I-70 Mountain Corridor Revised Draft Programmatic Environmental Impact Statement

SEPTEMBER 2010

DEPARTMENT OF TRANSPORTATION

U.S.Department of Transportation
Federal Highway Administration

Project IM 0703-244

I-70 MOUNTAIN CORRIDOR
REVISED DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
SECTION 4(f) DISCUSSION

Submitted Pursuant to:

42 U.S.C. 4332(2)(c) and 49 U.S.C. 303

Submitted by the:

UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
and the
COLORADO DEPARTMENT OF TRANSPORTATION

COOPERATING AGENCIES

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United States Department of the Interior, United States Fish and Wildlife Service
United States Army Corps of Engineers
United States Department of the Interior, Bureau of Land Management
United States Department of Transportation, Federal Transit Administration
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The Federal Highway Administration may publish a notice in the Federal Register, pursuant to 23 United States Code (USC) § 139(1), once 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 180 days after publication of a notice in the Federal Register announcing that the permit, license, or approval is final pursuant to the law under which the agency action is taken, unless a shorter time is specified in the Federal law pursuant to which judicial review is allowed. If no notice is published, then the periods of time that otherwise are provided by the Federal laws governing such claims will apply.

Abstract

The Colorado Department of Transportation and Federal Highway Administration prepared this Revised Draft Programmatic Environmental Impact Statement to provide reader-friendly, concise information about the major findings of the I-70 Mountain Corridor National Environmental Policy Act (NEPA) process. This Revised Draft Programmatic Environmental Impact Statement replaces the 2004 Draft Programmatic Environmental Impact Statement and is responsive to comments received on the 2004 Draft Programmatic Environmental Impact Statement. The I-70 Mountain Corridor extends between Glenwood Springs and C-470, from approximately milepost 116 to milepost 260, and traverses five counties in Colorado: Garfield, Eagle, Summit, Clear Creek, and Jefferson.

This document is the first tier of a Programmatic NEPA process. Twenty-one action alternatives and the No Action Alternative are evaluated for their ability to meet the purpose and need and to gain an understanding of the types of impacts that these alternatives will have in the I-70 Mountain Corridor. The decisions to be made at the first tier are mode, capacity, and general location. These decisions will not be revisited at Tier 2. This document identifies a Preferred Alternative, a long-term 2050 vision of a multimodal transportation solution for the Corridor that includes an Advanced Guideway System combined with local highway and limited highway capacity improvements with an adaptive management approach to additional improvements as they are needed. Potential impacts relative to all the alternatives are identified and considerations for mitigation are discussed. Once the first tier decision is made, further Tier 2 processes will be followed to identify specific alternatives and alignments consistent with the Tier 1 decision and analyze impacts. At that time, specific mitigation commitments will be made.

At the first tier, Colorado Department of Transportation and Federal Highway Administration commit to following the agreements made such as the A Landscape Level Inventory of Valued Ecosystem Components Memorandum of Understanding, Section 106 Programmatic Agreement, and I-70 Mountain Corridor Context Sensitive Solutions Guidance, which are attached in appendices to this document.

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Visit the **project website** at http://www.i70mtncorridor.com for an electronic version of the I-70 Mountain Corridor Revised Draft Programmatic Environmental Impact Statement, Appendices, and Technical Reports. The project website lists the methods in which to submit comments, the time and locations of upcoming public hearings, and the locations where paper copies of the Revised Draft Programmatic Environmental Impact Statement are available for public review.

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I-70 Mountain Corridor PEIS Safety Technical Report

I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report

I-70 Mountain Corridor PEIS Biological Resources Technical Report

I-70 Mountain Corridor PEIS Wetlands and Other Waters of the U.S. Technical Report

I-70 Mountain Corridor PEIS Water Resources Technical Report

I-70 Mountain Corridor PEIS Geologic Hazards Technical Report

I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report

List of Acronyms

µg/m3	micrograms per cubic meter
3Ps	Public-Private Partnerships
4P	Project Priority Programming Process
AASHTO	American Association of State Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
AGGA	AGGA (Alan Golin Gass) Architecture and Urban Design
AGS	Advanced Guideway System
ALIVE	A Landscape Level Inventory of Valued Ecosystem Components
AMI	Area Median Income
APCD	Air Pollution Control Division
APE	Area of Potential Effect
ARNF	Arapaho and Roosevelt National Forests
AST	aboveground storage tank
AVC	animal-vehicle collision
BASINS	Better Assessment Science Integrating Point and Nonpoint Sources
BLM	U.S. Bureau of Land Management
BMPs	best management practices
BRT	Bus Rapid Transit
BTU	British Thermal Units
CATEX	Categorical Exclusion
CCIA	Colorado Commission of Indian Affairs
CCWF	Clear Creek Watershed Foundation
CDBG	Community Development Block Grant
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CE	Collaborative Effort
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLG	Certified Local Government
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO_2	carbon dioxide
Corridor	I-70 Mountain Corridor
CRS	Colorado Revised Statutes
CSS	Context Sensitive Solutions
CTE	Colorado Tolling Enterprise

List of Acronyms

CWA	Clean Water Act
dB	decibel scale
dB(A)	decibel scale, A-weighting
DEIS	Draft Environmental Impact Statement
DIA	Denver International Airport
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOLA	Colorado Department of Local Affairs
DOT	U.S. Department of Transportation
DPM	Diesel Particulate Matter
Draft PEIS	Draft Programmatic Environmental Impact Statement
DRCOG	Denver Regional Council of Governments
EA	Environmental Assessment
EB	eastbound
ECO Trails	Eagle County Regional Trails
ECO Transit	Eagle County Regional Transportation Authority
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EJMT	Eisenhower–Johnson Memorial Tunnels
EO	Executive Order
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Endangered Species Act
FASTER	Funding Advancement for Surface Transportation and Economic Recovery
FGT	Fixed Guideway Transit
FHWA	Federal Highway Administration
F-MIS	Forest Sensitive-Management Indicator Species
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
Gal	gallons
GHG	greenhouse gas
GIS	geographic information system
GRP	Gross Regional Product
HB	House Bill
HHS	U.S. Department of Health and Human Services
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HRT	Heavy Rail Transit
HSST	High-Speed Surface Transport
HUD	U.S. Department of Housing and Urban Development

I-70	Interstate 70
IMC	Intermountain Connection
ITF	Issue Task Force
ITS	Intelligent Transportation System
kWh	kilowatt hour
LEED	Leadership in Energy & Environmental Design
LIZ	Linkage Interference Zone
LOS	Level of Service
LQG	Large Quantity Generator
LRT	Light Rail Transit
LUST	leaking underground storage tank
maglev	magnetic levitation
MBO	Colorado Minority Business Office
MBTA	Migratory Bird Treaty Act
MCAC	Mountain Corridor Advisory Committee
MIS	Major Investment Study
MMT	million metric tons
MOU	Memorandum of Understanding
MOVES	MOtor Vehicle Emission Simulator
MP	milepost
mpg	miles per gallon
mph	miles per hour
MPM	million person-miles
MPO	metropolitan planning organization
MSATs	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standard
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NOA	Notice of Availability
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWCCOG	Northwest Colorado Council of Governments
OAHP	Colorado Office of Archaeology and Historic Preservation
OPS	Colorado Division of Oil and Public Safety

List of Acronyms

OTAQ	Office of Transportation and Air Quality
PA	Programmatic Agreement
PEIS	Programmatic Environmental Impact Statement
Phase I ESA	Phase I Environmental Site Assessment
PLT	Project Leadership Team
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PMT	person miles of travel
PRIAA	Passenger Rail Investment and Improvement Act of 2008
PRR	Passenger Railroad
R1	Colorado Department of Transportation Region 1
R3	Colorado Department of Transportation Region 3
RAQC	Regional Air Quality Council
RCRA	Resource Conservation and Recovery Act
REMI	Regional Economic Models, Inc.
Revised Draft PEIS	Revised Draft Programmatic Environmental Impact Statement
RFTA	Roaring Fork Transportation Authority
RMRA	Rocky Mountain Rail Authority
ROD	Record of Decision
RTD	Regional Transportation District
RTT	Rubber Tire Transit
RV	recreational vehicle
RVD	recreation visitor days
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	Senate Bill
SCAP	Sediment Control Action Plan
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SH	State Highway (numbered highway route)
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SQG	Small Quantity Generator
SREP	Southern Rockies Ecosystem Project
SRHP	State Register of Historic Places
STIP	State Transportation Improvement Program
STOL	short take-off and landing
SWEEP	Stream and Wetland Ecological Enhancement Program
SWMP	Stormwater Management Plan
TAC	Technical Advisory Committee
TDM	Transportation (or Travel) Demand Management
TES	Threatened, Endangered and Sensitive Species

TIFIA	Transportation Infrastructure Finance and Innovation Act
TMDL	Total Maximum Daily Load
TNM	Traffic Noise Model
TP	Total Phosphorus
TPC	Train Performance Calculator
TPR	Transportation Planning Region
TSM	Transportation System Management
TSS	Total Suspended Solids
UCCWA	Upper Clear Creek Watershed Association
UPRR	Union Pacific Railroad
US	United States (also numbered highway route)
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	USDA Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VMT	vehicle miles of travel
VOC	Volatile Organic Compound
WB	westbound
WHI	Weighted Hazard Index
W-MIS	Wildlife Sensitive-Management Indicator Species
WRNF	White River National Forest

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Executive Summary

ES.1 Why did the Colorado Department of Transportation prepare this Revised Draft Programmatic Environmental Impact Statement?

The Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA) (lead agencies) prepared this Revised Draft Programmatic Environmental Impact Statement (Revised DPEIS) to provide reader-friendly, concise information about the Interstate 70 (I-70) Mountain Corridor National Environmental Policy Act (NEPA) process. This Revised DPEIS (referred to as "this document") replaces the 2004 Draft Programmatic Environmental Impact Statement (2004 Draft PEIS), which contains detailed information that is summarized in this document where appropriate. The information in this document is based on the 2004 Draft PEIS plus any changes that have occurred since 2004.

This document is the first tier of a Programmatic NEPA process. It is a stand-alone document that addresses the same topics as the 2004 Draft PEIS and brings the data and analysis up to date, under Council on Environmental Quality regulation 40 Code of Federal Regulations (CFR) 1502.9(a). This document analyzes alternatives developed since the Notice of Intent was issued in January 2000; it includes the alternatives evaluated in the 2004 Draft PEIS, the Preferred Alternative, and the No Action Alternative. This document is responsive to comments received during and since the 2004 Draft PEIS comment period, but does not provide a comment-by-comment response.

In response to public and stakeholder input received following publication of the 2004 Draft PEIS, CDOT initiated the I-70 Mountain Corridor Context Sensitive Solutions process and the Collaborative Effort team, discussed later in the Executive Summary.

ES.2 Why are improvements needed on this Corridor?

Population and employment growth in the Corridor, in the Denver metropolitan area and nationwide, along with accompanying traffic growth has noticeably increased traffic volumes on I-70 for more than 15 years. Recreational travelers currently experience substantial traffic delays on weekends and holidays on the eastern side of the corridor. The western side of the Corridor experiences work trip delays during the week. Congestion periods on both sides of the Corridor will expand with corresponding population and employment resulting in weekday congestion on the eastern side of the corridor

This substantial congestion has a negative impact on the local and statewide economy, decreases mobility, including for freight traffic, compromises the ability of emergency service providers to respond promptly to emergencies and increases accidents.

ES.3 How bad will traffic get in the future without these improvements?

In 2000, drivers traveling to and from the mountains (between Silverthorne and C-470) during weekend peak hours typically experienced an extra hour of driving time; on weekdays, the extra time occasioned by peak traffic conditions amounted to 20 minutes. If no improvements are made beyond those included in the No Action Alternative, congestion in the Corridor will continue to worsen, for example:

- Weekend travel time in 2035 will be about three times higher than today.
- Weekday travel time in 2035 would be more than double what weekday travel time was in 2000.

- Traffic will be especially congested between Copper Mountain and Denver on weekends in 2035, requiring two more hours to make that trip during weekend peak hours. On weekdays, the morning and afternoon peak periods will experience an extra 1 hour and 35 minutes.
- The Eisenhower-Johnson Memorial Tunnels are expected to have 55 percent more weekend traffic in 2035 than today. Weekday demand is expected to increase 85 percent.

ES.4 What is the purpose and need for this project?

The purpose for transportation improvements is to increase capacity, improve accessibility and mobility, and decrease congestion for travel demand, projected to occur in 2035 and 2050, to destinations along the I-70 Mountain Corridor as well as for interstate travel, while taking into account environmental sensitivity, community values, transportation safety, and ability to implement the proposed solutions for the Corridor.

The I-70 Mountain Corridor is shown on **Figure ES - 1**.

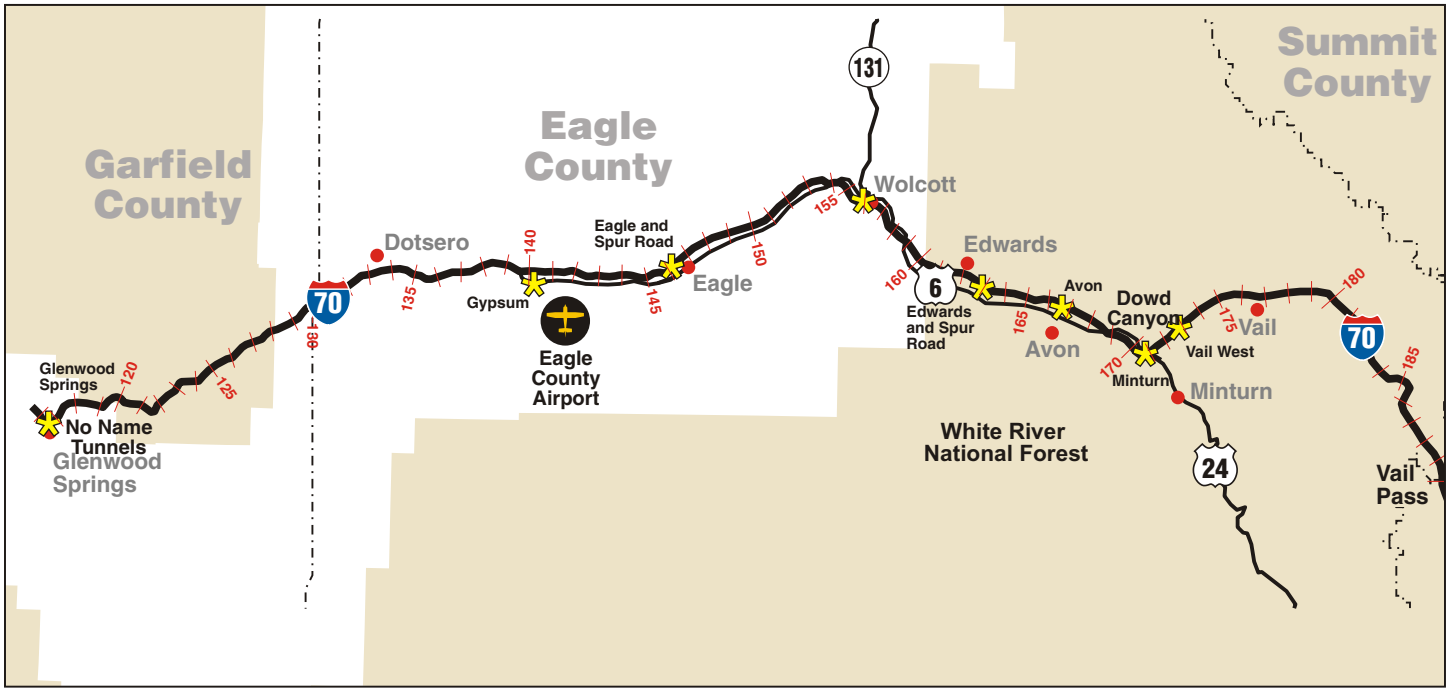
Safety plays a strong role in mobility, accessibility, and congestion. As such, in areas where safety problems currently exist, safety will be considered inherent in the project needs.

The project purpose and specific needs form the basis for developing and evaluating alternative transportation solutions for the I-70 Mountain Corridor, as they are measurable and apply throughout the Corridor. However, addressing transportation needs in the I-70 Corridor requires careful consideration of the physical, environmental and community constraints and requirements created by the mountain and valley terrain of the Corridor. The protection of the narrow mountain valleys, existing historic communities, and extensive natural resources is critical to the State and the communities in the Corridor and these resources—along with natural hazards—define critical constraints for transportation solutions in the Corridor. Alternatives must meet the transportation needs and be developed in a manner that provides for and accommodates the following:

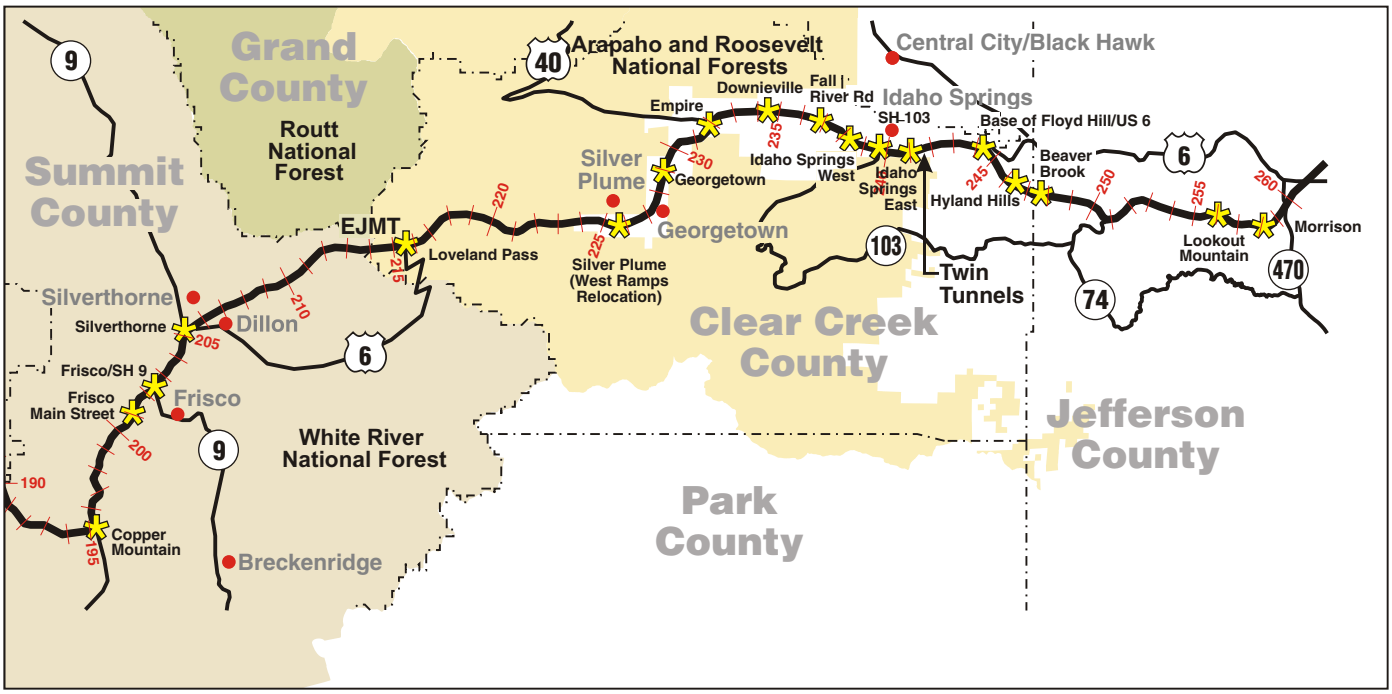
1. **Environmental Sensitivity –** Avoid and minimize adverse impacts on and, where possible, enhance environmental resources, including, but not limited to, stream sedimentation, water quality, wildlife crossings, and impacts on wetlands.
2. **Respect for Community Values –** Avoid and minimize adverse impacts on and, where possible, enhance air quality, historic resources, noise levels, visual resources, and social and economic values, as well as minimize the transportation system's footprint on the mountain communities. Consider the possible growth changes and economic effects that might occur, depending on the ease or difficulty of access.
3. **Safety –** Improve where possible problematic roadway geometric conditions, such as tight curves and lane drops, and consider the safety characteristics of the modes of travel. Many safety conditions along the I-70 Mountain Corridor have been identified as directly affecting the project need, specifically the mobility, accessibility, and congestion elements.
4. **Ability to Implement –** Consider technical feasibility (that is, overall use of a mode and the feasibility of the technology), as well as affordability in terms of capital costs, maintenance and operational costs, user costs, and environmental mitigation costs. Implementation includes construction impacts on existing mobility and the communities along the Corridor.

Figure ES-1. I-70 Mountain Corridor

Western Portion of Corridor



Eastern Portion of Corridor



Potential Interchange Modification Locations

County Boundaries

White River National Forest

Routt National Forest

Arapaho and Roosevelt National Forests

190 Milepost

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

ES.5 Who are the Corridor stakeholders?

Since the Corridor serves such a vital function for many different transportation needs, there are many stakeholders who care about improving mobility and accessibility of I-70 and who care about in what manner this is done. Examples of key stakeholders include the people who live and work in the mountain communities, people who live and work in the Denver metro area and use I-70 for work or recreational trips, freight haulers, recreational business owners including the ski resorts, regular recreational users of the Corridor (including skiers), regular commuters on the Corridor, and environmental groups.

ES.6 How were members of the public and stakeholders informed of and involved in the process?

The Colorado Department of Transportation developed and implemented a public and agency information and involvement program to engage members of the public, agencies, and stakeholders throughout the PEIS process. The program included:

- Notices published in the *Federal Register*.
- Newsletters, project website, telephone information line, and news media.
- Scoping meetings and public open houses.
- Community interviews and internal coordination and planning meetings with local communities; special interest groups; and federal, local, and state agencies.
- Native American consultation.
- Announcement and distribution of 2004 Draft PEIS for public and agency review.
- Public hearings in January and February 2005.
- Establishment of the I-70 Mountain Corridor Context Sensitive Solutions team to develop the I-70 Mountain Corridor Context Sensitive Solutions Guidance.
- Formation of the Collaborative Effort team to reach consensus on a recommended alternative for the Corridor (see **Section ES.15** for more information).
- Creation of a Project Leadership Team to complete the Final PEIS and Record of Decision.
- Formation of three Issue Task Forces to develop mitigation for impacts to cultural resources, environmental resources, and community values.

ES.7 How were agencies and stakeholders involved in the decision-making?

Stakeholders, including counties, municipalities, community associations, and special interest groups with various affected interests, attended agency scoping meetings and served on the several project committees and teams. Following release of the 2004 Draft PEIS, stakeholders became more involved through the formation of the I-70 Mountain Corridor Context Sensitive Solutions team, Project Leadership Team, Issue Task Forces, and the Collaborative Effort team. Project committees and teams are listed below:

- **Technical Advisory Committee (TAC) –** A cross-section of local, state, and federal agencies, counties, municipalities, community associations, and special interest groups with various affected interests formed to provide technical expertise relevant to the project and knowledge about resource areas and issues. The TAC merged with the Mountain Corridor Advisory Committee later in the process.
- **Mountain Corridor Advisory Committee (MCAC) –** Representatives from counties, municipalities, community associations, and special interest groups with various affected interests.

- **Federal Interdisciplinary Team** – Decision-makers from federal and state agencies, who provided expertise relevant to the resources managed by their respective agencies.
- **A Landscape Level Inventory of Valued Ecosystem Components Committee (ALIVE) –** Wildlife professionals from federal and state agencies who identified wildlife habitat of high ecological integrity, wildlife habitat linkages, and barriers to wildlife crossings along the Corridor. They developed a landscape-based ecosystem approach for consideration of wildlife needs and conservation measures, and identified measures to improve existing aquatic and terrestrial ecosystem connectivity across the I-70 Mountain Corridor between Denver and Glenwood Springs. In April 2008, CDOT, FHWA, U.S. Fish and Wildlife Service, the U.S. Department of Agriculture Forest Service, Bureau of Land Management, and Colorado Department of Natural Resources Division of Wildlife signed a Memorandum of Understanding documenting their commitment to identify mitigation and conservation measures during future Tier 2 processes to increase the permeability of the I-70 Mountain Corridor to terrestrial and aquatic species.
- **Stream and Wetland Ecological Enhancement Program (SWEEP) –** Representatives from federal and state agencies, watershed associations, and special interest groups. Members identified and addressed environmental issues related to the improvement of wetlands, streams, and fisheries in the Corridor.
- **Section 4(f) and 6(f) Ad Hoc Committee –** Representatives of state, federal, tribal, and historic entities. Section 4(f) and 6(f) Ad Hoc Committee members identified and inventoried Section 4(f) and Section 6(f) properties, including historic resources, recreation properties and waterfowl and wildlife refuges, within the Corridor.
- **Finance Committee –** Representatives of state, federal, and county agencies. Finance Committee members explored the potential affordability and economic feasibility of the alternatives.
- **Peer Review Committee –** Seven technical experts in their respective fields provided guidance and suggestions on the inputs to the 2025 travel demand model as it was being developed, and reviewed model outputs.

ES.8 How were alternatives developed?

A systematic screening process with public and agency input led to the development of more than 200 alternative elements, which consist of various components based on the following seven alternative element families:

- Transportation management
- Localized highway improvements
- Fixed guideway transit
- Rubber tire transit
- Highway
- Alternate routes
- Aviation

Tunnels are also considered separately because they are major infrastructure projects that apply to highway and transit families.

After evaluation and screening, the lead agencies advanced approximately 80 alternative elements, and retained approximately 10 alternative elements which are similar to those advanced and may be reconsidered during subsequent Corridor processes (called Tier 2 processes) as needed. These alternative elements are represented in the reasonable range of alternatives evaluated in this document. The alternative elements advanced combined to form the components of the 21 Action Alternatives. An

Action Alternative is a package of transportation components evaluated on its ability to address the project needs and evaluation criteria.

Alternative elements evaluated within each of the seven alternative element families listed above included:

- Ten transportation management alternative elements.
- Several localized highway improvements, including curve modifications, auxiliary lanes, and evaluation of 40 interchanges.
- Numerous variations of Fixed Guideway Transit.
- Five rubber tire transit alternative elements.
- Six primary highway improvements, including six-lane widening (horizontal and vertical widening), smart widening (barrier separated/variable shoulder), flex lanes, reversible/High Occupancy Vehicle/High Occupancy Tolled lanes, movable median, parallel routes).
- Seventeen alternate routes.
- Six aviation alternative elements.

ES.9 How were alternatives evaluated?

The alternative elements were evaluated based on their ability to address the project purpose and need, and on how well those elements met environmental, community, safety, and implementation criteria for the Corridor.

In recognition of the need for a short- and long-term sustainable transportation vision, the evaluation uses both a 2035 planning horizon and a 2050 long-term horizon. Data for the year 2035 are based on available projections from a variety of sources and provide the foundation for developing and evaluating alternatives. The 2035 planning horizon also provides a "stepping stone" allowing projections to 2050. The year 2050 provides a long-term horizon for developing solutions for the Corridor. The alternatives are developed and evaluated on a variety of performance measures that can be reliably established for 2035 and for their ability to meet travel demand in 2050.

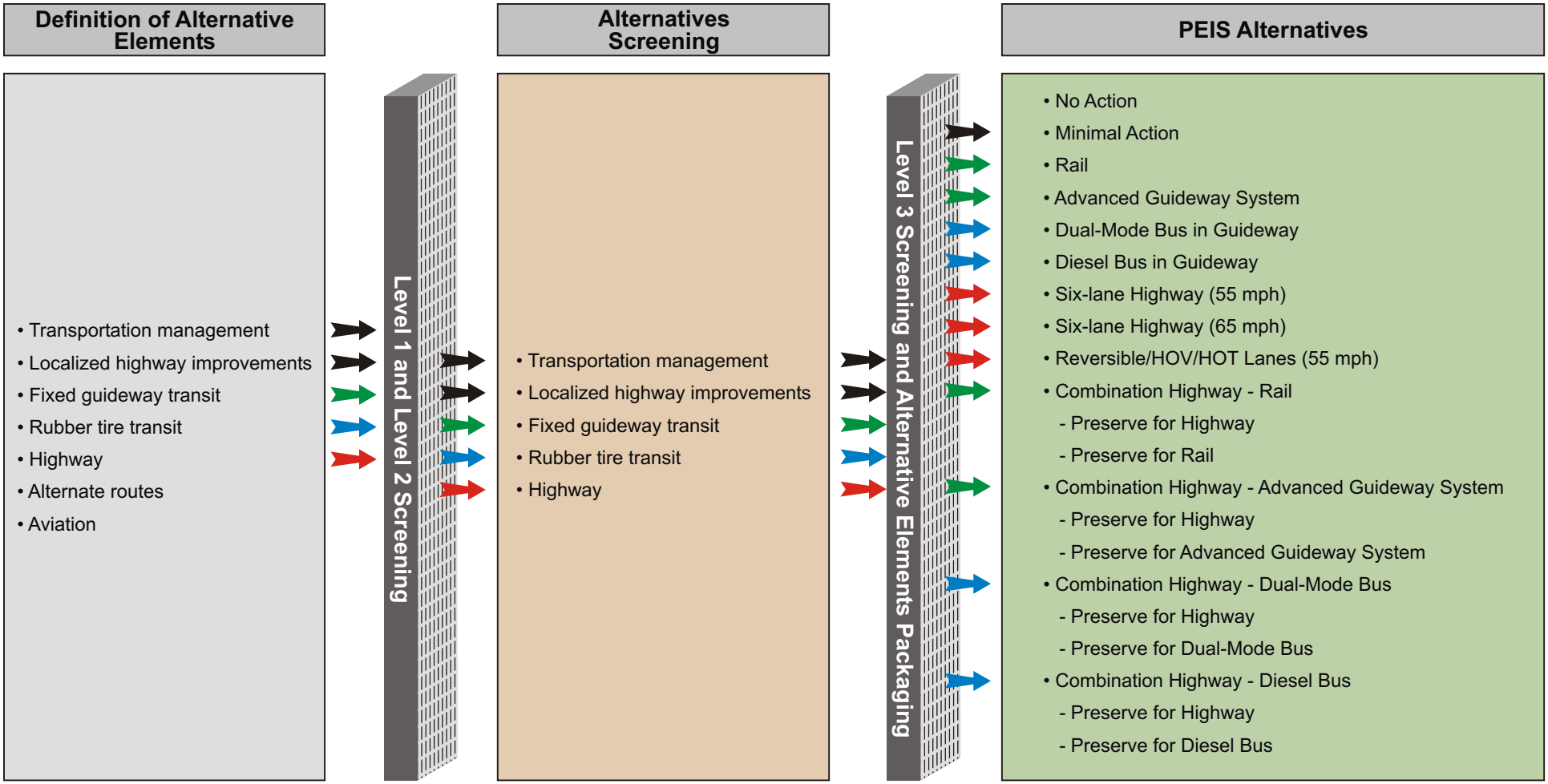
This evaluation used the following three sequential levels of screening:

- **Level 1** screening uses an initial conceptual level of evaluation and screening based on purpose and need.
- **Level 2** screening uses criteria based on purpose and need and Corridor issues applied to many alternative elements at a greater level of detail.
- **Level 3** screening uses detailed screening and refinement of the remaining alternative elements.

Through this three-step screening process, the alternative elements were eliminated, combined, modified, or enhanced into the components of the Action Alternatives that were advanced for further analysis as documented in this document.

Figure ES - 2 shows the alternative screening process.

Figure ES-2. Alternatives Screening Process



Screening and Packaging of Alternatives

- Minimal Action Elements Common to All Alternatives
- Fixed Guideway Transit Elements
- Rubber Tire Transit Elements
- Highway Elements

mph = Miles per Hour

Note: See Section 2.5 for more screening details.

This project began in 2000. During model development beginning in 2000, the 2000 data set provided a complete snapshot of conditions in the Corridor, and it was used for calibration of the travel demand model. Furthermore, the 2000 data set on characteristics of the Corridor provides a base year for comparison purposes to future year scenarios. This data set includes a large amount of travel and socioeconomic data, including the 2000 US Census as well as the I-70 User Survey conducted by the project.

The year 2000 remains valid as a base year for the Tier 1 process of this document because during the development of the PEIS, no major changes have taken place in the 144-mile Corridor that notably alter the snapshot of Corridor conditions provided by the year 2000. There have been no major or minor I-70 infrastructure improvements since 2000, and travel patterns and needs of Corridor users have not changed substantially. Confirmation of the travel demand model performance is provided by a comparison of the future trendline projected by the model with actual counts for 2008. The actual counts are below the model's projection for 2008, by an average of about 17 percent. This is a reasonable comparison given the economic conditions in the nation and the state of Colorado, and the circumstances of abnormally high petroleum prices during the year of 2008. As the economy rebounds, it is expected the demand for travel in the Corridor will again follow the trendline projected by the model to 2025, 2035, and 2050.

ES.10 What is the outcome of this process?

The decisions regarding the transportation solution at the first tier include travel mode, capacity, and general location. This document presents alternatives for this Tier 1 decision. These decisions will not be revisited during Tier 2 NEPA processes unless other laws, such as the Clean Water Act, require revisiting them. The public may comment on any aspect of this document, but the lead agencies would specifically like to hear the views of the public on factors relating to these decisions because these decisions will not be revisited at Tier 2. Although mitigation strategies are proposed at Tier 1 based on potential impacts, additional and specific mitigation measures will be developed at Tier 2.

The analysis of transit modes in this document is made with a representative technology for purposes of including a reasonable range of transit alternatives for broad decision making. Detail regarding a choice of technologies is not available for this Tier 1 decision and will be developed during the Tier 2 process consistent with the mode decision from this Tier 1. Transit technology decisions will be made during Tier 2 processes. The transit modes considered at Tier 1 include Advanced Guideway System, steel wheels-on-steel rail, and bus in guideway.

Tier 2 NEPA processes will refine alternatives, specific alignment, design, and mitigation decisions consistent with the Tier 1 Record of Decision, which is the final decision document for the first tier process. For the first transit-focused Tier 2 NEPA process, the transit technology decision will be made and then incorporated into subsequent Tier 2 NEPA processes. The technology decision may influence other decisions, such as station location or maintenance facility location.

ES.11 What alternatives were advanced for detailed analysis in this document?

The evaluation process resulted in 22 alternatives, including the No Action Alternative and the Preferred Alternative. The 22 alternatives advanced for analysis in this document include:

- No Action Alternative
- Minimal Action Alternative
- Preferred Alternative (Consensus Recommendation)
- Rail with Intermountain Connection
- Advanced Guideway System
- Dual-mode Bus in Guideway

- Diesel Bus in Guideway
- Six-Lane Highway 55 mph
- Six-Lane Highway 65 mph
- Reversible/HOV/HOT Lanes
- Combination Six-Lane Highway with Rail and Intermountain Connection
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Advanced Guideway System
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Dual-mode Bus in Guideway
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Diesel Bus in Guideway
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation

Refer to **Figure ES - 2**, which shows the results of the screening process. Many of the alternatives share many common components. For example, many alternatives simply provide different combinations of the same transit or roadway improvements.

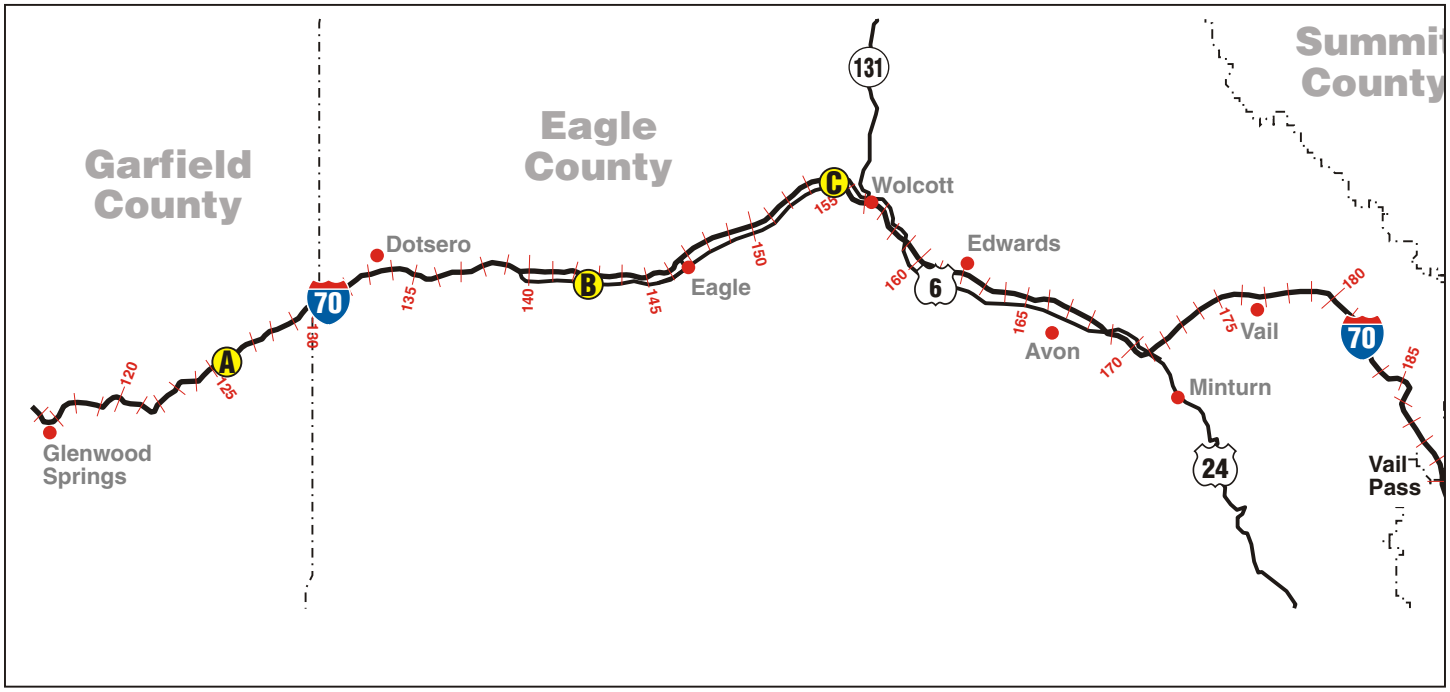
ES.12 What is the No Action Alternative?

The No Action Alternative includes only ongoing highway maintenance and improvements with committed funding sources highly likely to be implemented by the 2035 planning horizon. These improvements are committed whether or not any other improvements are constructed with this I-70 Mountain Corridor project. The No Action Alternative is assessed and used as a baseline for environmental analysis and represents what would exist if no action were taken based on the NEPA process. The No Action Alternative includes the following elements and is shown on **Figure ES - 3.**

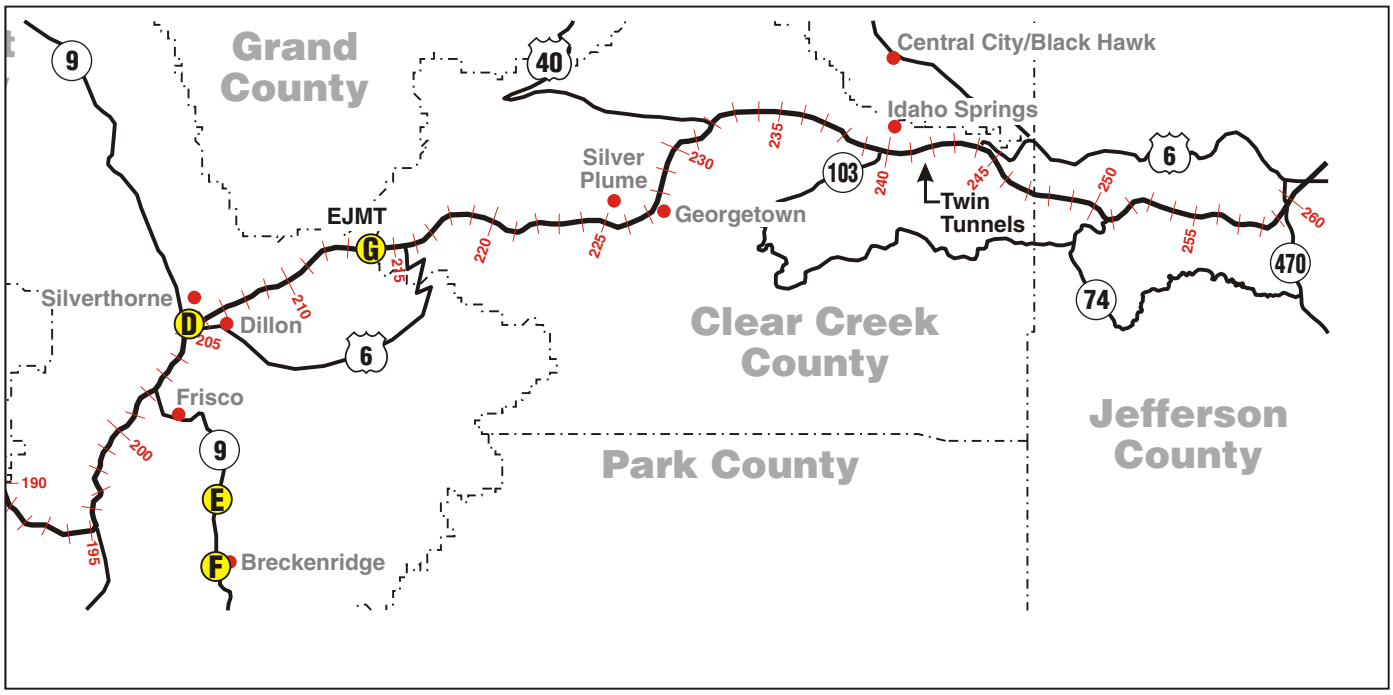
- Eagle County Regional Airport Interchange improvements
- Upgrading SH 9 between Frisco and Breckenridge to four lanes
- Overlay and shoulder widening on US 6 between milepost 153 and milepost 158
- Two new park-and-ride facilities at Silverthorne (milepost 206) and Breckenridge (SH 9)
- Enhancements to Hanging Lake Tunnel in Glenwood Canyon, and Eisenhower-Johnson Memorial Tunnels
- Routine safety, resurfacing, bridge repairs, sediment control, and other maintenance activities

Figure ES-3. No Action Alternative

Western Portion of Corridor



Eastern Portion of Corridor



Highway

- B Eagle County Regional Airport Interchange (mp 142-143) - EA
- C US 6 Improvements (mp 153-158)
- E Widening SH 9 from I-70 to Breckenridge (mp 203) - EIS

Park-and-Ride Facilities

- D Silverthorne (mp 205.5)
- F Breckenridge (SH 9)

Tunnel Enhancement

- A Hanging Lake (mp 125)
- G EJMT (mp 213.5-215)

GENERAL IMPROVEMENTS NOT SHOWN ON MAP

- Routine Safety
- Resurfacing
- Bridge Repairs
- Other Maintenance Activities
- Sediment Control

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

ES.13 What is the Minimal Action Alternative?

The Minimal Action Alternative provides a range of local transportation improvements along the Corridor without providing major highway capacity widening or dedicated transit components. These improvements include:

- **A transportation management program** that includes Transportation Demand Management (TDM), Transportation System Management (TSM), and Intelligent Transportation Systems (ITS).
- **Interchange modifications** to 26 Corridor interchanges.
- **Auxiliary lane improvements** for slow-moving vehicles at 12 locations.
- **Curve safety modifications**: proposed in four locations to increase design speed on mainline curves.
- **Sediment control programs** at Black Gore Creek, Straight Creek, and Clear Creek to provide better control of runoff from snowmelt and are early action projects.
- **Frontage road improvements** from Hidden Valley to US 6 Frontage Road.
- **Bus service in mixed traffic**: This was eliminated as a standalone alternative but is part of the Minimal Action Alternative to provide a corridorwide transit option where none currently exists. This bus service connects existing bus transit systems in the Corridor.

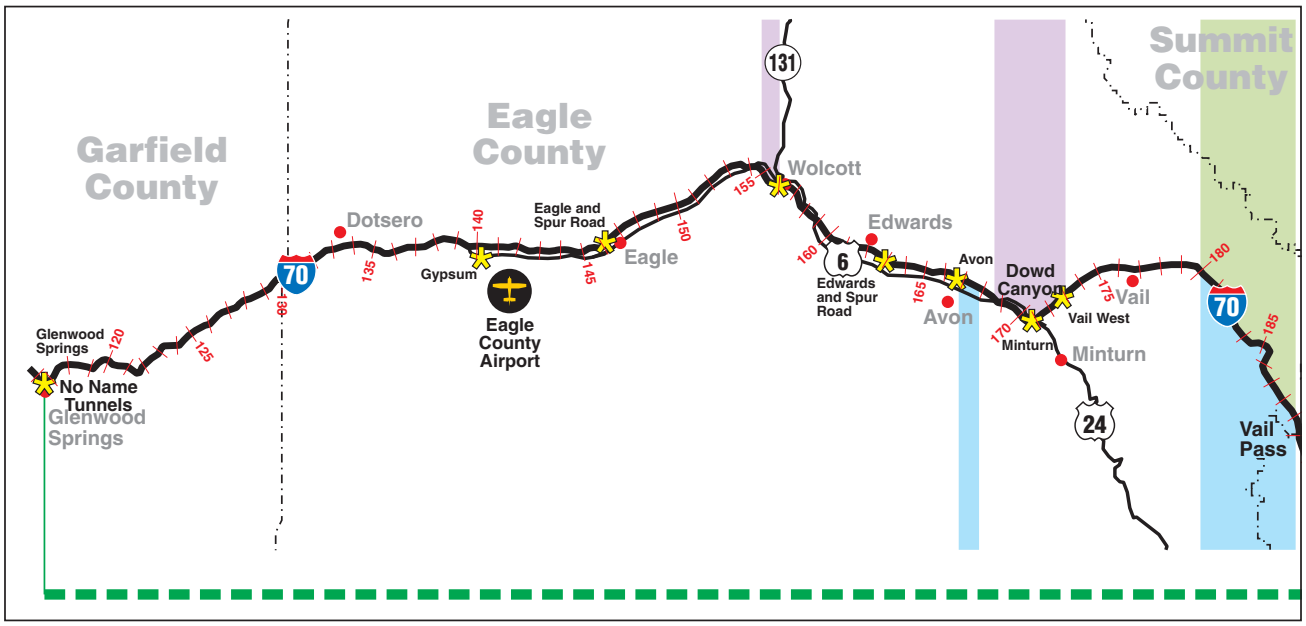
What is TDM / TSM / ITS?

- TDM increases roadway effectiveness by encouraging traveler behaviors that reduce vehicular demand during peak periods, such as ridesharing and telecommuting.
- TSM improves the operation of the physical roadway infrastructure, through the use of ramp metering (regulates the amount of traffic entering freeways through the use of a traffic signal based on traffic conditions) and traffic operations plans.
- ITS uses advanced applications of electronics and communications to achieve TSM and TDM goals, such as enhanced traveler information and variable message signs.□

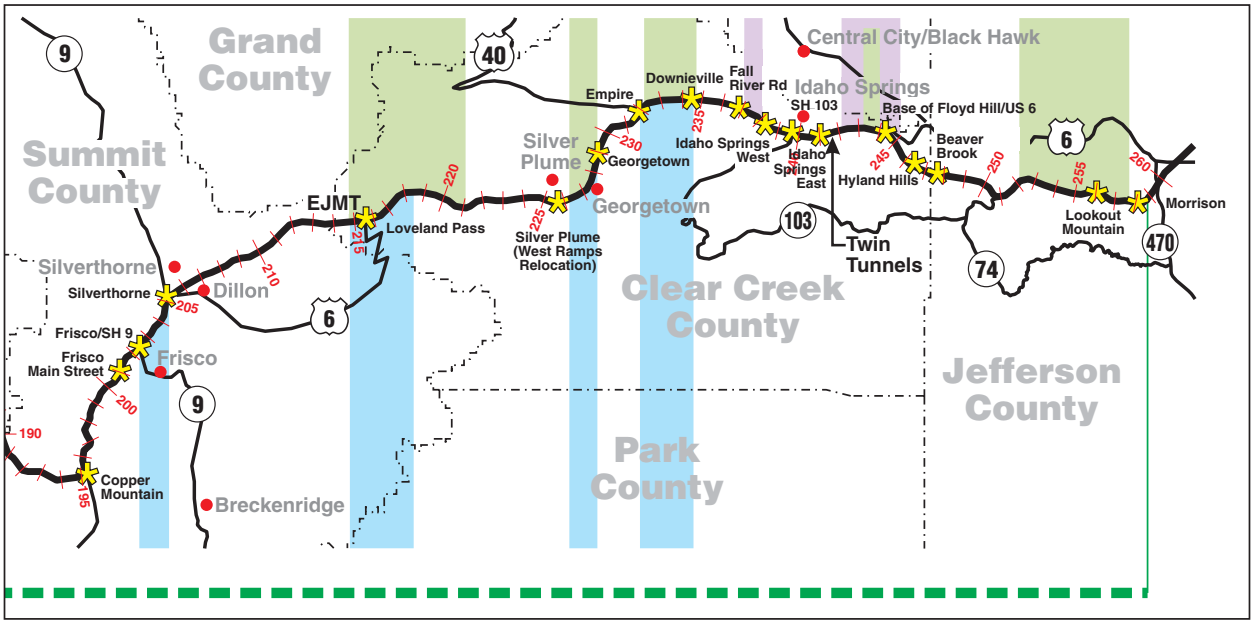
Figure ES - 4 shows these improvements by area. All or portions of this alternative are added to the other Action Alternatives and could proceed as early action projects (see **Introduction** of this document).

Figure ES-4. Minimal Action Alternative

Western Portion of Corridor



Eastern Portion of Corridor



- Potential Interchange Modification Locations
- Eastbound Auxiliary Lane Locations
- Westbound Auxiliary Lane Locations
- Curve Safety Modifications
- Bus in Mixed Traffic System (Service Coordinated with/Provided by Local Transit Agencies)

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

ES.14 What components are included in the remaining Action Alternatives?

Components that form the Action Alternatives include:

- Minimal Action Alternative Components
- Transit Alternative Components
- Highway Alternative Components
- Tunnels
- Combination Alternatives and Preservation Options

These components are summarized below.

ES.14.1 Minimal Action Alternative

The Minimal Action Alternative components discussed above are included in each of the 20 Action Alternatives, except as described below:

- All Action Alternatives with six-lane highway widening have auxiliary lane improvements in only the following locations:
  - Eastbound Avon to Post Boulevard,
  - Both directions on the west side of Vail Pass,
  - Eastbound Frisco to Silverthorne, and
  - Westbound Morrison to Chief Hosa.

  Auxiliary lanes are not needed in locations where six lanes are provided.
- Transit Alternatives do not have curve safety modifications at Dowd Canyon and only have auxiliary lane improvements at eastbound Eisenhower-Johnson Memorial Tunnels to Herman Gulch and westbound Downieville to Empire.
- With the Six-Lane Highway (65 mph) Alternative only, the curve safety modification at Dowd Canyon is replaced by tunnels.
- Action Alternatives do not include bus in mixed traffic because a more extensive transit system is provided and it does not provide travel time improvement commensurate with the added cost.

Potential Transit Station Locations

- Eagle County Regional Airport
- Town of Eagle
- Edwards/Wolcott
- Avon/Beaver Creek
- Vail
- Copper Mountain
- Frisco
- Silverthorne
- Loveland
- Georgetown
- Empire
- Idaho Springs
- US 6 / Gaming Station
- El Rancho
- Jefferson Station/C-470

ES.14.2 Variations in Minimal Action Alternative Components Among Action Alternatives

The Action Alternatives include some or all components described in the Minimal Action Alternative. In some cases, the Minimal Action components are designed differently because of the particular characteristics of the alternative. In other cases, certain Minimal Action Alternative components are not needed due to a particular alternative's ability to provide capacity or safety improvements. These variations are discussed below.

Transit Alternatives (including the Transit with Highway Preservation Alternatives) do not include the Dowd Canyon curve safety component because the high cost increases the overall cost of those alternatives without substantially improving the travel time characteristics. Because these Transit

Alternatives reduce the overall highway demand, only two of the 12 auxiliary lane improvements are needed:

1. The Eisenhower-Johnson Memorial Tunnels to Herman Gulch eastbound auxiliary lane, and
2. The Downieville to Empire westbound auxiliary lane.

Because the Highway Alternatives (including Combination Alternatives that package highway in combination with transit or highway with transit preservation) increase capacity instead of reducing demand on the highway, some of the auxiliary lanes are not needed. Only one of the seven auxiliary lanes east of the Eisenhower-Johnson Memorial Tunnels is included in the Highway Alternatives. This is the Morrison to Chief Hosa westbound auxiliary lane. For the Six-Lane Highway 65 mph Alternative, curve widening at Dowd Canyon is not needed because a new tunnel for I-70 would be constructed in this area, avoiding Dowd Canyon.

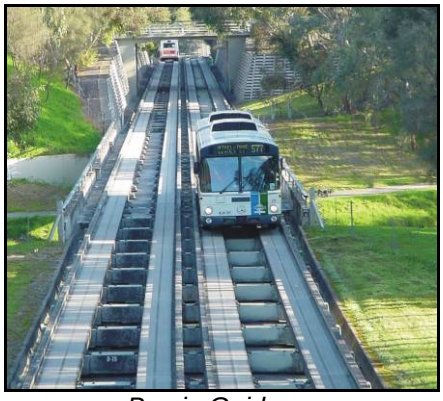
ES.14.3 Transit Alternative Components

Three Transit Alternative components were advanced for consideration in this document. All Transit Alternative components, unless noted, operate between the east end of the Corridor at the end of line (Jefferson Station/C-470) for the FasTracks light rail corridor to the Eagle County Regional Airport. Transit alignments could be on either side of the I-70 facility but are typically in median areas where six-lane highway widening occurs. All transit systems connect with the Regional Transportation District network at the Jefferson Station/C-470 and local and regional transit services at most stations along the route, such as Roaring Fork Transportation Authority, ECO Transit, and Summit Stage.

- **Rail with Intermountain Connection**: combines heavy rail with the Intermountain Connection. The rail portion includes a primarily on-grade electric facility adjacent to the I-70 facility with portions in the median and elevated sections where needed between Vail and C-470 to minimize impacts. The specific technology for the rail is not defined, other than electric rail. A specific technology would be defined in a Tier 2 process. This alternative would upgrade the existing Union Pacific Railroad track from the Minturn interchange to the Eagle County Regional Airport and new track from Minturn to Vail.
- **Advanced Guideway System**: is generally a high-speed fixed guideway transit system. It is fully elevated for 118 miles and varies in alignment between the north, the south, and the median of I-70. This system is not defined by a specific technology in this document but represents several technologies considered, such as monorail and magnetic levitation (maglev) transit systems. This document assumes an urban maglev system for analysis. However, the actual technology would be developed in a Tier 2 process.

Example of Advanced Guideway System

- **Bus in Guideway (Dual-Mode and Diesel)**: is evaluated generally within the median of I-70 and consists of a single guideway eastbound from the Eagle County Regional Airport to the west portal of the Eisenhower-Johnson Memorial Tunnels, and a bidirectional guideway from the Eisenhower Johnson Memorial Tunnels to C-470. The guideway is dedicated to special buses with guideway attachments such as guide wheels used for steering control permitting a narrow guideway and safer operations. The specific technology and alignment would be determined in a Tier 2 process. Two vehicle types are considered in this document: dual-mode and diesel. The dual-mode buses use electric power in the guideway and diesel power when outside the guideway in the general purpose lanes. The diesel buses use diesel power at all times. Because buses can drive outside the guideway in general purpose lanes, buses provide continuous routing, without transfers, between several Denver metropolitan area locations and multiple I-70 served destinations. In addition to stops along the Corridor, these destinations include Central City, Black Hawk, Winter Park Resort, Keystone Resort, Arapahoe Basin Ski Area, and Breckenridge.



Bus in Guideway

ES.14.4 Highway Alternative Components

Two Highway Alternative components are incorporated into some of the Action Alternatives. These include:

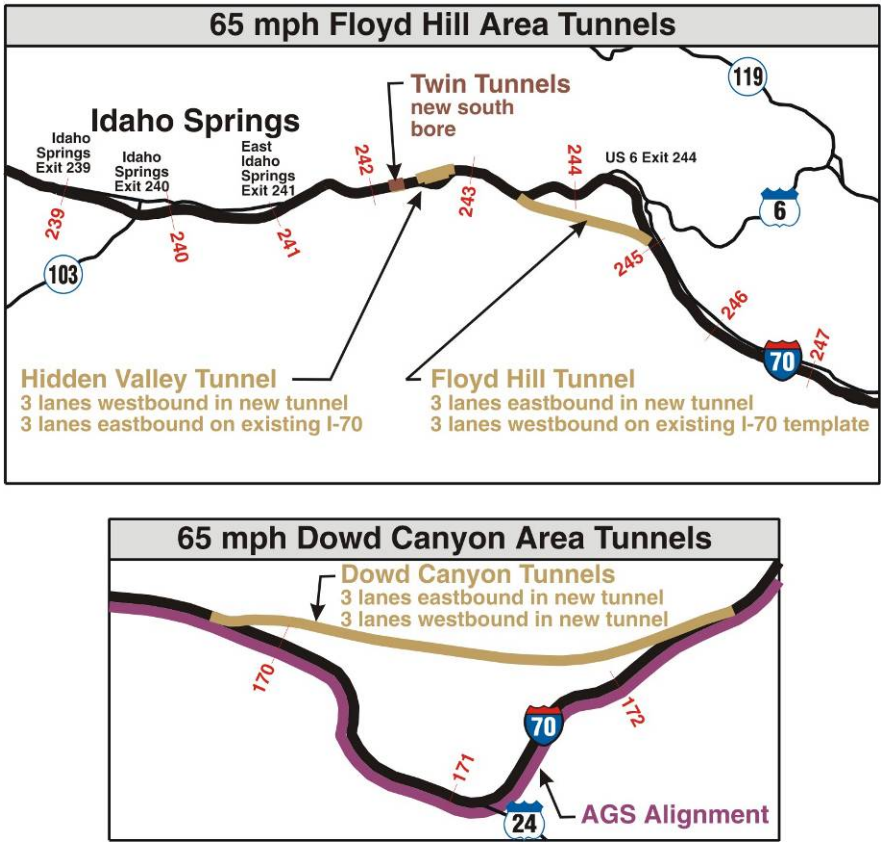
- **Six-Lane Highway Widening (55 mph and 65 mph)**: widening in Dowd Canyon (Eagle-Vail to Vail West) between milepost 170 and milepost 173, and Continental Divide to Floyd Hill between the Eisenhower-Johnson Memorial Tunnels (milepost 213.5) and Floyd Hill (milepost 247).
- **Reversible/HOV/HOT Lanes**: A reversible lane accommodates HOV and HOT lanes and changes traffic flow directions as needed to accommodate peak traffic demand. High occupancy toll lanes allow high occupancy vehicles (3 or more persons) to use the facility for free, while low occupancy vehicles use the facility for a fee. It includes two additional reversible traffic lanes and is built from the west side of the Eisenhower-Johnson Memorial Tunnels to just east of Floyd Hill. From the Eisenhower-Johnson Memorial Tunnels to US 6, two lanes are built with one lane continuing to US 6 and the other lane to the east side of Floyd Hill. The only entry and exit points for the lanes are at US 6 and the Empire Junction interchange. This component includes one additional lane in each direction at Dowd Canyon (milepost 170 to milepost 173) but is not barrier-separated or reversible. A structured configuration in Idaho Springs minimizes impacts on the community as with the six-lane highway widening at 55 mph and 65 mph.

ES.14.5 Tunnels Common to Many or All Action Alternatives

The Action Alternatives include the following new or rebuilt tunnels:

- For all Action Alternatives (Highway, Transit, and Combination), except the Minimal Action Alternative, new (third) tunnel bores are required at both the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels to accommodate improvements.
- For the Six-Lane Highway 65 mph Alternative, three new tunnels are required to accommodate the higher speed. The locations are in the Dowd Canyon area and the Floyd Hill area (westbound Hidden Valley tunnel and eastbound Floyd Hill tunnel). **Figure ES - 5** shows these tunnels.

Figure ES - 5. 65 mph Local Tunnel Alternatives



ES.15 What is the Collaborative Effort Team?

The Colorado Department of Transportation commenced a Collaborative Effort team to address the public involvement, the stakeholders' lack of trust, and the stakeholders' desire to be involved in the identification of the Preferred Alternative. An interview process involving more than 50 stakeholders throughout the Corridor was conducted by the U.S. Institute for Environmental Conflict Resolution to identify stakeholder issues and make recommendations regarding a process for developing consensus on a preferred alternative. Stakeholders voiced a range of procedural interests, concerns, and suggestions, ranging from a lack of trust and confidence in agency decision making, to acknowledgement that not all stakeholder groups have identical interests and a desire to better reflect factors that have changed since publication of the 2004 Draft PEIS.

Based on interview results, CDOT formed a 27-member Collaborative Effort team that included representatives of the following entities:

- Blue River Group, Sierra Club
- City of Idaho Springs
- Clear Creek County
- Colorado Association of Transit Agencies
- Colorado Dept. of Transportation (2)
- Colorado Environmental Coalition
- Colorado Motor Carriers Association
- Colorado Rail Passenger Association
- Federal Highway Administration
- Federal Transit Administration
- Garfield County
- Rocky Mountain Rail Authority
- Sierra Club, Rocky Mountain Chapter
- Summit Chamber
- Summit Stage
- Town of Frisco

- Colorado Ski Country USA
- Colorado Trout Unlimited
- Denver Mayor's Office
- Denver Metro Chamber of Commerce
- Eagle County
- Town of Georgetown, Georgetown Trust
- Town of Vail
- U.S. Army Corps of Engineers
- United States Forest Service
- Vail Resorts

The Collaborative Effort team's objective was to reach a consensus recommendation for Corridor transportation solutions that address these stakeholder issues. In June 2008, the Collaborative Effort team used a process consistent with the 2004 Draft PEIS Purpose and Need Statement to identify a "Consensus Recommendation" that included a multimodal solution, an incremental and adaptive approach to transportation improvements, and a commitment to continued stakeholder involvement. The Collaborative Effort process adhered to the purpose and need and provides for the long-term transportation needs beyond 2035 by establishing a vision for 2050. The Collaborative Effort team also agreed that the Preferred Alternative had to meet a 2050 Vision. The lead agencies committed to adopt the Collaborative Effort team's Consensus Recommendation as the Preferred Alternative in the Final PEIS. The Collaborative Effort team will convene at key project milestones during completion of this document and the Final PEIS, and will continue to meet through 2020.

ES.16 What is the I-70 Mountain Corridor Context Sensitive Solutions Process?

The Colorado Department of Transportation developed, adopted, and endorsed the I-70 Mountain Corridor Context Sensitive Solutions guidance and process to consider the total "context" of the proposed transportation projects—not just the study's physical boundaries. The CDOT NEPA Manual includes guidance on incorporating Context Sensitive Solutions in the NEPA process. In Section 3.3, the manual states that "CSS represents an evolution in the philosophical approach to transportation and supports the social, economic, and environmental context of the facility... It should be reflected in the way the NEPA process is implemented."

In 2007 CDOT formed an I-70 Mountain Corridor Context Sensitive Solutions team of 150 public and agency stakeholders to develop Context Sensitive Solutions Guidance for the Corridor. The I-70 Mountain Corridor Context Sensitive Solutions process is built on a commitment to collaborative decision making. The key principles of collaborative decision making are:

- Principle-based
- Outcome-driven
- Multidisciplinary

To achieve a truly collaborative process, the I-70 Mountain Corridor Context Sensitive Solutions team developed a 6-Step Process that can be used for all projects at any phase of the project life cycle. This process is based on the three principles above and uses the constructs of Decision Science to guide effective, collaborative decision making. The six steps are:

- **Step 1: Define Desired Outcomes and Actions**: Using the CSS Guidance and other relevant materials, this step establishes the project goals and actions. It also defines the terms to be used and decisions to be made.
- **Step 2: Endorse the Process**: This step establishes participants, roles, and responsibilities for each team. The process is endorsed by discussing, possibly modifying, and then finalizing with all teams the desired outcomes and actions to be taken.
- **Step 3: Establish Criteria**: This step establishes criteria, which provides the basis for making decisions consistent with the desired outcomes and project goals. The criteria measure support for the Core Values for the I-70 Mountain Corridor.

- **Step 4: Develop Alternatives or Options**: The Project Staff works with the Project Leadership Team, stakeholders, and the public to identify alternatives or options relevant to the desired outcomes, project-specific vision, and goals.
- **Step 5: Evaluate, Select, and Refine Alternative or Option**: The process of analyzing and evaluating alternatives applies the criteria to the alternatives or options in a way that facilitates decision making. This may be a one-step or multi-step process depending on the complexity of the alternatives and the decision.
- **Step 6: Finalize Documentation and Evaluate Process**: Documentation should be continuous throughout the process. Final documentation will include each of the previous steps, final recommendations, and the process evaluation.

These steps are intended to provide a clear, repeatable, and scalable process that is fair and understandable. The order of the steps is as important as the activities within each step.

The I-70 Mountain Corridor Context Statement is:

- The I-70 Mountain Corridor is a magnificent, scenic place. Human elements are woven through breathtaking natural features. The integration of these diverse elements has occurred over the course of time.
- This corridor is a recreational destination for the world, a route for interstate and local commerce, and a unique place to live.
- It is our commitment to seek balance and provide for twenty-first-century uses.
- We will continue to foster and nurture new ideas to address the challenges we face.
- We respect the importance of individual communities, the natural environment, and the need for safe and efficient travel.
- Well-thought-out choices create a sustainable legacy.

The I-70 Mountain Corridor Core Values, in concert with the Context Statement, represent a vision and goals for the I-70 Mountain Corridor. They are:

- Sustainability
- Safety
- Health Environment
- Biological Resources
- Climate and Air Quality
- Hazardous Materials
- Wetlands and Water Resources
- Wildlife
- Historic Context
- Communities
- Mobility and Accessibility
- Aesthetics
- Life Cycle Phases (planning, project development, project design, project construction, and operations, maintenance, and monitoring)

The I-70 Mountain Corridor Context Sensitive Solutions Guidance commits to form collaborative stakeholder teams, called Project Leadership Teams, on all Corridor projects. The I-70 Mountain Corridor Context Sensitive Solutions Guidance authorizes Project Leadership Teams to create Issue Task Forces to address specific issues outside the Project Leadership Teams' area of expertise. The I-70 Mountain Corridor Context Sensitive Solutions Guidance document is available on the project website at

www.i70mtncorridorcss.com, and should be amended to remain flexible to address and incorporate innovations, new techniques, advanced technologies, and emerging trends in the Corridor.

To be in compliance with the I-70 Mountain Corridor Context Sensitive Solutions Guidance, the I-70 PEIS Project Leadership Team was formed in October 2008 to facilitate completion of the NEPA process, including completion of this Revised Draft PEIS, the Final PEIS, and Record of Decision. The I-70 PEIS Project Leadership Team formed a Cultural Resources Issue Task Force, Environmental Issue Task Force, and Community Values Issue Task Force to develop potential mitigation strategies for impacts to resources identified. The lead agencies will incorporate the suggested mitigation strategies into the Final PEIS. This does not indicate that all strategies will be implemented—the decision on appropriate mitigation will be made on a project-by-project basis during Tier 2 processes.

Tier 2 processes are needed before any projects covered in this document can be built. This first tier study formalizes decisions on location, mode (type of improvement) and capacity of transportation improvement. Details needed in order to construct a project are not identified now but rather will be defined during a subsequent process of study that is more localized in nature.

ES.17 How was the Preferred Alternative (Consensus Recommendation) developed?

The lead agencies identified the Preferred Alternative for the I-70 Mountain Corridor based on the Consensus Recommendation (See **Appendix C**) developed by the Collaborative Effort team (see **Section ES.15**). The lead agencies participated in the development of the Consensus Recommendation for the Corridor. During the consensus building process they agreed to adopt the Recommendation as the Preferred Alternative if all of the stakeholders could reach consensus.

The Collaborative Effort process and the Consensus Recommendation adhere to the purpose and need and provide for the long-range transportation needs beyond 2035 by establishing a vision for 2050. The Consensus Recommendation identifies a 2050 Vision for a multimodal solution, with transit and highway improvements based on proven needs to enhance the Corridor, its environment, and its communities. The criteria below informed the Collaborative Effort's recommendation and will serve as criteria of effectiveness moving forward:

1. The solution should improve safety and mobility for all users.
2. The solution should be responsive and adaptive to broader global trends that will affect the way we make travel decisions in the future.
3. The solution will meet the purpose and need and all environmental and legal requirements.
4. The solution should preserve, restore and enhance community and cultural resources.
5. The solution should preserve and restore or enhance ecosystem functions.
6. The solution should be economically viable over the long term

The Consensus Recommendation is fully evaluated and referred to in this document as the Preferred Alternative.

ES.18 What does the Preferred Alternative consist of?

The Preferred Alternative consists of near-term and general long-term improvements for the Corridor to meet the travel demand for 2050 and address immediate Corridor needs. To address the future uncertainties, trigger points (see **Section ES.23** for details) and stakeholder involvement will be used to reassess the Corridor needs to determine the most appropriate transportation improvements to meet the future demands within the Corridor.

The Preferred Alternative is a multimodal solution and includes non-infrastructure related components, an Advanced Guideway System, and highway improvements.

Triggers for Long-Term Improvements

- Triggers create a mechanism for defining the specifics of future transportation solutions consistent with the Corridor vision.
- Triggers are used to evaluate the future needs to meet 2050 demand and are based on completion of specific highway improvements, feasibility of Advanced Guideway System, and global, regional, and local trends.

1. **Non-infrastructure Related Components –** These strategies can begin in advance of major infrastructure improvements to address immediate issues in the Corridor. These strategies and the potential tactics for implementation require actions and leadership by agencies, municipalities, and other stakeholders beyond the lead agencies. The strategies include, but are not limited to:
   - Increased enforcement
   - Bus, van, or shuttle service in mixed traffic
   - Programs for improving truck movements
   - Shift passenger and freight travel demand by time of day and day of week
   - Modify traveler behavior through driver education, and implementing promotions and incentives for high occupancy travel and transit use,
   - Expanded use of existing transportation infrastructure in and adjacent to the Corridor
   - Use of technology advancements and improvements to increase mobility without additional infrastructure
   - Traveler information and other ITS
   - Convert day trips to overnight stays
   - Other TDM measures to be determined
2. **Advanced Guideway System–** The Advanced Guideway System is a central part of the Preferred Alternative and includes the commitment by the lead agencies to evaluate and implement an Advanced Guideway System within the Corridor. The evaluation includes a vision of transit connectivity beyond the study area and local accessibility to such a system. At this first tier level, the Advanced Guideway System represents a mode encompassing a range of technologies, not a specific technology. A specific Advanced Guideway System technology would be determined in subsequent study or a Tier 2 process. The Colorado Department of Transportation commits to provide funding for studies to determine the viability, including cost and benefits, safety, reliability, environmental impacts, technology, and other considerations of an Advanced Guideway System. These studies will involve the Collaborative Effort stakeholder committee and follow the I-70 Mountain Corridor Context Sensitive Solutions process.

   The Advanced Guideway System provides transit service from the Eagle County Regional Airport to C-470, a distance of approximately 118 miles. It is a fully elevated transit system on two tracks and aligns to the north, south, or in the median of I-70. The Advanced Guideway System connects to the Regional Transportation District network in Jefferson County and local and regional transit services at most of the 15 proposed transit stations along the route. The

Advanced Guideway System requires new tunnel bores at both the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels.

3. **Highway Improvements –** Additional highway improvements are needed to address current Corridor conditions and future demands. No priority has been established for improvements and those improvements must be planned considering all components of the Preferred Alternative consistent with local land use planning. The "specific" highway improvements are called out specifically as the triggers for consideration of the future highway and non-Advanced Guideway System transit capacity improvements and need to be completed before implementing any future highway and non-Advanced Guideway System transit capacity improvements. For more information on these triggers, see **Section ES.23**. The "other" highway improvements are not subject to the parameters discussed under the triggers.

For analysis purposes, these improvements (non-infrastructure, Advanced Guideway System, and highway) represent the initial set of improvements and are the minimum program of improvements under the Preferred Alternative analyzed in **Chapter 3**. Agencies and stakeholders will review progress and effects of these improvements at least every two years to determine the need for additional highway and non-Advanced Guideway System transit capacity improvements. To meet the 2050 travel demand based on current understanding the Preferred Alternative needs to be equivalent to the Combination Six-Lane Highway with Advanced Guideway System Alternative. For National Environmental Policy Act analysis, this combination represents the maximum program of improvements and impacts under the Preferred Alternative and is analyzed in **Chapter 3** of this document. The Preferred Alternative Maximum Program comprises all of the improvements listed above and those included with the Combination Six-Lane Highway with Advanced Guideway System Alternative.

The six-lane highway widening improvements included with the Preferred Alternative Maximum Program include both 55 mph and 65 mph design options. This design option will be determined in Tier 2. The 55 mph option uses the existing I-70 alignment. The 65 mph design requires additional tunnels at Dowd Canyon, Hidden Valley, and Floyd Hill. At Dowd Canyon, two tunnels are required for eastbound and westbound traffic.

In **Chapter 2** of this document, **Table 2-10** lists and **Figure 2-11** illustrates the improvements associated with the Preferred Alternative.

ES.19 How much will this project cost?

The Preferred Alternative identifies a minimum and maximum range of multi-modal improvements ranging in cost from $16.1 billion to $20.2 billion (in year of expenditure assuming the mid year of construction for the whole alternative is 2025).

The 21 Action Alternatives evaluated in this document range in cost from $1.949 billion to $20.163 billion (in year of expenditure assuming the mid year of construction for the whole alternative is 2025). See **Chapter 2** for more information on the alternatives.

Cost estimates for alternatives were developed in 2003 from preliminary design item costs, cost estimating contingency factors and other component costs. To update costs for this document, CDOT used cost escalations for each alternative, using the Colorado Highway Construction Cost Index as a basis for determining long-term future cost escalation. The Preferred Alternative resulted in a current year cost (2010) of $9.2 billion to $11.2 billion dollars. The Advanced Guideway System cost estimates were established in conjunction with the Federal Transit Administration's Colorado Urban Maglev Project and were independently reviewed and confirmed by the Rocky Mountain Rail Authority as part of their High Speed Rail Feasibility Study. See *I-70 Mountain Corridor PEIS Cost Estimates Technical Report* (CDOT, August 2010) for detail on estimated methodology and assumptions.

The process of escalating costs provides a uniform treatment of alternatives for relative comparison. CDOT updated the 2010 cost estimate based on a revised methodology to provide a more reasonable range of costs consistent with a Tier 1 document for the 21 Action Alternatives, including the Preferred Alternative. The revised methodology focuses on Year of Expenditure cost assuming the mid-year of construction is 2020 for the Minimal Action, while all other alternatives assume mid-year of construction is 2025. The year 2025 was used because it is the midyear of the planning period. **Chart ES - 1** shows the capital costs by alternative. The year 2020 was used for the Minimal Action because the construction scope is much smaller and the belief is that that alternative could be delivered on a shorter time frame than the other alternatives.

The timeframe for implementing components of the Preferred Alternative is wide ranging; future Tier 2 processes will identify project level improvements. Those studies will include more detailed design information, specific mitigation measures to offset impacts and project specific cost estimates.

ES.20 Is the money for this project available?

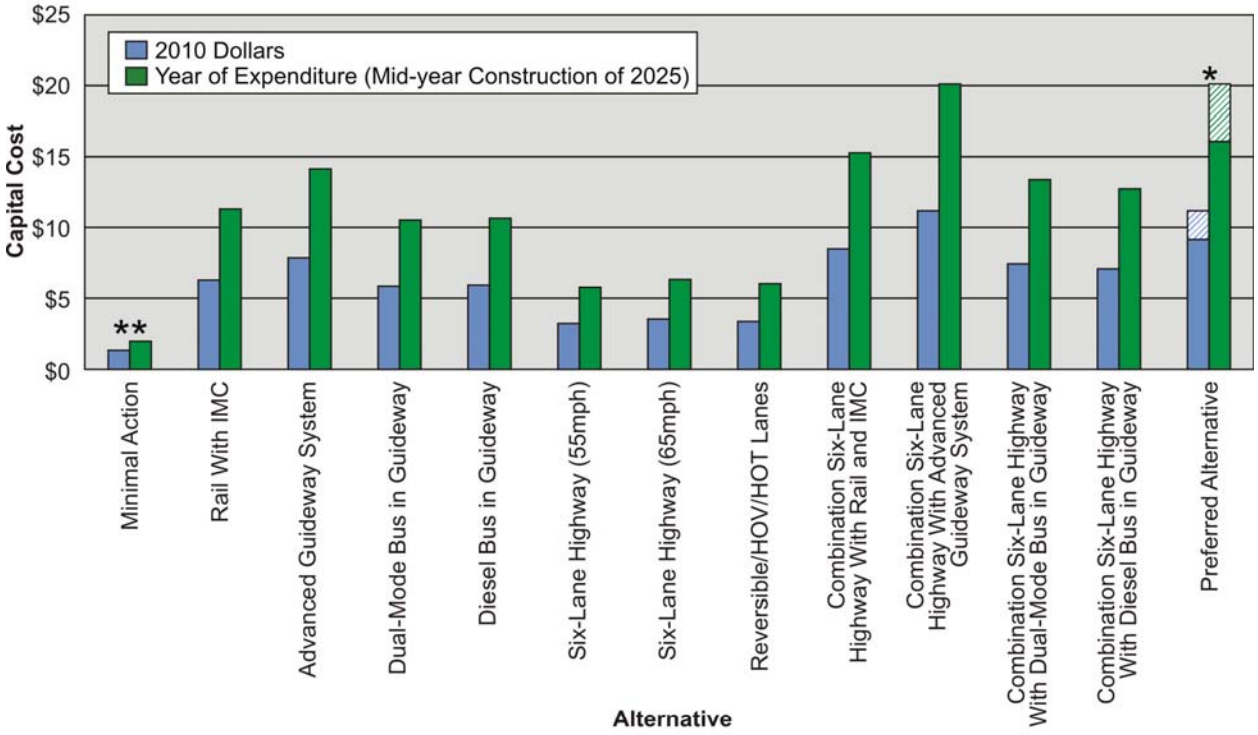
The Colorado Department of Transportation's revenue is obtained from federal and state funding sources. The Colorado State Constitution, federal law, and state statutes determine how CDOT can use these funds. In the past decade, transportation revenues have fluctuated significantly in receipts from these various revenue sources. This uncertainty is expected to continue into the future. These funding sources include, but are not limited, to, the Motor Fuel Tax, Senate Bill 09-108 called Funding Advancements for Surface Transportation and Economic Recovery (FASTER), and Senate Bill 09-228.

The Colorado Department of Transportation does not have enough available revenue sources to fund the Preferred Alternative improvements. To implement the Preferred Alternative, additional funding sources must be secured. Lawmakers and citizens recognize the I-70 Mountain Corridor is a key component of Colorado's economy and competes as one of the highest priorities in the state in need of capital improvements as new funding opportunities arise.

New funding sources are needed to fund the Preferred Alternative improvements. U.S. Congress is discussing a new long-term transportation bill that could provide opportunities for increased funding for highway and transit improvements identified in this document. The Transportation Finance and Implementation Panel formed by Governor Ritter released a 2008 report proposing a statewide vision for transportation, policy change recommendations, new investment categories, and funding for increased investment in transportation. The report estimates a minimum of $1.5 billion is needed annually above the existing investment to improve Colorado's transportation system. Six revenue options were recommended in the final report. Proposals for raising additional funds for the Corridor improvements must be approved by a public vote, by action of the Colorado General Assembly, or a combination of the two.

Options for innovative funding sources include public/private partnerships, tolling, bonding/loans, and corridor-specific resources (which are funding sources that apply to limited geographic areas and require voter approval, constitutional amendments, or both).

Chart ES - 1. Capital Costs by Alternative



* The Maximum Program presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

** The methodology focuses on year of expenditure cost to a mid-year of construction of 2020 for the Minimal Action Alternative.

ES.21 How will stakeholders be involved with implementing necessary improvements in this corridor?

Some planning, design, construction, and maintenance activities can take place before signing a Record of Decision. These activities are "early action projects." Early action projects must be common elements to all the Action Alternatives and have a clear need. These include:

- **Empire Junction (US 40/I-70) improvements –** Improves mobility and has public support.
- **I-70/Silverthorne interchange –** Has strong public support.
- **Eagle interchange –** Improves mobility.
- **Minturn interchange –** Enhances safety.
- **Edwards interchange –** Improves mobility.
- **Black Gore Creek and Straight Creek Sediment Control –** Provides environmental mitigation.
- **I-70 Wildlife Fencing –** Enhances safety.
- **Clear Creek Sediment Control Action Plan –** Provides environmental mitigation.

All Preferred Alternative components, including transit, must go through the established planning process. Because the transportation planning process identifies and prioritizes projects, the components will be defined into projects. The planning process involves coordination with transportation planning regions and metropolitan organizations to identify and prioritize projects to be included in a long-range

(20+ year) Statewide Transportation Plan and a short-range (six-year) Statewide Transportation Improvement Program, which is updated every four years using a Project Priority Programming Process (4P) guidance adopted by the Colorado Transportation Commission. Funding availability is considered in the identification and prioritization of projects.

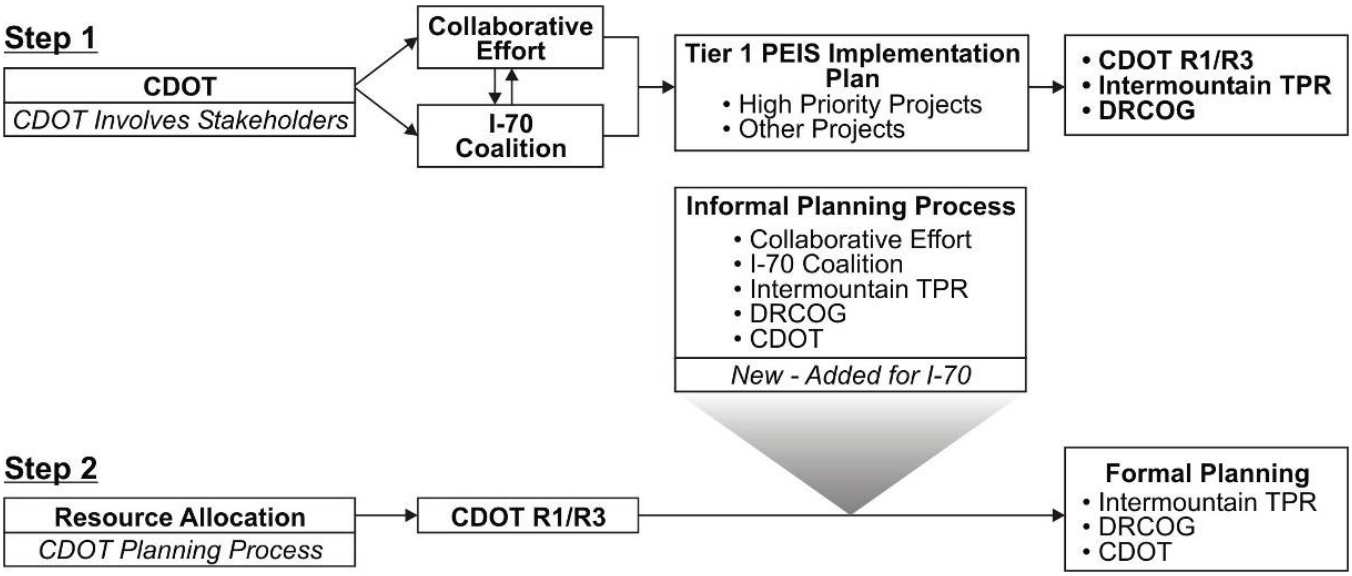
The Tier 1 decision identifies general capacity, mode, and location for transportation improvements in the Corridor and establishes the framework for future project-level activities. The Statewide Transportation Improvement Program identifies funds for feasibility studies, Tier 2 processes, design, or construction phases before a project is initiated. Funds for the completion of a project identified in the Tier 2 NEPA process must be reasonably anticipated in the long-range Statewide Transportation Plan. Sequencing, funding, and construction of projects within the Corridor are balanced among other statewide priorities and needs.

The Colorado Department of Transportation and the stakeholders will:

- Guide and monitor the implementation of projects in the Corridor; and
- Assess the Corridor's needs and priorities for recommendations by the Collaborative Effort, including assessments of larger projects for feasible options to phase and implement through planning and Tier 2 processes.

Step 1 in **Figure ES - 6** indicates the implementation process outlined in this document. The Colorado Department of Transportation and the stakeholders will communicate the priorities identified from the Preferred Alternative with the appropriate transportation planning regions and metropolitan planning organizations. As noted in Step 2, CDOT will work directly with the planning partners to facilitate the integration of the Collaborative Effort and other interested stakeholders into the formal 4P process.

Figure ES - 6. Planning Process



Key of Abbreviations/Acronyms

CDOT = Colorado Department of Transportation
DRCOG = Denver Regional Council of Governments
PEIS = Programmatic Environmental Impact Statement
R1/R3 – Region 1/Region 3
TPR = Transportation Planning Region

The considerations for priorities can change or be elevated in consultation with the stakeholders. The Preferred Alternative includes convening the Collaborative Effort or a stakeholder group with similar composition every two years to identify considerations and priorities for the Corridor.

The Colorado Department of Transportation is committed to advancing all elements of the Tier 1 decision through the federally mandated planning process. The Colorado Department of Transportation will pursue current and future priorities identified through stakeholder engagement in this process regardless of mode, including Advanced Guideway System and non-infrastructure improvements. The Colorado Department of Transportation will work with stakeholders to identify additional funding and innovative approaches to construct the Preferred Alternative.

ES.22 In what order would improvements be made?

While widening to six lanes at some locations and constructing an Advanced Guideway System are necessary to relieve congestion and accommodate increasing demand, it is recognized that construction funds are not currently available. In addition, local and regional conditions may change over time and require different solutions to be considered.

The Consensus Recommendation provides for an adaptive management approach, allowing Corridor stakeholders and agencies to assess impacts of improvements and funding availability over time before new improvements are implemented. This flexibility is needed to meet long-term transportation needs while adapting to changes in local and regional conditions.

The Preferred Alternative identifies high priority improvements, including:

- Widening I-70 to six lanes—three in each direction—between Floyd Hill and the Twin Tunnels, while improving curvature and grade. That five-mile segment between Genesee to the tunnels just east of Idaho Springs is where some of the worst weekend congestion occurs.
- Adding frontage roads and a bike trail from Idaho Springs East to Hidden Valley and Hidden Valley to US 6.
- Improving Empire Junction, where I-70 meets US 40.
- Constructing an eastbound auxiliary lane from the Eisenhower-Johnson Memorial Tunnels to Herman Gulch, a distance of 28 miles.
- Constructing a westbound auxiliary lane from Bakerville to the Eisenhower-Johnson Memorial Tunnels, a distance of 7 miles.

These improvements could slow the rate of worsening congestion for a few years, but alone would not accommodate projected traffic increases through 2050.

Concurrent with the highway improvements is the evaluation and implementation of the Advanced Guideway System, as described in **Section ES.14**.

ES.23 What are the triggers for additional highway and non-Advanced Guideway System transit capacity improvements?

The Preferred Alternative is responsive and adaptive to future trends within the Corridor. The use of triggers is consistent with the needs of the Corridor and recognizes that future travel demand and behavior is uncertain and that additional transportation solutions should be based on proven need. The triggers create a mechanism for defining the specifics of future transportation solutions consistent with the Corridor vision.

Additional highway and non-Advanced Guideway System transit capacity improvements may proceed if and when:

- The "specific" highway improvements are complete and an Advanced Guideway System is functioning from the Front Range to a destination beyond the Continental Divide, OR
- The "specific" highway improvements are complete and Advanced Guideway System studies that provide additional information on the ability to implement Advanced Guideway System within the Corridor are complete, OR
- Global, regional, local trends or events, such as climate change, resource availability, and/or technological advancements have unexpected effects on travel needs, behaviors, and patterns and demonstrate a need to consider other improvements.

The Colorado Department of Transportation will convene a committee that retains the Collaborative Effort member profile to check in at least every two years to review progress made on the above triggers. At these check-in points, the committee will:

- Review the current status of all projects,
- Identify unmet needs in the Corridor, and
- Consider the triggers in evaluating the need for additional capacity improvements beyond those specified.

In 2020, there will be a thorough reassessment of the overall purpose and need and effectiveness of the improvements to review study results and global trends before implementing additional transportation improvements. This will occur regardless of the status of the triggers. At this time, the full range of improvement options may be reconsidered to address the needs in the Corridor.

ES.24 What are some of the other highway improvements that can be made?

Other highway improvements identified in the Consensus Recommendation and included in the Preferred Alternative Minimum Program of Improvements are:

- More and better pullouts, chain stations, and parking spots for trucks
- Safety improvements on the interstate west of Wolcott
- An eastbound auxiliary lane from Frisco to Silverthorne
- An eastbound auxiliary lane from Avon to Post Boulevard
- A westbound auxiliary lane from Morrison to Chief Hosa
- Auxiliary lanes eastbound and westbound west of Vail Pass
- Safety and capacity improvements in Dowd Canyon
- Interchange improvements in 20 locations, some of the corresponding to potential Advanced Guideway System transit stops at:
  - East Glenwood Springs
  - Eagle
  - Minturn
  - Frisco/Main Street
  - Loveland Pass
  - Fall River Road
  - Lookout Mountain
  - Frisco/SH 9
  - Georgetown
  - Base of Floyd Hill/US 6
  - Morrison
  - Eagle County Regional Airport Interchange*
  - Avon
  - Copper Mountain

- Gypsum
- Edwards
- Vail West
- Silverthorne
- Downieville
- Hyland Hills/Beaver Brook

**Eagle County Regional Airport Interchange was carried out as a separate action from this Tier 1 process. A NEPA clearance has been completed for this interchange.*

ES.25 Why are both transit and highway improvements needed?

Through the alternatives development, screening, and evaluation process, the lead agencies and stakeholders determined that no single mode improvement alone would meet the purpose and need of the project. This is because the relationship of capacity and congestion is not direct. Lack of capacity may lead to congested conditions but increased capacity will not necessarily reduce congestion as the additional capacity can also result in more people traveling and using any additional capacity. As a result, both increased capacity and decreased congestion need to be addressed. The transit component provides enough additional capacity to be able to relieve some of the highway congestion and still be able to also improve accessibility and mobility. Another benefit of the combined improvements is that they offer travelers different options for traveling along the Corridor depending on their travel purpose.

ES.26 How do metro Denver residents access the Advanced Guideway System?

C-470 is the eastern terminus for all modes due to the system interchange of I-70 and C-470, the increase in I-70 volumes, and the predominance of urban travel patterns to the east of C-470. At its eastern terminus, the Advanced Guideway System connects to the Regional Transportation District system in Jefferson County, allowing people from the Denver metro area to ride a bus or light rail train and then transfer to the Advanced Guideway System. These termini do not preclude other NEPA transportation improvement studies outside the Corridor. Additional studies and NEPA processes may extend beyond these termini if needed.

ES.27 Do the dual-mode transportation improvements make traveling the Corridor safer?

Improving safety was one of the key factors considered during the development and evaluation process, and all alternatives were evaluated on their ability to address the safety issues identified in the Corridor.

Alternatives that include a Fixed Guideway Transit component provide a safer means of transportation for travelers than highway vehicle travel. National crash rates for rail modes are markedly lower than the comparable rates for motor vehicles. Buses operating in general purpose lanes are on average safer than automobile travel, but not as safe as rail technologies in fixed guideways. No separate statistics are available at a national level for buses operating in a separate guideway.

A number of Minimal Action highway components included in all of the Action Alternatives were developed to address safety problem areas. For this reason the Action Alternatives are not substantially different from each other in terms of highway safety. The higher profile safety problem areas in the Corridor addressed by all Action Alternatives include:

- Wolcott curve
- Dowd Canyon (not included with the Transit Alternatives)
- Silverthorne Interchange
- Eisenhower-Johnson Memorial Tunnels to Herman Gulch (eastbound)
- Base of Floyd Hill (Twin Tunnels to the US 6 interchange).

Fatality rates were used for comparison as the best measure of safety among the alternatives. The No Action Alternative is projected to have a fatality rate of 0.50 per 100 million person miles. In comparison, the Minimal Action Alternative, with its components that address most highway safety problems, has a rate of 0.37. Highway Alternatives are higher, with fatality rates that range between 0.40 and 0.42, since unimproved sections of the facility attract more vehicle miles of travel compared to the Minimal Action Alternative. Alternatives with transit, reflecting different transit technologies and usage, have rates ranging from 0.31 to 0.36. The Preferred Alternative has a fatality rate ranging from 0.31 to 0.34 per 100 million person miles, and the majority of those are on the highway.

ES.28 Are there other ways to decrease congestion without the Advanced Guideway System and/or widening the highway?

The Preferred Alternative includes non-infrastructure components that include the following elements (see **Section ES.18** for a complete list):

- Promoting public transportation and high-occupancy travel
- Promoting transit with incentives for more bus, van or shuttle traffic on I-70.
- Increasing traffic law enforcement
- Shifting traveler and freight demand by time of day and day of week.

Although these measures ease congestion on the I-70 Mountain Corridor, alone they do not address this project's purpose and need to increase capacity, improve accessibility and mobility, or decrease congestion for travel demand.

ES.29 Why do we need highway and transit improvements?

The ability of the alternatives to accommodate the 2050 travel demand is measured by the year network capacity is reached. This term means the year that the average speed on the highway drops to 30 miles per hour. The year network capacity is reached and the 2050 travel demand is based on projections for population and employment data. These projections are less reliable than the population and employment data used to model 2035 travel demand due to the uncertainties of growth and travel assumptions beyond the year 2035, but they provide a relative comparison between alternatives.

Analysis shows that the only alternatives with network capacity to accommodate the 2050 travel demand are the Combination Alternatives and the Preferred Alternative. The No Action Alternative reaches network capacity between 2010 and 2025. The Minimal Action Alternative performs slightly better but still reaches network capacity in the eastern portion of the Corridor by 2015. The Transit Alternatives reach network capacity in 2030, and the Highway Alternatives reach network capacity between 2035 and 2040. The Combination Alternatives provide a network capacity to 2050 if both transit and highway elements are constructed. If the transit corridor is preserved, these Combination Alternatives perform like Highway Alternatives, and if highway improvements are preserved, these alternatives perform like Transit Alternatives.

For the Preferred Alternative, the year network capacity is reached ranges from 2030 to 2050 for east of Silverthorne and 2050 for west of Silverthorne due to the peak recreation travel demand.

ES.30 What is SWEEP?

SWEEP stands for Stream and Wetland Ecological Enhancement Program. This group is made up of representatives from federal and state agencies, watershed associations, and special interest groups. Members identified and addressed environmental issues related to the improvement of wetlands, streams, and fisheries in the Corridor. The Stream and Wetland Ecological Enhancement Program group drafted a Memorandum of Understanding to serve as the foundation of mitigation for aquatic resource impacts

during projects along the Corridor and its communities. The Colorado Department of Transportation is committed to implementing the terms outlined in the Memorandum of Understanding. A draft is included in **Appendix D** of this document. The Colorado Department of Transportation will continue to work toward finalizing this Memorandum of Understanding to include with the Final PEIS.

ES.31 What is ALIVE?

ALIVE stands for A Landscape Level Inventory of Valued Ecosystem Components Committee. This group consists of wildlife professionals from federal and state agencies who identified wildlife habitat of high ecological integrity, wildlife habitat linkages, and barriers to wildlife crossings along the Corridor. They developed a landscape-based ecosystem approach for consideration of wildlife needs and conservation measures, and identified measures to improve existing aquatic and terrestrial ecosystem connectivity across the I-70 Mountain Corridor between Denver and Glenwood Springs. In April 2008, CDOT, FHWA, U.S. Fish and Wildlife Service, the U.S. Department of Agriculture Forest Service, Bureau of Land Management, and Colorado Department of Natural Resources Division of Wildlife signed a Memorandum of Understanding documenting their commitment to identify mitigation and conservation measures during future Tier 2 processes to increase the permeability of the I-70 Mountain Corridor to terrestrial and aquatic species. The Colorado Department of Transportation is committed to implementing the terms outlined in the Memorandum of Understanding.

ES.32 What are the types of environmental impacts of greatest concern?

Of the environmental resources listed above, resources shown to be of greatest concern to the public and stakeholders include:

- Air quality
- Wildlife (Linkage Interference Zones)
- Water resources and water quality (watersheds, rivers, streams, creeks)
- Regulated materials (hazardous substances/waste, petroleum products, mining contaminants)
- Noise
- Visual conditions
- Recreation resources
- Historic properties
- Socioeconomic considerations (including induced growth and land use)

Impacts to these resources are summarized below.

ES.32.1 How will air quality be impacted?

For all the alternatives, carbon monoxide emissions in 2035 are less than current day emissions, even though 2035 traffic volumes are higher than 2000 volumes. Emissions in the future (generally to 2035) are projected to be lower because older, higher-polluting vehicles continue to be replaced by newer, low-polluting vehicles.

Similar trends are forecast for small particulate matter (dust.) Forecasts for all of the alternatives show that particulate emissions decrease substantially from current levels, and all Action Alternatives are less than or equal to the No Action Alternative emissions.

Between 2035 and 2050, improvements in air quality because of emissions controls may reach their maximum point of effectiveness. After this time, trends in air pollution from vehicles may be more closely correlated with amount of travel.

ES.32.2 How will wildlife be impacted?

The Action Alternatives have varying effects on habitat for birds and mammals, including deer, elk, bighorn sheep, lynx, and other species. Habitat loss occurs due to actual construction of the transportation improvements. In addition, the improvements further impede the ability of wildlife to move across I-70.

The Colorado Department of Transportation examined habitat connectivity and animal-vehicle collisions through an interagency committee known as "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE). The committee identified 13 areas where the I-70 Mountain Corridor interferes with wildlife migration, including elk, mule deer, bighorn sheep, and Canada lynx. These locations are referred to as linkage interference zones. By focusing on areas of known migration and wildlife use, and creating wildlife crossings, animal-vehicle collisions can be reduced and habitat connectivity increased. A Memorandum of Understanding, signed in April 2008, details the responsibilities of each agency in addressing animal-vehicle collisions (see **Appendix E, ALIVE Memorandum of Understanding**).The removal, modification or disturbance of habitat also has an impact on fisheries and aquatic species.

ES.32.3 How will historic properties be impacted?

Historic resources identified in the I-70 Mountain Corridor include several nationally significant properties, including the Georgetown-Silver Plume National Historic Landmark District and the nationally significant portions of the interstate itself, along with many sites of statewide and local significance. Towns throughout the Corridor contain historic buildings and associations, and historic mining sites are abundant in the Corridor. Research suggests that hundreds of properties are officially eligible for listing or listed in the National Register within the Area of Potential Effect, and many more are likely to be identified once intensive surveys are completed.

Potential direct effects include physical destruction, alteration, or removal of historic properties, including archaeological and historic archaeological sites. Indirect effects generally include changes to a property's setting or use, or the introduction of visual, atmospheric, or audible elements that diminish a property's historic integrity.

As many as 75 different historic properties could be directly affected by one or more of the Action Alternatives. None of the Action Alternatives affect all 75 properties but the Action Alternatives affect different properties and each of the 75 properties is affected by one or more of the Action Alternatives. The impacts for the Preferred Alternative fall within the range of the other Action Alternatives. It is difficult to quantify the numbers of historic properties that may be subject to indirect effects alone. Based on footprint size and whether there are transit or highway improvements, certain Action Alternatives have greater potential for indirect effects than others, but the details of these effects will not be understood until the Tier 2 processes.

The lead agencies have worked closely with local communities and other agencies to develop the I-70 Mountain Corridor Section 106 Programmatic Agreement, which stipulates specific procedures to be undertaken to identify and protect historic properties (see **Appendix B** of this document).

ES.32.4 How will water resources be impacted?

All Action Alternatives have an impact on water quality. This impact largely results from contamination from vehicles on I-70 which then is washed into nearby streams. It ranges from a low of a 2 percent increase to a high of a 43 percent increase in runoff. The Preferred Alternative ranges from a 16 percent to a 24 percent increase in runoff compared to the No Action Alternative.

However, with the implementation of mitigation strategies associated with the Action Alternatives, water quality will improve above the No Action levels. The No Action Alternative would not improve water quality.

The Colorado Department of Transportation is leading an effort to define and accomplish water quality and water resource mitigation strategies. This is called the Stream and Wetland Ecological Enhancement Program (SWEEP). Implementation of these strategies will address many of the anticipated impacts to water resources.

ES.32.5 How will fish and fishing streams be impacted?

Removal, modification or disturbance of habitat for aquatic species including fish and important streams will occur with the Action Alternatives. Impacts on Gold Medal and "high-value" fisheries are greatest for the Combination Alternatives and Rail with Intermountain Connection Alternative because these alternatives have the largest overall footprint. The Preferred Alternative has a range of impacts comparable to the range of impacts between the Combination Alternatives and Rail with Intermountain Connection Alternative.

Alternatives that add more traffic lanes, the Highway and Bus in Guideway Alternatives require additional winter maintenance (such as the use of liquid deicers and traction sand), thereby leading to increased water quality impacts when compared to alternatives with less new roadway construction.

Agreements reached through the SWEEP Memorandum of Understanding were formulated specifically to mitigate impacts to fish and aquatic species.

ES.32.6 How will geologic hazards be affected?

The I-70 Mountain Corridor contains a variety of geologic hazards, including landslides, rockfall hazard areas, avalanche prone areas, mud slides and debris flow areas. All alternatives, including the No Action Alternative, affect geologic hazards and need careful examination during future Tier 2 processes to locate and design improvements to minimize the effect of the alternatives on these geologic hazards.

ES.32.7 How will regulated materials be impacted?

Regulated materials are hazardous substances, hazardous waste or petroleum products. A key issue of concern along the I-70 Corridor is the presence of hazardous waste or contamination from historic mining activities, including mill sites, mine waste and mine tunnel drainage. Construction activities may disturb these structures which may release contamination.

Action Alternatives have varying effects on regulated materials, depending on the amount, location and depth of construction needed.

The Colorado Department of Transportation has standard protective procedures to assure worker, local community and traveler safety when encountering regulated materials. Additional analysis will be done during Tier 2 processes to carefully identify the extent and nature of regulated materials of concern.

ES.32.8 What noise impacts will result?

Noise levels in the Corridor vary between decibels in the mid 50s to decibels in the low 70s, depending on how close the recipient of the noise is to the highway. The Colorado Department of Transportation considers a noise impact to occur when the loudest hour of noise is at or above 66 dBA or when there is an increase of 10 dBA or more affecting a noise receptor. Noise levels of less than 3 dBA) are generally considered imperceptible to humans. Increases of 3 to 5 dBA are considered noticeable, and increases of 10 dBA are perceived as a doubling of loudness. Alternatives with this trait encompass the No Action, Bus in Guideway, and Highway Alternatives. However, the Rail with Intermountain Connection and Advanced Guideway System Alternatives involve introducing noise sources with different frequency and time characteristics. Noise from these sources are likely noticeable even when it is less loud than the highway.

The No Action Alternative noise increases range from 0 dBA to 2 dBA. The Minimal Action Alternative noise increases range from 0 dBA to 4 dBA. The remaining Action Alternatives increase noise levels between 1 dBA (imperceptible) and 5 dBA (noticeable). The Preferred Alternative noise increases range between 1 dBA to 5 dBA, similar to those of the other Action Alternatives.

ES.32.9 How will visual conditions be impacted?

Action Alternatives with larger footprints or more elevated features are more likely to be visible and perceived as having a negative visual impact. The Advanced Guideway System Alternative generates a noticeable visual impact because it is elevated throughout the Corridor with supporting piers placed every 80 to 100 feet and a lattice structure underneath the guideway deck. The Combination Advanced Guideway System and Highway Alternatives including the Preferred Alternative (including the range between the Minimum or Maximum program) result in the greatest adverse visual impact by adding both highway widening and the Advanced Guideway System elements.

ES.32.10 How will recreation resources be impacted?

The Action Alternatives physically impact recreation resources adjacent to the I-70 highway, and indirectly affect resources farther afield, due to access and capacity changes. Up to five Section 6(f) resources could be impacted. In general, the Combination Alternatives impact recreation resources the most because they have both the largest footprint and the biggest increase in capacity (and thus recreation use). Increased visitation benefits commercial recreation providers and strains the sustainability of forest land resources. The Transit Alternatives have fewer direct impacts than the Highway Alternatives but result in higher increases in visitation. The Highway Alternatives have more direct impacts than the Transit Alternatives, but result in only modest visitation increases because the former have less capacity than the Transit Alternatives and therefore induce fewer recreation-oriented trips. The Preferred Alternative results in impacts similar to the Transit Alternatives, resulting from the Minimum Program of improvements. Direct impacts are lower, but visitation increases are high. Later phases of improvements under the Maximum Program, if implemented, have similar impacts to the Combination Alternatives, with more direct impacts and a higher increase in recreation visitation. The Preferred Alternative directly affects between approximately 65 and 90 recreation sites with the low end of the range similar to the Transit alternatives and the high end of the range similar to the Combination Alternatives. The Highway Alternatives' impacts fall in a range between the Transit and Combination Alternatives.

Close coordination with the United States Forest Service in the development of recreation and forest management techniques to effectively manage any increases in visitation rates is a key mitigation strategy to mitigate impacts to United States Forest Service lands due to the increased access.

ES.32.11 What will be the effects on the local economy and culture?

All alternatives including the No Action Alternative and the Action Alternatives affect the local economies and character of the mountain communities. The Action Alternatives likely suppress local economies during construction, but after construction all Action Alternatives except for the Minimal Action Alternative meet or surpass a Gross Regional Product of $4 billion a year. The Combination Alternatives have the greatest positive effect on the local economy. The effect of the Preferred Alternative is a range, depending on the extent of full transportation improvements that are implemented.

All Action Alternatives except the Minimal Action are expected to induce more population and employment growth in the Corridor. The amount and type of this varies, with the Transit, Combination and Preferred Alternatives (including the range between the Minimum and Maximum program) likely to induce the most. Eagle County, Summit County and Garfield County are all likely to experience this induced growth where as Clear Creek County is not expected to see growth.

Economic growth places pressure on property values, community services and other social infrastructure. The adaptive management approach of the Preferred Alternative allows improvements to be implemented over time, which may allow communities to better manage effects of economic growth. **Figure ES - 7** shows the 2000 to 2035 population and employment growth

ES.32.12 Summary of Impacts and Mitigation

Impacts to all environmental resources and mitigation measures are summarized in **Table 3.19-1** of this document. They are defined in much more detail in Chapter 3 of this document.

ES.33 How can the public provide input on this document?

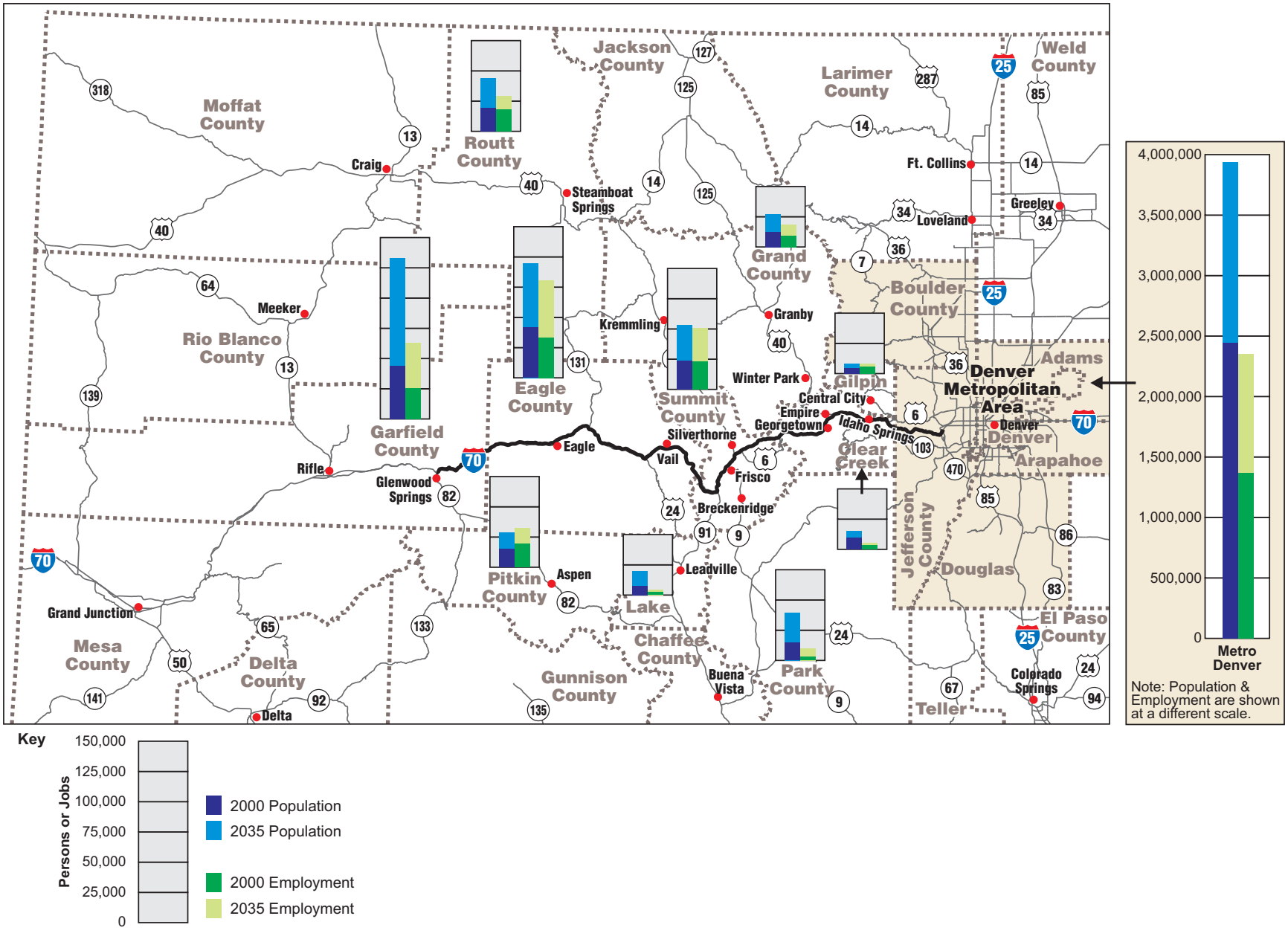
The lead agencies will distribute this document for a 60-day public comment period, during which time public hearings will be held to present the findings in this document and obtain public input. The public hearing dates and locations are as follows:

Summit County:	**Clear Creek County:**	**Eagle County:**
October 5, 2010	October 6, 2010	October 7, 2010
5:00 PM to 8:00 PM	5:00 PM to 8:00 PM	5:00 PM to 8:00 PM
Silverthorne Pavilions	Clear Creek High School	Eagle County Fairgrounds
400 Blue River Parkway	185 Beaver Brook Canyon Road	0426 Fairgrounds Road
Silverthorne, Colorado 80498	Evergreen, Colorado 80439	Eagle, Colorado 81631

Notices announcing availability of the document, comment period dates, opportunities to review the document, methods to provide comments, and dates and locations of the public hearings will be issued prior to the start of the comment period. Methods used to distribute the notices will include, but not be limited to, mailings, news advertisements, and project website.

The lead agencies will review all comments received and provide responses in the Final PEIS. These comments will be considered prior to preparing a final decision to be documented in the Record of Decision, which concludes the NEPA process for this Tier 1 study.

Figure ES-7. 2000 to 2035 Population and Employment Growth



ES.34 What are the next steps in the PEIS process?

Remaining steps to complete the first tier NEPA process for the I-70 Mountain Corridor PEIS after this document is issued include:

- Prepare Final PEIS, including responses to individual comments received during the public comment period.
  - Issue Notice of Availability
  - Provide 30-day review period
- Hold I-70 PEIS Project Leadership Team and Collaborative Effort team meetings through completion of the Record of Decision, as appropriate.
- Prepare and publish Record of Decision, the final decision document that concludes the NEPA process for this Tier 1 process.

The lead agencies anticipate the following public and agency involvement during future Tier 2 processes:

- The Colorado Department of Transportation will complete site-specific Tier 2 processes for future projects in the Corridor and develop public and agency involvement programs for each study, including scoping meetings, public open houses, project information distribution, public and agency document review and comment, and public hearings. The level of public involvement depends on the NEPA action undertaken (Environmental Impact Statement, Environmental Assessment, or Categorical Exclusion). The Colorado Department of Transportation will follow the I-70 Mountain Corridor Context Sensitive Solutions Guidance for each project.

A Collaborative Effort Committee using the Collaborative Effort team member profile will meet at least once every two years through 2020 to review the status of Tier 2 processes and consider the need for additional capacity improvements based on specific milestones or "triggers" included in the Consensus Recommendation.

- The Colorado Department of Transportation will continue stakeholder engagement through completion of the Final PEIS and Record of Decision, and site-specific Tier 2 processes. In 2020 the Colorado Department of Transportation will coordinate with the Collaborative Effort Committee to assess the overall purpose and need and effectiveness of implementation of those decisions. At that time, the lead agencies and the stakeholder committee may consider the full range of improvement options, not just those included in the PEIS recommended improvements.
- The Colorado Department of Transportation is committed to follow I-70 Mountain Corridor Context Sensitive Solutions Guidance for future Tier 2 processes on the Corridor to maintain ongoing stakeholder involvement in future decisions to help foster partnerships and communication sharing.

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Introduction

1. What is this document and its purpose?

The Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA) (lead agencies) prepared this Revised Draft Programmatic Environmental Impact Statement (Revised DPEIS) to provide reader-friendly, concise information about the major findings of the I-70 Mountain Corridor National Environmental Policy Act (NEPA) process. This Revised DPEIS is referred to as "this document."

This document replaces the 2004 Draft Programmatic Environmental Impact Statement (2004 Draft PEIS). The 2004 Draft PEIS serves as a basis for the information in this document; where appropriate, detailed information from the 2004 Draft PEIS is summarized. The 2004 Draft PEIS is available online at the following website: **http://www.i70mtncorridor.com.** The 2004 Draft PEIS is also available by request to one of the lead agency representatives listed in the abstract of this document.

This document's chapters and sections reference technical reports. These technical reports provide updated information collected before and since the 2004 Draft PEIS. The **References** section contains a full list of these reports. These technical reports are available on the attached CD, at the following website: **http://www.i70mtncorridor.com**, and by request.

This document is the first tier of a Programmatic NEPA process. It is a stand-alone document that addresses the same topics as the 2004 Draft PEIS and brings the data and analysis up to date, under Council on Environmental Quality regulation 40 Code of Federal Regulations (CFR) 1502.9(a). This document analyzes alternatives developed since the Notice of Intent was issued in January 2000. This document includes the alternatives evaluated in the 2004 Draft PEIS, the Preferred Alternative, and the No Action Alternative. This document is responsive to comments received during and since the comment period on the 2004 Draft PEIS. A comment-by-comment response will not be provided.

Commenters who believe that comments made on the 2004 Draft PEIS are still valid and not addressed in this document may resubmit comment(s) on this document during the comment period. Responses to comments on this document will be provided in the Final PEIS.

2. What is a Programmatic NEPA process?

The Council on Environmental Quality allows NEPA decisions to be made through a phased process. This process is referred to as programmatic or tiered decision making. This phased decision-making process provides for a broad level decision to inform more specific decisions using a programmatic or tiered approach. While the terms "programmatic" and "tiered" environmental impact statements are often used interchangeably, there is a difference in application. A programmatic environmental impact statement is a way of considering a program of improvements that resemble a planning process resulting in a number of projects, some with potentially different purposes and needs. A tiered environmental impact statement, on the other hand, addresses one large project with one overall purpose and need too cumbersome to analyze in a traditional environmental impact statement.

In this programmatic process, the lead agencies have identified a program of transportation improvements. To carry out these improvements, Tier 2 processes will be needed, which will be developed with their own specific purpose and need, to solve specific transportation problems consistent with the Tier 1 decision.

Both levels of decision making, the broad level (Tier 1) and the specific or Tier 2 decisions, require that alternatives and impacts are understood at an appropriate level of detail for that decision. A broad level

(Tier 1) decision is the projected outcome for this document and will not directly result in construction or impacts. This decision informs and refines the future, more detailed decisions using a Tier 2 NEPA process that will result in construction and impacts. A Tier 2 process also involves understanding the alternatives and impacts using the approach established by the NEPA and Council on Environmental Quality. It also requires lead agencies to establish a project-specific purpose and need, consider and evaluate alternatives, and understand and disclose the impacts of the alternative(s) to make the decisions regarding activities that lead to construction. An environmental impact statement, an environmental assessment, or a categorical exclusion document Tier 2 processes.

3. Why are the lead agencies doing this document?

Many changes have occurred within the I-70 Mountain Corridor and the State of Colorado since the lead agencies issued the Draft PEIS in December 2004. In 2007, CDOT convened stakeholders from the I-70 Mountain Corridor to work together to reach consensus on needed transportation solutions. This consensus-building process was a great success, bringing together a diverse group of representatives from every user group of I-70 and resulting in the Consensus Recommendation.

This document allows the lead agencies to address changes since the issuance of the 2004 Draft PEIS. In addition, this document concisely communicates to the public the basis for identifying the Preferred Alternative, which is the Consensus Recommendation. This document provides the public an opportunity to comment on an up-to-date, more understandable document. This document includes the decision-making process, the Preferred Alternative, and other changes, such as the removal of the $4 billion threshold and an inclusion of the 50-year horizon developed from the foreseeable transportation needs of the Corridor.

4. What changed since the 2004 Draft PEIS and how were comments received on the 2004 Draft PEIS addressed?

Consistent themes emerged from the comments received on the 2004 Draft PEIS. Highlighted below are common concerns expressed by the public that influenced the approach to identify a preferred alternative and proceed with this document. The Colorado Department of Transportation modified the process to complete this document and revised the content of the document in response to these comments.

- A primary area of comment on the 2004 Draft PEIS was the need for a longer-term horizon with full consideration of solutions for the long term. In response to these comments, the lead agencies decided to change the future timeframe to year 2050, looking at the need for improvements and possible alternatives to address that need.

- Numerous comments surrounded the use of the $4 billion threshold for defining the reasonableness of the preferred grouping of alternatives analyzed in the 2004 Draft PEIS. The comments asserted that this threshold was an arbitrary way to screen alternatives and unfairly biased against Transit Alternatives. In addition, comments reflected that a $4 billion threshold as the basis for the Preferred Alternative was inappropriate and was unfairly limited the alternatives for a multimodal solution on the Corridor. The lead agencies agreed that, for the Tier 1 decision, the ability to fund the alternative should not be the basis of a preferred alternative. The Colorado Department of Transportation modified the approach for identifying a preferred alternative to include a collaborative stakeholder process**)** and did not use a cost threshold in the decision making.
- Concerns were expressed about the transparency of the NEPA process used for the project. The Colorado Department of Transportation developed a transparent process with stakeholders and used the I-70 Mountain Corridor Context Sensitive Solutions process to assist identifying the

Preferred Alternative and move the documentation process forward. See **Appendix A** for a summary of the I-70 Mountain Corridor Context Sensitive Solutions Guidance.

- Questions were raised about the connectivity and segmentation of the western and eastern project termini. The western terminus is Glenwood Springs, based on the reduced level of congestion experienced west of Glenwood Springs. The eastern end terminates at a point on the existing I-70 alignment where mass transit systems do not exist today. The eastern terminus for the project is the C-470 interchange because of the change of travel patterns from highly recreational west of this location to highly urban to the east. **Chapter 1** clarifies this.

  The basis of the termini established by the purpose and need focuses on problems that need to be addressed. The length between the termini is sufficient and provides the ability to address environmental matters on a broad scope without restricting consideration of alternatives for reasonably foreseeable needed transportation improvements. Projects connecting eastward may proceed separately and likely have a different purpose and need than this process.
- Numerous comments were received about funding information provided for transit and the cost estimating methodology. This document includes updated costs for the alternatives and an updated funding chapter.
- In response to the concerns expressed about climate change, this document contains information about energy consumption, the uncertainties associated with future oil supply, and possible future changes in travel associated with those trends.
- This document includes anticipated environmental impacts on wildlife, water quality, geologic hazards, mineral resources, noise, cumulative, community, and historic resources. Each resource section in **Chapter 3** discusses impacts anticipated during construction.
- In response to questions about mitigation commitments made in the 2004 Draft PEIS, this document contains information about mitigation strategies and planned processes for determining how these strategies are incorporated into Tier 2 processes and activities.

In addition to comments received on the 2004 Draft PEIS, other changes affected this process and are included in this document. These include:

- How alternatives are defined. For example:
  1. The Bus in Guideway Alternatives extend from the Eisenhower Tunnel west to the Eagle Airport.
  2. A single preferred alternative is identified.
  3. Transit Alternatives are defined to be representative of the range of possible technologies that fit within the performance specifications identified in **Chapter 2**.

The Rocky Mountain Rail Authority has completed a study of the potential for high-speed rail along the I-70 Corridor. The results of this study were released in March 2010.

- The *Gaming Area Access Environmental Impact Statement* is no longer part of the No Action Alternative. The *Gaming Area Access Environmental Impact Statement* is no longer proceeding, and the Central City Parkway Project has been constructed.
- Changes in laws, such as the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, requiring that FHWA define prudent and feasible alternatives for Section 4(f) evaluations. New regulations for complying with Section 4(f) were published and are found at 23 CFR 774.
- Changes in some of the environmental and community resources located along the Corridor. **Chapter 3** of this document contains updated information.

Following the 2004 Draft PEIS public review period, CDOT undertook a higher level of involvement with representatives of cities and counties and other interests along the Corridor. The Colorado Department of Transportation:

- Formed a Collaborative Effort team to identify a preferred alternative,
- Developed a Context Sensitive Solutions process to be used as the I-70 project is defined and specific projects are identified,
- Developed a Programmatic Agreement, which is included in **Appendix B**, identifying how Section 106 of the National Historic Preservation Act is applied to historic properties for Tier 2 NEPA processes, and
- Formed a Project Leadership Team to keep the process moving forward.

A coordinated effort combining results from the Project Leadership Team, the lead agencies, and Issues Task Forces focused on incorporating specific issues into the process. **Chapter 6** of this document defines and describes in more detail the Project Leadership Team and Issues Task Forces groups and activities.

The public may comment on any aspect of this document. However, lead agencies would specifically like to hear the views of the public on factors relating to these decisions on the travel mode, capacity and general location because these aspects of the decision will not be revisited at Tier 2.

5. What decisions are addressed programmatically at Tier 1 and what decisions will be addressed at Tier 2?

The decisions regarding the transportation solution at the first tier include travel mode, capacity, and general location. This document presents alternatives for this Tier 1 decision. These decisions will not be revisited during Tier 2 NEPA processes unless other laws, such as the Clean Water Act, require revisiting them. The public may comment on any aspect of this document, but the lead agencies would specifically like to hear the views of the public on factors relating to these decisions because these decisions will not be revisited at Tier 2. Although mitigation strategies are proposed at Tier 1 based on potential impacts, additional and specific mitigation measures will be developed at Tier 2.

The analysis of transit modes in this document is made with a representative technology for purposes of including a reasonable range of transit alternatives for broad decision making. Detail regarding a choice of technologies is not available for this Tier 1 decision and will be developed during the Tier 2 process consistent with the mode decision from this Tier 1. Transit technology decisions will be made during Tier 2 processes. The transit modes considered at Tier 1 include Advanced Guideway System, steel wheels-on-steel rail, and bus in guideway

What are the transit modes?

Advanced Guideway System – A fully elevated guideway system that uses new technologies capable of performing in the difficult and challenging I-70 Mountain Corridor weather and terrain conditions, with 7 percent grades and sharp curves. The Advanced Guideway System is based on a magnetic levitation system, to represent this type of advanced technology for the first tier level of planning.

Steel Wheels-on-steel Rail – An on-grade electrically powered facility with elevated sections where needed. The type of rail system represented in the PEIS is based on design characteristics similar to the mountain railroads operating in Switzerland developed by the Swiss Federal Railways.

Bus in Guideway – A separated guideway for buses, assumed to be located in the median of I-70. Buses are equipped with guide wheels to permit a narrow guideway and safer operations. While no specific bus technology has been identified, this alternative is representative of various options of rubber tire transit operating in a separate guideway.

Tier 2 NEPA processes will refine alternatives, specific alignment, design, and mitigation decisions consistent with the Tier 1 Record of Decision, which is the final decision document for the first tier process. For the first transit-focused Tier 2 NEPA process, the transit technology decision will be made

and then incorporated into subsequent Tier 2 NEPA processes. The technology decision may influence other decisions, such as station location or maintenance facility location.

Subsequent Tier 2 processes will define and evaluate alternatives, alignment, interchange design, exact station locations, exact location of the transportation improvements, location of design or mitigation elements and bike paths, among other things. Tier 2 processes will also evaluate design details and specific environmental and community impacts. Specific mitigation commitments associated with impacts will be identified and agreed to at Tier 2.

Tier 2 NEPA processes may consider tolling and non-tolling alternatives. The public will have an opportunity to comment on all of these decisions during the Tier 2 NEPA processes.

6. What has been the decision-making process to get to the Preferred Alternative?

The decision-making process to identify a preferred alternative resolving the problems on I-70 is based on analysis and consensus. The Colorado Department of Transportation identified a representative group of stakeholders from the Denver metropolitan area and the I-70 Corridor to participate in a facilitated process to reach agreement on a recommended preferred alternative to address the transportation problems. The lead agencies agreed to adopt the alternative identified by full consensus of the Collaborative Effort team as the Preferred Alternative in the I-70 Programmatic Environmental Impact Statement. As members of this team, the lead agencies participated in the consensus process, ensuring that the Consensus Recommendation met purpose and need, state and federal laws, regulations, and policies. As a result, the lead agencies are able to adopt the Consensus Recommendation as the Preferred Alternative. **Appendix C** contains the Consensus Recommendation.

A consensus agreement is one that all group members support, built by identifying and exploring all parties' interests by developing an outcome that satisfies these interests to the greatest extent possible.

The decision-making process relied on consensus, meaning that everyone around the table had to compromise by reviewing analysis results, deliberating issues and reaching understandings all members could live with. The full report of the Collaborative Effort team is located on the I-70 website and is entitled the *Close Out Report for the Collaborative Effort*.

The Collaborative Effort team identified criteria for the Preferred Alternative and deliberated on how to address the purpose and need for the project with various transportation solutions. The Preferred Alternative is unique in its adaptive management approach to meeting transportation needs and relies on a strong multimodal and long-term vision approach to moving people.

Chapter 6 of this document describes in more detail the various roles of the different groups involved in the decision-making process.

7. What happens after the Tier 1 Record of Decision (Implementation Plan)?

The lead agencies, in collaboration with project stakeholders, developed an implementation process for the multimodal Preferred Alternative of the I-70 Mountain Corridor Tier 1 Programmatic Environmental Impact Statement.

The implementation process describes how projects are prioritized to carry out the Tier 1 decision, describes how the Tier 1 decision is carried out through the statewide planning process, and defines what Tier 2 processes are and options for how components of the Preferred Alternative can move forward.

A Record of Decision for this programmatic environmental impact statement does not mean that the Preferred Alternative will be constructed. Funding constraints limit CDOT's ability to fully implement the Preferred Alternative. Unless additional revenue sources are secured, it is difficult to complete the identified high-priority projects, as well as the other components of the Preferred Alternative. **Chapter 5**, **Financial Considerations,** contains more information. Even when funding is identified for a portion of the Preferred Alternative, a Tier 2 NEPA process is necessary to move into the final design and construction phases.

What is a Tier 2 NEPA process?

The Tier 2 NEPA process supports the Tier 1 decision and has independent utility, operational independence, and constructible use. In the case of this project, the Corridor is subdivided into projects that have the above characteristics and can be funded. Examples of Tier 2 processes in this case include, but are not limited to, interchanges, portions of interchanges, auxiliary lane(s), transit, and highway capacity with logical end points. Tier 2 processes require an individual NEPA class of action ranging from categorical exclusions, environmental assessments, or environmental impact statements depending on the size, scope, and context of individual projects. Tier 2 processes move the Tier 1 Preferred Alternative forward and reflect the Tier 1 decision regarding mode, general corridor location, and capacity.

- **Independent utility** means that a project is usable and a reasonable expenditure even if no additional transportation improvement in the area is made.
- **Operational independence** means that the project can operate effectively and completely on its own.
- **Constructible use** means that the project can be constructed and provides an independent benefit.

How is the class of action determined for Tier 2 processes?

Transportation projects vary in type, size, complexity, and potential to affect the environment. The lead agencies will work together to determine the class of action for Tier 2 processes. To account for the variability of project impacts, NEPA and 23 CFR 771.115 allow three basic "classes of action." The class of action determines how compliance with NEPA is carried out and documented:

- Class I – An environmental impact statement is prepared for projects that will cause a significant adverse effect on the environment.
- Class II – A categorical exclusion is prepared for projects that cause minimal social, economic, or environmental impact.
- Class III – An environmental assessment is prepared for larger-scale projects that do not meet the requirements for a categorical exclusion or those for which the significance of the environmental impact is not clearly established. If the project will have significant impacts, an environmental impact statement must be prepared.

Regardless of class, all environmental studies adhere to the I-70 Mountain Corridor Context Sensitive Solutions Guidance developed for the I-70 Mountain Corridor, which includes commitments to the SWEEP and ALIVE mitigation agreements.

What activities can be done to prepare for Tier 2 processes?

Because Tier 2 processes cannot proceed without the potential for identified funding, CDOT may initiate a feasibility study. Feasibility studies position CDOT to prepare for future funding opportunities and make meaningful improvements to the I-70 Mountain Corridor as soon as possible. Feasibility studies allow for a detailed understanding of the improvements needed and solidify approaches to deliver construction projects in a way that is adaptable to the amount of available funding. These studies may be

a prerequisite to detailed Tier 2 processes in cases where the problem, context, or potential solution is complex, or the scope of a potential project is so great that funding or financing the construction is not available.

The focus of these studies is to:

- Understand the detailed social and environmental limitations of the project area
- Develop criteria to compare alternatives
- Develop feasible alternatives to support the Tier 1 decision
- Evaluate the feasible alternatives
- Consider phasing opportunities

These feasibility studies provide an understanding of how a project could be phased to ensure that the lead agencies are prepared to implement Tier 2 NEPA processes as efficiently as possible. The feasibility studies provide assurance that Tier 1 alternatives are not precluded, and that Tier 2 NEPA processes have independent utility, are operationally independent, and have constructible use. Feasibility studies will proceed using the I-70 Mountain Corridor Context Sensitive Solutions process.

Why are Tier 2 processes necessary?

The Tier 1 decision is general for mode, location, and capacity. The level of detail for design is not available to make site-specific decisions for the transportation solution. Many assumptions about the design and footprint were made to compare the impacts of the Tier 1 alternatives for the Tier 1 decision. Tier 2 processes are necessary to identify specific environmental impacts, site-specific alternatives, alignments, technology, and transportation solutions for projects contained in the Preferred Alternative. Specific mitigation measures are identified to avoid or minimize the impacts of the transportation solution and to enhance impacted areas. All components of the Preferred Alternative require a Tier 2 process.

What are the currently identified high-priority components of the Preferred Alternative?

High-priority components currently identified for the Preferred Alternative are as follows:

- Advanced Guideway System – Improves mobility, reduces congestion, and has public support
- Non-infrastructure Improvements (that is, Intelligent Information Systems, Travel Demand Management, etc.) – Improves mobility, has public support, and enhances safety
- A six-lane component from Floyd Hill through the Twin Tunnels, including a bike trail and frontage roads from Idaho Springs East to Hidden Valley and Hidden Valley to US 6 – Improves mobility, reduces congestion, enhances safety, and has public support
- Empire Junction (US 40/I-70) improvements – Improves mobility and has public support
- Eastbound auxiliary lane from the Eisenhower-Johnson Memorial Tunnels to Herman Gulch – Improves mobility, enhances safety, and has public support
- Westbound auxiliary lane from Bakerville to the Eisenhower-Johnson Memorial Tunnels – Improves mobility, enhances safety, and has public support

In addition to high-priority components, what other components are identified in the Preferred Alternative?

The Preferred Alternative includes 26 interchange projects, 4 curve safety projects, 12 auxiliary lane[1] projects, specific safety and capacity improvements, and truck operations improvements. See **Chapter 2** for specific information.

What are the considerations for prioritizing Preferred Alternative components?

Although the Preferred Alternative does not distinguish priority among subsequent specific components, CDOT, in collaboration with the Project Leadership Team and stakeholders, developed the following non-weighted considerations for prioritizing projects:

- **Greater magnitude and cost –** The Colorado Department of Transportation acknowledges that some projects are greater in magnitude and cost with long lead times and superior benefits. These long-term projects need a higher priority to move forward.
- **System quality –** Projects that improve and address system quality such as bridge service life or pavement quality have higher priority. Measurable factors are maintenance Level of Service, bridge inventory (functional deficiencies, structural deficiencies, and remaining service life) and the pavement management system.
- **Maximize cost/benefit –** Projects that maximize benefit versus cost will receive a higher priority. Projects that include benefits to performance, operations, economics, environment, and maintenance relative to the costs of financial investment and environmental impacts have higher priority.
- **Funding availability –** Projects that maximize public and private funding availability have a higher priority. This includes where public and private funding opportunities are enhanced and local match money is available.
- **Improve mobility –** Projects reducing corridor congestion and improving mobility have a higher priority when improvements benefit the volume to capacity ratio, Level of Service, delays, travel times, throughput, and queuing.
- **Safety –** Projects that address safety have a higher priority. Safety is generally measured by a Weighted Hazard Index, high number of animal vehicle collisions, and curve deficiencies. Crash reports can be used to enhance this information.
- **Public support –** Projects with greater public support have a higher priority. Information will be gathered from comments on this document, I-70 Coalition input or other similar groups, county

What are the components of the Preferred Alternative?

The Preferred Alternative identifies three groups of projects to meet short-term transportation needs: Advanced Guideway System, non-infrastructure components, and highway improvements. These projects will move forward into detailed project development as funds are identified consistent with Colorado's long-range Statewide Transportation Plan.

The Preferred Alternative also includes a process (triggers) for assessing the progress of improvements and needs on the Corridor. The process is based on a set of conditions established through the stakeholder consensus and are part of the decision-making process affecting the implementation and prioritization of projects. These conditions include mandatory decision points (2020 and 2025) for assessing progress in the Corridor.

[1] Updated analysis resulted in the addition of one interchange (Wolcott). This was added after the Consensus Recommendation was adopted in 2008. Ongoing coordination will occur with the Collaborative Effort as the analysis is updated and new information becomes available.

coordination meetings, I-70 Mountain Context Sensitive Solutions Team meetings, Collaborative Effort meetings or similar group, and public involvement in the planning process.

- **Environmental mitigation –** Projects that best mitigate impacts on the built and natural environment, avoid impacts, and offer more mitigation opportunities and enhancement opportunities have a higher priority.

What activities can occur before the Record of Decision?

Some planning, design, construction, and maintenance activities can take place before signing a Record of Decision. These activities are "early action projects." Early action projects must be common elements to all the Action Alternatives identified in **Chapter 2** and have a clear need. Early action projects must demonstrate that they have logical termini and independent utility and cannot restrict consideration of alternatives for other reasonably foreseeable transportation improvements (23 CFR 771.111(f)). Additionally, if the No Action Alternative is selected, these projects are still needed. Early action projects include:

- Empire Junction (US 40/I-70) improvements – Improves mobility and has public support.
- I-70/Silverthorne interchange – Has public support.
- Eagle interchange – Improves mobility.
- Minturn interchange – Enhances safety.
- Edwards interchange – Improves mobility.
- Black Gore Creek and Straight Creek Sediment Control – Provides environmental mitigation.
- I-70 Wildlife Fencing – Enhances safety.
- Clear Creek Sediment Control Action Plan – Provides environmental mitigation.

How do prioritized components of the Preferred Alternative advance?

All components of the Preferred Alternative, including transit, must go through the established planning process. Because the transportation planning process identifies and prioritizes projects, the components will be defined into projects. Transportation planning in Colorado is conducted through 15 transportation planning regions. Transportation planning regions with urbanized areas of 50,000 people require formation of a metropolitan planning organization. Federal regulations require each state to develop a long-range (20+ year) Statewide Transportation Plan and a short-range (six-year) Statewide Transportation Improvement Program. The long-range Statewide Transportation Plan includes corridor visions and strategies implemented by programming priority projects into the Statewide Transportation Improvement Program. All federally funded and regionally significant projects are identified in the Statewide Transportation Improvement Program. The Statewide Transportation Improvement Program is updated every four years using the Project Priority Programming Process (4P) guidance adopted by the Colorado Transportation Commission. To facilitate the 4P process, each CDOT engineering region meets individually with transportation planning regions in their area to discuss project selection and prioritization within that transportation planning region. The purpose of the Transportation Planning Region meeting is to review funding availability, the projects in the current Statewide Transportation Improvement Program, and requests for new projects.

After meeting with each transportation planning region, CDOT regions hold a joint meeting with all of their transportation planning regions to elect and prioritize projects for the entire CDOT region in applicable programs when funding is available. Projects are selected in cooperation with local officials from the transportation planning regions based on a set of criteria developed to address or improve a particular mobility, safety, or system quality need on the transportation system. During the prioritization process, transportation planning regions and metropolitan planning organizations not wholly contained in one CDOT region may plan and conduct a joint prioritization meeting.

Metropolitan planning organizations develop their own Transportation Improvement Program included without modification into the Statewide Transportation Improvement Program. Non-urban transportation planning regions do not develop a Transportation Improvement Program because their projects are included directly in the Statewide Transportation Improvement Program. Statewide Transportation Improvement Program projects are consistent with the corridor visions and strategies identified in the long-range, fiscally-constrained Statewide Transportation Plan.

For additional information on the planning process refer to CDOT's website at the following link: **http://www.coloradodot.info/programs/statewide-planning/planning-process.html**.

What is the current significance of the I-70 Corridor in the long-range Statewide Transportation Plan?

On August 15, 1996, the Transportation Commission adopted the Strategic Transportation Project Investment Program, otherwise known as the "7th Pot." The I-70 Mountain Corridor is one of the 28 statewide strategic projects. The primary objectives of the 7th Pot Projects is to identify projects of statewide significance that were too large to implement and expedite the completion of these transportation projects. Currently, no money is identified for these priorities. See **Chapter 5**, **Financial Considerations,** for further discussion.

What is the relationship between identified project priorities and the planning process?

The implementation process outlined in this document does not supersede the CDOT planning process. It is a tool to inform the planning process regarding priorities on the Corridor.

How is the Tier 1 decision implemented through the planning process?

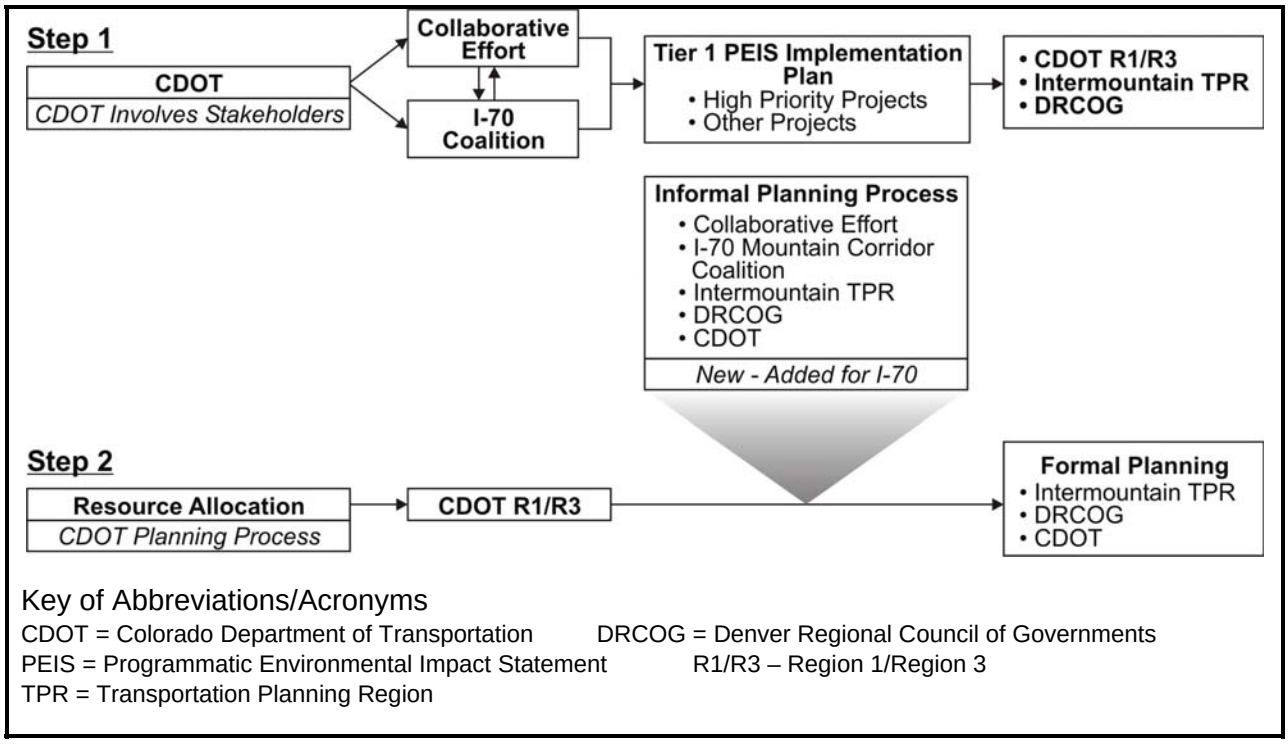
The Tier 1 decision identifies general capacity, mode, and location for transportation improvements in the Corridor and establishes the framework for future project-level activities. The Statewide Transportation Improvement Program includes funds for feasibility studies, Tier 2 processes, design, or construction phases before a project is initiated. Funds for the completion of a project identified in the Tier 2 NEPA process must be reasonably anticipated in the long-range Statewide Transportation Plan. Sequencing, funding, and construction of projects within the Corridor are balanced among other statewide priorities and needs.

The Colorado Department of Transportation and the stakeholders will:

- Guide and monitor the implementation of projects in the Corridor; and
- Assess the Corridor's needs and priorities for recommendations by the Collaborative Effort, including assessments of larger projects for feasible options to phase and implement through planning and Tier 2 processes.

Step 1 in **Figure I-1** indicates the implementation process outlined in this document. The Colorado Department of Transportation and the stakeholders will communicate the priorities identified from the Preferred Alternative with the appropriate transportation planning regions and metropolitan planning organizations. As noted in Step 2, CDOT will work directly with the planning partners to facilitate the integration of the Collaborative Effort and other interested stakeholders into the formal 4P process identified on page **9** of this **Introduction** under the question, "How do prioritized components of the Preferred Alternative advance?"

Figure I-1. Planning Process



The I-70 Mountain Corridor Coalition is a group of more than 30 local governments and businesses who formed in 2004 to address Corridor transportation issues (**http://www.i70solutions.org**).

How can this implementation process change?

The considerations for priorities can change or be elevated in consultation with the stakeholders. The Preferred Alternative includes convening the Collaborative Effort or a stakeholder group with similar composition every two years to identify considerations and priorities for the Corridor.

What is CDOT's role for implementing the Preferred Alternative?

The Colorado Department of Transportation is committed to advancing all elements of the Tier 1 decision through the federally mandated planning process. The Colorado Department of Transportation will pursue current and future priorities identified through stakeholder engagement in this process regardless of mode, including Advanced Guideway System and non-infrastructure improvements. The Colorado Department of Transportation will work with stakeholders to identify additional funding and innovative approaches to construct the Preferred Alternative.

Can the Preferred Alternative be built in its entirety?

Funding constraints limit the ability to fully construct the Preferred Alternative at one time. The Preferred Alternative includes a process for reassessing the effectiveness of built improvements and a review of study results and global trends before implementing additional capacity improvements. The Colorado Department of Transportation has committed to continuous stakeholder involvement (such as the I-70 Mountain Corridor Context Sensitive Solutions and Collaborative Effort teams) for all tasks and projects conducted on the I-70 Mountain Corridor.

The Colorado Department of Transportation acknowledges that some projects are greater in magnitude and cost with long-lead times and high benefits. Despite not having identified funding for constructing these projects, CDOT commits to pursuing pre-Tier 2 processes (such as feasibility studies) for these types of projects to keep them moving forward and find ways to phase them. **Chapter 2** of this document provides more information on Preferred Alternative phasing.

What happens in the 2020 decision point of the Preferred Alternative?

A thorough assessment of the overall purpose and need and effectiveness of implementation of these decisions will be performed. At that time, the lead agencies, in conjunction with stakeholders, may need to consider a full range of alternatives considered in the Final Programmatic Environmental Impact Statement and revisit the Tier 1 decision if necessary.

What happens in the 2025 decision point of the Preferred Alternative?

If the Advanced Guideway System cannot be built by 2025 and the Specific Highway Improvements from the Preferred Alternative are complete, CDOT, in consultation with stakeholders, can implement additional needed highway and non-Advanced Guideway System capacity improvements.

8. What is Context Sensitive Solutions and how does it work with future NEPA processes and other decision-making on the Corridor?

In 2008, the lead agencies and other signatories executed a Section 106 Programmatic Agreement (Programmatic Agreement) among the U.S. Department of Agriculture, U.S. Forest Service, U.S. Department of the Interior, U.S. Bureau of Land Management, Glenwood Springs Field Office, Advisory Council on Historic Preservation, and the Colorado State Historic Preservation Officer regarding implementation of the Interstate 70 Mountain Corridor Project, September 2008, in compliance with the National Historic Preservation Act. In this agreement, developed over several years, the lead agencies committed to initiate, before Tier 2 undertakings, development of design guidelines and historic context(s) for the I-70 Mountain Corridor. The guidelines are consistent with the principles of Context Sensitive Solutions and CDOT's *Policy Memo 26*. The intent of the engineering design criteria, aesthetic guidelines, and the historic context is to guide all future undertakings on the Corridor.

The Colorado Department of Transportation initiated the I-70 Mountain Corridor Context Sensitive Solutions process to provide effective guidelines for future planning, design, construction, and maintenance projects along the 144-mile Corridor.

The Colorado Department of Transportation initiated the I-70 Mountain Corridor Context Sensitive Solutions process to provide effective guidelines for all future planning, design, and construction projects along the I-70 Corridor. Context Sensitive Solutions is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. Context Sensitive Solutions is an approach that considers the total context within which a transportation improvement project will exist.

For the I-70 Mountain Corridor, a Context Sensitive Solutions Corridor Team was established to assist in the development of a context statement, core values and principles, a six-step Context Sensitive Solutions process, design criteria, and a Historic Context Report. An interactive website, **http://i70mtncorridorcss.com** includes all of this documentation.

9. How were the I-70 Mountain Corridor Context Sensitive Solutions Guidelines developed?

To develop the I-70 Mountain Corridor Context Sensitive Solutions Guidelines, the I-70 Mountain Corridor Context Sensitive Solutions Project brought together a multidisciplined, multi-interest stakeholder group to discuss, debate, and capture what they respect and will work to preserve in the Corridor. The lead agencies worked with state and federal agencies, counties, towns, the National Forests, ski corporations and resorts, residents, business owners, truckers, and commuters to develop the I-70 Mountain Corridor Context Sensitive Solutions design guidelines. This inclusive group of stakeholders became the I-70 Mountain Corridor Context Sensitive Solutions Team.

Through meetings, the Corridor Team developed processes, such as the 6-Step Decision-Making Process, to use on future studies, designs, and construction projects so that planners, designers, and contractors incorporate Corridor values into their decisions. These are documented in the I-70 Mountain Corridor Context Sensitive Solutions Guidance.

The first Corridor Team meeting was held October 26, 2007. Additional Corridor Team meetings were held in December 2007, March 2008, October 2008, and September 2009.

The 6-Step Decision-Making Process

Step 1: Define Desired Outcomes and Actions

Step 2: Endorse the Process

Step 3: Establish Criteria

Step 4: Develop Alternatives or Options

Step 5: Evaluate, Select, and Refine Alternatives or Options

Step 6: Finalize Documentation and Evaluate Process

In addition, an I-70 Mountain Corridor Context Sensitive Solutions Project Leadership Team was formed at the onset of the Context Sensitive Solutions process. Their mission was to make sure the Context Sensitive Solutions process moved forward, included the appropriate stakeholders, and developed aesthetic guidelines as directed in the Programmatic Agreement.

The I-70 Mountain Corridor Context Sensitive Solutions Guidance is the result of the stakeholders' passion and commitment to build world-class improvements along Colorado's I-70 Mountain Corridor. Broad groups of stakeholders came together to make sure that transportation improvements enhance the Corridor by applying the I-70 Mountain Corridor Context Sensitive Solutions Guidance on future NEPA processes and decisions made about the Corridor.

10. How is the I-70 Mountain Corridor Context Sensitive Solutions Guidance to be used?

The lead agencies committed to stakeholders that the I-70 Mountain Corridor Context Sensitive Solutions Guidance will be used on all future Corridor projects. Specifically, projects will have a Project Leadership Team, use the 6-Step Decision-Making Process, and comply with the design criteria for engineering and aesthetic guidelines.

The I-70 Mountain Corridor Context Sensitive Solutions Guidance provides direction, guidance, and resources to future planners, engineers, designers, and Corridor stakeholders about how decisions are made about Corridor improvements. To maximize ease of access, transparency, and future flexibility, CDOT posted the I-70 Mountain Corridor Context Sensitive Solutions Guidance on an interactive website that:

- Presents the Corridor Context Statement and Core Values;
- Delineates the decision-making process to be used;
- Defines the design criteria and guidance;

- Organizes Corridor environmental data on maps;
- Indexes the 2004 Draft PEIS data by mile marker;
- Provides tools, templates, photographs, exercises, and ideas for project managers;
- Makes available all Corridor agreements;
- Captures years of stakeholders' comments and concerns; and
- Contains links to other relevant materials.

11. What additional information is included in the I-70 Mountain Corridor Context Sensitive Solutions Guidance?

As an element of the Context Sensitive Solutions process, several Working Groups were formed to address specific issues along the Corridor. The conclusions of these Working Groups are included in the I-70 Mountain Corridor Context Sensitive Solutions Guidance and are available for all future Corridor planning, design, and construction projects.

Stream and Wetland Ecological Enhancement Program (SWEEP)

The SWEEP program focuses on efforts to integrate water resource needs (such as water quality, fisheries, wetlands, and riparian areas) with design elements for construction activities and long-term maintenance and operations of the transportation system. The working group developed a Memorandum of Understanding among the lead agencies and the U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. Bureau of Land Management, the Colorado Division of Wildlife, Clear Creek County, Clear Creek Watershed Foundation, Upper Clear Creek Watershed Association, Eagle River Watershed Council and Colorado Trout Unlimited. The Memorandum of Understanding establishes the management framework to assure protection of water resources throughout the life cycle of projects in the I-70 Mountain Corridor.

The lead agencies are working toward finalizing the SWEEP Memorandum of Understanding. **Appendix D** of this document contains the draft SWEEP Memorandum of Understanding. The lead agencies are working to have the Memorandum of Understanding finalized to include with the Final Programmatic Environmental Impact Statement.

A Landscape Level Inventory of Valued Ecosystems (ALIVE)

The ALIVE Working Group addresses issues related to improving wildlife movement and reducing habitat fragmentation in the Corridor. The ALIVE Working Group established an inventory of linkage interference zones where evidence suggests that the highway impedes important wildlife migration, movement, and dispersal. The lead agencies established a Memorandum of Understanding with the Colorado Division of Wildlife, the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the U.S. Bureau of Land Management for a program that focuses on identifying and addressing critical ecosystem habitats connections across I-.70. **Appendix E** provides the ALIVE Memorandum of Understanding.

Historic Context Working Group

The Historic Context Working Group developed a Multi-Property Document Form for the I-70 Mountain Corridor. This document is to be used in all future NEPA documents as part of the Section 106 process. The Multi-Property Document Form supports the consistent preservation of historic resources in the communities along the Corridor during planning, design, and construction of future projects.

Aesthetic Working Groups

The Aesthetic Working Groups were formed to assist the Corridor and consultant teams in preparing the aesthetic guidance. Four working groups formed around four geographic design segments that collectively represent the entire I-70 Mountain Corridor. The four design segments are:

- Front Range Foothills
- Mountain Mineral Belt
- Crest of the Rockies
- Western Slope Canyons and Valleys

For each segment, objectives and strategies were developed to guide the future improvements.

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Chapter 1. Purpose and Need

1.1 What's in Chapter 1?

Chapter 1 describes the transportation problems that exist in the Interstate 70 (I-70) Mountain Corridor (the Corridor) today and are forecast to occur in the future. These problems lead to the definition of the project purpose and need. **Chapter 1** documents the transportation problems and the need for a solution to these problems. The purpose and need provides the basis for defining reasonable alternatives and the foundation for eliminating alternatives in **Chapter 2**. **Chapter 1** also briefly describes the Corridor and summarizes background information from other studies that contribute to an understanding of the Corridor and its transportation problems. Other related project information presented in **Chapter 1** includes a description of the study limits, and the 2035 and 2050 forecasts years used to examine potential future growth and the associated travel demand, including the various types of trips that are likely to occur. For more detailed information on the travel demand forecasts, see the *I-70 Mountain Corridor PEIS Travel Demand Technical Report* (CDOT, August 2010).

1.2 Why was this Corridor study initiated?

Interstate 70 is the only east-west interstate to cross Colorado and the only continuous east-west highway in the study area. It is the major corridor for access to established communities and recreational areas that are important contributors to the quality of life and the economic base in the state. This Corridor provides access to the White River National Forest and the Arapaho and Roosevelt National Forests, the two most visited national forests in the United States (U.S.). Destinations along the Corridor include a number of major ski resorts that attract local, national, and international visitors. In addition to recreational travel, I-70 is an important freight corridor in Colorado. Heavy vehicles—trucks, buses, and recreational vehicles—represent about 10 percent of traffic along the Corridor. The variation in speeds between these vehicles and faster moving automobiles, particularly on the steep grades, contributes to safety, mobility and congestion problems in the Corridor. **Figure 1-1** displays Colorado and the I-70 Mountain Corridor.

Growth in the Corridor and the Denver metropolitan region has resulted in an increase in the number of trips along the I-70 Mountain Corridor. In the future, travelers will experience substantial travel time delays, which restrict mobility and accessibility along the Corridor. Projected travel demands in this Corridor exceed the design capacity of the facility and will result in severe congestion for extended periods of time.

The I-70 Mountain Corridor, referred to as the Corridor, extends 144 miles from Glenwood Springs in western Colorado to C-470 on the periphery of metropolitan Denver. The Corridor includes both the I-70 highway and the associated infrastructure.

The I-70 Mountain Corridor traverses the Rocky Mountains of Colorado. The portion of I-70 examined in this document extends for 144 miles and traverses the rugged terrain and outstanding scenery of central Colorado, including the steep grades leading up to the Continental Divide and Vail Pass, and the narrow, steep walled Clear Creek and Glenwood Canyons. Tight curves, steep grades, deficient interchanges, and the lack of climbing and passing lanes contribute to the capacity limitations.

The lead agencies prepared this document for the I-70 Mountain Corridor to identify transportation solutions at the Corridor level and to provide a foundation for future project-level analysis of specific improvements. This document recommends the general location, mode types, and capacity for future transportation improvements in the Corridor.

Figure 1-1. I-70 Mountain Corridor in Colorado

1.3 What other studies have been completed or are related to this Corridor?

Several related previous and ongoing studies provide background and ongoing information for this document. These include:

- *Feasibility Study*, 1989 – In an I-70 feasibility study, CDOT identified the need for additional capacity in Clear Creek County, primarily between Floyd Hill and Idaho Springs.
- *Major Investment Study*, 1998 – This I-70 Major Investment Study (MIS) resulted in a 50-year "Vision for the Corridor," between Glenwood Springs and C-470. The MIS Vision included a desire to change Corridor users' travel behavior through the introduction of high-speed transit and limited changes to the highway's capacity. The MIS recommended the preparation of a Programmatic EIS to examine elements of the vision and potential impacts.
- *I-70 Mountain Corridor Incident Management Program*, 2000 – The Incident Management Plan addresses procedural and coordination aspects of managing unplanned incidents on the highway affecting the flow of traffic. It includes an incident response manual providing response personnel with a quick, in-the-field reference.
- *Urban Maglev Technology Development Program*, 2004 – The Colorado Department of Transportation and Federal Transit Administration (FTA) sponsored this research effort. This research effort involved the Maglev Transit Group, Sandia National Laboratories, CDOT, and the former Colorado Intermountain Fixed Guideway Authority. The study assessed the potential introduction of magnetic levitation (maglev) high-speed transit in the Corridor. The 2004 final report proposed a high-speed surface transport CM200 design for the Corridor.
- *Colorado Tolling Enterprise*, 2004 – The Colorado General Assembly created the Colorado Tolling Enterprise to finance, build, operate, and maintain toll highways. The Colorado Tolling Enterprise conducted a toll system traffic and revenue feasibility analysis, which found that tolling is feasible on a widened I-70 between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill. In 2010, the Colorado Tolling Enterprise was reorganized as the High Performance Transportation Enterprise.
- *State Highway 9 Frisco to Breckenridge Final Environmental Impact Statement (EIS)*, 2004 – The State Highway (SH) 9 project proposed widening the highway from two to four lanes to increase the safety and mobility of drivers, transit, pedestrians, and bicyclists. Construction was completed for a 1.2-mile section in Breckenridge and continues on a 1.3-mile section just north of Breckenridge.
- *Colorado Climate Action Plan: A Strategy to Address Global Warming*, 2007 – To face the challenge of climate change, the State of Colorado initiated a plan that sets goals to reduce greenhouse gas emissions by 20 percent below 2005 levels by 2020, and makes a shared commitment with other states and nations to cut emissions even more by 2050.
- *I-70 Mountain Corridor Context Sensitive Solutions*, 2009 – The I-70 Mountain Context Sensitive Solutions process brought together a multidisciplined, multi-interest stakeholder group to discuss, debate, and capture what the stakeholders value and who will work together to preserve the Corridor. Processes were developed for use on future Corridor studies, designs, and construction projects to ensure incorporation of these values into the decision making at each phase of project development.
- *I-70 Coalition: Land Use Planning Study for Rail Transit Alignment throughout the I-70 Corridor*, 2009 – This study focused on how transit integrates with land uses in different communities in the Corridor at potential station locations for transit. It also addressed questions about land use and zoning amendments needed to better accommodate future transit.

- *Gaming Area Access Draft EIS* – This EIS began in 2000 and considered access improvements along SH 119, US 6, and I-70. The Notice of Intent was rescinded in 2010, and the study was never published or completed.
- *Rocky Mountain Rail Authority Feasibility Study*, 2010 – This study focused on the feasibility of high-speed passenger rail in Colorado and addressed specific criteria established by the Federal Railroad Administration (FRA). The study considered a range of technology options and operating speeds to evaluate feasibility. The results indicated that a high-speed passenger rail system is conceptually feasible along the I-25 and I-70 corridors from Pueblo to Fort Collins and from Denver International Airport to Eagle County Airport. The Rocky Mountain Rail Authority study used a market-based approach to evaluate potential route and station locations based on their ability to produce ridership. It used representative route options and per mile cost estimates for comparison purposes. The Rocky Mountain Rail Authority study is a separate study from this document and does not include a decision about specific technology or alignment location.

Other studies planned and related to this Corridor include:

- *Colorado State Rail Plan* – The Colorado Department of Transportation received funding from the FRA to complete a State Rail Plan. Completing this plan is a pre-requisite for applying for FRA high-speed rail funding under the Passenger Rail Investment and Improvement Act (PRIIA) of 2008.
- *Connectivity Study* – The Colorado Department of Transportation received funding from FRA for a Denver metropolitan area connectivity study in cooperation with the Regional Transportation District to examine how high-speed rail could interface with the Regional Transportation District FasTracks system. The Regional Transportation District FasTracks Program is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of Bus Rapid Transit, and enhance bus service across the eight-county Denver metropolitan area district. The connectivity study will address interoperability opportunities and potential ridership synergies between FasTracks and potential future high-speed passenger rail serving the I-70 and I-25 corridors.

1.4 What are the horizon years of analysis for the study?

In recognition of the need for a short- and long-term sustainable transportation vision, the project analysis uses both a 2035 planning horizon and a 2050 long-term horizon. Data for the year 2035 are based on available projections from a variety of sources and provide the foundation for developing and evaluating alternatives. The 2035 planning horizon also provides a milestone allowing projections to 2050. The year 2050 provides a long-term horizon for developing solutions for the Corridor. The alternatives are developed and evaluated on a variety of performance measures that can be reliably established for 2035 and for their ability to meet travel demand in 2050. To account for the increasing variability of projecting into the future, the 2050 travel demand is estimated with a high-low range.

This project began in 2000. Information on characteristics of the Corridor in 2000 provided a complete snapshot of conditions, and this data set was used for calibration of the travel demand model. Furthermore, the 2000 data set provides a base year for comparison purposes to future year scenarios. This data set includes a large amount of travel and socio-economic data, including the 2000 US Census, the I-70 User Survey, and the I-70 ridership survey conducted by the project.

2000 remains a valid base year for comparison purposes of this Tier 1 document since no major changes have taken place in the 144-mile Corridor that notably alter the snapshot of Corridor conditions provided in 2000. There have been no major or minor I-70 infrastructure improvements since 2000, and travel patterns, types, and needs of Corridor users have not changed substantially.

Chapter 2 includes the evaluation and comparison of alternatives.

1.5 What are the study limits and why were they selected?

The study limits, referred to as the Corridor, extend from Glenwood Springs (milepost 116) to C-470 (milepost 260) in metropolitan Denver. **Figure 1-2** shows the study limits. Glenwood Springs is the western terminus for all modes due to the change in travel patterns including a drop in the number of recreation trips west of Glenwood Springs. C-470 is the eastern terminus for all modes due to the system interchange of I-70 and C-470, the increase in I-70 volumes, and the predominance of urban travel patterns to the east of C-470. These termini do not preclude other National Environmental Policy Act (NEPA) transportation improvement studies outside the Corridor. Additional studies and NEPA processes may extend beyond these termini if needed.

1.6 What is the purpose and need for transportation improvements in the Corridor?

The purpose for transportation improvements is to increase capacity, improve accessibility and mobility, and decrease congestion for travel demand, projected to occur in 2035 and 2050, to destinations along the I-70 Mountain Corridor as well as for interstate travel, while providing for and accommodating environmental sensitivity, community values, transportation safety, and ability to implement the proposed solutions for the Corridor.

There is a need to address the transportation problems in the Corridor. The three interrelated need statements below specifically describe the need:

- **Increase capacity –** There is insufficient capacity to accommodate the current and projected demand for person trips in the Corridor. Person trips are used to portray the future demand, rather than vehicle trips, so that all potential modes of travel are examined. Lack of capacity leads to slower travel times and congested conditions, as discussed in the two need statements that follow. It also means that person trip travel demand cannot be adequately accommodated. The inability to adequately accommodate person trip demand results in a need to increase person trip capacity.

The relationship of capacity and congestion is not direct. Lack of capacity may lead to congested conditions but increased capacity will not necessarily reduce congestion as the additional capacity can also result in more people traveling. As a result, both increased capacity and decreased congestion are addressed as needs for the I-70 Mountain Corridor.

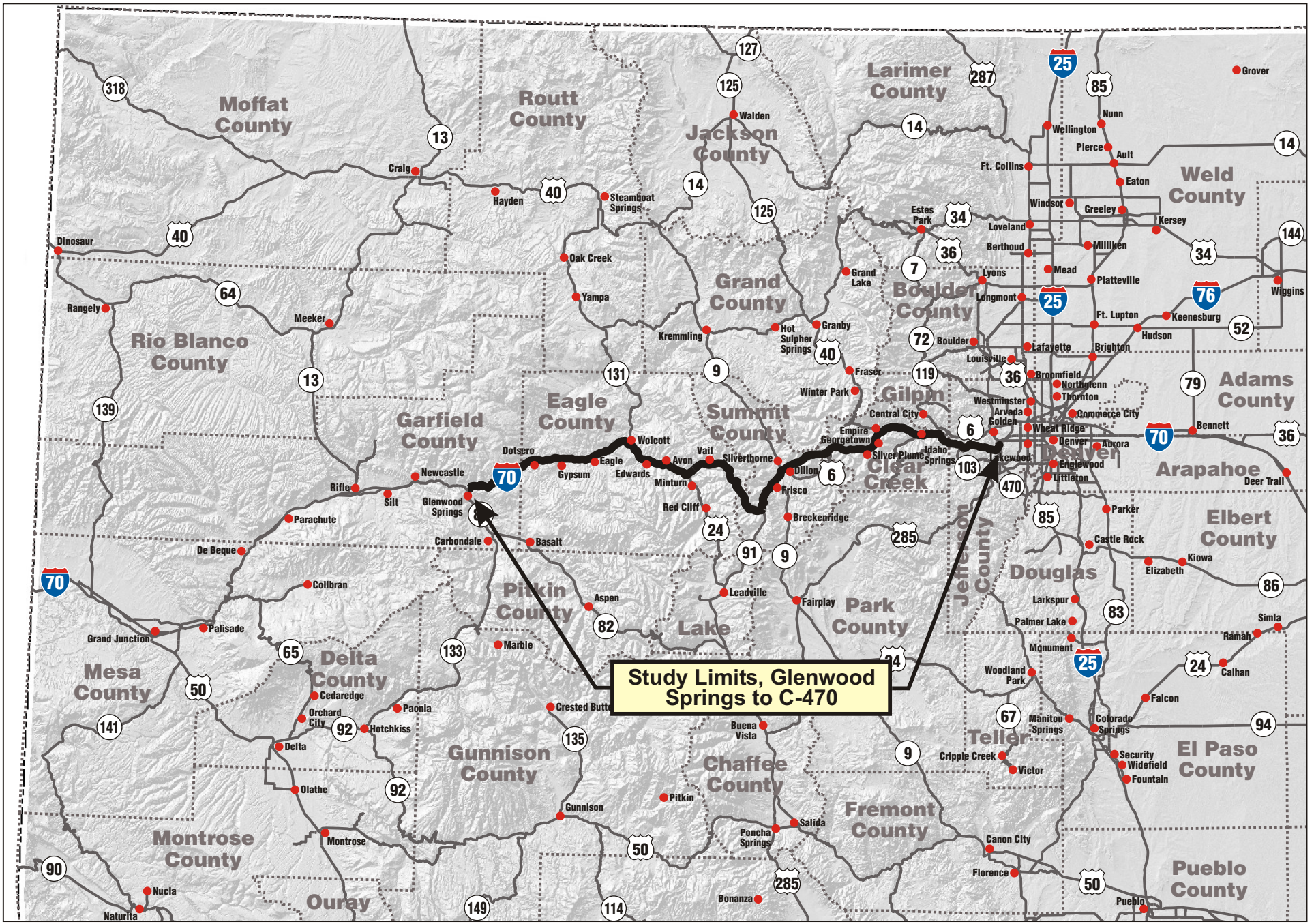
- **Improve mobility and accessibility –** Mobility along the I-70 Mountain Corridor is defined as the ability to travel along the Corridor safely and efficiently in a reasonable amount of time. The mix of vehicle types, particularly slow-moving vehicles, directly affects mobility in this Corridor. Slow moving vehicles (trucks, buses, and recreational vehicles) make up about 10 percent of weekday traffic. Accessibility is related to mobility and is defined as the ability to access destinations served by the I-70 Mountain Corridor safely, conveniently, and in a reasonable amount of time.

  Currently, there are long travel times to traverse the Corridor or reach Corridor destinations during peak weekend conditions. Future increases in person trip demand will result in more congestion, more delay, and increased travel times for weekends and weekdays. Long travel times affect all types of Corridor users, and result in a need to improve mobility and accessibility in the Corridor.

Slow moving vehicles prominently influence mobility along the I-70 Mountain Corridor because of:

1. The many areas of extended steep grades along the Corridor;
2. The lack of reasonable alternatives to trucks making deliveries along the Corridor; and
3. The many steep grades with only two lanes, where a truck passing a slower vehicle will block all faster vehicles causing congestion in both lanes.

Figure 1-2. Study Limits



- **Decrease congestion**. Severe congestion occurs on the Corridor during typical peak weekend conditions and is projected to worsen on weekends in the future and to occur on weekdays. Congestion is defined by a poor Level of Service and is measured over the course of a day at a specific location by the number of hours at Level of Service F.

  Many factors can cause congestion, including, but not limited to:

  - Deficient roadway geometrics,
  - Inadequate interchanges,
  - Slower-moving vehicles in areas of steep grades,
  - Unsafe conditions or actual crashes, or
  - Poor road conditions

Levels of Service are measurements that characterize the quality of operational conditions within a traffic stream and their perception by motorists and passengers. The six levels of service are designated by the letters A through F, with A representing the best operating conditions (light, free-flow traffic) and F the worst (stop-and-go traffic). Roadways operating at Level of Service E are generally considered to be at or near capacity, at which point traffic flow is interrupted by minor disturbances.

Congestion is also affected by high vehicle volume. Existing and future travel delay, forecast to increase with higher person trip demand, results in a need to decrease congestion along the I-70 Mountain Corridor.

Safety plays a strong role in mobility, accessibility, and congestion. As such, in areas where safety problems currently exist, safety will be considered inherent in the project needs.

The project purpose and specific needs form the basis for developing and evaluating alternative transportation solutions for the I-70 Mountain Corridor, as they are measurable and apply throughout the Corridor. However, addressing transportation needs in the I-70 Corridor requires careful consideration of the physical, environmental and community constraints and requirements created by the mountain and valley terrain of the Corridor. The protection of the narrow mountain valleys, existing historic communities, and extensive natural resources is critical to the State and the communities in the Corridor and these resources—along with natural hazards—define critical constraints for transportation solutions in the Corridor. Alternatives must meet the transportation needs and be developed in a manner that provides for and accommodates the following:

- **Environmental Sensitivity –** Avoid and minimize adverse impacts on and, where possible, enhance environmental resources, including, but not limited to, stream sedimentation, water quality, wildlife crossings, and impacts on wetlands.
- **Respect for Community Values –** Avoid and minimize adverse impacts on and, where possible, enhance air quality, historic resources, noise levels, visual resources, and social and economic values, as well as minimize the transportation system's footprint on the mountain communities. Consider the possible growth changes and economic effects that might occur, depending on the ease or difficulty of access.
- **Safety –** Improve where possible problematic roadway geometric conditions, such as tight curves and lane drops, and consider the safety characteristics of the modes of travel. Many safety conditions along the I-70 Mountain Corridor have been identified as directly affecting the project need, specifically the mobility, accessibility, and congestion elements.
- **Ability to Implement –** Consider technical feasibility (that is, overall use of a mode and the feasibility of the technology), as well as affordability in terms of capital costs, maintenance and operational costs, user costs, and environmental mitigation costs. Implementation includes construction impacts on existing mobility and the communities along the Corridor.

Beyond the Revised Draft Programmatic Environmental Impact Statement, these four considerations will be carried forward and used to develop and screen project-level alternatives in subsequent Tier 2 processes. They will be used for comparing the alternatives that are developed to address the project-level transportation problems. While a transportation purpose and need will be developed at Tier 2 consistent with the Tier 1 decision, the identified purpose and need will be specific to the problem at the Tier 2 project location. However, the four considerations above will apply to each Tier 2 process so that any proposed solutions(s) at Tier 2 level is developed in a manner that accommodates these four considerations.

1.7 What are the Corridor's features?

The I-70 Mountain Corridor is the only east-west interstate crossing Colorado and serves as the major transportation facility for east-west intra- and interstate movement of people and goods in Colorado. This 144-mile stretch of the interstate passes through five counties (Garfield, Eagle, Summit, Clear Creek, and Jefferson) and directly serves more than 20 communities. In addition, the I-70 Mountain Corridor connects to several north-south highways (SH 82, SH 131, US 24, SH 9, US 40, SH 103, US 6, SH 119, and C-470) providing access to outlying communities and counties. **Figure 1-2** displays these highways and communities of the I-70 Mountain Corridor.

The I-70 Mountain Corridor traverses the Continental Divide as it passes through the Rocky Mountains. The mountainous topography is a major constraint of the Corridor. **Figure 1-3** displays the vertical and horizontal profile of the I-70 Mountain Corridor and denotes areas of steep grades. There are numerous sharp curves on the Corridor due to the mountainous topography.

The I-70 Mountain Corridor has several nationally and exceptionally significant highway features including:

- Glenwood Canyon
- Vail Pass
- Eisenhower-Johnson Memorial Tunnels
- Twin Tunnels
- Genesee Park interchange

After the Corridor's inclusion in the national interstate system plan in 1957, construction of initial segments of the interstate occurred in the 1960s. After this time, major construction milestones included:

- The Eisenhower Memorial Tunnel at the Continental Divide in 1973, as a single two-lane bore serving both directions of travel;
- Vail Pass, as a four-lane facility in 1978;
- The Johnson Memorial Tunnel in 1979, as a second two-lane bore adjacent to the Eisenhower Tunnel allowing a two-lane tunnel for each direction of traffic, and
- Glenwood Canyon, as a four-lane facility in 1992.

Limited public transit serves the Corridor. Local public agencies operating on or near the Corridor include the Roaring Fork Transportation Authority (RFTA) in Garfield County, Eagle County's ECO Transit, and Summit Stage in Summit County. These agencies provide local and limited intercounty service for local commuters and other travelers. Other available transit services include private shuttle vans to mountain resorts, charter buses, casino buses to the gaming area from metropolitan Denver, and limited Greyhound intercity bus service. Amtrak offers limited service between Denver and Glenwood Springs.

Air travel serving the Corridor accounts for about 6 percent to 8 percent of all person trips within the Corridor. The primary airports serving the Corridor are Eagle County Airport and Aspen/Pitkin County Airport. Many flights to the Corridor airports originate from Denver International Airport.

The travel demand analysis used key Corridor locations, which are shown on **Figure 1-3**. Locations are:

- No Name Tunnels in Glenwood Canyon
- Dowd Canyon west of Vail
- Vail Pass west of Frisco
- Eisenhower-Johnson Memorial Tunnels at the Continental Divide
- Twin Tunnels east of Idaho Springs
- Floyd Hill east of the junction with US 6

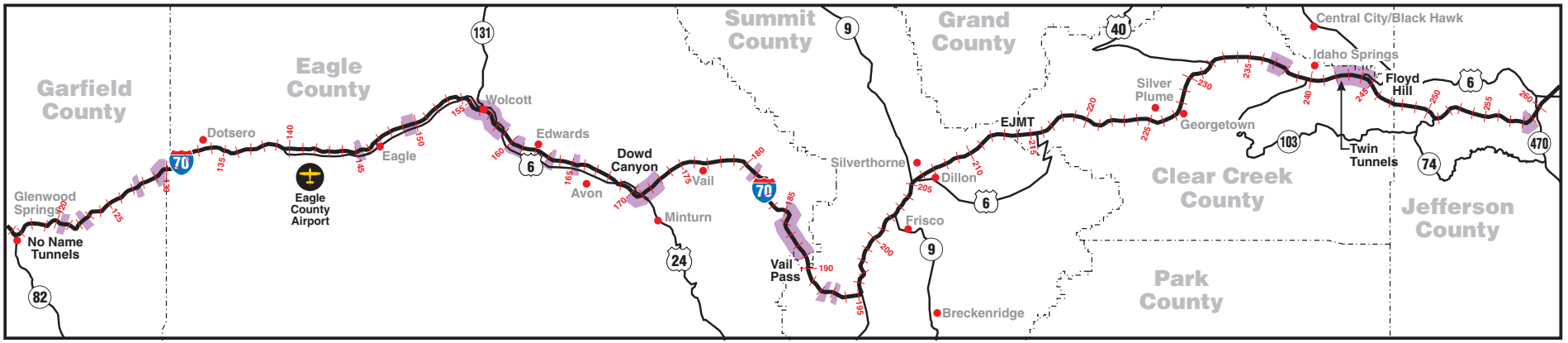
1.8 Who uses this Corridor and for what reasons?

The I-70 Mountain Corridor currently serves a variety of transportation users. Travelers include commuters, recreationalists, locals, intra- and interstate freight truckers, and others. The mix of users varies for weekdays and weekends along the Corridor, as shown in **Figure 1-4**. See the *I-70 Mountain Corridor PEIS Travel Demand Technical Report* (CDOT, August 2010). For a typical weekday, commute trips, local non-work trips, and recreational trips represent the majority of travelers, with some variations by location. Traffic to and from the gaming establishments in Black Hawk and Central City is present east of the US 6 junction at milepost 244. Heavy vehicles (trucks and recreational vehicles) represent about 10 percent of the vehicle mix. In contrast, for a typical weekend day, recreationalists dominate the Corridor traffic. On weekends, commuters, local non-work travelers, and heavy vehicles form only a small portion of the traffic stream. The overall mix of users is relatively consistent between summer and winter although overall volumes are different.

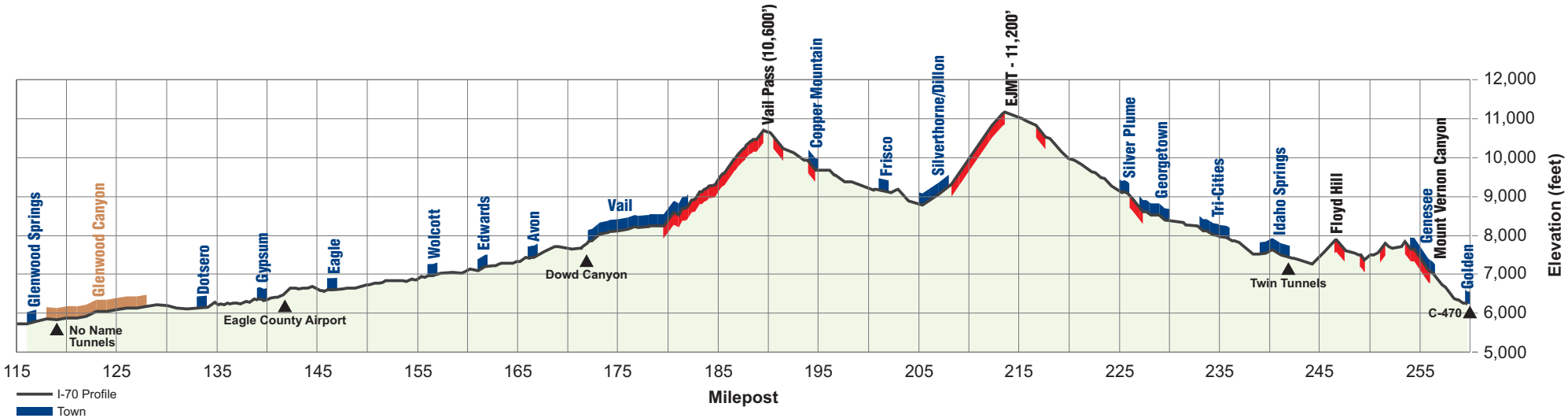
1.8.1 How does the mix of vehicle types affect operations?

Even though trucks, buses, and recreational vehicles together only make up about 10 percent of the weekday traffic, these heavy vehicles affect traffic conditions. Most heavy vehicles cannot travel up or down steep grades as fast as most passenger cars. There are several extended steep grade sections of up to 7 percent along the Corridor as I-70 traverses the mountainous terrain. The resulting variation of vehicle speeds creates safety problems, decreases capacity, and increases congestion. On steep two-lane segments, a truck, bus, or recreational vehicle passing a slower vehicle causes congestion in both lanes. These issues are exacerbated during winter weather conditions of snow and ice.

Figure 1-3. Vertical and Horizontal Profile of the I-70 Corridor



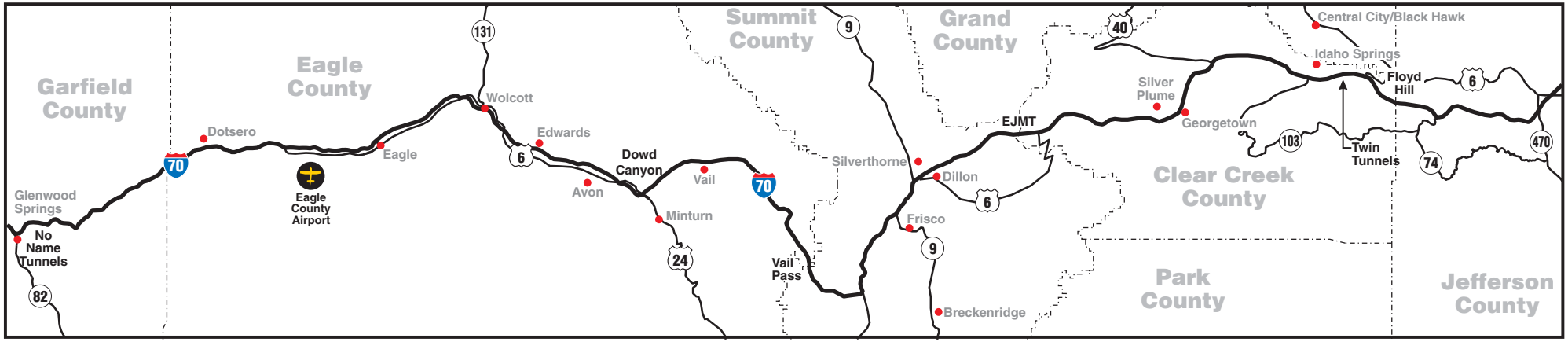
Sharp Curves

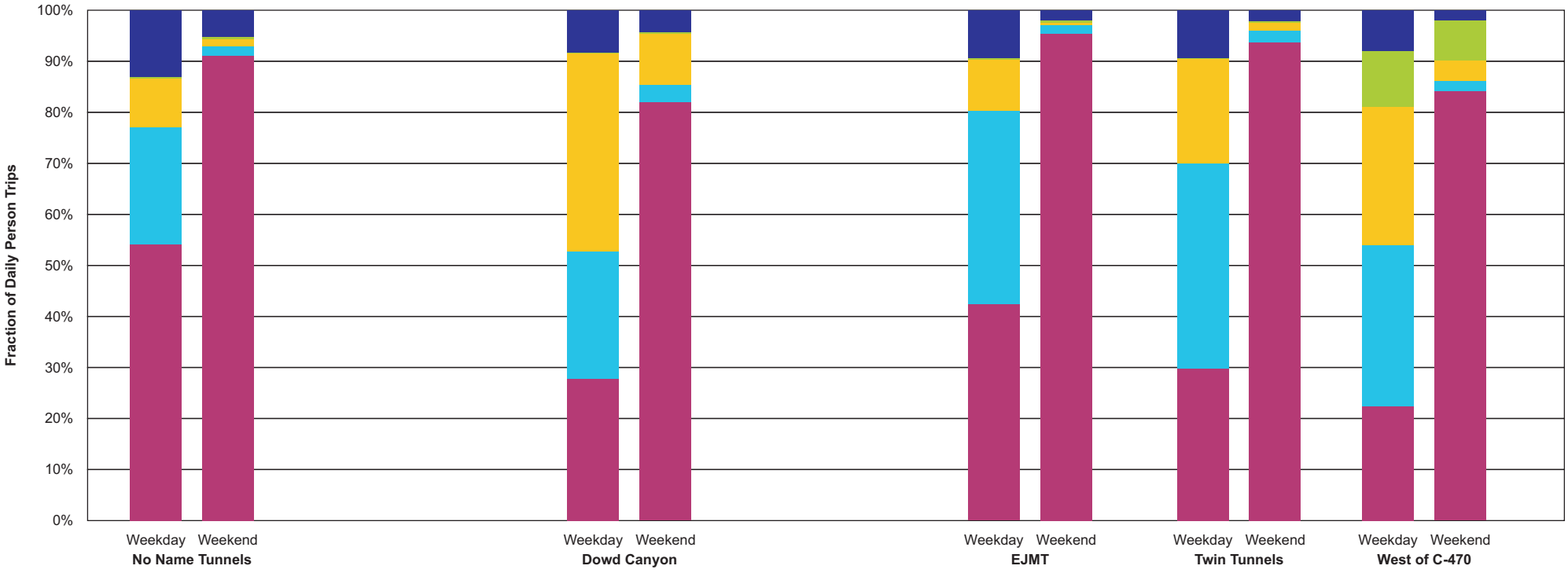


I-70 Profile
Town
Steep Grade
Exceptional Corridor with Low Speed Limit Waiver and Award-Winning Environmentally Sensitive Design

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

Figure 1-4. 2000 Travel By Trip Purpose





1.9 What future growth is expected to occur in the Corridor?

The area served by the I-70 Mountain Corridor—the Corridor communities, the Denver metropolitan area, and Colorado as a whole—has experienced tremendous growth, with additional growth projected to occur in the future.

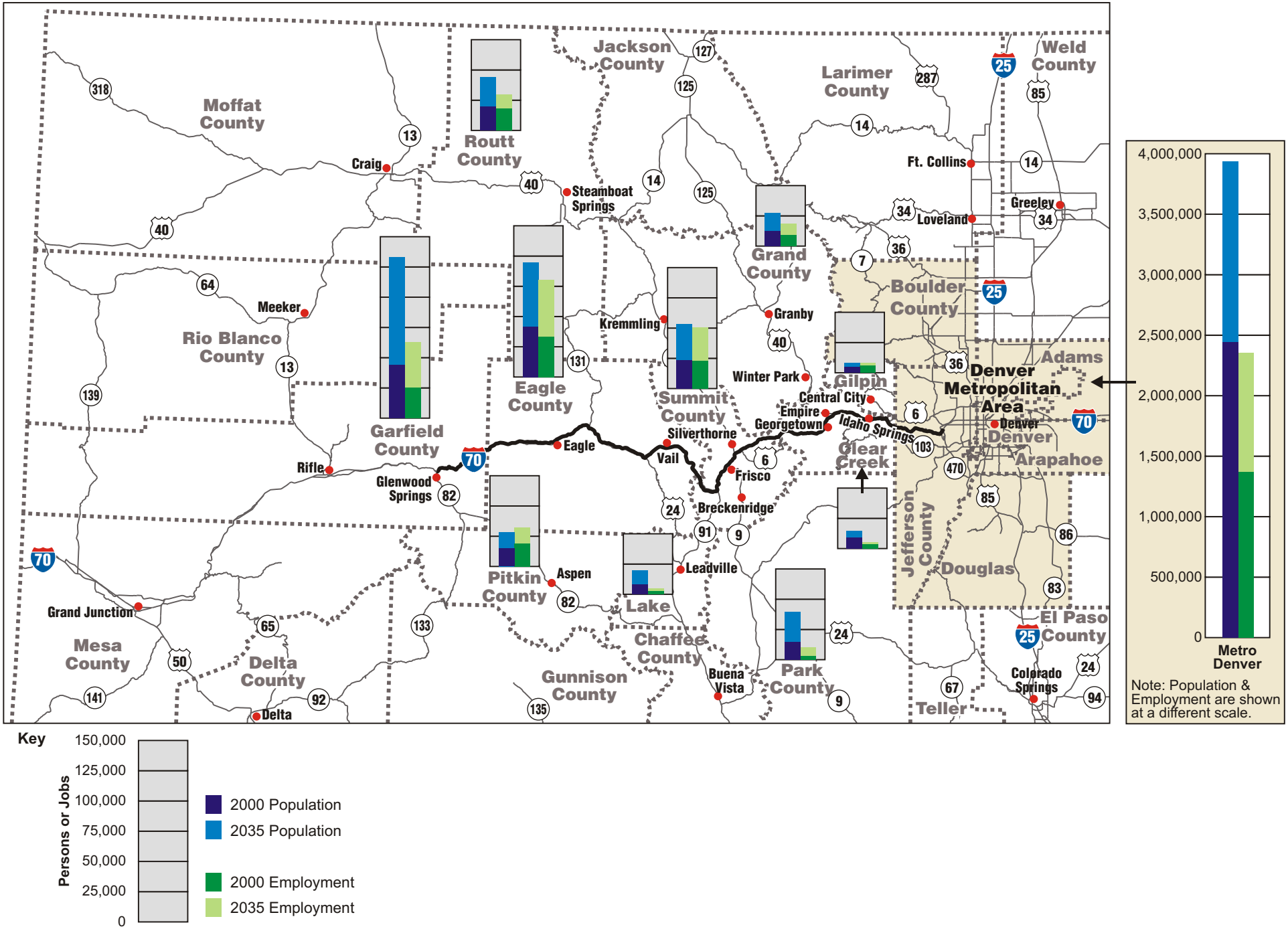
Estimates of future growth are based on projections of population and employment. The Colorado Department of Local Affairs prepares the employment projections in coordination with national economic projections. The agency also prepares an allocation of employment to each Colorado county based on historical patterns and assumptions of future economic activity by job sector. The projections for population estimates are based on the employment estimates and on assumptions of fertility, survival, and migration rates. Projections from the Department of Local Affairs are available for the planning horizon year of 2035. The Department of Local Affairs 2035 population and employment estimates provide an established and well-recognized source for growth projections.

Figure 1-5 illustrates the amount of growth to 2035 in the areas served by the Corridor. In 2035, in Eagle, Summit, and Clear Creek counties along the Corridor, total population is expected to reach over 160,000 and total employment over 135,000. This more than doubles the 2000 amount of socioeconomic activity in these counties. Outlying areas served by the I-70 Mountain Corridor also are projected to experience large increases in population and employment. West of the Corridor, Garfield County population will grow to about 130,000 in 2035, a tripling of the 2000 level. For Grand and Routt counties to the north, 2035 population and employment will be about twice the levels of 2000. Pitkin, Lake, and Park counties, which also are served by the I-70 Mountain Corridor, will almost double in population, reaching in combination over 85,000 people in 2035. Growth in the Denver metropolitan area is examined due to its generation of recreational trips to the Colorado Mountains using the Corridor. The metropolitan Denver population is projected to reach almost 4 million by 2035, compared to about 2.5 million in 2000.

1.9.1 Are population and employment projections available for 2050?

Projections from the Colorado Department of Local Affairs are available only to the horizon year of 2035. Beyond 2035, several local communities along the Corridor are examining desired growth patterns and limits. Future decisions about land use could have an effect on travel patterns and trip generation. While this long-term growth is under discussion, estimates of population and employment for 2050 are not available to provide data for projecting travel demand. Therefore, for the 2050 analysis, only travel demand has been projected. A high and low estimate of 2050 travel demand was created using the 2035 forecasts as a foundation. 2035 travel demand is based on travel demand modeling, while 2050 forecasts are based on trend analysis. Accounting for the potential variation by using high and low estimates provides confidence in the 2050 travel demand forecasts. **Section 1.10.6** discusses the travel demand extensions to 2050 and the assumptions associated with this long-range forecast.

Figure 1-5. 2000 to 2035 Population and Employment Growth



1.10 What is the current and projected travel demand?

Travel demand in the Corridor is directly related to the amount and location of population and employment activity in the Corridor communities, in the Denver metropolitan area, and in Colorado as a whole. Population growth results in increased demand for commute, shopping, recreation, and other trip purposes. Employment increases are reflected in a higher number of commute, retail, construction, and other trips. Land use patterns surrounding the Corridor affect trip origin and destination patterns. For example, both the imbalance of jobs and residents within counties and the desire of residents to recreate in the mountains of Colorado affect travel demand in the Corridor. On the I-70 Mountain Corridor, travel demand varies substantially by trip purpose, by location, by weekdays and weekends, and by season. For more detailed information on the travel demand forecasts, see the *I-70 Mountain Corridor PEIS Travel Demand Technical Report (*CDOT, August 2010*).*

1.10.1 How is demand defined?

Travel demand is defined in terms of person trips. Person trips, in contrast to vehicle trips, take into account the effectiveness of vehicle occupancy, alternative mode, and travel demand strategies. Travel demand for 2035 and for 2050 is presented for both typical weekday and weekend conditions. Typical conditions are defined by analyzing several representative days throughout the year establishing typical weekday and weekend travel demand volumes. Travel demand on various days throughout the year is higher than typical conditions and lower on other days. For purposes of analysis, typical conditions are assumed. **Chapter 2** discusses the method and measures used to analyze the ability of alternatives to meet 2035 and 2050 travel demand.

1.10.2 How are the travel demand forecasts prepared?

A travel demand model is a planning tool that provides future estimates of roadway and transit person trip volumes for defining the purpose and need, as well as comparing alternative scenarios that address the needs. Although travel demand models are typically used in urban areas, the lead agencies developed a travel demand model for this project's 144-mile rural Corridor.

To capture the Corridor's unique combination of recreational, long-distance commute, interstate, and other trips, CDOT conducted travel surveys in 2000 and 2001. These travel surveys, which recorded travelers' current travel behavior, also asked for mode preference responses related to future potential transit choices in the Corridor.

The travel demand model was calibrated and validated using observed traffic conditions in 2000, along with US Census data and the project survey data. The 2000 data remains valid for model calibration as no major changes in transportation infrastructure have occurred since 2000. The Corridor serves the same market of users with the same I-70 infrastructure as was in place in 2000. The validity of the travel demand model was shown to be within industry standards (modeled vehicle volumes are within a half-lane of capacity of observed vehicle volumes). Sensitivity tests demonstrated that the model responds as expected given different input data sets.

In 2008, a comparison of observed Corridor traffic volumes to the future travel model volume trendline illustrates that actual volumes are less than predicted by the travel model, but still within a reasonable margin of error. This is expected given the changes in economic conditions of the nation, state, and the Corridor as well as high petroleum prices in 2008. It is expected that upon a rebound of the economy, the demand for travel in the Corridor will again reflect the future travel demand projections. During the Tier 2 processes, more specific location modeling will be performed and inputs updated as they are available.

Detailed analysis prepared originally for 2025 was updated for 2035 using the 2035 socioeconomics and determining the growth rate for each trip purpose at specific locations along the Corridor. The 2025 and 2035 forecasts provide a foundation for the 2050 travel demand estimates, which are presented in a range to account for the increasing variability of projecting that far into the future.

As a simulation model, confidence in its output depends upon the assumptions of its major inputs of future population and employment and travel behavior parameters (trip generation rates, trip length preferences, mode choice factors) which are influenced by available technology, the availability and price of petroleum or other fuels, and other conditions influencing travel. Any model will have uncertainties inherent in trying to predict what travelers will do in the future. The methods used for the travel demand forecasting for this project utilize the most up-to-date technology and widely accepted standards for transportation planning.

The travel demand model future background network assumed a new tunnel between I-70 and SH 119 toward Black Hawk, proposed under the now withdrawn *Gaming Area Access Environmental Impact Statement*. Without the tunnels, more traffic will use US 6 and the Central City Parkway. The overall effect on I-70 is less traffic east of US 6, but more traffic on I-70 between US 6 and Central City Parkway. This change in traffic pattern is at a localized level over a distance of about 3 to 4 miles. This does not affect the Tier 1 recommendations for the general location, mode types, and capacity for future transportation improvements at the corridorwide level. Specific analysis of this travel demand effect will be conducted during Tier 2 processes at this location to define the appropriate project level design.

Further information about the travel demand model, including its major assumptions, validation, and results is in the *I-70 Mountain Corridor PEIS Travel Demand Technical Report* (CDOT, August 2010) and its appendices.

1.10.3 How do traffic patterns differ between summer and winter?

More traffic occurs in the summer when compared to winter. This is the case for weekends and weekdays. For example, traffic on a typical summer weekend day at the Eisenhower-Johnson Memorial Tunnels is about 45 percent higher than in the winter. At this location, typical summer weekday traffic is about 15 percent greater than in the winter. These differences vary along the Corridor. However, during the busiest hours, some winter volumes are higher than summer volumes at specific locations due to most ski area traffic departing at the same time.

1.10.4 How does the location of population and employment affect travel?

The balance of population and employment varies in the Corridor counties, as shown in **Figure 1-5**. Those counties with population substantially higher than employment have residents who commute out of the county for jobs using the I-70 Mountain Corridor. For example, residents from Lake, Park, and Grand counties typically commute to employment sites in Summit and Eagle counties. Many Corridor residents commute to jobs in the gaming district in Gilpin County and to the Aspen area of Pitkin County. Similarly, many commuters travel on the I-70 Mountain Corridor to jobs in the Denver metropolitan area.

1.10.5 What is the travel demand in 2035?

As the Corridor communities and Colorado have grown, travel demand on the I-70 Mountain Corridor has grown correspondingly. **Figure 1-6** presents travel demand for the Corridor for a typical weekday and a typical weekend day. The Corridor travel demand is displayed in terms of person trips, for 2000 and 2035 conditions. In general, demand is higher along the Corridor toward the Denver metropolitan area in the east. On weekends, the amount of travel demand to and from the Denver metropolitan area increases dramatically due to recreational trips. A rise in travel demand in the Eagle County area is due to commute and local trips using the Corridor.

Between 2000 and 2035, travel demand is expected to grow. For example, at the Eisenhower-Johnson Memorial Tunnels, the amount of person trip demand on a typical summer weekend day is expected to be more than 185,000 compared to 107,000 in 2000, an increase of about 75 percent. For a typical weekday, the future person trip demand at the Eisenhower-Johnson Memorial Tunnels is expected to be about 105,000 compared to 55,000 in 2000, or a 90 percent increase. Overall, growth in person trip demand

along the Corridor ranges from 65 percent to 175 percent between 2000 and 2035. For most of the Corridor, the 2035 weekday travel demand is equal to or greater than 2000 weekend demand.

1.10.6 What is the travel demand in 2050?

The 2050 travel demand forecasts are presented in a range to account for the increasing variability of projecting into the future. The range of low and high estimates of 2050 travel demand are based on projections from the 2035 data because there is no supporting population and employment forecast data available for the long-term year of 2050. The 2035 travel forecasts, using the available 2035 population and employment data estimates, provide a foundation for the 2050 forecasts. To extend travel demand to 2050, assumptions about travel growth rate provide for the low and high 2050 estimates. The assumptions are based on the projected travel growth pattern between 2025 and 2035, as it varies along the Corridor. The low estimate assumes, at each location, the average annual amount of absolute travel growth between 2025 and 2035 continues to 2050 (a simple linear growth trend). For the high estimate, the average percentage travel growth rate during the 10-year period prior to 2035 was applied for each location (compounded growth). The annual growth rate for the high travel estimate varies from about 1 percent in the eastern portion of the Corridor to over 3 percent in the western portion of the Corridor. While the 2050 travel demand estimates have an inherent uncertainty due to these assumptions for the growth rates between 2035 and 2050, the high-low range accounts for the variability of projecting out to 2050 and provides a reasonable range for the long-term horizon.

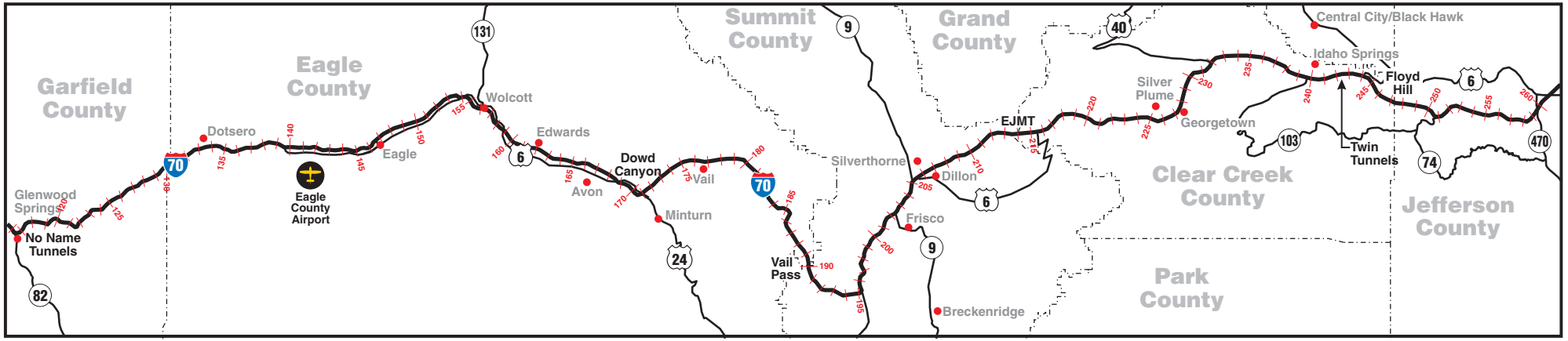
Using this method, the 2050 total daily two-way person trip demand increases between about 10 percent and 65 percent above 2035, as seen in **Figure 1-7.** In 2050, weekday demand will exceed 200,000 person trips at Dowd Canyon and west of C-470. Weekend demand in 2050 will exceed 200,000 person trips at all five representative locations; demand is expected to approach 300,000 and 500,000 person trips at Twin Tunnels and west of C-470, respectively. The variation due to the high-low range makes up about 1 percent to 15 percent of the total 2050 demand, depending on location.

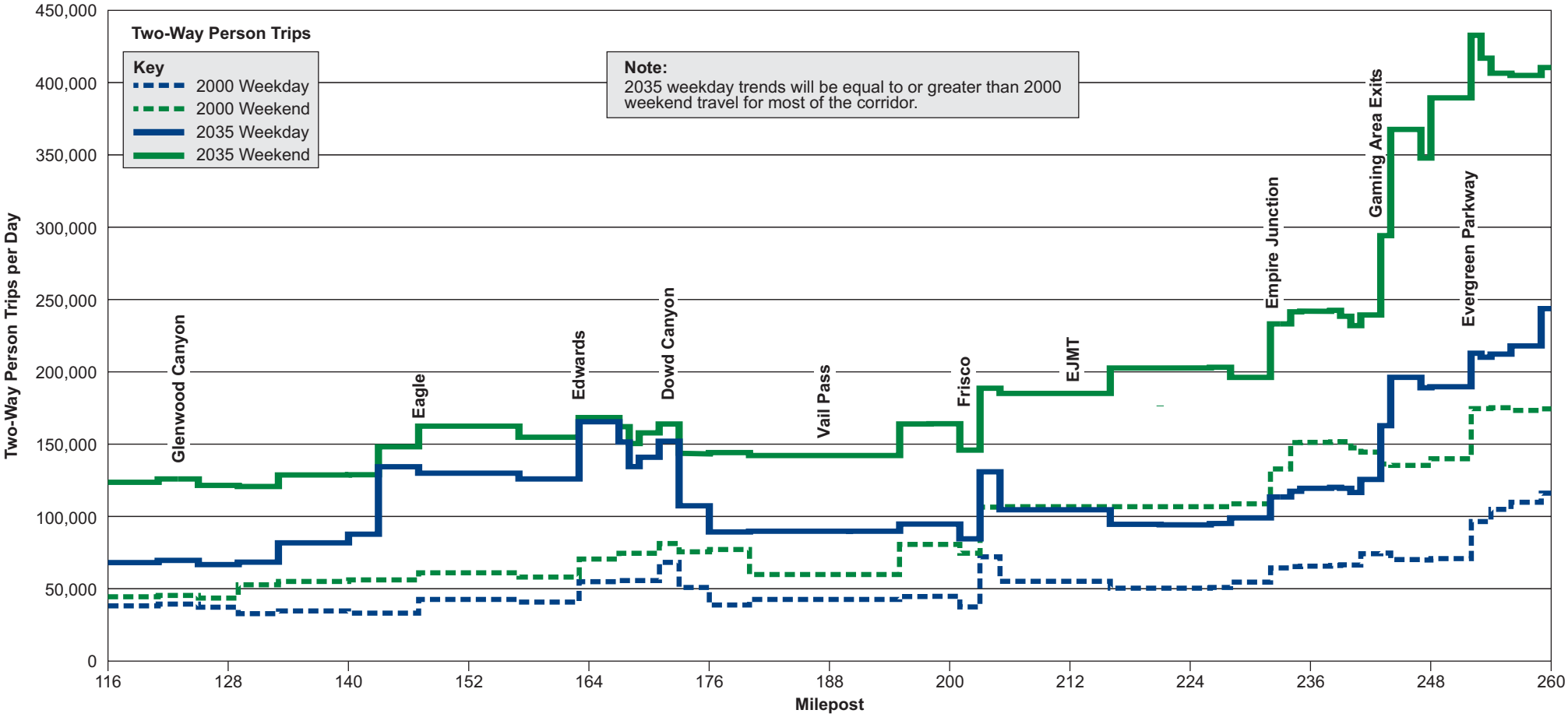
1.10.7 What is unmet demand?

The future projected travel demand exceeds the capacity of the I-70 Mountain Corridor. The excess demand is partially spread to other times and days, but part of the demand is unmet as some users will cancel their desired trip. Unmet demand occurs when travelers choose to not make a trip because of severe congestion conditions, long travel times, or other unsatisfactory conditions.

The concept of unmet demand recognizes that the number of trips taken along the Corridor is related to the conditions of travel. The measurement of unmet demand is based on the desire to take a trip using the I-70 Mountain Corridor based on current travel conditions in good weather. Improvements beyond those travel conditions potentially increase the desire to make a trip. In turn, this potentially results in increased demand and additional Corridor person trips.

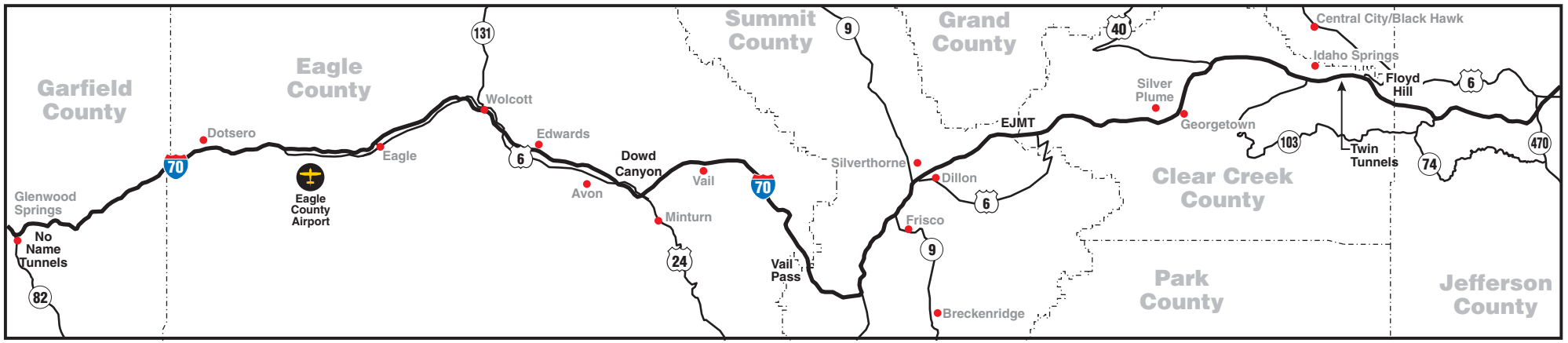
Figure 1-6. 2000 and 2035 Travel Demand

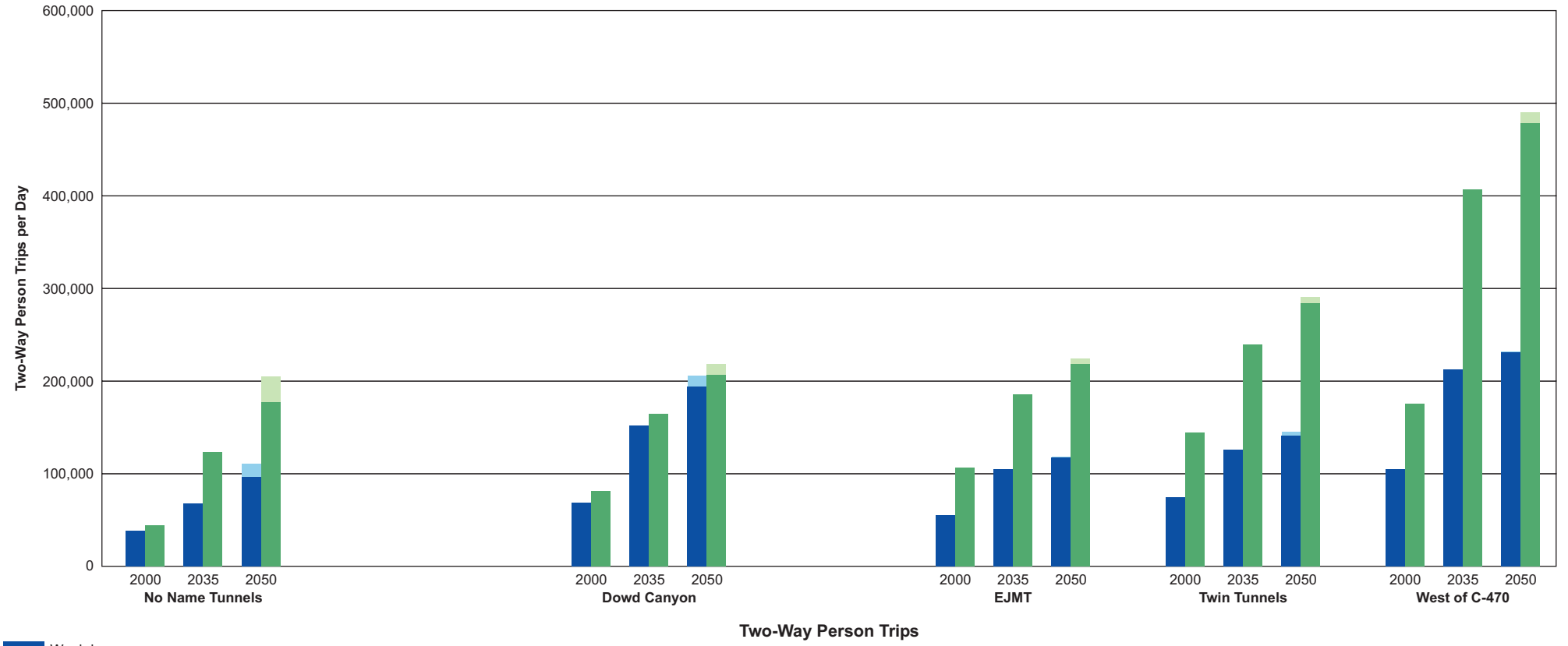




Note: EJMT = Eisenhower-Johnson Memorial Tunnels

Figure 1-7. 2000, 2035, and 2050 Travel Demand





Note: 2050 demand projection with Low-High range.

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

1.11 How are the needs demonstrated by transportation problems in the Corridor?

1.11.1 The need to increase capacity

The inability to adequately accommodate person trip demand results in a need to increase person trip capacity, as summarized in **Section 1.6**. This need addresses the transportation problems described below.

Unmet demand is measured in person trips. The need to increase capacity is based on person trips; there are various ways to increase person trip capacity. Increased person trip capacity can be provided by additional roadway capacity, new transit capacity, increased vehicle occupancy rates or improved use of existing facilities. Each of these options may have different effects on the need to improve mobility and accessibility, and the need to reduce congestion.

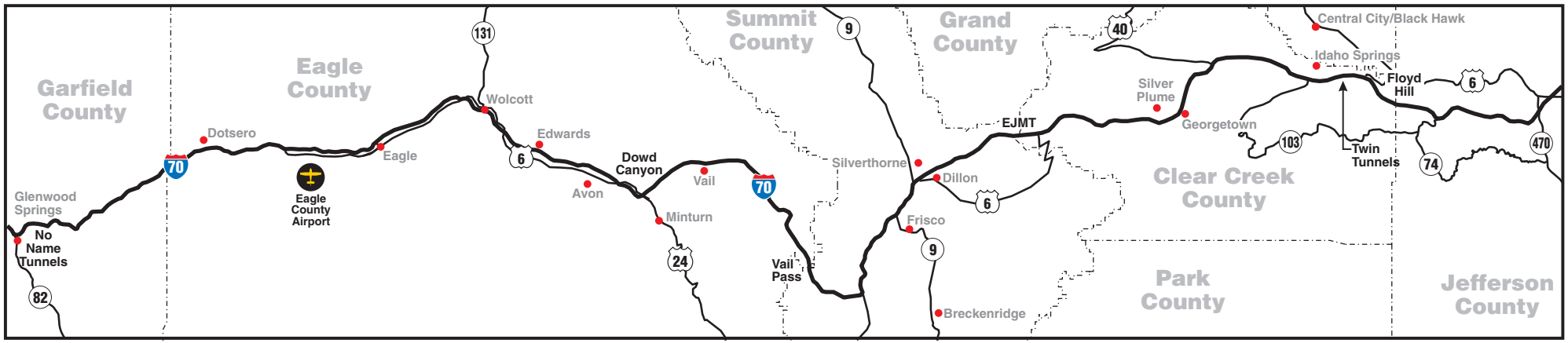
The I-70 Mountain Corridor serves a wide variety of trips as described in **Section 1.8**. Many of these trips could not occur without the I-70 Mountain Corridor. The ability of the Corridor to accommodate these trips is a major underpinning of all activity—social, work, and recreation —occurring within the Corridor and in areas served by the Corridor. The inability of the I-70 Mountain Corridor to accommodate demand for person trips now and in the future is an acute transportation problem.

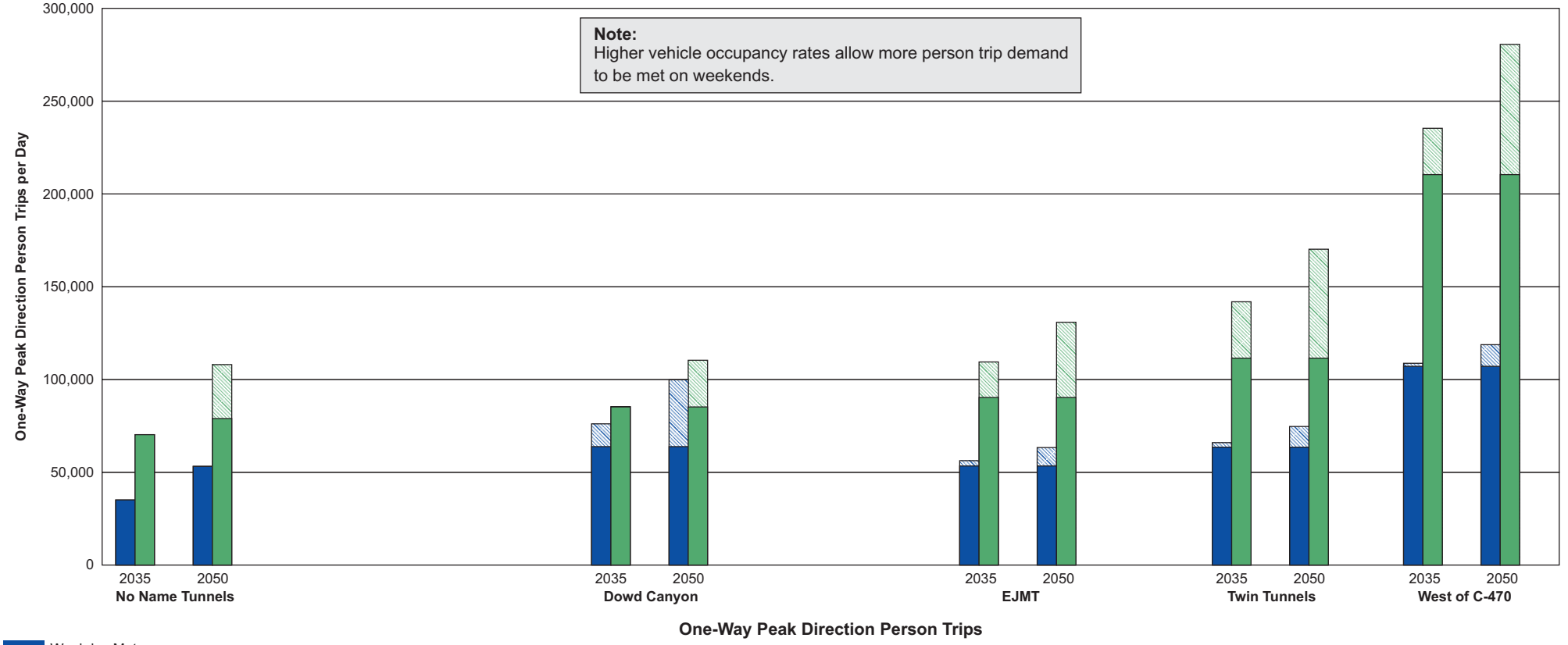
The travel demand model information presented in **Section 1.10** forecasts the amount of unmet demand as a result of severe congestion, long travel times, and other unsatisfactory travel conditions in the future. While it is recognized that there is already some unmet demand along the Corridor, particularly during weekends when congestion is the worst, the model forecasts the additional unmet demand for 2035 and 2050 relative to 2000 trip-making. **Figure 1-8** shows the unmet demand of person trips for representative locations along the Corridor. By 2035, unmet demand occurs during weekdays and weekends for locations east of and including the Eisenhower-Johnson Memorial Tunnels. Weekday unmet demand also occurs at Dowd Canyon representing the Vail Valley area. By 2050, unmet demand increases substantially in all parts of the Corridor. Unmet weekday demand at Dowd Canyon is forecast to be around 35,000 person trips per day in the peak direction. During weekends unmet demand west of C-470 is forecast to be around 70,000 person trips per day in the peak direction. These trips represent activities, such as social, work, and recreation that are desired along the Corridor but not occurring due to poor future travel conditions.

Because of poor travel conditions in the Corridor in 2050, around 9 million people annually who would use the I-70 Mountain Corridor to reach destinations will instead choose not to travel in the Corridor. This directly affects overall Corridor mobility, accessibility to Corridor destinations, recreational opportunities, and economic activity.

The amount of demand accommodated is different for weekdays and weekends due to automobile occupancy. On weekends, higher average vehicle occupancy ranging from 1.65 to 2.35 allows for more accommodation of person trips than weekdays, where an average rate between 1.45 and 1.65 is expected.

Figure 1-8. 2035 and 2050 Unmet Person Trip Demand





Note: EJMT = Eisenhower-Johnson Memorial Tunnels

1.11.2 The need to improve mobility and accessibility

Long travel times within the I-70 Mountain Corridor result in a need to safely, effectively, and efficiently improve mobility and accessibility in the Corridor. Long travel times result in less ability by travelers to engage in activities served by the Corridor, such as work, recreation, shopping, and social activities. Long travel times also result in increased traveler frustration and unmet demand as discussed in the previous section.

The much longer travel times in the future will result in people changing travel patterns, either avoiding trips entirely (unmet trips) or shifting when they travel during the day, or day of week. Congestion will occur for longer periods during the day and more days of the week.

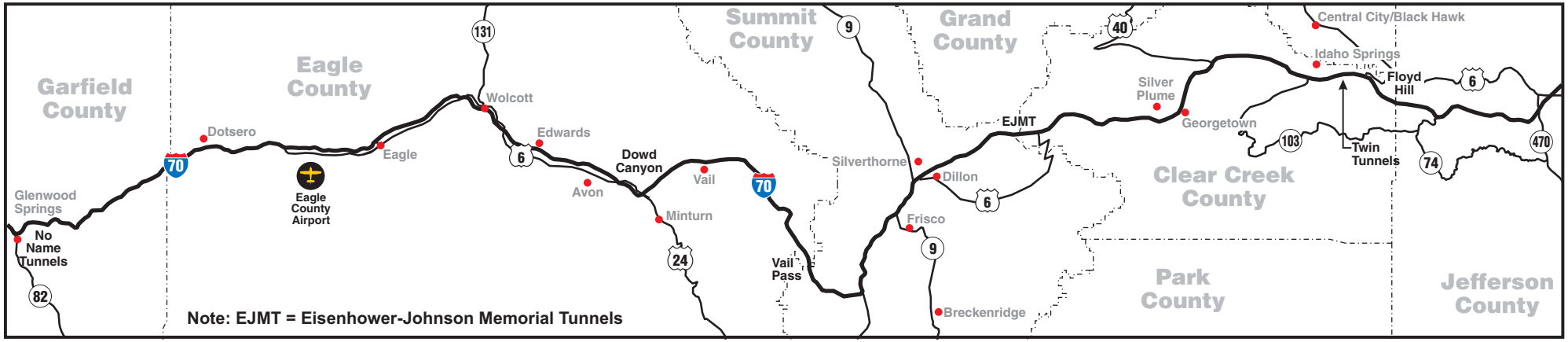
Travel time calculations for the Corridor analyzing transportation operations determined average speeds by segment, with consideration of steep grades, sharp curves, roadway design, and traffic conditions. **Figure 1-9** displays 2035 travel time conditions in comparison to free-flow. The year 2035 peak period travel times are around two to three times longer than free flow conditions. For the western part of the Corridor between Glenwood Springs and Silverthorne, weekday peak period travel times are around 185 minutes compared to around 80 minutes for free flow. Weekend peak period travel time for this part of the Corridor is about 160 minutes, twice as long as free flow. For the eastern part of the Corridor between Silverthorne and C-470, free flow travel time is between 50 minutes and 55 minutes. By 2035, peak period weekday and weekend travel times are about 115 minutes and 160 minutes, respectively.

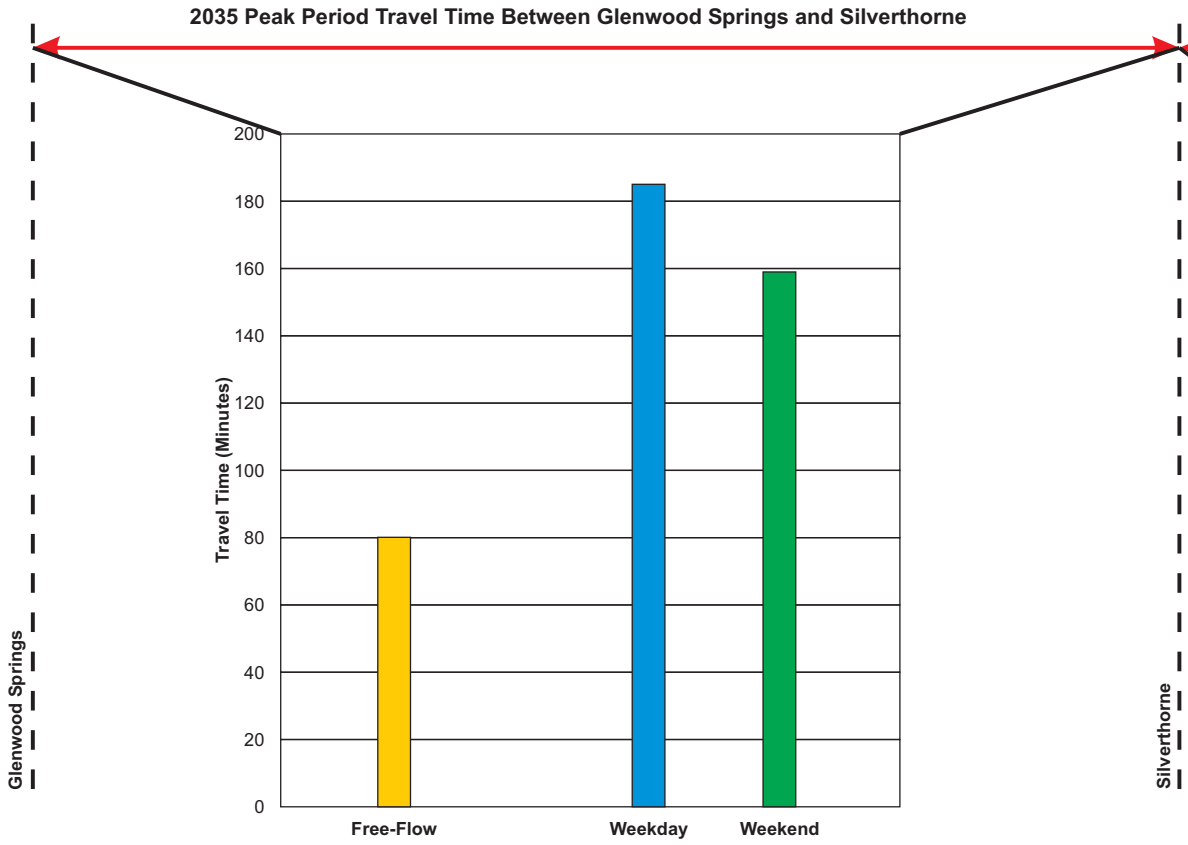
Long travel times greatly affect mobility in the Corridor for residents, workers, and visitors alike. Accessibility to locations served by the I-70 Mountain Corridor is greatly reduced given these long travel times.

Travel time calculations could not be developed for 2050 with a reasonable amount of confidence because the amount of detailed information available for 2050 is limited. For the need to improve mobility and accessibility, travel times in 2035 are used to display the extent of the problem. **Section 1.10.6** demonstrated the 2050 travel demand in comparison to 2035 travel demand. The higher levels of demand in 2050 strongly indicate that travel times deteriorate from 2035 conditions.

Slow-moving vehicles along the steep grades of the Corridor and the resulting congestion also create a need to improve mobility in the Corridor. In locations where steep grades occur, combined with limited ability to pass slow moving vehicles, mobility can be greatly reduced, particularly in times of heavy traffic conditions. **Figure 1-10** displays the locations where steep grades, combined with the limited ability of heavy vehicles to pass, result in areas of mobility problems. For example, Vail Pass has grades of up to 7 percent, and between 9 percent and 12 percent of all vehicles are trucks, buses, or recreational vehicles, depending on the time of year and day. With only two lanes of roadway in each direction, these slow-moving vehicles greatly reduce the ability of faster vehicles to pass and create congestion when slow-moving vehicles pass other slow-moving vehicles.

Figure 1-9. 2035 Peak Period Peak Direction Travel Time





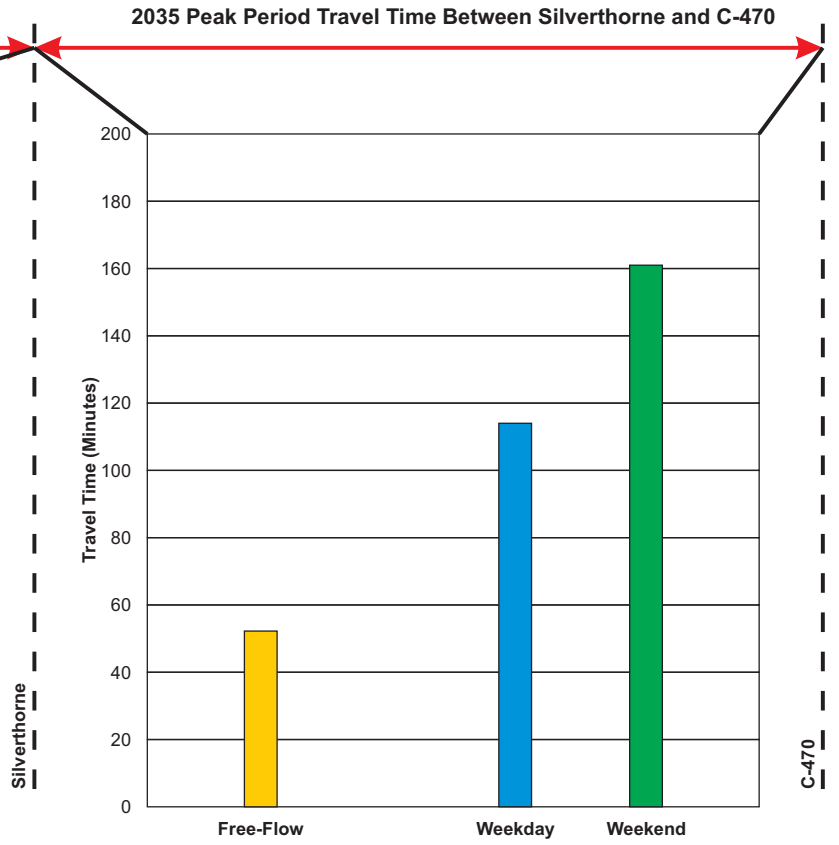
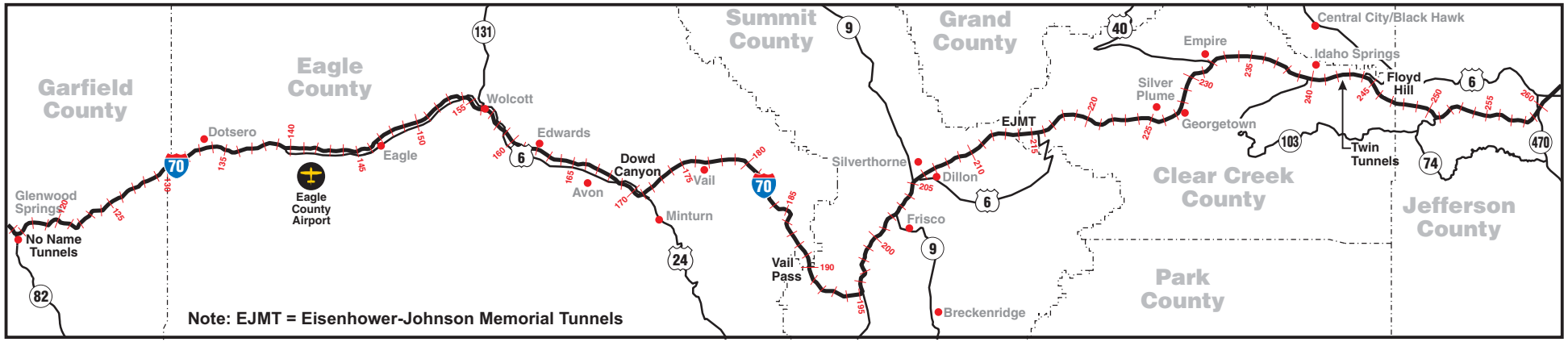
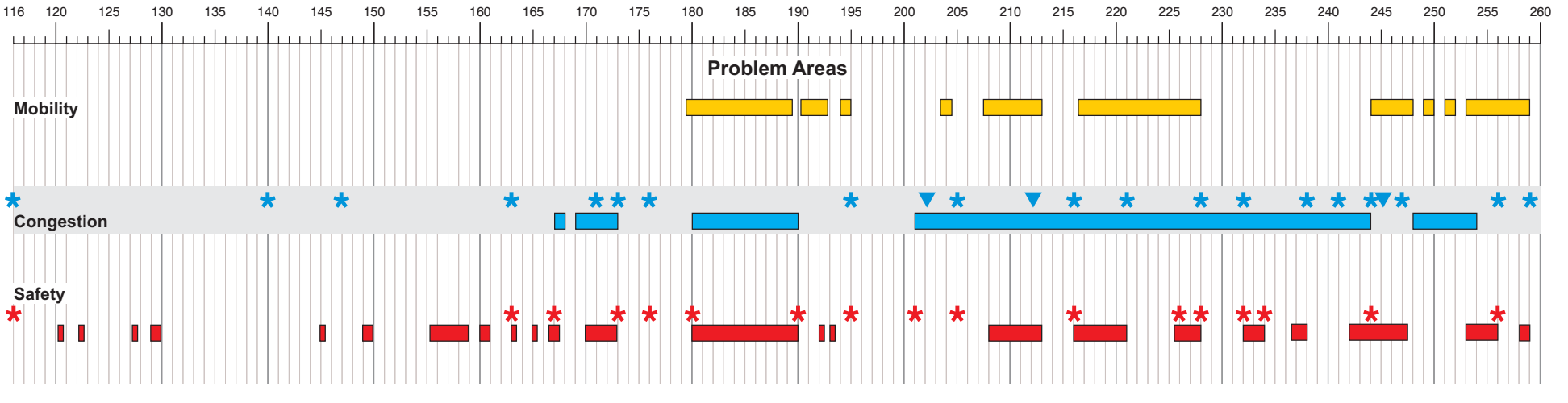


Figure 1-10. Problem Areas for Mobility, Congestion, and Safety





Key

- Interchange
- Lane Drop
- Mobility Problem Areas
- Congestion Problem Areas
- Safety Problem Areas

1.11.3 The need to decrease congestion

Existing and future periods of poor levels of service result in the need to decrease congestion along the I-70 Mountain Corridor, as summarized in **Section 1.6**. Severe congestion, defined as Level of Service F (stop-and-go traffic), is occurring along the Corridor and is projected to worsen in the future. **Figure 1-11** displays the hours of severe congestion for representative locations along the Corridor for 2000 and 2035. See the *I-70 Mountain Corridor PEIS Travel Demand Technical Report* (CDOT, August 2010).

For example, **Figure 1-11** shows that at the Eisenhower-Johnson Memorial Tunnels, an average of 2 hours of peak direction severe congestion occurred during the typical weekend in 2000. Three hours of peak direction severe congestion occurred at the Twin Tunnels on weekends. By 2035, conditions show noticeably worse levels of congestion at more locations along the Corridor. For example, during the typical weekday peak direction, congestion occurs for about 11 hours at Dowd Canyon, representing the Vail Valley, and for about 12 hours in the segment west of C-470. This represents about half a weekday where traffic is in stop-and-go conditions. Similarly, during the 2035 typical weekend peak direction, severe congestion at the Twin Tunnels occurs for about 10 hours. At some locations along the Corridor in the future, weekday congestion is more prevalent than weekend congestion. This is due to the high proportion of peak period work trips on I-70 west of C-470 (for commuters to and from metropolitan Denver) and in the Dowd Canyon area on weekdays compared to weekends. At the Eisenhower-Johnson Memorial Tunnels, future weekday congestion is worse than weekends because there is a higher portion of heavy trucks on weekdays that severely limit the highway capacity on the steep approach grades to the tunnels, compared to weekends. In contrast, at the Twin Tunnels the weekend congestion is higher than the weekday congestion due to higher peak period volumes at this location on weekends compared to weekdays, and heavy trucks do not limit capacity as much due to the relatively flat grades. The representative locations shown in **Figure 1-11** represent longer sections of I-70 because these congested conditions could back up for many miles.

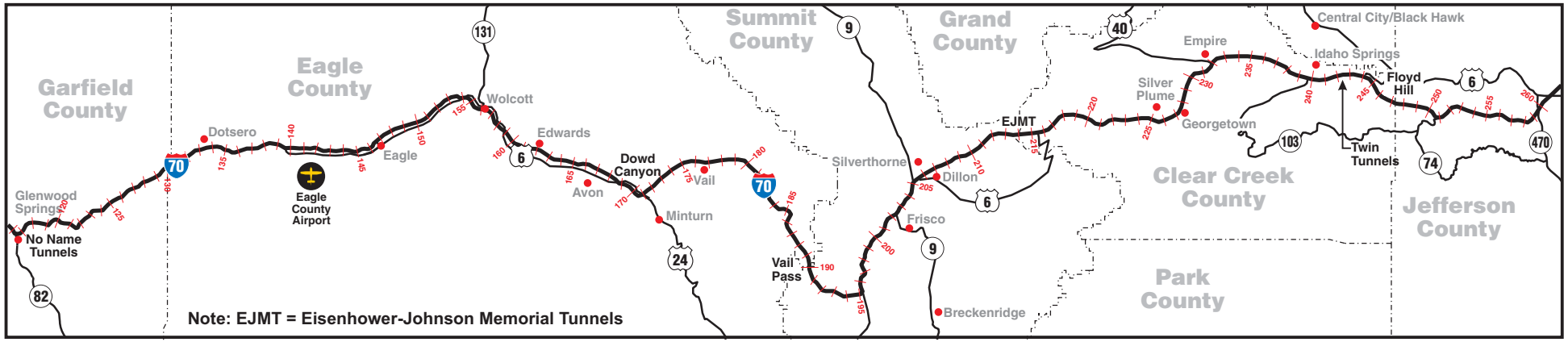
These widespread areas of congestion occur by 2035 for extended periods throughout the week, not only on weekends. These high levels of congestion contribute to long travel times and desired trips to destinations along the Corridor that are not taken. By 2035 the extent of the travel problems along the Corridor are severe and extensive resulting in poor mobility and restricted accessibility along the Corridor.

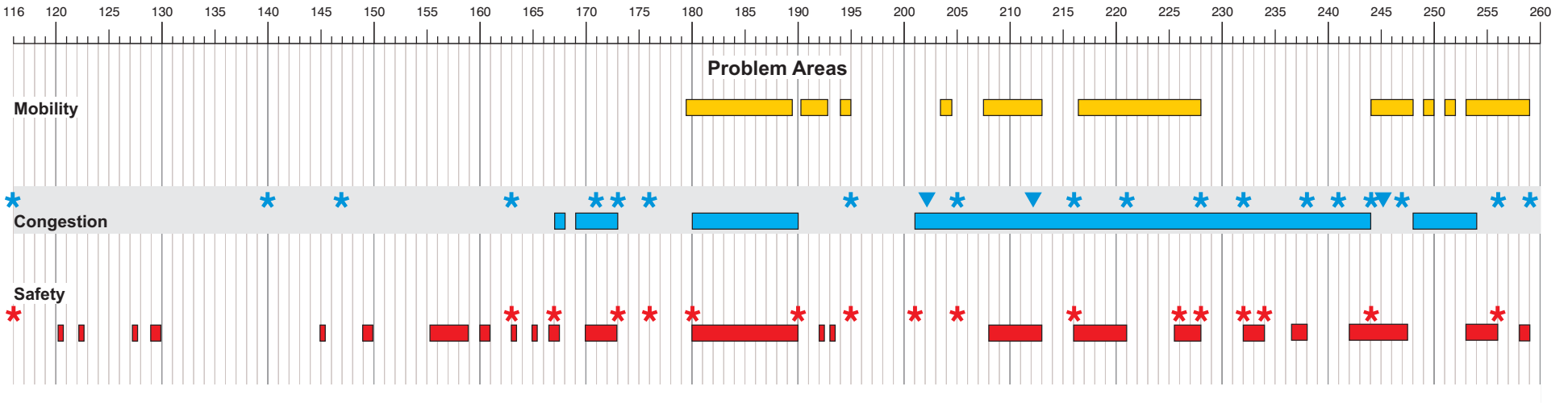
Further, while transportation analyses were conducted for 2035 and projected to 2050, the need for this project is to meet the long-term 2050 demand. The 2050 travel demand, while not as well defined and subject to more variability, is described in **Section 1.10.6**. The higher levels of demand compared to 2035 strongly indicate the expected worsening of congestion problems.

Travel delay is also directly attributable to other conditions, including deficient roadway geometrics, inadequate interchanges, unsafe conditions, actual crashes, poor road conditions, and slower moving vehicles in areas of steep grades. Locations along the I-70 Mountain Corridor that exhibit these conditions are categorized by safety and congestion problem areas. Safety problem areas are identified by a weighted hazard index (WHI) greater than zero, indicating an area with a higher weighted crash rate than the statewide average (measured by the number of observed crashes and their severity). Crashes reduce the flow of traffic and, therefore, increase delay within the Corridor. Areas where existing roadway facilities result in congestion are typically located at sharp geometric curves, interchanges that have the potential to back traffic onto I-70, and steep grades that result in slow-moving vehicles. These congestion problem locations reduce the flow of traffic and increase congestion. **Figure 1-10** shows the problem areas of mobility, safety, and congestion.

The large numbers of areas identified in the figure indicate the widespread problems in the I-70 Mountain Corridor. These problems directly affect overall congestion, as well as general mobility and accessibility to destinations served by the Corridor.

Figure 1-10. Problem Areas for Mobility, Congestion, and Safety





Key

- Interchange
- Lane Drop
- Mobility Problem Areas
- Congestion Problem Areas
- Safety Problem Areas

1.12 How is the project purpose and need used to evaluate potential solutions?

The 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 integral outcome of the alternatives evaluation process. Specific factors to illustrate the extent of the transportation problems that need to be addressed are used to measure how well alternatives meet these needs in the future. **Chapter 2** discusses the analysis of the alternatives and the methods used to measure their performance.

Addressing transportation needs in the I-70 Corridor requires careful consideration of the physical, environmental and community constraints and requirements created by the mountain and valley terrain of the Corridor. The protection of the narrow mountain valleys, existing historic communities, and extensive natural resources is critical to the State and the communities in the Corridor and these resources —along with natural hazards—define critical constraints for transportation solutions in the Corridor. Alternatives must meet the transportation needs and be developed in a manner that provides for and accommodates the following:

- Environmental sensitivity,
- Community values,
- Transportation safety, and
- The ability to implement the proposed solution.

Chapter 2 provides a more detailed description of how the purpose and need and the Corridor context-specific considerations have been used in developing, evaluating, and comparing alternatives and for identifying the Preferred Alternative.

Chapter 2. Summary and Comparison of Alternatives

2.1 What's in Chapter 2?

Project Purpose and Need

The purpose for transportation improvements is to increase capacity, improve accessibility and mobility, and decrease congestion for travel demand, projected to occur in 2035 and 2050, to destinations along the I-70 Mountain Corridor as well as for interstate travel, while providing for and accommodating environmental sensitivity, community values, transportation safety, and ability to implement the proposed solutions for the Corridor.

Chapter 2 describes how the problems within the I-70 Mountain Corridor (the Corridor) are used to develop a wide range of alternatives for transportation improvements, how those alternatives are evaluated, and how that evaluation leads to a Preferred Alternative. **Chapter 1** documents the existing and future transportation problems in the Corridor, while this chapter describes and analyzes alternatives to address the problems and identifies the Preferred Alternative. As described in **Chapter 1**, the transportation problems result in project needs, and these project needs are expressed in terms of the 2035 and the 2050 planning horizons. The 2050 planning horizon is used as the target for meeting the project needs and was developed based on public input and interest in a long-range vision for transportation solutions in the Corridor (see **Introduction**). However, the 2035 planning horizon is used as a more accurate forecast for analysis. In addition to the needs, criteria are identified to define what is important to project stakeholders and to help in comparing the attributes and impacts of the alternatives.

As described in this chapter, the evaluation process resulted in 22 alternatives, including the No Action Alternative, and 21 Action Alternatives which include the Preferred Alternative. **Section 2.5** discusses the more than 200 alternative elements evaluated and which were eliminated and why. **Section 2.6** discusses the alternatives that were advanced, describing the components of the Action Alternatives and the No Action Alternative. **Section 2.7** describes the Preferred Alternative and how it was developed. The 22 alternatives that were analyzed (shown at the right) represent the reasonable range of alternatives for analysis in this Tier 1document.

Project Alternatives Analyzed

- No Action Alternative
- Minimal Action Alternative
- Preferred Alternative
- Rail with Intermountain Connection
- Advanced Guideway System
- Dual-mode Bus in Guideway
- Diesel Bus in Guideway
- Six-Lane Highway 55 mph
- Six-Lane Highway 65 mph
- Reversible/HOV/ HOT Lanes
- Combination Six-Lane Highway with Rail and Intermountain Connection
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Advanced Guideway System
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Dual-mode Bus in Guideway
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation
- Combination Six-Lane Highway with Diesel Bus in Guideway
  - Build Transit with Highway Preservation
  - Build Highway with Transit Preservation

Chapter 2 also:

- Summarizes information from other chapters of this document to explain how decisions were made in the evaluation and screening of alternatives and in the consensus-building process to develop the Preferred Alternative.
- Discusses the role of stakeholders in the alternatives development and evaluation process, and the role of the Collaborative Effort in identifying a Preferred Alternative.
- Provides information on how Tier 1 alternatives differ from Tier 2 alternatives.

2.2 How were alternatives developed?

As described in **Chapter 1**, the project needs are based on understanding the transportation problems and the future demands of the Corridor. Alternatives were developed based on the ability to address the project needs while also providing for and accommodating the following considerations: environmental sensitivity, community values, transportation safety, and the ability to implement.

Alternative Element Families

- Transportation Management
- Localized Highway Improvements
- Fixed Guideway Transit
- Rubber Tire Transit
- Highway
- Alternate Routes
- Aviation

The process to identify potential transportation improvements began with the Corridor Vision in the *I-70 Corridor Major Investment Study* (MIS) completed in 1998. The project team used the MIS Vision and the information and suggestions identified through the Programmatic Environmental Impact Statement (PEIS) public scoping process to initiate the development of alternatives. A systematic screening process with public and agency input led to the development of alternatives. Alternatives consist of various components based on the seven alternative element families, shown in the box. Each alternative element addresses either a specific need in the Corridor or corridor-wide issues. Each family of elements provides relative advantages or disadvantages in consideration of the project needs. For example, some elements better improve capacity while others enhance mobility and accessibility.

When alternative elements are evaluated based on the project needs and evaluation criteria, some elements rise to the top and some are eliminated from further consideration. During the evaluation process, alternative elements can be revised or enhanced. Alternative elements that do not achieve performance screening criteria are either enhanced or eliminated. Through this process, better alternative elements are enhanced, if appropriate, and the best alternative elements are carried forward for further evaluation. Ultimately, alternative elements advanced are combined to form the components of Action Alternatives from which a preferred alternative is developed.

2.3 What process was used to evaluate and screen alternatives?

This project started in 2000. The initial alternative screening is for the horizon year of 2025, using 2000 as a base year for purposes of comparison. The 2000 information provides a valid snapshot of conditions in the Corridor because there have been no major infrastructure changes to the I-70 Corridor and the needs of the users of the Corridor have not changed. Although the initial screening is based on modeled conditions in 2025, travel demand is expected to grow between 2025 and 2035. Since the needs have grown, the results of initial screening would not be changed with updated data. In 2009, the comparative analysis of PEIS alternatives was updated to 2035 to reflect current long range planning horizon year. A longer planning horizon of 2050 is also used to compare alternatives in the PEIS.

The alternative elements were evaluated based on their ability to address the project purpose and need, and on how well those elements met environmental, community, transportation safety, and implementation criteria for the Corridor (see **Chapter 1** for more information on the purpose and need). This evaluation used three sequential levels of screening:

- The first level of screening uses an initial conceptual level of evaluation and screening based on purpose and need.
- The second level of screening uses criteria based on purpose and need and Corridor issues applied to many alternative elements at a greater level of detail.
- The third level of screening uses detailed screening and refinement of the remaining alternative elements.

The criteria developed for the needs measure the effectiveness of each alternative element. These criteria generally increase in detail at each level of screening. Alternative elements examined were either eliminated from further consideration through screening or advanced as representative of a group of similar elements and combined into full alternatives for analysis in this document. Some elements were retained for consideration in Tier 2 and not evaluated in this document, but informed what was evaluated.

The evaluation and screening levels are summarized below:

- **Level 1** screening studies are broad in concept and focus on identifying alternative elements that address the project needs to increase capacity, improve accessibility and mobility, and decrease congestion. Safety criterion is included at this level because of the interrelationship among safety, mobility, accessibility, and congestion (see **Chapter 1** for more information on safety). At this stage, alternative elements are conceptual, and evaluation is based on the suitability of technology and mode, rather than location and design; therefore, ability to implement, environmental and community value criteria are not applied.
- **Level 2** screening studies build on Level 1 studies and include a greater depth of analysis for alternative elements addressing capacity, mobility and accessibility, congestion, and safety. Level 2 screening also incorporates qualitative and quantitative criteria related to implementation (cost, technology, and constructability), environmental sensitivity, and community values. General location and design concepts are evaluated at this stage.
- **Level 3** focuses on the refinement of alternative elements remaining after Level 2 screening and their reasonableness for use in the Corridor. This results in some alternative elements being eliminated with others advanced for evaluation in this document. Some elements are retained for consideration in Tier 2 but are not evaluated in this document. More detailed design considerations are developed to qualitatively assess the ability to implement alternative alignments, environmental and community impacts, and travel demand performance. At this level, representative improvements are grouped by similar characteristics for analysis in this document.

Alternatives Development, Evaluation, and Screening Process Highlights:

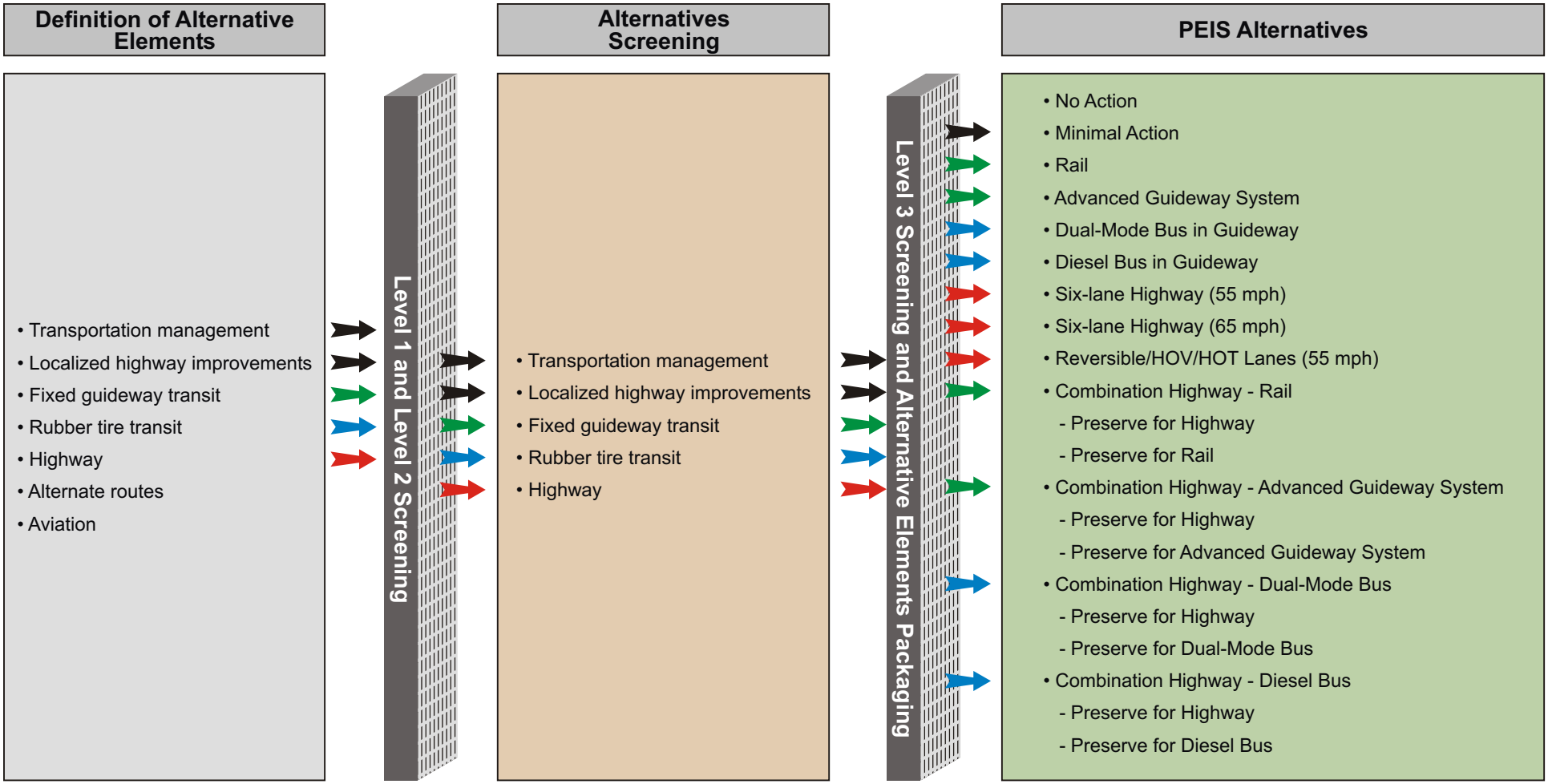
- The entire alternatives development, evaluation, and screening process involves public and agency involvement, as discussed in **Section 2.4**.
- The process is based on the purpose and need for the project and considers environmental sensitivity, community values, transportation safety, and ability to implement.
- The process looks at a wide range of alternative elements and results in a set of Action Alternatives, which were used to develop a Preferred Alternative.
- This rigorous process comparatively evaluates all alternative elements and carries forward those that best meet the purpose and need for the project and best address the evaluation criteria. This document fully evaluates the No Action Alternative and 21 Action Alternatives, including the Preferred Alternative.

Also see **Figure 2-1.**

Overall, alternative elements that have the ability to meet the purpose and need for the project while also addressing environmental sensitivity, community values, transportation safety, and ability to implement were advanced. Due to the topographically restricted nature of the Corridor caused by the mountainous terrain, this generally resulted in alternative elements being developed to fit within existing right-of-way to the extent feasible to minimize environmental impacts.

More detailed information on the alternatives development, evaluation, and screening process is found in the *I-70 Mountain Corridor PEIS Transportation Analysis Technical Report* (CDOT, August 2010) and the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report (*CDOT, August 2010).

Figure 2-1. Alternatives Screening Process



Screening and Packaging of Alternatives

Minimal Action Elements Common to All Alternatives

Fixed Guideway Transit Elements

Rubber Tire Transit Elements

Highway Elements

mph = Miles per Hour

Note: See Section 2.5 for more screening details.

2.4 How were stakeholders (communities and agencies) involved?

An extensive public and agency involvement process guided and collected input to the alternatives development, evaluation, and screening process. The process included numerous meetings with many stakeholders within the Corridor to discuss possible alternatives, the evaluation of alternatives, and the refinement of alternatives.

Collaborative Effort

The development of the Preferred Alternative used an engaged process called the Collaborative Effort. The Collaborative Effort team, a 27-member group representing varied stakeholders of the I-70 Mountain Corridor, worked closely in evaluating and discussing the results of the alternatives development, evaluation, and screening process to formulate not only a preferred alternative but also a long-term stakeholder engagement process to guide transportation improvements into the future.

Throughout alternatives development, evaluation, and screening, the project team met with the Federal Interdisciplinary Team, which was made up of the federal cooperating agencies, stakeholder groups, individual stakeholders, transit groups, and state, regional, and local agencies. In addition, several public open houses and workshops held at key points in the screening process informed Corridor stakeholders. Eight public open houses held throughout the Corridor during Level 1 screening introduced the public to the project, purpose and need, evaluation process, potential Corridor improvements, and solicited input on Corridor issues. During Level 2 screening, two public workshops discussed the screening criteria and methodology before actual screening, and three open houses presented the screening results.

Project newsletters provided updates on the evaluation and screening process and on project issues. These newsletters were sent to approximately 1,300 individuals on the project mailing list. A total of four mailed newsletters presented the alternatives screening process and results.

Chapter 6, Public and Agency Involvement, provides more detailed information on public and agency involvement.

2.5 Which alternative elements were eliminated and why?

The evaluation and screening process resulted in the development, evaluation, and screening of more than 200 alternative elements (see **Figure 2-1**). The following describes each alternative element and the process. Alternative elements were:

- Eliminated from further consideration during the screening process,
- Advanced for further evaluation, or
- Retained, but not evaluated in this document. This applies to those elements that were identified during the alternatives evaluation process but are similar to alternative elements advanced. The elements advanced represent the retained elements and a reasonable range of alternatives for analysis in this document. The retained alternative elements can be reconsidered during the Tier 2 process.

The alternative elements are categorized by seven alternative element families:

- Transportation management
- Localized highway improvements
- Fixed guideway transit
- Rubber tire transit
- Highway
- Alternate routes
- Aviation

Tunnels are also considered separately because they are major infrastructure projects that apply to highway and transit families. More detail and background on the alternatives development and screening process are found in the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010).

As a result of the evaluation and screening process, the lead agencies advanced approximately 80 alternative elements. In addition, the lead agencies retained approximately 10 alternative elements as similar to those advanced and may be reconsidered at Tier 2 as needed. These alternative elements represent the reasonable range of alternatives evaluated in this document. The alternative elements advanced combined to form the components of the Action Alternatives. An Action Alternative is a package of transportation components evaluated on its ability to address the project needs and evaluation criteria. **Section 2.6** discusses the Action Alternatives developed as a result of this screening process.

2.5.1 Transportation Management Alternative Elements

Ten transportation management alternative elements were evaluated. Transportation management strategies include transportation demand management, intelligent transportation systems, and transportation systems management. These strategies reduce the severity and duration of congestion and enhance overall mobility by improving the balance between the demand for travel on the Corridor with the capacity of I-70 to handle travel demand with minimal construction activities. Level 3 screening eliminated the following three transportation management elements (see **Table 2-1**) because they do not respond efficiently to the purpose and need of reducing congestion and improving mobility and safety in an efficient manner.

- **Bicycle improvements** alone do not have the ability to remove substantial traffic from the Corridor in order to reduce congestion. For the vast majority of trips on I-70, bicycling is not a valid option because of the mountainous terrain, weather conditions throughout much of the year, and length of the Corridor. For overnight trips and some recreational trips (skiing) bicycling does not provide a valid option for enough travelers to reduce congestion on the corridor. This alternative element was eliminated but included as part of mitigation strategies.
- **Limited access frontage roads (Clear Creek County)** were considered in only Clear Creek County due to the amount of congestion along I-70 through this area. The existing frontage roads get utilized during periods of heavy congestion. This alternative element was eliminated because frontage roads along the Corridor are considered state and federal highways and access cannot be limited or restricted to Clear Creek County residents or a particular vehicle type. In addition, this alternative element at most diverts two percent of traffic along the Hidden Valley to Bakerville stretch of I-70, which is not enough traffic to change operations or reduce travel time in the Corridor. Long-haul transit on frontage roads does not provide attractive travel conditions compared to travel on I-70.

- **Winter Park Ski Train** provided train service on an existing line from Denver Union Station to Winter Park during the ski season and was predominately used by skiers accessing the Winter Park Ski Resort in Grand County. This alternative element was eliminated due to the volume of freight trains through the Moffat Tunnel, which allows for a maximum of two Winter Park ski trains to run in each direction. Two trains to Winter Park, a single destination, do not remove enough traffic to change operations or reduce travel time in the Corridor. The seat capacity for one train is 750 seats. An additional train provides a 1,500 total seat capacity. No additional trips would be possible due to freight use on this line. The travel demand in 2035 on a winter Saturday westbound at the Twin Tunnels was estimated at 5,100 vehicle trips at peak hour, which would be at a Level of Service F for three hours. The demand would be over capacity by 1,700 vehicles. The ski train only accounts for a reduction of 600 vehicles at peak hour. In addition, since the initial consideration of this alternative element, the Winter Park ski train was discontinued in 2009 due to lack of funding.

Table 2-1. Transportation Management Alternative Elements

Transportation Management Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Ramp Metering				✔
Slow Moving Vehicle Plan				✔
Peak Spreading Vehicle Occupancy Incentives				✔
Park-n-Rides				✔
Enhanced Traveler Information				✔
Bicycle Improvements*			X	
Limited Access Frontage Roads (Clear Creek County)			X	
Parking Operations and Incentives Plan				✔
Winter Park Ski Train			X	
Buses in Mixed Traffic				✔

** Element can be revisited during Tier 2 for mitigation.*

2.5.2 Localized Highway Improvements Alternative Elements

Localized highway improvements focus on reducing Corridor congestion and improving overall mobility on the existing I-70 facility by making improvements to localized spots along the Corridor rather than adding capacity throughout the Corridor. This alternative element family includes an integrated package of strategies that maximize the operational efficiency, safety, and person-moving capacity of the Corridor by correcting structural and functional deficiencies of interchanges, curves, and localized areas of congestion. Localized highway improvements include interchange modifications, curve safety modifications, and auxiliary lanes. For more information on localized highway improvements see **Section 4.3** of the I-*70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010).

Forty interchanges were evaluated during the screening process. Each interchange location was analyzed based on volume to capacity ratio (representing traffic flow conditions at the interchange) and weighted hazard index (crash rate) to determine whether or not improvements were needed. If an interchange's volume capacity ratio indicated that it could not handle the current or projected volume and/or the

weighted hazard index indicated that it had a higher crash rate than the statewide average the interchange was identified as a problematic area needing improvement.

The following interchanges, eliminated in Level 3 screening, continue to have good traffic operations (good volume to capacity ratio) and better than average safety characteristics (low crash rate) and do not appear to require improvements through 2035. These interchange locations may be re-examined and monitored as the Preferred Alternatives is constructed. If changes are needed at these interchanges, CDOT is committed to work with the stakeholders and follow the I-70 Mountain Corridor Context Sensitive Solutions process (see **Appendix A**).

- Dotsero (milepost 133)
- Vail (milepost 176)
- Vail East Entrance (milepost 180)
- Vail Pass (milepost 190)
- Officer Gulch (milepost 198)
- Herman Gulch (milepost 218)
- Bakerville (milepost 221)
- Lawson (milepost 233)
- Dumont (milepost 235)
- Hidden Valley (milepost 243)
- El Rancho (milepost 251)
- Evergreen Parkway / SH 74 (milepost 252)
- Chief Hosa (milepost 253)
- Genesee (milepost 254)

Five curve safety modification locations were evaluated with one eliminated. Curve safety improvements east of Wolcott were eliminated in Level 3 screening based on its weighted hazard index and design speed and did not warrant any modifications.

Fourteen auxiliary lane locations were evaluated, resulting in elimination of two. The auxiliary lanes evaluated at Chief Hosa to Genesse and US 6 to Hyland Hills were eliminated because their weighted hazard index and design did not warrant the need for an auxiliary lane in either location.

Table 2-2. Localized Highway Improvement Alternative Elements

Localized Highway Improvement Alternative Elements	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Interchange Modifications				
Glenwood Springs (MP 116)				✔
Dotsero (MP 133)			X	
Gypsum (MP 140)				✔
Eagle and Spur Road (MP 147)				✔
Wolcott (MP 156)				✔
Edwards and Spur Road (MP 163)				✔
Avon (MP 167)				✔
Minturn (MP 171)				✔
Vail West / Simba Run (MP 173)				✔
Vail (MP 176)			X	
Vail East (MP 180)			X	
Vail Pass (Shrine Pass Road) (MP 190)			X	
Copper Mountain (MP 195)				✔
Officers Gulch (MP 198)			X	
Frisco / Main St. (MP 201)				✔
Frisco / SH 9 (MP 203)				✔
Silverthorne (MP 205)				✔
Loveland Pass (MP 216)				✔
Herman Gulch (MP 218)			X	
Bakerville (MP 221)			X	
Silver Plume (Potentially Move West Ramps to MP 224) (MP 226)				✔
Georgetown (MP 228)				✔
Empire (MP 232)				✔
Lawson (MP 233)			X	
Downieville (MP 234)				✔
Dumont (MP 235)			X	
Fall River Road (MP 238)				✔
Idaho Springs West (MP 239)				✔
Idaho Springs / SH 103 (MP 240)				✔
Idaho Springs East (MP 241)				✔
Hidden Valley (MP 243)			X	
Base of Floyd Hill / US 6 (MP 244)				✔

Localized Highway Improvement Alternative Elements	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Hyland Hills (MP 247)				✔
Beaver Brook (MP 248)				✔
El Rancho (MP 251)			X	
Evergreen Parkway / SH 74 (MP 252)			X	
Chief Hosa (MP 253)			X	
Genesee (MP 254)			X	
Lookout Mountain (MP 256)				✔
Morrison (MP 259)				✔
Curve Safety Modifications				
East of Wolcott (MP 158-159)			X	
West of Wolcott (MP 155–156)				✔
Dowd Canyon (MP 170–173)				✔
Fall River Road (MP 237–238)				✔
East of Twin Tunnels (MP 242–245)				✔
Auxiliary Lanes				
Avon to Post Boulevard, Uphill (EB) (MP 167–168)				✔
West Side of Vail Pass, Downhill (WB) (MP 180–190)				✔
West Side of Vail Pass, Uphill (EB) (MP 180–190)				✔
Frisco to Silverthorne (EB) (MP 202.7–205.1)				✔
EJMT to Herman Gulch, Downhill (EB) (MP 215–218)				✔
Bakerville to EJMT, Uphill (WB) (MP 215–221)				✔
Georgetown to Silver Plume, Uphill (WB) (MP 226–228)				✔
Silver Plume to Georgetown, Downhill (EB) (MP 226-228)				✔
Downieville to Empire, Uphill (WB) (MP 232–234)				✔
Empire to Downieville, Downhill (EB) (MP 232–234)				✔
US 6 Off-ramp to Hidden Valley Off-ramp, Uphill (WB) (MP 243–244)				✔
US 6 to Hyland Hills, Uphill (EB) (MP 244-247)			X	
Chief Hosa to Genesse, Flat (EB) (MP 252-253)			X	
Morrison to Chief Hosa, Uphill (WB) (MP 253–259)				✔

Key to Abbreviations/Acronyms

EB = eastbound
EJMT = Eisenhower-Johnson Memorial Tunnels
MP = milepost
WB = westbound

2.5.3 Fixed Guideway Transit Alternative Elements

The Fixed Guideway Transit alternative element family includes elements related to four major transit modes. They were analyzed for appropriateness for use in the Corridor by:

- General mode:
  - Automated Guideway Transit
  - Rail (light rail transit and heavy rail transit)
  - Passenger Railroads
  - Advanced Guideway System (monorail and magnetic levitation)
- Capacity (single and double track)
- Propulsion type (diesel and electric)
- Alignment grade (4 percent, 6 percent and 7 percent) capabilities

Because of the differences in ability of modes to operate on different grades, along with the widely varying capital costs, Fixed Guideway Transit systems were evaluated on alignments with various maximum grades and considered both single and double track operations. The existing I-70 highway contains grades up to approximately 7 percent. To address limitations of technologies to handle the steep highway grade, alignments with grades of 4 percent and 6 percent were developed; these alignments leave the highway for much of their routes to maintain consistent grades and as a result require substantial tunneling and new right-of-way.

Corridor constraints considered in the evaluation of Fixed Guideway Transit alternative elements include:

- Grades limit vehicle performance
- Curves limit speed
- Right-of-way size limits land available for infrastructure
- Mountain climate and terrain limit choice of power systems

Of the variations of Fixed Guideway Transit evaluated, two were advanced as representative of the various technologies along with one existing system. Alternative elements were eliminated for the reasons described below and at various screening levels described in **Table 2-3**. The following explanation summarizes the primary reason that the elements were eliminated from further consideration, although many failed on more than one measure. For example, all single track elements were eliminated because they cannot meet passenger capacity needs, but some of the technologies were found to be unsuitable for use in the Corridor regardless of capacity provided. The *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010) provides additional details on the evaluation of Fixed Guideway Transit alternative elements.

- Automated Guideway Transit Alternative Elements. Automated guideway transit systems are designed to function without an operator at the controls in controlled or restricted environments (such as indoors) where emergency assistance is available on short notice (such as in densely populated areas). Since the I-70 Mountain Corridor has physical constraints and remote areas, emergency assistance is not available on short notice in certain areas, and this system was determined unsafe for operation in the Corridor and was eliminated.
- Transit alternative elements that do not have the ability to meet the peak-hour peak-direction capacity requirement of 4,900 passengers were eliminated. This criterion is the minimum needed to adequately provide transit service and meaningfully reduce highway congestion in the peak hours and in the peak direction. These alternative elements include all the Light Rail Transit (LRT), all of the single track, and two of the Passenger Railroad (PRR).

- Diesel Heavy Rail Transit double track at both 4 percent and 6 percent grades do not provide reasonable travel times and were eliminated. With an average speed of less than 35 miles per hour (mph), Corridor travel time is more than 3.5 hours, which is not an attractive alternative to automobile travel.
- Fixed Guideway Transit alternative elements that do not have sufficient power or brakes to operate reliably on the grades in the Corridor were eliminated. These elements include the double track electric and diesel PRR locomotive hauled alternative elements for both 4 percent and 6 percent grades.
- Other Fixed Guideway Transit alternative elements with 4 percent and 6 percent grades were eliminated because the technologies not eliminated for other reasons are able to operate alongside the highway at steeper grades. The flatter grades (4 percent and 6 percent) result in severe environmental impacts on wetlands, streams, U.S. Forest Service land, wildlife habitat including lynx habitat, vegetation, water quality, and private property. These alignments also require substantial amounts of tunneling at considerable cost and logistical challenges. Problems constructing tunnels and new alignments in mountainous terrain include steep and unstable slopes, cliffs, and rivers.

Table 2-3. Fixed Guideway Transit Alternative Elements

Fixed Guideway Transit Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Existing I-70 Alignment (7% Grade) – Diesel Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track			X	
Existing I-70 Alignment (7% Grade) – Electric Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track			X	
Advanced Guideway System (urban maglev)				✔
Automated Guideway Transit (all grades and propulsion types)	X			
Heavy Rail Transit – Double Track (Moved from 6% Alignment) (MP 176–260)				✔
6% Grade Alignment – Diesel Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track			X	
Heavy Rail Transit – Single Track		X		
Heavy Rail Transit – Double Track		X		
Passenger Railroad – Locomotive Hauled – Single Track		X		
Passenger Railroad – Locomotive Hauled – Double Track		X		
6% Grade Alignment – Electric Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track		X		

Fixed Guideway Transit Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Heavy Rail Transit – Single Track		X		
Passenger Railroad Electric Multiple Unit – Single Track		X		
Passenger Railroad Electric Multiple Unit – Double Track			X	
4% Grade Alignment – Diesel Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track		X		
Heavy Rail Transit – Single Track		X		
Heavy Rail Transit –- Double Track		X		
Passenger Railroad – Locomotive Hauled – Single Track		X		
Passenger Railroad – Locomotive Hauled – Double Track		X		
4% Grade Alignment – Electric Power				
Light Rail Transit – Single Track		X		
Light Rail Transit – Double Track		X		
Heavy Rail Transit – Single Track		X		
Heavy Rail Transit – Double Track		X		
Passenger Railroad Electric Multiple Unit – Single Track		X		
Passenger Railroad Electric Multiple Unit – Double Track		X		
Existing Rail Facility				
Intermountain Connection (MP 142–176)				✔
Passenger Railroad – Winter Park Service Track		X		
Passenger Railroad – Glenwood Springs Service Track		X		

Key to Abbreviations/Acronyms
MP = milepost

2.5.4 Rubber Tire Transit Alternative Elements

Rubber Tire Transit alternative elements focus on bus operations. Buses are self-powered vehicles designed for commercial use, capable of operating on roadways, and carry more than six passengers. Rubber Tire Transit alternative elements are categorized by:

- Propulsion type (diesel, electric, and dual-mode)
- Facility use (regular travel lanes, HOV lanes, guideway or transitway)
- Direction of facility operation (peak direction only and both directions)

A guideway (a narrow facility where buses are steered by a device that tracks the edge of the guideway) or transitway (a separated facility where only buses are allowed) could be provided in a two-lane facility operating in both directions or in a single-lane facility operating in the peak direction only with buses operating in mixed traffic in the non-peak direction. The existing I-70 alignment is used with Rubber Tire Transit proposed in the median.

The following were eliminated at various screening levels as shown in **Table 2-4**:

- **Bus in mixed traffic** was eliminated as a single-mode alternative because of low average speeds and low capacity. This alternative element uses buses operating within the general traffic lanes of the Corridor. Because the buses have no lane priority, speeds are limited by traffic conditions. This element is unlikely to make any substantial impact on highway congestion.
- **Bus in high occupancy vehicle (HOV) lanes** was eliminated due to low transit capacity and low demand for ridership. High occupancy vehicle lanes include either a third lane or separated lanes that are restricted to HOVs, such as buses and vehicles carrying at least three persons. This alternative element was designed for use by an I-70 Mountain Corridor bus system and allows other HOVs to use the lane(s).
- **Bus (diesel or dual-mode) in transit-way – peak direction only** alternative elements were eliminated because they do not meet the mobility criterion due to lack of off-peak schedule dependability. Buses traveling in the off-peak direction are not on the guideway and are operating in mixed traffic, subject to highway congestion and cannot provide reliable off-peak service. The peak direction only alternatives would require nearly as much right-of-way width as the both direction alternatives, and would provide less operational flexibility.
- **Bus (diesel or dual-mode) in guideway – peak direction only** alternative elements were effectively eliminated when the guideway alternatives were revised to include peak direction only operation west of the Eisenhower-Johnson Memorial Tunnels and both direction operation east of the tunnels.
- **Electric bus in transitway and guideway** was eliminated due to accessibility problems. This alternative element required two separate transfers for passengers because electric buses, operating by power provided from an overhead wire infrastructure, cannot operate more than short distances off the Corridor and, therefore, was not considered a suitable technology in comparison with other bus technologies.

One alternative element is advanced and represents several similar elements that have relatively minor footprint and operational differences. It was assumed reasonable to evaluate the Bus in Guideway alternative element as representative of all of these elements because it moves a similar number of people, minimizes impacts on resources, and potentially meets the 2050 travel demand when combined with Highway Alternative elements. These alternative elements, and possibly other specific bus technologies, can be further evaluated in Tier 2 processes. The Rubber Tire Transit alternative elements considered similar to the Bus in Guideway alternative element include:

- Diesel or dual-mode bus in transitway—both directions
- Diesel or dual-mode bus in either transitway or guideway—both directions, using online stations

For the purposes of this evaluation, a system with online stations (stations on the guideway or transitway) is defined as bus rapid transit (BRT).

Table 2-4. Rubber Tire Transit Alternative Elements

Rubber Tire Transit Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Bus in Mixed Traffic		X		
Bus in HOV Lanes		X		
Bus in Transitway or Guideway – Diesel or Dual-mode – Both directions (Guideway assumed as most reasonable for evaluation)				✔
Bus in Transitway or Guideway – Diesel or Dual-mode - Peak direction only		X - Transitway	X - Guideway	
Bus in Transitway or Guideway – Electric		X		

Key to Abbreviation/Acronyms
HOV = high occupancy vehicle

2.5.5 Highway Improvement Alternative Elements

This alternative element family focuses on highway widening in areas where it is warranted in the Corridor. Six primary highway improvements were considered by corridor location defined by physical and community characteristics. The locations are based on areas within the Corridor that warrant consideration of highway capacity improvements related to mobility, safety and maintenance concerns. Not all areas of the Corridor require capacity improvements and many of these locations were considered for localized highway improvements such as interchange modifications, curve safety modifications and auxiliary lanes (see **Section 2.5.2**). Within each location, all or some of the improvements were considered and evaluated based on the conditions and constraints within that location.

Primary Highway Improvements
- Six-lane highway widening:
  - Horizontal widening
  - Vertical widening
- Flex lanes
- Reversible/HOV/HOT lanes
- Movable median
- Parallel route
- Silverthorne Tunnel

Within each location one or two of the highway improvements were advanced and fell into two of the improvement alternative elements:

- Six-lane highway widening
- Reversible/High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT) lanes

Several highway improvement alternative elements were eliminated at differing levels of screening, as shown in **Table 2-5**, and are discussed by location. In locations where the following highway improvements were considered, they were eliminated for the following reasons:

- **Flex lanes** offer a narrower roadway width of 90 feet providing a 16-foot flex lane shoulder used as a 12-foot-wide travel lane and 4-foot shoulder during peak volumes in the peak direction, and as a wide shoulder at other times. Control devices, such as a lane closure gate and message signing, are used during peak hours when the lane would function as a standard travel lane. Flex lanes are eliminated for all locations due to poor safety as a result of inconsistent lane balance for sections of the highway on either side of the flex lane section. The 4-foot shoulder width does not meet design standards and is incompatible with the Colorado Department of Transportation's Incident Management Plan, requiring sufficient shoulder width to operate emergency vehicles. A

4-foot shoulder does not allow broken-down vehicles to get out of the flow of traffic, which is a concern especially for commercial trucks.

- **Movable median** uses a five-lane highway with the reversible third lane using a movable median between Empire and Floyd Hill. A specially equipped vehicle lifts portable barrier segments and shifts them laterally to produce a new lane configuration. This element was eliminated in all locations due to the reduction of mobility as a result of loss in the travel time it would take to clear the traffic lanes and move the median.
- **Parallel route** north of Idaho Springs between Fall River Road and the Hidden Valley interchange (a two-lane multipurpose roadway) was eliminated because it does not meet the need criteria of reducing congestion between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill and because it is impossible to continue west of Idaho Springs due to steep terrain at the Fall River Road area. This was eliminated in the three highway locations where it was considered.
- **Silverthorne Tunnel** was considered between Silverthorne and Empire Junction as an alternate to the existing highway between Empire and Silverthorne. At a proposed length of 25 miles, this tunnel is longer than any tunnel ever constructed. It was eliminated because of major constructability challenges and lack of local access to communities such as Georgetown, Silver Plume and Bakerville.

Some of the highway improvements considered have footprint and configuration differences. For six-lane horizontal highway widening, three options were considered:

- Standard shoulder width (12-foot shoulders)
- Variable shoulder width (8-foot to 10-foot shoulders)
- Smart widening (reduced shoulders, medians and clear zones widths)

Six-lane highway widening was also considered in a vertical configuration for use in tightly constrained areas of the Corridor, such as Idaho Springs. Three vertical options were considered:

- Structured lanes where one direction of travel is elevated directly above
- Cantilevered lanes where one direction of travel is elevated and terraced (to the side)
- Tunneled lanes where one direction of travel is below grade

It is reasonable to evaluate the variable shoulder option as representative of the horizontal widening for the majority of locations in the Corridor because it moves a similar number of people as the other options, is consistent with AASHTO design standards for shoulder width by providing 8 to 10 foot shoulders, and minimizes impacts on resources due to the reduced shoulder width. Structured lanes are a reasonable representative of the vertical options because it moves a similar number of people as the other options, minimizes impacts on adjacent resources, and has fewer impacts associated with past mining operations. The tunneled lane option posed greater challenges because required construction activity would encounter greater impacts associated with water quality and hazardous material from past mining operations. For purposes of analysis in this document structured lanes are evaluated in the West Idaho Springs to East Idaho Springs area only because the benefit of the narrower footprint gained outweighed the cost of construction. In many locations, the alignment or direction of highway widening could be adjusted to avoid sensitive resources. The six-lane highway widening, either horizontal or vertical options, could be further evaluated in Tier 2.

Table 2-5. Highway Improvement Alternative Elements

Highway Improvement Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Eagle-Vail to Vail West (MP 169–MP 173)				
Six-Lane Highway – I-70 Alignment				✔
Silverthorne to Empire Junction (MP 205–MP 232)				
Silverthorne Tunnel		X		
Eisenhower Johnson Memorial Tunnel to Silver Plume (MP 215.5–MP 226)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
Silver Plume to Georgetown (MP 226–MP 228)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
Georgetown to Empire Junction (MP 228–MP 232)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
Empire Junction to West Idaho Springs (MP 232–MP 239)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Movable Median			X	
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
West Idaho Springs to East Idaho Springs (MP 239–MP 241)				
Structured Lanes as representative				✔
Movable Median			X	
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
Parallel Routes		X		
East Idaho Springs to Twin Tunnels (MP 241–MP 242)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Movable Median			X	
Reversible/HOV/HOT Lanes				✔

Highway Improvement Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Flex Lanes		X		
Parallel Routes		X		
Twin Tunnels to US 6 (MP 242–MP 244)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet) as representative				✔
Movable Median			X	
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		
Parallel Routes		X		
US 6 to Floyd Hill (MP 244–MP 247)				
Six-Lane Horizontal Widening – Variable Shoulder (8 feet to 10 feet as representative				✔
Movable Median			X	
Reversible/HOV/HOT Lanes				✔
Flex Lanes		X		

Key to Abbreviations/Acronyms

EB = eastbound HOT = High Occupancy Toll HOV = High Occupancy Vehicle
MP = milepost mph = miles per hour WB = westbound

2.5.6 Alternate Route Alternative Elements

Alternate routes were developed and evaluated to determine if the travel times and speeds could be competitive enough to attract enough Corridor travelers such that no mobility improvements are needed on the Corridor. The routes are shown on **Table 2-6**. Fifteen of the 17 alternate routes either had substantially longer travel times or were located too far away from the primary origination of travel, so they did not improve mobility or reduce congestion on the Corridor and were therefore eliminated.

Two of the alternate routes were examined in more detail in Level 2, however neither of these advanced beyond Level 2. Alternate Route 17 from Golden to Winter Park via a new tunnel was eliminated due to much larger capital costs and because of noticeably longer travel times. Alternate Route 9 from Denver to Copper Mountain via a new tunnel under Georgia Pass was eliminated because of greater environmental impacts and longer travels times during uncongested travel periods on I-70.

Table 2-6. Alternate Route Alternative Elements

Alternate Route Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Alternate Route 1: Fort Collins to Wolcott via Walden (SH 14 and SH 131)	X			
Alternate Route 2: Fort Collins to Wolcott via Kremmling (US 34)	X			
Alternate Route 3: Fort Collins to Copper Mountain via Kremmling (US 34 and SH 9)	X			
Alternate Route 4: Denver to Wolcott via Moffat Tunnel (SH 72, US 40, and US 34)	X			
Alternate Route 5: Denver to Copper Mountain via Moffat, Berthoud and Jones Pass Tunnels (SH 72 and SH 9)	X			
Alternate Route 6: Denver to Wolcott via Berthoud Pass Tunnel (US 40 and US 34)	X			
Alternate Route 7: Denver to Copper Mountain via Jones Pass Tunnel (SH 9)	X			
Alternate Route 8: Denver to Copper Mountain via Hoosier Pass (surface) (US 285 and SH 9)	X			
Alternate Route 9: Denver to Copper Mountain via Georgia Pass Tunnel (US 285)		X		
Alternate Route 10: Denver to Minturn via Buena Vista (US 285 and US 24)	X			
Alternate Route 11: Colorado Springs to Copper Mountain via Hoosier Pass (surface) (US 24 and SH 9)	X			
Alternate Route 12: Colorado Springs to Copper Mountain via Hoosier Pass Tunnel (US 24 and SH 9)	X			
Alternate Route 13: Colorado Springs to Minturn via Buena Vista (US 24)	X			
Alternate Route 14: Colorado Springs to Copper Mountain via Buena Vista (US 24 and SH 91)	X			
Alternate Route 15: Pueblo to Copper Mountain via Hoosier Pass (surface) (US 50 and SH 9)	X			
Alternate Route 16: Pueblo to Copper Mountain via Hoosier Pass Tunnel (US 50 and SH 9)	X			
Alternate Route 17: Golden to Winter Park via New Tunnel Parallel to Moffat Tunnel (SH 58, SH 93, and SH 72)		X		

Key to Abbreviations/Acronyms

SH = State Highway US = United States Highway

2.5.7 Aviation Alternative Elements

Aviation alternative elements focus on ways to help meet future travel demand and increase mobility by expanding or improving air service in the Corridor. The six aviation alterative elements evaluated were eliminated in various screening levels as shown in **Table 2-7** and described below. In general, they were eliminated due to the absence of demand for greater airport capacity and ability to reduce congestion or improve mobility and accessibility, or address safety on I-70 during peak travel demand periods.

- Improvement of existing commercial service aviation facilities through advanced technology was eliminated from consideration at Level 3 because the capacity of commercial service is sufficient in the Corridor and it is part of Eagle County Regional Airport plans, regardless of action on the Corridor. Capacity at commercial service airports is sufficient, if not abundant and is underutilized for eight months out of the year (most facilities are designed for peak winter season).
- Improvement of existing general aviation facilities to accommodate commercial operations was combined with the improvement of existing commercial service aviation facilities due to the minor difference between the two elements and also was eliminated in Level 3 for the same reasons.
- Development of aviation systems management and subsidy programs was eliminated due to the absence of demand for greater airport capacity and its inability to reduce congestion on the Corridor during peak travel demand periods. The Eagle County Regional Airport discontinued incentive programs and seat guarantees due to less seasonal fluctuations and growth in enplanements over the past ten years.
- Development of new airports in the Corridor was eliminated due to the lack of accessibility (e.g., not able to be sited in proximity to major activity centers) or sufficient air travel demand and inability to reduce congestion on the Corridor during peak travel demand periods. Aviation experts in the Corridor indicated that commercial service capacity is not an issue in the Corridor. With planned improvements at existing airports, there would be an estimated reduction of 500 person trips per day within the next 15 years. This reduction would provide minimal effects to the volume of traffic on I-70 during peak travel demand periods.
- Development of new heliport and short take-off and landing facilities was eliminated because smaller aircraft that carry too few passengers are less equipped to deal with mountain weather conditions and are unable to reduce congestion on the Corridor during peak travel demand periods. It is likely that greater capacity and the ability to meet travel demand are not realized, as vertical flight aircraft tend to be small and hold fewer passengers than traditional commercial aircraft. Additionally, vertical flight aircraft operate at half the speed of conventional aircraft and are noisier during take-off and landing. Therefore, diverting an insignificant number of cars from the highway. From a safety perspective, these aircraft, compared to conventional aircraft, are less equipped to deal with the extremes of mountain weather conditions.
- Development of Walker Field into a Western Slope regional hub airport was eliminated because it is currently underutilized compared to Hayden, Rifle, Aspen, Eagle County, and Glenwood Springs airports, and because it is unable to reduce congestion on the Corridor during peak travel demand periods. Prior to the development of the other Corridor airports, Walker Field served as a gateway airport. However, it is not likely it will resume that position in light of the capacities of the other airports and the technological advances making it safer to use the smaller, regional commercial service airports. Additionally, shifting the transport of goods from truck to aircraft historically has been deemed to have a minor impact on highway congestion given the small increase in capacity relative to the enormous cost (e.g., one plane carries about as much cargo as one truck).

Table 2-7. Aviation Alternative Elements

Aviation Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Improve Existing Commercial Service Aviation Facilities Through Advanced Technology (Included in Local Airport Planning)			X	
Improve Existing General Aviation Facilities to Accommodate Commercial Operations*			X	
Develop Aviation Systems Management and Subsidy Programs			X	
Develop New Airports in the Corridor	X			
Develop Heliport and Short Takeoff and Landing Facilities	X			
Develop Walker Field (Grand Junction) into a Western Slope Regional Hub Airport	X			

** Alternative element combined with "Improve Existing Commercial Service Aviation Facilities Through Advanced Technology" alternative element which was eliminated during Level 3 screening.*

2.5.8 Tunnel Alternative Elements

Tunnels were evaluated in order to improve mobility or provide additional capacity in specific locations for both highway and transit alternative elements. Several highway and transit improvements evaluated require the use of new or expansion of existing tunnels. Tunnels were used to improve geometry and address safety problems where design speed and roadway geometry required. Due to the cost and impact of tunnel facilities, a set of tunnel alternative elements was evaluated in support of the highway and transit elements and at existing tunnels that do not provide adequate capacity (see *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report*, CDOT, August 2010). Of the various tunnels evaluated, the following five were eliminated in Level 2 as shown in **Table 2-8**.

- Silverthorne tunnel was eliminated because of:
  - Specific severe geologic and engineering issues
  - Impacts on the surrounding communities
  - Environmental impacts on wildlife, fisheries, and water quality
- Silverthorne to Empire tunnel was evaluated at part of the highway improvement alternative elements (see **Section 2.5.5**) and was eliminated due to its very long length (over 20 miles) resulting in:
  - Very difficult implementation
  - Extremely high costs
  - Limited access to communities and destinations in-between
  - Potential safety problems of emergency access within the tunnel
- Loveland Pass tunnel (evaluated for Fixed Guideway Transit) was eliminated because the grade required for the tunnel approach would be too steep for the practical operation of fixed guideway transit systems.

- Silver Plume tunnel north (evaluated for Fixed Guideway Transit) was eliminated because:
  - Numerous mine tunnels in the area provide a drainage conduit for water containing toxic heavy metals resulting in poor water quality
  - It results in potential mine collapse posing safety hazards to the traveling public
- Mount Vernon Canyon Tunnel was evaluated with the 4 percent grade Fixed Guideway Transit alternative elements. Since these were eliminated due to environmental impacts and costs and because the systems could operate at a 6 percent grade, this 6.2 mile long tunnel is eliminated.

The following two tunnels were not eliminated but were found to have severe issues in encountering existing mining tunnels containing water with heavy metals. Unforeseen conditions within the existing tunnels create construction and operational safety issues.

- Georgetown Incline Tunnel (evaluated for fixed guideway transit with 6 percent grades or less)
- Georgetown Incline Tunnel (evaluated for highway alignment)

During Tier 2, tunnels could be considered as mitigation. While the following tunnels were evaluated, other tunnel elements could still be considered if appropriate.

Table 2-8. Tunnel Alternative Elements

Tunnel Alternative Element	Screened – Level 1 Screening	Screened – Level 2 Screening	Screened – Level 3 Screening	Advanced for Action Alternative Development
Proposed New Tunnels				
Dowd Canyon Tunnel				✔
Silverthorne Tunnel		X		
Silverthorne to Empire Tunnel - Highway		X		
Loveland Pass Tunnel – FGT		X		
Silver Plume Tunnels				
Silver Plume - North Tunnel – FGT		X		
Georgetown Incline Tunnel – FGT				✔*
Georgetown Incline Tunnel – Highway				✔*
Twin Tunnels to Hidden Valley				✔
Hidden Valley to Floyd Hill				✔
Mount Vernon Canyon Tunnel - FGT		X		
Third Bores at Existing Tunnels				
Eisenhower-Johnson Memorial Tunnels				✔
Twin Tunnels				✔

Key to Abbreviations/Acronyms
FGT = Fixed Guideway Transit EJMT = Eisenhower-Johnson Memorial Tunnels

* Retained, but not evaluated in this document due to likely severe issues with water quality, past mining operations, and safety but could be reconsidered in Tier 2.

2.6 What alternatives were advanced?

The screening process considered and evaluated more than 200 alternative elements. These alternative elements combined, modified, or enhanced into the components of 21 Action Alternatives (including the Preferred Alternative) advanced for analysis in this document. These Action Alternatives represent a reasonable range of alternatives and provide the best opportunity for operations within the Corridor and for minimizing impacts. While this document identifies potential modes, technologies that fit within the mode may need to be evaluated at Tier 2.

This section describes 20 of the Action Alternatives and the No Action Alternative. The response to the question in **Section 2.7** describes the development of the Preferred Alternative, forming the 21st Action Alternative. Many of the alternatives share many common components. For example, many alternatives simply provide different combinations of the same transit or roadway improvements.

For presentation in this chapter, first, the No Action Alternative and the Minimal Action Alternative are described in detail. Following the Minimal Action Alternative description, the remaining alternative components forming the other Action Alternatives are described to fully complete a description of all components contained in the Action Alternatives. The Preferred Alternative is described in **Section 2.7** and was developed out of the 20 Action Alternatives by the Collaborative Effort team.

The No Action Alternative includes previously committed or reasonably foreseeable transportation improvements in the Corridor common to all Action Alternatives. The Minimal Action Alternative includes a large number of transportation improvements contained in all Action Alternatives and forms a good basis for discussion. Many Minimal Action Alternative improvements are moving forward as early action projects.

Table 2-9 displays the specific components included in each alternative and provides a comparative summary for all the Action Alternatives. This table allows the reader to compare alternatives by major component and to understand appropriate detail for each component. Detailed descriptions of the alternatives are found in the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010).

2.6.1 History and Context of Advanced Alternatives

A history of evaluating and advancing the Action Alternatives is important to understand why this document fully evaluates so many alternatives. When the project was initiated in 2000, the horizon year for the project was 2025. Analyses of the 21 Action Alternatives showed that 20 of the 21 had overall network capacity to reach the 2025 horizon and strong potential to meet the purpose and need. Only the Minimal Action Alternative did not meet the 2025 horizon year network capacity. However, the Minimal Action Alternative was carried forward because it:

- Forms the basis of localized improvements common to all Action Alternatives
- Includes only localized improvements
- Provides a comparison with other Action Alternatives that all provide continuous longer distance and capacity improvements

After the completion the 2004 Draft PEIS, the lead agencies and stakeholders went through a detailed review process and decided to extend the horizon year to 2035 and created the 2050 planning horizon as a long-range vision for improvements in the Corridor. **Chapter 1** discusses this process. This review process evaluated the Action Alternatives and developed a Preferred Alternative. The Preferred Alternative, developed to address the 2050 planning horizon, recognized many factors could occur during the intervening years, substantially changing conditions along the Corridor. To address the uncertainty of projecting so far in the future, the Preferred Alternative was developed using an incremental and adaptive approach to transportation improvements. The Preferred Alternative identifies specific transportation

improvements and includes a process that allows any Action Alternative components to be reconsidered in the future if conditions change. Because Action Alternatives have transportation improvements that could be reconsidered in the future, they are included for full evaluation in this document.

The evaluation shows that many Action Alternatives do not meet the purpose and need for the project based on the 2035 and 2050 planning horizons. Similarly, the evaluation shows that the Preferred Alternative has the best opportunity to meet the purpose and need while minimizing impacts based on the best available data. **Section 2.7** discusses the incremental and adaptive approach included in the Preferred Alternative. This approach takes into consideration that future conditions could change and require consideration of transportation improvements included in any Action Alternative.

2.6.2 No Action Alternative

The No Action Alternative includes only ongoing highway maintenance and improvements with committed funding sources highly likely to be implemented by the 2035 planning horizon. These improvements are committed whether or not any other improvements are constructed with this I-70 Mountain Corridor project. The No Action Alternative is assessed and used as a baseline for environmental analysis and represents what would exist if no action were taken based on this NEPA process. Improvements included in the Action Alternatives would not be completed under the No Action Alternative.

Figure 2-2 shows the No Action Alternative improvements by area. These improvements include highway improvements, park-and-ride facilities, tunnel enhancements, and general improvements.

Highway Improvements

Highway improvements include the following:

- Eagle County Regional Airport Interchange – This includes a direct connection between the Eagle County Regional Airport and I-70 located between milepost 142 and milepost 143.
- SH 9 – This project includes upgrading SH 9 between Frisco and Breckenridge to four lanes.
- US 6 – This project includes overlay and shoulder widening on US 6 between milepost 153 and milepost 158.

Park-and-Ride Facilities

Two locations are identified for new park-and-ride facilities:

- Silverthorne (milepost 206)
- Breckenridge (SH 9)

Tunnel Enhancements

Tunnel enhancements are planned for the:

- Hanging Lake Tunnel in Glenwood Canyon
- Eisenhower-Johnson Memorial Tunnels

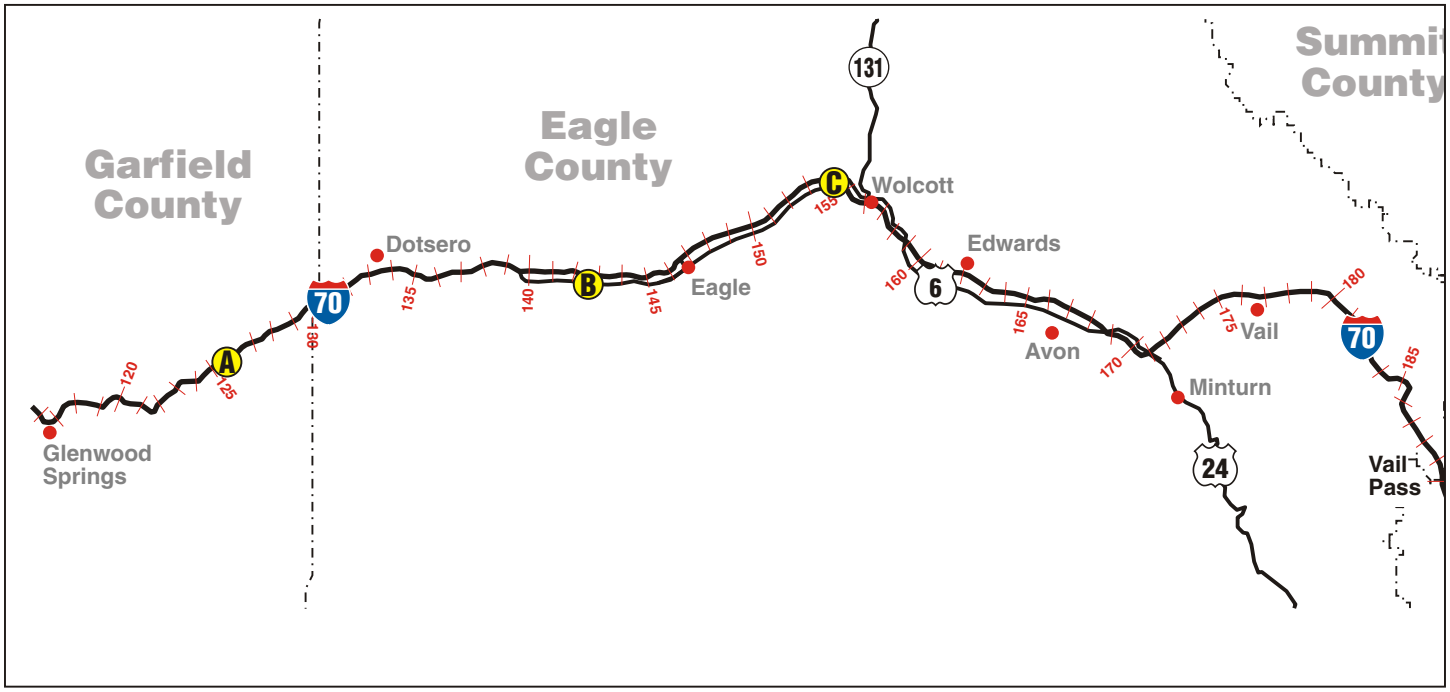
General Improvements

General improvements include the following:

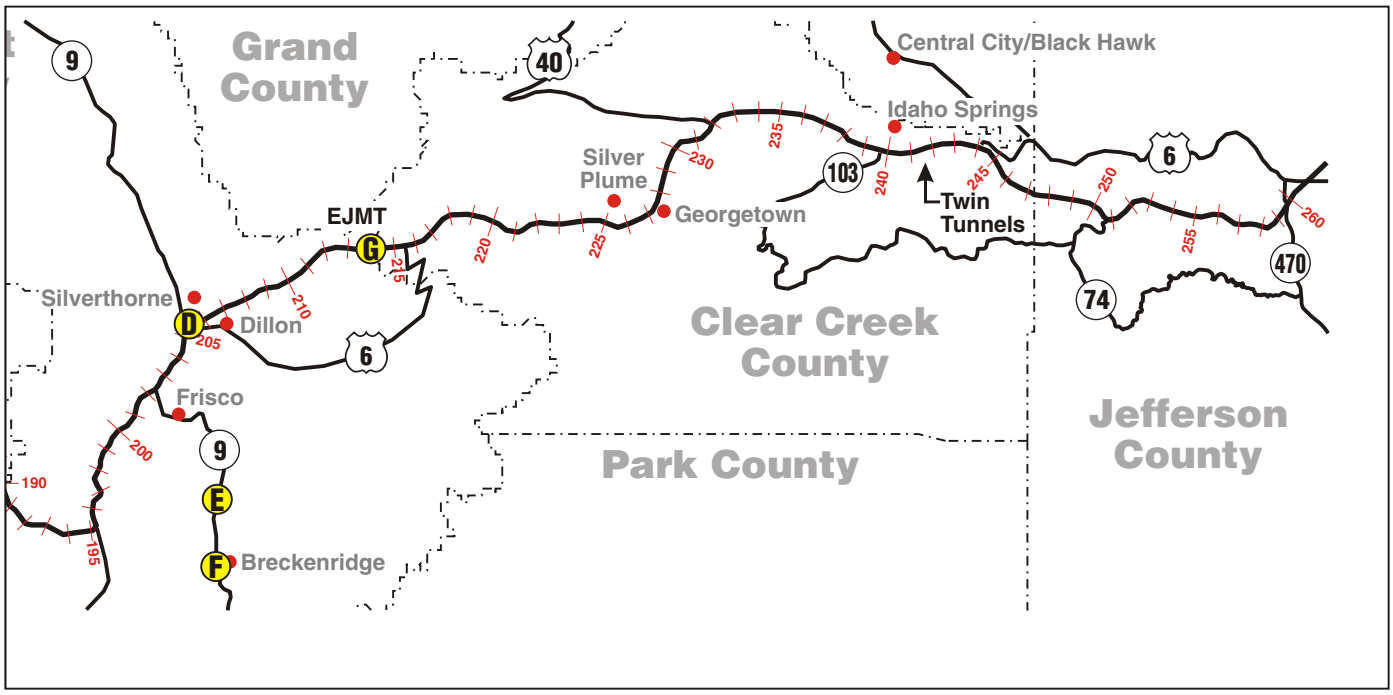
- Routine safety
- Resurfacing
- Bridge repairs
- Other maintenance activities
- Sediment control

Figure 2-2. No Action Alternative

Western Portion of Corridor



Eastern Portion of Corridor



Highway

- (B) Eagle County Regional Airport Interchange (mp 142-143) - EA
- (C) US 6 Improvements (mp 153-158)
- (E) Widening SH 9 from I-70 to Breckenridge (mp 203) - EIS

Park-and-Ride Facilities

- (D) Silverthorne (mp 205.5)
- (F) Breckenridge (SH 9)

Tunnel Enhancement

- (A) Hanging Lake (mp 125)
- (G) EJMT (mp 213.5-215)

GENERAL IMPROVEMENTS NOT SHOWN ON MAP

- Routine Safety
- Resurfacing
- Bridge Repairs
- Other Maintenance Activities
- Sediment Control

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

2.6.3 Minimal Action Alternative

The Minimal Action Alternative provides a range of local transportation improvements along the Corridor without providing major highway capacity widening or dedicated transit components. The Minimal Action Alternative addresses specific roadway problem areas identified throughout the Corridor. These improvements include:

- A transportation management program
- Interchange modifications
- Auxiliary lanes for slow-moving vehicles
- Curve safety modifications
- Sediment control programs
- Frontage road improvements
- Bus service in mixed traffic

Figure 2-3 shows these improvements by area. All or portions of this alternative are added to the other Action Alternatives and could proceed as early action projects (see Introduction of this document).

What is TDM / TSM / ITS?

- TDM increases roadway effectiveness by encouraging traveler behaviors that reduce vehicular demand during peak periods, such as ridesharing and telecommuting.
- TSM improves the operation of the physical roadway infrastructure, through the use of ramp metering (regulates the amount of traffic entering freeways through the use of a traffic signal based on traffic conditions) and traffic operations plans.
- ITS uses advanced applications of electronics and communications to achieve TSM and TDM goals, such as enhanced traveler information and variable message signs.

Transportation Management Program

The Transportation Management Program includes components identified as part of the transportation management family and includes minor improvements to improve operational efficiency without major capacity additions. Transportation management includes:

- Transportation Demand Management (TDM)
- Transportation System Management (TSM)
- Intelligent Transportation Systems (ITS)

Interchange Modifications

A majority of the interchanges in the I-70 Mountain Corridor are structurally deficient, functionally obsolete, or will be by 2035. Twenty-six interchange locations along the Corridor were identified as needing improvements and are included as part of this alternative. The existing or future problems at each interchange vary widely and are described further in the *I-70 Mountain Corridor PEIS Transportation Analysis Technical Report* (CDOT, August 2010). The interchanges are:

- Glenwood Springs (milepost 116)
- Gypsum (milepost 140)
- Eagle & Spur Road (milepost 147)
- Wolcott (milepost 157)
- Edwards & Spur Road (milepost 163)
- Avon (milepost 167)
- Minturn (milepost 171)
- Vail West / Simba Run (milepost 173)
- Copper Mountain (milepost 195)
- Frisco/Main Street (milepost 201)
- Frisco/SH 9 (milepost 203)
- Silverthorne (milepost 205)
- Loveland Pass (milepost 216)
- Silver Plume (milepost 226)
- Georgetown (milepost 228)
- Empire (milepost 232)
- Downieville (milepost 234)
- Fall River Road (milepost 238)
- Idaho Springs West (milepost 239)
- Idaho Springs/SH 103 (milepost 240)
- Idaho Springs East (milepost 241)
- Base of Floyd Hill/US 6 (milepost 244)
- Hyland Hills (milepost 247)
- Beaver Brook (milepost 247)
- Lookout Mountain (milepost 256)
- Morrison (milepost 259)

Auxiliary Lanes

Auxiliary lane improvements proposed in 12 locations throughout the Corridor are part of the Minimal Action Alternative. Auxiliary lanes for slow-moving vehicles, primarily located in areas of steep grades, increase the capacity of a highway for relatively short lengths.

Eastbound auxiliary lanes are located:

- East of Avon
- West side of Vail Pass
- East of Frisco
- East of Eisenhower-Johnson Memorial Tunnels
- West of Georgetown
- East of Empire

Westbound auxiliary lanes are located:

- In Mount Vernon Canyon
- West of Downieville
- West of Georgetown
- On the approach to Eisenhower-Johnson Memorial Tunnels
- West side of Vail Pass

Curve Safety Modifications

Curve safety modifications are proposed in four locations in the Corridor and include increasing the design speed on mainline curves more closely matching the design speed on adjoining sections of I-70. Locations include:

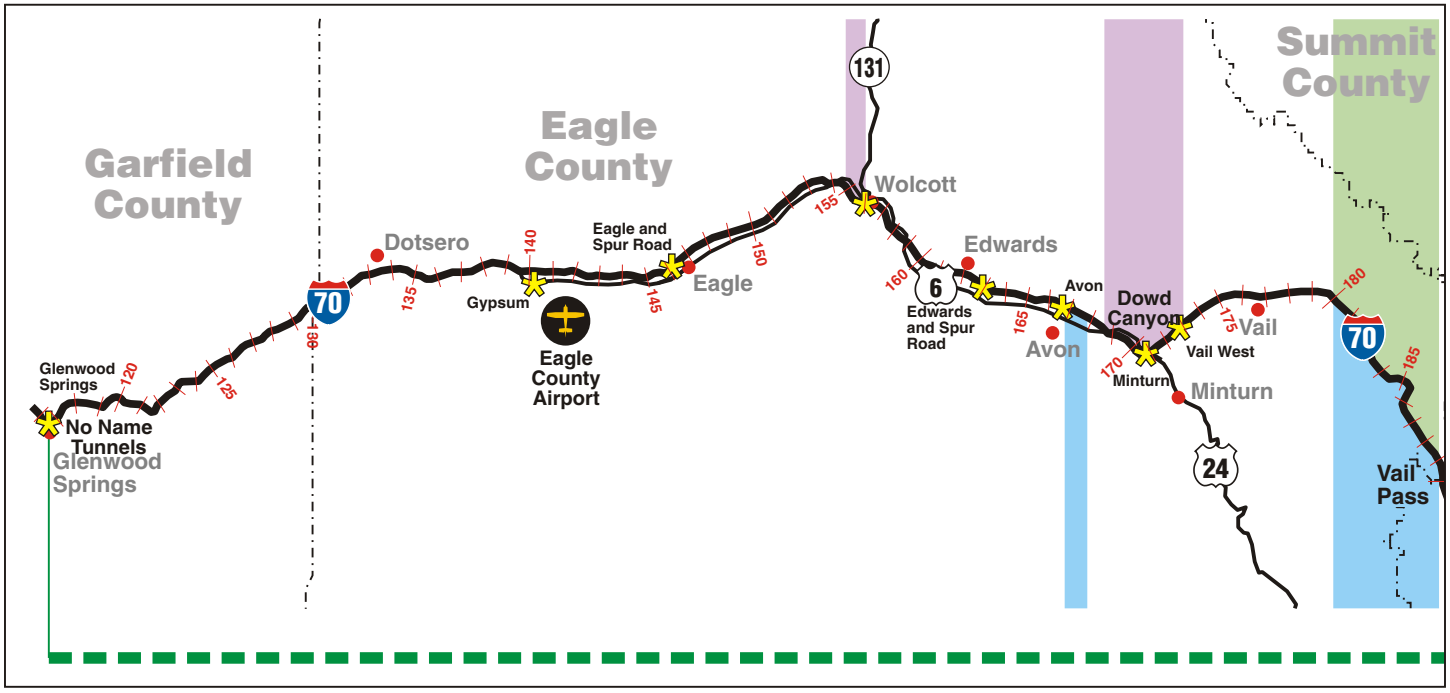
- West of Wolcott (milepost 155 to milepost 156)
- Dowd Canyon (milepost 170 to milepost 173)
- Fall River Road (milepost 237 to milepost 238)
- East of the Twin Tunnels (milepost 242 to milepost 245)

Other Improvements

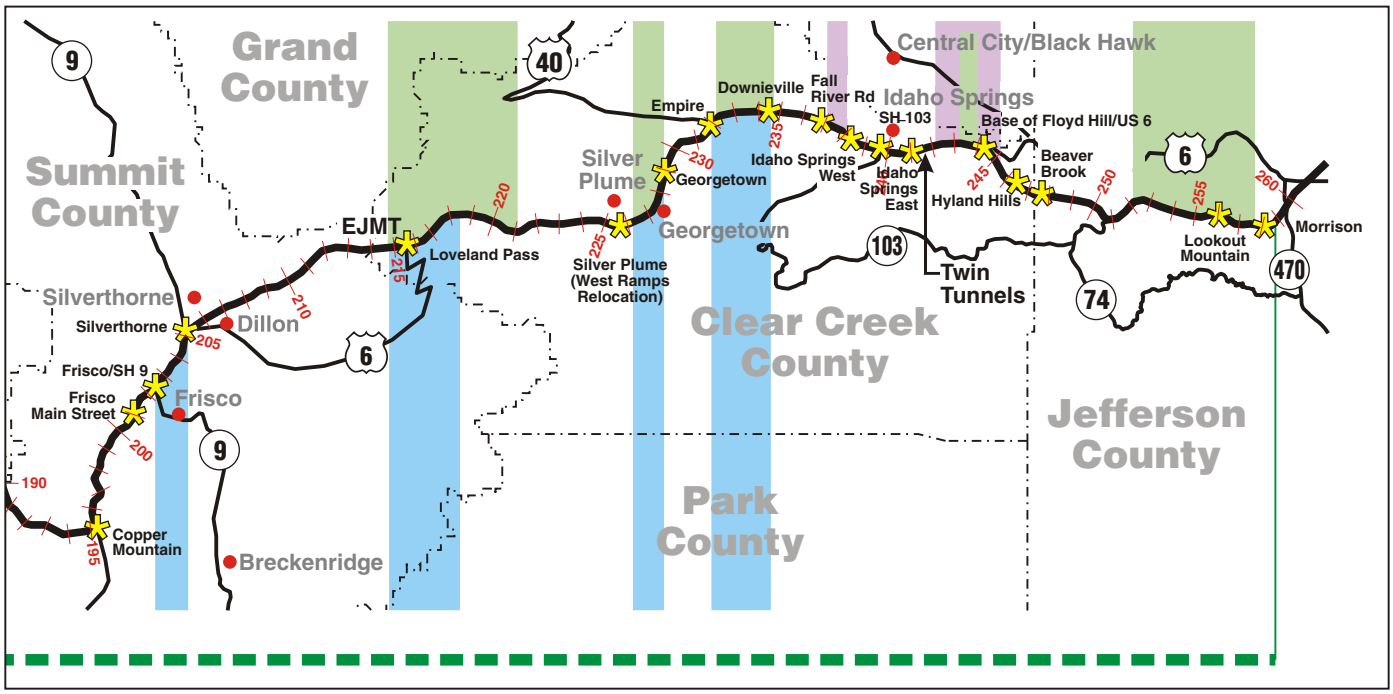
- Black Gore Creek, Straight Creek, and Clear Creek Sediment Control Action Plans provide better control of runoff from snowmelt and are early action projects.
- Hidden Valley to US 6 Frontage Road (two lanes between milepost 243 and milepost 244) provides a new frontage road to improve emergency and local access.
- Idaho Springs to Hidden Valley Frontage Road improvements include rebuilding or repaving portions of the road to higher design standards to improve emergency and local access.
- Bus Service in Mixed Traffic was eliminated as a standalone alternative but is part of the Minimal Action Alternative to provide a corridor-wide transit option where none currently exists. Such a service connects existing operators such as Roaring Fork Transportation Authority, ECO Transit, Summit Stage, and Regional Transportation District.

Figure 2-3. Minimal Action Alternative

Western Portion of Corridor



Eastern Portion of Corridor



Potential Interchange Modification Locations

Eastbound Auxiliary Lane Locations

Westbound Auxiliary Lane Locations

Curve Safety Modifications

Bus in Mixed Traffic System (Service Coordinated with/Provided by Local Transit Agencies)

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

2.6.4 Action Alternative Components

Following are the remaining alternative components that form the Action Alternatives and the figures depicting them (**Figure 2-5** through **Figure 2-10**). The Action Alternatives are at a sufficient level of conceptual design and specification to allow for a first tier analysis. The termini, general location and footprint, mode description, type of propulsion, and operation planning for each component are based on Federal Highway Administration (FHWA) standards, and existing types of transit systems or research concepts appropriate for the Corridor. There are also tunnel concepts required for the performance and operation of each Transit, Highway, and Combination Alternative. The *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010) presents more information on these alternative components.

Action Alternative components are categorized below by Minimal Action Alternative components, Transit Alternative components, Highway Alternative components, and Tunnel alternative components common to many or all Action Alternatives. These Action Alternative components function as standalone alternatives or as Combination Alternatives including components from both the Transit and Highway Alternatives.

Minimal Action Alternative Components

The various alternative components contained in the Minimal Action Alternative previously discussed (transportation management, interchange modifications, auxiliary lanes, curve safety modifications, and other improvements) are included in each of the Action Alternatives, except as described below:

- All Action Alternatives with six-lane highway widening have auxiliary lane improvements in only the following locations:
  - Eastbound Avon to Post Boulevard
  - Both directions on the west side of Vail Pass
  - Eastbound Frisco to Silverthorne
  - Westbound Morrison to Chief Hosa

  Auxiliary lanes are not needed in locations where six lanes are provided.
- Transit Alternatives do not have curve safety modifications at Dowd Canyon and only have auxiliary lane improvements at eastbound Eisenhower-Johnson Memorial Tunnels to Herman Gulch and westbound Downieville to Empire.
- With the Six-Lane Highway (65 mph) Alternative only, the curve safety modification at Dowd Canyon is replaced by tunnels.
- Action Alternatives do not include bus in mixed traffic because a more extensive transit system is provided and it does not provide travel time improvement commensurate with the added cost.

Potential Transit Station Locations

- Eagle County Regional Airport
- Town of Eagle
- Edwards/Wolcott
- Avon/Beaver Creek
- Vail
- Copper Mountain
- Frisco
- Silverthorne
- Loveland
- Georgetown
- Empire
- Idaho Springs
- US 6 / Gaming Station
- El Rancho
- Jefferson Station/C-470

Transit Alternative Components

Three Transit Alternative components advanced through screening for consideration in this document. All Transit Alternative components, unless noted, operate between the east end of the Corridor at Jefferson Station/C-470 to the Eagle County Regional Airport, a distance of approximately 118 miles. The eastern terminus of C-470 provides a

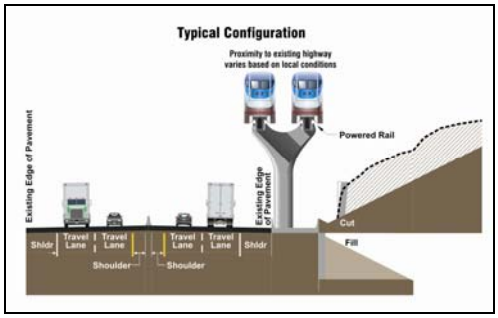
connection to existing and future Regional Transportation District service. The Eagle County Regional Airport provides an intermodal connection between aviation and transit service in the region.

Transit alignments could be on either side of the I-70 facility but are typically in median areas where six-lane highway widening occurs. All transit systems connect with the Regional Transportation District network at the Jefferson Station/C-470 and local and regional transit services at most stations along the route, such as Roaring Fork Transportation Authority, ECO Transit, and Summit Stage.

- **Rail with Intermountain Connection** is a Transit Alternative component that combines heavy rail with the existing Intermountain Connection. The rail portion includes a primarily on-grade electric facility adjacent to I-70 with portions in the median and elevated sections where needed between Vail and C-470 to minimize the footprint and avoid sensitive resources. The specific technology for the rail is not defined, other than electric rail. A specific technology would be defined in a Tier 2 process. The Intermountain Connection involves upgrading the existing Union Pacific Railroad track from the Minturn interchange to the Eagle County Regional Airport and adding new track from Minturn to Vail.

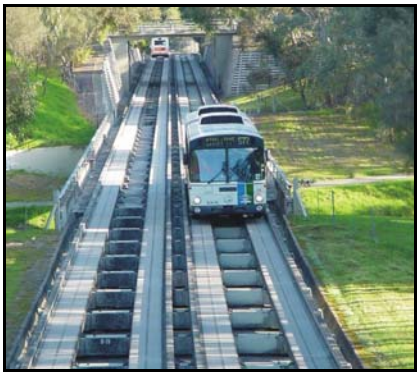
Rail with Intermountain Connection

- **Advanced Guideway System** is not defined by a specific technology in this document but represents several technologies considered, such as monorail and magnetic levitation (maglev) transit systems. This document assumes an urban maglev system for analysis. However, the actual technology would be developed in a Tier 2 process. In general, the Advanced Guideway System is a high-speed fixed guideway transit system capable of performing in the I-70 Mountain Corridor weather and terrain conditions. The Advanced Guideway System is fully elevated (for 118 miles) and varies in alignment between the north, the south, and the median of I-70.



Advanced Guideway System

- **Bus in Guideway (Dual-Mode and Diesel)** is evaluated generally within the median of I-70 and consists of a bidirectional guideway from the Eagle County Regional Airport to C-470. The guideway is dedicated to special buses with guideway attachments such as guide wheels used for steering control permitting a narrow guideway and safer operations. The specific technology and alignment would be determined in a Tier 2 process. Two vehicle types are considered in this document: dual-mode and diesel. The dual-mode buses use electric power in the guideway and diesel power when outside the guideway in the general purpose lanes. The diesel buses use diesel power at all times, both in the guideway and outside the guideway. Because buses can drive outside the guideway in general purpose lanes, buses provide continuous routing, without transfers, between several Denver metropolitan area locations and multiple I-70 served destinations. In addition to stops along the Corridor, these destinations include Central City, Black Hawk, Winter Park Resort, Keystone Resort, Arapahoe Basin Ski Area, and Breckenridge.



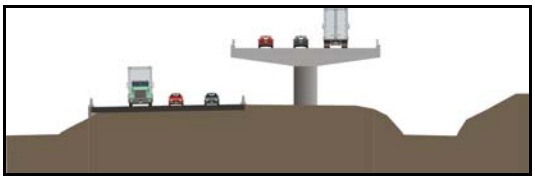
Bus in Guideway

Highway Alternative Components

Highway Alternative components incorporated into some of the Action Alternatives include six-lane highway widening for 55 mph and 65 mph options and reversible/ HOV/ HOT lanes. Both the 55 and 65 mph design speeds are included in the PEIS and retained for further analysis in Tier 2 when more detailed designs are developed and evaluations are conducted. The two design speeds are included to 1) establish corridor consistency and 2) address deficient areas within the Corridor. The 55 mph design speed establishes a consistent design speed throughout the Corridor, which currently doesn't exist. The 65 mph design speed furthermore improves mobility and addresses safety deficiencies in key locations such as Dowd Canyon and the Twin Tunnels. Both the 55 mph and the 65 mph design speed options are augmented by curve safety improvements, but the 65 mph design speed constructs tunnels in two of the locations: Dowd Canyon and Floyd Hill/Hidden Valley.

- **Six-Lane Highway Widening (55 mph and 65 mph) –** This component includes six-lane highway widening in two locations on the Corridor providing an additional lane in each direction:
  - Dowd Canyon (Eagle-Vail to Vail West) between milepost 169 and milepost 173, and
  - Eisenhower-Johnson Memorial Tunnels to Floyd Hill (milepost 213.5 to milepost 247).

  This component is primarily on grade, except in Idaho Springs, where structured lanes minimize impacts. The two design speed options: 55 mph and 65 mph include widening in the same two locations. As mentioned above the 55 mph design speed provides consistency throughout the Corridor, while the 65 mph option improves safety in key locations within the Corridor and includes tunnels at Dowd Canyon and near Floyd Hill/Hidden Valley.



Structured Lanes

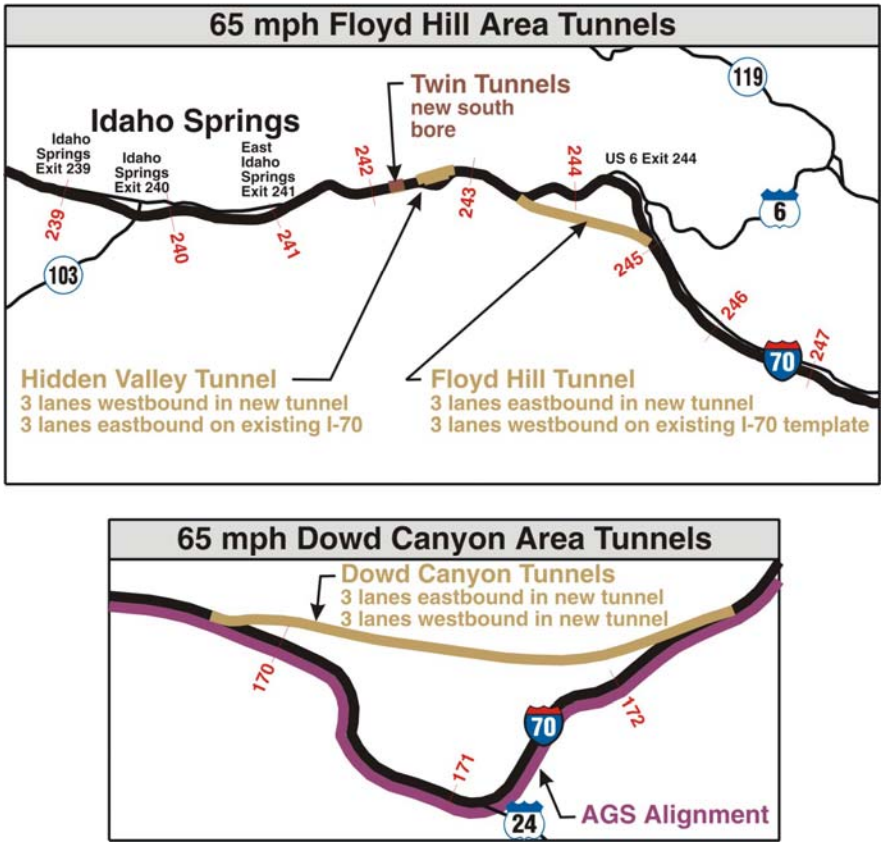
- **Reversible / HOV/ HOT Lanes –** A reversible lane facility accommodates HOV and HOT lanes and changes traffic flow directions as needed to accommodate peak traffic demand. High occupancy toll lanes allow high occupancy vehicles (3 or more persons) to use the facility for free, while low occupancy vehicles use the facility for a fee. The facility includes two additional reversible traffic lanes and is built from the west side of the Eisenhower-Johnson Memorial Tunnels to just east of Floyd Hill. From the Eisenhower-Johnson Memorial Tunnels to US 6, two lanes are built with one lane continuing to US 6 and the other lane to the east side of Floyd Hill. The only entry and exit points for the lanes are at US 6 and the Empire Junction interchange. This component includes one additional lane in each direction at Dowd Canyon (milepost 169 to milepost 173) but is not barrier-separated or reversible. A structured configuration in Idaho Springs minimizes impacts to the community as with the six-lane highway widening at 55 mph and 65 mph.

Tunnels Common to Many or All Action Alternatives

The Action Alternatives include new or rebuilt tunnels.

- For all Action Alternatives (Highway, Transit, and Combination), except the Minimal Action Alternative, new (third) tunnel bores are required at both the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels to accommodate improvements.
- For the Six-lane Highway 65 mph Alternative, three new tunnels are required to accommodate the higher speed. The locations are in the Dowd Canyon area and the Floyd Hill area (westbound Hidden Valley tunnel and eastbound Floyd Hill tunnel). **Figure 2-4** shows these tunnels.

Figure 2-4. 65 mph Local Tunnel Alternatives



Combination Alternatives and Preservation Options

All Transit alternative components are combined with the 55 mph six-lane highway widening to create Combination Alternatives. The 55 mph design speed is used with the transit alternative components because there is less impact and the higher design speed is not needed since transit service is alleviating capacity issues on I-70 reducing the need for the higher speed facility to address capacity needs. Each Combination Alternative includes variations that construct the transit and preserve the six-lane highway footprint or construct the six-lane highway and preserve the transit footprint. More specifically, preservation options include space for additional modes in the Corridor and do not preclude the ability to construct additional modes in the future.

Preservation options included in the Combination Alternatives evaluated:

- Rail with Intermountain Connection with Highway Preservation
- Advanced Guideway System with Highway Preservation
- Bus in Guideway (dual-mode and diesel) with Highway Preservation
- Highway with Rail and Intermountain Connection Preservation
- Highway with Advanced Guideway System Preservation
- Highway with Bus in Guideway (Dual-mode and Diesel) Preservation

2.6.5 Description of the 20 Action Alternatives

Figure 2-5 through **Figure 2-10** display various components of the Action Alternatives (except the Preferred Alternative which is discussed in **Section 2.7**) resulting from the screening process. All alternatives contain:

- Single components or
- Combination of components from
  - Minimal Action Alternative
  - Transit Alternatives
  - Six-lane Highway Alternatives

The Action Alternatives do not include the bus service in mixed traffic that is part of the Minimal Action Alternative. The reason is that all the Transit Alternatives include a more extensive transit system and it does not provide travel time improvement commensurate with the added cost as part of the Highway Alternatives. All transit components extend from Eagle County Regional Airport to C-470. Highway widening is included in specific locations within the Corridor: between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill and in the area of Dowd Canyon. The figures show the three major components (minimal action, transit and highway) included in the alternative, where they are included within the Corridor, and variations of these components. **Table 2-9** summarizes how the selected components of the Minimal Action Alternative are incorporated into each Transit, Highway, or Combination Alternative described below.

Variations in Minimal Action Alternative Components Among Action Alternatives

The Action Alternatives include some or all components described in the Minimal Action Alternative. In some cases, the Minimal Action Alternative components are designed differently because of the particular characteristics of the alternative. In other cases, certain Minimal Action Alternative components are not needed due to a particular alternative's ability to provide capacity or safety improvements. These variations are discussed below and summarized in **Table 2-9**.

Transit Alternatives (including the Transit with Highway Preservation Alternatives) do not include the Dowd Canyon curve safety component because the high cost increases the overall cost of those alternatives without substantially improving the travel time characteristics. Because these Transit Alternatives reduce the overall highway demand, only two of the 12 auxiliary lane improvements are needed at:

1. Eisenhower-Johnson Memorial Tunnels to Herman Gulch eastbound
2. Downieville to Empire westbound

Because the Highway Alternatives (including Combination Alternatives that package highway in combination with transit or highway with transit preservation) increase capacity instead of reducing demand on the highway, some of the auxiliary lanes are not needed. Only one of the seven auxiliary lanes east of the Eisenhower-Johnson Memorial Tunnels is included in the Highway Alternatives. This is the Morrison to Chief Hosa westbound auxiliary lane. For the Six-lane Highway 65 mph Alternative, curve widening at Dowd Canyon is not needed because a new tunnel for I-70 would be constructed in this area, avoiding Dowd Canyon.

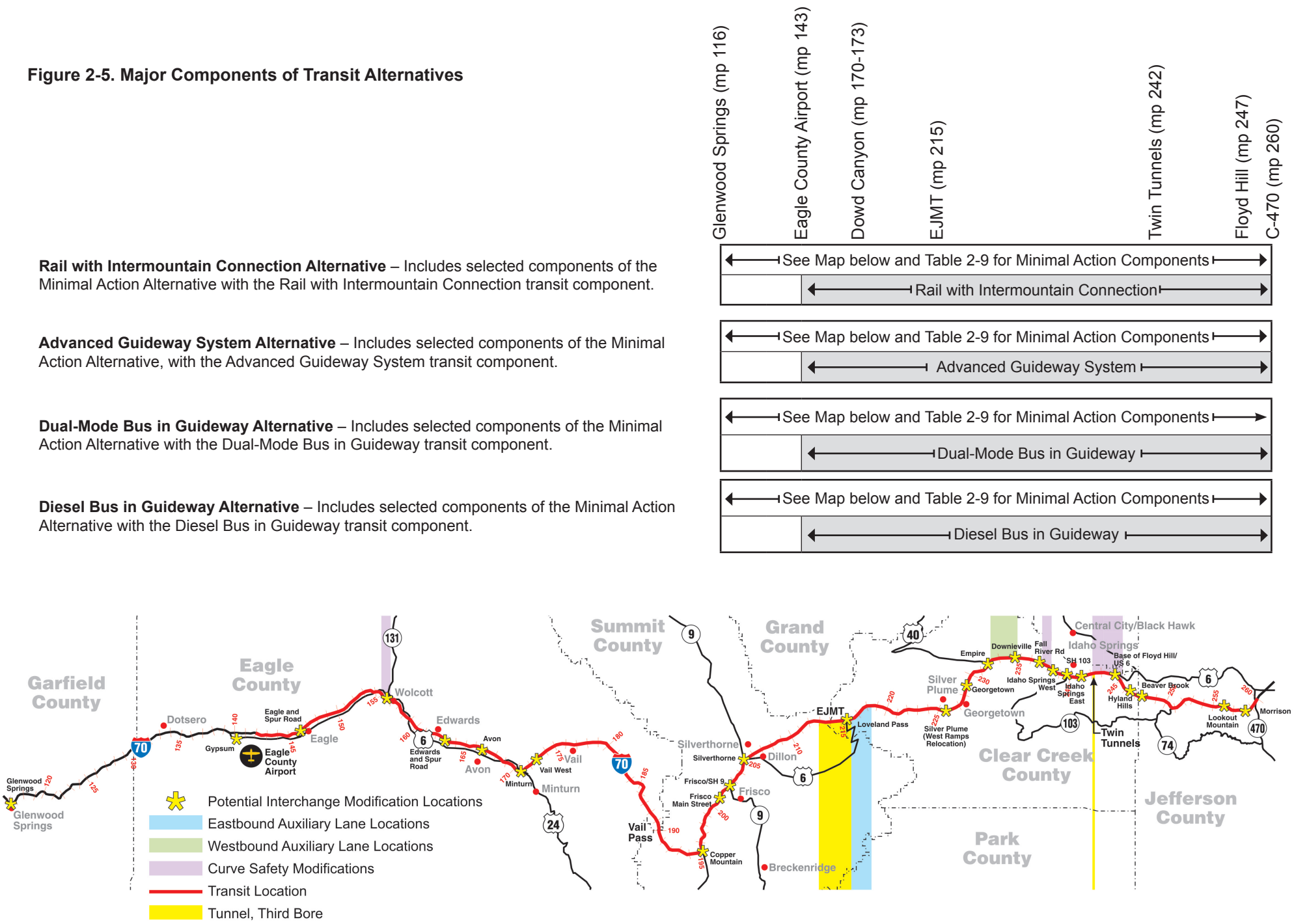
Figure 2-5. Major Components of Transit Alternatives

Rail with Intermountain Connection Alternative – Includes selected components of the Minimal Action Alternative with the Rail with Intermountain Connection transit component.

Advanced Guideway System Alternative – Includes selected components of the Minimal Action Alternative, with the Advanced Guideway System transit component.

Dual-Mode Bus in Guideway Alternative – Includes selected components of the Minimal Action Alternative with the Dual-Mode Bus in Guideway transit component.

Diesel Bus in Guideway Alternative – Includes selected components of the Minimal Action Alternative with the Diesel Bus in Guideway transit component.



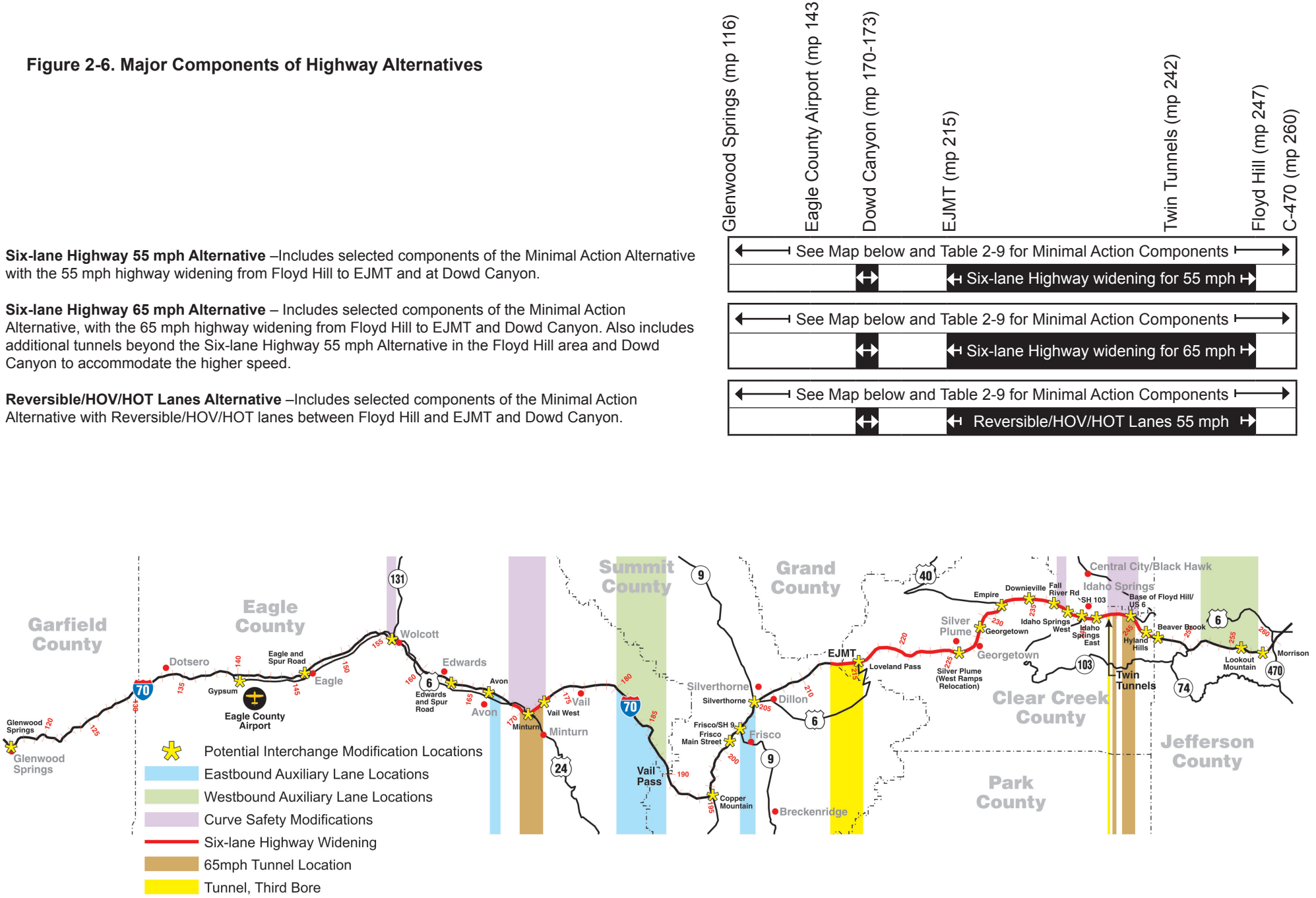
Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost

Figure 2-6. Major Components of Highway Alternatives

Six-lane Highway 55 mph Alternative –Includes selected components of the Minimal Action Alternative with the 55 mph highway widening from Floyd Hill to EJMT and at Dowd Canyon.

Six-lane Highway 65 mph Alternative – Includes selected components of the Minimal Action Alternative, with the 65 mph highway widening from Floyd Hill to EJMT and Dowd Canyon. Also includes additional tunnels beyond the Six-lane Highway 55 mph Alternative in the Floyd Hill area and Dowd Canyon to accommodate the higher speed.

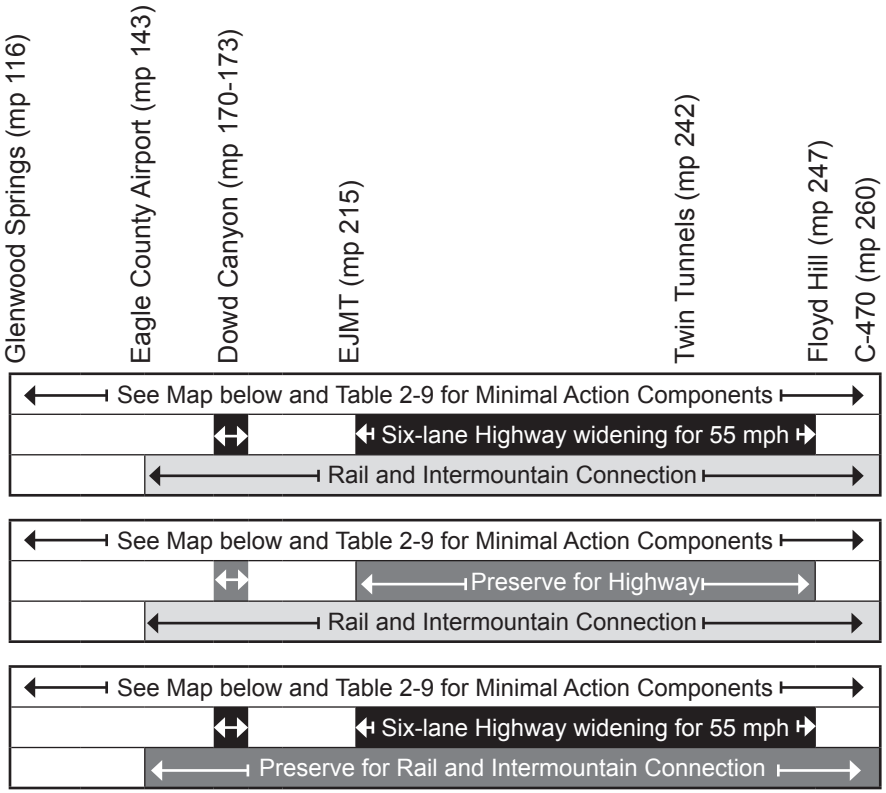
Reversible/HOV/HOT Lanes Alternative –Includes selected components of the Minimal Action Alternative with Reversible/HOV/HOT lanes between Floyd Hill and EJMT and Dowd Canyon.



Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost
mph = miles per hour

Note: Curve safety modifications at Dowd Canyon only occur with the 55 mph alternative.

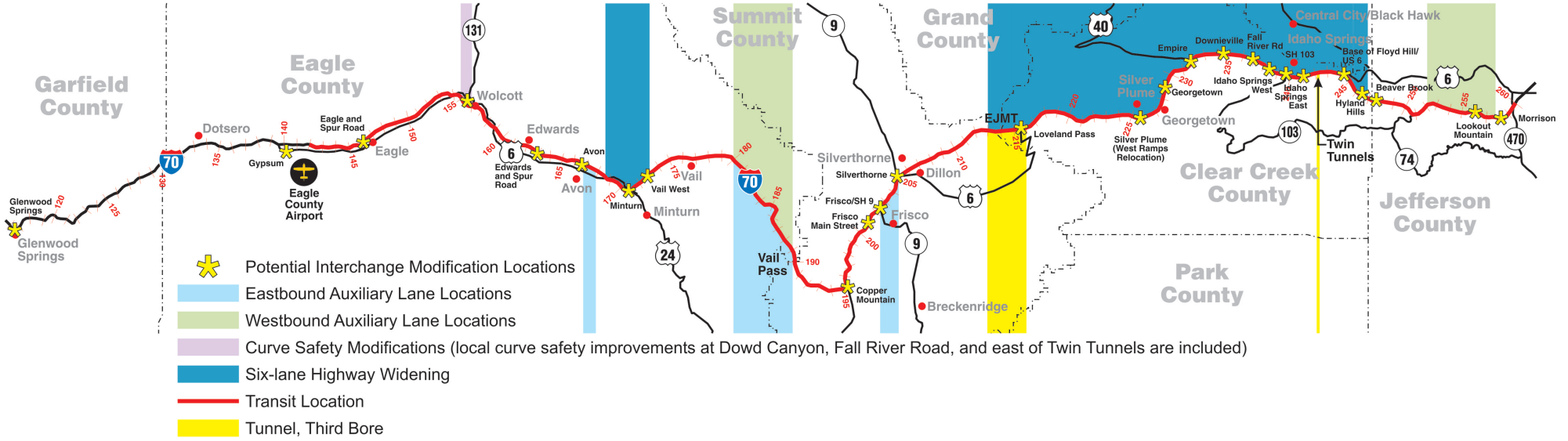
Figure 2-7. Major Components of Combination Six-lane Highway with Rail and Intermountain Connection Alternative



Combination Six-lane Highway with Rail and Intermountain Connection Alternative – Includes selected components of the Minimal Action Alternative, with the 55 mph Six-lane highway widening between Floyd Hill and EJMT and Dowd Canyon, and the Rail and Intermountain Connection transit component.

Combination Six-lane Highway with Rail and Intermountain Connection, Preserve for Highway Alternative – Same as the Combination Six-lane Highway with Rail and Intermountain Connection Alternative but only preserves the footprint for the six-lane highway component.

Combination Six-lane Highway with Rail and Intermountain Connection, Preserve for Transit Alternative– Same as the Combination Six-lane Highway with Rail and Intermountain Connection Alternative but only preserves the footprint for the Rail and Intermountain Connection transit component.



Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost
mph = miles per hour

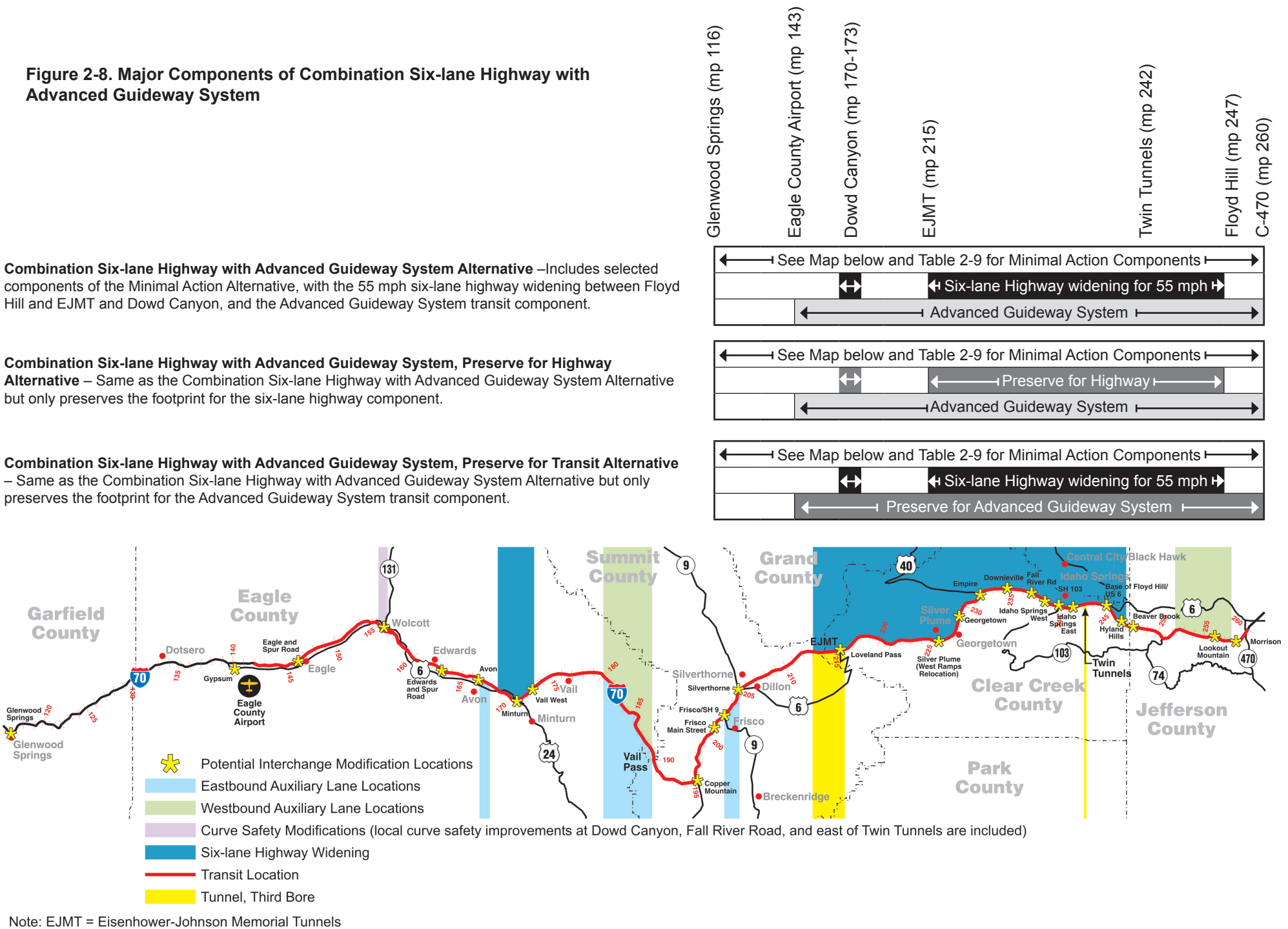
Note: there are no curve safety modifications at Dowd Canyon with the highway preservation alternatives.

Figure 2-8. Major Components of Combination Six-lane Highway with Advanced Guideway System

Combination Six-lane Highway with Advanced Guideway System Alternative –Includes selected components of the Minimal Action Alternative, with the 55 mph six-lane highway widening between Floyd Hill and EJMT and Dowd Canyon, and the Advanced Guideway System transit component.

Combination Six-lane Highway with Advanced Guideway System, Preserve for Highway Alternative – Same as the Combination Six-lane Highway with Advanced Guideway System Alternative but only preserves the footprint for the six-lane highway component.

Combination Six-lane Highway with Advanced Guideway System, Preserve for Transit Alternative – Same as the Combination Six-lane Highway with Advanced Guideway System Alternative but only preserves the footprint for the Advanced Guideway System transit component.



Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost
mph = miles per hour

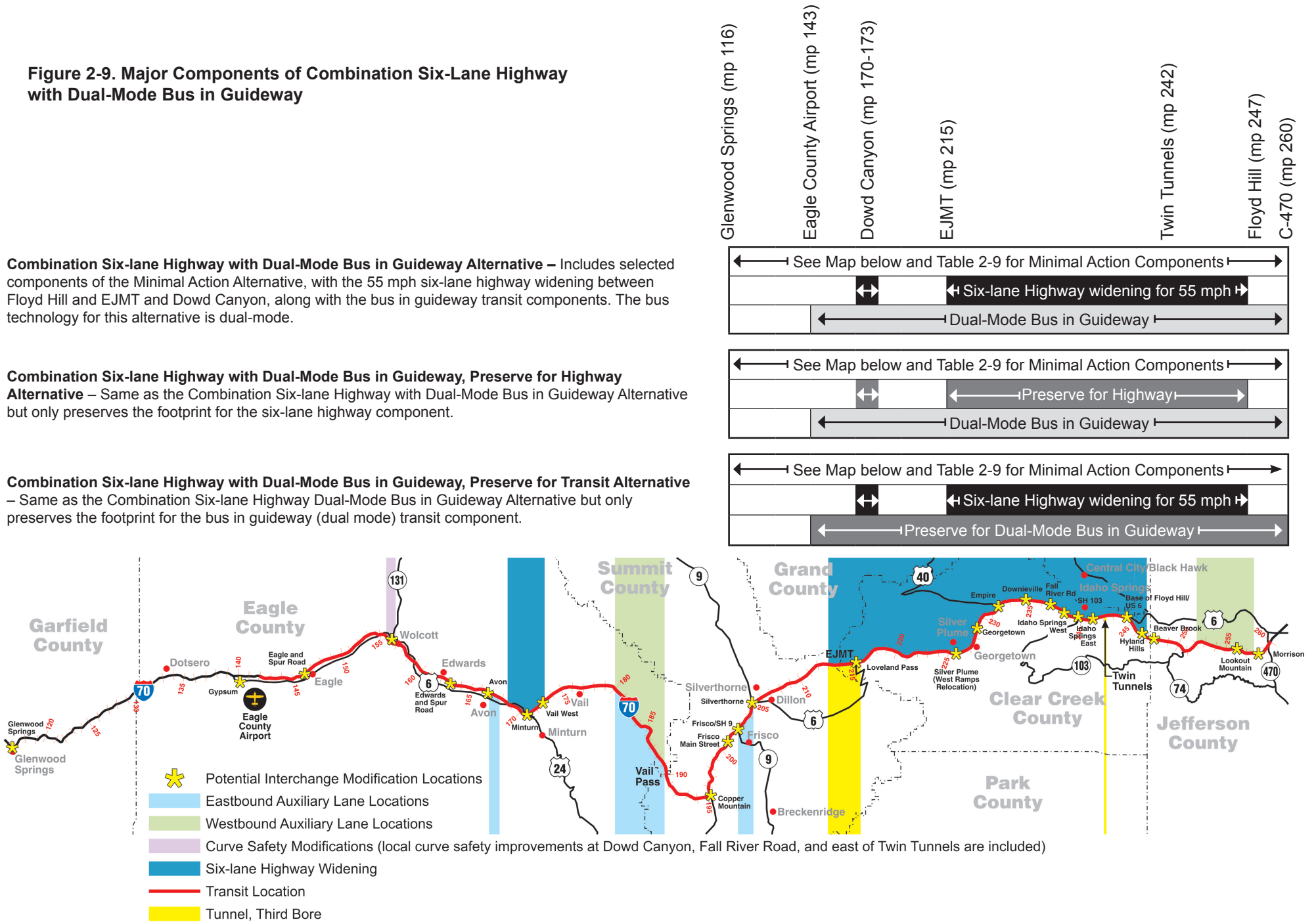
Note: there are no curve safety modifications at Dowd Canyon with the highway preservation alternatives.

Figure 2-9. Major Components of Combination Six-Lane Highway with Dual-Mode Bus in Guideway

Combination Six-lane Highway with Dual-Mode Bus in Guideway Alternative – Includes selected components of the Minimal Action Alternative, with the 55 mph six-lane highway widening between Floyd Hill and EJMT and Dowd Canyon, along with the bus in guideway transit components. The bus technology for this alternative is dual-mode.

Combination Six-lane Highway with Dual-Mode Bus in Guideway, Preserve for Highway Alternative – Same as the Combination Six-lane Highway with Dual-Mode Bus in Guideway Alternative but only preserves the footprint for the six-lane highway component.

Combination Six-lane Highway with Dual-Mode Bus in Guideway, Preserve for Transit Alternative – Same as the Combination Six-lane Highway Dual-Mode Bus in Guideway Alternative but only preserves the footprint for the bus in guideway (dual mode) transit component.



Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost
mph = miles per hour

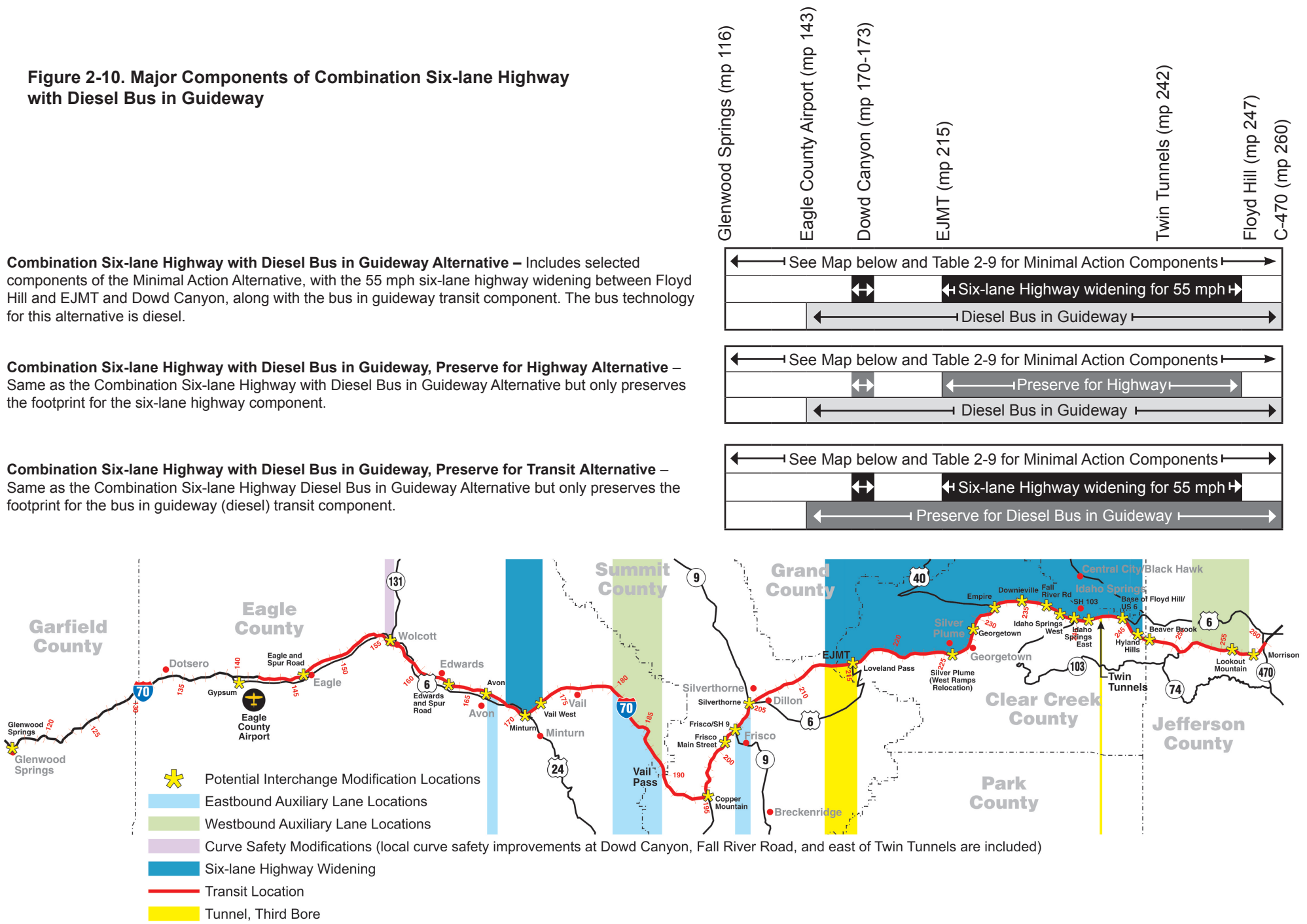
Note: there are no curve safety modifications at Dowd Canyon with the highway preservation alternatives.

Figure 2-10. Major Components of Combination Six-lane Highway with Diesel Bus in Guideway

Combination Six-lane Highway with Diesel Bus in Guideway Alternative – Includes selected components of the Minimal Action Alternative, with the 55 mph six-lane highway widening between Floyd Hill and EJMT and Dowd Canyon, along with the bus in guideway transit component. The bus technology for this alternative is diesel.

Combination Six-lane Highway with Diesel Bus in Guideway, Preserve for Highway Alternative – Same as the Combination Six-lane Highway with Diesel Bus in Guideway Alternative but only preserves the footprint for the six-lane highway component.

Combination Six-lane Highway with Diesel Bus in Guideway, Preserve for Transit Alternative – Same as the Combination Six-lane Highway Diesel Bus in Guideway Alternative but only preserves the footprint for the bus in guideway (diesel) transit component.



Note: EJMT = Eisenhower-Johnson Memorial Tunnels
mp = milepost
mph = miles per hour

Note: there are no curve safety modifications at Dowd Canyon with the highway preservation alternatives.

Table 2-9. Minimal Action Components Associated with Action Alternatives

Minimal Action Component	Transit Alternatives	Highway Alternatives	Combination Alternatives	Preservation Options	
				Transit with Highway Preservation	Highway with Transit Preservation
Interchanges					
Glenwood Springs (MP 116)					
Gypsum (MP 140)					
Eagle & Spur Road (MP 147)					
Wolcott (MP 157)					
Edwards & Spur Road (MP 163)					
Avon (MP 167)					
Minturn (MP 171)					
Vail West (MP 173) / Simba Run					
Copper Mountain (MP 195)					
Frisco / Main St. (MP 201)					
Frisco / SH 9 (MP 203)					
Silverthorne (MP 205)					
Loveland Pass (MP 216)					
Silver Plume (MP 226)					
Georgetown (MP 228)					
Empire (MP 232)					
Downieville (MP 234)					
Fall River Road (MP 238)					
Idaho Springs West (MP 239)					
Idaho Springs / SH 103 (MP 240)					
Idaho Springs East (MP 241)					
Base of Floyd Hill / US 6 (MP 244)					
Hyland Hills (MP 247)					
Beaver Brook (MP 248)					
Lookout Mountain (MP 256)					
Morrison (MP 259)					
Curve Safety Modifications					
West of Wolcott (MP 155–156)					
Dowd Canyon (MP 170–173)		55 mph only*			
Fall River Road (MP 237–238)					
East of Twin Tunnels (MP 242–245)					

Minimal Action Component	Transit Alternatives	Highway Alternatives	Combination Alternatives	Preservation Options	
				Transit with Highway Preservation	Highway with Transit Preservation
Auxiliary Lanes					
Avon to Post Boulevard, Uphill (EB) (MP 167–168)					
West side of Vail Pass, Downhill (WB) (MP 180–190)					
West side of Vail Pass, Uphill (EB) (MP 180–190)					
Frisco to Silverthorne (EB) (MP 202.7–205.1)					
EJMT to Herman Gulch, Downhill (EB) (MP 215–218)					
Bakerville to EJMT, Uphill (WB) (MP 215–221)					
Georgetown to Silver Plume, Uphill (WB) (MP 226–228)					
Silver Plume to Georgetown, Downhill (EB) (MP 226–228)					
Downieville to Empire, Uphill (WB) (MP 232–234)					
Empire to Downieville, Downhill (EB) (MP 232–234)					
US 6 Off-ramp to Hidden Valley Off-ramp (WB) (MP 244–243)					
Morrison to Chief Hosa, Uphill (WB) (MP 253–259)					
Transportation Management					
Transportation Management					
Other					
Idaho Springs to Hidden Valley (improve existing frontage road)					
Hidden Valley to US 6 (new frontage road)					
Buses in Mixed Traffic					
Black Gore Creek, Straight Creek and Clear Creek Sediment Control					

** 65 mph includes tunnels at Dowd Canyon to accommodate higher speed.*

Key to Abbreviations/Acronyms

EB = eastbound
EJMT = Eisenhower-Johnson Memorial Tunnels
MP = milepost
mph = miles per hour
WB = westbound

2.7 What was the decision-making process for identifying the Preferred Alternative?

The lead agencies adopted the Preferred Alternative for the I-70 Mountain Corridor based on the Consensus Recommendation developed by the Collaborative Effort team. The Collaborative Effort is a 27-member group representing varied interests of the Corridor charged with reaching consensus on a recommended transportation solution for the I-70 Mountain Corridor. The lead agencies participated in the development of the Consensus Recommendation for the Corridor and identification of the Consensus Recommendation as the Preferred Alternative.

The Collaborative Effort process and the Consensus Recommendation adhere to the purpose and need and provide for the long-range transportation needs beyond 2035 by establishing a vision for 2050. The Consensus Recommendation identifies a 2050 Vision for a multimodal solution, with transit and highway improvements based on proven needs to enhance the Corridor, its environment, and its communities. The criteria below informed the Collaborative Effort's recommendation and will serve as criteria of effectiveness moving forward:

- The solution should improve safety and mobility for all users.
- The solution should be responsive and adaptive to broader global trends that will affect the way we make travel decisions in the future.
- The solution will meet the purpose and need and all environmental and legal requirements.
- The solution should preserve, restore and enhance community and cultural resources.
- The solution should preserve and restore or enhance ecosystem functions.
- The solution should be economically viable over the long term

The Consensus Recommendation is fully evaluated and referred to in this document as the Preferred Alternative.

2.7.1 What is the Preferred Alternative?

The Preferred Alternative consists of near-term and general long-term improvements for the Corridor. These improvements meet the travel demand for 2050 and address the immediate needs in the Corridor. To achieve the long-term demand and address the future uncertainties, trigger points (see **Section 2.7.2** for details) and stakeholder involvement will be used to reassess the Corridor needs to determine the most appropriate transportation improvements to meet the future demands within the Corridor.

Triggers for Long-Term Improvements

- Triggers create a mechanism for defining the specifics of future transportation solutions consistent with the Corridor vision.
- Triggers are used to evaluate the future needs to meet 2050 demand and are based on completion of specific highway improvements, feasibility of Advanced Guideway System, and global, regional, and local trends.

The Preferred Alternative is a multimodal solution and includes non-infrastructure related components, Advanced Guideway System, and highway improvements. These improvements (non-infrastructure, Advanced Guideway System, and highway) represent the initial set of improvements and are the minimum program of improvements under the Preferred Alternative, which are expected to be implemented in the near term. Agencies and stakeholders will review progress and effects of these improvements at least every two years to determine the need for additional highway and non-Advanced Guideway System transit capacity improvements. To meet the 2050 travel demand, the Preferred Alternative is equivalent to the Combination Six-lane Highway with Advanced Guideway System Alternative, if the additional improvements are necessary. For NEPA analysis, this combination

represents the maximum program of improvements and impacts under the Preferred Alternative and is analyzed in **Chapter 3** of this document.

The six-lane highway widening improvements included with the Preferred Alternative Maximum Program include both 55 mph and 65 mph design options. Both design speed options are advanced for consideration in Tier 2. The selected design option will be determined in Tier 2 when more detailed designs are developed. The 55 mph option uses the existing I-70 alignment. The 65 mph design requires additional tunnels at Dowd Canyon, Hidden Valley, and Floyd Hill. At Dowd Canyon, two tunnels are required for eastbound and westbound traffic as shown in **Figure 2-4**. These tunnels accommodate three lanes in each direction. At Hidden Valley and Floyd Hill, two new tunnels are required—one for westbound traffic just east of the Twin Tunnels near Hidden Valley and one for eastbound traffic at Floyd Hill as shown in **Figure 2-4**. Each of these tunnels accommodates three lanes in one direction. Traffic in the other direction uses the existing I-70 configuration.

The Preferred Alternative Maximum Program comprises all of the improvements listed below and those included with the Combination Six-lane Highway with Advanced Guideway System Alternative.

1. **Non-infrastructure Related Components –** These strategies can begin in advance of major infrastructure improvements to address immediate issues in the Corridor. These strategies and the potential tactics for implementation require actions and leadership by agencies, municipalities, and other stakeholders beyond the lead agencies. The strategies include, but are not limited to:
   - Increased enforcement
   - Bus, van, or shuttle service in mixed traffic
   - Programs for improving truck movements
   - Driver education
   - Expanded use of existing transportation infrastructure in and adjacent to the Corridor
   - Use of technology advancements and improvements to increase mobility without additional infrastructure
   - Traveler information and other ITS
   - Shift passenger and freight travel demand by time of day and day of week
   - Convert day trips to overnight stays
   - Promote high occupancy travel and public transportation
   - Convert single occupancy vehicle commuters to high occupancy travel and/or public transportation
   - Implement transit promotion and incentives
   - Other TDM measures to be determined
2. **Advanced Guideway System–** The Advanced Guideway System is a central part of the Preferred Alternative and includes the commitment by the lead agencies to evaluate and implement an Advanced Guideway System within the Corridor including a vision of transit connectivity beyond the study area and local accessibility to such a system. At this Tier 1 level, the Advanced Guideway System represents a mode encompassing a range of technologies, not a specific technology. A specific Advanced Guideway System technology would be determined in subsequent study or a Tier 2 document. The Colorado Department of Transportation commits to provide funding for studies to determine the viability, including cost and benefits, safety, reliability, environmental impacts, technology, and other considerations of an Advanced Guideway System. These studies will involve the Collaborative Effort stakeholder committee and follow the I-70 Mountain Corridor Context Sensitive Solutions process.

   The Advanced Guideway System provides transit service from the Eagle County Regional Airport to C-470, a distance of approximately 118 miles. The Advanced Guideway System is a fully elevated transit system on two tracks and aligns to the north, south, or in the median of I-70.

The Advanced Guideway System connects to the Regional Transportation District network in Jefferson County and local and regional transit services at most of the 15 proposed transit stations along the route.

The Advanced Guideway System requires new tunnel bores at both the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels. At the Eisenhower-Johnson Memorial Tunnels, the proposed third tunnel bore would be located to the north of the existing tunnel bores and accommodate a bidirectional Advanced Guideway System. At the Twin Tunnels, the proposed third tunnel bore would be located to the south of the existing tunnel bores and accommodate a bidirectional Advanced Guideway System.

3. **Highway Improvements –** Additional highway improvements are needed to address current Corridor conditions and future demands. No priority has been established for improvements and those improvements must be planned considering all components of the Preferred Alternative consistent with local land use planning. The "specific highway improvements" identified below are called out specifically as the triggers for consideration of future highway and non-Advanced Guideway System transit capacity improvements and need to be completed before implementing any future highway and non-Advanced Guideway System transit capacity improvements. For more information on these triggers, see **Section 2.7.2**. The "other highway improvements" are not subject to the parameters discussed under the triggers. The listed highway improvements below are included in the Preferred Alternative Minimum Program of Improvements in addition to the Non-Infrastructure Related Components and the Advanced Guideway System identified above.

- Specific highway improvements:
  - Six–lane highway from Floyd Hill through the Twin Tunnels – Includes a bike trail and frontage roads from Idaho Springs to Hidden Valley and Hidden Valley to US 6
  - Empire Junction (US 40/I-70) interchange improvements
  - Eastbound auxiliary lane from Eisenhower-Johnson Memorial Tunnels to Herman Gulch
  - Westbound auxiliary lane from Bakerville to Eisenhower-Johnson Memorial Tunnels
- Other highway improvements:
  - Truck operation improvements (pullouts, parking and chain stations)
  - Curve safety improvements west of Wolcott
  - Safety and capacity improvements in Dowd Canyon
  - Interchange improvements at the following locations:
    - Glenwood Springs
    - Gypsum
    - Eagle County Airport (as cleared by the FONSI and future 1601 process) – part of the No Action Alternative
    - Eagle and Spur Road
    - Edwards and Spur Road
    - Avon
    - Minturn
    - Vail West
    - Copper Mountain
    - Frisco/Main Street
    - Frisco/SH9
    - Silverthorne
    - Loveland Pass
    - Georgetown
    - Downieville
    - Fall River Road
    - Base of Floyd Hill/US 6
    - Hyland Hills
    - Beaver Brook
    - Lookout Mountain
    - Morrison
- Additional auxiliary lanes:
  - Avon to Post Boulevard (Exit 168) (eastbound)
  - West of Vail Pass (eastbound and westbound)
  - Frisco to Silverthorne (eastbound)
  - Morrison to Chief Hosa (westbound)

Table 2-10 lists and **Figure 2-11** illustrates the improvements associated with the Preferred Alternative.

Table 2-10. Components of Preferred Alternative

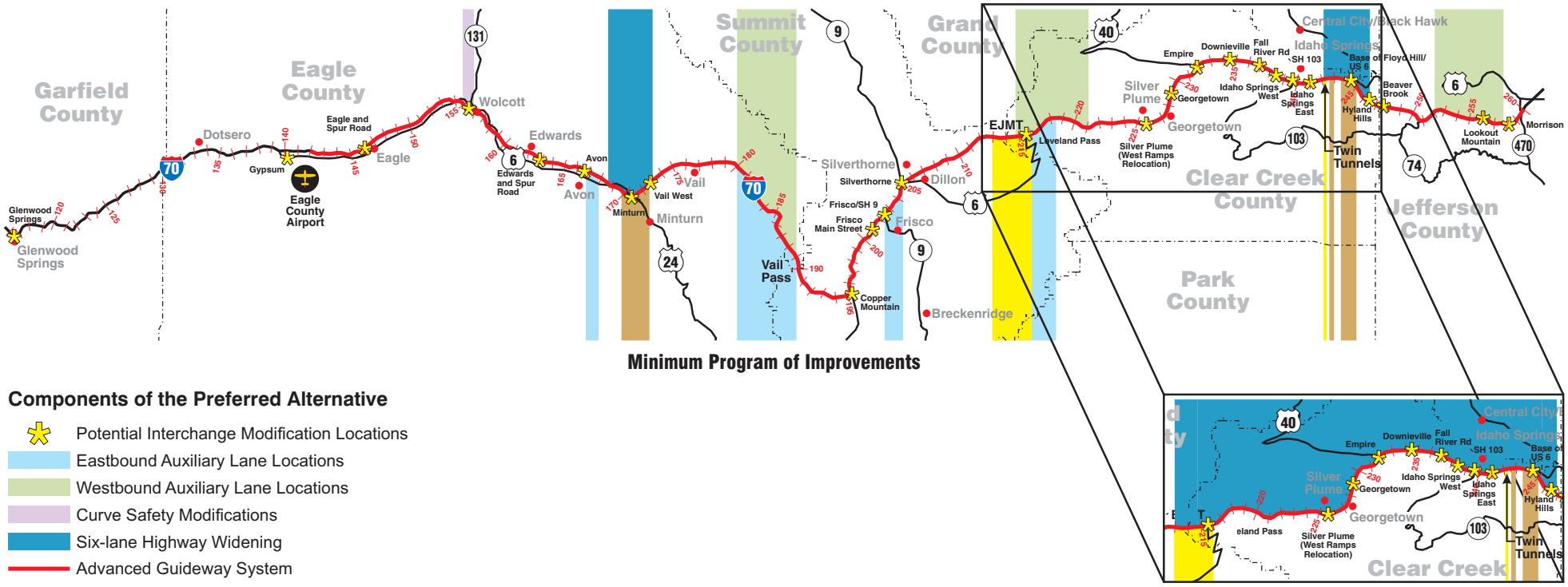
Transportation Components	Preferred Alternative			
	Minimum Program 55 mph	Minimum Program 65 mph	Maximum Program 55 mph	Maximum Program 65 mph
Transportation Management				
Transportation Management				
Advanced Guideway System				
Advanced Guideway System (MP 142–MP 260)				
Highway Improvements				
Specific Highway Improvements				
Six-Lane Highway Floyd Hill through Twin Tunnels with Bike Trail and Frontage Roads from Idaho Springs to Hidden Valley to US 6				
Empire Junction Interchange (MP 232)				
EB Auxiliary Lane – EJMT to Herman Gulch				
WB Auxiliary Lane – Bakerville to EJMT				
Other Highway Improvements – Interchanges				
Glenwood Springs (MP 116)				
Gypsum (MP 140)				
Eagle County Airport (part of No Action)				
Wolcott (MP 157)				
Eagle & Spur Road (MP 147)				
Edwards & Spur Road (MP 163)				
Avon (MP 167)				
Minturn (MP 171)				
Vail West (MP 173) / Simba Run				
Copper Mountain (MP 195)				
Frisco / Main St. (MP 201)				
Frisco / SH 9 (MP 203)				
Silverthorne (MP 205)				
Loveland Pass (MP 216)				
Silver Plume (MP 226)				
Georgetown (MP 228)				
Downieville (MP 234)				
Fall River Road (MP 238)				
Idaho Springs West (MP 239)				

Transportation Components	Preferred Alternative			
	Minimum Program 55 mph	Minimum Program 65 mph	Maximum Program 55 mph	Maximum Program 65 mph
Idaho Springs / SH 103 (MP 240)				
Idaho Springs East (MP 241)				
Base of Floyd Hill / US 6 (MP 244)				
Hyland Hills (MP 247)				
Beaver Brook (MP 248)				
Lookout Mountain (MP 256)				
Morrison (MP 259)				
Other Highway Improvements – Curve Safety Modifications				
West of Wolcott (MP 155–MP 156)				
Dowd Canyon (MP 170–MP 173)				
Fall River Road (MP 237–MP 238)				
East of Twin Tunnels (MP 242–MP 245)	Included in Six-Lane Highway Widening			
Other Highway Improvements – Auxiliary Lanes				
Avon to Post Boulevard, Uphill (EB) (MP 167–MP 168)				
West side of Vail Pass, Downhill (WB) (MP 180–MP 190)				
West side of Vail Pass, Uphill (EB) (MP 180–MP 190)				
Frisco to Silverthorne (EB) (MP 202.7–MP 205.1)				
Morrison to Chief Hosa, Uphill (WB) (MP 253–MP 259)				
Tunnels				
Dowd Canyon				
EJMT – third bore				
Twin Tunnels – third bore				
Hidden Valley Tunnel WB				
Floyd Hill Tunnel EB				
Other Improvements				
Truck operation improvements (pullouts, parking and chain stations)				
Black Gore Creek, Straight Creek and Clear Creek Sediment Control				

Key to Abbreviations/Acronyms

EB = eastbound EJMT = Eisenhower-Johnson Memorial Tunnels MP = milepost
mph = miles per hour WB = westbound

Figure 2-11. Preferred Alternative



Minimum Program of Improvements

Maximum Program of Improvements

Components of the Preferred Alternative

- Potential Interchange Modification Locations
- Eastbound Auxiliary Lane Locations
- Westbound Auxiliary Lane Locations
- Curve Safety Modifications
- Six-lane Highway Widening
- Advanced Guideway System
- Tunnel, Third Bore
- 65mph Tunnel Location

Note: EJMT = Eisenhower-Johnson Memorial Tunnels

For NEPA documentation and analysis purposes, the Preferred Alternative is characterized as a range from a Minimum Program of Improvements to address the short-term with non infrastructure, Advanced Guideway System, and specific highway improvements to a possible combination six-lane highway with Advanced Guideway System as a long-term Maximum Program of Improvements. This figure illustrates the locations of the transportation components of the Minimum and Maximum Programs. The review and trigger processes that would guide the planning decisions for the Preferred Alternative are described in Section 2.7.2.

Note: The Maximum Program of Improvements would result in Six-lane Highway Widening from EJMT to Floyd Hill and in Dowd Canyon. All other components in the Corridor are common to the Minimum and Maximum Programs of Improvement.

2.7.2 What are the triggers for additional highway and non-Advanced Guideway System transit capacity improvements?

The Preferred Alternative is responsive and adaptive to future trends within the Corridor. The use of triggers is consistent with the needs of the Corridor and recognizes that future travel demand and behavior is uncertain and that additional transportation solutions should be based on proven need. The triggers create a mechanism for defining the specifics of future transportation solutions consistent with the Corridor vision. Additional highway and non-Advanced Guideway System transit capacity improvements may proceed if and when:

- The "specific highway improvements" are complete and an Advanced Guideway System is functioning from the Front Range to a destination beyond the Continental Divide, OR
- The "specific highway improvements" are complete and Advanced Guideway System studies that answer questions regarding the feasibility, cost, ridership, governance, and land use are complete and indicate that Advanced Guideway System cannot be funded or implemented by 2025 or is otherwise deemed unfeasible to implement, OR
- Global, regional, local trends or events, such as climate change, resource availability, and/or technological advancements, have unexpected effects on travel needs, behaviors, and patterns and demonstrate a need to consider other improvements.

The Colorado Department of Transportation will convene a committee that retains the Collaborative Effort member profile to check in at least every two years to review progress made on the above triggers. At these check-in points, the committee will:

- Review the current status of all projects
- Identify unmet needs in the Corridor
- Consider the triggers in evaluating the need for additional capacity improvements beyond those specified

In 2020, there will be a thorough reassessment of the overall purpose and need and effectiveness of the improvements to review study results and global trends before implementing additional transportation improvements. This will occur regardless of the status of the triggers. At this time, the full range of improvement options may be reconsidered to address the needs in the Corridor.

2.8 How do the Alternatives compare?

As presented earlier, 22 alternatives emerged from the alternatives evaluation and screening process. This includes the No Action Alternative and 21 Action Alternatives including the Preferred Alternative.

Following is a comparison of the alternatives and justification leading to the identification of the Preferred Alternative. This comparison provides information on transportation impacts demonstrating how the 22 alternatives do or do not address the purpose and need for the project. The comparison includes safety, environmental, community, and implementation information and shows relevant information key to differentiating among alternatives.

The transportation impacts information summarizes key metrics for evaluating the alternatives and is consistent with the transportation problems documented in **Chapter 1**. For comparison purposes, the Preferred Alternative is presented as a range. Unless noted, the range varies from the Minimum Program 55 mph to the Maximum Program 65 mph. The *I-70 Mountain Corridor PEIS Transportation Analysis Technical Report* (CDOT, August 2010) provides the comparison of all 22 alternatives, including the elements of the Preferred Alternative described in **Section 2.7**.

More information on transportation impacts and supporting information on comparison information is found in the following technical reports:

- *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010),
- *I-70 Mountain Corridor PEIS Safety Technical Report* (CDOT, August 2010),
- *I-70 Mountain Corridor PEIS Travel Demand Technical Report* (CDOT, August 2010).

Environmental and community comparison information is based on the alternatives evaluation contained in **Chapter 3** of this document.

2.8.1 Transportation Comparisons

Consistent with the transportation problems and horizon years identified in **Chapter 1**, several transportation metrics were evaluated for 2035 and 2050 conditions. This section summarizes these evaluations, which include the following metrics:

- Peak period peak direction highway travel time for weekends and weekdays
- Peak direction congestion for weekends and weekdays
- Unmet demand (or additional trips accommodated) in relation to corridor congestion
- Transit share (the amount of travelers using transit)

Preferred Alternative Comparison

A comparison of the Preferred Alternative shows that it provides the best opportunity to meet the defined needs of the project because its triggered phasing process allows the alternative to:

- Provide for the short-term needs in the Corridor;
- Provide the most capacity to accommodate unmet demand;
- Minimize travel time, improving mobility and accessibility to destinations served by the I-70 Mountain Corridor; and
- Reduce congestion in the Corridor more than other alternatives, lowering the overall hours of poor operations on I-70.

For the 2050 travel demand, because the above metrics are not reliable enough to project beyond year 2035, a different metric measure, the year in which network capacity is reached, is used to measure alternative comparisons. Overall, these transportation comparisons show how well alternatives address the project purpose and need. These comparisons support the identification of the Preferred Alternative.

Peak Period Peak Direction Travel Time

Figure 2-12 shows year 2035 peak period peak direction highway travel time comparisons by alternative for weekend and weekday travel. This travel time is broken into travel time between the western portion (Glenwood Springs to Silverthorne) and the eastern portion (Silverthorne to C-470) of the Corridor. As discussed in **Chapter 1**, the weekend and weekday periods used for analysis are typical peak period conditions that occur throughout much of the year. Also shown are free-flow and year 2000 travel times for comparison.

What is the Peak Period?

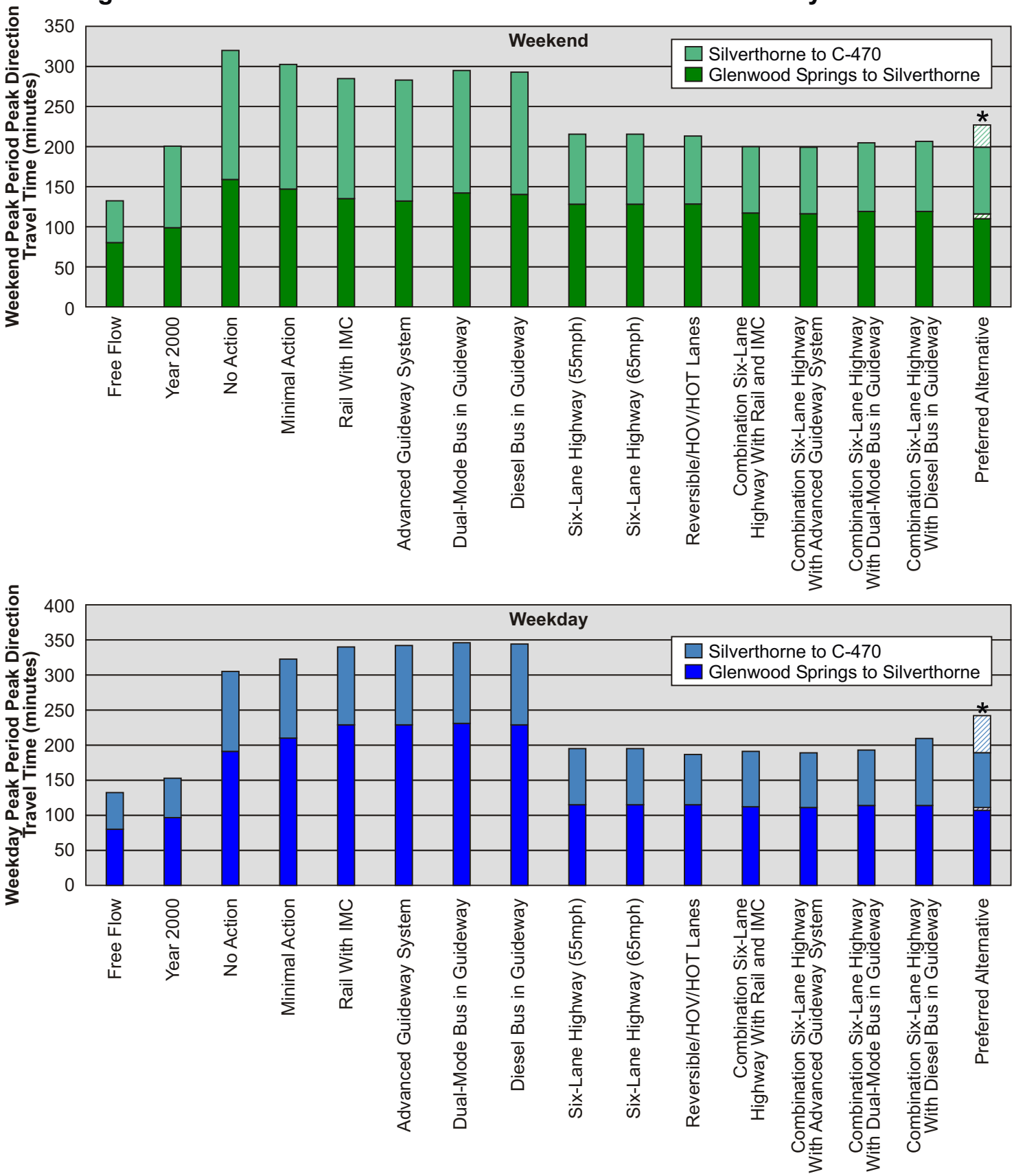
The peak period, in transportation terms, refers to the time of day when demand for travel is at its highest. This is frequently called rush hour traffic and is usually represented by high levels of congestion and stop and go conditions. Rush hour occurs in the morning and evening when most people are commuting to and from work. For this study, the morning peak period is from 6:00 a.m. to 10:00 a.m. and the evening peak period is from 3:00 p.m. to 7:00 p.m.

Figure 2-12 also shows that highway travel times vary substantially among the alternatives and between weekends and weekdays. The Preferred Alternative travel times range from better than the Transit Alternatives to about the same as the Combination Alternatives. During peak weekend conditions, the No Action Alternative has the longest travel times, followed closely by the Minimal Action Alternative. Overall weekend travel times tend to be longer than weekday travel times for the eastern portion of the Corridor. For the western portion of the Corridor, weekday travel times tend to be longer than weekend travel times.

For peak period weekend conditions, the average Corridor highway travel time for the Preferred Alternative ranges between approximately 200 and 220 minutes. This compares to the No Action Alternative, with an average highway travel time of approximately 320 minutes; the Minimal Action Alternative, with an average highway travel time of approximately 300 minutes; the Transit Alternatives, with a range of average highway travel time between approximately 285 and 295 minutes; the Highway Alternatives, with a range of average highway travel time between approximately 210 and 215 minutes; and the Combination Alternatives, with a range of average highway travel time between approximately 200 and 205 minutes.

For peak period weekday conditions, the average Corridor highway travel time for the Preferred Alternative ranges between approximately 190 and 250 minutes. This compares to the No Action Alternative, with an average highway travel time of approximately 305 minutes; the Minimal Action Alternative, with an average highway travel time of approximately 325 minutes; the Transit Alternatives, with a range of average highway travel time between approximately 340 and 345 minutes; the Highway Alternatives, with a range of average highway travel time between approximately 190 and 195 minutes; and the Combination Alternatives, with a range of average travel time between approximately 190 and 210 minutes.

Figure 2-12. 2035 Peak Period - Peak Direction Travel Time by Alternative



* The graphs present the range of impacts that could occur with the Preferred Alternative. The solid and hatched bars together represent the implementation of the Minimum Program only. The solid bar alone shows the travel time under the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Peak Direction Congestion

Figure 2-13 shows 2035 peak direction hours of congestion along the Corridor for weekend and weekday travel. Congestion is defined as Level of Service F conditions and indicates stop-and-go traffic. The amount of congestion over the course of a day varies by location along the Corridor. For comparison purposes, the hours of congestion at representative locations along the Corridor are summed for each alternative. The amount of congestion is shown separately for the portions of the Corridor west and east of Silverthorne. This congestion occurs on the general purpose highway lanes of the Corridor and does not measure transit within a dedicated facility. Travelers on transit may experience congestion at their origin and destination stations but can expect consistent travel time on the transit system. As discussed in **Chapter 1**, the weekend and weekday periods used for analysis are typical peak conditions occurring throughout much of the year.

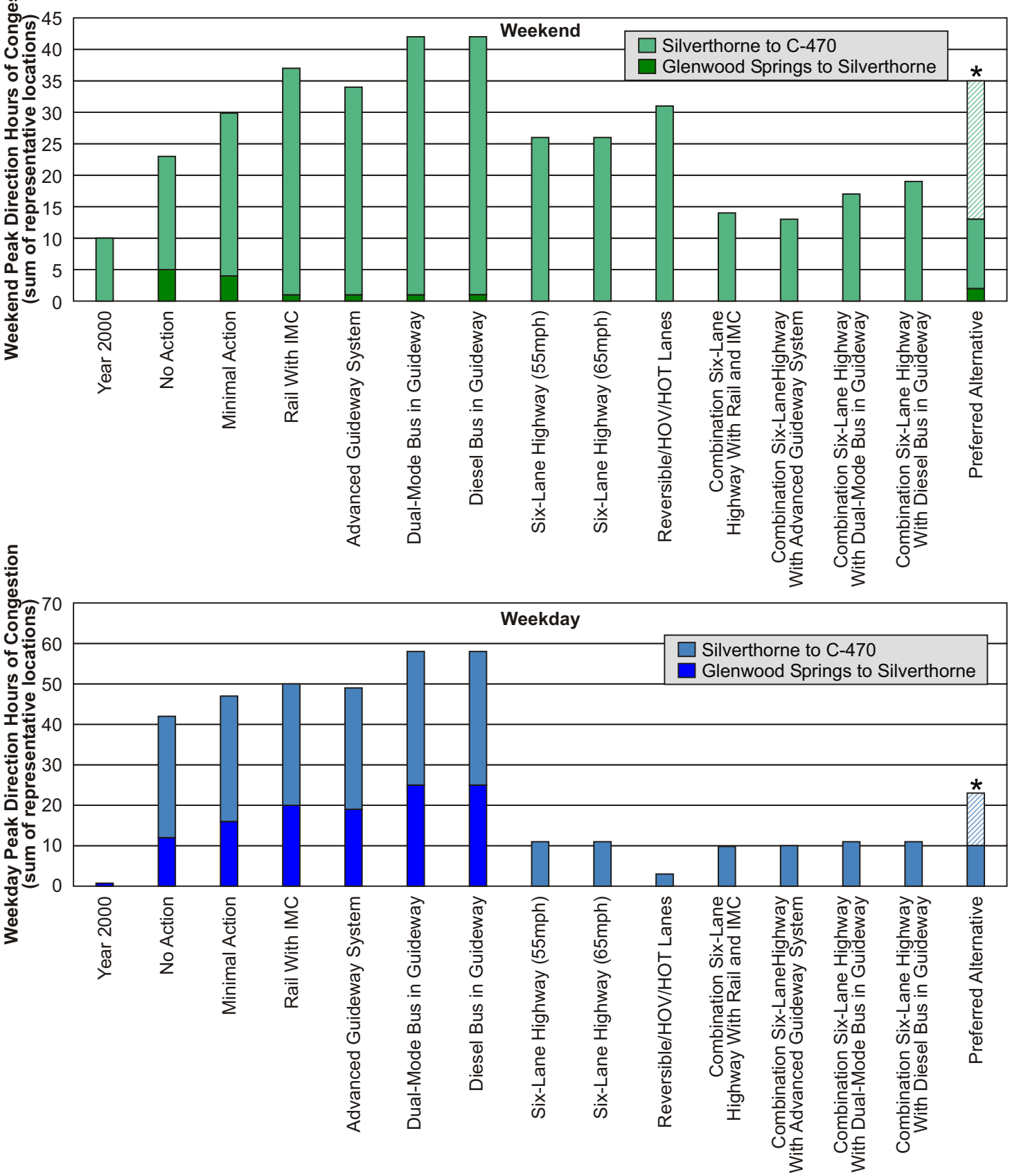
Figure 2-13 shows that congestion varies substantially among alternatives and between weekends and weekdays. Transit improvements slightly increase highway congestion by attracting more person trips to the Corridor. Six-Lane highway widening reduces congestion by increasing highway capacity. For weekend conditions, the Preferred Alternative has congestion ranging from about the same as that of the Transit Alternatives to about the same as that of the Combination Alternatives. For weekday conditions, the Preferred Alternative has congestion ranging from better than that of the Transit Alternatives to about the same as that of the Combination Alternatives. The Minimal Action Alternative has more congestion than that of the No Action Alternative because the localized highway improvements attract more trips, but Corridor capacity improvements are not included.

For peak direction weekend conditions, the Preferred Alternative total hours of congestion at representative locations along the Corridor range between 13 and 35 hours. This compares to the No Action Alternative, with 23 hours of congestion; the Minimal Action Alternative, with 30 hours of congestion; the Transit Alternatives, with a range of congestion between 34 and 42 hours; the Highway Alternatives, with a range of congestion between 26 and 31 hours; and the Combination Alternatives, with a range of congestion between 13 and 19 hours.

For peak direction weekday conditions, the Preferred Alternative total hours of congestion at representative locations along the Corridor range between 10 and 23 hours. This range compares to the No Action Alternative range of 42 hours of congestion; the Minimal Action Alternative, with 47 hours of congestion; the Transit Alternatives, with a range of congestion between 50 and 58 hours; the Highway Alternatives, with a range of congestion between 3 and 11 hours; and the Combination Alternatives, with a range of congestion between 10 and 11 hours.

Congestion is forecast to occur in different parts of the Corridor depending on the alternative, the time of day, and the direction of travel. In general, weekend westbound direction congestion occurs primarily in Jefferson County and weekend eastbound congestion occurs primarily in Clear Creek County. For weekday, traffic congestion is forecast to occur primarily in Eagle County, followed closely by Jefferson County and Clear Creek County.

Figure 2-13. 2035 Peak Direction Hours of Congestion by Alternative



* The graphs present the range of impacts that could occur with the Preferred Alternative. The solid and hatched bars together represent the implementation of the Minimum Program only. The solid bar alone shows the congestion under the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Unmet Demand (in Relation to Corridor Congestion)

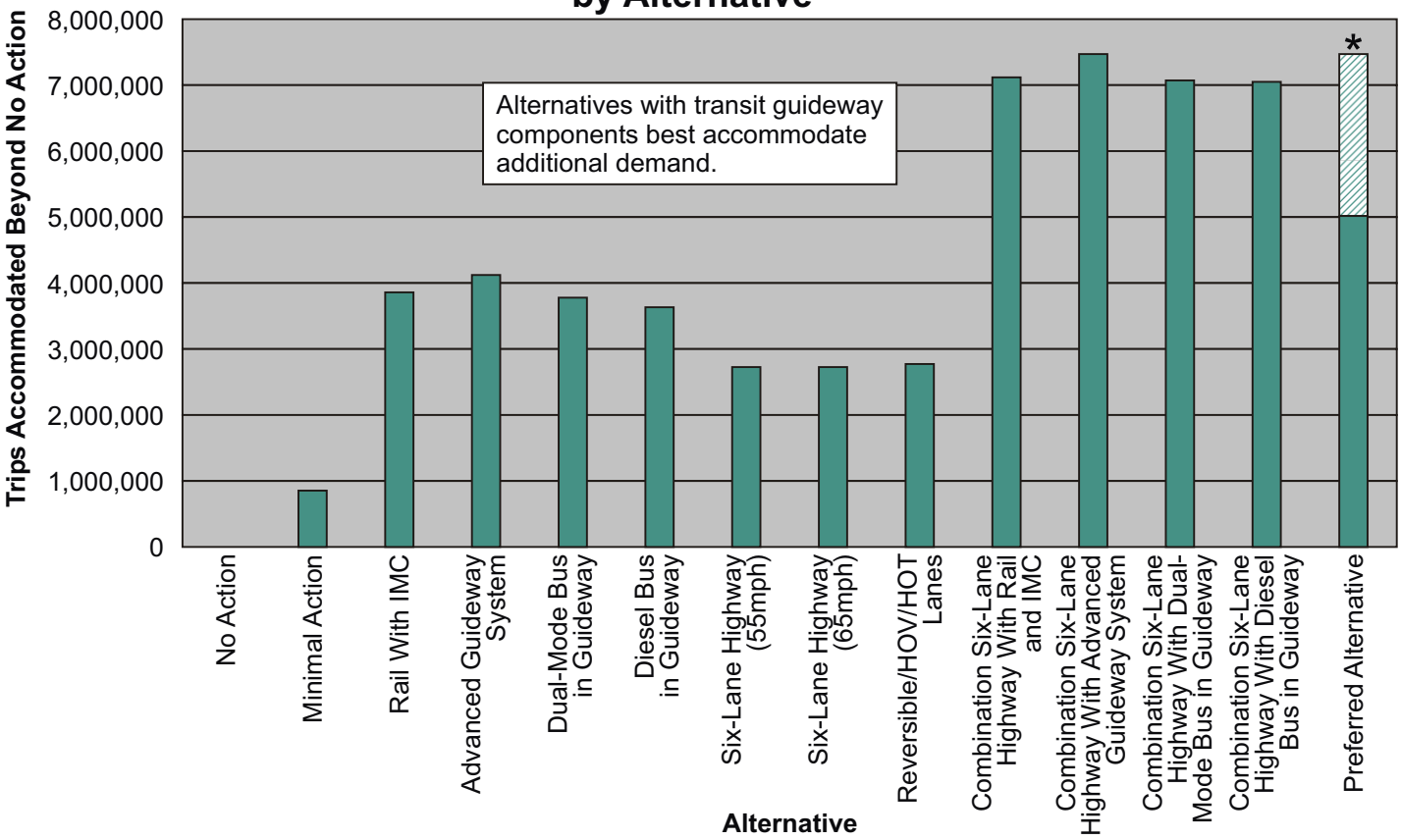
Improved travel conditions along the Corridor reduce the amount of unmet demand and increase the amount of trip demand that can be accommodated. **Figure 2-14** shows the annual number of trips forecast to be accommodated beyond the No Action Alternative, alongside the level of annual Corridor congestion. Alternatives reducing unmet demand by accommodating more trips best meet the capacity need of the project. The Preservation Alternatives are not shown because they operate like other alternatives. For example, the Combination Six-lane Highway with Transit Preservation Alternatives operate like the Six-lane Highway (55 mph) Alternative. For comparison purposes, the level of Corridor congestion is shown in terms of total hours of congestion over the course of a year.

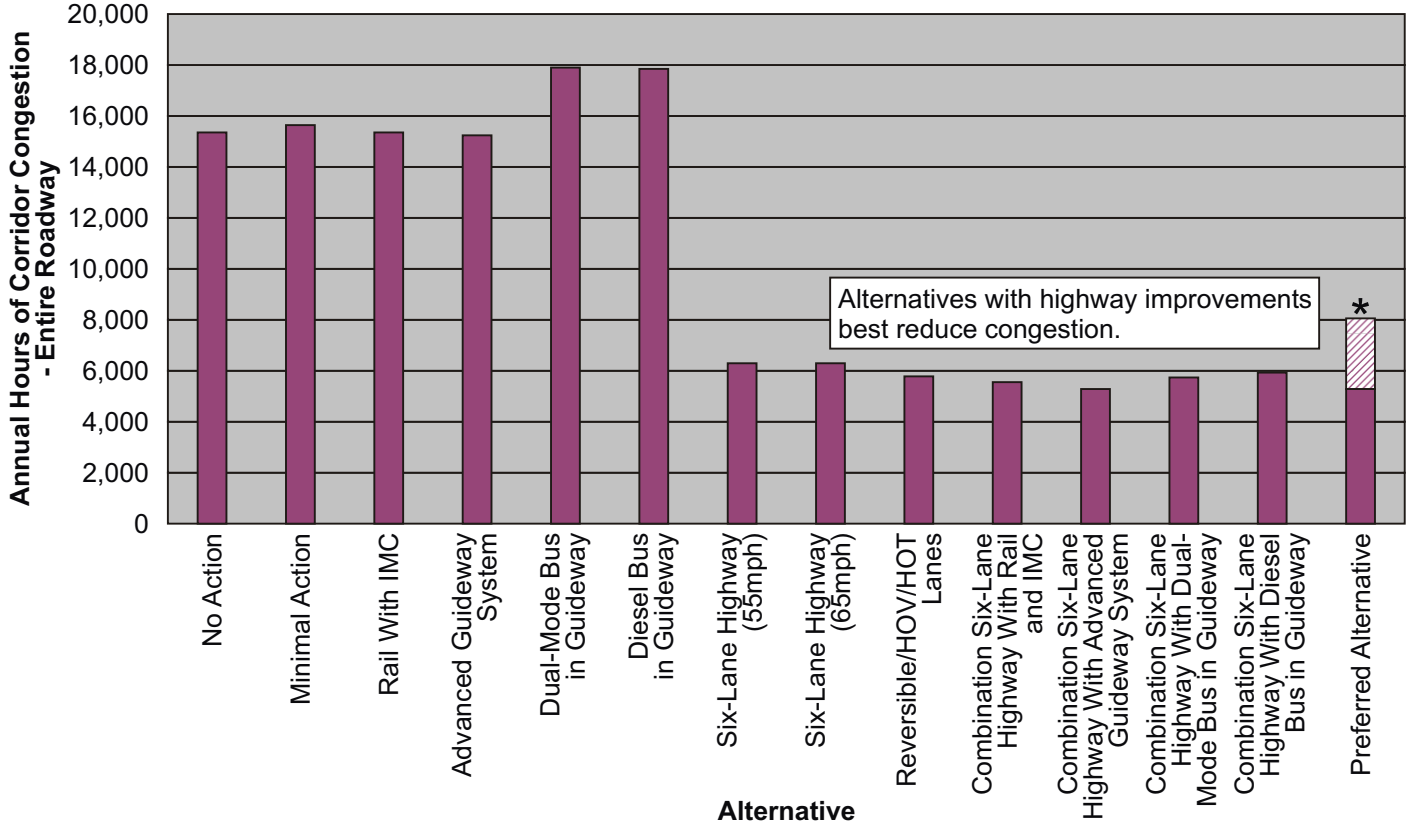
Unmet Demand

Unmet demand occurs when travelers choose to not make a trip because of severe congestion conditions, long travel times, or other unsatisfactory conditions. Current and future projected travel demand exceeds the capacity of the Corridor. This unmet demand occurs along the I-70 Mountain Corridor under current conditions. When additional travelers choose not to make a trip due to worse conditions in the future, this unmet demand increases. Increasing person trip capacity in the Corridor allows demand to be met. This can be measured by the number of person trips accommodated in the Corridor beyond the No Action Alternative.

Figure 2-14 shows that the ability of an alternative to provide additional capacity, measured by the amount of additional trips accommodated, does not directly relate to the ability of an alternative to reduce congestion. For example, the Transit Alternatives accommodate more than 3.5 million additional trips per year but do not reduce congestion. The Highway Alternatives provide less additional capacity than the Transit Alternatives, measured by the number of additional trips accommodated, but do a much better job at reducing congestion. The Combination Alternatives do a good job at providing increased capacity, as measured by the additional trips accommodated, and reducing overall congestion. The Preferred Alternative accommodates between 5 million and almost 7.5 million trips per year beyond the No Action Alternative. This range compares to the Minimal Action Alternative, which accommodates less than 1 million additional trips per year, and the Highway Alternatives, which accommodate between 2.5 million and 3 million additional trips per year. The Combination Alternatives, including highway and transit improvements, accommodate more than 7 million trips per year beyond the No Action Alternative.

Figure 2-14. Corridor Congestion and Additional Demand Accommodated by Alternative





* The graphs present the range of impacts that could occur with the Preferred Alternative. In the upper graph, the solid bar represents the number of additional trips under the Minimum Program, while the solid and hatched bars combined represent the additional trips with the Maximum Program. In the lower graph, the solid and hatched bars combined represent the congestion under the Minimum Program, while the solid bar alone represents the congestion with full implementation of the Maximum Program. This information is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Transit Share

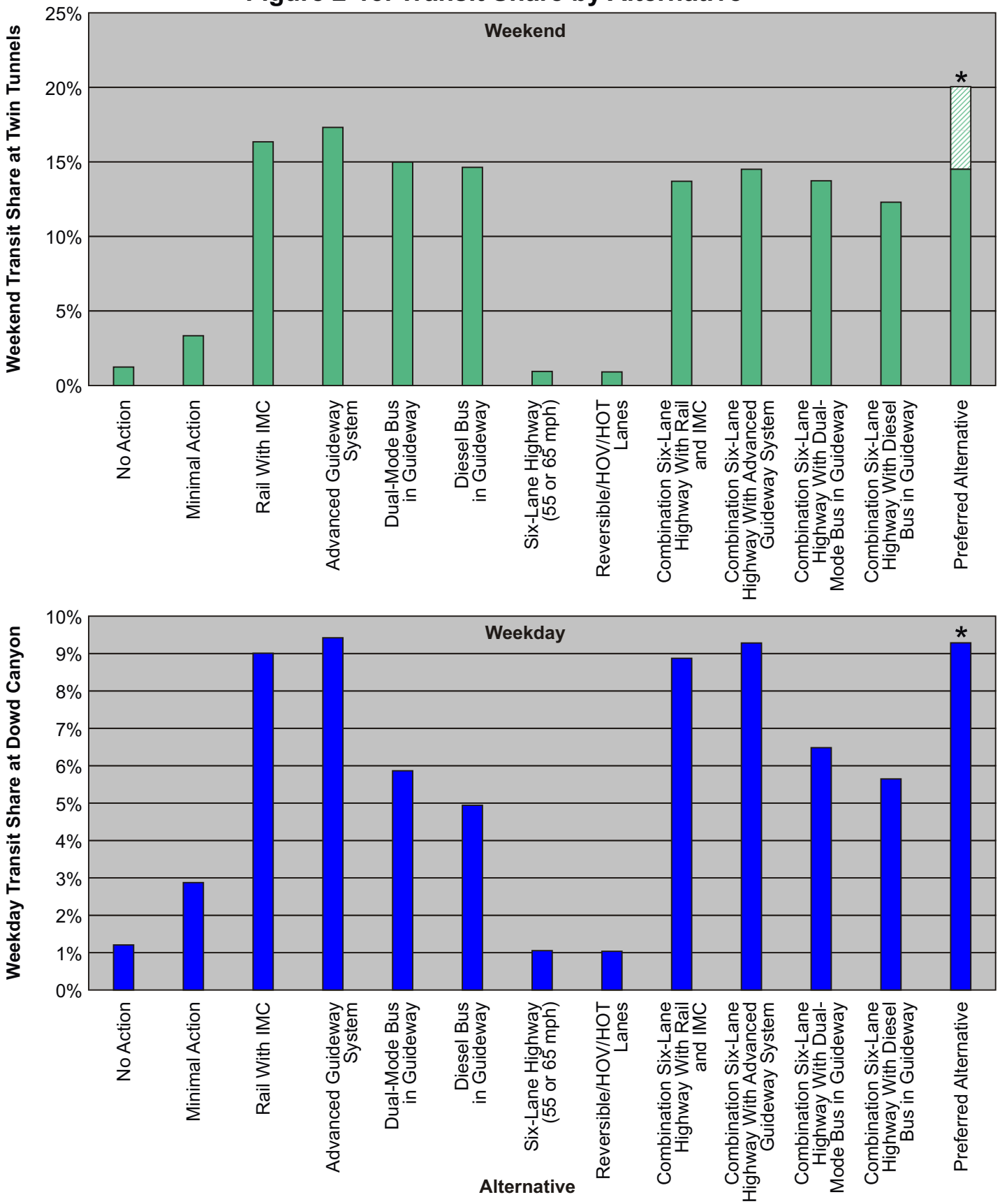
Figure 2-15 shows the peak direction transit share by alternative for weekend and weekday travel. To adequately demonstrate the difference among alternatives, locations along the Corridor with a relatively high amount of travel demand were selected for comparison. For weekends, the Twin Tunnels are shown as a representative location. For weekdays, Dowd Canyon is shown as a representative location. The transit share demonstrates the ability of the alternatives to provide modal choices and remove vehicular traffic from the Corridor.

Figure 2-15 shows that Action Alternatives with transit provide much higher transit shares than Highway alternatives. Furthermore, Transit Alternatives provide higher transit share than the Combination Alternatives on weekends because the higher levels of congestion on the Corridor experienced with the Transit Alternatives limits the amount of highway traffic, making transit appear more attractive and increases transit share. Similarly, the Preferred Alternative Minimum Program provides higher transit share on weekends (20 percent) than the Preferred Alternative Maximum Program (14.5 percent).

For peak direction weekend conditions, the Preferred Alternative transit share ranges between 14.5 percent and 20 percent. This compares to the No Action Alternative with a 1.2 percent transit share; the Minimal Action Alternative with a 3.3 percent transit share; the Transit Alternatives with a range of transit share between 14.6 percent and 17.3 percent; the Highway Alternatives with a transit share of 0.9 percent; and the Combination Alternatives with a range of transit share between 12.3 percent and 14.5 percent.

For peak direction weekday conditions, the Preferred Alternative transit share is expected to be 9.3 percent at Dowd Canyon for either the Minimum or Maximum Programs. This compares to the No Action Alternative with a 1.2 percent transit share; the Minimal Action Alternative with a 2.9 percent transit share; the Transit Alternatives with a range of transit share between 4.9 percent and 9.4 percent; the Highway Alternatives with a range of transit share between 1.0 percent and 1.1 percent; and the Combination Alternatives with a range of transit share between 6.5 percent and 9.3 percent.

Figure 2-15. Transit Share by Alternative



* The graphs present the range of impacts that could occur with the Preferred Alternative. The solid and hatched bars together represent the transit share by implementing the Minimum Program only. The solid bar alone represents the transit share from full implementation of the Maximum Program. No hatched bars are shown on the weekday graph because the weekday transit share would be the same for both the Minimum and Maximum Programs. This information is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Safety Comparisons

Alternatives are evaluated for how well they protect I-70 Mountain Corridor travelers. Alternatives that include a Fixed Guideway Transit component provide a safer means of transportation for travelers than highway vehicle travel. National crash rates for rail modes are markedly lower than the comparable rates for motor vehicles [crash rate statistics of fatalities and injuries per passenger mile indicate that Fixed Guideway Rail Transit is approximately 100 times safer than automobile travel (National Transportation Statistics 2010, Bureau of Transportation Statistics, USDOT, 2010)]. Buses operating in general purpose lanes are on average safer than automobile travel, but not as safe as rail technologies in fixed guideways. No separate statistics are available at a national level for buses operating in a separate guideway.

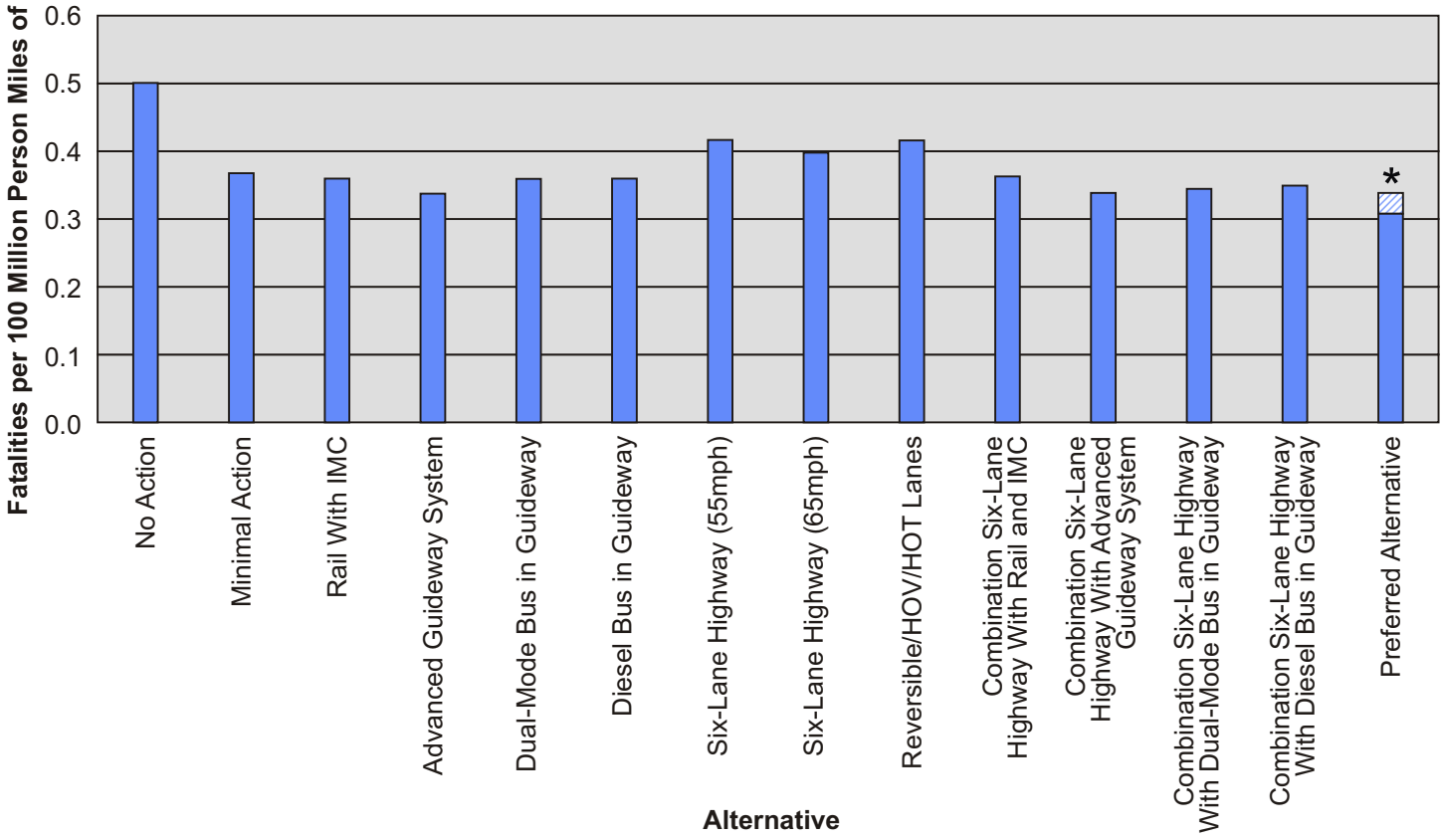
A number of Minimal Action highway components included in all of the Action Alternatives were developed to address safety problem areas as discussed in **Chapter 1, Section 1.12.3**, and as shown in Figure 1-10. For this reason the Action Alternatives are not substantially different in terms of highway safety. The higher profile safety problem areas in the Corridor addressed by all Action Alternatives include:

- Wolcott curve
- Dowd Canyon (not included with the Transit Alternatives)
- Silverthorne Interchange
- Eisenhower-Johnson Memorial Tunnels to Herman Gulch (eastbound)
- Base of Floyd Hill (Twin Tunnels to the US 6 interchange).

Figure 2-16 shows the overall multimodal fatality rate by alternative. Fatality rates were used for comparison as the best measure of safety collected consistently among the transportation modes. These blended rates reflect the relative amount of person trips using each mode and are based on projected fatalities per mode per 100 million person miles of travel.

The No Action Alternative is projected to have a fatality rate of 0.50 per 100 million person miles. In comparison, the Minimal Action Alternative, with its components that address most highway safety problems, has a rate of 0.37. Highway Alternatives are higher, with fatality rates that range between 0.40 and 0.42, since unimproved sections of the facility attract more vehicle miles of travel compared to the Minimal Action Alternative. Alternatives with transit, reflecting different transit technologies and usage, have rates ranging from 0.31 to 0.36. The Preferred Alternative has a fatality rate ranging from 0.31 to 0.34 per 100 million person miles.

Figure 2-16. Fatality Rates by Alternative



* The Maximum Program Range presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

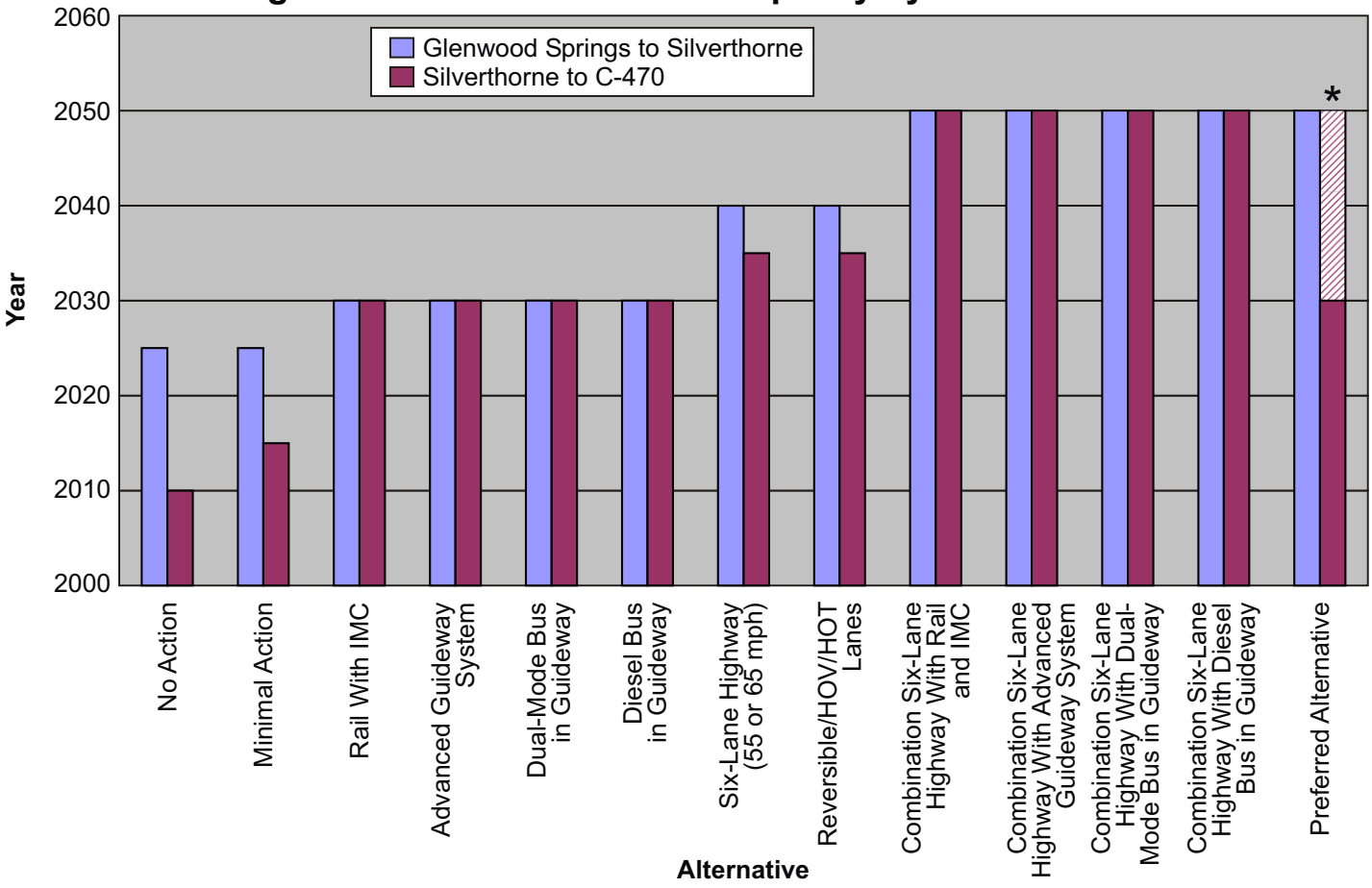
Year Network Capacity is Reached

The ability of the alternatives to accommodate the 2050 travel demand is measured by the year network capacity is reached. Whereas the transportation metrics discussed previously are based on 2035 travel demand model results derived from population and employment data,, the year network capacity is reached and the 2050 travel demand is based on projections for this data. These projections are less reliable due to the uncertainties of growth and travel assumptions beyond the year 2035, but provide a relative comparison between alternatives.

Figure 2-17 shows the year network capacity is reached by alternative. The network capacity measures congestion tolerance and is defined as the demand and capacity when average highway travel speed on the Corridor drops to 30 mph. The year network capacity is reached is rounded to the nearest five years due to the inherent uncertainties of the forecast. The network capacity is shown separately for the portions of the Corridor west and east of Silverthorne.

Figure 2-17 shows that the only alternatives with network capacity to accommodate the 2050 travel demand are the Combination Alternatives and the Preferred Alternative. The No Action Alternative reaches network capacity between 2010 and 2025. The Minimal Action Alternative performs slightly better but still reaches network capacity in the eastern portion of the Corridor by 2015. The Transit Alternatives reach network capacity in 2030, and the Highway Alternatives reach network capacity between 2035 and 2040. The Combination Alternatives provide a network capacity to 2050 if both transit and highway elements are constructed. If the transit corridor is preserved, these Combination Alternatives perform like Highway Alternatives, and if highway improvements are preserved, these alternatives perform like Transit Alternatives. For the Preferred Alternative, the year network capacity is reached ranges from 2030 to 2050 for east of Silverthorne and 2050 for west of Silverthorne due to the peak recreation travel demand.

Figure 2-17. Year at Network Capacity by Alternative



* The Maximum Program presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

2.8.2 Environmental and Community Resource Impact Comparisons

The following summary compares environmental and community resource impacts among the alternatives. The focus is on a discernable and relevant comparison among the alternatives, particularly with the Preferred Alternative. These comparisons support the evaluation process that led to the identification of the Preferred Alternative. **Chapter 3** provides a complete evaluation of resources.

Impacts used in this document are pre-mitigation. The lead agencies assumed that the application of mitigation strategies at Tier 2 improve adverse impacts by means of further avoidance, minimization, or enhancement of the qualities of resource conditions.

Overarching Impact Observations

Overarching impact observations are as follows:

- In some areas, all alternatives have the same environmental impacts because there is only one proposed improvement common to every Action Alternative. For example, the direct land use impacts in Summit County are the same because all alternatives include both interchange improvements at Silverthorne and an auxiliary lane, and the transit system stays within the right-of-way.
- The Minimal Action Alternative typically has the fewest environmental impacts of the Action Alternatives. However, the Minimal Action Alternative is the poorest in meeting the project purpose and need.
- The Preferred Alternative has a range of impacts. The low end of this range equates to the low end of impacts across alternatives. Even at the low end of impacts, the Preferred Alternative meets the purpose and need better than the Minimal Action Alternative.
- The Combination Alternative impacts are predominantly at the higher end of the range of impacts. The high end of the Preferred Alternative range of impacts is predominantly at the lower end of the Combination Alternatives' range of impacts. However, the triggers built into the Preferred Alternative limit the extent of the impacts. Impacts are minimized because they trigger construction of transportation improvements actually needed.
- Typically, among the Highway and Transit Alternatives, the Rail with Intermountain Connection has the most environmental impacts. Similarly, among the Combination Alternatives, either the Combination Six-lane Highway with Rail and Intermountain Connection or the Combination Six-lane Highway with Bus in Guideway has the greatest impact, depending on the resource.

Impact Mitigation

Impacts of all alternatives represent those before applying mitigation strategies.

Mitigation strategies, discussed in **Chapter 3**, will be determined in Tier 2 processes when transportation improvements are defined on a localized level.

- For the Preferred Alternative, the lower end of the range of impacts summarized below is typically for the Minimum Program 55 mph and the higher end of the range of impacts is typically for the Maximum Program 65 mph, unless otherwise noted.
- Unless noted, there are no impacts associated with the No Action Alternative. However, the No Action Alternative results in greater levels of highway congestion, which increase carbon monoxide and some particulate air emissions. The No Action Alternative does not provide more options for travel in the Corridor. The No Action Alternative does not provide for methods to improve water quality from highway runoff and road sanding operations nor does it provide for wildlife crossings.

Wetlands

Action Alternative impacts range from a low of 15 acres of wetland impacts for the Advanced Guideway System Alternative to 37 acres of impacts for the Combination Six-lane Highway with Rail and Intermountain Connection Alternative. The Preferred Alternative ranges from 16 acres to32 acres of wetland impact.

Biological Resources

Vegetation

Alternatives with the largest footprint, the Highway Alternatives and the Combination Alternatives, have the greatest impact on vegetation (ranging between approximately 225 acres to 325 acres, respectively) because roadway expansion causes the greatest amount of land disturbance. The Advanced Guideway System Alternative has the fewest direct impacts (approximately 150 acres) due to its smaller footprint. The Preferred Alternative has a range of potential impacts (between approximately 200 and 225 acres) comparable to nearly all the Action Alternatives.

Wildlife

Direct impacts on wildlife include loss of habitat due to construction and the increased barrier effect due to new roadway or transit improvements. The greatest impact is from the Highway and Combination Alternatives, the alternatives with the largest footprint. The Preferred Alternative has a range of potential impacts comparable to nearly all other Action Alternatives.

The Colorado Department of Transportation examined habitat connectivity and animal-vehicle collisions through an interagency committee known as "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE). The committee identified 13 areas where the I-70 Mountain Corridor interferes with wildlife migration, including elk, mule deer, bighorn sheep, and Canada lynx. These locations are referred to as linkage interference zones. By focusing on areas of known migration and wildlife use, and creating wildlife crossings, animal-vehicle collisions can be reduced and habitat connectivity increased. A Memorandum of Understanding, signed in April 2008, details the responsibilities of each agency in addressing animal-vehicle collisions (see **Appendix E, ALIVE Memorandum of Understanding**).

Fisheries and Aquatic Species

Impacts on Gold Medal and "high-value" fisheries are greatest for the Combination Alternatives and Rail with Intermountain Connection Alternative because these alternatives have the largest overall footprint. The Preferred Alternative has a range of impacts comparable to the range of impacts between the Combination Alternatives and Rail with Intermountain Connection Alternative.

Alternatives that add more traffic lanes, the Highway and Bus in Guideway Alternatives, require additional winter maintenance (such as the use of liquid deicers and traction sand), thereby leading to increased water quality impacts when compared to alternatives with less new roadway construction.

Protected Species

Table 2-11 summarizes the effects of alternatives on protected species; it includes only those species determined to occur in the Corridor.

Table 2-11. Protected Species Impact Determinations

Common Name	Scientific Name	Status[a]	Impact Determination[b] No Action	Impact Determination[b] All Action Alternatives
Federally Listed Species				
Canada lynx	*Lynx canadensis*	FT	LAA, NCEL	LAA, PCEL
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	FT	LAA	LAA
Least tern	*Sterna antillarum*	FE	NE	LAA
Piping plover	*Charadrius melodus*	FT	NE	LAA
Whooping crane	*Grus americana*	FE	NE	LAA
Yellow-billed cuckoo	*Coccyzus americanus*	FC	NE	NE
Bonytail chub	*Gila elegans*	FE	NE	LAA
Colorado pikeminnow	*Ptychocheilus lucius*	FE	NE	LAA
Humpback chub	*Gila cypha*	FE	NE	LAA
Razorback sucker	*Xyrauchen texanus*	FE	NE	LAA
Pallid sturgeon	*Scaphirhynchus albus*	FE	NE	LAA
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, FS-MIS	NE	LAA
Western prairie fringed orchid	*Platanthera praeclara*	FT	NE	LAA
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	FT	NE	LAA
State-Listed Species				
Common garter snake	*Thamnophis sirtalis*	SSC		
Midget faded rattlesnake	*Crotalus oreganos concolor*	SSC		
USFS-Sensitive Species				
Pygmy shrew	*Sorex hoyi montanus*	FS-S	MAII, NCEL	MAII, NCEL
River otter	*Lontra canadensis*	FS-S	MAII, NCEL	MAII, NCEL
American marten	*Martes americana*	FS-S	MAII, NCEL	MAII, PCEL
North American wolverine	*Gulo gulo luscus*	FS-S	MAII, NCEL	MAII, PCEL
Bighorn sheep	*Ovis canadensis*	FS-S, FS-MIS	MAII NCEL	MAII, PCEL
Bald eagle	*Haliaeetus leucocephalus*	FS-S	NI	MAII
Northern goshawk	*Accipiter gentilis*	FS-S	NI	MAII
American peregrine falcon	*Falco peregrinus anatum*	FS-S	NI	MAII
White-tailed ptarmigan	*Lagopus leucurus*	FS-S	NI	MAII
Boreal owl	*Aegolius funereus*	FS-S	NI	MAII
Flammulated owl	*Otus flammeolus*	FS-S	MAII	MAII
Black swift	*Cypseloides niger*	FS-S	NI	MAII
Brewer's sparrow	*Spizella breweri*	FS-S	NI	MAII

Common Name	Scientific Name	Status[a]	Impact Determination[b] No Action	Impact Determination[b] All Action Alternatives
USFS-Sensitive Species, Continued				
American three-toed woodpecker	*Picoides tridactylus dorsalis*	FS-S	NI	MAII
Olive-sided flycatcher	*Contopus cooperi*	FS-S	NI	MAII
Boreal toad	*Bufo boreas boreas*	FS-S, FS-MIS	MAII, NCEL	MAII, NCEL
Northern leopard frog	*Rana pipiens*	FS-S	MAII, NCEL	MAII, NCEL
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	FS-S, FS-MIS	NI	MAII
Bluehead sucker	*Catostomus discobolus discobolus*	FS-S	NI	MAII
Flannelmouth sucker	*Catostomus latipinnis*	FS-S	MAII	MAII
All FS-S plants analyzed	See Biological Report (Table BR-2)	FS-S, FC	MAII*	MAII*
USFS MIS				
WRNF				
Elk	*Cervus elaphus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Virginia's warbler	*Vermivora virginiae*	FS-MIS	NI	PEU, HEU
All trout	All species	FS-MIS	NI	PEU, HEU
Aquatic macroinvertebrates	All species	FS-MIS	NI	PEU, HEU
ARNF				
Elk	*Cervus elaphus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Mule deer	*Odocoileus hemionus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Bighorn sheep	*Ovis canadensis*	FS-S, FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Hairy woodpecker	*Picoides villosus*	FS-MIS	NI	PEU, HEU
Pygmy nuthatch	*Sitta pygmaea*	FS-MIS	NI	PEU, HEU
Mountain bluebird	*Sialia currucoides*	FS-MIS	NI	PEU, HEU
Warbling vireo	*Vireo gilvus*	FS-MIS	NI	PEU, HEU
Wilson's warbler	*Wilsonia pusilla*	FS-MIS	NI	PEU, HEU
Trout species (brook, brown)	(*Salvelinus fontinalis* and *Salmo trutta*)	FS-MIS	NI	PEU, HEU
Boreal toad	*Bufo boreas boreas*	FS-MIS	NCEL	PEU, HEU
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	FS-MIS	NI	PEU, HEU
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, FS-MIS	HEL	PEU, HEU

** Action alternatives would have relatively greater impacts on occupied habitats than the No Action alternative. Impacts associated with action alternatives would increase proportionally to the amount of occupied area that could be disturbed from each action alternative or with increasing recreational visitor use.*

[a] Status
FE = Federally listed as endangered
FT = Federally listed as threatened
FS-S = Listed as Forest Service sensitive
FC = Federal candidate for listing
FS-MIS = Management Indicator Species
SSC = State Species of Special Concern

[b] Impact Determinations
Federal Determinations
NE = No Effect
LAA = Likely to Adversely Affect
NLAA = May Affect, Not Likely to Adversely Affect
Other PEIS Determinations
PCEL = Positive Wildlife Crossing Effects Likely
NCEL = Negative Wildlife Crossing Effects Likely

USFS Determinations
NI = No Impact
MAII = May adversely impact individuals but not likely to result in a loss of viability in the Planning area nor cause a trend to federal listing.
LRLV = Likely to result in loss of species viability

MIS Determinations
PEU = Population Effects Unlikely
HEU – Habitat Effects Unlikely
PEL = Population Effects Likely
HEL = Habitat Effects Likely

Water Quality

All Action Alternatives have an impact on water quality. This impact largely results from I-70 runoff and ranges from a low of a 2 percent increase to a high of a 43 percent increase in runoff. The Preferred Alternative ranges from a 16 percent to a 24 percent increase in runoff compared to the No Action Alternative.

Geologic Hazards

All the alternatives, including the No Action Alternative, result in disturbance of geologic hazards along the Corridor. All of the Action Alternatives include mitigation for geologic hazards helping reduce the risks of disturbance to sensitive areas. The Preferred Alternative includes construction in areas susceptible to landslides, rockfall hazards, and poor rock quality. The elevated portion of the Advanced Guideway System allows debris or other materials to pass under the track with less effect on operations.

Historic Properties

As many as 75 different properties could be directly affected by one or more of the Action Alternatives. These properties include individual historic and archaeological sites as well as historic districts. Of the identified properties, only the No Action Alternative does not directly affect any historic properties. The Action Alternatives potentially affect between 47 and 69 historic properties. The Minimal Action Alternative affects the fewest, and the Combination Alternatives affect the most. The impacts for the Preferred Alternative fall within the range of the other Action Alternatives. The actual number of historic properties affected could be higher or lower depending on the final eligibility determinations of these properties and the additional properties that could be identified through Tier 2 surveys. Based on the surveys conducted to date, the Preferred Alternative affects between 56 and 66 historic properties. The 55 mph option of the Preferred Alternative affects more properties than the 65 mph option. The Advanced Guideway System, Rail with Intermountain Connection, and Highway Alternatives generally affect 50 to 55 potential historic resources, fewer than the Combination Alternatives or the Preferred Alternative but slightly more than the Minimal Action Alternative, which affects 47. All of the Action Alternatives affect several additional linear resources, including highways, railroads, and agricultural ditches.

Recreational Properties

The Action Alternatives physically impact recreation resources adjacent to the I-70 highway, and indirectly affect resources farther afield, due to access and capacity changes. Up to five Section 6(f) resources could be impacted. In general, the Combination Alternatives impact recreation resources the most because they have both the largest footprint and the biggest increase in capacity (and thus recreation use). Increased visitation benefits commercial recreation providers and strains the sustainability of forest land resources. The Transit Alternatives have fewer direct impacts than the Highway Alternatives but result in higher increases in visitation. The Highway Alternatives have more direct impacts than the Transit Alternatives, but result in only modest visitation increases because the former have less capacity than the Transit Alternatives and therefore induce fewer recreation-oriented trips. The Preferred Alternative results in impacts similar to the Transit Alternatives, resulting from the Minimum Program of improvements. Direct impacts are lower, but visitation increases are high. Later phases of improvements under the Maximum Program, if implemented, have similar impacts to the Combination Alternatives, with more direct impacts and a higher increase in recreation visitation. The Preferred Alternative directly affects between approximately 65 and 90 recreation sites with the low end of the range similar to the Transit alternatives and the high end of the range similar to the Combination Alternatives. The Highway Alternatives' impacts fall in a range between the Transit and Combination Alternatives.

Section 4(f) Properties

Section 4(f) properties include many historic, wildlife and waterfowl refuges, and recreational properties. The impacts for the Preferred Alternative range from 61 to 86 properties compared to the range of impacts for all properties from 50 to 86.

Air Quality

Air quality was evaluated for several pollutants and air toxics. Because pollutant emissions from vehicles are directly related to vehicle miles traveled, alternatives with higher vehicle miles traveled generally have higher total daily emissions. Transit Alternatives that shift travel from cars to transit vehicles have lower emissions. As a result, for all alternatives, including the No Action Alternative, there is a substantial decrease (approximately 75 percent to 85 percent) in emissions of pollutants (particulate matter, sulfur dioxide, and nitrogen oxides) that affect visibility. The Preferred Alternative falls within the same range.

For all the alternatives, carbon monoxide emissions in 2035 are less than current day emissions, even though 2035 traffic volumes are higher than 2000 volumes. Emissions in the future are projected lower because older, higher-polluting vehicles continue to be replaced by newer, low-polluting vehicles. Overall, carbon monoxide emissions under the Preferred Alternative range from being 10 percent to 20 percent lower than current emissions and between 3 percent lower to 4 percent higher than emissions under the No Action Alternative. All of the Action Alternatives have carbon monoxide emissions approximately equal to or less than the 2035 baseline. Most are within a 7 percent to 9 percent range of the No Action Alternative, with the Rail with Intermountain Connection Alternative being the lowest at 7 percent less than the No Action Alternative and the Combination Six-lane Highway with Rail and Intermountain Connection Alternative being the highest at 9 percent greater emissions than the No Action Alternative. The Preferred Alternative is within these ranges.

For $PM_{2.5}$ emissions forecasts for all of the alternatives show that $PM_{2.5}$ emissions decrease substantially from current levels, and all Action Alternatives are less than or equal to the No Action Alternative $PM_{2.5}$ emissions. The Highway and Combination Alternatives have the highest emissions (the same as the 2035 baseline), and the Diesel Bus in Guideway Alternative has the lowest emissions. The high range of emissions under the Preferred Alternative is the same as the No-Action Alternative. The *I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report* (CDOT, August 2010) provides more detail on air quality.

Energy Consumption

Operational energy consumption is the amount of fuel and electricity used to power the vehicles using the transportation facility. Energy use during operations of any alternative is directly related to the gasoline and diesel consumption of automobiles, trucks, and buses, and to the propulsion energy generated for powering transit vehicles. The Action Alternatives improve traffic flow and increase average peak-hour speeds, reducing overall energy consumption. The variation in total operational energy consumption among the alternatives, compared to the No Action Alternative, ranges from no difference in the case of Rail with Intermountain Connection and Advanced Guideway System Alternatives, to 17 percent higher in the case of the Combination Six-lane Highway with Diesel Bus in Guideway Alternative. The Preferred Alternative is among the lowest of all alternatives with expected increases ranging from 6 percent to 7 percent over the No Action Alternative by 2035.

Land Use (Right-of-Way)

The conceptual footprints of the Action Alternatives include the actual footprint of the transportation facility, 15-foot construction zones to each side of the facility, and additional 15-foot sensitivity zones beyond the construction zone. The Preferred Alternative has a range of impacts from 116 to 288

properties falling within the conceptual footprint. At the low end of the range, the Preferred Alternative results in fewer impacts than any other alternative. Among the remaining alternatives, between 220 (Minimal Action) and 312 (Combination Six-lane Highway with Rail and Intermountain Connection) properties fall within the conceptual footprint.

Noise

Commonly described on the decibel (dBA) scale, increases in noise levels of less than 3 dBA are generally considered imperceptible to humans. Increases of 3 to 5 dBA are considered noticeable, and increases of 10 dBA are perceived as a doubling of loudness. This holds true only when there is no change to the character of noise. Alternatives with this trait encompass the No Action, Bus in Guideway, and Highway Alternatives. However, the Rail with Intermountain Connection and Advanced Guideway System Alternatives involve introducing noise sources with different frequency and time characteristics. Noise from these sources are likely noticeable even when it is less loud than the highway.

The No Action Alternative noise increases range from 0 dBA to 2 dBA. The Minimal Action Alternative noise increases range from 0 dBA to 4 dBA. The remaining Action Alternatives increase noise levels between 1 dBA (imperceptible) and 5 dBA (noticeable). The Preferred Alternative noise increases range between 1 dBA to 5 dBA, similar to those of the other Action Alternatives.

2.8.3 Implementation Comparisons

Alternatives were evaluated for how well they can be implemented. Total capital costs of construction and overall construction duration and impact are discussed below.

Total Capital Costs

Cost estimates were developed to provide comparable cost information across Action Alternatives on a corridor-wide level. The costs provide planning-level estimates for Tier 1 and provide a reasonable understanding of the current year funding levels considered in the evaluation process.

The improvements defined in the Action Alternatives answer the general location, mode, and capacity of improvements in the Corridor even though alignments are generally defined for purposes of impact analysis and costs. Because the actual alignment is not defined with any detail until a Tier 2 process and Preliminary Engineering, the cost estimates developed consider only major items and assume other items as a percentage of the major items. This is consistent with planning-level cost estimates and recognizes the inherent uncertainty with variations that occur during the Tier 2 process and design. Developing costs for current year has implications because over time the inflation rate is anticipated to substantially increase total costs.

While the Advanced Guideway System costs are not directly comparable to the high-speed transit cost estimates developed for the Rocky Mountain Rail Authority's high-speed rail study, there is a similarity because the Advanced Guideway System Alternative identified in this document has characteristics similar to those of the maglev system considered in the Rocky Mountain Rail Authority study. Because of this similarity, the two studies coordinated unit cost information for this particular technology. However, the alignments are different, the stations are different, the operating characteristics are different, and the Rocky Mountain Rail Authority has an additional destination along the I-70 Mountain Corridor (Black Hawk/Central City gaming area). Furthermore, the Rocky Mountain Rail Authority study concluded that high-speed rail along the general I-70 Mountain Corridor should combine with high-speed rail along the Colorado Front Range between Pueblo and Fort Collins resulting in a different overall system.

Cost estimates for alternatives were developed in 2003 from preliminary design item costs, cost estimating contingency factors and other component costs. To update costs for this document, lead agencies used cost escalations for each alternative, using the Colorado Highway Construction Cost Index

as a basis for determining long-term future cost escalation. This resulted in a current year cost (2010) of $9.2 billion to $11.2 billion dollars. The Advanced Guideway System cost estimates were established in conjunction with the Federal Transit Administration's Colorado Urban Maglev Project and were independently reviewed and confirmed by the Rocky Mountain Rail Authority as part of their High Speed Rail Feasibility Study. See *I-70 Mountain Corridor PEIS Cost Estimates Technical Report* (CDOT, August 2010) for detail on estimated methodology and assumptions.

The process of escalating costs provides a uniform treatment of alternatives for relative comparison. The Colorado Department of Transportation updated the 2010 cost estimate based on a revised methodology to provide a more reasonable range of costs consistent with a Tier 1 document for the 21 Action Alternatives, including the Preferred Alternative. The revised methodology focuses on Year of Expenditure cost to a mid-year of construction of 2020 for the Minimal Action, while all other alternatives assume mid-year construction of 2025, which is the midpoint of the planning period (2050).

The Preferred Alternative identifies a minimum and maximum range of multi-modal improvements ranging in cost from $16.1 billion to $20.2 billion (in year of expenditure with a mid-year of construction of 2025).

The 21 Action Alternatives evaluated in this document range in cost from $1.9 billion to $20.2 billion (in year of expenditure with the mid-year of construction of 2025, except for the Minimal Action which has a mid-year of construction of 2020).

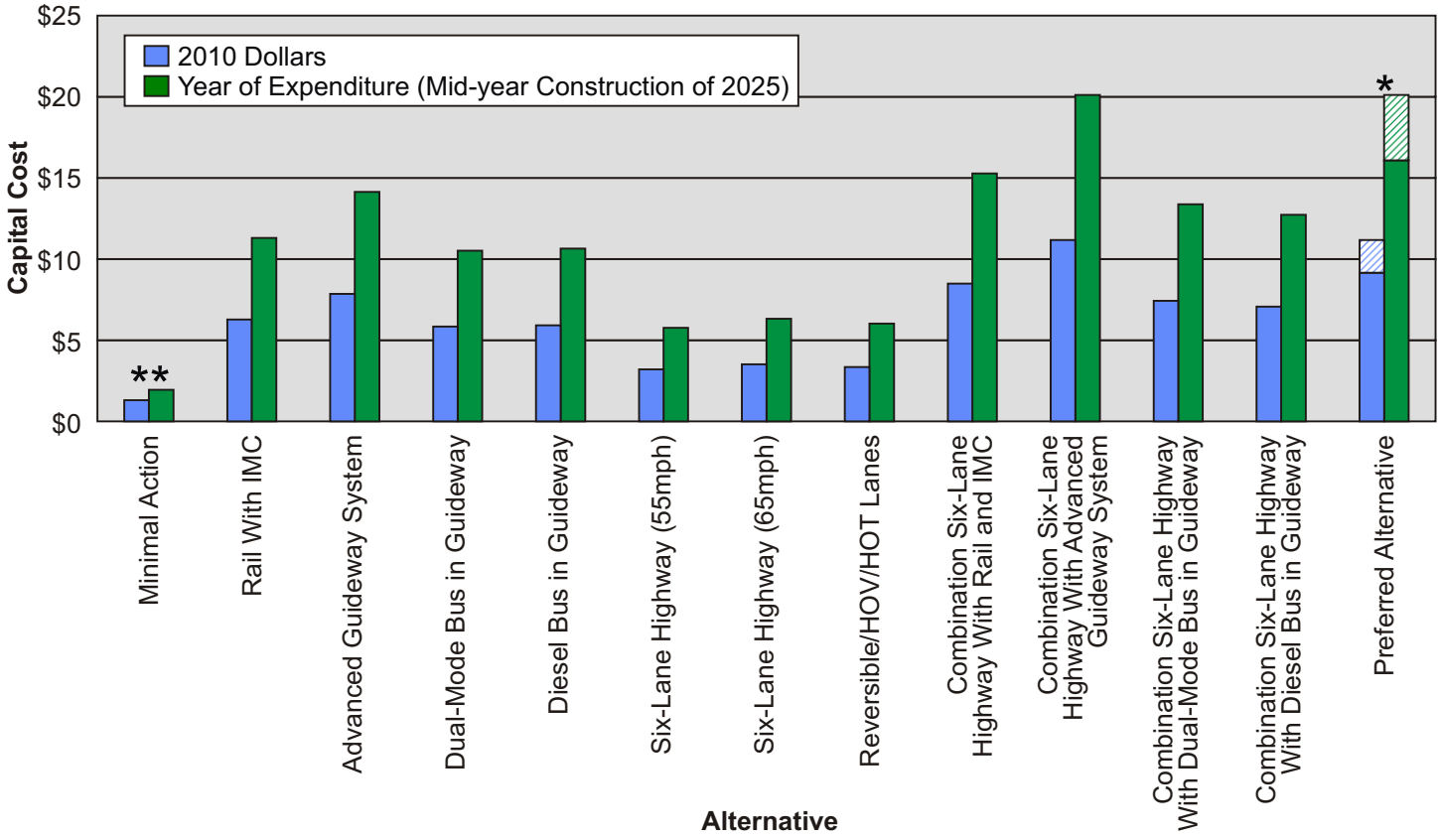
Figure 2-18 shows the total capital cost of construction for each alternative in current dollars and in year of expenditure. This does not include ongoing operations and maintenance costs or independently planned capital projects.

The No Action Alternative includes only projects that have existing or projected funding and are common to all Action Alternatives. Therefore, No Action Alternative costs are, for comparison purposes, zero. Combination Alternatives have the highest cost, followed by Transit Alternatives and then Highway Alternatives. Because Combination and Transit Alternatives include a new transit system between Eagle County Regional Airport and C-470, and while Highway Alternatives include major highway widening only between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill and in Dowd Canyon, transit costs tend to be higher. While the Preferred Alternative has high comparative costs, it addresses the project purpose and need while minimizing environmental and community impacts. The adaptive management approach to this alternative constructs improvements only as needed. The *I-70 Mountain Corridor PEIS Cost Estimates Technical Report* (CDOT, August 2010) provides more detail on project costs by alternative.

Construction Duration and Impact

The construction duration and impact is directly tied to the amount of construction required and the location of that construction. The No Action Alternative has the least construction duration and impact but results in ongoing traffic delays and congestion. The Minimal Action Alternative and Transit Alternatives in separate guideways (Advanced Guideway System and Rail with Intermountain Connection) have less construction duration and impact than alternatives requiring I-70 construction. These alternatives have less construction within the existing I-70 footprint resulting in less traffic control and shorter construction duration. All alternatives that include six-lane highway widening between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill and in Dowd Canyon have the longest construction durations and largest construction impacts. This includes the Preferred Alternative Maximum Program. The Preferred Alternative Minimum Program has less construction impact due to less widening of I-70.

Figure 2-18. Capital Cost by Alternative



* The Maximum Program presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

** The methodology focuses on year of expenditure cost to a mid-year of construction of 2020 for the Minimal Action Alternative.

2.8.4 Summary

In general, the Combination Alternatives provide the most capacity along the Corridor and best reduce congestion but also have the greatest environmental impacts. There is a tradeoff between meeting the needs of the project and direct impacts on resources.

The Transit and Highway Alternatives have lower levels of improvements and result in higher levels of congestion than the Combination Alternatives. The Preferred Alternative provides a range of increased capacity based on the triggers with the full implementation of the Maximum Program providing the greatest amount of capacity compared to the Combination Six-lane Highway with Advanced Guideway System Alternative.

On a corridorwide basis, the Preferred Alternative:

- Improves safety, mobility, and accessibility for all users
- Is responsive and adaptive to broader global trends that affect the way travel decisions are made in the future
- Best meets the project purpose and need
- Meets environmental and legal requirements
- Preserves, restores, and enhances community and cultural resources
- Preserves and restores or enhances ecosystem functions
- Is economically viable over the long term

Overall, the Preferred Alternative provides the best opportunity to meet the project purpose and need while minimizing environmental and community impacts, improving safety, and considering implementation due to its phased and adaptive approach. Compared to the other Action Alternatives, the Preferred Alternative performs best in meeting the purpose and need of increasing capacity, improving mobility and accessibility, and reducing congestion. An evaluation of 2035 performance measures and the 2050 travel demand shows that the Preferred Alternative provides the best opportunity to meet the performance measures of the purpose and need and accommodate the 2050 travel demand. While the Combination Six-Lane Highway with Advanced Guideway System Alternative also meets purpose and need and minimizes impacts, the phased nature of the Preferred Alternative, including triggers and events that allow particular improvements to be made or considered, helps minimize the overall impact on the Corridor by carefully considering the ongoing need and feasibility of improvements as conditions change in the Corridor.

2.9 How can the Preferred Alternative be implemented?

The Record of Decision for the PEIS selects a program of transportation improvements that identifies travel mode, future needed capacity, general location of the Preferred Alternative, and mitigation strategies for the Corridor. The Record of Decision also defines the process for subsequent Tier 2 processes, ensuring that the Corridor vision and programmatic guidance can be achieved. Projects included in the Tier 1 program decision are required to follow a Tier 2 NEPA process that evaluates specific alignment alternatives, impacts, and commits to specific mitigation. Future studies, Tier 2 or pre-Tier 2 processes, may also determine the feasibility of some improvements, particularly given the challenging terrain and environmental constraints of the Corridor.

Studies will be completed to answer questions on the Advanced Guideway System regarding feasibility, cost, ridership, governance, and land use. If these studies show that Advanced Guideway System cannot be funded or implemented by 2025 or is otherwise deemed unfeasible to implement, other alternatives fully evaluated in the Final PEIS could be pursued. The determination of feasibility needs to include considerations of cost and benefits, safety, reliability, environmental impacts, technology, among other considerations. Discussions on determination of feasibility will involve the Collaborative Effort stakeholder committee and follow the I-70 Mountain Corridor Context Sensitive Solutions process.

The use of triggers in the Preferred Alternative recognizes that future travel demand and behavior are uncertain and that additional transportation solutions should be based on proven need. Subsequent projects will be evaluated in terms of how that project can move the program forward to meet transportation needs. The Collaborative Effort stakeholder committee will review progress and effects of the Preferred Alternative at least every two years to determine if there is a need for additional highway and non-Advanced Guideway System transit capacity improvements. If the Preferred Alternative triggers are engaged, the Collaborative Effort stakeholder committee will discuss whether and how to implement elements of the Preferred Alternative Maximum Program improvements, recognizing that they may need to consider other alternatives fully evaluated in the Final PEIS.

The triggers create a mechanism for defining the specifics of future transportation solutions consistent with the Preferred Alternative. They are decision points allowing for adaptive management that takes into account the current and future conditions of the transportation system. The outcome of the triggers could result in:

- Additional highway and non-Advanced Guideway System transit capacity improvements,
- A determination that the Tier 1 decision should be revisited (for example, a different mode is more feasible), or
- No further action.

An assessment will be performed in 2020 to evaluate the overall purpose and need and the effectiveness of implementation of the programmatic decision. At that time, CDOT and the Collaborative Effort stakeholder committee may consider improvements from the Preferred Alternative Maximum Program, consider other alternatives fully evaluated in the Final PEIS, or pursue a new process because the context in which this Tier 1 decision was made is so changed that none of the alternatives evaluated in the Final PEIS meet future transportation needs. Global, regional, and local trends such as peak oil, climate change, technological advances, and changing demographics could affect these future transportation needs.

More detail on the implementation of the Preferred Alternative can be found in the **Introduction Chapter**, regarding Implementation.

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Chapter 3. Affected Environment and Environmental Consequences

What does Chapter 3 cover?

Chapter 3 discusses the affected environment and environmental impacts from construction and operation of the alternatives listed in **Chapter 2, Summary and Comparison of Alternatives**. **Chapter 3** presents background, methodologies, agency coordination, areas of interest, direct and indirect impacts, Tier 2 process information, and mitigation strategies for each resource. **Chapter 4, Cumulative Impacts Analysis,** discusses cumulative impacts of this action, along with other past, present and reasonably foreseeable future planned actions in the cumulative study area.

The natural and human environment resources inventoried and described in this chapter include the following:

3.1 Climate and Air Quality Resources
3.2 Biological Resources
3.3 Wetlands and Other Waters of the U.S.
3.4 Water Resources
3.5 Geologic Hazards
3.6 Regulated Materials and Historic Mining
3.7 Land Use and Right-of-Way
3.8 Social and Economic Values
3.9 Environmental Justice
3.10 Noise
3.11 Visual Resources
3.12 Recreation Resources and Section 6(f) Evaluation
3.13 Historic Properties and Native American Consultation
3.14 Section 4(f)
3.15 Paleontology
3.16 Energy

Additionally, discussions and summaries of other impacts or issues that are not resource or human environment-specific include those found in the following sections:

3.17 Irreversible and Irretrievable Commitment of Resources
3.18 Short-term Uses versus Long-term Productivity
3.19 Mitigation Summary

What is the context of the resource evaluations?

The Corridor that has been evaluated is analogous to the study area and varies by resource; it includes the highway and associated infrastructure and the project footprint. For example, when evaluating water resources, the Corridor includes all adjacent watersheds or when evaluating socioeconomic resources, the nine counties that represent the economic base of the Corridor are evaluated.

The Corridor is diverse and includes:

- Four life zones
  - Foothills
  - Montane
  - Subalpine
  - Alpine

- Four watersheds
  - Colorado River sub-basin
  - Eagle River sub-basin
  - Blue River sub-basin
  - Clear Creek sub-basin
- Nine geologic domains (see **Section 3.5)**
- Two national forests
  - White River National Forest
  - Arapaho and Roosevelt National Forests
- Five counties
  - Garfield
  - Eagle
  - Summit
  - Clear Creek
  - Jefferson
- Twenty-seven scenery analysis units (see **Section 3.11)**.

These zones, watersheds, domains, or jurisdictions are used to organize the resources.

In recognition of the need for a short-and long-term sustainable transportation vision, the project analysis uses both a 2035 planning horizon and a 2050 long-term horizon. The lead agencies (the Colorado Department of Transportation [CDOT] and Federal Highway Administration [FHWA]) performed the detailed analysis based on the best available data and what is known about the current conditions of the resource. Available future plans extend through the 2035 planning horizon. The lead agencies consider effects on resources based on trends or changes that may occur between 2035 and 2050, using 2035 as a stepping stone to look toward the 2050 planning horizon. The project purpose and need is based on the 2050 planning horizon. This 2050 analysis is affected by future fluctuations in global, regional and local trends, such as the declining availability of fossil fuels (peak oil), climate change, technological advances, and changing demographics.

Why is this analysis focused on specific issues?

This analysis focuses on resource issues that differentiate the alternatives being described. Council on Environmental Quality regulations on implementing the National Environmental Policy Act (NEPA) provide direction to focus the assessment criteria for alternative impact discussions (40 Code of Federal Regulations 1500.1). Highlights from section 1500.1 (b) and (c) state that “Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail” and “Ultimately it is not better documents, of course, but better decisions that count.”

It is the policy of NEPA (40 Code of Federal Regulations 1500.2 (b)) “…to emphasize real environmental issues and alternatives.”

The National Environmental Policy Act emphasizes reducing paperwork (40 Code of Federal Regulations 1500.4 (f) and (g)) by “Emphasizing the portions of the environmental impact statement that are useful to decision makers and the public” and “narrowing the scope of the environmental impact statement process….” to support the decision being made.

What is the general methodology for the natural and human environment resource evaluations?

The Project Leadership Team and Issue Task Force processes identified the main natural and human environment resource issues. **Chapter 6, Section 6.3** provides the more information on the following:

- Resource agency input,
- Workshops with jurisdictions and special interest groups,
- Public comment, and
- Data sources.

Resource and built environment specialists collected these data through the use of geographic information systems, public databases, published resources, and fieldwork.

The natural and human environment resource subsections describe more specific methodologies beyond the previously listed general approaches. Techniques for assessing impacts of the alternatives at the Tier 1 level of analysis include geographic information systems resource mapping overlaid with the project footprint, alternative design interpretation, and modeling. The project footprint includes the physical footprint of the alternatives, plus an additional 30 feet on each side. The 30 feet includes a 15-foot construction disturbance zone and an additional 15-foot sensitivity zone. Alternative designs at Tier 1 are conceptual. While alternatives provide detail appropriate for a first tier assessment, these techniques compare project alternatives and relative project impacts using consistent assumptions. This level of detail is too general to reflect final resource-related impacts for specific alternatives, but uses this broad scale of design impacts and environmental resource descriptions to show a relative comparison of impacts rather than actual numbers of impacts.

How did the lead agencies collect and update data for environmental analyses?

This project started in 2000. Some of the initial data collection to characterize the Corridor's affected environment occurred early in the study process – between 2001 and 2004 – and has not been updated. As time progressed, the lead agencies evaluated changes in the Corridor (such as development, land use, wetlands, biological resources, water quality, air quality, and visitation trends); and broader factors (such as economic conditions, gasoline prices and oil supply, and regulatory trends), to determine if these data remain representative of the Corridor conditions and provide a reasonable baseline to compare environmental impacts of the Action Alternatives. The lead agencies identified resources that might be sensitive to changes to evaluate whether data needed to be updated and, if necessary, updated those data accordingly. In most cases, the data collected in the early part of this study still accurately characterize resource conditions in the Corridor. Updating the data would not result in a discernible difference in the comparative analysis due to the relatively stable conditions in the Corridor over the last decade and because small variations in the existing conditions have little effect at the Tier 1 level when comparing impacts in 2035 or beyond. As Tier 2 processes are undertaken, new and often more detailed data will be collected and analyzed. Each resource area includes a discussion related to the validity of the data used for the comparative analysis.

How were impacts quantified?

For purposes of presenting impact quantities in this document, the Combination Alternatives include the Six-Lane Highway with Rail and Intermountain Connection, Six-Lane Highway with Advanced Guideway System, and Six-Lane Highway with Bus in Guideway. These following eight Preservation Alternatives are quantified within the category of Combination Alternatives:

- Combination Six-Lane Highway with Rail and Intermountain Connection, Preserve for Highway Alternative
- Combination Six-Lane Highway with Rail and Intermountain Connection, Preserve for Transit Alternative
- Combination Six- Lane Highway with Dual Mode Bus in Guideway, Preserve for Highway Alternative
- Combination Six-Lane Highway with Dual Mode Bus in Guideway, Preserve for Transit Alternative
- Combination Six-Lane Highway with Diesel Bus in Guideway, Preserve for Highway Alternative
- Combination Six-Lane Highway with Diesel Bus in Guideway, Preserve for Transit Alternative
- Combination Six-Lane Highway with Advanced Guideway System, Preserve for Highway Alternative
- Combination Six-Lane Highway with Advanced Guideway System, Preserve for Transit Alternative

The Preservation Alternatives are not presented separately in this document because they are all assumed to be built, so that the components that are "preserved" or "not precluded" are actually constructed and operating in 2050. These Preservation Alternatives become phasing options for implementing whichever Combination Alternative contains those same components.

How and in what order specific components of the Combination Alternatives are built create subtle differences in impacts on various resources. These could include differences such as:

- Economic or community impacts of a longer or two phased construction period,
- Increases in overall construction costs because of a need to pay for mobilization of labor and materials twice, or
- Greater responsiveness to funding sources.

In general, the impact variations are minor and not fully discernible at the first tier analysis. More detailed definitions of phasing will be developed and analyzed during Tier 2 NEPA processes if that alternative is selected.

The Highway alternatives and highway portions of the Combination alternatives have greater construction impacts on Clear Creek County due to the wider construction footprint needed in that area than the Transit alternatives. The Preferred Alternative avoids highway construction in Clear Creek County between Empire and Idaho Springs under the Minimum Program of Improvements, and the phased approach of the Maximum Program allows ongoing opportunities to avoid, minimize, and mitigate impacts. The impacts discussed in Chapter 3 reflect these differences. As a result, lower numbers of impacts may be reported in Clear Creek County for the Minimum Program of the Preferred Alternative than for the Minimal Action Alternative. Additionally, the impacts are reported before any mitigation.

What is the difference between direct and indirect impacts?

Direct impacts are defined as impacts that are:

- Caused by the action, and
- Occur at the same time and place. (40 Code of Federal Regulations 1508.8)

Indirect impacts are defined as impacts that:

- Are caused by the action;
- Are later in time or farther removed in distance;
- Are reasonably foreseeable; and
- May include growth-inducing effects, and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 Code of Federal Regulations 1508.8)

Indirect impacts in the form of induced growth are anticipated to vary by mode. Transit alternatives are expected to concentrate induced growth in urban areas surrounding transit centers in areas of existing or planned urban development. Highway alternatives are expected to distribute growth based on existing trends for urban/rural development in each county, resulting in increased densities in rural areas. Combination alternatives are expected to distribute growth equally between the above transit and highway distribution scenarios, resulting in increased pressure in both urban and rural areas. The Minimum Program of the Preferred Alternative is expected to initially induce growth in a manner similar to that of the Transit alternatives; growth would be concentrated in urban areas surrounding transit centers. If later phases of the Maximum Program of the Preferred Alternative are implemented, it induces growth in a manner more similar to that of the Combination Alternatives.

The adaptive management approach of the Preferred Alternative allows transportation improvements to be implemented over time, allowing it to be implemented based on future needs and associated triggers for further action. This approach also results in impacts being more spread out over time. For more information, see **Section 2.9**.

These predictions are based on statistical models. These predictions are intended to be conservative and do not account for possible growth restrictions that communities adopt during their land use planning processes. For more information on induced growth, see **Section 3.7, Land Use and Right-of-Way** and the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010).

How are impacts defined at Tier 1 versus Tier 2?

While the lead agencies recognize that the alternatives do not have discernible impact differences globally, the alternatives have discernible negative and beneficial impact differences locally. This document addresses those differences by evaluating a range of alternatives at a scale appropriate for first tier Corridor analysis.

Tiering the analysis addresses broad programs (travel mode, capacity, and general location) and associated issues at a higher level, and outlines mitigation “strategies” in initial (Tier 1) or systems-level analyses. Tier 2 processes analyze site-specific proposals and impacts, with site-specific mitigation commitments following the processes defined at Tier 1. The tiered process supports decision-making on major Corridor strategies ripe for decision and provides a means to preserve those decisions. This tiered process allows the advancement of smaller, fundable projects meeting the strategies adopted in the Tier 1 analysis and provides for consistency and an overarching vision to be met in the Corridor over time. This document also identifies existing and future needs along the Corridor.

Subsequent Tier 2 NEPA processes for these individual projects will address site-specific details and update information from Tier 1 studies (for example, new Census data), before technology, design, and location decisions are made. For example, final decisions on the precise location and configuration of lanes are made at the conclusion of Tier 2, based on traffic projections or other factors, when detailed information is developed. The actual alternative alignment could shift within the Corridor from what was evaluated in the Tier 1 process, which could provide additional benefits or impacts not stated in this document. The differences will be evaluated in the Tier 2 processes.

Compliance with applicable environmental laws and regulations must also occur for projects in Tier 2. The Tier 1 decisions do not preclude future avoidance and minimization measures as part of Tier 2. Furthermore, construction of individual projects cannot occur until the completion of the subsequent Tier 2 NEPA processes.

What is the programmatic approach to mitigation planning?

One role of this document is to provide general mitigation strategies guiding subsequent Tier 2 NEPA processes and implementation of the Preferred Alternative. These mitigation strategies will undergo necessary refinement as a result of public review and comment on the Revised Draft and Final PEIS, and may become specific mitigation commitments in Tier 2 processes. **Sections 3.1 through 3.18** of this document describe the environmental impacts and resource mitigation strategies for alternatives.

Practical measures were taken throughout this process to identify alternatives minimizing environmental and community impacts. These efforts centered on developing alternatives through the coordination of conceptual planning, design, and environmental studies, with the intent of minimizing alternative footprints. In addition, committees were formed to address issues and mitigation potential associated with sensitive resources. See **Chapter 6, Section 6.3** for more information. These measures are key considerations in design strategies for Tier 2. In Tier 2 NEPA processes, project-specific mitigation is further shaped and implemented with design efforts to further avoid and minimize impacts to the greatest extent possible.

Sections 3.1 through 3.18 describe the environmental impacts and resource mitigation strategies for alternatives. **Table 3.19-1, Summary of Resource Mitigation,** provides a verbatim compilation of the mitigation strategies contained in **Sections 3.1 through 3.18**.

In addition to the mitigation strategies, the lead agencies will comply with all laws and agreements including the following:

1. Employ I-70 Mountain Corridor Context Sensitive Solutions design criteria for engineering and aesthetic guidance to further minimize impacts on communities and the environment.
2. Apply the conditions set forth in the Programmatic Agreement among the consulting parties involving Section 106 of the National Historic Preservation Act.
3. Fulfill responsibilities set forth in the ALIVE Agreement (A Landscape level Inventory of Valued Ecosystem components) to be developed in conjunction with the ALIVE Committee consisting of city, county, local, and federal representatives. The ALIVE program provides opportunities to address issues related to improving wildlife movement and reducing habitat fragmentation in the Corridor.
4. Fulfill responsibilities set forth in the Biological Assessment/Biological Opinion to be developed in conjunction with the U.S. Fish and Wildlife Service.
5. Mitigation measures will be developed to offset impacts on species identified in the Biological Report for the White River National Forest and the Arapaho and Roosevelt National Forests.

6. Comply with the 404(b)(1) guidelines of the Clean Water Act.
7. Engage stakeholders to continue the work of the Stream and Wetland Ecological Enhancement Program (SWEEP) Committee to integrate water resource needs (such as water quality, fisheries, wetlands, and riparian areas) with design elements for construction activities and long-term maintenance and operations of the transportation system.
8. Integrate winter storm management and maintenance procedures into any of the proposed improvements. Highway Alternative improvements throughout Clear Creek County will include snow storage areas in select locations to capture snow and other roadway runoff to reduce impacts on adjacent ecosystems.
9. Address specifically identified total maximum daily load (TMDL) thresholds, and implement the Sediment Control Action Plans developed specifically for Straight Creek and Black Gore Creek to identify methods to control the existing transport of winter sanding materials. Develop Sediment Action Control Plans for other Corridor areas such as the upper reaches of Clear Creek.
10. Develop information systems (such as advertising campaigns to support local businesses, signage with hours of operation, and detour plans) to inform affected communities, I-70 travelers, businesses, and homeowners about construction activities and schedules.

How do I read Chapter 3?

On the **Chapter 3** tab, the reader can find a list describing the alternatives evaluated for their effects on the various environmental resources. The reader can use this tab for easy reference while reviewing the resource affected environments and environmental consequences by the Action Alternatives on the resources.

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3.1 Climate and Air Quality Resources

3.1.1 What are the air quality resources of concern to this project and why are they important?

Air pollution affects human, plant, and wildlife health, visibility, and global climate change, and is a concern to Corridor residents and visitors. Vehicle emissions, emissions from mining, the oil and gas industry, residences that burn wood, fires in project-area forests, and a variety of large-scale manufacturing plants in Jefferson County affect air quality in the Corridor. The dry climate in the Corridor contributes to particulate matter (very small dust particles) from windblown dust and road sanding.

The Clean Air Act requires the Environmental Protection Agency to set National Ambient Air Quality Standards (NAAQS) for pollutants, referred to as criteria pollutants, considered harmful to public health and the environment. Most of the Corridor meets NAAQS, with the exception of the east end of the Corridor in Jefferson County, which, along with the rest of the Denver metropolitan area, exceeds air quality standards for ozone.

Criteria Air Pollutants

The Environmental Protection Agency set standards for six criteria air pollutants:

- Carbon monoxide
- Ground level ozone
- Nitrogen dioxide
- Sulfur dioxide
- Lead
- Microscopic dust particles referred to as "particulate matter" or PM

Other pollutants of concern include vehicle emissions of toxic pollutants (referred to as mobile source air toxics or MSATs) and greenhouse gases. The Environmental Protection Agency has not set standards for allowable levels of toxic pollutants or greenhouse gases. A Colorado Executive Order (D 004 08) prescribes specific goals for reducing and reporting greenhouse gas emissions statewide and directs the Colorado Department of Public Health and Environment (CDPHE) to develop and implement a process for identifying and evaluating the benefits and impediments to measures that reduce greenhouse gas tailpipe emissions from cars and light trucks. The Colorado Department of Public Health and Environment has not established specific guidelines for reducing greenhouse gas emissions.

3.1.2 What study area and process was used to analyze air quality resources?

The Corridor includes five counties:

- Garfield
- Eagle
- Summit
- Clear Creek
- Jefferson

The Colorado Department of Transportation characterized air quality throughout the Corridor by analyzing current (2009) data from available air quality monitoring stations in the Corridor maintained by CDPHE, Air Pollution Control Division (APCD). Analysis included calculating emissions of criteria pollutants for each alternative. Ozone is considered a regional pollutant and was not evaluated for each alternative even though the eastern end of the Corridor is in non-attainment for ozone. The lead agencies also analyzed visibility, MSATs, and greenhouse gases. In recognition of the need for a short- and long-term sustainable transportation vision, the project analysis uses both a 2035 planning horizon and a 2050 long-term horizon. Over the past decade since the I-70 Mountain Corridor PEIS was initiated, a number of changes have occurred in air quality regulations and monitoring, and this section presents assessment

of the alternatives according to current (2010) standards. The Colorado Department of Transportation used year 2000 traffic volumes as the baseline for the travel demand modeling. The 2000 data remains valid for model calibration as no major changes in travel behavior or transportation infrastructure have occurred since 2000. The Corridor serves the same market of users with the same I-70 infrastructure as was in place in 2000. Therefore, traffic forecasts based on year 2000 data can be used for the air quality analysis. The *I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report* (CDOT, August 2010) provides additional details on the air pollutant monitoring, modeling methods, and emission calculations.

3.1.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

The lead agencies coordinated the air quality issues on this project with the Environmental Protection Agency and APCD. The Environmental Protection Agency asked that Tier 2 processes include in-depth MSAT emission impact analyses. The Air Pollution Control Division monitors air quality within the state and has no specific concerns, noting that airflow patterns and wind speed in the mountain areas disperse pollutants sufficiently so that pollutant concentrations meet NAAQS.

3.1.4 What are the areas of air quality interest identified in the Corridor?

The Corridor, except the east end in Jefferson County in the Denver metropolitan area, meets NAAQS for all criteria pollutants. No violations of air quality standards have been recorded outside Jefferson County. However, air quality is a growing concern to Corridor communities because of increasing development, construction, and traffic along the Corridor, combined with windblown dust from street maintenance activities, mine tailings, sand and gravel mining operations, and woodburning. Communities are also concerned about global climate change and the effects that the Action Alternatives may contribute to that issue. Temperature inversions and dry climates exacerbate air quality and visibility concerns throughout the Corridor.

Visibility in the White River National Forest's Class I Eagles Nest Wilderness Area near Vail is an important issue in the Corridor and is addressed in a statewide regional haze reduction plan (CDPHE, 2008). Although visibility is generally good in this area—averaging 140 miles—the plan seeks to improve visibility in all Class I areas and calls for reductions in air pollutants that contribute to haze, such as nitrogen, sulfur dioxide, and dust (particulate matter).

3.1.5 How do the alternatives potentially affect air quality and climate?

The relative differences in air pollutant emissions among the alternatives are presented below. The *I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report* (CDOT, August 2010) presents additional discussion and modeling results.

How do the alternatives affect criteria pollutant emissions?

For the alternatives, air pollutant emissions in 2035 and 2050 are anticipated to be less than current day emissions, even though 2035 and 2050 traffic volumes will be higher than 2000 volumes. Emissions in the future are assumed to be lower because stricter regulations are being enacted to control emissions and older, higher-polluting vehicles will continue to be replaced by newer, lower-polluting vehicles. Between 2035 and 2050, this trend may change, and PM_{10} emissions may correlate more directly with vehicle miles traveled.

To compare the air quality impacts among the various alternatives, total daily particulate matter, sulfur dioxide, nitrogen dioxide, and carbon monoxide emissions were calculated for each alternative and compared to the baseline emissions. The Colorado Department of Public Health and Environment,

APCD, in cooperation with the Environmental Protection Agency, monitors air quality and calculates baseline emissions. Because pollutant emissions from vehicles are directly related to vehicle miles traveled, alternatives with higher vehicle miles traveled generally have higher total daily emissions. Transit Alternatives that shift travel from cars to transit vehicles have lower emissions. **Table 3.1-1** compares emissions across the alternatives.

As presented in **Table 3.1-1**, emissions for the Preferred Alternative generally fall within the range of the other Action Alternatives, but Transit alternatives have lower emissions than the alternatives that include increased highway capacity.

Table 3.1-1. Estimated Pollutant Emissions by Alternative

Alternatives	Pollutants (tons per day)							
	Particulate Matter		Sulfur Dioxide		Nitrogen Dioxide		Carbon Monoxide	
	2000*	2035	2000*	2035	2000*	2035	2000*	2035
Baseline	3.99	0.14	4.26	0.11	16.45	4.28	113.79	76.03
No Action	N/A	0.13	N/A	0.09	N/A	3.87	N/A	69.51
Minimal Action	N/A	0.13	N/A	0.09	N/A	3.84	N/A	68.98
Rail with IMC	N/A	0.12	N/A	0.09	N/A	3.63	N/A	65.21
AGS	N/A	0.12	N/A	0.09	N/A	3.54	N/A	63.56
Dual-Mode Bus in Guideway	N/A	0.12	N/A	0.09	N/A	3.56	N/A	64.00
Diesel Bus in Guideway	N/A	0.11	N/A	0.09	N/A	3.61	N/A	64.82
Six-Lane Highway (55 or 65 mph)	N/A	0.14 (55mph) 0.13 (65mph)	N/A	0.11	N/A	4.25	N/A	76.07
Reversible/HOV/HOT Lanes	N/A	0.14	N/A	0.11	N/A	4.29	N/A	76.67
Combination Six-Lane Highway with Rail and IMC	N/A	0.14	N/A	0.10	N/A	4.12	N/A	73.82
Combination Six-Lane Highway with AGS	N/A	0.13	N/A	0.10	N/A	4.06	N/A	72.88
Combination Six-Lane Highway with Dual-Mode Bus in Guideway	N/A	0.14	N/A	0.10	N/A	4.09	N/A	73.15
Combination Six-Lane Highway with Diesel Bus in Guideway	N/A	0.14	N/A	0.10	N/A	4.12	N/A	73.61
Preferred Alternative*	N/A	0.12 to 0.13	N/A	0.09 to 0.10	N/A	3.68 to 4.06	N/A	66.00 to 72.88

**The Preferred Alternative is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Key to Abbreviations/Acronyms

AGS = Advanced Guideway System HOT = high occupancy toll HOV = high occupancy vehicle
IMC = Intermountain Connection mph = miles per hour

How do the alternatives affect MSAT emissions?

For all the alternatives, the amount of MSATs emitted is a function of vehicle miles traveled. The vehicle miles traveled estimated for the Preferred Alternative are slightly higher than that for the No Action Alternative because the additional capacity accommodates trips suppressed because of congestion. The increase in vehicle miles traveled for some of the alternatives also leads to higher MSAT emissions for these alternatives, although MSAT emissions may decrease along the parallel routes. The emissions increase is offset by lower MSAT emission rates due to increased speeds. According to the Environmental Protection Agency's MOBILE6.2 emissions model, emissions of all of the priority MSATs, except diesel particulate matter, decrease as speeds increase.

Because the estimated vehicle miles traveled under each alternative are nearly the same, overall MSAT emissions are not appreciably different. Regardless of the alternative chosen, future emissions are likely lower than present levels in 2050 as a result of the Environmental Protection Agency's national control programs that are projected to reduce MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, growth rates of vehicle miles traveled, and local control measures. However, the magnitude of the projected reductions is so great (even after accounting for growth in vehicle miles traveled) that MSAT emissions in the study area are likely to be lower in the future in all cases.

The additional highway travel lanes considered under some of the Action Alternatives and the auxiliary lanes included in all Action Alternatives have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, under each alternative, some localized areas may have higher ambient concentrations of MSATs under the Action Alternatives than under the No Action Alternative. The localized increases in MSAT concentrations are likely most pronounced along the roadway sections in Clear Creek County between Silverthorne and Idaho Springs, and in the Vail valley where the highway is closer to communities. Localized increases in MSAT emissions for the Action Alternatives, however, could be offset due to increases in travel speed and reductions in congestion (which are associated with lower MSAT emissions). Mobile source air toxics are lower in other locations when traffic shifts away from them. On a regional basis, the Environmental Protection Agency's vehicle and fuel regulations, coupled with fleet turnover, cause substantial reductions over time. In almost all cases, regionwide MSAT levels are projected to be lower than today's levels.

The *I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report* (CDOT, August 2010) provides additional details on MSAT emissions.

Visibility

Regional haze is caused by fine particles, such as air pollutants and dust, which scatter light and reduce visibility. Vehicle emissions are a factor affecting visibility but not directly correlated to a visibility index or range because emissions from other sources, as well as atmospheric conditions, also contribute to visual impairment.

How do the alternatives affect visibility?

Forecasts for all alternatives show that, although traffic volumes are higher, future tailpipe exhaust pollutants are lower because of stricter standards on vehicle emissions and the lower sulfur content of diesel fuel. As a result, for all alternatives, including the No Action Alternative, there is a substantial decrease (approximately 75 percent to 85 percent) in emissions of pollutants (particulate matter, sulfur dioxide, and nitrogen oxides) that affect visibility. The Preferred Alternative falls within the same range. The Class I Eagles Nest Wilderness Area is not adversely affected under any alternative (including the No Action Alternative).

How do the alternatives affect greenhouse gas emissions?

The issue of global climate change is an important national and global concern. The transportation sector is the second largest source of total greenhouse gases in the U.S. and the greatest source of carbon dioxide

emissions—the predominant greenhouse gas. Consumption of petroleum products such as gasoline and diesel fuel account for almost all (98 percent) of transportation-sector emissions.

Recognizing this concern, the lead agencies are working to:

- Develop strategies to reduce transportation's contribution to greenhouse gases,
- Assess the risks to transportation systems and services from climate changes,
- Support technological or operational advances that will reduce emissions, and
- Conduct public outreach and education regarding greenhouse gases and transportation, among other things.

Chapter 4, Cumulative Impacts Analysis, contains additional information about the lead agencies' actions to address climate change.

Although emission levels for the alternatives differ, the overall effect of greenhouse gas emissions is expected to be similar across alternatives because emissions changes are small compared to global totals. The Colorado Department of Transportation acknowledges that even though climate change is a global issue and local impacts do not differ substantially, incremental changes to emission levels will result in some effects.

The *I-70 Mountain Corridor PEIS Climate and Air Quality Technical Report* (CDOT, August 2010) provides additional details on the greenhouse gas emissions of the Action Alternatives.

How does construction of the alternatives affect air quality?

Construction of the Action Alternatives generates vehicle- and dust-related air emissions. Generally, the quantity of construction-related emissions is proportionate to the scope of construction. Boring of new tunnels generates substantial dust if not properly managed. Construction personnel working on these elements may be exposed to acute dust during blasting operations. Tunnel borings at the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels occur under all Action Alternatives, except the Minimal Action Alternative. The Six-Lane Highway (65 miles per hour [mph]) Alternative includes three additional tunnels not included in the other Action Alternatives. Alternatives with a larger footprint (and tunnel borings) generate more emissions for a longer duration. The Minimal Action generates fewer emissions because it involves less construction, while the Combination Alternatives are the most complex, have the largest footprints and associated construction areas, take the longest to construct, and, as a result, have the greatest impacts on air quality during construction. The impacts of the Preferred Alternative fall within the range of the other Action Alternatives, but the adaptive management component of the Preferred Alternative allows greater flexibility in implementing components, which may result in less construction and corresponding reduction in construction-related impacts.

What are the project effects on air quality in 2050?

Emission of traditional air pollutants is related to traffic volumes and congestion. Based on current trends, it is likely that traffic volumes will increase between 2035 and 2050. As new air quality regulations and cleaner car technologies are implemented, the trend of decreasing air pollutant emissions is expected to continue despite the increase in vehicle travel along the Corridor. Between 2035 and 2050, this trend may change and air pollutant emissions may correlate more directly with vehicles miles traveled.

Emissions of greenhouse gases are likely to continue to increase, even as new programs are put in place to control those increases. Controlling greenhouse gas emissions is a national and international problem that is difficult to address or affect on a project level. **Chapter 4, Cumulative Impacts Analysis** of this document, presents some of the statewide and national efforts to control greenhouse gases. The lead agencies will need to adapt the implementation of the Action Alternatives in accordance with guidance and policies that are expected to continue to evolve into 2050 and beyond. **Chapter 4, Cumulative Impacts Analysis,** also contains a discussion of cumulative air quality effects.

3.1.6 What will be addressed in Tier 2 processes?

The lead agencies will conduct project-specific Tier 2 processes in accordance with Federal Highway Administration and Environmental Protection Agency guidance available when analyses are conducted. Tier 2 processes will include localized air quality modeling (such as hot spot modeling for carbon monoxide and particulate matter at intersections) where appropriate in designated non-attainment or maintenance areas. The lead agencies will comply with current practices and standards for modeling and estimating air pollutants and will use the Environmental Protection Agency's latest air quality model, MOVES, where appropriate.

3.1.7 What are the mitigation strategies for air quality?

The Colorado Department of Transportation will support policies and programs to improve air quality in the Corridor, such as:

- Support local jurisdiction efforts, such as those in Clear Creek County, to secure grants to help develop data that will better inform the air quality measurements and mitigation
- Support engine idling ordinance to restrict emissions produced from idling auto and commercial vehicles, especially buses, delivery trucks, etc.
- Continue to explore highway maintenance strategies to minimize the amount of sand used for winter maintenance and to remove the sand from the roadway to minimize re-entrained dust
- Continue to support regional, statewide, and national efforts to reduce air pollutants and comply with current air quality regulations

This document acknowledges that some air quality issues, particularly emissions of greenhouse gases, are global issues that are difficult to effect on a project-specific level. As such, the lead agencies are committed to working on these broad issues, as described in **Chapter 4, Cumulative Impacts Analysis**, while also incorporating measures to control air pollutant emissions locally.

Because project alternatives are not anticipated to cause or result in violations of any NAAQS, most mitigation measures for air quality will center on controlling fugitive dust during construction, operations, and maintenance. Conceptual techniques for mitigation of construction impacts could include the following:

- Control fugitive dust through a fugitive dust control plan, including wetting of disturbed areas
- Use the cleanest fuels available at the time in construction equipment and vehicles to reduce exhaust emissions
- Keep construction equipment well maintained to ensure that exhaust systems are in good working order
- Control blasting and avoid blasting on days with high winds to minimize windblown dust from blasting, particularly near community areas
- Minimize dust from construction in or near tailing areas
- Investigate requirements or incentives for retrofitting construction vehicles and equipment to reduce emissions (such as idling equipment)

During Tier 2 processes, CDOT will:

- Develop specific and more detailed mitigation strategies and measures
- Develop best management practices specific to each project
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway

Strategies also are discussed in **Section 3.19, Mitigation Summary**.

3.2 Biological Resources

3.2.1 What are the biological resources in the Corridor and why are they important?

Biological resources in the I-70 Mountain Corridor include vegetation, wildlife, and aquatic resources, such as fish, amphibians, and macroinvertebrates. Federal and state regulations protect many of these biological resources and require evaluation of the effects of a proposed project on these resources. These federal and state regulations include the following:

- **Endangered Species Act** – Section 7 of the Endangered Species Act outlines the responsibilities of federal agencies to participate in the conservation and recovery of listed species and requires agencies to ensure that any action that is federally authorized, funded, or carried out is not likely to jeopardize the continued existence of listed species or modify their critical habitat.
- **Migratory Bird Treaty Act** – Protects raptors and other migratory birds and their active nest sites.
- **Bald and Golden Eagle Protection Act** – Provides for the protection of the Bald Eagle (*Haliaeetus leucocephalus*) and the Golden Eagle (*Aquila chrysaetos*).
- **Colorado Senate Bill 73-40** (§*33-5-101-107*, *Colorado Revised Statute 1973* as amended) – Requires any agency of the state to obtain wildlife certification from the Colorado Division of Wildlife when the agency plans construction in any stream or on any stream bank.

The United States Forest Service maintains lists of forest-sensitive species and management indicator species, which were included in this study. The United States Forest Service requires that any project on forest lands to identify agency-listed sensitive species and ensure that the project does not cause species to decline and subsequently require listing under the Endangered Species Act.

What are the major concerns regarding biological resources in the Corridor?

Lead agencies worked with local, state, and federal agencies to determine the following major concerns:

- Habitat loss due to vegetation impacts
- Increased barrier effect of the I-70 Mountain Corridor to wildlife movement and subsequent increase in animal-vehicle collisions
- Impacts on aquatic species due to construction in and next to waterways
- Impacts associated with the increased use of traction sands and deicers in the winter

The I-70 Mountain Corridor creates barriers to wildlife movement. Even where animals can cross the highway, traffic noise and vehicle lights can deter animals from approaching the highway and animal-vehicle collisions can result in their injury or death.

Which species are protected?

Based on information from the United States Fish and Wildlife Service, United States Forest Service, and Colorado Division of Wildlife, there are 68 individual protected species, as well as two groups of protected species, consisting of trout and aquatic macroinvertebrates, in the Corridor. There are four species protected under the Endangered Species Act whose habitat will be directly impacted by the proposed project, Canada lynx (*Lynx canadensis*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), greenback cutthroat trout (*Oncorhynchus clarki stomias*), and yellow-billed cuckoo (*Coccyzys americanus*). For the detailed assessment of all evaluated species, including the methodology to determine a given species' occurrence or absence within the Corridor and additional detail regarding indirect impacts, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT,

August 2010), which includes analysis of wildlife, vegetation, protected species, and aquatic resources in the I-70 Mountain Corridor.

3.2.2 What process was used to analyze biological resources?

How were vegetation and wildlife habitat determined?

The 1999 Colorado Gap Analysis Project and 1997 United States Forest Service geographic information systems data were used to map vegetation communities in the Corridor. The United States Forest Service considers the vegetation mapping units and classification system to be suitable for the evaluation of general Corridor-wide habitats. Analysis of rare and imperiled plant communities was based on the August 2008 Colorado Natural Heritage Program list, which was updated in July 2010. This update affected one vegetation community occurring in the Corridor and already included in the analysis, the Thinleaf Alder-Red-osier Dogwood Riparian Shrubland. Analysis of rare and imperiled plant communities is contingent upon state ranking, which in this case did not change between the 2008 and 2010 lists, therefore the existing analysis is valid. The Colorado noxious weeds lists were obtained from the Colorado Department of Agriculture in July 2009 and updated again in August 2010. Individual county-based noxious weed programs were obtained and reviewed in July 2009. This information, as applicable, was placed into a geographic information system and displayed on maps with the project aerials to provide baseline information for existing conditions within the I-70 Mountain Corridor.

How was wildlife habitat connectivity determined?

Lead agencies examined habitat connectivity and animal-vehicle collisions through an interagency committee known as "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE). The committee identified 13 areas where the I-70 Mountain Corridor interferes with wildlife migration, including elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), and Canada lynx (*Lynx canadensis*). These locations are referred to as linkage interference zones. By focusing on areas of known migration and wildlife use, and creating wildlife crossings, animal-vehicle collisions can be reduced and habitat connectivity increased. A Memorandum of Understanding, signed in April 2008, details the responsibilities of each agency in addressing animal-vehicle collisions (see **Appendix E, ALIVE Memorandum of Understanding**).

The ALIVE Committee is composed of the United States Fish and Wildlife Service, United States Forest Service, Colorado Division of Wildlife, Bureau of Land Management, CDOT, Federal Highway Administration, county, city, and local representatives that work collaboratively to improve habitat connectivity at 13 locations, known as linkage interference zones, along the I-70 Mountain Corridor.

How were Gold Medal and "high-value" fisheries identified

The Colorado Division of Wildlife, in 2009, identified important fisheries for recreational fishing purposes and fish species for State protection in the I-70 Mountain Corridor. All Gold Medal fisheries identified in the Corridor are located west of the Continental Divide, and "high-value" fisheries are located throughout the Corridor. **Figure 3.2-3** shows fishery locations.

How were protected species analyzed?

Lead agencies sought input from the following agencies to determine protected species within the I-70 Mountain Corridor:

- **United States Fish and Wildlife Service –** Upon request, the United States Fish and Wildlife Service provided a list of threatened, endangered, and sensitive species potentially occurring along the I-70 Mountain Corridor. As required by the United States Fish and Wildlife Service, a Programmatic Biological Assessment—a study prepared to determine the likely effects of a project on federally listed species, proposed species, or designated critical habitat—has been

submitted to the United States Fish and Wildlife Service. Coordination with the United States Fish and Wildlife Service has been ongoing and all data has been updated as of 2010.

- **United States Forest Service** – Upon request, the Arapaho and Roosevelt and White River National Forests provided lists of threatened, endangered, and sensitive species, United States Forest Service-sensitive animal, plant and aquatic species, management indicator species, and other species or habitats occurring on forest lands to be analyzed for this project. As required by the United States Forest Service, a Biological Report—a study prepared to determine the likely effects of a project on federally listed species, United States Forest Service-sensitive species, management indicator species, and other species or habitats on United States Forest Service land—has been submitted to the United States Forest Service. Coordination with the United States Forest Service has been ongoing and all data has been updated as of 2009.
- **Bureau of Land Management** – Provided a list of sensitive species located on Bureau of Land Management properties along the I-70 Mountain Corridor. This list is still valid, as it has not been updated by the Bureau of Land Management since 2000.
- **Colorado Division of Wildlife** – Provided input on state-listed and other special-status species, as well as wildlife habitat. State listed and other special status species have been updated for 2010. The updated 2006 lynx habitat inventory and 2008 National Diversity Information Source GIS data were applied to wildlife habitat assessments.

The Colorado Department of Transportation determined the likely presence of protected species by the presence of suitable habitat and known distribution records. Many protected species are "unlikely to occur in the area," and further consideration of these species was not included in the study. In addition to analysis of direct impacts on protected species within the I-70 Mountain Corridor, depletion to the Platte River or Colorado River basins constitutes an action that may affect, and is likely to adversely affect, threatened, endangered, and sensitive species that depend on the river for their existence. These effects will be determined during Tier 2 processes as site-specific biological assessments are prepared as agreed to with the United States Fish and Wildlife Service. The lists of threatened, endangered, and sensitive species potentially occurring along the I-70 Mountain Corridor are subject to change. Ongoing coordination will occur to ensure that current lists are used in project analysis.

For detailed analysis of project effects on protected species, see the I-*70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

Natural resource changes in the Corridor that occurred during this timeframe are dominated by the substantial loss of timber and resulting effect to many other resources (such as vegetation, wildlife habitat, visual quality) associated with the mountain pine beetle epidemic. The United States Forest Service notes that the ongoing beetle infestation is changing conditions on the ground, but that the extent and breadth of change are not yet necessarily predictable, and that the most appropriate time to address these changing conditions during Tier 2 processes.

3.2.3 What agencies have CDOT and the Federal Highway Administration coordinated with and what are their relevant issues?

Lead agencies coordinated, and will continue to coordinate, with the United States Fish and Wildlife Service, United States Forest Service, Colorado Division of Wildlife, and Bureau of Land Management. The comments received from these agencies are similar in nature and reflect the major concerns for biological resources in the I-70 Mountain Corridor discussed below. The United States Fish and Wildlife Service and United States Forest Service act as cooperating agencies for this document and are an integral part of the review process. Cooperating agencies are the federal agencies with jurisdiction by law or special expertise regarding environmental impact analysis.

Because federal- and state-protected species have changed since 2004, the lead agencies updated the analysis to include threatened, endangered, and sensitive species; United States Forest Service-sensitive species; and state-protected species. Ongoing coordination with these agencies ensures that this document includes the latest information regarding protected species and habitat (see **Section 3.2.6**). The lead agencies have submitted a Programmatic Biological Assessment to the United States Fish and Wildlife Service. The Record of Decision will include the resulting Programmatic Biological Opinion. The lead agencies have also submitted a Biological Report to the United States Forest Service.

Habitat connectivity for species of importance, such as elk, deer, bighorn sheep, and Canada lynx, and animal-vehicle collisions are a common concern among stakeholders and agencies, and were addressed by the ALIVE committee . The Memorandum of Understanding notes the long-term impact of the I-70 Mountain Corridor facilities on wildlife and makes recommendations for mitigating these impacts (see **Appendix E, ALIVE Memorandum of Understanding**).

One area of concern was stream and wetland health. Lead agencies initiated the Stream and Wetland Ecological Enhancement Program (SWEEP) as a streamlining program to identify and address environmental issues related to wetlands, streams, aquatic species, and fisheries in the I-70 Mountain Corridor. The SWEEP team included representatives from federal and state agencies, watershed associations, Clear Creek County, and special interest groups. This program resulted in a Memorandum of Understanding, including an implementation matrix, focused on improving stream and wetland health in the I-70 Mountain Corridor. A draft is included in **Appendix D** of this document. The Colorado Department of Transportation will continue to work towards finalizing the SWEEP Memorandum of Understanding to include in the final *I-70 Mountain Corridor PEIS*.

Lead agencies received comments about winter maintenance activities, requesting additional information on the effects of deicers, which have a high salt content, on vegetation and wildlife. The *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010) provides detailed information about the effects of winter maintenance activities.

3.2.4 What are the areas of biological resources interest identified in the Corridor?

Vegetation

What are the major vegetation types in the Corridor?

The I-70 Mountain Corridor crosses a wide range of elevations, and vegetation generally corresponds to changes in elevation and geographic variability (**Figure 3.2-1**). These changes in elevation create "life zones" that differentiate broad changes in plant communities and wildlife habitat. The elevations associated with life zones are general, and plant communities can exist at higher or lower elevations, depending on local climate.

Life Zones are typically defined by the following elevations (feet):

Foothills: 6,000 – 7,600

Montane: 7,600 – 9,000

Subalpine: 9,000 – 11,400

Alpine: 11,400 and above

Figure 3.2-1. Life Zones and Elevations

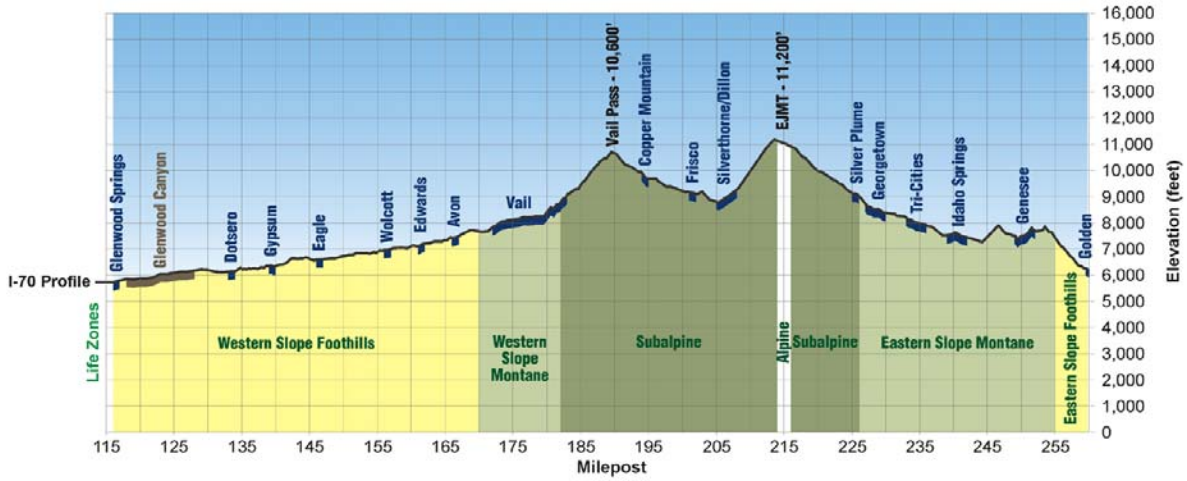


Table 3.2-1 shows the general plant communities associated with each life zone.

Table 3.2-1. Vegetation Communities and Associated Life Zone.

Vegetation Community	Life Zone
Alpine Meadows and Tundra	Alpine
Aspen Forest	Montane and Subalpine
Barren Land	All
Douglas-Fir Forest	Foothills and Montane
Grass/Forb Meadows	All
Lodgepole Pine Forest	Montane and Subalpine
Mountain Shrubland	Montane
Piñon-Juniper	Foothills and Montane
Sagebrush Shrubland	Foothills and Montane
Spruce-Fir Forest	Subalpine

What are the protected plant species in the Corridor?

Previous disturbance and ongoing maintenance activities limit suitable habitat in the I-70 Mountain Corridor right-of-way, but there is the potential for occurrence of protected plant species. Species such as moonwort rely on ground disturbance and can benefit from construction or maintenance activities. For a full list of all protected plant species potentially occurring in the I-70 Mountain Corridor, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

What other vegetation concerns are there?

Noxious weeds have increased in the I-70 Mountain Corridor as a result of human activity. All counties along the I-70 Mountain Corridor have implemented weed-control programs and have listed noxious weeds designated for management.

> **Noxious weeds** are invasive, non-native plants introduced to Colorado by accident or which spread after being planted for another purpose. Their presence results in lands with decreased economic and environmental value. Noxious weeds are regulated by the Colorado Department of Agriculture and the extermination or removal of certain species is required.

In addition to the vegetation communities described previously, wetlands are found along the I-70 Mountain Corridor. These habitat types are composed of unique vegetation and serve important ecological functions (**Section 3.3**, **Wetlands and Other Waters of the U.S.**). Riparian areas, which are found along the banks of water bodies, generally in the valleys along the Corridor, serve an important ecological function that correlates to other resources. These areas serve as buffer zones to rivers and streams and are home to unique wildlife species, including protected species.

Wildlife

Why is the Corridor important for terrestrial species?

The I-70 Mountain Corridor bisects habitat for a wide range of species, hindering movement of foraging species, and creating a barrier for migration between winter and summer ranges and calving and breeding grounds. Much of this habitat is found on large blocks of federal land largely protected from development (see **Section 3.7, Land Use and Right-of-Way)**. Five additional properties in the I-70 Mountain Corridor may be subject to protection under federal regulations (see **Section 3.14, Section 4(f) Discussion**):

- The Sheep Keep property
- Vail Deer Underpass
- Twin Tunnels Wildlife Land Bridge
- Gypsum Ponds State Wildlife Area
- Whiskey Creek

What wildlife species are found in the Corridor?

Numerous wildlife species inhabit or frequent the I-70 Mountain Corridor, including mammals, such as elk, bighorn sheep and deer, squirrels (*Sciurus spp.*), marmots (*Marmota spp.*), and bats; birds; fish; and a small number of reptiles and amphibians.

Figure 3.2-2 shows key wildlife habitat. Descriptions of wildlife species and habitat throughout the I-70 Mountain Corridor can be found in the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

What are the protected terrestrial and bird species in the Corridor?

The I-70 Mountain Corridor is home to federally listed species and species that are identified as protected by the United States Fish and Wildlife Service, United States Forest Service and Colorado Division of Wildlife. There are two terrestrial species and one bird species protected under the Endangered Species Act whose habitat will be directly impacted by the proposed project, Canada lynx, Preble's meadow jumping mouse, and the yellow-billed cuckoo. For a full list of all protected wildlife species potentially occurring in the I-70 Mountain Corridor, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

Figure 3.2-2. Key Wildlife Habitat

Aquatic Resources

What are the major fisheries in the Corridor?

Gold Medal and "high-value" fisheries are located in three watersheds in the I-70 Mountain Corridor (see **Table 3.2-2** and **Figure 3.2-3)**:

- Eagle River
- Blue River
- Clear Creek

Per the Colorado Division of Wildlife observations, Gold Medal streams provide outstanding opportunities for angling large trout, and "high-value" fisheries provide a high quantity/quality of fish populations and recreational value. For additional information regarding recreation areas and stream access, see **Section 3.12, Recreation and Section 6(f) Evaluation**.

Table 3.2-2. Gold Medal and "High-Value" Fisheries

Eagle River Sub-basin		Blue River Sub-basin	Clear Creek Sub-basin
Gold Medal Fisheries			
• Gore Creek		• Blue River	• n/a
"High-Value" Fisheries			
• Eagle River • Squaw Creek • Lake Creek • McCoy Creek • Miller Creek • Beaver Creek	• Booth Creek • Pitkin Creek • Polk Creek • Gore Creek • Black Gore Creek	• Tenmile Creek	• Clear Creek

The original construction of the I-70 Mountain Corridor affected these fisheries. Effects included channelization, sedimentation, increased runoff and erosion, and increased salt concentrations due to winter maintenance operations.

What fish and other aquatic species are in the Corridor?

Numerous fish species, including protected species and species popular with anglers, are located in the rivers, streams, and lakes (reservoirs) in the I-70 Mountain Corridor. These include many species of trout, such as brown trout, brook trout, and rainbow trout; fathead minnow; common carp; speckled dace; sculpin; and multiple species of sucker. The greenback cutthroat trout is the only fish species protected under the Endangered Species Act whose habitat will be directly impacted by the proposed project.

Two protected species, the Greenback Cutthroat Trout and Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*), are the focus of multi-agency conservation and recovery teams actively working to maintain and restore viable populations.

Amphibians in the I-70 Mountain Corridor include the Boreal Toad (*Bufo boreas boreas*) and the Northern Leopard Frog (*Rana pipiens*), both of which are protected species.

The benthic invertebrate communities, known to inhabit or potentially inhabit the I-70 Mountain Corridor's major watersheds, are composed primarily of the major clean-water taxa, including mayflies, stoneflies, caddisflies, and midges. The distribution of these taxa and the number of organisms within each taxon vary in response to natural and human-generated influences throughout the I-70 Mountain Corridor.

For a full list of all protected aquatic species potentially occurring in the I-70 Mountain Corridor, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

Figure 3.2-3. Fisheries and Vegetation

3.2.5 How do the alternatives affect biological resources?

From an ecological standpoint, the I-70 Mountain Corridor presents several complex issues for transportation planning and impact assessment, as the Corridor passes through numerous life zones. Therefore, Action Alternatives may affect a wide variety of ecological resources, including, but not limited to, unique and rare plant communities; wildlife migration patterns; general wildlife habitat, including summer and winter ranges; and aquatic resources. Project construction may also cause the death of some birds, small mammals, invertebrates, and plants. Impacts on resources groupings are discussed in greater detail below.

How were impacts calculated?

The Colorado Department of Transportation determined effects on biological resources by overlaying a project footprint of each alternative into a geographic information system containing the locations of the specific resource, such as habitat or wildlife crossings. The project footprint includes the physical footprint of the alternatives plus an additional 30 feet on each side. The 30 feet includes a 15-foot construction disturbance zone and an additional 15-foot sensitivity zone. Direct impacts occur where resources are located directly beneath the project footprint. Indirect impacts, occurring either farther away or later in time, are beyond the Action Alternatives footprint.

The *I-70 Mountain Corridor PEIS* (CDOT, 2010) examines impacts along the entirety of the Corridor. The Biological Report analyzes those species identified to exist on either the Arapaho and Roosevelt National Forests or the White River National Forest. The analysis of these species relates only to those impacts occurring on forest service lands. The Biological Assessment requires examination of all species protected under the Endanger Species Act, and candidate species, in the Corridor, whether or not they are on forest service lands. Due to the large presence of national forest lands along the Corridor, there is considerable overlap in the lists of protected species and the acreages of impacts appearing in the two documents, but they are not always identical.

How do the alternatives affect vegetation?

Direct impacts on vegetation occur when construction of new roadway or transit infrastructure removes existing vegetation. This decreases the natural function of the landscape and removes wildlife habitat. Loss of habitat results in a loss of foraging, nesting, and resting and denning areas for wildlife, which includes protected species.

Alternatives with the largest footprint, the Highway Alternatives and the Combination Alternatives, have the greatest impact on vegetation because roadway expansion causes the greatest amount of land disturbance. The Advanced Guideway System Alternative has the fewest direct impacts due to its smaller footprint. The Preferred Alternative has a range of potential impacts comparable to nearly all the Action Alternatives. **Chart 3.2-1** shows a comparison of direct impacts per alternative.

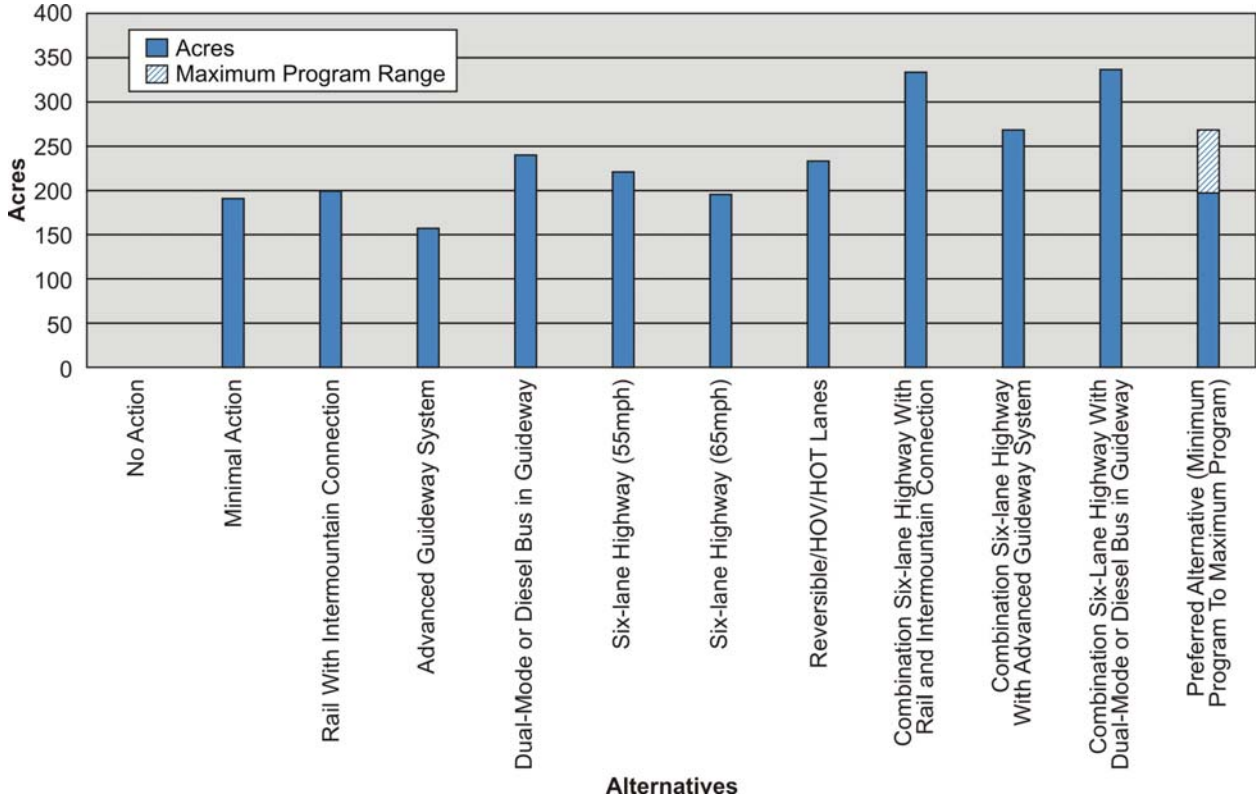
Temporary construction impacts on vegetation communities occur during the construction of any Action Alternative. Disturbance caused by construction equipment results in the short-term loss of vegetation communities. These impacts are offset by mitigation strategies discussed in **Section 3.2.6**.

Indirect impacts on vegetation, including riparian habitat, include the effects of winter roadway maintenance associated with deicers. Impacts are greatest nearest the highway, but splash, runoff, and aerial drift can affect vegetation over 300 feet from the highway. These salts can damage the needles and photosynthetic tissue of coniferous trees, and result in lower germination rates. Also, land disturbance caused by construction and increased traffic within the Corridor create favorable conditions for the introduction and further spread of noxious weeds into adjacent lands. These lands include wildlife habitat located on public lands, such as National Forests and designated wilderness areas. Alternatives that add

more traffic lanes (such as the Highway and Bus in Guideway Alternatives) require additional winter maintenance leading to increased impacts compared to alternatives with less new roadway construction.

Additional temporary disturbance to vegetation is expected during construction. The temporary removal of vegetation may result in some small animal mortality, and big game or bird species leaving the area. Forested lands will take the longest to return to their original state and grasslands will recover quickest.

Chart 3.2-1. Vegetation, Direct Impacts (Acres)



**The Maximum Program presents the range of impacts that occurs with the Preferred Alternative. The solid bar represents the implementation of the Minimum Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

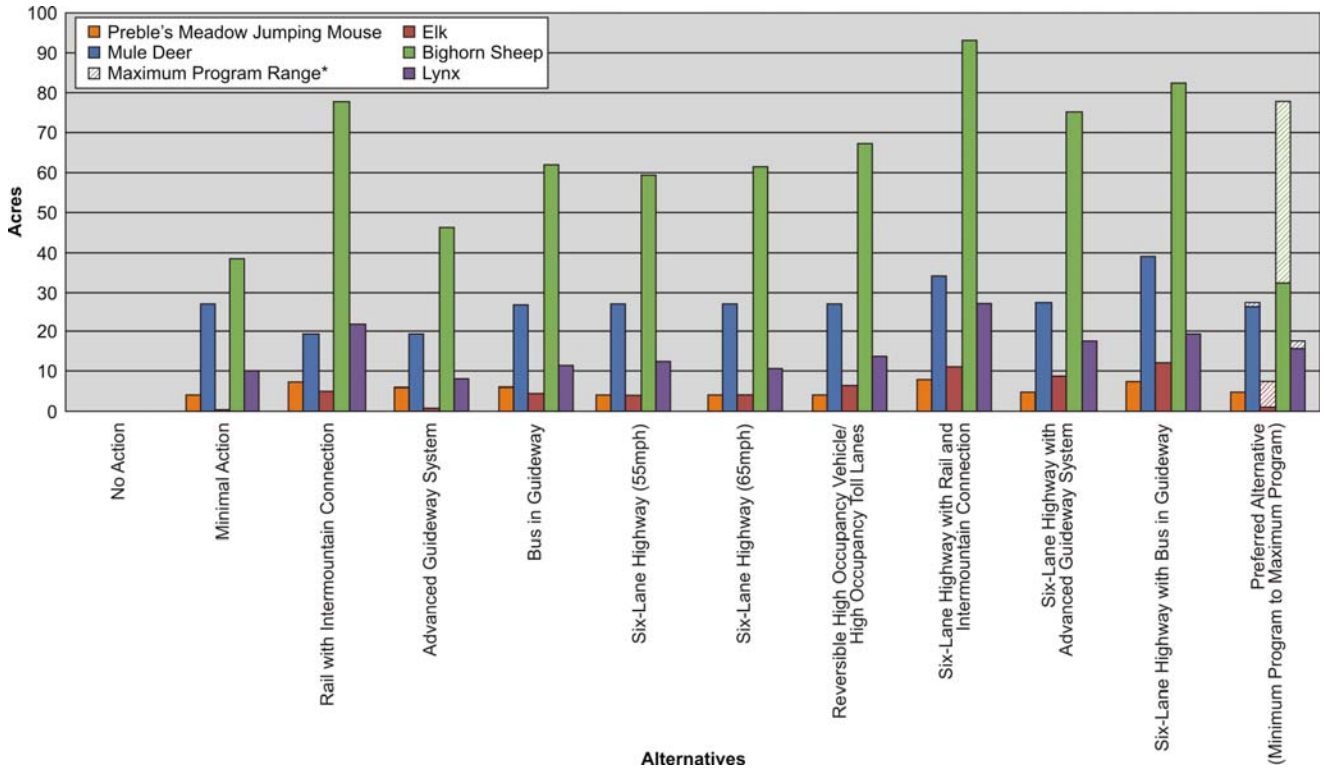
Key to Abbreviations/Acronyms

AGS = Advanced Guideway System HOT = High Occupancy Toll
HOV = High Occupancy Vehicle IMC = Intermountain Connection mph = miles per hour

How do the alternatives affect wildlife?

Direct impacts on wildlife include loss of habitat due to construction and the increased barrier effect due to new roadway or transit improvements. The greatest impact is from the Highway and Combination Alternatives, the alternatives with the largest footprint. The Preferred Alternative has a range of potential impacts comparable to nearly all other Action Alternatives. **Chart 3.2-2** details direct corridorwide habitat losses for Canada lynx and Preble's meadow jumping mouse, which are protected under the Endangered Species Act. It also identifies impacts to elk, mule deer, and bighorn sheep habitat, which are management indicator species for the United States Forest Service.

Chart 3.2-2. Habitat Loss, Direct Impacts (Acres)



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Key to Abbreviations/Acronyms

AGS = Advanced Guideway System HOT = High Occupancy Toll
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Lead agencies studied the barrier effect of the I-70 Mountain Corridor by considering the additional lanes, fencing, and retaining walls required for each Action Alternative. An increase in the barrier effect leads to increased animal-vehicle collisions, as wildlife attempting to cross the highway face additional travel lanes, walls, or fencing, slowing or blocking their passage.

Alternatives that extend through the greatest length of the Corridor (for example, Rail with Intermountain Connection, Advanced Guideway System, and the Combination Alternatives) offer the greatest opportunities to mitigate the existing barrier effects in the linkage interference zones. Therefore, the longer the Action Alternative, the more existing barriers are mitigated. If an Action Alternative does not encounter an existing barrier, then the barrier is altered only through partnering opportunities with other stakeholders. The No Action Alternative has the greatest impacts on wildlife because the existing habitat connectivity issues are not addressed.

Rail with Intermountain Connection and Bus in Guideway Alternatives require more walls and fencing than the Advanced Guideway System Alternative, and have the greatest impact on wildlife movement of all the Transit Alternatives. The Six-Lane Highway (55 and 65 mph) and Reversible/HOV/HOT Lanes Alternatives result in two additional 12-foot-wide traffic lanes and require guardrails and barriers in select locations. The Combination Alternatives increase the barrier effect, with the Combination Six-Lane Highway with Advanced Guideway System Alternative having the least impact due to the limited security

fencing required. The Preferred Alternative has a range of potential impacts that could be comparable to the three Combination Alternatives.

Through the implementation of the processes in the ALIVE Memorandum of Understanding (see **Appendix E**), the impacts of the barrier effect are reduced. **Section 3.2.7** further discusses mitigation strategies regarding animal-vehicle collisions.

Indirect impacts on wildlife include those associated with winter maintenance, noise, and habitat loss due to induced growth. Wildlife can be attracted to the salts from deicers. While no studies have been completed in Colorado, other studies have identified road salt attraction as a main reason for kills of bighorn sheep and a minor reason for kills of elk due to animal-vehicle collisions. Operational noise impacts can lead to changed migration and breeding habits. For additional information on indirect effects of salts and road noise, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

Induced growth leads to habitat loss. Transit Alternatives and Highway Alternatives affect growth patterns differently and are discussed in **Chapter 4**.

Additional temporary disturbance to protected species is expected during construction. Noise, dust, erosion, and air pollution are all examples of stresses placed on wildlife during the period of construction which can lead to displacement or morbidity due to stress. These construction activities may result in vegetation being temporarily removed, some small animal mortality, and big game or bird species leaving the area. Specific construction related mitigation will be implemented to minimize these impacts as much as possible. The area of impact will be minor compared to the area of habitat available.

How do the alternatives affect fisheries and aquatic species?

The removal, modification, or disturbance of habitat has an impact on fisheries and aquatic species. Impacts include the effects of increased sedimentation and reduced water quality as a result of construction, operation, and maintenance of an alternative. **Chart 3.2-3** details the potential impacts on Gold Medal and "high-value" fisheries. For additional information regarding recreation areas and stream access, see **Section 3.12, Recreation and Section 6(f) Evaluation**. **Section 3.2.7** discusses mitigation strategies outlined by the SWEEP Committee.

Impacts on Gold Medal and "high-value" fisheries are greatest for the Combination Alternatives and Rail with Intermountain Connection Alternative because these alternatives have the largest overall footprint. The Preferred Alternative has a range of impacts comparable to the range of impacts between the Combination Alternatives and Rail with Intermountain Connection Alternative.

Additional temporary disturbance to aquatic resources is expected during construction. These impacts include increased erosion, sedimentation and runoff, and spilled fuels, potentially causing reduced water quality in streams, rivers, lakes, and reservoirs.

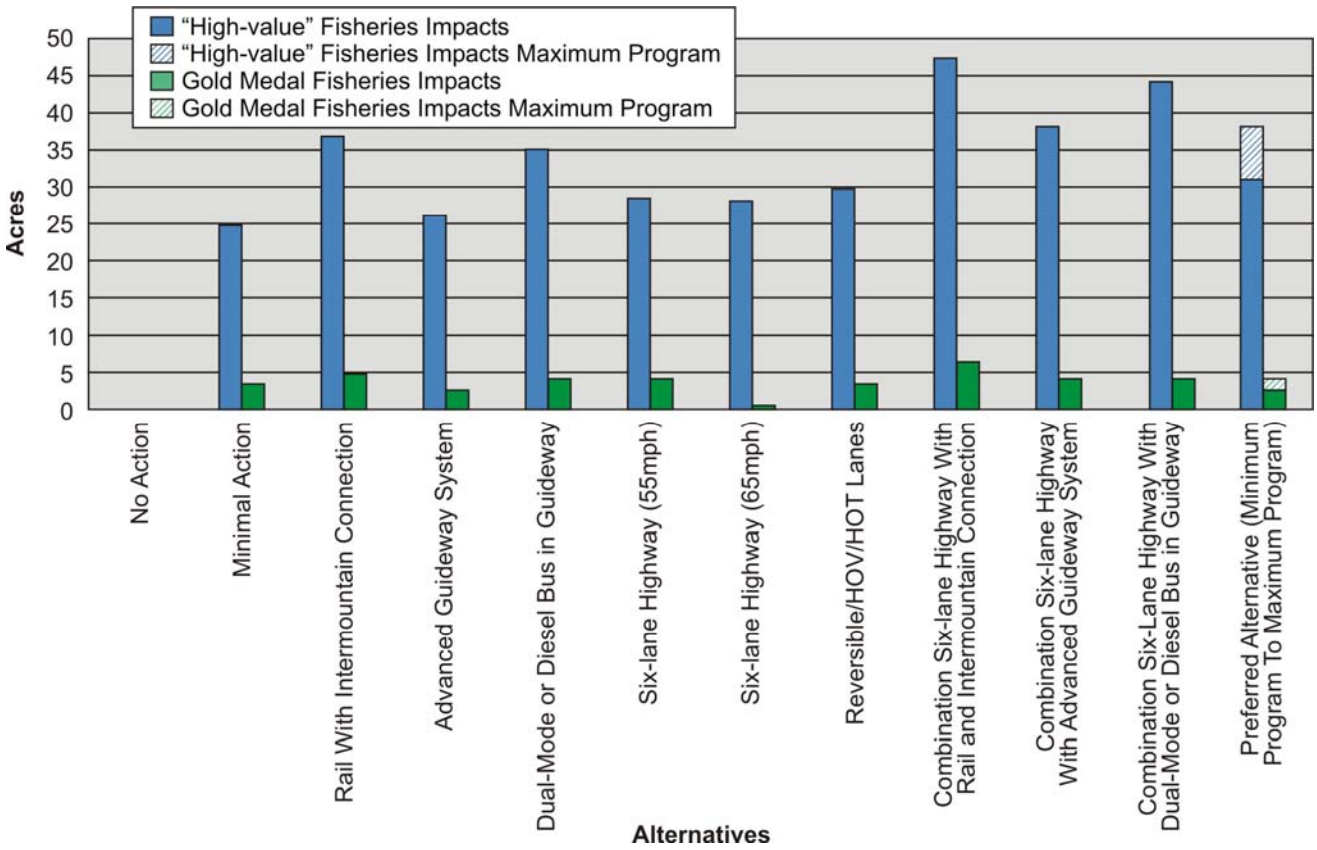
In addition to analysis of direct impacts on protected species within the I-70 Mountain Corridor, depletion to the Platte River or Colorado River basins constitutes an action that may affect, and is likely to adversely affect, threatened, endangered, and sensitive species that depend on the river for their existence. These effects will be determined during Tier 2 processes as site-specific biological assessments are prepared as agreed to with the United States Fish and Wildlife Service.

How will winter maintenance activities affect fisheries and aquatic species?

Liquid deicer and traction sand are currently used in the I-70 Mountain Corridor. Liquid deicers are linked with increasing chloride levels in local streams. Traction sand causes sedimentation of streams, which can degrade habitat, impede spawning by blanketing the streambed, and reduce populations of

macroinvertebrates on which fish feed. Alternatives that add more traffic lanes, the Highway and Bus in Guideway Alternatives, require additional winter maintenance, thereby leading to increased water quality impacts when compared to alternatives with less new roadway construction (see **Section 3.4, Water Resources**).

Chart 3.2-3. Impacts on Gold Medal and "High-Value" Fisheries (Acres)



**The Maximum Program presents the range of impacts that occurs with the Preferred Alternative. The solid bar represents the implementation of the Minimum Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Key to Abbreviations/Acronyms

AGS = Advanced Guideway System HOT=High Occupancy Toll
HOV=High Occupancy Vehicle IMC=Intermountain Connection mph = miles per hour

How do the alternatives affect protected species?

Direct impacts to Canada lynx and Preble's meadow jumping mouse are detailed in **Chart 3.2-2**, above. The Preferred Alternative has a range of impacts from 0.9-1.1 acres for greenback cutthroat trout habitat. This is comparable to all the Combination Alternatives, the Rail with Intermountain Connection Alternative and the Bus in Guideway Alternative. The Preferred Alternative, Maximum Program, if implemented, will impact 37.6 acres of yellow-billed cuckoo habit. For the detailed assessment of all evaluated species, including the methodology to determine a given species' occurrence or absence within the Corridor and additional detail regarding indirect impacts, see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010).

Table 3.2-3 summarizes the effects of alternatives on protected species, as determined in coordination with the United States Fish and Wildlife Service and United States Forest Service. **Table 3.2-3** includes only those species determined to occur in the Corridor. See the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, August 2010), which includes the following:

- A complete list of all species considered for analysis
- Impact numbers
- History
- Distribution
- Environmental baseline information
- Effects and rationale for protected species

The analysis of protected species will be approached conservatively until site-specific needs are determined. For Tier 1 processes, all Action Alternatives, including the Preferred Alternative, had the same effects determination and were condensed into a single column in the table. Action Alternatives have greater impacts than the No Action Alternative. Impacts associated with Action Alternatives increase proportionally to the amount of occupied area disturbed from each Action Alternative and with increasing recreational visitor use. Aquatic species are determined to be affected until water requirements are known for specific projects.

What are the project effects on biological resources in 2050?

By 2050, potential effects of climate change and the dynamic natural response to mountain pine beetle infestation could alter the existing terrestrial and aquatic habitat along the Corridor. These potential changes include, but are not limited to, alterations to existing vegetation communities, water quality concerns due to runoff from forests in early succession, and changes to the hydrologic cycle. The changes in habitat, and subsequent change in species present, alter the wildlife management efforts of the United States Fish and Wildlife Service, United States Forest Service, and Colorado Division of Wildlife, so the project could affect species currently not found in the Corridor but occurring there in the future. Continued habitat loss may occur due to commercial and residential development but may taper off by 2050 because of limited water resources and land use management. Benefits from the ALIVE and SWEEP Memoranda of Understanding could improve wildlife movement and protect aquatic resources, respectively.

For information on cumulative effects, see **Chapter 4, Cumulative Impacts Analysis,** of this document.

Table 3.2-3. Protected Species Impact Determinations

Common Name	Scientific Name	Status[a]	Impact Determination[b]: No Action	Impact Determination[b]: All Action Alternatives
Federally Listed Species				
Canada lynx	*Lynx canadensis*	FT	LAA, NCEL	LAA, PCEL
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	FT	LAA	LAA
Least tern	*Sterna antillarum*	FE	NE	LAA
Piping plover	*Charadrius melodus*	FT	NE	LAA
Whooping crane	*Grus americana*	FE	NE	LAA
Yellow-billed cuckoo	*Coccyzus americanus*	FC	NE	NE
Bonytail chub	*Gila elegans*	FE	NE	LAA
Colorado pikeminnow	*Ptychocheilus lucius*	FE	NE	LAA
Humpback chub	*Gila cypha*	FE	NE	LAA
Razorback sucker	*Xyrauchen texanus*	FE	NE	LAA
Pallid sturgeon	*Scaphirhynchus albus*	FE	NE	LAA
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, FS-MIS	NE	LAA
Western prairie fringed orchid	*Platanthera praeclara*	FT	NE	LAA
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	FT	NE	LAA
State-Listed Species				
Common garter snake	*Thamnophis sirtalis*	SSC		
Midget faded rattlesnake	*Crotalus oreganos concolor*	SSC		
USFS-Sensitive Species				
Pygmy shrew	*Sorex hoyi montanus*	FS-S	MAII, NCEL	MAII, NCEL
River otter	*Lontra canadensis*	FS-S	MAII, NCEL	MAII, NCEL
American marten	*Martes americana*	FS-S	MAII, NCEL	MAII, PCEL
North American wolverine	*Gulo gulo luscus*	FS-S	MAII, NCEL	MAII, PCEL
Bighorn sheep	*Ovis canadensis*	FS-S, FS-MIS	MAII NCEL	MAII, PCEL
Bald eagle	*Haliaeetus leucocephalus*	FS-S	NI	MAII
Northern goshawk	*Accipiter gentilis*	FS-S	NI	MAII
American peregrine falcon	*Falco peregrinus anatum*	FS-S	NI	MAII
White-tailed ptarmigan	*Lagopus leucurus*	FS-S	NI	MAII
Boreal owl	*Aegolius funereus*	FS-S	NI	MAII
Flammulated owl	*Otus flammeolus*	FS-S	MAII	MAII
Black swift	*Cypseloides niger*	FS-S	NI	MAII
Brewer's sparrow	*Spizella breweri*	FS-S	NI	MAII

Common Name	Scientific Name	Status[a]	Impact Determination[b]: No Action	Impact Determination[b]: All Action Alternatives
USFS-Sensitive Species, Continued				
American three-toed woodpecker	*Picoides tridactylus dorsalis*	FS-S	NI	MAII
Olive-sided flycatcher	*Contopus cooperi*	FS-S	NI	MAII
Boreal toad	*Bufo boreas boreas*	FS-S, FS-MIS	MAII, NCEL	MAII, NCEL
Northern leopard frog	*Rana pipiens*	FS-S	MAII, NCEL	MAII, NCEL
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	FS-S, FS-MIS	NI	MAII
Bluehead sucker	*Catostomus discobolus discobolus*	FS-S	NI	MAII
Flannelmouth sucker	*Catostomus latipinnis*	FS-S	MAII	MAII
All FS-S plants analyzed	See Biological Report (Table BR-2)	FS-S, FC	MAII*	MAII*
USFS MIS				
WRNF				
Elk	*Cervus elaphus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Virginia's warbler	*Vermivora virginiae*	FS-MIS	NI	PEU, HEU
All trout	All species	FS-MIS	NI	PEU, HEU
Aquatic macroinvertebrates	All species	FS-MIS	NI	PEU, HEU
ARNF				
Elk	*Cervus elaphus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Mule deer	*Odocoileus hemionus*	FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Bighorn sheep	*Ovis canadensis*	FS-S, FS-MIS	PEU, HEU, NCEL	PEU, HEU, PCEL
Hairy woodpecker	*Picoides villosus*	FS-MIS	NI	PEU, HEU
Pygmy nuthatch	*Sitta pygmaea*	FS-MIS	NI	PEU, HEU
Mountain bluebird	*Sialia currucoides*	FS-MIS	NI	PEU, HEU
Warbling vireo	*Vireo gilvus*	FS-MIS	NI	PEU, HEU
Wilson's warbler	*Wilsonia pusilla*	FS-MIS	NI	PEU, HEU
Trout species (brook, brown)	(*Salvelinus fontinalis* and *Salmo trutta*)	FS-MIS	NI	PEU, HEU
Boreal toad	*Bufo boreas boreas*	FS-MIS	NCEL	PEU, HEU
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	FS-MIS	NI	PEU, HEU
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, FS-MIS	HEL	PEU, HEU

** Action alternatives would have relatively greater impacts on occupied habitats than the No Action alternative. Impacts associated with action alternatives would increase proportionally to the amount of occupied area that could be disturbed from each action alternative or with increasing recreational visitor use.*

[a] **Status**
FE = Federally listed as endangered
FT = Federally listed as threatened
FS-S = Listed as Forest Service sensitive
FC = Federal candidate for listing
FS-MIS = Management Indicator Species
SSC = State Species of Special Concern

[b] **Impact Determinations**
Federal Determinations
NE = No Effect
LAA = Likely to Adversely Affect
NLAA = May Affect, Not Likely to Adversely Affect
Other PEIS Determinations
PCEL = Positive Wildlife Crossing Effects Likely
NCEL = Negative Wildlife Crossing Effects Likely

USFS Determinations
NI = No Impact
MAII = May adversely impact individuals but not likely to result in a loss of viability in the Planning area nor cause a trend to federal listing.
LRLV = Likely to result in loss of species viability

MIS Determinations
PEU = Population Effects Unlikely
HEU – Habitat Effects Unlikely
PEL = Population Effects Likely
HEL = Habitat Effects Likely

3.2.6 What will be addressed in Tier 2 processes?

Lead agencies will conduct further analysis of direct and indirect impacts on biological resources, including protected species, during future project-specific Tier 2 processes. These actions include the following:

- Lead agencies will perform surveys for protected species and their habitat. The United States Fish and Wildlife Service, United States Forest Service, and Colorado Division of Wildlife will provide relevant and updated species lists. This information will be incorporated into project design to avoid or minimize effects on such species. Lead agencies will complete a biological assessment and biological report, using the Tier 1 process as a foundation, to analyze impacts on protected species.
- Lead agencies will determine the effects on federally listed species that occur downstream from the I-70 Mountain Corridor in coordination with the United States Fish and Wildlife Service.
- Lead agencies will discuss the influence of the mountain pine beetle on the forested communities and its effects on wildlife habitat, in coordination with the United States Fish and Wildlife Service and United States Forest Service.
- Lead agencies will evaluate potential mitigation for winter maintenance and noise effects based on current research.
- Lead agencies will adhere to any new or revised laws or regulations pertaining to biological resources.
- Lead agencies will develop specific best management practices for each project.
- Lead agencies will develop specific and more detailed mitigation strategies and measures.
- Lead agencies will consider opportunities for enhancement on a project-by-project basis.
- Lead agencies will evaluate fisheries, including localized temperature concerns.
- Lead agencies will develop a Tier 2 Biological Impacts Plan to include analysis of sensitivity zones, terrestrial impacts, habitat connectivity, and cumulative impacts.

3.2.7 What are the approaches to programmatic mitigation planning for biological resources?

A phased approach to construction provides the opportunity for adapting transportation solutions to the environmental sensitivity of the I-70 Mountain Corridor over time. The phased approach allows ongoing opportunities to avoid and minimize environmental impacts, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions strategies. In summary, the overall mitigation strategies provide the opportunity to reduce impacts on wildlife habitats and enhance the compatibility of the I-70 Mountain Corridor with regional wildlife movement and habitat connectivity. **Section 3.19, Mitigation Summary,** also provides additional discussion of mitigation strategies.

How will vegetation and habitat impacts be minimized?

The Colorado Department of Transportation will identify areas of potential habitat restoration, in coordination with the United States Forest Service and local entities. Removal of trees and shrubs for implementation of Action Alternatives will be done during the non-nesting periods per the Migratory Bird Treaty Act. Also, mitigation of protected bird and fish species will comply with South Platte Water Related Activities Program and the Platte River Recovery Implementation Program.

How will the spread of noxious weeds be minimized?

The Colorado Department of Transportation will manage the clearing and earthmoving operations to minimize the potential for weeds to infest new areas and/or increase in abundance through the

construction disturbance area. This includes the application of best management practices to all construction sites to manage open soil surfaces and topsoil stockpiled for reuse, including landscape and planning designs that incorporate the use of native vegetation and integrated noxious weed controls. The Colorado Department of Transportation will prepare and implement Noxious Weed Management Plans for all projects, which are usually completed just prior to construction so as to reflect the most recent federal and local noxious weed lists and guidance.

How will winter maintenance and deicer impacts be minimized?

The Colorado Department of Transportation will limit the effects of winter maintenance by controlling the runoff of contaminants and winter maintenance materials to the greatest extent possible. The Colorado Department of Transportation will continue to refine its approach to winter maintenance in an effort to decrease the use of deicers and traction sand. Mitigation strategies will be designed to be complementary to the existing Sediment Control Action Plans on Straight Creek, Black Gore Creek, and Clear Creek.

How will habitat connectivity be improved and animal-vehicle collisions reduced?

Lead agencies will follow the processes outlined in the ALIVE Memorandum of Understanding (see **Appendix E**) to reduce animal-vehicle collisions and increase habitat connectivity throughout the Corridor. This includes, but is not limited to, the use of underpasses or overpasses dedicated to wildlife movement, fencing, berms, and vegetation to guide wildlife to crossing structures and signage to alert motorists of wildlife presence.

How will aquatic habitat be protected?

Lead agencies will follow the processes outlined in the SWEEP Memorandum of Understanding (see **Appendix D**). In addition, CDOT will use best management practices and erosion control measures to reduce soil losses, soil inundation, and sedimentation in areas adjacent to the construction area and provide sufficient cross-slope drainage structures during new construction to allow natural hydrologic conditions to be maintained on both sides of the right-of-way. Fish habitat will be restored and replaced, using photo documentation to help return these areas to previous conditions.

3.3 Wetlands and Other Waters of the U.S.

3.3.1 What are wetlands and other waters of the U.S. and why are they important?

Section 3.3 describes the affected environment and the environmental consequences to wetlands, fens, other waters of the U.S., and riparian areas associated with the various Action Alternatives under consideration in this document. The *I-70 Mountain Corridor PEIS Wetlands and Other Waters of the U.S. Technical Report* (Colorado Department of Transportation [CDOT], August 2010) was used as the primary reference for the information provided in **Section 3.3**. Wetlands and waters of the U.S. are part of the larger biological community for the Corridor, and can have direct correlations to riparian areas, water quality, and aquatic and other biological resources. **Section 3.2, Biological Resources**, discusses these biological resources.

Wetlands Issues

- Loss of wetlands, fens, and other waters of the U.S.
- Reduced function of wetlands, fens, and other waters of the U.S.
- Changes in surface and subsurface hydrology and water quality (for example, inflows, sedimentation, winter maintenance) that result in loss of area or function

Wetlands and other waters of the U.S. are regulated through a permit process administered by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The USACE's jurisdiction is limited to those wetlands considered waters of the U.S., as defined in 33 Code of Federal Regulations Part 328.3, with the exception of isolated wetlands whose nexus to interstate commerce is use, or potential use, by migratory birds. Jurisdictional waters of the U.S. include interstate waters, intrastate waters with a nexus to interstate commerce, and tributaries to such waters, including wetlands that are adjacent to waters of the U.S. Wetlands are defined for regulatory purposes as follows:

> *Wetlands consist of 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 similar areas* (Environmental Protection Agency, 40 Code of Federal Regulations 230.2 and USACE, 33 Code of Federal Regulations 328.3).

Fens are wetlands that are recognized as irreplaceable resources in the Southern Rocky Mountain Region due to the functional and biological values they provide (Cooper, 2009). They are afforded special protection because of their rarity and the difficulty of mitigation and restoration.

Other waters of the U.S. are classified as either channel/riverine or water storage features. Other waters of the U.S. exist below the ordinary high water mark of each stream system that occurs along the Corridor, as well as some ponds and lakes (for example, Black Lakes Reservoirs).

Executive Order 11990, Protection of Wetlands, requires that federal agencies "…take action to minimize the destruction, loss, or degradation of wetlands…" The Executive Order does not indicate exclusion of isolated wetlands (non-jurisdictional). The Federal Highway Administration (FHWA) Regulations at Code of Federal Regulations 23 Sections 771 and 777 and guidance provided in Technical Advisory T6640.8A (Section V.G.12) direct that impacts on wetlands be avoided wherever possible and minimized to the extent practicable during transportation construction projects.

3.3.2 What process was used to analyze wetland resources and other waters of the U.S.?

The three principal data categories identified for this resource are:

- **General wetlands –** These include wetland classifications of palustrine emergent, palustrine scrub-shrub, palustrine forested, and palustrine aquatic bed. These were analyzed as one category.
- **Fens –** These are distinguished from other wetlands and uplands by thickness of peat, hydrologic regime, and vegetation composition (Bedford and Godwin, 2003)
- **Other waters of the U.S. –** These include all "open waters" such as riverine (year-round flow), intermittent or seasonal tributaries, and water storage features (ponds or lakes). These were analyzed as one category.

The Colorado Department of Transportation mapped wetlands, other waters of the U.S., and riparian vegetation in a 2,000-foot-wide corridor along both sides of I-70 using color infrared aerial photography and field reconnaissance. Map units were ground-truthed to achieve confidence in the aerial photography interpretation and to obtain data on the feature in question.

The assessment area for fens included a 200-foot buffer along both sides of the I-70 highway. Identification and delineation of possible fens was based on landscape context and color signature in aerial imagery compared to the signature of known fens in the area (Tiner, 1999). Sites were field verified during September and October of 2009.

The Colorado Department of Transportation mitigates impacts on all affected wetlands including non-jurisdictional wetlands. While wetlands not connected by surface water to waters of the U.S. were mapped as isolated waters/wetlands, CDOT took the most conservative approach possible by classifying all mapped areas as jurisdictional under the Clean Water Act Section 404. The USACE concurred with this approach for Tier 1. Separating jurisdictional and non-jurisdictional wetland impacts will occur in Tier 2 processes, where issues of permitting for a specific alternative will be addressed.

3.3.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

Coordination with the USACE occurred throughout the analysis in this Corridor. Specific resource meetings held with the USACE, and the latter provided comments to the project team throughout development of this document. There have been no changes in how wetlands and other waters of the U.S., are classified since those USACE meetings, with the exception of the U.S. Supreme Court's consolidated ruling in *Rapanos v. United States and Carabel v. United States* decisions (June, 2007), commonly known as *Rapanos*. This decision affects issues of agency jurisdiction over wetlands and waters of the U.S. However, this decision does not affect this Tier 1 analysis because all wetlands located in the project area are considered jurisdictional. There are no changes in the standards or the methodology used in this analysis since meeting with the USACE.

The Colorado Department of Transportation initiated the Stream and Wetland Ecological Enhancement Program (SWEEP) program that included a team of representatives from federal and state agencies, watershed associations, Clear Creek County, and special interest groups. Clear Creek, from the Eisenhower-Johnson Memorial Tunnels downstream to Floyd Hill, was selected as an area where aquatic habitats could be improved in conjunction with capacity improvements. The Colorado Department of Transportation led the effort to develop Sediment Control Action Plans to address impacts of winter sanding operations in the I-70 Mountain Corridor, and coordinated with the Black Gore Creek Steering Committee and the Straight Creek Cleanup Committee. This action resulted in new practices to provide a

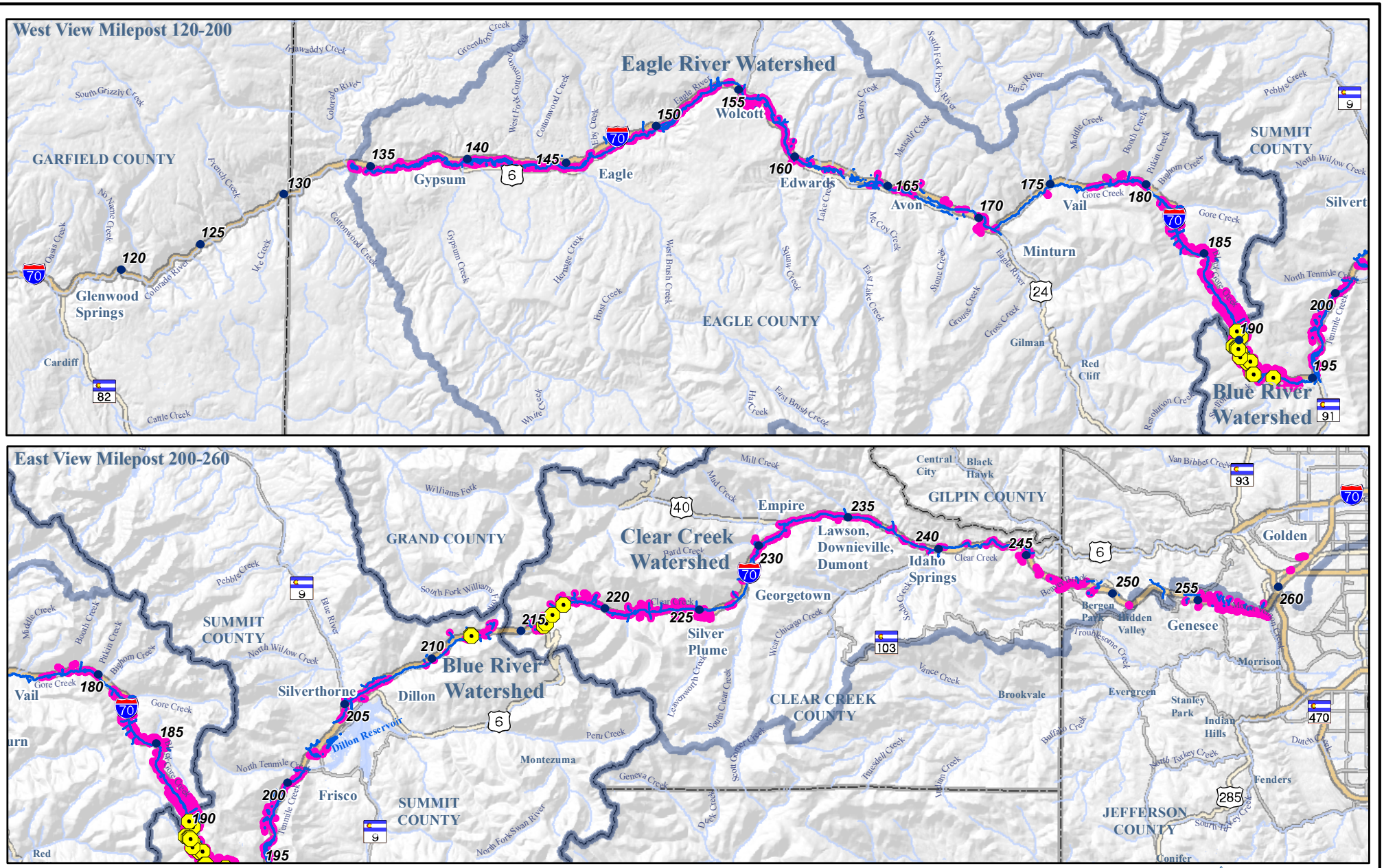
beneficial effect on many of the stream systems and associated wetlands along the Corridor. Development of a Clear Creek Sediment Control Action Plan is underway.

3.3.4 What are the areas of wetlands and other waters of the U.S. interest identified in the Corridor?

Wetlands and other waters of the U.S. within the Corridor were initially identified within a 4,000-foot-wide (2,000-feet on either side) area from Dotsero to C-470. The project area centers on I-70, and mapping was conducted using advanced photographic techniques, including geo-referenced, ortho-rectified, false-color infrared aerial photographs. Additional digitized, high-resolution, low-altitude, geo-referenced, ortho-rectified black-and-white or true color aerial photography was used to assist mapping. Areas of interest were determined by watershed basin and are discussed below.

The *I-70 Mountain Corridor PEIS Wetlands and Other Waters of the U.S. Technical Report* (CDOT, August 2010) provides detailed descriptions of the sub-basins within the Corridor, including existing wetland types, general geographic locations, acreage quantities for each sub-basin, and graphics showing the locations of mapped wetlands and other waters of the U.S. in the Corridor. **Figure 3.3-1** provides a Corridor-wide overview of wetland locations. The sub-basins discussed in the Technical Report are:

- Colorado River Sub-basin
- Eagle River Sub-basin – including Eagle River, Gore Creek, and Black Gore Creek
- Blue River Sub-basin – including West Tenmile Creek, Tenmile Creek, and Straight Creek
- Clear Creek Sub-basin – including Clear Creek and Mount Vernon Creek


West View Milepost 120-200
Eagle River Watershed
GARFIELD COUNTY
EAGLE COUNTY
SUMMIT COUNTY
Glenwood Springs
Cardiff
Gypsum
Eagle
Wolcott
Edwards
Avon
Vail
Minturn
Gilman
Red Cliff
Silverthorne
Dillon
Frisco
Blue River Watershed
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
East View Milepost 200-260
GRAND COUNTY
GILPIN COUNTY
CLEAR CREEK COUNTY
JEFFERSON COUNTY
Clear Creek Watershed
Empire
Lawson, Downieville, Dumont
Idaho Springs
Georgetown
Silver Plume
Central City
Black Hawk
Golden
Bergen Park
Hidden Valley
Genesee
Morrison
Evergreen
Stanley Park
Indian Hills
Fenders
Conifer
Brookvale
Montezuma
Peru Creek
Dillon Reservoir
210
215
220
225
230
235
240
245
250
255
260
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Watershed Boundary
General Wetlands
Channel / Waterbody
Fen Locations
0
3.31
6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
DOT
U.S. Department of Transportation
Federal Highway Administration
WETLANDS

3.3.5 How do the alternatives potentially affect wetlands and other waters of the U.S.?

This section addresses direct, indirect, and temporary impacts on wetlands, fens, and other waters of the U.S. for each Action Alternative considered in this document. Impacts on wetlands, fens and other waters of the U.S. were determined through a GIS overlay process in which the impact footprint was superimposed onto each of the above-mentioned resources within the Corridor. Impacts were quantified for the whole Corridor for each resource. In determining potential effects on wetlands and other waters of the U.S. from the Action Alternatives, direct and indirect effects were included. The following text addresses and **Figure 3.3-1** illustrates impacts by alternatives on wetlands, fens, and other waters of the U.S.

How do the alternatives directly affect wetlands and other waters of the U.S.?

Figure 3.3-1 provides a visual summary of direct impacts on wetlands, fens, and other waters of the U.S. by Action Alternative and resource.

All of the Action Alternatives result in impacts on wetlands and waters of the U.S., except for the No Action Alternative. The Minimum Program of the Preferred Alternative impacts 15.8 acres of wetlands and waters of the U.S. This is less than the impacts associated with all other alternatives with the exception of the Minimal Action Alternative (14.6 acres) and Advanced Guideway System Alternative (15.4 acres), which do not meet the purpose and need of the this project. If the Maximum Program of the Preferred Alternative is fully implemented, its impacts on wetlands and waters of the U.S. are 32.3 acres. This is more than the impacts associated with other Action Alternatives, except the Combination Six-Lane Highway with Rail and Intermountain Connection Alternative (36.6 acres), and the Combination Six-Lane Highway with Diesel Bus in Guideway (32.5 acres).

All Action Alternatives avoid fens. This conclusion will be updated through an inventory of wetlands and fens completed in Tier 2 processes.

How do the alternatives indirectly affect wetlands and other waters of the U.S.?

Indirect impacts on wetlands include erosion and sedimentation from winter sanding and effects associated with possible induced growth associated with Action Alternatives, as presented in **Chapter 3.7: Land Use and Right of Way** of the *I-70 Mountain Corridor PEIS* (CDOT, 2010). All Action Alternatives, other than No Action and Minimal Action, induce varying levels of growth in the Eagle River sub-basin. Induced growth causes additional impacts on wetlands and other waters of the U.S. due to encroachment/loss and construction impacts (erosion/sedimentation). Sedimentation is an existing problem in the Corridor, and all of the Action Alternatives could contribute to that problem during construction. However, through implementation of the mitigation strategies presented in the *I-70 Mountain Corridor PEIS* (CDOT, 2010), primarily the SWEEP Memorandum of Understanding, all Action Alternatives improve the sedimentation problem throughout the Corridor.

Another indirect impact from induced growth in the Corridor is the increase of stormwater runoff to wetlands and other waters of the U.S. Increased stormwater runoff increases the level of pollutants entering wetland systems, surface flows into adjacent streams, and the creation of channels in wetlands that were previously free of channelization.

Importing water to accommodate increased water supply demands from induced growth increases the flow of water in waterways. This increased flow potentially destabilizes streambanks throughout the Corridor. A more detailed analysis of indirect impacts on wetlands and other waters of the U.S. will be conducted during Tier 2 processes.

Winter traction sanding operations and erosion along the Corridor have been identified as impairments to wetlands and water quality. Sediment loading in wetlands due to erosion and sanding operations degrades the natural function of wetlands and degrades water quality in rivers, creeks, streams, reservoirs, and lakes. Means to reduce the impacts of winter sanding operations to area streams are currently being implemented in the Corridor. Sediment Control Action Plans are focusing on Black Gore Creek (Upper Eagle River sub-basin) and Straight Creek (Upper Blue River sub-basin) because these systems have already been adversely affected by traction sand. A Clear Creek Sediment Control Action Plan is under development. The Colorado Transportation Commission identified these two creeks for immediate remediation action regardless of the outcome of the *I-70 Mountain Corridor PEIS* (CDOT, 2010). The Colorado Department of Transportation has led the effort and has coordinated with the Black Gore Creek Steering Committee and the Straight Creek Cleanup Committee. This action will result in new practices to provide a beneficial effect on many of the stream systems and associated wetlands along I-70. Other measures to address winter maintenance are currently being evaluated and include sand retrieval, automated deicing systems, and solar snow storage zones (CDOT 2002a, 2002b).

How does construction of the alternatives affect wetlands and other waters of the U.S.?

Impacts associated with the footprint of the project are considered permanent because the transportation facility (such as additional traffic lanes, rail, or guideways) covers the given resource. Impacts associated with construction disturbance are considered temporary because this area could later be reclaimed.

In addition to causing losses of wetlands, construction of Action Alternatives has the potential to affect wetlands adjacent to and downstream from the alternatives. Changes in hydrological regime and water quality can cause changes in plant dispersal and survival, leading to plant community shifts over time and resulting in effects on an entire ecosystem's function.

What are the project effects on wetlands and other waters of the U.S. in 2050?

By 2050, climate change, continued development and changing water supply demands in the Corridor could affect both groundwater and surface water levels, potentially contributing to the existing trend of loss and degradation of wetlands. As a result, the wetland acreage present at the time of construction impacts may be less than the current condition, resulting in the Action Alternatives impacting less wetland acreage than currently estimated. Because the Action Alternatives contribute to the existing trend of loss and degradation of wetlands in the Corridor, extending the timeframe for construction impacts out to 2050 allows the wetlands to exist in and contribute to the biological system for additional time. This benefits the biological system in the short-term.

For more information on cumulative effects, see **Chapter 4, Cumulative Impacts Analysis**.

3.3.6 What will be addressed in Tier 2 processes?

Tier 2 processes will include the following:

- A delineation of all wetlands to identify affected wetlands, using the latest approved U.S. Army Corps of Engineers methodology.
- Identification and analysis of impacts to fens for each specific project and will require in-depth field studies to identify affected fens. In such cases, project plans will need to be modified to avoid affecting these areas.
- Functional Assessment of wetlands within the Corridor using the Functional Assessment of Colorado Wetlands (FACWet) Methodology.
- Analysis to separate jurisdictional and non-jurisdictional wetlands for permitting the specific alternative.

- A more detailed analysis of direct and indirect impacts on wetlands and other waters of the U.S.
- Development of specific and detailed mitigation strategies and measures.
- Development of specific best management practices for each project.

3.3.7 What are the approaches to programmatic mitigation planning for wetlands and other waters of the U.S.?

At the first tier, the mitigation focuses on avoidance and minimization of impacts. Impact avoidance and minimization strategies are incorporated into the development of Action Alternative alignments and design concepts, outlined in **Section 3.19, Mitigation Summary** of this document. However, while mitigation activities avoid and minimize impacts, some impacts on Corridor wetlands and other water resources are likely.

Avoidance and Minimization Efforts for the First Tier

- Conceptual planning for roadway alignment and to reduce alternative template width
- Use of existing I-70 Mountain Corridor area
- Snow storage areas located to capture snow and roadway runoff
- Modification of Rail with Intermountain Connection and Advanced Guideway System alignments to avoid impacts on wetlands

The Colorado Department of Transportation is committed to implementing the SWEEP Memorandum of Understanding as the foundation of mitigation for aquatic resource impacts during projects along the Corridor and its communities (see **Appendix D, SWEEP Memorandum of Understanding**). The SWEEP Committee will identify and recommend appropriate mitigation strategies, including design, implementation, and monitoring to anticipate environmental impacts resulting from redevelopment of the Corridor. The SWEEP Committee will coordinate with the ALIVE (A Landscape Level Inventory of Valued Ecosystem Components) Committee to increase the permeability of the I-70 Mountain Corridor to terrestrial and aquatic species to provide and maintain long-term protection and restoration of wildlife linkage areas, improve habitat connectivity, and preserve essential ecosystem components.

Overall, mitigation strategies provide the opportunity to reduce impacts and enhance wetland environments in the Corridor. Impacts on wetlands and other waters of the U.S. will be addressed more specifically for each project evaluated in Tier 2 processes. Additionally, CDOT's policy is to mitigate all impacts on a one-to-one per acre basis, regardless of whether the wetland is jurisdictional or non-jurisdictional.

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3.4 Water Resources

3.4.1 What are water resources and why are they important?

A water quality evaluation study

Water resources in the I-70 Mountain Corridor include the watersheds—and the rivers, streams, and creeks fed by those watersheds—that run to and along the interstate and ultimately continue flowing away from the Corridor to downstream users. These water resources are protected by:

- The Clean Water Act;
- State water quality standards; and
- The Source Water Assessment and Protection program, which assesses potential water quality issues for public water supplies mandated by the Safe Drinking Water Act.

These regulations protect surface and groundwater quality for drinking water, recreation, agriculture, and aquatic life. Water quality is protected to minimize siltation of lakes and reservoirs and to minimize the loss of wetlands that help filter the water system in natural ways.

3.4.2 What study area and process was used to analyze water resources?

For water resources, the Colorado Department of Transportation (CDOT) used the intersecting watersheds of the Corridor for context, with adjacent streams along the Corridor providing the more specific study area for impacts. The Colorado Department of Transportation coordinated with federal, state, and local agencies and asked for public input to identify water resources in the Corridor. Additionally, CDOT established the following three programs to gather information on water resources within the Corridor:

- *Draft Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding* (CDOT, et al. 2009) identifies water-related issues and mitigation strategies in the Corridor, with immediate attention given to the Clear Creek portion of the Corridor;
- The *I-70 Storm Event/Snowmelt Water Quality Monitoring Program* (Clear Creek Consultants, Inc., 2008) conducted sampling from 2000 to present to quantify existing water quality conditions from I-70 highway runoff; and
- *The Sediment Control Action Plan (SCAP) for Black Gore Creek and Straight Creek* (CDOT, 2002) outlines mitigation strategies for the two streams listed as impaired waters under the Clean Water Act. A summary of these findings is in this section; additional information is in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010a). Additionally, a Sediment Control Action Plan is under development for Clear Creek.

The Colorado Department of Transportation estimated impacts from highway runoff by quantifying increased impervious surface area and winter maintenance material usage (increases in sand/salt and liquid deicer). Highway stormwater runoff and associated increases in water quality pollutant concentrations and loads in streams were quantified using the Federal Highway Administration (FHWA) water quality model. Storm events of once every three years were used as a measure for the fairly regular heavy flush of stormwater typically collecting pollutants and washing them downstream. Stream disturbance impacts were estimated quantitatively in terms of Action Alternative footprints, estimated by adding 30 feet beyond the edge of the project design to allow for some final design adjustment as well as room for construction equipment to move around the site. Although construction impacts are discussed in this document, Tier 2 processes will be necessary to identify more specific impacts on water resources

(including impacts on specific water supplies, wastewater facilities, fisheries, and impaired waters that have limited Total Maximum Daily Loads of certain pollutants such as sediments and heavy metals because of the existing levels that are already negatively affecting the water resource), as well as specific mitigation activities. Areas of potential concern include existing impaired segments resulting from I-70 highway runoff (Black Gore Creek, Straight Creek, and Upper Clear Creek) and impaired segments resulting from historic mining in Lower Clear Creek. Construction disturbance of mining waste and mineralized rock (mercury and other minerals releases from mining tailings could impact water quality and biological resources, such as macroinvertebrates and the fish that feed on them, that live in these waters), and long-term operation of the transportation corridor could potentially affect some I-70 highway segments.

3.4.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

The Colorado Department of Transportation and FHWA consulted the following agencies regarding their issues and concerns with implementing a project along the Corridor:

- U.S. Fish and Wildlife Service,
- United States Forest Service,
- U.S. Army Corps of Engineers (USACE),
- Environmental Protection Agency,
- Colorado Department of Public Health and the Environment (CDPHE),
- U.S. Bureau of Land Management,
- Colorado Division of Wildlife, and
- Representatives from the watersheds, counties, and cities along the Corridor.

For water quality issues, agencies raised general concerns regarding contaminants coming from the I-70 highway, the possibility of releasing into the streams contaminants came from past mining activities during construction, and long-term indirect effects on water quality from induced growth caused by the project. The following specific concerns also were raised:

- Agencies are concerned about the stormwater run-off and drainage from the I-70 highway into Georgetown. The Upper Clear Creek Monitoring Station upstream from Georgetown is designed to quantify water quality from upstream sources in the vicinity of the Eisenhower Johnson Memorial Tunnels, I-70 highway, and US 6. See Table 2 in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010a) for details. This monitoring station exhibits concentrations of total suspended solids, total phosphorus, dissolved salts, and manganese higher than background levels. Sources of sediment and dissolved salts include highway traction sand/salt accumulations along the I-70 and US 6 highways, and potential erosion of dirt parking lots at Loveland Ski area. Sedimentation from the I-70 highway impairs Straight Creek and Black Gore Creek water quality. Trace metals found are attributable to mining rather than I-70 highway runoff except in highly mineralized rock cuts such as along Upper Clear Creek.
- Agencies are concerned about I-70 highway contaminants flowing into Straight Creek that provides the water supply to Dillon and Dillon Valley. A monitoring station above the Dillon Water Supply Diversion Structure indicates an elevated level of sediments and chloride exists in the stream from unconsolidated traction sand deposited along the I-70 highway, along with highway cut-and-fill slope erosion. *The Sediment Control Action Plan (SCAP) for Black Gore Creek and Straight Creek* (CDOT, 2002) stresses the importance of standard sediment control best management practices at the source to reduce sediment and phosphorus transport in Straight Creek.

3.4.4 What are the water resources of interest identified in the Corridor?

The I-70 Mountain Corridor crosses four watersheds. From west to east the watersheds include:

- Eagle River
- Blue River
- Clear Creek
- Bear Creek

West Tenmile Creek monitoring station above Copper Mountain

The Corridor includes 11 identified waterways adjacent to the I-70 highway (from west to east):

- Eagle River
- Gore Creek
- Black Gore Creek
- West Tenmile Creek
- Tenmile Creek
- Straight Creek
- Upper/Middle/Lower Clear Creek
- Beaver Brook
- Mount Vernon Creek

The Corridor also includes two reservoirs along the way (Lake Dillon and Georgetown Reservoir). **Figure 3.4-1** shows the watersheds and stream segments within the I-70 Mountain Corridor.

Four Bay Excel Plant is the drinking water supply for Georgetown. More information about water resources, watersheds, and adjacent streams/rivers is available in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010a). All of these streams/rivers have regulated limits on what is allowed to enter these water systems to protect these intended uses (including water supply, aquatic life, recreation, and agricultural uses) or to help improve the water quality of impaired or use-protected streams. Heavy metals contamination related to historic mining activities (copper, zinc, and cadmium) has an impact on Middle and Lower Clear Creek (two stretches of Clear Creek). Black Gore Creek and Straight Creek are monitored for sedimentation input from the I-70 highway runoff. They have been placed on the 303(d) list of water quality impaired streams for sediment which requires monitoring and evaluation to meet stream water quality targets or goals. The 303(d) identifies threatened or impaired waters that may require a Total Maximum Daily Loads limit for pollutants of concern for that stretch of water. Additionally, the Colorado River Glenwood Canyon area is going through the designation process for a Wild and Scenic River, which affords it protection under the Wild and Scenic Rivers Act.

Most of the impacts on water quality in Corridor streams are the result of planned urban and rural development that increases both point and nonpoint source loads of total phosphorus. The phosphorus loads are expected to increase as a result of these planned land use changes through 2025 by 34 percent in the Eagle River Watershed, by 7 percent in the Blue River Watershed, and by 28 percent in the Clear Creek Watershed (estimated from the Environmental Protection Agency's Better Assessment Science Integrating Point and Nonpoint Sources [BASINS] model). County planning does not have substantially different projections beyond 2025 so there is no need to project out to 2035 for this phosphorous load estimate. Impacts from the existing I-70 highway are generally included in the changes from existing to planned development in the BASINS modeling study.

Stream appearance in the Corridor has been altered over time in negative ways. They have been interrupted by man-made features, such as the I-70 highway, and channelized so that the flows are quicker and more erosive that further affect the banks of the streams, stream bottom, and stream bank shape.

Changes caused by these man-made features affect the ability of a stream to support fisheries and affect the overall function of the stream habitat for macroinvertebrates. Macroinvertebrates are animals without backbones that are larger than the size of a pencil dot. These animals live on rocks, logs, sediment, debris and aquatic plants during some period in their life and include crayfish, clams and snails, aquatic worms and the immature forms of aquatic insects such as stonefly and mayfly nymphs.

Macroinvertebrates are good indicators of water quality because they cannot leave the area if sediments or other contaminants are impacting them. They are important to fish as a food source and they eat plants that fall or grow in the water so they help clean up the water and release nutrients from those materials back into the ecosystem.

3.4.5 How do the Action Alternatives potentially affect water resources?

Past and current activities in the Corridor have affected water resources:

- Trail, road, and railroad construction in stream valleys have affected water resources due to the otherwise steep challenging terrain and the maintenance of these features (such as winter maintenance with deicers and sand);
- Mining activities have left mining tailings containing and exposing the heavy metals and acids to surface runoff;
- Settlement and urbanization of the Corridor have added more hard surfaces, thereby increasing stormwater runoff volumes and construction sedimentation. Chemicals such as fertilizers have been added into the system, and additional demand on water supply for drinking water has created a need to import water to the creeks causing flows to increase beyond historical levels;
- Channelization (i.e., moving and/or straightening) of stream beds has increased the speed of water flow and the erosive force and sediment load of these flows, modified stream habitat characteristics making them less desirable to aquatic species such as fish, and impacted wetlands so they cannot properly function to help filter out sediments and other contaminants; and
- Hazardous materials transport and the effects of subsequent spills into nearby waterways have affected water resources.

Ice and snow accumulation in the winter, as well as heavy snowmelt and rainfall events that occur in the mountains in the spring and summer, further impacts water resources. These conditions loosen and move sediments off the steep hillsides and flush contaminants from human activities and settlements down the Corridor. The Action Alternatives complicate this water system.

The Action Alternatives potentially affect water resources both directly and indirectly to various degrees.

Direct impacts include impervious surface area/roadbed expansion, new construction disturbances, additional stream channelization, further impedance or blockage of cross-slope streams, impacts from disturbance of historic mine waste materials, and impacts from transportation system operations and maintenance of the new facilities. Changes in impervious surface and roadbed expansion are permanent impacts, while construction impacts are considered temporary.

Indirect or secondary water quality impacts come from possible induced growth, more localized to areas of Eagle and Summit counties, and vary with specific Action Alternatives.

Figure 3.4-1. I-70 Corridor Watersheds

How do the alternatives directly affect water resources?

The Action Alternatives directly affect water resources through the introduction of sediments and other contaminants into the stream channels, as well as by physically affecting stream length by placing the road or its supports next to or in the stream channel.

At the request of CDPHE and the Environmental Protection Agency, a monitoring program conducted since 2000 measured actual direct snowmelt and stormwater runoff contaminants from the I-70 highway and their impacts on receiving streams. The data are explained in the *Data Evaluation Report Interstate 70 Mountain Corridor, Storm Event/Snowmelt Water Quality Monitoring 2000-2006* (Clear Creek Consultants, Inc. 2008). In addition, the results are described in the *Water Quality Modeling, I-70 PEIS Direct Impact Analysis* (Clear Creek Consultants, Inc., 2010), which includes 2010 updates to the monitoring data. The selected pollutants monitored include:

- Suspended solids (such as sediments that can carry other pollutants);
- Phosphorus (found in sediment and winter maintenance materials used on the I-70 highway and in fertilizers); and
- Chloride (from rock salt and liquid magnesium chloride deicers);
- Copper (from moving engine parts, brake linings and fungicides/insecticides); and
- Zinc (from tire wear, motor oil and grease).

The monitoring of existing conditions provides an estimate for future impacts from additional roadway capacity improvements. Current CDOT maintenance data indicates a major change in winter maintenance material usage in the recent years: there is a trend away from sand/salt toward more widespread use of sand/slicer mixture (a solid deicer that is more concentrated than rock salt) and liquid deicer salts. This shift decreases sediment and phosphorus loading in the high-elevation streams receiving I-70 highway runoff and increases chloride concentrations and loads in recent years exceeding the long-term aquatic life chloride standard.

Direct impacts on water resources related to the Action Alternatives include:

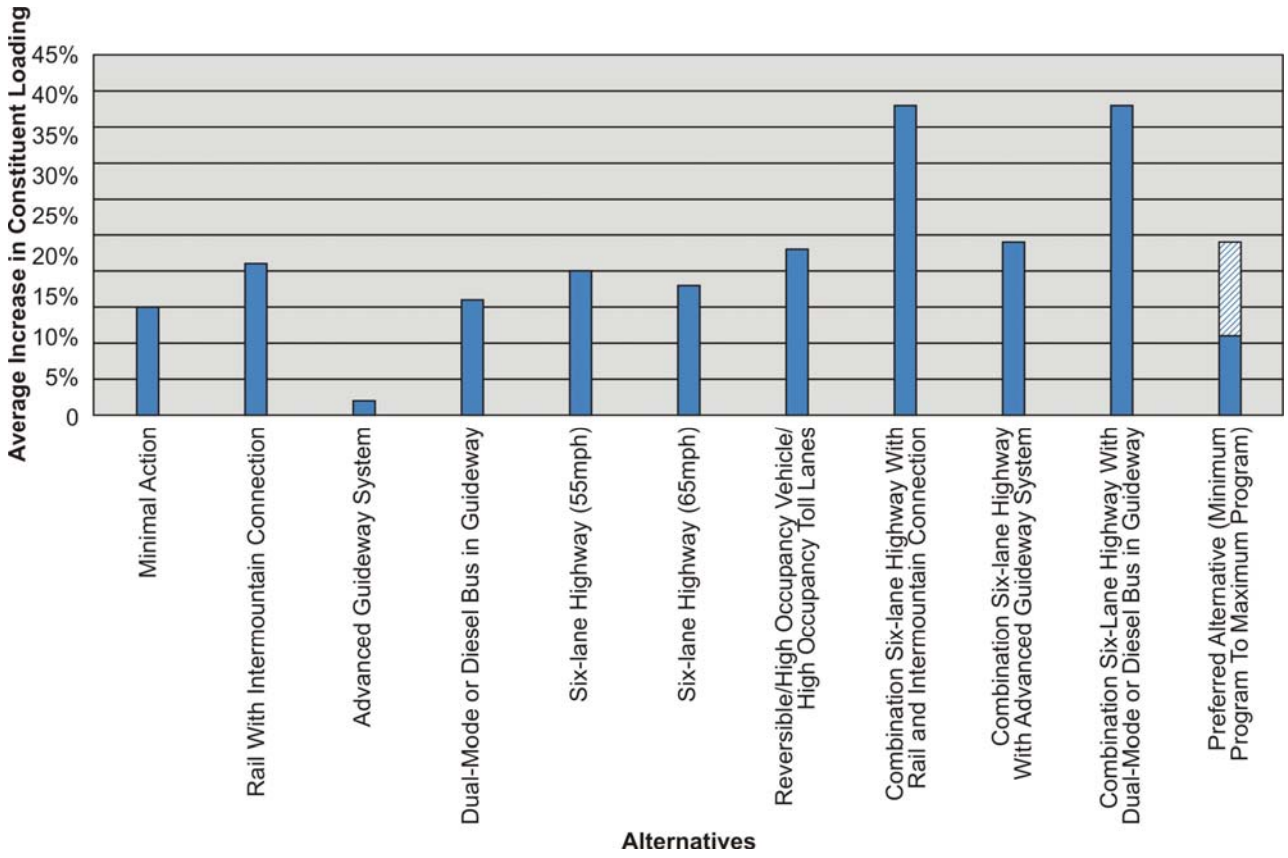
- Increases in impervious surface area/roadbed expansion,
- New construction disturbances,
- Stream channelization,
- Impedance or blockage of cross-slope streams,
- Impacts from disturbance of historic mine waste materials, and impacts from transportation system operations and maintenance.

Changes in impervious surface and roadbed expansion are considered long-term impacts due to the continued winter maintenance activities required to keep this roadway operational. Winter maintenance activities that add sand and anti-icing products to the road surface to minimize vehicular sliding on the ice cause sedimentation and sodium/magnesium sources of contamination into the adjacent streams during snow melt and spring stormwater runoff. Construction impacts are considered temporary and short-term because the soil-disturbance action causing pollutants to be loosened or made available to the water systems are mitigated by adding impervious surfaces or covering it with rock or vegetation to keep the soils in place. Sedimentation is often used as a surrogate for other water quality issues because other pollutants often accompany sedimentation into the waterways.

Chart 3.4-1 shows the result of a sediment stream loading model run for the performance of the Preferred Alternative compared to the other alternatives being considered in this document. The adaptive management approach to implementation of the Preferred Alternative allows some or all of the components of the Preferred Alternative to be built as funding allows and as improvements are needed for the Corridor. Therefore, a range of impacts is shown on **Chart 3.4-1** for the Preferred Alternative. The No

Action Alternative does not have sediment and hydrologic mitigation associated with it. The other Action Alternatives do have mitigation strategies, but the No Action Alternative still causes a continuing impact on water quality over time. The Minimal Action Alternative shows more of an impact on sedimentation than the Minimum Program for the Preferred Alternative because the Minimum Program for the Preferred Alternative does not include some of the improvements in the Minimal Action Alternative; that is, it does not include the Idaho Springs interchanges, Fall River Road curve, and the Empire to Downieville eastbound auxiliary lane improvements planned for Clear Creek County.

Chart 3.4-1. Predicted Corridor Stream Loading Impacts by Alternative



**Stream water quality loading increases were calculated using the FHWA water quality model. The load changes were based on stream concentrations and highway runoff from impervious surfaces. Although the No Action Alternative does not show an increase with regard to what is built for the project, there are indirect increases from land use changes and population growth that cause an increase in sediment loading. None of these columns include mitigation as part of the measure, which greatly reduces the sediment loading of any Action Alternative including the Preferred Alternative. Mitigation is not be included for the No Action Alternative and likely has a higher sediment loading after mitigation is considered over all of the Action Alternatives.*

Bar Chart Source: Water Quality Modeling, I-70 PEIS Direct Impact Analysis, February 2004 with March 2010 Addendum, *Clear Creek Consultants, Inc. 2010*

**The Maximum Program presents the range of impacts that occurs with the Preferred Alternative. The solid bar represents the implementation of the Minimum Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Possible disturbance of historic mine waste is discussed in the *I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010b). Tier 2 processes will be necessary to identify specific water quality impacts from disturbance of historic mine waste and associated avoidance/mitigation measures. Sediment control structures that have been or will be built are expected to remove much of total metals and particulate phosphorous.

Winter maintenance calculations assume that the average application rate per unit area for sand and chemical deicers remains the same for all alternatives. This assumption is based on existing data that incorporate historic weather conditions and maintenance procedures for both four-lane and six-lane I-70 highway segments (Straight Creek and Mount Vernon/Beaver Brook). Although No Action projects include some additional sand and deicer usage, such amounts are considered minimal in comparison with the Action Alternatives. The increase in material usage reflects the increase in the number of highway lanes and quantity of impervious surface. Although the absolute material volumes may change, these changes are proportional to the surface disturbance of the alternative.

In all watersheds, the Corridor footprint and roadside cut and fill estimates of the Action Alternatives amount to less phosphorus loads on the system than any of the planned development land use categories; however, they amount to 12 percent to 30 percent of the total phosphorus loads expected at that time in the Corridor. Most of the impacts on water quality in Corridor streams are the result of planned urban and rural development, increasing point and nonpoint source loads of total phosphorus. For information on Cumulative Effects of actions planned in the area on water quality, see **Chapter 4** of this document.

Combination Alternatives (including the Preferred Alternative) are expected to distribute induced growth equally between the above transit and highway distribution scenarios that results in increased pressure on areas planned for rural development.

Notable differences in water quality impacts among Action Alternatives include:

- The elevated Advanced Guideway System Alternative results in fewer water quality impacts than the Rail with Intermountain Connection or Bus in Guideway Alternatives. There is little additional impervious pavement and pier construction for the Advanced Guideway System Alternative, which requires less excavation that might loosen sediments.
- The Bus in Guideway Alternatives result in fewer impacts than the Rail with Intermountain Connection Alternative because it is largely contained in the median (a previously disturbed area) and requires minimal excavation.
- The Highway Alternatives have similar overall impacts due to comparable footprints. However, the Highway Alternatives have more impacts on historic mine heavy metal sources that could be released into the waterways than just the Advanced Guideway System Alternative. These alternatives likely have fewer impacts compared to the Rail with Intermountain Connection Alternative because they will require more cuts into mine waste areas and mineralized rock by the roadway along the Middle and Lower Clear Creek stretches to accommodate the wider footprint. The strategy for winter maintenance of these lanes minimizes the additional deicers needed for the additional roadway.
- The Combination Six-Lane Highway with Rail and Intermountain Connection Alternative probably has the greatest direct impacts on water quality because of its greater impervious surface and potential to disturb historic mine waste materials because of its footprint width.
- The Combination Six-Lane Highway with Advanced Guideway System (Preferred Alternative Maximum Program, if fully implemented) best meets the project's purpose and need and still has a limited footprint due to the Advanced Guideway System being on piers among the other Combination alternatives.

Channelizing, moving, or placing piers in the waterway also have an impact on water resources. **Table 3.4-1** lists these impacts by alternative and watershed. **Table 3.4-1** shows that the impacts resulting from the Preferred Alternative (Minimum Program of Improvements) are less than the impacts for the Minimal Action Alternative. The primary differences between the stream channel impacts from the footprint of these alternatives are to Clear Creek within Clear Creek County. The Minimal Action Alternative shows more of an impact on stream length than the Minimal Program for the Preferred Alternative because the Minimum Program for the Preferred Alternative does not include some of the improvements in the Minimal Action Alternative. It does not include the Idaho Springs interchanges, Fall River Road curve, and the Empire to Downieville eastbound auxiliary lane improvements planned for Clear Creek County. As a result, there is 0.4 miles less impact on stream channels. These impacts are based on the overall footprint area of alternatives and do not assume any mitigation or avoidance potential.

Table 3.4-1.Summary of Stream Channel Impacts (Miles)

Alternative	Clear Creek Watershed	Blue River Watershed	Eagle River Watershed	Total Impacts
No Action	0.0	0.0	0.0	0.0
Minimal Action	3.0	0.3	0.7	4.0
Rail with IMC	5.0	0.6	0.7	6.3
AGS	3.8	0.3	0.5	4.6
Dual-Mode Bus in Guideway	4.0	0.5	1.1	5.6
Six-Lane Highway (55 mph)	4.9	0.3	0.7	5.9
Six-Lane Highway (65 mph)	5.2	0.3	0.3	5.8
Reversible/HOV/HOT Lanes	5.5	0.3	0.7	6.5
Combination Six-Lane Highway with Rail and IMC	6.8	0.6	1.2	8.6
Combination Six-Lane Highway with AGS	6.5	0.3	0.9	7.7
Combination Six-Lane Highway With Diesel Bus in Guideway	6.2	0.5	1.2	7.9
Preferred Alternative[1]	2.6 - 6.8	0.3 - 0.3	0.7 - 0.9	3.8 - 7.7

[1]The Preferred Alternative is presented as a range because the adaptive management component allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Key to Abbreviations/Acronyms

IMC = Intermountain Connection AGS = Advanced Guideway System
HOV = High Occupancy Vehicle HOT = High Occupancy Toll

Notable differences in stream length impacts among Action Alternatives include:

- The elevated Advanced Guideway System Alternative results in fewer water quality impacts than the Rail with Intermountain Connection or Bus in Guideway Alternatives because there is little additional impervious pavement and pier construction for the Advanced Guideway System, which requires less of a footprint than either of the other alternatives.
- The Bus in Guideway Alternatives results in fewer impacts than the Rail with Intermountain Connection Alternative because it largely is contained in the median (a previously disturbed area) and requires minimal expansion to the outside of the I-70 highway where the streams are located.

- The Highway Alternatives have similar overall impacts due to comparable footprints.
- The Combination Six-Lane Highway with Rail and Intermountain Connection Alternative probably has the greatest direct impacts on stream lengths because of its footprint width.
- The Combination Six-Lane Highway with Advanced Guideway System (Preferred Alternative Maximum Program, if fully implemented) best meets the project's purpose and need and still has a limited footprint due to the Advanced Guideway System being on piers among the other Combination alternatives. Additionally, although not specifically calculated for this alternative, there are better opportunities to minimize direct impacts on the stream because the impacts calculated in Tier 2 processes are more related to pier placement than to roadway width.

How do the alternatives indirectly affect water resources?

Indirect water quality impacts are related to the induced growth that the completed project will bring to the area and include:

- The increase in impervious area causing additional runoff,
- Increased importation of water adding an unnatural volume to the waterways below, and
- Increased use of fertilizers and other chemicals that can be a source of contamination.

The No Action Alternative is expected to have the fewest indirect impacts, with the Minimal Action Alternative expected to have the next fewest indirect impacts. However, neither of these alternatives meets the purpose and need for the project.

Alternatives that include tunnels (Transit, Highway, and Combination) have considerable potential for indirect impacts related to highway operation and maintenance activities, as well as construction disturbance of geological substrate that could release pollutants into the waterways.

The Combination Alternatives have the greatest amount of indirect impacts through induced growth, partly because of their effectiveness at moving more people through the Corridor.

Table 3.4-1 summarizes sediment loading impacts on water resources directly correlating with phosphorus loading by alternative. See the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010a. There is not a measurable difference in heavy metal loading among the alternatives so it is not described in **Chart 3.4-1**. However, heavy metal loading correlates to the Clear Creek Watershed sedimentation impacts.

Indirect water quality impacts from possible induced growth are more localized to areas of Eagle and Summit counties and vary with specific alternatives. Transit Alternatives (including the Preferred Alternative with the adaptive management approach) may induce growth in urban areas with transit centers, including Eagle, Avon, Vail, Dillon, and Silverthorne, and increase stormwater runoff, phosphorus loading and sedimentation from these areas. Highway and Combination Alternatives may induce more dispersed growth in rural areas, possibly leading to the greatest cumulative impacts on water quality from new development activities.

Coordination with planners in Garfield, Eagle, and Summit counties resulted in the following assumptions regarding the distribution of induced growth as it relates to the alternatives being considered:

- Transit Alternatives (including the Preferred Alternative) concentrate induced growth in urban areas surrounding transit centers in areas of existing or planned urban development.
- Highway Alternatives distribute growth based on existing trends for urban/rural development in each county, resulting in increased densities in rural areas of the Eagle and Blue River watersheds.

How does construction of the Action Alternatives affect water resources?

Construction disturbance constitutes temporary sedimentation impacts on streams and water bodies caused by work that may be required in the stream and temporary crossing of the streams during construction activities. The use of best management practices along the edge of the streams will minimize other sediments from entering the stream from adjacent earth-moving activities. In some areas, such as along Lower Clear Creek where heavy metals are natural in the soil, these construction-related earth moving activities release these metals into the sediments so that temporary heavy metal loads could enter the stream with the other sediments from the project. Having equipment working so close to, and possibly working within, the streams may temporarily release oils and other petroleum products into the waters. Stormwater runoff from freshly poured concrete areas could temporarily slightly increase the alkalinity of the stream (this is the opposite of acidity). Although the project design minimizes permanent impacts on stream channels, project footprints might require additional channelization of the stream banks or pier placement for bridges within the stream flow.

What are the project effects on water resources in 2050?

By 2050, streams could receive higher than-normal flows due to increased water importation and increased stormwater runoff due to increased impervious surface, caused by land use changes and population growth in the area. These changes in natural flows of the creeks and rivers may increase water scour of the waterways further adding sediment and soil minerals to the waterways system while not allowing these sediments and nutrients to settle out. Climate change could also have a negative impact on water resources by contributing to deforestation already started by the mountain pine beetle epidemic. The loss of trees could increase sedimentation of aquatic habitat along the Corridor during rain and snow-melt events due to lack of vegetative cover that holds the soil in place. Existing Sediment Control Action Plans for Black Gore and Straight Creeks do not protect all of the areas from increased sedimentation that could be affected by the alternatives. Implementation of Action Alternatives includes sediment control through the SWEEP program and also helps to address and correct the impacted hydrologic system of the watershed. Over time, the Action Alternatives improve water resources by helping the waterways manage sedimentation from some natural or man-made events in the Corridor. For more on cumulative effects, see **Chapter 4** of this document.

3.4.6 What will be addressed in Tier 2 processes?

Some of the water quality impacts cannot be further assessed until the transportation mode is selected and the pier placement or roadway cuts are identified. Therefore, the following information is more appropriate to investigate in Tier 2 processes:

- Reservoir impact analysis from phosphorus concentrations in highway runoff impacts water quality.
- A decreased in stream flow caused by drought conditions lowers the stream's ability to dilute contaminants and might lower the amount of acceptable pollutants allowed in the stream.
- Further analysis of permanent stormwater best management practices along the Corridor could verify that potential reductions to stream concentrations of priority constituents could be achieved by the alternatives beyond existing annual conditions.

In Tier 2 processes, it can be determined whether a stream channel will be affected by the proposed alignment and what kinds of mitigations could offset this impact. Likewise, the placement of permanent water quality features such as catchment basins could benefit the Corridor by repairing stream health and minimizing impacts of the projects.

- Potential water quality issues arising from disturbance of mine tailings and therefore, metal loading, will be covered in the Regulated Materials and Historic Mining analysis during the Tier 2 process.
- Tier 2 processes will evaluate and identify permanent mitigation measures for specific issues and could include structural controls (beyond the Black Gore Creek and Straight Creek Sediment Control Action Plan and the Clear Creek Sediment Control Action Plan that is currently under development).
- Tier 2 processes will include specific identification of stream disturbance during construction, including construction disturbance areas, channelized segments, pier placement, and structural modifications (for example, embankment walls, cantilevered sections, or elevated structural segments and bridges). The USACE requires compliance with the Clean Water Act that requires Section 404 permitting of temporary and permanent impacts on stream flow and channels.
- Tunnel discharges are typically considered point source discharges under the Clean Water Act, requiring one or more National Pollutant Discharge Elimination System permits. Further study will be necessary during Tier 2 processes to identify if any new tunnels will require National Pollutant Discharge Elimination System permits and/or water treatment systems. Water rights issues must also be considered in the context of water law for new groundwater discharges.
- Impacts associated with washout of sand onto bike paths will be addressed in Tier 2 processes.
- Impacts from Straight Creek runoff on the Blue River will be addressed in Tier 2 processes. These were not monitored for this analysis.
- The Colorado Department of Transportation will specify how the SWEEP Memorandum of Understanding mitigation strategies will be incorporated in the project design that will be detailed in the Tier 2 process.

3.4.7 What are the approaches to programmatic mitigation planning for water resources?

The Colorado Department of Transportation will incorporate the following strategies to minimize and avoid potential environmental impacts on water resources from the proposed project. A more comprehensive discussion of mitigation strategies is found in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010a).

- Water quality and water resource mitigation strategy recommendations from the *Draft Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding* (CDOT, et al. 2009) (but may be modified in the final Memorandum of Understanding) are adopted by the CDOT and FHWA for this Programmatic Environmental Impact Statement. The Colorado Department of Transportation is leading the primary effort to initiate the SWEEP, facilitating open discussions and working relationships to accomplish stream mitigation goals and providing technical support and funding mechanisms. These mitigation strategies include, but are not limited to, sedimentation control and stream restoration measures.

- The Colorado Department of Transportation will work cooperatively with various local, state, and federal agencies and local watershed groups to avoid further impacts on and possibly improve Clear Creek water quality, including management of impacted mine waste piles and tunnels within the Corridor and through the use of appropriate best management practices during storm water permitting. For additional information on minimizing water quality effects from disturbing mine waste, tailings, and drainage tunnels, see **Section 3.6, Regulated Materials and Historic Mining**.

- Local watershed initiatives will be incorporated into site-specific Action Alternative mitigation strategies, and mitigation will consider the goals of the local watershed planning entity. Detention basins for the collection of sediment as outlined in the Sediment Control Action Plans developed for the Black Gore Creek and Straight Creek corridors (the Clear Creek Sediment Control Action Plan is under development) will be part of the mitigation strategy for this Corridor. Sediment Control Action Plans could be implemented concurrently with development of an Action Alternative and will consider drinking water source protection.
- The Colorado Department of Transportation is looking into ways to mitigate for winter maintenance activities beyond the implementation of SWEEP that will provide for sediment and stormwater catchment basins. Better training for snowplow staff so they know when they can minimize the use of sand or deicers if the roadway conditions do not need as much as for other times would help minimize the introduction of these contaminants over time.
- The Colorado Department of Transportation will mitigate construction impacts primarily through the implementation of a Stormwater Management Plan that proposes appropriate best management practices for erosion and sediment control according to the *CDOT Erosion Control and Storm Water Quality Guide* (CDOT, 2002). Appropriate water quality protection best management practices must be in place to protect water quality before construction begins and remain until the site is stabilized and vegetation has regrown.
- Efforts will be included in further design phases to minimize impacts on water quality and other water resources by refining placement of roadway and road piers to avoid impacts when feasible.

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3.5 Geologic Hazards

3.5.1 What are the geologic hazards in the Corridor and why are they important?

Geology in the Corridor includes highly complex and varied ground conditions found in both the natural and man-made settings. Numerous conditions influence the mountainous Corridor, such as geologic structure, slope configuration, precipitation, wind, and extreme temperature fluctuations that contribute to geologic hazards in the Corridor. Some of the hazards include faults, adverse rock structure, landslides, rockfalls, debris flows, avalanches, and collapsible soil. Steep, unstable slopes limit engineering options for improvements, and most slopes are highly susceptible to erosion because of sparse vegetative cover. The initial construction of the I-70 highway intensified some of these hazards.

Geologic Hazards in the Corridor

- **Adverse faulting** – Fault that tends to decrease the stability or coherence of a rock mass or decrease the stability of a structure to be constructed in a rock mass
- **Adverse rock structure** – A structure in a rock mass that potentially detracts from the performance of the mass itself or from a structure constructed in the rockmass if not accommodated for
- **Poor rock quality** – Rock that by virtue of its fracturing, alteration, or inherent characteristics has a low or unreliable mechanical strength
- **Debris flow and mudflow** – A moving mass of rock fragments, soil, and mud
- **Rockfall** – Falling of boulders or detached blocks of rock from a cliff or very steep slope
- **Landslides** – Downward movement of rock masses and soil
- **Avalanche** – Large mass of snow or ice that moves rapidly down a slope
- **Erosion/collapsible soil** – Fine sandy and silty soils with a loose, open structure that collapse when wet

3.5.2 What study area and process was used to analyze geologic hazards?

The study area for geologic hazards includes the areas surrounding the Corridor that may be encountered during construction or operation of the Action Alternatives. The lead agencies identified existing geologic conditions in the Corridor using information from geologic maps, United States Geological Survey reports, Colorado Geological Survey publications, topographic maps, aerial photographs, drilling, field mapping, literature reviews, and information from the *I-70 Georgetown Incline Rockfall Mitigation Feasibility Study* (CDOT, 2005). The characterization of geologic hazards included examining active and inactive limits of landslide features. The characterization of geologic hazards was conducted between 2001 and 2005. Because no new construction has occurred since this time and geologic conditions are very slow to change, the data remain a valid representation of existing conditions.

The lead agencies characterized the severity of disturbance to an area using ratings for the existing geologic hazards. Rating criteria include the influence of climate, proximity to the I-70 highway, history of occurrence, and impact on transportation and mobility. Based on these criteria, the lead agencies developed five categories for geologic hazard severity:

- Severe
- High
- Moderate
- Low
- Slight

Each alternative is characterized according to the severity categories for each type of hazard.

3.5.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

The Natural Resources Conservation Service and the United States Forest Service provided maps and reports on the soil erosion potential in the Corridor. The Natural Resources Conservation Service provided soil descriptions, characteristics, and modeling factors. The United States Forest Service provided erodibility descriptions and management considerations. Both agencies characterize soil types as slightly, moderately, or severely susceptible to erosion.

The Town of Silver Plume expressed concern with rockfall on Georgetown/Silver Plume Hill. The Colorado Geological Survey considers two potential rockfall areas in Silver Plume to be "perilous."

3.5.4 What are the areas of geologic hazard interest identified in the Corridor?

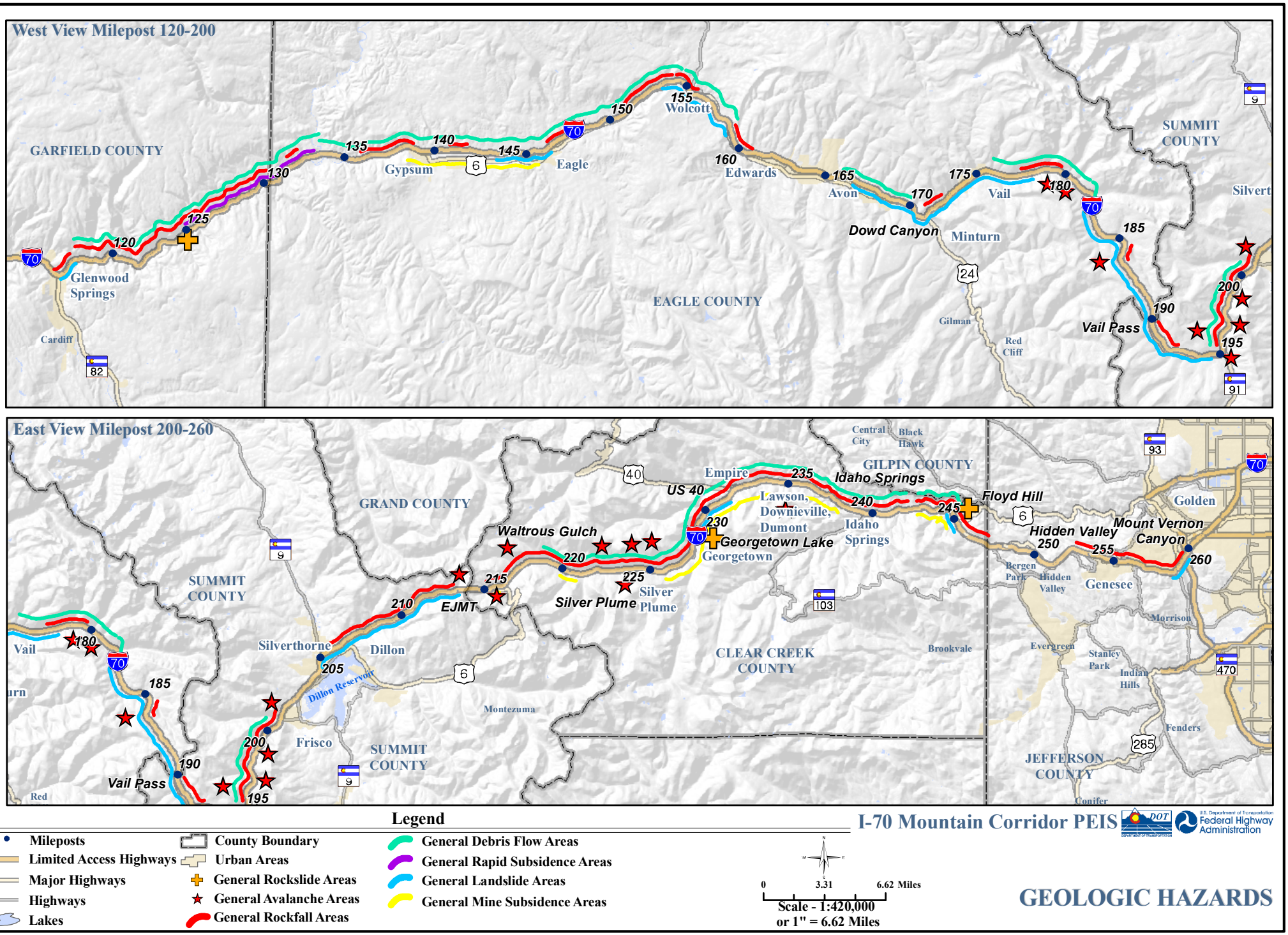
The western segment of the Corridor includes the Continental Divide, with Straight Creek on the west side of the Eisenhower-Johnson Memorial Tunnels and Clear Creek on the east side of the Eisenhower-Johnson Memorial Tunnels. The primary rock type on the western side of the Continental Divide is hard granite, which is relatively intact with minimal fracturing and/or faulting. Rock types on the eastern side consist of granites and granite/migmatite mixtures. The major fault system in the vicinity is the Loveland Shear Zone, consisting of numerous faults and smaller shear zones of diverse orientation and generally trending northeast to southwest. The *I-70 Mountain Corridor PEIS Geologic Hazards Technical Report* (CDOT, August 2010) details the geologic conditions and hazards in the Corridor.

Geologic hazards of some type are present throughout the Corridor, as shown in **Figure 3.5-1**. The greatest hazards are landslides, rockfall, avalanches, and debris flow/mudflow. To a lesser degree, the potential effects of collapsible soils and rapid subsidence impact existing facilities. These hazards have the potential to cause roadway closures, and managing hazards requires ongoing highway maintenance.

Landslides causing roadway closures or maintenance issues are most prevalent in Dowd Canyon, on Vail Pass, and along the Floyd Hill rockslide. Areas of concern for rockfall hazards include rockfall excavations through Dowd Canyon between Avon and Vail and along US 40 through Mount Vernon Canyon, where rocks originating from US 40 (runs parallel to the Corridor and at a higher elevation on the north) roll onto the highway. Debris flow/mudflows have the potential to affect the highway at Watrous Gulch, Georgetown Lake, and west of Silver Plume. Both triggered and natural avalanches result in impacts on the roadway, especially at the chutes west of the Eisenhower-Johnson Memorial Tunnels and on Vail Pass. Ground subsidence from past mining has affected the highway at Hidden Valley and Idaho Springs, but the extent of this hazard is unknown at this time. **Figure 3.5-1** shows these hazard locations.

3.5.5 How do the alternatives potentially affect geologic hazards?

In general, the Action Alternatives have similar effects on geologic conditions. Excavations in rock and soil cause both temporary impacts from construction activities and long-term impacts associated with achieving and maintaining slope stability. As shown in **Figure 3.5-1**, the most prevalent geologic hazard for the alternatives throughout the Corridor is rockfall, particularly in the area between Silver Plume and Georgetown, commonly referred to as the Georgetown Incline. Proposed tunnel boring locations in the Continental Divide increase exposure to rockfall hazards and potential landslides. Alternatives disturb the highly fractured and foliated rock that make up the Floyd Hill rockslide (south of the US 6 merge), increasing rockslide hazards in this area. The greatest area of active debris flow disturbance for the capacity improvements is near Georgetown Lake. Finally, with the exception of the Minimal Action Alternative, which does not include an additional tunnel bore at the Eisenhower-Johnson Memorial Tunnels, avalanches in the Mount Bethel area north of the Eisenhower-Johnson Memorial Tunnels potentially have an impact on alternatives.


West View Milepost 120-200
GARFIELD COUNTY
EAGLE COUNTY
SUMMIT COUNTY
Glenwood Springs
Cardiff
Gypsum
Eagle
Wolcott
Edwards
Avon
Dowd Canyon
Minturn
Gilman
Red Cliff
Vail
Vail Pass
Silverthorne
Dillon
Frisco
Montezuma
Dillon Reservoir
East View Milepost 200-260
GRAND COUNTY
CLEAR CREEK COUNTY
GILPIN COUNTY
JEFFERSON COUNTY
Central City
Black Hawk
Empire
US 40
Lawson, Downieville, Dumont
Idaho Springs
Floyd Hill
Georgetown
Georgetown Lake
Waltrous Gulch
EJMT
Silver Plume
Brookvale
Golden
Mount Vernon Canyon
Hidden Valley
Bergen Park
Genesee
Morrison
Evergreen
Stanley Park
Indian Hills
Fenders
Conifer
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Urban Areas
General Rockslide Areas
General Avalanche Areas
General Rockfall Areas
General Debris Flow Areas
General Rapid Subsidence Areas
General Landslide Areas
General Mine Subsidence Areas
0 3.31 6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
GEOLOGIC HAZARDS

How do the alternatives directly affect geologic hazards?

All alternatives, including the No Action Alternative, interact with geologic hazards along the Corridor. All Action Alternatives construct interchange improvements, climbing lanes, and auxiliary lanes. Climbing lanes in Dowd Canyon (milepost 170 to milepost 173) are not included in the Transit-only alternatives; in this location, the structure of geologic layers contributes to landslides and rockfall hazards, and avoiding construction in this area reduces landslide and rockfall hazards. Climbing lanes on Vail Pass (milepost 180 to milepost 190) common to all Action Alternatives are constructed in terrain affected by alpine glaciation where extensive landslides persist as a result of glacial events and poor rock quality. Widening on the cut slope side of the highway along the west approach to the Eisenhower-Johnson Memorial Tunnels (milepost 215.3 to milepost 218.3), also common to all alternatives, may trigger large slope failures. The Bus in Guideway proposed within the median impedes efforts to use the I-70 highway median as a catchment area of debris/mudflow from the highway when necessary and may lead to additional accumulation of debris on the highway.

Highway components included in the Action Alternatives encounter essentially the same geologic hazards along the Corridor with a few exceptions. The 65 miles per hour variation of the Six-Lane Highway Alternative is the only Action Alternative that includes a proposed tunnel at Dowd Canyon; this component avoids many of the geologic hazards and provides safer highway conditions, bypassing the active slide by placing the eastbound lanes in a new three-lane tunnel and lowering potential for rockslides. From Floyd Hill through the Twin Tunnels, including a bike trail and frontage roads from Idaho Springs East to Hidden Valley and Hidden Valley to US 6, all of the Action Alternatives cut through rugged terrain with areas of adverse structure and poor rock quality. Rockfall is the most prevalent hazard. Debris flow and erosion are common in the Empire Junction area (at the junction with US 40 at milepost 232) and may affect improvements at that location (included in all Action Alternatives), as the effects of glaciation terminate and the valley develops a “V” shape that directs debris materials toward the Corridor. Debris flow and potential avalanches could impact auxiliary lanes eastbound from the Eisenhower-Johnson Memorial Tunnels to Herman Gulch and westbound from Bakerville to the Eisenhower-Johnson Memorial Tunnels.

The impacts of the Rail with Intermountain Connection and Advanced Guideway System Alternatives are essentially the same; however, the on-grade Rail with Intermountain Connection is more susceptible to geologic hazards than the elevated Advanced Guideway System. The Advanced Guideway System elevated structure allows for debris flow or any other material to potentially pass underneath with no impact to operations, whereas debris flow could affect operations at Watrous Gulch, Silver Plume, and Georgetown Lake for the other Transit-only alternatives. The Rail with Intermountain Connection and Advanced Guideway System Alternatives extend farther than the Bus in Guideway Alternative, creating a greater impact on existing slides on the Western Slope (Vail Pass). The Combination alternatives extend the entire length of the Corridor and combine impacts of the Transit and Highway alternatives due to the larger footprint and scope of construction.

Impacts of the Preferred Alternative are similar to those of other alternatives. All the alternatives, including the No Action Alternative, result in disturbance of geologic hazards. While the impacts of the Preferred Alternative could be as great as the Combination alternatives if the Maximum Program is fully implemented, the adaptive management approach of the Preferred Alternative allows the project components and mitigations to be phased or adapted in implementation to address geologic hazard conditions that exist at the time improvements are constructed.

How do the alternatives indirectly affect geologic hazards?

Indirect impacts from geologic hazards result from operations and maintenance activities that are required for all of the alternatives, including the No Action Alternative. Hazards persist in the Corridor but the probability of such hazards creating impacts are no greater than the existing conditions. The Action

Alternatives reduce the risks posed by geologic hazards in some cases where construction stabilizes slopes. Regular avalanche control and rockfall mitigation continues under all alternatives. Avalanches are often controlled by triggering slides. In some cases avalanche or rockfall control work fails resulting in the roadway being covered and causing temporary road closures.

How does construction of the alternatives affect geologic hazards?

Constructing tunnels creates large quantities of waste rock, some of which is reused on-site but some requires disposal. Construction also disturbs unstable rock formations and creates rockfalls or landslides.

What are the project effects on geologic hazards in 2050?

Geologic hazards continue in the Corridor, with and without the Action Alternatives. The effects of geologic hazards in 2050 relate to timing of the implementation of the Action Alternatives, including mitigations that could improve rockfalls, avalanches, or other hazardous conditions, as well as disturbance of unstable geologic units that could create long-term maintenance or safety issues. Some conditions may be improved, while others may worsen. The longer implementation timeframe does not change impacts in a meaningful way because some potentially adverse impacts of disturbing geologic hazards might be avoided temporarily but mitigations that may reduce hazards from geologic conditions may also be delayed.

3.5.6 What will be addressed in Tier 2 processes?

Tier 2 processes will involve a more detailed analysis of the geologic hazards present in the Corridor and identify specific mitigation measures that will be required. For alternatives requiring tunneling, the Tier 2 processes will address impacts of blasting activities and the disposal of waste materials. In locations where a strong potential for rockfall or avalanches exists, the Tier 2 processes will consider the options that may be used to avoid or contain debris.

During Tier 2 processes, the lead agencies will:

- Develop specific and more detailed mitigation strategies and measures
- Develop best management practices specific to each project
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway

3.5.7 What are the approaches to programmatic mitigation planning for geologic hazards?

The lead agencies will incorporate mitigation strategies learned from previous projects, such as:

- Incorporating new design features to minimize slope excavation and follow natural topography.
- Using excavation and landscaping techniques to minimize soil loss and reverse existing erosion problems.
- Using rock sculpting, which involves blasting rock by using the existing rock structure to control overbreak and blast damage, to create a more natural-looking cut.
- Using proven techniques, such as rockfall catchments, mesh, cable netting, and fences, as well as scaling and blasting, to address rockfall from cut slope areas.

- Reusing excavated material from tunnel construction onsite where possible. If materials are used on United States Forest Service lands, the lead agencies will follow the *Memorandum of Understanding Related to Activities Affecting the State Transportation System and Public Lands in the State of Colorado among the Federal Highway Administration, Colorado Department of Transportation, Bureau of Land Management, and United States Forest Service*.
- Adhering to the *Programmatic Agreement among the Federal Highway Administration, Advisory Council on Historic Preservation, United States Forest Service, Colorado Department of Transportation and State Historic Preservation Officer Regarding Rockfall Mitigation Projects along Interstate 70 within the Georgetown-Silver Plume National Historic Landmark District* (2009).

Mitigation strategies also are presented in **Section 3.19, Mitigation Strategies**.

3.6 Regulated Materials and Historic Mining

3.6.1 What are the concerns related to regulated materials and historic mining and why are they important to this project?

Regulated materials are hazardous substances, hazardous waste, or petroleum products. The Colorado Department of Transportation (CDOT) evaluated the potential for harm from these regulated materials by identifying the presence or likely presence of an existing or past release of hazardous materials on a property. Historic mining is included in the discussion of regulated materials because there are mine tailings and other mining waste contamination in the Corridor (such as heavy metals and acids). Encountering contaminants in soils, groundwater, and surface water can:

- Increase worker health and safety requirements,
- Result in project delays,
- Increase construction costs due to remediation and disposal, and
- Increase land purchase liability.

Example of Historic Mining Site

These contaminants can indirectly have an impact on nearby habitats, residents, and employees if appropriate steps to contain them are not taken. Examples of commonly regulated materials are asbestos; lead-based paint; heavy metals such as cadmium, mercury, and zinc; dry-cleaning solvents; and materials stored in underground storage tanks, such as gasoline and diesel. Section 2 of the *I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a) provides regulatory authority information for these materials.

The Colorado Department of Transportation identified known and potential contamination in the Corridor to help reduce the possibility of exposing people and the environment to regulated materials. Identifying contamination also helps to plan for project costs related to land purchase and to compare the costs of avoiding contamination with the costs for hazardous materials handling, disposal, and remediation requirements.

The project will use regulated materials during construction, which also increases the chances of unintended release into the environment. Likewise, the operation of the I-70 highway includes the transportation and use of regulated materials, which can also increase the likelihood of release along the Corridor.

3.6.2 What process was used to analyze regulated materials and historic mining sites?

Data for the evaluation of regulated materials and historical mining sites were primarily collected in the 2002–2003 timeframe. The Colorado Department of Transportation determined that these data remain valid for the purposes of this PEIS because they provide an overall assessment of the magnitude of these issues and their potential impacts on the project. The number and locations of regulated material sites is dynamic because of changes in population and industry-base within the five county project area. Although what we have identified may change over time, the types of materials identified in this document are characteristic of what will be encountered during Tier 2 processes. This information will be identified for each Tier 2 process.

Federal and state agencies maintain databases for environmental records. The lead agencies reviewed these records and studied the locations of known or potential sites in relation to areas that construction of Action Alternatives may disturb. **Section 3.6.4** provides a summary of findings.

3.6.3 What agencies have CDOT and the Federal Highway Administration coordinated with and what are their relevant issues?

Agency comments regarding regulated materials and historic mining sites are summarized below. They come from the Colorado Department of Public Health and Environment, the Environmental Protection Agency, and municipalities and stakeholder groups along the Corridor.

The Clear Creek Foundation and Upper Clear Creek Watershed Association raised concerns about mill sites within the I-70 highway right-of-way in Clear Creek County. Additional surveys were conducted to identify all mill sites within the I-70 highway right-of-way. **Section 3.6.4** provides a summary of results.

Comments include concerns about the relative impacts of mills, mine waste, tunnel drainages, and exposed mineral veins (mineralized rock) on water quality that result from the Action Alternatives. Sections 2.2 and 3.3 of the *I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August, 2010a) discuss how mine waste materials, tunnel drainage, and mineralized rock might affect water quality. Additional information is in the *I-70 Mountain Corridor PEIS Water Resource Technical Report* (CDOT, August 2010b). Further studies will be conducted during Tier 2 processes (see **Section 3.6.6**).

Agencies requested more detail on avoidance and mitigation strategies for regulated materials and historic mine sites. **Section 3.6.7** summarizes mitigation strategies. More detailed mitigation strategies will be provided in Tier 2 when impacts are more clearly defined (see **Section 3.6.6**).

Agencies expressed concerns about the likelihood of road construction as a source of metals loading. Further detail will be provided during Tier 2 processes (see **Section 3.6.6**).

3.6.4 Where are the areas of regulated materials and historic mining in the Corridor?

The Colorado Department of Transportation searched records to determine the presence or likely presence of hazardous substance (including those from historic mining activities) or petroleum products that have been released or are present in the Corridor. The following information summarizes findings on regulated material sites, incidents, and historic mining sites in the Corridor. The *I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a) provides detailed information, including the location of all known regulated materials and historic mining sites in the Corridor.

Information gathered in January 2010 identified the locations of Superfund sites and mine-related mill sites in and surrounding the I-70 highway right-of-way (sees **Table 3.6-1** and **Figure 3.6-1**). This information is important because a Superfund site is one where major contamination issues are present. Even though directly impacting these Superfund sites should be avoided, these contaminants may have leached from the site to the groundwater and could be encountered during construction if excavation encounters groundwater. Five historic mine-related cleanup sites (operable units) within the Clear Creek/Central City Superfund site are located within the Corridor. Several other Superfund-site operable units located near Black Hawk and Central City are outside the Corridor but contain mine-related materials that contribute to nonpoint source impacts in the lower Clear Creek Basin.

Table 3.6-1 lists and **Figure 3.6-1** shows several known registered generators of waste in the Corridor. These registered generators could be a source of contamination if the materials were mismanaged. However, none of those sites were associated with contamination, and CDOT does not expect any of the sites to affect alternatives in the Corridor.

Two overlapping lists of reported hazardous substance spill incidents are from the Environmental Protection Agency Emergency Response Notification System and from the National Response Center Spill Sites. These lists denote areas of concern in the Corridor. See **Figure 3.6-1** and **Table 3.6-1**. These spills come from various sources. Although some include multiple spills along the I-70 highway from trucks transporting hazardous materials, the Colorado State Patrol and/or federal, state, and local hazardous materials emergency response personnel generally handle these incidents with appropriate actions to protect the environment. The number of transport spills has increased between 1990 and 2002.

Table 3.6-1. Federal and State Superfund Sites, Generators, and Releases

County	Superfund Sites	LQG Sites	SQG Sites	ERNS Spill Sites (1987 to 1997)	NRC Spill Sites (1990 to 2002)
Garfield	0	1	10	2	10
Eagle	0	0	8	15	14
Summit	0	0	4	6	22
Clear Creek	3	0	0	1	15
Jefferson	0	2	32	16	13
Total	3	3	54	40	74

Key to Abbreviations/Acronyms
LQG = Large Quantity Generator SQG = Small Quantity Generator
ERNS = Emergency Response Notification System NRC = National Response Center

Numerous sites were identified with underground storage tanks, aboveground storage tanks, and leaking underground storage tanks associated with retail fuel stations and vehicle maintenance facilities. See **Table 3.6-2**. These locations are also represented on **Figure 3.6-1** as large quantity generators. These tank locations are important because they could be the source of a contamination spill, even if it has not been reported as a leaking tank. The contamination leaks often occur over a long period of time undiscovered, traveling through the ground and entering the groundwater. Those contaminants in the groundwater then travel horizontally away from the source and could be encountered when a project conducts deep excavation, such as those for installing bridge piers. A majority of these sites are clustered at population centers along the I-70 highway and near interchanges. Additional information will be provided as well as maps depicting the locations of these sites during Tier 2 processes. See **Section 3.6.6**.

Table 3.6-2. Listed Storage Tank Sites

County	Cities	Total USTs on Record	Active USTs on Record	Active ASTs	Inactive LUST Sites	Active LUST Sites
Garfield		154	49			
	Glenwood Springs			0	39	1
Eagle		297	123			
	Avon			0	10	3
	Eagle			6	12	0
	Edwards			4	4	1
	Gypsum			7	4	0

County	Cities	Total USTs on Record	Active USTs on Record	Active ASTs	Inactive LUST Sites	Active LUST Sites
	Mintum			0	3	0
	Vail			4	13	3
	Wolcott			1	2	1
Summit		170	73			
	Dillon			0	7	1
	Frisco			0	9	3
	Silverthorne			1	15	8
Clear Creek		117	52			
	Idaho Springs			0	9	2
	Silver Plume			0	0	1
	Georgetown			0	4	2
	Downieville			0	1	1
	Dumont			0	0	1
Jefferson		3	3			
	Genesee			0	1	0
	El Rancho			0	1	0

Key to Abbreviations/Acronyms

UST = underground storage tank; AST = aboveground storage tank; LUST = leaking underground storage tanks

Inactive = LUST sites have been adequately addressed according to requirements of the Division of Oil and Public Safety.

Active = LUST sites are being investigated or cleaned up and monitored under the Division of Oil and Public Safety.

The Corridor passes through areas of substantial historic metals mining and other types of mining. The Environmental Protection Agency lists 789 historic mines within a 2-mile radius of the Corridor. There are approximately 754 historic mines located between I-70 highway milepost 222 and milepost 242. The exact location of many mine tailings and mill waste piles are unknown, but **Figure 3.6-1** shows the approximate locations along the Corridor. Some of these mining sites are part of the Clear Creek/Central City Superfund National Priorities List sites adjacent to the I-70 highway. The National Priorities List is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. These mine and mill waste piles are a source of contaminants if disturbed.

Many of the historic mines in the Corridor are in much the same condition as when mining activity ceased. Their present-day mine features pose hazards and constraints on proposed Corridor modifications.

- Mill sites are a concern because ore that was processed in milling operations was ground to a fine powder (like talcum powder) and then mixed with chemicals or mercury to remove the gold. The material is so fine that it is much more reactive and more likely to leach pollutants into the environment than pebble, cobble, or boulder-sized material. Therefore, the fine size, the possible presence of processing chemicals, and local volumes of waste at mill sites combine to have the most potential environmental impacts of all mining sites. Mine waste is less of a concern than mill sites because the rock sizes at mine dumps vary from huge boulders to powder.
- Other mine wastes and metal-loading concerns include acid mine waters occurring in the Silver Plume, Georgetown, Empire Junction, Dumont, Fall River, Idaho Springs, and Hidden Valley areas adjacent to the I-70 highway that could be released into the environment if disturbed. All of these areas of historic mining also indicate high levels of natural metals in the substrate that could

be a source of metal loading if disturbed sediments containing these metals are released into the streams.

- Mineralized rock is a concern because exposure of mineralized veins can also create metal-rich, acid rock drainage that might affect water quality. Veins have more metals than mine waste or mill tailings (since the waste is, by definition, too low in metals to be processed profitably). However, heavily veined areas that are exposed by road cuts along the I-70 highway are limited in size and are slower to react than crushed rock.

  Below is a summary of the cleanup efforts that have been conducted or are ongoing in the Clear Creek Watershed to address historic mining contamination in this area.

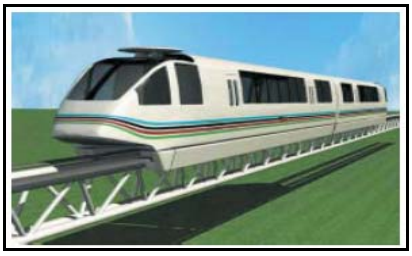
- The Clear Creek Watershed Foundation has developed roughly 60 actual and/or potential watershed-based sustainability projects that promote innovation, cooperation, and cost-efficiency. Orphan (Abandoned) Mine Remediation is one project that Clear Creek Watershed Foundation has been conducting, facilitating, and expediting cleanup of the 1,600 or so remaining orphan mine/mill sites not listed as priorities in the Clear Creek/Central City Superfund Operating Units Record of Decision. This work supports remediation efforts in the Clear Creek/Central City Superfund Study Area.
- The Environmental Protection Agency Superfund Program has been ongoing since 1983. In 2009, the Environmental Protection Agency announced $5 million in new funding through the American Recovery and Reinvestment Act of 2009 for the Clear Creek/Central City Superfund Site in Clear Creek and Gilpin counties. The funding was to accelerate the hazardous waste cleanup already underway at the site. Some of the activities during the 2010 construction season include a pipeline to transport the mine drainage and proposed plan to allow active treatment of mine wastes at a new water treatment plant.

3.6.5 How do the alternatives potentially affect regulated materials and historic mining sites?

Direct and indirect impacts are associated with construction of all Action Alternatives, including the Preferred Alternative. Regulated materials and mining wastes in the vicinity of the project can cause increased cost to a project due to having to properly handle or mitigate for encountered contaminants. The project also uses these regulated materials and creates subsequent wastes from their use; these materials could accidentally be released into the project site and enter the environment during construction or operation.

How do the alternatives directly affect regulated materials and historic mining sites?

- Direct impacts are associated with construction of all Action Alternatives, including the Preferred Alternative. All of the Action Alternatives cause similar impacts on regulated and hazardous materials such as affecting underground storage tank/leaking underground storage tank sites and encountering residual spill material at spill sites. Construction of all Action Alternatives in Clear Creek County require the disturbance and reworking of many mine waste piles, including some designated Clear Creek/Central City Superfund sites. All Action Alternatives likely affect mine and mill waste, and acid mine drainage in the Silver Plume, Georgetown, Empire Junction, Dumont, Fall River, Idaho Springs, and Hidden Valley areas. A higher degree of impact is expected for the Rail with Intermountain Connection Alternative, Highway Alternatives in Clear Creek County, Combination Alternatives, and the Preferred



Example of Advanced Guideway System

Alternative if the Maximum Program is implemented. There are no direct impacts from the No Action Alternative because improvements are not proposed for this alternative. In the process of constructing any of the Action Alternatives that will affect the I-70 roadbase, there is the potential to disturb historic mine waste located under the roadway, where there are potential unknown and uncharacterized mine waste materials in Clear Creek County.

Notable differences among alternatives include:

- The elevated Advanced Guideway System Alternative results in fewer surface impacts of known regulated materials and wastes, such as mining/mill waste piles from the Superfund site along the old Clear Creek channel, mineralized veins, and storage tanks than the Rail with Intermountain Connection or Bus in Guideway Alternatives, since the surface disturbance footprint is smaller than that of these Transit Alternatives.
- The elevated Advanced Guideway System Alternative results in greater subsurface impact risks, such as by encountering contaminated groundwater than the Rail with Intermountain Connection or Bus in Guideway Alternatives, because the pier construction for the Advanced Guideway System Alternative requires deeper excavation than these alternatives. Building of piers require considerably less surface disturbance and, if accurately mapped and carefully planned, could avoid mine adits that contain water.
- The Bus in Guideway Alternatives likely result in fewer impacts than the Rail with Intermountain Connection Alternative because this alternative is largely constructed in the median (a previously disturbed area) and require less surface excavation than for the Rail with Intermountain Connection Alternative.
- The Highway Alternatives have similar overall impacts because they have comparable footprints. The highway consists of structured lanes through much of the ore body near Idaho Springs and Dumont. Re-construction of the highway in this area will require considerable excavation and disturbance of underlying soil, some of which will be mine waste residual or mine adits containing water. An adit is a nearly horizontal passage from the surface into a mine.
- The Highway Alternatives likely have more impacts on historic mine waste materials than the Advanced Guideway System and Bus in Guideway Alternatives because less excavation is required for these alternatives. The Highway Alternatives have fewer impacts compared to the Rail with Intermountain Connection Alternative because more excavation is required for the Rail with Intermountain Connection Alternative.
- The Combination Six-Lane Highway with Rail and Intermountain Connection Alternative has the most direct impacts on historic mine waste materials. This alternative has a greater construction footprint (as discussed above) that increases the likelihood for encountering historic mine waste.
- The Preferred Alternative has a range of impacts depending on adaptive management strategies used as the need arises. The Minimum Program includes non-infrastructure related components, Advanced Guideway System, and highway improvements. If later phases of improvements under the Maximum Program are implemented, it includes the same components as the Six-Lane Highway and Combination Six-Lane Highway with Advanced Guideway System Alternatives with greater impacts due to additional areas of highway widening. For more detailed information on the Preferred Alternative, see **Chapter 2** of this document.

Table 3.6-3 summarizes direct impacts on regulated materials and historic mine waste by alternative.

How do the alternatives indirectly affect regulated materials and historic mining sites?

Indirect impacts are those that could arise from the operations of the Corridor that are not directly related to the alternative component construction. These impacts could occur during or after construction is complete. Indirect impacts include:

- Induced growth caused by easier access provided by the transportation improvements that could increase travel demand and increase the number of traffic crashes because of this traffic increase.
- Induced growth that will also bring more regulated materials, including fertilizers and petroleum products, into the Corridor as demand for these materials increases.
- Construction detours that have to temporarily reroute traffic, thereby exposing new areas to increased tanker truck traffic that could cause a spill if the truck is involved in an accident.
- Transit, and to a lesser extent, Highway Alternatives have the potential to induce growth primarily in Summit and Eagle counties, which might cause indirect impacts from increased residential, industrial, and commercial activities.
- Positive indirect impacts caused by correcting a problem in the area that affects the release of regulated materials, such as by addressing the curve safety issues that are associated with large tanker truck accidents along the Corridor or by improving a spill plan in the area where spills are more prevalent.

The No Action Alternative is expected to have the fewest induced growth related impacts. However, this alternative is associated with a higher incidence of accidents and spills as a result of on-going traffic delays and congestion.

The Highway Alternatives may result in increased truck transport; however, they also address safety issues and crash areas that are expected to lower the overall truck spill incidences. Changes in land use patterns may require added truck service, which could increase truck travel on the I-70 highway.

The Combination Alternatives have the widest footprint that could impact mineralized veins in the mountain side, exposing these veins to weathering that increase the acid water and metal content leaving the site and entering the Corridor waterways. These alternatives could also destabilize mine wastes such as mine tailings or acid mine waters that could enter the environment over time if not properly addressed at the time of disturbance.

Table 3.6-3 summarizes indirect impacts on regulated materials and historic mine waste by alternative.

How does construction of the alternatives affect regulated materials and historic mining sites?

Vehicles and equipment such as fuel storage tanks used during construction activities have the potential to release hazardous materials, mainly petroleum products. Appropriate construction safety procedures and equipment stockpiling methods will be used to minimize releases. All releases will be reported and addressed under appropriate regulatory guidance. **Section 3.6.7** summarizes mitigation strategies.

Construction activities increase the likelihood for encountering existing and unknown regulated materials. These concerns include impacting historic mining wastes including tailings and contaminated water trapped in old mining tunnels; the likelihood of encountering these kinds of issues is higher in the Middle and Lower Clear Creek areas where mining activities were prevalent. In addition, dewatering activities during construction could potentially alter existing groundwater contamination plumes and potentially affect additional properties. Construction dewatering requires coordination with Colorado Department of Public Health and Environment to determine necessary treatment and handling of extracted water before

final discharge/disposition. Heavy truck traffic may also increase with an increase in construction, which has the potential for higher material spills.

What are the alternative effects on regulated materials and historic mining sites in 2050?

There may be changes to regulated materials and historic mining sites by the year 2050. Further, acidic, heavy-metal laden mine water that drains from historic mines, and mine wastes, such as tailings and waste rock, contribute to the nonpoint source impacts on the Clear Creek basin that are anticipated to occur through 2050. However, the Environmental Protection Agency and local watershed groups will continue remedial efforts by installing erosion control best management practices and treating acid mine drainage. Construction of the Action Alternatives in the Corridor results in additional erosion further exposing historic mining tailing and/or mineralized rock unless this material is handled to reduce releases into the environment. A contingency plan for handling these materials will be implemented to mitigate these impacts. The impact from historic mining sites is expected to continue to decrease over time, as trends indicate improvements in water quality over the past 30 years. The Action Alternatives are not expected to have any effect on these improving trends through 2050.

Clear Creek is a drinking water source for more than 350,000 people living in the Denver metropolitan area and is a favored place for kayaking, rafting, fishing, and wildlife observation. There will be continued efforts to reduce human exposure to heavy metals, primarily lead, arsenic, and cadmium associated with these sites. For more on cumulative effects, see **Chapter 4** of this document.

3.6.6 What will be addressed in Tier 2 processes?

Before properties are acquired, Phase I Environmental Site Assessments will be conducted in accordance with the American Society for Testing and Materials E1527-05 standard practice. Detailed information will be collected about possible contamination from all known or suspected sites to determine actual direct impacts on these sites as a result of the Action Alternatives. Further assessments will be conducted of mine mills, mine waste dumps, Clear Creek/Central City Superfund sites, and areas of intense metal veining, including environmental conditions along Colorado Boulevard in Clear Creek County, where previous Initial Site Assessments identified mining activities and potential groundwater plumes.

The following activities will be done during Tier 2 processes:

- Involve stakeholders in the discussion of mine waste and regulated materials mitigation and develop specific mitigations and best management practices for each project.
- Consider alignments that avoid hazardous materials.
- Conduct a thorough analysis of the potential disturbance of acid mine drainage and acid rock drainage and recommend construction methods and best management practices in areas of mineralized rock.
- Provide a comprehensive listing and description of current regulations for regulated materials, including regulatory requirements for superfund and historic mining materials.
- Look at road construction as a source of metal loading from disturbance of mineralize veins in further detail and provide mitigation strategies to minimize or reduce metal loads from road construction.
- Provide procedures on identifying, characterizing, and handling waste in the study area. Information on contacting local authorities will also be provided in the event waste is encountered.
- Update information on regulated materials and historic mining.

Table 3.6-3. Summary of Impacts

Alternative	Areas Likely to Be Encountered				
	Potential Direct Impacts (Potential to Encounter Regulated Materials or Historic Mine Waste)				Identified Direct Impacts
	Residual Spill Materials	LUST / UST Sites	Historic Mine Waste Materials	Acid Rock / Acid Mine Drainage	Impact Areas
No Action	No	No	No	No	No
Minimal Action	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible acid rock / acid mine drainage from tunnel enhancements and rock cuts in Clear Creek County.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a), except the Excelsior Mine / Mill Site (milepost 200) and the Johnny Bull Mine (milepost 224.2). Acid rock / acid mine drainage (milepost 237 to milepost 239).
Rail with IMC	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost239).
AGS	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock /acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost 239).
Dual-Mode and Diesel Bus in Guideway	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost 239).

Alternative	Areas Likely to Be Encountered				
	Potential Direct Impacts (Potential to Encounter Regulated Materials or Historic Mine Waste)				Identified Direct Impacts
	Residual Spill Materials	LUST / UST Sites	Historic Mine Waste Materials	Acid Rock / Acid Mine Drainage	Impact Areas
Six-Lane Highway (55 and 65 mph)	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock/acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include mileposts 223 to 228 and mileposts 233 to 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a), except the Excelsior Mine / Mill Site (milepost 200). Acid rock / acid mine drainage (milepost 237 to milepost 239).
Reversible/HOV/HOT Lanes	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include mileposts 223 to 228 and mileposts 233 to 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a), except the Excelsior Mine / Mill Site (milepost 200). Acid rock / acid mine drainage (milepost 237 to milepost 239).
Combination Six-Lane Highway with Rail and IMC	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost239).
Combination Six-Lane Highway with AGS	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost 239).

Alternative	Areas Likely to Be Encountered				
	Potential Direct Impacts (Potential to Encounter Regulated Materials or Historic Mine Waste)				Identified Direct Impacts
	Residual Spill Materials	LUST / UST Sites	Historic Mine Waste Materials	Acid Rock / Acid Mine Drainage	Impact Areas
Combination Six-Lane Highway with Dual-Mode and Diesel Bus in Guideway	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible effects from acid rock / acid mine drainage due to tunnel construction and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a). Acid rock / acid mine drainage (milepost 237 to milepost 239).
Preferred Alternative – Minimum Program	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County. However, no widening from milepost 223 to milepost 242 where the majority of the mill sites and historic mining sites are located.	Possible acid rock / acid mine drainage from tunnel enhancements and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245. However, no widening from milepost 223 to milepost 242 where the majority of the mill sites and historic mining sites are located.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a), except the sites located between milepost 200 to milepost 235.7. Acid rock / acid mine drainage (milepost 237 to milepost 239).
Preferred Alternative – Maximum Program	Yes	LUST sites in Corridor communities	Possible effects from disturbance of placer mines along Clear Creek. Potential unknown / uncharacterized mine waste materials in Clear Creek County.	Possible acid rock / acid mine drainage from tunnel enhancements and rock cuts in Clear Creek County. Specific areas of concern include milepost 223 to milepost 228 and milepost 233 to milepost 245.	All mine waste material areas listed in Table 6 of *the I-70 Mountain Corridor PEIS Regulated Materials and Historic Mining Technical Report* (CDOT, August 2010a), except the Excelsior Mine / Mill Site (milepost 200). Acid rock / acid mine drainage (milepost 237 to milepost 239).

Key to Abbreviations/Acronyms

LUST = Leaking Underground Storage Tank UST = Underground Storage Tank HOV = high-occupancy vehicle
HOT = high-occupancy toll AGS = Advanced Guideway System IMC = Intermountain Connection

3.6.7 What are the approaches to programmatic mitigation planning for regulated materials and historic mining sites?

The Colorado Department of Transportation will take the following steps to minimize and avoid potential environmental impacts resulting from regulated materials and historic mine waste. See also **Section 3.19** of this document.

- Minimize property acquisition and disturbance of mine wastes, tailings, and drainage tunnels and areas adjacent to or within active/inactive leaking underground storage tank sites.
- Minimize impacts on Clear Creek channel and floodplain both during and after disturbance of mine waste, tailings, and drainage tunnels.
- Manage mine waste and tailings materials onsite, when possible, to minimize potential disposal problems and costs.
- Minimize wind-blown dust from mine tailings on construction sites by wetting or other dust control measures.
- Manage mine waste and tailings materials under Colorado Department of Public Health and Environment and Environmental Protection Agency guidance and authority.
- Manage contaminated soil and groundwater under applicable Colorado Department of Public Health and Environment, Division of Oil and Public Safety, Environmental Protection Agency, and CDOT regulations and guidance.
- Follow CDOT procedures and other applicable guidance for the storage and handling of regulated materials and historic mine waste during construction activities.
- Work cooperatively with various local, state, and federal agencies and local watershed groups to avoid further impacts on and possibly improve water quality.
- Develop a monitoring and sampling program, as necessary, to monitor contamination, with consideration of the mining history in the Corridor. Previous studies have identified the need to monitor and sample eight metals regulated under the Resource Conservation and Recovery Act due to extensive historic mining in the Corridor.
- Any soil removed during trenching or augering will be conducted in accordance with specified health and safety regulations concerning the handling of soils with heavy metal content.

Leaking Underground Storage Tank Sites

Disturbance of identified leaking underground storage tank sites will require coordination with Division of Oil and Public Safety to ensure proper handling and disposal of contaminated materials (also see CDOT requirements and best management practices below). Construction activities associated with the alternatives may also uncover petroleum contamination from identified leaking underground storage tank sites or from leaking underground storage tank site contamination that was not indicated by research activities (or during subsequent research). Should contamination be discovered, construction activities will be temporarily halted until characterization/storage/disposal/cleanup requirements can be discussed with the Division of Oil and Public Safety or a professional familiar with Division of Oil and Public Safety procedures and requirements. Non-petroleum contaminants might also be encountered and will be handled under Colorado Department of Public Health and Environment Solid Waste or Resource Conservation and Recovery Act Hazardous Materials regulations and requirements, and Environmental Protection Agency toxic substances requirements if applicable.

Underground Storage Tank Sites

Underground storage tanks from existing and historic service stations might also be encountered. Underground storage tanks must be removed according to Division of Oil and Public Safety requirements

during excavation/construction activities for any of the alternatives where they are affected by the project footprint. Tank removal will include sampling and analysis of underlying soil and soil removal (if necessary) to meet Division of Oil and Public Safety designated standards.

Dewatering

Excavation and grading activities for all of the alternatives, especially those that will include tunnel construction, might encounter groundwater and require dewatering activities. Tunnel construction practices will include consolidation grouting to minimize inflow into the tunnel. However, dewatering activities will be required on the tunnel and at the waste disposal (spoil) areas. Permit acquisition (from Colorado Department of Public Health and Environment) for discharge of groundwater into nearby surface water will require water analyses, removal of specific contaminants to Colorado Department of Public Health and Environment and Environmental Protection Agency approved levels, and lowering of total suspended solids to acceptable levels. Groundwater treatment will be accomplished by filtration, air stripping for volatile compounds, or stage dewatering methods. A permit variance will be necessary for effluent parameter to meet discharge standards. Construction dewatering will require coordination with Colorado Department of Public Health and Environment to determine necessary treatment and handling of extracted water before final discharge/disposition.

Acid Rock Drainage

Excavation of road cuts in areas of mineralized rock will have the potential to introduce conditions for the leaching of metals from these excavated materials. Potential areas of mineralized rock requiring excavation will be specifically identified during Tier 2 processes. Tier 2 mitigation plans will ensure that acid rock drainage will not affect Corridor water quality through the implementation of appropriate best management practices and appropriate disposition activities for these materials.

Metal Highway Structures

Disturbance or replacement of highway structures such as painted guardrails, signs, or metal bridge components will require appropriate characterization and disposal according to Colorado Department of Public Health and Environment guidelines and requirements.

CDOT Requirements and Best Management Practices

The Colorado Department of Transportation contractors are required to comply with Section 250, Environmental, Health and Safety Management of CDOT Standard Specifications, when applicable. The specifications provide guidelines and requirements for health and safety measures during construction, the investigation and testing of contaminated materials, and procedures to use if contamination is encountered during construction.

All petroleum products and other hazardous materials, such as fuel and solvents, used for Action Alternatives' construction purposes will be handled and stored per CDOT best management practices to prevent accidental spillage or other harm to the project area. If suspected hazardous or petroleum products were encountered during construction, samples of the material will be collected and analyzed for metals, hydrocarbons, organic chemicals (volatile or semivolatile organic compounds), and other parameters to determine what special handling and disposal requirements are appropriate. The telephone numbers for medical and emergency services will be maintained onsite. If any unplanned occurrence requires assistance, the site supervisor or designated person will contact the appropriate response team.

Historic Mine Waste

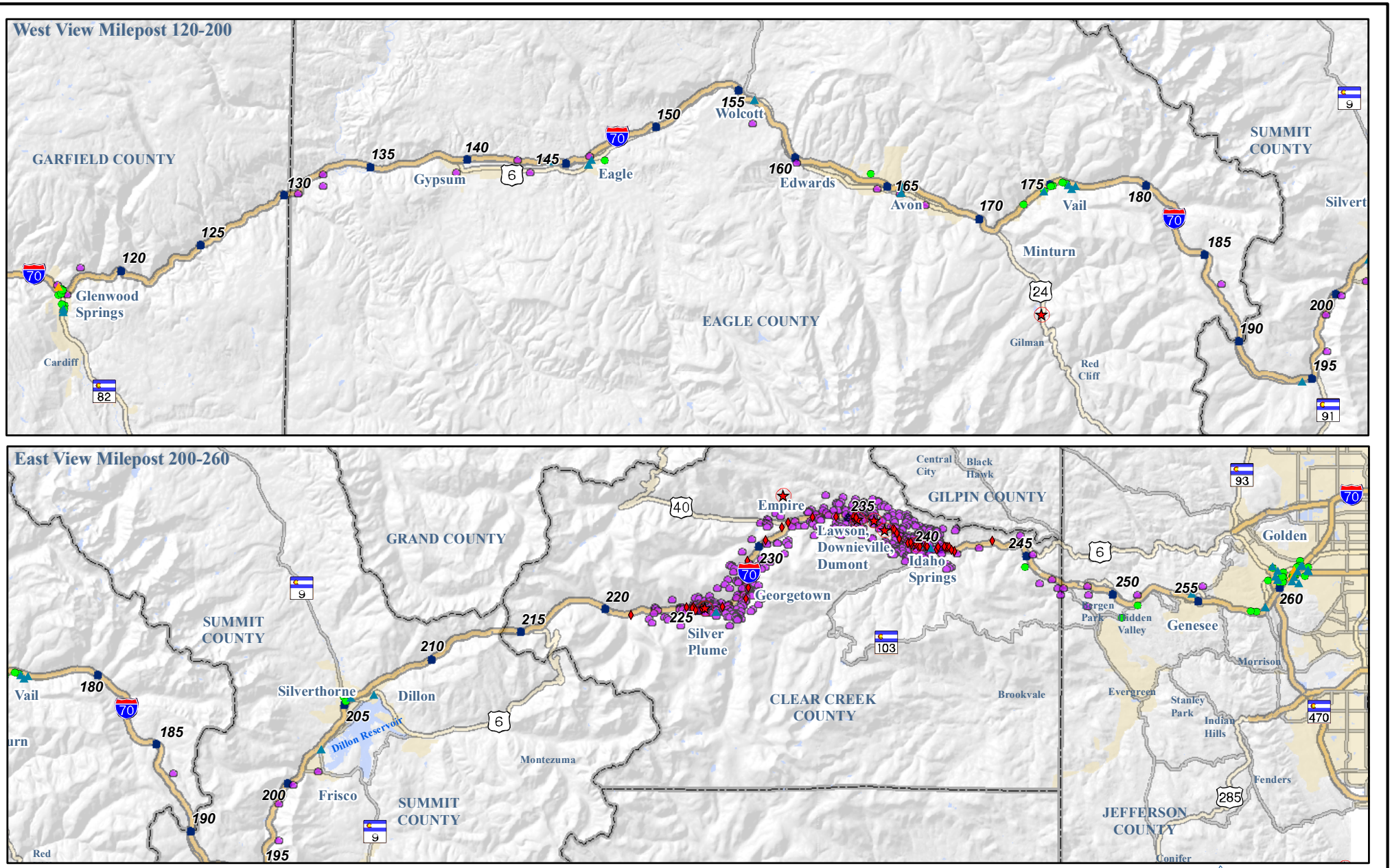
The Colorado Department of Public Health and Environment and Environmental Protection Agency coordination will be required for the handling of mine waste materials, and specific Colorado Department of Public Health and Environment and Environmental Protection Agency approval will be required for

construction disturbance of sites that are currently designated as National Priority List sites within the Clear Creek/Central City Superfund Area. Other Clear Creek historic mining sites that pose considerable threats to Clear Creek will also require specific regulatory actions under the Comprehensive Environmental Response, Compensation, and Liability Act. Regulatory authority for mine tailings and waste fall under various state and federal programs, depending on where the waste is located and its designation under the Comprehensive Environmental Response, Compensation, and Liability Act. The Colorado Department of Public Health and Environment will be the lead agency (working with Environmental Protection Agency) for regulatory actions at the Clear Creek/Central City Superfund Area, and Colorado Department of Public Health and Environment Solid Waste Division will have authority for mine tailings not covered by the Comprehensive Environmental Response, Compensation, and Liability Act.

In addition, the Federal Highway Administration (FHWA) encourages "participation in transportation projects that include the use and redevelopment of contaminated sites when appropriate." Alternative implementation might offer a means to clean up contaminants that might not otherwise be addressed by means of the FHWA 1998 Brownfields Economic Redevelopment Initiative. The initiative, administered by Environmental Protection Agency, provides assistance and incentives to agencies for the assessment, cleanup, and economic reuse of contaminated properties known as Brownfields.

The Colorado Department of Transportation will attempt to avoid disturbance of mine waste wherever possible. If avoidance is not feasible, CDOT will characterize the mine materials and reuse the material onsite, if possible. Offsite disposal of mine waste materials will be the least desirable mitigation option. Long-term impacts will include the potential to release contaminants from disturbance of mine waste (or other contaminants encountered in soil or groundwater) during construction activities. Such impacts could be avoided with appropriate handling of materials and implementation of state-of-the-practice erosion and sediment control plans.

Although contaminant sampling and testing has not yet specifically been performed for mine waste materials within the alternative footprints, it is expected (based on previous studies) that much of these waste materials will have relatively low levels of contaminants and will not be within or from sites requiring specific Comprehensive Environmental Response, Compensation, and Liability Act remedial actions. Such materials are suitable for construction material uses, including backfill and landscaping. These materials will be stabilized and maintained during and after construction to minimize environmental impacts. In certain cases, highway improvements through proper handling and stabilization of these materials, will serve to enhance environmental conditions in the Corridor.



I-70 Mountain Corridor PEIS

REGULATED MATERIALS AND HISTORIC MINING SITES

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3.7 Land Use and Right-of-Way

3.7.1 What are the land use and right-of-way concerns for this project and why are they important?

Transportation projects influence the way surrounding land is used and managed. The Corridor runs through five counties, two national forests (White River National Forest and Arapaho and Roosevelt National Forests), and the Colorado River Valley District, formerly the Glenwood Springs District, of the Bureau of Land Management (see **Figure 3.7-1**). Important considerations are the compatibility of a proposed project with the surrounding land uses and management policies, and how it affects future land use patterns and policies.

Right-of-way is the land used for transportation facilities and their maintenance. The Colorado Department of Transportation (CDOT) owns the right-of-way for existing I-70 highway facilities. In areas where the current I-70 highway right-of-way is narrower than the proposed footprint of an alternative, CDOT needs to acquire additional right-of-way. The Colorado Department of Transportation studies right-of-way needs to understand the resulting impacts on properties adjacent to the highway.

3.7.2 What study area and process was used to analyze land use and right-of-way?

The study area comprises lands immediately adjacent to the I-70 highway for the direct impacts analysis and the five counties surrounding the Corridor for the indirect impacts analysis. The Colorado Department of Transportation collected resource management information for all federally managed lands in the Corridor, along with planning and zoning information from all counties and municipalities. The Colorado Department of Transportation used geographic information systems overlays of the alternatives on survey data, zoning, and parcel data gathered from Corridor jurisdictions, and White River National Forest and Arapaho and Roosevelt National Forests management area prescription maps to determine direct impacts related to right-of-way acquisition and I-70 highway expansion into currently developed lands. Some parcels, especially in Clear Creek County, encroach on the existing right-of-way and could be affected by alternatives regardless of whether additional right-of-way is required.

The Colorado Department of Transportation assessed project compatibility with county and municipality land use planning documents. To determine planning trends in the Corridor, the review of planning documents focused on the following topics: growth and population, transit, the I-70 highway, regional coordination, environmental sustainability, and water resources (see **Table 3.7-1**). Refer to the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a) for additional details on the review of these planning documents.

Indirect impacts occur when a transportation alternative induces or suppresses growth in population or development in a manner different than expected if no transportation action were implemented. To analyze induced growth, as documented in the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a), the lead agencies estimated the amount of induced development that occurs beyond what is currently planned in surrounding communities. The lead agencies conducted a separate evaluation, documented in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010b), considering the potential of water availability to influence future growth in the Corridor.

3.7.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

Coordination with Corridor and state agencies was an integral part of the land use study. Specific efforts included meetings with and presentations to Corridor county, city, and regional planning organizations, such as the Northwest Colorado Council of Governments and planning staff from individual counties. Numerous discussions involved the Corridor issues of growth, build-out, tourism, affordable housing, and second homes. The lead agencies coordinated with the Bureau of Land Management and the United States Forest Service to discuss management priorities and concerns (see **Chapter 6, Public and Agency Involvement**).

All counties traversed by the Corridor support the development of a regional transit system. It appears that the focus on I-70 highway improvements through these counties may have influenced increased engagement in regional transportation planning. Planning efforts are emerging in some Corridor counties and municipalities to handle growth in a coordinated manner, balancing the impacts of growth with sustaining environmental quality.

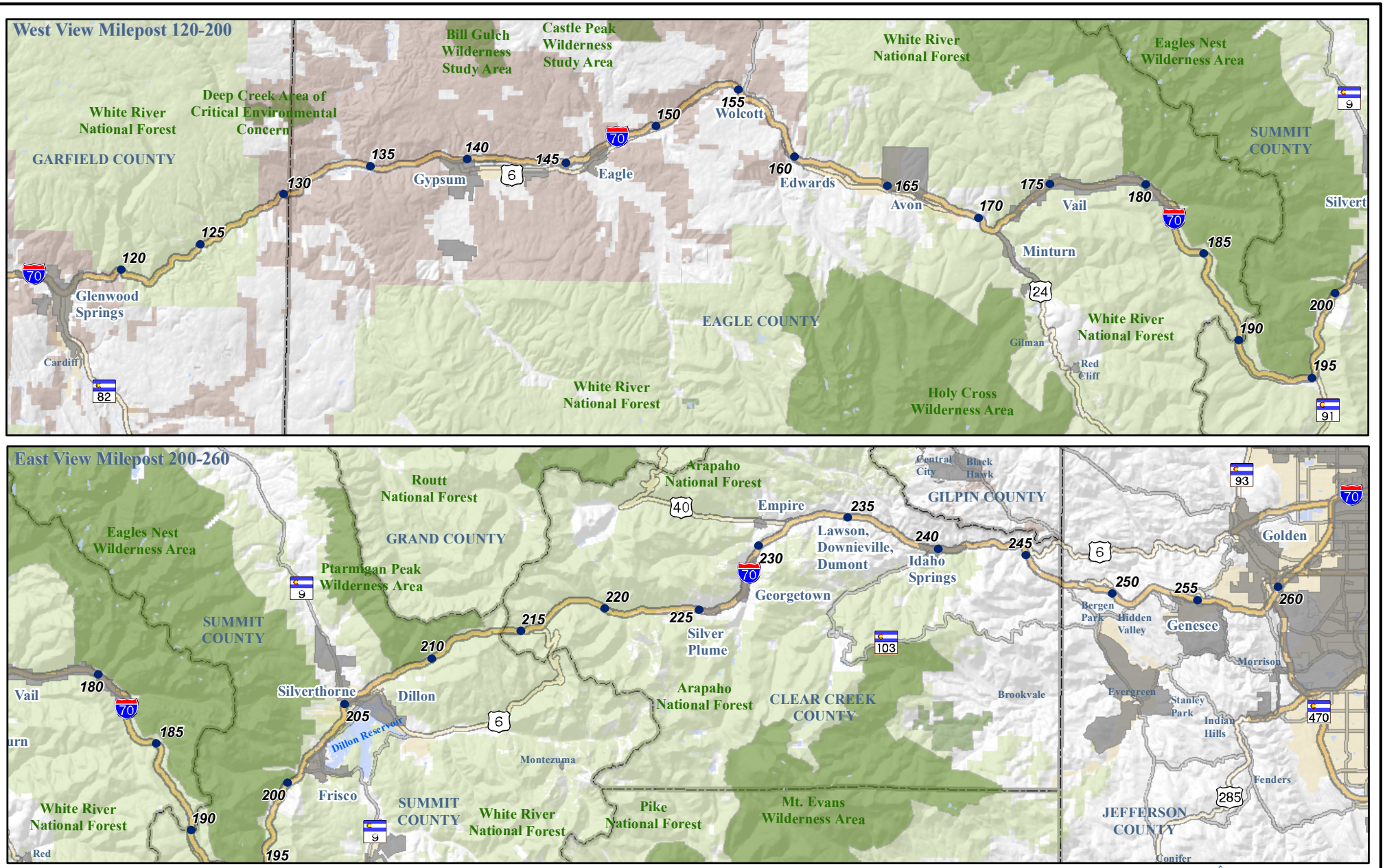
The Colorado Department of Transportation also coordinated with the Environmental Protection Agency; the agency officials suggest a need for CDOT and Corridor communities to develop regional strategies to avoid and minimize land use impacts on the environment. The Environmental Protection Agency has indicated an interest in working with local and regional entities to consider the environment in land use planning.

3.7.4 What are the areas of land use and right-of-way interest identified in the Corridor?

The Corridor runs through five counties—Garfield, Eagle, Summit, Clear Creek, and Jefferson—and is surrounded almost entirely by federal lands, consisting of the White River National Forest, Arapaho and Roosevelt National Forests, and Colorado River Valley District of the Bureau of Land Management. Non-federal lands along the Corridor include state-owned lands, private properties, county open space, and urban and rural development. **Figure 3.7-1** illustrates land ownership in the Corridor. Private land adjacent to the I-70 highway is located primarily in the numerous communities surrounding the interstate. Existing I-70 highway right-of-way is most limited in Clear Creek County, where private land in some cases encroaches on the interstate right-of-way.

A review of county and municipality planning documents reveals many topics of interest related to the Corridor, as summarized in **Table 3.7-1**. See the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a) for a detailed summary of relevant planning document policies.

County and community land use plans anticipate considerable growth based on existing growth trends and Colorado Department of Local Affairs projections for population and employment growth. Many Corridor communities are approaching build-out (the point at which they can no longer accommodate new development under current planning policies), and some counties and communities initiated limitations on housing densities and dispersed development. Other factors—such as infrastructure limitations like water supply—affect development patterns and density as well. Counties and communities in the Corridor have different strategies for addressing growth, and some are more stringent than others.


West View Milepost 120-200
Bill Gulch Wilderness Study Area
Castle Peak Wilderness Study Area
White River National Forest
Eagles Nest Wilderness Area
Deep Creek Area of Critical Environmental Concern
White River National Forest
GARFIELD COUNTY
SUMMIT COUNTY
Gypsum
Eagle
Wolcott
Edwards
Avon
Vail
Minturn
Silverthorne
Glenwood Springs
Cardiff
EAGLE COUNTY
White River National Forest
Gilman
Red Cliff
Holy Cross Wilderness Area
120
125
130
135
140
145
150
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160
165
170
175
180
185
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195
200
East View Milepost 200-260
Routt National Forest
Arapaho National Forest
Central City
Black Hawk
GILPIN COUNTY
Empire
Lawson, Downieville, Dumont
Idaho Springs
Georgetown
Golden
Eagles Nest Wilderness Area
GRAND COUNTY
Ptarmigan Peak Wilderness Area
SUMMIT COUNTY
Silver Plume
Bergen Park
Hidden Valley
Genesee
Morrison
Vail
Silverthorne
Dillon
Dillon Reservoir
Arapaho National Forest
CLEAR CREEK COUNTY
Brookvale
Evergreen
Stanley Park
Indian Hills
Montezuma
Frisco
SUMMIT COUNTY
White River National Forest
Pike National Forest
Mt. Evans Wilderness Area
Fenders
JEFFERSON COUNTY
Conifer
Red
230
235
240
245
250
255
260
205
210
215
220
225
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Urban Areas
General Land Use
USFS Land
BLM Land
Wilderness Areas
State Land
Private Land
City Boundaries
0
3.31
6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
DOT
U.S. Department of Transportation
Federal Highway Administration
LAND OWNERSHIP

Table 3.7-1. Summary of Corridor County Master Plan Topics Related to the Corridor

Topic	Summary
Growth and Population	Issues regarding population growth in the five counties reviewed vary. • Garfield County is concerned about dispersed population and its pressures on the transportation system and the environment. • Eagle County anticipates a continued high rate of population growth and seeks to balance that growth with economic success, quality of life, and environmental preservation. • Summit County faces build-out in the near future (2030) and raises concerns over the effects of a high rate of second home ownership. • Clear Creek County anticipates that the county will be able to accommodate projected growth through 2030. • The Evergreen Area of Jefferson County plans to maintain the rural character of its community.
Transit	• Counties are planning for multimodal transportation systems, with a focus on mass transit and the preservation of local character. • All counties are planning for transit to some extent, locally and/or regionally. • All counties except Garfield include the development of transit stations along the I-70 highway in their planning. Garfield County focuses on a regional public transit system and the need to ensure access for its residents.
The I-70 Highway	• Eagle, Summit, and Clear Creek counties note their involvement in the I-70 Mountain Corridor PEIS process within their planning documents. • All counties identify the I-70 highway as a major arterial route requiring planning attention. Summit, Clear Creek, and Jefferson counties raise concerns over congestion. • Clear Creek and Jefferson counties are concerned with the competing interests of through-traffic on the I-70 highway with the need of residents to use the highway for local trips.
Regional Coordination	Increased discussion of regional coordination in transportation planning is occurring between counties and with state and federal authorities
Environmental Sustainability	More recent plans, such as those of Eagle, Summit, and Clear Creek counties, as well as those of some municipalities, incorporate concepts of environmental sustainability. These concepts include encouraging building to Leadership in Energy and Environmental Design standards and focusing on renewable energy sources.
Water Resources	County plans, while indicating sufficient water resources for current growth projections, also indicate a heightened awareness of water as a finite resource requiring conservation and careful planning.

Numerous Corridor communities currently have high numbers of second homes. This type of development is generally rural and dispersed. Eagle and Summit counties have experienced the greatest growth pressure from second-home ownership, which has increased land values, made it difficult for local workers and residents to find affordable housing, and influenced commuting patterns from other counties. Both counties addressed this issue in their planning strategies, and the slumping housing market in recent years helped narrow the housing affordability gap for local workers. See **Section 3.8, Social and Economic Values,** for more information.

Resource management plans govern public lands managed by the Bureau of Land Management and United States Forest Service. The White River National Forest and Arapaho and Roosevelt National Forests land and resource management plans group different land areas into “management prescription areas” sharing related management emphasis. See the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a) for a description of the goals for management prescription areas surrounding the Corridor. The United States Forest Service permits certain uses, such as utilities, transportation easements, and outfitters through “special use permits.” Special use permits in the Corridor are described in the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a).

3.7.5 How do the alternatives potentially affect land use and right-of-way?

The Action Alternatives directly impact properties due to right-of-way acquisition and the I-70 highway expansion into currently developed lands, and indirectly impact counties and communities surrounding the Corridor due to induced growth. While this document generally analyzes 11 groupings of alternatives, the land use analysis discusses the Highway alternatives separately because impacts are different. In general, the Minimal Action Alternative acquires the fewest properties, and the Combination alternatives have the greatest right-of-way needs. The Transit and Highway Alternatives fall in the middle range. The Preferred Alternative acquires few properties under the Minimum Program, similar to the Minimal Action Alternative, because it does not include some of the interchange improvements in Clear Creek County that the other alternatives include; if the Maximum Program is implemented, property impacts increase and become similar to those of the Combination Alternatives.

Indirect impacts in the form of induced growth vary by mode. Transit Alternatives are expected to concentrate induced growth in areas of existing or planned urban development; Highway Alternatives are expected to distribute growth based on existing trends, resulting in more acres of developed land in rural areas; and Combination Alternatives are expected to distribute growth equally between the transit and highway distribution scenarios, resulting in increased pressure in both urban and rural areas. The Preferred Alternative induces growth similar to the Transit Alternatives, under the Minimum Program; if the Maximum Program is implemented, growth patterns become more similar to the Combination Alternatives.

How do the alternatives directly affect land use and right-of-way?

The No Action Alternative does not directly affect land use or right-of-way. A preliminary analysis of the conceptual Action Alternative footprints indicates that between 120 and 310 parcels, and between 3 and 8 acres of United States Forest Service land, fall within the footprints (see **Chart 3.7-1**). The footprints include:

- Limits of proposed improvements,
- 15-foot construction zones to each side of the improvement limits, and
- Additional 15-foot sensitivity zones beyond the construction zone.

Because these footprints include a sensitivity zone, they are much larger than the required right-of-way. Between 30 and 80 parcels fall within the conceptual construction zone footprints of the Action Alternatives; no properties are affected in Garfield or Jefferson Counties under any of the Action Alternatives. The lower numbers are more representative of the right-of-way and construction easements potentially required. Further, many of those properties are only partially acquired, with small slivers of land that front the I-70 highway acquired, and the remainder of the parcels left intact with their current owners. Tier 2 processes will refine the design of alternatives and analyze specific properties affected.

The vast majority of affected properties (between half and three-quarters) are located in Clear Creek County, where the existing highway right-of-way is most limited, and result largely from interchange improvements. Other affected private properties are mostly located in Eagle County, generally in unincorporated areas, and do not include buildings or other improvements. Of the affected properties in Clear Creek County, the majority are in Idaho Springs and unincorporated portions of the county, with impacts also occurring in Dumont/Downieville/Lawson under the Combination Alternatives. Most of the Action Alternatives use an elevated structure to minimize impacts in Idaho Springs, except the Minimal Action, Rail with Intermountain Connection, and Advanced Guideway System Alternatives, which have narrower footprints. The Minimum Program of the Preferred Alternative affects the fewest properties because it does not include improvements to interchanges in Silver Plume or Idaho Springs, or the Fall

River Road curve safety improvements which impact a large number of parcels. The Maximum Program, if implemented, has effects similar to those of the Combination alternatives.

Chart 3.7-1 summarizes the approximate numbers of properties that fall within the alternative footprints. Interchange improvements are only conceptually defined at this Tier 1 level, and design refinement of interchanges or other components during Tier 2 may substantially reduce property impacts.

Direct impacts on buildings or other improvements are anticipated to occur only in Clear Creek County. Operations and maintenance activities are not expected to affect land use. Housing is needed for transit operators under the alternatives with transit elements, but this is an insignificant portion of the growth expected to occur in the Corridor.

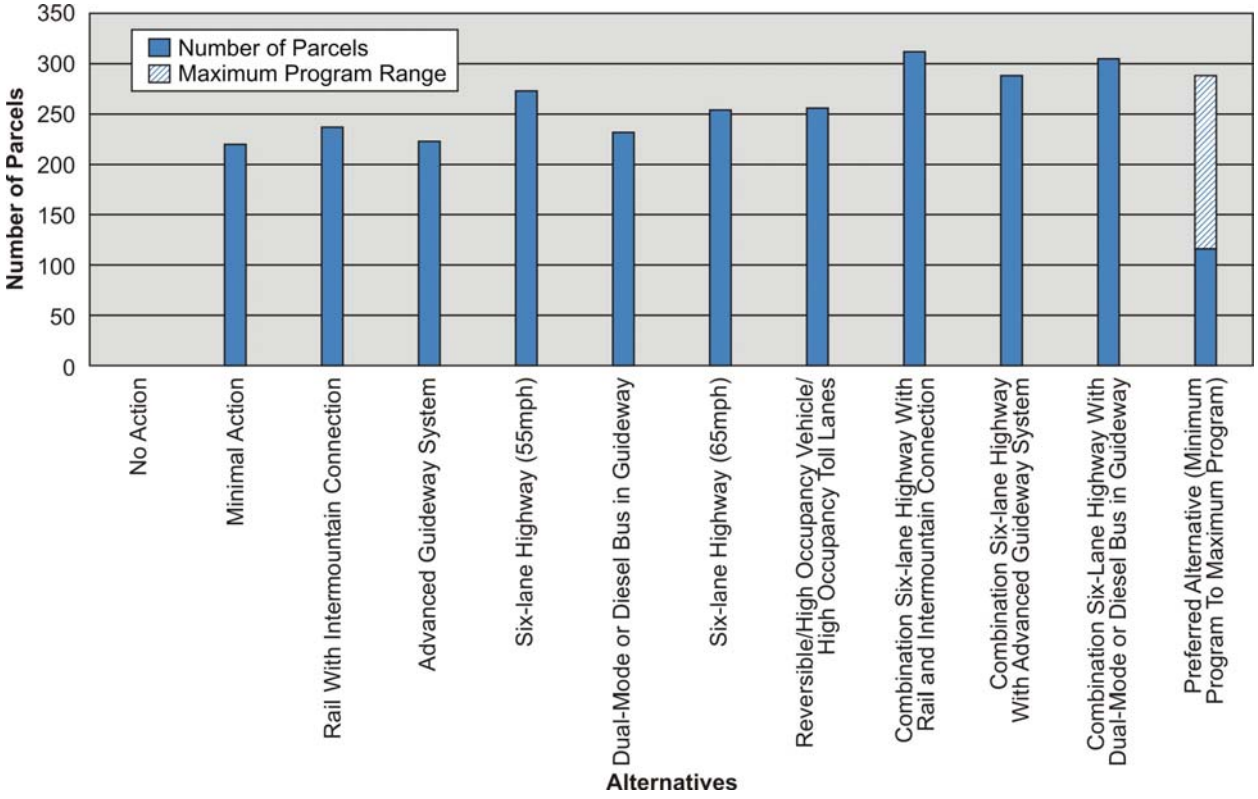
Of the 3 acres to 8 acres of United States Forest Service land affected, the majority of impacts occur on White River National Forest lands. This acreage is dispersed, with only small slivers of land being acquired adjacent to the I-70 highway over many miles. The Advanced Guideway System Alternative has the fewest and the Combination Six-Lane Highway with Rail and Intermountain Connection has the most impacts on White River National Forest lands. The Preferred Alternative impacts approximately 5 acres of White River National Forest lands, falling in the middle range of Action Alternative impacts. Five White River National Forest management prescription areas are affected:

- Elk habitat,
- Deer and elk winter range,
- Forested flora and fauna habitats,
- Backcountry recreation, and
- Scenic travel corridors.

Under all Action Alternatives, the only impacts on Arapaho and Roosevelt National Forests lands are less than half an acre of impact on the Loveland Ski Area due to the third tunnel bore at the Eisenhower-Johnson Memorial Tunnels. Special use permits are impacted when facilities such as access roads and utilities are disturbed.

The lead agencies evaluated the proposed Action Alternatives for compatibility with relevant county and municipality master plans. Plans show corridorwide support of the development of a regional transit system, along with local transportation planning to support such a system, an emphasis on cooperative regional planning, and a focus on sustainability.

Chart 3.7-1. Summary of Properties within Project Footprint by Alternative



**The Maximum Program presents the range of impacts that occurs with the Preferred Alternative. The solid bar represents the implementation of the Minimum Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Key to Abbreviations/Acronyms

IMC = Intermountain Connection AGS = Advanced Guideway System
HOV = High-Occupancy Vehicle HOT = High-Occupancy Toll

How do the alternatives indirectly affect land use and right-of-way?

The indirect impacts analysis focuses on the potential for induced or suppressed growth as a result of the Action Alternatives. To analyze induced growth, the lead agencies estimated the change in population that results from possible induced or suppressed travel demand and then estimated the amount of induced development that occurs beyond what is currently planned in surrounding communities. The *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a) describes the methodology in greater detail.

According to the analysis, growth likely occurs beyond what is planned, except under the No Action and Minimal Action Alternatives, which could suppress growth in all counties except Clear Creek County. Susceptibility to changes in population due to travel demand is limited primarily to Eagle and Summit counties, while Clear Creek County experiences insignificant

Transportation and Growth

Many government and private entities expressed concern that Corridor improvements will induce growth. They stated that improved transportation access brings more recreational users into the Corridor, stimulating the economy and population growth, and in turn causes adverse environmental impacts on land use (see **Section 3.8, Social and Economic Values,** and **Section 3.12, Recreation Resources and Section 6(f) Evaluation,** for analyses of indirect effects on the economy and recreation use).

induced growth. Growth in Garfield County is susceptible to changes in Eagle County because of the number of residents commuting to Eagle County for employment. Coordination with Garfield, Eagle, and Summit county planners resulted in the following assumptions regarding the distribution of induced growth:

- Transit Alternatives concentrate induced growth in urban areas surrounding transit centers in areas of existing or planned urban development primarily in Eagle County, including Eagle, Avon, and Vail.
- Highway Alternatives distribute growth based on existing trends for urban/rural development in each county, resulting in additional development in rural areas, primarily in Eagle County.
- Combination Alternatives distribute growth equally between the above transit and highway distribution scenarios, resulting in increased pressure in both urban and rural areas in Eagle and Summit counties.
- The Preferred Alternative induces growth in a manner similar to the Transit Alternatives, under the Minimum Program, and concentrates growth in urban areas surrounding transit centers, primarily in Eagle County. If the Maximum Program is implemented, it induces growth in a manner more similar to the Combination Alternatives; growth pressures occur in both urban and rural areas in Eagle and Summit counties.

Induced growth beyond planned growth is not consistent with existing county and community land use plans and policies. Transit Alternatives may be more compatible with some planning policies that encourage future development in and around existing communities and allow rural areas to remain less developed. In contrast, Highway and Combination Alternatives are less compatible with such planning policies, as they may encourage more dispersed and rural development. The adaptive management component of the Preferred Alternative allows it to be implemented in coordination with Corridor communities over time, based on future needs and associated triggers for further action, and is more compatible with Corridor planning policies.

A review of current county and municipality master plans (most of which date between 2000 and 2006 and have been updated in 2010) indicates emerging planning efforts in the Corridor for regional growth management and resource sustainability. However, in the absence of aggressive and coordinated growth management strategies, induced growth could lead to unwanted growth and development patterns surrounding the Corridor. Changes to the transportation system are not the only factors influencing growth in the Corridor; other factors include water supply, public policy, and geographic issues. See **Section 3.8, Social and Economic Values; Section 3.12, Recreation Resources and Section 6(f) Evaluation;** and **Chapter 4, Cumulative Impacts Analysis,** for additional discussion of the effects of induced growth on the economy, recreation resources, and other environmental resources surrounding the Corridor.

The Colorado Department of Transportation evaluated water resources in the Corridor to consider the potential of water availability to influence future growth. That evaluation, documented in the *I-70 Mountain Corridor Water Resources Technical Report* (CDOT, August 2010b), found that water resources and associated water infrastructure are likely to influence future land development patterns; that water supply shortages are projected in some areas of the Corridor based on planned development by 2025; and that management measures are not currently in place for Corridor communities to effectively deal with water and growth issues. While the Action Alternatives do not affect water supply, they have an impact on water quality and future growth.

How does construction of the alternatives affect land use and right-of-way?

Construction workers need housing in the Corridor during the construction timeframe. For construction occurring east of the Eisenhower-Johnson Memorial Tunnels, workers are expected to commute from the Denver metropolitan area, alleviating the need for worker housing in Clear Creek County. For construction occurring west of the Eisenhower-Johnson Memorial Tunnels, additional housing is needed to accommodate the influx of workers. Communities have voiced concern about the future use of worker housing once construction is complete.

What are the project effects on land use in 2050?

The Action Alternatives influence Corridor land use, based on the degree to which they accommodate or suppress the demand for travel on the I-70 highway. The No Action Alternative, which suppresses up to 9 million trips per year by 2050, and the Minimal Action Alternative both decrease the demand for growth in Corridor communities, and possibly increase demand in other areas of the state that currently experience less growth and visitation. The other Action Alternatives accommodate increased travel demand and may increase demand for growth in Corridor communities. However, by 2050, the effects of the Action Alternatives are likely balanced or even controlled by other growth-limiting factors, such as water availability and community controls on growth and land use planning. The Preferred Alternative's adaptive management component allows Corridor improvements to respond and adapt to Corridor land use changes and long-term growth needs. **Chapter 4, Cumulative Impacts Analysis,** provides additional analysis of the alternatives in relation to past and current trends and other reasonably foreseeable future actions and events.

3.7.6 What will be addressed in Tier 2 processes?

The Colorado Department of Transportation will conduct further analysis of changes that affect the functionality of parcels near the I-70 highway, such as changes in access, visibility, and noise levels, during future project-specific Tier 2 processes. The analysis will include coordination with individual communities and agencies to determine functional impacts on businesses, homeowners, and other property owners and to determine appropriate mitigation. Regarding forest lands, Tier 2 processes will provide a more definitive determination of impacts on special use permits and will work to avoid and minimize these impacts. Tier 2 processes will also analyze impacts to existing construction housing built during construction of the original I-70 highway (including potential environmental justice impacts), the future use of new workforce housing once construction is complete, and long-term housing needs for operations and maintenance staff.

The Colorado Department of Transportation convened a Community Values Issue Task Force to study mitigation strategies for impacts related to community values. The task force recommended that Tier 2 processes effectively coordinate projects with local communities and their land use plans. The lead agencies will consider those approaches, which include:

- Using United States Forest Service definitions in land use planning; including at least one local jurisdiction representative with a land use planning background on the Project Leadership Team;
- Identifying an I-70 Mountain Corridor Context Sensitive Solutions manager and agency staff liaisons who can serve across the entire Corridor, to provide continuity in process; and
- Providing communities with possible alignments as early as possible to allow them to make timely land use decisions.

The Colorado Department of Transportation will fund the I-70 Mountain Corridor Context Sensitive Solutions program during Tier 2 processes. For more information on I-70 Mountain Corridor Context Sensitive Solutions, see the **Introduction** to this document.

During Tier 2 processes, the lead agencies will:

- Develop specific and more detailed mitigation strategies and measures,
- Develop best management practices specific to each project, and
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.7.7 What are the approaches to programmatic mitigation planning for land use and right-of-way?

The phased approach of the Preferred Alternative provides ongoing opportunities to avoid and minimize impacts on adjacent land use, establish effective mitigation, employ I-70 Mountain Corridor Context Sensitive Solutions, and implement future phases of the alternative based on future needs and associated triggers for further action. Primary mitigation strategies to avoid or reduce direct effects to adjacent properties include design refinement, particularly at interchanges, and physical measures such as the use of retaining walls or elevated structures.

The lead agencies will conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act (1970, referred to as the "Uniform Act," as amended in 1987) to provide a consistent policy for fair and equitable treatment of displaced persons. The lead agencies will provide affected individuals with compensation and assistance with finding suitable sites for relocation. Regarding workforce housing, the lead agencies will consider coordinating with local jurisdictions and federal housing authorities to create and implement a Workforce Plan addressing workforce housing needs and permanent housing strategies.

The lead agencies will follow United States Forest Service standards and guidelines for the protection of federal lands, provided by White River National Forest and Arapaho and Roosevelt National Forests resource specialists (see the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010a) for a list of these standards and guidelines categorized by forest and resource). Any deviations from standards must be analyzed and documented in a forest plan amendment; deviations from guidelines require explanation of reasons for the deviations, but not a forest plan amendment. Tier 2 processes will include conceptual mitigation plans for impacts on United States Forest Service special use permits, including measures such as maintaining access to permitted areas and uses during construction, relocating permitted structures and utility easements, and minimizing interruptions to service during construction.

The Colorado Department of Transportation will consider an approach to promote and assist communities, as possible, in the adoption of more comprehensive, regional growth management plans that can be applied to Tier 2 processes. The recommendations for this approach include exploring the possibility of creating grants for communities that lack the resources to develop a growth plan; working with local councils of government and the Colorado Department of Local Affairs to assist with funding; and promoting the consideration of open space as community separators, or view sheds distinguishing communities, including studies led by the United States Forest Service and Bureau of Land Management. While the lead agencies will consider this type of policy approach, efforts to control growth are greatly dependent on local planning and community political direction.

3.8 Social and Economic Values

3.8.1 What are the social and economic values of concern to this project and why are they important?

Social and economic values reflect the economic setting of the counties and communities in the Corridor and the social setting relating to housing, income, employment, and commuting. The Colorado Department of Transportation (CDOT) evaluates these values to determine the effects of a transportation action on a community and its quality of life. The I-70 highway plays an important role in the economic activity and quality of life of surrounding counties. It is the primary access to communities and the abundant recreation resources in the Corridor, both for local Corridor residents and for the Denver metropolitan area and out-of-state visitors. Tourism, the primary industry in the Corridor, generates 41 percent of jobs and 38 percent of income; these numbers are even higher in the resort counties of Eagle and Summit. Visitor access to Corridor counties via the I-70 highway strongly influences the Corridor economy, and the lead agencies must analyze changes to the I-70 transportation system for potential economic effects.

3.8.2 What study area and process was used to analyze social and economic values?

Because the I-70 Mountain Corridor influences the regional mountain economy, the study area is made up of nine counties primarily accessed by the I-70 highway or whose workforce supports counties primarily accessed by the I-70 highway. They include Garfield, Eagle, Pitkin, Summit, Lake, Park, Grand, Gilpin, and Clear Creek counties (see **Figure 3.8-1**). Jefferson County was not included in the study area because its economy is tied to the Denver metropolitan area rather than to tourism in the Corridor.

The Colorado Department of Transportation obtained historic and projected demographic information to characterize the existing socioeconomic conditions in the Corridor and understand growth trends. Sources of data for population, employment, housing, commuting, and economic conditions included the:

- Demography Section of the Colorado Department of Local Affairs
- Denver Regional Council of Governments (DRCOG)
- Northwest Colorado Council of Governments (NWCCOG)
- Corridor counties

Most of the data gathered for this analysis provided information on Corridor conditions as they existed in year 2000, and provided projections for conditions as they would be in 2025, the original planning horizon for this study. As the study progressed, CDOT continued to evaluate new data and extended the planning horizon to 2035. However, CDOT determined that because Corridor socioeconomic conditions have been stable, 2010 U.S. Census data are not available, and the programmatic nature of impact evaluation at the Tier 1 level focuses on trends and comparative differences among alternatives, the year 2000 and 2025 planning horizon provided a reasonable baseline for a comparative analysis of alternatives.

The lead agencies predicted the economic impacts of alternatives using the REMI® (Regional Economic Models, Inc.) model. The model relies on Department of Local Affairs population and employment data and predicts economic impacts across the nine-county Corridor region. The Department of Local Affairs projections assume that transportation and other public infrastructure can and will expand in step with demographic trends. The REMI® model, in turn, modifies those projections by considering the influence of traffic congestion and other constraints of the I-70 highway on those long-term population and employment projections (that is, how the Action Alternatives might suppress or induce growth). The REMI® model and its outputs are described in **Section 3.8.5** and detailed in the *I-70 Mountain Corridor PEIS Social and Economic Values Technical Report* (CDOT, August 2010).

In 2009, the Department of Local Affairs developed population and employment forecasts for year 2035, and revised their initial estimates of population and employment for years 2000 and 2025. These updated estimates were used primarily to qualify and validate the original REMI® model. projections. Evaluation of the updated estimates confirmed that the initial estimates are still valid for the broad decision making at Tier 1.

3.8.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

The Colorado Department of Transportation coordinated with the Department of Local Affairs, NWCCOG, DRCOG, and Corridor communities to obtain and evaluate demographic data and to discuss issues of growth, build-out assumptions, tourism, and second homes. The team also met with the Colorado Department of Budgeting and Long-Range Planning and State Demographer's Office to obtain feedback and corroborate study results and conclusions. The Environmental Protection Agency suggests a need for CDOT and Corridor communities to develop regional strategies to avoid and minimize land use impacts on the environment. The agency has indicated an interest to work with local and regional entities on considering the environment in land use planning.

3.8.4 What are the areas of social and economic interest identified in the Corridor?

Population and traffic have been increasing in the Corridor since the initial construction of the I-70 highway. Clear Creek, Gilpin, Pitkin, Park, and Grand counties experienced steady, moderate growth in recent decades, where Garfield, Eagle, and Summit Counties experienced dramatic growth every year since about 1970. By 2035, the Department of Local Affairs projects the permanent population of the nine Corridor counties to reach almost 420,000, more than doubling the year 2000 population. **Figure 3.8-1** provides a reference for the social and economic conditions discussed here.

Population and traffic growth are correlated directly to improvements on the I-70 highway, which opened access to Corridor communities. The earliest construction of the I-70 highway occurred in the late 1950s and early 1960s, moving east to west. Between 1970 and 1980, most of the major features of the I-70 highway, including the twin tunnels, Eisenhower-Johnson Memorial Tunnels, and Vail Pass, were constructed. The last segment in Glenwood Canyon was completed in the mid-1990s.

The bulk of regional economic activity in the Corridor is concentrated among the central and western counties of the Corridor: Eagle, Summit, Pitkin, and Garfield. These four counties account for approximately 85 percent of the nine-county region's Gross Regional Product.

What is the relationship among second homes, affordable housing, employment, and commuting patterns?

The Northwest Colorado Council of Governments found that second homeowners account for more than 50 percent of home ownership in Eagle, Pitkin, Grand, and Summit counties. Numerous Corridor communities are projected to experience steep increases in the percentage of second homes. This type of development is generally rural and dispersed and is expected to reach expansion limits in resort areas by 2025. The effects of second homes are summarized by NWCCOG:

> *Increasing numbers of second homes have begun absorbing large amounts of land in an area where land available for development is limited by terrain and the public domain. The consequence is a growing impact on real estate prices and the cost of living, as well as increasing demands for service from local government. (NWCCOG, 2004)*

Eagle and Summit counties are experiencing the greatest pressure from second-home ownership, which increases land values, makes it difficult for local workers and residents to find affordable housing, and

influences commuting patterns from neighboring counties. Approximately 64 percent of the housing in Summit County is owned by second homeowners, and the lack of affordable housing for local residents is a significant concern that its Comprehensive Plan (2009 revision) provides strategies to correct. Summit County aims to lower the ratio of second home to permanent home ownership to 60:40. The slumping housing market in recent years helped narrow the housing affordability gap for local residents.

Employment trends in the Corridor are also on the rise, with overall employment expected to grow more than 200 percent between 2000 and 2035. Park County employment is expected to grow the most (261 percent), followed by Garfield (243 percent) , Eagle (227 percent), and Summit (217 percent) . Employment in counties east of the Continental Divide is expected to grow the least. Employment is expected to grow 127 percent in Gilpin County and 137 percent in Clear Creek County. Tourism and industries related to the second home market (construction, real estate) account for more than half of the Corridor employment. These types of jobs do not support the housing prices in the Corridor, and nearly half of workers in some counties must commute from outlying areas to employment centers. This trend, which is expected to continue into the future, strongly affects commuting patterns in the Corridor. At the east end of the Corridor in Gilpin and Clear Creek counties, this pattern exists too but relates to residents commuting to jobs in the Denver metropolitan area rather than to tourist-related jobs that dominate the western end of the Corridor. See **Section 3.9, Environmental Justice,** for information on how these conditions affect low-income and minority households in the Corridor.

How do emergency services operate in the Corridor?

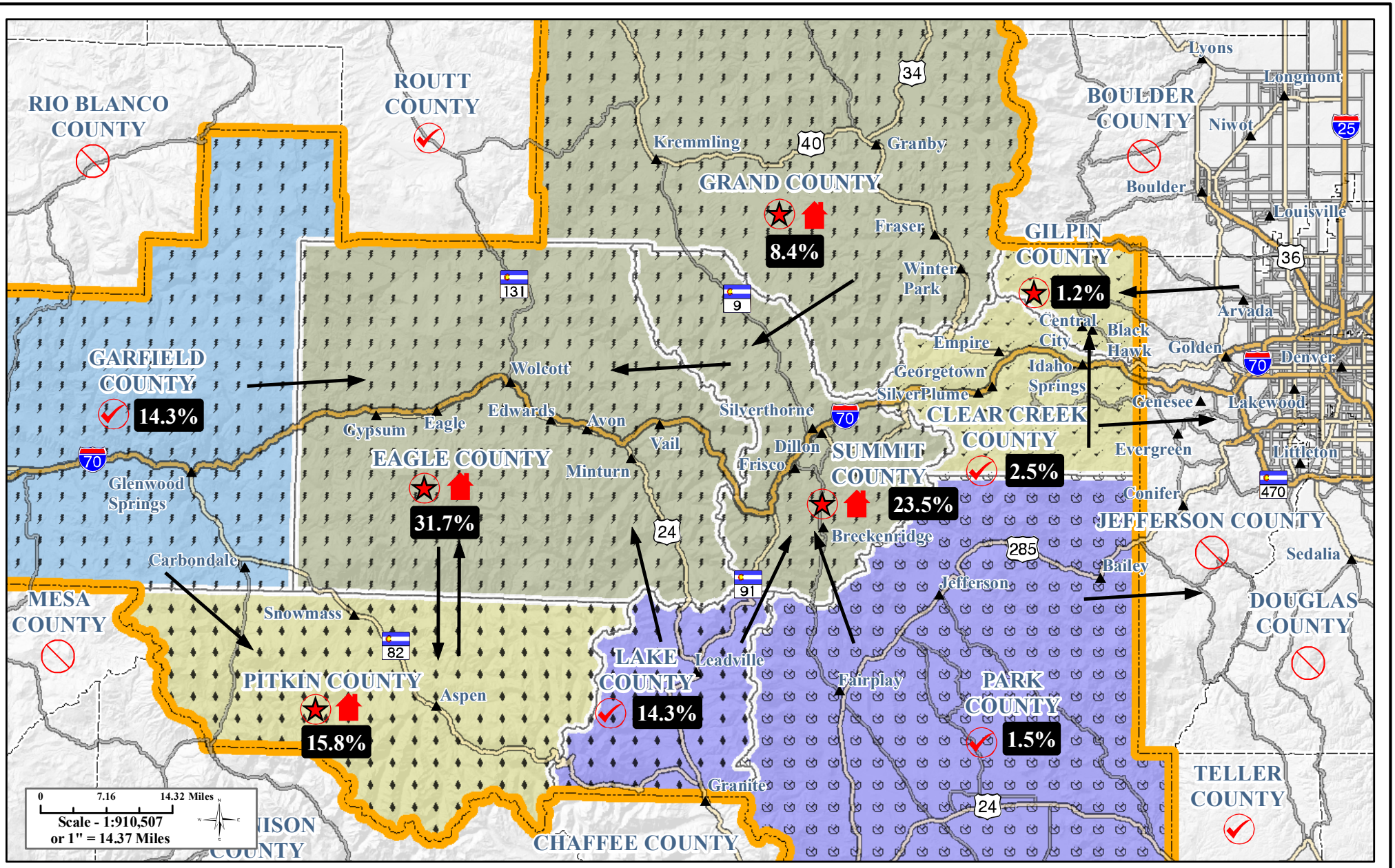
Ambulances and emergency care facilities are limited, and Corridor communities are called to respond to crashes and medical issues on the I-70 highway. Crashes on the I-70 highway account for 13 percent of medical emergency calls in Eagle County and 25 percent in both Summit and Clear Creek counties. Clear Creek County's emergency response expenses are disproportionately high. The county has no hospital to respond to emergencies and must transport injured persons to medical facilities outside the county (typically Jefferson County).

3.8.5 How do the alternatives potentially affect social and economic values?

Alternatives primarily affect social and economic values through indirect and construction impacts on the Corridor economy. The Colorado Department of Transportation examined direct and indirect impacts on emergency services as well. The No Action and Minimal Action Alternatives suppress economic growth. Generally, the Combination Alternatives provide the greatest economic benefits in the nine-county Corridor region; however, they also create the greatest growth and commuting pressures. The Highway Alternatives have similar impacts, but to a lesser extent; and Transit Alternatives' impacts fall somewhere in between. The Preferred Alternative is expected to have impacts similar to those of the Transit Alternatives, resulting from the Minimum Program of improvements. Later phases of the Preferred Alternative under the Maximum Program of improvements, if implemented, have impacts similar to those of the Combination Alternatives.

How do the alternatives affect emergency services?

The Highway Alternatives, Combination Alternatives, and the Preferred Alternative address highway safety issues. Therefore, they likely have beneficial direct impacts on emergency services because they reduce emergency calls related to the I-70 highway. This improvement in highway safety especially benefits Clear Creek County because the county's I-70 highway-related emergency response expenses are disproportionately high. The No Action, Minimal Action, and Transit Alternatives, for the most part, do not address highway safety issues and do not likely affect the I-70 highway emergency-related calls. Emergency service response time on the I-70 highway improves under all Action Alternatives, except the Minimal Action Alternative, because they reduce congestion and, therefore, travel time delays.



Legend

- Mileposts
- Highways
- Major Highways
- Limited Access Highways
- Lakes
- County Boundary
- Urban Areas
- X% — % of 9-County Gross Regional Product (2035 Baseline Estimate)
- Nine-County Study Area
- Cities
- % of 2nd Home >= 45% (2000)
- County-to-County Commuting Patterns (2000)

% of Total Jobs Related to Tourism (2001)
- 40% or More
- 14 - 39%
- 4 - 13%

% Employment Growth 2000-2035
- 100-149 %
- 150-199 %
- 200-249 %
- 250-299 %

% Population Growth 2000-2035
- 150-199 %
- 200-249 %
- 250-299 %
- 300-349 %

I-70 Mountain Corridor PEIS

U.S. Department of Transportation Federal Highway Administration

SOCIAL AND ECONOMIC CONDITIONS

How do the alternatives indirectly affect social and economic values?

The Colorado Department of Transportation first conducted a growth analysis to determine induced or suppressed population growth by alternative (see the *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010). Then an economic analysis was conducted to determine the effects of each alternative on tourism, employment, commuting patterns, and other economic indicators. See the *I-70 Mountain Corridor PEIS Social and Economic Values Technical Report* (CDOT, August 2010).

How do the alternatives indirectly affect growth in the Corridor?

As discussed in **Section 3.7, Land Use and Right-of-Way**, and **Chapter 4, Cumulative Impacts Analysis**, the growth analysis found that the No Action and Minimal Action Alternatives likely suppress growth for all Corridor counties except Clear Creek County. In Eagle County, the Transit Alternatives, the Combination Alternatives, and the Preferred Alternative likely increase growth pressure; the Highway Alternatives also do so, but to a lesser extent. In Summit County, the Combination Alternatives and, if implemented, the Preferred Alternative Maximum Program induce the greatest growth pressure. Growth in Garfield County is susceptible to changes in Eagle County because of the number of residents commuting to Eagle County for employment. The analysis found growth in the remaining Corridor counties to be less dependent on transportation conditions along the I-70 highway, and the alternatives do not likely induce growth in those counties.

Regardless of alternative, the Department of Local Affairs projects that job needs will greatly exceed worker supply in Gilpin and Pitkin counties and will be relatively high compared to worker supply in the resort counties of Eagle and Summit. Although conditions are improving in Summit and Eagle counties, where the lack of affordable housing is an ongoing issue being addressed through planning strategies, most workers must seek affordable housing in adjacent counties where housing values are lower. This situation increases commuting issues, growth pressure in adjacent counties, and housing requirements in counties where many commuting workers reside, such as Garfield and Lake Counties. These issues are even greater with those alternatives that increase growth pressure in resort counties (the Transit Alternatives, Combination Alternatives, and Preferred Alternative).

Induced growth indirectly impacts emergency services by increasing crashes and emergency calls in Corridor counties susceptible to induced growth. Although Clear Creek County, which is not as susceptible to induced growth, has a high per-capita call rate and lack of in-county medical destination facilities, indirect impacts on that county's emergency services are unlikely since measurable induced growth in the county is not anticipated and highway safety in Clear Creek County is improved under most Action Alternatives.

How do the alternatives indirectly affect economic conditions in the Corridor?

The economic impact analysis used the REMI® model to evaluate changes in tourism spending, congestion (translated as the value of a driver's or passenger's time), and construction on the Corridor economy.

According to the REMI® model, the No Action Alternative likely suppresses economic conditions in the nine-county Corridor region when compared to the Action Alternatives (except the Minimal Action), due to increased highway congestion and reduced access to recreational and tourist amenities.

Measuring Economic Impacts

Under the Action Alternatives (except the Minimal Action), the Gross Regional Product would be approximately $45 billion by year 2035. The No Action Alternative would depress the Gross Regional Product by nearly $10 billion per year, a factor of more than one-fifth the potential level of economic activity for the region

The Action Alternatives likely suppress economic growth during construction, due to worsening travel conditions on the I-70 highway. Construction is phased and occurs in different areas of the Corridor at different times during the construction period. Dispersing construction activities throughout the Corridor over time minimizes economic hardship. Once CDOT completes construction of the alternatives, economic conditions improve throughout the Corridor. By 2035, the REMI® model predicts that all Action Alternatives except the Minimal Action Alternative meet or surpass a Gross Regional Product of approximately $45 billion per year. The Combination Alternatives have the greatest positive effect on economic conditions; the Transit Alternatives have a slightly lesser effect, and the Highway Alternatives have the least effect. The Preferred Alternative is expected to affect economic growth similar to the Transit Alternatives under the Minimum Program. If additional improvements of the Preferred Alternative–Maximum Program are implemented by 2035, economic growth begins to be more similar to that of the Combination Alternatives.

Because Eagle, Summit, Pitkin, and Garfield counties have the greatest share of the Corridor tourism industry, they also have the greatest vulnerability to suppressed visitor trips arising from chronic traffic congestion, and the largest numbers of intercounty commuting workers, exacerbating congestion in the Corridor.

Because of the interdependency of the Corridor counties, economic analysis was conducted for the nine-county region as a whole. It cannot be assumed, however, that all counties benefit equally from the Action Alternatives. Historic trends indicate, for example, that Clear Creek County has not received the economic benefits of past improvements to the I-70 highway in proportion to the benefit received by Corridor counties to the west. That trend is expected to continue in the future.

How does construction of the alternatives affect social and economic values?

Construction likely suppresses visitor trips and causes congestion and delay for resident and local commuter trips on the I-70 highway. The REMI® model, explained above, factors construction activities into the analysis and thus accounts for the suppressed economic activity that occurs. Although construction suppresses economic activity, the entire Corridor is not under construction all at once. The model predicts that if construction is complete by year 2025, then by year 2035, economic activity surpasses the Gross Regional Product of the No Action Alternative by $10 billion. However, depending on when construction is complete, the economic benefits could be delayed.

Clear Creek County raised the concern that construction impacts on Corridor communities in Clear Creek outweigh the benefits to other counties from any of the Action Alternatives. Construction impacts on Clear Creek communities are primarily borne by resident commuters and resident local travelers, who experience congestion and delay from construction activities; and by retail businesses, which are affected by restricted visitor access from the I-70 highway. The effects on the county economy of employing construction workers are likely small, as most construction workers commute from the Denver metropolitan area to worksites in Clear Creek County.

The Highway Alternatives and highway portion of the Combination Alternatives have greater construction impacts on Clear Creek County communities, due to the wider construction footprint needed,

than the Transit Alternatives. The Preferred Alternative widens only 4 miles of the highway at the east end of Clear Creek County under the Minimum Program of Improvements; if the Maximum Program is implemented, the phased approach allows ongoing opportunities to avoid, minimize, and mitigate economic impacts.

What are the project effects on social and economic values in 2050?

The REMI® model predicts that all Action Alternatives, except the Minimal Action Alternative, meet or surpass a Gross Regional Product of $45 billion by year 2035. The model takes into account the effects of construction, during which time economic growth slows down, in comparison to the period after construction when the rate of growth increases. Presumably, the period of construction is a smaller portion of the overall period between now and 2050, allowing the economies more time to grow without the effects of construction. The No Action and Minimal Action Alternatives suppress economic growth, and that suppression likely continues to 2050.

The beneficial economic growth under the Action Alternatives, except the Minimal Action Alternative, could have either positive or negative effects on social values, depending on local planning policies. Economic growth places pressure on property values, community services, and other social infrastructure. These pressures could negatively affect quality of life, community services and infrastructure, and commuting patterns if local planning efforts and mitigation measures do not adequately address them.

The adaptive management approach of the Preferred Alternative allows improvements to be implemented over time, which may allow communities to manage the indirect effects associated with those improvements better. Future changes such as fuel types, resource availability, climate change, and water availability could substantially affect the social and economic fabric of the Corridor communities. The Action Alternatives could either suppress economic conditions or increase anticipated Gross Regional Product. **Chapter 4, Cumulative Impacts Analysis** provides additional analysis of the alternatives in relation to past and current trends and other reasonably foreseeable future actions and events.

3.8.6 What will be addressed in Tier 2 processes?

The lead agencies will conduct further analysis of local county economic impacts during future project-specific Tier 2 processes, and will develop information about county-level travel demand, project phasing, time-phased estimates of capital expenditures, worksite locations and scheduling, and sourcing of materials, equipment, services, and labor for use in the analysis. The REMI® model, which has the ability to incorporate travel demand data with a robust economic impact analysis engine, could be useful for local economic modeling during Tier 2 processes if it is used. With regard to construction impacts, Tier 2 processes will provide information about work duration, detours, lane closures, and other disturbances that would occur. The I-70 Mountain Corridor Context Sensitive Solutions Guidance, described in the **Introduction** to this document, will be followed during Tier 2 processes.

During Tier 2 processes, the lead agencies will:

- Develop specific and more detailed mitigation strategies and measures,
- Develop best management practices specific to each project, and
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.8.7 What are the approaches to programmatic mitigation planning for social and economic values?

The phased approach of the Preferred Alternative allows ongoing opportunities to avoid and minimize economic impacts, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions. Corridorwide coordination, state involvement and support, and localized efforts to control growth and maintain quality of life would improve the ability of Corridor communities to maintain and protect and social and economic values.

The lead agencies will coordinate a variety of construction mitigation strategies with Clear Creek and other Corridor counties. This may include the development of a Tier 2 Public Involvement and Marketing Plan. Tier 2 processes will also include strategies to avoid and minimize construction impacts on Clear Creek communities, such as:

- Considerations for peak seasonal traffic (e.g., cessation of construction activities during ski season weekends),
- Accessibility to Idaho Springs businesses,
- Assisting the county with historic tourism marketing, and
- Developing a site-specific Tier 2 interpretive signage plan.

Mitigation strategies will also aim to address the disparity in the distribution of benefits and impacts that might result from construction activities. The lead agencies will address safety issues on the I-70 highway, which will reduce the number of crashes on the highway. This will reduce the frequency of emergency response to crashes on the I-70 highway, which, in turn, will reduce local community emergency services costs.

The following list summarizes some of the construction mitigation strategies that would be considered.

- Not permitting lane restrictions in the peak direction during peak periods.
- Providing optimal spacing between work zones would allow traffic flow to recover between work zones.
- Requiring contractors to demonstrate that there is no reasonable alternative to a proposed lane closure. When lane restrictions and closures are required, CDOT will work with local communities to minimize impacts on local traffic and transit services. If actual total closure and/or stoppage of traffic are needed, they will be advertised and communicated to the public in advance of when they would occur.
- Maintaining community and business access to the highest degree possible. Information technologies, such as well-placed and highly visible signs, provide safe and efficient access during construction activities.
- Determining an appropriate scheduling approach to day versus night work during Tier 2 processes.
- Considering public concerns about local mobility in CDOT construction contracts and traffic control strategies.
- Holding public meetings at critical construction phases to provide information and discuss mitigation strategies. Providing construction information exchange centers in the Corridor for public input and up-to-date construction information.
- Including as public information strategies media advisories, variable message signs, advance signs, a telephone hotline, real-time web cameras, the use of intelligent transportation systems and technology in construction work zones, a construction project website, and alternate route advisories.

- As each construction phase is undertaken, working with communities to identify community representatives. These persons will partner in the construction traffic control program and provide assistance/feedback to the traffic control team.
- Providing emergency responders traffic control contact information. In an emergency, responders contact the traffic control office, provide their approximate arrival time at the construction zone, and traffic control could provide a clear path through the construction zone.
- Providing effective directional signage.
- Being sensitive to blockage during prime business hours.
- Providing outreach to impacted businesses as early as possible before any construction.
- Identifying business relocation opportunities.
- Coordinating with local chambers and town economic offices to help develop promotional strategies during construction.
- Establishing a specialized website for businesses to access construction schedules that might affect their businesses.

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3.9 Environmental Justice

3.9.1 What is environmental justice and how is it important to this project?

Environmental justice promotes the fair treatment and meaningful involvement of all people in the decision-making process for transportation projects. Environmental justice seeks to avoid disproportionately high and adverse impacts on low-income and minority populations. The I-70 Mountain Corridor extends 144 miles through diverse communities and socioeconomic conditions. The lead agencies analyzed environmental justice to determine if the impacts and benefits of the Action Alternatives disproportionately affect minority or low-income populations.

3.9.2 What study area and process was used to analyze environmental justice?

Assessing Environmental Justice in Transportation Projects

Environmental justice requirements stem from the Civil Rights Act of 1964; Executive Order (EO) 12898—*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*—issued in 1994; and U.S. Department of Transportation and Federal Highway Administration (FHWA) procedures for compliance with EO 12898.

The lead agencies coordinated with the Environmental Protection Agency, the Northwest Colorado Council of Governments (NWCCOG), and representatives from the five Corridor counties during the scoping period to develop an approach for evaluating environmental justice. The lead agencies collected year 2000 U.S. Census information to identify minority and low-income populations at the community (U.S. Census blocks and block groups) and county levels. The 2000 U.S. Census contains the most current data available for variables important to environmental justice analysis. The lead agencies reviewed more current population and economic data available at the community level and engaged municipal planners and others to identify minority and low-income populations that might not be represented in the U.S. Census data. Additional identification of "pockets" of low-income and minority populations is being conducted to solicit comments from these communities on the Draft PEIS. This information will be included in the Final PEIS.

Minority refers to persons who are Black, Hispanic, Asian American, or Native American Indian or Alaskan. Issues of importance to Native American tribes are discussed in **Section 3.13.4, Historic Properties and Native American Consultation**. Low-income is defined using the Community Development Block Grant (CDBG) income guidance threshold, which considers individuals and households earning less than 50 percent of the area median income of a community to be low-income. This measure differs from the lead agencies' standard practices to define low-income according to U.S. Health and Human Services (HHS) poverty guidelines or U.S. Department of Housing and Urban Development (HUD) low-income thresholds. The lead agencies used the CDBG definition for this analysis because the CDBG low-income threshold is approximately 20 percent to 40 percent higher than HHS poverty guidelines and more closely reflects the economic conditions, housing market, and variability among income levels within the Corridor. The *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* (CDOT, August 2010) contains additional details on the methodology for identifying minority and low-income populations.

To capture potential "pockets" of low-income and minority individuals that may be overlooked by aggregated U.S. Census data, CDOT:

- Contacted local planners, housing authorities, health and human services, and school superintendents throughout the Corridor
- Conducted community outreach activities with potentially affected populations

The community outreach efforts included a variety of formats, timeframes, and approaches providing opportunities for low-income and minority populations to participate in the planning process. Some of the outreach methods included:

- Scoping meetings
- Community interviews
- Community profile research
- Geographic characterization of the Corridor
- Environmental justice interviews
- Community outreach meetings
- Newsletters and event participation

Additional details about these efforts are contained in the *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* (CDOT, August 2010), and results of the outreach effort for this document will be included in the Final PEIS.

3.9.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

During the study process, the lead agencies coordinated with county and municipal staff and the Environmental Protection Agency to collect information and concerns regarding minority and low-income populations in the Corridor. These agencies expressed concerns about:

- Displacement of low-income and minority residents
- Separation of neighborhoods
- Affordable housing
- Access to public transportation
- Commute times for Corridor residents
- Adverse effects for residents living close to new transportation facilities and construction

The *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* (CDOT, August 2010) contains additional information about the coordination with and concerns expressed by agencies.

3.9.4 What are the areas of interest for environmental justice in the Corridor?

Existing minority and low-income populations are scattered throughout the Corridor communities, and no concentrations of minority or low-income populations were identified through U.S. Census data or local research. The discussion below, therefore, focuses of broad issues of concern for minority and low-income residents. Additional identification of "pockets" of low-income and minority populations is being conducted in order to solicit comments from these communities on the Draft PEIS. This information will be included in the Final PEIS. Tier 2 processes will evaluate impacts to neighborhoods or other subgroups of communities along the Corridor to determine effects of specific designs on minority or low-income populations.

What minority populations are present in the Corridor?

Minority populations, like the general population, have expanded in recent years in the Corridor. The growth in minority populations correlates to job growth in tourism-related industries, including service and construction. The U.S. Census data indicate that a low percentage of minorities live in the Corridor, ranging from 2 percent to 30 percent, and averaging 9 percent across the Corridor. The U.S. Census data indicate that minorities are dispersed throughout the communities and do not number more than 50 percent in any block group in the Corridor. Mapping of the U.S. Census block group data is presented in the *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* (CDOT, August 2010).

What low-income populations are present in the Corridor?

Low-income households exist within the Corridor. Percentages of low-income households in the five counties range from 17 percent in Eagle County to 21 percent in Garfield County. Low-income households for towns within the counties range from 9 percent (Dotsero and Lawson, Downieville, and Dumont) to 27 percent (Silver Plume). More recent data from the Colorado Department of Local Affairs (2004) suggest that Silver Plume may have a higher percentage of low-income households than is represented by the 2000 U.S. Census. Those updated data do not change the relative comparison of low-income populations in the Corridor, as Silver Plume has the highest number of low-income households in the Corridor under both measures.

U.S. Census block group data indicate locations of low-income households are highly variable in terms of residential density, geographic location within the communities, and proximity to the I-70 highway. (See the *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* [CDOT, August 2010].) The U.S. Census data verify information obtained from county planners and local officials that low-income residents are distributed throughout the Corridor and that no discrete or concentrated areas of low-income populations exist along the Corridor. Small groups of low-income populations might be found in areas not recognized by the CDBG data, but the small number does not substantially change the percentage identified that are relevant at this first tier of analysis. It is also possible that smaller "pockets" of low-income populations could be present and not reflected in the U.S. Census data because the block groups account for larger geographic and population areas. Little formal public housing is available in the Corridor for low-income residents. However, more affordable housing is likely located close to highway facilities, as these locations are less desirable than areas located farther from the highway. In some communities, therefore, low-income households may live closer to the I-70 highway than more affluent residents.

What public transportation is available in the Corridor, and what are the commuting patterns?

Local transit services are available in several communities along the Corridor including Glenwood Springs, Snowmass, Avon, Beaver Creek, Vail, and Breckenridge. These local transit systems serve a broad customer base, providing local service within communities for residents commuting from home to work, shopping, medical facilities, and other destinations. Transit systems such as the Roaring Fork Transportation Authority, Eagle County Regional Transportation Authority, and Summit Stage in Summit County provide services between communities in the western part of the Corridor. In the eastern part of the Corridor, the Regional Transportation District and private companies provide transit service for both Denver and the mountain resort areas. The proportion of low-income and non-low-income residents that use transit is about the same in the western and eastern parts of the Corridor.

A large number of workers commute across county lines for employment, and many do so because of a lack of available affordable housing within the counties where jobs are located. Garfield County, for instance, estimates that 80 percent to 90 percent of the county's low-income workers commute between 20 minutes and 90 minutes daily because they cannot afford to live where they work.

What are the issues with affordable housing in the Corridor?

Issues with affordable housing in the Corridor include the following:

- The projected increase in population and the demand for second homes in some of the Corridor counties escalates land and home prices and decreases availability of affordable housing. Although the slumping housing market in recent years helped narrow the housing affordability gap for some local workers, longer term pressures on the housing prices remain and housing is still relatively expensive compared to incomes of local residents.
- The high cost of land is a major impediment to developing affordable housing. Lowest-income residents are most affected by high housing costs because they must compete for affordable rental units with residents with higher incomes who can afford higher rents but cannot afford to purchase a home. In some communities, employers are considering employer-assisted housing options and developing employee housing units to retain workers and handle labor shortages.
- Several Corridor communities are considering implementing requirements for new developments to provide affordable units. A federally operated rental subsidy program is available for very low-income residents in Eagle County, and programs are available to provide housing assistance to qualifying homebuyers. Summit County initiated some housing assistance programs for low-income residents, and Clear Creek County initiated a study of affordable housing options. However, neither county has a formal program at this time. Very little public (Section 8) housing exists within the Corridor. Section 8 is a federal housing program that provides rental subsidies for low-income renters and homeowners.

3.9.5 How do the alternatives potentially affect minority and low-income populations?

All of the alternatives have the potential to directly and/or indirectly affect minority and low-income populations living in the Corridor at some level.

How do the alternatives directly affect minority and low-income populations in the Corridor?

Based on the percentage and distribution of minorities and low-income households, none of the alternatives have direct effects on minority or low-income populations that are different (disproportionate) in comparison to the population on a corridorwide basis. This analysis focuses on low-income populations because minorities are not present in high numbers anywhere in the Corridor.

The No Action Alternative neither provides additional travel options nor addresses congestion or travel delays in the Corridor. In this respect, it is the least beneficial to the employees that rely on the highway to commute to their jobs.

Action Alternatives that reduce commute times or provide additional commuting options, such as public transportation, are a benefit to low-income populations and lessen the impact of the housing and employment disparity. Generally, the Combination Alternatives and the Maximum Program of the Preferred Alternative, if fully implemented, provide the greatest commuting benefits to low-income residents by offering a range of transportation choices, but also have the greatest negative effect on affordable housing because improved access could disperse demand for housing and increase the cost of housing in outlying areas that are now more convenient to affluent second home residents. The Minimal Action Alternative has little effect on congestion or commuting travel time but improves options by including a corridorwide bus service in mixed traffic with connections to existing transit operators.

Under all but the Highway Alternatives, the efficiency of local, municipal transit service is improved, including the bus in mixed traffic option that is included as part of the Minimal Action Alternative.

Alternatives that maintain additional transportation options benefit low-income residents who do not own a car or who depend on public transportation for commuting to work, shopping, and medical facilities.

The Transit and Combination Alternatives provide transit options for minority and low-income residents along the Corridor commuting to regional destinations and connecting to existing transit services in Eagle and Summit counties where the majority of jobs occur. These alternatives also allow second home residents and some permanent residents to commute greater distances, which could continue to exacerbate the problem of affordable housing by increasing housing prices in outlying areas.

Alternatives that include transit potentially benefit low-income and minority residents who spend a high percentage of their income on automobile-related commuting expenses. Public transit could meet their needs if the provided service met their schedules and improved direct access to destinations in the Corridor where they travel.

The benefits of the Preferred Alternative are within the range of the Transit and Combination Alternatives. However, the Preferred Alternative is the most flexible and potentially beneficial of the Action Alternatives because its adaptive management approach allows implementation to fit community needs, growth trends, and transportation needs.

How do the alternatives indirectly affect minority and low-income populations in the Corridor?

According to the REMI® (Regional Economic Models, Inc.) model (discussed in **Section 3.8, Social and Economic Values**), the No Action and Minimal Action Alternatives likely suppress economic conditions in the five-county Corridor region due to increased highway congestion and reduced access to recreational and tourist amenities. Under all of the alternatives, including the No Action Alternative, lack of affordable housing near places of employment continues to be a problem in the Corridor. The availability of affordable housing and public transportation are indirect impacts that could accrue differently between low-income or minority populations and non-low-income or nonminority populations. Increased transportation access and capacity could induce growth and may create more demand for second home ownership and general population growth. As land values increase, low-income residents could be faced with insufficient affordable housing options within a reasonable distance of destinations where they need to travel. **Sections 3.7** and **3.8** further discuss indirect impacts. As noted in **Section 3.9.4**, affordable housing may be located closer to the highway, and residents living closer to the I-70 highway could be disproportionately affected by noise, dust, and access restrictions during construction. Some or many of these residents may be lower income. These impacts are temporary and may be outweighed by the transportation benefits such as shorter commute times, improved access, and transit options.

The Minimal Action Alternative provides corridorwide bus service in mixed traffic with connections to municipal transit providers to improve access and mobility for commuters. The potential for induced growth would be greater for the Combination Alternatives than for the Highway or Transit Alternatives alone. Induced growth results in a greater demand for affordable housing as available land is converted to second homes and industries that support this growth. Induced growth potentially increases job opportunities in the construction- and service-related positions that are often filled by low-income and minority workers.

How does construction of the alternatives affect minority and low-income populations in the Corridor?

Construction of any of the Action Alternatives creates community disruption throughout the Corridor:

- Access and travel through the Corridor is more challenging for Corridor residents.
- Restricted access and construction-related traffic congestion affect revenues.
- Construction-related noise, dust, and equipment emissions increase.

Low-income populations are not affected by these impacts more than the general population.

What are the project effects on environmental justice in 2050?

The No Action and Minimal Action Alternatives suppress economic growth, and that suppression likely continues to 2050. These circumstances may result in low-income and minority households relocating to other areas of the state in response to a sluggish jobs market.

As suggested in **Section 3.8, Social and Economic Values**, construction has a negative effect on economic growth. Delaying construction or spreading it over a longer period of time likely decreases the intensity of the economic impacts but causes Corridor communities to be affected by construction over a longer period.

Economic growth continues to place pressure on the real estate market, and without established regulatory mechanisms, affordable housing options remain limited in Summit and Eagle counties. By 2050, the effects on low-income and minority households from the alternatives likely have less influence than other growth-limiting factors, such as water availability and community controls on growth and land use planning. **Chapter 4, Cumulative Impacts Analysis,** provides additional analysis of the alternatives in relation to past and current trends and other reasonably foreseeable future actions and events.

3.9.6 What will be addressed in Tier 2 processes?

This document and the associated *I-70 Mountain Corridor PEIS Environmental Justice Technical Report* (CDOT, August 2010) provide an overview of the minority and low-income populations from a Corridor perspective. Local municipalities highlighted particular areas of concern that will be evaluated on a local level in Tier 2 processes. Most, if not all, of the Tier 2 processes can and will reference updated U.S. Census data as the 2000 U.S. Census is replaced with the 2010 U.S. Census.

Tier 2 processes will use the most current data and guidance, including updated data on affordable housing, to analyze impacts on minority and low-income populations. During Tier 2 processes, CDOT will:

- Develop specific and more detailed mitigation strategies and measures
- Develop best management practices specific to each project
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway
- Continue to directly coordinate with local government entities and social services to identify low-income populations along the Corridor
- Coordinate with the Colorado Minority Business Office to obtain a listing of minority-owned business enterprises that register with the office in Colorado and are located along the study Corridor

Tier 2 processes will develop public involvement to ensure full and fair participation by all potentially affected communities in the transportation decision-making process.

3.9.7 What are the approaches to programmatic mitigation planning for environmental justice?

At the Corridor level, no disproportionate adverse impacts on minority or low-income populations were identified, but mitigation strategies for social and economic resources will apply to all communities in the Corridor and also will benefit minorities and low-income populations. If Tier 2 processes conclude that disproportionately high or adverse impacts will occur on low-income or minority populations, the Colorado Department of Transportation will work to avoid, minimize, or mitigate such impacts. Tier 2 processes that occur in populated areas will consider pockets of minority and/or low income populations that may require additional attention and/or mitigation for issues such as:

- Localized air quality impacts
- Noise impacts
- Shading from elevated structures or walls
- Residential and business relocations
- Changes in access or travel patterns
- Loss of community cohesion

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3.10 Noise

3.10.1 What concerns related to noise are important to this project?

Traffic noise is an important issue to residents living near the I-70 highway. The I-70 Mountain Corridor carries large volumes of high-speed traffic, but traffic congestion (and, therefore, speed) is erratic and does not produce consistent noise levels. Many trucks use the Corridor, some of which use engine compression brakes that produce intermittent and very loud noises. Topography and other constraints mean that many residences sit close to or above the noise sources, where mitigation is difficult to achieve.

Noise is defined as unwanted sound and is most commonly measured on the decibel (dB) scale, ranging from 0 dB (threshold of human hearing) to 140 dB (where sound causes pain). An "A-weighted decibel," or dBA, is used for impact assessment because it mimics the varying sensitivity of humans to sounds at different frequencies. Noise levels of 40 to 50 dBA are typical of a quiet neighborhood, while 70 to 80 dBA might be heard adjacent to a busy urban street or highway. An increase or decrease in noise by 5 dBA is readily noticeable by most people. The human ear perceives an increase or decrease in noise by 10 dBA as twice or half as loud, respectively.

New highway and rail facilities must consider their noise effects on sensitive receptors, such as residences, schools, parks, and businesses. In addition to the National Environmental Policy Act (NEPA), state and federal regulations specific to transportation noise also apply to the Corridor. Federal Highway Administration (FHWA) regulations governing highway noise appear in 23 Code of Federal Regulations Part 772. The Colorado Department of Transportation (CDOT) established procedures that implement the federal regulations in the *CDOT Noise Analysis and Abatement Guidelines* (December 2002). Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) regulations apply to transit noise, regulating vibration and horn noise assessment for transit facilities.

3.10.2 What study area and process was used to analyze noise?

The lead agencies analyzed existing and future noise levels at select locations within seven representative communities along the Corridor (see **Figure 3.10-1**). The lead agencies measured noise levels continuously for several days in each of the representative communities between 2001 and 2004 to determine existing noise levels. Although these noise measurements are six to nine years old, they are still representative of noise conditions in the Corridor. The noise level analysis considers noise conditions during the loudest hour of the day (the hour of peak traffic volumes, when traffic is traveling at free-flow speeds). The majority of the Corridor areas studied already reached the loudest hour on a regular basis at the time of the measurements, meaning, the highway was filling to capacity during the measurements and thus got as loud as it is going to get under current capacity while maintaining free-flowing travel speeds. In areas where the highway still has capacity, and therefore the loudest hour noise levels have the potential to increase, increases would be small (1 dB or less) and regardless would not affect the results of the study, which are based on loudest hour noise levels and future traffic conditions.

The lead agencies then predicted the increase in noise levels occurring as a result of the Action Alternatives. They used FHWA procedures to predict highway noise and FTA procedures to predict rail and Advanced Guideway System noise. Predicted changes in noise levels were based on the following:

- The Federal Highway Administration Traffic Noise Model (TNM) was used to estimate the increase in noise levels expected due to projected (2035) traffic volume increases.
- The noise increase from outward lane shifts to accommodate transit was estimated to be 1 dB.

- Federal Transit Administration procedures were used to estimate the noise from transit systems.
- General acoustic principles were used to estimate the effects on noise levels of reflections from cliffs, elevation of highway lanes and transit systems, and changes in line of sight from receivers to highway/transit noise sources.

These changes in noise levels were added together to predict noise levels in each of the representative communities for each alternative. For Combination Alternatives, estimates of future noise levels included the total of both highway improvements and transit systems.

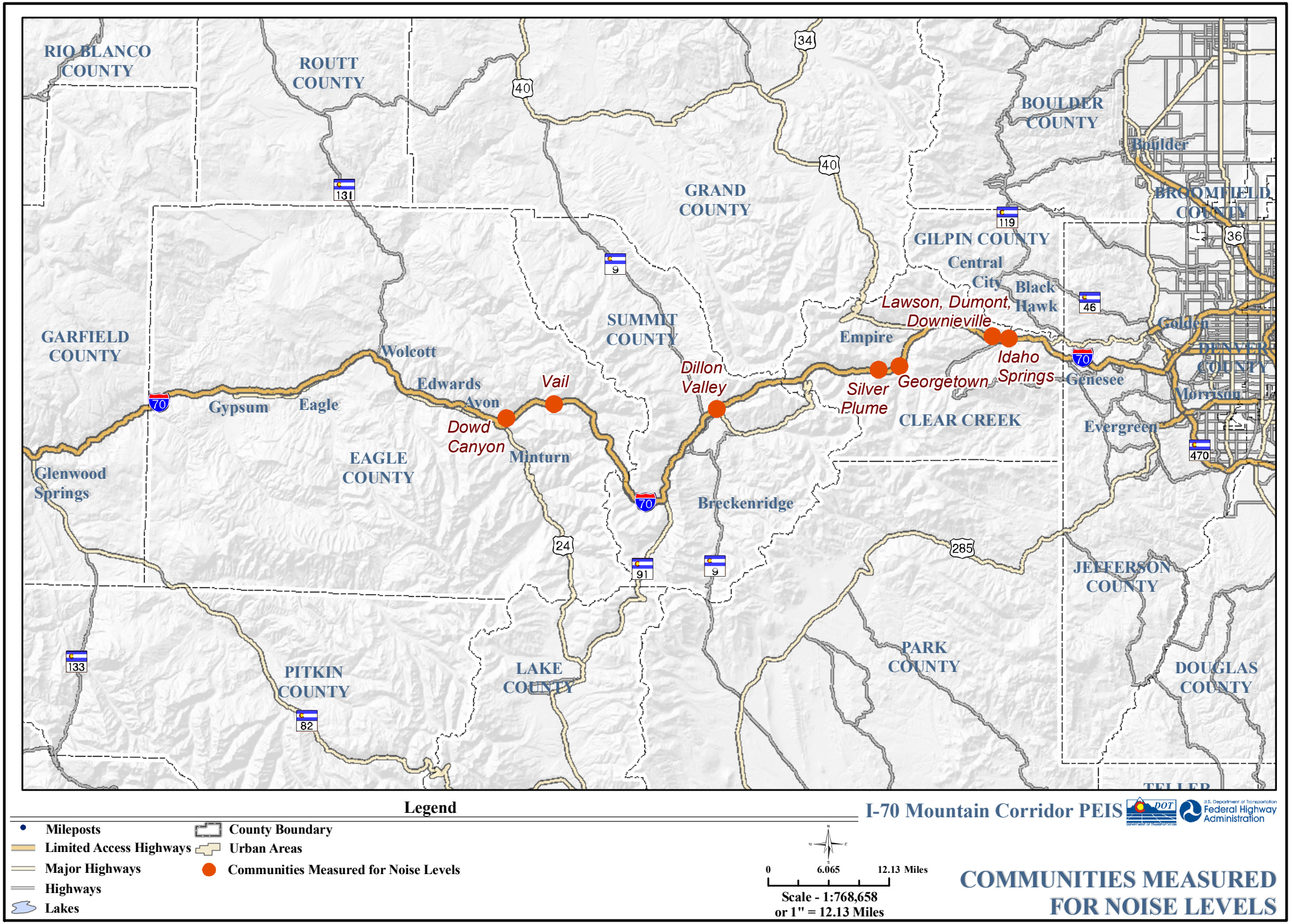
Once future noise levels were predicted, the lead agencies compared those noise levels to impact criteria to determine whether a noise impact occurs. Because vehicles on the I-70 highway will likely be the dominant source of noise in the Corridor even if Rail or AGS is implemented, CDOT's highway noise impact assessment methodology was employed in this study to judge impacts of the Action Alternatives. Specifically, predicted noise levels were compared to CDOT's Noise Abatement Criteria (NAC); FTA and FRA impact criteria were not employed.

Colorado Department of Transportation NAC consider noise-sensitive receptors such as residences, parks, or schools impacted if noise levels during the loudest hour of the day equal or exceed 66 dBA, or if future noise levels exceed existing levels by 10 dBA or more. These regulations apply to all noise analyses conducted in Colorado. Some stakeholders suggest that travel patterns and noise conditions in the Corridor are more variable than typical highways and, therefore, are not represented accurately by CDOT and FHWA noise policies. Lead agencies must follow statewide and national noise guidance but acknowledge that noise is an important issue to be evaluated further in Tier 2 processes.

Colorado Department of Transportation guidelines require noise mitigation to be considered for any impacted noise-sensitive receptor. The Colorado Department of Transportation must meet the feasibility and reasonableness test of proposed mitigation measures based on considerations such as the amount of noise reduction that can be achieved and the cost per benefited receiver per dBA of noise reduction. The *I-70 Mountain Corridor PEIS Noise Technical Report* (CDOT, August 2010) includes additional information about the noise evaluation, methodology, and results.

3.10.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

Noise specialists with the lead agencies helped develop the methodology and approach to noise analysis for the Corridor. No outside agencies regulate noise studies or impact analyses; however, stakeholders participated in the discussion of noise issues.



Legend

- Mileposts
- Limited Access Highways
- Major Highways
- Highways
- Lakes
- County Boundary
- Urban Areas
- Communities Measured for Noise Levels

0 6.065 12.13 Miles

Scale - 1:768,658
or 1" = 12.13 Miles

I-70 Mountain Corridor PEIS

U.S. Department of Transportation Federal Highway Administration

COMMUNITIES MEASURED FOR NOISE LEVELS

3.10.4 What are the areas of noise interest identified in the Corridor?

Noise along the existing Corridor exceeds CDOT NAC in many locations, with existing peak-hour noise levels ranging from 52 dBA to 72 dBA (**Table 3.10-1**). With the exception of Dowd Canyon, noise levels are currently at or above the impact threshold of 66 dBA for at least one location in every community sampled. **Figure 3.10-1** illustrates the communities and locations where noise levels were measured.

Table 3.10-1. Measured Noise Levels 2001–2004

Town	Location**	Loudest Hour (dBA)**
Dowd Canyon	Creekside Condos	62
	Kayak Crossing Condos	60
Vail	Golf course	63
	West side of town, south of I-70	67
	West side of town, north of I-70	65
Dillon Valley (before construction of noise wall)	East side of residential area	66
	West side of residential area	61
	Church	69
Silver Plume	Behind existing noise wall	57
	Near interchange	59
	East end of town	68
	RR depot	63
Georgetown	Below I-70 bench	52
	East of interchange	68
Lawson, Downieville, and Dumont	Lawson: South side of I-70, along Silver Lakes Drive	65
	Dumont: South side of I-70, along Stanley Road	68
Idaho Springs	Residences on east end of town	65
	Downtown	65
	Residences on west end of town	64
	Charlie Tayler Waterwheel	72

***Shaded cells represent impacted areas.*

3.10.5 How do the alternatives potentially affect noise?

The Action Alternatives directly impact noise-sensitive receptors due to changes in noise levels on the I-70 highway and indirect impacts related to increased traffic and induced growth in other areas. Except in the Vail area, which is affected by existing noise, the No Action Alternative does not result in noise impacts; the Minimal Action, Bus in Guideway and Advanced Guideway System Alternatives result in minor increases in noise levels; and the Rail with Intermountain Connection, Highway, and Combination Alternatives cause the greatest increase in noise levels. The Preferred Alternative results in minor increases in noise levels under the Minimum Program of Improvements, and greater increases if the Maximum Program is implemented.

In the seven communities measured for this Tier 1 study, impacts primarily occur in Vail, Lawson, Downieville, Dumont, and Idaho Springs from most or all alternatives, because those areas already experience elevated noise levels. See the *I-70 Mountain Corridor PEIS Noise Technical Report* (CDOT, August 2010) for additional information.

How do the alternatives directly affect noise in the Corridor?

Table 3.10-2 summarizes the predicted 2035 loudest hour noise levels, which range from 53 dBA to 70 dBA. The table also shows in parentheses the predicted increase over existing conditions. The analysis and table group the alternatives because noise levels are similar among modes. Loudest hour noise for Transit Alternatives is the hour of day when the most trips occur. For the Highway Alternatives, loudest hour levels occur when the highway is at capacity but still flowing freely. As congestion builds, traffic speeds (and noise levels) decrease. The predicted noise levels in **Table 3.10-2** are estimates of future noise levels at representative locations in the Corridor; Tier 2 processes will include a more exhaustive analysis of potential noise levels at all potentially affected receptors.

Table 3.10-2. 2035 Predicted Noise Levels

	Area (West to East)						
Alternative	**Dowd Canyon**	**Vail**	**Dillon Valley**	**Silver Plume**	**Georgetown**	**Lawson, Downieville, and Dumont**	**Idaho Springs**
No Action	62 (+2)	67 (+2)	59 (0)	57 (0)	53 (0)	65 (0)	65 (0)
Minimal Action	62 (+2)	67 (+2)	59 (0)	57 (0)	57 (+4)	67 (+2)	65 (0)
Rail with IMC	64 (+4)	68 (+3)	60 (+1)	58 (+1)	57 (+4)	66 (+1)	66 (+1)
AGS	62 (+2)	67 (+2)	60 (+1)	58 (+1)	56 (+3)	65 (0)	65 (0)
Bus in Guideway	63 (+3)	68 (+3)	61 (+1)	58 (+1)	54 (+1)	66 (+1)	69 (+4)
Six-Lane Highway (55 or 65 mph)	64 (+4)	- - -	- - -	59 (+2)	55 (+2)	67 (+2)	70 (+5)
Reversible/HOV/HOT Lanes	64 (+4)	- - -	- - -	59 (+2)	55 (+2)	67 (+2)	70 (+5)
Combination Six-Lane Highway with Rail and IMC	65 (+5)	68 (+3)	60 (+1)	61 (+4)	57 (+4)	68 (+3)	70 (+5)
Combination Six-Lane Highway with AGS	64 (+4)	67 (+2)	60 (+1)	61 (+4)	57 (+4)	68 (+3)	70 (+5)
Combination Six-Lane Highway Bus in Guideway	64 (+4)	67 (+2)	60 (+1)	61 (+4)	57 (+4)	68 (+3)	70 (+5)
Preferred Alternative[1]	64 (+4)	67 (+2)	60 (+1)	58 to 61 (+1 to +4)	56 to 57 (+3 to +4)	65 to 68 (0 to +3)	65 to70 (0 to +5)

[1]The Preferred Alternative is presented as a range because the adaptive management component allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Key to Abbreviations/Acronyms

---- = not applicable; the alternative does not include improvements in this location

AGS = Advanced Guideway System IMC = Intermountain Connection

HOV = High Occupancy Vehicle HOT = High Occupancy Toll

Increases in noise levels of less than 3 dBA are generally imperceptible to humans. Increases of 3 dBA to 5 dBA are noticeable, and increases of 10 dBA are perceived as a doubling of loudness. These relationships hold true, however, only when there is no change to the character of the noise. This is the case with the No Action, Bus in Guideway, and Highway Alternatives. However, alternatives with the Advanced Guideway System and Rail Transit elements introduce noise sources with different frequency and time characteristics, which are likely noticeable even when they are less loud than the highway.

In general, the Minimal Action Alternative generates noise levels similar to those of the No Action Alternative for all communities except Georgetown, which experiences a 4 dBA increase under the Minimal Action Alternative, and Lawson, Downieville, Dumont, which experiences a 2 dBA increase under the Minimal Action Alternative. The remaining Action Alternatives increase noise levels between 1 dBA (imperceptible) and 5 dBA (noticeable) in the seven representative communities. The Preferred Alternative results in noise levels similar to those of the other Action Alternatives, in most cases. Under all alternatives, trucks use engine compression brakes that produce intermittent and very loud noises.

- Dowd Canyon, Dillon Valley, Silver Plume, and Georgetown do not experience noise impacts above the NAC under any alternative. However, Dowd Canyon and Georgetown experience perceptible noise increases under most alternatives, and Silver Plume experiences perceptible noise increases under the Combination alternatives.
- Vail experiences noise impacts above the NAC under all alternatives, primarily because the existing noise level already exceeds the NAC.
- Similarly, because existing noise levels in Lawson, Downieville, Dumont and Idaho Springs are only 1 dBA lower than the NAC, those communities experience noise impacts above the NAC under most alternatives except the No Action and Advanced Guideway System Alternatives.
- Idaho Springs experiences the highest increase in noise of the Corridor communities under all Action Alternatives except Minimal Action and Advanced Guideway System Alternatives, which do not affect noise levels in Idaho Springs.

Most maintenance activities, such as snow plowing and deicing, generate noise levels within the levels analyzed under regular operations of the alternatives. Some longer-term maintenance activities could involve construction. Noise from such activities is similar to construction noise and is discussed below.

How do the alternatives indirectly affect noise?

Indirect noise impacts include increased traffic on roads providing access to the transit stations. Noise levels increase 3 dBA for every doubling of traffic volumes, provided there is no congestion. In addition, induced growth in the area results in additional background noise, such as traffic on local streets, building construction, and other daily activities.

How does construction of the alternatives affect noise?

Construction generates noise from construction equipment that potentially impacts nearby residences and businesses. Nighttime construction noise also occurs off and on. Construction noise at receptor locations usually depends on the loudest one or two pieces of equipment operating nearby. Noise levels from diesel-powered equipment range from 80 dBA to 95 dBA at a distance of 50 feet. Impact equipment such as rock drills and pile drivers could generate louder noise levels.

Construction noise is subject to local ordinances. Most of the towns in the Corridor have only “nuisance” codes in place and do not specifically address construction noise. One exception is Vail, where construction noise is limited to 90 dBA between 7:00 AM and 7:00 PM.

Construction activities could produce considerable vibration levels. Although the FTA regulations were not used to analyze noise impacts for this analysis, the FTA impact assessment procedures provide limits for both damage and annoyance from vibration that must be followed during construction.

What are the project effects on noise in 2050?

Loudest-hour noise levels from highway and transit facilities in 2050 are likely nearly the same as those in 2035. The I-70 highway is the loudest noise source in the Corridor and reaches capacity in most areas under all alternatives by 2035. Any additional traffic demand increases congestion, which decreases rather than increases noise levels. In areas with additional peak-hour capacity in 2035, the extra capacity and the corresponding traffic increases are so small, associated loudest-hour noise level increases are imperceptible. Maximum noise levels from intermittent noise such as engine compression brakes do not increase between 2035 and 2050. Changes in auto technology could result in quieter-operating vehicles between 2035 and 2050, which may reduce noise levels (however, such changes are likely small).

Regarding transit service, if bus or train service operates more frequently, noise levels increase. On a long-term average basis, service frequency needs to double before noise level increases become perceptible, and such high service increases are unlikely. Also, the maximum noise level created by passing trains will not get any louder. However, the number of noise "events" caused by passing trains increase correspondingly with service increases.

3.10.6 What will be addressed in Tier 2 processes?

Tier 2 processes will include a more robust analysis of potential noise impacts and mitigation based on the configuration of proposed highway improvements, associated traffic projections, and refined field noise measurements taken at potentially affected receptor locations. Noise studies will be conducted in accordance with appropriate regulatory standards; that is, following CDOT noise impact assessment methodology for highway improvements, and FTA noise impact assessment methods for rail improvements. Information about noise studies, methodologies, and modeling results will be included in any public involvement efforts associated with Tier 2 processes.

Colorado Department of Transportation noise policies suggest that a quantitative analysis of construction noise be considered for large, complex projects. This is the case here, and CDOT should conduct such an analysis as part of any future Tier 2 environmental processes. The Colorado Department of Transportation should also analyze construction vibration as part of Tier 2 environmental processes.

During Tier 2 processes, CDOT will:

- Develop specific and more detailed mitigation strategies and measures
- Develop best management practices specific to each project
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway, including new regulations regarding noise abatement criteria expected to go into effect in July 2011.

3.10.7 What are the approaches to programmatic mitigation planning for noise?

The lead agencies do not propose any specific mitigation strategies at this time but will consider a full range of mitigation options in Tier 2 processes to reduce highway noise for impacted communities. See the *I-70 Mountain Corridor PEIS Noise Technical Report* (CDOT, August 2010) for details. Mitigation options to be considered include:

- Noise walls
- Noise berms

- Concrete barriers
- Creation of noise buffer areas
- Enforcing engine compression brake muffler use
- Noise insulation of buildings
- Pavement type
- Active noise control
- Cut and cover tunnels
- Adjusting vertical and horizontal alignments

The Federal Highway Administration does not consider pavement type as noise mitigation at this time, because the long-term effectiveness of pavement types in noise mitigation has not yet been proven. Active noise control and cut and cover tunnels are also not considered as noise mitigation by FHWA, although CDOT may consider them in addition to other federally-approved noise mitigation measures.

The lead agencies will follow I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Guidelines and consider landscaping and vegetated berms for noise mitigation during design. The Colorado Department of Transportation will work with local planning agencies to minimize noise effects on planned development in the Corridor.

Generally, the most practical noise mitigation strategy to avoid or reduce direct effects in the Corridor includes the construction of noise barriers. In some areas, topography may reduce the effectiveness of noise barriers—for example, when receptors sit higher than the road—and Tier 2 processes will conduct project-specific noise analyses to determine where noise barriers can offer effective mitigation. Other strategies to mitigate noise impacts, such as land acquisition for buffer zones and altering the horizontal and vertical alignment, are effective but may be less practical in the Corridor because of topographic and development constraints.

Construction noise impacts could be mitigated by limiting work to certain hours of the day when possible, requiring the use of well-maintained equipment, and other strategies.

3.11 Visual Resources

3.11.1 What are the visual resources related to this project and why are they important?

> **Visual or scenic resources** are the natural and built features of the landscape contributing to the public's experience and appreciation of an environment.

Visual resource or scenic impacts are generally defined in terms of a project's physical characteristics and potential visibility, and the extent to which that project's presence changes the perceived visual character and quality of the environment surrounding it. Sightseeing is one of the activities that engage a high percentage of Colorado's recreationalists, indicating the importance of visual character to I-70 Mountain Corridor visitors and residents; visual resources need protection for both economic and aesthetic purposes.

3.11.2 What study area and process were used to analyze visual resources?

The Colorado Department of Transportation (CDOT) coordinated the approach for the visual resource assessment with federal land managers, consistent with the Bureau of Land Management and the United States Forest Service visual analysis methodologies. The Colorado Department of Transportation examined county and municipal land use plans to understand established viewsheds and visual resources identified for preservation. The Colorado Department of Transportation also coordinated with staff and citizens from the Corridor communities to understand each community's values and identity (see **Chapter 6**, **Public and Agency Involvement**).

The Colorado Department of Transportation inventoried the existing visual environment by examining the character of the landscape and identifying potential viewers (also called sensitive receptors) within the viewshed of the Corridor. The "peak to peak" viewshed considers all views and viewers located in between the northern and southern ridgelines through which the interstate passes. The Colorado Department of Transportation organized landscape characteristics and sensitive receptor locations into 27 distinct scenery analysis units or landscape units throughout the Corridor, which are described in the *I-70 Mountain Corridor PEIS Visual Resources Technical Report* (CDOT, August 2010). The inventory also identified gateway views, focal views, and canyon views.

Following the Bureau of Land Management Visual Resource Management Program and United States Forest Service Scenery Management System of landscape classifications, CDOT evaluated each landscape unit to determine the overall landscape scenic attractiveness and visibility of the Corridor from sensitive viewpoints. The visual designations established by the Bureau of Land Management and United States Forest Service for their lands remained as determined by those agencies.

3.11.3 What agencies have CDOT and the Federal Highway Administration coordinated with and what are their relevant issues?

During project scoping, CDOT and FHWA (the lead agencies) coordinated with the Bureau of Land Management, the United States Forest Service, and numerous Corridor communities to understand important scenic values and preservation standards. Common concerns identified from the scoping period include preserving the scenic beauty of mountains and canyons, suggesting consistent and unobtrusive design elements, and considering the visual and shading impacts of elevated alternatives (CDOT, May 2001).

Agencies are concerned that highway widening could increase congestion, cause indirect impacts, and make the unique mountain experience more urban, badly degrading the visual and aesthetic experience of the Colorado Mountains. Additionally, municipalities raised concerns that while noise walls mitigate for noise impacts, they could alter existing scenic vistas of mountains and historic towns. They requested that the I-70 Mountain Corridor Context Sensitive Solutions, meant to protect both natural and community resources, consider visual resources. Increasing light pollution in the Corridor and changing the nature of the Corridor from a small highway to an "expanse of pavement" are also concerns.

3.11.4 What are the areas of visual interest identified in the Corridor?

Geology, topography, water bodies, vegetation, and the built environment define the visual characteristics of the Corridor. Urban development historically is the primary driver behind the visual change in the Corridor. Scars from the construction of the original I-70 highway and historic mining activities (including exposed mineral cuts) still remain. Roadway cut-and-fill slopes are most evident in the canyon environments of Clear Creek and Garfield counties and along Straight Creek, where existing cut-and-fill slopes dominate the setting. In recent years, however, the mountain pine beetle infestation in Colorado's mountains left behind rust-colored forests of dead trees, changing the visual character of the mountainsides. The visual characteristics of the Corridor are described below from west to east. The *I-70 Mountain Corridor PEIS Visual Resources Technical Report* (CDOT, August 2010) contains additional details about the visual resources in the Corridor.

The town of Glenwood Springs is located at the confluence of the Colorado and Roaring Fork rivers and is known for its striking red rock escarpments. From Glenwood Springs, the Corridor extends east through the Glenwood Canyon for 12 miles, with canyon walls extending 2,500 feet above the river elevation. The canyon transitions into a broad river valley surrounded by steep hillsides at the Eagle County border.

Dominant geologic elements throughout Eagle County are the colorful and rugged sandstone cliffs and canyons of the Eagle Valley Formation, including the red rock escarpments at Red Canyon. Much of the landform between Dotsero and Dowd Canyon includes a glaciated, U-shaped valley following the riparian corridor of the Eagle River. The banded cliffs of the Minturn Formation through Dowd Canyon open again into the U-shaped Vail Valley. Significant alteration to the natural landscape has occurred in this segment, where urban development has been spurred by both Vail and Beaver Creek ski resorts.

The rugged Gore Mountain Range dominates the landscape east and west of Vail Pass. Vail Pass itself is characterized by the spruce fir forests, open meadows, and contrasting red sandstone cliffs. After leaving Vail Pass and east of Copper Mountain ski resort, the I-70 highway traverses Officers Gulch and Tenmile Canyon, paralleling Tenmile Creek. The Corridor passes through the Blue River Valley, in the Dillon/Silverthorne vicinity, where views from the interstate include open vistas of the Gore Range to the west, the Williams Fork Range (part of the Continental Divide) to the east, and Dillon Reservoir to the south. The Silverthorne and Dillon areas are highly developed towns that alter the natural landscape notably. The Corridor continues along the heavily forested Straight Creek on the ascent to the Continental Divide (Eisenhower-Johnson Memorial Tunnels), and the effects of the mountain pine beetle kill are especially apparent on the hillsides in this segment.

Figure 3.11-1. Eastern View of Tenmile Canyon

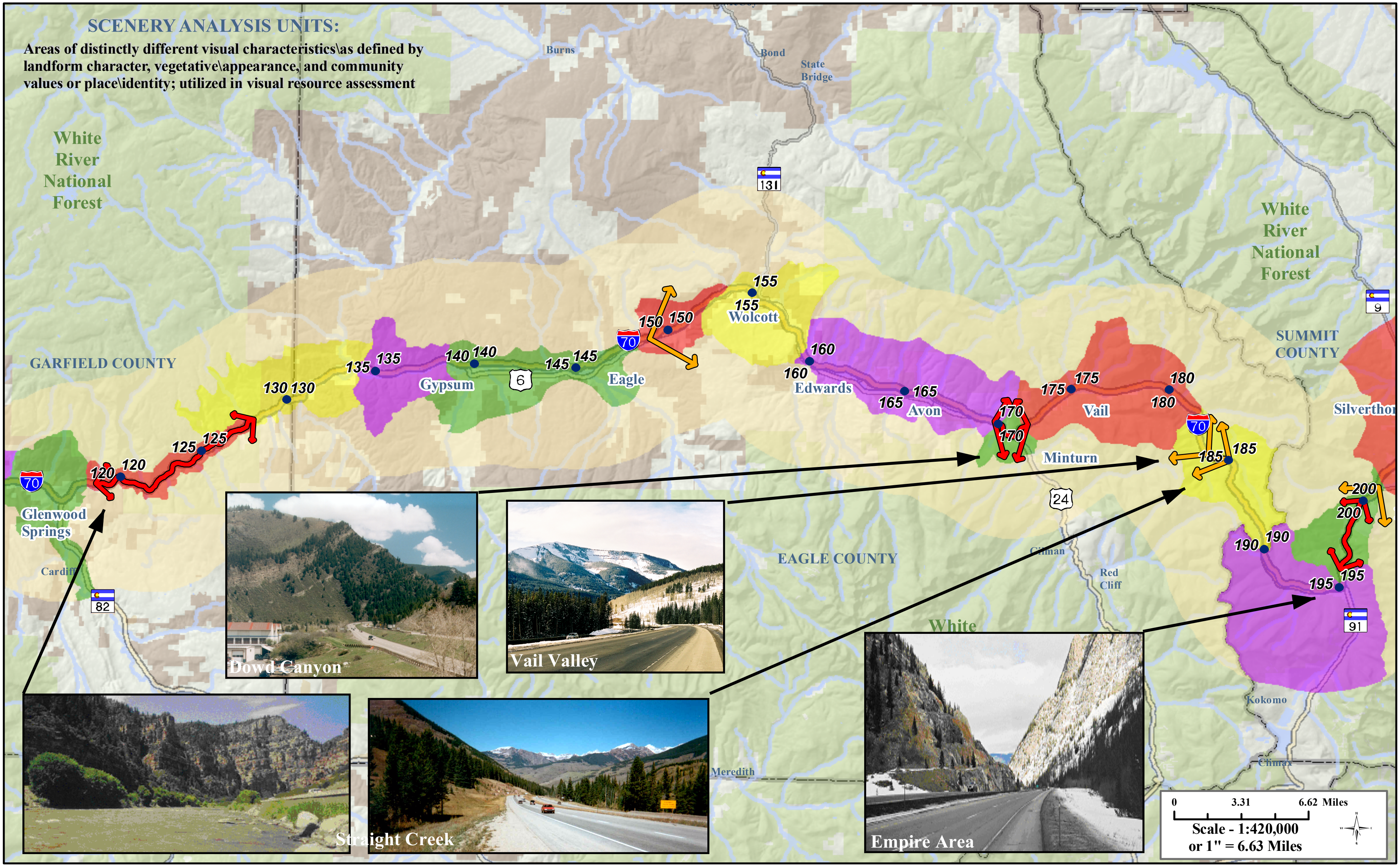
The landscape east of the Eisenhower-Johnson Memorial Tunnels offers views of the Continental Divide and Loveland ski area. This western portion of Clear Creek County, between Herman Gulch and Silver Plume, is characterized by the largely undeveloped forest setting, where the interstate passes through a glaciated, U-shaped valley from Loveland ski area to the US 40 turn off (milepost 232). To the east, the topography transforms into a rugged unglaciated, V-shaped canyon, following Clear Creek, where views of the county's mining history (such as the Georgetown train and Argo Gold Mill) and 14,000 foot peaks are prominent. Starting at Silver Plume, urban development, mostly from remaining historic mining towns, is more prevalent.

Figure 3.11-2. Eastern View of Herman Gulch

The Corridor leaves Clear Creek County at Floyd Hill, where the Corridor enters the panoramic Beaver Brook and Mount Vernon Canyon. The Corridor offers motorists heading east their first view of the Denver metropolitan area and travelers heading west their first view of the Continental Divide at the Buffalo Overlook (milepost 254). Denver's metropolitan area development, including Genesee and Lookout Mountain, extends to this part of the Corridor and gives this last segment of the Corridor a more developed character. The Corridor culminates in the Rooney Valley, where the sharp ridgeline of the Hogback/Dinosaur Ridge formation serves as a gateway into the Denver metropolitan area.

Figure 3.11-3. Western View at Buffalo Overlook

Figure 3.11-4 and **Figure 3.11-5** illustrate the limits of the 27 scenery analysis units or landscape units and the key viewpoints throughout the corridor.



Legend

- Mileposts
- Limited Access Highways
- Major Highways
- Highways
- Lakes
- County Boundary
- Urban Areas
- USFS Land
- BLM Land

Scenery Analysis Units

Scenic Analysis Units (Colors visually distinguish units and do not represent rank or visual quality; units are named based upon cultural associations and do not represent jurisdictional boundaries.)

Scenic Views

Focal Views - Dramatic views dominated by a central identifying feature, providing a notable landmark.

Gateway Views - Provide a sense of entry or arrival to key protions of the Corridor.

Representative Views - Provide a sense of the typical natural or cultural character of different sections of the Corridor.

I-70 Mountain Corridor PEIS

CDOT

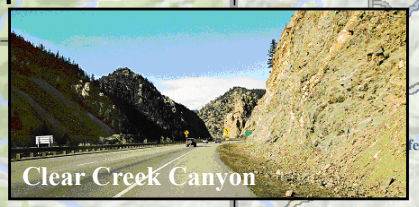
U.S. Department of Transportation Federal Highway Administration

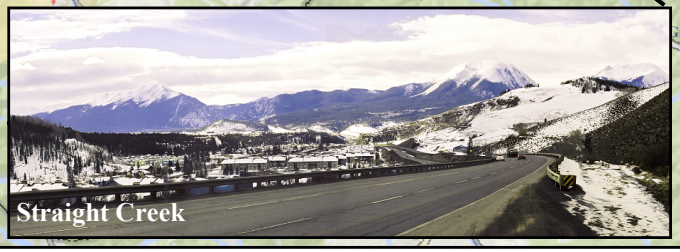
SCENERY ANALYSIS UNITS

Map 1 of 2

SCENERY ANALYSIS UNITS:

Areas of distinctly different visual characteristics\as defined by landform character, vegetative\appearance, and community values or place\identity; utilized in visual resource assessment





GRAND COUNTY
SUMMIT COUNTY
SUMMIT COUNTY
CLEAR CREEK COUNTY
GILPIN COUNTY
JEFFERSON COUNTY
White River National Forest
Arapaho/Roosevelt National Forest
Eldora
Nederland
East Portal
Central City
Black Hawk
Empire
Lawson, Downieville, Dumont
Idaho Springs
Georgetown
Silver Plume
Golden
Bergen Park
Hidden Valley
Genesee
Morrison
Brookvale
Evergreen
Stanley Park
Indian Hills
Fenders
Vail
Silverthorne
Dillon
Dillon Reservoir
Frisco
Montezuma
Red Cliff
Breckenridge
Kokomo
Grant
Singleton
Leyden
Marshall
Superior
South Platte
Buffalo Creek
180
185
190
195
200
205
210
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220
225
230
235
240
245
250
255
260
0 3.31 6.62 Miles
Scale - 1:420,000
or 1" = 6.63 Miles

Legend

- Mileposts
- Limited Access Highways
- Major Highways
- Highways
- Lakes
- County Boundary
- Urban Areas
- USFS Land
- BLM Land

Scenery Analysis Units

Scenic Analysis Units
(Colors visually distinguish units and do not represent rank or visual quality; units are named based upon cultural associations and do not represent jurisdictional boundaries.)

Scenic Views

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Representative Views - Provide a sense of the typical natural or cultural character of different sections of the Corridor.

I-70 Mountain Corridor PEIS

DOT — U.S. Department of Transportation Federal Highway Administration

SCENERY ANALYSIS UNITS

Map 2 of 2

3.11.5 How do the alternatives potentially affect visual resources?

The Colorado Department of Transportation evaluated project components common to each alternative to determine their effects upon surrounding landforms and their structural elements. Direct impacts on visual resources are generally localized given that the length of the Corridor and the mountainous terrain breaks up any continuous or extended views in the Corridor. Induced growth changes development in the Corridor and could indirectly affect the visual landscape.

How do the alternatives directly affect visual resources?

Because the landscape character varies within each landscape unit, the result of the Action Alternative components may produce a more or less visually dominant effect. Typically, more diverse landscapes are able to absorb more change before added elements become dominant. A combination of large and multiple project components result in higher visual contrast than components fewer in number, low in diversity, and smaller in size. The level of visual contrast associated with the Action Alternatives is combined with the number of viewers to fully gauge the visual impacts. The amount of visual contrast created by the project features are related to the distance of the feature from the viewers.

Based on these considerations, alternatives with larger footprints or more elevated features have higher levels of visual impact than those that add fewer new transportation components. The No Action and Minimal Action alternatives, therefore, create the least visual impact. The Minimal Action Alternative provides improvements to 24 existing interchanges, climbing lanes, and auxiliary lanes. The Rail with Intermountain Connection and Advanced Guideway System Alternatives add new modes to the landscape and have the greatest single-mode impact. The Advanced Guideway System Alternative generates a larger visual impact than the Rail with Intermountain Connection Alternative because it is elevated through the Corridor, with supporting piers spaced every 80 feet to 100 feet and a lattice structure underneath the guideway deck. Options that build on the existing highway and increase the footprint of the highway, including the Highway alternatives, further degrade the visual landscape by increasing manmade features but result in lesser landform contrast and lesser visual impact than the Rail with Intermountain Connection and Advanced Guideway System Alternatives. The Six-Lane Highway 65 miles per hour (mph) Alternative creates a larger impact than the 55 mph option because the former requires three new tunnel bores to accommodate the higher speed through the Corridor canyons. The Combination Alternative and the Preferred Alternative result in the greatest adverse visual impact by adding both the six-lane highway widening with curve safety improvements and the above-grade Advanced Guideway System. The range of visual impact differences between the Preferred Alternative Minimum and Maximum Programs is relatively minor given that the majority of all visual changes occur under both Programs with minimal additional impacts occurring under the Maximum Program, if it is implemented.

Visual Contrast

The levels of visual contrast range from weak to strong, denoting the extent of change to the landscape experienced by viewers. Weak contrast is associated with changes that can be seen but do not attract attention and are subordinate to the setting. Moderate contrast is associated with changes that are noticeable but are still subordinate to the setting. Moderate to strong contrast is associated with changes that attract attention and begin to dominate the setting. Strong contrast is associated with changes that attract attention and dominate the setting. Very strong contrast is associated with changes that demand attention, will not be overlooked by the average observer, and dominate the setting.

The *I-70 Mountain Corridor PEIS Visual Resources Technical Report* (CDOT, August 2010) provides detailed analysis of the visual contrast and visual impacts for each landscape unit. Locations of these

specific elements and their corresponding visual impacts beyond the general landscape unit will be developed in the Tier 2 processes.

How do the alternatives indirectly affect visual resources?

The importance of the Corridor as a historical mining and modern recreation corridor influenced its settlement patterns and culminated in a transportation system unable to support current travel demand. Currently, 13 percent of the land within the Corridor viewshed is developed, and according to adopted land use plans, an additional 19 percent of land will be converted from vacant undeveloped land to developed land. Corridor improvements under all Action Alternatives are expected to strongly influence existing and future development trends and potentially alter the existing visual character and quality. Transit Alternatives could cause planned future growth to develop in concentrated patterns surrounding proposed transit stations in existing urban areas in Eagle County. Highway Alternatives could relieve Corridor congestion and facilitate growth into rural areas beyond current population projections instead of suppressing growth in Eagle County. Combination Alternatives result in increased pressure in both urban and rural areas in Eagle and Summit counties. The Minimum Program of the Preferred Alternative induces concentrated growth in urban areas surrounding transit centers in Eagle County. If the Maximum Program is implemented, it induces growth pressures in both urban and rural areas of Eagle and Summit counties. **Section 3.7, Land Use and Right-of-Way,** provides an expanded discussion of indirect impacts relating to land use conversion.

The majority of Corridor municipalities and counties have development review design standards that are considered during the development review process. Many of these standards include preserving ridgelines, encouraging cluster development, and maintaining distinct buffers between towns. Municipalities and counties will be principally responsible for the manner in which future development is constructed and the way in which it interacts with the natural landscapes.

How does construction of the alternatives affect visual resources?

During the construction phase of the project, a temporary construction easement extends approximately 15 feet beyond the permanent highway footprint. In this easement area, existing vegetation is removed, and construction staging areas and equipment storage areas are established. Existing construction scars are likely to be altered during future construction phases.

What are the project effects on visual resources in 2050?

Because urban development is a principal driver of visual change in the I-70 Mountain Corridor, the Action Alternatives impact visual resources based on the degree to which they accommodate or suppress growth pressures. The No Action and Minimal Action Alternatives both decrease the demand for growth in Corridor communities, which presumably reduces the amount of undeveloped lands being converted to new urban development. The other Action Alternatives increase demand for growth in Corridor communities, which likely results in conversion of undeveloped land to developed land. However, the visual impact of new development varies greatly, depending on the policies communities implement to guide or control growth. For example, dense development on a scale disproportionate to a rural mountain setting has greater visual impacts than integrated, dispersed development, even though the latter develops more land.

By 2050, the Action Alternatives likely have less influence on visual resources than community controls on growth and land use planning, as well as Bureau of Land Management and United States Forest Service visual resource management plans. Local land use decisions could have either positive or negative impacts on visual resources. The Bureau of Land Management and United States Forest Service visual resource management plans minimize visual impacts on these federal lands. **Chapter 4, Cumulative Impacts Analysis,** provides additional analysis of the alternatives in relation to past and current trends and other reasonably foreseeable future actions and events.

3.11.6 What will be addressed in Tier 2 processes?

The Colorado Department of Transportation will use the visual inventory developed in the first tier analysis to focus attention in Tier 2 processes on visual elements that have either corridorwide or local importance. Additionally, they will conduct a more detailed and localized analysis of visual resources in individual jurisdictions and segments along the Corridor to define further important visual elements and assess potential effects of Tier 2 processes. Additional analysis of direct impacts to visual resources during Tier 2 processes may determine the impact type (temporary or permanent) and description. The Colorado Department of Transportation will consider creating visual simulations during the Tier 2 processes to accurately illustrate the visual change at specific locations. The Colorado Department of Transportation will continue to coordinate with all jurisdictions regarding direct and indirect impacts to visual resources. Mitigation options (such as design modifications) that could minimize disruption to or interference with the Corridor's historic towns and mountain scenery will be explored using the I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Design Guidelines.

The lead agencies will develop specific and more detailed mitigation strategies and measures, as well as establish best management practices specific to each project during Tier 2 processes. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.11.7 What are the approaches to programmatic mitigation planning for visual resources?

Mitigation strategies for visual resources will be defined in Tier 2 processes in coordination with Corridor communities and will focus on reducing visual contrast associated with implementation of Action Alternatives. Any Tier 2 process involving transit will impact the entire Corridor. Because visual contrast is most closely associated with the addition of structural elements and changes to landform characteristics, mitigation measures will consider efforts to minimize impacts related to both landform and structures.

Development of mitigation strategies will involve the review of United States Forest Service, Bureau of Land Management, and other jurisdictions' visual standards. The Colorado Department of Transportation will refer to the I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Guidelines and create a site-specific Tier 2 Aesthetic Plan and Lighting Plan. Additionally, CDOT will consider creation of Visual Impact and Mitigation Plan for each Tier 2 process that addresses:

- Past visual impacts and scarring
- Project-related visual impacts
- Consideration of mitigation strategies for both that includes:
  - Review and consideration of all United States Forest Service, Bureau of Land Management, and other jurisdictions' visual standards (or as otherwise agreed to or amended)
  - Non-obstructed views of items like narrow canyons to valleys, rivers, etc.
- Adoption of rockfall mitigation measures
- Minimal use of signage, light poles, guard rails, or other infrastructure elements, where safety permits
- Use of vertical and horizontal alignments to preserve views of items such as rivers, canyons, etc.
- Use of minimum amounts of road cuts, fills, turnarounds, etc.

3.12 Recreation Resources and Section 6(f) Discussion

3.12.1 What are recreation and Section 6(f) resources and why are they important?

The I-70 Mountain Corridor provides access to abundant recreation resources, including ski resorts, hiking and biking trails, rivers and fisheries, and Federally-managed public lands, among others. The White River National Forest, the Arapaho and Roosevelt National Forests, and a number of recreation and environmental management areas managed by the Colorado River Valley Field Office of the Bureau of Land Management surround the Corridor.

The I-70 Mountain Corridor and Recreation

The majority of Colorado's population lives along the Front Range, while most of the state's public lands are west of the Continental Divide. Access to recreation resources heavily influences traffic patterns and congestion along the I-70 highway, and the Corridor communities are dependent on recreation visitors to support the local economies. Tourism jobs, which include skiing and outdoor recreation, account for a higher percentage of total jobs along the Corridor than anywhere else in the state—more than 40 percent of jobs in much of the Corridor.

In addition to the National Environmental Policy Act (NEPA), other laws and regulations applicable to recreation resources include Section 6(f) of the Land and Water Conservation Fund Act (36 Code of Federal Regulations 59) and Section 4(f) of the U.S. Department of Transportation Act of 1966 (23 Code of Federal Regulations 774). Section 6(f) protects recreational lands planned, acquired, or developed with Land and Water Conservation Funds. Section 4(f) protects significant publicly-owned public parks, recreation areas, and wildlife and waterfowl refuge; see **Section 3.14, Section 4(f) Discussion**, for the analysis of effects under Section 4(f).

3.12.2 What study area and process was used to analyze recreation and Section 6(f) resources?

The study area comprised recreation resources within three miles on either side of the I-70 highway. The indirect impacts analysis included I-70 Mountain Corridor districts of the White River National Forest and Arapaho and Roosevelt National Forests. The Colorado Department of Transportation (CDOT) collected recreation resource information from Corridor counties and municipalities, the Bureau of Land Management, and the United States Forest Service. Data gathered include federal land management plans, open space and recreation plans, and geographic information system (GIS) databases. National Park Service and Colorado State Parks supplied information for the inventory of Section 6(f) resources; the U.S. Department of the Interior, Office of Environmental Compliance provided supplemental information.

The Colorado Department of Transportation mapped the recreation and Section 6(f) resources within three miles on either side of the I-70 highway. Additional coordination occurred with the United States Forest Service and county and municipal planners to better understand amenities and functions of recreation sites adjacent to the I-70 highway. Recreation planners from the White River National Forest and Arapaho and Roosevelt National Forests provided forest visitation projections and helped develop the methodology to analyze indirect effects on recreation resources. The Colorado Department of Transportation analyzed direct impacts to recreation sites and Section 6(f) resources using GIS overlays of the alternative footprints on recreation sites. Indirect impacts were estimated using forest land visitation estimates as an indicator of overall indirect impacts on recreation resources accessed by the I-70 highway. United States Forest Service planners provided forest visitation projections, including ski area visitation, for year 2020 for the White River National Forest and year 2010 for the Arapaho and Roosevelt National Forests. The Colorado Department of Transportation extrapolated these projections to 2025, the

original planning horizon for this study. Although the planning horizon has been extended to 2035, year 2035 recreation visitor days were not estimated. The 2025 projection of visitors to the United States Forest Service lands is not updated because Forest Plan revisions are done on an as needed basis. The life of most Forest Plans is 15 to 20 years and therefore, projections past 2025 are not available at this time. Therefore, the indirect effects analysis estimates recreation impacts that occur in the year 2025.

3.12.3 What agencies have CDOT and Federal Highway Administration coordinated with and what are their relevant issues?

The Colorado Department of Transportation and Federal Highway Administration (the lead agencies) coordinated with staff at Corridor counties and municipalities, the Bureau of Land Management, the United States Forest Service, and the Colorado Division of Wildlife to discuss management priorities and concerns about impacts to recreation resources in the Corridor. The United States Forest Service expressed particular concern about indirect impacts of increased access and induced growth on the White River National Forest and Arapaho and Roosevelt National Forests due to capacity improvements to the I-70 highway. Many United States Forest Service facilities already experience visitor use levels at or near practical capacity on summer weekends, and the forests lack adequate resources to maintain existing facilities or add new ones. The United States Forest Service feels that the White River National Forest and Arapaho and Roosevelt National Forests cannot accommodate additional visitation likely to result from capacity improvements on the I-70 highway, but that visitation via transit trips could be better managed than dispersed highway trips. The Environmental Protection Agency also voiced concern that additional visitation and growth do affect the sustainability of recreation resources.

3.12.4 What are the areas of recreation and Section 6(f) resources interest identified in the Corridor?

More than 700 recreation sites are located within 3 miles of the I-70 highway. Farther afield, the I-70 highway provides primary access to hundreds more sites. Seventeen recreation sites adjacent to the I-70 highway are also Section 6(f) resources. Recreation resources include trails, campsites, rivers and lakes, ski areas, other developed facilities such as parks and ballfields, and undeveloped backcountry. These resources support an enormous variety of recreation activities. The larger recreation resources are described below, and the *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010) provides a more detailed and comprehensive discussion of recreation resources.

Access to Recreation Sites

On a broad scale, changes to the I-70 highway affect recreation resources that depend on the I-70 highway as their primary access, regardless of their proximity to the Corridor. Recreational travel is the predominant contributor to peak I-70 traffic, especially during summer and winter weekends. Therefore, the consideration of indirect effects strongly influenced the discussion of recreation resources for this project.

What are the recreation resources on forest and Bureau of Land Management lands in the Corridor?

The White River National Forest and Arapaho and Roosevelt National Forests (see **Figure 3.12-1**) receive most of the recreation use in the region, especially by non-resident visitors (including the Denver metropolitan area visitors). The forests are two of the top ten mostly highly visited national forests in the U.S. They contain 15 downhill ski areas, wilderness areas, scenic byways, and many easily accessible trails, forest roads, recreation sites, picnic areas, and campgrounds.

Visitor use in year 2000 for I-70 Mountain Corridor districts in the White River National Forest and Arapaho and Roosevelt National Forests was calculated to be 8.3 million and 3.2 million recreation visitor days, respectively. Year 2025 recreation visitor days for these same districts are estimated to be 11.3 million for the White River National Forest and 6.4 million for the Arapaho and Roosevelt National

Forests. The White River National Forest projects that developed recreation facilities in the forest will be at 90 percent of current practical capacity by 2020, while use of Arapaho and Roosevelt National Forests developed recreation facilities in 2000 was already at capacity on many summer weekends. The *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010) explains the calculations and methodologies further.

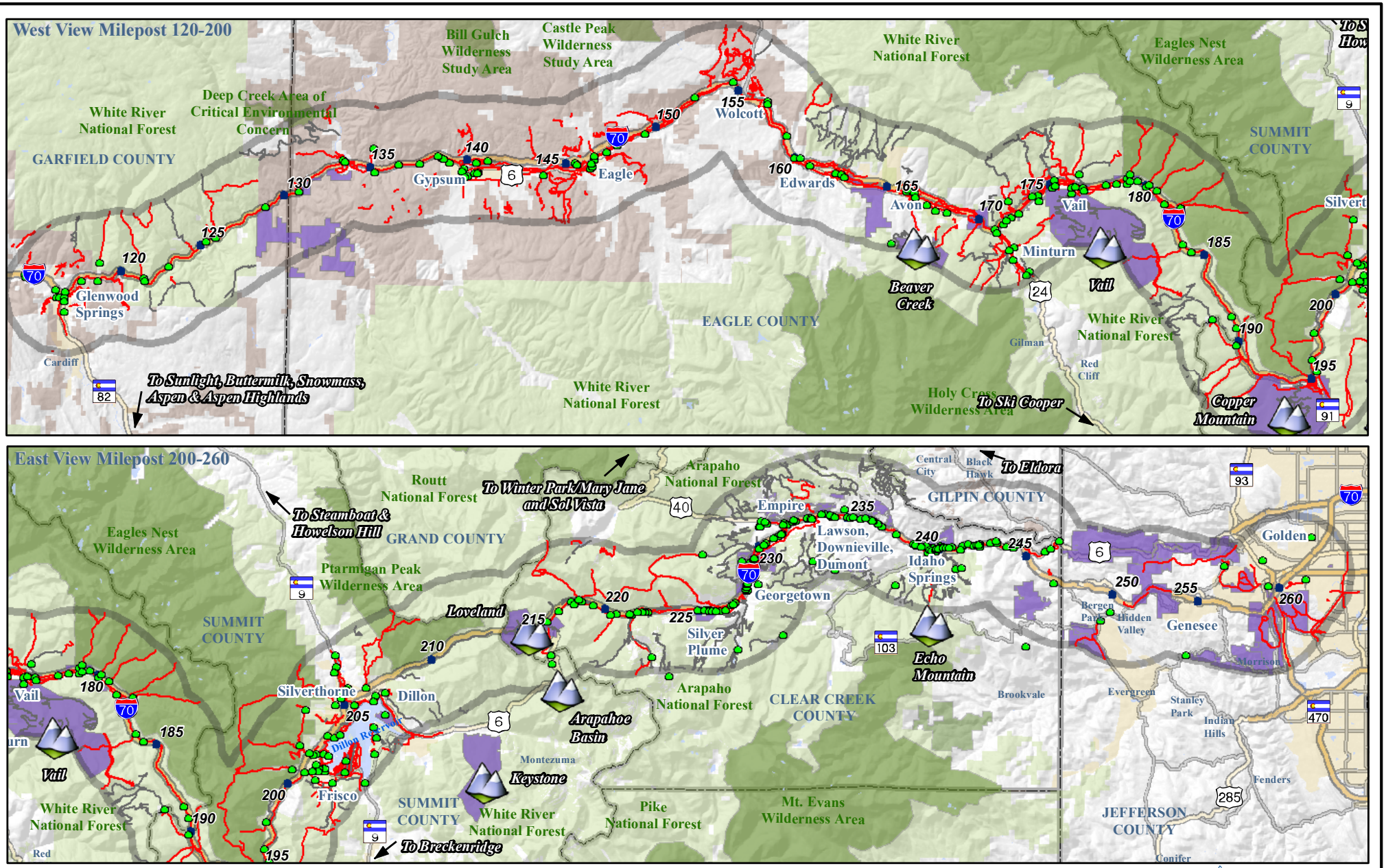
The projected visitation increases are primarily linked to increases in local and regional (including Denver Metropolitan Area) population, and do not consider capacity constraints on the I-70 highway. Management capacity and resource sustainability, rather than access to these resources, limit visitor use for many of the resources on forest lands. The White River National Forest travel management plan proposes controlling or restricting access to sites at certain times to manage forest recreation use. The United States Forest Service has goals for the Arapaho and Roosevelt National Forests to add and improve facilities for dispersed recreation to support increased demand but lacks the resources to construct these facilities.

Bureau of Land Management lands are concentrated at the west end of the Corridor, extending from the western end of the Corridor east to Vail. The Colorado River Valley Field Office (formerly the Glenwood Springs Field Office) manages these lands for multiple uses. Recreation uses include hunting, fishing, and off-road vehicle driving but at much lower levels than the United States Forest Service lands in the Corridor.

How does ski area visitation relate to the Corridor?

The Corridor provides primary access to 19 of the state's 27 ski areas (see **Figure 3.12-1**). The ski areas bring high numbers of tourists and tourism dollars into Colorado, making it the nation's top ski destination. Existing traffic congestion on the I-70 highway is thought to greatly affect ski areas, suppressing skier visits, and reducing tourism revenues. Congestion caused by skiers visiting areas along the Corridor affects local Corridor travel as well.

Total year 2001 skier visits in the White River National Forest were 6.8 million, and year 2000 skier visits in the Arapaho and Roosevelt National Forests were 1.8 million. Extrapolated year 2025 skier visits are estimated to be 8.7 million for Corridor districts of the White River National Forest and 2.4 million for Corridor districts of the Arapaho and Roosevelt National Forests. The projected growth rates for skiing are relatively low compared to increases in other types of recreation use, and future ski resort expansions are anticipated to accommodate the modest growth rates projected. Therefore, unlike summer visitation, access (rather than infrastructure capacity) is considered to be the limiting factor in visitor use of the ski areas.



I-70 Mountain Corridor PEIS

RECREATION SITES

What other recreation resources are in the Corridor?

Many recreation resources such as trails and rivers are adjacent to the I-70 highway (see **Figure 3.12-1**), and the I-70 highway provides access to numerous others. Recreationalists use these resources heavily now, and CDOT projects their use will increase similarly to use of the United States Forest Service lands described above. Existing and proposed trails near the I-70 highway are most highly concentrated in the Eagle River Valley, between Glenwood Canyon and east Vail, and in Clear Creek County, between Bakerville and the Hidden Valley interchange. They are part of the Eagle County Regional Trails (ECO Trails) system and the Clear Creek County Greenway.

The Corridor provides access to rivers and creeks used for fishing, rafting, boating, and other water-related activities. Twelve creeks and rivers flow along the I-70 Mountain Corridor, many of which support Gold Medal fisheries, and the I-70 highway provides access to multiple lakes and reservoirs. The Stream and Wetland Ecological Enhancement Program (SWEEP), a program focused on integrating water resource needs with transportation design, identifies aquatic systems as significant recreation resources requiring protection and improvement. Water-based recreation activities are influenced by water quality, water demand, biological considerations, and the overall health of river ecosystems. See **Section 3.2, Biological Resources**, **Section 3.4, Water Resources**, and **Section 3.7, Land Use** for discussions on these topics. Other recreation resources are shown in **Figure 3.12-1** and discussed in *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010).

3.12.5 How do the alternatives potentially affect recreation and Section 6(f) resources?

The Action Alternatives physically impact recreation resources adjacent to the I-70 highway, and indirectly affect resources farther afield, due to access and capacity changes. Analysis indicates that up to five Section 6(f) resources could be impacted. In general, the Combination Alternatives impact recreation resources the most because they have both the largest footprint and the biggest increase in capacity (and thus recreation use). Increased visitation benefits commercial recreation providers and strains the sustainability of forest land resources. The Transit Alternatives have fewer direct impacts than the Highway Alternatives but result in higher increases in visitation. The Highway Alternatives have more direct impacts than the Transit Alternatives, but result in only modest visitation increases because the former have less capacity than the Transit Alternatives and therefore induce fewer recreation-oriented trips. The Preferred Alternative results in impacts similar to the Transit Alternatives, resulting from the Minimum Program of improvements. Direct impacts are lower, but visitation increases are high. Later phases of improvements under the Maximum Program, if implemented, have similar impacts to the Combination Alternatives, with more direct impacts and a higher increase in recreation visitation.

How do the alternatives directly affect recreation and Section 6(f) resources?

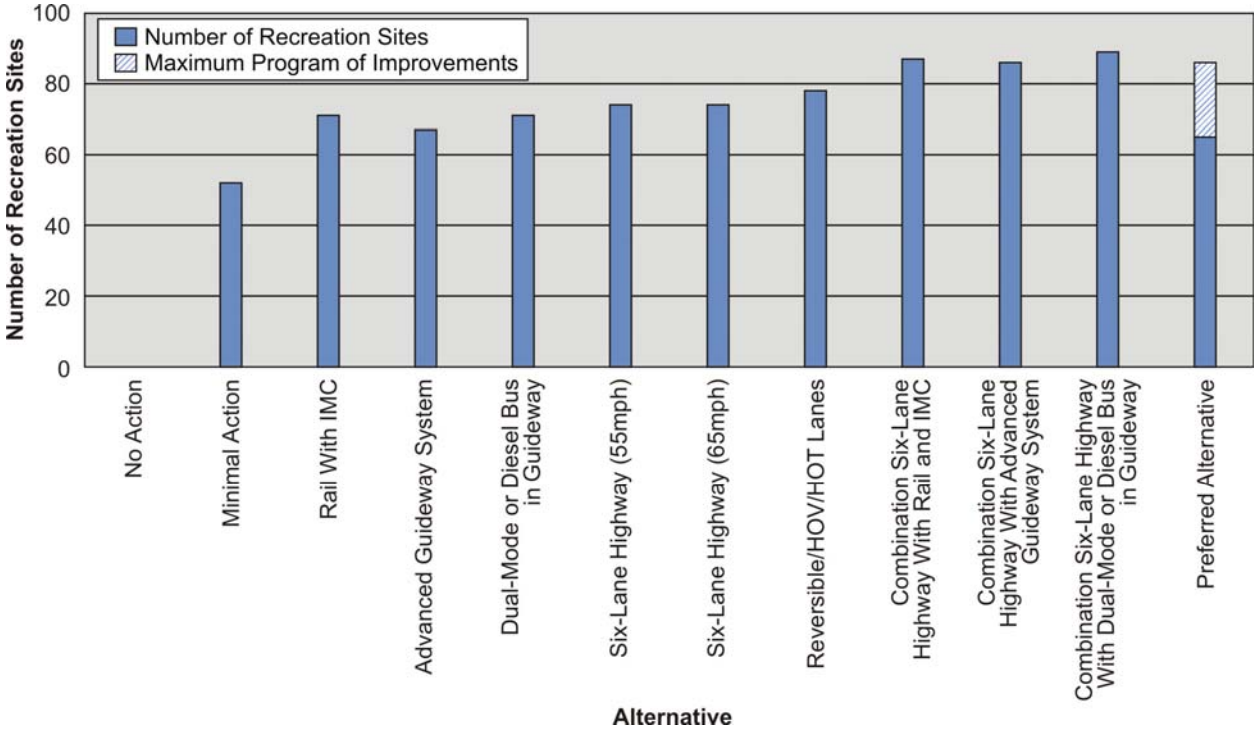
Nearly 90 existing and proposed recreation resources fall within the Action Alternative footprints, which include the limits of proposed improvements, 15-foot construction zones to each side of the improvement limits, and 15-foot sensitivity zones beyond the construction zone. These potentially affected recreation resources include five Section 6(f) resources: the Georgetown Lake Recreation Area access road, Genesee Park in Jefferson County, the Blue River Trail in Silverthorne, a portion of the Vail Trail, and a portion of the Eagle Valley Regional Trails between Avon and Dowd Junction.

All Action Alternatives, except the Minimal Action Alternative, include a third tunnel bore at the Eisenhower-Johnson Memorial Tunnels that directly affects the Loveland Ski Area. The third bore conflicts with “The Face” ski run and the access tunnel under the I-70 highway that returns to the base area from the north side of the I-70 highway. Loveland Ski Area management has indicated they can adapt to these impacts. All Action Alternatives, except the Minimal Action Alternative, impact many of the Clear Creek County Greenway recreation resources and trails west of Vail Pass. The lead agencies

will coordinate with Clear Creek County to identify the locations of these impacts and discuss creative design solutions during Tier 2 processes.

Chart 3.12-1 illustrates the number of existing and proposed recreation resources that may be temporarily or permanently directly affected by the project. These numbers include the five Section 6(f) resources that experience impacts. In general, the Transit Alternatives directly impact fewer recreation sites than the Highway Alternatives, and the Combination Alternatives impact the most. The Preferred Alternative directly impacts fewer recreation sites under the Minimum Program, similar to the Transit Alternatives. If the Maximum Program is implemented, later phases of improvements may directly impact high numbers of recreation sites, similar to the Combination Alternatives. The No Action Alternative does not directly affect any recreation resources.

Chart 3.12-1. Summary of Potential Impacts on Recreation Resources by Alternative



**The Maximum Program presents the range of impacts that occurs with the Preferred Alternative. The solid bar represents the implementation of the Minimum Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Key to Abbreviations/Acronyms

IMC = Intermountain Connection
AGS = Advanced Guideway System
HOT = High Occupancy Toll
HOV = High Occupancy Vehicle

How do the alternatives indirectly affect recreation and Section 6(f) resources?

The analysis of indirect impacts focuses on the potential for forest land visitation increases or decreases resulting from the alternatives. The United States Forest Service visitation data allows CDOT to quantify possible changes in recreation use, which is not possible with other Corridor resources that lack visitation data. Although the analysis focuses on forest land visitation, CDOT considers it representative of overall impacts on recreation resources accessed by the I-70 highway, including those outside of forest lands. Although many other factors affect recreation patterns (such as forest service management, the national

economy, technology, and user preference), this analysis focuses on transportation impacts. See the *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010) for details on the methodology. The analysis estimated the indirect impacts to forest lands using two methods:

- Analyzing access to and use of forest lands by comparing estimated forest land visitation in year 2025 (the estimates do not consider the capacity of the I-70 highway and are considered to be very general estimates of visitor use) to the number of estimated recreation-oriented trips resulting from each alternative in year 2025 (predicted by the travel demand model). This analysis considers how congestion on the I-70 highway affects access to forest lands.
- Analyzing additional forest land visitation likely to occur as a result of induced or suppressed resident population growth in the Corridor due to the alternatives. This analysis considers how Corridor population growth affects the amount of visitation to forest lands by Corridor residents. Population growth estimates were based on 2025 Colorado Department of Local Affairs population projections. Estimates of resident forest land visitor trips were based on assumptions regarding resident visitation of forest lands.

Table 3.12-1 summarizes the estimated changes in visitation by alternative to I-70 Mountain Corridor districts of the White River National Forest and Arapaho and Roosevelt National Forests. The No Action and Minimal Action Alternatives are estimated to suppress forest visitation, although the United States Forest Service feels this is unlikely in the Arapaho and Roosevelt National Forests. The travel demand model shows a relatively small number of induced recreation-oriented trips for the Highway Alternatives; thus, the Highway Alternatives probably slightly increase nonresident visitation. The travel demand model shows higher numbers of induced tourism- or recreation-related trips for the Transit, Combination, and Preferred Alternatives, and correspondingly, these alternatives likely induce forest visitation. Induced population growth in the Corridor is anticipated only in the vicinity of White River National Forest lands (see **Section 3.7, Land Use and Right-of-Way**), where current growth is already a concern for White River National Forest planners. Induced growth in the vicinity of Arapaho and Roosevelt National Forests lands is a much more limited concern.

Table 3.12-1. Indirect Impacts on Forest Land Visitation: Annual Change in Destination Trips (In Millions)

Alternative	WRNF[a]		ARNF[b]	
	Winter Destination Trips (millions)	Summer Destination Trips (millions)	Winter Destination Trips (millions)	Summer Destination Trips (millions)
No Action	-0.9	-0.8	-0.4	-0.4
Minimal Action	-0.7	-0.6	-0.3	-0.3
Transit-only	0.7	0.5	0.2	0.2
Highway-only	0.2	0.1	0.05	0.05
Combination	1.3	1.0	0.4	0.4
Preferred Alternative (Minimum Program and Maximum Program)	0.7–1.3	0.5–1.0	0.2–0.4	0.2–0.4

[a] *Includes I-70 Mountain Corridor districts only: Sopris, Aspen, Eagle, Holy Cross, and Dillon.*
[b] *Includes I-70 Mountain Corridor districts only: Clear Creek and Sulphur.*

Keys to Abbreviations/Acronyms
WRNF = White River National Forest ARNF = Arapaho and Roosevelt National Forests

These estimates of changes to visitation are theoretical and general, and are provided as an indication of possible pressure for recreation use associated with the alternatives. As explained in the previous section, access to ski areas is considered to be the limiting factor on skier visits, and future ski resort expansion is anticipated to accommodate future growth. Ski areas benefit greatly from the additional visitation induced by most of the Action Alternatives. Forest lands, on the other hand, already experience visitor use levels at or near their practical capacity, and the forests lack adequate resources to maintain existing facilities or add new ones. Additional visitation strains forest resources under current management practices and resources. Forest management activities are the most important factor in responding to these visitation pressures. The United States Forest Service feels that, although visitation pressure is greater under the Transit Alternatives, they could better manage visitation via transit trips than dispersed highway trips.

The health of water-based recreation resources such as streams and fisheries is affected by winter maintenance activities, including applications of liquid deicers and traction sand during snowy conditions. Traction sand increases sediment loads in streams, and liquid deicers often increase chloride concentrations in exceedance of standards for aquatic life. See **Section 3.2, Biological Resources**, and **Section 3.4, Water Resources**, for more information.

How does construction of the alternatives affect recreation resources, including Section 6(f)?

Project construction temporarily impacts access and use of some recreation sites. The direct impacts analysis already includes these sites because the Tier 1 alternative footprints include the 15-foot construction zone to each side of the limits of proposed improvements. The number of recreation-oriented trips on the I-70 highway could decrease during construction if visitors choose to avoid construction areas due to actual or perceived congestion and delay. The bulk of construction activity occurs during the traditional spring, summer, and fall construction seasons, and affects winter recreation trips less than summer ones.

What are the project effects on recreation resources in 2050?

The project's effects on recreation resources in 2050 likely continue the trends discussed above. Increased capacity improves access to recreation destinations, and population increases continue to increase travel demand up to 2050. Additional access from the I-70 highway continues to benefit ski areas, while additional visitation further strains forest land resources. The United States Forest Service is likely to implement additional management actions by 2050 to balance visitor access with the health of recreation resources; these management activities likely play a larger role in the sustainability of those resources than the access provided by the Corridor in 2050. **Chapter 4, Cumulative Impacts Analysis**, provides additional analysis of the alternatives in relation to past and current trends and other reasonably foreseeable future actions and events.

3.12.6 What will be addressed in Tier 2 processes?

The Colorado Department of Transportation will conduct further analysis of direct and indirect impacts on recreation resources during future project-specific Tier 2 processes. Additional analysis of direct impacts on recreation resources during Tier 2 processes will determine the degree and extent of impact. The lead agencies will continue to coordinate with all jurisdictions regarding direct and indirect impacts to recreation resources, and specifically with Eagle County, Summit County, Clear Creek County, Jefferson County, and the United States Forest Service regarding ECO Trails, the *Clear Creek County Greenway Plan* (2005), and United States Forest Service management activities. The mountain pine beetle infestation continues to change conditions surrounding recreation resources, and the United States Forest Service confirmed that these conditions are most appropriately addressed during Tier 2 processes.

Corridor communities strongly advocate maintaining and improving trail connectivity along the I-70 highway. The Colorado Department of Transportation will consider during Tier 2 processes the following

approaches to incorporate and maintain future bike routes in the I-70 highway right-of-way and improve bike and other non-motorized path connectivity, in a manner compatible with CDOT and FHWA guidance:

- Refer to principles applied to the Glenwood Canyon bike path and river access;
- Consider policies to help identify state and federal transportation funding for pedestrian enhancement and connectivity;
- Consider whether moving trails elsewhere is a more economical option to modifying the design of proposed transportation components;
- Continue to coordinate with local jurisdictions, including the United States Forest Service regarding their motor vehicle facilities.

The lead agencies will develop specific and more detailed mitigation strategies and measures, and develop best management practices specific to each project, during Tier 2 processes. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.12.7 What are the approaches to programmatic mitigation planning for recreation resources?

The phased approach of the Preferred Alternative allows for ongoing opportunities to avoid and minimize impacts to recreation resources, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions. Primary mitigation strategies to avoid or reduce direct effects to recreation resources include replacement or enhancement of functions of parklands or trails; design efforts to minimize the area of impact; and realignment of affected trails. The lead agencies will consider principles applied to the Glenwood Canyon recreation resources—including the bike path, hiking amenities, and river access—during development of mitigation for impacted recreation resources elsewhere in the Corridor. The lead agencies must mitigate any impacts to Section 6(f) resources with replacement lands of equal value, location, and usefulness as the impacted lands.

Other strategies to mitigate direct impacts may include the following: facilitate efficient access to recreation sites from transportation networks; include outdoor recreation and tourism in the CDOT regional planning processes; consider intermodal transportation networks and transportation hub development; consider off-peak use incentives; consider river access “hot spots” mitigation actions; increase the capability to access recreation sites on mountain passes from road networks.

Mitigation of indirect impacts includes strategies outlined in the *Statewide Comprehensive Outdoor Recreation Plan* (Colorado State Parks, 2008) and United States Forest Service consideration of forest management plans and the continuing and evolving use of forest management techniques. The availability of resources and funding for implementation of recreation and forest management techniques is a major factor in the accommodation of increased visitation and protection of recreation resources. The *Statewide Comprehensive Outdoor Recreation Plan* suggests these goals can potentially be achieved by establishing funding partnerships through regional collaborative forums and through state/federal cost-share agreements to renovate federal properties.

Mitigation of construction impacts on bike paths, trail heads, and other recreational amenities includes maintaining pedestrian and bicycle access during construction and addressing special events to maintain access during those times. Mitigation strategies to accommodate the demand for recreation-oriented trips on the I-70 highway during construction include minimizing lane closures or reductions during peak travel weekends. **Section 3.8, Social and Economic Values**, provides additional mitigation strategies for providing timely and accessible public information on construction activities.

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3.13 Historic Properties and Native American Consultation

3.13.1 What are historic properties and why are they important?

Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (National Register). A property is eligible for the National Register of Historic Places if it possesses historic integrity (such as maintaining original materials and design) and meets one or more of the following four criteria:

Criterion A—Associated with important historical events or patterns

Criterion B—Associated with lives of persons significant in our past

Criterion C—Embodies distinctive characteristics of an architectural type, period, or method of construction

Criterion D—Has yielded or is likely to yield information important in prehistory or history

The Corridor is rich in historic resources. Preserving historic properties and districts is important to the communities along the Corridor—as a physical reminder and link to the past, a source of revenue from heritage tourism, and a way to promote sustainable development.

The Federal Highway Administration (FHWA) has a special government-to-government relationship with federally recognized Native American tribes that requires the former to work with tribes that may have a cultural or religious association to historic properties affected by FHWA actions. Consulting tribes are offered an opportunity to identify concerns about cultural resources and comment on how projects may affect them.

3.13.2 What study area and process was used to analyze historic properties?

The Area of Potential Effect (APE) follows the I-70 Mountain Corridor for its 140-mile reach. The width of the APE is defined based on a viewshed from the mountain ridgelines; in some locations, the APE is as wide as 3 miles on either side of I-70, resulting in a total of as much as 6 miles.

Section 106 of the National Historic Preservation Act of 1966, as amended, requires projects proposed or funded by federal agencies to identify and assess effects to historic properties listed on or eligible for inclusion in the National Register of Historic Places. Agencies must consult with the State Historic Preservation Office (SHPO). Other interested parties can become consulting parties to the Section 106 process. The historic resources in the Corridor are important to Corridor communities. 28 agencies, historical organizations, and municipalities are participating as consulting parties. In addition, 11 Native American tribes are contributing as consulting parties specific to their interests in properties of religious or cultural significance to tribes (see **Section 3.13.4** for a discussion of Native American consultation).

Section 106 of the National Historic Preservation Act Compliance Steps

The Section 106 process is a series of sequential steps requiring agencies to:

1. Determine the Area of Potential Effect for historic properties.
2. Identify historic properties within the Area of Potential Effect.
3. Determine effects on historic properties from the Proposed Action (and alternatives).
4. Resolve adverse effects (agree upon mitigation measures) with consulting parties.

The purpose of the Tier 1 study is to identify broad environmental effects of potential alternatives for the Corridor. The lead agencies used a phased process for the identification and evaluation of historic properties in the Corridor. This approach is consistent with 36 Code of Federal Regulations 800.4(b)(2) and 36 800.5(a)(3), which allow agencies to defer final identification and evaluation of historic properties for large corridors like the I-70 Mountain Corridor. Following this approach for the Tier 1 study, historic properties were identified from file searches and broad field review of properties, but intensive surveys were not conducted. Effects to historic properties were determined broadly to assess potential differences among Action Alternatives. The lead agencies initiated a Programmatic Agreement with the Section 106 consulting parties to define how each of the steps of the Section 106 process will be completed during Tier 2 processes.

The Colorado Department of Transportation conducted file searches of the APE in 2003 and 2009 through the Colorado Office of Archaeology and Historic Preservation (OAHP), the official repository of all recorded historic properties in the state. The file searches identified more than 2,000 sites within the APE. Many of these properties do not have an official determination of National Register of Historic Places eligibility, and most require reevaluation. The file searches are considered a starting point for identifying historic properties. However, for Section 106 compliance, the data in the OAHP files are not considered to be complete (not all areas have been surveyed) or correct (discrepancies in the National Register of Historic Places status is common).

Reconnaissance or windshield surveys supplemented the OAHP file data. As part of the windshield surveys, local officials and historians identified additional historic properties and areas or districts throughout the Corridor that may or may not have been included in the OAHP records. In addition to identifying specific sites of interest, the reconnaissance survey provides an overview of the Corridor history and types of resources likely to be found. This information is contained in the *I-70 Mountain Corridor PEIS Historic Properties and Native American Consultation Technical Report* (CDOT, August 2010).

Section 106 Consulting Parties

Federal

National Park Service, Intermountain Region

Bureau of Land Management, Glenwood Springs Field Office

United States Forest Service, Arapaho & Roosevelt National Forest / Pawnee National Grassland

State

State Historic Preservation Officer

Colorado Historical Society

County

Clear Creek County

Eagle County

Summit County Historic Preservation Commission

Jefferson County Historical Commission

Eagle County Historical Society

Clear Creek County Archives

Municipal

City of Glenwood Springs

City of Idaho Springs

Town of Georgetown

Town of Silver Plume

Town of Breckenridge

Denver Landmark Preservation Commission

Frisco Historic Preservation Board

Glenwood Springs Design and Review Commission

Other

Colorado Preservation Incorporated

Georgetown-Silver Plume Historic District Public Lands Commission

National Trust for Historic Preservation/Plains Office

Historic Georgetown, Inc.

Historical Society of Idaho Springs

Mill Creek Valley Historical Society

People for Silver Plume

Anne Callison

Alan Golin Gass

3.13.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

Agency coordination on historic properties at Tier 1 has been ongoing since 2001. Between 2001 and 2002, CDOT contacted all local and county governments with historic preservation ordinances and boards, including Certified Local Governments, to solicit information on sites of local interest. Twenty-eight organizations

are participating as Section 106 consulting parties (see box). Additional historic property coordination occurred as part of the Section 4(f) process described in **Section 3.14, Section 4(f) Discussion**.

Topics of interest to the consulting parties include how the Section 106 process is applied in Tier 1, how historic properties are identified, how effects—particularly indirect noise, vibration, and visual effects—and cumulative effects are determined, how effects on heritage tourism are considered, and how information is gathered from and distributed to the public. Minimizing adverse effects to historic properties is a key concern for consulting parties. Through the development of Programmatic Agreements with the consulting parties and Native American tribes, a process is established to address these concerns and outline specifically how Section 106 requirements will be addressed in Tier 2 processes. **Appendix B** includes the Section 106 Programmatic Agreement.

A series of meetings were held from 2004 to 2008 to develop a Section 106 Programmatic Agreement involving the FHWA, Advisory Council on Historic Preservation, Department of Interior, National Park Service, Bureau of Land Management, United States Forest Service, the State Historic Preservation Officer (SHPO), CDOT, and other agencies and consulting parties. The *I-70 Mountain Corridor Section 106 Programmatic Agreement* was executed in 2008 and outlines the implementation of Section 106 for Tier 2 undertakings. The Programmatic Agreement also proposes possible mitigation and measures to minimize harm for historic properties. The consulting parties are involved in developing some of the mitigation measures identified in the Section 106 process.

3.13.4 How did FHWA and CDOT consult with Native American tribes?

Consultation with a Native American tribe recognizes the government-to-government relationship between the federal government and sovereign tribal nations. Historic properties of religious and cultural significance to one or more tribes may be located on ancestral, aboriginal, or ceded lands beyond modern reservation boundaries. In addition to Section 106 and its implementing regulations (36 CFR 800), other federal statutes mandate consultation with Indian Tribes, including the American Indian Religious Freedom Act of 1978 and the Archaeological Resources Protection Act of 1979.

The lead agencies consulted with tribal representatives of the following 11 Native American tribes in the identification of properties of religious or cultural significance to the tribes and potential effects to those properties:

- Kiowa
- Northern Arapaho
- Northern Cheyenne
- Ute Tribe of the Uintah and Ouray Agency
- Rosebud Sioux
- Standing Rock Sioux
- Southern Cheyenne and Southern Arapaho (known as the Cheyenne and Arapaho Tribes of Oklahoma)
- Southern Ute
- Ute Mountain Ute
- White Mesa Ute

Two meetings and a field trip were held with interested tribes. The trip provided the tribal representatives an opportunity to visit the Corridor and simultaneously receive information about the proposed improvements and their possible effects on the natural and cultural environment. Although no specific properties of significance were identified by tribal members, the lead agencies and tribes signed a Programmatic Agreement (which is incorporated in the *I-70 Mountain Corridor Section 106 Programmatic Agreement* included as **Appendix B** to this document) to formalize the consultation process, specify consultation procedures for Tier 2 processes, and address issues pertinent to both the agencies and tribes. The *I-70 Mountain Corridor Historic Properties and Native American Consultation Technical Report* (CDOT, August 2010) provides additional information about the consultation with Native American tribes.

3.13.5 What are the areas of historic properties interest identified in the Corridor?

Historic properties are found throughout the Corridor. **Figure 3.13-1** provides an overview of historic properties in the Corridor listed in or officially eligible for listing in the National Register of Historic Places. **Figure 3.13-1** shows trends and areas of potential historic interest; however, it is not a complete representation of historic properties in the Corridor because comprehensive historic property inventories have not been conducted. Several nationally significant properties, including the Georgetown-Silver Plume National Historic Landmark District and the nationally significant portions of the interstate itself, are present in the Corridor, along with many sites of statewide and local importance. Developed towns throughout the Corridor, from Glenwood Springs to Frisco to Idaho Springs, contain historical buildings and associations. Historical mining sites are abundant in the Corridor, and other historical sites related to transportation, mining, and recreation also are represented. Although the entire Corridor has not been surveyed, file search and reconnaissance information suggest that hundreds of properties are officially eligible for listing or listed in the National Register of Historic Places within the APE, and many more are likely to be identified once intensive surveys are completed and the National Register of Historic Places criteria are applied systematically. The *I-70 Mountain Corridor PEIS Historic Properties and Native American Consultation Technical Report* (CDOT, August 2010) provides a complete mapping of properties in the OAHP database, as well as additional information about the history and properties in the APE.

Historic Properties in the Corridor

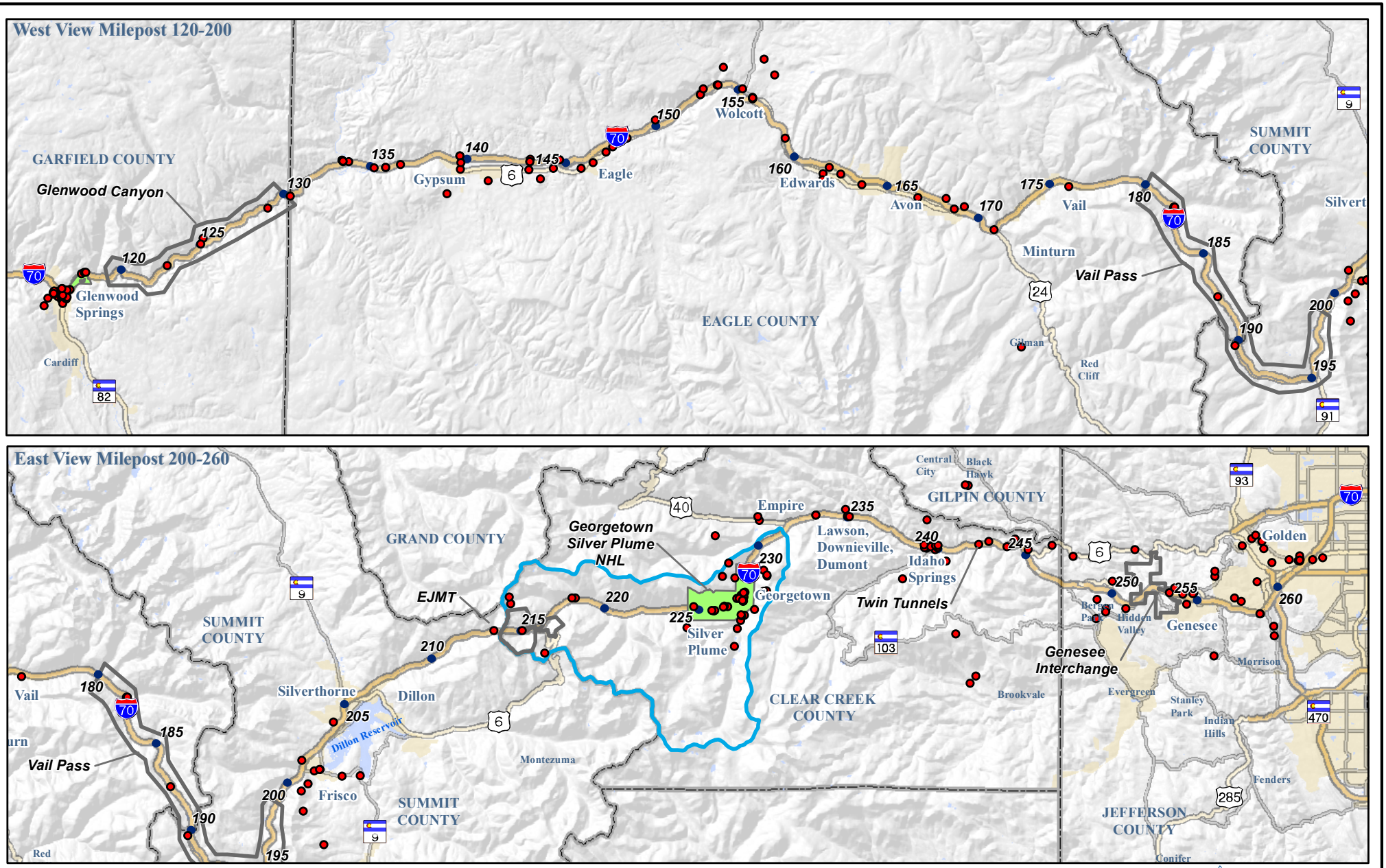
The importance of historic properties and districts in the Corridor is widely recognized. The Georgetown-Silver Plume National Historic Landmark District, located along I-70 between Georgetown and Silver Plume, is one of just 21 National Historic Landmarks (sites of exceptional national importance) in Colorado. The Town of Georgetown also is recognized by the White House and Advisory Council on Historic Preservation as a "Preserve America" community for the town's initiatives to protect and celebrate its cultural heritage.

The Federal Highway Administration considers five transportation resources in the Corridor—Glenwood Canyon, Twin Tunnels, the Eisenhower-Johnson Memorial Tunnels, Vail Pass, and the Genesee Park Interchange Bridge— to be nationally significant interstate resources.

Multiple communities in Clear Creek County along the Corridor are included in the Colorado Preservation, Inc. 2005 List of Most Endangered Places. Colorado Preservation, Inc. is a Colorado nonprofit organization that promotes historic preservation in the state; while inclusion on the organization's endangered list does not afford any protection, inclusion on the list recognizes the historic importance of and threats to those resources.

3.13.6 How do the alternatives potentially affect historic properties?

Historic properties could be directly or indirectly affected by the Action Alternatives. Direct effects include physical destruction, alteration, or removal of historic properties, including archaeological and historic archaeological sites. Indirect effects generally include changes to a property's setting or use, or the introduction of visual, atmospheric, or audible elements that diminish a property's historic integrity. The analysis presented below provides context to differences among the Action Alternatives and is consistent with the phased approach to identify and evaluate of historic properties at first tier studies. It does not represent a full impact analysis or determination of effects to historic properties because intensive surveys have not been conducted and, therefore, the identification of historic properties is incomplete. All properties identified in the OAHP database are included in the analysis, with the majority being treated as eligible for the National Register of Historic Places for the purpose of analysis. This approach is accepted for Tier 1 studies and is considered conservative because many of the properties being treated as eligible may not meet National Register of Historic Places criteria for significance once surveys are completed. However, other properties that meet National Register of Historic Places criteria but have not yet been recorded could be identified.


West View Milepost 120-200
GARFIELD COUNTY
Glenwood Canyon
Glenwood Springs
Cardiff
EAGLE COUNTY
Gypsum
Eagle
Wolcott
Edwards
Avon
Vail
Minturn
Gilman
Red Cliff
Vail Pass
SUMMIT COUNTY
Silvert
East View Milepost 200-260
GRAND COUNTY
SUMMIT COUNTY
Georgetown
Silver Plume
NHL
EJMT
Empire
Lawson, Downieville, Dumont
Idaho Springs
Georgetown
Twin Tunnels
Silver Plume
GILPIN COUNTY
Central City
Black Hawk
Golden
Genesee
Genesee Interchange
Hidden Valley
Berger Park
Morrison
Evergreen
Stanley Park
Indian Hills
Fenders
JEFFERSON COUNTY
Conifer
CLEAR CREEK COUNTY
Brookvale
Silverthorne
Dillon
Dillon Reservoir
Montezuma
Frisco
Vail
Vail Pass
Red
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Urban Areas
Historic Districts
Silver Heritage Area
Listed or Officially Eligible Historic Properties
0 3.31 6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
DOT
U.S. Department of Transportation
Federal Highway Administration
HISTORIC PROPERTIES

How do the alternatives directly affect historic properties?

Based on the historic properties identified to date, as many as 75 different properties could be directly affected by one or more of the Action Alternatives. These properties include individual historic and archaeological sites as well as historic districts. Of the 75 properties, 7 are listed in the National Register of Historic Places; 1 is listed in the State Register of Historic Places (State Register); 5 are nationally significant interstate resources; and 10 are officially eligible for listing in the National Register of Historic Places. The other 52 properties are included in the OAHP database but do not have an official National Register status. None of the Action Alternatives affect all 75 properties but the Action Alternatives affect different properties and each of the 75 properties is affected by one or more of the Action Alternatives. Of the identified properties, only the No Action Alternative does not directly affect any historic properties. The Action Alternatives potentially affect between 47 and 69 historic properties. The Minimal Action Alternative affects the fewest, and the Combination Alternatives affect the most. The impacts for the Preferred Alternative fall within the range of the other Action Alternatives. The actual number of historic properties affected could be higher or lower depending on the final eligibility determinations of these properties and the additional properties that could be identified through intensive survey.

Table 3.13-1 outlines the impacts by alternative. Direct impacts include areas where the conceptual footprints of alternatives, including estimated construction zones, intersect with identified historic properties. Impacts may range from minor effects, such as acquisition of an easement along part of the property, to acquisition and destruction of the property. The alternatives presented in **Table 3.13-1** vary slightly from the grouping described in **Chapter 2.** They include both variations of the Highway Alternatives at 55 miles per hour (mph) and 65 mph because the number of historic properties affected is different under these scenarios.

How do the alternatives indirectly affect historic properties?

Additional properties are affected indirectly by visual, noise, and access changes to the historic setting of the Corridor. All of the Action Alternatives may include noise walls that could block views of historic towns and change the character of the mountain setting. The Highway Alternatives increase the modern highway intrusions by increasing the amount and width of pavement in the Corridor. Except for the Bus in Guideway Alternative, the Transit Alternatives introduce a new mode of transportation through most of the Corridor, which creates a substantial change to the visual environment. The Combination Alternatives have the greatest effect, combining the setting changes of the Highway and Transit Alternatives. Generally, the alternatives with smaller footprints (No Action and Minimal Action Alternatives) create fewer intrusions and thus have less indirect impact to historic properties. The Preferred Alternative impacts are on the higher side of the Action Alternatives, because the Minimum Program includes highway components and the Advanced Guideway System, and the Maximum Program, if implemented, adds more highway components.

How does construction of the alternatives affect historic properties?

Construction of any of the Action Alternatives could affect access to historic properties and could negatively affect heritage tourism, particularly if lane closures and detours are not coordinated with local communities to avoid peak visitation periods. The Combination Alternatives, which are the most complex and have the longest duration construction schedules, have the greatest impact.

Table 3.13-1. Comparison of Direct Impacts on Historic Properties

Alternative	National Register-Listed	State Register-Listed	Nationally Significant Interstate Features	Officially Eligible	Treated as National Register-Eligible[1]	Total
No Action	0	0	0	0	0	0
Minimal Action	2	1	3	9	32	47
Rail with IMC	4	1	3	8	36	52
AGS	2	1	3	9	40	55
Bus in Guideway	3	1	4	9	47	64
Six-Lane Highway (55 mph)	4	1	4	9	36	54
Six-Lane Highway (65 mph)	4	1	4	8	33	50
Reversible/HOV/HOT Lanes	4	1	4	9	37	55
Combination Six-Lane Highway with Rail and IMC	7	1	4	9	43	64
Combination Six-Lane Highway with AGS	5	1	4	10	46	66
Combination Six-Lane Highway with Bus in Guideway	6	1	4	10	48	69
Preferred Alternative [2]	2 to 5	1	4	9 to 10	39 to 46	56 to 66

[1] *Properties recorded in the OAHP database but requiring further evaluation to determine eligibility*

[2] *The Preferred Alternative is presented as a range because the adaptive management component allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.*

Key to Abbreviations/Acronyms

IMC = Intermountain Connection
HOV = high occupancy vehicle
AGS = Advanced Guideway System
mph = miles per hour
HOT = high occupancy toll

What are the project effects on historic properties in 2050?

The timing of the implementation of the Action Alternatives does not change the impacts on historic properties to any great extent. The direct loss of historic properties occurs when those properties are removed to construct transportation components. If implementation of the Action Alternatives occurs over a longer timeframe, historic properties and historic settings would remain intact longer in the short term. The indirect effects of changes to noise or visual conditions or other changes to historic setting occur at the time when those character-altering features, such as noise walls, are constructed. As with direct effects, the longer timeframe for implementation may avoid disruption of historic settings in the short term. The adaptive management approach of the Preferred Alternative allows phased implementation of mitigation that may reduce long-term changes to historic settings. By 2050, more properties will be older than 50 years and may become eligible for the National Register of Historic Places. **Chapter 4, Cumulative Impacts Analysis**, contains additional discussion about potential future effects to historic properties.

3.13.7 What will be addressed in Tier 2 processes?

For each Tier 2 process, CDOT will review existing information about historic properties within the project APE. The project APE will consider the viewscape (the area within which a particular point is visible) and viewshed (the area visible from a particular point). The lead agencies will determine, in consultation with the SHPO and consulting parties, additional efforts needed in Tier 2 processes to

identify historic properties needed to adequately evaluate the effects of undertakings on historic properties.

The Tier 2 processes will complete the Section 106 process, following the agreements in the *I-70 Mountain Corridor Section 106 Programmatic Agreement* and the tribal consultation Programmatic Agreement (the latter of which is included as **Appendix B** of the *I-70 Mountain Corridor Section 106 Programmatic Agreement*). The *I-70 Mountain Corridor Section 106 Programmatic Agreement* outlines specific requirements for each step of the Section 106 process, from identification of the APE through to identification of mitigation, and the tribal consultation Programmatic Agreement outlines consultation, treatment, monitoring, and recovery for sites of importance to tribes. In most cases, the Tier 2 processes will include agreement on an APE for the individual project, an intensive survey of historic properties within the APE, determination of effects to include visual and noise effects of project designs, and agreement on mitigation measures with the SHPO and consulting parties.

3.13.8 What are the approaches to mitigation planning for historic properties?

Historic context is one of the core values of the I-70 Mountain Corridor Context Sensitive Solutions process, and CDOT, in cooperation with the SHPO, is developing documentation for seven dominant historical themes in the Corridor. The lead agencies commit to using this context on future projects to guide and inform evaluation of historic properties in the Corridor and will consider historic context in developing designs for future projects in the Corridor.

Mitigation for effects to historic properties will not occur until Tier 2 processes when historic properties are identified through intensive survey and enough information is available to determine effects to those properties. Strategies for mitigation and Section 106 compliance for Tier 2 processes are well defined in two relevant Programmatic Agreements:

- Strategies for consultation, treatment, monitoring, and recovery for sites of importance to tribes are described in the *Section 106 Tribal Consultation Process for the I-70 Mountain Corridor Programmatic Agreement*.
- The *I-70 Mountain Corridor Project Programmatic Agreement* (included in **Appendix B, I-70 Mountain Corridor Section 106 Programmatic Agreement**) stipulates how consultations will occur and how each phase of the Section 106 process will be carried out in Tier 2 processes. Mitigation strategies for historic properties are included in Section VI of the Programmatic Agreement (Resolution of Adverse Effects).

These mitigation strategies also are presented in **Section 3.19, Mitigation Summary**. The lead agencies will develop specific and more detailed mitigation strategies and measures, and develop best management practices specific to each project, during Tier 2 process. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.14 Section 4(f) Discussion

3.14.1 What is Section 4(f)?

Section 4(f) refers to a portion of a law that only applies to actions of U.S. Department of Transportation agencies. It protects the following resources:

- Publicly-owned park and recreation areas of national, state, or local significance, both existing and planned.
- Historic sites either on the National Register of Historic Places (National Register), eligible to be on the National Register of Historic Places, or in some cases, of state or local significance.
- Publicly-owned wildlife and waterfowl refuges of national, state, or local significance.

These protected resources are referred to as "Section 4(f) properties."

The law requires that before a U.S. Department of Transportation agency may use all or a portion of any of these Section 4(f) properties, the agency must prove that there is no feasible and prudent alternative to using any of these resources, and that the agency has included all possible planning to minimize harm to the resources.

Section 4(f) "Use"

As defined in 23 Code of Federal Regulations, part §774.17, the "use" of a protected Section 4(f) property occurs when

- Land is permanently incorporated into a transportation facility;
- There is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or
- There is no permanent incorporation of land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection are substantially impaired (i.e., "constructive use").

What is Section 4(f)?

Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended, and codified in 49 United States Code § 303, declares that "[i]t 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."

Section 4(f) specifies that:

"The Administration may not approve the use of a Section 4(f) property unless it makes a determination that:

1) there is no feasible and prudent avoidance alternative to the use of land from the property; and

2) the action includes all possible planning to minimize harm to the property resulting from such use."

This Section 4(f) discussion has been prepared in accordance with the joint Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) regulations for Section 4(f) compliance codified at 23 Code of Federal Regulations §774, et seq. Additional guidance has been obtained from the FHWA Technical Advisory T 6640.8A (1987) and the revised FHWA Section 4(f) Policy Paper (2005).

These uses and how they apply to this discussion are further defined below.

Direct Use

A direct use of a Section 4(f) property takes place when there is a direct physical impact to the resource or the land from the resource is obtained for a transportation project. A direct use occurs when land is permanently incorporated into a transportation facility. Land is considered permanently incorporated into a transportation project when it has been purchased as right-of-way or a permanent easement, or similar permanent usage agreement has been made. Temporary uses are direct uses that occur when there is a brief use of a Section 4(f) property considered adverse in terms of the preservationist purposes of the

Section 4(f) statute. A *de minimis* use is also direct but is so minor that it results in no adverse effect to an historic property in accordance with 36 Code of Federal Regulations 800, and does not adversely affect the features, attributes, or activities that qualify parks, recreation, and wildlife and waterfowl refuges for protection under Section 4(f).

Direct uses in this evaluation are considered to be "potential" uses because this Section 4(f) discussion is based on broad-scale information related to a first tier Environmental Impact Statement (EIS). The information is considered to be broad in this study because it addresses location, mode and capacity improvements for the I-70 Mountain Corridor, but does not include design details for projects in specific areas or identify specific uses of each Section 4(f) property. Direct uses are treated as "potential uses" for all identified Section 4(f) properties in this evaluation.

What does Section 4(f) cover at the first tier?

A Section 4(f) discussion is based on the information available. A first tier level of detail may not have the information available to make final approvals on uses of protected resources. This discussion therefore focuses on "potential" uses of these properties. Final decisions on specific location and design will be made in Tier 2 National Environmental Policy Act (NEPA) processes as more detailed information is available and specific properties can be evaluated.

Constructive Use

Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. This type of use is not determined in this discussion because the information needed to make this determination is not available. For example, as described in the Section 106 Programmatic Agreement, effects to historic properties and whether they are adverse will be undertaken during Tier 2 studies. Because this information is not available until Tier 2 processes are undertaken, the indirect impacts and mitigation for specific Section 4(f) properties are not known until that time. Although constructive use determinations are not part of this discussion, a buffer of an additional 15 feet has been added to the project footprint to take into account these potential uses which may be determined constructive uses during Tier 2 NEPA processes.

3.14.2 What process was followed for this first tier Section 4(f) Discussion?

This Section 4(f) discussion addresses potential impacts of the proposed action and other alternatives to Section 4(f) properties. It describes whether there are prudent and feasible avoidance alternatives based on location, mode, and capacity. It includes the number and type of Section 4(f) properties potentially used by each alternative, explains the constraints and opportunities to avoid or minimize impacts to the 4(f) properties and compares the alternatives. It includes all possible planning to minimize harm, identifies what has been done to consult with the Officials with Jurisdiction, and describes what will be done during Tier 2 processes.

What are considered to be Section 4(f) properties in this discussion?

As described in **Section 3.14.1**, Section 4(f) properties include significant publicly-owned parks and recreation areas, historic sites, and publicly-owned wildlife and waterfowl refuges. This Section 4(f) discussion broadly considers what is included as a Section 4(f) property because the exact status of the resource is not determined at this first tier. This first tier takes an inclusive approach to resources treated as Section 4(f) properties and includes:

- Historic properties in the State Register of Historic Places (State Register)
- Historic properties with unknown eligibility

- All archaeological properties
- Historic properties already included in the National Register of Historic Places
- Nationally significant Interstate highway features
- Officially National Register of Historic Places eligible properties
- Existing parks with assumed boundaries taken from Geographic Information System mapping
- Future parks with assumed boundaries taken from local jurisdiction planning materials
- Existing and future trails
- Existing open space areas that are used as parks or recreation areas or wildlife refuges
- Wildlife and waterfowl refuge properties with assumed boundaries

At the first tier, based on the data that is available, the exact status of all of these potential Section 4(f) properties is unknown. It will be fully determined during Tier 2 processes. Since an inclusive approach is taken at this first tier, the Tier 2 processes will specifically evaluate properties to determine if Section 4(f) applies.

Why do we refer to Section 4(f) uses as potential Section 4(f) uses?

The use of the term "potential" Section 4(f) uses acknowledges the broad level of analysis at this first tier. As with "potential" Section 4(f) properties, the term "potential" uses reflects an inclusive approach at this level. Detailed design information is not available to fully characterize the type of use or the extent or size of the use. No attempt is made to differentiate potential permanent uses from potential temporary uses or occupancies. No attempt is made to identify uses that may be classified as *de minimis* impacts, For these reasons, the term "potential" Section 4(f) uses is used in this Section 4(f) discussion.

Are we making a Section 4(f) approval for use of Section 4(f) properties?

No. We cannot make a Section 4(f) approval at Tier 1 because the information available for this broad Tier 1 decision is not detailed enough to support an approval. However, the Tier 1 information shows that the Preferred Alternative appears to have the least use of Section 4(f) resources among alternatives that meet the 2050 purpose and need. Although Single Mode Alternatives and the Minimal Action Alternative may use fewer Section 4(f) properties, they do not meet the purpose and need in 2050. In addition, given the adaptive nature of the Preferred Alternative, it offers the greatest opportunities to minimize impacts to Section 4(f) resources. The discussion below provides supporting detail for these conclusions.

For this Section 4(f) discussion, prudent and feasible avoidance alternatives are evaluated, potential uses are identified, the alternatives are compared, and Officials with Jurisdiction have been consulted. Additionally, the Section 4(f) discussion includes all possible planning to minimize harm to the extent that the level of detail available for this Programmatic EIS allows. Based on this discussion, there are no prudent and feasible alternatives at the Corridor level that avoid use of Section 4(f) properties. However, the Advanced Guideway System component of the Preferred Alternative represents a clear opportunity to mitigate some of these potential uses, because of its elevated, narrower footprint and ability to move from side to side or in the median of the Corridor to avoid Section 4(f) properties.

How are potential uses identified?

Potential uses are identified by overlaying a project footprint of each alternative on a Geographic Information System (GIS) containing locations and/or boundaries of historic properties, parks, recreation areas and wildlife and waterfowl refuges. The project footprint includes the physical footprint of the alternatives plus an additional 30 feet on each side. The 30 feet includes a 15-foot construction disturbance zone and an additional 15-foot sensitivity zone. The construction disturbance zone is the expected limit of cuts into slopes, fills of material, toes of slopes, retaining walls, and other highway improvements related to construction of the project. If any portion of an identified Section 4(f) property intersected with the project footprint of an alternative, that property was treated as having a potential use.

Because the exact alignment of the alternatives is not known in this first tier study, use of Section 4(f) properties for the selected alternative will be refined in Tier 2 processes.

All of the inventory information used to identify potential Section 4(f) properties was updated in 2009 and 2010.

3.14.3 What is the project's purpose and need?

The purpose for the transportation improvements in the Corridor is to increase capacity, improve accessibility and mobility, and decrease congestion for projected travel demand to destinations along the Corridor as well as for interstate travel. Alternatives must be developed in a manner that also provides for and accommodates environmental sensitivity, respect for community values, safety and ability to implement. More details are contained in **Chapter 1** of this document.

3.14.4 What alternatives are being considered in the PEIS?

Chapter 2 of this document describes the No Action Alternative and the 21 Action Alternatives including the Preferred Alternative being considered under NEPA. These alternatives are fully evaluated in **Chapter 3** and **Chapter 4** of this document. Although this Section 4(f) discussion focuses on the alternatives which meet the purpose and need for the project, as described in **Section 3.14.7** and **Chapter 1**, the following description of alternatives includes all 22 alternatives to be consistent with the other chapters of this document.

No Action Alternative

The No Action Alternative consists of ongoing highway maintenance and projects that have a committed source of funding within the fiscally constrained plan.

Minimal Action Alternative

The Minimal Action Alternative includes localized highway improvements (interchange modifications, auxiliary lanes, and curve safety modifications) along with corridor wide Transportation System Management, Transportation Demand Management, and Intelligent Transportation System programs, in addition to high frequency bus service in mixed traffic and sediment control programs.

Single Mode Alternatives

The Single Mode Alternatives considered in the NEPA process and evaluated in this Section 4(f) evaluation include:

- **Rail with Intermountain Connection Alternative—**This combines Rail with the Intermountain Connection. The rail portion includes a primarily on-grade electric facility adjacent to the Corridor with portions in the median and with elevated sections as needed between Vail and C-470. The Intermountain Connection involves upgrading the existing Union Pacific Railroad track from the Minturn interchange to the Eagle County Regional Airport and new track from Minturn to Vail. This alternative also includes auxiliary lane improvements at eastbound Eisenhower-Johnson Memorial Tunnels to Herman Gulch and westbound Downieville to Empire and all other Minimal Action Alternative elements except for curve safety modifications at Dowd Canyon, buses in mixed traffic and other auxiliary lane improvements.
- **Advanced Guideway System Alternative—**This is a fully elevated guideway system that uses new technologies capable of performing in the very difficult and challenging I-70 Mountain Corridor weather and terrain conditions. This alternative also includes the same Minimal Action elements as described previously for the Rail with Intermountain Connection Alternative.

- **Bus in Guideway (Dual Mode) Alternative—**This alternative is located in the median of the Corridor and consists of a single guideway eastbound from Silverthorne to the west portal of the Eisenhower-Johnson Memorial Tunnels and a bidirectional guideway from the Eisenhower-Johnson Memorial Tunnels to C-470. The buses use electric power in the guideway and diesel power when outside the guideway in general purpose lanes. This alternative also includes the same Minimal Action Alternative elements as described previously for the Rail with Intermountain Connection Alternative.
- **Bus in Guideway (Diesel) Alternative—**This includes all components of the Bus in Guideway (Dual Mode) Alternative except that the buses use diesel power at all times.
- **Six-Lane Highway 55 mph Alternative—**This alternative includes six-lane highway widening in two locations: Dowd Canyon and the Eisenhower- Johnson Memorial Tunnels to Floyd Hill. It also includes auxiliary lane improvements at eastbound Avon to Post Boulevard, both directions on the west side of Vail Pass, eastbound Frisco to Silverthorne and westbound Morrison to Chief Hosa, and all other Minimal Action Alternative elements except for buses in mixed traffic and other auxiliary lane improvements.
- **Six-Lane Highway 65 mph Alternative—**This alternative includes the same locations for six-lane widening and the same Minimal Action Alternative elements (except that the curve safety modification at Dowd Canyon is replaced by tunnels) as discussed previously with the Six-Lane Highway 55 mph Alternative. The higher design speed of 65 mph requires curve safety modifications near Floyd Hill and Fall River Road.
- **Reversible Lanes Alternative—**This alternative is a reversible lane facility accommodating high occupancy vehicles and high occupancy toll lanes. It changes traffic flow directions as needed to accommodate peak traffic demands. It includes two additional reversible traffic lanes from the west side of the Eisenhower-Johnson Memorial Tunnels to just east of Floyd Hill. From the Eisenhower-Johnson Memorial Tunnels to US 6, two lanes are built with one lane continuing to US 6 and the other lane to the east side of Floyd Hill. It also includes one additional lane in each direction at Dowd Canyon. This alternative includes the same Minimal Action Alternative Elements as the Six-Lane Highway 55 mph Alternative.

Combination Alternatives

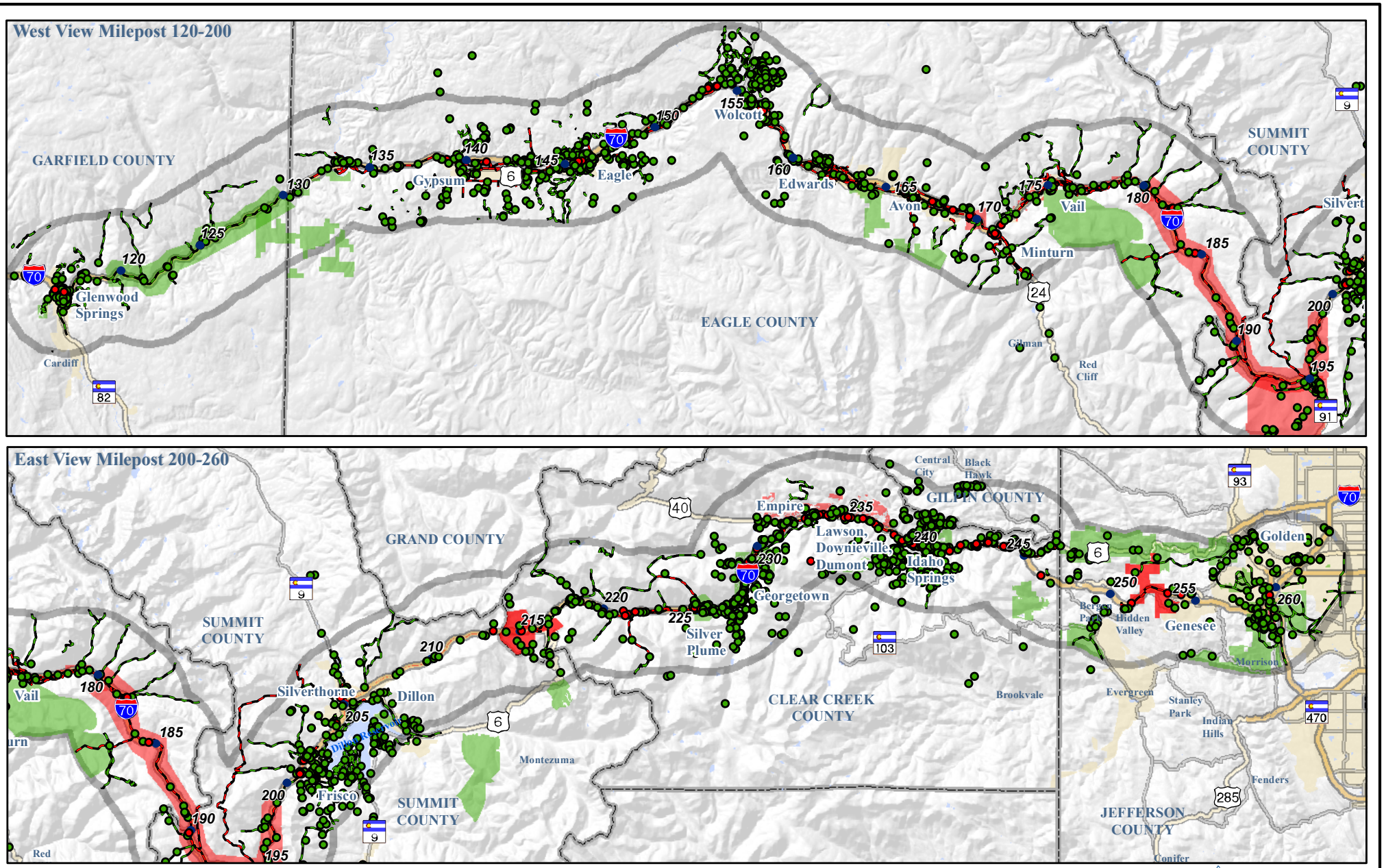
- **Combination Rail and Intermountain Connection and Six-Lane Highway Alternative—**This includes only one of the auxiliary lane improvements (from Morrison to Chief Hosa westbound) but all of the rest of the components of the Minimal Action Alternative, the 55 mph six-lane highway widening between Floyd Hill and Eisenhower-Johnson Memorial Tunnels, and the Rail and Intermountain Connection transit components.
- **Combination Advanced Guideway System and Six-Lane Highway Alternative—**This includes the same Minimal Action Alternative elements as the Combination Rail and Intermountain Connection and Six-Lane Highway Alternative, the 55 mph six-lane highway widening between Floyd Hill and Eisenhower-Johnson Memorial Tunnels, and the Advanced Guideway System transit components.
- **Combination Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative—**This includes the same Minimal Action Alternative components as the alternative in the first bullet above, the 55 mph six-lane highway widening between Floyd Hill and Eisenhower-Johnson Memorial Tunnels, and the bus in guideway transit components. The bus technology for this alternative is dual mode.
- **Combination Bus in Guideway (Diesel) and Six-Lane Highway Alternative—**This includes the same Minimal Action Alternative components as the alternative in the first bullet above, the 55 mph six-lane highway widening between Floyd Hill and Eisenhower-Johnson Memorial

Tunnels, and the bus in guideway transit components. The bus technology for this alternative is diesel.

- **Combination Rail & Intermountain Connection and Preservation of Six-Lane Highway Alternative—**This is the same as the Combination Rail and Intermountain Connection and Six-Lane Highway Alternative but preserves the footprint for the six-lane highway components.
- **Combination Advanced Guideway System and Preservation of Six-Lane Highway Alternative—**This is the same as the Combination Advanced Guideway System and Six-Lane Highway Alternative but preserves the footprint for the six-lane highway components.
- **Combination Bus in Guideway (Dual Mode) and Preservation of Six-Lane Highway Alternative—**This is the same as the Combination Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative but preserves the footprint for the six-lane highway components.
- **Combination Bus in Guideway (Diesel) and Preservation of Six-Lane Highway Alternative—**This is the same as the Combination Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative but preserves the footprint for the six-lane highway components.
- **Combination Preservation of Rail and Intermountain Connection and Six-Lane Highway Alternative—**This is the same as the Combination Rail and Intermountain Connection and Six-Lane Highway Alternative but preserves the footprint for the Rail and Intermountain Connection transit components.
- **Combination Preservation of Advanced Guideway System and Six-Lane Highway Alternative—**This is the same as the Combination Advanced Guideway System and Six-Lane Highway Alternative but preserves the footprint for the Advanced Guideway System transit components.
- **Combination Preservation of Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative—**This is the same as the Combination Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative but preserves the footprint for the bus in guideway (dual mode) transit components.
- **Combination Preservation of Bus in Guideway (Diesel) and Six-Lane Highway Alternative—**This is the same as the Combination Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative but preserves the footprint for the bus in guideway (diesel) transit components.
- **Preferred Alternative–Minimum and Maximum Program—**This is a range of improvements. Both the Minimum and the Maximum include the Advanced Guideway System Alternative. The primary variation is the extent of the highway widening between the Twin Tunnels and the Eisenhower-Johnson Memorial Tunnels. The Maximum Alternative includes six-lane widening between these points (the Twin Tunnels and the Eisenhower-Johnson Memorial Tunnels) based on certain events and triggers and a recommended adaptive management strategy.

3.14.5 What are the Section 4(f) properties that are potentially used by the alternatives advanced in the NEPA process?

Properties protected under Section 4(f) are categorized as historic properties, parks, recreation areas, and wildlife and waterfowl refuges. A summary by property type is provided below. **Figure 3.14-1** shows potential use of Section 4(f) properties in the Corridor.


West View Milepost 120-200
GARFIELD COUNTY
EAGLE COUNTY
SUMMIT COUNTY
Glenwood Springs
Cardiff
Gypsum
Eagle
Wolcott
Edwards
Avon
Vail
Minturn
Gilman
Red Cliff
Silverthorne
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
East View Milepost 200-260
GRAND COUNTY
SUMMIT COUNTY
GILPIN COUNTY
CLEAR CREEK COUNTY
JEFFERSON COUNTY
Central City
Black Hawk
Empire
Lawson
Downieville
Dumont
Idaho Springs
Georgetown
Silver Plume
Brookvale
Golden
Berger Park
Hidden Valley
Genesee
Morrison
Evergreen
Stanley Park
Indian Hills
Fenders
Conifer
Vail
Silverthorne
Dillon
Frisco
Montezuma
Red
205
210
215
220
225
230
235
240
245
250
255
260
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Urban Areas
3 Mile Study Area of I-70
4(f) Properties With a Potential Use Under 200 Acres
4(f) Properties Under 200 Acres
4(f) Properties With a Potential Use Over 200 Acres
4(f) Properties Over 200 Acres
4(f) Properties With a Potential Use - Trails
4(f) Properties - Trails
0
3.31
6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
DOT
U.S. Department of Transportation
Federal Highway Administration
POTENTIAL SECTION
4(f) PROPERTIES

Historic Properties

Historic resources and resources which may be historic were identified through a review of existing literature, a file and records search, a "windshield" survey, and input from local communities. Section 4(f) applies to historic sites that are listed on, or eligible for, the National Register of Historic Places and may include resources that are of local, state, or national significance as defined in 23 Code of Federal Regulations §774.17. Historic properties listed on or eligible for the National Register of Historic Places and properties listed on the State Register of Historic Places were identified as part of this effort. Because this evaluation is based on information from a first tier EIS, properties with unknown eligibility status are treated as eligible to the National Register of Historic Places and therefore are identified as potential Section 4(f) properties. Additionally, Section 4(f) was applied to all archaeological sites which are assumed to be listed on or eligible for inclusion on the National Register of Historic Places.

There are exceptions to the requirement for Section 4(f) approval for historic sites. Examples include work that does not adversely affect the historic qualities of a property listed or eligible to the National Register of Historic Places, and archaeological resources that are important chiefly because of what can be learned by data recovery and have minimal value for preservation in place. Any exceptions to Section 4(f) are deferred until Tier 2 processes when the Section 4(f) approvals will be made and there will be more specific project information.

There are 75 historic properties identified with the potential for use. Seven of these properties are listed in the National Register of Historic Places and five properties have been determined to be nationally significant features of the Interstate Highway System in Colorado. Of the remaining properties, 10 are eligible for the National Register of Historic Places, one is listed on the State Register of Historic Places, and 46 other properties are treated as eligible for the National Register of Historic Places. Overall, the properties include historic districts, archaeological, and historic archaeological sites, linear resources, bridge structures, architectural properties, town sites, a ski area, as well as sites identified by local communities that have not been evaluated in the field and documented. For more information on these properties, please see the *I-70 Mountain Corridor PEIS Section 4(f) Evaluation Technical Report* (CDOT, August 2010a) and the *I-70 Mountain Corridor PEIS Historic Properties and Native American Consultation Technical Report* (CDOT, August 2010b).

The following section highlights examples of the known historic properties in the I-70 Mountain Corridor identified as potential Section 4(f) properties during the first tier analysis. This discussion provides additional information about the nature of some of the known historic properties and shows the different property types located along the Corridor.

Georgetown-Silver Plume National Historic Landmark District (see **Figure 3.14-2**)—This property is located in Clear Creek County. It was listed on the National Register of Historic Places and designated a National Historic Landmark in 1966. The district includes the entire commercial and residential areas of Georgetown and Silver Plume, and the Georgetown Loop Railroad that connects them. The district boundary also encompasses the nearby mountainsides that contribute to a larger mining landscape. It is significant under National Register of Historic Places Criterion A for its association with the development of gold and silver mining in the region. The property is also significant under National Register of Historic Places Criterion C for its intact examples of Victorian architecture in Georgetown and the simpler wood frame architecture of Silver Plume.

Figure 3.14-2. Georgetown-Silver Plume National Historic Landmark District

Idaho Springs Downtown Commercial Historic District—The district is located in Idaho Springs. The district was listed in the National Register of Historic Places in 1984. It is significant under National Register of Historic Places Criterion A as the site of the first major discovery of placer gold in Colorado and as an important milling and supply center for mining, which contributed to the settlement of Colorado. Under Criterion C the district is important for its examples of Victorian architecture.

Eisenhower-Johnson Memorial Tunnels—These twin tunnels extend 1.7 miles through the Continental Divide and connect the Clear Creek Valley to the east with Straight Creek to the west. They extend through both Clear Creek and Summit counties. The west portals are located along the I-70 highway near the Loveland Ski Area. The east portals open west of the Divide as the I-70 highway extends into Silverthorne and Dillon. This property was determined officially eligible for the National Register of Historic Places in March 2006. Opened for traffic in 1973 (Eisenhower Tunnel) and 1979 (Johnson Tunnel), the property is significant under National Register of Historic Places Criterion C for engineering significance and Criterion Consideration G as a property that achieved significance within the past 50 years. The property is also on FHWA's *Final List of Nationally and Exceptionally Significant Features of the Federal Interstate Highway System*.

Glenwood Springs Viaduct—Built in 1953, the Glenwood Springs Viaduct carries SH 82 over the Colorado River into Glenwood Springs. The bridge is a steel plate deck girder with concrete abutments and spill-through piers. It features standard Colorado Department of Highways steel baluster guardrails. The bridge was determined eligible for the National Register of Historic Places as part of the 2000 Colorado Statewide Historic Bridge Inventory. It is significant under National Register of Historic Places Criterion A for its role in regional traffic and under Criterion C as a long-span example of its structural type.

Parks, Recreation Areas, and Wildlife and Waterfowl Refuges

Parks, recreation areas, and wildlife and waterfowl refuges were identified through searches of community maps, local planning documents, and extensive scoping with local jurisdictions and land management agencies. These properties are only considered to be Section 4(f) properties if they are publicly owned, the major purposes and functions are as a park, recreation or refuge, and there is a potential use of the land. All park, recreation and refuge properties that met these criteria were treated as being significant at the first tier in accordance with 23 CFR §774.11(c) and are therefore considered

3.14. Section 4(f) Discussion

Section 4(f) properties for Tier 1. The Tier 1 approach has been as inclusive as possible so as not to miss any potential uses of potential Section 4(f) resources. As a result, more detailed analysis at Tier 2 may result in a determination that some properties identified as potential Section 4(f) properties at Tier 1 are not in fact Section 4(f) properties. These changes are unlikely to affect the relative comparison of Section 4(f) use among the Action Alternatives because of the similarity in footprint among many of the alternatives.

There are 93 individual park, recreation, or wildlife properties identified within the project footprint with the potential for use by the alternatives under consideration. Of these properties, 68 were identified as properties that already exist while the remainder were proposed through approved planning documents and/or funded for construction. For more information on these properties, please see the *I-70 Mountain Corridor PEIS Section 4(f) Evaluation Technical Report* (CDOT, August 2010a) and the *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010c).

The properties are broken down into the following categories:

- Trails or associated facilities: 49 (31 existing)
- Nature preserve/wildlife area/open space (managed for wildlife): 5 (all existing)
- Park or recreation area, open space (managed for recreation): 22 (15 existing)
- River access points: 17 (all existing)

The following discussion highlights several representative parks, recreation areas, and wildlife refuges identified as potential Section 4(f) properties during this evaluation.

The Clear Creek Greenway Plan

Within the Clear Creek County portion of the Corridor nearly all of the properties identified are various elements of the *Clear Creek County Greenway Plan* (Clear Creek County Open Space Commission, 2005). Jurisdiction over the properties falls among the county and the cities of Georgetown, Idaho Springs and Silver Plume. The plan describes a system of parks, open space, recreation facilities, and other recreational opportunities that follow Clear Creek from the Jefferson County line to the Continental Divide. Certain elements of the Plan have been developed, while many others are proposed.

The Clear Creek County Greenway Plan states:

> *The development of a greenway for Clear Creek County's residents and visitors has become a priority of the Clear Creek County Open Space Program, and a focal point of its 2003 Open Space Plan. Running alongside Clear Creek between Jefferson County and the Continental Divide, a greenway is envisioned to serve as the backbone of the County. It will tie together communities with a string of parks, recreational facilities, open space and commercial recreational opportunities.*

Much of the Greenway Plan trail and its facilities exist on, or are proposed to exist on, CDOT ROW or private lands. Section 4(f) protection is assumed for these properties at this Tier 1 level on the basis of maintaining the continuity of the physical trail and facilities, and the overall concept of the Greenway Plan and to comply with the inclusive approach that taken to analyze properties for potential Section 4(f) protection. Properties identified include ten separate bridges, eight trail segments, and four trailheads that are either existing or proposed as elements of the Clear Creek Greenway Trail. The Greenway Plan also incorporates the *River Access Plan* from the *2030 Clear Creek County Master Plan* (Clear Creek County, 2004) consisting of seventeen identified river access points within the project footprint. Additionally, five separate open space parcels are identified as elements of the Greenway Plan. **Figure 3.14-3** highlights recreation activities in the Clear Creek County Greenway.

Figure 3.14-3. Recreation Activities in Clear Creek County Greenway

Genesee Park

Located in western Jefferson County, Genesee Denver Mountain Park is the largest of the Denver Mountain Parks. It was the first to be established, with portions of the Park acquired in 1912 and a second portion acquired in 1937. Recreation activities include picnicking, hiking, wildlife viewing, and formal park developments such as volleyball and softball fields. Genesee Park is bisected by or directly adjacent to the Corridor for approximately two miles.

Forest Service Lands

Many of the lands adjacent to I-70 within the study area are under the ownership of the federal government and managed by the U. S. Department of Agriculture. The White River National Forest is between Glenwood Springs and Dotsero and between Edwards and Vail Pass. The Arapaho and Roosevelt National Forests are located from Vail Pass east to Idaho Springs.

In these national forests, only lands specifically managed for recreation are considered Section 4(f) properties. The United States Forest Service properties identified as potentially protected by Section 4(f) and located within the project footprint of the alternatives include:

- Loveland and Copper Mountain Ski Areas
- One proposed and seven existing trails
- Two trailheads
- One existing park
- One proposed park
- Arapaho and Roosevelt National Forest Visitors Center in Idaho Springs

Wildlife and Waterfowl Refuges Managed by the Colorado Division of Wildlife

Three properties managed by the Colorado Division of Wildlife were identified as potential Section 4(f) properties within the project footprint of the alternatives:

- Gypsum Ponds State Wildlife Area is a 90-acre refuge managed for the benefit of deer and a variety of waterfowl species. This property is located on the south side of the Corridor east of the town of Gypsum in Eagle County. The property is open to the public year round for fishing, hunting, and wildlife observation.
- The Whiskey Creek State Land Board Property is located east of Avon in Eagle County on both side of the I-70 highway. The property is leased by Colorado Division of Wildlife and managed for the protection of wildlife habitat (elk winter range, calving) and hunting and fishing access. The property is open to the public September 1 to February 28 for the hunting of deer, elk, bears, blue grouse, rabbits, and coyotes. There are no other facilities on the property.
- The Vail Underpass Open Space Property is approximately 114 acres managed as critical wildlife habitat. It is the staging area for deer as they prepare to migrate under the highway at the Mud Springs deer underpass. The underpass was the first one built in Colorado and was created for the sole purpose of providing a safe passage for mule deer migration. There are no existing or planned facilities on the property. The property is closed to hunting entirely and is closed from November 1 to June 15 for all uses.

3.14.6 What are the potential uses of the Section 4(f) properties?

This evaluation focuses on the numbers of properties that will be potentially used but does not provide detailed information on the resources, the type of use, or the extent or size of the use. The actual number of Section 4(f) properties could be higher or lower. Additional Section 4(f) properties may be identified during Tier 2 processes when intensive-level cultural resource surveys of specific project areas are conducted and when more detailed information is available. Alternatively, as more detailed studies are completed, some of the resources identified in this Section 4(f) may not be determined significant when more information is available, may be avoided, or impacts will be minor enough to be evaluated as *de minimis* in nature.

Potential Use of Section 4(f) Historic Properties by Alternative

Table 3.14-1 summarizes potential uses of historic properties by alternative. Based on the historic and potentially historic properties identified to date, 47 properties could be potentially used by the Minimal Action, the least of all alternatives. The Transit and Highway Alternatives potentially use between 50 and 64 properties while the Combination Alternatives potentially use 64 to 69 properties. A range of 56 to 66 properties may be used under the Preferred Alternative. Of the Combination Alternatives, the Combination Bus Alternative impacts the greatest number of historic and potentially historic properties with a potential use of 69 properties due to its wider footprint. Overall, the Single Mode Alternatives potentially use slightly less properties while the Combination Alternatives have a similar to slightly higher potential use of properties than the Preferred Alternative.

This table uses categories for type of historic properties. Definitions for these categories are:

- National Register of Historic Places-Listed: Properties listed in the National Register of Historic Places
- Nationally Significant Interstate Features: Features of the Interstate Highway System that are included on the Federal Highway Administration's "Final List of Nationally and Exceptionally Significant Features of the Federal Interstate Highway System."
- Officially Eligible: Properties that have been determined eligible for inclusion to the National Register of Historic Places in consultation with the State Historic Preservation Officer

- State Register of Historic Places-Listed: Properties listed in the State Register of Historic Places
- Treated as National Register of Historic Places Eligible: Properties that have no official National Register of Historic Places eligibility status or where significance is unknown. May include archaeological properties, properties of local significance or architectural properties.

Potential use of the Georgetown-Silver Plume National Historic Landmark District is particularly challenging because the Corridor extends through and bisects the National Historic Landmark boundary. **Figure 3.14-4** highlights the difficulty in avoiding properties protected by Section 4(f) in this area. Two contributing elements of the National Historic Landmark, the Dunderberg Mine and the Mendota Mine, as well as the Toll House are located in the existing Corridor right-of-way. All the Combination Alternatives in this area will, at a minimum, potentially use a strip of land from the Georgetown-Silver Plume National Historic Landmark District and the Toll House. Avoidance of these properties may not be possible; however, there may be opportunities for minimization during Tier 2 processes.

Another area with a high density of potential Section 4(f) properties is in Idaho Springs. This area contains the National Register of Historic Places-Listed Idaho Springs Commercial District, the State Register of Historic Places-Listed Charlie Tayler Waterwheel, and numerous other Section 4(f) properties (see **Figure 3.14-5**). Avoiding use of Section 4(f) properties in this area is challenging due to the proximity of the Corridor to these potential properties. Opportunities to minimize impacts to Section 4(f) properties will be evaluated in Tier 2 processes and will include incorporation of I-70 Mountain Corridor Context Sensitive Solutions procedures as well as those defined in the Section 106 Programmatic Agreement.

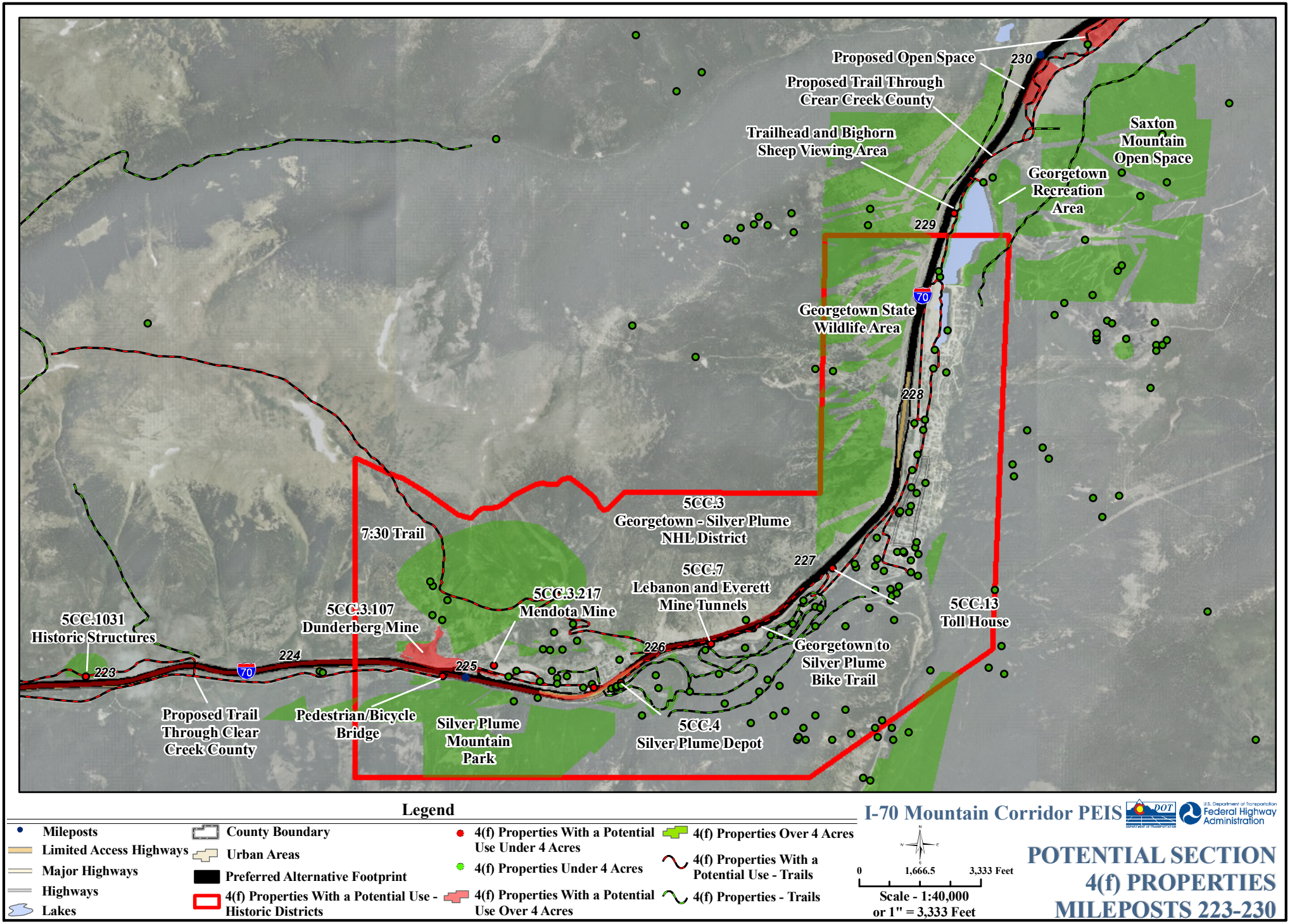
Two interstate features might be used by all Action Alternatives. These interstate features are the Twin Tunnels and Vail Pass.

Table 3.14-1. Potential for Use of Historic Properties by Alternative

		Transit			Highway			Combination			
Category	Minimal Action	Rail	AGS	Bus	55 mph	65 mph	Reverse	Highway Rail	Highway AGS	Highway Bus	Preferred Alternative
National Register-Listed	2	4	2	3	4	4	4	7	5	6	2-5
Nationally Significant Interstate Features	3	3	3	4	4	4	4	4	4	4	4
Officially Eligible	9	8	9	9	9	8	9	9	10	10	9-10
State Register-Listed	1	1	1	1	1	1	1	1	1	1	1
Treated as National Register-Eligible	32	36	40	47	36	33	37	43	46	48	39-46
Total	47	52	55	64	54	50	55	64	66	69	56-66

Notes:

1. The Rail Combination Alternative represents the Combination Rail and Intermountain Connection and Six-Lane Highway Alternative, the Combination Rail and Intermountain Connection and Preservation of Six-Lane Highway Alternative, and the Combination Preservation of Rail and Intermountain Connection and Six-Lane Highway Alternative.
2. The Advanced Guideway System Combination Alternative represents the Combination Advanced Guideway System and Six-Lane Highway Alternative, the Combination Advanced Guideway System and Preservation of Six-Lane Highway Alternative, and the Combination Preservation of Advanced Guideway System and Six-Lane Highway Alternative.
3. The Bus Combination Alternative represents the Combination Bus in Guideway (Dual-Mode) and Six-Lane Highway Alternative, the Combination Bus in Guideway (Diesel) and Six-Lane Highway Alternative, the Combination Bus in Guideway (Dual-Mode) and Preservation of Six-Lane Highway Alternative, the Combination Bus in Guideway (Diesel) and Preservation of Six-Lane Highway Alternative, the Combination Preservation of Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative, and the Combination Preservation of Bus in Guideway (Diesel) and Six-Lane Highway Alternative.
4. Total quantities in the table are generally identical between the Advanced Guideway System Combination Alternative and the Preferred Alternative–Maximum Program except the Preferred Alternative Maximum Program is at the 65 miles per hour scenario and the Combination Six-Lane Highway Alternative with Advanced Guideway System is at 55 miles per hour, so there are minor differences in potential use between those two alternatives.



Legend

- Mileposts
- Limited Access Highways
- Major Highways
- Highways
- Lakes
- County Boundary
- Urban Areas
- Preferred Alternative Footprint
- 4(f) Properties With a Potential Use - Historic Districts
- 4(f) Properties With a Potential Use Under 4 Acres
- 4(f) Properties Under 4 Acres
- 4(f) Properties With a Potential Use Over 4 Acres
- 4(f) Properties Over 4 Acres
- 4(f) Properties With a Potential Use - Trails
- 4(f) Properties - Trails

0 1,666.5 3,333 Feet

Scale - 1:40,000
or 1" = 3,333 Feet

I-70 Mountain Corridor PEIS

DOT

U.S. Department of Transportation Federal Highway Administration

POTENTIAL SECTION 4(f) PROPERTIES MILEPOSTS 223-230

Potential Use of Section 4(f) Parks, Recreation Areas, and Wildlife Refuges by Alternative

Table 3.14-2 outlines the potential use of parks, recreation areas, and wildlife refuges by alternative. All of the alternatives potentially use Section 4(f) parks, recreation areas, and wildlife refuges. Based on the park, recreation area, and wildlife refuge properties identified to date, 50 properties could be potentially used by the Minimal Action, the least of all alternatives. The Transit and Highway Alternatives potentially use between 65 and 76 properties while the Combination Alternatives potentially use 84 to 86 properties. A range of 61 to 86 properties may be used under the Preferred Alternative. Of the Combination Alternatives, the Combination Bus Alternative impacts the greatest number of park, recreation area, and wildlife refuge properties with a potential use of 86 properties due to its wider footprint. Overall, the Single Mode Alternatives potentially use slightly less properties while the Combination Alternatives have a similar to slightly higher potential use of properties than the Preferred Alternative.

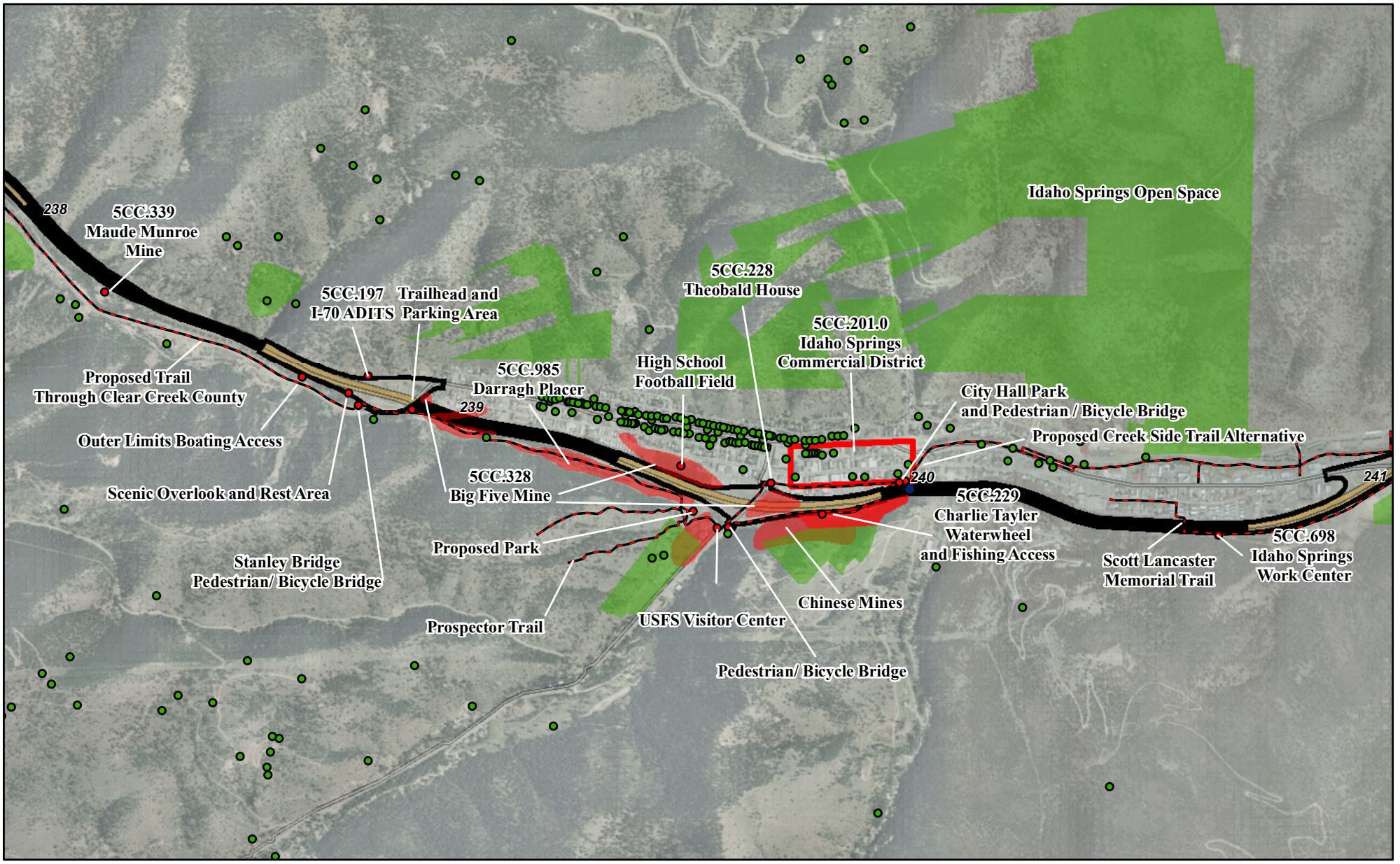
All identified Section 4(f) properties are considered significant at the first tier; however, the Clear Creek Greenway Plan is highlighted as an example of the difficulty in avoiding Section 4(f) properties in the Corridor. There are 46 identified Section 4(f) properties described as elements in the Clear Creek Greenway Plan. The Combination Alternatives potentially use 44 of the 46 elements in the Clear Creek Greenway Plan. Potential uses for the Preferred Alternative range from 29 to 44. Avoiding use of Section 4(f) properties may not be possible in the area of the Clear Creek corridor, as highlighted in **Figure 3.14-4** and **Figure 3.14-5**; however, there may be opportunities for minimization during Tier 2 processes. In addition, because many of these properties are early in the planning process there may be opportunities to work with Clear Creek County to accomplish joint planning.

Table 3.14-2. Potential Use of Section 4(f) Parks, Recreation Areas, and Wildlife Refuges

		Transit			Highway			Combination			
Category	Minimal Action	Rail	AGS	Bus	55 mph	65 mph	Reverse	Highway Rail	Highway AGS	Highway Bus	Preferred Alternative
Trails and Associated Features	28	34	33	38	38	36	39	45	46	47	32-46
Nature Preserve / Wildlife Refuge / Open Space (managed for wildlife)	2	4	3	2	3	4	3	4	3	4	1-4
Park or Recreation Area / Open Space (managed for recreation)	12	16	15	16	18	19	20	20	20	20	14-21
River Access Points	8	14	14	12	13	13	14	15	15	15	14-15
Total	50	68	65	68	72	72	76	84	84	86	61-86

Notes:

1. The Rail Combination Alternative represents the Combination Rail and Intermountain Connection and Six-Lane Highway Alternative, the Combination Rail and Intermountain Connection and Preservation of Six-Lane Highway Alternative, and the Combination Preservation of Rail and Intermountain Connection and Six-Lane Highway Alternative.
2. The Advanced Guideway System Combination Alternative represents the Combination Advanced Guideway System and Six-Lane Highway Alternative, the Combination Advanced Guideway System and Preservation of Six-Lane Highway Alternative, and the Combination Preservation of Advanced Guideway System and Six-Lane Highway Alternative.
3. The Bus Combination Alternative represents the Combination Bus in Guideway (Dual-Mode) and Six-Lane Highway Alternative, the Combination Bus in Guideway (Diesel) and Six-Lane Highway Alternative, the Combination Bus in Guideway (Dual-Mode) and Preservation of Six-Lane Highway Alternative, the Combination Bus in Guideway (Diesel) and Preservation of Six-Lane Highway Alternative, the Combination Preservation of Bus in Guideway (Dual Mode) and Six-Lane Highway Alternative, and the Combination Preservation of Bus in Guideway (Diesel) and Six-Lane Highway Alternative.
4. Total quantities in the table are generally identical between the Advanced Guideway System Combination Alternative and the Preferred Alternative–Maximum Program except the Preferred Alternative Maximum Program is at the 65 miles per hour scenario and the Combination Six-Lane Highway Alternative with Advanced Guideway System is at 55 miles per hour, so there are minor differences in potential use between those two alternatives.



Legend

- Mileposts
- Limited Access Highways
- Major Highways
- Highways
- Lakes
- County Boundary
- Urban Areas
- Preferred Alternative Footprint
- 4(f) Properties With a Potential Use - Historic Districts
- 4(f) Properties With a Potential Use Under 4 Acres
- 4(f) Properties Under 4 Acres
- 4(f) Properties With a Potential Use Over 4 Acres
- 4(f) Properties Over 4 Acres
- 4(f) Properties With a Potential Use - Trails
- 4(f) Properties - Trails

I-70 Mountain Corridor PEIS

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0 760.5 1,521 Feet

Scale - 1:18,000
or 1" = 1,521 Feet

POTENTIAL SECTION 4(f) PROPERTIES MILEPOSTS 238-241

3.14.7 What alternatives were considered that potentially avoid Section 4(f) properties in the Corridor?

Seventy five historic or potentially historic properties and 93 parks, recreation areas, and wildlife refuges have potential for use by alternatives being considered. The intent of Section 4(f) is to avoid use of these properties unless there is no feasible and prudent alternative to the use of such land. Therefore, the first step is to determine whether there are feasible and prudent alternatives that avoid these properties. According to 23 Code of Federal Regulations §774.17, an alternative is not feasible if it cannot be built as a matter of sound engineering judgment. An alternative is not prudent if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;
- After reasonable mitigation, it still causes:
  - Severe social, economic or environmental impacts;
  - Severe disruption to established communities;
  - Severe disproportionate impacts to minority or low-income populations; or
  - Severe impacts to environmental resources protected under other Federal statutes.
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- It causes other unique problems or unusual factors; or
- It involves multiple factors (listed above) that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

Avoidance alternatives were evaluated throughout the screening process. If there is an avoidance alternative that is prudent and feasible, it must be selected. If an alternative is not feasible and prudent, it is not carried further in the Section 4(f) discussion.

Corridor wide avoidance alternatives and whether they are feasible and prudent are described below for the different NEPA screening levels including the alternative element families, specific alternative elements within the families, and the alternatives that were evaluated in detail in the NEPA process. Alternatives advanced in the NEPA process including the Preferred Alternative and the No Action Alternative are evaluated against prudent and feasible alternatives that avoid use of Section 4(f) properties in the Corridor.

Alternative Element Families

The alternative element families defined in detail in **Section 2.5** of this document include:

- Transportation Management
- Localized Highway Improvements
- Fixed Guideway Transit
- Rubber Tired Transit
- Highway
- Alternate Routes
- Aviation

Alternative element families that avoid potential use of Section 4(f) properties in the Corridor include Aviation and Alternate Routes. These alternative element families avoid Section 4(f) properties in the Corridor but are not feasible and prudent avoidance alternatives for the reasons described below. The

remaining five families were carried forward for further analysis and include transportation management, localized highway improvements, fixed guideway transit, rubber tired transit, and highway.

Aviation

Six aviation alternative elements were considered that avoid use of Section 4(f) properties in the Corridor. These elements include new airports, new heliport and short take-off and landing (STOL) facilities, a regional airport hub at Walker Field, improving existing commercial aviation airports, improvement of existing general aviation facilities to accommodate commercial operations combined with improvement of existing commercial service aviation facilities and system management and subsidy programs. None of the aviation alternative elements meet the project purpose and need due to the absence of demand for greater airport capacity and lack of ability to reduce congestion or improve mobility and accessibility on the Corridor during peak-period travel. See the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d) for more detailed information. These six alternatives do not satisfy the purpose and need for improvements to the Corridor and are not prudent and feasible alternatives.

Alternate Routes

There were 17 alternate corridors developed in the screening process. The details of the alternate corridors are described in Appendix I of the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d). All 17 of these corridors avoid potential use of the Section 4(f) properties located along the Corridor. Fifteen of these corridors were eliminated from further consideration in the first level of screening step because they either had substantially longer travel times or were located too far away from the primary origination of travel, so they did not improve mobility or reduce congestion on the Corridor.

Two of the alternate routes were carried into the second level screening for further analysis. The alternate route from Golden to Winter Park via a new tunnel was eliminated due to much larger capital costs and because of noticeably longer travel times, which means it did not improve mobility or reduce congestion on the Corridor. The alternate route from Denver to Copper Mountain via a new tunnel under Georgia Pass was eliminated because even after reasonable mitigation, this route results in severe environmental impacts to environmental resources some of which are protected by the Endangered Species Act or the Clean Water Act, including wetlands, streams, historic properties, state wildlife areas and lynx habitat. Because none of these 17 alternate corridors satisfy the purpose and need for the improvements to the Corridor, or because they have severe environmental impacts none of them are considered prudent and feasible.

Specific Elements within Alternative Families

The remaining five families include transportation management, localized highway improvements, fixed guideway transit, rubber tired transit, and highway. Some alternative elements within these families may avoid Section 4(f) properties while others are expected to potentially use Section 4(f) properties. Some of these specific elements were not prudent and feasible for the reasons described below.

Transportation Management

Transportation Management is a strategy that reduces the severity and duration of congestion and improves mobility by balancing the demand with capacity of the highway to handle the traffic. Three Transportation Management elements are not prudent and feasible because they do not have the capability to meet to the purpose and need. These three strategies are described in detail in Section 2.5.1 of this document and include bicycle improvements, frontage road transit in Clear Creek County, and the Winter Park ski train. Since bicycle improvements, at most, result in a one percent mode share [*Bicycling and Walking in the U.S.: 2010 Benchmarking Report* (Alliance for Biking and Walking, 2010)], they do not remove substantial traffic from the highway and therefore by themselves will not meet the purpose and

need requirement to improve mobility. Frontage roads could not be limited to transit because state and federal highways cannot be restricted to a particular vehicle type. Transit on these roads do not meet the purpose and need of improving mobility and accessibility for the entire Corridor as it only serves Clear Creek County. The Winter Park ski train is not a prudent and feasible alternative because it does not remove a substantial amount of traffic from the highway, thereby reducing congestion and improving mobility. The volume of freight trains through the Moffat Tunnel only allows for a maximum of two Winter Park ski trains to run in each direction per day which does not improve mobility and accessibility on the Corridor.

Other Transportation Management strategies, such as Transportation Demand Management and Intelligent Transportation Systems, have been included in the Action Alternatives including the Preferred Alternative.

All Transportation Management strategies are described in greater detail in the I-*70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d).

Localized Highway Improvements

Curve safety modifications, auxiliary lanes, and interchange modifications at other locations in the corridor are retained as part of the Action Alternatives as described in **Chapter 2** of this document. These components are analyzed as part of the Action Alternatives below for whether they are feasible and prudent avoidance alternatives.

Fixed Guideway Transit

Fixed guideway transit includes four modes: Automated Guideway Transit, Rail (light rail transit and heavy rail transit), Passenger Railroad, and Advanced Guideway System (monorail and magnetic levitation). Forty-three variations of fixed guideway transit were evaluated. Some of these alternative elements may avoid Section 4(f) properties while others are expected to potentially use Section 4(f) properties.

Fixed guideway transit options are not considered to be prudent and feasible alternatives if they do not meet the purpose and need for the project. Several criteria were used to determine whether the fixed guideway transit options meet the purpose and need.

- Potential systems must traverse 127 miles from C-470 to Dotsero in less than 3.5 hours to meet the mobility requirement of the purpose and need. This criterion equates to an average speed of 35 mph and is considered to be the maximum time that is reasonably comparable to automobile travel time. In order to improve Corridor accessibility and mobility, transit options must be competitive with automobile travel time so that transit ridership actually removes automobiles from the highway. See the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Report* (CDOT, August 2010d) for details.
- Fixed guideway transit options have to accommodate a peak-hour, peak direction flow of 4,900 passengers. This number equates to 25 percent of person-trips in 2035 in the peak-hour peak direction and is based on ridership surveys and the travel demand model. This criterion is the minimum needed to adequate provide transit service and meaningfully reduce highway congestion in the peak hours and in the peak direction, thus meeting the mobility and capacity requirement for the purpose and need.
- Some of the transit options did not have sufficient power or brakes to operate on the grades in the Corridor. These alternatives are not prudent and feasible because they do not meet the mobility and capacity requirement for the purpose and need because of insufficient travel times.

3.14. Section 4(f) Discussion

Alternatives were not feasible and prudent based on other factors such as severe environmental impacts even after reasonable mitigation, having additional construction, maintenance, or operational costs of an extraordinary magnitude, creating an unacceptable safety problem, or not feasible to build as a matter of sound engineering judgment. Most of the fixed guideway transit options are not prudent and feasible based on the factors described below.

- Twenty-two alternative elements do not have the ability to meet the peak-hour peak direction flow of 4,900 passengers. These alternative elements include the all of the Light Rail Transit, all of the single track elements and two of the Passenger Railroad elements. These alternatives were modeled using the RAILSIM7® Train Performance Calculator that included estimates of the number of passengers per hour in the peak direction. Details on these estimates and other performance criteria are provided in the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d). Because these alternatives do not meet the capacity requirement of the purpose and need, they are not prudent and feasible alternatives.
- Three of the fixed guideway transit options do not meet the travel time criteria based on having average speeds of less than 35 mph. These alternative elements include the six percent grade diesel Heavy Rail Transit double tracks, the Passenger Railroad Winter Park Ski Train and the Passenger Railroad Glenwood Springs Service Track. Details on the estimated speeds and travel times for these alternatives are provided in *the I-70 Mountain Corridor PEIS Alternatives Development and Screening Report* (CDOT, August 2010d). These fixed guideway transit options do not meet the mobility requirement of the purpose and need because it takes more than 3.5 hours to travel from C-470 to Dotsero. For this reason, these options are not prudent and feasible alternatives.
- Four alternative elements do not have sufficient power or brakes to operate on the grades in the Corridor. These options include the four percent and six percent grade diesel Passenger Railroad sing and double track locomotive hauled alternative elements. The limitations of these alternatives based on having insufficient power or brakes means that they do not meet travel times and requirements for the purpose and need and have unacceptable safety problems. These alternatives are not prudent and feasible alternatives.
- Any fixed guideway transit options operating on a four percent or six percent grade are not considered to be prudent and feasible alternatives because of severe environmental impacts, extraordinary costs, and possible constructability issues. The alignment for these alternatives is outside the right-of-way for at least 25 percent of its length. These alternatives could result in a disturbance of at least 300 acres of previously undisturbed land, which are not impacted by other alternatives along the highway alignment. This undisturbed land is used as wildlife habitat, including lynx habitat. Other environmental resources affected include 90 acres of wetlands, local fen disturbance (0.1 acre), 7.5 miles of streams, and approximately 500 parcels of private land. (These quantities are for the six percent alignment. Quantities for the four percent alignment are higher.) These resources are protected under other Federal statutes including the Clean Water Act, Endangered Species Act, and the Migratory Bird Treaty Act. Even after reasonable mitigation, these alternatives cause severe environmental impacts because of the amount of new disturbance. Because of the severe impacts to environmental resources protected by other Federal statutes, the alternatives on a four percent or six percent grade are not prudent and feasible alternatives.

  In addition, fixed guideway transit options on four percent or six percent grades require substantial amounts of tunneling. As much as 22 percent of the 117-mile transit corridor needs to be in a tunnel. It is difficult to construct tunnels and new alignments in mountainous terrain where there are steep unstable slopes, cliffs, and rivers. Tunnel costs are expected to be more than seven times ($2.7 billion) the cost of keeping the alternatives along the current highway grade

($350 million). These alternatives result in additional construction costs of an extraordinary magnitude compared to the highway alignment alternatives and in some places, may be difficult to build. For these reasons, the four percent and six percent grade fixed guideway transit options are not feasible and prudent alternatives.

- One alternative element, the automated guideway transit, creates unacceptable safety problems. This alternative element functions without an operator at the controls and is intended to operate in environments where emergency assistance could be available on short notice. Since the I-70 Mountain Corridor has physical constraints and remote areas, emergency assistance is unavailable on short notice in certain areas. This element is not safe for passengers and therefore is not a prudent and feasible alternative.

Three alternative elements were retained for the Action Alternatives. These alternative elements include the Advanced Guideway System electric power on the existing alignment, the Heavy Rail Transit with double track on the existing alignment, and the Intermountain Connection on the existing rail facility. These alternative elements were incorporated into the Action Alternatives.

Rubber Tire Transit

Rubber tire transit elements are categorized by propulsion type (diesel, electric, and dual mode), facility use (in mixed traffic or separate guideway or transitway), and alignment grade capabilities. Some of these alternative elements may avoid Section 4(f) properties, while others are expected to use Section 4(f) properties. Fifteen variations of rubber tire transit were evaluated. Five of these alternative elements are not considered to be prudent and feasible for the following reasons.

- **The bus in mixed traffic element** has low average speeds and low capacity. As described in the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d), the high-frequency bus service has a maximum theoretical capacity of 2,500 passengers per hour in the peak direction. This compares to other alternatives with 41,700 to 78,800 passengers per hour in the peak direction. Because it has such low capacity, it does not decrease highway congestion which is part of the purpose and need for the project. Because this alternative element does not meet the purpose and need for the project, it is not a prudent and feasible alternative.
- **Bus in HOV (High Occupancy Vehicle) lanes** has low transit capacity and low demand for ridership because it is not an exclusive guideway. Because it has low transit capacity and low ridership, it does not accommodate the current and projected demand for person trips in the Corridor and does not meet the project need for increased capacity. Because it does not meet the purpose and need for the corridor, it is not a prudent and feasible alternative. This alternative element can be combined with the highway/HOV alternative element considered under highway.
- **Electric bus in transitway and guideway** was eliminated due to accessibility problems. This option requires two separate transfers for passengers because electric buses, operating by power provided from an overhead wire infrastructure, cannot operate more than short distances off the Corridor and is not considered a suitable technology because it cannot access destinations served by the Corridor. This alternative did not meet the accessibility criterion for meeting purpose and need and is not a prudent and feasible alternative.
- **Peak-direction-only diesel and dual-mode bus in guideway and peak-direction-only bus in transitway** alternative elements were eliminated because they do not meet the mobility criterion due to lack of off-peak schedule dependability. Buses traveling in the off-peak direction are not on the guideway and are operating in mixed traffic, subject to highway congestion and cannot provide reliable off-peak service. Because this alternative does not meet purpose and need, it is not a prudent and feasible alternative.

Some of the rubber tire transit alternative elements that were forwarded in transitway or guideway have relatively minor footprint and operational differences. The Bus in Guideway Alternative is considered to be representative of all of these options because it moves a similar number of people, minimizes impacts to resources including Section 4(f) properties, and has the potential to meet the 2050 travel demand when combined with the highway alternatives. If the bus mode is selected in the first tier Record of Decision, these alternative elements, and possibly other specific bus technologies, then further evaluation in Tier 2 processes is needed. The rubber tire transit alternatives considered similar to the Bus in Guideway Alternative include diesel or dual mode bus in transitway—both directions and diesel or dual mode bus in either transitway or guideway—both directions, using on-line stations. For purposes of this evaluation, a system with on-line stations (stations on the guideway or transitway) is defined as bus rapid transit.

Highway Alternative Elements

There were six primary highway improvement options considered by corridor segment or location. Within each segment, all or some of the improvement options were considered and evaluated based upon the conditions and constraints within that segment. Some of these alternative elements may avoid Section 4(f) properties in certain corridor segments or locations while others are expected to use Section 4(f) properties. The following improvement options are not prudent and feasible alternatives and have been eliminated.

- **Flex lanes** offer a narrower roadway of 90 feet by using a 16-foot flex lane shoulder with a 12-foot-wide travel lane and a 4-foot shoulder during peak volumes in the peak direction, and as a wide shoulder at other times. A control device such as a lane closure gate and message signing is used during peak hours when the lane functions as a standard travel lane. Flex lanes create safety issues because of the inconsistency in lane balance for sections of the highway on either side of the flex lane section. The 4-foot shoulder width (compared to 8 feet for the Preferred Alternative configuration) does not meet design standards and is incompatible with CDOT's *Incident Management Plan* (CDOT, 2000), which requires sufficient shoulder width to operate emergency vehicles. A 4-foot-wide shoulder does not allow broken-down vehicles to leave the flow of traffic, which is a concern especially for commercial trucks. Unsafe conditions may cause accidents that affect the flow of traffic and therefore increase congestion. This alternative results in unacceptable safety problems and does not meet the purpose and need to reduce congestion. For these reasons, this highway improvement option is not a prudent and feasible alternative.
- **Movable median** uses a five-lane highway with the third lane reversing by use of a movable median between Empire and Floyd Hill. A specially-equipped vehicle lifts portable barrier segments and shifts them laterally to produce a new lane configuration. This option does not meet the 2050 purpose and need requirement to improve mobility and accessibility because of loss in the travel time it takes to clear the traffic lanes and move the median. For these reasons, this alternative is not a prudent and feasible alternative for avoiding Section 4(f) properties.
- Parallel route north of Idaho Springs between Fall River Road and the Hidden Valley interchange (a two-lane multipurpose roadway) was eliminated because it does not meet the need criterion of reducing congestion between the Eisenhower-Johnson Memorial Tunnels and Floyd Hill and because it is impossible to continue west of Idaho Springs due to steep terrain at the Fall River Road area. For these reasons, this alternative is not a prudent and feasible alternative because it does not meet purpose and need.
- Silverthorne Tunnel was considered between Silverthorne and Empire Junction. At a proposed length of 25 miles, this tunnel is longer than any tunnel ever constructed. It was eliminated because it is unlikely to be built as a matter of sound engineering judgment and because of its lack of access to Corridor communities, thus not meeting the accessibility criterion of purpose and need. For these reasons, this alternative is not a prudent and feasible alternative.

Alternatives Advanced and Fully Evaluated in the NEPA Process

The Action Alternatives fully analyzed in the NEPA process include a Minimal Action Alternative and 21 Action Alternatives, including the Preferred Alternative that include various combinations of either highway components alone, transit components alone, and various Combination Alternatives. The No Action Alternative was also fully evaluated in the NEPA process and Section 4(f) discussion. None of the Action Alternatives in the Corridor completely avoid potential use of all Section 4(f) properties. The No Action Alternative, the Minimal Action Alternative, and the Single Mode Alternatives are not prudent and feasible for the reasons described below.

No Action Alternative

This alternative avoids use of Section 4(f) properties. Because it does not satisfy the need to improve capacity, mobility, accessibility and decrease congestion, it is not a feasible and prudent alternative for avoiding potentially used Section 4(f) properties in the I-70 Mountain Corridor.

Minimal Action Alternative

Although not a true avoidance alternative, the Minimal Action is not a prudent and feasible alternative for the following reasons. As described in the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d), the high-frequency bus service is only expected to carry approximately four percent of travelers during peak hours. Buses are not be able to go faster than autos and do not attract additional ridership because of congestion. This alternative does not increase capacity or decrease congestion and does not meet the purpose and need for the project. See **Chapter 2**, **Sections 2.8.1** and **2.8.2** for information on the inability of the Minimal Action Alternative to meet the project purpose and need. For these reasons, this alternative is not a prudent and feasible alternative.

Single Mode Alternatives

Single Mode Alternatives are those that include highway, fixed guideway, or rubber tire transit components as the only type of transportation improvement that expands capacity. These Single Mode Alternatives, while not avoidance alternatives, are not able to accommodate the 2050 travel demand. As measured by the year network capacity is reached and described in **Chapter 2, Section 2.8.1** under **"Year Network Capacity is Reached"** of this document. Network capacity is a measure of congestion tolerance and is generally defined as the capacity when average travel speed on the Corridor drops to 30 miles per hour.

The Single Mode Alternatives cannot achieve speeds greater than 30 miles per hour in 2050. All Single Mode Alternatives reach network capacity between 2030 and 2040 while the Combination Alternatives provide network capacity to 2050, if both highway and transit elements are constructed. See the *I-70 Mountain Corridor PEIS Alternatives Development and Screening Technical Report* (CDOT, August 2010d) for more detailed information.

At speeds less than 30 miles per hour, the purpose and need criterion of improving mobility is not met, nor is congestion relieved. **Chapter 2, Section 2.8.2** of this document provides information that illustrates the higher total hours of congestion in 2035 for both peak direction weekend and weekday conditions for the Single Mode Alternatives compared to the Combination Alternatives. These conditions become more obvious by 2050, thus the resulting finding that the Single Mode Alternatives are not able to operate at speeds over 30 miles per hour and thus not able to improve Corridor mobility nor relieve congestion. For these reasons, these alternatives are not prudent and feasible alternatives.

Combination Alternatives

The Combination Alternatives also are not avoidance alternatives but they meet the 2050 purpose and need. These alternatives are summarized in **Section 3.14.4** and described in detail in **Chapter 2**. These alternatives include components of both the Transit and Highway Alternatives. **Section 3.14.8** describes

opportunities to avoid and minimize potential uses of Section 4(f) properties and constraints associated with these alternatives. **Section 3.14.8** compares these alternatives based on their potential to use Section 4(f) properties as well as least harm factors.

3.14.8 What are constraints and opportunities to avoid Section 4(f) properties associated with the Combination Alternatives?

Avoidance opportunities were also evaluated at a more localized level and the potential to avoid Section 4(f) properties was a major consideration during the Level 3 alternatives development process.

Corridor Constraints

The distribution and density of known Section 4(f) properties along the Corridor limits the opportunity to avoid all potential properties. In locations like Clear Creek County (and in particular the general Idaho Springs area and in the Silver Plume/Georgetown area), Silverthorne and Dillon Reservoir, there are numerous historic and recreational properties that, even if an alignment could be designed to avoid one Section 4(f) property, it is highly likely that other Section 4(f) properties will be used.

Other obstacles to avoidance of Section 4(f) properties include the limitations of the mountainous terrain. Physical terrain features such as rock walls, steep unstable slopes, and rivers along with already built up commercial and residential development limits the transportation improvements.

To demonstrate that there is no feasible and prudent avoidance alternatives, a Section 4(f) analysis addresses:

- Location alternatives and
- Design shifts.

This Section 4(f) discussion is based on available information for a broad decision at the first tier of analysis. It addresses general location alternatives. Constraints and opportunities are discussed. Specific locations and design shifts to avoid specific Section 4(f) properties are deferred to Tier 2 processes.

Constraints and Opportunities Associated with Highway Components

Highway improvements are limited by existing grades in some places. Vail Pass, along Straight Creek between Silverthorne and the West Portal of the Eisenhower-Johnson Memorial Tunnels and on Floyd Hill already exceed the American Association of State Highway and Transportation Officials recommended maximum grades of six percent (for mountainous or hilly terrain on interstate highways.) The need to provide a space for recovery from errant vehicles results in a wider cross section. Existing highway interchanges provide access to already existing developed areas and limit the ability to avoid use of Section 4(f) properties which may be located adjacent to the existing interchanges.

As alternatives were defined in more detail in Level 3 screening, their relative ability to avoid Section 4(f) properties was included in their definition. The two six-lane highway alternatives and the reversible HOV/HOT lane alternative were both developed to avoid key Section 4(f) properties. Several highway alignments were considered near Silver Plume to attempt to avoid encroachment on sensitive historic properties and on Clear Creek. One alternative improves the safety of the westbound on-ramp without moving the ramp but it requires lengthening the ramp into the town of Silver Plume, resulting in severe disruption to an established community. For this reason, this alternative is not a prudent and feasible alternative.

The highway components incorporate such features as structured lanes in the Twin Tunnels and Idaho Springs area and reduced width of the outside shoulder from twelve to eight feet to minimize potential Section 4(f) uses. In other locations, vertical widening such as structured or tunneled lanes or horizontal widening such as Smart Widening can be considered as a means to avoid or minimize use of a Section 4(f) property. These design refinements can be considered during Tier 2 processes.

Constraints and Opportunities Associated with Transit Components

Rail and Advanced Guideway System transit require certain grades based on the technological capabilities of the system. Traditional high speed rail is limited to four percent and Advanced Guideway System is limited to about seven percent. Curvature of the tracks is limited by transit speeds which were chosen to be competitive with free flow highway travel. Because of transit stops, transit operating speeds need to be faster than highway speeds requiring flatter curves. These design requirements limit the ability of the rail and Advanced Guideway System alternatives to avoid Section 4(f) properties. Its relatively narrower footprint of 26 to 34 feet for a double guideway system (compared to a much wider footprint for the six-lane highway configurations because of the need to allow for space for errant vehicles) helps to compensate for the other design requirements. In addition, the alignment of rail and Advanced Guideway System can move from north of the highway to south of the highway based on the proximity of sensitive features. Station locations are not definitively set at the first tier, so that they can potentially be placed to avoid Section 4(f) properties.

One localized transit alignment was considered. An Advanced Guideway System alternative alignment called the Snake Creek (located in Summit County between the top of Loveland Pass, through Keystone and into Dillon) Alternative deviated from the Corridor and traveled along the Snake Creek watershed rather than the Straight Creek (located along I-70 between the Eisenhower-Johnson Memorial Tunnels and Silverthorne) watershed. It avoided potential uses of the Eisenhower-Johnson Memorial Tunnels but created potentially more substantial uses of other Section 4(f) properties including sensitive forest areas and recreational areas and trails outside the I-70 Mountain Corridor. Constructing the new tunnel requires steep grades to access both of the new portals. This results in unacceptable operational problems. Severe impacts might occur to numerous environmental and socio-economic resources (including bisecting the proposed Porcupine Gulch Wilderness Area, creating major conflicts with central operations of the Loveland Ski Area, which might result in likely removal of all ski area operations, and substantial new impacts to the Snake Creek watershed) due to construction of a new transportation corridor located over the Continental Divide. For these reasons, this is not a feasible and prudent alternative.

The transit components incorporated various design components reducing the potential use of Section 4(f) properties and fully elevated the Advanced Guideway System guideway, elevated other rail alternatives in sensitive areas, located the bus in guideway in the median of the highway and adjusted the alignment of the Rail with Intermountain Connection and Advanced Guideway System alternatives to the south side of Idaho Springs to avoid the potential use of Section 4(f) resources north of the highway.

Additional Opportunities to Avoid and/or Minimize Harm During Tier 2 Processes

Design refinements to avoid specific Section 4(f) properties and/or to minimize harm will be addressed in Tier 2 processes. In addition, Tier 2 processes will complete the Section 106 process, following the agreement in the I-70 Mountain Corridor Programmatic Agreement. The Programmatic Agreement outlines each step of the Section 106 process, from identification of the Area of Potential Effect (APE) through resolving adverse effects. In most cases, the Tier 2 processes will include agreement on an APE for the individual project, a survey of historic resources within the APE, determination of effects including visual and noise effects of the project, and agreement on resolving adverse effects with the consulting parties.

3.14.9 How do the alternatives compare?

All the Combination Alternatives have a potential to use Section 4(f) properties. Potential Section 4(f) uses of historic properties range from 56 at the lower range of the Preferred Alternative to 69 with the Combination Bus Alternative. Potential Section 4(f) uses of the parks, recreation areas or wildlife refuges range from 61 at the lower range of the Preferred Alternative to 86 with the Combination Bus Alternative. This totals 117 potential uses with the lower range of the Preferred Alternative to 155 with the

Combination Bus Alternative. The Preferred Alternative has a range of potential uses from 117 to 152 which has a slightly lower to similar potential for use of Section 4(f) properties compared to the other Combination Alternatives.

Because none of the Combination Alternatives in the I-70 Mountain Corridor completely avoids use of all Section 4(f) properties, the alternatives were compared based not only on their potential use of the Section 4(f) properties but also on other factors. These factors include the ability to mitigate the use in Tier 2 processes, the views of the Officials with Jurisdiction, the responsiveness of the alternative to the purpose and need, cost, and the impact to other environmental resources.

One factor that was considered is the ability to mitigate the use in Tier 2 processes. The alternatives that include Advanced Guideway System as a part of their mix (the Preferred Alternative and the Advanced Guideway System Combination Alternative) have an opportunity to mitigate potential uses because the Advanced Guideway System is flexible in its exact location, it has a noticeably smaller footprint and it is elevated. It can be placed so it cantilevers over the roadway shoulder. Visual impacts related to the Advanced Guideway System are identified in **Section 3.11** of this document and will be evaluated in more detail during Tier 2 NEPA processes.

All Section 4(f) properties are treated as significant at the first tier so there is no recognized difference among alternatives in terms of the relative significance of the properties being used. The relative severity of remaining harm is similarly not identified at this level and will be addressed in Tier 2 processes.

The views of the Officials with Jurisdiction over the resource have been considered. In general, the Officials with Jurisdiction are less supportive of alternatives that include highway widening because of the overall width of the footprint and the effects of that widening to the setting of historic properties. Highway traffic noise, especially truck traffic, has the potential to affect historic properties. The Officials with Jurisdiction are in general more supportive of alternatives that include the Advanced Guideway System because it has a better potential to avoid Section 4(f) properties and is expected to be quieter than additional traffic on the highway. The U.S. Forest Service, one of the Officials with Jurisdiction, is more supportive of the transit component of the Combination Alternatives because of their consistency with future plans to manage future access to U.S. Forest Service recreational areas. Letters from the U.S. Forest Service and Clear Creek County provide more detail about these opinions. See the *I-70 Mountain Corridor PEIS Recreation Resources Technical Report* (CDOT, August 2010c) for examples.

Each of the considered alternatives is more or less responsive to purpose and need. The Preferred Alternative, if it is fully implemented, and the Advanced Guideway System Combination Alternative result in the fastest weekend highway travel time in the future. Transit travel time is fastest with the Preferred Alternative and the Advanced Guideway System Combination Alternative. The Preferred Alternative–Minimum Program provides the most noticeable transit travel time advantage over highway travel time and all of the Combination Alternatives provide an option for travelers to avoid highway congestion, potentially serving as a mechanism for changes in traveler behavior over time. See **Chapter 2** for more information on alternatives and how well they meet the purpose and need.

Chapter 3 of this document describes the impact of the Action Alternatives to other environmental resources. Analyses show that for several resources (biological, threatened and endangered species, water resources and wetlands) the Advanced Guideway System Combination Alternative and the Bus Combination Alternative results in the greatest impacts. These effects can be mitigated in many cases. Effects that are more difficult to mitigate include: effects to climate and air quality, operational energy consumption, and cumulative effects caused by induced growth. The Preferred Alternative has potential to have the least effect to these resources because of the adaptive management approach to phasing the improvements.

The Preferred Alternative provides an opportunity to monitor conditions over time and adapt future improvements to changes in technology, demographics or other global, regional or local trends. This characteristic could result in reductions of the environmental impacts predicted in this document.

The anticipated capital costs of construction were evaluated. Of the Combination Alternatives, the Preferred Alternative at its maximum range and the Advanced Guideway System Combination Alternative were the most costly. More information on costs is found in **Chapter 2, Section 2.8.3**.

To summarize, the Preferred Alternative is anticipated to result in a range of potential uses of Section 4(f) properties (from 117 to 147). This alternative has a slightly lower to similar potential use compared to the other Combination Alternatives. The inclusion of the Advanced Guideway System component represents a clear opportunity to mitigate some of these potential uses because it is able to move from one side of the Corridor to another or to be located in the median. The Preferred Alternative is anticipated to result in a range of potential impacts to other environmental resources, but many of these impacts can be mitigated. It is likely to result in the greatest amount of induced growth and development, but that can also be guided and thus mitigated through effective actions of local governments. The Preferred Alternative is effective at responding to the purpose and need of reducing highway congestion and minimizing highway travel time. It provides a clear transit travel time advantage for the user, avoiding highway congestion. The adaptive nature of the Preferred Alternative over time is the most responsive to anticipated future technological, global and regional changes. And in Tier 2 processes, there are numerous opportunities to minimize harm to the remaining Section 4(f) properties that may result from the potential uses that are defined in this evaluation.

3.14.10 What planning to minimize harm has been incorporated?

Actions taken at this first tier ensure that opportunities to minimize harm are not precluded in subsequent Tier 2 processes. These actions include following the Section 106 Programmatic Agreement for complying with National Historic Preservation Act and development of the I-70 Mountain Corridor Context Sensitive Solutions process described in more detail in **Chapter 6** and in **Appendix A**.

The Section 106 Programmatic Agreement identifies considerations for minimizing harm to historic properties including variances from CDOT's design standards, use of modern explosive techniques, protection of archaeological and historic archaeological properties, noise abatement and minimization measures, visual impact minimization and measures to minimize and mitigation economic impacts on heritage tourism.

The I-70 Mountain Corridor Context Sensitive Solutions process emphasizes development of alternatives and options during Tier 2 processes consistent with the core values of sustainability, open decision making, enhancing safety, providing a healthy environment, respecting the corridor's historic context, protecting communities, addressing mobility and accessibility and enhancing the corridor's aesthetics. Specific I-70 Mountain Corridor Context Sensitive Solutions actions may be implemented during Tier 2 processes to minimize harm to Section 4(f) properties and include such features as retaining walls, cantilevered highway sections, alignment shifts, interchange design refinements and tunnels.

For the many future Section 4(f) properties planned in the Corridor, another opportunity to minimize harm exists by conducting joint planning/joint development of improvements in the Corridor along with the future recreational properties, pursuant to 23 Code of Federal Regulations 774.111 (i).

Other opportunities to minimize harm that have been identified in first tier but may be more refined during Tier 2 processes include: narrowing outside shoulders for the highway, fully elevating the Advanced Guideway System guideway, implementing structured or tunneled highway lanes, elevating other rail alternatives in sensitive areas, locating the bus in guideway in the median of the highway and adjusting the alignment of the Rail with Intermountain Connection and Advanced Guideway System

Alternatives to the south side of Idaho Springs to avoid the potential use of Section 4(f)properties north of the highway.

3.14.11 What agencies have CDOT and FHWA coordinated with?

Agency coordination regarding potential Section 4(f) properties has been ongoing and comprehensive. This effort was coordinated through a Section 4(f) Ad Hoc Committee composed of members from FHWA, CDOT, National Park Service, United States Forest Service, U.S. Bureau of Land Management, Advisory Council on Historic Preservation, the State Historic Preservation Officer, and the Colorado Commission of Indian Affairs. This Committee identified and inventoried Section 4(f) properties within the Corridor to provide guidance on the level of detail appropriate for this evaluation. This effort provided the basis for determining alternative impacts on a protected site to ensure that there are no other feasible or prudent alternatives that have less impact and that all measures to minimize harm were considered.

Agency coordination for Section 4(f) historic properties is closely tied to the Section 106 process. Coordination for parks, recreation, and wildlife and waterfowl refuges was initiated with local municipalities, counties and various land management agencies through the Mountain Corridor Advisory Committee and with individual agencies since 2001. The following sections describe the agency coordination process for the Section 4(f) property categories.

Parks, Recreation Areas, and Wildlife and Waterfowl Refuges

Participation in the Mountain Corridor Advisory Committee and ongoing stakeholder groups provided agencies the first opportunity to offer opinions regarding Section 4(f) properties. Additionally scoping letters were sent out to all local municipalities, counties and land management agencies soliciting information on potential Section 4(f) properties. Agencies that CDOT and FHWA coordinated with include:

Federal:

- U.S. Department of the Interior, Bureau of Land Management
- United States Forest Service, White River National Forest
- United States Forest Service, Arapahoe and Roosevelt National Forest and Pawnee National Grassland
- U.S. Department of the Interior, National Park Service
- U.S. Department of the Interior, Fish and Wildlife Service

State:

- Colorado State Parks
- Colorado Division of Wildlife

County:

- Garfield County
- Eagle County
- Clear Creek County
- Jefferson County
- Summit County (GIS data)
- Western Eagle County Metropolitan Recreation District

Municipal:

- Eagle-Vail Metro District
- Town of Frisco
- Town of Silverthorne
- Town of Georgetown
- City of Idaho Springs
- Vail
- Eagle
- Minturn
- Gypsum
- Glenwood Springs
- Golden
- Empire
- Dillon
- Breckenridge
- Avon
- Silver Plume

Historic Properties

Agency coordination on historic properties at the first tier has been ongoing since 2001. The initial effort was facilitated through a series of meetings between 2001 and 2009 starting with the Section 4(f) and 6(f) Ad Hoc Committee that included representatives from the Colorado Office of Archaeology and Historic Preservation, the Advisory Council on Historic Preservation, Department of Interior, National Park Service, and the Colorado Commission of Indian Affairs. This committee identified historic properties and provided guidance on the level of detail appropriate for the first tier Section 4(f) effort.

Opinions of Officials with Jurisdiction and other Parties

During the process, concerns were raised by the Officials with Jurisdiction. The following sections summarize the concerns expressed by the Officials with Jurisdiction and other parties and indicate how those concerns are addressed.

Parks, Recreation Areas, and Wildlife and Waterfowl Refuges

Officials voiced concerns that some properties potentially impacted were not identified. Clear Creek County and local municipalities were particularly concerned about resources associated with the *Clear Creek County Greenway Plan* (Clear Creek County Open Space Commission, 2005). Continued consultation with the county resulted in the addition of all elements of this proposed and partially existing resource and potential uses of these properties are recognized. Concerns raised about how constructive use is analyzed with in regard to potential Section 4(f) impacts will be evaluated at Tier 2. Communities and agencies felt that postponing this analysis to Tier 2 results in additional Section 4(f) properties not identified in this document being impacted by Tier 2 projects. Although constructive and temporary use determinations are not a part of this study because the level of detail of design and understanding of the alternatives is not available, an additional 15 foot buffer was added to the alternative footprints to account for additional potential uses of properties.

A second round of agency scoping was initiated in early 2009 to ensure up to date information in this document, formalizing an extensive involvement process with Corridor communities that occurred between 2004 and 2009. Scoping letters were sent out to the Officials with Jurisdiction. Additional properties identified in this recent agency coordination were researched and included in this document, and the *I-70 Mountain Corridor PEIS Section 4(f) Evaluation Technical Report* (CDOT, August 2010a), or dismissed from inclusion as indicated in the Technical Report. Furthermore, during the 2009 scoping, agencies were given another opportunity to identify properties to include. The complete property list was evaluated following the 2009 scoping effort with an emphasis on being overly inclusive ensuring that no properties that should be included on this list were missed.

Historic Properties

Concerns regarding missed properties, inadequate effects analysis, and constructive use were raised many times throughout this process. The Colorado Department of Transportation performed an additional file search of the Colorado Office of Archaeology and Historic Preservation Compass database in 2009 to identify properties documented or added to the database since the 2003 file search resulting in a more robust list of properties. In addition, the methodology for identifying possible Section 4(f) properties was modified and resulted in a more inclusive list of properties officially listed, officially eligible, and potentially eligible where a potential use of property. Concerns about inadequate effects analysis will be addressed during Tier 2 process when there is enough detailed information to be able to assess effects and Section 4(f) use.

3.14.12 What can we conclude from this Discussion?

Although we cannot make a Section 4(f) approval because the information available for this broad Tier 1 decision is not detailed enough to support it, the Tier 1 information shows that the Preferred Alternative appears to have the least use of Section 4(f) resources among alternatives that meet the 2050 purpose and need.

For this Section 4(f) discussion, prudent and feasible avoidance alternatives are evaluated, potential uses are identified, the alternatives are compared, and Officials with Jurisdiction have been consulted. Additionally, the Section 4(f) discussion includes all possible planning to minimize harm to the extent that the level of detail available for this PEIS allows. Based on this discussion, there are no prudent and feasible alternatives at the Corridor level that avoid use of Section 4(f) properties. The Single Mode Alternatives and the Minimal Action Alternative may use fewer Section 4(f) resources than the Preferred Alternative, but they do not meet the purpose and need in 2050. In addition, given the adaptive nature of the Preferred Alternative, it offers the greatest opportunities to minimize impacts to Section 4(f) resources. The discussion below provides supporting detail for these conclusions.

The Preferred Alternative is anticipated to result in a range of potential impacts to other environmental resources, but many of these impacts can be mitigated. It, along with the Advanced Guideway System Combination Alternative and the Rail with Intermountain Connection Combination Alternative, may result in the greatest amount of induced growth and development; however, but the Preferred Alternative, with its adaptive nature, provides the best opportunity for local governments to guide induced growth and development to mitigate any effects of this.

The Preferred Alternative is the most effective of all of the alternatives at responding to the purpose and need of reducing highway congestion and minimizing highway travel time. At the other end of the range, it provides a clear transit travel time advantage for the user, avoiding highway congestion. The adaptive nature of the Preferred Alternative over time is the most responsive to anticipated future technological, global and regional changes. For these reasons, the Preferred Alternative has a greater potential to avoid Section 4(f) properties and minimize harm to Section 4(f) properties and other resources.

3.14.13 What will be addressed in Tier 2 processes?

The full Section 4(f) evaluations for projects in the Corridor will be completed during Tier 2 processes. This will include the following steps:

- **Step 1: Conduct continued coordination with the Officials with Jurisdiction.** This will be done to confirm the properties, confirm property boundaries, obtain input on the effects of the project and proposed mitigation, and if a *de minimis* impact is anticipated, obtain concurrence that the impact is indeed *de minimis*. Coordination with the State Historic Preservation Officer will also be done to obtain concurrence with eligibility of a property, with determination of effects and with proposed mitigation. If a “no adverse effect” determination is proposed that will be used to

determine a *de minimis* impact, the State Historic Preservation Officer will be notified of this intention on the part of CDOT and FHWA.

- **Step 2: Identify properties.** Tier 2 will include a step to confirm the eligibility of assumed Section 4(f) properties, including ownership details, property boundaries, and National Register of Historic Places eligibility if the property is a historic property and details from property management plans.
- **Step 3: Collect information needed to determine detailed use by alternative.** This step will include laying the edges of physical disturbance and future right-of-way over the mapping of the property boundaries. This information will then be used to determine whether or not the anticipated use could be classified as a *de minimis* impact. Combining this information with the findings of noise analysis, access analysis, and visual analysis will be used to determine whether or not an alternative could result in a constructive use. If a constructive use occurs, indirect impacts will be examined. Analysis of temporary impacts will be done as well to determine if the conditions for temporary occupancy are met, as defined in 23 Code of Federal Regulations 774.13 (d).
- **Step 4: Conduct Section 4(f) evaluations to determine if a prudent and feasible alternative that avoids the Section 4(f) properties exists**. This evaluation will include the I-70 Mountain Corridor Context Sensitive Solutions measures, alignment shifts, use of tunnels, use of design variances, and other design related measures. Uses of the properties will be considered and compared to the Tier 1 alternatives and this evaluation. If there is a substantial change in properties used, or in the significance of the use, a determination will be made of the need to revisit the Tier 1 decision. This determination will take into account the adaptive nature of implementing the Preferred Alternative.
- **Step 5: Identification of all possible planning to minimize harm.** This step will include development of full mitigation measures as well as other measures to minimize harm
- **Step 6: Development of least harm analysis.** If no prudent and feasible avoidance alternative exists, more than one alternative is developed for Tier 2 processes, and both use Section 4(f) properties, a least harm analysis will be conducted to determine which alternative causes the least overall harm in light of the statute's preservation purpose.

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3.15 Paleontology

3.15.1 What is paleontology and why is it important to this project?

Paleontology, or the study of fossils and ancient life forms, tells the story of the history of life on Earth. Paleontological resources are managed for their scientific and educational values and to promote public enjoyment.

A variety of federal, state, and local regulations and policies protect paleontological resources. These include the National Environmental Policy Act (NEPA), federal Antiquities Act of 1906, National Natural Landmarks Program, Federal Land Policy and Management Act of 1976, and the recently enacted federal Paleontological Resources Preservation Act. Colorado's Historical, Prehistorical, and Archaeological Resources Act, also known as the State Antiquities Act, governs fossils on state-owned lands. As an indication of the importance of paleontological resources in Colorado, the Colorado Department of Transportation (CDOT) maintains a dedicated Paleontology Program to evaluate potential effects on paleontological resources for all construction and maintenance activities.

3.15.2 What study area and process was used on this project to analyze paleontological resources?

The study area for paleontology includes the rock formations surrounding the I-70 Mountain Corridor that may be encountered during construction of the Action Alternatives. Professional paleontologists identified and evaluated these formations to determine those with high or moderate potential to contain scientifically important paleontological resources. This potential is called paleontological sensitivity. Sensitivity analysis relies on four widely accepted paleontological resource assessment criteria developed by the Society of Vertebrate Paleontology, the United States Forest Service, the Bureau of Land Management, and the National Academy of Sciences, respectively. Using these criteria, along with information about the local formation conditions in the Corridor, the paleontologists assigned an overall sensitivity ranking to each of the geologic units in the Corridor. Impact analysis considers the potential disturbance of sensitive geologic units for each alternative.

3.15.3 What agencies have CDOT and FHWA coordinated with and what are their relevant issues?

Qualified paleontologists performed the assessment of paleontological resources in the Corridor. Their assessment included a comprehensive literature review, museum records search, and review of geologic maps. Through these efforts, the paleontologists coordinated with museum and academic professionals who have expertise in the Corridor. In addition, the lead agencies consulted with the Bureau of Land Management and United States Forest Service, who manage a portion of the Corridor's lands and paleontological resources. These organizations and agencies recommended that standard assessment and mitigation strategies be employed on projects in the Corridor but did not raise any specific concerns. Data collection and coordination to identify geologic formations with fossil potential occurred early in the study (2001 to 2003). The characterization of paleontological resources along the Corridor remains current because the geologic formations that may contain fossils are millions of years old and have not changed in the past several years.

3.15.4 What are the areas of paleontology interest identified in the Corridor?

The Corridor includes 40 mapped geologic units. Of these, three are classified as highly sensitive for paleontological resources, and 19 are classified as moderately sensitive. The remaining 18 geologic units have little or no potential for important paleontological resources. As shown in **Figure 3.15-1**, sensitive areas in the Corridor, west to east, generally include the first 42 miles from Gypsum to Vail Pass, the 6.6 miles between Frisco to Dillon, and the last 1.6 miles of the Hogback near C-470. The *I-70 Mountain Corridor PEIS Paleontological Resources Technical Report* (CDOT, August 2010) provides descriptions and sensitivity rankings of all formations.

3.15.5 How do the alternatives potentially affect paleontological resources?

The No Action Alternative does not affect paleontological resources. Action Alternatives could affect paleontological resources if sensitive geologic units are directly disturbed during construction. Impacts on paleontological resources are often highly localized and require more detailed design or even construction to assess fully. Relative conclusions about impacts on paleontological resources, however, can be drawn at Tier 1. Alternatives that include actions along the portions of the Corridor identified as sensitive have a greater potential effect than those that occur in areas of low or no sensitivity. Likewise, alternatives with larger footprints have a greater scope of potential impacts on bedrock than those requiring little bedrock disturbance.

None of the Action Alternatives avoid disturbing important geologic units, which occur generally between mileposts 140 and 192, 202 and 207, and 259 and 260. Curve safety modifications, interchange modifications, and auxiliary lane construction potentially affect sensitive geologic units and are included to some extent in all Action Alternatives. The Highway Alternatives and Bus in Guideway Alternative potentially affect additional resources because of wider footprints required for travel lanes. The Transit Alternatives may have less of an effect because they have a narrower footprint and do not include curve safety modifications common to the other alternatives. The Combination alternatives have higher levels of potential impact because they have both the widest footprints and the longest reaches. The Preferred Alternative initially has impacts similar to those of the Transit Alternatives, under the Minimum Program of Improvements. If the Maximum Program is implemented, the impacts are more similar to those of the Combination Alternatives. As noted previously, however, field survey and additional design information are required to assess impacts on paleontological resources. This work is anticipated to occur in Tier 2 processes and beyond during final design and construction. See the *I-70 Mountain Corridor PEIS Paleontological Resources Technical Report* (CDOT, August 2010) for additional information.

Paleontological resources are affected by direct disturbance to geologic units, and indirect effects are not anticipated.

How does construction of the alternatives affect paleontological resources?

Sensitive geologic formations are disturbed during construction, exposing or damaging important paleontological resources. Impacts of construction are the same as described for direct effects above.

What are the project effects on paleontological resources in 2050?

Paleontological resources are affected by the alternatives when and if sensitive geologic formations are disturbed by construction activities. The effects on these resources relate to the timing of construction of transportation components. The longer timeframe for implementation of the Action Alternatives allows important geologic formations to remain undisturbed longer.

Figure 3.15-1. Areas of Paleontological Sensitivity in the Corridor

3.15.6 What will be addressed in Tier 2 processes?

The Tier 2 process will use information gathered in Tier 1 to focus additional field surveys in areas of high or moderate paleontological potential. The Tier 2 process will include:

- Identification of any newly recorded and/or relocated previously recorded fossil localities,
- An assessment of the scientific importance of identified sites, and
- A recommendation for mitigation if appropriate.

During Tier 2 processes, CDOT will:

- Develop specific and more detailed mitigation strategies and measures, and best management practices specific to each project; and
- Adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.15.7 What are the approaches to programmatic mitigation planning for paleontological resources?

All construction in areas of moderate or high paleontological sensitivity in the Corridor will include pre-construction survey and evaluation, construction monitoring, implementation of a Worker Awareness Training Program, and spot-check monitoring of sensitive formations during construction. All work will be overseen by the CDOT staff paleontologist or other qualified and permitted paleontologist and will follow CDOT's *Paleontology Analysis and Documentation Procedures* (CDOT, 2006). In the event of discovery of unanticipated fossil remains, such as unexpected concentrations of fossils, unusually large specimens, or unexpected discoveries in sediments, all ground disturbances in the area will cease immediately. The qualified paleontologist and appropriate project personnel will be notified immediately to assess the find and make further recommendations.

Mitigation will follow the *Society of Vertebrate Paleontology Standard Guidelines* (Society of Vertebrate Paleontology, 1995) for treatment of sensitive paleontological resources and *CDOT Paleontology Analysis and Documentation Procedures* (CDOT, 2006). **Section 3.19, Mitigation Summary** also presents mitigation strategies.

3.16 Energy

3.16.1 What are the concerns related to energy and why are they important to this project?

Energy is used during the construction and operation of transportation facilities. The energy used in the construction of various facilities is inclusive of the manufacture and transport of materials and equipment and operation of construction equipment. Operational energy consumption is the fuel and electricity used to power the vehicles using the transportation facility. This total energy is based on the vehicle mix and vehicle miles of travel for each alternative evaluated.

Traffic volumes and large elevation changes make energy an important issue in the Corridor.

The past several years were tumultuous ones for world energy markets, with oil prices soaring through the first half of 2008 and diving in its second half. The downturn in the world economy had an impact on energy demand, and the near-term future of energy markets is tied to the downturn's uncertain depth and persistence.

Key Global Energy Issues

- Higher but uncertain world oil prices;
- Greenhouse gas emissions;
- Increasing renewable fuel use;
- Increasing production of unconventional natural gas;
- Shift in transportation fleet to more efficient vehicles; and
- Improved efficiency in end-use appliances.

United States Department of Energy, Energy Information Administration - Annual Energy Outlook 2009

3.16.2 What study area and process was used to analyze energy?

The project footprint was used to analyze energy consumption. The common unit of energy measurement, British thermal units (BTU), was used to determine energy consumption for the I-70 Mountain Corridor. Estimating the number of BTU for Corridor construction can be even more complex given the altitude, the steep grades that have to be overcome, and the abbreviated construction seasons that can result in reduced efficiencies. Construction consumption numbers were developed with an accepted technique using data developed by the Engineering News Record and Caltrans (Talaga et al., 1983). Construction energy consumption for all alternatives having a transit component was evaluated in terms of both track mileage and construction costs. Fuel prices were updated for 2009 and were used to determine operational energy impacts. Both construction and operational energy impacts were determined using 2035 traffic projections.

Operational energy consumption by vehicles operating on the roadway is directly proportional to the number of miles driven. Variables considered include vehicle type, speeds, roadway grades, and fuel economy. Average gas mileage for all vehicles in the traffic stream can be used to convert miles driven to a measurement of energy. The U.S. Department of Energy has data readily available in its *Transportation Energy Data Book* (Davis et al., 2002) that was used to calculate the energy consumption rate per person mile of travel. That document includes a table relating passenger travel and energy use in the U.S. for the year 2000 for various modes of transportation, including automobiles, buses, and rail. Having assimilated information from various sources, and recognizing the empirical nature of this subject and unknown impacts due to other variables, an energy consumption rate of 125,000 BTU per gallon of gasoline and an average gas mileage of 22 miles per gallon (mpg) were used.

Energy consumption for the transit components of each alternative was calculated on various bases. Transit energy usage consists of electrical energy expressed in kilowatt-hours and fuel consumption expressed in gallons of diesel fuel. For the Rail with Intermountain Connection and Advanced Guideway System components, electrical energy consumption was calculated on the basis of RAILSIM 7® Train

Performance Calculator simulation output. However, for the Advanced Guideway System Alternative, the Train Performance Calculator calculated only the propulsion and on-board energy requirements, not the energy required to levitate the trains. That was derived from the Federal Transit Administration (FTA) *Urban Maglev Technology Development Program—Colorado Maglev Project Report* (FTA, 2004) and added to the propulsion energy calculated in this section.

For purposes of determining fuel consumption by the buses (both diesel and dual-mode) off the guideway, a fuel consumption rate of 2.6 mpg was used for the diesel bus and 2.0 mpg for the dual-mode bus. Running time and distance for the segments off the guideway were based on simulations conducted using the VisSim™ software. See the *I-70 Mountain Corridor PEIS Energy Technical Report* (Colorado Department of Transportation [CDOT], August 2010) for more detailed methodology information.

3.16.3 What agencies have CDOT and the Federal Highway Administration coordinated with and what are their relevant issues?

There was no formal coordination with agencies about energy issues in the Corridor. However, as noted in the methodology section, information from the U.S. Department of Energy was used for energy consumption calculations.

Also, guidance from the Environmental Protection Agency is used during the PEIS process. The Environmental Protection Agency's Office of Transportation and Air Quality protects public health and the environment by regulating air pollution from motor vehicles, engines, and the fuels used to operate them, and by encouraging travel choices that minimize emissions. The Environmental Protection Agency produced regulations and standards for

- Controlling greenhouse gases,
- Improving fuel economy for new trucks and cars sold in the U.S., and
- Incorporating more renewable fuels.

3.16.4 What are the areas of energy interest identified in the Corridor?

The Corridor stretches from the Denver metropolitan area to Glenwood Springs and serves as the only viable through route for surface transportation. Traffic volumes vary considerably, with the higher concentration east of the Continental Divide, especially east of Empire Junction.

The Corridor, while generally in rural mountainous terrain, passes through several highly developed areas. It includes major changes in elevation from Denver to the Continental Divide affecting energy consumption. Moving a vehicle from less than 6,000 feet to 11,000 feet involves overcoming an elevation change of 1 mile, at grades as high as 7 percent. This impacts energy requirements and it cannot be concluded that the additional effort to accomplish this can be compensated for by a corresponding decrease in energy needed on the descent, especially as it applies to heavy trucks.

3.16.5 How do the alternatives potentially affect energy?

The alternatives' potential operational and construction energy impacts, as well as impacts in 2050, are discussed below.

This document acknowledges the uncertainty in projecting advances in the following areas:

- Technology;
- Worldwide petroleum demand;

- Status of the oil supply, fuel costs, future public policy regarding energy use, and environmental controls; and
- Changing economies and world markets.

This document attempts to address these uncertainties by evaluating a range of alternatives to develop its forecasts. See the *I-70 Mountain Corridor PEIS Energy Technical Report* (CDOT, August 2010) and **Chapter 4, Cumulative Impacts Analysis**, for more information about the Corridor's cumulative impacts on global issues.

How do the Action Alternatives affect operational energy?

Operational energy consumption is the amount of fuel and electricity used to power the vehicles using the transportation facility. Energy use during operations of any alternative is directly related to the gasoline and diesel consumption of automobiles, trucks, and buses, as well as to the propulsion energy generated for powering transit vehicles. The variation in total operational energy consumption among the alternatives, compared to the No Action Alternative, ranges from no difference in the case of Rail with Intermountain Connection and Advanced Guideway System, to 17 percent higher in the case of the Combination Six-Lane Highway with Diesel Bus in Guideway Alternative. The Preferred Alternative is among the lowest of all alternatives, with expected increases ranging between 6 percent and 7 percent over the No Action Alternative by 2035.

Table 3.16-1 summarizes energy consumption for each alternative, broken down by both transit travel and vehicles on the roadway. Roadway vehicles in any alternative represent the great majority of impacts in terms of energy usage. Because energy consumption can be different for each alternative, the 11 standard alternative groupings were further broken out to show differentiating impacts.

How does construction of the Action Alternatives affect energy?

These impacts are the direct result of the operation of construction equipment, as well as delivery of materials to the site. If the No Action were selected, no action would be taken therefore there would be no energy usage associated with the No Action, which would be an appropriate baseline to compare energy usage of the Action Alternatives. The Minimal Action, Six-Lane Highway (55 or 65 miles per hour (mph)), and Reversible/High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT) Lanes Alternatives are anticipated to have the lowest total construction energy consumption. Less overall construction requires fewer materials and, therefore, less energy consumption. The Preferred Alternative, Advanced Guideway System, Combination Six-Lane Highway with Advanced Guideway System, and Combination Six-Lane Highway with Rail and Intermountain Connection Alternatives are anticipated to have the highest total construction energy consumption. **Table 3.16-2** summarizes the estimated energy consumption for construction of each alternative. Because energy consumption can be different for each alternative, the 11 standard alternative groupings were further broken out to show differentiating impacts.

What are the project effects on energy in 2050?

By 2050, the decreased availability of fossil fuels is likely to affect travel. Potential effects include a change of fuel type resulting in more hybrids and electrically powered vehicles. Reductions in fossil fuel supply could also result in changes in public policy such as a carbon tax or vehicle miles of travel, which could decrease travel overall. Reductions in fossil fuel supply could also result in dramatically increased fuel costs, which could decrease travel overall. Therefore, based on available information about fossil fuel availability, vehicle technology advancements, and the trends from 2035 data related to traffic flow improvement from the Action Alternatives, the Preferred Alternative continues to be among the lowest of all alternatives in operational energy consumption. Because construction of the Preferred Alternative occurs over a longer period of time (2050 rather than 2035), energy impacts from construction are more spread out over time.

3.16.6 What will be addressed in Tier 2 processes?

The Colorado Department of Transportation will conduct more detailed analyses of energy impacts during future Tier 2 processes, which will use the most current data and guidance available. Tier 2 processes will include additional analysis of construction and operational impacts based on the specific improvements and mode(s) selected. This document considered fossil fuel as the primary fuel source when calculating energy consumption. Tier 2 processes will have further consideration of power sources and mixes of energy supply types (renewable/alternative energy, fossil fuel, and other future concepts). Tier 2 processes will also include development of specific best management practices for each project.

3.16.7 What are the approaches to programmatic mitigation planning for energy?

Mitigation strategies for energy impacts will be developed and refined in Tier 2 processes in the context of a specific project. However, mitigation strategies that typically apply to construction projects to reduce impacts are addressed below. Construction and operational impacts will be mitigated through implementation of appropriate best management practices.

Conceptual techniques for mitigation of construction impacts could include the following:

- Limiting the idling of construction equipment;
- Encouraging employee carpooling or vanpools for construction workers;
- Encouraging the use of the closest material sources (for example, aggregate or concrete);
- Locating construction staging areas close to work sites;
- Using cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies);
- Using alternative fuels and asphalt binders; and
- Implementing traffic management schemes that minimize motorist delays and vehicle idling.

Conceptual techniques for mitigation of operational impacts could include the following:

- Carrying out maintenance activities during periods of reduced traffic volumes;
- Encouraging greater use of transit through measures such as incentive programs;
- Working with chambers of commerce or tourist organizations to encourage resort operators to offer incentives for visitors who use transit or who use low emission or alternative fuel vehicles; and
- Promoting carpooling for regular facility users.

Table 3.16-1. Daily Operational Energy Consumption – Based on 2035 Travel Demand

Alternative	Total Transit Energy Use per Day (kWh)	Total Transit Energy Use per Day (Gal)	Daily Transit Energy Consumption (Billion BTU)	Daily Vehicle Miles on Roadway	Daily Gasoline Consumption (Gal)	Total Daily Energy Consumption (Billion BTU)	Total Daily Energy Operations Cost*	Change in Energy Consumption Relative to No Action	Change in Energy Cost Relative to No Action
No Action	N/A	N/A	N/A	7,937,501	360,796	45.1	$939,872	N/A	N/A
Minimal Action	N/A	10,307	1.43	7,886,351	358,470	46.2	$962,778	3%	2%
Rail with IMC	353,893	5,611	1.99	7,602,796	345,582	45.2	$951,396	0%	1%
AGS	480,505	1,691	1.87	7,577,457	344,430	44.9	$950,042	0%	1%
Dual-Mode Bus in Guideway	419,317	6,084	2.28	7,657,130	348,051	45.8	$965,702	2%	3%
Diesel Bus in Guideway	N/A	43,159	5.99	7,668,452	348,566	49.6	$1,029,291	10%	10%
Six-Lane Highway (55 and 65 mph)	N/A	N/A	N/A	8,906,240	404,829	50.6	$1,054,580	12%	12%
Reversible/HOV/HOT Lanes	N/A	N/A	N/A	8,916,457	405,293	50.7	$1,055,790	12%	12%
Combination Six-Lane Highway with Rail and IMC	382,036	5,907	2.12	8,164,669	371,121	48.5	$1,021,573	8%	9%
Combination Six-Lane Highway with AGS	501,607	1,691	1.95	8,119,072	369,049	48.1	$1,016,284	7%	8%
Combination Six-Lane Highway with Dual-Mode Bus in Guideway	334,464	6,886	2.09	8,132,914	369,678	48.3	$1,015,751	7%	8%
Combination Six-Lane Highway with Diesel Bus in Guideway	N/A	45,913	6.38	8,179,969	371,817	52.9	$1,097,598	17%	17%
Preferred Alternative[1]	501,607 - 501,969	1,690 – 1,691	1.95	8,077,130 - 8,119,072	367,142 - 369,049	47.8 – 48.1	$1,011,351 - $1,016,284	6% - 7%	8%

** Electrical energy cost for transit is based on $0.10 per kWh. Diesel energy cost for transit and gasoline cost for cars are based on per gallon costs for the Rocky Mountain Region as posted on the U.S. Department of Energy, Energy Information Administration, website (http://www.eia.doe.gov/oog/info/gdu/gasdiesel.asp), accessed November 2, 2009.*

[1]The Preferred Alternative is presented as a range because the adaptive management component allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Key to Abbreviations/Acronyms

N/A = not applicable kWh = kilowatt-hours Gal = gallons BTU = British thermal units HOV = high-occupancy vehicle
HOT = high-occupancy toll AGS = Advanced Guideway System IMC = Intermountain Connection

Table 3.16-2. Construction Energy Consumption – Based on 2035 Travel Demand, in Billion BTU

Alternative	Number of Transit Track Miles	Civil Construction Energy Consumption	Track Construction Energy Consumption	Total Construction Energy Consumption
No Action	N/C	N/C	N/C	N/C
Minimal Action	N/A	12	N/A	12
Rail with IMC	147	26	3	29
AGS	236	43	5	47
Bus in Guideway (Dual-Mode and Diesel)	N/A	36	N/A	36
Six-Lane Highway 55 mph	N/A	19	N/A	19
Six-Lane Highway 65 mph	N/A	22	N/A	22
Reversible/HOV/HOT Lanes	N/A	20	N/A	20
Combination Six-Lane Highway with Rail and IMC	147	48	3	51
Combination Six-Lane Highway with AGS	236	67	5	71
Combination Six-Lane Highway with Bus in Guideway (Dual-Mode and Diesel)	N/A	46	N/A	46
Preferred Alternative[1]	N/A - 236	58 – 67	N/A – 5	58 – 71

[1]The Preferred Alternative is presented as a range because the adaptive management component allows it to be implemented based on future needs and associated triggers for further action. Chapter 2, Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

Key to Abbreviations/Acronyms

N/C = not calculated N/A = not applicable BTU = British thermal units AGS = Advanced Guideway System
IMC = Intermountain Connection

3.17 Irreversible and Irretrievable Commitment of Resources

3.17.1 What is an irreversible and irretrievable commitment of resources and why is it important to this project?

A resource commitment is considered *irreversible* when direct and indirect impacts from its use limit future use options. Irreversible commitments apply primarily to nonrenewable resources, such as cultural resources, and also to those resources that are renewable only over long periods of time, such as soil productivity or forest health. A resource commitment is considered *irretrievable* when the use or consumption of the resource is neither renewable nor recoverable for future use. Irretrievable commitments apply to loss of production, harvest, or use of natural resources. Irreversible and irretrievable commitments of resources could be incurred as a result of development of specific projects within the Corridor. This analysis is required by:

Sustainability, as defined by the I-70 Mountain Context Sensitive Solutions Working Group, is *an overarching value that creates solutions for today that does not diminish resources for future generations. Ideal solutions generate long-term benefits to economic strength, scenic integrity, community vitality, environmental health, and ecosystems.*

- National Environmental Policy Act (40 Code of Federal Regulations 1502.16);
- Federal Highway Administration's (FHWA) Regulations at Code of Federal Regulations 23 Sections 771 and 777; and
- Guidance provided in FHWA's Technical Advisory T6640.8A.

While the Corridor consists of a mixture of natural and man-made resources, there is a desire to preserve and enhance the existing natural and biological resources. Protection of resources within the Corridor, including the National Forests, and throughout the region is vital, and efforts to sustain and enhance existing resources are an objective of the I-70 Mountain Corridor Context Sensitive Solutions process. The Colorado Department of Transportation is committed to the concept of sustainability to preserve, to the extent possible, vital natural resources in the state of Colorado. Implementation of the Action Alternatives involve a commitment of a wide range of natural, physical, biological, human, and fiscal resources that are irreversible and irretrievable.

3.17.2 What process was used to determine the commitment of resources due to this project?

The process for determining whether or not the proposed action results in an irreversible and irretrievable commitment of resources includes the identification of:

- Existing resources within the Corridor, the region, and the State; and
- Resources needed to build the alternatives.

The lead agencies then determined if the proposed action results in an irreversible or irretrievable loss of the resources.

3.17.3 What are the areas of interest in these resources in the Corridor?

Natural and biological resources were "flagged" as areas of concern within the Corridor. Regionally, there is concern about impacts on diminishing fiscal resources. The I-70 Mountain Corridor Context Statement and Core Values emphasized sustainability as an "overarching value that creates solutions for today that do not diminish resources for future generations." The Context Sensitive Solutions Sustainability

Working Group stated that any solution to transportation problems within the Corridor should "generate long-term benefits in economic strength, environmental health and community vitality."

3.17.4 How do the alternatives affect these resources?

The No Action Alternative has less impact on irreversible and irretrievable commitment of resources. Continued maintenance and operation of the existing I-70 Mountain Corridor, in addition to the planned and funded construction projects within the Corridor, result in an irretrievable and irreversible loss of resources. These projects cause an irretrievable loss of land, construction materials, natural resources, fiscal resources, and labor. In addition, there is a loss of money, time, and transportation user hardship related to loss of mobility and increasing congestion of the Corridor. A decreasing level of service for both auto and truck traffic results in an irreversible commitment of resources associated with cost and time.

Land used in the construction of the transportation improvements associated with any of the Action Alternatives is considered an irreversible commitment of resources because it is unlikely that this land could ever be committed to another use. Parks and recreation resources may be irreversibly lost as a result of land acquisition.

Fossil fuels are irretrievably expended in several ways with implementation of any of the Action Alternatives. Fossil fuels are consumed during the construction of transportation improvements during grading, material movement, and other activities. The fuel and electricity used in the process are dedicated to the improvements.

Construction materials, such as aggregate for concrete and petroleum products used in asphalt and operation of construction materials, are not retrievable. The materials, including, but not limited to, asphalt, steel, aggregates, sand, gravel, and cement, are dedicated to improving the facility and are not available for other uses.

Water resources could also be consumed during construction, although water use is temporary and largely limited to onsite concrete mixing and dust abatement activities.

Irretrievable losses of vegetation and associated animal habitat could occur during construction. Individual animals may experience impacts during project construction and operation.

Historic, cultural, and paleontological resources are nonrenewable, and disturbance of these resources constitutes an irreversible and irretrievable commitment of resources. Access to previously inaccessible areas could lead to vandalism of both known and unknown cultural, historic, and paleontological resources, thereby rendering them irretrievable.

Wetland impacts associated with construction of the Action Alternatives are considered irreversible because the given resource is covered by the transportation facility (such as additional traffic lanes, rail, or guideways).

Impacts on visual resources could constitute an irreversible and irretrievable commitment of resources.

Fiscal resources, such as state and federal funds required for implementation of any of the Action Alternatives, are consumed and unavailable for other projects in the State. Human resources are also required. During construction, members of the labor force, including construction crews, government staff, consultants, and engineers, are dedicated to the project.

Generally, the commitment of resources increases with the size of the program being implemented. Aside from the No Action Alternative, the Minimal Action Alternative has the least commitment of resources. A

range of irreversible and irretrievable commitment of resources associated with the Preferred Alternative occurs during construction. Similar to the No Action and Minimal Action Alternatives, the Advanced Guideway System Alternative does not require the use of resources that the Combination Alternatives require. The Combination Alternatives require the largest commitment of irreversible and irretrievable natural, physical, biologic, labor, and capital resources. The Maximum Program of the Preferred Alternative, if fully implemented, falls within the range of the Combination Alternatives; however, due to the adaptive nature of implementation of the program of improvements, a commitment of resources should only occur based on a proven need.

The irreversible and irretrievable commitment of resources by the improvement of the Corridor is offset by short- and long-term improvements to the regional economic base and achievement of goals to meet the project purpose and need.

3.17.5 What are the project effects on resources in 2050?

By 2050, biological resources could continue to be affected by climate change, continued development, and changing water supply. Habitats and ecological communities may shift toward higher elevations due to increasing temperatures and soil moisture reduction. These changes may mean that fewer habitats are available to irretrievably impact. Effects on land are expected to be similar to 2035, as land should be at or near build-out in 2035. Other growth-limiting factors may control land use, such as water availability and community controls on growth and land use planning, thereby limiting the acquisition of private property The availability of labor may be affected as land prices may rise as communities near build-out, making it harder for construction industry laborers to find affordable housing along the Corridor (see **Sections 3.1** through **3.16** for details of the direct, indirect, and construction impacts for the resources).

3.17.6 What will be addressed in Tier 2 processes?

As projects are defined in greater detail during Tier 2 processes, irretrievable and irreversible commitment of resources will be identified, including, but not limited to, loss of wetlands and water resources, loss of materials incorporated into the transportation facility, loss of park and recreation resources, loss or alterations to historic structures and loss of right-of-way, energy consumption, natural habitats and lands due to implementation of the proposed action.

3.17.7 What are the mitigation strategies for this resource?

Certain resource loss is unavoidable but can be minimized to the extent practicable by employing the concepts of sustainability and best management practices. The I-70 Mountain Corridor Context Sensitive Solutions Working Group developed guidance and criteria for CDOT to incorporate sustainability into the "5-life cycles" of any project on the Corridor. The Colorado Department of Transportation defines the life cycles from planning through operations, maintenance, and monitoring. Each phase has its own set of requirements and expectations. The criteria incorporate sustainability and encourage creative approaches for use beginning at project development through to construction. Each project is rated based on sustainability and adherence to environmentally sensitive practices, and work is rewarded to the projects that reach and exceed expectations. The I-70 Mountain Corridor Context Sensitive Solutions program also developed specialized Engineering Design Criteria for the Corridor to increase the sustainability of the transportation facilities. See the **Introduction** for more information about the I-70 Mountain Corridor Context Sensitive Solutions process.

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3.18 Short-Term Uses versus Long-Term Productivity

3.18.1 What is the relationship between local short-term uses and long-term productivity and why is it important to this project?

The balance or tradeoff between short-term uses and long-term productivity needs to be defined in relation to the proposed activity in question. Each resource must be provided with its own definitions of short-term and long-term (40 Code of Federal Regulations 1502.16).

Short-term impacts and uses of the environment are generally associated with the construction phase of the project. Localized impacts on air quality, water quality, and noise result in short-term losses in revenue for local businesses and cause disruption and inconvenience to local residents. These impacts need to be assessed relative to the long-term gains associated with a project to determine if impacts are generally acceptable or can be mitigated by the benefits of the project.

3.18.2 What process was used to determine the impacts of short-term uses on long-term productivity due to this project?

The process for determining whether or not the proposed action results in short-term uses of resources—which could lead to long-term benefits—considered localized and short-term impacts in the Corridor relative to long-term benefits within the Corridor, the region, and the State.

3.18.3 What are the areas of interest related to short-term uses and long-term productivity in the Corridor?

Short-term impacts on existing noise levels, water quality, air quality, aesthetic surroundings, or economic development are concerns to local and regional stakeholders. Traffic delays during construction could disrupt daily activities for local residents.

3.18.4 How do the alternatives affect short-term uses and long-term productivity?

The No Action Alternative results in greater impacts to long-term productivity than any of the Action Alternatives. Fewer temporary impacts (or short-term uses of resources) are associated with the No Action Alternative. Impacts on long-term productivity associated with ongoing operations and maintenance are negligible. Localized construction impacts due to planned and funded construction projects could occur within the Corridor. Current deficiencies such as congestion and decreased mobility and accessibility remain in the Corridor. Reduced traffic safety, mobility, and possible loss of economic growth opportunities remain.

The Action Alternatives assist in the long-term productivity of the Corridor by improving accessibility and mobility and increasing capacity that allow for long-term economic growth along the Corridor. Air quality improves due to reduced traffic congestion. Long-term economic benefits are realized through improved material and product distribution throughout the State, as well as increased economic activity locally. The Action Alternatives improve safety and overall emergency response times. These long-term beneficial effects of the Action Alternatives outweigh the potentially great, but mitigable short-term impacts on the environment resulting primarily from project construction.

The Highway alternatives and highway portion of the Combination Alternatives result in greater construction impacts on the Clear Creek County communities located along the Corridor, due to the amount of construction required to accommodate these alternatives. Long-term productivity benefits are

realized throughout the Corridor, but it is possible in Clear Creek County that the long-term benefits realized may not totally offset the proportions of the impacts realized by these communities. The Preferred Alternative Minimum Program and Transit Alternatives have less effect on the communities, but there are still impacts on natural resources and delays and disruption due to construction. Due to the adaptive nature of implementation of the program of improvements, construction of the Preferred Alternative should only occur based on a proven need; therefore, construction can be "staged" to minimize some of the short-term uses.

Under the No Action and Minimal Action Alternatives, economic growth is suppressed and that suppression likely continues to 2050.

3.18.5 What are the project effects on resources in 2050?

The exact degree to which short-term uses associated with construction impacts communities between 2035 and 2050 is unknown. Analyses indicate that increased economic growth is delayed if construction is spread out over a longer period of time. The effects of construction, during which time economic growth is slowed, in comparison to the period after construction when the rate of growth increases results in delayed economic revenue to the region and to the State. If construction of the Preferred Alternative occurred intermittently over a longer period of time, average annual economic growth rates may not be as high between now and 2050 as if construction occurred in the near future over a short period of time. The adaptive management approach of the Preferred Alternative allows Corridor improvements to be implemented over time, when communities feel they are able to appropriately manage the indirect effects associated with those improvements. This could be a beneficial effect, slowing economic growth to a rate at which communities can accommodate the associated pressures.

Short-term uses associated with the Action Alternatives include:

- Loss of soil through erosion and fugitive dust
- Temporary disruption of traffic in the proposed construction areas
- Temporary degradation of air quality due to reduced traffic speed through construction zones
- Temporary impacts on businesses and residents as a result of detours or modifications of access and emergency vehicle response time
- Temporary impacts on water resources as a result of increased run-off, chemical compounds, or disturbance of geological substrate during construction
- Decreased trips to recreational areas as a result of congestion and delay associated with construction
- Increased energy consumption during construction
- Temporary visual impacts associated with construction staging during construction for Corridor travelers
- Potential for light and noise pollution affecting adjacent residential areas during construction
- Temporary noise and/or vibration impacts due to construction
- Temporary use of land for construction staging and storage of materials

The long-term benefits associated with the Action Alternatives include:

- Improving safety within the Corridor
- Decreasing the overall travel times within the Corridor
- Improving product and material distribution
- Improving accesses to businesses within the travel corridor
- Improving emergency vehicle access

- Modernizing existing transportation infrastructure to accommodate future demands
- Creating a more environmentally sustainable and aesthetically pleasing corridor
- Improving air quality within the Corridor by reducing traffic congestion

Although localized and temporary impacts occur during construction, they are consistent with the goals of improved long-term benefits and mobility for the Corridor, the region, and the State. Construction impacts are detailed in **Sections 3.1** through **3.16**.

3.18.6 What will be addressed in Tier 2 processes?

As projects are defined in greater detail during Tier 2 processes, additional short-term uses may be identified, including, but not limited to:

- Locations of construction easements,
- Locations of anticipated water quality impacts,
- Locations of noise impacts due to construction,
- Locations of any impairment to parks and recreation resources due to construction, and
- Temporary visual impacts on historic structures due to implementation of the proposed action.

3.18.7 What are the mitigation strategies for short-term uses?

Specific mitigation strategies, such as employment of best management practices, will be identified in Tier 2 processes to offset temporary impacts due to construction near or adjacent to natural, biological, or man-made resources. For resource-specific mitigation strategies, see **Section 3.19, Mitigation Summary**.

Short-term impacts due to construction may be unavoidable, but these can be greatly offset by the long-term productivity associated with the proposed action. Because projects are often identified in the comprehensive planning process, the short-term impacts will normally be consistent with the maintenance and enhancement of long-term productivity because the process takes into account the needs and goals of the communities for land use, transportation, environmental protection, and economic development.

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3.19 Mitigation Summary

One role of this document is to provide general mitigation strategies guiding subsequent Tier 2 National Environmental Policy Act (NEPA) processes and implementation of the Preferred Alternative. These mitigation strategies will undergo necessary refinement as a result of public review and comment on the Revised Draft and Final PEIS, and may become specific mitigation commitments in Tier 2 processes. **Sections 3.1 through 3.18** of this document describe the environmental impacts and resource mitigation strategies for alternatives.

Practical measures were taken throughout this process to identify alternatives minimizing environmental and community impacts. These efforts centered on developing alternatives through the coordination of conceptual planning, design, and environmental studies, with the intent of minimizing alternative footprints. In addition, committees were formed to address issues and mitigation potential associated with sensitive resources. See **Chapter 6, Section 6.3** for more information. These measures are key considerations in design strategies for Tier 2. In Tier 2 NEPA processes, project-specific mitigation is further shaped and implemented with design efforts to further avoid and minimize impacts to the greatest extent possible.

Sections 3.1 through 3.18 describe the environmental impacts and resource mitigation strategies for alternatives. **Table 3.19-1, Mitigation Strategies,** provides a verbatim compilation of the mitigation strategies contained in **Sections 3.1 through 3.18**.

In addition to the mitigation strategies, the lead agencies will comply with all laws and agreements including the following:

1. Employ I-70 Mountain Corridor Context Sensitive Solutions design criteria for engineering and aesthetic guidance to further minimize impacts on communities and the environment.
2. Apply the conditions set forth in the Programmatic Agreement among the consulting parties involving Section 106 of the National Historic Preservation Act.
3. Fulfill responsibilities set forth in the ALIVE Memorandum of Understanding (A Landscape level Inventory of Valued Ecosystem components) to be developed in conjunction with the ALIVE committee comprised of city, county, local, and federal representatives. The ALIVE program provides opportunities to address issues related to improving wildlife movement and reducing habitat fragmentation in the Corridor.
4. Fulfill responsibilities set forth in the Biological Assessment/Biological Opinion to be developed in conjunction with the U.S. Fish and Wildlife Service (USFWS).
5. Mitigation measures will be developed to offset impacts on species identified in the Biological Report for the White River National Forest and the Arapaho and Roosevelt National Forests.
6. Comply with the Section 404(b)(1) guidelines of the Clean Water Act.
7. Engage stakeholders to continue the work of the Stream and Wetland Ecological Enhancement Program (SWEEP) committee to integrate water resource needs (such as water quality, fisheries, wetlands, and riparian areas) with design elements for construction activities and long-term maintenance and operations of the transportation system.
8. Integrate winter storm management and maintenance procedures into any of the proposed improvements. Highway Alternative improvements throughout Clear Creek County will include snow storage areas in select locations to capture snow and other roadway runoff to reduce impacts on adjacent ecosystems.

9. Address specifically identified Total Maximum Daily Load (TMDL) thresholds, and implement the Sediment Control Action Plans developed specifically for Straight Creek and Black Gore Creek to identify methods to control the existing transport of winter sanding materials. Develop Sediment Action Control Plans for other Corridor areas such as the upper reaches of Clear Creek.
10. Develop information systems (such as advertising campaigns to support local businesses, signage with hours of operation, and detour plans) to inform affected communities, I-70 travelers, businesses, and homeowners about construction activities and schedules.

Table 3.19-1. Mitigation Strategies

Resource Topic	Potential Impacts	Mitigation Strategies
3.1, Climate and Air Quality Resources	• Continued vehicular emissions of pollutants of concern globally and locally • Emissions of vehicle and dust generated during construction	The lead agencies will support policies and programs to improve air quality in the Corridor, such as: • Support local jurisdiction efforts, such as those in Clear Creek County, to secure grants to help develop data that will better inform the air quality measurements and mitigation • Support engine idling ordinance to restrict emissions produced from idling auto and commercial vehicles, especially buses, delivery trucks, etc. • Continue to explore highway maintenance strategies to minimize the amount of sand used for winter maintenance and to remove the sand from the roadway to minimize re-entrained dust • Continue to support regional, statewide, and national efforts to reduce air pollutants and comply with current air quality regulations This document acknowledges some issues of air quality, particularly emissions of greenhouse gases, are global issues that are difficult to affect on a project-specific level. As such, the lead agencies are committed to working on these broad issues, as described in **Chapter 4, Cumulative Impacts Analysis**, while also incorporating measures to control air pollutant emissions locally. Because project alternatives are not anticipated to cause or result in violations of any National Ambient Air Quality Standards (NAAQS), most mitigation measures for air quality will center on controlling fugitive dust during construction, operations, and maintenance. Conceptual techniques for mitigation of construction impacts could include the following: • Control fugitive dust through a fugitive dust control plan, including wetting of disturbed areas • Use the cleanest fuels available at the time in construction equipment and vehicles to reduce exhaust emissions • Keep construction equipment well maintained to ensure that exhaust systems are in good working order • Control blasting and avoid blasting on days with high winds to minimize windblown dust from blasting, particularly near community areas • Minimize dust from construction in or near tailing areas • Investigate requirements or incentives for retrofitting construction vehicles and equipment to reduce emissions (e.g., idling equipment) The lead agencies will develop specific and more detailed mitigation strategies and measures, as well as develop best management practices specific to each project during Tier 2 processes. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.

3.19. Mitigation Summary

Resource Topic	Potential Impacts	Mitigation Strategies
3.2, Biological Resources, Vegetation and Wildlife Habitat	• Vegetation and habitat loss due to construction • Disturbance of nesting birds • Downstream impacts to aquatic species	The Colorado Department of Transportation will minimize vegetation and habitat impacts by constructing new roadway and transit facilities in the existing right-of-way to the greatest extent possible and identifying areas of potential habitat restoration, in coordination with the U.S. Forest Service and local entities. Removal of trees and shrubs for implementation of Action Alternatives will be done during the non-nesting periods per the Migratory Bird Treaty Act. Also, mitigation of protected bird and fish species will comply with South Platte Water Related Activities Program and the Platte River Recovery Implementation Program. A Biological Impacts Plan will address habitat sensitivity and cumulative impacts for both protected and unprotected species.
3.2, Biological Resources, Noxious Weeds	• Introduction and/or spread of noxious weeds into lands adjacent to the I-70 Mountain Corridor	The Colorado Department of Transportation will manage the clearing and earthmoving operations to minimize the potential for weeds to infest new areas and/or increase in abundance through the construction disturbance area. This includes the application of best management practices to all construction sites to manage open soil surfaces and topsoil stockpiled for reuse, including landscape and planning designs that incorporate the use of native vegetation and integrated noxious weed controls. The Colorado Department of Transportation will prepare and implement Noxious Weed Management Plans for all projects.
3.2, Biological Resources, Winter Maintenance	• Increased sedimentation and salinization of streams in the I-70 Mountain Corridor	The Colorado Department of Transportation will limit the effects of winter maintenance by controlling the runoff of contaminants and winter maintenance materials to the greatest extent possible. The Colorado Department of Transportation (CDOT) will continue to refine its approach to winter maintenance in an effort to decrease the use of deicers and traction sand. Mitigation strategies will be designed to be complementary to the existing Sediment Control Action Plans on Straight Creek, Black Gore Creek and Clear Creek.
3.2, Biological Resources, Habitat Connectivity and Animal Vehicle Collisions	• A larger highway footprint increases the barrier effect of wildlife movement and the likelihood of animal vehicle collisions	The lead agencies will follow the processes outlined in the ALIVE Memorandum of Understanding to reduce animal vehicle collisions and increase habitat connectivity throughout the Corridor (see **Appendix E**). This includes, but is not limited to, the use of underpasses or overpasses dedicated to wildlife movement, fencing, berms and vegetation to guide wildlife to crossing structures, as well as signage to alert motorists of wildlife presence.
3.2, Biological Resources, Aquatic Habitat	• Increased sedimentation due to erosion and stormwater runoff • Increased channelization due to stormwater runoff • Loss of fish habitat due to construction in and/or adjacent to streams in the I-70 Mountain Corridor.	The lead agencies will follow the processes outlined in the SWEEP Memorandum of Understanding (see **Appendix D**). In addition, the Colorado Department of Transportation will use best management practices and erosion control measures to reduce soil losses, soil inundation, and sedimentation in areas adjacent to the construction area and provide sufficient cross-slope drainage structures during new construction to allow natural hydrologic conditions to be maintained on both sides of the right-of-way. Fish habitat will be restored and replaced, using photo documentation to help return these areas to previous conditions.

Resource Topic	Potential Impacts	Mitigation Strategies
3.3, Wetlands and Other Waters of the U.S.	• Loss of wetlands, fens, and other waters of the U.S. • Reduced function of wetlands, fens, and other waters of the U.S. • Changes in surface and subsurface hydrology and water quality (for example, inflows, sedimentation, and winter maintenance) that result in loss of either area or function • Indirect impacts of sedimentation and stormwater runoff on wetlands and other waters of the U.S. during construction, during road maintenance operation, and post-construction	At the first tier the focus of mitigation is on avoidance and minimization of impacts. Impact avoidance and minimization strategies were incorporated into the development of Action Alternative alignments and design concepts, as outlined in **Section 3.19, Mitigation Summary**, of this document. **Chapter 2, Summary and Comparison of Alternatives**, also listed efforts to avoid and minimize impacts. However, while mitigation activities are expected to avoid and minimize impacts, some impacts on Corridor wetlands and other water resources are still likely. The Colorado Department of Transportation is committed to implementing the SWEEP Memorandum of Understanding as the foundation of mitigation for aquatic resource impacts during projects along the Corridor and its communities (**see Appendix D** for the SWEEP Memorandum of Understanding). The SWEEP Committee will identify and recommend appropriate mitigation strategies, including design, implementation and monitoring, for anticipated environmental impacts likely to occur as a result of redevelopment of the I-70 Mountain Corridor. The SWEEP Committee will coordinate with the ALIVE Committee whose goal is to increase the permeability of the I-70 Mountain Corridor to terrestrial and aquatic species; provide and maintain long-term protection and restoration of wildlife linkage areas; improve habitat connectivity; and preserve essential ecosystem components. Overall mitigation strategies will provide the opportunity to reduce impacts and enhance wetland environments in the Corridor. Impacts on wetlands, and other waters of the U.S. will be addressed more specifically for each project that is evaluated during Tier 2 processes; however, it is CDOT's policy to mitigate all impacts on a one-to-one per acre basis, regardless of whether the wetland is jurisdictional or non-jurisdictional. **Avoidance and Minimization Efforts** • Detailed planning to reduce alternative template width • Use of existing I-70 area • Snow storage areas located to capture snow and roadway runoff Modification of Rail with Intermountain Connection and Advanced Guideway System alignments to avoid impacts on wetlands
3.4, Water Resources	• Increase existing mine waste, tailings, and drainage tunnels impacts (acids, minerals, additives) on watershed water quality through project disturbance of these areas • Increased sedimentation and salt issues due to construction activities or increased road surface requiring winter maintenance Increased metals being released into the watershed due to disturbance of baseline soils	The Colorado Department of Transportation will incorporate the following strategies to minimize and avoid potential environmental impacts on water resources from the proposed project. A more comprehensive discussion of mitigation strategies is found in the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010). • Water quality and water resource mitigation strategy recommendations from the *Draft Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding* (CDOT, et al 2009) (but may be modified in the final MOU) are adopted by CDOT and FHWA for this Programmatic Environmental Impact Statement. The Colorado Department of Transportation is leading the primary effort to initiate the SWEEP facilitating open discussions and working relationships to accomplish stream mitigation goals and providing technical support and funding mechanisms. These mitigation strategies include, but are not limited to, sedimentation control and stream restoration measures. • The lead agencies will work cooperatively with various local, state, and federal agencies and local watershed groups to avoid further impacts on and possibly improve Clear Creek water quality, including management of impacted mine waste piles and tunnels within the Corridor and through the

Resource Topic	Potential Impacts	Mitigation Strategies
	having high contents of these metals or due to increased roadway wash from stormwater runoff • The increase of hydraulic disruption (length of stream alteration) of tributary flows into the main creek, stream, and river channels • The unnatural increase in water flow caused by induced growth in the area that influences the need to import water and the affects of these flows on the natural system	use of appropriate best management practices during storm water permitting. For additional information on minimizing water quality effect from disturbing mine waste, tailings, and drainage tunnels, see **Section 3.6, Regulated Materials and Historic Mining**. • Local watershed initiatives will be incorporated into site-specific Action Alternative mitigation strategies, and mitigation will consider the goals of the local watershed planning entity. Detention basins for the collection of sediment as outlined in the Sediment Control Action Plans developed for the Black Gore Creek and Straight Creek corridors (Clear Creek Sediment Control Action Plan is under development) will be part of the mitigation strategy for this Corridor. Sediment Control Action Plans could be implemented concurrently with development of an Action Alternative, and will consider drinking water source protection. • The Colorado Department of Transportation will mitigate construction impacts primarily through the implementation of a Stormwater Management Plan that proposes appropriate best management practices for erosion and sediment control according to the *CDOT Erosion Control and Storm Water Quality Guide* (CDOT 2002). Appropriate water quality protection best management practices must be in place to protect water quality prior to construction start and remain until the site is stabilized and vegetation has regrown. • Efforts will be included in further design phases to minimize impacts to water quality and other water resources by refining placement of roadway and road piers to avoid impacts when feasible.
3.5, Geologic Hazards	• Existing geologic hazards could be disturbed and exacerbated, adversely affecting safety, service, and mobility due to rockfalls, debris flows, mudflows, avalanches, landslides, and other hazards • Construction could intersect areas of geologic instability (adverse jointing fracture patterns and/or bedding) and create geologic hazards • Boring of new tunnels will generate large quantities of wastes that are difficult to manage and dispose of	The lead agencies will incorporate mitigation strategies learned from previous projects, such as: • Incorporating new design features to minimize slope excavation and follow natural topography. • Use of excavation and landscaping techniques to minimize soil loss and reverse existing erosion problems. • Use of rock sculpting, which involves blasting rock by using the existing rock structure to control overbreak and blast damage, to create a more natural-looking cut. • Use of proven techniques, such as rockfall catchments, mesh, cable netting, and fences, as well as scaling and blasting, to address rockfall from cut slope areas. • Reuse of excavated material from tunnel construction onsite where possible. If materials are used on U.S. Forest Service lands, the lead agencies will follow the *Memorandum of Understanding Related to Activities Affecting the State Transportation System and Public Lands in the State of Colorado among the Federal Highway Administration, Colorado Department of Transportation, Bureau of Land Management, and United States Forest Service*. • The lead agencies will adhere to the *Programmatic Agreement among the Federal Highway Administration, Advisory Council on Historic Preservation, United States Forest Service, Colorado Department of Transportation and State Historic Preservation Officer Regarding Rockfall Mitigation Projects along Interstate 70 within the Georgetown-Silver Plume National Historic Landmark District (2009).*

Resource Topic	Potential Impacts	Mitigation Strategies
3.6, Regulated Materials and Historic Mining	• Potential for impacting and/or acquiring properties contaminated by hazardous waste, petroleum products, and/or mining waste • Potential release of environmental contaminants into adjacent lands and streams from highway accidents and/or construction disturbance • Contamination from existing mine tailings and wastes from historic mines could be encountered in the Corridor	The Colorado Department of Transportation will take the following steps to minimize and avoid potential environmental impacts resulting from regulated materials and historic mine waste: • Minimize property acquisition and disturbance of mine wastes, tailings, drainage tunnels, and areas adjacent to or within active/inactive leaking underground storage tank sites • Minimize impacts on the Clear Creek channel and floodplain both during and after disturbance of mine waste, tailings, and drainage tunnels • Manage mine waste and tailings materials onsite, when possible, to minimize disposal problems and costs • Minimize wind-blown dust from mine tailings on construction sites by wetting or other dust control measures • Manage mine waste and tailings materials under Colorado Department of Public Health and Environment (CDPHE) and Environmental Protection Agency guidance and authority • Manage contaminated soil and groundwater under applicable CDPHE, Environmental Protection Agency, Division of Oil and Public Safety, and CDOT regulations and guidance • Follow CDOT procedures and other applicable guidance for storage and handling of regulated materials, as well as historic mine waste during construction activities • Work cooperatively with various local, state, and federal agencies and local watershed groups to avoid further impacts on and possibly improve water quality • Develop a monitoring and a sampling program, as necessary, to monitor contamination, with consideration of the mining history in the Corridor. Previous studies have identified the need to monitor and sample eight metals regulated under the Resource Conservation and Recovery Act due to extensive historic mining in the Corridor. • Any soil removed during trenching or augering will be conducted in accordance with specified health and safety regulations concerning the handling of soils with heavy metal content. **Leaking Underground Storage Tank Sites** Disturbance of identified l**eaking underground storage tank** sites will require coordination with Division of Oil and Public Safety to ensure proper handling and disposal of contaminated materials (also see CDOT requirements and best management practices below). Construction activities associated with the alternatives may also uncover petroleum contamination from identified l**eaking underground storage tank** sites or from l**eaking underground storage tank** site contamination that was not indicated by research activities (or during subsequent research). Should contamination be discovered, construction activities will be temporarily halted until characterization/storage/disposal/ cleanup requirements can be discussed with the Division of Oil and Public Safety or a professional familiar with Division of Oil and Public Safety procedures and requirements. Non-petroleum contaminants might also be encountered and will be handled under CDPHE Solid Waste or Resource Conservation Recovery Act Hazardous Materials regulations and requirements, and Environmental Protection Agency toxic substances requirements, if applicable.

Resource Topic	Potential Impacts	Mitigation Strategies
		Underground Storage Tank Sites Underground Storage Tanks from existing and historic service stations might also be encountered. Underground Storage Tanks must be removed according to Division of Oil and Public Safety requirements during excavation/construction activities for any of the alternatives where they are affected by the project footprint. Tank removal will include sampling and analysis of underlying soil and soil removal (if necessary) to meet Division of Oil and Public Safety designated standards. **Dewatering** Excavation and grading activities for all of the alternatives, especially those that will include tunnel construction, might encounter groundwater and require dewatering activities. Tunnel construction practices will include consolidation grouting to minimize inflow into the tunnel. However, dewatering activities will be required on the tunnel and at the waste disposal (spoil) areas. Permit acquisition (from CDPHE) for discharge of groundwater into nearby surface water will require water analyses, removal of specific contaminants to CDPHE- and Environmental Protection Agency-approved levels, and lowering of total suspended solids to acceptable levels. Groundwater treatment will be accomplished by filtration, air stripping for volatile compounds, or stage dewatering methods. A permit variance will be necessary for effluent parameter to meet discharge standards. Construction dewatering will require coordination with CDPHE to determine necessary treatment and handling of extracted water before final discharge/disposition. **Acid Rock Drainage** Excavation of road cuts in areas of mineralized rock will have the potential to introduce conditions for the leaching of metals from these excavated materials. Potential areas of mineralized rock requiring excavation will be specifically identified during Tier 2 processes. Tier 2 mitigation plans will ensure that acid rock drainage will not affect Corridor water quality through the implementation of appropriate best management practices and appropriate disposition activities for these materials. **Metal Highway Structures** Disturbance or replacement of highway structures such as painted guardrails, signs, or metal bridge components will require appropriate characterization and disposal according to CDPHE guidelines and requirements. **Colorado Department of Transportation Requirements and Best Management Practices** The Colorado Department of Transportation contractors are required to comply with Section 250, Environmental, Health and Safety Management of CDOT Standard Specifications, when applicable. The specifications provide guidelines and requirements for health and safety measures during construction, the investigation and testing of contaminated materials, and procedures to use if contamination is encountered during construction. All petroleum products and other hazardous materials such as fuel and solvents, used for Action Alternatives' construction purposes will be handled and stored per CDOT best management practices to prevent accidental spillage or other harm to the project area. If suspected hazardous or petroleum products were encountered during construction, samples of the material will be collected and analyzed for metals, hydrocarbons, organic chemicals (volatile or semivolatile organic compounds), and other

Resource Topic	Potential Impacts	Mitigation Strategies
		toxicity and characteristic parameters to determine what special handling and disposal requirements are appropriate. The telephone numbers for medical and emergency services will be maintained onsite. If any unplanned occurrence requires assistance, the site supervisor or designated person will contact the appropriate response team. **Historic Mine Waste** The Colorado Department of Public Health and Environment and Environmental Protection Agency coordination will be required for the handling of mine waste materials, and specific CDPHE and Environmental Protection Agency approval will be required for construction disturbance of sites that are currently designated as National Priority List sites within the Clear Creek/Central City Superfund Area. Other Clear Creek historic mining sites that pose considerable threats to Clear Creek will also require specific regulatory actions under the Comprehensive Environmental Response, Compensation, and Liability Act. Regulatory authority for mine tailings and waste fall under various state and federal programs, depending on where the waste is located and its designation under the Comprehensive Environmental Response, Compensation, and Liability Act. The Colorado Department of Public Health and Environment will be the lead agency (working with Environmental Protection Agency) for regulatory actions at the Clear Creek/Central City Superfund Area, and CDPHE Solid Waste Division will have authority for mine tailings not covered by the Comprehensive Environmental Response, Compensation, and Liability Act. In addition, FHWA encourages "participation in transportation projects that include the use and redevelopment of contaminated sites when appropriate." Alternative implementation might offer a means to clean up contaminants that might not otherwise be addressed by means of the FHWA 1998 Brownfields Economic Redevelopment Initiative. The initiative, administered by Environmental Protection Agency, provides assistance and incentives to agencies for the assessment, cleanup, and economic reuse of contaminated properties known as Brownfields. The Colorado Department of Transportation will attempt to avoid disturbance of mine waste wherever possible. If avoidance is not feasible, CDOT will characterize the mine materials and reuse the material onsite, if possible. Offsite disposal of mine waste materials will be the least desirable mitigation option. Long-term impacts will include the potential to release contaminants from disturbance of mine waste (or other contaminants encountered in soil or groundwater) during construction activities. Such impacts could be avoided with appropriate handling of materials and implementation of state-of-the-practice erosion and sediment control plans. Although contaminant sampling and testing has not yet specifically been performed for mine waste materials within the alternative footprints, it is expected (based on previous studies) that much of these waste materials will have relatively low levels of contaminants and will not be within or from sites requiring specific Comprehensive Environmental Response, Compensation, and Liability Act remedial actions. Such materials may be suitable for construction material uses, including backfill and landscaping. These materials will be stabilized and maintained during and after construction to minimize environmental impacts. In certain cases, highway improvements through proper handling and stabilization of these materials, will serve to enhance environmental conditions in the Corridor.

Resource Topic	Potential Impacts	Mitigation Strategies
		Tier 2 Undertaking • Involve stakeholders in the discussion of mine waste and regulated materials mitigation. • Consider alignments that avoid hazardous materials. • Include mitigation strategies to minimize or reduce metal loads from road construction. • Conduct a thorough analysis of the potential disturbance of acid mine drainage and acid rock drainage and recommend construction methods and best management practices in areas of mineralized rock. • Provide a comprehensive listing and description of regulations for regulated materials, including regulatory requirements for superfund and historic mining materials. • Look at road construction as a source of metal loading in further detail and provide mitigation strategies to minimize or reduce metal loads from road construction. • Develop specific and more detailed mitigation strategies and measures. • Develop specific best management practices for each project. • Provide procedures on identifying, characterizing, and handling waste in the study area. Local authority contact information will also be included in the event waste is encountered. • Adhere to any new laws/regulations. • Update information on regulated materials and historic mining.
3.7, Land Use and Right-of-Way	• The Action Alternatives increase the footprint of the I-70 highway and its interchanges. This impacts properties adjacent to the I-70 highway, primarily in Clear Creek County, as well as U.S. Forest Service lands and special use permits • Induced growth likely occurs in Summit and Eagle counties, and in Garfield County, which is susceptible to changes in Eagle County • Construction workers need temporary housing in the Corridor throughout the construction period. Affordable housing is not available and Corridor communities are concerned about the reuse of housing once construction is complete	The phased approach of the Preferred Alternative provides ongoing opportunities to avoid and minimize impacts to adjacent land use, establish effective mitigation, employ I-70 Mountain Corridor Context Sensitive Solutions, and implement future phases of the alternative based on future needs and associated triggers for further action. Primary mitigation strategies to avoid or reduce direct effects to adjacent properties include design refinement, particularly at interchanges, and physical measures such as the use of retaining walls or elevated structures. The lead agencies will conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act (1970, referred to as the "Uniform Act," as amended in 1987) to provide a consistent policy for fair and equitable treatment of displaced persons. The lead agencies will provide affected individuals with compensation and assistance with finding suitable sites for relocation. Regarding workforce housing, the lead agencies will consider coordinating with local jurisdictions and federal housing authorities to create and implement a Workforce Plan addressing workforce housing needs and permanent housing strategies. The lead agencies will follow U.S. Forest Service standards and guidelines for the protection of federal lands, provided by White River National Forest and Arapaho and Roosevelt National Forests resource specialists. See *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010) for a list of these standards and guidelines categorized by forest and resource. Any deviations from standards must be analyzed and documented in a forest plan amendment; deviations from guidelines require explanation of reasons for the deviations, but not a forest plan amendment. Tier 2 processes will include conceptual mitigation plans for impacts on U.S. Forest Service special use permits, including measures such as maintaining access to permitted areas and uses during construction, relocating permitted structures and utility easements, and minimizing interruptions to service during construction.

Resource Topic	Potential Impacts	Mitigation Strategies
		The Colorado Department of Transportation will consider an approach to promote and assist communities, as possible, in the adoption of more comprehensive, regional growth management plans that can be applied to Tier 2 processes. The recommendations for this approach include exploring the possibility of creating grants for communities that lack the resources to develop a growth plan; working with local councils of government and the Colorado Department of Local Affairs to assist with funding; and promoting the consideration of open space as community separators, or view sheds distinguishing communities, including studies led by the U.S. Forest Service and Bureau of Land Management (BLM). While the lead agencies will consider this type of policy approach, efforts to control growth are greatly dependent on local planning and community political direction.
3.8, Social and Economic Values	• Induced growth likely occurs in Summit and Eagle counties, and in Garfield County, which is susceptible to changes in Eagle County • Construction causes congestion and delay for residents and visitors in the Corridor and restricts visitor access to businesses	The phased approach of the Preferred Alternative allows ongoing opportunities to avoid and minimize economic impacts, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions. Corridorwide coordination, state involvement and support, and localized efforts to control growth and maintain quality of life would improve the ability of Corridor communities to maintain and protect and social and economic values. The lead agencies will coordinate a variety of different construction mitigation strategies with Clear Creek and other Corridor counties. This may include the development of a Tier 2 Public Involvement and Marketing Plan. Tier 2 processes will also include strategies to avoid and minimize construction impacts on Clear Creek communities, such as considerations for peak seasonal traffic (e.g., cessation of construction activities during ski season weekends), accessibility to Idaho Springs businesses, assisting the county with historic tourism marketing, and developing a site-specific Tier 2 interpretive signage plan. Mitigation strategies will also aim to address the disparity in the distribution of benefits and impacts that might result from construction activities. The lead agencies will address safety issues on the I-70 highway, which will reduce the number of crashes on the highway. This will reduce the frequency of emergency response to crashes on the I-70 highway, which will in turn reduce local community emergency services costs. The following list summarizes some of the construction mitigation strategies that would be considered. • Lane restrictions in the peak direction would generally not be permitted during peak periods. • Optimal spacing between work zones would allow traffic flow to recover. • Contractors would be required to demonstrate that there is no reasonable alternative to a proposed lane closure. When lane restrictions and closures are required, CDOT would work with local communities to minimize impacts on local traffic and transit services. If actual total closure and/or stoppage of traffic were needed, they would be advertised and communicated to the public in advance of when they would occur. • Maintain community and business access to the highest degree possible. Information technologies, such as well-placed and highly visible signs, would provide safe and efficient access during construction activities. • Determine an appropriate scheduling approach to day versus night work during Tier 2 processes. • Public concerns about local mobility would be considered in CDOT construction contracts and traffic control strategies.

Resource Topic	Potential Impacts	Mitigation Strategies
		• Public meetings would be held at critical construction phases to provide information and discuss mitigation strategies. Construction information exchange centers would be provided in the Corridor for public input and up-to-date construction information. • Public information strategies would include media advisories, variable message signs, advance signs, a telephone hotline, real-time web cameras, the use of intelligent transportation systems and technology in construction work zones, a construction project website, and alternate route advisories. • As each construction phase was undertaken, CDOT would work with communities to identify community representatives. These persons would partner in the construction traffic control program and provide assistance/feedback to the traffic control team. • Emergency responders would be provided traffic control contact information. In an emergency, responders would contact the traffic control office, provide their approximate arrival time at the construction zone, and traffic control could provide a clear path through the construction zone. • Effective directional signage would be provided. • The Colorado Department of Transportation would be sensitive to blockage during prime business hours. • Outreach to impacted businesses would occur as early as possible prior to any construction. • Business relocation opportunities would be identified. • Coordination with local chambers and town economic offices would occur to help develop promotional strategies during construction. A specialized web site would be established for businesses to access construction schedules that might affect their businesses.
3.9, Environmental Justice	• No disproportionate adverse effects to communities on a Corridorwide level • Potential for pockets of minority- or low-income populations to be affected, particularly near proposed facilities and construction	At the Corridor level, no disproportionate adverse impacts to minority- or low-income populations were identified, but mitigation strategies for social and economic resources will apply to all communities in the Corridor and also would benefit minorities and low-income populations. If Tier 2 processes conclude that disproportionately high or adverse impacts would occur to low-income or minority populations, CDOT will work to avoid, minimize, or mitigate such impacts. Tier 2 processes that occur in populated areas will consider pockets of minority and/or low income populations that may require additional attention and/or mitigation for issues such as localized air quality impacts, noise impacts, shading from elevated structures or walls, residential and business relocations, changes in access or travel patterns, and loss of community cohesion.
3.10, Noise	• Without noise mitigation, projected noise levels exceed noise abatement criteria (NAC) in some areas of the Corridor under most or all alternatives. • During construction, intermittent noise from diesel-powered equipment ranges from 80 to 95 dBA at a distance of 50 feet.	The lead agencies do not propose any specific mitigation strategies at this time but will consider a full range of mitigation options in Tier 2 processes to reduce highway noise for impacted communities. See the *I-70 Mountain Corridor PEIS Noise Technical Report* (CDOT, August 2010) for details. Mitigation options to be considered include noise walls, noise berms, concrete barriers, creation of noise buffer areas, enforcing engine compression brake muffler use, noise insulation of buildings, pavement type, active noise control, cut and cover, tunnels, and adjusting vertical and horizontal alignments. The Federal Highway Administration does not consider pavement type as noise mitigation at this time, because the long-term effectiveness of pavement types in noise mitigation has not yet been proven.

Resource Topic	Potential Impacts	Mitigation Strategies
	Impact equipment such as rock drills and pile drivers generate louder noise levels.	Active noise control and cut and cover tunnels are also not considered as noise mitigation by FHWA, although CDOT may consider them in addition to other federally-approved noise mitigation measures. The lead agencies will follow I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Guidelines and consider landscaping and vegetated berms for noise mitigation during design. The Colorado Department of Transportation will work with local planning agencies to minimize noise effects on planned development in the Corridor. Generally, the most practical noise mitigation strategy to avoid or reduce direct effects in the Corridor includes the construction of noise barriers. In some areas, topography may reduce the effectiveness of noise barriers—for example, when receptors sit higher than the road—and Tier 2 processes will conduct project-specific noise analyses to determine where noise barriers would be effective mitigation. Other strategies to mitigate noise impacts, such as land acquisition for buffer zones and altering the horizontal and vertical alignment, are effective but may be less practical in the Corridor because of topographic and development constraints. Construction noise impacts could be mitigated by limiting work to certain hours of the day when possible, requiring the use of well-maintained equipment, and other strategies.
3.11, Visual Resources	• Alternatives change landscape setting and scenery in sensitive viewsheds • Change within sensitive viewsheds: ▪ Adjacent to the interstate (views from communities and recreation areas) ▪ From the interstate itself (views from I-70) • Compliance with U.S. Forest Service and BLM visual resource management prescriptions	Mitigation strategies for visual resources will be defined in Tier 2 processes in coordination with Corridor communities and will focus on reducing visual contrast associated with implementation of Action Alternatives. Any Tier 2 process involving transit will impact the entire Corridor. Because visual contrast is most closely associated with the addition of structural elements and changes to landform characteristics, mitigation measures will consider efforts to minimize impacts related to both landform and structures. Development of mitigation strategies will involve the review of U.S. Forest Service and BLM and other jurisdictions' visual standards. The lead agencies will refer to the I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Guidelines and create a site-specific Tier 2 Aesthetic Plan and Lighting Plan. Additionally, the lead agencies will consider creation of Visual Impact and Mitigation Plan for each Tier 2 process that addresses: • Past visual impacts and scarring • Project-related visual impacts • Consideration of mitigation strategies for both that includes: ▪ Review and consideration of all U.S. Forest Service, BLM and other jurisdictions' visual standards (as agreed to or amended) ▪ Non-obstructed views of narrow canyons to valleys, rivers, etc. • Adopt rock fall mitigation measures • Minimal use of signage, light poles, guard rails, or other infrastructure elements, where safety permits • Use of vertical and horizontal alignments to preserve views of items such as rivers, canyons, etc. • Use minimum amount of road cuts, fills, turnarounds, etc.

3.19. Mitigation Summary

Resource Topic	Potential Impacts	Mitigation Strategies
3.12, Recreation Resources and Section 6(f) Evaluation	• The Action Alternatives increase the footprint of the I-70 highway and its interchanges, impacting recreation resources adjacent to the Corridor. • Induced growth in the Corridor and induced recreation trips by visitors from outside the Corridor increase the use of recreation resources accessed by the I-70 highway. • Construction temporarily restricts access to some recreation resources and temporarily closes or detours some trails and bike paths. Construction causes congestion and delay for recreation visitors traveling on the Corridor.	The phased approach of the Preferred Alternative allows for ongoing opportunities to avoid and minimize impacts to recreation resources, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions. Primary mitigation strategies to avoid or reduce direct effects to recreation resources include replacement or enhancement of functions of parklands or trails; design efforts to minimize the area of impact; and realignment of affected trails. The lead agencies will consider principles applied to the Glenwood Canyon recreation resources—including the bike path, hiking amenities, and river access—during development of mitigation for impacted recreation resources elsewhere in the Corridor. The lead agencies must mitigate any impacts to Section 6(f) resources with replacement lands of equal value, location, and usefulness as the impacted lands. Other strategies to mitigate direct impacts may include the following: facilitate efficient access to recreation sites from transportation networks; include outdoor recreation and tourism in the CDOT regional planning processes; consider intermodal transportation networks and transportation hub development; consider off-peak use incentives; consider river access "hot spots" mitigation actions; increase the capability to access recreation sites on mountain passes from road networks. Mitigation of indirect impacts would include strategies outlined in the *Statewide Comprehensive Outdoor Recreation Plan* (Colorado State Parks, 2008) and U.S. Forest Service consideration of forest management plans and the continuing and evolving use of forest management techniques. The availability of resources and funding for implementation of recreation and forest management techniques is a major factor in the accommodation of increased visitation and protection of recreation resources. The *Statewide Comprehensive Outdoor Recreation Plan* suggests these goals can potentially be achieved by establishing funding partnerships through regional collaborative forums and through state/federal cost-share agreements to renovate federal properties. Mitigation of construction impacts on bike paths, trail heads, and other recreational amenities would include maintaining pedestrian and bicycle access during construction and addressing special events to maintain access during those times. Mitigation strategies to accommodate the demand for recreation-oriented trips on the I-70 highway during construction include minimizing lane closures or reductions during peak travel weekends. **Section 3.8, Social and Economic Values**, provides additional mitigation strategies for providing timely and accessible public information on construction activities.

Resource Topic	Potential Impacts	Mitigation Strategies
3.13, Historic Properties and Native American Consultation	• All Action Alternatives affect historic properties directly and indirectly. • Based on currently identified properties, between 46 and 68 historic properties could be directly affected by one or more of the Action Alternatives. • Additional properties are affected by the change in visual setting in the Corridor that has an adverse effect on the historic character and integrity of the Corridor and individual properties.	Historic context is one of the core values of the I-70 Mountain Corridor Context Sensitive Solutions process, and the lead agencies, in cooperation with the State Historic Preservation Office (SHPO), are developing documentation for seven dominant historical themes in the Corridor. The lead agencies commit to using this context on future projects to guide and inform evaluation of historic properties in the Corridor and will consider historic context in developing designs for future projects in the Corridor. Mitigation for effects to historic properties will not occur until Tier 2 processes when historic properties are identified through intensive survey and enough information is available to determine effects to those properties. Strategies for mitigation and Section 106 compliance for Tier 2 processes are well defined in two relevant Programmatic Agreements: • Strategies for consultation, treatment, monitoring, and recovery for sites of importance to tribes are described in the Section 106 Tribal Consultation Process for the I-70 Mountain Corridor Programmatic Agreement. • The I-70 Mountain Corridor Project Programmatic Agreement (included in **Appendix B**) stipulates how consultations will occur and how each phase of the Section 106 process will be carried out in Tier 2 processes. Mitigation strategies for historic properties are included in Section VI of the Programmatic Agreement (Resolution of Adverse Effects). The lead agencies will develop specific and more detailed mitigation strategies and measures, and develop best management practices specific to each project, during Tier 2 process. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway. The lead agencies will develop specific and more detailed mitigation strategies and measures, and develop best management practices specific to each project, during Tier 2 process. The lead agencies will also adhere to any new laws and regulations that may be in place when Tier 2 processes are underway.
3.14, Section 4(f) Evaluation	**Potential Use of Section 4(f) Properties** • Historic: ▪ Properties listed on or eligible for the National Register of Historic Places ▪ NHL ▪ Properties listed on or eligible for the SRHP • Parks, Recreation Areas and Wildlife Refuges: ▪ Recreations Areas ▪ Wildlife Refuges ▪ Trails ▪ River Access	Actions have been taken at this Tier 1 level to ensure that opportunities to minimize harm are not precluded in subsequent Tier 2 processes. These actions include development of the Programmatic Agreement for complying with Section 106 of the National Historic Preservation Act and development of the I-70 Mountain Corridor Context Sensitive Solutions process. **All Possible Planning to Minimize Harm/Mitigation** • Development of the Programmatic Agreement for complying with Section 106 of the National Historic Preservation Act. See mitigation strategies for 3.13, Historic Properties and Native American Consultation. • Development of the I-70 Mountain Corridor Context Sensitive Solutions process and a commitment to implement I-70 Mountain Corridor Context Sensitive Solutions principles in Tier 2 processes. **All Possible Planning for Tier 2 Processes** • Design modifications to avoid or minimize use • Replace land or facilities of comparable value and function • Provide monetary compensation to enhance remaining property

Resource Topic	Potential Impacts	Mitigation Strategies
		• Promote agreements with Officials with Jurisdiction over historic sites on preserving activities, features or attributes • Encourage joint planning/development of I-70 improvements and future recreational properties
3.15, Paleontology	Paleontological resources could be disturbed during construction activities that affect sensitive geologic units. Damage would be permanent.	All construction in areas of moderate or high paleontological sensitivity in the Corridor will include pre-construction survey and evaluation, construction monitoring, implementation of a Worker Awareness Training Program, and spot-check monitoring of sensitive formations during construction. All work will be overseen by the CDOT staff paleontologist or other qualified and permitted paleontologist and will follow CDOT's *Paleontology Analysis and Documentation Procedures* (CDOT, 2006). In the event of discovery of unanticipated fossil remains such as unexpected concentrations of fossils, unusually large specimens, or unexpected discoveries in sediments, all ground disturbances in the area will cease immediately. The qualified paleontologist and appropriate project personnel will be notified immediately to assess the find and make further recommendations. Mitigation will follow the *Society of Vertebrate Paleontology Standard Guidelines* (Society of Vertebrate Paleontology, 1995) for treatment of sensitive paleontological resources and *CDOT Paleontology Analysis and Documentation Procedures* (CDOT, 2006).
3.16, Energy	• Increased vehicle miles of travel • Increased use of fuel and materials (for example, aggregate) during construction	Mitigation strategies for energy impacts will be developed and refined in Tier 2 processes in the context of a specific project. However, mitigation strategies that typically apply to construction projects to reduce impacts are addressed below. Construction and operational impacts will be mitigated through implementation of appropriate best management practices. Conceptual techniques for mitigation of construction impacts could include the following: • Limiting the idling of construction equipment; • Encouraging employee carpooling or vanpools for construction workers; • Encouraging the use of the closest material sources (for example, aggregate, concrete); • Locating construction staging areas close to work sites; • Using cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies); • Using alternative fuels and asphalt binders; and • Implementing traffic management schemes that minimize motorist delays and vehicle idling. Conceptual techniques for mitigation of operational impacts could include the following: • Carrying out maintenance activities during periods of reduced traffic volumes; • Encouraging greater use of transit through measures such as incentive programs; • Working with chambers of commerce or tourist organizations to encourage resort operators to offer incentives for visitors who use transit or who use low emission or alternative fuel vehicles; and • Promoting carpooling for regular facility users.

Resource Topic	Potential Impacts	Mitigation Strategies
3.17, Irreversible and Irretrievable Commitment of Resources	• Permanent loss of resources	Certain resource loss is unavoidable, but can be minimized to the extent practicable by employing the concepts of sustainability and best management practices. The I-70 Mountain Corridor Context Sensitive Solutions has developed specialized Engineering Design Criteria for the I-70 Mountain Corridor which will increase the sustainability of the transportation facilities during the "5-life cycles" of any project on the Corridor (see the Introduction to this document for more information about the I-70 Mountain Corridor Context Sensitive Solutions process). Each project is rated based on sustainability and adherence to environmentally sensitive practices and work is rewarded to the projects that reach and exceed expectations.
3.18, Short-term Uses Versus Long-term Productivity	• Short-term construction impacts to natural and human resources	Specific mitigation strategies, such as employment of best management practices, will be identified in Tier 2 processes to offset temporary impacts due to construction near or adjacent to natural, biological or man-made resources. Short-term impacts due to construction are unavoidable, but these can be greatly offset by the long-term productivity associated with the proposed project. Because projects are often identified in the comprehensive planning process, and because of the I-70 Mountain Corridor Context Sensitive Solutions guidance, the short-term impacts will attempt to be consistent with the maintenance and enhancement of long-term productivity. This planning process and guidance takes into account the needs and goals of the communities for land use, transportation, environmental protection and economic development.

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Chapter 4. Cumulative Impacts Analysis

4.1 What is in Chapter 4?

Chapter 4 describes the approach used to assess cumulative impacts for the project, and the results of this analysis. The chapter provides information describing the impacts of past and present actions on resources of concern, along with the possible future impacts of other reasonably foreseeable future actions, both with and without I-70 Mountain Corridor improvements.

4.2 What are cumulative impacts and why are they important?

Federal regulations in 40 Code of Federal Regulations 1508.7 define cumulative impacts as those that:

- Result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.
- Can result regardless of what agency (federal or non-federal) or person undertakes such other actions.
- Can result from individually minor but collectively significant actions taking place over a period of time.

It is difficult to predict future conditions because of unforeseen events and changes in technologies and evolving economic cycles. The Colorado Department of Transportation (CDOT) examines cumulative impacts to determine if any resources are reaching a level where there may be a fundamental change in the health of the resource because of its overall capacity to support a population (from a biological standpoint), its ability to rejuvenate itself, or its ability to serve in the same role it has in the past.

This analysis examines direct and indirect actions occurring as a result of the proposed actions and how they affect the resources of concern. These impacts are additive and do not always result in a one-to-one relationship but rather can compound the degree of effect.

The focus of this first tier assessment is to evaluate the inter-relationships between the transportation network and community values and environmental resources within the Corridor and surrounding counties, National Forests, and watersheds; and to identify possible cumulative impacts that may result from reasonably foreseeable future actions, from project alternatives, and from both of those combined.

This cumulative impact assessment describes possible future land use and socioeconomic growth scenarios that alternatives could impact, including the potential environmental consequences of inducing growth beyond local agency planning and the population and employment projections for the Corridor.

This is not a standard cumulative impact analysis approach, but due to the overarching concern about induced growth and its contribution to cumulative effects, this analysis focused on the effects to resources from travel demand, population increases and development associated with the Action Alternatives.

Additional and more localized cumulative impact assessments will be completed during Tier 2 NEPA processes.

4.3 What resources are examined as part of the cumulative effect analysis?

Lead agencies examined the resources during the 2000 and 2001 project scoping, which is a part of the National Environmental Policy Act (NEPA) process when project critical issues are identified. **Table 4-1** includes information on the resources of concern identified during scoping. A primary concern was the potential for the Action Alternatives to induce growth, or increase the potential for development and population increases to occur.

Table 4-1. Cumulative Impacts Issues

Resource	Cumulative Impact Concerns
Air Quality	• Increased emissions due to increased congestion and/or vehicles on I-70 • Increase in dust and particulates from Interstate 70 (I-70) winter maintenance and sanding • Increased emissions due to possible induced growth • Impacts of global climate change
Biological Resources	• Fragmentation of habitat resulting from induced growth • Hindrance of wildlife movement due to barriers • Habitat loss due to planned development • Disturbance of habitat and wildlife from collisions and winter maintenance • Negative effects on "high-value" fisheries as defined by the Colorado Division of Wildlife
Wetlands	• Increased sedimentation, runoff rates and contaminants resulting from additional lanes, winter maintenance and induced growth • Loss of wetlands and decreases in functional value from changes in hydrology and increases in sedimentation, runoff rates, and exposure to contaminants
Water Resources	• Decrease in water quality due to winter roadway maintenance, stormwater runoff from development and highways, and historic mining activities • Demands on water supply from growth • Physical impacts on streams (e.g., changes to stream form and structure, encroachment, channelization) • Impacts on stream hydrology and habitat
Social and Economic Values and Land Use	• Effects on the regional economy from induced growth or development • Growth-related impacts on local communities • Impact of decreased water quantity and quality on future growth.
Recreation	• Increased access to recreational areas and associated effects to natural resources • Increased pressure for visitations to national forests
Visual Resources	• Changes in views and the "rural character" of the landscape for travelers, recreational users and residents
Historic Communities	• Increased access to and pressure on historic areas and communities (National Historic Landmark District, Historic Districts, and potential historic areas)

Issues raised that were not included in the Cumulative Impact Analysis include geologic hazards, paleontological resources, and energy. While geologic hazards, including rock fall areas, are of considerable concern in the Corridor, they were not included in the cumulative impact analysis because CDOT has implemented extensive mitigation programs to reduce the risks of these hazards. Paleontological resources were not included due to federal laws and state regulations protecting fossils, and standard mitigation procedures required during construction activities. Energy related issues were evaluated with a greenhouse gas emissions analysis included in **Section 3.1.5**, **Air Quality**.

4.4 What is the geographic scope for cumulative impact analysis?

Figure 4-1 shows the geographic scope of the cumulative impact analysis. The study area encompasses portions of the Eagle River, Blue River, and Clear Creek watersheds that are adjacent to the Corridor, as well as future development areas, based on a review of local zoning and future land use plans. This watershed-based approach allows for assessment based on natural (rather than political) boundaries and makes it possible to connect upstream impacts to downstream effects.

4.5 What is the time frame for cumulative impact analysis?

The time frame begins from the period well before construction of I-70 (in the 1960s) and extends to 2050. This duration includes the influences of historic mining in Clear Creek County, as well as impacts that have persisted from the period before the Corridor was built to the projected horizon year time frame of 2050.

By 2050 various global, national and regional trends could result in changes in current conditions that could affect travel in the Corridor. Climate change, population growth, changing demographics and availability of fossil fuels are major trends with potentially far-reaching results. The potential effects of climate change include:

- Increased demands for water for agriculture; and increased potential for drought, along with nonrenewable groundwater supply shortages, which could combine to create a water gap that could potentially result in noticeably slowing the rate of future development in the Corridor. *Water and the Colorado Economy (*Front Range Water Council, December 2009).
- Increased water temperatures and changes in the patterns of precipitation, which could increase sediment load in surface waters. *Climate Change in Colorado* (University of Colorado, 2008).
- An increase in the likelihood of insect outbreaks and invasive plant species. *Climate Change and Aspen: An Assessment of Impacts and Potential Responses* (Aspen Global Change Institute, July 2006). The outbreak of mountain pine beetle is an example of this outcome, along with associated subsequent major changes in plant and animal communities, rates of surface water runoff, and degradations of water quality.
- Potential effects to economic conditions due to reduced snow pack and a decreased length of the skiing season, including reductions in skier visits. This could result in reductions in direct ski operations, businesses serving the ski industry, and residential investments (second homeowners).
- Higher stream temperatures and low instream flows, which could affect aquatic ecosystems and recreational fisheries.

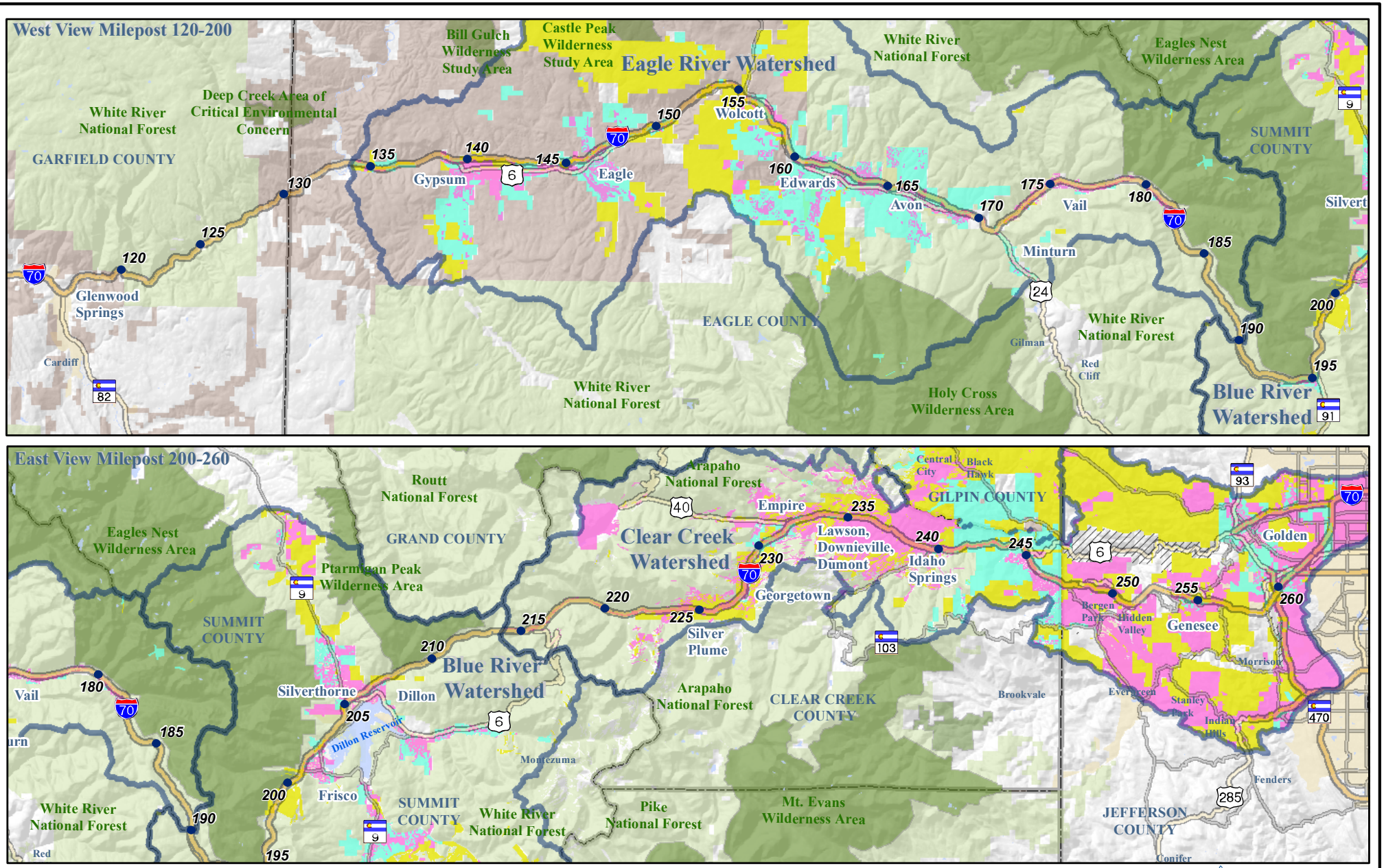
Ongoing population growth could place further strains on water supply, water quality, natural plant and animal communities, and Corridor recreation resources. Population growth also places increasing demands on resources outside of Colorado, which can affect natural systems in the Corridor, such as dust from energy development in eastern Utah. The changes in demographics occurring now have already affected skier visits and changed recreational patterns.

The decreased availability of fossil fuels is likely to affect travel by 2050. A potential effect is a change of fuel type, resulting in more hybrids and electrically powered vehicles. Reductions in supply could also result in changes in public policy, such as a carbon tax or vehicle miles traveled fee, which could decrease travel overall. Reductions in supply could also result in dramatically increased fuel costs, which could decrease travel overall.

The effectiveness of fuel and vehicle emissions controls could reach their peak in 2035; resulting in emissions of many air pollutants by 2050 that are more directly related to the number of vehicles and the amount of travel overall, rather than the effectiveness of emissions controls.

Elected officials representing the I-70 Mountain Corridor communities have recognized these trends and have already started altering some policies (such as programs to support local transit, promote energy efficiency, and reduce emissions, waste, and consumption) to respond to them. By 2050 changes in policies at the statewide or local jurisdiction level are expected to include policies to conserve water, to increase water infrastructure projects, to encourage more clustering of development, to protect water quality, to protect rural mountain character and historic integrity, to control or slow development trends, or to develop other “sustainable” policies.

Chapter 3 further discusses possible changes by 2050 to specific resources assessed in this chapter.


West View Milepost 120-200
Bill Gulch Wilderness Study Area
Castle Peak Wilderness Study Area
Eagle River Watershed
White River National Forest
Eagles Nest Wilderness Area
Deep Creek Area of Critical Environmental Concern
White River National Forest
GARFIELD COUNTY
SUMMIT COUNTY
Gypsum
Eagle
Wolcott
Edwards
Avon
Vail
Minturn
Silverthorne
Glenwood Springs
Cardiff
EAGLE COUNTY
White River National Forest
Gilman
Red Cliff
Holy Cross Wilderness Area
Blue River Watershed
East View Milepost 200-260
Routt National Forest
Arapaho National Forest
Central City
Black Hawk
GILPIN COUNTY
Eagles Nest Wilderness Area
GRAND COUNTY
Ptarmigan Peak Wilderness Area
Empire
Clear Creek Watershed
Lawson, Downieville, Dumont
Idaho Springs
Georgetown
Golden
SUMMIT COUNTY
Silver Plume
Blue River Watershed
Vail
Silverthorne
Dillon
Dillon Reservoir
Arapaho National Forest
CLEAR CREEK COUNTY
Brookvale
Bergen Park
Hidden Valley
Genesee
Morrison
Evergreen
Stanley Park
Indian Hills
Montezuma
Frisco
SUMMIT COUNTY
White River National Forest
Pike National Forest
Mt. Evans Wilderness Area
Fenders
JEFFERSON COUNTY
Conifer
Red
Legend
Mileposts
Limited Access Highways
Major Highways
Highways
Lakes
County Boundary
Urban Areas
Land Jurisdiction
USFS Land
BLM Land
Wilderness Areas
State Land
Development Status
Existing Development
(includes mining - Clear Creek Co.)
Planned Rural Development
Planned Urban Development
Protected Lands
0
3.31
6.62 Miles
Scale - 1:420,000
or 1" = 6.62 Miles
I-70 Mountain Corridor PEIS
DOT
U.S. Department of Transportation
Federal Highway Administration
CUMULATIVE IMPACTS STUDY AREA

4.6 What methods were used to estimate cumulative impacts?

Historic (1957) aerial photographs show changes to communities and resources in the Corridor. As an example, the two aerial photos in **Figure 4-2a and Figure 4-2b** illustrate changes in the Georgetown area caused by the development of I-70 to its current state (in 2000). Photos shown in **Figure 4-3** illustrate changes to the Georgetown area from 1901 to the present. The *I-70 Mountain Corridor PEIS Cumulative Impacts Technical Report* [CDOT, August 2010] has photo illustrations of other areas.

Because the development of the Corridor has influenced development patterns in the Corridor over the past 30 years, the cumulative analysis focused on how different alternatives would continue to affect these patterns. This involved assessing the different types of changes the alternatives would have on travel demand, population increases, and development.

The Colorado Department of Transportation gathered information from the various local jurisdictions along the Corridor on reasonably foreseeable future projects, as well as information on planned future build-out development. Reasonably foreseeable future projects are those that are sufficiently likely to occur, that a person of ordinary prudence would take into account in making a decision. Possible future projects that are considered too speculative were not included. The planned future build-out gave an estimate of a maximum area of future physical disturbance, which would encompass the reasonably foreseeable future project's impacted area.

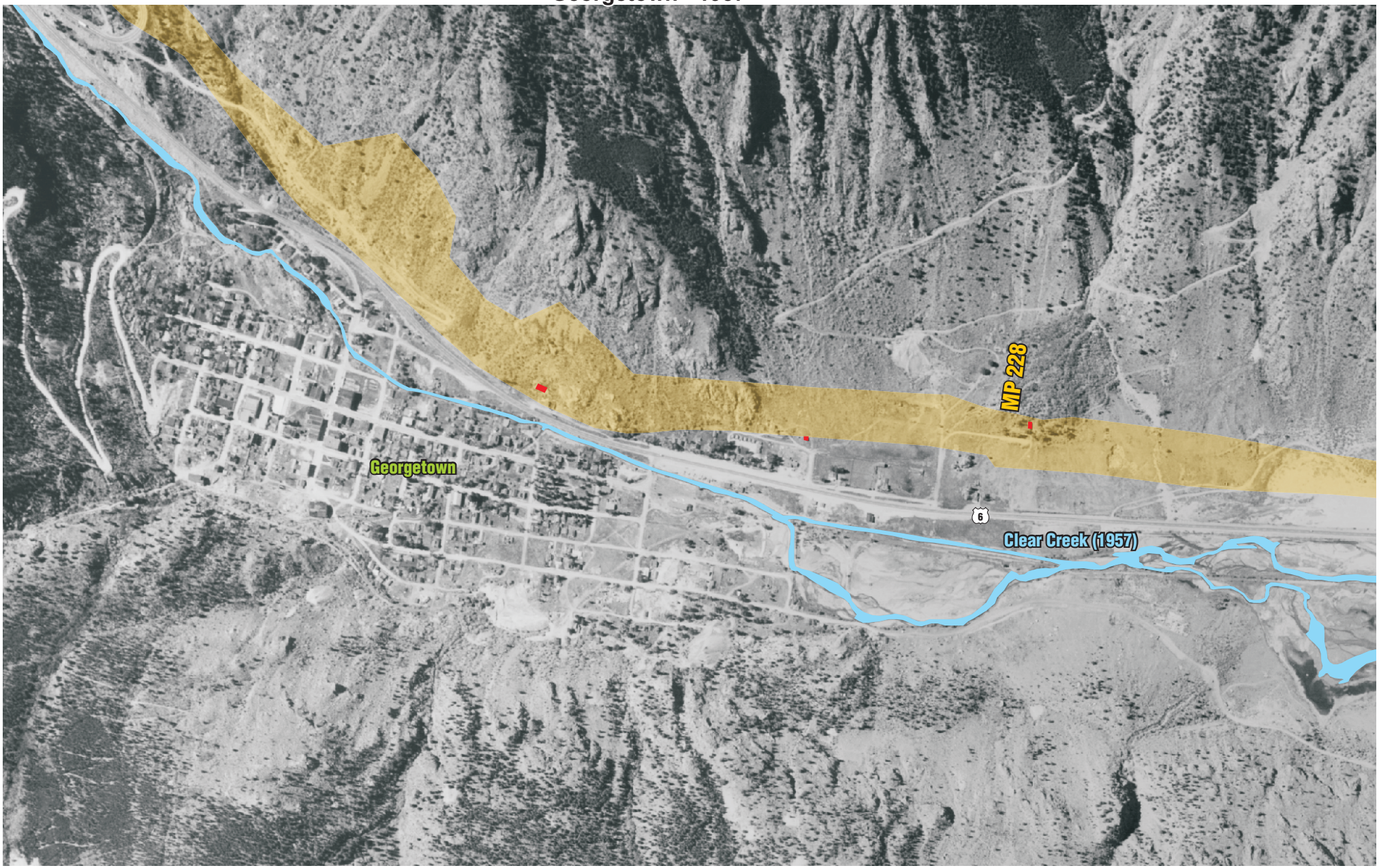
The *I-70 Mountain Corridor PEIS Cumulative Impacts Technical Report* (CDOT, August 2010) has detailed descriptions about how the lead agencies assessed the induced growth effects of the various alternatives.

Various time frames were used to collect and analyze data describing the affected environment and to project future conditions. Specific assumptions by resource can be found in the following sections of this document:

- Land Use (see **Section 3.7**)
- Biological Resources (see **Section 3.2**)
- Wetlands (see **Section 3.3**)
- Water Resources (see **Section 3.4**)
- Social and Economic Values (see **Section 3.8**)
- Recreation Resources (see **Section 3.12**)
- Visual Resources (see **Section 3.11**)
- Historic Resources (see **Section 3.13**)
- Air Quality (see **Section 3.1**)

4-2a. Changes That Have Occurred in the Georgetown Area with the Development of I-70 to Its Current State (in 2000)

Georgetown - 1957

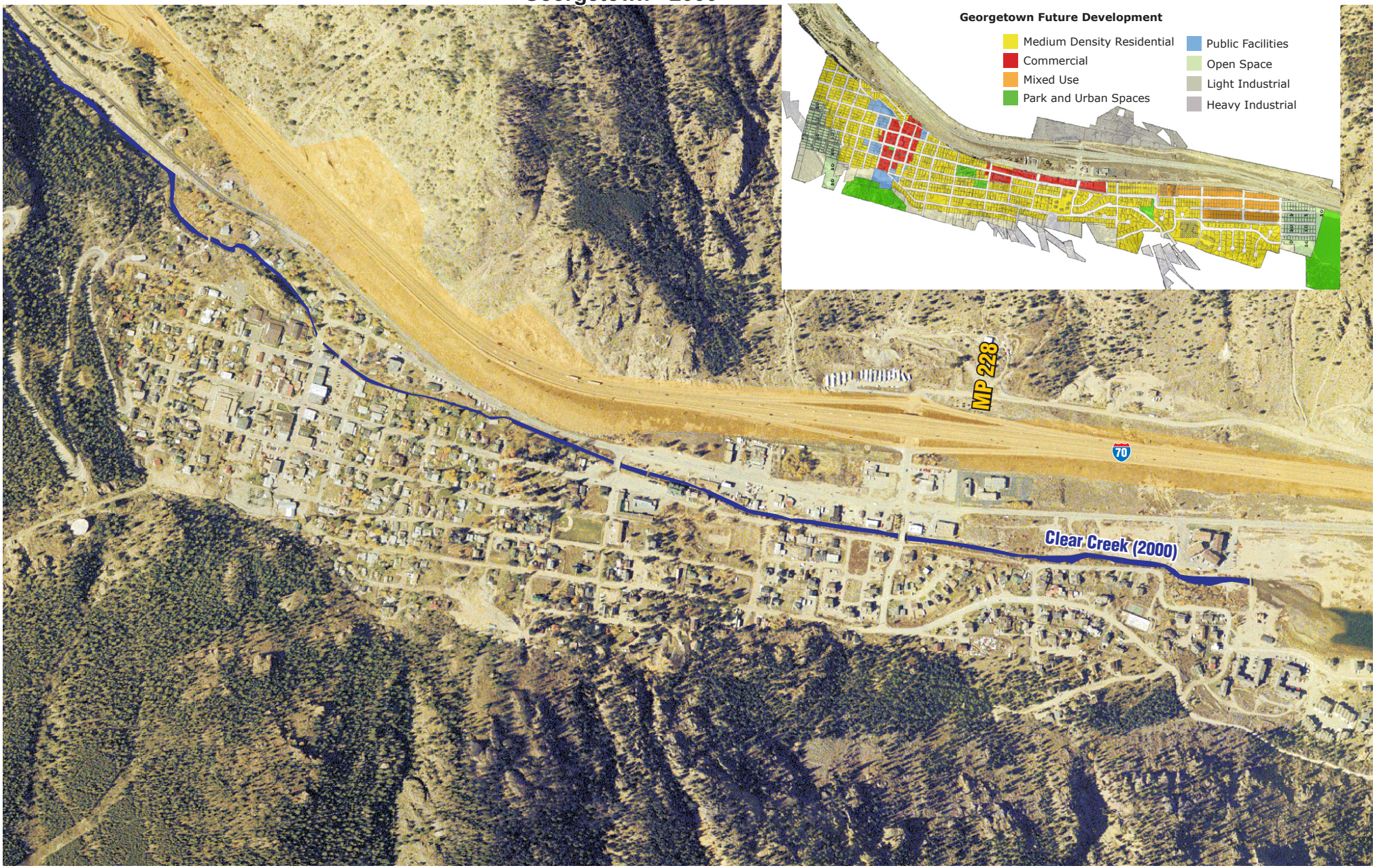


Structures Lost Within or Adjacent to I-70 Footprint

Approximate Location of I-70 Disturbance

4-2b. Changes That Have Occurred in the Georgetown Area with the Development of I-70 to Its Current State (in 2000)

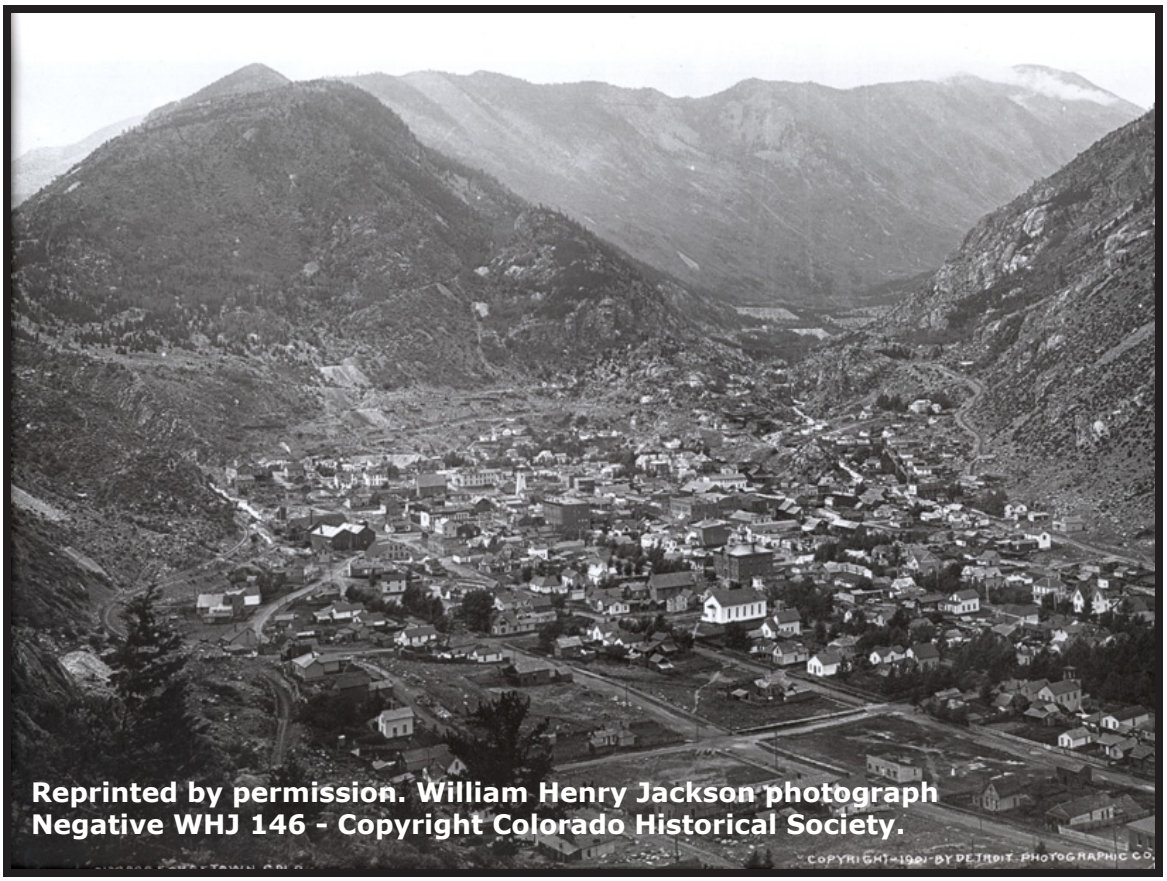
Georgetown - 2000



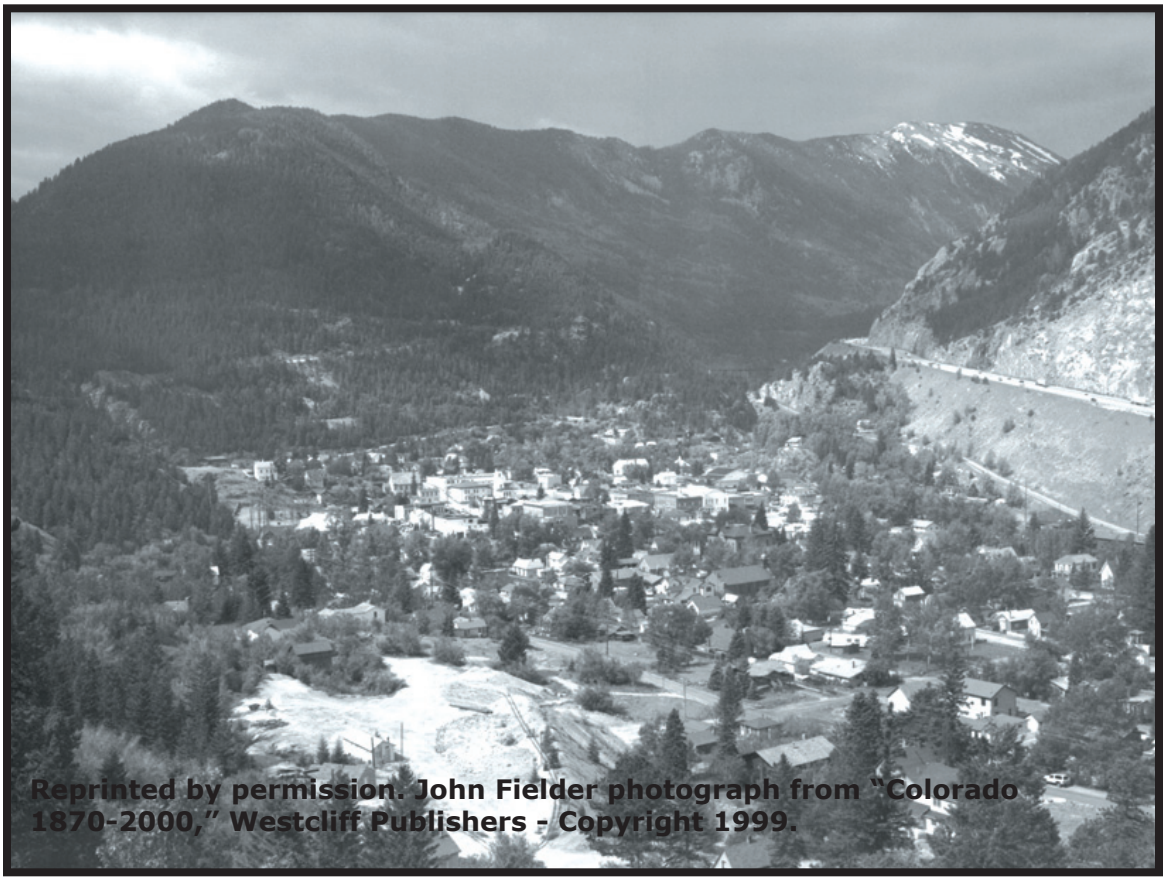
Structures Lost Within or Adjacent to I-70 Footprint

Approximate Location of I-70 Disturbance

Figure 4-3. Changes to the Georgetown Area from 1901 to the Present



1901 View



Existing Conditions

4.7 What past, present, and reasonably foreseeable future actions were considered?

What past actions were considered?

Past actions considered include historic mining, ski area development, and residential and commercial development. Lead agencies assessed past actions in relation to their effects on environmental resources of concern, such as historic mining effects on water quality. Past transportation actions included the original I-70 construction and Central City Parkway construction, notably through and adjacent to historic communities in Clear Creak County. In the Clear Creek watershed, the Corridor was constructed through mineral deposits and mine waste residuals using cut-and-fill methods, creating the potential for pollutants (e.g., metals) entering Clear Creek from stormwater runoff.

The Corridor is located within the Southern Rockies Ecoregion, an ecological network of lands through portions of Wyoming, Colorado, and New Mexico. Past actions have influenced the natural function of the Southern Rockies Ecoregion, resulting in:

- Loss and decline of native species, along with invasion by exotic plants and animal species.
- Loss and degradation of terrestrial and aquatic ecosystems.
- Loss and fragmentation of wildlife habitat.
- Pollution and climate change.
- Loss and decline of wetlands.

The Southern Rockies Ecosystem Project (SREP) compiled mapping to show past and expected growth patterns from 1960 to 2050. See the *I-70 Mountain Corridor PEIS Cumulative Impacts Technical Report* (CDOT, August 2010) for additional information about the SREP findings.

What present actions were considered?

The Colorado Department of Transportation examined these present actions to determine their effect on the resources of concern: existing land use and development, the Corridor as it exists today (including maintenance operations on I-70), current recreational usage of the National Forests, and the current condition of biological resources.

What reasonably foreseeable future actions were considered?

Examples of reasonably foreseeable future actions that may affect the resources include these major projects in and adjacent to the Corridor:

- Airport expansions (such as Eagle County Airport)
- Ski area expansions at four of the ski areas
- Transportation projects in addition to the proposed construction on the Corridor (such as Bus Rapid Transit improvements planned along SH 82)
- New I-70 Mountain Corridor planned interchanges (such as the interchange planned east of Eagle)
- Large residential and commercial developments (such as Battle Mountain Planned Development)
- United States Forest Service recreation development, and energy development along the Western Slope

Ski resort expansions are planned for:

- Breckenridge
- Keystone
- Vail
- Winter Park

In addition, there are future maintenance activities that may affect resources along the Corridor.

Zoning and future land use maps from the local governments within the cumulative study area (as defined in **Figure 4-1**) identify areas designated for future development. **Figure 4-1** includes major, reasonably foreseeable developments, such as ski area expansions. Collectively, the past, present, and reasonably foreseeable future projects make up the baseline for this analysis. This baseline does not include the I-70 project alternatives nor how they could affect environmental resources or alter the type and extent of future development. Future land use maps and zoning provide the most up-to-date compilation of long-range planning for the cumulative impacts study area. It should be noted that there is no single comprehensive land use plan for the cumulative study area.

4.8 What are the anticipated cumulative impacts?

Chapter 3 presents direct and indirect impacts to the environmental resources studied as part of this cumulative analysis. Also, **Section 4.2** of the *I-70 Mountain Corridor PEIS Water Resources Technical Report* (CDOT, August 2010) has a discussion on indirect and cumulative impacts to water resources, including the impact of planned land use on water quality and changes in stream flow or channelization. The *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010) discusses water quality and availability issues specific to county and municipal planning and growth.

For each of the three watersheds shown in **Figure 4-1**, the analysis included resource effects from baseline conditions (i.e., effects from past, present, and reasonably foreseeable future projects) to implementation of the Action Alternatives. Induced growth differs by alternative in two fundamental ways—the amount of growth and how that growth is distributed. Conclusions include:

- No Action and Minimal Action Alternatives have the potential to suppress or slow population growth in the region.
- Transit Alternatives concentrate induced growth in urban areas surrounding transit centers in areas of existing or planned urban development, including Eagle, Avon and Vail.
- Highway Alternatives distribute growth based on existing trends for urban/rural development in each county, resulting in increased densities in rural areas of the Eagle and Blue River watersheds.
- Combination Alternatives distribute induced growth equally between the above transit and highway distribution scenarios, resulting in increased growth in both urban and rural areas in Eagle and Summit counties.
- The Preferred Alternative initially induces growth in a manner similar to the Transit Alternatives, resulting from the Minimum Program of Improvements: growth would be concentrated in urban areas surrounding transit stations. Later phases of improvements, if the Maximum Program of Improvements is implemented, induce growth in a manner more similar to the Combination Alternatives: growth pressures occur primarily in both urban and rural areas in Eagle and Summit counties. Impacts associated with the Preferred Alternative range between the two programs.

Coordination with local county planners indicated that the distribution of growth would vary along the Corridor. The planners do not expect Clear Creek County to experience a measurable amount of induced growth compared to Summit and Eagle Counties, partly because of topographic constraints (see **Section 3.7**).

The sections below summarize the results for each resource.

What are the land use cumulative impacts?

The development of the Corridor has influenced land use patterns in the Corridor over the past 30 years, and a relationship between growth in traffic and population in the Corridor region (past 30 years) suggests that changes in travel demand in the future also will affect growth in the region. The analysis of induced

growth from alternatives is tied to past relationships of I-70 traffic and land use. The potential influence of induced or suppressed travel demand on land use development patterns, population, and employment projections in the Corridor region vary by alternative and by Corridor county and watershed.

The "gray" section of the bar chart illustrated in **Chart 4-1** indicates indirect impacts on land use associated with induced growth from alternatives. This estimate of induced growth provided the basis for quantifying the effects of induced growth on wildlife habitat, wetlands, water resources, social and economic values, and visual resources. In contrast, the "black" section of the bar chart reflects cumulative impacts due to the change from existing to planned land use.

Chart 4-1 illustrates the impacts of the different distribution of population resulting from Transit, Highway, and Combination Alternatives. Although Transit Alternatives would have the potential to induce more population growth than the Highway Alternatives, it is assumed that growth would take place in urban areas and would result in fewer acreage impacts. The Combination Alternatives would have the potential to increase developed land by approximately 18 percent increase beyond planned growth by 2035. Highway Alternatives would have the potential to increase developed land by 9 percent, and Transit Alternatives by almost 3 percent. Note that the likelihood of such impacts occurring would depend on factors such as local planning and land use restrictions and infrastructure limitations. The Preferred Alternative would result in a range of potential impacts, from 3 percent to 18 percent by 2035.

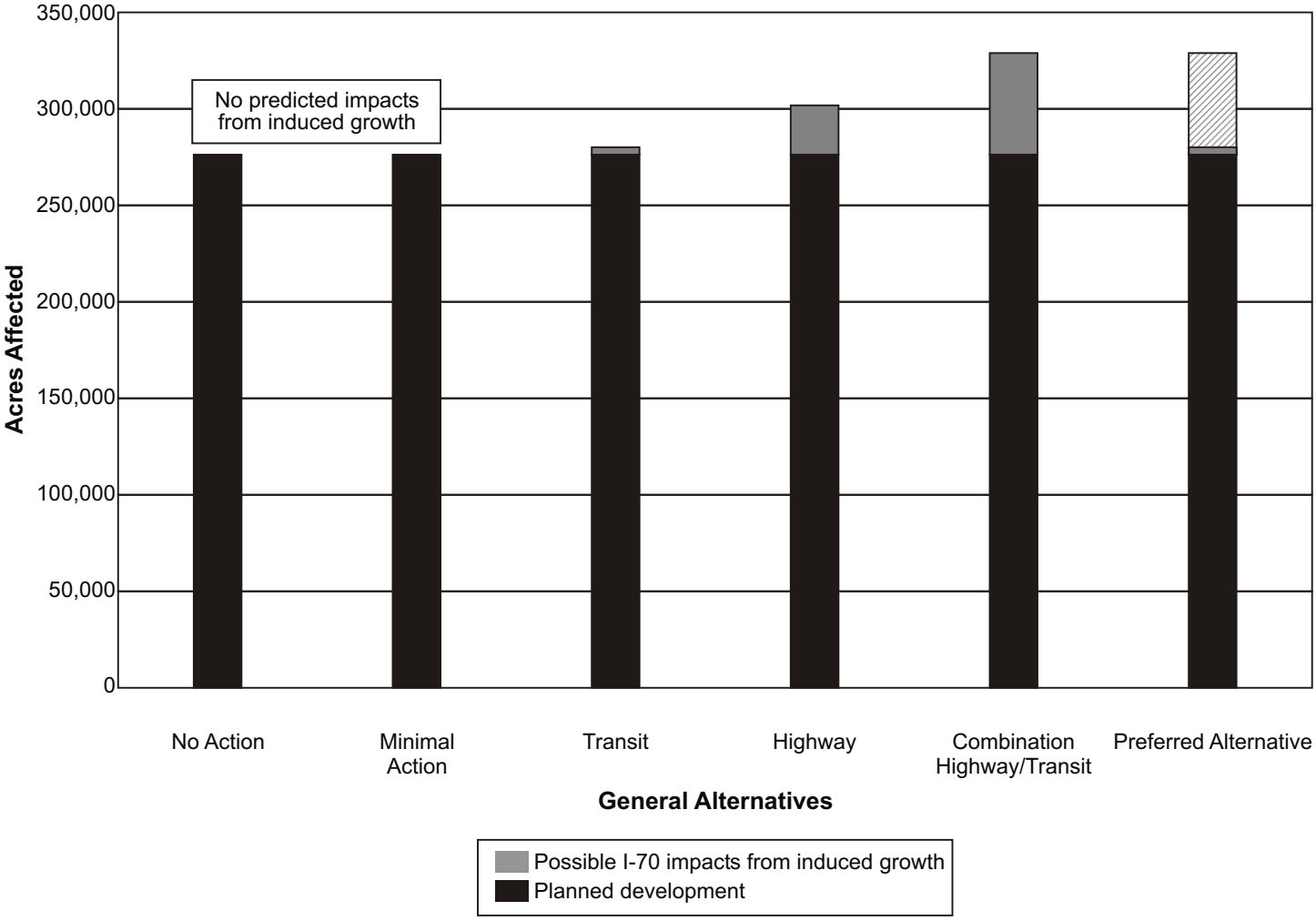
The extent and capacity of public water and wastewater infrastructure, including treatment plants, public water supply systems, and wastewater treatment facilities, also will play a role in future development. The *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010) and the Water Resources **Section 4.8** of this chapter discuss water quality and availability issues specific to local planning and growth.

In the coming years, water quality and water supply will greatly influence growth and future development.

Summary: The change in land use historically in the Corridor has been one of the most obvious, visible changes. The change in the Corridor from large ranchland adjacent to US 6 in the 1960s to the many higher-density residential and commercial uses that exist today has transformed Corridor character. Planned Corridor growth without improvements to I-70 is anticipated to affect around 275,000 acres of currently undeveloped land. The Action Alternatives could add an additional 3 percent to 18 percent of developed land to this planned Corridor growth. The effect of this over time (and to 2050) is likely to vary substantially, depending on a number of factors, such as the availability of water, the quality of the water, the health of the recreation resources (dependent on economic conditions, climate change, mountain pine beetle ecological changes and others), and the overall economic health and character of the local jurisdictions.

When combined with the past, present, and reasonably foreseeable cumulative impacts to land use, the lead agencies expect the transportation improvements to the Corridor to contribute to substantial cumulative changes in land use in the cumulative impacts study area shown in **Figure 4-1**. If local agencies manage land use change in a coordinated manner, these cumulative changes may not be detrimental to the Corridor and could provide benefits to residents and visitors. However, if land use changes occur without effective management or coordinated planning efforts, these cumulative changes could overwhelm Corridor communities and subsequently affect quality of life, community services and infrastructure, and the overall character of mountain communities. The adaptive management approach of the Preferred Alternative (described in **Section 2.9** of this document) allows transportation improvements to be implemented over time, which may allow communities to appropriately manage the indirect effects associated with those improvements.

Chart 4-1. Corridor Cumulative Impacts on Land Use by 2035



The Maximum Program presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

What are the biological resources cumulative impacts?

Baseline: I-70 construction, previous and ongoing development, and projected population growth in the Corridor have and will result in habitat loss and fragmentation, and will create barriers to wildlife movement. Evidence suggests that the existing highway's barrier effect impedes traditional wildlife movement through certain corridors. These linkage interference zones affect migration routes, as well as pathways a species uses to access important habitat on a more frequent basis.

Examples of impacts to biological resources include fragmentation of wildlife habitat in Eagle County due to land use growth and the increased incidences of animal/vehicle collisions along the Corridor. The I-70 Mountain Corridor construction and previous and ongoing development also have resulted in adverse effects to aquatic resources, including macro invertebrates and fisheries.

Ongoing winter maintenance on the Corridor has affected aquatic resources, including "high-value" fisheries, as defined by the Colorado Division of Wildlife.

Planned commercial and residential growth along the Corridor as a result of the baseline condition could increase wildlife habitat loss, with habitat impacts ranging from 100 acres to 8,000 acres. In addition to habitat loss, impacts would include an increase in the barrier effect on wildlife movement and habitat fragmentation. There would be notable reductions in wildlife habitat in the Eagle River and Clear Creek watersheds; habitat reductions in the Blue River watershed would not be as extensive as those in the Eagle River and Clear Creek watersheds. Deer and elk species would experience the greatest habitat losses from growth.

The mountain pine beetle infestation is causing regional habitat losses, which is causing ongoing and expected long-term change in forest conditions. Without mitigation, this forest resource could reach a point where it would not be able to maintain its health, resulting in substantial effects to biological resources.

Alternatives: Direct impacts on key wildlife habitats from the Action Alternatives are limited to approximately 111 to 443 acres (representing 0.02 to 0.3 percent of the total evaluated area). These impacts are relatively minor when compared to baseline conditions; impacts from existing and planned development would affect 10 percent to 49 percent of the total evaluated area. **Table 4-2** shows estimated impacts for the baseline condition and alternatives.

Table 4-2. Cumulative Impacts (acres) on Key Wildlife Habitat in the Corridor

Alternative	Deer	Elk	Bighorn Sheep	Songbird	Total Wildlife	Increase over Baseline (%)
Baseline	45,800	36,600	8,300	20,600	111,300	
No Action	45,800	36,600	8,300	20,600	111,300	0%
Minimal Action	45,800	36,600	8,400	20,600	111,400	0%
Transit	46,000	36,800	8,500	21,000	112,300	1%
Highway	50,000	40,100	8,700	25,000	123,800	11%
Combination	53,500	45,000	8,900	29,000	136,400	23%
Preferred Alternative	46,000 to 53,500	36,800 to 45,000	8,500 to 8,900	21,000 to 29,000	112,300 to 136,400	1% to 23%

Areas of key wildlife habitat, threatened and endangered species movement areas, and linkage interference zones could experience increased pressure from induced development from the Combination and Highway Alternatives, due to the considerable induced growth that local planners expect there. (This induced growth is a conservative estimate of a possible future scenario that may not be sustainable.) This is particularly the case in the Eagle River Watershed. The alternatives all include implementation of mitigation strategies to reduce the barrier effect of the Corridor and its improvements.

Cumulative impacts that could affect threatened and endangered species include increased human intrusion into their habitats, habitat losses, and effects to their movement corridors from land development. Most of the habitat for these species is on United States Forest Service and Bureau of Land Management (BLM) lands, which provide some protection from direct habitat losses. However, increased use of these areas for recreation could place additional stress on these species (see recreation discussion below).

Summary: The past and present effects of I-70 construction and residential and commercial growth in the Corridor have substantially changed the health of the natural vegetation communities; wildlife; and threatened, endangered and special status species, resulting in habitat loss and fragmentation. Reasonably foreseeable future actions (such as ski area expansions and ongoing commercial and residential development) are likely to continue to negatively affect Corridor wildlife and fisheries resources. The Action Alternatives result in further impacts to 1 percent to 23 percent of existing acres of wildlife habitat. A Landscape Level Inventory of Valued Ecosystem Components (ALIVE) Memorandum of Understanding, described further in **Sections 3.2.7** and **3.19**, defines actions that could partially mitigate impacts associated with the barrier effect of the Action Alternatives. Actions defined in the Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding, described further in **Sections 3.2.7** and **3.19**, partially mitigate impacts to riparian areas, wetlands, and streams within the Corridor. The impacts of Corridor improvements are substantial when combined with the past, present and reasonably foreseeable cumulative impacts to biological resources, and based on the effectiveness of implemented mitigation. Local agencies' adoption of land use policies that preserve open space adjacent to the crossings is a key to effective mitigation of wildlife crossings.

What are the wetlands cumulative impacts?

Baseline: Baseline conditions include the direct loss of wetlands from previous, ongoing, and future development activities; ski area expansion; and roadway construction. There are already and will continue to be future effects to the valuable functions that wetlands provide to the environment. Also, development activities, roadway construction, and winter maintenance activities can lead to increased sediment and stormwater runoff that, in turn, can degrade wetland water quality and the wildlife habitat that wetlands provide.

Figure 4-1 shows the areas of existing and planned development along the Corridor that covers 25,000 acres of water resources in the Corridor, including wetlands. This accounts for approximately 45 percent of the water resources mapped in the Eagle River watershed. Development covers approximately 30 percent and 62 percent of these resources in the Blue River and Clear Creek watersheds, respectively. These figures provide a snapshot how much the development areas might affect these resources. Please note that these estimates are conservative and do not account for compliance with wetland regulations that require development projects to avoid and minimize wetland impacts. Also, local governments could implement water resources buffer zones and other land development controls that would further protect wetlands.

Alternatives: Action Alternatives have relatively minor direct impacts to water resources and wetlands (up to 0.3 percent of the developed area) when compared to potential impacts from induced growth and development. In the Eagle River watershed, Transit Alternatives increase impacts slightly over baseline

conditions (additional increase of approximately 500 acres) because of the ability to concentrate induced growth in urban areas. Highway and Combination Alternatives increase impacts by 3,000 acres and 5,000 acres respectively. The Preferred Alternative ranges in impacts from 500 acres to 5,000 acres.

In the Blue River and Clear Creek watersheds, the lead agencies anticipate no increases in impacts with the Transit and Highway Alternatives, because the induced growth from these two alternatives would not impact estimated wetland areas. Combination Alternatives have the potential to induce growth and development in the Blue River watershed (increasing acreage impacts by approximately 2,200 acres). Preferred Alternative impacts range from no impacts to 2,200 acres. This induced growth is a conservative estimate of a possible future scenario that may not be sustainable. In the Clear Creek watershed, wetland impacts from the Combination Alternatives and the Preferred Alternative Maximum Program (if fully implemented) would be limited to direct impacts because no induced growth impacts are anticipated.

Within the Corridor the past actions of ski area development, I-70 construction, and residential and commercial development have all resulted in loss and degradation of Corridor wetlands.

Summary: Nationally and within Colorado there is a loss and degradation of wetlands from development-related impacts and climate change. Reasonably foreseeable future actions without mitigation could continue this existing trend of wetland loss. Although the Action Alternatives increase the amount of Corridor wetland impact in the future, when combined with the past, present and reasonably foreseeable future cumulative impacts to wetlands, the lead agencies do not expect the Action Alternatives to deviate from the existing trend of wetland loss on the national, state, or Corridor level. (*National Water Summary on Wetland Resources*, U.S. Geological Survey Water Supply Paper 2425, as found on http://water.usgs.gov/nwsum/WSP2425 [USGS, 1999].) To minimize the impact of the Action Alternatives on this existing trend, the project will adhere to wetland mitigation guidance/regulation for wetland impacts and would adhere to the requirements of SWEEP (see **Sections 3.3.7** and **3.19**).

What are the water resources cumulative impacts?

Baseline: There have been adverse effects to the Corridor's water resources due to past activities, such as historic mining, construction of I-70 and other roadways, highway winter maintenance, and urban development. Impacts include impairment to water quality, physical changes to streams (e.g., channelization), and adverse effects on stream hydrology and habitat.

Historic mining has affected streams in the Eagle River, Blue River, Clear Creek, and South Platte Headwaters sub-basins. Some of the most substantial impacts to water resources have been along Clear Creek immediately adjacent to the Corridor. Also, construction in the Corridor played a role in the exposure and disturbance of mine waste and mineralized rock, further degrading water resources.

Winter maintenance has and will continue to contribute sand and de-icing chemicals to highway runoff and impair water quality. For example, based on monitoring results since 2001, Black Gore Creek winter chloride concentrations have exceeded water quality standards for several days each winter as a result of Corridor runoff.

Construction of the Corridor has caused up to 35 percent of the stream channelization in the Clear Creek watershed. Most of Lower Clear Creek (i.e., Clear Creek from Empire Junction to US 6 interchange) is constrained in a narrow valley or canyon. However, the construction of US 6, US 40, and I-70 has further constricted or channelized streams; and there are many areas today where the embankments between US 6, US 40, and I-70 constrict Clear Creek on both sides.

Planned urban and rural development will cause most future water quality issues, which will increase both point and nonpoint source pollution from entering the Corridor's streams and lakes. The measure of

increased water pollution is represented by the amount of phosphorus that would enter water resources. Baseline conditions would result in an estimated 42,000 pounds of increased phosphorus in the Corridor per year, mostly from planned development. (These estimates are conservative because they do not account for measures that can be implemented to reduce nonpoint source pollution from stormwater).

Alternatives: Action Alternatives directly impact water resources because they increase stormwater runoff and highway winter maintenance. Possible induced growth causes secondary water quality impacts mostly in Eagle and Summit Counties. Throughout the Corridor, the Transit Alternatives and the Preferred Alternative Minimum Program increase phosphorus amounts by 17 percent over baseline conditions. Induced growth in urban areas with transit centers, including Eagle, Avon, Vail, Dillon, and Silverthorne, cause most of these increases.

Pollution originating from a single, identifiable source, such as a discharge pipe from a factory or sewage plant, is called point-source pollution. Pollution that does not originate from a single source, or point, is called nonpoint-source pollution (e.g., stormwater runoff).

Highway and Combination Alternatives (including the Preferred Alternative Maximum Program if it is fully implemented) induce dispersed growth in rural areas, which would have the greatest cumulative impacts from new development activities. The Highway and Combination Alternatives (including the Preferred Alternative Maximum Program if it is fully implemented) increase phosphorus amounts by an estimated 20 percent and 55 percent, respectively, over baseline conditions.

Phosphorus increases are greatest in the Eagle River watershed due to the extent of induced growth projected. This induced growth is a conservative estimate of a possible future scenario that may not be sustainable. In the Blue River watershed, the Combination Alternatives (including the Preferred Alternative Maximum Program) would increase phosphorus over the baseline. The Action Alternatives would not cause measurable induced growth in the Clear Creek watershed; however, construction of Action Alternatives would cause direct impacts.

Summary: Straight Creek and Black Gore Creek and upper Clear Creek are impaired streams due to sediment loading and the first two currently have Sediment Control Action Plans to develop mitigation strategies for them. A Sediment Control Action Plan is currently under development for Clear Creek as well. The Colorado Department of Transportation is also continuing a water quality monitoring program for suspended solids, phosphorus, chloride, copper, and zinc; pollutants associated with roadways; and adjusting winter maintenance activities to minimize traction sand, sodium chloride and magnesium chloride impacts from highway runoff on receiving streams. The Action Alternatives would further implement permanent water quality sediment catchment basins along other streams that would help improve the water quality along the Corridor. This would indirectly add benefits to water quality from erosion associated with vegetation losses, which may occur from climate change and from other land use changes. Total phosphorus loads are expected to increase along the Corridor as a result of planned land use changes by 2050 and the Action Alternatives could further increase phosphorus and other pollutant loadings from old mining waste but the sediment catchment basins will help trap these phosphorus and other pollutant loads and keep them from entering the waterways. Impacts associated with the Action Alternatives could also be mitigated by the implementation of stream restoration and other activities as described in **Section 3.4** and as emphasized by the SWEEP to help off-set impacts from the initial construction of I-70. The No Action Alternative would not include these additional sediment catchment basins or stream restoration activities and would therefore result in the greatest negative impact from a cumulative standpoint.

When combined with the past, present and reasonably foreseeable future cumulative impacts, the Action Alternatives are not expected to have a noticeably negative impact on water resources and water quality and could actually show a beneficial result to water quality in the Corridor over time.

What are the social and economic values cumulative impacts?

Baseline: While construction of the original Corridor provided economic benefits, it disrupted the fabric of some communities. Clear Creek County's historic mining communities most keenly felt these effects. There were approximately 35 acres of Clear Creek County developed lands lost due to the original Corridor construction (based on 1956 and 1957 photography). Losses for Clear Creek County communities include:

- Idaho Springs: approximately 5 percent of the 161 acres of developed land
- Dumont: approximately 9 percent of the 45 acres of developed land
- Downieville: approximately 38 percent of the 16 acres of developed land
- Lawson: approximately 9 percent lost within 23 acres of developed land
- Georgetown: approximately 5 percent lost within 65 acres of developed land
- Silver Plume: approximately 18 percent lost within 65 acres of developed land

West of the Continental Divide, communities generally developed during and after construction of Corridor and did not experience similar impacts.

In the coming years, state projections indicate that the Corridor will have considerable population growth. By 2035, the permanent population of the nine Corridor counties is projected to reach almost 420,000, more than doubling the 2000 population.

Economic growth is expected to accompany population growth in the Corridor, with a Gross Regional Product (GRP) increase of over 200 percent anticipated by 2035. This is the case for all corridor counties with the exception of Clear Creek County. However, as discussed in **Section 3.9**, tourism and second homes drive the Corridor economy. These population and economic projections do not consider the influence of Corridor traffic, although I-70 access is integral to the delivery of goods and services, commuters, tourists, and local business. Continued Corridor congestion during peak weekends and at certain key points along the Corridor is expected to suppress economic growth (see **Section 3.8.5**).

Alternatives: The No Action and Minimal Action Alternatives have the greatest impact on the regional economy. Both alternatives suppress economic conditions and decrease the expected growth in GRP by approximately 22 percent. Transit Alternatives and the Preferred Alternative Minimum Program both support the projected growth in GRP, while Combination Alternatives and the Preferred Alternative Maximum Program (if fully implemented) supports or could even exceed the expected growth in GRP.

The alternatives have similar impacts on other economic indicators. For example, the No Action and Minimal Action Alternatives might suppress regional personal income as much as 25 percent. Counties with resort destinations that contribute the most to the existing tourism economy (i.e., Eagle, Pitkin, Summit, and Grand) would experience the greatest effects.

In Eagle County, the induced growth projected for the Action Alternatives could increase growth pressures and lead to related socioeconomic effects, such as increased property value and increased pressure for the provision of community services. For example, Highway and Combination Alternatives (including the Preferred Alternative Maximum Program if fully implemented) are expected to allow some amount of dispersed growth in rural areas and might require increased local planning efforts to address issues related to urban sprawl. Alternatives with transit components are expected to concentrate growth in urban areas with transit centers, including Eagle, Avon, and Vail. Growth in Garfield County is susceptible to changes in Eagle County because of the number of residents commuting to Eagle County for employment.

In Summit County, induced growth from the Combination Alternatives and from the Preferred Alternative Maximum Program, if it is fully implemented, could increase growth pressures. Similar to

above, alternatives with transit components (including the Preferred Alternative Minimum Program) concentrate growth in urban areas with transit centers including Dillon and Silverthorne. Highway and Combination Alternatives (including the Preferred Alternative Maximum Program if fully implemented) are expected to allow some amount of dispersed growth in rural areas and have related effects. All estimates of induced growth are conservative, projecting one possible future land use scenario that may not be sustainable.

Summary: Past actions in the Corridor have had a considerable influence on social and economic values to Corridor communities. The past economic base of mining has been transformed into a social and economic base defined by tourism. Reasonably foreseeable future actions and events (such as changes in fuel types, resource availability, climate change, water availability), when projected to 2050, could substantially affect the social and economic fabric of the Corridor communities. The Action Alternatives could either suppress economic conditions or increase anticipated GRP.

When combined with past, present, and reasonably foreseeable future actions and events, the Action Alternatives, except for the Minimal Action Alternative, would be expected to have a substantially beneficial impact on economic (job and tax) growth in the Corridor for all counties except for Clear Creek County. The growth in Clear Creek County is expected to be minimal, if at all. However, such growth places additional pressure on property values, community services, and other social infrastructure. The Action Alternatives, when combined with past, present, and reasonably foreseeable future actions and events, result in substantial indirect impacts on quality of life, community services, and local infrastructure unless mitigating actions are undertaken by local agencies. The adaptive management approach of the Preferred Alternative (defined in **Section 2.9** of this document) allows agencies to implement transportation improvements over time, which may allow communities to appropriately manage the indirect impacts associated with those improvements.

What are the recreation resources cumulative impacts?

Without implementation of mitigation, the ability of the United States Forest Service to maintain the ecological health of the resource while accommodating increased pressure for recreational activity is in jeopardy.

Baseline: The United States Forest Service has indicated that demand for recreation is such that the agency cannot maintain any additional parking or new trailheads. Recreation use of United States Forest Service lands is at or over use capacity now. Land managers are struggling to maintain existing trails because of increasing use levels and declining maintenance budgets. Also, there is increased use of backcountry trails and roads not originally designed for intensive uses. The United States Forest Service has granted expansions of the major ski resorts in the Corridor, while participation in other winter activities has grown. Summer visitations also have increased.

Population increases in the Corridor, combined with increased visitation from nonresidents (primarily Front Range visitors), will continue to strain United States Forest Service amenities. The extent of these effects will depend on forest management activities, as discussed in **Section 3.12, Recreation Resources**.

While the economic downturn has slowed tourism in the short term, the outlook is for continued increased growth. The mountain pine beetle infestation, which is causing ongoing change in forest conditions, is altering the setting of recreation resources in these forests.

Alternatives: Recreation visitor days are measured as 12 hours of continuous activity; as such, they are less susceptible to changes in transportation access than forest destination trips, which can reflect very short site visits. Therefore, the analysis was not sensitive enough to note changes from alternatives in skier visits and recreation visitor days. However, it included estimated changes in forest destination trips by alternative. Because of reduced mobility and access, the No Action and Minimal Action Alternatives

might retard the projected increases in forest destination trips. Meanwhile, the United States Forest Service has indicated that alternatives with transit components complement their future plans to manage access into the Corridor's National Forests through transit. Therefore, the Transit, Combination, and Preferred Alternatives increase United States Forest Service visitation levels, but are also better able to support United States Forest Service plans to control visitation impacts. Projected changes in forest destination trips from alternatives are as follows:

- In the Arapaho and Roosevelt National Forest, Highway Alternatives increase winter and summer forest destination trips in 2025 by 50,000 annually. In the White River National Forest, increases would be 200,000 and 100,000 annual winter and summer trips, respectively. Visitor use in 2025 was extrapolated from 2010 Arapahoe/Roosevelt National Forests and 2020 White River National Forest visitation projections (United States Forest Service, 2000). The projections do not consider the capacity of the Corridor. They are considered to be very general estimates of visitor use. Visitor use estimates were not extrapolated for 2035. United States Forest Service visitor projections have not been updated since year 2000. Extrapolation of visitor use to 2035 would not yield significantly different trends than those extrapolated from 2025 and would not change the results of the analysis.
- In the Arapaho and Roosevelt National Forests, the Transit Alternatives (including the Preferred Alternative Minimum Program) would increase winter and summer trips in 2025 by 200,000 each. In the White River National Forest, increases are 700,000 and 500,000 for winter and summer trips, respectively. These alternatives are more consistent with the United States Forest Service's desire to serve highly used recreation areas with transit and could, therefore, help mitigate and control impacts.
- In the Arapaho and Roosevelt National Forests, the Combination Alternatives (including the Preferred Alternative Maximum Program if fully implemented) could increase winter and summer forest destination trips in 2025 by 400,000 each. In the White River National Forest, the Combination Alternatives increase winter and summer forest destination trips by 1.3 million and 1 million trips, respectively. These alternatives are more consistent with the United States Forest Service's desire to serve highly used recreation areas with transit and could, therefore, help mitigate and control impacts.

Summary: Past and present actions have resulted in demand for recreation resources that are already at or near capacity now. Reasonably foreseeable future actions are likely to further strain forest resources, especially by 2050, such that the ability of the United States Forest Service to maintain the quality of the recreation experience, while accommodating increased demand could surpass the capacity of the resource. While the Minimal Action Alternative likely suppresses projected increases in forest destination trips, the remaining Action Alternatives increase annual trips from 400,000 to over 3 million between the two forests. When combined with the past, present and reasonably foreseeable future impacts to recreation resources, the Action Alternatives noticeably diminish the quality of the recreation experience over time, unless the United States Forest Service implements management actions to balance visitor access with the health of the resource. The Colorado Department of Transportation has been already coordinating closely with the United States Forest Service to mitigate any I-70 impacts and will continue to do so. The adaptive management characteristics of the Preferred Alternative (as defined in **Section 2.9** of this document), when combined with its transit component, present the best potential to alleviate cumulative impacts to recreation resources.

The United States Forest Service has indicated that the alternatives that include transit could assist to mitigate and control impacts because they would concentrate rather than disperse visitors, allowing the United States Forest Service more control over visitor use and associated resource management.

What are the visual resources cumulative impacts?

Baseline: Visual scars from Corridor construction remain prominent along several stretches of I-70, and are most evident in the canyon environment of Clear Creek County and along Straight Creek, where existing cut-and-fill slopes dominate the setting. Recent construction of the Central City Parkway has also created prominent cut- and fill-slopes.

Existing and historic development has altered the visual setting of the Corridor and changed its rural character. Scarring from mining and Corridor construction is also evident. Planned development would continue the trend of visual character change. Along the entire Corridor, planned development would affect between 7.5 percent to 32 percent of the total acreage visible along the Corridor. All of the viewsheds reflect this percentage increase. The remaining area visible along the Corridor would remain as forest management, recreation, or open space areas.

Alternatives: Section 3.11 describes direct visual impacts from the alternatives. Induced development contributes to these changes as follows:

- The Transit Alternatives (including the Preferred Alternative Minimum Program) have substantial impacts on visual resources due to increased urbanization around transit centers in the Eagle River watershed and due to its elevated structural components.
- The Highway Alternatives have intermediate impacts on visual resources due to distribution of induced growth based on existing trends in urban and rural development in the Eagle River watershed.
- The Combination Alternatives have the greatest potential for inducing growth in the Eagle River and Blue River watersheds and, therefore, have the greatest cumulative visual impacts of all the alternatives.
- The Preferred Alternative has a range of visual impacts depending on how fully it is implemented.

The elevated structure needed for the Advanced Guideway System will be a new visually intrusive element along the Corridor.

Summary: Past actions, including mining, roadway construction, urban development, and ski area development, have produced localized changes in the visual character of the corridor. Residential and commercial development along the highway has been the primary driver behind the visual change in the corridor. Currently 13 percent of the land within the Corridor viewshed is developed, and according to adopted land use plans, it is anticipated that an additional 19 percent of land will be converted from vacant, undeveloped land to developed land. It is expected that reasonably foreseeable future actions of urban development and ski area expansion will continue to alter the visual character, particularly by 2050. Additionally, the ongoing loss of pine forests because of the mountain pine beetle continues to alter the forest landscapes. The Action Alternatives introduce new visual elements into the Corridor, producing substantial visual contrast with the presence of elements, such as elevated structures and increased footprint width. Higher than expected growth projections resulting from the implementation of the Preferred Alternative could diminish the visual quality within the corridor, producing a negative cumulative impact. Commitment to the Engineering Design Criteria and Aesthetic Guidelines identified in the I-70 Mountain Corridor Context Sensitive Solutions process, combined with local planning regulations, will minimize the visual impacts generated by the Corridor.

What are the historic resources cumulative impacts?

Baseline: Numerous communities along the Corridor attest to the 19th and early 20th century history of mineral, milling, timber, and railroad industries in Colorado. Today, most historic resources that remain

in the Corridor reflect these industries. Most are located in the Clear Creek Valley, from Idaho Springs to Graymont, where the past influences of mining history and settlement remain evident.

The initial construction of I-70 directly and indirectly affected many of these historic resources. The Corridor construction caused the loss of approximately 80 historic structures in Clear Creek County. Indirect impacts include increased noise and visual impacts on areas in historic districts and mining-related landmark areas.

Other past actions that have affected historic resources include ski area development and expansion, residential and commercial developments, and roadway construction.

Several recent events regarding Clear Creek County communities emphasize the importance of historic resources along the Corridor:

- Colorado's Most Endangered Places List 2005 included multiple communities in Clear Creek County along the Corridor.
- Georgetown was identified as a Preserve America Community.
- In 2008, the National Park Service (which administers the National and Historic Landmarks Program) identified a threat level of Watch for the Georgetown-Silver Plume National Historic Landmark District that bisects the Corridor. The threat level was due to the possible future adverse effects from the proposed widening of the interstate highway. This was lifted in 2009 due to the efforts of the lead agencies in developing the Section 106 Programmatic Agreement.

Planned development in the reasonably foreseeable future adds to past and present adverse effects to historic properties. Without adequate consideration, cumulative effects contribute to the loss of integrity of the Georgetown-Silver Plume National Historic Landmark District, affecting its designation. The lead agencies are committed to following the Programmatic Agreement, and the Colorado Department of Transportation will employ I-70 Mountain Corridor Context Sensitive Solutions process to avoid and minimize their effects.

Alternatives: Induced growth in the Eagle and Blue River watersheds could affect historic properties. However, based on the induced growth analysis and local input, the historic communities in Clear Creek County are not particularly susceptible to similar impacts from induced growth due primarily to topographic constraints. Instead, cumulative impacts for historic properties largely would depend on the lingering effects of the construction of the Corridor transportation improvements, ongoing influences of the Corridor to historic properties, and any added loss of integrity to the historic properties from the Action Alternatives. Types of impacts include direct impacts on historic properties, including loss of structures and property encroachment. Visual impacts from construction of Action Alternatives combined with previous impacts from initial I-70 construction could alter the historic setting within the communities (see **Section 3.13**).

Direct impacts from the Action Alternatives on historic properties, as well as visual and audible impacts on the setting, result in cumulative impacts on the Georgetown-Silver Plume National Historic Landmark District, Lawson, Downieville, Dumont historic area, and the Idaho Springs historic areas. A summary of anticipated impacts to historic properties associated with the Action Alternatives, a large proportion of which are in Clear Creek County, is provided below.

- The Minimal Action Alternative will result in impacts on 22 properties in Clear Creek County out of 44 historic properties in the Corridor.
- The Transit Alternatives have potential direct effects on up to 29 properties in Clear Creek County out of 62 properties in the Corridor.

- The Highway Alternatives affect up to 30 properties in Clear Creek County out of 52 historic properties in the Corridor.
- There are potential direct effects due to the Combination Alternatives for up to 32 historic properties in Clear Creek County out of 67 properties in the Corridor.
- The Preferred Alternative Minimum Program directly affects up to 23 properties in Clear Creek County out of 56 properties in the Corridor. The Preferred Alternative Maximum Program (if fully implemented) directly affects 30 historic properties in Clear Creek County out of 64 properties in the Corridor.

The Section 106 Programmatic Agreement (described in more detail in **Section 3.13.7** of this document) identifies specific measures to minimize harm to historic properties, including visual impact, noise abatement, and economic impacts on heritage tourism.

Summary: Past actions, such as mining, road construction, and other transportation improvements, have affected the historic integrity of communities along the Corridor, specifically in Clear Creek County where there is a higher concentration of historic and potentially historic resources. Reasonably foreseeable future actions, such as alternative energy development, planned future commercial and residential development, and some ski resort developments, by 2050 are more likely to affect the western counties along the Corridor, including Summit, Eagle, and Garfield Counties, where this document indicates there is a lower concentration of historic and potentially historic resources compared to Clear Creek County. When combined with past, present, and reasonably foreseeable future actions, the size of the Corridor, geographic constraints, and the concentration of historic and potentially historic resources, the Action Alternatives would have more of an impact in Clear Creek County and less of an impact in the western counties of Summit, Eagle, and Garfield Counties. More localized studies at Tier 2 will refine the potential for cumulative impacts to historic resources.

What are the air quality cumulative impacts?

The following primary sources in the Corridor can affect air quality:

- Emissions from vehicles on roadways
- Emissions from stationary commercial and industrial facilities (considered minimal in the Corridor)
- Re-entrained dust from roadway sanding
- Urban area emissions including wood burning and dust from construction sites

The U.S. Environmental Protection Agency expects air quality to continue to improve as regulations are implemented and states work to meet current and recently revised national air quality standards. As new air quality regulations and cleaner car technologies are implemented, the trend of decreasing air pollutant emissions is expected to continue despite the increase in vehicle travel along the Corridor. However, this trend may slow or reverse as technological advances and regulatory controls reach their limits and can no longer offset increased travel miles. If this occurs, increases in air pollutant emissions correlate more directly with increased vehicles miles traveled.

Carbon Monoxide (from emissions from vehicles on roadways)

Carbon monoxide emissions are expected to decrease substantially in the future, as presented in **Section 3.1** of this document. As **Table 3.1-1** shows, CO emissions vary among the project alternatives. Compared to the No Action Alternative, project-related emissions range from a reduction of 9 percent to an increase of 10 percent. Emissions for the Preferred Alternative fall in the middle of this range. Compared to existing emissions, emissions under all alternatives would be substantially less than current

day emissions, and none of the alternatives are likely to lead to any violations of the NAAQS. Cumulative impacts from CO emissions are not indicated.

PM_{10} (from emissions from vehicles on roadways, re-entrained dust from sanding plus emissions from wood burning and dust)

Diesel engines are the primary source of particulate matter emissions from transportation, and these emissions are expected to decrease in the future because of national mobile source control programs, including reformulated gasoline and required controls on heavy-duty diesel engines. Control programs have proven effective, and tailpipe PM_{10} emissions from mobile sources are 31 percent lower than in 1970 despite a substantial increase in travel miles (USEPA, 2010). Other sources of PM_{10} emissions in the Corridor may not decrease and may increase (due to population growth, construction, etc.) but the cumulative effect of emissions would still decrease because of decreases in tailpipe emissions.

Re-entrained dust impacts are proportional to sanding for winter maintenance. Emission control programs, such as street sweeping, mobile emission control programs, and woodburning controls, are expected to continue to control emissions. Highway maintenance improvements, such as the immediate cleanup of sand following snowmelt and the increased use of deicers in appropriate weather conditions, will reduce emissions. Re-entrained dust and fugitive dust from construction are proportional to the increase in construction-related to growth but can be managed by best management practices (see **Section 3.1, Climate and Air Quality**). Fugitive dust from gravel/rock quarries is regulated as a stationary source. Cumulative impacts from re-entrained dust are minimal. Effects of re-entrained dust on visibility are described in the next section.

Visibility (from vehicle emissions, re-entrained dust, wood burning and dust from construction)

The Colorado Department of Transportation analyzed the visibility impacts of the Action Alternatives comparing future 2035 emissions of motor vehicle pollutants and re-entrained road dust with existing (2000) emissions. Emissions were calculated for $PM_{2.5}$, SO_2, and NO_x (see **Table 3.1-1**). $PM_{2.5}$ emissions include particulates in tailpipe exhaust (carbon and sulfates), plus brake and tire wear. SO_2 and nitrogen oxides are gaseous emissions that contribute to secondary particle formation. Total daily emissions in 2035 of all pollutants contributing to visibility impairment are less in the future due to stricter standards on vehicle emissions, the lower sulfur content of diesel fuel, and other factors. Therefore, the future 2035 cumulative impacts on visibility from the Action Alternatives are less than existing conditions and no cumulative impacts are expected.

Nitrogen Deposition

The Colorado Department of Transportation analyzed the potential for nitrogen deposition associated with the Action Alternatives by comparing future emissions of nitrogen with existing (2000) emissions. Emissions of NO_x are 70 to 80 percent lower than 2000 emissions because of stricter standards on vehicle emissions, particularly heavy-duty diesel trucks. According to a recent NO_x emission inventory (CDPHE, 2007), NO_x emissions are projected to decrease in nearly all categories with especially large decreases (35 to nearly 100 percent) projected for road-related emissions. Future emissions of ammonia (which has nitrogen as one of its components so is a contributor to nitrogen deposition) increase as traffic volumes increase because emission control technology does not reduce ammonia emissions. However, nitrogen emissions from ammonia are only 15 to 20 percent of total motor vehicle nitrogen emissions and are, therefore, offset and not an important contributor to cumulative effects.

Air Toxics

Mobile sources emit higher portions of total air toxics generally in this Corridor because no manufacturing and few stationary sources of air toxics exist in the Corridor. Cumulative impacts are not likely because mobile sources are the primary causes of emissions in the Corridor (that is, other sources

do not contribute much), and the U.S. Environmental Protection Agency issued regulations to decrease mobile sources of air toxics by 2020. As a result of these and other controls, highway emissions nationwide are projected to be reduced by 67 to 76 percent, and highway diesel particulate matter emissions are reduced by 90 percent.

Summary: Traffic volumes and congestion, wood burning from residential development, dust from mine tailings, gravel mining, and road maintenance activities (re-entrained dust) affect air quality in the Corridor. The dry climate throughout the Corridor contributes to windblown dust issues and corresponding particulate matter emissions. However, despite growth in vehicle miles traveled, energy consumption, population, and gross domestic product, emissions of air pollutants have declined steadily since the passage of the Clean Air Act in 1970. For criteria pollutants, the Environmental Protection Agency tracked emissions data show that emissions decreased substantially, from 31 to 79 percent, depending on the type of emissions, between 1980 and 2008 (Environmental Protection Agency, 2010).

Likewise, emissions of mobile source air toxics declined by 40 percent between 1990 and 2005, and visibility in scenic areas has improved throughout the country (Environmental Protection Agency, 2010). Technological advances and stricter regulations are credited for cleaner air. The Environmental Protection Agency expects air quality to continue to improve as recent regulations are implemented and states work to meet current and recently revised national air quality standards. Reductions in air emissions of common (criteria) and toxic air pollutants in the Corridor are expected to continue through 2035 despite increased traffic and development, continued wood burning, dust from past and present mining operations, and loss of forested areas affected by the mountain pine beetle. After 2035, emissions may change to more closely correlate with vehicle miles traveled.

Global Climate Change Cumulative Effects Discussion

The federal government is addressing important national and global concerns about global climate change in several ways. The transportation sector is the second largest source of total greenhouse gases in the United States, and the greatest source of carbon dioxide (CO_2) emissions—the predominant greenhouse gas. In 2004, the transportation sector was responsible for 31 percent of all U.S. CO_2 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. The consumption of petroleum products, such as gasoline, diesel fuel, and aviation fuel, accounts for almost all (98 percent) of transportation-sector emissions. Recognizing this concern, the Federal Highway Administration (FHWA) is working nationally with other modal administrations through the Department of Transportation Center for Climate Change and Environmental Forecasting to develop strategies to reduce transportation's contribution to greenhouse gases (particularly CO_2 emissions) and to assess the risks to transportation systems and services from climate changes.

Did you know?

An average car emits one pound of carbon dioxide for every mile it is driven. So for every mile you avoid driving, you reduce the carbon dioxide added to the atmosphere by one pound.

At the state level, there are also several programs underway in Colorado to address transportation greenhouse gases. The Governor's Climate Action Plan, adopted in November 2007, includes measures to adopt vehicle CO_2 emissions standards and to reduce vehicle travel through transit, flex time, telecommuting, ridesharing, and broadband communications. The Colorado Department of Transportation issued a Policy Directive on Air Quality in May 2009. The Colorado Department of Transportation developed this Policy Directive with input from a number of agencies, including the State of Colorado's Department of Public Health and Environment, the Environmental Protection Agency, FHWA, the Federal Transit Administration, the Denver Regional Transportation District, the Denver Regional Air Quality Council.

This Policy Directive addresses unregulated mobile source air toxics and greenhouse gases produced from Colorado's state highways, interstates, and construction activities.

As a part of CDOT's commitment to addressing MSATs and greenhouse gases, some of CDOT's program-level activities include:

- Developing truck routes/restrictions with the goal of limiting truck traffic in proximity to facilities, with sensitive receptor populations, including schools. (Note: This activity is a statewide activity and does not apply to the Corridor.)
- Continuing research about pavement durability opportunities with the goal of reducing the frequency of resurfacing and/or reconstruction projects.
- Developing air quality educational materials for citizens, elected officials, and schools that are specific to transportation issues.
- Offering outreach to communities to integrate land use and transportation decisions to reduce growth in vehicle miles traveled, such as smart growth techniques, buffer zones, transit-oriented development, walkable communities, access management plans, etc.
- Committing to research additional concrete additives that would reduce the demand for cement.
- Expanding Transportation Demand Management efforts statewide to better utilize the existing transportation mobility network.
- 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.
- Exploring congestion and/or right-lane only restrictions for motor carriers.
- Funding truck parking electrification (note: mostly via exploring external grant opportunities).
- Researching additional ways to improve freight movement and efficiency statewide.
- Committing to incorporating ultra-low sulfur diesel for non-road equipment statewide—likely using incentives during bidding.
- Developing a low volatile organic compound-emitting tree landscape specifications (basically specifying which trees emit fewer volatile organic compounds).

The Colorado Department of Transportation acknowledges that even though climate change is a global issue and no one strategy as described previously will make a noticeable difference, incremental changes such as the ones described above will result in some effect.

Because climate change is a global issue, and the emissions changes due to Action Alternatives are very small compared to global totals, the greenhouse gas emissions associated with the alternatives were not calculated. Because greenhouse gases are directly related to energy use, the changes in greenhouse gas emissions would be similar to the changes in energy consumption presented in **Section 3.16** of this document. **Table 4-3** shows the relationship of current and projected Colorado highway emissions to total global CO_2 emissions. Colorado highway emissions are expected to increase by 4.7 percent between now and 2035. The benefits of the fuel economy and renewable fuels programs in the 2007 Energy Bill are offset by growth in vehicle miles traveled; the draft 2035 Statewide Transportation Plan predicts that Colorado vehicle miles traveled will double between 2000 and 2035. This table also illustrates the size of the Corridor relative to total Colorado travel activity.

Table 4-3. Annual Carbon Dioxide Emissions

Global CO_2 Emissions, 2005, MMT[1]	Colorado Highway CO_2 Emissions, 2005, MMT[2]	Projected Colorado 2035 Highway CO_2 Emissions, MMT[2]	Colorado Highway Emissions, % of Global Total (2005)[2]	Project Corridor VMT (Preferred Alternative), % of Statewide VMT (2005)
27,700	29.9	31.3	0.108%	6.06

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

Key to Abbreviations/Acronyms
CO_2 = carbon dioxide MMT = million metric tons VMT = vehicle miles of travel

4.9 What are the cumulative benefits?

Implementation of the Action Alternatives, when combined with other reasonable foreseeable actions, provides cumulative benefits. The extent of these benefits varies by alternative. They include increased mobility, regional connectivity, and access to recreational amenities. **Section 3.9** discusses the various economic benefits anticipated from the transportation infrastructure investments. Induced growth in Summit and Eagle Counties would provide short-term construction employment, indirect jobs stemming from construction, and longer-term tax revenue increases for the area's local governments. **Section 3.4** includes measures that would be included along with the Action Alternatives to improve water quality.

4.10 What measures will be taken to address issues related to cumulative impacts?

Chapter 3 and **Section 3.19** include mitigation strategies for direct and indirect impacts to the environmental resources studied in this cumulative chapter in their respective sections. To address cumulative impacts, the following mitigation strategies can be considered by CDOT:

- Coordinate with Clear Creek County communities regarding implementation of a marketing program that would include an approach to marketing for historic tourism to address the possible disparate distribution of benefits and impacts from construction activities.
- Follow the processes outlined in ALIVE Memorandum of Understanding (see **Section 3.2**) to increase the ability of wildlife, particularly protected species, to cross the highway and transit infrastructure throughout the Corridor.
- Implement the strategies discussed previously to address MSATs and green house gas emissions.
- Continue to participate in and promote the SWEEP program. Implement the SWEEP Memorandum of Understanding and matrix of mitigation to address stream impairment and benefit aquatic resources.
- Implement the mitigation commitment to reduce the effect of the Corridor visual scars from original I-70 construction.
- Implement aesthetic guidelines prepared as part of the I-70 Mountain Corridor Context Sensitive Solutions program for establishing an aesthetically positive visual experience for all viewers.
- To avoid any negative effects of induced growth, Corridor counties could coordinate regional growth management. The *I-70 Mountain Corridor PEIS Land Use Technical Report* (CDOT, August 2010) summarizes all current county and municipal plans including strategies for balancing the impacts of growth with sustaining environmental quality.

The Community Values Issues Task Force recommends that the Colorado Department of Transportation adopt a policy approach before the Tier 2 process that promotes and assists communities in the adoption of more comprehensive, regional growth management plans that can be applied to Tier 2 projects. The Colorado Department of Transportation has not committed to the adoption of such an approach but will consider the possibility of doing so before the Tier 2 processes. The recommendations for this approach include exploring the possibility of creating grants for communities that lack the resources to develop a growth plan; working with local councils of government and the Colorado Department of Local Affairs to assist with funding; and promoting the consideration of open space as community separators, or view sheds distinguishing communities, including studies led by the United States Forest Service and Bureau of Land Management. While CDOT will consider this type of policy approach, efforts to control growth are greatly dependent on local planning and community political direction.

In addition, certain resources of concern could be approaching saturation or tipping points, as discussed previously, and could require more aggressive monitoring and appropriate mitigation strategies as the project moves toward implementation during Tier 2 processes.

4.11 What conclusions can be made?

The focus of this first tier cumulative assessment is to evaluate the inter-relationships between the transportation network, community values, and environmental resources within the Corridor, and to identify possible cumulative impacts and resource vulnerabilities that may result from project alternatives. A key role of this first tier document is to outline a broad framework for cumulative impact mitigation strategies involving interagency and regional coordination.

The information in this chapter indicates that past and present actions in the Corridor have resulted in loss or modification to the area's environmental resources. Reasonably foreseeable future actions, including projected development and other actions, when combined with direct and indirect impacts (including induced growth) from alternatives, would continue to affect resources.

The phased approach allows ongoing opportunities to avoid and minimize environmental impacts, establish effective mitigation, and employ I-70 Mountain Corridor Context Sensitive Solutions.

The phased approach of the Preferred Alternative provides a unique opportunity for adapting transportation solutions to the environmental sensitivity and community values of the Corridor over time.

4.12 What's next and how will analysis differ from Tier 1 to Tier 2?

The Colorado Department of Transportation will promote and assist communities, as possible, in the adoption of more comprehensive, regional growth management plans that can be applied to Tier 2 processes. Cumulative impacts analyses done during Tier 2 will focus on those environmental resources studied that are of most concern in that particular Tier 2 study area and watershed. Further, the Tier 2 processes will include:

- Updated impacts information based on greater design detail and much more localized resource information.
- Revised study area boundaries, as necessary.
- More detailed studies to assess effects to historic properties.
- Development of interagency cumulative impact mitigation plans through regional coordination in conjunction with the implementation plan for the Preferred Alternative.

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Chapter 5. Financial Considerations

5.1 What's in Chapter 5?

This chapter discusses potential funding sources that could be used to construct the Preferred Alternative improvements for the I-70 Mountain Corridor. Please see the *I-70 Mountain Corridor PEIS Financial Considerations Technical Report* (CDOT, August 2010a) and the *I-70 Mountain Corridor PEIS Cost Estimates Technical Report* (CDOT, August 2010b) for detail about potential funding sources and alternative cost estimates.

5.2 How were cost estimates determined?

Cost estimates for alternatives were developed in 2004 from preliminary design item costs, cost estimating contingency factors and other component costs. To update costs for this document, lead agencies used cost escalations for each alternative, using the Colorado Highway Construction Cost Index as a basis for determining long-term future cost escalation. This resulted in a current year cost (2010) of $9.2 billion to $11.2 billion dollars. The Advanced Guideway System cost estimates were established in conjunction with the Federal Transit Administration's Colorado Urban Maglev Project and were independently reviewed and confirmed by the Rocky Mountain Rail Authority as part of their High Speed Rail Feasibility Study. See the *I-70 Mountain Corridor PEIS Cost Estimates Technical Report* (CDOT, August 2010b) for details on estimated methodology and assumptions.

The process of escalating costs provides a uniform treatment of alternatives for relative comparison. The Colorado Department of Transportation (CDOT) updated the 2010 cost estimate based on a revised methodology to provide a more reasonable range of costs consistent with a Tier 1 document for the 21 Action Alternatives, including the Preferred Alternative. The revised methodology focuses on Year of Expenditure cost using a midyear of construction of 2020 for the Minimal Action, while all other alternatives use a midyear construction of 2025, which is the midyear of the planning period. **Chart 5-1** shows capital cost by alternative.

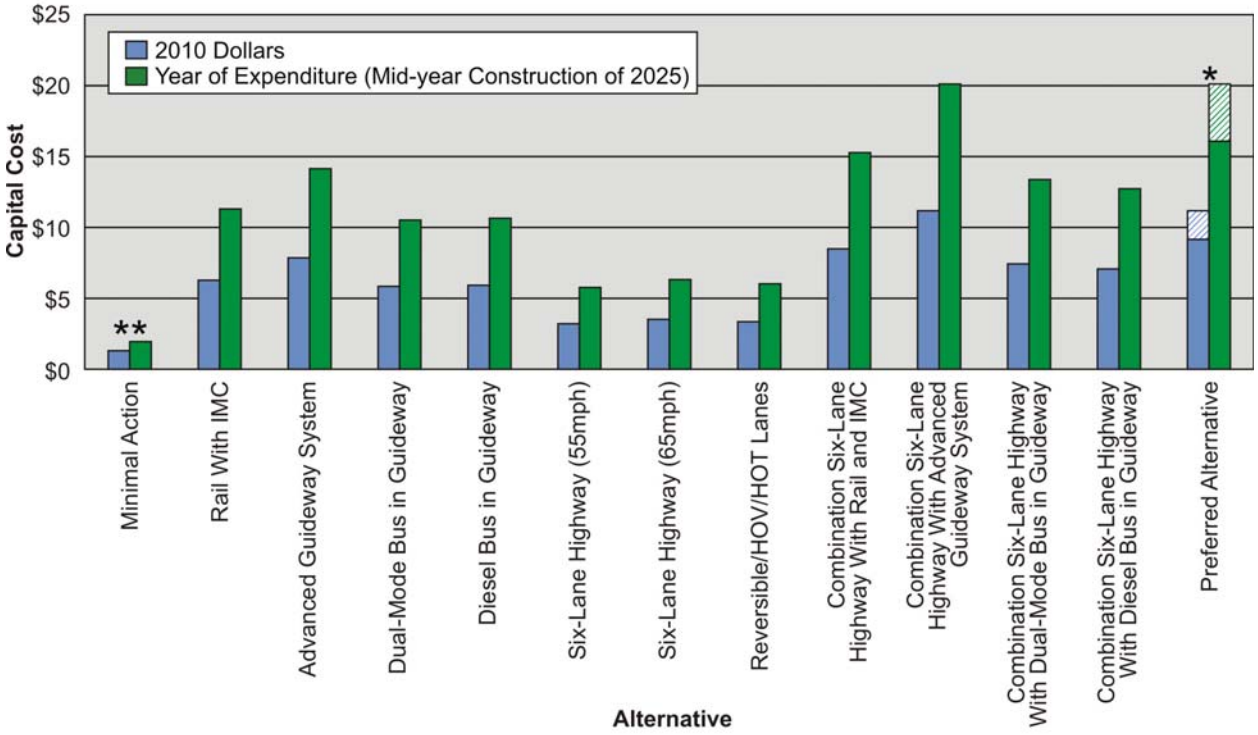
The timeframe for implementing components of the Preferred Alternative is wide ranging; future Tier 2 processes will identify project level improvements. Those studies will include more detailed design information, specific mitigation measures to offset impacts and project specific cost estimates.

5.3 What is the cost of the Preferred Alternative?

The Preferred Alternative identifies a minimum and maximum range of multimodal improvements ranging in cost from $16.1 billion to $20.2 billion (in year of expenditure with a 2025 midyear of construction).

The 21 Action Alternatives evaluated in this document range in cost from $1.9 billion to $20.2 billion (in year of expenditure with a 2025 midyear of construction). See **Chapter 2** for more information on the alternatives.

Chart 5-1. Capital Cost by Alternative



* The Maximum Program presents the range of impacts that could occur with the Preferred Alternative. The solid bar represents the implementation of the Minimal Program only. The hatched bar area shows the range of the Maximum Program. It is presented as a range because the adaptive management component of the Preferred Alternative allows it to be implemented based on future needs and associated triggers for further action. The top end of the bar represents the full implementation of the Maximum Program. Section 2.7 of this document describes the triggers for implementing components of the Preferred Alternative.

** The methodology focuses on year of expenditure cost to a mid-year of construction of 2020 for the Minimal Action Alternative.

5.4 How much funding is currently allocated to the I-70 Mountain Corridor?

As part of the amended *2035 Statewide Transportation Plan* (CDOT, March 2008), $218 million is allocated for the I-70 Mountain Corridor in Fiscal Year (FY) 2012-2017 and $989 million is identified for the Corridor during FY 2018–2035. Please refer to **Section 5.5** for information on funding sources.

The Colorado Transportation Commission identified the I-70 Mountain Corridor as one of 28 strategic statewide projects collectively known as the 7th Pot in 1996. Approximately $1.8 billion (in FY 2010 dollars) remains unfunded for the Corridor as part of this program.

The 7th Pot Projects received funding from Senate Bill 97-001, which provided a dedicated revenue stream from additional sales and use tax revenues associated with automobiles and automobile-related accessories. In 2009, Senate Bill 97-001 was repealed by Senate Bill 09-228, eliminating the dedicated revenue stream for remaining 7th Pot Projects, including the I-70 Mountain Corridor.

The Colorado Department of Transportation assumes a probable increase in federal, or state revenue streams, or a combination of both, occurring after FY 2017. The additional funding could mitigate the elimination of Senate Bill 97-001 revenue within the long-range plan funding horizon.

As Tier 2 processes identify projects, these improvements will need to be fiscally constrained and listed in the Statewide Transportation Improvement Program (STIP). See the **Introduction Chapter** for additional information on the statewide planning process.

5.5 What are the sources for current funding and their limitations?

The Colorado Department of Transportation's revenue is derived from federal and state funding sources. The Colorado State Constitution, federal law, and state statutes determine how CDOT can use these funds. In the past decade, transportation revenues have fluctuated significantly in receipts from these various revenue sources. This uncertainty is expected to continue into the future. These funding sources and their limitations are summarized below.

Motor Fuel Tax

The motor fuel tax, the primary source of transportation-related revenue for the state and federal government is stagnant. Because the motor fuel tax is a fixed per-gallon excise tax, revenue collected depends on the number of gallons sold, not on the sales price. In the years since the state (1991) or federal government (1993) increased the motor fuel tax, revenues have not kept pace with inflationary increases experienced by the construction sector of the economy, which averaged six percent per year over the past decade.

Despite historical increases in vehicle miles traveled, increasing fuel efficiency of motor vehicles led to a decline in the rate of growth of motor fuel tax collections. The recent spike in fuel prices, national economic instability and a push for consumers to purchase more fuel-efficient vehicles resulted in a national trend of decreased vehicle miles traveled. As a result, the motor fuel tax is an even less reliable source for sustained transportation funding than in years past.

Funding Advancements for Surface Transportation and Economic Recovery

Passed in 2009, Senate Bill 09-108 Funding Advancements for Surface Transportation and Economic Recovery (FASTER) generates an average of $292 million annually over the next 25 years for roadway, bridge and transit projects through the establishment of new user fees. A new Road Safety Fund will complete construction, reconstruction or maintenance projects that enhance the safety of the state's highways. A new Bridge Safety Fund is devoted to replace the state's 128 poor bridges. A dedicated revenue stream for multi-modal projects also was identified. While FASTER made significant additions to Colorado's transportation funding, projected long-term transportation revenues remain stagnant due to the elimination of other funding sources.

Senate Bill 09-228

Senate Bill 09-228 established methods to transfer money to transportation, capital construction, and the state's statutory reserve. After a five percent growth rate is met, a five-year transfer beginning in FY 2012 of General Funds would occur to transportation, totaling 2 percent of General Fund revenues at approximately $170 million. Based on current budget scenarios, the earliest CDOT anticipates funds may be available to transportation under this new law is FY 2013–2014.

House Bill 95-1174

The Colorado Department of Transportation requested Capital Construction Funds from the General Assembly in 1995 after the passage of House Bill (HB) 95-1174, which enabled CDOT to submit an annual request of prioritized state highway reconstruction, repair and maintenance projects for consideration. The Colorado Department of Transportation last received these funds in FY 2008-09 and does not anticipate appropriations in the future given state budget constraints.

As noted in **Section 5.4**, this Corridor was eligible for Senate Bill 97-001 funding as part of the 7th Pot Program. That legislation was repealed in 2009, which means CDOT will not receive the $1.8 billion that was identified for to the I-70 Mountain Corridor. House Bill 02-1310, which allocated additional General Fund surpluses to transportation projects, also was repealed in 2009.

Federal Authorization

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, or "SAFETEA-LU" is the federal authorization act under which Colorado receives an allocation of federal fuel tax revenues. SAFETEA-LU funding authorizations expired on September 30, 2009, but were extended at the FY 2009 levels by a series of continuing resolutions, extending the act through December 31, 2010.

The Colorado Department of Transportation is currently operating with funding provided under this series of extensions of SAFETEA-LU authorities. In addition, collections from the federal gas tax cannot sustain the current level of funding to the states. The Federal Highway Trust Fund will again face the possibility of a zero balance in the near future for the third time in three years and Congress will be forced to reduce funding to the States, slow down reimbursements to the States, or again transfer a significant amount of general fund revenue into the Highway Trust Fund.

5.6 Is there enough funding to implement the Preferred Alternative?

No. The Colorado Department of Transportation does not have enough available revenue sources allocated to fund the improvements identified by the Preferred Alternative. To implement the Action Alternatives, additional funding sources must be secured. Lawmakers and citizens recognize the I-70 Mountain Corridor is a key component of Colorado's economy and competes as one of the highest priorities in the state in need of capital improvements as new funding opportunities arise.

5.7 What are potential funding sources and their limitations?

New funding sources are needed to fund improvements identified by the Preferred Alternative.

New Federal Surface Transportation Bill

While operating under the temporary extension of SAFETEA-LU funding authorizations, Congress is discussing a new, multi-year, transportation bill. Such legislation could provide opportunities for increased funding for highway and transit improvements identified in this document.

Until Congress identifies policy priorities and the revenues to fund them, the federal program will remain unstable. If Congress fails to identify increased revenues in a new Authorization bill, Colorado's share of federal transportation dollars could be reduced by 30 to 40 percent. Conversely, if Congress identifies new revenue streams to fund infrastructure priorities, Colorado's share of federal transportation dollars could increase as much as 50 to 100 percent.

Transportation Finance and Implementation Panel Recommendations

Convened by Governor Bill Ritter, Jr., a 32-member Transportation Finance and Implementation Panel (the Panel) released *A Report to Colorado* (January 2008), proposing a statewide vision for transportation, policy change recommendations, new investment categories, and funding thresholds for increased investment in transportation. The report estimates a minimum of $1.5 billion is needed annually above the existing investment to improve Colorado's transportation system. A Technical Advisory Committee helped the Panel analyze numerous alternatives for generating more revenue for transportation. The Technical Advisory Committee compiled and ranked a list of 39 options using16 criterion. Six revenue

options were recommended in the final report, found at www.colorado.gov/governor. Specific proposals for raising additional funds for the Corridor improvements must be approved by a public vote, by action of the Colorado General Assembly or by a combination of the two.

5.8 What innovative funding sources might be available?

Options for innovative sources include the following:

Public Private Partnerships

Public private partnerships are joint partnerships that could be formed between a private entity and CDOT to implement transportation projects funded mostly by private dollars. If a private entity is awarded a project, the financing, design and construction are the responsibility of that private entity. Before construction, CDOT must complete the appropriate environmental studies and clearances and meet applicable state and federal requirements.

Tolling

At the Programmatic tier, tolling was considered a funding tool, not a primary objective of the project and no determination has been made as to whether it will be implemented in the Corridor. Tolling could be considered at Tier 2 and should include the following considerations:

- Effects of tolling on travel demand
- Public support
- Benefits to capacity and congestion management
- Revenue generation
- Incentives for local residents
- Tolling rates
- Flexibility in tolling requirements or exemptions for certain demographics.
- Timing/user pricing

There is a renewed interest in user pricing as the cost of capacity improvements continues to exceed available funding. Colorado law allows for the tolling of new capacity as well as the tolling of existing capacity if supported by local communities. Tolls may be used for transit-related projects in the Corridor for which the toll or user fee is collected. Federal law requires interstate tolling be approved through established SAFETEA-LU pilot programs.

Bonding/Loans

Private activity bonds are another potential funding source. Private activity bonds are federally tax-exempt bonds used to finance facilities used by private businesses. Interest on private activity bonds is excluded from gross income for federal income tax purposes if the bonds fall within certain defined categories.

The Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA) established a federal credit program for eligible transportation projects of national or regional significance under which the U.S. Department of Transportation may provide three forms of credit assistance—secured (direct) loans, loan guarantees, and standby lines of credit. The program's fundamental goal is to leverage federal funds by attracting substantial private and other non-federal co-investment in critical improvements to the nation's surface transportation system to accelerate creditworthy projects of regional or national significance. No revenue from these sources is currently projected, but such sources may be investigated during Tier 2 processes.

Corridor-Specific Sources

Distinguished from the sources above, Corridor-specific sources are funding sources that apply to limited geographic areas. Geographic limitations are determined by the jurisdictions of local governments or by tax region. Funding sources could be implemented on a localized scale to fund specific projects or portions of projects within the jurisdiction from which the revenue was generated. Corridor-specific sources require voter approval, constitutional amendments, or both and could be considered at Tier 2.

Chapter 6. Public and Agency Involvement

6.1 What's in Chapter 6?

This chapter summarizes the public and agency information and involvement for the *I-70 Mountain Corridor Programmatic Environmental Impact Statement* (PEIS) process. It describes the objectives of the public and agency information and involvement program; how the Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) (lead agencies) informed members of the public, agencies, and stakeholders and engaged them in the PEIS process; how the lead agencies reached out to low-income and minority populations; public and agency input; and plans for public and agency involvement through completion of this document and future Tier 2 processes. The *I-70 Mountain Corridor PEIS Public and Agency Involvement Technical Report* (CDOT, August 2010) provides more detail about how the lead agencies notified and engaged members of the public and project stakeholders in the process.

6.2 What are the objectives of the public and agency information and involvement program?

The objectives of the program are to communicate with the public and agencies, document those issues, and identify and incorporate any issues into the planning and decision making process. The lead agencies accomplished these objectives in scoping, alternative family identification, alternatives packaging, impacts assessment, preferred alternative groupings, and the preferred alternative recommendations.

Public and agency involvement is vital to the National Environmental Policy Act (NEPA) process to help make informed decisions about future transportation planning in the Corridor.

The Colorado Department of Transportation formed several project committees and teams to inform and interact with technical experts, local residents and officials, interest groups, and government agencies (see **Section 6.3**). The Colorado Department of Transportation worked closely with the committees and teams over the last three years to identify the Preferred Alternative.

The lead agencies are committing to continue the public and agency involvement and interactive communication through:

- Completion of the Final PEIS and Record of Decision (ROD) (the final decision document that concludes the NEPA process for this Tier 1 process); and
- Future Tier 2 processes for individual projects in the Corridor. See **Section 6.8** for more information.

Context Sensitive Solutions

The lead agencies developed I-70 Mountain Corridor Context Sensitive Solutions beginning in spring 2007 in response to stakeholder desires to have a Corridor-wide perspective and to formalize commitments to ongoing stakeholder involvement on projects in the Corridor. The Colorado Department of Transportation based the I-70 Mountain Corridor Context Sensitive Solutions Guidance on the concepts articulated in FHWA's definition of Context Sensitive Solutions (CSS), which is:

> *. . . a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will*

exist. CSS principles include the employment of early, continuous and meaningful involvement of the public and all stakeholders throughout the project development process.

The lead agencies committed to follow the I-70 Mountain Corridor Context Sensitive Solutions Guidance developed for all current and future projects in the Corridor. See **Appendix A, I-70 Mountain Corridor Context Sensitive Solutions,** for more information.

6.3 How were agencies and stakeholders involved in the public and agency information and involvement program?

The Colorado Department of Transportation included local, state, and federal agencies in the PEIS process by inviting them to participate in project scoping and project meetings. The Colorado Department of Transportation formed project committees and teams to further involve stakeholders in the process, which are summarized below. The *I-70 Mountain Corridor PEIS Public and Agency Involvement Technical Report* (CDOT, August 2010) lists the agencies involved.

Project Committees

The Colorado Department of Transportation formed committees to assist in understanding Corridor issues and/or to provide advice throughout the process. The lead agencies provided updates to the committees throughout the process. Members of the committees included:

- **Technical Advisory Committee (TAC) –** A cross-section of local, state, and federal agencies, counties, municipalities, community associations, and special interest groups with various affected interests. The TAC provided technical expertise relevant to the project and knowledge about resource areas and issues. The TAC merged with the Mountain Corridor Advisory Committee later in the process.
- **Mountain Corridor Advisory Committee (MCAC) –** Representatives from counties, municipalities, community associations, and special interest groups with various affected interests.
- **Federal Interdisciplinary Team** – Decision-makers from federal and state agencies, who provided expertise relevant to the resources managed by their respective agencies.
- **A Landscape Level Inventory of Valued Ecosystem Components Committee (ALIVE) –** Wildlife professionals from federal and state agencies who identified wildlife habitat of high ecological integrity, wildlife habitat linkages, and barriers to wildlife crossings along the Corridor. They developed a landscape-based ecosystem approach for consideration of wildlife needs and conservation measures, and identified measures to improve existing aquatic and terrestrial ecosystem connectivity across the I-70 Mountain Corridor between Denver and Glenwood Springs. In April 2008, CDOT, FHWA, U.S. Fish and Wildlife Service, the U.S. Department of Agriculture Forest Service, Bureau of Land Management, and Colorado Department of Natural Resources Division of Wildlife signed a Memorandum of Understanding documenting their commitment to identify mitigation and conservation measures during future Tier 2 processes to increase the permeability of the I-70 Mountain Corridor to terrestrial and aquatic species.
- **Stream and Wetland Ecological Enhancement Program (SWEEP) –** Representatives from federal and state agencies, watershed associations, and special interest groups. Members identified and addressed environmental issues related to the improvement of wetlands, streams, and fisheries in the Corridor.
- **Section 4(f) and 6(f) Ad Hoc Committee –** Representatives of state, federal, tribal, and historic entities. Section 4(f) and 6(f) Ad Hoc Committee members identified and inventoried Section 4(f) and Section 6(f) properties within the Corridor.

- **Finance Committee –** Representatives of state, federal, and county agencies. Finance Committee members explored the potential affordability of the alternatives and the economical feasibility of the Preferred Alternative.
- **Peer Review Committee –** Seven technical experts in their respective fields provided guidance and suggestions on the inputs to the travel demand model as it was being developed, and reviewed model outputs.

I-70 Mountain Corridor Context Sensitive Solutions Team

The Colorado Department of Transportation adopted the I-70 Mountain Corridor Context Sensitive Solutions process to consider the total "context" of the proposed transportation projects—not just the study's physical boundaries. In 2007 CDOT formed an I-70 Mountain Corridor Context Sensitive Solutions Team that included 150 public and agency stakeholders to develop Context Sensitive Solutions Guidance for the Corridor. The I-70 Mountain Corridor Context Sensitive Solutions Guidance commits to implement Context Sensitive Solutions and to form collaborative stakeholder teams, called Project Leadership Teams, on all Corridor projects. The I-70 Mountain Corridor Context Sensitive Solutions Guidance authorizes Project Leadership Teams to create Issue Task Forces to address specific issues outside the Project Leadership Teams' area of expertise. The I-70 Mountain Corridor Context Sensitive Solutions Guidance document is available on the project website at **www.i70mtncorridorcss.com**, and may be amended to remain flexible to address and incorporate innovations, new techniques, advanced technologies, and emerging trends in the Corridor.

The I-70 Mountain Corridor Context Sensitive Solutions Team considered the unique scenic, aesthetic, historic, and environmental resources of the Corridor to develop the I-70 Mountain Corridor Context Sensitive Solutions Guidance that will serve as the framework for all current and future projects along the Corridor.

- **Project Leadership Teams –** The I-70 PEIS Project Leadership Team helps facilitate completion of the NEPA process. The Project Leadership Team's objectives were to efficiently and effectively complete an easily understood, publicly supported, and legally sufficient Revised DPEIS, Final PEIS, and ROD. The Project Leadership Team identified critical issues to be addressed, provided guidance for development of the comparative analysis, and provided insights about what was important to stakeholders to present in the Final PEIS. These enduring documents represent the best direction for future generations, and provide a "state-of-the-art" project.

  The I-70 PEIS Project Leadership Team first met in October 2008, with representatives from FHWA, CDOT, the United States Forest Service, Trout Unlimited, I-70 Coalition, Garfield County, Eagle County, Summit County, Clear Creek County, Jefferson County, and consultants. The I-70 PEIS Project Leadership Team coordinated with the Collaborative Effort (discussed below) and will remain active through the ROD. Future projects along the Corridor will have Project Leadership Teams.

- **Issue Task Forces –** The I-70 PEIS Project Leadership Team formed a Cultural Resources Issue Task Force , Environmental Issue Task Force, and Community Values Issue Task Force to develop potential mitigation strategies for impacts to resources identified in the 2004 Draft PEIS for Tier 2 processes. The lead agencies will incorporate the suggested mitigation strategies into the Final PEIS. This does not indicate that all strategies will be implemented—the decision on appropriate mitigation will be made on a project-by-project basis during Tier 2 processes.

Collaborative Effort Team

The Colorado Department of Transportation formed the Collaborative Effort team to establish trust and confidence in agency leadership and collaborative decision making, to build agreement around a broad alternative that identifies travel modes and transportation improvement priorities.

The Colorado Department of Transportation commenced a Collaborative Effort team to address the public involvement, the stakeholders' lack of trust, and the stakeholders' desire to be involved in the identification of the Preferred Alternative. The Colorado Department of Transportation worked with the U.S. Institute for Environmental Conflict Resolution to establish a selection committee made up of diverse stakeholders and to select a facilitator. The Colorado Department of Transportation chose the Keystone Center to facilitate the effort. The Keystone Center interviewed more than 50 stakeholders throughout the Corridor in August 2007 to identify stakeholder issues and make recommendations regarding a process for developing consensus on a preferred alternative. Stakeholders voiced a range of procedural interests, concerns, and suggestions, ranging from a lack of trust and confidence in agency decision making, to acknowledgement that not all stakeholder groups have identical interests and a desire to better reflect factors that have changed since publication of the 2004 Draft PEIS.

The Colorado Department of Transportation formed a 27-member Collaborative Effort team to reach a consensus recommendation for Corridor transportation solutions that address these stakeholder issues. In June 2008, the Collaborative Effort team used a process consistent with the 2004 Draft PEIS Purpose and Need Statement to identify a "Consensus Recommendation" that included a multi-modal solution, an incremental and adaptive approach to transportation improvements, and a commitment to continued stakeholder involvement. The lead agencies committed to adopt the Collaborative Effort team's Consensus Recommendation as the Preferred Alternative in the Final PEIS. The Collaborative Effort team will convene at key project milestones during completion of this document and the Final PEIS, and will continue to meet through 2020 (see **Section 6.8** for future Collaborative Effort team activities). The Collaborative Effort Team included representatives of the following entities:

- Blue River Group, Sierra Club
- City of Idaho Springs
- Clear Creek County
- Colorado Association of Transit Agencies
- Colorado Dept. of Transportation (2)
- Colorado Environmental Coalition
- Colorado Motor Carriers Association
- Colorado Rail Passenger Association
- Colorado Ski Country USA
- Colorado Trout Unlimited
- Denver Mayor's Office
- Denver Metro Chamber of Commerce
- Eagle County
- Federal Highway Administration
- Federal Transit Administration
- Garfield County
- Rocky Mountain Rail Authority
- Sierra Club, Rocky Mountain Chapter
- Summit Chamber
- Summit Stage
- Town of Frisco
- Town of Georgetown, Georgetown Trust
- Town of Vail
- U.S. Army Corps of Engineers
- United States Forest Service
- Vail Resorts

I-70 Coalition

The I-70 Coalition addresses accessibility and mobility issues along the I-70 Mountain Corridor apart from the I-70 Mountain Corridor PEIS project. In January 2004, more than 30 political jurisdictions adopted an intergovernmental agreement to address Corridor transportation issues and respond to the 2004 Draft PEIS. Coalition members include representatives from cities and counties located along the Corridor, Denver Regional Council of Governments, Roaring Fork Transit Authority, and the private

sector. I-70 Coalition representatives also participated in the I-70 PEIS Project Leadership Team and Collaborative Effort team processes.

6.4 How did you involve members of the public and local organizations in the public and agency information and involvement program?

The Colorado Department of Transportation used several different processes to notify, inform, involve, and engage members of the public and local organizations, including agency coordination, media relations, and public information and participation, summarized here and under **Section 6.3**:

- Published Notice of Intent in the January 13, 2000 Federal Register.
- Mailed six newsletters between 1999 and 2004.
- Set up project website (**www.i70mtncorridor.com**) and telephone information line (877-408-2930) to provide project information, obtain questions and comments, and add names to project mailing list.
- Distributed project information through news media.
- Held four agency scoping meetings.
- Held four sets of public open houses in 2000 and 2001.
- Conducted 16 community interviews.
- Held approximately 89 internal coordination and planning meetings with local communities; special interest groups; and federal, local, and state agencies.
- Invited 16 Native American tribes to participate and held two field trips.
- Announced the Notice of Availability of the 2004 Draft PEIS in the December 10, 2004, Federal Register; 38 regional and local newspapers; and in notices sent to more than 11,000 recipients.
- Extended the original 90-day comment period an additional 75 days. Announced the extension in an amended Notice of Availability in the February 25, 2005 Federal Register, in postcards sent to more than 11,000 recipients, and on the project website.
- Distributed the 2004 Draft PEIS for public and agency review to 17 libraries, 4 county offices, 5 community centers, and other locations in and around the Corridor; 13 federal agencies; 6 Colorado state agencies; 31 elected officials (Executive Summary only); and 75 Mountain Corridor Advisory Committee/Technical Advisory Committee members. Posted the 2004 Draft PEIS on the project website.
- Held 10 public hearings in January and February 2005 at locations throughout metropolitan Denver and Corridor communities where the public could question the project team and provide formal comments to a stenographer. Held hearings in an interactive open house format with a 30-minute presentation.
  - Announced public hearings via notices sent to more than 11,000 recipients, news ads in 38 regional and local newspapers, and ads on Comcast cable channels and 14 radio stations.
  - A total of 817 people attended the hearings, of which 213 provided verbal comments on the 2004 Draft PEIS. Others submitted comments via the project website, e-mail, letters, and comment sheets. Received 766 comments from 540 commenters; those 766 comments identified 2,055 specific concerns.
- Held MCAC meeting on January 12, 2005, to review key differences between the 2004 Draft PEIS and the September 2003 Summary of Preliminary Findings; to discuss document availability options, public hearings, and public repositories; and to identify the process for

responding to public , next steps, and the MCAC's/TAC's future role. Posted the meeting presentation on the project website.

- The Colorado Department of Transportation established the I-70 Mountain Corridor Context Sensitive Solutions Team to develop the I-70 Mountain Corridor Context Sensitive Solutions Guidance to be the framework for all current and future projects along the Corridor. See **Section 6.3** for more information.
- The Colorado Department of Transportation formed the Collaborative Effort team to reach consensus on a recommended alternative for the Corridor. See **Section 6.3** for more information.
- The Colorado Department of Transportation created a Project Leadership Team to address issues identified in the 2004 Draft PEIS and complete the Final PEIS and ROD. See **Section 6.3** for more information. The Project Leadership Team then formed three Issue Task Forces to develop strategies to mitigate impacts to cultural resources, environmental resources, and community values.

6.5 How did you involve minority and low-income populations?

The lead agencies implemented an environmental justice outreach program to ensure public involvement opportunities for minority and low-income populations, and distributed more than 900 copies of the March 2001 newsletter with a bilingual insert. The *I-70 Mountain Corridor PEIS Public and Agency Involvement Technical Report* (CDOT, August 2010) details the environmental justice outreach program.

6.6 What public and agency input was received?

The lead agencies solicited public and agency input to help identify issues and concerns to consider in the study.

Publication on December 10, 2004 of the Draft PEIS and 165-day public review period provided formal milestones in the NEPA process where the public could view the project findings and review and comment on the project proposal. Members of the public; municipal, county, state, and federal agencies; and associations and special interest groups commented on the 2004 Draft PEIS. The **Introduction** of this document summarizes those comments.

This document is responsive to comments that were received during and since the comment period on the 2004 Draft PEIS. However, a comment-by-comment response was not provided. The *I-70 Mountain Corridor PEIS Public and Agency Involvement Technical Report* (CDOT, August 2010) provides more information about the public and agency comments.

Responses to individual comments received on this document will be provided in the Final PEIS.

6.7 How were the stakeholders involved in the decision making process?

Stakeholders had an opportunity to receive information early in the process by attending agency scoping meetings and serving on the several project committees and teams. As the project progressed and following release of the 2004 Draft PEIS, stakeholders expressed the desire for a higher level of involvement in decision making and became more involved through the formation of the I-70 Mountain Corridor Context Sensitive Solutions Team, Project Leadership Team, Issue Task Forces, and the Collaborative Effort team. The stakeholders' involvement and commitment were critical in achieving consensus on a recommended alternative. See **Section 6.3** .

6.8 What public and agency involvement opportunities will be provided going forward from this point in the process?

Remaining steps to complete the first tier NEPA process for the I-70 Mountain Corridor PEIS are:

- Distribute this document.
  - Issue Notice of Availability
  - Hold public hearings
  - Provide 60-day public comment period
- Prepare Final PEIS, including responses to individual comments received during the public comment period.
  - Issue Notice of Availability
  - Hold public hearings
  - Provide 30-day public comment period
- Hold I-70 PEIS Project Leadership Team and Collaborative Effort team meetings through completion of the ROD, as appropriate.
- Prepare ROD, the final decision document that concludes the NEPA process for this Tier 1 study.

The public may comment on any aspect of this document. However, lead agencies would specifically like to hear the views of the public on factors relating to these decisions on the travel mode, capacity, and general location because these aspects of the decision will not be revisited at Tier 2.

The lead agencies anticipate the following public and agency involvement during future Tier 2 processes:

- The lead agencies will complete site-specific Tier 2 processes for future projects in the Corridor and develop public and agency involvement programs for each study, including scoping meetings, public open houses, project information distribution, public and agency document review and comment, and public hearings. The level of public involvement depends on the NEPA action undertaken (Environmental Impact Statement, Environmental Assessment, or Categorical Exclusion). The lead agencies will follow the I-70 Mountain Corridor Context Sensitive Solutions Guidance for each project, as discussed under **Section 6.3**.
- The lead agencies will continue stakeholder engagement through completion of the Final PEIS and ROD, and site-specific Tier 2 processes. See **Section 2.7** for more information. In 2020 the lead agencies will coordinate with the Collaborative Effort Committee to assess the overall purpose and need and effectiveness of implementation of those decisions. At that time, the lead agencies and the stakeholder committee may consider the full range of improvement options, not just those included in the PEIS recommended improvements.
- The lead agencies committed to follow I-70 Mountain Corridor Context Sensitive Solutions Guidance for future Tier 2 processes on the Corridor to maintain ongoing stakeholder involvement in future decisions to help foster partnerships and communication sharing.

A Collaborative Effort Committee using the Collaborative Effort team member profile will meet at least once every two years through 2020 to review the status of Tier 2 processes and consider the need for additional capacity improvements based on specific milestones or "triggers" included in the Consensus Recommendation.

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Glossary of Terms

2050 Vision

The year 2050 provides a vision horizon for developing long-term transportation solutions for the I-70 Mountain Corridor project. The alternatives are developed and evaluated on a variety of performance measures that can be reliably established for 2035 and for their ability to meet travel demand in 2050.

7th Pot Program

A group of 28 statewide transportation projects that the Colorado Department of Transportation (CDOT) has identified and placed on an accelerated construction schedule because they have strategic and high priority significance to regional and local transportation planning.

Acid mine drainage

Drainage from mines and mine wastes with a pH between 2.0 and 4.5. It results from the oxidation of sulfides exposed during mining, which produces sulfuric acid and sulfate salts. The acid dissolves minerals in the rocks, degrading the quality of the drainage water.

Adit

An almost-horizontal entrance to a mine.

Advanced Guideway System

One of the Fixed Guideway Transit Alternative Elements that are currently under review in the I-70 Mountain Corridor Revised Draft PEIS. A "fixed guideway" refers to any transit service that uses exclusive or controlled rights-of-way or rails, entirely, or in part. The term includes heavy rail, commuter rail, light rail, monorail, trolleybus, aerial tramway, inclined plane, cable car, automated guideway transit, ferryboats, that portion of motor bus service operated on exclusive or controlled rights-of-way, and high-occupancy-vehicle (HOV) lanes. Funds can be used to modernize or improve existing fixed guideway systems.

Aesthetic Design Guidelines

Guidelines that professionals who plan, design, and construct transportation facilities use to improve the aesthetic appearance of transportation projects. The goal of aesthetics design in the highway environment is to create a pleasurable experience for the user and a positive contribution to the visual character of the community, while attending to safety and efficiency needs.

A Landscape Level Inventory of Valued Ecosystem Components (ALIVE)

The Colorado Department of Transportation initiated the A Landscape Level Inventory of Valued Ecosystem Components (ALIVE) Committee to develop an ecosystem approach at a landscape level to identify wildlife habitat of high ecological integrity, wildlife habitat linkages, and barriers to wildlife crossings along I-70. The ALIVE committee was composed of wildlife professionals from agencies with jurisdictional concerns in the Corridor. The committee also evaluated goals for the development of conservation measures such as the design of structures suitable for wildlife crossings and protective land purchase to preserve habitat linkage for lynx and other wildlife species in the Corridor.

Annual average daily traffic (AADT)

Daily traffic volumes averaged over all 365 days in the year.

Area of Potential Effect (APE)

Geographic area likely to be affected by direct, indirect, and/or cumulative impacts of a proposed action.

Attainment area

An area considered to have air quality as good as or better than the National Ambient Air Quality Standards defined in the Clean Air Act.

Auxiliary lane

A lane that extends between a freeway on-ramp and off-ramp. They are added on freeways to reduce impacts of heavy on-ramp traffic merging with a freeway through lane.

Avalanche

A large mass of snow, ice, soil, rock, or mixtures of these materials, falling, sliding, or flowing very rapidly under the force of gravity. Velocities can sometimes exceed 500 kilometers per hour.

Avalanche blast

A very destructive avalanche wind occurring when an avalanche is stopped abruptly, as when it falls vertically onto a valley floor or when it displaces a large volume of air by flowing horizontally for a long distance.

Barrier effect

The results of adding natural or man-made diversion structures that prevent a plant or animal from moving across an otherwise permeable area. Barriers can be physical obstructions that physically prevent movement (such as walls or fences), or they can be behavioral obstructions that prevent movement due to a perception of danger or risk (for example, areas with substantial human activity or habitat transitions such as a forest edge).

Best management practices

Structural and/or management practices employed before, during, and after construction to protect receiving-water quality. These practices provide techniques to either reduce soil erosion or remove sediment and pollutants from surface runoff.

British Thermal Unit (BTU)

The amount of energy required to heat one pound of water one degree Fahrenheit. It is used to describe the efficiency of fuels; that is, the heat energy obtained when a certain quantity is burned.

Brownfield

A tract of land that has been developed for industrial purposes, polluted, and then abandoned.

Bus in Guideway

One of the Rubber Tire Transit Alternative Elements that are currently under review in the I-70 Mountain Corridor Revised Draft PEIS. The Bus in Guideway diesel or dual mode has been retained as an Action Alternative.

Cantilever

To construct something in such a way that it is attached or supported at only one end.

Catenary

Overhead wires that provide electricity for transit propulsion.

Clean Water Act (CWA)

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and regulating quality standards for surface waters. The Federal Water Pollution Control Act was enacted in 1972 by Public Law 92-500 and amended by the Water Quality Act of 1987. The CWA prohibits discharge of pollutants to waters of the U.S without a National Pollutant Discharge and Elimination System (NPDES) permit. Section 404 of the CWA addresses protection of wetlands and aquatic habitats from dredge and fill activities.

Collaborative Effort

A process to establish trust and confidence in agency leadership and collaborative decision-making. The lead agencies who form the 27-member stakeholder group have built agreement (consensus) around a broad alternative that identifies travel modes and transportation improvement priorities for the I-70 Mountain Corridor project.

Collapsible soil

Deposits that undergo a sudden change in structural configuration when inundated with water, with an accompanying decrease in volume. This process is also known as *hydrocompaction*, *hydroconsolidation*, *collapse*, *settlement*, *shallow subsidence*, and *near-surface subsidence*. The volume change occurs with no change in vertical load, caused solely by the effects of water. Additional subsidence can be caused by solution of disseminated gypsum crystals in the soil when saturation occurs.

Community Development Block Grant (data)

Beginning in 1974, the U.S. Department of Housing and Urban Development (HUD) created a flexible program that provides communities with resources to address a wide range of unique community development needs. The annual CDBG appropriation is allocated between States and local jurisdictions called "non-entitlement" and "entitlement" communities respectively. Entitlement communities are comprised of central cities of Metropolitan Statistical Areas (MSAs); metropolitan cities with populations of at least 50,000; and qualified urban counties with a population of 200,000 or more (excluding the populations of entitlement cities). States distribute CDBG funds to non-entitlement localities not qualified as entitlement communities. 2000 U.S. Census data was created at the CDBG block group level for statistical review and analysis of MSAs, metropolitan cities, and counties.

Consensus Recommendation

The Collaborative Effort, a 27-member group representing varied interests of the corridor, was charged with reaching consensus on a recommended transportation solution for the I-70 Mountain Corridor. *See* **Collaborative Effort**. The lead agencies were active participants in this group and committed to adopt the consensus recommendation in the I-70 Programmatic Environmental Impact Statement (PEIS). The recommendation for I-70 through Colorado's mountain corridor is a multi-modal solution including non-infrastructure components, a commitment to evaluation and implementation of an Advanced Guideway System, and highway improvements. The Preferred Alternative has been characterized into two parts:

- The minimum program of improvements, represented by the alignment and footprint of the Advanced Guideway System Alternative and comparable highway improvements analyzed in the Revised Draft PEIS
- The maximum program of improvements, represented by the Combination Six-Lane Highway with Advanced Guideway System Alternative evaluated in the Revised Draft PEIS

Construction energy

The energy that goes into developing the raw materials and equipment necessary to build and maintain the roadway; the energy expended in physically constructing a roadway.

Construction zone

An area designated for stationary, long-term duration, highway construction such as building a new bridge, adding travel lanes to the roadway, and extending an existing trafficway. A construction zone is typically marked by signs, channeling devices, barriers, pavement markings, and so on.

Context Sensitive Solutions (CSS)

A collaborative, interdisciplinary approach that involves all stakeholders in developing a transportation project that fits into its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. Stakeholders are involved early, continuously, and meaningfully throughout the project development process.

Criteria pollutant

A pollutant determined to be hazardous to human health and regulated under the Environmental Protection Agency's National Ambient Air Quality Standards. The 1970 amendments to the Clean Air Act require the Environmental Protection Agency to describe the health and welfare impacts of a pollutant as the "criteria" for inclusion in the regulatory regime.

Cultural resource

The physical remains of past human activity having demonstrable association with prehistoric or historical events, individuals, or cultural systems. Cultural resources may include archaeological sites, districts, and objects; standing historical structures, objects, or groups of resources; locations of important historic events; or places, objects, and living or nonliving things that are important to the practice and continuity of traditional cultures.

Cumulative impacts

Impacts that occur when the effects of an action are added to or interact with the effects of other human-initiated actions or natural events in a particular place and within a particular timeframe. Other known past, present, and future actions must be taken into account. Cumulative impacts combine to produce effects that are different than if each occurred in isolation. The Council on Environmental Quality (CEQ) requires that these impacts be addressed in National Environmental Policy Act documents. The study area is usually larger and the timeframe longer than for direct and indirect effect analyses.

Cut and fill

The process of constructing a railway, road, or canal whereby the amount of material from cuts roughly matches the amount of fill needed to make nearby embankments, so minimizing the amount of construction labor.

dB(A)

The abbreviation for the *A-weighted sound level* measured in decibels that describe a receiver's noise at a specific moment in time. The letter *A* indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear filters sound.

de minimis impact

For publicly-owned public parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that will not adversely affect the activities, features, or attributes of the property. For historic sites, a *de minimis* impact means that the FHWA has determined (in accordance with 36 Code of Federal Regulations Part 800) that either no historic property is affected by the project or that the project will have "no adverse effect" on the historic property. A *de minimis* impact determination does not require analysis to determine if avoidance alternatives are feasible and prudent, but consideration of avoidance, minimization, mitigation or enhancement measures should occur.

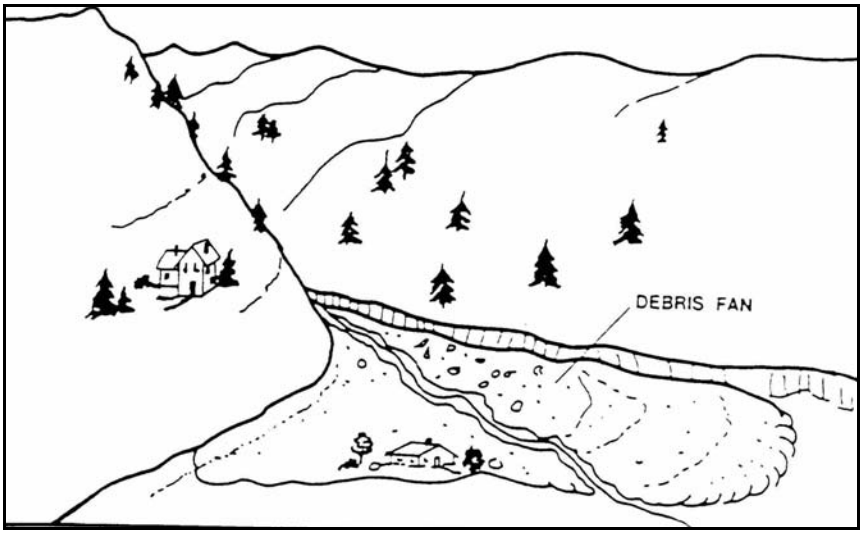
Debris

The remains of geological activity from landslides, volcanic explosions, avalanches, mudflows, or glacial soil and rock. Geological debris sometimes moves in a stream. *See* **debris flow**.

Debris fan

The area where debris flow material is deposited. Multiple periods of deposition typically produce a fan shape over time (see **Figure 1** below**)**.

Figure 1. Debris Fan Formed by Debris Flows (Jochim, et. al., 1988)



Debris flow

A moving mass of rock fragments, soil, and mud in which more than half of the particles are larger than sand size. *See* **debris fan** and **landslide**.

Decibel

The unit used to measure the intensity of a sound.

Decrease congestion

Steps taken by CDOT, FHWA and other local transportation authorities to reduce or mitigate traffic conditions in the I-70 Mountain Corridor characterized by slower speeds, longer traffic times, and a large number of vehicles on the road. Congestion is defined by a poor level of service (LOS) and is measured in the Corridor by the number of hours at LOS F.

Denver metropolitan area

The greater Denver area consisting of Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties.

Dewater

Remove or separate a portion of the water in a sludge or slurry to dry the sludge so that it can be handled and disposed of.

Direct impact

Effects that in some way alter the quality of life or fitness of a receptor. Direct impacts are experienced immediately when a project is implemented.

Drainage tunnel

A drainage tunnel or adit is a horizontal opening designed to intersect mine workings and ore veins below the groundwater table to dewater the mines without pumping.

Ecotone

The zone where two vegetation types or successive stages meet.

Effluent

Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Energy consumption

The use of energy to power engines, machines, or buildings. Vehicles consume petroleum-based fuels, one of the earth's main energy sources. Vehicle energy consumption is affected by the type of vehicle using the roadway, the travel speed, geometry, congestion, and condition of the road.

Entrenched channel

An area that contains continuously or periodically flowing water that is confined by banks and a streambed. An entrenched channel usually has a relatively narrow width with little or no flood plain and often has meanders worn into the landscape.

Environmental Justice

Refers to tools and techniques to ensure the full and fair participation by all potentially affected communities in the transportation decision-making process with an emphasis on involvement by minority and low-income populations. The goal of Environmental Justice is to ensure that adverse human health or environmental effects resulting from transportation activities do not fall disproportionately among minority and low-income populations.

Expansive soil and rock

Soil and rock composed entirely or in part of clay or claystone. Expansive soil exhibits swell when wet.

Fault

A fracture in rock along which there has been observable displacement. Faults are rarely single planar units; normally, they occur as parallel to sub parallel sets of planes along which movement has taken place to a greater or lesser extent. Such sets are called fault or fracture-zones.

Fen

Wetlands with a highly organic upper soil horizon (more than 12 percent organic matter).

Fixed Guideway Transit

A mass transportation facility that uses and occupies a separate right-of-way or rail for the exclusive use of mass transportation vehicles or other high occupancy vehicles. The Fixed Guideway Transit is one of the Alternative Elements that is currently under review in the I-70 Mountain Corridor Revised Draft PEIS. Three variations of the Fixed Guideway Transit have been retained as Action Alternatives. They include Heavy Rail Transit – Double Track, Advanced Guideway System, and Intermountain Rail Connection. *See* **Advanced Guideway System**.

Fossil fuel

Non-renewable fuels formed by the decomposition of organic matter, including coal, natural gas, and petroleum.

Fossils

The remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, and un-mineralized bones and teeth, soft tissue, shells, wood, leaf impressions, footprints, burrows, and microscopic remains.

Fugitive dust

A type of nonpoint source air pollution that does not originate from a specific point. Fugitive dust originates in small quantities over large areas. Significant sources include unpaved roads, agricultural cropland**,** and construction sites.

Generator(s)

A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 Code of Federal Regulations 260.10). Generators are divided into three categories based upon the quantity of waste they produce:

1. Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste, more than 1 kilogram per month of acutely hazardous waste, or more than 100 kilograms per month of acute spill residue or soil.
2. Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms of hazardous waste per month.
3. Conditionally Exempt Small Quantity Generators (CESQGs) generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste, or less than 100 kilograms per month of acute spill residue or soil.

Geographic Information System (GIS)

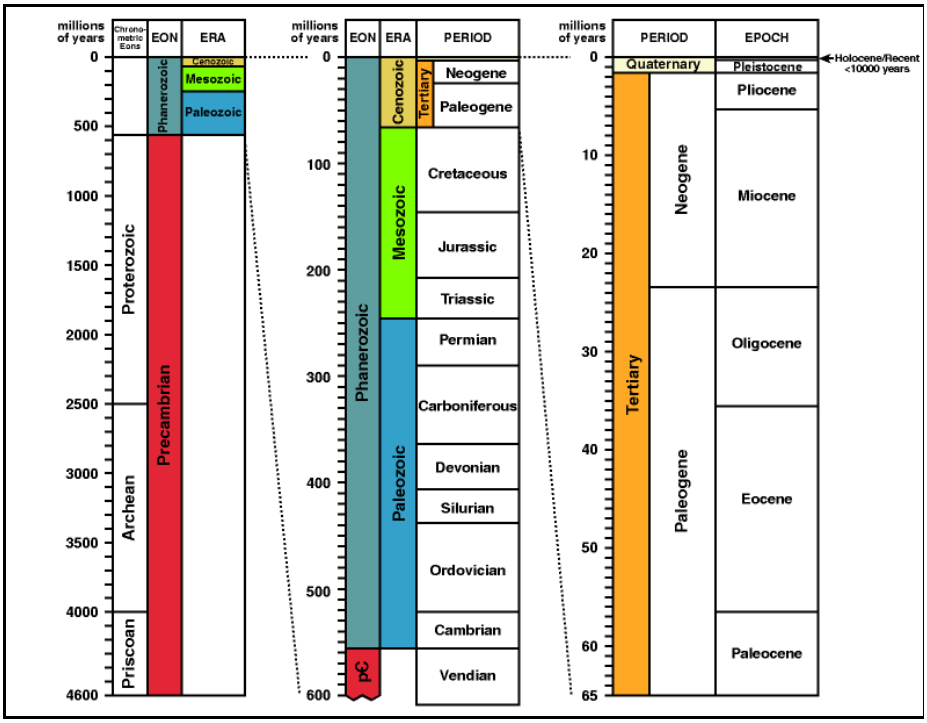
A computerized data management system designed to capture, store, retrieve, analyze, and display geographically referenced information. An environmental inventory is a collection of GIS data pertaining to a geographic area, and it can be used in environmental analysis and documentation for highway projects.

Geologic hazard

A naturally occurring or man-made geologic condition or phenomenon that presents a risk or potential danger to life and property. Examples include landslides, flooding, earthquakes, ground subsidence, faulting, dam leakage and failure, mining disasters, pollution, and waste disposal.

Geologic time periods

Figure 2. Geologic time periods in millions of years



Geologic units

A volume of a certain kind of rock of a given age range. Geologic units of different ages usually appear in different shades of color on a map. For example, sandstone of one age might be colored bright orange, while sandstone of a different age might be colored pale brown. Many geologic units are given names that relate to where their characteristics are best displayed, or where they were first studied. They are named and defined by the geologists who made the geologic map, based on their observations of the kinds of rocks and their investigations of the age of the rocks.

Geology

The study of the planet Earth including the materials of which it is made; the processes that act on these materials; the products formed; and the history of the planet and its life forms since its origin. Geology considers the physical forces that act on the Earth, the chemistry of its constituent materials, and the biology of its past inhabitants as revealed by fossils.

Geomorphology

The science that treats the general configuration of the Earth's surface; specifically, the study of the classification, description, nature, origin, and development of present landforms and their relationships to underlying structures, and the history of geologic changes as recorded by these surface features. The term applies especially to the genetic interpretation of landforms and is also used to describe features produced only by erosion or deposition.

Gold Medal fishery

Designations made by the Colorado Division of Wildlife based on more formal studies of fish population and fish weight as well as "exceptional" recreational value.

Greenhouse gas emissions

The physical and chemical reactions that release gases into the atmosphere through natural and human-made processes. Some sources of human-made greenhouse gas emissions include the combustion of fossil fuels, deforestation, livestock, and agricultural activities.

Greenhouse gases

Many chemical compounds found in the Earth's atmosphere act as "greenhouse gases." These gases allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap the heat in the atmosphere. Many gases exhibit these "greenhouse" properties. Some of them occur in nature (water vapor, carbon dioxide, methane, and nitrous oxide), while others are exclusively human-made (like gases used for aerosols).

Gross Regional Product

One of several measures used to estimate the size of a metropolitan area's economy. The market value of all final goods and services produced within a metropolitan area in a given period of time.

Habitat

The environment suitable to meet the needs of an animal, a fish, or a plant. A habitat includes food, water, shelter, and space.

Historic property

A legal term that refers specifically to any cultural resource listed on or eligible for inclusion in the National Register of Historic Places (National Register). A historic property can be an archaeological site, a historic site, or a traditional use area. Not all such sites meet the specific National Register criteria for historic property designation.

HOV/HOT lanes

An HOV lane is an exclusive traffic lane or facility limited to carrying high occupancy vehicles (HOVs) and certain other qualified vehicles. An HOV is a passenger vehicle carrying more than a specified minimum number of passengers (for example, an automobile carrying more than one or more than two people). HOVs include carpools and vanpool as well as buses. A High Occupancy Toll (HOT) lane is an HOV facility that allows lower occupancy vehicles (that is, solo drivers) to use these facilities in return for toll payments, which could vary by time-of-day or level of congestion.

Impervious surface

Impervious surfaces are mainly artificial structures–such as pavements (roads, sidewalks, driveways and parking lots) that are covered by impenetrable materials such as asphalt, concrete, brick, and stone–and rooftops. Soils compacted by urban development are also highly impervious. Impervious surfaces are an environmental concern because, with their construction, that can modify urban air and water resources. For example, pavement materials seal the soil surface, eliminating rainwater infiltration and natural groundwater recharge, or pollutants can enter stormwater/sewer systems and ultimately streams, leading to negative effects on fish, animals, plants, and people.

Improve mobility and accessibility

Steps taken by CDOT, FHWA and other local transportation authorities to enhance mobility (defined as the ability to travel along the I-70 Mountain Corridor safely, effectively, and efficiently in a reasonable amount of time) and accessibility (defined as the ability to access destinations served by the Corridor safely, effectively, and efficiently in a reasonable amount of time).

Increase capacity

Steps taken by CDOT, FHWA and other local transportation authorities to raise the maximum rate of traffic flow at which vehicles can traverse a point of highway in one hour. There is insufficient capacity to adequately accommodate the current and projected future demand for person trips in the I-70 Mountain Corridor.

Indirect impact

Effect on a receptor, its habitat, or its environment that occurs after project implementation. An indirect impact is often not immediately obvious.

Induced growth

Indirect land use impacts (or longer-run and wider-spread changes to development patterns and comprehensive plans) that are induced by a transportation improvement. Induced growth can reduce the effectiveness of transportation investment, may conflict with local growth desires, and trigger adverse environmental impacts.

The estimation of induced growth effects requires the identification of the transportation project contribution to changes in development patterns. Once the project effect on land use has been identified, this information can be used to estimate the environmental impacts attributable to land use changes caused by the transportation project, such as habitat fragmentation or stormwater runoff effects on water quality.

Intelligent Transportation Systems (ITS)

The application of advanced technologies to improve the safety and efficiency of transportation systems.

Intensive survey

A type of field survey characterized by the complete or near-complete coverage of the survey area using a high-resolution approach, most often by having teams of subject matter experts walk in a systematic way over parcels of the landscape in question to document findings. Intensive surveys are designed to provide a more comprehensive picture of the location of sites and the nature of off-site data (e.g. field systems, isolated finds, etc.). An intensive survey is more costly, timely, and ultimately informative than an extensive survey.

Jurisdictional wetland

A wetland that falls under state or federal regulatory authority. Two federal agencies oversee wetland issues. The Natural Resources Conservation Service has jurisdiction over wetlands on “Agricultural Lands.” The U.S. Army Corps of Engineers (USACE) and Environmental Protection Agency have jurisdiction over “waters of the United States, including wetlands.” Section 404 is administered by USACE and governs dredge and fill operations in the nation’s waterways (“waters of the United States”), including wetlands. Examples of non-jurisdictional wetlands include irrigation ditches and roadside drainage ditches.

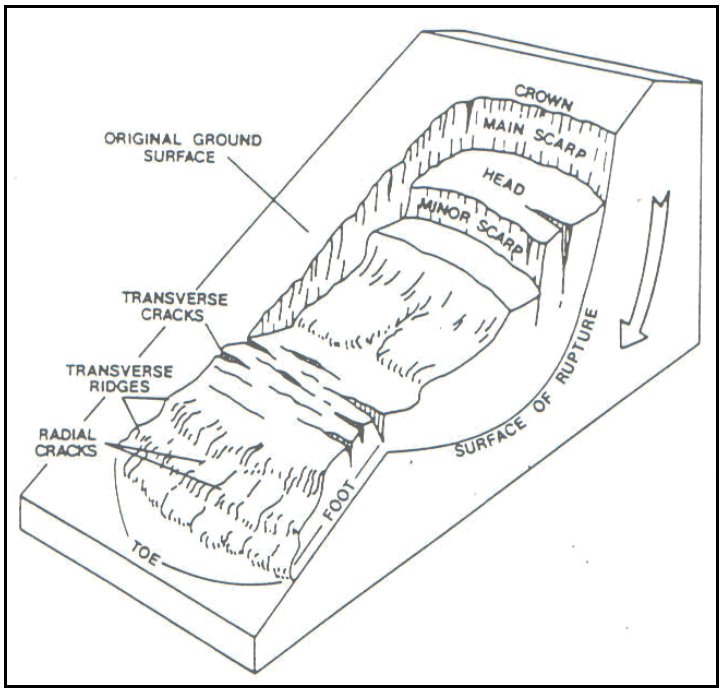
Kilowatts (or kilowatt-hours)

A unit of energy equal to 1,000 watts. A kilowatt is used to quantify the energy output or energy consumption of engines or machines. One kilowatt is approximately equivalent to 1.34 horsepower.

Landslide

A perceptible movement of earth material (rock, debris, or soil) down a slope. The specific name for a landslide is defined by the type of movement and the type of material: rockfall, debris flow, mudflow, rotational earth flow, etc. (Varnes et al. 1978). See **Figure 3** below.

Figure 3. Block Diagram of Idealized Complex Landslide-Earth Flow (Varnes 1978)



Lateral channel

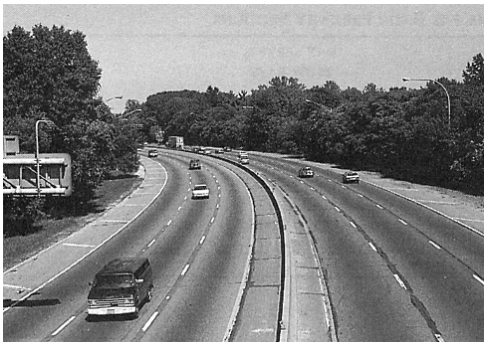
An area of continuously or periodically flowing water that is confined by banks and a streambed but undergoes structural changes that can be measured due to erosion.

LEED

The LEED (Leadership in Energy & Environmental Design) Green Building Rating System™ is a voluntary, consensus-based standard to support and certify successful green building design, construction and operations. LEED is transforming the marketplace by providing a nationally recognized certification system to promote integrated, whole-building design practices in the building industry.

Level of Service (LOS)

A qualitative measure of the operational characteristics of a traffic stream, ranked from A (best) to F (worst). LOS is described in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.



Level of Service A: Free-flow operations; vehicles are able to move freely within the traffic stream. Average spacing between vehicles is 528 feet or 26 car lengths, giving motorists a high comfort level. Effects of minor traffic incidents are easily absorbed, with traffic quickly returning to free-flow operation.

Level of Service B: Reasonably free-flow; speeds are generally maintained. Lowest average spacing between vehicles is 330 feet or 18 car lengths. Ability to maneuver within the traffic stream is only slightly restricted; the motorist has a generally high comfort level. Incidents are still quickly absorbed.

Level of Service C: Speeds are still at or near free-flow speeds, but freedom to maneuver is noticeably restricted; lane changes require vigilance. Minimum average spacing between vehicles is in the range of 220 feet or 11 car lengths. Queues may form behind any significant lane blockage. Drivers experience an increase in tension because of additional vigilance required for safe operation.

Level of Service D: Speeds begin to decline slightly with increasing flows. Vehicles are spaced at about 165 feet or 9 car lengths. In this range, density begins to increase more quickly with increasing flow. Freedom to maneuver is more limited; drivers experience reduced physical and psychological comfort levels. Even minor disturbances create queuing.

Level of Service E: Operations are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are spaced at approximately 6 car lengths, with little room to maneuver at more than 50 mph. Any disruption (vehicles entering from an entrance ramp or changing lanes) causes a disruption wave to move throughout the traffic flow. The lower boundary of LOS E (between LOS E and LOS F) is considered to be operating at capacity, at which point the traffic stream has no ability to dissipate any disruptions. Maneuverability is extremely limited, and driver comfort level is extremely poor.

Level of Service F: This LOS signifies a breakdown in vehicular flow. Queues form behind breakdown points that occur because of traffic incidents and recurring points of congestion (merging or weaving where the number of vehicles arriving is greater than the number of vehicles discharged). Breakdown occurs when the ratio of arrival flow rate to actual capacity or the forecast flow rate to estimated capacity exceeds 1.00. Whenever LOS F conditions exist, there is a potential for breakdown in traffic flow to extend upstream for significant distances.

Life zones

A geographic region or area defined by its characteristic life forms that are usually delineated by latitudes. In Colorado, the Alpine life zone has different plant and animal communities than the Foothills life zone.

Linkage interference zone

A term for habitat connectivity that refers to the connection of or the interference with habitats across a barrier. Linkage zones are not necessarily associated with predictable daily or seasonal movements.

Loudest hour

Noise impacts are defined by loudest hour equivalent noise levels (Leq) that approach or exceed FHWA Noise Abatement Criteria (NAC) values for the appropriate Activity Category. For example, the Noise Abatement Criterion for residential areas (Category B) is 67 dB(A) Leq. The FHWA Noise Abatement Criteria are used in determining traffic noise impacts on human activities.

Low-income population

Individuals living at or below 50 percent of an area's median income as defined by the Community Development Block Grant (CDBG) level for the county.

Macroinvertebrates

Invertebrates visible to the naked eye, such as insect larvae and crayfish.

Magnetic levitation (maglev)

A system of transportation that suspends, guides, and propels vehicles (predominantly trains) using magnetic levitation from a very large number of magnets for lift and propulsion. This method has the potential to be faster, quieter, and smoother than wheeled mass transit systems. The power needed for levitation is usually not a particularly large percentage of the overall consumption; most of the power used is needed to overcome air drag, as with any other high speed train.

Maintenance area

An area in compliance with the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act.

Management indicator species

A list of wildlife species developed by the United States Forest Service and used to track ecological conditions in key habitats associated with each species.

Management prescription area

Specific geographical areas defined by a forest plan. Each management area has a set of objectives and a management prescription unique to it.

Mill tailings

Remnant rock that was crushed and ground to 40 mesh size and processed through amalgamation or other procedures to extract precious metals.

Mine

(1) An underground excavation for the extraction of mineral deposits, in contrast to surface excavations such as quarries. The term is also applied to various types of open pit workings. (2) The area or property with a mineral deposit that is being excavated; a mining claim. (3) To excavate for and extract from mineral deposits or building stone.

Minority population

The smaller part of a population group. A population group within a country or state that differs in race, religion, or national origin from the dominant population group.

Mitigation measure

Action developed in response to an impact identified in the analysis that could be taken to avoid, reduce, or compensate for the projected impact. Usually includes appropriate monitoring and enforcement activities to comply with NEPA's intent.

Mobile source air toxics (MSATs)

Compounds emitted from highway vehicles and nonroad equipment which are known or suspected to cause cancer or other serious health and environmental effects. Identified by the Environmental Protection Agency, MSATs are the 21 hazardous air pollutants generated in large part by transportation sources.

MOBILE6

An emission factor model that the Environmental Protection Agency uses for predicting gram per mile emissions of hydrocarbons (HC), carbon monoxide (CO), nitrogen oxides (NOx), carbon dioxide (CO_2), particulate matter (PM), and toxics from cars, trucks, and motorcycles under various conditions.

Mountain pine beetle

The mountain pine beetle, *Dendroctonus ponderosae*, is a species of bark beetle native to the forests of western North America. Mountain pine beetles inhabit pines, particularly the Ponderosa pine, lodgepole pine, whitebark pine, Scots pine, and limber pine. During early stages of an outbreak, attacks are limited largely to trees under stress from injury, poor site conditions, fire damage, overcrowding, root disease, or old age. As beetle populations increase, the beetles attack the largest trees in the outbreak area. After an outbreak, entire groves of trees will appear red when viewed from above.

Mudflow

Similar to a debris flow, with mud being the predominant material. *See* **landslide**.

National Ambient Air Quality Standards

The Clean Air Act requires the Environmental Protection Agency to set National Ambient Air Quality Standards (40 Code of Federal Regulations Part 50) for pollutants considered harmful to public health and the environment. The Environmental Protection Agency's Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. They include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), and sulfur dioxide (SO_2).

National Environmental Policy Act (NEPA)

The National Environmental Policy Act of 1969 establishes policy, sets goals, and provides means for the protection of the environment in federal decision-making. Under NEPA, all federal agencies must consider the environmental impacts of any proposed action that includes federal money or affects federal land and public input in relevant decisions. The Council on Environmental Quality regulations for implementing NEPA are found in 43 Code of Federal Regulations 1500–1508.

National Register of Historic Places

The official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

Noise abatement criteria

Federal Highway Administration regulations for mitigation of highway traffic noise in the planning and design of federally aided highways are contained in 23 Code of Federal Regulations Part 772. The regulations require the following during the planning and design of a highway project:

1. Identification of traffic noise impacts; examination of potential mitigation measures;
2. Incorporation of reasonable and feasible noise mitigation measures into the highway project; and
3. Coordination with local officials to provide helpful information on compatible land use planning and control.

The regulations contain noise abatement criteria that represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require meeting the abatement criteria in every instance. Rather, they require highway agencies make every reasonable and feasible effort to provide noise mitigation when the criteria are approached or exceeded. Compliance with the noise regulations is a prerequisite for the granting of Federal-aid highway funds for construction or reconstruction of a highway.

Nonattainment area

A geographic area in which the level of air pollution is higher than the level allowed by nationally accepted standards for one or more pollutants.

Nonjurisdictional wetland

The U.S. Army Corps of Engineers regulates jurisdictional wetlands and other waters of the U.S. under Section 404 of the CWA. The agency does not regulate wetlands delineated as non-jurisdictional on federal aid projects. For example, Federal Highway Administration is responsible for overseeing jurisdictional and non-jurisdictional wetlands on the I-70 Mountain Corridor Revised Draft PEIS.

Nonpoint source pollution

Pollution that originates from diffuse areas and unidentifiable sources. Common non-point sources are agriculture, forestry, the atmosphere, ground water, city streets, mining, construction, dams, channels, landfills, and saltwater intrusion.

Noxious weeds

An alien plant or parts of an alien plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one or more of the following criteria:

1. Aggressively invades or is detrimental to economic crops or native plant communities;
2. Is poisonous to livestock;
3. Is a carrier of detrimental insects, diseases, or parasites; and
4. Is detrimental to the environmentally sound management of natural or agricultural ecosystems due to the direct or indirect effect of the presence of this plant.

Operational energy

The energy consumed by vehicles once a highway is constructed that is dependent on the fleet make-up and projected traffic volumes.

Paleontology

A multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth.

Pier

In engineering, a term applied to a mass of reinforced concrete or masonry supporting a large structure, such as a bridge.

Placer mine

The extraction and concentration of heavy metals or minerals from placer deposits by various methods, generally using running water. Also *hydraulic mining, drift mining.*

Point source pollution

Any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship, or factory smokestack.

Power grid

The network of electric transmission that includes power plants, substations, and transmission lines.

Preferred Alternative

The alternative identified by means of the Environmental Impact Statement process as the action recommended to best meet the purpose and need of a project. The Preferred Alternative has been identified in the Revised Draft PEIS process as one of the action alternatives for the I-70 Mountain Corridor project. **Chapter 2, Section 2.7** of the I-70 Mountain Corridor Revised Draft PEIS describes the development of the Preferred Alternative.

Preservation options

Strategies used by state and local governments to protect existing transportation or planned corridors from inconsistent development. These techniques may include, but are not limited, to the following:

- Local zoning and subdivision controls
- Growth management controls
- Right-of-way acquisition

Programmatic Agreement

A document that spells out the terms of a formal, legally binding agreement between a state Department of Transportation (DOT) and other state and/or federal agencies. A Programmatic Agreement establishes a process for consultation, review, and compliance with one or more federal laws, most often with those federal laws concerning historic preservation. There are two basic kinds of programmatic agreements:

- A Programmatic Agreement that describes the actions that will be taken by the parties to meet their environmental compliance responsibilities for a specific transportation project, called here a *project–specific Programmatic Agreement*
- A Programmatic Agreement that establishes a process through which the parties will meet their compliance responsibilities for an agency program, a category of projects, or a particular type of resource, called here a *procedural Programmatic Agreement*

Programmatic Environmental Impact Statement (PEIS)

A report developed as part of the NEPA requirements that details any adverse economic, social, and environmental effects of a proposed transportation project for which Federal funding is being sought under the extent of broad agency actions. Adverse effects could include air, water, or noise pollution; destruction or disruption of natural resources; adverse employment effects; injurious displacement of people or businesses; or disruption of desirable community or regional growth.

Propulsion energy

The energy required to move a vehicle; today, vehicles generally use internal combustion engines or electrical motors. Recent trends in technology aim to reduce energy consumption through development of energy-efficient propulsion systems.

Prospect hole

General term for any shaft, pit, adit, drift, tunnel, or drill hole made for prospecting mineral-bearing ground. More specific terms such as *prospect shaft* and *prospect pit* are generally used.

Rapanos

Rapanos v. United States, 547 U.S. 715 (2006), was a U.S. Supreme Court case challenging the Clean Water Act. The CWA governs discharges to "navigable waters." Although the law contains language defining navigable waters as "waters of the United States," the Supreme Court rejected the position of the U.S. Army Corps of Engineers that its authority over water was essentially limitless under the CWA. In *Rapanos v. United States*, the Supreme Court clarified that the term "waters of the United States" "includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.'"

All waters with a "significant nexus" to "navigable waters" are covered under the CWA; however, the words "significant nexus" remains open to judicial interpretation and considerable controversy. Some regulations included water features such as intermittent streams, playa lakes, prairie potholes, sloughs and wetlands as "waters of the United States."

In *Rapanos v. United States*, the Army Corps of Engineers applied that broad definition, seeking millions of dollars in fines and penalties from John A. Rapanos in Michigan who drained and filled 22 acres of wetland with sand despite warnings from the Michigan Department of Natural Resources (MDNR), the advice of his own private consultant, a cease-and-desist letter from the MDNR, and finally an administrative compliance order from the Environmental Protection Agency. The U.S. Army Corps of Engineers claimed that by filling the wetland he had discharged a pollutant into the "waters of the United States." The U.S. Supreme Court rejected that position in a 4-1-4 plurality, holding that isolated wetlands could not be considered "waters of the United States" for purposes of the CWA.

Rapid subsidence

The accelerated downward settling or sinking of the Earth's surface with little or no horizontal motion.

Reconnaissance survey

A preliminary survey, usually executed rapidly and at relatively low cost, prior to mapping in detail and with greater precision.

Record of Decision

The final approval of an Environmental Impact Statement issued by FHWA.

Receptor

Another term for an affected resource, either human or natural. NEPA provides a complete list of receptors that must be analyzed in EIS documents.

Re-entrained dust

Material re-suspended in the air by vehicles traveling on unpaved and paved roads. Re-entrained dust on road and pavement surfaces arises from winter sanding, vehicle tires tracking soil from unpaved roads, the erosion of the road surface itself, and the degradation of parts of the vehicle, especially the tires.

Regulated materials

The generation, storage, disposal, and release of any hazardous substance or petroleum product that falls within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). Regulated materials are transported on I-70 (in the Corridor) under regulatory authority of the U.S. Department of Transportation (DOT) and the Colorado Department of Public Safety (CDPS) State Patrol Hazardous Materials Section. Properties contaminated by hazardous waste or petroleum products, highway accidents that potentially release environmental contaminants into adjacent land and streams; and potential contamination from mine tailings and wastes from historic mines in the Corridor are examples of regulated materials.

REMI (TranSight) model

TranSight is the leading tool for evaluating the total economic effects of changes to transportation systems. With TranSight, users test alternative transportation changes and are able to observe the short- and long-term impact on jobs, income, population, and other economic variables. This sophisticated modeling tool integrates travel demand models with the REMI model, and is constructed with extensive data on emissions, safety valuation factors, and other data.

Residual impact

Any direct, indirect, or cumulative impact of an action that remains after application of all mitigation measures. When describing residual impacts, consideration must be given to future generations, long-term productivity of resources, and irreversible and irretrievable commitments of resources.

Resource tipping point

The critical point in an evolving situation that leads to a new and irreversible development for a resource.

Revised Draft Programmatic Environmental Impact Statement (Revised Draft PEIS)

A revised draft report developed as part of the NEPA requirements that details any adverse economic, social, and environmental effects of a proposed transportation project for which Federal funding is being sought. Adverse effects could include air, water, or noise pollution; destruction or disruption of natural resources; adverse employment effects; injurious displacement of people or businesses; or disruption of desirable community or regional growth.

Riffle

A stretch of choppy water caused by a shoal or sandbar; a rapid.

Right-of-way

The land (usually a strip) acquired for or devoted to highway transportation purposes.

Riparian

Of, on, or relating to the banks of a river, stream, or drainageway.

Roadless area

United States Forest Service-managed lands that are larger than 5,000 acres, or lie adjacent to Wilderness or Primitive Areas, contain no roads, and have been inventoried by the former for potential inclusion in the Wilderness Protection System.

Rockfall

Can occur on any slope where loose rock exists; common in areas where bedrock is highly jointed and exposed in outcrops. Areas where joints dip downslope are especially prone to rockfall. Physical weathering effects such as freezing/thawing, significant temperature changes, increased pore pressure from water in the joints, and root wedging can loosen rock. *See* **landslides**.

Sacred site

A place important to the practice of traditional religions. The relationship between sacred sites and religions makes it possible for the former to become historic properties; however, sacred sites are also considered under statutes that protect First Amendment guarantees to the free practice of religions.

Scarp

A line of cliffs produced by faulting or erosion.

Screening (alternatives analysis)

A systematic process in which a broad range of alternatives is narrowed down to those that best meet the goals of a project based on the project's purpose and need, as well as focus on key issues and concerns related to the study area. Alternatives that pass through the screening process are retained for full evaluation in the Environmental Impact Statement to identify a preferred alternative.

Scoping

An early step in the NEPA process that includes seeking agency and public views and information, receiving comments and suggestions, and determining issues to evaluate during the environmental analysis. Scoping can involve public meetings, telephone conversations, or written correspondence.

Secondary effect

Another term for indirect effect.

Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires federal agencies to define and document the Area of Potential Effects (APE) in consultation with the State Historic Preservation Office (SHPO). This requirement applies to any federal undertaking and should take place early in the environmental review process. In the Section 106 process, the federal agency, or a representative of the federal agency, must identify historic properties and determine the effect of the proposed project on them. This applies to all federally-funded and permitted projects that will impact sites listed on, or eligible for listing on, the National Register of Historic Places. The reason for defining an APE is to determine the area in which historic properties must be identified so that effects to any identified properties can, in turn, be assessed.

Section 404

Regulates the discharge of dredged or fill material into the aquatic ecosystem, including wetlands. Impacted ecosystems must be mitigated and monitored according to the Clean Water Act.

Section 4(f)

Properties that are defined under Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303). Depart of Transportation (DOT) regulations explicitly state that the Secretary of Transportation cannot approve the acquisition of publicly-owned land from a park, recreation area, or wildlife refuge, or land from a national, state, or local historic site unless no feasible and prudent alternative exists. These properties are commonly referred to as 4(f) properties.

Section 6(f)

Properties that are defined under Section 6(f)(3) of the Land and Water Conservation Fund Act signed into law on September 3, 1964. These properties consist of publicly-owned land, including parks and recreation areas purchased or improved with monies from the Land and Water Conservation Fund, and are intended to remain in use for public recreation in perpetuity.

Sediment Control Action Plan

The management practice that protects surface and ground water resources. Transportation projects are designed, constructed, and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties. Erosion control includes developing erosion control plans and selecting, installing, and inspecting erosion and sediment control measures.

Sedimentation

The deposition of soil or mineral particles, usually into a water body or drainage.

Seeps

A place where groundwater flows slowly to the surface and often forms a pool; a small spring. Seeps are usually not flowing, with the liquid sourced only from underground. Seeps are often used in environmental sciences to define an exfiltration zone (seepage zone) where contaminated water from waste dumps or other sources leaves a waste system.

Sensitivity analysis

The study of how the variation (uncertainty) in the output of a mathematical model can be apportioned, qualitatively or quantitatively, to different sources of variation in the input of the model. Put another way, it is a technique for systematically changing parameters in a model to determine the effects of such changes.

Settling basin

(1) An artificial basin or trap designed to collect the suspended sediment of a stream before it flows into a reservoir and prevent rapid siltation of the reservoir; for example, a desilting basin. The settling basin is usually provided with means to draw off the clear water. (2) A sedimentation structure designed to remove pollutant materials from mill effluents; a tailings pond.

Short take off and landing (STOL) facility

Aircraft with very short runway requirements.

Solid waste

Nonliquid, nonsoluble materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid waste also refers to liquids and gases in containers.

Special management area

Public lands with federal management prescriptions that favor wildlife and their habitats because of limits they impose in some way on human activities.

State Transportation Improvement Plan

A plan that establishes state transportation spending for a period of six years.

Superfund site

A Superfund site is any land in the United States that has been contaminated by hazardous waste and identified by the Environmental Protection Agency as a candidate for cleanup because it poses a risk to human health and/or the environment. All sites where releases or potential releases have been reported are listed in the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS).”

Suppressed growth

Indirect land use impacts (or longer-run and wider-spread changes to development patterns and comprehensive plans) that are suppressed by a transportation improvement. Suppressed growth can alter the effectiveness of transportation investment, may conflict with local growth desires, and trigger environmental impacts.

The estimation of suppressed growth effects requires the identification of the transportation project contribution to changes in development patterns. Once the project effect on land use has been identified, this information can be used to estimate the environmental impacts attributable to land use changes caused by the transportation project.

Sustainability

The concept of sustainability is accommodating the needs of the present population without compromising the ability of future generations to meet their own needs. Sustainability applies to environmental, economic, and social principles. Sustainable transportation planning, design, construction,

and maintenance can incorporate a variety of strategies to avoid ecosystem impacts, conserve natural resources (including use of clean fuels), encourage modes other than single occupant vehicles, and promote travel reduction strategies.

Stream and Wetland Ecological Enhancement Program (SWEEP)

The Colorado Department of Transportation initiated Stream and Wetland Ecological Enhancement Program (SWEEP) to identify and address environmental issues related to the improvement of wetlands, streams, and fisheries in the I-70 Corridor. The streamlining process provides early consideration of water-related needs in future design and construction decisions. The SWEEP process also facilitates the 404 (b)1 process and the application of identifying the least damaging practical alternative.

The SWEEP team included representatives from federal and state agencies, watershed associations, and special interest groups. The team evaluated water-resources-related impacts and methods that could be used to improve the aquatic environment in Clear Creek from the Eisenhower Tunnel downstream to Floyd Hill. Results of the study were used to develop mitigation and design needs to address the water resource issues.

Threatened, Endangered, and Special Status (TES) species

A classification of plant and animal species listed in the Endangered Species Act. Endangered species are in danger of becoming extinct; threatened species are in danger of being listed as endangered.

Tier 1

Overall, Tier 1 work on the I-70 Mountain Corridor consists of the preparation of a Revised Draft PEIS and Record of Decision. These documents present information on transportation need in the area, key environmental resources, the development and evaluation of feasible alternatives, a preliminary assessment of expected impacts, and the identification of a recommended transportation plan (set of feasible alternatives) to be carried through into more detailed study during Tier 2 processes. The goal of Tier 1 work is not an either/or determination among modes or alternatives within a mode, but rather an effort to identify how the various modal investments may be best implemented in consideration of engineering, environmental, financial, public input, land use, and community development factors.

Tier 2

Tier 2 processes will be conducted after the completion of the Tier 1 Revised Draft PEIS and Record of Decision. Tier 2 processes will involve more detailed engineering and environmental analyses and final NEPA documentation for the feasible alternatives identified in Tier 1. Tier 2 NEPA documents will refer to the purpose and need and other background information presented in the Tier 1 EIS, but will incorporate more detailed alignment development, environmental field assessment, impact evaluation, preferred alternative selection, and mitigation plan development on a project-by-project basis in order to complete the NEPA process.

Total Maximum Daily Load (TMDL)

A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Water quality standards identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. Section 303 of the Clean Water Act establishes the water quality standards and TMDL programs.

Transportation/Travel Demand Management (TDM)

Programs designed to reduce or shift demand for transportation through various means, such as the use of public transportation, carpooling, telecommuting, and alternative work hours. TDM strategies can be used to manage congestion during peak periods and mitigate environmental impacts.

Traffic Noise Model (TNM)

A traffic noise prediction model designed, developed, tested and documented by the Federal Highway Administration. The FHWA TNM® contains the following components:

- Modeling of five standard vehicle types, including automobiles, medium trucks, heavy trucks, buses, and motorcycles, as well as user-defined vehicles.
- Modeling of both constant-flow and interrupted-flow traffic using a 1994/1995 field-measured data base.
- Modeling of the effects of different pavement types, as well as the effects of graded roadways.
- Sound level computations based on a one-third octave-band data base and algorithms.
- Graphically-interactive noise barrier design and optimization.
- Attenuation over/through rows of buildings and dense vegetation.
- Multiple diffraction analysis.
- Parallel barrier analysis.
- Contour analysis, including sound level contours, barrier insertion loss contours, and sound-level difference contours.

Transportation System Management (TSM)

Actions that improve the operation and coordination of transportation services and facilities.

Total suspended solids (TSS)

Particles, both mineral (clay and sand) and organic (algae and small pieces of decomposed plant and animal material), that are suspended in water.

Unmet demand

A situation that occurs when travelers choose to not make a trip or avoid a desired trip because of severe congestion conditions, long travel times, or other unsatisfactory conditions of the I-70 Mountain Corridor.

Vehicle mile of travel

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

Vehicles per day (vpd)

This is a measure of traffic volume and is used as the unit for Average Annual Daily Traffic.

Vehicles per hour (vph)

A ratio used in defining the hourly volume.

Viewshed

An area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point. The term is used widely in such areas as urban planning, archaeology, and military science. In urban planning, viewsheds tend to be areas of particular scenic or historic value that are deemed worthy of preservation against development or other change. Viewsheds are often spaces that are readily visible from public areas such as from public roadways or public parks. The preservation of viewsheds is frequently a goal in the designation of open space areas, green belts, and community separators.

Visibility

The distance at which a given standard object can be seen and identified with the unaided eye.

Volume/capacity (V/C) ratio

The ratio of flow rate to capacity. The V/C may be the actual or projected rate of flow on a designated lane group during a peak 15-minute interval divided by the capacity of the lane group. The V/C ratio is a measure of capacity sufficiency, that is, whether or not the physical geometry provides sufficient capacity for the subject movement. Low V/C ratios depict relatively free flow conditions. High V/C ratios depict more congested conditions. Actual V/C ratios are calculated from vehicle count data (defining volume) and the geometrics of a roadway (determining capacity). V/C ratios are used to broadly define problem areas on a freeway and to make preliminary operational decisions concerning the freeway (for example, ramp metering rates). In some cases, the V/C ratio is used to define Level of Service.

Waste rock

Material excavated from mine workings and disposed of without further processing.

Watershed

The areas that drain to surface water bodies, including lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape.

Waters of the U.S.

The term waters of the U.S. means:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce;
4. All impoundments of waters otherwise defined as waters of the U.S. under this definition;
5. Tributaries of waters;
6. The territorial sea;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands)

Weighted Hazard Index (WHI)

Compares the weighted accident rate, measured as weighted accidents (higher weight given to a higher severity accident) per million vehicle miles of travel, at a location to the statewide average weighted accident rate for similar roadways and determines if the observed rate is higher than the statewide average. If a WHI is greater than zero, it signifies that the location in question has a higher weighted accident rate than the statewide average and is, hence, a potentially problematic area in terms of either number of accidents observed or their severity.

Wetland

Wetlands consist of 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 similar areas (Environmental Protection Agency, 40 Code of Federal Regulations 230.2 and USACE, 33 Code of Federal Regulations 328.3).

Wilderness area

An area of at least 5,000 acres that contains most of its natural characteristics, is little influenced by human activities, and provides opportunities for solitude. Wilderness areas are protected and managed to preserve these natural conditions.

Wildlife movement corridor

A segment of land that maintains connectivity between areas of critical wildlife habitat, allowing members of a species to travel across and between landscapes.

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Distribution List

Federal Agencies

Federal Highway Administration

Environmental Protection Agency, Region 8

Advisory Council on Historic Preservation

Bureau of Land Management, Colorado River Valley Field Office

Federal Aviation Administration

Federal Motor Carrier Safety Administration

Federal Railroad Administration

Federal Transit Administration

National Park Service

United States Army Corps of Engineers

United States Department of Interior

United States Fish and Wildlife Service

United States Forest Service

State Agencies

Colorado Department of Transportation

Colorado Department of Public Health and Environment

Colorado Division of Wildlife, Vail District

Colorado Geological Survey

Colorado State Historic Preservation Office

Colorado Tourism Office

Elected Officials

United States Senator Michael Bennet

United States Senator Mark Udall

United States Representative Diana DeGette

United States Representative Jared Polis

United States Representative Ed Perlmutter

United States Representative John Salazar

United States Representative Mike Coffman

United States Representative Betsy Markey

United States Representative Doug Lamborn

State Senator Dan Gibbs

State Senator Moe Keller

State Senator Al White

State Senator Gail Schwartz

State Senator Betty Boyd

State Representative Randy Baumgardner

State Representative Kathleen Curry

State Representative Christine Scanlan

State Representative Cheri Gerou

State Representative Claire Levy

State Representative Max Tyler

State Representative Andy Kerr

Corridor Governments

City of Glenwood Springs – City Council

City of Idaho Springs – City Council

City of Leadville – City Council

Clear Creek County – Board of County Commissioners

Eagle County – Board of County Commissioners

Garfield County – Board of County Commissioners

Gilpin County – Board of County Commissioners

Grand County – Board of County Commissioners

Jefferson County – Board of County Commissioners

Lake County – Board of County Commissioners

Summit County – Board of County Commissioners

Town of Avon – Town Council

Town of Breckenridge – Town Council

Town of Dillon – Town Council

Town of Eagle – Board of Trustees

Town of Empire – Board of Trustees

Town of Fraser – Board of Trustees

Town of Frisco – Town Council

Town of Georgetown – Board of Selectmen

Town of Grand Lake – Board of Trustees

Town of Gypsum – Town Council

Town of Kremmling – Town Council

Town of Minturn – Town Council

Town of Silver Plume – Board of Trustees

Town of Silverthorne – Town Council

Town of Vail – Town Council

Town of Winter Park – Town Council

Collaborative Effort

Blue River Chapter of the Sierra Club – Karn Stiegelmeier

City and County of Denver – Amy Mueller

City of Idaho Springs – Jack Morgan

Clear Creek County – Kevin O'Malley

Colorado Association of State Transit Agencies (CASTA) – Ann Rajewski

Colorado Environmental Coalition – Stephanie Thomas

Colorado Motor Carriers Association – Art Ballah

Colorado Rail Passenger Association – Ira Schreiber

Colorado Ski Country USA – Melanie Mills

Colorado Trout Unlimited – Gary Frey

Denver Metro Chamber of Commerce – Sara Cassidy

Eagle County – Peter Runyon

Garfield County – Tresi Houpt

I-70 Coalition – Michael Penny

Rocky Mountain Rail Authority –Doug Lehnen

Sierra Club, Rocky Mountain Chapter – Betsy Hand

Summit County Chamber of Commerce – Eric Turner

Summit Stage – Thad Noll

Town of Georgetown, Georgetown Trust – Cindy Neely

Town of Vail – Stan Zemler

United States Army Corps of Engineers – Tim Carey

United States Forest Service – Carol Kruse

Vail Resorts, Inc. – Brendan McGuire

Project Leadership Team

Clear Creek County – Cindy Neely

Colorado Trout Unlimited – Gary Frey

Eagle County – Eva Wilson

Garfield County – Tamara Allen

I-70 Coalition – Harry Dale

Jefferson County – Jeannie Rosslin

Summit County – Bill Linfield

United States Forest Service – Carol Kruse

Consulting Parties

Cheyenne and Arapaho Business Committee
Cheyenne and Arapaho Tribes of Oklahoma – Janice Prairie Chief-Bosell, Chairwoman

Kiowa Business Committee
Kiowa Tribe of Oklahoma – Donnie Tofpi, Chairman

Northern Arapaho Business Council
Northern Arapaho Tribe – Harvey Spoonhunter, Chairman

Northern Cheyenne Tribal Council
Northern Cheyenne Tribe – Leroy Spang, President

Rosebud Sioux Tribe Rodney Bordeaux, President

Southern Ute Indian Tribe – Matthew Box, Chairman

Standing Rock Sioux Tribal Council – Charles Murphy, Chairman

Uintah and Ouray Tribal Business Committee – Curtis Cesspooch, Chairman

Ute Mountain Ute Tribe – Ernest House, Sr., Chairman

Advisory Council on Historic Preservation – Carol Legard

Bureau of Land Management – Cheryl Harrison

Clear Creek County Commissioners
c/o Clear Creek County – Beth Luther

Colorado Preservation, Inc. – Jim Hare

Eagle County Community Development – Rebecca Leonard

Historic District Public Lands Commission – Cindy Neely

Historic Preservation Commission, City of Glenwood Springs – Gretchen Ricehill

Historic Georgetown, Inc. – Sharon Rossino

c/o Idaho Springs Historic Preservation Review Commission – Jack Morgan, Mayor

Historical Society of Idaho Springs – Robert T. Bowland

Mill Creek Valley Historical Society – Larrice M. Sell

Mountains/Plains Regional Office – Barbara Pahl

State Historic Preservation Officer, History Colorado – Edward C. Nichols

Town of Georgetown, Design and Review Commission – Merinel Williams

Town of Silver Plume – Claire Mootz

United States Forest Service – Glenn P. Casamassa

Interested Parties

Bicycle Colorado – Dan Grunig

Club 20 – Reeves Brown

Colorado Association of Ski Towns – Paul Strong

Colorado Counties, Inc. – Eric Bergman

Colorado High Performance Transportation Enterprise – Charlotte Robinson

Colorado Municipal League – Mark Radtke

Colorado Public Interest Research Group – Danny Katz

Colorado Public Utilities Commission – Ray Jantzen

Colorado Water Quality Control Commission – Paul Frohardt

Denver Regional Council of Governments – Steve Rudy

Dumont Lawson Downieville Association – Joan Drury

ECO Transit – Ellie Caryl

I-70 Coalition – Margaret Bowes

Jefferson County Historical Commission – Dennis Dempsey

Northwest Colorado Council of Governments – Pamela Caskie

Regional Transportation District – Bill Van Meter

Roaring Fork Transportation Authority – Dan Blankenship

Summit Stage – John Jones

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Colorado Department of Transportation

- Headquarters (Public Relations Office)
- Region 1 (Aurora)
- Region 1 (Golden Residency)
- Region 3 (Eagle Residency)
- Region 3 (Glenwood Residency)
- Region 3 (Grand Junction Residency)
- Website

Federal Highway Administration Division (Lakewood Office)

Libraries

Denver Public Library

Lakewood Library

Evergreen Public Library

Idaho Springs Public Library

John Tomay Memorial Library (Georgetown)

Idaho Springs Public Library

Summit County Public Library – North Branch, Silverthorne

Summit County Public Library – Main Branch, Frisco

Avon Library

Town of Vail Library

Gypsum Library

Glenwood Springs Library

Gilpin County Public Library

Fraser Valley Library

Lake County Public Library

Pitkin County Library

Community Centers

Empire Town Hall

Silver Plume Town Hall

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