

# US 6 Bridges Design Build Project

BR 0061-083

Sub Account Number 18838 (CN)

## Air Quality Technical Report

Prepared for:  
Colorado Department of Transportation  
Federal Highway Administration

Prepared by:

**PARSONS  
BRINCKERHOFF**

| ~~October-November~~ 2012

## Contents

List of Abbreviated Terms .....	iv
Project Background .....	1
The Valley Highway Project .....	1
US 6 Bridges Design Build Project .....	3
Relationship of the Valley Highway Project and the US 6 Bridges Design Build Project .....	5
<i>Phasing of the FEIS Preferred Alternative</i> .....	5
<i>Additional Project Elements in the Project</i> .....	5
Air Quality Analyses .....	8
Current Air Quality Standards and Guidelines .....	8
Regulatory Setting .....	10
Conformity Rule .....	10
Pollutants of Concern .....	11
Existing Conditions .....	12
Microscale CO Analysis .....	12
<i>Analysis Site and Receptor Locations</i> .....	12
<i>Dispersion Modeling</i> .....	13
<i>Traffic Data</i> .....	14
<i>Analysis Year</i> .....	15
<i>Vehicle Emission Factors, Background Concentrations and Persistence Factor</i> .....	15
<i>Results</i> .....	16
PM <sub>10</sub> Analysis .....	17
MSAT Analysis .....	18
<i>MSAT Assessment</i> .....	21
Global Climate Change Cumulative Effects Discussion .....	23
Conclusions .....	25
Conformity Statement .....	25
<i>Requirements</i> .....	25
Comparison of FEIS and 2007 ROD to the Project .....	26
<i>Mitigation Recommendations</i> .....	26
References .....	29
List of Abbreviated Terms .....	iii

Formatted: Default Paragraph Font, Check spelling and grammar

<u>Introduction</u> .....	<u>1</u>	<b>Formatted:</b> Default Paragraph Font, Check spelling and grammar
<u>Project Background</u> .....	<u>1</u>	<b>Formatted:</b> Default Paragraph Font, Check spelling and grammar
<u>The Valley Highway Project</u> .....	<u>1</u>	<b>Formatted:</b> Default Paragraph Font
<u>US 6 Bridges Design Build Project</u> .....	<u>3</u>	<b>Formatted:</b> Default Paragraph Font
<u>Relationship of the Valley Highway Project and the US 6 Bridges Design Build Project</u> .....	<u>5</u>	<b>Formatted:</b> Default Paragraph Font
<u>Phasing of the FEIS Preferred Alternative</u> .....	<u>5</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Additional Project Elements in the Proposed Project</u> .....	<u>5</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Air Quality Analyses</u> .....	<u>8</u>	
<u>Current Air Quality Standards and Guidelines</u> .....	<u>8</u>	<b>Formatted:</b> Default Paragraph Font, Check spelling and grammar
<u>Regulatory Setting</u> .....	<u>10</u>	<b>Formatted:</b> Default Paragraph Font
<u>Conformity Rule</u> .....	<u>10</u>	<b>Formatted:</b> Default Paragraph Font
<u>Pollutants of Concern</u> .....	<u>11</u>	<b>Formatted:</b> Default Paragraph Font
<u>Existing Conditions</u> .....	<u>12</u>	<b>Formatted:</b> Default Paragraph Font
<u>Microscale CO Analysis</u> .....	<u>12</u>	<b>Formatted:</b> Default Paragraph Font
<u>Analysis Site and Receptor Locations</u> .....	<u>12</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Dispersion Modeling</u> .....	<u>13</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Traffic Data</u> .....	<u>14</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Analysis Year</u> .....	<u>15</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Vehicle Emission Factors, Background Concentrations and Persistence Factor</u> .....	<u>15</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Results</u> .....	<u>16</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>PM10 Analysis</u> .....	<u>17</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>MSAT Analysis</u> .....	<u>18</u>	<b>Formatted:</b> Default Paragraph Font
<u>MSAT Assessment</u> .....	<u>21</u>	<b>Formatted:</b> Default Paragraph Font
<u>Global Climate Change Cumulative Effects Discussion</u> .....	<u>23</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Conclusions</u> .....	<u>25</u>	<b>Formatted:</b> Default Paragraph Font
<u>Conformity Statement</u> .....	<u>25</u>	<b>Formatted:</b> Default Paragraph Font, Check spelling and grammar
<u>Requirements</u> .....	<u>25</u>	<b>Formatted:</b> Default Paragraph Font
<u>Comparison of FEIS and 2007 ROD to Proposed Project</u> .....	<u>26</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
<u>Mitigation Recommendations</u> .....	<u>26</u>	<b>Formatted:</b> Default Paragraph Font
<u>References</u> .....	<u>29</u>	<b>Formatted:</b> Default Paragraph Font, Font: Not Italic, Check spelling and grammar
		<b>Formatted:</b> Default Paragraph Font, Check spelling and grammar

## Figures

Figure 1: I-25 Valley Highway Project Preferred Alternative .....	2
Figure 2: Project .....	4
Figure 3: FEIS Phased Implementation of the Preferred Alternative .....	6
Figure 4: Project Elements .....	7
Figure 5: Modeling Site and Receptor Locations .....	13
Figure 6: NATIONAL MSAT EMISSION TRENDS 1999 – 2050 FOR VEHICLES OPERATING ON ROADWAYS USING EPA'S MOBILE6.2 MODEL.....	22
Figure 1: I-25 Valley Highway Project Preferred Alternative .....	2
Figure 2: Proposed Project .....	4
Figure 3: Valley Highway EIS Phased Implementation of the Preferred Alternative .....	6
Figure 4: Proposed Project Elements .....	7
Figure 5: Modeling Site and Receptor Locations .....	13
Figure 6: NATIONAL MSAT EMISSION TRENDS 1999 – 2050 FOR VEHICLES OPERATING ON ROADWAYS USING EPA'S MOBILE6.2 MODEL.....	22

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

## Tables

Table 1: National and State Air Quality Standards .....	9
Table 2: Representative Ambient Air Quality Data (2011) .....	12
Table 3: Background Concentrations and Persistence Factor .....	16
Table 4: Highest One and Eight Hour CO Concentrations (ppm) .....	16
Table 5: Average Summer/Winter MSAT Emissions in the Project Area (pounds/season).....	23
Table 6: Comparison of Global CO <sub>2</sub> Emissions to CO <sub>2</sub> Emissions from Colorado Highways .....	25
Table 7: Summary of Previously and Currently Identified Air Quality Impacts and Mitigation.....	27
Table 1: National and State Air Quality Standards .....	9
Table 2: Representative Ambient Air Quality Data (2011) .....	12
Table 3: Background Concentrations and Persistence Factor .....	16
Table 4: Highest One and Eight Hour CO Concentrations (ppm) .....	16
Table 5: Average Summer/Winter MSAT Emissions in the Project Area (pounds/season).....	23
Table 6: Comparison of Global CO <sub>2</sub> Emissions to CO <sub>2</sub> Emissions from Colorado Highways.....	25
Table 7: Summary of Previously and Currently Identified Air Quality Impacts and Mitigation.....	27

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

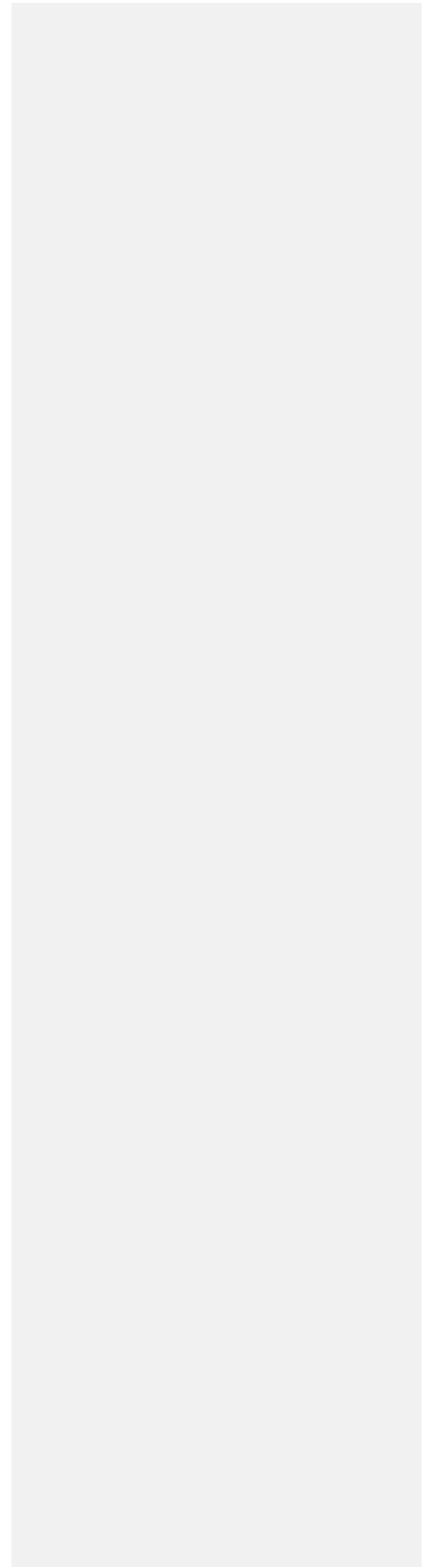
**Formatted:** Default Paragraph Font, Check spelling and grammar

**Formatted:** Default Paragraph Font, Check spelling and grammar

## **List of Abbreviated Terms**

<u>AADT</u>	<u>Annual Average Daily Traffic</u>
<u>AM</u>	<u>morning</u>
<u>APCD</u>	<u>CDPHE Air Pollution Control Division</u>
<u>CAA</u>	<u>Clean Air Act</u>
<u>CDOT</u>	<u>Colorado Department of Transportation</u>
<u>CDPHE</u>	<u>Colorado Department of Public Health and Environment</u>
<u>CFR</u>	<u>Code of Federal Regulations</u>
<u>CO</u>	<u>carbon monoxide</u>
<u>DPM</u>	<u>Diesel Particulate Matter</u>
<u>DRCOG</u>	<u>Denver Regional Council of Governments</u>
<u>EB</u>	<u>eastbound</u>
<u>EIS</u>	<u>Environmental Impact Statement</u>
<u>EPA</u>	<u>US Environmental Protection Agency</u>
<u>FEIS</u>	<u>Final Environmental Impact Statement</u>
<u>FHWA</u>	<u>Federal Highway Administration</u>
<u>GHG</u>	<u>Greenhouse Gas</u>
<u>HEI</u>	<u>Health Effects Institute</u>
<u>I-25</u>	<u>Interstate 25</u>
<u>IRIS</u>	<u>Integrate Risk Information System</u>
<u>LOS</u>	<u>level of service</u>
<u>MMT</u>	<u>Million Metric Tons</u>
<u>MSAT</u>	<u>Mobile Source Air Toxic</u>
<u>MVRTP</u>	<u>Metro Vision Region Transportation Plan</u>
<u>NAAQS</u>	<u>National Ambient Air Quality Standard</u>
<u>NATA</u>	<u>National Air Toxics Assessment</u>
<u>NCHRP</u>	<u>National Cooperative Highway Research Program</u>
<u>NO<sub>2</sub></u>	<u>Nitrogen dioxide</u>
<u>O<sub>3</sub></u>	<u>Ozone</u>
<u>OAQPS</u>	<u>Office of Air Quality Planning and Standards</u>
<u>Pb</u>	<u>Lead</u>
<u>PM</u>	<u>afternoon/evening</u>
<u>PM<sub>2.5</sub></u>	<u>Particulate matter smaller than 2.5 microns in diameter</u>
<u>PM<sub>10</sub></u>	<u>particulate matter less than 10 microns in size</u>
<u>POM</u>	<u>Polycyclic Organic Matter</u>
<u>PPM</u>	<u>parts per million</u>
<u>RAQC</u>	<u>Denver Regional Air Quality Council</u>
<u>ROD</u>	<u>Record of Decision</u>
<u>ROD2</u>	<u>Record of Decision 2</u>
<u>RTD</u>	<u>Regional Transportation District</u>
<u>RTP</u>	<u>Regional Transportation Plan</u>
<u>SB</u>	<u>southbound</u>
<u>SIP</u>	<u>State Implementation Plan</u>
<u>SO<sub>2</sub></u>	<u>Sulfur dioxide</u>
<u>TDM</u>	<u>Transportation Demand Management</u>

TIP            Transportation Improvement Program  
US 6        6<sup>th</sup> Avenue  
VMT        Vehicle-Miles Traveled  
WB         westbound



## **Project Background**

The Project includes modifications to the roadway, interchanges, and bridges along 6<sup>th</sup> Avenue (US 6) between Sheridan Boulevard and the BNSF Railway in Denver, Colorado. The Colorado Department of Transportation (CDOT) is preparing a Reevaluation and Record of Decision (ROD2) to document the impacts of and mitigation for the Project.

## **The Valley Highway Project**

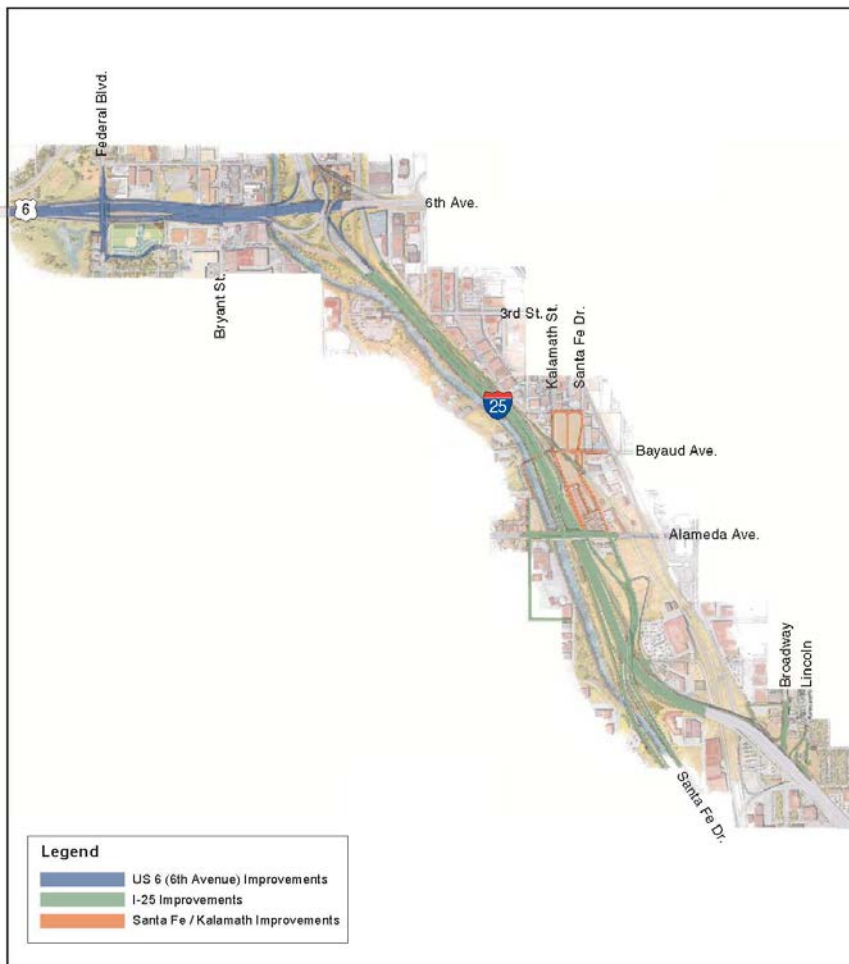
The Federal Highway Administration (FHWA) and CDOT prepared a Final Environmental Impact Statement (FEIS) in 2006 and a ROD in 2007 for the Interstate 25 (I-25) Valley Highway Project, located in Denver, Colorado. The Valley Highway Project includes the reconstruction of I-25 and reconfiguration of interchanges from Logan Street to United States Highway (US) 6, US 6 from I-25 to Federal Boulevard, and the crossing of Santa Fe Drive and Kalamath Street at the Consolidated Main Line railroad. The Preferred Alternative, as described in the FEIS, includes the following elements:

- I-25 Mainline: Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction throughout the project area
- I-25/Broadway: Tight diamond interchange
- I-25/Santa Fe Drive: Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25
- I-25/Alameda/Santa Fe/Kalamath: Offset partial urban interchange at I-25 and Alameda Avenue; Santa Fe Drive and Kalamath Street grade separated under the railroad close to their current alignments
- US 6: Ramp improvements at the I-25/US 6 interchange; closure of the Bryant Street interchange; diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street and a braided ramp from Federal Boulevard to eastbound US 6; reconstruction of US 6 with collector-distributor roads/auxiliary lanes throughout the project area

The Preferred Alternative of the Valley Highway Project is shown in Figure 1.

Formatted: Not Different first page header

Formatted: Bulleted + Level: 1 + Aligned at: 0.25" + Indent at: 0.5"



**Formatted:** Font: Bold, No underline, Font color: Auto

**Figure 1: I-25 Valley Highway Project Preferred Alternative**



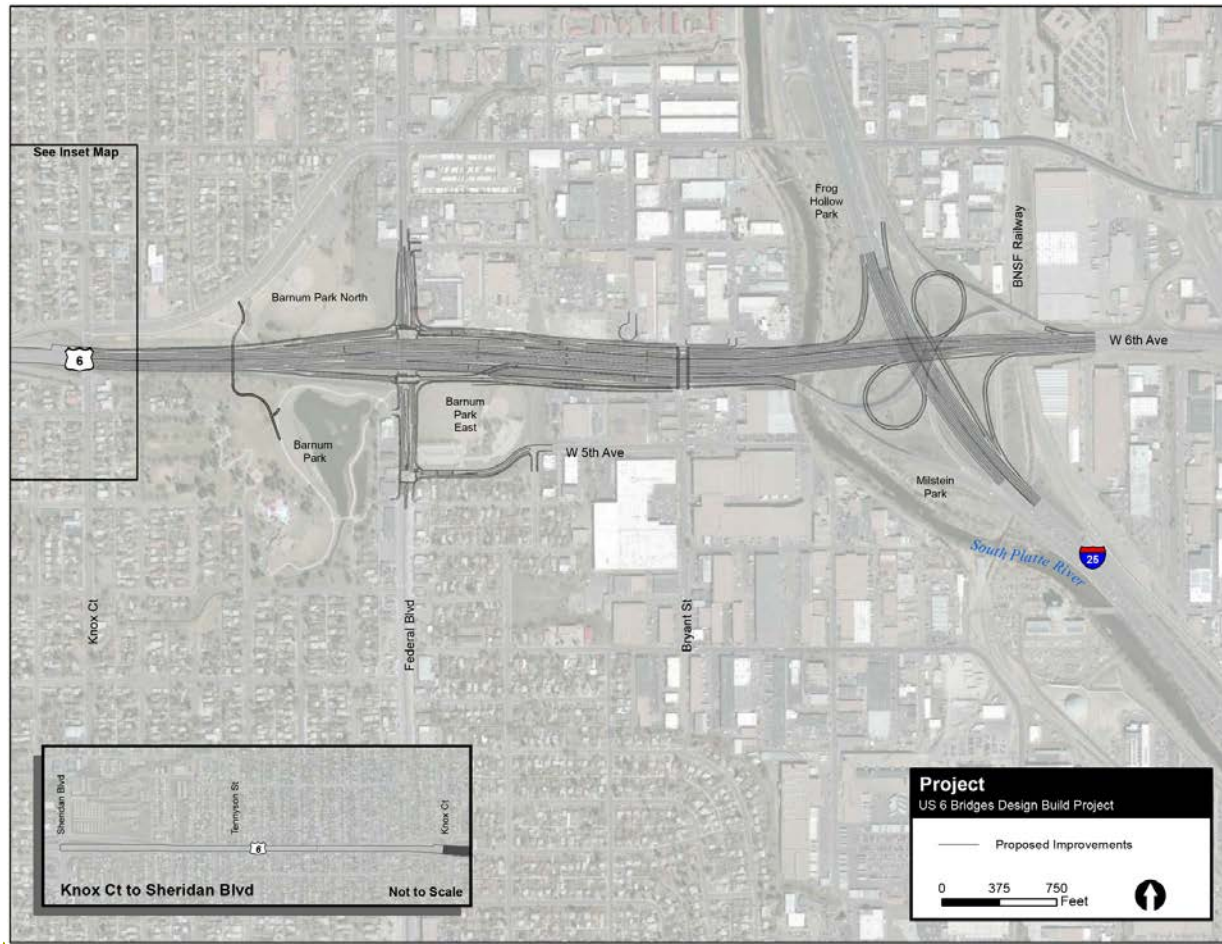
## US 6 Bridges Design Build Project

The Project includes the reconstruction of US 6, reconfiguration of interchanges from Federal Boulevard to I-25, and replacement of the US 6 bridges from Federal Boulevard to the bridge over the BNSF Railway. More specifically, the Project includes the following elements:

- The replacement of five bridges along US 6: Federal Boulevard, Bryant Street, South Platte River, I-25, and BNSF Railway. Three of these bridges are in poor condition and the other two are functionally obsolete. The project would also add a tunnel immediately east of I-25 under US 6 to separate traffic on northbound I-25 from traffic exiting the interstate to travel east and west on US 6.
- Ramp improvements at the I-25/US 6 interchange, closure of the westbound (WB) US 6 to Bryant Street ramp, a diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street, and a braided ramp from Federal Boulevard to eastbound (EB) US 6.
- Reconstruction of US 6 with collector-distributor roads/auxiliary lanes from Federal Boulevard to the BNSF Railway bridge structure
- Conversion of 5<sup>th</sup> Avenue to two-way traffic from Federal Boulevard to Decatur Street
- Widening of Federal Boulevard, from five to six lanes, from 5<sup>th</sup> to 7<sup>th</sup> Avenues to accommodate current and future improvements
- Pavement resurfacing of US 6 from Knox Boulevard to Sheridan Boulevard
- In-kind replacement of impacted facilities for Barnum East Park
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North Park and Barnum Park (also known as Barnum Park South, and herein referred to as Barnum Park South)
- Upgrading portions of the South Platte River Trail to current standards

Figure 2 shows the Project.

Formatted: Bulleted + Level: 1 + Aligned at: 0.25" + Indent at: 0.5"



Formatted: No underline, Font color: Auto

**Figure 2: Project**

## **Relationship of the Valley Highway Project and the US 6 Bridges Design Build Project**

At the time of the FEIS, funding had not been identified for the entire Preferred Alternative. Although budget placeholders were included in the 2030 Regional Transportation Plan (RTP), these budgets fell short of the estimated cost of the Preferred Alternative. Therefore, FHWA and CDOT planned for a phased implementation of the Preferred Alternative. These six phases are outlined in Chapter 7 of the FEIS. The ROD2 for the Project will reevaluate part of Phase 1 (the part including the US 6/Federal Boulevard interchange) as presented in the 2007 ROD, and provide a decision for Phase 5 of the Valley Highway Project. The ROD2 for the Project will also address six new, minor project elements, which were not part of the FEIS. Due to the minor environmental significance and nature of these additional components, they are included in the ROD2 and will not affect the independent utility, logical termini, or Preferred Alternative of the Valley Highway Project.

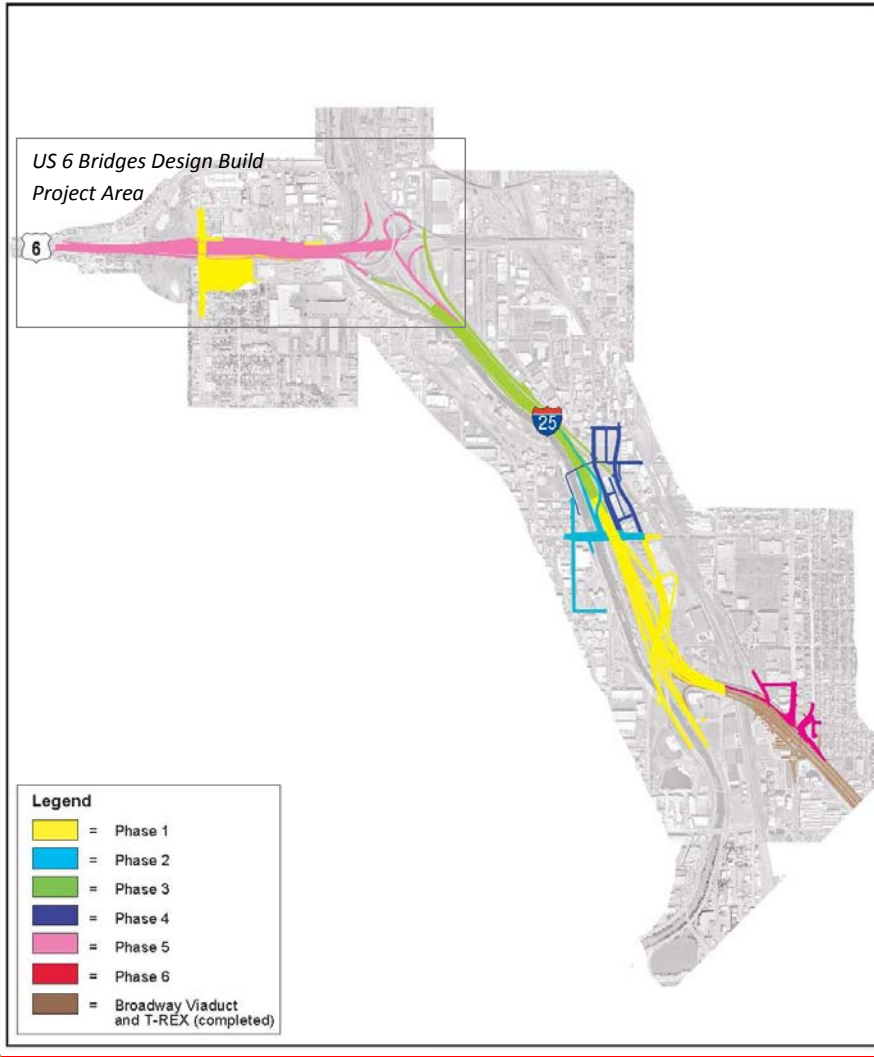
### **Phasing of the FEIS Preferred Alternative**

The Project includes elements of two of the six construction phases—Phase 1 and Phase 5—from the Valley Highway Project. A decision on construction Phase 1 of the Valley Highway Project, which included the US 6/Federal Boulevard bridge and ramps, excluding the braided ramp, was made in the 2007 ROD. Figure 3 shows the phases of the Valley Highway Project’s Preferred Alternative and Figure 4 shows the Project Elements and how they relate to the FEIS phasing.

### **Additional Project Elements in the Project**

At this time, the Project includes six additional elements that were not included in the FEIS or 2007 ROD:

- Reconstruction of the southbound (SB) I-25 to EB US 6 ramp;
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North and Barnum South parks;
- Replacement of the US 6 bridge over Bryant Street;
- Replacement of the US 6 bridge over I-25;
- Replacement of the US 6 bridge over the BNSF Railway; and
- Pavement resurfacing of US 6 between Sheridan Boulevard and Knox Court



**Figure 3: FEIS Phased Implementation of the Preferred Alternative**

*(source: I-25 Valley Highway FEIS)*

**Formatted:** Font: Bold, No underline, Font color: Auto

**Formatted:** Caption, Centered, Tab stops: Not at 2.21" + 3.25"

Formatted: No underline, Font color: Auto

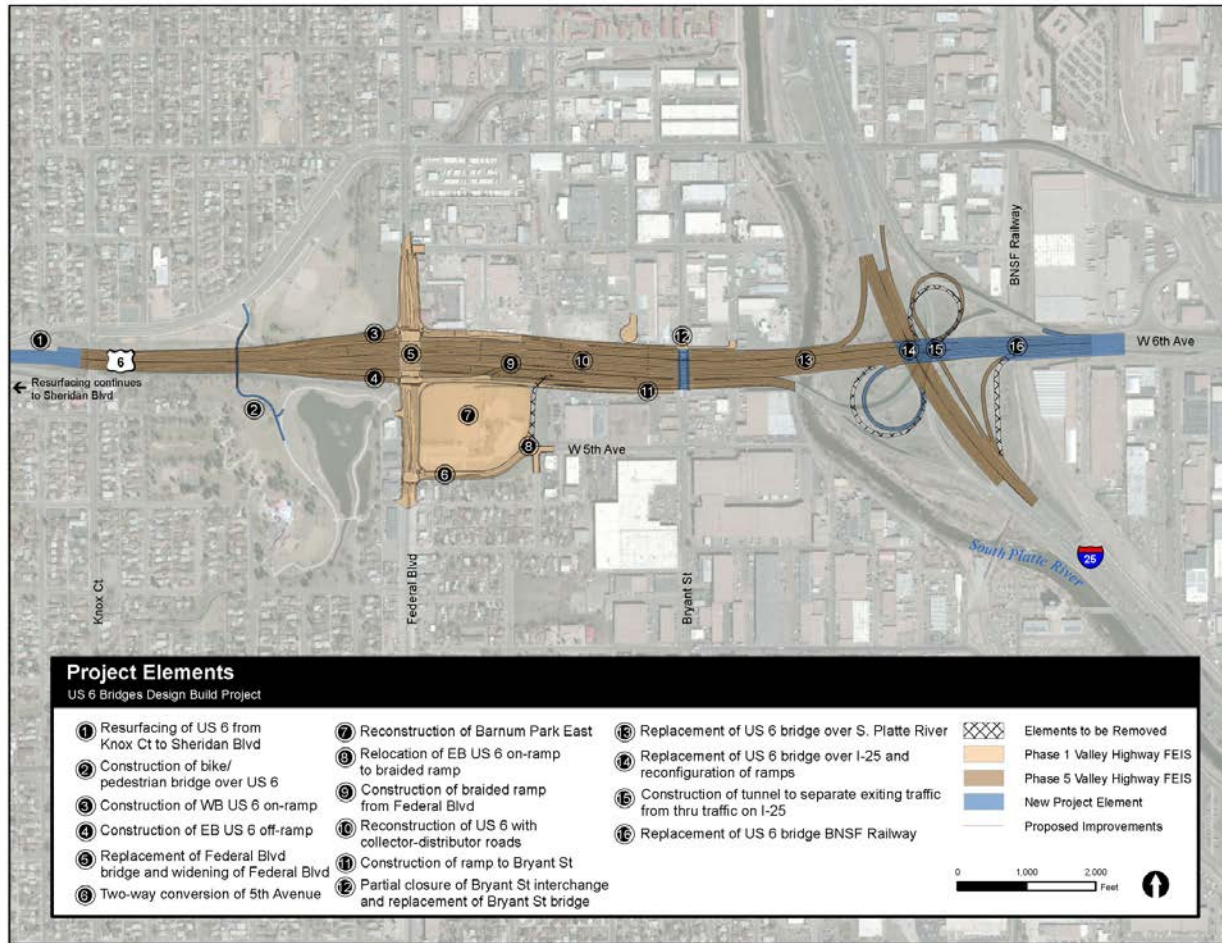


Figure 4: Project Elements

## List of Abbreviated Terms

AA DT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
AM	morning
APCD	CDPHE Air Pollution Control Division
BMP	best management practice
CAA	Clean Air Act
CCD	City and County of Denver
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHS	Colorado Historical Society
CML	Consolidated Main Line railroad
CO	carbon monoxide
DPM	Diesel Particulate Matter
DRCOG	Denver Regional Council of Governments
EB	eastbound
EIS	Environmental Impact Statement
EPA	US Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
HEI	Health Effects Institute
I-25	Interstate 25
IGA	intergovernmental agreement
IRIS	Integrate Risk Information System
ITS	intelligent transportation system
LOS	level of service
MS4	municipal separate storm sewer system
MSAT	Mobile Source Air Toxic
MVRTP	Metro Vision Region Transportation Plan
NAAQS	National Ambient Air Quality Standard
NAC	Noise Abatement Criteria
NB	northbound
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
OAQPS	Office of Air Quality Planning and Standards
PM	afternoon/evening
PM <sub>2.5</sub>	Particulate matter smaller than 2.5 microns in diameter
PM <sub>10</sub>	particulate matter less than 10 microns in size
PUC	Public Utilities Commission
RCRA	Resource Conservation and Recovery Act

ROD	Record of Decision
RTD	Regional Transportation District
RTP	Regional Transportation Plan
SB	southbound
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
TIP	Transportation Improvement Program
T-REX	Transportation Expansion Project
US 6	6 <sup>th</sup> Avenue
USACE	US Army Corps of Engineers
USC	US Code
USDOI	US Department of Interior
USFWS	US Department of Interior Fish and Wildlife Service
WB	westbound

## Introduction

This Air Quality Technical Report documents an air quality analysis conducted in support of a Re-evaluation under 23 CFR 771.129 for the US 6 Bridges Design Build Project (the Proposed Project). It takes into consideration the following factors relative to the I-25 Valley Highway Environmental Impact Statement and the resultant 2007 Record of Decision:

- Have there been changes in the project or its surroundings?
- Revised national ambient air quality standards?
- Revised FHWA guidance for conducting analyses for mobile source air toxics and particulate matter?

## Project Background

The Proposed Project includes modifications to the roadway, interchanges, and bridges along 6<sup>th</sup> Avenue (US-6) between Sheridan Boulevard and the BNSF Railway in Denver, Colorado. The Colorado Department of Transportation (CDOT) is preparing a Reevaluation and Record of Decision (ROD) to document the impacts of and mitigation for the Proposed Project.

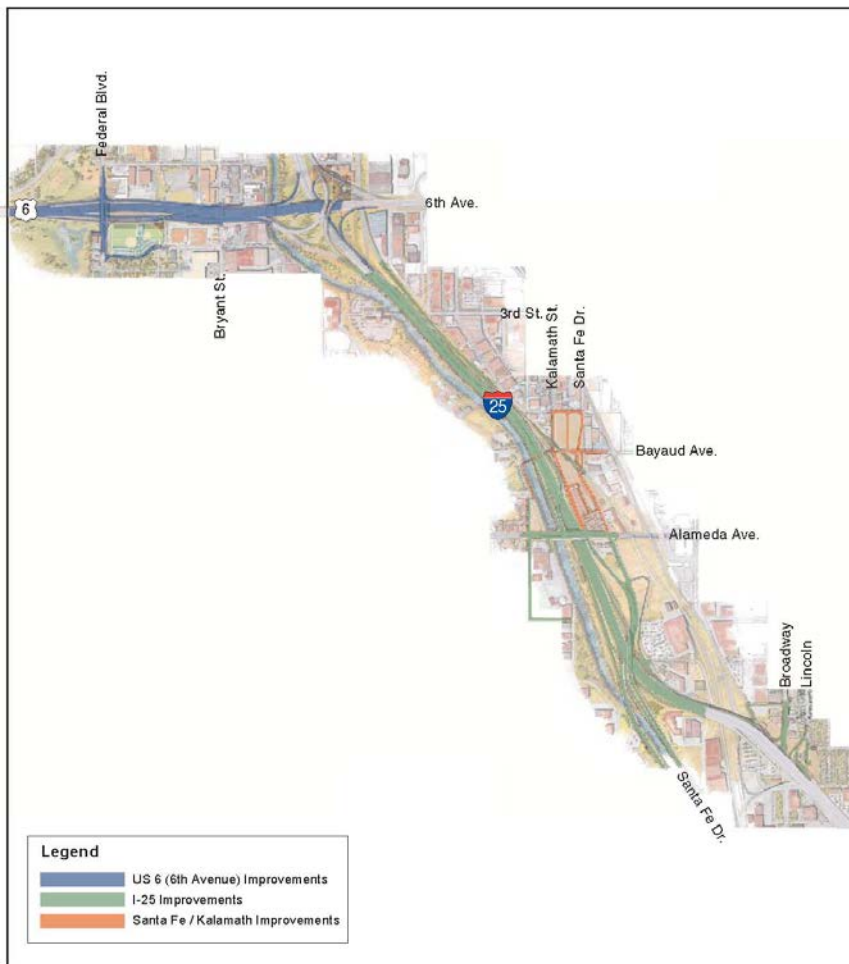
## The Valley Highway Project

The Federal Highway Administration (FHWA) and CDOT prepared a Final Environmental Impact Statement (FEIS) in 2006 and a ROD in 2007 for the Interstate 25 (I-25) Valley Highway Project, located in Denver, Colorado. The Valley Highway Project includes the reconstruction of I-25 and reconfiguration of interchanges from Logan Street to United States Highway (US) 6, US 6 from I-25 to Federal Boulevard, and the crossing of Santa Fe Drive and Kalamath Street at the Consolidated Main Line railroad. The Preferred Alternative, as described in the FEIS, includes the following elements:

- I-25 Mainline: Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction throughout the project area
- I-25/Broadway: Tight diamond interchange
- I-25/Santa Fe Drive: Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25
- I-25/Alameda/Santa Fe/Kalamath: Offset partial urban interchange at I-25 and Alameda Avenue; Santa Fe Drive and Kalamath Street grade separated under the railroad close to their current alignments
- US 6: Ramp improvements at the I-25/US 6 interchange; closure of the Bryant Street interchange; diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street and a braided ramp from Federal Boulevard to eastbound US 6; reconstruction of US 6 with collector-distributor roads/auxiliary lanes throughout the project area

The Preferred Alternative of the Valley Highway Project is shown in Figure 1.





**Figure 1: I-25 Valley Highway Project Preferred Alternative**

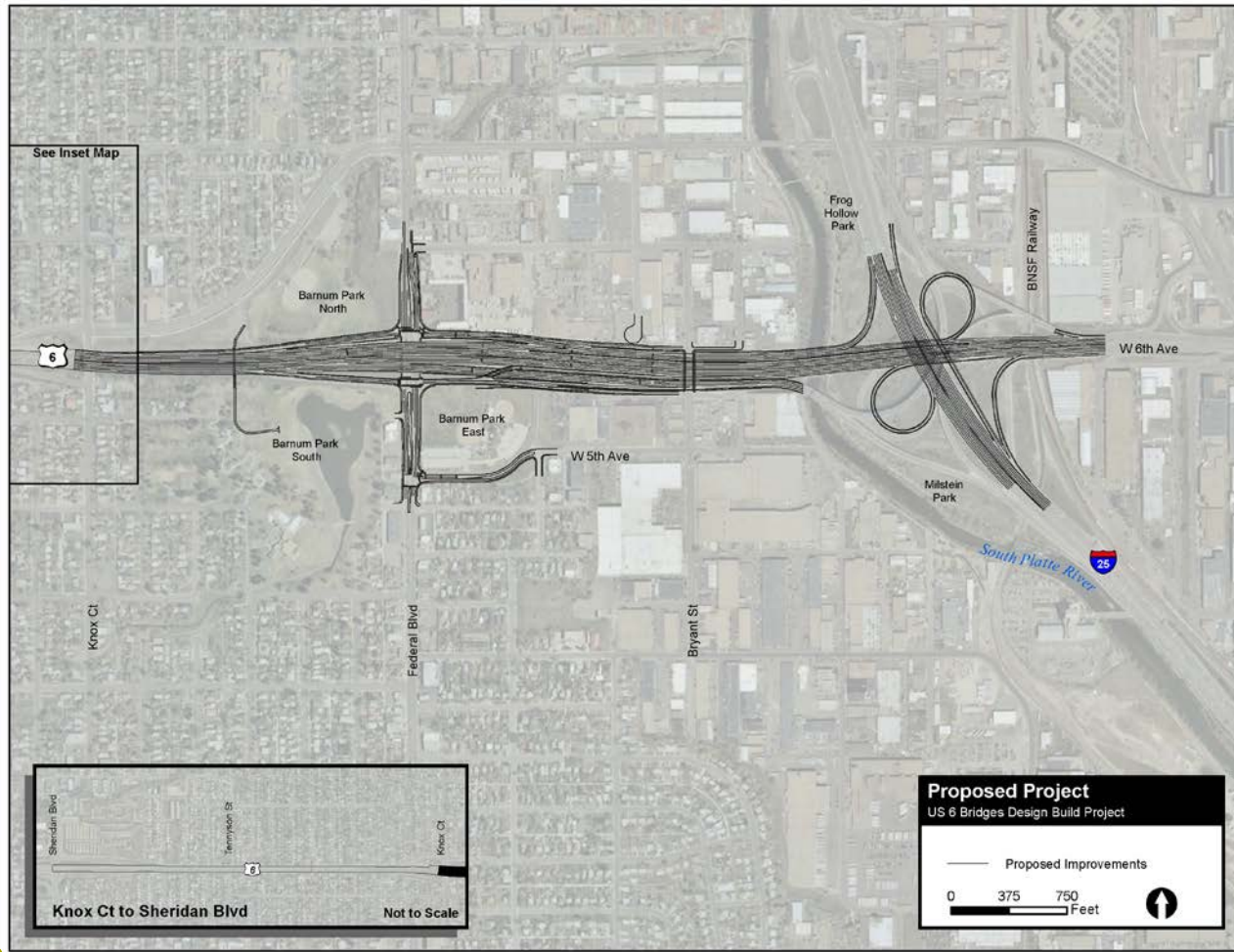
**Formatted:** Font: Bold, No underline, Font color: Auto

## US 6 Bridges Design-Build Project

The Proposed Project includes the reconstruction of US 6, reconfiguration of interchanges from Federal Boulevard to I-25, and replacement of the US 6 bridges from Federal Boulevard to the bridge over the BNSF Railway. More specifically, the Proposed Project includes the following elements:

- The replacement of five bridges along US 6: Federal Boulevard, Bryant Street, South Platte River, I-25, and BNSF Railway. Three of these bridges are in poor condition and the other two are functionally obsolete. The project would also add a tunnel immediately east of I-25 under US 6 to separate traffic on northbound I-25 from traffic exiting the interstate to travel east and west on US 6.
- Ramp improvements at the I-25/US 6 interchange, closure of the westbound (WB) US 6 to Bryant Street ramp, a diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street, and a braided ramp from Federal Boulevard to eastbound (EB) US 6.
- Reconstruction of US 6 with collector-distributor roads/auxiliary lanes from Federal Boulevard to the BNSF Railway bridge structure
- Conversion of 5<sup>th</sup> Avenue to two-way traffic from Federal Boulevard to Decatur Street
- Widening of Federal Boulevard, from five to six lanes, from 5<sup>th</sup> to 7<sup>th</sup> Avenues to accommodate current and future improvements
- Pavement resurfacing of US 6 from Knox Boulevard to Sheridan Boulevard
- In-kind replacement of impacted facilities for Barnum East Park
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North Park and Barnum Park (also known as Barnum Park South, and herein referred to as Barnum Park South)
- Upgrading portions of the South Platte River Trail to current standards

Figure 2 shows the Proposed Project.



Formatted: No underline, Font color: Auto

Figure 2: Proposed Project

## **Relationship of the Valley Highway Project and the US 6 Bridges Design-Build Project**

At the time of the FEIS, funding had not been identified for the entire Preferred Alternative. Although budget placeholders were included in the 2030 Regional Transportation Plan (RTP), these budgets fell short of the estimated cost of the Preferred Alternative. Therefore, FHWA and CDOT planned for a phased implementation of the Preferred Alternative. These six phases are outlined in Chapter 7 of the FEIS. The Reevaluation and ROD for the Proposed Project will reevaluate part of Phase 1 (the part including the US 6/Federal Boulevard interchange) as presented in the 2007 ROD, and provide a decision for Phase 5 of the Valley Highway Project. The Reevaluation and ROD for the Proposed Project will also address six new project elements, which were not part of the FEIS. Due to the minor environmental significance and nature of these additional components, they are included in the Reevaluation and ROD and will not affect the independent utility, logical termini, or Preferred Alternative of the Valley Highway Project.

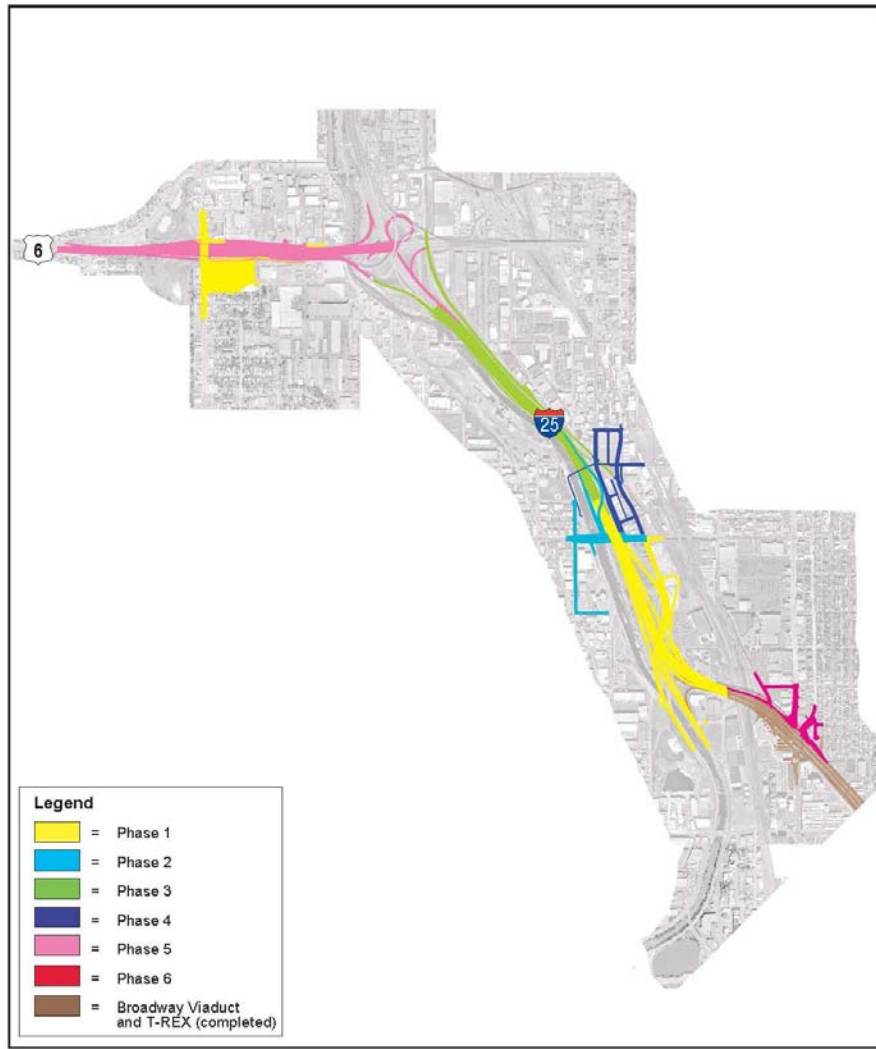
### ***Phasing of the FEIS Preferred Alternative***

The Proposed Project includes elements of two of the six construction phases—Phase 1 and Phase 5—from the Valley Highway Project. A decision on construction Phase 1 of the Valley Highway Project, which included the US 6/Federal Boulevard bridge and ramps, excluding the braided ramp, was made in the 2007 ROD. Figure 3 shows the phases of the Valley Highway Project's Preferred Alternative and Figure 4 shows the Proposed Project Elements and how they relate to the FEIS phasing.

### ***Additional Project Elements in the Proposed Project***

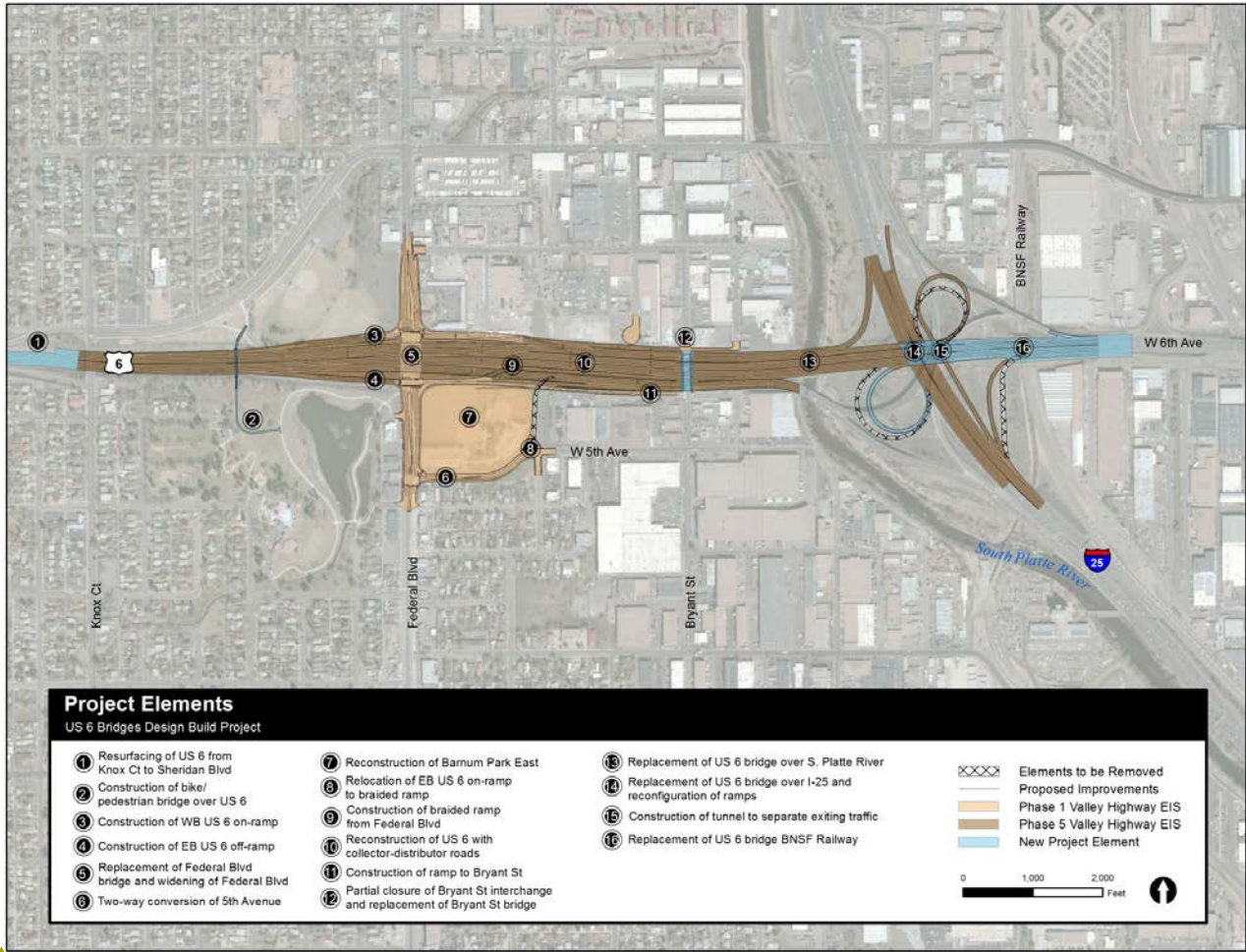
At this time, the Proposed Project includes six additional elements that were not included in the FEIS or 2007 ROD:

- Reconstruction of the southbound (SB) I-25 to EB US 6 ramp;
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North and Barnum South parks;
- Replacement of the US 6 bridge over Bryant Street;
- Replacement of the US 6 bridge over I-25;
- Replacement of the US 6 bridge over the BNSF Railway; and
- Pavement resurfacing of US 6 between Sheridan Boulevard and Knox Court



**Formatted:** Font: Bold, No underline, Font color: Auto

**Figure 3: Valley Highway EIS Phased Implementation of the Preferred Alternative**



**Figure 4: Proposed Project Elements**

Formatted: No underline, Font color: Auto

## Air Quality Analyses

The air quality analysis was conducted to estimate the changes of emission levels under the 2035 No Build (without the ~~Proposed~~ Project) and 2035 Build (with the ~~Proposed~~ Project) scenarios and to assess whether impacts of these changes could cause or exacerbate a violation of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO). In addition, through interagency consultation with CDOT, the Colorado Department of Public Health and Environment (CPDHE), the Environmental Protection Agency (EPA), and FHWA, the following additional analyses were requested: a qualitative analysis of particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>), a mobile source air toxics (MSAT) analysis, and analysis of greenhouse gas (GHG) emissions.

The changes with the ~~Proposed~~ Project would potentially affect air quality levels in Barnum Park and near the signalized intersections of the US 6 ramps and Federal Boulevard.

## Current Air Quality Standards and Guidelines

In accordance with the requirements of the Clean Air Act and its Amendments (CAA), the EPA has promulgated NAAQS for pollutants considered harmful to public health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for seven principal pollutants, which are called “criteria” pollutants that apply to transportation projects (Table 1). These pollutants are CO, nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), PM<sub>10</sub>, particulate matter smaller than 2.5 microns in diameter (PM<sub>2.5</sub>), and sulfur dioxide (SO<sub>2</sub>). Colorado has adopted the NAAQS as the ambient air quality standards for the state.

In addition to the criteria pollutants, changes in the emissions of a wide range of the non-criteria mobile source air toxic (MSAT) pollutants from project-related changes in automobile and truck traffic are also of concern. EPA has not defined any NAAQS for air toxics. Methods for quantifying air toxic impacts from mobile sources are subject to scientific debate, and the analysis of air toxics is an emerging field. A MSAT analysis was conducted for the FEIS using FHWA guidance applicable at that time. In order to estimate air toxic impacts of the ~~Proposed~~ Project under current guidance, project-related changes in MSAT emissions were quantified. This analysis considered seven MSAT pollutants that have been identified by EPA: acrolein, benzene, 1,3 butadiene, formaldehyde, diesel particulate matter (DPM), naphthalene, and polycyclic organic matter (POM). However, since the latest version of the EPA Mobile 6.2 emission model used in this analysis does not estimate naphthalene and POM emission factors, emission rates were estimated for the five remaining MSAT pollutants.

**Table 1: National and State Air Quality Standards**

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
<u>Carbon Monoxide</u>		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
<u>Lead</u>		primary and secondary	Rolling 3 month average	0.15 µg/m <sup>3</sup> <sup>(1)</sup>	Not to be exceeded
<u>Nitrogen Dioxide</u>		primary	1-hour	100 ppb	98 <sup>th</sup> percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb <sup>(2)</sup>	Annual Mean
<u>Ozone</u>		primary and secondary	8-hour	0.075 ppm <sup>(3)</sup>	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
<u>Particle Pollution</u>	PM <sub>2.5</sub>	primary and secondary	Annual	15 µg/m <sup>3</sup>	annual mean, averaged over 3 years
			24-hour	35 µg/m <sup>3</sup>	98th percentile, averaged over 3 years
	PM <sub>10</sub>	primary and secondary	24-hour	150 µg/m <sup>3</sup>	Not to be exceeded more than once pr year on average over 3 years
<u>Sulfur Dioxide</u>		primary	1-hour	75 ppb <sup>(4)</sup>	99th percentile of 1-hour daly maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes:

- (1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m<sup>3</sup> as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
- (2) The official level of the annual NO<sub>2</sub> standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
- (3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
- (4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO<sub>2</sub> standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

The greenhouse gas emission impacts of the ~~Proposed~~ Project resulted from the change in the vehicle miles due to traffic improvements. The principal anthropogenic (human-made) source of carbon emissions is the combustion of fossil fuels, which accounts for approximately 80 percent of anthropogenic emissions of carbon worldwide. Almost all (98 percent) of transportation-sector emissions result from the consumption of petroleum products such as gasoline, diesel fuel, and aviation fuel. The GHG analysis considered the effects of the ~~Proposed~~ Project on the GHG emissions.



## Regulatory Setting

The CAA defines nonattainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS, and maintenance areas as former non-attainment areas that subsequently demonstrated compliance with the standards. The Denver Metropolitan Area is designated as a “nonattainment” area for the 8-hour ozone standard, a “maintenance” area for CO and PM<sub>10</sub>, and an attainment area for the other criteria pollutants, including NO<sub>2</sub>. The area was designated as a NO<sub>2</sub> attainment area by EPA in 2010 (and was considered as a NO<sub>2</sub> attainment area in the I-25 Valley Highway FEIS); however, the EPA will make a new NO<sub>2</sub> attainment determination for the recently promulgated 1-hour standard. This re-designation will be based on three years of data collected at near road monitors, including a monitor that is being installed by Colorado Department of Public Health & Environment (CDPHE) along I-25 at Yuma Street and West Mulberry Place, approximately half mile north of the project area.

The CAA requires that a State Implementation Plan (SIP) be prepared for each nonattainment area, and a maintenance plan be prepared for each former non-attainment area. The SIP outlines how the State will meet the NAAQS under the deadlines established by the CAA. In addition, EPA’s Transportation Conformity Rule requires Metropolitan Planning Organizations and the FHWA to make conformity determinations on projects before they are approved. Conformity to the purpose of a SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS.

The US 6 and Federal Boulevard Intersection improvement is included in the fiscally constrained 2035 Regional Transportation Plan (RTP) which was adopted in February 2011 as part of the Metro Vision 2035 Plan. The Metro Vision 2035 RTP complies with the applicable Denver-area SIP.

## Conformity Rule

The Clean Air Act (CAA) Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct the EPA to implement environmental policies and regulations that will ensure acceptable levels of air quality. The Conformity Rule affects the funding and approval of proposed transportation projects. According to Title I, Section 176 (c) 2:

*No federal agency may approve, accept or fund any transportation plan, program or project unless such plan, program or project has been found to conform to any applicable State Implementation Plan (SIP) in effect under this act.*

Section 176(c)1(A) of the CAA defines conformity as follows:

Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards; and that such activities will not:

- Cause or contribute to any new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

### Pollutants of Concern

Of the seven criteria pollutants, CO and PM<sub>10</sub> are considered as pollutants of interest for the **Proposed** Project. Ambient concentrations of Pb, SO<sub>2</sub> and NO<sub>2</sub> are not significantly affected by highway emissions and therefore are not likely to be significantly affected by the roadway improvements to US 6, and the associated changes in transportation-sector sources of emissions for these pollutants and are not discussed further in this report. Project-related changes in ozone levels were also not considered in this analysis because O<sub>3</sub> is a regional pollutant that is evaluated on an area-wide basis, and, as the US 6 Bridges improvement project is incorporated in the region's planning documents and area-wide dispersion modeling analyses, project-related changes will be accounted for in the SIP.

CO is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles, and CO concentrations can vary greatly over relatively short distances. This pollutant was selected for analysis because relatively high concentrations of CO are typically found near congested intersections and along heavily used roadways carrying slow-moving traffic. The **Proposed** Project may affect traffic conditions at nearby congested intersections.

PM<sub>10</sub> was selected for analysis because the project area is designated as a PM<sub>10</sub> maintenance area and the **Proposed** Project would affect diesel-fueled truck traffic on several local roadways. Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids and metals. Particulate matter also forms when industry and gases emitted from motor vehicles undergo chemical reactions in the atmosphere. Major sources of PM<sub>10</sub> include motor vehicles; wood-burning stoves and fireplaces; dust from construction, landfills and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions.

Carcinogenic pollutants generated by diesel and gasoline-fueled vehicles are classified as mobile source air toxics (MSATs), and include, among others: formaldehyde, benzene, acrolein, 1,3 butadiene, acetaldehyde, and diesel particulate matter. Emission burdens of these six MSATs are considered in this analysis.

## Existing Conditions

Representative monitored ambient air quality data for the project area are summarized in Table 2. These data are provided on the EPA AirData database and are for year 2011, the latest full year for which data are currently available. Monitored levels are the highest pollutant levels recorded during the 2011 calendar year. The maximum recorded ambient levels are not always used to measure the pollutant standard; to be consistent among the standard averaging times and durations, monitored pollutant levels are statistically adjusted for various percentiles. With the exception of recorded ozone levels being above the standards, monitored values of all of the other criteria pollutants are within (less than) the NAAQS.

**Table 2: Representative Ambient Air Quality Data (2011)**

Pollutant	Monitor	Averaging Time	Value
O <sub>3</sub>	678 Jason St.	8-hour	0.095 ppm
CO	2105 Broadway – Camp	8-hour	1.9 ppm
		1-Hour	3.5 ppm
NO <sub>2</sub>	2105 Broadway – Camp	1-Hour	94 ppb
SO <sub>2</sub>	2105 Broadway – Camp	1-Hour	52 ppb
PM <sub>10</sub>	2105 Broadway – Camp	24-Hour	109 µg/m <sup>3</sup>
PM <sub>2.5</sub>	2105 Broadway – Camp	Annual	7.5 µg/m <sup>3</sup>
		24-Hour	31.6 µg/m <sup>3</sup>

Source: EPA Airdata Database: <http://www.epa.gov/airdata>

## Microscale CO Analysis

### ***Analysis Site and Receptor Locations***

One large analysis site was considered in this modeling analysis (i.e., all affected roadways under each set of traffic conditions were evaluated in one modeling run). This site consists of the intersection of Federal Boulevard and US 6, which would be redesigned as a result of the relocation of the EB US 6 entrance ramp, and the intersection of Federal Boulevard and 5<sup>th</sup> Avenue, which would become a signalized intersection. The 5<sup>th</sup> Avenue/Federal Boulevard intersection was also selected because it has the highest truck volumes, one of the highest overall traffic volumes, and worst levels of service (LOS) in the project area. The analysis included both intersections (see Figure 4). Receptors (i.e., locations where pollutant concentrations were estimated) were placed along the approach and departing lanes of each intersection at distances recommended in the EPA *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* (EPA-454/R-92-005).



Figure 5: Modeling Site and Receptor Locations

### ***Dispersion Modeling***

Carbon monoxide levels near affected roadway intersections were estimated using the EPA CAL3QHC (Version 2.0) air quality dispersion model (EPA-404/12-92-006). This model is currently recommended in the EPA CO Modeling Guidelines for estimating CO levels near congested intersections and along heavily traveled roadways. It can be used to estimate pollutant concentrations downwind of a roadway based on the following assumptions: (1) pollutants emitted from motor vehicles traveling along a segment of roadway can be represented by a “line source” of emissions, and (2) pollutants will disperse in a Gaussian, or “normal,” distribution from a defined “mixing zone” over the roadway being modeled. The rate at which pollutants disperse is assumed to be a function of wind speed and direction, and the temperature profile of the atmosphere.

The transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind speed, wind direction, and stability. Following EPA guidelines, a wind speed of one meter per second and neutral atmospheric conditions were used.

Different emission rates occur when vehicles are stopped (idling), accelerating, decelerating, and moving at different speeds. CAL3QHC simplifies these different emission rates into the following two components:

- Emissions when vehicles are stopped (idling) during the red phase of a signalized intersection; and
- Emissions when vehicles are in motion during the green phase of a signalized intersection.

In addition, CAL3QHC estimates the average number of vehicles that would queue during the red phase of an intersection based on the characteristics of intersection and traffic conditions. This model was used to directly estimate 1-hour CO concentrations. Meteorological data used with the CAL3QHC analysis conservatively assumes the reasonable worst case scenario as recommended by the EPA in the Guidelines for the Modeling Carbon Monoxide from Roadway Intersections.

#### ***Traffic Data***

Traffic analysis of the project area is described in the US 6 Bridges Design Build Project Transportation Analysis Technical Report for existing conditions, future conditions without the ~~Proposed~~ Project, and future conditions with the ~~Proposed~~ Project. The existing condition is the year 2012; the future scenarios are for the year 2035.

Using the 2025 FEIS traffic projections documented in various traffic reports<sup>1</sup> as the basis, Year 2035 traffic volumes on the project area roadways were forecasted. Vehicle mix assumptions and traffic analysis parameters, especially related to the percentage of trucks assumed for the EIS analyses, were based upon information obtain from the Valley Highway EIS.

An in depth analysis was performed regarding the vehicle mix and traffic circulation for the eastbound Bryant Street off-ramp from US 6 and the ingress and egress traffic movements from 5<sup>th</sup> Avenue at Federal Boulevard. In the current and No-Build conditions, vehicles with origins and destinations along 5<sup>th</sup> Avenue, 7<sup>th</sup> Avenue and Bryant Street have two options for access.

1. They can use the US 6 ramps at Bryant Street.
2. They can utilize Federal Boulevard at the intersections with 5<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup>.

An important point in this current configuration is that vehicles on the south side of US 6 can utilize the 5<sup>th</sup> Avenue slip ramp connection to access US 6. In the ~~Proposed~~ Project, this slip ramp is replaced with

---

<sup>1</sup> Traffic Report for the Valley Highway EIS Denver, Colorado, prepared for FHWA by Felsburg, Holt & Ullevig and CDOT, February 28, 2005; Traffic Report addendum for the Valley Highway EIS Denver, Colorado, prepared for FHWA by Felsburg, Holt & Ullevig and CDOT, October, 2006; Valley Highway System Level Study, Colorado, prepared for CDOT by Felsburg, Holt & Ullevig, May 2007; and Record of Decision for the I-25 Valley Highway Logan to US 6 Denver CDOT Project IM 0252-315 FHWA-CO-EIS-05-01-F, Colorado, prepared for FHWA by Felsburg, Holt & Ullevig, June, 2007.

the braided ramp from Federal. The result is that vehicles destined to US 6 will be required to access it from Federal, via the 5<sup>th</sup> Avenue/Federal Boulevard intersection.

### **Traffic Volumes and Projections**

The existing, eastbound US 6 off ramp at Bryant Street carries over 1,800 vehicles per day with volumes of about 140 vehicles in both the AM and PM peak periods.

In the 2035 No-build condition, the eastbound US 6 off ramp at Bryant Street is projected to increase to approximately 2,700 vehicles per day with volumes of about 220 vehicles in both the AM and PM peak periods.

### ***Analysis Year***

The EPA conformity rule requires that project-level analysis consider the year of expected peak emissions for the project. FHWA/EPA guidance also requires the analysis to consider the full timeframe of the area's transportation plan. The current adopted transportation plan in the Denver metropolitan area is the DRCOG *2035 Metro Vision Regional Transportation Plan (2035 MVRTP)* (DRCOG, February 2011). In accordance with the 2035 MVRTP, 2035 was selected as the future year for the air quality analysis. Microscale analyses were therefore performed for future conditions with and without the ~~Proposed~~ Project for the projected year 2035.

### ***Vehicle Emission Factors, Background Concentrations and Persistence Factor***

Emission factors for the analysis were obtained from the Colorado Department of Public Health and Environment (CDPHE). Emission factors at each link were estimated using the modeled traffic speeds from the regional traffic demand model and vehicle classes unique to this roadway. Existing year (2012) vehicular emission factors were conservatively used to predict future (2035) Build and No Build pollutant levels.

Microscale modeling is used to predict CO concentrations resulting from emissions from motor vehicles using roadways immediately adjacent to the locations at which predictions are being made. A CO background level must be added to this value to account for CO entering the area from other sources upwind of the receptors. The CO background level should be located away from the influence of local traffic congestion.

A persistence factor is a factor that takes into account variation of traffic and meteorological conditions over the eight hours compared with the single peak hour. Traffic volumes are usually lower during the off-peak hours while vehicular speeds are higher which creates conditions for lower emissions. Meteorological conditions (most significantly, wind speeds and directions) vary and change concentrations compared with the estimate for the single hour.

Background CO concentrations and a persistence factor for the project area used in this analysis were also obtained from the CDPHE and are presented in the Table 3. Further details of the CO analysis for this ~~Proposed~~ Project are provided in the Appendix to this report.

**Table 3: Background Concentrations and Persistence Factor**

Time period	Background Concentrations (ppm)	Persistence factor
1 Hour	6.4	n/a
8 Hour	3.6	0.56

**Results**

The modeling procedures described above were used to estimate air quality levels under future (2035) conditions without the ~~Proposed~~ Project (i.e., the No Build Alternative) and with the ~~Proposed~~ Project. The results of the analysis are presented in Table 4. Presented are the highest values estimated under Future No Build, and Future Build Alternative scenarios under any of the meteorological conditions considered for the AM and PM peak hours. The predicted values, which include background values, are all within the respective NAAQS for one hour and eight hour CO concentrations. Therefore, the potential mobile source air quality impacts of the Build Alternative are not considered to be significant.

**Table 4: Highest One and Eight Hour CO Concentrations (ppm)**

Scenario	2035 No Build	2035 Preferred Alternative	CO NAAQS
One Hour	12.3	12.3	35
Eight Hour	6.9	6.9	9

Notes:

1. Highest concentrations between the Build and the No Build condition. The results of the Build and No Build condition occurred at different receptors within the analysis area.
2. Background concentrations are included.

## PM<sub>10</sub> Analysis

The project was evaluated to determine if the proposed improvements and resultant changes to diesel truck traffic would rise to the level of a PM<sub>10</sub> project of concern under 40 CFR 93, requiring a PM<sub>10</sub> conformity analysis. Criteria were evaluated following the guidelines in the FHWA/EPA *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas (June 12, 2009, referred to as "PM<sub>2.5/10</sub> Guidance")*, which is an update of the guidelines used in the FEIS.

Applying the PM<sub>2.5/10</sub> Guidance, a PM<sub>10</sub> hot-spot analysis should be conducted according to qualitative guidance only if the project is a project of air quality concern, as defined in 40 CFR 93.123(b)(1) as follows:

- i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;*
- ii. 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;*
- iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;*
- iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and*
- v. Projects in or affecting locations, areas, or categories of sites which are identified in the PM<sub>2.5</sub> or PM<sub>10</sub> applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.*

Examples of projects of air quality concern that would be covered by 40 CFR 93.123(b)(1)(i) and (ii) include the following:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) where 8% or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E or F) that has a significant increase in the number of diesel trucks; and
- Similar highway projects that involve a significant increase in the number of diesel transit buses and/or diesel trucks.



The traffic projections performed for the ~~Proposed~~ Project (as described in memo: Traffic Circulation Evaluation for US6 Bridges—Air Quality (PM10 and MSAT), August 2012 demonstrated that the ~~Proposed~~ Project will improve traffic circulation compared with the No Build condition. The FEIS documented that the vehicle mix at the Bryant Street and 5<sup>th</sup> and 8<sup>th</sup> Avenue intersections is 30 percent trucks under Existing Conditions. The projected number of trucks at the Bryant Street Off Ramp intersection will increase under the No Build Alternative by 66 to 74 trucks per hour (57 percent increase) and decrease under the Preferred Alternative by 11 to 12 trucks per hour (74 to 75 percent decrease). Truck volumes and percentages will decrease between the No Build and the Preferred Alternative by 55 to 62 trucks and 84 percent, respectively. Truck volumes at the 5<sup>th</sup> Avenue and Federal Boulevard intersection are projected to increase from the Existing Condition to the No Build and to the Preferred Alternative: from 98 to 190 trucks per hour under the Existing Condition to 261 to 383 trucks per hour under the No Build or 147 to 171 trucks per hour under the Preferred Alternative. However, the ~~Proposed~~ Project will improve traffic conditions compared with the No Build scenario. The truck percentages and overall traffic volumes at the 5<sup>th</sup> Avenue intersection are projected to decrease in the Preferred Alternative. Truck percentages are estimated to decrease by between 35 to 62 percent and the total truck volumes are projected to decrease by between 90 to 236 trucks per hour. The US 6 Freeway traffic includes 3 percent trucks and buses under Existing Conditions according to the Valley Highway FEIS. The traffic volume and truck percentage on US 6 is not affected by the ~~Proposed~~ Project.

Based on these projections, the ~~Proposed~~ Project is predicted to minimally affect truck operations on the affected roadways and that the diesel truck volumes on the roadways affected by the ~~Proposed Project~~ are less than volumes that would be considered as significant. Following guidance set forth in 40 CFR 93.123(b)(1)(i), the Colorado Department of Public Health and Environment, Air Pollution Control Division, EPA and FHWA determined on August 22, 2012 that the ~~Proposed Project~~ is not considered a project of air quality concern regarding PM<sub>10</sub> emissions. This has been confirmed through an interagency consultation procedure.

### MSAT Analysis

In addition to the criteria pollutants for which there are NAAQS, USEPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). The Clean Air Act identified 188 air toxics. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007 [which is an update to the procedures used in the FEIS]) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (<http://www.epa.gov/ncea/iris/index.html>). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (<http://www.epa.gov/ttn/atw/nata1999/>). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and

polycyclic organic matter. While FHWA considers these priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

***Sec. 1502.22 Incomplete or Unavailable Information***

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

- a. If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
- b. If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
  1. a statement that such information is incomplete or unavailable;
  2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
  3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
  4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.
- c. The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

***Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis***

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action. The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, <http://www.epa.gov/ncea/iris/index.html>). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, <http://pubs.healtheffects.org/view.php?id=282>) or in the future as vehicle emissions substantially decrease (HEI, <http://pubs.healtheffects.org/view.php?id=306>).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 and Emfac2011 model, and the latest EPA's MOVES2010b model in forecasting MSAT emissions are highly inconsistent. MOVES results indicate that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study ([http://www.epa.gov/scram001/dispersion\\_alt.htm#hyroad](http://www.epa.gov/scram001/dispersion_alt.htm#hyroad)), which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (<http://pubs.healtheffects.org/view.php?id=282>). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (<http://www.epa.gov/risk/basicinformation.htm#g>) and the HEI (<http://pubs.healtheffects.org/getfile.php?u=395>) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

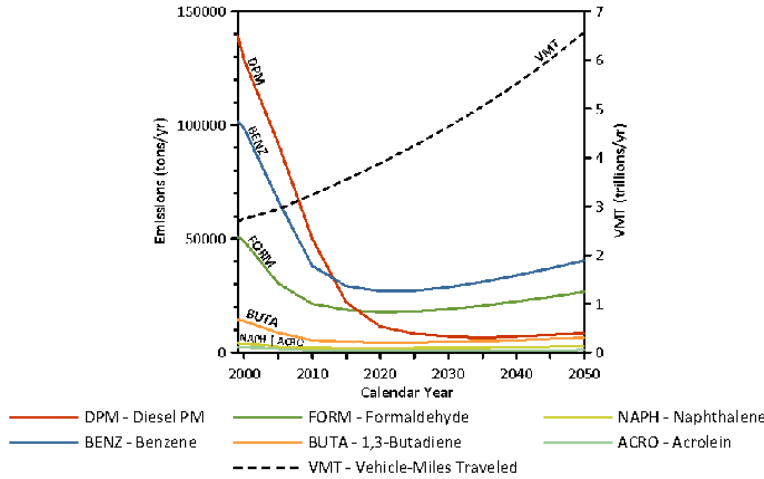
#### ***MSAT Assessment***

Technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and the effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions with the project. While a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences in MSAT emissions, if any, from the project alternatives.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in Figure 6.

Also, regardless of the alternative, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. The magnitude of the EPA-

projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the project area are likely to be lower in the future in nearly all cases.



**Figure 6: NATIONAL MSAT EMISSION TRENDS 1999 – 2050 FOR VEHICLES OPERATING ON ROADWAYS USING EPA'S MOBILE6.2 MODEL**

**Notes:**

- (1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
- (2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: U.S. Environmental Protection Agency. MOBILE6.2 model run 20 August 2009.

**Traffic Assessment for the Project Area**

Changes in traffic circulation were evaluated under existing and future conditions at Bryant Street and off ramp from the US 6 and at the intersection of 5<sup>th</sup> Avenue and Federal Boulevard. High truck percentages were documented along the Bryant Street under the Existing Condition in the I-25 Valley Highway FEIS. As mentioned previously in this report, the actual estimated number of trucks at Bryant Street off ramp is small, 42 to 47 trucks per hour under the Existing scenario, as provided in the memorandum titled "Traffic Circulation Evaluation for US6 Bridges—Air Quality (PM10 and MSAT)." The projected number of trucks at that intersection will increase under the No Build Alternative to 66 to 74 trucks per hour (57 percent increase) and decrease under the Preferred Alternative to 11 to 12 trucks per hour (74 to 75 percent decrease). Truck volumes and percentages will decrease between the No Build and the Preferred Alternative by 55 to 62 trucks and 84 percent, respectively. Truck volumes at the 5<sup>th</sup> Avenue and Federal Boulevard intersection are projected to increase from the Existing Condition to the No Build and to the Preferred Alternative: from 98 to 190 trucks per hour under the Existing Condition to 261 to 383 trucks per hour under the No Build or 147 to 171 trucks per hour under the

Preferred Alternative. However, the ~~Proposed Project~~ will improve traffic conditions compared with the No Build scenario. The truck percentages and overall traffic volumes at the 5<sup>th</sup> Avenue intersection are projected to decrease in the Preferred Alternative. Truck percentages are estimated to decrease by between 35 to 62 percent and the total truck volumes are projected to decrease by between 90 to 236 trucks per hour.

**MSAT results**

As shown in Table 5, MSAT emissions in the project area would be less in 2035 under the Preferred Alternative than under future No Build condition for all pollutants. Traffic volumes, and specifically the truck volumes and percentage of trucks at the sensitive areas affected by the ~~Proposed Project~~ under the Preferred Alternative, will be less than under future No Build scenario.

The slight predicted increase in some MSAT emissions in the future compared with the Existing Condition resulted from VMT increases, which more than offset the decrease in vehicle emissions. Overall, the project’s MSAT impacts are not considered to be significant.

**Table 5: Average Summer/Winter MSAT Emissions in the Project Area (pounds/season)**

Pollutants	Existing	Future No Build	Preferred (Build) Alternative
Acrolein	237	252	242
Benzene	14,020	11,320	10,811
1,3-Butadiene	1,495	1,337	1,299
DPM	50	21	21
Formaldehyde	5,321	5,796	5,596

Source: CPDHE

**Global Climate Change Cumulative Effects Discussion**

The issue of global climate change is an important national and global concern that is being addressed in several ways by the Federal government. The transportation sector is the second largest source of total greenhouse gases (GHGs) in the U.S., and the greatest source of carbon dioxide (CO<sub>2</sub>) emissions – the predominant GHG. In 2010, the transportation sector was responsible for 32 percent of all U.S. CO<sub>2</sub> emissions. The principal anthropogenic (human-made) source of carbon emissions is the combustion of fossil fuels, which account for approximately 80 percent of anthropogenic emissions of carbon worldwide. 98 percent of transportation-sector emissions result from the consumption of petroleum products such as gasoline, diesel fuel, and aviation fuel.

Recognizing this concern, FHWA is working nationally with other modal administrations through the DOT Center for Climate Change and Environmental Forecasting to develop strategies to reduce transportation’s contribution to greenhouse gases - particularly CO<sub>2</sub> emissions - and to assess the risks to transportation systems and services from climate changes.

At the state level, there are also several programs underway in Colorado to address transportation GHGs. The Governor’s Climate Action Plan, adopted in November 2007, includes measures to adopt vehicle CO<sub>2</sub> emissions standards and to reduce vehicle travel through transit, flex time, telecommuting,

ridesharing, and broadband communications. CDOT issued a policy Directive on Air Quality in May 2009. This Policy Directive was developed with input from a number of agencies, including the State of Colorado's Department of Public Health and Environment (CDPHE), the U.S. Environmental Protection Agency (EPA), the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Denver Regional Transportation District (RTD), the Denver Regional Air Quality Council (RAQC). This Policy Directive addresses unregulated mobile source air toxics (MSAT) and greenhouse gases (GHG) produced from Colorado's state highways, interstates, and construction activities.

As a part of CDOT's commitment to addressing MSATs and GHGs, some of CDOT's program-wide activities include:

1. Developing truck routes/restrictions with the goal of limiting truck traffic in proximity to facilities, including schools, with sensitive receptor populations.
2. Continue researching pavement durability opportunities with the goal of reducing the frequency of resurfacing and/or reconstruction projects.
3. Developing air quality educational materials, specific to transportation issues, for citizens, elected officials, and schools.
4. Offering outreach to communities to integrate land use and transportation decisions to reduce growth in vehicle miles traveled (VMT), such as smart growth techniques, buffer zones, transit-oriented development, walkable communities, access management plans, etc.
5. Committing to research additional concrete additives that would reduce the demand for cement.
6. Expanding Transportation Demand Management (TDM) efforts statewide to better utilize the existing transportation mobility network.
7. Continuing to diversify the CDOT fleet by retrofitting diesel vehicles, specifying the types of vehicles and equipment contractors may use, purchasing low-emission vehicles, such as hybrids, and purchasing cleaner burning fuels through bidding incentives where feasible. Incentivizing is the likely vehicle for this.
8. Exploring congestion and/or right-lane only restrictions for motor carriers.
9. Funding truck parking electrification (note: mostly via exploring external grant opportunities).
10. Researching additional ways to improve freight movement and efficiency statewide.
11. Developing a low-VOC emitting tree landscaping specification.

Because climate change is a global issue, and the emissions changes from the project alternatives are very small compared to global totals, the GHG emissions associated with the ~~Proposed Project~~Project were not calculated. The relationship of current and projected Colorado highway emissions to total global CO<sub>2</sub> emissions is presented in the table below. Colorado highway emissions are expected to increase by 4.7% between 2009 and 2035. The benefits of the fuel economy and renewable fuels programs in the 2007 Energy Bill are offset by growth in VMT; the draft 2035 statewide transportation plan predicts that Colorado VMT will double between 2000 and 2035.

**Table 6: Comparison of Global CO<sub>2</sub> Emissions to CO<sub>2</sub> Emissions from Colorado Highways**

Global CO <sub>2</sub> emissions, 2005, million metric tons (MMT) <sup>1</sup>	Colorado highway CO <sub>2</sub> emissions, 2005, MMT <sup>2</sup>	Projected Colorado 2035 highway CO <sub>2</sub> emissions, MMT <sup>2</sup>	Colorado highway emissions, % of global total (2005) <sup>2</sup>
27,700	29.9	31.3	0.108%

Notes:

1. EIA, International Energy Outlook 2007
2. Calculated by FHWA Resource Center

## Conclusions

### Conformity Statement

#### Requirements

The Transportation Conformity Rule provides criteria and procedures for determining the conformity to a SIP of a highway project funded under Title 23 U.S.C or approved by FHWA. The **Proposed Project** is located in an area that is designated as nonattainment for O<sub>3</sub> and maintenance area for CO and PM<sub>10</sub>, and hence a conformity determination is required.

The US 6 Intersection improvement is on the fiscally constrained 2035 Regional Transportation Plan (RTP) which was adopted in February 2011 as part of the Metro Vision 2035 Plan, and the Metro Vision 2035 RTP complies with the applicable Denver-area ozone SIP. The **Proposed Project** is fully funded in the current 2012-2017 Metropolitan Transportation Improvement Program (TIP) and the Statewide Transportation Improvement Program (STIP). In addition, it has been determined that the **Proposed Project**:

- Would not cause or exacerbate a violation of a CO standard;
- Is not of air quality concern for PM<sub>10</sub> and is not expected to create or worsen a PM<sub>10</sub> violation;
- In all cases, MSAT emissions will be lower under Preferred Alternative than under the No Build scenario as a result of traffic improvements connected with the project; and
- Is not a significant source of GHG emissions.

Therefore, the **Proposed Project** will comply with the conformity requirements established by the CAA.



## Comparison of FEIS and 2007 ROD to ~~the~~Proposed Project

### ***Mitigation Recommendations***

No mitigation was associated with the operational phase of the 2007 ROD. The following air quality-related construction phase mitigation measures were included:

- Maintain construction equipment in good working order, minimize excessive idling of inactive equipment or vehicles, and consider using higher-grade fuel (which is now obsolete as all non-road diesel vehicles are now required to use ultra-low sulfur fuel)
- Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible

These same measures will apply to the construction phase of the proposed US 6 Bridges Project. Table 7 shows this comparison in detail.

The major air quality findings are that the ~~Proposed Project~~Project:

- Would not cause or exacerbate an exceedance of an air quality standard
- Meets air quality conformity requirements
- Minimizes temporary increases in air emissions during construction

**Table 7: Summary of Previously and Currently Identified Air Quality Impacts and Mitigation**

Resource	FEIS and 2007 ROD		US 6 Bridges Design Build Project: What Has Changed	US 6 Bridges Design Build Project	
	Impacts of Proposed Action	Mitigation		Impacts of Proposed Action	Mitigation
Air Quality	Improved air quality due to improved traffic flow  Meets air quality conformity requirements	N/A	2007: EPA rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007)  2008: EPA modified NAAQS for PM10  2009: New PM2.5/10 Guidance from FHWA/EPA	Improved air quality due to improved traffic flow  Meets air quality conformity requirements	N/A
Air Quality	Temporary increase in air emissions during construction	Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible	N/A	Temporary increase in air emissions during construction	In accordance with CDPHE-APCD requirements, prepare and implement a dust control plan.  Locate stationary emissions equipment with consideration of public health and environment.

Air Quality	Temporary increase in air emissions during construction	Maintain construction equipment in good working order, minimize excessive idling of inactive equipment or vehicles, and consider using higher-grade fuel	2010 EPA requirement that all non-road equipment should use ultra-low sulfur diesel	Maintain construction equipment in good working order; minimize excessive idling of inactive equipment or vehicles, and consider using higher-grade fuel.	<p>Minimize excessive idling of inactive equipment or vehicles.</p> <p><u>All non-road equipment will use ultra-low sulfur diesel.</u></p> <p>If construction equipment is creating excessive air quality emissions that have a potential to affect air quality for operators or persons working/living in the area, equipment shall be taken out of operation until fixed or replaced.</p>
Air Quality	N/A	N/A	N/A	Increased risk of exposure of dust emissions and asbestos to workers, nearby residents and recreational users may be encountered during construction.	Comply with CDOT's Specification 250.70 - Asbestos Containing Material Management if asbestos is encountered.

Formatted: Space After: 0 pt, Line spacing: single

## References

- U.S. Environmental Protection Agency (EPA), 2012. National Ambient Air Quality Standards (NAAQS). Technology Transfer Network, <http://www.epa.gov/ttn/naaqs/>
- EPA, 2012. Mobile Source Air Toxics. Office of Transportation and Air Quality, <http://www.epa.gov/otag/toxics.htm>
- EPA, 2010. Transportation Conformity Regulations (EPA-420-B-10-006)
- Code of Federal Regulations, Title 40 – Protection of Environment, 2012. Transportation Conformity in parts 51 ([Requirements for Preparation, Adoption, and Submittal of Implementation Plans](#)) and 93 (Determining Conformity of Federal Actions to State or Federal Implementation Plans)
- Denver Regional Council of Governments (DRCOG), 2011. 2035 Metro Vision Regional Transportation Plan, Denver CO
- Colorado Department of Transportation (CDOT), 2012. CDOT Air Quality Analysis and Documentation Procedures, Denver CO
- EPA, 1992. Guidelines for Modeling Carbon Monoxide from Roadway Intersections (EPA-454/R-92-005)
- EPA, 1995. User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations near Roadway Intersections
- EPA, 2012. Air Quality System Data Mart, Monitoring Values, <http://www.epa.gov/airdata/>
- U.S. Department of Transportation, Federal Highway Administration (FHWA), 2009. Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA
- EPA, 2010. Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas
- Parsons Brinckerhoff, US 6 Bridges Design Build Project Transportation Analysis Technical Report, July 2012
- Parsons Brinckerhoff, "Traffic Circulation Evaluation for US6 Bridges—Air Quality (PM10 and MSAT)," August 2012