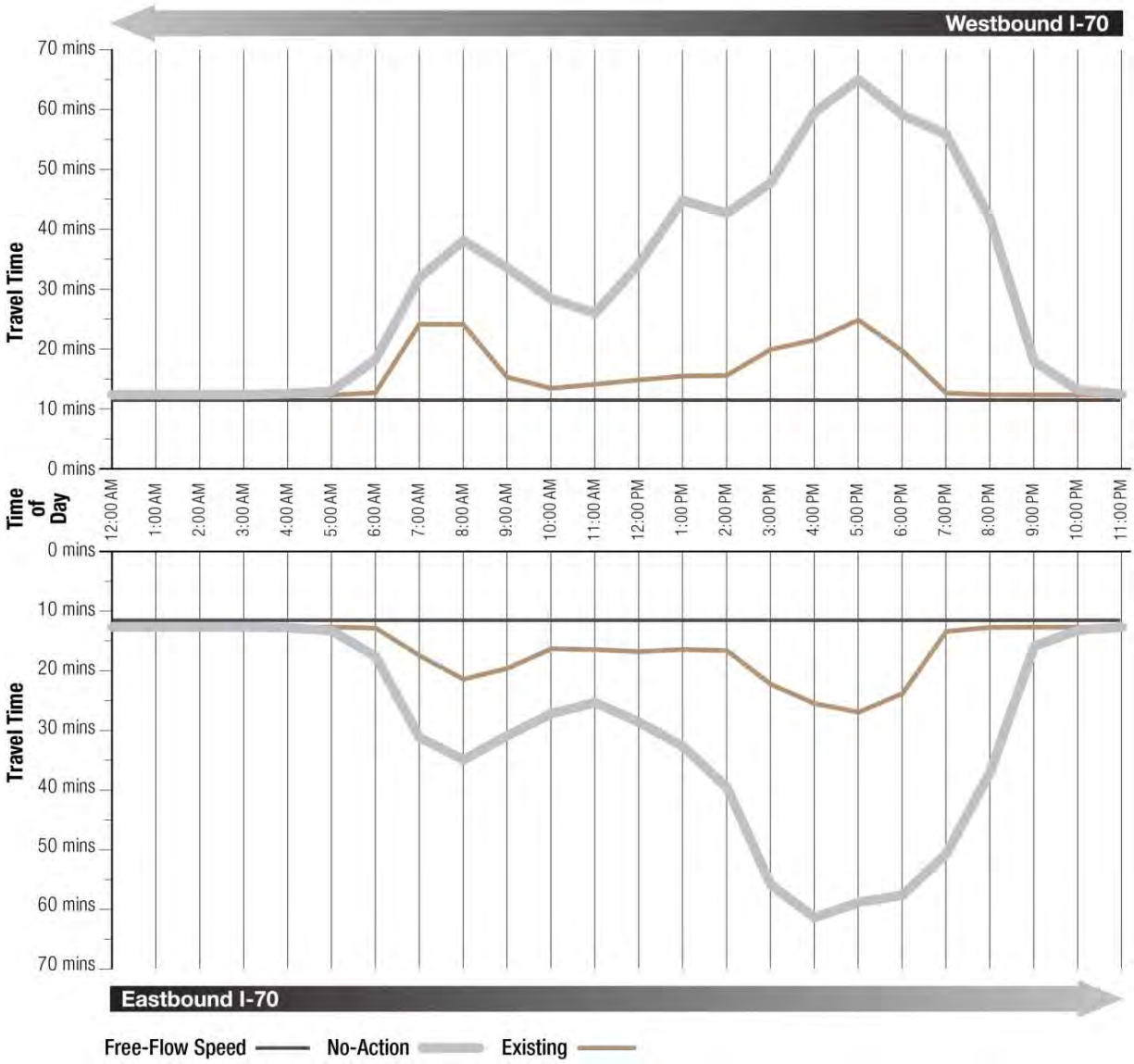
Source: Build (2035) Alternatives DynusT models

4.7.6 Future I-70 travel times

Exhibit 4-37 shows the No-Action Alternative travel times for I-70 between I-25 and Tower Road compared to the existing conditions and free-flow conditions. Travel times for westbound I-70 increase to about 40 minutes during the morning peak period and 65 minutes during the evening peak period, which is triple the current time. Eastbound travel times increase in the morning peak period to 35 minutes and in the evening peak period to about 60 minutes,

which is double the current travel times. The travel times show that the peak periods occur over more hours of the day with higher levels of congestion and longer delays in the future.

Exhibit 4-37 No-Action Alternative, I-70 Travel Times



Source: No-Action (2035) DynusT model

Exhibit 4-38 shows the Build Alternatives' travel times compared to the No-Action Alternative. For the Managed Lanes Option, a driver can choose to make a trip through the study area by using either general-purpose lanes, managed lanes, or a combination of the two. The aforementioned exhibit contains two lines for each of the alternatives that have managed lanes: (1) a dashed line that represents the travel time for vehicles that use only managed lanes to go

from I-25 to Tower Road or vice-versa, and (2) a solid line that represents a vehicle that makes the same trip using only general-purpose lanes. This represents the best- and worst-case scenarios, but many travelers will likely experience travel times between these two extremes. The current analysis focuses on travel times for trips going from end to end of the study area within a single lane type.

All of the Build Alternatives have lower travel times during the peak periods. The General-Purpose Lanes Option continues to have distinct morning and evening peak periods, but the additional lanes on I-70 result in shorter overall peak periods and times (ranging from 19 minutes to 32 minutes) compared to the No-Action Alternative (ranging from 35 minutes to 65 minutes). The Managed Lanes Option tends to have lower overall peak-period travel times in the general-purpose lanes as compared to the No-Action Alternative (ranging from 21 minutes to 40 minutes), but the peak periods occur over more hours of the day compared to the General-Purpose Lanes Option. This is because drivers will change their travel behaviors by making trips at different times of the day to avoid paying tolls and because there are fewer general-purpose lanes on I-70. As a result, trips are spread out over more hours of the day and the managed lanes will operate more reliably at lower toll rates.

Improved I-70 travel times

The Managed Lanes Option tends to have lower overall peak travel times, but the peaks are spread out over more hours of the day. Overall, travel times in the managed lanes are nearly the same as the free-flow travel times, while the adjacent general-purpose lanes experience delay within the same alternatives.

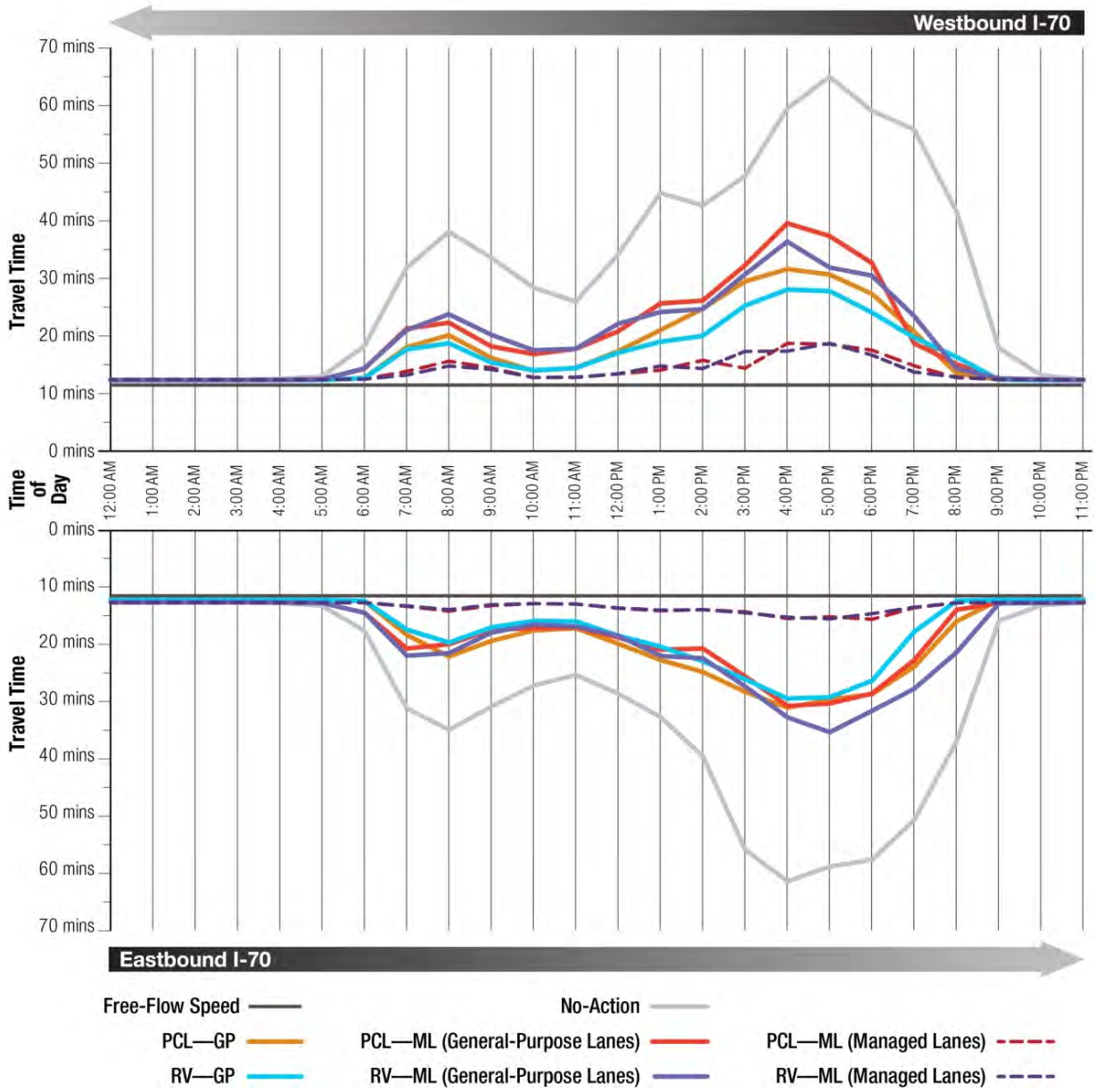
Travel times indicate that all of the Build Alternatives provide a benefit to the operations of I-70, with the Managed Lanes Option generally providing more benefit throughout the day.

4.7.7 Future 46th Avenue and Stapleton Drive North/South travel times

Exhibit 4-39 presents the results of the No-Action Alternative travel times for 46th Avenue and Stapleton Drive North/South compared to existing conditions. Without improvements to I-70, the travel times for these roadways nearly double during the evening peak period. All trips on 46th Avenue and Stapleton Drive North/South between about 8:00 a.m. and 10:00 p.m. (about 14 hours of the day) experience longer trip times under the No-Action Alternative. Drivers are using these parallel local streets to avoid congestion on I-70.

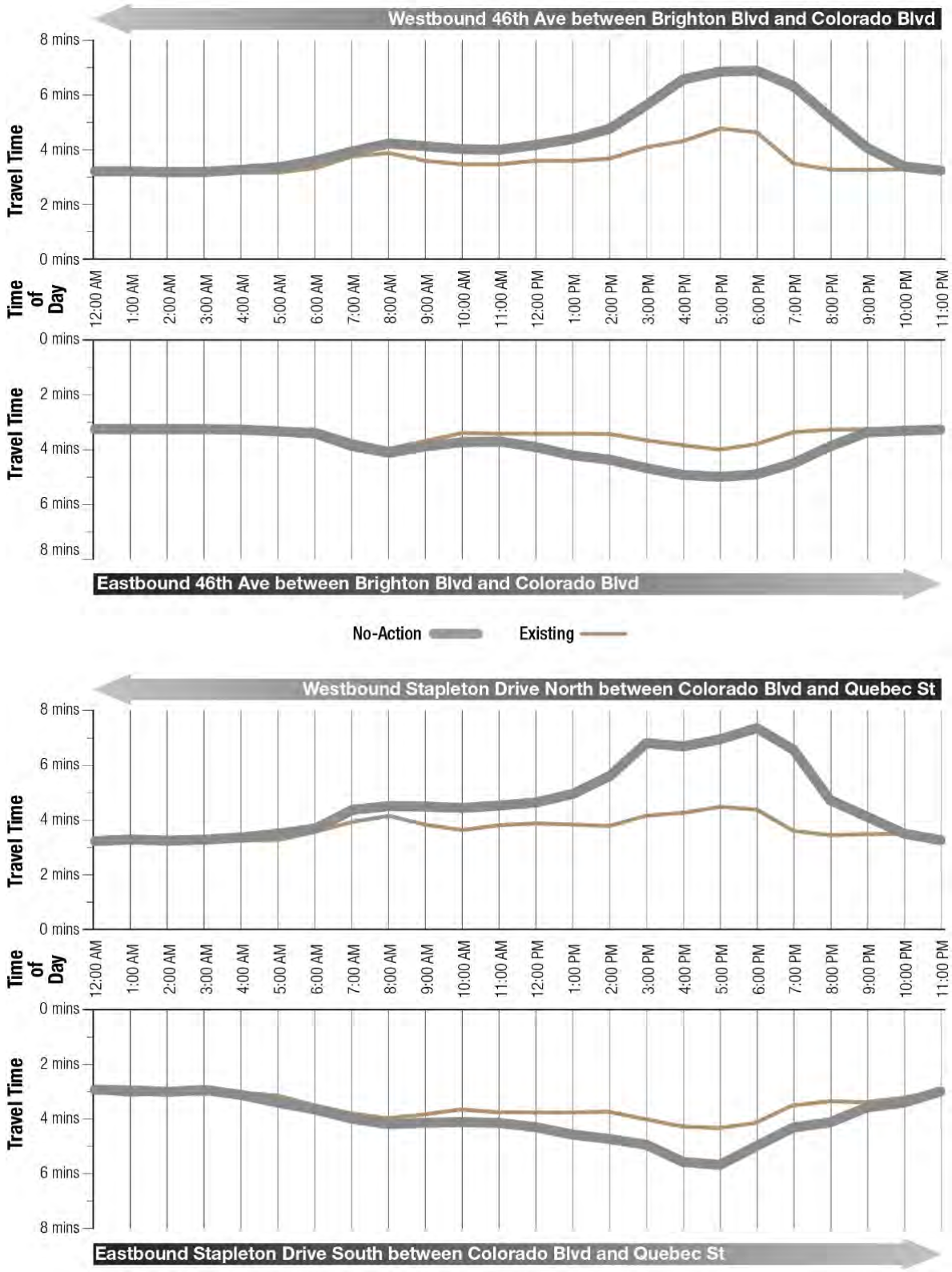
Exhibit 4-40 displays the Build Alternatives' travel times for 46th Avenue and Stapleton Drive North/South compared to the No-Action Alternative. In general, improvements to I-70 reduce the number of vehicles using these roadways, which results in travel times that are very similar to or lower than those of the No-Action Alternative.

Exhibit 4-38 Build Alternatives, I-70 Travel Times



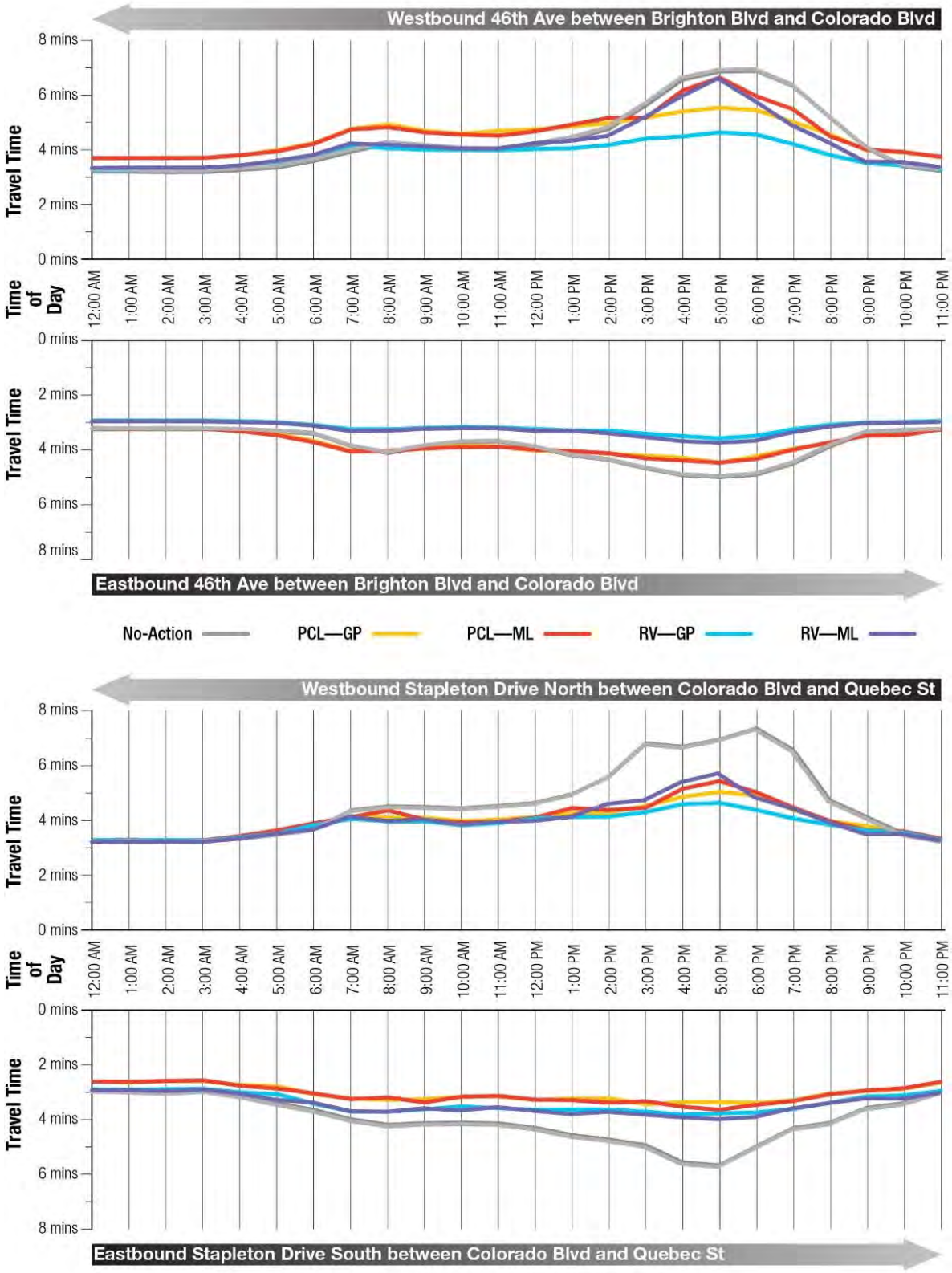
Source: Build (2035) Alternatives DynusT models

Exhibit 4-39 No-Action Alternative, 46th Avenue and Stapleton Drive North/South Travel Times



Source: No-Action (2035) DynusT model

Exhibit 4-40 Build Alternatives, 46th Avenue and Stapleton Drive North/South Travel Times



Source: Build (2035) Alternatives DynusT models

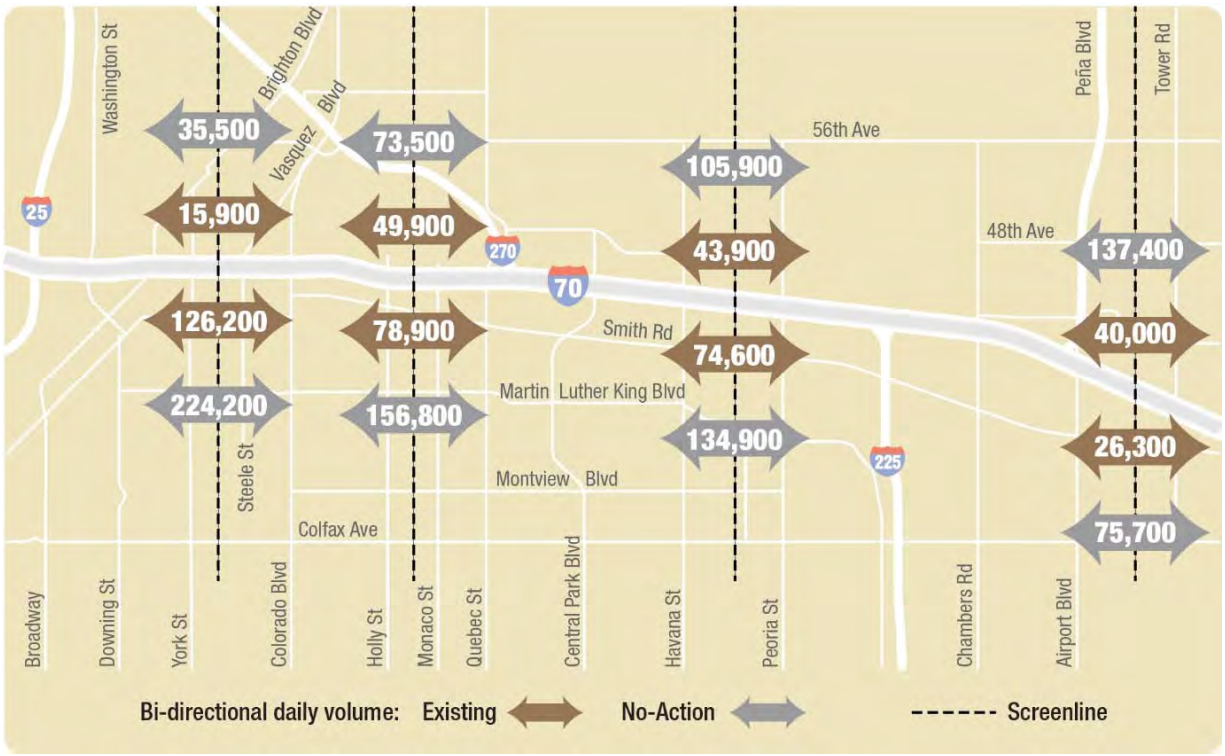
4.7.8 Future east-west screenline volumes

Exhibit 4-41 shows the east-west volumes crossing the screenlines for the No-Action Alternative compared to existing conditions. Traffic using local streets traveling east and west within the study area doubles—and it even triples in some areas. While some of this increase can be associated with natural growth in traffic, the large increases are consistent with drivers avoiding congestion on I-70 by using parallel local streets.

Local street traffic

The Build Alternatives reduce congestion on I-70, resulting in more drivers using the highway for east-west trips. This alleviates congestion on local roads.

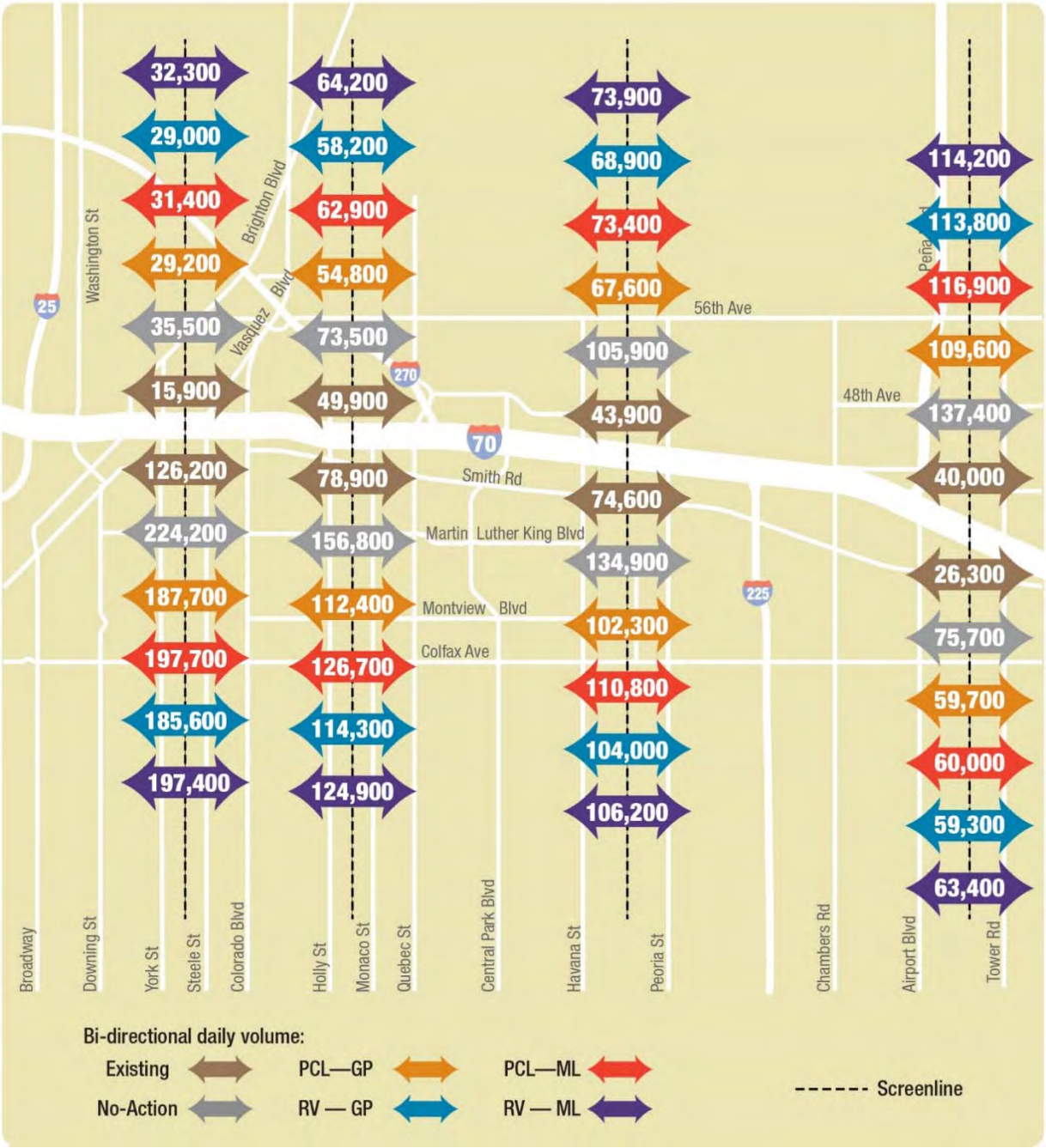
Exhibit 4-41 No-Action Alternative, Screenline Volumes



Source: No-Action (2035) DynusT model

Exhibit 4-42 displays the screenline volumes for the Build Alternatives compared to the No-Action Alternative. All of the Build Alternatives result in lower traffic volumes crossing the screenlines.

Exhibit 4-42 Build Alternatives, Screenline Volumes



Source: Build (2035) Alternatives DynusT models

4.7.9 Travel time reliability

The ability to preserve capacity and provide reliable travel times is the main purpose for including managed lanes on a highway. The operating speed of managed lanes must be sufficiently higher than the nearby general-purpose lanes for drivers to perceive a benefit and choose to pay a toll to use the managed lanes. Operating speeds above 45 mph in the managed lanes for all hours of the day ensure drivers a reliable trip time for which they are willing to pay. DynusT dynamically assigns vehicle trip paths based on a person's value of time, current travel times for all possible paths between a particular origin and destination, and the current toll in the managed lane. The value of time is a fixed function within the model, but the other two factors can vary based on prevailing traffic conditions and a set of pre-defined managed lane criteria.

One criterion allowed DynusT to vary the price of the managed lanes based on the level of congestion (congestion pricing) within the managed lanes. The congestion pricing was controlled by establishing a minimum price of $0.25 per car or $40.00 per truck. The maximum toll was set at $20.00 per car ($60.00 per truck). DynusT uses an algorithm to determine if a driver will choose to use the managed lanes based on the estimated travel time it will take to complete the desired trip given current and projected congestion on I-70, the value of time, and the current toll rate. As operations begin to deteriorate in the general-purpose lanes, more drivers will choose to use the managed lanes, which will decrease the average travel speeds in the managed lanes, triggering an increase in the toll price. The toll price increases or decreases depending on traffic demand in the managed lanes so that an operating speed at or above 45 mph is maintained in the managed lanes at all times. Overall, the goal is to provide reliable trip times by preserving the capacity of the managed lanes through congestion pricing.

The managed lanes are about 12 miles long in each direction. A travel time of 16 minutes or less from end to end equates to operating speeds of 45 mph or greater. The Build Alternatives maintain an average operating speed of 45 mph or greater (in both directions) between 79 percent (19 hours) and 88 percent (21 hours) of the day.

Reliable travel times

Managed lanes provide the ability to change their price so that the volume of traffic using the managed lanes is able to travel at higher speeds. Even as the adjacent general-purpose lanes become congested, drivers can choose to use the managed lanes to complete trips in a consistent amount of time regardless of the time of day or traffic conditions on the roadway.

4.8 Summary of transportation impacts and mitigation measures

Evaluation of the impacts on mobility and access needs of the study area for the No-Action Alternative and the Build Alternatives has considered the effectiveness of the improvements on traffic operations and safety on I-70, impact on access and circulation needs on the local streets in the vicinity of I-70, and impact on the other transportation facilities in the study area (transit, freight, and bicycle/pedestrian). **Exhibit 4-43** provides a summary of transportation impacts and mitigation.

Generally, any of the Build Alternatives will improve I-70 operations compared to the No-Action Alternative, due to the addition of new lanes, improvement to ramps, addition of auxiliary lanes, improvements to roadways, and modification of interchanges to better facilitate traffic movements. Implementation of managed lanes will provide additional benefits to operations of I-70 as a whole, will preserve capacity on I-70, and will provide reliable travel times. The general-purpose lanes in these alternatives will operate slightly less efficiently than the managed lanes.

The removal of the York Street interchange in all Build Alternatives and changes to the Steele Street/Vasquez Boulevard and Colorado Boulevard interchanges will have an impact on circulation and an increase in traffic on some of the local streets in the vicinity of these changes.

Freight service within and through the study area via rail will have minimal impacts, as none of the existing rail lines will be severed by I-70 improvements. Through-truck freight movements will be improved by the added capacity and improved safety of all Build Alternatives. CDOT will coordinate with Denver to define future truck routes due to changes in interchanges at York Street, Steele Street/Vasquez Boulevard, and Colorado Boulevard.

None of the Build Alternatives will adversely affect any of the existing or planned transit or bicycle/pedestrian facilities in the study area. All of the Build Alternatives improve pedestrian/bicycle facilities through the construction of sidewalks, addition of ramps, and the addition of a cover over I-70 in the Partial Cover Lowered Alternative. Access to the managed lanes could improve transit operations and reliability.

Exhibit 4-43 Summary of Transportation Impacts and Mitigation

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
All Alternatives	Temporary road closures and traffic detours may have impacts on access to certain public services	• Coordinate with RTD for phasing of improvements to minimize disruptions to transit operations • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Coordinate with UPRR, BNSF, and DRIR for phasing of improvements to minimize disruptions to railroad operations • Coordinate with Denver to determine appropriate truck routes on city streets
No-Action Alternative	Adverse effects to mobility, access, safety, and operations since no changes to capacity, interchanges, or other facilities will be made	
Revised Viaduct Alternative	• Improved pedestrian/bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, addition of auxiliary lanes, improvements to roadways, and modification of interchanges • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Partial Cover Lowered Alternative	• Improved pedestrian/bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, addition of auxiliary lanes, improvements to roadways, and modification of interchanges • Temporary impacts to rail facilities will result from the construction of railroad bridge structures and/or the relocation of track operations • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Managed Lanes Option (option to Build Alternatives)	Improved transportation operations, preservation of transportation capacity, and the ability to provide reliable travel times	

CHAPTER 5: AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION

This chapter discusses the affected environment and environmental impacts from the construction and operation of the project alternatives and how these impacts will be mitigated.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, no content-related updates were made.

5.1 Introduction to Chapter 5

Chapter 5 is divided into sections (listed in the text box to the right) discussing various environmental and social resources and how the project alternatives benefit or impact these resources. In addition to the resources listed, the following topics also are discussed in this chapter:

- 5.21 Irreversible and Irretrievable Commitment of Resources
- 5.22 Short-Term Uses and Long-Term Productivity
- 5.23 Summary of Impacts and Mitigations

Each section includes subsections that identify the study area for that resource, discuss how the project alternatives will affect the resource, and provide mitigation measures to offset the adverse impacts. The discussion of impacts begins with those that are common for all alternatives and then moves into the impacts that are specific to each alternative for each resource.

Corresponding technical reports documenting detailed analysis for the following resources covered in Chapter 5 have been included with this document as attachments. The attachments provide technical data and detailed analysis supporting the results provided in this document. Some of these technical reports include an addendum, which updates the analysis that was previously performed in preparing the 2014 Supplemental Draft EIS.

- Environmental justice (Attachment F)
  Environmental Justice Technical Report
  (included in Supplemental Draft EIS)
- Relocations and displacements (Attachment G)
  Conceptual Stage Relocation Technical Report Addendum
- Hazardous materials (Attachment H)
  Hazardous Materials Technical Report Addendum
- Historic preservation (Attachment I, Section 106)
  Section 106 Determinations of Eligibility and Effects Documentation for Finding of Adverse Effect
- Air quality (Attachment J)
  Air Quality Technical Report
- Noise (Attachment K)
  Noise Technical Report

Resources evaluated in Chapter 5

5.2 Social and Economic Conditions
5.3 Environmental Justice
5.4 Land Use and Zoning
5.5 Relocations and Displacements
5.6 Historic Preservation
5.7 Paleontological Resources
5.8 Visual Resources and Aesthetic Qualities
5.9 Parks and Recreational Resources
5.10 Air Quality
5.11 Energy
5.12 Noise
5.13 Biological Resources
5.14 Floodplains and Drainage/ Hydrology
5.15 Wetlands and Other Waters of the U.S.
5.16 Water Quality
5.17 Geology and Soils
5.18 Hazardous Materials
5.19 Utilities
5.20 Human Health Conditions

- Biological resources (Attachment L)
  Biological Assessment Addendum
- Floodplains and drainage/hydrology (Attachment M)
  Hydrology and Hydraulics Addendum
- Wetlands and other waters of the U.S. (Attachment N)
  Wetland Finding
  Wetlands and Other Waters of the U.S. Technical Report Addendum

5.1.1 What is the study area?

In this document, each resource has a specific study area. Those study areas may be the same as the project area or construction limits of the evaluated alternatives depending on the resource. The project area was primarily identified to initiate this study and identify possible project alternatives. **Exhibit 5.1-1** shows the project area, the project limits along I-70, and the construction limits of the proposed alternatives.

Some resources—such as social and economic resources—have a broader study area that includes all the neighborhoods impacted along the corridor, while others—such as utilities—are analyzed within the project's construction limits.

Project area

An approximate one-mile buffer zone around I-70 within the project limits.

Study area

A geographic boundary created to define the extent of the analysis associated with a resource.

Construction limits

The area to which the proposed construction activities for all alternatives is expected to be limited.

Project limits

The east and west boundaries of the project along I-70: I-25 to Tower Road.

Exhibit 5.1-1 Project Area, Project Limits, and Construction Limits

5.1.2 What are the alternatives analyzed in Chapter 5?

The I-70 East Final EIS examines potential effects to environmental resources resulting from proposed improvements to I-70 between I-25 and Tower Road. Consistent with federal regulations, this document fully evaluates potential effects that might result from the No-Action Alternative and the Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative). The alternatives and options are presented in **Exhibit 5.1-2**.

For more details on the alternatives and their options, see Chapter 3, Summary of Project Alternatives.

Exhibit 5.1-2 Summary of Project Alternatives and Options

Alternative		Expansion Options	Operational Options
No-Action		• North • South	N/A
Build Alternatives	Revised Viaduct	• North • South	• General-Purpose Lanes • Managed Lanes
	Partial Cover Lowered	N/A	• General-Purpose Lanes • Managed Lanes

5.1.3 What resources are not affected by the project alternatives?

Data collection for the I-70 East EIS determined that the following resources are not present in the project area, so the alternatives will have no effect on them:

- Prime and unique farmlands
- Wild and scenic rivers

Because these resources are not present in the project area, they are not analyzed or discussed in this document.

5.2 Social and Economic Conditions

This section provides data on the social and economic resources and conditions of the study area and explains why they are important to the project. The impacts of the project alternatives on these conditions also are evaluated, and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- The discussion on human health was moved to become the standalone Section 5.20 in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation.
- Based on the revised construction limits and refined data on the number of impacted housing units, the number of relocations and displacements was revised.
- The economic output from the proposed alternatives was revised.

5.2.1 What are social and economic conditions and why are they important to this project?

The social and economic condition of an area is the combination of various social and economic resources. Social resources generally are qualitative, dynamic, and intangible, while economic resources tend to be quantitative and tangible.

Social resources contribute to the quality of life in each of the neighborhoods along the project corridor and define the character of a neighborhood. The social resources of a neighborhood are important because impacts that may occur from the proposed project may impact the character or livability of a neighborhood. Social resources that contribute to social conditions include neighborhood cohesion, shared community vision and values, transportation resources, and community mixed-use developments. Neighborhood elements that contribute to social resources include schools, churches, parks, shopping, and emergency services.

What is neighborhood character?

Neighborhood character is generally considered to be a combination of the various elements that give a neighborhood its distinct personality. These elements can include land use, visual resources, historic resources, socioeconomic conditions, and other physical or social characteristics.

What is neighborhood cohesion?

Neighborhood cohesion refers to the social interaction or potential for social interaction between or among people within neighborhoods. Cohesion can also refer to the presence or absence of barriers (physical or perceived) that discourage neighborhood interaction across the barrier or physically isolate one section of a neighborhood from the rest.

Economic resources that contribute to the economic conditions in the study area include employment and tax base, businesses, housing, infrastructure and public services, and property values. The economic resources of a neighborhood are important because impacts that may occur from the proposed project may increase or decrease business activity, property values, and tax revenues, thus impacting the community's economic livelihood.

5.2.2 What study area and evaluation process were used to analyze social and economic conditions?

The study area for social and economic conditions only focuses on neighborhoods likely to be impacted by the project alternatives. This study area is based on Denver neighborhood boundaries and a portion of Aurora (Aurora Neighborhood). The updated existing conditions data on social and economic resources and characteristics are presented for the neighborhoods within the study area. The study area for social and economic conditions is shown in **Exhibit 5.2-1**.

The existing conditions data for each of the neighborhoods in the study area were compiled from the U.S. Census Bureau and American Community Survey (ACS) data, site visits, and records from extensive public outreach.

A description of each neighborhood was developed to identify existing neighborhood character (see Section 5.2.3) and summarize transportation facilities, as well as public services and facilities. Summaries of demographic statistics are included in Section 5.2.5 for population growth, age distribution, racial and ethnic composition, Limited English Proficiency (LEP), general housing characteristics, median household income, and low-income populations.

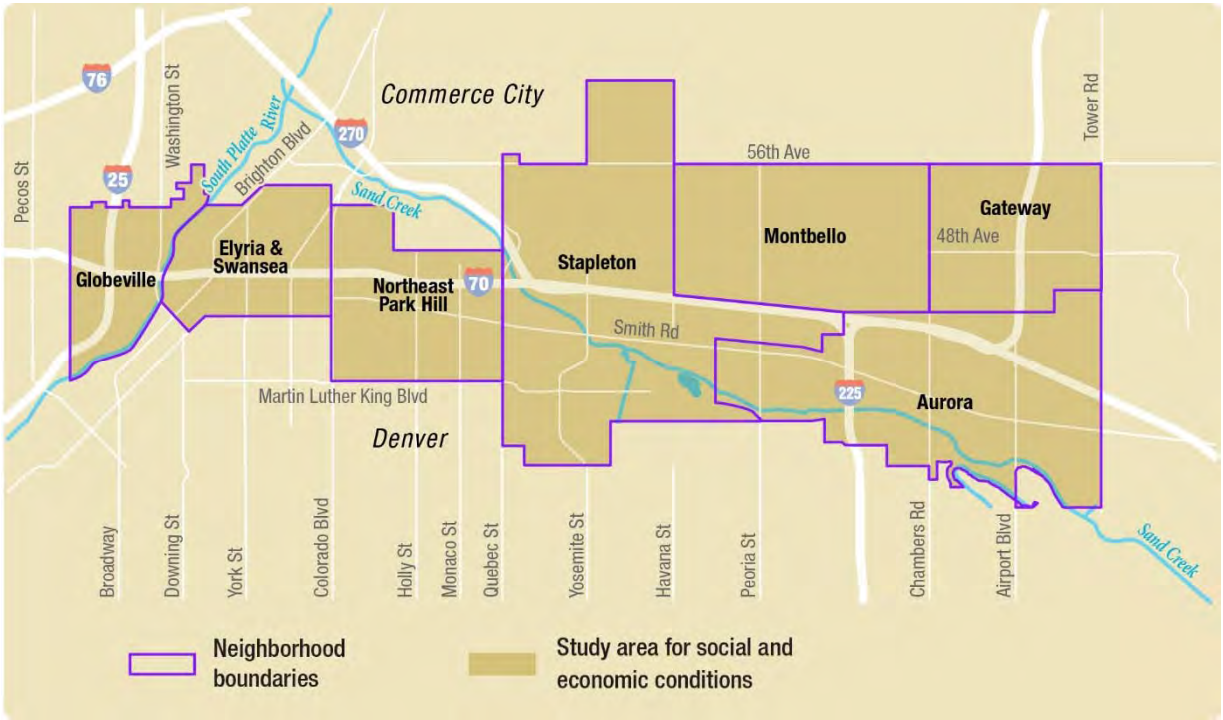
Comparisons were made between demographic data for the study area and each neighborhood to Denver and Adams Counties and to the Denver Metropolitan Statistical Area (Denver MSA) to uncover notable trends and draw general social and economic conclusions about the study area and each neighborhood.

Why is the Denver MSA included in this study?

The resource study is located within the Denver MSA. Typical metropolitan statistical areas are centered on a single city that influences the region. MSAs consist of one or more counties containing the urban core, as well as any adjacent counties that have a high degree of social and economic integration.

Data for each neighborhood are compiled from Census Block Groups and then compared to the respective county to identify if the neighborhood contains a higher percentage of a particular demographic group. County data is compared to the Denver MSA for the same evaluation purposes.

Exhibit 5.2-1 Study Area for Social and Economic Conditions



This information then was used to determine the potential impacts from the project alternatives to neighborhood character and cohesion, public services and facilities, mobility, and safety in each neighborhood of the study area.

Summaries of economic conditions were prepared for the Denver MSA and Denver and Adams Counties. This information was used to determine the potential impacts from the proposed alternatives to business activities, property values, and tax revenues.

The following key terms and definitions are used in the social and economic analysis:

- **Denver-Aurora-Broomfield, Colorado Metropolitan Statistical Area (Denver MSA).** The Denver MSA, as defined by the Office of Management and Budget and used in the 2010 United States Census of Population and Housing (also referred to as the 2010 Census), consists of 10 counties: Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, and Park.

- **Census Block Group (block group).** A block group is a geographic unit identified by the U.S. Census Bureau, intermediate in size between census tracts and census blocks. Block groups generally contain between 600 and 3,000 people (U.S. Census Bureau, 2011a). The block group is the finest resolution for which the 2010 Census and ACS provides income and housing data. Each of the study area neighborhoods is comprised of several block groups.
- **Housing unit.** As defined by the U.S. Census Bureau, a housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied as separate living quarters (U.S. Census Bureau, 2011a).
- **Household.** A household includes all the persons who occupy a housing unit.

5.2.3 What are the existing conditions of the neighborhoods in the study area?

This section provides a description of each neighborhood in the study area, including existing neighborhood character and cohesion, and a summary of transportation facilities in each neighborhood.

Globeville

Globeville is located on the western end of the study area and is bounded by the South Platte River to the south and east, Inca Street to the west, and by the Denver city limits to the north. The 2010 Census population count of the neighborhood was 3,687 persons.

The construction of I-25 and I-70 in the 1950s and 1960s left Globeville somewhat isolated from the rest of Denver. This split left only two local roads, Lincoln Street and Washington Street, open to north-south vehicular traffic. At present, Globeville can be described as a residential island surrounded by industry. With both interstates bisecting Globeville, there are substantial barriers to neighborhood cohesion (Harris and Wheeler, 1989).

Elyria and Swansea

Located immediately to the east of Globeville, the Elyria and Swansea Neighborhood is bounded by Colorado Boulevard to the east, 40th Avenue to the south, the South Platte River to the west, and then extends north to the Denver city limits. The 2010 Census population count of the neighborhood was 6,401 persons.

The neighborhood has a long history of industrial use. In addition to the large amount of industrial and commercial development, the most significant influence on Elyria and Swansea has been I-70, which was constructed in the 1960s. Present-day Elyria and Swansea is comprised of residential enclaves surrounded by large areas of industrial-zoned land. Small sections of well-maintained, single-family homes are interspersed with larger areas of commercial and industrial development, such as the National Western Stock Show Complex, the Nestlé Purina PetCare Factory, and Pepsi-Cola Bottlers (Denver Community Planning and Development Office, 1989).

A longstanding neighborhood issue in Elyria and Swansea is the presence of a large number of salvage yards and landfills, primarily related to auto parts recycling businesses (Denver Community Planning and Development Office, 2003a). Information about landfills and other hazardous material sites is discussed in Section 5.18, Hazardous Materials.

Swansea Elementary School is located within Elyria and Swansea, adjacent to I-70.

Neighborhood cohesion is disrupted by the presence of I-70, industrial areas, and railroad lines. I-70 bisects the neighborhood from west to east and industrial areas are interspersed throughout the residential areas. Railroad lines and spurs interrupt direct street access between major thoroughfares and destination points. For example, the UPRR train tracks between Brighton Boulevard and Vasquez Boulevard run directly between residential areas to the north of I-70.

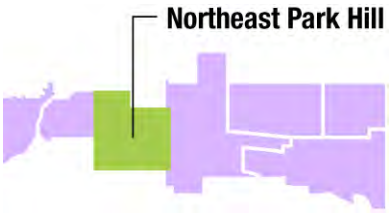
Elyria and Swansea

Although residents of Elyria and Swansea Neighborhood sometimes see Elyria and Swansea as separate communities, Denver recognizes them as one neighborhood; therefore, Elyria and Swansea are identified as one neighborhood in this document.

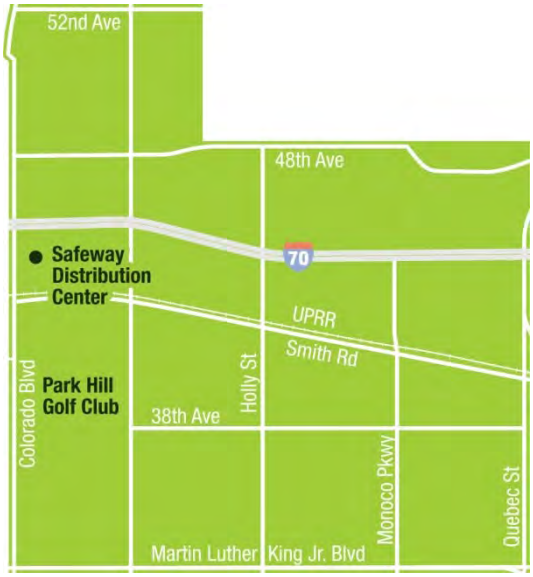
A commuter rail station is being developed at the National Western Stock Show Complex as part of RTD's North Metro Rail Line. The station will provide a regional connection for this neighborhood to downtown Denver and the northern metropolitan communities of Commerce City, Northglenn, and Thornton.

A commuter rail station is being developed near Colorado Boulevard and 41st Avenue as part of RTD's East Rail Line. The rail station provides a regional connection for this neighborhood to downtown Denver and DIA.

Northeast Park Hill



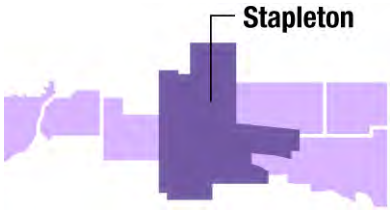
Northeast Park Hill is located near the center of the study area and immediately east of the Elyria and Swansea Neighborhood. The neighborhood is bordered by Colorado Boulevard to the west, Denver city limits to the north, Quebec Street to the east, and Martin Luther King Jr. Boulevard to the south. The 2010 Census population count of the neighborhood was 7,821 persons.



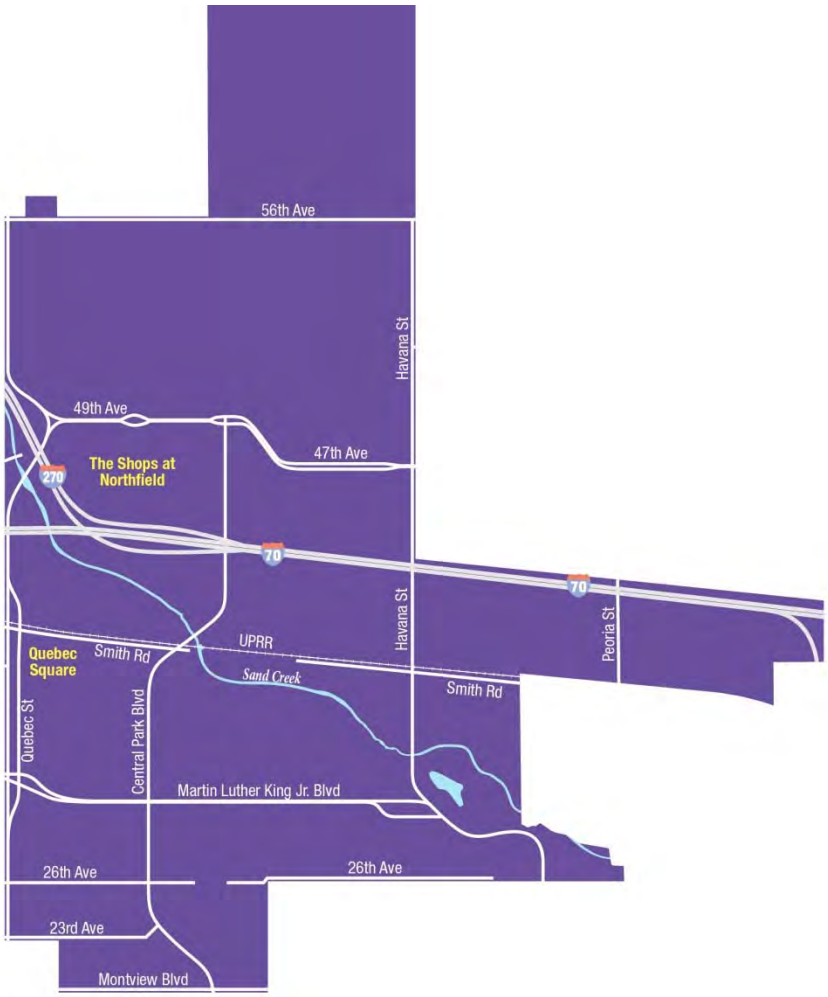
The Northeast Park Hill Neighborhood is the northern half of the Greater Park Hill Neighborhood. Greater Park Hill is described as a "uniquely integrated neighborhood" (U.S. Department of Housing and Urban Development [HUD], 1998). This integration is largely due to events that happened during the 1950s that encouraged blacks to reside in Greater Park Hill despite existing segregationist real estate practices in place at the time.

The neighborhood is predominantly residential south of 38th Avenue, with single-family residences characterizing the area, while the northern portion includes more industrial and commercial development along I-70, such as the Safeway Distribution Center located east of Colorado Boulevard at I-70. The UPRR also travels east and west through the neighborhood to the south of I-70. The portion of the neighborhood that these travel corridors run through is predominantly commercial and industrial, so these corridors do not present barriers to residential neighborhood cohesion.

Stapleton



The developing Stapleton Neighborhood is located east of Northeast Park Hill. It is bounded by Quebec Street to the west, the Denver city limits to the north, Havana Street and the Denver city limits to the east, and Montview Boulevard and the Denver city limits to the south. The 2010 Census population count of the neighborhood was 13,948 persons.

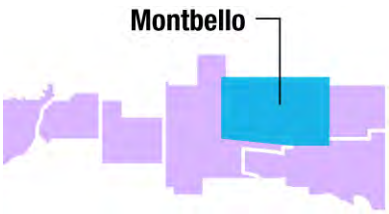


The neighborhood encompasses approximately 4,700 acres (7.5 square miles), including the property that served as the former Stapleton International Airport, as well as some surrounding areas. The neighborhood is one of the nation's largest urban redevelopment projects. The full build-out of the redevelopment area is expected to be completed by 2020 and consists of approximately 12,000 homes and apartments, 13 million square feet of commercial space, and more than 1,100 acres of new parks and open space (Forest City Stapleton, Inc., 2006). Two large retail centers have opened in the neighborhood: Quebec Square Regional Retail Center (740,000 square feet) and the Shops at Northfield (1.2 million square feet).

The Stapleton Neighborhood is bisected by I-70 and the UPRR, both of which are located in areas currently zoned for commercial and industrial land uses. The neighborhood also contains remnant facilities associated with Stapleton International Airport. As redevelopment of the area continues, however, these remnant airport facilities will likely be eliminated, and I-70 and UPRR will be incorporated in a way that minimizes any negative effects on neighborhood cohesion.

In 2011, the Central Park Boulevard interchange was added to I-70 to support the development of the neighborhood and promote cohesion between areas north and south of I-70. Located to the southwest of this interchange, a commuter rail station is currently being developed at Smith Road that will provide a regional connection for this neighborhood to downtown Denver and DIA.

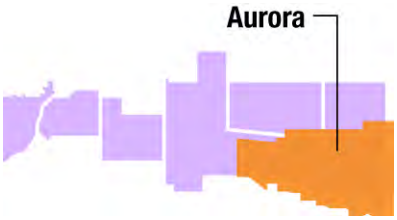
Montbello



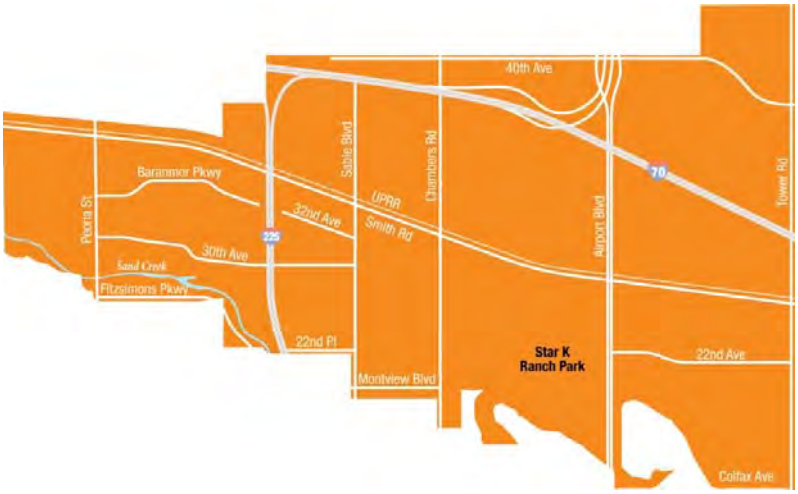
The Montbello Neighborhood is located in the eastern portion of the study area and is bounded by Havana Street to the west, 56th Avenue to the north, Chambers Road to the east, and I-70 to the south. The neighborhood is located entirely north of I-70. The 2010 Census population count of the neighborhood was 30,348 persons.

Land use between Havana Street to Peoria Street is comprised primarily of light industrial business parks. The remaining portion of the neighborhood (between Peoria Street and Chambers Road) is primarily made up of single-family homes, although there are some businesses located along Peoria Street and Chambers Road in the southern portion of the neighborhood. Distinctive features of the neighborhood are its suburban character, meandering street system, and nearby open space areas. Neighborhood cohesion is generally intact, with no substantial physical barriers.

Aurora



The small portion of Aurora included in the social and economic analysis is referred to as the Aurora Neighborhood. The Aurora Neighborhood is different from other neighborhoods in the study area, in that it was created specifically for this study. The boundary of the Aurora Neighborhood is based on five census block groups and is located at the southeastern end of the study area. The 2010 Census population count of the neighborhood was 7,380 persons.



The UPRR runs through the Aurora Neighborhood, with the railroad serving as a barrier between primarily commercial and industrial land uses to the north and primarily residential and commercial land uses to the south. Sections of major highways (I-70, I-225, and Peña Boulevard) also are located in this segment. The Aurora Neighborhood is likely to benefit from two commuter rail stations that are being developed within its boundaries. The Peoria Street station and the 40th Avenue/Airport Boulevard-Gateway Park station will provide access to a regional commuter rail transportation facility that connects the neighborhood to downtown Denver and DIA.

Gateway

The Gateway Neighborhood is located on the northeastern end of the study area, to the east of the Montbello Neighborhood and to the north of the Aurora Neighborhood. Gateway is a relatively new Denver development. Denver annexed the land that now makes up Gateway to link the city with DIA. Before annexation, this area was predominantly undeveloped or in agricultural use. The 2010 Census population count of the neighborhood was 6,962 persons.

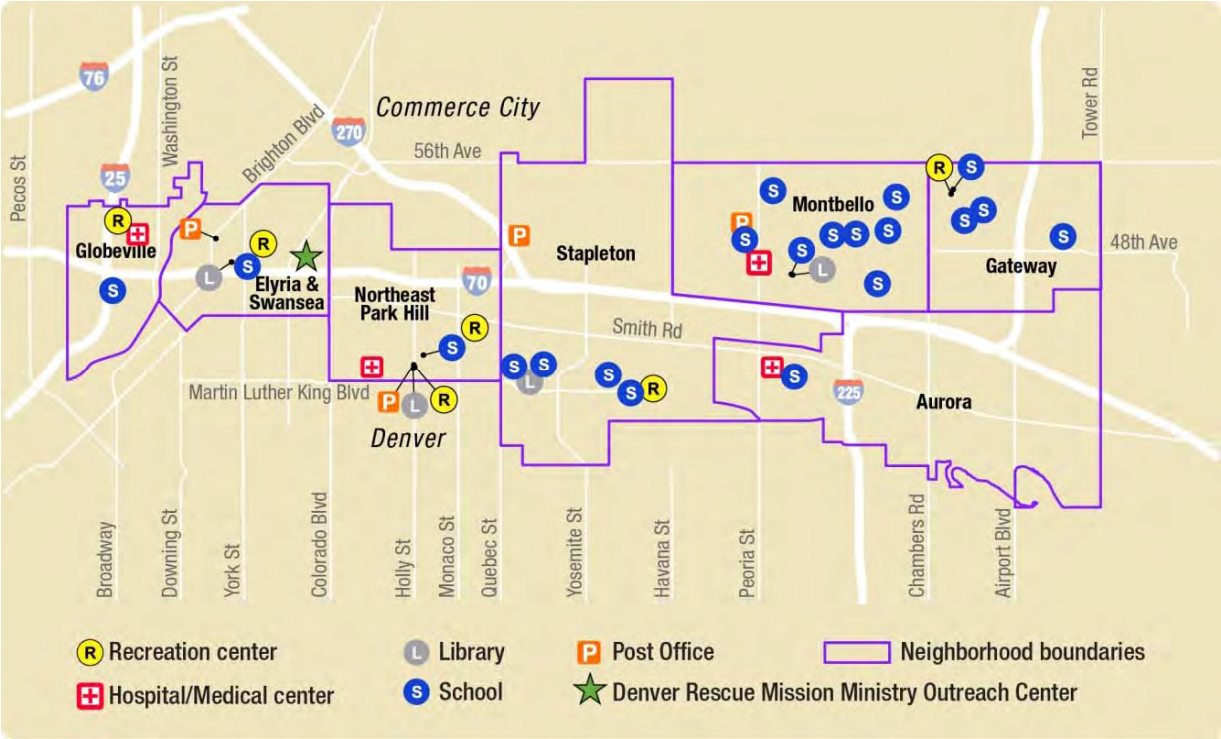
The *Gateway Concept Plan* (Denver Community Planning and Development Office, 1990), adopted in 1990, provides a master plan for mixed-density residential and commercial development. Some of the land has already been developed, with clusters of residential, commercial, and industrial uses, including office parks, hotels, and restaurants. More than 3,000 acres of land within the community is zoned for industrial and commercial uses. One of the goals for the Gateway neighborhood is that "its scale and size should create densities and images that complement Downtown."

Peña Boulevard, which is the primary access road for DIA from I-70, runs north-south through the center of the Gateway Neighborhood. Due to the commercial nature of the Gateway Neighborhood, Peña Boulevard and other roadways serving DIA are critical to this community and do not currently represent barriers to neighborhood cohesion.

5.2.4 What are the public services and facilities in the study area?

Public services include police and law enforcement, fire protection, and emergency response. Public facilities include schools, health care facilities, recreation centers, libraries, and post offices. **Exhibit 5.2-2** shows the location of public services and facilities within the study area.

Exhibit 5.2-2 Public Facilities



Source: http://maps.dpsk12.org

Police and law enforcement

Police services within Denver are provided by the Denver Police Department. Of the six police districts that serve Denver, three overlap the study area: District 1, District 2, and District 5. Denver stations in the study area include:

- District 1 has a station located at 1311 West 46th Avenue that provides services to the Globeville Neighborhood.
- District 2 has a station located at 3921 Holly Street that provides services to the Elyria and Swansea and Northeast Park Hill Neighborhoods.

- District 5 has a station located at 4685 Peoria Street that provides services to the Stapleton, Montbello, and Gateway Neighborhoods. In addition, two "COP Shops" are located in the Stapleton Neighborhood. The Northfield COP Shop is located at 8216 East Northfield Boulevard and the Town Center COP Shop is located at 7484 East 29th Avenue.

Police services within Aurora are provided by the Aurora Police Department. Of the three police districts that serve Aurora, Districts 1 and 2 overlap the study area. Aurora police stations that provide services to the study area are located outside of the study area at:

- District 1—13347 East Montview Boulevard
- District 2—15001 East Alameda Parkway

The Denver County Jail is operated by the Denver Sheriff Department and is located in the Stapleton neighborhood at 10500 Smith Road.

Fire and emergency response

The Denver Fire Department is divided into six response Districts, with DIA designated as a separate Division. Three districts overlap the study area. Stations located in the study area are identified by district.

- District 4 provides services to the Northeast Park Hill Neighborhood. Station 10 is located at 3200 Steele Street.
- District 5 provides services to the Stapleton, Gateway, and Montebello Neighborhoods. Three district stations are located at:
    - Station 2—8300 Memphis Street
    - Station 26—7934 Martin Luther King Jr. Boulevard
    - Station 27—12927 East Albrook Drive
- District 6 provides services to the Globeville and Elyria and Swansea Neighborhoods. Station 9 is located at 4400 Brighton Boulevard.

The Aurora Fire Department is divided into 15 response areas, with four response areas overlapping the study area (Response Areas 1, 3, 5, and 12). Two stations are located in the study area, Station 3 at 3172 Peoria Street and Station 12 at 19491 East 34th Drive.

What is a COP Shop?

Denver COP Shops are storefronts that place officers in readily accessible commercial areas to aid citizens in preventing crime and accessing police services. The purpose of Denver's COP Shops is to provide a convenient place for citizens and local businesses to be able to file police reports, such as non-injury auto accidents, thefts, drug activity, graffiti and gang activities. (Denver Police Department, 2015)

The Denver Health Paramedic Division, a division of the Denver Health and Hospital Authority (Denver Health Paramedic Division, 2005), provides all 911 emergency services within Denver.

The Aurora Fire Department provides emergency response services for Aurora.

Schools

Denver Public Schools operates 89 elementary schools, 20 kindergarten through 8th grade schools, 45 middle schools, 53 high schools, and 6 schools classified as "other." The total enrollment for the school system for the 2013–2014 school year was 87,398 students (Denver Public Schools, 2013).

Aurora Public Schools operates four preschools, 25 elementary schools, four preschool through 8th grade schools, six middle schools, one 6th grade through 12th grade academy, four high schools, and 15 schools with unique classifications. Enrollment through July 2014 was 38,442 students (Aurora Public Schools, 2014).

Schools located within the study area are shown on **Exhibit 5.2-2**. Of the schools shown in **Exhibit 5.2-2**, Swansea Elementary School at 4650 Columbine Street is the closest to I-70. The school is on a parcel next to the viaduct and 46th Avenue. Located in the Elyria and Swansea neighborhood, Swansea Elementary School serves the Elyria and Swansea and Northeast Park Hill Neighborhoods with an enrollment of 583 students for the 2013–2014 school year. The Elyria and Swansea Neighborhood also is served by Harrington Elementary School, a kindergarten through 8th grade school located south of I-70 at 2401 East 37th Avenue, which also serves students in the Clayton and Cole Neighborhoods. Globeville is served by Garden Place Academy Elementary School at 4425 Lincoln Street and Northeast Park Hill is served by Smith Elementary School at 3590 Jasmine Street.

Health care facilities

Several hospitals and other health care facilities provide medical services in and near the study area. There are four health care facilities within the study area, as shown on **Exhibit 5.2-2**. These facilities include:

- Clínica Tepeyac Health Clinic at 5075 Lincoln Street (Globeville Neighborhood)

- Denver Health/Park Hill Family Health Center at 4995 East 33rd Avenue (Northeast Park Hill Neighborhood)
- Denver Health/Montbello Family Health Center at 12600 Albrook Drive (Montbello Neighborhood)
- North Aurora Family Health Service at 3292 Peoria Street (Aurora Neighborhood)

In addition, Denver Health operates several school-based health centers at public schools within the study area (Denver Health, 2014). These include:

- Bruce Randolph School at 3955 Steele Street
- Montbello High School at 5000 Crown Boulevard
- Rachel B. Noel Middle School at 5290 Kittredge Street
- Evie Garrett Dennis Campus at 4800 Telluride Street

Recreation facilities

Denver operates a number of public recreation facilities in the study area. These are organized as Regional, Local, and Neighborhood recreation centers, and are shown on **Exhibit 5.2-2**. These recreation centers include:

- Regional
    - Central Park Recreation Center at 9651 East Martin Luther King Jr. Boulevard (Stapleton Neighborhood)
    - Montbello Recreation Center at 15555 East 53rd Avenue (Gateway Neighborhood)
- Local
    - Hiawatha Davis Jr. Recreation Center at 3334 Holly Street (Northeast Park Hill Neighborhood)
- Neighborhood
    - Martin Luther King Jr. Recreation Center at 3880 Newport Street (Northeast Park Hill Neighborhood)
    - Stapleton Recreation Center at 5090 Broadway (Globeville Neighborhood)
    - Swansea Recreation Center at 2650 East 49th Avenue (Elyria and Swansea Neighborhood)

In addition, the Denver Coliseum is located at the southeast corner of I-70 and Brighton Boulevard. The Coliseum seats 8,000 to 10,000 spectators and is used for many types of indoor events, including the Ringling Brothers and Barnum and Bailey Circus, the National Western Stock Show, and concerts (Denver Coliseum, 2014).

Aurora does not operate any public recreation centers in the study area.

Public libraries

The Denver Public Library system has 25 branches located throughout Denver (Denver Public Library, 2014). The following four branches are located in the study area and shown on **Exhibit 5.2-2**:

- Valdez-Perry Library at 4690 Vine Street (Elyria and Swansea Neighborhood)
- Montbello Library at 12955 Albrook Drive (Montbello Neighborhood)
- Pauline Robinson Library at 5575 East 33rd Avenue (Northeast Park Hill Neighborhood)
- Sam Gary Library at 2961 Roslyn Street (Stapleton Neighborhood)

The Aurora Public Library system operates eight branches throughout Aurora, none of which are located in the study area.

Postal service facilities

There are four U.S. Postal Service facilities in the study area. The following facilities are shown on **Exhibit 5.2-2**:

- Stockyards Post Office at 4910 Brighton Boulevard (Elyria and Swansea Neighborhood)
- General Mail Facility at 7550 East 53rd Place (Stapleton Neighborhood)
- Park Hill Post Office at 3355 Hudson Street (Northeast Park Hill Neighborhood)
- Montbello Post Office at 4710 Nome Street (Montbello Neighborhood)

Community organizations

Community organizations, including religious and secular institutions and non-profit organizations such as the Denver Rescue Mission and Focus Points Family Resource Center,

also provide vital services within study area neighborhoods. These groups provide an array of programs, including, but not limited to, youth development, human services, community development, and education.

5.2.5 What are the existing social characteristics and recent trends of the neighborhoods in the study area?

The following subsections provide an update and overview of social characteristics and highlight notable population and housing trends in the study area by neighborhood. Median household income, percentage of low-income households, and availability of vehicles by household also are identified.

Information was obtained from the 2010 U.S. Census (U.S. Census Bureau, 2011a) and ACS 5-Year Estimate (2006–2010) (U.S. Census Bureau, 2011b) by census block group. Demographic comparisons were made for the state, Denver MSA, and Denver and Adams Counties to uncover notable trends and draw general social characteristic conclusions about the study area and each neighborhood.

2010 census and ACS 5-year estimates

The U.S. Census is conducted once every 10 years to obtain population counts and basic characteristics (e.g., sex, age, race, origin, and homeowner status).

The ACS 5-year estimates represent characteristics of populations over a specific data collection time period.

Population characteristics

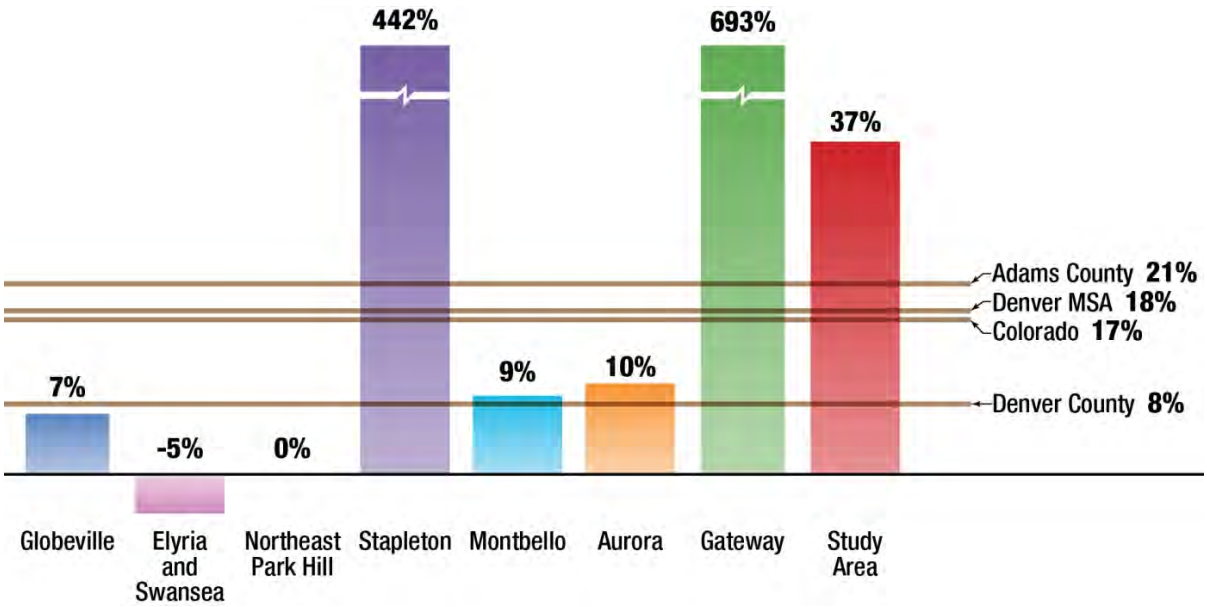
Population characteristics include population trends, future population, age distribution, racial and ethnic composition, and LEP in the study area and neighborhoods.

Population trends

Population trends for the state, Denver MSA, Denver and Adams Counties, and the study area are summarized in **Exhibit 5.2-3**.

The population of the study area increased from 56,071 to 76,547 between 2000 and 2010, a 36.5-percent increase. This percentage increase is notably higher than the population increases experienced by the state as a whole, the Denver MSA, and Denver and Adams Counties. This is attributed to the substantial growth occurring in master planned developments in the Stapleton and Gateway Neighborhoods. Both of these neighborhoods consisted primarily of undeveloped or non-residential land in 2000.

Exhibit 5.2-3 Population Trends, Percentage Population Change 2000 to 2010



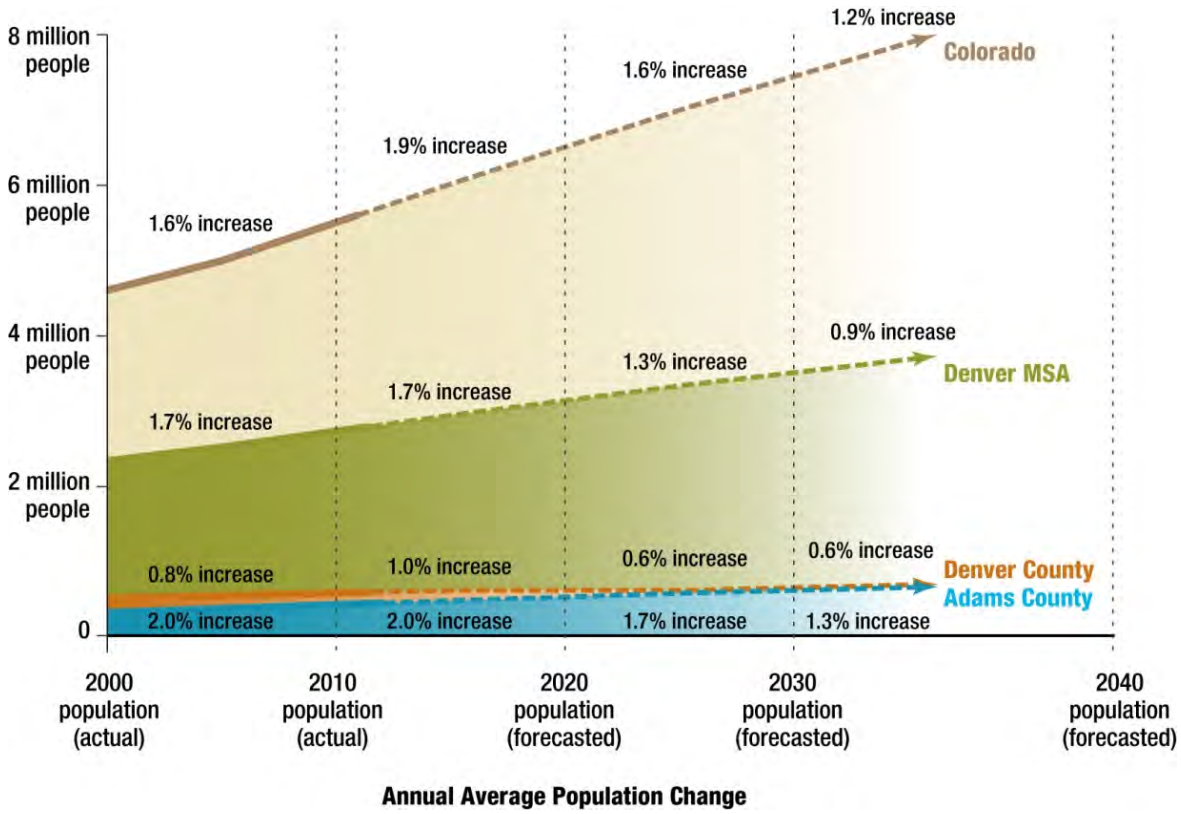
Source: U.S. Census Bureau, 2002, Table P001; 2011a, Table P1

As shown in **Exhibit 5.2-3**, the Elyria and Swansea Neighborhood experienced a population decline of approximately 5 percent. The remaining Denver neighborhoods in the study area (Globeville, Northeast Park Hill, and Montbello) experienced population growth rates of less than 10 percent, which is consistent with Denver County as a whole. The population growth rate of the Aurora Neighborhood is notably less than that of Adams County, but is consistent with growth rates of an established suburban neighborhood that was primarily developed in the late 1960s through the 1980s.

Future population

The Colorado Department of Local Affairs' (DOLA) State Demography Office prepares population forecasts to assist state agencies in estimating future demand for facilities and services. Using DOLA data, future population forecasts are summarized by county for the years 2020, 2030, and 2040. As shown in **Exhibit 5.2-4**, population forecasts for 2010 to 2020 are consistent with recent population trends from 2000 to 2010. Population forecasts for the years 2030 and 2040 continue to increase, but at slower rates. Per the data trends, the Stapleton and Gateway Neighborhoods will continue to experience population growth consistent with the ongoing phased construction of these master-planned developments.

Exhibit 5.2-4 Forecasted Population Increase

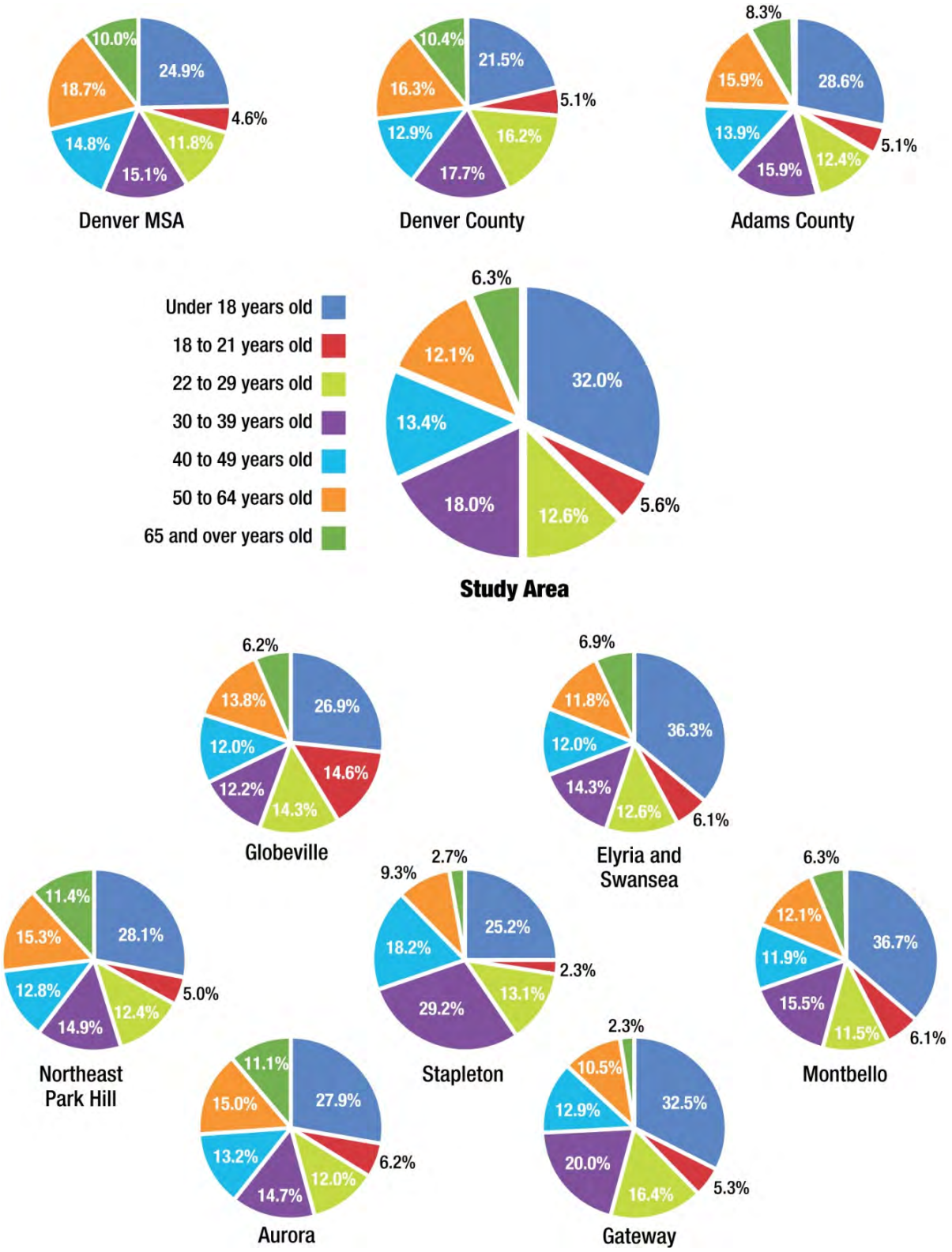


Source: U.S. Census Bureau, 2011a; DOLA, 2012

Age distribution

Overall, the age distribution of the study area is consistent with the Denver MSA and Denver and Adams Counties, as shown in **Exhibit 5.2-5**. The population percentage of elderly residents (age 65 or older) in each of the study area neighborhoods does not exceed the population percentage of each neighborhood's respective county, resulting in no concentrations of elderly residents in any of the study area neighborhoods.

Exhibit 5.2-5 2010 Age Distribution



Source: U.S. Census Bureau, 2011a, Table P12, "Sex by Age"
Note: Due to rounding, totals may not add to 100 percent

Four neighborhoods, however, have concentrations of residents in particular age groups (18 to 21 and Under 18). Census data indicates 14.6 percent of the Globeville Neighborhood is college age (18 to 21). The percentage of residents in this age group is approximately 10 percentage points higher when compared to Denver County as a whole. The higher percentage of residents in this age group is likely associated with the Regency Student Housing Community, which is located in the northeast quadrant of the I-70/I-25 interchange at 3900 Elati Street. This community offers housing for students attending school at the Auraria campus, located approximately two miles away in downtown Denver.

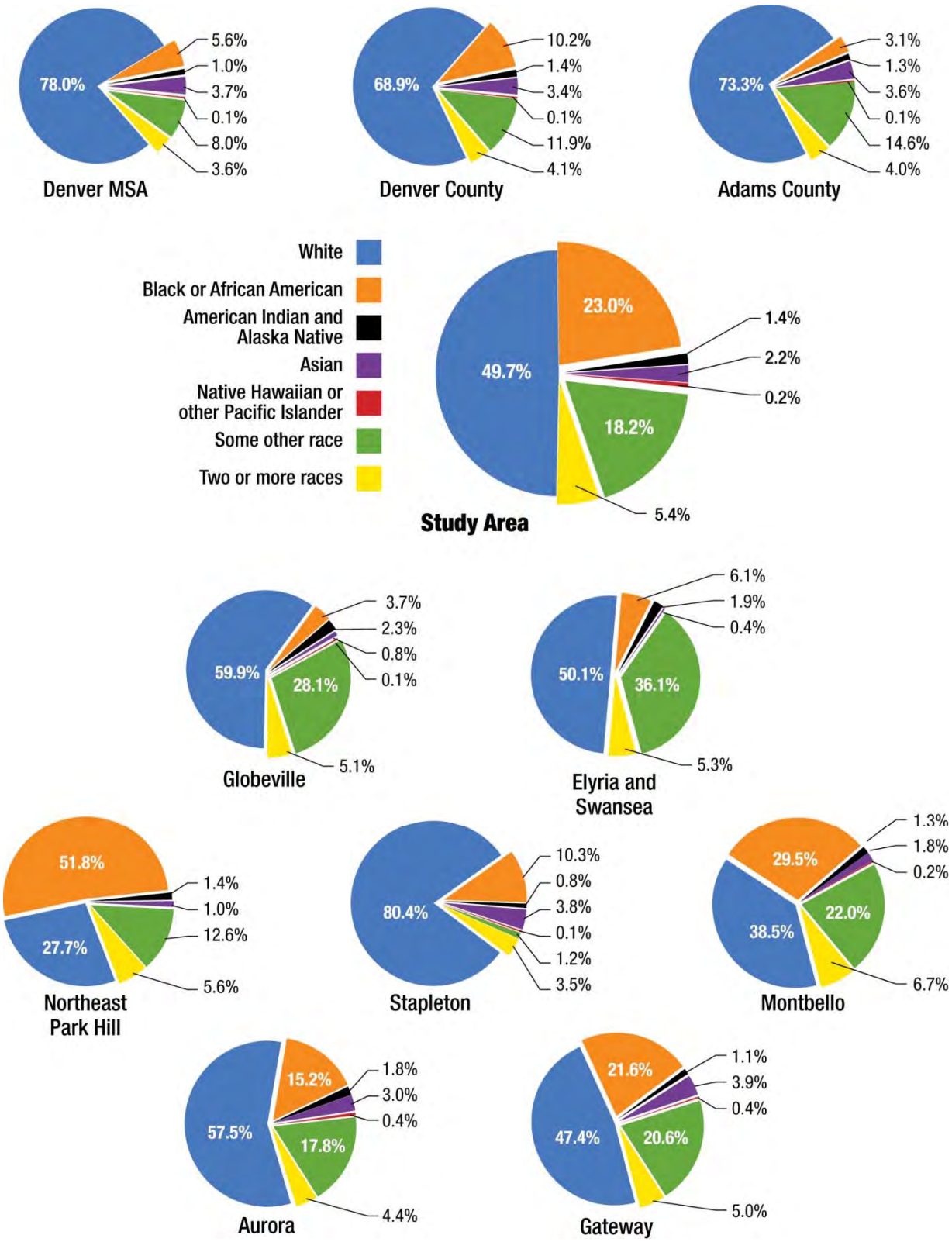
The Elyria and Swansea, Montbello, and Gateway Neighborhoods have a higher percentage of residents under the age of 18 compared to Denver County by 10 percentage points. This concentration of individuals is expected in the Montbello and Gateway Neighborhoods since they offer a suburban setting that typically attracts families with children.

In the Elyria and Swansea Neighborhood, the high percentage of residents under the age of 18 is likely associated with a 39 percent national increase of Latino children from 2000 to 2010 (Pew Hispanic Center, 2011). According to 2010 Census data, this neighborhood is approximately 84 percent Hispanic or Latino.

Racial and ethnic composition

The racial composition of study area neighborhoods, Denver MSA, and Denver and Adams Counties are shown in **Exhibit 5.2-6**. Approximately half of the study area population in 2010 was non-white. This is a decrease from 2000, when 67.2 percent of the study area was non-white. This indicates that the racial composition of the study area as a whole is changing. This change is primarily the result of new development in the Stapleton and Gateway Neighborhoods. The non-white population in the Globeville and Elyria and Swansea Neighborhoods has remained stable between 2000 and 2010.

Exhibit 5.2-6 2010 Racial Composition



Source: U.S. Census Bureau, 2011a, Table P3, "Race"
Note: Due to rounding, totals may not add to 100 percent.

In 2000, Blacks or African-Americans accounted for 36.8 percent of the study area population, with notably higher concentrations in the Northeast Park Hill, Stapleton, Montbello, Aurora, and Gateway Neighborhoods than in the greater Denver and Adams Counties. The percentage of this population group in the study area decreased to 23 percent in 2010. Notably higher population concentrations are still present in the Northeast Park Hill, Montbello, Aurora, and Gateway Neighborhoods than in the greater Denver and Adams Counties.

In 2000, the white population of the study area was approximately 32.8 percent. In 2010, whites made up approximately 49.7 percent of the study area population. This population increase is primarily the result of new development in the Stapleton Neighborhood.

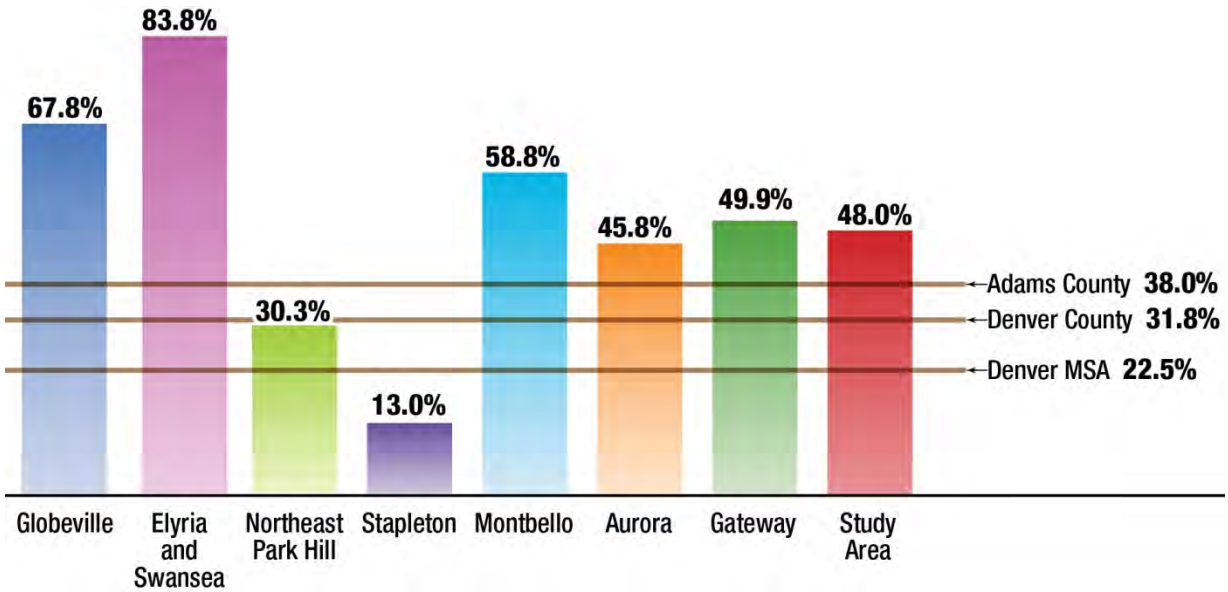
In 2000, the Globeville and Elyria and Swansea Neighborhoods had notably higher concentrations in the U.S. Census category of "Some Other Race" compared to Denver County as a whole. In past U.S. Census information-gathering efforts, many Hispanics or Latinos have identified themselves in the "Other" category. The percentage of residents identifying as Other decreased in the 2010 Census, but remained notably higher in these neighborhoods compared to Denver County.

The U.S. Census recognizes Hispanic or Latino as an ethnic category that can include persons of any race. As a result, the Hispanic or Latino population is discussed exclusive of race. The percentage of all other racial groups increased slightly or remained the same from 2000 to 2010.

Hispanic or Latino origin

According to the 2010 Census, 48.0 percent of residents in the study area identified themselves as Hispanic or Latino, as shown in **Exhibit 5.2-7**. This is notably higher compared to the Denver MSA (22.5 percent), Denver County (31.8 percent), and Adams County (38.0 percent). This is an increase from 41.9 percent of residents identifying themselves as Hispanic or Latino in 2000.

Exhibit 5.2-7 2010 Hispanic or Latino Origin



Source: U.S. Census Bureau, 2011a, Table P4, "Hispanic or Latino Origin"

The two oldest neighborhoods in the study area (Globeville and Elyria and Swansea) have the highest percentage of Hispanic or Latino residents. Both neighborhoods have numerous small markets, restaurants, and other businesses that cater to the Hispanic community.

Limited English Proficiency

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," requires all federal fund recipients to provide meaningful access to persons who are limited in their English proficiency. The U.S. Department of Justice defines LEP individuals as those "who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English" (67 *Federal Register* 41459).

Transportation projects applying for federal funds must ensure they comply with obligations to provide written translations in languages other than English. The U.S. Department of Transportation's (USDOT) *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons* (USDOT, 2005) outlines the requirements for translation of written documents. This guidance defines the threshold for providing translation as either five percent of the total population in the study area or 1,000 persons within a particular language group who speak English less than "Very Well." Data were used from the ACS 5-Year Estimates (2006–2010) to identify adults aged 18 or older

Spanish-speaking outreach efforts

Additional detail on outreach to Spanish-speaking residents in the project area is included in Chapter 10, Community Outreach and Agency Involvement.

who speak English less than "Very Well" by language group. Results of the LEP analysis are shown in **Exhibit 5.2-8**. The study area meets the threshold requirement for presence of a Spanish LEP population.

Exhibit 5.2-8 Limited English Proficiency Analysis Summary

Geography	Total Adult Population	Primary Language Groups of Persons Who Speak English Less than Very Well							
		Spanish		Other—Indo European		Asian/ Pacific		Other	
		#	%	#	%	#	%	#	%
Denver MSA	1,844,006	129,502	7.0	15,958	0.9	26,766	1.5	7,755	0.4
Denver County	452,947	50,223	11.1	3,906	0.9	5,828	1.3	2,645	0.6
Adams County	303,605	38,106	12.6	2,403	0.8	5,160	1.7	455	0.1
Globeville	2,633	794	30.2	0	0.0	9	0.3	0	0.0
Elyria and Swansea	4,260	1,739	40.8	0	0.0	11	0.3	0	0.0
Northeast Park Hill	5,469	675	12.3	0	0.0	7	0.1	30	0.5
Stapleton	8,837	288	3.3	43	0.5	71	0.8	63	0.7
Montbello	18,675	5,970	32.0	48	0.3	346	1.9	55	0.3
Aurora	4,949	975	19.7	31	0.6	328	6.6	45	0.9
Gateway	4,434	1,015	22.9	0	0.0	112	2.5	104	2.3
Study area	49,257	11,456	23.3	122	0.2	884	1.8	297	0.6

Source: U.S. Census Bureau 2011b, Table B16004, "Age by Language Spoken at Home for the Population 5+ Years"

In accordance with the USDOT's *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons*, written translations of important I-70 East EIS documents will be provided for the Spanish LEP language group in addition to other measures assuring meaningful access. These other measures include providing notice of citizens' Right to Language Access for project meetings and using interpreters to help with public participation.

Housing characteristics

The existing housing characteristics of the study area and neighborhoods include the number of units and occupancy status, median household income, median home value, estimated population living below the poverty level, and vehicle availability.

Housing units and occupancy

Exhibit 5.2-9 shows the number of existing housing units in 2010 in the study area and each neighborhood.

Exhibit 5.2-9 Total Housing Units by Neighborhood

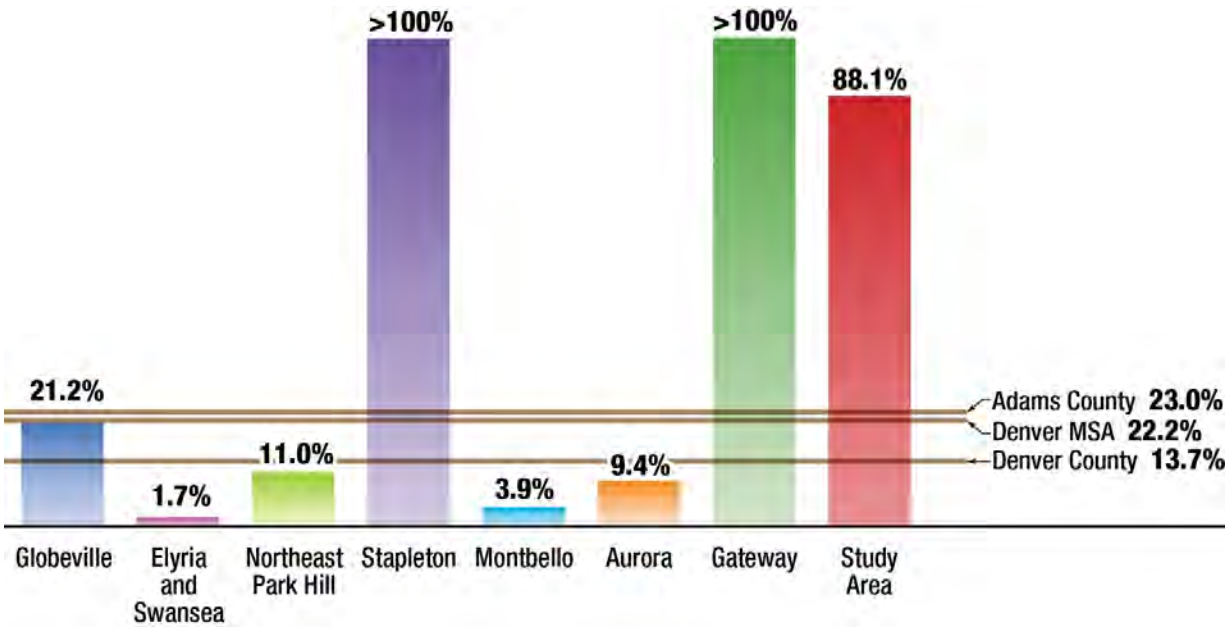
Neighborhood	Total Housing Units in 2010
Globeville	1,157
Elyria and Swansea	1,844
Northeast Park Hill	3,012
Stapleton	4,338
Montbello	7,776
Aurora	2,210
Gateway	9,900
Study Area Total	**30,237**

Source: U.S. Census 2000 and 2010, Table H1, "Total Housing Units"

The number of housing units in the study area increased 88.1 percent from 2000 to 2010, as shown in **Exhibit 5.2-10**. This growth rate is considerably higher than the growth rate experienced by the Denver MSA, as well as Denver and Adams Counties. The Stapleton and Gateway Neighborhoods, which were nearly vacant land in 2000, account for the majority of housing unit growth in the study area. The growth in housing units in these neighborhoods is in line with the rate of population growth in these neighborhoods.

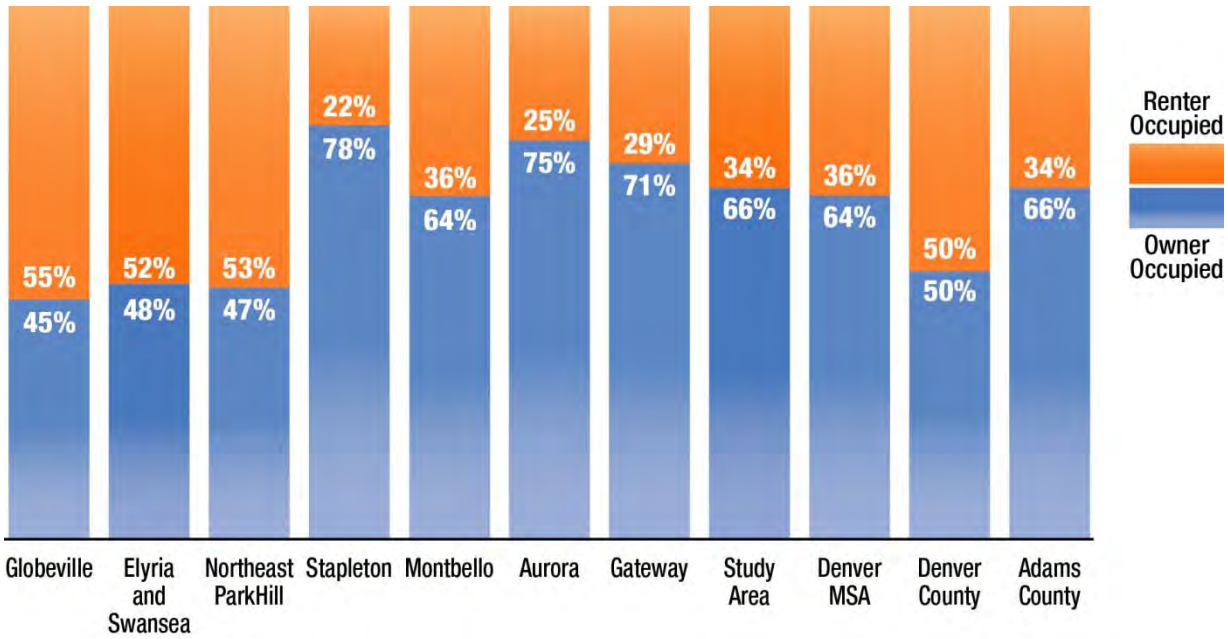
The percentage of occupied housing units (approximately 90 percent to 95 percent) in the study area and in each neighborhood is similar to that of the Denver MSA, as well as Denver and Adams Counties. **Exhibit 5.2-11** shows whether the housing units were owner or renter occupied in 2010 in the study area. The Stapleton, Aurora, and Gateway Neighborhoods have a considerably higher percentage of homes occupied by owners compared to the Denver MSA and study area counties.

Exhibit 5.2-10 Increase in Housing Units from 2000 to 2010



Source: U.S. Census Bureau, 2002, Table H001; 2011a, Table H1, "Total Housing Units"

Exhibit 5.2-11 Occupancy Status of Housing Units

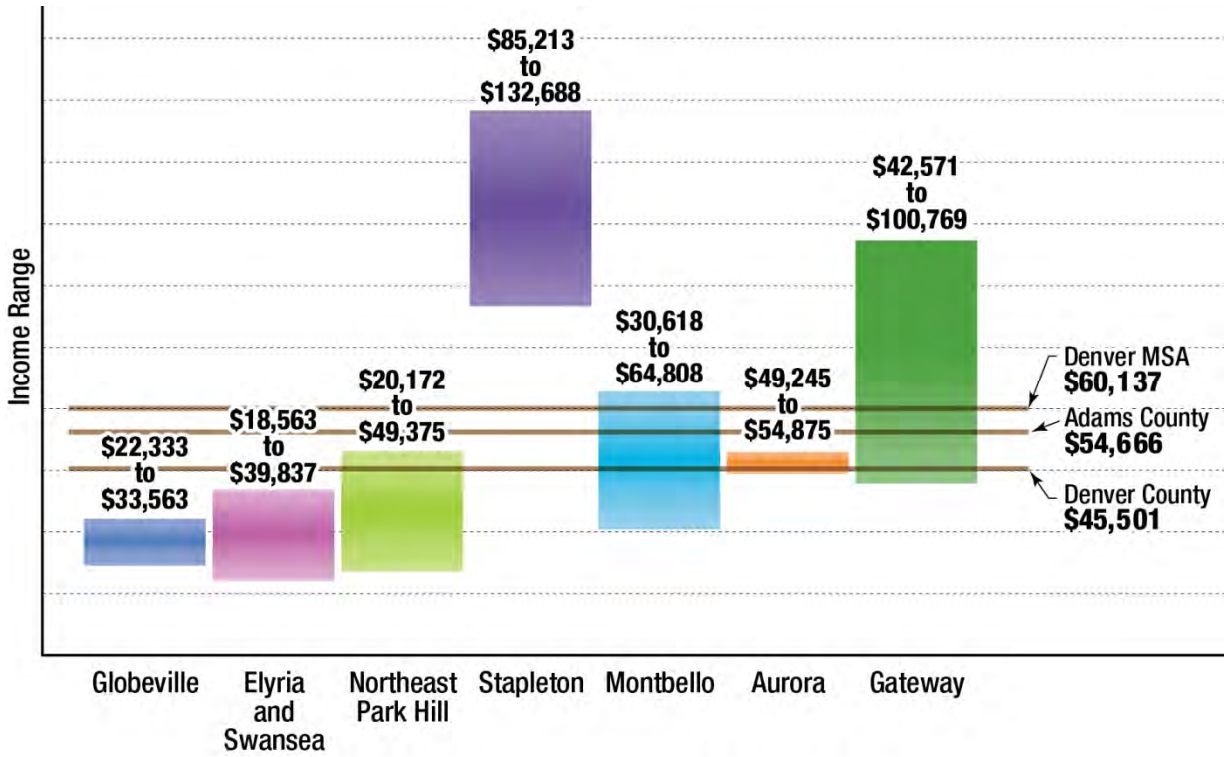


Source: U.S. Census Bureau, 2011a, Table H3, "Occupancy Status," and Table H4, "Tenure"

Median household income

Median household income for each neighborhood was obtained from the ACS 5-Year Estimates (2006–2010) for each block group within the study area. A range of incomes for each neighborhood is shown in **Exhibit 5.2-12**. The Stapleton and Gateway Neighborhoods have the highest median incomes in the study area. The neighborhoods that experienced population decline or little growth from 2000 to 2010 (Globeville, Elyria and Swansea, and Northeast Park Hill) have the lowest median household incomes in the study area.

Exhibit 5.2-12 Median Household Income

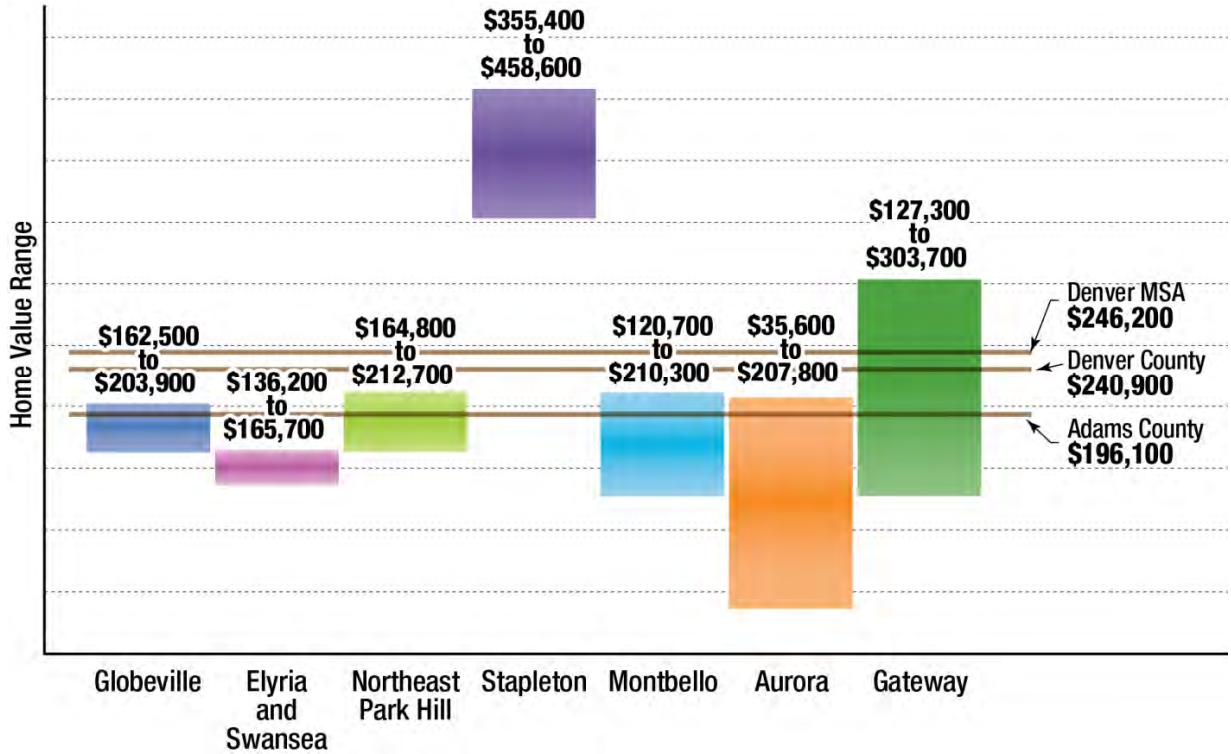


Source: U.S. Census Bureau, 2011b, Table B19013, "Median Household Income"

Median home value

Exhibit 5.2-13 lists data on median home value. Median home values are lower in the Globeville, Elyria and Swansea, Northeast Park Hill, Montbello, and Aurora Neighborhoods than the value of their respective county-wide medians and the Denver MSA median. Study area neighborhoods with higher than county-wide median home values are those that also have high rates of new construction (Stapleton and Gateway).

Exhibit 5.2-13 Median Home Value



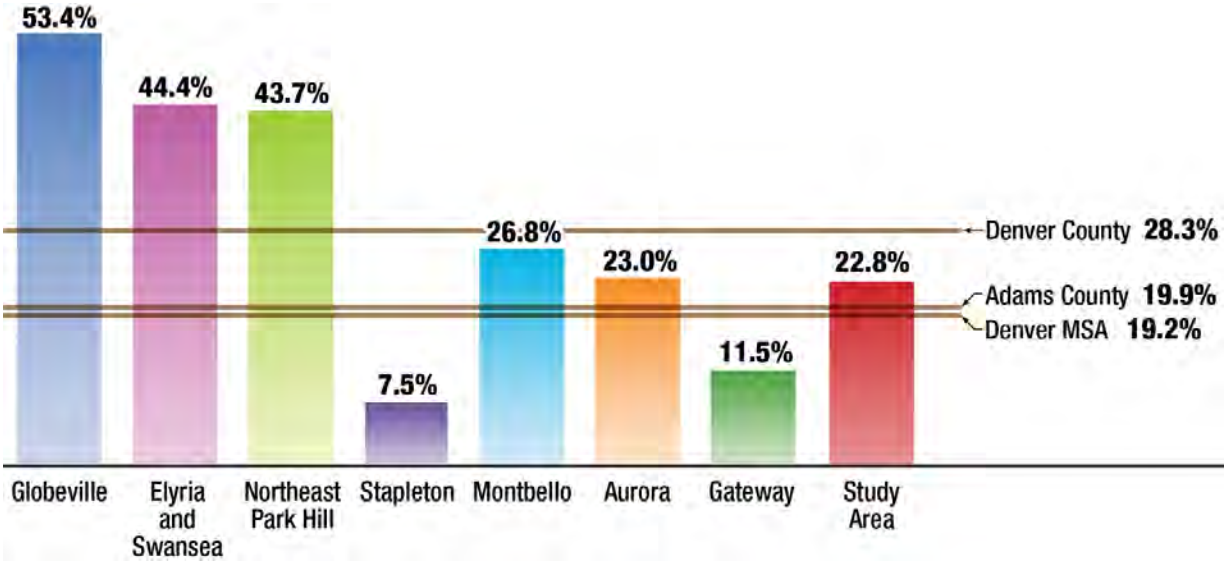
Source: U.S. Census Bureau, 2011b, Table B25077, "Median Value"

Population below poverty level

To identify residents living below the poverty level, the HUD 30 Percent Area Median Income (AMI30) was used as a threshold. AMI30 households are those with median incomes 30 percent or less of the county median income. The 2010 fiscal year HUD median income for the Denver MSA was $75,900. As calculated by HUD, the AMI30 for a four-person household in the Denver MSA was $22,750. Denver and Adams Counties are included in the Denver MSA.

HUD's methodology for calculating median family income is based on ACS 5-Year Estimate data. The ACS provides household income in $5,000 increments. The AMI30 threshold falls within the $20,000 to $24,999 increment. As a result, all households in this increment and below (regardless of the number of individuals in the household) are considered low income. This methodology is consistent with CDOT's *NEPA Manual* (CDOT, 2013b) in calculating low-income populations. **Exhibit 5.2-14** shows the percentage of low-income households in each neighborhood of the study area. The neighborhoods with the highest amount of low-income households are Globeville, Elyria and Swansea, and Northeast Park Hill.

Exhibit 5.2-14 Estimated Percentage of Households with Median Family Income of $24,999 or Less (Low Income)

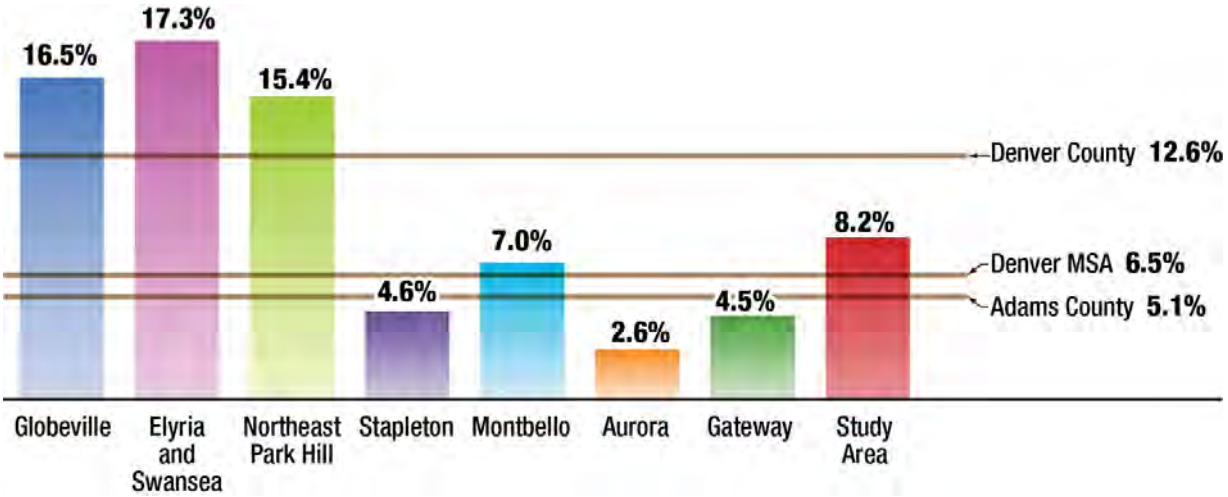


Source: U.S. Census Bureau, 2011b, Table B19001

Vehicle availability

ACS data were used to estimate the number of households with no access to personal vehicles. In the study area, the neighborhoods of Globeville, Elyria and Swansea, and Northeast Park Hill have a higher percentage of households that do not have access to a personal vehicle compared to Denver County, as shown on **Exhibit 5.2-15**.

Exhibit 5.2-15 Percentage of Households with No Personal Vehicles



Source: U.S. Census Bureau, 2011b, Table B25044, "Tenure by Vehicles Available"

Food Desert

The U.S. Department of Agriculture (USDA) and the Economic Research Service (ERS) have documented food deserts as part of the Healthy Food Financing Initiative. The USDA defines food deserts as:

"… urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food. Instead of supermarkets and grocery stores, these communities may have no food access or are served only by fast food restaurants and convenience stores that offer few healthy, affordable food options."

Using the definition of a "food desert" as a low-income census tract with limited access to healthy food, the ERS has identified 11 census tracts in the study area as food deserts (USDA, 2014). Four of the study area neighborhoods in their entirety are considered food deserts (Globeville, Elyria and Swansea, Northeast Park Hill, and Gateway) with portions of the Montbello and Aurora neighborhoods also considered food deserts.

5.2.6 What are the impacts from the alternatives to neighborhood social conditions?

The alternatives under consideration have direct and indirect effects on social conditions. Direct effects are those that occur within the immediate area of the project and/or within the same timeframe as project construction or operation. Indirect effects are those that occur later and/or in a different location, but are still reasonably foreseeable and related to the project.

Many effects to social conditions are related to property acquisition that results in the relocation of residential units and businesses that serve the local neighborhood. All of the residential relocations due to the project alternatives occur in the Elyria and Swansea Neighborhood. Northeast Park Hill also will experience effects to social resources resulting from business relocations.

No relocations are required from the Globeville, Stapleton, Montbello, Aurora, or Gateway Neighborhoods. Therefore, none of the project alternatives are anticipated to negatively impact neighborhood character and cohesion, community social groups, public services and facilities, mobility, or safety in these neighborhoods.

Changes since the Supplemental Draft EIS

Revised construction limits and refined data on the number of impacted housing units has resulted in a change to the number of relocations and displacements since publication of the Supplemental Draft EIS. These changes are documented in Section 5.5, Relocations and Displacements.

All of the alternatives will result in I-70 being located closer to some homes than it is today.

Potential impacts from the project alternatives to Elyria and Swansea and Northeast Park Hill are identified in Section 5.2.7 and Section 5.2.8 by neighborhood.

There are impacts to Swansea Elementary School from all of the alternatives. However, there will be no impacts from any of the alternatives to other schools in the study area.

5.2.7 How does the No-Action Alternative impact neighborhood social conditions?

Neighborhoods impacted by the No-Action Alternative

Elyria and Swansea

The No-Action Alternative impacts only the Elyria and Swansea Neighborhood. In general, the effects to social resources by the No-Action Alternative are similar regardless of whether the North Option or South Option is discussed. Both options will affect comparable numbers of households and local businesses in the Elyria and Swansea Neighborhood. The No-Action Alternative does not add capacity to the highway, so it does not have the beneficial effect of improved travel time in the study area and would not discourage neighborhood cut-through traffic when I-70 is congested.

Housing and population

The effect to social resources by the No-Action Alternative is similar regardless of choosing the North Option or the South Option. Both options will affect comparable numbers of housing units (13 to 15) and local businesses. The relocations represent less than one percent of existing housing (1,844 units) in the Elyria and Swansea Neighborhood (see Section 5.5, Relocations and Displacements).

As previously noted, renters occupy the majority of housing units (52 percent) in the neighborhood. The neighborhood's 2010 vacancy rate was approximately 8.1 percent; therefore, it may be possible for displaced residents to relocate within the neighborhood. Even if affected residents relocate outside of the neighborhood, effects on the overall neighborhood population will be minimal.

Neighborhood character and cohesion

During construction, traffic disruptions will interfere with access to homes, businesses, and public services, such as the Swansea Elementary School, Swansea Recreation Center, and Valdez-Perry Library. Construction-related traffic, light,

glare, and noise will result in temporary effects on neighborhood character and cohesion for several years.

Since its initial construction in the 1960s, the presence of I-70 has disrupted neighborhood cohesion in Elyria and Swansea by bisecting the neighborhood. Further encroachment and reconstruction of the viaduct in the neighborhood will impact neighborhood cohesion from the removal of homes and businesses. Based on public outreach conducted for this EIS, some residents view the reconstructed viaduct as an improvement over the existing structure.

Local Road Network

The No-Action Alternative does not require changes to the overall local road network within the Elyria and Swansea Neighborhood. The alternative continues to provide through-street access under the viaduct and connections to 46th Avenue at all cross streets, with the exception of Elizabeth Street. Elizabeth Street does not connect across I-70 today. Pedestrian access is included on all cross-street connections to 46th Avenue, with continuous pedestrian access incorporated along 46th Avenue from Brighton Boulevard to Garfield Street.

Public services and facilities

Public services and facilities in the Elyria and Swansea Neighborhood potentially affected by the No-Action Alternative Options include Swansea Elementary School and Denver Rescue Mission. The locations of these resources are shown on **Exhibit 5.2-2**.

Swansea Elementary School

The No-Action Alternative, North Option will acquire the buffer area between 46th Avenue and the field to the south of Swansea Elementary School for right of way. The school will not be impacted with the South Option.

The No-Action Alternative, North Option moves the I-70 viaduct closer to the school by approximately 60 feet. The school building will not be directly affected; however, the proximity of I-70 may have effects on the future operation of the school. It is important to note that these effects do not take into account mitigation measures to reduce effects on the school. Mitigation measures are discussed in Section 5.2.15.

Denver Rescue Mission

The Denver Rescue Mission's Ministry Outreach Center was located at 3501 East 46th Avenue, just north of I-70. As identified on the Denver Rescue Mission's website, the Ministry Outreach Center:

"[Is the] administrative office and central warehouse location for Denver Rescue Mission. Ministry Outreach Center warehouses food that is distributed to the Lawrence Street Shelter, Champa House and The Crossing program locations, as well as in food boxes given to the needy in the Denver area. Clients can receive clothing, furniture, and other household items donated by the community at the location."

The facility provides services to some individuals who reside in the study area neighborhoods, so displacing this building may have an impact on these individuals.

Because of effects from both the No-Action Alternative and the Build Alternatives, the Ministry Outreach Center was acquired by CDOT in 2014, and has been relocated to 6501 East Smith Road, not far from its original location. The overall effect on local residents has been mixed. The relocation of the Ministry Outreach Center has not had an effect on regional residents.

Neighborhoods impacted by the Build Alternatives

Elyria and Swansea

Northeast Park Hill

5.2.8 How do the Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative) impact neighborhood social conditions?

The Build Alternatives will result in impacts to the entire study area, but most of these impacts will occur in the Elyria and Swansea and Northeast Park Hill Neighborhoods.

The expanded capacity of the Build Alternatives will have beneficial effects for residents of the study area. Residents who use the highway routinely to commute between home and work or to access public services, such as hospitals or schools, will experience faster travel times.

The improved I-70 also will have beneficial effects for those who drive or walk on nearby arterial and local roads. Improved traffic flow on I-70 will reduce cut-through traffic on neighborhood streets. It also will improve safety for motorists, both on local roads and on I-70, while also creating a safer environment for pedestrians. Generally, across the study area, connectivity and mobility will improve

Connectivity

Connectivity means the physical connections within and between neighborhoods, primarily in the form of the road network.

Mobility

Mobility refers to how well the available transportation choices (highway, local roads, sidewalks, and transit) move people and goods.

compared to existing conditions and the No-Action Alternative. The benefit of increased connectivity and mobility will be most important for people who use I-70 regularly.

Effects from the Build Alternatives are identified below by effect to housing and population, neighborhood character and cohesion, and public services and facilities.

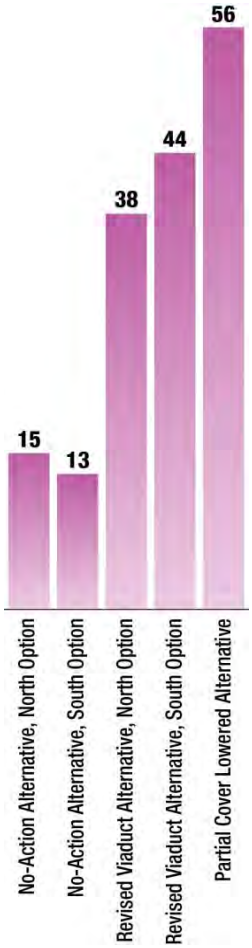
Housing and population

The effect to social resources by the Revised Viaduct Alternative is similar for the North Option and the South Option. Both options will affect comparable numbers of housing units (38 to 44), which is approximately two percent of the housing units, in the Elyria and Swansea Neighborhood.

The Partial Cover Lowered Alternative will affect 56 housing units, which is approximately three percent of the housing units in the Elyria and Swansea Neighborhood.

The Build Alternatives do not displace any housing units in the Northeast Park Hill Neighborhood.

As previously noted, renters occupy slightly more than half of the housing units (52 percent) in the Elyria and Swansea Neighborhood. The neighborhood's 2010 vacancy rate was approximately 8.1 percent; therefore, it may be possible for displaced residents to relocate within the neighborhood. Even if affected residents relocate outside of the neighborhood, effects on the overall neighborhood population will be minimal.



Number of residential relocations by alternative and option for the Elyria and Swansea Neighborhood (out of 1,844 existing housing units in the neighborhood)

Neighborhood character and cohesion

Of the seven markets and convenience stores in Elyria and Swansea, El Tepetate Market and El Rinconcito Mini Market would be displaced by the Revised Viaduct Alternative, South Option. The Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative would displace the Stop N Shop and Pilot Travel Center.

The Revised Viaduct Alternative will offset negative impacts by including an urban space for community and neighborhood activities under the new viaduct. Some of the uses include walking/jogging loops, sports fields, and skate parks. Incorporation of a community space under the viaduct could improve and enhance neighborhood cohesion.

The Partial Cover Lowered Alternative will have both positive and negative effects on neighborhood cohesion in the

Elyria and Swansea Neighborhood. This alternative requires the greatest number of residential relocations from the neighborhood and will displace approximately 3 percent of the housing units.

These negative impacts will be offset by removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities. The viaduct has been identified in the past as a barrier to neighborhood cohesion. Removing the viaduct from the residential neighborhood and lowering the highway below the existing grade will improve the visual and aesthetic characteristics of the area by removing a major visual barrier. Additional information on the highway cover is provided in Chapter 3, Summary of Project Alternatives.

On the north side of I-70, 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the highway cover.

The Revised Viaduct Alternative and Partial Cover Lowered Alternative modify access to and within Northeast Park Hill. Existing slip ramps at Dahlia Street, Monaco Street, and Holly Street will be consolidated into an interchange at Holly Street.

Overall, modifications to I-70 will not cause a substantial change in access to or through Northeast Park Hill and will not affect mobility or neighborhood cohesion.

Local Road Network

Changes to the local road network will have minor impacts to neighborhood cohesion in Elyria and Swansea.

The Revised Viaduct Alternative and Partial Cover Lowered Alternative remove the York Street interchange. The loss of direct access on and off I-70 from York Street will inconvenience people who use the interchange today. The interchange at Brighton Boulevard (a half-mile west of the York Street interchange) still will provide access to and from the nearby area.

Steele Street/Vasquez Boulevard (1.5 miles east of York Street) still will provide partial access to and from the nearby area with the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. The Steele Street/Vasquez Boulevard interchange will be a split-diamond interchange with Colorado Boulevard. In addition,

slip ramps are included to provide an eastbound off-ramp and westbound on-ramp at Colorado Boulevard.

Changes to the local road network from the Revised Viaduct Alternative will have minor impacts and benefits to neighborhood cohesion in Elyria and Swansea. Existing local north-south connectivity across I-70 will be maintained via York Street, Josephine Street, Columbine Street, Clayton Street, Steele Street/Vasquez Boulevard, and Monroe Street. Through-street access will be added at Fillmore Street and Milwaukee Street (see **Exhibit 4-22** in Chapter 4, Transportation Impacts and Mitigation Measures).

To provide local east-west connectivity, 46th Avenue will run underneath I-70 as a two-lane road with turn lanes, as part of this alternative.

The Partial Cover Lowered Alternative continues to provide north-south connectivity at York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, and Steele Street/Vasquez Boulevard. It also provides additional north-south connectivity over I-70 at Cook Street and Monroe Street (see **Exhibit 4-23** in Chapter 4, Transportation Impacts and Mitigation Measures).

46th Avenue is no longer located underneath I-70, but is a one-way couplet between Brighton Boulevard and Josephine Street and between Milwaukee Street and Colorado Boulevard with eastbound travel on the south side of I-70 and westbound travel on the north side of I-70. Between York Street and Milwaukee Street, 46th Avenue has two-way operations on both sides of I-70. Additionally, on the north side of I-70, 46th Avenue will be discontinued between Clayton Street and Columbine Street. This alternative eliminates the portion of Elizabeth Street north of 46th Avenue and south of 47th Avenue. All other north-south streets within this area end at either eastbound or westbound 46th Avenue. 46th Avenue extends across Colorado Boulevard and connects with the existing one-way couplet of Stapleton Drive North and Stapleton Drive South. These streets are extended to the east and connect to the Quebec Street ramps to allow for connectivity between Colorado Boulevard and Quebec Street.

The closure of Elizabeth Street provides an opportunity to reconfigure the Swansea Elementary School property. This reconfiguration is discussed in more detail later in this section. Access to 46th Avenue also will be eliminated at Elizabeth Street and Milwaukee Street. All other cross

streets still will connect to 46th Avenue. Pedestrian access will be included on all through-street structures over I-70, with continuous pedestrian access incorporated along 46th Avenue from Brighton Boulevard to Monaco Street.

Public services and facilities

Public services and facilities potentially affected by the Build Alternatives include the Swansea Elementary School and the Denver Rescue Mission in the Elyria and Swansea Neighborhood. The location of these resources is shown on **Exhibit 5.2-2**.

The Build Alternatives will not impact public services and facilities or safety in other neighborhoods, since no public facilities will be required for right-of-way access, and services and safety are provided by agencies located outside of the neighborhoods.

Swansea Elementary School

The Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative will acquire right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School. The school property is approximately 3.6 acres.

In the area of the playground, the Revised Viaduct Alternative, North Option shifts the edge of the highway towards the Swansea Elementary School building, resulting in approximately 135 feet between the edge of the highway and the school building. The expansion of the highway in this area requires the acquisition of approximately 0.53 acre of playground, as well as the 0.23-acre buffer zone, for a total of 0.76 acre. This acquisition results in the viaduct abutting the area of the playground where equipment and other amenities are located.

For this alternative, the school site will be redesigned using adjacent parcels and closing Elizabeth Street from 46th Avenue to 47th Avenue. The Revised Viaduct Alternative, North Option also will use the space under the reconstructed viaduct as a park or recreational space. The redesign of the school lot for the Revised Viaduct Alternative, North Option increases the school playground from the current 1.4 acres to as much as 2.0 acres, depending on the site plan design. It includes new or replaced multi-purpose fields, sport courts, and school gardens

It is important to note that these effects do not take into account mitigation measures that reduce effects to the Swansea Elementary School. Mitigation measures are discussed in Section 5.2.15.

This Partial Cover Lowered Alternative removes the existing viaduct and reconstructs the highway below ground level. It also adds a cover across the highway in the area of Swansea Elementary School. This alternative requires approximately 0.72 acre of right-of-way acquisition from the school playground and the entire 0.23-acre buffer zone for a total of 0.95 acre.

This acquisition includes the entire playground field (including the buffer zone), and results in the footprint of the highway abutting the area of the school playground where equipment and other amenities are located. Under this option, the edge of the highway shifts north placing it approximately 120 feet from the edge of the school building. The highway will be below grade underneath the cover and will not be visible from the school.

The school site under the Partial Cover Lowered Alternative, will be redesigned using adjacent parcels and closing Elizabeth Street from 46th Avenue to 47th Avenue. The redesign of the school with the Partial Cover Lowered Alternative will result in an increase in the playground acreage. The design includes new or replaced multi-purpose fields, sport courts, and school gardens. Additional space up to 4.0 acres of shared used space may be available for school recreation in the area on top of the cover.

Although this alternative pushes the highway closer to the school compared to the other alternatives, Denver Public Schools is in favor of the Partial Cover Lowered Alternative since it will place the highway below grade and construct a cover over the highway at this location to provide a safer environment for the students.

Denver Rescue Mission

The Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative required the acquisition of the Ministry Outreach Center formerly located at 3501 East 46th Avenue for right-of-way access. The facility provides services to some individuals who reside in the study area neighborhoods, so displacing this building may have an impact on these individuals. The Denver Rescue Mission was acquired by CDOT in 2014 and relocated to 6501 East Smith

Road, not far from its original location, causing the overall effect on local residents to be mixed. The relocation of the Ministry Outreach Center will not have an effect on regional residents.

The Revised Viaduct Alternative, South Option will not impact this resource.

Managed Lanes Option

There is no difference in effects to social conditions between the General-Purpose and Managed Lanes Options.

5.2.9 What are the construction impacts on social resources?

During construction, traffic disruptions will interfere with access to homes, businesses, and public services, such as Swansea Elementary School, Swansea Recreation Center, and Valdez-Perry Library. Construction-related traffic, light, glare, and noise will cause temporary effects on neighborhood character and cohesion for several years. Temporary construction impacts associated with project alternatives also include construction-related travel disruptions (such as road closures, detours, and access and circulation disruptions), RTD service disruptions and/or delays, and traffic-related travel disruptions. These impacts will cause temporary quality-of-life disruptions to households near construction areas. People who work near construction areas or use affected roadways to travel to other activities (for example, health care) also will experience some temporary disruption during construction. Mitigation measures are discussed in Section 5.2.15.

5.2.10 What are the economic conditions in the study area?

Economic factors considered include regional employer types and business sectors, prominent businesses in the corridor, and estimated local employment statistics within the study area and region. The study area for economic conditions is the same as the social conditions section; however, many of the data sources provide information for a different defined Denver metropolitan area. For this section, the Denver metropolitan area includes the following seven counties: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson.

The majority of information in this section is from Denver's *An Economic & Demographic Overview of the Denver*

Metropolitan Areas

Data sources used in the social and economic section may define the Denver metropolitan area with different limits (generally, the number of counties included in the data set is different depending on the source). Discussion topics for the social and economic study area are identified for each neighborhood (where possible) and then compared to the respective county and the metropolitan area (for that topic and data set) to uncover notable trends and draw general conclusions about the study area and each neighborhood.

Metropolitan Area, (Denver, 2012b). This document notes that the Denver metropolitan area is the largest population and employment center within the state of Colorado, and "accounts for about 60 percent of Colorado jobs and 55 percent of the state's total population" (Denver, 2012b, p. 1).

Private and public sector employers

As a regional center for the Rocky Mountain states and western Plains states, Denver is the location for several corporate and regional headquarters for large private companies, and has more federal employees than any United States city except Washington, D.C. (Denver, n.d.).

The largest private-sector employers in the greater metropolitan Denver area are health care, high-technology (such as aerospace and telecommunications), and financial services. Many public sector employers, such as universities and local and federal agencies, also employ significant numbers of people in the Denver metropolitan area.

There are numerous businesses located within the study area. These businesses benefit from their proximity to I-70 and other federal and state highways in various ways. Factories and distribution centers use I-70 for transportation of goods and materials to and from factories and distribution centers. Examples of this in the study area are the Nestlé Purina PetCare Company's manufacturing plant south of I-70 near York Street, the Univar distribution facility south of I-70 on Holly Street, the Manna Pro facility on Madison Street south of I-70, and the Safeway factories and distribution centers north and south of I-70 near Holly Street. Commercial businesses, such as the Pilot Travel Center at the intersection of I-270 and Quebec Street, also benefit from their proximity to I-70 through ready access and the business is high visibility to highway drivers.

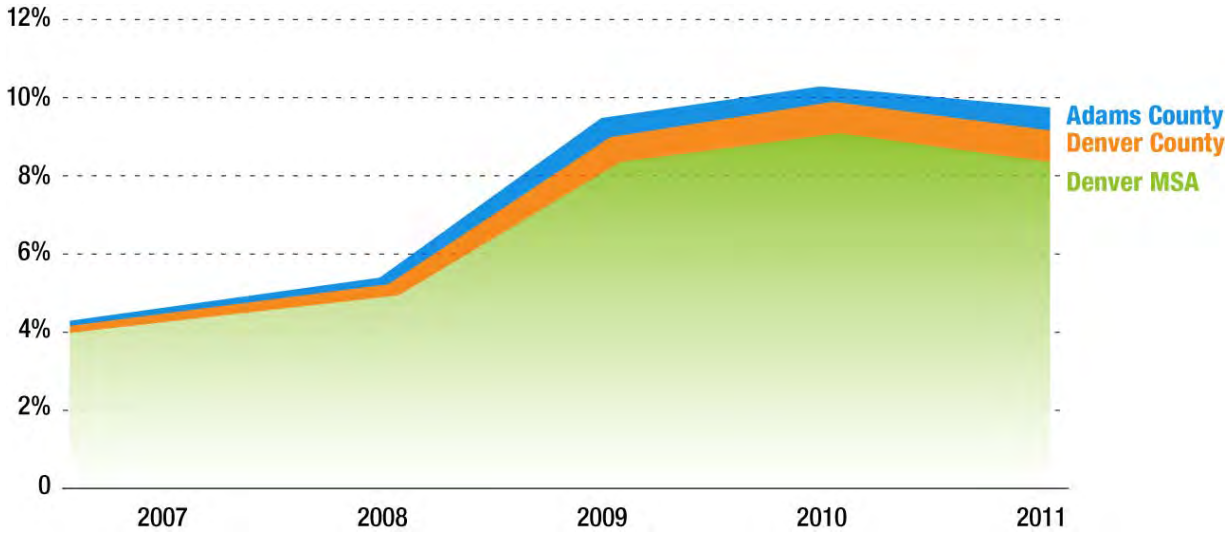
A major regional economic asset is the National Western Stock Show Complex, located north of I-70 at the Brighton Boulevard interchange. The National Western Complex includes more than 600,000 square feet of developed facilities, including an events center, exposition hall, hall of education, stadium hall, and stadium arena. The complex is a major economic asset in Denver's economy, primarily because it is the site of the National Western Stock Show and Rodeo. Inaugurated in 1906, the National Western is now billed as the largest livestock, rodeo, and horse show in the world. The event attracts more than 600,000 visitors a year, with approximately a quarter of these visitors coming

from outside of the Denver metropolitan area. Visitors often stay in the Denver area for approximately a week (PRWeb, 2005). The 16-day event is a benefit to the local economy because it occurs during the middle of January, which is otherwise a slow period for tourism. In addition to the National Western Stock Show, numerous other events are held at the complex throughout the year, including trade shows, sporting events, circuses, and horse shows. The facility has identified expansion opportunities that are documented in a master plan for the complex recently completed in March 2015.

Unemployment rates

The annual unemployment rate in recent years for the Denver MSA, Denver County, and Adams County is shown in **Exhibit 5.2-16** (note that unemployment statistics are not available below the county level).

Exhibit 5.2-16 Annual Unemployment Rate



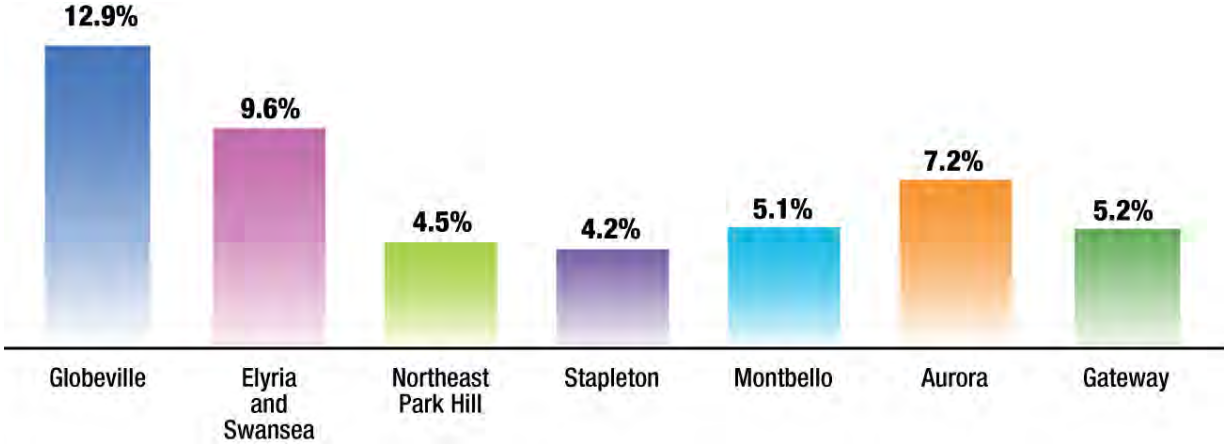
Source: Bureau of Labor Statistics, 2012

Unemployment in each of the three geographic areas increased sharply from 2008 to 2009. This trend is consistent with the national economic downturn during that period.

Detailed owner, worker, and customer characteristics for individual businesses within the study area are not known at this time, but **Exhibit 5.2-17** shows the percentage of residents that travel less than 10 minutes to work for each neighborhood. The information in the exhibit can be used to gauge how much job loss associated with business displacements may directly affect residents of that

neighborhood. For example, a business displacement in the Elyria and Swansea Neighborhood is less likely to result in job losses for that neighborhood because approximately 90 percent of residents' commute time is 10 minutes or more.

Exhibit 5.2-17 Percentage of Residents with Less than 10-Minute Travel Time to Work



Source: U.S. Census Bureau, 2011b, Table C08134, "Means of Transportation to Work by Travel Time to Work"
Note: Includes all modes of transportation to work.

Public revenue base

Colorado, Denver, and Aurora rely on a variety of tax mechanisms to fund state and local government programs, including highway construction and maintenance. Governments levy taxes on personal and corporate income, sales of goods and services, property, and gasoline.

Colorado and municipalities levy state and local retail sales taxes based on the sale price of goods, and also assess a use tax on the market value of using tangible property and services for which the sales tax has not been paid. Based on the most current data available, Denver's 2012 budget projected $441 million in sales and use tax revenues, out of a total anticipated revenue of $932 million for the general fund (Denver, 2012b). Aurora's 2013 budget projects $131.5 million in sales tax, out of a total anticipated revenue for the general fund of $243 million (City of Aurora, 2013).

Property and real estate, including land, buildings, and other improvements, are subject to property tax. For 2012, the total property tax levy for Denver was estimated to be $259 million. About $72 million of the 2012 levy was for Denver's general fund (Denver, 2012e). Approximately $25 million of Aurora's 2013 levy is expected for the city's general fund (City of Aurora, 2013).

5.2.11 How do the project alternatives potentially affect economic resources?

All alternatives under consideration will have direct and indirect effects to economic resources. Direct effects are those that occur at the same time and in the same place as the project. Indirect effects occur later in time and/or in a different location, but are still reasonably foreseeable and related to the project.

Most project-related economic effects will result from right-of-way acquisitions of businesses serving local and/or regional clientele. Proposed business relocations range from six for the No-Action Alternative, North Option up to 27 for the Revised Viaduct Alternative, South Option. These acquisitions will reduce property tax revenue for local taxing authorities; however, they are expected to have only minimal effects to the employment of local residents.

The majority of local residents do not work within the study area, and the improved mobility on I-70 will bolster the economic and social success of developing urban centers in the Stapleton and Gateway Neighborhoods. Therefore, despite the loss of some businesses, continued employment opportunities will exist within the area. Additionally, redevelopment opportunities will exist in neighborhoods such as Elyria and Swansea.

Over the long term, factors outside of CDOT's control—including the federal, state, and local economies and the actions of neighboring and distant cities—are likely to have greater effects (either positive or negative) that will diminish the importance of this short-term adverse impact on the property tax base.

Economic effects are identified by alternative in the following discussion.

5.2.12 What are the effects to economic conditions by the No-Action Alternative?

The direct impacts from the No-Action Alternative only affect the Elyria and Swansea Neighborhood. Parcels affected by right-of-way acquisition include one neighborhood market/convenience store between York Street and Colorado Boulevard along East 46th Avenue. This will impact the Elyria and Swansea Neighborhood since there are a limited number of food markets in the corridor. The loss of a market is discussed in more detail in Section 5.3, Environmental Justice.

Neighborhoods impacted by the No-Action Alternative

Elyria and Swansea

The No-Action Alternative will create jobs through the construction phase. Access to businesses in the operation phase will be essentially the same as the existing network, but will degrade over time as the population in the region continues to grow and traffic congestion increases. This future scenario results in major economic impacts in the Denver area and beyond, because it will restrain the movement of goods and people and generally decreases both the quality of life in Denver and the attractiveness of Denver as a place to live and work.

No-Action Alternative, North Option

The No-Action Alternative, North Option will relocate six businesses (including one neighborhood market/convenience store) and result in a short-term loss in property tax revenues for Denver. Based on property valuation and tax information from the Denver Tax Assessor's Office (Denver Tax Assessor Office, 2012), the assessed value for parcels to be acquired (full acquisition only) in Denver is about $4.4 million. This will result in a minor decrease in Denver's property tax revenues (approximately 0.01 percent, because the assessed value of effected parcels is 0.01 percent of Denver's total assessed 2011 property valuation).

No-Action Alternative, South Option

The No-Action Alternative, South Option will relocate 15 businesses, including several properties currently owned by the Nestlé Purina PetCare Company. One of these properties is a large factory on the south side of I-70 just west of York Street. If the company decides to move the factory to a location outside of the study area, there could be a minor loss of local employment opportunities. However, as mentioned above, the majority of local residents do not work within the study area. The No-Action Alternative, South Option will relocate one neighborhood market/convenience store.

Property acquisitions for right of way will result in a short-term loss in property tax revenues for Denver. Based on property valuation and tax information from the Denver Tax Assessor's Office (Denver Tax Assessor Office, 2012), the assessed value for parcels to be acquired (full acquisition only) in Denver is $10.1 million. This causes a minor decrease in Denver's property tax revenues (approximately 0.01 percent, because the assessed value of effected parcels is 0.01 percent of Denver's total assessed 2011 property valuation).

5.2.13 What are the effects to economic conditions from the Build Alternatives?

The effects from the Build Alternatives (Revised Viaduct and Partial Cover Lowered) result in business relocations in the Elyria and Swansea and Northeast Park Hill Neighborhoods. In addition, CDOT's current maintenance yard in Stapleton will have to relocate.

Neighborhoods impacted by the Build Alternatives

Elyria and Swansea

Northeast Park Hill

The number of businesses that will be acquired by the Build Alternatives range from 15 to 27. Of these properties, four are of particular importance because they are neighborhood markets/convenience stores in the Elyria and Swansea Neighborhood between York Street and Colorado Boulevard along East 46th Avenue. However, each of the Build Alternatives will only relocate two out of the four markets/convenience stores. Impacts to these neighborhood markets would further contribute to the presence of a food desert in the area and affect residents by forcing them to travel farther for food.

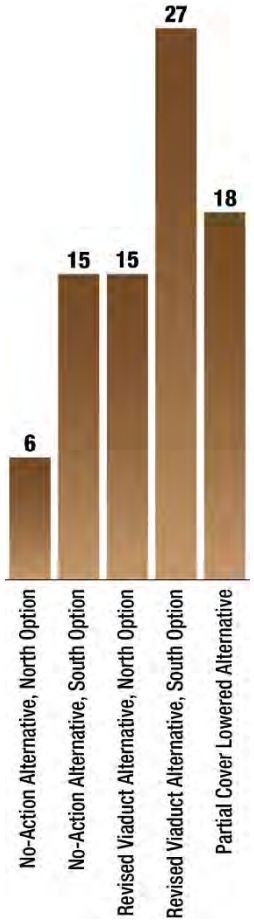
Effects on regional employment due to right-of-way acquisition of parcels occupied by businesses are expected to be minor.

Revised Viaduct Alternative

When the Revised Viaduct Alternative is built, access to businesses generally will improve because of the additional lanes added to I-70 and the resulting improvements in travel time to and from businesses. The elimination of the York Street interchange will cause some access disruptions for local businesses, but the overall effect will be minor because access to I-70 still will be provided through interchanges at Brighton Boulevard and Steele Street/Vasquez Boulevard. The changes in north-south through-street access under the viaduct between Brighton Boulevard and Colorado Boulevard also will cause minor changes in access to and from local businesses.

Revised Viaduct Alternative, North Option

The Revised Viaduct Alternative, North Option will relocate 15 businesses, including the Pilot Travel Center. Full property acquisitions for right of way from the Revised Viaduct Alternative, North Option will result in some loss in the property tax base for Denver. Based on property valuation and tax information from the Denver Tax Assessor's Office (Denver Tax Assessor Office, 2012), the assessed valuation for parcels to be acquired (full acquisition only) in Denver is about $17.2 million. This will result in a minor decrease in Denver's property tax revenues (approximately 0.022 percent, because the assessed value of effected parcels is 0.022 percent of Denver's total assessed 2011 property valuation).



Number of business relocations by alternative and option in the study area

Revised Viaduct Alternative, South Option

The Revised Viaduct Alternative, South Option will relocate 27 businesses. Manna Pro is one of the more prominent businesses affected by full right-of-way acquisition between the two Revised Viaduct Options. Although the Revised Viaduct Alternative, South Option has similar right-of-way acquisition effects as the Revised Viaduct Alternative, North Option on businesses like Manna Pro, it also has additional effects on other properties—for instance, the Nestlé Purina PetCare Company manufacturing plant and the Univar distribution center on Holly Street.

The effects on these prominent businesses and smaller businesses in the corridor will result in a loss of some local employment opportunities. Given that the majority of individuals working in Elyria and Swansea and Northeast Park Hill live outside the study area, the effect on employment for those living in the study area is likely to be minor. In addition, many residents in the immediate area of the Nestlé Purina PetCare Company's facility view it as a blight on the neighborhood because of the visual intrusion of the plant and the noise and odors that the plant emits. Consequently, these local residents may view the displacement of the factory as a positive effect.

Full property acquisitions for right of way from the Revised Viaduct Alternative, South Option will result in some loss of property tax base for Denver. Based on property valuation and tax information from the Denver Tax Assessor's Office (Denver Tax Assessor Office, 2012), the assessed valuation for parcels to be acquired (full acquisition only) in Denver is about $24.3 million. This will result in a minor decrease in

Denver's property tax revenues (approximately 0.032 percent, because the assessed value of effected parcels is 0.032 percent of Denver's total assessed 2011 property valuation).

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will relocate 18 businesses, including the Pilot Travel Center. Property acquisitions for right of way will result in a short-term loss in property tax revenues for Denver. Based on property valuation and tax information from the Denver Tax Assessor's Office (Denver Tax Assessor Office, 2012), the assessed value for parcels that are to be acquired (full acquisition only) in Denver is about $19.6 million. This will result in a minor decrease in Denver's property tax revenues (approximately 0.025 percent, because the assessed value of effected parcels is 0.025 percent of Denver's total assessed 2011 property value).

The *National Western Center Master Plan* (March 2015) was developed under the assumption that the Partial Cover Lowered Alternative is implemented. The plan identifies expansion opportunities for the facility that rely on improved access to the site from I-70. These improvements would be constructed as part of the Partial Cover Lowered Alternative and consist of simplified traffic movements at the Brighton Boulevard interchange from the removal of 46th Avenue between Brighton Boulevard and Humboldt Street.

When the Partial Cover Lowered Alternative is built, access to businesses generally will improve because of the added lanes on I-70 and the resulting improvements in travel time to and from businesses. Effects on businesses from relocations in the corridor will result in a loss of some local employment opportunities. Given that the majority of individuals working in the Elyria and Swansea Neighborhood live outside the study area, the effect on employment for those living in the study area is likely to be minor.

The elimination of the York Street interchange will cause some access disruptions for local businesses in the Elyria and Swansea Neighborhood, but the overall effect will be minor because access to I-70 still will be provided through interchanges at Brighton Boulevard and Steele Street/Vasquez Boulevard.

Managed Lanes Option

Depending on the policy decisions for managed lanes fee structures, there could be economic benefits to residents in the surrounding communities, such as reliable commute times to employment centers. Per FHWA's *Environmental Justice Emerging Trends and Best Practices Guidebook* (FHWA, 2011), consideration of equity issues—such as who bears the burden of the road pricing charges, who benefits from the improved road, and how the toll revenues are used—is critical in calculating the road pricing to ensure low-income and minority populations are considered. While the pricing on managed lanes will help provide a reliable and delay-free transportation option, the tolling fees will be implemented with thorough consideration of equity impacts.

5.2.14 What are the construction impacts on economic resources?

The alternatives under consideration will have both positive and negative construction impacts on economic resources. Positive construction impacts include the job creation and economic stimulus estimates for I-70 East based on the Regional Economic Impact Model for Highway Systems (REIMHS), a sketch-planning model of highway construction activity developed by the FHWA (Politano & Roadifer, 1989). The economic output includes the multiplier effect of direct construction dollars being re-spent in service or other sectors of the economy, as well as the ongoing efficiency gains from improved highway travel.

Economic activity generated by the proposed project will benefit the Denver area, as well as the regional labor and material markets for highway-related construction. From the model, the total number of jobs (full-time person years of employment positions) created will be about 9.1 jobs for each $1 million, adjusting for inflation, of highway investment in urban interstate-type construction. For the project alternatives, the total jobs created to build the project range from about 4,200 for the No-Action Alternative, South Option to 13,900 for the Partial Cover Lowered Alternative, Managed Lanes Option as shown in **Exhibit 5.2-18**. The job increases and most of the economic output increases will take place in the year of the construction expenditures. These numbers are different from the Supplemental Draft EIS because the construction costs have been updated since the publication of the Supplemental Draft EIS to reflect changes in the alternatives.

A negative construction impact will be a temporary effect to the regional economy from construction-related traffic congestion.

Exhibit 5.2-18 Jobs Created

Alternative/Option	Millions of 2016 dollars			Total Jobs (Person Years of Employment)
	Construction Value Including Engineering[1]	Regional Economic Output	Total Earnings	
No Action Alternative, North Option	471.0	828.9	216.7	4,300
No Action Alternative, South Option	465.3	818.9	214.0	4,200
Revised Viaduct Alternative, North Option with General-Purpose Lanes	1,202.0	2,115.6	552.9	10,900
Revised Viaduct Alternative, South Option with General-Purpose Lanes	1,204.1	2,119.1	553.9	11,000
Revised Viaduct Alternative, North Option with Managed Lanes	1,322.5	2,327.6	608.4	12,000
Revised Viaduct Alternative, South Option with Managed Lanes	1,324.5	2,331.2	609.3	12,100
Partial Cover Lowered Alternative with General-Purpose Lanes	1,408.3	2,478.6	647.8	12,800
Partial Cover Lowered Alternative with Managed Lanes	1,528.8	2,690.7	703.3	13,900

Sources: A.L Politano and Carol J. Roadifer, Regional Economic Impact Model for Highway Systems, Transportation Research Record 1229, Transportation Research Board, Washington D.C., 1989. (Model adjusted to reflect inflation.) Atkins, 2015.
1. Construction value does not include right-of-way costs.

5.2.15 How are negative effects to social and economic conditions mitigated?

A variety of mitigation measures are provided for potential impacts to social and economic conditions in the study area. One of the foremost measures is that any person(s) whose real property is acquired by the project must be compensated according to the Uniform Act. In addition, CDOT right-of-way staff will make every effort to relocate people within their current neighborhoods (if desired). CDOT also helps relocated people find services in their new communities. Mitigation for residential and business relocation is discussed in more detail in Section 5.5, Relocations and Displacements.

Some of the construction-related circulation disruptions (for example, temporary road closures and traffic detours) may have impacts on access to certain public services, such as Swansea Elementary School, Swansea Recreation Center,

and Valdez-Perry Library. Proposed mitigation measures for these disruptions include:

- Safe and efficient connections through the neighborhood will be provided during construction for all modes of transportation, including bicycles and pedestrians.
- CDOT will coordinate with local municipal officials during construction to minimize effects on emergency service providers and response times.
- Standard measures, such as phased construction, advance notice of road closures and detours, and fixed and variable signage, will be used to reduce effects on local residents and I-70 motorists.
- Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained.
- Signs and notifications will be used to reduce adverse effects on access to homes, businesses, and services during the construction period.
- The *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community, will be used during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed. CDOT is committed to following the guidelines and continued community involvement during final design and construction.

The highway cover between Columbine Street and Clayton Street also will make it possible for pedestrians and bicyclists to cross anywhere between these two streets, which will improve non-motorized connectivity.

To mitigate impacts to the Swansea Elementary School playground, options to redesign the school site plan were developed for the Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative. For each option, the redesign uses adjacent parcels and includes closing Elizabeth Street from 46th Avenue to 47th Avenue. The Partial Cover Lowered Alternative also will close 46th

Avenue between Columbine Street and Elizabeth Street to allow for a seamless connection between the school property and the cover, and the Elyria and Swansea Neighborhood over the highway.

Because the primary adverse effects to social resources are in the Elyria and Swansea Neighborhood, which is a predominantly Hispanic or Latino and low-income neighborhood, additional mitigation for social and economic effects are discussed in Section 5.3, Environmental Justice.

Exhibit 5.2-19 shows a summary of the impacts and mitigations related to social and economic conditions to which CDOT has already committed.

Exhibit 5.2-19 Summary of Social and Economic Conditions Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures
All Alternatives	• Residential relocations • Business relocations • Temporary effect to the regional economy from construction-related traffic congestion • Temporary road closures and traffic detours may have impacts on access to certain public services	• Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians • Coordinate with emergency service providers during construction to minimize effects on response times • Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists • Provide a robust and context-sensitive communications and outreach plan throughout construction to ensure residents are kept informed • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours • Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction

Exhibit 5.2-19 Summary of Social and Economic Conditions Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures
No-Action Alternative	• 13 to 15 residential relocations • 6 to 15 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School (North Option only) • $818.9 million to $828.9 million of regional economic output (4,200 to 4,300 person years of employment)	No mitigation measures specific to this alternative
Revised Viaduct Alternative	• 38 to 44 residential relocations • 15 to 27 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School (North Option only) • $2,115.6 million to $2,331.2 million of regional economic output (10,900 to 12,100 person years of employment)	• Create an urban space for community and neighborhood activities under the new viaduct • Redesign and reconstruct the school playground (North Option only); this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue
Partial Cover Lowered Alternative	• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School • $2,478.6 million to $2,690.7 million of regional economic output (12,800 to 13,900 person years of employment)	• Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover

5.3 Environmental Justice

This section defines environmental justice and explains why it is important to the project. Using environmental justice principles, impacts of the project alternatives on the low-income and minority populations in the study area are evaluated. This section also discusses proposed mitigation measures to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Impacts from associated resources were updated from other sections.
- Number of relocations were updated (see 5.5 Relocations and Displacements for details on why the numbers have changed).
- Determination for the No-Action Alternative has been updated.
- The mitigation measures were updated and refined.

Federal and state regulations and guidance

- Executive Order 12898
- Title VI of the Civil Rights Act of 1964, as amended
- Executive Order 13166
- NEPA of 1969
- Federal-Aid Highway Act of 1970
- Americans with Disabilities Act of 1990
- Uniform Act of 1970, as amended
- Title VI Regulations, 49 CFR §21 and 23 CFR §200
- Environmental Impact and Related Procedures, 23 CFR §771
- USDOT Order 5610.2(a) on Environmental Justice
- FHWA Order 6640.23A on Environmental Justice
- FHWA Environmental Policy Statements 1990 and 1994
- Environmental justice section of CDOT *NEPA Manual* (CDOT, 2013b)
- FHWA 2011 Guidance on Environmental Justice and NEPA

5.3.1 What is environmental justice and why is it important to this project?

There are three fundamental principles that define environmental justice:

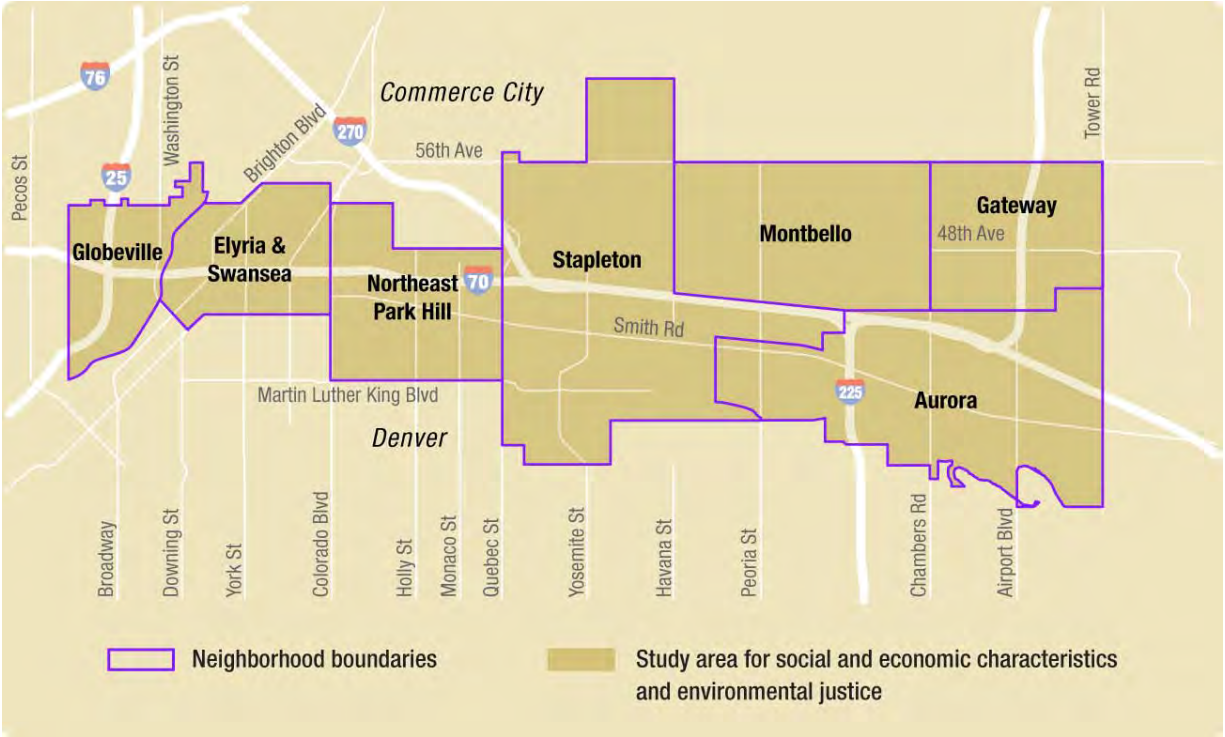
- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction of, or significant delay in the receipt of benefits by minority and low-income populations.

Environmental justice analysis is very important for this project because—as identified in Section 5.2, Social and Economic Conditions—the majority of the neighborhoods along the project corridor have notably higher concentrations of minority and low-income populations when compared to Denver and Adams Counties.

5.3.2 What study area was used to identify environmental justice populations?

Low-income and minority populations were identified using the same study area from Section 5.2, Social and Economic Conditions. The study area consists of those neighborhoods likely to be impacted by the project alternatives in Denver and Aurora. These neighborhoods from west to east are Globeville, Elyria and Swansea, Northeast Park Hill, Stapleton, Montbello, Gateway, and Aurora, as shown in **Exhibit 5.3-1**.

Exhibit 5.3-1 Environmental Justice Study Area



Minorities with a presence in the study area include African-American and Hispanic or Latino. The U.S. Census recognizes Hispanic or Latino as an ethnic category that can include persons of any race; therefore, there might be some individuals in the study area that qualify as both African-American and Hispanic or Latino. There is not a major

presence of individuals claiming Asian-American, American Indian, Alaskan Native, Native Hawaiian, or Pacific Islander ancestry in the study area. The minority and low-income populations within the study area were identified using the 2010 U.S. Census data, as discussed in the following sections.

5.3.3 How are the low-income and minority populations distributed in the study area?

Minority populations

Based on the available data, minority populations have a presence in all of the neighborhoods in the study area. The percentage of minority populations (Hispanic or Latino and African-American) in Globeville, Elyria and Swansea, Northeast Park Hill, Montbello, Gateway, and Aurora Neighborhoods are notably larger than the minority population overall in Denver and Adams Counties.

As shown in **Exhibit 5.3-2**, there are high concentrations of Hispanic or Latino populations in five out of seven neighborhoods along the corridor: Globeville, Elyria and Swansea, Montbello, Aurora, and Gateway. For this analysis, if the percentage of low-income or minority populations within the neighborhoods or the study area exceeded the county average, then the entire block group containing the minority and low-income populations was studied.

Based on the data, 48 percent of the total population of the study area is Hispanic or Latino. This percentage is considerably higher than Denver and Adams Counties at 31.8 percent and 38 percent, respectively.

There are high concentrations of African-Americans in Northeast Park Hill, Stapleton, Montbello, Aurora, and Gateway, resulting in a 23 percent African-American minority concentration in the study area, which is considerably higher than Denver and Adams Counties at 10.2 percent and 3.1 percent, respectively, as shown in **Exhibit 5.3-3**.

How is "minority" defined as it applies to environmental justice?

Per USDOT Order 5610.2(a), "minority" is defined as a person who is:

Black or African-American: A person having origins in any black racial groups of Africa

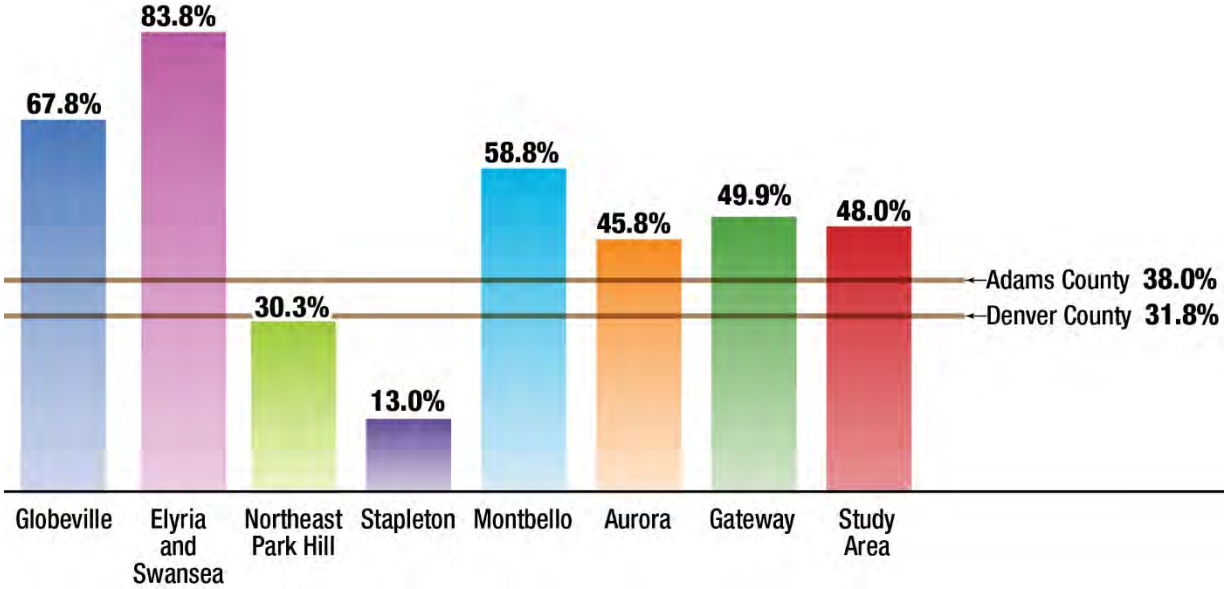
Hispanic or Latino: A person who claims Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture of origin, regardless of race

Asian-American: A person with ancestry in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent

American Indian and Alaskan Native: People who identify their origins in any of the native civilizations of North America or South America (including Central America), who maintain cultural identification through tribal affiliation or community recognition

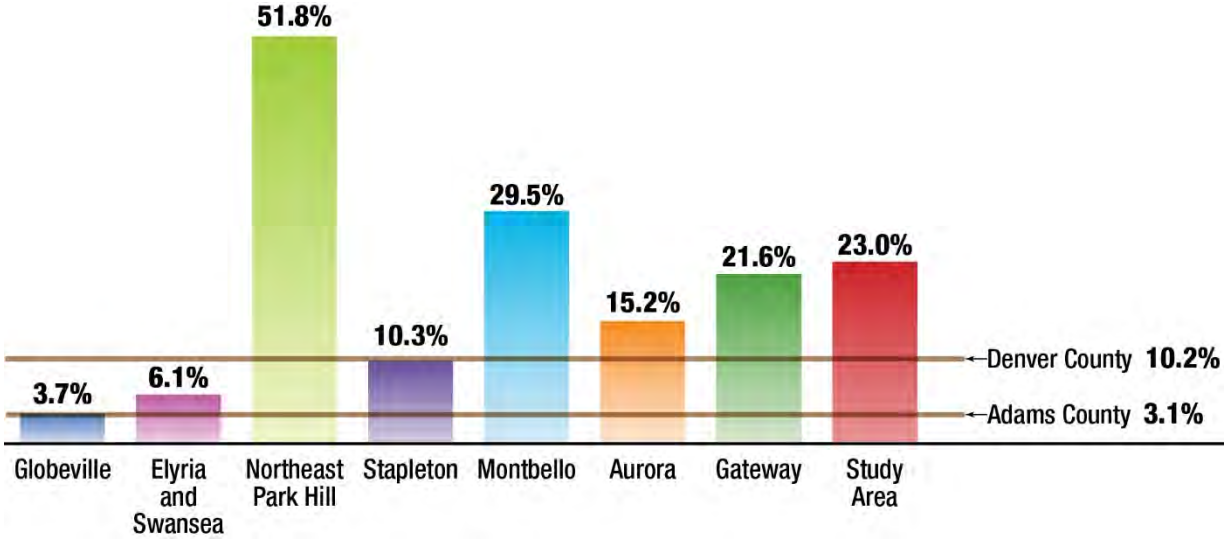
Native Hawaiian or Pacific Islander: People who claim cultural identity with any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands

Exhibit 5.3-2 Hispanic or Latino Populations in the Study Area



Source: U.S. Census Bureau, 2011a, Table P4 "Hispanic or Latino Origin"

Exhibit 5.3-3 African-American Populations in the Study Area



Source: U.S. Census Bureau, 2011a, Table P3, "Race"

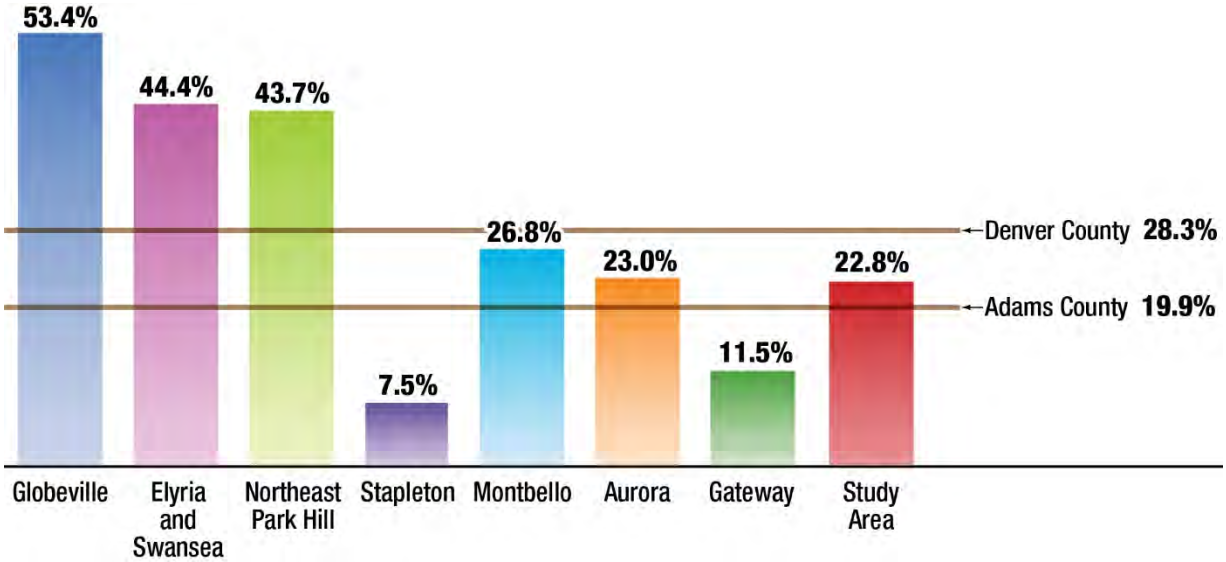
Low-income populations

Based on the HUD methodology for calculating median family income using the ACS 5-year estimate data as explained in Section 5.2, Social and Economic Conditions, the income threshold for the study area to identify low-income households was rounded up to the top of the census income category, which is $24,999 for a family of four.

Based on the available data, and as shown in **Exhibit 5.3-4**, four neighborhoods within the study area exceed the average

of low-income households within the county in which they are located. These neighborhoods—from west to east—are: Globeville, Elyria and Swansea, Northeast Park Hill, and Aurora.

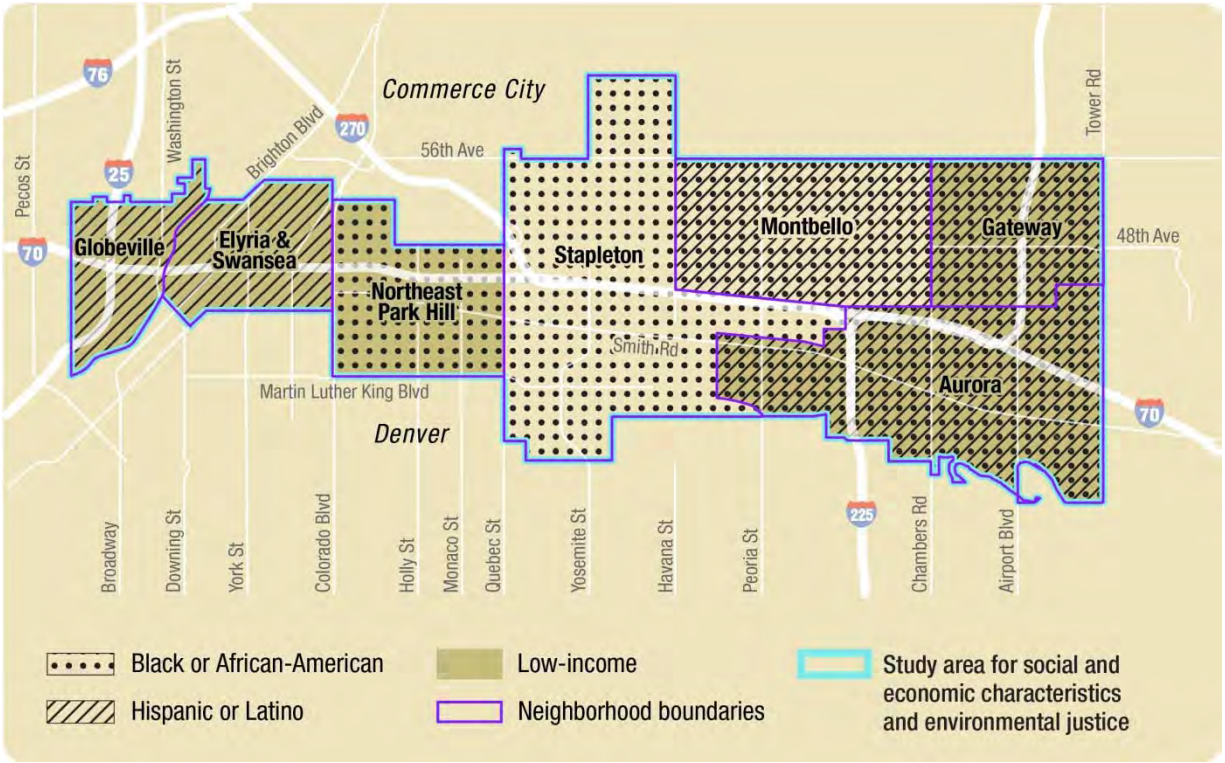
Exhibit 5.3-4 Percentage of Low-Income Households in the Study Area



Source: U.S. Census Bureau, 2011b, Table B19001

Exhibit 5.3-5 illustrates neighborhoods in the study area with high concentrations of minority and low-income populations. As shown in the exhibit, most of the neighborhoods in the study area include large minority or low-income populations.

Exhibit 5.3-5 Low-Income and Minority Population Concentrations in the Study Area



5.3.4 How were the low-income and minority populations involved in the study process?

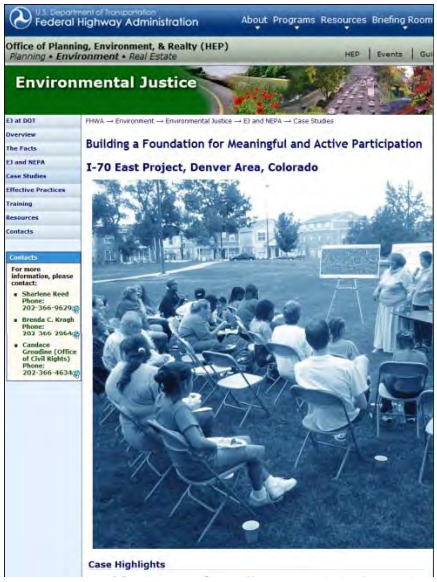
Environmental justice guidelines and orders require that low-income and minority populations be provided with opportunities for meaningful public involvement. Extensive and comprehensive public outreach was performed before publishing the 2008 Draft EIS to inform low-income and minority populations about the project and to provide an opportunity to comment on issues, impacts of concern, and the alternatives under consideration. A variety of tools were used to solicit input and involvement from stakeholders that addressed issues of diversity in language, level of literacy, and exposure to media. Specific tools included: door-to-door surveys, block meetings, neighborhood meetings, corridor-wide meetings, working groups, and forums

During the preparation of—and after publication of—the 2014 Supplemental Draft EIS, the project team continued the public outreach activities to the general public and specifically to low-income and minority populations in order to engage everyone in the decision-making process. In addition to corridor-wide meetings and community working

groups, the project team held monthly meetings at accessible locations in the area to provide project updates, answer questions, and collect input on various elements of the project. Project team members also attended local community events to meet with the community and provide information about the project. Chapter 10, Community Outreach and Agency Involvement explains the public outreach activities in more detail.

Food and childcare were provided at all outreach meetings to further encourage public participation. The location and set up of all meetings were compliant with the Americans with Disabilities Act of 1990 guidelines to be easily accessible by individuals with special needs.

Because of the extensive outreach to all population groups specifically low-income and minority within the study area, FHWA has selected this project as a case study for environmental justice best practices among projects that focused on environmental justice analysis.



FHWA web page on environmental justice best practices

Limited English Proficiency outreach

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," requires all federal funds recipients to provide meaningful access to LEP individuals. Additionally, under Title VI provisions, CDOT requires special attention for persons with LEP, in compliance with the USDOT LEP Handbook.

The analysis identified a large Spanish-speaking LEP group in the study area—more than 23 percent of the total population of the study area. In compliance with the U.S. Department of Justice provisions regarding the LEP population and the LEP Handbook, Spanish translation was available at all the meetings during the outreach process. The percentage of LEP populations other than Spanish speakers was very low in the study area, as discussed in Section 5.2, Social and Economic Conditions; therefore, translation for other LEP populations was only available upon prior request. Also, bilingual (English and Spanish) flyers and e-mail blasts were sent before the meetings and outreach activities to encourage participation from LEP populations. Project team members accompanied by a Spanish translator conducted door-to-door outreach for some of the corridor-wide meetings to invite members of the community to participate in the meetings. A bilingual (English and Spanish) project team member contacted

Limited English Proficiency (LEP) qualification

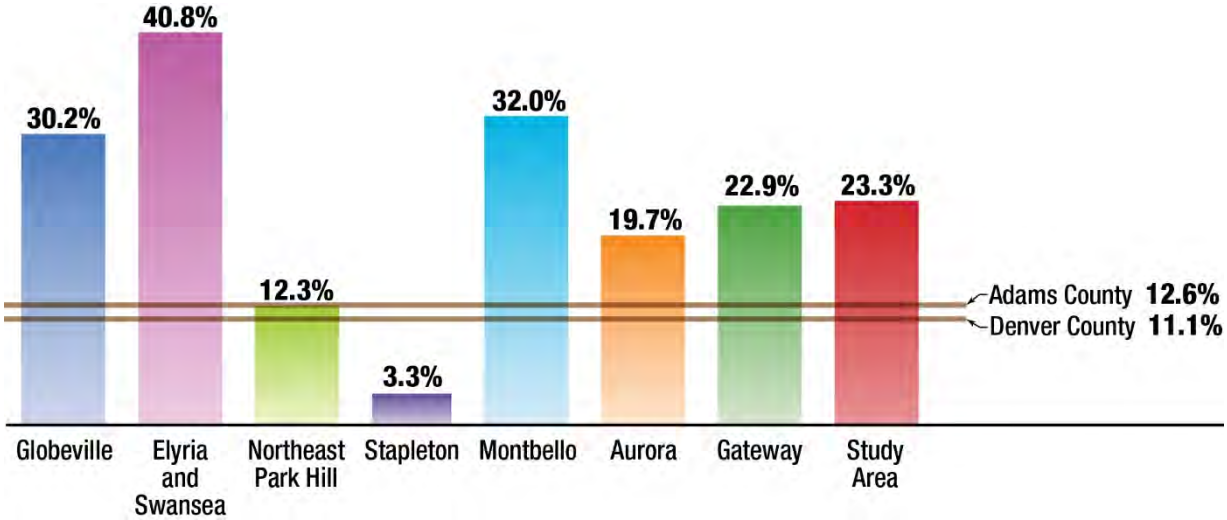
The study area meets the U.S. Department of Justice threshold requirement for the presence of an LEP population, as identified in guidance issued by USDOT in their Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons (USDOT, 2005b).

individuals who requested to be notified by telephone to be invited to all the public and community meetings held by the project team.

During the Supplemental Draft EIS public review period, a Spanish-speaking project team member was available at the project office to assist any person with LEP who had questions regarding the document. Additionally, the Executive Summary of the Supplemental Draft EIS and the summary of the project impacts and mitigations was translated into Spanish and were available at viewing locations.

As shown in **Exhibit 5.3-6**, a high percentage of Spanish-speaking LEP population is present in all of the neighborhoods except Stapleton.

Exhibit 5.3-6 Spanish Speaking LEP Population in the Study Area



Source: U.S. Census Bureau 2011b, Table B16004, "Age by Language Spoken at Home for the Population 5+ Years"

5.3.5 Was an alternative evaluated that avoids impacts to low-income and minority populations?

More than 90 alternatives were considered during the initial stages of the project. Some of these alternatives proposed realigning the highway and removing it from the neighborhoods that are currently affected by the highway. The Realignment Alternatives were developed and carried forward through the Draft EIS as a way to avoid impacts to low-income and minority populations along the highway in the Elyria and Swansea Neighborhood. As discussed in Chapter 3, Summary of Project Alternatives, additional

analysis was done on the Realignment Alternatives after the Draft EIS was published.

This additional analysis concluded that the Realignment Alternatives are not reasonable and lack public and stakeholder support. Although the Realignment Alternatives would improve mobility on the highway and avoid direct impacts to the low-income and minority populations by removing the highway from those neighborhoods, they would divert a high volume of vehicles from I-70 to 46th Avenue, thus increasing the traffic volume on 46th Avenue by 10 to 20 times. The impacted communities expressed their concern that the increase in the traffic along 46th Avenue through the Elyria and Swansea Neighborhood is not acceptable.

Originally thought to avoid impacts to the low-income and minority populations in the Elyria and Swansea Neighborhood, the Realignment Alternatives were eliminated from further consideration prior to the Supplemental Draft EIS because additional analysis concluded that they truly do not avoid impacts.

5.3.6 How were alternatives modified to minimize impacts to low-income and minority populations?

After receiving several comments on the Draft EIS involving the impacts to the residential and business properties between Brighton Boulevard and Colorado Boulevard, the project team adjusted and refined the proposed Existing Alignment Alternatives (called the Revised Viaduct Alternative in the Supplemental Draft EIS and in this document) by moving 46th Avenue under the viaduct and thereby minimizing impacts to the surrounding homes and businesses. Additional north/south connectivity also has been added to this alternative to improve community cohesion compared to the Existing Alignment Alternatives in the Draft EIS.

To reduce visual presence of the viaduct in these neighborhoods, improve connectivity, and improve safety in the area, the project team introduced a new alternative in the Supplemental Draft EIS: the Partial Cover Lowered Alternative. This alternative removes the viaduct between Brighton Boulevard and Colorado Boulevard and places the highway below grade within this area. In addition, it includes a highway cover in the vicinity of Columbine Street and Clayton Street with an urban landscape for community use. Removing the viaduct improves safety compared to the

How are the impacts, benefits, and mitigation measures discussed in this section?

Unlike other sections of Chapter 5, benefits and mitigation measures for each alternative are discussed directly after the impacts discussion. A summary section is added for each alternative, which explains how the mitigation measures alleviate impacts to the low-income and minority communities.

existing conditions by eliminating falling objects from the highway, removing the dark space under the viaduct, and eliminating the unsafe crossings as they exist currently under the viaduct.

For more details on the project alternatives, see Chapter 3, Summary of Project Alternatives.

5.3.7 How are the environmental justice impacts of the project identified?

Any type of environmental, social, or economic effect has the potential to adversely impact low-income and minority populations or be borne largely by low-income and minority populations. The environmental justice analysis considers effects on low-income and minority populations by the project alternatives. This section reviews the positive and negative effects of the project alternatives on the low-income and minority populations to identify if the project has adverse impacts on these communities.

The greatest impacts to the low-income and minority populations occur where there are direct impacts to residential areas. A high concentration of low-income and minority populations is present in the residential areas of the Elyria and Swansea Neighborhood adjacent to the highway. Because of this, the discussion focuses on each alternative's impacts, benefits, and mitigation measures on this area, since the Elyria and Swansea Neighborhood is the only location where there are differences between alternatives.

Outside of the Elyria and Swansea Neighborhood within the project corridor, there are no major impacts to residential areas, so there will be no disproportionately high and adverse impacts to those neighborhoods.

5.3.8 What impacts to low-income and minority populations are similar among all alternatives?

All alternatives result in impacts to resources. The resource impacts discussed in this section have the potential to disproportionately affect the low-income and minority residents of the Elyria and Swansea Neighborhood. Additional information on these impacts, as well as the specific impacts related to each alternative, are discussed later in this section.

Residential relocation

All of the alternatives will require the relocation of residential units from the Elyria and Swansea Neighborhood. Since the relocation impacts are different in the neighborhood for each alternative, the impacts are discussed by alternative later in this section.

None of the alternatives require residential relocations in the Globeville, Northeast Park Hill, Stapleton, Montbello, Aurora, or Gateway neighborhoods. There are no disproportionately high and adverse effects to low-income and minority populations in any of these neighborhoods.

Hazardous materials

Based on past land uses, and both documented and undocumented releases of hazardous materials, all alternatives will disturb some hazardous materials sites in the Elyria and Swansea Neighborhood during construction. Disturbing hazardous materials can impact the health and safety of the surrounding neighborhood by the potential spread of soil and groundwater contamination. Since there is a notably high presence of low-income and minority populations in the Elyria and Swansea Neighborhood, when any hazardous material sites are disturbed in this neighborhood, there will be high and adverse effects to low-income and minority populations. Additional information on impacts from the project alternatives is available in Section 5.18, Hazardous Materials.

Air quality

Air quality analysis of the alternatives evaluated in the Final EIS shows that the project is not expected to cause any violations or exceedances of air quality standards. For additional information on air quality, see Section 5.10, Air Quality. Additionally, air quality at schools in the corridor, including Swansea Elementary School and Garden Place Elementary School, will not exceed any of the air quality pollutant standards.

Construction

The construction of the proposed project could extend for several years. Dust during construction could be particularly problematic for residents in the Elyria and Swansea Neighborhood who do not have air conditioners and ventilate their homes by opening windows. Most large dust particles (greater than 100 microns in diameter) settle within 30 feet

of their source, but smaller particles can travel as far as several hundred feet, depending on wind conditions.

Ambient noise from construction is a concern among the residents around the construction zone, specifically in Elyria and Swansea since many residents do not have air conditioners and ventilate their homes by opening windows. Without mitigation, there will be disproportionately high and adverse construction impacts to the environmental justice population of the Elyria and Swansea Neighborhood.

For all the neighborhoods along the corridor with a large environmental justice population other than Elyria and Swansea Neighborhood, construction dust and noise will be less of an issue because there are few or no residences near the construction zones. Therefore, there will be no disproportionately high and adverse construction impacts to environmental justice populations in Globeville, Northeast Park Hill, Montbello, Aurora, and Gateway.

While mobility impacts will occur in the entire study area from detours during construction, the impact will result in a disproportionately high and adverse effect on the low-income and minority populations in the Elyria and Swansea Neighborhood.

Temporary or permanent closures, delays, or route changes to public transit service areas and schedules will occur during the construction period, which also will result in disproportionately high and adverse effects on low-income and minority populations in the Elyria and Swansea Neighborhood.

There will be no disproportionately high and adverse impacts to environmental justice populations in Globeville, Northeast Park Hill, Montbello, Aurora, and Gateway because there will be no or minor temporary or permanent closures and delays in these neighborhoods.

5.3.9 What benefits to low-income and minority populations are similar among all alternatives?

All alternatives will create construction-related jobs. These jobs will be available to people regionally, including low-income and minority populations. As discussed in Section 5.2, Social and Economic Conditions, the REIMHS model was used to determine the potential number of jobs created by each alternative based on the construction cost. The total number of jobs created by the project ranges from

approximately 4,200 to 13,900 depending on the alternative and associated options. These numbers are different from the Supplemental Draft EIS because the construction costs have been updated for the Final EIS to reflect changes in the alternatives, Although these jobs are not specifically created for the environmental justice populations, they will benefit all sectors of the economy, from low-wage workers to high-wage professionals; therefore, there will be a fair distribution of job opportunities from the project across all populations, including low-income and minority.

All alternatives widen and reconstruct the highway to the current standards, making the highway safer for motorists. This will improve mobility within the area and improve access to and from the impacted neighborhoods, which will benefit low-income and minority populations of the Elyria and Swansea Neighborhood as well as the rest of the populations in the area.

Additional benefits specific to each Build Alternative are discussed later in this section.

5.3.10 What mitigation measures are similar among all alternatives?

Mitigation measures are the same for impacts resulting in relocations, hazardous material contamination, and construction impacts among all alternatives as described below.

Relocations

All applicable federal regulations, state statutes, and CDOT's *Right-of-Way Manual* will be followed in the acquisition of right of way and when working with displaced occupants of residential, non-profit, and business properties. This practice ensures fair and equitable treatment of property owners and displacees, as provided for under applicable law. Translators will be available to accommodate those with LEP. The relocation regulations are discussed in Section 5.5, Relocations and Displacements.

Per an agreement between CDOT and the Community Resource Housing Development Corporation (CRHDC), CDOT has provided funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans. This funding was provided to CRHDC as an early mitigation.

Hazardous materials

CDOT follows standard procedures for cleaning up hazardous materials from disturbed sites. CDOT also will prepare and implement site-specific health and safety plans and materials 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. For all sites containing hazardous materials that may be disturbed by the alternatives, best available construction management practices will be used to avoid harmful releases of hazardous materials in the area. The practices include implementing standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil.

CDOT also is working with EPA and will collect representative soil samples of recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities; this will include identifying three or four properties from EPA's database and contacting those property owners to ensure they will participate in this activity.

Construction

For households using window ventilation, construction noise or construction dust could be an issue on windy days. Dust suppression measures (for example, stabilizing and covering loads of soil and debris during transport and storage, or stabilizing and revegetating exposed areas after construction) will be implemented to control dust impacts.

CDOT will comply with Denver regulations on construction noise, as discussed in Section 5.12, Noise.

To mitigate additional dust and noise concerns during construction for residents close to the highway, between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard, CDOT will provide:

- Two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs
- Interior storm windows

Information about disruptions in mobility caused by construction activity will be shared in both English and Spanish with the residents of the community to accommodate those with LEP. Safe and efficient connections through the neighborhoods and across the highway—including access to Swansea Elementary School—will be provided during construction for vehicles, bicycles, and pedestrians.

CDOT will facilitate opportunities to promote hiring individuals from the communities such as job fairs with contractors. Translators will be provided to accommodate those with LEP at these job fairs. CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program to execute geographic-based hiring preferences for the I-70 East project. CDOT is also researching opportunities to invest funds in a local workforce development program aimed at job readiness training prior to construction.

CDOT will coordinate with RTD to minimize temporary or permanent closures, delays, or route changes to public transit service areas and schedules. In case of any disruptions, the public will be notified well in advance in both English and Spanish to accommodate those with LEP.

Also, air quality monitoring will be conducted in the area during construction to evaluate the mitigation measures used to decrease impacts.

5.3.11 What are the environmental justice impacts specific to the No-Action Alternative?

Section 5.3.8 lists resource impacts common to all alternatives, including general details on residential relocation, hazardous materials, air quality, and construction. Resource impacts specific to the No-Action Alternative, including the North and South Options, are described below.

Impacts to low-income and minority populations

The discussion of impacts to low-income and minority populations focuses on the Elyria and Swansea Neighborhood since it is the only area with a low-income and minority concentration where the impacts between alternatives differ from one another.

Physical barrier

Although the No-Action Alternative does not add lanes to the highway, it still results in widening of the viaduct. Widening and other improvements to I-70 increase the presence of a physical barrier in all the neighborhoods along the corridor. This barrier is most apparent in the Elyria and Swansea Neighborhood due to the high number of residential units close to the elevated highway. Because the Elyria and Swansea Neighborhood was identified as a low-income and minority population, a wider viaduct in this area

has a disproportionate impact on the low-income or minority population of the area as compared to the rest of the corridor.

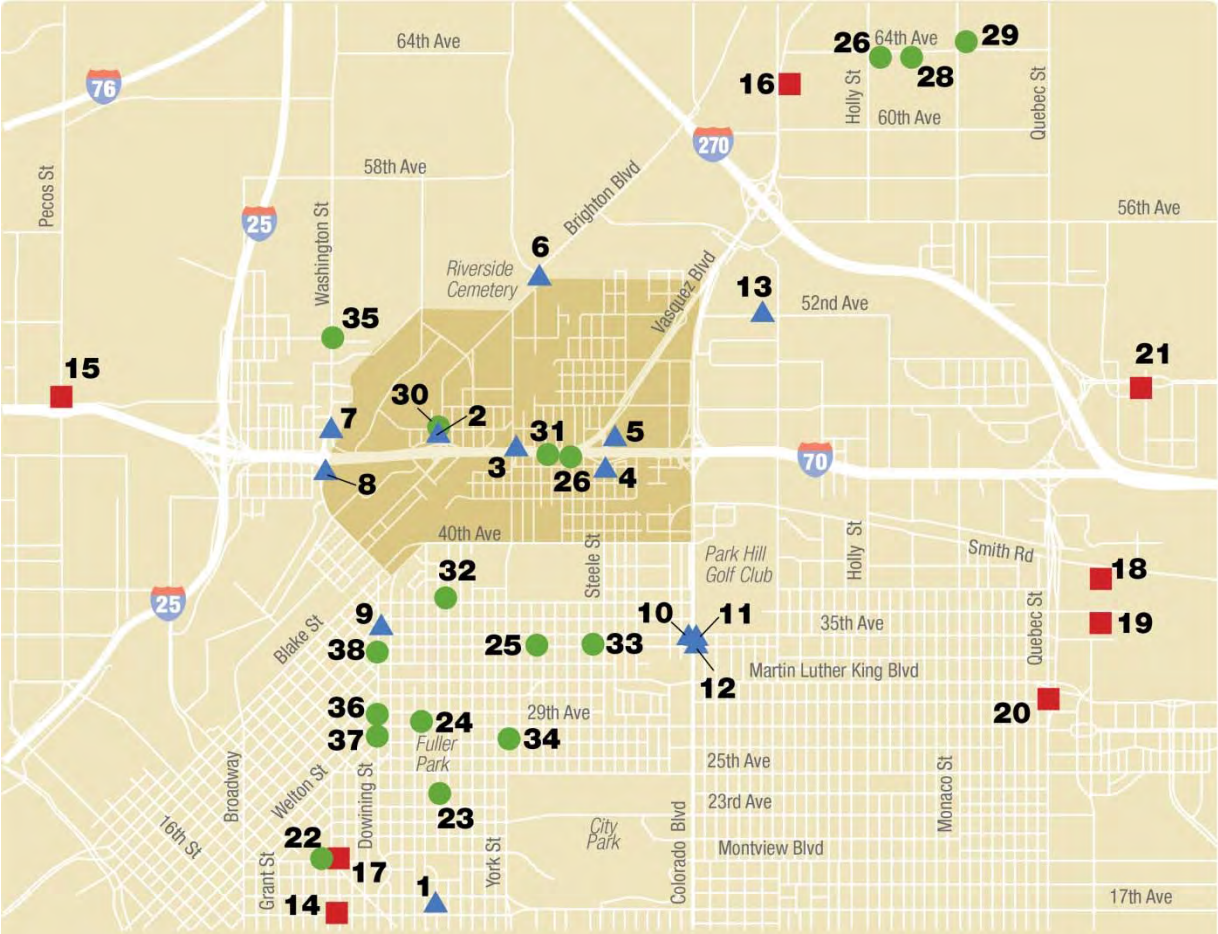
Food market displacements

Exhibit 5.3-7 shows the location of grocery stores, convenience stores, and markets in the area in relation to the Elyria and Swansea Neighborhood. As shown in the exhibit, the Elyria and Swansea Neighborhood is underserved by grocery stores. The displacement of any community markets by any of the project alternatives will negatively impact the residents in the area.

The No-Action Alternative, North Option will impact and relocate the Stop N Shop and the Pilot Travel Center (numbers 3 and 5 in **Exhibit 5.3-7**). Even though the total number of markets available to the Elyria and Swansea Neighborhood residents is reduced, this option avoids displacing the two larger markets that cater to the minority population in the neighborhood.

The No-Action Alternative, South Option will impact and displace El Tepetate Market and El Rinconcito Mini Market in the Elyria and Swansea Neighborhood (numbers 31 and 26 in **Exhibit 5.3-7**), which primarily cater to Hispanic and Latino customers. This alternative would result in a disproportionately high and adverse impact.

Exhibit 5.3-7 Food Markets and Grocery Stores in the Area



Number	Name	Type
1	7 Eleven	▲
2	7 Eleven	▲
3	Stop N Shop	▲
4	7 Eleven	▲
5	Pilot Travel Center	▲
6	Tartan Sinclair	▲
7	7 Eleven	▲
8	C Store	▲
9	Conoco K & G Stores	▲
10	7 Eleven	▲
11	Diamond Shamrock	▲
12	Malmart Conoco	▲
13	Gasamat	▲
14	Marczyk Fine Foods	■
15	Save-A-Lot	■
16	King Soopers	■
17	Safeway	■
18	Wal-Mart Supercenter	■
19	Sam's Club	■

Number	Name	Type
20	King Soopers	■
21	Super Target	■
22	Uptown Market	●
23	Lincoln Market	●
24	Papa's Corner Market	●
25	Sahara Mini Market	●
26	El Rinconcito Mini Market	●
27	La Pradera Meat Market	●
28	Liborio Market	●
29	Neely's Food Market	●
30	Munoz Market	●
31	El Tepetate Market	●
32	Golden Gate Market	●
33	Tommy's Market	●
34	Ben's Super Market	●
35	Westerkamp Meat Market & Deli	●
36	Gem Supermarket	●
37	Town Grocery	●
38	Downing Supermarket	●

Residential relocations

All the residential relocations for the No-Action Alternative, North and South Options occur in the Elyria and Swansea Neighborhood. These impacts are disproportionately high and adverse when compared to the overall population in the study area.

As discussed previously, the Elyria and Swansea Neighborhood is 83.8 percent Hispanic or Latino and approximately 44.4 percent low-income households. The No-Action Alternative, North Option will relocate 15 households within this neighborhood. Based on the noted percentages, it is expected that 13 out of the 15 households are Hispanic or Latino and seven are low income.

The estimated number of household relocations for the No-Action Alternative, South Option is 13. Based on the percentages discussed previously, it is assumed that 11 out of the 13 households are Hispanic or Latino and six are low income.

Swansea Elementary School

The No-Action Alternative will not require relocation of the Swansea Elementary School. With this alternative, the school will remain at its current location, which primarily serves residents of the Elyria and Swansea Neighborhood.

The No-Action Alternative, North Option moves the highway 60 feet closer to the school, which will require acquisition of portions of the playground.

The No-Action Alternative, South Option widens the highway to the south and away from the school property; therefore, there are no impacts to the school with this option.

Noise

Results of the analysis show that the No-Action Alternative will cause noise to exceed the NAC of 66 dBA at various locations, including Swansea Elementary School. Without mitigation, 349 noise receptors with the No-Action Alternative, North Option and 347 noise receptors with the No-Action Alternative, South Option in Elyria and Swansea could be impacted (compared to 84 impacted under existing conditions). These impacts are disproportionately high and adverse when compared to the overall population in the study area. For additional information on noise, see Section 5.12. Noise at Garden Place Elementary School will not exceed the NAC.

5.3.12 What are the benefits of the No-Action Alternative?

Section 5.3.9 listed the benefits common to all alternatives, including creating construction jobs, reconstructing the highway to current standards, and improving access to and from impacted neighborhoods.

The replacement of the viaduct will remain a visual and physical barrier; however, the presence of the viaduct can be lessened by improving the aesthetic quality of the area by replacing the viaduct with a newer structure that can be designed to complement neighborhood architecture. A new structure would have longer bridge spans and fewer columns that will provide more open space under the viaduct. Better lighting also will be provided to improve safety. Any additional improvements to enhance the visual effects of the viaduct will be in accordance with Attachment O, *Aesthetic and Design Guidelines*, which has been developed through a collaborative process to reflect the needs of individual neighborhoods and local aesthetic context.

The Nestlé Purina PetCare Company generates some noise in the surrounding community and has been identified by many of the residents as the main source of odor in the area. The No-Action Alternative, South Option will relocate the Nestlé Purina PetCare Company, eliminating a source of odor and noise from the neighborhood.

The No-Action Alternative, North Option will keep the Nestlé Purina PetCare Company at its existing location, which is a source of employment for residents all over the Denver metropolitan area. Denver is coordinating with the Nestlé Purina PetCare Company to reduce the pollutant particles and odor from its facility by 90 percent or higher if it remains in its current location.

The No-Action Alternative, North Option eliminates the Pilot Travel Center truck stop and relocates it outside of the residential neighborhood. This will benefit the surrounding area because it has been identified as a point-source pollutant (air quality concern) in the neighborhood.

There will be a fair distribution of these benefits from the project across all populations, including low income and minority.

5.3.13 What are the environmental justice mitigation measures of the No-Action Alternative?

Many mitigation measures for the No-Action Alternative were discussed previously in Section 5.3.10. These mitigation measures have been designed to increase the benefits, reduce the impacts, and provide enhancements for the low-income and minority residents of the Elyria and Swansea Neighborhood. Additional mitigation measures specific to the No-Action Alternative are discussed in this section. These mitigation measures will minimize impacts and provide enhancements to the Elyria and Swansea Neighborhood.

Food market displacements

Due to the potential displacement of food markets by different alternatives, CDOT will provide contributions to existing programs that facilitate access to fresh food. Additional business displacement and relocation mitigation measures are discussed in Section 5.5, Relocations and Displacements.

Swansea Elementary School

With the No-Action Alternative, CDOT will provide the school with a new heating, ventilation, and air conditioning (HVAC) system, doors, and windows to reduce the dust and noise impacts to the school and students, specifically during the roadway construction period. CDOT also will pay for the construction of two new classrooms. These new classrooms, which will be built prior to highway construction, will help mitigate some impacts by providing offsetting benefit to the community to enhance the overall quality of the school beyond the roadway construction period. These upgrades will be completed before the roadway construction starts.

Noise

To mitigate the increase in ambient noise due to higher highway traffic volume in the future, noise walls will be constructed where feasible and reasonable. The proposed noise walls will reduce the number of impacts to 46 receptors for No-Action Alternative, North Option and 41 receptors for No-Action Alternative, South Option. For additional information, see Section 5.12, Noise. CDOT has been working with the community to develop guidelines for aesthetics in the corridor that includes artwork that is

meaningful to the community, including noise walls, and those guidelines are available in *Aesthetic and Design Guidelines*, included as Attachment O.

5.3.14 Does the No-Action Alternative result in disproportionately high and adverse impacts to low-income and minority populations?

As discussed previously in this section, most of the benefits of the project with the No-Action Alternative are fairly distributed in the study area. The project has avoided some impacts, minimized others, and mitigated all impacts that could not be avoided or minimized. Without considering the avoidance, minimization, and mitigation measures, the No-Action Alternative would have a disproportionately high and adverse impact to the environmental justice communities due to residential relocations, disturbance of hazardous material sites, construction impacts, increased physical barrier, displacement of food markets, impacts to Swansea Elementary School, and increased noise.

However, the No-Action Alternative includes many innovative mitigation measures to offset the impacts to the low-income and minority populations. Some of these mitigation measures include but are not limited to, providing residents close to the highway construction interior storm windows and two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction, providing contributions to existing programs that facilitate access to fresh food, providing HVAC system and upgraded doors and windows for the Swansea Elementary School, and providing funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans.

The No-Action Alternative will also improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct.

After considering the benefits of the No-Action Alternative along with the mitigation measures, the alternative will not cause disproportionately high and adverse effects on any minority or low-income populations, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A. No further environmental justice analysis is required.

FHWA guidance on determining impacts

Per FHWA Executive Order 6640.23A, "when determining whether a particular program, policy, or activity will have disproportionately high and adverse effects on minority and low-income populations, FHWA managers and staff should take into account mitigation and enhancement measures and potential offsetting benefits to the affected minority and/or low-income populations. Other factors that may be taken into account include design, comparative impacts, and the relevant number of similar existing system elements in non-minority and non-low-income areas."

5.3.15 What are the environmental justice impacts specific to the Revised Viaduct Alternative?

Section 5.3.8 listed the resource impacts common to all alternatives, including general details on residential relocation, hazardous materials, air quality, and construction. Resource impacts specific to the Revised Viaduct Alternative, including the North and South Options, are described below.

Physical barrier

Widening and other improvements to I-70 increase the presence of a physical barrier in all the neighborhoods along the corridor. This barrier is most apparent in the Elyria and Swansea Neighborhood due to the high number of residential units close to the highway. Because the Elyria and Swansea Neighborhood was identified as a low-income and minority population, a wider viaduct in this area has a disproportionate impact on the low-income or minority population of the area as compared to the rest of the corridor.

Food market displacements

The neighborhoods along the corridor are currently underserved by food retailers. The displacement of any community markets by the project alternatives will negatively impact the residents in the area.

The Revised Viaduct Alternative, North Option will impact and relocate the Stop N Shop and Pilot Travel Center (numbers 3 and 5 in **Exhibit 5.3-7**). Even though the total number of food choices available to the Elyria and Swansea Neighborhood residents is reduced, this option avoids displacing the two larger markets that cater to the minority population in the neighborhood.

The Revised Viaduct Alternative, South Option will impact and displace El Tepetate Market and El Rinconcito Mini Market in the Elyria and Swansea Neighborhood (numbers 31 and 26 in **Exhibit 5.3-7**), which primarily cater to Hispanic and Latino customers. This impact would result in a disproportionately high and adverse impact.

Residential relocations

All the residential relocations for the Revised Viaduct Alternative, North and South Options occur in the Elyria and Swansea Neighborhood. These impacts are

disproportionately high and adverse when compared to the overall population in the study area.

As discussed previously, the Elyria and Swansea Neighborhood is 83.8 percent Hispanic or Latino and approximately 44.4 percent low-income households. The Revised Viaduct Alternative, North Option will relocate 38 households within this neighborhood. Based on the noted percentages, it is expected that 32 out of the 38 households are Hispanic or Latino and 17 are low income.

The estimated number of household relocations for the Revised Viaduct Alternative, South Option is 44. Based on the percentages discussed previously, it is assumed that 37 out of the 44 households are Hispanic or Latino and 20 are low-income.

Swansea Elementary School

The Revised Viaduct Alternative will not require relocation of the Swansea Elementary School. With this alternative, the school—which primarily serves residents of the Elyria and Swansea Neighborhood—will remain at its current location.

The Revised Viaduct Alternative, North Option moves the north edge of the highway closer to the school, placing it at 135 feet from the edge of the school structure, which will require acquisition of portions of the playground. CDOT has been coordinating with Denver Public Schools and Swansea Elementary School's principal throughout the project to identify the school's needs and to help with redesigning the school site. Denver Public Schools is not in favor of leaving the school at its current location if the Revised Viaduct Alternative, North Option is chosen, due to the proximity of the highway to the school. Denver Public Schools has requested that the elementary school be relocated to a site farther from the highway if the Revised Viaduct Alternative, North Option is selected as the Preferred Alternative. A suitable site for the school relocation has not been identified within the neighborhood. These impacts are disproportionate when compared to the overall population in the study area.

The Revised Viaduct Alternative, South Option widens the highway to the south and away from the school property; therefore, there are no impacts to the school with this option.

Noise

Results of the analysis show that the Revised Viaduct Alternative will cause noise to exceed the NAC of 66 dBA at various locations, including Swansea Elementary School. Without mitigation, 403 noise receptors for the Revised Viaduct Alternative, North Option, and 381 noise receptors for the Revised Viaduct Alternative, South Option in Elyria and Swansea could be impacted (compared to 84 impacted under existing conditions). These impacts are disproportionately high and adverse when compared to the overall population in the study area. For additional information on noise, see Section 5.12. Noise at Garden Place Elementary School will not exceed the NAC.

5.3.16 What are the benefits of the Revised Viaduct Alternative?

Section 5.3.9 listed the benefits common to all alternatives, including creating construction jobs, reconstructing the highway to current standards, and improving access to and from impacted neighborhoods.

The Revised Viaduct Alternative preserves the north-south connectivity in the community and maintains the neighborhood cohesion as it exists. The north-south connectivity in the Elyria and Swansea Neighborhood is preserved by maintaining all the existing crossings at York Street, Josephine Street, Columbine Street, Fillmore Street, Clayton Street, Milwaukee Street, Monroe Street, and Steele Street/Vasquez Boulevard.

The replacement of the viaduct will remain a visual and physical barrier; however, the presence of the viaduct can be lessened by improving the aesthetic quality of the area by replacing the viaduct with a newer structure that can be designed to complement neighborhood architecture. A new structure would have longer bridge spans and fewer columns that will provide more open space under the viaduct. Better lighting also will be provided to improve safety. Any additional improvements to enhance the visual effects of the viaduct will be in accordance with the *Aesthetic and Design Guidelines*, which has been developed through a collaborative process to reflect the needs of individual neighborhoods and local aesthetic context.

The Nestlé Purina PetCare Company generates some noise in the surrounding community and has been identified by many of the residents as the main source of odor in the area.

The Revised Viaduct Alternative, South Option will relocate the Nestlé Purina PetCare Company, eliminating a source of odor and noise from the neighborhood.

The Revised Viaduct Alternative, North Option will keep the Nestlé Purina PetCare Company at its existing location, which is a source of employment for residents all over the Denver metropolitan area. Denver is coordinating with the Nestlé Purina PetCare Company to reduce the pollutant particles and odor from its facility by 90 percent or higher if it remains in its current location.

The Revised Viaduct Alternative, North Option eliminates the Pilot Travel Center truck stop and relocates it outside of the residential neighborhood. This will benefit the surrounding area because it has been identified as a point-source pollutant (air quality concern) in the neighborhood.

There will be a fair distribution of these benefits from the project across all populations, including low income and minority.

5.3.17 What are the environmental justice mitigation measures for the Revised Viaduct Alternative?

Many mitigation measures for the Revised Viaduct Alternative were discussed previously in Section 5.3.10. These mitigation measures have been designed to increase the benefits, reduce the impacts, and provide enhancements for the low-income and minority residents of the Elyria and Swansea Neighborhood. Additional mitigation measures specific to the Revised Viaduct Alternative are discussed in this section. These mitigation measures will minimize impacts and provide enhancements to the Elyria and Swansea Neighborhood.

Food market displacements

Due to the potential displacement of food markets by different alternatives, CDOT will provide contributions to existing programs that facilitate access to fresh food. Additional business displacement and relocation mitigation measures are discussed in Section 5.5, Relocations and Displacements.

Swansea Elementary School

Because the highway is so close to Swansea Elementary School and results in impacts to the school playground, the

Revised Viaduct Alternative, North Option includes redesigning the school site to use adjacent parcels and the open space under the viaduct. As a result of the changes to the school site, Elizabeth Street from 47th Avenue to 46th Avenue would be closed; however, access to the school would be provided from 46th Avenue and other adjacent streets.

In addition, with the Revised Viaduct Alternative, CDOT will provide the school with a new HVAC system, doors, and windows to reduce the dust and noise impacts to the school and students, specifically during the roadway construction period. CDOT also will pay for the construction of two new classrooms. These new classrooms, which will be built prior to highway construction, will help mitigate some impacts by providing offsetting benefit to the community to enhance the overall quality of the school beyond the roadway construction period. These upgrades will be completed before the roadway construction starts

With the Revised Viaduct Alternative, South Option, the highway remains within approximately the same distance to the school as it currently is, so this option does not include reconstruction of the school grounds; however, new doors, windows, and an HVAC system will be provided to the school to mitigate the construction impacts.

The designs of the Revised Viaduct Alternative, North and South Options, were modified to place 46th Avenue under the south side of the viaduct below the I-70 eastbound traffic. This keeps the school property and residential areas on the north side of I-70 farther away from 46th Avenue. This design provides an open space under the viaduct on the north side, which can be developed based on the community needs. CDOT will work with the community and Denver to define and finalize this space. For example, this could include an urban gathering area, play area, or recreational park providing enhancements to the Elyria and Swansea Neighborhood.

Noise

To mitigate the increase in ambient noise due to higher highway traffic volume in the future, noise walls will be constructed where feasible and reasonable. The proposed noise walls will reduce the number of impacts to 64 receptors for the Revised Viaduct Alternative, North Option, and 33 receptors for the Revised Viaduct Alternative, South Option. For additional information, see Section 5.12, Noise. CDOT has been working with the community to develop guidelines

for aesthetics in the corridor that includes artwork that is meaningful to the community, including noise walls, and those guidelines are available in *Aesthetic and Design Guidelines*, included as Attachment O.

5.3.18 Does the Revised Viaduct Alternative result in disproportionately high and adverse impacts to low-income and minority populations?

As discussed previously in this section, most of the benefits of the project with the Revised Viaduct Alternative are fairly distributed in the study area. The project has avoided some impacts, minimized others, and mitigated all those impacts that could not be avoided or minimized. Without considering the avoidance, minimization, and mitigation measures, the Revised Viaduct Alternative would have a disproportionately high and adverse impact to the environmental justice communities due to residential relocations, disturbance of hazardous material sites, construction impacts, increased physical barrier, displacement of food markets, impacts to Swansea Elementary School, and increased noise.

However, the Revised Viaduct Alternative includes many innovative mitigation measures to offset the impacts to the low-income and minority populations. Some of these mitigation measures include but are not limited to, providing residents close to the highway construction interior storm windows and two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction, providing contributions to existing programs that facilitate access to fresh food, providing HVAC system and upgraded doors and windows for the Swansea Elementary School, and providing funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans.

The Revised Viaduct Alternative will also improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct.

The Swansea Elementary School has been identified by the residents as a valuable community resource. Although the Revised Viaduct Alternative, North Option, will impact the school property, it creates provisions for an upgrade by adding the adjacent parcels to the school site and redesigning the school parking lot. Additionally, the Revised

Viaduct Alternative, North Option, will create an urban space for community and neighborhood activities under the new viaduct. The Revised Viaduct Alternative, South Option will avoid impacts to the school property completely.

After considering the benefits of the Revised Viaduct Alternative along with the avoidance, minimization, and mitigation measures, the alternative will not cause disproportionately high and adverse effects to any minority or low-income populations, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A. No further environmental justice analysis is required.

5.3.19 What are the environmental justice impacts specific to the Partial Cover Lowered Alternative?

Section 5.3.8 listed the resource impacts common to all alternatives, including general details on residential relocation, hazardous materials, air quality, and construction. Resource impacts specific to the Partial Cover Lowered Alternative are described in this subsection.

Physical barrier

Widening and other improvements to I-70 increase the presence of a physical barrier in all the neighborhoods along the corridor. The Partial Cover Lowered Alternative removes the existing visual barrier between Brighton Boulevard and Colorado Boulevard in the Elyria and Swansea Neighborhood created by the viaduct, while the rest of the corridor follows the same design as the other Build Alternative. With this alternative, the highway is less visible, but the wider highway still remains a barrier in the Elyria and Swansea Neighborhood.

The noise walls or safety barriers for the Partial Cover Lowered Alternative will create visual barriers for surrounding neighborhoods, limiting views across the highway, as discussed in Section 5.8, Visual Resources and Aesthetic Qualities. The Elyria and Swansea Neighborhood has been identified as a low-income and minority neighborhood and the impacts as a result of the visual barriers are predominantly borne by these populations, as compared to the general population.

Food market displacements

The neighborhoods along the corridor are currently underserved by food retailers. The displacement of any

community markets by the project alternatives will negatively impact the residents in the area.

The Partial Cover Lowered Alternative impacts two local food stores: the Stop N Shop and the Pilot Travel Center (numbers 3 and 5 in **Exhibit 5.3-7**). However, the El Tepetate Market and El Rinconcito Mini Market do not have to be relocated with the Partial Cover Lowered Alternative. Even though the total number of markets available to the Elyria and Swansea Neighborhood is reduced, this alternative avoids displacing the two markets that cater to the minority population in the neighborhood.

Residential relocations

There are more residential impacts with this alternative compared to the No-Action Alternative and the Revised Viaduct Alternative. All these residential relocations occur in the Elyria and Swansea Neighborhood. As discussed previously, Elyria and Swansea's population is approximately 83.8 percent Hispanic or Latino and 44.4 percent low-income households. The Partial Cover Lowered Alternative relocates 56 households. Based on the noted percentages, it is assumed that 47 of the 56 households are Hispanic or Latino and 25 are low-income. The impacts are disproportionately high and adverse when compared to the overall population in the study area.

Swansea Elementary School

The Partial Cover Lowered Alternative does not require relocation of the Swansea Elementary School, which primarily serves residents of the Elyria and Swansea Neighborhood. Located underground, the edge of the highway will be 120 feet from the school structure. With this alternative, 46th Avenue will be discontinued in front of the school, The discontinued 46th Avenue may result in minor mobility impacts through the neighborhood; however, it will avoid moving surface traffic closer to the school.

Although the highway will be closer to the school with this alternative, the presence of the highway will be minimized since the highway will be below grade and will be covered with an urban landscape. This idea was widely supported by Denver Public Schools, the communities, and the surrounding neighborhoods.

Noise

Results of the noise analysis show that the Partial Cover Lowered Alternative will cause noise to exceed the NAC of 66 dBA without mitigation at some locations. Without mitigation, 105 receptors could be impacted (compared to 84 impacted under existing conditions). These impacts are disproportionate when compared to the overall population in the study area. For additional information on noise, see Section 5.12. Noise at Garden Place Elementary School will not exceed the NAC.

Connectivity

Even though there are limited marked crossings across 46th Avenue under the viaduct, existing conditions allow bicyclists and pedestrians to cross anywhere (or jaywalk) under the viaduct across 46th Avenue. There is limited north-south connectivity with the Partial Cover Lowered Alternative—especially for pedestrians and bicyclists—due to design restrictions. Specifically, the lowered profile of the highway and the ramp locations impact connectivity, since all crossings must occur at marked crossings because the highway is below grade.

What will be on the highway cover in the Partial Cover Lowered Alternative?

Based on community input and area needs, an urban landscape will be created on top of the cover, which will be located adjacent to Swansea Elementary School. This will provide shared space for a park or other community uses, such as playgrounds and sports fields (to be determined by the community), and remove the highway from view.

The cover for the highway was developed to mitigate the adverse impacts to the Elyria and Swansea Neighborhood and to restore and enhance the neighborhood cohesion, which was disrupted decades ago by the original I-70 construction in the 1960s.

5.3.20 What are the benefits of the Partial Cover Lowered Alternative?

Section 5.3.9 listed the benefits common to all alternatives, including creating construction jobs, reconstructing the highway to current standards, and improving access to and from impacted neighborhoods.

The Partial Cover Lowered Alternative will be more aesthetically pleasing for the Elyria and Swansea Neighborhood because it removes the viaduct and places the highway below ground level. The neighborhood will be less visually dominated by the highway, as shown in the visual simulations in Section 5.8, Visual Resources and Aesthetic Qualities.

Because of the lowered profile of the highway and the nature of how and where noise travels in the environment, the noise impacts of the Partial Cover Lowered Alternative will be considerably less compared to the future conditions with the No-Action Alternative and Revised Viaduct Alternative. Also, the highway cover provides incidental noise reductions in the area.

Because of the limited number of crossing opportunities (only at the locations where bridges connect the north side of the highway to the south side of the highway and at the cover) and improved lighting and sidewalks, the overall safety for pedestrians and bicyclists crossing the highway and 46th Avenue is increased. The improved 46th Avenue with enhanced crossings, sidewalks, and lighting will support the east-west mobility for all modes of transportation, such as vehicles, pedestrians, and bicyclists.

The Partial Cover Lowered Alternative will not require the relocation of the Swansea Elementary School. Denver Public Schools is in favor of this alternative because the school could remain in its current location and it improves safety for the students.

Improved safety is a result of the removal of the viaduct. This eliminates falling objects from the highway, removes the dark space under the viaduct, and eliminates the unsafe crossings as they exist currently under the viaduct.

With the Partial Cover Lowered Alternative, there may be less cut-through truck traffic in the study area's low-income and minority neighborhoods. Since there are fewer access points to the highway, fewer trucks may be attracted to the area to access the highway. The Partial Cover Lowered Alternative eliminates the Pilot Travel Center. This will benefit the surrounding area because the truck stop has been identified as a point-source pollutant (air quality concern) in the neighborhood due to heavy truck traffic and idling trucks.

Based on community input and the needs in the area, an urban landscape will be included on top of the highway cover that will be located adjacent to the Swansea Elementary School. Placing the cover next to the school and discontinuing 46th Avenue in front of the school allows for shared school and other community uses, while it reduces the highway noise impacts to the school and adjacent properties.

There will be a fair distribution of these benefits from the project across all populations, including low-income and minority residents.

5.3.21 What are the environmental justice mitigation measures for the Partial Cover Lowered Alternative?

Many mitigation measures for the Partial Cover Lowered Alternative were discussed previously in Section 5.3.10. These mitigation measures have been designed to increase the benefits and reduce the impacts for the low-income and minority residents of the Elyria and Swansea Neighborhood. Additional mitigation measures specific to the Partial Cover Lowered Alternative are discussed in this section. These mitigation measures will minimize impacts and provide enhancements to the Elyria and Swansea Neighborhood.

Physical barrier

With the Partial Cover Lowered Alternative, the area will be less visually dominated by the highway. Additionally, incorporation of the highway cover in front of Swansea Elementary School with this alternative will result in elimination of a physical barrier at this location by eliminating the need for noise walls or safety barriers at that location.

Food market displacements

Due to the potential displacement of food markets by different alternatives, CDOT will provide contributions to existing programs that facilitate access to fresh food. Additional business displacement and relocation mitigation measures are discussed in Section 5.5, Relocations and Displacements.

Residential relocations

In addition to mitigation identified for all alternatives, to offset the loss of residential units in the neighborhood, CDOT will provide funding to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs.

Swansea Elementary School

Because the highway and 46th Avenue will be closer to the school, and result in impacts to the school playground, the school site will be redesigned and reconstructed. The redesign includes the adjacent parcels as part of the elementary school site and eliminates Elizabeth Street between 46th Avenue and 47th Avenue.

Other mitigation measures for the school include providing a new HVAC system, doors, and windows to reduce the dust and noise impacts to the school and its users, specifically during the roadway construction period. CDOT also will pay for the construction of two new classrooms. These new classrooms, which will be built prior to highway construction, will help mitigate some impacts by providing offsetting benefit to the community to enhance the overall quality of the school beyond the roadway construction period. CDOT has been coordinating with Denver Public Schools and Swansea Elementary School's principal throughout the project to identify the school's needs and redesign the school site.

Noise

To mitigate the increase in ambient noise due to higher highway traffic volume in the future that is not captured by the lowered profile of the highway, noise walls will be constructed where feasible and reasonable. The proposed noise walls will reduce the number of impacts down to 58 receptors. For additional information, see Section 5.12, Noise. CDOT has been working with the community to develop guidelines for aesthetics in the corridor that include artwork that is meaningful to the community, including noise walls. Those guidelines are available in Attachment O, *Aesthetic and Design Guidelines*.

The presence of the highway cover in front of the school eliminates the need for noise walls or safety barriers at that location; however, it is recommended to install safety barriers at all cross streets over the lowered I-70 section, and between 46th Avenue and the lowered highway where noise walls are currently not reasonable and feasible.

Connectivity

The cover for the highway was developed to mitigate the adverse impacts to the Elyria and Swansea Neighborhood and to restore and enhance neighborhood cohesion, which was disrupted decades ago by the original I-70 construction in the 1960s. The highway cover also is intended to serve as an active community space for the surrounding residents and local neighborhoods, as well as provide required mitigation for Swansea Elementary School. Negotiations are ongoing between Denver and Denver Public Schools to determine the boundaries of the school playground (school use only areas) and the potential use of the shared space (shared school and community use) on the highway cover.

Maintaining the status of the school as a community center in the neighborhood is critical to providing an active and safe space on the highway cover. The integrated design of the highway cover will have a direct impact on the perception of safety and will influence an individual's willingness to use the space. Designing for safety includes meeting the needs of its users; providing diverse and interesting features; and connecting people with place.

Incorporation of the highway cover will reconnect the surrounding areas and provide easy and safe connections between these communities for all users, especially pedestrians and bicyclists. The inclusion of the highway cover helps achieve some broader community goals of livability, quality schools, and safe streets along with supporting the existing communities along the corridor. In addition, the highway cover reduces noise impacts in adjacent areas. The cover also will directly contribute to improved air quality, resulting in PM_{10} concentrations that are lower at Swansea Elementary School than future conditions without the cover (No-Action Alternative), and indirectly by encouraging more walking and bicycling for short trips to local destinations. For additional information on air quality, see Section 5.10.

The landscaped cover also supports social connections in the Elyria and Swansea Neighborhood by creating a place where residents and visitors can gather and interact. Based on community input and area needs, the amenities and design in these spaces—such as playgrounds and sports fields (to be determined by the community)—will encourage users to stay and interact.

These mitigation measures will minimize impacts and provide enhancements to the Elyria and Swansea Neighborhood.

5.3.22 Does the Partial Cover Lowered Alternative result in disproportionately high and adverse impacts to low-income and minority populations?

As discussed previously in this section, most of the benefits of the project with the Partial Cover Lowered Alternative are fairly distributed in the study area. The project has avoided some impacts, minimized others, and mitigated all impacts that could not be avoided or minimized. Without considering the avoidance, minimization, and mitigation measures, the Partial Cover Lowered Alternative would

have a disproportionately high and adverse impact to the environmental justice communities due to residential relocations, disturbance of hazardous material sites, construction impacts, increased physical barrier, displacement of food markets, impacts to Swansea Elementary School, increased noise, and impacts to connectivity because of the lowered highway.

However, the Partial Cover Lowered Alternative includes many innovative mitigation measures to offset the impacts to the low-income and minority populations. Some of these mitigation measures include but are not limited to, providing residents close to the highway construction interior storm windows and two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction, providing contributions to existing programs that facilitate access to fresh food, providing HVAC system and upgraded doors and windows for the Swansea Elementary School, and providing funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans.With the Partial Cover Lowered Alternative, the highway is less visible compared to all the other alternatives and the presence of it is minimized due to the lower profile. The highway cover in front of the school eliminates the physical barrier at that location and provides a seamless connection across the highway with an urban landscape.

The cover for the highway was developed to restore the community cohesion and improve connectivity in the neighborhood.

To offset the loss of additional residential units in the neighborhood with the Partial Cover Lowered Alternative as compared to the other alternatives, CDOT will provide $2 million to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs.

After considering the benefits of the Partial Cover Lowered Alternative along with the avoidance, minimization, and mitigation, the alternative will not cause disproportionately high and adverse effects on any minority or low-income populations, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A. No further environmental justice analysis is required.

5.3.23 What are the environmental justice impacts specific to the Managed Lanes Option?

The Managed Lanes Option is under consideration for the Build Alternatives as a way to manage traffic volume over the long term. There will be no additional right-of-way acquisition impacts to the low-income or minority populations in the Elyria and Swansea Neighborhood with this option because the construction limits remain the same as with the General-Purpose Lanes Option. Therefore, no additional direct impacts to environmental justice populations from the Managed Lanes Option is anticipated.

The Managed Lanes Options raises additional environmental justice concerns related to equity impacts. Per FHWA's *Environmental Justice Emerging Trends and Best Practices Guidebook* (FHWA, 2011), consideration of equity issues—such as who bears the burden of the road pricing charges, who benefits from the improved road, and how the toll revenues are used—is critical in calculating the road pricing to ensure low-income and minority populations are considered.

Four principles are considered when implementing an operational strategy on a transportation facility (such as a highway) in relation to environmental justice. As explained by FHWA, these principles relate to the following questions:

1. Who from all sectors of the economy can use the facility?
2. Will there be additional physical impacts in low-income and minority neighborhoods with implementation of this operational strategy?
3. What kind of impact will this operational strategy have on those who do not have a personal vehicle but instead bike, walk, or use transit?
4. How has the public been involved in the decision making for this strategy?

While the pricing on managed lanes will help provide a reliable and delay-free transportation option, it will be implemented with thorough consideration of equity impacts.

5.3.24 What are the benefits specific to the Managed Lanes Option?

Managed lanes offer congestion-free lanes for those who need a reliable travel time to reach their destination.

Congestion on roadways will result in longer and more unreliable travel times. Low-income populations are more likely to be affected by the negative impacts of congestion because they are more likely to use buses that travel through roadway congestion. By allowing buses to use the managed lanes, delays will be reduced and the negative effects of congestion will be alleviated for the portions of these populations that rely on transit without costing them additional money. Low-income populations also are more likely to be employed in blue-collar or otherwise inflexible jobs where delays in getting to work could mean lost income. The Managed Lanes Option not only provides an option for congestion-free lanes, it also improves traffic operations in the general-purpose lanes. By offering more reliable travel times, the Managed Lanes Option provides improved travel choices to these populations.

5.3.25 What are the environmental justice mitigation measures for the Managed Lanes Option?

The equity impacts on low-income and minority populations can be mitigated through careful design and implementation of the operational strategy programs and policy. To offset impacts to the low-income communities, there are statewide policy decisions that will be refined and implemented later as part of a statewide initiative and not specific to this project. Mitigation strategies being considered by CDOT—used in other highway projects with managed lanes across the nation—include allowing vehicles with three or more occupants to use the managed lanes free of charge.

CDOT is also researching ways to provide assistance for low-income populations within the area (such as free transponders) for using the managed lanes. As part of the project, all communities and stakeholders potentially affected have been invited and continue to participate in the project development process and operational strategy implementation. This includes outreach aimed at providing equal opportunity for the low-income or minority populations identified previously to participate, as well as others within the study area. The outreach also focuses on addressing any community concerns regarding equity impacts of the managed lanes on low-income populations.

5.3.26 What is the summary of environmental justice impacts and mitigation measures of the project's Build Alternatives?

Environmental justice impacts include effects on various resources on an identified low-income or minority population or community; therefore, any mitigation measures for those resources apply to environmental justice as well. Some mitigation measures, however, were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities. **Exhibit 5.3-8** at the end of this section, shows a summary of the impacts and mitigations related to environmental justice. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed in the exhibit, mitigations for other resources are listed by name and section for reference.

Information about disruptions in mobility caused by construction activity, will be shared in both English and Spanish with the residents of the community to accommodate Spanish-speaking LEP individuals.

The noise impacts of the Partial Cover Lowered Alternative will be considerably less than the Revised Viaduct Alternative because of the lowered profile of the highway and the nature and direction that noise travels.

Safety barriers or noise walls will be installed in residential areas depending on the project alternative to reduce ambient noise caused by highway traffic. CDOT has been working with the community to develop guidelines for aesthetics in the corridor that include artwork that is meaningful to the community, including noise walls. Those guidelines are available in Attachment O, *Aesthetic and Design Guidelines*.

With the Partial Cover Lowered Alternative, there will be no noise barriers necessary in the location of the cover. Safety barriers are proposed on the outside edge of the cover to provide a barrier between the traveling public on these bridges and the below-grade highway. The safety barriers also will provide incidental noise reduction benefits for the cover and adjacent properties.

With the Partial Cover Lowered Alternative, the highway is less visible. The wider highway still remains a barrier in the Elyria and Swansea Neighborhood; however, the presence of the highway is minimized because of the lowered profile of the highway compared to the Revised Viaduct Alternative.

The highway cover in front of the school eliminates the physical barrier at that location and provides a seamless connection across the highway with an urban landscape.

During construction, inevitable increases in dust in the area will have an adverse impact on the residential areas close to the highway. However, this impact will be reduced by standard dust control measures, such as spraying water. Section 5.10, Air Quality, provides more detail on mitigation measures for air quality during construction. CDOT also will provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance in paying for the potential additional utility costs during construction.

Both the Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative will create provisions for an upgrade to the Swansea Elementary School by adding the adjacent parcels to the school site and redesigning the school parking lot and playground. Providing upgraded doors and windows and a new HVAC system for the school also will reduce the noise and dust impacts of highway construction to the school structure and its users.

All alternatives require the acquisition of properties and relocation of residents and businesses in the Elyria and Swansea Neighborhood. The impacts to the displaced residents will be mitigated by providing targeted assistance to help residents find new locations and to ensure that homeowners receive compensation for their properties in full compliance with CDOT and FHWA relocation regulations, as discussed in Section 5.5, Relocations and Displacements. Per an agreement between CDOT and the CRHDC,

CDOT has provided funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans. This funding was provided to CRHDC as an early mitigation.

In addition, to offset the loss of residential units in the neighborhood with the Partial Cover Lowered Alternative, CDOT will provide $2 million to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs.

As discussed previously in this section, most of the benefits with the Build Alternatives are fairly distributed in the

study area. The project has avoided some impacts, minimized others, and mitigated all those impacts that could not be avoided or minimized. After considering the benefits of the Build Alternatives along with the avoidance, minimization, and mitigation measures, the Build Alternatives will not cause disproportionately high and adverse effects to any minority or low-income populations, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A. No further environmental justice analysis is required.

Exhibit 5.3-8 shows a summary of the impacts and mitigations related to environmental justice.

Exhibit 5.3-8 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
All Alternatives	**Benefits** • Creating new construction-related jobs • Building the highway to updated standards and improving mobility **Impacts** • Increasing noise and dust during construction • Potential for disturbing hazardous material sites during construction • Impacting mobility during construction due to detours • Temporarily closing or delaying, or permanently rerouting, public transit services in the area	Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods • Provide funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans; CDOT has already provided funding to CRHDC as early mitigation • Collect representative soil samples of three or four recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—interior storm windows • Provide contributions to existing programs that facilitate access to fresh food • Facilitate opportunities to promote hiring individuals from the communities such as job fairs with contractors • Execute geographic-based hiring preferences (CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program) • Research opportunities to invest funds in a local workforce development program aimed at job readiness training prior to construction • Provide a new HVAC system, doors, and windows for Swansea Elementary School • Prior to the start of roadway construction, build two new classrooms at Swansea Elementary School to enhance the overall quality of the school Environmental justice impacts include effects on various resources on an identified low-income or minority population or community; therefore, any mitigation measures for those resources apply to environmental justice as well. The resources listed below are discussed previously in this section, and the mitigation measures discussed in the sections below are also applicable to environmental justice: • Mitigations from Section 5.2, Social and Economic Conditions • Mitigations from Section 5.5, Relocations and Displacements • Mitigations from Section 5.8, Visual Resources and Aesthetic Qualities • Mitigations from Section 5.12, Noise • Mitigations from Section 5.18, Hazardous Materials

Exhibit 5.3-8 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
No-Action Alternative, North Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Improving aesthetic quality with a structure that complements the neighborhood • Keeping the Nestlé Purina Petcare Company at its existing location • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution **Impacts** • Increasing physical barrier effect • Displacing Stop N Shop and Pilot Travel Center truck stop • Relocating 15 residences • Impacting 349 noise receptors • Moving the highway closer to Swansea Elementary School	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct
No-Action Alternative, South Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Improving aesthetic quality with a structure that complements neighborhood • Displacing Nestlé Purina Petcare Company • Swansea Elementary School remains at its existing location **Impacts** • Increasing physical barrier effect • Displacing El Tepetate Market and El Rinconcito Mini Market • Impacting 347 noise receptors • Relocating 13 residences	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Exhibit 5.3-8 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
Revised Viaduct Alternative, North Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Preserving north-south connectivity • Improving aesthetic quality with a structure that complements neighborhood • Keeping the Nestlé Purina Petcare Company at its existing location • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution **Impacts** • Increasing physical barrier effect • Impacting 403 noise receptors • Displacing Stop N Shop and Pilot Travel Center truck stop • Relocating 38 residences • Moving the highway closer to Swansea Elementary School	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Create an urban space for community and neighborhood activities under the new viaduct • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue
Revised Viaduct Alternative, South Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Preserving north-south connectivity • Improving aesthetic quality with a structure that complements neighborhood • Displacing Nestlé Purina Petcare Company • Swansea Elementary School remains at its existing location **Impacts** • Increasing barrier effect • Impacting 381 noise receptors • Impacting and displacing El Tepetate Market and El Rinconcito Mini Market • Relocating 44 residences	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Exhibit 5.3-8 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
Partial Cover Lowered Alternative	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Removing the viaduct's visual barrier between Brighton Boulevard and Colorado Boulevard • Minimizing the presence of the highway in this area since it is below grade and is covered • Providing multi-modal safety from improved lighting and sidewalks at north-south connections • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution • Reducing highway noise and air quality impacts to the school and adjacent properties by placing a cover over the highway • Keeping the Nestlé Purina Petcare Company at its existing location **Impacts** • Limiting north-south pedestrian and bicycle connectivity compared to the existing conditions • Relocating 56 residences • Impacting 105 noise receptors • Moving the highway closer to Swansea Elementary School • Displacing Stop N Shop and Pilot Travel Center truck stop • Creating visual obstruction with safety barriers; eliminating views across the highway	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Remove the viaduct, lower the highway, and cover portions of the highway to include space for community and neighborhood activities • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover • Provide $2 million in funding to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs
Managed Lanes (option to Build Alternatives)	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Creating reliable travel time • Providing congestion-free lanes • Reducing congestion in all travel lanes **Impacts** • Creating a financial burden to the low-income community, who may not be able to afford to use the managed lanes	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Research ways to provide assistance for low-income populations within the area (such as free transponders) for using the managed lanes

5.4 Land Use

This section discusses how land is used in the study area today and the relationship between land uses and I-70. It also explains how the project alternatives could impact land use patterns.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Information on the state and regional planning process, previously found in Chapter 3, Summary of Project Alternatives, was included.
- Regional and local planning documents published since August 2014 were reviewed for impacts and added to the list in the text.
- The acreage numbers converted to a transportation use were reduced due to revisions in the construction limits.

5.4.1 What is land use and why is it important to this project?

Land use is the way land is developed and used for various activities, such as commerce, recreation, or transportation. Land use is important to this project because decisions regarding land use and transportation affect one another. CDOT recognizes that the planning and construction of highways can affect existing and proposed land uses.

5.4.2 What study area and evaluation process were used to analyze land use?

The study area used in this analysis is shown in **Exhibit 5.4-1**. It shares the same boundary as the project area.

To determine potential effects of the proposed project on land use within the study area, the project team collected and mapped existing land use data from Denver, Adams County, Aurora, and Commerce City.

Exhibit 5.4-1 Land Use Study Area

To compare various land uses in each of the local cities and counties, land use data are simplified into the following general land use categories:

- **Residential**—Any property with one or more permanent residence; including single- and multi-family residences that are owner or renter occupied
- **Commercial**—Any property containing a business relating to or selling goods or services
- **Industrial**—Any property used for the manufacturing of goods for distribution
- **Governmental/institutional**—Any publicly owned property that serves the community, such as schools, churches, fire stations, libraries, and hospitals
- **Parks/open space**—Any property privately or publicly owned that is open to the public as green space; includes golf courses, cemeteries, named parks, and greenways
- **Transportation/right of way**—Any property used specifically to allow for the movement of people or goods; includes railroad and highway corridors
- **Vacant**—Any property that is currently undeveloped

Local and regional land use and transportation plans in the study area were identified and then reviewed to determine if

the potential effects from the project alternatives are consistent with the plans.

Effects to land use occur if project alternatives directly change how land is used. Direct changes in land use occur through project acquisition of right of way. Effects to land use also occur if project implementation induces enough unanticipated development that land use patterns change. Induced development is possible when alternatives require highway access points where there currently are none or when new highway access points are planned for low-density or undeveloped areas, since these areas are more susceptible to new growth brought on by project implementation. A distinction is made between planned and unplanned growth because land use change is not inherently negative when it is planned for and anticipated.

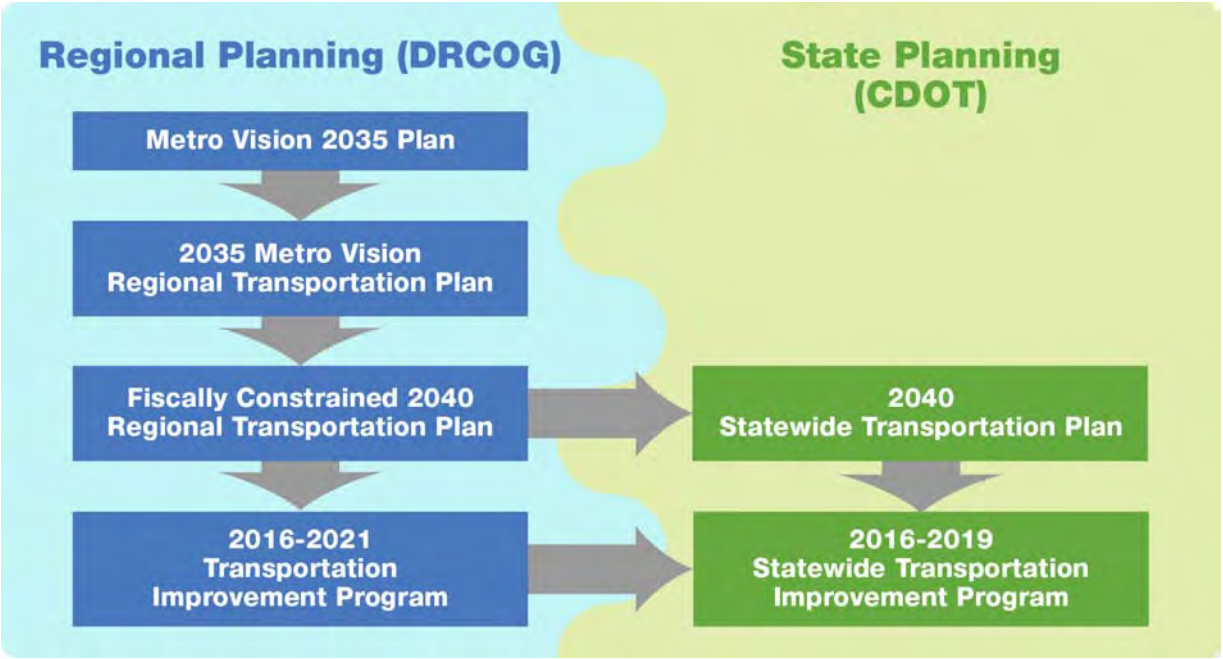
5.4.3 How does I-70 relate to the state and regional transportation planning process?

The I-70 East project is part of a coordinated regional transportation planning process intended to ensure regional air quality conformity and to identify project funding. The transportation planning process in the Denver region is guided by DRCOG, which serves as the region's metropolitan planning organization and develops both short-term and long-term transportation plans.

The planning documents developed by DRCOG and currently used by various state and local agencies to prioritize improvements and identify transportation projects are the *2035 Metro Vision Regional Transportation Plan* (MVRTP) (DRCOG, 2011 and DRCOG, 2015b), the *2040 Fiscally Constrained Regional Transportation Plan* (DRCOG, 2015c) and the *2016–2021 Transportation Improvement Program* (TIP) (DRCOG, 2015d).

In addition to the documents developed by DRCOG, CDOT also produces transportation plans for the state. These include Colorado's *2040 Statewide Transportation Plan* (SWP) (CDOT 2015a) and the *2016–2019 Statewide Transportation Improvement Program* (STIP) (CDOT, 2015b). DRCOG's *2040 Fiscally Constrained Regional Transportation Plan* and the 2035 MVRTP are incorporated without modification into the STIP and the SWP, respectively. **Exhibit 5.4-2** shows the relationship between the planning documents developed by DRCOG and CDOT.

Exhibit 5.4-2 Relationship between DRCOG and CDOT Planning Documents



Metro Vision 2035 Plan

For nearly 20 years, DRCOG has continued to update its *Metro Vision Plan* to reflect current challenges and opportunities while building on the strong foundation of the Metro Vision Guiding Vision originally adopted in 1992. The current plan for the region's future, *Metro Vision 2035 Plan*, was adopted by the DRCOG Board of Directors in January 2011.

DRCOG is working with the region's residents to update Metro Vision for 2040. *Metro Vision 2040 Plan* will continue to focus on key regional issues such as transportation and the environment.

2035 Metro Vision Regional Transportation Plan

The 2035 MVRTP, updated in 2011, develops multi-modal corridor visions for freeways to help guide the definition, prioritization, and design attributes of future transportation projects. The transportation vision for the I-70 East corridor is "… to serve as a multi-modal interstate freeway and rapid transit corridor serving regional and statewide trips. Future improvements will primarily increase mobility as well as maintain system quality, improve safety, and reduce environmental impact." (DRCOG, 2011, appendix p. 151) DRCOG is in the process of preparing a new 2040 MVRTP.

2040 Fiscally Constrained Regional Transportation Plan

The *2040 Fiscally Constrained Regional Transportation Plan* was adopted by DRCOG on February 18, 2015. The Fiscally Constrained RTP includes only those transportation projects from the MVRTP that can be built over the next 25 years based on current forecasts for transportation funding. Regionally significant projects like the highway improvements that are being considered as part of this EIS must be part of the Fiscally Constrained RTP and the TIP to be eligible for federal funding.

Denver Regional Council of Governments

2040 Fiscally Constrained Regional Transportation Plan

Adopted February 18, 2015

DRCOG

Currently, the only I-70 improvements within the project area that are listed in the Fiscally Constrained RTP are a new interchange at Central Park Boulevard (completed in 2012), future replacement of the viaduct from Brighton Boulevard to York Street ($256 million, 2008 dollars), and travel lanes to be added from I-270 to Havana Street ($166 million, 2008 dollars).

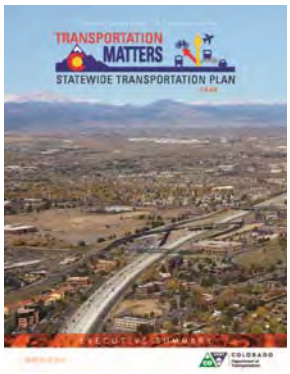
The 2040 RTP includes the reconstruction of I-70 and the addition of four managed lanes on I-70 from Brighton Boulevard to I-270. The plan recognizes that the reconstruction of I-70 will eliminate some interchange movements between Brighton Boulevard and Colorado Boulevard.

As a fiscally constrained roadway improvement in the 2040 RTP, the I-70 East project is identified as an improvement that will benefit the movement of freight and improve system quality by reconstructing I-70 and adding managed lanes.

2016–2021 Transportation Improvement Program

The DRCOG 2016–2021 TIP is a six-year implementation program for the Fiscally Constrained RTP that is required by federal regulations. For projects to be included in the TIP, they must be identified in the Fiscally Constrained RTP. The TIP identifies all federally funded transportation projects anticipated for the Denver metropolitan area during fiscal years 2016 to 2021. Within the project area, the current TIP includes funding for I-70 road reconstruction.

Transportation Matters—2040 Statewide Transportation Plan



The *Transportation Matters—2040 Statewide Transportation Plan* (CDOT, 2015a), is CDOT's roadmap for the next 10 to 25 years ahead. The plan identifies future needs of the transportation system and provides strategic actions to achieve planning goals. The goals are:

- **Safety Goal**—Move Colorado toward zero deaths by reducing traffic-related deaths and serious injuries.
- **Mobility Goal**—Improve mobility and connectivity with a focus on operations and transportation choice.
- **Economic Vitality Goal**—Improve competitiveness of the state economy through strategic transportation investments.
- **Maintaining the System Goal**—Preserve and maintain the existing transportation system.
- **Strategic Policy Actions**—Address multiple goal areas through key policies and initiatives.

The I-70 East Project is consistent with all of the goals of the 2040 Statewide Transportation Plan.

2016–2019 Statewide Transportation Improvement Program

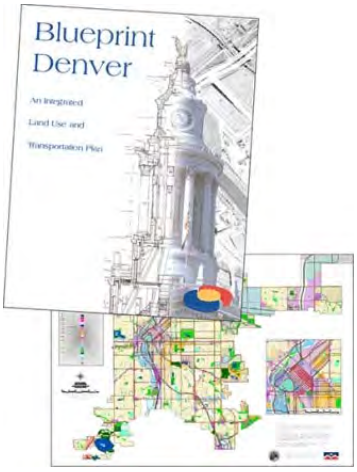
The STIP is the CDOT planning document that identifies the transportation projects CDOT intends to fund over a four-year period. Currently, projects through July 1, 2018, have been programmed to receive funding. The STIP is prepared in cooperation with local governments throughout the state and is developed concurrently with DRCOG's TIP. All state and federally funded transportation projects are included in the STIP. Projects included in the STIP are consistent with the SWP and conform to the applicable state air quality implementation plan.

The 2016–2019 STIP includes funding for I-70 East road reconstruction.

5.4.4 What local land use and transportation plans are considered?

To determine the consistency of the project alternatives with local land use plans in the study area, the following plans were identified and reviewed.

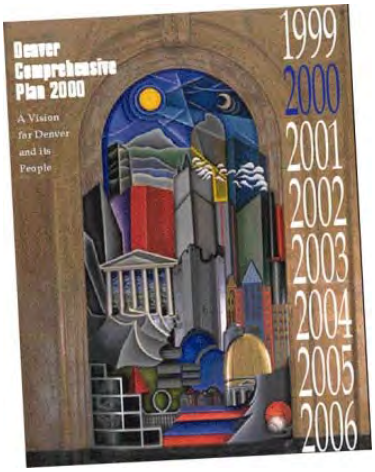
Blueprint Denver and Areas of Change Map Update



Blueprint Denver (Denver, 2002) identifies "Areas of Stability" and "Areas of Change." According to the document, the "… purpose of Areas of Change is to channel growth where it will be beneficial and can best improve access to jobs, housing, and services with fewer and shorter auto trips. Areas of Change are parts of the city where most people agree that development or redevelopment would be beneficial" (Denver, 2002, p.127). *Blueprint Denver* identifies three large Areas of Change in the study area that are traversed by I-70, and include large portions of the Elyria and Swansea, Stapleton, and Gateway Neighborhoods.

Plan priorities for roadway and other infrastructure identified in the document call for the elimination of gaps and infrastructure mismatches with development and redevelopment in Areas of Change. Denver updated the Areas of Change map in 2009. Additional amendments are made to the Areas of Change map as small area plans are adopted by the Denver City Council.

Denver Comprehensive Plan 2000

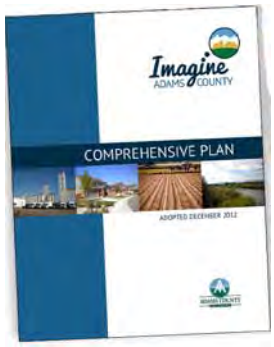


The *Denver Comprehensive Plan 2000* (Denver, 2000) recommends a strategy to "… enhance existing business centers and establish new business centers in a manner that offers a variety of high-quality uses that support Denver's business environment, complements neighboring residential areas, generates public revenue, and creates jobs" (Denver, 2000, p. 135). A top priority of this strategy includes solidifying the business identity of northeast Denver as a "new, high-quality, high-technology" business location linked to the redevelopment of Stapleton, Gateway, and the I-70 corridor, among others. The plan also recommends expediting public transportation development and other infrastructure improvements to reinforce linkages within the area, between DIA and downtown, and throughout the region.

City of Aurora Comprehensive Plan 2009

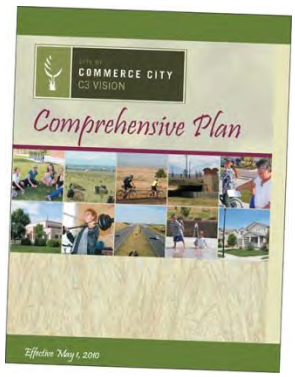
The *City of Aurora Comprehensive Plan 2009* (Aurora, 2010) identifies nine strategic areas in the city that are critical to the city's economy and identity. Each strategic area has its own mix of uses and unique physical characteristics, and requires specific strategies to affect the City's vision for the area. The only strategic area of the comprehensive plan in the study area is the northern portion of the I-225 corridor and city center. As a strategic area, the plan recognizes changing land use patterns and recommends strategies to manage this change.

Imagine Adams County, Comprehensive Plan



The *Imagine Adams County—The Comprehensive Plan* (Adams County, 2012b) covers the areas of Adams County not within the planning jurisdiction of Aurora. The plan "establishes goals, policies, and strategies to guide day-to-day decision making regarding future growth and public investment in the County over the next ten to twenty years." The plan was reviewed, but did not address land use along I-70 in the study area.

Commerce City C3 Vision Comprehensive Plan



The *Commerce City C3 Vision Comprehensive Plan* (Commerce City, 2010) addresses land use and growth in Commerce City through 2035, but does not address land use along the I-70 corridor.

Other area plans reviewed

Neighborhood assessments, approved site development plans, and transit-oriented development station area plans in the study area also were reviewed for consistency in incorporating the goals and objectives of *Blueprint Denver* and Aurora's *Comprehensive Plan 2009*. They are meant to assist city departments in making planning and public investment decisions:

- *38th & Blake Station Area Plan* (Denver Community Planning and Development Office, 2009a)
- *Context-Sensitive Solutions, Brighton Boulevard* (Denver Public Works Policy/Planning and Community Planning and Development, 2011a)
- *River North Greenway Master Plan* (The Greenway Foundation, 2009)

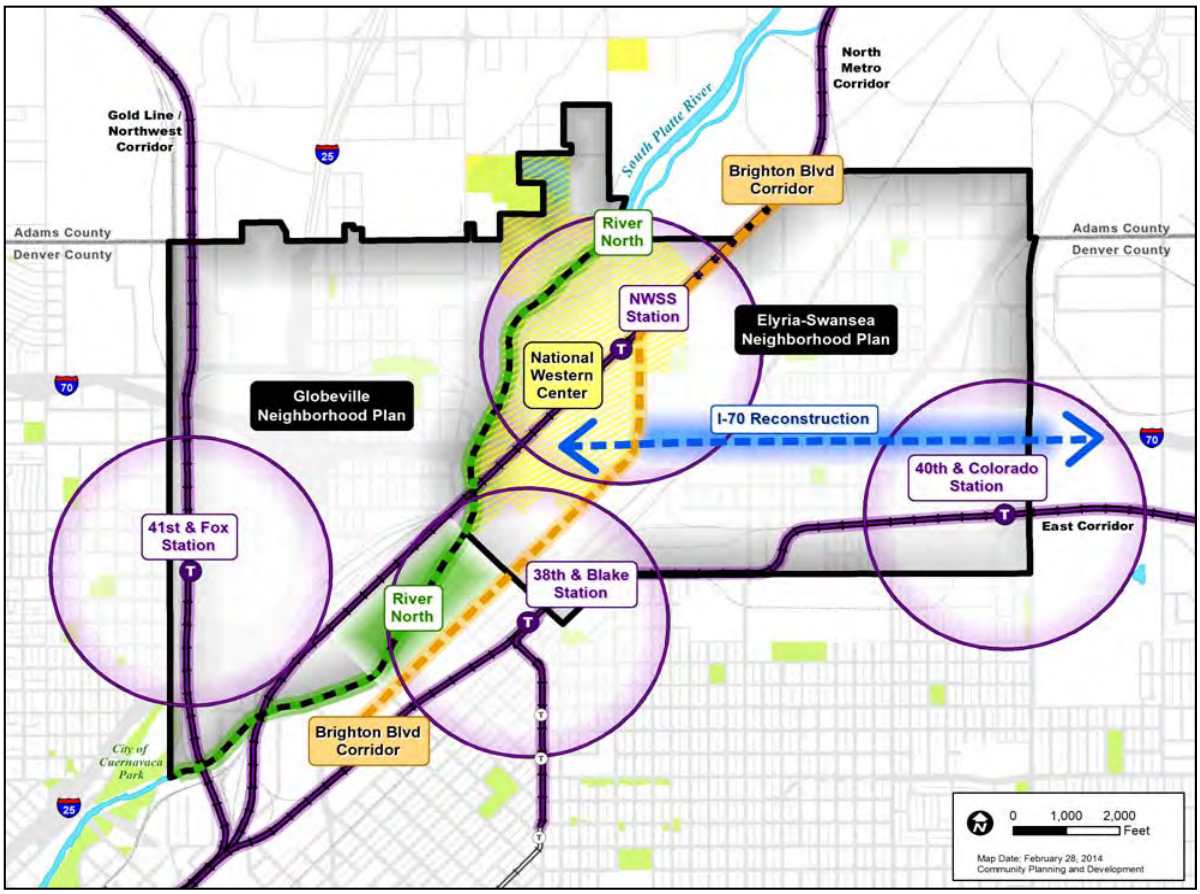
- *River North Plan* (Denver Community Planning and Development, 2003b)
- *River Vision Implementation Plan (RVIP)* (The Greenway Foundation, 2011)
- *Brighton Boulevard Corridor* (Denver Public Works Policy/Planning, ongoing)
- *Brighton Boulevard Parking & Access* (Denver Public Works Policy/Planning, 2013)
- *Elyria and Swansea Neighborhoods Plan* (Denver Community Planning and Development, February 2015)
- *National Western Center Master Plan* (Denver Community Planning and Development, March 2015)
- *Colorado Boulevard Station Area Plan* (Denver Community Planning and Development, ongoing)
- *National Western Stock Show Station Area Plan* (Denver Community Planning and Development, draft January 28, 2015)
- *Globeville Neighborhood Plan* (Denver Community Planning and Development, 2014a*)*
- *South Platte River Corridor Study* (Denver Community Planning and Development, 2013)
- *Heron Pond Master Plan* (Denver Parks and Recreation, ongoing)
- *Globeville-Utah Junction Watershed Outfall Systems Plan* (Denver Public Works, ongoing)
- *Northeast Downtown Next Steps Study* (Denver Public Works Policy/Planning, 2011b)
- *Airport City Denver* (Denver Department of Aviation, 2012)
- *Stapleton Development Plan* (Denver, 1995)
- *Gateway Concept Plan* (Denver Community Planning and Development and Gateway/Stapleton Development Office, 1990)

5.4.5 How is this project related to the North Denver Cornerstone Collaborative?

The North Denver Cornerstone Collaborative is an effort that began in early 2013 to ensure coordination and integrated planning among six redevelopment projects in the north Denver area. These projects represent a unique opportunity to rebuild a connected community and a vibrant gateway to Downtown Denver. I-70 East is one of the six redevelopment projects, and the other five projects (See **Exhibit 5.4-3**) include:

1. Neighborhood Plans (Globeville Neighborhood and Elyria and Swansea Neighborhood)
2. National Western Stock Show
3. Brighton Boulevard Corridor Redevelopment
4. River North (RiNo)
5. RTD Station Development

Exhibit 5.4-3 North Denver Cornerstone Collaborative Projects



Source: Denver Office of Community Planning and Development, February 2014

5.4.6 What are the existing and proposed future land uses in the study area?

The existing land use in the study area is a mix of established residential, commercial, and industrial development interspersed with government/institutional properties and parks/open space, summarized by category in **Exhibit 5.4-4** and shown in **Exhibit 5.4-5**.

Future land use conditions are anticipated to be a mix of land development types consistent and similar to the existing conditions.

Exhibit 5.4-4 Summary of Existing Land Use (acres) in Study Area

Existing Land Use	Study Area	
	Acres	Percentage
Commercial	5,148	18.1
Government/institutional	1,580	8.0
Industrial	6,185	21.7
Park	5,533	19.4
Residential	6,057	21.3
Transportation	1,561	5.5
Vacant	1,698	6.0
Total	**28,461**	**100.0**

Source: Denver Community Planning and Development Office, 2012a, 2012b; Aurora, 2012b; M. Grondalski (Adams County, 2012a), personal communication, August 27, 2012

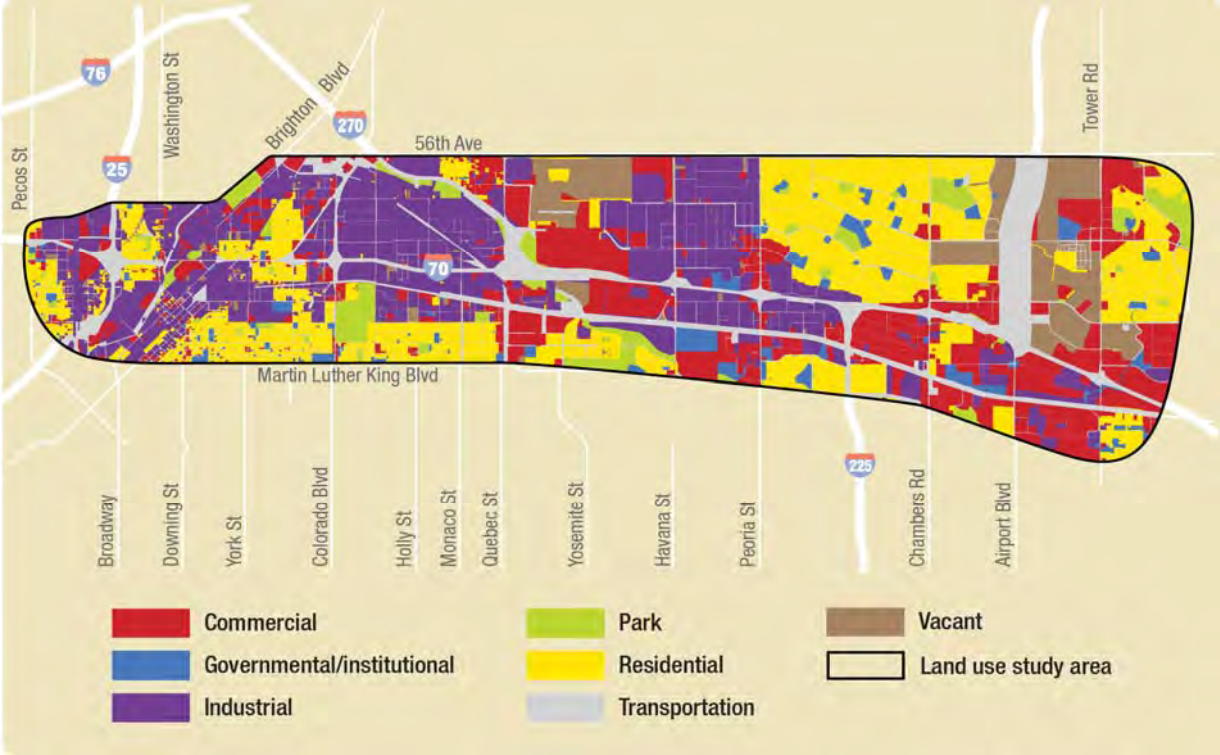
5.4.7 Are existing and future planned land uses consistent with existing zoning?

Generally, existing land use is consistent with current zoning rules. Changes to land use in the future would comply with the local government zoning designations. Zoning data for the study area are shown on **Exhibit 5.4-6**.

What is zoning?

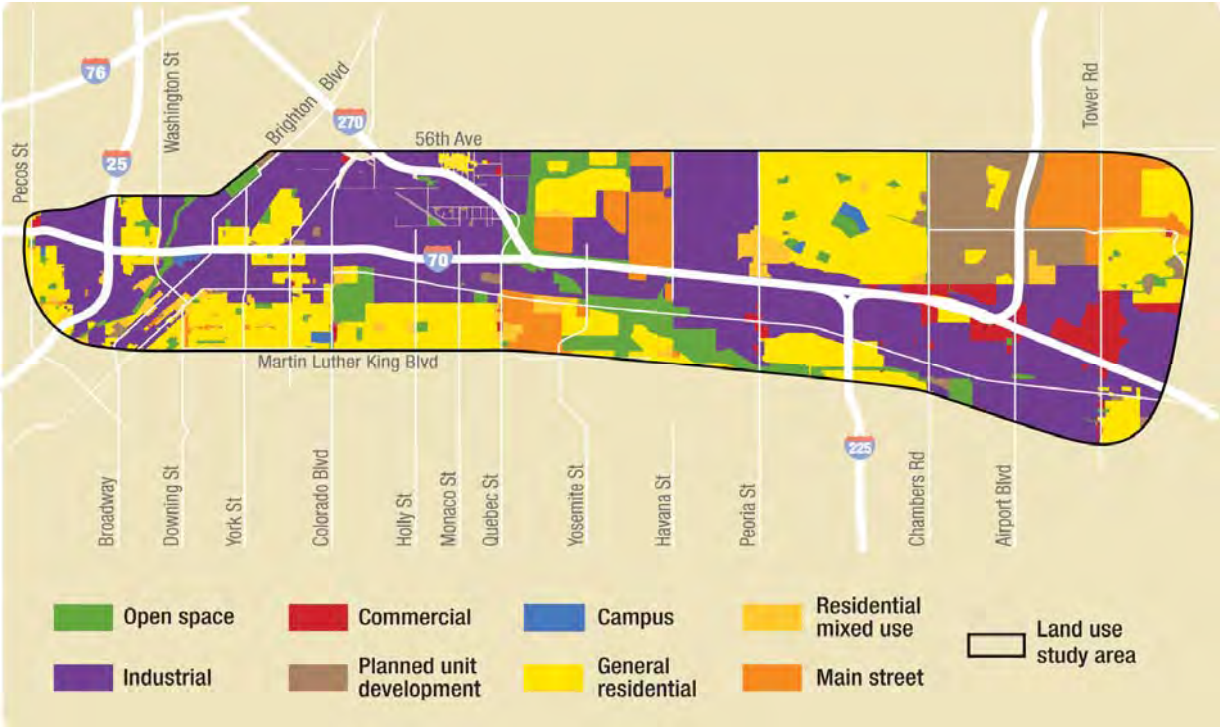
Zoning is a tool used in land use planning to delineate districts and establish regulations governing the use, placement, spacing, and size of land and buildings.

Exhibit 5.4-5 Existing Land Use



Source: Denver Community Planning and Development Office, 2012a, 2012b; Aurora, 2012c; M. Grondalski (Adams County), personal communication, August 27, 2012

Exhibit 5.4-6 Existing Zoning



Source: Denver, 2012c; Aurora, 2012b; M. Grondalski (Adams County, 2012a), personal communication, August 27, 2012

5.4.8 How do local agencies account for future land use change?

As previously mentioned, growth is not inherently detrimental when it is planned for and anticipated. Denver's *Blueprint Denver* plans for land use change by identifying Areas of Change. Areas of Change "… represent those parts of the city where change is either underway or desirable" (Denver, 2002, p.17) and would benefit from increased population, economic activity, and investment. Three large Areas of Change are located within the study area and are linked by I-70. Aurora's *Comprehensive Plan 2009* discusses strategic areas that are critical to the city's economy and identity. **Exhibit 5.4-7** shows Denver's Areas of Change and Aurora's strategic planning area.

Exhibit 5.4-7 Areas of Change and Strategic Planning Area

Source: Denver, 2002a; Fregonese and Calthorpe, Inc., 2002, Denver Community Planning and Development Office, 2012d; Aurora, 2010

5.4.9 How do the project alternatives potentially affect land use in the study area?

All of the project alternatives directly affect land use in the study area through right-of-way acquisition. **Exhibit 5.4-8** summarizes each of the project alternatives' conversion of existing land use type into a transportation use. These numbers are lower than those reported in the Supplemental Draft EIS as a result of various design changes that revised the construction limits.

Exhibit 5.4-8 Summary of Land Use Change (acres)

Alternative	Land Use Category[1]					
	Commercial	Government/ Institutional	Industrial	Residential	Vacant	Total Acres
No-Action Alternative, North Option	1.9	0.4	0.8	0.9	—	4.0
No-Action Alternative, South Option	1.3	—	3.7	1.0	—	6.0
Revised Viaduct Alternative, North Option	20.1	0.8	16.5	3.2	—	40.6
Revised Viaduct Alternative, South Option	18.2	—	20.1	3.7	—	41.9
Partial Cover Lowered Alternative	30.1	1.1	28.0	7.4	0.1	66.6
Managed Lanes Option (Option to Build Alternatives)[2]	+ 0.6	—	+ 1.1	—	—	+ 1.7

1. No existing park will be changed to a transportation use by any of the project alternatives.
2. The acreage listed for Managed Lanes Option represents impacted areas in addition to what is listed for each of the Build Alternatives.

5.4.10 Are the project alternatives consistent with local and regional plans?

In general, the project alternatives are consistent with local and regional plans. Conflicts exist with all of the project alternatives when residential and/or business property acquisition is necessary. Neighborhood cohesion is a common theme in local area plans.

As previously noted, a new neighborhood plan was initiated by Denver in January 2013 for the Elyria and Swansea Neighborhood. This planning process is part of the North Denver Cornerstone Collaborative. The *Elyria and Swansea Neighborhoods Plan* recommends the Partial Cover Lowered Alternative (Denver Community Planning and Development Office, 2015, p. 97) and includes recommendations intended to further mitigate impacts by the alternative. As a result, the No-Action Alternative and the Revised Viaduct Alternative would not be consistent with this local plan.

No-Action Alternative

Direct changes to land use are similar for both of the Expansion Options of the No-Action Alternative, so they are discussed together. The No-Action Alternative includes options to expand the roadway either to the north or to the south. Both of these options are inconsistent with regional and local area plans in the following ways:

Strategies in DRCOG's 2035 MVRTP call to "… expand capacity of existing regional roadways in the most critically congested corridors," and to "… encourage transportation projects that support the growth of housing and employment within designated urban centers" (DRCOG, 2011, pp. 42–43). The No-Action Alternative does not support the strategies of the MVRTP, since it does not expand the capacity of I-70.

A major element of *Blueprint Denver* is the concept of Areas of Change. The purpose of Areas of Change is to channel growth where it will be beneficial and "… increase economic activity in the area to benefit existing residents and businesses, and where necessary, provide the stimulus to redevelop" (Denver, 2002, p. 127). The No-Action Alternative does not accommodate opportunities for redevelopment, since it does not provide alternate transportation choices as identified in *Blueprint Denver*.

Recommendations in the *Elyria and Swansea Neighborhoods Plan* call for stabilizing residential areas and establishing buffers next to non-residential uses. The plan

acknowledges that *Blueprint Denver* identifies the area as an Area of Change. The No-Action Alternative increases the footprint and presence of I-70 in the neighborhood and would not stabilize or provide a buffer between the existing transportation corridor and residential uses.

The No-Action Alternative does not include new access points, so it is not expected to induce development in the study area.

Revised Viaduct Alternative

Direct changes to land use are similar for both of the Expansion Options of the Revised Viaduct Alternative, so they are discussed together. The Revised Viaduct Alternative and its associated options are consistent with regional and local plans because they would improve mobility and the connection between existing and developing urban centers by adding highway capacity.

The alternative removes the York Street interchange, which would improve mobility on I-70. The removal of the interchange is not likely to affect access to the Elyria and Swansea Neighborhood because the adjacent interchanges of Brighton Boulevard and Steele Street/Vasquez Boulevard would be improved. With the Revised Viaduct Alternative, the improved Steele Street/Vasquez Boulevard interchange does not provide direct access from westbound I-70 to Steele Street/Vasquez Boulevard or from Steele Street/Vasquez Boulevard to eastbound I-70. Access at Steele Street/Vazquez Boulevard and Colorado Boulevard is provided by a split-diamond interchange. In addition, slip ramps are included to provide an eastbound off-ramp and a westbound on-ramp at Colorado Boulevard.

The alternative consolidates the existing slip ramp interchange system of Dahlia Street, Holly Street, and Monaco Street to one interchange at Holly Street. This modified interchange would alleviate congestion at the adjacent interchanges of Colorado Boulevard and Quebec Street. The modified interchange would not degrade mobility on I-70 and is not likely to affect access to the Northeast Park Hill Neighborhood. The Revised Viaduct Alternative, therefore, is not expected to cause access-related land use changes.

The improved mobility on I-70 would bolster the economic and social success of developing urban centers, such as Stapleton and the Gateway District, as well as

redevelopment opportunities in existing neighborhoods, such as Elyria and Swansea.

The Revised Viaduct Alternative is not anticipated to induce development or cause unforeseen land use changes (beyond locations identified in the *Blueprint Denver* Areas of Change maps) through improving mobility.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative removes the viaduct between Brighton Boulevard and Colorado Boulevard and places the highway below grade. A four-acre cover will be built over I-70 between Columbine Street and Clayton Street with an urban landscape on top. The landscape may add up to three acres of public park/open space land use in the Elyria and Swansea Neighborhood, depending on how much acreage is reserved for the school. This alternative is consistent with regional and local planning documents in that the proposed changes would improve mobility on I-70 and bolster redevelopment opportunities in a *Blueprint Denver* Area of Change.

This alternative removes the York Street interchange, which would improve mobility on I-70. The removal of the interchange is not likely to affect access to the Elyria and Swansea Neighborhood because the adjacent interchanges of Brighton Boulevard and Steele Street/Vasquez Boulevard would be improved. Highway access is provided through a split-diamond interchange at Steele Street/Vasquez Boulevard and Colorado Boulevard. In addition, slip ramps are included to provide an eastbound off-ramp and a westbound on-ramp at Colorado Boulevard.

The alternative consolidates the existing slip ramp interchange system of Dahlia Street, Holly Street, and Monaco Street to one interchange at Holly Street. This modified interchange would alleviate congestion at the adjacent interchanges of Colorado Boulevard and Quebec Street. The modified interchange would not degrade mobility on I-70 and is not likely to affect access to the Northeast Park Hill Neighborhood. The Partial Cover Lowered Alternative, therefore, is not expected to cause access-related land use changes.

The Partial Cover Lowered Alternative is not anticipated to induce development or cause unforeseen land use changes (beyond locations identified in the *Blueprint Denver* Areas of Change maps) through improving mobility.

Managed Lanes Option

Both of the Build Alternatives include a Managed Lanes Option, which is consistent with regional and local plans. It improves highway capacity, which, in turn, improves mobility and the connection between existing and developing urban centers. The Managed Lanes Option requires approximately 1.7 additional acres of right of way than the General-Purpose Lane Option of the Build Alternatives would; however, the land use changes induced by the Managed Lanes Option would be similar to those previously described for both Build Alternatives.

5.4.11 How are land use changes by the project alternatives mitigated?

Continued coordination with local jurisdictions will occur to ensure compatibility with land use plans and to address any inconsistency that may arise due to the project alternatives. Land use changes that result in the relocation or displacement of existing occupants due to right-of-way acquisition are addressed in Section 5.5, Relocations and Displacements.

Exhibit 5.4-9 shows a summary of the impacts and mitigations relating to land use.

Exhibit 5.4-9 Summary of Land Use Impacts and Mitigation

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	4.0 acres to 6.0 acres converted to transportation use	Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise due to the project alternatives
Revised Viaduct Alternative	40.6 acres to 41.9 acres converted to transportation use	
Partial Cover Lowered Alternative	• 66.6 acres converted to transportation use • Creation of a 4 acre cover with up to 3 acres of public space over I-70	
Managed Lanes (option to Build Alternatives)	• An additional 1.7 acres would be required if the Managed Lanes Option is selected with the Revised Viaduct Alternative, resulting in 42.3 acres to 43.6 acres converted to transportation use • An additional 1.7 acres would be required if the Managed Lanes Option is selected with the Partial Cover Lowered Alternative, resulting in 68.3 acres converted to transportation use	

5.5 Relocations and Displacements

This section investigates the impacts from the project alternatives resulting from land acquisition of residential units, businesses, and non-profit organizations for right of way in the study area. Proposed mitigation measures also are discussed to offset any adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Based on the revised construction limits and refined data on the number of impacted housing units, the number of relocations and displacements was revised.
- Early acquisition of properties was recognized and explained.

5.5.1 What is a relocation or displacement and why is it important to this project?

A relocation or displacement results from a project's need for real property to accommodate roadway improvements. This property, and the right to own and/or use it, is referred to as right of way. A relocation or displacement occurs when it is necessary to acquire an occupied property for right of way and relocate all occupants (residential) and businesses within the property. In instances where it is necessary to acquire occupied buildings (either tenant or owner occupied), displaced residential, business, or non-profit occupants will be relocated to a replacement site. A relocation and displacement analysis is important to this project because property acquisition is required with all of the project alternatives.

What is right of way?

The *CDOT Right of Way Manual* (CDOT, 2011b) defines right of way as real property and rights therein used for the construction, operation, or maintenance of a transportation or related facility under Title 23, United States Code (USC).

5.5.2 What study area and evaluation process were used to analyze potential relocations and displacements?

The study area used in this analysis is the construction limits of the project alternatives (collectively), as shown in **Exhibit 5.5-1**. This exhibit shows the anticipated construction limits and the proposed permanent roadway footprint. For the purposes of the relocation analysis, the

anticipated construction limits extend five feet to 10 feet from the edge of the proposed permanent roadway footprint, 15 feet from walls, and 20 feet from bridges. Drainage easements are included within the construction limits; however, they are not anticipated to result in any relocations and displacements.

Exhibit 5.5-1 Relocations and Displacements Study Area

The proposed permanent roadway footprint and the anticipated construction limits were overlaid with parcel data to identify the properties that require either full or partial acquisition. A parcel is considered a full acquisition if the construction impact limits encroach on a structure, remove all reasonable access, or acquire more than 20 percent of a parcel. The evaluation of parking areas located within a parcel occurred on a site-by-site basis. If more than 50 percent of parking is taken, a full acquisition is assumed.

Potential acquisitions identified using this methodology represent a conservative estimate, based on conceptual design plans. All proposed alternatives consistently applied this methodology. After further refinement of design impacts and working with impacted property owners, certain assumed full acquisitions could become partial acquisitions

Acquisition

Full acquisition occurs when the construction impact limits encroach on a structure, remove all reasonable access, or acquire more than 20 percent of a parcel.

Partial acquisitions include all other impacted parcels.

and vice versa. All parcel data are obtained from the Denver and Adams County tax assessors' databases. Potentially affected parcels were field verified by the project team to prevent misclassification due to dated or inaccurate records.

Properties identified as full acquisitions are reviewed to determine the number and type of potential relocations.

Types of relocations and displacements

The categories of potential relocations and displacements include the following:

- **Residential.** Any property with single-family or multi-family housing structure(s).
- **Business.** Any property with commercial or industrial structure(s) and/or storage yards. This includes government-owned property, such as Denver or CDOT properties.
- **Non-Profit.** Any property owned by a non-profit organization with a structure providing services to the community.

The relocation reports used to summarize relocation effects for each neighborhood by alternative are included in Appendix A of Attachment G, *Conceptual Stage Relocation Technical Report Addendum*. The technical report also considers the availability of resources needed to accomplish the necessary relocations. Governmental and non-profit agencies that may be able to help displacees affected by the project also are included in the technical report.

Has CDOT started purchasing property?

As allowed under 23 CFR 710.501, Early Acquisition, "the State may initiate acquisition of real property at any time it has the legal authority to do so based on program or project considerations. The State may undertake early acquisition for corridor preservation, access management, or other purposes."

In September 2013, CDOT began the early acquisition of properties to assist with implementation of the Preferred Alternative. The majority of these property acquisitions would be required by more than one of the proposed alternatives.

Advanced purchase of property for this project has not influenced this environmental impact study, including:

(i) The decision on need to construct the project

(ii) The consideration of alternatives

(iii) The selection of the design or location

Properties already purchased are still included in this document as an impacted property under all applicable alternatives.

5.5.3 What are the residential relocations and displacements?

All of the residential relocations that result from the proposed project alternatives are located in the Elyria and Swansea Neighborhood. No residential relocations are anticipated by any of the alternatives from the Globeville, Northeast Park Hill, Stapleton, Montbello, Aurora, or Gateway Neighborhoods. **Exhibit 5.5-2** summarizes potential residential relocation impacts anticipated under each of the alternatives. These numbers have changed since the Supplemental Draft EIS due to revised construction limits for the Partial Cover Lowered Alternative and more refined relocation information in all alternatives.

Exhibit 5.5-2 Residential Relocations by Alternative

Alternative/Option	Residential Relocations		
	Total Residential	Owner-Occupied[1]	Tenant-Occupied
No-Action Alternative, North Option	15	7	8
No-Action Alternative, South Option	13	3	10
Revised Viaduct Alternative, North Option	38	16	22
Revised Viaduct Alternative, South Option	44	11	33
Partial Cover Lowered Alternative	56	21	35

Source: Attachment G, Conceptual Stage Relocation Technical Report Addendum
1. Occupancy status of owner-occupied housing determined by Denver and Adams County Assessor data.

As shown in **Exhibit 5.5-2**, the total number of residential relocations estimated for each alternative ranges from 13 residences (No-Action Alternative, South Option) to 56 residences (Partial Cover Lowered Alternative). For all three alternatives plus their options, the majority of residential relocations are tenant occupied. As identified in Section 5.2, Social and Economic Conditions, many of the potentially relocated households in the Elyria and Swansea Neighborhood are considered low income. Mitigation measures to address low-income and minority impacts are identified in Section 5.3, Environmental Justice.

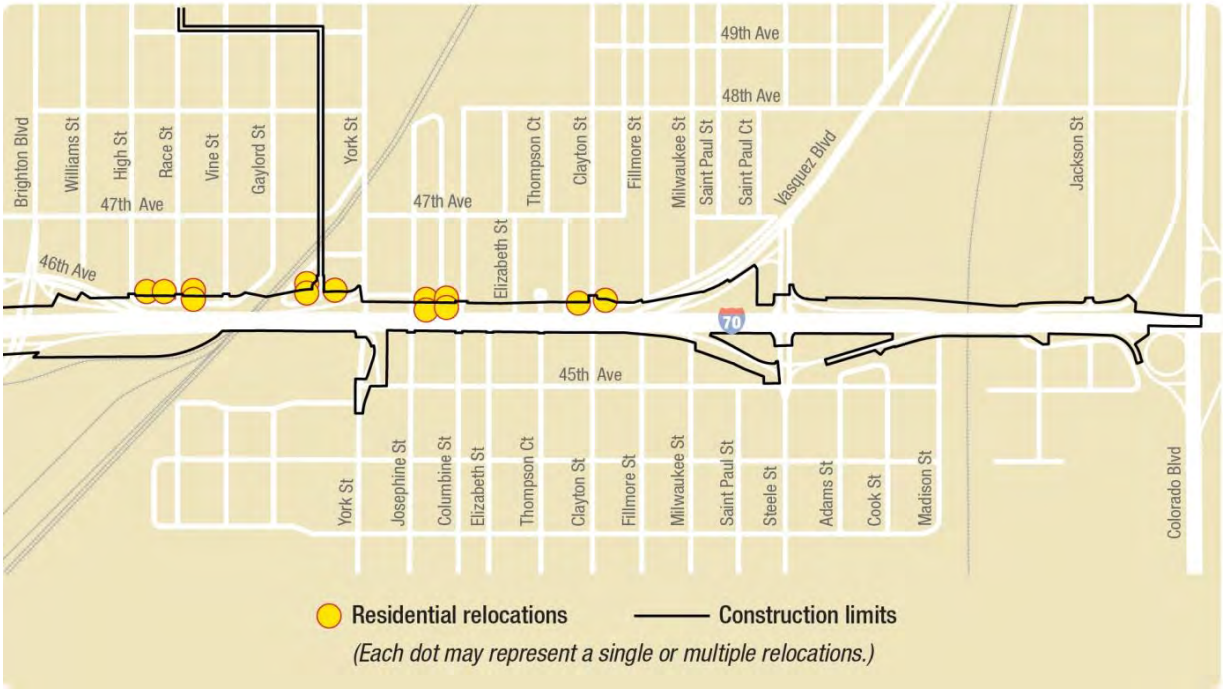
No-Action Alternative

The number of residential relocations anticipated in the Elyria and Swansea Neighborhood is comparable between the Expansion Options of the No-Action Alternative. The option to shift I-70 to the north will result in 15 residential relocations. These residences are located on the 4600 block between High Street and Fillmore Street, as shown on **Exhibit 5.5-3**.

Changes in relocations since the Supplemental Draft EIS

Through the advance acquisition process and public comments received on the Supplemental Draft EIS, some property descriptions have been corrected to reflect their current condition. For example, a property may have been previously identified as a single-family residence when it was actually a duplex, or vice versa, thus affecting the overall number of relocations required. These corrections were applied to all alternatives under consideration. As a result, relocation numbers may vary from those identified previously in the Supplemental Draft EIS.

Exhibit 5.5-3 No-Action Alternative, North Option Residential Relocations



The option to shift I-70 to the south will result in 13 residential relocations. These residences are located on the 4500 block between Josephine Street and Milwaukee Street, as shown on **Exhibit 5.5-4**.

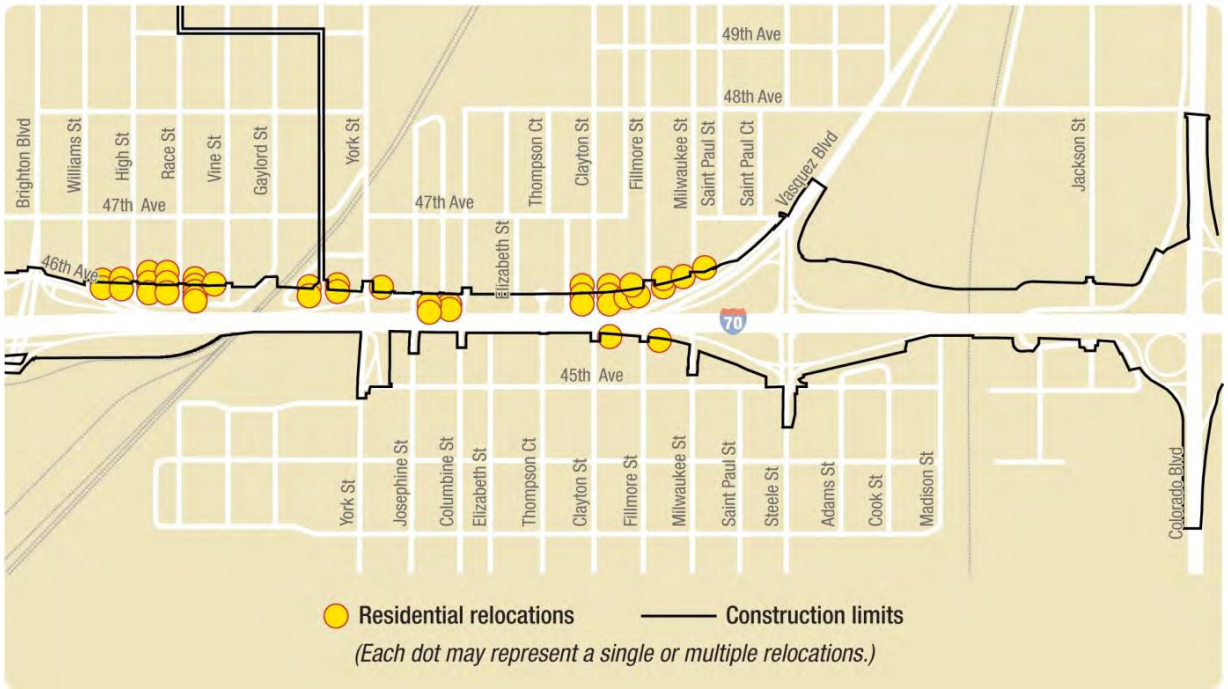
Exhibit 5.5-4 No-Action Alternative, South Option Residential Relocations

Revised Viaduct Alternative

The Revised Viaduct Alternative includes Expansion Options to expand the roadway either to the north or to the south.

The option to expand the roadway to the north will result in 38 residential relocations. These residences are located north of I-70 on the 4600 block between Williams Street and St. Paul Street and on the south side of I-70 on the 4500 block between Clayton Street and Milwaukee Street, as shown on **Exhibit 5.5-5**.

Exhibit 5.5-5 Revised Viaduct Alternative, North Option Residential Relocations



The option to expand the roadway to the south will result in 44 residential relocations. As shown on **Exhibit 5.5-6**, potential residential relocations are located on the south side of I-70 on the 4500 block between Josephine Street and Madison Street. This option also requires relocations on the north side of I-70 in the 4600 block between Williams Street and Vine Street and on Fillmore Street.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will expand the roadway to the north and will result in 56 residential relocations. As shown on **Exhibit 5.5-7**, all of the relocations will be from the north side of I-70 on the 4600 block between Williams Street and Milwaukee Street.

Exhibit 5.5-6 Revised Viaduct Alternative, South Option Residential Relocations

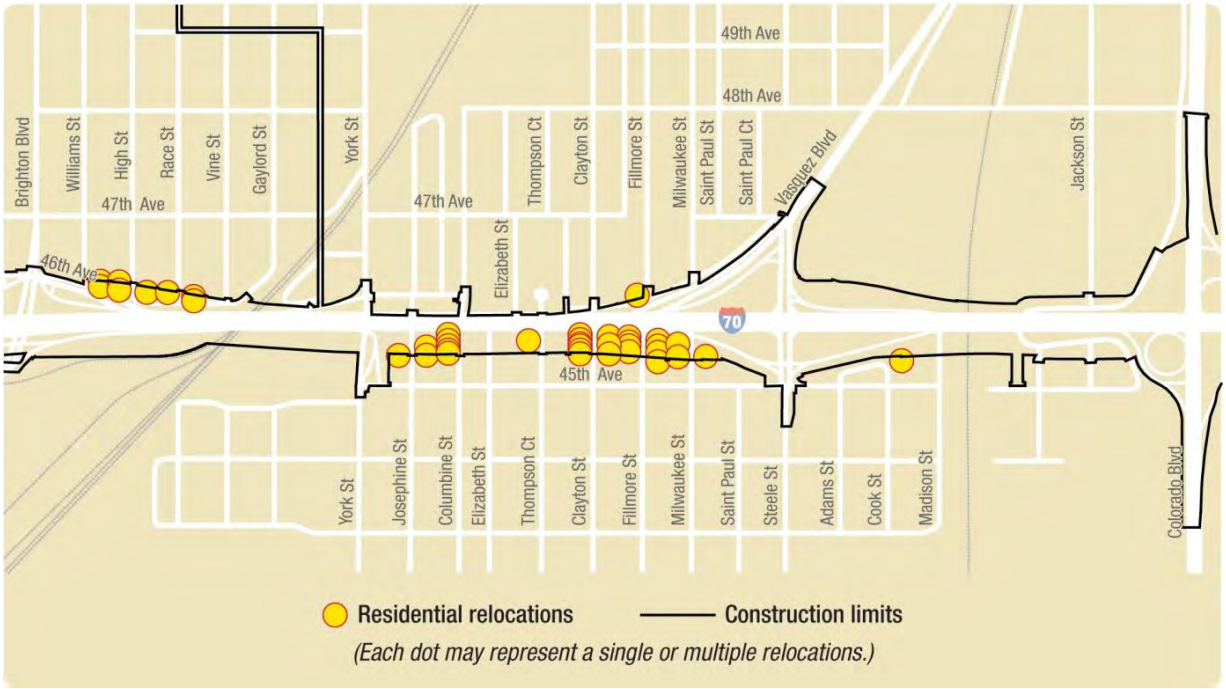
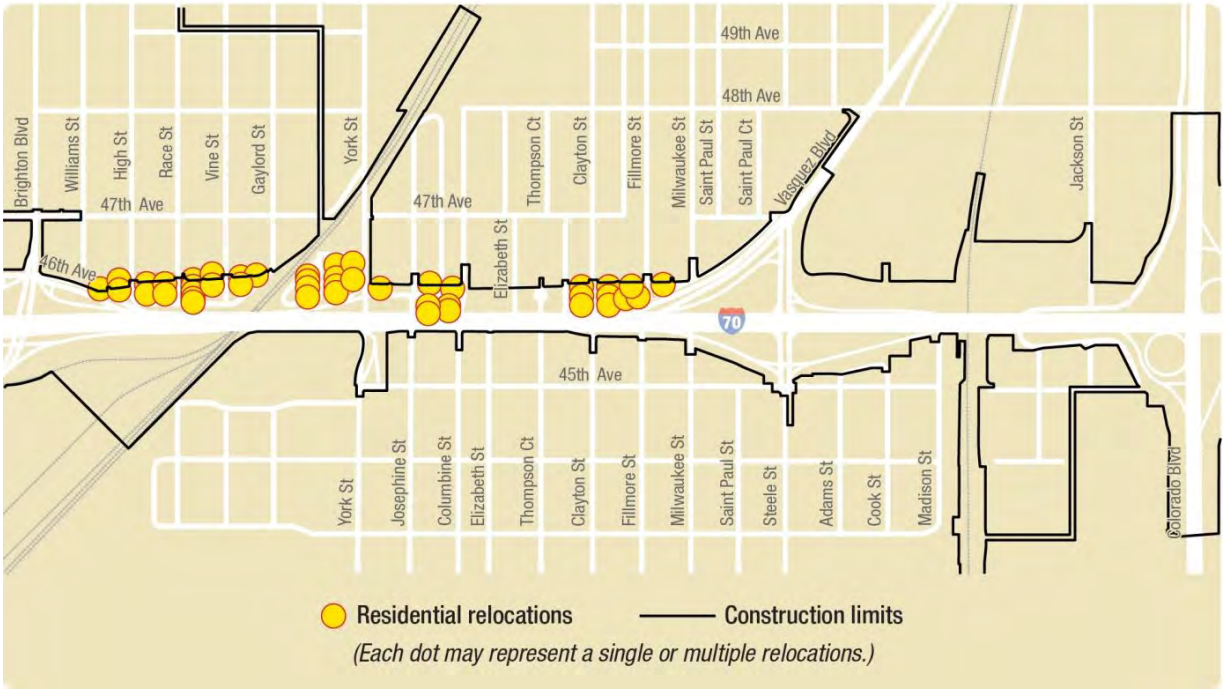


Exhibit 5.5-7 Partial Cover Lowered Alternative Residential Relocations



Managed Lanes Option

The inclusion of the Managed Lanes Option with either the Revised Viaduct Alternative or the Partial Cover Lowered Alternative will not change the number of potential residential relocations.

Available housing

Based on 2012 property information, the individual tax value of impacted residential property located in the Elyria and Swansea Neighborhood ranges from a low of $36,300 to a high of $210,400. The median tax value is approximately $85,000. In December 2012, using the REcolorado.com website, properties for sale within Elyria and Swansea and surrounding neighborhoods ranging in value from $85,000 to $250,000 were researched, resulting in 152 available properties. No available rental homes (including duplexes) were found in classified ads on the *Denver Post*, Zillow, Craig's List, or Colorado Housing Search websites in Elyria and Swansea or surrounding neighborhoods. According to Zillow's website, as of July 16, 2015, there were 881 units for rent in all other Denver neighborhoods combined. It is anticipated that additional listings for rental properties from other websites, combined with those listed on Zillow, offer an adequate supply of replacement housing in the Denver area. Apartments, condominiums, and townhomes provide additional sources of available rental properties.

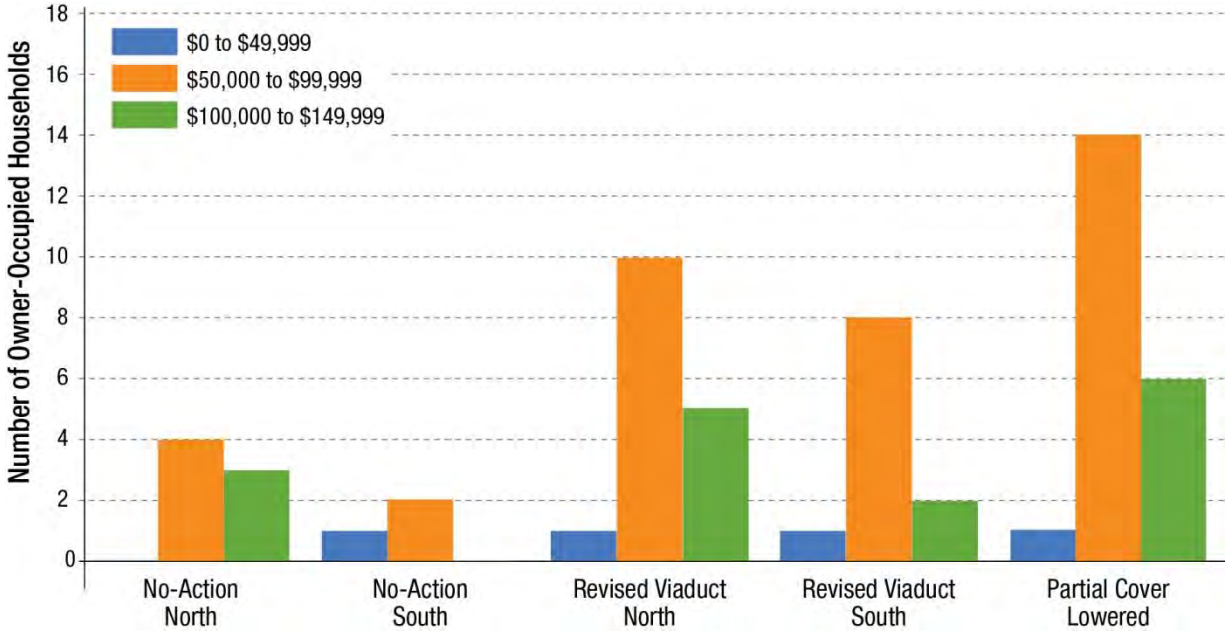
What is tax value of property?

Tax value is the actual value of real estate property (including land and improvements) on which a local government bases property tax.

Current market conditions indicate that an adequate supply of decent, safe, and sanitary (DSS) replacement housing is available to support the residential displacements that result from any of the project alternatives.

Exhibit 5.5-8 shows the values of owner-occupied households relocated by the alternatives. All of these households are located in the Elyria and Swansea Neighborhood. The majority of households impacted by each alternative have homes valued between $50,000 and $99,999. No homes are valued at $150,000 or more.

Exhibit 5.5-8 Property Value of Relocated Owner-Occupied Households by Alternative/Option (Land and Improvements)



Source: Supplement Draft EIS Attachment G, Conceptual Stage Relocation Technical Report; Denver Assessor's Office

5.5.4 Will there be any business relocations?

Exhibit 5.5-9 summarizes potential business and non-profit relocation impacts anticipated under each of the alternatives by neighborhood. These numbers have changed since the Supplemental Draft EIS due to revised construction limits and more refined relocation information. The majority of business relocations associated with all of the alternatives will occur in the Elyria and Swansea Neighborhood, as shown on **Exhibit 5.5-10** through **Exhibit 5.5-15**. All of the design options under both of the Build Alternatives will require three business relocations from the Northeast Park Hill Neighborhood and one business relocation in the Stapleton Neighborhood. No business relocations are anticipated with any of the alternatives in the Globeville, Montbello, Aurora, and Gateway Neighborhoods.

Exhibit 5.5-9 Business and Non-Profit Relocations by Alternative and Neighborhood

Alternative/ Option	Neighborhood	Business Relocations	Non-Profit Relocations
No-Action Alternative, North Option	Elyria and Swansea	5	1
	Total	**5**	**1**
No-Action Alternative, South Option	Elyria and Swansea	15	—
	Total	**15**	**—**
Revised Viaduct Alternative, North Option	Elyria and Swansea	10	1
	Northeast Park Hill	3	—
	Stapleton	1	—
	Total	**14**	**1**
Revised Viaduct Alternative, South Option	Elyria and Swansea	22	1
	Northeast Park Hill	3	—
	Stapleton	1	—
	Total	**26**	**1**
Partial Cover Lowered Alternative	Elyria and Swansea	13	1
	Northeast Park Hill	3	—
	Stapleton	1	—
	Total	**17**	**1**

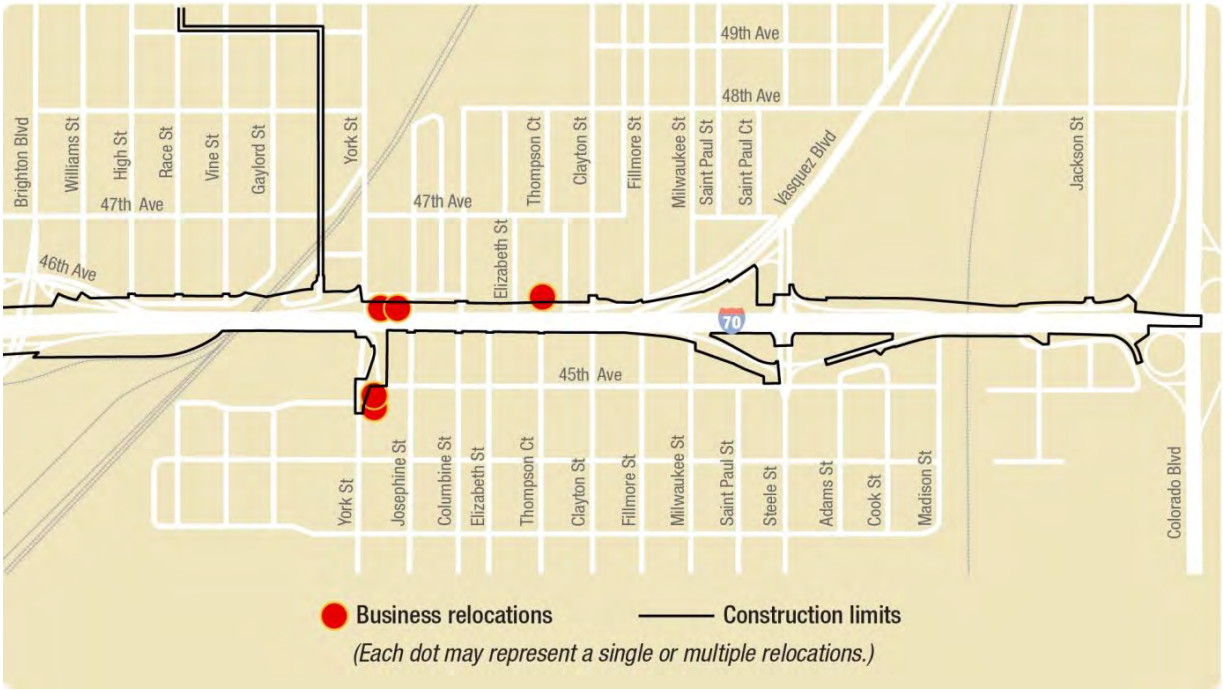
Source: Attachment G, Conceptual Stage Relocation Technical Report Addendum
Note: There is no difference in the number of business or non-profit relocations as a result of the Managed Lanes Option

Attachment G, *Conceptual Stage Relocation Technical Report Addendum*, provides an estimate of business relocations, including those that are within an alternative's right-of-way limits and businesses that are likely to lose access. Project alternatives will relocate between five (No-Action Alternative, North Option) and 26 businesses (Revised Viaduct Alternative, South Option).

No-Action Alternative

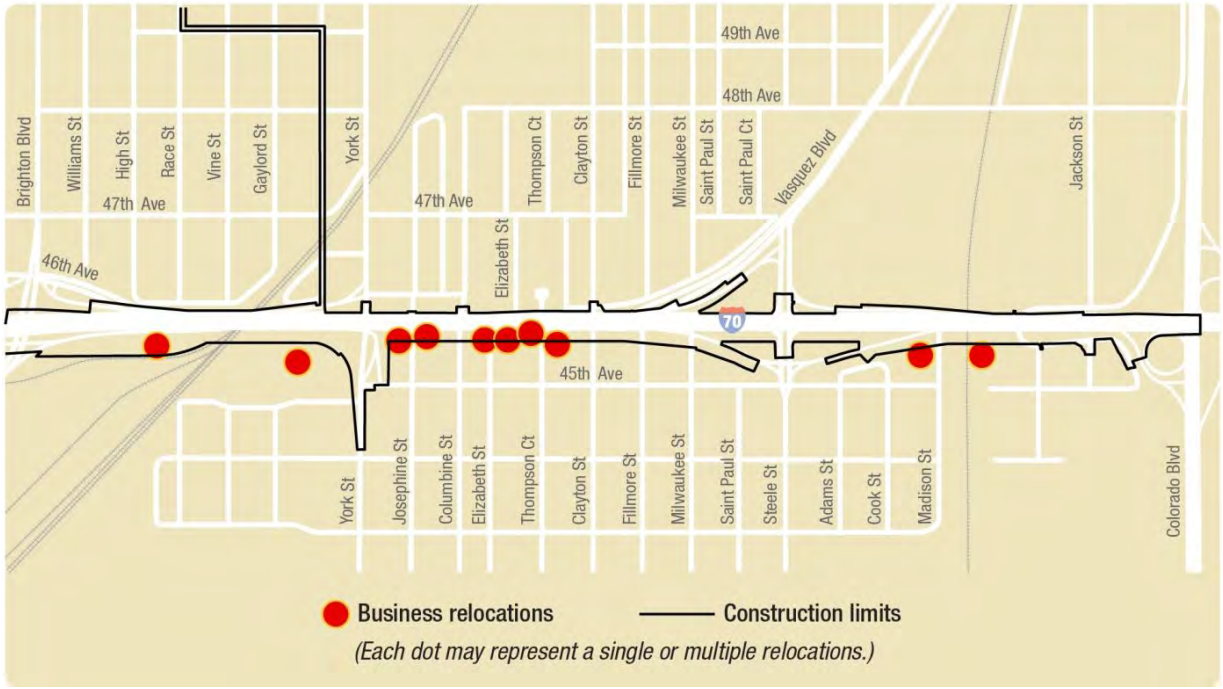
The option to shift I-70 to the north will result in approximately five business relocations. All five of these businesses are located in the Elyria and Swansea Neighborhood near the York Street interchange, as shown on **Exhibit 5.5-10**. Included in these relocations are a liquor store and a convenience store at 2381 East 46th Avenue and the Colonial Manor Motel located at 2615 East 46th Avenue.

Exhibit 5.5-10 No-Action Alternative, North Option Business Relocations



The option to shift I-70 to the south will result in approximately 15 business relocations. All 15 of these businesses are located in the Elyria and Swansea Neighborhood, as shown on **Exhibit 5.5-11**. Ten out of the 15 businesses to be relocated with this option are located on 46th Avenue (under or adjacent to the existing viaduct). This option also will result in the relocation of the Nestlé Purina PetCare Company manufacturing facility located at 2151 East 45th Avenue. Another large warehouse facility that will be relocated by this alternative is the Manna Pro Products Company located south of the existing viaduct on Madison Street.

Exhibit 5.5-11 No-Action Alternative, South Option Business Relocations



Revised Viaduct Alternative

The Revised Viaduct Alternative, North Option will require 14 business relocations. Ten of the 14 businesses are located in the Elyria and Swansea Neighborhood, as shown on **Exhibit 5.5-12**. Almost half of the business relocations in the Elyria and Swansea Neighborhood are located along 46th Avenue. The other four business relocations are shown on **Exhibit 5.5-13** and include three in the Northeast Park Hill Neighborhood (two located at 5175 East Stapleton Drive North and one at 5601 East Stapleton Drive North), with the final business relocation being the CDOT maintenance yard located in the southwest corner of the Havana Street interchange with I-70. Similar to the No-Action Alternative, North Option, this option will require the relocation of the Colonial Manor Motel located at 2615 East 46th Avenue, plus the Pilot Travel Center and Sno-White Linen and Uniform Company, both located on 46th Avenue, and the Penske Truck Rental facility located at 4605 Jackson Street.

Exhibit 5.5-12 Revised Viaduct Alternative, North Option Business Relocations in the Elyria and Swansea Neighborhood

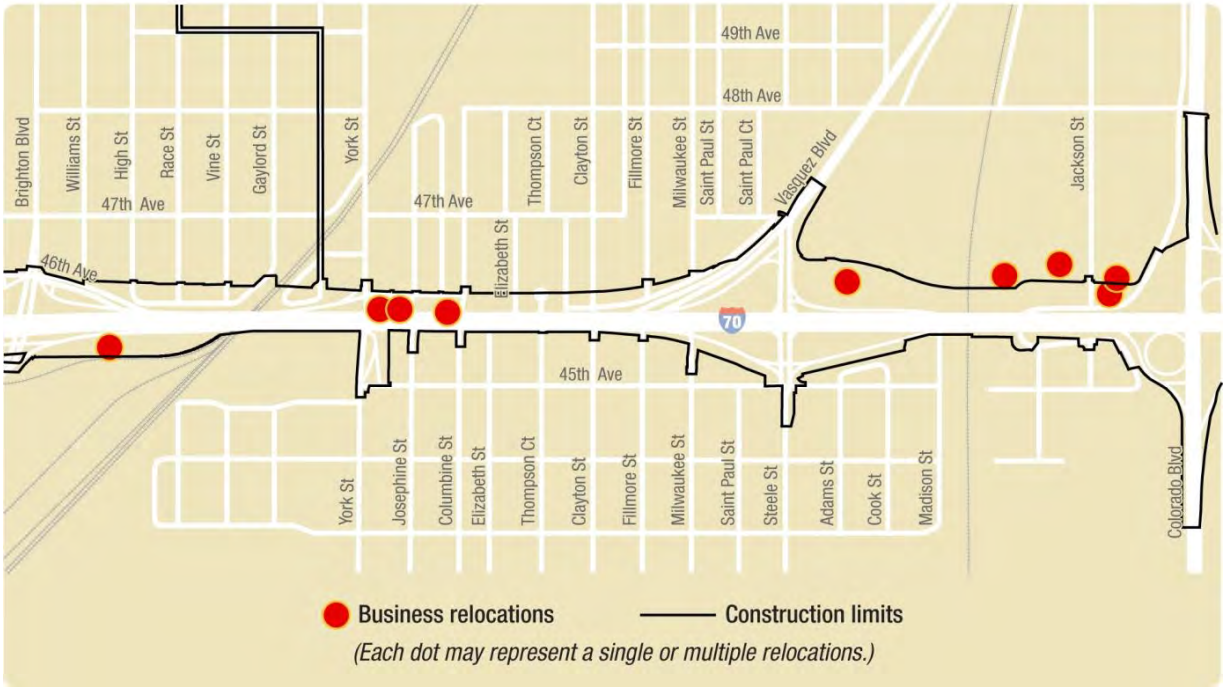
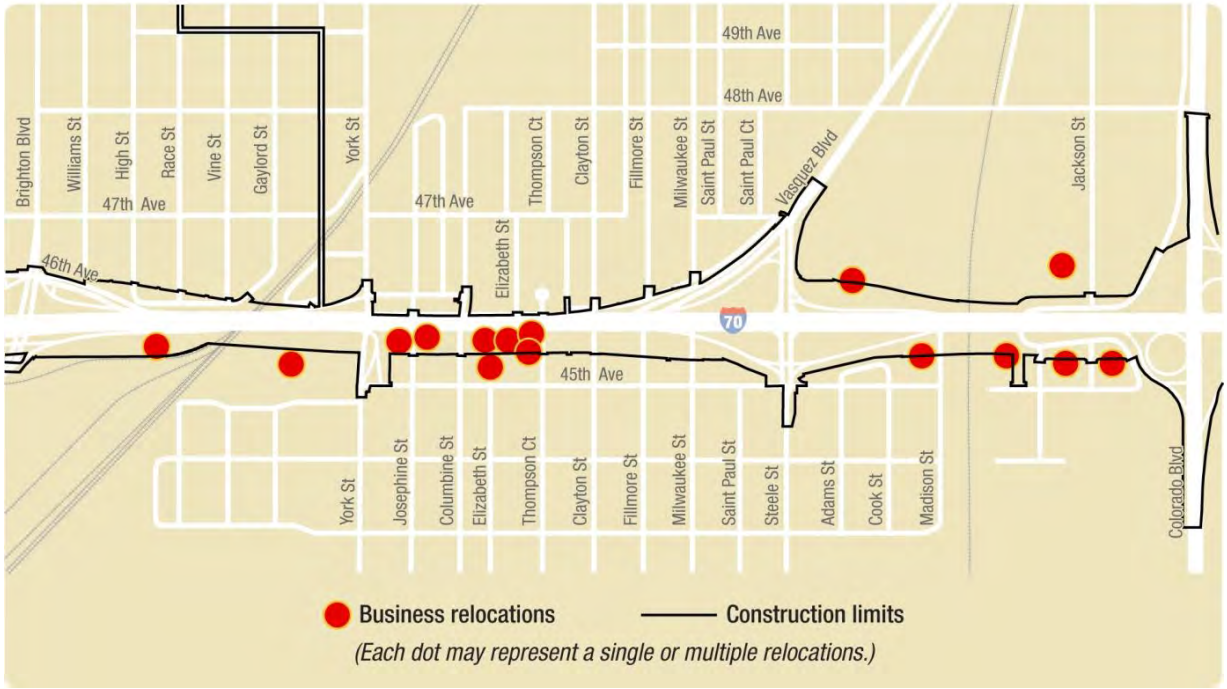


Exhibit 5.5-13 Business Relocations in the Northeast Park Hill and Stapleton Neighborhoods

The Revised Viaduct Alternative, South Option will require the most business relocations of all the proposed alternatives—26 in total. This includes 22 businesses in the Elyria and Swansea Neighborhood. Approximately 13 out of these 22 business relocations are located along 46th Avenue, as shown on **Exhibit 5.5-14**. Businesses impacted include the Pilot Travel Center at 3223 East 46th Avenue and Penske Truck Rental located at 4605 Jackson Street.

Exhibit 5.5-14 Revised Viaduct South Option Business Relocations in the Elyria and Swansea Neighborhood

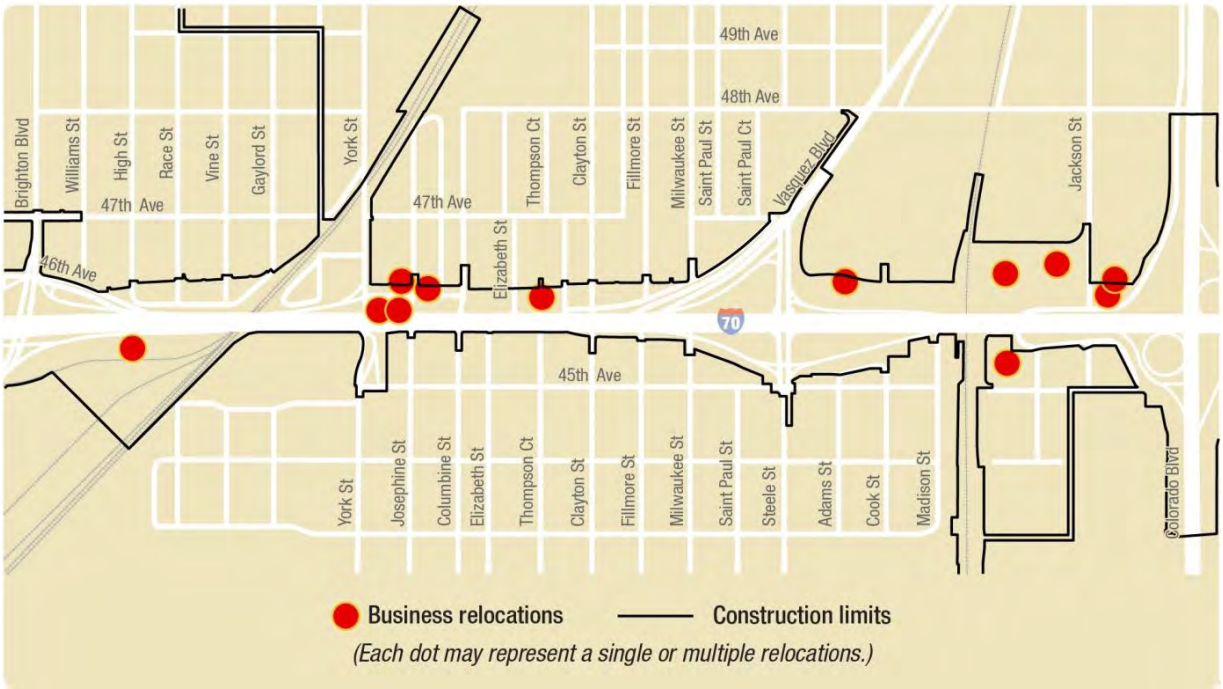


The remaining four business relocations are the same four identified with the Revised Viaduct Alternative, North Option: three businesses from the Northeast Park Hill Neighborhood and the CDOT maintenance yard in the Stapleton Neighborhood, as shown on **Exhibit 5.5-13**. Similar to the No-Action Alternative, South Option, this option will require the relocation of the Nestlé Purina PetCare Company manufacturing facility located at 2151 East 45th Avenue and the Manna Pro Products Company located on Madison Street.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will require 17 business relocations. All but four of the business relocations are from the Elyria and Swansea Neighborhood, as shown on **Exhibit 5.5-15**. Nine of the 13 business relocations from the Elyria and Swansea Neighborhood are located on 46th Avenue. Similar to both the No-Action Alternative, North Option and the Revised Viaduct Alternative, North Option, the Partial Cover Lowered Alternative will require the relocation of the Colonial Manor Motel at 2615 East 46th Avenue, the Pilot Travel Center, and Sno-White Linen and Uniform Company (both located on 46th Avenue). In addition, this option also will require the relocation of Penske Truck Rental located at 4605 Jackson Street. The Partial Cover Lowered Alternative also will require relocation of the same three businesses in the Northeast Park Hill Neighborhood and the CDOT maintenance yard in the Stapleton Neighborhood, as shown on **Exhibit 5.5-13**.

Exhibit 5.5-15 Partial Cover Lowered Alternative, Business Relocations in the Elyria and Swansea Neighborhood



Managed Lanes Option

With or without the Managed Lanes Option, the number of business relocations is the same for each of the Build Alternatives.

Unique factors with business relocations

Unique factors associated with business relocations are considerations with each alternative and option. For example, several of the potential business displacements involve manufacturing and/or distribution that rely on access from railroad lines for transporting goods or receiving materials. Many of these businesses occupy large parcels or multiple sites. The total operation needs of a business are considered when determining business relocations. The Nestlé Purina PetCare Company and Manna Pro are two examples of business relocations that require this kind of consideration.

Several storage yards have been identified within the study area neighborhoods. Zoning and land use codes, environmental regulations, hazardous waste concerns, and effects to surrounding properties are a few of the issues encountered when attempting to relocate these businesses to a replacement site that meets the needs of the business. Due to the very specific nature of such industrial sites, availability of replacement sites has not been determined at this time. Additional research, including contact with those potentially displaced, is needed to adequately evaluate the feasibility of a relocation, as well as determine the availability of suitable replacement sites.

Since many of the business relocations are industrial and manufacturing in nature, the potential for hazardous waste or use of hazardous materials in the manufacturing process is high. There are several storage yards in the study area neighborhoods, including the Pilot Travel Center, DJV Transmission, and Sno-White Linen and Uniform, that are potential candidates for hazardous materials. Section 5.18, Hazardous Materials, includes information regarding potential sites where hazardous materials may be present and how they will affect considerations for business relocations.

Available business locations

Neighborhoods in the study area have many commercial sites that are improved with warehouse-type buildings occupied by multiple tenants, ranging from business offices and service-related industries to manufacturing plants. There are many additional warehouse complexes located within the immediate area of potential relocations and displacements. Signs advertising available space were seen on many of the potential replacement sites. New warehouse

sites are being developed along the I-70 corridor east of the I-270 interchange. Considering these factors, it is anticipated that adequate replacement sites will be available for relocated warehouse occupants.

Temporary disruption of services during relocation is not anticipated to create any severe hardships to patrons in the area. As explained in the Supplemental Draft EIS Attachment G, *Conceptual Stage Relocation Technical Report*, similar business services will remain available.

5.5.5 Will there be any non-profit relocations?

There is one non-profit business located in the study area. All of the alternatives and options, except the No-Action Alternative, South Option, require the relocation of the Ministry Outreach Center located at 3501 East 46th Avenue. The Ministry Outreach Center is part of the Denver Rescue Mission, which is a Section 501(c)3 non-profit organization dedicated to serving the needs of the homeless and needy in the Denver metropolitan area.

As previously noted, there are a large number of commercial sites with improved warehouse-type buildings in the project area to help relocate this non-profit operation. Special consideration will be made to continue services provided to the local community during the relocation process.

5.5.6 How are the negative effects from land acquisition by the project alternatives mitigated?

Any person(s) whose property needs to be acquired for the Preferred Alternative will be compensated according to the U.S. Constitution and the Uniform Act of 1970, as amended.

CDOT's *Right of Way Manual* (CDOT, 2011) provides additional guidance on policies and procedures relating to right-of-way acquisition and their relocation program.

Acquisition

The Fifth Amendment of the U.S. Constitution provides that private property may not be taken for a public use without payment of "just compensation." Additionally, 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, such as the implementation of project alternatives. The Uniform Act was created to provide for and ensure that

just compensation for government-acquired land is applied "uniformly." CDOT requires Uniform Act compliance on any project for which it has oversight responsibility, regardless of the funding source.

CDOT will notify all impacted owners of the 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 help them with this process (CDOT, 2011).

Relocation

The Uniform Act helps individuals both financially and with advisory services related to relocating their residence or business operation. Uniform Act benefits are available to both owner occupants and tenants of residential or business properties.

In some situations, only personal property must be moved from the real property, which also is covered under the relocation program. As soon as feasible, any person scheduled to be displaced must be furnished with a general written description of CDOT's relocation program that provides, at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments, and the appeal process.

Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the Uniform 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 (CDOT, 2011).

CDOT also will provide notification that the displaced persons are not required to move without at least 90 days' advance written notice. For residential relocations, 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.

All of the residential displacements occur in the Elyria and Swansea Neighborhood and include both single-family and multi-family units. As previously noted, Spanish is the primary language for 40.8 percent of the residents in this neighborhood. As a result, bilingual services will be provided for any of the relocated and displaced businesses or households that need it.

Because home prices in the Elyria and Swansea neighborhood are relatively low compared to other neighborhoods in the Denver area, there is the concern that residents will not be able to find a home of comparable value and might be forced to make tradeoffs in housing condition and location.

Residents will not be required to move unless at least one comparable DSS replacement unit is available. Decent, safe, and sanitary standards are established by federal regulations and conform to applicable local housing and occupancy codes. CDOT will provide comparable replacement housing that is DSS and within the resident's financial means, before any residents will be required to move. If such comparable replacement housing is not available, the regulations allow the agency to provide a replacement housing payment in excess of the statutory maximum as part of the Last Resort Housing process. More information regarding FHWA relocation regulations is available at http://www.fhwa.dot.gov/realestate/rights/index.html.

What is Last Resort Housing?

The law requires that comparable DSS housing within a person's financial means be made available before that person may be displaced. When such housing cannot be provided by using replacement housing payments, the agency provides for "Last Resort Housing." Housing of last resort may involve the use of replacement housing payments that exceed the maximum amounts (U.S. Department of Housing and Urban Development, 2013).

Relocation assistance will be made available to businesses, including move reimbursement, relocation notification, and re-establishment expenses. For business owners who choose not to re-establish, compensation will be made available.

CDOT will meet directly with those owners and occupants who would be relocated as a result of the proposed project. CDOT staff will conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act. CDOT will provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community. These meetings also will identify individual eligibility for benefits.

Exhibit 5.5-16 shows a summary of the impacts and mitigations related to relocations and displacements. Additional mitigation measures to address potential Environmental Justice impacts resulting from any relocations and displacements are identified in Section 5.3, Environmental Justice.

Exhibit 5.5-16 Summary of Relocations and Displacements Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative, North Option	• 15 residential relocations • 6 business relocations (includes 1 non-profit relocation)	• Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide all impacted owners 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; assign a right of way specialist to each property owner to assist them with this process • Provide bilingual services for any of the relocated and displaced businesses or households that need them • Meet directly with those owners and occupants who would be relocated as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits
No-Action Alternative, South Option	• 13 residential relocations • 15 business relocations	
Revised Viaduct Alternative, North Option	• 38 residential relocations • 15 business relocations (includes 1 non-profit relocation)	
Revised Viaduct Alternative, South Option	• 44 residential relocations • 27 business relocations (includes 1 non-profit relocation)	
Partial Cover Lowered Alternative	• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation)	

5.6 Historic Preservation

This section discusses efforts to comply with Section 106 of the National Historic Preservation Act, which requires federal agencies to take into account the effects of their undertakings on historic resources The impacts of the project alternatives on historic resources also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- The APE was revised to accommodate design.
- New historic resources were evaluated.
- Final determinations of eligibility and effects were included.
- Information from the 2008 Draft EIS was included to provide a more inclusive description of the consultation process.

5.6.1 What are historic resources and why are they important to this project?

Analysis of historic resources is important to this project because, under Section 106 of the National Historic Preservation Act of 1966 (36 CFR §800), federal agencies are required to evaluate the effects of planned undertakings on historic resources. Historic resources include buildings, sites, structures, objects, and districts that are eligible for listing in, or are listed in, the NRHP.

There are four criteria that determine the eligibility of a site as a historic resource. The site can be eligible under one or more criteria. These criteria are discussed in the text box to the right.

To meet the obligations of Section 106, consultation between the lead federal agency and the State and Tribal Historic Preservation Offices, Indian tribes, and other consulting parties, as applicable, is required. The purpose of this

consultation is to identify historic resources that may be affected, determine if effects will be adverse and, if so, identify measures to avoid, minimize, or mitigate those effects. Historic resources reviewed for the I-70 East project include historic districts, individual buildings, bridges, and linear features, including railroads.

5.6.2 What is a Section 106 Consultation?

36 CFR Part 800, Protection of Historic Resources, commonly referred to as the Section 106 implementing regulations, outlines the process through which the above actions are carried out. To meet the obligations of Section 106, consultation with SHPO, Indian tribes, local governments, and other consulting parties, as applicable, is required. The purpose of this consultation is to identify historic resources that may be affected, determine if effects will be adverse and, if so, identify measures to avoid, minimize, or mitigate those effects.

For this project, the FHWA is responsible for making determinations about the project's effects on historic resources. This includes consultation with a number of entities. In particular, the SHPO is provided an opportunity to review and comment on the FHWA's determinations. . Indian tribes, consulting parties, and the public also may be involved in review and comment. The Advisory Council on Historic Preservation (ACHP) is the federal agency that oversees the Section 106 process. FHWA has advised the ACHP of adverse effects to historic resources during the Section 106 process. The ACHP determined its participation was not needed to resolve adverse effects connected with the project (see Attachment B, letter dated July 6, 2015).

Indian consultation

Consultation with Indian tribes recognizes the government-to-government relationship between the United States and sovereign tribal governments. In that context, federal agencies must be sensitive to the fact that historic resources of religious and cultural significance to one or more tribes may be located on lands beyond modern reservation boundaries.

Consulting tribes are offered the opportunity to identify concerns about cultural resources and comment on how the project might affect them. Tribes' participation includes consulting on how best to avoid, minimize, or mitigate potential effects.

What criteria determine if a property is eligible for listing on the NRHP?

Four criteria are used to determine eligibility of a resource for listing. Resources also can be eligible under more than one criterion.

Criterion A: Resource is associated with events that have made a significant contribution to the broad pattern of our history.

Criterion B: Resource is associated with the lives of persons significant in our past.

Criterion C: Resource (1) embodied the distinctive characteristics of a type, period, or method of construction; (2) represents the work of a master; (3) possesses high artistic values; and/or (4) represents a significant and distinguishable entity whose components may lack individual distinction.

Criterion D: Resource has yielded, or may be likely to yield, information important in prehistory or history.

For this project, FHWA contacted the following federally recognized tribes with an established interest in Adams, Arapahoe, and Denver counties, and invited them to participate as consulting parties:

- Apache Tribe of Oklahoma
- Cheyenne and Arapaho Tribes of Oklahoma (two tribes administered by a unified tribal government)
- Cheyenne River Sioux Tribe (South Dakota)
- Comanche Nation of Oklahoma
- Crow Creek Sioux Tribe (South Dakota)
- Kiowa Tribe of Oklahoma
- Northern Arapaho Tribe (Wyoming)
- Northern Cheyenne Tribe (Montana)
- Pawnee Nation of Oklahoma
- Oglala Sioux Tribe (South Dakota)
- Rosebud Sioux Tribe (South Dakota)
- Standing Rock Sioux Tribe (North Dakota)

As a result of the consultation, two tribes have become consulting parties: the Pawnee Nation and the Northern Cheyenne Tribe. Neither the Pawnee Nation nor the Northern Cheyenne Tribe indicated they had any information pertaining to specific localities of religious and cultural significance within the project study area. A copy of Indian consultation correspondence is included in Attachment B, *Agency Consultation Addendum,* of the 2008 Draft EIS. FHWA and CDOT are committed to notifying both tribes if cultural materials related to Indian occupation are discovered during any phase of construction and to keep the tribes apprised of progress as the project develops.

Other consultation

Coordination with consulting parties is on-going and will continue throughout the project. In addition to CDOT and SHPO, consulting parties include Historic Denver, Inc., Colorado Preservation, Inc., Denver Landmark Preservation Commission, and Riverside Cemetery (Fairmount Heritage Foundation and Fairmount Cemetery Company). The Fairmount Cemetery Company, representing Riverside Cemetery, requested to become a consulting party following the release of the 2014 Supplemental Draft EIS.

Consulting parties

State Historic Preservation Office (SHPO)

Colorado Department of Transportation (CDOT)

Historic Denver, Inc.

Colorado Preservation, Inc.

Denver Landmark Preservation Commission

Fairmount Heritage Foundation

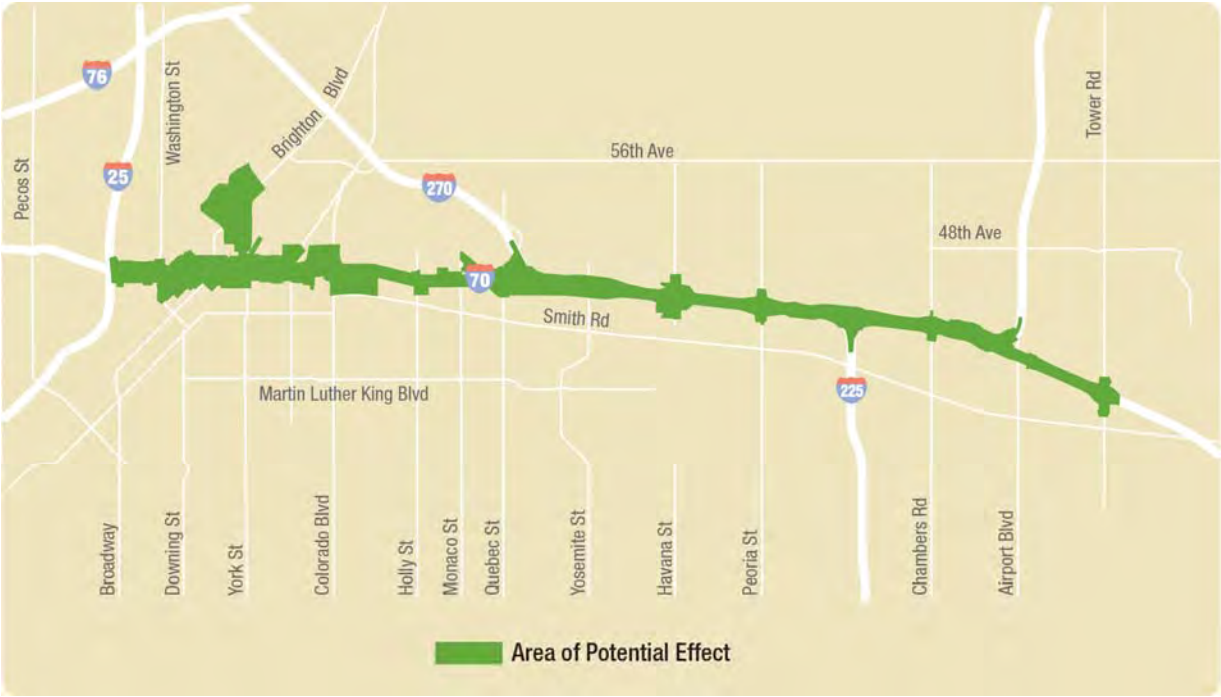
Fairmount Cemetery Company

The National Trust for Historic Preservation indicated it would no longer be a consulting party, but would rely on Historic Denver, Inc., and Colorado Preservation, Inc., to participate in future consultation. Letters documenting the coordination efforts to date are included with this document in Attachment B, *Agency Consultation Addendum*.

5.6.3 What is the APE and what evaluation process was used to analyze historic resources?

An APE is a geographic area or areas within which a project may directly or indirectly cause alterations in the character or use of historic resources (36 CFR 800.16(d)). Due to changes in the project alternatives, the APE boundary has been revised over time in coordination with SHPO and consulting parties, as documented in Attachment B, *Agency Consultation Addendum*. **Exhibit 5.6-1** reflects the updated APE.

Exhibit 5.6-1 Area of Potential Effect



The APE boundary is based on the combined footprint of all alternatives analyzed in the Final EIS. The APE is wider in the residential area of the Elyria and Swansea Neighborhood to take into account indirect effects that project alternatives might have to the historic setting.

Updates to the APE were made for the Supplemental Draft EIS, and minor changes have been made for this document, as well. Changes to existing project alternatives and the addition of a new alternative in the Supplemental Draft EIS required additional assessment of potential effects to historic resources. The Realignment Alternatives were eliminated from further consideration and the Partial Cover Lowered Alternative was added as a Build Alternative. Because the Realignment Alternatives were eliminated, the APE was refined to focus primarily on the current alignment of I-70, with expanded areas to accommodate the routing of a storm drainage system that discharges into the South Platte River and the construction of several water quality detention ponds along the current alignment. Consultation and concurrence for these changes is presented in Attachment B, *Agency Consultation Addendum*.

Historic resources and the APE documented in this section are discussed in detail in the following reports:

- Cultural Resources Survey Report, December 2007
- Section 106 Determination of Effects, January 2010
- Section 106 Determination of Eligibility and Effects, August 2014
- Section 106 Determination of Eligibility and Effects, revised March 2015

The Section 106 consultation process consists of the following steps:

1. Establish the extent of the project undertaking and engage the appropriate consulting parties who will comment on the project effects.
2. Identify historic resources that have the potential to be affected by the project and request comments from consulting parties.
3. Identify whether historic resources will be adversely affected by the undertaking and request comments from consulting parties.
4. Resolve adverse effects through continued discussion with consulting parties to consider means to avoid, minimize, or mitigate adverse effects to historic resources. Agreed-upon measures are recorded in a project Programmatic Agreement and implemented as part of the project action.

Reports prepared for historic resources

The following reports have been prepared for historic resources, and are listed according to which EIS document they can be found in.

Included in 2008 Draft EIS (Appendix D):

Historic Preservation, November 2008

Additional reports: (available on the project website www.i-70east.com/reports.html)

Cultural Resources Survey Report, December 2007

Section 106 Determination of Effects, January 2010 (replaced Appendix D, Historic Preservation, of the 2008 Draft EIS)

Included in 2014 Supplemental Draft EIS (Attachment I):

Section 106 Determination of Eligibility and Effects, August 2014

Included in Final EIS (Attachment I):

Section 106 Determination of Eligibility and Effects, revised March 2015; Concurrence on final report, May 2015

Documentation for Finding of Adverse Effect, August 2015

Historic resources are identified through a review of existing literature, field work, and input from consulting parties. The process is cataloged in this document and the other reports prepared for historic resources, listed on the right. FHWA, in conjunction with CDOT, thoroughly reviews this information and make determinations of NRHP eligibility in consultation with consulting parties.

To identify historic resources within the APE, project historians conducted a records search of the project area at the Colorado Office of Archaeology and Historic Preservation and reviewed historic maps and other relevant data in a comprehensive group of libraries and other sources. In addition, project historians conducted reconnaissance surveys of the project area and an intensive historic architectural survey on all structures built in or before 1965 within the APE.

Most of the I-70 corridor has been previously surveyed for archaeological sites. Literature and archive searches also were employed. Tribal consultation did not result in any additional information regarding cultural resources in the APE.

Historic resources in the APE

There are 66 historic resources in the APE, as listed below:

Historic districts: 6

Alfred R. Wessell (49 contributing resources)

National Western Complex (8 contributing resources)

Safeway Distribution Center (6 contributing resources)

Riverside Cemetery (entire property contributes to historic attributes and characteristics)

Garden Place

Globeville

Individually eligible resources: 60

51 residential or commercial structures and nine linear resources

5.6.4 What are the areas of interest for historic preservation that are being analyzed and what are their existing conditions?

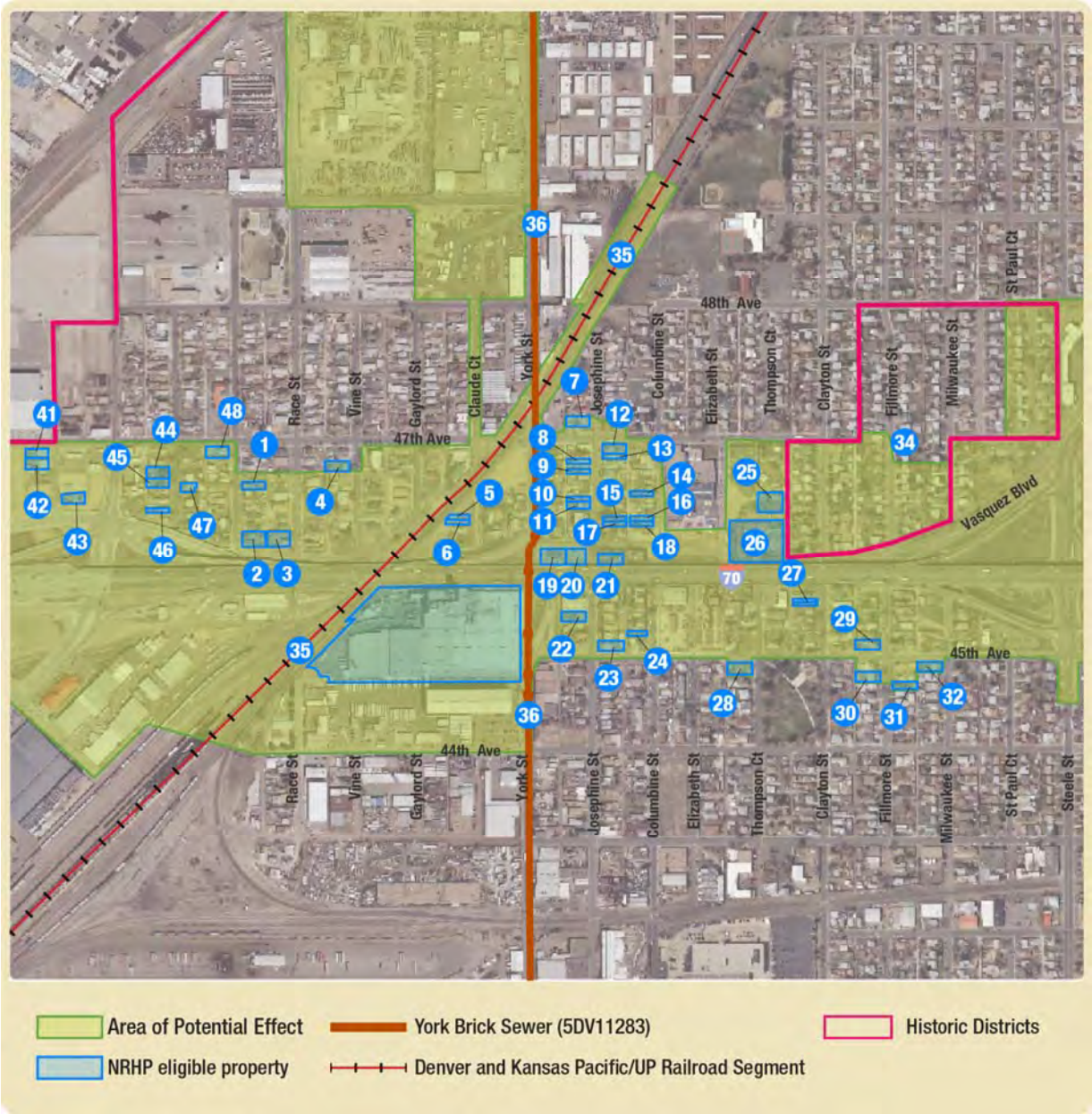
The major historic themes and areas of interest are largely the same as those addressed in the reports documented previously (see sidebar on previous page). Historians expected to find historic resources that are significant examples of the history of transportation, industry, and urban development, as well as significant architectural styles.

After this thorough process, and its iterative revisions, the surveys determined that there are 66 historic resources within the project APE. Six of these are historic districts that contain multiple contributing elements, with 60 individually eligible resources also identified. The final APE was presented previously in **Exhibit 5.6-1**. **Exhibit 5.6-2** shows each historic property within the APE. **Exhibit 5.6-3** shows a detailed view of the historic resources in Elyria and Swansea.

Exhibit 5.6-2 Historic Resources within the APE

Note: The numbers associated with the NRHP eligible property correspond to the numbers listed in ***Exhibit 5.6-5***

Exhibit 5.6-3 Historic Resources within the APE in the Elyria and Swansea Neighborhood



Note: The numbers listed here correspond with the NRHP eligible resources listed in ***Exhibit 5.6-5***

5.6.5 How do the project alternatives potentially affect historic resources?

The Section 106 Regulations of the National Historic Preservation Act define an effect on a historic resource as an "… alteration to the characteristics of a historic resource qualifying it for inclusion in or eligibility for the National Register" (36 CFR §800.16[i]). Effects are discussed as "no effect," "no adverse effect," or "adverse effect" (36 CFR §800.5). These terms are defined as follows:

- **No Effect:** No historic resources are present, or there are historic resources present but the project will have no effect on them.
- **No Adverse Effect:** This determination can be made in one of two ways: (1) The project *does not* alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that will diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association; or (2) The project is modified or conditions are imposed to avoid adverse effects.
- **Adverse Effect:** The undertaking alters, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that will diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Exhibit 5.6-4 summarizes effects to historic resources, while **Exhibit 5.6-5** lists every historic property in the APE and the associated effects determination for each alternative (located at the end of this chapter). SHPO has concurred with all determinations of eligibility and with effects. A comprehensive discussion of all historic resources, their significance, and effects within the APE is included in Attachment I, *Section 106 Determination of Eligibility and Effects*.

SHPO consultation status

SHPO has concurred with eligibility and effects for historic resources within the APE. Documentation of this consultation is included in Attachment B, *Agency Consultation Addendum*.

Exhibit 5.6-4 Summary of Effects for Historic Resources in the APE

Effect	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Adverse Effect[1]	7	1	8	8	13
Adverse Effect due to acquisition/demolition[2]	7	1	7	6	9
No Adverse Effect	50	56	54	54	50
No Effect	9	9	4	4	3

Note: There are no differences in effect between the General-Purpose Lanes and Managed Lanes Options because the project footprint is the same for both options between Brighton Boulevard and Colorado Boulevard, where the majority of historic resources are located.

1. *Total includes adverse effects to entire historic district (includes the Alfred R. Wessel Historic District as one resource) and does not include individual contributing resources*
2. *Adverse effects generally consist of full acquisition and demolition of historic structures, except in the instance of linear resources and historic districts*

No-Action Alternative

The No-Action Alternative, North Option will result in Adverse Effect to seven historic resources and the No-Action Alternative, South Option will result in Adverse Effect to one historic property. The Adverse Effects occur because of the need for additional right of way due to the larger footprint of the highway and acquisition/demolition of the resources.

The Alfred R. Wessel Historic District (5DV10126) will have two contributing resources demolished as a result of the No-Action Alternative, North Option, resulting in an Adverse Effect to the district and to the demolished contributing resources. The No-Action Alternative, South Option will have no effect on the Alfred R. Wessel Historic District and its contributing resources.

The No-Action Alternative, North Option, will result in findings of No Adverse Effect to 50 historic resources, while the No-Action Alternative, South Option, will result in No Adverse Effect to 56 historic resources. The No-Action Alternative (North and South Options) will result in No Effect for nine resources.

Revised Viaduct Alternative

Both the Revised Viaduct Alternative, North Option and the Revised Viaduct Alternative, South Option will result in Adverse Effect to eight resources primarily because of the need for additional right of way due to the larger footprint of the highway and acquisition/demolition of the resources. In the Revised Viaduct Alternative, North Option, one of the resources (a linear resource), is considered an Adverse Effect because of proximity impacts rather than acquisition/demolition. In the Revised Viaduct, South Option, two linear resources are considered an Adverse Effect because of proximity impacts rather than acquisition/demolition.

The difference in effects to historic resources between the two options is primarily in the Alfred R. Wessel Historic District (5DV10126). The North Option will result in the demolition of seven contributing resources, which constitutes an Adverse Effect to the district as a whole and to the individual resources, as compared to the partial acquisition of two contributing resources with the South Option, also resulting in an Adverse Effect to the district.

The Revised Viaduct Alternative, North Option and the Revised Viaduct Alternative, South Option will result in No Adverse Effect to 54 resources. The Revised Viaduct Alternative, regardless of option, will result in No Effect for four historic resources.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will result in Adverse Effects for a total of 13 resources. For the Partial Cover Lowered Alternative, four of the resources (linear resources), are considered an Adverse Effect because of proximity impacts rather than acquisition/demolition.

The Alfred R. Wessel Historic District (5DV10126), which is counted as a single resource, will result in the demolition of nine contributing resources, which constitutes an Adverse Effect to the district as a whole and to the individual resources.

The Partial Cover Lowered Alternative will result in No Adverse Effect to 50 resources, and will result in No Effects for three historic resources.

Effects Summary

Exhibit 5.6-5 lists every historic property in the APE and the associated effects determination for each alternative. Effects determinations have been abbreviated as listed below in **Exhibit 5.6-5**.

- NAE—No Adverse Effect
- AE—Adverse Effect
- NE—No Effect (No Historic Resources Affected)

Exhibit 5.6-5 Historic Resources within the APE and Their Effects Determination

#	Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
		North Option	South Option	North Option	South Option	
1	Ponce Residence 4668 High Street (5DV10034)	NAE	NAE	NAE	NAE	NAE
2	Rudy/Bernal Residence 4618 High Street (5DV9735)	AE	NAE	AE	AE	AE
3	Garcia Residence 4617–4625 Race Street (5DV9780)	AE	NAE	AE	AE	AE
4	Abrams/Loretta Residence 4679 Vine Street (5DV10135)	NAE	NAE	NAE	NAE	NAE
5	Toth/Kelly Residence 4639 Claude Court (5DV9668)	NAE	NAE	NAE	NAE	AE
6	Brown and Alarid Residence 4637 Claude Court (5DV9667)	NAE	NAE	NAE	NAE	AE
7	Huffman Residence 4707 Josephine Street (5DV10058)	NAE	NAE	NAE	NAE	NAE
8	Krutzler/Barajas Residence 4681 Josephine Street (5DV9761)	NAE	NAE	NAE	NAE	NAE
9	Hovan/Plazola Residence 4673 Josephine Street (5DV1172)	NAE	NAE	NAE	NAE	NAE
10	James Residence 4651 Josephine Street (5DV9753)	NAE	NAE	NAE	NAE	NAE
11	Waggoner Residence 4647 Josephine Street (5DV9751)	NAE	NAE	NAE	NAE	NAE
12	Lovato Residence 4696 Josephine Street (5DV5623/5DV9765)	NAE	NAE	NAE	NAE	NAE
13	Geo Trust/Araujo Residence 4682 Josephine Street (5DV9762)	NAE	NAE	NAE	NAE	NAE
14	Tomas/Eagan Residence 4653 Columbine Street (5DV9996)	NAE	NAE	NAE	NAE	NAE

Exhibit 5.6-5 Historic Resources within the APE and Their Effects Determination

#	Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
		North Option	South Option	North Option	South Option	
15	Miranda Residence 4632 Josephine Street (5DV5677)	NAE	NAE	NAE	NAE	NAE
16	Pavon Residence 4633 Columbine Street (5DV9706)	NAE	NAE	NAE	NAE	NAE
17	Chavez Residence 4628 Josephine Street (5DV9748)	NAE	NAE	NAE	NAE	NAE
18	Castorena/Braswell Residence 4631 Columbine Street (5DV9705)	NAE	NAE	NAE	NAE	NAE
19	Stop-N-Shop Food Store 4600 York Street (5DV9801)	AE	NAE	AE	NAE	AE
20	Sanchez Business 2381 East 46th Avenue (5DV9655)	AE	NAE	AE	NAE	AE
21	Portales Residence 4608 Josephine Street (5DV9746)	AE	NAE	AE	NAE	AE
22	Kenworthy/Wyckoff Residence 4529 Josephine Street (5DV9745)	NAE	NAE	NAE	AE	NAE
23	Langenberg Residence 4502 Josephine Street (5DV9742)	NAE	NAE	NAE	NAE	NAE
24	Gonzales Residence 4515 Columbine Street (5DV9994)	NAE	NAE	NAE	NAE	NAE
25	Portales Residence/ Windsor Artesian Water Company 4623–4625 Thompson Court (5DV9787)	NAE	NAE	NAE	NAE	NAE
26	Colonial Manor Motel Tourist Court 2615 East 46th Avenue (5DV7130)	AE	NAE	AE	NAE	AE
27	4541 Clayton LLC Residence 4541 Clayton Street (5DV9679)	NAE	NAE	NAE	AE	NAE
28	Rodriquez Residence 4539 Clayton Street (5DV9678)	NAE	NAE	NAE	AE	NAE
29	Clay II LLC/Rosthan Residence 4459 Thompson Court (5DV10124)	NAE	NAE	NAE	NAE	NAE
30	Olive Street LLC Property 4503 Fillmore Street (5DV9714)	NAE	NAE	NAE	NAE	NAE
31	Tenenbaum Residence 4453 Fillmore Street (5DV10014)	NAE	NAE	NAE	NAE	NAE
32	Guerca/Perez Residence 4446 Fillmore Street (5D10013)	NAE	NAE	NAE	NAE	NAE

Exhibit 5.6-5 Historic Resources within the APE and Their Effects Determination

#	Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
		North Option	South Option	North Option	South Option	
33	Lopez/Hartzell Residence 4461 Milwaukee Street (5DV10065)	NAE	NAE	NAE	NAE	NAE
34	Alfred R. Wessel Historic District (5DV10126)	AE two contributing resources	NAE	AE seven contributing resources	AE two contributing resources	AE nine contributing resources
35	Union Pacific Railroad Segment (5DV6248.4)	NAE	NAE	NAE	NAE	AE
36	York Street/East 40th Ave. Brick Sanitary Sewer (5DV11283)	NAE	NAE	NAE	NAE	AE
37	Ralston Purina Plant/Nestlé Purina PetCare Company 2151 East 45th Avenue (5DV9245)	NAE	AE	NAE	AE	NAE
38	Riverside Cemetery 5201 Brighton Boulevard (5AM125)	NAE	NAE	NAE	NAE	NAE
39	National Western Historic District (5DV10050)	NE	NE	NAE	NAE	NAE
40	Banker's Warehouse Co. (5DV11720)	NAE	NAE	NAE	NAE	NAE
41	E.G. Trading Post 1630–1632 East 47th Avenue (5DV9805)	NAE	NAE	NAE	NAE	NAE
42	Kosik Residence 4681–4683 Baldwin Court (5DV1247)	NAE	NAE	NAE	NAE	NAE
43	Torres Residence 4656 Baldwin Court (5DV9660)	NAE	NAE	NAE	NAE	NAE
44	Miller Residence 4675 Williams Street (5DV9823)	NAE	NAE	NAE	NAE	NAE
45	Herzberg Property 4665–4669 Williams Street (5DV9828)	NAE	NAE	NAE	NAE	NAE
46	Adams Clock LLC/Mann Residence 4645 Williams Street (5DV9795)	NAE	NAE	NAE	NAE	NAE
47	Allen Investment Group, Inc./Kretschmar Residence 4662–4664 Williams Street (5DV10085)	NAE	NAE	NAE	NAE	NAE
48	Garcia Residence 4695 High Street (5DV10040)	NAE	NAE	NAE	NAE	NAE
49	McGee Residence 4460 Adams Street (5DV9968)	NAE	NAE	NAE	NAE	NAE
50	Yoshimura Residence 4450 Adams Street (5DV9966)	NAE	NAE	NAE	NAE	NAE

Exhibit 5.6-5 Historic Resources within the APE and Their Effects Determination

#	Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
		North Option	South Option	North Option	South Option	
51	Vasquez Residence 4450 Cook Street (5DV10003)	NAE	NAE	NAE	NAE	NAE
52	Tri-R Recycling 3600 East 48th Avenue (5DV9227)	NAE	NAE	NAE	NAE	NAE
53	Core Power Construction/Buckley JD Inc.-Buckley Explosives of Wyoming 4701 Jackson Street (5DV10047)	NAE	NAE	NAE	NAE	NAE
54	General Motors Corporation-Goalie Construction Business 4715 Colorado Boulevard (5DV9988)	NAE	NAE	NAE	NAE	NAE
55	4800 Colorado LLC/United States Rubber Company 4800 Colorado Boulevard (5DV9989)	NAE	NAE	NAE	NAE	NAE
56	Safeway Distribution Center Historic District (5DV9232)	NE	NE	NAE	NAE	NAE
57	Univar 4300 Holly Street (5DV9231)	NE	NE	NAE	NAE	NAE
58	Burlington Ditch/ O'Brien Canal (5AM465.9)	NE	NE	NE	NE	NE
59	Delgany Common Interceptor Sewer (5DV4725.5)	NE	NE	NE	NE	NAE
60	Burlington and Colorado/Chicago, Burlington, and Quincy Railroad Segment (5DV6247.3)	NE	NE	NE	NE	NE
61	Market Street RR/ Chicago Burlington & Quincy Railroad Segment (5AM1298.2)	NAE	NAE	NAE	NAE	AE
62	Union Pacific Beltline RR Segment (Denver Rock Island Railroad, 5AM2083.1)	NE	NE	NAE	NAE	NAE
63	Rocky Mountain Arsenal Railroad Segment (5DV7048.2)	NE	NE	AE	AE	AE
64	High Line Canal (5AM261.2) (Not pictured in Exhibit 5.6-2)	NE	NE	NE	NE	NE
65	Garden Place District	NAE	NAE	NAE	NAE	NAE
66	Globeville District	NAE	NAE	NAE	NAE	NAE

AE = Adverse Effect, NAE = No Adverse Effect, NE = No Effect

5.6.6 How are the adverse effects from the project alternatives mitigated for historic resources?

Section 106 of the National Historic Preservation Act requires that federal agencies take into account the effects that a proposed action may have on cultural resources. The most effective mitigation measure is to avoid resources, but this is not always possible. Where avoidance is not possible, alternatives or modifications have been evaluated for the project that minimize or mitigate adverse effects to historic resources. Mitigation is designed to take into account the magnitude of the undertaking and the nature of its effects on historic resources.

A draft Programmatic Agreement that provides a process to agree on mitigation of adverse effects and reevaluate eligibility and effects to historic properties, as appropriate, has been developed and is in review with SHPO and the consulting parties. The Programmatic Agreement also includes examples of mitigation measures that could be implemented. The Programmatic Agreement will be executed prior to the ROD and will be included as an attachment. At a minimum, mitigation will include Level II archival documentation, as defined by the Colorado Office of Archaeology and Historic Preservation in Form 1595. CDOT also has committed to provide funding and participation in a documentary covering the history of I-70 East and its relationship to the neighborhoods of Elyria, Swansea, and Globeville, where the majority of adverse effects to historic resources are created by the project. CDOT has completed this mitigation measure, and the documentary is available to view at www.i-70east.com.

Additional mitigation as prescribed in the Programmatic Agreement will be identified through consultation with SHPO and consulting parties. **Exhibit 5.6-6** summarizes possible mitigation for each alternative.

If unidentified historic resources are encountered during construction, they will be treated in a manner consistent with 36 CFR 800.13 for post-review discoveries. Work will cease and CDOT and SHPO will be notified immediately. FHWA and CDOT will notify the two consulting Indian tribes, the Pawnee Nation of Oklahoma and the Northern Cheyenne Tribe, if Indian cultural materials are discovered during any phase of construction.

Cumulative effects to historic resources are discussed in Chapter 6, Cumulative Impacts.

Exhibit 5.6-6 Summary of Historic Preservation Impacts and Mitigations

Alternative	Impacts	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Adverse Effect—1 to 7 historic resources • No Adverse Effect—50 to 56 historic resources • No Effect—9 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	• Establish a Programmatic Agreement with SHPO and consulting parties • Provide Level II archival documentation for adversely affected resources • Provide funding and participate in the creation of a documentary covering the history of I-70 East and its relationship to the Elyria and Swansea and Globeville Neighborhoods (mitigation has been completed, and is available to view at www.i-70east.com) • Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties as described in the Programmatic Agreement • Cease work during construction if unidentified historic resources are encountered and notify CDOT and SHPO immediately • Contact consulting Indian tribes if Indian cultural materials are identified at any time during construction
Revised Viaduct Alternative	• Adverse Effect—8 historic resources • No Adverse Effect—54 historic resources • No Effect—4 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	
Partial Cover Lowered Alternative	• Adverse Effect—13 historic resources • No Adverse Effect—50 historic resources • No Effect—3 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	

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5.7 Paleontological Resources

This section discusses the paleontological resources in the study area and explains why they are important to the project. The impacts of the project alternatives on these resources also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Revisions to figures and text were made to reflect an updated APE.
- The 2010 revisions to the Bureau of Land Management's Potential Fossil Yield Classification System and the Society of Vertebrate Paleontology guidelines were incorporated into the paleontological analysis.

5.7.1 What are paleontological resources and why are they important to this project?

Paleontological resources are the fossilized remains or traces of plant and animal life, or other organisms, which offer insight into understanding the history of life on Earth. These resources differ from archaeological resources, which are focused on past human life and activities. Paleontological resources can include physical remains—such as bones, teeth, shells, and leaves—and trace remains—such as footprints. Paleontological resources are important because they can be used to document the presence and evolutionary history of now-extinct organisms, to expand knowledge of the life cycle of those organisms, and to understand the environment and geographic region in which they lived.

5.7.2 What study area and evaluation process were used to analyze paleontological resources?

The study area for paleontological resources is the same as the APE for historic resources. An APE boundary was developed cooperatively among consulting parties, as described in Section 5.6, Historic Preservation. **Exhibit 5.7-1** reflects the agreed-upon APE.

Exhibit 5.7-1 Paleontological Resources Study Area

The methodology for identifying paleontological resources and analyzing impacts follows the Bureau of Land Management's Potential Fossil Yield Classification System and the Society of Vertebrate Paleontology guidelines (1995, revised 2010).

The analysis process has three main objectives: (1) to identify and generally describe fossil locations known to exist in the APE; (2) to identify sub-areas where fossils are likely to be found; and (3) to classify all sub-areas according to their probable significance to paleontological investigations.

The first objective, identifying and generally describing fossil locations known to exist in the APE, is completed by investigating published literature on the known paleontology and geology of the APE and examining museum collections and databases, along with associated unpublished records documenting previous finds.

The second objective, identifying sub-areas where fossils are likely to be found, is achieved through the use of geologic maps, which provide a link between the geographic positions of known fossil localities (where fossils have been found previously) and the predicted likelihood of future finds in other areas.

The third objective, classifying these sub-areas and determining their significance, required evaluation of two geologic maps (Moore et al, 2001; Tweto, 1979) to delineate and classify two sub-areas within the APE. The first sub-area consists of sedimentary deposits that are less than 10,000 years old—classified as originating from "recent" or Holocene time. These deposits are less likely to contain fossils of paleontological interest and generally can be excluded as having little significance.

The remaining sediments and sedimentary rocks (10,000 years or older) may vary considerably in fossil content, but the likelihood of finding fossils correlates closely with the area of surface exposure of specific geologic units, and with the geographic concentration of previous finds in the units.

5.7.3 What are the areas of interest for paleontological resources that are being analyzed and what are their existing conditions?

There are nine geologic units or layers underlying the APE. They vary by taxonomic affinity, significance, and density across their distribution (Lindvall 1979, 1980, 1983). **Exhibit 5.7-2** shows the locations of the geologic units within the APE.

The paleontological potentials of these units or layers were evaluated using the Potential Fossil Yield Classification System from the Bureau of Land Management. This system uses resource assessment criteria with rankings from Class 1, Very Low, to Class 5, Very High. The criteria rankings for geologic units that are present in the APE are summarized in **Exhibit 5.7-3**.

Potential Fossil Yield Classification System

Class 1—Very Low

Geologic units that are not likely to contain recognizable fossil remains

Class 2—Low

Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils

Class 3—Moderate or Unknown

Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential

Class 4—High

Geologic units containing a high occurrence of significant fossils

Class 5—Very High

Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation

Taxonomic affinity

Characteristics used to classify geologic units as similar.

Exhibit 5.7-2 Geologic Units within the APE

Exhibit 5.7-3 Geologic unit or layer with criteria ranking

Note: No geologic unit underlying the APE has a Class 5, Very High, or Class 3, Moderate, paleontological potential.

The depth of the Denver and Arapahoe Formations within the APE is unknown, but—based on geologic maps—it is likely not less than 10 feet below the surface (Lindvall 1979, 1980, 1983) in some areas. The geologic units or layers with low potential are all surficial deposits known to produce scattered and often poorly preserved fossil remains in the Denver area, although many of these remains are identifiable vertebrate fossils that are significant paleontological resources under Society of Vertebrate Paleontology (1995, revised 2010) guidelines.

All of the unconsolidated sedimentary deposits within the APE are relatively youthful Quaternary deposits that date back to the late Pleistocene period (between 120,000 and 11,700 years ago) and overlay the much older geologic deposits of the Late Cretaceous Arapahoe Formation and Late Cretaceous and early Paleocene Denver Formation. Within the APE, the Denver and Arapahoe Formations are the only formations that can be considered to be of high potential for the presence of significant fossil finds.

Of the Pleistocene sedimentary deposits, the Broadway Alluvium and the unnamed loess unit are noted to contain remains of Pleistocene mammals. Bison bones are reported to be commonly found in the Broadway Alluvium, as well as the occasional mammoth. The unnamed loess unit has produced a variety of small mammal fossils, as well as fossilized horse and camel remains. Many of these Pleistocene mammal fossils that are identifiable are significant paleontological resources under the guidelines of the Society of Vertebrate Paleontology (1995, revised 2010). The remaining Quaternary geological units in the APE are considered to have low paleontological potential to produce scattered fossil remains.

A database search of the University of Colorado Museum and the Denver Museum of Nature and Science records revealed no previously recorded fossil localities within the project area. However, 25 previously documented localities (at least 13 within the Denver Formation) occur within approximately six miles of the project area and five previously recorded fossil localities (geological formations unknown) occur within one mile of the project area. The University of Colorado Museum has approximately 60 fossil vertebrate localities from the Denver Formation throughout the Denver Basin, but most are located win the Denver metropolitan area. Although the database search listed no recorded fossil localities within the project area, Charles B.

What are the Denver and Arapahoe Formations?

The Denver Formation overlies the Arapahoe Formation. Both are geologic formations underlying Denver, Colorado, consisting mainly of claystone, siltstone, and fine-grained sandstone with minor conglomerate beds and local lava flows. The Denver Formation ranges in thickness from 600 feet to 1,580 feet and the Arapahoe Formation is 300 feet at its maximum thickness. Each formation is known to contain plant fossils and remains of vertebrates.

What is loess?

Loess is a yellowish-brown to light-grayish-brown sandy silt. It contains large amounts of clay and silty clay with a thickness generally less than 10 feet, but locally it may be as much as 30 feet thick.

What is Broadway Alluvium?

Broadway Alluvium is sediment that was deposited during the late Wisconsinan glaciation period (85,000 to 10,000 years ago). It consists of mixed deposits of sands, clays, and occasional gravels with an average depth of 20 feet. This sedimentary deposit creates the most prominent terraces of the South Platte River.

Hunt (Hunt, 1954) shows fossil localities from Late Pleistocene Alluvium within the APE. Surficial Pleistocene deposits, such as these, are considered to have low potential.

The terrain within the APE is topographically flat with previously disturbed surface sediments. These sediments are vegetated and covered with urban development, including buildings, roadways, and railroads. The deposits directly beneath the APE consist mostly of low-potential, Pleistocene- and Holocene-aged surficial sediments. These sediments overlay the paleontologically sensitive bedrock of the Denver Formation, which occurs at varying depths.

5.7.4 How do the project alternatives affect paleontological resources?

Impacts to paleontological resources can result from the disturbance of surface and subsurface sediments. Direct effects primarily concern the potential destruction of paleontological resources and the loss of information associated with these resources.

The No-Action Alternative and the Revised Viaduct Alternative generally involve minimal deep surface disturbance, with most disturbance occurring at or just below the existing grade (with the exception of bridge pilings).

The Partial Cover Lowered Alternative will construct I-70 below grade, resulting in subsurface excavation to approximately 40 feet. The lowest grade for the Partial Cover Lowered Alternative is located between the UPRR and York Street. Subsurface geotechnical data indicate that roadway excavation in this location will primarily affect Quaternary surficial deposits and may require minor bedrock excavation.

All alternatives will require new storm drain pipes and utilities. These activities could require bedrock excavation, which has a high potential for paleontological resources. However, effects are expected to be minimal. Mitigation for these potential impacts is provided in Section 5.7.5.

5.7.5 How are the adverse effects from the project alternatives mitigated for paleontological resources?

Prior to initiating all earth-moving construction activities in rock units of high paleontological potential, an intensive preconstruction paleontological survey will be required. This will be followed by spot-checking of excavations by a qualified paleontologist until bedrock is encountered. When bedrock is encountered, continuous monitoring will be required. Upon discovery of any paleontological resources, work will cease immediately in the vicinity of the discovery, and the contractor will fence off the area to allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment. Work will not resume in the area until the paleontologist sends formal notification allowing work to resume.

Within the APE, Pleistocene and Lower Holocene-period surficial deposits—including alluvium, eolian sand, and loess—have low paleontological potential. Monitoring will not be required, but spot-checking may be conducted in certain areas at the discretion of the project or staff paleontologist. This also will help to ensure that older underlying sediments known to contain fossils are not being affected. Areas of no paleontological potential within the APE will not require mitigation. **Exhibit 5.7-4** lists the impacts and mitigations related to paleontological resources.

Exhibit 5.7-4 Summary of Paleontological Resources Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	Minimal deep surface disturbance	• Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring • Cease work immediately upon discovery of any paleontological resources, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; do not resume work in the area until receiving formal notification from the paleontologist allowing work to resume
Revised Viaduct Alternative		
Partial Cover Lowered Alternative	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	

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5.8 Visual Resources and Aesthetic Qualities

This section discusses the visual resources and aesthetic qualities in the study area and explains why they are important to the project. The impacts of the project alternatives on these resources also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- An *Aesthetic and Design Guidelines* plan for the corridor was developed. This document is included as Attachment O to the Final EIS.
- Section was reorganized to better describe impacts from the alternatives.

5.8.1 What are visual resources and why are they important to this project?

FHWA defines visual resources in the memorandum, "Esthetics and Visual Quality Guidance Information" as, "those physical features that make up the visible landscape, including land, water, and vegetative and man-made elements. These elements are the stimuli upon which actual visual experience is based." (FHWA, 1986, page 5)

NEPA and CEQ regulations identify aesthetics as one of the elements in the human environment that must be considered in determining the effects of a proposed project. Visual resources make up the aesthetic qualities of an area. They are important to this project, especially between Brighton Boulevard and Colorado Boulevard, because the existing viaduct has a dominant visual presence in the area and any changes to it will result in changes in the surrounding environment.

5.8.2 What study area and evaluation process were used to analyze visual resources?

The study area for visual resources is composed of two parts: (1) the view from the highway, and (2) the view of the highway from surrounding neighborhoods.

An inventory of visual resources seen from key observation points (vantage points) within the study area was developed through field survey and public scoping meetings. These resources were evaluated to determine their aesthetic quality—either positive or negative—and then reviewed to identify potential impacts from the project alternatives. Computer simulations, photos, aerial imagery, site visits, and draft engineering drawings assisted in this evaluation.

In compliance with FHWA visual impact assessment guidance (FHWA, 1986, page 136), the visual quality or aesthetic quality of each resource is noted, rated, and compared to the existing conditions based on the following terms from FHWA guidelines:

- **Vividness.** How memorable and distinctive the landscape component is.
- **Intactness.** How much visual integrity the natural and human-built landscape has, and its freedom from encroaching elements.
- **Unity.** How much visual coherence and compositional harmony the landscape has, considered as a whole.

Potential impacts are noted when the view of a visual resource is blocked or impeded, the view is changed, and if light and glare would adversely affect the day or night view.

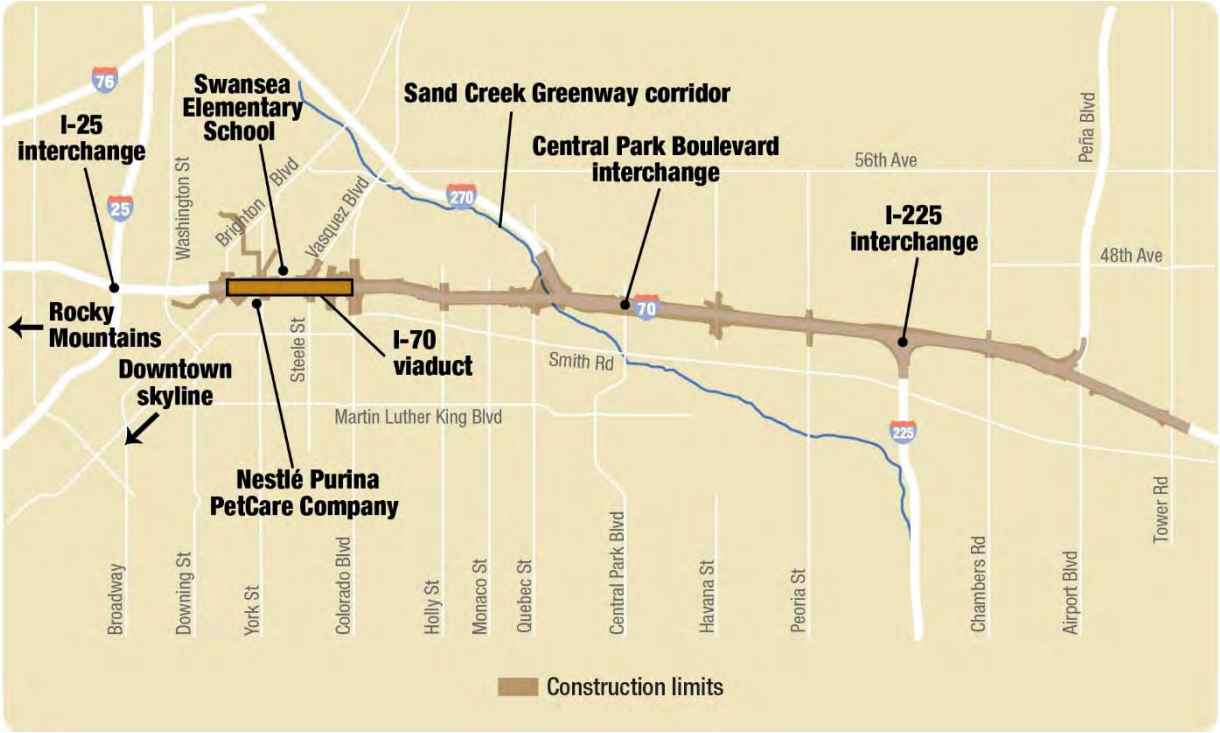
Following this assessment, each of the project alternatives was assessed for potential impacts from light and glare to visual resources.

5.8.3 What are the existing visual resources along I-70?

The general visual character along I-70 is urban, dominated by commercial and industrial warehouses, transportation facilities, and residential structures. Visual resources are those that are visible to travelers on I-70 and those that are visible from the surrounding neighborhoods. Due to the visual character of the corridor being urban, the number of visual resources is too numerous to identify every resource.

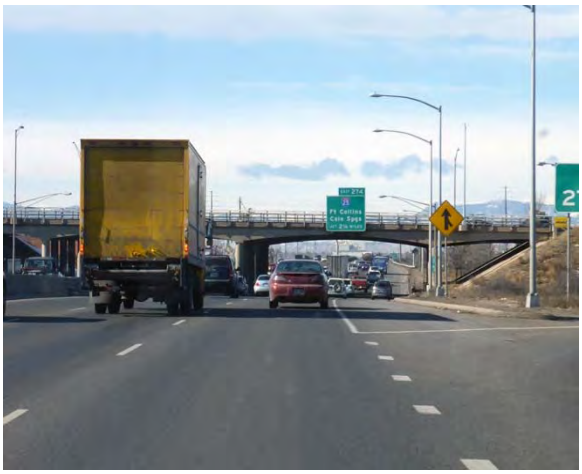
As a result, the locations of some of these resources are shown in **Exhibit 5.8-1** and are explained in detail in this section. These resources have been identified through public involvement and include views from the highway and views of the highway, depending on their location.

Exhibit 5.8-1 Visual Resources along I-70



I-70 East highway

The highway has a large footprint and is a dominant landscape feature. Concrete traffic lanes, overpasses, barriers, and moving vehicles dominate the visual character of I-70, which is typical of urban highways. Throughout the project corridor, I-70 is either elevated on a bridge structure (the viaduct) or at grade. The viaduct portion begins at the I-25 interchange and extends eastward to just west of the Colorado Boulevard interchange. The at-grade portion of the highway extends from just west of the Colorado Boulevard interchange to the eastern edge of the project corridor at Tower Road.



I-70 at Colorado Boulevard looking west

The visual presence of the roadway is greater where it is elevated because it is more noticeable from afar and more dominant from nearby as compared to the at-grade section. The presence of the highway also is distinctly greater to nearby residential neighborhoods. Most nearby residents dislike the viaduct visually because it dominates views. This is considered an aesthetic disadvantage to the neighborhood.

Rocky Mountains

Travelers going west on I-70, and some residents in the surrounding neighborhoods, can view the Front Range of the Rocky Mountains. The mountains are visible at the far west on a clear day and are considered a desirable visual resource in the area.

I-70 east of Brighton Boulevard looking west

Downtown skyline

Downtown Denver is located approximately five miles southwest of the I-70 viaduct. The downtown skyline is visible only to the travelers on I-70 near or on the viaduct. The viaduct and the larger industrial buildings block this view from the residential neighborhoods in the area. The view of the downtown skyline is a desirable resource that should be preserved and enhanced.

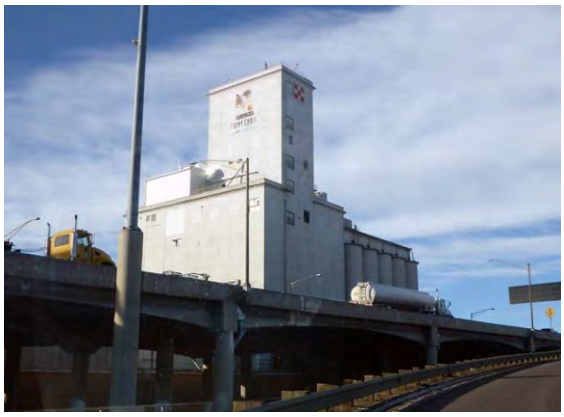
I-70 looking southwest

I-25 interchange

The I-25 and I-70 interchange is located at the western edge of the project corridor. This interchange also is known locally as the "mousetrap" due to sharp turns of the original design. The visual characteristic of this resource is that of a typical highway-to-highway interchange, so it is not considered a negative or positive visual resource.

Westbound I-70 east of the I-25 interchange looking west

Nestlé Purina PetCare Company



Nestlé Purina PetCare Company tower south of I-70 at York Street

The Nestlé Purina PetCare Company operates a large manufacturing facility in the center of the Elyria and Swansea Neighborhood. This facility is located to the south, adjacent to the existing I-70 viaduct, and dominates the skyline of the area with its large white concrete façade.

This building has been a major landmark in the area for decades. Due to its shape and condition, however, it is not considered a desirable visual resource. Other commercial facilities along the corridor have a similar visual quality, including Manna Pro Corporation, Univar, Safeway Distribution Center, and numerous other warehouses anddistribution buildings.

Swansea Elementary School

Swansea Elementary School playground from Elizabeth Street

Swansea Elementary School serves grades pre-kindergarten through fifth in the Denver Public Schools District and is located in the Elyria and Swansea Neighborhood just north of the I-70 viaduct. The school is one of the few public facilities in this neighborhood and is highly valued by the residents. The school also is only visible from surrounding residences north and south of I-70. The school's playground provides a view of mature trees and playground facilities for residents.

I-70 viaduct

Elizabeth Street at 46th Avenue intersection looking southwest

The construction of the I-70 viaduct in 1964 bisected the Elyria and Swansea Neighborhood. This aging viaduct is considered structurally deficient and functionally obsolete by CDOT and FHWA standards. The viaduct is a dominant visual feature in Elyria and Swansea. The viaduct is considered undesirable by residents, as it visually divides the neighborhood.

Sand Creek Greenway corridor

The existing I-70 alignment, immediately east of Quebec Street, crosses over the Sand Creek Greenway corridor. The Sand Creek Greenway corridor is a natural area and open space that includes an urban greenway trail. The corridor has an aesthetically high value, though it is difficult to see from the highway.

Sand Creek Drive and East 49th Avenue looking south

Central Park Boulevard interchange

The Central Park Boulevard and I-70 interchange is located in the eastern portion of the project corridor. The visual characteristic of this resource is that of a typical highway-to-major street interchange, so it is considered a neutral visual resource.

I-70 east of the Central Park Boulevard interchange looking west

I-225 interchange

The I-225 and I-70 interchange is located in the eastern portion of the project corridor. The visual characteristic of this resource is that of a typical highway-to-highway interchange, so it is not considered a negative or positive visual resource.

Eastbound I-70 at the I-225 interchange looking east

5.8.4 What are the potential impacts to visual resources and aesthetic qualities and how are they assessed?

Impacts to aesthetic qualities were assessed for views of the highway from the surrounding area and views from the highway that drivers will experience. Various tools were used for this assessment, including visual simulations, vantage point views, and aesthetic quality rating criteria. The conclusions made through this assessment are the basis for identifying the impacts from alternatives.

What are visual simulations?

Visual simulations are computer-generated images that illustrate proposed visual changes and relative scale of the proposed structures compared to the existing facilities from a pedestrian's point of view.

What is a vantage point?

A vantage point is a place from which something can be viewed. In this case, the selected vantage points are locations in Elyria and Swansea where the I-70 viaduct is visible from the neighborhood.

Changes to views from the highway

For the No-Action Alternative and the Revised Viaduct Alternative, vehicles traveling eastbound on I-70 between Brighton Boulevard and Colorado Boulevard will experience a view similar to the existing conditions. Traveling westbound on I-70, the views will be slightly different depending on the north or south options.

Vehicles traveling west on the highway with the North Option of each alternative will experience a view similar to existing conditions, with the Nestlé Purina PetCare Company's building remaining on the south side of the highway and a view of the mountains to the far west. The new noise walls on the viaduct, however, will obstruct views of the downtown skyline.

Vehicles traveling west on the highway with the South Option of each alternative will have a different view compared to existing conditions due to removal of the Nestlé Purina PetCare Company facility. The new viaduct's noise walls also will obstruct views of the downtown skyline.

The views for vehicles traveling eastbound and westbound with the Partial Cover Lowered Alternative will be entirely different from the existing conditions. Between the UPRR tracks and Colorado Boulevard, vehicles traveling on I-70 in either direction will be below the existing ground level with retaining walls on each side, resulting in completely different views for drivers on the highway as compared to the existing conditions. The view under the covered area is constrained by the cover

Driver's view visual simulation of Partial Cover Lowered Alternative (Managed Lanes Option)

and the height of the walls separating eastbound and westbound traffic.

Other features that will be part of the I-70 East project include new or rebuilt water quality ponds, detention basins, retaining walls, and so on. These features will change the terrain and, therefore, the visual environment along the project corridor that people on or off the highway are accustomed to seeing. These other features will be designed in accordance with the *Aesthetic and Design Guidelines,* as seen in Attachment O of this document.

With the Managed Lanes Option, vehicles traveling on I-70 experience slightly different views from the General-Purpose Lanes Option because of the direct connections from the managed lanes to other facilities at I-270, I-225, and Peña Boulevard.

In addition, the Managed Lanes Option for the Revised Viaduct Alternative and Partial Cover Lowered Alternative will require construction and installation of new infrastructure on the highway in the form of overhead gantries and new signage. This addition will create new visual impacts along the project corridor. Since no specific features have been designed at this time, it is not possible to estimate how many gantries or signs will be needed or where they will be located exactly. Because there are other similar managed lanes facilities already in use in the Denver metro area, e.g., along US 36 and I-25, it is reasonable to assume that the new managed lanes infrastructure along I-70 would be very similar in appearance. Despite the lack of specifics, it is important to acknowledge that managed lanes infrastructure will create a different visual image than people on or off the highway are accustomed to seeing, but these facilities will be designed in accordance with the *Aesthetic and Design Guidelines,* as seen in Attachment O of this document.

Changes to views toward the highway

As part of the analysis, vantage points were selected between Brighton Boulevard and Colorado Boulevard to prepare visual simulations for the project alternatives. The vantage points were selected in this area because the major changes to the visual resources occur between Brighton Boulevard and Colorado Boulevard. The field of view of the visual simulations is limited to match the human-eye view, but the overall visual analysis considers the entire view. **Exhibit 5.8-2** shows the location and direction of the vantage points for which visual simulations have been prepared. Although the exhibits simulate the potential future view, they do not show the specific final aesthetic treatments, styles, and colors that may be used.

Exhibit 5.8-2 Vantage Points

Vantage Point 1—Elyria and Swansea Neighborhood north of I-70

The first vantage point is identified on the west side of the UPRR tracks on Vine Street in the residential area of the Elyria and Swansea Neighborhood. The Vantage Point 1 visual simulations are pointed southeast toward one of the tallest buildings and a major landmark in the area, the Nestlé Purina PetCare Company facility.

The Revised Viaduct, North Option will not substantially change the visual character of this vantage point. A new bridge structure with larger column spacing—as envisioned in preliminary designs—will slightly improve the aesthetic quality of this area compared to the existing conditions.

The Revised Viaduct, South Option also replaces the bridge structure but removes the Nestlé Purina PetCare Company facility, resulting in a greater visual change in the area. Removing this building potentially opens up some views to the downtown Denver skyline; however, it will be limited from this vantage point because of the viaduct structure.

With the Partial Cover Lowered Alternative, the area will be less visually dominated by the highway structure. Safety barriers will introduce a new, though smaller, visual obstacle to the area.

The Managed Lanes Option for the Revised Viaduct Alternative and Partial Cover Lowered Alternative will require construction and installation of new infrastructure on the highway in the form of overhead gantries and new signage. This addition will create new visual impacts along the project corridor.

Exhibit 5.8-3 shows the visual simulations of Vantage Point 1 for Build Alternatives compared to the existing conditions.

Exhibit 5.8-3 Vantage Point 1: Elyria and Swansea Neighborhood North of I-70

Existing conditions

Revised Viaduct Alternative, North Option

Revised Viaduct Alternative, South Option

Partial Cover Lowered Alternative

Vantage Point 2—Swansea Elementary School

The second vantage point is on Elizabeth Street, adjacent to Swansea Elementary School, on the north side of the highway. The Vantage Point 2 visual simulations are pointed southwest toward Swansea Elementary School, which is one of the major landmarks in the neighborhood.

The Revised Viaduct Alternative, North Option and Partial Cover Lowered Alternative propose changes and updates to the school property because they move the highway closer to the school and require acquisition of a portion of the school property. **Exhibit 5.8-4** shows the changes in the visual character for Build Alternatives compared to the existing conditions. The new space under the viaduct would be designed in context with input from the community and Denver and will follow the *Aesthetic and Design Guidelines* prepared for the corridor, provided in Attachment O of this document.

The Managed Lanes Option for the Revised Viaduct Alternative and Partial Cover Lowered Alternative will require construction and installation of new infrastructure on the highway in the form of overhead gantries and new signage. This addition will create new visual impacts along the project corridor.

The overall visual character and aesthetic quality of this area will improve as a result of the new facility with all of the alternatives as envisioned in the preliminary designs. Although the visible mass of the structure increases with the Revised Viaduct Alternative, this alternative improves the aesthetic quality by replacing the old viaduct with new infrastructure. The Partial Cover Lowered Alternative improves the aesthetic quality of the area more than the No-Action and Revised Viaduct Alternatives because it reduces the roadway's visual dominance in the area by removing the existing viaduct and introducing a new public space.

Exhibit 5.8-4 Vantage Point 2: Swansea Elementary School

Existing conditions

Revised Viaduct Alternative, North Option

Revised Viaduct Alternative, South Option

Partial Cover Lowered Alternative

Vantage Point 3—Elyria and Swansea Neighborhood south of I-70

The third vantage point is south of the existing highway on Fillmore Street in the Elyria and Swansea Neighborhood. The Vantage Point 3 visual simulations point north toward the highway.

The Managed Lanes Option for the Revised Viaduct Alternative and Partial Cover Lowered Alternative will require construction and installation of new infrastructure on the highway in the form of overhead gantries and new signage. This addition will create new visual impacts along the project corridor.

The overall visual character and aesthetic quality of this area will improve as a result of the new facility with all of the alternatives. Although the visible mass of the structure increases with the Revised Viaduct Alternative, this alternative improves the aesthetic quality by replacing the old viaduct with new infrastructure. With the Partial Cover Lowered Alternative, similar to the first and second vantage points, the highway will be below the existing ground level, making it less visible in this area. Safety barriers will introduce a new, though smaller, visual obstacle to the area.

Exhibit 5.8-5 shows the visual simulation of the Build Alternatives compared to the existing conditions.

Exhibit 5.8-5 Vantage Point 3: Elyria and Swansea Neighborhood South of I-70

Existing conditions

Revised Viaduct Alternative, North Option

Revised Viaduct Alternative, South Option

Partial Cover Lowered Alternative

Aesthetic quality assessment

The effects to the aesthetic quality caused by impacts to visual resources were assessed by comparing the existing conditions to the project alternatives. The comparison reviewed each alternative for vividness, intactness, and unity of the visual character of the area. Each of the project alternative would provide visual continuity for the corridor and compliment aesthetic treatments through the use of wall colors, textures, and forms to unite the corridor. **Exhibit 5.8-6** summarizes the aesthetic quality effects of each alternative compared to the existing conditions. The following criteria were used to rate the aesthetic quality of alternatives:

- Vividness
  - Low: Mundane or nondescript landscape
  - Moderate: Some features with striking attributes
  - High: Presence of dominant feature
- Intactness
  - Low: Built features placed without sensitivity to or in conflict with existing setting
  - Moderate: Built features placed somewhat in response to existing setting
  - High: Natural and built components in balance and harmony with each other and their relationship to the landscape
- Unity
  - Low: Reduced integrity due to prevalence of incompatible structures including conflicting scales, colors, or purposes
  - Moderate: Presence of some features not compatible with the existing landscape
  - High: The visual elements of the environment join together to form a harmonious visual pattern

Visually successful projects generally have a high balance of this criteria.

Exhibit 5.8-6 Aesthetic Quality Effects Summary

Alternative/Option	Vividness	Intactness	Unity
Existing Conditions	High	Low	Low
No-Action Alternative, North Option	High	Low	Low
No-Action Alternative, South Option	Moderate	Low	Low
Revised Viaduct Alternative, North Option	High	Low	Moderate
Revised Viaduct Alternative, South Option	Moderate	Low	Low
Partial Cover Lowered Alternative	High	High	High

The existing conditions between Brighton Boulevard and Colorado Boulevard have a high vividness rating. The highway structure and several large industrial buildings on the south side of the highway are dominant and memorable features for the viewers. The existing condition is rated low for intactness because the presence of the highway and industrial buildings conflict with the residential setting. Unity is rated low because the visual elements of the area do not form a harmonious pattern.

The visual character for the No-Action Alternative, North Option is similar to the existing visual character because the structure will be rebuilt similarly to the existing viaduct, but only slightly modified to comply with the current safety and engineering standards. Intactness is rated low because the presence of the highway and industrial buildings conflict with the residential setting. Unity is rated low because there will be no improvements to the community with this alternative and the visual elements of the area do not form a harmonious pattern.

Vividness for the No-Action Alternative, South Option is moderate because this option will remove the tallest structure in the area (Nestlé Purina PetCare Company), eliminating one of the dominant features. Intactness is rated low because the presence of the highway and industrial buildings conflict with the residential setting. Unity is rated low because the highway still will be visible from the surrounding neighborhoods and there will be no changes or beautification to the school and the neighborhoods north of the highway and visual elements of the area do not form a harmonious pattern.

The Revised Viaduct Alternative, North Option has a high vividness rating. The highway structure and several large industrial buildings on the south side of the highway are dominant and memorable features for the viewers.

Intactness is rated low because the presence of the highway and industrial buildings conflict with the residential setting. Unity is rated as moderate because of the modifications to the Swansea Elementary School site and additional amenities under the viaduct. The new structure also could incorporate more creative and visually pleasant design elements. These will help to create a somewhat harmonious visual pattern. Because the viaduct will still be visible from the community, though, and the expansion to the north brings the highway closer to the school, it results in a visual feature that is not compatible with the rest of the landscape.

The aesthetic quality for the Revised Viaduct Alternative, South Option is similar to the No-Action Alternative, South Option, discussed earlier in this subsection.

The Partial Cover Lowered Alternative offers high vividness, intactness, and unity. The lowered highway will have noise walls or safety barriers that can incorporate artistic designs which are meaningful to the neighborhood, and the proposed cover will introduce a new urban gathering or park space in the neighborhood, which results in creating a memorable feature for the viewer and, therefore, high vividness for this alternative.

Unity and intactness also are rated high because the presence of the highway will no longer be visible from the surrounding neighborhoods. A new park in the area that covers the highway and proposed modifications to the school property also will contribute to the high unity and intactness of this alternative because the natural and built components will be in balance and harmony with their surroundings and with each other.

Summary of impacts to visual resources and aesthetic qualities

Impacts to visual resources caused by the project alternatives result in changes to the aesthetic quality of the corridor. **Exhibit 5.8-7** describes the general type of improvement by the project alternatives and visual resources that will be affected.

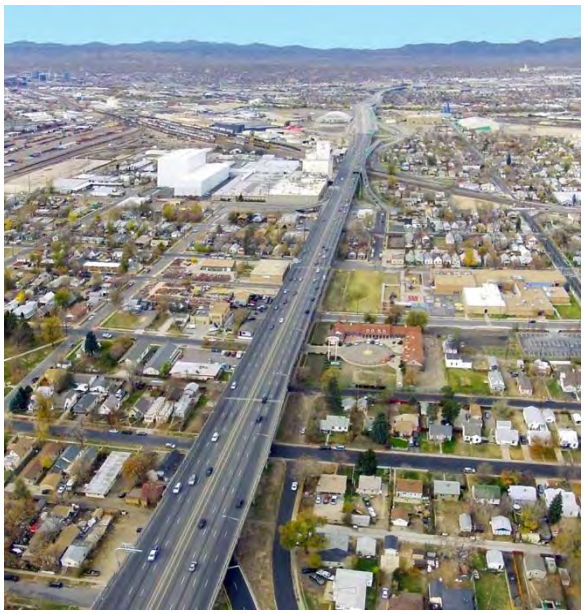
The majority of impacts to visual resources occur from Brighton Boulevard to Colorado Boulevard in the Elyria and Swansea Neighborhood; therefore, the visual assessment focuses on this area. The following discussions identify effects to visual resources in this area by the project alternative and option and discuss the minor visual impacts associated with the Managed Lanes Option.

Exhibit 5.8-7 Effects to Visual Resources by Type of Improvement

Description of Improvements	Positive and Negative Visual Effects
Widening: Widening the highway to accommodate additional traffic	Highway widening increases visible mass, which is considered a negative effect. The South Expansion Option for the Revised Viaduct Alternative and the No-Action Alternative will result in removal of the Nestlé Purina PetCare Company structure, which is considered a positive visual effect.
Lowering the highway below grade: Moving the highway below existing grade between Brighton Boulevard and Colorado Boulevard	Lowering I-70 removes the existing viaduct between Brighton Boulevard and Colorado Boulevard and eliminates a dominant skyline obstruction. The visual presence of the highway will be decreased in this area, which is considered a positive effect.
Walls: The project alternatives may include noise walls measuring 10 feet to 20 feet tall or safety barriers adjacent to the roadway Lowering the highway below existing grade between Brighton Boulevard and Colorado Boulevard will require retaining walls adjacent to the roadway	Noise walls block views from surrounding land uses and increase the highway's visible mass, which is considered a negative effect. Noise walls or safety barriers also present opportunities for context-sensitive mitigation and artistic treatments, which is considered a positive effect. Retaining walls present opportunities for context-sensitive mitigation and artistic treatments, which is considered a positive effect.
Interchange and structures: Bridges average 25 to 40 feet in height. Proposed improvements at interchanges may increase the existing vertical profile of interchange structures by as much as 12 feet.	Bridges and interchanges have the potential to block views from surrounding land uses, which could be considered a negative effect. Bridges and interchanges offer opportunities for context-sensitive mitigation and architecturally pleasing treatments, which could be considered a positive effect.
Light and glare: Additional lighting will be added for safety and to avoid the "black hole effect" of lowering the highway below grade	Adding a new light source in the area could change the visual appearance of the area. However, since the project corridor is an urban setting, the additional lighting from the highway will not cause major negative impacts to aesthetic qualities.

There are minor impacts to visual resources between Colorado Boulevard and Tower Road. The only changes to the visual resources in this area resulting from the Build Alternatives are the increase in highway width, which results in a wider paved area and removal of vegetation adjacent to the existing highway. However, clearing and grubbing in this area will be a minimal change and will not result in a substantive impact to the visual character of the area. Direct connections at I-270, I-225, and Peña Boulevard with the Managed Lanes Option pose new visual barriers in these sections, but this is not considered a substantive impact since they do not block a valuable visual resource.

No-Action Alternative



Bird's-eye view of existing I-70 looking west from above Fillmore Street

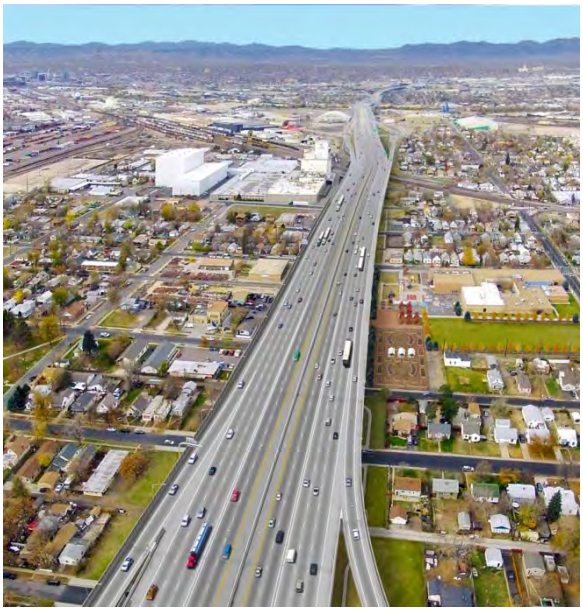
The No-Action Alternative will not dramatically change the overall aesthetic quality of the corridor or study area. Due to the condition of the aging viaduct, the No-Action Alternative includes replacement of the existing viaduct between Brighton Boulevard and Colorado Boulevard without adding capacity. The highway footprint will be wider to meet current design standards, causing a few buildings to be acquired with either the North or South Options. The potential acquisition of taller buildings adjacent to the highway—such as the Nestlé Purina PetCare Company building that currently blocks views—will provide unobstructed views of the highway and the mountains from the surrounding neighborhood. This is not an adverse effect on the existing visual characteristics of the area because it does not change any of the visual elements or the overall visual character of the area.

Build Alternatives

The greatest visual resource impacts of the project alternatives occur where a physical widening of the highway occurs within the established residential neighborhoods.

The Build Alternatives include the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. The effects on the visual resources and aesthetic quality between Brighton Boulevard and Colorado Boulevard vary based on the alternative.

Revised Viaduct Alternative



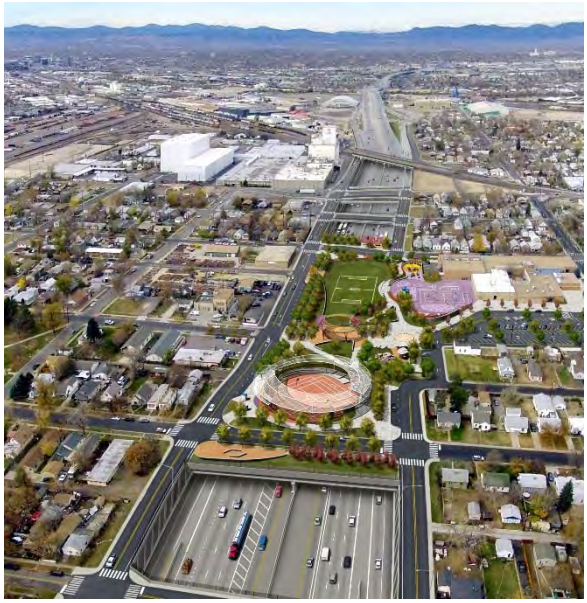
Bird's-eye view simulation of Revised Viaduct Alternative looking west from above Fillmore Street (North Option)

This alternative replaces the viaduct with a new structure that includes additional capacity and conforms to the new highway and bridge standards. The proposed replacement structure includes a wider footprint and structure, and will require business and residential property acquisition. The proposed structure is approximately 200 feet wide, while the existing structure is only approximately 90 feet wide.

Proposed noise walls range between 12 feet and 18 feet in height and will be located on the north edge of the highway, roughly between Brighton Boulevard and Vasquez Boulevard, and on the south edge of the highway between York Street and Madison Street. The noise walls will further contribute to the highway visual mass.

The replaced structure will be located along the existing highway alignment with either Expansion Option. Since the new structure has a larger footprint, the highway will have a more visible presence in the Elyria and Swansea Neighborhood in contrast to the existing structure.

Partial Cover Lowered Alternative



Bird's-eye view simulation of Partial Cover Lowered Alternative looking west from above Fillmore Street (Note: Preliminary design, will be revised during the public input process.)

This alternative removes the viaduct and reconstructs the highway between Brighton Boulevard and Colorado Boulevard to a maximum depth of 40 feet below the existing ground level while also adding capacity to the existing facility. Although this alternative increases the highway's total concrete surface similar to the Revised Viaduct Alternative, it does not increase the highway's visible mass because a large portion of the highway in this area is below ground level and out of sight from surrounding areas.

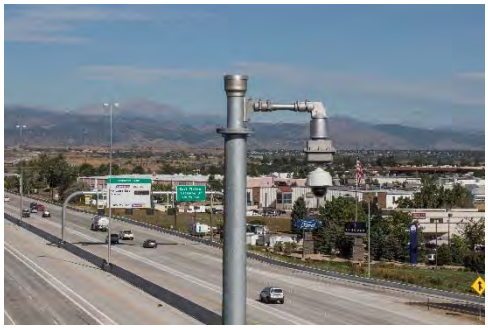
This alternative includes noise walls at ground level that are approximately 16 feet tall. These noise walls will be located on the north edge of the highway between Brighton Boulevard and the UPRR. Safety barriers

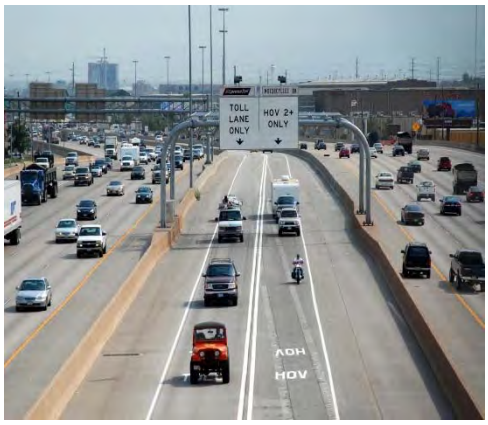
will be located along the edge of the lowered highway. As part of this alternative, a cover will be placed on the lowered section of the highway in front of the Swansea Elementary School. The cover will include an urban landscape on top. The length of this cover is proposed to be less than 1,000 feet and its placement on the highway eliminates the need for noise walls or safety barriers in this area.

Managed Lanes Option

The Managed Lanes Option has direct connections to I-270, I-225, and Peña Boulevard. The direct connection structures from the managed lanes to the adjacent highways pose permanent visual barriers. These barriers are not considered to have substantive impacts to the aesthetic qualities of the area, because the area where these direct connections are located in within an existing transportation corridor and are mostly industrial land use and are not considered sensitive neighborhood views.

Additionally, the Managed Lanes Option for the Revised Viaduct Alternative and Partial Cover Lowered Alternative will require construction and installation of new infrastructure on the highway in the form of overhead gantries and new signage. This addition will create new visual impacts along the project corridor. Since no specific features have been designed at this time, it is not possible to estimate how many gantries or signs will be needed or where they will be located exactly. Because there are other similar managed lanes facilities already in use in the Denver metro area, e.g., along US 36 and I-25, it is reasonable to assume that the new managed lanes infrastructure along I-70 would be very similar in appearance. Despite the lack of specifics, it is important to acknowledge that managed lanes infrastructure will create a different visual image than people on or off the highway are accustomed to seeing, but these facilities will be designed in accordance with the *Aesthetic and Design Guidelines,* as seen in Attachment O of this document.





Managed lanes infrastructure along I-25 and US 36

Light and glare

Increased ambient light levels have the potential to impact visual resources. Adding a new light source in the area could change the visual appearance of the area. However, since the project corridor is an urban setting, the additional lighting from the newly constructed highway will not cause major negative impacts to the aesthetic qualities.

Lighting for the Revised Viaduct Alternative and the No-Action Alternative are similar to the existing conditions. For most of the viewers in the area, noise walls block light and glare from the highway. The presence of a lighted structure above ground emphasizes the structure cutting across the surface streets for nighttime views and the visibility of the viaduct. This is considered an intrusive element in the residential area of the Elyria and Swansea Neighborhood.

Elevated light source also is an additional disruptive source of glare for upper windows of buildings that will not be directly affected by lighting of surface streets; however, the taller buildings in the area are industrial, so an elevated light source will not impact them as much as it would impact a residential unit. The residential houses in the area are shorter than the viaduct, so there will be minimal glare impact on them with the No-Action Alternative and Revised Viaduct Alternative.

The lighting of the Partial Cover Lowered Alternative also will be in compliance with the lighting standards. The lighting of the covered section will be designed to avoid the "black hole effect" by using the latest lighting technologies and evaluating factors affecting the performance of the lighting system.

The glare effect for the Partial Cover Lowered Alternative will be different from the Revised Viaduct Alternative. The lighting of the highway will not be as intrusive as the Revised Viaduct Alternative because the highway is not located on an elevated structure and the light sources are below grade and blocked by safety barriers or noise walls. Depending on future plans for the highway cover, additional lighting sources may be introduced by the planned activities on the cover. The future lighting of the highway cover will be designed not to conflict with the lighting of the surrounding area and will blend in with the neighborhood's existing lighting.

What is the black hole effect?

The black hole effect is the substantial light contrast between outside and inside of a tunnel, causing motorists to slow down. This phenomenon can be minimized by providing adequate lighting at the tunnel entrance or the threshold zone to allow time for the eyes to adapt.

5.8.5 How are negative effects from the project alternatives to visual resources mitigated?

There are minor impacts to visual resources and aesthetic qualities in the study area. The project alternatives will improve the aesthetic quality of the area either by replacing the viaduct with a newer structure that can be designed to complement neighborhood architecture or by removing the viaduct and locating the highway below grade with a landscaped cover between Clayton and Columbine Streets. Any additional improvements to enhance the visual effects of the proposed highway alternatives will be developed through a collaborative process to reflect the needs of individual neighborhoods and local aesthetic context.

Community input is sought from neighborhoods impacted by the Preferred Alternative to retain and develop aesthetic qualities of the corridor. Local communities and participating agencies provided input during the development of a vision for urban design and aesthetics in the corridor. The *Aesthetic and Design Guidelines*, included as Attachment O, discusses the existing aesthetic characteristics for the corridor and provides a strategy for how to reach the vision established by the community.

The purpose of the *Aesthetic and Design Guidelines* is to ensure that the project will not result in a disjointed visual setting. Using the guidelines, future engineering and construction efforts can design noise walls, signing, bridges, sidewalks, and landscapes that will lessen the visual impact and allow the design structures associated with the proposed project to blend with the surrounding built environment to complement the visual landscape. The *Aesthetic and Design Guidelines* describe how the overall corridor will look while embracing the unique qualities of the surrounding neighborhood and communities. **Exhibit 5.8-8** lists the impacts and mitigations associated with visual resources and aesthetic qualities.

Exhibit 5.8-8 Summary of Visual Resources and Aesthetic Qualities Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Replacing the existing viaduct with new infrastructure will improve the visual quality • New noise walls on the viaduct can obstruct views of the downtown Denver skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline (South Option only) • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction.
Revised Viaduct Alternative	• Replacing the existing viaduct with new infrastructure will improve the visual quality • New noise walls on the viaduct can obstruct views of the downtown Denver skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline (South Option only) • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	
Partial Cover Lowered Alternative	• Introducing public space to the area and reducing the roadway's visual dominance by removing the existing viaduct will greatly improve the visual quality • Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway • Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	
Managed Lanes Option (option to Build Alternatives)	• Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard • Managed lanes infrastructure will create new visual impacts along the project corridor	

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5.9 Parks and Recreational Resources

This section identifies parks and recreational resources located within the study area and explains why they are important to the project. It also addresses any potential impacts these resources might sustain from the project alternatives. Impacts to resources protected under Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965 also are identified and discussed in this section.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Based on the revised construction limits, impacts were updated.
- Information from the 2008 Draft EIS was included to provide a more inclusive description of the existing parks and recreational areas.

What is Section 6(f)?

The LWCF Act of 1965 (Public Law 88-578. 78 Stat 897) was enacted "[…] to assist in preserving, developing, and assuring to all citizens of the United States of present and future generations such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable for individual active participation."

Section 6(f) properties are recreation areas administered by state or local governments that have received grants for acquisition and/or development through the National Park Service State Assistance Program. Under Section 6(f)(3), these areas must remain in recreational use unless the National Park Service approves a conversion. A conversion requires replacement property of reasonably equivalent usefulness and location as the Section 6(f) property being converted to non-recreation use.

5.9.1 What are parks and recreational resources and why are they important to this project?

Parks and recreational resources are facilities that typically are publicly owned and open to the public. These can include community parks and ball fields, school playgrounds, sports complexes, regional bicycle/pedestrian trails or greenways, golf courses, open space corridors, and recreation centers. These resources are important to this project because public lands are protected resources for the benefit and use of all. These resources provide opportunities to be physically active, provide space for social interactions, and have numerous environmental benefits, including reducing effects from urban heat islands (built-up areas that are hotter than nearby rural areas) and offering floodplain protection.

5.9.2 What study area and evaluation process were used to analyze parks and recreational resources?

The parks and recreation study area boundary is the same as the project area. Existing and proposed parks and recreational resources located within the study area were identified through parcel data records, site visits, Internet

and local planning document research, and coordination with local government agencies.

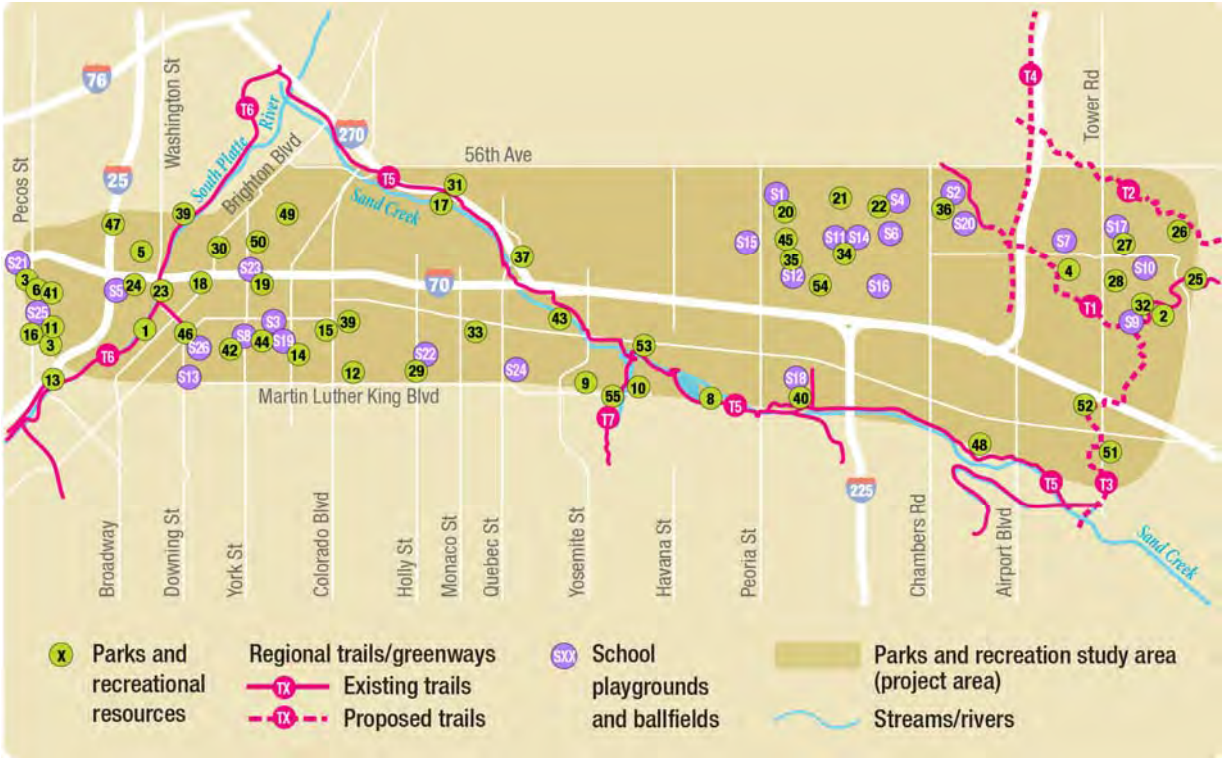
To identify resources protected by Section 6(f), reports titled *Detailed Listing of Grants Grouped by County* were obtained for Adams, Arapahoe, and Denver counties from the LWCF website (U.S. Department of the Interior, National Park Service, 2012) and verified using the Colorado State Parks LWCF Project Grants List (Colorado Department of Natural Resources, Colorado Parks and Wildlife, 2012).

After completing resource identification, each park and recreational resource was reviewed to determine if the project alternatives would impact the resource.

5.9.3 What are the parks and recreational resources that are being analyzed and what are their existing conditions?

Parks and recreational resources in the study area are shown in **Exhibit 5.9-1**, which includes the following existing and proposed resources: 45 parks, 13 recreation centers, two golf courses, six open space/nature areas, and one multi-use special events center. Several of these resources are associated with one another and share facilities or locations. **Exhibit 5.9-2** lists each of these resources, its facilities, and the amenities available at each location.

Exhibit 5.9-1 Parks and Recreational Resources in the Study Area



Also shown in **Exhibit 5.9-1** are seven regional trails/greenways and 26 school playgrounds/ball fields. These resources are identified in **Exhibit 5.9-3** and **Exhibit 5.9-4**, respectively. The majority of these resources are owned and operated by the Denver Department of Parks and Recreation; Denver Public Schools; Aurora Department of Parks, Recreation & Open Space; or the Commerce City Department of Parks and Recreation.

Exhibit 5.9-2 Parks and Recreational Resources

Exhibit 5.9-1 #	Resource Name	Recreational Use	Owner/ Operator	Facilities/Amenities								
				Pool	Restrooms	Baseball Field	Football/Soccer Field	Tennis Court	Basketball Court	Picnic Area	Playground	Bicycle/Pedestrian Path
1	34th Street and Arkins Court	Proposed community park	Denver Parks and Recreation									
2	41st Avenue and Ensenada Street (Ensenada Park)	Community park	Denver Parks and Recreation							X	X	X
3	46th Avenue and Pecos Park	Community park	Denver Parks and Recreation			X	X					
4	47th Avenue and Walden Street	Proposed community park	Denver Parks and Recreation									
5	Argo Park	Community park/pool	Denver Parks and Recreation	X	X	X	X	X	X	X	X	
6	Aztlan Recreation Center and Park	Community park/ recreation center	Denver Parks and Recreation	X	X	X	X		X	X	X	
7	Bernabe Indio Franco Park	Community park	Denver Parks and Recreation						X	X	X	
8	Bluff Lake	Natural area/ nature center	Bluff Lake Nature Center									X
9	Central Park (Stapleton)	Community park	Denver Parks and Recreation		X		X			X	X	X
10	Central Park Recreation Center	Community recreation center	Denver Parks and Recreation									
11	Ciancio Park	Community park	Denver Parks and Recreation			X	X			X		
12	City of Axum Park	Community park	Denver Parks and Recreation		X				X	X	X	X
13	City of Cuernavaca Park (Adjacent to South Platte River Trail)	Community park/ riverfront access	Denver Parks and Recreation			X				X		X
14	City of Nairobi Park	Community park	Denver Parks and Recreation			X				X	X	
15	Colorado Boulevard Park	Community park	Denver Parks and Recreation									X

Exhibit 5.9-2 Parks and Recreational Resources

Exhibit 5.9-1 #	Resource Name	Recreational Use	Owner/ Operator	Facilities/Amenities								
				Pool	Restrooms	Baseball Field	Football/Soccer Field	Tennis Court	Basketball Court	Picnic Area	Playground	Bicycle/Pedestrian Path
16	Columbus Park	Community park	Denver Parks and Recreation						X	X	X	
17	Commerce City Wetlands Park and Trailhead (Access to Sand Creek Greenway Trail)	Community park/ riverfront access	Commerce City Parks and Recreation		X							X
18	Denver Coliseum	Multi-use special events center	City and County of Denver									
19	(Lee) Dunham Park	Community park	Denver Parks and Recreation			X			X	X	X	
20	Elmendorf Park	Community park	Denver Parks and Recreation			X	X		X	X	X	
21	Falcon Park	Community park	Denver Parks and Recreation			X	X		X	X	X	X
22	(Barney L.) Ford Park	Community park	Denver Parks and Recreation				X			X		
23	Globeville Landing Park (Adjacent to South Platte River Trail)	Community park/ riverfront access	Denver Parks and Recreation							X		X
24	Globeville Recreation Center	Community recreation center	Denver Parks and Recreation		X							
25	Green Valley East Ranch Park (Adjacent to High Line Canal Trail)	Community park	Denver Parks and Recreation	X	X	X	X	X		X	X	
26	Green Valley Ranch Golf Club	Golf course	Privately owned course open to the public									
27	Green Valley Recreation Center (Green Valley Ranch Town Center Park)	Community park/ recreation center	Denver Parks and Recreation		X	X			X	X		X
28	Green Valley West Ranch Park	Community park	Denver Parks and Recreation			X	X		X	X	X	
29	Hiawatha Davis Jr. Recreation Center (Skyland Park)	Community park/ recreation center	Denver Parks and Recreation	X	X	X	X	X	X		X	X
30	Johnson Recreation Center (Elyria Park)	Community park/ recreation center	Denver Parks and Recreation			X			X	X	X	
31	Leyden Park	Community park	Commerce City Parks and Recreation							X	X	
32	Marrama Park (Adjacent to High Line Canal Trail)	Community park	Denver Parks and Recreation							X		

Exhibit 5.9-2 Parks and Recreational Resources

Exhibit 5.9-1 #	Resource Name	Recreational Use	Owner/ Operator	Facilities/Amenities								
				Pool	Restrooms	Baseball Field	Football/Soccer Field	Tennis Court	Basketball Court	Picnic Area	Playground	Bicycle/Pedestrian Path
33	Martin Luther King Jr. Recreation Center (Martin Luther King Park)	Community park/ recreation center	Denver Parks and Recreation	X	X	X	X	X	X	X	X	X
34	Montbello Central Park	Community park	Denver Parks and Recreation		X	X	X	X		X	X	X
35	Montbello Civic Center Park	Community park	Denver Parks and Recreation							X		X
36	Montbello Recreation Center (Parkfield Park)	Community park/ recreation center	Denver Parks and Recreation	X	X	X	X	X	X	X	X	X
37	Northfield Pond Park	Community park/ recreation center	Park Creek Metropolitan District/Denver Parks and Recreation									X
38	Northside Park (Adjacent to South Platte River Trail)	Community park	Denver Parks and Recreation				X					X
39	Park Hill Golf Course	Golf course	Privately owned course open to the public									
40	Parklane Park (Access to Sand Creek Greenway Trail)	Community park/pool	Aurora Parks, Recreation & Open Space	X						X		
41	Quigg Newton Senior Center	Community recreation center	Denver Parks and Recreation									
42	Russell Square Park	Community park	Denver Parks and Recreation							X	X	
43	Sand Creek Open Space (Access to Sand Creek Greenway Trail)	Open space/ natural area	Denver Parks and Recreation									
44	(Martin J.) Schafer Park	Community park	Denver Parks and Recreation			X	X	X	X	X	X	X
45	(Melvin F.) Silverman Park	Community park	Denver Parks and Recreation				X		X	X	X	
46	St. Charles Park Recreation Center and Park	Community park/ recreation center	Denver Parks and Recreation		X	X			X	X	X	
47	Stapleton Recreation Center (51st and Broadway) Park	Community park/ recreation center	Denver Parks and Recreation	X	X				X	X	X	
48	Star K Ranch Natural Area (Morrison Nature Center) (Access to Sand Creek Greenway Trail)	Natural area/ nature center	Aurora Parks, Recreation & Open Space		X					X		X

Exhibit 5.9-2 Parks and Recreational Resources

Exhibit 5.9-1 #	Resource Name	Recreational Use	Owner/ Operator	Facilities/Amenities								
				Pool	Restrooms	Baseball Field	Football/Soccer Field	Tennis Court	Basketball Court	Picnic Area	Playground	Bicycle/Pedestrian Path
49	Swansea Neighborhood Park	Community park	Denver Parks and Recreation							X	X	X
50	Swansea Recreation Center (Swansea Park)	Community park/ recreation center	Denver Parks and Recreation	X	X	X	X	X		X	X	X
51	Terrace Park	Community park	Aurora Parks, Recreation & Open Space			X				X	X	
52	Upland Park	Community park	Aurora Parks, Recreation & Open Space									
53	Urban Farm	Community education/ recreation	The Urban Farm									
54	Village Place Park	Community park	Denver Parks and Recreation			X	X		X	X	X	X
55	Westerly Creek Park	Community park	Park Creek Metropolitan District/Denver Parks and Recreation									X

Source: Denver,2012a; Aurora, 2012a; Bluff Lake Nature Center, 2012; The Urban Farm, 2012; Commerce City, 2012

Exhibit 5.9-3 Regional Trails/Greenways

Exhibit 5.9-1 #	Resource Name	Owner/Operator
T1	Proposed Derby Lateral Trail	Denver Parks and Recreation
T2	Proposed First Creek Trail	Denver Parks and Recreation
T3	High Line Canal Trail	Multi-Jurisdictional
T4	Proposed Peña Boulevard Trail	Denver Parks and Recreation
T5	Sand Creek Greenway Trail	Multi-Jurisdictional
T6	South Platte River Greenway Trail	Multi-Jurisdictional
T7	Westerly Creek Trail	Multi-Jurisdictional

Source: Denver Bike Map, www.denvergov.org; www.auroragov.org/ThingsToDo/Trails/index.htm; www.sandcreekgreenway.org/

Exhibit 5.9-4 School Playgrounds and Ball Fields

Exhibit 5.9-1 #	Resource Name	Owner/Operator	Facilities				
			Baseball Field	Football/ Soccer Field	Tennis Court	Basketball Court	Playground
S1	Amesse Elementary School Playground	Denver Public Schools				X	X
S2	Archuleta Elementary School Playground	Denver Public Schools	X				X
S3	Bruce Randolph Middle and High School	Denver Public Schools	X	X		X	
S4	Ford Elementary School Playground	Denver Public Schools	X				X
S5	Garden Place Elementary School Playground	Denver Public Schools	X	X		X	X
S6	Greenwood K-8 School Playground	Denver Public Schools	X	X		X	X
S7	Evie Garrett Dennis Campus (Multiple Schools)	Denver Public Schools	X	X			X
S8	Harrington School Playground	Denver Public Schools					X
S9	Marrama Elementary School Playground	Denver Public Schools		X		X	X
S10	Martin Luther King Jr. Early College High School	Denver Public Schools	X	X	X	X	
S11	Maxwell Elementary School Playground	Denver Public Schools				X	X
S12	McGlone Elementary School Playground	Denver Public Schools	X	X		X	X
S13	Mitchell Elementary School Playground[1]	Denver Public Schools	X		X	X	X
S14	Montbello STRIVE Prep	Denver Public Schools		X	X	X	
S15	Monarch Montessori of Denver	Denver Public Schools					X
S16	Oakland Elementary School Playground	Denver Public Schools	X	X	X	X	X
S17	Omar D. Blair Edison K-8 Charter School	Denver Public Schools			X		X
S18	Park Lane Elementary School Playground	Aurora Public Schools					X
S19	Pioneer Charter School (ECE-6)	Denver Public Schools	X			X	X
S20	KIPP Montbello College Prep Middle School	Denver Public Schools	X	X		X	
S21	Remington School Playground[1]	Denver Public Schools	X				X
S22	Smith Renaissance School of the Arts	Denver Public Schools		X		X	X
S23	Swansea Elementary School Playground	Denver Public Schools		X			X
S24	Swigert International School	Denver Public Schools		X		X	X
S25	Trevista at Horace Mann K-8	Denver Public Schools	X		X	X	X
S26	Wyatt-Edison K-8 Charter School	Denver Public Schools				X	X

Source: www.dpsk12.org/schoollist/default.aspx; www.aurorak12.org/
1. School closed to academic use in 2008 with the outdoor facilities maintained for public use.

5.9.4 Are any of the parks and recreational resources a Section 6(f) resource?

There are six resources in the study area that have received LWCF assistance: Aztlan Park, Montbello Civic Center Park, Montbello Recreation Center Pool, Montbello Central Park, South Platte River Greenway (including Globeville Landing Park and South Platte River Greenway Trail), and Swansea Park. These Section 6(f) resources are shown in **Exhibit 5.9-5**.

Exhibit 5.9-5 Section 6(f) Resources in the Study Area

5.9.5 How do the project alternatives potentially affect parks and recreational resources?

One or more of the project alternatives will affect the Swansea Elementary School playground, and Globeville Landing Park. In addition, impact to the Sand Creek Greenway Trail is expected. Potential impacts to these resources by the project alternatives are discussed in the following subsections.

As shown on **Exhibit 5.9-5**, Globeville Landing Park is a feature of the South Platte River Greenway, a Section 6(f) resource. Section 6(f) impacts are included with each resource discussion.

Swansea Elementary School playground

Swansea Elementary School playground

Swansea Elementary School is located between Columbine Street and Elizabeth Street directly north of and adjacent to the existing I-70 alignment. The school playground is open for public use outside of school hours and offers substantial "walk-on" recreation use by neighborhood children. Facilities associated with the school playground include a variety of jungle gym equipment, such as slides and swings; a paved area with basketball courts and a variety of games, such as hopscotch and four square; a pavilion; and a field. The field located onsite is subdivided by a fence that lines the playground property. From this fence to the southern property line of the school is a buffer of approximately 35 feet. This buffer is part of the school property, but is not used for recreational purposes. The intent of this area is to provide a buffer between the existing highway bridge structure and the playground where children are present.

Three of the proposed alternative options require property acquisition from Swansea Elementary School for right-of-way expansion, as summarized in **Exhibit 5.9-6**. The potential impact to this resource from these proposed alternatives and options requires a Section 4(f) analysis, which is included in Chapter 7, Section 4(f) Evaluation.

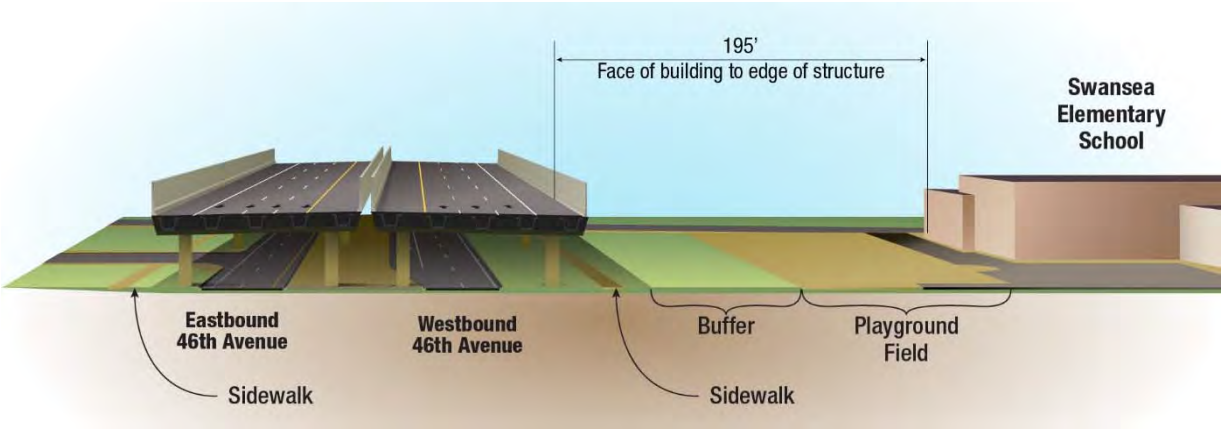
Exhibit 5.9-6 Comparison of Swansea Elementary School Impacts

Alternative/Option	Acres of Impact	Percentage of Parcel
No-Action Alternative, North Option	0.39	11%
No-Action Alternative, South Option	0.00	0%
Revised Viaduct Alternative, North Option	0.76	21%
Revised Viaduct Alternative, South Option	0.00	0%
Partial Cover Lowered Alternative	0.95	27%

No-Action Alternative, North Option

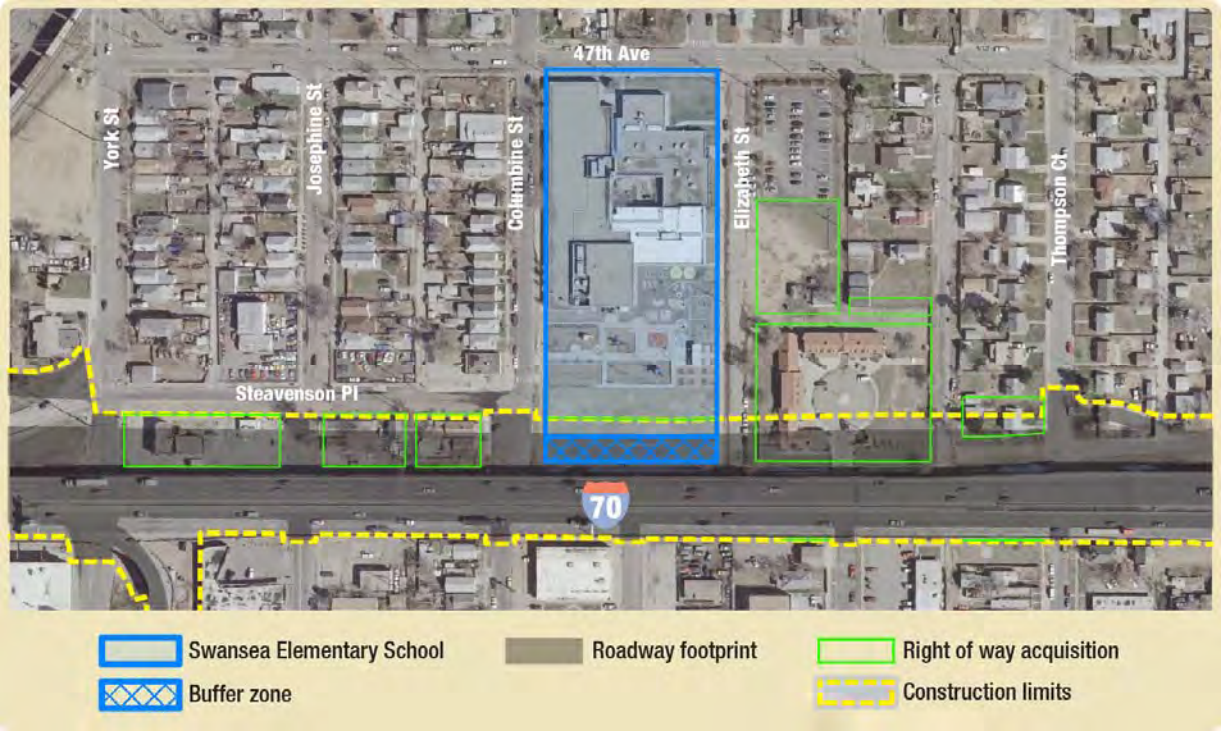
In the area of the playground, this option reconstructs the viaduct to meet current design standards. This will shift the edge of the highway 60 feet to the north; approximately 195 feet from the edge of the Swansea Elementary School building, as shown in **Exhibit 5.9-7**.

Exhibit 5.9-7 Swansea Elementary School, Side Perspective: No-Action Alternative, North Option



This alternative requires permanent right-of-way acquisition totaling 0.16 acre of the school playground/field, as well as the entire buffer zone (0.23 acre) for a total impact of 0.39 acre as shown in **Exhibit 5.9-8**.

Exhibit 5.9-8 Swansea Elementary School: No-Action Alternative, North Option

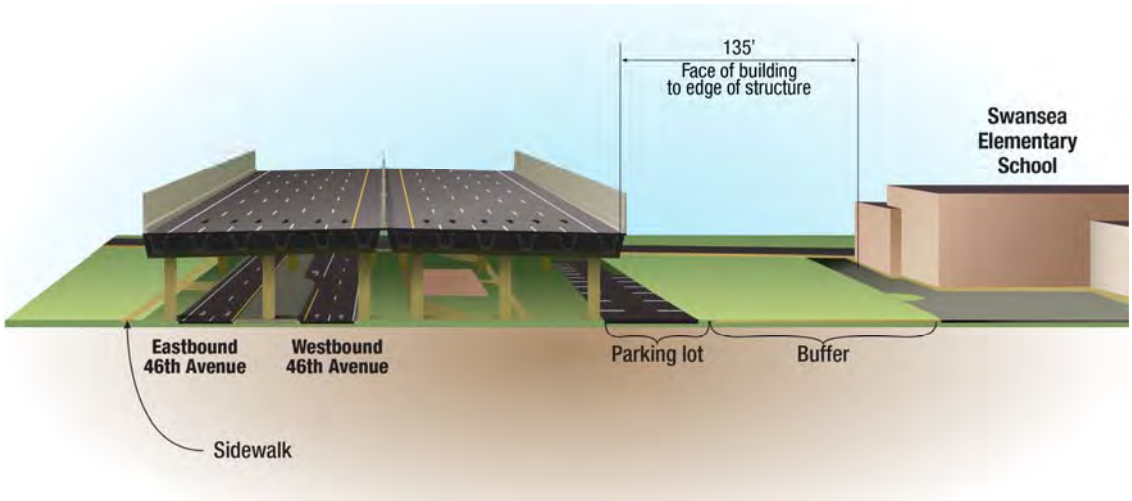


While no playground structures will be impacted, this option uses roughly half of the playground field. A new buffer needs to be created between the highway and the playground to maintain a safe environment for children playing in the field.

Revised Viaduct Alternative, North Option

In the area of the playground, this option reconstructs the viaduct, adds two travel lanes in each direction, and adds acceleration/deceleration lanes, which moves the highway alignment 120 feet closer to, or approximately 135 feet away from, the Swansea Elementary School building, as shown in **Exhibit 5.9-9**.

Exhibit 5.9-9 Swansea Elementary School, Side Perspective: Revised Viaduct Alternative, North Option



The expansion of the highway in this area requires the acquisition of approximately 0.53 acre of playground, as well as the 0.23-acre buffer zone, for a total of 0.76 acre (see **Exhibit 5.9-10**). This acquisition results in the viaduct abutting the area of the playground where equipment and other amenities are located, thereby leaving the remainder of the playground unsafe and unusable. This option also requires a new buffer zone, which will further preclude use of the remaining playground.

Exhibit 5.9-10 Swansea Elementary School: Revised Viaduct Alternative, North Option

Partial Cover Lowered Alternative

This alternative removes the existing viaduct and reconstructs the highway below ground level. Similar to the Revised Viaduct Alternative, it includes the addition of two travel lanes in each direction, as well as acceleration/deceleration lanes. This option requires approximately 0.72 acre of right-of-way acquisition from the school playground and the entire 0.23 acre buffer zone for a total of 0.95 acre, as shown in **Exhibit 5.9-11**.

This acquisition includes the entire playground field (including the buffer zone), and results in the footprint of the highway abutting the area of the school playground where equipment and other amenities are located, thereby leaving the remainder of the school playground unsafe and unusable. Under this option, the edge of the highway shifts north (approximately 120 feet from the edge of the school building), as shown in **Exhibit 5.9-12**. The highway will be below grade under the cover and will not be visible from the school. Because this alternative does not include a viaduct, a new buffer is not required since the safety concern for debris falling from the viaduct will be eliminated.

Exhibit 5.9-11 Swansea Elementary School, Side Perspective: Partial Cover Lowered Alternative

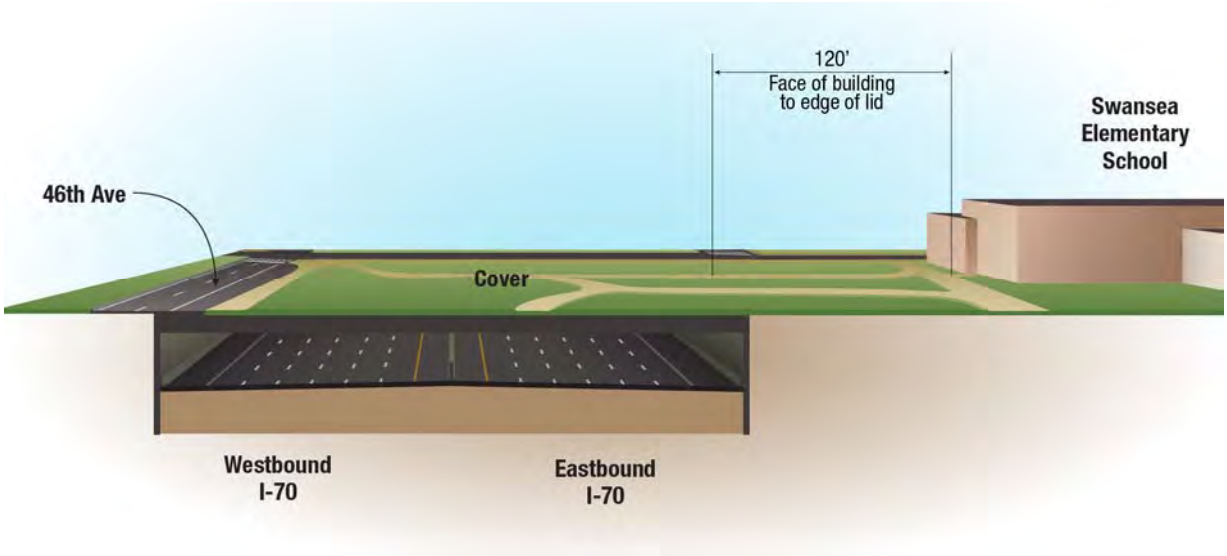
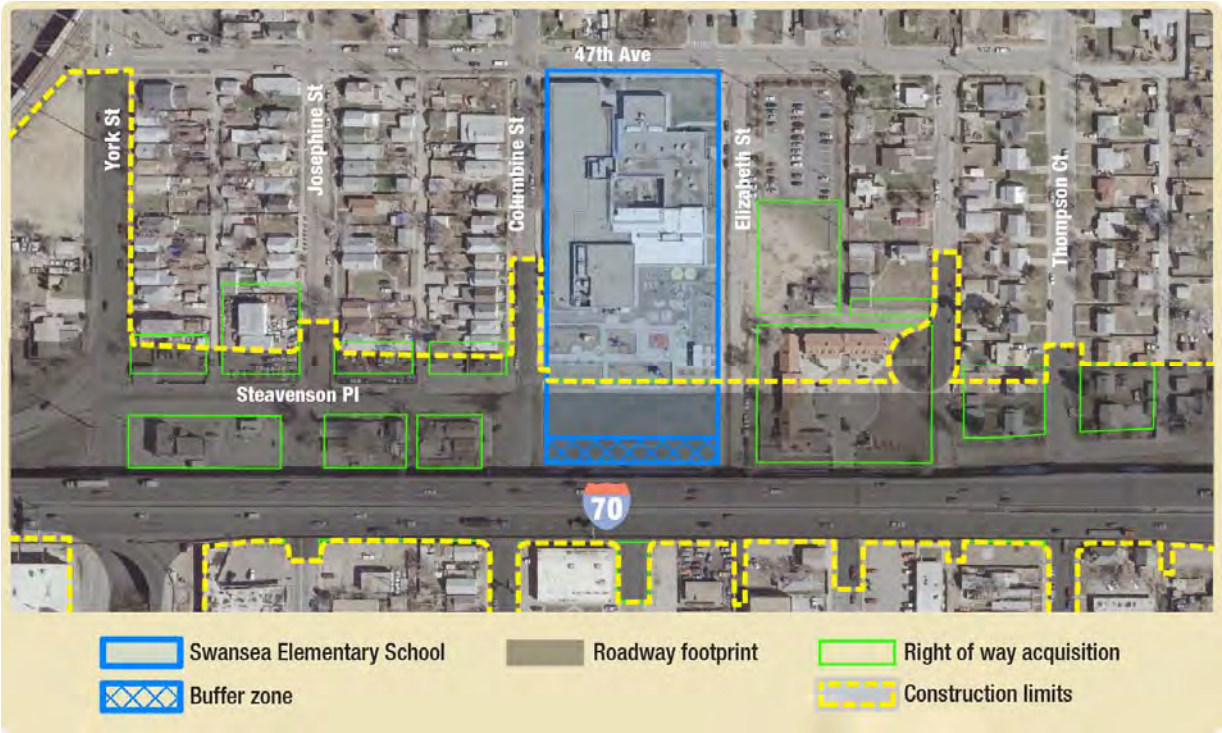


Exhibit 5.9-12 Swansea Elementary School: Partial Cover Lowered Alternative



South Platte River Greenway (Section 6(f) resource only)

All of the alternatives will require a drainage easement/access permit on the north side of I-70 for a storm drain. Construction of a drain pipe will temporarily impact the South Platte River Greenway at its location west of the Franklin Street Bridge over the South Platte River on the east bank of the river. Although South Platte River Greenway is a Section 6(f) resource, it is not considered a recreational resource. The South Platte River Greenway Trail is a recreational element of this resource, however this project will not impact the trail at all. The storm drain will be entirely underground and emerge from the bank above the river. The relatively low flows from the pipe will allow the runoff to discharge directly into the river. No energy dissipation or erosion protection is needed. A 52-foot-wide drainage easement/access permit area will be centered on the pipe alignment. The easement placed on the pipe alignment will allow for future maintenance of the pipe.

The storm drain pipe for this alignment will fall within the underground utility easement exception under Section 6(f). As noted in the LWCF State Assistance Programs Federal Financial Assistance Manual, (Department of the Interior, National Park Service, 2008), "The State may allow underground utility easements within a Section 6(f)(3) area as long as the easement site is restored to its pre-existing condition to ensure the continuation of public outdoor recreational use of the easement area within 12 months after the ground within the easement area is disturbed." The location of the drainage easement is shown on **Exhibit 5.9-13**.

Proposed drainage

All the alternatives include drainage improvements on the north side of I-70 to capture and convey the onsite water runoff.

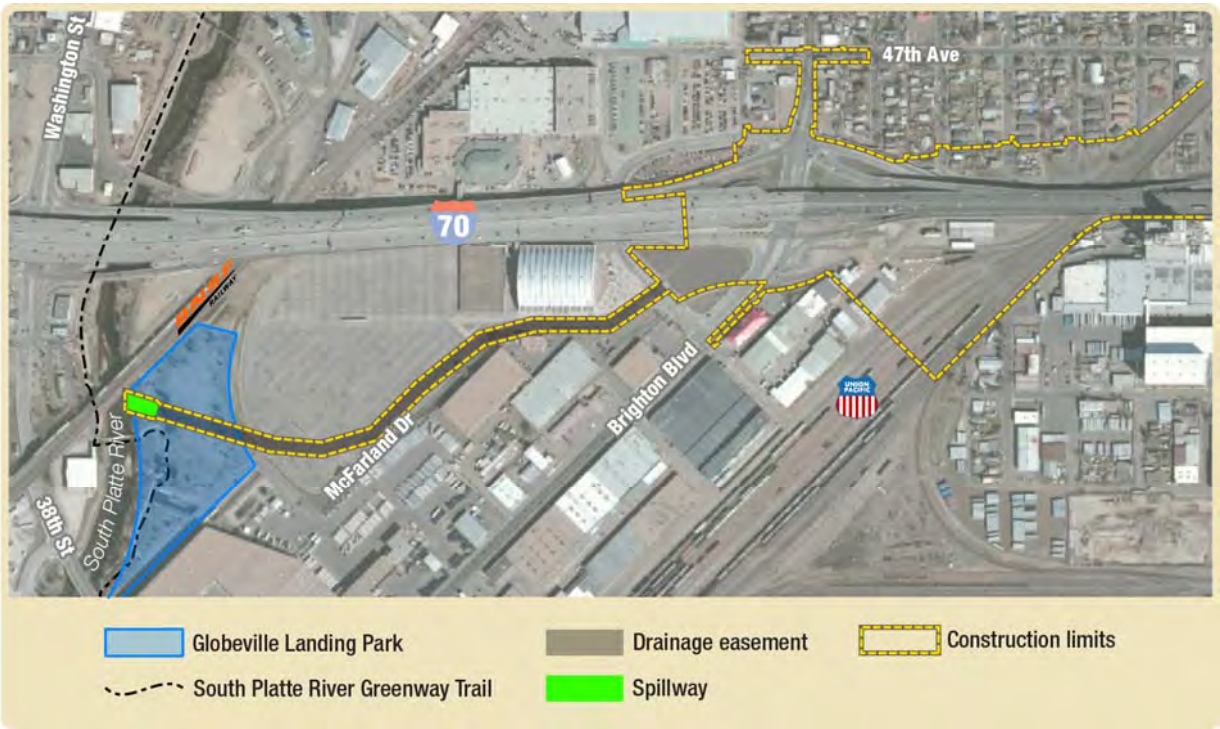
The Partial Cover Lowered Alternative also includes an offsite drainage system south of I-70 to capture surface water before it enters the lowered section of the highway.

Exhibit 5.9-13 South Platte River Greenway

Globeville Landing Park

The Partial Cover Lowered Alternative will impact Globeville Landing Park to construct an offsite drainage system through the park south of I-70. The alignment, as shown on **Exhibit 5.9-14**, will bury approximately 430 linear feet of storm drain pipe across the park, terminating at the South Platte River. A 52-foot wide drainage easement/ access permit area will be centered on the pipeline alignment. The easement will allow for future maintenance of the storm drain. The storm drain pipe for this alignment will fall within the utility easement exception under Section 6(f), previously discussed.

Exhibit 5.9-14 Globeville Landing Park



However, the construction of a spillway will require the permanent conversion of approximately 0.3 acre of the park into a non-recreational use. Permanent ground disturbance will consist of constructing a boulder drop structure along the west end of the pipe at its terminus near the South Platte River. This drop structure is needed for energy dissipation.

Conversion of the park will be mitigated in-kind in accordance with Section 6(f)(3) of the LWCF Act, which requires land of at least equivalent fair market value and equivalent usefulness and location. Coordination with, and

approval from, the National Park Service will be required prior to any Section 6(f) property conversion.

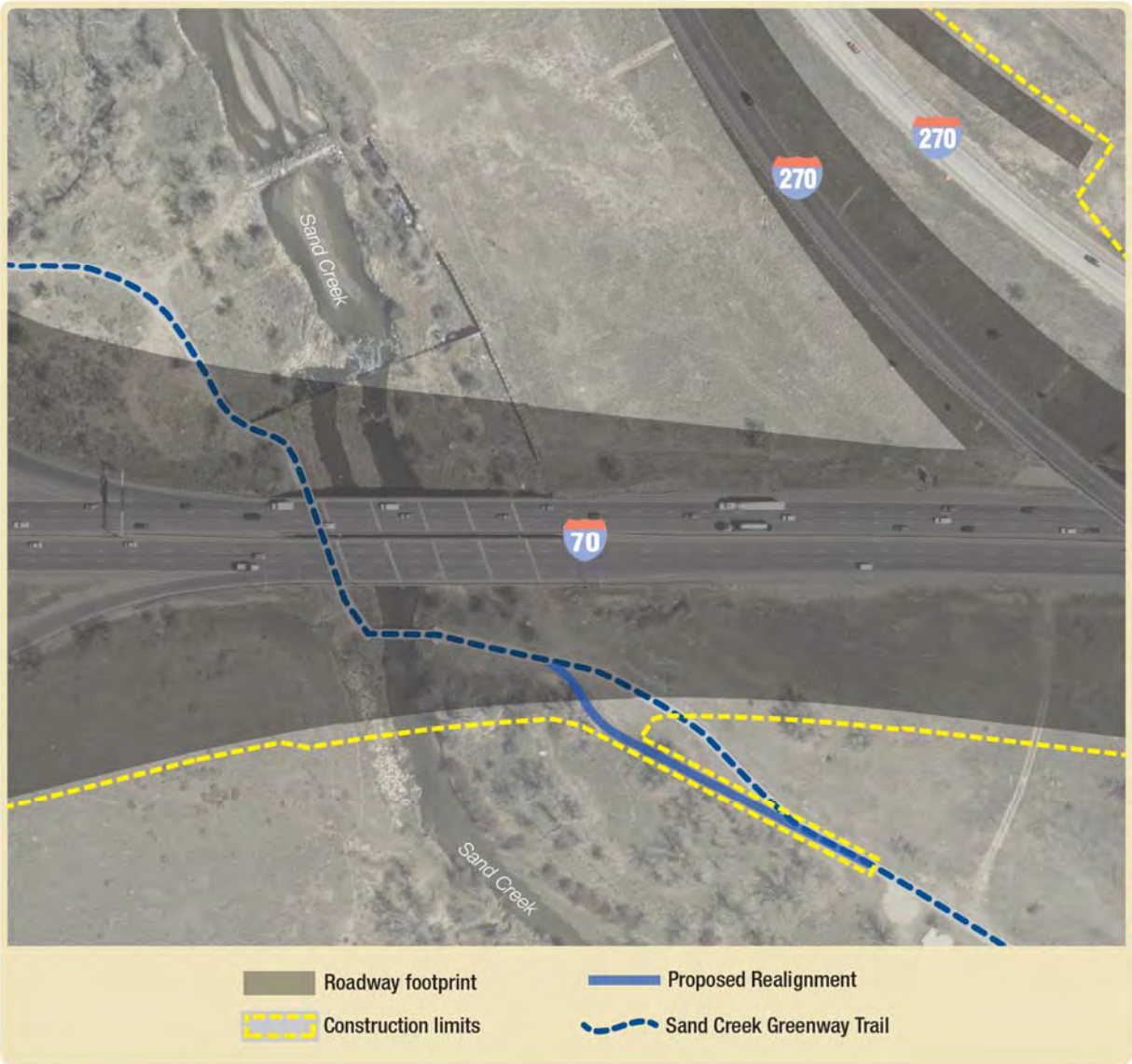
Portions of the disc-golf course within the park will be temporarily closed during the construction. Following construction, the disc-golf holes will be returned to their pre-construction condition. The location of the drainage easement is shown in **Exhibit 5.9-14**. Impacts to this resource also require a Section 4(f) analysis, which is included in Chapter 7, Section 4(f) Evaluation.

Sand Creek Greenway Trail

This 14-mile recreational trail is part of a public greenway loop that connects the High Line Canal Trail with the South Platte River Greenway Trail in the northeast metropolitan Denver area. Public funding sources include the three partner cities of Denver, Aurora, and Commerce City; other public funds from Great Outdoors Colorado, Colorado State Trails, and CDOT; and private foundations under the non-profit entity of the Sand Creek Greenway Partnership. The trail was constructed through licensed agreements held by the partner cities from public and private lands throughout the 14-mile trail corridor.

The Sand Creek Greenway Trail crosses under I-70, east of Quebec Street, in CDOT right of way. For all Build Alternatives, the trail at this location will require minor realignment, as shown in **Exhibit 5.9-15**, since the new eastbound ramp bridge abutment and pier at the I-70 interchange with Quebec Street also will be placed here. During construction, temporary trail closures may be necessary. The trail closure periods will be kept to the minimum amount of time possible and will be determined during construction phasing. Physical changes to the trail will be located within existing CDOT right of way to maintain trail continuity and will be identified during final design.

Exhibit 5.9-15 Sand Creek Greenway Trail and Proposed Realignment

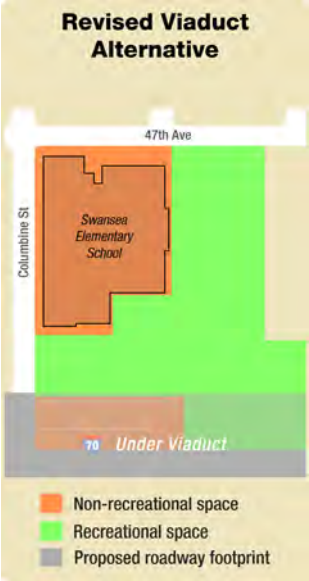


5.9.6 How are the negative effects from the project alternatives mitigated?

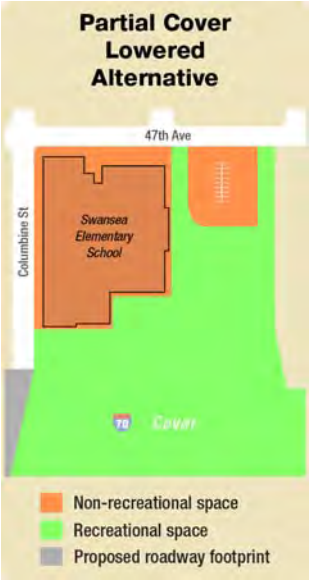
Mitigation measures will be implemented prior to, during, and immediately following construction of the Preferred Alternative to avoid and minimize long-term effects to the Swansea Elementary School playground, the South Platte River Greenway, Globeville Landing Park, and Sand Creek Greenway Trail.

Swansea Elementary School playground—mitigation details

To mitigate impacts to the school playground, options to redesign the school site plan were developed for the Revised Viaduct Alternative, North Option and the Partial Cover Lowered Alternative. For both alternatives, the redesign uses adjacent parcels and includes closing Elizabeth Street from 46th Avenue to 47th Avenue. The Revised Viaduct Alternative, North Option also will use the space under the reconstructed viaduct as a park or recreational space.



The redesign of the school lot for the Revised Viaduct Alternative, North Option increases the school playground from 1.4 acres to approximately 2.0 acres, depending on the site plan design. Denver Public Schools does not support the Revised Viaduct Alternative, North Option because it brings the elevated highway much closer to the school site, even with the reconfiguration of the site.



The redesign of the school lot for the Partial Cover Lowered Alternative, which includes a four-acre cover over the highway between Columbine Street and Clayton Street, will increase the playground size by up to 1.5 acres, for a total of almost three acres. Additional details on the highway cover can be found in Section 3.1.2 of Chapter 3, Summary of Project Alternatives.

South Platte River Greenway (Section 6(f) resource only)—mitigation details

Although South Platte River Greenway is not a recreational resource, because it is considered a Section 6(f) resource, the temporary impacts as a result of the drainage pipe will be minimized by providing adequate notice and signing to Greenway users prior to construction. The area of temporary disturbance will be returned to existing or a comparable state following construction.

Globeville Landing Park—mitigation details

During construction on Globeville Landing Park, the area surrounding the construction will be fenced off to install the drain pipe. The majority of the park will remain open to the public for recreational use.

To minimize the use of the park, an alignment north of the South Platte River Greenway Trail and bridge over the South Platte River was selected for the storm drainage system through the park. This alignment also avoids placement of storm manhole lids within the park, which would permanently use the park. Most of this alignment option is a temporary disturbance to the park and the drainage easement/access permit area will be available for recreational use following construction, with the exception of constructing a 0.3-acre drop structure. To offset this impact, the 0.3-acre drop structure of the park permanently converted to a non-recreation use will be replaced in-kind with land of at least current fair market value and of reasonable equivalent usefulness and location. Also, since the drainage easement/access permit area could also limit the function of the area in the future (Denver may not want to located certain activities there in case repairs would need to occur), the 22,360 square foot area will also be replaced in-kind with land of at least current fair market value and of reasonable equivalent usefulness and location.

With the exception of constructing a boulder drop structure, use of the property will be limited to temporary ground-disturbing activities, which will remove ground vegetation and trees, and will temporarily diminish the use of the disc golf course. After the storm drain is put into place, all of the easement, except the 0.3-acre drop structure, will be available for recreational use, although the aesthetics of the immediate area will be disturbed by construction. As mentioned, following construction, areas of temporary disturbance will be returned to pre-construction conditions. This includes any impact to the disc golf course and replacement of vegetation and trees.

To provide the replacement land, the project is investigating acquiring additional land that Denver has identified near Milstein Park, which is also along the South Platte River trail.

Coordination with and concurrence from Denver Parks and Recreation (official with jurisdiction) has occurred, and correspondence is included in Attachment B, *Agency*

Consultation Addendum. Conditional approval from Colorado Parks and Wildlife (CPW) and National Park Service (NPS) is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.

Sand Creek Greenway Trail—mitigation details

A trail control plan will be developed as part of the construction management plan to reduce construction-related closures and delays to maintain trail flow and access to the Sand Creek Greenway Trail.

During construction, adequate trail detours and advanced notice and signing before construction will be provided. Construction zone warning signage will be present to maintain safe passage through the construction zone and identify temporary closures.

Detour signage will comply with the Americans with Disabilities Act of 1990 and Part 6F of the *Manual on Uniform Traffic Control Devices* (FHWA, 2009).

A minor realignment of the Sand Creek Greenway Trail may be required under the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. Mitigation specific to this impact includes returning the trail and any detours to the existing or comparable state following construction. Alternate trail routes with similar connections will be provided where the trail must be realigned.

Exhibit 5.9-16 summarizes the impacts and mitigations associated with parks and recreational resources.

Exhibit 5.9-16 Summary of Parks and Recreational Resource Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
All Alternatives	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	• Provide adequate notice and signing to Greenway users prior to construction • Return Greenway to pre-construction or comparable state following construction
No-Action Alternative	0.39 acre of impact to Swansea Elementary School (North Option)	No mitigation measures specific to this alternative
Revised Viaduct Alternative	• 0.76 acre of impact to Swansea Elementary School (North Option) • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction	• Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction
Partial Cover Lowered Alternative	• 0.95 acre of impact to Swansea Elementary School • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction	• Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction • Coordinate with Denver Parks and Recreation, CPW, and NPS regarding impact to Globeville Landing Park, a Section 6(f) resource • Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement • Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.

5.10 Air Quality

This section presents the air quality analysis for the study area. The discussion includes air quality concerns, emissions of interest, evaluation methodology, air quality impact analyses, and mitigation evaluations. Additionally, hotspot analysis for carbon monoxide and PM_{10} is included for Transportation Conformity. All other analyses and evaluations included in this section are not intended for conformity purposes.

Federal and state regulations

- NEPA
- CEQ Regulations
- Clean Air Act
- Transportation Conformity Rule
- Colorado Air Pollution Prevention and Control Act

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Updated traffic data from the DRCOG Compass model (Version 5.0) was used in the analysis.
- Only the Preferred Alternative (Partial Cover Lowered Alternative) was modeled in the carbon monoxide hotspot analysis, since all of the alternatives were modeled previously and showed low values, and there were only minor changes to the traffic data. This alternative resulted in the highest carbon monoxide concentrations in the previous modeling, so it is assumed that if the modeled values are in conformity with air quality standards, all of the other alternatives would be as well.
- An updated/corrected inspection and maintenance file was used for the carbon monoxide hotspot analysis.
- Dispersion modeling for the PM_{10} hotspot analysis used meteorological data from the Stapleton meteorological station to better represent the weather conditions at the project location.
- The PM_{10} background concentration for the hotspot analysis was determined using new guidance from EPA.
- On the recommendation of the EPA, changes were made to how the below-grade section of highway in the Preferred Alternative was modeled for the PM_{10} hotspot analysis, and the receptor network was expanded to include all locations outside the project right of way.
- An updated emissions inventory for NAAQS pollutants/precursors and Mobile Source Air Toxics (MSAT) pollutants is included.
- An updated discussion on greenhouse gases is included.
- Objectives and requirements for an air quality monitoring plan that will be utilized during the construction phase of the project to monitor for PM_{10} emissions are included.
- An update on the transportation conformity determination is included.

5.10.1 What are air quality concerns and why are they important to this project?

Air pollution comes from many different sources: stationary sources, such as factories, power plants, and dry cleaners; on- and off-road mobile sources, such as cars, buses, planes, trucks, and trains; and naturally occurring sources, such as windblown dust and emissions from vegetation.

The primary air quality concerns about the I-70 East highway improvements focus on local population exposure to criteria pollutants—specifically, particulate matter, carbon monoxide, and ozone; MSATs; and fugitive dust from construction activities—because this project is proposing to add capacity. Although stationary sources exist in this project area the air quality impact analysis is focusing on analysis from mobile sources. Greenhouse gases, while not an exposure issue, also are of interest due to climate change concerns.

Criteria pollutants

The Clean Air Act of 1970, as amended, identifies six commonly found air pollutants, also known as criteria pollutants. Each of the criteria pollutants has been proven through scientific study to have adverse effects on human health and the environment and/or property (see Attachment J, *Air Quality Technical Report,* for health effects of the criteria pollutants).

The criteria pollutants for which NAAQS have been set by the EPA are ozone, carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide, sulfur dioxide, and lead. The EPA and state and local air quality agencies track these criteria pollutants through actual measurements of pollutant concentrations in the air at monitoring sites across the nation, including in the Denver region.

Of the NAAQS criteria pollutants, only ozone, particulate matter (PM_{10}), and carbon monoxidehave been of concern in the Denver region, since current and/or historical monitoring data have shown exceedances of the standards. Of these three, ozone is the only pollutant for which the region is currently in nonattainment. The Denver region was re-designated to attainment/ maintenance status for carbon monoxide (2001) and PM_{10} (2002).

Criteria pollutants

- Ozone (O_3)
- Carbon monoxide (CO)
- Particulate matter 10 microns or less (PM_{10})
- Particulate matter 2.5 microns or less ($PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)
- Lead (Pb)

What is a nonattainment area?

A “nonattainment area” is a locality where air pollution levels persistently exceed NAAQS.

Ground-level ozone

Ozone is a pollutant created by the chemical reaction of volatile organic compounds and nitrogen oxides in the presence of sunlight. The ozone molecule is formed through this chemical transformation, which typically occurs downwind from the volatile organic compounds and nitrogen oxides emission sources. As a result, ozone is considered a regional issue rather than a localized street or intersection issue, and an individual highway project will typically have little or no effect on regional ozone concentrations. Ozone is evaluated using the volatile organic compounds and nitrogen oxides emission precursors in an emission inventory burden analysis instead of using a localized, or hotspot, analysis as is typical for particulate matter and carbon monoxide, because it is a regional air quality pollutant.

As of 2015, the Denver region is classified as nonattainment for the 8-hour 2008 ozone standard. The region was originally designated under the 1-hour standard, which has since been replaced with an 8-hour standard in 2008.

Particulate matter

Particulate matter is a complex mixture of very small particles and liquid droplets classified as either inhalable coarse-sized particles (PM_{10} refers to particles 10 microns or less) or fine particles ($PM_{2.5}$ refers to particles 2.5 microns or less and makes up a portion of PM_{10}). Diesel tailpipe emissions; road, brake, and tire dust; and dust from construction activities all contribute to particulate matter. Particulate matter is not a major component of emissions from gasoline-powered vehicles, which are the predominant source of traffic in this corridor.

PM_{10} is a product of vehicle emissions, road sanding, and brake and tire wear. This includes some particles that are large enough to be visible. $PM_{2.5}$ is not visible to the naked eye and is mainly a product of vehicle emissions and other combustion sources.

The ratio of $PM_{2.5}$ to PM_{10} varies. Based on the emissions inventory analysis presented in this chapter below, non-dust $PM_{2.5}$ accounts for approximately 57 percent of non-dust PM_{10} emissions; for road dust, EPA has estimated the ratio of $PM_{2.5}$ to PM_{10} emissions to be 25 percent (EPA, 2011a).

PM_{10} has been a concern in the Denver region in the past, but the region is currently in attainment/maintenance for this pollutant. The Denver PM_{10} nonattainment area was re-designated to attainment/maintenance status by the EPA

on September 16, 2002 (EPA, 2002) and has maintained the NAAQS since that time.

Denver is in attainment for both the 1997, 2006, and 2012 $PM_{2.5}$ standards. There has been one exceedance of the 24-hour $PM_{2.5}$ standard since 1999, which occurred at the Denver Continuous Air Monitoring Program (CAMP) monitoring station in 2001; however, $PM_{2.5}$ is not a pollutant of concern in the Denver area at the present time, or for the foreseeable future.

Carbon monoxide

Carbon monoxide is a colorless, odorless gas emitted directly from vehicle tailpipes as a product of incomplete combustion. Because of this, carbon monoxide tends to concentrate at busy intersections with high vehicle delays and congestion.

Carbon monoxide has been a concern in the Denver region in the past, but the region was re-designated to an attainment/ maintenance area for this pollutant in December 2001 (EPA, 2001).

Mobile source air toxics

As part of the Hazardous Air Pollutants (HAP) Program of the Clean Air Act Amendments of 1990, EPA has identified approximately 188 pollutants that are known to cause health problems. Of the 188 HAP toxic air pollutants, 21 have been identified by the EPA as Mobile Source Air Toxics (MSATs; see box to the right). MSATs are compounds emitted from motor vehicles and motorized equipment that are known or suspected to cause cancer or other serious health and environmental effects.

Of the 21 MSATs, the EPA has indicated that the majority of adverse health effects come from seven pollutants, which FHWA has labeled as priority MSATs for NEPA studies. These pollutants are benzene, formaldehyde, naphthalene, diesel particulate matter/diesel exhaust organic gases, acrolein, 1,3-butadiene, and polycyclic organic matter (see Attachment J, *Air Quality Technical Report,* for health effects of the seven priority MSAT pollutants). Based on FHWA's analysis using the EPA's air quality models, diesel particulate matter is the dominant MSAT of concern.

The EPA has programs to reduce emissions of many MSATs through emission control technologies and other methods. Primary among these is EPA's *Control of Hazardous Air Pollutants from Mobile Sources: Final Rule to Reduce Mobile*

Mobile source air toxics

MSATs include seven pollutants designated by EPA as having serious health and/or environmental effects:

1. Benzene
2. Formaldehyde
3. Naphthalene
4. Diesel particulate matter/Diesel exhaust organic gases
5. Acrolein
6. 1,3-Butadiene
7. Polycyclic organic matter

Of these, diesel particulate matter has become the primary MSAT of concern. Diesel particulate matter refers to the particles emitted from heavy diesel vehicles, such as freight/delivery trucks and construction equipment.

Source Air Toxics, issued February 26, 2007, to lower emissions of benzene and other air toxics.

In response to concerns from Denver and residents about the effects of MSATs on the communities of north Denver and Commerce City, CDOT provided additional emissions modeling data to the Denver Department of Environmental Health to use in their independent air quality study for the area, which is called *Going One Step Beyond in North Denver: A Neighborhood Scale Air Pollution Modeling Assessment* (The Good Neighbor Project 2015). The study's results are available on the Denver Environmental Health website at www.denvergov.org/content/denvergov/en/environmental-health/environmental-quality/air-quality.html.

Greenhouse gases

Greenhouse gases trap heat and make the planet warmer. The primary sources of greenhouse gas emissions in the United States are from electricity production, transportation, industry, commercial and residential activities, and agriculture. Most of the emissions are due to burning fossil fuels, such as petroleum, coal, and natural gas. Others are due to the handling and waste management of certain chemicals. Recent concerns with climate change (global warming) have prompted directives to reduce greenhouse gases, of which carbon dioxide is the primary component.

The full effects of global warming caused by greenhouse gases are largely unknown but potentially very serious, including changes in precipitation causing flooding and drought; heat waves; warming of the oceans with the associated melting of the ice caps and rising sea levels; and higher acidity in the oceans.

Fugitive construction dust

Fugitive dust in the lower atmosphere is a type of particulate matter. It can be harmful to humans and the environment. Fugitive dust has been linked to asthma, emphysema, chronic obstructive pulmonary disease, bronchitis, and heart disease. It is also a component of haze, which causes visibility problems. It has both natural and man-made causes. Natural examples of fugitive dust include wind erosion and wildfires. Human activities that cause fugitive dust include agriculture, construction, commercial and industrial operations, burning materials, vehicle exhaust, and travel (for example, unpaved roads, tire wear,

and brake dust). The term "fugitive" refers to the widespread or open-area sources of the dust as compared to a single-point source, such as a smokestack.

Fugitive construction dust is only one component of lower atmospheric dust and particulate matter, but it is singled out for special consideration because of the potential effects on people within or near a major construction project such as I-70 East. Dust particles can be so small that they pass through the nasal cavity and into the lungs to cause damage. Also, toxic and cancer-causing chemicals can attach to dust and produce much more profound effects when inhaled. These situations may be worsened during construction projects requiring longer durations to complete.

5.10.2 What is required for Transportation Conformity?

All state governments are required to develop a State Implementation Plan (SIP), which explains how the State will comply with the requirements of the Clean Air Act. The Act requires that transportation plans, programs, and projects that are developed, funded, or approved by FHWA must demonstrate that such activities "conform" to the SIP. Transportation conformity requirements apply to any transportation-related criteria pollutants for which the project area has been designated a nonattainment or attainment/maintenance area (for the I-70 East project, these criteria pollutants are carbon monoxide, PM_{10}, and ozone).

Under Section 176(c) of the Clean Air Act, a transportation project is said to "conform" to the provisions and purposes of the SIP if the project, both alone and in combination with other planned projects, does not:

- Cause or contribute to new air quality violations of the NAAQS,
- Worsen existing violations of the NAAQS, or
- Delay timely attainment of the NAAQS or required interim milestones.

Conformity applies at both a regional and project level for transportation projects in air quality nonattainment and attainment/ maintenance areas. The regional conformity evaluations are not performed by CDOT, nor are they performed for individual CDOT projects. The regional evaluations are done by the Metropolitan Planning Organization (DRCOG, in this case) and the Colorado

Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) as part of the formal approval process for the RTP and TIP. The DRCOG Board voted on the 2040 Fiscally Constrained RTP 2015 Cycle 2 Amendment Application in October 2015 and will complete regional air quality modeling in time for a public hearing in January 2016, and a final Board vote in February 2016. The final conformity determination will be made before FHWA issues a ROD, in compliance with 40 CFR 93.

Furthermore, if the project changes in concept or design during the planning process, the regional emission analysis will need to be revisited and a conformity determination completed before the project can proceed (40 CFR 93.115).

Project-level or hotspot conformity analyses are performed by CDOT for individual projects. The analyses are needed to demonstrate that an individual project does not create new, increase the frequency of, or exacerbate the severity of air quality violations. A Memorandum of Agreement between APCD and CDOT provides local guidance for the hotspot evaluation process. Currently, these analyses apply only to carbon monoxide and particulate matter emissions.

A hotspot analysis for I-70 East is required for carbon monoxide because the Denver region is an attainment/maintenance area and because project screening criteria cited in 40 CFR 93.123 (a) were triggered. A PM_{10} hotspot analysis is required for projects of local air quality concern in PM_{10} nonattainment and attainment/ maintenance areas per 40 CFR § 93.123(b).

EPA regulations state that a project will be determined to be of local air quality concern if it meets any of five evaluation criteria. Two of the five criteria are related to transit projects and are not applicable to the I-70 East project. The remaining three criteria are all potentially applicable:

- New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles.
- Projects affecting intersections that are at level of service (LOS) D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.

What is a hotspot analysis?

A hotspot analysis is an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant NAAQS.

The small scale of the analysis (at the level of a congested highway interchange, for example) allows for a detailed examination of portions of the project area with the worst air quality to determine whether it will meet the NAAQS.

Project of local air quality concern

Projects are evaluated against five criteria defined by the EPA for determining if a project is of local air quality concern for PM_{10}. These criteria are related to projects that cause a significant increase in the number of diesel vehicles.

- Projects in or affecting locations in areas, or categories of sites that are identified in the $PM_{2.5}$ or PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The I-70 East project was determined to be a project of local air quality concern for reasons listed in the first two bullets on the previous page (significant increase in the number of diesel vehicles and intersections that are/will change to LOS D, E, or F with a significant number of diesel vehicles), through the Interagency Consultation process with CDOT, FHWA, EPA, and APCD. This determination confirmed the need for in-depth hotspot analysis to be completed for the Final EIS. Further detail of this interagency determination process is included in Attachment J, *Air Quality Technical Report*.

5.10.3 What study area was used to analyze air quality?

The air quality analyses for I-70 East are based on both a large geographic study area that encompasses the corridor and surrounding neighborhoods and localized hotspot areas that are focused on an intersection or interchange. These study areas are shown in **Exhibit 5.10-1**.

Exhibit 5.10-1 Air Quality Study Area

Sources of air pollution within the study area are mainly a result of traffic and industrial activity. Moderate to heavy traffic along north-south arterials, as well as the I-70 corridor itself, are major local contributors of traffic-related air pollution in the study area. The study area contains several locations of moderate- to high-intensity industrial activity, so it is prone to several point sources of air pollution, along with the commercial traffic and railroads associated with those activities.

5.10.4 What are the existing conditions for air quality?

The Denver metropolitan area is located in the South Platte River drainage area, with mountains located to the west and relatively high terrain to the south and north. Under certain meteorological conditions, the local topography has the tendency to trap pollutants, resulting in elevated ambient concentrations. The pollutants can be trapped under strong atmospheric temperature inversions that inhibit dispersion and cause poor air quality.

The areas directly adjacent to the I-70 corridor are primarily industrial with pockets of residential neighborhoods. In addition to the mobile source emissions analyzed in detail in this document, point-source pollution caused by nearby commercial sites is also a consideration for air quality. Pollution from large trucks is also a local consideration. Diesel vehicles travel the highway corridor, and use the local roadway network to reach commercial destinations throughout the study area.

Existing air quality conditions are described in this subsection in terms of the Denver region's attainment and nonattainment status for criteria pollutants, the status of the project as it relates to transportation conformity requirements, and the estimated 2010 emissions levels based on modeling of criteria pollutants, MSATs, and greenhouse gases.

Existing conditions—criteria pollutant emissions

EPA air quality status

As of January 2015, ground-level ozone is the only NAAQS criteria pollutant for which areas of Colorado are designated as nonattainment. Seven counties in the Denver metropolitan area and portions of two counties in the Colorado North Front Range are currently designated as nonattainment for exceeding the 2008 8-hour ozone standards.

The Denver region was previously designated nonattainment for carbon monoxide and PM_{10}. The region was re-designated to attainment/maintenance status (see box to the right) for carbon monoxide by the EPA on January 14, 2002, and for PM_{10} by the EPA on September 16, 2002 (EPA, 2002). Denver is in attainment for the 1997, 2006 and 2012 $PM_{2.5}$ standards. There have not been any exceedances of the carbon monoxide standard at any of the four monitoring stations in the study area since 1999. There has been one exceedance of the 24-hour $PM_{2.5}$ standard in 2001 at the CAMP station. Monitoring stations in the study area were shown previously in **Exhibit 5.10-1**.

Attainment/ maintenance status

Any geographic region of the United States that was previously designated nonattainment pursuant to the Clean Air Act Amendments of 1990 can subsequently be re-designated to attainment subject to the requirement to develop a maintenance plan under section 175A of the Clean Air Act, as amended.

Although there is currently no monitoring station located in close proximity to I-70, recently a near-road monitoring station was set up in the area to measure ambient air quality adjacent to a major interstate highway. Located along I-25 approximately 0.5 mile south of the Colfax Avenue interchange, this monitor collects data in close proximity to the busy I-25 corridor. In the first complete year of data collection (2014), the average 24-hour PM_{10} concentration was found to be 28.1 $\mu g/m^3$, and the maximum value for the year was 115.2 $\mu g/m^3$. These values are substantially below the 24-hour NAAQS for PM_{10} of 150 $\mu g/m^3$

Emission inventories—criteria pollutants

Emission inventories were developed for the NAAQS criteria pollutants. The year 2010 is used to represent existing levels of emissions, since this year is consistent with the most recent regional conformity model available at the time of publication. Existing emissions of criteria pollutants (or their precursors, as defined in Section 5.10.1) in the I-70 air quality study area are shown in **Exhibit 5.10-2.**

Exhibit 5.10-2 Existing (2010) Criteria Pollutant Emissions (study area, tons per day)

Pollutant	January	July
Volatile organic compounds (Ozone precursor)	3.34	3.38
Nitrogen oxides (Ozone precursor)	15.38	14.64
Carbon monoxide	53.10	55.58
PM_{10}	0.91	0.66
$PM_{2.5}$	0.74	0.51
Sulfur dioxide[1]	0.09	0.07

Note: Because lead has been eliminated from on-road vehicle fuels, it is no longer a pollutant of concern from roadway emissions, so it is not included in the analysis of criteria pollutants.

1. *Sulfur dioxide was analyzed because it is a pollutant of general air quality concern and contributes to the overall conditions of the study area. Sulfur dioxide is not considered a transportation-related criteria pollutant.*

Existing conditions—MSAT emissions

Although FHWA guidance recommends a quantitative analysis of MSATs, there are no national standards. Knowledge of MSATs is progressing and research continues. FHWA has issued interim guidance (Marchese, 2012) that addresses incomplete or unavailable information related to MSATs, and that language is included in Attachment J, *Air Quality Technical Report*. The technical report also contains information about national MSAT trends and ongoing MSAT research.

Emission inventories—MSATs

Emission inventories were prepared for the seven MSATs. The year 2010 is used to represent existing levels of emissions, since this year is consistent with the base year of the DRCOG regional travel demand model and the conformity determination for the RTP and TIP. Existing MSAT emissions in the I-70 air quality study area are shown in **Exhibit 5.10-3**.

Exhibit 5.10-3 Existing (2010) MSAT Emissions (study area, tons per day)

Pollutant	January	July
Benzene	0.066	0.093
Formaldehyde	0.050	0.053
1,3-Butadiene	0.009	0.011
Acrolein	0.003	0.004
Naphthalene	0.007	0.007
Polycyclic organic matter	0.003	0.003
Diesel particulate matter	0.374	0.377

Existing conditions—Greenhouse gas emissions

Within the study area, the daily greenhouse gas emission inventories were estimated by APCD to be 3,939 tons per weekday in January 2010 and 4,184 tons per weekday in July 2010. There are no specific requirements for conducting a greenhouse gas analysis for a NEPA project. To date, no national standards have been established regarding greenhouse gases, nor has the EPA established criteria or public health and safety thresholds for ambient greenhouse gas emissions pursuant to its authority to establish motor vehicle emission standards for carbon dioxide under the Clean Air Act.

The Air Quality Protocol developed through the Interagency Consultation process used for this project calls for the reporting of global, national, statewide, and regional emissions of greenhouse gases to provide context for the study area emissions calculated for the I-70 alternatives. Greenhouse gases are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere. The affected environment for carbon dioxide and other greenhouse gas emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric greenhouse gas concentrations. In contrast to broad scale actions such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the greenhouse gas emissions impacts from a particular transportation project. Furthermore, there is currently no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

FHWA has concluded, based on the nature of greenhouse gas emissions and the exceedingly small potential greenhouse gas impacts of the proposed action, that the greenhouse gas emissions from the proposed action will not result in "reasonably foreseeable adverse impacts on the human environment" (40 CFR 1502.22(b)).

The transportation sector—defined as all vehicles whose primary purpose is transporting people and/or goods from one physical location to another—is the second largest source of total greenhouse gas emissions in the U.S., behind

electricity generation. According to data from the Inventory of Greenhouse Gas Emissions and Sinks, 1990-2010 (EPA, 2012), the transportation sector was responsible for approximately 27 percent of all anthropogenic (human caused) greenhouse gas emissions in the U.S. in 2010. Carbon dioxide makes up the largest component of these greenhouse gas emissions. The U.S. Energy Information Administration calculates that U.S. transportation carbon dioxide emissions currently account for about 6 percent of worldwide carbon dioxide emissions.

While the contribution of greenhouse gases from transportation in the U.S. as a whole is a large component of U.S. greenhouse gas emissions, as the scale of analysis is reduced, the greenhouse gas contributions become quite small. **Exhibit 5.10-4** presents the relationship between current and projected state and global motor vehicle carbon dioxide emissions, as well as information on the scale of the project relative to statewide travel activity.

Exhibit 5.10-4 Existing (2010) Greenhouse Gas Emissions

Carbon dioxide emissions[1] (million metric tons)		Colorado motor vehicle emissions, % of global total	Project study area VMT, % of statewide VMT[2]
Global	Colorado motor vehicles		
29,670	24.1	0.0813%	5.6%

1. *These estimates are from the Energy Information Administration's International Energy Outlook 2010, and are considered the best-available projections of emissions from fossil fuel combustion. These totals do not include other sources of emissions, such as cement production, deforestation, or natural sources; however, reliable future projections for these emissions sources are not available.*
2. *Statewide annual VMT in 2010 (46,940 million) provided by U.S. DOT, FHWA, Highway Statistics, April 26, 2012*

Based on emissions estimates from EPA's MOVES model and global carbon dioxide estimates and projections from the Energy Information Administration, carbon dioxide emissions from motor vehicles in the entire state of Colorado contributed less than one tenth of one percent of global emissions in 2010 (0.0813 percent).

The daily VMT in the project study area in 2010 was about 5.6 percent of total VMT in the state. While there is not an exact correlation between VMT and emissions, there is a very strong relationship between the two, so it could reasonably be stated that the greenhouse gas emissions in the study area are roughly 5.6 percent of total statewide emissions from motor vehicles in 2010.

5.10.5 What process was used to analyze air quality?

The air quality analysis procedures for this document build upon the air quality analysis conducted for the 2014 Supplemental Draft EIS. For some pollutants, new guidance from EPA and/or APCD affected the analysis methodology.

There are many pollutants being considered as part of the air quality analysis for I-70 East. While similarities exist, the methodology for estimating pollution concentrations is specific to each pollutant. There also are separate requirements and procedures for conducting analyses for transportation conformity and NEPA. For this document, project-related effects on local ambient concentrations of carbon monoxide and PM_{10} were investigated using hotspot analyses, as described below. $PM_{2.5}$, nitrogen oxides, and other pollutants described above were examined more broadly with emission inventories for the study area as they are not considered to be pollutants of concern in the Denver area, based on the fact that the Denver area is not designated as nonattainment for these NAAQS.

Traffic data from the 2035 DRCOG regional travel demand model are used to conduct the air quality analysis for the Final EIS. The DRCOG model data comes from the Compass (Version 5.0) model, including minor updates to the socio-economic data set used in the Supplemental Draft EIS, and not from the newer Focus regional travel demand model. The Compass model is still the official model for use on project-level studies in the region, and is immediately available. For the Supplemental Draft EIS, traffic data from the FHWA approved DynusT model were compared to the DRCOG model traffic data through a series of sensitivity tests. Data from the two sources were found to be reasonably close, and thus the Final EIS continues to use the DRCOG model data.

The following subsections summarize the air quality study area and the methodologies used for the carbon monoxide and PM_{10} hotspot analyses and the emissions inventory burden analysis for NAAQS criteria pollutants, MSATs, and greenhouse gases. Additional details of the analysis are provided in Attachment J, *Air Quality Technical Report*.

Carbon monoxide hotspot methodology

The Denver region is an attainment/maintenance area for the pollutant carbon monoxide. Because of this, a quantitative project-level hotspot analysis was conducted for

this document. The Transportation Conformity Rule requires that emissions from a proposed FHWA or FTA project—when considered with existing background concentrations—will not cause or contribute to any new violations, worsen existing violations, or delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones. These criteria are satisfied for projects in carbon monoxide attainment/ maintenance areas using a hotspot analysis.

The Denver region originally received a nonattainment designation because of carbon monoxide levels in 1978, when it exceeded both the 1-hour and 8-hour NAAQS limits for carbon monoxide. The trends through the 1980s and mid-1990s, however, primarily exceeded only the 8-hour standard. The last time Denver exceeded the 1-hour standard occurred prior to 1990, according to the *Carbon Monoxide Maintenance Plan for the Denver Metropolitan Area* (Colorado Air Quality Control Commission, 2005). Because of this, the 8-hour standard is used as the basis for the carbon monoxide hotspot analysis. As long as the estimated concentrations for the relevant pollutants in these areas of interest are equal to or lower than the NAAQS, the project will demonstrate that Clean Air Act conformity requirements are met.

The carbon monoxide hotspot analysis for conformity purposes also serves as the analysis for NEPA. Results of the Supplemental Draft EIS analysis showed carbon monoxide concentrations below the NAAQS for all project alternatives. The Interagency Consultation process determined that for this document, only the Preferred Alternative would be initially modeled to be consistent with conformity determination. If results of the Preferred Alternative were shown to be in violation of the NAAQS, the No-Action Alternative would be modeled in addition to the Preferred Alternative. This decision is documented in the Air Quality Protocol, Appendix A of Attachment J, *Air Quality Technical Report*.

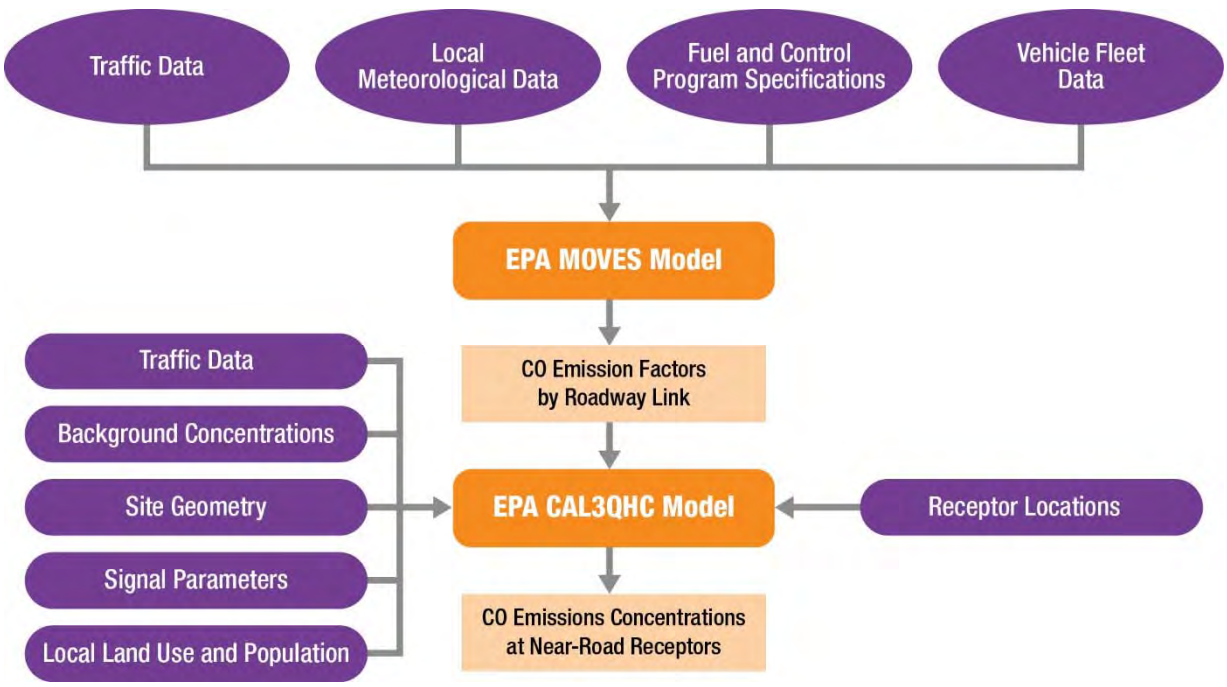
Traffic data in the form of future traffic volumes, vehicle miles of travel, and travel speeds simulates the activities that generate emissions from on-road motor vehicles.

The No-Action Alternative and Revised Viaduct Alternative both have options that shift I-70 south or north. These shifts have no impact on traffic circulation and are each considered a single alternative for the purpose of generating emissions from on-road motor vehicles.

Local meteorological conditions, fuel specifications, and emissions control programs are input into EPA's MOVES2010b model, in addition to the travel demand model results. The MOVES model uses this information to estimate on-road mobile-source (i.e., vehicle) emissions.

Emissions rates produced by MOVES then are fed into the CAL3QHC air quality dispersion model. CAL3QHC takes the carbon monoxide emissions rates and travel information from vehicles operating on the local roads and highways and models a single hour for two time periods (AM peak and PM peak), which generates a one-hour maximum predicted concentration. A persistence factor then is applied to generate an eight-hour maximum predicted concentration. To be consistent with local conformity processes, modeled background concentrations were provided by APCD as inputs for CAL3QHC analysis for this evaluation. **Exhibit 5.10-5** shows the modeling process used for the quantitative carbon monoxide hotspot analysis.

Exhibit 5.10-5 Modeling Process for the Carbon Monoxide Hotspot Analysis



Model selection

As required by the Transportation Conformity Rule, an emissions model and an air quality dispersion model were selected through the Interagency Consultation process. EPA's MOVES model was selected for use at the project scale to estimate emissions for each roadway link in the carbon monoxide hotspot study area. MOVES is the

approved and recommended emissions model for carbon monoxide hotspot analyses for conformity determinations (EPA-420-B-12-010).

EPA's CAL3QHC model was selected for the air dispersion analysis and estimation of pollutant concentrations at receptors in and around the carbon monoxide hotspot study area. CAL3QHC combines a steady-state dispersion model with a traffic model to calculate delays and queues at signalized intersections. CAL3QHC is one of the approved and recommended air dispersion models for analyzing carbon monoxide impacts at intersections.

Locations to model

The intersection location(s) for the carbon monoxide hotspot analysis were determined through the Interagency Consultation process. The Transportation Conformity Rule requires modeling of intersection locations that are or will be at LOS D or worse (see box to the right). In the case of the I-70 project, this would be dozens of intersections. The 2008 Draft EIS included carbon monoxide hotspot modeling for four worst-case intersections. For the 2014 Supplemental Draft EIS, the modeling effort was scaled back to one intersection.

The 2008 Draft EIS found that the interchange at I-70 and Colorado Boulevard will have the highest carbon monoxide concentrations in the study area for the build scenarios previously considered. The alternatives evaluated in this document are expected to have similar impacts on speeds and traffic volumes to those in the 2008 Draft EIS and the 2014 Supplemental Draft EIS. Thus, this location still is considered to represent the worst case for emissions within the study area and is the only location modeled as part of the carbon monoxide hotspot analysis.

With EPA Regional Administrator approval, the modeling of only one location is an alternative methodology allowed under Section 93.123(a)(1) of the Transportation Conformity Rule. The alternative approach was proposed through the Interagency Consultation process and approved by the EPA Regional Administrator in a letter to CDOT dated June 12, 2013, as required by the rule. This letter states that the carbon monoxide hotspot location must be re-evaluated for the Final EIS using revised traffic data which was completed for this document. The EPA's letter as well as details about the re-selection of Colorado Boulevard as the carbon

Level of service

Roadway level of service (LOS) is a measure of congestion delay. It can be thought of as a grading scale, where LOS A is excellent and implies high levels of mobility and ease of maneuverability. LOS F represents failure and indicates that the road is experiencing heavy traffic volumes, congestion, and stop-and-go traffic. LOS D indicates congesting traffic conditions.

monoxide hotspot location is contained in Appendix B of Attachment J, *Air Quality Technical Report*.

Analysis years/year of peak emissions

Section 93.116(a) of the Transportation Conformity Rule requires that carbon monoxide hotspot analyses consider the full time frame of an area's transportation plan. If the carbon monoxide concentrations in the year of peak emissions are lower than the NAAQS, then it can be assumed that no adverse impacts will occur in any years within the time frame of the plan.

Rather than perform traffic modeling and hotspot analyses for numerous years to determine the year of peak emissions, the effort was streamlined through the Interagency Consultation process and approved by the EPA Regional Administrator. In the streamlined approach, CDOT used the highest carbon monoxide emissions factors—in this case, for the year 2010—and the highest VMT (2035) to represent a worst-case condition. (Air quality trending analysis shows vehicle emissions decreasing over time due to fleet turnover and improving efficiency in vehicle technologies.) With this approach, it is not necessary to analyze several years to determine the year of peak emissions.

If the worst traffic conditions (e.g., highest traffic volumes, most congestion delay, highest travel times, etc.) and highest emission rates are modeled, then the resulting carbon monoxide concentration is the highest that potentially could be experienced between 2010 and 2035. If the worst resulting concentration is less than the NAAQS, then all other less congested locations in the corridor could be expected to be lower than the NAAQS as well.

Project-specific data

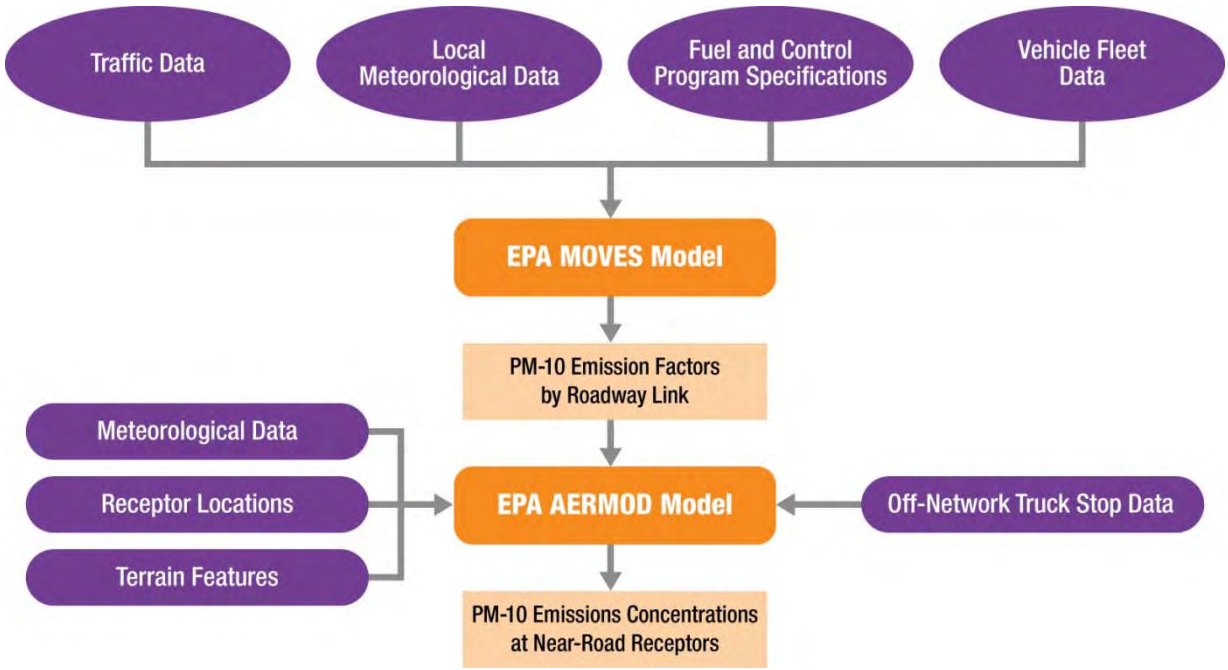
The Transportation Conformity Rule requires that the carbon monoxide hotspot analysis assumptions be consistent with the regional emissions analysis for conformity of the RTP and TIP, and it requires that project-specific data be used that are consistent with the major design features of the project. The data applied in this carbon monoxide hotspot analysis are consistent with the assumptions used in the conformity determination for the RTP and TIP. In addition, project-specific data—such as traffic volumes and site geometry—are consistent with the major design features of the project. The hotspot analysis uses background concentrations of 4.55 ppm for 8-hour and 6.73 ppm for 1-hour averaging times, derived from ambient monitoring

data as provided by APCD. Data sources and assumptions used in the carbon monoxide hotspot analysis are included in Attachment J, *Air Quality Technical Report*, for the MOVES and CAL3QHC models.

PM_{10} hotspot methodology

I-70 East was determined, through the Interagency Consultation process, to be a project of local air quality concern for PM_{10}; therefore, a formal conformity determination must be performed. This hotspot analysis follows the requirements in the Transportation Conformity Rule and EPA's conformity guidance for quantitative particulate matter hotspot analyses (EPA-420-B-13-053), as described in **Exhibit 5.10-6**.

Exhibit 5.10-6 Modeling Process for the PM_{10} Hotspot Analysis



A hotspot analysis is conducted for specific locations, such as congested roadway intersections. It uses an on-road mobile emissions model in combination with an air quality dispersion model to determine design values that represent local PM_{10} pollutant concentrations at near-road receptor locations. The modeled pollutant concentrations then are compared to the NAAQS. PM_{10} concentrations, or design values, must be equal to or lower than the NAAQS to meet Clean Air Act conformity requirements.

In addition to the conformity rule, an EPA memorandum (*Using MOVES and EMFAC Emissions Models in NEPA Evaluations*, Bromm, February 8, 2011b) provides guidance

for the PM_{10} hotspot analysis by recommending that the same model be used in NEPA documents as is used for determining transportation conformity to maximize coordination and minimize confusion. For this project, the PM_{10} hotspot analysis for conformity purposes also serves as the analysis for NEPA.

Emissions rates produced by MOVES then were entered into the AERMOD air quality dispersion model. AERMOD uses the PM_{10} emissions rates from vehicles operating on the local roads and highways, truck idling activity at the off-network truck stop, and the emission factors from the covered highway (as applicable). AERMOD performs all ambient air impact calculations on an hourly basis at each receptor. These hourly concentrations for all receptors then are post-processed by different algorithms to calculate the corresponding averaging periods (e.g., 8-hour, 24-hour, etc.) and design concentrations according to the statistical form of each NAAQS.

Details about specifications for using AERMOD are included in Attachment J, *Air Quality Technical Report*.

Model selection

An emissions model and an air quality dispersion model were selected through the Interagency Consultation process. EPA's MOVES2010b model was selected for use at the project scale to estimate emissions for each roadway link in the PM_{10} hotspot locations. EPA's AERMOD model (version AERMOD14134) was selected through Interagency Consultation for the air dispersion analysis and estimation of pollutant concentrations at receptors in the local near-road land areas. AERMOD can model closure of the truck stop in the corridor affected by some of the alternatives, and it also can model the outflow from the proposed covered portion of I-70. Depressed sections of the roadway were modeled using AERMOD's OPENPIT source type.

Locations to model

The geographic area to be covered by the PM_{10} hotspot analysis was determined through the Interagency Consultation process. As per EPA conformity guidance, it was agreed that rather than analyzing all interchange locations across the entire study area, it would be appropriate to focus the PM_{10} hotspot analysis at two locations that were expected to have the highest concentrations. Considerations for locations with the highest concentrations include areas with the highest traffic volumes

and congestion, nearby land uses with public access, high numbers of diesel vehicles, and other factors. The highest volume locations in the study area are associated with major interchanges. The major interchanges and their 2035 traffic forecasts from the DRCOG regional travel demand model run are listed in **Exhibit 5.10-7**. The forecasted volumes for the other alternatives are similar.

Exhibit 5.10-7 Interchange Traffic Volumes (2035)

Interchange	2035 Annual Average Daily Traffic
I-70/I-25	~495,000
I-70/I-270	~260,000
I-70/I-225	~355,000
I-70/Peña Boulevard	~235,000

Source: 2035 DRCOG regional travel demand model, Compass Version 5.0

The I-70/I-25 interchange is just outside of the project limits, but upwind of the study area under some conditions. As the numbers in **Exhibit 5.10-7** indicate, the interchanges of I-70 with I-25 and I-225 have higher traffic volumes than the other two locations. Furthermore, background concentrations are expected to be very similar at the four locations based on the proximity of nearby PM_{10} monitors.

Considering these factors, two interchange locations were selected for the analysis:

- I-70/I-25 interchange area from I-25 to the Steele Street/Vasquez Boulevard interchange
- Area around the I-70/I-225 interchange

Decisions about what seasons to model and the analysis year/year of peak emissions were determined through the Interagency Consultation process. Data sources and assumptions about the PM_{10} hotspot analysis are included in Attachment J, *Air Quality Technical Report*.

Estimating emissions from road dust, construction, and additional sources

Through the Interagency Consultation process, the agencies agreed that a quantitative PM_{10} hotspot analysis will be conducted to calculate design values at more than 16,000 receptors in the areas around the locations of interest for the No-Action and Build Alternatives. The PM_{10} hotspot analysis includes PM_{10} emissions from on-road mobile sources and from an off-highway truck stop located at the northeast

corner of I-70/46th Avenue and Steele Street/Vasquez Boulevard.

The following list summarizes the emissions included and not included in this PM_{10} hotspot analysis:

- Exhaust, brake wear, and tire wear emissions from on-road vehicles were included in this analysis.
- Re-entrained road dust kicked up into the air by passing vehicles was included in this PM_{10} hotspot analysis. Road dust is a significant component of PM_{10} emissions from mobile sources (see below).
- Emissions from construction-related activities were not required and, therefore, not included in this PM_{10} hotspot analysis since these emissions are considered temporary, as defined in 40 CFR 93.123(c)(5). Temporary increases in PM_{10} emissions due to construction-related activities are defined in the regulation as those occurring only during construction that last five years or less at any given site.

Road dust emissions

Dust from erosion, deposition and winter sanding is a significant factor of particulate emissions within the project area. Road dust emissions are estimated to contribute approximately 70 percent of the total daily PM_{10} emissions at the two hotspot locations. MOVES does not calculate PM emissions from road dust. To estimate road dust and sanding emissions for this analysis, emissions factors from the most recent PM_{10} maintenance conformity modeling were compared with control factors currently achieved by CDOT.

CDOT currently uses increased sweeping and sanding control measures to reduce road dust emissions. In some places, emissions factors are reduced beyond factors reported in the SIP by as much as 60 percent. The results of the PM_{10} analysis include maintenance program benefits and values to include the existing sweeping program for all alternatives.

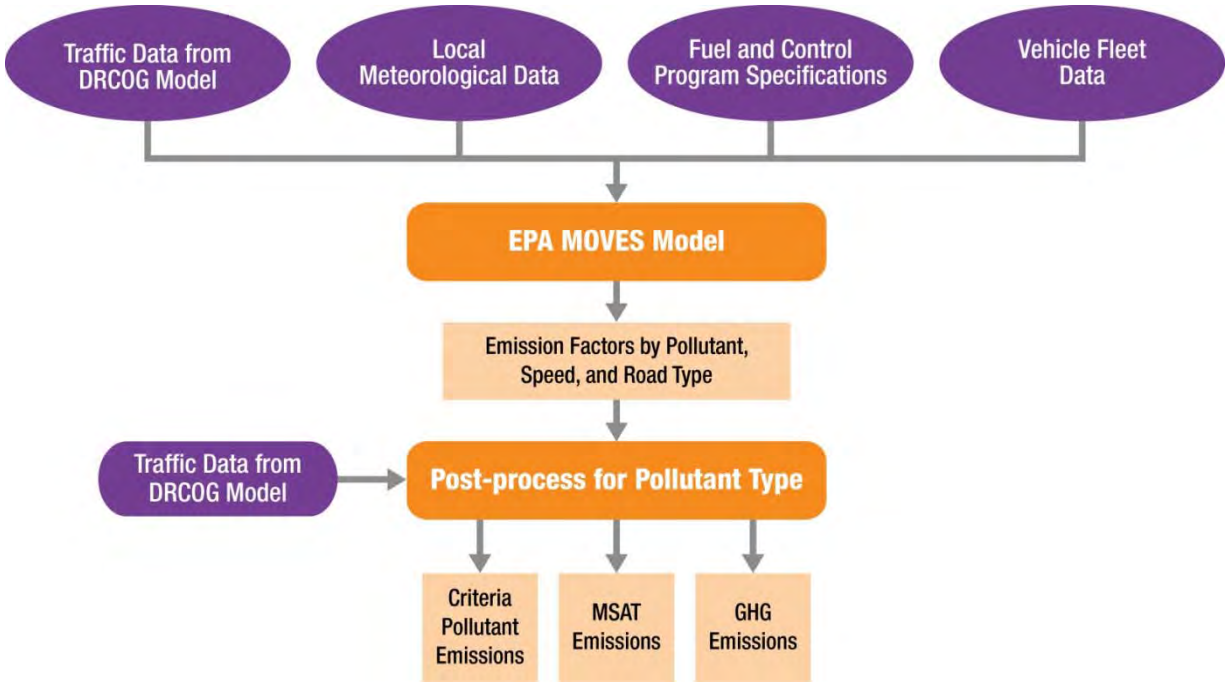
Background concentrations

After reviewing locations of three monitors on aerial photographs, the Commerce City site was selected through Interagency Consultation as the background monitor since it is most representative of the industrial PM_{10} contributions in the study area and is a reasonable distance from the I-70 corridor. For this document, the background concentrations were estimated using 2011 to 2013 data, resulting in a background PM_{10} value of 89 $\mu g/m^3$.

Methodology for criteria pollutants, mobile source air toxics, and greenhouse gases

Emission inventories of NAAQS criteria pollutants, mobile source air toxics, and greenhouse gases were developed for the No-Action Alternative and the Build Alternatives. The inventories allow for the assessment of these pollutants and their potential impacts by alternative. The methodologies to prepare the inventories and assess impacts are common to each of these three categories of pollutants. The inventories were prepared for 2010 and 2035 by APCD using EPA's MOVES2010b model and interpolated for each interim five-year increment. **Exhibit 5.10-8** shows the modeling process used for this analysis.

Exhibit 5.10-8 Modeling Process for the Criteria Pollutant, MSAT, and Greenhouse Gas Analyses



For this analysis, the project alternatives were modeled to generate traffic information. The No-Action Alternative and Revised Viaduct Alternative both have options that shift I-70 south or north. These shifts have no impact on traffic circulation and are each considered a single alternative for the purpose of projecting traffic, congested speeds, and emissions for all of the alternatives.

Local meteorological conditions, fuel specifications, and emissions control programs are input into the MOVES model, in addition to the travel demand model results. The MOVES model uses this information to estimate on-road

mobile source emissions factors in units of grams per mile. The emissions factors are multiplied by the daily (24-hour weekday period) vehicle miles of travel for every roadway link in the study area based on the link's roadway functional classification and estimated congested speed. The emission inventories are the sum of the link emissions. The resulting inventories represent a weekday (24-hour period) for January and July in the respective analysis years.

Air quality model selection

EPA's MOVES2010b model was selected through the Interagency Consultation process for use in preparing the criteria pollutant, MSAT, and greenhouse gas emission inventories. MOVES allows for the use of project-specific, local data where it is available, and it has the capability of modeling pollutant-origination processes that estimate exhaust and evaporative emissions, as well as brake and tire wear emissions, from all types of on-road vehicles.

Pollutants to analyze

Analysis of NAAQS-related emissions addresses five criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide, and ozone. Sulfur dioxide was analyzed because it is a pollutant of general air quality concern and contributes to the overall conditions of the study area. Sulfur dioxide is not considered a transportation-related criteria pollutant. Because lead has been eliminated from on-road vehicle fuels, it is no longer a pollutant of concern from roadway emissions, so it is not included in the analysis of criteria pollutants. MSAT analyses cover the most recent list of seven priority MSATs in FHWA's 2012 guidance (Marchese, 2012). The MOVES emissions factors for greenhouse gases include adjustments for the most recent changes to the corporate average fuel economy (CAFE) standards. Identical travel and meteorological data were used for all pollutants.

Geographic area

The emission inventories are based on a large geographic study area that encompasses the corridor study area and surrounding neighborhoods. The study area was determined based on the area in which forecasted traffic volumes change between the No-Action Alternative and the Build Alternatives.

Analysis years

As defined in the Air Quality Protocol developed through the Interagency Consultation process, the emission inventories

were prepared for the 2010 base year and the regional transportation plan's horizon year of 2035 by APCD. To support the trends analysis, inventories were estimated for each intervening five-year increment: 2015, 2020, 2025, and 2030. A Phase 1 condition was also analyzed to show conditions at the first phase of project construction. More information on the results are included in Chapter 8, Phased Project Implementation.

The project is anticipated to be completed between 2020 and 2025, so 2025 is the first analysis year to contain a Build Alternative condition. Therefore, the 2010, 2015, and 2020 inventories are common to all alternatives for a given pollutant, whereas the 2025, 2030, and 2035 inventories are specific to each alternative.

Temporal and seasonal conditions

The emission inventories for criteria pollutants, MSATs, and greenhouse gases represent a January weekday (24-hour period) and a July weekday (24-hour period) in the respective analysis years. The use of weekdays captures peak traffic conditions that occur in the morning and evening rush hours on weekdays. Both January and July are reported separately to indicate peaking characteristics of the various pollutants.

Planning assumptions

In preparing the emission inventories, the most recent planning assumptions consistent with the most recent conformity determination for the RTP and TIP were used by APCD. Many of these planning assumptions, such as existing and future households and employment, are built into the DRCOG regional travel demand model.

Traffic data

The traffic data (e.g., vehicle miles of travel, congested speeds) for this analysis were obtained from the 2010 base year model and the 2035 DRCOG regional travel demand model runs for the No-Action Alternative and Build Alternatives. The 2035 No-Action Alternative model is consistent with the model, network, and other assumptions used for the conformity determination of the RTP and TIP. The 2035 Build Alternatives were developed using the 2035 No-Action roadway network as a starting point.

Overview of the MOVES modeling process

Emissions factors were generated using MOVES at the county scale. In MOVES, the county scale is one of three options for running the model. It facilitates the use of local

input data to develop emissions factors. It does not mean that county-level emissions totals are generated. Rather, the emissions factors from MOVES are multiplied by the VMT at the roadway link level based on the speed estimated for the link. This is done for all links in the air quality study area so that the resulting emission inventories represent the on-road mobile source emissions generated in the study area.

Construction fugitive dust

The estimation of fugitive emissions from construction is not possible until specific construction methods and sequencing are developed for the selected Preferred Alternative. This is because the emissions factors used to estimate construction emissions require specific information regarding equipment type, (i.e., dozer, scraper, grader, etc.), operating hours, vehicle speed, project duration, and so forth.

In the absence of this detailed information, it is possible to provide a relative comparison among the alternatives based on the amount of material to be handled. In general, the more material moved, the greater the construction-related fugitive dust emissions. Therefore, the total amount of material handled is used as a surrogate measure for understanding the relative dust and equipment-related exhaust particulate emissions during construction.

5.10.6 How do the project alternatives potentially affect air quality?

This subsection discusses the results of the air quality analysis and the effects of the alternatives on air quality. It is arranged in the following order of pollutant analyses:

- Carbon monoxide hotspot analysis
- PM_{10} hotspot analysis
- Criteria pollutant emission inventories
- MSAT emission inventories
- Greenhouse gas emission inventories
- Construction fugitive dust emissions

Carbon monoxide hotspot results and effects

According to Section 4.7.3 of the 1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA, 1992), the total carbon monoxide concentration at each receptor is calculated as the sum of the modeled concentration and the background concentration

attributable to other local emissions sources. Concentrations in **Exhibit 5.10-9** are shown for the receptors with the highest levels inside the carbon monoxide hotspot study area.

As shown in **Exhibit 5.10-9**, the 8-hour design values resulting from the carbon monoxide hotspot analysis are below the 8-hour NAAQS limit of 9 ppm, and the 1-hour design values are well below the 1-hour NAAQS limit of 35 ppm. Since the carbon monoxide hotspot analysis is a worst-case study, it is reasonable to conclude that the carbon monoxide emissions at any intersection affected by the project also will be below the NAAQS limit.

Exhibit 5.10-9 Carbon Monoxide Hotspot Analysis at I-70 and Colorado Boulevard for the Partial Cover Lowered Alternative with Managed Lanes Option

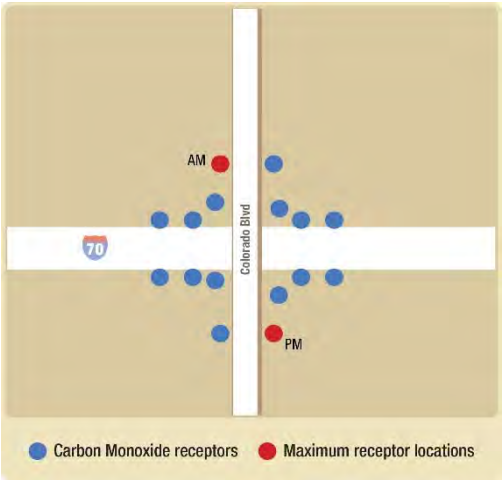
Period	Averaging Time	Carbon Monoxide Concentration (ppm)		
		Modeled Result from CAL3QHC	Background	Total Carbon Monoxide
AM	1 hour	3.61	6.73	10.34
AM	8 hour	2.53	4.55	7.08
PM	1 hour	3.53	6.73	10.26
PM	8 hour	2.47	4.55	7.02

Note: 8-hour design values resulting from the carbon monoxide hotspot analysis are below the 8-hour NAAQS limit of 9 ppm, and the 1-hour design values are well below the 1-hour NAAQS limit of 35 ppm.

It is noteworthy to repeat that the carbon monoxide hotspot analysis used a worst-case scenario in which the 2035 VMT activity was multiplied by MOVES emissions factors that represent the year 2010. With regard to Section 93.116 of the Transportation Conformity Rule, based on the carbon monoxide hotspot analysis and resulting total carbon monoxide concentrations, the project will not cause new local violations of the NAAQS standards for carbon monoxide, nor will it increase the severity or number of existing violations or required interim emission reductions or other milestones. Although the Preferred Alternative meets the hotspot analysis requirements for project-level conformity, it also must be included in the regional emissions analysis of a conforming RTP and TIP before a conformity determination can be made.

Maximum receptor locations

The receptors with the maximum carbon monoxide concentrations are shown by AM and PM traffic period (figure to the right). The maximum receptor in the AM period is located in the northwestern quadrant of the intersection, the maximum receptor in the PM period is located in the southeastern quadrant. These results are consistent with general traffic flow during those hours.



Maximum receptors show the highest daily concentration for the Partial Cover Lowered Alternative under worst-case conditions. The locations of receptors are shown for illustrative purposes and are upon the relative location of the receptor in relation to the interchange.

Sensitive receptors

Sensitive receptors include locations in the vicinity of a roadway that are likely to contain populations who are most susceptible to the adverse effects of exposure to pollutants, such as hospitals, schools, child care facilities, and elder care facilities. Residential communities that are located in proximity to high-traffic freeways and roads also can be considered sensitive populations.

There are no sensitive receptors within the I-70/Colorado Boulevard hotspot study area, which represents the highest concentration of carbon monoxide in the study area. The hotspot study area consists of industrial and commercial facilities within the Elyria and Swansea Neighborhood.

Swansea Elementary School is the most notable concern for pollutant exposure because of its youth population, proximity to the highway, and frequency of outdoor activities. This school is located at Elizabeth Street between York Street and Steele Street/Vasquez Boulevard, just north of I-70 and outside of the carbon monoxide hotspot study area. Since the carbon monoxide emission concentrations for all alternatives at the worst-case interchange are below the NAAQS limit at all modeled receptor locations, it is reasonable to conclude that the carbon monoxide emissions at Swansea Elementary School also are below the NAAQS limit.

PM_{10} hotspot results and effects

EPA's guidance (EPA-420-B-13-053) for calculating design values was applied for the PM_{10} hotspot analysis; and the design values estimated through the hotspot analysis were compared against the NAAQS for PM_{10}. Compliance with the 24-hour PM_{10} NAAQS is based on the expected number of 24-hour exceedances of a particular level (currently 150 $\mu g/m^3$), averaged over three consecutive years. Currently,

the NAAQS is met when the expected number of exceedances is less than or equal to one. The 24-hour PM_{10} design value is rounded to the nearest 10 µg/m³. For example, 155.000 rounds to 160, and 154.999 rounds to 150. These rounding conventions were followed when calculating design values for the hotspot analysis. The contributions from the project, nearby sources, and background concentrations from other sources are combined to estimate 2035 emission concentrations (i.e., design values) at receptor locations in the two hotspot study areas.

Design values

Current direction from the EPA's Office of Transportation and Air Quality states that a design value for PM_{10} is calculated at each receptor by directly adding the sixth highest modeled 24-hour concentrations to the fourth highest 24-hour background concentration recorded over the past three years of monitoring data. **Exhibit 5.10-10** and **Exhibit 5.10-11** show receptor locations and design value concentrations of PM_{10} for the No-Action Alternative and the Partial Cover Lowered Alternative in 2035. Values shown include both background concentrations and modeled values. **Exhibit 5.10-12** contains the hotspot analysis results for the I-70/I-25 and I-70/I-225 locations. The modeled project emissions concentrations include exhaust, brake wear, and tire wear emissions from on-road vehicles and re-entrained road dust kicked up into the air by passing vehicles.

Exhibit 5.10-10 I-70/I-25 PM_{10} Hotspot Receptor Locations and Maximum Concentrations for No-Action Alternative (2035)

Exhibit 5.10-11 I-70 / I-25 PM_{10} Hotspot Receptor Locations and Maximum Concentrations for Partial Cover Lowered Alternative (2035)

Exhibit 5.10-12 PM_{10} Hotspot Analysis

Alternative	Forecasted 2035 PM_{10} Concentrations (µg / m³)					
	General-Purpose Lanes Option			Managed Lanes Option		
	Modeled Project	Project + Background[1]	Design Value	Modeled Project	Project + Background[1]	Design Value
I-70 at I-25						
No-Action Alternative	62	151	150	N/A	N/A	N/A
Revised Viaduct Alternative	62	151	150	64	153	150
Partial Cover Lowered Alternative	63	152	150	57	146	150
I-70 at I-225						
No-Action Alternative	26	115	120	N/A	N/A	N/A
Revised Viaduct Alternative	35	124	120	41	130	130
Partial Cover Lowered Alternative	46	135	140	40	129	130

Note: Design values for all alternatives at the I-25 and I-225 hotspot locations are less than the 24-hour PM_{10} NAAQS of 150 µg/m3.
1. A background concentration of 89 µg/m³ was used to estimate total 24-hour concentrations

As shown **Exhibit 5.10-12**, the results of the PM_{10} hotspot analysis demonstrate that all of the alternatives, including the No-Action Alternative, will be in compliance with the applicable 24-hour NAAQS standard for PM_{10}. The largest variation in PM_{10} results is reported at the I-225 hotspot location where the design value for the Partial Covered

Lowered Alternative is higher than both the No-Action and Revised Viaduct Alternatives. These differences are mainly explained by variations in VMT between alternatives at that location. Because of the large dust component of particulate matter emissions, the design values are very sensitive to differences in VMT between alternatives.

The design values for all alternatives at the I-25 and I-225 hotspot locations are less than the 24-hour PM_{10} NAAQS of 150 μg/m^3.

These design values vary from those modeled in the Supplemental Draft EIS. It is worth noting that the difference in results does not stem from any design changes made to the alternatives modeled, but instead, reflects decisions made during the Interagency Consultation process. Methodology differences that had the greatest impact on modeling results include the following:

- As requested by APCD, meteorological data from the former Stapleton International Airport site was used rather than DIA, as used in the Supplemental Draft EIS. The data from Stapleton show a significantly lower atmospheric mixing height than at DIA, which can result in stronger inversions and changes to dispersion rates of pollutants from the highways.
- EPA guidance revised since the publishing of the Supplemental Draft EIS updated requirements for the placement of model receptors. This document includes modeling more receptors in the hotspot area than for the Supplemental Draft EIS. Changes to the EPA guidance for receptor placement also resulted in significantly more receptors in close proximity to the highway, and therefore, a thorough analysis of potential near-road conditions.
- Revised EPA guidance on background concentrations for PM_{10} hotspot analyses resulted in a background concentration of 89 μg/m^3, substantially lower than what was used for the previous analyses (113 μg/m^3).

Again, the design values presented in **Exhibit 5.10-12** simulate worst-case conditions because they represent the highest PM_{10} concentrations at the highest traffic volume locations in the corridor and in the year of peak emissions (2035). Therefore, it can be assumed that the PM_{10} concentrations will be lower than these values at every possible receptor location throughout the corridor, including all schools, parks, open spaces, and other places.

Sensitive receptors

As noted earlier, sensitive receptors are locations in the vicinity of a roadway that are likely to contain populations who are most susceptible to the adverse effects of exposure to pollutants. Sensitive receptors within the study area consist of schools, homes, and recreational facilities within the Elyria and Swansea Neighborhood. Swansea Elementary School is the most notable concern for pollutant exposure because of its youth population, proximity to the highway, and frequency of outdoor activities.

The school is located at Elizabeth Street between York Street and Steele Street/Vasquez Boulevard just north of I-70. It is within the I-70/I-25 PM_{10} hotspot study area. Following the procedures described above in PM_{10} Hotspot Methodology and in Attachment J, *Air Quality Technical Report*, receptors within the hotspot location have been highlighted to show effects to sensitive receptors. Modeled pollutant concentrations are available for 10 receptors located on the school property, as listed in **Exhibit 5.10-13** and shown in **Exhibit 5.10-14**.

Exhibit 5.10-13 PM_{10} Design Value Concentrations at Swansea Elementary School

Receptor Number and Location	Forecasted 2035 PM_{10} Concentrations ($\mu g/m^3$)[1]		
	No Action Alternative	Revised Viaduct Alternative	Partial Cover Lowered Alternative
1. Playground Southwest	110	120	100
2. School Building Southwest Corner	110	110	100
3. Playground South	110	120	100
4. School Building South Edge	110	110	100
5. Playground Southeast	110	120	100
6. Playground Northeast	110	110	100
7. Columbine St—School Bus Loading Zone	110	110	100
8. Columbine St between 46th Ave and 47th Ave	110	110	100
9. Columbine St and 47th Ave	100	100-110[2]	100
10. Elizabeth St between 46th Ave and 47th Ave—unpaved parking lot across from school	110	110	100

Note: 24-hour NAAQS for PM_{10} is 150 $\mu g/m^3$
1. Concentrations include project concentrations by alternative plus a background concentration of 89 $\mu g/m^3$
2. Range in values reflects the lower concentration with the Managed Lanes Option (100) compared to the General Purpose-Lanes Option of 110. There are no differences between the options for the other locations.

Exhibit 5.10-14 Sensitive Receptor Locations

As shown in **Exhibit 5.10-13**, all of the modeled concentrations at the school are well below the 24-hour PM_{10} standard of 150 μg/m^3. With regard to Section 93.116 of the Transportation Conformity Rule, based on the PM_{10} hotspot analysis and resulting total PM_{10} concentrations, the project will not cause new local violations of the NAAQS standards for PM_{10}, nor will it increase the severity or number of existing violations or required interim emission reductions or other milestones. Although the Preferred Alternative meets the hotspot analysis requirements for project-level conformity, it also must be included in the regional emissions analysis of a conforming RTP and TIP before a conformity determination can be made. It is also worth noting that these results are significantly lower than those modeled for the Supplemental Draft EIS, due to the revision to EPA guidance on background concentrations discussed above.

Criteria pollutant emission inventories and effects

An emission inventory, also referred to as an emission burden analysis, is a generalized study of emission trends in the study area, and separate from the required hotspot analysis discussed above. The emission inventories for the criteria pollutants were developed based on the previously described process and input data. The emission inventories are based on vehicle traffic for the roadway segments included in DRCOG's regional travel demand model and in the air quality study area shown in **Exhibit 5.10-1**. This includes all roadway segments directly affected by the project, and additional roadway segments where traffic volumes will change as a result of the project alternatives. Because the analyses are designed to encompass the project study area, they also reflect traffic on some roadway segments that would not be affected by the project.

As a result, the emissions *totals* reported in this section should be interpreted as representing motor vehicle emissions projected to occur within the study area, including both the roadways that are affected by the project and those that are not. Since all the highway segments and most of the major streets in the study area do experience traffic volume changes as a result of the project alternatives, the majority of the emissions reported in this section do occur on roadways affected by the project. Also note that the *differences* in emissions between alternatives reported in the various exhibits are solely due to the project's differences between the alternatives.

Each of the Build Alternatives as well as the No-Action Alternative have been analyzed to determine if any of the alternatives result in a pollutant to become a discriminating factor, or outlier, in this analysis. Any variations in the general emission inventory trends are noted.

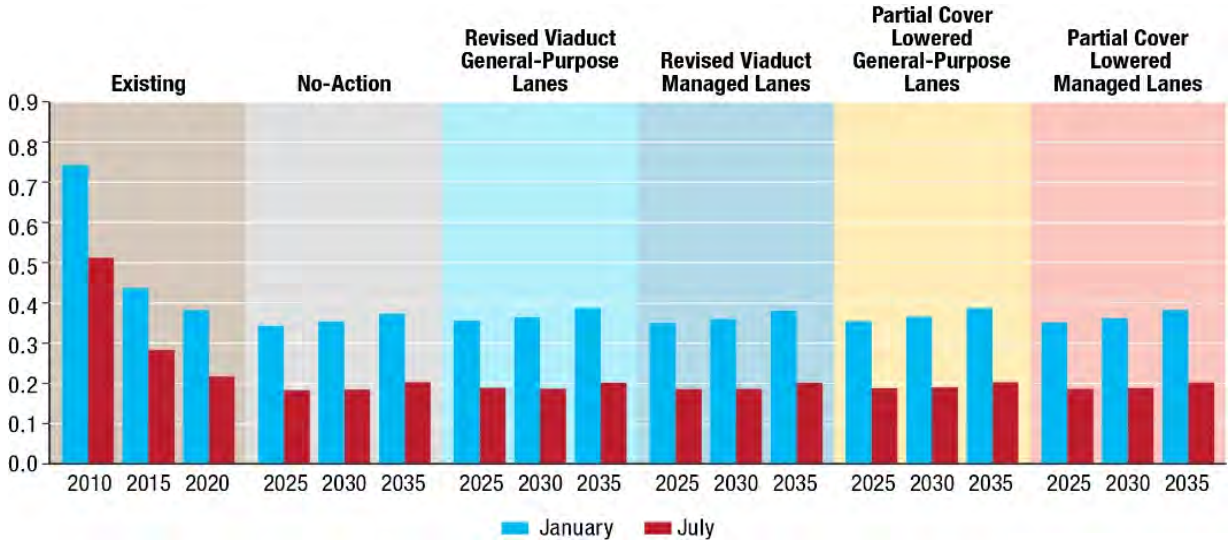
The criteria emissions information that is provided in this section appears in pounds per day and only as bar graphs. Table format (i.e., numeric) data also are available in Attachment J, *Air Quality Technical Report*.

Ozone-related emissions are documented with inventories of its two primary precursor pollutants: volatile organic compounds and nitrogen oxides. Lead has been completely phased out of motor vehicle fuels in the United States and is no longer a vehicle emissions concern, so no inventories were prepared for that pollutant.

Particulate matter

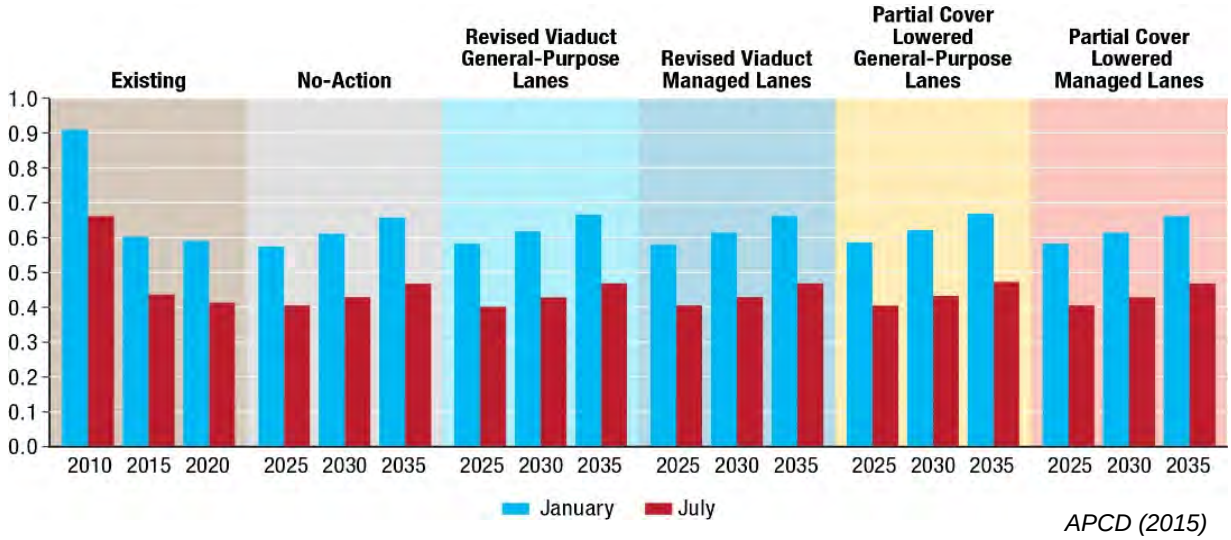
Exhibit 5.10-15 and **Exhibit 5.10-16** show the values for the $PM_{2.5}$ and PM_{10} emission inventories. From 2010 forward, both pollutants trend downward, due primarily to the cleaner standards for diesel engines, until about 2025 or 2030, when they trend higher as vehicular travel growth overtakes the technology-based emission reductions. Although there are minor differences in emissions among the No-Action Alternative and Build Alternatives, there is no real discernible difference since they are all very close in any given year. Therefore, the particulate matter emissions are not a discriminating factor in the identification of a Preferred Alternative. Note that road dust is not included in these estimates, but is presented in **Exhibit 5.10-24**.

Exhibit 5.10-15 $PM_{2.5}$ Emission Inventories (tons per day)



APCD (2015)

Exhibit 5.10-16 PM_{10} Emission Inventories (tons per day)



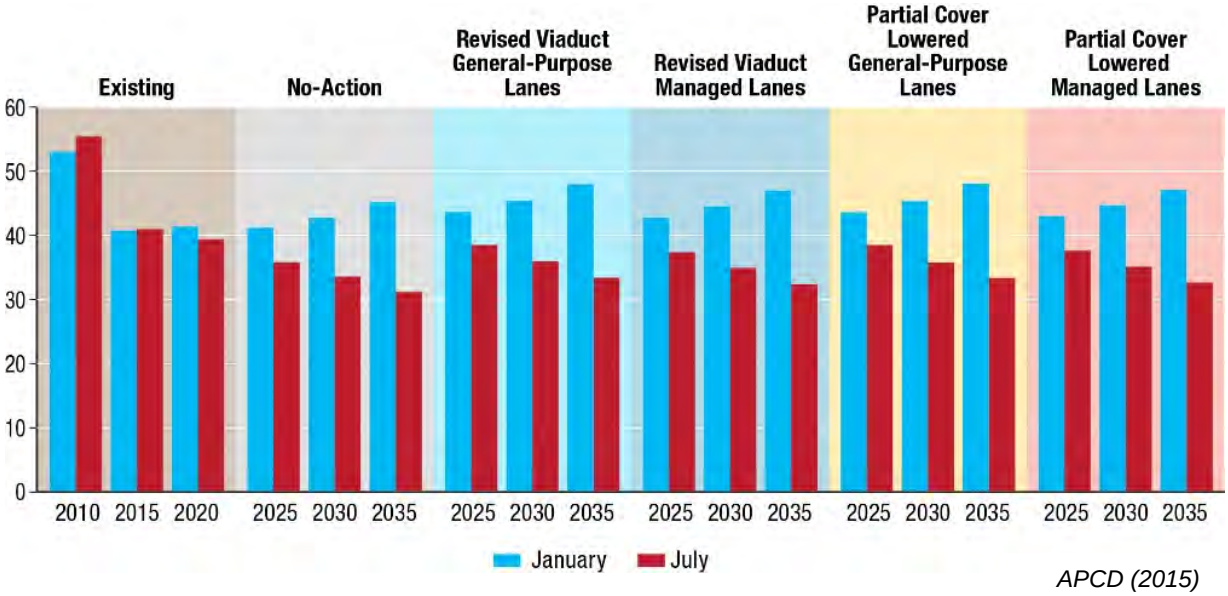
APCD (2015)

The 2010, 2015, and 2020 emissions are the same for all alternatives. Future build conditions begin after opening day and are reflected in the 2025, 2030, and 2035 emissions in **Exhibit 5.10-15** and **Exhibit 5.10-16**.

Carbon monoxide

Exhibit 5.10-17 shows the carbon monoxide emission inventories. In almost all cases, the January emissions are shown to be higher than July emissions because of cold weather driving and cold engine starts. The July emissions trend down from 2010 to 2035 largely because of fuel economy standards and engine technology. However, the January emissions show a different trend as they begin to increase after 2020. This is explained by an increasing number of cold starts as vehicle counts increase within the study area. There are minor differences in emissions among the alternatives in any given year. The No-Action Alternative and Partial Cover Lowered Alternative, Managed Lanes Option have slightly lower carbon monoxide emissions than the General-Purpose Lanes Option, but the differences are small, so carbon monoxide is not a discriminating factor in the identification of a preferred alternative.

Exhibit 5.10-17 Carbon Monoxide Emission Inventories (tons per day)

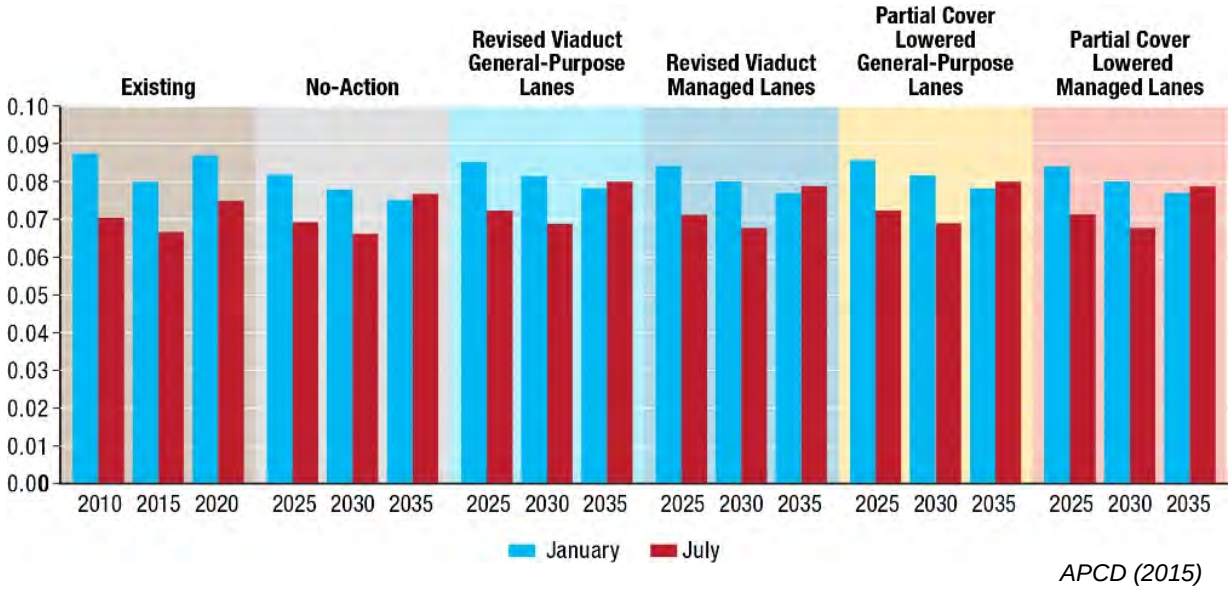


APCD (2015)

Sulfur dioxide

Exhibit 5.10-18 shows the sulfur dioxide emission inventories. In all years except 2035, the January emissions are higher than the July results. The July emissions display a slight upward trend from 2010 through 2035, whereas the January emissions peak in 2020, then begin a downward trend. There are minor differences in emissions among the alternatives in any given year. The No-Action Alternative and Partial Cover Lowered Alternative, Managed Lanes Option have slightly lower sulfur dioxide emissions than the General-Purpose Lanes Option, but the differences are small, so sulfur dioxide is not a discriminating factor in the identification of a preferred alternative.

Exhibit 5.10-18 Sulfur Dioxide Emission Inventories (tons per day)

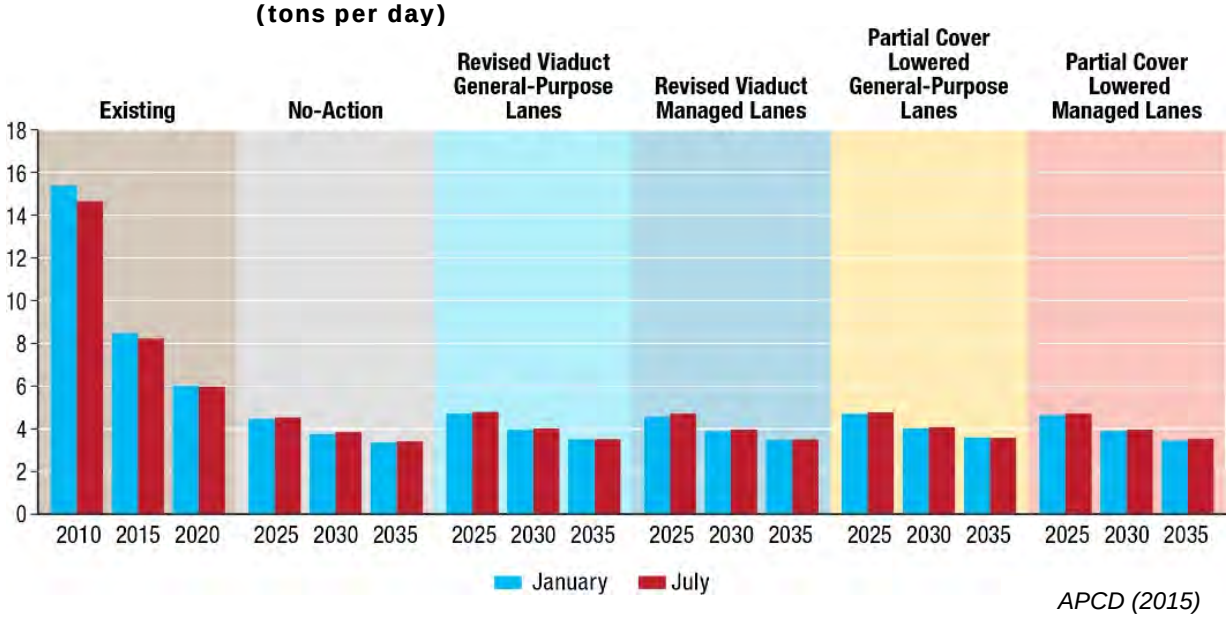


APCD (2015)

Ozone

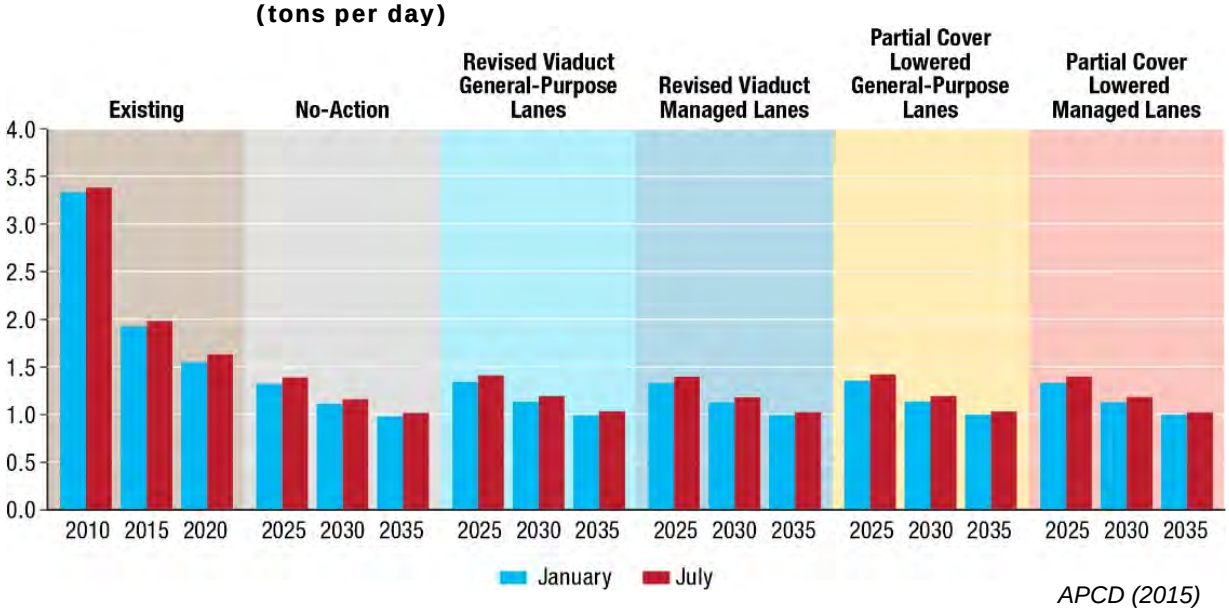
Emission inventories for the ozone precursors, nitrogen oxides and volatile organic compounds, are shown in **Exhibit 5.10-19** and **Exhibit 5.10-20**. Since the ozone molecule is formed in the presence of sunlight through a chemical reaction of these two precursors, it is only possible to report trends for the two precursor pollutants and infer what effect these may have on ozone levels.

Exhibit 5.10-19 Nitrogen Oxides Emission Inventories (tons per day)



APCD (2015)

Exhibit 5.10-20 Volatile Organic Compounds Emission Inventories (tons per day)



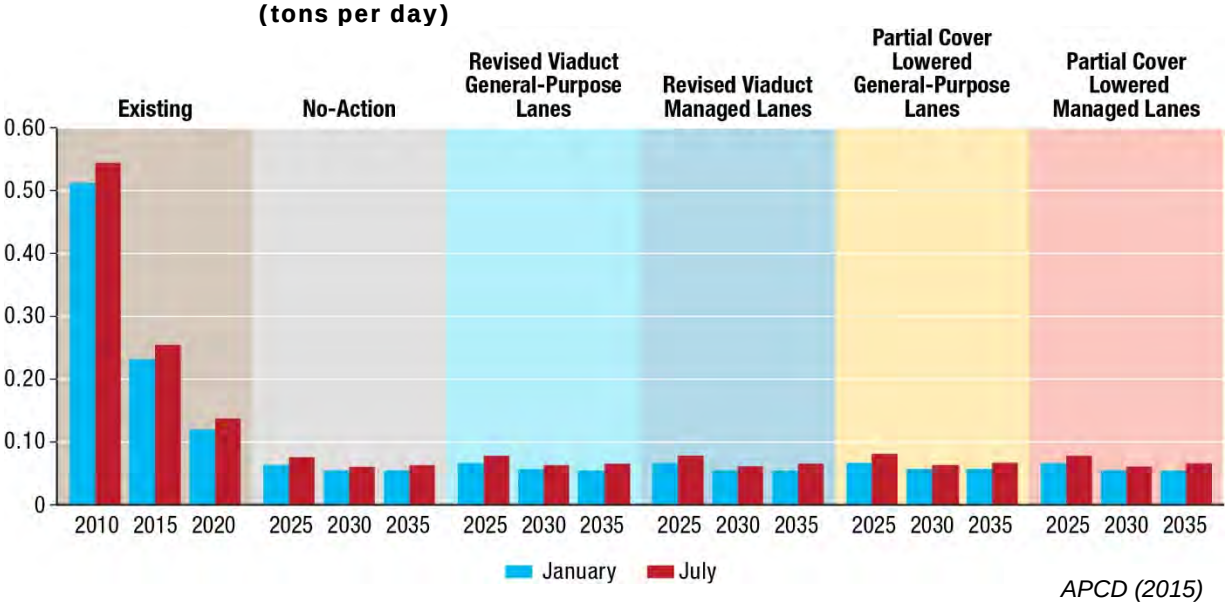
APCD (2015)

Emissions of both nitrogen oxides and volatile organic compounds trend downward from 2010 through 2035. Therefore, the on-road motor vehicle contribution to the ozone problem is decreasing over time, which will likely result in lower ozone levels, but that depends on the precursor emission trends from other non-road, stationary, and industrial sources.

MSAT emission inventories and effects

The emission inventories for the MSAT pollutants were developed based on the previously described process and input data. Of the 21 MSATs, EPA has indicated that the majority of adverse health effects arise from seven pollutants, which FHWA has labeled as priority MSATs for NEPA studies. **Exhibit 5.10-21** and **Exhibit 5.10-22** show the combined MSAT emission inventories, in tons per day, for months of January and July during the No-Action Alternative and Build Alternatives. Although, in some cases, other project alternatives have higher emissions, none of the alternatives affect the overall decreasing trend in MSATs and, in general, there are only minor differences between the No-Action Alternative and Build Alternatives. For detailed results of each MSAT pollutant analysis, see Appendix J, *Air Quality Technical Report*.

Exhibit 5.10-21 Combined MSAT Emission Inventories (tons per day)



APCD (2015)

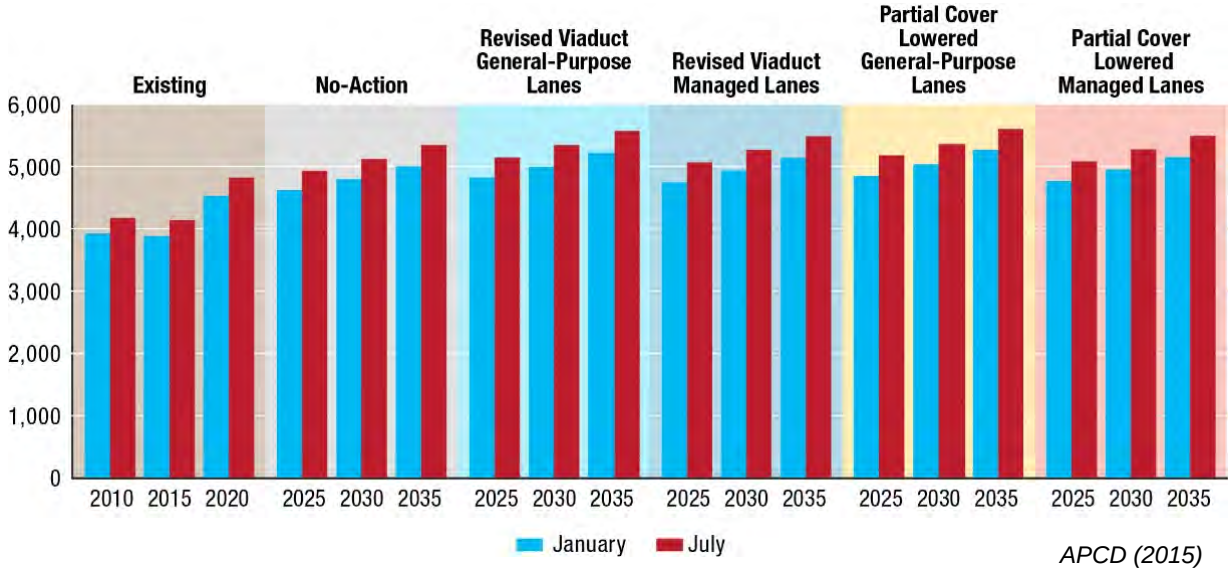
Exhibit 5.10-22 Design Year (2035) MSAT Emission Inventories Comparison

Alternative	Combined MSAT Emissions (tons)		Difference from No-Action Alternative		Percent Difference	
	Jan	July	Jan	July	Jan	July
No-Action Alternative (2035)	0.054	0.064	N/A	N/A	N/A	N/A
Revised Viaduct Alternative (General-Purpose Lanes)	0.055	0.066	0.001	0.002	2.6%	2.7%
Revised Viaduct Alternative (Managed Lanes)	0.055	0.066	0.001	0.002	2.1%	2.1%
Partial Cover Lowered Alternative (General-Purpose Lanes)	0.056	0.067	0.002	0.003	3.8%	3.8%
Partial Cover Lowered Alternative (Managed Lanes)	0.055	0.066	0.001	0.001	2.3%	2.3%

Greenhouse gas emission inventories and effects

The greenhouse gas (i.e., atmospheric carbon dioxide) emission inventories are shown in **Exhibit 5.10-23**. Summer (July) emissions are greater than winter (January) in all years and alternatives because of the additional energy consumption related to air conditioning use. The two alternatives with general-purpose lanes that were modeled show almost identical greenhouse gas emissions, which will be expected because the freeway capacity is the same for both. The Partial Cover Lowered Alternative, Managed Lanes Option results in lower greenhouse gas emissions than the modeled Build Alternatives with general-purpose lanes only, but the difference is minor.

Exhibit 5.10-23 Greenhouse Gas Emission Inventory (atmospheric carbon dioxide, tons per day)



APCD (2015)

Road dust emissions inventory

Estimates for road dust include all particulate debris that is made airborne through the movement of traffic, including residual material from road sanding along with soils and minerals blown on to the road. Estimates for road dust show an increase of 43 percent between 2010 and the 2035 No-Action Alternative, a direct result in the increase in VMT estimated along the corridor. As shown in **Exhibit 5.10-24**, there is only a slight difference between the 2035 No-Action Alternative and Build Alternatives; the Preferred Alternative has 1.6 percent more road dust in tons per day than the No-Action Alternative.

Exhibit 5.10-24 Fugitive Dust Emissions Inventory

Alternative	Total Fugitive Dust Emissions (tons/day)	Percent Difference from No-Action Alternative
No-Action Alternative	4.9	N/A
Revised Viaduct Alternative (General-Purpose Lanes)	5.0	2.7
Revised Viaduct Alternative (Managed Lanes)	5.0	1.6
Partial Cover Lowered Alternative (General-Purpose Lanes)	5.0	2.8
Partial Cover Lowered Alternative (Managed Lanes)	5.0	1.6

Source: APCD (2015)

Fugitive emissions during construction

As discussed previously, the estimation of fugitive emissions during construction is not possible until specific construction methods and sequencing are developed for the selected preferred alternative. It is possible, however, to use the amount of material handled to provide an indication of the relative construction emissions for each alternative as a result of the movement of dirt, but emissions from construction vehicles is not included in this estimate.

Exhibit 5.10-25 presents the volume of material estimated to be handled for each project alternative. These numbers represent the amount of material brought to the project area to serve as embankment material. This quantification assumes that the Partial Cover Lowered Alternative will use excavation material derived from Brighton Boulevard to Colorado Boulevard as embankment material elsewhere within the project, requiring less new material to be handled. Excluding the No-Action Alternative, the Revised Viaduct Alternative is projected to have the highest volume of material to be handled, and will, therefore, likely generate the greatest

amount of fugitive emissions and equipment-related exhaust particulate emissions during construction.

The difference between the highest and lowest volumes of material is 97 percent.

Exhibit 5.10-25 Excavation and Fill Material Handled by Alternative

Alternative	Total Material Handled (Cubic Yards)
No-Action Alternative	117,200
Revised Viaduct Alternative	4,200,000
Partial Cover Lowered Alternative	3,900,000

Note: These numbers are rough estimates based on the best data available at present, and may change during final design, quantities included are for Managed Lanes Option (except for the No-Action Alternative).

5.10.7 What are the summary points of this air quality analysis?

Following guidelines established by EPA for conducting an analysis of air quality impacts, and through interagency consultation, the air quality effects of the No-Action Alternative and Build Alternatives for I-70 East have been evaluated. The I-70 East project is in a nonattainment or maintenance area for ozone, PM_{10}, and carbon monoxide and therefore must comply with transportation conformity requirements for these NAAQS. The project has been determined to be a project of local air quality concern for PM_{10} and requires a localized hotspot analysis. Carbon monoxide hotspot analysis is also required, per the transportation conformity rule.

Locations for the hotspot analysis have been selected based on their ability to represent worst-case conditions for the I-70 East project and modeling. With regard to both carbon monoxide and PM_{10} for all project alternatives, the project is not expected to cause any new violations of any standard, increase frequency or severity of any existing violation, or delay timely attainment of the NAAQS or required interim milestones. The modeled values are below the NAAQS and suggest that there is no exceedance or impact from the project based on the standards.

The DRCOG Board is expected to vote on the 2040 Fiscally Constrained RTP 2015 Cycle 2 Amendment Application in October 2015, with regional air quality modeling complete in time for a public hearing in January 2016, and a final Board vote in February 2016. The final conformity determination will

be made before FHWA issues a ROD, in compliance with 40 CFR 93.

Results of the carbon monoxide hotspot analysis indicate that both the 1- and 8-hour concentrations at the worst-case location, Colorado Boulevard are below the NAAQS. Results of PM_{10} analysis indicate 24-hour PM_{10} concentrations do not exceed the NAAQS for any of the project alternatives, including the Preferred Alternative. Note that the modeled values for the Preferred Alternative are the same as those for the No-Action Alternative at the I-70/I-25 hotspot location. Results of the emission inventory indicate that none of the alternatives change the general downward trend of most pollutants, and when an upward trend is displayed, no alternatives appear to exacerbate or minimize those tendencies in emissions.

A comparison of air quality conditions for all pollutants demonstrates the effects of minor differences in traffic volume and roadway configuration between the alternatives, such as variations at the I-225 hotspot. Minor variations aside, air pollution impacts for all design alternatives are similar.

Several factors are evident at the conclusion of this analysis:

- Air quality conditions under the No-Action Alternative are similar to all alternatives analyzed
- Traffic volume and traffic speed are the primary drivers of project-level air quality impacts
- Road dust emissions are the primary indicators of future particulate matter emissions
- The cover provides benefits to sensitive receptors located at Swansea Elementary School. PM_{10} concentrations are lower in this area (well-below the NAAQS) in close proximity to the roadway.

Significant changes in any of these factors could impact pollutant emissions at the project level.

5.10.8 Will mitigation efforts be required to offset any negative effects on air quality from the project alternatives?

Motor vehicle emissions from the implementation of the No-Action Alternative and all of the Build Alternatives (including the Preferred Alternative) will not cause or contribute to any new localized carbon monoxide or particulate matter violations, nor will they increase the frequency or

severity of any existing violations based on the hotspot analysis. Therefore, no specific mitigation measures are required for the project to proceed. Although mitigation is not required, one or more of the potential emission reduction measures described below will be utilized to minimize impacts to air quality.

Any transportation-related measures or baseline emission reduction strategies already required as part of carbon monoxide or particulate matter maintenance plans that relate to I-70 East will continue to be implemented with any of the alternatives. An example of this is street sanding/sweeping, which CDOT has committed to continue as part of its standard maintenance practices as a way to reduce dust on roads that becomes air pollution. Additionally, during construction, dust in the air should be minimized by following best management practices (BMPs) to control fugitive dust. See **Exhibit 5.10-26** for a summary of these activities and practices.

Several ongoing and planned strategies are used in the Denver/North Front Range ozone nonattainment area to reduce precursor emissions of volatile organic compounds and nitrogen oxides, including multimodal transportation options, rideshare programs, vehicle emissions testing, and intersection improvements. Likewise, several strategies have been, and continue to be, implemented to maintain carbon monoxide and PM_{10} attainment. For details of these strategies to manage criteria pollutant emissions, see Attachment J, *Air Quality Technical Report*.

Reduction of global greenhouse gas emissions

To help address the global issue of climate change, USDOT is committed to reducing greenhouse gas emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon-intensive fuels.

At the state level, there also are several programs underway to address transportation greenhouse gases. The Governor's Climate Action Plan, adopted in November 2007, includes measures to adopt vehicle carbon dioxide emissions standards and to reduce vehicle travel through transit, flex time, telecommuting, ridesharing, and broadband communications. CDOT also issued a Policy Directive on Air Quality in May 2009. This Policy Directive and implementation document—the CDOT Air Quality Action Plan—address unregulated

MSATs and greenhouse gases produced from Colorado's state highways, interstates, and construction activities.

For details on state and federal programs to reduce greenhouse gases from transportation projects, see Attachment J, *Air Quality Technical Report*.

Reduction of fugitive particle emissions during construction

Construction-related fugitive particle emissions will be minimized by implementing dust control practices in accordance with requirements in CDPHE Air Quality Control Commission Regulation No. 1, Emission Control for Particulate Matter, Smoke, Carbon Monoxide, and Sulfur Oxides. Additionally, for any road construction project, a written control plan must be submitted for approval by CDPHE. The control plan includes all available practical methods that are technologically feasible and economically reasonable to reduce, prevent, and control fugitive particulate emissions from the source into the atmosphere. When a plan is approved, CDPHE may take enforcement action if the owner or operator fails to comply with the provisions.

An Air Quality Monitoring, Maintenance, and Mitigation Plan will be prepared prior to construction and will include the following commitments:

- Documentation of daily visual inspections of active work sites by State and Federally certified personnel
- Daily opacity readings from stationary sources subject to Section II.A of Air Quality Control Commission Regulation No. 1 (5 CCR 1001-3) and applicable permit conditions
- Continuous PM_{10} monitoring during construction
- Presentation of continuous PM_{10} monitoring data to the public after quality review of the data, anticipated to be within one week of collection

Permitting

All alternatives will require demolition permits and an Air Pollutant Emission Notice (APEN). An APEN form is used to record general project information, including the project description, location, size, and duration. In addition, the APEN form includes detailed information on the Fugitive Dust Control Plan (FDCP). The FDCP addresses how dust will be kept to a minimum at the project site. Control measures listed in the plan should be specific to the land development site.

Fugitive dust control techniques commonly included in the plan are shown in **Exhibit 5.10-26**.

Exhibit 5.10-26 Summary of Air Quality Commitments and Strategies

Air Quality Consideration (all alternatives)	Commitments and Strategies Applicable to All Alternatives
• MSAT emissions could increase temporarily during construction • Construction fugitive dust could cause temporary impacts • No violation of the NAAQS for the No-Action Alternative or the Build Alternatives	Before and during construction: • Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction During construction, BMPs could include the following measures and others, if applicable, as identified during project development (per the FDCP): • Cover, wet, compact, or use chemical stabilization binding agents to control dust and excavated materials at construction sites • Use wind barriers and wind screens to prevent spreading of dust from the site • Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets • Use vacuum-powered street sweepers to remove dirt tracked onto streets • Cover all dump trucks leaving sites to prevent dirt from spilling onto streets • Minimize disturbed areas, particularly in winter • Prohibit unnecessary idling of construction equipment • Locate construction diesel engines as far away as possible from residential areas • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology • Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, compressed natural gas, fuel cells, and electric engines, if applicable • Install engine pre-heater devices to eliminate unnecessary idling for winter-time construction • Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness • Require construction vehicle engines to be properly tuned and maintained • Use construction vehicles and equipment with the minimum practical engine size for the intended job Post construction: • Continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations BMPs could also include the following measures and others as identified during project development: • Optimize signal timing at intersections and along arterial streets near the highway to reduce vehicle delay and tailpipe emissions • Implement congestion pricing and commuter incentive programs that reduce peak-period highway congestion and emissions • Encourage TDM options, such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs

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5.11 Energy

This section defines energy and explains why it is important to the project. It analyzes the energy consumption by the project alternatives within the study area, both during construction of the highway and during operation of the highway, and proposes mitigation measures to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- The study area for Energy matches the study area for Air Quality because the analysis is closely related. Since the Air Quality study area changed, the Energy study area was revised to match.
- The construction energy consumption factor was revised to reflect 2015 dollars.
- Construction costs were updated to reflect the cost of the revised alternatives.
- The operational energy factors were updated based on the new Air Quality analysis.

5.11.1 What is energy and why is it important to this project?

There are two types of energy consumption which are measured in British thermal units (Btu): operational energy and construction energy. A single Btu is approximately equal to the energy output from burning one wooden match, and one million Btu equals about 8 gallons of vehicle gasoline. In terms of the energy consumption from a single vehicle or even the daily capacity of vehicles traveling on a highway, in this case I-70, one individual Btu is insignificant. In 2008, the United States used a total of more than 99 quadrillion Btu of energy (Environment and Ecology, 2015).

During the construction of the project, energy will be expended through the use of liquid or gaseous fuels, petroleum products, and electricity to operate machinery, transport materials, mix and pour concrete, and perform many other work tasks. On a highway such as I-70, large amounts of energy are consumed every day through the

Construction Energy

Energy used during construction of the proposed project, including manufacturing of materials, operation and servicing of equipment, and other construction tasks.

Operational Energy

Energy consumed during the operation of the vehicle mix using the existing (2010) and newly constructed roadway (2035) system.

operation of the highway facilities and the operation of the many vehicles using the corridor.

Energy impacts are important to this project because energy is closely related to air quality and greenhouse gases. It should be considered throughout the planning, design, development, construction, and use of a transportation project such as I-70 East.

5.11.2 What study area and methodology were used to analyze energy impacts?

The study area used for evaluating operational energy consumption is based on the air quality study area. It is a large geographic area that encompasses the corridor, surrounding neighborhoods, and localized hotspot areas that are focused on an intersection or interchange. The study area is based on the air quality study area because the analysis is closely related. Fuel consumption to create energy in turn creates emissions that affect the quality of air. Using the larger area provides a better understanding of traffic flow to and from the project corridor and vehicle mix using the highway from the surrounding areas.

Construction energy consumption is calculated from the construction costs of each alternative because construction activities will be confined to the construction limits along the corridor.

Exhibit 5.11-1 shows two elements: the study area for calculating estimated operational energy consumption, and the combined construction limits of the evaluated alternatives for calculating construction energy expenditure.

Energy consumption is calculated for the construction period and during the highway operation design year of 2035. Energy consumption during construction includes manufacturing and movement of construction materials, operation and servicing of equipment, and many other construction-related work tasks.

Energy consumption rates developed by the California Department of Transportation in their Energy and Transportation Systems report (Caltrans, 1983) were applied in this analysis. This report, although dated, is widely used in estimating energy consumed during the construction of highway facilities. It correlates energy consumption during construction with the project cost in 1977 dollars.

Exhibit 5.11-1 Study Area for Energy Resources

Using the construction energy consumption rate for an urban freeway and adjusting from 1977 to 2015 dollars using the Consumer Price Index Inflation Calculator from the U.S. Department of Labor, Bureau of Labor Statistics, yields a figure of approximately 6,997 Btu consumed for every $1 of construction cost (in 2015 dollars). This energy consumption rate is multiplied by the construction cost estimate for each of the project alternatives to arrive at the estimates of energy consumed during construction.

Operational energy consumption is calculated by multiplying VMT from the DRCOG Compass model by an energy consumption factor from EPA's MOVES model. The MOVES model inputs include, but are not limited to, fuel specifications, vehicle inspection/maintenance program parameters, fleet characteristics, and meteorological data. This is done for every roadway segment in the study area based on traffic volume, congested speed, vehicle type (mix), and fuel type (i.e., gas, diesel). The energy consumption values then are summed across all roads in the study area to obtain an alternative's total operational energy value in joules per day. The joules were converted to Btu for consistency across the study.

Congested Speed Variable

Because average vehicle speeds change by time period and fuel consumption rates vary by speed, the addition of the congested speed variable in the analysis allows for a more meaningful comparison of energy consumption among alternatives.

5.11.3 What are the existing conditions for energy consumption?

The year 2010 is defined as the base year for existing conditions because the VMT and speed data are available from the DRCOG Compass model for that year.

In the Denver metropolitan area, the primary sources of energy are hydrocarbons, including petroleum (gasoline/diesel), natural gas, and electricity. Automobiles, commercial trucks, buses, and rail vehicles are the major ground transportation energy consumers. Energy also is consumed for the construction and maintenance of transportation facilities.

I-70 currently operates as a six-lane freeway, so there is a considerable amount of energy consumed from the operation of vehicles along the corridor. The existing operational conditions can be characterized as heavy traffic congestion in the peak periods compounded by an outdated geometric design and aging structure and pavement.

The existing operational energy consumption in the study area was estimated by using the outputs from the DRCOG Compass model (2010) and the MOVES consumption factors. The models produce an output in total joules consumed per day. The total joules were converted to daily Btu, for a total of 53.3 billion Btu consumed per day.

5.11.4 How do the project alternatives potentially affect energy consumption?

The energy consumed during construction and operation will differ among each of the alternatives in the 2035 project analysis year. This subsection presents the energy estimates for construction and operation for each of the alternatives.

Energy consumed during construction

Construction energy consumption is affected by the varying efforts to build any of the alternatives, including ease of construction, length of construction, and materials used during construction. In this manner, construction energy is closely connected with the estimated construction cost (excluding engineering, design, and right-of-way costs) of each alternative discussed in the methodology section.

Exhibit 5.11-2 details construction costs and energy consumption during construction for each project alternative, based on the present consumer pricing index. The No-Action Alternative yields a lower estimated energy

consumption because of the comparatively low construction cost. Each build alternative will consume energy in the range of 6,018 billion to 7,698 billion Btu over the course of construction. The Revised Viaduct Alternative is estimated to consume approximately one billion Btu less than the Partial Cover Lowered Alternative. In terms of energy consumption over the course of the projected five-year construction term, this is not a substantial difference.

Exhibit 5.11-2 Construction Costs and Energy Consumption During Construction

Alternative/Option	General-Purpose Lanes Option		Managed Lanes Option	
	Construction Cost (millions of 2015 dollars)	Energy Consumption (Btu in billions)	Construction Cost (millions of 2015 dollars)	Energy Consumption (Btu in billions)
No-Action Alternative	$340	2,380	N/A	—
Revised Viaduct Alternative	$860	6,018	$950	6,648
Partial Cover Lowered Alternative	$1,010	7,068	$1,100	7,698

Calculations based on $1 spent on construction = 6,997 Btu (2015 Consumer Pricing Index)
Note: Construction costs do not include right of way, engineering, or design.

Energy consumed during operation

Each alternative influences operational energy consumption by its ability to relieve traffic congestion. Generally, higher operational speeds—or less traffic congestion—equates to less energy consumed on a per vehicle-mile basis.

Exhibit 5.11-3 presents the energy consumption estimates for on-road vehicles in the study area. The 2010 existing conditions estimate is included for reference.

Exhibit 5.11-3 Operational Energy Consumption Per Day (2035)

Alternative / Option	Energy Consumption (billion Btu per day)
Existing Conditions (2010)	53.3
No-Action	68.0
Revised Viaduct, General-Purpose Lanes Option	70.9
Revised Viaduct, Managed Lanes Option	70.4
Partial Cover Lowered, General-Purpose Lanes Option	71.3
Partial Cover Lowered, Managed Lanes Option	70.0

Based on **Exhibit 5.11-3**, the estimated daily operational energy consumption for the current corridor is expected to increase by approximately 14.7 billion Btu daily from 2010 to 2035. Although transportation trends show that fuel efficiencies are improving, the estimates are heavily influenced by the anticipated increase in demand along the corridor through the study year 2035.

The model estimates that each alternative will expend similar amounts of energy within a range of 3.3 billion Btu per day. In terms of energy consumption, the range between alternatives is relatively low. This includes the No-Action Alternative, which has slightly lower operational energy consumption as compared to the other build alternatives because the alternative proposes fewer lanes.

The data show that the managed lanes option will have slightly less energy expenditure than with general-purpose lanes. The managed lanes option has the potential to increase carpooling through benefits to motorists traveling with multiple passengers. Additionally, the option will attract motorists to use the managed lanes, removing congestion from the general-purpose lanes. The increased flow is projected to lead to lower energy consumption.

5.11.5 How are the negative effects from the project alternatives mitigated for energy?

Construction contracts are a primary tool for implementing CDOT's commitment to environmental stewardship. CDOT's *Environmental Stewardship Guide* (CDOT, 2003) explains and documents CDOT's environmental ethic and the policies and procedures CDOT uses in carrying out that ethic. CDOT commits to work with designers, contractors, and suppliers to implement environmental sustainability policies as infrastructure is designed and constructed. Where appropriate, energy conservation measures in accordance with CDOT's *Lighting Design Guide* (CDOT, 2006)—including energy-efficient electrical systems, lighting, and mechanical equipment—will be implemented.

The Partial Cover Lowered Alternative will have additional operational consumption from the usage of ventilation fans, lighting, and other various amenities for the proposed cover. Energy-efficient options for these facilities will be explored to provide mitigation for the additional energy consumed.

In addition, to minimize the use of energy during the construction period, the following mitigation measures will be used during construction:

- Limit idling of construction equipment
- Encourage employee carpooling and vanpooling for construction workers
- Encourage use of closest material sources
- Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses
- Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies)
- Encourage use of alternative fuels and asphalt binders
- Implement traffic management schemes that minimize delays and idling

Exhibit 5.11-4 lists the impacts and mitigations associated with energy.

Exhibit 5.11-4 Summary of Energy Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 68 billion Btu consumed per day • 2,380 billion Btu consumed during construction	• Limit idling of construction equipment • Encourage employee carpooling and vanpooling for construction workers • Encourage use of closest material sources • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies) • Encourage the use of alternative fuels and asphalt binders • Implement traffic management schemes that minimize delays and idling • Implement energy conservation measures where appropriate, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's Lighting Design Guide (CDOT, 2006) • Encourage energy-efficient options for the cover facilities (Partial Cover Lowered Alternative only)
Revised Viaduct Alternative, General-Purpose Lanes Option	• 70.9 billion Btu consumed per day • 6,018 billion Btu consumed during construction	
Revised Viaduct Alternative, Managed Lanes Option	• 70.4 billion Btu consumed per day • 6,648 billion Btu consumed during construction	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 71.3 billion Btu consumed per day • 7,068 billion Btu consumed during construction	
Partial Cover Lowered Alternative, Managed Lanes Option	• 70.0 billion Btu consumed per day • 7,698 billion Btu consumed during construction	

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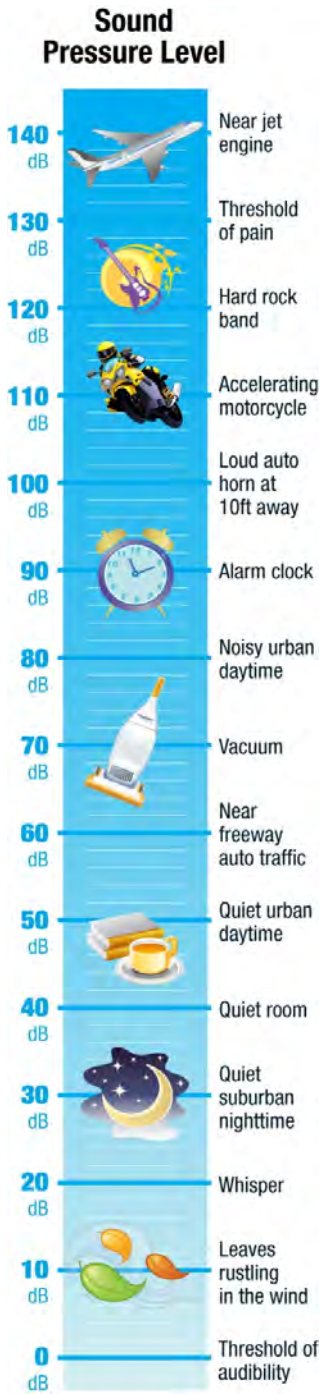
5.12 Noise

This section discusses noise and explains why it is important to the project. The noise impacts of the project alternatives in the study also are evaluated, then mitigation measures to reduce noise where feasible and reasonable are discussed to offset the adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Based on the revised construction limits, noise impacts were updated for the Partial Cover Lowered Alternative.
- Rounded noise levels were used for impact counts for all alternatives.
- A range of feasible and reasonable wall heights and a wall height that corresponds to the average number of benefited receptors was given that will require further optimization in final design for all alternatives.
- Updated traffic data from the DRCOG Compass model (Version 5.0) was used in the analysis for all alternatives.

5.12.1 What is noise and why is it important to this project?



Noise generally is defined as unwanted or undesired sound. It is emitted from many natural and man-made sources. Noise can affect daily activities, especially those that occur outdoors. Noise from traffic on roadways can be very disruptive at high noise levels if it is not mitigated.

Noise typically affects humans in three different ways: intensity, frequency, and variation with time. Noise intensity, or loudness, is determined by how sound pressure fluctuates. Since the range of sound pressure ratios vary greatly over many orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). The range of noise normally encountered can be expressed by values between 0 (threshold of hearing) dB and 120 dB. A 3-dB change in sound level generally represents a barely noticeable change in noise level, whereas a 10-dB change is typically perceived as a doubling of loudness. Because sensitivity to sound varies from person to person, the A-weighted system—

expressed as dBA—is used to provide a value that represents human response. $L_{eq}(h)$ is the hourly equivalent noise level; the equivalent steady-state sound level that contains the same amount of acoustic energy as the time-varying sound level over a one-hour period.

Due to the expected increase in traffic volumes along the I-70 East corridor by 2035, and the changes proposed by the design alternatives, traffic noise will increase. Communities affected by this project want to limit its negative impacts. For this reason, an increase in traffic noise is an important issue that needs to be addressed.

5.12.2 What study area and evaluation process were used to analyze noise?

The study area for traffic noise was broken down into five neighborhoods: Globeville, Elyria and Swansea, Stapleton, Montbello, and Aurora (see **Exhibit 5.12-1**). These neighborhoods were identified as areas of noise sensitivity (homes, parks, schools, etc.), compared to other areas dominated by industrial and non-noise sensitive commercial development. Noise-sensitive sites are defined as any location where traffic noise may be adverse to the function and outdoor enjoyment of the property. Noise receptors were placed at these noise-sensitive sites, and were analyzed in the noise models.

The noise analysis was performed as outlined in federal and state requirements (CDOT *Noise Analysis and Abatement Guidelines* (January 2015)). For this project, the focus was on residential and public facilities in the corridor that have frequent outdoor uses. Noise impacts were analyzed for land uses such as homes, parks, schools, and churches that were located within 500 feet of the edge of the pavement of I-70. Typically, noise mitigation is not considered for any industrial or commercial properties unless they have a noise-sensitive function, such as a recording studio or a hotel. Noise impacts were predicted using FHWA's approved noise modeling software, Traffic Noise Model version 2.5 (TNM).

Noise receptor

A noise receptor is a single point that is analyzed in the noise model. Each modeled location can represent a single receptor or multiple receptors. Only those that are within close proximity to one another—e.g., adjacent urban properties that share a common property line—and are the same Noise Abatement Criteria (NAC) category are grouped together.

Noise impacts

Per CDOT noise guidance, noise impacts can occur in two ways:

1. Project meets or exceeds the NAC, or
2. Project substantially increases noise 10 dBA or more over existing conditions

Traffic volumes modeled in TNM for each alternative were generated from the DRCOG Compass model (Version 5.0). Future traffic forecasts for the alternatives used the year 2035. While both AM peak and PM peak traffic volumes were generated using the DRCOG models, PM peak traffic volumes were used in the TNM models because they represented a worst case scenario for noise analysis.

Referred to as the NAC, CDOT and FHWA have established noise levels at which mitigation measures must be considered. As presented in **Exhibit 5.12-2**, the NAC vary according to the land use activity category. With regard to determining if mitigation is feasible and reasonable, a benefitted noise receptor survey is used to ultimately determine reasonableness.

Exhibit 5.12-1 Noise Study Area

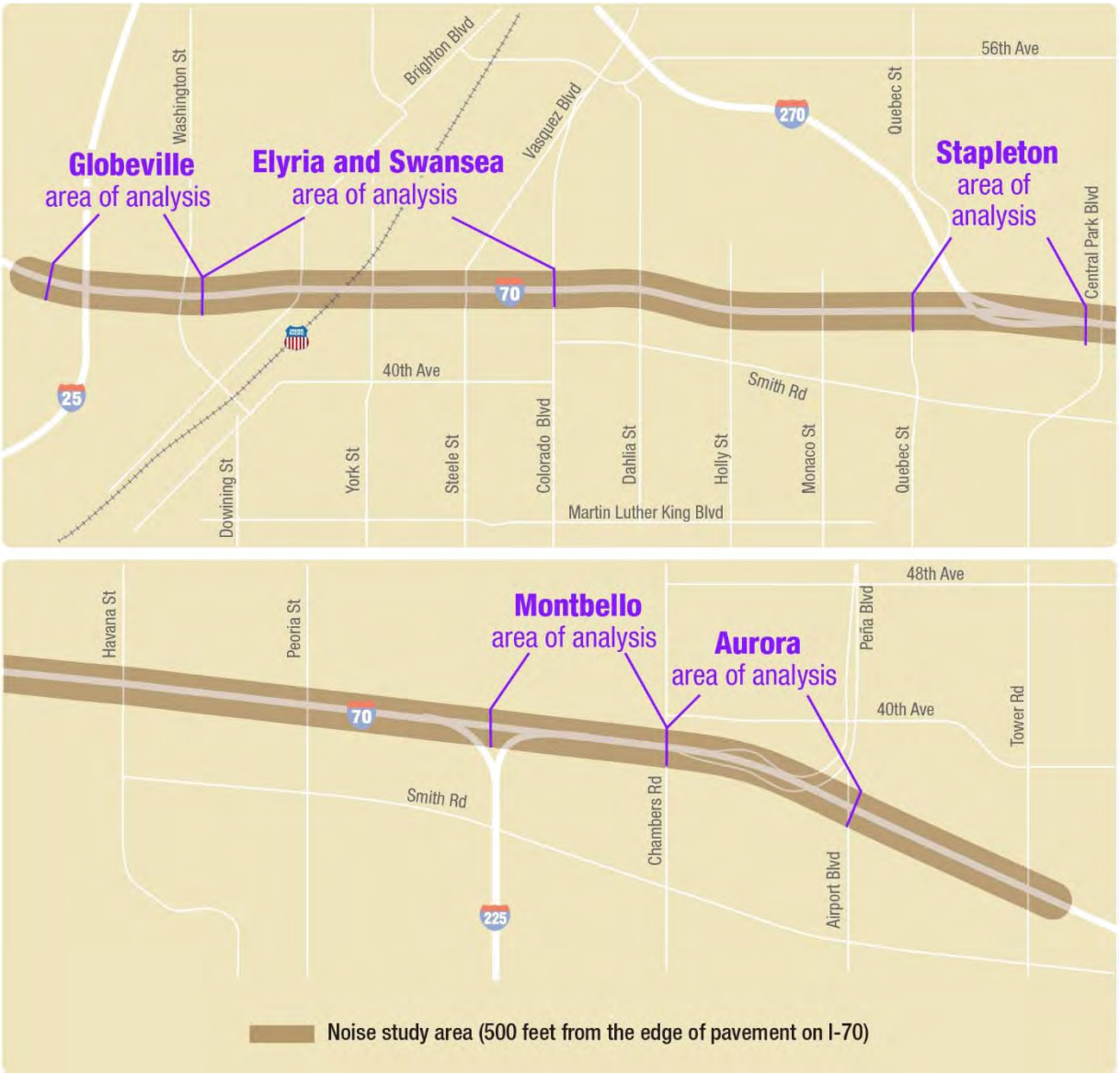


Exhibit 5.12-2 CDOT Noise Abatement Criteria

Activity Category	Leq(h) (dBA)[1]	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 non-profit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) properties, 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 non-profit institutional structures, radio studios, recording studios, schools, and television studios
E	71 (Exterior)	Hotels, motels, time-share resorts, vacation rental properties, offices, restaurants/bars, and other developed lands, properties, or activities not included in Activity Categories A to D or F
F	—	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	—	Undeveloped lands that are not permitted for development.

Source: CDOT, 2015c

1. *Leq(h) is the hourly equivalent noise level; the equivalent steady-state sound level that contains the same amount of acoustic energy as the time-varying sound level over a one-hour period; the noise threshold level that is used for all traffic noise analyses for CDOT projects.*

Per CDOT noise guidance, noise impacts can occur in two ways:

- The project meets or exceeds the NAC, or
- The project substantially increases noise by 10 dBA or more over existing conditions (hereafter referred to as a substantial noise increase).

If a project alternative impacts noise in an area of noise sensitivity, an assessment of noise mitigation is required per state and federal guidelines.

5.12.3 How are noise impacts described in this section?

Noise impacts are described by neighborhood, then by alternative, as described below.

The No-Action Alternative and Operational Options (General-Purpose or Managed Lanes) for the Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative) are evaluated in the Globeville, Stapleton, Montbello, and Aurora Neighborhoods. Expansion Options (North or South) do not affect the noise analysis in these neighborhoods.

In the Elyria and Swansea Neighborhood, the No-Action Alternative, Revised Viaduct Alternative, and Partial Cover Lowered Alternative are evaluated. North and South Expansion Options are evaluated for the No-Action and Revised Viaduct Alternatives. Operational Options do not affect the noise analysis in Elyria and Swansea.

In each neighborhood, the results of the noise analysis are quantified by the number of receptors, such as residences and apartments, and the number of other noise-sensitive properties that are impacted. The exhibits in the following subsections show the modeled locations of noise receptors, such as dwelling units and other noise-sensitive properties in each neighborhood. Noise receptors are color coded to reflect whether they currently experience noise levels higher than the NAC threshold level during the loudest hour of the day and how they are affected by the project alternatives. All noise walls currently in place were included in modeling the existing conditions.

The noise impacts changed since the Supplemental Draft EIS due to the Traffic Noise Models (TNM) being updated with the most recent traffic volume data available. Impacts also were affected by rounding; previously, the Supplemental Draft EIS did not include 65.5 dBA to 65.9 dBA as impacted for a threshold of 66 dBA (NAC Category B or C receptors). To better follow CDOT's most recent Noise Analysis and Abatement Guidelines released in January 2015, noise levels in this document have been rounded.

As a result of the comments received on the Supplemental Draft EIS and additional stakeholder outreach and agency coordination, the Partial Cover Lowered Alternative has been refined to include elements of both the Basic Option and the Modified Option of the Partial Cover Lowered Alternative as they were analyzed in the Supplemental

Dwelling unit

A dwelling unit refers to a single-family home, an individual apartment or unit of a multi-plex building. Each dwelling unit is considered as an individual point of noise impact and mitigation evaluation.

Loudest hour

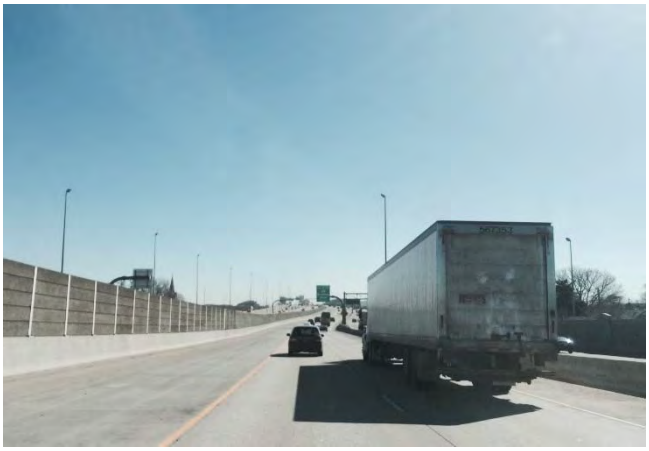
CDOT has established criteria for the loudest hour, which are used if the peak traffic hour volumes exceed the capacity of the roadway during the analysis period.

Draft EIS. This document includes updated noise level results and mitigation analysis of the refined Partial Cover Lowered Alternative and does not include Basic and Modified Options.

See Attachment K, *Noise Technical Report,* for a full discussion of the future noise conditions in each neighborhood.

5.12.4 How do the project alternatives affect noise in Globeville?

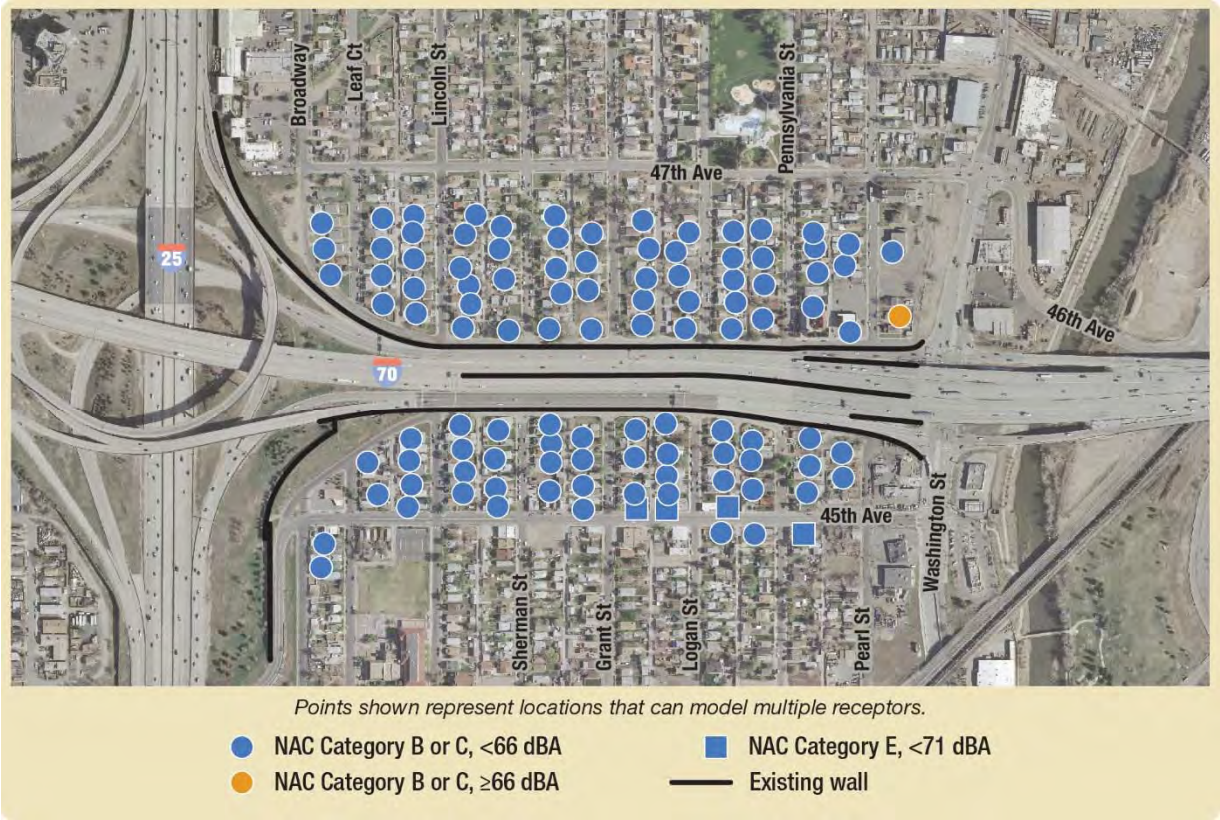
The area of interest in the Globeville Neighborhood lies between I-25 and Washington Street. Existing noise walls are in place along this section of I-70 and a 10-foot median barrier is in place between eastbound and westbound I-70 (shown in the figure). Most properties in this area are residential and fall under the NAC B activity category. There are three NAC C activity category properties: two churches and a school. Four properties are commercial in nature and fall under the NAC E activity category.



Existing median barrier in Globeville

Because of the existing noise walls, very few noise receptors in the Globeville Neighborhood currently experience noise levels greater than their respective NAC levels. Only three of the 232 noise receptors (one modeled location, see **Exhibit 5.12-3**) currently experience noise levels above their associated NAC thresholds.

Exhibit 5.12-3 Existing Noise Conditions in Globeville

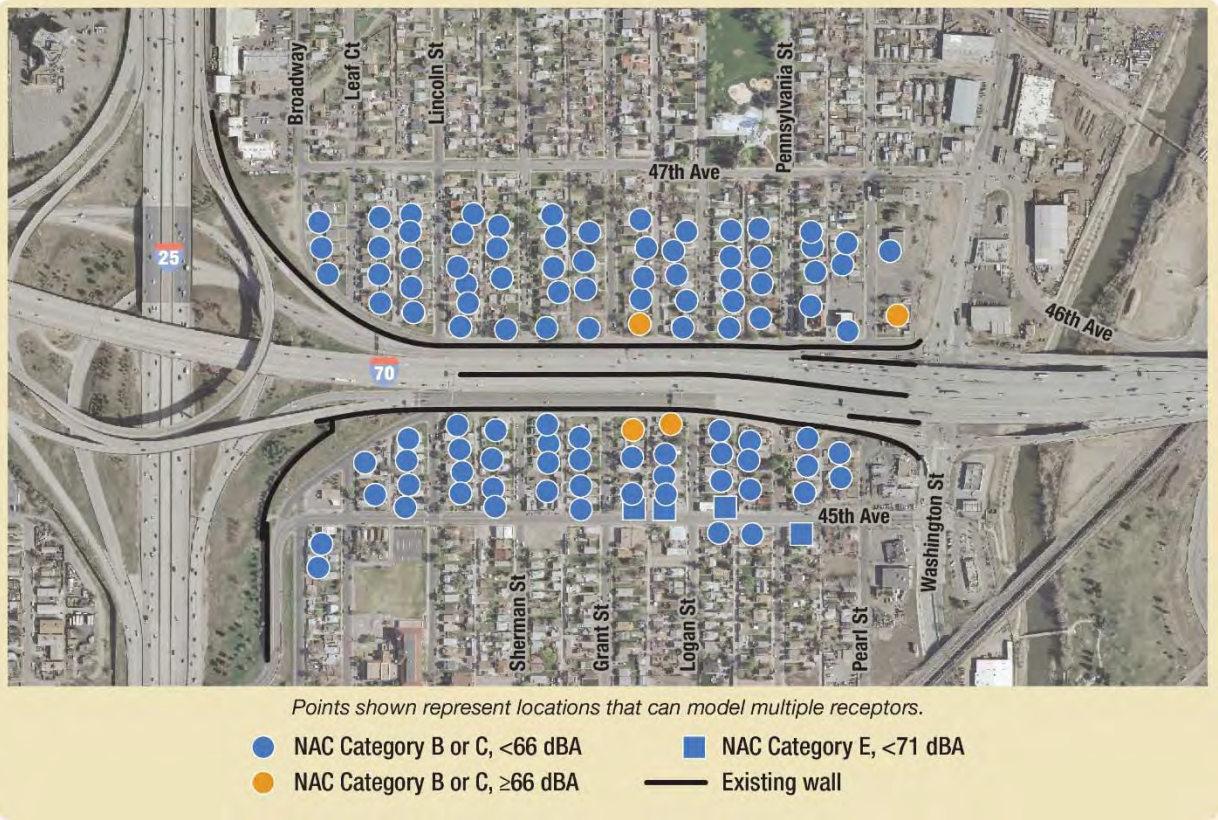


No-Action Alternative

Under the No-Action Alternative for both the North and South Expansion Options, there will be no construction or changes to the number, alignment, or spacing of lanes on I-70 near Globeville. The existing noise walls will remain in place, so the analysis of the No-Action Alternative was conducted with the walls included.

However, with the anticipated population growth, higher traffic volumes are expected in this neighborhood. Independent of the proposed project, noise levels are anticipated to range from 60 dBA to 68 dBA north of I-70, which is an increase of 1 dBA to 3 dBA above the existing noise levels. South of I-70, noise levels are anticipated to range from 60 dBA to 67 dBA, which is an increase of 1 dBA to 3 dBA above the existing noise levels. Of the 232 noise receptors, nine are expected to exceed their respective NAC levels (four modeled locations), but none will experience a substantial increase in noise. **Exhibit 5.12-4** shows the noise impacts with the No-Action Alternative.

Exhibit 5.12-4 Noise Impacts in Globeville for No-Action Alternative



Build Alternatives

The analysis of Build Alternatives (the Revised Viaduct Alternative and the Partial Cover Lowered Alternative) in the Globeville Neighborhood includes two Operational Options: General-Purpose Lanes and Managed Lanes. These options are considered in both the Revised Viaduct Alternative and the Partial Cover Lowered Alternative.

General-Purpose Lanes Option

The General-Purpose Lanes Option does not include construction, but does include restriping to transition the existing roadway to improved conditions. Restriping will add capacity on I-70 adjacent to Globeville. The existing noise walls will remain in place, so the analysis of the General-Purpose Lanes Option was conducted with the walls included. **Exhibit 5.12-5** shows the noise impacts as a result of this option.

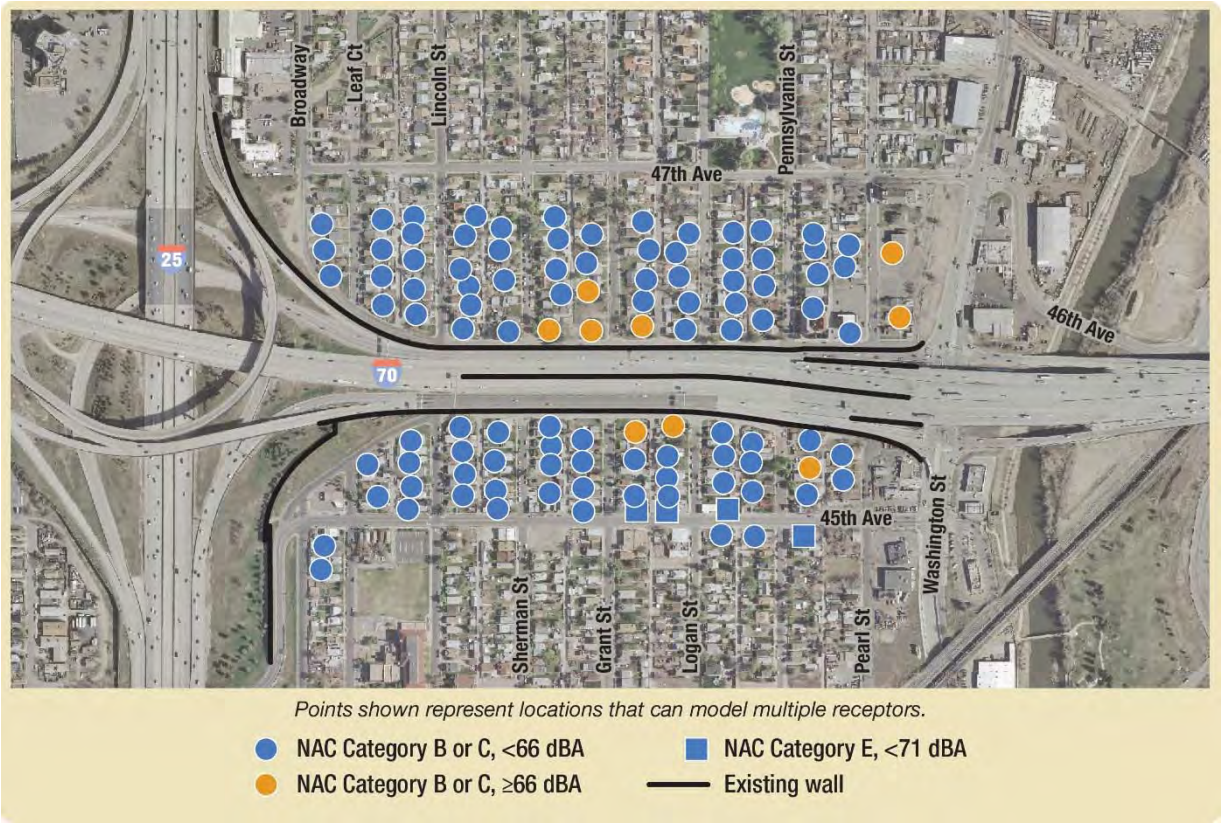
Exhibit 5.12-5 Noise Impacts in Globeville for Build Alternatives, General-Purpose Lanes Option

The future traffic volumes for the Build Alternatives are higher than for the No-Action Alternative due to background growth in the area as a result of the added capacity to the east. Of the 232 noise receptors, 24 will exceed their respective NAC thresholds (12 modeled locations). Of these 24 impacted noise receptors, none will experience substantial increases in noise. Noise levels will range from 60 dBA to 68 dBA north of I-70, which is an increase of 0 dBA to 3 dBA above the existing noise levels. Noise levels will range from 61 dBA to 68 dBA south of I-70, which is an increase of 1 dBA to 3 dBA above the existing noise levels.

Managed Lanes Option

As previously stated, the Build Alternatives do not propose construction adjacent to the Globeville Neighborhood. However, with the Managed Lanes Option, one managed lane is proposed to be added on the inside of the existing eastbound lanes by restriping the roadway. The existing noise walls will remain in place, so the analysis of the Managed Lanes Option was conducted with the walls included. **Exhibit 5.12-6** shows the noise impacts as a result of this option.

Exhibit 5.12-6 Noise Impacts in Globeville for Build Alternatives, Managed Lanes Option



The Managed Lanes Option has greater impacts than the No-Action Alternative and similar impacts to the General-Purpose Lanes Option. Of the 232 noise receptors in Globeville, 18 (nine modeled locations, see **Exhibit 5.12-6**) are anticipated to exceed their respective NAC thresholds, although none experience a substantial noise increase. Noise in the Managed Lanes Option will range from 60 dBA to 68 dBA north of I-70, which is an increase of 0 dBA to 3 dBA above existing noise levels. Noise levels will range from 61 dBA to 67 dBA south of I-70, which is an increase of 1 dBA to 3 dBA above existing noise levels.

Summary of noise impacts in Globeville

As shown in **Exhibit 5.12-7**, 9 noise receptors are anticipated to exceed their respective NAC thresholds under the No-Action Alternative. Under the Build Alternatives, due to added capacity and higher traffic volumes, 18 to 24 noise receptors are anticipated to exceed their respective NAC thresholds. Mitigation is discussed in Section 5.12.10.

Exhibit 5.12-7 Noise Impact Summary in Globeville

Alternative/ Option	Location	Predicted Noise Range $L_{eq}(h)$ (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase
		Min	Max			
Existing	North of I-70	59	66	130	3	N/A
	South of I-70	59	65	102	0	N/A
	Total	**59**	**66**	**232**	**3**	**N/A**
No-Action Alternative	North of I-70	60	68	130	5	0
	South of I-70	60	67	102	4	0
	Total	**60**	**68**	**232**	**9**	**0**
Build Alternatives (Revised Viaduct and Partial Cover Lowered Alternative)						
General-Purpose Lanes Option	North of I-70	60	68	130	13	0
	South of I-70	61	68	102	11	0
	Total	**60**	**68**	**232**	**24**	**0**
Managed Lanes Option	North of I-70	60	68	130	12	0
	South of I-70	61	67	102	6	0
	Total	**60**	**68**	**232**	**18**	**0**

5.12.5 How do the project alternatives affect noise in Elyria and Swansea?

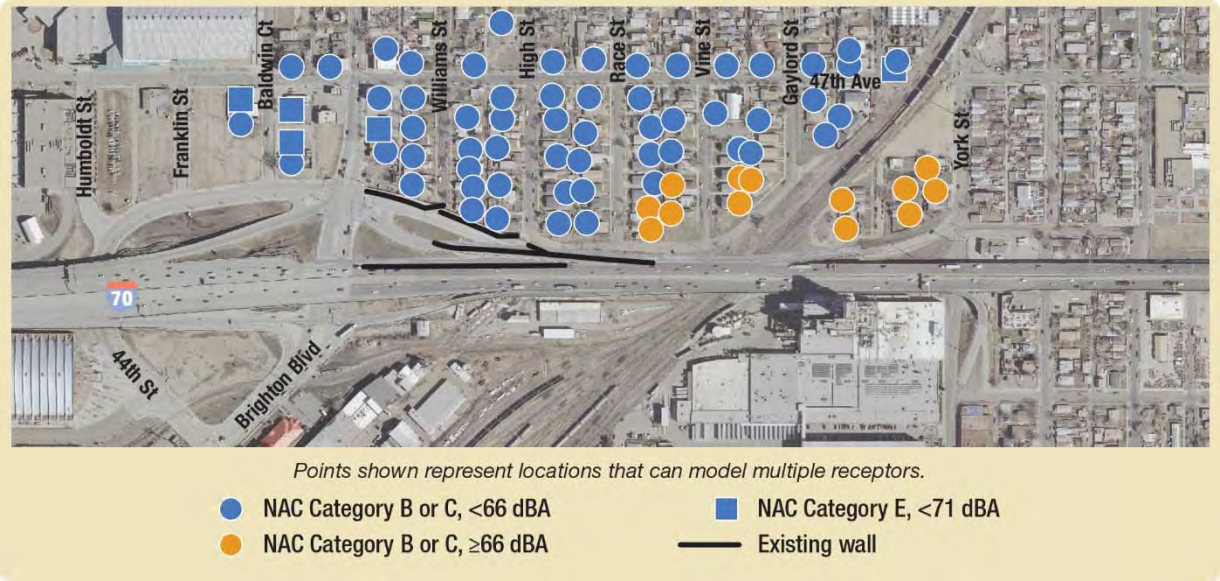
The Elyria and Swansea Neighborhood is located between Brighton Boulevard and Vasquez Boulevard. In Elyria, located in the western portion of the neighborhood, from Brighton Boulevard to York Street on the north side of I-70, residential properties represent the primary land use. It also includes a school, library, and five commercial properties. To the south, most properties are industrial, or activity categories NAC E or F. There are some existing noise walls along this section of I-70 that were only modeled if each respective alternatives' construction limits would not require the removal of existing walls.

Existing noise walls in Elyria

Noise walls are in place along the westbound ramps and highway approaching Brighton Boulevard in Elyria. They block some traffic noise for the western part of the neighborhood. However, many noise receptors between Race Street and York Street currently experience noise levels above the NAC threshold. The existing noise levels in Elyria

range from 58 dBA to 71 dBA. Based on existing noise levels, 30 of the 158 noise receptors (13 modeled locations, see **Exhibit 5.12-8**) currently exceed their respective NAC levels.

Exhibit 5.12-8 Existing Noise Conditions in Elyria

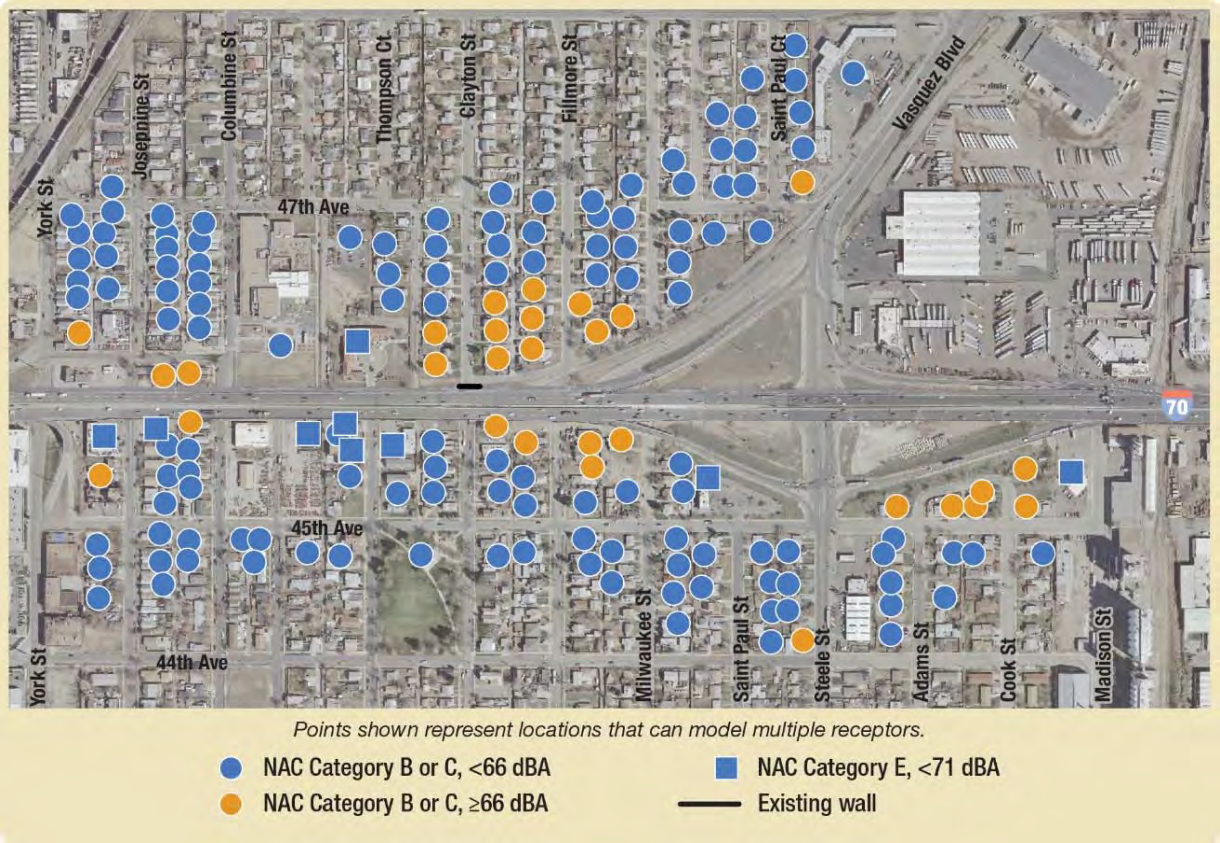


The eastern portion of the area, the Swansea Neighborhood, lies between York Street and Madison Street (just past Steele Street/Vasquez Boulevard). Safety barriers are in place in this area along the north and south edge of the I-70 viaduct from York Street to Clayton Street. These barriers were added to the I-70 viaduct as a safety measure rather than for noise mitigation. They are not made of sufficiently dense material, nor do they have sufficient length or height, to shield all of the noise receptors, which makes them less effective for blocking noise. Most of the land use in this area is residential, with a park, school, and nine commercial noise receptors included in the area.

Safety barriers in Swansea

Within Swansea, the noise levels for the 325 noise receptors range from 57 dBA to 71 dBA on either side of I-70. There are currently 29 impacted NAC B and C receptors (15 modeled locations) north of I-70 and 25 (14 modeled locations) south of I-70, as shown in **Exhibit 5.12-9**. One of the modeled locations exceeds its NAC mainly due to traffic on Steele Street, and not due to noise from the highway.

Exhibit 5.12-9 Existing Noise Conditions in Swansea



No-Action Alternative

The No-Action Alternative replaces the existing viaduct between Brighton Boulevard and Colorado Boulevard without adding any capacity.

Typically, a no-action alternative does not involve any new construction, so the noise levels are used as a baseline for analysis of any build alternatives. However, due to the poor condition of the existing I-70 viaduct, the No-Action Alternative for this project requires the viaduct to be replaced. It will have the same number of lanes and will have some right-of-way impacts since it will be wider to accommodate current interstate design standards (i.e., providing minimum lane and shoulder widths). There are different numbers of noise receptors and different impacts between the North and South options because the design varies. Additionally, there are different property acquisitions for each option, which do not count as impacted noise receptors.

No-Action Alternative, North Option

The No-Action Alternative, North Option results in impacts to numerous noise receptors primarily because of the higher future (2035) traffic volumes coupled with the highway alignment moving closer to many of the noise receptors.

In Elyria, the noise levels will range from 64 dBA to 75 dBA, which is 3 dBA to 13 dBA greater than the existing noise range. Of the 136 noise receptors modeled for this option, 116 (50 modeled locations, see **Exhibit 5.12-10**) are anticipated to exceed their respective NAC thresholds. Of the 116 impacted noise receptors, 20 will experience a substantial noise increase.

In Swansea, the noise levels range from 61 dBA to 76 dBA, which is 2 dBA lower to 11 dBA greater than the existing noise levels. Of the 297 noise receptors modeled for this option, 233 (113 modeled locations, see **Exhibit 5.12-10**) are anticipated to exceed their respective NAC thresholds. Of the 233 impacted noise receptors, 20 will experience a substantial noise increase.

No-Action Alternative, South Option

With the No-Action Alternative, South Option, noise levels in Elyria are predicted to range from 64 dBA to 73 dBA, which is 2 dBA to 10 dBA greater than the existing Elyria range. Of the 123 noise receptors in Elyria modeled for this option, 108 (45 modeled locations) are anticipated to exceed their respective NAC thresholds (see **Exhibit 5.12-11**). Seven of the 108 impacted noise receptors will experience a substantial increase in noise.

In Swansea, noise levels are predicted to range from 61 dBA to 76 dBA, which ranges from 1 dBA to 12 dBA greater than existing Swansea levels. Of the 277 noise receptors modeled for this option, 239 (115 modeled locations) are anticipated to exceed their respective NAC thresholds. Of the 237 impacted noise receptors, 27 will experience a substantial increase in noise.

Exhibit 5.12-10 Noise Impacts in Elyria and Swansea for No-Action Alternative, North Option

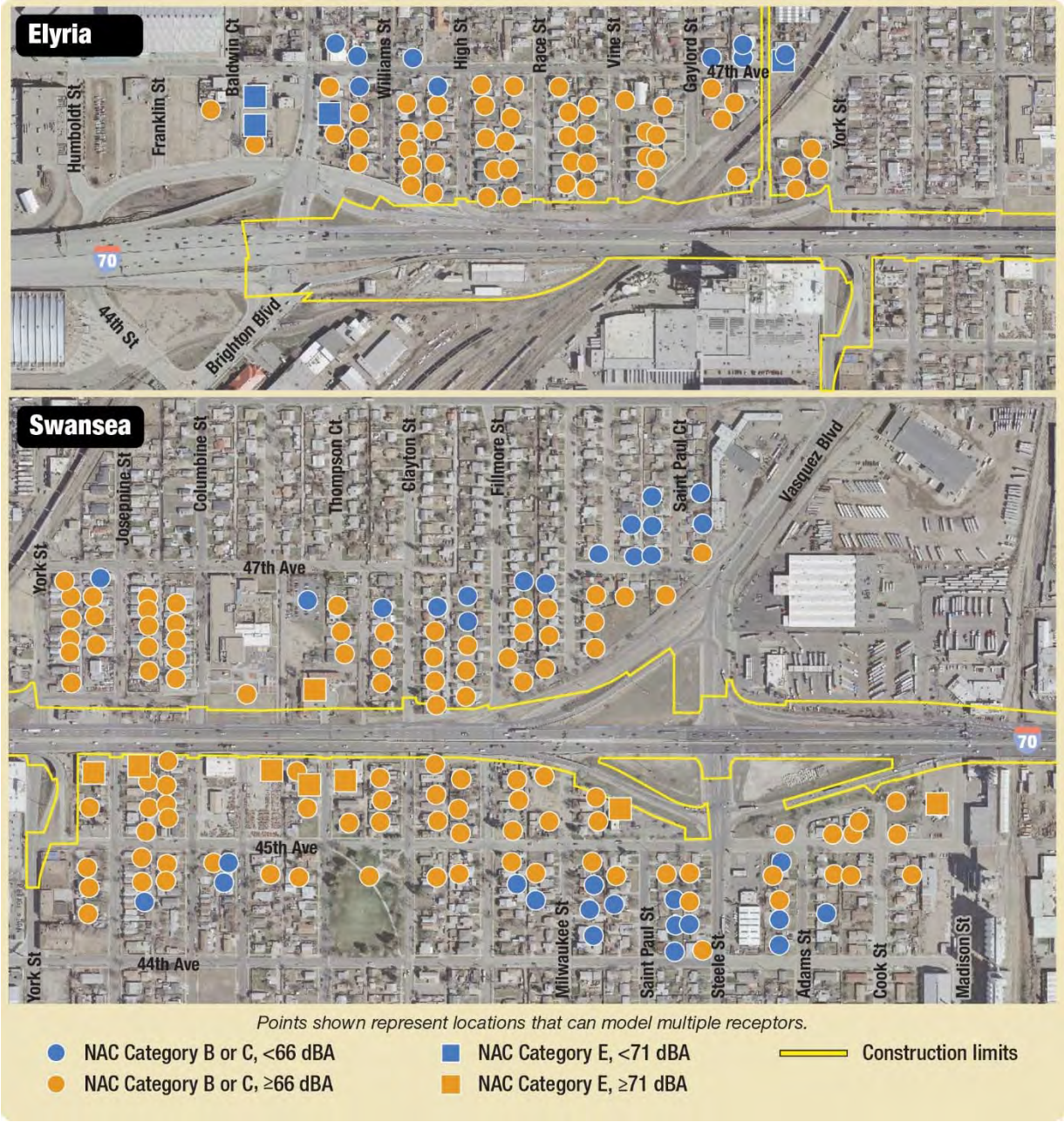
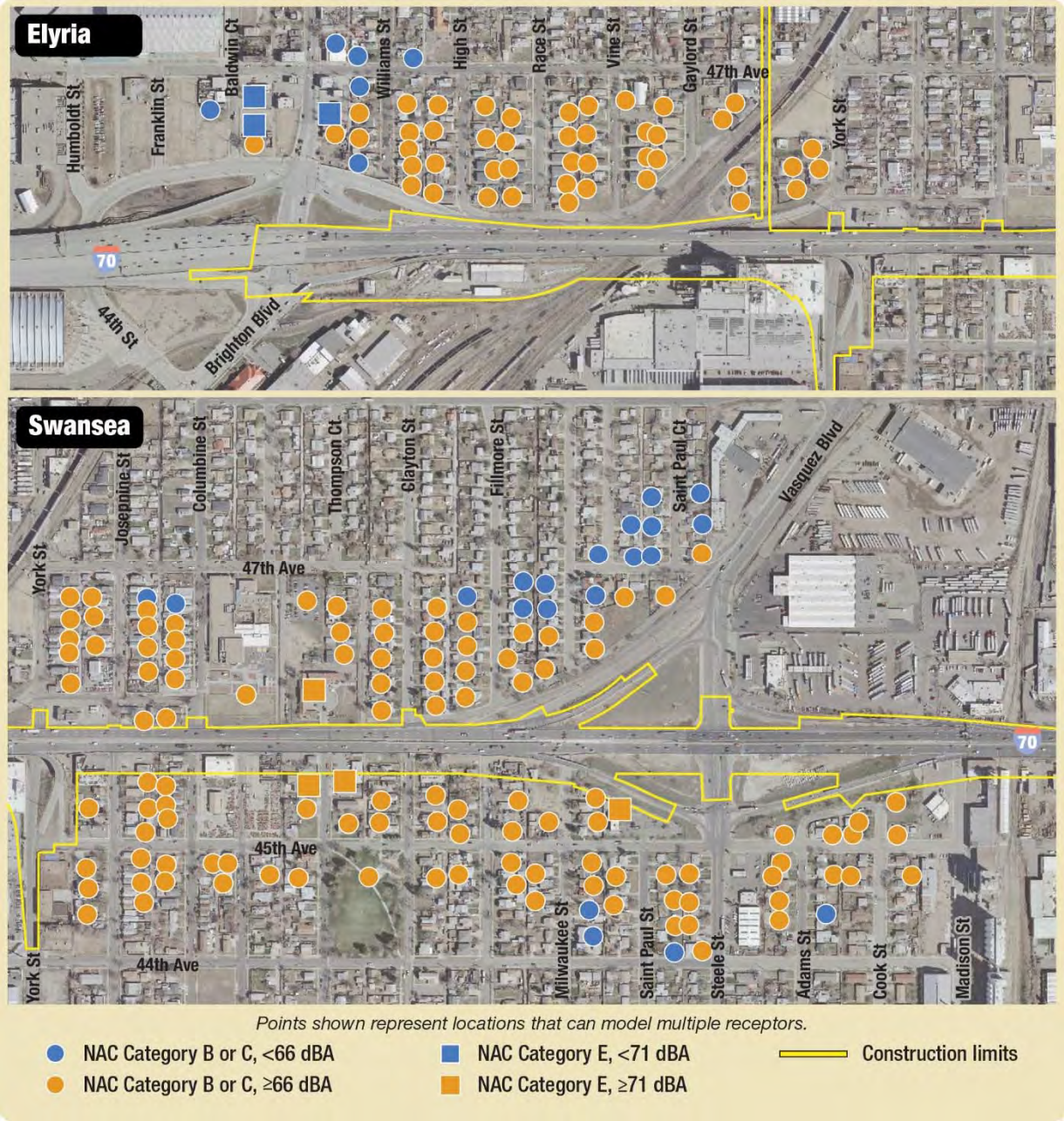


Exhibit 5.12-11 Noise Impacts in Elyria and Swansea for No-Action Alternative, South Option



Revised Viaduct Alternative

The Revised Viaduct Alternative replaces the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard. This alternative includes two additional travel lanes per direction in the area between Brighton Boulevard and York Street, with a continuous acceleration and deceleration lane, totaling three new lanes in each direction. There are different numbers of noise receptors and different impacts between the North and South options because the design varies. Additionally, there are different property acquisitions for each option, which do not count as impacted noise receptors.

Revised Viaduct Alternative, North Option

Of the 133 noise receptors modeled, 125 noise receptors (58 modeled locations, see **Exhibit 5.12-12**) within Elyria will exceed their respective NAC thresholds under the Revised Viaduct Alternative, North Option. Of the 125 impacted noise receptors, 31also will experience a substantial increase in noise. The noise levels in Elyria will range from 65 dBA to 76 dBA, which is approximately 3 dBA to 13 dBA higher than the existing noise range in Elyria.

Of the 306 noise receptors in Swansea modeled, 278 noise receptors (136 modeled locations, see **Exhibit 5.12-12**) will exceed their respective NAC thresholds under the Revised Viaduct Alternative, North Option, and 66 of the 278 impacted noise receptors also will experience a substantial increase in noise. The noise levels in Swansea will range from 61 dBA to 77 dBA, which is approximately 2 dBA lower to 12 dBA greater than existing noise levels in Swansea.

Revised Viaduct Alternative, South Option

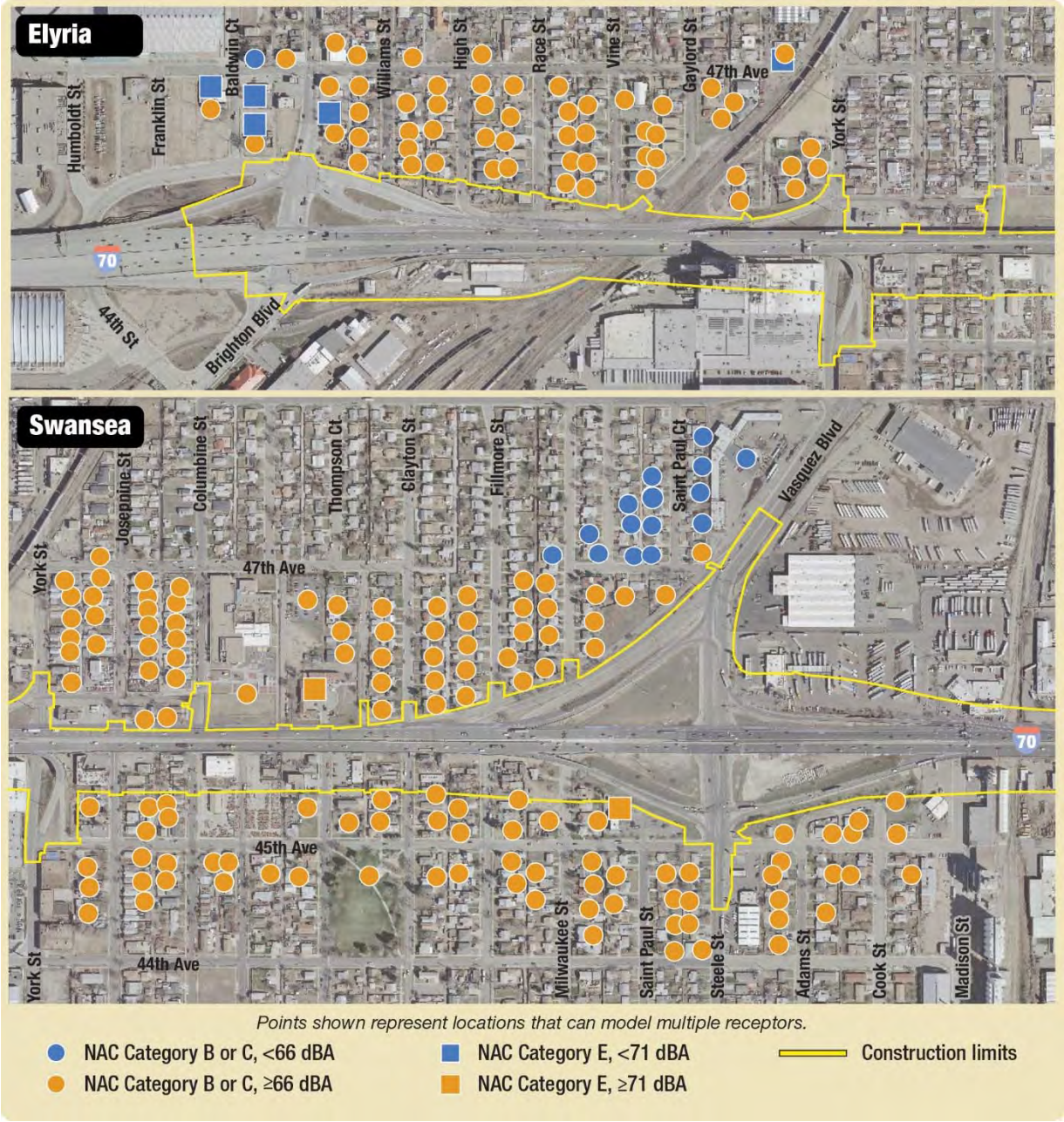
Under the Revised Viaduct Alternative, South Option, 121 (55 modeled locations, see **Exhibit 5.12-13**) of the 129 noise receptors modeled for this option in Elyria will exceed their respective NAC thresholds, with 19 of them also experiencing a substantial increase in noise. The noise levels in Elyria will range from 65 dBA to 75 dBA within the project limits for this option, which is approximately 3 dBA to 12 dBA greater than the existing noise range in Elyria.

Of the 287 noise receptors in Swansea modeled for this option, 260 noise receptors (128 modeled locations, see **Exhibit 5.12-13**) will exceed their respective NAC thresholds under the Revised Viaduct Alternative, South Option. Of the 260 impacted noise receptors, 49 experience a substantial increase in noise. The noise levels in Swansea

range from 60 dBA to 76 dBA, which is equal to or as much as 15 dBA greater than the existing noise levels in Swansea.

Exhibit 5.12-12 Noise Impacts in Elyria and Swansea for Revised Viaduct Alternative, North Option

Exhibit 5.12-13 Noise Impacts in Elyria and Swansea for Revised Viaduct Alternative, South Option



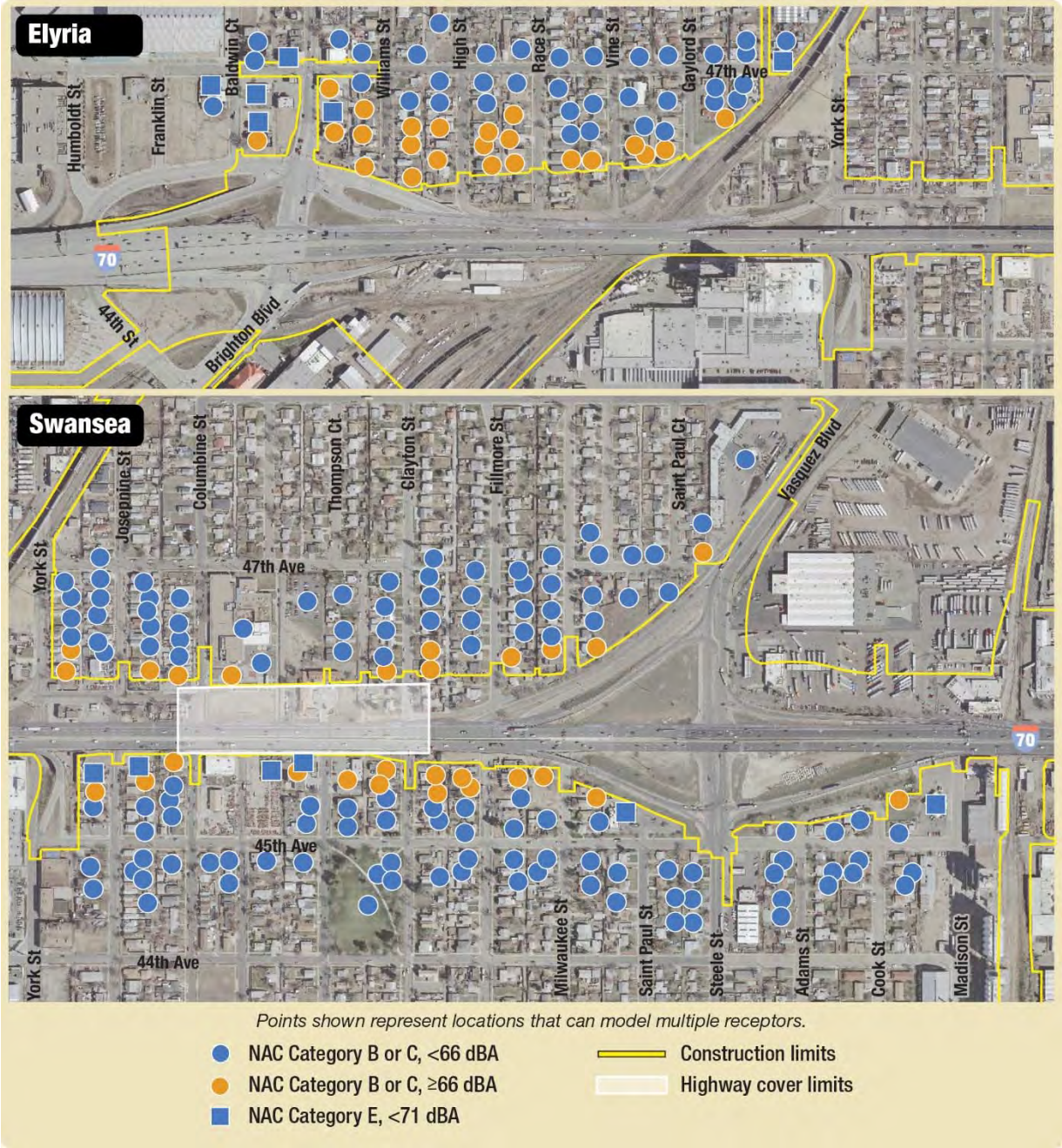
Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative removes the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard, lowering the highway below ground level through the Elyria and Swansea Neighborhood. This option has a highway cover between Clayton Street and Columbine Street. The 46th Avenue frontage road will be designed as a two-way street on both the north and south sides of the highway. However, it will be removed between Clayton Street and Columbine Street on the north side to allow for a seamless connection between Swansea Elementary School and the I-70 cover. Vehicular north/south connectivity across the highway will occur at York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, Steele Street/Vasquez Boulevard, and Cook Street. The remainder of the lowered highway is exposed, as shown in Attachment A, *Alternative Maps*.

Of the 129 noise receptors in Elyria, 55 noise receptors (23 modeled locations) are anticipated to exceed the NAC threshold under the Partial Cover Lowered Alternative (see **Exhibit 5.12-14**). Of these 55 impacted noise receptors, 11 also will experience a substantial increase in noise. The noise levels in Elyria will range from 60 dBA to 75 dBA, which is 3 dBA lower to 16 dBA greater than the existing noise levels.

In Swansea, of the 287 noise receptors, 50 noise receptors (21 north of I-70 and 29 south of I-70, 27 modeled locations) will exceed their respective NAC thresholds under the Partial Cover Lowered Alternative (see **Exhibit 5.12-14**). None of the 50 impacted noise receptors will experience a substantial noise increase. The noise levels with the Partial Cover Lowered Alternative in Swansea range from 52 dBA to 74 dBA, which is 6 dBA lower to 8 dBA greater than existing noise levels.

Exhibit 5.12-14 Noise Impacts in Elyria and Swansea for Partial Cover Lowered Alternative



Summary of noise impacts in Elyria and Swansea

Exhibit 5.12-15 summarizes impacts to Elyria and **Exhibit 5.12-16** summarizes impacts to Swansea. Analysis of mitigation is required and is discussed in Section 5.12.10.

Exhibit 5.12-15 Noise Impact Summary in Elyria

Alternative/ Option	Predicted Noise Range Leq(h) (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase[1]
	Min	Max			
Existing	58	71	158	30	N/A
No-Action Alternative					
North Option	64	75	136	116	20
South Option	64	73	123	108	7
Revised Viaduct Alternative					
North Option	65	76	133	125	31
South Option	65	75	129	121	19
Partial Cover Lowered Alternative					
N/A	58	67	129	55	11

Note: There are more impacted noise receptors in some alternatives and options because there are different property acquisitions for each alternative, which do not count as impacted receptors if they have to be acquired by the project action.

1. *All receptors that experience at least a 10 dBA increase over existing noise levels also exceed their respective NAC thresholds and are included in those counts.*

Exhibit 5.12-16 Noise Impact Summary in Swansea

Alternative/ Option	Location	Predicted Noise Range $L_{eq}(h)$ (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase*
		Min	Max			
Existing	North of I-70	57	71	157	29	N/A
	South of I-70	57	71	168	25	N/A
	Total	**57**	**71**	**325**	**54**	**N/A**
No-Action Alternative						
North Option	North of I-70	61	74	130	100	0
	South of I-70	63	76	167	133	20
	Total	**61**	**76**	**297**	**233**	**20**
South Option	North of I-70	61	76	132	101	0
	South of I-70	64	75	145	138	27
	Total	**61**	**76**	**277**	**239**	**27**
Revised Viaduct Alternative						
North Option	North of I-70	61	76	139	118	25
	South of I-70	65	77	167	160	41
	Total	**61**	**77**	**306**	**278**	**66**
South Option	North of I-70	60	76	150	123	1
	South of I-70	66	76	137	137	48
	Total	**60**	**76**	**287**	**260**	**49**
Partial Cover Lowered Alternative						
N/A	North of I-70	52	73	123	21	0
	South of I-70	56	74	164	29	0
	Total	**52**	**74**	**287**	**50**	**0**

Note: There are more impacted receptors in some alternatives and options because there are different property acquisitions for each alternative, which do not count as impacted receptors if they have to be acquired by the project action.

1. *All receptors that experience at least a 10 dBA increase over existing noise levels also exceed their respective NAC threshold and are included in those counts.*

5.12.6 How is noise in Stapleton affected by the project alternatives?

The commercial area near Central Park Boulevard, known as Northfield Stapleton, contains some NAC E properties, such as hotels and restaurants. There are no existing noise walls in this area. As shown in **Exhibit 5.12-17**, the hotels and restaurants are not currently experiencing noise levels greater than 71 dBA.

Exhibit 5.12-17 Existing Noise Conditions in Stapleton

Points shown represent locations that can model multiple receptors.

NAC Category E, <71 dBA

No-Action Alternative

There will be no changes to I-70 adjacent to the Northfield Stapleton commercial area with the No-Action Alternative. Due to surrounding area growth, however, traffic volumes are anticipated to be higher.

With the No-Action Alternative, the predicted noise levels range from 60 dBA to 67 dBA, which is 1 dBA to 2 dBA greater than the existing noise level range. None of the six noise receptors exceed their respective NAC criteria or experience a substantial increase in noise levels.

Build Alternatives

None of the noise receptors in this area exceed the NAC threshold under the Build Alternatives, both with the General-Purpose Lanes and with the Managed Lanes options. The noise levels at the modeled noise receptors with both, the General-Purpose Lanes Option and Managed

Lanes Option, will range from 61 dBA to 69 dBA, which is an increase of 2 dBA to 4 dBA over the existing noise levels. For both options, none of the six noise receptors exceed the respective NAC threshold or experience a substantial increase.

Summary of noise impacts in Stapleton

Exhibit 5.12-18 summarizes noise impacts in Stapleton. Because none of the alternatives will result in noise levels substantially increasing or exceeding the NAC threshold, no mitigation is required.

Exhibit 5.12-18 Noise Impact Summary in Stapleton

Alternative / Option	Predicted Noise Range $L_{eq}(h)$ (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase
	Min	Max			
Existing	59	65	6	0	N/A
No-Action	60	67	6	0	0
Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative)					
General-Purpose Lanes Option	61	69	6	0	0
Managed Lanes Option	61	69	6	0	0

5.12.7 How is noise in the Peoria Street area and Montbello affected by the project alternatives?

The area north of I-70 near Peoria Street includes hotels, which are NAC E with an impact threshold of 71 dBA, and a school, which is NAC C with an impact threshold of 66 dBA. The two-story hotel at the northwest corner of the I-70 and Peoria Street interchange has patios and balconies in each room. There are 98 noise receptors represented by 12 modeled locations in the TNM model (at six locations, there are two noise receptors with different heights to represent the two stories).

Current noise walls in Montbello

Located northeast of the I-70/I-225 interchange and just west of Chambers Road, the Montbello Neighborhood land use is predominantly residential. No noise impacts exist currently at the Peoria Street area or in the Montbello Neighborhood. The noise receptors and noise levels at Peoria Street are shown in **Exhibit 5.12-19**. There is a 10-foot-tall

noise wall along a ramp on the north side of I-70 in the Montbello Neighborhood. As shown in **Exhibit 5.12-20**, the existing noise wall is very effective at blocking traffic noise for the Montbello Neighborhood.

Exhibit 5.12-19 Existing and No-Action Noise Conditions at Peoria Street

Exhibit 5.12-20 Existing and No-Action Noise Conditions in Montbello

No-Action Alternative

There will be no changes to I-70 adjacent to Peoria Street or the Montbello Neighborhood with the No-Action Alternative. Due to surrounding area growth, however, higher traffic volumes are anticipated in the future. The existing noise wall in Montbello was included in the analysis of the No-Action Alternative.

With the No-Action Alternative, the noise levels in the Peoria Street area will range from 61 dBA to 69 dBA, which is equal to or as much as 3 dBA greater than existing noise levels. None of the 100 noise receptors will exceed its respective NAC threshold or experience a substantial noise increase. To represent the two stories and the rooms of the hotel, 98 of the receptors in the Peoria Street area are modeled at the six locations clustered just west of Peoria Street. Because no impacts will occur under the No-Action Alternative in Peoria, the impacts remain the same as those shown in **Exhibit 5.12-19**.

In the Montbello area, noise levels will range from 57 dBA to 65 dBA, which is 0 dBA to 2 dBA greater than existing noise levels. None of the 112 noise receptors will exceed their respective NAC thresholds or experience a substantial noise increase. Because no impacts will occur under the No-Action

Alternative in Montbello, the impacts remain the same as those shown in **Exhibit 5.12-20**.

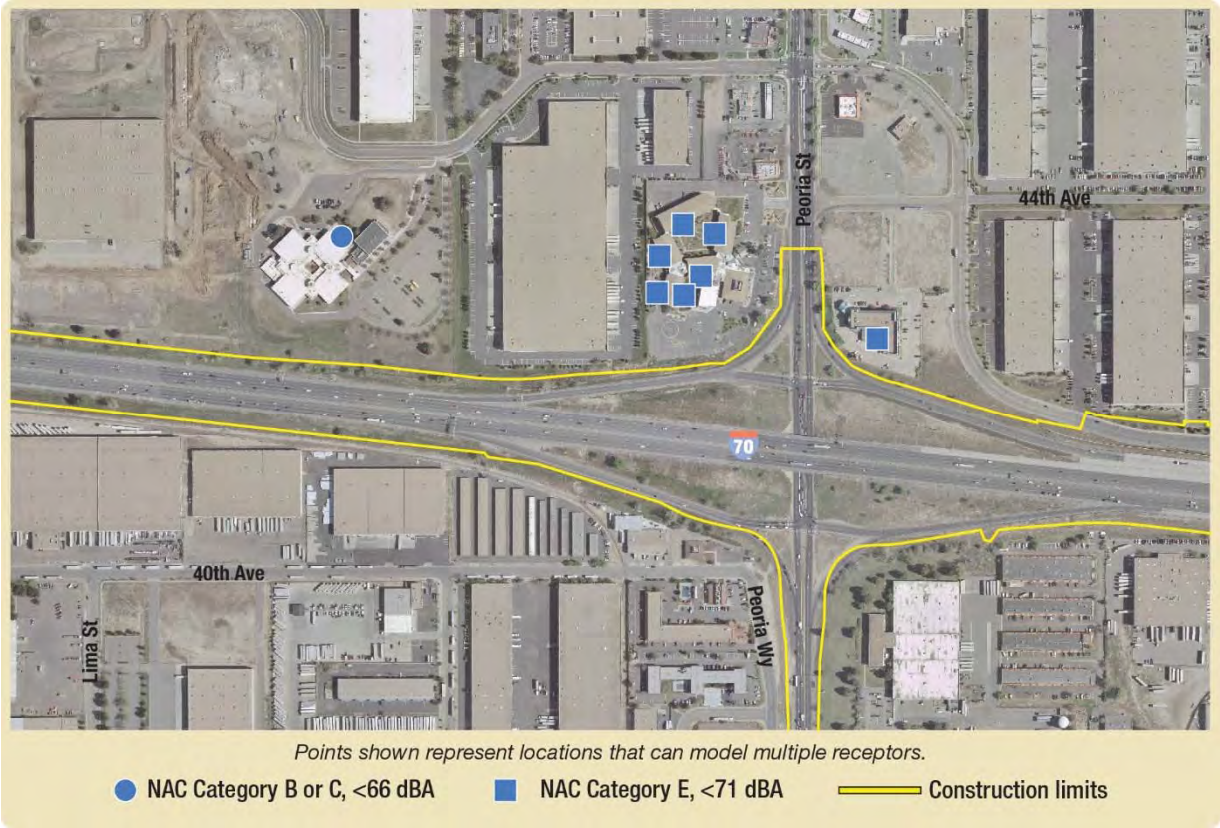
Build Alternatives

Two additional through-lanes of travel are proposed on I-70 in this area for both Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative). Noise levels in the Peoria Street area will range from 62 dBA to 71 dBA for the General-Purpose Lanes Option, which is 1 dBA to 4 dBA greater than existing noise levels. In contrast, noise levels for the Managed Lanes Option will be slightly lower, ranging from 62 dBA to 70 dBA. These noise levels are equal to or as much as 4 dBA greater than existing noise levels.

For the General-Purpose Lanes Option, one (one modeled location) of the 100 noise receptors (14 modeled locations) shown in **Exhibit 5.12-21** will exceed their respective NAC threshold, but none of the noise receptors will experience a substantial increase. Of the 100 noise receptors, none of the noise receptors will exceed its respective NAC threshold under the Managed Lanes Option and none of the 100 noise receptors will experience a substantial increase in noise levels (see **Exhibit 5.12-22**).

Exhibit 5.12-21 Noise Impacts at Peoria Street for General-Purpose Lanes Option

Exhibit 5.12-22 Noise Impacts at Peoria Street for Managed Lanes Option



Based on the construction limits of the proposed roadway, the existing noise wall along I-70 that blocks noise to the Montbello Neighborhood will remain in place. The analysis of the Build Alternatives was conducted with the existing 10-foot noise wall included.

Exhibit 5.12-23 shows that 34 (13 modeled locations) of the 112 noise receptors will exceed the NAC threshold under the General-Purpose Lanes Option, but none of the 34 impacted noise receptors will experience a substantial noise increase. Noise levels will range from 59 dBA to 68 dBA, which is 1 dBA to 5 dBA greater than existing noise levels.

Under the Managed Lanes Option, 29 (11 modeled locations) of the 112 noise receptors will exceed the NAC threshold, while none of these 29 impacted noise receptors will experience a substantial noise increase (see **Exhibit 5.12-24**). Noise levels will range from 59 dBA to 69 dBA, which is 1 dBA to 6 dBA greater than existing noise levels.

Exhibit 5.12-23 Noise Impacts in Montbello for General-Purpose Lanes Option

Points shown represent locations that can model multiple receptors.

NAC Category B or C, <66 dBA
NAC Category B or C, ≥66 dBA
Construction Limits
Existing wall

Exhibit 5.12-24 Noise Impacts in Montbello for Managed Lanes Option

Points shown represent locations that can model multiple receptors.

NAC Category B or C, <66 dBA
NAC Category B or C, ≥66 dBA
Construction Limits
Existing wall

Summary of noise impacts to Peoria Street and Montbello

Exhibit 5.12-25 and **Exhibit 5.12-26** summarize the impacts to Peoria Street and the Montbello Neighborhood. In the Peoria Street area and Montbello, no noise receptors are anticipated to exceed their respective NAC threshold under the No-Action Alternative. Under the Build Alternatives, due to added capacity and higher traffic volumes, one noise receptor in the Peoria Street area and 29 to 34 noise receptors in Montbello are anticipated to exceed their respective NAC thresholds. Mitigation is discussed in Section 5.12.10.

Exhibit 5.12-25 Noise Impact Summary at Peoria Street

Alternative / Option	Predicted Noise Range L_{eq}(h) (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase
	Min	Max			
Existing	61	69	100	0	N/A
No-Action Alternative	61	69	100	0	0
Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative)					
General-Purpose Lanes Option	62	71	100	1	0
Managed Lanes Option	62	70	100	0	0

Exhibit 5.12-26 Noise Impact Summary in Montbello

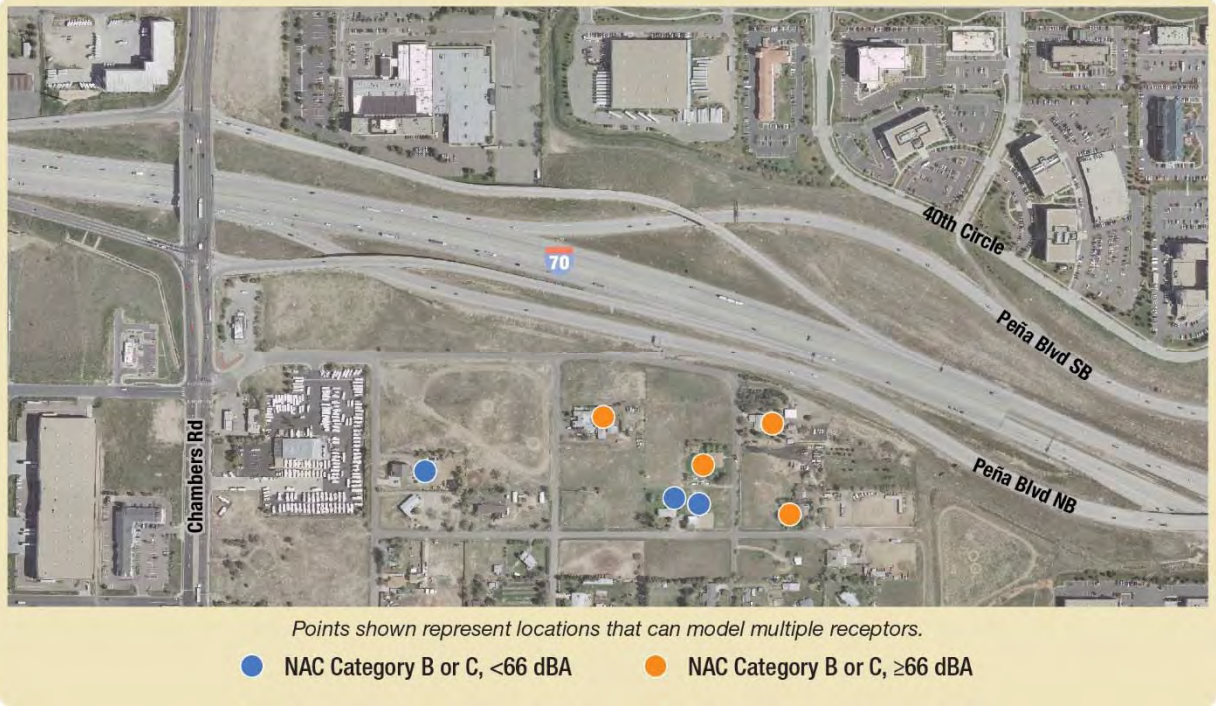
Alternative / Option	Predicted Noise Range Leq(h) (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase
	Min	Max			
Existing	57	64	112	0	N/A
No-Action Alternative	57	65	112	0	0
Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative)					
General-Purpose Lanes Option	59	68	112	34	0
Managed Lanes Option	59	69	112	29	0

5.12.8 How is noise in Aurora affected by the project alternatives?

There are several single-family homes in Aurora, southeast of the interchange of I-70 and Chambers Road. There are no noise walls on this section of I-70. **Exhibit 5.12-27** shows that some of the single-family homes in the Aurora area currently experience traffic noise due to the lack of noise

walls. The existing noise levels range from 61 dBA to 70 dBA, and four of the seven noise receptors exceed their respective NAC threshold.

Exhibit 5.12-27 Existing and No-Action Noise Conditions in Aurora



No-Action Alternative

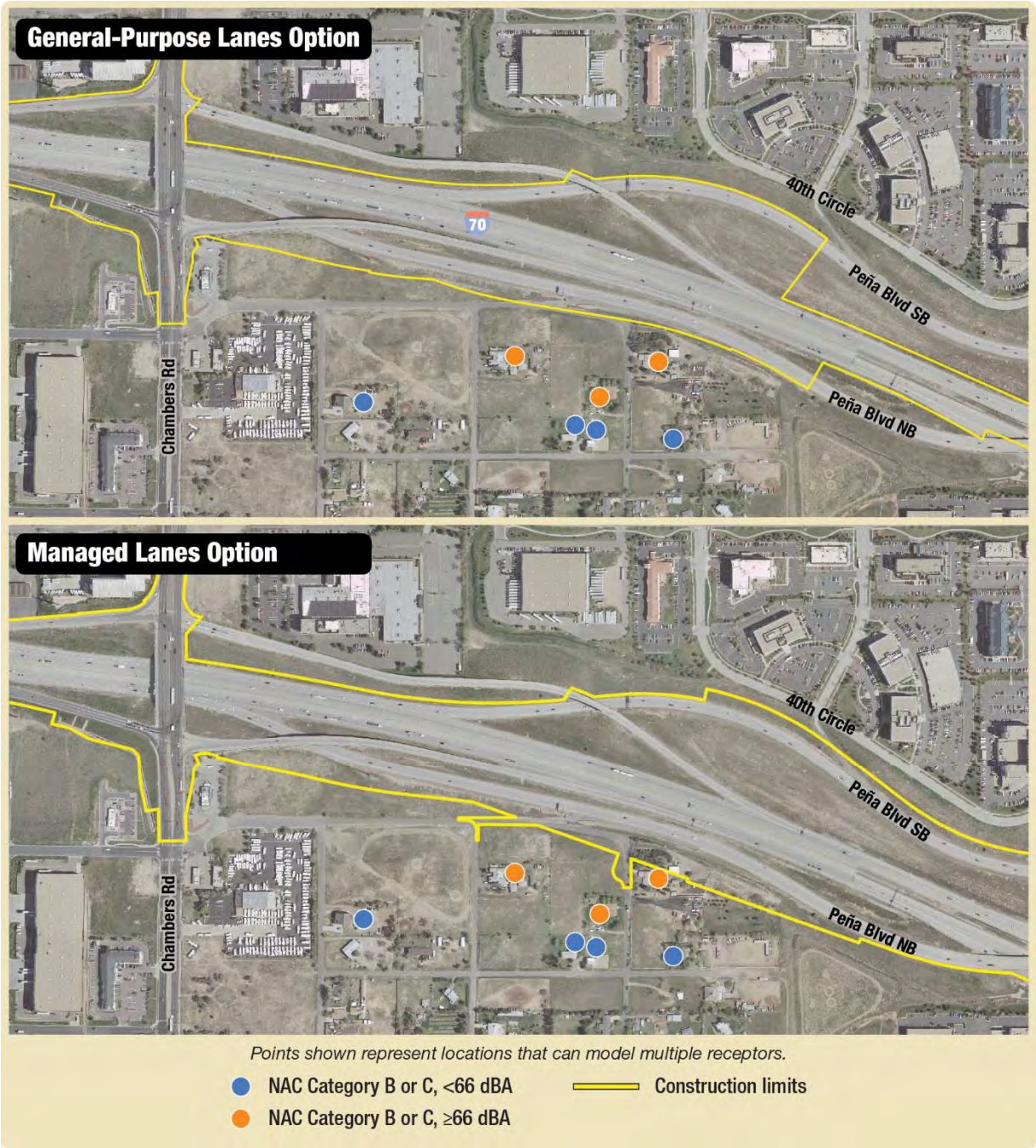
With the No-Action Alternative, no changes will occur to the lane configuration on I-70 adjacent to the Aurora Neighborhood. Due to surrounding area growth, traffic volumes are anticipated to be higher on the highway. Based on the increase in traffic by 2035, the noise levels are anticipated to range from 62 dBA to 70 dBA, which is equal to or as much as 1 dBA over existing noise levels. Four of the seven noise receptors will exceed their respective NAC thresholds, but none of these four impacted noise receptors will experience a substantial noise increase (see **Exhibit 5.12-27**).

Build Alternatives

Near the residential Aurora Neighborhood, two additional through-lanes are proposed on I-70 with the Build Alternatives. The noise levels for the noise receptors range from 62 dBA to 70 dBA with the General-Purpose Lanes Option. Three of the seven noise receptors will exceed their respective NAC thresholds, but none will experience a substantial noise increase (see **Exhibit 5.12-28**).

With the Managed Lanes Option in Aurora, noise levels range from 61 dBA to 70 dBA. Three of the noise receptors will exceed the NAC threshold, but none will experience a substantial noise increase (see **Exhibit 5.12-28**).

Exhibit 5.12-28 Noise Impacts in Aurora for Build Alternatives, General-Purpose Lanes Option and Managed Lanes Option



Summary of noise impacts in Aurora

Exhibit 5.12-29 summarizes impacts to noise receptors in Aurora. The Build Alternatives will have fewer noise

impacts on the neighborhood than the No-Action Alternative, due to the design of the highway causing some lanes to be shifted further north than Existing and No-Action conditions. The Build Alternatives require analysis of mitigation.

Exhibit 5.12-29 Noise Impact Summary in Aurora

Alternative / Option	Predicted Noise Range L_{eq}(h) (dBA)		Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold	Number of Noise Receptors with a Substantial Noise Increase[1]
	Min	Max			
Existing	61	70	7	4	N/A
No-Action Alternative	62	70	7	4	0
Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative)					
General-Purpose Lanes Option	62	70	7	3	0
Managed Lanes Option	61	70	7	3	0

1. *All noise receptors that experience at least a 10 dBA increase over existing noise levels also exceed their respective NAC threshold and also are included in those counts.*

5.12.9 Are noise impacts going to be mitigated?

As discussed earlier, CDOT must consider noise mitigation measures if the noise level at a sensitive site, such as a residence, meets or exceeds the NAC threshold for the specific land use. Before recommending mitigation, though, it needs to be determined if mitigation is feasible *and* reasonable.

Feasibility of mitigation

For a noise wall to be determined feasible, it must provide at least a 5-dBA reduction for at least one impacted noise receptor. It also must not reduce safety, such as reducing sight distance. Finally, it must be possible to construct it with reliable and common engineering practices. CDOT has determined that—for Colorado terrain and weather conditions, including common high wind events—20 feet is the maximum allowable noise wall height without compromising structural integrity under typical construction design specifications. If a noise wall does not meet these criteria, it cannot be recommended.

Reasonableness of mitigation

There are three criteria, all of which must be met, to determine if a noise wall is reasonable:

- As a result of the noise wall, at least one noise receptor must experience a 7-dBA noise reduction.

Benefitted receptor survey

Viewpoints of the impacted residents and property owners are solicited through a benefitted receptor survey. The survey will take place during the final design phase of the project, prior to construction.

Each receptor that gets 5 dBA noise reduction from the wall is a benefitted receptor and will get two votes, one for the resident and one for the owner. Whichever option (for or against the mitigation action) receives the most votes will determine whether the mitigation is built.

- A Benefitted Receptor's Survey must be performed, and more than 50 percent of the responding owners and residents must support the construction of the noise wall. The required survey will be deferred until the final design phase of the project.
- The cost-benefit index must be no more than $6,800 per dBA per receptor. An example of how the cost benefit index is calculated is shown below.

If a 1,000-foot-long, 10-foot-high noise wall provides a 5-dBA reduction for six noise receptors, and a 7-dBA reduction for 10 noise receptors, the cost calculation will be as follows:

- Noise wall cost = 1,000-foot-long x 10-foot-high x $45 per square foot = $450,000 ($45 per square foot is a unit cost specified in CDOT guidance for computing the cost-benefit factor only and does not necessarily represent all of the costs that are incurred when constructing a noise wall)
- Decibels per benefitted receptors = (6 receptors x 5-dBA reduction) + (10 receptors x 7 dBA) = 100 total dBA of reduction
- The total noise wall cost of $450,000 divided by the total 100 dBA benefitted receptor noise reduction results in a Cost-Benefit Index of $4,500 per dBA reduction per benefitted receptor

This cost-benefit index is considered economically reasonable because it is less than the $6,800 per benefitted receptor maximum amount.

If the potential noise wall does not benefit any receptors by at least 5 dBA, then the wall does not meet feasibility requirements and further analysis of the wall is not necessary. Similarly, if a potential noise wall benefits at least one receptor by 5 dBA, but does not benefit at least one receptor by 7 dBA, then the wall does not meet reasonability requirements and the cost benefit index will not be calculated.

If a noise wall fails to meet all the feasibility and reasonableness criteria, the wall cannot be recommended. If a single criterion for feasibility or reasonability is not met, analysis for that particular noise mitigation ends. If a wall does meet all the feasibility and reasonability requirements, it will be recommended pending completion of a benefitted receptor survey with 50 percent approval by owners and residents.

Statement of Likelihood

A Statement of Likelihood includes the preliminary location and physical description of noise mitigation measures determined to be feasible and reasonable in the preliminary analysis. It is included in the environmental document because feasible and reasonable determinations may change due to changes in final project design after approval of the environmental document.

For this evaluation, possible noise walls were analyzed as single-height walls ranging from eight feet up to 20 feet in height by two-foot increments. Feasibility and reasonability were analyzed for single-height walls in each neighborhood. At final design, the Preferred Alternative will be analyzed in a more in-depth manner to optimize the wall heights and lengths. When this optimization takes place, the ultimate goal of each wall will be to maximize the number of benefitted receptors while still meeting feasibility and reasonability requirements.

Mitigation figures in the following sections show the benefits of single-height walls. Single-height walls that met feasibility and reasonability requirements (pending a benefitted receptor survey) were analyzed to determine which single height provides a benefit to the average number of benefitted receptors. The single-height wall shown in the following figures is the single height rounded up to the nearest two-foot increment that provides a benefit to the approximate average number of benefitted receptors.

5.12.10 How will noise impacts be mitigated?

Usually, noise abatement—or mitigation—means constructing noise barriers. These noise barriers can be walls or earthen berms. Berms were considered for this project, but they would require more property acquisition because they require a larger footprint, which would create more impacts to the residents in the neighborhoods. Because of this, berms generally are ruled out in urban areas like I-70 due to space restrictions. To be most effective, noise walls should be built with minimal gaps and be tall enough to block the line of sight from the source of the noise to the noise receptors.

Noise walls

Noise mitigation options include erecting a noise wall, which can be earthen berms or walls made of concrete, masonry block, or plastic products.

The following discussion addresses where noise mitigation is recommended, what form noise mitigation might take, how much noise reduction it will achieve, and if it is feasible and reasonable in each neighborhood. These recommendations for noise mitigation will be carried forward and analyzed in more detail for the Preferred Alternative in final design. The preliminary noise walls described are based upon preliminary design, and if conditions substantially change during final design, the mitigation options and material types are subject to change or might not be provided. For more information on the mitigation determination, please see the associated CDOT Noise Abatement Worksheet forms

included in Appendix B of Attachment K, *Noise Technical Report*.

Mitigation for Globeville

The No-Action Alternative does not propose changes in this area, so existing noise walls remain as adequate noise mitigation because they are functional and in good condition. However, with the Build Alternatives—both General-Purpose Lanes and Managed Lanes Options—analysis was performed to determine if taller noise walls (12-foot, 14-foot, 16-foot, 18-foot, or 20-foot), as compared to the existing noise walls (10-foot), are a possibility in this area to block the additional traffic noise predicted for the future. The following findings were made:

- Taller walls along the north side of I-70 were determined to be neither reasonable nor feasible for both options.
- Taller walls along the south side of I-70 were determined to be feasible in some instances, but not reasonable for both options. More specifically, 18-foot and 20-foot noise walls were determined to be feasible for both options, but not reasonable, since no noise receptor is benefitted by 7 dBA.

The noise wall analysis for Globeville is summarized in **Exhibit 5.12-30** and the location of the analyzed noise walls are shown in **Exhibit 5.12-31** and **Exhibit 5.12-32**. The noise walls shown are existing walls that will remain in place since analyzed noise walls with additional height (also shown) failed to meet both feasibility and reasonability requirements. Noise wall analysis details can be found in Appendix E of Attachment K, *Noise Wall Mitigation Tables*.

Exhibit 5.12-30 Mitigation Summary in Globeville for the Build Alternatives

Criteria	Globeville North of I-70		Globeville South of I-70	
	General-Purpose Lanes Option	Managed Lanes Option	General-Purpose Lanes Option	Managed Lanes Option
Evaluated Wall Heights (ft)	12 to 20	12 to 20	12 to 20	12 to 20
Feasible Wall Heights (ft)	None	None	18 to 20	18 to 20
Reasonable Wall Heights (ft)	None	None	None	None
Wall Heights (ft) Recommended for Advancement	**None Recommended**	**None Recommended**	**None Recommended**	**None Recommended**
Wall Height (ft)	N/A	N/A	N/A	N/A

Exhibit 5.12-31 Mitigation Benefits to Globeville for Build Alternatives, General-Purpose Lanes Option

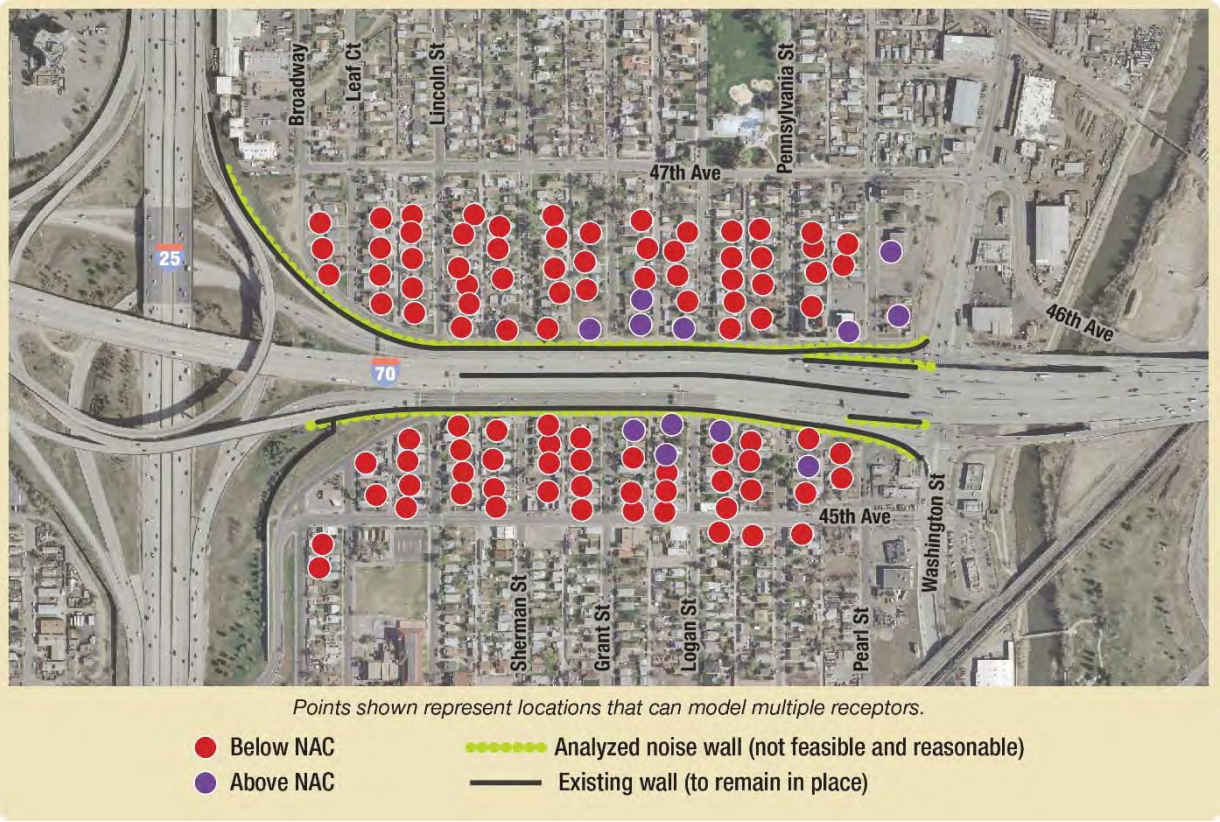
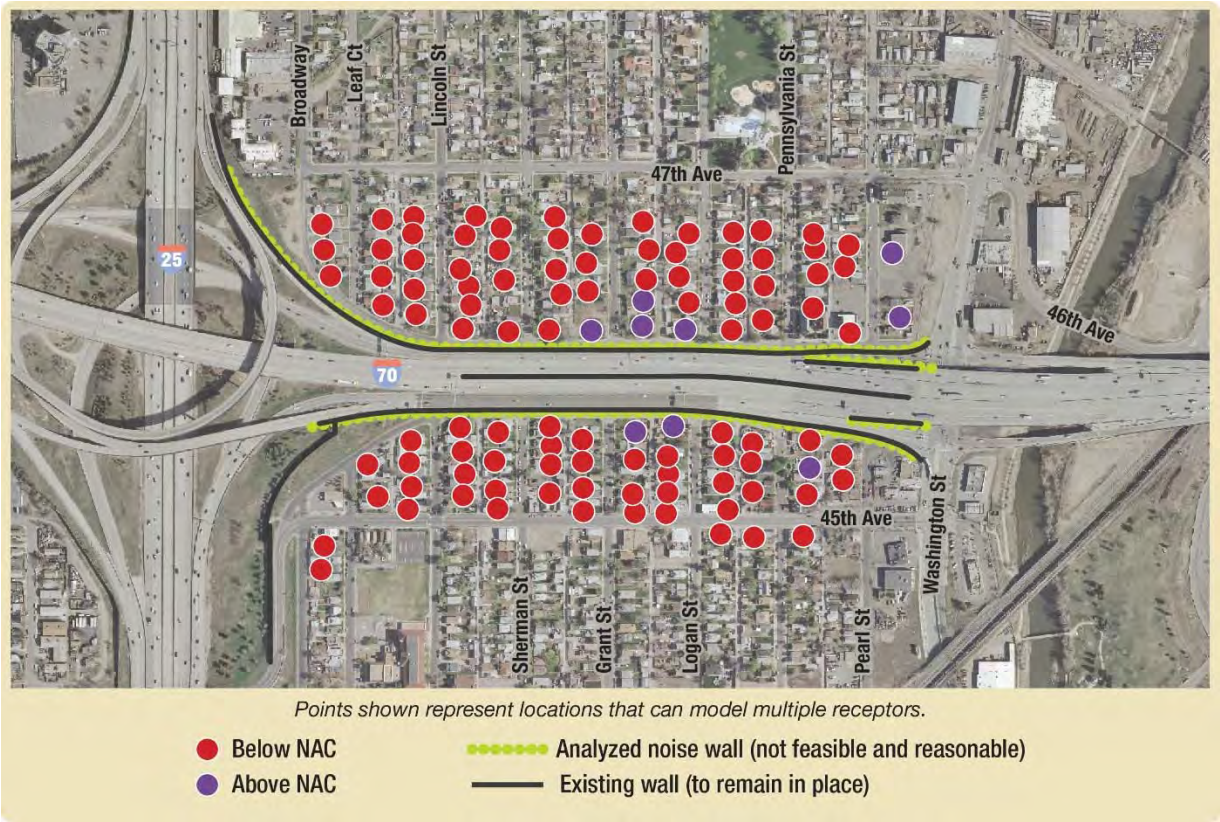


Exhibit 5.12-32 Mitigation Benefits to Globeville for Build Alternatives, Managed Lanes Option



Mitigation for Elyria and Swansea

Because the existing noise walls in the Elyria Neighborhood are limited, new noise walls are recommended for each alternative in areas where they are deemed to be feasible and reasonable, as required by CDOT. Noise walls were placed along the edges of mainline I-70, and along the on and off ramps for each alternative.

In the Swansea Neighborhood, new noise walls were analyzed along mainline I-70 and the on and off ramps. They are recommended for each alternative except the Partial Cover Lowered Alternative. The opportunity to place long noise walls along the edges of mainline I-70 and the on and off ramps is diminished for this alternative due to elevation differences between the highway and frontage roads and due to the cross-streets that continue across the highway. The following analysis shows that noise walls in the Swansea area are less effective for the Partial Cover Lowered Alternative because the neighborhood roads will require frequent gaps in the noise walls that will make them less effective.

No-Action Alternative, North Option

Based on the analysis performed for the No-Action Alternative, North Option, noise walls are recommended adjacent to the highway on the viaduct. Proposed noise walls will total 2,660 feet in Elyria, 4,010 feet north of I-70 in Swansea, and 5,010 feet south of I-70 in Swansea. Per TNM analysis, eight-foot to 20-foot single-height walls in all three areas are feasible and achieve the reasonability criterion of a 7-dBA design reduction goal with an acceptable cost-benefit index.

Between all analyzed feasible and reasonable potential noise wall heights (eight-foot to 20-foot), the average number of benefitted noise receptors corresponds with a 12-foot wall height in Elyria. In Swansea, north of I-70, a 12-foot wall height provides benefit to the average number of benefitted noise receptors, and in Swansea south of I-70, a 14-foot wall height provides benefit to the average number of benefitted receptors.

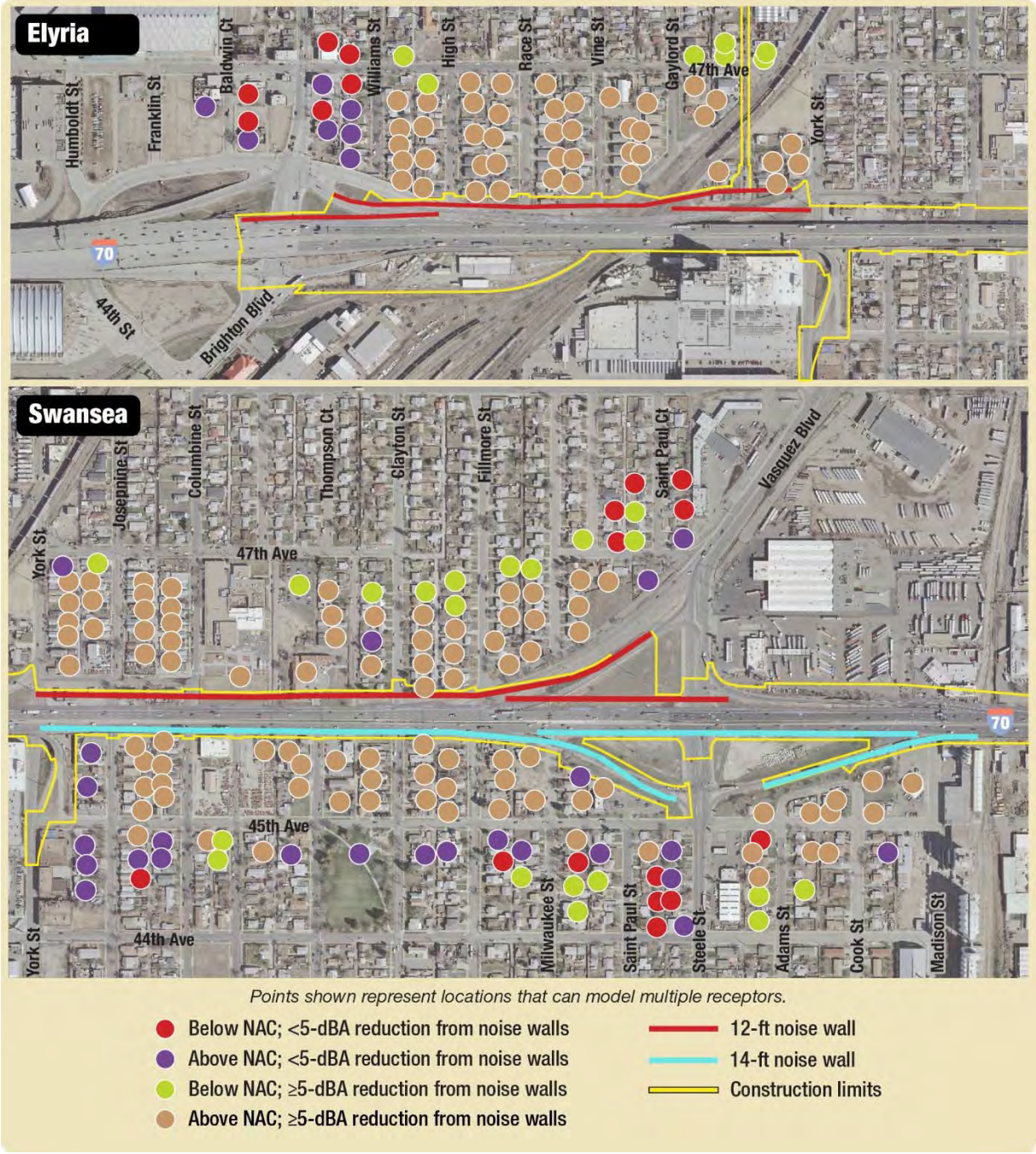
Exhibit 5.12-33 shows the details of the noise wall analysis in each area and **Exhibit 5.12-34** shows the location of the wall modeled in TNM to obtain the design goal and an acceptable cost-benefit index. The noise walls shown are based on preliminary design and are subject to change.

Exhibit 5.12-33 Mitigation Summary in Elyria and Swansea for No-Action Alternative, North Option

Criteria	Elyria	Swansea North of I-70	Swansea South of I-70
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**
Wall Height (ft)[1]	12	12	14

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-34 Mitigation Benefits in Elyria and Swansea for No-Action Alternative, North Option



No-Action Alternative, South Option

Based on the analysis performed for the No-Action Alternative, South Option, the total length of the noise walls proposed is 2,550 feet in Elyria, 4,130 feet north of I-70 in Swansea, and 5,280 feet south of I-70 in Swansea. Per TNM analysis, eight-foot to 20-foot walls in all three areas are feasible and achieve the 7-dBA design reduction goal with an acceptable cost-benefit index, making them reasonable as well.

Between all analyzed feasible and reasonable potential noise wall heights (eight-foot to 20-foot), the average number of benefitted noise receptors corresponds with a 12-foot wall height in Elyria. In Swansea, north of I-70, a 12-foot wall height provides benefit to the average number of benefitted noise receptors; in Swansea, south of I-70, a 14-foot wall height provides benefit to the average number of benefitted noise receptors.

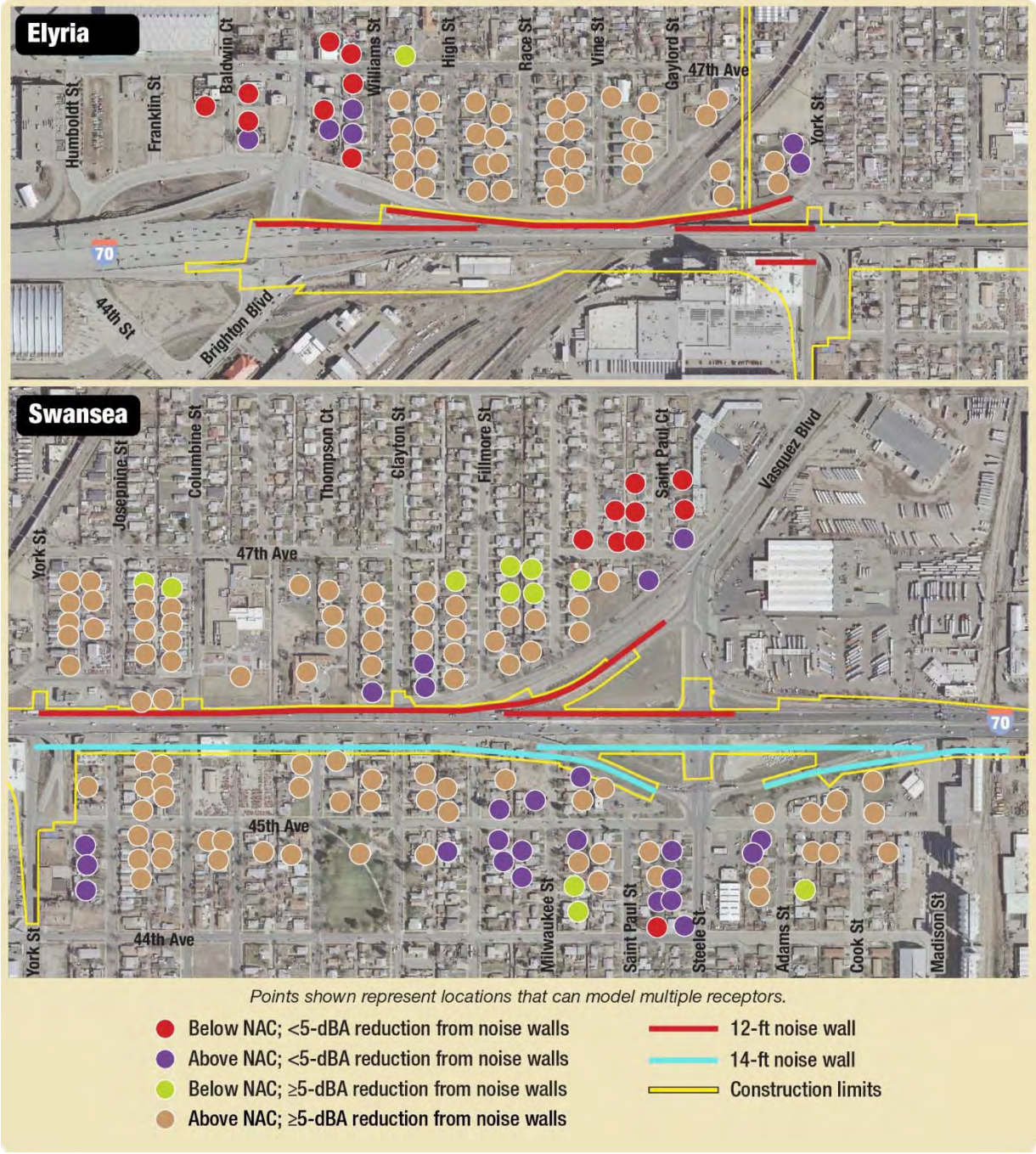
Exhibit 5.12-35 shows the details of the noise wall analysis in each area and **Exhibit 5.12-36** shows the location of the wall modeled in TNM to obtain the design goal and an acceptable cost-benefit index. The noise walls shown are based on preliminary design and are subject to change.

Exhibit 5.12-35 Mitigation Summary in Elyria and Swansea for No-Action Alternative, South Option

Criteria	Elyria	Swansea North of I-70	Swansea South of I-70
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**
Wall Height (ft)[1]	12	12	14

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-36 Mitigation Benefits in Elyria and Swansea for No-Action Alternative, South Option



Revised Viaduct Alternative, North Option

Based on the analysis performed for the Revised Viaduct Alternative, North Option, the total length of the noise walls proposed is 2,570 feet in Elyria, 3,520 feet north of I-70 in Swansea, and 4,250 feet south of I-70 in Swansea. Per the TNM analysis, eight-foot to 20-foot walls in Elyria and Swansea both north and south of I-70 are feasible and achieve the 7-dBA design reduction goal with an acceptable cost-benefit index, making them reasonable as well.

Between all analyzed feasible and reasonable potential noise wall heights (eight-foot to 20-foot), the average number of benefitted noise receptors corresponds with a 14-foot wall height in Elyria. In Swansea, north of I-70, a 14-foot wall height provides benefit to the average number of benefitted noise receptors and, in Swansea south of I-70, a 12-foot wall height provides benefit to the average number of benefitted noise receptors.

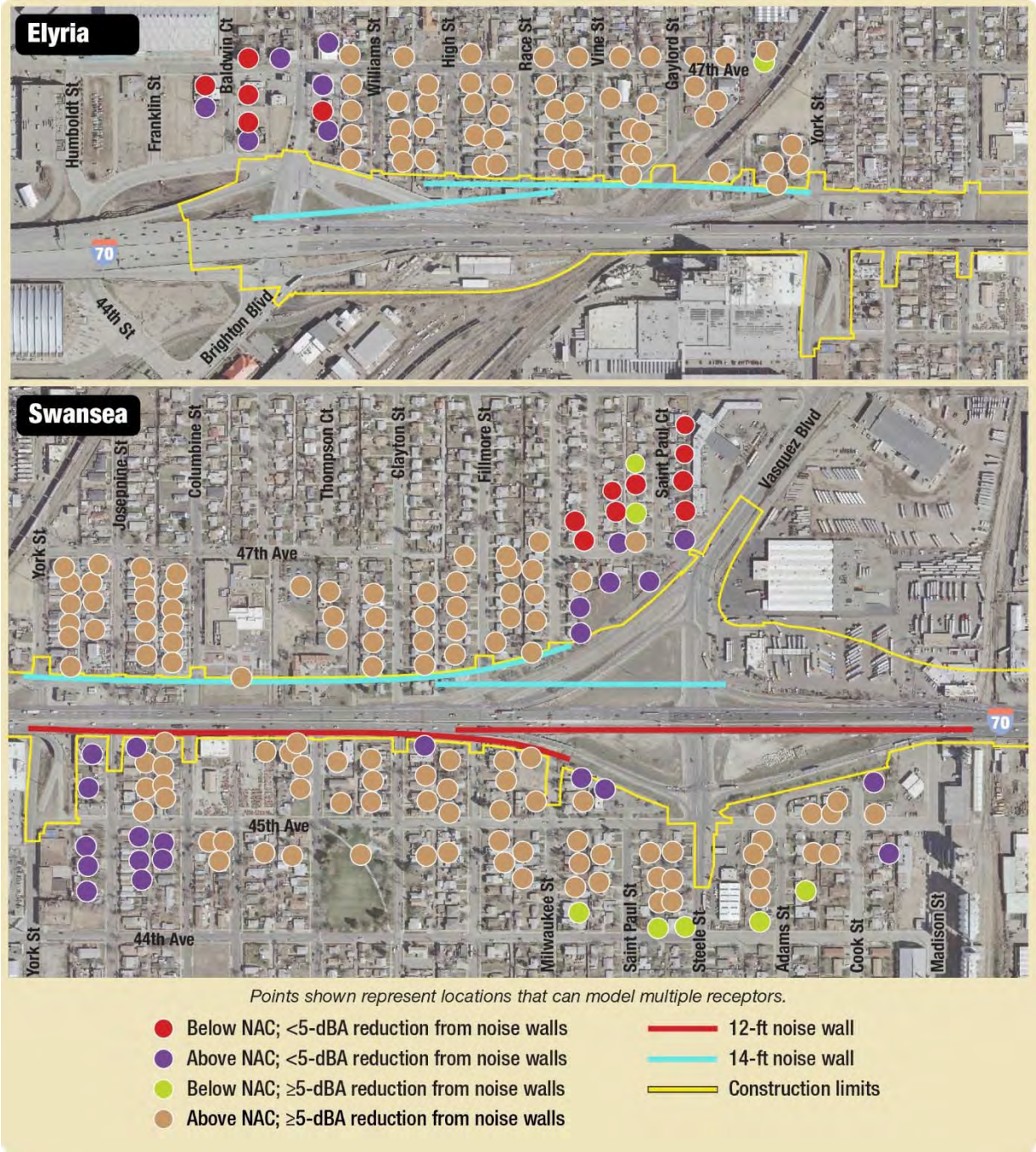
Exhibit 5.12-37 shows the details of the noise wall analysis in each area and **Exhibit 5.12-38** shows the location of the wall modeled in TNM to obtain the design goal and an acceptable cost-benefit index. The noise walls shown are based upon preliminary design and are subject to change.

Exhibit 5.12-37 Mitigation Summary in Elyria and Swansea for Revised Viaduct Alternative, North Option

Criteria	Elyria	Swansea North of I-70	Swansea South of I-70
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**
Wall Height (ft)[1]	14	14	12

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-38 Mitigation Benefits in Elyria and Swansea for Revised Viaduct Alternative, North Option



Revised Viaduct Alternative, South Option

Based on the analysis performed for the Revised Viaduct Alternative, South Option, the total length of the noise walls proposed is 3,050 feet in Elyria, 3,790 feet north of I-70 in Swansea, and 4,320 feet south of I-70 in Swansea. Per TNM analysis, eight-foot to 20-foot walls in all three areas are feasible and achieve the 7-dBA design reduction goal. Additionally, the walls are reasonable, since they achieve an acceptable cost-benefit index.

Between all analyzed feasible and reasonable potential noise wall heights (eight-foot to 20-foot), the average number of benefitted noise receptors corresponds with a 12-foot wall height in Elyria and Swansea south of I-70. In Swansea north of I-70, the average number of benefitted noise receptors corresponds with an 18-foot wall height.

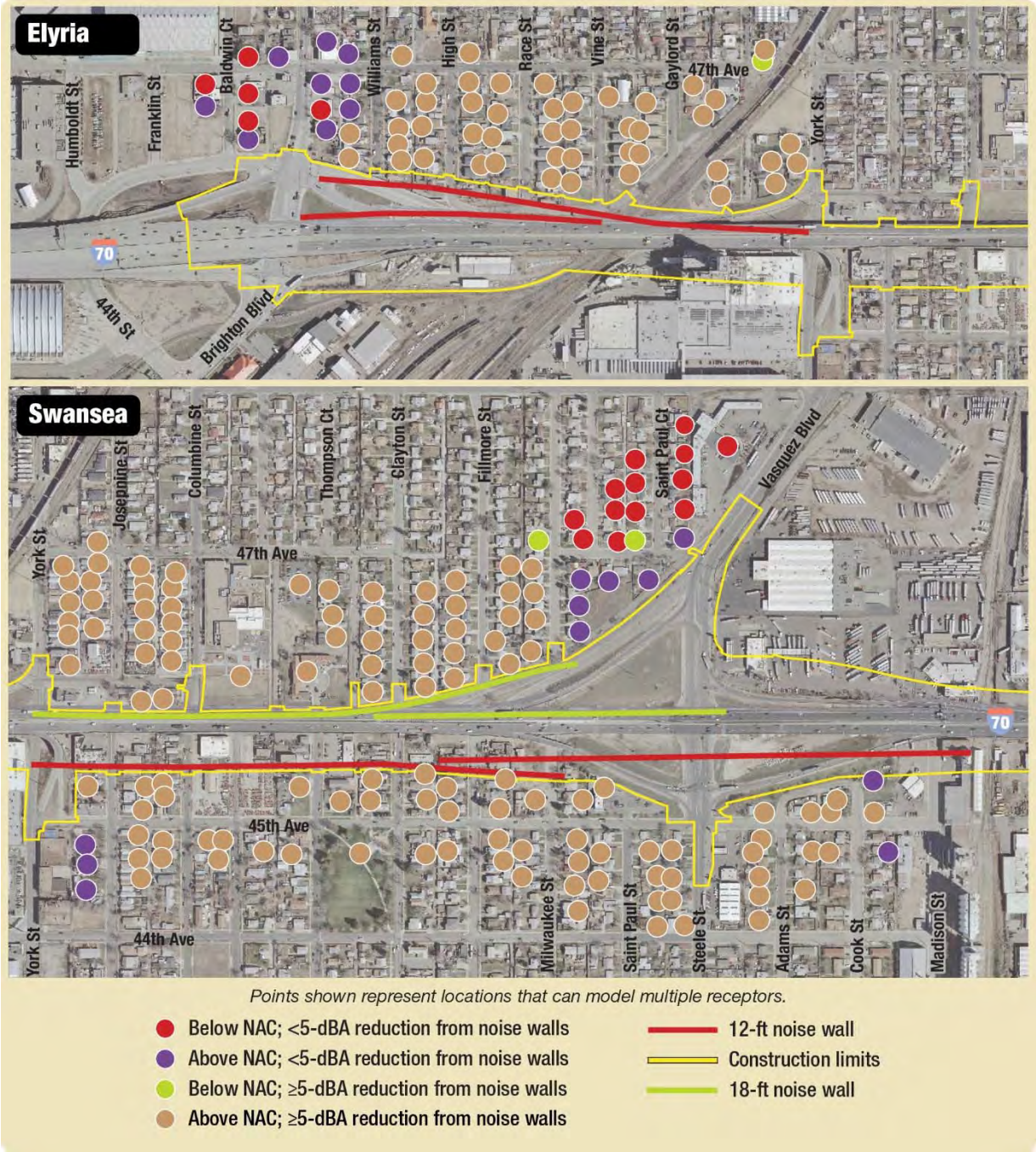
Exhibit 5.12-39 shows the details of the noise wall analysis in each area and **Exhibit 5.12-40** shows the location of the wall modeled in TNM to obtain the design goal and an optimal cost-benefit index. The noise walls shown are based on preliminary design and are subject to change.

Exhibit 5.12-39 Mitigation Summary in Elyria and Swansea for Revised Viaduct Alternative, South Option

Criteria	Elyria	Swansea North of I-70	Swansea South of I-70
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**
Wall Height (ft)[1]	12	18	12

1. This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.

Exhibit 5.12-40 Mitigation Benefits in Elyria and Swansea for Revised Viaduct Alternative, South Option



Partial Cover Lowered Alternative

Based on the mitigation analysis performed, the total length of the noise wall complex is proposed to be approximately 2,380 feet in Elyria. The noise wall complex that was analyzed along the north side of I-70 in Swansea was approximately 1,370 feet, and approximately 3,650 feet along the south side of I-70 in Swansea. In Elyria, 12-foot to 20-foot walls were found to be both feasible and reasonable.

In Swansea north of I-70, walls from 12 feet to 20 feet were found to be feasible but they failed and achieve the 7-dBA design reduction goal. In Swansea south of I-70, eight-foot to 20-foot walls met feasibility requirements, but failed to meet reasonability requirements. An eight-foot wall did not benefit any noise receptors by 7 dBA and 10-foot to 20-foot wall heights did not result in an acceptable cost-benefit index value. The walls were not found to be reasonable in Swansea because the highway cover in the area provides enough noise reduction to the surrounding noise receptors. Additionally, placement of noise walls on the neighborhood side of frontage roads requires frequent gaps that decrease the effectiveness of the walls.

Between all analyzed feasible and reasonable potential noise wall heights (12-foot to 20-foot in Elyria), the average number of benefitted noise receptors corresponds with a 16-foot wall height.

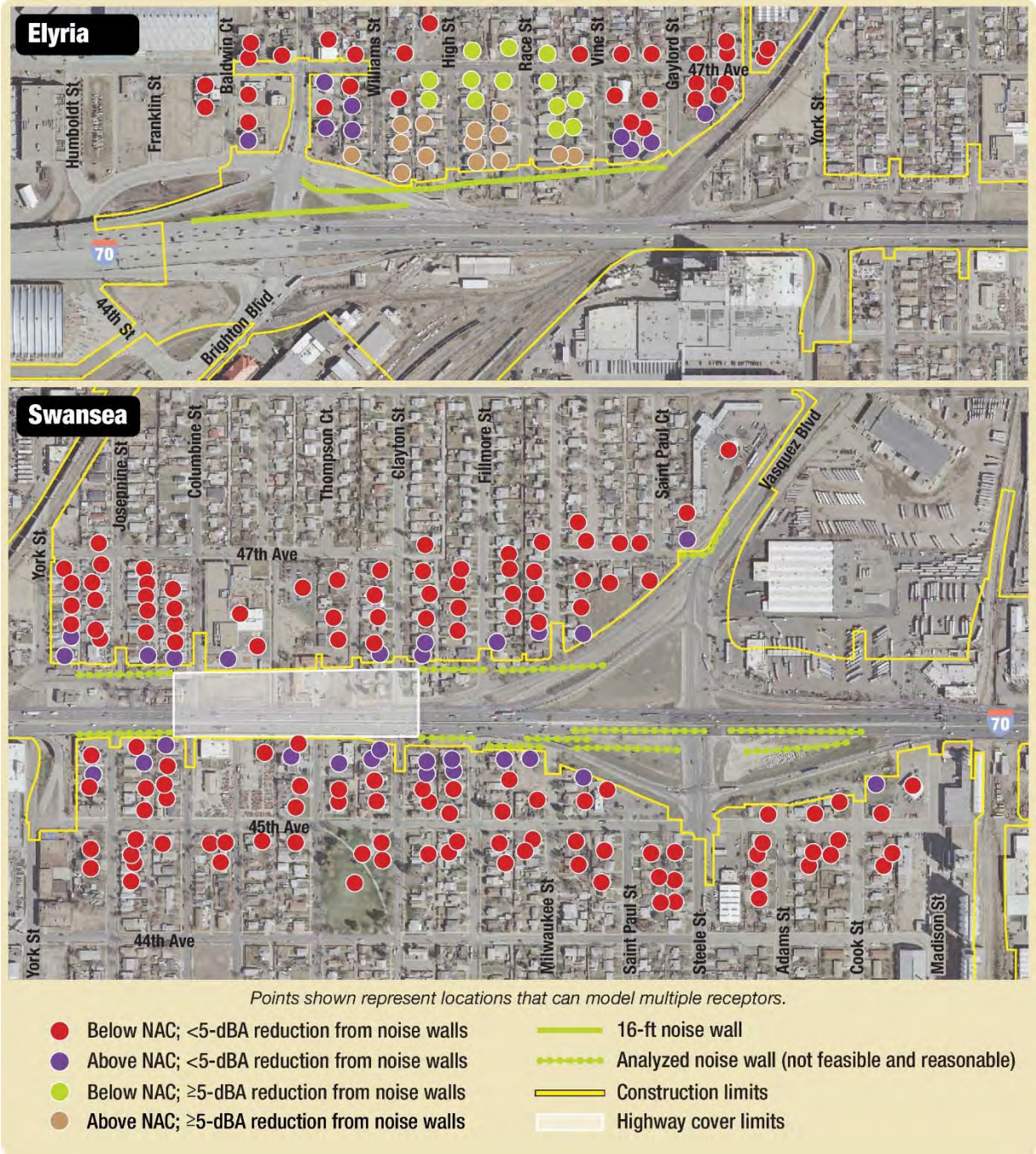
Exhibit 5.12-41 shows the details of the noise wall analysis in each area and **Exhibit 5.12-42** shows the location of the walls modeled in TNM to obtain the design goal and an acceptable cost-benefit index. The noise walls shown are based on preliminary design and are subject to change.

Exhibit 5.12-41 Mitigation Summary in Elyria and Swansea for the Partial Cover Lowered Alternative

Criteria	Elyria	Swansea North of I-70	Swansea South of I-70
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	12 to 20	8 to 20
Reasonable Wall Heights (ft)	12 to 20	None	None
Wall Heights (ft) Recommended for Advancement	**12 to 20**	**None Recommended**	**None Recommended**
Wall Height (ft)[1]	16	N/A	N/A

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-42 Mitigation Benefits in Elyria and Swansea for Partial Cover Lowered Alternative



Summary of mitigation in Elyria and Swansea

Exhibit 5.12-43, **Exhibit 5.12-44**, and **Exhibit 5.12-45** provide a summary of the mitigation results for the proposed walls for each alternative and option in each of the three areas.

Exhibit 5.12-43 Mitigation Summary in Elyria for Build Alternatives

Criteria	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	12 to 20
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**	**8 to 20**	**12 to 20**
Wall Height (ft)[1]	12	12	14	12	16

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-44 Mitigation Summary in Swansea North of I-70 for Build Alternatives

Criteria	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	12 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	None
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**	**8 to 20**	**None Recommended**
Wall Height (ft)[1]	12	12	14	18	N/A

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Exhibit 5.12-45 Mitigation Summary in Swansea South of I-70 for Build Alternatives

Criteria	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Evaluated Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	8 to 20
Reasonable Wall Heights (ft)	8 to 20	8 to 20	8 to 20	8 to 20	None
Wall Heights (ft) Recommended for Advancement	**8 to 20**	**8 to 20**	**8 to 20**	**8 to 20**	**None Recommended**
Wall Height (ft)[1]	14	14	12	12	N/A

1. *This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.*

Mitigation for Peoria Street and Montbello

Under the No-Action Alternative, the Peoria Street and Montbello areas have no noise impacts requiring mitigation. The No-Action Alternative does not propose changes in the Montbello area, so the existing noise wall will remain as adequate noise mitigation, because it is functional and in good condition.

Along Peoria Street, under the General-Purpose Lanes Option of the Build Alternatives, one noise receptors will be impacted. Under the Managed Lanes Option, no noise receptors will be impacted so no mitigation analysis was performed. A 420-foot-long noise wall was modeled near the impacted noise receptor (one modeled location) on the east side of Peoria Street for the General-Purpose Lanes Option. The noise wall was analyzed from eight-foot to 20-foot heights and was found to be neither feasible nor reasonable in the Peoria Street area.

For both the General-Purpose Lanes and Managed Lanes options, analysis was performed to determine if a taller noise wall (12-foot, 14-foot, 16-foot, 18-foot, or 20-foot)—as compared to the existing 10-foot wall—would be feasible and reasonable in the Montbello area to block the additional traffic noise predicted for the future. Additionally, a new 1,050-foot-long wall was analyzed at heights of eight feet to 20 feet as an extension of the existing 3,200-foot-long wall. The combined 4,250-foot-long wall complex analyzed was determined to be feasible in some instances, but not reasonable for both options. More specifically, 14-foot to 20-foot walls were determined to be feasible for both options,

but not reasonable, since no noise receptor is benefitted by 7 dBA.

The existing 3,200-foot-long, 10-foot tall noise wall will remain in place, since additional height and length did not meet feasibility and reasonableness criteria. If the existing 3,200-foot-long noise wall along I-70 is demolished, a new wall has to be constructed to replace the existing wall, per CDOT noise guidelines. If the noise wall is demolished, more in-depth analysis will take place to optimize the number of benefitted receptors impacted by the replacement wall. If analysis shows no feasible and reasonable wall options, the wall must be replaced in-kind per CDOT standards.

Exhibit 5.12-46 summarizes mitigation measures for the Peoria Street area and Montbello Neighborhood. **Exhibit 5.12-47** shows the location of the wall modeled in TNM for the Peoria Street area. **Exhibit 5.12-48** shows the location of the walls modeled in TNM for the Montbello Neighborhood. The noise walls shown are based on preliminary design and are subject to change.

Exhibit 5.12-46 Mitigation Summary in Peoria Street and Montbello

Criteria	Peoria Street		Montbello	
	Build Alternatives		Build Alternatives	
	General-Purpose Lanes Option	Managed Lanes Option	General-Purpose Lanes Option	Managed Lanes Option
Evaluated Wall Heights (ft)	8 to 20	N/A	8 to 20	8 to 20
Feasible Wall Heights (ft)	None	N/A	14 to 20	14 to 20
Reasonable Wall Heights (ft)	None	N/A	None	None
Wall Heights (ft) Recommended for Advancement	**None Recommended**	**None Recommended**	**None Recommended**	**None Recommended**
Wall Height (ft)[1]	N/A	N/A	N/A	N/A

1. This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.

Exhibit 5.12-47 Mitigation Benefits at Peoria Street for Build Alternatives, General-Purpose and Managed Lanes Options

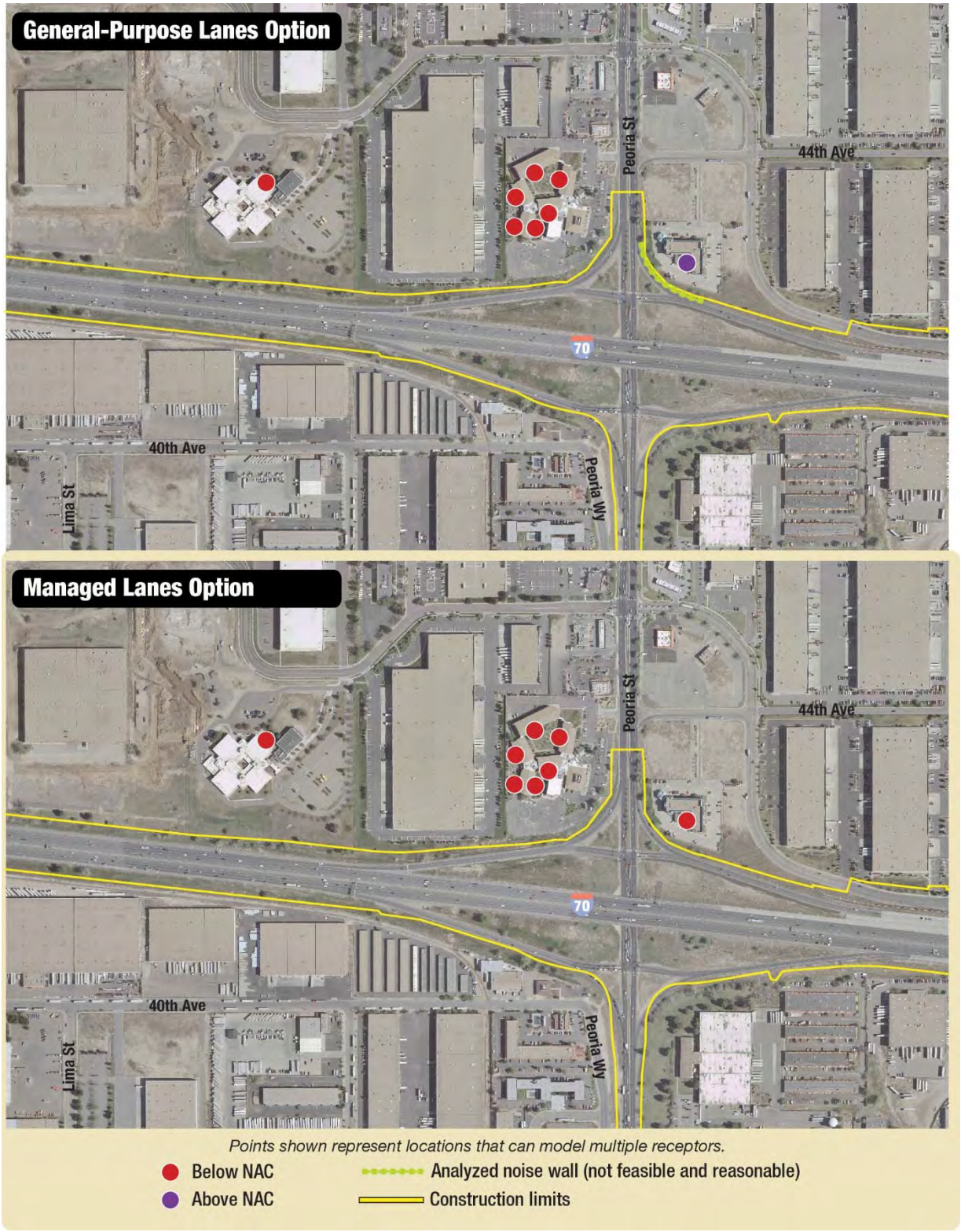
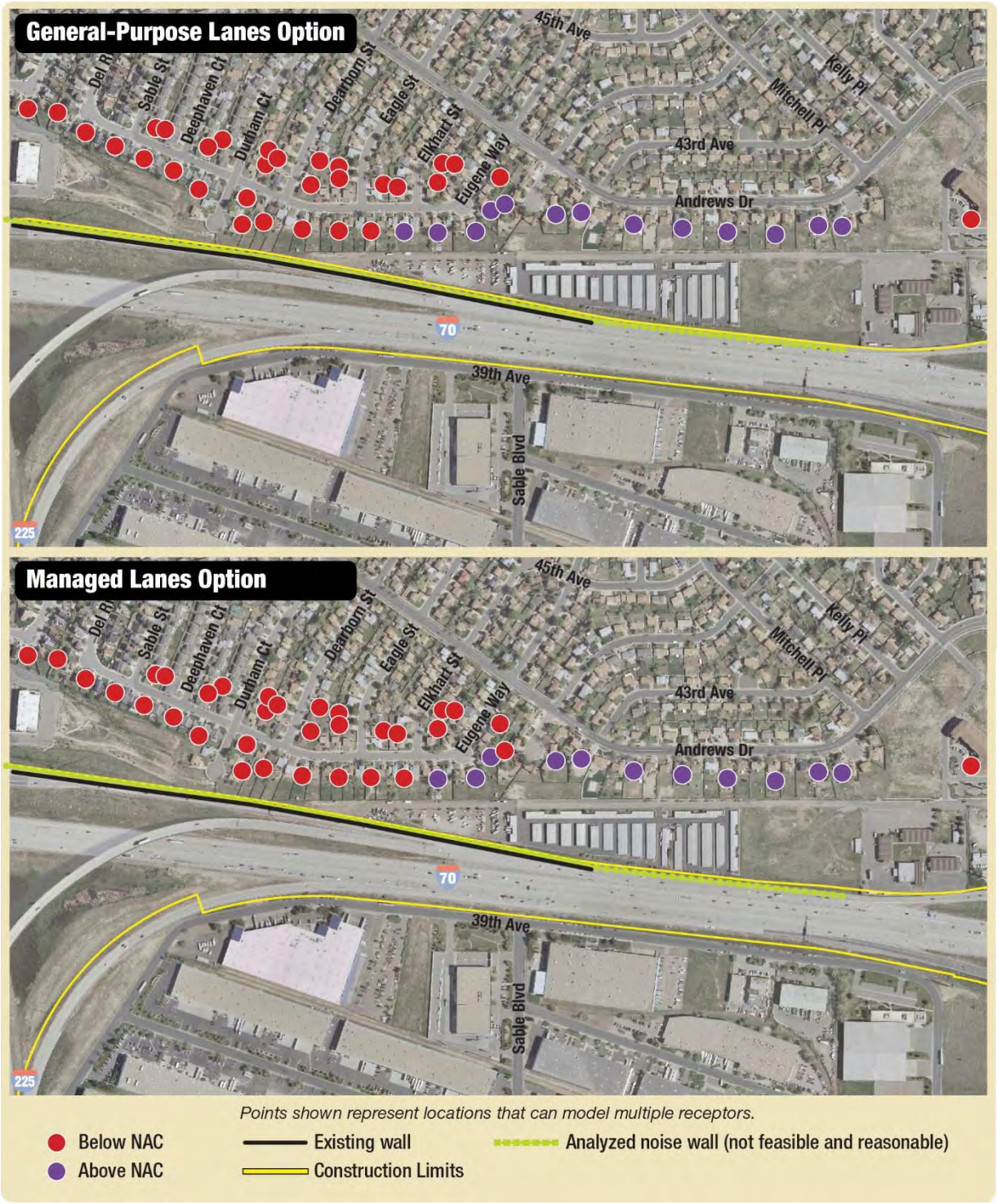


Exhibit 5.12-48 Mitigation Benefits in Montbello for Build Alternatives, General-Purpose and Managed Lanes Options



Mitigation for Aurora

The No-Action Alternative does not result in any additional noise impacts to this neighborhood and, therefore, does not require mitigation.

For the Build Alternatives with the General-Purpose Lanes Option, a 1,750-foot-long noise wall along the Peña Boulevard off ramp and mainline of I-70 was evaluated for heights ranging from eight feet to 20 feet for the single-family homes south of I-70 in Aurora. For the General-Purpose Lanes Option, the wall was found to be feasible from eight-foot to 20-foot in height, but was not found to be reasonable since it exceeded the cost-benefit index and/or no noise receptors received a benefit of 7 dBA. From this initial review, noise mitigation is not reasonable due to such a small number of noise receptors receiving benefit.

Exhibit 5.12-49 shows the location of the wall modeled in TNM for the General-Purpose Lanes Option in Aurora. The noise walls shown are based on preliminary design and are subject to change.

For the Build Alternatives with the Managed Lanes Option, a 1,750-foot wall along the Peña Boulevard off ramp and mainline of I-70 was evaluated for heights ranging from eight feet to 20 feet. For the Managed Lanes Option, the wall was found to be feasible from 10-foot to 20-foot in height, but was not found to be reasonable since it exceeded the cost-benefit index and/or no receptors received a benefit of 7 dBA.

This wall provided a benefit of at least 5 dBA to only two residences at a cost-benefit index of nearly $125,000 per dBA reduction per benefitted noise receptor. From this initial review, noise mitigation is not reasonable due to such a small number of noise receptors receiving benefit.

Exhibit 5.12-49 shows the location of the wall modeled in TNM for the Managed Lanes Option in Aurora The noise walls shown are based on preliminary design and are subject to change. **Exhibit 5.12-50** summarizes mitigation measures for the Aurora Neighborhood.

Exhibit 5.12-49 Mitigation Benefits in Aurora for Build Alternatives, General-Purpose Lanes Option and Managed Lanes Options

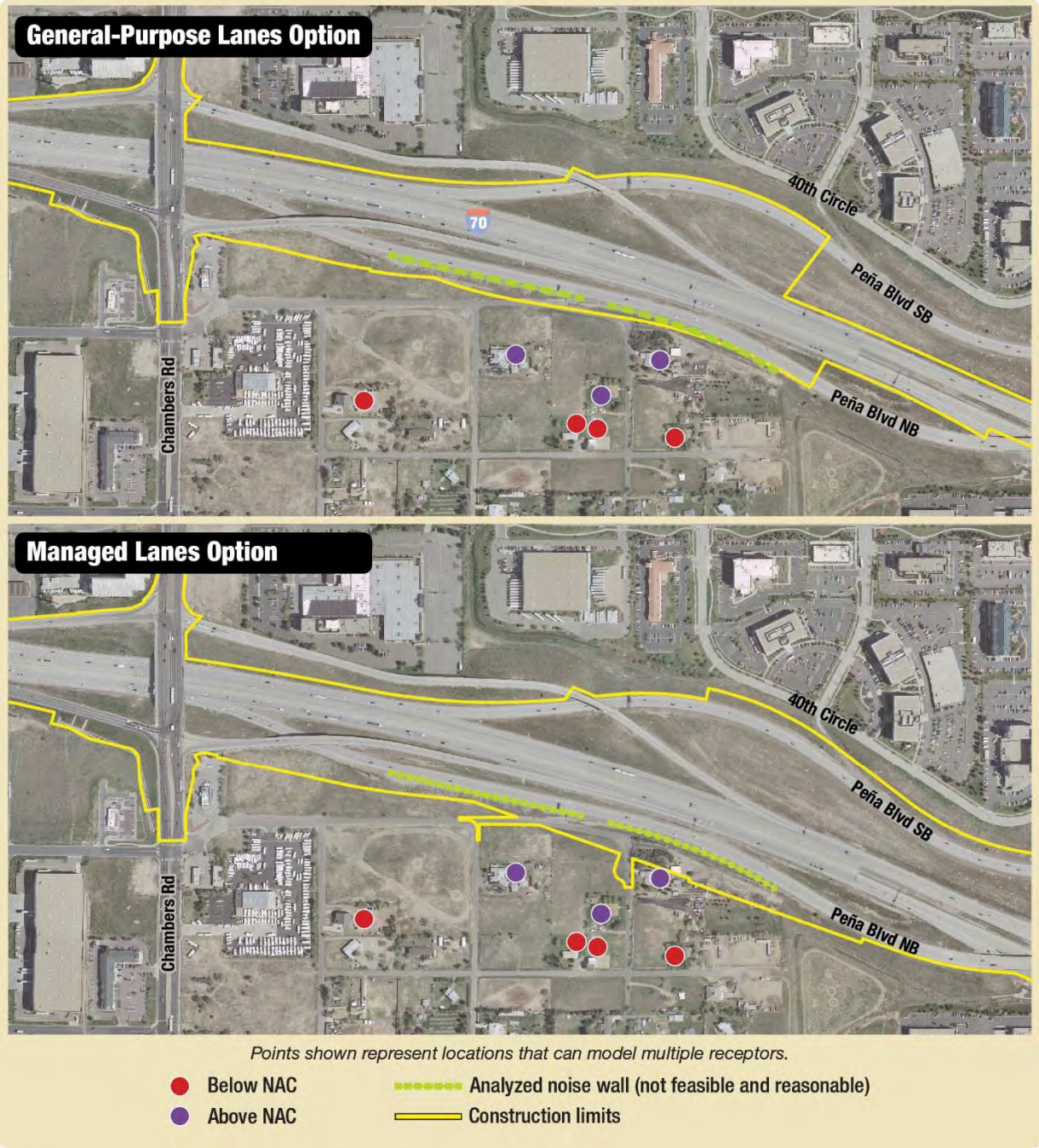


Exhibit 5.12-50 Mitigation Summary in Aurora

Criteria	Aurora	
	Build Alternatives	
	General-Purpose Lanes Option	Managed Lanes Option
Evaluated Wall Heights (ft)	8 to 20	8 to 20
Feasible Wall Heights (ft)	8 to 20	10 to 20
Reasonable Wall Heights (ft)	None	None
Wall Heights (ft) Recommended for Advancement	**None Recommended**	**None Recommended**
Wall Height (ft)	N/A	N/A

Summary of mitigations

An evaluation of noise reductions based on preliminary design available at this time was performed to identify if construction of single-height noise walls in the area is feasible and reasonable to mitigate the future traffic noise from the reconstructed I-70, specifically in the residential areas. The height and length of the noise walls vary based on the location and the adjacent land use and the forecasted noise levels from the highway. **Exhibit 5.12-51** includes the summary of the lengths and heights associated with the average number of benefitted noise receptors of the proposed noise walls. Verification for the proposed mitigation in the Preferred Alternative at final design will include a more in-depth analysis of feasible and reasonable noise walls, focusing on maximizing the number of benefitted noise receptors by optimizing each wall to have varying heights. For example, a single wall could have heights varying from eight feet up to 20 feet while still benefitting the same number of receptors as a wall with a constant height of 20 feet. This additional analysis should help optimize the cost of each wall, while focusing on providing benefit to the greatest number of noise receptors.

A final decision of the installation of mitigation measures will be made upon completion of the project's final design and the public involvement process. The viewpoints of the benefitted residents and property owners will be a major consideration in determining the reasonableness of mitigating the highway traffic noise, through the use of the benefitted receptor survey. The opinions and desires of the public are important factors in dealing with the overall problems of highway traffic noise. For more information on the mitigation determination, please see the associated CDOT Noise Abatement Worksheet forms included in Appendix B of Attachment K, *Noise Technical Report*.

Exhibit 5.12-51 Noise Wall Mitigation Summary by Neighborhood

Alternative	Option	Evaluated Wall Heights (ft)	Feasible Wall Heights (ft)	Reasonable Wall Heights (ft)	Wall Heights (ft) Recommended for Advancement	Wall Height (ft)[1]
Globeville North of I-70						
Build Alternatives	General-Purpose Lanes Option	12 to 20	None	None	None Recommended	N/A
	Managed Lanes Option	12 to 20	None	None	None Recommended	N/A
Globeville South of I-70						
Build Alternatives	General-Purpose Lanes Option	12 to 20	18 to 20	None	None Recommended	N/A
	Managed Lanes Option	12 to 20	18 to 20	None	None Recommended	N/A
Elyria						
No-Action Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	12
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	12
Revised Viaduct Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	14
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	12
Partial Cover Lowered Alternative	N/A	8 to 20	8 to 20	12 to 20	12 to 20	16
Swansea North of I-70						
No-Action Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	12
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	12
Revised Viaduct Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	14
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	18
Partial Cover Lowered Alternative	N/A	8 to 20	12 to 20	None	None Recommended	N/A

Exhibit 5.12-51 Noise Wall Mitigation Summary by Neighborhood

Alternative	Option	Evaluated Wall Heights (ft)	Feasible Wall Heights (ft)	Reasonable Wall Heights (ft)	Wall Heights (ft) Recommended for Advancement	Wall Height (ft)[1]
Swansea South of I-70						
No-Action Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	14
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	14
Revised Viaduct Alternative	North Option	8 to 20	8 to 20	8 to 20	8 to 20	12
	South Option	8 to 20	8 to 20	8 to 20	8 to 20	12
Partial Cover Lowered Alternative	N/A	8 to 20	8 to 20	None	None Recommended	N/A
Peoria Street						
Build Alternatives	General-Purpose Lanes Option	8 to 20	None	None	None Recommended	N/A
	Managed Lanes Option	N/A	N/A	N/A	None Recommended	N/A
Montbello						
Build Alternatives	General-Purpose Lanes Option	8 to 20	14 to 20	None	None Recommended	N/A
	Managed Lanes Option	8 to 20	14 to 20	None	None Recommended	N/A
Aurora						
Build Alternatives	General-Purpose Lanes Option	8 to 20	8 to 20	None	None Recommended	N/A
	Managed Lanes Option	8 to 20	10 to 20	None	None Recommended	N/A

1. This is the wall height rounded to the nearest two-foot increment that benefits the average number of noise receptors.

5.12.11 What are the impacts from noise during construction?

Noise can occur from general construction equipment use near sensitive receptors, particularly pile driving from compaction equipment for substructure elements. Construction noise will present short-term effects to those noise receptors located along the corridor and along designated construction access routes. 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.

Pile driving and demolition are expected to be the loudest construction operations. Piles will be required at most major bridge installations. Bridge and road demolition also will be required at many locations.

5.12.12 How will construction noise be mitigated?

Measures will be taken to minimize noise during construction. Construction noise mitigation measures can be found in the FHWA's *Highway Construction Noise Handbook* (FHWA, 2006). Heavy construction activities that occur within approximately 50 feet of existing structures will require special care to prevent structural damage. Details of these provisions will be determined during final design and before construction begins.

This project will abide by the appropriate city codes as they pertain to construction noise. If noise levels during construction are expected to exceed the limits from the city codes, the contractor must obtain the necessary ordinance variance.

In the vicinity of the elementary school in Swansea, construction noise should be reduced to the maximum extent possible during school hours. If possible, construction should take place during times when school is not in session. If this is not possible, high construction noise activities should take place during non-school hours. Temporary noise shielding also could be used around the school playground and other outdoor areas of frequent use.

The following best management practices (BMPs) for construction noise mitigation will be required by the contractor, as applicable:

- Avoiding areas of work near noise-sensitive receptor locations, or minimizing work in these areas where people or the environment is noise sensitive
- Eliminating slamming of truck beds, truck tailgates, and equipment buckets
- Limiting the idling of construction equipment
- Scheduling trucks properly to minimize long queuing lines
- Installing noise shielding when in close proximity to residential areas

Additionally, public outreach efforts will be considered, such as providing a 24-hour telephone contact line for questions and concerns and remaining in contact with residents and business owners about the planned construction activities.

Exhibit 5.12-52 shows a summary of the impacts and mitigations related to noise. The range of single-height noise walls that meet feasible and reasonable requirements pending a benefitted noise receptor survey is provided. At final design, the Preferred Alternative noise walls will undergo a final optimization that will analyze the perturbation process—a single wall that uses varying heights.

Exhibit 5.12-52 Summary of Noise Impacts and Mitigation Measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures
All Alternatives	Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes.	• Implement BMPs to minimize noise during construction, as per FHWA's *Highway Construction Noise Handbook* (2006) • Conduct a benefited receptor survey prior to construction to determine if the recommended noise wall is desired; if the survey results show that the majority of benefitted receptors who respond to the survey desire the noise wall, the noise wall will be optimized and built
No-Action Alternative, North Option	Number of noise receptors that exceed NAC threshold • Globeville: 9 • Elyria: 116 (20 that increase by 10 dBA or more) • Swansea: 233 (20 that increase by 10 dBA or more) • Stapleton: 0 • Peoria Street: 0 • Montbello: 0 • Aurora: 4	Location and height of feasible and reasonable walls: • Elyria: 8 feet to 20 feet • Swansea: 8 feet to 20 feet
No-Action Alternative, South Option	Number of noise receptors that exceed NAC threshold • Globeville: 9 • Elyria: 108 (7 that increase by10 dBA or more) • Swansea: 239 (27 that increase by 10 dBA or more) • Stapleton: 0 • Peoria Street: 0 • Montbello: 0 • Aurora: 4	
Revised Viaduct Alternative, North Option	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 125 (31 that increase by 10 dBA or more) • Swansea: 278 (66 that increase by 10 dBA or more) • Stapleton: 0 • Peoria Street: 0 • Montbello: 29 to 34 • Aurora: 3	Location and height of feasible and reasonable walls: • Elyria: 8 feet to 20 feet • Swansea: 8 feet to 20 feet
Revised Viaduct Alternative, South Option	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 121 (19 that increase by 10 dBA or more) • Swansea: 260 (49 that increase by 10 dBA or more) • Stapleton: 0 • Peoria Street: 1 • Montbello: 29 to 34 • Aurora: 3	
Partial Cover Lowered Alternative	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 55 (11 that increase by 10 dBA or more) • Swansea: 50 • Stapleton: 0 • Peoria Street: 0 • Montbello: 29 to 34 • Aurora: 3	Location and height of feasible and reasonable walls: • Elyria: 12 to 20 feet

Per CDOT regulations, if an existing noise wall is demolished, a replacement barrier meeting current noise regulatory requirements must be constructed.

5.13 Biological Resources

This section provides a summary of the biological resources in the study area and explains why they are important. The impacts of the project alternatives on the biological resources also are evaluated, then proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Based on the revised construction limits, impacts were updated.
- Agency coordination required by law was updated.
- Impact calculation methodology was refined.
- Mitigation of impacts to biological resources was updated to reflect new guidance and standards.

5.13.1 What are biological resources and why are they important to this project?

Biological resources collectively define the types of animal and plant species that may be found within the study area. Animal species (wildlife)—both native and exotic—include mammals, birds, reptiles, amphibians, and fish. Plant or vegetation communities are classified as distinct groupings of individual species that occur in areas with similar physical environmental characteristics.

Special-status species (both wildlife and vegetation) are those that are listed or are candidates for listing as threatened or endangered under the federal Endangered Species Act of 1973 by the U.S. Fish and Wildlife Service (USFWS), and species in Colorado designated as endangered, threatened, or of special concern by CPW.

The existence and preservation of animals and plants are intrinsically valuable; these resources provide aesthetic, recreational, and economic value to the community. This analysis focuses on species that typically occupy the habitats of the study area, those that may be important to the function of the ecosystem, and those that are of special societal importance.

5.13.2 What study area and evaluation process were used to analyze biological resources?

Biologists from CDOT, CPW, USFWS, and various nonprofit agencies—including Sand Creek Regional Greenway, Bluff Lake Nature Center, and the Rocky Mountain Bird Observatory—were contacted to help describe wildlife resources in the study area (see **Exhibit 5.13-1**).

Exhibit 5.13-1 Biological Resources Study Area

Although no formal surveying or sampling for wildlife was conducted for this project, observations of wildlife and signs of wildlife use were noted during field visits. Field visits were conducted in August 2005, September 2012, November 2012, and April 2015. A literature and records review was conducted, including a review of the Natural Diversity Information Source (NDIS) (NDIS, 2012), to determine species habitat needs and records of species presence in Denver and Adams counties. Species activity maps from CPW also were used to document seasonal activity of deer, Bald Eagles, and black-tailed prairie dogs within the study area.

Impact calculations were tabulated by overlaying the construction limits of each alternative with the areas of the species analyzed. Some habitat areas intersect the existing I-70 roadway footprint. These locations were subtracted out of the total impact calculations.

Vegetation and cover types were identified within the study area from Gap Analysis Program data (USGS, 2011), riparian mapping data (CPW, 2012), and field visits. The method to calculate impacts to riparian areas used the construction limits of each alternative. Areas where the construction limits intersected the riparian areas were counted as permanent impacts. Riparian areas within a 10-foot buffer around the construction limits were counted as temporary impacts.

5.13.3 What are the existing conditions of biological resources analyzed in the study area?

Wildlife

The study area is primarily urban and contains little wildlife habitat. There is no known critical or essential wildlife habitat within the study area. Nevertheless, rivers and streams serve as movement corridors for urban wildlife. Also, there are several designated natural areas that occur adjacent to the study area, including the Sand Creek Regional Greenway, the Bluff Lake Nature Center, and Rocky Mountain Arsenal National Wildlife Refuge (Refuge).

The most natural segment in the study area is along Sand Creek, which contains upland, riparian, wetland, and aquatic habitats. While still highly impacted by the surrounding urban environment, it does provide habitat to a number of species. The Sand Creek Regional Greenway is a trail and nature area that spans 14 miles from the High Line Canal in Aurora to the Platte River Greenway in Commerce City and intersects the study area just east of Quebec Street. The executive director of the Sand Creek Regional Greenway was contacted to obtain updated information concerning special-status species and other general wildlife in the area. The Greenway facilitates urban wildlife, such as mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), muskrats (*Ondatra zibethicus*), coyotes (*Canis latrans*), beavers

Sand Creek immediately north of I-70

(*Castor canadensis*), King Fishers (*Alcedininae* spp.), Blue Heron (*Ardea herodias*), Wild Turkey (*Meleagris gallopavo),* red fox (*Vulpes vulpes*), along with many other species (Refuge, 2014).

Bald Eagles are known to occupy the Sand Creek Regional Greenway during the winter months from November through March, especially near Morrison Nature Center on Star K Ranch in Aurora, Colorado, and the Bluff Lake Nature Area in Denver, Colorado. However, no Bald Eagle nesting sites have been documented within the study area near the greenway (Refuge, 2014).

The Bluff Lake Nature Center is a 123-acre natural area located along Sand Creek that includes a seasonal lake, emergent wetlands, short-grass prairie, mixed-grass prairie, a riparian zone, and forested wetland. Located approximately one-half mile south of the study area east of Havana Street, the Bluff Lake Nature Center is home to urban wildlife, including deer, fox, beaver, reptiles, amphibians, and more. Bluff Lake Nature Center provided a list of 158 bird species that have been recorded near the center. The list includes the Ferruginous Hawk, Bald Eagle, and Golden Eagle. Based on consultation with Bluff Lake Nature Center's executive director, Bald and Golden Eagles are known to occupy trees near the Bluff Lake Nature Center; however, no nesting activity has been documented (Bluff Lake Nature Center, 2014).

The Refuge, part of the USFWS National Wildlife Refuge System, is located approximately 1.25 miles north of I-70. Habitat at the Refuge includes small patches of relatively undisturbed native prairie, wooded areas, and wetlands. It is home to several species of bats and birds, various fish species, black-tailed prairie dogs (*Cynomys ludovicianus*), coyotes, mule deer, numerous species of reptiles, amphibians, and insects. Bald Eagles have been known to nest on the Refuge in the past and often utilize the area for winter roosting. Currently, there is one known active nesting site on the Refuge located approximately 1.5 miles north of the study area (CPW Public SAM Data, 2014).

The South Platte River also flows through the study area. It provides extremely limited habitat, and what is available is highly degraded. Both the South Platte River and Sand Creek provide movement corridors for wildlife and bird species, and are considered to contain appropriate numbers and diversity of fish species for metropolitan rivers.

Additional habitats, including stormwater detention basins, also provide some habitat to waterfowl and other wildlife, but are highly impacted by trash and poor water quality. Wetland habitats, Sand Creek, and the South Platte River are discussed in more detail in Section 5.15, Wetlands and Other Waters of the U.S., and Section 5.16, Water Quality.

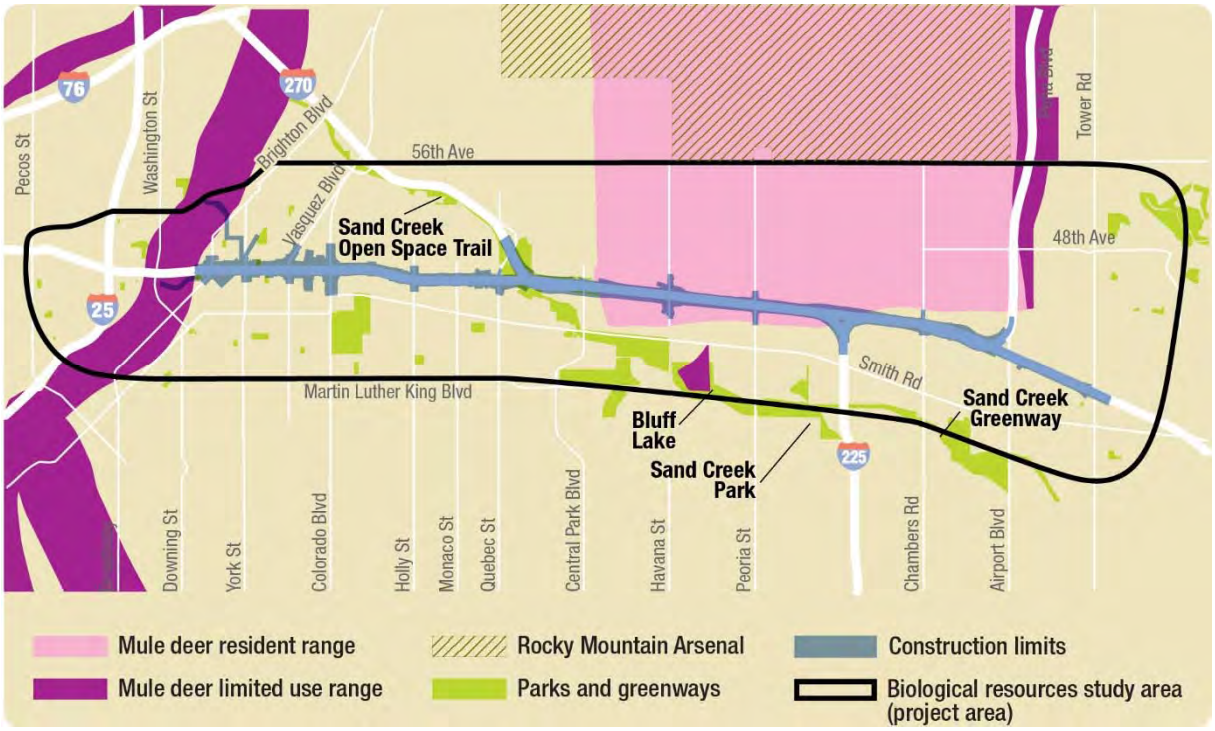
Raptors, Waterbirds, and Other Birds

According to NDIS, approximately 307 species of raptors, upland game birds, waterbirds, and other birds are known to occur or are likely to occur in Denver and Adams counties (NDIS, 2013). During preliminary field surveys, 10 raptor species, two upland game birds, 26 waterbirds, and 36 various other birds were detected.

Large Mammals

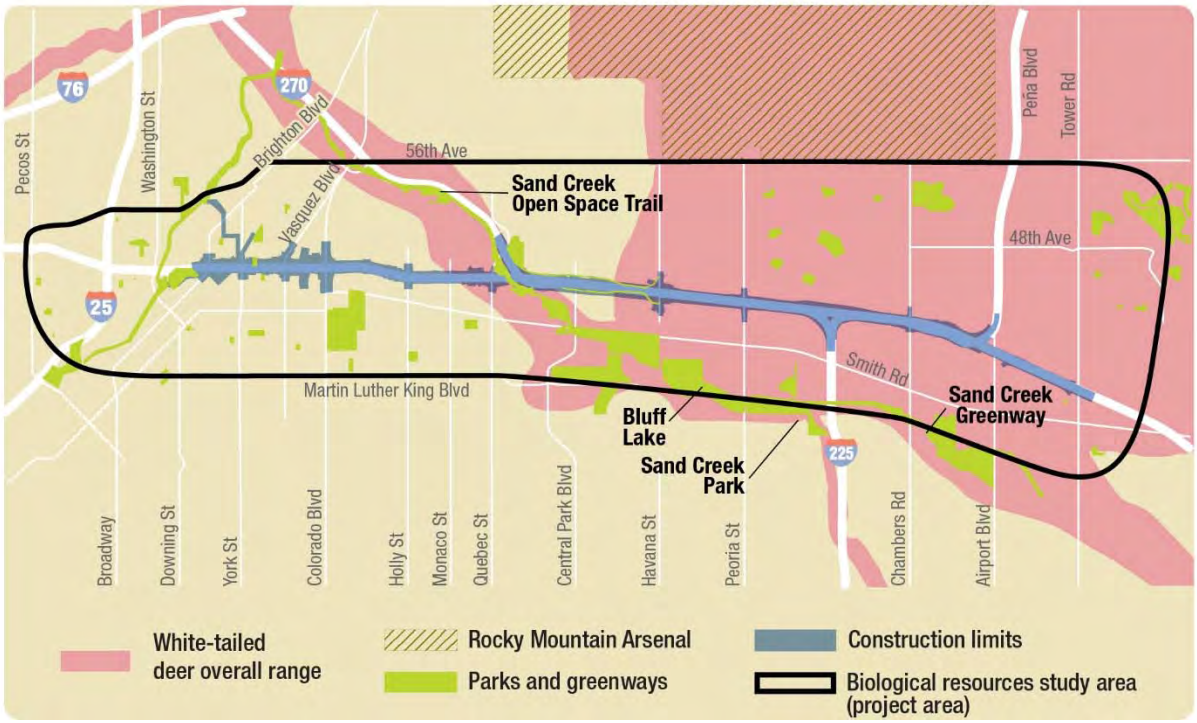
Large mammals within the study area are primarily restricted to linear river and creek corridors; however, their exact range and distribution are not well documented. According to NDIS, there are 10 large mammals known to occur or likely to occur in Denver and Adams counties, including various species of fox, mountain lion, bobcat, and coyote (NDIS, 2013). Four hoofed mammals are known to occur in Denver and Adams counties. Pronghorn (*Antilocapra americana*) and American elk (*Cervus elaphus*) are considered rare within the study area, while mule deer and white-tailed deer (*Odocoileus virginianus*) are considered to be fairly common. The overall range of the pronghorn and elk is well outside the study area. Species activity maps from CPW were used to document seasonal activity of mule deer and white-tailed deer within the study area. The various alignments intersect mapped mule deer and white-tailed deer activity areas, as shown in **Exhibit 5.13-2** and **Exhibit 5.13-3**.

Exhibit 5.13-2 Mule Deer Activity Areas



Source: CPW Public SAM Data, 2014

Exhibit 5.13-3 White-Tailed Deer Activity Areas



Source: CPW Public SAM Data, 2014

Small Mammals

According to NDIS, approximately 42 different species of small mammals are known to occur or are likely to occur within the study area, such as black-tailed prairie dogs, numerous other rodents, bats, rabbits, raccoon, skunk, badger, porcupine, and opossum (NDIS, 2013).

Reptiles and Amphibians

Based on data from the NDIS, 29 species of reptiles and amphibians may be present within the study area (NDIS, 2013). Species common within the study area include the tiger salamander (*Ambystoma tigrunum*), many-lined skink (*Eumeces multivirgatus*), numerous toads and frogs, and various snakes, lizards, and turtles.

Fish

The I-70 East study area crosses two linear water bodies; the South Platte River and Sand Creek. Fish inhabit the South Platte River, which is predominantly considered to be a warmwater fishery (P. Winkle, personal communication, January 3, 2013). Common fish species in the South Platte River in the vicinity of I-70 include common carp (*Cyprinus carpio*), white sucker (*Catostomus commersonii*), and fathead minnows (*Pimephales promelas*). Other species can include longnose dace (*Rhinichthys cataractae*), creek chub (*Semotilus atromaculatus*), Iowa darter (*Etheostoma exile*), Johnny darter (*Etheostoma nigrum*), sand shiners (*Notropis stramineus*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*) (P. Winkle, personal communication, January 3, 2013).

Vegetation

The entire study area falls within mapped urban/built cover type. Urban land cover represents landscaped areas associated with residential and commercial development. Included in this category are cities, towns, villages, strip developments along highways, transportation, power, communications facilities, shopping centers, and industrial and commercial complexes. Vegetation observed during field visits includes lambsquarter (*Chenopodium album*), perennial pepperweed (*Lepidium latifolium*), kochia (*Kochia scoparia*), giant ragweed (*Artemisia trifida*), pigweed (*Amaranthus albus*), curly dock (*Rumex crispus*), and several species of thistle.Riparian mapping data were collected by CPW using the National Aerial Photography Program aerial color infrared photographs. Photographs were analyzed based on the various landforms that were observed and the

vegetation that those landforms support. The vegetation communities then were classified into one of 40 categories. Riparian data are based solely on photography and were not field verified.

There were three riparian categories mapped within the study area: riparian herb, cottonwood, and riparian shrub. Riparian herb includes areas dominated by sedges (*Carex* spp.), rushes (*Juncus* spp.), mesic grasses, and waterlogged or moist soils. Cottonwood areas represent areas dominated by cottonwood trees. Riparian shrub includes areas dominated by Gambel oak (*Quercus gambelii*), sagebrush (*Phalaris arundinacea*), alder (*Alnus* spp.), and other shrubs.

Dominant species observed during field visits were Russian olive (*Elaeagnus angustifolia*), willow, curly dock, cottonwood, smooth brome (*Bromus inermis*), leafy spurge (*Euphorbia esula*), and reed canarygrass (*Phalaris arundinacea*). These areas were mapped primarily along Sand Creek. Riparian corridors provide food and shelter for many species and are particularly important to urban wildlife as transportation corridors.

A riparian mitigation area also exists west of Sand Creek, south of the I-270 and Quebec Street interchange. Species such as golden currant (*Ribes aureum*), skunkbrush (*Rhus trilobata*), chokecherry (*Padus virginiana*), American plum (*Prunus americana*), snowberry (*Symphoricarpos occidentalis*), rubber rabbitbrush (*Ericamerica nauseosa*), wood's rose (*Rosa woodsii*), cottonwood trees, and willows were observed to occur in the site.

Special-status species

Federal and state species of concern in the study area were identified through the USFWS Information, Planning, and Conservation System (USFWS, 2015) and the CPW Threatened and Endangered List (CPW, 2015). FHWA and CDOT have jointly prepared a Biological Assessment that addresses the following South Platte River species of concern: Least Tern (*Sternula antillarum*) (interior population), pallid sturgeon (*Scaphirhynchus albus*), Piping Plover (*Charadrius melodus*), western prairie fringed orchid (*Platanthera praeclara*), and the Whooping Crane (*Grus americana*), as well as designated critical habitat for the Whooping Crane. Therefore, these species are not discussed in this chapter. More information regarding these species and the *Biological Assessment* can be found in Attachment L

of the Supplemental Draft EIS. **Exhibit 5.13-4** shows the federal and state special-status species of concern addressed in this chapter.

Exhibit 5.13-4 Special-Status Species of Concern

Species	Status
Raptors	
Bald Eagle *(Haliaeetus leucocephalus)*	State species of special concern
Burrowing Owl *(Athene cunicularia)*	State threatened species
Ferruginous Hawk *(Buteo regalis)*	State species of special concern
Other Birds	
Mountain Plover *(Charadrius vociferous)*	State species of special concern
Large Mammals	
Swift fox *(Vulpes velox)*	State species of special concern
Small Mammals	
Black-tailed prairie dog *(Cynomys ludivicianus)*	State species of special concern
Reptiles	
Common garter snake *(Thamnopis sirtalis)*	State species of special concern
Amphibians	
Northern leopard frog *(Rana pipiens)*	State species of special concern
Fish	
Iowa darter *(Etheostoma exile)*	State species of special concern
Plants	
Ute ladies'-tresses orchid *(Spiranthes diluvialis)*	Federal threatened species
Colorado butterfly plant *(Gaura neomexicana ssp. coloradensis)*	Federal threatened species

Source: USFWS, 2015; CPW, 2015

Bald and Golden Eagle

The Bald Eagle had been listed by the Endangered Species Act as a federally threatened species since February 1978. In 2007, it was determined that threats to the Bald Eagle have been removed or reduced enough that it has recovered and no longer meets the definition of a threatened species under the Endangered Species Act. The species was removed from the list in August 2007. Despite its delisting by USFWS, it was still listed as a state threatened species by CPW until 2009. Currently, the Bald Eagle is listed as a state species of special concern by CPW (CPW, 2015) and is still protected by the Bald and Golden Eagle Protection Act of 1940, as amended, and the Migratory Bird Treaty Act of 1918, as amended (USFWS, 2014), both of which prohibit “taking”

(killing, selling, or otherwise harming) of eagles, their nests, or eggs.

As previously mentioned, Bald and Golden Eagles are known to occupy areas within and adjacent to the study area during the winter months, from November to March. Bald Eagles have communal roosts, located roughly one mile north of the study area, at the Refuge. Also at the Refuge, there is one known nesting site approximately 1.5 miles north of the study area. They also roost at the Bluff Lake Nature Center, located within the study area. There is a long, narrow section of land designated as Bald Eagle winter range that extends southward from the Refuge, crosses I-70, and covers a portion of the Sand Creek Greenway (**Exhibit 5.13-5**).

Exhibit 5.13-5 Designated Bald Eagle Winter Range

Source: CPW Public SAM Data, 2014

Black-tailed prairie dog

The black-tailed prairie dog lives on grassy plains or prairies in communities called "towns," which can vary greatly in size. Prairie dog towns are an integral part of the prairie ecosystem and many other wildlife species interact or are dependent on the prairie dog town. Black-footed ferrets, prairie rattlesnakes, eagles, badgers, weasels, and Burrowing Owls all may use the colonies for shelter and/or hunting. Grasses and occasionally insects, such as

grasshoppers, make up the diet of the black-tailed prairie dog (CPW, 2015).

Black-tailed prairie dogs are known to exist within the study area. During site visits, their towns have been spotted; however, no formal mapping has been completed.

Burrowing Owl

The Burrowing Owl is a small, ground-dwelling bird found in Colorado as a migratory species. They are primarily found in grasslands and mountain parks, usually in or near prairie dog colonies. The owl is also known to use steppes, deserts, prairies, and agriculture lands and is thought to favor well-grazed, early successional grasslands with soils having significant sand content. Burrowing Owl food includes rodents, small birds, eggs, nestlings, reptiles, and insects. They will hunt for food anytime, day or night (CPW, 2015).

Burrowing Owls have been observed migrating to and nesting in the prairie dog complexes found on the Refuge. Burrowing Owls also were observed nesting in the study area between I-70 and the Refuge before the development of the shopping mall in that area. If their nest burrow is destroyed, they will seek to build a nest at a nearby location (Hetrick, 2012). For this reason, and the high degree of fragmentation of existing prairie dog colonies, it is difficult to predict where Burrowing Owls may attempt to nest in the future. Due to the recent (2012) presence of active nests within the study area, fragmentation of prairie dog colonies, and limited early successional grassland habitat, the likelihood of occurrence of this species is moderate.

Burrowing Owls in the project corridor

Burrowing Owl nests observed between I-70 and the Rocky Mountain Arsenal National Wildlife Refuge are relevant to improvements along the I-70 East project corridor because male Burrowing Owls have relatively high nest fidelity and return to their nest burrows year after year.

Ferruginous Hawk

The Ferruginous Hawk is a raptor whose diet consists primarily of hares, rabbits, ground squirrels, and prairie dogs. Its habitat during both summer and winter includes grasslands, deserts, and other open areas with isolated shrubs or trees where less than 50 percent of the land is under cultivation. During winter, Ferruginous Hawks often are found around colonies of prairie dogs, which make up much of their winter diet. The hawk begins nesting in early March (FerruginousHawk.org, 2007). The species can be found throughout most of Colorado, including the project study area; however, due to the urban nature of the corridor the likelihood is low.

Mountain Plover

Mountain Plovers are birds that inhabit prairie grasslands, arid plains, and fields. Nesting plovers choose shortgrass prairies grazed by prairie dogs, bison, and cattle; tallgrass prairies; and fallow fields. The birds feed singly or in small flocks, mostly on insects. Southeastern Colorado is the primary breeding ground for the Mountain Plover, with more than half of the world's population nesting in the state. (CPW, 2015). The study area is within the Mountain Plover summer range, with known occurrences in Adams County. The species is most likely to be present in the study area east of I-225; however, due to urbanization in this area, the likelihood of occurrence is low.

Swift fox

The swift fox is one of the smallest wild dogs in North America. They live primarily in shortgrass prairies and deserts. They often form their dens in sandy soils on open prairies, along fences, or in plowed fields. Their diet includes small mammals, birds, reptiles, amphibians, fish, and insects. The fox typically will eat whatever live prey it can catch but it also will eat berries and grasses. The swift fox is mainly nocturnal, but its daytime activities vary seasonally (Animal Diversity Web, 2015). The current overall range in Colorado for the swift fox is throughout most of the Front Range on the eastern half of the state; however, they are not found within the project study area (CPW Public SAM Data, 2014).

Common garter snake

In Colorado, the common garter snake inhabits marshes, ponds, and edges of streams, and generally is restricted to aquatic, wetland, and riparian habitat. It feeds opportunistically on frogs, toads, amphibian larvae, fishes, earthworms, and rodents, obtained on land or in the water. Garter snakes are common throughout the metro area, often noted by Denver employees working in and around natural areas in close proximity to water. The species could potentially occur within the study area along the South Platte River and Sand Creek (CPW, 2015).

Northern leopard frog

The northern leopard frog inhabits wet meadows, marshes, ponds, lakes, reservoirs, streams, and irrigation ditches (CPW, 2015). The northern leopard frog has been (2013) found recently to inhabit the Parkfield Lake/Natural Area, which is within the study area. Due to the recent occurrence,

the northern leopard frog has the likelihood to occur throughout suitable habitat within the study area, most likely along the South Platte River and Sand Creek.

Iowa darter

The Iowa darter is a fish species of special concern in Colorado. It occurs in the South Platte River and Sand Creek (Winkle, 2013); therefore, it has the potential to occur within the study area. Iowa darters prefer cool, clear water over a sand or vegetative substrate (NDIS, 2013). In streams, they are only found in areas with undercut banks (NDIS, 2013).

Colorado butterfly plant

The Colorado butterfly plant is a biennial member of the primrose family that flowers from June to September and fruits from July to October. It is found in subirrigated, alluvial soils on level or slightly sloping floodplains and drainage bottoms and in old, abandoned stream channels with a high water table at elevations between 5,000 feet and 6,400 feet. Colonies often are found in low depressions or along bends in wide, meandering stream channels. Most populations are found a short distance from the actual channel and may even occur at the base of low, alluvial ridges at the interface between riparian meadows and drier grasslands (Center for Plant Conservation, 2006). The Colorado butterfly plant has the potential to occur in the study area along the South Platte River and Sand Creek; however, the likelihood is low because the areas have been degraded and contain large communities of non-native and noxious species.

Ute ladies'-tresses orchid

Ute ladies'-tresses orchids bloom from late July through August; however, depending on location and climatic conditions, the orchids may bloom in early July or still be in flower as late as early October. The Ute ladies'-tresses orchid is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams at elevations from 4,200 feet to 7,000 feet. The orchid colonizes early successional riparian habitats, such as point bars, sand bars, and low-lying gravelly, sandy, or rocky edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The species occurs primarily in areas where the vegetation is relatively open and not overly dense, overgrown, or overgrazed (USFWS, 2002). The largest known population

can be found in the City of Boulder near Boulder Creek. Two other documented populations are found along Clear Creek; one in the City of Golden and another in the City of Wheat Ridge. The orchid is also known to be present in Larimer and Moffat counties (USFWS, 1995). The Ute ladies'-tresses orchid has the potential to occur in the study area along the South Platte River and Sand Creek; however, the likelihood is low because the areas have been degraded and contain large communities of non-native and noxious species.

Noxious weeds

Introduced species are present throughout the study area, many of which were planted for agriculture, erosion control, and revegetation. Due to the prevalence of introduced species, most of these species do not affect the natural environment, but rather compete with other introduced species. Some non-native species are extremely hardy and competitive and are able to permanently alter the structure, composition, and function of native plant communities. These are identified by the Colorado Department of Agriculture's Noxious Weed Management Program.

A total of 38 noxious weeds of concern are listed for Colorado, of which 34 are listed for Denver and Adams and Denver counties and 16 of which have a greater potential to be encountered within the construction limits (CDOA, 2015a; CDOA, 2015b; CDOT, 2013) The list is summarized below in **Exhibit 5.13-6**.

Colorado State Noxious Weed Management Program (Colorado Department of Agriculture)

List A: Weed species designated for eradication

List B: Weed species of which the continued spread is to be stopped

List C: Weed species of which the continued spread is to be stopped and for which the state is to provide additional education, research, and biological control resources

Exhibit 5.13-6 Noxious Weed Species of Concern

Common Name	Scientific Name	State Listing	Construction Limits	Denver County	Adams County
Absinth wormwood	*Artemisia absinthium*	B		X	X
Black henbane	*Hyoscyamus niger*	B		X	X
Bouncingbet	*Saponaria officinalis*	B	X	X	X
Bull thistle	*Cirsium vulgare*	B		X	X
Canada thistle	*Cirsium arvense*	B	X	X	X
Corn chamomiles	*Anthemis arvensis*	B		X	X
Chinese clematis	*Clematis orientalis*	B		X	X
Common burdock	*Arctium minus*	C	X		
Common mullein	*Verbascum thapsus*	C	X		
Common tansy	*Tanacetum vulgare*	B		X	X
Common teasel	*Dipsacus fullonum*	B	X	X	X
Cutleaf teasel	*Dipsacus laciniatus*	B		X	X

Exhibit 5.13-6 Noxious Weed Species of Concern

Common Name	Scientific Name	State Listing	Construction Limits	Denver County	Adams County
Dalmation toadflax	*Linaria dalmatica*	B		X	X
Dames rocket	*Hesperis matronalis*	B	X	X	X
Diffuse knapweed	*Centaurea diffusa*	B	X	X	X
Eurasian watermilfoil	*Myriophyllum spicatum*	B		X	X
Field bindweed	*Convolvulus arvensis*	C	X		
Hoary cress	*Cardaria draba*	B	X	X	X
Houndstongue	*Cynoglossum officinale*	B		X	X
Jointed goatgrass	*Aegilops cylindrica*	B	X	X	X
Leafy spurge	*Euphorbia esula*	B	X	X	X
Moth mullein	*Verbascum blattaria*	B		X	X
Musk thistle	*Carduus nutans*	B		X	X
Orange hawkweed	*Hieracium aurantiacum*	A		X	
Perennial pepperweed	*Lepidium latifolium*	B	X	X	X
Plumeless thistle	*Carduus acanthoides*	B		X	X
Puncturevine	*Tribulus terrestris*	C	X		
Purple loosestrife	*Lythrum salicaria*	A		X	X
Russian knapweed	*Acroptilon repens*	B		X	X
Russian olive	*Elaeagnus angustifolia*	B	X	X	X
Salt cedar	*Tamarix chinensis*	B		X	X
Scotch thistle	*Onopordum acanthium*	B	X	X	X
Spotted knapweed	*Centaurea maculosa*	B		X	X
Sulfur cinquefoil	*Potentilla recta*	B		X	X
Wild caraway	*Carum carvi*	B		X	X
Yellow nutsedge	*Cyperus esculentus*	B		X	X
Yellow toadflax	*Linaria vulgaris*	B	X	X	X
Oxeye daisy	*Chrysanthemum leucanthemum*	B		X	X

Source: CDOA, 2015a; CDOA, 2015b; CDOT, 2013

5.13.4 How do the project alternatives potentially affect biological resources?

Effects to biological resources—including wildlife, vegetation, special-status species, and noxious weeds—are summarized in the following subsections.

Wildlife

No-Action Alternative

This alternative will replace the existing viaduct between Brighton Boulevard and Colorado Boulevard, which requires additional right of way. No improvements, aside from existing maintenance practices, are proposed between Colorado Boulevard and Tower Road. The alternative also will include construction of a drainage system to the South Platte River on the north side of I-70, which is proposed for all alternatives. Because of the lack of habitat where any project-related activities will take place, the No-Action Alternative will only have minimal direct impacts to the mule deer limited use range near the South Platte River.

Build Alternatives

Between Brighton Boulevard and Colorado Boulevard, the Build Alternatives either consist of replacing the existing viaduct (Revised Viaduct Alternative) or removing the viaduct and lowering the highway (Partial Cover Lowered Alternative). Between Colorado Boulevard and Tower Road, the Build Alternatives will add two lanes in each direction, which increases the highway width and will result in some habitat loss (as discussed below). The I-70 bridge over Sand Creek also will be widened. Additionally, two drainage systems that will outfall to the South Platte River will be constructed on the north and south sides of I-70 for the Partial Cover Lowered Alternative. Only the north drainage will be constructed for the Revised Viaduct Alternative, as with the No-Action Alternative.

The improvements proposed under the Build Alternatives are anticipated to have minimal, direct impacts to large- or medium-sized mammals, water birds, reptiles, amphibians, or fish within the study area. This is mainly because of the species' mobility, avoidance of human activities, and the general degraded condition of the habitat in the potentially impacted areas. Impacts to wildlife can be expected through reductions in the habitat available to them. These types of impacts will occur to mule deer activity areas (**Exhibit 5.13-2**), white-tailed deer activity areas (**Exhibit 5.13-3**),

and Bald Eagle winter range (**Exhibit 5.13-5**). Direct impacts to deer and Bald Eagle winter range are included in **Exhibit 5.13-7**.

Because of the urban nature of the study area, and the location of the impacts adjacent to an established transportation corridor, these impacts to wildlife are considered minor to negligible. The Build Alternatives do not cause new habitat fragmentation, and existing connections along the South Platte River and Sand Creek will be maintained. Specifically, the proposed bridge structure at Sand Creek likely will not affect the wildlife crossing at this location because of its substantial height, which is more favorable for deer use than lower heights. Usage by other species—such as fox, coyotes, skunk, and raccoons—will not be impeded.

Exhibit 5.13-7 Projected Direct Impacts to Deer, Bald Eagle, and Black-Tailed Prairie Dog Habitats

Alternative	Mule deer limited-use area (acres)[1]	Mule deer resident population area (acres)	White-tailed deer overall range (acres)	Bald Eagle winter range (acres)	Total impacts to wildlife habitat (acres)[2]
No-Action Alternative	3.5	—	—	—	3.5
Build Alternatives, General-Purpose Lanes Option					
Revised Viaduct Alternative	3.5	110.9	177.7	21.8	313.9
Partial Cover Lowered Alternative	6.6	110.9	177.7	21.8	317.0
Build Alternatives, Managed Lanes Option					
Revised Viaduct Alternative	3.5	117.0	222.9	21.8	365.2
Partial Cover Lowered Alternative	6.6	117.0	222.9	21.8	368.3

Source: CPW 2014

1. *Direct mule deer limited-use area habitat impacts are due to the construction of the drainages to the South Platte River.*
2. *Total impact calculations do not account for overlapping wildlife areas.*

Temporary effects from construction are anticipated for small mammals and other local wildlife. Wildlife that currently occupies the study area uses the area for foraging or as a source of prey. These species are likely accustomed to noise and movement due to the urban nature of the study area, so they will be minimally affected by impacts associated with construction.

Vegetation

No-Action Alternative

Due to the urbanized nature of the study area between Brighton Boulevard and Colorado Boulevard, replacement of

the existing viaduct and construction of a drainage system north of I-70 are expected to have negligible impacts to roadside vegetation. East of Colorado Boulevard, the No-Action Alternative consists of standard maintenance practices and also is expected to have negligible vegetation impacts. No wetland areas will be impacted by the No-Action Alternative; however, riparian areas will be impacted for the construction of a north drainage system that will outfall to the South Platte River.

Build Alternatives

Similar to the No-Action Alternative, the western end of the corridor (Brighton Boulevard to I-270) is more urbanized, so both Build Alternatives are expected to have negligible impacts to vegetation in this area. From I-270 to Tower Road, roadway widening will directly impact roadside vegetation. Impacts to roadside vegetation are expected to be greater under the Managed Lanes Option compared to the General-Purpose Lanes Option because the overall footprint is wider on the eastern portion of the project.

Riparian and wetland areas will be affected by construction of the Build Alternatives, as shown in **Exhibit 5.13-8**. Wetland areas are discussed in more detail in Section 5.15, Wetlands and Other Waters of the U.S. Total permanent impacts to riparian areas range from 0.977 acres to 1.298 acres, depending on the Build Alternative and associated options. The difference in impacts between the Build Alternatives is a result of the drainage system south of I-70, which will be constructed as part of the Partial Cover Lowered Alternative and result in an additional 0.048 acre of permanent impact and 0.012 acre of temporary impact to riparian habitat along the South Platte River.

The majority of the permanent impacts to riparian areas occurs along Sand Creek and will be caused by on/off ramps over Sand Creek and roadway widening. An additional 0.272 acre of permanent impact will occur to Sand Creek riparian areas with the Managed Lanes Option. Temporary riparian impacts in the Sand Creek area will be 0.020 acre more for the Managed Lanes Option than each of the General-Purpose Lanes options. Permanent impacts will occur from the addition of new bridge piers, as well as through direct shading of vegetation near Sand Creek. Direct fill-related impacts from bridge piers are minimal within Sand Creek. Permanent fill-related impacts from bridge piers will total roughly 0.001 acre of waters of the U.S., including wetlands, and 0.002 acre of riparian areas.

Exhibit 5.13-8 Projected Impacts to Riparian Areas Caused by the Build Alternatives

Alternative	Riparian Impacts (acres)	
	Permanent	Temporary
No-Action Alternative	0.014	0.011
Build Alternatives, General-Purpose Lanes Option		
Revised Viaduct Alternative	0.977	0.222
Partial Cover Lowered Alternative	1.025	0.234
Build Alternatives, Managed Lanes Option		
Revised Viaduct Alternative	1.249	0.241
Partial Cover Lowered Alternative	1.298	0.253

Note: Impacts were calculated based on conceptual design and are subject to change.

Indirect, permanent impacts at Sand Creek will result from interception of precipitation and shading, both of which affect vegetation growth. Temporary, construction-related impacts (such as site disturbance) to riparian areas from the No-Action Alternative and the Build Alternatives are similar.

Special-status species

As previously discussed, the No-Action Alternative is expected to have negligible impacts to vegetation and will have no direct or indirect effects to wildlife; therefore, the following discussion is focused on the Build Alternatives. Species considered are listed in **Exhibit 5.13-4**.

Bald Eagle

There is a long, narrow section of land designated as Bald Eagle winter range that extends southward from the Refuge, crossing I-70, covering a portion of Sand Creek (see **Exhibit 5.13-5**). Roughly 21.8 acres of this winter range will be directly impacted by the Build Alternatives from I-270 to I-225 (**Exhibit 5.13-7**). Indirect effects would primarily result from construction noise, human activity, and a slight decrease in their winter prey base. The closest active Bald Eagle nest to the study area is 1.5 miles; therefore, impacts to any nesting population are not anticipated.

What is a "prey base"?

The term "prey base" refers to all of the animals that comprise a predator's diet.

Specifically, impacts to black-tailed prairie dogs represent a potential loss in winter prey base for Bald Eagles. The locations of the prairie dog towns are surrounded by development and human activity and typically are small in size and population. The degree to which eagles use these areas for foraging is unknown. Additionally, the colonies occur outside of the mapped winter range for Bald Eagles,

making them marginal foraging habitat at best. Based on the aforementioned details, no impacts to Bald Eagles are anticipated. With the implementation of mitigation measures outlined in Section 5.13.5, potential indirect effects to the Bald Eagle can be prevented or minimized.

Black-tailed prairie dogs and Burrowing Owls

It is important to note that black-tailed prairie dog mapping has not been updated by CPW/NDIS since 2008, and that the size and distribution of active black-tailed prairie dogs may reduce dramatically if there is an outbreak of disease, such as plague, in the community. Other factors, such as predation and drought, may cause negligible fluctuations in prairie dog community growth and expansion. For these reasons, the projected impacts to black-tailed prairie dogs from the Build Alternatives provide an estimate of the relative amount of impact that can be expected, but actual impacts (location and extent) will vary because future population levels and distributions are unpredictable. With the implementation of mitigation measures outlined in Section 5.13.5, potential direct and indirect effects to the black-tailed prairie dog can be prevented or minimized.

Impacts to the Burrowing Owl are not anticipated, but cannot be completely excluded because of their occurrence at the nearby Refuge. These impacts will be minimized to the greatest extent practicable by following current CDOT and CPW guidance on Burrowing Owl nest surveys and seasonal restrictions and guidance if a nest is located. With the implementation of mitigation measures outlined in Section 5.13.5, potential direct and indirect effects to the Burrowing Owl can be prevented or minimized.

Ferruginous Hawk

There is very little to no open grassland and prairie habitat within the study area. Prairie dogs, which make up much of the Ferruginous Hawk's winter diet, generally are located adjacent to major roadways or residential areas. It is likely that the hawk would choose to hunt at the Refuge, Bluff Lake Nature Center, or open grassland east of the study area rather than in developed areas. Due to lack of suitable habitat and undesirable hunting conditions, effects to the Ferruginous Hawk are not anticipated.

Mountain Plover and swift fox

The swift fox overall range is not within the study area (CPW Public SAM Data, 2014). There is very little to no open grassland and prairie habitat within the study area,

where the Mountain Plover and swift fox typically are found. Due to lack of suitable habitat, impacts to the Mountain Plover and swift fox are not anticipated.

Common garter snake and northern leopard frog

Construction activities in riparian and wetland areas under the Build Alternatives may directly impact the common garter snake (*Thamnophis sirtalis*) and/or the northern leopard frog (*Rana pipiens*), which are species of special concern in Colorado. Both species have been documented as occurring in Denver and Adams Counties (NDIS, 2012) and the northern leopard frog was documented in the study area in the Parkfield Lake/Natural Area. These species may occur throughout suitable habitat within the study area, most likely along the South Platte River and Sand Creek.

Sand Creek offers habitat for these species, although the areas within the limits of construction are degraded. Direct impacts could result from the destruction of potentially suitable riparian and wetland habitat along Sand Creek as a result of the construction of ramps and bridge widening. Indirect impacts may occur to these species due to decreased local availability of prey during construction activities.

Iowa darter

Direct impacts to the Iowa darter (*Etheostoma exile*), which is a species of special concern in Colorado, are not expected from the Build Alternatives. Though unlikely, indirect impacts from increased turbidity and stormwater runoff may temporarily impact the Iowa darter near Sand Creek.

Colorado butterfly plant and Ute ladies'-tresses orchid

Within the study area, two federally threatened plant species may occur: (1) the Ute ladies'-tresses orchid (*Spiranthes diluvialis*), and (2) the Colorado butterfly plant (*Gaura neomexicana ssp. Coloradensis*). A review of potentially suitable habitat in the study area has resulted in a "may affect, but not likely to adversely affect" determination. The determination is based on a conservative interpretation of where these species can potentially occur. To further ensure that these plants are not adversely impacted by either of the Build Alternatives, botanical surveys of the study area along Sand Creek must be conducted during the summer months before starting construction. Depending on the findings during the surveys, CDOT will complete formal or informal consultation with the USFWS prior to construction.

Noxious weeds

Noxious weed infestation was observed to be moderate throughout the study area. However, during the most recent field visits conducted in April 2015, dense infestations within the study area near Sand Creek were observed. Patches of leafy spurge, hoary cress, and Russian olive were notable species identified.

During construction, any newly disturbed surface as part of the project would be susceptible to invasive/noxious weed infestations. In addition, seeds can be transported by construction equipment and vehicles.

From I-25 to I-270, the area is so highly urbanized that the overall risk of noxious weed infestation is relatively low because much of the area affected by the project is already paved or built upon. The area east of I-270 is still a highly urban environment, but is slightly less built up, and will be more susceptible to noxious weeds than the west. Within the area east of I-270, the Managed Lanes Option disturbs more land than the General-Purpose Lanes Option, so it is expected to pose a slightly higher risk for noxious weed establishment in the study area.

5.13.5 How are the negative effects from the project alternatives mitigated for biological resources?

There are no direct effects anticipated to hoofed and other large mammals, water birds, or fish within the study area due to the project alternatives, so no mitigation is currently planned for these resources. The reptile (garter snake) and amphibian (northern leopard frog) may be directly impacted; however, mitigation for impacts to riparian areas will offset potential impacts to these species. Impacts to riparian areas will be mitigated in accordance with Senate Bill 40, limited to the area necessary for construction, and replaced upon completion, per the *Guidelines for Senate Bill 40 Wildlife Certification Developed and Agreed Upon by Colorado Parks and Wildlife and the Colorado Department of Transportation (April 1, 2013).*

Mitigation measures are outlined to prevent or minimize potential indirect effects to migrating birds, Bald Eagles, prairie dogs, and Burrowing Owls. Mitigation for effects to black-tailed prairie dogs will be conducted in accordance with the CDOT Impacted Black-Tailed Prairie Dog Policy (2005).

- In the case of prairie dog colonies less than two acres, CDOT will avoid and minimize effects to the greatest extent possible. This includes relocating prairie dogs, as long as the relocation will not affect other resources—such as wetlands or historic properties—and is not cost prohibitive. Relocation of colonies larger than two acres will be conducted in accordance with CRS 35-7-203. If an adequate site cannot be located for colonies larger than two acres, the prairie dogs will be captured and donated to a raptor rehabilitation facility or black-footed ferret reintroduction program. CDOT will not, at any time, authorize any earth-moving activities that result in the burying of living prairie dogs. If necessary, CDOT will coordinate with CPW to facilitate the humane killing of prairie dogs within a town less than two acres in size. On January 15, 2009, the Impacted Black-Tailed Prairie Dog Policy was amended, eliminating the requirement to notify and receive approval from the Food and Drug Administration (FDA) prior to the relocation of prairie dogs (CDOT, 2009). However, CDOT will still coordinate with CPW before the manipulation of prairie dogs or their colonies.
- If construction in prairie dog colonies occurs during Burrowing Owl nesting season (February 1 to August 31), a survey following CPW protocols will be conducted no more than 30 days prior to construction. If a nesting pair is discovered, no construction activity will occur within 150 feet of the nest, between March 15 and October 31.

Mitigation for Bald Eagles and all migratory birds will be conducted in accordance with the Migratory Bird Treaty Act of 1918. Measures will be taken to ensure that effects are minimized.

The following mitigation measures for the protection of migratory birds also will be adhered to (see CDOT Standard Specifications, Section 240):

- A qualified wildlife biologist will be retained for the project.
- Vegetation removal or trimming activities will be timed to avoid the migratory bird-breeding season, which begins on April 1 and runs to August 31.

- All areas scheduled for clearing and grubbing, and within 50 feet of such areas, between April 1 and August 31, will first be surveyed for active migratory bird nests within seven days of the work being performed. The contractor's wildlife biologist also will survey for active migratory bird nests within 50 feet outside construction limits.
- CPW must be contacted if any nests must be moved or are inadvertently destroyed.
- The contractor will avoid all active migratory bird nests. The contractor will avoid the area within 50 feet of the active nests or the area within the distance recommended by the biologist until all nests within that area have become inactive.
- On structures, the contractor will remove existing nests after August 31 and prior to April 1.
- 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.
- If the birds have started to build any nests, they will be removed before the nest is completed. Water will not be used to remove the nests if nests are located within 50 feet of any surface waters.
- The taking of a migratory bird will be reported to the engineer. The contractor will be responsible for all penalties levied by the USFWS for the taking of a migratory bird.

To manage and minimize the proliferation of noxious weeds and preserve existing vegetation within the study area, the following measures will be taken:

- An Integrated Noxious Weeds Management Plan will be prepared and implemented prior to construction activities.
- Monitoring of disturbed sites will be required during the construction periods to identify and treat any noxious weed invasion.
- Contractor's vehicles and equipment will be inspected before they are used for construction to ensure that they are free of soil and debris capable of transporting noxious weeds, seeds, or roots.

- Equipment will be cleaned prior to entering the construction site to prevent the spread of noxious weeds by wind, water, or accidental transport on construction vehicles.
- Topsoil will consist of loose, friable loam free of subsoil, refuse, stumps, roots, rocks, brush, noxious weed seed, and reproductive vegetative plant parts, such as, but not limited to, knapweed, purple loosestrife, Canadian thistle, heavy clay, hard clods, toxic substances, or other material that will be detrimental to its use on the project.
- Disturbed areas will be reclaimed in phases throughout construction with native grasses and forbs.
- In accordance with the Colorado Weed Free Forage Crop Certification Act, mulches or straw bales used for erosion control purposes will be certified weed free.
- All seed mixes, soil, and nursery material used for reclamation will be free of noxious weed seeds, roots, and rhizomes.
- No fertilizer will be used onsite.
- Herbicides will be applied by use of wicks or sponges and spot spraying to avoid off-target injury.
- Broadcast herbicide spraying will only be approved through written consent of the engineer.
- In compliance with Senate Bill 40, each riparian tree removed during construction will be replaced at a 1:1 ratio. All riparian shrubs removed during construction will be replaced at a 1:1 square foot ratio.

Botanical surveys of riparian and wetland habitat in projected impact areas at Sand Creek will be conducted by a qualified biologist during the appropriate summer months (when the plants are blooming) prior to construction initiation for the Ute ladies'-tresses orchid and the Colorado butterfly plant. If either species is identified, formal consultation will be completed with the USFWS prior to construction.

Exhibit 5.13-9 lists the impacts and mitigation measures associated with biological resources.

Exhibit 5.13-9 Summary of Biological Resources Impacts and Mitigation Measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 3.5 acres of permanent, direct impact to wildlife habitat • 0.014 acre of permanent impacts and 0.011 acre of temporary impacts to riparian areas	• Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds • Monitor disturbed sites during construction to identify and treat any noxious weed invasion • Reclaim disturbed areas in phases throughout construction with native grasses and forbs • Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio • Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction will occur in prairie dog colonies between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31 • Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season • Survey areas to be cleared and grubbed, as well as areas within 50 feet of these areas, between April 1 and August 31 for active migratory bird nests within seven days of the work being performed • Remove existing nests from structures after August 31 and prior to April 1 • Monitor structures at least once every three days for any nesting activity between April 1 and August 31 • Prepare and implement an Integrated Noxious Weeds Management Plan prior to construction activities • Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant prior to the start of construction activities
Revised Viaduct Alternative, General-Purpose Lanes Option	• 313.9 acres of permanent, direct impact to wildlife habitat • 0.977 acres of permanent impacts and 0.222 acre of temporary impacts to riparian areas	
Revised Viaduct Alternative, Managed Lanes Option	• 365.2 acres of permanent, direct impact to wildlife habitat • 1.249 acres of permanent impacts and 0.241 acre of temporary impacts to riparian areas	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 317.0 acres of permanent, direct impact to wildlife habitat • 1.025 acres of permanent impacts and 0.234 acre of temporary impacts to riparian areas	
Partial Cover Lowered Alternative, Managed Lanes Option	• 368.3 acres of permanent, direct impact to wildlife habitat • 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	

5.14 Floodplains and Drainage/Hydrology

This section discusses floodplain and drainage/hydrology resources and explains why they are important to the project. The impacts from the project alternatives on these resources also are evaluated, and proposed mitigation measures are discussed to minimize negative effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Added in reasons for evaluation under NEPA.
- Included information on potential ponding areas north of I-70.
- Refined offsite flow summary.
- Revised onsite drainage alignment.

5.14.1 What are floodplains and ponding areas and why are they important to this project?

Floodplains typically are defined as areas adjacent to streams and rivers that periodically are flooded by water. The flood zones that are designated by the Federal Emergency Management Agency (FEMA) within the study area are located along the South Platte River and Sand Creek. Both of these areas are classified as having a 1-percent chance of flooding each year—also referred as a 100-year flood event. Potential ponding areas are developed areas with limited-capacity storm drain systems that result in periodic flooding during storm events. It is important to perform a detailed analysis of floodplains, ponding areas, and drainage to ensure that adequate drainage is designed for the project alternatives in case of a storm and that the project alternatives will not negatively impact the floodplains and ponding areas.

Reasons for evaluation of floodplains under NEPA

CDOT conducts floodplain assessments to:

- Ensure that floodplains are identified and their services and functions are protected to the maximum extent possible
- Comply with CDOT's Environmental Stewardship Policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- Comply with federal acts and executive orders

The regulations, advisories, and orders are directed toward the treatment of floodplains under NEPA. The intent of these regulations is to avoid or minimize highway encroachments within 100-year (base) floodplains, where practicable, and to avoid supporting land use development that is incompatible with floodplain services. Under the requirements of Executive Order 11988, "Floodplain Management" (Carter, 1977b), all federal-aid projects must make diligent efforts to:

- Avoid support of incompatible floodplain development
- Minimize the impact of highway actions that adversely affect the base floodplain
- Restore and preserve the natural and beneficial floodplain services
- Be consistent with the standards/criteria of the National Flood Insurance Program (NFIP) of FEMA

In addition to federal and state laws and regulations, local jurisdictions may have ordinances and regulations that must be followed. The CDOT Project Engineer must coordinate with counties, cities, and other jurisdictions in the study area to ensure any proposed encroachment or alteration of a floodplain meets their requirements.

Both Denver and Aurora have specific regulations and/or ordinances related to the proper management of floodplains. Denver's regulations are presented in the *Storm Drainage Design and Technical Criteria Manual* (Denver Wastewater Management, 2006) and a Floodplain Ordinance in the Revised Municipal Code. The general purpose of Denver's floodplain regulations includes:

- To reduce the hazards of floods to life and property
- To protect and preserve the hydraulic characteristics of water courses used for conveyance of flood waters
- To protect the public from extraordinary financial expenditures for flood control and relief

Aurora's policy for floodplains lists the major concerns as:

- Prevention of excessive erosion, flood heights, or flow velocities
- Protection of any use within or adjacent to a floodplain from damage
- Control or alteration of natural floodplains and channels
- Prevention of barriers which would divert flood waters and increase flood hazards in other areas

Analysis of drainage and floodplains seeks to encompass all of the policies and regulations to determine the best solution to drainage and floodplain issues.

5.14.2 What study area and process were used to analyze floodplains and drainage?

The study area for floodplains and drainage is the combined construction limits of the project alternatives. It includes bridge crossings at the South Platte River and Sand Creek, as seen in **Exhibit 5.14-1**. Both streams include a delineated 100-year floodplain. Due to the new smaller study area, Westerly Creek is no longer impacted by this project.

A review of the effective FEMA Flood Insurance Rate Maps (FIRMs) was completed for the study area. The South Platte River and Sand Creek both have detailed hydrologic and hydraulic studies and delineated floodplains.

Additionally, I-70 East crosses potential ponding areas identified in several locations. These are located in areas of the watershed that receive substantial surface flows or where water collects during extreme rainfall events.

Exhibit 5.14-1 Floodplains and Drainage Study Area

Smaller drainage crossings are not defined by FEMA; however, Denver has identified potential ponding areas within the study area. Potential ponding areas identified in the *Denver Storm Drainage Master Plan* (Denver Wastewater Management Division, 2014), *Park Hill (North of Smith Road) Drainage Outfall System Plan Conceptual Design Report* (Enginuity & Matrix Design Group, 2012), *Lower Montclair Street Flow Criteria Analysis Memorandum* (Enginuity, 2010), and the *Memorandum for I-70 Partial Cover Lowered Montclair Drainage Basin Hydrologic Analysis* (Enginuity, 2014a), and the *Memorandum for I-70 Partial Cover Lowered Park Hill Drainage Basin Hydrologic Analysis* (Enginuity, 2014b) were used to identify areas for additional drainage consideration and analysis.

5.14.3 What are the areas of floodplain and drainage interest that are being analyzed and what are their existing conditions?

The South Platte River is a confined urban floodplain that has been narrowed by previous development. The existing I-70 bridges and frontage road bridges cross the South Platte River. At this time, FEMA delineates the floodplain as Zone AE with calculated base flood elevations. A primary source of stream flow in the South Platte River is releases from upstream reservoirs, including Chatfield and Cherry Creek Reservoirs. Although waters in the reservoirs originate as groundwater, snowmelt, precipitation, effluent discharge, and stormwater runoff, instream flows are strongly influenced by releases from upstream reservoirs and, as a result, may not always reflect the timing of precipitation events.

The existing I-70 bridge crosses Sand Creek. FEMA currently delineates the floodplain as Zone AE with calculated base flood elevations.

Exhibit 5.14-2 shows the identified potential ponding areas along the I-70 corridor. These potential ponding areas represent flooding risks for the existing developed watershed, including flooded streets and structures.

FEMA floodplain zones

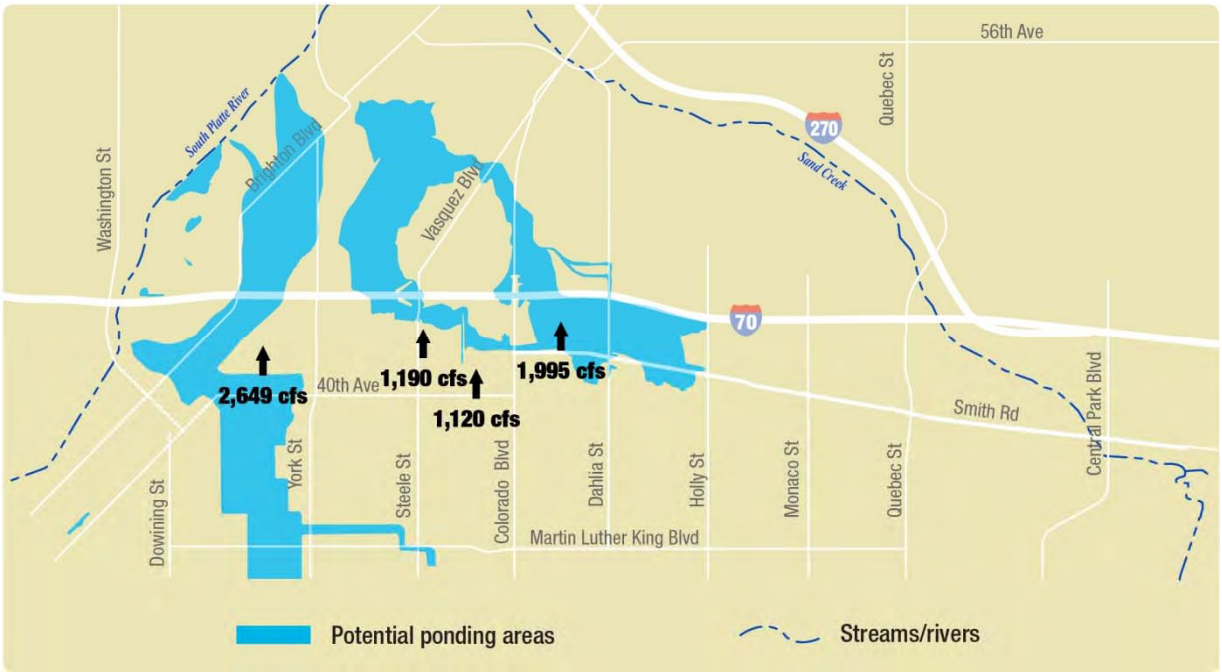
Floodplain zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are shown in a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map.

Each zone reflects the severity or type of flooding in the area.

Cubic feet per second

Cubic feet per second (cfs) denotes the volume of water passing any given point in one second.

Exhibit 5.14-2 Potential Ponding Areas



Denver's *Storm Drain Master Plan* identified substantial offsite flows through the area, including surface overflows crossing I-70 between Brighton Boulevard and York Street, near Steele Street/Vasquez Boulevard, and between Colorado Boulevard and Dahlia Street. The Denver standard is to design local storm drain systems for a 20-percent annual chance (five-year) storm event.

Additional analysis of Montclair Basin and Park Hill Basin provided detailed information about the surface overflows impacting I-70. Because of the complexity of the project, local interest in the potential ponding areas, the fact that multiple projects would be impacted by the ponding areas, and the need for additional analysis of existing conditions, a Multi-Agency Technical Team (MATT) was developed. This MATT included CDOT, Denver, RTD, and the National Western Complex staff. Analysis of the existing ponding areas was developed through the MATT for use in this EIS and with future project planning. The I-70 Partial Cover Lowered Alternative Drainage Multi-Agency Technical Team Memo, dated August 1, 2014, provides peak discharges at I-70, which also are provided in **Exhibit 5.14-3**.

Exhibit 5.14-3 I-70 East Offsite Flow Summary Table

Location	1-Percent Annual Chance Peak Discharge (cfs)
I-70 at Race Street	2,649
I-70 at York Street	1,190
I-70 at Steele Street	1,120
I-70 at Colorado Boulevard	1,995

5.14.4 How do the project alternatives potentially affect floodplains and drainage?

The increased width of the viaduct for the No-Action Alternative and the Revised Viaduct Alternative could increase the amount of onsite water runoff from the I-70 viaduct. However, the additional runoff will follow existing flow patterns and the necessary drainage infrastructure will be in place to avoid an adverse impact to the surrounding areas.

A proposed onsite drainage system (see **Exhibit 5.14-4**) is included for all alternatives to capture and convey the onsite stormwater and discharge it into the South Platte River. This outfall will not change the boundary of the existing South Platte floodplain.

The No-Action Alternative and the Revised Viaduct Alternative have a minimal impact to the potential ponding areas. However, the Partial Cover Lowered Alternative substantially impacts the potential ponding areas located between Brighton Boulevard and Dahlia Street. The lowering of I-70 will create a depression that captures and retains surface flows from the upstream basin before their discharge to the South Platte River.

The drainage system included with the Partial Cover Lowered Alternative will capture and convey offsite flows between Brighton Boulevard and Dahlia Street that currently drain north under the existing I-70 viaduct. The capture and conveyance of this offsite flow substantially reduces the ponding areas and existing flooding north of I-70. This drainage system (see **Exhibit 5.14-5**) starts at the Market Lead Railroad low point approximately 1,220 feet to the west of Colorado Boulevard and is located within the 46th Avenue right of way on the south side of I-70. The storm drain continues to the west looping around the south of the Denver Coliseum within McFarland Drive, through the parking lot of the Coliseum, and through Globeville Landing Park, ultimately discharging the offsite flow into the South Platte River. It will not change the boundary of the existing floodplain.

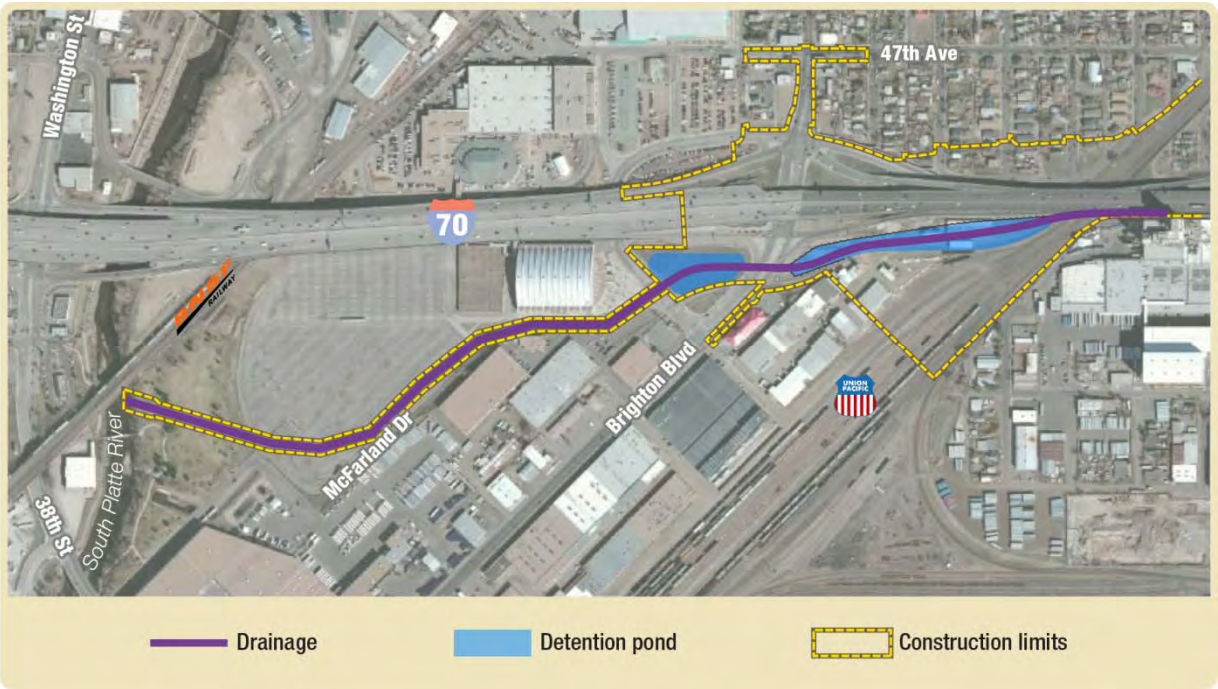
Proposed drainage

All the alternatives include drainage improvements on the north side of I-70 to capture and convey the onsite water runoff.

The Partial Cover Lowered Alternative also includes an offsite drainage system south of I-70 to capture surface water before it enters the lowered section of the highway.

Exhibit 5.14-4 Onsite Drainage System North of I-70

Exhibit 5.14-5 Offsite Drainage for the Partial Cover Lowered Alternative South of I-70



The Build Alternatives may impact the floodplain for Sand Creek, with bridge construction and new bridge structures crossing this waterway. Bridge piers are considered as a minimal floodplain encroachment; however, new bridge structures will be designed to have minimal effect on the existing regulatory base flood elevation and floodplain limits.

Attachment M, *Hydrology and Hydraulics Technical Report Addendum*, includes additional detail on the hydrologic and hydraulic analysis of the offsite and onsite drainage. A preliminary onsite hydrological analysis was done to estimate flows and size the drainage system to route the onsite flows to the South Platte River. Additional design and analysis for the proposed drainage facilities, including pipe and pond sizes, will be conducted as part of the final design.

5.14.5 How are the negative effects from the project alternatives mitigated for floodplains and drainage?

The No-Action Alternative and the Build Alternatives will not negatively impact the floodplain resources for the South Platte River and Sand Creek. The effects to human safety, health, and welfare will be minimized and the beneficial values of the floodplains will be preserved. Any encroachment into the Sand Creek floodplain or floodway will require compliance with FEMA, NFIP, and Denver local floodplain permitting requirements.

The potential ponding areas between Brighton Boulevard and Dahlia Street will be minimally impacted by the No-Action Alternative and Viaduct Alternatives. On-site detention, to reduce possible increases in runoff from the widened I-70 will be implemented to match pre-existing runoff rates from I-70 and runoff will follow historical flow paths.

The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted by the Partial Cover Lowered Alternative. To mitigate the risk to human safety, an offsite drainage system is required to capture and convey the offsite surface runoff before reaching the lowered section of I-70 between Brighton Boulevard and Colorado Boulevard and to discharge the stormwater runoff to the South Platte River. An additional offsite system is required to capture the offsite flows between Colorado Boulevard and Dahlia Street, reduce the discharges in a regional detention pond, and convey the flows north of I-70 to an existing storm drain system.

The runoff from I-70 will be captured and conveyed in a storm drain system that discharges to the South Platte River. Prior to discharging to the South Platte River, the system will discharge to a water quality pond to provide water quality treatment. Additional detail on water quality is discussed in Section 5.16, Water Quality. **Exhibit 5.14-6** lists the impacts and mitigations associated with floodplains and drainage/hydrology.

Exhibit 5.14-6 Summary of Floodplains and Drainage/Hydrology Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	• Create detention ponds and implement storm drainage for onsite drainage system improvements • Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain
Revised Viaduct Alternative	• May impact the floodplain for Sand Creek since bridge construction and new bridge structures will cross this waterway • Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	
Partial Cover Lowered Alternative	• Impact to the Sand Creek floodplain with the proposed bridge construction and new bridge structures will cross this waterway • Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70 • The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	• Create detention ponds and implement storm drainage for onsite drainage system improvements • Build an offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River • Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain

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5.15 Wetlands and Other Waters of the U.S.

This section discusses wetlands, open waters, and other waters of the U.S. in the study area and explains why these resources are important to the project. The impacts of the project alternatives on wetlands, open waters, and other waters of the U.S. also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- New wetlands, open waters, and other waters of the U.S. were surveyed, leading to new analysis that is included.
- Based on the revised construction limits, impacts were updated.
- The impact calculation methodology was refined.
- The study area was revised. Figures and text were changed to reflect this.
- A *Wetland Finding*, Attachment N, was completed in compliance with Executive Order 11990.

5.15.1 What are wetlands, open waters, and other waters of the U.S. and why are they important to this project?

The primary vehicle for protection and regulation of wetlands, open waters, and other waters of the U.S. is Section 404 of the Federal Water Pollution Control Act amendments of 1972, as amended by the Clean Water Act of 1977. These regulations set the basic structure for regulating discharge of pollutants to waters of the U.S. Section 404 of the Clean Water Act established a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Any dredge or fill activity proposing to impact waters of the U.S. must request a permit from the U.S. Army Corps of Engineers (USACE). Under the guidance of these and other regulations, it is FHWA and CDOT policy to mitigate for all wetland impacts, regardless of their jurisdictional status.

Clean Water Act, Section 404, jurisdictional waters

Jurisdictional waters are those waters that: (1) are subject to the ebb and flow of the tide, and/or (2) are presently used, or have been used in the past, or may be susceptible to use, to transport interstate or foreign commerce, including the territorial seas; including their tributaries and adjacent wetlands and isolated waters where the use, degradation, or destruction of such waters could affect interstate or foreign commerce.

Wetlands are specifically defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and other similar areas. Wetland boundaries are delineated (defined) by the presence of hydrophytic vegetation (plant life that thrives in wet conditions) and soil, in addition to the presence of hydrological indicators (USACE, 1999).

The term "waters of the U.S." generally is defined as all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce. According to 33 CFR §328, this includes the territorial seas, intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, wetlands adjacent to waters, sloughs, wet meadows, natural ponds, and all tributaries of those waters. These waters are referred to as jurisdictional waters. The boundaries of waters of the U.S., other than wetlands, are delineated by their bed, bank, and ordinary high water mark.

Open waters found in the study area associated with isolated stormwater basins that do not have wetland (hydrophytic) vegetation and do not connect to waters of the U.S. are referred to as open waters.

Wetlands, open waters, and other waters of the U.S. are important to this project for several reasons, including providing water quality improvement from runoff into the local watershed, flood protection, and erosion control. The other waters of the U.S. within the project area—the South Platte River and Sand Creek—provide water for human consumption and for recreation, and create integral habitat for fish and wildlife species within the area.

5.15.2 What study area and evaluation process were used to analyze wetlands, open waters, and other waters of the U.S.?

The study area reviewed for wetlands and wetland impacts occurs within 50 feet of the existing edge of pavement or within 50 feet of the proposed construction limits. **Exhibit 5.15-1** shows the locations of the wetlands, open waters, and other waters of the U.S. located in the study area.

Field surveys and delineation (defining the boundaries) of wetlands have been conducted several times over the life of this project, but were most recently completed in 2012, 2013, and 2015. Wetland functions were assessed using CDOT's Functional Assessment of Colorado Wetlands (FACWet) method. FACWet is a rapid assessment methodology that rates wetland condition by evaluating ecological stressors and their effects on nine state variables that drive wetland function. Stressors are used as indicators of functional impairment.

What does FACWet evaluate?

The following seven functions were evaluated for this analysis (Johnson et al., 2011):

1. Support of characteristic wildlife habitat
2. Support of characteristic fish/aquatic habitat
3. Flood attenuation
4. Short- and long-term water storage
5. Nutrient/ toxicant removal
6. Sediment retention/ shoreline stabilization
7. Production export/food chain support

5.15.3 What are the existing conditions of wetlands, open waters, and other waters of the U.S.?

The study area evaluated for wetlands, open waters, and other waters of the U.S. lies entirely within developed urban areas. Due to the urban nature of the project corridor, hydrology has been altered in many areas. Streams throughout the study area have been channelized and the removal of meanders in streams has removed hydrology in areas that historically received creek overflow. Also, stormwater detention ponds and roadside drainages have been constructed to prevent flooding, creating wetland conditions in areas that historically were dry. Wetlands, open waters, and other waters of the U.S. that exist within the study area are summarized in **Exhibit 5.15-2**.

Exhibit 5.15-1 Wetlands, Open Waters, and Other Waters of the U.S. in the Study Area

Exhibit 5.15-2. Summary of Wetlands, Open Waters, and Other Waters of the U.S. Found in the Study Area

Jurisdiction	Water Body	Type	Size (acre)
Jurisdictional	Sand Creek	Other Waters of the U.S	4.510
		Wetlands	0.304
	South Platte River	Other Waters of the U.S	6.019
		Wetlands	—
Non-Jurisdictional	Roadside Ditches	Open Water	—
		Wetlands	0.781
	Stormwater Basins	Open Water	0.805
		Wetlands	6.058
Total Wetlands, Open Waters, and Other Waters of the U.S.:			**18.477**

Wetlands

Wetlands in the study area contain both emergent and scrub-shrub vegetation. Emergent wetlands primarily support herbaceous vegetation. Scrub-shrub wetlands support small trees and shrubs that are less than 20 feet in height. The characteristics of the existing plant communities vary, but the typical dominant species are noted in the sidebar to the right.

Jurisdictional wetlands within the study area are associated with the South Platte River and Sand Creek. Non-jurisdictional wetlands, which are associated with stormwater detention basins and roadside ditches in the study area, generally lack a hydrologic connection to jurisdictional waters, so the USACE does not regulate them. The jurisdictional status for each wetland and water of the U.S. (excluding the four wetlands surveyed in April 2015) was determined based on the current guidance and approved by the USACE on July 9, 2013.

Mapped wetlands in the study area include four scrub-shrub wetlands, two scrub-shrub/emergent wetlands, and 25 emergent wetlands totaling 7.143 acres. Approximately 0.304 acres are considered jurisdictional and 6.839 acres are considered non-jurisdictional wetlands. The portions of the South Platte River and Sand Creek that exist within the study area were mapped as open water, and are referred to as waters of the U.S. Open waters found in the study area associated with isolated stormwater basins that do not have wetland (hydrophytic) vegetation and do not connect to waters of the U.S. are referred to as open waters.

Dominant wetland plant species in the study area

- Cattails (*Typha* spp.)
- Bulrushes (*Scirpus* spp.)
- Sedges (*Carex* spp.)
- Barnyard grass (*Echinochloa* spp.)
- Spikerushes (*Eleocharis* spp.)
- Smartweeds (*Polygonum* spp.)
- Western dock (*Rumex crispus*)
- Coyote willow (*Salix exigua*)
- Plains cottonwood trees (*Populus deltoides*)

Other waters of the U.S.

Two major open water bodies are located within the study area: the South Platte River and Sand Creek. Both are considered jurisdictional waters.

South Platte River

South Platte River intersecting with I-70

The South Platte River is a perennial (continuous water flow) water body with a relatively large watershed. The primary sources of stream flow in the South Platte River include groundwater, snowmelt, precipitation, effluent discharge, and stormwater runoff. The river intersects I-70 just north of downtown Denver near the Globeville Neighborhood, where its banks have been highly disturbed. The existing spillway in Globeville Landing Park, which is connected to the river and serves as a stormwater detention pond, also is an open water body. Wetland and riparian areas were mapped adjacent to the river and the spillway.

Sand Creek

Sand Creek is a perennial stream with a relatively small watershed. The primary sources of stream flow are groundwater, precipitation, and stormwater runoff, although it may be influenced by effluent discharge and/or irrigation runoff. The creek crosses the project corridor west of the I-70/I-270 interchange. As with the South Platte River, Sand Creek also has been highly disturbed by urban development; however, the creek has retained more of a floodplain and wetland and riparian areas than the South Platte River through Denver.

5.15.4 How do the project alternatives potentially impact wetlands, open waters, and other waters of the U.S.?

An analysis of the potential impacts on wetlands, open waters, and other waters of the U.S. was conducted for each alternative and option. The Build Alternatives result in greater impacts to wetlands, open waters, and other waters of the U.S. than the No-Action Alternative, so they are discussed in greater detail.

Impact calculations to wetlands, open waters, and other waters of the U.S. were completed using GIS. Permanent impacts were calculated by intersecting all mapped wetlands, open waters, and other waters of the U.S. with each alternative's respective construction limits. A 10-foot buffer outside each alternative's construction limits that intersected with the mapped wetlands, open waters, and

other waters of the U.S was used to calculate the temporary impacts.

The majority of impacts associated with the Build Alternatives will be permanent. Permanent impacts result from construction activities—specifically, placement of bridge piers, fill, shading, or new roadway where a complete change in functionality of a wetland, open water, or other waters of the U.S. occurs.

Temporary impacts include those that temporarily alter the function of wetlands, open waters, and other waters of the U.S. due to modification or disturbance during construction. Effects such as erosion, sedimentation, hydrologic modification, or noxious weed invasion can result from vegetation removal, soil exposure, and construction activities taking place in or adjacent to wetlands. These effects can be mitigated and the resources can be returned to their pre-construction condition after construction activities are complete, if proper management is applied. **Exhibit 5.15-3** summarizes the impacts by the alternatives.

Exhibit 5.15-3 Impacts to Wetlands, Open Waters, and Other Waters of the U.S. in the Study Area

Alternative/Option	Jurisdictional				Non-Jurisdictional			
	Wetlands (acres)		Waters of the U.S. (acres)		Wetlands (acres)		Open Waters (acres)	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
No-Action Alternative	—	—	0.005	0.013	—	—	—	—
Revised Viaduct, General-Purpose Lanes Option	0.098	0.009	0.291	0.043	4.254	0.233	0.402	—
Revised Viaduct, Managed Lanes Option	0.104	0.010	0.310	0.042	4.338	0.234	0.402	—
Partial Cover Lowered, General-Purpose Lanes Option	0.098	0.009	0.350	0.081	4.254	0.233	0.402	—
Partial Cover Lowered, Managed Lanes Option	0.104	0.010	0.369	0.080	4.338	0.234	0.402	—

Note: Impacts were calculated based on conceptual design and are subject to change.

No-Action Alternative

The No-Action Alternative will require an upgraded drainage system on the west end of the corridor, to the north of I-70, which will outfall to the South Platte River. Impacts to wetlands, open waters, and other waters of the U.S. will result from this construction in the form of minor fill-related impacts. The construction of the drainage pipe will account for 0.005 acre of permanent impacts and 0.013 acre of temporary impacts. All impacts resulting from this alterative will be to the South Platte River, which is classified as a jurisdictional other water of the U.S.

Build Alternatives

The I-70 East project has two Build Alternatives analyzed for wetlands impacts: the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. The project also analyzed two Operational Options associated with each of the Build Alternatives: the General-Purpose Lanes Option and the Managed Lanes Option. Each of the proposed Build Alternatives includes the north drainage system that is described previously for the No-Action Alternative. The Partial Cover Lowered Alternative requires an additional drainage system that is proposed to be constructed on the south side of I-70; it also will discharge to the South Platte River. The following subsections describe the impacts each Build Alternative will have to wetlands, open waters, and other waters of the U.S. in further detail.

Build Alternatives, General-Purpose Lanes Option

The Revised Viaduct Alternative, General Purpose Lanes Option and the Partial Cover Lowered Alternative, General-Purpose Lanes Option have similar impacts to wetlands, open waters, and other waters of the U.S. The difference between the two is the additional impacts for the construction of the south drainage as part of the Partial Cover Lowered Alternative, which only has impacts to riparian areas (discussed in Section 5.13, Biological Resources) and jurisdictional other waters of the U.S.

The Build Alternatives with the General-Purpose Lanes Option will permanently impact a total of 0.098 acre of jurisdictional wetlands and 4.254 acres of non-jurisdictional wetlands. Temporary impacts for the Build Alternatives with General-Purpose Lanes will total 0.009 acre of impacts to jurisdictional wetlands and 0.233 acre of non-jurisdictional wetlands.

The Revised Viaduct Alternative, General-Purpose Lanes Option will result in 0.291 acre of permanent impacts and 0.043 acre of temporary impacts to other waters of the U.S, while the Partial Cover Lowered Alternative, General-Purpose Lanes Option increases these impacts by 0.059 acre and 0.038 acre, respectively. Additionally, all the Build Alternatives will permanently impact 0.402 acre of other non-jurisdictional open waters.

Build Alternatives, Managed Lanes Option

Each Build Alternative with the Managed Lanes Option will have similar impacts and will show a minimal increase or decrease compared to the Build Alternatives with the General-Purpose Lanes Option. Impacts to wetlands for the alternatives with managed lanes will have increased permanent impacts of 0.006 acre to jurisdictional wetlands and 0.001 acre of temporary impacts to jurisdictional wetlands. Impacts for these alternatives will increase permanent non-jurisdictional impacts by 0.084 acre and temporary non-jurisdictional impacts by 0.001 acre.

Compared to the Build Alternatives with the General-Purpose Lanes Option, permanent impacts to other waters of the U.S. for the Managed Lanes Option will increase by 0.019 acre and temporary impacts will decrease by 0.001 acre. As mentioned above, all Build Alternatives also will permanently impact 0.402 acre of other non-jurisdictional open waters.

All of the Build Alternatives are expected to have minimal fill-related impacts caused by the installation of two bridge piers in Sand Creek for the proposed off-ramps. Total permanent fill-related impacts to jurisdictional wetlands, open waters, and other waters of the U.S. will be less than 0.001 acre.

5.15.5 Can impacts to wetlands, open waters, and other waters of the U.S. be avoided? If not, how are impacts minimized?

Each alternative results in unavoidable impacts to wetlands, open waters, and other waters of the U.S. A number of measures were implemented for each alternative to reduce the overall construction footprint of the roadway improvements and other associated facilities.

All the alternatives include drainage improvements on the north side of I-70 to capture and convey the onsite water runoff. The additional runoff will follow existing flow patterns and the necessary drainage infrastructure will be in place to avoid an adverse impact to the surrounding areas. The location and design of the structure was determined using a number of factors. The drainage pipe must traverse the Burlington Ditch/O'Brien Canal, which runs along the east side of the South Platte River, prior to discharging. The canal narrows further south, terminating at the South Platte River near the Franklin Street Bridge. The proposed outfall location makes the most sense because moving it further north or south would impact wetland areas or the Union Pacific railroad line, respectively.

The south drainage outfall, needed for the Partial Cover Lowered Alternative, has been located at the northernmost location to avoid impacts to a wetland area at the south side of Globeville Landing Park. Moving the outfall location from this location, further south, also would impact an existing trail that runs along the South Platte River.

The majority of the impacts to wetlands, open waters, and other waters of the U.S. at Sand Creek result from shading due to the construction of new on- and off-ramps to Quebec Street. The existing I-70 bridge spanning Sand Creek will remain in place. The Build Alternatives propose widening the structure, however no new piers for the main structure will need to be constructed. The new ramps for all Build Alternatives require piers near the Sand Creek channel. One pier for the north off-ramp will be constructed within a wetlands area, causing fill-related impacts to wetlands. This unavoidable impact is caused by the fact that design standards need to be upheld to ensure roadway safety for motorists using the off-ramp.

I-70 has a number of roadway ditches and stormwater basins that exhibit wetland functions. These water-quality features along the corridor are non-jurisdictional wetlands

and open stormwater basins. The remaining impacts to wetlands for the Build Alternatives will result from widening the roadway, which impacts the non-jurisdictional water-quality features.

5.15.6 How are the negative effects from the project alternatives mitigated for wetlands, open waters, and other waters of the U.S.?

Per CDOT policy, all permanent and temporary impacts to wetlands, open waters, and other waters of the U.S.—both jurisdictional and non-jurisdictional—will be replaced at a 1:1 ratio. At this time, unavoidable impacts will be mitigated at a wetland mitigation bank in the South Platte River watershed.

Based on current estimates for the Build Alternatives, compensatory mitigation will be required totaling from 5.045 to 5.213 acres from permanent impacts and 0.285 to 0.324 acres from temporary impacts. Non-jurisdictional wetlands also may form at planned new stormwater detention facilities, but these are not currently included in proposed mitigation measures.

Wetlands, open waters, and other waters of the U.S. temporarily impacted by both the No-Action Alternative and Build Alternatives will be returned to pre-construction conditions after construction is complete. Temporary erosion control and sediment control BMPs will be installed before ground-disturbing activities begin. Completed areas will be permanently stabilized within seven days.

All contractors will be required to consider methods, where feasible, to limit the effects of construction on water resources, as listed in the *Wetlands Finding* provided in Attachment N.

Permitting

All alternatives are expected to have minimal dredge and fill-related permanent and temporary impacts to waters of the U.S., including wetlands, and will require a Section 404 permit. It is likely that a Nationwide Permit 14 (Linear Transportation Projects) will permit the project because impacts to jurisdictional wetlands are less than the threshold of 0.5 acre. In addition, Senate Bill 40 certification from Colorado Parks and Wildlife will be required, and an internal Wetland Finding written in compliance with Executive Order 11990 is included as an attachment to this

Final EIS. CDOT will complete the Senate Bill 40 and obtain a permit from the USACE before starting work.

Completion of the Section 404/NEPA merger process currently is not necessary because of the limited amount of fill-related permanent impacts to jurisdictional wetlands (less than 0.5 acre). This will be revisited in the event additional jurisdictional impacts are identified. **Exhibit 5.15-4** summarizes impacts to wetlands, open waters, and other waters of the U.S. and outlines mitigation.

5.15.7 What is the only practicable alternative finding?

A *Wetland Finding* for the I-70 East project has been prepared in compliance with Executive Order 11990, and is provided in Attachment N. Section 5.15.5 in this chapter and the Wetland Finding provide detailed avoidance and minimization measures to wetlands, open waters, and other waters of the U.S. for the Preferred Alternative. Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands, open waters, and other waters of the U.S. and that the proposed action includes all practicable measures to minimize harm to wetlands, open waters, and waters of the U.S. that may result from this use.

Exhibit 5.15-4 Summary of Wetlands, Open Waters, and Other Waters of the U.S. Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• No permanent wetland impacts • 0.005 acre of permanent other waters of the U.S. impacts • 0.013 acre of temporary impact to other waters of the U.S.	• Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed • Install temporary erosion control and sediment control BMPs before ground-disturbing activities; permanently stabilize completed areas within seven days; proposed BMPs are listed in the *Wetlands Finding* provided in Attachment N • Restore wetlands temporarily affected during construction to pre-construction conditions • Obtain and follow requirements of Section 404 permitting and Senate Bill 40 certification
Revised Viaduct Alternative, General-Purpose Lanes Option	• 4.352 acres of permanent and 0.242 acre of temporary wetland impacts • 0.693 acre of permanent and 0.043 acre of temporary impacts to other waters of the U.S. and open waters	
Revised Viaduct Alternative, Managed Lanes Option	• 4.442 acres of permanent and 0.244 acre of temporary wetland impacts • 0.712 acre of permanent and 0.042 acre of temporary impacts to other waters of the U.S. and open waters	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 4.352 acres of permanent and 0.242 acre of temporary wetland impacts • 0.752 acre of permanent and 0.081 acre of temporary impacts to other waters of the U.S. and open waters	
Partial Cover Lowered Alternative, Managed Lanes Option	• 4.442 acres of permanent and 0.244 acre of temporary wetland impacts • 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	

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5.16 Water Quality

This section discusses the water quality in the study area and explains why water quality is important to the project. The impacts of the project alternatives on water quality also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Added list of potential contaminants from transportation projects.
- Included text on applicable regulations and guidance, impaired waters within the project, and other considerations for water quality.
- Added exhibit to show possible water quality pond locations.

5.16.1 What is water quality and why is it important to this project?

Water quality refers to the physical, chemical, and biological characteristics of aquatic systems. It is important to protect water quality for the intended uses of a water body that may include support of aquatic habitats, domestic water supply, contact recreation (such as swimming or other water sports), or agricultural irrigation. Transportation projects can impact water resources used for drinking, recreation, agriculture, and wildlife habitat. Any increase in impervious cover will lead to an increase in the amount of runoff and associated pollutants and cause a drop in water quality. Potential contaminants that may impact water resources from transportation projects are shown in **Exhibit 5.16-1**. It is important to determine the potential effects of the project on the water quality of the receiving water bodies and to mitigate any adverse effects.

Exhibit 5.16-1 Potential Contaminates from Transportation Projects That May Impact Water Resources

Source	Pollutant
Construction Phase	
Adhesives	Phenols, formaldehydes, asbestos, benzene, naphthalene
Cleaners	Metals, acidity, alkalinity, chromium
Plumbing	Lead, copper, zinc, tin
Painting	Volatile Organic Compounds (VOCs), metals, phenolics, mineral spirits
Wood	Biological Oxygen Demand (BOD), formaldehyde, copper, creosote
Masonry/concrete	Acidity, sediment, metals, asbestos
Demolition	Asbestos, aluminum, zinc, dusts, lead
Yard operation and maintenance	Oils, grease, coolants, benzene and derivatives, vinyl chloride, metals, BOD,sediment, disinfectants, sodium arsenate, dinitro compounds, rodenticides,insecticides
Landscaping and earthmoving	Pesticides, herbicides, fertilizers, BOD, alkalinity, metals, sulfur, aluminum sulfate
Materials storage	Spills, leaks, dust, sediment
Operation Phase	
Leaks, spills, accidents	Oil, gasoline, diesel, grease, VOCs, chemicals, other potentially hazardous materials
Vehicle traffic	Oils, grease, gasoline, diesel, benzene and derivatives, aromatic hydrocarbons, coolants, rust (iron), heavy metals (lead, zinc, iron, chromium, cadmium, nickel, copper), rubber, asbestos
Winter sanding	Sediment
Deicing	Calcium, sodium, magnesium, chloride
Landscape maintenance	Herbicides, pesticides, fertilizers, BOD, alkalinity, metals, sulfur, aluminum sulfate
Adhesives	Phenols, formaldehydes, asbestos, benzene, naphthalene
Cleaners	Metals, acidity, alkalinity, chromium
Painting	VOCs, metal, phenolics, mineral spirits

Source: CDOT NEPA Manual, October 2014

5.16.2 How is water quality regulated and assessed?

CDOT conducts water resource assessments to:

- Comply with CDOT's Environmental Stewardship Policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- Comply with federal acts and Executive Orders, state laws, and FHWA technical guidance

Applicable regulations and guidance

The regulations and certifications applicable to water resource evaluations are summarized below.

Clean Water Act (Sections 401, 402)

The Clean Water Act established the basic structure for regulating discharges of pollutants into navigable waters. It provides the statutory basis for the National Pollutant Discharge Elimination System (NPDES) permit program and the basic structure for regulating the discharge of pollutants into waters of the U.S.

Safe Drinking Water Act (40 CFR Parts 141–143)

The Safe Drinking Water Act (SDWA) protects public health by regulating the nation's public drinking water supply and protecting drinking water and its sources. CDOT is a stakeholder in the Colorado Source Water Assessment and Protection (SWAP) program mandated by the SDWA.

Erosion and Sediment Control on Highway Construction Projects (23 CFR 650 Subpart B)

All highways funded in whole or in part by FHWA must be designed, constructed, and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties and abate pollution of surface and groundwater resources.

Colorado Water Quality Control Act (Colorado Revised Statutes [CRS] Title 25, Article 8)

The Colorado Water Quality Control Act protects and maximizes the beneficial uses of state waters and regulates water quality. EPA has delegated authority for enforcement of the Clean Water Act and SDWA to the CDPHE. Under this authority, the Colorado Water Quality Control Act was passed and the Water Quality Control Commission (WQCC)

was created to provide regulations to be implemented by CDPHE to keep Colorado in compliance with the Clean Water Act.

Based on requirements promulgated under Section 402 of the Clean Water Act, the WQCC has implemented Regulation 61 identifying CDOT as a regulated Municipal Separate Storm Sewer System (MS4). By definition, a separate storm sewer system includes not only a storm drainage system but also ditches, gutters, or other similar means of collecting and conveying stormwater runoff that do not connect with a wastewater collection system or wastewater treatment facility.

Colorado Discharge Permit System

Section 402 of the Clean Water Act outlines the regulations for complying with the NPDES (implemented by Colorado as the Colorado Discharge Permit System or CDPS). Under NPDES, states were required to "phase in" EPA regulations that were aimed at reducing point source pollution to waters of the state. These regulations encouraged states to develop a variety of programs to reduce point source and stormwater runoff pollution from construction projects during both the construction and operation phases of those projects. In 1990, EPA issued the Phase I MS4 Permit. Under the Phase I regulations, an MS4 that served more than 100,000 people was required to obtain a permit. CDOT was included in Phase I as an MS4 permittee. The area covered by the Permit included the roadways owned and operated by CDOT located within the cities that served more than 100,000 people (i.e., Denver, Lakewood, Aurora, and Colorado Springs).

The CDOT New Development and Redevelopment Program provides direction, criteria, and procedures to ensure that permanent BMPs are incorporated, as appropriate, into CDOT projects. Projects that will fall within CDOT jurisdiction, but are initially constructed by others, such as local governmental entities, also must comply with BMP requirements. It should be noted that some construction projects may occur in areas where multiple MS4 Permits apply. If this is the case, the MS4 with the most stringent requirements applies.

In 1999, MS4s serving urbanized areas were required to obtain Phase II MS4 Permits that required them to develop a program to reduce point source pollution to waters of the state. CDOT's MS4 Permit area of coverage was expanded to

include Phase II permits. Phase II also reduced the minimum size of construction projects requiring a CDPS permit from five acres of disturbed area to one acre or more of disturbed area.

Construction projects that disturb one acre or greater or are part of a larger common plan of development require a CDPS Construction Stormwater Permit from the Water Quality Control Division (WQCD) and a Stormwater Management Plan (SWMP). The SWMP is prepared in the final design application submitted to the WQCD at least 30 days prior to construction.

Sites that must discharge groundwater from a construction site to a surface water body also require a CDPS Dewatering Permit. If a project feature will require permanent dewatering, the necessary permits should be coordinated through CDPHE's WQCD.

Colorado Regulation Number 31

Most recently renewed on January 31, 2013, the Basic Standards and Methodologies for Surface Water establishes "basic standards, an antidegradation rule, an implementation process, and establishes a system for classifying state surface waters" (5 Code of Colorado Regulations 1002-31) according to the uses for which they are presently suitable or intended to become suitable. Classifications may be established for any state surface waters, except water in ditches and other manmade conveyance structures. This regulation classifies waters based on suitability for use in recreation, agriculture, aquatic life, and water supply. While this regulation provides the basic standards by which state waters will be classified, additional regulations have been established to classify individual waters. Classifications and standards specific to the South Platte River and Sand Creek are set forth in Regulation 38 of the Clean Water Quality Control Act. **Exhibit 5.16-2** details the classifications for stream segments within the study area.

Exhibit 5.16-2 Colorado Regulation Number 38 Water Use Classifications

Stream Segment	Use Classification	Description
Segment 14 Main stem of the South Platte River from Bowles Avenue in Littleton, Colorado to the Burlington Ditch diversion in Denver, Colorado	Aquatic Life, Class 1 Warm Water Aquatic Life	Waters currently capable of sustaining a wide variety of warm water biota, including sensitive species. Waters will be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.
	Recreation, Class E Existing Primary Contact Use	Surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.
	Domestic Water Supply	Suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent), these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements thereto (CRS §25-8-101-703).
	Agriculture	Suitable or intended to become suitable for irrigation of crops usually grown in Colorado and not hazardous as drinking water for livestock (CRS §25-8-101-703).
Segment 15 Main stem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek	Aquatic Life, Class 2 Warm Water Aquatic Life	Waters could sustain a wide variety of warm water biota, including sensitive species, but for correctable water quality conditions. Waters will be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.
	Recreation, Class E Existing Primary Contact Use	Surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.
	Domestic Water Supply	Suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent), these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements thereto (CRS §25-8-101-703).
	Agriculture	Suitable or intended to become suitable for irrigation of crops usually grown in Colorado and not hazardous as drinking water for livestock (CRS §25-8-101-703).
Segment 16a Main stem of Sand Creek from the confluence of Murphy and Coal Creek in Arapahoe County to the confluence with the South Platte River	Aquatic Life, Class 2 Warm Water Aquatic Life	Waters could sustain a wide variety of warm water biota, including sensitive species, but for correctable water quality conditions. Waters will be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.
	Recreation, Class E Existing Primary Contact Use	Surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.
	Agriculture	Suitable or intended to become suitable for irrigation of crops usually grown in Colorado and not hazardous as drinking water for livestock (CRS §25-8-101-703).

Regulation Number 93—Impaired Waters

Every two years, the Clean Water Act requires states to publish an updated list of water bodies that are not meeting their beneficial uses because of excess pollutants; these pollutants can be naturally occurring or a result of human activity. The list, known as the EPA Section 303(d) list, is based on violations of water quality standards and is organized by watersheds, which are further divided into stream segments. Regulation Number 93 satisfies the federal requirements of Section 303(d) reporting and the WQCC assigns total maximum daily loads to these impaired segments, which accelerates their clean-up.

What is a watershed?

"Per EPA, A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place."

Based on Regulation Number 93, WQCC has identified three stream segments within the study area as impaired—Segments 14 and 15 of the South Platte River and Segment 16a of Sand Creek. WQCC defines pollutants that are the main cause for impairment and describes the portion of the segment for which the impairment applies. Lastly, they assign a clean-up priority to each segment. The impaired waters are summarized in **Exhibit 5.16-3**, and their locations are shown on **Exhibit 5.16-4** in the following subsection.

Exhibit 5.16-3 Impaired Waters Identified on EPA Section 303(d) List

Stream Segment	Segment Description	Portion	Impairment	Priority
Segment 14	South Platte River, Bowles Avenue to Burlington Ditch	All	Arsenic	High
Segment 15	South Platte River, Burlington Ditch to Big Dry Creek	Clear Creek to Fulton Canal diversion and Burlington Canal headgate to Metro Wastewater Reclamation District	E. coli, Cadmium	High
Segment 16a	Sand Creek	All	Selenium, E. coli	Low to High

5.16.3 What study area and process was used to analyze water quality?

The study area for water quality matches the construction limits of the project alternatives. However, the impacts are applied to the overall watershed to determine if the impacts are significant (see **Exhibit 5.16-4**).

Exhibit 5.16-4 Water Quality Study Area

The study area is located within the Upper South Platte River watershed, which drains into the South Platte River. It can be characterized by high plains and rolling foothills with elevations ranging from approximately 4,800 feet to 8,300 feet above mean sea level. The watershed is highly urbanized within the study area with little natural groundcover. The average annual rainfall in the Denver metropolitan area is 15.4 inches and the average annual snowfall is 55.4 inches.

Surface water resources located within the study area include the South Platte River and Sand Creek. Each of these meets one or more of CDOT's "sensitive" criteria, due to their listing on the EPA Section 303(d) list, as described in the "New Development and Redevelopment Program."

Permanent BMPs are required by CDOT for projects that may affect "sensitive" waters.

The method of Driscoll analysis was prepared for FHWA in 1990 to help predict the effect of runoff to the water quality of a receiving water body through an estimation of the pollutant loading in the runoff.

The water quality analysis used a partial Driscoll model. The pollutants analyzed for included lead, copper, phosphorous, zinc, and total suspended solids.

The partial Driscoll analysis was performed for all of the alternatives for both water bodies: the South Platte River and Sand Creek.

What does a partial Driscoll analysis entail?

The Driscoll model is used to determine highway runoff pollutant loading impacts to receiving waters. This modeling approach identifies and quantifies the elements in highway runoff, identifies the sources and migration paths of these pollutants from the highways to the receiving waters, analyzes the effects of these pollutants on the receiving waters, and then develops the necessary abatement/ treatment methodology for objectionable pollutants.

5.16.4 What are the areas of water quality interest that are being analyzed and what is the existing water quality condition in the study area?

Several different areas of water quality interest are addressed within this Final EIS. These include specific interests within the study area and regulation requirements.

Since many surface water bodies span hundreds of miles, the WQCC has separated water bodies into segments with specific boundaries to identify the water body, and each segment is assigned its own set of water quality standards. These regulations include surface water standards, groundwater standards, and the Denver Metro Wastewater Reclamation District's (Metro District) role with wastewater treatment in the Denver metropolitan area.

Drinking Water Sources, Wellhead Protection Areas

These resources are not located within the study area and are not expected to be affected by this project.

Irrigation Ditches and Canals

Several irrigation ditches and canals are located in the study area, including the Farmers High Line Canal and Burlington Ditch. According to the Colorado Water Quality Control Act, water in ditches, canals, and other man-made conveyances is not subject to water quality standards, but can be used for the purposes of discharge permits.

Groundwater

Preliminary groundwater investigation has been performed and the results are briefly discussed in Section 5.18, Hazardous Materials. Additional investigation will be

performed as needed during final design of the project. Groundwater information related to site-specific standards and "Limited Use and Quality" areas was provided by the CDPHE.

WQCC Regulation Numbers 41 and 42 cover water quality standards and beneficial uses for groundwater. Regulation Number 42 further defines site-specific water quality standards for isolated areas within Colorado. These site-specific standards are primarily in place to protect groundwater drinking supplies (also known as wellhead protection areas or sole-source aquifers). Site-specific standards also are used by the WQCC for areas that encompass gas and oil fields. Groundwater in these locations is classified as "Limited Use and Quality," which alerts the public that groundwater may contain higher concentrations of organic chemicals. The WQCC has not placed any site-specific standards on groundwater within the study area, including special drinking supplies or "Limited Use and Quality" areas.

5.16.5 How do the project alternatives potentially affect water quality?

The partial Driscoll analysis involves the estimation of pollutant loads per mean storm event. The following list shows the polluting factors and the reason why they are analyzed:

- Lead, copper, and zinc are a concern because they dissolve in water and can have toxic effects when they build up in water plants and aquatic life.
- Total Suspended Solids (TSS) is a concern because it can increase the murkiness of water; as the floating particles in murky water settle, this can lead to loss of aquatic habitat and channel instability.
- Phosphorus is a concern because it can increase the production of algae in water, which can reduce oxygen levels in streams.

The existing loads of these factors in the South Platte River and Sand Creek were estimated using the partial Driscoll analysis and are presented in **Exhibit 5.16-5** and **Exhibit 5.16-6**, respectively, along with the load estimations for the alternatives.

Exhibit 5.16-5 South Platte River Water Quality Effect Summary

Alternative/Option	Water Quality Factor (pounds per mean storm event)						
	Percent impervious	Lead	Copper	Phosphorous	Zinc	TSS	Percentage TSS Increase
Existing Conditions	55%	2.20	0.30	2.20	1.81	781	N/A
No-Action Alternative, North Option	58%	2.29	0.31	2.29	1.88	811	4%
No-Action Alternative, South Option	51%	2.08	0.28	2.08	1.71	738	0%
Revised Viaduct Alternative, North Option	67%	2.58	0.35	2.58	2.12	915	17%
Revised Viaduct Alternative, South Option	60%	2.35	0.32	2.35	1.94	836	7%
Partial Cover Lowered Alternative	63%	2.44	0.33	2.44	2.01	866	11%

Exhibit 5.16-6 Sand Creek Water Quality Effect Summary

Alternative/Option	Water Quality Factor (pounds per mean storm event)						
	Percent impervious	Lead	Copper	Phosphorous	Zinc	TSS	Percentage TSS Increase
Existing Conditions	32%	5.31	0.72	5.31	4.37	1,886	N/A
Build Alternatives, General-Purpose Lanes Option	37%	6.46	0.87	6.46	5.31	2,292	22%
Build Alternatives, Managed Lanes Option	40%	7.26	0.98	7.26	5.97	2,576	37%

As shown in **Exhibit 5.16-5**, the No-Action Alternative will have slight adverse effects on water quality in the South Platte River. Results in **Exhibit 5.16-6** show an overall increase in pollutant and TSS loads, which generally includes phosphorous and heavy metals such as lead, copper, and zinc. The percentage increase in factor loads in runoff will require permanent BMPs to mitigate the effects of the proposed alternatives back to the existing conditions.

Exhibit 5.16-7 summarizes the comparison of the traffic volumes, total project impervious areas, and impervious area over streams. The analysis shows that traffic volumes can increase while minimal change will occur in impervious surface area. The exhibit also shows an increase in impervious area for the Build Alternatives up to 22 percent.

Exhibit 5.16-7 Water Quality Factor Summary

Alternative/Option	Water Quality Factor			
	Percent Increase in Impervious Surface	Daily Traffic Volume (vehicles per day)	Number of Stream Crossings	New Impervious Surface Over Streams (acres)
South Platte River				
Existing Conditions	N/A	143,800	1	0
No-Action Alternative, North Option	0%	191,700	1	0
No-Action Alternative, South Option	22%	191,700	1	0
Revised Viaduct Alternative, North Option	9%	214,600	1	0
Revised Viaduct Alternative, South Option	14%	214,600	1	0
Partial Cover Lowered Alternative	14%	214,600	1	0
Sand Creek				
Existing Conditions	N/A	132,300	1	0
No-Action Alternative	N/A	174,300	1	0
Build Alternatives, General-Purpose Lanes Option	13%	229,100	1	1.08
Build Alternatives, Managed Lanes Option	25%	174,500	1	3.15

Increased impervious area over streams also is shown in **Exhibit 5.16-7** for each of the alternatives ranging from 0 acres to 3.15 acres. The amount of surface area at stream crossings is important due to difficulty in capturing constituents at the crossing. During snow events, plowing may push sand, gravel, and de-icing agents off the highway and outside the drainage system, making it inaccessible for treatment by the permanent BMPs before discharge into the receiving water bodies.

5.16.6 How are the negative effects from the project alternatives mitigated for water quality?

The runoff from I-70 will be captured and conveyed in a storm drain system that discharges to the South Platte River or to Sand Creek. Prior to discharging to the receiving streams, the system will discharge to a water quality pond to provide water quality treatment. The outlet of the pond is smaller than the inlet of the pond, so runoff is temporarily stored in the pond and releases over a period of a few days. During this time (CDOT requires a minimum drain time of 40 hours), sediment settles out of the runoff and is stored in the pond and the runoff, with reduced sediments, discharges to the South Platte River. Preliminary locations of permanent water quality ponds are shown on **Exhibit 5.16-8**.

Exhibit 5.16-8 Preliminary Water Quality Pond Locations

Permitting

CDOT will take maintenance responsibility for any MS4 improvements constructed as part of this project or document operation and maintenance by others for improvements constructed as part of this project and maintained by others. CDOT also will obtain the CDPS permit that covers stormwater discharges during construction. Additionally, CDOT requires that construction contractors secure dewatering permits for construction activities, if necessary.

Permanent BMPs

For each alternative option, these BMPs will be implemented to comply with CDOT's MS4 permit, which will ultimately have a beneficial effect on water quality. A variety of BMPs could be implemented at the site to remove the particulate pollutants from the stormwater with practical ranges from 10 percent to 90 percent. Removal of soluble pollutants and oil and grease by typical BMPs is less effective. Most notably and widely used in the Denver metropolitan area are extended detention basins with typical removal rates ranging from 50 percent to 80 percent for a well-designed basin. These basins increase retention times, allowing sediment and other suspended solid pollutants, such as metals that are carried with sediment, to settle to the bottom. Then, other pollutants, such as oils and greases, can partially volatilize before the stormwater runoff enters receiving waters.

CDOT also will consider the use of green infrastructure techniques to provide water quality treatment. Green infrastructure is a general term applied to an approach using environmentally friendly techniques to manage stormwater.

Possible locations of permanent water quality BMPs are shown on **Exhibit 5.16-8**. Water quality mitigation will be provided as required by CDOT's MS4 Permit and their New Development and Redevelopment Program. Draft versions of both the CDOT MS4 Permit and the New Development and Redevelopment Program are currently being reviewed and have yet to be approved. This project will conform to the requirements of the approved CDOT MS4 Permit and the New Development and Redevelopment Program.

Winter maintenance

CDOT implements "non-structural" BMPs in its winter maintenance practices, including policies and common sense practices that ensure the agency is meeting or exceeding the water quality standards of its MS4 Permit. Based on CDOT standards obtained by personal interview, current non-structural practices include:

- Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads.
- Apply sand/salt mixtures (30 percent/70 percent, respectively) at rates of 105 pounds to 115 pounds per lane mile, which is roughly one-third of the maximum allowable amount of 300 pounds per lane mile.
- Use liquid de-icer products, such as magnesium chloride and Caliber (a mixture of magnesium chloride, cornstarch, alcohol, and tree sap); apply these products at rates of 40 pounds to 80 pounds per lane mile.
- Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations. Only 35 percent removal outside the "core" areas is required. For the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—and CDOT will continue to do so.
- Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials. This technology prevents over-treating; the majority of the CDOT Region 1 fleet is currently equipped with these computers.
- Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile. This product is preferred over regular sand/salt mixtures because it produces less fugitive dust.
- Stockpile solid mixtures at the I-70 and Havana Street CDOT maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters.

- Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures.
- Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements.
- Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes.
- Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping.
- Rely on cameras/ITS systems to determine problem areas during each storm event.

Construction BMPs

During construction, as soils are disturbed, storm runoff may create erosion and degradation of water quality if proper BMPs are not employed. Alternative implementation will be done in accordance with the programs established under CDOT's MS4 Permit. Site-specific engineering design studies will be performed during final design, and care will be exercised during construction to prevent problems of stability and erosion during and after construction. To mitigate these effects, BMPs for erosion and sediment control, dust control, stormwater control, and expansive soils will be implemented during construction. BMPs for erosion and blowing dust during construction include the use of silt fences, erosion control blankets, sediment traps, sediment basins, soil stockpile management, temporary diversion structures, and spill prevention and control measures.

After construction, other BMPs will be followed for permanent erosion control. These include regrading as necessary, seeding and revegetating soils and slopes, mulch protection for new plantings, and stormwater control channels. These BMPs are described in numerous standard publications, including the *Erosion Control and Stormwater Quality Pocketbook* (CDOT, 2002b), *Best Management Practices for Erosion and Sediment Control* (U.S. Department of Transportation, 1995), and *Erosion and Sediment Control Handbook* (Goldman, Jackson & Bursztynsky, 1986).

Exhibit 5.16-9 lists the impacts and mitigations associated with water quality.

Exhibit 5.16-9 Summary of Water Quality Impacts and Mitigations

Alternative/ Option	Permanent Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
All Alternatives	• Stormwater runoff can create erosion and degradation of water quality during and after construction • Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	• Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway • Consider environmentally friendly techniques to provide water quality treatment • Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program Implement the following BMPs for erosion and sediment control, dust control, stormwater control, and expansive during and after construction: • Silt fences, erosion control blankets • Sediment traps, sediment basins • Soil stockpile management • Temporary diversion structures • Spill prevention and control measures • Regrading • Seeding and revegetating soils and slopes • Mulch protection for new plantings • Stormwater control channels Use the following winter maintenance BMPs to meet or exceed the water quality standards of CDOT's MS4 permit: • Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads • Apply sand/salt mixtures (30 percent/70 percent, respectively) at rates of 105 pounds to 115 pounds per lane mile, which is roughly one-third of the maximum allowable amount of 300 pounds per lane mile • Use liquid de-icer products, such as magnesium chloride and Caliber (a mixture of magnesium chloride, cornstarch, alcohol, and tree sap); apply these products at rates of 40 pounds to 80 pounds per lane mile • Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations; only 35 percent removal outside the "core" areas is required; for the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—and CDOT will continue to do so • Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials; this technology prevents over-treating; the majority of the CDOT Region 1 fleet is currently equipped with these computers
No-Action Alternative	• Increase in runoff TSS loads of up to 4 percent to the South Platte River	
Revised Viaduct Alternative	• Increase in runoff TSS loads of 7 percent to 17 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	
Partial Cover Lowered Alternative	• Increase in runoff TSS loads of 11 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	

Exhibit 5.16-9 Summary of Water Quality Impacts and Mitigations

Alternative/ Option	Permanent Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
Managed Lanes Option (option to Build Alternatives)	• Increase in runoff TSS loads of 15 percent (for a total of 37 percent) to Sand Creek	• Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile; this product is preferred over regular sand/salt mixtures because it produces less fugitive dust • Stockpile solid mixtures at the I-70 and Havana Street CDOT maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters • Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures • Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements • Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes • Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping • Rely on cameras/ITS systems to determine problem areas during each storm event

5.17 Geology and Soils

This section discusses the geologic and soil resources in the study area. The impacts of the project alternatives on these resources also are evaluated and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, no content-related updates were made.

Why are geology and soil resources evaluated in this document?

There are no federal or state laws that apply specifically to geologic or soil resources. However, the CDOT *NEPA Manual* (2014, Version 4) requires this analysis to:

- Ensure that geologic/soil resources are identified and that their natural and economic values and visual aesthetics are protected
- Identify potential negative impacts that the project could have on geology or soils
- Comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner

5.17.1 What are geology and soil resources and why are they important to this project?

Geology includes complex and varied soil and ground conditions in the study area. Soil considerations and potential hazards include slope stability, expansive soils, differential settlement, erosion, presence of bedrock, high groundwater levels, and flooding. These resources are important to consider during the planning of projects since they can influence the project design.

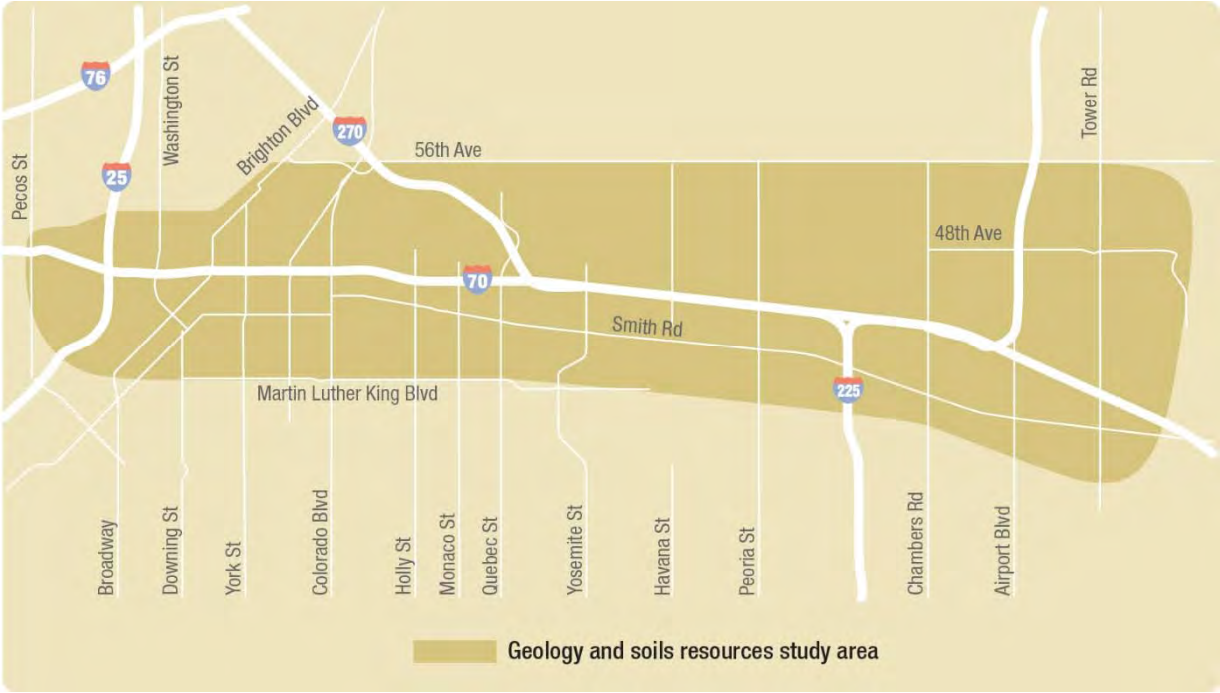
5.17.2 What study area and process were used to analyze impacts to geology and soil resources?

The study area for geology and soil resources is shown in **Exhibit 5.17-1**. Existing information and documents available from public agencies were reviewed to establish the existing geological conditions. State and federal agencies—including the U.S. Geological Survey, Colorado Geological Survey, and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS)—were contacted to obtain relevant reports and maps.

A determination of the depth to bedrock and groundwater was completed through a preliminary subsurface investigation. The investigation was performed during the months of March to June 2014, between Brighton Boulevard and Dahlia Street, and December 2014 to March 2015, between Dahlia Street and I-270. Geotechnical laboratory tests on soil and bedrock samples were completed and results of the investigation are summarized later in this section. Section 5.18, Hazardous Materials, describes the

investigation of soil and groundwater, including chemical analysis.

Exhibit 5.17-1 Geology and Soil Resources Study Area



5.17.3 What are the existing geology and soil resources in the study area?

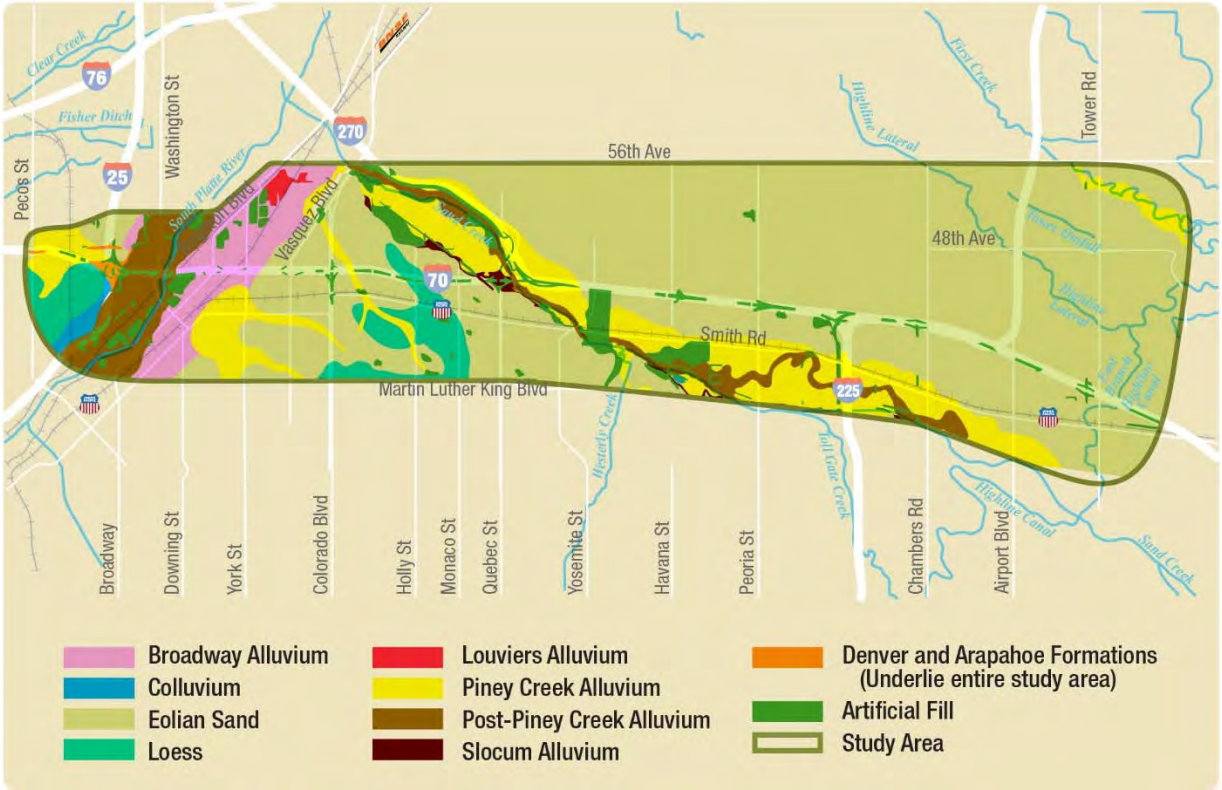
The study area is located east of the Front Range and is situated on the western margin of the Denver Basin. The Denver Basin is a north-south trending, asymmetrical basin with a relatively steep western flank and shallow eastern flank. The Denver Basin is more than 13,000 feet deep at its deepest point and contains bedrock of Paleozoic, Mesozoic, and Cenozoic age (Bilodeau & Costa, 1982). The basin extends north into Wyoming and east from the Front Range across the eastern plains to the Colorado border with Nebraska and Kansas.

The majority of the study area is paved or covered by urban development. There are some unpaved areas, especially along the South Platte River, other drainages, and right of way where soils exist and support vegetation.

Geologic units

The study area is underlain by 10 geologic units. Most of the formations in the study area are composed of alluvial sediments. The geologic units are shown in **Exhibit 5.17-2**.

Exhibit 5.17-2 Geologic Units



Sources: Lindvall 1979, 1980, 1983

The primary geologic units underlying the project area are the Piney Creek Alluvium, Post-Piney Creek Alluvium, artificial fill, loess, Broadway Alluvium, and eolian sand (Lindvall, 1979, 1980, 1983; Machette & Trimble, 1979). Eolian sand is the most extensive geologic unit underlying the area. There are small, isolated areas of Louviers Alluvium and Slocum Alluvium in the western portion of the study area and isolated segments of the Denver and Arapahoe Formations are exposed beneath the I-70/I-25 interchange, east of Quebec Street, and south of I-70 along the western bank of Sand Creek.

The preliminary subsurface investigation identified that bedrock is present at depths ranging from 31 feet to 79 feet below existing grade—an approximate elevation of 5,142 feet to 5,165 feet— between Brighton Boulevard and Colorado Boulevard except near Columbine Street, where bedrock was encountered at an elevation of 5,113 feet. The lower bedrock elevation appears to be associated with a paleo-channel created by the historic South Platte River. The bedrock consists of hard to very hard claystone that contains interbedded, hard to very hard sandstone.

Bedrock and groundwater excavation issues

Although excavating into bedrock and below groundwater depths is not impossible, the excavation at these depths is more complicated and costly.

To minimize the construction cost and time, it is desirable for the highway to be designed and constructed with minimal groundwater and bedrock disturbance.

There are scattered mineral deposits in the study area. Most of which consist of sand, gravel, and clay pits with some processing plants in the study area. These mines and mining claims are located in the western portion of the study area.

Geologic hazards

Colorado is in a region that has minimal earthquake activity. The only major earthquake recorded in Colorado occurred in 1882. Since the 1882 earthquake, there has been little seismic activity within the 200-mile radius around Denver. Tremors were felt in Denver between 1962 and 1967 in the vicinity of the Rocky Mountain Arsenal National Wildlife Refuge and a minor earthquake occurred in 1994 south of Castle Rock. The tremors at the arsenal have been attributed to the pumping of fluid into a deep injection well (Bilodeau & Costa, 1982). The U.S. Geological Survey has evaluated the stability of the geologic units during earthquakes; this information is summarized in **Exhibit 5.17-3**.

Exhibit 5.17-3 Summary of Geologic Unit Stability During an Earthquake

Geologic Unit	Stability During Earthquake
Broadway Alluvium	Poor to Fair
Piney Creek Alluvium	Poor to Fair
Post-Piney Creek Alluvium	Poor to Fair
Louviers Alluvium	Poor to Fair
Slocum Alluvium	Poor to Fair
Colluvium	Poor to Fair
Loess	Poor to Fair
Eolian Sand	Poor
Denver/Arapahoe Formation	Good to Very Good
Artificial Fill Layer	Poor

Sources: Lindvall, 1979, 1980, 1983; Machette & Trimble, 1979

Stability of the eolian sand deposits will depend, in part, on moisture content and angle of slope. The colluvium and loess units have low to moderate swelling pressures when wetted and the Denver Formation has low to very high swelling pressures when wetted (Shroba, 1980). The overall tectonic activity and seismic risk to the greater Denver metropolitan area is continually being evaluated by federal and state geophysicists. There does not appear to be any specific risk in the study area.

Soil types and associations

The soils in the study area have been grouped into associations by the NRCS. A soil association normally consists of one or more major soil types and at least one minor soil and is named for the major soils. Soil associations are useful for planning purposes. However, detailed geotechnical investigations and testing are required to determine site conditions for future facility construction.

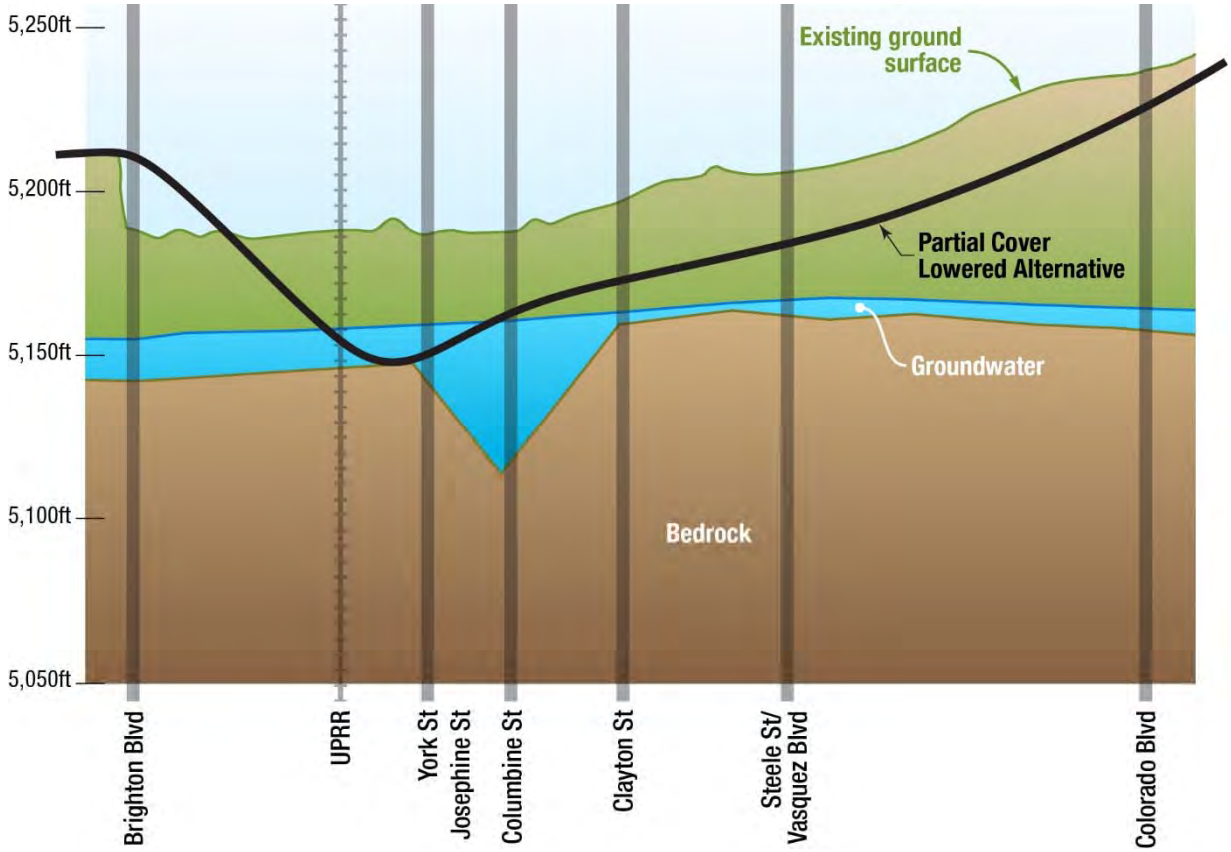
The study area is highly urbanized and most of the native soils in the area have been paved over or excavated for buildings. Because much of the area from I-25 to I-225 along I-70 consists of introduced urban fill, it has not been mapped by the NRCS. There are areas of native soils that still exist along I-70 east of I-225. The predominant soil associations in this area are Blakeland-Valent-Terry, Ascalon-Vona-Truckton, Platner-Ulm-Renohill, and Weld-Adena-Colby.

Groundwater

The preliminary subsurface investigation identified that the depth to groundwater between Brighton Boulevard and Colorado Boulevard ranges from approximately 24 feet to 76 feet below existing grade. The depth to groundwater exists at an elevation of 5,155 feet to 5,170 feet. Permanent groundwater wells were installed to monitor variations of groundwater levels over time. Variations in the groundwater levels can occur during different seasons, following precipitation events, after construction and site grading, and due to changes in surface and subsurface drainage characteristics of the surrounding area. Since the monitoring wells were installed, the variations in the groundwater levels have been found to be minimal.

Exhibit 5.17-4 compiles the results from the preliminary subsurface investigations. The graphic shows a general profile of groundwater and bedrock depths relative to existing and proposed ground surfaces. Note that the proposed ground surface represents the lowest elevation being evaluated, which is the Partial Cover Lowered Alternative.

Exhibit 5.17-4 Comparison of Surface, Groundwater, and Bedrock Elevations



Source: Preliminary Subsurface Investigation Report, Partial Cover Lowered Alternative, I-70 East EIS, CDOT Region 1, 2015

5.17.4 How do the project alternatives affect the geology and soil resources?

Effects to geologic and soil resources may occur during the construction phase of the project, but likely would not cause any geologic hazards or affect the predominant soil types identified in the study area.

Geologic and soil resource risks related to engineering in the study area are associated with the unconsolidated surficial deposits. These deposits mantle the bedrock to depths of as much as 100 feet in some areas, although they are typically less thick. Some of the engineering geology effects related to construction can be attributed to the underlying bedrock of the Denver and Arapahoe Formations. These conclusions are based on U.S. Geological Survey evaluation (Lindvall, 1980, 1983) of construction activity on deposits in the study area, including excavation, compaction, and stability, specifically in areas where structural fill would be imported for some areas of the highway.

Excavation and compaction of the alluvial and loess deposits during construction generally would be easy to moderately easy, and artificial fill would be variable, depending on soil composition. Compaction of the sand deposits would be difficult, and moisture content of the sand and loess deposits must be controlled.

Stability of the Piney Creek and Post-Piney Creek alluvial deposits ranges from poor to good, while stability of the Broadway, Slocum, and Louviers alluvial deposits is good to excellent. Stability of the colluviums is poor to fair. Stability of the loess and sand units is variable, depending on moisture content. Stability of the artificial fill is variable and usually poor.

Construction activities associated with all of the alternatives would take place in an already urbanized area along an existing highway. Construction may cause either minor effects or no effects to geologic and soil resources. In general, the stability of all soil formations depends on water content. Cut slopes of the alluvial, loess, and sand deposits may stand vertically for short periods—longer periods for loess—but eventually will slump to become stable slopes of approximately 3:1 (horizontal to vertical). The colluvial deposits are not stable. Slope stability of the bedrock units ranges from good to excellent. The alluvial and loess deposits are moderately resistant to erosion, while colluvial deposits are generally erodible. The eolian sand and alluvium are moderately resistant to erosion on flat areas, but easily eroded on slopes and cut banks. Resistance to erosion in the bedrock deposits is moderate to excellent.

The Partial Cover Lowered Alternative requires the largest excavation of the alternatives, so it has the greatest potential to affect—and to be affected by—geologic conditions. The excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street. It will be necessary to prevent the groundwater from entering the excavated trench for the lowered portion of I-70.

The lowest grade for the Partial Cover Lowered Alternative is located between the UPRR separation and York Street, where an approximate 40-foot cut is proposed. The excavation for the roadway is located just above the bedrock, so minimal bedrock excavation is anticipated. Tunneling for a drainage outfall north to the South Platte River, for other storm drain pipes, and for utilities could require bedrock excavation, but it is not expected to be significant.

Any uncontaminated excavated material from the Partial Cover Lowered Alternative could be used potentially as fill for other parts of the project.

5.17.5 How are the impacts to the geological resources minimized and mitigated?

To minimize impacts to the lowered highway from the groundwater, the contractor can construct retaining walls to the depth of bedrock. This will include cutting off groundwater infiltration into the lowered section of the highway. Storm underdrain pipes below the pavement will drain any additional groundwater that still enters the lowered section. Extensive dewatering during the construction is anticipated for the Partial Cover Lowered Alternative. For the Revised Viaduct Alternative, the construction of structure foundations also will require dewatering. Water collected from dewatering will be treated according to regulations if contaminants are discovered.

Dewatering

Dewatering is the removal or draining of groundwater or surface water from a construction area.

The proposed retaining walls could be constructed using top-down construction techniques. This involves drilling a caisson or driving a pile first, followed by excavation in phases. The wall is constructed as the excavation progresses. Within the area of large excavations and below groundwater, caisson walls are anticipated. The caisson walls provide additional wall stiffness and support in deep excavation areas. Secant or grouted injection wall types can be designed to seal the portion of the I-70 highway that will be below the groundwater table elevation.

Exhibit 5.17-5 summarizes the impacts and mitigation measures pertaining to geologic and soil resources.

Secant caisson wall

Secant caisson walls are formed by constructing a series of drilled shafts and a series of secondary overlapping shafts. These walls minimize deflection and keep groundwater from flowing into the facility.

Exhibit 5.17-5 Summary of Geology and Soils Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	• Dewater structure foundations during construction
Revised Viaduct Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	
Partial Cover Lowered Alternative	• Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street • Temporary impacts to groundwater during excavation	• Prevent groundwater infiltration into the lowered section of the highway; install underdrain pipes below the pavement to drain any additional groundwater that still enters the lowered section • Dewater during the construction process

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5.18 Hazardous Materials

This section provides data on hazardous materials in the study area and explains why locating, identifying, and analyzing them is important to the project. The impacts of the project alternatives on sites that contain hazardous materials also are evaluated, then proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Based on the revised construction limits, impacts were updated.
- Additional subsurface investigation reports were reviewed; this revealed additional impacts to soil and groundwater, which are discussed in detail.
- Subsurface investigations were conducted along I-70 between I-25 and I-270; this revealed additional impacts to groundwater, which are discussed in detail.
- CERCLIS NFRAP sites were evaluated, resulting in an additional three known hazardous materials sites in both the Revised Viaduct and Partial Cover Lowered Alternatives.
- The Fugitive Dust Control, Dewatering, and Asbestos-Containing Materials mitigation measures were revised.

5.18.1 What are hazardous materials and why are they important to this project?

Hazardous materials are solids, liquids, or gases that are harmful to human health and to the environment. Hazardous materials are likely present along the I-70 East corridor because of current or past land uses. Identified known releases of hazardous materials are primarily from leaking underground storage tanks (LUST) that released gasoline, diesel, waste oil, or other vehicle maintenance/ fuel products into the ground or the groundwater. Other identified known releases are primarily from industrial uses in the area—from hazardous substances associated with past land uses and the use and storage of hazardous waste.

Hazardous materials may impact the health and safety of construction workers, environmental resources, and

Common contaminants

Common contaminants identified in soil and/or groundwater include:

- Petroleum products (i.e., fuels, waste oils)
- Chlorinated solvents
- Metals
- Asbestos

community residents located within the project corridor and surrounding area. Also, encountering hazardous materials during construction can impact the cost of construction, as contaminated media generated during construction must be managed in accordance with federal and state regulations.

5.18.2 What study area and process were used to analyze hazardous materials?

The hazardous materials analysis uses two different search areas. One is a larger area for an environmental records search to comply with the American Society for Testing and Materials (ASTM) standards (ASTM, n.d.); hereafter, this section refers to this as the data search area. The second area—the one shown throughout this chapter on exhibits—is smaller and accounts for project ground disturbance; hereafter, referred to the study area.

The data search area, which extends between one-quarter mile and one mile from the project construction limits, is in accordance with the requirements of ASTM Standard E 1527-05, The objective was to identify specific federal and state environmental sources and search distances for each record source to be included in a Standard Environmental Record Search. The data search was completed in October 2012. Attachment H, *Hazardous Materials Technical Report*, in the 2014 Supplemental Draft EIS fully details the results of the records search.

The study area corresponds to the greatest potential extent of the project construction limits and is used to assess potential encounters with hazardous materials by project alternatives, shown in **Exhibit 5.18-1**. This area has a long history of commercial and industrial activity associated with hazardous materials.

Exhibit 5.18-2 summarizes the database results from the search, together with the number of sites within each database the environmental records search identified within the study area.

Environmental records search

An environmental records search was conducted using ASTM Standard E 1527-05 search distances for environmental resources.

Databases were searched for the following resources:

- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)
- National Priorities List (NPL)
- Resource Conservation and Recovery Act (RCRA)
- Solid Waste Landfill (SWL)
- Voluntary Cleanup Program (VCUP)
- Underground Storage Tank (UST)
- Leaking Underground Storage Tank (LUST)

Exhibit 5.18-1 Hazardous Materials Study Area

Exhibit 5.18-2 Environmental Records Search Results

Hazardous Material Database	Number of Sites
CERCLIS	0
CERCLIS, No Further Remedial Action Planned	3
NPL	1
RCRA, Generators (Large, Small, and Transporter)	8
RCRA, Corrective Action (CORRACTS)	1
RCRA, Treatment, Storage, and Disposal Facilities	1
SWL	4
VCUP	1
UST	28
LUST	26

Sources: Satisfi, Inc., 2012

Two previous subsurface investigations were performed within the study area. A preliminary subsurface investigation was performed in October 2012 at the western portion of the study area, along I-70 between Brighton Boulevard and Colorado Boulevard. A subsurface investigation also was performed between March 2014 and February 2015 along I-70 between Colorado Boulevard and I-270. Soil and groundwater samples were collected and

analyzed for common contaminants, including petroleum hydrocarbons, chlorinated solvents, heavy metals, volatile organic compounds, semi-volatile organic compounds, and pesticides.

Results of the 2012 preliminary subsurface investigation are included in the 2014 Supplemental Draft EIS in Attachment H, *Hazardous Materials Technical Report*. The Supplemental Draft EIS is available for review on the I-70 East project website at www.i-70east.com. Results of the 2015 subsurface investigation report are included in Attachment H, *Hazardous Materials Technical Report Addendum,* in this document.

5.18.3 What are the areas of interest for hazardous materials that are being analyzed and what are their existing conditions?

The environmental records search, conducted in 2012, presented in the *Environmental FirstSearch Database Report* identified more than 1,300 sites in the data search area, of which 132 sites were located within the study area. The more significant hazardous materials sites identified in the environmental records search include Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), RCRA, Colorado VCUP, SWL, and UST/LUST sites, of which 73 sites were identified within the study area. **Exhibit 5.18-3** through **Exhibit 5.18-10** include sites within and outside of the study area identified within the data search area.

CERCLA Assessment and Response Program

The CERCLA Assessment and Response Program, as described in the National Contingency Plan (40 CFR Part 300), commonly known as the Superfund Program, provides a framework for identifying, evaluating, and cleaning up sites with uncontrolled hazardous substance releases from past industrial activities that pose a threat to human health and the environment. CERCLIS is the comprehensive system used to track sites under assessment or needing to be addressed, and sites where releases are currently being addressed or have been addressed. The environmental data search identified the following sites listed in CERCLIS:

- Three CERCLIS sites, as shown on **Exhibit 5.18-3** (CERCLIS sites are actively undergoing initial evaluation for contamination)

- Twenty-six CERCLIS, No Further Remedial Action Planned (NFRAP) sites, as shown on **Exhibit 5.18-4** (sites have been evaluated and no further action is planned; the EPA or CDPHE could reopen these sites at any time in the future if new information or data are made available)
- One proposed NPL site (Asarco Globe Plant) and two active NPL sites (Chemical Sales Site and Vasquez Boulevard at I-70 Site), as shown on **Exhibit 5.18-5**

CERCLIS and NPL sites are discussed in further detail in Appendices A and B of Attachment H, *Hazardous Materials Technical Report* of the Supplemental Draft EIS.

Exhibit 5.18-3 CERCLIS Sites

Exhibit 5.18-4 CERCLIS, NFRAP Sites

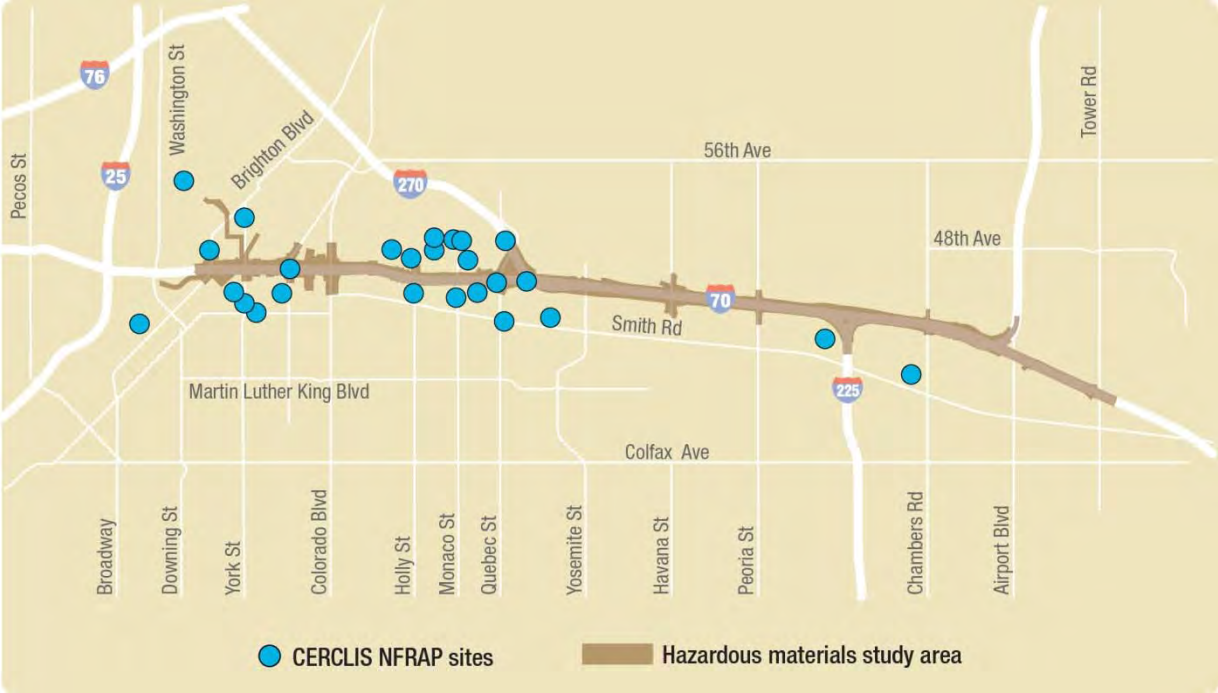


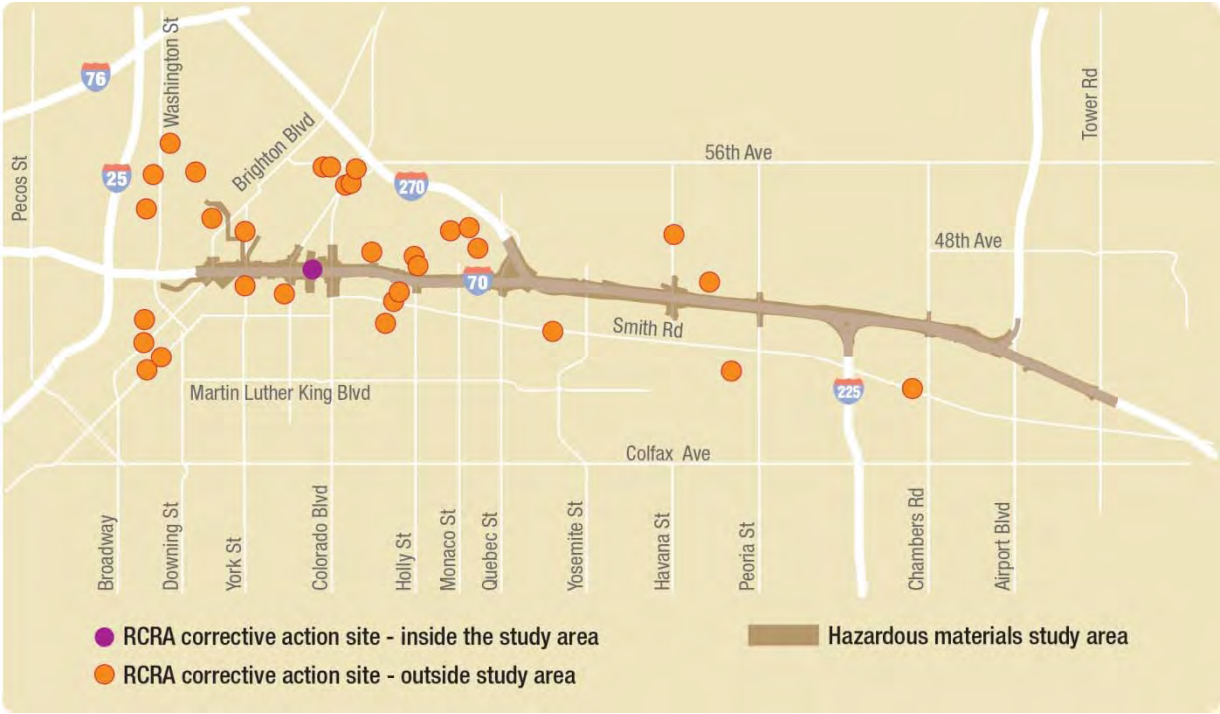
Exhibit 5.18-5 NPL Sites

RCRA Corrective Action Program

The RCRA Corrective Action Program, administered in Colorado by CDPHE, provides the framework for the identification, evaluation, and cleanup of sites contaminated by the release of RCRA hazardous waste and waste constituents that pose a threat to human health and the environment. RCRA sites in the data search area include 32 sites, as shown on **Exhibit 5.18-6**.

RCRA Corrective Action sites are discussed in further detail in the Supplemental Draft EIS in Appendix C of Attachment H, *Hazardous Materials Technical Report*.

Exhibit 5.18-6 RCRA Corrective Action Sites



Solid Waste Landfill and Voluntary Cleanup Program

The Solid Waste and Materials Management Program, which is administered by CDPHE's Hazardous Materials and Waste Management Division, regulates SWLs. SWL locations in the data search area include six sites and 40 areas, as shown on **Exhibit 5.18-7**.

CDPHE's Hazardous Materials and Waste Management Division, VCUP, provides a framework for the evaluation and cleanup of contaminated sites that do not fall under other regulatory programs. There are three VCUP sites located within the data search area, as show on **Exhibit 5.18-8**.

SWL and VCUP sites are discussed in further detail in Appendices D and E of Attachment H, *Hazardous Materials Technical Report* of the Supplemental Draft EIS.

Exhibit 5.18-7 Solid Waste Landfill Sites

Exhibit 5.18-8 Voluntary Cleanup Program Sites

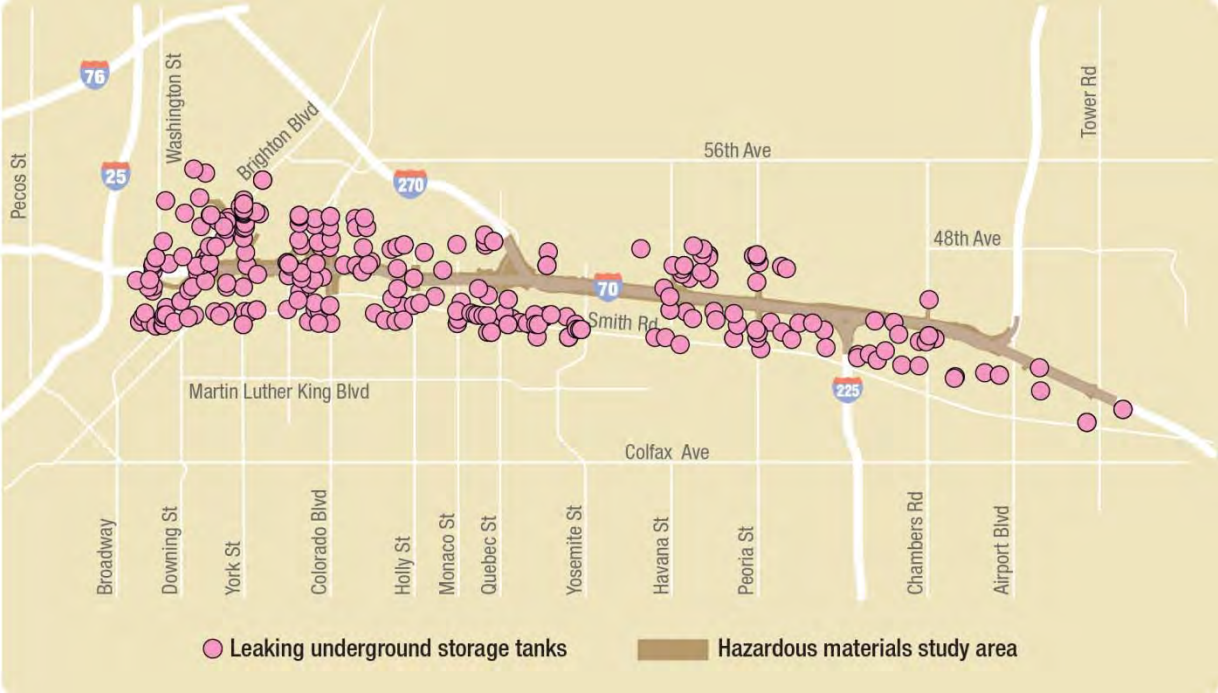
AST, UST, and LUST Sites

The Colorado Department of Labor and Employment, Division of Oil and Public Safety, regulates petroleum products and chemical USTs and certain petroleum-containing above-ground storage tanks (ASTs). Releases must be reported to the Division of Oil and Public Safety, and investigation and cleanup must be implemented, as required. Most USTs have had a spill or leak at some point in their life cycle. Small leaks may not be identified until the UST is taken out of service and formally closed. AST, UST, and LUST sites within the data search area include 289 registered AST/UST sites and 343 LUST sites, as shown on **Exhibit 5.18-9** and **Exhibit 5.18-10**.

LUST sites are discussed in further detail in Appendix F of Attachment H, *Hazardous Materials Technical Report* of the Supplemental Draft EIS.

Exhibit 5.18-9 Petroleum Storage Tank Locations

Exhibit 5.18-10 Leaking Underground Storage Tank Locations



5.18.4 Are there other hazardous material regulations the project will follow?

CDPHE's Hazardous Materials and Waste Management Division regulates asbestos in soil. Regulations require awareness of the possibility of asbestos-containing building materials found in soil. If asbestos is encountered during soil disturbance activities, such as construction, the regulations require that material to be removed and disposed of in accordance with regulatory requirements. Some of the main indicators that there may be asbestos in soil include, but are not limited to:

- Any remnants of an old building (i.e., visible footings, old foundations, partial structure components, construction debris, etc.)
- Indication of historical land-filling activities
- Evidence of old utility pipelines

In addition to the many types of hazardous materials and waste sites that have been identified in the data search area, the potential exists for currently unknown contamination. This may be due to the following factors:

- Contaminated areas associated with known sites that are not accurately identified because of factors such as contaminant migration, or limitations in the ability to determine the extent of contamination
- New contamination sites that have occurred because of recent activities
- Old contamination sites for which records do not exist, or which were not identified previously

5.18.5 How do the project alternatives potentially encounter hazardous materials?

Construction of the proposed alternatives will likely encounter sites contaminated by hazardous materials. Construction activities associated with the alternatives have the potential to release hazardous materials at these locations into soil or groundwater. They could also lead to exposure of workers or the public to these materials if proper health, safety protocols are not followed and remediation efforts are not applied.

The likelihood of impacting hazardous materials is dependent on the number of hazardous materials sites encountered during construction. In addition, the location and amount of contamination remaining at the site also will dictate impacts.

Encounters with hazardous materials are proportional to the amount of ground disturbance. For example, a larger area of land disturbed is likely to increase encounters with hazardous material sites, leading to a greater impact. Alternatives that incorporate subsurface improvements versus at-grade improvements also have a higher potential to encounter hazardous materials, soils, and/or groundwater at greater depths.

The No-Action Alternative will potentially disturb approximately 41 acres of land and encounter seven known hazardous materials sites.

The Revised Viaduct Alternative, North Option (General-Purpose Lane Option) will potentially encounter 25 known hazardous materials sites, while the Revised Viaduct Alternative, South Option (General-Purpose Lane Option) will potentially encounter 24 sites. Both North and South Options disturb approximately 575 acres of land. This is a larger potential impact to hazardous materials than the No-Action Alternative. Replacing the General-Purpose

Summary of encounters with hazardous materials sites by alternative

No-Action Alternative:

- 7 hazardous materials sites affected

Revised Viaduct Alternative:

- North—25 hazardous materials sites affected
- South—24 hazardous materials sites affected

Partial Cover Lowered Alternative (General-Purpose and Managed Lanes Options):

- 28 hazardous materials sites affected

Lanes Option with the Managed Lanes Option would increase land disturbance by an additional 83 acres. No additional known hazardous materials sites would be encountered with the Managed Lanes Option.

The Partial Cover Lowered Alternative (General-Purpose and Managed Lanes Options) will potentially encounter 28 hazardous materials sites, an approximate 19-percent increase in sites compared to the Revised Viaduct Alternative. The Partial Cover Lowered Alternative, General-Purpose Lanes Option will potentially disturb approximately 620 acres of land, an approximate 7-percent increase in land area impact compared to the Revised Viaduct Alternative, General-Purpose Lanes Option.

The Partial Cover Lowered Alternative, Managed Lanes Option will potentially disturb approximately 703 acres of land, an approximate 22-percent increase in land area impact compared to the Revised Viaduct Alternative, General-Purpose Lanes Option, and a 13-percent increase in land area impact compared to the Partial Cover Lowered Alternative, General-Purpose Lanes Option. Additionally, lowering the highway will impact soil and/or groundwater at greater depths than the No-Action Alternative and Revised Viaduct Alternative. Disturbing greater volumes of soil and/or groundwater increases the potential to encounter hazardous materials, both documented and undocumented.

The Managed Lanes Option for both the Revised Viaduct Alternative and the Partial Cover Lowered Alternative increases the ground disturbance by approximately 83 acres due to a large construction footprint; however, the number of known hazardous materials sites identified within the construction footprints will not increase. Additional ground disturbance may result in a greater likelihood to encounter hazardous materials. Since this area has been previously developed, undocumented contaminants may be disturbed during construction activities. Potential encounters with known hazardous materials sites and area of ground disturbance by alternative or option is summarized in **Exhibit 5.18-11**.

Exhibit 5.18-11 Summary of Potential Hazardous Materials Sites and Area of Ground Disturbance Impacted by Project Alternatives

Alternative/Option	Number of Known Hazardous Materials Sites	Area of Ground Disturbance (acres)
No-Action Alternative	7	41
Build Alternatives, General-Purpose Lanes Option		
Revised Viaduct Alternative, North Option	25	575
Revised Viaduct Alternative, South Option	24	575
Partial Cover Lowered Alternative	28	620
Build Alternatives, Managed Lanes Option		
Revised Viaduct Alternative, North Option	25	658
Revised Viaduct Alternative, South Option	24	658
Partial Cover Lowered Alternative	28	703

Specific facilities of concern likely to be encountered by alternatives

The I-70 and Vasquez Boulevard NPL site has been identified within all the proposed alternatives. NPL sites are likely to have a greater effect on the alternatives. The level of effect depends on the level of hazardous materials contamination remaining at the site, as well as the location of the contamination relative to the right of way/construction footprint.

The site was placed on the NPL because of metals contamination identified in soil and groundwater associated with historic smelter operations. Remediation activities have occurred at the site. Soil and groundwater contamination (lead and arsenic) at this site have not been fully characterized. Construction activities associated with the proposed alternatives will likely encounter the contaminants identified at the NPL site.

An NPL site (Chemical Sales Company) has been identified adjacent to and north of all the proposed alternatives. Chemical Sales Company was a wholesale distributor of commercial and industrial chemicals, detergents, and pool chemicals. Contaminants of concern in soil and groundwater include tetrachloroethylene (PCE), trichloroethylene (TCE), and benzene.

Extensive remediation has occurred at the site. However, a groundwater plume has been identified in the shallow alluvial aquifer south of Sand Creek, which is located approximately one mile north of the proposed alternatives. Groundwater flow generally moves north to northwest, away from the alternative footprints. Paleochannels in the alluvium influence regional flow, at times resulting in flow patterns that are different from the regional flow. Contaminants associated with the NPL site may be encountered during construction of the alternatives.

An NPL site (ASARCO, Inc.) is located northwest of the proposed alternatives. ASARCO, Inc. was a heavy-metal smelter and refining facility. Contaminants of concern in soil and groundwater at the facility include cadmium, arsenic, lead, and zinc. Groundwater flow generally moves north to northwest, away from the alternative footprints. However, similar to the Chemical Sales Company facility, paleochannels in the alluvium influence regional flow, at times resulting in flow patterns that are different from the regional flow. Therefore, contaminants associated with the NPL site may be encountered during construction of the alternatives. NPL sites are discussed in further detail in the Supplemental Draft EIS in Appendices A and B of Attachment H, *Hazardous Materials Technical Report*.

Multiple closed LUST sites have been identified within all highway alternatives. Since these facilities have been issued closure/No Further Action notices, they are expected to have minor effects during the construction phase. The hazardous materials contamination at these sites has been removed or remediated to meet state or federal action levels; however, low levels of residual contamination may remain in soil and groundwater at the sites. In some cases, unknown contamination not identified during the previous site investigations may be present. LUST sites are discussed in further detail in the Supplemental Draft EIS in Appendix F of Attachment H, *Hazardous Materials Technical Report*.

Historical landfills have been identified within the Revised Viaduct and Partial Cover Lowered Alternatives. Recent subsurface investigation at the Denver Coliseum—a historical landfill that overlaps the I-70 and Vasquez Boulevard NPL site—has identified chloroform, PCE, TCE, manganese, iron, arsenic, hexavalent chromium, and cadmium in groundwater that exceed standards. Hazardous materials also have been identified in soils in this area, including asbestos-containing materials (ACM), arsenic, and

landfill gas at levels that can result in a potential explosion hazard during construction. Construction activities associated with all of the proposed alternatives will likely encounter the contaminants at this site. The Partial Cover Lowered Alternative will likely encounter these contaminants to a greater extent based on the location of the Globeville outfall specific for this alternative.

Subsurface investigations conducted along I-70 between I-25 and I-270 identified contaminants, including metals, semi-volatile organic compounds (SVOCs), and VOCs in groundwater at levels that exceed permitted standards. Hydrocarbons and arsenic also were identified in soil at levels above regulatory standards. The subsurface investigations are discussed further in Attachment H, *Hazardous Materials Technical Report Addendum* of this document.

Effects of hazardous materials and waste also are associated with runoff of contaminants in stormwater. Contaminants likely to be in stormwater runoff include fuel and lubricants, metals, compounds from tires, and automobile engine coolants. Additional operational effects may include herbicide use for weed control and magnesium chloride for de-icing operations.

5.18.6 What are the impacts to hazardous materials during construction?

Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination. Standard construction measures for fugitive dust control and stormwater erosion and sediment controls minimize the spread of contaminated soil. Some sites, particularly NPL sites, may have onsite repositories for contaminated soil and debris, active soil vapor extraction systems, or active groundwater remediation systems, including groundwater-monitoring wells. Disturbance of these structural controls by construction activities can result in the release of hazardous materials contamination, as well as additional costs if the impacted controls must be replaced in kind.

Metals and VOCs that exceed regulatory standards (expected permit limits) have been identified in groundwater. Construction activities for any of the alternatives would require dewatering and associated permitting if contaminated groundwater is encountered during construction. Dewatering activities include treating and discharging water onsite or characterizing and removing

water offsite to a permitted disposal facility, resulting in increased construction costs. The dewatering activities would be more substantial for the Partial Cover Lowered Alternative because the excavation will reach below groundwater elevation. In addition, permanent dewatering may be required for this alternative since a portion of the below-grade section will be constructed below groundwater elevation, potentially resulting in additional post-construction costs for this alternative.

Construction at hazardous materials sites also may affect the construction budget and schedule. Construction activities may require the offsite disposal of contaminated soil and debris in permitted facilities, increasing costs. If previously unidentified contamination is found, costs and schedules both stand to be affected. The acquisition of contaminated properties may require additional site investigation and monitoring to evaluate site condition. Remediation at these sites may be necessary before and during the construction.

5.18.7 How are the negative effects from the project alternatives mitigated for hazardous materials?

Any contamination encountered during the construction of the project will be cleaned up in compliance with applicable state and federal regulations, which will benefit the area in the future. Implementation of several mitigation measures will avoid or minimize the effects of the alternatives on hazardous materials including:

- Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition. Based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project.
- The project will avoid contaminated sites whenever practical. However, where avoidance is not feasible, further site investigation will be required and will be coordinated with the affected property owner.
- Follow *CDOT Standard Specifications for Road and Bridge Construction*, Section 250, Environmental, Health and Safety Management.

- Follow Tri-County Health Department Health and Safety Practices during Construction on or Near Former Landfills.
- Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines. If ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure. Additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations.
- Update contaminated sites search databases to reflect most recent records.

Additionally, the following construction mitigation measures will avoid or minimize the effects of the alternatives on hazardous materials including:

- Prepare and implement a project-specific Health and Safety Plan and Materials Management Plan 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.
- In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan.

- Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil. During the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities. Additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards.
- The contractor will obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water Permit or Construction Activities Discharging to Ground Water Permit, as required, utilizing readily available data. The selected contractor will follow the permit requirements.
- The Partial Cover Lowered Alternative (both options) will require excavation below existing groundwater. If this alternative requires permanent dewatering, obtain and follow the necessary CDPS Dewatering Permits. Under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility.
- Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines. If existing monitoring wells are impacted during construction, the project will replace them, as necessary.

Exhibit 5.18-12 lists the impacts and mitigations associated with hazardous materials.

Exhibit 5.18-12 Summary of Hazardous Materials Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 7 hazardous materials sites affected • 41 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	• Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project • Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners • Follow *CDOT Standard Specifications for Road and Bridge Construction,* Section 250, Environmental, Health and Safety Management • Follow Tri-County Health Department *Health and Safety Practices during Construction on or Near Former Landfills* • Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines; if ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure; additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations • Update contaminated sites search databases to reflect most recent records • Prepare and implement a project-specific Health and Safety Plan and Materials Management Plan 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 • In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan
Revised Viaduct Alternative, General-Purpose Lanes Option	• 24 to 25 hazardous materials sites affected • 575 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	
Revised Viaduct Alternative, Managed Lanes Option	• 24 to 25 hazardous materials sites affected • 658 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	

Exhibit 5.18-12 Summary of Hazardous Materials Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 25 hazardous materials sites affected • 620 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	• Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities; additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards • Obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water Permit or Construction Activities Discharging to Ground Water Permit, as required, utilizing readily available data; the selected contractor will follow the permit requirements • Obtain and follow the necessary CDPS Dewatering Permits if this alternative requires permanent dewatering; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility • Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary
Partial Cover Lowered Alternative, Managed Lanes Option	• 28 hazardous materials sites affected • 703 acres of land disturbed • Extensive excavation through a known landfill that contains contaminants • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	

5.19 Utilities

This section discusses existing utilities located within the study area and explains why they are important to the project. The impacts of the project alternatives on utilities also are evaluated, and proposed mitigation measures are discussed to offset any potential adverse effects.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Additional utility information was obtained, which allowed for further refinement of numbers and extent of overall utility impacts for each alternative.
- Refinement in the size and material of existing utilities being impacted was made.
- Additional detail on type of overhead electrical lines impacted by the project was obtained.
- Additional explanation of existing storm sewer deficiencies was added.

5.19.1 What are utilities and why are they important to this project?

For purposes of this analysis, a utility is a privately, publicly, or cooperatively owned line, facility, or system that produces, transmits, or distributes various commodities that directly or indirectly serve the public (23 CFR §645.10).

Various utilities are located within the study area, including electric, water, sanitary and storm sewer, communications, natural gas, and petroleum. The natural gas, electric, communications, and petroleum utilities are privately owned and/or corporately operated to service local communities. Water and sewer facilities typically are provided by local governments to residents and businesses within their jurisdictional boundaries.

Commodities include communications, cable television, power, electricity, lights, heat, gas, oil, crude products, water, steam, waste, stormwater not connected with highway drainage, or any other similar commodity, including any fire or police signal system or street lighting system.

Are railroads a utility?

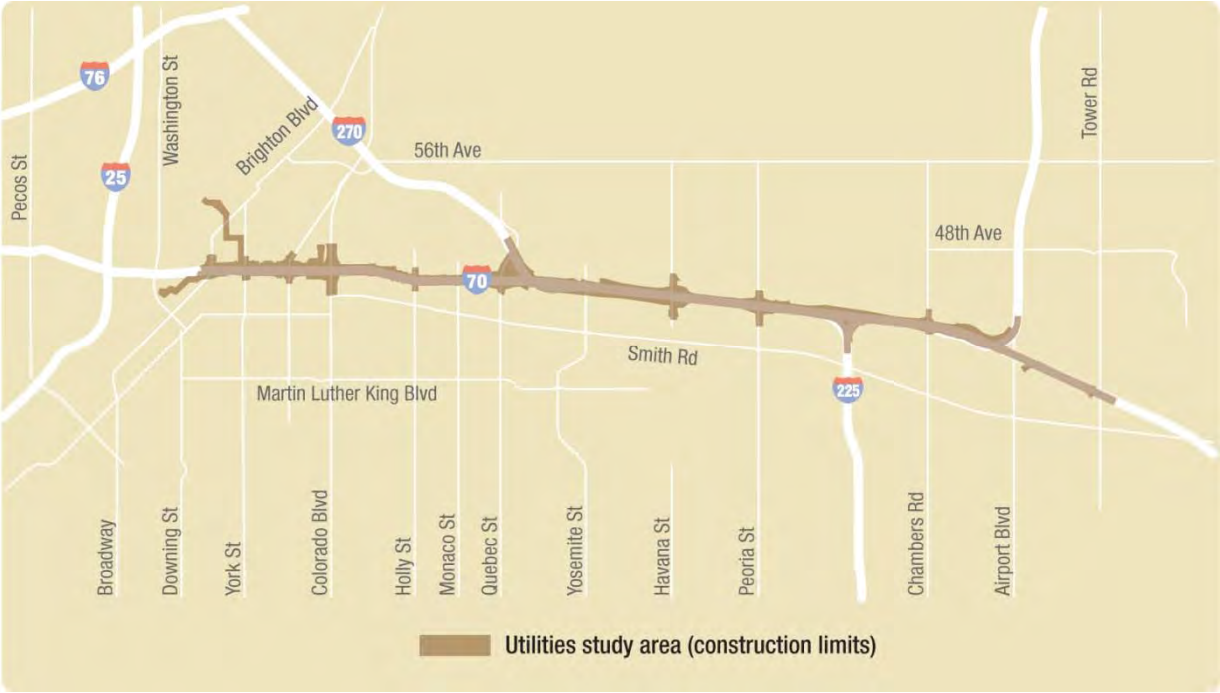
The definition of utility also includes railroads. Because of their transportation function, however, railroads are addressed in Chapter 4, Transportation Impacts and Mitigation Measures.

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

5.19.2 What study area and evaluation process were used to analyze utility impacts?

Utility impacts occur as a result of construction. Thus, the project alternatives' construction limits were used to identify the type and location of existing utilities and potential impacts from the alternatives. **Exhibit 5.19-1** shows the utilities study area, which is a composite of the construction limits from all of the alternatives.

Exhibit 5.19-1 Study Area for Utilities Analysis



To prepare the utilities inventory and analyze potential conflicts, design drawings, spatial data, mapping, and other information available from the respective utility owners were used. Data to support the analysis varied in quality, but there were enough good data values for planning purposes. Utilities were field located and surveyed to prepare utility mapping that was used to identify potential conflicts and required relocations.

Utility conflicts were identified by comparing the proposed construction limits of each alternative with the location of existing utilities. Potential mitigations were identified where the proposed alternative conflicts with a utility. Evaluation of utility mitigations used the following definitions and assumptions:

- Relocation—A utility will be moved horizontally and/or vertically to provide adequate clearance and avoid conflict.
- Adjustment—A utility will be affected by the proposed improvement, but will 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 elevation of manholes or valves.
- A utility that crosses a roadway or ramp, where that roadway or ramp is not in excavation, likely will result in an adjustment of the utility, at a minimum.
- All utilities attached to the existing viaduct will be relocated, as the existing viaduct is to be removed and replaced with one of the discussed alternatives.
- A utility attached to a bridge support will result in either an adjustment or relocation. This will be determined in a future phase when more detailed designs for the structures are prepared. For this analysis, it is assumed that the utility will be relocated.
- A utility crossing I-70 in the Partial Cover Lowered Alternative (from Brighton Boulevard to Colorado Boulevard) most likely will need to be relocated. A utility crossing I-70 in the No-Action or Revised Viaduct Alternatives likely will require adjustment or potential relocation. A utility crossing I-70 in an at-grade situation for any alternative likely will require adjustment or possible relocation. For this analysis, it is assumed that the utility will be adjusted.
- A utility running parallel to I-70 likely will require adjustment or relocation due to shifting and/or widening of the highway. For this analysis, it is assumed that the utility will be relocated.

5.19.3 What are the existing conditions for utilities in the study area?

This section describes the existing conditions of the utilities, including the approximate location, type, and description.

Water

Water lines provide filtered potable water to homes and businesses. Most of these lines cross I-70 at right or skewed angles, with some lines running parallel to I-70 or 46th Avenue, within the existing right of way.

At least 20 major water lines, defined as lines greater than or equal to 12 inches in diameter, were identified within the study area:

- 24-inch pipe running north-south along Race Street from 49th Avenue to Brighton Boulevard
- 12-inch pipe running north-south near Brighton Boulevard and Race Court
- 12-inch pipe running north-south along 44th Street in front of the Coliseum
- 20-inch pipe running north-south along 44th Street in front of the Coliseum
- 24-inch pipe running north-south along Brighton Boulevard
- 12-inch main running north-south along York Street
- 36-inch conduit running north-south along Columbine Street
- 42-inch recycled line running north-south along Fillmore Street
- 12-inch main running north-south along Milwaukee Street
- 12-inch main running east-west along 46th Avenue from Milwaukee Street to Jackson Street
- 16-inch main running north-south east of Colorado Boulevard
- 12-inch main running north-south along Dahlia Street
- 12-inch main running east-west along Stapleton Drive North and Stapleton Drive South from Glencoe Street to Oneida Street

- 12-inch main running north-south along Holly Street
- 12-inch main running north-south along Monaco Street
- 24-inch main running north-south along Monaco Street
- 16-inch main running north-south along Havana Street
- 24-inch pipe running north-south along Peoria Street
- 36-inch pipe running north-south across I-70 within the vicinity of Salem Street and Crown Boulevard
- 12-inch pipe running north-south across I-70 extending north of Sable Boulevard
- 16-inch pipe running north-south across I-70 near the Chambers Boulevard westbound off ramp

Sanitary sewer

Sanitary sewers carry sewage from homes and businesses to wastewater treatment plants through a system of underground pipes. Several sanitary sewer lines cross or run parallel to I-70 or 46th Avenue.

At least 13 major sewer lines, defined as greater than or equal to 15 inches in diameter, were identified within the study area:

- 15-inch clay pipe running north-south along Brighton Boulevard near Race Court
- 48-inch reinforced concrete pipe running west from Brighton Boulevard adjacent to Riverside Cemetery
- 77-inch brick pipe running north-south in Globeville Landing Park
- 78-inch reinforced concrete pipe running north-south in Globeville Landing Park
- 48-inch brick pipe running north-south along York Street
- 21-inch reinforced concrete pipe east of Colorado Boulevard running north-south
- 21-inch reinforced concrete pipe east of Colorado Boulevard running east-west along Stapleton Drive North to Dahlia Street
- 18-inch reinforced concrete pipe running north-south along Dahlia Street

- 21-inch PVC pipe running east-west along Stapleton Drive South from Monaco Street to Oneida Street
- 18-inch PVC pipe running north at Oneida Street through the DRIR yard
- 24-inch reinforced concrete pipe and 39-inch (unknown) pipe running north-south along Sand Creek under I-70
- 15-inch PVC pipe running north-south along Sable Boulevard
- 27-inch reinforced concrete pipe running north-south parallel to the west side of Airport Boulevard

Storm sewer

A storm sewer system can consist of curbs, gutters, drains, inlets, pipes, and open ditches that convey rainfall and other drainage (other than sewage) to streams, lakes, or other surface water bodies.

At least nine major sewer lines, defined as greater than or equal to 36 inches in diameter, were identified within the study area:

- 36-inch pipe running north-south along Race Street
- 72-inch pipe running north-south along York Street
- 42-inch pipe running north-south along Colorado Boulevard
- 48-inch pipe running north-south east of Colorado Boulevard
- 120-inch pipe running north-south along Forest Street
- 60-inch sewer pipe running north-south east of Grape Street
- 48-inch pipe running north-south along Airlawn Road
- 48-inch pipe running northeast crossing Quebec Street
- 42-inch pipe running east-west between I-225 and Chambers Road

Storm sewer deficiencies are known to exist within the Montclair and Park Hill Drainage Basins in the study area. Inadequate facilities result in surface flooding generally in a southeasterly to northwesterly direction from Brighton Boulevard to Dahlia Street and below the existing viaduct.

Storm sewer deficiencies

Descriptions of the Montclair and Park Hill Drainage Basins can be found in Sections 2.1 and 2.2 of the Summary of Existing Studies and Flows, Attachment M, *Hydrology and Hydraulics Technical Report*, Appendix B.

Criteria for the 100-year event (a flood of such a magnitude that it has a 1-percent chance of happening in any given year) are being used for the design to intercept all offsite flows that would potentially reach the Partial Cover Lowered section. Applying these criteria ensures protection from large-event drainage flows entering the lowered roadway section of the Partial Cover Lowered Alternative. Also, drainage facilities on the existing viaduct were not originally designed to adequately handle larger storms. Stormwater drainage for the alternatives is addressed in Section 5.14, Floodplains and Drainage/Hydrology.

Communications/fiber optics

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. Fiber optic lines operate at higher bandwidths and frequencies than traditional copper wire carrying electrical signals, so they have higher throughput, or capacity. Fiber optic lines generally have replaced copper wire used traditionally for trunk lines in communications systems. For the majority of installations, fiber lines are placed in conduits referred to as ducts. Fiber ducts can either be single conduits or multi-conduit groupings known as duct banks or large ducts.

Fiber lines within or crossing the I-70 highway corridor also are used for ITS and traffic signal operations.

At least 37 fiber optic lines cross or run parallel to the project alternatives in the study area. The following list of existing fiber optic lines is based on preliminary utility data collected:

- Four regular ducts running north-south along Brighton Boulevard, near Race Court
- One duct running north-south along 44th Street in front of the Coliseum
- Two regular ducts running north-south along Brighton Boulevard at I-70
- One large duct and two regular ducts running north-south along the Union Pacific Railroad corridor
- One large duct and one line running along the southern edge of the existing I-70 right of way for almost the entire length of the project
- Two large ducts and one regular duct running north-south along York Street

- One large duct running north-south along Josephine Street
- One large duct running north-south along Steele Street/Vasquez Boulevard
- One duct running north-south along the BNSF Market Lead Railroad
- One large duct west and two large ducts east running north-south near Colorado Boulevard
- One large duct and two regular ducts running north-south along Dahlia Street
- One duct running north-south along Holly Street
- One duct running east-west along Stapleton Drive North from Holly Street to the DRIR yard
- One large duct running north-south along Monaco Street
- One large duct running north-south along Quebec Street
- Two regular ducts running north-south along Havana Street
- Two regular ducts running north-south along Peoria Street
- One large duct and one regular duct running north-south across I-70 near Crown Boulevard
- One duct running north-south along Chambers Road
- One duct running north-south west of Airport Boulevard
- One duct running north-south along Tower Road

In addition to the fiber optic lines within the project, there are many above- and below-ground telephone and cable lines that cross and run parallel to the highway, arterial roads, collector roads, and local streets.

Electric

Electric power facilities are used to provide power to commercial, industrial, public, and residential users. Electric lines can either be buried underground or installed on overhead structures.

Electric lines typically fit into one of four categories:

1. Distribution Lines—overhead lines that provide power service to individual users; usually 4 to 13 kilovolts (kv)
2. Transmission Lines—overhead lines that transport power from one place to another; usually 69 to 500 kv
3. Underground Distribution Lines—underground lines that provide power service to individual users; usually 4 to 13 kv
4. Underground Transmission Lines—underground lines that transport power from one place to another; usually 69 to 138 kv

While relocating distribution lines is less problematic and a common occurrence on roadway projects, relocating transmission lines, whether underground or overhead, is significantly more disruptive, particularly when power must be shut down.

At least seven overhead transmission lines that cross I-70 were identified within the study area:

- A transmission line running north-south along Race Street
- A transmission line running north-south along York Street
- A transmission line running north-south along Steele Street/Vasquez Boulevard
- A transmission line running north-south along Jackson Street
- A combination line running north-south along Dahlia Street
- A transmission line running north-south west of Quebec Street along the DRIR corridor
- A transmission line running north-south west of Chambers Road

Four overhead distribution lines that cross I-70 also were identified within the study area:

- A distribution line running north-south along the alley between Josephine Street and Columbine Street
- A distribution line running north-south along Glencoe Street

- A distribution line running north-south west of Quebec Street near the DRIR corridor
- A distribution line running north-south along Havana Street

Many other overhead distribution lines parallel the highway or cross arterials, collector roads, and local streets. In addition to overhead lines, there are a myriad of underground lines that cross and run parallel to the highway, arterials, collector roads, and local streets. At this stage, none of the underground lines have been identified as transmission lines.

Natural gas, petroleum, and jet fuel

Natural gas and petroleum pipelines are used to bring energy to commercial, industrial, public, and residential users.

At least 22 major gas, petroleum, or jet fuel lines, defined as greater than or equal to 6 inches in diameter, were identified within the study area:

- 12-inch gas pipe running north-south into a natural gas collector facility on the northwest corner of the Brighton Boulevard interchange
- 20-inch gas pipe running north-south along Brighton Boulevard
- 6-inch gas pipe running north-south along York Street
- 16-inch gas pipe running north-south along York Street
- 20-inch gas pipe running north-south along Steele Street/Vasquez Boulevard
- 10-inch gas pipe running north-south along Steele Street/Vasquez Boulevard
- 6-inch gas pipe running east-west along 46th Avenue from Madison Street to Garfield Street
- Two 6-inch gas pipes running north-south along Dahlia Street
- 6-inch gas pipe running north-south along Holly Street
- 6-inch petroleum pipe running east-west along the DRIR west of Quebec Street

- 10-inch petroleum pipe running east-west along the DRIR west of Quebec Street
- 8-inch petroleum pipe running north-south along Central Park Boulevard
- Two 6-inch petroleum pipes running north-south along Central Park Boulevard
- 10-inch petroleum pipe running east-west south of I-70 from west of Central Park Boulevard to Havana Street
- 16-inch gas pipe running north-south along Peoria Street
- 6-inch gas pipe running east-west south of I-70 from I-225 to Chambers Road
- 20-inch gas pipe running north-south west of Chambers Road
- 6-inch gas pipe running north-south west of Chambers Road
- 6-inch petroleum pipe running north-south west of Airport Boulevard
- 10-inch jet fuel pipe running north-south west of Airport Boulevard
- 22-inch petroleum pipe running north-south west of Airport Boulevard

In addition to the major pipelines, there are many smaller lines that cross and run parallel to the highway, arterials, collector roads, and local streets. All major and minor pipelines are underground.

5.19.4 How do the project alternatives potentially affect utilities?

Based on the definitions and assumptions described previously, each potential utility conflict was evaluated to determine if the effect on the utility will require an adjustment or a relocation. If the conflict was determined to require an adjustment, it was considered a minor impact. If the conflict was determined to require a relocation to a major utility, as defined in the above section, then it was considered a major impact. A qualitative comparison between the alternatives analyzes major impacts only (as detailed in the above section).

Within the Brighton Boulevard to Colorado Boulevard section, the No-Action Alternative and Revised Viaduct Alternative are anticipated to have fewer utility relocations (and more utility adjustments) as compared to the Partial Cover Lowered Alternative. Since the Partial Cover Lowered Alternative will require extensive excavation from Brighton Boulevard to Colorado Boulevard, all the existing utilities crossing I-70 within this section will need to be relocated. Because utility relocations tend to cost significantly more than utility adjustments, the Partial Cover Lowered Alternative will have substantially higher utility-related costs than the Revised Viaduct Alternative and the No-Action Alternative. From Colorado Boulevard to Tower Road, the utility conflicts are the same for the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. However, from Quebec Street to Tower Road, the Managed Lanes Option increases utility impacts in locations with managed lanes direct connections.

The alternatives are broken out into the following subsections: No-Action Alternative, Revised Viaduct Alternative, Partial Cover Lowered Alternative, Colorado Boulevard to Tower Road, and Managed Lanes Option. The No-Action Alternative, Revised Viaduct Alternative, and Partial Cover Lowered Alternative only document major impacts from Brighton Boulevard to Colorado Boulevard. As the name implies, the Colorado Boulevard to Tower Road section discusses all major impacts within that segment. The Managed Lanes Option subsection discusses the additional major impacts associated with the construction of the managed lanes direct connections.

No-Action Alternative

The No-Action Alternative has the fewest utility impacts of all the Build Alternatives. The minimal utility impacts are due to 46th Avenue remaining at existing grade and the viaduct being replaced from Brighton Boulevard to Colorado Boulevard. Most utilities cross under the viaduct and will need to be adjusted to match the new ramp and side street locations. There also will need to be relocations for any utilities that cross the north drainage outfall system. Additional utility relocations will be required for any utility within the footprint of a proposed viaduct pier.

The number and types of conflicts between the No-Action Alternative, North Option and No-Action Alternative, South Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options.

The following subsections explain the No-Action Alternative's potential impacts to the major utilities in the study area.

Water

- 12-inch and 20-inch pipes, respectively, running north-south along 44th Street in front of the Coliseum will require relocation because they cross the proposed outfall system
- 24-inch pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east bridge abutment for the I-70 structure over Brighton Boulevard
- 12-inch pipe running east-west along 46th Avenue from Milwaukee Street to Jackson Street will need to be relocated to avoid the proposed bridge piers

There are other major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be disrupted and adjusted, but the majority of pipelines should not need to be relocated.

Sanitary sewer

There are major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be adjusted where there are conflicts with bridge abutments or piers, but the majority of sewer lines should not need to be relocated.

Storm sewer

The No-Action Alternative will disrupt all the storm sewer systems within the study area. All the inlets and pipes along 46th Avenue will need to be reconstructed to match the new 46th Avenue location and grades. The existing drainage system for the viaduct will be removed during demolition of the existing viaduct and will need to be completely replaced for the new viaduct.

It should be noted that all proposed drainage systems will convey only drainage for the new infrastructure and will not offer relief from the existing offsite surface flooding and drainage issues in the study area. The No-Action Alternative includes a new drainage outfall for the improved bridge structure drainage conveyance.

Communications/fiber optics

- All the above-ground telephone and cable lines that cross I-70 will need to be relocated to accommodate the new viaduct structure, underground line relocation is anticipated to be minor
- One duct running east-west under 46th Avenue will need to be relocated to avoid the proposed series of bridge piers for the I-70 structure

Other existing fiber lines that cross and run parallel to the highway, arterials, collector roads, and local streets should not require major relocation due to the minimal excavation required.

Electric

All overhead electric lines that cross I-70 will need to be relocated to accommodate the new viaduct structure. Although there may be sufficient vertical clearance, relocation of towers that are close to or within the footprint of the highway may be required. Underground line relocation is anticipated to be minor.

Natural gas, petroleum, and jet fuel

- 20-inch gas pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east bridge abutment for the I-70 structure over Brighton Boulevard

There are other major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be disrupted and adjusted, but the majority of pipelines should not need to be relocated.

Revised Viaduct Alternative

The Revised Viaduct Alternative impacts are estimated to be more than the No-Action Alternative impacts because the proposed highway typical section increases from six lanes to 10 lanes. Unlike the No-Action Alternative, the Revised Viaduct Alternative project limits do not end prior to Colorado Boulevard.

Similar to the No-Action Alternative, the Revised Viaduct Alternative impacts are likely to result in adjustments rather than relocations. There will be increased minor relocations for the Revised Viaduct Alternative due to the increased footprint and associated impacts to local streets, either south or north of the current I-70 highway. Only additional impacts beyond the No-Action Alternative are listed below. It is assumed that all of the impacts from the No-Action Alternative apply to the Revised Viaduct Alternative.

The number and types of conflicts between the Revised Viaduct Alternative, North Option and Revised Viaduct Alternative, South Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options. The following subsections explain the Revised Viaduct Alternative's potential impacts to the major utilities in the study area.

Water

Major impacts generally match the No-Action Alternative impacts.

Sanitary sewer

Major impacts generally match the No-Action Alternative impacts.

Storm sewer

Major impacts generally match the No-Action Alternative impacts. Similar to the No-Action Alternative, the proposed drainage systems will only convey drainage for the new infrastructure and will not offer relief from the existing offsite surface flooding and drainage issues in the study area. The Revised Viaduct Alternative also includes a new drainage outfall for the improved bridge structure drainage conveyance.

Communications/fiber optics

Major impacts generally match the No-Action Alternative impacts.

Electric

Major impacts generally match the No-Action Alternative impacts.

Natural gas, petroleum, and jet fuel

Major impacts generally match the No-Action Alternative impacts.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative has substantially greater impacts as compared to both the No-Action Alternative and the Revised Viaduct Alternative. The increased impacts are caused by the extensive excavation required for the lowered section. In addition to the excavation required, a storm outfall conveying offsite drainage is required from I-70 going west through the Coliseum property to the South Platte River. This outfall system adds more impacts relative to the other alternatives.

All of the utilities that cross the lowered section of I-70 require relocation. Utilities need to be moved to cross the proposed lowered section at proposed structure locations: either bridges, the highway cover, or on their own separate structure. Similar relocation considerations are necessary for utilities that run parallel to the highway within the construction limits.

The number and types of conflicts between the Partial Cover Lowered Alternative, Basic Option and the Partial Cover Lowered Alternative, Modified Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options. The following subsections explain the Partial Cover Lowered Alternative's potential impacts to the major utilities in the study area.

Water

- 24-inch pipe running north-south along Race Street from 49th Avenue to Brighton Boulevard will need to be relocated for construction of the onsite drainage outfall system
- 12-inch and 20-inch pipes, respectively, running north-south along 44th Street in front of the Coliseum will need to be relocated at their crossing with the offsite drainage outfall system

- 24-inch pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east I-70 bridge abutment as well as the crossing of the offsite drainage outfall system
- 12-inch main running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 36-inch conduit running north-south along Columbine Street will need to be relocated within the proposed Columbine Street bridge or separate structure to cross the lowered section
- 42-inch recycled line running north-south along Fillmore Street will need to be relocated to the proposed Fillmore Street bridge or separate structure to cross the lowered section
- 12-inch main running north-south along Milwaukee Street will need to be relocated to either the proposed Fillmore Street or Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 12-inch main running east-west along 46th Avenue from Milwaukee Street to Jackson Street will need to be relocated outside the lowered section
- 16-inch pipe running north-south east of Colorado Boulevard may need to be relocated within the proposed Colorado Boulevard bridge structure or lowered in place

There are many other minor pipelines that cross and/or parallel the highway. All lines that intersect with the proposed lowered section will need to be relocated and most other lines will need to be adjusted or relocated to better match the new side street and ramp locations.

Sanitary sewer

- 77-inch brick and 78-inch reinforced concrete pipe, respectively, running north-south in the Globeville Landing Park; these pipes should not need to be relocated, but the proposed drainage outfall will cross over them; They will need to be protected to prevent damage
- 48-inch brick pipe running north-south along York Street will need to be relocated to cross the lowered section

There are many other minor pipelines that cross and/or parallel the highway. All lines that intersect with the proposed lowered section will need to be relocated. Most other lines will need to be either adjusted or relocated to better match the new 46th Avenue, side streets, and ramp locations.

Storm sewer

The Partial Cover Lowered Alternative will disrupt all the storm sewer systems within the study area. All the inlets and pipes along 46th Avenue will need to be relocated to match the new 46th Avenue location and grades. The existing drainage system for the viaduct will be removed during demolition of the existing viaduct and a new system within the lowered section needs to be constructed. Two major existing system impacts are of concern and are listed below:

- 72-inch pipe running north-south along York Street will need to be relocated along the York Street bridge or on a separate structure to cross the lowered section
- 42-inch pipe running north-south along Colorado Boulevard will need to be reconstructed in conjunction with the storm drain ponds proposed for the two east quadrants of the interchange

The Partial Cover Lowered Alternative includes two drainage outfall systems. A system is proposed on the south side of I-70 to capture existing offsite drainage and convey it to the South Platte River. Another system is proposed on the north side of I-70 to convey onsite drainage from the lowered I-70 highway, running approximately one mile to the South Platte River. Due to its depth, the north outfall will be bored approximately 35-40 feet below current ground level.

Communications/fiber optics

- Two ducts running north-south along Brighton Boulevard will need to be relocated for the reconstruction of Brighton Boulevard
- Three ducts running north-south along the Union Pacific Railroad corridor will need to be relocated for construction of the Union Pacific Railroad bridge structure, the lowered section of I-70, 46th Avenue, and sidewalks

- Two ducts running along the southern edge of the existing I-70 right of way from Brighton Boulevard to Colorado Boulevard will need to be relocated outside of the lowered section
- Three ducts running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- One duct running north-south along Josephine Street will need to be relocated at either the Josephine Street or Columbine Street bridge structure to cross the lowered section
- One duct running north-south along Steele Street/Vasquez Boulevard will need to be relocated to the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- One duct running north-south along the BNSF Market Lead railroad will need to be relocated to one of the new Market Lead bridge structures to cross the lowered section
- One duct west and two ducts east running north-south near Colorado Boulevard will require relocation to the Colorado Boulevard bridge structure to cross the lowered section

All the above- and below-ground telephone and cable lines that cross I-70 will need to be relocated to accommodate the lowered section.

Electric

All overhead and underground electric lines that cross I-70 will need to be relocated to accommodate the lowered section. Although there may be sufficient vertical clearance, relocation of five to seven transmission towers and four to five distribution poles that are close to or within the footprint of the highway may be required.

Many other overhead and underground distribution lines parallel the I-70 highway, arterials, collector roads, and local streets. It is anticipated that most of these lines will require relocation.

Natural gas, petroleum, and jet fuel

- 20-inch gas pipe running north-south along Brighton Boulevard will need to be relocated to make room for the east Brighton Boulevard bridge abutment and onsite outfall system

- 6-inch gas pipe running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 16-inch gas pipe running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 20-inch gas pipe running north-south along Steele Street/Vasquez Boulevard will need to be relocated within the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 10-inch gas pipe running north-south along Steele Street/Vasquez Boulevard will need to be relocated within the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 6-inch gas pipe running east-west along 46th Avenue from Madison Street to Garfield Street will possibly need relocation to accommodate the new 46th Avenue roadway section

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the lowered section and/or adjusted to better match new side street and ramp locations.

Colorado Boulevard to Tower Road

From Colorado Boulevard to Tower Road, the impacts for the Revised Viaduct Alternative and Partial Cover Lowered Alternative are the same. This segment does not apply to the No-Action Alternative, as the project limits for the No-Action Alternative end just prior to Colorado Boulevard.

The following subsections explain the potential impacts to the major utilities from Colorado Boulevard to Tower Road.

Water

- 12-inch pipe running north-south along Dahlia Street will need to be adjusted for the reconstruction of Dahlia Street
- 12-inch pipe running east-west along Stapleton Drive North and Stapleton Drive South from Glencoe Street to Oneida Street will need to be at least partially relocated to better match the new Stapleton Drive South alignment and grade

- 12-inch pipe running north-south along Holly Street will need to be relocated for the reconstruction of the roadway and I-70 bridge
- 12-inch and 24-inch pipes running north-south along Monaco Street will need to be adjusted for the reconstruction of Monaco Street
- 16-inch pipe running north-south along Havana Street will require relocation to accommodate the Havana Street reconstruction
- 24-inch pipe running north-south along Peoria Street will need to be adjusted for the reconstruction of Peoria Street
- 36-inch pipe running north-south across I-70 within the vicinity of Salem Street and Crown Boulevard will need to be relocated to avoid retaining walls proposed in this section

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the proposed highway footprint and/or adjusted to better match new side street and ramp locations.

Sanitary sewer

- 21-inch reinforced concrete pipe running north-south to the east of the Colorado Boulevard interchange may need to be adjusted or relocated for the I-70 construction
- 21-inch reinforced concrete pipe east of Colorado Boulevard running east-west along Stapleton Drive North to Dahlia Street will require relocation to move it out of the I-70 footprint
- 21-inch PVC pipe running east-west along Stapleton Drive South from Monaco Street to Oneida Street will require relocation due to conflict with proposed roadway retaining walls
- 18-inch PVC pipe running north at Oneida Street through the DRIR yard will require relocation due to conflicts with proposed bridge structures
- 24-inch reinforced concrete pipe and 39-inch (unknown) pipe running north-south along Sand Creek under I-70 will require relocation to avoid conflict with proposed bridge structures

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely be maintained or adjusted to better match new side street and ramp locations.

Storm sewer

- 120-inch pipe running north-south along Forest Street will need to be protected from proposed retaining walls crossing above it in this section
- 60-inch sewer pipe running north-south east of Grape Street will need to be partially relocated or protected to avoid retaining walls proposed in this section
- 48-inch pipe running north-south along Airlawn Road will require relocation to better match the proposed Stapleton Drive North alignment and profile
- 48-inch pipe running northeast crossing Quebec Street will require partial relocation due to Quebec Street reconstruction
- 42-inch pipe running east-west between I-225 and Chambers Road will need to be relocated to match the revised I-70 width

There are other minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the proposed highway footprint and/or adjusted to better match new side street and ramp locations.

Communications/fiber optics

- Two ducts running east-west along the south side of the existing I-70 will need to be relocated due to the widening in this section
- Two ducts running north-south along Havana Street will require relocation to better fit with the proposed Havana Street alignment and grade
- One duct running north-south west of Airport Boulevard may need to be relocated to avoid retaining walls proposed in this section

Other existing fiber optic lines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets may need adjustments due to the required improvements.

All the above-ground telephone and cable lines that share poles with electrical distribution lines and cross I-70 will

need to be relocated. Underground line relocation is anticipated to be minor with the exception of two locations:

- Two lines running north-south along Havana Street, one along the east side, the other along the west side will need to be relocated for the reconstruction of Havana Street

Electric

All overhead electric lines that cross I-70 will need to be relocated to accommodate the wider footprint. Although there may be sufficient vertical clearance, relocation of towers that are close to or within the footprint of the highway will be required. Generally, most underground line relocation is anticipated to be minor, with the exception of the following locations:

- One line running north-south along Havana Street requiring relocation for the reconstruction of Havana Street
- One line running north-south along Peoria Street requiring relocation for the reconstruction of Peoria Street

Natural gas, petroleum, and jet fuel

- 4-inch and 6-inch petroleum pipes running east-west along the DRIR west of Quebec Street will need to be relocated to avoid the proposed bridge abutments for I-70 and respective ramp structures over the railroad
- 10-inch petroleum pipe running east-west along the DRIR west of Quebec Street will need to be relocated to avoid the proposed bridge abutments for I-70 and respective ramp structures over the railroad
- 6-inch gas pipe running east-west south of I-70 from I-225 to Chambers Road may need to be relocated outside of the proposed I-70 footprint

There are other minor pipelines that cross and/or parallel the highway. These lines will most likely not be in conflict or require adjustment.

Managed Lanes Option

The Managed Lanes Option for the Build Alternatives has slightly greater utility impacts than the General-Purpose Lanes Option because it includes direct managed lane connection at the I-270, I-225, and Peña Boulevard interchanges with I-70. All the additional impacts occur east of Quebec Street. Managed lanes direct connections—

consisting of independent ramps, structures, and mainline realignments—result in a larger roadway footprint, so they introduce additional impacts.

The following subsections explain the Managed Lanes Option additional major potential impacts to the utilities in the study area, as compared to the overall Colorado Boulevard to Tower Road segment.

Water

The Managed Lanes Option has no additional major impacts.

Sanitary sewer

The Managed Lanes Option has no additional major impacts. There is one additional minor adjustment at the I-270 connection.

Storm sewer

The Managed Lanes Option has no additional major impacts.

Communications/fiber optics

The Managed Lanes Option has one additional major impact to the twin fiber trunk lines running east-west at I-270.

Electric

The Managed Lanes Option has no additional major impacts. There are two additional minor relocations of underground electric lines, one at I-225 and the other at Peña Boulevard.

Natural gas, petroleum, and jet fuel

The Managed Lanes Option has no additional major impacts.

5.19.5 How are the impacts from the project alternatives mitigated for the utilities?

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. With the Partial Cover Lowered Alternative, for example, it is necessary to relocate many of the utilities within the covered section or within bridge structures.

The following mitigation measures will be used to address impacts:

- Conduct early coordination with utility owners for designs and/or construction that can be advanced to take place prior to design-build construction.
- Schedule service disruptions to coincide with periods of lower demand. This will be especially critical for large water conduit lines.
- 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 for any of the alternatives will be temporary. During construction, the affected utilities will be protected, temporarily interrupted, and/or relocated, as necessary. At completion of construction, all remaining impacted utilities will be returned to an upgraded condition of compliance with current codes and standards with renewed serviceability life. This work will result in an overall improvement to the community's permanent utility infrastructure. **Exhibit 5.19-2** shows a summary of the impacts and mitigations related to utilities.

Exhibit 5.19-2 Summary of Utilities Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• All utility types will be affected to some extent • Construction impacts to utilities, mainly adjustments, will be limited to the section of the existing viaduct, realigned ramps, and drainage outfall	• 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
Revised Viaduct Alternative	• All utility types will be affected to some extent • Construction impacts to utilities are estimated to be greater than the No-Action Alternative due to wider construction impacts and reconfiguration of ramps	
Partial Cover Lowered Alternative	• All utility types will be affected to some extent • Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width • Offsite stormwater drainage system south of I-70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	
Managed Lanes Option (option to Build Alternatives)	• Additional temporary impacts to Build Alternatives only at locations of direct connections to I-270, I-225, and Peña Boulevard	

5.20 Human Health Conditions

This section discusses what the existing concerns are about health issues in the project area (based on public comment), and relates these concerns to the analyses of air quality, noise, and hazardous materials performed for this project.

Additionally, at the request of the public commenters, it summarizes human health studies performed in the area in recent years by other parties that are not part of this project specifically.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS.

This Chapter is a new inclusion for the Final EIS and was not included in the Supplemental Draft EIS. Previously, the discussion summarizing health studies was included in Section 5.2, Social and Economic Conditions.

5.20.1 Why discuss human health conditions?

Human health conditions are important in the project area. Several of the analyses in the Final EIS are designed to determine if project activities create new health hazards that are not currently present, worsen existing health conditions, or contribute to a cumulative adverse impact to the health of residents or workers in the area.

During project scoping meetings for the proposed improvements to I-70, the public expressed concerns about various health issues within and near the project study area that they felt should be evaluated. In addition, the proximity of Swansea Elementary School to I-70 in the project area raised concerns about potential health impacts to children attending the school.

Following the release of the Draft EIS in 2008 and the Supplemental Draft EIS in 2014, many comments were received on health and how it relates to the project.

5.20.2 How are project impacts, benefits, and mitigation measures related to human health evaluated in this document?

The concerns to human health included in this section are organized by topics identified during project scoping and from public comments received on the 2008 Draft EIS and the 2014 Supplemental Draft EIS. Specific resource sections in this Final EIS listed below were reviewed to determine if there would be associated potential impacts to human health. The following discussions are not listed in order of importance, but in the order in which they appear in this Final EIS:

- Transportation facilities and choice
- Air quality
- Noise
- Water quality
- Hazardous materials

A full discussion of project impacts for each of the resources listed above can be found in Chapter 4 and Section 5.2 for transportation facilities and choice, Section 5.10 for air quality, Section 5.12 for noise, Section 5.16 for water quality, and Section 5.18 for hazardous materials. In the following subsections, a short summary of possible outcomes is included.

Each of these resources also includes a discussion of the benefits related to health and the highway cover included in the identified Preferred Alternative, the Partial Cover Lowered Alternative with Managed Lanes Option. Construction impacts and mitigations also are discussed.

Transportation facilities and choice

As noted in Chapter 4, Transportation Impacts and Mitigation Measures, of this document, pedestrian and bicycle facility improvements associated with the Build Alternatives will enhance the safety of pedestrians and bicyclists within the study area. Intersections that are being improved will have countdown lights installed at signalized crosswalks to improve pedestrian safety. More opportunities to enhance the pedestrian environment include sidewalk connectivity, ADA improvements, greater sidewalk width, and improved lighting. These enhancements will potentially benefit human health by improving multi-modal connectivity in the project area. In addition, the Build Alternatives will

enhance the safety of the motorists using the facilities by utilizing the current highway design standards (such as shoulder widths, lane widths, grades, and curves).

Benefits of the highway cover (Preferred Alternative only)

The proposed landscaped highway cover between Columbine Street and Clayton Street that is included as part of the Partial Cover Lowered Alternative will provide multiple benefits to human health in the Elyria and Swansea neighborhood. The proposed cover will reconnect the north and south sides of the neighborhood by providing a safe connection for pedestrians and bicyclists across I-70, allowing them to cross anywhere along the cover area and thereby improving non-motorized connectivity. The cover also will provide a place for activity and exercise. The Partial Cover Lowered Alternative also maintains the existing local north-south street network and it provides a greater sense of neighborhood cohesion by removing the dominant visual barrier created by the highway structure in this neighborhood.

Construction Mitigation

As discussed in Section 5.2, Social and Economic Conditions, temporary construction impacts associated with project alternatives include construction-related travel disruptions (such as road closures, detours, and access and circulation disruptions), RTD service disruptions and/or delays, and traffic-related travel disruptions. These impacts will cause temporary quality-of-life disruptions to households near construction areas. People who work near construction areas or use affected roadways to travel to other activities (for example, health care) also will experience some temporary disruption during construction.

Proposed mitigation measures for these disruptions include:

- Provide safe and efficient connections through the neighborhood during construction for all modes of transportation, including bicycles and pedestrians.
- Coordinate with local municipal officials during construction to minimize effects on emergency service providers and response times.
- Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes.

Air quality

As summarized in Section 5.10, Air Quality, the air quality analysis follows guidelines established by EPA for conducting analysis of air quality impacts for project alternatives. With regard to carbon monoxide and PM_{10} for all project alternatives, the project is not expected to cause any new violations of any standard, increase frequency or severity of any existing violation, or delay timely attainment of the NAAQS or required interim milestones. The modeled values are below the NAAQS and demonstrate that there is no exceedance or impact from the project based on EPA's health-based standards for these pollutants.

Results of the carbon monoxide hotspot analysis indicate that both the 1-hour and 8-hour concentrations at the worst-case location, Colorado Boulevard, are below the NAAQS. Results of PM_{10} analysis indicate 24-hour PM_{10} concentrations do not exceed the NAAQS for any of the project alternatives, including the identified Preferred Alternative, the Partial Cover Lowered Alternative with Managed Lanes Option.

A comparison of air quality conditions for all pollutants demonstrates the effects of minor differences in traffic volume and roadway configuration between the alternatives; air pollution impacts for all design alternatives are similar.

Several factors are evident at the conclusion of the analysis:

- Air quality conditions under the No-Action Alternative are similar to all alternatives analyzed.
- Traffic volume and traffic speed are the primary drivers of project-level air quality impacts.
- Fugitive dust emissions from road sanding, as well as road dust and brake and tire wear, are the primary indicators of future particulate matter emissions.

Motor vehicle emissions from the implementation of the No-Action Alternative and the Build Alternatives will not cause or contribute to any new localized carbon monoxide or particulate matter violations, nor will they increase the frequency or severity of any existing violations based on the hotspot analysis. Therefore, no specific mitigation measures are necessary for the project to proceed. Although mitigation is not required, one or more of the potential emission reduction measures described below will be utilized to minimize impacts to air quality. Each of these measures will result in a benefit to human health.

- Any transportation-related measures or voluntary baseline emission reduction strategies already included as part of carbon monoxide or particulate matter maintenance plans that relate to I-70 East, such as street sanding/sweeping activities, will continue to be implemented.
- During construction, dust emissions should be minimized by following BMPs to control fugitive dust (see **Exhibit 5.10-26** for a summary of these activities and practices).
- Ongoing and planned strategies to reduce precursor emissions of volatile organic compounds and nitrogen oxides in the Denver/North Front Range ozone nonattainment area—including multi-modal transportation options, rideshare programs, vehicle emissions testing, and intersection improvements—will be implemented. Likewise, several strategies have been, and continue to be, implemented to maintain carbon monoxide and PM_{10} attainment. For details of these strategies to manage criteria pollutant emissions, see Attachment J, *Air Quality Technical Report*.
- Construction-related fugitive particle emissions will be minimized by implementing dust control practices in accordance with requirements in CDPHE Air Quality Control Commission Regulation No. 1, Emission Control for Particulate Matter, Smoke, Carbon Monoxide, and Sulfur Oxides.

In summary, the NAAQS limits set by the EPA protect human health. The modeled values for the I-70 East project are below the NAAQS and demonstrate that there is no exceedance or impact from the project based on the EPA's health-based standards for these pollutants. Therefore, there are no projected impacts from the project related to NAAQS.

In addition, CDOT conducted a mobile source air toxic emissions analysis for the area affected by the project, and the analysis estimates that emissions in the project design year will be roughly 80 percent lower than current emissions. Additionally, the emissions for all of the Build Alternatives vary from 2.1 percent to 3.8 percent higher than the No-Action Alternative.

Benefits of the highway cover (Preferred Alternative only)

The cover included with the Partial Cover Lowered Alternative is an emissions reduction strategy for the area around Swansea Elementary School. The cover will redirect PM_{10}, carbon monoxide, and other emissions away from the school and the surrounding neighborhood. It also includes trees as an amenity on top of the highway cover, since trees provide incidental benefits to air quality.

Construction Mitigation

Dust during construction could be particularly problematic for residents in the Elyria and Swansea Neighborhood who do not have air conditioners and ventilate their homes by opening windows. For households using window ventilation, construction dust could be an issue on windy days. Dust suppression measures (for example, stabilizing and covering loads of soil and debris during transport and storage, or stabilizing and revegetating exposed areas after construction) will be implemented to control dust impacts.

To mitigate additional dust concerns during construction for residents close to the highway, between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard, CDOT will provide:

- Two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs
- Interior storm windows

Also, an Air Quality Monitoring, Maintenance, and Mitigation Plan will be prepared prior to construction and will include continuous PM_{10} monitoring during construction, as described in Section 5.10, Air Quality.

Noise

Section 5.12, Noise, of this chapter identifies existing noise conditions and potential noise impacts from the proposed improvements to I-70. Results of the analysis show that all of the alternatives will cause noise to exceed the NAC of 66 dBA at various locations, including Swansea Elementary School. The section includes a discussion on where noise mitigation is needed, what that noise mitigation will look like, and how much noise reduction the mitigation will achieve. **Exhibit 5.20-1** summarizes by alternative the number of noise receptors that exceed the NAC threshold both with and without mitigation.

Exhibit 5.20-1 Noise Receptors Exceeding NAC Threshold by Alternative

Alternative/Option	Number of Noise Receptors	Number of Noise Receptors that Exceed NAC Threshold		Number of Noise Receptors with a Substantial Noise Increase	
		Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Existing	940	91		N/A	
No-Action Alternative, North Option	890	362	59	40	0
No-Action Alternative, South Option	857	360	54	34	0
Revised Viaduct Alternative, North Option	896	453	114	97	0
Revised Viaduct Alternative, South Option	873	432	83	68	2
Partial Cover Lowered Alternative	873	155	108	11	0

As discussed in Section 5.12, Noise, noise walls will be constructed, where feasible and reasonable, to mitigate the future traffic noise from the reconstructed I-70. In several locations, the proposed noise walls will reduce the number of noise receptors below existing conditions, resulting in a benefit to human health.

Benefits of the highway cover (Preferred Alternative only)

The proposed landscaped highway cover between Columbine Street and Clayton Street that is included as part of the Partial Cover Lowered Alternative helps reduce noise pollution at Swansea Elementary School and in the surrounding neighborhood. The highway cover is a noise barrier that will assist in reducing the number of noise receptors below existing conditions, resulting in a benefit to human health.

Construction Mitigation

Construction noise will present short-term effects to those receptors located along the corridor and along designated construction access routes. 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.

Ambient noise from construction is a concern among the residents around the construction zone—specifically in the Elyria and Swansea Neighborhood, since many residents do not have air conditioners and ventilate their homes by opening windows. As previously described under air quality

for construction impacts related to dust, to mitigate noise concerns during construction for residents close to the highway, between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard, CDOT will provide:

- Two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs
- Interior storm windows

CDOT also will comply with Denver regulations on construction noise, as discussed in Section 5.12, Noise.

Pile driving and demolition are expected to be the loudest construction operations. Piles will be required at most major bridge installations. Bridge and road demolition also will be required at many locations.

Measures will be taken to minimize noise during construction. Mitigation actions specific to construction noise impacts are summarized in Section 5.12 and include limiting construction noise during school hours in the vicinity of Swansea Elementary School and idling equipment motors when the equipment is not in use.

Water quality

As discussed in Section 5.16, Water Quality, both the South Platte River and Sand Creek cross the I-70 corridor and are listed on the Section 303(d) list for impaired waters. The primary reason both streams are listed for impairment is most likely due to polluted urban runoff in the highly urbanized watershed in which they are located. CDOT cannot prevent individuals from having contact with these impaired water bodies; however, efforts by CDOT to prevent polluting factors from impacting water quality in the study area will benefit human health.

The following is a list of polluting factors from roadway runoff during storm events and the reason why they are analyzed:

- Lead, copper, and zinc are a concern because they dissolve in water and can have toxic effects when they build up in water plants and aquatic life.
- Total Suspended Solids is a concern because it can increase the murkiness of water; as the floating particles in murky water settle, this can lead to loss of aquatic habitat and channel instability.

- Phosphorus is a concern because it can increase the production of algae in water, which can reduce oxygen levels in streams.

As noted in Section 5.16, Water Quality, runoff from I-70 will be captured and conveyed in a storm drain system that discharges to the South Platte River. Prior to discharging to the receiving streams, the onsite drainage system will discharge to a water quality pond to provide water quality treatment. The outlet of the pond is smaller than the inlet of the pond, so runoff is temporarily stored in the pond and releases over a period of a few days. During this time (CDOT requires a minimum drain time of 40 hours), sediment settles out of the runoff and is stored in the pond; then, the runoff, with reduced sediments, discharges to the receiving stream.

Additional permanent BMPs discussed in Section 5.16 also will be implemented to remove particulate pollutants from stormwater. This will provide further benefits to human health.

Common contaminants

Common contaminants identified in soil and/or groundwater include:

- Petroleum products (i.e., fuels, oils)
- Chlorinated solvents
- Metals
- Asbestos

Construction Mitigation

During construction, as soils are disturbed, storm runoff may create erosion and degradation of water quality if proper BMPs are not employed. Alternative implementation will be done in accordance with the programs established under CDOT's MS4 permit. Site-specific engineering design studies will be performed during final design, and care will be exercised during construction to prevent problems of stability and erosion during and after construction. To mitigate these effects, BMPs for erosion and sediment control, dust control, stormwater control, and expansive soils will be implemented during construction. BMPs for erosion and blowing dust during construction include the use of silt fences, erosion control blankets, sediment traps, sediment basins, soil stockpile management, temporary diversion structures, and spill prevention and control measures.

After construction, other BMPs will be followed for permanent erosion control. These include regrading as necessary, seeding and revegetating soils and slopes, mulch protection for new plantings, and stormwater control channels.

Hazardous materials

During construction activities, hazardous materials may impact the health and safety of workers, as well as environmental resources and community residents located

within the project corridor and surrounding area. Also, encountering hazardous materials during construction can impact the cost of construction, as contaminated media generated during construction must be managed in accordance with federal and state regulations.

Section 5.18, Hazardous Materials, of this chapter provides a summary of the environmental records search conducted on the project study area. As noted in Section 5.18, the likelihood of impacting hazardous materials is dependent on the number of hazardous materials sites encountered during construction. In addition, the location and amount of contamination remaining at the site also will dictate impacts. The Partial Cover Lowered Alternative could affect up to 25 known hazardous materials sites since it will require a large amount of soil displacement to lower the highway below grade. This soil displacement has raised concerns from local residents since several extensive soil remediation projects have occurred in the project corridor.

Any contamination encountered during the construction of the project will be cleaned up in compliance with applicable state and federal regulations, which will benefit human health by removing contaminated soils. CDOT also is working with the EPA and will collect representative soil samples of recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities; this will include identifying three or four properties from the EPA's database and contacting those property owners to ensure they will participate in this activity. Specific mitigation measures related to hazardous materials are detailed in Section 5.18 of this chapter.

5.20.3 What conclusions can be drawn about potential human health impacts?

As previously discussed, several impact categories could result in negative effects to human health in the project study area. However, with implementation of BMPs and mitigation measures, these potential negative effects will be avoided or minimized. BMPs and mitigation measures are listed in Chapter 9, Preferred Alternative Mitigation Commitments. **Exhibit 5.20-2** summarizes the impacts and mitigations highlighted in this section.

Exhibit 5.20-2 Summary of Impacts and Mitigations

Resource	Impacts and/or Benefits and Mitigations
Transportation facilities and choices	• Pedestrian and bicycle facility improvements associated with the Build Alternatives will enhance the safety of pedestrians and bicyclists within the study area • The proposed cover will reconnect the north and south sides of the neighborhood by providing a safe connection for pedestrians and bicyclists across I-70, the cover also will provide a place for activity and exercise
Air quality	• Air quality conditions under the No-Action Alternative are similar to all alternatives analyzed • Motor vehicle emissions from the implementation of the No-Action Alternative and the Build Alternatives will not cause or contribute to any new localized carbon monoxide or particulate matter violations, nor will they increase the frequency or severity of any existing violations based on the hotspot analysis • Modeled values for the I-70 East project are below the NAAQS and demonstrate that there is no exceedance or impact from the project based on EPA's health-based standards for these pollutants • The cover included with the Preferred Alternative is an emissions reduction strategy for the area around Swansea Elementary School. The cover will redirect PM_{10}, carbon monoxide, and other emissions away from that stretch of highway and the surrounding neighborhood
Noise	• Noise walls will be constructed, where feasible and reasonable, to mitigate the future traffic noise from the reconstructed I-70 • In several locations, the proposed noise walls will reduce the number of noise receptors below existing conditions, resulting in a benefit to human health • The highway cover included with the Preferred Alternative is a noise barrier that will assist in reducing the number of noise receptors below existing conditions, resulting in a benefit to human health
Water quality	• Prior to discharging to the receiving streams, the onsite drainage system will discharge to a water quality pond to provide water quality treatment • Additional permanent BMPs discussed in Section 5.16 also will be implemented to remove particulate pollutants from stormwater which will provide further benefits to human health
Hazardous materials	• Any contamination encountered during the construction of the project will be cleaned up in compliance with applicable state and federal regulations, which will benefit human health by removing contaminated soils • Collect representative soil samples of three or four recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities

Additionally, the landscaped cover over the highway in the identified Preferred Alternative will potentially provide improved health outcomes. When combined with project BMPs and mitigation measures, opportunities to improve existing human health conditions may be even greater.

5.20.4 What additional studies were conducted by others on human health conditions within or near the study area?

In addition to the project impacts, benefits, and mitigation measures (discussed in the previous subsection) that could have an impact on human health due to the project alternatives, a review of recent studies of human health conditions within and near the project area was conducted. Studies conducted by major agencies responsible for public health—including CDPHE, the Denver Department of Environmental Health, and the USDA—were identified that included information about the study corridor.

Although not a study, the EPA announced in December 2014 that residential soil sampling and cleanup is complete at the Vasquez Boulevard and I-70 Superfund site. However, EPA was not able to gain access from the owners of a few properties. Reviewing these properties will be part of the state of Colorado's operation and maintenance responsibilities and these properties will be reviewed as part of future Vasquez Boulevard and I-70 five-year reviews.

Some of the reports summarized below have been brought to the attention of the project team by members of the public. The listing of these studies does not infer any endorsement, nor does it include any conclusions regarding the accuracy or applicability of these studies. Six relevant studies were identified to review:

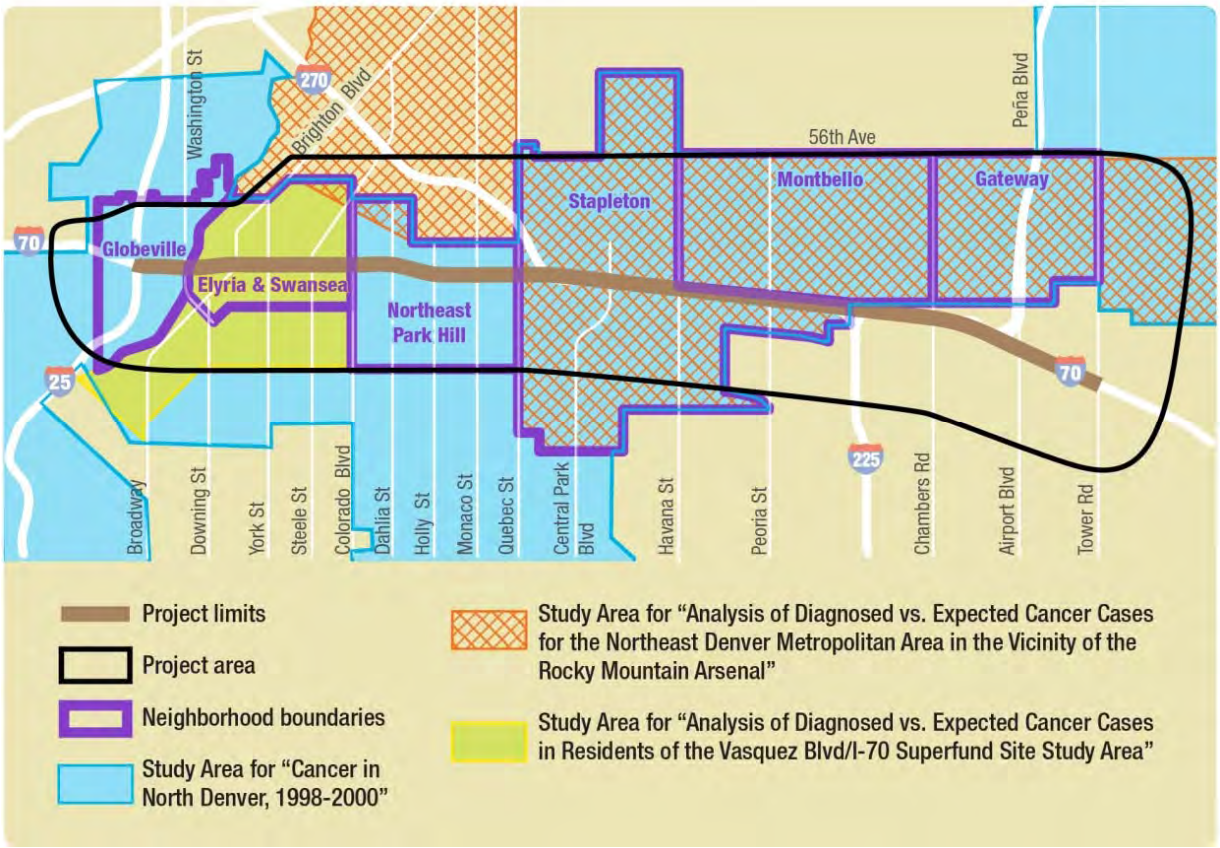
- Health Impact Assessment: *How Neighborhood Planning Affects Health in Globeville and Elyria Swansea* (Denver, 2014)
- *Good Neighbor Project* (Denver Department of Environmental Health, 2007)
- CDPHE cancer study: Urban Air Toxics Concentration in Denver, May 2002 through April 2003 (CDPHE, 2006)
- CDPHE cancer study: *Analysis of Diagnosed Versus Expected Cancer Cases in Residents of the Vasquez*

Boulevard/I-70 Superfund Site Study Area (CDPHE, 2003a)

- CDPHE cancer study: *Cancer in North Denver: 1998-2000* (CDPHE, 2002)
- CDPHE cancer study: *Analysis of Diagnosed Versus Expected Cancer Cases for the Northeast Denver Metropolitan Area in the Vicinity of the Rocky Mountain Arsenal, 1979-1996 and 1997-2000* (CDPHE, 2003a and 2003b)

A summary of each study is discussed below and the study areas for three of these studies are shown in **Exhibit 5.20-3**. Boundaries are not shown for the other three studies as they are too small or are consistent with neighborhood boundaries.

Exhibit 5.20-3 Areas of Analysis for Studies Conducted by Others Within or Near the Study Area



Cancer occurrence studies were conducted by the CDPHE in response to concerns about exposure to environmental contaminants associated with hazardous waste sites located within and near the project study area. The studies provide an index of cancer occurrence in some of the communities in

and near the study area. Based on CDPHE's cancer study results, the occurrence of certain types of cancer is higher in the EIS study area than in the Denver MSA as a whole. CDPHE noted that other factors—such as exposure to carcinogens in the occupational, indoor, and ambient air—and behavioral risk factors—such as smoking, dietary habits, and alcohol consumption—also may contribute to the overall individual and population risk (CDPHE 2002, 2003a, 2003b, 2003c). The most recent update of this information does not indicate a change in the previously reported trends (CDPHE, 2010).

This discussion is not a comprehensive assessment of the current health status in the study area. The studies summarized here do not provide indicators of human health as it relates to the proposed project and are being provided only to establish that many studies of this area have been done over the past 15 to 35 years.

How Neighborhood Planning Affects Health in Globeville and Elyria Swansea

The Health Impact Assessment (HIA), *How Neighborhood Planning Affects Health in Globeville and Elyria Swansea* was completed in September 2014 by the Denver Department of Environmental Health. The HIA focuses solely on the Globeville and Elyria Swansea Neighborhood Plans and does not examine specific development projects, including I-70 East. This HIA is described as a "process to incorporate health considerations into a plan, project, or policy." Through resident participation in the neighborhood planning and HIA processes, five major health factors were identified and analyzed in the HIA. These included:

- Environmental quality
- Connectivity and mobility
- Access to goods and services
- Community safety
- Mental wellbeing

Key findings of the HIA reflect the public's concerns for the population groups and resources identified in Sections 5.2.4 and 5.2.5 of the Final EIS, and the findings of studies previously discussed in this section. The key findings of the HIA are discussed in the following subsections.

Environmental quality

- Highway traffic is the main source of air pollution in the communities
- There are noticeable spikes in poor air quality depending on location, time of day, and weather. Annual average air pollution is not higher than in other areas of Denver.
- Odors emitted from industrial operations sometimes cause short-term health effects, such as watering eyes or throat irritation.
- Highway traffic, freight trains, and industrial plants generate noise at levels that sometimes exceed recommended federal thresholds.
- Two large soil cleanup projects have mostly been completed over the last several decades, yet residents continue to express concerns about hazardous materials in the soil and a distrust of government intentions in the cleanup efforts.
- A lack of trees and green infrastructure in the Globeville and Elyria and Swansea neighborhoods does not help to improve air and water quality.

Connectivity and mobility

- Physical barriers, such as railroad tracks and disconnected roads, isolate residents and limit opportunities for physical activity, including walking.
- Residents are concerned with the number of freight trucks on residential streets.
- Many streets lack sidewalks, bus stops lack benches or safe places to stand, and there is minimal bicycle infrastructure.
- Many residents do not own a vehicle and therefore, must rely on public transportation. Pedestrian, bicycle, and bus connections to four new transit rail stations in the neighborhoods are unclear to residents.

Access to goods and services

- There is no grocery store in the community and convenience stores do not offer affordable, nutritious, or fresh produce.
- Residents must travel outside of the neighborhoods since there are few retail stores or local services.

- Residents reported concerns about safety and amenities in the neighborhoods. Residents also identified a lack of programming at neighborhood recreation centers that meets their needs.

Community safety

- Vehicle crashes at some intersections has raised concerns about unsafe conditions for pedestrians and bicyclists.
- Resident perception of crime is higher than reported crime rates. There is some concern that crime may go unreported due to resident unwillingness to interact with law enforcement.
- Street lighting is inadequate and less than in other Denver neighborhoods.
- Residents raised safety concerns due to the presence of graffiti, illegal activities, and stray animals.

Mental wellbeing

- Odor and noise impacts add stress to residents in their lives.
- Trains cause lengthy delays for vehicles and pedestrians.
- Concerns about safety limit resident use of parks and the South Platte River Greenway trail.
- Resident perception of and fear of pollution continue despite the substantial environmental cleanup activities. Lack of outreach in Spanish regarding this issue has led to continued misperceptions among residents who only speak Spanish.
- Unknown impacts associated with the construction activities of the I-70 project and other large redevelopment projects in the neighborhoods add to residents' stress.

Good Neighbor Project

Going One Step Beyond in North Denver: A Neighborhood Scale Air Toxics Assessment (Denver Department of Environmental Health, 2007), otherwise known as the Good Neighbor Project, was a detailed air pollution modeling assessment that evaluated known sources of emissions in the Globeville and Elyria and Swansea neighborhoods, as well as in Commerce City. It built upon previous

assessments conducted by the Denver Department of Environmental Health.

The primary goal of the Good Neighbor Project was to evaluate concentration gradients of air pollutants near major roadways like I-70, I-25, I-270, and Colorado Boulevard. Earlier Denver Department of Environmental Health assessments apportioned county-level emissions to census block groups using a variety of surrogate data, such as VMT and population density. Earlier assessments tended to spread the emissions across the entire block group, whereas the Good Neighbor Project allocated on-road mobile source emissions to actual roadways.

Key findings of this study include:

- Modeled mean annual concentrations from highways were well below estimated Integrated Risk Information System (IRIS) cancer (1/100,000) and non-cancer risk values for all six MSAT;
- Modeled concentrations dropped off sharply within 150 feet of roadways;
- Modeled MSAT concentrations tended to be higher along highways near the Denver Central Business District (CBD) than along the I-70 East corridor (in some cases, they were higher within the CBD itself, as were the monitored values); and
- Dispersion model results were generally lower than monitored concentrations but within a factor of two at all locations.

These findings match with air pollution monitoring data collected along freeways in California (Zhu et al, 2002). The Good Neighbor Project study provided a much improved level of detail over earlier Denver Department of Environmental Health assessments, though it required a significantly higher level of resources across a limited geographic area.

CDPHE cancer studies: Urban Air Toxics Concentration in Denver, May 2002 through April 2003

In this 2006 report, CDPHE discusses occurrences of cancer, from May 2002 to April 2003, and airborne pollutants exhibited at air monitoring stations near I-70 East (CDPHE, 2006). Although none of the pollutants or the pollutant concentrations were unique to Denver, total cancer risks were found to range from 100 to 200 excess cancers per one

million people. This range slightly exceeds the EPA's proposed "acceptable" health risk for carcinogens which is one in one million to 100 per million. The report also concluded that there were little to no known non-cancer health risks associated with the pollutants exhibited in the area.

CDPHE cancer studies: Analysis of Diagnosed Versus Expected Cancer Cases in Residents of the Vasquez Boulevard/I-70 Superfund Site Study Area

The *Analysis of Diagnosed Versus Expected Cancer Cases in Residents of the Vasquez Boulevard/I-70 Superfund Site Study Area* (CDPHE, 2003a) investigated cancer occurrence for neighborhoods in the Vasquez Boulevard/I-70 Superfund Site in north-central Denver. Previous studies conducted by the U.S. EPA have indicated high levels of arsenic and lead in soil at some homes in the Elyria and Swansea, Clayton, Cole, and southwest Globeville neighborhoods. The study was conducted at the request of citizen representatives of Colorado People's Environmental and Economic Network and the Cole, Elyria and Swansea, and Clayton Neighborhood Coalition to conduct a review of cancer rates in their community. The study area for this report is shown in **Exhibit 5.20-3**.

CDPHE found an elevated incidence of cancer in the Superfund Site Study Area. Additional statistical analyses did not detect an association between the occurrence of lung cancer and high levels of arsenic in the soil of homes where individuals with lung cancer lived. CDPHE notes that many or most of the lung and laryngeal cancers reported from these neighborhoods are likely related to smoking.

CDPHE cancer studies: Cancer in North Denver: 1998-2000

The primary focus of *Cancer in North Denver: 1998-2000* (CDPHE, 2002) was to analyze cancer rates in North Denver compared to those in the Denver MSA, and to identify behavioral and other risk factors that could be contributing to observed elevated rates. The study area for this report is shown in **Exhibit 5.20-3**.

The principal findings of the comparisons between North Denver and the remainder of the Denver MSA include:

- For all cancer types combined, cancer rates in North Denver were statistically higher for men of all racial/ethnic backgrounds combined, and for non-

Latino White men and women considered as subgroups.

- For some specific cancer types, cancer rates in North Denver were statistically higher for men and women of all racial/ethnic backgrounds combined, and for non-Latino White men and women considered as subgroups, but not for Latino men or women, nor for non-Latino African-American men or women.
- Cancer rates in North Denver were not statistically higher for Latino or non-Latino African-American men and women, either considering all cancer types together or for individual types of cancer.

CDPHE cancer studies: Analysis of Diagnosed Versus Expected Cancer Cases for the Northeast Denver Metropolitan Area in the Vicinity of the Rocky Mountain Arsenal, 1979-1996 and 1997-2000

These two reports (CDPHE, 2003a and 2003b), covering the periods 1979 through 1996 and 1997 through 2000, report the initial and follow-up findings of previous cancer surveillance for communities in the northeast Denver metropolitan area—specifically, the area surrounding the Rocky Mountain Arsenal National Wildlife Refuge in Adams County (north of 56th Avenue), and the Stapleton and Montbello neighborhoods. Both reports have the same study area shown in **Exhibit 5.20-3**.

As indicated in both the 1979 to 1996 and 1997 to 2000 analyses, when all cancers were combined together within a study area, there were not statistically significant differences between the study area populations and the Denver metropolitan area population. However, when the data were disaggregated and examined to show different types of cancer, statistically significant differences between the populations of each study area and the Denver metropolitan area population were identified.

5.20.5 What additional studies conducted by others on human health conditions outside of the study area were reviewed?

As previously noted, air quality in the project area or the Denver region is not anticipated to worsen over existing conditions. However, public concern regarding air quality continues. An additional review of literature on air pollution health effects was conducted, including the following reports:

- Health Risk Contributions from Highway Projects
- Status of Research on Potential Mitigation Concepts to Reduce Exposure to Nearby Traffic Pollution (Air Resources Board of California Environmental Protection, 2012)
- Air Quality in Southern California—Time for a Paradigm Shift (Winer, 2004)
- Near-Roadway Air Pollution and Coronary Heart Disease: Burden of Disease and Potential Impact of a Greenhouse Gas Reduction Strategy in Southern California (Environmental Health Perspectives, July 2015)
- Associations of Mortality with Long-Term Exposures to Fine and Ultrafine Particles, Species and Sources: Results from the California Teachers Study Cohort (Environmental Health Perspectives, June 2015)

The last four reports were cited by members of the public, identifying correlations between human health effects to roadway proximity. FHWA's listing of the last four studies does not infer any endorsement, nor does it include any conclusions regarding the accuracy or applicability of these studies. The following are summaries of the additional literature review.

Health Risk Contributions from Highway Projects

At the request of EPA, FHWA conducted a review of four separate health risk assessments from around the country for the South Mountain Freeway (Loop 202) EIS in Arizona. FHWA's review focused on the methodologies used in the studies and the findings related to incremental health risks. All four studies reported a very low risk of estimated incremental cancer risk from vehicle traffic at each studies' worst-case location. The following is the conclusion from the South Mountain Freeway EIS review of these reports.

> "To help put these low health risks from roadway emissions into perspective, FHWA compared them with health risks from traffic fatalities. In 2010, there were 2.47 million deaths in the United States, and 32,728 of these were due to traffic fatalities, meaning that the risk of dying in a traffic accident in 2010 was 0.0106 percent. Converted to terms of risk per million people, this represents a risk of 106 in a million per year, or 7,420 in a million as a 70-year lifetime risk, consistent with cancer risk estimation. While this risk is very high, and while FHWA is actively working to improve highway safety, most people seem to consider this risk "acceptable" in the sense that they do not avoid vehicle trips to reduce it. Also, if the MSAT risk estimates in the studies summarized above are correct, it means that the incremental risk of cancer from breathing air near a major roadway is several hundred times lower than the risk of a fatal accident from using a major roadway.
>
> EPA must make decisions regarding acceptable risk when it develops regulations to control hazardous air pollutants (air toxics) under Titles II and III of the Clean Air Act. EPA's National Emission Standards for Hazardous Air Pollutants for benzene emissions is based on attaining a risk level of no more than 100 cases of cancer per million people. EPA's 2007 MSATs rule, covering vehicles, fuels, and fuel containers, is designed to result in a remaining risk of approximately 5 in a million. Both of these risk levels, considered acceptable by EPA as an outcome of its rulemaking processes, are much higher than the estimated risk from the highway projects that FHWA reviewed." (pg 4-81, AZDOT FEIS 2014)

Status of Research on Potential Mitigation Concepts to Reduce Exposure to Nearby Traffic Pollution (Air Resources Board of California Environmental Protection, 2012)

In the *Status of Research on Potential Mitigation Concepts to Reduce Exposure to Nearby Traffic Pollution*, the Air Resources Board of California Environmental Protection reports that populations living within 500 feet of busy roadways are highly prone to pollutants associated with vehicular traffic. They also reported that among residents living near roadways, children are more vulnerable to adverse health effects of traffic emissions because they tend

to spend a larger amount of time outside and have higher breathing rates per unit of body mass relative to adults.

Air Quality in Southern California—Time for a Paradigm Shift (Winer, 2004)

The *Air Quality in Southern California – Time for a Paradigm Shift*, reports that poor health conditions exist in close proximity to heavy traffic corridors, especially at locations were the traffic make-up consists of diesel fuel vehicles. Pollution from these vehicles has been linked with declines in lung function and increased respiratory symptoms. The study concludes that pollution is both a regional and localized issue for people living near to major roadways.

Near-Roadway Air Pollution and Coronary Heart Disease: Burden of Disease and Potential Impact of a Greenhouse Gas Reduction Strategy in Southern California (Environmental Health Perspectives, July 2015)

The study investigated the burden of coronary heart disease from near-roadway air pollution and compared it with the $PM_{2.5}$ burden in the California South Coast Air Basin for 2008 and under a compact urban growth greenhouse gas reduction scenario for 2035. The study results suggest that a large burden of preventable coronary heart disease mortality is attributable to near-roadway air pollution and is likely to increase even with decreasing exposure by 2035 due to the vulnerability of an aging population. The study also notes that greenhouse gas reduction strategies developed to mitigate climate change offer unexploited opportunities for air pollution health co-benefits.

Associations of Mortality with Long-Term Exposures to Fine and Ultrafine Particles, Species and Sources: Results from the California Teachers Study Cohort (Environmental Health Perspectives, June 2015)

The study researched the effectiveness of near-road vehicle emissions modeling to assess human effects. Using an emissions-based model, the research team observed significant positive associations between ischemic heart disease mortality and both fine and ultrafine particle species and sources. The results of this research project suggest that the exposure model effectively measured local exposures and facilitated the examination of the relative toxicity of particle species.

5.21 Irreversible and Irretrievable Commitment of Resources

This section discusses the potential commitment of resources for this project that could be irreversible and irretrievable, which includes the impact of the project alternatives on resources that will be forever lost or altered.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, no content-related updates were made.

5.21.1 What is an irreversible and irretrievable commitment of resources and why is it important to this project?

The phrase "irreversible commitment of resources" describes those resources that are used or expended during project implementation and will never return. Examples of irreversibly committed resources include the use of fuel, mineral resources, labor, and expense. The "irretrievable commitment of resources" is one in which the resource or its use is lost for a period of time. An example of an irretrievably committed resource is land used during construction.

Federal law requires examination of the irreversible and irretrievable commitment of resources. Also, if the loss caused by these resource commitments outweighs the potential benefit of a project alternative, the merits of project implementation should be questioned.

5.21.2 What study area and evaluation process were used to analyze the irreversible and irretrievable commitment of resources?

The irreversible and irretrievable commitment of resources is determined for all project-related actions regardless of geography. Analysis is not limited to the study area because project-related actions may require an irreversible or irretrievable commitment of resources from areas far removed from the study area boundaries, such as extracting, refining, and delivering construction materials; deriving, refining, and transporting required fuels; and obtaining,

transporting, processing, and converting resources (primarily coal) into energy.

The process used to determine the irreversible and irretrievable commitment of resources examines all environmental resources documented in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation. For each affected environment and environmental consequence reported, potential irreversible and irretrievable commitments are researched and documented.

5.21.3 How do the project alternatives potentially affect resources in an irreversible and/or irretrievable manner?

All alternatives, including the No-Action Alternative, require a substantial commitment of resources in ways that are irreversible and irretrievable. For example, construction requires vast commitments of construction materials, fuel, energy, land, funding, and labor, all of which are used in a manner that is irreversible and/or irretrievable.

Construction materials used to build any of the alternatives—such as aggregate, steel, and petroleum—will be irretrievably committed to the project. These materials cannot be retrieved until they are removed, recycled, and used elsewhere. In addition, water used directly in concrete mixtures or through dust abatement will effectively be an irreversible expenditure. Although concrete can be retrieved through recycling and reuse, the water used to make it is irreversibly locked in solid form.

Fossil fuels consumed during construction activities, such as through electricity and vehicle use, will be irreversibly expended since their use cannot be reversed or resources replenished.

An irretrievable commitment of land will result from construction of any alternative because this land will be occupied by the alternative for as long as it is present. For example, acquisition of portions of the Swansea Elementary School playground will represent an irretrievable loss under the No-Action Alternative, North Option, the Revised Viaduct Alternative, North Option, and the Partial Cover Lowered Alternative. However, mitigation strategies planned for implementation with the Build Alternatives will compensate for and minimize the impact to the playground.

Historic resources adversely affected by the construction of any alternatives will result in an irreversible loss. When

these resources are demolished, or are impacted such that their historic integrity is compromised, the historic value cannot be restored.

Visual and aesthetic qualities "used" for construction of the alternatives will be an irretrievable commitment of these resources because viewsheds and aesthetic qualities will be changed as long as the project is present.

Similarly, the alternatives will create additional noise, resulting in quiet lost through the duration of the project life. Quiet, or noise at an acceptable level, could conceivably be restored if the project is removed.

Irretrievable losses of vegetation and habitat will result from constructing the roadway and associated infrastructure over or on top of these resources. The lost vegetation and habitat could only be retrieved and restored if the project is removed. Wetlands also will be irretrievably lost through placement of fill to construct the project. While these impacts will be mitigated to ensure no net loss, the function and value of impacted wetlands may be irretrievably lost.

Water quality also may be degraded through increased impervious surface, which can result in increased runoff into adjacent water bodies. This degradation will constitute an irretrievable commitment of water resources because water quality improvements could conceivably be retrieved if the alternative is removed and restoration strategies are implemented.

Lastly, manpower and funding used to construct any alternative will result in irreversible fiscal resource commitments. When time and money are dedicated to the project and used, these expenditures cannot be restored or dedicated to another project, even if an alternative is removed one day.

Despite these common effects among alternatives, there are some differences in the irreversible and irretrievable commitment of resources between the Build Alternatives and the No-Action Alternative. These differences are discussed in the following sections.

No-Action Alternative

Due to its smaller footprint and overall scope compared to the Build Alternatives, the No-Action Alternative commits fewer irreversible and irretrievable resources—such as land and fiscal resources—than the Build Alternatives. Nevertheless, more fuel and time will be irreversibly lost from greater levels of congestion and delay associated with the No-Action Alternative over a long-term timeframe.

Build Alternatives

Because both Build Alternatives have a larger footprint compared to the No-Action Alternative, they require a greater irreversible and irretrievable commitment of land, construction material, fuel, energy, funding, and labor than the No-Action Alternative. There are no substantial differences, however, between the Build Alternatives in their irreversible and irretrievable commitment of resources.

Nevertheless, the Build Alternatives provide substantial long-term benefits that are not offered by the No-Action Alternative. These long-term benefits—such as improved neighborhood cohesion—outweigh the up-front irreversible and irretrievable commitment of resources associated with the Build Alternatives. The most substantial benefit of the Build Alternatives is greater mobility, which means less congestion and, in turn, less fuel is irreversibly lost to engine idling. Less congestion also benefits the drivers who irretrievably lose their time sitting in congested traffic. The time savings with the Build Alternatives compared to the No-Action Alternative is approximately 13,000 daily hours (Dunham, 2013).

5.21.4 How are the negative effects from the project alternatives mitigated for these resources?

No mitigation specific to the irreversible and irretrievable commitment of resources is required for the project alternatives. However, the irreversible and irretrievable commitment of resources is minimized through the mitigation provided for other affected environments and environmental consequences, as identified in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation.

5.22 Short-Term Uses versus Long-Term Productivity

This section discusses an evaluation of the tradeoffs between the short-term uses of the local environment versus the positive long-term productivity provided by the project alternatives.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, no content-related updates were made.

5.22.1 What is the relationship between the short-term uses of the environment and long-term productivity and why is it important to this project?

The relationship between local, short-term uses of the environment and the maintenance and enhancement of long-term productivity of resources serves as a benchmark for decision makers, who must determine if the benefits to long-term productivity outweigh negative impacts from the short-term uses of the environment.

5.22.2 What study area and evaluation process were used to determine the short-term uses and long-term productivity?

The study area for short-term uses and long-term productivity is consistent with the study area for each resource. To determine impacts of short-term uses on long-term productivity, “short-term” and “long-term” timeframes are defined. “Short-term” describes impacts that occur while a project alternative is being constructed and otherwise implemented. “Long-term” impacts are those that persist over an extended period of time after an alternative is fully implemented. With timeframes defined, subjective evaluations of short-term impacts versus long-term benefits can be made.

5.22.3 How do the project alternatives potentially affect short-term uses and long-term productivity?

No major negative impacts are expected for short-term uses versus long-term productivity. Short-term use impacts from the No-Action Alternative and the Build Alternatives (but to a greater degree for the Build Alternatives because of their larger footprint) include noise, fugitive dust, energy use, right-of-way relocations, and cost required for construction.

Short-term use impacts are offset by the benefits to long-term productivity generated by the project alternatives. This is most true of the Build Alternatives, which add travel capacity required by growing demand, and are called for in long-range plans such as the *CDOT 2040 Statewide Transportation Plan* (CDOT, 2015a).

Only the Build Alternatives provide the long-term benefits of improved mobility, accessibility, and safety. Due to improved mobility and accessibility, the time spent in congestion will decrease compared to the No-Action Alternative, resulting in approximately 13,000 hours of daily time savings (Dunham, 2013). While the No-Action Alternative improves safety by replacing the deficient viaduct structure, it does not provide the additional safety improvements planned along the entire project corridor. It will ultimately result in slower travel speeds, longer travel times, and higher congestion levels.

The ratio of short-term use versus long-term productivity favors the Build Alternatives, which deliver substantial long-term benefits—unlike the No-Action Alternative, which will require short-term uses but not produce the aforementioned long-term benefits of the Build Alternatives.

5.22.4 How are the negative effects from the project alternatives mitigated for short-term uses?

Short-term impacts will be minimized through the sum of all mitigation measures described in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation; Sections 5.2 through 5.19.

5.23 Summary of Impacts and Mitigations

The exhibits in this section summarize the impacts and mitigations for which CDOT has already committed related to transportation (Chapter 4), the resources evaluated in Sections 5.2 through 5.19 of this chapter (Chapter 5), Section 4(f), and Section 6(f).

Exhibit 5.23-1 Summary of Transportation Impacts and Mitigation

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
All Alternatives	Temporary road closures and traffic detours may have impacts on access to certain public services	• Coordinate with RTD for phasing of improvements to minimize disruptions to transit operations • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Coordinate with UPRR, BNSF, and DRIR for phasing of improvements to minimize disruptions to railroad operations • Coordinate with Denver to determine appropriate truck routes on city streets
No-Action Alternative	Adverse effects to mobility, access, safety, and operations since no changes to capacity, interchanges, or other facilities will be made	
Revised Viaduct Alternative	• Improved pedestrian/bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, addition of auxiliary lanes, improvements to roadways, and modification of interchanges • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Partial Cover Lowered Alternative	• Improved pedestrian/bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, addition of auxiliary lanes, improvements to roadways, and modification of interchanges • Impacts to local circulation since some of the north-south street connectivity is being discontinued due to design restrictions • Temporary impacts to rail facilities will result from the construction of railroad bridge structures and/or the relocation of track operations • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Managed Lanes Option (option to Build Alternatives)	Improved transportation operations, preservation of transportation capacity, and the ability to provide reliable travel times	

Exhibit 5.23-2 Summary of Social and Economic Conditions Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures
All Alternatives	• Residential relocations • Business relocations • Temporary effect to the regional economy from construction-related traffic congestion • Temporary road closures and traffic detours may have impacts on access to certain public services	• Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians • Coordinate with emergency service providers during construction to minimize effects on response times • Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists • Provide a robust and context-sensitive communications and outreach plan throughout construction to ensure residents are kept informed • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours • Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction

Exhibit 5.23-2 Summary of Social and Economic Conditions Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures
No-Action Alternative	• 13 to 15 residential relocations • 6 to 15 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School (North Option only) • $818.9 million to $828.9 million of regional economic output (4,200 to 4,300 person years of employment)	No mitigation measures specific to this alternative
Revised Viaduct Alternative	• 38 to 44 residential relocations • 15 to 27 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School (North Option only) • $2,115.6 million to $2,331.2 million of regional economic output (10,900 to 12,100 person years of employment)	• Create an urban space for community and neighborhood activities under the new viaduct • Redesign and reconstruct the school playground (North Option only); this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue
Partial Cover Lowered Alternative	• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School • $2,478.6 million to $2,690.7 million of regional economic output (12,800 to 13,900 person years of employment)	• Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover

Exhibit 5.23-3 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
All Alternatives	**Benefits** • Creating new construction-related jobs • Building the highway to updated standards and improving mobility **Impacts** • Increasing noise and dust during construction • Potential for disturbing hazardous material sites during construction • Impacting mobility during construction due to detours • Temporarily closing or delaying, or permanently rerouting, public transit services in the area	Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods • Provide funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans; CDOT has already provided funding to CRHDC as early mitigation • Collect representative soil samples of three or four recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—interior storm windows • Provide contributions to existing programs that facilitate access to fresh food • Facilitate opportunities to promote hiring individuals from the communities such as job fairs with contractors • Execute geographic-based hiring preferences (CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program) • Research opportunities to invest funds in a local workforce development program aimed at job readiness training prior to construction • Provide a new HVAC system, doors, and windows for Swansea Elementary School • Prior to the start of roadway construction, build two new classrooms at Swansea Elementary School to enhance the overall quality of the school Environmental justice impacts include effects on various resources on an identified low-income or minority population or community; therefore, any mitigation measures for those resources apply to environmental justice as well. The resources listed below are discussed previously in this section, and the mitigation measures discussed in the sections below are also applicable to environmental justice: • Mitigations from Section 5.2, Social and Economic Conditions • Mitigations from Section 5.5, Relocations and Displacements • Mitigations from Section 5.8, Visual Resources and Aesthetic Qualities • Mitigations from Section 5.12, Noise • Mitigations from Section 5.18, Hazardous Materials

Exhibit 5.23-3 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
No-Action Alternative, North Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Improving aesthetic quality with a structure that complements the neighborhood • Keeping the Nestlé Purina Petcare Company at its existing location • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution **Impacts** • Increasing physical barrier effect • Displacing Stop N Shop and Pilot Travel Center truck stop • Relocating 15 residences • Impacting 349 noise receptors • Moving the highway closer to Swansea Elementary School	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct
No-Action Alternative, South Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Improving aesthetic quality with a structure that complements neighborhood • Displacing Nestlé Purina Petcare Company • Swansea Elementary School remains at its existing location **Impacts** • Increasing physical barrier effect • Displacing El Tepetate Market and El Rinconcito Mini Market • Impacting 347 noise receptors • Relocating 13 residences	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Exhibit 5.23-3 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
Revised Viaduct Alternative, North Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Preserving north-south connectivity • Improving aesthetic quality with a structure that complements neighborhood • Keeping the Nestlé Purina Petcare Company at its existing location • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution **Impacts** • Increasing physical barrier effect • Impacting 403 noise receptors • Displacing Stop N Shop and Pilot Travel Center truck stop • Relocating 38 residences • Moving the highway closer to Swansea Elementary School	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Create an urban space for community and neighborhood activities under the new viaduct • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue
Revised Viaduct Alternative, South Option	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Preserving north-south connectivity • Improving aesthetic quality with a structure that complements neighborhood • Displacing Nestlé Purina Petcare Company • Swansea Elementary School remains at its existing location **Impacts** • Increasing barrier effect • Impacting 381 noise receptors • Impacting and displacing El Tepetate Market and El Rinconcito Mini Market • Relocating 44 residences	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Exhibit 5.23-3 Summary of Environmental Justice Benefits, Impacts, and Mitigations

Alternative/ Option	Benefits/Impacts	Mitigation Measures
Partial Cover Lowered Alternative	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Removing the viaduct's visual barrier between Brighton Boulevard and Colorado Boulevard • Minimizing the presence of the highway in this area since it is below grade and is covered • Providing multi-modal safety from improved lighting and sidewalks at north-south connections • Displacing Pilot Travel Center truck stop to eliminate a point-source location for air pollution • Reducing highway noise and air quality impacts to the school and adjacent properties by placing a cover over the highway • Keeping the Nestlé Purina Petcare Company at its existing location **Impacts** • Limiting north-south pedestrian and bicycle connectivity compared to the existing conditions • Relocating 56 residences • Impacting 105 noise receptors • Moving the highway closer to Swansea Elementary School • Displacing Stop N Shop and Pilot Travel Center truck stop • Creating visual obstruction with safety barriers; eliminating views across the highway	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Remove the viaduct, lower the highway, and cover portions of the highway to include space for community and neighborhood activities • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover • Provide $2 million in funding to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs
Managed Lanes (option to Build Alternatives)	Benefits/impacts listed previously under All Alternatives also apply. **Benefits** • Creating reliable travel time • Providing congestion-free lanes • Reducing congestion in all travel lanes **Impacts** • Creating a financial burden to the low-income community, who may not be able to afford to use the managed lanes	Mitigation measures listed previously under All Alternatives also apply. Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Research ways to provide assistance for low-income populations within the area (such as free transponders) for using the managed lanes

Exhibit 5.23-4 Summary of Land Use Impacts and Mitigation

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	4.0 acres to 6.0 acres converted to transportation use	Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise due to the project alternatives
Revised Viaduct Alternative	40.6 acres to 41.9 acres converted to transportation use	
Partial Cover Lowered Alternative	• 66.6 acres converted to transportation use • Creation of a 4 acre cover with up to 3 acres of public space over I-70	
Managed Lanes (option to Build Alternatives)	• An additional 1.7 acres would be required if the Managed Lanes Option is selected with the Revised Viaduct Alternative, resulting in 42.3 acres to 43.6 acres converted to transportation use • An additional 1.7 acres would be required if the Managed Lanes Option is selected with the Partial Cover Lowered Alternative, resulting in 68.3 acres converted to transportation use	

Exhibit 5.23-5 Summary of Relocations and Displacements Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative, North Option	• 15 residential relocations • 6 business relocations (includes 1 non-profit relocation)	• Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide all impacted owners 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; assign a right of way specialist to each property owner to assist them with this process • Provide bilingual services for any of the relocated and displaced businesses or households that need them • Meet directly with those owners and occupants who would be relocated as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits
No-Action Alternative, South Option	• 13 residential relocations • 15 business relocations	
Revised Viaduct Alternative, North Option	• 38 residential relocations • 15 business relocations (includes 1 non-profit relocation)	
Revised Viaduct Alternative, South Option	• 44 residential relocations • 27 business relocations (includes 1 non-profit relocation)	
Partial Cover Lowered Alternative	• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation)	

Exhibit 5.23-6 Summary of Historic Preservation Impacts and Mitigations

Alternative	Impacts	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Adverse Effect—1 to 7 historic resources • No Adverse Effect—50 to 56 historic resources • No Effect—9 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	• Establish a Programmatic Agreement with SHPO and consulting parties • Provide Level II archival documentation for adversely affected resources • Provide funding and participate in the creation of a documentary covering the history of I-70 East and its relationship to the Elyria and Swansea and Globeville Neighborhoods (mitigation has been completed, and is available to view at www.i-70east.com) • Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties as described in the Programmatic Agreement • Cease work during construction if unidentified historic resources are encountered and notify CDOT and SHPO immediately • Contact consulting Indian tribes if Indian cultural materials are identified at any time during construction
Revised Viaduct Alternative	• Adverse Effect—8 historic resources • No Adverse Effect—54 historic resources • No Effect—4 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	
Partial Cover Lowered Alternative	• Adverse Effect—13 historic resources • No Adverse Effect—50 historic resources • No Effect—3 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	

Exhibit 5.23-7 Summary of Paleontological Resources Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	Minimal deep surface disturbance	• Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring • Cease work immediately upon discovery of any paleontological resources, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; do not resume work in the area until receiving formal notification from the paleontologist allowing work to resume
Revised Viaduct Alternative		
Partial Cover Lowered Alternative	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	

Exhibit 5.23-8 Summary of Visual Resources and Aesthetic Qualities Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Replacing the existing viaduct with new infrastructure will improve the visual quality • New noise walls on the viaduct can obstruct views of the downtown Denver skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline (South Option only) • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction.
Revised Viaduct Alternative	• Replacing the existing viaduct with new infrastructure will improve the visual quality • New noise walls on the viaduct can obstruct views of the downtown Denver skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline (South Option only) • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	
Partial Cover Lowered Alternative	• Introducing public space to the area and reducing the roadway's visual dominance by removing the existing viaduct will greatly improve the visual quality • Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway • Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions • New features of the project (e.g., detention ponds, retaining walls) will change the visual environment along the project corridor	
Managed Lanes Option (option to Build Alternatives)	• Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard • Managed lanes infrastructure will create new visual impacts along the project corridor	

Exhibit 5.23-9 Summary of Parks and Recreational Resource Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
All Alternatives	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	• Provide adequate notice and signing to Greenway users prior to construction • Return Greenway to pre-construction or comparable state following construction
No-Action Alternative	0.39 acre of impact to Swansea Elementary School (North Option)	No mitigation measures specific to this alternative
Revised Viaduct Alternative	• 0.76 acre of impact to Swansea Elementary School (North Option) • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction	• Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction
Partial Cover Lowered Alternative	• 0.95 acre of impact to Swansea Elementary School • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction	• Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction • Coordinate with Denver Parks and Recreation, CPW, and NPS regarding impact to Globeville Landing Park, a Section 6(f) resource • Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement

Exhibit 5.23-10 Summary of Air Quality Commitments and Strategies

Air Quality Consideration (all alternatives)	Commitments and Strategies Applicable to All Alternatives
• MSAT emissions could increase temporarily during construction • Construction fugitive dust could cause temporary impacts • No violation of the NAAQS for the No-Action Alternative or the Build Alternatives	Before and during construction: • Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction During construction, BMPs could include the following measures and others, if applicable, as identified during project development (per the FDCP): • Cover, wet, compact, or use chemical stabilization binding agents to control dust and excavated materials at construction sites • Use wind barriers and wind screens to prevent spreading of dust from the site • Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets • Use vacuum-powered street sweepers to remove dirt tracked onto streets • Cover all dump trucks leaving sites to prevent dirt from spilling onto streets • Minimize disturbed areas, particularly in winter • Prohibit unnecessary idling of construction equipment • Locate construction diesel engines as far away as possible from residential areas • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology • Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, compressed natural gas, fuel cells, and electric engines, if applicable • Install engine pre-heater devices to eliminate unnecessary idling for winter-time construction • Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness • Require construction vehicle engines to be properly tuned and maintained • Use construction vehicles and equipment with the minimum practical engine size for the intended job Post construction: • Continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations BMPs could also include the following measures and others as identified during project development: • Optimize signal timing at intersections and along arterial streets near the highway to reduce vehicle delay and tailpipe emissions • Implement congestion pricing and commuter incentive programs that reduce peak-period highway congestion and emissions • Encourage TDM options, such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs

Exhibit 5.23-11 Summary of Energy Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 68 billion Btu consumed per day • 2,380 billion Btu consumed during construction	• Limit idling of construction equipment • Encourage employee carpooling and vanpooling for construction workers • Encourage use of closest material sources • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies) • Encourage the use of alternative fuels and asphalt binders • Implement traffic management schemes that minimize delays and idling • Implement energy conservation measures where appropriate, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's Lighting Design Guide (CDOT, 2006) • Encourage energy-efficient options for the cover facilities (Partial Cover Lowered Alternative only)
Revised Viaduct Alternative, General-Purpose Lanes Option	• 70.9 billion Btu consumed per day • 6,018 billion Btu consumed during construction	
Revised Viaduct Alternative, Managed Lanes Option	• 70.4 billion Btu consumed per day • 6,648 billion Btu consumed during construction	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 71.3 billion Btu consumed per day • 7,068 billion Btu consumed during construction	
Partial Cover Lowered Alternative, Managed Lanes Option	• 70.0 billion Btu consumed per day • 7,698 billion Btu consumed during construction	

Exhibit 5.23-12 Summary of Noise Impacts and Mitigation Measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures
All Alternatives	Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes.	• Implement BMPs to minimize noise during construction, as per FHWA's *Highway Construction Noise Handbook* (2006) • Conduct a benefited receptor survey prior to construction to determine if the recommended noise wall is desired; if the survey results show that the majority of benefitted receptors who respond to the survey desire the noise wall, the noise wall will be optimized and built
No-Action Alternative, North Option	Number of noise receptors that exceed NAC threshold • Globeville: 9 • Elyria: 116 (20 that increase by 10 dBA or more) • Swansea: 233 (20 that increase by 10 dBA or more) • Stapleton: 0 • Peoria Street: 0 • Montbello: 0 • Aurora: 4	Location and height of feasible and reasonable walls: • Elyria: 8 feet to 20 feet • Swansea: 8 feet to 20 feet
No-Action Alternative, South Option	Number of noise receptors that exceed NAC threshold 1. Globeville: 9 2. Elyria: 108 (7 that increase by 10 dBA or more) 3. Swansea: 239 (27 that increase by 10 dBA or more) 4. Stapleton: 0 5. Peoria Street: 0 6. Montbello: 0 7. Aurora: 4	
Revised Viaduct Alternative, North Option	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 125 (31 that increase by 10 dBA or more) • Swansea: 278 (66 that increase by 10 dBA or more) 8. Stapleton: 0 9. Peoria Street: 0 10. Montbello: 29 to 34 11. Aurora: 3	Location and height of feasible and reasonable walls: • Elyria: 8 feet to 20 feet • Swansea: 8 feet to 20 feet
Revised Viaduct Alternative, South Option	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 121 (19 that increase by 10 dBA or more) • Swansea: 260 (49 that increase by 10 dBA or more) 12. Stapleton: 0 13. Peoria Street: 1 14. Montbello: 29 to 34 15. Aurora: 3	
Partial Cover Lowered Alternative	Number of noise receptors that exceed NAC threshold • Globeville: 18 to 24 • Elyria: 55 (11 that increase by 10 dBA or more) • Swansea: 50 • Stapleton: 0 • Peoria Street: 0 • Montbello: 29 to 34 • Aurora: 3	Location and height of feasible and reasonable walls: • Elyria: 12 to 20 feet

Note: Per CDOT regulations, if an existing noise wall is demolished, a replacement barrier meeting current noise regulatory requirements must be constructed.

Exhibit 5.23-13 Summary of Biological Resources Impacts and Mitigation Measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 3.5 acres of permanent, direct impact to wildlife habitat • 0.014 acre of permanent impacts and 0.011 acre of temporary impacts to riparian areas	• Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds • Monitor disturbed sites during construction to identify and treat any noxious weed invasion • Reclaim disturbed areas in phases throughout construction with native grasses and forbs • Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio • Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction will occur in prairie dog colonies between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31 • Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season • Survey areas to be cleared and grubbed, as well as areas within 50 feet of these areas, between April 1 and August 31 for active migratory bird nests within seven days of the work being performed • Remove existing nests from structures after August 31 and prior to April 1 • Monitor structures at least once every three days for any nesting activity between April 1 and August 31 • Prepare and implement an Integrated Noxious Weeds Management Plan prior to construction activities • Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant prior to the start of construction activities
Revised Viaduct Alternative, General-Purpose Lanes Option	• 313.9 acres of permanent, direct impact to wildlife habitat • 0.977 acres of permanent impacts and 0.222 acre of temporary impacts to riparian areas	
Revised Viaduct Alternative, Managed Lanes Option	• 365.2 acres of permanent, direct impact to wildlife habitat • 1.249 acres of permanent impacts and 0.241 acre of temporary impacts to riparian areas	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 317.0 acres of permanent, direct impact to wildlife habitat • 1.025 acres of permanent impacts and 0.234 acre of temporary impacts to riparian areas	
Partial Cover Lowered Alternative, Managed Lanes Option	• 368.3 acres of permanent, direct impact to wildlife habitat • 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	

Exhibit 5.23-14 Summary of Floodplains and Drainage/Hydrology Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	• Create detention ponds and implement storm drainage for onsite drainage system improvements • Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain
Revised Viaduct Alternative	• May impact the floodplain for Sand Creek since bridge construction and new bridge structures will cross this waterway • Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	
Partial Cover Lowered Alternative	• Impact to the Sand Creek floodplain with the proposed bridge construction and new bridge structures will cross this waterway • Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70 • The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	• Create detention ponds and implement storm drainage for onsite drainage system improvements • Build an offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River • Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain

Exhibit 5.23-15 Summary of Wetlands, Open Waters, and Other Waters of the U.S. Impacts and Mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• No permanent wetland impacts • 0.005 acre of permanent other waters of the U.S. impacts • 0.013 acre of temporary impact to other waters of the U.S.	• Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed • Install temporary erosion control and sediment control BMPs before ground-disturbing activities; permanently stabilize completed areas within seven days; proposed BMPs are listed in the *Wetlands Finding* provided in Attachment N • Restore wetlands temporarily affected during construction to pre-construction conditions • Obtain and follow requirements of Section 404 permitting and Senate Bill 40 certification
Revised Viaduct Alternative, General-Purpose Lanes Option	• 4.352 acres of permanent and 0.242 acre of temporary wetland impacts • 0.693 acre of permanent and 0.043 acre of temporary impacts to other waters of the U.S. and open waters	
Revised Viaduct Alternative, Managed Lanes Option	• 4.442 acres of permanent and 0.244 acre of temporary wetland impacts • 0.712 acre of permanent and 0.042 acre of temporary impacts to other waters of the U.S. and open waters	
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 4.352 acres of permanent and 0.242 acre of temporary wetland impacts • 0.752 acre of permanent and 0.081 acre of temporary impacts to other waters of the U.S. and open waters	
Partial Cover Lowered Alternative, Managed Lanes Option	• 4.442 acres of permanent and 0.244 acre of temporary wetland impacts • 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	

Exhibit 5.23-16 Summary of Water Quality Impacts and Mitigations

Alternative/ Option	Permanent Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
All Alternatives	• Stormwater runoff can create erosion and degradation of water quality during and after construction • Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	• Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway • Consider environmentally friendly techniques to provide water quality treatment • Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program Implement the following BMPs for erosion and sediment control, dust control, stormwater control, and expansive during and after construction: • Silt fences, erosion control blankets • Sediment traps, sediment basins • Soil stockpile management • Temporary diversion structures • Spill prevention and control measures • Regrading • Seeding and revegetating soils and slopes • Mulch protection for new plantings • Stormwater control channels Use the following winter maintenance BMPs to meet or exceed the water quality standards of CDOT's MS4 permit: • Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads • Apply sand/salt mixtures (30 percent/70 percent, respectively) at rates of 105 pounds to 115 pounds per lane mile, which is roughly one-third of the maximum allowable amount of 300 pounds per lane mile • Use liquid de-icer products, such as magnesium chloride and Caliber (a mixture of magnesium chloride, cornstarch, alcohol, and tree sap); apply these products at rates of 40 pounds to 80 pounds per lane mile • Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations; only 35 percent removal outside the "core" areas is required; for the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—and CDOT will continue to do so
No-Action Alternative	• Increase in runoff TSS loads of up to 4 percent to the South Platte River	
Revised Viaduct Alternative	• Increase in runoff TSS loads of 7 percent to 17 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	
Partial Cover Lowered Alternative	• Increase in runoff TSS loads of 11 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	

Exhibit 5.23-16 Summary of Water Quality Impacts and Mitigations

Alternative/ Option	Permanent Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
Managed Lanes Option (option to Build Alternatives)	• Increase in runoff TSS loads of 15 percent (for a total of 37 percent) to Sand Creek	• Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials; this technology prevents over-treating; the majority of the CDOT Region 1 fleet is currently equipped with these computers • Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile; this product is preferred over regular sand/salt mixtures because it produces less fugitive dust • Stockpile solid mixtures at the I-70 and Havana Street CDOT maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters • Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures • Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements • Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes • Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping • Rely on cameras/ITS systems to determine problem areas during each storm event

Exhibit 5.23-17 Summary of Geology and Soils Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	• Dewater structure foundations during construction
Revised Viaduct Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	
Partial Cover Lowered Alternative	• Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street • Temporary impacts to groundwater during excavation	• Prevent groundwater infiltration into the lowered section of the highway; install underdrain pipes below the pavement to drain any additional groundwater that still enters the lowered section • Dewater during the construction process

Exhibit 5.23-18 Summary of Hazardous Materials Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 7 hazardous materials sites affected • 41 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	• Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project • Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners • Follow *CDOT Standard Specifications for Road and Bridge Construction,* Section 250, Environmental, Health and Safety Management • Follow Tri-County Health Department *Health and Safety Practices during Construction on or Near Former Landfills* • Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines; if ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure; additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations • Update contaminated sites search databases to reflect most recent records • Prepare and implement a project-specific Health and Safety Plan and Materials Management Plan 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 • In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan
Revised Viaduct Alternative, General-Purpose Lanes Option	• 24 to 25 hazardous materials sites affected • 575 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	
Revised Viaduct Alternative, Managed Lanes Option	• 24 to 25 hazardous materials sites affected • 658 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	

Exhibit 5.23-18 Summary of Hazardous Materials Impacts and Mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
Partial Cover Lowered Alternative, General-Purpose Lanes Option	• 25 hazardous materials sites affected • 620 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	• Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities; additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards • Obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water Permit or Construction Activities Discharging to Ground Water Permit, as required, utilizing readily available data; the selected contractor will follow the permit requirements • Obtain and follow the necessary CDPS Dewatering Permits if this alternative requires permanent dewatering; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility • Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary
Partial Cover Lowered Alternative, Managed Lanes Option	• 28 hazardous materials sites affected • 703 acres of land disturbed • Extensive excavation through a known landfill that contains contaminants • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	

Exhibit 5.23-19 Summary of Utilities Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	• All utility types will be affected to some extent • Construction impacts to utilities, mainly adjustments, will be limited to the section of the existing viaduct, realigned ramps, and drainage outfall	• 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
Revised Viaduct Alternative	• All utility types will be affected to some extent • Construction impacts to utilities are estimated to be greater than the No-Action Alternative due to wider construction impacts and reconfiguration of ramps	
Partial Cover Lowered Alternative	• All utility types will be affected to some extent • Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width • Offsite stormwater drainage system south of I-70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency	
Managed Lanes Option (option to Build Alternatives)	• Additional temporary impacts to Build Alternatives only at locations of direct connections to I-270, I-225, and Peña Boulevard	

Exhibit 5.23-20 Summary of Section 4(f) and Section 6(f) Recreation Resources Impacts and Mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
All Alternatives	Section 6(f) • South Platte River Greenway temporary impacts may occur during construction	• Provide adequate notice and signing to Greenway users prior to construction • Return Greenway to pre-construction or comparable state following construction
No-Action Alternative	Section 4(f) • Use of Swansea Elementary School (North Option)	No mitigation measures specific to this alternative
Revised Viaduct Alternative	Section 4(f) • Use of Swansea Elementary School (North Option)	Section 4(f) • Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue
Partial Cover Lowered Alternative	Section 4(f) • Use of Swansea Elementary School Public Playground • Use of Globeville Landing Park Section 6(f) • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction	• Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Coordinate with Denver Parks and Recreation, CPW, and NPS regarding impact to Globeville Landing Park, a Section 6(f) resource • Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement • Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.

Exhibit 5.23-21. Summary of Section 4(f) Historic Resource Impacts and Mitigations

Alternative	Impacts	Mitigation Measures Applicable to All Alternatives
No-Action Alternative, North Option	Use of 10 historic resources, which includes 3 *de minimis* impact determinations	• Adverse Effects to historic resources will be resolved by the execution of the Section 106 Programmatic Agreement between FHWA, CDOT, SHPO and consulting parties • Consultation has discussed mitigation measures such as documenting historic structures and ways to preserve the larger history of the project corridor
No-Action Alternative, South Option	Use of 4 historic properties, which includes 3 *de minimis* impact determinations	
Revised Viaduct Alternative, North Option	Use of 14 historic resources, which includes 6 *de minimis* impact determinations	
Revised Viaduct Alternative, South Option	Use of 14 historic resources, which includes 6 *de minimis* impact determinations	
Partial Cover Lowered Alternative	Use of 18 historic resources, which includes 5 *de minimis* impact determinations	

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CHAPTER 6: CUMULATIVE IMPACTS

A cumulative impacts analysis considers all aspects of the environment affected by project alternatives in the context of other past, present, and reasonably foreseeable future actions in an area. The analysis identifies topics and areas where the project alternatives may contribute incrementally to impacts over time.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- Additional foreseeable future actions identified in recently completed plans and investment programs were incorporated.
- Additional contextual information was included.

6.1 What are cumulative impacts and why are they important to this project?

Cumulative impacts are: "The impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CEQ, 1978).

What are incremental impacts?

Incremental impacts appear over time, can be minor individually, and can occur in small amounts. Collectively, however, these impacts can be substantial.

6.2 What resources, study areas, and methods are included in this cumulative impacts analysis?

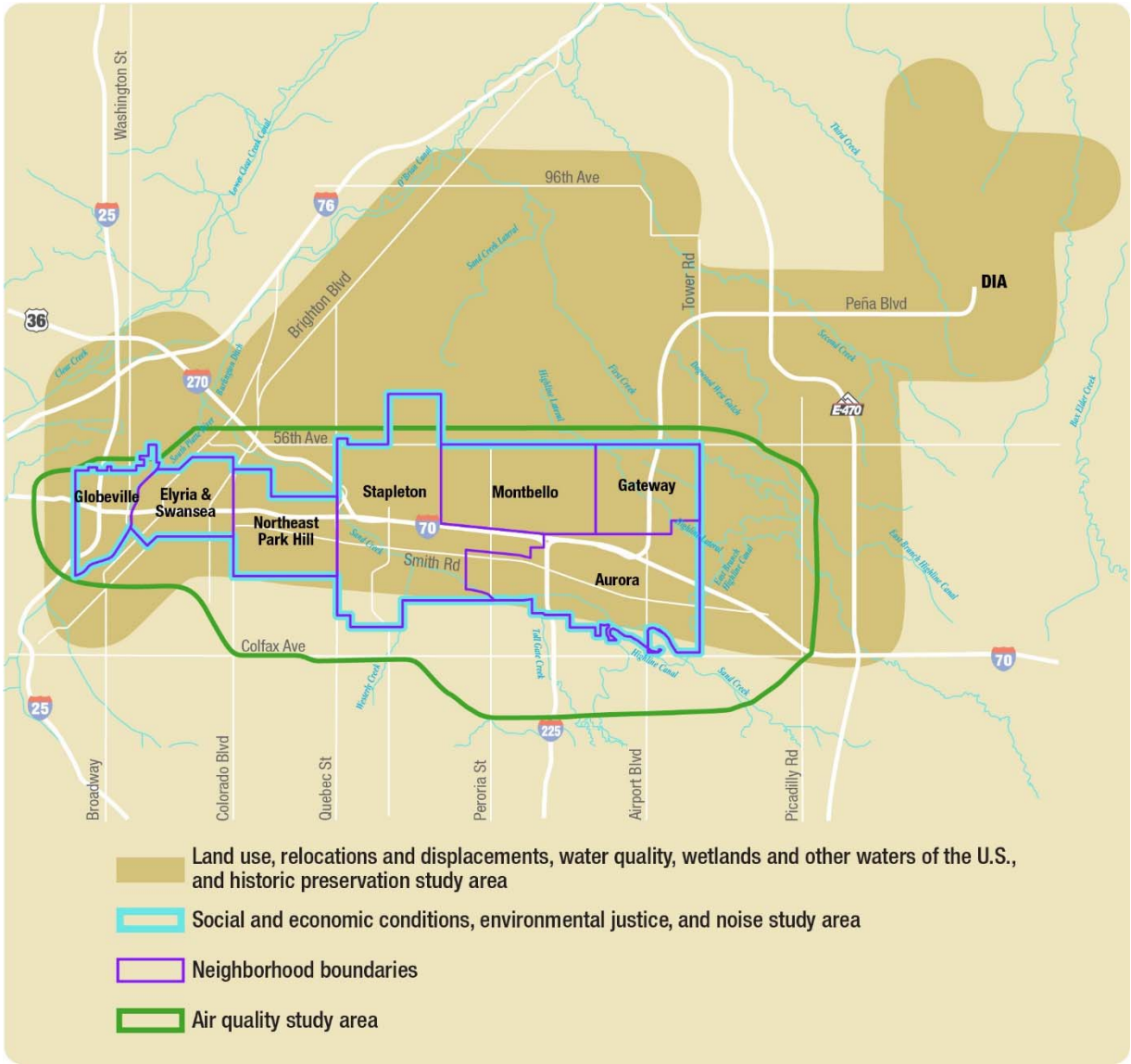
Environmental resources that are analyzed for cumulative impacts were identified through scoping and by the degree to which the resources are directly impacted, as documented in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation. Formal scoping for this project began in 2003, as detailed in Chapter 10, Community Outreach and Agency Involvement. **Exhibit 6-1** summarizes resources identified for cumulative impacts analysis through scoping and direct impact analysis and contains the rationale for their inclusion in the cumulative impacts assessment, in addition to their potential to contribute to cumulative impacts.

Cumulative impact study areas vary by resource. Study areas are determined by the individual resource to ensure that cumulative impact analyses consider all relevant factors in a boundary that is logical and appropriate to a particular resource. For example, the boundary required to assess cumulative impacts to air quality is different than the boundary used to examine stormwater runoff. The rationale for their geography is documented in **Exhibit 6-1**, and **Exhibit 6-2** displays these geographic boundaries for each resource.

Exhibit 6-1 Key Resources Evaluated for Cumulative Impacts

Resource	Basis for Inclusion	Study Area Rationale
Land use	This resource is included based on agency and stakeholder scoping requests and its relationship to other resources evaluated for cumulative impacts.	Agency and stakeholder scoping conducted during the EIS process determined that the land use study area (see **Exhibit 6-2**) provides adequate context for determining cumulative impacts.
Relocations and displacements	This resource is included because of specific public, agency, and stakeholder scoping requests, as well as the presence of direct impacts (21 to 74 potential relocations).	Agency and stakeholder scoping conducted during the EIS process determined that the relocation study area (see **Exhibit 6-2**) provides context for understanding past, present, and foreseeable future relocations and displacements.
Social and economic conditions	Agency and stakeholder scoping requests qualified this resource for inclusion in the cumulative analysis; additionally, the presence of direct impacts—such as barriers, relocations, and access—called for inclusion.	The study area is based on the neighborhood boundaries that are potentially impacted by project alternatives and used as analytical boundaries in Sections 5.2, Social and Economic Conditions, and Section 5.3, Environmental Justice.
Historic preservation	This resource is included because of the number of potential direct impacts (1 to 13 historic resources adversely affected).	This study area is based on agency and stakeholder scoping.
Air quality	Requests made by agencies and the general public during scoping qualified this resource for inclusion in the cumulative impacts analysis.	The study area is based on the analytical boundaries used in Section 5.10, Air Quality, to quantify impacts.
Noise	This resource is included based on the presence of direct impacts (up to 403 noise receptors exceed established noise thresholds with Build Alternatives, compared to 84 under existing conditions) and neighborhood concerns.	The study area is based on the neighborhood boundaries that are potentially impacted by project alternatives and used as analytical boundaries in Section 5.12, Noise.
Wetlands and other waters of the U.S.	Agency and stakeholder scoping requests and severity of impacts obligated this resource for inclusion. Build Alternatives permanently impact 4.352 acres to 4.442 acres of jurisdictional wetlands and 0.693 acres to 0.771 acres of other waters of the U.S. and open waters.	This study area is determined through agency and stakeholder scoping.
Water quality	This resource is included due to agency and stakeholder scoping requests and the severity of direct impacts (potential for ponding and flooding risks, as well as changes in water quality to South Platte River and Sand Creek).	Agency and stakeholder scoping conducted during the EIS process determined that the water quality study area (see **Exhibit 6-2**) provides adequate context for determining cumulative impacts.
Environmental justice	The presence of potential direct impacts through property displacements, noise, air quality, mobility, and neighborhood cohesion could be especially apparent in the minority and low-income populations.	The study area is based on the neighborhood boundaries that are potentially impacted by project alternatives and used as analytical boundaries in Sections 5.2, Social and Economic Conditions, and Section 5.3, Environmental Justice.

Exhibit 6-2 Cumulative Impact Resource Study Areas



The analysis timeframe of 1960 through 2035 has been established based on scoping and stakeholder input. The year 1960 is used because it coincides with the initial planning and construction of I-70. The analysis uses the end year of 2035 because it is the forecast year for DRCOG's 2035 travel demand model origin-destination trip data.

The cumulative impacts analysis involves adding the effects of project alternatives to similar resource effects caused by other past, present, and reasonably foreseeable future actions. If the Build Alternatives have no direct or indirect impacts on a resource, then they have no cumulative impacts on that resource.

To perform a cumulative impact assessment, a baseline condition must be evaluated for each resource topic. That baseline has been identified as the impacts resulting from all other past, present, and reasonably foreseeable future projects. These are identified in Section 6.3, below. Although the No-Action Alternative typically is included in the baseline conditions, the No-Action Alternative for I-70 East has impacts and is evaluated in the cumulative discussions below.

6.3 What past, present, and future actions are considered?

To determine cumulative impacts, project alternatives are analyzed for their combined impact when coupled with the other past, present, and reasonably foreseeable future actions. The project team obtained information on these actions through review of local, state, and federal planning documents. It is not the intent to provide an exhaustive list of every project in each study area, but rather to provide a reasonable characterization of projects that have affected or may affect key resources being evaluated.

As a starting point, past, present, and reasonably foreseeable future actions are separated into transportation and development categories, as shown in **Exhibit 6-3** and cataloged in **Exhibit 6-4** and **Exhibit 6-5**. For the purposes of this analysis, transportation and development projects considered are large-scale projects that change either the way people move or live, or dramatically change physical geography (for example, the development of previously unused land). Generally, present and reasonably foreseeable future transportation projects are those listed in either long-range transportation plans or capital improvement programs. Local and regional land use and other comprehensive planning documents generally identify foreseeable future development projects.

Exhibit 6-3 Transportation and Development Project Locations

Exhibit 6-4 Past, Present, and Future Transportation Projects

Exhibit 6-3 Identifier	Project	Timeframe	Description
1	I-70	Past, 1961	Opening of I-70 through metropolitan Denver and Aurora
2	I-270	Past, 1968	Opening of I-270 between I-70 to I-25, adjacent to Sand Creek
3	I-225	Past, 1976	Opening of three-lane highway through Aurora linking I-70 and I-25
4	16th Street Mall Shuttle	Past, 1982	One-mile city street in Denver's central business district closed to private vehicles and replaced with public bus and pedestrian corridor

Exhibit 6-4 Past, Present, and Future Transportation Projects

Exhibit 6-3 Identifier	Project	Timeframe	Description
5	E-470	Past, 1991	Ten-mile circumferential toll facility connecting to I-25 north and south of the Denver metropolitan area
6	RTD Light Rail	Past, 1994	First light rail line, from I-25 and Broadway to the Auraria Campus
7	Peña Boulevard	Past, 1995	Construction of Peña Boulevard, providing access to DIA from I-70 via more than 10 miles of divided roadway
8	DIA	Past, 1995	Development of international airport northeast of metropolitan Denver.
9	I-70 Viaduct Replacement	Past, 2003/09	Viaduct replaced from Washington Street to Brighton Boulevard
10	Colorado Boulevard Bridge Replacement	Past, 2005	Safety and capacity improvement 0.8 mile north of I-70
11	I-25 High-Occupancy Vehicle	Past, 2006	High-occupancy vehicle lane conversion to high-occupancy vehicle/toll—20th Street to US 36
12	56th Avenue	Past, 2010	Road widening for new through lanes from Quebec Street to Havana Street
13	US 36 Bus Rapid Transit Corridor	Past, 2010	Bus rapid transit and roadway improvements between Denver and Boulder along US 36; Phase 1 is complete
14	Central Park Boulevard	Past, 2012	New I-70 interchange at Central Park Boulevard.
3	I-225 Widening	Past, 2014	Widening of I-225 between I-25 and I-70.
15	Denver Union Station	Past, 2014	Expansion of major intermodal center in downtown Denver connecting regional corridors
16	RTD West Corridor (Transit)	Present	Twelve-mile commuter rail line between downtown Denver and Golden
17	RTD I-225 (Transit)	Present	Approximately 11-mile transit line connecting Southeast Corridor and East Corridor though Aurora
18	RTD East Corridor (Transit)	Present	Twenty-three-mile commuter rail line between Denver and DIA
8	DIA terminal expansion	Present	New terminal, commuter rail station, and hotel
19	Peoria Street-Smith Road area improvements	Present	Peoria Street-Smith Road commuter rail related road, crossing, bike, and pedestrian access improvements
20	North Metro commuter rail, Segment One	Present	First segment of the North Metro commuter rail line from Denver Union Station to 124th Avenue in Northglenn

Exhibit 6-4 Past, Present, and Future Transportation Projects

Exhibit 6-3 Identifier	Project	Timeframe	Description
21	RTD Gold Line (Transit)	Present	Approximately 11-mile electric commuter rail transit corridor from Denver Union Station to the vicinity of Ward Road in Arvada
22	Tower Road	Present	Roadway widening from Colfax Avenue to 48th Avenue
23	RTD Northwest Corridor, Segment One (Transit)	Present	Six-mile commuter rail line between Denver Union Station and Westminster
24	RTD Central Corridor (Transit)	Future	One-mile transit extension from 30th Avenue/Downing Street to East Corridor alignment
25	I-270	Future	Capacity improvements from Vasquez Boulevard to Quebec Street
8	DIA expansion	Future	Adding capacity through new runways, de-icing facilities, concourse space, parking, cargo facilities, and air traffic control tower
26	Brighton Boulevard	Present, Future	Construct critical public infrastructure (e.g., cycle track, sidewalks, curb/gutter, on-street parking) helping develop gateway to Denver.

Source: Statewide Transportation Improvement Program, DRCOG Transportation Improvement Plan, Denver Six-Year Capital Improvement Plan, Commerce City Capital Improvement Program

Exhibit 6-5 Past, Present, and Future Development Projects

Exhibit 6-3 Identifier	Project	Timeframe	Description
1	Skyline Redevelopment	Past, 1969 to 1977	Redevelopment of 30 blocks of the old Central Business District
2	Auraria Campus	Past, 1969 to 1974	Construction of a higher education center over former residential neighborhood
3	National Western Stock Show	Past, 1973, 1991, 1995, Present, Future	Expansion of National Western Complex to more than 600,000 square feet of developed facilities. Redevelopment and expansion of the 95-acre National Western Complex site
4	Downtown Redevelopment	Past, Present, Future	Addition of 47,000 jobs and 21,000 households in downtown Denver from 2000 to 2020
5	Prairie Gateway Development	Past, Present	Development of 900 acres of the former Rocky Mountain Arsenal National Wildlife Refuge property to an entertainment/ commercial retail complex

Exhibit 6-5 Past, Present, and Future Development Projects

Exhibit 6-3 Identifier	Project	Timeframe	Description
6	Stapleton Redevelopment	Past, Present	Redevelopment of former Stapleton airport site into mixed-use commercial and residential land uses
7	Green Valley Ranch	Present	Development of more than 5,000 acres featuring a complete town center, 500 acres of open space, commercial development, and residential neighborhoods
8	Gateway Park	Present	Addition of between 34,000 and 65,000 new residents and more than 54 million square feet of commercial space
9	Fitzsimons	Present	Redevelopment of 570 acres, anchored by the 227-acre University of Colorado Health Sciences Center and 160-acre Colorado Bioscience Park in Aurora; at build-out, employment is expected to exceed 32,000 jobs
10	Reunion	Present	A new 3,000-acre development northeast of the Rocky Mountain Arsenal National Wildlife Refuge offering full range of retail, industrial, office, and residential
11	Majestic Commercenter	Present	Development of 15 million square feet of industrial and warehousing space on 1,200 acres
12	Denver Union Station	Present	Development of 1.8 million square feet in lower downtown Denver coupled with multi-modal improvements to the transit hub
13	Denver Connection	Present	Addition of 400 acres of mixed-use development of high- and low-rise office, hospitality, research and development, industrial, retail, and residential buildings
14	High Point Development	Present	A mixed-use development covering 2,000 acres with plans for 3,000 residential units and more than 11 million square feet of commercial space
15	Denver International Business Center	Present	Development of 450 acres for high-end business hotels, corporate headquarters, and restaurants
16	Transit-oriented Development	Present, Future	Increased mix-use (re)development near transit stations
17	Eastgate	Future	Future location of 350-acre warehousing and office complex
18	ProLogis Park	Future	Future location of 2.7 million square feet of industrial space on 260 acres
19	Mile High Greyhound Park Redevelopment	Future	65 acres owned by Commerce City Urban Renewal Authority for future development
20	Denver Two Basin Drainage Project	Future	120 acres for protecting existing and future development from 100-year floods.

Source: Area comprehensive plans, 2035 DRCOG Metro Vision Plan.

6.4 What are the anticipated cumulative impacts?

The discussion below assesses and documents cumulative impacts for the resources summarized in **Exhibit 6-1**. Other past, present, and future actions documented in **Exhibit 6-4** and **Exhibit 6-5** provide the baseline from which No-Action Alternative impacts and Build Alternatives impacts are assessed.

6.4.1 Land use

Land use has changed dramatically in the greater cumulative impacts study area since 1960. For purposes of this analysis, historic development is defined in two ways: (1) development activity as measured by years in which homes were built, and (2) land use changes as measured by land cover analysis and identification of major projects.

Generally, development has increased over the past four decades. In the 1960s, development activity within the land use and development cumulative impacts study area occurred primarily in and around Denver's central business district and near the newly constructed I-70 and I-270. The 1970s marked the beginning of new suburban development, including Montbello in the east and other planned communities in the northwest. The 1980s, however, were heavily affected by economic slowing with little new development or redevelopment in Denver's urban areas.

Still affected by economic conditions of the 1980s, the early 1990s were initially characterized by slow growth, but growth increased markedly through the decade. Influenced heavily by the construction of Denver's new international airport in the northeast and plans for redevelopment of the former Stapleton Airport, 1990 marked the beginning of increased development in the east as well as redevelopment within Denver's central business district. This development and redevelopment trend continued through the early 2000s, but slowed through the nationwide economic recession of December 2007 to June 2009. Recovery has been steady since mid-2009 and remains ongoing.

The number of homes built since 1960 also measures development activity. By this measure, development activity has increased 254 percent in study area neighborhoods (neighborhoods are indicated in **Exhibit 6-2**) from 1960 to 2010, as illustrated in **Exhibit 6-6**.

Degree of impact

This cumulative impacts analysis examines direct and indirect impacts occurring as a result of project alternatives and how they affect resources of concern. These impacts can build on each other—they do not always result in a one-to-one relationship. Instead, they can compound the degree of impact.

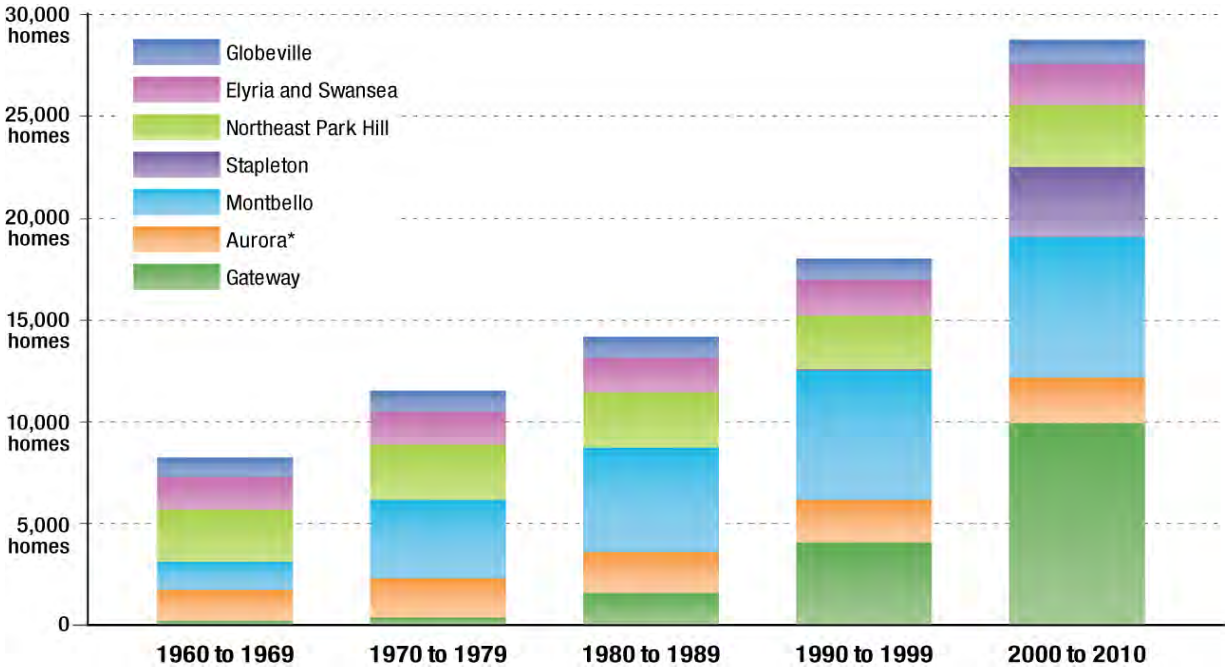
Development and redevelopment is expected to continue into the foreseeable future. As indicated in **Exhibit 6-5**, numerous large-scale residential, commercial, hotel, and mix-use development projects are planned throughout the land use study area. Foreseeable future development-related projects immediately adjacent to I-70 East include:

- **National Western Complex.** Expansion of the 95-acre National Western Complex includes more than 600,000 square feet of developed facilities.

- **Transportation-oriented development.** Surrounding new transit stations, increased mix-use (re)development is planned. Transit oriented development immediately adjacent to I-70 East include the National Western Stock Show, 40th and Colorado, Central Park Boulevard, Peoria and 40th, and Airport stations.

- **Two Basin Drainage Project.** To protect current and future development from 100-year floods, approximately $134 million in drainage improvements will be made near I-70 East (see **Exhibit 6-5**). The project requires approximately 120 acres of property acquisition.

Exhibit 6-6 Total Neighborhood Home Quantities, 1960 to 2010



Source: U.S. Census Bureau, 2011b
*Note: This term is used to describe a small portion of Aurora that is included in the land use study area, as illustrated in **Exhibit 6-2**.*

In addition to the future actions discussed in Section 6.3, above, future land use also is discussed in Section 5.4, Land Use. Exhibit 5.4-7 identifies three planned "Areas of Change" that are linked by I-70. Areas of Change represent parts of Denver where change is underway, desirable, and will benefit from increased population, economic activity, and investment.

Impacts

Cumulative impacts to land use are evaluated based on a project alternative's ability to induce unplanned development and its likelihood to add to other unplanned development caused by the other foreseeable future projects. Induced development is possible when alternatives require highway access points where there currently are none or when new highway access points are planned for low-density or undeveloped areas, since these areas are more susceptible to new growth brought on by project implementation. The distinction between planned and unplanned development is made because land use change is not inherently detrimental if it is part of a predetermined vision and is formally planned for in state and municipal plans. Conversely, unplanned development may impact surrounding land uses or impede regional and local planning objectives.

Project alternatives are not anticipated to cause unplanned development because no new highway access points are planned in areas where there currently are none or in low-density or undeveloped areas. Therefore, project alternatives will not contribute to cumulative land use impacts. As discussed in Section 5.4, Land Use, I-70 East improvements and continued I-70 mobility are cited and relied upon in municipal and CDOT long-range planning documents.

When combined with other past, present, and reasonably foreseeable future transportation projects (see **Exhibit 6-4** for a full list of projects), the Build Alternatives will improve future mobility more than the No-Action Alternative will. The improved mobility will support developing urban centers, such as the Stapleton and Gateway Neighborhoods, as well as the Elyria and Swansea Neighborhood and other well-established neighborhoods in the study area. Neighborhoods in the study area are expected to benefit from the reduced congestion levels provided by the project alternatives in combination with past, present, and foreseeable development because an aspect of building and maintaining viable neighborhoods relies on efficient transportation access and mobility.

Summary

In summary, when combined with other past, present, and reasonably foreseeable future projects, project alternatives will not substantially contribute to cumulative land use impacts in the study area.

Land use

Project alternatives will not substantially contribute to land use-related cumulative impacts.

6.4.2 Relocations and displacements

Extensive land and infrastructure development-related right-of-way acquisitions and relocations have occurred in the study area over the past 50 years. In the 1960s, transportation projects—including I-70 and I-270—required large-scale relocations. Just outside of the relocations and displacements study area identified in **Exhibit 6-2**, major development relocations occurred in the Auraria Neighborhood (1969) to accommodate Denver's higher education campus. The new campus displaced 169 acres of largely low-income, Latino residential neighborhoods. Widespread right-of-way acquisitions occurred in the 1970s as part of the "Skyline" urban renewal effort where 30 downtown city blocks were designated for demolition in hopes of sparking redevelopment. The Rocky Mountain Arsenal's 1992 conversion into a national wildlife refuge prompted Denver to annex 2,000 acres of agricultural land for the future development of the Gateway area. Through intergovernmental agreement, 27,500 acres of largely agricultural and rural residential land was identified as the "Commerce City Annexation Area" to be developed around DIA. Residential acquisitions and relocations near I-70 were associated with the expansion of the National Western Complex Hall of Education (1973), Expo Hall (1991), and Events Center (1995).

Foreseeable future right-of-way acquisitions will occur through the implementation of the *National Western Center Master Plan* and the Two Basin Drainage Project. The *National Western Center Master Plan* recommends purchasing available land for expansion improvements. Drainage improvements and protection from flooding, as part of the Two Basin Drainage Project, will require the acquisition of nearly 120 acres of industrial, commercial, and residential property.

Impacts

Cumulative relocation impacts exist in cases where foreseeable future projects cause relocations to occur in the same area and timeframe. In these situations, projects may

have to compete to relocate businesses or residences in suitable (nearby and equivalent) locations while not exceeding available housing stock. Relocations due to project implementation are, therefore, considered with other foreseeable future projects for their combined, cumulative impact. This type of cumulative relocation impact is not expected from the project alternatives because relocations will not occur within the same timeframe as other foreseeable projects illustrated in **Exhibit 6-3** that also have potential right-of-way acquisitions and relocations. Also, housing stock based on 2010 Census data exceeds the potential relocation need that will be created by the project alternatives.

Mitigation for federally funded projects requires strict adherence to the Uniform Act, which requires that just compensation be provided to any residential property owner or business owner and that relocation assistance be provided to any owner occupant, renter, or business that is displaced due to the acquisition of property by a public entity for public use.

Summary

When combined with other past, present, and reasonably foreseeable future projects, project alternatives will not substantially contribute to cumulative relocations and displacements impacts because the proposed project schedule does not overlap with other relocation-intensive project timetables or exceed available housing stock. In addition, compliance with the Uniform Act will minimize the project's contribution to incremental impacts related to property acquisition.

Relocations and displacements

Project alternatives will not contribute to relocation and displacements-related cumulative impacts.

6.4.3 Social and economic conditions

Public outreach and research conducted on behalf of this project indicates that past projects have impacted neighborhood cohesion within the study area. The residential communities of Elyria and Swansea, Globeville, and Northeast Park Hill became bisected when I-70 was originally constructed in the early 1960s. During these early I-70 years, areas along the interstate urbanized with commercial and industrial uses that benefitted from being close to the highway. While Denver's central business district and the neighborhoods immediately surrounding downtown have seen redevelopment in the past 30 years, other neighborhoods immediately adjacent to I-70 have not benefitted from this urban renewal.

Into the foreseeable future, existing transportation corridors are expected to be improved in response to increasing travel demand. Many of these improvements will occur in communities that have been affected by past transportation projects, including I-70. The following communities affected by past projects are likely to experience future transportation project expansion:

- Globeville, which will experience additional future activity from these projects: I-70 East, East Corridor (commuter rail transit), US 36 Corridor (bus rapid transit), Brighton Boulevard corridor redevelopment, and North Metro Corridor (commuter rail transit).

- Elyria and Swansea, which will experience additional future activity from these projects: I-70 East, Brighton Boulevard corridor redevelopment, North Metro Corridor, East Corridor, and station and redevelopment activities at National Western Center.

- Five Points Neighborhood, which will experience additional future activity from these projects: North Metro Corridor, East Corridor, and Central Corridor/Downing Street Extension (light rail transit).

Impacts

The No-Action Alternative will not contribute to the viability of local and regional communities since it will not add much-needed mobility. The No-Action Alternative will further affect historically impacted neighborhoods along I-70 through property acquisitions. Property acquisitions can have additive effects on neighborhood cohesion through the removal of homes and businesses, which causes loss of neighborhood consistency. Because of the No-Action Alternative's limited revisions, the requirements of the Uniform Act, and the availability of housing stock, these acquisitions will add to, but will be less severe than, displacements of the past.

The No-Action Alternative will not improve long-term mobility. As traffic volumes and travel times increase on I-70, congestion will increase on adjacent neighborhood roads when motorists and truck traffic seek alternate routes east and west. In turn, this will adversely affect social and economic conditions by impacting pedestrian safety, increasing pollution, delaying emergency services, lowering commercial patronage, hindering mobility and access, and increasing local street noise. These effects will be felt most in densely populated communities adjacent to I-70, including

Globeville, Elyria and Swansea, Northeast Park Hill, Stapleton, and Montbello.

Future regional mobility provided by the Build Alternatives and other foreseeable future transportation projects support the viability of new communities and the sustainability of existing neighborhoods, unlike the No-Action Alternative. All of the Build Alternatives will contribute to the collective positive effects of other foreseeable future transportation projects to maintain or enhance regional connectivity. The Partial Cover Lowered Alternative provides neighborhood cohesion benefits by removing the viaduct, lowering the highway, and adding a cover over the highway to be used as public community space.

Like the No-Action Alternative, property acquisitions necessary for the Build Alternatives will impact historically affected neighborhoods adjacent to I-70. As the Build Alternatives require more properties and housing relocations than the No-Action Alternative, the cumulative impacts are greater in this scenario.

Summary

Communities throughout the region rely on sufficient mobility to maintain social and economic conditions. Only the Revised Viaduct Alternative and the Partial Cover Lowered Alternative provide this regional mobility. Property acquisitions required by all alternatives impact social and economic conditions in historically impacted communities immediately adjacent to I-70. However, the Build Alternatives do so to a greater degree because of their larger footprints. Since the reconstructed viaduct will have a larger footprint, the Revised Viaduct Alternative has the potential to add to past social and economic condition cumulative impacts that resulted from constructing the original I-70 viaduct in the 1960s. However, the Partial Cover Lowered Alternative provides neighborhood cohesion benefits by removing the viaduct, lowering the highway, and adding a highway cover for use as a public community space.

Social and economic conditions

Project alternatives will not contribute substantially to social and economic conditions cumulative impacts.

Although the Partial Cover Lowered Alternative requires the greatest number of acquisitions, removing the viaduct, lowering the highway, and adding a cover over the highway to be used as public community space will improve neighborhood cohesion by reconnecting communities bisected by I-70 since its construction in 1960. Therefore, potential impacts to social and economic conditions from the Partial Cover Lowered Alternative are anticipated to be

offset and not contribute substantially to cumulative impacts. Regardless of the alternative, any residential owner/occupant, renter, or business that is displaced receives assistance.

In summary, when combined with other past, present, and reasonably foreseeable future projects, project alternatives will not substantially contribute to social and economic conditions cumulative impacts.

6.4.4 Historic preservation

Public outreach and research conducted for this study indicates that past projects have impacted neighborhood cohesion within the study area. The residential communities of Elyria and Swansea, Globeville, and Northeast Park Hill became bisected when I-70 was originally constructed in the early 1960s which also supported the growth of large-scale commercial operations along the interstate. In the 1960s, transportation projects—including I-70—required residential and commercial relocations. Residential acquisitions and relocations near I-70 were associated with the expansion of the National Western Complex Hall of Education (1973), Expo Hall (1991), and Events Center (1995). During these early I-70 years, areas along the interstate urbanized with commercial and industrial uses that benefitted from being close to the highway.

While Denver's central business district and the neighborhoods immediately surrounding downtown have seen redevelopment in the past 30 years, other neighborhoods immediately adjacent to I-70 have not experienced this urban renewal or investment in their significant historic districts. The relationship between socioeconomics, neighborhood cohesion, land use, right-of-way acquisition, noise, public infrastructure, and historic resources has been weak in the Elyria and Swansea Neighborhood. Even though the neighborhood has a number of significant historic resources, there has been very little effort prior the I-70 East project to better understand the history or to preserve or save buildings that are threatened. In addition, very little investment has been made in the historic resources in the neighborhood, either through grant-funded preservation projects or by supporting the continued usage of older buildings as residences or as viable businesses or restaurants. The cohesion of the neighborhood has been negatively impacted by the location of the viaduct, which is a barrier for residents who want to travel within the

neighborhood, including access to the Swansea Elementary School or local businesses.

Impacts

Subsection 800.5 of the Section 106 regulations (36 CFR Part 800) requires federal agencies to consider the effects of their projects on historic resources. The criteria of adverse effect [800.5(a)(1)] includes the following language pertinent to cumulative effect assessments: "Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative."

The methodology for this Section 106 cumulative effects assessment is reflective of reasonably foreseeable future effects, based on an analysis of past and present actions; reasonably foreseeable future effects are evaluated for each alternative and option, as required by 36 CFR Part 800. Much of the analysis regarding potential cumulative effects to historic resources is discussed in Attachment I, *Section 106 Determinations of Eligibility and Effects*. Cumulative impacts analysis in this section incorporates the findings of the Section 106 cumulative effects assessment.

The project alternatives, coupled with other transportation and development projects identified in **Exhibit 6-1** and **Exhibit 6-2**, would utilize the existing highway alignment, but would expand for constructability reasons or for additional capacity, requiring right-of-way acquisitions. A central concern with regard to the potential project and alternatives under evaluation with regard to cumulative effects to historic preservation is related to land use and the potential for induced development. As noted in Section 5.4, Land Use, induced development occurs when project alternatives directly change how land is used or if project implementation induces enough anticipated or unanticipated development that land use patterns change. Induced development is possible when alternatives require highway access points where there are currently none.

Present and future threats to historic resources continue through private development, which is not subject to the same oversight standards or avoidance controls as federal projects. Foreseeable future projects that have the greatest potential for historical impacts are land development projects or those infrastructure projects that may spur private development. In the foreseeable future, transit projects are the most likely to induce new private

development through transit-orient development. Transit projects in the study area (East Corridor, North Metro Corridor, Central Corridor, Gold Line, West Corridor, and the I-225 Corridor, as identified in **Exhibit 6-3**) are expected to foster transit-oriented development near stations, which could create cumulative threats to historical resources. In the foreseeable future, the National Western Complex will be redeveloped and existing buildings within the National Western Historic District would be replaced. Foreseeable future changes involving property acquisition include the Two Basin Drainage Project, which will require the acquisition of nearly 120 acres, including a portion of the Market Street Lead railroad.

However, I-70 East project alternatives will not induce development and will not contribute to loss of historic resources through private development.

Improved mobility may support developing urban centers within the Elyria and Swansea Neighborhood. These urban centers could result in foreseeable investments in residential and commercial development, which could ultimately benefit historic resources through restoration and rehabilitation efforts. Conversely, the investment in the community could result in the redevelopment of the area and demolition or alteration of historic buildings, resulting in impacts to the historic character of the community.

Summary

Subsection 800.5 of the Section 106 regulations (36 CFR Part 800) requires federal agencies to consider the effects of their projects on historic resources. The criteria of adverse effect [800.5(a)(1)] includes the following language pertinent to cumulative effect assessments: "Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative."

The methodology for this Section 106 cumulative effects assessment is reflective of reasonably foreseeable future effects, based on an analysis of past and present actions; reasonably foreseeable future effects are evaluated for each alternative and option, as required by 36 CFR Part 800. Much of the analysis regarding potential cumulative effects to historic resources is discussed in Attachment I, *Section 106 Determinations of Eligibility and Effects*.

When combined with other past, present, and reasonably foreseeable future projects, project alternatives are not

Historic preservation

When combined with other past, present, and reasonably foreseeable future projects, project alternatives are not anticipated to result in setting changes that would diminish the eligibility of historic resources beyond those affected by acquisition, are not anticipated to result in induced development, and would not result in significant cumulative effects.

anticipated to result in setting changes that would diminish the eligibility of historic resources beyond those affected by acquisition, are not anticipated to result in induced development, and would not result in significant cumulative effects.

6.4.5 Air quality

Air quality in the Denver region has fluctuated over the past 50 years. From the 1960s to the late 1980s, air quality got steadily worse due primarily to increased traffic tied to population growth in the region. In the late 1980s, the Denver metropolitan area was frequently in violation of the EPA air quality standards for carbon monoxide, particulate matter, and ozone—the criteria pollutants that have been of concern in the Denver region because of past exceedances of the NAAQS standards. Failure to meet these standards resulted in a designation of nonattainment by the EPA.

In the 1990s, regulatory and other actions (such as vehicle emissions programs, ethanol in gasoline during the winter, adding scrubbers to factories/refineries, road sweeping programs, etc.) were mandated by the federal and state governments in their quest to improve air quality. These efforts have contributed significantly to reducing air pollution in the Denver region.

Of the three criteria pollutants—carbon monoxide, particulate matter, and ozone—ozone is the only one for which the region is currently in nonattainment. The Denver region has been re-designated to attainment/maintenance status for PM_{10} (2002) and carbon monoxide (2001).

As of December 2012, all areas in Colorado are in attainment of all NAAQS for criteria pollutants, except for ground-level ozone. Seven counties in the Denver metropolitan area and portions of two counties in the Colorado North Front Range are currently designated as nonattainment for exceeding the 8-hour ozone standard. The region was originally designated as nonattainment under the 1-hour standard, which has since been replaced by an 8-hour standard. Prior to 2006, there was only one exceedance of the ozone standard at any of the four monitoring stations in the study area; however, several exceedances have been recorded at north Denver's Welby station since then.

On December 12, 2008, the Colorado Air Quality Control Commission approved the Ozone Action Plan, including revisions to the SIP, for the Denver Metro Area and North

Climate change

The CEQ instructs that NEPA documents comment on global climate change. These discussions are detailed in Attachment J, *Air Quality Technical Report* and in Section 5.10, Air Quality.

Front Range. The Ozone Action Plan identifies specific control measures designed to bring the region into compliance with the ozone standard by 2015.

The Denver region was designated nonattainment for carbon monoxide in 1978, subsequent to the Clean Air Act Amendments of 1977. On September 27, 2010, all carbon monoxide areas in the country were re-designated to maintenance status. There have not been any exceedances of the carbon monoxide standard at any of the four monitoring stations in the study area since 1999.

The region was re-designated to attainment/maintenance status for PM_{10} by the EPA on September 16, 2002 (EPA, 2002). There was one exceedance of the $PM_{2.5}$ standard in 2001, but this was not enough to trigger a nonattainment designation for that pollutant.

Impacts

The I-70 East project will be a substantial congestion-reducing transportation improvement for the Denver region. As big as it is, however, the project's vehicular travel and associated emissions are relatively small in comparison to those of the greater Denver region. **Exhibit 6-7** shows the VMT for the project alternatives in the study area compared to the VMT for the Denver region. **Exhibit 6-8** shows project-related on-road mobile source emissions compared to those of the Denver region, where applicable.

As the data in **Exhibit 6-7** indicate, the project's VMT ranges from 9.7 percent to 10.4 percent of the regional VMT, depending on the alternative. The Build Alternatives have between 3.9 percent and 6.5 percent higher VMT than the No-Action Alternative. Since the No-Action Alternative is consistent with the most recent conformity analysis for the regional transportation plan, it is part of the baseline for regional on-road mobile source emissions. The information in **Exhibit 6-7** also indicates that VMT increases a small degree for the Build Alternatives compared to the No-Action Alternative. While any increase or decrease is noteworthy, it is also important to note that these differences are extremely small when taken in context of regional travel and emissions.

Exhibit 6-8 provides perspective for the carbon monoxide, PM_{10}, volatile organic compounds, and nitrogen oxides emissions associated with the project alternatives as compared to the regional emissions and State Implementation Plan emissions budgets. As the data show,

project-related emissions are a fraction of the regional emissions; and the regional emissions, which are from the most recent conformity determination conducted by DRCOG, are much lower than the SIP budgets.

Exhibit 6-7 Project and Regional Vehicle Miles of Travel (2035)

Alternative	2035 VMT	Percent of Regional VMT	Percent Difference from No-Action VMT
No-Action	10,453,600	9.7%	n/a
Revised Viaduct, General-Purpose Lanes Option[1]	11,129,500	10.4%	6.5%
Revised Viaduct, Managed Lanes Option	10,865,200	10.1%	3.9%
Partial Cover Lowered, General-Purpose Lanes Option[1]	11,129,700	10.4%	6.5%
Partial Cover Lowered, Managed Lanes Option	10,885,000	10.0%	4.1%
Denver Region[2]	107,259,600	n/a	n/a

1. *Note: for air quality study area*
2. *Source: Appendix C, Modeling Summary Tables, 2013 Amendment Cycle 1 Denver Southern Subarea 8-hour Ozone Conformity Determination (DRCOG, 2013)*

Exhibit 6-8 2035 Project and Regional Emissions (tons per day)

Pollutant	I-70 East (Study Area Emissions)		Regional Emissions	No-Action Emissions as a Percent of Regional Emissions	Allowance[3]
	No-Action Alternative	Build Alternatives			
Volatile organic compounds	1.0	1.0	21.6[1]	4.6%	89.7[1]
Nitrogen oxides	3.4	3.4 to 3.6	17.5[1]	19.0%	102.4[1]
Carbon monoxide	48.2	32.6 to 48.2	958.8[2]	5.0%	1,600.0[2]
PM_{10}	0.7	0.5 to 0.7	43.1[2]	1.6%	55.0[2]

1. *Source: Appendix C, Modeling Summary Tables, of 2013 Amendment Cycle 1 Denver Southern Subarea 8-hour Ozone Conformity Determination (DRCOG, 2013)*
2. *Source: 2013 Amendment Cycle 1 DRCOG carbon monoxide and PM_{10} Conformity Determination for the Amended Fiscally Constrained 2040 Regional Transportation Plan and the Amended 2012-2017 Transportation Improvement Program (DRCOG, 2015d)*
3. *Allowance estimates are budgeted amounts from the State Implementation Plan*

Ozone is considered a regional issue rather than a localized street or intersection issue, and an individual highway project will typically have little or no effect on regional ozone concentrations. Ozone is evaluated using the volatile organic compounds and nitrogen oxides emission precursors in an emission inventory burden analysis. To review the results of air quality analysis in its entirety, see Section 5.10, Air Quality.

Exhibit 6-9 shows the 2010 volatile organic compounds and nitrogen oxides emissions estimates for each of these sources from the region's 8-hour Ozone Attainment Plan. On-road mobile sources are only 6.7 percent and 16.8 percent of total volatile organic compounds and nitrogen oxides emissions in the region. Combining this information with the percent of project emissions to regional emissions shows that the project volatile organic compounds and nitrogen oxides emissions are roughly 0.1 percent and 0.5 percent of total regional volatile organic compounds and nitrogen oxides emissions, respectively.

Exhibit 6-9 2010 Volatile Organic Compounds and Nitrogen Oxides Regional Emissions

Source Category	VOC (tons per day)	% of Total	NOx (tons per day)	% of Total
Point	37.0	2.3%	86.4	11.8%
Oil and Gas Point & Area	203.3	12.4%	46.2	6.3%
Area	61.0	3.7%	22.1	3.0%
Non-Road Mobile	61.3	3.7%	61.0	8.4%
On-Road Mobile	109.2	6.7%	122.9	16.8%
Anthropogenic[1]	471.8	28.8%	338.6	46.4%
Biogenic[2]	694.0	42.4%	53.0	7.3%
Total	**1,637.6**		**730.1**	

Source: Denver Metro and North Front Range 8-Hour Ozone Attainment Plan (Colorado Air Quality Control Commission, 2008)
1. Anthropogenic refers to emissions produced by human beings
2. Biogenic refers to emissions produced by living organisms

Other Actions

As part of the discussion of cumulative air quality effects, it is necessary to identify other actions that could contribute to long-term air quality degradation. These will be actions associated with or potentially influenced by the project and its alternatives. The East Corridor rail commuter line to DIA being constructed as part of the Fastracks program is noteworthy in this regard. Although a separate project from the I-70 East project, it is being constructed in relative proximity to the I-70 corridor.

In terms of long-term effects, these two major transportation improvements will potentially attract new private sector investment to the corridor. This could possibly include redevelopment of existing land uses in some locations with higher densities and a mix of retail, office, and residential

uses. Additional industrial development is possible as well. While it is possible that localized emissions could increase with increased economic activity in the general area, it could have positive regional air quality impacts due to shorter trip lengths and increased transit use. These future potential actions are extremely difficult to predict, especially at the local level, but they are worth mentioning for disclosure purposes. Other factors, such as infrastructure investment, could affect future impacts as well.

Air quality

Project alternatives will not substantially contribute to air quality related cumulative impacts.

Summary

If project alternatives contribute to air quality degradation and nonattainment of air quality standards when coupled with other foreseeable future actions, they cause cumulative impacts to air quality. Based on the air quality analysis reported in Section 5.10, Air Quality, and in the summary of air quality analysis results discussed earlier in this subsection, no substantial direct impacts were determined for all project alternatives. Project alternatives will not contribute to an increase of air pollutants region-wide and no NAAQS air quality violations are expected with implementation of these project alternatives at a local level. Because there are no direct impacts due to these project alternatives, there will be no meaningful additive impacts with other reasonably foreseeable future actions.

6.4.6 Noise

The geographic extent of noise impacts has grown with increased urbanization in the study area. Noise levels have been influenced by increasing urban density and intensity of use over time. Noise impacts associated with urban areas have encroached into rural lands as new development and transportation systems have been constructed over the past 50 years. These changes occur when unbuilt areas are replaced or become encroached upon by more intensive (and noisy) land uses, such as roads or urban development. Major transportation projects that have previously increased noise levels include the construction of I-70 and I-270 during the 1960s, E-470 in 1991, and Peña Boulevard and DIA in 1995. While noise levels have generally increased and have expanded spatially, some improvements have been made, such as the closure of Stapleton International Airport in 1995.

Foreseeable future actions also will contribute to urban noise as new development in the east will convert large areas of rural land into more noise-intensive urban

development. Continuing downtown redevelopment also is expected to contribute to noise levels in the western part of the study area. Additional housing, office, and commercial capacity coupled with forecasted population and employment growth will intensify noise generation in these areas. Future rail transit projects also will contribute to increased noise levels, especially where rail transit corridors converge downtown. Transit alignments located in existing transportation corridors will have the potential for cumulative impacts through combined highway and rail transit noise; however, mitigation can be, and is being, used to limit noise levels to reduce noise impacts.

Impacts

If project alternatives increase noise levels or contribute to the collective noise impacts of foreseeable future projects, then they are likely to have cumulative noise impacts.

As illustrated in Section 5.12, Noise, both the No-Action Alternative and the Build Alternatives will have direct noise impacts. While mitigation that complies with CDOT's Noise Abatement Criteria (CDOT, 2015) will be implemented and existing noise walls replaced, noise will not be mitigated when unreasonable or infeasible or not recommended. In these very localized areas, noise will incrementally increase due to the project alternative and cause a cumulative noise impact. In the Elyria and Swansea Neighborhood, the Partial Cover Lowered Alternative impacts fewer receptors than any other alternative, including the No-Action Alternative. Across the cumulative noise study area identified in **Exhibit 6-2**, noise impacts will not be substantial due to the overall benefits of noise mitigation.

Summary

In summary, when combined with other past, present, and reasonably foreseeable future projects, the project alternatives will contribute to cumulative noise impacts in very localized areas by increasing noise over existing conditions. In the Elyria and Swansea Neighborhood, the Partial Cover Lowered Alternative impacts fewer receptors than any other alternative, including the No-Action Alternative. Throughout the cumulative noise impact study area, where reasonable and feasible or required by guidance and regulations, noise will be minimized through construction of noise walls and will not substantially contribute to cumulative noise impacts after mitigation.

Noise

Project alternatives will not substantially contribute to noise-related cumulative impacts after mitigation.

6.4.7 Wetlands and other waters of the U.S.

Urbanization in the study area has affected wetlands and other waters of the U.S. through physically displacing and degrading streams, rivers, ponds, or lakes. As the study area has urbanized over time, streams have been channelized little by little and cleared of meanders that were once prone to periodic overflow. The stormwater detention ponds and roadside drainages that came with urbanization prevented flooding, creating wetland conditions in historically dry areas.

For the purposes of this document, hydrologic change is measured by the degree to which impervious surfaces intrude into hydrologic areas. This is determined by spatially overlaying urbanized areas since 1965 with hydrologic features data (rivers, streams, ponds, and lakes). By detecting impervious surfaces within 100 feet of hydrologic features, it was found that 8 percent of hydrologic features were overlapped by urbanized land in 1965, 8 percent in 1980, and 14 percent in 1990. By 2002, more than 20 percent of hydrologic features in the study area were intruded upon by impervious surfaces.

Impervious surface

Impervious surfaces include roads, parking lots, driveways, sidewalks, compacted soils, and rooftops—surfaces that reduce infiltration and increase surface runoff, altering the pathways by which water reaches urban streams.

In 1965, impervious, urbanized areas near hydrologic features were mostly located in the west portion of the study area in places such as the South Platte River, Sand Creek, Cherry Creek, and Clear Creek. Development along I-70 in the 1960s encroached into these riparian areas. Wetland protection during this time was minimal, so unmitigated development into these areas was allowed. Although change in impervious surface from 1965 to 1980 was limited in quantity, increased urbanization near hydrologic features occurred primarily along Sand Creek, adjacent to I-270.

Land use changes between 1980 and 1990 marked an increase of impervious surface in existing urban areas. The following decade marked expanded urbanization into previously unbuilt areas. By 2002, urbanization had further encroached along hydrologic features in the west, including the South Platte River, Sand Creek, Clear Creek, Fisher Ditch, and the Rocky Mountain Ditch. Urbanization near hydrologic features also began in the east during this time, primarily due to DIA and the build-out of Green Valley Ranch.

In the reasonably foreseeable future, wetlands and other waters of the U.S. will be most threatened in the northeast portion of the study area where undeveloped land is under

increasing development pressure. Urbanization in this area will require greater flood control measures and the possibility of physical wetland displacement. The condition of wetlands and other waters of the U.S. in urbanized areas west and south of Stapleton is not expected to change dramatically in the future, since these areas are generally established and close to full build-out. This area is fortifying drainage though the Two Basin Drainage Project which will provide 100-year storm protection and desired redundancy. Future actions that directly and indirectly affect these resources will be subject to mitigation as regulated by the federal Water Pollution Control Act, Clean Water Act, and Executive Order 11990, "Protection of Wetlands" (Carter, 1977).

Impacts

The Build Alternatives will cause cumulative impacts to wetlands or other waters of the U.S. if wetlands lost or modifications to other waters of the U.S. dramatically contribute to losses experienced region-wide or if there are substantial induced losses (wetlands lost through project-induced, unplanned development).

If left unmitigated, the Build Alternatives will directly affect local wetlands. As discussed in Section 5.15, Wetlands and Other Waters of the U.S., the Build Alternatives permanently impact 4.352 acres to 4.442 acres of wetlands and 0.693 acre to 0.771 acres of other waters of the U.S. and open waters.

The regional sustainability of wetland resources is dependent on the ability of each individual future action to be sufficiently mitigated to avoid further incremental degradation. To this end, the project will mitigate both jurisdictional and non-jurisdictional wetlands at a 1:1 ratio to offset impacts to wetlands. Therefore, impacts will cumulatively contribute to wetland loss in the short term at the onset of the impact, but are not expected to contribute to long-term cumulative wetland loss because of mitigation measures.

Wetlands and other waters of the U.S. also are susceptible to cumulative impacts through private development by either direct displacement or degradation due to changes in stormwater runoff and non-point pollution. Because the No-Action Alternative and the Build Alternatives are not expected to induce development, they will not add to

cumulative impacts to wetlands or other waters of the U.S. due to increased development.

Summary

In summary, when combined with other past, present, and reasonably foreseeable future projects, the Build Alternatives will not contribute substantially to long-term cumulative wetland loss because of compliance with Executive Order 11990 and FHWA's and CDOT's policies of no net loss. In addition, the Build Alternatives are not expected to substantially contribute to cumulative impacts to other waters of the U.S. given the minimal permanent impacts and implementation of BMPs (as discussed in Section 5.15, Wetlands and Other Waters of the U.S.). Because the No-Action Alternative has no wetland impacts, it will have no cumulative effects to wetlands and no long-term cumulative effects to other waters of the U.S.

Wetlands and other waters of the U.S.

Project alternatives will not contribute substantially to negative wetland cumulative impacts.

6.4.8 Water quality

Historically, land use patterns and urbanization have influenced water quality by changing stormwater runoff levels and composition. The nature of runoff is directly related to land uses and the geographic coverage of urbanized areas. Growth of the water quality study area's urban footprint since 1960 has increased the potential of stormwater runoff to affect water quality. In addition, increases in impervious area affect the ability of existing drainage systems to accommodate peak stormwater events. Through the land cover analysis discussed in Section 6.4.7, it is estimated that impervious surface in the stormwater and water quality study area (study area boundary illustrated in **Exhibit 6-2**) has increased 255 percent from 1965 to 2002, translating to an increase of approximately 32,000 acres during the 36-year span.

Despite this increase in impervious urban land cover, water quality has improved throughout the region. Local, state, and federal regulations enacted during this timeframe have produced positive changes to water quality. Ordinances have strengthened over time, beginning with the federal Water Pollution Control Act of 1972, and later in 1974 with the passage of the Safe Drinking Water Act. The resulting National Pollutant Discharge Elimination System permit program places limits on the amount of pollutants that may be discharged from point sources. The EPA granted Colorado the authority to issue and manage these permits through

Definition of point-source pollution

Point-source pollution is pollution that comes from a single source, such as an oil refinery's wastewater discharge outlet.

Regulation 61 of the Colorado Discharge Permit System Regulations (CDPHE, 2006).

These regulations require operators of large municipal storm sewer systems—such as Denver, Aurora, and CDOT—to obtain permits and develop stormwater management programs. These programs include issuance of construction and maintenance BMPs for preventing harmful pollutants from entering stormwater systems. Recent changes provide more stringent controls on construction-related discharges by requiring construction projects one acre in size or larger to secure a Colorado Discharge Permit System permit for stormwater discharges.

Foreseeable future development at Stapleton and farther east in the study area will result in additional stormwater runoff and may adversely affect water quality due to conversion of rural, pervious land into impervious urban development. New development east of Stapleton could contribute to cumulative stormwater runoff impacts on Second Creek and Third Creek (creek locations are shown in **Exhibit 6-2**). Local, state, and federal stormwater regulations will control and minimize the impacts of this foreseeable future development, however.

Foreseeable future stormwater improvements will be made through the forthcoming Two Basin Drainage Project. At a cost of $134 million, the project will provide 100-year storm protection and desired redundancy for the I-70 East project area. The project will add necessary stormwater detention areas, open channels, storm pipes, and storm drains.

Impacts

The increase in impervious surface caused by the project alternatives will be negligible when considering the study area as a whole. These changes will have no impact on stormwater runoff and water quality because drainage and detention standards require control of stormwater release and compliance with local, state, and federal water quality standards. In fact, the project alternatives may improve water quality since the existing highway was constructed before such rigorous stormwater and water quality standards existed. The project alternatives may, therefore, have beneficial cumulative impacts for stormwater runoff and water quality.

The No-Action Alternative will improve water quality, since reconstruction of the viaduct will require new stormwater detention features. These improvements are limited to the

area between Brighton Boulevard and Colorado Boulevard, but will have a minor beneficial cumulative impact on regional water quality.

The Build Alternatives will have impacts to water quality if unmitigated, as documented in Section 5.16, Water Quality. Because of these potential impacts, mitigation—such as water quality ponds—will be used as part of any Build Alternative implemented. The Partial Cover Lowered Alternative has the potential to create ponding areas between Brighton Boulevard and Dahlia Street. The alternative requires mitigation to reduce surface runoff to prevent water from reaching the lowered section of I-70. It also must allow for safe discharge of stormwater runoff to existing drainage systems. Implementation of mitigation measures is expected to improve water quality conditions by treating runoff that otherwise would be untreated.

Summary

In summary, when combined with other past, present, and reasonably foreseeable future projects, the increased impermeable surface caused by the project alternatives—and resulting increase in stormwater runoff—will not contribute substantially to negative cumulative water quality impacts. This is due to compliance with stormwater regulations, implementation of BMPs, and utilization of stormwater collection improvements, all of which are ultimately expected to improve water quality over existing conditions.

Water quality

Project alternatives will not contribute substantially to water quality cumulative impacts.

6.4.9 Environmental justice

While Section 5.3, Environmental Justice, examines how direct and indirect resource impacts affect low-income and minority populations, the environmental justice cumulative impacts analysis examines if these specific populations could be harmed by the collective effect of other past, present, and foreseeable actions in combination with the project alternatives.

As established in the preceding cumulative resource sections (Section 6.4.1 through 6.4.8), neighborhoods adjacent to I-70 East have a history of cumulative impacts. These communities include the low-income and minority neighborhoods of Globeville, Elyria and Swansea, Northeast Park Hill, Montbello, Aurora, and Gateway, as identified in Section 5.3, Environmental Justice. The residential communities of Elyria and Swansea, Globeville, and

Northeast Park Hill became bisected when I-70 was originally constructed in the early 1960s. In the 1960s, transportation projects—including I-70 and I-270—required large-scale relocations in this area. Community cohesion was impacted in these neighborhoods as a result.

A foreseeable future project that could potentially contribute to environmental justice cumulative impacts is the redevelopment of the National Western Stock Show facilities. While the *National Western Center Master Plan* emphasizes stronger local connections and other neighborhood benefits, the project may require further land acquisition. Details about the range of possible relocations are not known at this time. The Two Basin Drainage Project, will also require the acquisition of nearly 120 acres of industrial, commercial, and residential property. The project will examine environmental justice impacts during NEPA-level review. The other large-scale project being implemented in these neighborhoods is the East Corridor rail-transit line. It was documented though NEPA review that the project will have positive long-term environmental justice effects in these neighborhoods.

Impacts

Cumulative environmental justice impacts are determined by examining the cumulative resource impacts documented in Sections 6.4.1 through 6.4.8 for their effect on the low-income and minority populations identified in Section 5.3, Environmental Justice (**Exhibit 5.3-5**).

All alternatives have the following environmental justice cumulative impacts:

- Social and economic conditions impacts caused directly through property acquisitions
- Overall noise increase

In addition to the cumulative environmental justice impacts noted above, the No-Action Alternative also will have the following cumulative environmental justice impacts:

- Lack of mobility will not support the viability of regional neighborhoods, including other low-income and minority populations
- Increased neighborhood congestion caused by cut-through traffic will affect safety, air quality, emergency services, noise, and local mobility

In addition to the list of cumulative environmental justice impacts shared among all alternatives noted above, the Build Alternatives will have the following cumulative environmental justice impacts:

- Improved mobility will support the viability of regional neighborhoods, including other low-income and minority populations
- Social and economic conditions impacts will be caused by the large number of property acquisitions required for implementation
- The Partial Cover Lowered Alternative will improve neighborhood cohesion in historically impacted low-income and minority neighborhoods by providing new, open, public community space and removing physical barriers (the viaduct) within the neighborhood
- Historic resources will be acquired during implementation

Summary

In summary, when combined with other past, present, and reasonably foreseeable future projects, both the No-Action Alternative and the Build Alternatives have the potential to substantially contribute to environmental justice cumulative impacts.

The tradeoffs between cumulative impacts for the No-Action Alternative and the Build Alternatives are subjective and are open to wide interpretation. For example, the No-Action Alternative benefits I-70 East adjacent low-income and minority neighborhoods by avoiding extensive property displacements. As a tradeoff, however, this scenario also causes mobility-related impacts to the local neighborhoods, as well as other low-income and minority neighborhoods region-wide. Also, the viaduct remains a barrier to neighborhood cohesion. The Build Alternatives, however, require more property displacements, but as a tradeoff, avoid mobility-related impacts to local and regional low-income and minority neighborhoods. The Partial Cover Lowered Alternative has the added benefit of improving neighborhood cohesion in historically impacted low-income and minority neighborhoods by restoring community connectivity.

Environmental justice

Project alternatives have the potential to contribute to environmental justice cumulative impacts.

6.5 What are the cumulative benefits?

Project alternatives coupled with other past, present, and future projects have the cumulative benefits necessary to support a growing metropolitan area. Cumulative benefits are the positive effects experienced through the collective implementation of past, present, and foreseeable future projects in combination with the proposed alternatives.

The primary benefit of the Build Alternatives is increased mobility. Mobility is an integral component of maintaining a viable city. Mobility supports aspects of commercial and private travel, as well as local and regional access, without which commerce, quality of life, and the overall function of a city will be overloaded. The Build Alternatives will improve future mobility more than the No-Action Alternative, thereby supporting developing urban centers, such as the Stapleton and Gateway Neighborhoods, as well as the Elyria and Swansea Neighborhood and other well-established neighborhoods in the study area.

The Partial Cover Lowered Alternative provides additional benefits to neighborhood cohesion by removing the viaduct, lowering the highway, and adding a highway cover for use as a public community space. Because an aspect of building and maintaining viable and cohesive neighborhoods relies on efficient transportation access and mobility, neighborhoods in the study area are expected to benefit from the reduced congestion levels provided by the Build Alternatives over the No-Action Alternative.

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CHAPTER 7: SECTION 4(F) EVALUATION

This chapter discusses Section 4(f) properties and any use of those properties by the project alternatives. It presents a discussion of alternatives to avoid uses and measures to minimize harm. Since all Build Alternatives would use Section 4(f) properties, it also presents a least overall harm discussion.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- Minor design changes made revisions to the APE and impacts. Uses of the South Platte River Greenway Trail and Burlington ditch were avoided.
- Least overall harm argument was revised.
- Final Section 4(f) determinations were included.

7.1 What are Section 4(f) properties and why are they important to this project?

A Section 4(f) property is a publicly owned park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or a historic site of national, state, or local significance. Significance is determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site. Along the project corridor, Section 4(f) properties consist of public parks, recreation areas, and historic sites on, or eligible for listing on, the NRHP.

FHWA may not approve a transportation program or project that uses a Section 4(f) property unless:

a) the Administration determines that:

There is no feasible and prudent avoidance alternative, as defined in § 774.17, to the use of land from the property; and

The action includes all possible planning, as defined in § 774.17, to minimize harm to the property resulting from such use; or

b) The Administration determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact, as defined in § 774.17, on the property.

Area of Potential Effect (APE)

References to the APE in the Section 4(f) Evaluation refer to the Section 106 APE, which was analyzed for historic properties (see Section 5.6, Historic Preservation).

7.2 What federal regulations mandate a Section 4(f) evaluation?

Section 4(f) has been part of federal law since 1966, when it was enacted as Section 4(f) of the U.S. Department of Transportation Act. It is codified in 23 USC Section 138 and 49 USC Section 303. Section 4(f) of the U.S. Department of Transportation Act of 1966 declares that "[it is] the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites" (49 USC §303). This Section 4(f) evaluation has been conducted in accordance with 23 CFR 774 and FHWA's 2012 Section 4(f) Policy Paper.

FHWA's Colorado Division Administrator is responsible for determining that this project meets the criteria and procedures set forth in the federal regulations.

7.3 What constitutes a "use" under Section 4(f)?

A use of a Section 4(f) property can occur in three ways:

- Land is **permanently incorporated** into a transportation facility, such as through right-of-way acquisition (this is a direct use).
- Land is **temporarily occupied** by a transportation project, such as by a construction easement, and the occupancy is adverse in terms of the Section 4(f) statute's preservationist purposes (this is a temporary use).
- There is no permanent incorporation of land, but the proximity of the transportation project results in adverse effects (such as noise, access, and/or ecological effects) that are so severe that the activities, features, or attributes that qualify the resource for protection under Section 4(f) are substantially impaired. These types of effects are considered a **constructive use.**

In addition to these use categories, a *de minimis* impact determination can be applied if the use of the impact will not adversely affect the activities, features or attributes that qualify the resource for Section 4(f) protection. A *de minimis* impact determination does not require further analysis for avoidance or impact minimization.

7.3.1 How is a de minimis impact determined?

A determination of *de minimis* impact on a historic site (23 CFR 774.5(b)(1)) may be made when:

- The process required by Section 106 of the National Historic Preservation Act results in the determination of "no adverse effect" or "no historic properties affected" with the concurrence of SHPO and ACHP, if participating in the Section 106 consultation.

- SHPO, as the official with jurisdiction over historic sites, is informed of FHWA's intent to make a *de minimis* impact determination based on their written concurrence in the Section 106 determination.
- FHWA has considered the view of any consulting parties participating in the Section 106 consultation.

The use of a transportation project on a park, recreational area, or wildlife and waterfowl refuge that qualifies for Section 4(f) protection may be determined to be *de minimis* if the following criteria (23 CFR 774.5(b)(2)) are met:

- The use of the Section 4(f) resource, together with any avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f).
- The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, and attributes of the Section 4(f) resource.
- The official(s) with jurisdiction over the property are informed of FHWA's intent to make the *de minimis* impact determination based on their written concurrence after public review and comment that the project will not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f).

7.4 What is the purpose and need for the project?

The purpose of the project is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area. The need for this project results from the following issues:

- Transportation infrastructure deficiencies
- Increased transportation demand
- Limited transportation capacity
- Safety concerns

Chapter 2, Purpose and Need, provides more information on the purpose and need for the project.

7.5 What alternatives are evaluated in the Final EIS?

Impacts from the No-Action Alternative and Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative) are fully evaluated in this document. **Exhibit 7-1** summarizes the alternatives and options under consideration. Chapter 3, Summary of Project Alternatives, provides detailed information on the alternatives evaluated and screening process.

7.5.1 No-Action Alternative

The No-Action Alternative replaces the existing viaduct between Brighton Boulevard and Colorado Boulevard without adding any capacity; the remainder of the corridor will reflect existing conditions and include existing, planned, and programmed roadway and transit improvements (such as FasTracks) in the project area. The No-Action Alternative includes Expansion Options described later in this section. Note that the No-Action Alternative compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need. Therefore, it is not a prudent Section 4(f) avoidance alternative.

7.5.2 Build Alternatives

The Build Alternatives add capacity to I-70 between I-25 and Tower Road by constructing additional lane(s) or restriping.

Revised Viaduct Alternative

The Revised Viaduct Alternative replaces the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard. It adds additional lane(s) in each direction from Brighton Boulevard to Tower Road. It also adds capacity from I-25 to Brighton Boulevard by restriping. The Revised Viaduct Alternative also includes Expansion Options and Operational Options described later in this section.

Exhibit 7-1 Summary of Project Alternatives and Options

Partial Cover Lowered Alternative

As a result of the comments received on the Supplemental Draft EIS and additional stakeholder outreach and agency coordination, the Partial Cover Lowered Alternative has been refined to include elements of both the Basic Option and the Modified Option of the Partial Cover Lowered Alternative as they were analyzed in the Supplemental Draft EIS.

The Partial Cover Lowered Alternative with Managed Lanes Option has been identified as the Preferred Alternative. The Partial Cover Lowered Alternative as it is presented in this document removes the existing I-70 viaduct between Brighton Boulevard and Colorado Boulevard, lowering the highway below grade in this area.

It adds additional lane(s) in each direction from Brighton Boulevard to Tower Road. It also adds capacity from I-25 to Brighton Boulevard by restriping. This alternative includes a cover over the highway that is approximately but not more than 1,000 feet in length in the vicinity of Clayton Street and Columbine Street.

As part of this alternative, 46th Avenue will become a frontage road located on the north and south side of the highway. It will be a two-way street between Josephine Street and Milwaukee Street on both sides of the highway and one way in the other locations.

This alternative eliminates the portion of 46th Avenue north of I-70 between Columbine Street and Clayton Street to allow for a seamless connection between Swansea Elementary School and the highway cover. As part of this alternative, access to and from I-70 at the Steele Street/Vasquez Boulevard interchange is maintained. The Operational Options of the Partial Cover Lowered Alternative—General-Purpose Lanes and Managed Lanes—remain the same as those analyzed in the Supplemental Draft EIS.

There have been slight alterations to this alternative since it was introduced in the Supplemental Draft EIS. These revisions have been coordinated with all regulatory agencies, including the State Historic Preservation Officer (SHPO). The alterations added two historic districts (Garden Place, 5DV1690 and Globeville, 5DV1691) and one historic property (Banker's Warehouse, 5DV11720) to the APE.

7.5.3 Alternative Options

Expansion Options

Expansion Options refer to moving the north edge of the highway north or the south edge of the highway south of the existing facility from Brighton Boulevard to Colorado Boulevard to accommodate the larger footprint resulting from wider lanes and shoulders and construction phasing. These options apply to the No-Action Alternative and the Revised Viaduct Alternative. The Partial Cover Lowered Alternative does not include the Expansion Options because expansion of the highway can occur only on the north side due to engineering restrictions and the location of the UPRR rail yard at Brighton Boulevard.

Operational Options

Operational Options include two scenarios on how the additional capacity with the Build Alternatives will be managed and operated. The General-Purpose Lanes Option will allow all vehicles to use all the lanes on the highway, while the Managed Lanes Option implements operational strategies (such as pricing) for the additional lanes that will be adjusted based on real-time traffic demand for vehicles that use these lanes. The additional lanes are separated with a four-foot buffer from the rest of the lanes under the Managed Lanes Option, and they have direct connections to I-225, I-270, and Peña Boulevard. Operational Options apply to the Revised Viaduct Alternative and the Partial Cover Lowered Alternative.

7.6 How were Section 4(f) properties identified?

FHWA is responsible for determining which properties qualify as a Section 4(f) resource(s). A Section 4(f) property is a publicly owned park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or a historic site of national, state, or local significance. Significance is determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site.

Through its Section 4(f) regulations, FHWA has established that a historic property is considered significant—and therefore qualifies as a Section 4(f) resource—if the site is listed on, or is eligible for listing on, the NRHP. The consultation process established under Section 106 of the National Historic Preservation Act is used to identify properties that are listed on, or eligible for listing on, the NRHP. Section 106 consultation involves research to identify and evaluate potential NRHP-eligible sites in a project area, as well as any NRHP-listed properties in that area. Four criteria (36 CFR 60.4) are used to determine eligibility of a resource for listing on the NRHP. Properties can be eligible under more than one criterion.

The results of the Section 106 process are documented in Section 5.6, Historic Preservation. The results of the Section 106 process were used to identify historic resources that qualify for protection under Section 4(f).

Public lands that might qualify for the Section 4(f) regulations as parks, recreation areas, and refuges are identified as part of the NEPA process. In general, the boundaries of publicly owned parks, recreation areas, and refuges are well-established and can be readily identified. However, there are situations where the Section 4(f) status of publicly owned lands is unclear. For this project the Swansea Elementary School public playground is afforded Section 4(f) protection. See the discussion for Swansea Elementary School Public Playground in Section 7.8.3 for further explanation.

Historic resources for this project include houses, commercial buildings, historic districts, and historic linear features, such as sewers and railroads. To identify historic resources, cultural resource surveys were conducted in the APE (**Exhibit 7-2**). These studies documented all of the historic resources in the Section 106 APE that were built in

What criteria determine if a property is eligible for listing on the NRHP?

Four criteria are used to determine eligibility of a resource for listing. Properties also can be eligible under more than one criterion.

Criterion A: Resource is associated with events that have made a significant contribution to the broad pattern of our history.

Criterion B: Resource is associated with the lives of persons significant in our past.

Criterion C: Resource (1) embodied the distinctive characteristics of a type, period, or method of construction; (2) represents the work of a master; (3) possesses high artistic values; and/or (4) represents a significant and distinguishable entity whose components may lack individual distinction.

Criterion D: Resource has yielded, or may be likely to yield, information important in prehistory or history.

1965 or before, and identified which resources are on or eligible for listing on the NRHP. Updates to the APE were made for the Supplemental Draft EIS, and minor changes have been made for this document, as well. Changes to existing project alternatives and the addition of a new alternative in the Supplemental Draft EIS required additional assessment of potential effects to historic resources.

As Section 5.6, Historic Preservation indicates, the project employed an extensive and thorough Section 106 process to identify historic resources and to assess effects to them. This includes considerable consultation with the Colorado SHPO, Native American tribes, and consulting parties.

SHPO concurrence on determinations of effect

SHPO has concurred with the determination of eligibility and effects for historic resources within the Section 106 APE. Documentation of this consultation is included in Attachment B, *Agency Consultation Addendum*.

7.7 What Section 4(f) properties are located within the project area?

The project area contains historic resources and publicly owned parks and recreation areas. Within the Section 106 APE, there are 66 historic resources. This includes six historic districts, each with multiple contributing elements that are protected by Section 4(f).

In addition, there are 45 parks and 43 other recreational areas (such as recreation centers, golf courses, open space/nature areas, special events centers, trails, and school playgrounds/ball fields) that are publicly owned and publicly accessible (see Section 5.9, Parks and Recreational Resources). Each of these parks and recreation areas are considered Section 4(f) properties. However, as illustrated in **Exhibit 5.9-1** and **Exhibit 7-2**, most of these properties are so far removed from the project that there will be no physical or proximity impacts, and, therefore, no use. Only three of these parks and recreational areas are evaluated for Section 4(f) use (see Section 7.8 for a discussion of the South Platte River Greenway Trail).

There are a total of 25 Section 4(f) properties subject to a use described in this chapter (including 22 historic properties/districts and three parks/recreational resources). **Exhibit 7-2** maps each of these Section 4(f) properties.

Exhibit 7-2 Overview of Section 4(f) Properties

7.7.1 Historic resources

The following list of historic resources are Section 4(f) properties located within the Section 106 APE. Resources numbered 1 through 22 are subject to a use and are described in Section 7.8.2, Historic Resources. Resources numbered 23 through 66 are Section 4(f) properties located within the Section 106 APE, but are not subject to a use, and are not further described or discussed in this chapter.

1. Market Street RR/ Chicago Burlington & Quincy Railroad Segment (5AM1298.2)
2. Union Pacific Beltline RR Segment (5AM2083.1)
3. Union Pacific Railroad Segment (5DV6248.4)
4. Rocky Mountain Arsenal Railroad Segment (5DV7048.2)
5. York Street/East 40th Ave. Brick Sanitary Sewer (5DV11283)
6. Colonial Manor Tourist Court, 2615 East 46th Avenue (5DV7130)
7. Univar, 4300 Holly Street (5DV9231)
8. Safeway Distribution Center, Historic District (5DV9232)
9. Ralston Purina Plant/Nestle Purina PetCare Company, 2151 East 45th Avenue (5DV9245)
10. Sanchez Business, 2381 East 46th Avenue (5DV9655)
11. Stop-N-Shop Food Store, 4600 York Street (5DV9801)
12. Brown and Alarid Residence, 4637 Claude Court (5DV9667)
13. Toth/Kelly Residence, 4639 Claude Court (5DV9668)
14. Rodriquez Residence, 4539 Clayton Street (5DV9678)
15. 4541 Clayton LLC Residence, 4541 Clayton Street (5DV9679)
16. Rudy/Bernal Residence, 4618 High Street (5DV9735)
17. Garcia Residence, 4617–4625 Race Street (5DV9780)
18. Kenworthy/Wyckoff Residence, 4529 Josephine Street (5DV9745)
19. Portales Residence, 4608 Josephine Street (5DV9746)
20. Alfred R. Wessel Historic District, (5DV10126)
21. National Western Historic District, (5DV10050)
22. Banker's Warehouse Co., (5DV11720)
23. Riverside Cemetery, 5201 Brighton Boulevard (5AM125)
24. Delgany Common Interceptor Sewer, (5DV4725.5)

25. Burlington Ditch/ O'Brien Canal, (5AM469.5)
26. Burlington and Colorado/Chicago, Burlington, and Quincy Railroad Segment (5DV6247.3)
27. Hovan/Plazola Residence, 4673 Josephine Street (5DV1172)
28. Kosik Residence, 4681–4683 Baldwin Court (5DV1247)
29. Miranda Residence, 4632 Josephine Street (5DV5677)
30. Tri-R Recycling, 3600 East 48th Avenue (5DV9227)
31. Torres Residence, 4656 Baldwin Court (5DV9660)
32. Castorena/Braswell Residence, 4631 Columbine Street (5DV9705)
33. Pavon Residence, 4633 Columbine Street (5DV9706)
34. Olive Street LLC Property, 4503 Fillmore Street (5DV9714)
35. Langenberg Residence, 4502 Josephine Street (5DV9742)
36. Chavez Residence, 4628 Josephine Street (5DV9748)
37. Waggoner Residence, 4647 Josephine Street (5DV9751)
38. James Residence, 4651 Josephine Street (5DV9753)
39. Krutzler/Barajas Residence, 4681 Josephine Street (5DV9761)
40. Geo Trust/Araujo Residence, 4682 Josephine Street (5DV9762)
41. Lovato Residence, 4696 Josephine Street (5DV5623/5DV9765)
42. Portales Residence/ Windsor Artesian Water Company, 4623–4625 Thompson Court (5DV9787)
43. Adams Clock LLC/Mann Residence, 4645 Williams Street (5DV9795)
44. E.G. Trading Post, 1630–1632 East 47th Avenue (5DV9805)
45. Miller Residence, 4675 Williams Street (5DV9823)
46. Herzberg Property, 4665–4669 Williams Street (5DV9828)
47. Yoshimura Residence, 4450 Adams Street (5DV9966)
48. McGee Residence, 4460 Adams Street (5DV9968)
49. General Motors Corporation-Goalie Construction Business, 4715 Colorado Boulevard (5DV9988)
50. 4800 Colorado LLC/United States Rubber Company, 4800 Colorado Boulevard (5DV9989)

51. Gonzales Residence, 4515 Columbine Street (5DV9994)
52. Tomas/Eagan Residence, 4653 Columbine Street (5DV9996)
53. Vasquez Residence, 4450 Cook Street (5DV10003)
54. Guerca/Perez Residence, 4446 Fillmore Street (5D10013)
55. Tenenbaum Residence, 4453 Fillmore Street (5DV10014)
56. Ponce Residence, 4668 High Street (5DV10034)
57. Garcia Residence, 4695 High Street (5DV10040)
58. Core Power Construction/Buckley JD Inc.-Buckley Explosives of Wyoming, 4701 Jackson Street (5DV10047)
59. Huffman Residence, 4707 Josephine Street (5DV10058)
60. Lopez/Hartzell Residence, 4461 Milwaukee Street (5DV10065)
61. Allen Investment Group, Inc./Kretschmar Residence, 4662–4664 Williams Street (5DV10085)
62. Clay II LLC/Rosthan Residence, 4459 Thompson Court (5DV10124)
63. Abrams/Loretta Residence, 4679 Vine Street (5DV10135)
64. High Line Canal (5AM261.2)
65. Garden Place Historic District (5DV1690)
66. Globeville Historic District (5DV1691)

7.7.2 Parks and recreation resources

The following list of parks and recreation resources are Section 4(f) properties subject to a use and are described in Section 7.8.3, Parks and recreation areas.

1. Swansea Elementary School Public Playground
2. Sand Creek Greenway Trail
3. Globeville Landing Park

7.8 Does the proposed project use any Section 4(f) properties?

Each of the alternatives and associated options under consideration will use Section 4(f) properties to varying degrees, as summarized in **Exhibit 7-3**. Depending on the alternative and associated options, 22 historic resources and three parks and recreation areas could be subject to a use by the project. The following sections describe how the project will impact these resources and if these impacts constitute a use under Section 4(f). Section 7.10 discusses minimization measures that have been implemented in project design and resulted in avoidance of Section 4(f) resources previously subject to a use.

Since the Supplemental Draft EIS additional design changes have modified the project area and changed impact determinations. Specifically, the drainage outfall north of I-70 has been moved south. This modification entirely avoids use of the South Platte River Greenway Trail and the Burlington Ditch. The project has no use of these resources. Modifying the outfall does create a *de minimis* impact within the National Western Historic District.

7.8.1 *De minimis* impact determinations

Exhibit 7-3 summarizes *de minimis* impact determinations for each alternative, which consists of up to seven *de minimis* impact determinations for historic resources and one *de minimis* impact determination for parks and recreational areas. Why *de minimis* impact determinations are made for these resources is discussed in detail in the individual resource discussions throughout this chapter. Correspondence with and concurrence from officials with jurisdiction is provided in Attachment B, *Agency Consultation Addendum*.

Exhibit 7-3 Summary of Section 4(f) Properties and Use Determinations

Alternative/Option	Section 4(f) Uses[1]								
	Historic resources[2]			Parks and recreation areas			Total		
	Use	*De minimis*	No Use	Use	*De minimis*	No Use	Use	*De minimis*	No Use
No-Action Alternative, North Option	7	3	56	1	0	2	8	3	58
No-Action Alternative, South Option	1	3	62	0	0	3	1	3	65
Revised Viaduct Alternative, North Option	8	6	52	1	0	2	9	6	54
Revised Viaduct Alternative, South Option	8	6	52	0	0	3	8	6	55
Partial Cover Lowered Alternative (Preferred Alternative)	13	5	48	2	0	1	15	5	49

1. *The number in the Use column does not include de minimis impact determinations*
2. *Historic districts are presented as one Section 4(f) resource; individual contributing properties to historic districts are not included in this total*

Numerous design modifications have been implemented that reduce impacts of the project to the corridor as a whole. These design modifications, in turn, also reduce the number of Section 4(f) properties used—including those with *de minimis* impact determinations. These modifications, as well as design modifications specific to individual Section 4(f) properties, are discussed in Section 7.10. Generally, these modifications are applicable to all historic resources where a *de minimis* impact determination is made. For linear resources (e.g., railroads) and where site-specific measures were implemented, minimization measures are addressed under individual resource discussions.

The 2012 Section 4(f) Policy Paper states, "The definition of all possible planning in 23 CFR 774.17 explains that a *de minimis* impact determination does not require the traditional second step of including all possible planning to minimize harm because avoidance, minimization, mitigation, or enhancement measures are included as part of the determination" (FHWA 2012:9).

7.8.2 Historic resources

There are 66 historic resources within the APE. The alternatives avoid most of these properties and no use will result. There are 22 historic resources, including historic districts, that will be used (including *de minimis*) by one or more of the alternatives and associated options, as shown on **Exhibit 7-2** and listed in **Exhibit 7-3**. For these resources, the project alternatives permanently or temporarily convert all or part of the property into a transportation facility.

The following subsections provide a brief description of each historic property subject to a use, and why there is a use for the alternatives and options under consideration. Note that alternatives and/or options not specifically discussed under a resource description will not use that resource.

There is one historic property for which the Section 106 consultation has found an Adverse Effect under Section 106, but is not considered a Section 4(f) use (4541 Clayton LLC under the No-Action Alternative South Option). This property is discussed in more detail on page 7-56. In this case, FHWA has determined that impacts would constitute Adverse Effects to the setting of the historic property, but there are no direct impacts, and the impacts are not so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Therefore, there is no use. For a more in-depth description of what these properties consist of and how they were determined to be listed or eligible for listing on the NRHP, refer to Attachment I, *Section 106 Determinations of Eligibility and Effects*.

Parcel data used for figures

Parcel data from Denver's open data catalog were used for all exhibits within this chapter. In some instances, the parcel lines (as reflected by both NRHP property boundaries and right-of-way acquisition boundaries) may not appear consistent with the aerial photography. The data layers are believed to be accurate, but accuracy is not guaranteed.

Market Street Railroad/Chicago, Burlington & Quincy Railroad Segment (5AM1298.2)

This railroad has three tracks that currently pass under the I-70 viaduct. The railroad alignment crosses 46th Avenue at grade between Steele Street/Vasquez Boulevard and Colorado Boulevard.

Market Street Railroad Segment

Constructed:	1911
Eligibility:	Criterion A
Type:	Railroad segment
Used by:	No-Action (*de minimis*), Revised Viaduct (*de minimis*), and Partial Cover Lowered (use) Alternatives

No-Action Alternative

Both the North and South Options under this alternative will reconstruct the railroad tracks in place. A temporary construction easement on approximately 210 feet of the railroad—as reflected by the construction limits on **Exhibit 7-4**—will be needed to facilitate track reconstruction and reconstruction of the viaduct. Because the tracks will be replaced along the historic alignment and within the historic right of way, Section 106 consultation has determined the No-Action Alternative will have No Adverse Effect to the railroad.

Efforts were made to minimize the overall footprint of the No-Action Alternative, which in turn reduces impacts to the railroad. Following construction, the railroad will return to pre-existing functionality. There is no physical impact to the resource. The temporary construction easement could be considered a temporary occupancy. However, as indicated in the 2012 FHWA Section 4(f) Policy Paper, a *de minimis* impact determination may be made for a temporary occupancy of Section 4(f) property. Since SHPO concurred in a finding of No Adverse effect, FHWA makes a *de minimis* impact determination for this resource in accordance with Section 4(f) for the No-Action Alternative. The impact determination includes all possible planning to minimize harm.

Revised Viaduct Alternative

As with the No-Action Alternative, the Revised Viaduct Alternative reconstructs the railroad tracks in place and adds railroad crossing panels. The Revised Viaduct Alternative, North Option will require a temporary construction easement on approximately 295 feet of the railroad (see **Exhibit 7-5**) and the Revised Viaduct

Alternative, South Option will require a temporary construction easement on 335 feet of the railroad.

Because the project will not diminish the integrity of the property's contributing characteristics, Section 106 consultation has determined the Revised Viaduct Alternative will have No Adverse Effect to the railroad

Minimization efforts, as described in Section 7.10, result in a reduction in the overall footprint of the alternative, which reduces the use of the railroad. The railroad will maintain its functionality throughout construction, as well as following project completion.

There is no physical impact to the resource. The temporary construction easement could be considered a temporary occupancy. However, as indicated in the 2012 FHWA Section 4(f) Policy Paper, a *de minimis* impact determination may be made for a temporary occupancy of Section 4(f) property. Since SHPO concurred in a finding of No Adverse effect, FHWA makes a *de minimis* impact determination for this resource in accordance with Section 4(f). The impact determination includes all possible planning to minimize harm.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative reconstructs I-70 below ground level. As a result, approximately 1,300 feet of the existing tracks will be relocated onto two new bridges over I-70 (see **Exhibit 7-6**). The alternative eliminates the easternmost railroad track at its intersection with I-70, rather than placing it on the new bridges. However, the track will be maintained approximately 500 feet to the south of I-70 for the BNSF Railroad to continue its use for storage.

This alternative requires both the permanent and temporary relocation of the railroad tracks to facilitate new bridge construction. The reconstruction and relocation of the tracks under this alternative will constitute an Adverse Effect under Section 106, and a direct use of the railroad with the Partial Cover Lowered Alternative.

Exhibit 7-4 Market Street Railroad/Chicago, Burlington & Quincy Railroad Segment—No-Action Alternative

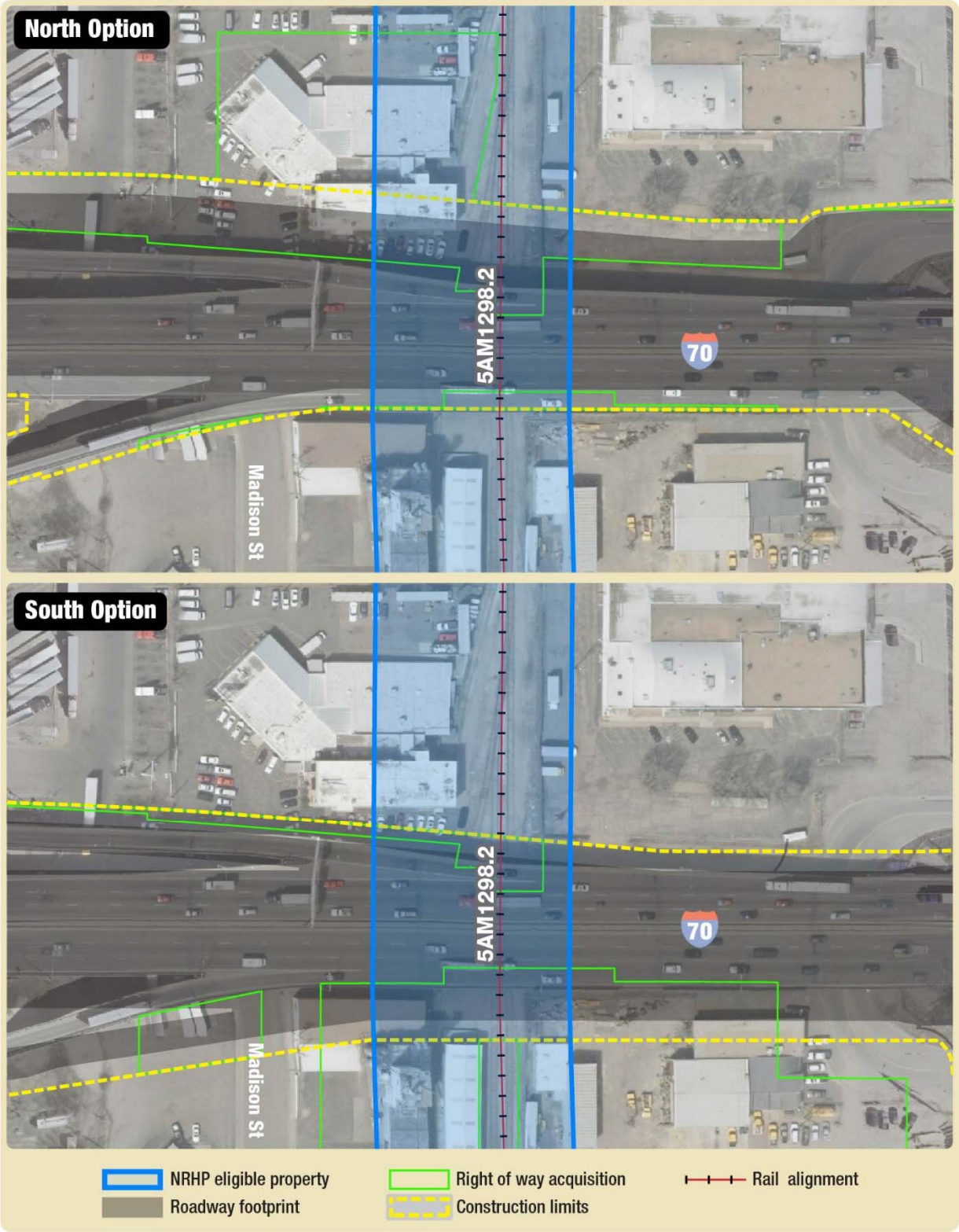


Exhibit 7-5 Market Street Railroad/Chicago, Burlington & Quincy Railroad Segment—Revised Viaduct Alternative

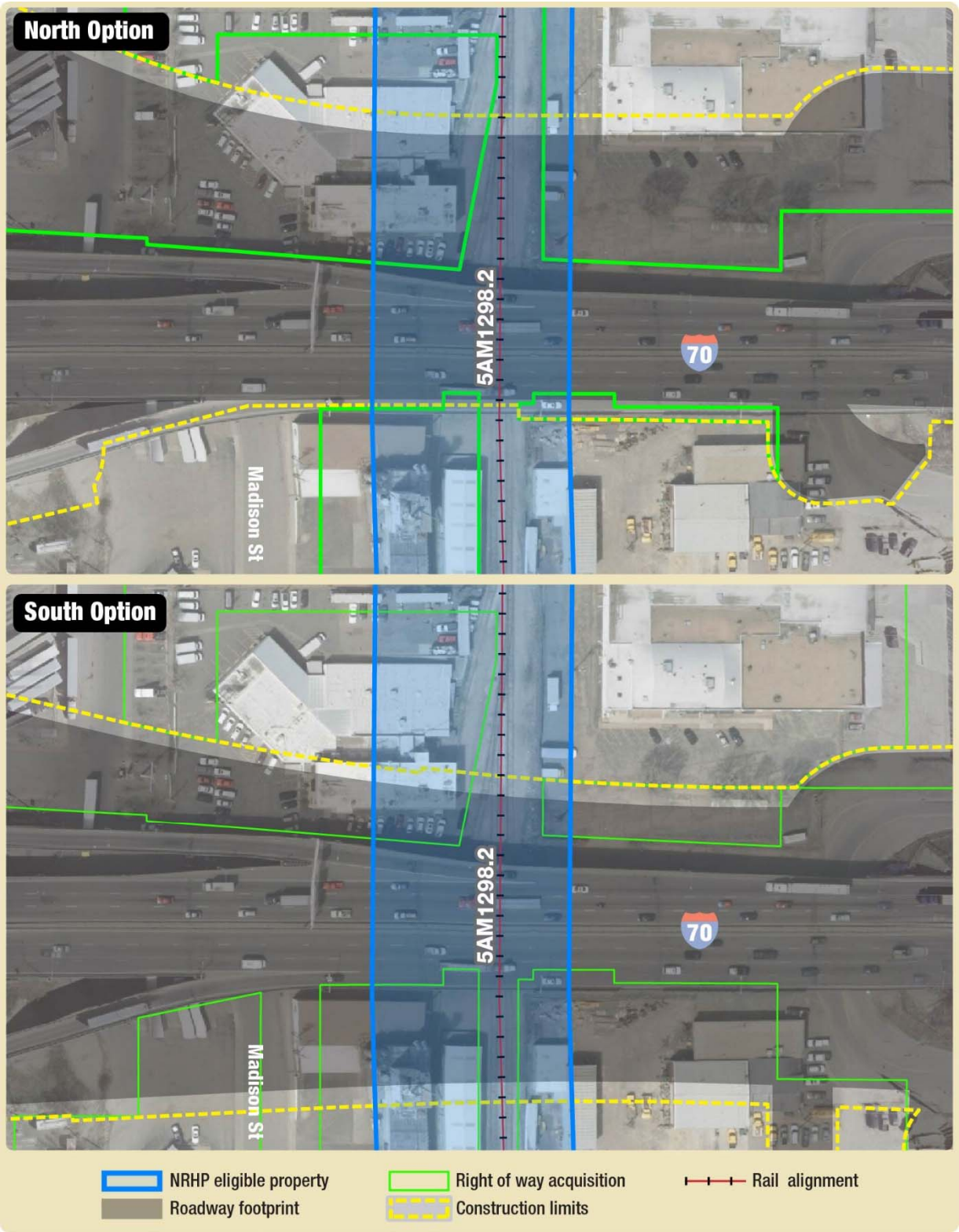
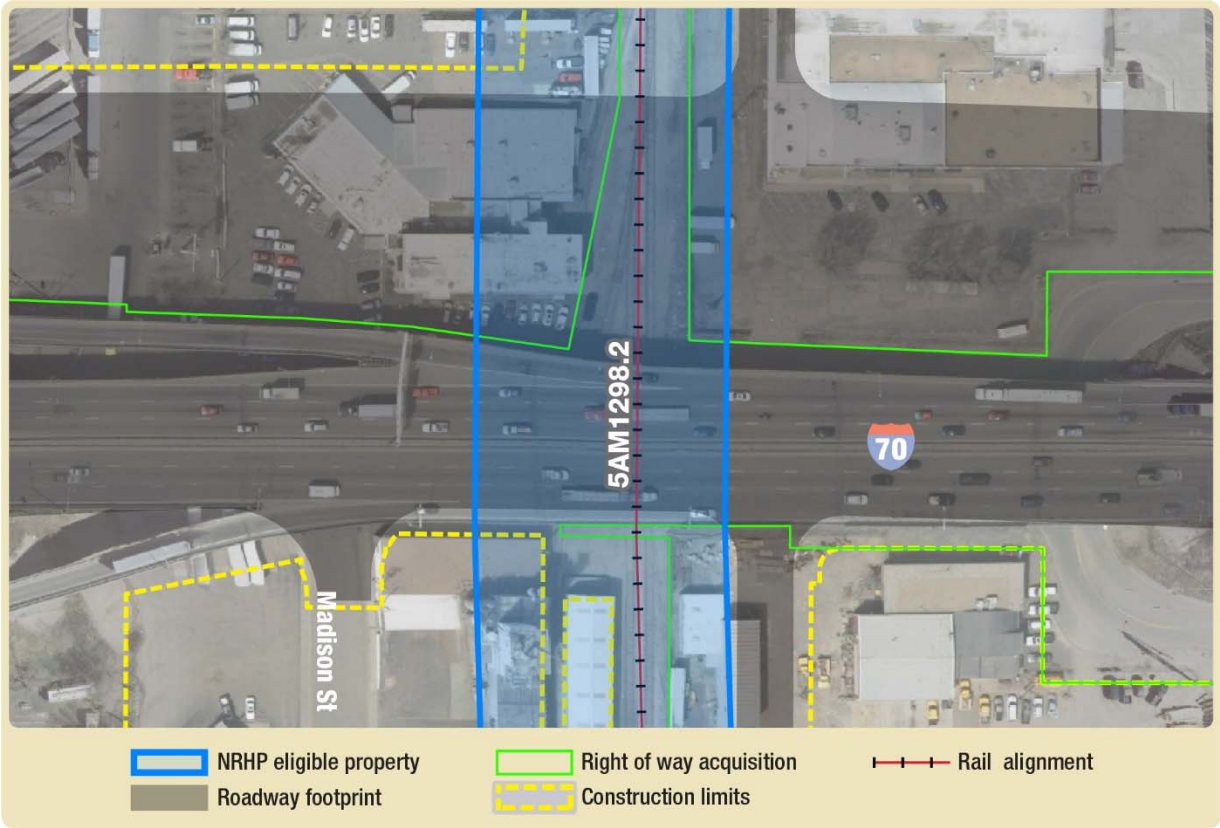


Exhibit 7-6 Market Street Railroad/Chicago, Burlington & Quincy Railroad Segment—Partial Cover Lowered Alternative



Avoidance alternatives

None of the alternatives would avoid use of this property. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9 of this chapter.

The Realignment Alternatives (Alternatives 4 and 6 from the 2008 Draft EIS) would avoid the use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources and so do not represent avoidance alternatives. The Realignment Alternatives are not prudent because of the large diversion of the highway traffic onto local streets, introducing safety, access, and mobility issues at the local street level, and, therefore, failing to meet the mobility purpose of the project, and resulting in additional unacceptable safety or operation problems.

The railroad property crosses the entire I-70 corridor, meaning that there are no smaller, site-specific alignment shifts to the north or south that will avoid the use of this

site. All possible planning has been incorporated to minimize impact to this property.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Union Pacific Beltline Railroad Segment (Denver Rock Island Railroad, 5AM2083.1)

Within the project corridor, the Union Pacific Beltline Railroad segment is located just west of the Quebec Street interchange.

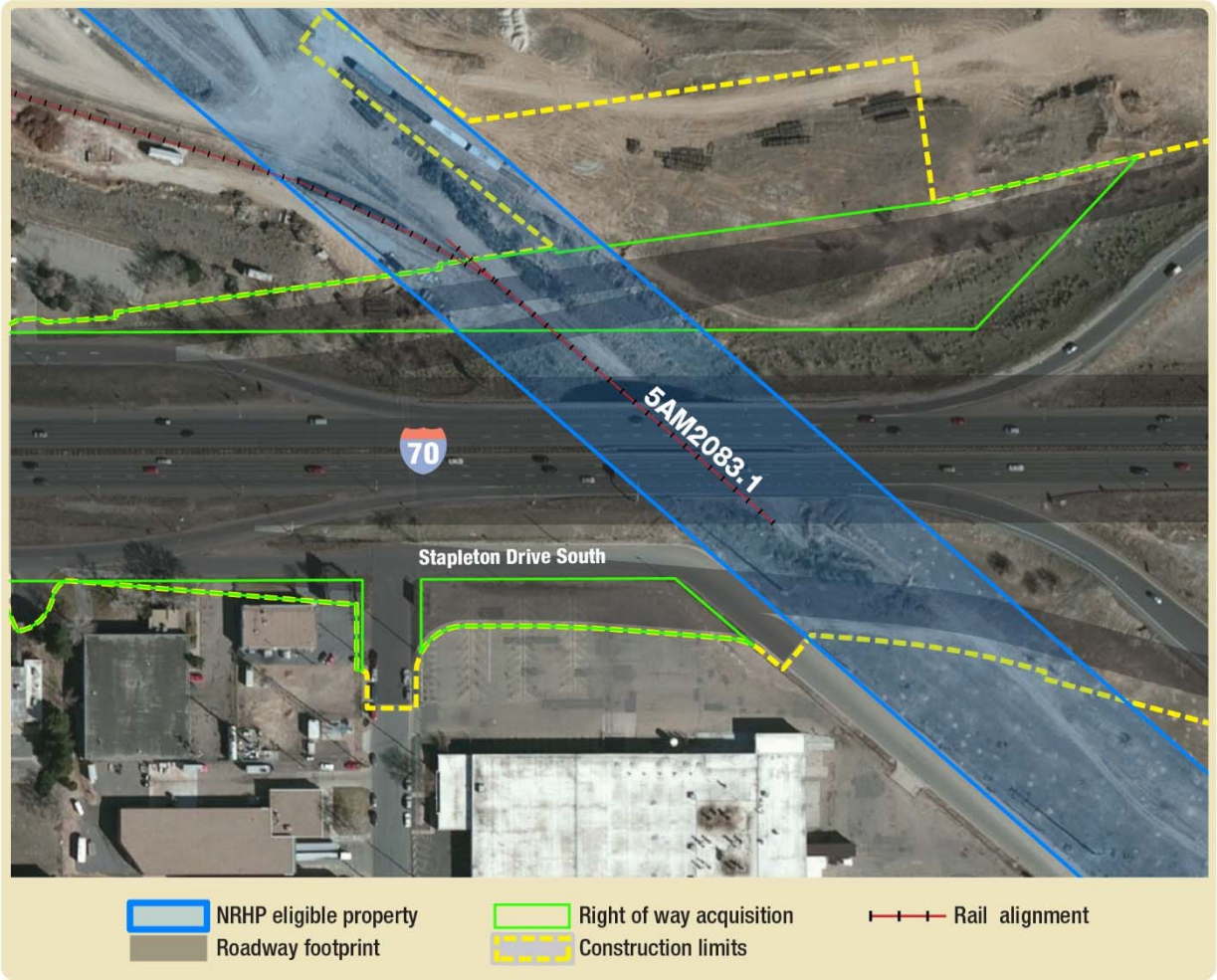
Build Alternatives

The Build Alternatives will construct a new I-70 bridge and westbound Quebec Street ramp bridge over the existing track. To facilitate overhead bridge construction, the project will require a construction easement on approximately 311 feet of the railroad (see **Exhibit 7-7**).

Union Pacific Beltline Railroad Segment

Constructed:	1951
Eligibility:	Criterion A
Type:	Railroad segment
Used by:	Build Alternatives (*de minimis*)

Exhibit 7-7 Union Pacific Beltline Railroad Segment—Build Alternatives



Because the Build Alternatives will not diminish the diminish the integrity of the property's contributing characteristics, Section 106 consultation has determined the Build Alternatives will have No Adverse Effect to the railroad segment. Minimization efforts, as described in Section 7.10, result in a reduction in the overall footprint of the alternative. The railroad also will maintain its functionality throughout construction, as well as following project completion. There is no physical impact to the resource. The temporary construction easement could be considered a temporary occupancy. However, as indicated in the 2012 FHWA Section 4(f) Policy Paper, a *de minimis* impact determination may be made for a temporary occupancy of Section 4(f) property. Since SHPO concurred in a finding of No Adverse Effect, FHWA makes a *de minimis* impact determination for this resource in accordance with Section 4(f). The impact determination includes all possible planning to minimize harm.

Denver and Kansas Pacific/Union Pacific Railroad Segment (5DV6248.4)

Within the project corridor, this railroad segment is located just west of the Nestlé Purina Petcare Company facility. The railroad passes underneath the I-70 viaduct via the UPRR bridge, which goes over 46th Avenue, and travels into the north Denver rail yards.

Denver and Kansas Pacific/UPRR Railroad Segment

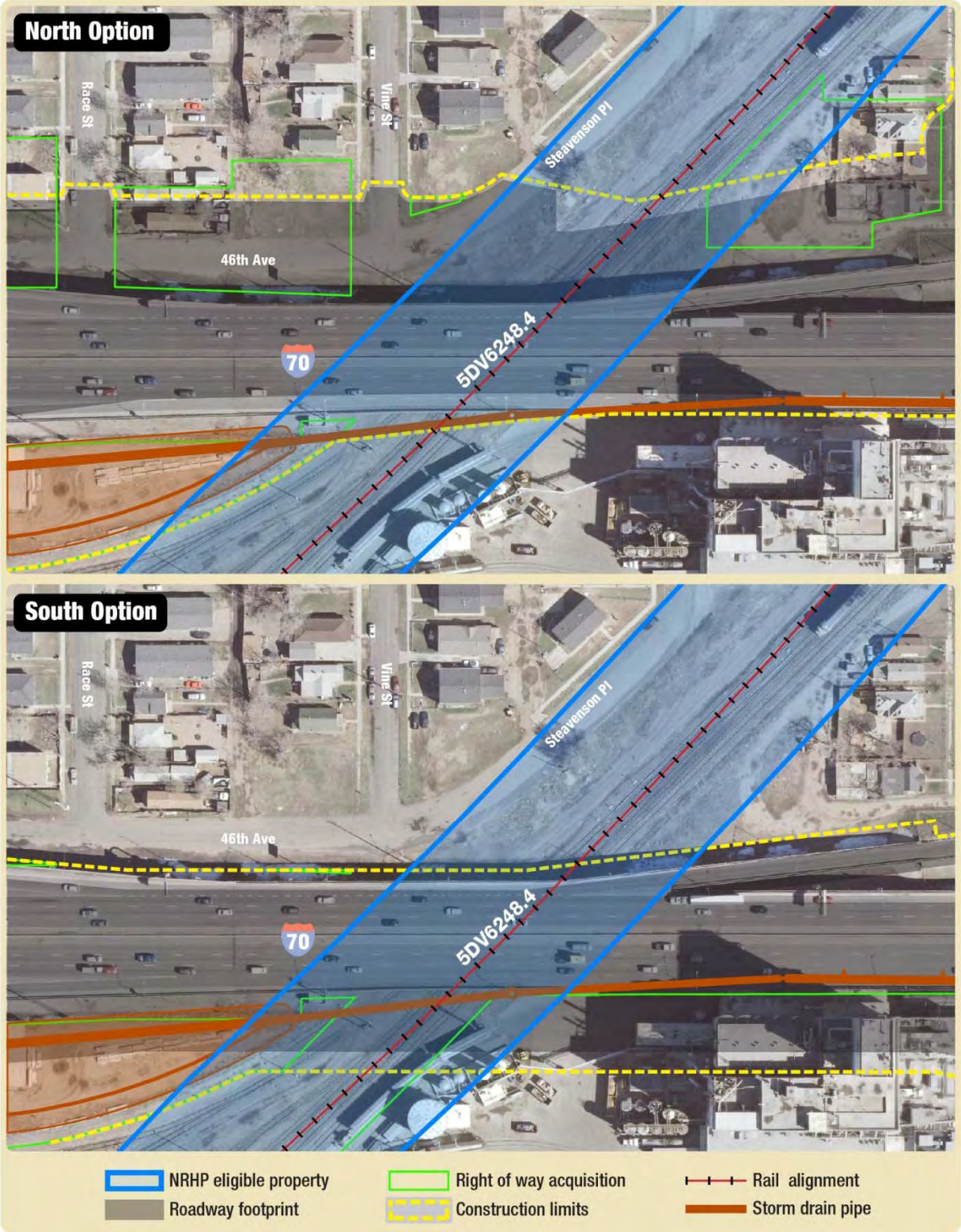
Constructed:	1867–1870
Eligibility:	Criterion A
Type:	Railroad segment
Used by:	No-Action (*de minimis*), Revised Viaduct (*de minimis*), and Partial Cover Lowered (use) Alternatives

No-Action Alternative

For both No-Action Alternative options, the existing UPRR bridge over 46th Avenue will remain in place. Reconstruction of the viaduct above the UPRR bridge will require a construction easement to make overhead viaduct construction easier. The easement will encompass roughly 210 feet of railroad, as reflected by the construction limits in **Exhibit 7-8**.

Because the easement and construction will not diminish the integrity of the property's contributing characteristics, the Section 106 determination is No Adverse Effect to the railroad. Minimization efforts, as described in Section 7.10, result in a reduction in the overall footprint of the alternative. The railroad also will maintain its functionality throughout construction, as well as following project completion. There is no physical impact to the resource. The temporary construction easement could be considered a temporary occupancy. However, as indicated on page 8 of the 2012 FHWA Section 4(f) Policy Paper, a *de minimis* impact determination may be made for a temporary occupancy of Section 4(f) property. Since SHPO concurred in a finding of No Adverse Effect, FHWA makes a *de minimis* impact determination for this resource in accordance with Section 4(f). The impact determination includes all possible planning to minimize harm.

Exhibit 7-8 Denver and Kansas Pacific/Union Pacific Railroad Segment—No-Action Alternative



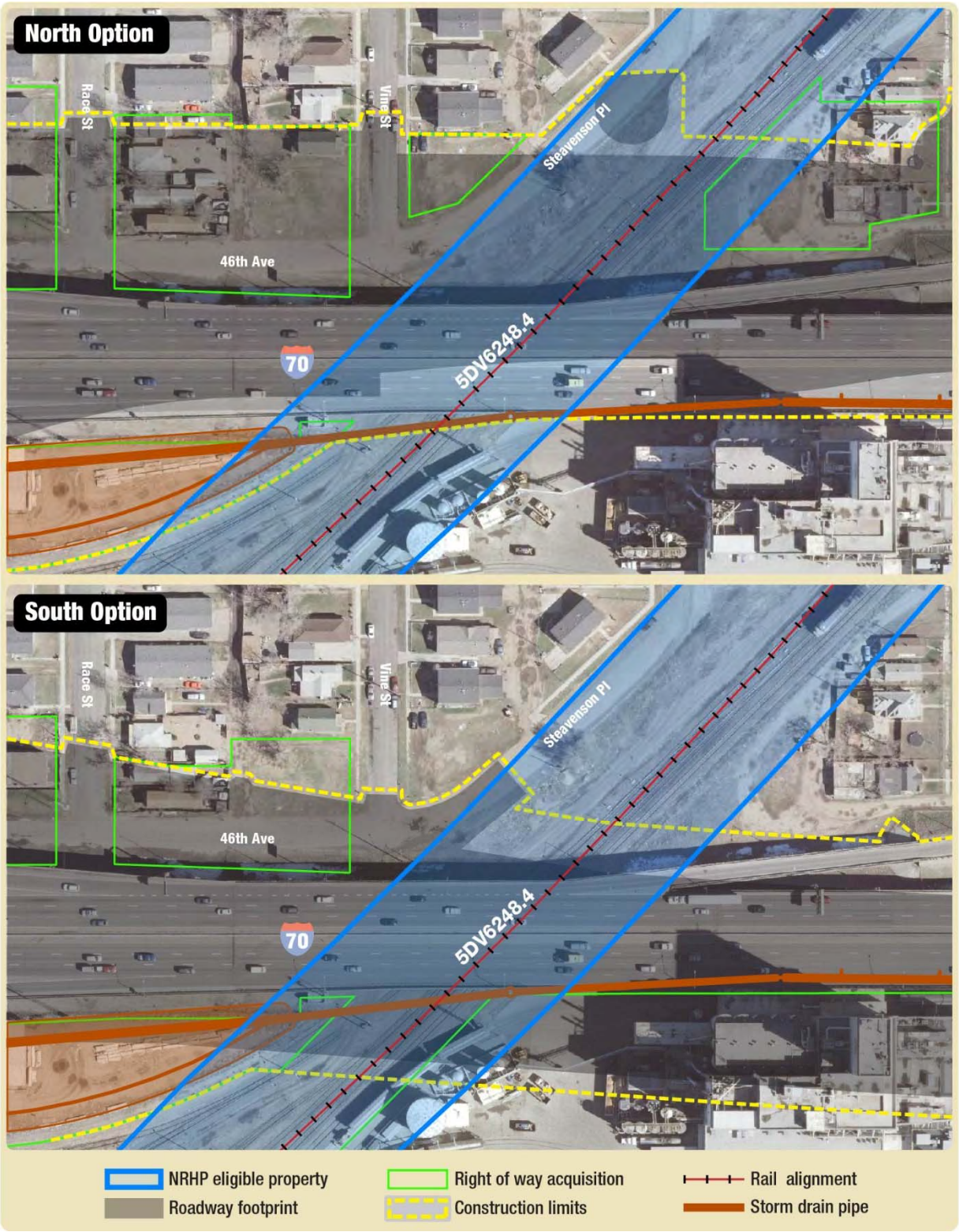
Revised Viaduct Alternative

As with the No-Action Alternative, the Revised Viaduct Alternative will require a construction easement over a portion of the railroad in the I-70 area to make overhead viaduct construction easier. **Exhibit 7-9** displays the easement needed for the North Option (reflected as the construction limits), which encompasses 300 feet of the railroad. The exhibit also displays the construction easement of 300 feet of the railroad needed for the South Option.

In addition to the viaduct construction, a storm drain will be bored beneath the tracks at Claude Court, which will have no track bed impacts. The bore locations will be outside historic right of way.

Since the affects to the resource will not diminish the integrity of the property's contributing characteristics, they result in a finding of No Adverse Effect to the railroad. Minimization efforts, as described in Section 7.10, result in a reduction in the overall footprint of the alternative. The railroad also will maintain its functionality throughout construction, as well as following project completion. There is no physical impact to the resource. The temporary construction easement could be considered a temporary occupancy. However, as indicated on page 8 of the 2012 FHWA Section 4(f) Policy Paper, a *de minimis* impact determination may be made for a temporary occupancy of Section 4(f) property. Since SHPO concurred in a finding of No Adverse Effect, FHWA makes a *de minimis* impact determination for this resource in accordance with Section 4(f). The impact determination includes all possible planning to minimize harm.

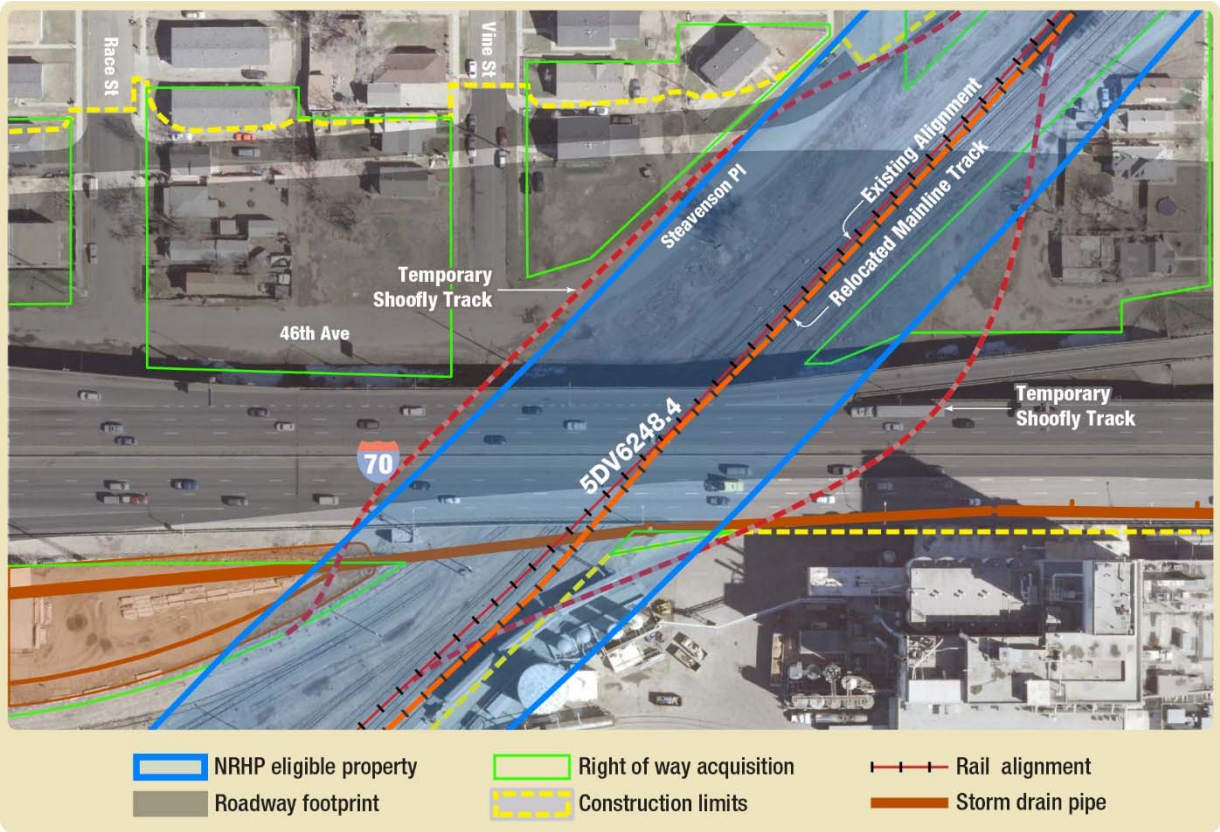
Exhibit 7-9 Denver and Kansas Pacific/Union Pacific Railroad Segment—Revised Viaduct Alternative



Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will remove the existing viaduct and reconstruct I-70 below ground level in this location. Because of this, the existing bridge will be replaced with a multi-span bridge that will carry the railroad over the reconstructed I-70 and eastbound and westbound lanes of 46th Avenue. Track relocation will be required for the new bridge construction. The removal of the existing bridge, which currently carries the railroad over 46th Avenue, and the relocation of the tracks will constitute an Adverse Effect under Section 106, and a direct use for the Partial Cover Lowered Alternative. As shown on **Exhibit 7-10**, this alternative will impact approximately 550 feet of the railroad.

Exhibit 7-10 Denver and Kansas Pacific/Union Pacific Railroad Segment—Partial Cover Lowered Alternative



As with the Revised Viaduct Alternative, a storm drain will be bored beneath the railroad at Claude Court, which will have no track bed impacts. Also, a storm drain will either be bored under the railroad just west of the Nestlé Purina Petcare Company facility or will be constructed in phases to correspond with the track relocations. Bore locations are

expected to be outside of historic right of way. No temporary or permanent easements are expected to be required for construction or maintenance of the storm drain pipe. As a result, the storm drain pipe is not expected to impact the railroad.

Avoidance alternatives

None of the alternatives would avoid use of this property. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9 of this chapter.

The Realignment Alternatives (Alternatives 4 and 6 from the 2008 Draft EIS) would avoid the use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. The Realignment Alternatives are not prudent because of the large diversion of the highway traffic onto local streets, introducing safety, access, and mobility issues at the local street level, and, therefore, failing to meet the mobility purpose of the project, thereby resulting in additional unacceptable safety or operation problems.

The railroad property crosses the entire I-70 corridor, meaning that smaller, site-specific shifts to the north or south still would use the resource, and therefore are not avoidance alternatives.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Rocky Mountain Arsenal Railroad Segment (5DV7048.2)

This railroad segment parallels Havana Street and enters the project corridor in the same location where Havana Street intersects I-70.

Rocky Mountain Arsenal Railroad Segment

Constructed:	1942
Eligibility:	Criterion A
Type:	Railroad segment
Used by:	Build Alternatives (use)

Build Alternatives

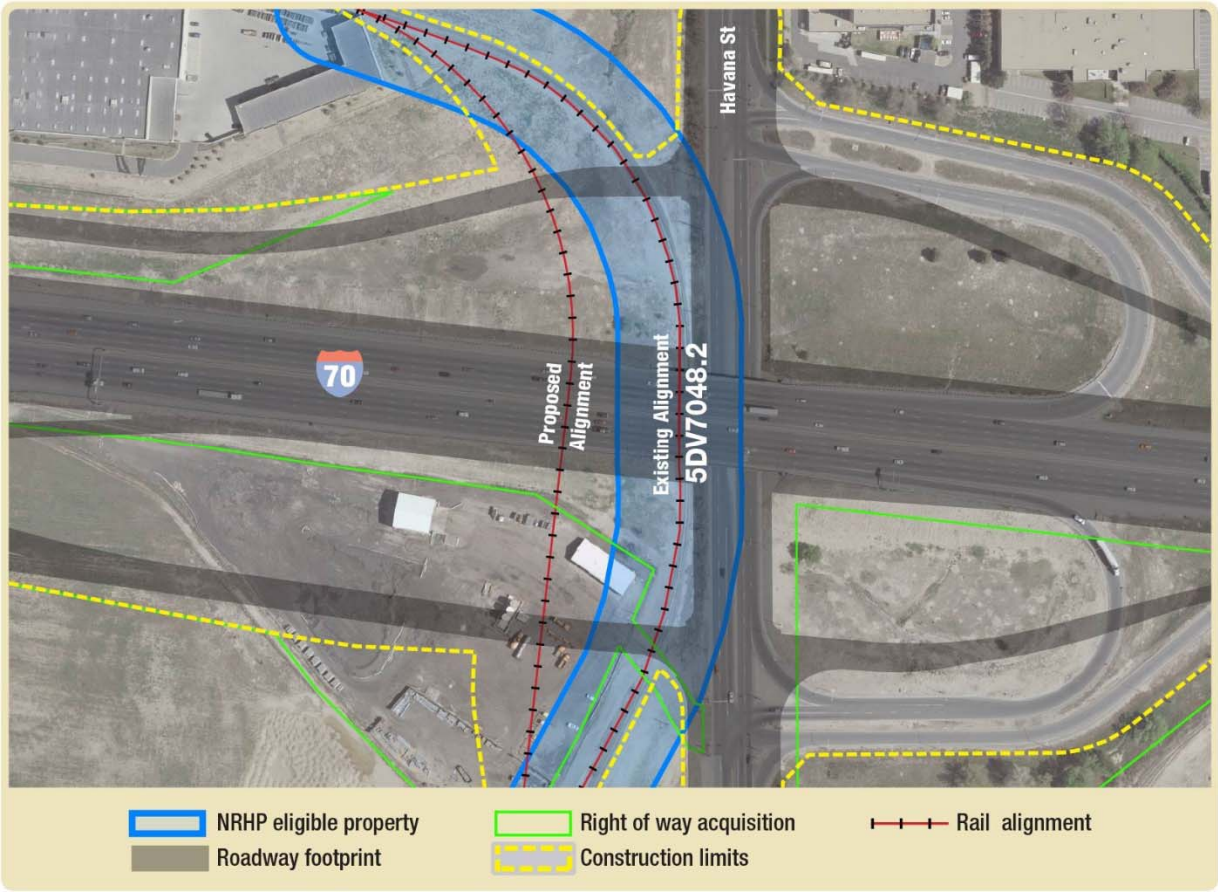
The Build Alternatives will relocate a track spur and construct a new I-70 bridge and Havana Street ramp bridges over the relocated track spur. The relocation of the track will result in the direct use of 1,230 feet of the railroad (see **Exhibit 7-11**). Construction of the new bridge will require line re-alignment and grade lowering to meet the clearance specifications of the new bridge and the railroad will be relocated approximately 180 feet west of its current location. The alteration of this segment of the historic railroad line will modify the historic grade. The relocation of the track, as well as lowering of the grade, will result in an Adverse Effect under Section 106 and a direct use of the resource under both the Revised Viaduct Alternative and the Partial Cover Lowered Alternative.

Avoidance alternatives

The No-Action Alternative would avoid use of this property. Although the No-Action Alternative avoids this resource, it uses other Section 4(f) resources, and so is not an avoidance alternative. Moreover, it is not a prudent alternative, since it would compromise the project to an unreasonable degree in light of the project's stated purpose and need. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

The site crosses the entire I-70 corridor, meaning that smaller, site-specific shifts to the north or south still use the resource and do not represent avoidance alternatives.

Exhibit 7-11 Rocky Mountain Arsenal Railroad Segment—Build Alternatives



Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Build Alternatives have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource. All possible planning has been incorporated to minimize impact to this property.

York Street/East 40th Avenue Brick Sanitary Sewer (5DV11283)

This brick sanitary sewer is nearly two miles long and is unique for its oval shape, since most brick sewer lines in Denver are circular in shape. The sewer line crosses under I-70 at York Street and East 46th Avenue.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will lower the highway, as shown in **Exhibit 7-12**, which requires the removal and replacement of the brick sewer line. The removal and replacement of the sewer line constitutes a direct use under Section 4(f) with the Partial Cover Lowered Alternative.

York Street/East 40th Avenue Brick Sanitary Sewer*

Constructed:	1906
Eligibility:	Criterion D
Type:	Brick sanitary sewer line
Used by:	Partial Cover Lowered Alternative (use)

**No photo available*

Exhibit 7-12 York Street/East 40th Avenue Brick Sanitary Sewer—Partial Cover Lowered Alternative

Avoidance alternatives

The No-Action Alternative and Revised Viaduct Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

The sewer will not be impacted outside of the limits of the lowered highway with the Partial Cover Lowered Alternative. On either side of the highway, the existing grade is maintained and the impacted portion is minimized to the lowered highway portion plus a small transition on each side.

For the Partial Cover Lowered Alternative, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Partial Cover Lowered Alternative and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Colonial Manor Motel (5DV7130)

Colonial Manor Motel

Constructed:	1946
Eligibility:	Criteria A and C
Type:	23-unit motel
Used by:	No-Action Alternative, North Option (use); Revised Viaduct Alternative, North Option (use); and Partial Cover Lowered Alternative (use)

No-Action Alternative, North Option

The No-Action Alternative, North Option will extend the north edge of the highway 70 feet north, which will place the westbound lanes of the new highway viaduct through the Colonial Manor Motel property, as shown in **Exhibit 7-13**. This requires the acquisition and permanent incorporation of the 1.28-acre property into the I-70 corridor. It constitutes an Adverse Effect under Section 106 and is a direct use.

Revised Viaduct Alternative, North Option

For the Revised Viaduct Alternative, North Option, the reconstructed viaduct alignment shifts up to 160 feet to the north, which results in the viaduct being located directly over the motel property (see **Exhibit 7-14**). This would create a full acquisition of this parcel and is an Adverse Effect under Section 106 and constitutes a direct use of the property.

Exhibit 7-13 Colonial Manor Motel—No-Action Alternative, North Option

Exhibit 7-14 Colonial Manor Motel—Revised Viaduct Alternative, North Option

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative shifts the north edge of the highway up to 160 feet, and reconstructs the below-grade I-70 alignment at this location, as well as the westbound 46th Avenue alignment, through the motel property (see **Exhibit 7-15**). This results in the acquisition and demolition of the property, which is an Adverse Effect under Section 106 and a direct use of the property.

Avoidance alternatives

The Revised Viaduct Alternative, South Option and the No Action, South Option would avoid use of this property. Although the alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Exhibit 7-15 Colonial Manor Motel—Partial Cover Lowered Alternative

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm under the No-Action Alternative, Revised Viaduct Alternative, North Option, or the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Univar (5DV9231)

Build Alternatives

Univar

Constructed:	1960
Eligibility:	Criterion C
Type:	One-story commercial building
Used by:	Build Alternatives (*de minimis*)

The Univar property is located in an area of the project corridor where the Build Alternatives and Options have the same impact footprint. They will require the acquisition of a total of 0.03 acre of right of way on the northwest and northeast corners of the Univar property, as shown in **Exhibit 7-16**. Despite the right-of-way acquisition, the property will continue to convey the characteristics qualifying it for inclusion on the NRHP. Section 106 consultation has determined the Build Alternatives will have No Adverse Effect to the property. As a result, FHWA makes a *de minimis* impact determination for the resource. The impact determination includes all possible planning to minimize harm.

Exhibit 7-16 Univar—Build Alternatives

Safeway Distribution Center Historic District (5DV9232)

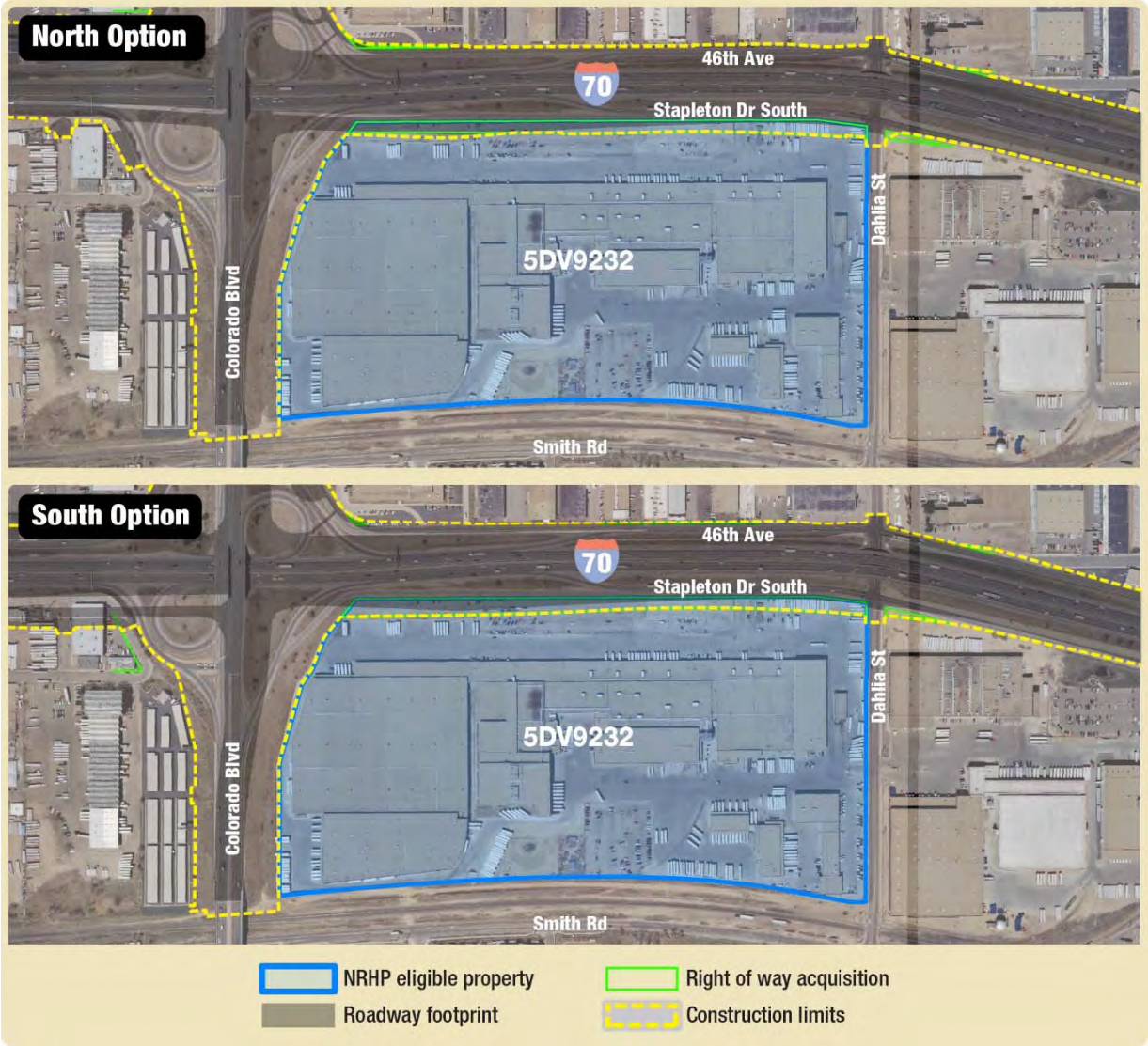
Under Section 4(f), the use of a historic district is ultimately determined by how a project uses resources that contribute to the historic district. The contributing resources in the Safeway Distribution Center Historic District include five commercial buildings and one railroad spur. None of the contributing resources are individually eligible for or listed on the NRHP.

Revised Viaduct Alternative

With the Revised Viaduct Alternative, the expanded highway footprint pushes the Stapleton Drive South alignment farther into the Safeway Distribution Center Historic District, as shown in **Exhibit 7-17**. In total, the North Option will permanently incorporate 2.1 acres of the district into the I-70 corridor, while the South Option will permanently incorporate 2.5 acres of the district. For both of these options, the primary right-of-way acquisition is located on the northern edge of the parking lot and includes acquisition of the Transport Control Facility (5DV10395), which was officially determined to be non-contributing to the eligibility of the district. Only one contributing property, the Security Building (5DV10396), will be used by the options. A temporary construction easement will encompass the Security Building, and none of the options will demolish or move the Security Building during construction. There will be no physical impact to any historic element of the district.

The Revised Viaduct Alternative will not diminish the features of the resource qualifying it for inclusion in the NRHP, and work will not affect the architectural qualities of the standing structures. Section 106 consultation has determined the alternative will have No Adverse Effect to the district. Because of the No Adverse Effect determination, FHWA makes a *de minimis* impact determination. The impact determination includes all possible planning to minimize harm.

Exhibit 7-17 Safeway Distribution Center Historic District—Revised Viaduct Alternative, North and South Options



Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative has the same impacts and resulting use as the Revised Viaduct Alternative, North Option. By expanding the highway footprint, the Stapleton Drive South alignment is pushed farther into the historic district and results in the permanent incorporation of 2.1 acres of the district into a transportation facility (**Exhibit 7-18**). Again, the right-of-way acquisition is primarily located on the northern edge of the parking lot and includes acquisition of the Transport Control Facility (5DV10395). This alternative will not compromise the historic integrity of the district, Section 106 consultation has determined the alternative will have No Adverse Effect to the district; therefore, FHWA makes a *de minimis* impact determination for the district. The impact determination includes all possible planning to minimize harm.

Exhibit 7-18 Safeway Distribution Center Historic District—Partial Cover Lowered Alternative

Nestlé Purina PetCare Company (5DV9245)

No-Action Alternative, South Option

For the No-Action Alternative, South Option, the reconstruction of the viaduct will expand the existing width of the bridge from Brighton Boulevard to Colorado Boulevard by more than 50 feet. This expansion results in the viaduct's southern edge extending through the Nestlé Purina PetCare Company facility, as shown in **Exhibit 7-19**. An off ramp will be provided to access York Street, which is directly east of the facility. This interchange further encroaches on the building and crosses the northeast corner of the facility. Because of this, the South Option will require the acquisition of the entire 9.95-acre property and will permanently incorporate it into the I-70 corridor, resulting in an Adverse Effect and a direct use with the No-Action Alternative, South Option.

Nestlé Purina PetCare Company

Constructed:	1928
Eligibility:	Criterion A
Type:	Office, warehouse, manufacturing facility, and grain silos
Used by:	No-Action Alternative, South Option (use) and Revised Viaduct Alternative, South Option (use)

Revised Viaduct Alternative, South Option

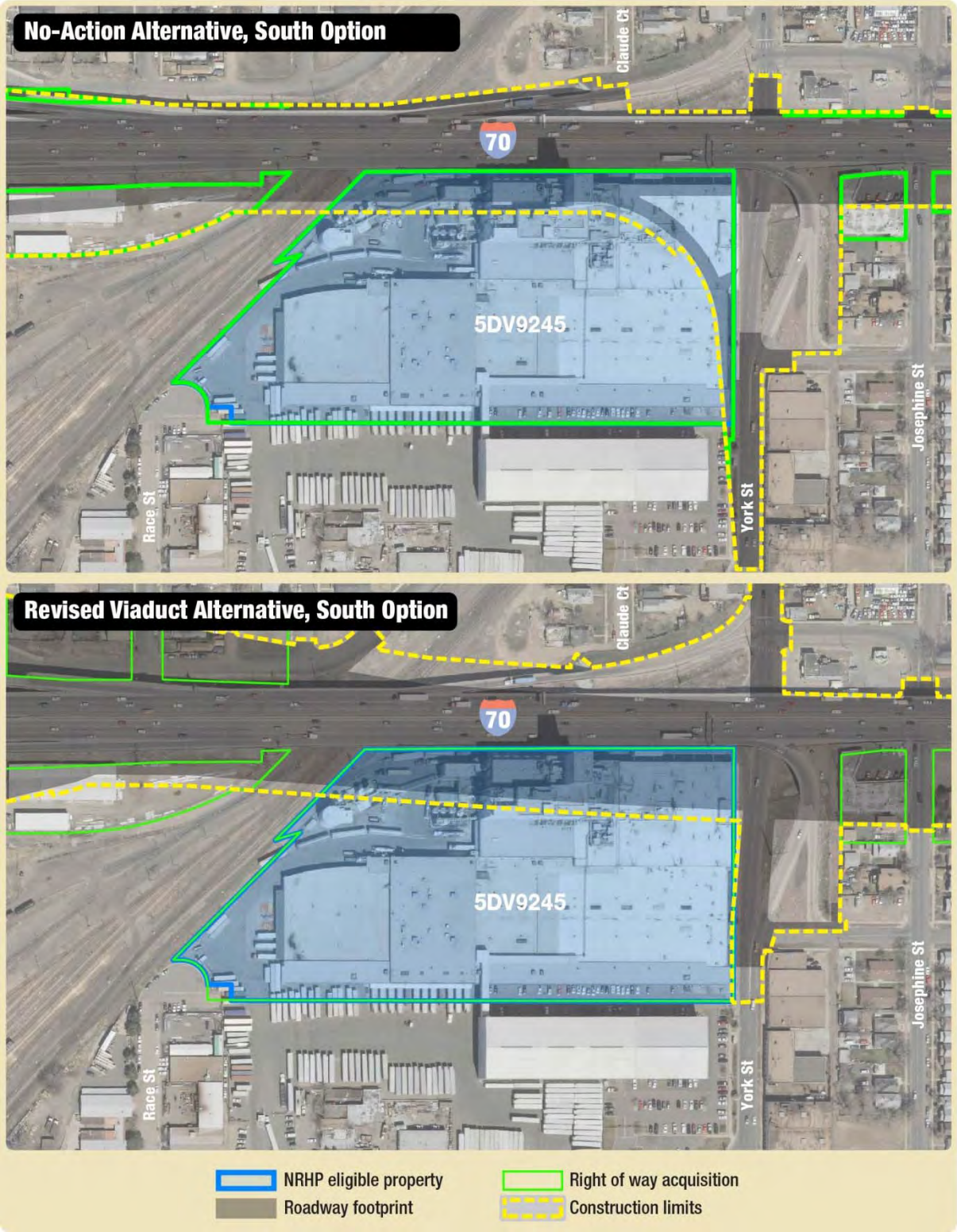
The Revised Viaduct Alternative, South Option has impacts similar to the No-Action Alternative, South Option, and also results in a direct use of the Nestlé Purina PetCare Company facility. This option will reconstruct the existing viaduct and add capacity to the highway. This expands the bridge width by 111 feet and extends the southern edge of the highway up to 140 feet south of the existing highway, which then crosses the Nestlé Purina PetCare Company facility, as shown in **Exhibit 7-19**. The new alignment of 46th Avenue beneath the viaduct will cross a portion of the northeastern edge of the property.

As with the No-Action Alternative, South Option, the Revised Viaduct Alternative, South Option will create an Adverse Effect under Section 106, and a direct use of the entire 9.95-acre property into the transportation facility.

Avoidance alternatives

The No-Action Alternative, North Option, Revised Viaduct Alternative, North Option, and Partial Cover Lowered Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Exhibit 7-19 Nestlé Purina PetCare Company—No-Action Alternative and Revised Viaduct Alternative, South Option



Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

The original designs for the No-Action Alternative, North Option and Revised Viaduct Alternative, North Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, South Option or the Revised Viaduct Alternative, South Option have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Sanchez businesses (5DV9655 and 5DV9801)

Sanchez Businesses

Constructed: 5DV9655 was constructed in 1952. 5DV9801 was constructed in 1941

Eligibility: Criteria A and C

Type: One-story commercial buildings

Used by: No-Action Alternative, North Option (use); Revised Viaduct Alternative, North Option (use); and Partial Cover Lowered Alternative (use)

No-Action Alternative, North Option

The 70-foot extension of the north edge of the roadway will result in the alignment of the westbound I-70 lanes being constructed directly above both of the Sanchez businesses, as shown in **Exhibit 7-20**. Full acquisition of both properties will be required for this construction. It will be an Adverse Effect under Section 106 and a direct use of the properties. This totals 0.36 acre that will be permanently incorporated into the I-70 corridor.

Exhibit 7-20 Sanchez Businesses—No-Action Alternative, North Option

Revised Viaduct Alternative, North Option

The Revised Viaduct Alternative, North Option expands the north edge of the highway up to 160 feet to the north. As shown in **Exhibit 7-21**, the North Option will reconstruct the viaduct over the Sanchez businesses, requiring full acquisition of the properties, totaling 0.36 acre of right-of-way acquisition. The full acquisition results in an Adverse Effect under Section 106 and a direct use of both of these Section 4(f) properties.

Exhibit 7-21 Sanchez Businesses—Revised Viaduct Alternative, North Option

Partial Cover Lowered Alternative

Like the Revised Viaduct Alternative, North Option, the Partial Cover Lowered Alternative expands the north edge of the highway up to 160 feet to the north. This alternative removes the existing viaduct and constructs the highway below ground level at this location, which places the approximate centerline of I-70 right through both properties, as shown in **Exhibit 7-22**. This requires full acquisition of the properties, totaling 0.36 acre of right-of-way acquisition. It constitutes an Adverse Effect under Section 106 and a direct use of both of these Section 4(f) properties.

Exhibit 7-22 Sanchez Businesses—Partial Cover Lowered Alternative

Avoidance alternatives

The Revised Viaduct Alternative, South Option would avoid use of this property. Although the alternative avoids this resource, it uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70.

Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS. In the No-Action Alternative, South Option, design modifications minimized the acquisition of both Sanchez businesses, and instead of fully acquiring only use 0.02 acre and fully avoided structures.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

The original designs for the Revised Viaduct Alternative, South Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative; Revised Viaduct Alternative, North Option; and Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Brown and Alarid property (5DV9667)

Partial Cover Lowered Alternative

The alignment of the westbound 46th Avenue lanes will be located directly south of the property, as shown in **Exhibit 7-23**. Construction will require the acquisition of the 0.07-acre property and its permanent incorporation into the transportation facility, which results in an Adverse Effect under Section 106, and a direct use of the property.

Brown and Alarid Property

Constructed:	1886
Eligibility:	Criterion C
Type:	One-story residence
Used by:	Partial Cover Lowered Alternative (use)

Avoidance alternatives

The No-Action Alternative and Revised Viaduct Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

For the Partial Clover Lowered Alternative, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Partial Cover Lowered Alternative and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Exhibit 7-23 Brown and Alarid Property and Toth/Kelly Residence—Partial Cover Lowered Alternative

The original design for the Revised Viaduct Alternative, North Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Toth/Kelly residence (5DV9668)

Partial Cover Lowered Alternative

The Toth/Kelly residence is located directly north of the Brown and Alarid property. For the Partial Cover Lowered Alternative, the standard right-of-way requirement for the westbound 46th Avenue lanes to the south of the Kelly residence requires encroachment onto the property. As a result, the Partial Cover Lowered Alternative will acquire the whole 0.07-acre property, as shown previously in **Exhibit 7-23**, and will permanently incorporate it into the transportation facility, resulting in an Adverse Effect under Section 106 and a direct use of the property.

Toth/Kelly Residence

Constructed:	1888
Eligibility:	Criteria A and C
Type:	One-story residence
Used by:	Partial Cover Lowered Alternative (use)

Avoidance alternatives

The No-Action Alternative and Revised Viaduct Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

The minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Partial Cover Lowered Alternative and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Rodriguez residence (5DV9678)

Revised Viaduct Alternative, South Option

This alternative reconstructs the highway and expands to the south. As a result, the new alignment for I-70 goes through the Rodriguez property, as shown in **Exhibit 7-24**, requiring acquisition of the 0.05-acre property. This will create an Adverse Effect under Section 106. The property will be permanently incorporated into the transportation facility, which is a direct use of the property.

Rodriguez Residence

Constructed:	1889
Eligibility:	Criterion C
Type:	One-story residence
Used by:	Revised Viaduct Alternative, South Option (use)

Avoidance alternatives

The No-Action Alternative, Revised Viaduct Alternative, North Option, and Partial Cover Lowered Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Exhibit 7-24 Rodriguez Residence and 4541 Clayton LLC Property—Revised Viaduct Alternative, South Option

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

The original designs for the Revised Viaduct Alternative, North Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Revised Viaduct Alternative, South Option have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

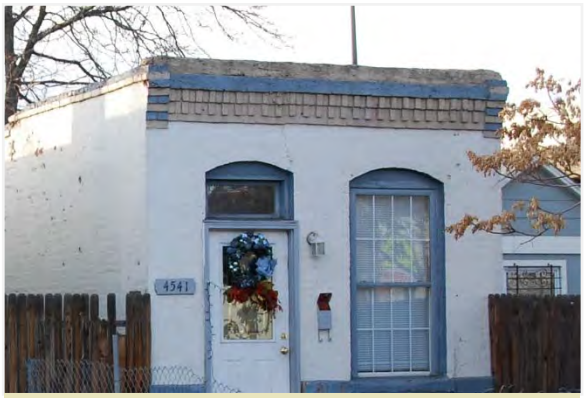
4541 Clayton LLC property (5DV9679)

No Action Alternative, South Option

For 4541 Clayton LLC, Section 106 consultation has determined the No Action Alternative, South Option would result in an Adverse Effect to the setting of the historic property. There are no direct effects to the resource. The property is significant under NRHP Criterion C in the area of architecture. Per the Policy Paper, the proximity impacts proposed under this alternative will not substantially impair the architectural attributes for which the property is eligible to the NRHP. Therefore, there is no Section 4(f) use of the resource under this alternative.

Revised Viaduct Alternative, South Option

Located directly north of the Rodriguez residence, the reconstruction and realignment of I-70 goes through the 4541 Clayton LLC property, as shown in **Exhibit 7-24**. A direct use of the property will occur through the acquisition of the 0.05-acre property and its permanent incorporation into the transportation facility.



4541 Clayton LLC Property

Constructed:	1889
Eligibility:	Criterion C
Type:	One-story residence
Used by:	Revised Viaduct Alternative, South Option (use)

Avoidance alternatives

The No-Action Alternative, Revised Viaduct Alternative, North Option, and Partial Cover Lowered Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct will require

acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

The original design for the Revised Viaduct Alternative, North Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Revised Viaduct Alternative, South Option have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Rudy/Bernal residence (5DV9735)

No-Action Alternative, North Option

This residence is located between the southern termini of High Street and Race Street. For the No-Action Alternative, North Option, the existing street that connects Williams Street and Gaylord Street will be shifted to the north. This places the alignment of the connector street directly through the Rudy/Bernal residence, as shown in **Exhibit 7-25**. As a result, the 0.07-acre property will be acquired and permanently incorporated into the transportation facility, which constitutes an Adverse Effect under Section 106 and a direct use.

Rudy/Bernal Residence

Constructed:	1886
Eligibility:	Criterion C
Type:	One-story residence
Used by:	No-Action Alternative, North Option (use) and Build Alternatives (use)

Revised Viaduct Alternative

Similar to the No-Action Alternative, North Option, both design options under the Revised Viaduct Alternative shift the connector street to the north. While the exact alignment of the roadway through the Rudy/Bernal residence varies, as shown in **Exhibit 7-26** and **Exhibit 7-27**, each option will result in an Adverse Effect under Section 106 and a direct use of the property through the acquisition and permanent incorporation of the entire 0.07-acre property into the transportation facility.

Partial Cover Lowered Alternative

This alternative also shifts the connector street to the north, which places the alignment through the Rudy/Bernal residence, as shown in **Exhibit 7-28**. This requires the full acquisition of the property and results in an Adverse Effect under Section 106 and a direct use.

Avoidance alternatives

The No-Action Alternative, South Option would avoid use of this property. Although the No-Action Alternative, South Option avoids this resource, it uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Exhibit 7-25 Rudy/Bernal and Garcia Residences—No-Action Alternative, North Option

Exhibit 7-26 Rudy/Bernal and Garcia Residences—Revised Viaduct Alternative, North Option

Exhibit 7-27 Rudy/Bernal and Garcia Residences—Revised Viaduct Alternative, South Option

Exhibit 7-28 Rudy/Bernal and Garcia Residences—Partial Cover Lowered Alternative

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, North Option or the Build Alternatives have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Garcia residence (5DV9780)

No-Action Alternative, North Option

Similar to the Bernal residence, this residence is located between the southern termini of High Street and Race Street. For the No-Action Alternative, North Option, the existing street that connects Williams Street and Gaylord Street will be shifted to the north. This places the alignment of the connector street directly through the Garcia residence, as shown in **Exhibit 7-25**. As a result, the 0.07-acre property will be acquired and permanently incorporated into the transportation facility, which constitutes an Adverse Effect under Section 106 and a direct use.

Garcia Residence

Constructed:	1890
Eligibility:	Criterion C
Type:	Two-story, four-unit residence
Used by:	No-Action Alternative, North Option (use) and Build Alternatives (use)

Revised Viaduct Alternative

As shown in **Exhibit 7-26** and **Exhibit 7-27**, both design options under the Revised Viaduct Alternative realign the connector street through the property. This requires full acquisition of the property, which results in an Adverse Effect under Section 106 and a direct use.

Partial Cover Lowered Alternative

Exhibit 7-28 shows how the alternative realigns the connector street through the property, similar to the Revised Viaduct Alternative. The realignment requires full acquisition of the property, thereby resulting in an Adverse Effect under Section 106 and a direct use.

Avoidance alternatives

The No-Action Alternative, South Option would avoid use of this property. Although the No-Action Alternative, South Option avoids this resource, it uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, North Option or the Build Alternatives have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Kenworthy / Wyckoff residence (5DV9745)

Revised Viaduct Alternative, South Option

In this area, the alternative extends the southern roadway edge of I-70 60 feet farther south. As shown in **Exhibit 7-29**, this results in the construction of the southern edge of the viaduct over a portion of the Kenworthy/ Wyckoff residence. The 0.15-acre property will be permanently incorporated into the transportation facility through right-of-way acquisition, resulting in an Adverse Effect under Section 106 and a direct use.

Kenworthy / Wyckoff Residence

Constructed:	1926
Eligibility:	Criterion C
Type:	One-story residence
Used by:	Revised Viaduct Alternative, South Option (use)

Avoidance alternatives

The No-Action Alternative, Revised Viaduct Alternative, North Option, and Partial Cover Lowered Alternative would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

Exhibit 7-29 Kenworthy / Wyckoff Residence—Revised Viaduct Alternative, South Option

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

The original designs for the Revised Viaduct Alternative, North Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the Revised Viaduct Alternative, South Option have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Portales residence (5DV9746)

No-Action Alternative, North Option

With the No-Action Alternative, North Option, the extension of the northern edge of the highway 70 feet to the north places the westbound lanes of the viaduct directly over the property, as shown in **Exhibit 7-30**. This results in a direct use of the Portales residence. This will require the acquisition and incorporation of the entire 0.14-acre property into the I-70 corridor, and as such constitutes an Adverse Effect under Section 106 and a direct use.

Portales Residence

Constructed:	1889
Eligibility:	Criterion C
Type:	One-story residence
Used by:	No-Action Alternative, North Option (use); Revised Viaduct Alternative, North Option (use); and Partial Cover Lowered Alternative (use)

Revised Viaduct Alternative, North Option

Similar to the No-Action Alternative, North Option, the Revised Viaduct Alternative, North Option reconstructs and expands the viaduct so that the alignment is located directly over the Portales property (see **Exhibit 7-31**). This option results in an Adverse Effect under Section 106 and a direct use by acquiring the entire 0.14-acre property and permanently incorporating it into the I-70 corridor.

Partial Cover Lowered Alternative

The Partial Cover Lowered Alternative will have a similar alignment to the Revised Viaduct Alternative, North Option except—instead of a viaduct going over the property—the highway alignment will go directly through the property (see **Exhibit 7-32**). This alternative will result in an Adverse Effect under Section 106 and a direct use by acquiring the entire 0.14-acre property and permanently incorporating it into the I-70 corridor.

Exhibit 7-30 Portales Residence—No-Action Alternative, North Option

Exhibit 7-31 Portales Residence—Revised Viaduct Alternative, North Option

Exhibit 7-32 Portales Residence—Partial Cover Lowered Alternative

Avoidance alternatives

The Revised Viaduct Alternative, South Option would avoid use of this property. Although the alternative avoids this resource, it uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These

measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

The original design for the Revised Viaduct Alternative, South Option required a partial acquisition of this property. Design modifications were made to move the construction limits off the property, avoiding use of this resource.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, Revised Viaduct Alternative, North Option or the Partial Cover Lowered Alternative have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

Alfred R. Wessel Historic District (5DV10126)

Representative Structures in Alfred R. Wessel Historic District

Constructed:	Contributing resources were constructed between 1940 and 1949
Eligibility:	Criteria A, B, and C
Type:	Buildings
Used by:	No-Action Alternative, North Option (use) and Build Alternatives (use)

The Alfred R. Wessel Historic District includes the Wulfekuhler's, Vasquez Plaza, and Vasquez Court subdivisions. The three subdivisions were developed because of their proximity to various manufacturing facilities, as well as State Highway 85/Vasquez Boulevard, which serves as a transportation corridor. The period of construction of the Alfred R. Wessel Historic District is from 1940 to 1948. The district contains 114 residences, of which 60 are in the project APE. Of the 60 resources recorded within the APE, Section 106 consultation has determined that 49 are contributing resources to the district and 11 are non-contributing. None of the contributing properties are individually eligible for or listed on the NRHP, but the district itself is a historic resource.

Both the No-Action Alternative and the Build Alternatives use individual properties that contribute to the historic eligibility of the Alfred R. Wessel Historic District. These uses are summarized in **Exhibit 7-33**.

Exhibit 7-33 Summary of Alfred R. Wessel Historic District Contributing Resources Subject to a Use

Site No.	Resource Name/Location	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
		North Option	South Option	North Option	South Option	
5DV9682	Casillas Residence 4600 Clayton Street	Full	—	Full	—	Full
5DV9683	Luchetta Residence 4601 Clayton Street	Full	—	Full	—	Full
5DV9684	Ramirez Residence 4610 Clayton Street	—	—	Full	—	Full
5DV9685	Dady Residence 4611 Clayton Street	—	—	Full	—	Full
5DV9686	Martinez Residence 4620 Clayton Street	—	—	—	—	Full
5DV9687	Carrera and Ortiz Residence 4621 Clayton Street	—	—	—	—	Full
5DV9689	Chaires Residence 4631 Clayton Street	—	—	—	—	—
5DV9726	Fletcher Residence 4610 Fillmore Street	—	—	Full	Partial	Full
5DV9727	Griffie Residence 4615 Fillmore Street	—	—	Full	Partial	Full
5DV9728	Santa Cruz Property 4620 Fillmore Street	—	—	Full	—	Full
	Total	**2 Full**	**—**	**7 Full**	**2 Partial**	**9 Full**

Full: Full acquisition and demolition of the property for construction
Partial: Partial acquisition of the property

No-Action Alternative, North Option

This alternative reconstructs the viaduct and expands the footprint 70 feet to the north, which extends I-70 into the southwestern boundary of the Alfred R. Wessel Historic District. As a result of this reconstruction, the acceleration lane stemming from the on ramp from Vasquez Boulevard encroaches into the district and requires the acquisition of 0.3 acre of right of way within the district, as shown in **Exhibit 7-34**. This right-of-way acquisition includes acquisition of two of 49 contributing properties (4 percent) within the district and, as such constitutes an Adverse Effect to the district under Section 106 and a direct use under Section 4(f).

Exhibit 7-34 Alfred R. Wessel Historic District—No-Action Alternative, North Option

Revised Viaduct Alternative, North Option

The expanded footprint of the Revised Viaduct Alternative, North Option results in construction directly on top of a portion of the historic district, including two contributing properties. It also realigns the on- and off-ramps to and from Vasquez Boulevard through the southwestern boundary of the district. As a result, seven of 49 contributing properties (14 percent) will be acquired, as shown in **Exhibit 7-35**. In total, 1.4 acres of right of way will be acquired from the historic district under the Revised Viaduct Alternative, North Option, resulting in an Adverse Effect to the district under Section 106 and a direct use under Section 4(f).

Revised Viaduct Alternative, South Option

This alternative will minimize impacts to the historic district, with most of the impacts occurring south of I-70. The Vasquez Boulevard on-ramp also will be realigned through the southwestern boundary of the district. This will require the incorporation of 0.2 acre of the district into the I-70 corridor. As shown in **Exhibit 7-36**, this includes the acquisition of 0.03 acre of right of way from the Warren residence (5DV9726) and 0.002 acre from the Griffie residence (5DV9727). While this option permanently incorporates a small portion of two of 49 contributing properties (4 percent) into a transportation facility, it avoids encroaching on any contributing structures. Section 106 consultation has determined the Revised Viaduct Alternative, South Option will have an Adverse Effect to the district under Section 106, and a direct use under Section 4(f).

Partial Cover Lowered Alternative

With the Partial Cover Lowered Alternative, the alignment of the westbound 46th Avenue lanes will go through the southwestern boundary of the historic district, resulting in a direct use under Section 4(f), as shown in **Exhibit 7-37**. The alternative will acquire nine of 49 contributing properties (18 percent) and a total of 2.02 acres of right of way from the district. This creates an Adverse Effect under Section 106 and a direct use under Section 4(f).

Avoidance alternatives

The No-Action Alternative, South Option would avoid use of this property. Although the alternative avoids this resource, it uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Exhibit 7-35 Alfred R. Wessel Historic District—Revised Viaduct Alternative, North Option

Exhibit 7-36 Alfred R. Wessel Historic District—Revised Viaduct Alternative, South Option

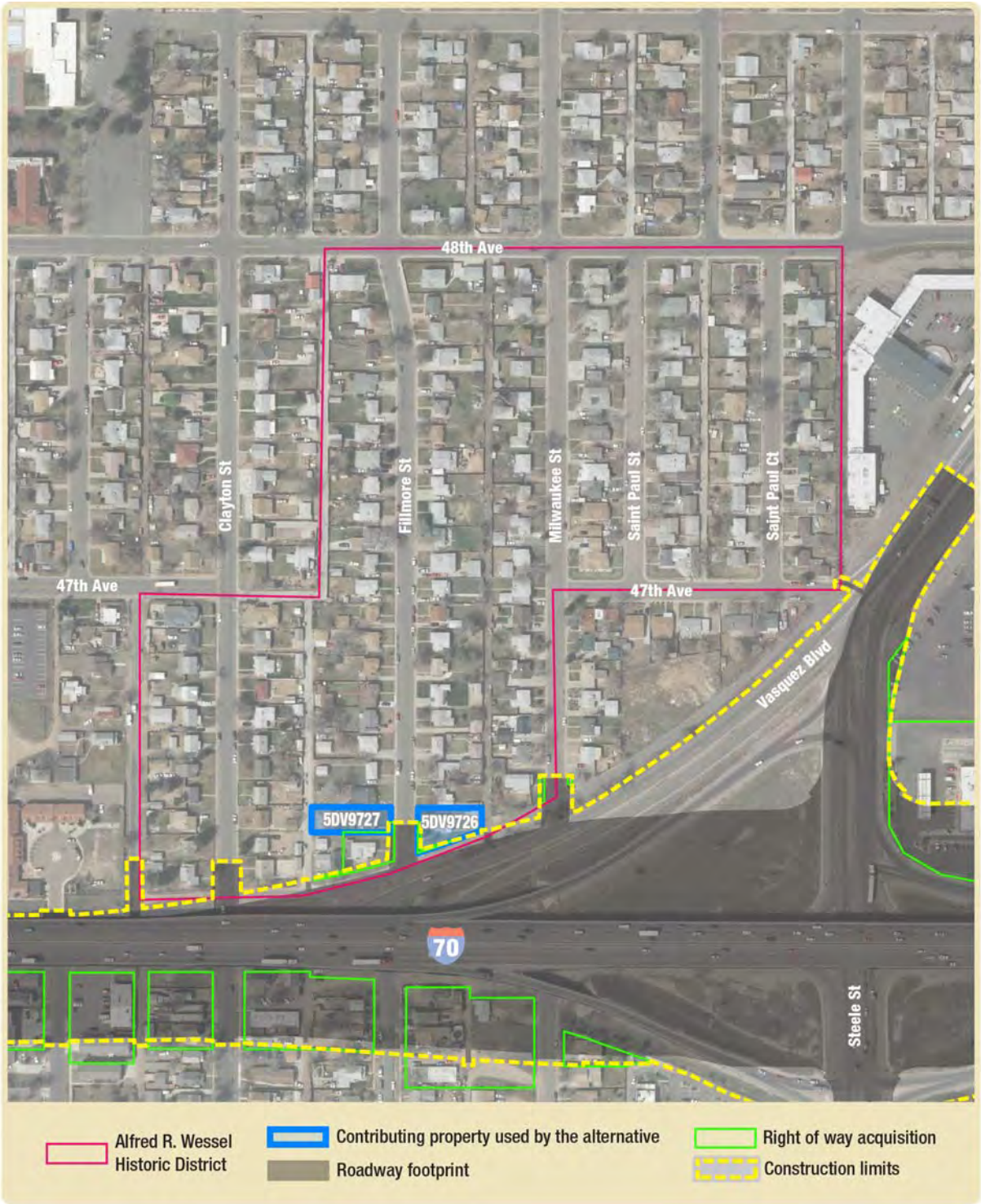


Exhibit 7-37 Alfred R. Wessel Historic District—Partial Cover Lowered Alternative

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources.

For the No-Action Alternative, construction limits were reduced from 50 feet to 20 feet compared to what was evaluated in the 2008 Draft EIS. This reduced the use of the Alfred R. Wessel Historic District. Previously, the No-Action Alternative, North Option acquired 0.79 acre, fully acquired two contributing properties, and partially acquired one contributing property. Now, it will acquire 0.3 acre and fully acquire two contributing properties.

For the Revised Viaduct Alternative, the original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Due to the location of this historic district and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, South Option or the Build Alternatives have been identified. During final design and engineering, additional modifications may be made to further minimize harm to this resource.

National Western Historic District (5DV10050 includes 5DV3815, 5DV9162 [5DV9282], 5DV10059, 5DV10060 [5DV9163], 5DV10081, 5DV10082, and 5DV10447)

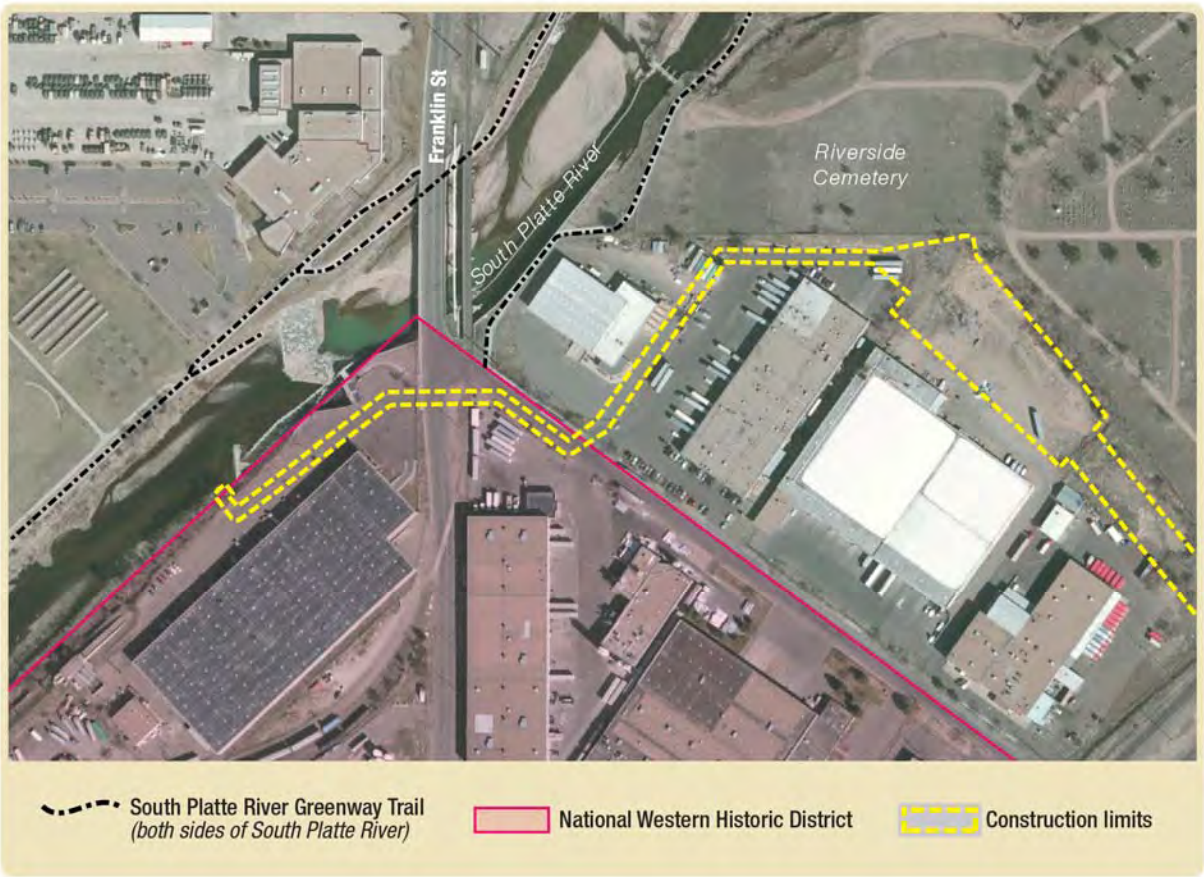
National Western Historic District	
Eligibility:	Criterion A and C
Type:	Historic district
Used by:	All Alternatives (*de minimis*)

The National Western Complex, containing 47 buildings and features, has been identified as a historic district, eligible for listing on the NRHP under Criteria A and C. Of the 47 buildings and features, 10 have been evaluated for NRHP eligibility, and eight have been determined to be contributing resources. Eight contributing resources in the historic district are within the revised APE.

All Alternatives

Each project alternative will require a drainage easement on the north side of I-70 to accommodate a storm drain, as seen in **Exhibit 7-38**.

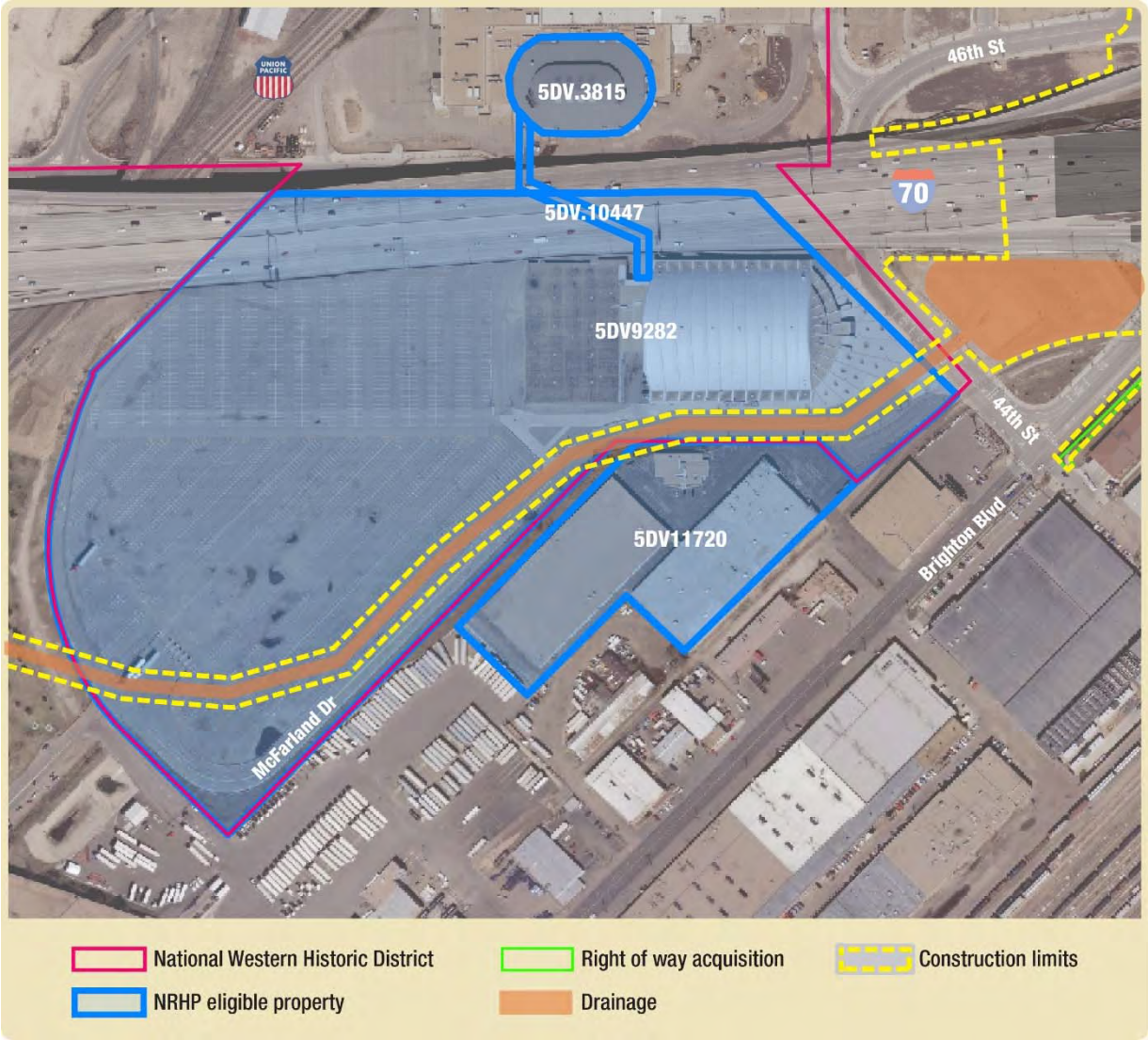
Exhibit 7-38 National Western Historic District—All Alternatives



The storm drain will be conveyed beneath Franklin Street to access the South Platte River, crossing under this historic district. The storm drain will be directional bore drilled beneath Franklin Street and the National Western Historic District property. No surface work or disturbance will occur. The project will require a 1.005 acre easement for maintenance of the storm drain. Because the improvements proposed under the alternatives would not impact any of the character-defining features of the property or diminish the integrity of the property's contributing characteristics, Section 106 consultation has determined that this alternative would result in a finding of No Adverse Effect. Therefore, FHWA makes a de minimis impact determination. Partial Cover Lowered Alternative

In addition to the pipe described above, a stormwater outfall pipe would be installed within the district, south of I-70, which would be built south of the Denver Coliseum underneath the parking lot between the Coliseum and the South Platte River. The outfall system would result in the placement of a new stormwater pipe underneath the pavement, which is not original and has been re-paved as needed throughout the years. This would not change or modify the current appearance of the historic district or its contributing buildings. Temporary or permanent easements may be required, but there would be no right of way acquisition of any portion of the historic district associated with the Partial Cover Lowered Alternative. The district would still retain its association with the commercial, economic, and social history of Colorado, and the diverse building styles and types would remain unaltered (**Exhibit 7-39**). Therefore, FHWA concluded that the Partial Cover Lowered Alternative would result in a determination of No Adverse Effect under Section 106, and a *de minimis* impact determination under Section 4(f). The impact determination includes all possible planning to minimize harm.

Exhibit 7-39 National Western Historic District—Partial Cover Lowered Alternative



Banker's Warehouse (5DV11720)

Partial Cover Lowered Alternative

Banker's Warehouse

Constructed:	1955
Eligibility:	Criterion C
Type:	Warehouse and office buildings
Used by:	Partial Cover Lowered Alternative (*de minimis*)

This resource is located 987 feet from the existing viaduct. The highway west of Brighton Boulevard would remain in place and improvements associated with the Partial Cover Lowered Alternative structure would start east of Brighton Boulevard. There would, however, be an acquisition of approximately 1,515 square feet from the northwest corner of the resource to construct a retaining wall and box culvert. The area where the acquisition will occur is does not contain any historically significant features, is covered in overgrown grass, and sits on a lower topography than the buildings. The building closest to where the acquisition will occur, Building 3, is situated high atop a bluff and the wall and box culvert would not be visible from the building. Because the improvements proposed under the Partial Cover Lowered Alternative would not impact any of the character-defining features of the property or diminish the integrity of the property's contributing characteristics, Section 106 consultation has determined that this alternative would result in a finding of No Adverse Effect. Therefore, FHWA makes a *de minimis* impact determination (**Exhibit 7-39**). The impact determination includes all possible planning to minimize harm.

7.8.3 Parks and recreation areas

The majority of the parks and recreation areas within the project area are located far enough away from the project alternatives that they will not be impacted by the project and do not have the potential for a Section 4(f) use. Of the 45 parks and 43 recreational areas identified, the project has the potential to impact one park and two recreation areas. It will potentially use one park and two recreation areas. **Exhibit 7-40** shows the location of resources with potential impacts. These resources are discussed in detail in the following sections.

Exhibit 7-40 Overview of Section 4(f) Parks and Recreational Areas

Globeville Landing Park

Partial Cover Lowered Alternative

This alternative includes construction of a storm drainage system south of I-70. This system proposes an outfall to the South Platte River adjacent to Globeville Landing Park.

The system will bury approximately 430 linear feet of storm drain pipe across the park, terminating at the river, as shown on **Exhibit 7-41**. A 52-foot (0.5 acre) easement will be centered on the pipeline alignment for the duration of construction. The easement likely will be permanent to allow for future maintenance of the storm drain, and will be owned by CDOT.

While the easement itself will be permanent, the majority of the storm drain construction will only temporarily impair use of a portion of the park. Permanent ground disturbance will consist of constructing a 0.3-acre boulder drop spillway along the west end of the pipe at its terminus near the South Platte River.

Globeville Landing Park

Ownership:	City and County of Denver (Denver Parks and Recreation)
Open to public:	Yes
Amenities:	Plaza, picnic tables, South Platte River Trail, disc-golf course
Description:	Nine-acre park located adjacent to South Platte River and UPRR
Used by:	Partial Cover Lowered Alternative (use)

With the exception of constructing a spillway, use of the property will be limited to temporary ground-disturbing activities, which will remove ground vegetation and trees, and will temporarily diminish the use of the disc-golf course. After the storm drain is put into place, all of the easement, except the 0.3-acre spillway, will be available for recreational use, although the aesthetics of the immediate area will be disturbed by construction. Following construction, areas of temporary disturbance will be returned to pre-construction conditions. This includes any impact to the disc-golf course and provides replacement of vegetation and trees. The permanent incorporation of 0.3 acres in Globeville Landing Park due to the spillway results in a direct use of the property.

Avoidance alternatives

The No-Action and Revised Viaduct Alternatives avoid use of this property. Although the alternatives avoid this resource, they uses other Section 4(f) resources. Other alternatives that avoid this property were eliminated because they were not considered feasible and prudent, and are summarized in Section 7.9.

Routing the storm drain pipe to the north of Globeville Landing Park through the UPRR right of way was considered as an avoidance alternative. Due to the invert elevation and presence of two historic brick sanitary sewer lines, the storm drain pipe will need to be buried approximately 40 feet below ground level at the UPRR crossing. This depth will not allow for the pipe to outfall to the river, and so is not prudent.

Moreover, the pipe cannot connect to existing storm drains or ponds, because the existing storm drains do not have capacity to convey large flows required to protect the lowered section of I-70. To upsize the existing drainage facilities which currently include a pond and a concrete drop structure in Globeville Landing Park to convey the large flows needed to protect I-70 East would approximately double the size of the existing pond and drop structure causing a large impact to the park, therefore upsizing the existing drainage facilities was not pursued.

It is not feasible to go around Globeville Landing Park to the north because of the UPRR crossing and presence of two historic brick sanitary sewer lines. With these constraints the proposed storm drain is not able to drain into the South Platte River. It is not feasible to go around the Globeville Landing Park to the south because the design will be flowing against the natural slope and the proposed storm drain is not able to drain into the South Platte River.

Exhibit 7-41 Globeville Landing Park—Partial Cover Lowered Alternative

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties.

To minimize the use of the park, an alignment north of the South Platte River Greenway Trail and bridge over the South Platte River was selected for the storm drainage system through the park. This alignment also avoids placement of storm manhole lids within the park, which will permanently use the park. Most of this alignment option is a temporary disturbance to the park, and the permanent easement will be available for recreational use following construction, with the exception of constructing a 0.3-acre spillway. To offset this impact, the 0.3 acre of the park permanently converted to a transportation use will be replaced in-kind with land of at least current fair market value and of reasonable equivalent usefulness and location.

Sand Creek Greenway Trail

The Sand Creek Greenway Trail is a 14-mile recreational trail that connects the High Line Canal Trail with the South Platte River Greenway Trail in the northeast metropolitan Denver area. Most of the trail within the project area is located in CDOT right of way. The Sand Creek Greenway Trail segment used by the project crosses under I-70, east of Quebec Street, and is located entirely within CDOT right of way. The project will re-align a portion of this trail in this location, and will maintain continuity by diverting the trail to the new location before affecting the portion of the existing trail.

FHWA published a Section 4(f) Final Rule in the *Federal Register* to help clarify the Section 4(f) approval process and simplify its regulatory requirement. In this Final Rule, FHWA identified several exceptions to the requirement for Section 4(f) approval, including “trails, paths, bikeways, and sidewalks that occupy a transportation facility right of way without limitation to any specific location within that right of way, so long as the continuity of the trail, path, bikeway, or sidewalk is maintained” (23 CFR 774.13(f)(3)). This ruling means that the Sand Creek Greenway Trail is excepted from the requirements for Section 4(f) approval in the location.

Swansea Elementary School Public Playground

For this project the Swansea Elementary School playground is afforded Section 4(f) protection. The 2012 FHWA Section 4(f) policy paper says, "When a public school playground is open to the public and serves either organized or substantial walk-on recreational purposes that are determined to be significant, it will be subject to the requirements of Section 4(f)." Because this playground is open for public use outside of school hours and offers substantial "walk-on" recreation use by neighborhood children, it has been determined to be subject to Section 4(f). Where a judgment call is needed, FHWA makes this determination in consultation with the official that has jurisdiction over the resource. The official with jurisdiction is the public agency that owns or manages the property.

Swansea Elementary School Public Playground

Ownership:	Denver Public Schools
Open to public:	Yes, after school hours
Amenities:	A variety of jungle gym equipment, such as slides and swings; a paved area with basketball courts and a variety of games, such as hop scotch and four square; a pavilion; a field; and gardens
Description:	The playground is located between Columbine Street and Elizabeth Street. The field on site is subdivided by a fence that lines the playground property. From this fence to the southern property line of the school is a buffer of approximately 35 feet. The buffer is part of school property but is not used for recreational purposes and is not subject to Section 4(f).
Used by:	No-Action Alternative, North Option (use); Revised Viaduct Alternative, North Option (use); and Partial Cover Lowered Alternative (use)

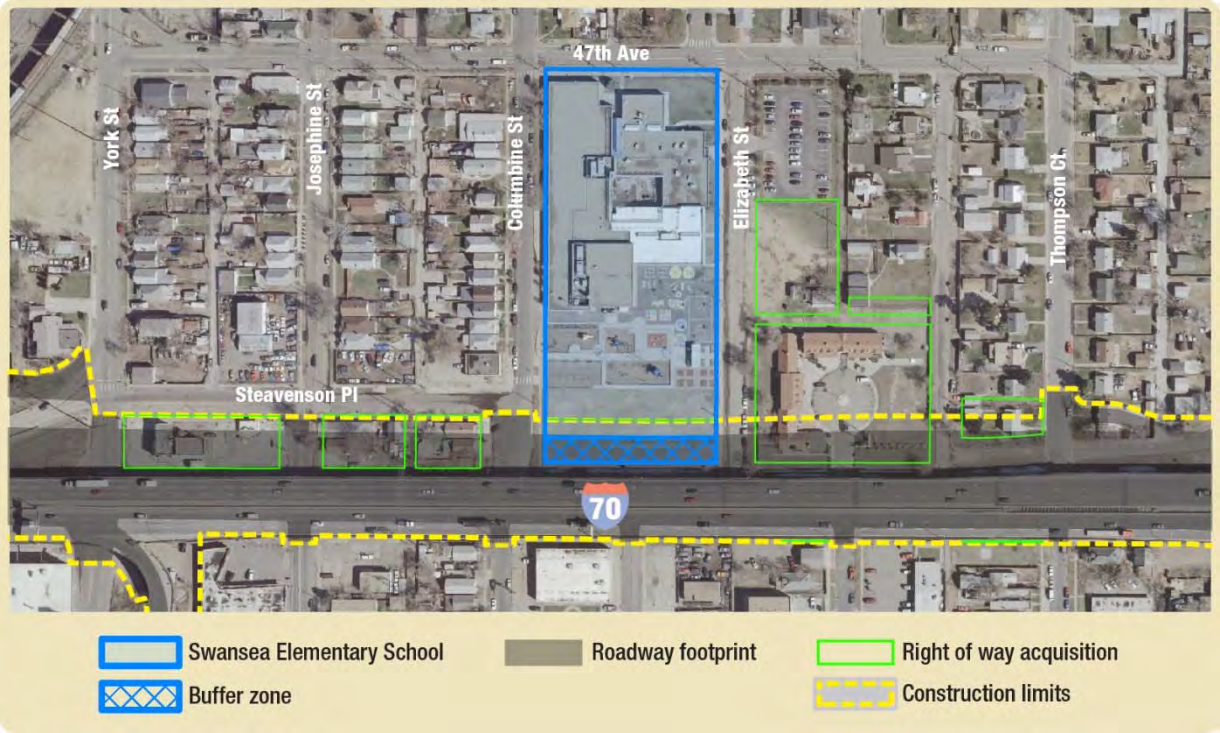
Options under both the No-Action Alternative and the Build Alternatives have the potential to use the school playground. The No-Action Alternative, North Option, Revised Viaduct Alternative, North Option, and Partial Cover Lowered Alternative all will require portions of school property, including the designated playground area, to be permanently incorporated into the I-70 corridor, resulting in a direct use of the playground.

No-Action Alternative, North Option

To rebuild the viaduct to current highway standards, the reconstruction of the existing viaduct expands the width of the highway bridge from Brighton Boulevard to Colorado Boulevard by 50 feet. For the No-Action Alternative, North Option, the construction limits of the highway shift 60 feet to the north, approximately 195 feet from the edge of the Swansea Elementary School building which will require permanent right-of-way acquisition totaling 0.39 acres of school property. All right-of-way acquisition will be from the field located on the school property, which includes 0.16 acre from the area of the field designated as playground and all of the 0.23-acre buffer zone (see **Exhibit 7-42**).

While no playground structures will be impacted, the No-Action Alternative, North Option uses roughly half of the field and permanently impairs recreational use, resulting in a direct use of the playground. In addition, creation of a new buffer between the highway and the playground is desirable. Through property acquisition and the need to create a new buffer zone, nearly all of the field will be rendered unusable for recreation.

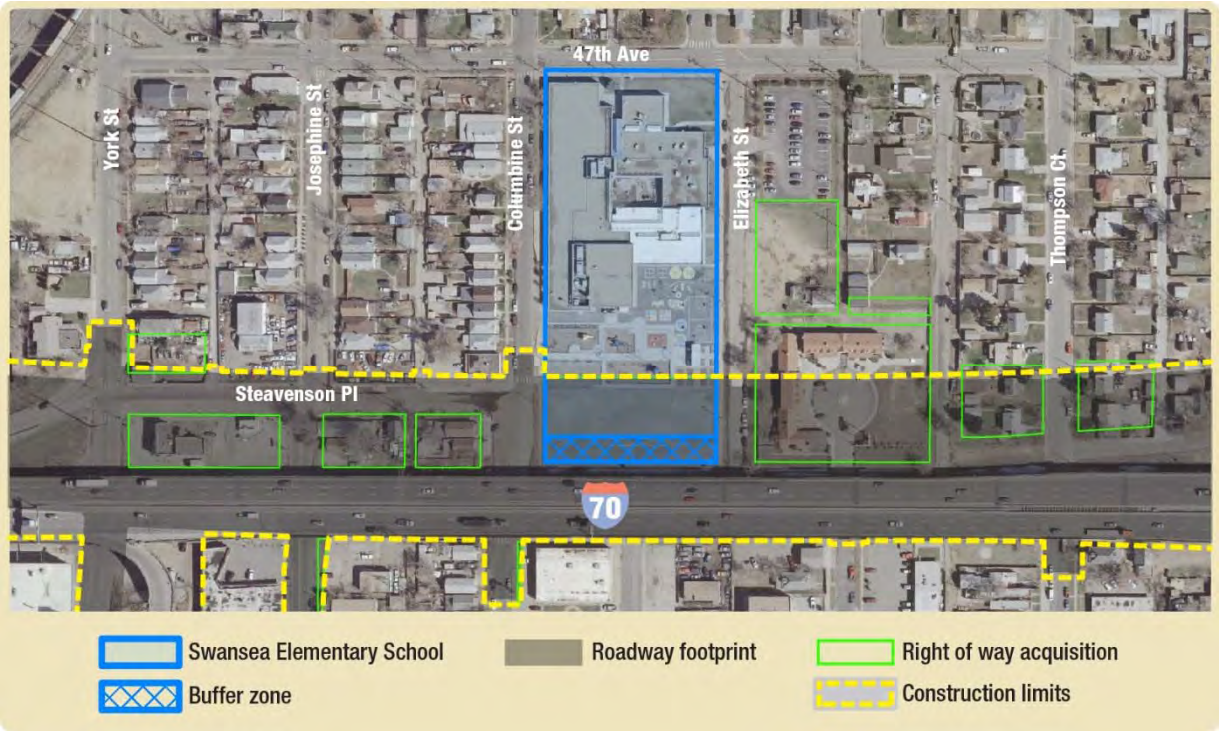
Exhibit 7-42 Swansea Elementary School Public Playground—No-Action Alternative, North Option



Revised Viaduct Alternative, North Option

This alternative consists of reconstructing the viaduct, adding two travel lanes in each direction, and adding acceleration/deceleration lanes, which moves the highway alignment 120 feet closer, or approximately 135 feet away from, the Swansea Elementary School building. The expansion of the highway in this area will incorporate approximately 0.76 acre of school property into the I-70 corridor, which results in a direct use of the property (see **Exhibit 7-43**). This acquisition will consist of acquiring the entire 0.53-acre field that is considered part of the playground, as well as the 0.23-acre buffer zone. This results in the viaduct abutting the area of the school's public playground that houses equipment and other amenities, leaving the remainder of the school's public playground unusable for recreational purposes, as well. This option also will require the creation of a new buffer zone, which further precludes recreational use on the remaining playground.

Exhibit 7-43 Swansea Elementary School Public Playground—Revised Viaduct Alternative, North Option



If the Revised Viaduct Alternative, North Option is chosen for construction, Denver Public Schools has preliminarily indicated a desire for CDOT to relocate the entire school property. To mitigate the use of the school's public playground and ensure its continual and safe use for recreation, a redesign of the playground is proposed under this option.

Partial Cover Lowered Alternative

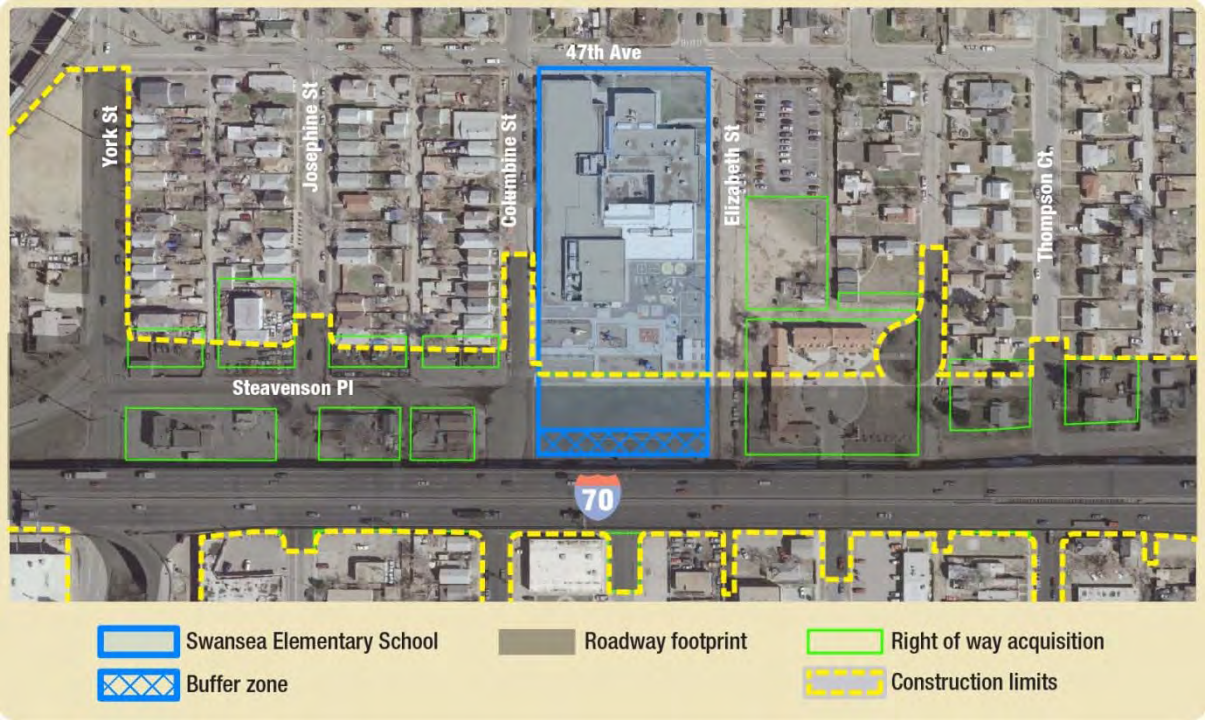
The Partial Cover Lowered Alternative will remove the existing viaduct and reconstruct the highway below ground level at this location. Similar to the Revised Viaduct Alternative, North Option, it adds two travel lanes in each direction, as well as acceleration/ deceleration lanes.

This alternative removes the existing viaduct and reconstructs the highway below ground level at this location. It also adds a cover across the highway in the area of Swansea Elementary School. This option requires approximately 0.72 acre of right-of-way acquisition from the playground and the entire 0.23-acre buffer zone, for a total of 0.95 acre (see **Exhibit 7-44**), which constitutes a direct use of the property.

This acquisition includes the entire playground field (including the buffer zone), and results in the footprint of the highway abutting the area of the playground where equipment and other amenities are located. Under this option, the edge of the highway shifts north placing it approximately 120 feet from the edge of the school building. The highway will be below grade underneath the cover and will not be visible from the school. Because this alternative does not include a viaduct, a new buffer zone is not required since the safety concern for debris falling from the viaduct will be eliminated.

As with the Revised Viaduct Alternative, the school site will be redesigned using adjacent parcels and closing Elizabeth Street from 46th Avenue to 47th Avenue. The redesign of the school lot for the Partial Cover Lowered Alternative will increase the playground. The precise amount is still being coordinated with the school and public. The design includes new or replaced multi-purpose fields, sport courts, and school gardens. As much as 4.0 acres of public space may be available for school and public recreation in the area on top of the cover.

Exhibit 7-44 Swansea Elementary School Public Playground—Partial Cover Lowered Alternative



The No-Action Alternative, South Option and Revised Viaduct Alternative, South Option would avoid use of this property. Although these alternatives avoid this resource, they use other Section 4(f) resources. Other avoidance alternatives that were eliminated because they were not considered feasible and prudent are described below and summarized in Section 7.9.

Measures to minimize harm

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties. These minimization efforts are summarized in Section 7.10.

For the No-Action Alternative and Revised Viaduct Alternative, 46th Avenue has been designed under the viaduct below I-70 to keep 46th Avenue farther away from the Swansea Elementary School property. While this minimizes the use of the playground under the Revised Viaduct Alternative, North Option, it also moves the edge of the viaduct 18 feet farther from the school with the Revised Viaduct Alternative, South Option. For both Build Alternatives, the 46th Avenue typical section is reduced to

minimize the encroachment of the Build Alternatives onto the school property.

Additionally, when compared to the alternatives evaluated for a replaced viaduct in the 2008 Draft EIS (Alternatives 1 and 3), the reduced encroachment on Swansea Elementary School property will now avoid a full acquisition of the property.

To mitigate impacts to the playground, options for the redesign of the school site plan were developed for both the Revised Viaduct Alternative, North Option and Partial Cover Lowered Alternative.

For the Revised Viaduct alternative, the school site will be redesigned using adjacent parcels and closing Elizabeth Street from 46th Avenue to 47th Avenue. The Revised Viaduct Alternative, North Option also will use the space under the reconstructed viaduct as a park or recreational space. The redesign of the school lot for the Revised Viaduct Alternative, North Option increases the playground from the current 1.4 acres to as much as 2.0 acres, depending on the site plan design. It includes new or replaced multi-purpose fields, sport courts, and school gardens.

For the Partial Cover Lowered Alternative, the school site will be redesigned using adjacent parcels and closing Elizabeth Street from 46th Avenue to 47th Avenue. The redesign of the school lot for the Partial Cover Lowered Alternative will increase the playground. The precise amount is still being coordinated with the school and the public. The design includes new or replaced multi-purpose fields, sport courts, and school gardens. As much as 4.0 acres of public space may be available for school recreation in the area on top of the cover.

Due to the location of this property and the preliminary nature of the design, no additional ways to minimize harm from the No-Action Alternative, North Option, Revised Viaduct Alternative, North Option, or the Partial Cover Lowered Alternative have been identified.

7.8.4 Summary of Section 4(f) properties used by the project

Exhibit 7-45 summarizes the discussions in the previous subsections, and lists each Section 4(f) property along with how each of the proposed alternatives may use Section 4(f) property.

Exhibit 7-45 Summary of Section 4(f) Property Use

Historic Resource Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative (Preferred Alternative)
	North Option	South Option	North Option	South Option	
Market Street RR/ Chicago Burlington & Quincy Railroad Segment (5AM1298.2)	*De minimis.* Temporary easement on 210 feet of railroad.		*De minimis.* Reconstruct tracks; temporary easement on 295 feet (North Option) to 335 feet (South Option) of railroad.		Use. Relocate 1,300 feet of track onto two new bridges; eliminate easternmost track.
Union Pacific Beltline RR Segment (5AM2083.1)	No Use.	No Use.	*De minimis.* Temporary easement on 311 feet of railroad.		
Union Pacific Railroad Segment (5DV6248.4)	*De minimis.* Temporary easement on 210 feet (No-Action Alternative) to 300 feet (Revised Viaduct Alternative) of railroad.				Use. Track relocation; easement on 550 feet of railroad.
Rocky Mountain Arsenal Railroad Segment (5DV7048.2)	No Use.	No Use.	Use. Relocate 1,230 feet of spur track and change historic grade.		
York Street/East 40th Ave. Brick Sanitary Sewer (5DV11283)	No Use.	No Use.	No Use.	No Use.	Use.
Colonial Manor Tourist Court 2615 East 46th Avenue (5DV7130)	Use. Full acquisition.	No Use.	Use. Full acquisition.	No Use.	Use. Full acquisition.
Univar 4300 Holly Street (5DV9231)	No Use.	No Use.	*De minimis.* 0.03 acre of right-of-way acquisition.		
Safeway Distribution Center Historic District (5DV9232)	No Use.	No Use.	*De minimis.* Acquire 2.1 acres of the district.	*De minimis.* Acquire 2.5 acres of the district.	*De minimis.* Acquire 2.1 acres of the district.
Ralston Purina Plant/Nestle Purina PetCare Company 2151 East 45th Avenue (5DV9245)	No Use.	Use. Full acquisition.	No Use.	Use. Full acquisition.	No Use.
Sanchez Business 2381 East 46th Avenue (5DV9655)	Use. Full acquisition.	No Use.	Use. Full acquisition.	No Use.	Use. Full acquisition.
Stop-N-Shop Food Store 4600 York Street (5DV9801)	Use. Full acquisition.	No Use.	Use. Full acquisition.	No Use.	Use. Full acquisition.
Brown and Alarid Residence 4637 Claude Court (5DV9667)	No Use.	No Use.	No Use.	No Use.	Use. Full acquisition.
Toth/Kelly Residence 4639 Claude Court (5DV9668)	No Use.	No Use.	No Use.	No Use.	Use. Full acquisition.
Rodriquez Residence 4539 Clayton Street (5DV9678)	No Use.	No Use.	No Use.	Use. Full acquisition.	No Use.
4541 Clayton LLC Residence 4541 Clayton Street (5DV9679)	No Use.	No Use.	No Use.	Use. Full acquisition.	No Use.

Exhibit 7-45 Summary of Section 4(f) Property Use

Historic Resource Property Name and Address	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative (Preferred Alternative)
	North Option	South Option	North Option	South Option	
Rudy/Bernal Residence 4618 High Street (5DV9735)	Use. Full acquisition.	No Use.	Use. Full acquisition.		Use. Full acquisition.
Garcia Residence 4617–4625 Race Street (5DV9780)	Use. Full acquisition.	No Use.	Use. Full acquisition.		Use. Full acquisition.
Kenworthy/Wyckoff Residence 4529 Josephine Street (5DV9745)	No Use.	No Use.	No Use.	Use. Full acquisition.	No Use.
Portales Residence 4608 Josephine Street (5DV9746)	Use. Full acquisition.	No Use.	Use. Full acquisition.	No Use.	Use. Full acquisition.
Alfred R. Wessel Historic District (5DV10126)	Use. Fully acquire two contributing properties.	No Use.	Use. Fully acquire seven contributing properties.	Use. Acquire 0.032 acres from two contributing properties.	Use. Fully acquire nine contributing properties.
National Western Historic District (5DV10050)	*De minimis.* Permanent easement over storm water pipe within district.				*De minimis.* Two permanent easements over storm water pipes within district.
Banker's Warehouse Co. (5DV11720)	No Use.	No Use.	No Use.	No Use.	*De minimis.* Acquisition of approximately 1,515 square feet to construct a retaining wall and box culvert.
Parks and Recreational Resources	**No-Action Alternative**		**Revised Viaduct Alternative**		**Partial Cover Lowered Alternative (Preferred Alternative)**
	North Option	**South Option**	**North Option**	**South Option**	
Swansea Elementary School Playground	Use. Acquire 0.39 acre of school property.	No Use.	Use. Acquire 0.76 acre of school property.	No Use.	Use. Acquire 0.95 acre of school property.
Globeville Landing Park	No Use.	No Use.	No Use.	No Use.	Use. Storm drainage system temporarily disturbs and places permanent easement on 0.5 acre of the park; of this, 0.3 acre will be permanently impacted for spillway construction.

7.9 Are there any feasible and prudent alternatives that will avoid using Section 4(f) properties?

Section 4(f) requires a determination of whether there are feasible and prudent alternatives that avoid the use of all Section 4(f) properties and do not cause severe problems to a degree that substantially outweighs the importance of protecting the Section 4(f) property.

As defined at 23 CFR 774.17, "A feasible and prudent avoidance alternative avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property." Feasible and prudent are defined in the box to the right.

While the No-Action Alternative and the Build Alternatives will avoid the use of some Section 4(f) properties, none of the improvements under consideration will avoid all of the Section 4(f) properties. Other alternatives eliminated as part of the alternative screening process would compromise the project to a degree that it is unreasonable to proceed in light of the project's purpose and need. As discussed in the 2008 Draft EIS, Chapter 3, Alternatives Considered, these alternatives have been eliminated because they did not address the project purpose and need, goals, and objectives.

Exhibit 7-46 summarizes the alternatives that were eliminated and why they were not considered feasible and prudent.

The inability to identify a feasible and prudent alternative that avoids all Section 4(f) properties is primarily due to the large scale of the project and its location within this highly urbanized area of Denver. In addition, to maintain the function and operation of the highway, right-of-way acquisition is required regardless of the alternative.

A maintenance alternative would not reconstruct the viaduct and consists of continuing existing maintenance practices along the entire project corridor. A maintenance alternative would avoid the use of all Section 4(f) properties but is not prudent because the safety and operation of the roadway cannot be maintained with this alternative and, eventually, I-70 will have to be closed because of the aging viaduct.

When is an alternative not feasible and prudent?

An alternative is not *feasible* if it cannot be built as a matter of sound engineering judgment.

An alternative is not *prudent* if:

1. It compromises the project such to a degree that it is unreasonable to proceed in light of the stated purpose and need
2. It results in unacceptable safety or operation problems
3. Reasonable mitigation does not effectively address impacts
4. It results in additional construction, maintenance, or operational costs of an extraordinary degree
5. It causes other unique or unusual factors
6. It involves multiple factors listed previously that, while individually minor, cumulatively cause unique problems or impacts of extraordinary degree

Exhibit 7-46 Alternatives Evaluated During Screening and Section 4(f) Resources

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Maintenance Alternative	No. This alternative would not reconstruct the viaduct, but would merely continue existing maintenance practices along the entire project corridor. The safety and operation of the roadway cannot be maintained with this alternative and, eventually, I-70 will have to be closed because of the aging viaduct.	No Section 4(f) resources used	All Section 4(f) resources avoided

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Final EIS Alternatives			
No-Action Alternative, North Option	Yes	5DV7130, 5DV9655, 5DV9801, 5DV9735, 5DV9780, 5DV9746, 5DV10126 Swansea Elementary School Public Playground	5DV7048.2, 5DV11283, 5DV9231, 5DV9245, 5DV9667, 5DV9668, 5DV9678, 5DV9679, 5DV9745 Globeville Landing Park
No-Action Alternative, South Option	Yes	5DV9245	5DV7048.2, 5DV11283, 5DV9231, 5DV9667, 5DV9668, 5DV9678, 5DV9679, 5DV9735, 5DV9780, 5DV9745 Globeville Landing Park Swansea Elementary School Public Playground
Revised Viaduct Alternative, North Option	Yes	5DV7048.2, 5DV7130, 5DV9655, 5DV9801, 5DV9735, 5DV9780, 5DV9746, 5DV10126 Swansea Elementary School Public Playground	5DV11283, 5DV9245, 5DV9667, 5DV9668, 5DV9678, 5DV9679, 5DV9745 Globeville Landing Park
Revised Viaduct Alternative, South Option	Yes	5DV7048.2, 5DV9245, 5DV9678, 5DV9679, 5DV9735, 5DV9780, 5DV9745	5DV11283, 5DV7130, 5DV9655, 5DV9801, 5DV9667, 5DV9668, 5DV9746 Globeville Landing Park Swansea Elementary School Public Playground
Partial Cover Lowered Alternative	Yes	5AM1298.2, 5DV6248.4, 5DV7048.2, 5DV11283, 5DV9655, 5DV9801, 5DV9667, 5DV9668, 5DV9735, 5DV9780, 5DV9746, 5DV10126 Globeville Landing Park Swansea Elementary School Public Playground	5DV9245, 5DV9678, 5DV9679, 5DV9745

Exhibit 7-46 Alternatives Evaluated During Screening and Section 4(f) Resources

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Alternatives Eliminated Since 2008 Draft EIS			
Realignment Alternative	No. The Realignment Alternative is not prudent, as it does not meet the project's purpose and need, which is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area.	5DV1247, 5DV4396, 5DV4404, 5DV9660, 5DV9805, 5DV9808, 5DV9809, 5DV9813, 5DV9814, 5DV9818, 5DV9819, 5DV9823, 5DV9828, 5DV10500 South Platte River Greenway Trail National Western Complex Historic District	5AM1298.2, 5DV6248.4 Globeville Landing Park Swansea Elementary School Public Playground

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Alignment Alternatives			
Lower I-70 below ground	No. This alternative requires building I-70 through the South Platte River, resulting in unacceptable effects on aquatic and ecological resources and increased potential for encountering contaminated groundwater or soils, which causes unique or unusual factors and cannot be built as a matter of sound engineering judgment. Therefore it is not feasible and prudent. (Note: this alternative was evaluated earlier in the EIS process as a tunnel, and concepts from this alternative were used to develop the Partial Cover Lowered Alternative.)	5DV9245, 5DV9655, 5DV9745, 5DV9746, 5DV9667, 5DV9678, 5DV9679, 5DV9231, 5DV9748, 5DV9705, 5DV9706, 5DV9787, 5DV9714 National Western Complex Historic District Swansea Elementary School Public Playground South Platte River Greenway Trail	5DV1247, 5DV4396, 5DV9660, 5DV9805, 5DV9808, 5DV9809, 5DV9813, 5DV9814, 5DV9818, 5DV9819, 5DV9823, 5DV9828
Add a level to the viaduct	No. This alternative requires complex construction techniques to provide access to local arterial streets, which causes unique or unusual factors and cannot be built as a matter of sound engineering judgment. Therefore it is not feasible.		
Enclose I-70	No. This alternative requires complex construction techniques to provide access to local arterial streets, which causes unique or unusual factors and cannot be built as a matter of sound engineering judgment. Therefore it is not feasible.		
Put I-70 at grade	No. This alternative requires at-grade intersection with existing railroad, which is strictly prohibited. Rail operations cannot be lowered, resulting in unacceptable safety and operational problems. Therefore it is not prudent.		
Triple level I-70	No. This alternative requires at-grade intersection with existing railroad, which is strictly prohibited. Rail operations cannot be lowered, resulting in unacceptable safety and operational problems. Therefore it is not prudent.		
I-70 above and below with 46th Avenue at grade	No. This alternative requires building I-70 through the South Platte River, resulting in unacceptable effects on aquatic and ecological resources and increased potential for encountering contaminated groundwater or soils, which causes unique or unusual factors and cannot be built as a matter of sound engineering judgment. Therefore it is not feasible and prudent.		
Improve I-270 and reclassify I-70	No. This alternative requires reconstruction of I-76/I-25 interchange and major widening of I-270 and I-76 for approximately 12 miles to accommodate relocated traffic. This alignment also would require improvements on I-25 between I-76/I-270 and the existing I-70/I-25 interchange for traffic that wants to go south on I-25 toward downtown Denver, a major destination from I-70. These trips on I-25 to access I-70 result in almost four miles of out-of-direction travel. The combination of these factors results in other unique problems, including extraordinary community disruption. Therefore it is not prudent.	Unknown	All Section 4(f) discussed in this document

Exhibit 7-46 Alternatives Evaluated During Screening and Section 4(f) Resources

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Alignment Alternatives			
Realign the I-70 westbound lanes north	No. This alternative requires constructing a new highway through the primarily residential area of the Globeville and Elyria and Swansea neighborhoods not currently affected. The extraordinary community disruption would result in unacceptable and severe adverse social, economic, or other environmental impacts. This alternative is not prudent, as any reasonable mitigation does not effectively address the impacts.	5AM125, 5DV10043, 5DV9227, 5DV9989 A.R. Wessel Historic District National Western Complex Historic District Elyria Johnson Center Swansea Park	5DV9231, 5DV9245, 5DV9655, 5DV9667, 5DV9678, 5DV9679, 5DV9705, 5DV9706, 5DV9714, 5DV9735, 5DV9745, 5DV9746, 5DV9748, 5DV9780, 5DV9787, 5DV9795, 5DV9801, 5DV9705, 5DV9706, 5DV9748, 5DV9787, 5DV9795 A.R. Wessel Historic District Safeway Historic District Swansea Elementary School Public Playground
Realign the I-70 eastbound lanes to Smith Road	No. This alternative requires constructing a new highway through neighborhoods south of I-70. The extraordinary community disruption would result in unacceptable and severe adverse social, economic, or other environmental impacts. This alternative is not prudent, as any reasonable mitigation does not effectively address the impacts.	National Western Complex Historic District	All Section 4(f) resources avoided except National Western Complex Historic District
Move I-70 to the north of Elyria and Swansea neighborhood (adjacent to rail alignment)	No. This alternative requires constructing a new highway between an existing highway and rail line. The extraordinary community disruption would result in unacceptable and severe adverse social, economic, or other environmental impacts. This alternative is not prudent, as any reasonable mitigation does not effectively address the impacts.	National Western Complex Historic District 5AM125	5DV9231, 5DV9245, 5DV9655, 5DV9667, 5DV9678, 5DV9679, 5DV9735, 5DV9745, 5DV9746, 5DV9780, 5DV9801 A.R. Wessel Historic District, Safeway Historic District Swansea Elementary School Public Playground **Resources not in the APE** 5DV9705, 5DV9706, 5DV9714, 5DV9748, 5DV9787, 5DV9795
Move I-70 to the north of Elyria and Swansea neighborhood (along 52nd Avenue)	No. This alternative requires constructing a new highway through a primarily residential area. The extraordinary community disruption would result in unacceptable and severe adverse social, economic, or other environmental impacts. This alternative is not prudent, as any reasonable mitigation does not effectively address the impacts.	National Western Complex Historic District	All Section 4(f) resources avoided except National Western Complex Historic District

Exhibit 7-46 Alternatives Evaluated During Screening and Section 4(f) Resources

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Transportation Demand Management/Transportation System Management (TDM/TSM) Strategies			
These TDM/TSM strategies and improvements were not evaluated as stand-alone alternatives, but can be combined with other alternatives as necessary to improve overall system operations. Complementary to the alternatives considered for I-70, TDM/TSM strategies were considered as part of the alternative screening process. These strategies would not provide any substantial highway improvements to the I-70 corridor other than the following localized actions or incentives for alternative transportation modes:			
Improved pedestrian facilities	No. These strategies would not substantially alleviate the need to add capacity to I-70, as improvements are localized and still would result in unacceptable safety and operational problems on I-70. Therefore it is not prudent.	No Section 4(f) resources used	All Section 4(f) resources discussed in this document
Improved bicycle facilities			
Enhanced bus service			
Ride sharing			
Vary business work schedule (Flex time)			
Intelligent Transportation Systems			
Freight transport management			
Road pricing/ congestion pricing			

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Local System Improvement Alternatives			
Similar to the TDM/TSM strategies, local system improvements were considered as a way to improve other transportation facilities without improving I-70. These local system improvements would not provide any substantial highway improvements to the I-70 corridor other than the following localized actions:			
Connect I-76 to DIA	No. This alternative would require building the highway through the Rocky Mountain Arsenal National Wildlife Refuge, resulting in unacceptable and severe adverse social, economic, or other environmental impacts. Reasonable mitigation does not effectively address the impacts. For these reasons, this alternative is not prudent,	Rocky Mountain National Wildlife Refuge	All Section 4(f) resources discussed in this document
Improve 56th Avenue	No. This alternative would not substantially alleviate the need to add capacity to I-70. Improving 56th Avenue to a six-lane facility only reduces volumes on I-70 by 0 percent to 2 percent during peak hours and 0 percent to 1 percent daily. Therefore, it does not meet the project purpose and need. Reasonable mitigation does not effectively address the impacts. For these reasons, this alternative is not prudent,	5AM1875, 5AM125	All Section 4(f) resources avoided except, 5AM1875 and 5AM125
Improve Smith Road	No. This alternative would not substantially alleviate the need to add capacity to I-70. Improving Smith Road to a four-lane facility would only reduce volumes on I-70 by 0 percent to 9 percent during peak hours and 1 percent to 4 percent daily. Therefore, it does not meet the project purpose and need. Reasonable mitigation does not effectively address the impacts and would still result in unacceptable safety and operational problems on I-70. For these reasons, this alternative is not prudent,	Unknown	All Section 4(f) resources discussed in this document

Exhibit 7-46 Alternatives Evaluated During Screening and Section 4(f) Resources

Alternative	Is the alternative feasible and prudent?	Section 4(f) resources used	Section 4(f) resources avoided
Local System Improvement Alternatives			
Extend Smith Road	No. An extension of Smith Road is a planned improvement that will be completed as part of the Stapleton redevelopment. This improvement would have no effect on I-70 and would still result in unacceptable safety and operational problems on I-70. For these reasons it is not prudent.	Unknown	All Section 4(f) resources discussed in this document
Improve 6th Avenue	No. This alternative does not meet the project purpose and need because this improvement would have no effect to I-70 and would still result in unacceptable safety and operational problems on I-70. For these reasons it is not prudent.	Unknown	All Section 4(f) resources discussed in this document
Build an outer loop	No. This alternative would not be located in the study area and does not meet the project purpose and need because this improvement would have no effect to I-70 and would still result in unacceptable safety and operational problems on I-70. For these reasons it is not prudent.	Unknown	All Section 4(f) resources discussed in this document
Remove through trucks from I-70	No. This alternative would not provide access to the corridor for the businesses and because I-70 is an interstate highway, trucks cannot be restricted. Would not alleviate the need to add capacity to I-70; therefore, it does not meet the project purpose and need and would still result in unacceptable safety and operational problems on I-70. For these reasons it is not prudent.	No Section 4(f) resources used	All Section 4(f) resources discussed in this document
Improve I-270	No. Would not substantially alleviate the need to add capacity to I-70. Improving I-270 to an eight-lane facility would only reduce volumes on I-70 between I-25 and I-270 by 3 percent to 5 percent during peak hours and 2 percent daily. The remainder of I-70 is unaffected, and, therefore, does not meet the project purpose and need and would still result in unacceptable safety and operational problems on I-70. Therefore it is not prudent.	Unknown	All Section 4(f) resources discussed in this document
Improve intersections where the railroad crosses local streets	No, would not substantially alleviate the need to add capacity to I-70, as improvements are localized. Therefore, it does not meet the project purpose and need as a stand-alone alternative and would still result in unacceptable safety and operational problems on I-70. Therefore it is not prudent.	Unknown	All Section 4(f) resources discussed in this document
Extend Smith Road from Quebec Street to Havana Street		Unknown	All Section 4(f) resources discussed in this document
Remove at-grade railroad crossings in the study area		No Section 4(f) resources used	All Section 4(f) resources discussed in this document

7.10 How does the project incorporate all possible planning to minimize harm?

Minimization measures have been implemented to the overall design of the project with the intention of reducing impacts to numerous properties along the corridor. Site-specific minimization and/or mitigation measures were implemented for a number of individual Section 4(f) properties. These measures to minimize harm were discussed previously for each resource.

Overall minimization efforts were implemented in the design of each alternative and associated option to minimize impacts to adjacent properties, which in turn also minimizes the use of a number of Section 4(f) properties. These minimization efforts are summarized in **Exhibit 7-47**, and are described generally by alternative following the exhibit.

Exhibit 7-47 Summary of Section 4(f) Property Minimization Measures

Alternative	Minimization Measure	Result
Realignment Alternatives from 2008 Draft EIS (Alternatives 4 and 6)	Eliminated from further consideration	Fourteen Section 4(f) historic resources avoided, including use of the National Western Stock Show Historic District
No-Action Alternative	Reduced construction limits from 50 feet to 20 feet compared to 2008 Draft EIS	Two Section 4(f) historic resources avoided, including the National Western Stock Show Historic District Instead of fully acquiring both Sanchez businesses under South Option, acquired only 0.02 acre and fully avoided structures Reduced use of Alfred R. Wessel Historic District; previously, North Option acquired 0.79 acre, fully acquired two contributing properties, and partially acquired one contributing property; now, it will acquire 0.3 acre and fully acquire two contributing properties
Revised Viaduct Alternative (from Brighton Boulevard to Colorado Boulevard)	Reduced construction limits to proposed viaduct and 46th Avenue compared to 2008 Draft EIS	Avoided use of one Section 4(f) historic property Reduced use of Alfred R. Wessel Historic District; Alternatives 1 and 3 from the 2008 DEIS acquired four acres of the district, fully acquired 18 contributing properties, and partially acquired one contributing property; now, the greatest use for the Revised Viaduct Alternative will be 1.4 acres of right-of-way acquisition from the district and full acquisition of seven contributing properties; the South Option will have no use of the district under Section 4(f) Reduced encroachment on Swansea Elementary School property, and avoided full acquisition of the property
	46th Avenue alignment located below viaduct compared to 2008 Draft EIS, where it was adjacent	
	46th Avenue typical section has been minimized	
	I-70 mainline geometry has been adjusted using lower design speed as compared to 2008 Draft EIS	

Exhibit 7-47 Summary of Section 4(f) Property Minimization Measures

Alternative	Minimization Measure	Result
Partial Cover Lowered Alternative (from Brighton Boulevard to Colorado Boulevard)	Use of 4-percent grade on I-70	Reduced use in Elyria and Swansea Neighborhood Reduced use in Alfred R. Wessel Historic District Reduced encroachment on Swansea Elementary School property
	46th Avenue typical section has been minimized	
	I-70 mainline geometry has been adjusted using lower design speed as compared to 2008 Draft EIS	
	Interchange ramps located parallel to I-70 mainline with walls	
	46th Avenue reduced to one lane westbound from Brighton to York Street	
	Removes I-70 auxiliary lanes; removal of ramps allows I-70 alignment to be shifted 24 feet south at Steele Street/Vasquez Boulevard	Four contributing resources in the Alfred R. Wessel Historic District are not impacted
Build Alternatives (from Colorado Boulevard to Quebec Street)	Previous 2008 Draft EIS included two alignment options, improvements north of existing and south of existing	Single alignment minimizes overall impacts Reduces use of Safeway Historic District from 4.32 acres to between 1.5 acres and 2.5 acres Minimized encroachment on Univar property, and avoids full acquisition of the property
	Stapleton Drive has been tightened to be closer to the mainline	
	Stapleton Drive typical section has been reduced from 47 feet to 38.5 feet	
Build Alternatives (at Tower Road)	Construction does not include any work on Tower Road, eliminating full reconstruction of the Tower Road interchange	Avoids use of the historic High Line Canal, as well as potential use of future High Line Canal Trail segment
Managed Lanes Option	Removed concrete barrier and replaced with striped buffer	Minimizes overall encroachment on properties

All Alternatives

Because of the condition of the existing viaduct between Brighton Boulevard and Colorado Boulevard, all of the existing alignment alternatives will consist of replacing the viaduct in this area. This replacement will be necessary to maintain the continuing safety and operation of I-70. Reconstruction of the existing viaduct, even under the No-Action Alternative, will require acquisition of additional right of way to maintain traffic on I-70 during the reconstruction effort.

No-Action Alternative

Construction limits were reduced from 50 feet in the 2008 Draft EIS, to 20 feet in the 2014 Supplemental Draft EIS.

Build Alternatives

For the Build Alternatives, the minimum number of lanes required to address future capacity needs was used. These measures minimized the harm of the Build Alternatives and satisfied the goals and objectives of the purpose and need, but still require the use of several Section 4(f) resources. Site specific minimization measures are discussed with each resource.

Revised Viaduct Alternative

The original design required equal right-of-way acquisition from both sides of I-70. To minimize the overall harm by the alternative, two expansion options were developed to avoid resources on either the north or south side of I-70. The expansion options for reconstructing the viaduct will shift to the north or to the south of the existing viaduct.

Additionally, when compared to what was evaluated in the 2008 Draft EIS, 46th Avenue has been relocated below the viaduct (located adjacent in the 2008 Draft EIS) and construction limits were reduced for the proposed viaduct.

Partial Cover Lowered Alternative

As the Partial Cover Lowered Alternative was developed, elements to minimize the overall harm were included in the design including the use of 4-percent grade on I-70, adjusting I-70 mainline geometry using a lower design speed, and locating interchange ramps parallel to I-70 mainline with walls. Additionally, the 46th Avenue typical section was minimized and 46th Avenue has been reduced to one lane westbound from Brighton to York Street. These changes reduced the amount of right of way needed.

Specific Section 4(f) properties that were avoided due to some of these measures are shown in **Exhibit 7-48**. All of these properties are historic resources. Additionally, Realignment Alternatives from the 2008 Draft EIS (Alternatives 4 and 6) were eliminated from further consideration. This elimination resulted in 13 Section 4(f) historic resources avoided. Section 4(f) properties no longer subject to a use compared to 2008 Draft EIS are listed in **Exhibit 7-48**. Properties previously identified as subject to a use under Section 4(f) that have been demolished or closed—independent of the proposed project—since the 2008 evaluation are not shown in **Exhibit 7-48**.

Exhibit 7-48 Section 4(f) Properties No Longer Subject to a Use Compared to 2008 Draft EIS

Site Number	Resource Name/Location	Reasoning
5AM261.2	High Line Canal, Tower Road at I-70	Project footprint was reduced in these areas
5DV5677	Miranda Residence, 4632 Josephine Street	
5DV9705	Braswell Residence, 4631 Columbine Street	
5DV9706	Pavon Residence, 4633 Columbine Street	
5DV9714	Olive Street LLC Property, 4503 Fillmore Street	
5DV9748	Chavez Residence, 4628 Josephine Street	
5DV9787	Davis Residence, 4623–4625 Thompson Court	
5DV1247	Kosik Residence, 4681–4683 Baldwin Court	Realignment Alternatives were eliminated from consideration
5DV4396	Rocha Residence, 4751 Williams Street	
5DV4404	Diaz Residence, 4747 Williams Street	
5DV9660	Torres Residence, 4656 Baldwin Court	
5DV9795	Mann Residence, 4645 Williams Street	
5DV9805	E.G. Trading Post, 1630 E. 47th Street	
5DV9808	Elyria's Western Guest House, 4700 Baldwin Court	
5DV9809	Haynes and Yuhasz Residence, 4712 Baldwin Court	
5DV9813	Lewis Investments LLC Property, 4727 Brighton Boulevard	
5DV9814	Sundheim Property, 4750 Brighton Boulevard	
5DV9818	Lewis Investments LLC Property, 4709 Brighton Boulevard	
5DV9819	Marmolejo Residence, 4741–4747 Brighton Boulevard	
5DV9823	Montour and Miller Residence, 4675 Williams Street	
5DV9828	Helzberg Property, 4665–4669 Williams Street	
Alfred R. Wessel Historic District and contributing resources		
5DV5149	Pacheco Residence, 4650 Clayton Street	Project footprint was reduced in these areas
5DV9688	Contreras Residence, 4630 Clayton Street	
5DV9690	Gorniak Residence, 4640 Clayton Street	
5DV9691	Romero Residence, 4641 Clayton Street	
5DV9692	Erives Residence, 4651 Clayton Street	
5DV9730	Villarreal Property, 4630 Fillmore Street	
5DV9731	Martinez Property, 4635 Fillmore Street	
5DV9732	Cuevas Residence, 4640 Fillmore Street	
5DV9733	Pacheco Residence, 4645 Fillmore Street	

7.11 What alternative will have the least overall harm?

Because there are no feasible and prudent alternatives that avoid the use of all Section 4(f) resources, an analysis must be performed to determine which alternative causes the least overall harm. FHWA may approve only the alternative that causes the least overall harm. Each of the seven factors considered in the least-overall-harm analysis are addressed in this section. The No-Action Alternative does not meet the purpose and need of the project and, therefore, is discussed in the least-overall-harm analysis for comparative purposes only. In most cases the Managed Lanes Option present no difference in the least overall harm analysis. In cases where they do make a difference (e.g. cost and right of way) they are mentioned in the text. The analysis concludes that the Partial Covered Lower Alternative is the least overall harm alternative.

7.11.1 Factor 1: Ability to mitigate adverse impacts to Section 4(f) properties

The following subsections discuss the ability to mitigate adverse impacts to Section 4(f) properties used by the proposed project. The ability to mitigate adverse impacts is greatest for the Partial Cover Lowered Alternative, for the reasons discussed below.

Mitigation for Swansea Elementary School Public Playground impacts

The No-Action Alternative, South Option and Revised Viaduct Alternative, South Option avoid the playground. Since the amount of acquisition (0.39 acre) from the playground under the No-Action Alternative, North Option is so small, no site redesign of the playground is proposed.

Both the Revised Viaduct Alternative, North Option and Partial Cover Lowered Alternative would include site redesigns to mitigate for impacts to the playground. The Partial Cover Lowered Alternative site redesign provides greater mitigation due to the design of the cover—as many as four additional acres of open space.

Mitigation for Globeville Landing Park impacts

For Globeville Landing Park, the Partial Cover Lowered Alternative results in a use of the park. Use of the park will be minimal since the major amenities will remain unaffected—with the exception of the disc-golf course.

How is the least-overall-harm alternative determined?

The alternative that causes the least overall harm is determined by balancing the following factors:

1. Ability to mitigate adverse impacts to each Section 4(f) property
2. Relative severity of remaining harm after mitigation to the protected activities, attributes, or features that qualify each Section 4(f) property for protection
3. Relative significance of each property
4. Views of official(s) with jurisdiction over each property
5. Degree to which each alternative meets the project purpose and need
6. After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f)
7. Substantial differences in costs among alternatives

Portions of the disc-golf course within the park will be temporarily closed during the construction. Following construction, the disc-golf holes will be returned to their pre-construction condition and all impacted areas, including the disc-golf course, will be mitigated by revegetating the site and the easement on the park will be used for regular recreational activities. No mitigation is necessary for the other alternatives.

Mitigation for historic resource impacts

A draft Programmatic Agreement that provides a process to agree on mitigation of adverse effects and reevaluate eligibility and effects to historic properties, as appropriate, has been developed and is in review with SHPO and the consulting parties. The Programmatic Agreement also includes examples of mitigation measures that could be implemented. The Programmatic Agreement will be executed prior to the ROD and will be included as an attachment.

Whichever alternative is selected in the ROD, adverse effects to historic resources will be resolved through the implementation of the Section 106 Programmatic Agreement. Consultation has discussed mitigation measures such as documenting historic structures and ways to preserve the larger history of the project corridor. Since the Programmatic Agreement resolves adverse effects for any alternative, the ability to mitigate for historic resources impacts is equal across all alternatives. Because it has the most impacts to historic resources, selection of the Partial Cover Lowered Alternative would likely require the most mitigation. **Exhibit 7-49** in the next subsection summarizes impacts to historic Section 4(f) properties.

7.11.2 Factor 2: Relative severity of remaining harm after mitigation

For Section 4(f) historic resources that are subject to direct use resulting from full acquisition and demolition, the severity of remaining impacts after mitigation remains high. There is no remaining harm anticipated after mitigation for *de minimis* impact determinations.

Exhibit 7-49 Historic Resource and Contributing Property Use

Category	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative
	North Option	South Option	North Option	South Option	
Total Section 4(f) Uses[1]	10	4	14	14	18
De minimis impact determination	3	3	6	6	5
Historic resources used (greater than *de minimis)*	7	1	8	8	13
Historic resources used (greater than *de minimis)* due to acquisition/demolition[2]	7	1	7	6	9
Alfred R. Wessel Historic District contributing property acquisitions	2 full acquisitions	—	7 full acquisitions	2 partial acquisitions	9 full acquisitions

Note: Historic districts are presented as one Section 4(f) resource; individual contributing properties to historic districts are not included in this total

1. *Total Section 4(f) Uses includes de minimis impact determinations*
2. *Uses generally consist of full acquisition and demolition of historic structures, except in the instance of linear resources. This total also includes the Alfred R. Wessel Historic District as one resource.*

The remaining harm for the Partial Cover Lowered Alternative following mitigation at Globeville Landing Park also will be low, given that the area will be returned to pre-construction conditions and available for recreational use, and that the 0.3 acre of converted land will be replaced in-kind.

The main difference between alternatives and options is with regard to the Swansea Elementary School Public Playground. For the No-Action Alternative, North Option, no mitigation is proposed. Because of this, the relative severity of harm to the playground will be moderate because the viaduct will encroach on the playground and reduce its size. As discussed previously, both the Revised Viaduct Alternative, North Option and Partial Cover Lowered Alternative include site redesigns to mitigate for impacts to the playground. The Revised Viaduct Alternative, North Option redesign increases the playground by between 0.6 acre and 0.7 acre. The Partial Cover Lowered Alternative site redesign increases the school's public playground/shared use area by 1.6 acres. Under the Partial Cover Lowered Alternative, the school also is placed next to the highway cover which is estimated to be four acres of open space that will include amenities to benefit the public users of the playground.

Both of these proposals under the Revised Viaduct, North Option and Partial Cover Lowered Alternative—when considering the playground by itself—will mitigate for the adverse impacts to the Section 4(f) resource. However, if the Revised Viaduct Alternative, North Option was selected as the preferred alternative, Denver Public Schools' preference would be to relocate the school and redesign of the playground will not be necessary and will not mitigate for the use of the resource. If the school needs to relocate, it could be moved to a location outside of the community and the resource could be lost.

7.11.3 Factor 3: Relative significance of each Section 4(f) property

While the Alfred R Wessel Historic District is a significant historic resource, the structures within the project APE are not individually eligible for the NRHP. They are contributing elements to the district and subject to Section 4(f), but they do not warrant eligibility on their own merit. For these reasons they are considered less significant, relative to other Section 4(f) properties that are eligible for nomination as individual resources.

7.11.4 Factor 4: Views of officials with jurisdiction

Coordination with officials with jurisdiction is on-going and will continue through the ROD.

SHPO has jurisdiction over historic resources, and has concurred with Section 106 determination of eligibility and findings of effect. This correspondence is included in Attachment B, *Agency Consultation Addendum*. SHPO has also acknowledged all *de minimis* impact determinations in correspondence dated September 8, 2015 (also included in Attachment B).

Denver Public Schools, which is the official with jurisdiction over the Swansea Elementary School Public Playground, has stated that they are opposed to leaving the school in its current location if the Revised Viaduct Alternative, North Option is selected.

The mayor of Denver, along with Denver City Council and staff, also has expressed support for the Partial Cover Lowered Alternative. Preference for this alternative is based on improved pedestrian connections and facilities with the planned cover, and improvement of north-south and east-west movement in the corridor. Additional coordination will

occur with the officials with jurisdiction throughout the NEPA and design process.

7.11.5 Factor 5: Ability to meet purpose and need

The purpose of the project is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70. The No-Action Alternative marginally improves safety by reconstructing the existing viaduct to meet current design standards. However, as described in Chapter 4, the No-Action Alternative will not improve access and mobility and will not address the congestion issues. Therefore, the No-Action compromises the project to a degree that it is unreasonable to proceed, given the purpose and need.

Both Build Alternatives meet the purpose and need of the project, but to varying degrees. Future peak travel periods and percentage of congestion is similar for both; however, the Partial Cover Lowered Alternative provides crossings of 46th Avenue that are less imposing than those proposed with the Revised Viaduct Alternative.

7.11.6 Factor 6: Magnitude of impacts on non-Section 4(f) resources

Along the project corridor, the alternatives generally have the same impacts on non-Section 4(f) resources. It is between Brighton Boulevard and Colorado Boulevard where impacts differ and alternatives and options distinguish themselves. After mitigation, the primary resources of concern that differ between alternatives are relocations, land acquisition, noise, visual/aesthetics, social, air quality and environmental justice impacts. They also vary by the drainage options associated with each alternative.

Relocations, displacements, and land use acquisition

Exhibit 7-50 compares the relocations, displacements and land use converted to right of way for each alternative. Because of its right-of-way needs, the Partial Cover Lowered Alternative has the greatest potential to acquire property and relocate residences and businesses. The Partial Cover Lowered Alternative requires three more relocations than the alternative with the next most, and 58 percent more right of way. Mitigation under each alternative will be done in accordance with the Fifth Amendment of the U.S. Constitution and the Uniform Act of 1970. Each property owner will be justly compensated and the magnitude of

impacts of relocation or acquisition of their property will be minimized for each alternative.

Exhibit 7-50 Relocation and Land Use Impacts

Category	No-Action Alternative		Revised Viaduct Alternative		Partial Cover Lowered Alternative	Additional Impacts caused by Managed Lanes Option[1]
	North Option	South Option	North Option	South Option		
Residential, business, and non-profit relocations	21	28	53	71	74	—
Land use acquisition (acres of right of way)	4.0	6.0	40.6	41.9	66.6	+1.7

1. *Only applicable to the Build Alternatives (Revised Viaduct Alternative and Partial Cover Lowered Alternative)*

Noise

Based on the initial noise analysis, the Revised Viaduct Alternative has the greatest noise impacts while the Partial Cover Lowered Alternative has the fewest noise impacts. Noise impacts mostly occur in neighborhoods containing low-income and minority populations, specifically in Elyria and Swansea, Globeville, Montbello, and Aurora. Before mitigation, the Revised Viaduct Alternative, North Option impacts 562 receptors. The Revised Viaduct Alternative, South Option impacts 511 receptors. The Partial Covered Lower Alternative impacts 178 receptors.

Mitigation for these impacts consists of building noise walls, so an assessment of the feasibility and reasonableness of abatement was performed.

The Elyria and Swansea Neighborhood has the densest number of sensitive dwelling units, as well as the largest low-income and minority populations. Noise from the Partial Cover Lowered Alternative affects fewer dwelling units than either the other build alternatives in this neighborhood. The Partial Cover Lowered Alternative creates 116 noise impacts, either from exceeding the NAC or by creating a substantial increase. The Revised Viaduct alternatives create 500 and 449, for the North and South Options respectively.

For all the alternatives, in neighborhoods where noise walls are recommended, noise impacts will be mitigated so that remaining impacts will be negligible. Therefore, there is little difference between alternatives after mitigation.

Visual and aesthetics

Visual resources are those that are visible to travelers on I-70 and those that are visible from the surrounding neighborhoods. Visual resources have been identified as the downtown Denver skyline, view of the Rocky Mountains, Sand Creek Greenway corridor, I-25 interchange, I-225 interchange, Swansea Elementary School, and the I-70 viaduct. All potential major visual impacts occur between Brighton Boulevard and Colorado Boulevard. Between Colorado Boulevard and Tower Road, the impacts to visual resources are related to a wider paved surface, as required for the Build Alternatives. No expansion of the roadway width will occur under the No-Action Alternative between Colorado Boulevard and Tower Road.

The assessment of visual quality (Section 5.8, Visual and Aesthetics) assessed each alternative for vividness, intactness and unity, which are defined in that chapter. Visually successful projects generally have a high balance of these criteria. The analysis concluded that only the Partial Covered Lower Alternative achieves that high balance for all criteria. The viaduct alternatives scored low for intactness and unity.

The analysis also indicates that the viaduct is a dominant visual feature in Elyria and Swansea. It blocks downtown views. The viaduct is considered undesirable by residents, as it visually divides the neighborhood and dominates views. This is considered an aesthetic disadvantage to the neighborhood.

The No-Action Alternative will generally maintain the existing visible mass of the viaduct, and the increase in visible mass will be negligible.

The Revised Viaduct alternatives would replace the existing viaduct with a new, larger one. This would improve the aesthetic quality of the area over the existing conditions, and have minimal new impact, because it would be designed to complement neighborhood architecture. However, replacing the viaduct and increasing its size through the Revised Viaduct Alternative results in an increase in the visible mass of the highway. The viaduct would still create the notable intrusion upon the visual quality of the area and block important views.

The Partial Cover Lowered Alternative eliminates the entire viaduct. Moreover, it does not increase the highway's visible mass to sensitive viewers because a large portion of the

highway in this area is below ground level. In addition, it improves overall aesthetics by adding four acres of public space via the cover. For these reasons, the Partial Cover Lowered Alternative is expected to improve visual quality more so than other options.

Social impacts

The alternatives and options primarily differ with regard to social impacts based on neighborhood cohesion in Elyria and Swansea. The presence of I-70 has disrupted neighborhood cohesion in the Elyria and Swansea Neighborhood by bisecting the neighborhood since its initial construction in the 1960s. Further encroachment and reconstruction of the viaduct in the neighborhood will continue to affect neighborhood cohesion. For the No-Action Alternative and Revised Viaduct Alternative, proposed mitigation will use the space under the viaduct adjacent to 46th Avenue as an urban space for community and neighborhood activities. This mitigation will alleviate the extent to which neighborhood cohesion is disrupted and will be most effective under the No-Action Alternative, as there is less encroachment into the neighborhood when compared to the Revised Viaduct Alternative. The discontinuity in the neighborhood still will be felt, however.

Further encroachment from the Partial Cover Lowered Alternative may negatively affect neighborhood character, whereas the Revised Viaduct Alternative would only create slight differences in character. For the Partial Covered Lower Alternative, the removal of the viaduct and construction of the below-grade highway will positively affect neighborhood cohesion. The alternative does require the greatest amount of relocations from the neighborhood (either 3 or 21 more than other build alternatives), which can negatively affect neighborhood character by modifying land use from residential to a transportation corridor, as well as demolishing a number of historic resources. Construction of the below-grade highway will affect neighborhood cohesion as well by eliminating some local north-south connectivity across I-70. However, removal of the viaduct and adding a cover on the highway to include a space for community and neighborhood activities generally will offset these negative impacts. In addition, the Partial Covered Lowered alternative will improve north-south connectivity, provide better pedestrian access and sidewalks, and improve bicycle options in the project area. These will benefit all residents in the environmental justice

neighborhoods. The viaduct has previously been identified as a barrier to neighborhood cohesion, so removing it will improve cohesion. The proposed urban landscape with this alternative, which will be a four-acre plot on top of the highway cover, will further enhance cohesion by providing connectivity for the neighborhood across the transportation corridor.

Air quality

The PM_{10} analysis, summarized in **Exhibit 5.10-13**, shows all of the modeled concentrations at Swansea Elementary School Playground are all in compliance with the NAAQS. It also shows that PM_{10} concentrations are lowest for the Partial Covered Lower Alternative. Modeled concentrations for the Partial Covered Lower Alternative are 100 $\mu g/m^3$, but range between 110 $\mu g/m^3$ and 120 $\mu g/m^3$ for the Revised Viaduct Alternative.

Environmental justice

The majority of the neighborhoods along the project corridor have notable concentrations of minority and low-income populations. The total population in the environmental justice analysis is 48 percent Hispanic or Latino, and 23 percent Black or African-American. These percentages are considerably higher than Denver and Adams Counties. Based on the studies, the three neighborhoods listed below have notably high numbers of low-income households. These neighborhoods are Globeville with 53.4 percent, Elyria and Swansea with 44.4 percent, and Northeast Park Hill with 43.7 percent low-income households.

The greatest impacts to the low-income and minority populations occur where there are direct impacts to residential areas. A high concentration of low-income and minority populations is present in the residential areas of the Elyria and Swansea Neighborhood adjacent to the highway. Therefore, environmental justice impacts occur in the Elyria and Swansea Neighborhood. Outside of the Elyria and Swansea Neighborhood within the project corridor, there are no major impacts to residential areas.

Due to the high concentration of low-income and minority populations in the area, the impacts associated with the No-Action Alternative are predominantly borne by the low-income and minority populations. CDOT will provide a new HVAC system, doors, and windows for the school to block the dust and noise expected during the construction period. However, no additional mitigation measures are identified

for the No-Action Alternative to alleviate the impacts to these populations other than acquisition and relocation benefits. The impacts to low-income and minority populations with the No-Action Alternative are disproportionately high and adverse.

Without mitigation, the construction of the Revised Viaduct Alternative has disproportionately high and adverse impacts that are predominantly borne by the low-income or minority populations of the Elyria and Swansea Neighborhood because most residences and businesses impacted by the project are located within this neighborhood. When all the mitigation measures are implemented and benefits realized that accompany this alternative, there will be no disproportionately high and adverse impacts to the low-income and minority populations.

These mitigation measures and benefits unique to the Revised Viaduct Alternative are:

- Developing the open space under the viaduct on the north side based on community needs. CDOT will work with the community and Denver to define and finalize this space, which can include an urban gathering area, play area, or recreational park (only Revised Viaduct Alternative, North Option)
- Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Without mitigation, the Partial Cover Lowered Alternative also has disproportionately high and adverse impacts predominantly borne by the low-income or minority population in the Elyria and Swansea Neighborhood. Although the impacts are predominantly borne by the environmental justice community, after the mitigation measures are fully implemented and benefits are realized, there will be no disproportionately high and adverse impacts to the low-income and minority populations.

Again, this is primarily a result of right-of-way acquisition and relocations. The mitigation measures and benefits unique to the Partial Cover Lowered Alternative are:

- Greatest visual benefit, by removing the viaduct's visual barrier between Brighton Boulevard and Colorado Boulevard
- Minimizing the presence of the highway in this area since it is below grade and is covered

- Reducing highway noise and air quality impacts to the school and adjacent properties by placing a cover over the highway
- Construct a cover over the highway to mitigate community impacts and design an urban area on top of the highway cover adjacent to Swansea Elementary School. This will provide for greater community cohesion than other alternatives
- Provide two million dollars to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs.

All of the alternatives and options will use the standard procedures set forth in the Uniform Act, which will minimize impacts resulting from acquisition/relocation.

Drainage

With the Partial Cover Lowered Alternative, an extensive drainage system is required on the north and south sides of I-70. Although the Revised Viaduct Alternative also improves the drainage system, the Partial Cover Lowered Alternative greatly improves drainage in the surrounding neighborhoods. The drainage system south of I-70 with the Partial Cover Lowered Alternative will capture the water flow and eliminate water from running into the proposed below-grade highway, while also alleviating flooding in the neighborhood north of it.

7.11.7 Factor 7: Substantial cost differences

The No-Action Alternative will cost less than the Build Alternatives, with an estimated construction cost of $510 million or $600 million depending on the option selected. The Revised Viaduct Alternative costs approximately $1,330 million or $1,450 million ($1,450 or $1,570 million with managed lanes), while the Partial Cover Lowered Alternative costs approximately $1,580 million to construct ($1,700 million with managed lanes). The cost difference among these alternatives is not substantial enough to be a determining factor in this analysis.

7.11.8 Summary of least-overall-harm analysis

Based on the least-overall-harm analysis, the Partial Cover Lowered Alternative causes less overall harm when compared to other alternatives. While the Partial Cover Lowered Alternative has greater right-of-way needs—and,

therefore, has greater initial impacts—its ability to mitigate for those impacts lessens the magnitude of remaining harm for both Section 4(f) properties and non-Section 4(f) properties. In particular, it is expected to lessen the harm to low-income and minority populations better than the Revised Viaduct Alternative by providing a public space on top of the highway cover and removing the viaduct and lowering the highway to reduce visual intrusion and improve neighborhood cohesion. In addition, Swansea School, will benefit from increased space for recreation, better air quality, and lower noise levels. The severity of its impacts to Section 4(f) properties, namely historic resources, is slightly higher than the other alternatives under consideration but many of those impacts are to resources not individually eligible. In addition, the Partial Cover Lowered Alternative is not substantially different from the Revised Viaduct Alternative in terms of project cost. **Exhibit 7-51** summarizes the least-overall-harm analysis and how the conclusion was reached.

Exhibit 7-51 Summary of Least-Overall-Harm Analysis

Factor	Revised Viaduct Alternative		Partial Cover Lowered Alternative	Managed Lanes Option	Factor Summary
	North Option	South Option			
1: Ability to mitigate adverse impacts to Section 4(f) properties	• No discernible difference between alternatives for historic resources and Globeville Landing Park mitigation • Redesigns school playground and increases, but may not mitigate for impacts due to potential for school relocation	• No discernible difference between alternatives for historic resources and Globeville Landing Park mitigation • No mitigation required for school playground	• No discernible difference between alternatives for historic resources and Globeville Landing Park mitigation • Redesigns school playground and increases its size, and adds as much as 4 acres of open space on a highway cover	No additional impacts or mitigation required with this option	• Differentiation between alternatives is with regard to the Swansea Elementary School Public Playground • Partial Cover Lowered Alternative best mitigates adverse effects because, while it does use the public playground as opposed to the Revised Viaduct Alternative, South Option, it ultimately improves the playground by increasing the size of the playground and adding open space for recreational use • No difference between General-Purpose and Managed Lanes Options
2: Relative severity of remaining harm after mitigation	• Severity of remaining harm will be the same among project alternatives for historic resources and Globeville Landing Park • Severity of harm after mitigation will be high if the school requires relocation	• Severity of remaining harm will be the same among project alternatives for historic resources and Globeville Landing Park • No encroachment on the school property; therefore, no harm	• Severity of remaining harm will be the same among project alternatives for historic resources and Globeville Landing Park • Severity of harm after mitigation will be low at the public playground	No additional impacts to Section 4(f) properties or mitigation required with this option	Severity of remaining harm after mitigation is the least with the Revised Viaduct Alternative, South Option, due to its avoidance of Swansea Elementary School Public Playground and Globeville Landing Park

Exhibit 7-51 Summary of Least-Overall-Harm Analysis

Factor	Revised Viaduct Alternative		Partial Cover Lowered Alternative	Managed Lanes Option	Factor Summary
	North Option	South Option			
3: Relative significance of each Section 4(f) property	Contributing elements to the historic district are considered less significant, relative to other Section 4(f) properties that are eligible as individual resources	Contributing elements to the historic district are considered less significant, relative to other Section 4(f) properties that are eligible as individual resources	Contributing elements to the historic district are considered less significant, relative to other Section 4(f) properties that are eligible as individual resources	Contributing elements to the historic district are considered less significant, relative to other Section 4(f) properties that are eligible as individual resources	Contributing elements to the historic district are considered less significant, relative to other Section 4(f) properties that are eligible as individual resources
4: Views of officials with jurisdiction	• Denver Public Schools does not support this option due to its proximity to the school • No other officials with jurisdiction have expressed a view for or against this option	No preference for or against the option has been made by officials with jurisdiction.	• Denver and Denver Public Schools have stated a preference for the Partial Cover Lowered Alternative. • No other officials with jurisdiction have expressed a view for or against this alternative and associated option	No preference for or against the option has been made by officials with jurisdiction	Those officials with jurisdiction, who have stated a preference, prefer the Partial Cover Lowered Alternative. No officials with jurisdiction have stated a preference between General-Purpose and Managed Lanes
5: Ability to meet purpose and need	Future peak travel periods and percentage of congestion similar for all build options	Future peak travel periods and percentage of congestion similar for all build options	• Future peak travel periods and percentage of congestion similar for all build options • This option provides additional pedestrian safety and shorter crossings of 46th Avenue	Further improves future peak travel periods and percentage of congestion when added to other build options	The Partial Cover Lowered Alternative with Managed Lanes Option is the least harm because it best meets the purpose and need through reducing peak travel periods and percentage of congestion

Exhibit 7-51 Summary of Least-Overall-Harm Analysis

Factor	Revised Viaduct Alternative		Partial Cover Lowered Alternative	Managed Lanes Option	Factor Summary
	North Option	South Option			
6: Magnitude of impacts on non-Section 4(f) resources	**Relocations and Land Use Acquisition:** 53 relocations, 40.6 acres **Noise:** Impacts 562 receivers **Visual and Aesthetics:** Poor balance of unity, intactness and vividness. Improves aesthetics by replacing existing viaduct, but increases visible mass over existing conditions **Social Impacts:** Least impact to neighborhood character (due to fewer ROW acquisition and relocations). Increases impacts to neighborhood cohesion by increasing viaduct footprint **Environmental Justice:** Disproportionate high and adverse impacts to low-income or minority population, but mitigation measures will offset these impacts	**Relocations and Land Use Acquisition:** 71 relocations, 41.9 acres **Noise:** Impacts 511 receivers **Visual and Aesthetics:** Poor balance of unity, intactness and vividness. Improves aesthetics by replacing existing viaduct, but increases visible mass over existing conditions **Social Impacts:** Moderate impact to neighborhood character (due to ROW acquisition and relocations). Increases impacts to neighborhood cohesion by increasing viaduct footprint **Environmental Justice:** Disproportionate high and adverse impacts to low-income or minority population, but mitigation measures will offset these impacts	**Relocations and Land Use Acquisition:** 74 relocations, 66.6 acres (81.3 with managed lanes) **Noise:** Impacts 178 receivers **Visual and Aesthetics:** High balance of unity, intactness and vividness. Best improves aesthetics by removing existing viaduct and minimizing visual obstruction through a below ground highway; improves overall aesthetics through four-acre public space on cover **Social Impacts:** Greatest impact to neighborhood character (due to ROW acquisition and relocations), but greatest improvement on neighborhood cohesion through removal of viaduct **Environmental Justice:** Disproportionate high and adverse impacts to low-income or minority population, but mitigation measures will offset these impacts	**Land Use Acquisition:** Minor increase in land acquisition (14.7 acres) No substantial increase in impacts to non-Section 4(f) resources with this option	Overall magnitude of non-Section 4(f) resource impacts is generally lowest under the Partial Cover Lowered Alternative Magnitude of impacts between the General-Purpose and Managed Lanes Options, is negligible
7: Substantial cost differences	$1,330 million ($1,450 million with managed lanes)	$1,450 million ($1,570 million with managed lanes	$1,580 million ($1,700 million for managed lanes)	Additional $100-130 million	There is no substantial cost difference between the project alternatives

7.12 What coordination has been completed with officials having jurisdiction over Section 4(f) properties?

Coordination with local officials and/or agencies having jurisdiction over the Section 4(f) resources has been conducted throughout the analysis. For historic resources, consultation has been conducted with SHPO, which is the official with jurisdiction. A record of consultation is presented in Attachment B.

Coordination with the Denver Parks and Recreation Department has been conducted with regard to Globeville Landing Park. Additional jurisdictional agencies, such as Aurora and Commerce City, were coordinated with previously but no Section 4(f) properties subject to a use are currently within their jurisdiction.

Coordination with Denver Public Schools, which has jurisdiction over the Swansea Elementary School Public Playground has been conducted as well.

Coordination with jurisdictional agencies has been ongoing since the 2008 scoping process. The majority of this coordination has been regarding historic resources, as detailed in Attachment B, *Agency Consultation Addendum*.

7.13 What is the conclusion of this Section 4(f) Evaluation?

The Partial Cover Lowered Alternative causes less overall harm to all resources compared to the Revised Viaduct Alternative. Although it has greater impacts to some resources, it provides significant benefit by removing the dominant visual impact of the viaduct. It provides the cover over the highway, which serves to reduce noise impacts and protects air quality. Mitigation provided to environmental justice neighborhoods provides more public open space.

After extensive coordination with local officials and/or agencies having jurisdiction over the Section 4(f) resources, as well as public review, FHWA has determined that there are no feasible and prudent avoidance alternatives and, that the Partial Cover Lowered Alternative causes the least overall harm.

7.14 Final Section 4(f) Statement

Based on the above analysis, FHWA makes the following determination with regard to the Preferred Alternative for the I-70 East Project.

The Preferred Alternative would have *de minimis* impacts on the following Section 4(f) properties:

- National Western Historic District (5DV10050)
- Banker's Warehouse Co. (5DV11720)
- Safeway Distribution Center Historic District (5DV9232)
- Union Pacific Beltline RR Segment (5AM2083.1)
- Univar (5DV9231)

In addition, there is no feasible and prudent alternative that avoids the use of the following Section 4(f) properties.

- Rudy/Bernal Residence, 4618 High Street (5DV9735)
- Garcia Residence, 4617–4625 Race Street (5DV9780)
- York Street/East 40th Avenue Brick Sanitary Sewer (5DV11283)
- Union Pacific Railroad Segment (5DV6248.4)
- Colonial Manor Motel Tourist Court (5DV7130)
- Sanchez Business, 2381 East 46th Avenue (5DV9655)
- Brown and Alarid Residence, 4637 Claude Court (5DV9667)
- Toth/Kelly Residence, 4639 Claude Court (5DV9668)
- Portales Residence, 4608 Josephine Street (5DV9746)
- Stop-N-Shop Food Store (5DV9801)
- Alfred R. Wessel Historic District (5DV10126)
- Market Street RR/ Chicago Burlington & Quincy Railroad Segment (5AM1298.2)
- Rocky Mountain Arsenal Railroad Segment (5DV7048.2)
- Globeville Landing Park
- Swansea Elementary School Public Playground

FHWA has concluded that the Preferred Alternative includes all possible planning to minimize harm to these properties.

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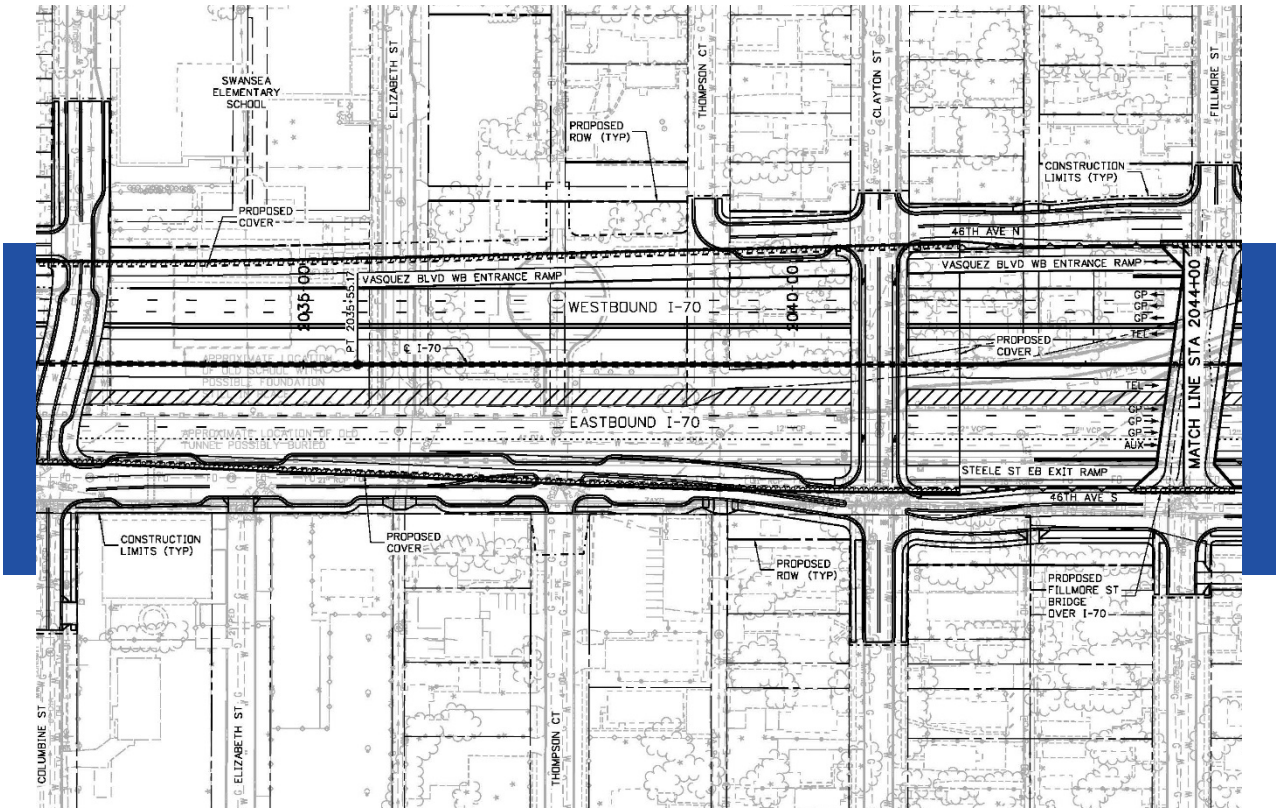
CHAPTER 8: Phased Project Implementation



CHAPTER 8: PHASED PROJECT IMPLEMENTATION

This chapter describes the proposed phases for the Partial Cover Lowered Alternative with Managed Lanes—the project's identified Preferred Alternative. It evaluates the phased implementation scenario separately as a subset of the analysis presented in this document. The evaluation focuses on how the effects of phased implementation would differ from those of full build, and on how constructing the project in phases might have different effects from constructing it all at one time.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS.

This Chapter is a new inclusion for the Final EIS and was not included in the Supplemental Draft EIS.

8.1 Will the project's Preferred Alternative be built all at once or in phases?

Revenue sources for the I-70 East project include allocations from various sources, but there remains a gap between the estimated cost of the project and the revenue available to build it. Because of these funding limitations, the project will be constructed in phases over time. Phase 1 is the only defined phase for the project at this time.

Any of the Build Alternatives—described in detail in Chapter 3, Summary of Project Alternatives—could be implemented using a phased approach, with each phase contributing to the overall project purpose and need. The ability to define phases was not a factor in the identification of the Preferred Alternative.

As stated in 23 CFR §771.111(f), project phases must:

- Connect logical termini
- Be of sufficient length to address environmental matters on a broad scope
- Have independent utility in that they would be a usable and a reasonable expenditure even if no additional transportation improvements in the area are made
- Not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements

Using this approach, which allows for disclosure and discussion of project phasing during the NEPA process, additional detail can be evaluated regarding phasing. This tactic serves as an enhancement to the typical NEPA process because only what is included in the Fiscally Constrained Regional Transportation Plan can be approved in the ROD.

This process—including the preparation of a ROD for each project phase—will be repeated until construction of the entire Preferred Alternative identified in the Final EIS is completed. Implementation of future phases may not occur if funding beyond the initial phase cannot be identified. No phases would restrict the consideration of alternatives for other reasonably foreseeable future transportation improvements.

Phase 1 project

Phase 1 is the only defined phase for the project at this time.

Future phases have not been determined. They will rely on future funding; therefore, any future phases will be referred to as Phase 2.

Furthermore, project phases may be constructed in one or more construction packages.

The following general considerations will be taken into account when determining the scope of future phases for the project:

- CDOT will consider equity issues and the need to balance the construction of improvements throughout the corridor.
- If local agency funding or other reasonably available funding (such as private funds or other unexpected or nontraditional funding sources) becomes available, improvements may be identified for inclusion in future phases.
- Decisions made during the Final EIS process may need to be reevaluated if circumstances in the corridor change which may impact the phasing of improvements.

8.2 What are the proposed project phases?

Phase 1 is the only defined phase for the project at this time. Future phases have not been determined and will rely on future funding; therefore, any future phases are referred to as Phase 2.

8.2.1 Phase 1

Phase 1 incorporates portions of the identified Preferred Alternative, the Partial Cover Lowered Alternative with Managed Lanes. CDOT has elected to manage the additional lanes on I-70 East by implementing tolled express lanes (see sidebar). In general, Phase 1 includes the complete reconstruction of I-70 from Brighton Boulevard to the bridge over Sand Creek (near I-270) with pavement width for the addition of two tolled express lanes in each direction. Only one lane will be open for use until traffic demand is met to open the second lane (included in Phase 2). It also includes widening the remaining stretch of I-70 from I-270 to Chambers Road to accommodate one additional tolled express lane in each direction and restriping from I-25 to Brighton Boulevard to accommodate one additional tolled express lane in each direction. See the map provided in **Exhibit 8-1** for an overview of Phase 1, a typical section of Phase 1 is shown in **Exhibit 8-2**. Construction is anticipated to take approximately 5 years for Phase 1.

Managed lanes and tolled express lanes

The Managed Lanes Option was identified as the Operational Option of the Preferred Alternative.

CDOT has elected to manage the additional lanes on I-70 East by implementing tolled express lanes. In this chapter, Phase 1 will refer to the additional lanes as tolled express lanes (rather than managed lanes).

Tolled express lanes will be built in addition to any existing general-purpose lanes, providing drivers the choice of new, optional lanes. Tolls can change in price depending on the time of day, such as during peak morning or evening traffic, to make sure the lane provides a more reliable trip alternative for travelers at all times. An additional strategy to encourage ridesharing being considered includes allowing vehicles with three or more occupants to use these lanes free of charge.

Tolled express lanes work to move more people, rather than move more cars. By presenting choices, Express Lanes will reduce delays, manage congestion, and keep travel times reliable for motorists.

Exhibit 8-1 Phase 1 Overview

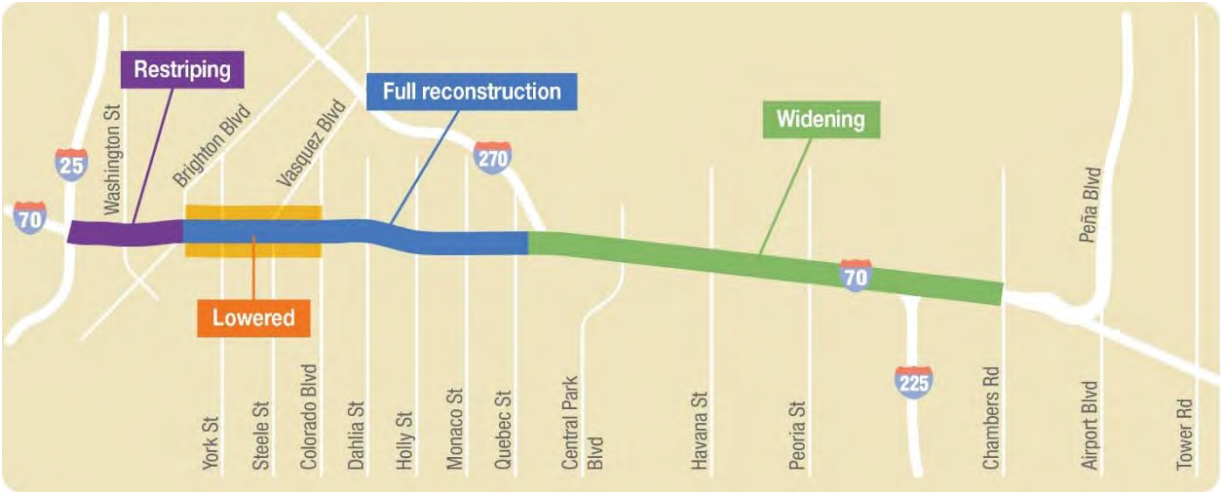
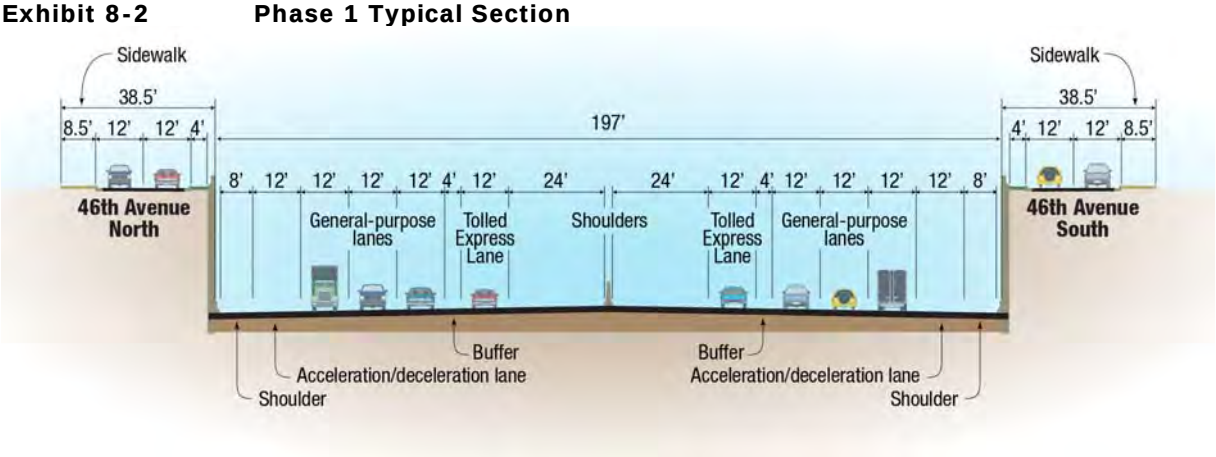


Exhibit 8-2 Phase 1 Typical Section



Phase 1 removes the existing viaduct between Brighton Boulevard and Colorado Boulevard, and rebuilds I-70 below grade along this segment, expanding the roadway just north of the existing alignment. North-south connections over the lowered freeway will be maintained at Brighton Boulevard, York Street, Josephine Street, Columbine Street, Clayton Street, Fillmore Street, Steele Street/Vasquez Boulevard, and Colorado Boulevard. It also provides additional north-south connectivity over I-70 at Cook Street and Monroe Street, shown in **Exhibit 8-3**. York Street will become a two-way street north of 46th Avenue.

Exhibit 8-3 Phase 1 North/South Connectivity over I-70

Phase 1 includes the highway cover between the Clayton Street and Columbine Street bridges. The cover is adjacent to Swansea Elementary School, the most desirable location along the corridor because of its proximity to the school and because it accommodates the maximum length of the cover that can be placed on the highway. The highway cover design includes an urban landscape to serve the community with the potential to include playgrounds, plazas, outdoor classrooms, and community gardens. Strategically placed landscape elements—such as trees and shrubs—are included only at designated locations to minimize the loading on the structure. Maintenance of the features and landscaping on the cover has not been determined at this time. CDOT is working with Denver and Denver Public Schools to develop agreements for shared use on the cover and long-term operations and maintenance of the cover. These agreements will be finalized before construction begins.

Highway cover

Phase 1 includes the highway cover and the associated school, shared, and community uses that are currently planned for the top of the cover.

The existing UPRR bridge structure—currently located beneath the viaduct—will be replaced, and any corresponding track work will be included in Phase 1. The I-70 mainline and 46th Avenue will cross under the UPRR bridge. The BNSF Market Lead railroad line will include an at-grade crossing at 46th Avenue and span over I-70. This also will include track design to accommodate the new structures.

Since 46th Avenue will be moved to the north and south side of the highway from its current location under the viaduct, it will become a pair of frontage roads. It will vary between

allowing one-way traffic and two-way traffic in places. The road will be renamed to 46th Avenue North or 46th Avenue South, with 46th Avenue North running parallel to I-70 on the north side and 46th Avenue South running parallel to I-70 on the south side. The reason for changing the name of the frontage road is twofold: (1) since 46th Avenue is now split, the new name will differentiate between the two street locations; and (2) the new naming convention matches the naming convention of Stapleton Drive North and Stapleton Drive South, which is the frontage road along I-70 east of Colorado Boulevard.

Phase 1 includes the removal of the York Street interchange, and creates a split-diamond interchange configuration with one-way frontage roads between Steele Street/Vasquez Boulevard and Colorado Boulevard. In addition, slip ramps are included to provide an eastbound off-ramp and westbound on-ramp at Colorado Boulevard.

Full reconstruction of I-70 and the associated frontage road will continue between Colorado Boulevard and Quebec Street. This work will consist of roadway widening to accommodate increased shoulder widths and the addition of eastbound and westbound lanes. The existing slip ramps at Dahlia Street and Monaco Street, respectively, will be removed and replaced with a full interchange at Holly Street.

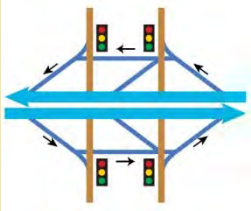
From Quebec Street to Chambers Road, funding is only available to widen for one lane going eastbound and one lane going westbound. Therefore, for lane continuity in Phase 1, only a single lane will be striped from Brighton Boulevard to Quebec Street, even though the highway in this area will be wide enough to accommodate two lanes.

Quebec Street will be widened between the ramp terminals, with minimal vertical alignment changes, to allow for a center pier for the I-70 bridge replacement. The I-270 southbound to I-70 eastbound flyover structure will be replaced. Central Park Boulevard has recently been constructed, so it will not be disturbed under this project. CDOT is currently reconstructing I-70 at Havana Street and this work will build the I-70 section width to match this project. Therefore, the only work required at this location is restriping to include an additional lane.

A new structure will be built at Peoria Street to maintain the required width for the additional lanes along I-70. The

Slip ramps

A slip ramp is generally located between a freeway mainline and an adjacent frontage road. These ramps allow motorists to "slip" from one roadway to the adjacent parallel roadway. The connection of the slip ramp and the parallel roadway are typically not intersections, but just merging zones.



new structure is proposed as a two-span bridge to reduce the structure depth and the associated embankment required on I-70. As with Quebec Street, Peoria Street will be widened to accommodate the center pier. Phase 1 ends at the Chambers Road bridge.

Tolled Express Lanes

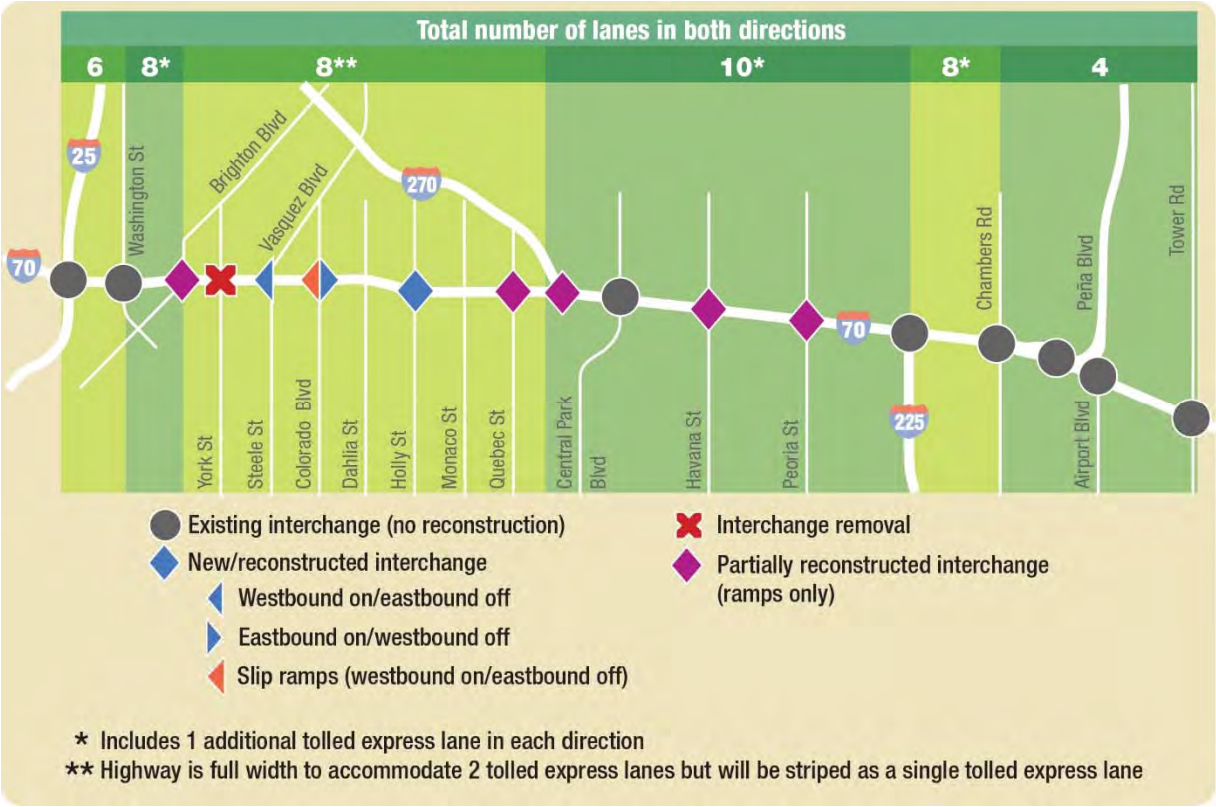
Although the Preferred Alternative includes two tolled express lanes in each direction from Brighton Boulevard to Tower Road, continuity constraints only allow for a single tolled express lane to be built for Phase 1 in each direction. Because of these limitations, the highway will be built to the full width of the Preferred Alternative (to accommodate two additional lanes), but it will be striped as a single tolled express lane from Brighton Boulevard to Quebec Street. No tolled express lane direct connections or flyovers are included in Phase 1.

From I-25 to Brighton Boulevard, a single tolled express lane will be striped into the existing shoulder in the eastbound direction. At Brighton Boulevard, an ingress will be provided to allow vehicles from I-25 to enter the tolled express lane. The next eastbound ingress/egress location is at Holly Street. This ingress/egress is located to allow for vehicles to enter the tolled express lane from Colorado Boulevard and exit the tolled express lane to Quebec Street, Central Park Boulevard, Havana Street, and Peoria Street. Similarly, an egress is provided at Peoria Street to allow for vehicles to exit the tolled express lane to I-225, Chambers Road, and Peña Boulevard. The lane continues, separated by a striped four-foot buffer, through the I-225 interchange. Vehicles wishing to continue on I-70 past I-225 and Peña Boulevard do not need to exit the tolled express lane at the same time as the vehicles choosing to exit the highway.

The westbound tolled express lane begins east of the I-225 interchange to allow vehicles on I-70 and coming from Peña Boulevard to enter into the tolled express lane prior to the traffic coming from I-225. An ingress is provided at Peoria Street to allow for vehicles entering from I-225 northbound. Moving west, the next ingress/egress location is at Holly Street, which allows for sufficient weave from the tolled express lane to safely exit at Colorado Boulevard and Brighton Boulevard. The westbound tolled express lane provides a continuous egress, beginning at the Brighton Boulevard westbound exit ramp, to allow enough distance to the I-25 exit. The tolled express lane then continues west to the east side of the I-25 interchange.

Exhibit 8-4 shows total number of lanes and interchange reconstruction included in Phase 1.

Exhibit 8-4 Phase 1 Lane Configuration and Interchange Reconstruction



Additionally, Phase 1 includes an overall approach to design and construction that would not preclude the construction of a second cover over the highway from west of the Steele Street/Vasquez Boulevard highway crossing to east of Cook Street. This second cover will not be included as a part of the Preferred Alternative or Phase 1.

Phase 1 includes all associated roadside facilities, lighting infrastructure, and drainage facilities. Drainage facilities are included for both the interstate facility and reconstructed local streets adjacent to the highway. Stormwater detention facilities also will be constructed. Drainage for the Preferred Alternative—including the drainage improvements on the north side of I-70 to capture and convey the onsite water runoff and the offsite drainage system south of I-70 to capture surface water before it enters the lowered section of the highway—is included in Phase 1.

Other general improvements along the reconstructed 46th Avenue between Colorado Boulevard and Brighton Boulevard including lighting, pedestrian and bicycle

Second cover

To accommodate Denver's interest in constructing a second cover in the future, the Phase 1 includes an overall approach to design and construction that would not preclude the construction of a second cover over the highway from west of the Steele Street/Vasquez Boulevard highway crossing to east of Cook Street.

This second cover will not be included as a part of the Preferred Alternative or Phase 1.

amenities, and other streetscape improvements as agreed upon by CDOT (included in Attachment O, *Aesthetic and Design Guidelines*) are included in Phase 1.

Phase 1 also includes environmental mitigation measures during and after construction, as described in Section 8.3.

8.2.2 Phase 2

Phase 2 incorporates the remaining improvements needed for the Preferred Alternative. (**Exhibit 8-5**)

Phase 2 would stripe in an additional tolled express lane from Brighton Boulevard to Quebec Street. Phase 1 constructed this section of I-70 wide enough to accommodate the additional lane.

From Quebec Street to Chambers Road, I-70 would be widened for an additional single lane in each direction, one going eastbound and one going westbound.

From Chambers Road to Tower Road, capacity is increased by widening to accommodate additional lanes. Three direct connections are included from the tolled express lanes to I-270, I-225, and Peña Boulevard to accommodate regional and airport traffic. These direct connections result in a shift of eastbound I-70 to create room for the connections.

Exhibit 8-5 Phase 2 Overview

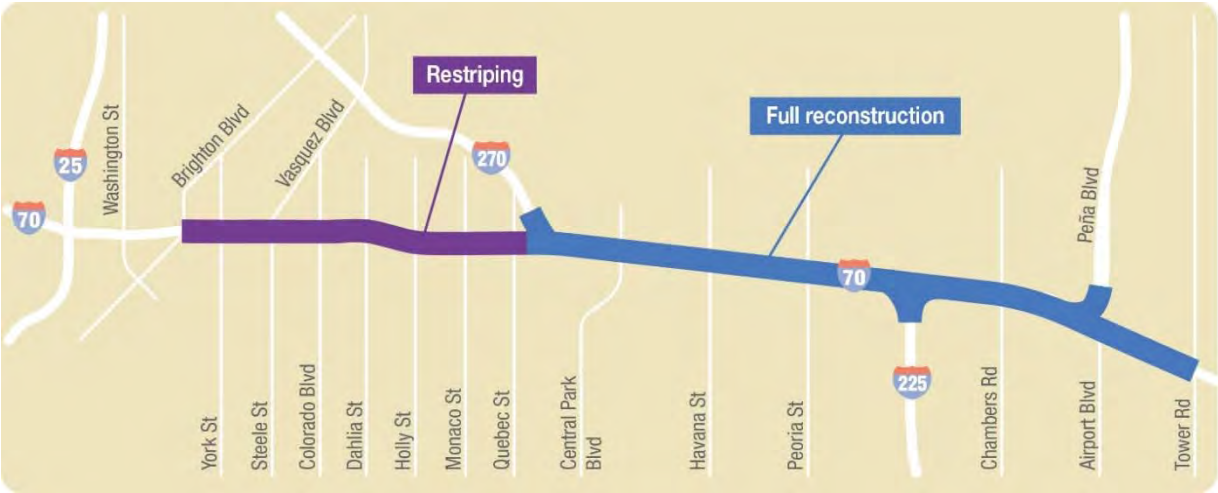
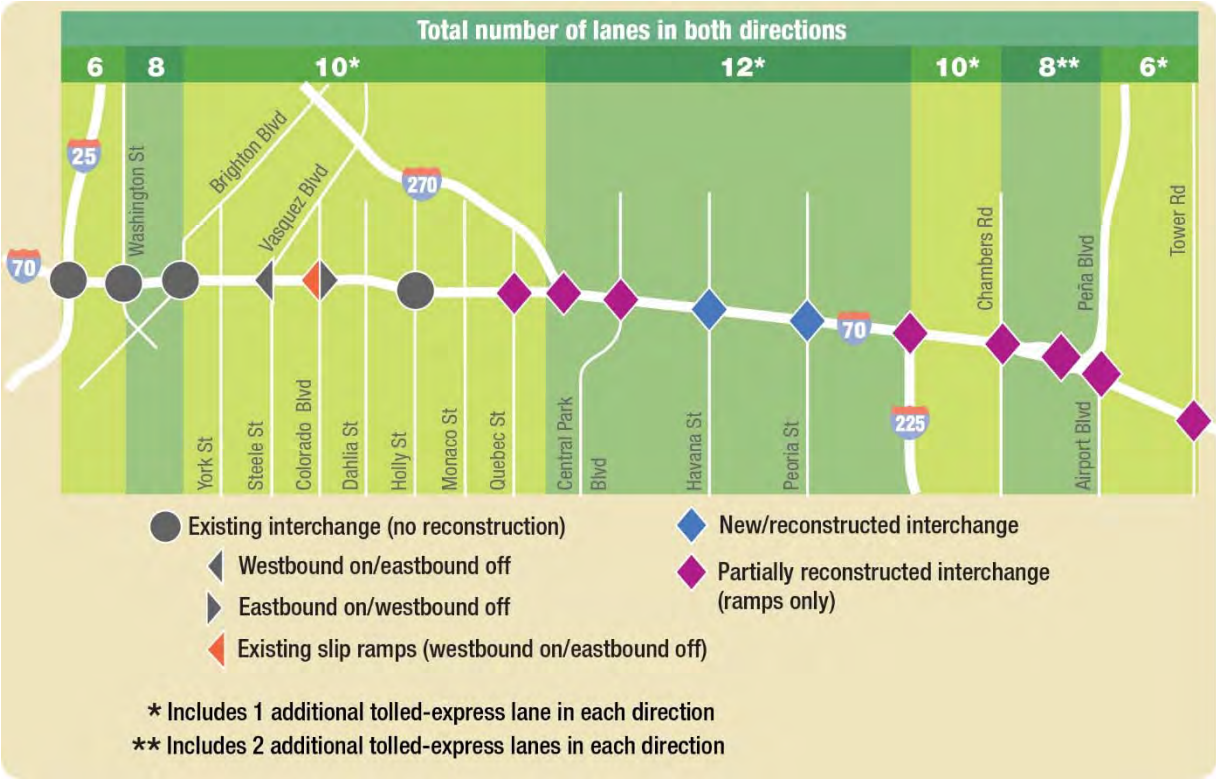


Exhibit 8-6 shows the total number of lanes and interchange reconstruction included in Phase 2.

Exhibit 8-6 Phase 2 Lane Configuration and Interchange Reconstruction



8.3 What are the resource impacts and mitigation measures associated with Phase 1?

To address the phased project implementation, this section evaluates the phased implementation of the project separately as a subset of the analysis described in Chapter 5, Affected Environment, Environmental Consequences, and Mitigation. The evaluation focuses on how the effects of phased implementation would differ from those of full build and on how constructing the project in phases might have different effects from constructing it all at one time. Impact calculations for the physical effects of phased implementation (for example, acres of wetlands and parks affected) are presented in **Exhibit 8-7**, alongside those for full build of the Preferred Alternative where applicable. If there is an impact shown in **Exhibit 8-7** for Phase 1, the mitigation also will happen in Phase 1.

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Social and Economic Conditions	
Preferred Alternative Impact	**Phase 1 Impact**
• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation) • Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School • Temporary effect to the regional economy from construction-related traffic congestion • Temporary road closures and traffic detours may have impacts on access to certain public services	Same as Preferred Alternative
• $2,690.7 million of regional economic output (13,900 person years of employment)	• $1,736.3 million of regional economic output (9,000 person years of employment)
Mitigation for Phase 1	
• Compensate any person(s) whose property needs to be acquired according to the Uniform Act of 1970, as amended • Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians • Coordinate with emergency service providers during construction to minimize effects on response times • Use standard measures, such as phased construction, advance notice of road closures and detours, and fixed and variable signage, to reduce effects on local residents and I-70 motorists • Provide a robust and context sensitive communications and outreach plan throughout construction to ensure residents, businesses, and travelers are kept informed • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours • Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction • Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Environmental Justice	
Preferred Alternative Impact	**Phase 1 Impact**
• Increasing noise and dust during construction • Potential for disturbing hazardous material sites during construction • Impacting mobility during construction due to detours • Temporarily closing or delaying, or permanently rerouting, public transit services in the area • Limiting north-south pedestrian and bicycle connectivity compared to the existing conditions • Relocating 56 residences • Impacting 105 noise receptors • Moving the highway closer to Swansea Elementary School • Displacing Stop N Shop and Pilot Travel Center truck stop • Creating visual obstruction with safety barriers; eliminating views across the highway • Creating a financial burden to low-income community, who may not be able to afford to use the managed lanes	Same as Preferred Alternative
Mitigation for Phase 1	
Mitigation measures that were developed specifically to reduce impacts to low-income and minority populations living in the adjacent communities are listed below: • Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods • Provide funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans (CDOT has already provided this funding as early mitigation) • Collect representative soil samples of three or four recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction • Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—interior storm windows • Facilitate opportunities to promote hiring individuals from the communities such as job fairs with contractors • Execute geographic-based hiring preferences (CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program) • Research opportunities to invest funds in a local workforce development program aimed at job readiness training prior to construction • Provide a new HVAC system, doors, and windows for Swansea Elementary School • Prior to the start of roadway construction, build two new classrooms at Swansea Elementary School to enhance the overall quality of the school • Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities • Provide contributions to existing programs that facilitate access to fresh food • Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover • Provide $2 million in funding to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs • Research ways to provide assistance for low-income populations within the area (such as free transponders) for using the managed lanes Environmental justice impacts include effects on various resources on an identified low-income or minority population or community; therefore, any mitigation measures for those resources apply to environmental justice as well. The resources listed below are discussed in this section, and the mitigation measures discussed in the sections below are also applicable to environmental justice: • Mitigations from Section 5.2, Social and Economic Conditions • Mitigations from Section 5.5, Relocations and Displacements • Mitigations from Section 5.8, Visual Resources and Aesthetic Qualities • Mitigations from Section 5.12, Noise • Mitigations from Section 5.18, Hazardous Materials	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Land Use	
Preferred Alternative Impact	**Phase 1 Impact**
• 68.3 acres converted to transportation use • Creation of a 4-acre cover, with up to 3 acres of public space over I-70	• 47.4 acres converted to transportation use • Creation of a 4-acre cover, with up to 3 acres of public space over I-70
Mitigation for Phase 1	
Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise	

Relocations and Displacements	
Preferred Alternative Impact	**Phase 1 Impact**
• 56 residential relocations • 18 business relocations (includes 1 non-profit relocation)	Same as Preferred Alternative
Mitigation for Phase 1	
• Compensate any person(s) whose property needs to be acquired for the Preferred Alternative according to the Uniform Act of 1970, as amended • Provide all impacted owners 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; assign a right of way specialist to each property owner to assist them with this process • Provide bilingual services for any of the relocated and displaced businesses or households that need them • Meet directly with those owners and occupants who would be relocated as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits	

Historic Preservation	
Preferred Alternative Impact	**Phase 1 Impact**
• Adverse Effect—13 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	Same as Preferred Alternative
Mitigation for Phase 1	
• Establish a Programmatic Agreement with SHPO and other consulting parties • Provide Level II archival documentation for adversely affected resources • Provide funding and participate in the creation of a documentary covering the history of I-70 East and its relationship to the Elyria and Swansea and Globeville Neighborhoods (mitigation has been completed, and is available to view at www.i-70east.com) • Implement other mitigation measures, as identified, in consultation with SHPO and other consulting parties as described in the Programmatic Agreement • Cease work during construction if unidentified historic resources are encountered and notify CDOT and SHPO immediately • Contact consulting Indian tribes if Indian cultural materials are identified at any time during construction	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Paleontological Resources	
Preferred Alternative Impact	**Phase 1 Impact**
Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Same as Preferred Alternative
Mitigation for Phase 1	
• Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring • Upon discovery of any paleontological resources, work shall immediately cease in the vicinity of the discovery, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; work shall not resume in the area until receiving formal notification from the paleontologist allowing work to resume	

Visual Resources and Aesthetic Qualities	
Preferred Alternative Impact	**Phase 1 Impact**
• Introducing public space to the area and reducing the roadway's visual dominance by removing the existing viaduct will enhance the visual quality • Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway • Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions • Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard • Managed lanes infrastructure will create new visual impacts along the project corridor	• Introducing public space to the area and reducing the roadway's visual dominance by removing the existing viaduct will enhance the visual quality • Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway • Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions
Mitigation for Phase 1	
Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Parks and Recreational Resources	
Preferred Alternative Impact	**Phase 1 Impact**
• South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction • 0.95 acre of impact to Swansea Elementary School • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction	• South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction • 0.95 acre of impact to Swansea Elementary School • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction
Mitigation for Phase 1	
• Provide adequate notice and signing to Greenway users prior to construction • Return Greenway to pre-construction or comparable state following construction • Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction • Coordinate with Denver Parks and Recreation, CPW, and NPS regarding impact to Globeville Landing Park, a Section 6(f) resource • Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement • Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Air Quality	
Preferred Alternative Air Quality Commitments and Strategies	**Phase 1 Air Quality Commitments and Strategies**
• MSAT emissions could increase temporarily during construction • Construction fugitive dust could cause temporary impacts • No violation of the NAAQS	Same as Preferred Alternative
Mitigation for Phase 1	
Before and during construction: • Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction During construction, BMPs will also be implemented and could include the following measures and others, if applicable, as identified during project development (per the Fugitive Dust Control Plan): • Cover, wet, compact, or use chemical stabilization binding agent to control dust and excavated materials at construction sites • Use wind barriers and wind screens to prevent spreading of dust from the site • Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets • Use vacuum-powered street sweepers to remove dirt tracked onto streets • Cover all dump trucks leaving sites to prevent dirt from spilling onto streets • Minimize disturbed areas particularly in winter • Prohibit unnecessary idling of construction equipment • Locate construction diesel engines as far away as possible from residential areas • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology • Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, or compressed natural gas, fuel cells, and electric engines, if applicable. • Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction • Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness • Require construction vehicle engines to be properly tuned and maintained • Use construction vehicles and equipment with the minimum practical engine size for the intended job Post construction, CDOT will continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations Post construction, BMPs could also include the following measures and others as identified during project development: • Optimize signal timing at intersections and along arterial streets near the freeway to reduce vehicle delay and tailpipe emissions • Implement congestion pricing and commuter incentive programs that reduce peak period freeway congestion and emissions • Encourage TDM options such as high-occupancy vehicle lanes, if available, and agreements with major employers to promote and implement flexible work programs	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Energy	
Preferred Alternative Impact	**Phase 1 Impact**
• 70.0 billion Btu consumed per day • 7,698 billion Btu consumed during construction	• 70.0 billion Btu consumed per day (daily Btu is calculated based on study area, which is the same for all phases) • 5,808 billion Btu consumed during construction
Mitigation for Phase 1	
• Limit idling of construction equipment • Encourage employee carpooling and vanpooling for construction workers • Encourage use of closest material sources • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies) • Encourage use of alternative fuels and asphalt binders • Implement traffic management schemes that minimize delays and idling • Where appropriate, implement energy conservation measures, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's *Lighting Design Guide* • Encourage energy-efficient options for the cover facilities	

Noise	
Preferred Alternative Impact	**Phase 1 Impact**
Number of noise receptors that exceed NAC threshold • Globeville: 18 • Elyria: 55 (11 that increase by 10 dBA or more) • Swansea: 50 • Stapleton: 0 • Peoria Street: 0 • Montbello: 29 • Aurora: 3*	Number of noise receptors that exceed NAC threshold • Globeville: 6 • Elyria: 54 (11 that increase by 10 dBA or more) • Swansea: 42 • Stapleton: 0 • Peoria Street: 0 • Montbello: 3 • Aurora: 4*
Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes ** In Aurora, the Preferred Alternative will have fewer noise impacts than Phase 1 due to the design of the highway causing some lanes to be shifted further north than Phase 1 conditions*	
Mitigation for Phase 1	
• Implement BMPs to minimize noise during construction, as per FHWA's *Highway Construction Noise Handbook* • Construct a 2,380 foot noise wall 12 to 20 feet tall in Elyria • Conduct a benefited receptor survey prior to construction to determine if the recommended noise wall is desired; if the survey results show that the majority of benefitted receptors who respond to the survey desire the noise wall, the noise wall will be optimized and built	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Biological Resources	
Preferred Alternative Impact	**Phase 1 Impact**
• 368.3 acres of permanent, direct impact to wildlife habitat • 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	• 93.1 acres of permanent, direct impact to wildlife habitat • 0.363 acres of permanent and 0.152 acres of temporary impacts to riparian areas
Mitigation for Phase 1	
• Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds • Monitor disturbed sites during construction to identify and treat any noxious weed invasion • Reclaim disturbed areas in phases throughout construction with native grasses and forbs • Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio • Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction will occur in prairie dog colonies between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31 • Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season • Survey areas to be cleared and grubbed, as well as areas within 50 feet of such areas, between April 1 and August 31 for active migratory bird nests within 7 days of the work being performed • Remove existing nests from structures after August 31 and prior to April 1 • Monitor structures at least once every three days for any nesting activity between April 1 and August 31 • Prepare and implement an Integrated Noxious Weeds Management Plan prior to construction activities • Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant prior to the start of construction activities	

Floodplains and Drainage/Hydrology	
Preferred Alternative Impact	**Phase 1 Impact**
• Impact to the Sand Creek floodplain with the proposed bridge construction and new bridge structures will cross this waterway • Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70 • The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	• Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70 • The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway
Mitigation for Phase 1	
• Create detention ponds and implement storm drainage for onsite drainage system improvements • Build an offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Wetlands and Other Waters of the U.S.	
Preferred Alternative Impact	**Phase 1 Impact**
• 4.442 acres of permanent and 0.244 acres of temporary wetland impacts • 0.771 acres of permanent and 0.080 acres of temporary impacts to other waters of the U.S. and other open waters	• 0.892 acres of permanent and 0.178 acres of temporary wetland impacts • 0.183 acres of permanent and 0.112 acres of temporary impacts to other waters of the U.S. and other open waters
Mitigation for Phase 1	
• Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed • Install temporary erosion control and sediment control BMPs before ground disturbing activities; permanently stabilize completed areas within 7 days; proposed BMPs are listed in the *Wetlands and Other Waters of the U.S. Technical Report* provided in Attachment N • Restore wetlands temporarily affected during construction to pre-construction conditions • Obtain and follow requirements of Section 404 permitting and Senate Bill 40 certification	

Water Quality	
Preferred Alternative Impact	**Phase 1 Impact**
• Increase in runoff TSS loads of 11 percent to the South Platte River • Increase in runoff TSS loads of 37 percent to Sand Creek	• Increase in runoff TSS loads of 11 percent to the South Platte River • Increase in runoff TSS loads of 15 percent to Sand Creek
• Storm water runoff can create erosion and degradation of water quality during and after construction • Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	
Mitigation for Phase 1	
• Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway • Consider environmentally friendly techniques to provide water quality treatment • Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program Implement the following BMPs for erosion and sediment control, dust control, stormwater control, and expansive during and after construction: • Silt fences, erosion control blankets • Sediment traps, sediment basins • Soil Stockpile Management • Temporary diversion structures • Spill prevention and control measures • Regrading • Seeding and revegetating soils and slopes • Mulch protection for new plantings • Stormwater control channels The following winter maintenance BMPs will be used to meet or exceed CDOT's water quality standards of its MS4 permit: • Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads • Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials. This technology prevents over-treating. • Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile. This product is preferred over regular sand/salt mixtures because it produces less fugitive dust	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Water Quality cont.
Mitigation for Phase 1 cont.
• Stockpile solid mixtures at a local maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters • Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures • Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements • Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes • Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping • Rely on cameras/ITS systems to determine problem areas during each storm event

Geology and Soils	
Preferred Alternative Impact	**Phase 1 Impact**
• Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street • Temporary impacts to groundwater during excavation	Same as Preferred Alternative
Mitigation for Phase 1	
• Prevent groundwater infiltration into the lowered section of the highway; install underdrain pipes below the pavement to drain any additional groundwater that still enters the lowered section • Dewater during the construction process	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Hazardous Materials	
Preferred Alternative Impact	**Phase 1 Impact**
• 28 hazardous materials sites affected • Extensive excavation through a known landfill which contains contaminants • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	Same as Preferred Alternative
• 703 acres of land disturbed	• 374 acres of land disturbed
Mitigation for Phase 1	
• Before right-of-way acquisition, conduct a Phase 1 Environmental Site Assessment (Phase 1) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project. • Avoid contaminated sites wherever practical; where unavoidable, further site investigation and coordination with affected property owners will be initiated • Follow *CDOT Standard Specification for Road and Bridge Construction* Section 250 Environmental, Health and Safety Management • Follow Tri-County Health Department *Health and Safety Practices during Construction on or Near Former Landfills* • Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines; if ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure; additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations • Update contaminated sites search databases to reflect most recent records • Prepare and implement a project-specific *Health and Safety Plan and Materials Management Plan* 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 • In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan • Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities; additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards • Obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water Permit or Construction Activities Discharging to Ground Water Permit, as required, utilizing readily available data; the selected contractor will follow the permit requirements • If this alternative requires permanent dewatering, obtain and follow the necessary CDPS Dewatering Permits; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility • Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Utilities	
Preferred Alternative Impact	**Phase 1 Impact**
• All utility types will be affected to some extent • Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width • Offsite stormwater drainage system south of I-70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency • Additional temporary impacts at locations of direct connections to I-270, I-225, and Peña Boulevard	• All utility types will be affected to some extent • Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width • Offsite stormwater drainage system south of I-70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency
Mitigation for Phase 1	
• 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	

Exhibit 8-7 Summary of Impacts and Mitigations by Resource for Phase 1

Section 4(f) and Section 6(f)—Recreation Resources	
Preferred Alternative Impact	**Phase 1 Impact**
Section 4(f) • Use of Swansea Elementary School Public Playground • Use of Globeville Landing Park Section 6(f) • South Platte River Greenway temporary impacts may occur during construction • Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park • Part of Globeville Landing Park will be closed during construction	Same as Preferred Alternative
Mitigation for Phase 1	
• Provide adequate notice and signing to Greenway users prior to construction • Return Greenway to pre-construction or comparable state following construction • Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue • Coordinate with Denver Parks and Recreation, CPW, and NPS regarding impact to Globeville Landing Park, a Section 6(f) resource • Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement • Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.	

Section 4(f)—Historic Resources	
Preferred Alternative Impact	**Phase 1 Impact**
Use of 18 historic resources, which includes 5 *de minimis* impact determinations	Same as Preferred Alternative
Mitigation for Phase 1	
• Adverse Effects to historic resources will be resolved by the execution of the Section 106 Programmatic Agreement between FHWA, CDOT, SHPO and consulting parties • Consultation has discussed mitigation measures such as documenting historic structures and ways to preserve the larger history of the project corridor	

8.4 Would there be additional impacts and mitigation measures associated with Phase 2?

Exhibit 8-8 discusses the additional environmental impacts of Phase 2, or full build-out of the Preferred Alternative. Resources listed below are not anticipated to be impacted beyond the improvements previously described for Phase 1 (although mitigation measures, including BMPs, still apply):

- Environmental Justice
- Historic Preservation
- Section 4(f) and Section 6(f)

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Social and Economic Conditions
Phase 2 Impact
• 0 residential and business relocations (partial property acquisitions anticipated in Phase 2) • $954.4 million of regional economic output (4,900 person years of employment) • Temporary effect to the regional economy from construction-related traffic congestion • Temporary road closures and traffic detours may have impacts on access to certain public services
Mitigation for Phase 2
• Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians • Coordinate with emergency service providers during construction to minimize effects on response times • Use standard measures, such as phased construction, advance notice of road closures and detours, and fixed and variable signage, to reduce effects on local residents and I-70 motorists • Provide a robust and context sensitive communications and outreach plan throughout construction to ensure residents, businesses, and travelers are kept informed • Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained • Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours • Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Land Use
Phase 2 Impact
20.9 acres converted to transportation use
Mitigation for Phase 2
Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise

Relocations and Displacements
Phase 2 Impact
0 residential and business relocations (partial property acquisitions anticipated in Phase 2)
Mitigation for Phase 2
• Compensate any person(s) whose property needs to be acquired for the Preferred Alternative according to the Uniform Act of 1970, as amended • Provide all impacted owners 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; assign a right of way specialist to each property owner to assist them with this process • Provide bilingual services for residential or business partial property acquisitions • Meet directly with owners of partial property acquisitions as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits

Paleontological Resources
Phase 2 Impact
Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations
Mitigation for Phase 2
• Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring • Upon discovery of any paleontological resources, work shall immediately cease in the vicinity of the discovery, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; work shall not resume in the area until receiving formal notification from the paleontologist allowing work to resume

Visual Resources and Aesthetic Qualities
Phase 2 Impact
• Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard • Managed lanes infrastructure will create new visual impacts along the project corridor
Mitigation for Phase 2
Develop aesthetic and design guidelines and standards for future phases of the project that are consistent with the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design.

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Parks and Recreational Resources
Phase 2 Impact
• Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction
Mitigation for Phase 2
• Provide trail detours and ADA-compliant detour signage during construction • Return trails to pre-construction or comparable state following construction

Air Quality
Phase 2 Air Quality Commitments and Strategies
• MSAT emissions could increase temporarily during construction • Construction fugitive dust could cause temporary impacts • No violation of the NAAQS
Mitigation for Phase 2
Before and during construction: • Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction During construction, BMPs could include the following measures and others, if applicable, as identified during project development (per the Fugitive Dust Control Plan): • Cover, wet, compact, or use chemical stabilization binding agent to control dust and excavated materials at construction sites • Use wind barriers and wind screens to prevent spreading of dust from the site • Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets • Use vacuum-powered street sweepers to remove dirt tracked onto streets • Cover all dump trucks leaving sites to prevent dirt from spilling onto streets • Minimize disturbed areas particularly in winter • Prohibit unnecessary idling of construction equipment • Locate construction diesel engines as far away as possible from residential areas • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology • Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, or compressed natural gas, fuel cells, and electric engines, if applicable. • Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction • Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness • Require construction vehicle engines to be properly tuned and maintained • Use construction vehicles and equipment with the minimum practical engine size for the intended job Post construction, CDOT will continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations Post construction, BMPs could also include the following measures and others as identified during project development: • Optimize signal timing at intersections and along arterial streets near the freeway to reduce vehicle delay and tailpipe emissions • Implement congestion pricing and commuter incentive programs that reduce peak period freeway congestion and emissions • Encourage TDM options such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Energy
Phase 2 Impact
• 70.0 billion Btu consumed per day (daily Btu is calculated based on study area, which is the same for all phases) • 1,890 billion Btu consumed during construction
Mitigation for Phase 2
• Limit idling of construction equipment • Encourage employee carpooling and vanpooling for construction workers • Encourage use of closest material sources • Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses • Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies) • Encourage use of alternative fuels and asphalt binders • Implement traffic management schemes that minimize delays and idling • Where appropriate, implement energy conservation measures, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's *Lighting Design Guide*

Noise
Phase 2 Impact
Number of noise receptors that exceed NAC threshold: • Globeville: 12 • Elyria: 1 • Swansea: 8 • Stapleton: 0 • Peoria Street: 0 • Montbello: 26 • Aurora: 1 Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes
Mitigation for Phase 2
Implement BMPs to minimize noise during construction, as per FHWA's *Highway Construction Noise Handbook*

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Biological Resources
Phase 2 Impact
• 275.2 acres of permanent, direct impact to wildlife habitat • 0.934 acres of permanent and 0.223 acre of temporary impacts to riparian areas
Mitigation for Phase 2
• Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds • Monitor disturbed sites during construction to identify and treat any noxious weed invasion • Reclaim disturbed areas in phases throughout construction with native grasses and forbs • Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio • Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction will occur in prairie dog colonies between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31 • Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season • Survey areas to be cleared and grubbed, as well as areas within 50 feet of such areas, between April 1 and August 31 for active migratory bird nests within 7 days of the work being performed • Remove existing nests from structures after August 31 and prior to April 1 • Monitor structures at least once every three days for any nesting activity between April 1 and August 31 • Prepare and implement an Integrated Noxious Weeds Management Plan prior to construction activities • Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant prior to the start of construction activities

Floodplains and Drainage/Hydrology
Phase 2 Impact
Impact to the Sand Creek floodplain with the proposed bridge construction and new bridge structures will cross this waterway
Mitigation for Phase 2
Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain

Wetlands and Other Waters of the U.S.
Phase 2 Impact
• 3.550 acres of permanent and 0.244 acres of temporary wetland impacts • 0.588 acres of permanent and 0.026 acres of temporary impacts to other waters of the U.S. and other open waters
Mitigation for Phase 2
• Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed • Install temporary erosion control and sediment control BMPs before ground disturbing activities; permanently stabilize completed areas within 7 days; proposed BMPs are listed in the *Wetlands and Other Waters of the U.S. Technical Report* provided in Attachment N • Restore wetlands temporarily affected during construction to pre-construction conditions • Obtain and follow requirements of Section 404 permit and Senate Bill 40 certification

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Water Quality
Phase 2 Impact
• Increase in runoff TSS loads of 22 percent to Sand Creek • Storm water runoff can create erosion and degradation of water quality during and after construction • Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff
Mitigation for Phase 2
• Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway • Consider environmentally friendly techniques to provide water quality treatment • Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program The following BMPs for erosion and sediment control, dust control, stormwater control, and expansive soils will be implemented during and after construction: • Silt fences, erosion control blankets • Sediment traps, sediment basins • Soil Stockpile Management • Temporary diversion structures • Spill prevention and control measures • Regrading • Seeding and revegetating soils and slopes • Mulch protection for new plantings • Stormwater control channels The following winter maintenance BMPs will be used to meet or exceed CDOT's water quality standards of its MS4 permit: • Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads • Apply sand/salt mixtures (30 percent/70 percent, respectively) at rates of 105 pounds to 115 pounds per lane mile, which is roughly one-third of the maximum allowable amount of 300 pounds per lane mile • Use liquid de-icer products, such as magnesium chloride and Caliber (a mixture of magnesium chloride, cornstarch, alcohol, and tree sap); apply these products at rates of 40 pounds to 80 pounds per lane mile • Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations. Only 35 percent removal outside the "core" areas is required. For the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—this practice will continue • Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials. This technology prevents over-treating. • Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile. This product is preferred over regular sand/salt mixtures because it produces less fugitive dust • Stockpile solid mixtures at a local maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters • Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures • Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements • Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes • Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping • Rely on cameras/ITS systems to determine problem areas during each storm event

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Geology and Soils
Phase 2 Impact
Temporary impacts to groundwater during excavation
Mitigation for Phase 2
Dewater during the construction process

Hazardous Materials
Phase 2 Impact
• 0 known hazardous materials sites affected • Potential to encounter previously unidentified contamination which may affect construction budget and schedule
Mitigation for Phase 2
Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the Recognized Environmental Conditions (RECs) identified and potential risk to the project. • Avoid contaminated sites wherever practical; where unavoidable, further site investigation and coordination with affected property owners will be initiated • Follow *CDOT Standard Specification for Road and Bridge Construction* Section 250 Environmental, Health and Safety Management will be followed • Follow Tri-County Health *Department Health and Safety Practices during Construction* on or Near Former Landfills • Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines If ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure Additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations • Update contaminated sites search databases to reflect most recent records • Prepare and implement a project-specific *Health and Safety Plan and Materials Management Plan* 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 • In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan • Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities. Additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards • The contractor will obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water or Construction Activities Discharging to Ground Water, as required, utilizing readily available data; the selected contractor will follow the permit requirements • If this alternative requires permanent dewatering, obtain and follow the necessary CDPS Dewatering Permits; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility • Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary

Exhibit 8-8 Summary of Impacts and Mitigations by Resource for Phase 2

Utilities
Phase 2 Impact
Additional temporary impacts at locations of direct connections to I-270, I-225, and Peña Boulevard
Mitigation for Phase 2
• 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

8.5 How will Phase 1 affect traffic conditions compared to the full build-out of the Preferred Alternative?

The following subsections provide a discussion of how Phase 1 will affect traffic conditions compared to the Preferred Alternative and the No-Action Alternative using the same performance measures previously described for existing and future conditions (see Chapter 4, Transportation Impacts and Mitigation Measures). Attachment E, *Traffic Technical Report* provides a detailed description of the analyses, results, and comparisons of the performance measures between the existing conditions (2012), No-Action Alternative (2035), and Build Alternatives (2035).

The following summarizes what will occur for Phase 1 as compared to the Preferred Alternative and the No-Action Alternative:

- Both Phase 1 and the Preferred Alternative will reduce the amount of time drivers spend in traffic. Sub-area VHT for Phase 1 is 11 percent less than the No-Action Alternative. The Preferred Alternative reduces sub-area VHT by another 21 percent as compared to Phase 1.
- The traffic volumes on 46th Avenue and the local street network decrease due to the additional capacity provided to I-70 by Phase 1 and the Preferred Alternative when compared to the No-Action Alternative. This results in less congestion on I-70 and the local street network. Local street volumes for both Phase 1 and the Preferred Alternative have similar reductions (as much as 17 percent) between Brighton Boulevard and Colorado Boulevard. On the east end of the corridor, Phase 1 will reduce local street traffic volumes by approximately 7 percent. The Preferred Alternative will further reduce these volumes by as much as 15 percent compared to Phase 1.
- Travel times on I-70 improve with the changes provided by Phase 1 and the Preferred Alternative as compared to the No-Action Alternative. In addition, the tolled express lane provides reliable trip times.

Vehicle Hours of Travel (VHT)

VHT represents the total vehicle hours expended traveling on the roadway network or a single roadway in a specified area during a defined period. As congestion increases, VHT will increase since it will take drivers longer to travel to their destinations.

Sub-area

A sub-area is a portion of the regional travel demand model created to capture a vast majority of trips into, out of, and through the study area. Measures such as VHT and vehicle miles of travel (VMT) are calculated for the I-70 corridor, as well as the sub-area, to determine traffic changes in the area.

8.5.1 Future I-70 volumes

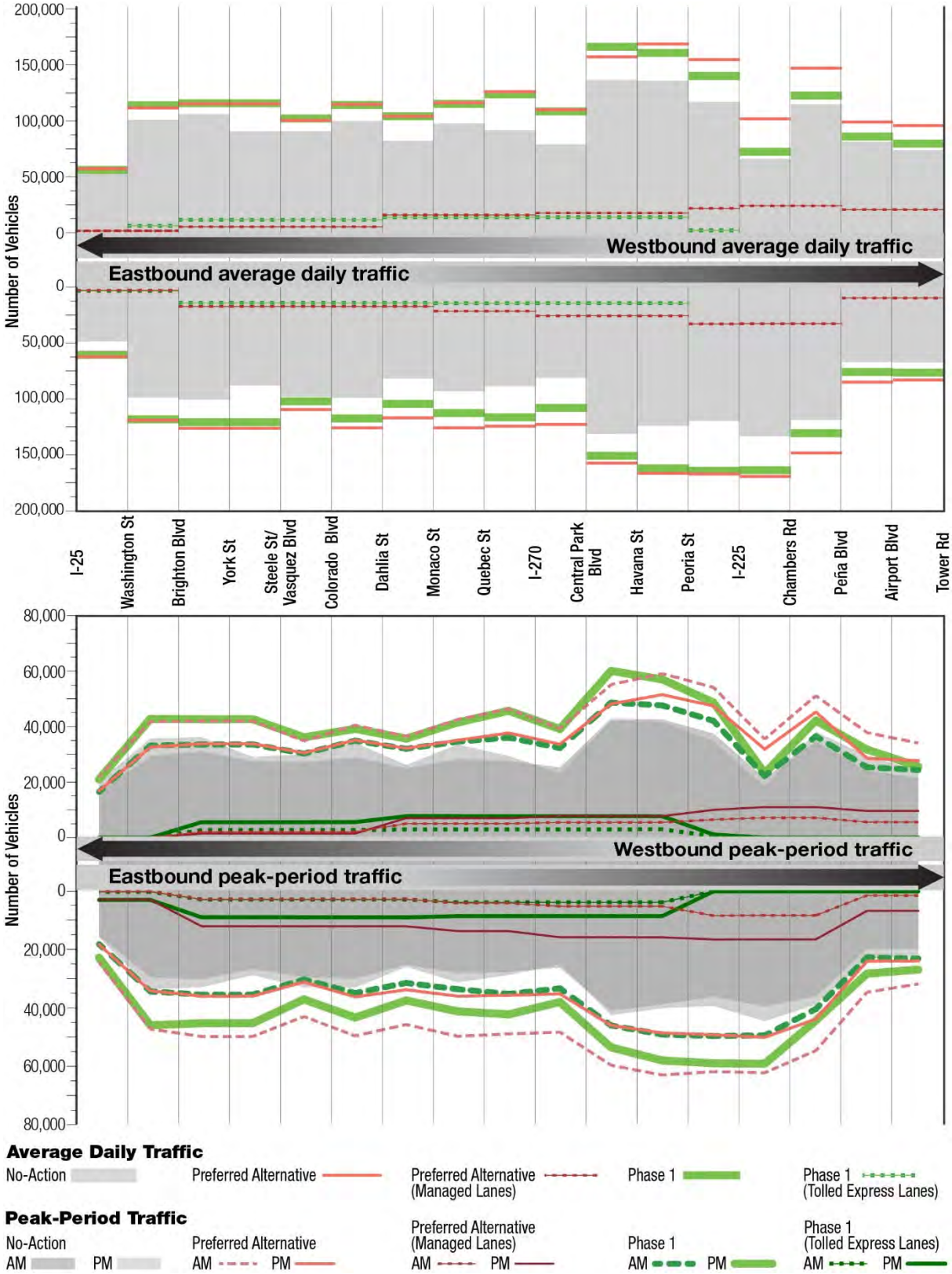
Daily and peak-period volumes are indicators of how well a particular roadway is able to process vehicles. Changes to the roadway geometry, such as adding capacity (in the form of new lanes) or improving regional connectivity, may result in changes to the volume of traffic using any particular roadway. Maximizing the capacity of I-70 will result in lower volumes on the local streets, including 46th Avenue, as drivers will choose to use the freeway for a faster trip. Conversely, not improving I-70 capacity increases the traffic on local streets like 46th Avenue and may result in an increase in crashes and safety issues along with reducing the overall quality of life for the neighborhood residents.

Exhibit 8-9 displays the comparison of the I-70 daily and peak-period traffic volumes for Phase 1 compared to the Preferred Alternative and the No-Action Alternative. The volumes shown for Phase 1 and the Preferred Alternative represent the total volume for all lanes of I-70 (general-purpose lanes and tolled express lanes). Daily volumes for Phase 1 increase between 10 and 40 percent compared to the No-Action Alternative. Daily volumes for the Preferred Alternative are between 15 and 45 percent higher than the No-Action Alternative and between 5 and 10 percent higher than Phase 1.

The peak-period volumes have similar trends as the daily volumes. Overall, Phase 1 and the Preferred Alternative process similar westbound volumes throughout the day between I-25 and I-270. Phase 1 volumes on I-70 in the eastbound direction are lower than the Preferred Alternative because only a single tolled express lane without direct connections is included. The Preferred Alternative provides additional capacity, including a second tolled express lane and direct connections east of I-270. This additional capacity results in the ability to process close to 20 percent higher volumes for I-70 westbound traffic and 10 percent higher for eastbound traffic. The Preferred Alternative also significantly increases the volumes processed by I-70 during the peak hours.

Phase 1 is able to handle more traffic volumes than the No-Action Alternative, and the Preferred Alternative can handle more than Phase 1 because of the additional capacity. The additional capacity provided by Phase 1 will increase traffic volumes on I-70 by at least 10 percent and reduce the traffic volumes on the local street network. The Preferred Alternative is able to process nearly 20 percent more traffic than Phase 1 which results in further reductions to traffic on the local network as shown in **Exhibit 8-10**.

Exhibit 8-9 I-70 Volumes



Source: Build (2035) Alternatives DynusT models

8.5.2 Future 46th Avenue and Stapleton Drive North/South traffic volumes

Exhibit 8-10 shows the daily and peak-period volumes projected to use 46th Avenue and Stapleton Drive North/South for Phase 1 and the Preferred Alternative compared to the No-Action Alternative. In general, most segments of the roadways experience a decrease in traffic compared to the No-Action Alternative as drivers will use I-70 to complete trips and not the local streets. The segments to the east and west of Holly Street also see an increase due to the interchange ramps at Monaco Street and Dahlia Street being moved to this location. Overall, Phase 1 has less traffic on 46th Avenue and Stapleton Drive North/South as compared to the No-Action Alternative, but more than the Preferred Alternative because Phase 1 has fewer lanes on I-70 than the Preferred Alternative. Adding an additional lane to I-70 with the Preferred Alternative will further reduce local street traffic.

8.5.3 Future east-west local street volumes

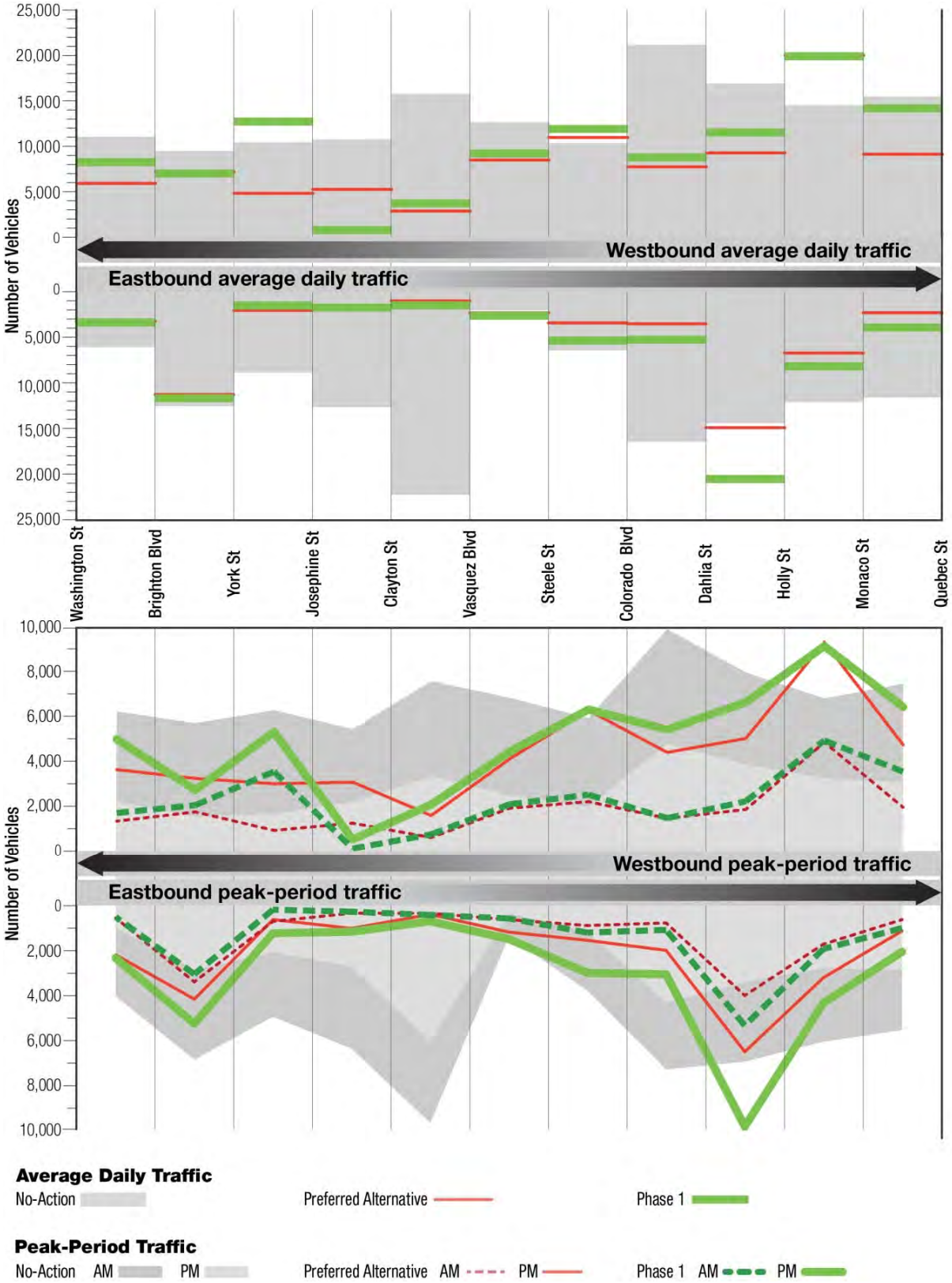
DynusT identifies the volume of traffic that will choose to use the freeway versus the volume of traffic that will use the local street network. This measure is important because it quantifies the amount of traffic that may divert to local roads when encountering congestion on I-70. This measure helps identify impacts to residents, pedestrians, and bicyclists along these local roadways resulting from changes in traffic patterns.

As I-70 becomes congested, motorists may decide to use parallel local streets to complete east-west trips within the sub-area. **Exhibit 8-11** displays the local streets that were used to determine how much traffic is using the local street network for each alternative. **Exhibit 8-12** summarizes the east-west volumes crossing the screenlines on the local street network for the No-Action Alternative compared to Phase 1 and the Preferred Alternative. These screenline volumes do not include I-70 or 46th Avenue/Stapleton Drive as those volumes are discussed separately. Phase 1 will reduce traffic on the local street network as compared to the No-Action Alternative between Washington Street and Quebec Street because of the additional capacity provided on I-70. The Preferred Alternative provides additional capacity on I-70 as compared to the Phase 1 Alternative which further reduces traffic using the local street network. East of Quebec Street, Phase 1 will result in lower traffic volumes on the local street network than the No-Action Alternative; however, the Preferred Alternative reduces the local street volumes by as much as 15 percent due to additional capacity on I-70 east of Quebec Street.

Screenline

A screenline is an imaginary line drawn on a map that represents a location where vehicles crossing the line in either direction of travel are counted over a defined period of time.

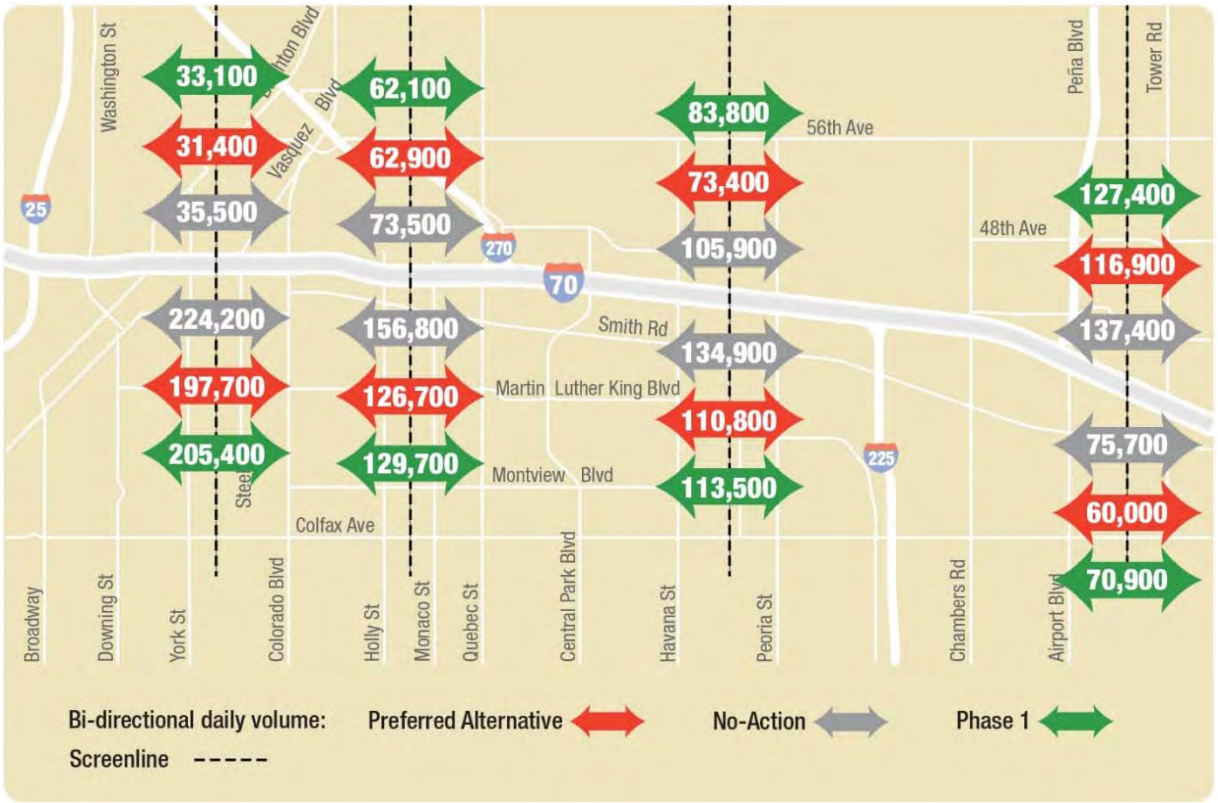
Exhibit 8-10 46th Avenue and Stapleton Drive North/South Volumes



Source: Build (2035) Alternatives DynusT models

Exhibit 8-11 East-West Parallel Route Screenlines

Exhibit 8-12 Traffic Volumes on the Local Street Network

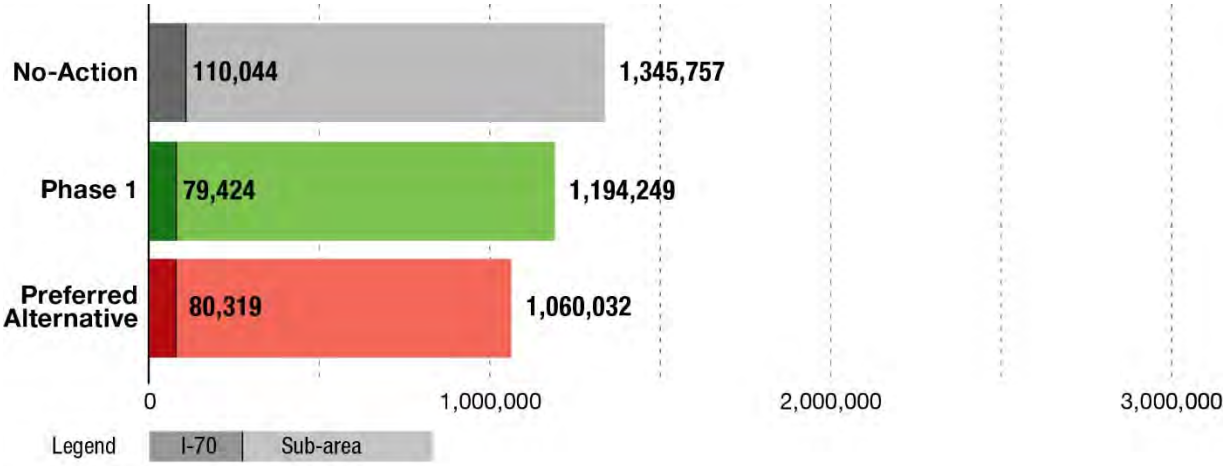


Source: Build (2035) Alternatives DynusT models

8.5.4 Future VHT

VHT represents the total time spent by all vehicles completing trips in a roadway network. As congestion increases, VHT will increase since it will take drivers longer to travel to their destinations. **Exhibit 8-13** compares the daily VHT for Phase 1 and the Preferred Alternative in the sub-area and on I-70 to the No-Action Alternative. The VHT for Phase 1 and the Preferred Alternative includes the drivers using the general-purpose and tolled express lanes on I-70.

Exhibit 8-13 VHT



Source: Build (2035) Alternatives DynusT models

Phase 1 and the Preferred Alternative result in lower overall VHT for both the sub-area and I-70. Within the sub-area, the Phase 1 Alternative reduces VHT by 11 percent while the Preferred Alternative reduces VHT by 21 percent compared to the No-Action Alternative. Both Phase 1 and the Preferred Alternative reduce the VHT on I-70 by approximately 27 percent compared to the No-Action Alternative. The VHT on I-70 for Phase 1 is slightly higher than the Preferred Alternative since Phase 1 does not implement all of the capacity improvements of the Preferred Alternative.

Overall, the capacity added by Phase 1 and the Preferred Alternative reduce congestion on I-70 and in the study area. The tolled express lane also provides users shorter, more reliable travel times. This reduction in congestion results in less time spent traveling within the sub-area and on I-70.

8.5.5 Future Vehicle Miles of Travel (VMT)

VMT is a common measure of highway use that is calculated by multiplying the number of vehicles using an entire system or an individual roadway by the distance they travel. VMT is useful in estimating crash rates and pollutant emissions. The transportation system as a whole will benefit from the ability of I-70 to account for a larger share of the sub-area VMT.

Exhibit 8-14 compares the daily VMT for Phase 1 and the Preferred Alternative in the sub-area and on I-70 to that of the No-Action Alternative. The VMT for the Preferred Alternative includes the vehicles using the general-purpose and tolled express lanes on I-70. Phase 1 increases VMT by nearly 20 percent on I-70 while VMT for the entire sub-area increased by less than 2 percent. The Preferred Alternative increases VMT on I-70 another 8 percent over Phase 1 with VMT for the entire sub-area less than 1 percent higher than the No-Action Alternative.

Exhibit 8-14 VMT

Source: Build (2035) Alternatives DynusT models

Both Phase 1 and the Preferred Alternative increase VMT slightly because VHT is reduced and more traffic is choosing to travel I-70 rather than the local streets compared to the No-Action Alternative. Looking at both VMT and VHT together indicates that more trips occur in less time with Phase 1 and the Preferred Alternative.

8.5.6 Future I-70 average speeds

Average speeds, which represent the level of congestion on I-70, affect two performance measures of the highway system: mobility and safety. Higher speeds, or lower levels of congestion, result in shorter travel times, or better mobility. Speed also can reduce safety on a facility, especially if there is a large speed differential or stop-and-go conditions typically associated with congestion.

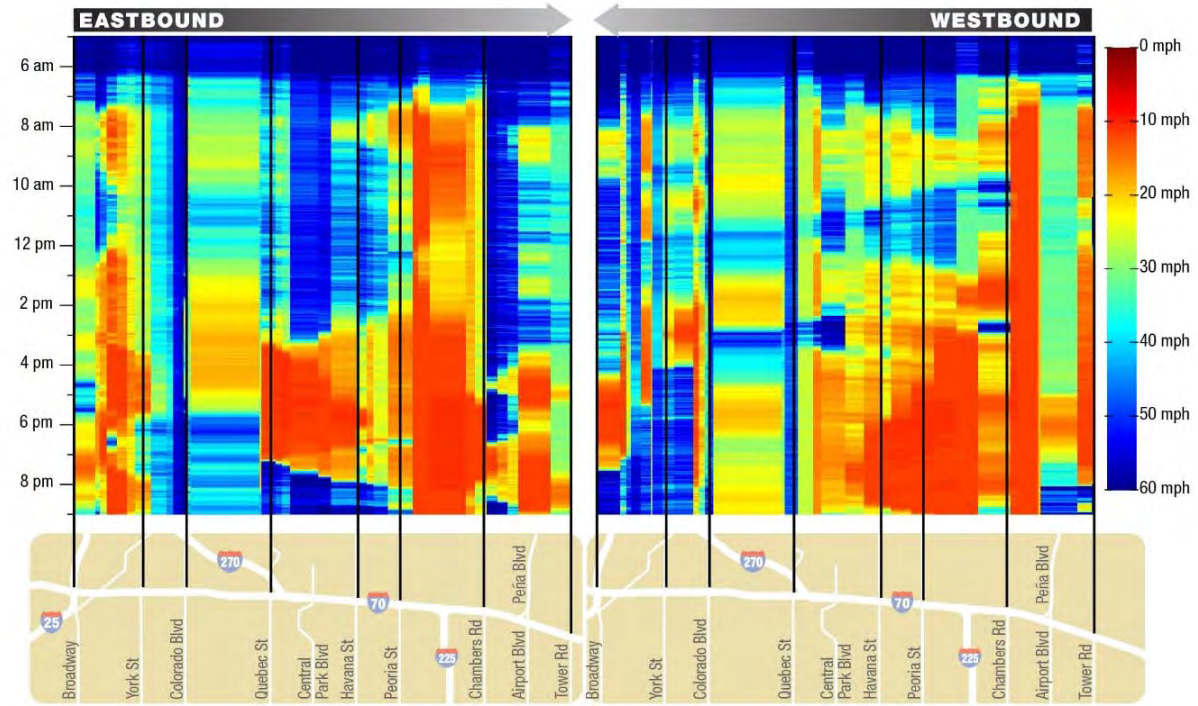
Exhibit 8-15 displays the No-Action Alternative average speeds for eastbound and westbound I-70. Both directions of I-70 will experience longer periods of congestion and reduced speeds throughout the day. This will happen at locations where there are high merge/diverge movements, such as freeway-to-freeway interchanges or where several ramps occur in a short distance. Speeds as low as 10 mph will be common in both directions during the peak periods and speeds below 45 mph will be typical for most of the day for both directions. The increase in traffic volumes on I-70 will result in congestion for long periods of the day. This identifies a need for capacity improvements. The increase in I-70 congestion will result in drivers using parallel local streets within the study area.

Heat diagrams

The purpose of heat diagrams is to identify overall trends in vehicle speeds or congestion levels on I-70. The areas that have warmer colors (yellow/orange/red) identify locations of reduced speeds or higher congestion.

It is more important first to focus on where the congestion occurs and the pattern of the congestion (recurring or isolated), and then to look at the length or duration of the congestion.

Exhibit 8-15 No-Action Alternative Average Speeds



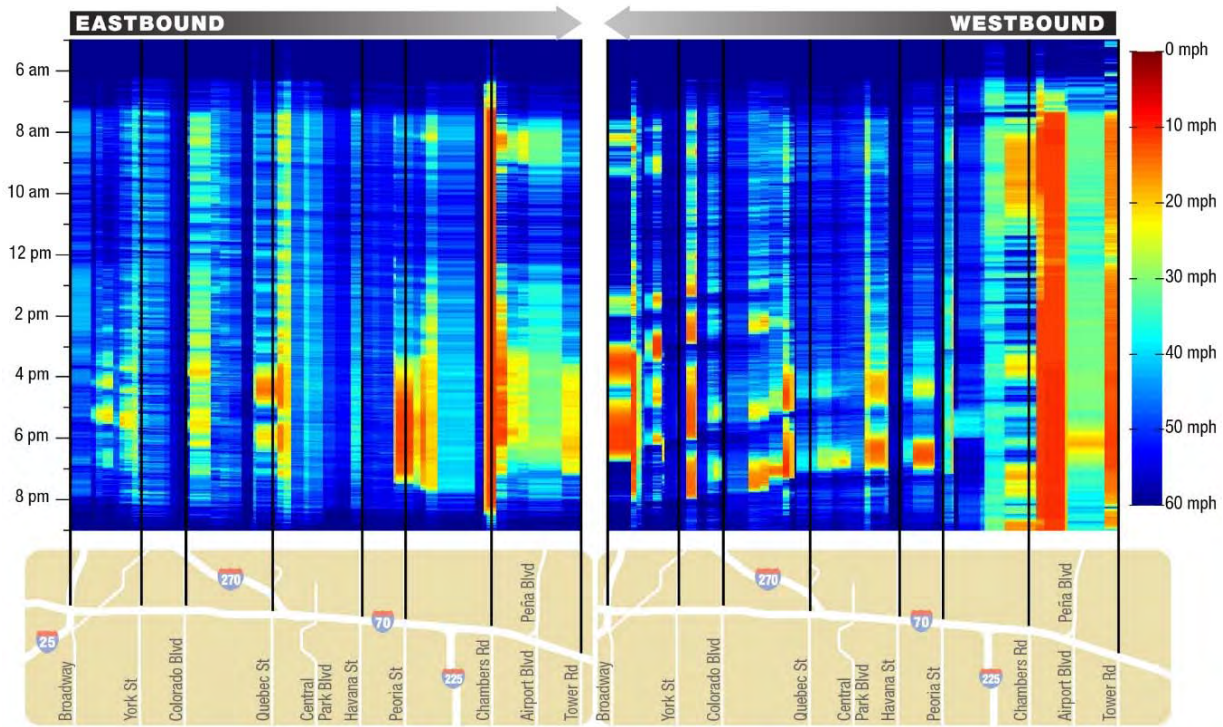
Source: No-Action (2035) DynusT model

Exhibit 8-16 and **Exhibit 8-17** display the average speeds on I-70 for Phase 1 and the Preferred Alternative. The figures display the average speeds for vehicles using the general-purpose lanes only. The tolled express lane will be priced in a manner that will ensure a reliable trip timed is maintained with average speeds above 45 mph all day. In general, both Phase 1 and the Preferred Alternative shows less congestion throughout the day compared to the No-Action Alternative.

The following describes what will occur for Phase 1 and the Preferred Alternative:

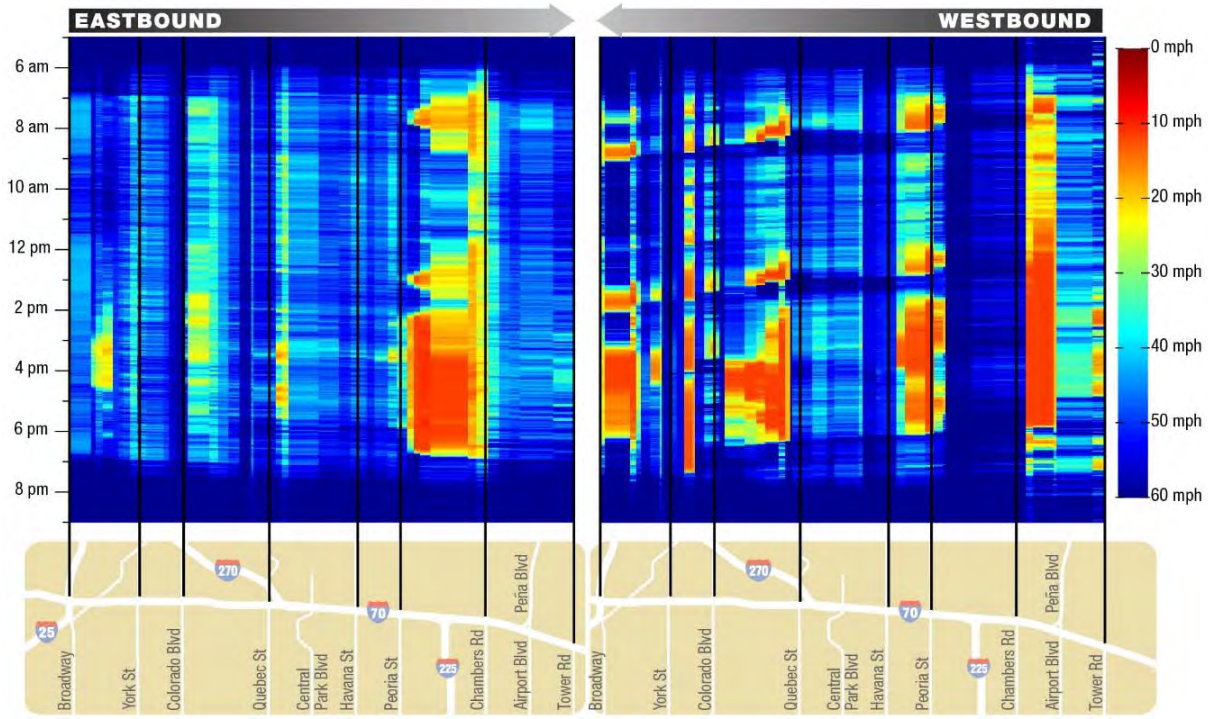
- Overall, the westbound heat diagrams show similar characteristics to each other for the entire day. However, Phase 1 has more congestion due to minimal improvements on the east end of the corridor.
- For eastbound trips, the Preferred Alternative continues to encounter congestion in the area between I-225 and Chambers Road. This congestion is due to the high number of merge/diverge movements between the tolled express lanes and the general purpose lanes in this area. Phase 1 terminates the tolled express lane at Chambers Road which allows traffic traveling to Pena Boulevard, Airport Boulevard, and Tower Road to bypass the congestion at the I-225 diverge. The tolled express lanes for the Preferred Alternative terminate at Tower Road with an egress point at Peoria Street. Therefore, all traffic traveling to Airport Boulevard and Tower Road must merge out of the tolled express lanes prior to the I-225 diverge point, which creates additional congestion in the area. Overall, the eastbound heat diagrams show similar traits to each other, exhibiting a cyclic pattern that is consistent with the prices in the managed lanes fluctuating up and down as demand for these lanes changes throughout the day.

Exhibit 8-16 I-70 Average Speeds for Phase 1



Source: Build (2035) Alternative DynusT models

Exhibit 8-17 I-70 Average Speeds for Preferred Alternative

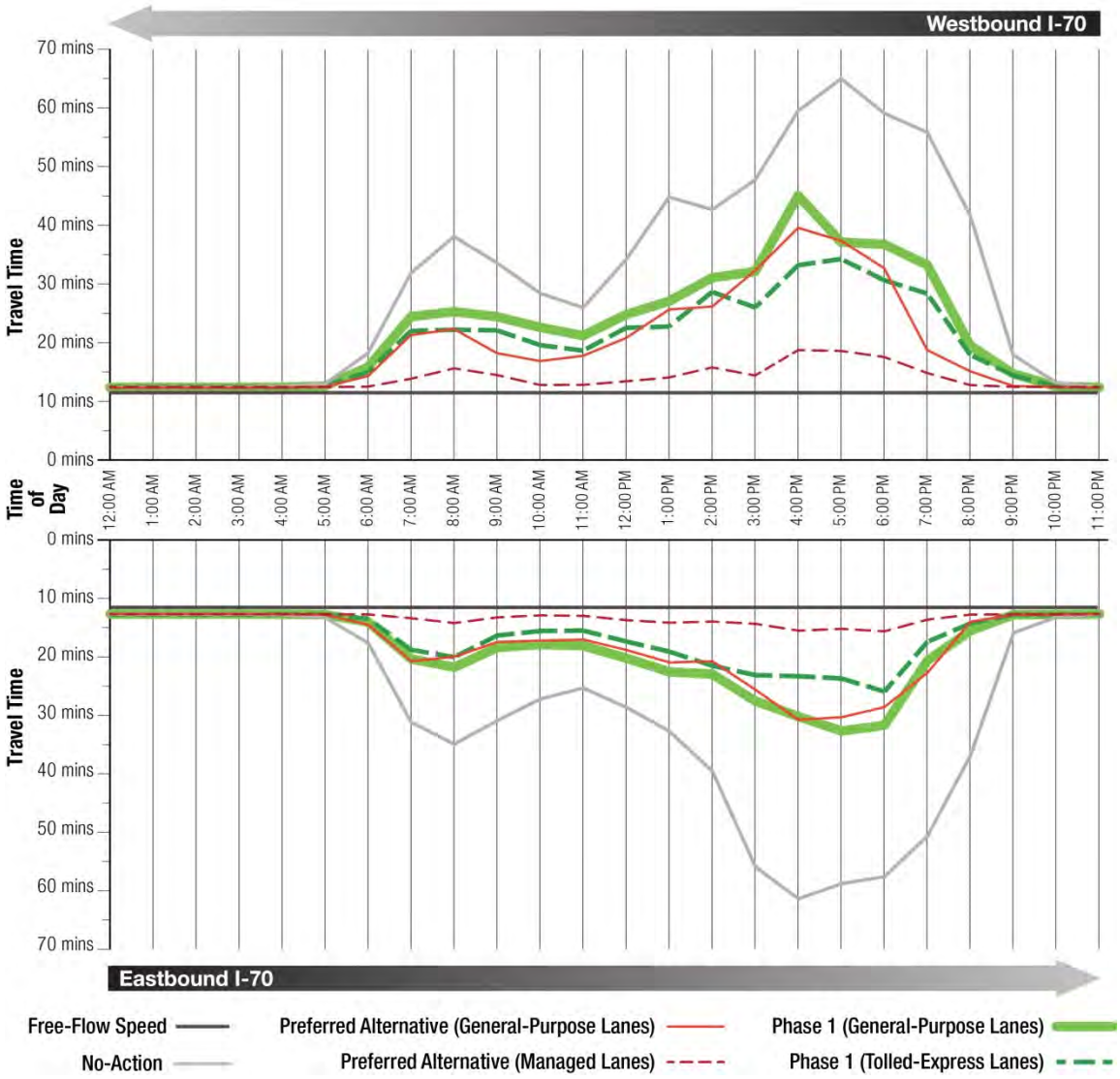


Source: Build (2035) Alternative DynusT models

8.5.7 Future I-70 travel times

Travel time is the amount of time it will take a driver to travel from one point to another. This measure will indicate the amount of delay drivers will experience when traveling on I-70 between I-25 and Tower Road. **Exhibit 8-18** shows the travel times of Phase 1 and the Preferred Alternative compared to the No-Action Alternative between I-25 and Tower Road. For Phase 1 or the Preferred Alternative, a driver can choose to make a trip through the study area by using either general-purpose lanes, tolled express lanes, or a combination of the two.

Exhibit 8-18 I-70 Travel Times



Source: Build (2035) Alternatives DynusT models

The aforementioned exhibit contains two lines for each of the alternatives that have tolled express lanes: (1) a dashed line that represents the travel time for vehicles that use a combination of general-purpose and tolled express lanes to go from I-25 to Tower Road or vice-versa, and (2) a solid line that represents a vehicle that makes the same trip using only general-purpose lanes. This represents the best- and worst-case scenarios, but many travelers will likely experience travel times between these two extremes.

Phase 1 travel times for westbound I-70 decrease to about 25 minutes during the morning peak period and 45 minutes during the evening peak period, which is a 30 percent reduction as compared to the No-Action Alternative. Eastbound travel times in the morning peak period decrease to 20 minutes and to about 33 minutes in the evening peak period, which is half the No-Action Alternative travel times. The travel times show that the peak periods occur over fewer hours of the day with lower levels of congestion and shorter delays in the future compared to the No-Action Alternative. The Preferred Alternative travel times for westbound I-70 decrease to about 22 minutes during the morning peak period and 28 minutes in the evening peak period. Eastbound I-70 travel times decrease to about 20 minutes during the morning peak and 30 minutes during the evening peak period. The shorter travel times with the Preferred Alternative are due to additional improvements to I-70 such as a second managed lane and direct connections.

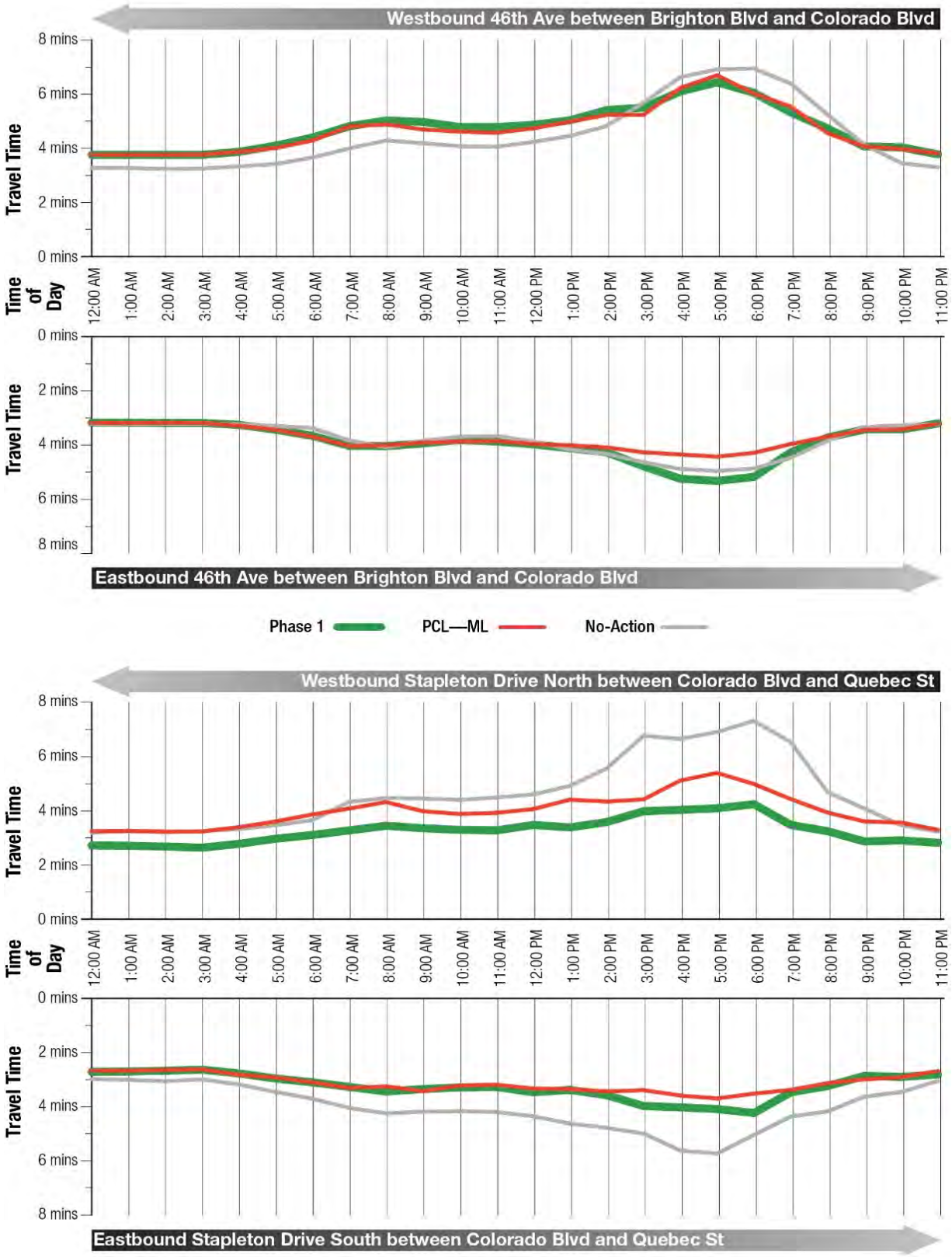
Phase 1 and the Preferred Alternative both reduce travel times as compared to the No Action Alternative. However, the Preferred Alternative further reduces the westbound evening travel times by 17 minutes and the travel times in the tolled express lane for the Preferred Alternative are half those of Phase 1.

The tolled express lanes are about 12 miles long in each direction. A travel time of 16 minutes or less from end to end equates to operating speeds of 45 mph or greater. Phase 1 maintains an average operating speed of 45 mph or greater (in both directions) for 10 hours (42 percent) of the day. The Preferred Alternative maintains an average operating speed of 45 mph or greater for 20 hours (83 percent) of the day.

8.5.8 Future 46th Avenue and Stapleton Drive North/South travel times

Exhibit 8-19 presents the results of the No-Action Alternative travel times for 46th Avenue and Stapleton Drive North/South compared to Phase 1 and the Preferred Alternative. In general, improvements to I-70 in both Phase 1 and the Preferred Alternative reduce the number of vehicles using these roadways, which results in travel times that are very similar to or lower than those of the No-Action Alternative.

Exhibit 8-19 46th Avenue and Stapleton Drive North/South Travel Times



Source: Build (2035) Alternatives DynusT models.

8.5.9 Summary of transportation impacts and mitigation measures

Evaluation of the impacts on mobility and access needs of the study area for Phase 1 has considered the effectiveness of the improvements on traffic operations and safety on I-70 and impact on access and circulation needs on the local streets in the vicinity of I-70. Phase 1 does not provide the full benefits that the Preferred Alternative provides; however, Phase 1 improves most aspects of I-70 as compared to the No-Action Alternative.

- Both Phase 1 and the Preferred Alternative will reduce the amount of time drivers spend in traffic. Sub-area VHT for Phase 1 is 11 percent less than the No-Action Alternative. The Preferred Alternative reduces sub-area VHT by another 21 percent as compared to Phase 1.
- The traffic volumes on 46th Avenue and the local street network decrease due to the capacity provided by the Phase 1 and Preferred Alternative when compared to the No-Action Alternative. This results in less congestion for I-70 and the local street network. Local street volumes for both Phase 1 and the Preferred Alternative have similar reductions (as much as 17 percent) between Brighton Boulevard and Colorado Boulevard. On the east end of the corridor, Phase 1 will reduce local street traffic volumes by approximately 7 percent. The Preferred Alternative will further reduce these volumes by as much as 15 percent compared to Phase 1 in some areas on the east end of the corridor.
- Travel times on I-70 improve with improvements provided by Phase 1 and the Preferred Alternative as compared to the No-Action Alternative. In addition, the tolled express lane provides reliable trip times.

8.6 How will the project be funded?

Revenue sources for the I-70 East project include allocations from various sources, but there remains a gap between the estimated cost of the project and the revenue available to build it. Because of these funding limitations, the project will be constructed in phases over time. Phase 1 is the only defined phase of the project with funding at this time. Funding for Phase 2 has not been identified, and is not included in future planning documents.

Phase 1 of the project is estimated to cost approximately $1.1 billion. The following funding sources are currently committed to the project:

- $850 million—Colorado Bridge Enterprise Safety Surcharge
- $50 million—DRCOG: Surface Treatment Program-Metro and Surface Treatment Program-CMAQ
- $180 million—Senate Bill 09-228 Transfers
- $37 million—Denver

Colorado Bridge Enterprise Safety Surcharge

Bridge Enterprise was formed by CDOT in 2009 as part of the FASTER (Funding Advancement for Surface Transportation and Economic Recovery) legislation to finance, repair, reconstruct, and replace structurally deficient bridges. It is funded from a bridge safety surcharge on vehicle registration based upon vehicle weight.

DRCOG: Surface Treatment Program-Metro and Surface Treatment Program-CMAQ

DRCOG establishes guidelines, sets policy, and allocates funding in the area of transportation and personal mobility in the Denver region. Federal transportation planning dollars comprise the majority of DRCOG's funding sources. In addition, other local funds (including funds from Denver) are expected to be contributed to the project.

DRCOG administers and selects projects for funding from the federal programs Surface Treatment Program-Metro and Surface Treatment Program-CMAQ. Metro funds are mostly used on roadway improvements. CMAQ funds are used mostly for projects and activities related to improving air quality and reducing congestion.

Senate Bill 09-228 Transfers

SB 09-228 is a state law enacted in 2009 that sets the conditions that must be met for up to 2 percent of gross general fund revenues to transfer to transportation.

Denver

A 2015 Intergovernmental Agreement between Denver and CDOT provides for a $37 million contribution to the Project from Denver. These funds are allocated as an annual payment that will begin after construction completion.

CHAPTER 9: PREFERRED ALTERNATIVE MITIGATION COMMITMENTS

This chapter describes the mitigation commitments for the Preferred Alternative, the Partial Cover Lowered Alternative with Managed Lanes. This mitigation-tracking spreadsheet is used by CDOT to follow the project through the design, construction, and maintenance phases. The table will be updated as the project progresses.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS.

This Chapter is a new inclusion for the Final EIS and was not included in the Supplemental Draft EIS.

Per the *CDOT NEPA Manual*, prior to mitigation, CDOT always makes best efforts to:

- Avoid the impact altogether by not taking a certain action or parts of an action
- Minimize impacts by limiting the degree or magnitude of the action and its implementation

However, if avoidance or minimization is not feasible, then mitigation measures may be implemented, including:

- 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
- Compensating for the impact by replacing or providing substitute resources or environments (CEQ, 40 CFR § 1508.20)

FHWA regulations require that mitigation measures presented as commitments in the EIS be incorporated into a project (FHWA and FTA, 23 CFR § 771.109[b] and 23 CFR § 771.125[a][1]). Monitoring conducted during project construction and operation is the means to ensure mitigation measures are implemented effectively. If monitoring identifies any deficiencies in mitigating the impact, adjustments to the level, timing, and/or procedure of mitigation must be made accordingly.

Mitigation commitments are specific and include information regarding responsibility, monitoring, performance standards, and schedules for implementation. The Record of Decision makes commitments about implementing and monitoring the proposed mitigation measures. (CDOT, 2013b, Chapter 4)

Exhibit 9-1, on the following pages, includes impacts and mitigation measures for the Preferred Alternative, the Partial Cover Lowered Alternative with Managed Lanes. This mitigation-tracking spreadsheet is used by CDOT to follow the project through the design, construction, and maintenance phases. The table will be updated as the project progresses.

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
1	Transportation	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD for phasing of improvements to minimize disruptions to transit operations	CDOT Engineering/ Developer	Pre-construction/ during construction	Chapter 4 4-56
2	Transportation	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained	CDOT Engineering/ Developer	Pre-construction/ during construction	Chapter 4 4-56
3	Transportation	Temporary impacts to rail facilities will result from the construction of railroad bridge structures and/or the relocation of track operations	Coordinate with UPRR, BNSF, and DRIR for phasing of improvements to minimize disruptions to railroad operations	CDOT Engineering/ Developer	Pre-construction/ during construction	Chapter 4 4-56
4	Transportation	Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	Coordinate with Denver to determine appropriate truck routes on city streets	CDOT Engineering/ Developer	Pre-construction/ during construction	Chapter 4 4-56
5	Social and Economic Conditions	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended	CDOT Right of Way	During property acquisition	Section 5.2 5.2-51
6	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Provide safe and efficient connections through neighborhoods during construction for all modes of transportation, including bicycles and pedestrians	CDOT Engineering/ Developer	During construction	Section 5.2 5.2-51

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
7	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with emergency service providers during construction to minimize effects on response times	CDOT Engineering/ Developer	During construction	Section 5.2 5.2-51
8	Social and Economic Conditions	Temporary effect to the regional economy from construction-related traffic congestion	Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists	CDOT Engineering/ Developer	During construction	Section 5.2 5.2-51
9	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Use standard measures—such as phased construction, advance notice of road closures and detours, and fixed and variable signage—to reduce effects on local residents, businesses, and services and on I-70 motorists	CDOT Engineering/ Developer	During construction	Section 5.2 5.2-51
10	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Provide a robust and context-sensitive communications and outreach plan throughout construction to ensure residents are kept informed	CDOT Public Involvement/ Developer	Pre-construction/ during construction	Section 5.2 5.2-51
11	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Coordinate with RTD more than 30 days in advance during construction to minimize disruptions to service areas and schedules and notify transit users in advance of any closures, delays, or modifications in bus or rail routes; and on modifications or relocation of transit stops or signage along the affected routes since accessibility is required to be maintained	CDOT Engineering/ Developer	Pre-construction/ during construction	Section 5.2 5.2-51
12	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from detours	CDOT Engineering/ Developer	During construction	Section 5.2 5.2-51

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
13	Social and Economic Conditions	Temporary road closures and traffic detours may have impacts on access to certain public services	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction	CDOT Public Involvement and Environmental/ Developer	Final design/ during construction	Section 5.2 5.2-51
14	Social and Economic Conditions	Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School	Removing the viaduct, lowering the highway, and covering portions of the highway to include space for community and neighborhood activities	CDOT Engineering/ Developer	Pre-construction/ during construction	Section 5.2 5.2-52
15	Social and Economic Conditions	Acquisition of right of way from the buffer area between 46th Avenue and the field to the south of Swansea Elementary School	Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover	CDOT Engineering	Final design	Section 5.2 5.2-52
16	Environmental Justice	18 business relocations (includes 1 non-profit relocation)	Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods	CDOT Right of Way	During property acquisition	Section 5.3 5.3-41
17	Environmental Justice	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Provide funding to CRHDC to assist residential and business displacees with financial counseling and procurement of financing for replacement property and securing business and residential loans; CDOT has already provided funding to CRHDC as early mitigation	CDOT Right of Way and Engineering	During property acquisition/ pre-construction (complete)	Section 5.3 5.3-41

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
18	Environmental Justice	Potential for disturbing hazardous material sites during construction	Collect representative soil samples of three or four recently cleaned-up residential properties pre-, during, and post-construction to test for lead and arsenic to ensure that the properties aren't re-contaminated due to construction activities	CDOT Environmental/ Developer	Pre-construction/ during construction/ post-construction	Section 5.3 5.3-41
19	Environmental Justice	Increasing noise and dust during construction	Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration and assistance for the potential additional utility costs during construction	CDOT Engineering/ Developer	Pre-construction/ during construction	Section 5.3 5.3-41
20	Environmental Justice	Increasing noise and dust during construction	Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—two free portable or window-mounted air conditioning units with air filtration	CDOT Engineering/ Developer	Pre-construction	Section 5.3 5.3-42
21	Environmental Justice	Increasing noise and dust during construction	Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—assistance for the potential additional utility costs during construction to run the two free portable or window-mounted air conditioning units with air filtration	CDOT Engineering/ Developer	During construction	Section 5.3 5.3-41
22	Environmental Justice	Increasing noise and dust during construction	Provide residents close to the highway construction—between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard—interior storm windows	CDOT Engineering/ Developer	Pre-construction	Section 5.3 5.3-41
23	Environmental Justice	18 business relocations (includes 1 non-profit relocation)	Facilitate opportunities to promote hiring individuals from the communities, such as job fairs with contractors	CDOT Public Involvement/ Developer	Pre-construction/ during construction	Section 5.3 5.3-44

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
24	Environmental Justice	18 business relocations (includes 1 non-profit relocation)	Execute geographic-based hiring preferences (CDOT has submitted an application and received approval under Special Experiment Project 14 (SEP-14) for the US DOT pilot program)	CDOT Civil Rights and Engineering/ Developer	Pre-construction/ during construction	Section 5.3 5.3-41
25	Environmental Justice	18 business relocations (includes 1 non-profit relocation)	Research opportunities to invest funds in a local workforce development program aimed at job readiness training prior to construction	CDOT Civil Rights and Engineering/ Developer	Pre-construction/ during construction	Section 5.3 5.3-41
26	Environmental Justice	Increasing noise and dust during construction at the school	Provide a new HVAC system, doors, and windows for Swansea Elementary School	CDOT Engineering	Pre-construction	Section 5.3 5.3-41
27	Environmental Justice	Moving the highway closer to Swansea Elementary School	Prior to the start of roadway construction, build two new classrooms at Swansea Elementary School to enhance the overall quality of the school	CDOT Engineering	Pre-construction	Section 5.3 5.3-41
28	Environmental Justice	Limiting north-south pedestrian and bicycle connectivity compared to the existing conditions	Remove the viaduct, lower the highway, and covering portions of the highway to include space for community and neighborhood activities	CDOT Engineering/ Developer	Final design/ during construction	Section 5.3 5.3-44
29	Environmental Justice	Displacing Stop N Shop and Pilot Travel Center truck stop	Provide contributions to existing programs that facilitate access to fresh food	CDOT Environmental and Engineering	Pre-construction/ during construction	Section 5.3 5.3-41
30	Environmental Justice	Moving the highway closer to Swansea Elementary School	Redesign and reconstruct the school playground; this will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue and 46th Avenue between Clayton Street and Columbine Street will be removed to allow for a seamless connection between Swansea Elementary School and the landscape on the highway cover	CDOT Engineering/ Developer	Final design/ during construction	Section 5.3 5.3-44
31	Environmental Justice	Relocating 56 residences	Provide $2 million in funding to develop affordable housing units in the Elyria and Swansea Neighborhood through available programs	CDOT Environmental and Engineering	Pre-construction/ during construction	Section 5.3 5.3-44

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
32	Environmental Justice	Creating a financial burden to the low-income community, who may not be able to afford to use the managed lanes	Research ways to provide assistance for low-income populations within the area (such as free transponders) to use the managed lanes	CDOT HPTE	Post-construction	Section 5.3 5.3-44
33	Land use	68.3 acres converted to transportation use	Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise	CDOT Engineering/ Developer	Final design	Section 5.4 5.4-18
34	Relocations and displacements	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Compensate any person(s) whose property needs to be acquired according to the U.S. Constitution and the Uniform Act of 1970, as amended	CDOT Right of Way	During property acquisition	Section 5.5 5.5-20
35	Relocations and displacements	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Provide all impacted owners 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; assign a right of way specialist to each property owner to assist them with this process	CDOT Right of Way	During property acquisition	Section 5.5 5.5-20
36	Relocations and displacements	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Provide bilingual services for any of the relocated and displaced businesses or households that need them	CDOT Right of Way	During property acquisition	Section 5.5 5.5-20
37	Relocations and displacements	56 residential relocations 18 business relocations (includes 1 non-profit relocation)	Meet directly with those owners and occupants who would be relocated as a result of the proposed project; conduct multiple meetings with these individuals to provide an introduction and overview of the process associated with the Uniform Act; provide information on resources available, including assistance from local, state, and federal agencies, and private agencies in the community; identify individual eligibility for benefits	CDOT Right of Way	During property acquisition	Section 5.5 5.5-20
38	Historic preservation	Adverse Effect—13 historic resources	Establish a Programmatic Agreement with SHPO and consulting parties	CDOT Environmental	Pre-construction (complete)	Section 5.6 5.6-17

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
39	Historic preservation	Adverse Effect—13 historic resources	Provide Level II archival documentation for adversely affected resources	CDOT Environmental	Pre-construction/ during construction	Section 5.6 5.6-17
40	Historic preservation	Adverse Effect—13 historic properties	Provide funding and participate in the creation of a documentary covering the history of I-70 East and its relationship to the Elyria and Swansea and Globeville Neighborhoods (mitigation has been completed, and is available to view at www.i-70east.com)	CDOT Environmental	Pre-construction (complete)	Section 5.6 5.6-17
41	Historic preservation	Adverse Effect—13 historic properties Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties as described in the Programmatic Agreement	CDOT Engineering and Environmental	Pre-construction/ during construction	Section 5.6 5.6-17
42	Historic preservation	Adverse Effect—13 historic properties Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	Cease work during construction if unidentified historic resources are encountered and notify CDOT and SHPO immediately	CDOT Engineering and Environmental/ Developer	Pre-construction/ during construction	Section 5.6 5.6-17
43	Historic preservation	Adverse Effect—13 historic properties Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	Contact consulting Indian tribes if Indian cultural materials are identified at any time during construction	CDOT Engineering and Environmental/ Developer	Pre-construction/ during construction	Section 5.6 5.6-17
44	Paleontological	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Perform an intensive preconstruction paleontological survey	CDOT Environmental	Pre-construction	Section 5.7 5.7-7

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
45	Paleontological resources	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Perform spot-checking of excavations by a qualified paleontologist in areas of high paleontological potential during all phases of construction until bedrock is reached, then perform continuous paleontological monitoring	CDOT Environmental/ Developer	During construction	Section 5.7 5.7-7
46	Paleontological resources	Increased potential for encountering paleontological resources in excavated bedrock of the Denver and Arapahoe Formations	Cease work immediately upon discovery of any paleontological resources, fence off the area, and allow the paleontologist to conduct sampling or excavation of specimens by hand or with mechanized equipment; do not resume work in the area until receiving formal notification from the paleontologist allowing work to resume	CDOT Environmental/ Developer	During construction	Section 5.7 5.7-7
47	Visual resources and aesthetic qualities	Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact by blocking the view across the highway	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction	CDOT Environmental and Engineering/ Developer	Final design/ pre-construction/ during construction	Section 5.8 5.8-25
48	Visual resources and aesthetic qualities	Views for drivers traveling eastbound and westbound will be entirely different from the existing conditions	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction	CDOT Environmental and Engineering/ Developer	Final design/ pre-construction/ during construction	Section 5.8 5.8-25

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
49	Visual resources and aesthetic qualities	Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard Managed lanes infrastructure will create new visual impacts along the project corridor	Use the *Aesthetic and Design Guidelines* (see Attachment O) developed during the EIS process with Denver and the community during final design to help CDOT identify appropriate aesthetic design elements to ensure compatibility within the community and each viewshed; CDOT is committed to following the guidelines and continued community involvement during final design and construction	CDOT Environmental and Engineering/ Developer	Final design/ pre-construction/ during construction	Section 5.8 5.8-25
50	Parks and recreational resources	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	Provide adequate notice and signing to Greenway users prior to construction	CDOT Environmental/ Developer	During construction	Section 5.9 5.9-22
51	Parks and recreational resources	South Platte River Greenway (Section 6(f) resource) temporary impacts may occur during construction	Return Greenway to pre-construction or comparable state following construction	CDOT Environmental/ Developer	Post construction	Section 5.9 5.9-22
52	Parks and recreational resources	0.95 acre of impact to Swansea Elementary School	Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue	CDOT Engineering/ Developer	During construction	Section 5.9 5.9-22
53	Parks and recreational resources	Minor realignment of Sand Creek Greenway Trail, Sand Creek Greenway Trail closures may occur during construction	Provide trail detours and ADA-compliant detour signage during construction	CDOT Engineering/ Developer	During construction	Section 5.9 5.9-22
54	Parks and recreational resources	Minor realignment of Sand Creek Greenway Trail, Sand Creek Greenway Trail closures may occur during construction	Return trails to pre-construction or comparable state following construction	CDOT Engineering/ Developer	Post construction	Section 5.9 5.9-22
55	Parks and recreational resources	Part of Globeville Landing Park will be closed during construction	Return to pre-construction or comparable state following construction	CDOT Environmental/ Developer	Pre-construction	Section 5.9 5.9-22

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
56	Parks and recreational resources	Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park (Section 6(f) resource)	Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.	CDOT Environmental and Right of Way/ Developer	During construction	Section 5.9 5.9-22
57	Air quality	Construction fugitive dust could cause temporary impacts	Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
58	Air quality	Construction fugitive dust could cause temporary impacts	Cover, wet, compact, or use chemical stabilization binding agent to control dust and excavated materials at construction sites	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
59	Air quality	Construction fugitive dust could cause temporary impacts	Use wind barriers and wind screens to prevent spreading dust from the site	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
60	Air quality	Construction fugitive dust could cause temporary impacts	Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
61	Air quality	Construction fugitive dust could cause temporary impacts	Use vacuum-powered street sweepers to remove dirt tracked onto streets	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
62	Air quality	Construction fugitive dust could cause temporary impacts	Cover all dump trucks leaving sites to prevent dirt from spilling onto streets	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
63	Air quality	Construction fugitive dust could cause temporary impacts	Minimize disturbed areas, particularly in winter	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
64	Air quality	MSAT emissions could increase temporarily during construction	Prohibit unnecessary idling of construction equipment	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
65	Air quality	MSAT emissions could increase temporarily during construction	Locate construction diesel engines as far away as possible from residential areas	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
66	Air quality	MSAT emissions could increase temporarily during construction	Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47
67	Air quality	MSAT emissions could increase temporarily during construction	Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47
68	Air quality	MSAT emissions could increase temporarily during construction	Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, or compressed natural gas, fuel cells, and electric engines, if applicable.	CDOT Environmental/ Developer	During construction	Section 5.10 5.10-47
69	Air quality	MSAT emissions could increase temporarily during construction	Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47
70	Air quality	MSAT emissions could increase temporarily during construction	Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47
71	Air quality	MSAT emissions could increase temporarily during construction	Require construction vehicle engines to be properly tuned and maintained	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47
72	Air quality	MSAT emissions could increase temporarily during construction	Use construction vehicles and equipment with the minimum practical engine size for the intended job	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.10 5.10-47

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
73	Air quality	Construction fugitive dust could cause temporary impacts	Continue the "sweepbox" program on the highway to achieve the current level of fugitive dust reduction; and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations	CDOT Maintenance/ Developer	Post construction	Section 5.10 5.10-47
74	Air quality	MSAT emissions could increase temporarily during construction	Optimize signal timing at intersections and along arterial streets near the freeway to reduce vehicle delay and tailpipe emissions	CDOT Engineering/ Developer	Post construction	Section 5.10 5.10-47
75	Air quality	MSAT emissions could increase temporarily during construction	Implement congestion pricing and commuter incentive programs that reduce peak-period highway congestion and emissions	CDOT HPTE/ Developer	Post construction	Section 5.10 5.10-47
76	Air quality	MSAT emissions could increase temporarily during construction	Encourage TDM options, such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs	CDOT Engineering/ Developer	Post construction	Section 5.10 5.10-47
77	Energy	7,698 billion Btu consumed during construction	Limit idling of construction equipment	CDOT Environmental and Engineering/ Developer	During construction	Section 5.11 5.11-7
78	Energy	7,698 billion Btu consumed during construction	Encourage employee carpooling and vanpooling for construction workers	CDOT Engineering/ Developer	During construction	Section 5.11 5.11-7
79	Energy	7,698 billion Btu consumed during construction	Encourage use of closest material sources	CDOT Environmental and Engineering/ Developer	During construction	Section 5.11 5.11-7
80	Energy	7,698 billion Btu consumed during construction	Locate construction staging areas close to work sites, while situating them as far away as possible from residential uses	CDOT Environmental and Engineering/ Developer	Pre-construction/ during construction	Section 5.11 5.11-7
81	Energy	7,698 billion Btu consumed during construction	Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies)	CDOT Environmental and Engineering/ Developer	Pre-construction/ during construction	Section 5.11 5.11-7

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
82	Energy	7,698 billion Btu consumed during construction	Encourage use of alternative fuels and asphalt binders	CDOT Environmental and Engineering/ Developer	During construction	Section 5.11 5.11-7
83	Energy	7,698 billion Btu consumed during construction	Implement traffic management schemes that minimize delays and idling	CDOT Engineering/ Developer	During construction	Section 5.11 5.11-7
84	Energy	70.0 billion Btu consumed per day	Implement energy conservation measures where appropriate, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation in accordance with CDOT's *Lighting Design Guide* (CDOT, 2006)	CDOT Engineering/ Developer	Final design/ during construction	Section 5.11 5.11-7
85	Energy	70.0 billion Btu consumed per day	Encourage energy-efficient options for the cover facilities	CDOT Engineering/ Developer	Final design/ during construction	Section 5.11 5.11-7
86	Noise	Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes	Implement BMPs to minimize noise during construction, as per FHWA's *Highway Construction Noise Handbook* (2006)	CDOT Environmental/ Developer	During construction	Section 5.12 5.12-62
87	Noise	Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes	Conduct a benefited receptor survey prior to construction to determine if the recommended noise wall is desired; if the survey results show that the majority of benefitted receptors who respond to the survey desire the noise wall, the noise wall will be optimized and built	CDOT Environmental/ Developer	Final design/ pre-construction	Section 5.12 5.12-62

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
88	Noise	Number of noise receptors exceed NAC threshold: • Globeville: 18 to 24 • Elyria: 55 (11 that increase by 10 dBA or more) • Swansea: 50 • Stapleton: 0 • Peoria Street: 0 • Montbello: 29 to 34 • Aurora: 3	Location and height of feasible and reasonable walls: Elyria: 12 to 20 feet	CDOT Environmental/ Developer	Final design/ during construction	Section 5.12 5.12-62
89	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat; 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
90	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat; 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	Monitor disturbed sites during construction to identify and treat any noxious weed invasion	CDOT Environmental/ Developer	During construction	Section 5.13 5.13-26
91	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat; 1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	Reclaim disturbed areas in phases throughout construction with native grasses and forbs	CDOT Environmental/ Developer	During construction	Section 5.13 5.13-26
92	Biological resources	1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio	CDOT Environmental/ Developer	During construction	Section 5.13 5.13-26

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Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
93	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction if construction in prairie dog colonies will occur between February 1 and August 31; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
94	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
95	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Survey areas to be cleared and grubbed, as well as areas within 50 feet of these areas, between April 1 and August 31 for active migratory bird nests within seven days of the work being performed	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
96	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Remove existing nests from structures after August 31 and prior to April 1	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
97	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Monitor structures at least once every three days for any nesting activity between April 1 and August 31	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
98	Biological resources	368.3 acres of permanent, direct impact to wildlife habitat	Prepare and implement an Integrated Noxious Weeds Management Plan	CDOT Environmental/ Developer	Pre-construction	Section 5.13 5.13-26
99	Biological resources	1.298 acres of permanent impacts and 0.253 acre of temporary impacts to riparian areas	Perform botanical surveys for Ute ladies'-tresses orchid and Colorado butterfly plant	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.13 5.13-26
100	Floodplains and drainage/ hydrology	Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70	Create detention ponds and implement storm drainage for onsite drainage system improvements	CDOT Engineering and Environmental/ Developer	Final design/ during construction	Section 5.14 5.14-11

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
101	Floodplains and drainage/ hydrology	The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	Build an offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River	CDOT Engineering and Environmental/ Developer	Final design/ during construction	Section 5.14 5.14-11
102	Floodplains and drainage/ hydrology	Impact to the Sand Creek floodplain with the proposed bridge construction and new bridge structures will cross this waterway	Design proposed bridge structures to cause no adverse impact to the Sand Creek floodplain	CDOT Engineering/ Developer	Final design	Section 5.14 5.14-11
103	Wetlands, open waters, and other waters of the U.S.	4.442 acres of permanent and 0.244 acre of temporary wetland impacts 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.15 5.15-13
104	Wetlands, open waters, and other waters of the U.S.	4.442 acres of permanent and 0.244 acre of temporary wetland impacts 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	Obtain and follow requirements of Section 404 permitting and Senate Bill 40 certification	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.15 5.15-13
105	Wetlands, open waters, and other waters of the U.S.	4.442 acres of permanent and 0.244 acre of temporary wetland impacts 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	Install temporary erosion control and sediment control BMPs before ground-disturbing activities; permanently stabilize completed areas within seven days	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.15 5.15-13
106	Wetlands, open waters, and other waters of the U.S.	4.442 acres of permanent and 0.244 acre of temporary wetland impacts 0.771 acre of permanent and 0.080 acre of temporary impacts to other waters of the U.S. and open waters	Restore wetlands temporarily affected during construction to pre-construction conditions	CDOT Environmental/ Developer	During construction	Section 5.15 5.15-13

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
107	Water quality	Stormwater runoff can create erosion and degradation of water quality during and after construction	Implement the following BMPs for erosion and sediment control, dust control, stormwater control, and expansive soils during and after construction: • Silt fences, erosion control blankets • Sediment traps, sediment basins • Soil stockpile management • Temporary diversion structures • Spill prevention and control measures • Regrading • Seeding and revegetating soils and slopes • Mulch protection for new plantings • Stormwater control channels	CDOT Environmental/ Developer	Pre-construction/ during construction/ post-construction	Section 5.16 5.16-17
108	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Prevent over-treating by commencing liquid de-icer application at the beginning of snowfall and no longer pre-treating roads	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17
109	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Apply sand/salt mixtures (30 percent/70 percent, respectively) at rates of 105 pounds to 115 pounds per lane mile, which is roughly one-third of the maximum allowable amount of 300 pounds per lane mile	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17
110	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use liquid de-icer products, such as magnesium chloride and Caliber (a mixture of magnesium chloride, cornstarch, alcohol, and tree sap); apply these products at rates of 40 pounds to 80 pounds per lane mile	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
111	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Completely remove sand/salt within the "core" sweeping area within four days of snow events, as per DRCOG and CDOT regulations; only 35 percent removal outside the "core" areas is required; for the past two years, it has been CDOT practice to remove all remaining sand/salt from the study area even though it is not in the "core" sweeping area—and CDOT will continue to do so	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17
112	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Perform fleet upgrades that include on-board computers to track the amount of mixture being applied, as well as rates of application of de-icing materials; this technology prevents over-treating; the majority of the CDOT Region 1 fleet is currently equipped with these computers	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17
113	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use Ice Slicer, another solid mixture; this product is a sand/salt mixture with anti-corrosive additives and is applied at a rate of 100 pounds to 150 pounds per lane mile; this product is preferred over regular sand/salt mixtures because it produces less fugitive dust	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18
114	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Stockpile solid mixtures at the I-70 and Havana Street CDOT maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18
115	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Perform quality assurance audits on de-icing mixtures several times per year to ensure elevated levels of harmful anti-caking compounds are not found in the mixtures	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
116	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Train snowplow drivers annually, stressing the importance of meeting or exceeding water quality and air quality permit requirements	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18
117	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use temperature gauges built into trucks and roadway surfaces to assist with making decisions related to de-icing application rates and mixes	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18
118	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Use vacuum sweepers, not side-cast sweepers, as part of ongoing fleet upgrades; trash within the right of way is picked up prior to each sweeping	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-17
119	Water quality	Winter maintenance activities use solutions and compounds that could lead to water quality issues from runoff	Rely on cameras/ITS systems to determine problem areas during each storm event	CDOT Maintenance/ Developer	During construction/ post-construction	Section 5.16 5.16-18
120	Water quality	Increase in runoff TSS loads of 11 percent to the South Platte River Increase in runoff TSS loads of 37 percent to Sand Creek	Provide permanent water quality control features (i.e., extended detention pond) as part of the project to treat stormwater runoff from the highway	CDOT Engineering and Environmental/ Developer	Final design/ during construction/ post-construction	Section 5.16 5.16-17
121	Water quality	Increase in runoff TSS loads of 11 percent to the South Platte River Increase in runoff TSS loads of 37 percent to Sand Creek	Consider environmentally friendly techniques to provide water quality treatment	CDOT Environmental/ Developer	Final design/ during construction/ post-construction	Section 5.16 5.16-17
122	Water quality	Increase in runoff TSS loads of 11 percent to the South Platte River Increase in runoff TSS loads of 37 percent to Sand Creek	Treat runoff entering the South Platte River and Sand Creek in conformance with CDOT's MS4 Permit and New Development and Redevelopment Program	CDOT Environmental/ Developer	Final design/ during construction/ post-construction	Section 5.16 5.16-17

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
123	Geology and soils	Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street	Prevent groundwater infiltration into the lowered section of the highway; install underdrain pipes below the pavement to drain any additional groundwater that still enters the lowered section	CDOT Engineering/ Developer	Final design/ during construction/ post-construction	Section 5.17 5.17-9
124	Geology and soils	Temporary impacts to groundwater during excavation	Dewater during the construction process	CDOT Engineering/ Developer	During construction	Section 5.17 5.17-9
125	Hazardous materials	28 hazardous materials sites affected; 703 acres of land disturbed	Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment (Phase I) or initial site assessment for those properties identified for acquisition; based on these assessments, additional subsurface investigation may be required depending on the recognized environmental conditions identified and potential risk to the project	CDOT Environmental/ Developer	Prior to property acquisition	Section 5.18 5.18-19
126	Hazardous materials	28 hazardous materials sites affected; 703 acres of land disturbed	Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners	CDOT Engineering and Environmental/ Developer	Final design/ during construction	Section 5.18 5.18-19
127	Hazardous materials	28 hazardous materials sites affected, 703 acres of land disturbed	Follow *CDOT Standard Specifications for Road and Bridge Construction*, Section 250, Environmental, Health and Safety Management	CDOT Engineering and Environmental/ Developer	During construction	Section 5.18 5.18-19
128	Hazardous materials	Extensive excavation through a known landfill that contains contaminants	Follow Tri-County Health Department *Health and Safety Practices during Construction on or Near Former Landfills*	CDOT Environmental/ Developer	During construction	Section 5.18 5.18-19

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
129	Hazardous materials	28 hazardous materials sites affected, 703 acres of land disturbed	Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these materials are encountered, remove them in accordance with applicable regulations and guidelines; if ACM is encountered, including buried utilities, follow CDOT Specification 250.07, Asbestos-Containing Material Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure; additionally, depending on the type of ACM, clean up this material in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations	CDOT Environmental/ Developer	During property acquisition/during construction	Section 5.18 5.18-19
130	Hazardous materials	28 hazardous materials sites affected, 703 acres of land disturbed	Update contaminated sites search databases to reflect most recent records	CDOT Environmental/ Developer	Pre-construction/ during construction/ post construction	Section 5.18 5.18-19
131	Hazardous materials	28 hazardous materials sites affected, 703 acres of land disturbed	Prepare and implement a project-specific Health and Safety Plan and Materials Management Plan 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	CDOT Environmental/ Developer	Pre-construction	Section 5.18 5.18-19
132	Hazardous materials	Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Materials Management Plan	CDOT Environmental/ Developer	During construction	Section 5.18 5.18-19

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
133	Hazardous materials	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil; during the construction phase, require the Developer to file and abide by a dust management plan to minimize the effects of dust on surrounding communities; additionally, conduct air monitoring to determine whether dust control efforts are successful in preventing violations of air quality standards	CDOT Environmental/ Developer	During construction	Section 5.18 5.18-20
134	Hazardous materials	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	Obtain a CDPHE CDPS Construction Dewatering Permit, Remediation Activities Discharging to Surface Water or Construction Activities Discharging to Ground Water, as required, utilizing readily available data; the selected Developer will follow the permit requirements	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.18 5.18-20
135	Hazardous materials	Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination	If this alternative requires permanent dewatering, obtain and follow the necessary CDPS Dewatering Permits; under the temporary construction and permanent feature dewatering permits, treat and discharge source water onsite in accordance with the permit or characterize and remove source water offsite to a permitted disposal facility	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.18 5.18-20
136	Hazardous materials	Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	Properly abandon and close monitoring wells or septic systems disturbed during construction activities in accordance with applicable regulations and guidelines; if existing monitoring wells are impacted during construction, the project will replace them, as necessary	CDOT Environmental/ Developer	Pre-construction/ during construction	Section 5.18 5.18-20
137	Utilities	Impacts to utilities from project activities	Minimize service disruptions by connecting to active utilities, and scheduling to coincide with periods of lower demand	CDOT Utilities/ Developer	During construction	Section 5.19 5.19-26

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
138	Utilities	Impacts to utilities from project activities	Encase or provide protective cover over any impacted underground utilities	CDOT Utilities/ Developer	During construction	Section 5.19 5.19-26
139	Utilities	Impacts to utilities from project activities	Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations	CDOT Utilities/ Developer	Pre-construction/ during construction	Section 5.19 5.19-26
140	Utilities	Impacts to utilities from project activities	Identify and improve any utility concerns that can be addressed as part of project implementation	CDOT Utilities/ Developer	Pre-construction/ during construction	Section 5.19 5.19-26
141	Utilities	Impacts to utilities from project activities	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	CDOT Utilities/ Developer	Final design/ during construction	Section 5.19 5.19-26
142	Utilities	Impacts to utilities from project activities	Move above-ground utilities underground to the greatest extent practical	CDOT Utilities/ Developer	Final design/ during construction	Section 5.19 5.19-26
143	Section 4(f) and Section 6(f) – Recreation Resources	South Platte River Greenway temporary impacts may occur during construction	Provide adequate notice and signing to Greenway users prior to construction	CDOT Environmental/ Developer	During construction	Section 5.9 5.9-22
144	Section 4(f) and Section 6(f) – Recreation Resources	South Platte River Greenway temporary impacts may occur during construction	Return Greenway to pre-construction or comparable state following construction	CDOT Environmental/ Developer	During construction	Section 5.9 5.9-22
145	Section 4(f) – Recreation Resources	Use of Swansea Elementary School Public Playground	Use remnants of adjacent parcels obtained for right-of-way expansion to reconfigure the school site plan and replace all the playground facilities; this includes closing Elizabeth Street between 46th Avenue and 47th Avenue	CDOT Engineering/ Developer	During construction	Section 5.9 5.9-22 Chapter 7 7-105

Exhibit 9-1 Preferred Alternative Mitigation Commitments

Mitigation #	Mitigation category	Impact from Final EIS	Mitigation commitment	Responsible branch	Timing/phase of construction mitigation	Final EIS page number
146	Section 4(f) and Section 6(f) – Recreation Resources	Part of Globeville Landing Park will be closed during construction	Return to pre-construction or comparable state following construction	CDOT Environmental/ Developer	Pre-construction	Section 5.9 5.9-22 Chapter 7 7-106
147	Section 4(f) and Section 6(f) – Recreation Resources	Utility easement/access permit required and 0.3 acre will be converted to a drainage outfall/spillway in Globeville Landing Park	Replace 0.3 acre of land converted to a non-recreation use by the construction of the spillway in Globeville Landing Park and the utility easement/access permit area with in-kind land of at least current fair market value and reasonable equivalent usefulness and location and investigate the acquisition of land identified by Denver near Milstein Park for this replacement Conditional approval from CPW and NPS is anticipated before the ROD is completed. FHWA has indicated that approval, or lack of objection, at this point is sufficient for NEPA clearance. Near the end of construction, but before closing the project, a formal Section 6(f) conversion proposal will be submitted to the NPS by CPW. CDOT will prepare the request for CPW with their approval.	CDOT Environmental and Right of Way/ Developer	During construction	Section 5.9 5.9-22 Chapter 7 7-107
148	Section 4(f) – Historic Resources	Use of 18 historic resources, which includes 5 *de minimis* impact determinations	Adverse Effects to historic resources will be resolved by the execution of the Section 106 Programmatic Agreement between FHWA, CDOT, SHPO and consulting parties	CDOT Environmental	Pre-construction	Chapter 7 7-106
149	Section 4(f) – Historic Resources	Use of 18 historic resources, which includes 5 *de minimis* impact determinations	Consultation has discussed mitigation measures such as documenting historic structures and ways to preserve the larger history of the project corridor	CDOT Environmental	Pre-construction/ during construction	Chapter 7 7-106

CHAPTER 10: COMMUNITY OUTREACH AND AGENCY INVOLVEMENT

The I-70 East EIS has followed an extensive community and agency involvement process since the project began in July 2003 as the I-70 East Corridor EIS. After the separation of the highway and transit elements of the project in June 2006, the innovative public involvement techniques continued as part of the I-70 East EIS. The purpose of this chapter is to describe the methods used and procedures followed to engage the community, stakeholders, and agencies involved, and to solicit input during the entire EIS process.

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this chapter, the updates include the following items:

- Information from the 2008 Draft EIS was included to provide a more inclusive description of the outreach process.
- Outreach methods used during the development of the Final EIS are discussed.
- The section discussing future planned outreach was updated.

10.1 What are the objectives of community outreach and agency 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 …" The overall goal of the community outreach and agency involvement process is to solicit input through a transparent, open, and dynamic process that includes community members, businesses, agencies, stakeholders, and community groups within the project area. 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.

This chapter describes the entire I-70 East agency and public involvement process, which has essentially gone through five phases since the beginning of the project:

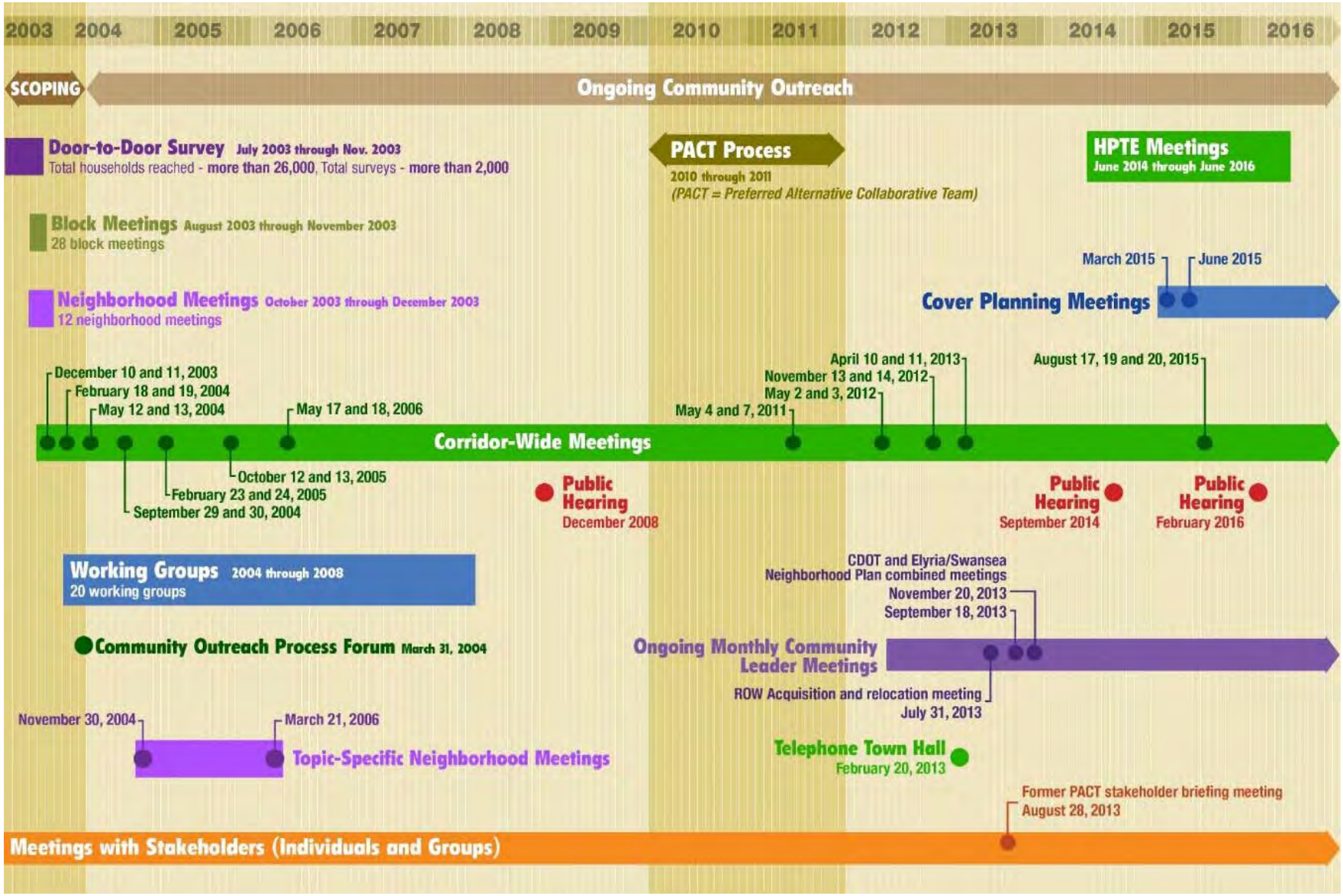
- Project Scoping
- Draft EIS
- Preferred Alternative Collaborative Team (PACT)
- Supplemental Draft EIS
- Final EIS

Each phase consists of two elements used to maximize community input: agency coordination and community outreach. As the project focus and needs have changed throughout the phases, the agency involvement and community outreach methods have evolved to solicit the most meaningful input for the issues and tasks at hand. **Exhibit 10-1** shows a summary of community outreach activities for this project since it began in 2003.

10.2 What is project scoping and what was the result?

Scoping is a formal coordination process used to gain input on the extent of a project and the major issues that need to be addressed. This initial outreach phase provides an opportunity for the community and government agencies to identify the range of concerns and possible solutions that need to be addressed in a project.

Exhibit 10-1 Community Outreach Process



In accordance with NEPA, scoping was initiated early in the combined transit/highway EIS process. All meetings and communication with participating agencies and the community were documented through meeting notes, contact reports, and an outreach database. Through scoping with the community, stakeholders, and numerous governmental agencies, issues were identified that helped define the project purpose and need. Objectives of the scoping process included:

- Inviting federal, tribal, state, and local governments and other interested parties to participate in the identification of significant environmental, social, and economic issues.
- Identifying a range of reasonable alternatives to be evaluated.
- Determining the depth of analysis and significance of issues to be addressed in the EIS.
- Determining which issues and resources do not require detailed analysis.
- Identifying how the proposed project contributes to cumulative effects in the region.

The scoping process included agency scoping and public scoping, and each is described in the following subsections.

10.2.1 Agency scoping

The agency scoping process began in October 2003 under the combined study with the identification of prospective agencies that would guide and contribute to the project development process. The agency groups included in scoping fall under the following categories:

- The lead agencies for the I-70 East project are FHWA and CDOT, which are responsible for ensuring that NEPA requirements are met, initiating the project, and identifying and evaluating alternatives.
- Cooperating agencies are those with a vested interest in the project for which the EIS is being prepared. These agencies may administer properties within the project boundary, have permitting authority, or have expertise in an impacted element of the environment. The USACE, EPA, FTA, RTD, and CDPHE serve as cooperating agencies.

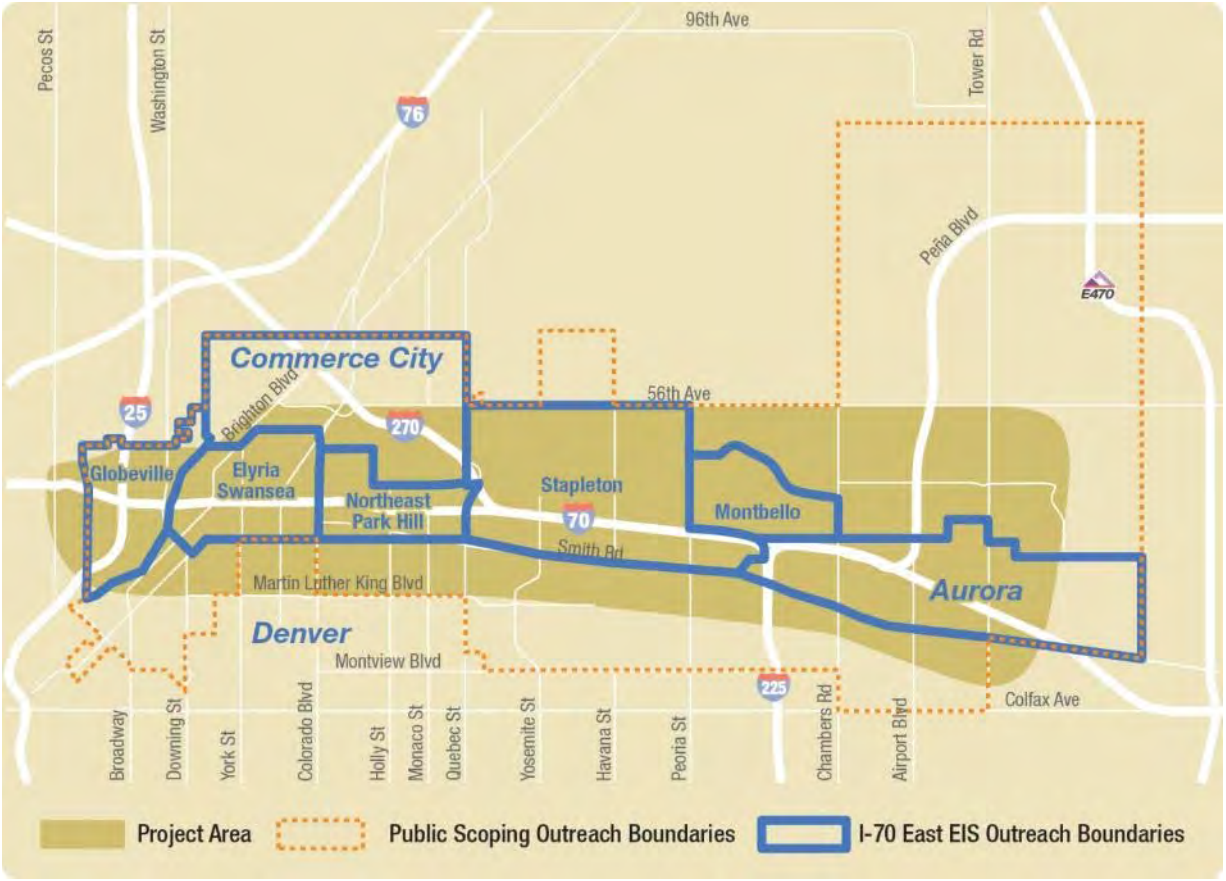
To gather input and respond to individual agency issues, four scoping meetings were held with various agencies, including but not limited to CDPHE, CPW, Colorado Historical Society, SHPO, USACE, USFWS, Denver, and DIA. The agency issues included potential environmental and construction effects, mitigation measures, alternative development, design constraints, analysis methodologies, and reporting requirements. The meetings were held between October 2003 and February 2004. Additional information on the agency scoping meetings can be found in the *I-70 East Corridor EIS Scoping Report* (CDOT, 2004).

10.2.2 Public scoping

The public scoping process began with an analysis of the neighborhoods and businesses within the project area in an effort to develop a logical community outreach boundary. A comprehensive public scoping process was developed that ensured every neighborhood within the project area had ample opportunities to provide input to the study. Several techniques were used during the public scoping process conducted from July to December 2003, including door-to-door outreach to more than 26,000 households, followed by 28 block meetings, 12 neighborhood meetings, eight business meetings, 12 stakeholder meetings, and two corridor-wide meetings. Total attendance at the public scoping meetings exceeded 1,000. **Exhibit 10-2** shows the scoping outreach boundaries that were followed, as well as the outreach boundaries and project area.

Issues identified by the public in the scoping process included health and safety, availability of funding for construction, toll roads, noise, congestion, bus routes, alternate routes, environmental justice, construction timing and impacts, interchanges, accommodating growth and local plans, and drainage on highways and existing bridges. Additional information on the public scoping can be found in the *I-70 East Corridor EIS Scoping Report* (CDOT, 2004).

Exhibit 10-2 Community Outreach Boundaries and Project Area



10.3 What was the outreach completed at the beginning of the project and during the development of the 2008 Draft EIS?

The goal of the outreach effort was to develop a process that created an atmosphere of openness and trust with the public and various agency stakeholders. The outreach methods used prior to the development of the 2008 Draft EIS are summarized below.

10.3.1 Agency coordination

The I-70 East EIS agency coordination provided a framework for involvement by interested federal, state, and local agencies. The specific committees and their roles and responsibilities, membership, and meeting logistics are described in the following subsections.

Executive Oversight Committee

The Executive Oversight Committee (EOC) was formed to provide guidance, insight, and input to the project team throughout the study. Major policy-related recommendations and general updates were presented to the EOC. The EOC, comprised of executives from CDOT, FHWA, and Denver, served as a decision-making group for major policy-related decisions.

Project Management Committee

The primary role of the Project Management Committee (PMC) was to provide direction to the project team and make recommendations to the EOC. The PMC reviewed all major deliverables, decided on recommendations from the compliance committees, and provided decisions for overall project direction with EOC oversight.

The PMC provided project oversight and had representatives from the federal, state, and local city and county agencies sponsoring the project. During the I-70 East Corridor EIS, the PMC was comprised of managers from CDOT, FHWA, RTD, FTA, and Denver. After the projects separated in June 2006, the PMC for the I-70 East EIS included CDOT, FHWA, and Denver. Coordination with other agencies was conducted through individual meetings.

Project Management Team

The PMT began during the I-70 East Draft EIS process. It consisted of CDOT management, FHWA liaison, and the consultant team. The PMT met on a regular basis to discuss upcoming project milestones and provide insight on issues. The PMT prepared recommendations for the EOC based on the project knowledge to facilitate policy-related decisions.

Intergovernmental Coordination and Compliance Committee

The Intergovernmental Coordination and Compliance Committee (ICCC) provided technical guidance and support with respect to the members' respective agencies, regulations, and areas of expertise. The ICCC consisted of staff from various agencies in the project area and provided an opportunity for staff to understand and work toward balancing the conflicting needs and desires from a corridor-wide perspective. The ICCC reviewed the Project Management and Public Involvement Plans, reviewed the study process relative to respective agency policies, reviewed and provided insights on alternative analysis, provided project updates to respective senior management and peers, and evaluated analysis and recommendations of the various

working groups that did not have corresponding compliance committees. The ICCC was comprised of representatives from Adams County, Aurora, CDOT, Commerce City, Denver, DIA, DRCOG, EPA, Federal Aviation Administration, FHWA, Federal Railroad Administration, FTA, the Public Utilities Commission, and RTD.

Environmental Justice Compliance Committee

The Environmental Justice Compliance Committee (EJCC) provided technical input into environmental justice analysis. The EJCC was comprised of regulatory agency experts from CDOT, Denver, DRCOG, EPA, FHWA, and FTA with support from consultant team experts both locally and nationally to provide a broad perspective. The EJCC identified major issues for analysis and ensured compliance with NEPA and federal directives.

Air Quality Compliance Committee

The Air Quality Compliance Committee (AQCC) provided technical input into the air quality analysis. The intent of the committee was to provide experts in air quality analysis and a strong understanding of the federal and state processes to provide guidance and oversight. The AQCC was comprised of a combination of consultant and regulatory agency experts from CDPHE, Denver, DIA, EPA, and the National Jewish Medical Research Center, both locally and nationally to provide a broad perspective. Based on requests from the community, three health experts were added to the AQCC. The AQCC played a key role in determining the methodology for initial air quality analysis, provided relevant information about other air quality studies in the area, and ensured compliance with NEPA and federal directives.

Intergovernmental Forum

The Intergovernmental Forum (IF) provided guidance, input, and advice on policy issues relative to their respective agencies. The IF also provided an opportunity for local elected officials to understand other agency issues and the need to balance conflicting needs from a corridor-wide perspective. The IF provided input into the public outreach efforts, reviewed the study process relative to respective agency policies and precedence, provided insights on alternative analysis, and provided project updates to respective councils, boards, and commissions. A total of eight IF meetings were held.

Resource Agency Coordination

Coordination activities with federal and state resource agencies included phone calls, emails, letters, and meetings to provide study information to these agencies and to gain necessary support through the planning and environmental process. Attachment B, *Agency Coordination*, of the 2008 Draft EIS contains correspondence with the various resource agencies.

10.3.2 Community outreach

The community outreach process continued after project scoping. The process was executed in way to reach as many community members as possible to gather input on the many alternatives that were proposed. Each outreach activity was customized to address the individual characteristics of the neighborhood.

Specific community outreach techniques were used to establish a level of trust in neighborhoods, beginning with developing an understanding of the community's culture. These techniques are discussed in further detail in the following subsections. All the public meetings held by CDOT and FHWA included childcare, food, and Spanish translations/translators to encourage participation by as many community members as possible. Additional special needs were addressed upon request. The following section describes the various types of meetings that were held leading up to the preparation of the 2008 Draft EIS.

Community awareness

Prior to beginning the community outreach process, individual community leaders, stakeholders, advocates, and activists provided input that allowed the study team to gain a practical overview of neighborhood concerns and sensitivities. The input collected during public scoping meetings as well as during one-on-one conversations with project team members produced several recommended procedures that served as the foundation of overall public involvement protocols, including:

- Providing food and child care at public meetings to encourage public participation
- Placing meeting announcements in church bulletins and attending church services to address their congregations

- Providing Spanish translators at all public meetings to address the needs of the LEP population in the area
- Providing a comment period at the beginning and end of every committee meeting

Soliciting and incorporating these elements into the community outreach process showed that the project team was committed to providing the residents, businesses, and property owners' access to information and opportunities for input.

Outreach specialists and training

To facilitate the initial phase of the community outreach process, individuals living within the community were hired to assist with outreach efforts, including door-to-door outreach, block meetings, and neighborhood meetings. These individuals leveraged their existing relationships and community understanding to gain credibility and trust and engaged their neighbors to get involved in the project. All individuals were required to go through an extensive training program to better understand the project and their roles. This training also was required for any member of the project team involved in community outreach.

Door-to-door outreach during project scoping

Door-to-door survey

A door-to-door survey was used in specific neighborhoods that were directly affected by the project. Outreach specialists used the survey to gather information from the residents as part of the scoping process. A standard dialogue was used to ensure that all of the outreach specialists were communicating the same message to the residents. Spanish-speaking outreach specialists were also made available. A neighborhood resources canvas bag was offered to every person that agreed to complete a survey. Surveys were collected at the end of each day and input into a database to track the results. The information was used to develop a summary of the transportation characteristics and issues disclosed by each neighborhood. Summary reports for each neighborhood were also developed.

Block meetings

In neighborhoods where door-to-door outreach was conducted, block meetings also were held. The purpose of the meetings was to inform residents of the EIS process, introduce the project team, and provide an intimate setting to develop a better understanding of specific concerns in certain areas. Meetings began with a short presentation followed by an open forum to answer questions and solicit input. Translation services and meals were provided.

Residents attend one of many project block meetings.

Neighborhood meetings

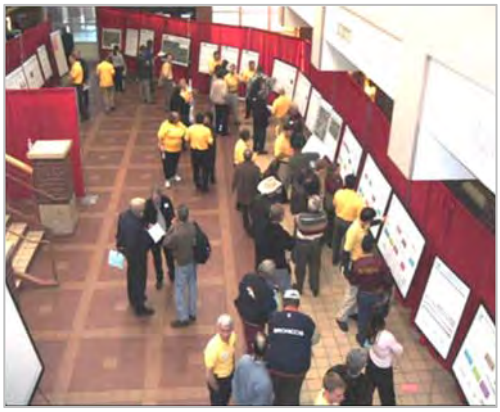
Following the block meetings, neighborhood meetings were conducted to focus on broader neighborhood issues. These meetings were held in all of the neighborhoods throughout the corridor and included short presentations and an open forum to allow the community to interact with the project team. Meeting materials were available in both English and Spanish. Summaries of the questionnaires and block meetings from within each neighborhood were discussed. Translation services, meals, and childcare were provided at each neighborhood meeting.

Community Outreach Process Forum

Representatives from local jurisdictions, as well as business owners and members of the public, attended the Community Outreach Process Forum on March 31, 2004. The purpose of the forum was to solicit insights and suggestions on how to improve the community outreach process. As a result of the forum, the study team began posting working group minutes on the project website.

Corridor-wide meetings

Following the neighborhood meetings, corridor-wide meetings were conducted to discuss all of the issues from the various neighborhoods and to provide a corridor-wide understanding of similarities and differences. Meeting notes were produced, including a summary of the questions that were asked. Each round of corridor-wide meetings provided two opportunities for the public to attend. The meetings were held back-to-back on a Wednesday and Thursday evening at strategic locations within the project area to make it as convenient as possible for the public to attend. Translation, meals, and child care were provided at each corridor-wide meeting.



Project team members answer questions at a corridor-wide meeting.

The traditional audience-style format with informational boards, presentation, and question-and-answer period was used for the corridor-wide meetings during the scoping process. The format of subsequent community outreach meetings was modified by substituting the formal presentation and question-and-answer period with small, topic-specific discussion groups, moderated by technical consultants. Each discussion group had a scribe who recorded comments and questions. Comments received during the open house were recorded and posted on comment boards to be reviewed by all participants. Overall summaries of the meetings were prepared and posted on the project website along with all of the meeting exhibits and handouts.

Draft EIS

The input obtained during corridor-wide meetings helped identify the needs of highway travelers, business owners, and residents living near the highway, and played an important role in the development and screening of alternatives.

Working groups

After the scoping phase, six working groups were established to provide an opportunity for residents, businesses, stakeholders, and property owners to continue their participation and learn more about how the scientists, engineers, and planners would evaluate specific resources:

- Alternate routes
- Bicycle/pedestrian/open space
- Community impacts
- Economic development
- Interchanges
- Trucking/motor carriers

Working groups were comprised of members of the community that expressed interest in joining the groups at neighborhood and corridor-wide meetings or signed up on the project website.

The working groups were used to solicit input, establish dialogue about specific issues, and educate the members about the resources that would be considered in the EIS. Innovative exercises were incorporated into the meetings, such as monitors on local streets to get readings on traffic noise, puzzles that helped participants gain an

understanding of alternative packaging, and an exercise designed to help participants understand how the various alternatives would be screened by comparing the process to buying a car. Issues from each working group were then communicated back to the PMC (see Section 10.3.1) and compliance committees to be resolved.

Topic-specific neighborhood meetings

During the development of alternatives and analysis of impacts, additional neighborhood meetings were conducted to focus on issues that affected sub-areas of the project area. Meetings were held in Globeville, Elyria and Swansea, and Commerce City focusing on gathering input on the various highway alternatives.

Stakeholder meetings

Individual meetings were conducted with elected officials and established community groups throughout the development of the 2008 Draft EIS. The meetings were used to answer questions, solicit input, provide information about the EIS process and the need for meaningful involvement, establish a dialogue with individuals and groups who live and work in specific neighborhoods, obtain input on the outreach methodology, and solicit their support early to help lend credibility to the process. Prior to major project decisions, the project team met with elected officials to brief them on project recommendations.

In addition to formal neighborhood leaders, the project provided outreach to church congregations in the project area to inform them about the outreach process and upcoming meetings.

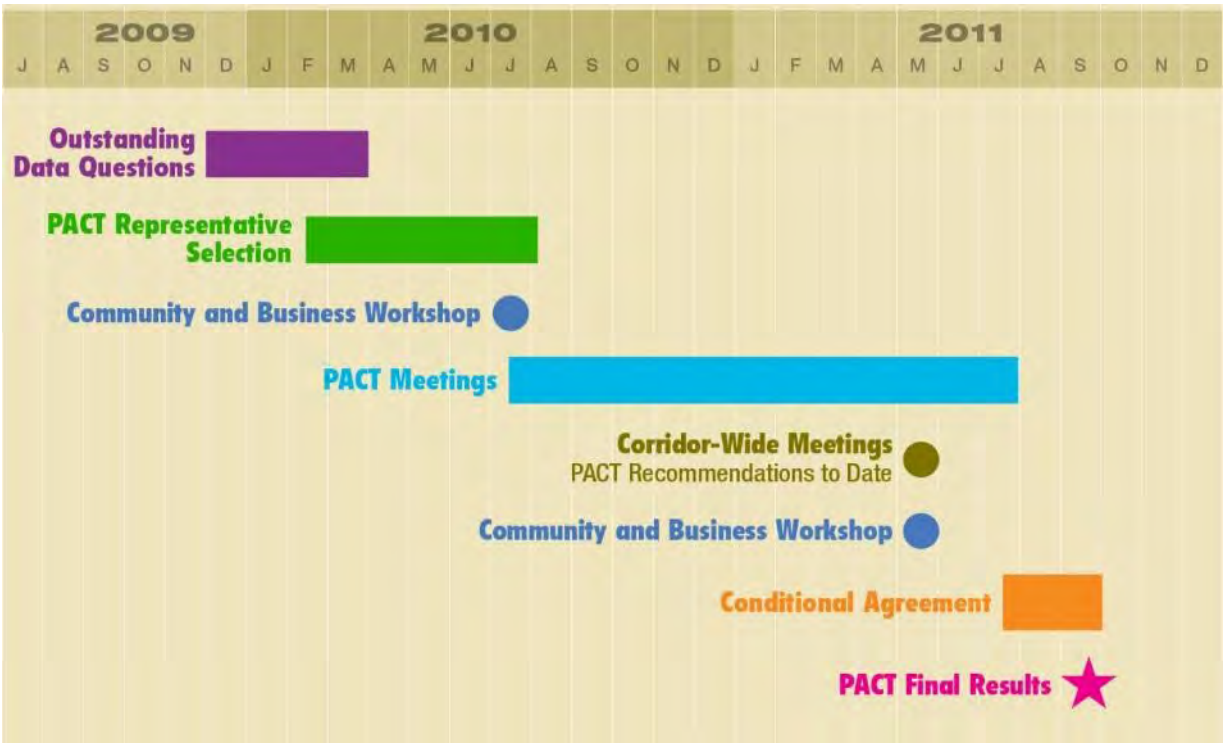
Project team members also visited community organizations during their regular meetings to provide an update on the project, answer questions, solicit input, and inform the participants of upcoming meetings for the project. Stakeholder meetings also were held by request and typically included property or business owners, business or homeowners associations, special interest groups, religious organizations, neighborhood associations, police/fire personnel, and others, as appropriate. As part of the outreach process, members of the project team made presentations to these stakeholder groups at various meetings.

10.4 What was the Preferred Alternative Collaborative Team process?

With the assistance of a neutral facilitator, the PACT was formed in July 2010 after release of the 2008 Draft EIS to identify a preferred alternative for the I-70 East EIS. The PACT was made up of a group of stakeholders who represented federal and state agencies, local governments, and community and business interests. The PACT's goal was to build mutual understanding of all interests, data, and concerns about the alternatives evaluated in the 2008 Draft EIS, and to agree upon and identify a preferred alternative that will meet the purpose and need of the project and best address all concerns. **Exhibit 10-3** summarizes the PACT process.

Preferred Alternative Collaborative Team

Exhibit 10-3 PACT Process



The first step in the PACT process was to develop a collaborative team comprised of state and federal agencies, advocacy groups, and stakeholders from Adams County, Aurora, Commerce City, and Denver. The selected committee had a total of 27 members representing 23 different agencies and organizations. For a list of the selected PACT members with their respective affiliations, see the *Preferred Alternative Collaborative Team Summary Report* included in Attachment D of the Supplemental Draft EIS, *Community Outreach and Agency Involvement Technical Report*.

After PACT members were selected, they agreed to meet on the second Thursday of every month. As a result, 13 facilitated PACT meetings were held from July 2010 to July 2011 to reach a consensus to identify a preferred alternative. All meetings were open to the public and time was dedicated for the public to comment at each meeting. The PACT conducted five additional meetings of the full PACT or subcommittees to address additional concerns. Attachment D in the 2014 Supplemental Draft EIS, *Community Outreach and Agency Involvement Technical Report,* includes a full summary of the PACT process and meetings.

During the PACT process, two corridor-wide meetings were held to present the PACT results and recommendations to date. These meetings were held on May 4 and 7, 2011, at the Commerce City Recreation Center and Swansea Recreation Center. More than 100 community members and stakeholders attended these corridor-wide meetings collectively.

10.4.1 How were the community members involved in the PACT process?

Seven representatives from the impacted communities were selected to be part of the PACT. Aside from the PACT community representatives, PACT meetings were open to the public to give the community an opportunity to comment and voice their opinion.

PACT Representatives

Federal, state, and local agency representatives

- FHWA (2)
- CDOT (2)
- USACE (1)
- CDPHE (1)
- RTD (1)
- SHPO (1)
- EPA (1)
- Adams County (1)
- Aurora (1)
- Commerce City (1)
- Denver (2)
- Sand Creek Greenway (1)

Seven community representatives:

- Denver (Elyria/ Globeville) (1)
- Denver (Swansea) (1)
- Denver (1)
- Commerce City (2)
- Adams County (1)
- Aurora (1)

Five business representatives:

- Denver (Swansea/Elyria/ Globeville) (1)
- Commerce City (1)
- Adams County/ Aurora (1)
- National Western Stock Show (1)
- Colorado Motor Carriers (1)

10.4.2 Did PACT members identify a preferred alternative?

PACT members at a facilitated meeting

The PACT members were unable to reach agreement on a preferred alternative at the final PACT meeting. Although the PACT members did come to consensus on the Current Alignment Alternative, in the end there was no consensus on the north or south option. An official conclusion was published on October 12, 2011, on the project website and via an e-mail blast to announce that there was no consensus on a preferred alternative by PACT, and that CDOT and FHWA would identify a preferred alternative based on the best available data. The PACT process and its conclusions are discussed in more detail in the *PACT Summary Report* in Attachment D in the Supplemental Draft EIS.

10.4.3 What happened after the PACT process?

After the conclusion of the PACT process, Denver initiated an outreach effort with several of the community working groups. More than 90 community members participated in these working group sessions, which resulted in the development of a list of neighborhood goals and expectations to be integrated in the I-70 East EIS. Relocation of the Swansea Elementary School was discussed with the community members at that time; however, a site suitable to the community and in the proximity of the existing school could not be found. This led to re-examination of the project alternatives. More details on these work groups and the meeting summaries are available in Attachment D in the Supplemental Draft EIS.

After failing to reach a consensus on a preferred alternative and because of lack of public support for the 2008 Draft EIS alternatives, CDOT and FHWA re-examined the previously eliminated alternatives. The additional analysis resulted in development of a new alternative that is a hybrid of the below-grade and the tunnel alternatives previously considered during the project. The new alternative, called the Partial Cover Lowered Alternative, met the project's purpose and need and also addressed the public and agency comments. The new option is explained in more detail in Chapter 3, Summary of Project Alternatives.

10.5 How were communities and agencies involved following the completion of the PACT process and during the development of the 2014 Supplemental Draft EIS?

The outreach process continued after the PACT process to keep the public and agencies updated on the project's progress. The outreach methods used prior to the development of the Supplemental Draft EIS are summarized below in the following subsections.

10.5.1 Agency coordination

The project team continued coordination with local government agencies, including Denver, Aurora, Commerce City, and Denver Public Schools, to ensure the I-70 East EIS plans complied with local plans. Denver and Denver Public Schools were contacted on a regular basis to remain updated on the project progress and to collect their input on various issues in the study area and develop mitigation measures.

Executive Oversight Committee

The EOC continued to provide guidance, insight, and input to the project team throughout the development of the Supplemental Draft EIS. As mentioned previously, the EOC was comprised of executives from CDOT and FHWA and served as a decision-making group for major policy-related decisions.

Agency Coordination Committee

The Agency Coordination Committee (ACC) was formed to provide guidance, insight, and input to the project team through the identification of the preferred alternative. The ACC was comprised of representatives from CDOT, FHWA, and Denver.

Each agency included in the committee appointed a representative who could speak with authority for the agency and who could speak about their agency's interests, coordinate internally, make decisions, and bring their agency's views/approval to the ACC.

Project Management Team

The PMT was carried over from the I-70 Draft EIS process. It still consisted of CDOT management, FHWA liaison, and the consultant team. The PMT continued to meet on a

regular basis to discuss upcoming project milestones and provide insight on issues.

Resource Agency Coordination

Coordination activities with federal and state resource agencies continued after the release of the 2008 Draft EIS and the PACT process. As the project evolved, the project team maintained, ceased, or began coordination with agencies to provide necessary input and help stay on top of any project issues. Attachment B, *Agency Coordination*, of the 2014 Supplemental Draft EIS contains correspondence with the various resource agencies.

10.5.2 Community outreach

Much of the community outreach methods used prior to the release of the 2008 Draft EIS were continued through the development of the Supplemental Draft EIS. Information gathered from community input had great influence on the alternatives that were analyzed in the updated study.

Each meeting still included childcare, food, and Spanish translations/translators to encourage participation by as many community members as possible. The following section describes the various types of meetings that were held leading up to the preparation of the Supplemental Draft EIS.

Supplemental Draft EIS

Public hearings

After the public release of the Draft EIS in November 2008, three open houses/public hearings were held to provide an update of recent study developments, summarize the 2008 Draft EIS findings, and provide an opportunity for public comment on the document. The date, location of each meeting, and the number of attendees are presented in **Exhibit 10-4**.

Exhibit 10-4 Public Hearings for 2008 Draft EIS

Date	Location	Number of Attendees
December 9, 2008	Sable Elementary School, Aurora	15
December 10, 2008	Commerce City Recreation Center	65
December 11, 2008	Bruce Randolph Middle School, Denver	70
	Total	**150**

The 45-day public review period was scheduled to end on December 31, 2008. Because of multiple requests for additional time, the review period was extended to January 31, 2009, and then again to March 31, 2009. More than 300 individual submissions, some with multiple comments were received from the public, stakeholders, and agencies during the public comment period.

Typically, comments from a Draft EIS are formally addressed in the Final EIS. Because a Supplemental Draft EIS was prepared in 2014, all comments received on the 2008 Draft EIS were considered and addressed where appropriate in the Supplemental Draft EIS, but a comment-by-comment response was not provided. The comments received on the 2008 Draft EIS are available in Attachment D of the Supplemental Draft EIS, *Community Outreach and Agency Involvement Technical Report*.

The following list briefly describes the major topics covered by the comments received on the 2008 Draft EIS:

- **Realignment.** Several comments from the public and agencies opposed the Realignment Alternatives because they will not solve the existing I-70 issues and will divert through-traffic to local streets, causing safety concerns for the adjacent communities.
- **Tunnel.** Comments were received asking for further consideration of this alternative for the project. Although it was eliminated early in the screening process, elements of this neighborhood-proposed concept were used to design the new Partial Cover Lowered Alternative.
- **Traffic.** The majority of the traffic comments, which were mostly from the affected agencies, asked for more clarification of the analysis documentation and an extension for the horizon year to 2035. These comments have been addressed in the Supplemental Draft EIS (see Chapter 4, Transportation Impacts and Mitigation Measures).
- **Air quality.** Concerns about air pollution have been voiced in several comments received on the 2008 Draft EIS. Impacts to air quality resulting from the proposed project have been analyzed and documented in Section 5.10, Air Quality, of the Supplemental Draft EIS. The air quality analysis performed for this document is well above regulatory requirements to supply information to the public in response to the

comments. The air quality analysis shows that the project will not cause substantial air quality impacts, and that future emissions will stay within levels that are considered to be acceptable under U.S. Environmental Protection Agency standards.

- **Health.** Concerns were expressed about current and recent health conditions within and near the project area. Studies do indicate that residents living next to highways experience higher levels of air pollution and have a higher risk of developing illnesses related to air pollution (CDPHE, 2002, 2003a, 2003b, 2003c). Regional air quality regulations address air pollution at regional levels, but not at the micro-level for populations living within several hundred feet of highways. These studies have been included in the Supplemental Draft EIS (see Section 5.2, Social and Economic Conditions).
- **Environmental justice.** Environmental justice comments included concerns about neighborhood cohesion and lack of sufficient mitigation measures to address the issue. A new alternative was developed to address neighborhood cohesion more specifically. It is evaluated in this document. Additional mitigation measures also have been identified for the proposed Preferred Alternative to address these concerns.
- **Neighborhood cohesion.** Concerns about neighborhood cohesion were raised. Highway improvements will improve mobility and connectivity, support and encourage population and economic growth, and reduce cut-through traffic on local streets. A new alternative was developed to address neighborhood cohesion more specifically. It is evaluated in the Supplemental Draft EIS.
- **Funding.** Comments on the available funding to pay for construction of the project were received. Available funding is identified and an anticipated construction schedule is discussed in Chapter 3 of the Supplemental Draft EIS, Summary of Project Alternatives, along with a brief discussion on how the project construction will be phased.
- **Tolling.** There were questions about the fairness of the value-pricing aspect of managed lanes and whether toll pricing affects the financial ability to access these facilities by low-income drivers. This

issue, and how the low-income population can benefit from toll lanes, is discussed in Section 5.3, Environmental Justice of the Supplemental Draft EIS, in more detail.

During the public comment period, CDOT and FHWA committed to identify the project's Preferred Alternative in partnership with the corridor communities and stakeholders; however, the public comments received on the document showed no strong support for any of the 2008 Draft EIS alternatives. Due to this lack of endorsement, CDOT and FHWA initiated PACT, which is discussed in more detail in the previous sections.

Corridor-wide meetings

The project team held corridor-wide meetings to provide opportunities for the community to interact with the project team to discuss project issues and recommendations. The meetings were conducted at major project milestones to present changes to alternatives and project progress. The goal of these meetings was to solicit input from the public on the I-70 East project.

Monthly community leader meetings

In June 2012, the project team started a monthly meeting with community leaders in the study area to keep the community updated on the progress of the project. The community members who volunteered to be community leaders at the May 2012 corridor-wide meetings were specifically invited to these meetings by phone and bilingual e-mails. An e-mail blast also was sent to the project e-mail list and flyers were placed at major community resource centers before these meetings to notify the community members.

These meetings were held at Focus Points Family Resource Center or Swansea Elementary School, both accessible locations in the study area, as open-house/open-discussion meetings. Walk-ins were welcome at any time to talk to project team members, ask questions, express concerns, and provide comments. Each month, the meeting's focus was on a different subject based on the project's progress and available data to share with the public. Attachment D in the 2014 Supplemental Draft EIS, *Community Outreach and Agency Involvement Technical Report,* lists the community leader meetings, highlighting the topic that was discussed at each meeting and the number of attendees. The community

leaders meetings will continue until the completion of the environmental documentation.

CDOT and Elyria and Swansea Neighborhood Plan combined meetings

CDOT and Denver planned a series of meetings to gather ideas on how to improve the communities surrounding the I-70 East project. The first meeting was held on September 18, 2013, and focused on the community space on the highway cover, the connection to Swansea Elementary School, the frontage roads, and the Steele Street/Vasquez Boulevard interchange. A subsequent meeting was held on November 20, 2013, to solicit further input on the topics.

Telephone town hall

A telephone town hall meeting is an innovative approach to outreach through mass personal communication. Using the telephone town hall conference, project team members can interact with hundreds or thousands of participants in a single live telephone conference. A large number of phone numbers are rapidly dialed and the targeted audience receives a prerecorded message from the speaker inviting them to remain on the line if they wish to join the conference. The audience has the opportunity to ask questions when the presentation is over by being placed in a question queue.

A telephone town hall meeting was conducted on February 20, 2013, which included two separate sessions, one in English and one in Spanish. More than 38,000 phone numbers were contacted and more than 2,600 participants joined the conference. Polling questions were designed to solicit specific input on various subjects by having the audience press a number on their phone to select an answer. The result of the polling questions and more information about this meeting is available in Attachment D in the Supplemental Draft EIS, *Community Outreach and Agency Involvement Technical Report*.

Elected officials outreach

Individual meetings were conducted with elected officials and established community groups after the PACT process. The meetings were conducted to answer questions, request input, and provide information and updates on the project. Before making major project decisions, the project team would meet with elected officials on a regular basis to brief them on project recommendations.

10.6 How have communities and agencies been involved during the development of the Final EIS?

During the development of the Final EIS, the agency involvement and community outreach efforts continued to identify the community's needs and refine the identified Preferred Alternative to better address these needs. The agency involvement and community outreach opportunities provided are described in the following subsections.

10.6.1 Agency coordination

Agency coordination continues to be an important focus for the project team as project design evolves. Local government agencies, including Denver, Aurora, Commerce City, and Denver Public Schools are contacted regularly to get input on the facilities and issues that may arise associated with the Partial Cover Lowered Alternative.

Since the Supplemental Draft EIS, agency coordination has been modified for efficiency to include those agency members that have the ability to give meaningful input and make major project decisions. The committees that were active during the development of the Final EIS are discussed below.

Executive Oversight Committee

The EOC has been active since the 2008 Draft EIS. The group consists of executives from CDOT and FHWA and was formed to provide guidance, insight, and input to the project team throughout the study. They continue to serve as a decision-making group for major policy-related decisions.

Agency Coordination Committee

The ACC was formed prior to the Supplemental Draft EIS. The group includes high-level members from CDOT, FHWA, and Denver to provide guidance, insight, and input to the project team. Agency representatives included in the committee have the authority to discuss their agency's interests, coordinate internally, make decisions, and bring their agency's views/approval to the ACC.

Project Management Team

The PMT has been ongoing since the initiation of the project and remains active. It consists of CDOT management, FHWA liaison, and the consultant team. The PMT meets on a regular basis to discuss upcoming project milestones and

provide insight on issues. The PMT prepares recommendations for the EOC based on the project knowledge to facilitate policy-related decisions.

10.6.2 Community outreach

The outreach process during the preparation of the Final EIS specifically focused on giving the public the opportunity to provide input on the Partial Cover Lowered Alternative, along with other issues. A number of the meetings held were topic specific focusing on decision making for associated project facilities such as the cover near Swansea Elementary School. This section describes the community outreach process during the preparation of the Final EIS.

Public hearings

The project team conducted three open houses/public hearings on September 23, 24, and 25, 2014, after the release of the Supplemental Draft EIS, as part of the ongoing community outreach process. The primary purpose of the public hearings was to provide an update of recent study developments, summarize the Supplemental Draft EIS document available for public review, and provide an opportunity for public comment. The date, location of each meeting, and the number of attendees are presented in **Exhibit 10-5**.

Exhibit 10-5 Public Hearings for Supplemental Draft EIS

Date	Location	Number of Attendees
September 23, 2014	Sable Elementary School, Aurora	28
September 24, 2014	Kearney Middle School, Commerce City	47
September 25, 2014	Bruce Randolph Middle School, Denver	187
	Total	**262**

The 45-day public review period, which began on August 29, 2014, was scheduled to end on October 13, 2014. Because of multiple requests for additional time, the review period was extended to October 31, 2014. During the comment period, nearly 900 individual submissions—many containing multiple comments—were received from the public, stakeholders, and agencies.

Attachment D, *Community Outreach and Agency Involvement Technical Report Addendum*, provides more detail on the comments received, including a map showing the location of the addresses and their relation to the project area in Appendix A. The majority of comments came from around the metro Denver area with 125 from neighborhoods most directly impacted by the project.

The following list briefly describes the major topics covered by the comments received on the 2014 Supplemental Draft EIS:

- **Alternatives.** A large number of comments requested the project take a look at alternatives that remove I-70 from its current location and move it north. The project considered a number of alternatives that accomplished this during the 2008 Draft EIS process. The purpose of this project is to implement a transportation solution that improves safety, access, and mobility and addresses congestion on I-70 in the project area. Moving the alignment north does not fit the need of the project and would defeat the purpose. All "reroute" alternatives were eliminated as a result of them not meeting the project purpose and need.
- **Air Quality.** Concerns about air pollution have been voiced in several comments received on the 2014 Supplemental Draft EIS focusing on the dust from excavation of the lowered section during construction and the increase of emissions from the traffic using the added capacity during operation. Impacts to air quality resulting from the proposed project have been analyzed and documented in Section 5.10, Air Quality. The air quality analysis performed for this document is above regulatory requirements to supply information to the public in response to the comments. The air quality analysis shows that the project will not cause substantial air quality impacts, and that future emissions will stay within levels that are considered to be acceptable under EPA standards.

Public comments

In December 2007, the CEQ published *A Citizen's Guide to the NEPA: Having Your Voice Heard*. This resource states: "It is important to understand that commenting on a proposal is not a 'vote' on whether the proposed action should take place." (CEQ, 2007, p. 12)

Dust from construction will be suppressed using approved BMPs. More information on this is also provided in Section 5.10, Air Quality.

- **Noise.** Existing noise levels are already a concern among the residents of the neighborhoods adjacent to I-70. Many of the comments received regarding noise showed concern for increases in noise levels once construction is complete and the added capacity of the highway draws more vehicles. Others were concerned about construction noise levels and disruptions it might cause to the nearby Swansea Elementary School. Noise impacts from the project and mitigation have been analyzed and documented in Section 5.12, Noise. The impacts and mitigation were analyzed in accordance with CDOT's *Noise Analysis and Abatement Guidelines (2015)*. Thorough analysis was conducted for each neighborhood and each alternative. Mitigation analyzed optimal noise wall placement and height for all impact receptors. The analysis then determined if the optimal noise wall were feasible and reasonable per CDOT's standards. During construction, the project will abide by any city codes as they pertain to construction noise.
- **Environmental Justice.** Comments regarding Environmental Justice expressed concerns about past impacts to the adjacent neighborhoods, the property impacts to residents and businesses, and the potential increase in pollution leading to greater health impacts. Furthermore, the commenters believed that the current mitigation measures for impacts to these communities was not enough. The benefits of the project with the Preferred Alternative are fairly distributed in the study area. The project has avoided some impacts, minimized others, and mitigated all impacts that could not be avoided or minimized. The alternative will not cause disproportionately high and adverse effects on any minority or low-income populations, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A.
- **Swansea Elementary School.** The comments had concerns that the existing Swansea Elementary School would be too close to the highway once construction is completed, and that a new location

should be identified within the neighborhood further from I-70. Other commenters were worried about the noise and air impacts to the school that could potentially affect the students and staff. The project team researched other locations for the construction of a new school further from I-70, but a suitable site could not be identified within the existing neighborhood. CDOT will continue to work with the school and Denver Public Schools to ensure construction impacts are minimized and unavoidable impacts are mitigated for.

- **Traffic Modeling.** Many comments were concerned that the traffic demand modeling used in the future traffic forecasts did not account for current trends; therefore, the proposed width of the Preferred Alternative is not necessary. Many believe that the "millennial" generation prefer to use public transportation rather than own a car. Also, with the completion of the RTD East Corridor scheduled to begin operations in 2016, the demand along I-70 will decrease. The traffic model analysis used the most recent traffic modeling tool available from DRCOG, which included household and employment data from the region and includes programmed projects including East Corridor. The needed capacity along I-70 for this project was adjusted based on the forecasted traffic demand volumes.
- **Project Limits.** Some comments showed concern about the western termini of the project limits and how widening the road would create a bottleneck to motorists traveling west on I-70 past I-25. The majority assumed that the bottleneck would lead to another I-70 widening project that would impact the adjacent neighborhoods west of I-25 along I-70. I-25 was chosen as the projects western termini because of the high diversion of traffic from I-70 to both northbound and southbound I-25. Between 40 and 50 percent of the traffic traveling westbound on I-70 diverts onto I-25.
- **Health Impacts.** The comments associated with human health were split between construction impacts from fugitive dust affecting air quality and increase in emissions from vehicles after I-70 is widened. Health concerns were expressed for the residents adjacent to I-70 and the students and staff

at Swansea Elementary School. Fugitive dust during construction activities will be monitored closely. Mitigation measures have been proposed to minimize the impacts, including dust suppression, portable air conditioning units and financial assistance for higher utility costs for residents close to the highway construction, and a new HVAC system, doors, and windows for Swansea Elementary School. Air Quality monitoring will be conducted in the area during and after construction to evaluate the mitigation measures used. An air quality analysis was performed to forecast air quality levels once construction is complete. The analysis showed that pollutant levels are expected to be lower in 2035 for all alternatives compared to the existing conditions. This Final EIS includes information on Human Health Conditions in Section 5.20.

- **Property Impacts.** In order to widen the highway, the project will have impacts to properties adjacent to the highway. Comments regarding property impacts had questions about how many properties would be impacted and how CDOT would assist the displaced residents. The Preferred Alternative will require the acquisition of property that will result in the relocation of 56 residential units, 18 businesses (including 1 non-profit entity). CDOT will provide comparable replacement housing that is Decent, Safe, and Sanitary under federal regulations. Any acquisition of real property or displacements of persons for public use must ensure "just compensation" under the Uniform Act and the Fifth Amendment of the U.S. Constitution. CDOT requires any project to comply with the Uniform Act, regardless of funding source.
- **Connectivity.** A number of comments wondered how the project would improve neighborhood connectivity, including walkability and bicycle routes, especially near interchanges and along the north-south street connections. The Partial Cover Lowered Alternative was developed in response to the community's concerns to reconnect the Elyria and Swansea Neighborhood by removing the viaduct and placing the highway below ground level. The cover over the highway in the lowered section will have a park or urban landscape that can draw in residents from both the north side and the south side of the highway,

creating a seamless connection across the highway and providing additional connectivity within the neighborhood. Bicycle and pedestrian experience will be improved by providing safe crossings over the highway with upgraded sidewalks and lighting following Denver standards.

- **Lowered Section.** Concerns about the lowered section, proposed as part of the Preferred Alternative, involve conveyance of stormwater year round and potential freezing conditions in the winter. Additionally, there are concerns that the stormwater runoff will be highly contaminated from the typical highway pollutants. The Preferred Alternative proposes an on-site and offsite drainage system that will flow down gradient to the South Platte River. The drainage systems are designed to capture and convey up to 100-year stormwater events. Stormwater quality from highway runoff is regulated by the NPDES and the EPA, which delegates this responsibility to the CDPHE in Colorado. The NPDES has strict requirements for stormwater discharge to waters of the U.S and the project will be following these requirements. An NPDES permit will be acquired and permanent BMPs will be installed to meet stormwater discharge quality standards.

Each comment received on the Supplemental Draft EIS was reviewed and responses have been provided. The comments and comment responses are provided in Attachment Q of the I-70 East Final EIS and on the project website at www.i-70east.com.

The project team developed frequently received comments and responses based on the input received during the Supplemental Draft EIS comment period. Many of them go in to further detail about the topics discussed above. The Frequently Received Comments and Responses are provided in Part 1 of Attachment Q of this document.

Corridor-wide meetings

During the preparation of the Final EIS, the project team continued to hold corridor-wide meetings to solicit input on any outstanding topics, such as aesthetics and design guidelines of the project. The meetings were held at major project milestones to present project progress, gather ideas for project facilities, and discuss issues.

Community leader meetings

Community leader meetings were continued through the Final EIS process. These meetings were held at Swansea Elementary School and provide an opportunity for community members to interact with project team members, ask questions, and express their concerns or support. Each meeting has a specific focus to provide an update on the progress of the project on a specific topic.

Final EIS

Community planning workshops for the highway cover

CDOT and Denver organized these meetings together to gather ideas and explore possibilities of different outdoor uses for the cover. The proposed cover, part of the Partial Cover Lowered Alternative, will be located over the highway near Swansea Elementary School. A presentation and group workshops were used to solicit the best input from the meeting attendees. A community workshop was held on March 4, 2015, at the Swansea Recreation Center as part of this effort. A second workshop was held on June 9, 2015, also at Swansea Recreation Center, to select a final preferred alternative for the design of the cover. Further opportunities for the public to provide input on the cover planning are intended for the future.

10.7 What is HPTE's transparency policy and public engagement process?

CDOT, together with the High Performance Transportation Enterprise (HPTE), has undergone a public process to determine how the I-70 East project will be financed and delivered, including the possibility of public-private partnership. The Governor's Executive Order D 2014-010 along with HPTE's own *Colorado High Performance Transportation Enterprise Transparency Relating to Public-Private Partnerships* require an extensive outreach process to engage the public in reviewing and commenting on financing options.

CDOT and HPTE began a series of public meetings in June 2014 on this topic and will continue these meetings and other outreach activities throughout the procurement process. Following a public workshop in February 2015, the Transportation Commission decided to pursue a Design-Build-Finance-Operate-Maintain public-private partnership to deliver the I-70 East project. **Exhibit 10-6** lists the meetings that have been held to date. More information can be found at www.coloradohpte.com.

What is HPTE?

The Colorado High Performance Transportation Enterprise (HPTE) was formed to pursue innovative ways to finance, construct, or operate and maintain transportation projects.

Innovative financing is needed to offset the limited transportation funding available. The HPTE operates as a government-owned business within CDOT.

Exhibit 10-6 HPTE I-70 East Events

Date	Meeting
June 25, 2014	I-70 East Telephone Town Hall
July 8, 2014	Town Hall Open House
October 16, 2014	I-70 East Telephone Town Hall
November 5, 2014	I-70 East Town Hall Meeting
February 5, 2015	Special HPTE/Transportation Commission Workshop
March 11-12, 2015	I-70 East Industry Forum
August 17, 18, 19, and 20, 2015	I-70 East Telephone Town Hall and Corridor-wide Meetings

10.8 What tools have been used to provide the public with project information

Throughout the community outreach for the I-70 East project, a number of tools have been used to relay information to the public and agency stakeholders. These tools are discussed in the following subsections.

10.8.1 Door-to-door outreach

One of the most effective ways of communicating the latest status of the project, or other updates, is by engaging in person-to-person conversations with the communities that will be most affected by the project. Door-to-door outreach was used at various times throughout the project to provide an opportunity for community members to put a face to an issue and work through any reservations or challenges right then and there. A Spanish translator was involved in the outreach to assist members of the Spanish-speaking public.

Door-to-door outreach

After publishing the Supplemental Draft EIS, the I-70 East project team conducted door-to-door outreach for the homes between 45th Avenue and 47th Avenue from Brighton Boulevard to Colorado Boulevard to raise awareness of the project and invite the community to attend the public hearings and provide comments on the project.

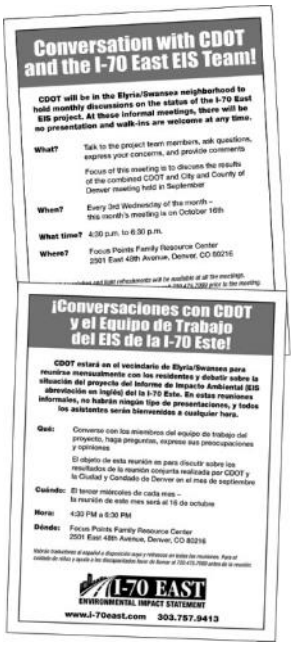
In October 2015, prior to the release of the Final EIS, door-to-door outreach was conducted in the same area to provide an update on the mitigation that will be provided with the project and allow residents to have the chance to ask questions or voice concerns.

10.8.2 Community functions

As part of the outreach effort, the project team reserved tables and attended community functions, providing information and answering questions. These community functions varied from community picnics to church festivals and school fairs.

Swansea Elementary School Fair

10.8.3 Flyers, posters, and mailers


Conversation with CDOT and the I-70 East EIS Team!

CDOT will be in the Elyria/Swansea neighborhood to hold monthly discussions on the status of the I-70 East EIS project. At these informal meetings, there will be no presentation and walk-ins are welcome at any time.

What? Talk to the project team members, ask questions, express your concerns, and provide comments

Focus of this meeting is to discuss the results of the combined CDOT and City and County of Denver meeting held in September

When? Every 3rd Wednesday of the month – this month's meeting is on October 16th

What time? 4:30 p.m. to 6:30 p.m.

Where? Focus Points Family Resource Center 2501 East 48th Avenue, Denver, CO 80216

¡Conversaciones con CDOT y el Equipo de Trabajo del EIS de la I-70 Este!

CDOT estará en el vecindario de Elyria/Swansea para reunirse mensualmente con los residentes y debatir sobre la situación del proyecto del Informe de Impacto Ambiental (EIS abreviación en inglés) del la I-70 Este. En estas reuniones informales, no habrán ningún tipo de presentaciones, y todos los asistentes serán bienvenidos a cualquier hora.

Qué: Converse con los miembros del equipo de trabajo del proyecto, haga preguntas, exprese sus preocupaciones y opiniones

El objeto de esta reunión es para discutir sobre los resultados de la reunión conjunta realizada por CDOT y la Ciudad y Condado de Denver en el mes de septiembre

Cuándo: El tercer miércoles de cada mes – la reunión de este mes será el 16 de octubre

Hora: 4:30 PM a 6:30 PM

Dónde: Focus Points Family Resource Center 2501 East 48th Avenue, Denver, CO 80216

I-70 EAST ENVIRONMENTAL IMPACT STATEMENT

www.i-70east.com 303.757.9413

Flyers are distributed door-to-door prior to most community meetings. Typically, they are distributed one to two days prior to the meeting, and are printed both in Spanish and in English. Additional bilingual posters advertising public meetings are placed throughout the corridor to invite those not reachable through existing community groups, the project's mailing list, or e-mail distribution list. The posters also are placed in libraries, community centers, businesses, recreation centers, barbershops, beauty salons, and neighborhood economic centers. More than 20,000 bilingual mailers also are sent to the project's mailing list two weeks prior to the meetings.

10.8.4 Newsletters

Newsletters provided status updates and information throughout the project and were one of the primary sources for meeting notification. Newsletters were mailed to property owners, businesses, interested parties, and those who requested to be contacted via mail. Newsletters also were distributed to all corridor residents. Newsletters were published in English and Spanish, and included contact information for the project team and a section on how to stay involved. The newsletters, like the rest of the project information, also could be found on the project website.

10.8.5 Advertising and media outreach

Advertisements were placed in local weekly newspapers, Denver daily newspapers, and other relevant and local publications to announce corridor-wide meetings. All of the advertisements were published in both English and Spanish newspapers, including *Commerce City Beacon, Denver Post, Denver Weekly News, El Hispano, El Seminario, Greater Park Hill News, La Voz, North Denver Tribune, Rocky Mountain News,* and *Urban Spectrum*.

10.8.6 E-mail and telephone notification

Members of the public who specified that they wanted to be informed of project activities through e-mail were sent regular information. The notifications covered new information on the website, upcoming public meetings, and any other relevant information. People who preferred to be notified of public meetings by telephone were called within one week of the public meetings.

10.8.7 Project-specific hotline and e-mail address

To ensure that the public had access to project information, a telephone hotline and a project-specific e-mail address were established at the beginning of the outreach process and have been maintained. The phone number and e-mail address were included on all public information materials in the English and Spanish versions. The phone greeting for the project hotline is recorded in both English and Spanish, providing opportunities for the public to leave voicemails in either language. The voicemails and e-mails are checked daily and phone calls returned within one business day.

10.8.8 Project website

A project website (www.i-70east.com) was developed to publicize information and provide a schedule of events. The site offers English and Spanish options and includes features such as an online feedback form, an automatic e-mail distribution for when new information is posted, technical documents, meeting materials, and meeting summaries.

The website is updated whenever new information is available, such as meeting announcements and the availability of meeting materials. The website has been heavily used since the 2008 Draft EIS was published. The website visits grow when the corridor-wide meetings are advertised and when the meeting materials are available for review.

Because "smartphones" have become more popular, a quick response (QR) code was developed for the project website. The QR code can be scanned by any smartphone with the appropriate application and will take the user directly to the project website.

Project website's home page in English and Spanish

10.8.9 Project kiosk

A project kiosk is located outside of the Swansea Elementary School building facing Columbine Street and 47th Avenue. The kiosk provides contact information and project announcements, including upcoming meetings for the general public.

Project website's QR code

10.8.10 Project office

At the initiation of the I-70 East Corridor EIS, the project team established a project office within the corridor. Managers and key project staff from RTD, CDOT, and the consultant team were co-located in this office and day-to-day project management activities were conducted from there. After the separation of the two projects, the office remained available for many of the working group and compliance committee meetings. The office was open to the public to drop-in and meet with CDOT staff during regular business hours.

After publishing the Supplemental Draft EIS, the I-70 East project team opened another project office for the duration of the public review period. Office hours were 10:00 a.m. to 7:00 p.m. A Spanish translator was available during office hours to assist members of the Spanish-speaking public.

After the completion of the Supplemental Draft EIS public review period, the office remained open for right of way coordination purposes until September 2015. CDOT is planning to maintain a project office within close proximity to the project area during construction of the project.

10.9 What future public and agency involvement opportunities will be provided?

Agency coordination and community outreach will continue through the remainder of the NEPA process and during construction. After the release of the Final EIS, corridor-wide open houses/public hearings are scheduled to be held during February 2016. The hearings will be held during a 30-day public review period that will allow the public, stakeholders, and agencies an opportunity to provide comments on the Final EIS.

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In addition to the viewing locations, the following organizations, agencies, and people also have received a copy of the document. The list includes all federal, state, and local agencies, and organizations that have an interest in the proposed project. The list also includes those individuals and entities who submitted substantive comments on the Supplemental Draft EIS pursuant to 40 CFR § 1502.19(d).

- Adams County
- Advisory Council on Historic Preservation (ACHP)
- American Institute of Architects Denver and American Society of Landscape Architects
- Anthony, Tom
- Avery, Anthony
- Bike Denver
- Billick, Keith
- Carstens, Richard
- Chaffee Park Registered Neighborhood Association
- City and County of Denver (Denver)
- Former Denver Auditor Dennis Gallagher
- Denver Councilman Albus Brooks
- Denver Councilwoman Stacie Gilmore
- Denver Councilman Christopher Herndon
- Denver Councilwoman Robin Kniech
- Denver Councilwoman Deborah Ortega
- City of Aurora (Aurora)
- City of Commerce City (Commerce City)
- Commerce City Councilman Rene Bullock
- Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD)
- Colorado Department of Transportation (CDOT)

- CDOT Commissioner Shannon Gifford
- Colorado Historical Society (History Colorado)
- Colorado Motor Carriers Association (CMCA)
- Colorado Preservation, Inc.
- Colorado Public Interest Research Group (CoPIRG)
- Colorado State Library
- Colorado State Representative Crisanta Duran
- Colorado State Representative Jovan Melton
- Colorado State Representative Dominick Moreno
- Colorado State Representative Dan Pabon
- Colorado State Representative Max Tyler
- Colorado State Representative Angela Williams
- Colorado State Senator Morgan Carroll
- Colorado State Senator Lucía Guzmán
- Colorado State Senator Jessie Ulibarrii
- Conservation Colorado and Southwest Energy Efficiency Project (SWEEP)
- Denver International Airport (DIA)
- Denver Landmark Preservation Commission
- Denver Public Schools (DPS)
- Denver Regional Council of Governments (DRCOG)
- Dutcher, Drew
- Fairmount Cemetery Company
- Fairmount Heritage Foundation
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
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- Globeville, Elyria, Swansea Organizers Group
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- Habitat for Humanity of Metro Denver

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- Regional Air Quality Council (RAQC)
- Regional Transportation District (RTD)
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- U.S. Environmental Protection Agency (EPA)

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