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Northwest Corridor  
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## 2.0 ALTERNATIVES

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### PREFACE

This chapter describes the iterative process of developing, screening, and refining alternatives based on evaluation criteria and project goals. The decision process integrated FHWA and U.S. Army Corps of Engineers (USACE) environmental analysis and documentation requirements. As described elsewhere in this document, the process was discontinued because federal and state funds for construction were not available in the foreseeable future.

This chapter retains the complete history of the evaluations and selections as they happened and was written during the NEPA process. Some NEPA language therefore remains, where it is necessary to maintain readability. The recommended alternative also remains, since it is a suitable conclusion of the comprehensive analysis and can serve as a planning vision for future efforts in the area.

The final section of this chapter describes supplemental design refinement efforts taken with the City of Golden in attempt to achieve greater consensus.

### INTRODUCTION

The National Environmental Policy Act (NEPA) of 1969 and subsequent Council on Environmental Quality (CEQ) and U.S. Department of Transportation (DOT) regulations require that the process consider all reasonable alternatives including a No Action Alternative. The CEQ has defined reasonable alternatives as “those that are practical or feasible from the technical and economic standpoint and using common sense rather than simply desirable from the standpoint of the applicant” and are proposed by the agency in response to the purpose and need for the project (see **Chapter 1**). **Chapter 2** describes the process used to identify all of the reasonable alternatives that are fully assessed in this study, provides the concepts used to evaluate each alternative, and identifies the Recommended Alternative (**Section 2.6**).

This project was conducted with the U.S. Army Corps of Engineers (USACE) in a merged process between NEPA and Section 404 of the Clean Water Act. In Colorado, this process was formalized in an agreement and signed by CDOT, USACE, and FHWA in December 2004/January 2005. The merger is an agreement for complying with the substantive requirements of the Clean Water Act while at the same time meeting the procedural requirements of the NEPA process (CDOT, U.S. Army Corps of Engineers, FHWA, 2005). In general, the range of alternatives was defined using the NEPA process as well as the Section 404 process which focuses on practicable measures as defined by USACE. Alternatives evaluation and screening techniques were developed and conducted in a manner that complies with NEPA and provides evidence that CDOT has not eliminated the “Least Environmentally Damaging Practicable Alternative” (LEDPA). This process described in the USACE Merger Agreement includes concurrence on the purpose and need statement, the alternatives selected for detailed evaluation, the preferred alternative, and compensatory mitigation (see **Appendix B**). At the time of this writing, USACE has concurred with the purpose and need statement and the screening to determine the alternatives selected for detailed evaluation.

The **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening** prepared for this study presents a detailed description of the work effort undertaken during each step of the process and the results. Copies of this document are available for review on the project website. **Chapter 2** summarizes the process documented in this report.



## ***2.1 AGENCY COORDINATION AND PUBLIC INVOLVEMENT PROCESS***

Agency coordination and public involvement activities were specifically planned to be open, inclusive, and ongoing throughout the study process. This process was designed to respond to the high level of community interest about future improvements within the Northwest Corridor study area.

The process included numerous outreach activities to ensure a high level of public awareness of the project and provided a wide range of opportunities for public input, review, and comment, particularly important during the alternatives development and evaluation process. Throughout the process—from initial scoping through the identification of alternatives to be evaluated in detail—input from federal, state, and local agencies, and the public was considered. These activities and agencies are fully described (see **Chapter 6** and **Chapter 7**) and include:

- A Corridor Consensus Committee (CCC) composed of elected officials from each community within the study area as well as regional economic and environmental representatives. This group met regularly throughout the course of the study process and provided input on purpose and need and the alternatives development and screening process.
- A Technical Support Committee (TSC) composed of technical, professional staff appointed by the CCC. The TSC provided the technical expertise from local governments and other entities to the alternatives development and screening process and preliminary engineering. This group also met regularly throughout the alternatives development and screening process.
- Thirteen general public meetings were held (three in January, three in April, four in October 2004 and three in May/June 2005). These meetings were held at various community facilities throughout the study area and provided the public with information about the project and process, as well as the opportunity to make comments and ask questions.
- Environmental Focus Group meetings included regulatory agencies and local government representatives who provided input on methodologies and results of specific technical analyses.
- Citizen Working Groups were formed to provide a resource for more in-depth information on specific topics. Meetings were held about various resource issues associated with the Northwest Corridor study.

## ***2.2 PROCESS FOR DEVELOPMENT AND EVALUATION OF ALTERNATIVES***

Alternatives were created and evaluated through an extensive process—taking approximately two years and including agency and public involvement, and consisting of several levels of screening, each at a greater level of detail. The process to develop a range of potential transportation improvements and then screen and refine them to those fully evaluated in detail is discussed in subsequent sections and is summarized (see **Figure 2.2-1**). In general, the process included the following steps:

- **Development of Purpose and Need and Project Goals and Objectives**—This included development of overall goals and objectives for the project and the need for improvements in the corridor, which guided the development of all alternatives.
- **Development of Evaluation Criteria**—Criteria were developed based on purpose and need and project goals and objectives, by which each potential transportation improvement was evaluated. Both quantitative and qualitative measures were included in a wide range of categories that addressed connectivity, mobility, engineering feasibility and cost, and environmental concerns.



- **Development, Evaluation, and Screening of Range of Alternatives**—All possible alternatives, or the universe of alternatives, were identified. Sources for these alternatives included input from the agency and public scoping process, research of previously completed studies in the area, and from existing traffic, environmental, and other collected data. The range of potential alternatives was then screened to eliminate those with fatal flaws, did not meet purpose and need, had technical difficulties that made them impractical or infeasible, and/or had unacceptable environmental or community impacts.
- **Identification of Alternatives**— A range of alternatives was identified for further analysis in the study.
- **Refinement of Alternatives**—The remaining alternatives were then developed to a greater level of detail prior to full evaluation along with the No Action Alternative.
- **Identification of a Recommended Alternative**—A recommended alternative was identified as the alternative that balances transportation performance benefits and environmental impacts. Agency and public input could result in additional refinements to this alternative.

As described in **Chapter 1** of this document, the purpose of the Northwest Corridor project is to address connectivity, functionality, and capacity of inter-regional and regional transportation systems to accommodate the movements of people, goods, and services from the vicinity of US 36 and Northwest Parkway to the vicinity of SH 58, I-70, or C-470, in Broomfield, Jefferson and Boulder counties. From the purpose and need, project goals were developed based on three different categories to guide the alternatives development and screening process (see **Table 2.2-1**). These goals were developed together with the CCC and the TSC and reviewed at public meetings.

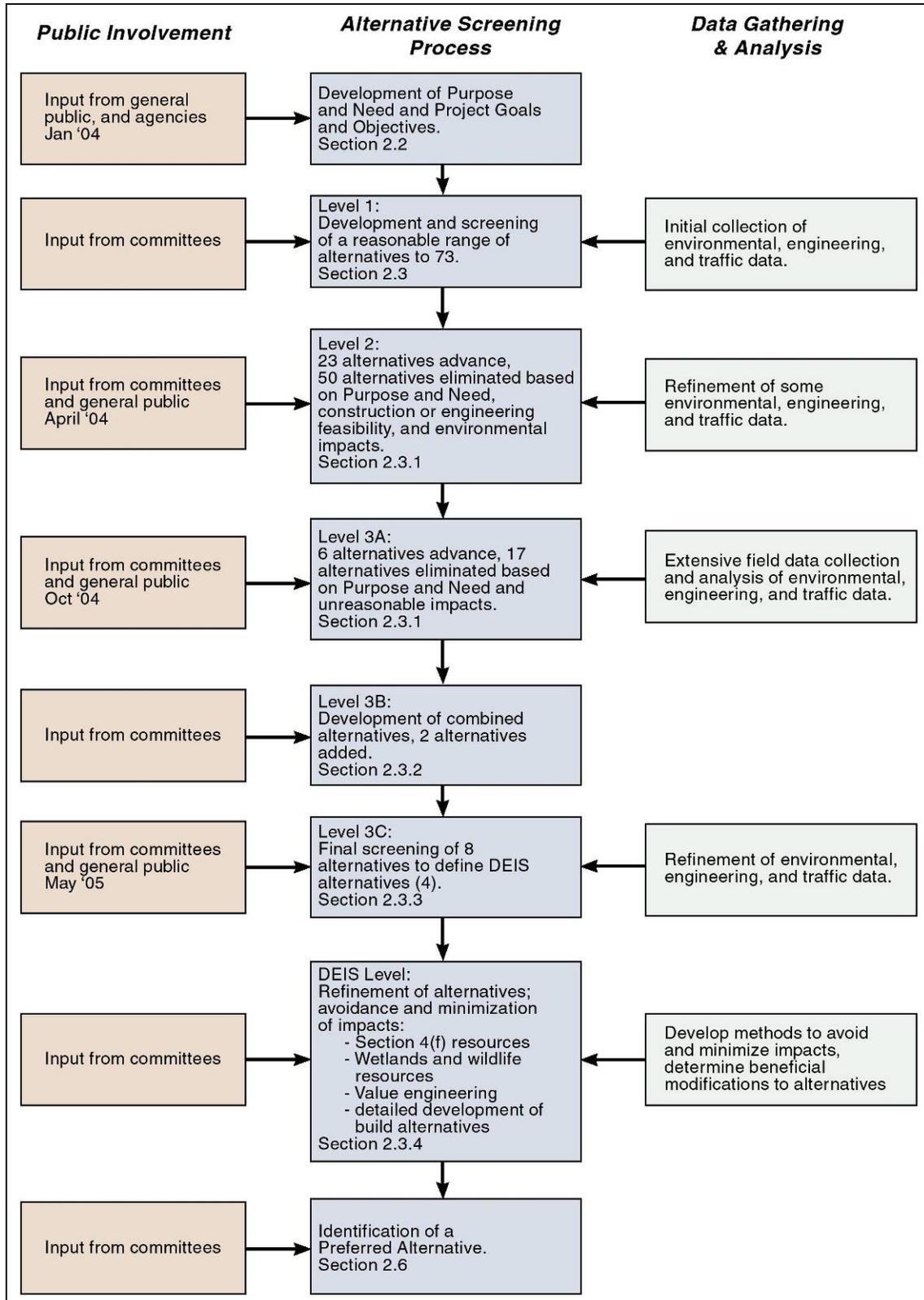
*Table 2.2-1 Project Goals*

Category	Goal
Purpose and Need	System Connectivity—Enhance the corridor’s regional and inter-regional system for a more direct, well-connected, and functional roadway system.
	Travel Demand—Expand and enhance the system capacity to respond to future demand increases and improve inter-regional and regional movements of people, goods, and services.
	Travel Reliability—Reduce the variability of travel times and improve driver expectancy.
	Modal Inter-relationships—Expand highway systems to provide enhanced access to transit choices to improve mobility through intermodal connections.
Practicality and Feasibility	Make use of existing technology, meet engineering requirements, are constructible, and fall within reasonable budgetary constraints.
Environmental Considerations	Minimize impacts to the human or natural environment.

To objectively and fairly compare potential alternatives, evaluation criteria were prepared that reflected the overall project (see **Appendix B, Table B.3-1**). Evaluation criteria were developed for each project goal with input from the CCC and TSC to provide the basis for comparative evaluation of the alternatives. The criteria were applied throughout the screening process and evolved as additional data was collected.



*Figure 2.2-1 Overview of the Northwest Corridor Screening Process*





### 2.3 ALTERNATIVES CONSIDERED

An initial set of alternatives, covering a very wide range of possibilities, was identified based on agency and public scoping. In order to determine which alternatives would be further evaluated during a more detailed alternatives development and screening process, the study team applied broad criteria to evaluate the initial set, or universe, of alternatives. Essentially, the full range of possible alternatives was pre-screened to avoid improvements with “fatal flaws.” Those alternatives with fatal flaws were not carried forward in the process.

This screening included criteria that focused on locations and alternative types that should be eliminated based on constraints such as geographic and environmental surroundings, and from a technical and economic standpoint (see **Figure 2.3-1**). To determine areas and alternatives that were not practical and feasible, existing information on cost, engineering feasibility and constructability, technology, and environmental impacts was used. Based on this evaluation, the following types of alternatives were not advanced for further development:

1. Alternatives that bisect or traverse Rocky Flats National Wildlife Refuge. Alternatives must be located outside of national parks, wilderness areas, wildlife refuges, and superfund sites. The Wildlife Refuge Act enacted by Congress specifically denies transportation corridors within the Rocky Flats National Wildlife Refuge other than the 300-foot transportation right-of-way dedication designated along the west side of Indiana Street.
2. Alternatives that bisect a major lake or reservoir such as Standley Lake, Arvada-Blunn, Ralston, and Welton reservoirs. Bridges or dikes across large water bodies would be expensive and would compromise the quality of potable water.
3. Alternatives located east of Wadsworth Boulevard (SH 121). High population density to the east of Wadsworth Boulevard would create difficult conditions for construction and would be costly.
4. Alternatives located west of SH 93 in the foothills. These would require complex, construction and operational difficulties related to grade, geology, and structural design.
5. Alternatives that traverse the tops of North and South Table Mountains. These would require complex design, construction and operational difficulties related to grade, geology, and structural design.
6. Alternatives located between Ward Road and McIntyre Street that do not use existing facility right-of-way. High population density between Ward Road and McIntyre Street would create difficult conditions for construction and would be costly.
7. Alternatives located between Wadsworth Boulevard (SH 121) and Ward Road that do not use existing facility right-of-way. High population density between Wadsworth Boulevard and Ward Road would create difficult conditions for construction and would be costly.
8. Alternatives that involve monorail, advanced guideway transit, or personal rapid transit technologies. These alternatives would not be compatible with existing or planned technologies in or near the corridor.\*

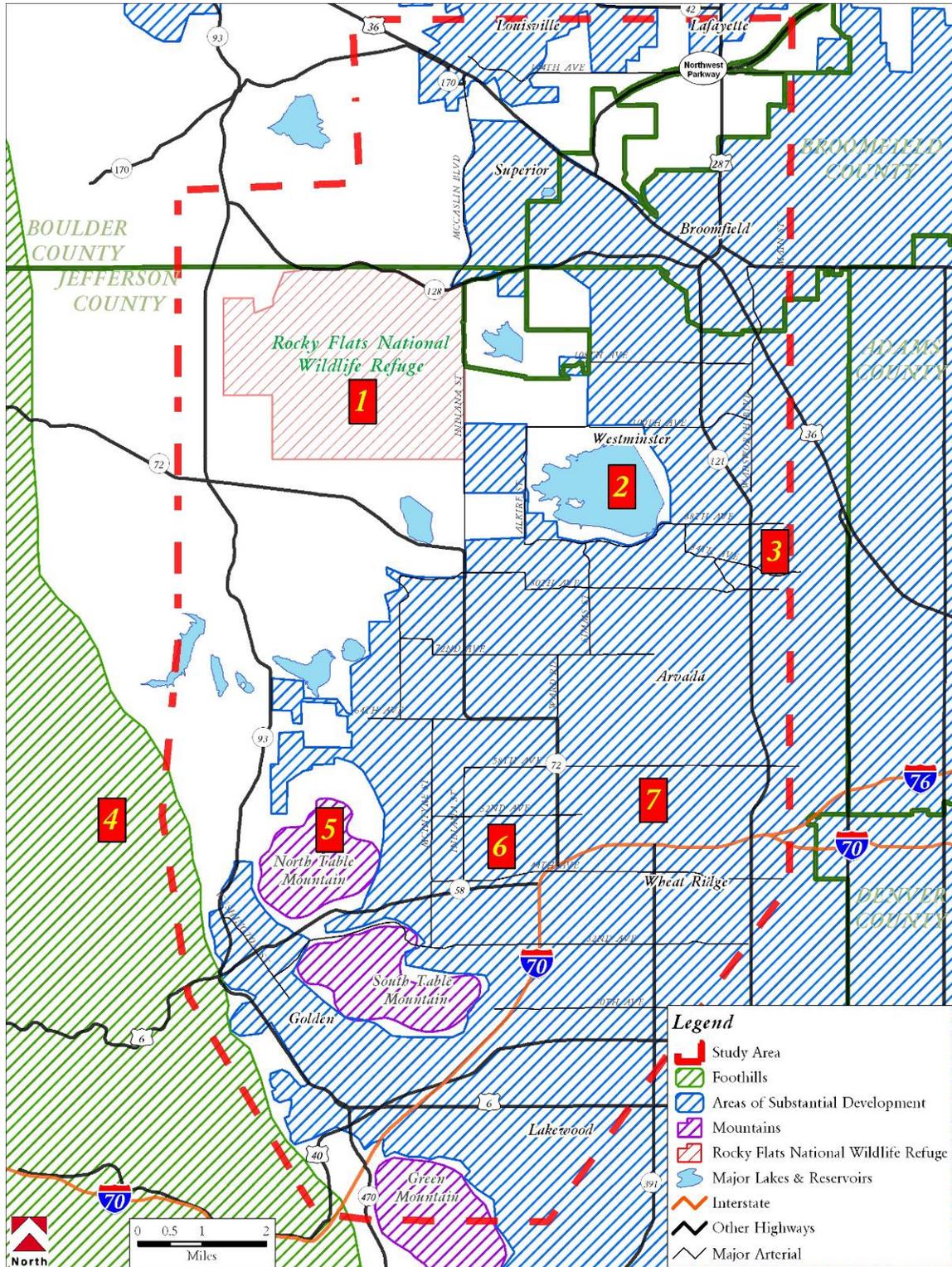
These alternative type limitations coincide with the location numbers within the study area (see **Figure 2.3-1**).

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\*No specific locations for alternatives using these transit technologies were identified; therefore they are not referenced on **Figure 2.3-1**.



Figure 2.3-1 Study Area Limitations



Source: Compiled by FHU, 2007.



Following this fatal flaw screening, conceptual engineering was used to create alternatives that fell generally within five basic types of transportation improvements along six general alignments (see **Table 2.3-1** and **Figure 2.3-2**). In general, each alignment included most facility types. The combination of these facilities types and alignments resulted in 73 build alternatives for further development and evaluation. Alternatives were fully developed and subsequently screened through a detailed process, resulting in four build alternatives plus the No Action Alternative for detailed analysis.

The analysis of the 73 build alternatives began with the collection of existing data throughout the study area, including traffic, engineering, environmental, and community information. These data were compiled and analyzed in a broad sense to determine the overall potential impacts of each conceptual alternative (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**)

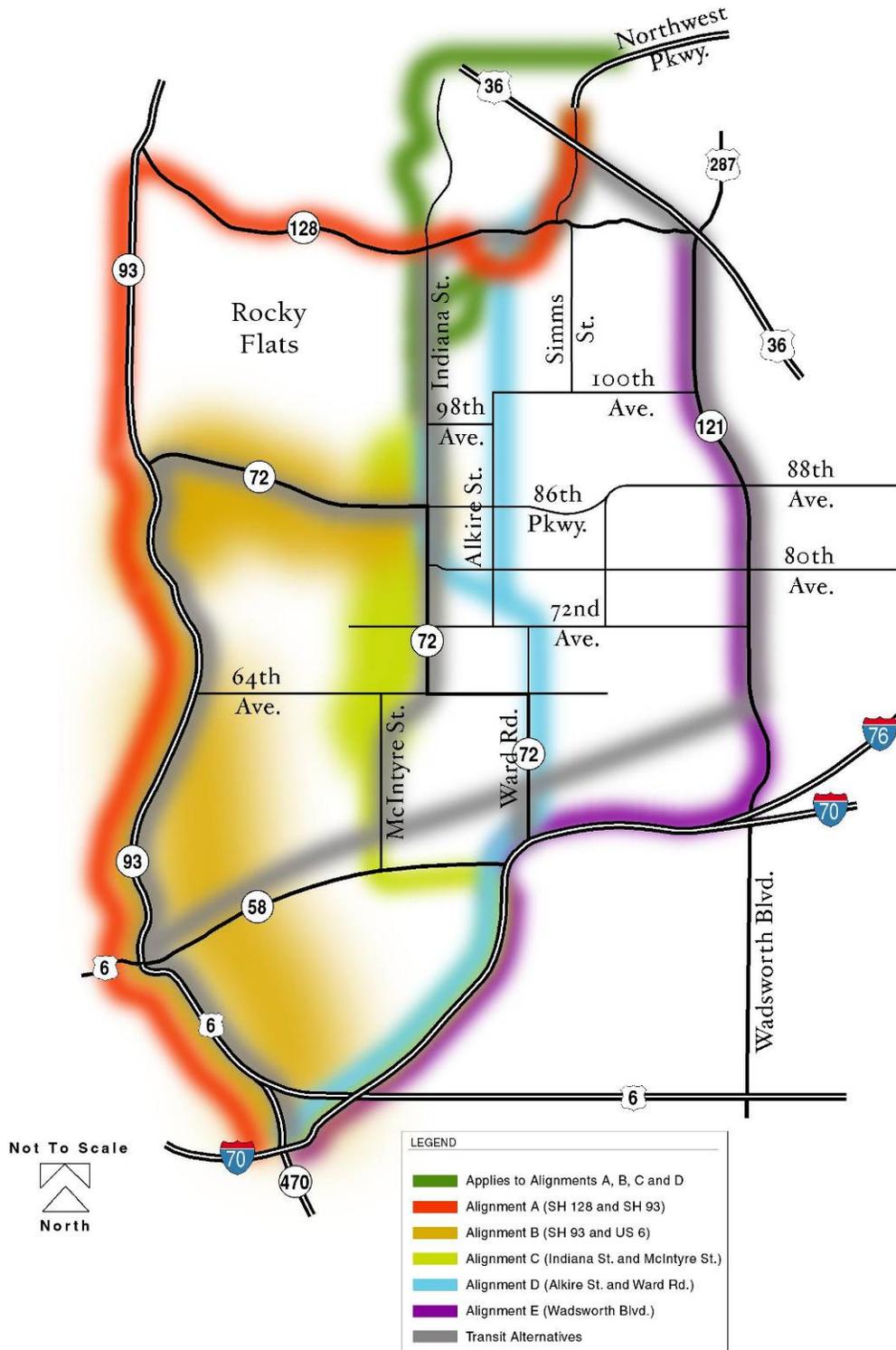
**Table 2.3-1 Description of Transportation Types**

Transportation Types	
Freeways (F)	Multi-lane divided highways with access restricted to grade-separated interchanges. About 35 percent of all vehicle miles traveled in the Denver region are on the freeway system. The freeways serve as statewide connectors and intraregional travel corridors. Usually designed for 70 mph in rural and 55 mph to 60 mph in urban settings.
Tollways (T)	Multi-lane divided highways with access restricted to grade-separated interchanges. Similar to freeways in design and function except that tolls (fees) are collected for use. In Colorado these can only be considered for expansion of existing systems or for entirely new roadways. Tolls are collected with automated sensors. Usually designed for 55 mph to 75 mph travel.
Major Regional Arterials (R)	Multi-lane divided and undivided roadways that provide for high traffic volumes by minimizing left turns, side access, and cross streets. They have limited at-grade crossings and occasionally grade-separated interchanges. They form the backbone of the regional roadway system and support the freeway network. The major regional arterials serve as intraregional travel corridors. Usually designed for 45 mph to 60 mph travel.
Principal Arterials (P)	Major streets that primarily serve regional and local traffic, with at-grade intersections and regulated side accesses. In established areas they serve as multimodal streets with pedestrian, transit, and commercial activity. The principal arterial system represents the regional accessibility roadways. Designed for 40 mph to 50 mph travel.
Transit Systems (TR)	Regional rapid transit systems that include light rail, commuter rail, bus/high occupancy vehicle (HOV) lanes, and bus rapid transit (BRT) features that exist in exclusive travelways. They serve in intraregional corridors. Designed for travel at different rates depending on conditions from 30 mph to over 100 mph.

*Source: Based on Denver Regional Council of Governments (DRCOG), November 15, 2004.*



Figure 2.3-2 General Alternative Alignments



Note: Numerous alternatives are represented by each alignment color.

Source: Compiled by FHU, 2007.



### **2.3.1 ALTERNATIVES ELIMINATED**

Through the screening process, a total of 67 alternatives were eliminated based on three primary factors:

- Engineering or construction feasibility and cost
- Ability to meet the purpose and need for the project (see **Chapter 1**)
- Environmental impacts

Additionally, alternatives were eliminated based on alignment locations. This occurred as a two-step process that determined the best routes along general alignments and then identified the alignment that best met purpose and need and had fewer overall environmental impacts.

#### **2.3.1.1 ENGINEERING FEASIBILITY**

Forty-five alternatives were eliminated because of complexities related to engineering feasibility. This could entail components such as construction on steep side-slopes, tunnels, extensive elevated roadways, and unacceptable interchange spacing. Alternatives were eliminated based on one or several of these factors, with many of the alternatives being eliminated based on a combination of these engineering constraints. The following discusses the engineering constraints and the eliminated alternatives (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**).

##### **STEEP SIDE-SLOPES**

Eighteen alternatives along alignments A and B requiring construction on the excessively steep slopes of North and/or South Table Mountains were eliminated based on cost and impact concerns. Eight of these were eliminated exclusively for this reason. Eight had the additional engineering constraint of unacceptable interchange spacing. Two alternatives also had greater environmental impacts than other alternatives.

The slopes on North and South Table Mountains are especially steep (50 to 60 degree slopes) and would require special roadway design. Traffic lanes at different elevations would be required for approximately five miles of the roadway and piers driven into competent bedrock would be necessary for their foundations. Increased costs would result. The undulating nature of the topography along the flanks of the two mountains would require hill-slope bridges over canyons as well as bridges over Clear Creek and SH 58. Such structures on the steep slopes magnify the difficulties of such alternatives and would likely cost at least five times more than similar length roadways built on relatively flat ground.

##### **EXTENSIVE TUNNEL ROADWAY**

Fourteen alternatives along alignments A and B requiring a tunnel through North and South Table Mountains were eliminated based on cost concerns. Six of these were eliminated exclusively for this reason. Six had the additional engineering constraint of unacceptable interchange spacing, and two had greater environmental impacts.

All alternatives that required the construction of tunnels through North and South Table Mountains were not advanced for further analysis. The required tunnels would have a combined length of 2.4 miles and involve the excavation and disposal of approximately 1,400,000 cubic yards of soil. Additional engineering issues associated with connecting the two tunnels between North and South Table Mountains would require a substantial bridge with a total length of approximately 2,500 feet. This structure would have to be erected over the top of Jefferson County's largest commercial facility (Coors Brewing Company) and SH 58. Alternatives that would require these tunnels would cost as much as 10 times more than other alternatives that do not require tunnels.



### **EXTENSIVE ELEVATED ROADWAY**

Two alternatives along Alignment E required an elevated viaduct down Wadsworth Boulevard for construction of a freeway or a tollway. Both alternatives were eliminated based on cost and access concerns resulting from the construction of this structure.

Freeway and tollway alternatives along Wadsworth Boulevard would require approximately three miles of this roadway to be elevated. Difficulty would be encountered establishing on and off ramps for use by the freeway or tollway traffic as well as providing local access along and under the elevated roadway. Additionally, constructing such a facility would disrupt local traffic and the business community for extended periods of time. Such a facility could cost as much as four times the cost of a similar facility not requiring elevation over an existing major regional arterial.

### **UNACCEPTABLE INTERCHANGE SPACING**

Eleven alternatives along alignments B and C were eliminated exclusively for having unacceptable interchange spacing. Other more suitable alternatives exist that avoid this substandard configuration.

Freeway or tollway alternatives requiring a new interchange on US 36 between McCaslin Boulevard and the Northwest Parkway/Interlocken Loop do not meet American Association of State Highway and Transportation Officials (AASHTO) engineering design standards of interchange spacing, safety, and operations. A new interchange between the two existing interchanges on US 36 does not meet recommended interchange spacing standards of two miles for a rural freeway, which is the official designation for US 36. A system-to-system interchange connecting to US 36 would add to the complexity of the existing interchange system (i.e., McCaslin Boulevard, West Interlocken Loop, and East Interlocken Loop) by causing excessive weaving between the connecting ramps, thus decreasing driver expectancy and safety. Additionally, to construct this interchange would require improvements to US 36 and would add substantially to project costs.

#### **2.3.1.2 PURPOSE AND NEED**

Any proposed transportation alternative must meet the project purpose and need to be advanced for further analysis. Purpose and need criteria include:

- System connectivity/functionality
- Travel demand/capacity
- Travel reliability
- Modal interrelationships

The analysis determined that several of the transit and regional arterial alternatives and the Congestion Management Systems (CMS) Alternative were performing at a level lower than other alternatives and did not meet the project purpose and need. The following 11 alternatives were eliminated for their inability to meet the project purpose and need as defined in **Chapter 1** of this document (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**).

### **EXPANDED BUS SERVICE**

This stand-alone alternative did not fulfill the connectivity and demand aspects of the project purpose and need. Regional bus service already exists in the area and expanding such service would not fulfill anticipated demand.



### **BUS RAPID TRANSIT**

This stand-alone alternative was removed because it did not fulfill the connectivity and demand aspects of the project purpose and need. Modeling forecasts for Bus Rapid Transit along Wadsworth Boulevard from US 36 to I-70 and along Indiana Street, SH 72 and SH 93 from US 36 to the western terminus of the FasTracks Corridor in Golden showed:

- Approximately 2,500 boardings during an average workday in 2030. This is far fewer than forecasts generally expected by RTD for FasTracks corridors, at 15,000 to 20,000 boardings per day.
- Approximately 1,400 more linked daily transit trips than No Action forecasts. This would represent less than one percent of the daily north-south travel demand in the Northwest Corridor study area.

### **LIGHT RAIL**

This stand-alone alternative was removed because it did not fulfill the connectivity and demand aspects of the project purpose and need. Modeling forecasts for light rail along Wadsworth Boulevard from US 36 to the planned Gold Line LRT north of I-70, and along Indiana Street and McIntyre Street from US 36 to the Gold Line LRT north of the I-70/SH 58 interchange showed:

- The Wadsworth Boulevard portion of the alternative is expected to carry approximately 3,800 boardings during an average workday in 2030. Like the Bus Rapid Transit Alternative, these ridership forecasts represent only a fraction of the total expected for the FasTracks corridors that are being implemented by RTD.
- The addition of approximately 1,300 linked daily transit trips compared with No Action forecasts. Similar to the Bus Rapid Transit Alternative, this would represent less than one percent of the daily north-south travel demand in the Northwest Corridor study area.

Furthermore, RTD planners determined that 2030 population and employment densities clearly would not support a light rail transit line along Indiana Street/McIntyre Street (Alignment C).

### **COMMUTER RAIL**

This stand-alone alternative was removed because it did not fulfill the connectivity and demand aspects of the project purpose and need. Commuter Rail would have followed existing heavy-rail right-of-way from Golden to approximately the intersection of SH 72 and Indiana, where it would have then required new north-south right-of-way and tracks. Construction and operation of such a line would have had impacts, would not have met the basic needs of the project, and would not have been supported by the area land uses.

### **SH 93/SH 128 REGIONAL ARTERIAL ALTERNATIVE (ALIGNMENT A)**

This alternative was removed because it could not fulfill the functionality and travel demand aspects of the project purpose and need. It would have upgraded SH 128 from the Interlocken Loop to SH 93 and SH 93 from SH 128 to US 6 to 4-lane major regional arterials, with access provided by a mix of grade-separated interchanges and at-grade intersections. Modeling forecasts and additional analysis showed that this alternative:

- Increases regional vehicle hours of travel (VHT) by 80 hours over the No Action Alternative. The regional arterial along SH 93/Indiana Street reduces vehicle hours of travel by 2,620 hours and the regional arterial along Indiana Street/McIntyre Street reduces vehicle hours of travel by 5,109 hours.
- Does not efficiently connect the Northwest Parkway and C-470 because of its out-of-direction travel along SH 128.



### **SH 93/INDIANA STREET REGIONAL ARTERIAL ALTERNATIVE (ALIGNMENT B)**

One of the two alternatives along this alignment was created by entirely realigning SH 93 to the east side of the Rocky Flats National Wildlife Refuge to reduce wildlife/vehicle encounters. This alternative would create approximately six miles of out-of-direction travel and disrupt existing land uses in the area. Therefore, this alternative was removed because it could not fulfill the connectivity between the Northwest Parkway and C-470 or the demand aspects of the project purpose and need.

### **WADSWORTH BOULEVARD REGIONAL ARTERIAL ALTERNATIVE (ALIGNMENT E)**

This alternative was removed because it could not fulfill the connectivity and demand aspects of the project purpose and need. This alternative would upgrade Wadsworth Boulevard to a continuous 6-lane major regional arterial from US 36 to I-70, with access provided by a mix of grade-separated interchanges and at-grade intersections. Modeling forecasts showed that this alternative:

- Provides the least travel-time savings for the north-south travel paths of all roadway alternatives
- Increases regional VHT more than any other alternative
- Does not provide connectivity between the Northwest Parkway and C-470

### **TWO FREEWAY ALTERNATIVES WITHOUT TRANSIT ENVELOPES ALONG SH 93/INDIANA STREET AND INDIANA STREET/MCINTYRE STREET (ALIGNMENTS B AND C)**

These two alternatives were eliminated because they are identical to two other freeway alternatives along SH 93/Indiana Street and Indiana Street/McIntyre Street except for the additional right-of-way to accommodate multimodal expansion opportunities. During alternative screening, a transit envelope was considered beneficial to potentially enhancing the capacity of inter-regional and regional trips related to the purpose and need statement.

### **NORTHWEST QUADRANT ALTERNATIVE**

This alternative includes the many near-term improvements to existing local roadways recommended in the Northwest Quadrant Feasibility Study (NWQFS). Transportation modeling showed that enacting the extensive NWQFS local street improvement recommendations would provide some transportation benefits in the study area. However, the alternative does not provide system connectivity because it does not allow a clear connection to or an extension of the higher-function facilities to the north and south. Specifically, street improvements on McIntyre Street to the south and the Interlocken Loop on the north do not provide complete functional corridors and connectivity. This is further demonstrated by relatively less peak travel-time savings and less regional mobility and reliability due to lower functional classification roadways. For example, a driver unfamiliar with the study area would have a difficult time negotiating an efficient travel path through the corridor. This would decrease driver expectancy and travel-time savings. Additionally, because the alternative only improves local roads and not a singular path through the corridor, the travel reliability would be reduced because a similar functional classification connection in the north and south is not provided. Due to these parameters, this alternative does not meet the project purpose and need and is not advanced. This conclusion does not preclude the opportunity for local cities and counties to pursue the recommendations for improvements to the streets within their jurisdictions.

### **CONGESTION MANAGEMENT SYSTEM (CMS) ALTERNATIVE**

In addition to the 73 build alternatives, a Congestion Management System Alternative was included in the screening process as an alternative approach to fulfill the project purpose and need through means other than construction of a major facility. Strategies considered include changes or improvements to public transit (Local and Express/Regional Service), ridesharing, park-n-Rides, carpools, vanpools, Transportation Demand Management (TDM), bike/pedestrian facilities, employer-based programs, Intelligent Transportation Systems (ITS), signal coordination and prioritization, variable messaging systems, incident management, and land use/“Smart Growth” policies. While certain elements of the CMS alternative provide some transportation benefit and will be evaluated in conjunction with the Recommended Alternative, the CMS alternative by itself does not meet the project purpose and need because it would:



- Not change the discontinuous street networks and limited north-south connectivity
- Be inadequate to accommodate the estimated growth in demand on each roadway
- Not improve the variability of travel times and driver expectancy within the study area

### **2.3.1.3 ENVIRONMENTAL IMPACTS**

Twelve alternatives were eliminated based on the analysis of environmental impacts. Numeric data were used for evaluating the natural and built and social environmental impacts associated with each alternative. The following environmental criteria were used during the analysis (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**):

- Biological resources
- Wetlands and waters of the United States
- Water supply reservoirs, streams, and canals
- Physical resources
- Traffic and transportation plans
- Section 4(f) properties
- Communities of low-income or minority populations
- Visual resources
- Community cohesion

### **SH 93/SH 128 FREEWAY AND TOLLWAY ALTERNATIVES (ALIGNMENT A)**

Two SH 93/SH 128 alternatives (one freeway and one tollway) located along the north and west side of Rocky Flats National Wildlife Refuge along SH 93 would cause great impacts to the natural environment and were therefore eliminated. Analysis showed these alternatives would impact sensitive aquatic areas near Coal Creek and important wildlife crossing areas (to and from Rocky Flats National Wildlife Refuge). These alternatives also would impact Prebles' Meadow Jumping Mouse habitat and would be in close proximity to landfills.

### **INDIANA STREET/WARD ROAD ALTERNATIVES (ALIGNMENT D)**

These two freeway alternatives, one with and one without transit accommodations, would impact greater than four times the amount of businesses and residences than other alternatives, would disrupt community cohesion, and were therefore eliminated.

### **ELIMINATION OF ALTERNATIVE ALIGNMENT ROUTES**

As part of the screening to further eliminate alternatives, site-specific environmental factors were used to identify the best route in selected areas where mobility/transportation performance is substantially the same for all alternative routes, therefore, only the environmental factors were used for eliminating alternatives. Freeway and tollway alternatives with multiple alignments in certain geographic areas were evaluated. This resulted in eight alternatives being eliminated (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**).

### **SH 93/Indiana Street Freeway and Tollway Alternatives (Alignment B)**

Two freeway and two tollway variations of the SH 93/Indiana Street alternatives, which provided alternate alignments for the new connection between Indiana Street and SH 93 to the southwest, would cause greater impacts to the natural environment than the remaining alignment for the freeway and tollway and were therefore eliminated. Impacts to wetlands, linear feet of sensitive creeks crossed, and the Section 4(f) areas were among the criteria most influential in these decisions.



### **Indiana Street/McIntyre Street Alternatives (Alignment C)**

One tollway and one freeway variation of the Indiana Street/McIntyre Street alternatives were created in attempt to avoid built and social environmental impacts in Arvada by veering through rural areas. After analysis, these alternative variations were eliminated due to environmental impacts to the natural and built and social environment beyond the benefit envisioned. This alignment would be located less than 100 feet from the Arvada-Blunn Reservoir complex, a source of drinking water for the City of Arvada. It would also impact 93 acres of developed Section 4(f) recreation lands compared to 0.5 acres for the remaining alignment for the freeway and tollway.

### **Alkire Street/Ward Road Alternatives (Alignment D)**

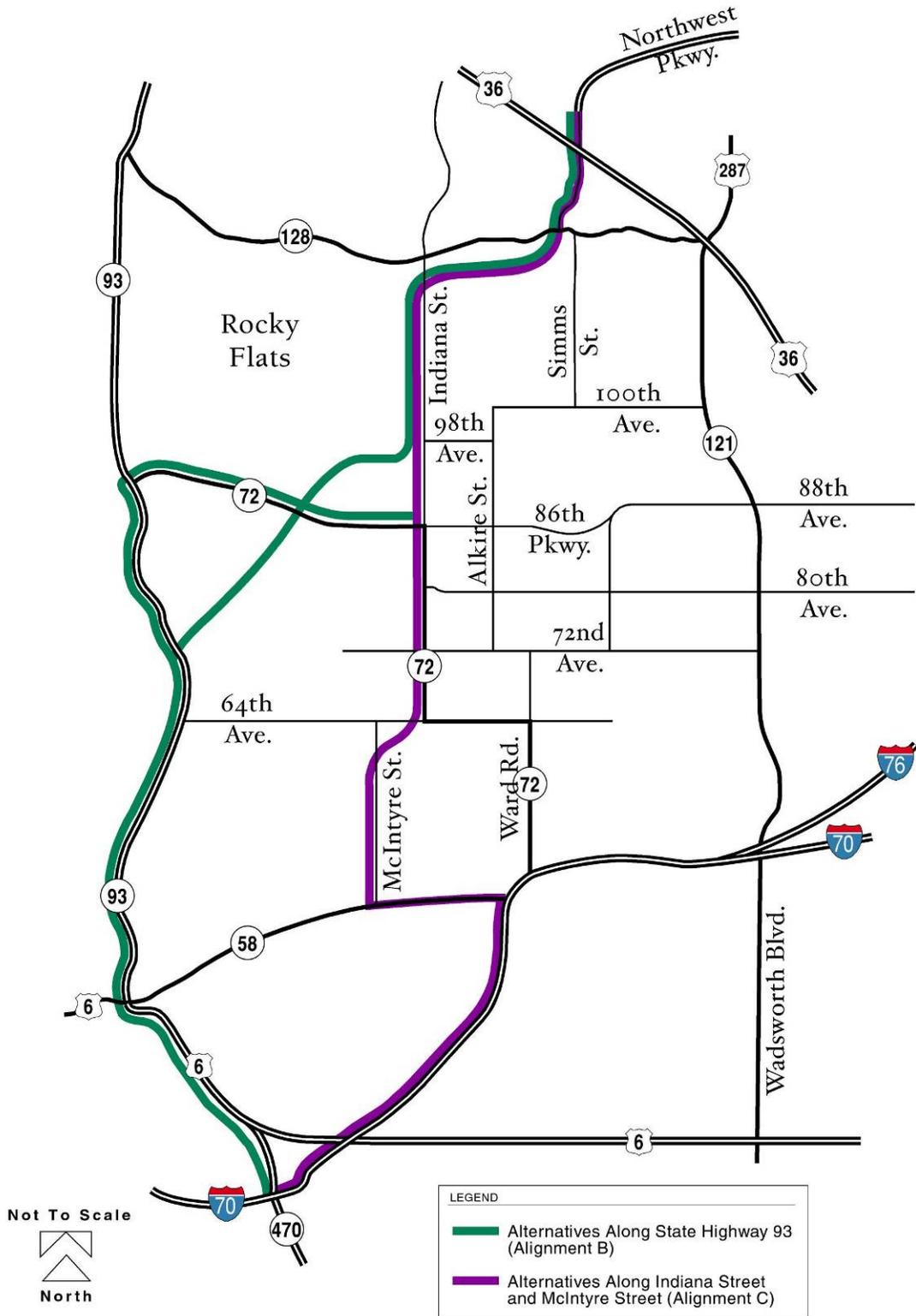
The two Alkire Street/Ward Road alternatives, one freeway and one tollway, located just east of Great Western Reservoir along Alkire Street down to Ward Road on the south would cause greater impacts to the natural and built and social environment than other viable and similar alternatives and were therefore eliminated. This alignment would be located less than 50 feet from Standley Lake, a source of potable water. It would be located within the one-half mile buffer area determined by the Department of Wildlife (DOW) for protected Bald Eagle habitat. This alignment would require the displacement of 112 residences compared to 37 for the Indiana Street alignment.

#### **2.3.1.4 SUMMARY OF SIX REMAINING ALTERNATIVES**

The six remaining alternatives include a freeway, tollway, and a regional arterial along SH 93/Indiana Street (Alignment B) and along Indiana Street/McIntyre Street (Alignment C) (see **Figure 2.3-3**). They were screened from 73 by comparing engineering feasibility, purpose and need, and environmental impacts. The remaining alternatives had some attributes that could be packaged into new alternatives.



Figure 2.3-3 Final Set of Alignments



Source: Compiled by FHU, 2007.



### 2.3.2 DEVELOPMENT OF COMBINED ALTERNATIVES

Combined alternatives were created by incorporating attributes from the six remaining alternatives to form new alternatives. This process was conducted during three meetings (occurring on May 3, 12, and 13, 2005) with the CCC and TSC. The group brainstormed several ideas for creating combined alternatives. Each idea was reviewed and discussed, resulting in two practical and effective combined alternatives for further analysis (see **Figure 2.3-4**). These two additional combined alternatives were developed to the same level of engineering and joined the other six for further evaluation:

- **Combination 1 (Tollway and Regional Arterial along the SH 93/Indiana Street Alignment, and Principal Arterial along the Indiana Street/McIntyre Street Alignment)**

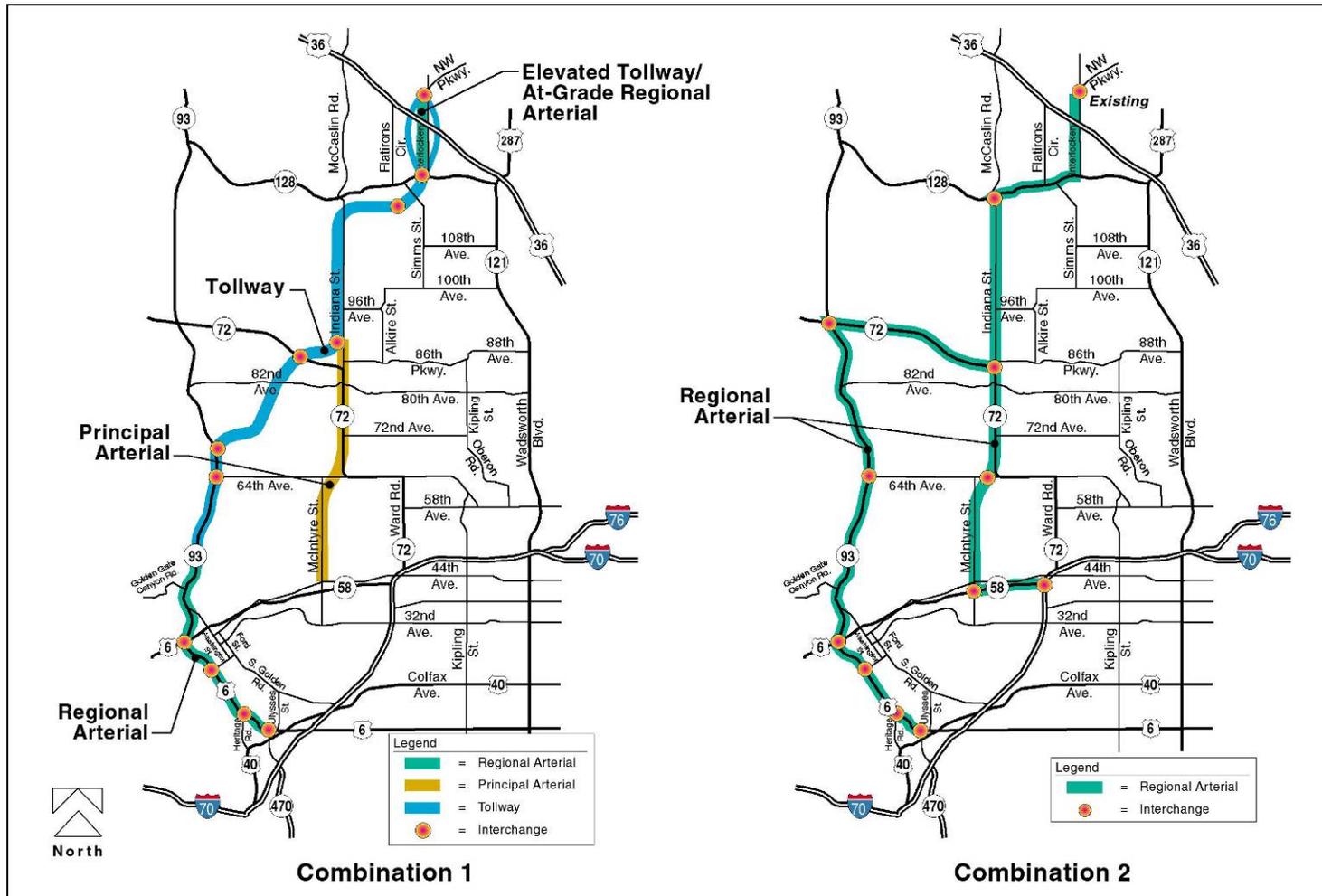
This alternative is a four-lane toll facility beginning at the southern terminus of the Northwest Parkway. It proceeds south along 96<sup>th</sup> Street through the US 36/Interlocken Loop Interchange on elevated structures. The route parallels Interlocken Loop, crosses SH 128, proceeds southwest across undeveloped land, then turns south along Indiana Street just south of SH 128. At this point, the tollway portion of the alternative continues south along Indiana Street, and turns west at approximately 98<sup>th</sup> Avenue. The alternative turns southwest through open ground just west of Indiana Street, crosses SH 72 and Leyden Road, then turns west and continues to SH 93. The toll portion continues south along SH 93 to approximately 56<sup>th</sup> Avenue. At this point, the toll facility transitions into a six-lane regional arterial facility and proceeds south on SH 93 and US 6 to C-470.

A four-lane principal arterial configured for moderate speeds was added to the alternative along the Indiana Street/McIntyre Street alignment. Medians and shoulders are smaller than that of regional arterials and regulated side-access and intersections are at-grade and are more compatible with the existing community structure than a regional arterial. The road follows Indiana Street from 86<sup>th</sup> Parkway south to a point just north of 64<sup>th</sup> Avenue where it turns southwest through open ground, crosses 64<sup>th</sup> Avenue between McIntyre Street and Indiana Street, then follows McIntyre Street south to SH 58.

- **Combination 2 (Regional Arterials along the SH 93/Indiana Street Alignment and Indiana Street/McIntyre Street Alignment)**

This four- or six-lane alternative includes the attributes of both remaining regional arterial alternatives. The northern portion of the alternative from the Northwest Parkway to SH 72 was identical for both of the regional arterial alternatives. From that point south, a portion of the alternative follows SH 72 and then turns south and follows SH 93 and US 6 to C-470. The other portion follows Indiana Street and McIntyre Street south to SH 58.

Figure 2.3-4 Combined Alternatives



Source: Compiled by FHU, 2007.



### **2.3.3 FINAL SCREENING TO DETERMINE ALTERNATIVES FOR DETAILED ANALYSIS**

As a result of the alternatives evaluation and screening process described in the previous sections, 67 were eliminated and 8 remained. Of the remaining alternatives, three alternatives—a freeway, a tollway, and a regional arterial—follow Alignment B (SH 93/Indiana Street). Three other alternatives—a freeway, a tollway, and a regional arterial—follow Alignment C (Indiana Street/McIntyre Street). The remaining two are the combination alternatives utilizing both alignments. The next step in the evaluation process was to determine the alternatives to be evaluated in detail. These remaining eight alternatives were evaluated using further detailed measures related to purpose and need, engineering feasibility, and environmental impacts. The measures that clearly differentiated these alternatives were those related to purpose and need and those related to community impact and disruption. Impacts to the community included the evaluation of actual property acquisitions as well as the proximity of the alternatives to community facilities (schools, churches, meeting halls, etc.).

Findings of this step concluded that four alternatives—three alternatives along Alignment C and the Combination 2 alternative—had greater environmental impacts without providing additional purpose and need benefits compared to the three alternatives along Alignment B and the Combination 1 alternative. These four alternatives were removed from further analysis. The following describes the rationale for eliminating each of these alternatives along Alignment C and the Combination 2 alternative.

#### **FREEWAY ALONG THE INDIANA STREET/MCINTYRE STREET (ALIGNMENT C)**

The introduction of a four- to six-lane freeway, including extensive elevated structures, through the established rural residential communities found along existing, two-lane local roads—Indiana Street and McIntyre Street—would have unacceptable visual, noise, and right-of-way impacts to the community and does not address certain aspects of the purpose and need as well as those alternatives along Alignment B and the Combination 1 alternative. The freeway along Alignment C would be unacceptable because it:

- Does not address system connectivity as well as other alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street alignment through interchange ramps from eastbound SH 58 to westbound I-70 in order to connect with C-470. This alternative also results in some out-of-direction travel and additional traffic on I-70 from SH 58 to C-470. This additional traffic could cause safety concerns on I-70 due to merging and weaving. Alignment B alternatives make the connection to the north and south with one single facility.
- Has 52 residential displacements, which is at least 20 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 22 business displacements, which is at least 6 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 250 potentially impacted noise receivers, which is at least 92 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative

#### **TOLLWAY ALONG THE INDIANA STREET/MCINTYRE STREET (ALIGNMENT C)**

The introduction of a four- to six-lane tollway, including extensive elevated structures, through the established rural residential communities found along existing, two-lane local roads—Indiana Street and McIntyre Street—would have unacceptable impacts to the community and does not address certain aspects of the purpose and need as well as alternatives along Alignment B and the Combination 1 alternative. The tollway along Alignment C would be unacceptable because it:



- Does not address system connectivity as well as other alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street alignment through interchange ramps from eastbound SH 58 to westbound I-70 in order to connect with C-470. This alternative also results in some out-of-direction travel and additional traffic on I-70 from SH 58 to C-470. This additional traffic could cause safety concerns on I-70 due to merging and weaving. Alignment B alternatives make the connection to the north and south with one single facility.
- Has 52 residential displacements, which is at least 20 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 22 business displacements, which is at least 6 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 253 potentially impacted noise receivers, which is at least 95 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative

#### **REGIONAL ARTERIAL ALONG THE INDIANA STREET/MCINTYRE STREET (ALIGNMENT C)**

The introduction of a four- to six-lane regional arterial through the established rural residential communities found along existing, two-lane local roads—Indiana Street and McIntyre Street—would have unacceptable impacts to the community and does not meet purpose and need. The regional arterial along Alignment C would be unacceptable because it:

- Does not address system connectivity as well as other alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street alignment through interchange ramps from eastbound SH 58 to westbound I-70 in order to connect with C-470. This alternative also results in some out-of-direction travel and additional traffic on I-70 from SH 58 to C-470. This additional traffic could cause safety concerns on I-70 due to merging and weaving. Alignment B alternatives make the connection to the north and south with one single facility.
- Has 43 residential displacements, which is at least 11 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 17 business displacements, which is at least 1 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Is the worst in reducing overall system congestion. It improves congestion over the No Action Alternative by 4 percent. All other alternatives improve system congestion by 15 to 23 percent.

#### **COMBINATION 2 ALTERNATIVE—REGIONAL ARTERIALS ALONG SH 93/INDIANA STREET AND INDIANA STREET/MCINTYRE STREET (ALIGNMENTS B AND C)**

Two four- to six-lane regional arterials along both Alignment B and Alignment C would cause greater community impacts and does not meet purpose and need. The Combination 2 alternative would be unacceptable because it:

- Has 61 residential displacements, which is at least 29 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Has 27 business displacements, which is at least 11 more than alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative
- Increases regional VHT by 843 hours over the No Action Alternative. Alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1 alternative reduce VHT by at least 1,225 hours.



### **2.3.4 ALTERNATIVE REFINEMENT**

The remaining freeway, tollway, and regional arterial alternatives along Alignment B and the Combination 1 alternative (from this point forward, referred to as the Combined Alternative), were advanced for further analysis. These four alternatives consistently meet the purpose and need and maintain a balance of environmental and community impacts.

Several refinements made to these alternatives prior to detailed analysis include:

- Design refinements to avoid and minimize impacts to water resources and wetlands, wildlife corridors, and adjacent property
- Design refinements to avoid and minimize impacts to Section 4(f) resources
- Value engineering to reduce construction cost
- Input from agencies and the public
- Removal of the transit envelope to reduce alternative footprints

#### **2.3.4.1 ALTERNATIVE REFINEMENTS FOR AVOIDANCE AND MINIMIZATION OF IMPACTS TO ENVIRONMENTAL RESOURCES**

An interdisciplinary team of environmental resource specialists and engineering specialists analyzed the potential to refine the four build alternatives along the SH 93/Indiana Street alignment to determine if they could avoid or minimize impacts to the natural environment and the built and social environment. This team used information gathered from local municipalities, state and federal agencies, and field collected data to assist in this refinement effort.

Specific refinements for avoidance and minimization of impacts included:

- Water Resources and Wetlands—Water resource impacts were avoided or minimized to the extent feasible by bridging major natural drainages and integrating water quality ponds throughout the alignment. Wetland impacts were avoided or minimized by shifting roadway alignments to the extent practical and providing retaining walls. These mitigation measures were applied to wetlands north of Sun Microsystems (west of 96<sup>th</sup> Street), along Ralston Creek, and in the Van Bibber Creek drainage tributaries.
- Wildlife Corridor Accommodation—Critical wildlife corridors were identified and major bridges were provided at Leyden Gulch, Ralston Creek, and North Table Mountain for wildlife crossing. In addition, smaller mammals would have access across the roadway through enlarged culverts at some secondary drainages.
- Adjacent Property Impacts—Impacts to adjacent properties were minimized to the extent possible by providing single-point urban interchanges at Heritage Road/10<sup>th</sup> Street and at 19<sup>th</sup> Street in the southern portion of the corridor. These interchanges incorporate a configuration with the proposed roadway as an underpass of the existing cross streets which would reduce noise and visual impacts (see **Figure 2.3-5**).

#### **2.3.4.2 ALTERNATIVE REFINEMENTS FOR AVOIDANCE AND MINIMIZATION OF IMPACTS TO SECTION 4(F) RESOURCES**

Numerous properties identified as known or potential Section 4(f) resources are located along the alignments. Section 4(f) resources include publicly owned parks or areas used for recreation, wildlife or waterfowl refuges, or any historic or archaeological site that is on the National Register of Historic Places (or eligible to be included on the National Register). Section 4(f) refers to a specific section in the Department of Transportation Act of 1966. Currently this section is found in 49 USC 303 and 23 USC 138. This particular piece of legislation is stringent in its requirements for a federal agency to look very closely at any projects that might require land from a Section 4(f) property and to analyze all alternatives that avoid the property. The



approval of such use of land is typically acceptable only if there is no prudent and feasible avoidance alternative. However, approval of such use of land could also be acceptable if impacts to the property are *de minimis* (i.e., judged to be minor by the property owner and FHWA). Extensive alternative refinements were considered to determine if avoidance of these Section 4(f) properties could be developed in a manner that was prudent and feasible. These refinements resulted in modifications to the build alternatives.

In Broomfield, to the north of the Great Western Reservoir, retaining walls were added along the alignment of the Freeway Alternative, Tollway Alternative, and Combined Alternative in order to achieve *de minimis* impacts to a Section 4(f) designated parcel for the Great Western Reservoir Prairie Dog Relocation Area. These walls range in length from 3,000 to 3,400 feet and in height from 15 to 25 feet.

The alignment of the Freeway Alternative, Regional Arterial Alternative, and Combined Alternative were modified to avoid impacts to all the Section 4(f) resources in the Golden area. Specifically, from Washington Avenue to C-470, the typical section of the roadway was narrowed from 144 feet with a depressed grass median to 122 feet with a median barrier. Retaining walls were also added throughout this area to minimize the width of the footprint for the alignment. These walls range in length from 800 to 3,750 feet and in height from 6 to 30 feet. Section 4(f) resources avoided are the White Ash Mine Park, Colorado School of Mines property, Parfet, and Eagle Ridge. The Tollway Alternative could not be modified in a prudent and feasible manner to avoid the White Ash Mine Park. To avoid the White Ash Mine Park, overpasses at both Washington Avenue and Iowa Street are required for the Freeway Alternative. The Regional Arterial Alternative and Combined Alternative would require an overpass at Iowa Street with an at-grade intersection at Washington Avenue.

The implementation of retaining walls and shifting of the principal arterial alignment along the Indiana Street/McIntyre Street portion of the Combined Alternative have resulted in *de minimis* impacts to Section 4(f) resources.

The effect of Section 4(f) refinements is that some additional impacts to noise levels, views, access, and community cohesion may occur. Visual simulations were prepared to illustrate some of these refinements (see **Figure 2.3-5** and **Figure 2.3-6**). The Section 4(f) consultation process is anticipated to continue with all municipalities with Section 4(f) interests. Impacts associated with Section 4(f) refinements are fully documented in **Chapter 4**.



*Figure 2.3-5 Photo Simulation of the Proposed Single Point Urban Interchange Looking Southeast along US 6 near 19th Street*

*Before Simulation*



*After Simulation*





*Figure 2.3-6 Photo Simulation of the Overpass of Iowa Street  
Looking West*

*Before Simulation*



*After Simulation*





### 2.3.4.3 VALUE ENGINEERING PROCESS

Recommendations for alternative refinements were discussed in a Value Engineering (VE) session that included experienced professionals and study team members. The goal of the VE team was to reduce construction costs for the alternatives while still meeting project goals and purpose and need. Recommended refinements include:

- Remove the 56 foot transit envelope from the median of the Combined Alternative in the tollway portion to be consistent with the regional arterial portion
- Lower the design speed for freeway and tollway components of alternatives to reduce impacts and costs
- Emphasize connectivity between the Northwest Parkway and C-470 as a project evaluation criterion
- Include value pricing for the toll system

Subsequent engineering was required to implement these recommended refinements.

### 2.3.4.4 AGENCY AND PUBLIC INPUT

Input from the project committees and local jurisdictions resulted in additional refinements to the four build alternatives. Some of this input came from a combined CCC and TSC meeting held May 1, 2006. Additional Section 4(f) resources were identified during the conceptual design period. Specific recommendations for refinements include:

- Removal of the elevated pass-through lanes in the Interlocken area for the Combined Alternative for an approximate savings of \$255 million. These modifications are carried forward for detailed analysis in **Chapter 4** and are included as part of the Combined Alternative.
- Adjustments to the alternatives to avoid Section 4(f) resources or identify *de minimis* use. The specific measures are discussed (see **Section 2.3.4.2**).

### 2.3.4.5 FOOTPRINT REDUCTION AND TRANSIT ENVELOPE REMOVAL

Discussions with the RTD concluded that no dedicated transit systems were planned in the next 20 years within the study area, except for those identified as part of the No Action Alternative (see **Section 2.4.1**). For this reason, right-of-way preservation for transit was no longer deemed necessary for any alternative. Therefore, to minimize impacts to natural resources, the transit envelope was removed from alternatives analyzed in the study. It should be noted that this does not preclude any future transit projects in the Northwest Corridor study area.

## 2.4 FINAL ALTERNATIVES

After completing the various levels of screening and refinements, detailed analysis was performed on four build alternatives. These four alternatives represent all reasonable alternatives and are defined as the Freeway Alternative, Tollway Alternative, Regional Arterial Alternative, and Combined Alternative. Along with the four build alternatives, the No Action Alternative was also carried forward throughout the alternatives development and evaluation process and into this analysis. The No Action Alternative serves as a baseline against which the other alternatives are compared.

Conceptual engineering drawings of each build alternative were prepared and are available with this document (see included dvd **Northwest Corridor Supporting Design Engineering Drawings**). These drawings provide a representation of the physical features of each alternative and how they relate to existing community elements.



A detailed description of the No Action Alternative and each of the build alternatives carried forward for final analysis in this study is included in the following sections. Three distinct portions are described for each build alternative alignment the northern portion, the central portion, and the southern portion. The Combined Alternative has an additional portion along the Indiana Street/McIntyre Street alignment that is not found in the other alternatives. The northern portion is located in a mainly commercial area consisting of Storage Technology, Flatiron Crossing Mall, and other various commercial facilities along Interlocken Loop. The central portion is primarily located in a rural, undeveloped area where the alignment traverses open and sparsely populated areas. The southern portion is located in the Golden area and consists of residential and commercial developments.

Congestion management methods are included as part of each build alternative and would be implemented as complementary solutions in locations where they would be most effective to improve transportation facility operations and to enhance the alternative. Some congestion management elements such as enhanced local bus service, while not able to be implemented by CDOT, are not precluded. Elements that may be implemented as part of any build alternative include:

- Incident Management—Alternative roadway sections would allow for provision of full shoulder widths, enhancing the ability to clear incidents from travel lanes.
- Intelligent Transportation System Measures—New traffic signal systems implemented with the build alternatives would accommodate intelligent transportation system measures such as enhanced signal timing and advanced vehicle detection.

The final design process would determine specifics for integration of the above elements into the Recommended Alternative.

#### 2.4.1 NO ACTION ALTERNATIVE

The No Action Alternative consists of existing transportation facilities, including recently completed projects, and committed transportation projects (see **Figure 2.4-1**). Committed projects are those that:

- Are included in the six year regional Transportation Improvement Program
- Have funding identified in city or county Capital Improvement Programs or RTD's Transit Development Plan

Provided is a list of those projects that have been recently completed or projects that have been committed for construction in the near future.

#### RECENTLY COMPLETED TRANSPORTATION IMPROVEMENT PROJECTS

- **Improvements to the I-70/C-470 Interchange, including ramp movements between I-70 to the west and the C-470 to the north**  
This project included the construction of two additional ramp movements at the existing interchange that were missing: eastbound I-70 to westbound C-470 and eastbound C-470 to westbound I-70. The project is complete.
- **Construction of the southwest loop ramp at the US 36/McCaslin Boulevard interchange**  
This project included the construction of a southbound loop on-ramp to US 36, a re-stripe of the McCaslin Boulevard bridge from 4 to 6 lanes, and an expansion of the park-n-Ride on the southwest quadrant to 500 spaces. The project is complete.
- **Intersection improvements at SH 72/Indiana Street**  
This project replaced the existing curving alignment of SH 72 with a new four-legged intersection at SH 72/Indiana Street/and 86<sup>th</sup> Parkway. Approach roadways were widened to allow for future four-lane alignments of all legs and the installation of a new signal. The project is complete.



## **COMMITTED TRANSPORTATION IMPROVEMENT PROJECTS TO BE CONSTRUCTED IN NEAR FUTURE**

- **Completion of the I-70/SH 58 Interchange, including ramp movements between SH 58 to the west and I-70 to the southwest**

This project includes the environmental study and construction of an interchange from eastbound I-70 to westbound SH 58, and eastbound SH 58 to westbound I-70 along with the reconstruction of the 44<sup>th</sup> Avenue ramps and right-of-way acquisition. The project has funding of \$58 million.

- **FasTracks West Corridor**

The RTD West Corridor is a 12.1 mile light rail transit project that will operate along portions of the former Associated Railroad right-of-way primarily along 13<sup>th</sup> Avenue and US 6 in Lakewood. The transit line will run west from downtown Denver's Union Station, through Denver and Lakewood, to the Lakewood Technology Center at 13<sup>th</sup> Avenue and Oak Street. The line will then run south to the Denver Federal Center and stop west of Union Boulevard and north of 2<sup>nd</sup> Avenue. The line will continue north to 6<sup>th</sup> Avenue and west along 6<sup>th</sup> Avenue to the Jefferson County Government Center in Golden. The project has funding of \$508.2 million.

- **Construction of a grade separation on the Wadsworth Bypass at the Burlington Northern and Santa Fe Railway**

The railroad and Grandview Avenue, an adjacent local street, will be reconstructed on separate bridges over the Wadsworth Bypass. Grandview Avenue will not have motor vehicle access to the bypass. The project includes constructing six standard-width lanes on the bypass through the project area, installing sidewalk/bike paths along both sides of the bypass with pedestrian ramps up to Grandview Avenue, building a raised center median, eliminating access within the project limits, and minor reconstruction of the Ralston Road intersection. This project will accommodate LRT crossings of the bypass. The project has funding of \$25 million.

- **Indiana Street: Croke Canal Bridge Replacement**

This project includes an environmental study, construction of a replacement bridge over the Croke Canal, and purchase of right-of-way. The project is located approximately at 55<sup>th</sup> Avenue and Indiana Street in Arvada. The project has funding of \$0.69 million.

- **Intersection improvements at 120<sup>th</sup> Avenue/Wadsworth Parkway**

This project will reconstruct this intersection to provide a 2-lane left turn from northbound Wadsworth, a right turn lane from eastbound 120<sup>th</sup> Avenue, and realignment of the eastbound and westbound left turn lanes on 120<sup>th</sup> Avenue. The project has funding of \$1.8 million.

- **Signal improvements to I-70 and Colfax Avenue Signals**

This project will rebuild two deficient traffic signals at the ramps of I-70 and Colfax Avenue. This project has funding of \$0.4 million.

- **Operational improvements at 72<sup>nd</sup> Avenue/Ward Road**

This project will construct improvements at 72<sup>nd</sup> Avenue and Ward Road as follows: (a) re-stripe the existing asphalt to provide a second northbound to westbound left turn lane; (b) construct an eastbound acceleration lane from Ward Road to Urban Place; (c) construct curb, gutter, and a 6.5-foot-wide walk on the south side of 72<sup>nd</sup> Avenue east from Ward Road; (d) widen the westbound approach to include a second westbound to southbound left turn lane, an additional through lane and an on-street 4-foot-wide bike lane; (e) continue the second westbound through lane approximately 500 feet before transitioning back to a single lane; (f) install new conduit east of 72<sup>nd</sup> Avenue and Ward Road, to tie into existing conduit west of the intersection and extend the interconnect line for traffic signals on 72<sup>nd</sup> Avenue to include Ward, Zinnia and Alkire; and (g) install bicycle signal detection for the bike lanes on the east and west legs of the intersection. This series of projects has funding of \$0.73 million.



- **Zip Shuttle System, US 36 and 96<sup>th</sup> Street Bus Service**

This project will construct a new 2.6-mile circular bus service connecting the planned RTD facility at US 36 and 96<sup>th</sup> Street, Flatiron Crossing Mall, and two other multi-use developments. This service will operate on its own path independent of surrounding traffic. The project has funding of \$5.8 million.

- **Zip Shuttle System, Purchase Vehicles**

This project will purchase replacement vehicles, GPS equipment, maintenance facility, and guideway maintenance of the ZIP Shuttle at the Flatiron Crossing Mall in Broomfield. The project has funding of \$3.1 million.

- **Intersection improvements at 58<sup>th</sup> Avenue/Kipling Parkway**

This project will realign the left turn lanes of the intersection thereby allowing drivers to see around queued vehicles in opposing lanes and add one southbound and one westbound turning lane. Additional work will include rebuilding the intersection's deficient traffic signal. The project has funding of \$1.1 million.

- **Signal Improvements at SH 121 and *West 52<sup>nd</sup> Avenue* and SH 121 and West 53<sup>rd</sup> Avenue**

This project includes signal upgrades to these two locations with new street lights, curb and sidewalk improvements. This project is funded to \$0.8 million.

- **Pedestrian and Bicycle Projects, Rock Creek Trail Link: at US 287 to Northwest Parkway, McCaslin Link, and Coal Creek to Rock Creek**

This project will construct three missing sections of the Coal Creek/Rock Creek Trail System: between US 287 and Northwest Parkway, between Coal Creek and Rock Creek, and west of McCaslin Boulevard. This project has funding of \$0.68 million.





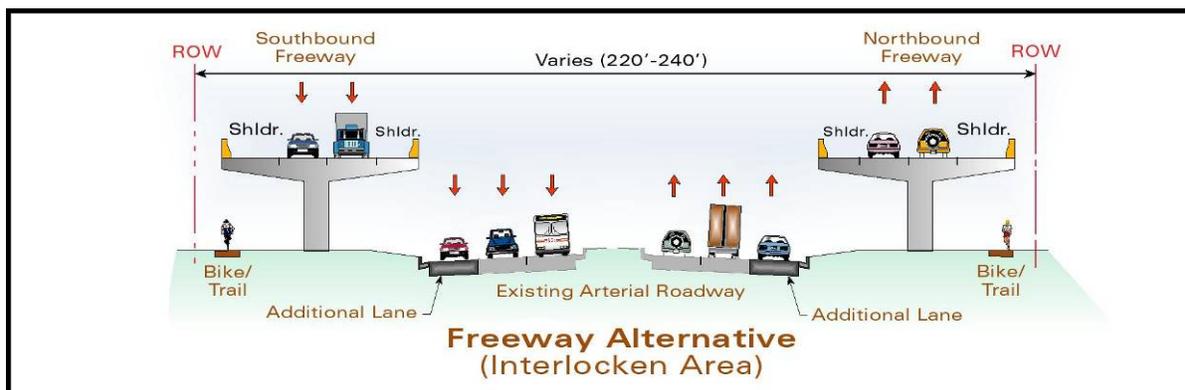
## 2.4.2 FREEWAY ALTERNATIVE (ALTERNATIVE FB)

The Freeway Alternative is a 20.3-mile high-speed facility (55–65 mph posted speed) within the study area that connects the Northwest Parkway in Broomfield with C-470 in Golden. Access to and from the facility is provided exclusively through 11 new or improved interchanges at various locations along the alignment (see **Figure 2.4-2**). Spacing between interchanges is generally one mile or greater. The Freeway Alternative consists of four to six through lanes with an overall roadway width ranging from 122 feet to 144 feet as measured from the edge of outside shoulder to the edge of outside shoulder. Retaining walls will minimize impacts to properties adjacent to the roadway. The majority of these walls will be located in constrained areas and will generally vary in height from 10 feet to 30 feet. A regional bike trail will also be provided along the alignment of the Freeway Alternative. Existing and proposed bike/pedestrian trails will provide continuity of the study area's trail. The total probable cost to implement this alternative, including both construction and right-of-way costs, is \$1,157 million in 2005 dollars.

### NORTHERN PORTION

The northern portion of the Freeway Alternative begins at the southern terminus of the Northwest Parkway and follows an alignment south to SH 128. The northbound and southbound lanes of the Freeway Alternative will be elevated pass-through structures paralleling both sides of 96<sup>th</sup> Street and Interlocken Loop through most of the northern portion. There will be no direct access to US 36 or any of the cross streets along Interlocken Loop. Southbound travelers on the Northwest Parkway will use the Northwest Parkway/96<sup>th</sup> Street interchange to access 96<sup>th</sup> Street and Interlocken Loop which will provide access to US 36, the Flatiron Crossing Mall and surrounding commercial facilities (see **Figure 2.4-3**). Interlocken Loop will serve as a frontage road for local connections in this area and will be widened to six through lanes from just north of US 36 to SH 128. Northbound travelers will use the SH 128 interchange to gain access to US 36, Flatiron Crossing Mall, and surrounding commercial facilities from Interlocken Loop (see **Figure 2.4-4**). Since there will be no access points along the new freeway between the SH 128 interchange and the Northwest Parkway/96<sup>th</sup> Street interchange, the local roadway network in the Interlocken area will operate much as it does today.

In the northern portion, the roadway configuration of the pass-through structures will consist of two 12-foot through lanes, 8-foot inside shoulders and 12-foot outside shoulders for a total width of 44 feet. Additionally, one 11-foot through lane will be added to Interlocken Loop in each direction.



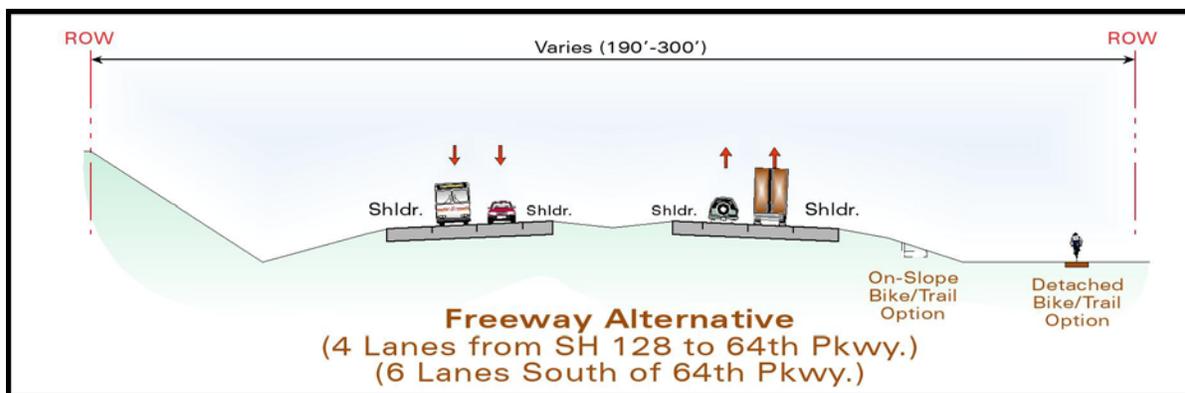
### CENTRAL PORTION

The central portion begins just south of the SH 128 interchange and follows an alignment south to Golden Gate Canyon Road in Golden. This portion is primarily located in relatively undeveloped rural areas. From the SH 128 interchange, the alignment heads southwest through open ground where an interchange with the future Eldorado Boulevard will be constructed near the Great Western Reservoir. This interchange will serve future development in the area. The alignment crosses over and parallels Indiana Street to the west along the



eastern boundary of the Rocky Flats National Wildlife Refuge to the west. Local traffic on Indiana Street will continue to operate independent of the Freeway Alternative. The alignment continues south along the west side of Indiana Street past 96<sup>th</sup> Avenue and turns southwest where an interchange to connect with Indiana Street will be constructed. This new interchange will provide connectivity for the City of Arvada and will integrate Indiana Street into the expanded transportation network. The alignment continues southwest through undeveloped land to SH 72 where a new interchange will be constructed. The new alignment will bridge across Leyden Road and interchange with SH 93. This interchange will provide access to Boulder from SH 93 to the north. Regional traffic along SH 93 between the SH 93 interchange and Golden Gate Canyon Road will use the freeway alignment. Local traffic will obtain access from a new frontage road on the west side of the alignment and new access connections will be provided to the east. The freeway alignment will replace existing SH 93 to the 64<sup>th</sup> Parkway interchange which will serve as a connection to community facilities within the area such as the Jefferson County North Athletic Complex and also planned future development to the west (see **Figure 2.4-5**). The freeway alignment remains parallel to the new frontage road to just past the location of the historic Ramstetter Ranch where the two alignments split. The Freeway Alternative follows a new alignment to the west of the Kilgroe Industrial Park and the new frontage road crosses to the east of the alignment and connects to existing SH 93. The alignment replaces existing SH 93 just south of the new Golden Gate Canyon Road interchange. The Golden Gate Canyon Road interchange will serve as access to existing SH 93 to the east and new frontage roads to the west.

In the central portion, the alignment from SH 128 to 64<sup>th</sup> Parkway contains four 12-foot through lanes, 8-foot inside shoulders, 12-foot outside shoulders, and a 56-foot depressed grass median. Adequate median width is provided in order to ensure that future transportation improvements are not precluded. The alignment from 64<sup>th</sup> Parkway to Golden Gate Canyon Road has six 12-foot through lanes, 10-foot inside shoulders, 12-foot outside shoulders, and a 28-foot depressed grass median.



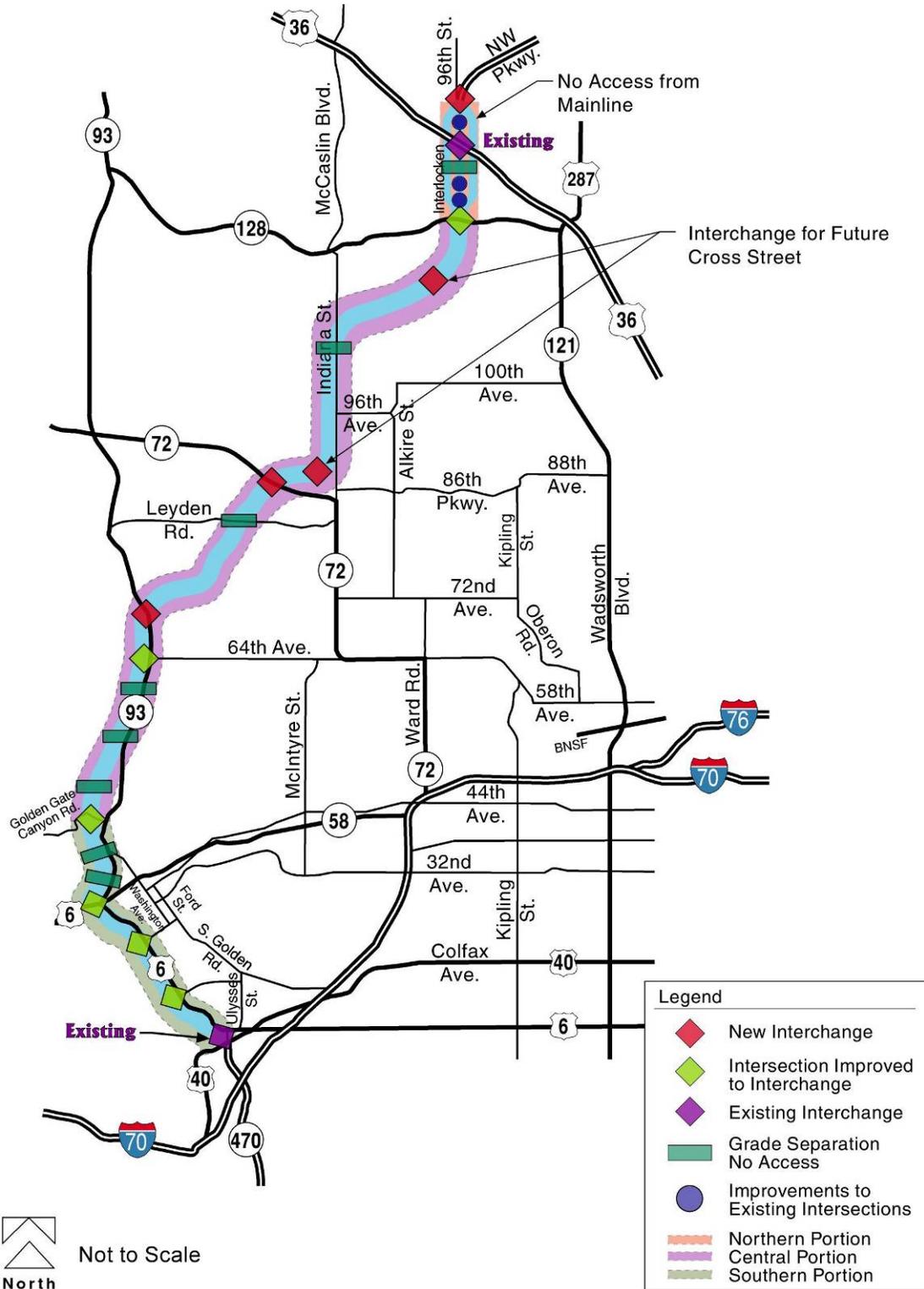
### SOUTHERN PORTION

The southern portion begins at Golden Gate Canyon Road and follows an alignment south to the connection at C-470. Residential and commercial developments in the Golden area occupy the majority of this portion. Traveling south from Golden Gate Canyon Road, the Freeway Alternative is constructed on the existing SH 93 alignment and includes two overpasses with no access at Washington Avenue and Iowa Street. The Canyon Point Commercial Center, Mitchell Elementary School, and local communities, such as the Village at Mountain Ridge, will remain accessible from the Golden Gate Canyon Road interchange. A new frontage road that connects Golden Gate Canyon Road to Washington Avenue on the west side of the alignment provides access to these locations (see **Figure 2.4-6**). Continuing south, the new US 6/SH 58 interchange will provide a regional connection for westbound US 6 to the west and SH 58 to the east. Westbound US 6 will provide access through Clear Creek Canyon to Blackhawk and Central City and SH 58 will provide access to downtown Golden and I-70. Local access to the Canyonside Condominiums on the west side of US 6 will be provided through this interchange. Residents will use the US 6/SH 58 interchange to connect to a new access road located to the west that will bridge across Clear Creek providing access to the complex. The alignment





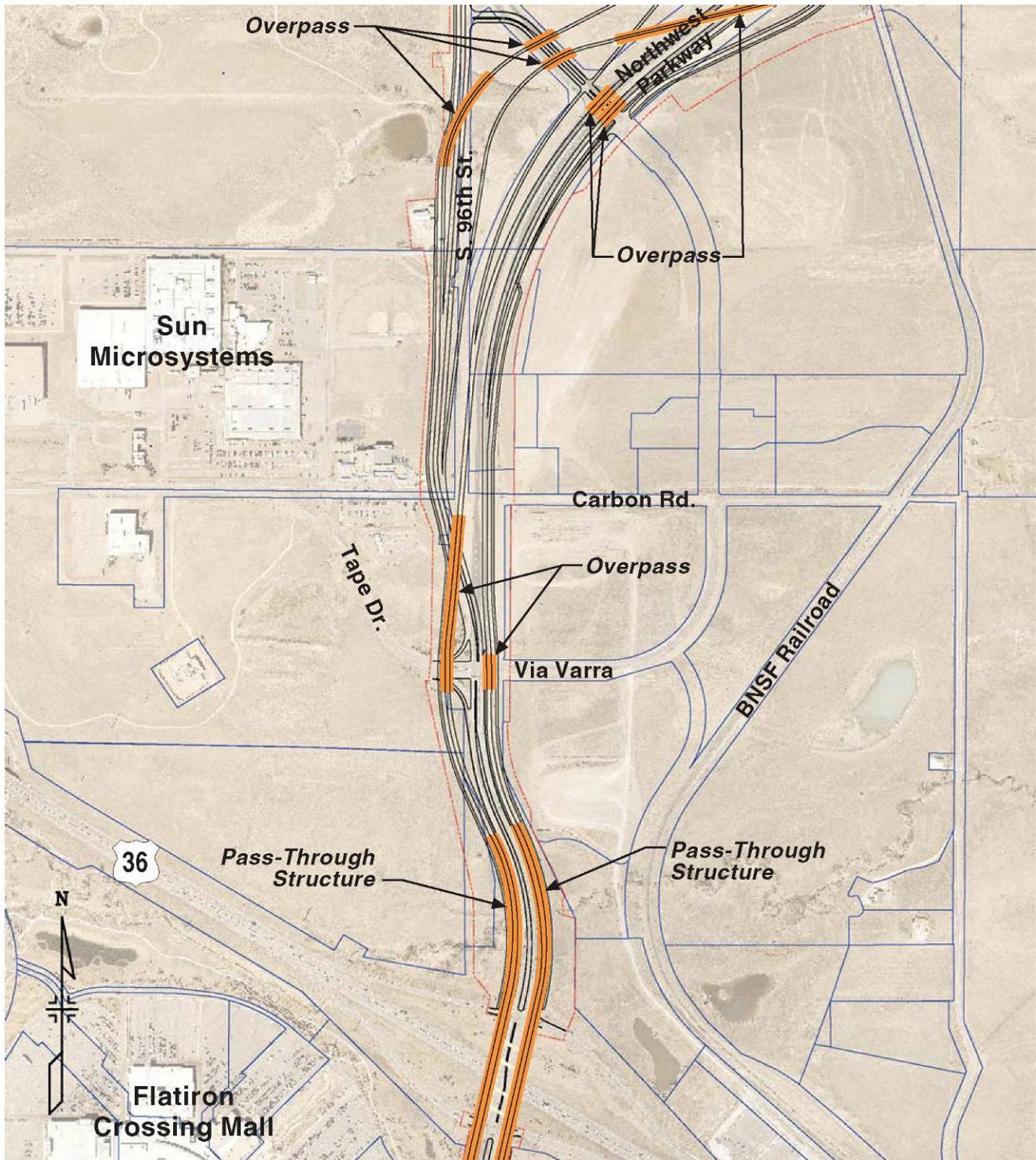
Figure 2.4-2 Freeway Alternative



Source: Compiled by FHU, 2007.



*Figure 2.4-3 Freeway Alternative—Access to Interlocken from Northwest Parkway*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-4 Freeway Alternative—Access to Interlocken from SH 128*

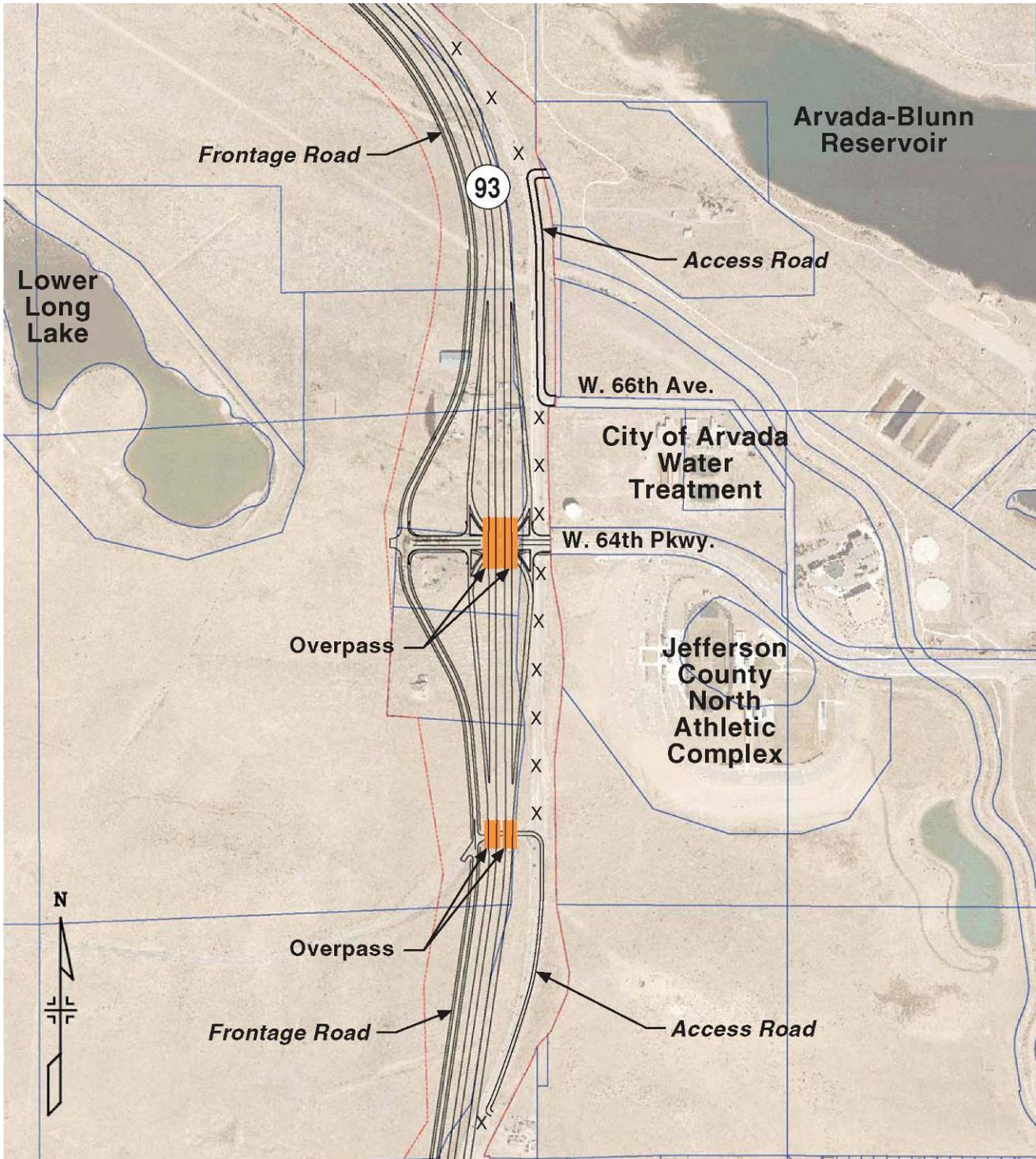


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-5 Freeway Alternative-64<sup>th</sup> Parkway Access*

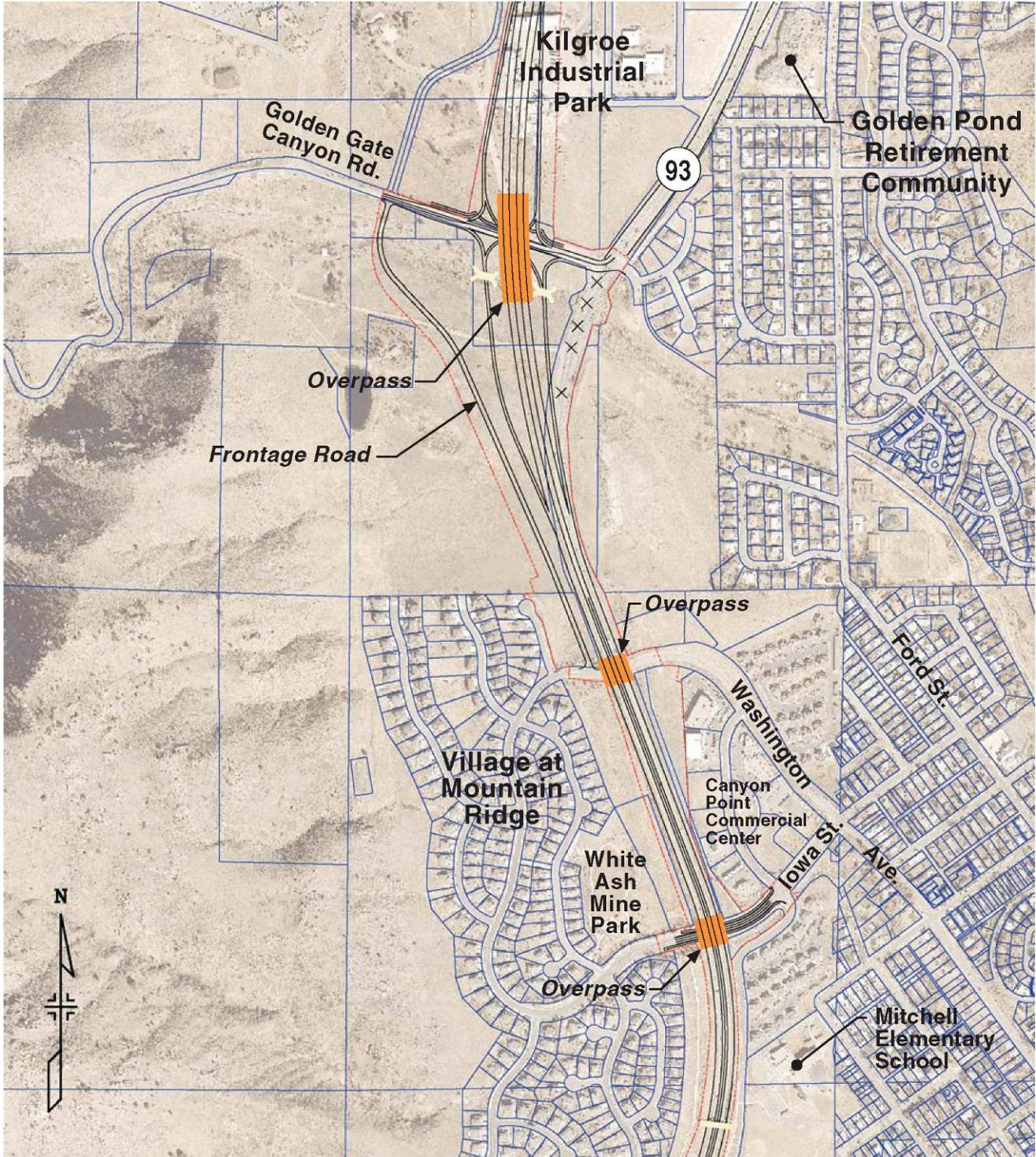


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-6 Freeway Alternative—Access to Washington Avenue and Iowa Street from Golden Gate Canyon Road*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-7 Freeway Alternative—US 6/SH 58 and 19<sup>th</sup> Street Access*

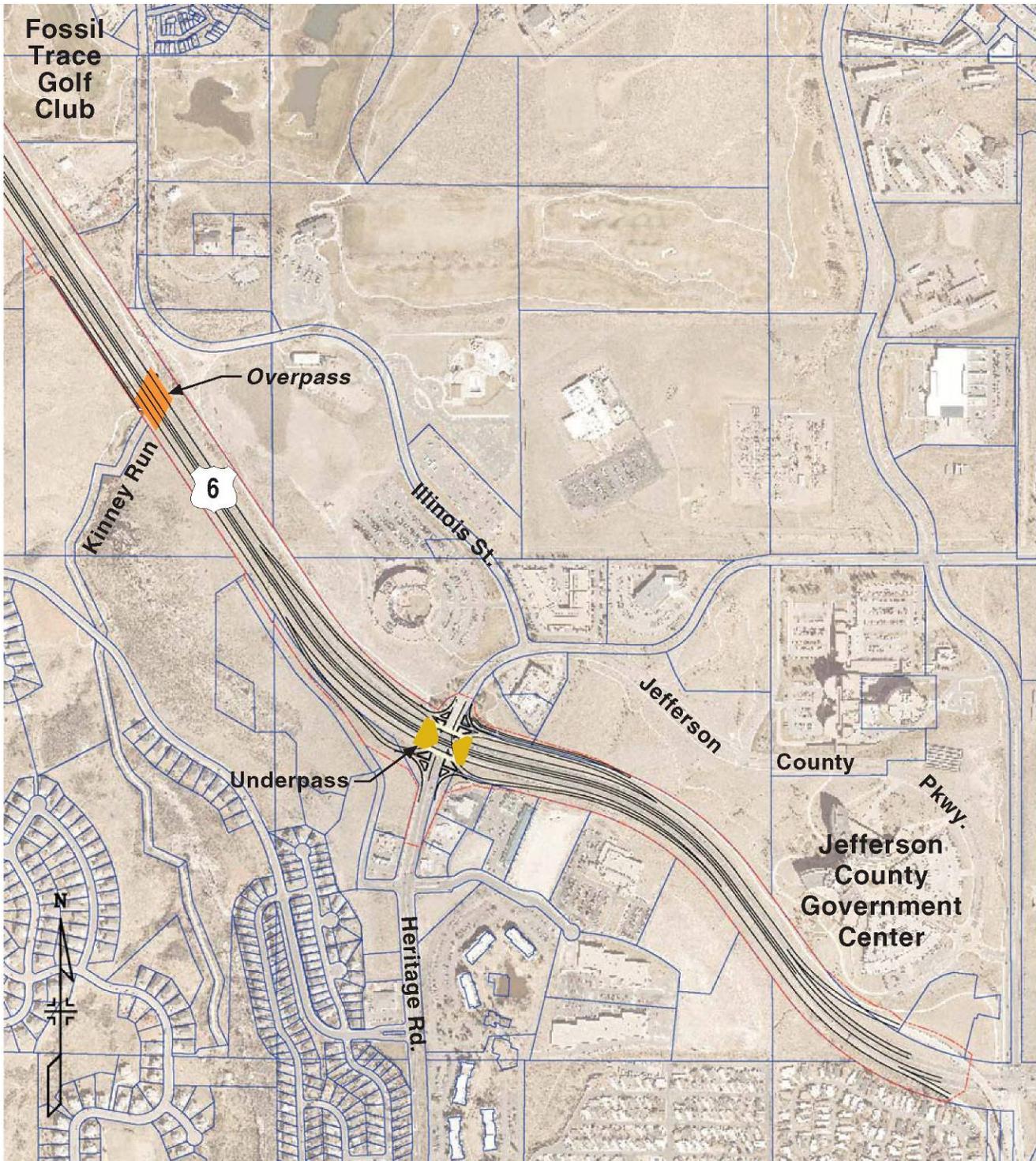


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-8 Freeway Alternative–Heritage Road/Jefferson County Parkway Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



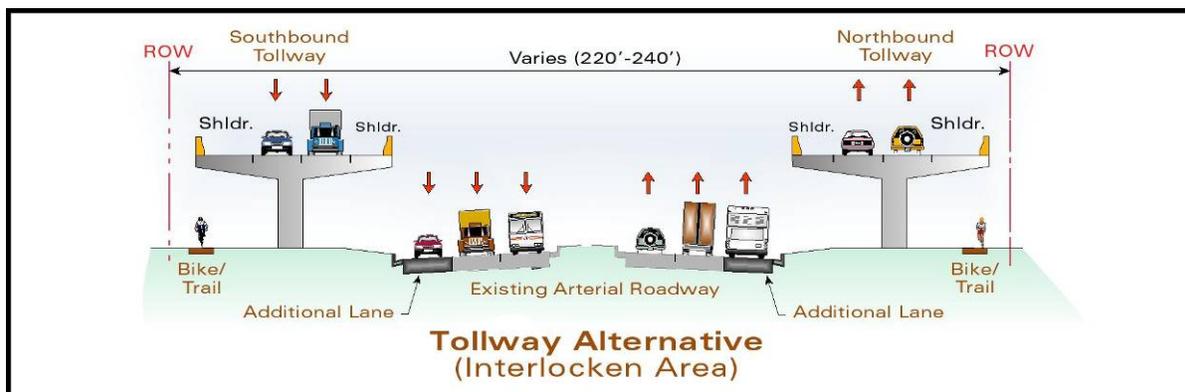
### 2.4.3 TOLLWAY ALTERNATIVE (ALTERNATIVE TB)

The Tollway Alternative is a 20.3-mile high-speed facility (55–65 mph posted speed) within the study area that connects the Northwest Parkway in Broomfield with C-470 in Golden. Access to and from the facility is provided through seven new or improved interchanges at various locations along the alignment and three sets of slip ramps in the Golden area (see **Figure 2.4-9**). Spacing between interchanges is generally one mile or greater. Slip ramps provide access between two parallel facilities. This feature is used in the area where US 6 and SH 93 run parallel to the tolled facility. The Tollway Alternative consists of four tolled lanes throughout its entire length that will be located to ensure that no general purpose lanes are impacted by the foot print of the tollway. Tolls will be collected electronically with transponders. Retaining walls will minimize impacts to properties adjacent to the roadway. The majority of these walls will be located in constrained areas and will generally vary in height from 10 feet to 30 feet. A regional bike trail will be provided along the alignment of the Tollway Alternative. Existing and proposed bike/pedestrian trails will provide continuity of the study area's trail system. The total probable cost to implement this alternative, including both construction and right-of-way costs, is \$1,176 million in 2005 dollars.

#### NORTHERN PORTION

The northern portion of the Tollway Alternative begins at the southern terminus of the Northwest Parkway and follows an alignment south to SH 128. The northbound and southbound lanes of the Tollway Alternative will be elevated pass-through structures paralleling both sides of 96<sup>th</sup> Street and Interlocken Loop through most of the northern portion. There will be no direct access to US 36 or any of the cross streets along Interlocken Loop. Southbound travelers on the Northwest Parkway will use the Northwest Parkway/96<sup>th</sup> Street interchange to access 96<sup>th</sup> Street and Interlocken Loop which will provide access to US 36, the Flatiron Crossing Mall and surrounding commercial facilities (see **Figure 2.4-10**). Interlocken Loop will serve as a frontage road for local connections in this area and will be widened to six through lanes from just north of US 36 to SH 128. Northbound travelers will use the SH 128 interchange to gain access to US 36, Flatiron Crossing Mall, and surrounding commercial facilities from Interlocken Loop (see **Figure 2.4-11**). Since there will be no access points along the tollway between the SH 128 interchange and the Northwest Parkway/96<sup>th</sup> Street interchange, the local roadway network in the Interlocken area will operate much as it does today.

In the northern portion, the roadway configuration of the pass-through structures will consist of two 12-foot through lanes, 8-foot inside shoulders and 12 foot outside shoulders for a total width of 44 feet. One additional 11-foot through lane will be added to Interlocken Loop in each direction.



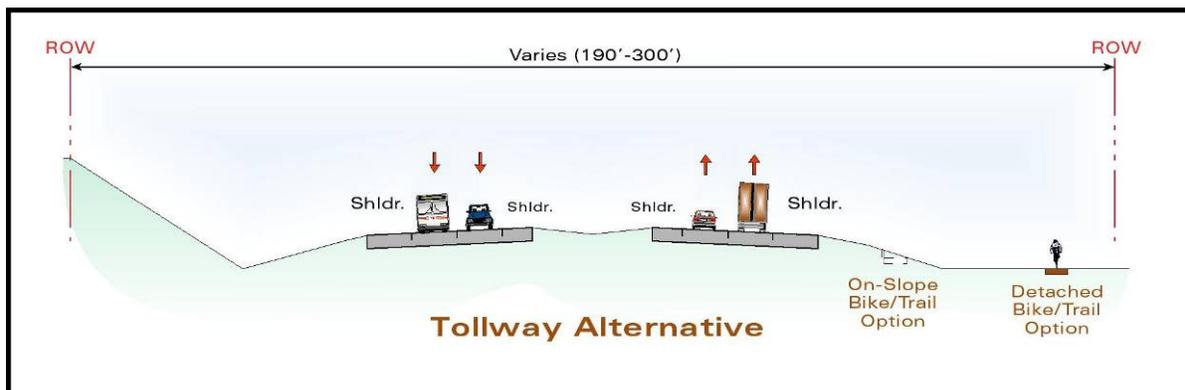
#### CENTRAL PORTION

The central portion begins just south of the SH 128 interchange and follows an alignment south to Golden Gate Canyon Road in Golden. This portion is primarily located in relatively undeveloped rural areas. From the SH 128 interchange, the alignment heads southwest through open ground where an interchange with the future Eldorado Boulevard will be constructed near the Great Western Reservoir. This interchange will serve



planned future development in the area. The alignment crosses over and parallels Indiana Street to the west along the eastern boundary of the Rocky Flats Wildlife Refuge. Local traffic on Indiana Street will continue to operate independent of the Tollway Alternative. The alignment continues south along the west side of Indiana Street past 96<sup>th</sup> Avenue and turns southwest where an interchange to connect with Indiana Street will be constructed. The alignment continues southwest through undeveloped land to SH 72 where a new interchange will be constructed. Planned future development in this area will be served by this interchange. The new alignment will bridge across Leyden Road and interchange with SH 93. This interchange will provide access to Boulder from SH 93 to the north. From this interchange to the south, SH 93 will remain uninterrupted by the tollway lanes. The tollway alignment parallels SH 93 on the west to the 64<sup>th</sup> Parkway interchange that will serve as a connection to community facilities within the area such as the Jefferson County North Athletic Complex and also planned future development to the west (see **Figure 2.4-12**). Continuing south, the alignment remains parallel to SH 93 on the west to 56<sup>th</sup> Avenue where it crosses over SH 93 and runs parallel to the east. The alignment crosses back over to the west of SH 93 near the historic Ramstetter Ranch. The Tollway Alternative follows a new alignment to the west of the Kilgroe Industrial Park and converges towards SH 93 near the Golden Gate Canyon Road overpass.

In the central portion, the alignment from SH 128 to Golden Gate Canyon Road contains four 12-foot through lanes, 8-foot inside shoulders, 12-foot outside shoulders, and a 56-foot depressed grass median. Adequate median width is provided in order to ensure that future transportation improvements are not precluded.



### SOUTHERN PORTION

The southern portion begins south of Golden Gate Canyon Road and follows an alignment south to the connection at C-470. The majority of the land use in this area is residential and commercial. Traveling south from Golden Gate Canyon Road, the Tollway Alternative alignment will be constructed parallel to existing SH 93. The northbound lanes will be located on the east side of SH 93 and the southbound lanes will be located on the west side. The northbound lanes will pass over SH 93 in order to shift them to the east side of the alignment and an overpass at Washington Avenue will be constructed for both the northbound and southbound lanes. Continuing south, the tollway alignment will pass under Iowa Street with no direct connection. Local access along Washington Avenue and Iowa Street will remain unchanged and no access to the tollway will be provided. The access to Canyon Point Commercial Center, Mitchell Elementary School, and local communities, such as the Village at Mountain Ridge, will remain the same for travelers using SH 93. Southbound tollway travelers will access this area by using the 64<sup>th</sup> Parkway interchange or the US 6/SH 58 slip ramps to connect to SH 93. Northbound tollway travelers will be able to connect to SH 93 using the US 6/SH 58 slip ramps (see **Figure 2.4-13**). Continuing south, slip ramps provide access to the US 6/SH 58 intersection. This intersection will provide a regional connection to westbound US 6 to the west and SH 58 to the east. Westbound US 6 will provide access through Clear Creek Canyon to Blackhawk and Central City and SH 58 will provide access to downtown Golden and I-70. Local access to the Canyonside Condominiums on the west side of US 6 will be provided through this intersection. Residents will use the intersection to



connect to a new access road located to the west that will bridge across Clear Creek and provide access to the complex. Lanes for both the northbound and southbound tollway will pass under 19<sup>th</sup> Street with no direct connection. Access to 19<sup>th</sup> Street will be from US 6. Southbound tollway travelers will access US 6 from slip ramps north of the US 6/SH 58 intersection and northbound tollway travelers will access US 6 from the C-470 ramps. Southbound travelers will access the tollway from US 6 at the C-470 ramps and northbound travelers will access the tollway at slip ramps just north of the US 6/SH 58 intersection. Nineteenth Street will provide access to the Colorado School of Mines, Parfet Estates, and other local communities (see **Figure 2.4-14**). The alignments of SH 93 and US 6 will be reconstructed between Washington Avenue and just south of 19<sup>th</sup> Street in order to maintain functionality and local access between the tollway lanes. Continuing south, the northbound and southbound tollway lanes will pass under Heritage Road with no direct connection. Access to Heritage Road and Jefferson County Parkway will be from US 6. Southbound tollway travelers will access US 6 from slip ramps south of 19<sup>th</sup> Street and northbound tollway travelers will access US 6 from the C-470 ramps. Southbound travelers will access the tollway at the C-470 ramps and northbound travelers will access the tollway at slip ramps south of the 19<sup>th</sup> Street intersection. Heritage Road and Jefferson County Parkway will provide access to the Jefferson County Government Center as well as businesses to the west of the alignment. The tollway lanes connect to C-470 utilizing the existing ramp connections to US 6 (see **Figure 2.4-15**).

The southern portion has four 12 foot through lanes, 8 foot inside shoulders, and 12 foot outside shoulders. The two northbound lanes will be located on the east side of US 6 and the two southbound lanes will be located on the west side. The tollway lanes will tunnel under Iowa Street, 19<sup>th</sup> Street, and Heritage Road adjacent to SH 93 and US 6 providing no interruption to the operation of SH 93 and US 6 or the cross streets.

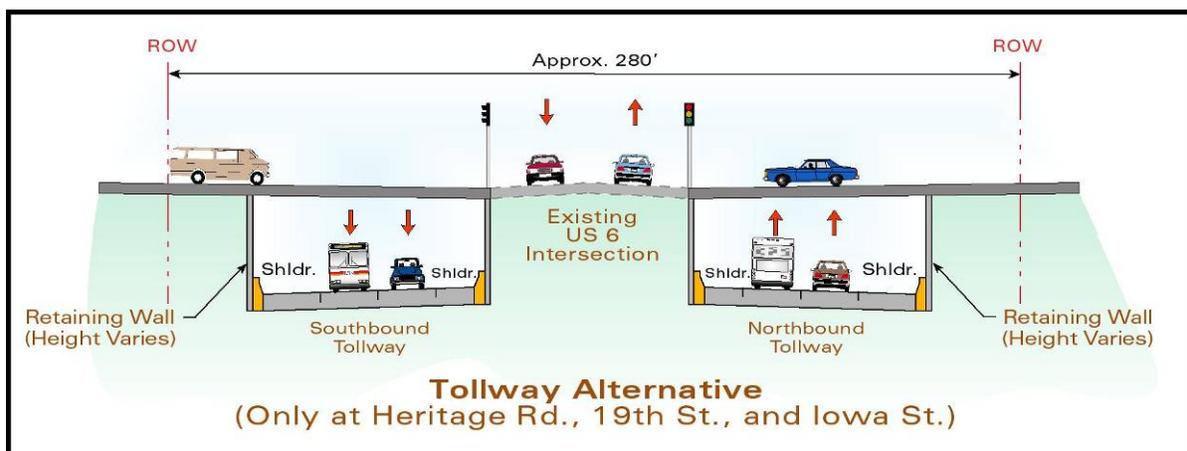
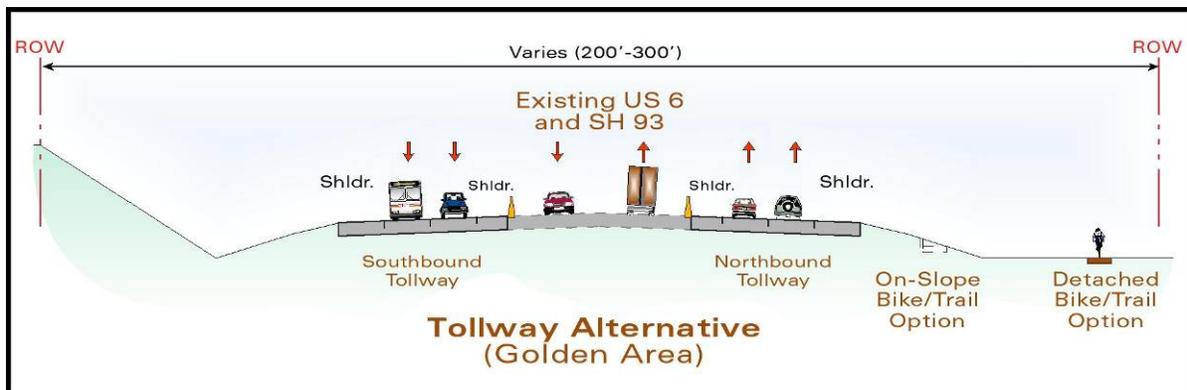
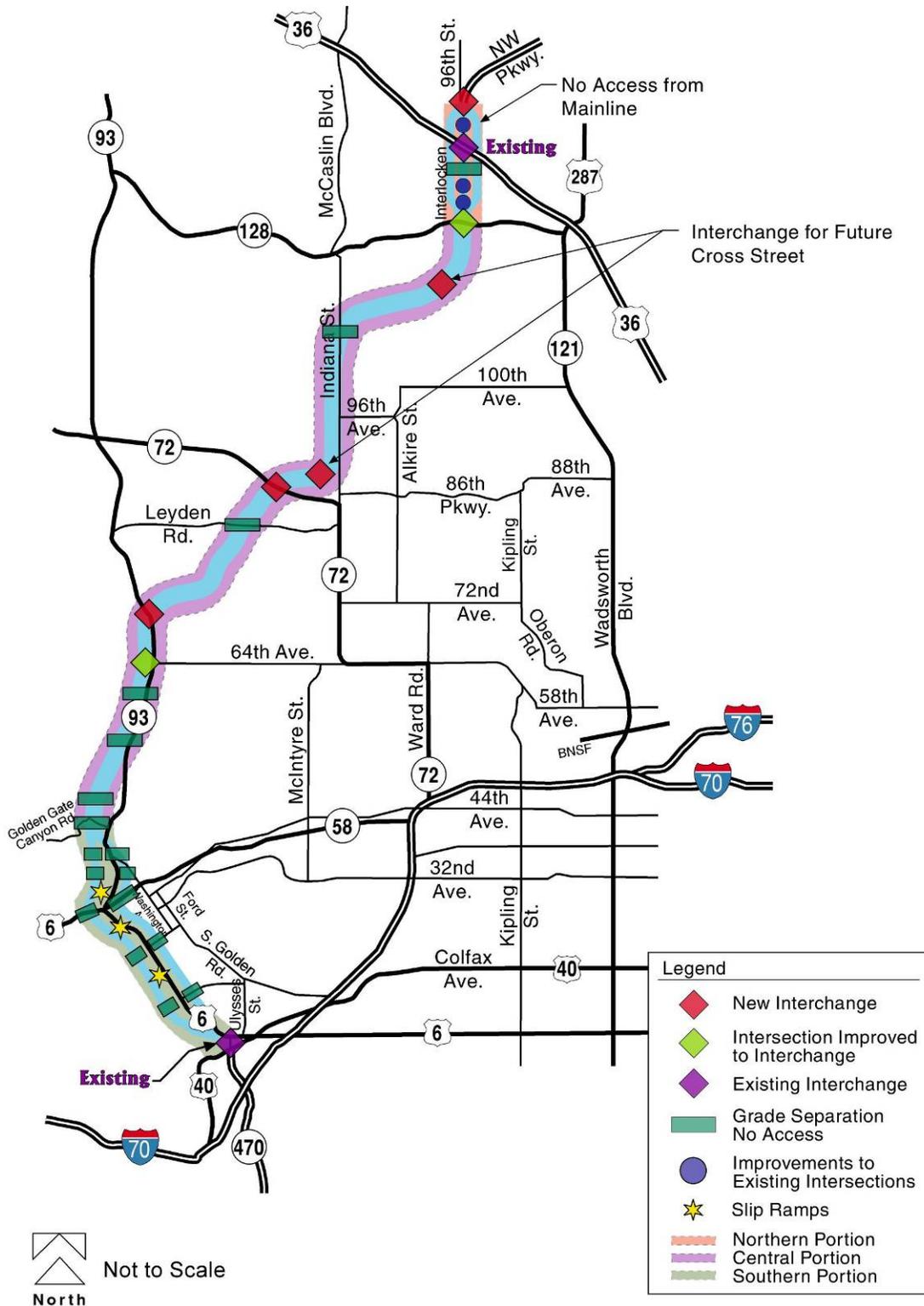




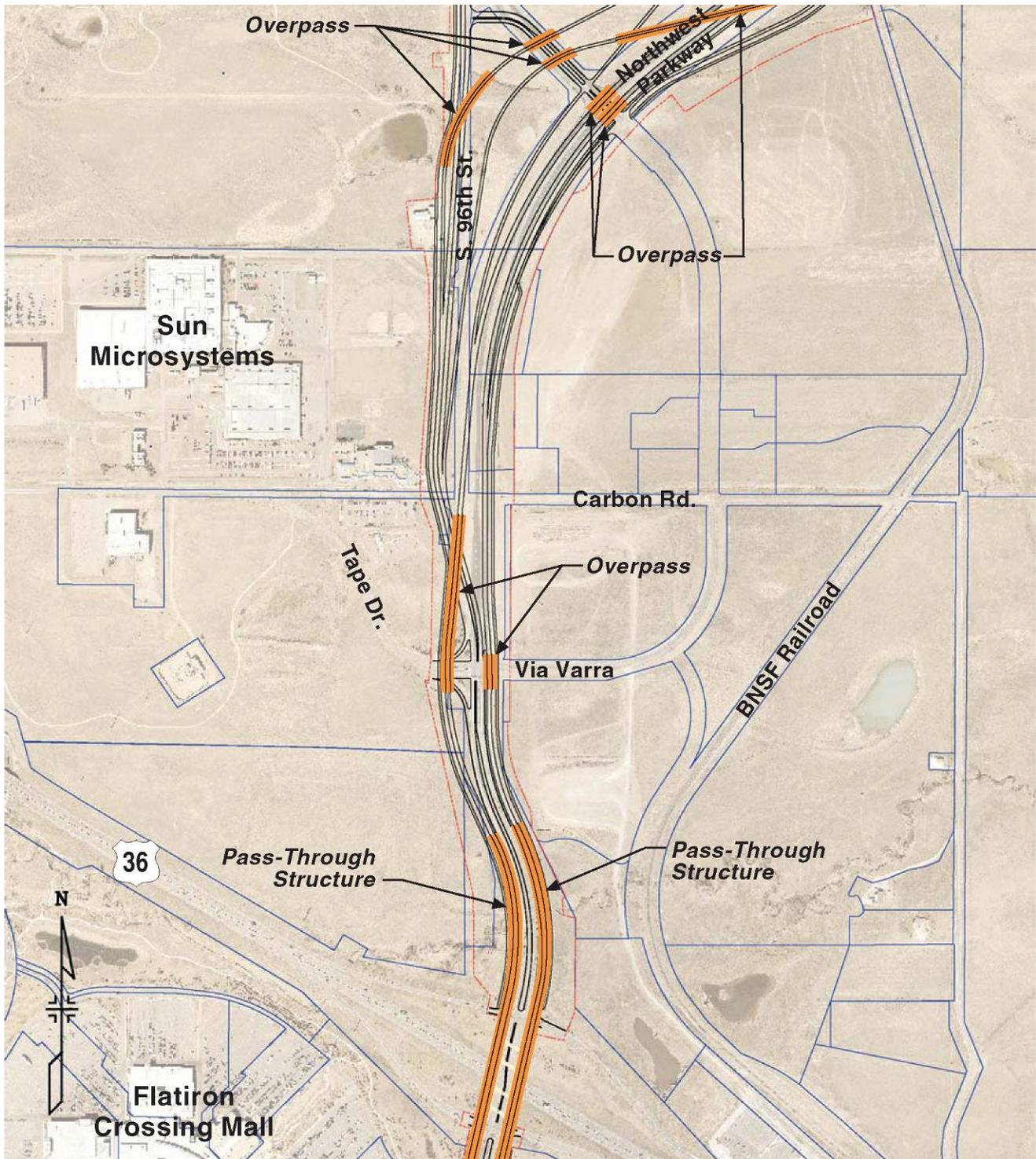
Figure 2.4-9 Tollway Alternative



Source: Compiled by FHU, 2007.



*Figure 2.4-10 Tollway Alternative—Access to Interlocken from Northwest Parkway*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-11 Tollway Alternative—Access to Interlocken from SH 128*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-12 Tollway Alternative—64<sup>th</sup> Parkway Access*

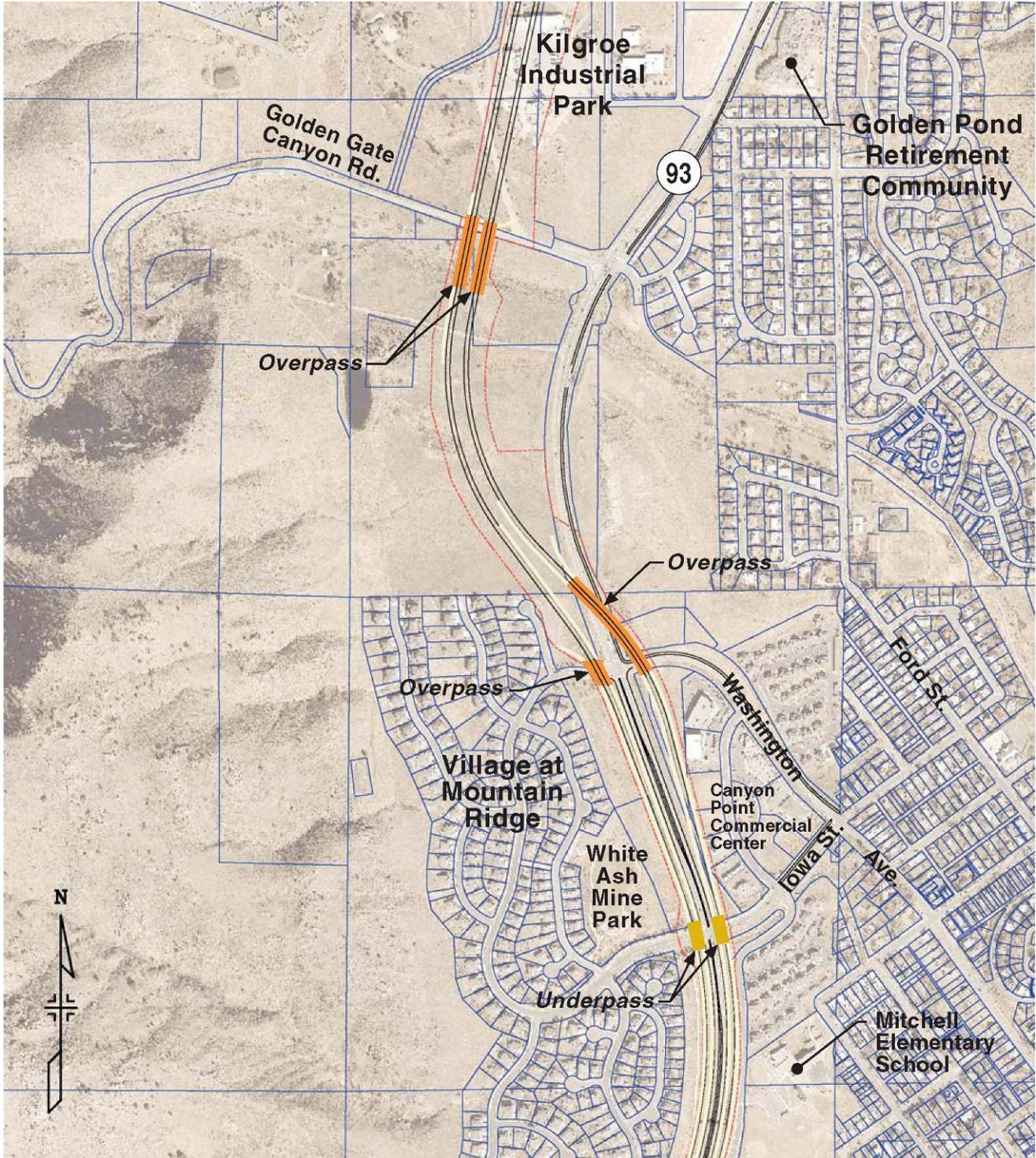


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-13 Tollway Alternative—Access to Washington Avenue and Iowa Street from Golden Gate Canyon Road*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-14 Tollway Alternative—US 6/SH 58 and 19<sup>th</sup> Street Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-15 Tollway Alternative—Heritage Road/Jefferson County Parkway Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



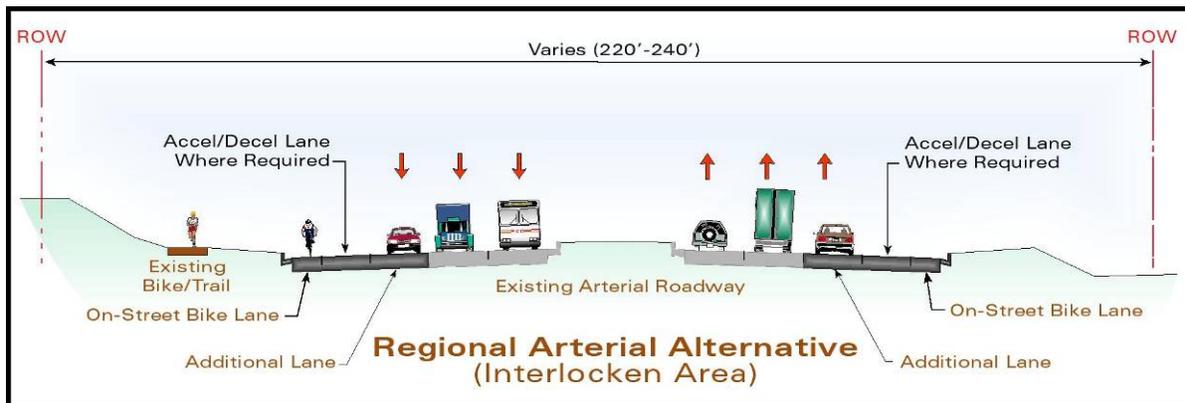
#### 2.4.4 REGIONAL ARTERIAL ALTERNATIVE (ALTERNATIVE RB)

The Regional Arterial Alternative is a 22.4-mile facility (45–55 mph posted speed) within the study area that connects the Northwest Parkway in Broomfield with C-470 in Golden. Access to and from the facility is provided through six new or improved interchanges at various locations along the alignment and numerous new or improved intersections (see **Figure 2.4-16**). Spacing between interchanges is generally one mile or greater. The Regional Arterial Alternative consists of four to six through lanes with an overall roadway width ranging from 122 feet to 144 feet as measured from the edge of outside shoulder to the edge of outside shoulder. Retaining walls will minimize impacts to properties adjacent to the roadway. The majority of these walls will be located in constrained areas and will generally vary in height from 10 feet to 30 feet. A regional bike trail will be provided along the alignment of the Regional Arterial Alternative. Existing and proposed bike/pedestrian trails will provide continuity of the study area's trail system. The total probable cost to implement this alternative, including both construction and right-of-way costs, is \$672 million in 2005 dollars.

##### NORTHERN PORTION

The northern portion of the Regional Arterial Alternative begins at the intersection of Northwest Parkway and 96<sup>th</sup> Street and follows the existing alignment of 96<sup>th</sup> Street and Interlocken Loop to SH 128. Improvements to both 96<sup>th</sup> Street and Interlocken Loop will include widening to six through lanes and adding on-street bike lanes in each direction. Existing access to and from US 36, Flatiron Crossing Mall, and surrounding commercial facilities will be maintained as it is today (see **Figure 2.4-17**). The intersection with SH 128 and Interlocken Loop will be reconfigured to allow the Regional Arterial alignment to be the through traffic movement along Interlocken Loop and SH 128 to the west. SH 128 to the east will T into the reconfigured Regional Arterial alignment (see **Figure 2.4-18**).

The northern portion consists of curb and gutter and three 11-foot through lanes in each direction, no inside shoulders, 10-foot outside shoulders, 6-foot on-street bike lanes, and a 28-foot raised landscaped median. This is consistent with the typical roadway configuration of the Northwest Parkway for at-grade facilities.



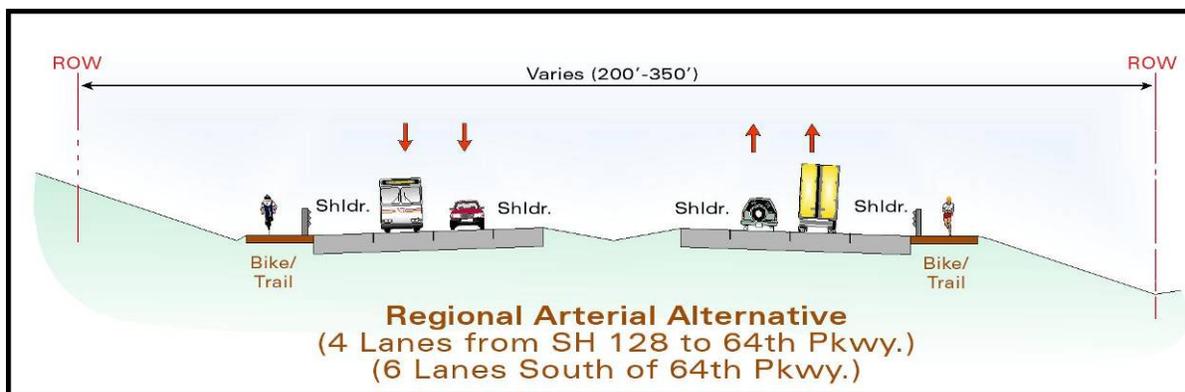
##### CENTRAL PORTION

The central portion begins from just south of the intersection of Interlocken Loop and SH 128 and follows an alignment on existing roadways west along SH 128, south along Indiana Street, west along SH 72, and south along SH 93 to Golden Gate Canyon Road in Golden. This portion is primarily located in relatively undeveloped rural areas. From the intersection of Interlocken Loop and SH 128, the alignment changes from a six-lane to a four-lane facility and heads west along SH 128 to Indiana Street. Major intersections will be constructed at Eldorado Boulevard and Ridge Parkway. The alignment bends south onto Indiana Street where a new trumpet type interchange will be constructed at Indiana Street and SH 128. This interchange will provide mainline continuity as the alignment transitions from SH 128 to Indiana Street. The alignment continues south on Indiana Street along the east side of the Rocky Flats Wildlife Refuge. The existing intersection with West 96<sup>th</sup> Avenue will be improved and will serve local access to the east as it does today.



From Indiana Street the alignment turns west along SH 72. A new intersection will be constructed at Indiana Street and SH 72. This will serve as access to points south along existing Indiana Street and future development to the west. At this point the Regional Arterial Alternative follows along SH 72 west to SH 93. Two full access intersections, two right-in right-out intersections, and a connecting frontage road on the south side of the alignment will be constructed in this area to provide access to the existing commercial properties along SH 72. These new facilities will consolidate the numerous existing accesses into two main access points along SH 72 (see **Figure 2.4-19**). As the alignment turns south onto SH 93, a new interchange will be constructed to provide full access connections between SH 72 and SH 93. This interchange provides mainline continuity as the alignment transitions from SH 72 to SH 93. A new intersection just south of the interchange will be constructed to provide access to a landfill site west of SH 93. The alignment will continue south along SH 93 and a new intersection with Leyden Road will be constructed. Continuing south, the alignment at 64<sup>th</sup> Parkway will include construction of a new interchange. This interchange will provide access to future developments to the west and community facilities to the east, including the Jefferson County North Athletic Complex (see **Figure 2.4-20**). The Regional Arterial Alternative will become a six-lane facility south of the 64<sup>th</sup> Avenue interchange along the SH 93 alignment. An improved intersection with 58<sup>th</sup> Avenue will be constructed, including a new connection with 56<sup>th</sup> Avenue to the west providing access to properties west of SH 93. Continuing south, the alignment remains on existing SH 93 to just past the location of the historic Ramstetter Ranch. At this point, the Regional Arterial Alternative follows along a new alignment west of the Kilgroe Industrial Park. Existing SH 93 will connect to the Regional Arterial Alternative to the east of the alignment by way of a new intersection, providing local access as it does today. The new roadway rejoins existing SH 93 near the new Golden Gate Canyon Road intersection. The Golden Gate Canyon Road intersection will serve as access to existing SH 93 to the east and continue to provide access to existing properties to the west.

In the central portion, the alignment from the intersection of Interlocken Loop and SH 128 to 64<sup>th</sup> Parkway consists of four 12-foot through lanes, 8-foot inside shoulders, 12-foot outside shoulders, and a 56 foot depressed grass median. Adequate median width is provided in order to ensure that future transportation improvements are not precluded. The alignment from 64<sup>th</sup> Parkway to Golden Gate Canyon Road consists of six 12-foot through lanes, 10 foot inside shoulders, 12-foot outside shoulders, and a 28-foot depressed grass median.



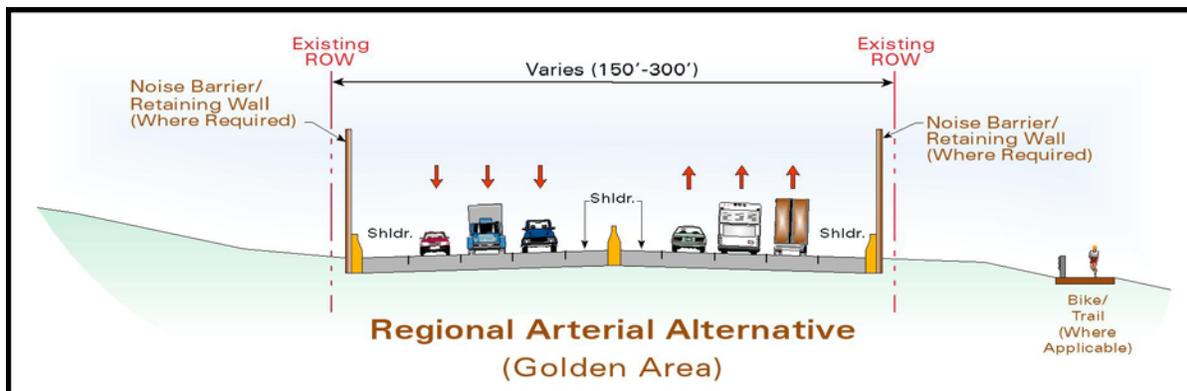
### SOUTHERN PORTION

The southern portion begins at the Golden Gate Canyon Road intersection and follows an alignment south to the connection at C-470. Residential and commercial developments in the Golden area occupy the majority of this portion. South of Golden Gate Canyon Road, the Regional Arterial Alternative will be constructed on the existing SH 93 alignment and includes an improved intersection at Washington Avenue and an overpass at Iowa Street. There will be no direct access to the arterial roadway from Iowa Street. The Canyon Point Commercial Center, Mitchell Elementary School, and local communities, such as the Village at Mountain Ridge, will remain accessible from the Washington Avenue intersection (see **Figure 2.4-21**). Continuing



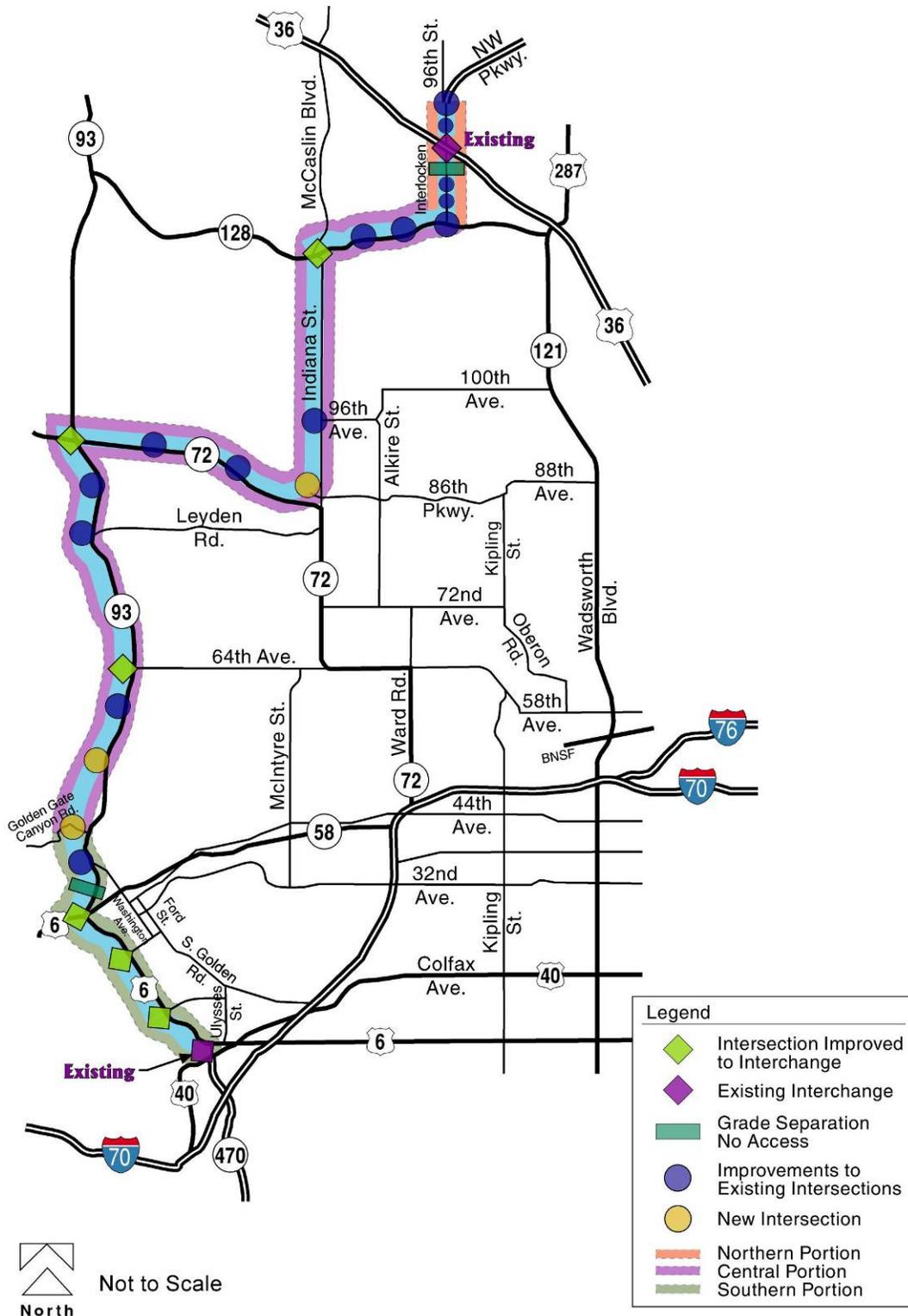
south, the new US 6/SH 58 interchange will provide a regional connection to westbound US 6 to the west and SH 58 to the east. Westbound US 6 will provide access through Clear Creek Canyon to Blackhawk and Central City and SH 58 will provide access to downtown Golden and I-70. Local access to the Canyonside Condominiums on the west side of US 6 will be provided through this interchange. Residents will use the US 6/SH 58 interchange to connect to a new access road located to the west that will cross over Clear Creek providing access to the complex. The alignment follows the existing US 6 south to 19<sup>th</sup> Street where a new interchange will provide access to local communities as well as the Colorado School of Mine (see **Figure 2.4-22**). Passing Fossil Trace Golf Course, southbound travelers approach the Heritage Road/Jefferson County Parkway interchange which will provide access to the Jefferson County Government Center on the east and local businesses on the west. Regional traffic will connect to C-470 utilizing the existing ramps that connect to US 6 (see **Figure 2.4-23**).

The southern portion has six 12 foot through lanes, 12-foot inside shoulders, 12-foot outside shoulders, and a 2-foot wide median barrier. Auxiliary lanes will be constructed between the 19<sup>th</sup> Street interchange and Heritage Road interchange and between the Heritage Road interchange and the C-470 ramps in order to improve traffic flow. The interchanges at 19<sup>th</sup> Street and Heritage Road both direct the regional arterial mainline under the cross street allowing the cross streets to remain at their current grade (see **Figure 2.3-5**).





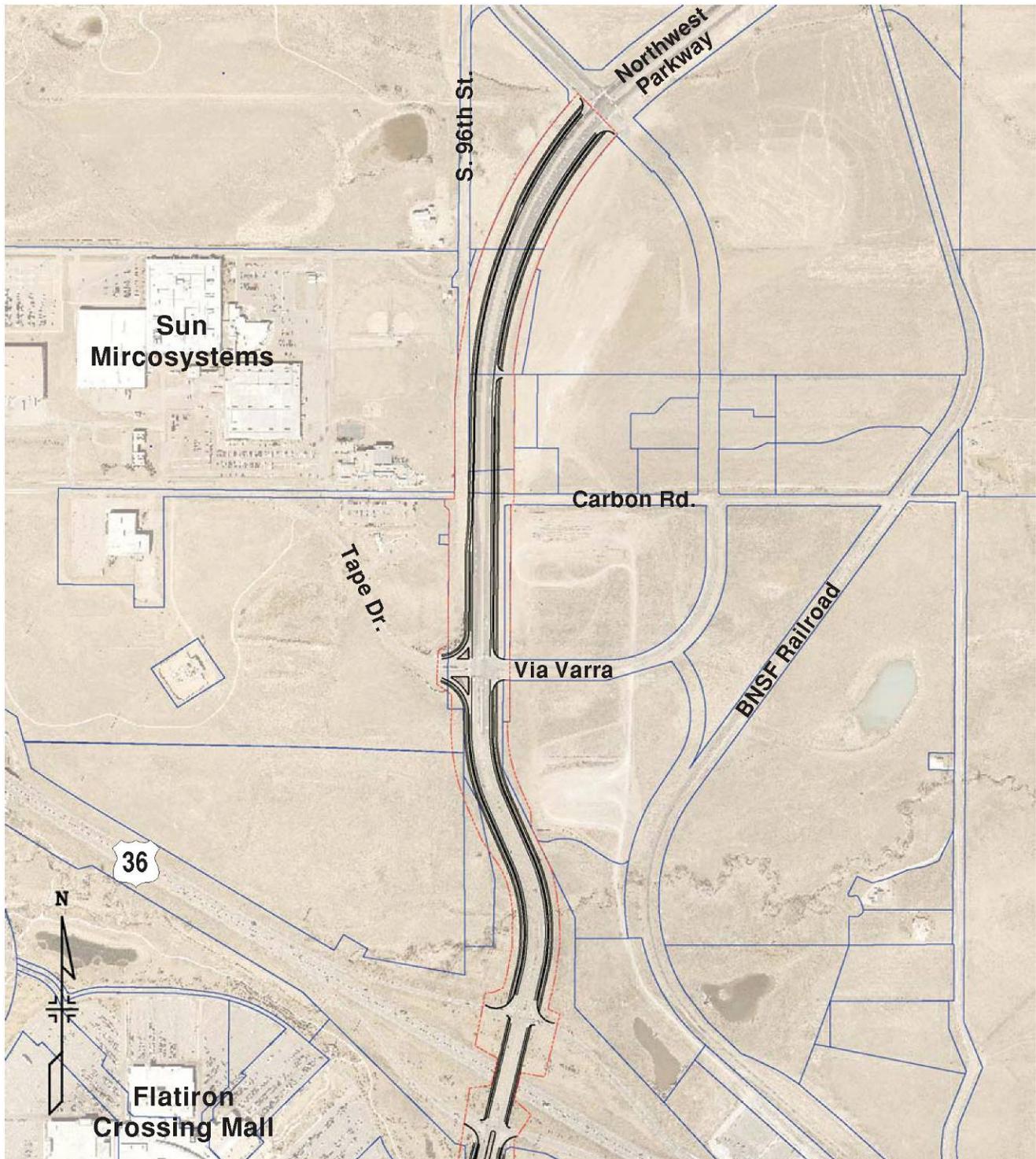
*Figure 2.4-16 Regional Arterial Alternative*



Source: Compiled by FHU, 2007.



*Figure 2.4-17 Regional Arterial Alternative—Access to Interlocken from Northwest Parkway*

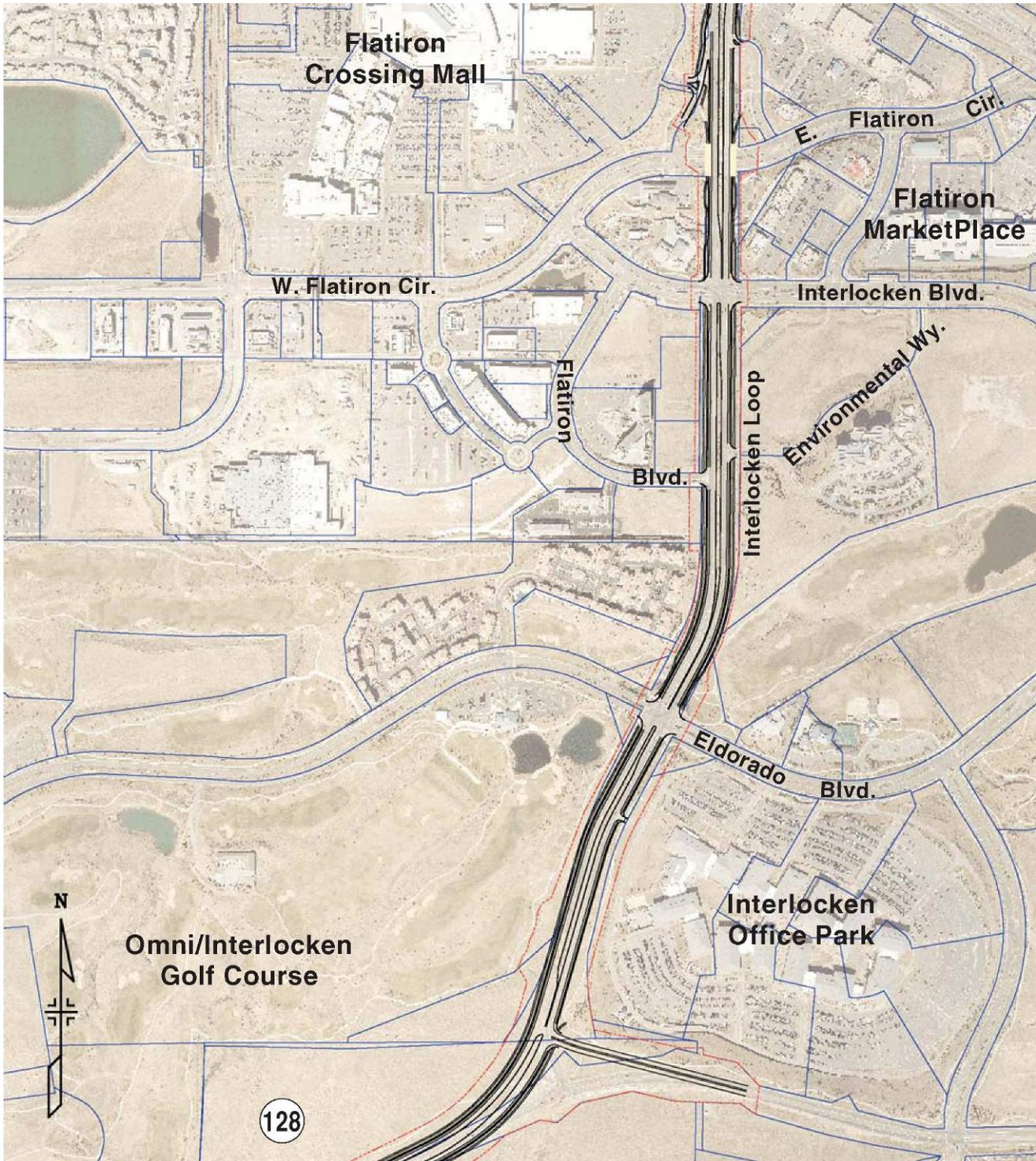


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-18 Regional Arterial Alternative—Access to Interlocken from SH 128*

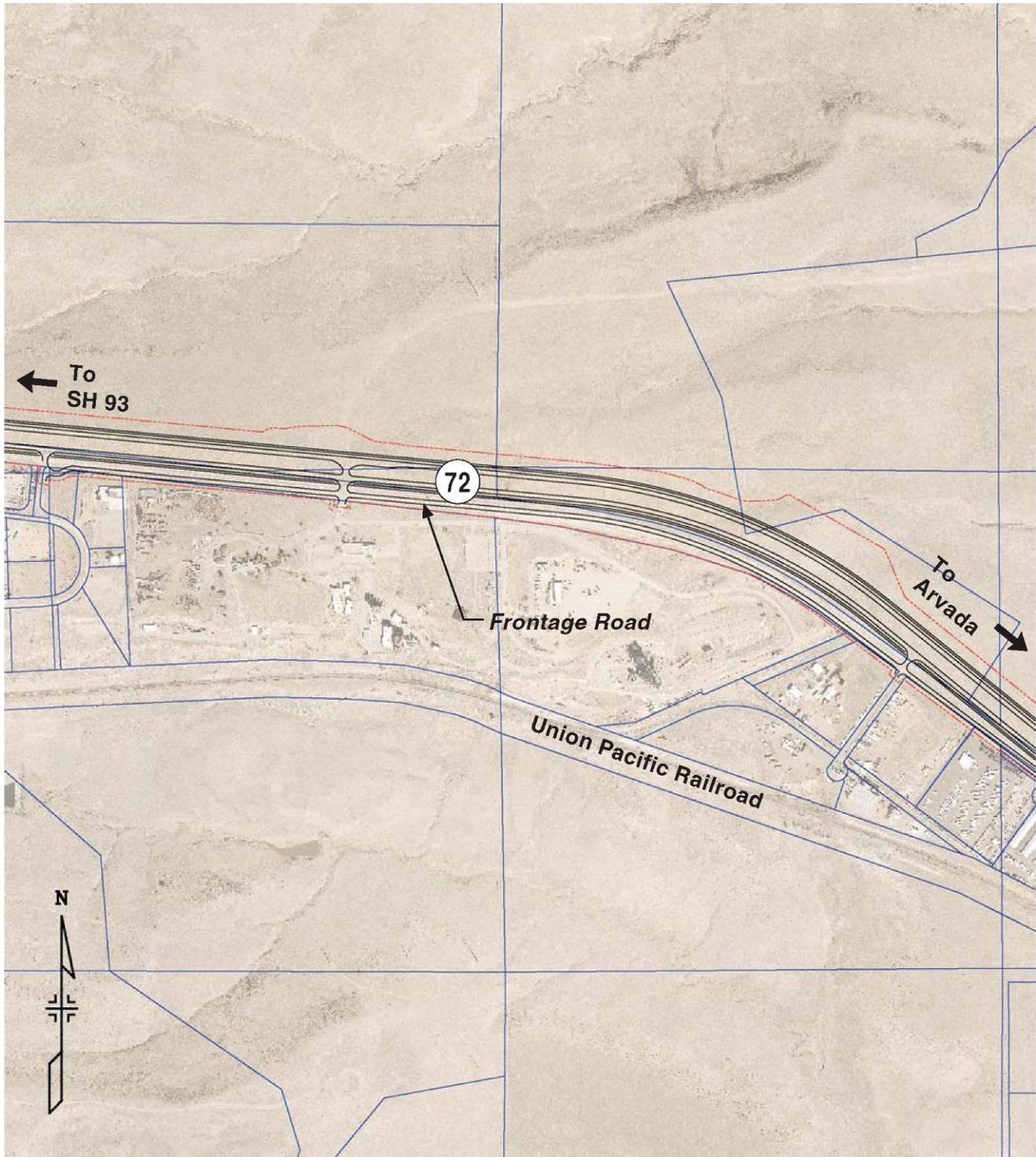


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-19 Regional Arterial Alternative—SH 72 Frontage Road Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.

*Figure 2.4-20 Regional Arterial Alternative-64<sup>th</sup> Parkway Access*

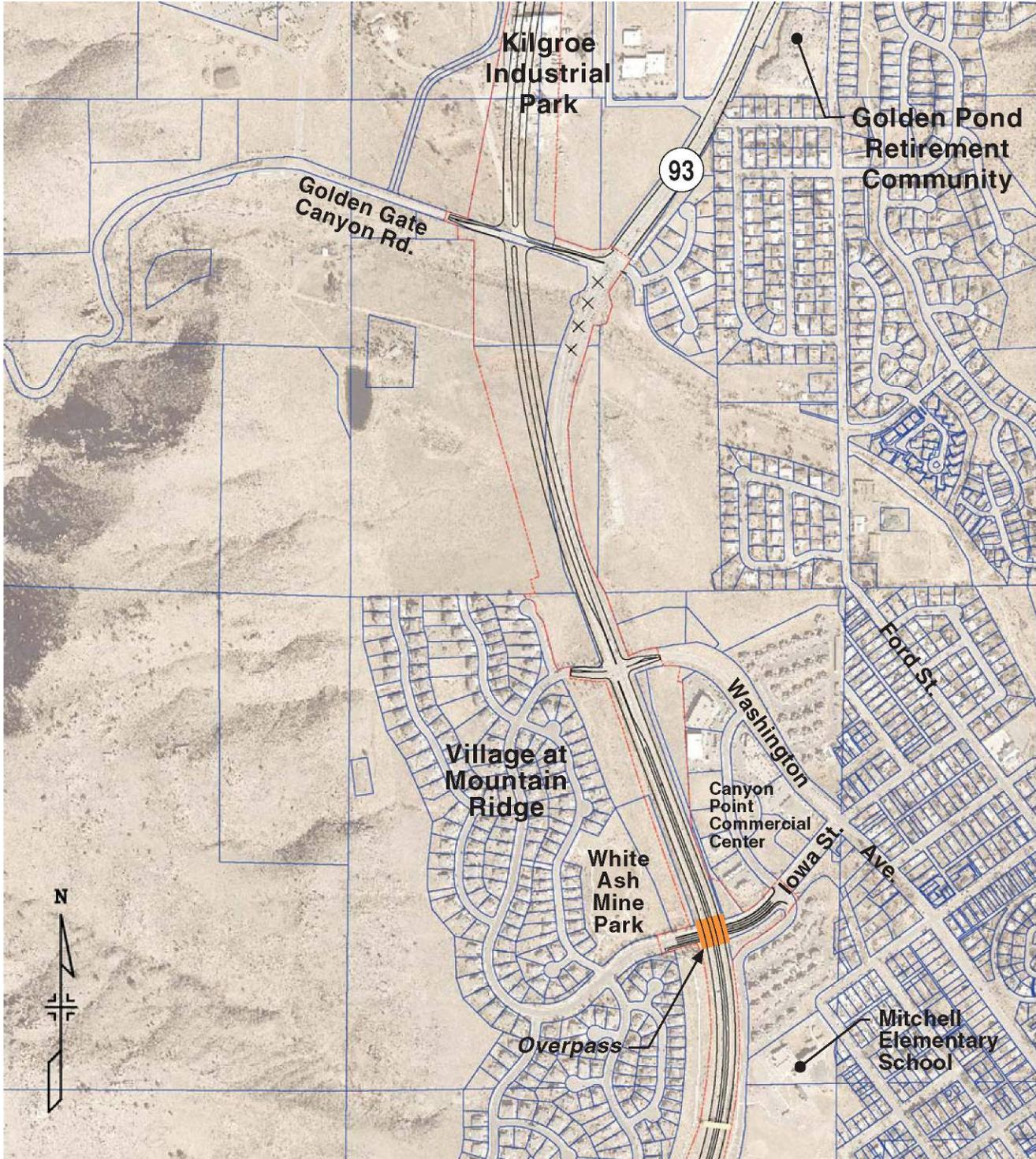


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-21 Regional Arterial Alternative—Access to Washington Avenue and Iowa Street from Golden Gate Canyon Road*

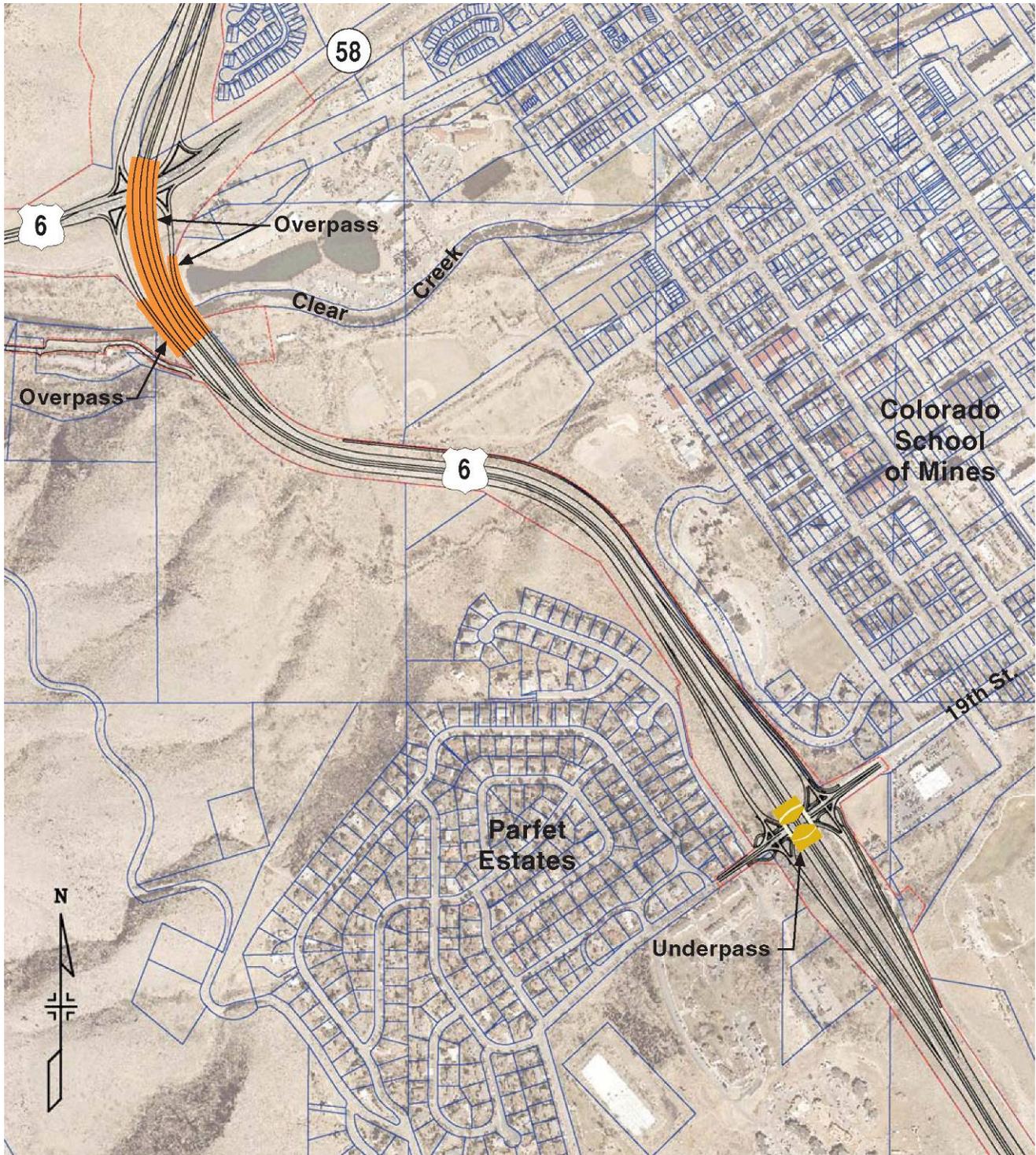


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-22 Regional Arterial Alternative—US 6/SH 58 and 19<sup>th</sup> Street Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-23 Regional Arterial Alternative—Heritage Road/Jefferson County Parkway Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



### 2.4.5 COMBINED ALTERNATIVE (ALTERNATIVE TB/RB & PC)

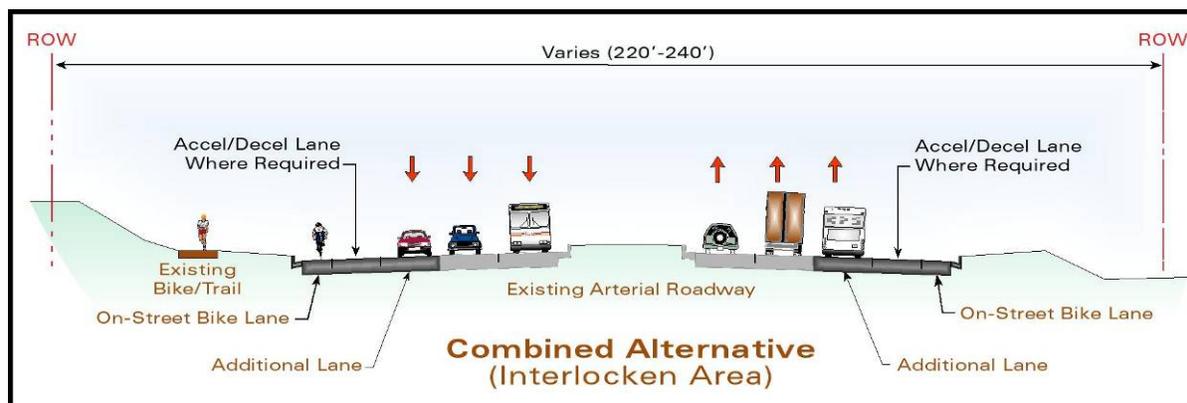
The Combined Alternative is a merged and packaged alternative bringing together three different roadway classifications: tollway, major regional arterial, and principal arterial. From the Northwest Parkway to SH 128, the facility is classified as a major regional arterial. From SH 128 to just south of 64<sup>th</sup> Parkway, the facility is classified as a tollway. From this point south to C-470, the facility is again classified as a major regional arterial. The total length of this alignment is 20.1 miles. This alignment is packaged with a 7.5 mile principal arterial alignment on Indiana Street and McIntyre Street.

The alignment between Northwest Parkway and C-470 is a mixture of a high-speed tollway facility (55–65 mph posted speed) that is fully access controlled with the use of interchanges and a lower-speed major regional arterial facility (45–55 mph posted speed) that is access controlled with the use of interchanges and intersections. Spacing between interchanges is generally one mile or greater. The Indiana Street/McIntyre Street alignment is a principal arterial that is a lower-speed facility (40–50 mph posted speed) and is access controlled with the use of intersections and driveways (see **Figure 2.4-24**). The alignment between Northwest Parkway and C-470 consists of four to six through lanes with an overall width ranging from 122 feet to 144 feet as measured from edge of outside shoulder to edge of outside shoulder. On the Indiana Street/McIntyre Street alignment, the roadway width varies from 109 feet to 145 feet as measured from edge of sidewalk to edge of sidewalk. Retaining walls will minimize impacts to properties adjacent to the roadway. The majority of these walls will be located in constrained areas and will generally vary in height from 10 feet to 30 feet. A regional bike trail will be provided along the alignment of the Combined Alternative. Existing and proposed bike/pedestrian trails will provide continuity of the study area’s trail system. The total probable cost to implement this alternative, including both construction and right-of-way costs, is \$922 million in 2005 dollars.

#### NORTHERN PORTION

The northern portion of the Regional Arterial alignment begins at the intersection of Northwest Parkway and 96<sup>th</sup> Street and follows the existing alignment of 96<sup>th</sup> Street and Interlocken Loop to SH 128. Improvements to both 96<sup>th</sup> Street and Interlocken Loop will include widening to six through lanes and adding on-street bike lanes in each direction. Existing access to and from US 36 and commercial and residential areas, including the Flatiron Crossing Mall, along this portion of the alignment will be maintained much as it is today (see **Figure 2.4-25**). At the SH 128 interchange, the major regional arterial will transition to a tollway. Southbound travelers will be required to pay tolls after they pass through this interchange (see **Figure 2.4-26**).

The northern portion consists of curb and gutter and three 11-foot through lanes in each direction, no inside shoulders, 10-foot outside shoulders, 6-foot on-street bike lanes, and a 28-foot raised landscaped median. This is consistent with the typical roadway configuration of the Northwest Parkway for at-grade facilities.

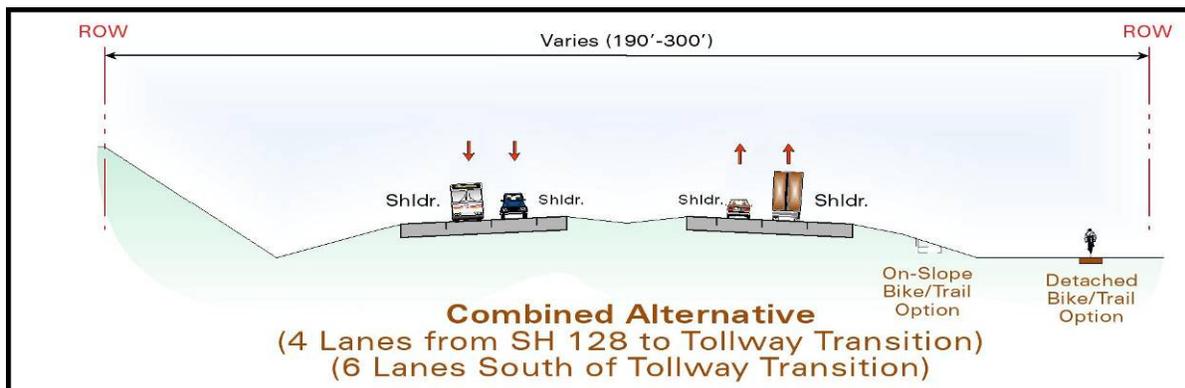




### CENTRAL PORTION

The central portion begins just south of the SH 128 interchange and follows an alignment south to Golden Gate Canyon Road in Golden. This portion is primarily located in relatively undeveloped rural areas. From the SH 128 interchange, the alignment heads southwest through open ground where an interchange with the future Eldorado Boulevard will be constructed near the Great Western Reservoir. This interchange will serve planned future development in the area. The alignment crosses over and parallels Indiana Street to the west along the eastern boundary of the Rocky Flats Wildlife Refuge. Local traffic on Indiana Street will continue to operate independent of the Tollway Alternative. The alignment continues south along the west side of Indiana Street past 96<sup>th</sup> Avenue and turns southwest where an interchange to connect with Indiana Street will be constructed. This interchange will provide access to Indiana Street and the Cimarron Park/Vauxmont future developments to the north (see **Figure 2.4-27**). The alignment continues southwest through undeveloped land to SH 72 where a new interchange will be constructed. Planned future development in this area will be served by this interchange. The new alignment will bridge across Leyden Road and interchange with SH 93. This interchange will provide access to Boulder from SH 93 to the north. From this interchange to the south, SH 93 will remain uninterrupted by the tollway lanes. The tollway alignment parallels SH 93 on the west to the 64<sup>th</sup> Parkway interchange that will serve as a connection to community facilities within the area such as the Jefferson County North Athletic Complex (see **Figure 2.4-28**). Just south of this interchange, the tollway transitions to a major regional arterial and follows the alignment of SH 93. From the north, SH 93 merges onto the Combined Alternative alignment where it transitions to a major regional arterial. Continuing south, the alignment remains on existing SH 93 to just past the location of the historic Ramstetter Ranch. At this point, the Regional Arterial Alternative follows along a new alignment west of the Kilgroe industrial park. Existing SH 93 will connect to the regional arterial to the east of the alignment by way of a new intersection, providing local access as it does today. The new roadway rejoins existing SH 93 near the new Golden Gate Canyon Road intersection. The Golden Gate Canyon Road intersection will serve as access to existing SH 93 to the east and continue to provide access to existing properties to the west.

The tollway alignment from SH 128 to the transition contains four lanes with 12-foot through lanes, 8 foot inside shoulders, 12-foot outside shoulders, and a 56-foot depressed grass median. Adequate median width is provided in order to ensure that future transportation improvements are not precluded. The major regional arterial alignment from the transition to Golden Gate Canyon Road has a six lane section with 12-foot through lanes, 10-foot inside shoulders, 12-foot outside shoulders, and a 28-foot depressed grass median.



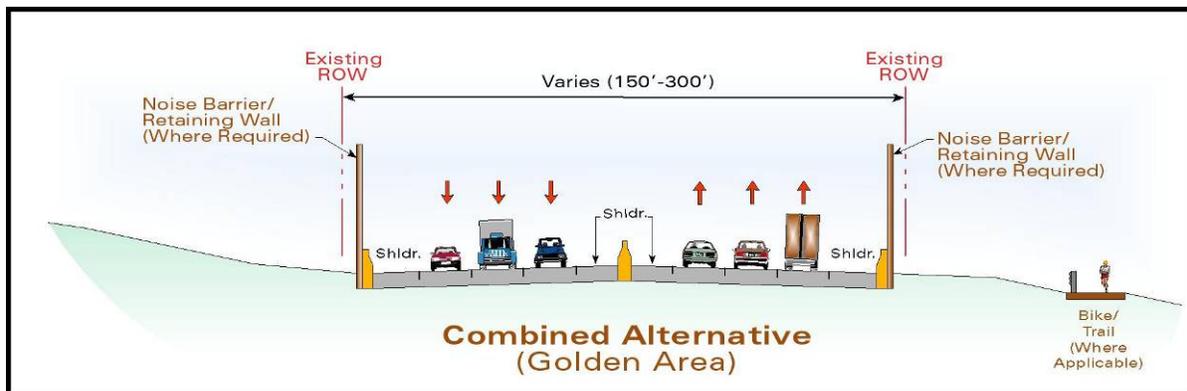
### SOUTHERN PORTION

The southern portion begins at the Golden Gate Canyon Road intersection and follows an alignment south to the connection at C-470. Residential and commercial developments in the Golden area occupy the majority of this portion. South from Golden Gate Canyon Road, the Regional Arterial Alternative will be constructed on the existing SH 93 alignment and includes an improved intersection at Washington Avenue and an overpass at Iowa Street. There will be no direct access to the arterial roadway from Iowa Street. The Canyon



Point Commercial Center, Mitchell Elementary School, and local communities, such as the Village at Mountain Ridge, will remain accessible from the Washington Avenue intersection (see **Figure 2.4-29**). Continuing south, the new US 6/SH 58 interchange will provide a regional connection to westbound US 6 to the west and SH 58 to the east. Westbound US 6 will provide access through Clear Creek Canyon to Blackhawk and Central City and SH 58 will provide access to downtown Golden and I-70. Local access to the Canyonside Condominiums on the west side of US 6 will be provided through this interchange. Residents will use the US 6/SH 58 interchange to connect to a new access road located to the west that will cross over Clear Creek providing access to the complex. The alignment follows existing US 6 south to 19<sup>th</sup> Street where a new interchange will provide access to local communities as well as the Colorado School of Mines (see **Figure 2.4-30**). Passing Fossil Trace Golf Course, southbound travelers approach the Heritage Road/Jefferson County Parkway interchange which will provide access to the Jefferson County Government Center on the east and local businesses on the west. Regional traffic will connect to C-470 utilizing the existing ramps that connect to US 6 (see **Figure 2.4-31**).

The southern portion has six 12-foot through lanes, 12-foot inside shoulders, 12-foot outside shoulders, and a 2-foot wide median barrier. Auxiliary lanes will be constructed between the 19<sup>th</sup> Street interchange and Heritage Road interchange and between the Heritage Road interchange and the C-470 ramps in order to improve traffic flow. The interchanges at 19<sup>th</sup> Street and Heritage Road both direct the regional arterial mainline under the cross street allowing the cross streets to remain at their current grade (see **Figure 2.3-5**).

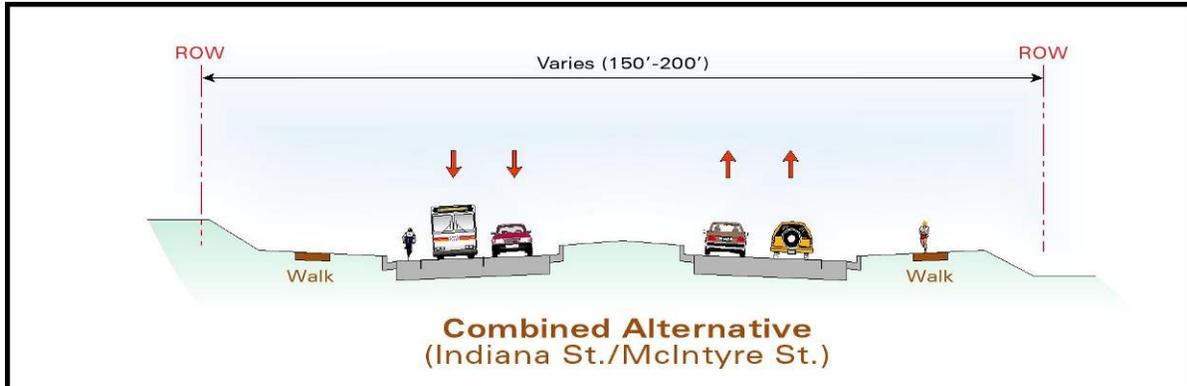


### INDIANA STREET/MCINTYRE STREET PORTION

This portion begins at the Indiana Street Connection interchange and follows Indiana Street and McIntyre Street south to SH 58. This alignment runs through mostly residential and commercial developments in Arvada. Both Indiana Street and McIntyre Street will be widened to four through lanes along the entire length of this alignment. The Indiana Street Connection interchange provides access to and from northbound and southbound Indiana Street. The Indiana Street Connection turns to the south from the tollway alignment and follows Indiana Street. Traveling south on Indiana Street, all existing access points will be maintained. A new overpass structure of the Union Pacific Railroad will be constructed just south of the intersection of Indiana Street and SH 72. An alignment shift west begins just south of Leyden Road to avoid the historic Pearce Grocery store. The alignment shifts back to existing Indiana Street at West 76<sup>th</sup> Drive. Further south the alignment shifts slightly to the east to avoid the Croke Canal. Just past West 68<sup>th</sup> Avenue, the alignment turns to the west and then back to the south to the West 64<sup>th</sup> Avenue/McIntyre Parkway intersection. This is a full movement intersection that is located at the existing intersection of Kendrick Drive and West 64<sup>th</sup> Avenue. The alignment follows McIntyre Parkway which becomes McIntyre Street (see **Figure 2.4-32**). The alignment continues south on McIntyre Street maintaining all access points to SH 58. A slight shift of the alignment to the east is made to avoid the historical site located at the northwest corner of McIntyre Street and 50<sup>th</sup> Avenue. The interchange at SH 58 will be improved to accommodate the additional lanes on McIntyre Street.



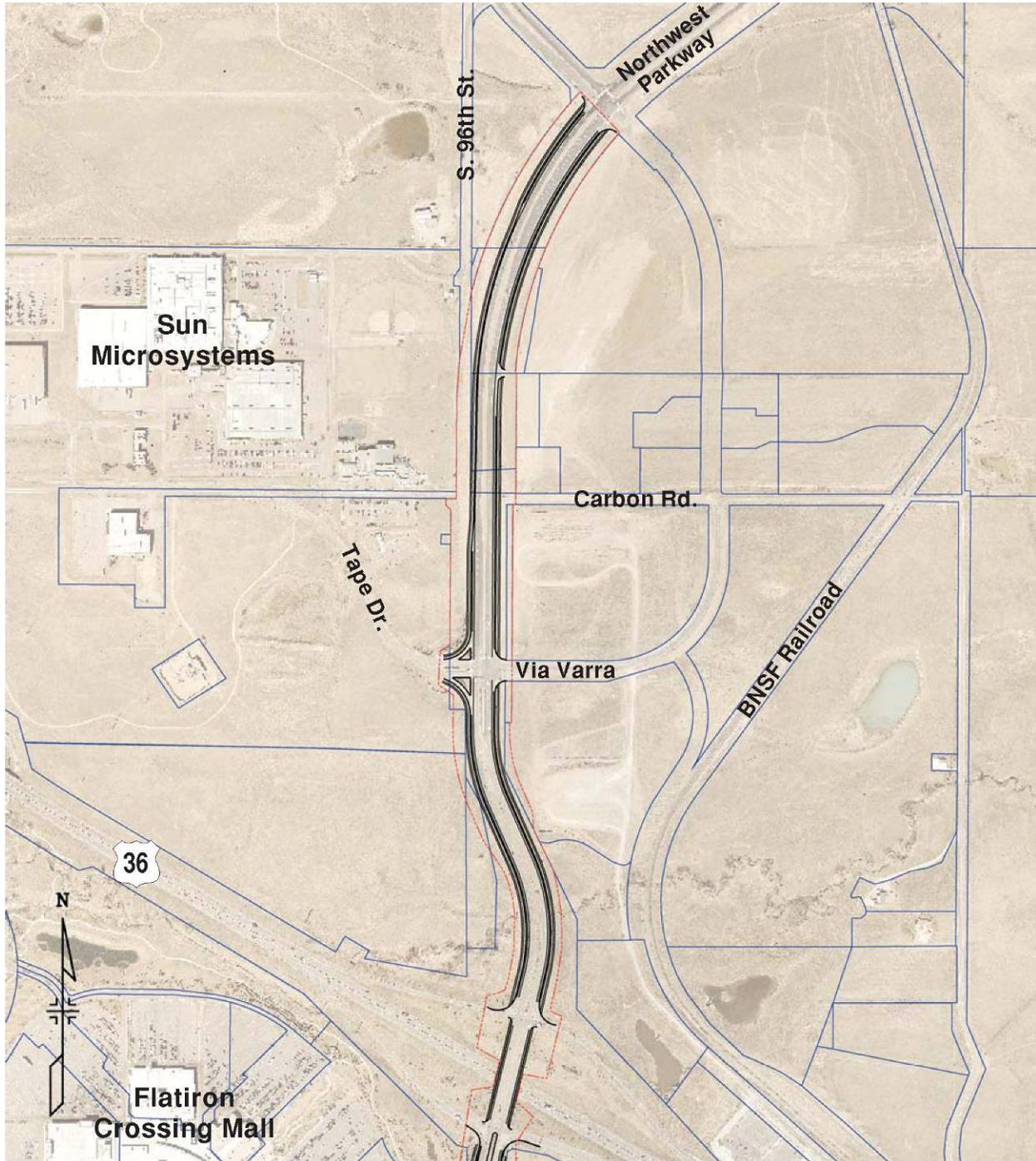
The Indiana Street/McIntyre Street portion has four 11 foot through lanes, two five foot bike lanes, two 6.5 foot detached sidewalks and a 17-28 foot raised median.







*Figure 2.4-25 Combined Alternative—Access to Interlocken from Northwest Parkway*

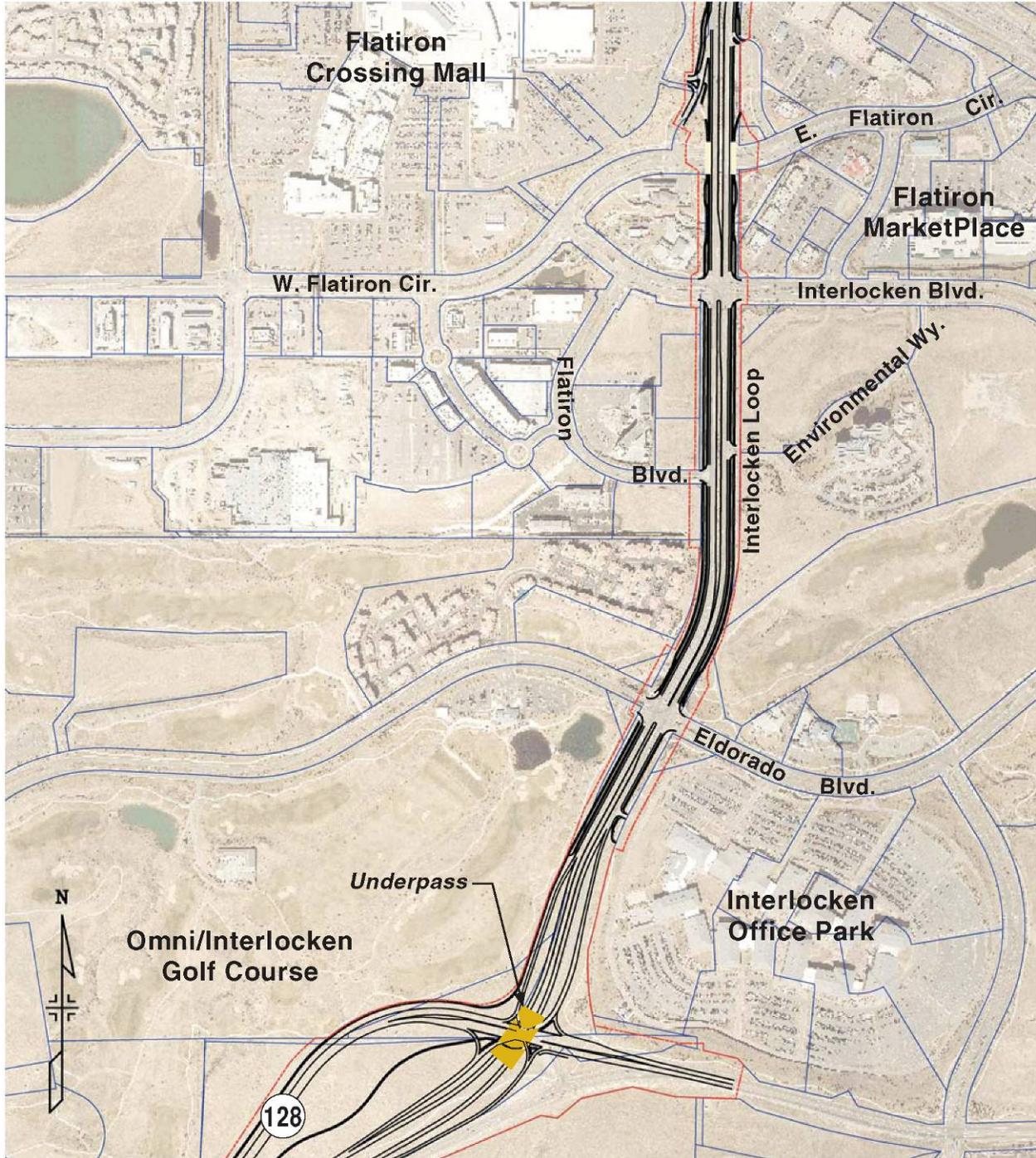


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ulevig, 2006.

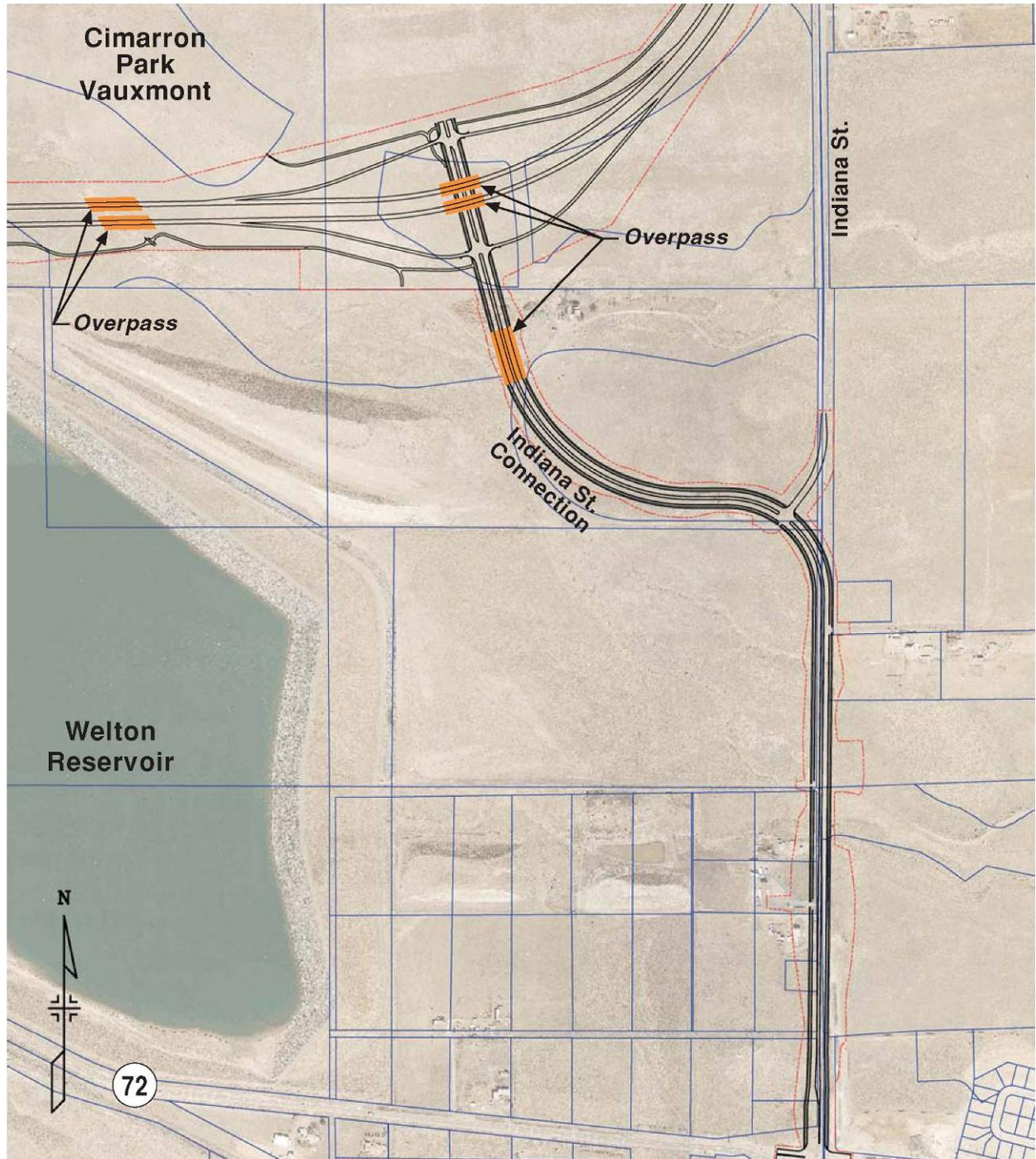


*Figure 2.4-26 Combined Alternative—Access to Interlocken from SH 128*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



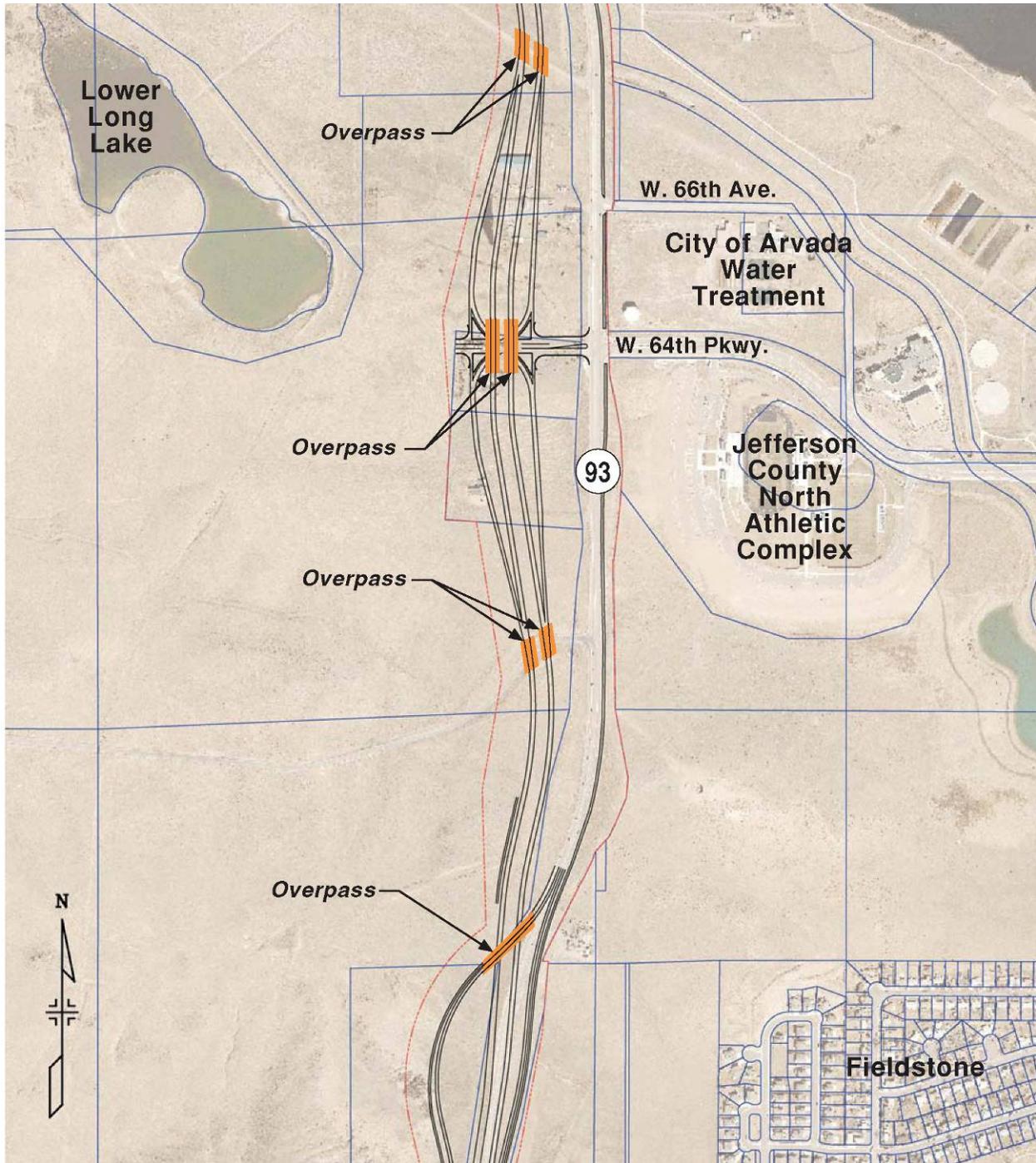
*Figure 2.4-27 Combined Alternative–Indiana Street Access*

Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-28 Combined Alternative–64<sup>th</sup> Parkway Access*

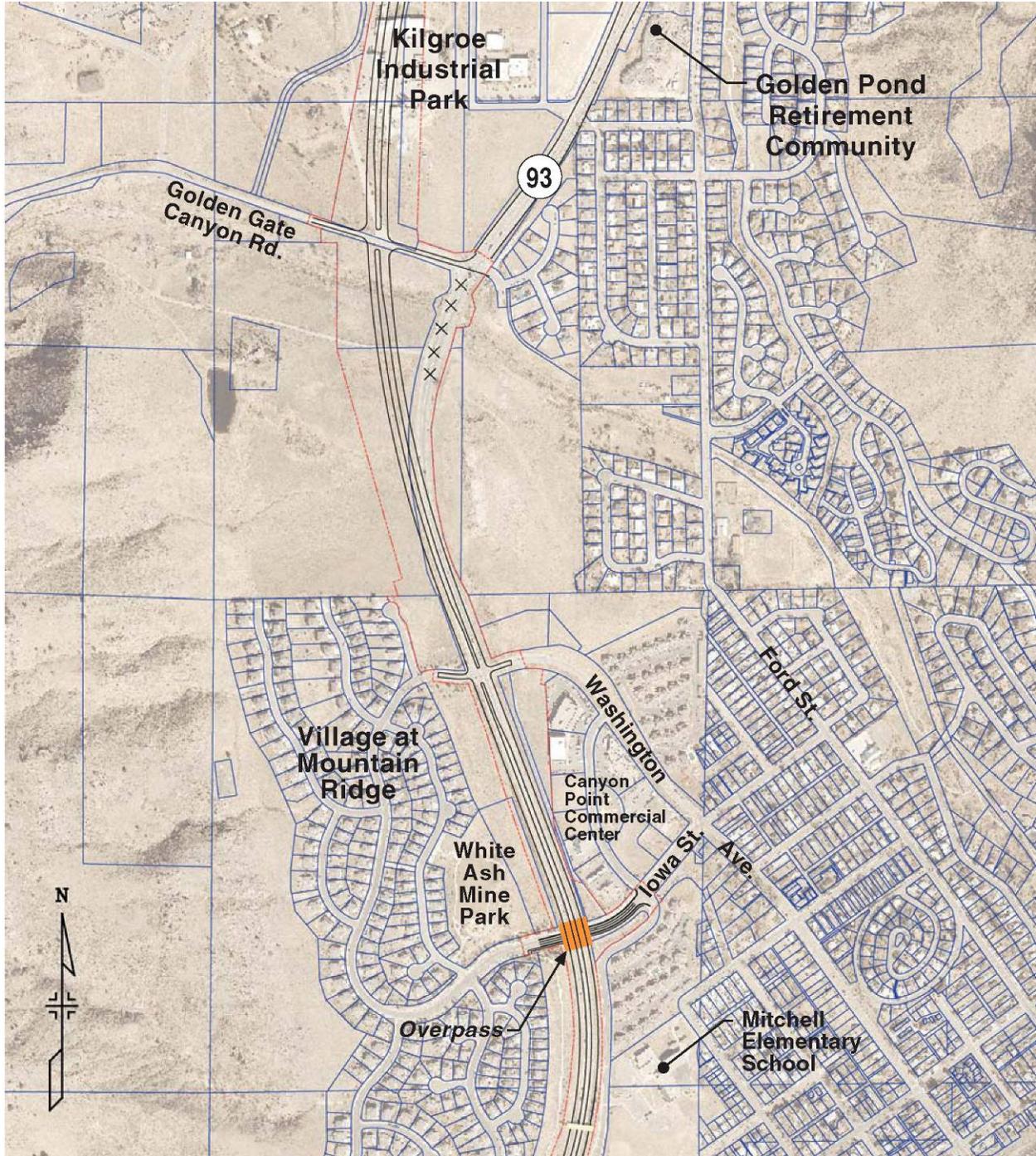


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ulevig, 2006.



*Figure 2.4-29 Combined Alternative— Access to Washington Avenue and Iowa Street from Golden Gate Canyon Road*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ulevig, 2006.



*Figure 2.4-30 Combined Alternative—US 6/SH 58 and 19<sup>th</sup> Street Access*

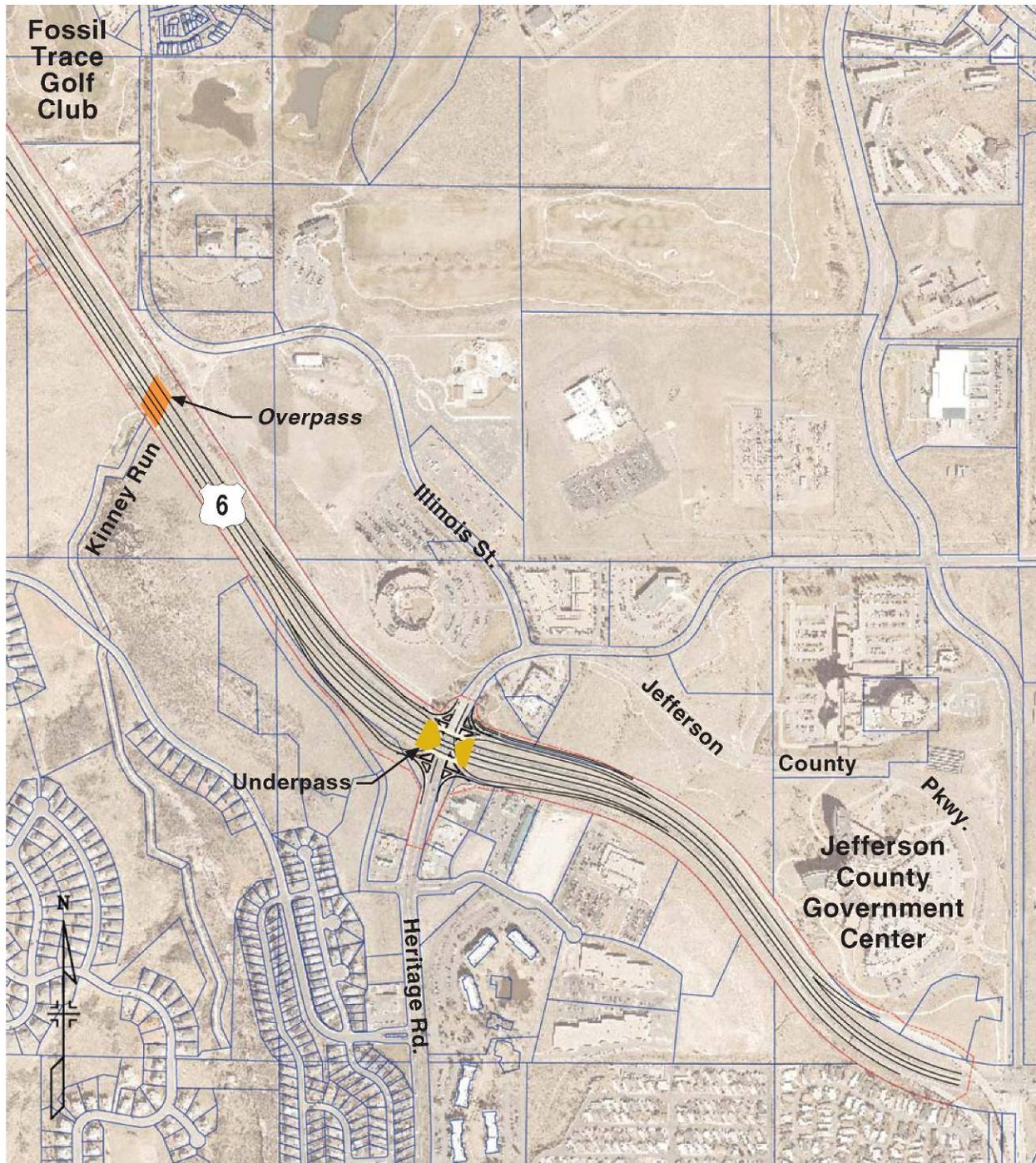


Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-31 Combined Alternative—Heritage Road/Jefferson County Parkway Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



*Figure 2.4-32 Combined Alternative—Indiana Street/McIntyre Street Access*



Note: Red lines represent alternative right-of-way.

Source: Felsburg Holt and Ullevig, 2006.



## 2.5 FINANCIAL CONSIDERATIONS

CDOT does not currently have the funding resources to implement all of the improvements needed on the state’s roadway system as defined in the 2030 Statewide Transportation Plan (CDOT, 2005). The State has developed a process to prioritize the funding of statewide transportation improvements for inclusion in the Fiscally Constrained DRCOG 2030 RTP. The No Action Alternative incorporates the improvements defined in the Fiscally Constrained DRCOG 2030 RTP into the current roadway network within the study area. The Northwest Corridor project is in the DRCOG 2030 Metro Vision RTP, but is not currently in the Fiscally Constrained DRCOG 2030 RTP.

### 2.5.1 PROBABLE COSTS OF BUILD ALTERNATIVES

The probable costs for the build alternatives range between \$672 million and \$1,176 million (2005 dollars). The Regional Arterial Alternative is the least expensive, followed by the Combined Alternative, the Freeway Alternative, and the Tollway Alternative. The probable construction costs, right-of-way costs, and total costs for each build alternative have been summarized for comparison purposes (see **Table 2.5-1**).

*Table 2.5-1 Probable Costs for Construction and ROW Revenues (2005 dollars) for the Build Alternatives*

Alternative	Construction Cost	ROW Cost	Total Cost
Freeway Alternative	\$1,095 million (\$1.095 billion)	\$62 million (\$0.062 billion)	<b>\$1,157 million</b> <b>(\$1.157 billion)</b>
Tollway Alternative	\$1,104 million (\$1.104 billion)	\$72 million (\$0.072 billion)	<b>\$1,176 million</b> <b>(\$1.176 billion)</b>
Regional Arterial Alternative	\$617 million (\$0.617 billion)	\$55 million (\$0.055 billion)	<b>\$672 million</b> <b>(\$0.672 billion)</b>
Combined Alternative (Recommended Alternative)	\$827 million (\$0.827 billion)	\$95 million (\$0.095 billion)	<b>\$922 million</b> <b>(\$0.922 billion)</b>

### 2.5.2 FACILITY MAINTENANCE COSTS

All of the build alternatives will require ongoing maintenance in order to provide a safe and reliable facility. The magnitude of maintenance operations will increase as the facility matures, resulting in higher costs per year. Shortly after construction, the average annual maintenance costs are estimated to range from \$125,000 to \$175,000 per mile. As the road matures, the annual maintenance costs will be substantially higher ranging from \$350,000 to \$475,000 per mile. This cost range is similar for the functional classifications of all build alternatives. These future costs are substantial and impose a burden on CDOT budgets. Revenue from tolls can be used to fund facility maintenance for the tolled alternatives, but other funding sources would be required for alternatives without tolling.

### 2.5.3 TOLLING REVENUE

Tolling revenues can be used to fund the operations and maintenance costs of a roadway, cover the costs of toll collection and administration, and service the bond debt. The tolling revenues and the operation and maintenance costs have been estimated for a 35-year period. The two tolled alternatives have different tolled lengths and will therefore produce different tolling revenue. The Tollway Alternative is approximately 20 miles long and is anticipated to produce as much as \$25 million of revenue during its first year of operation. The Combined Alternative includes a tolled portion that is approximately 11 miles long and is anticipated to produce over \$9 million of revenue during that same year.



The magnitude of revenues from either of the tolled alternatives will cover the cost of debt service, tolling operations, and roadway maintenance. The revenues will grow each year as bond debt is retired and traffic volume increases on the tolled facility. The bond proceeds available (depending on the source of maintenance funding) for construction range from \$390 million to \$510 million for the Tollway Alternative and \$135 million to \$230 million for the tolled portion of the Combined Alternative (see **Table 2.5-2**).

**Table 2.5-2 Alternatives Probable Remaining Costs after Bond Allocations**

Alternative	Total Cost	Projected Bond Proceeds Available for Construction	Probable Remaining Costs
Freeway Alternative	\$1,157 million (\$1.157 billion)	\$0	<b>\$1,157 million</b> <b>(\$1.157 billion)</b>
Tollway Alternative	\$1,176 million (\$1.176 billion)	\$390–510 million* (\$0.390–0.510 billion)	<b>\$666–786 million</b> <b>(\$0.666–0.786 billion)</b>
Regional Arterial Alternative	\$672 million (\$0.672 billion)	\$0	<b>\$672 million</b> <b>(\$0.672 billion)</b>
Combined Alternative (Recommended Alternative)	\$922 million (\$0.922 billion)	\$135–230 million* (\$0.135–0.230 billion)	<b>\$692–787 million</b> <b>(\$0.692–0.787 billion)</b>

Note: \*Projected Bond Proceeds discounted to 2005 dollars.

## **2.6 COMPARISON OF ALTERNATIVES AND IDENTIFICATION OF A RECOMMENDED ALTERNATIVE**

All four of the final build alternatives meet the project purpose and need. A brief discussion of the transportation performance, environmental impacts, and constructability for each alternative is provided in the following section. Community acceptance and the ability to gain project funding are examples of constructability factors that are considered throughout the study. A recommended alternative is identified as the alternative that provides the optimal balance of all these measures.

The Freeway Alternative has a direct connection from the Northwest Parkway to C-470. The functionality of this alternative is enhanced by its controlled access. This will attract more vehicle trips per day than the other build alternatives and provide safer driving conditions. This alternative would reduce the number of highly congested LOS F intersections by eight over the future no action conditions. This alternative would also improve the movement of vehicles between neighborhoods and transit stations because of its higher speeds. The environmental impacts resulting from this alternative are of a similar magnitude to those of other alternatives, but it has large noise and visual impacts. The cost of this alternative is estimated to be \$1,157 million and there is little potential for additional funding other than federal and state funds. The elevated sections of this alternative in the Interlocken area would be difficult to construct and would result in more temporary impacts to local economic centers during construction. It also does not provide as direct an access to the Interlocken economic centers because of this elevated configuration. This alternative does not perform as well as others with respect to community acceptance because of cost, noise, local impacts and because it does not provide improvements along the Indiana Street/McIntyre Street alignment.

The Tollway Alternative has a direct connection from the Northwest Parkway to C-470. The functionality and safety of this alternative are enhanced by its controlled access, but it would attract less vehicle trips per day than the other build alternatives because of tolling. This alternative would reduce the number of highly congested LOS F intersections by four over the future no action conditions. It would also improve the movement of vehicles between neighborhoods and transit stations because of its high speeds and lack of congestion, but would be used by fewer travelers because of tolling. The environmental impacts resulting from this alternative are of a similar magnitude to those of other alternatives, except that its extra lanes in



Golden and elevated sections in Interlocken create visual intrusions to local residents. The cost of this alternative is estimated to be \$1,176 million and would be partially funded by tolls. The elevated sections of this alternative and the need to construct tolled lanes adjacent to existing US 6 and SH 93 would result in difficult construction conditions and temporary impacts to local economic centers and residential neighborhoods. It also does not provide as direct an access to the Interlocken economic centers because of this elevated configuration. The visual intrusions, local impacts, lack of community acceptance to tolling, and lack of improvements along the Indiana Street/McIntyre Street alignment reduce the preference for this alternative.

The Regional Arterial Alternative has a less-direct connection from the Northwest Parkway to C-470 than the other alternatives because of out-of-direction travel along SH 72. The functionality of this alternative is reduced by the number of signalized intersections and slower speeds. The potential accident rate for this alternative would be greater than that for other alternatives because of numerous intersections along the alignment. This alternative would reduce the number of highly congested LOS F intersections by four over the future no action conditions, but would be used by a lower volume of inter-regional and regional travelers than the other alternatives because of its lower functional classification and out-of-direction travel. This alternative would also improve the movement of vehicles between remote neighborhoods and transit stations but to a lesser extent than the other alternatives because of its lower speeds, indirect route, and greater number of intersections. The environmental impacts associated with this alternative are of a lesser magnitude than those of the other alternatives except for impacts to wetlands and water quality. The cost of this alternative is estimated to be \$672 million, and there is little potential for additional funding besides federal and state funds. The reduced ability of this alternative to accommodate inter-regional and regional trips, its impacts to the aquatic environment, and lack of improvements along the Indiana Street/McIntyre Street alignment reduces its desirability.

The Combined Alternative has a direct connection from the Northwest Parkway to C-470 and an additional connection to SH 58. This is the only alternative that provides improvements along Indiana Street/McIntyre Street. The functionality of this alternative is enhanced by its two alignments. The safety characteristics of this alternative are enhanced in the tolled section where access is controlled. This alternative would reduce the number of highly congested LOS F intersections by eight over the future no action conditions and would accommodate a high volume of inter-regional and regional trips. This alternative would also improve the movement of vehicles between neighborhoods and transit stations because of the two improved alignments. The environmental impacts associated with this alternative are of a higher magnitude to those of other alternatives because of its greater length. This additional length results in more residential and business displacements. The cost of this alternative is estimated to be \$922 million, \$107 million of which is for improvements to the Indiana Street/McIntyre Street alignment. There would be a source of funding from tolling and the potential for local-agency funding because a portion of the alignment is off the state highway system. Public acceptance of this alternative would be enhanced by its improved access to local economic centers, lower speeds in developed areas, consistency with local and regional transportation and land-use plans, and the potential to incorporate context-sensitive design elements along Indiana Street/McIntyre Street. This is the only alternative that improves access and traffic flow to commercial developments located near the intersection of 64<sup>th</sup> Avenue and Indiana Street/McIntyre Street (see **Figure 4.4-3**). This alternative best balances environmental impacts with transportation benefits and constructability considerations.

**The Combined Alternative has been identified as the recommended alternative.** It best satisfies the need for improved access and mobility to the community/economic activity centers of the local area. It best fits the context of its location (regional arterial or principal arterial) through populated areas and conforms well to local and regional transportation and land-use plans. It provides improvements across the entire study area and distributes the burden of future traffic increases between the SH 93 and Indiana Street/McIntyre Street corridors. The lower-speed facilities of the Combined Alternative reduce traffic noise and provide more opportunities for context-sensitive design elements. The following discussion compares the major advantages and disadvantages of the final alternatives considered by FHWA and CDOT.



The Freeway Alternative and Combined Alternative satisfy the project's purpose and need. The estimated cost of the Freeway Alternative is \$1,157 million with no identified funding source. The estimated cost of the Combined Alternative is \$922 million with potential funding from tolling and local agency participation. The difference in cost between these two alternatives is between \$370 and \$465 million after including funding from tolling. This difference in project cost is unacceptably high (see **Table 2.5-2**). In addition, some important community impacts, such as noise and local access, are better addressed by the Combined Alternative. The addition of the principal arterial alignment of the Combined Alternative provides more transportation benefits to the entire study area than the Freeway Alternative because it improves capacity along two alignments.

The project cost for the Tollway Alternative is similar to that of the Combined Alternative after including funding from tolling. The Tollway Alternative would also require an additional cost of approximately \$400 million in modifications to avoid Section 4(f) properties in Golden. This additional cost to the project was determined to not be prudent or feasible and thus was unacceptable to CDOT. Additionally, community comments regarding the acceptability of the Tollway Alternative were generally unfavorable because it would require eight lanes in Golden to maintain the existing lanes with additional tolled lanes. This would be a substantial increase in the alignment's footprint over the existing condition. The addition of the principal arterial alignment of the Combined Alternative provides more transportation benefits to the entire study area than the Tollway Alternative because it improves capacity along two alignments. The Combined Alternative also does not have the same community concerns because it best fits the context of its location through populated areas and does not create as much disturbance to the communities.

Although the Regional Arterial Alternative satisfies the purpose and need, it does not do so as well as the Combined Alternative. The project cost for the Regional Arterial Alternative is similar to that of the Combined Alternative after including funding from tolling and may be greater after including funding from local agencies. The Regional Arterial Alternative performs worse with more LOS F intersections (11) than the Combined Alternative (7). Additionally, the Combined Alternative carries 7,600 more inter-regional and regional trips per day than the Regional Arterial Alternative across the northern portion of the study area and 9,400 more inter-regional and regional trips per day across the southern portion. The Regional Arterial Alternative requires out-of-direction travel along SH 72, and has greater impact on wetlands than the Combined Alternative. The addition of the principal arterial alignment of the Combined Alternative provides more transportation benefits to the entire study area than the Regional Arterial Alternative because it improves capacity along two alignments. Additionally, the Combined Alternative is consistent with local and regional transportation plans.

The Combined Alternative best meets the purpose and need considering system connectivity and functionality, future travel demand and capacity, travel reliability and modal interrelationships. This alternative balances these transportation benefits with environmental impacts better than the other alternatives. The alternative has multiple potential sources of funding including toll revenues and local agency participation. The alternative is affordable, and can be funded over an acceptable period of time. Access to commercial centers in the northern, central and southern portions would be enhanced by this alternative and it would contribute to the economic growth of Jefferson and Broomfield counties. Public acceptability of this alternative is enhanced by its ability to distribute future traffic growth, its slower speeds in developed areas, its consistency with local and regional transportation and land-use plans, and its ability to incorporate context-sensitive design elements on the Indiana Street/McIntyre Street portion.



## 2.7 COMBINED ALTERNATIVE MODIFICATIONS TO ACCOMMODATE FEATURES OF THE GOLDEN PLAN

This section summarizes supplemental efforts made during 2006 and 2007 to refine the design of the Combined Alternative, which was generated with input from local government representatives within the study area.

In early 2006, each of the build alternatives were refined to achieve complete avoidance of all Section 4(f) resources including publicly owned parks, recreational areas, wildlife refuges, and historical sites to the extent possible. Design modifications, including the addition of retaining walls, reduced the footprints of the alternatives within the City of Golden and resulted in avoidance of Section 4(f) resources. The Combined Alternative was further modified to address concerns heard from local agencies within the study area. This modified Combined Alternative was presented as the likely recommended alternative at the CCC/TSC meeting on May 1, 2006.

In late 2006, a series of letters and meetings between the City of Golden and CDOT identified differences between the modified Combined Alternative (Recommended Alternative) and the design expressed in the conceptual Golden Plan. Specific differences in design features included

- design speed
- horizontal alignment and vertical profile
- median and shoulder widths
- interchange layouts
- pedestrian facilities

In 2007, a series of meetings and workshops took place with the City of Golden in attempt to reach greater consensus on design features of the Combined Alternative (Recommended Alternative) and use of Section 4(f) property within Golden city limits. A potential de minimis use of Section 4(f) resources in Golden was requested in order to incorporate design features similar to those in the Golden Plan. As the agency with jurisdiction, Golden must concur with the de minimis determination in order for the Section 4(f) resource to be used. Possible design considerations discussed included:

- phased implementation, starting with four through lanes and adding additional lanes as necessary;
- 55 mile per hour design speed (45 mile per hour posted speed) curvilinear alignment between Heritage Road and 19th Street;
- a variable width landscaped median and split profiles for aesthetic enhancement at Golden's request;
- modification of the SH 93 profile for an underpass at Iowa Street; and
- oversized bridge structures to accommodate pedestrian movements at interchanges.

As a result of the workshops, a new concept was obtained that incorporated design features similar to those in the *Golden Plan*. A comparison of this concept with the *Golden Plan* and Combined Alternative is presented (see **Figure 2.7-1**, **Figure 2.7-2**, **Figure 2.7-3**, and **Table 2.7-1**).

The new design concept was presented by the City Engineer to the Golden City Council in August, 2007. Afterwards, the City Engineer expressed to CDOT the City Council's opinions and general belief that the proposed changes failed to include critical elements of the conceptual *Golden Plan*, thus, further discussions ended.

All collaborative efforts were discontinued and the Combined Alternative (Recommended Alternative) remained essentially the same as it was presented at the May 1, 2006 CCC/TSC meeting and was evaluated as such in this document. Concepts developed throughout the consultation process with Golden have the potential to be incorporated into future projects by CDOT or other entities.



Northwest Corridor  
A TRANSPORTATION ENVIRONMENTAL STUDY

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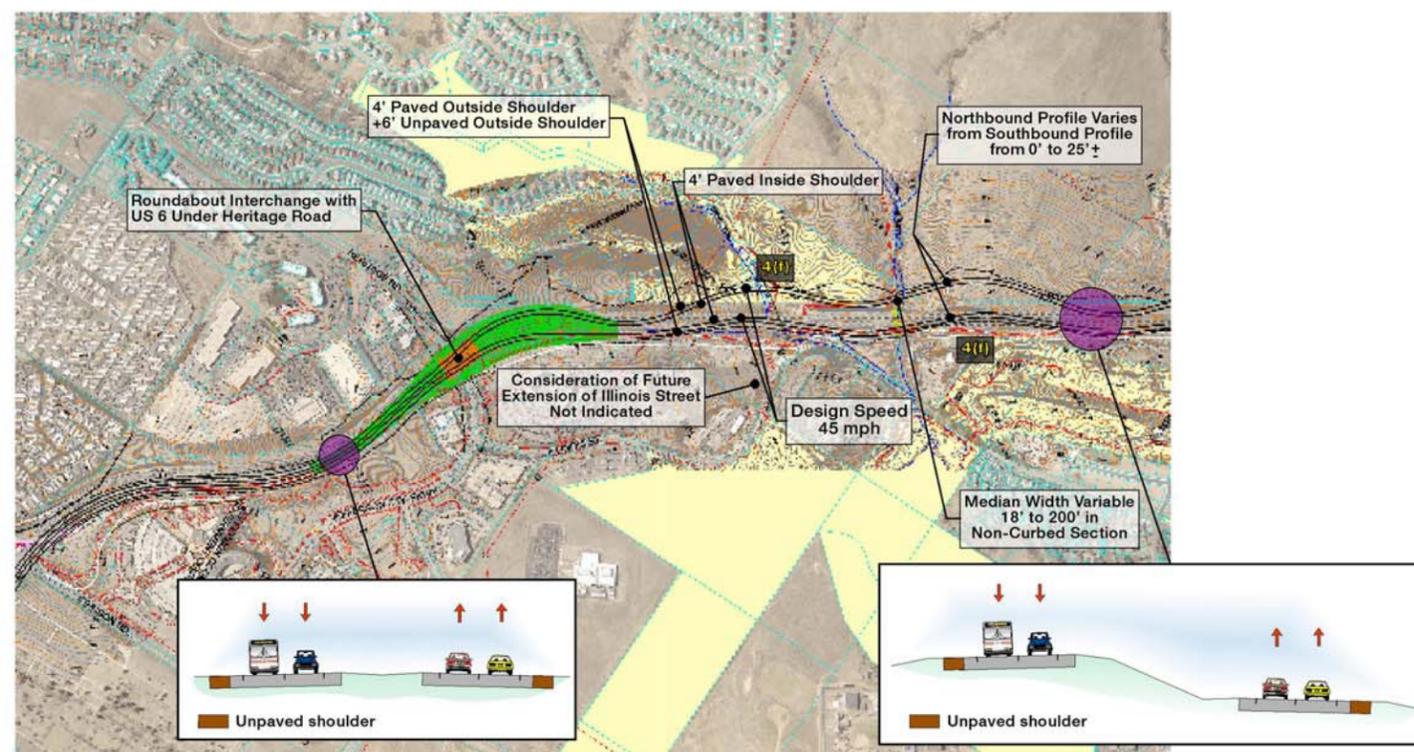
Figure 2.7-1 Alternative Comparison—C-470 to South of 19<sup>th</sup> Street

## Golden Plan

The Golden Plan was designed as an arterial roadway within the context of the Northwest Quadrant Feasibility Study to meet community goals and address community concerns within the City of Golden.

Related design features from C-470 to south of 19th Street include:

- Four through lanes (no consideration for future phasing to six through lanes)
- A curvilinear alignment with a 45 mph design speed
- A variable width landscaped median (18 feet to 200 feet)
- Independent northbound and southbound profiles
- Four foot inside shoulders
- Ten foot outside shoulders (four foot paved, six foot unpaved)
- An interchange at the current intersection of US 6 and Heritage Road. A Roundabout Interchange has been considered in the plan. Importance of pedestrian environment is emphasized in the plan

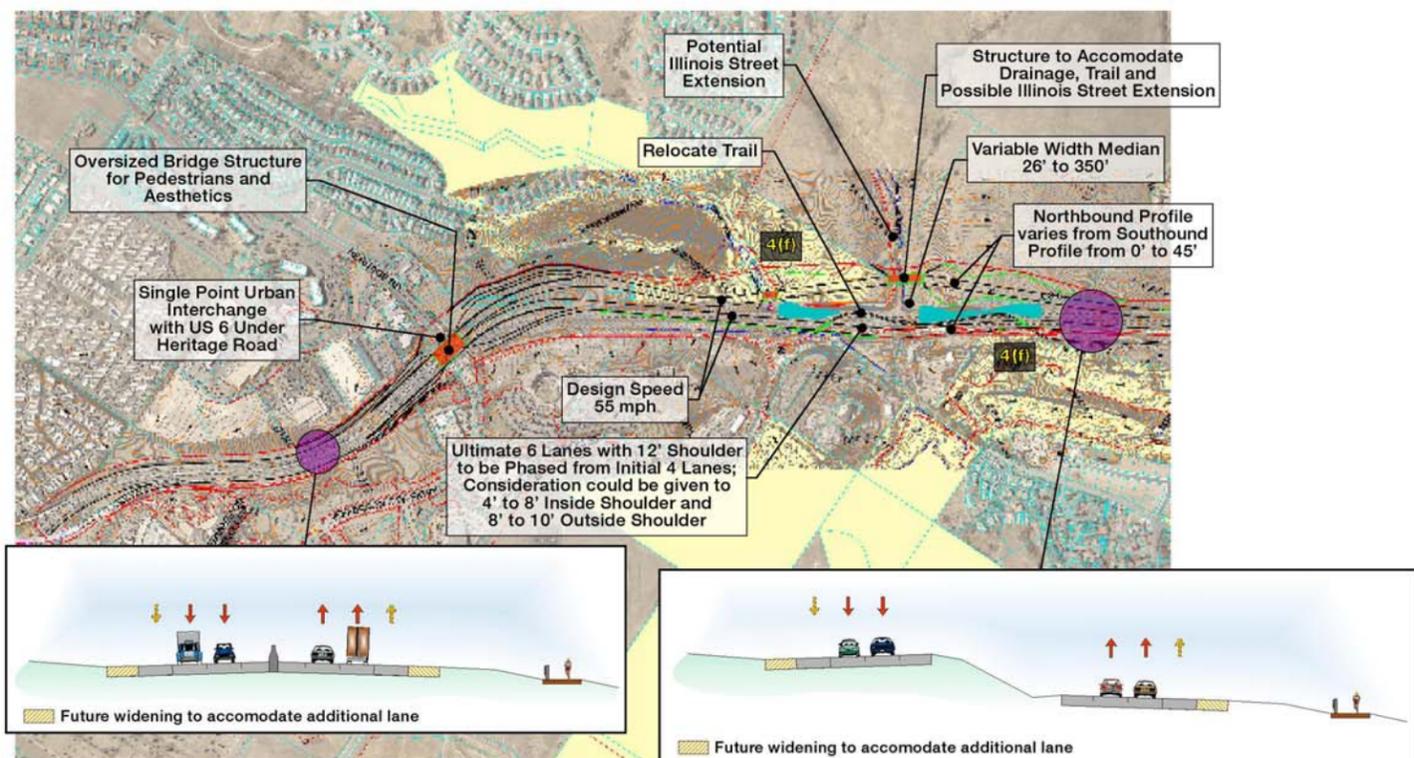


## CDOT Workshop Proposal

The Northwest Corridor Combined Alternative (Recommended Alternative) was designed as a major regional arterial through Golden within the context of the DRCOG Metro Vision Plan to accommodate inter-regional and regional movements within the northwest Denver metropolitan area.

Modifications to the Combined Alternative (Recommended Alternative) to better accommodate features of the Golden Plan include:

- Initial implementation of four through lanes with future phasing to six through lanes as traffic volumes warrant
- Implementation of a curvilinear alignment with a 55 mph design speed (55 mph used instead of 45 mph for increased mobility and safety of the inter-regional roadway system)
- Implementation of a variable width landscaped median (26 feet to 350 feet)
- Incorporation of independent northbound and southbound profiles. The profiles consider extending Illinois Street to connect the Colorado School of Mines future campus expansion with the FasTracks West Corridor station
- Consideration of reducing the inside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Consideration of reducing the outside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Incorporation of an oversized bridge structure at the Heritage Road Single Point Urban Interchange for enhanced pedestrian environment



North  Not to Scale

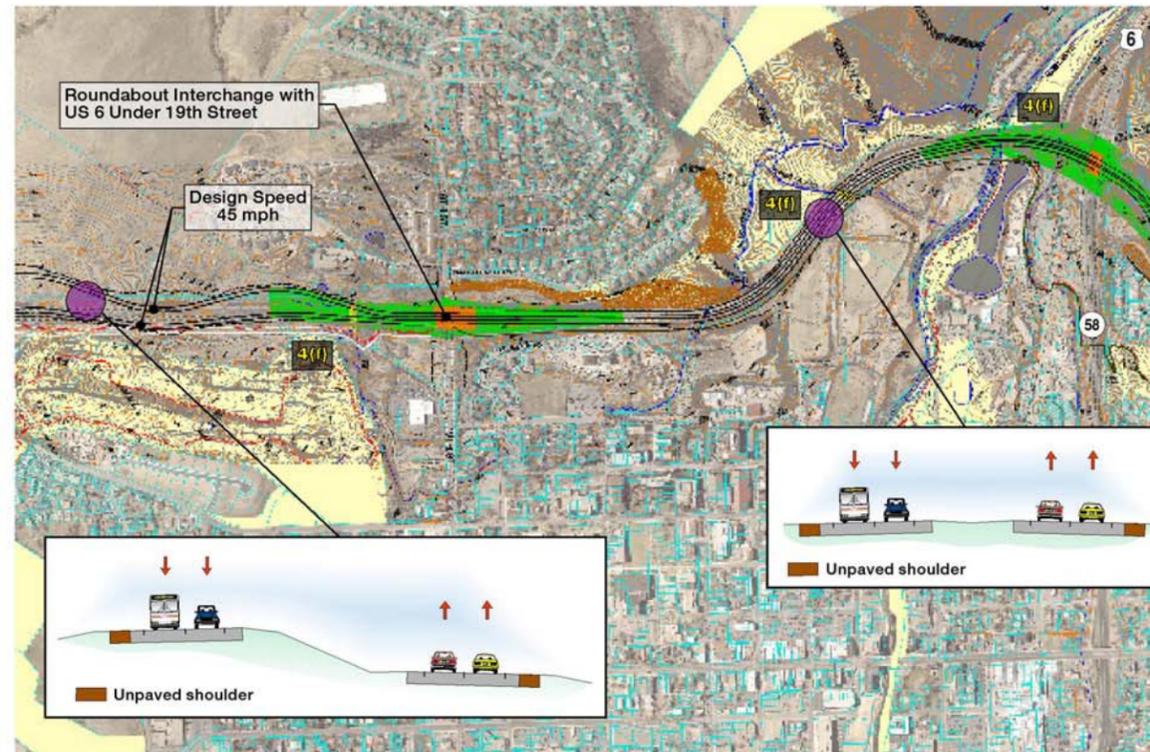
Figure 2.7-2 Alternative Comparison—South of 19<sup>th</sup> Street to North of SH 58

## Golden Plan

The Golden Plan was designed as an arterial roadway within the context of the Northwest Quadrant Feasibility Study to meet community goals and address community concerns within the City of Golden.

Related design features from south of 19th Street to north of SH 58 include:

- Four through lanes (no consideration for future phasing to six through lanes)
- A curvilinear alignment with a 45 mph design speed
- A variable width landscaped median (18 feet to 200 feet)
- Independent northbound and southbound profiles
- Four foot inside shoulders
- Ten foot outside shoulders (four foot paved, six foot unpaved)
- An interchange at the current intersection of US 6 and 19th Street. A Roundabout Interchange has been considered at this location. Importance of pedestrian environment is emphasized in the plan



## CDOT Workshop Proposal

The Northwest Corridor Combined Alternative (Recommended Alternative) was designed as a major regional arterial through Golden within the context of the DRCOG Metro Vision Plan to accommodate inter-regional and regional movements within the northwest Denver metropolitan area.

Modifications to the Combined Alternative (Recommended Alternative) to better accommodate features of the Golden Plan include:

- Initial implementation of four through lanes with future phasing to six through lanes as traffic volumes warrant.
- Implementation of a curvilinear alignment with a 55 mph design speed (55 mph used instead of 45 mph for increased mobility and safety of the inter-regional roadway system)
- Implementation of a variable width landscaped median (26 feet to 350 feet)
- Incorporation of independent northbound and southbound profiles
- Consideration of reducing the inside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Consideration of reducing the outside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Incorporation of an oversized bridge structure at the 19th Street interchange along with a tight diamond configuration for enhanced pedestrian environment

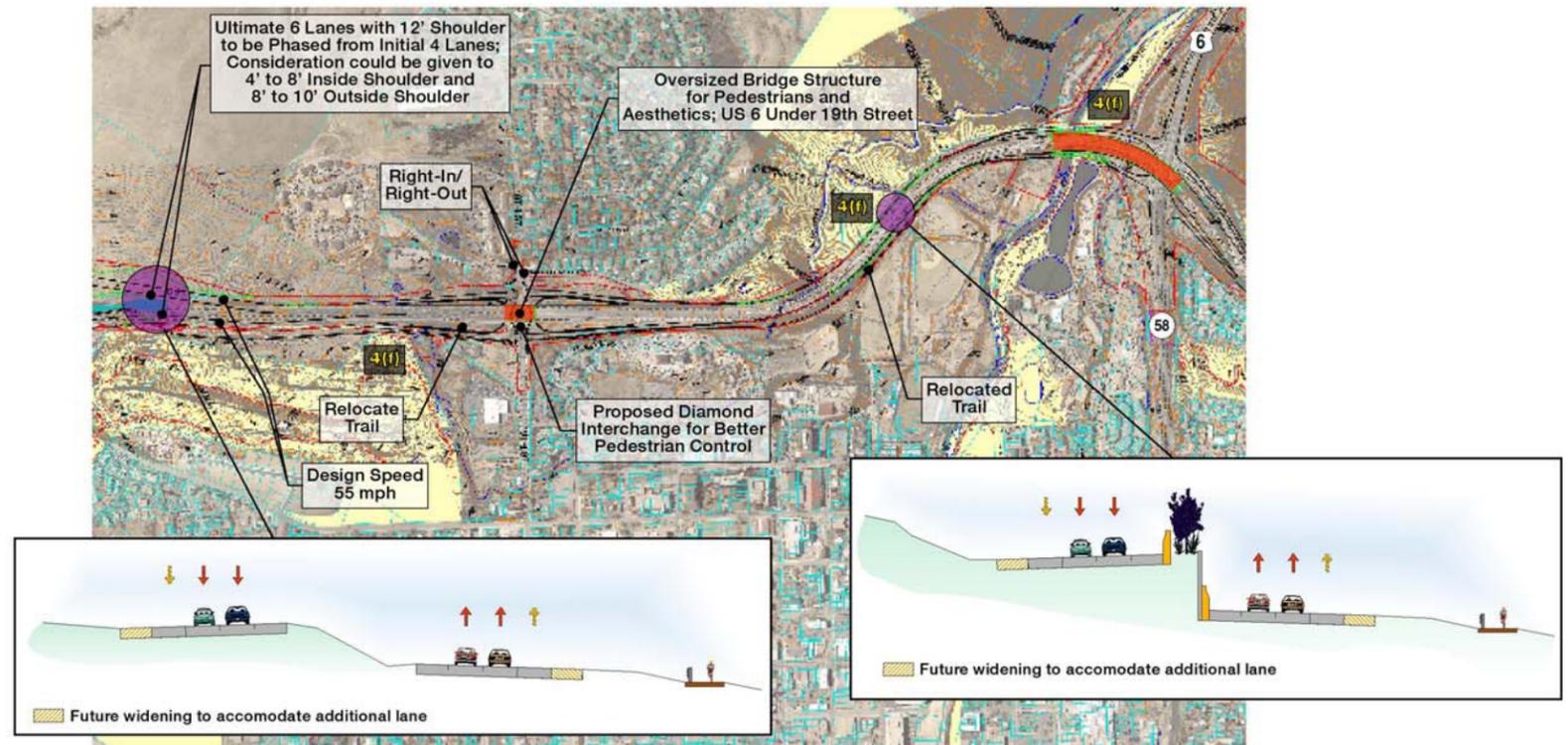


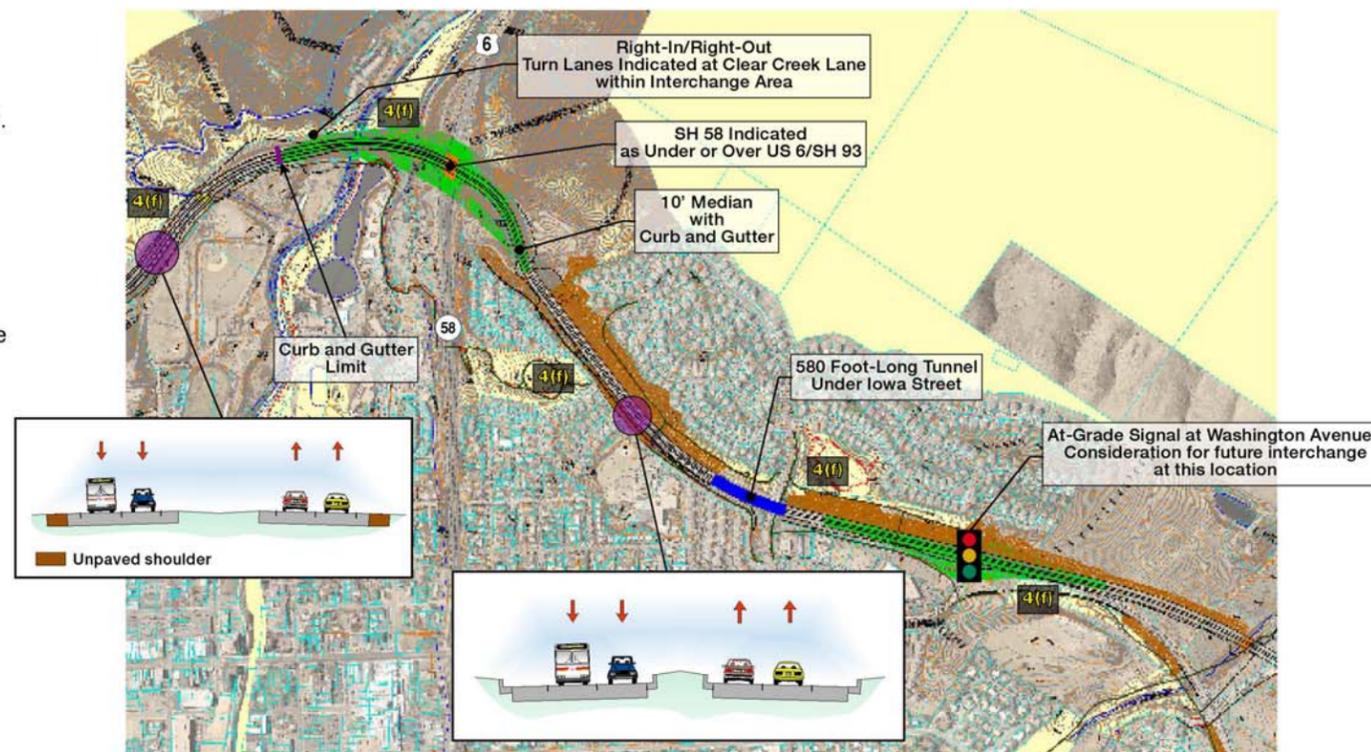
Figure 2.7-3 Alternative Comparison—South of SH 58 to Golden Gate Canyon Road

## Golden Plan

The Golden Plan was designed as an arterial roadway within the context of the Northwest Quadrant Feasibility Study to meet community goals and address community concerns within the City of Golden.

Related design features from south of SH 58 to Golden Gate Canyon Road include:

- Four through lanes (no consideration for future phasing to six lanes)
- Curb and gutter and no inside shoulder
- Six foot outside shoulders with curb and gutter
- An interchange at the current intersection of US 6/SH 93 and SH 58. A grade separated interchange with SH 58 over or under the existing grade of US 6/SH 93 has been considered at this location
- Right in/right out access at Clear Creek Lane
- A 580 foot-long tunnel at Iowa Street
- Consideration of a future interchange at Washington Avenue

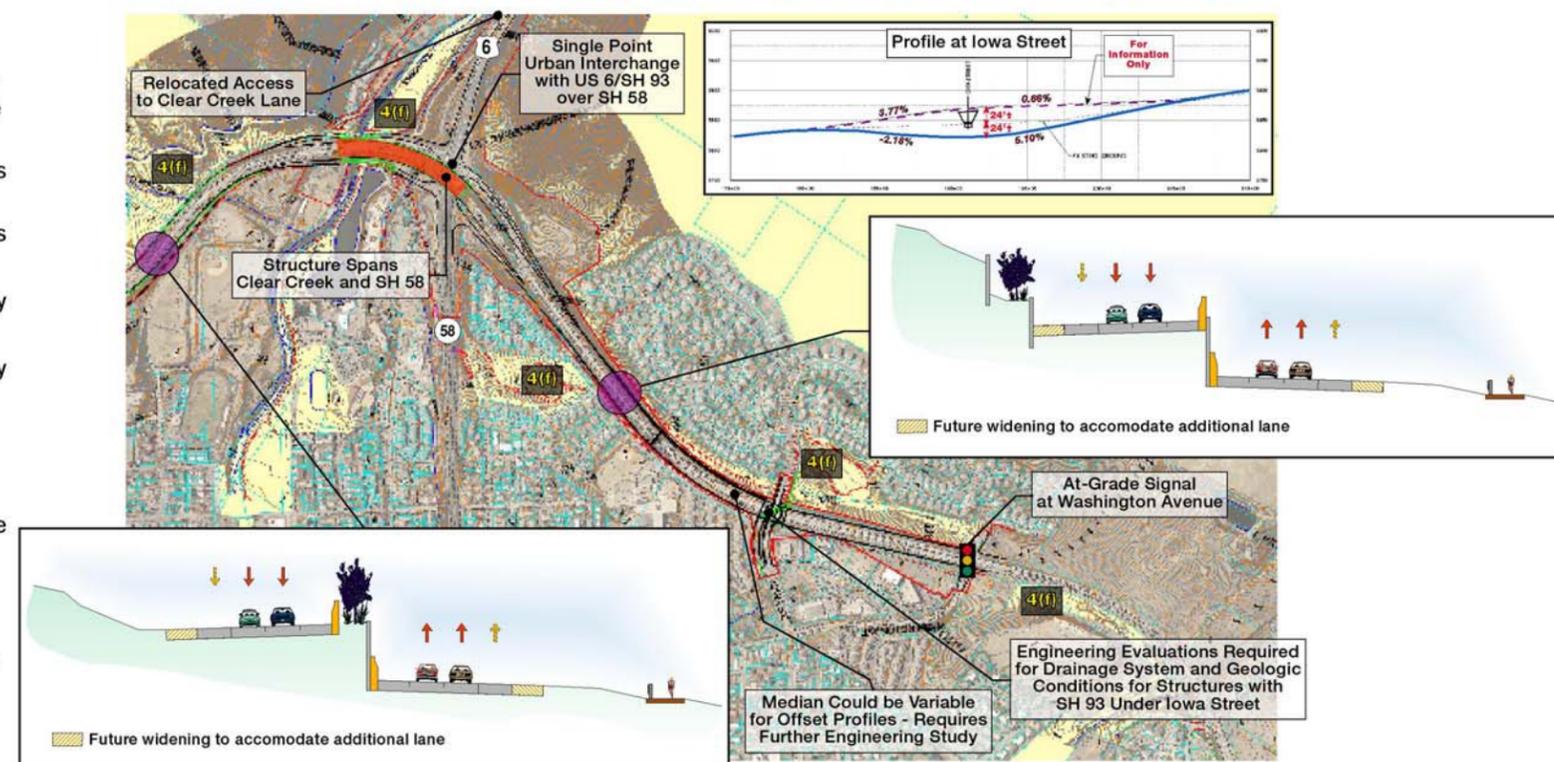


## CDOT Workshop Proposal

The Northwest Corridor Combined Alternative (Recommended Alternative) was designed as a major regional arterial through Golden within the context of the DRCOG Metro Vision Plan to accommodate inter-regional and regional movements within the northwest Denver metropolitan area.

Modifications to the Combined Alternative (Recommended Alternative) to better accommodate features of the Golden Plan include:

- Initial implementation of four through lanes with future phasing to six through lanes as traffic volumes warrant
- Consideration of reducing the inside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Consideration of reducing the outside shoulder width from 12 feet (dependent on mobility and safety concerns)
- Incorporation of a Single Point Urban Interchange at the current intersection of US 6/SH 93 and SH 58 with US 6/SH 93 over SH 58. Geologic slope stability concerns at this location requires US 6/SH 93 to pass over SH 58.
- Incorporation of a new access road off the west leg of US 6 to replace the current Clear Creek Lane access
- Consideration of replacing the planned overpass at Iowa Street with an underpass for aesthetic purposes subject to drainage and geologic conditions
- Consideration of a future interchange at Washington Avenue subject to a separate analysis such as a CDOT PD 1601



North Not to Scale

**Table 2.7-1 Alternatives Probable Remaining Costs after Bond Allocations**

Features / Elements	Golden Plan	Combined Alternative	CDOT Workshop Proposal	Comments
<b>Descriptive Measures</b>				
<b>Design Data</b>				
<b>US 6</b>				
Maximum Design Speed	45 mph	55 mph	55 mph	
Posted Speed	45 mph	55 mph	45 mph	
Maximum Grade	6.9%	5.0%	6.0%	
Minimum Radius of Curve	818.51 ft	1,065 ft	1,065 ft	
Profile	Split NB and SB between Heritage Road and 19 <sup>th</sup> Street and between 19 <sup>th</sup> Street and SH 58	Same grade for NB and SB	Split NB and SB between Heritage Road and 19 <sup>th</sup> Street and between 19 <sup>th</sup> Street and SH 58	CDOT Proposal includes split profiles per Golden's request at workshops.
<b>SH 93</b>				
Maximum Design Speed	45 mph	60 mph	60 mph	
Posted Speed	45 mph	55 mph	45 mph	
Maximum Grade	6.0%	6.0%	6.0%	
Minimum Radius of Curve	672.57 ft	1,340 ft	1,340 ft	
<b>Typical Sections</b>				
<b>US 6</b>				
Number of Lanes	4	6	6	CDOT proposal to phase from 4 to 6 lanes when required to meet traffic demand.
Inside Shoulder Width	4 ft paved - No Curb 0 ft - Curb	12 ft paved	12 ft paved	4-8 ft could be considered - discussions suspended before conclusion.
Outside Shoulder Width	4 ft paved/ 6 ft unpaved - No Curb 6 ft paved - Curb	12 ft paved	12 ft paved	8-10 ft could be considered - discussions suspended before conclusion.
Median Width	18 ft - Curb Varies 18 ft to 200+ ft - No Curb	26 ft	Varies 26 ft to 350+ ft	10-18 ft could result from reduction in shoulder width - Large median to accommodate curvilinear segment.
Width - EOP to EOP	100 ft	122 ft	122 ft	Width for non curvilinear segments
<b>SH 93</b>				
Number of Lanes	4	6	6	CDOT proposal to phase from 4 to 6 lanes when required to meet traffic demand.
Inside Shoulder Width	0 ft - Curb	12 ft paved	12 ft paved	4-8 ft could be considered - discussions suspended before conclusion.
Outside Shoulder Width	6 ft paved - Curb	12 ft paved	12 ft paved	8-10 ft could be considered - discussions suspended before conclusion.
Median Width	18 ft	26 ft	26 ft	10-18 ft could result from reduction in shoulder width - Increased in areas for left turns.
Width - EOP to EOP	83 ft	122 ft	122 ft	Golden Plan includes curb and gutter.
<b>Interchanges / Intersections</b>				
<b>US 6</b>				
Interchange Locations	Heritage Road, 19 <sup>th</sup> Street, SH 58	Heritage Road, 19 <sup>th</sup> Street, SH 58	Heritage Road, 19 <sup>th</sup> Street, SH 58	CDOT Proposal—US 6/SH 93 over SH 58. Golden Plan—SH 58 over US 6/SH 93.
<b>SH 93</b>				
Signalized Intersection Locations	Washington Avenue, Golden Gate Canyon Road, Existing SH 93	Washington Avenue, Golden Gate Canyon Road, Existing SH 93	Washington Avenue, Golden Gate Canyon Road, Existing SH 93	Equal future interchange options at Washington Ave., Golden Gate Canyon Road, and existing SH 93
<b>Mitigation Features</b>				
<b>US 6</b>				
Noise	Combination of Berms & Noise Barriers (clear)	Noise Barriers	Noise Barriers	Golden Plan Noise Berms impact Section 4(f) Resources. CDOT Proposal would include berms with approved use of parks.
Water Quality	None Shown	Ponds	Ponds	
<b>SH 93</b>				
Noise	Combination of Berms & Noise Barriers (clear)	Noise Barriers	Noise Barriers	Golden Plan Noise Berms impact Section 4(f) Resources. CDOT Proposal would include berms with approved use of parks.
Water Quality	None Shown	Ponds	Ponds	
<b>Quantitative Measures</b>				
<b>Design Data</b>				
<b>US 6</b>				
Retaining walls	105,000 SF	482,800 SF	159,000 SF	Combined Alternative uses retaining walls to achieve avoidance of Section 4(f) resources.
<b>SH 93</b>				
Retaining walls	0 SF	181,400 SF	153,960 SF	Combined Alternative - Fill walls required at Iowa Street overpass. CDOT Proposal - Cut walls required at Iowa Street underpass.
Iowa Street Separation	48,140 SF (Tunnel)	15,790 SF (Overpass)	10,960 SF (Underpass)	Golden Plan includes 580 foot-long tunnel.
<b>Additional Right-of-Way</b>				
<b>US 6</b>				
C-470 to SH 58	24.8 acres	12.45 acres	58.3 acres	CDOT Proposal requires use of 28.4 acres of Section 4(f) Resources and CSM property.
<b>SH 93</b>				
SH 58 to Existing SH 93	35.8 acres	57.5 acres	57.5 acres	CDOT Proposal requires use of Section 4(f) resources.



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