Northwest Corridor
A TRANSPORTATION ENVIRONMENTAL STUDY

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PREFACE

Similar to **Chapter 2**, this appendix describes the iterative process of developing, screening, and refining alternatives based on evaluation criteria and project goals. **Chapter 2** presents the decision process in summary fashion using primarily NEPA phrasing, while this appendix describes the process more completely and in terms of an integrated FHWA and U.S. Army Corps of Engineers (USACE) analysis.

This chapter retains the full story of the evaluations and selections written during the process. Language remains that would only apply to a federal action such as the use of federal funds, but within this context the section could provide data for future projects in the area.

Northwest Corridor
A TRANSPORTATION ENVIRONMENTAL STUDY

NEPA/CLEAN WATER ACT SECTION 404 MERGER

EXECUTIVE SUMMARY

The Northwest Corridor study began in January 2004 with scoping discussions including transportation professionals, local officials, regulatory experts, and citizens. This project was conducted together with the US Army Corps of Engineers 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 Clean Water Act substantive requirements at the same time as the NEPA process, which has procedural requirements. Alternative screening and evaluation techniques were developed and conducted in a manner that complies with NEPA and provides evidence that CDOT has not inappropriately eliminated the "Least Environmentally Damaging Practicable Alternative" (LEDPA) from further consideration. Concurrence with the USACE was reached for each stage except for the final concurrence that the recommended alternative was also the LEDPA. This was never reached because the NEPA process was ended.

The alternative screening process resulted in the No Action Alternative and four build alternatives; the Freeway Alternative, the Tollway Alternative, the Regional Arterial Alternative, and the Combined Alternative. Each alternative was analyzed to determine its ability to meet the project's purpose and need, environmental impacts, community acceptance, and costs. Based on the analysis performed, the Combined Alternative has been selected as the recommended alternative. When considering the weighted wetland impacts based on functionality, the Combined Alternative impacts are within 1.12 acres of the Tollway Alternative, the alternative with the least weighted wetland impacts.

APPENDIX B
NEPA/CLEAN WATER ACT SECTION 404 MERGER

INTRODUCTION

The Northwest Corridor study began in January 2004 with scoping discussions including transportation professionals, local officials, regulatory experts, and citizens. From these meetings, the project purpose and need and supporting project goals and objectives were created as the basis for the exploration and evaluation of a full range of transportation alternatives. Alternatives were created and evaluated, with input from officials and the public using progressively more detailed data in order to determine direct or relative alternative deficiencies. Alternatives shown to be inferior by measurable factors such as practicability, transportation (purpose and need), or environmental (natural and human/built) impacts were removed from further consideration. The No Action Alternative was used as a baseline and a viable option to the build alternatives and has been carried through the alternative screening process.

This project was conducted together with the US Army Corps of Engineers 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 Clean Water Act substantive requirements at the same time as the NEPA process, which has procedural requirements. Alternatives that were determined to be not practicable, as defined by Section 404 of the Clean Water Act, also were not reasonable, as defined by CEQ regulations for carrying out the NEPA process and were eliminated from further consideration. Alternatives screening and evaluation techniques were developed and conducted in a manner that complies with NEPA and provides evidence that CDOT has not inappropriately eliminated the "Least Environmentally Damaging Practicable Alternative" (LEDPA) from further consideration. This process includes concurrence from the USACE for the purpose and need statement, the alternatives selected for detailed evaluation, the recommended alternative, and potential strategies for compensatory mitigation. 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. Because the study findings are being presented in a planning document, no further progress was made toward identification of a LEDPA and no commitments are made toward mitigation.

B.1 PROJECT SCOPING AND PUBLIC INVOLVEMENT

"Scoping" is the act of identifying and discussing the values and interests of all stakeholders, such as the cities, counties, residents, businesses, users, and property owners to be considered in the alternative creation and analysis process. The Northwest Corridor study process began in January 2004 with several agency and public scoping meetings. Comments and concerns heard during these sessions as well as all subsequent public and local entity participation events held throughout the alternative screening process helped shape the analysis and decisions, though decisions were ultimately made by the project decision makers—the FHWA in concert with CDOT. Cities and counties provided input through the Corridor Consensus Committee and Technical Support Committee (see **Chapter 5**). Citizens and other stakeholders provided comments in public meetings and through other modes of communication (see **Chapter 6**).

B.2 PURPOSE AND NEED

Any proposed transportation alternatives must meet the intent of the project purpose and need to be viable. As discussed in **Chapter 1**, the purpose of the proposed transportation improvements in the Northwest Corridor is to enhance the connectivity, functionality, and capacity of the inter-regional and regional system from the vicinity of US 36 and the Northwest Parkway to the vicinity of SH 58, I-70, or C-470. This enhanced system will better accommodate the movement of people, goods and services. The current ineffective, incomplete roadway system creates the need for better system connectivity, capacity, travel

reliability, and modal inter-relationships.

B.3 GOALS AND OBJECTIVES

Project goals and objectives link the primary and secondary goals of the project with the means by which to measure them (see **Table B.3-1**). Primary project *goals* are generally related to the project purpose and need while secondary *goals* include things such as the minimization of environmental impacts. *Objectives* then provide elaboration of the goals, which lead to the specific and measurable *criteria* by which alternatives are judged. These criteria are applied throughout the screening process, though they evolve as additional data is collected and in some screening intervals are judged to be constant or non-discerning. The project goals and objectives also provide a basis for the final and most detailed alternative analysis contained in this document, but it is possible for additional data to become available when full analysis takes place.

Table B.3-1 Goals and Objectives

Project Goals	Objectives	Criteria
Purpose and Need (PN)		
PN1 System Connectivity Enhance the corridor's regional and inter-regional system for a more direct, well connected, and functional roadway system.	A. Provide a facility to integrate with the regional functional classification system.	Consistency in mainline continuity, functionality, and therefore driver expectancy.
	B. Balance local and regional connectivity for enhanced mobility.	Connectivity of inter-regional, regional, and local trip types traveling within and through the corridor.
PN2 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.	A. Provide mobility and capacity to keep pace with forecasted growth of the region and corridor absorption of population and employment increases.	Screenline demands, comparative volume capture and comparative Volume to Capacity Ratio (V/C).
	B. Relieve capacity and constraints to the corridor network to better move person and freight trips.	Vehicle Miles Traveled (VMT)/Vehicle Hours Traveled (VHT) regionally within study area.
	C. Better accommodate inter-regional, regional, and local trips contributing to congestion on the existing arterial systems.	V/C and number and percentage of regional and local trips within study area and corridor system capacity.
PN3 Travel Reliability Reduce the variability of travel times and improve driver expectancy.	A. Provide for more logical movements for route connections and reduce crossroad disruptions of through traffic at current intersections.	Travel time savings between corridor destinations.
	B. Improve system deficiencies through route continuity of facility laneage and improve access management for safer movements for multi-trip purposes.	Functional classification, facility configuration, and alternative type safety features.
PN4 Modal Interrelationships Expand highway/transit choices to improve mobility through intermodal connections.	A. Preserve opportunities to connect and enhance accessibility to programmed rapid transit corridors.	Proximity and compatibility for access to transit lines and network integration for better routing to aviation and transit modes.

Project Goals	Objectives	Criteria
Practicability (PR)		
PR1 Consider the "practicability" of alternatives	A. Existing Technology	Must use proven technology and be technically feasible to construct.
	B. Logistics	Must conform to federal and state laws.
		Must be located outside of national parks, wilderness areas, wildlife refuges, and Superfund sites.
		Must be socially feasible – would not require extensive relocation of numerous families or businesses within one or more neighborhoods.
	C. Costs	Must not be, by inspection or detailed analysis during later screenings, unreasonably expensive.
Environmental (EN)		
EN1 Must not jeopardize the continued existence of a Threatened & Endangered Species nor result in destruction or adverse modification of critical habitat	A. To advance, an alternative must avoid a Jeopardy or Adverse Modification Biological Opinion, issued after completion of consultation under section 7(a) of the Endangered Species Act.	Acres of Ute Ladies – tresses Orchid habitat.
		Miles of eagle nest buffer zone encroachment.
		Acres of prairie dog habitat impacted within 3 miles of Bald Eagle nest.
		Acres of Preble's Meadow Jumping Mouse habitat impacted.
EN2 Avoid or minimize impacts to the aquatic resources	A. To advance, an alternative must avoid and minimize direct, indirect, and cumulative impacts to the aquatic ecosystem.	Acres of known wetland areas impacted.
		Number of waters of the US crossings.
EN3 Avoid or minimize impacts to the natural environment	A. To advance, an alternative should consider other significant, adverse effects to the natural environment.	Prairie Dog colonies outside of 3 mile radius of Bald Eagle nest.
		Feet of potential important wildlife crossings crossed.
		Impacts to domestic water supplies.
		Minimization of impacts from hazardous materials.
		Noise impacts to receivers within a zone potentially meeting or exceeding the CDOT Noise Abatement Criteria (NAC).
EN4 Avoid or minimize impacts to the built and social environment	A. To advance, an alternative should consider the impacts to community fabric.	Percent change in traffic volume intensity.
		Conformity with federal/state, DRCOG, and local (city and county) transportation plans.
		Impacts to aesthetic corridor character.
		Impacts to a receptor's viewshed in the corridor.
	B. To advance, an alternative should consider the impacts to parklands and open space.	Acres of parks and recreation areas in right-of-way.
		Acres of potential open space impacted.
		Feet of existing trails in right-of-way.
		Acres of local, state, national wildlife refuges in right-of-way.

Project Goals	Objectives	Criteria
EN4 Avoid or minimize impacts to the built and social environment (continued)	C. To advance, an alternative should consider impacts to sensitive historic and cultural sites.	Number of structures on National Register/historical listing.
		Number of structures with potential for listing in the National Register.
	D. To advance, an alternative should consider the impacts to low income and minority populations.	Number of residential and business takes in low income census area.
		Percentage of low income census takes compared to total takes.
		Number of residential and business takes in minority census area.
		Percentage of minority population census takes compared to total takes.

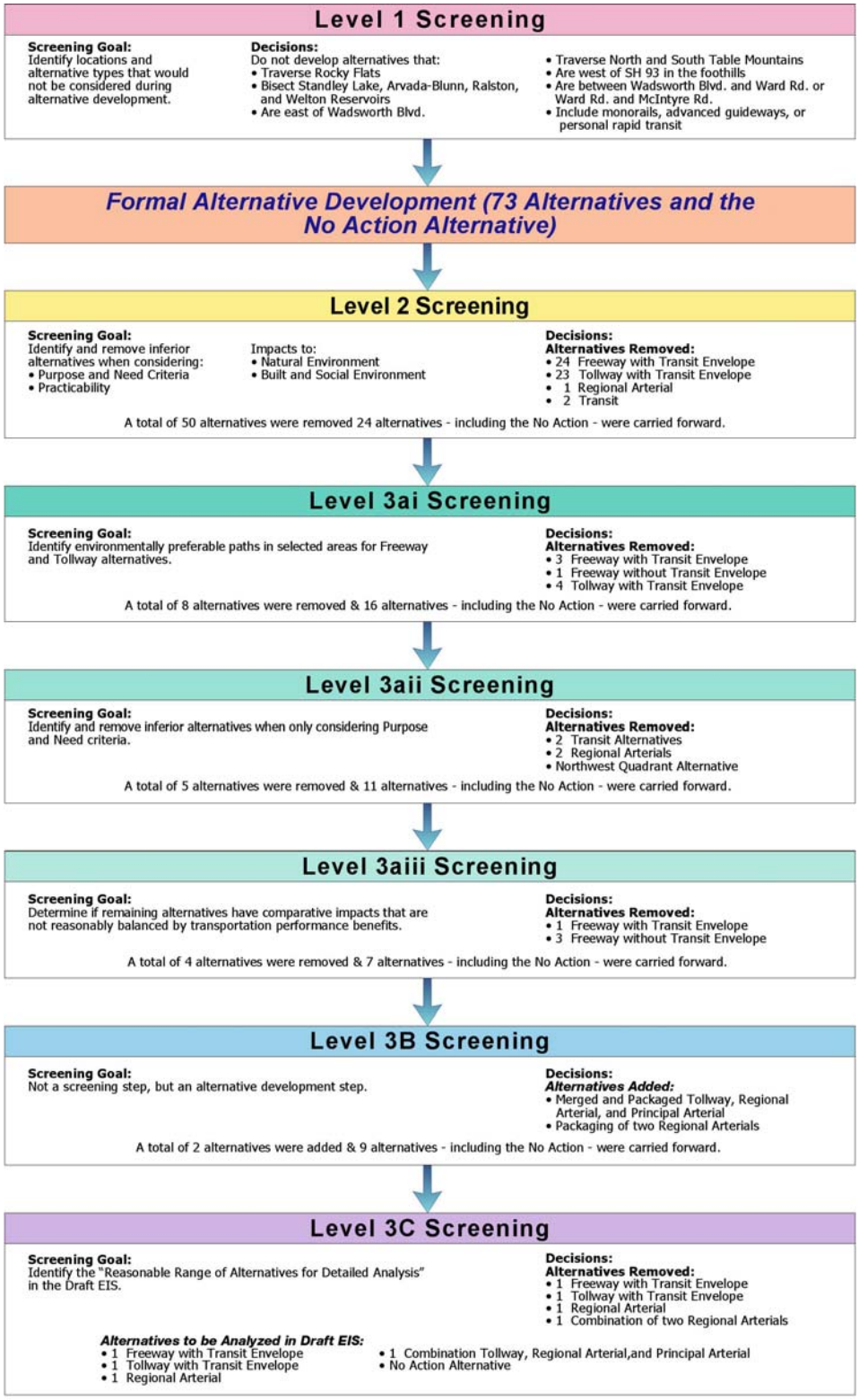
B.4 ALTERNATIVES DEVELOPMENT AND SCREENING

The process by which alternatives were created and progressively evaluated was extensive and took nearly two years. Level 1 Screening identified geographic and regulatory conditions that precluded development opportunities in the initial creation of alternatives. Seventy-three "build" alternatives were identified during Level 1 screening. Each subsequent screening step was then defined as data analysis evolved and logical screening opportunities presented themselves (see **Figure B.4-1**). Following is a summary of the process that concluded with the four most reasonable build alternatives considered for detailed evaluation. Details of this process are published (see **Northwest Corridor Supporting Document-Alternatives Development, Evaluation, and Screening**) and continue to be available on the project website. It should be noted that as the screening levels progressed, a higher level of detail and refinement of engineering, transportation, and environmental data was achieved.

CDOT and FHWA, in an effort to ensure that the LEDPA was not inappropriately eliminated during each of the appropriate screening processes performed a LEDPA analysis. This consisted of comparing the alternatives that were eliminated, the reasons for their elimination, and the quantitative data regarding the aquatic environment that was deemed appropriate to the USACE for their review. These analyses were performed at Level 2, Level 3a(i), Level 3a(ii), Level 3a(iii), Level 3C, and for the final four build alternatives (see **Table B.7-3**, **Table B.8-2**, **Table B.8-5**, **Table B.8-7**, **Table B.10-11**, and **Table B.15-1**, respectively).

The No Action Alternative was also carried forward throughout the alternatives selection process and into this analysis to serve as a baseline against which the other alternatives are compared. This alternative could be reasonable for situations where the impacts are great and the need is relatively minor. A Congestion Management System alternative was also studied that would reduce transportation demand or otherwise manage congestion to the point where a build alternative would not be needed. This alternative is discussed (see **Chapter 2**, **Section 2.4.1**).

Figure B.4-1 Overview of the Northwest Corridor Screening Process



B.5 LEVEL 1—NON-VIABLE ALTERNATIVE SCREENING

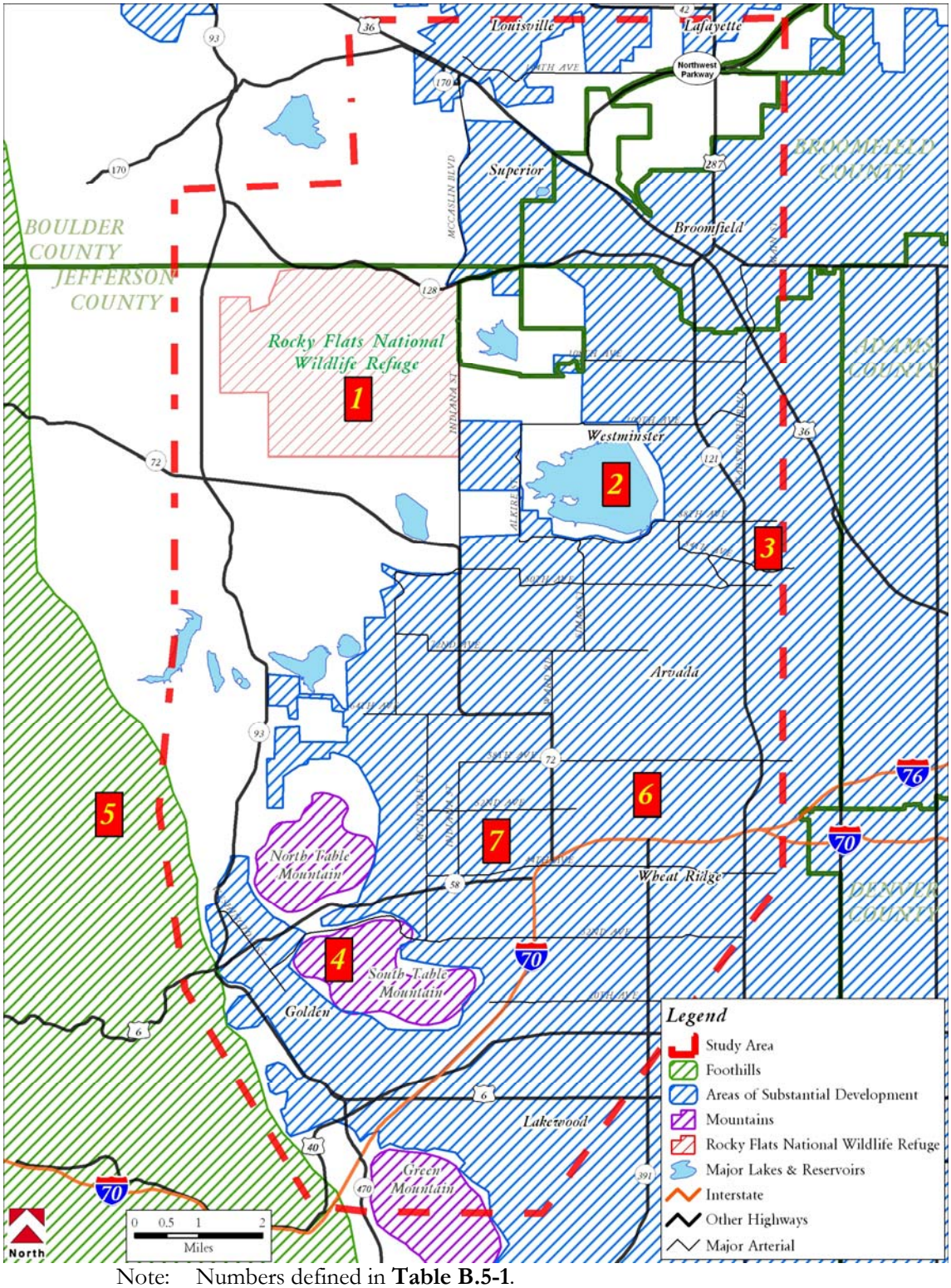
Level 1 Screening			
Screening Goal: Identify locations and alternative types that would not be considered during alternative development.	**Approach:** Use existing information on cost, logistics, and technology to determine impracticable areas and alternatives.	**Evaluation Criteria:** Existing information on: • Population Density • National Wildlife Refuges • Large Waterbodies • Significant Landforms • Costs associated with developing transportation technologies	**Decisions:** Do not develop alternatives that: • Traverse Rocky Flats • Bisect Standley Lake, Arvada-Blunn, Ralston, and Welton Reservoirs • Are east of Wadsworth Blvd. • Traverse North and South Table Mountains • Are west of SH 93 in the foothills • Are between Wadsworth Blvd. and Ward Rd. or Ward Rd. and McIntyre Rd. • Include monorails, advanced guideways, or personal rapid transit

Level 1 screening identified transportation alternative types and locations that should not be considered further based on inability to meet project purpose and need, infeasibility (practicability) or clear and significant impacts to the natural or manmade environment. This step took into account factors identified during Agency and Public Scoping and subsequent conceptual engineering meetings, and ultimately yielded 73 build alternatives. The initial screening processes of Level 1 considered broad criteria to evaluate the initial set, or universe, of alternatives and eliminate geographic areas and alternatives that are clearly not viable (practicable) or are obviously inferior to other alternatives (see **Figure B.5-1** and **Table B.5-1**).

A note on "practicability" and United States Army Corps of Engineers Involvement

"Practicable" is a term that was used throughout the screening process and is often the reason for alternative elimination or screening. This term has not traditionally been used in transportation National Environmental Policy Act (NEPA) documents, and is instead more commonly used as part of the Clean Water Act 404 permit process overseen by the USACE. However, FHWA, CDOT, and USACE have recently merged the transportation NEPA and Clean Water Act processes so that the integrated process comes to a common conclusion in a timely manner. For this reason, the USACE is a "cooperating" agency in this study effort. "Practicability" suggests that an alternative must be feasible in terms of cost, logistics, or technology (40 CFR § 230.3). "Logistics" has historically consisted of such factors as legality or social feasibility. Practicability is how the USACE will judge that the process has concluded with the Least Environmentally Damaging Practicable Alternative, where the environment, for their purposes, is defined as the aquatic environment only. This NEPA study considers all elements of the environment, both natural and built, for the purposes of the larger screening effort. Alternatives deemed not practicable may also be considered not "reasonable" in the context of this larger transportation NEPA process. Each step of this screening process has been discussed and concurred with by the USACE.

Figure B.5-1 Level 1 Areas to Avoid



Note: Numbers defined in **Table B.5-1**.

Source: Compiled by FHU, 2006.

Table B.5-1 Level 1 Screened Alternatives

Reference Number	Level 1 Screened Alternatives	Rationale
1	Alternatives that bisect or substantially traverse Rocky Flats (Rocky Flat Wildlife Refuge)	Logistically impracticable. The Wildlife Refuge Act enacted by the US Congress specifically denies transportation corridors within the wildlife refuge other than in the 300-foot transportation easement along Indiana Street.
2	Alternatives that bisect reservoirs that are used for drinking water or irrigation	Logistically and financially impracticable. Bridges or dikes across large water bodies would be excessively expensive and have many adverse effects without any potential benefit.
3	Alternatives east of Wadsworth Boulevard (SH 121)	Logistically impracticable based on the study area definition. Alternatives to the east of Wadsworth Boulevard fail to meet the project need in the broadest sense and are therefore not considered viable alternatives.
4	Alternatives that traverse the tops of North and South Table Mountains	Logistically and financially impracticable due to extreme design, construction, and operational difficulties related to grade, geology, and structural design as well as likely significant environmental impacts without any foreseen benefits.
5	Alternatives west of SH 93 in the foothill region of the corridor	Logistically and financially impracticable due to extreme design, construction, and operational difficulties related to grade, geology, and structural design as well as likely significant environmental impacts without any foreseen benefits.
6	Alternatives between Wadsworth Boulevard (SH 121) and Ward Road	Logistically and financially impracticable due to extreme impacts associated with the creation of a new major transportation corridor through high population areas. These alternatives could require a very large number of relocations because of very limited existing right of way.
7	Alternatives between Ward Road and McIntyre Street	Logistically and financially impracticable due to extreme impact associated with the creation of a new major transportation corridor through high population areas. These alternatives could require a very large number of relocations because of very limited existing right of way.
8	Alternatives that involve monorail, advanced guideway transit, or personal rapid transit technologies	Technologically impracticable. These alternatives are not compatible with existing or planned technologies in or near the corridor.*

* No specific locations for alternatives using these transit technologies were identified; therefore they are not referenced on **Figure B.5-1**.

B.6 Alternative Development and Naming Convention

Conceptual engineering based on Level 1 Screening criteria and information acquired in agency and public scoping was used to create several potential facility classifications (families), routes, and methods of connections to existing facilities. A spectrum of transportation families was created (see **Table B.6-1**). These aspects were sorted into possible combinations, resulting in 73 build alternatives. Due to the large number of alternatives, a naming convention for travel routes and transportation families was established to facilitate project communication (see **Table B.6-2**). These routes were then studied in progressively greater detail through the screening process (see **Figure B.6-1**).

Table B.6-1 Description of Transportation Types

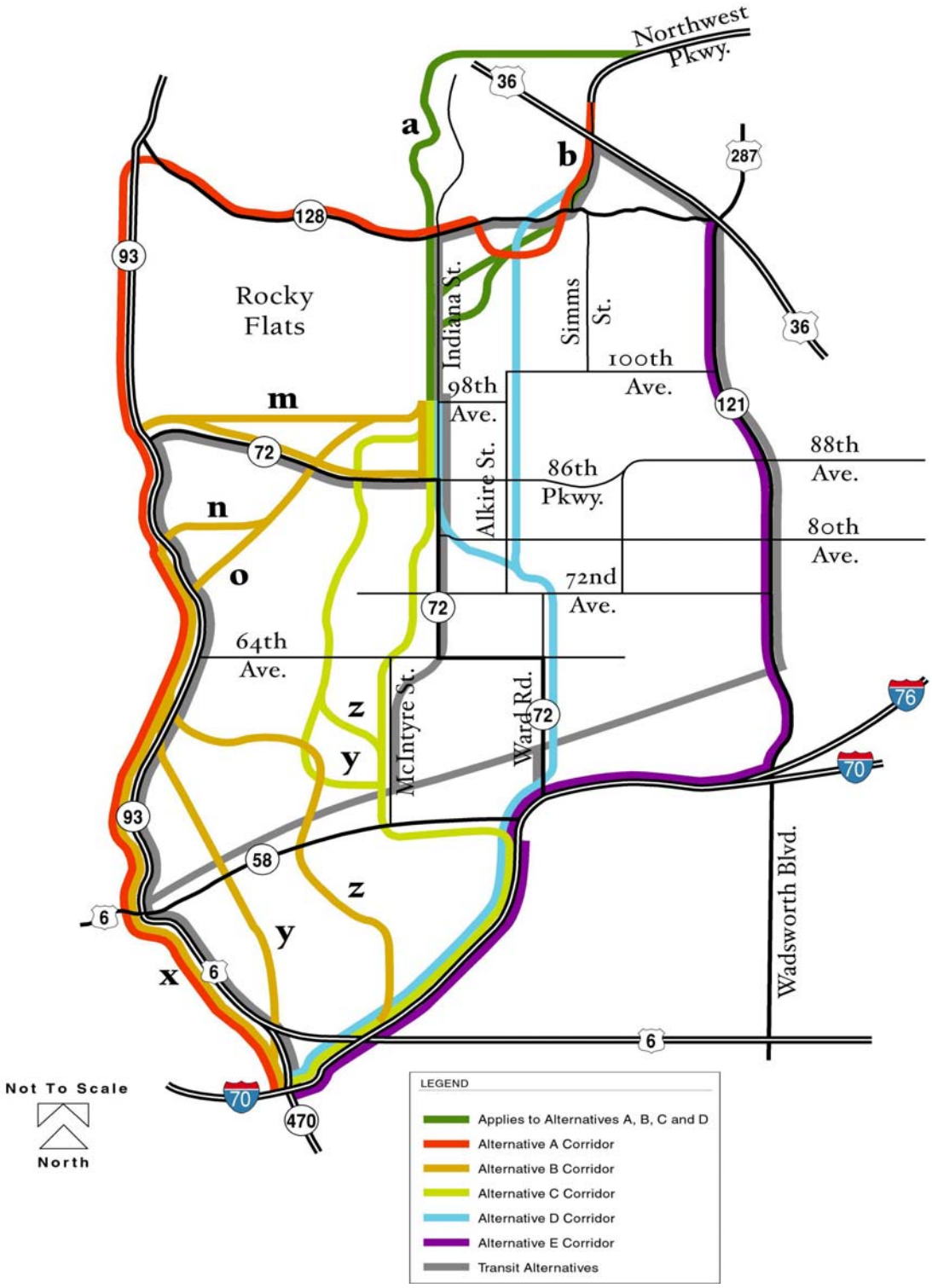
Transportation Types	
Freeways	Multi-lane divided highways with access restricted to grade-separated interchanges. About 35 percent of all vehicle miles traveled in the Denver region are on the freeway system. The freeways serve as statewide connectors and intraregional travel corridors. Usually designed for 70 mph in rural and 55–60 mph in urban settings.
Tollways	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 at booth locations and/or with automated sensors. Usually designed for 55 to 75 mph travel.
Major Regional Arterials	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 to 60 mph travel.
Principal Arterials	Major streets primarily serving regional and local traffic, with at-grade intersections and regulated side accesses. In established areas they serve as multimodal streets with significant pedestrian, transit, and commercial activity. The principal arterial system represents the regional accessibility roadways. Designed for 40 to 50 mph travel.
Transit Systems	Regional rapid transit systems 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 to over 100 mph.

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

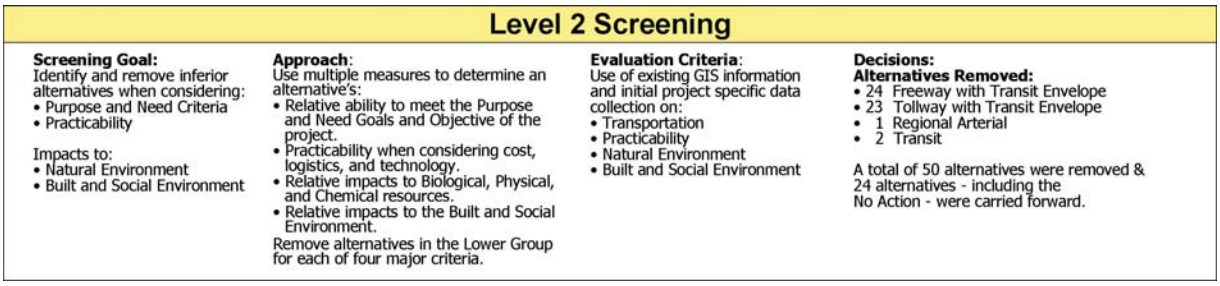
Table B.6-2 Alternatives Naming Convention

Alternatives Naming Convention	
The Alternative Families	
F	Indicates a freeway
T	Indicates a tollway
R	Indicates a regional arterial
P	Indicates a principal arterial
TR	Indicates a transit alternative (Bus, Light Rail, or Commuter Heavy Rail)
NQA	Roadway improvement suggested by the Northwest Quadrant Feasibility Study
The General Alignments	
A Alignment	SH 128 and SH 93
B Alignment	SH 93 and US 6
C Alignment	Indiana Street and McIntyre Street
D Alignment	Alkire Street and Ward Road (SH 72)
E Alignment	Wadsworth Boulevard
F Alignment	Indiana Street and Ward Road
The Roadway Links	
North	Alternative paths (links) are called "a" or "b" of the various alternatives
Middle	Alternative paths (links) are called "m," "n," or "o" of the various alternatives
South	Alternative paths (links) are called "x," "y," or "z" of the various alternatives
The Complete Alternative Name	
First letter indicates the roadway family	
Second letter indicates the general alternative location	
Third, fourth and as necessary the fifth letters indicate the roadway links	
Example: FBamx is a Freeway along the "B" alternative following the "a", "m", and "x" paths at different points along the alternative's route.	

Figure B.6-1 Level 2 Alternative Routes



B.7 LEVEL 2 ALTERNATIVES EVALUATION AND SCREENING



B.7.1 LEVEL 2 SCREENING APPROACH

The analysis of the 73 initial build alternatives began with the collection of existing data throughout the study area, including traffic, engineering, environmental, and community information. This data was compiled and analyzed in a broad sense to determine the overall potential of each conceptual alternative. Specific measures are shown in the criteria column of the goals and objectives (see **Table B.3-1**). Alternatives with clear deficiencies relative to other alternatives were eliminated during this step.

B.7.2 LEVEL 2 SCREENING DECISIONS

The Level 2 screening process identified 50 alternatives that were either not practicable (because of technical, logistical, or cost considerations) or had elevated potential environmental impacts without overriding transportation advantages. Purpose and need criteria and the built and social environment impact criteria were utilized, but there was insufficient detail to warrant elimination of an alternative based solely on these factors. Twenty-three build alternatives survived to be analyzed in greater detail in subsequent steps. The detailed rationale for removing alternatives is discussed below. The supporting data developed for each alternative is presented (see **Northwest Corridor Supporting Technical Document-Alternatives Development, Evaluation, and Screening**).

While much information was considered, 46 alternatives were screened from further consideration simply for being not practicable. A "practicable" alternative is one that could be built when considering elements of logistics, technology, and cost. An analysis to determine if the apparent LEDPA was eliminated during this screening step concluded that an apparent LEDPA still remained as an alternative (see **Table B.4-1**). Alternatives were eliminated based on:

B.7.2.1 IMPRACTICABLE INTERCHANGE

Twenty-five alternatives would have required a system connection with a new interchange on US 36 between McCaslin Boulevard and the Northwest Parkway/Interlocken Loop, which would have violated FHWA engineering design standards of interchange spacing, safety, and operations and are therefore impracticable. Eleven alternatives were eliminated exclusively for this reason.

B.7.2.2 IMPRACTICABLE STEEP-SIDED SLOPES

Eighteen alternatives would have required construction on the steep side slopes of North Table Mountain. These alternatives are impracticable because of the logistical and cost issues associated with construction on 50-60 degree slopes with piers driven into bedrock. Eight were eliminated for this reason.

B.7.2.3 IMPRACTICABLE TUNNEL ROADWAY

Fourteen alternatives would have required a tunnel through North and South Table Mountain with a bridge between the tunnels and over Coors Brewing Company. The broad logistical issues associated with construction of 2.4 mile-long tunnels, and the large cost, render these alternatives impracticable. Six alternatives were eliminated for this reason.

B.7.2.4 IMPRACTICABLE ELEVATED ROADWAY

Two alternatives, a freeway and a tollway down Wadsworth, would have required an elevated viaduct roadway. Approximately three miles of such structures would have been necessary to maintain local access and would have had significant costs and impacts and were therefore judged to be impracticable.

B.7.2.5 IMPRACTICABLE–OUT OF DIRECTION TRAVEL

The RE Alternative was intended to reduce wildlife impacts by entirely realigning SH 93 to the east side of the Rocky Flats area to reduce wildlife/vehicle encounters. With the advent of the Rocky Flats Wildlife Refuge, a greater volume of wildlife crossings of existing SH 93 to and from the foothills is expected. Unfortunately this alternative would create approximately six miles of out-of-direction travel and disrupt existing land uses in the area. The RE alternative was therefore judged to be impracticable and eliminated.

B.7.2.6 OUT OF DIRECTION TRAVEL WITH GREATER NATURAL ENVIRONMENTAL IMPACT

Six alternatives would have been located along the west side of Rocky Flats along SH 93. Such alternatives would have unnecessarily added distance to trips and caused greater impacts to the natural environment. Analysis showed significant conflicts with aquatic areas near Coal Creek, Prebles' Meadow Jumping Mouse habitat, wildlife crossing areas (to and from Rocky Flats National Wildlife Refuge), and potential conflicts with landfills. Two alternatives were eliminated exclusively for these deficiencies while the other four had additional practicability issues.

B.7.2.7 INADEQUATE IN FULFILLING BASIC PURPOSE AND NEED

One alternative (Regional Bus Service–TRA) was removed from further consideration because it could not remotely fulfill the basic project need by itself. Regional bus service already exists in the area and expanding such service would not fulfill anticipated demand and that alternative was therefore eliminated as a stand-alone alternative, but will be considered in combination with other project alternatives through the congestion management analysis.

One alternative (Commuter Rail–TRD) would have followed existing heavy-rail right-of-way from Golden to approximately the intersection of SH 72 and Indiana Street, where it would have then required new north-south right-of-way and tracks. Construction and operation of such a line would have had considerable impacts, would not have met the basic needs of the project, and would not have been supported by the area land uses. This alternative was therefore eliminated from further consideration.

In total, 50 alternatives were eliminated during Level 2 screening (see **Table B.7-1**). Twenty-three build alternatives survived for further analysis (see **Table B.7-2**).

Table B.7-1 Level 2 Screening Summary

Alternative		Screening Rationale
1	FAx	Out of direction travel with greater natural environment impact
2	FAy	Out of direction travel with greater natural environment impact; impracticable Table Mountain tunnels
3	FAz	Out of direction travel with greater natural environment impact and impracticable steep side slopes
4	FBamx	Impracticable interchange
5	FBamy	Impracticable interchange; impracticable Table Mountain tunnels
6	FBamz	Impracticable interchange; impracticable steep side slopes
7	FBanx	Impracticable interchange
8	FBany	Impracticable interchange; impracticable Table Mountain tunnels
9	FBanz	Impracticable interchange; impracticable steep side slopes
10	FBaox	Impracticable interchange
11	FBaoy	Impracticable interchange; impracticable Table Mountain tunnels
12	FBaoz	Impracticable interchange; impracticable steep side slopes
13	FBbmy	Impracticable Table Mountain tunnels
14	FBbmz	Impracticable steep side slopes
15	FBbny	Impracticable Table Mountain tunnels
16	FBbnz	Impracticable steep side slopes
17	FBboy	Impracticable Table Mountain tunnels
18	FBboz	Impracticable steep side slopes
19	FCax	Impracticable interchange
20	FCay	Impracticable interchange; impracticable steep side slopes
21	FCaz	Impracticable interchange
22	FCby	Impracticable steep side slopes
23	FE	Impracticable elevated viaduct on Wadsworth
24	FFa	Impracticable interchange
25	RE	Impracticable disruption of current SH 93
26	TAx	Out of direction travel with greater natural environment impact

Alternative		Screening Rationale
27	TAy	Out of direction travel with greater natural environment impact; impracticable Table Mountain tunnels
28	TAz	Out of direction travel with greater natural environment impact and impracticable steep side slopes
29	TBamx	Impracticable interchange
30	TBamy	Impracticable interchange; impracticable Table Mountain tunnels
31	TBamz	Impracticable interchange; impracticable steep side slopes
32	TBanx	Impracticable interchange
33	TBany	Impracticable interchange; impracticable Table Mountain tunnels
34	TBanz	Impracticable interchange; impracticable steep side slopes
35	TBaox	Impracticable interchange
36	TBaoy	Impracticable interchange; impracticable Table Mountain tunnels
37	TBaoz	Impracticable interchange; impracticable steep side slopes
38	TBbmy	Impracticable Table Mountain tunnels
39	TBbmz	Impracticable steep side slopes
40	TBbny	Impracticable Table Mountain tunnels
41	TBbnz	Impracticable steep side slopes
42	TBboy	Impracticable Table Mountain tunnels
43	TBboz	Impracticable steep side slopes
44	TCax	Impracticable interchange
45	TCay	Impracticable interchange; impracticable steep side slopes
46	TCaz	Impracticable interchange
47	TCby	Impracticable steep side slopes
48	TE	Impracticable elevated viaduct on Wadsworth
49	TRA	Improving/expanding only bus service could not fulfill the project need.
50	TRD	Commuter rail, following existing rail lines, would not fulfill the project need.

Table B.7-2 Level 2 Screening Remaining Alternatives (24)-Geographic Locations

General Location	Alternative Type	Alternative Name		
SH 93/Indiana Alternatives (8)	**Freeway with Transit**	FBbmx	FBbox	FBbnx
	Freeway without Transit	FG		
	Tollway with Transit	TBbmx	TBbox	TBbnx
	Regional Arterials	RB		
SH 93/SH 128 Alternative (1)	**Regional Arterials**	RA		
Indiana/McIntyre Alternatives (6)	**Freeway with Transit**	FCbx	FCbz	
	Freeway without Transit	FH		
	Tollway with Transit	TCbx	TCbz	
	Regional Arterials	RC		
Alkire/Ward Alternatives (2)	**Freeway with Transit**	FD		
	Tollway with Transit	TD		
Wadsworth Alternative (1)	**Regional Arterial**	RD		
Indiana/Ward Alternatives (2)	**Freeway with Transit**	FFb		
	Freeway without Transit	FI		
Entire Corridor Alternative (3)	**Arterial Improvements**	NWQ		
	Transit Improvements	TRB	TRC	
No Action Alternative (1)	No Action			

B.7.3 LEVEL 2 LEDPA ANALYSIS

Table B.7-3 Level 2 Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis

Freeway with Transit Envelope Alternatives							
Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed1 (miles)	Alternative Removed	Rational for Removal	Alternative	Number of Water Bodies Crossed2	Alternative Removed	Rational for Removal
FA z	8.05	Yes	Practicability	FE	15	Yes	Practicability
FB boy	8.24	Yes	Practicability	FB anx	22	Yes	Practicability
FB bny	8.38	Yes	Practicability	FB any	22	Yes	Practicability
FA y	8.85	Yes	Practicability	FF a	23	Yes	Practicability
FB aoy	9.75	Yes	Practicability	FB anz	24	Yes	Practicability
FB any	10.04	Yes	Practicability	FB amx	25	Yes	Practicability
FB bmy	10.51	Yes	Practicability	FB amy	25	Yes	Practicability
FB boz	11.41	Yes	Practicability	FC ay	25	Yes	Practicability
FD	11.51	No	--	FD	25	No	--
FB bnz	11.55	Yes	Practicability	FB amz	27	Yes	Practicability
FB box	11.59	No	--	FB aox	27	Yes	Practicability
FB bnx	11.74	No	--	FB aoy	27	Yes	Practicability
FA x	11.93	Yes	Environmental	FB bnx	27	No	--
FB amy	12.03	Yes	Practicability	FB bny	27	Yes	Practicability
FB aoz	12.93	Yes	Practicability	FC az	27	Yes	Practicability
FB aox	13.11	Yes	Practicability	FF b	27	No	--
FB anz	13.21	Yes	Practicability	FA x	28	Yes	Environmental
FB anx	13.39	Yes	Practicability	FA y	28	Yes	Practicability
FF b	13.45	Yes	Practicability	FB aoz	29	Yes	Practicability
FB bmz	13.45	No	--	FB bnz	29	Yes	Practicability
FB bmx	13.68	Yes	Practicability	FB bmx	30	No	--
FF a	13.87	No	--	FB bmy	30	Yes	Practicability
FB amz	14.39	Yes	Practicability	FC ax	30	Yes	Practicability
FB amx	15.20	Yes	Practicability	FC by	30	Yes	Practicability
FC bx	15.38	Yes	Practicability	FA z	31	Yes	Practicability
FC by	17.61	No	--	FB bmz	32	Yes	Practicability
FC ax	17.94	Yes	Practicability	FB box	32	No	--
FC ay	19.13	Yes	Practicability	FB boy	32	Yes	Practicability
FC bz	19.46	Yes	Practicability	FC bz	32	No	--
FC az	19.46	No	--	FB boz	34	Yes	Practicability

Increasing Potential Impacts to Wetlands, Orchard Habitat, and Riparian Area

Increasing Potential Impacts to Water Resources

Table B.7-3 Level 2 Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis (continued)

Tollway with Transit Envelope Alternatives								
Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed[1] (miles)	Alternative Removed	Rational for Removal	Increasing Potential Impacts to Wetlands, Orchard Habitat, and Riparian Area	Alternative	Number of Water Bodies Crossed[2]	Alternative Removed	Rational for Removal
TB boy	8.24	Yes	Practicability		TE	15	Yes	Practicability
TB bny	8.38	Yes	Practicability		TB anx	22	Yes	Practicability
TB aoy	9.75	Yes	Practicability		TB any	22	Yes	Practicability
TB any	10.04	Yes	Practicability		TB anz	24	Yes	Practicability
TB bmy	10.51	Yes	Practicability		TB amx	25	Yes	Practicability
TB boz	11.41	Yes	Practicability		TB amy	25	Yes	Practicability
TD	11.51	No	--		TC ay	25	Yes	Practicability
TB bnz	11.55	Yes	Practicability		TD	25	No	--
TB box	11.59	No	--		TB amz	27	Yes	Practicability
TB bnx	11.74	No	--		TB aox	27	Yes	Practicability
TB amy	12.03	Yes	Practicability		TB aoy	27	Yes	Practicability
TB aoz	12.93	Yes	Practicability		TB bnx	27	No	--
TB aox	13.11	Yes	Practicability		TB bny	27	Yes	Practicability
TB anz	13.21	Yes	Practicability		TC az	27	Yes	Practicability
TB anx	13.39	Yes	Practicability		TA x	28	Yes	Environmental
TE	13.45	Yes	Practicability		TA y	28	Yes	Practicability
TB bmz	13.68	Yes	Practicability		TB aoz	29	Yes	Practicability
TB bmx	13.87	No	--		TB bnz	29	Yes	Practicability
TA y	14.02	Yes	Practicability		TB bmx	30	No	--
TB amz	15.20	Yes	Practicability		TB bmy	30	Yes	Practicability
TB amx	15.38	Yes	Practicability		TC ax	30	Yes	Practicability
TA x	17.37	Yes	Environmental		TC by	30	Yes	Practicability
TC bx	17.61	No	--		TA z	31	Yes	Practicability
TC by	17.94	Yes	Practicability		TB bmz	32	Yes	Practicability
TC ax	19.13	Yes	Practicability		TB box	32	No	--
TC ay	19.46	Yes	Practicability		TB boy	32	Yes	Practicability
TC bz	19.46	No	--		TC bz	32	No	--
TA z	20.69	Yes	Practicability		TB boz	34	Yes	Practicability
TC az	20.98	Yes	Practicability		TC bx	35	No	--

Increasing Potential Impacts to Water Resources

Table B.7-3 Level 2 Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis (continued)

Freeway without Transit Envelope Alternatives

Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed[1] (miles)	Alternative Removed	Rational for Removal
FG	**11.55**	**No**	**--**
FI	**13.45**	**No**	**--**
FH	**17.61**	**No**	**--**

Alternative	Number of Water Bodies Crossed[2]	Alternative Removed	Rational for Removal
FI	**27**	**No**	**--**
FG	**30**	**No**	**--**
FH	**41**	**No**	**--**

Northwest Quadrant Alternative

Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed[1] (miles)	Alternative Removed	Rational for Removal
NQA	81.01	No	--

Northwest Quadrant Alternative

Alternative	Number of Water Bodies Crossed[2]	Alternative Removed	Rational for Removal
NQA	115	No	--

Regional Arterial Alternative

Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed[1] (miles)	Alternative Removed	Rational for Removal
RD	8.05	No	--
RC	8.85	No	--
RB	11.93	No	--
RA	17.37	No	--
RE	23.48	Yes	Practicability

Regional Arterial Alternative

Alternative	Number of Water Bodies Crossed[2]	Alternative Removed	Rational for Removal
RD	15	No	--
RB	25	No	--
RA	30	No	--
RC	31	No	--
RE	35	Yes	Practicability

Transit Alternative

Alternative	Wetlands, Orchid Habitat, Riparian Area Crossed[1] (miles)	Alternative Removed	Rational for Removal
TRA	12.73	Yes	Inappropriate
TRD	18.94	No	--
TRB	25.05	No	--
TRC	27.23	Yes	Practicability

Transit Alternative

Alternative	Number of Water Bodies Crossed[2]	Alternative Removed	Rational for Removal
TRA	12.73	Yes	Inappropriate
TRD	18.94	No	--
TRB	25.05	No	--
TRC	27.23	Yes	Practicability

Increasing Potential Impacts to Wetlands, Orchard Habitat, and Riparian Area

Increasing Potential Impacts to Water Resources

Notes: Practicable Alternative

Alternative removed for environmental reasons (T & E, Wildlife crossing, and Landfills)

[1]Because jurisdictional wetlands and Ute-ladies tresses orchid habitat typically occurs within riparian areas, the riparian areas were used as a proxy measurement for these resources.

[2]Number of water bodies crossed is a measurement of all streams, rivers, creeks, canals, and ditches crossed by each alternative. This measure was selected to represent a proxy measurement for potential impacts to overall water quality, the aquatic environment, and riparian areas.

B.8 LEVEL 3 ALTERNATIVES EVALUATION AND SCREENING

Level 3 alternatives evaluation and screening was a multi-step process that further analyzed the remaining 23 build alternatives and the No Action Alternative, totaling 24 alternatives. The goal of Level 3 screening was to reduce the number of alternatives to be analyzed in further detail. The Level 3 screening process was broken into primary steps, each with a unique approach. Level 3A consisted of three sub-steps, i, ii, and iii, which looked at the discerning elements of alternatives to determine their comparative differences. Level 3B looked for merging and packaging opportunities among the remaining alternatives. Level 3C completed the process by evaluating the remaining and newly merged/combined alternatives utilizing further data and analysis. Following are descriptions and results of each step.

B.8.1 LEVEL 3A(I) – CRITICAL LINK EVALUATION AND COMPARATIVE SCREENING

Level 3ai Screening			
Screening Goal: Identify environmentally preferable paths in selected areas for Freeway and Tollway alternatives.	**Approach**: In areas where transportation/mobility characteristics are similar, identify the path by using specified criteria that has the fewest collective impacts to the Natural and Built and Social Environments	**Evaluation Criteria**: Use of existing GIS information and initial project specific data collection on: • Natural Environment Data used focused on regulated resources important to cooperating agencies and communities.	**Decisions:** **Alternatives Removed:** • 3 Freeway with Transit Envelope • 1 Freeway without Transit Envelope • 4 Tollway with Transit Envelope A total of 8 alternatives were removed & 16 alternatives - including the No Action - were carried forward.

B.8.1.1 LEVEL 3A(I) APPROACH

Level 3A(i) evaluation and screening used site-specific environmental factors to identify the best route, or "link", in selected areas where mobility/transportation performance is substantially the same for all link alternatives. Freeway and tollway alternatives with multiple alignments in certain geographic areas were the focus of this screening. Quantitative data were used, including natural environment components such as wildlife, threatened and endangered species, waterways, and wetlands, as well as built and social environmental impact criteria such as parks and recreation areas, likely historical sites, and residential and commercial acquisition requirements.

Link decisions were made in three areas (see **Figure B.8-1**). The m, n, and o links apply to B alternatives connecting Indiana Street to SH 93. An "m1" link was recognized as a possibility during this step and was created. The x and z links are options for C alternatives down Indiana Street and McIntyre Street. The third links were never given link letter titles and compared Indiana Street and Alkire Street options on the D alignments.

B.8.1.2 LEVEL 3A(I) DECISION

The analysis during Level 3A(i) indicated that the freeway and tollway alternatives with "n, x, and Indiana" links had fewer potential impacts compared to the other links. Those freeway and tollway alternatives that use the other links (m, m1, o, z, and Alkire Street) were screened out and not considered further. Eight freeway and tollway alternatives were removed during Level 3A(i) (see **Table B.8-1**). Fifteen build alternatives were carried forward for further analysis. An analysis to determine if the apparent LEDPA was eliminated during this screening step concluded that an apparent LEDPA still remained as an alternative (see **Table B.4-2**).

Figure B.8-1 Level 3A(i) Critical Links

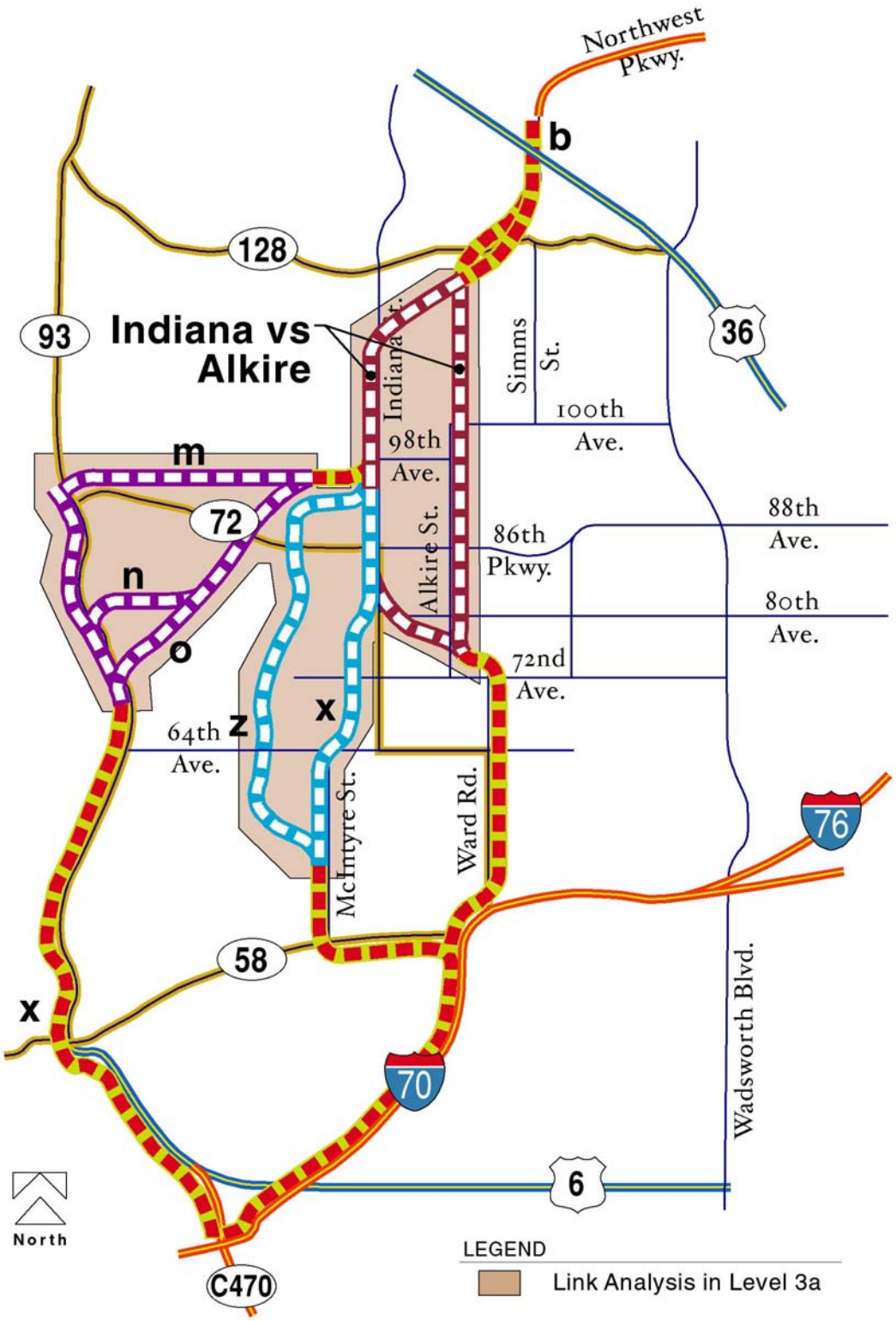


Table B.8-1 Level 3A(i) Screening—Critical Links Evaluation

3A(i) Critical Links	Alignment	Is Alignment Carried Forward	Comments/Explanation
m, n, o	M	No	The "m" alignment is located near the southern boundary of Rocky Flats before connecting with SH 93 south of the SH 72/SH 93 intersection. The alignment follows SH 93 for about two and one-quarter miles to the southern terminus of the critical links area just south of Ralston Creek. The "m" alignment is eliminated from further evaluation because other alignments better avoid impacts in this area. The criterion having the most influence on the removal of this alignment is its potential to impact habitat of food supply for bald eagles (10 acres), wetlands in the ROW (8 acres), and the number of trails in the ROW (15). While this alignment avoids more impacts then the "o" link, it does not avoid impacts as well as the "n" alignment. **Alternatives FBbmx and TBbmx are removed** by this decision.
m, n, o	M1	No	The "m1" alignment is identical to the "m" alignment over much of the northern and southern portions of the alignment except that it passes east of the Jefferson County landfill instead of west of the landfill as SH 93 does. The alignment follows SH 93 for about one and one-quarter miles to the southern terminus of the Critical Links area just south of Ralston Creek. This alternative was designed to avoid the grassland impacts of other alternatives. The "m1" alignment does not pass because other alignments better avoid impacts in this area. Criteria effecting the removal of this alignment include the potential impacts to habitat of bald eagle food supply (10 acres) and the number of streams and rivers crossed (15). While this alignment avoids more impacts than the "o" link, it does not avoid impacts as well as the "n" alignment. Since "m1" was a variation of an alignment, its removal does not affect any alternatives.
m, n, o	N	Yes	The "n" alignment crosses SH 72 just east of the Rocky Flats Industrial Park and connects with SH 93 south of Leyden Gulch hogback. The alignment follows SH 93 for about one mile to the southern terminus of the critical links area just south of Ralston Creek. The "n" alignment avoids impacts better then other alternatives in this critical link area. This alternative is advanced for further analysis because of its comparatively minimal impact to historical resources, potential Section 106 sites, biological resources, and it has fewer impacts to wetlands, water resources, and potential 4(f) recreational areas. **Alternative FBbnx and TBbnx are passed** forward for further evaluation.

3A(i) Critical Links	Alignment	Is Alignment Carried Forward	Comments/Explanation
m, n, o	O	NO	The "o" alignment crosses SH 72 just east of the Rocky Flats Industrial Park and connects with SH 93 about a mile south of the Leyden Gulch intersection. The alignment follows SH 93 for only about one-quarter mile to the southern terminus of the critical links area south of Ralston Creek. The "o" alignment does not pass because it does not avoid impacts as well as all other alignments in this area. Criteria affecting the removal of this alignment include potential impacts to wetlands in the ROW (7 acres), the linear feet of sensitive creeks crossed (770 feet), and the potential 4(f) areas within the ROW (18 acres). This alignment would have greater impacts to recreational lands (Arvada-Blunn Reservoir) and water bodies (Ralston Creek) then the other alignments in this area. **Alternatives FBbox and TBbox are removed** by this decision
z, x	X	Yes	The "x" alignment follows Indiana Street starting north of 96th Avenue and extending south near 72nd Avenue. The alignment meanders from that point to the southwest near 64th Avenue where it continues south on McIntyre Street to its southern terminus near 54th Avenue. The "x" alignment better avoids impacts then the "z" link. This alternative is advanced for further analysis because of its comparatively limited disturbance of PMJM habitat, crossing fewer streams or rivers, and because it is further from potable reservoirs then the "z" alignment (2100 feet compared with only 90 for the "z" alignment). Additionally, this alignment has minimal impacts to potential 4(f) lands (0.5 acres compared to 93 acres disturbed in the "z" alignment). **Alternatives FCbx and TCbx are passed** forward for further evaluation by this decision.
z, x	Z	No	The "z" alignment follows Indiana Street in the north, turns west to pass to the west of Welton Reservoir, crosses Leyden Gulch and passes between Tucker Lake and Arvada-Blunn Reservoir. After passing between the two reservoirs the alignment follows Van Bibber Creek for about one and one-half mile to again merge with Indiana Street near 54th Avenue. The "z" alignment is eliminated because it does not avoid impacts as well as the "x" alignment. The criteria effecting the removal of this alignment result from its proximity to the Arvada-Blunn reservoir complex (less than 100 feet distance), thus more potential impacts to the drinking water reservoir. This alignment also has significantly more impacts to developed potential 4(f) recreation lands (93 acres as compared to 0.5 acres for "x" alignment). Additionally this alignment crosses more streams or rivers (10) and affects an historic site that is known to be eligible for the NRHP. **Alternatives FCbz and TCbz are removed** by this decision.

3A(i) Critical Links	Alignment	Is Alignment Carried Forward	Comments/Explanation
Indiana/Alkire	Indiana	Yes	The Indiana alignment under this Critical Links analysis starts in the north about one-half mile south of SH 128, directly north of the current northern terminus of Alkire Street. The alignment extends southwest to Indiana Street then follows Indiana south for about three miles. Near the outfall from Leyden Reservoir at about 80th Avenue, the alignment follows the creek southeast for about one mile until connecting with Alkire Street. The Indiana alignment avoids impacts better than the Alkire alignment. This alternative is advanced for further analysis because of its avoidance of recreational values, comparatively minimal impact to the water quality of Standley Lake, and fewer impacts to residential properties (37 as compared to 112 for the Alkire alignment). Additionally this alignment avoids potential 4(f) and Section 106 impacts better then the Alkire alignment; it also slightly better avoids noise, air, stream impacts, and better avoids potential eagle impacts. In an effort to be conservative, potential 4(f) impacts have been assumed on Rocky Flats because the transportation easement has not yet been determined. **Alternative FFb is passed** forward for further evaluation.
Indiana/Alkire	Alkire	No	The "Alkire" alignment under this Critical Links analysis starts in the north about one-half mile south of SH 128, directly north of the current northern terminus of Alkire Street. The alignment passes directly south, just east of Great Western Reservoir, for about one and one-half mile to the current northern terminus of Alkire Street and hence along Alkire Street for about two and one-half miles to Leyden Creek. The Alkire alignment does not pass forward because it does not avoid impacts as well as the Indiana alignment. The criteria effecting the removal of this alignment were its proximity to Standley Lake (50 feet), potential impacts to the protected Bald Eagle (within the DOW-determined one-half mile buffer area), and potential impacts to water quality of potable water supply. Additionally, this alternative would impact nearly three times the number of homes, 112 removed, as would the Indiana alignment with 37 homes removed. This alignment would also impact more potential 4(f) and Section 106 areas than the Indiana alignment. **Alternatives FD and TD are removed** by this decision.

B.8.1.3 LEVEL 3A(I) LEDPA ANALYSIS

Table B.8-2 Level 3a(i) Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis

		Level 3ai--Critical Links (Partial Alignment Analysis)										
				Wetlands & Potential Waters of the U.S.		Water Supplies						
						Sensitive Creeks and Canals/Ditches Crossed						
						Creeks		Canals/Ditches				
	3ai Critical links	Purpose and Need Assessment	Practicability Assessment	Preliminary Wetlands in ROW (Acres)	Streams and Rivers Crossed (Number)	Number	Linear Feet	Number	Linear Feet	Total Linear Feet	Distance to Nearest Potable Water Source (Linear Feet)	Is Alignment Carried Forward?
m, n, o	n	Currently acceptable for P&N	Currently Practicable	2.9	3	1	388	0	0	388	500	Yes
m, n, o	m1	Currently acceptable for P&N	Currently Practicable	3.7	5	1	388	0	0	388	500	**No**
m, n, o	o	Currently acceptable for P&N	Currently Practicable	7.1	4	1	770	0	0	770	300	**No**
m, n, o	m	Currently acceptable for P&N	Currently Practicable	8.0	6	2	494	0	0	494	500	**No**
z,x	x	Currently acceptable for P&N	Currently Practicable	7.7	6	2	950	11	3,840	4,790	2,100	Yes
z,x	z	Currently acceptable for P&N	Currently Practicable	7.9	10	2	743	2	1,420	2,163	90	**No**
Indiana/Alkire	Alkire*	Currently acceptable for P&N	Not Practicable	9.1	3	3	712	5	1,840	2,552	50	**No**
Indiana/Alkire	Indiana	Currently acceptable for P&N	Currently Practicable	15.4	4	3	796	3	1,475	2,271	2,100	Yes

Increasing Potential Impacts to Aquatic Environment

Notes: Critical link removed from further analysis.

*The Alkire alignment was removed from further analysis because it is not a logistically practicable based on high impacts to social feasibility criteria. The Alkire alignment requires removal of 114 buildings while the Indiana alignment requires 43 building removals.

B.8.2 LEVEL 3A(II) – INITIAL TRANSPORTATION PERFORMANCE EVALUATION

Level 3aii Screening			
Screening Goal: Identify and remove inferior alternatives when only considering Purpose and Need criteria.	**Approach**: A transportation criteria analysis was performed by using the Denver Regional Council of Government's (DRCOG) 2030 regional growth and traffic model as a starting point, remaining alternatives were modeled to determine comparative Purpose and Need performance.	**Evaluation Criteria**: DRCOG 2030 Model that was manipulated to reflect transportation alternatives. Only transportation data used.	**Decisions:** **Alternatives Removed:** • 2 Transit Alternatives • 2 Regional Arterials • Northwest Quadrant Alternative A total of 5 alternatives were removed & 11 alternatives - including the No Action - were carried forward.

B.8.2.1 LEVEL 3A(II) APPROACH

Level 3A(ii) screening utilized the newly available 2030 DRCOG regional growth and traffic model to determine which of the remaining fifteen alternatives would not meet transportation performance criteria to a reasonable degree. Traffic forecasts were prepared for the transit and regional arterial alternatives, and the performance attributes of these alternatives were compared against a sampling of higher performing alternatives (freeways or tollways) to make a determination as to the suitability of the transit and regional arterial alternatives.

For each alternative the following transportation criteria were applied: ability to serve corridor travel demand, total vehicle miles traveled (VMT), total vehicle hours traveled (VHT), the ratio of traffic volume and roadway capacity (v/c), and connectivity of modal functional class within the study area. Environmental and practicability criteria were not considered in this step and only those alternatives with clear purpose and need deficiencies were eliminated.

B.8.2.2 LEVEL 3A(II) DECISION

This analysis determined that five of the transit and regional arterial alternatives were performing at a level significantly lower than the other alternatives and did not meet the project purpose and need (see **Table B.8-3** and **Table B.8-4**). Ten alternatives survived for further analysis and screening. An analysis to determine if the apparent LEDPA was eliminated during this screening step concluded that an apparent LEDPA still remained as an alternative (see **Table B.8-5**). The following is a summary rationale for screening of the five removed alternatives.

TRB ALTERNATIVE (BUS RAPID TRANSIT) EVALUATION SUMMARY

Alternative TRB would consist of Bus Rapid Transit (BRT) 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. Modeling forecasts show:

- Approximately 2,500 boardings during an average workday in 2030. This is far fewer than forecasts generally implemented by RTD for FasTracks corridors, at 15,000 to 20,000 boardings per day.
- There would be 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.

These forecasted figures suggest the TRB Alternative could not, by itself, meet the area needs expressed in the project purpose and need. The TRB Alternative is therefore screened from further consideration as a stand-alone alternative. Inclusion of a transportation envelope that could accommodate a future transit corridor will continue to be considered.

TRC ALTERNATIVE (LIGHT RAIL) EVALUATION SUMMARY

Alternative TRC would consist of Light Rail Transit (LRT) 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. Modeling forecasts show:

- The Wadsworth Boulevard portion of the TRC alternative is expected to carry approximately 3,800 boardings during an average workday in 2030. Like the TRB 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. Similarly to the TRB Alternative, this would represent less than one percent of the daily north-south travel demand in the Northwest Corridor study area.

These figures suggest that Alternative TRC could not, by itself, meet the area needs expressed in the project purpose and need. Furthermore, RTD planners judged that 2030 population and employment densities clearly would not support a LRT Alternative along the Indiana Street/McIntyre Street portion of the TRC Alternative system. TRC Alternative is therefore screened out as a stand-alone alternative. Inclusion of a transportation envelope that could accommodate a future transit corridor will continue to be considered.

RA ALTERNATIVE EVALUATION SUMMARY

Alternative RA would upgrade 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 show:

- Compared with the RB Alternative, the RA Alternative would attract less traffic to this major regional arterial corridor. The RA Alternative provides similar to slightly reduced relief to other north-south arterial routes, including Indiana Street/McIntyre Street and Wadsworth Boulevard.
- The RA Alternative provides less travel-time savings along most travel paths compared with the RB Alternative, the RC Alternative, and all freeway and tollway alternatives.
- The RA Alternative increases regional vehicle hours of travel slightly over the No Action Alternative.
- The RA Alternative does not significantly improve connectivity in the study area.

For these reasons, the RA Alternative is removed from further consideration for having comparatively poor transportation (purpose and need) performance.

RD ALTERNATIVE EVALUATION SUMMARY

The RD 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 show:

- The RD Alternative does not provide significant relief to other study area north-south arterial routes, including SH 93 and Indiana Street/McIntyre Street.
- The RD Alternative provides the least travel time savings for the north-south travel paths of all roadway alternatives.
- The RD Alternative is the only alternative that increases regional VHT.
- The RD Alternative does not provide connectivity in the study area.

For these reasons, the RA Alternative is removed from further consideration for having comparatively poor transportation (purpose and need) performance.

NORTHWEST QUADRANT ALTERNATIVE EVALUATION SUMMARY

This alternative includes the many near-term improvements to existing roadways recommended in the NWQFS. Other recommendations of the Feasibility Study, as addressed by this study and described in **Chapter 1**, include additional studies for long-term improvements to: connect Indiana Street and SH 93; address future interchange locations; and plan for long-term access control and right-of-way preservation. The recommended roadway improvements of the NWQFS Study were retained for Level 3A transportation modeling and screening.

Transportation modeling shows that enacting the extensive NWQFS local street improvement recommendations would provide transportation benefits in the project area. However, the alternative would be deficient with regard to system connectivity measures because it does not allow a clear connection to or extension of the higher-function facilities to the north and south. This is demonstrated in part by relatively poor peak travel-time savings and other measures of qualitative factors necessary for such connectivity/functionality to exist. Due to these parameters this alternative does not meet the Northwest Corridor Purpose and Need and is screened from further consideration. This conclusion does not preclude the opportunity for local cities and counties to pursue the recommendations for improvements to the streets within their jurisdictions.

Table B.8-3 Level 3A(ii) Comparative Evaluation—Purpose and Need—2030 Demand and Demand Capacity

Purpose and Need											
Alternative	2030 Demand and Demand Capacity										Acceptable for Purpose and Need?
	Screenline	Select Screenlines	Alternative Alignment		SH 93		Indiana/McIntyre		Wadsworth		
		Volumes	Volumes	v/c	Volumes	v/c	Volumes	v/c	Volumes	v/c	
FB (via SH 93)	*N*	132,000	45,000	<0.85	21,000	1.19	18,000	1.22	47,000	0.85	Yes
	M	179,000	57,000	<0.85	23,000	0.96	19,000	1.30	61,000	0.96	
	S	218,000	76,000	<0.85	76,000	1.01	15,000	0.97	58,000	<0.85	
TB (via SH 93)	*N*	121,000	34,000	<0.85	19,000	1.11	19,000	1.26	47,000	0.86	Yes
	M	161,000	35,000	<0.85	24,000	1.10	20,000	1.23	62,000	0.92	
	S	206,000	31,000	<0.85	25,000	1.35	21,000	1.18	58,000	<0.85	
FG (via SH 93)	*N*	132,000	45,000	<0.85	21,000	1.19	18,000	1.22	47,000	0.85	Yes
	M	179,000	57,000	<0.85	23,000	0.96	19,000	1.30	61,000	0.96	
	S	218,000	76,000	<0.85	76,000	1.01	15,000	0.97	58,000	<0.85	
FH (via McIntyre)	*N*	141,000	56,000	<0.85	19,000	1.09	19,000	<0.85	45,000	<0.85	Yes
	M	183,000	66,000	<0.85	23,000	1.20	15,000	<0.85	60,000	0.95	
	S	220,000	49,000	<0.85	26,000	1.37	25,000	<0.85	57,000	<0.85	
RA (via SH 128 /SH 93)	*N*	128,000	38,000	<0.85	38,000	<0.85	21,000	1.43	50,000	0.91	***No***
	M	150,000	45,000	<0.85	45,000	<0.85	21,000	1.42	64,000	1.01	
	S	201,000	50,000	0.94	50,000	0.94	18,000	1.11	61,000	<0.85	
RB (via SH 93)	*N*	111,000	22,000	<0.85	22,000	1.29	22,000	<0.85	49,000	0.90	Yes
	M	151,000	37,000	<0.85	37,000	<0.85	25,000	1.67	64,000	1.01	
	S	200,000	44,000	<0.85	44,000	<0.85	21,000	1.16	61,000	<0.85	

Purpose and Need											
Alternative	2030 Demand and Demand Capacity										Acceptable for Purpose and Need?
	Screenline	Select Screenlines	Alternative Alignment		SH 93		Indiana/McIntyre		Wadsworth		
		Volumes	Volumes	v/c	Volumes	v/c	Volumes	v/c	Volumes	v/c	
RC (via McIntyre)	*N*	134,000	50,000	<0.85	19,000	1.00	50,000	<0.85	48,000	0.89	Yes
	M	155,000	52,000	<0.85	23,000	1.19	52,000	<0.85	62,000	0.98	
	S	213,000	62,000	1.05	26,000	1.35	62,000	1.05	58,000	<0.85	
RD (via Wadsworth)	*N*	117,000	68,000	<0.85	20,000	1.16	22,000	1.47	68,000	<0.85	***No***
	M	172,000	111,000	1.33	24,000	1.24	20,000	1.23	111,000	1.33	
	S	215,000	102,000	1.22	26,000	1.39	22,000	1.23	102,000	1.22	
FC (via McIntyre)	*N*	141,000	56,000	<0.85	19,000	1.09	19,000	<0.85	45,000	<0.85	Yes
	M	183,000	66,000	<0.85	23,000	1.20	15,000	<0.85	60,000	0.95	
	S	220,000	49,000	<0.85	26,000	1.37	25,000	<0.85	57,000	<0.85	
TC (via McIntyre)	*N*	122,000	35,000	<0.85	19,000	1.11	19,000	1.31	46,000	0.85	Yes
	M	162,000	42,000	<0.85	23,000	1.21	16,000	0.99	61,000	0.96	
	S	206,000	32,000	<0.85	26,000	1.38	24,000	1.14	58,000	<0.85	
FF (via Ward)	*N*	145,000	62,000	<0.85	19,000	1.09	19,000	<0.85	44,000	<0.85	Yes
	M	184,000	70,000	<0.85	21,000	1.11	17,000	<0.85	58,000	0.92	
	S	222,000	66,000	<0.85	25,000	1.35	19,000	1.16	55,000	<0.85	
FI (via Ward)	*N*	145,000	62,000	<0.85	19,000	1.09	19,000	<0.85	44,000	<0.85	Yes
	M	184,000	70,000	<0.85	21,000	1.11	17,000	<0.85	58,000	0.92	
	S	222,000	66,000	<0.85	25,000	1.35	19,000	1.16	55,000	<0.85	
NW Quadrant	*N*	128,000	NA	NA	32,000	<0.85	34,000	<0.85	54,000	<0.85	***No***
	M	153,000	NA	NA	37,000	<0.85	34,000	1.07	62,000	0.98	
	S	208,000	NA	NA	44,000	<0.85	30,000	<0.85	58,000	<0.85	

Purpose and Need											
Alternative	2030 Demand and Demand Capacity										Acceptable for Purpose and Need?
	Screenline	Select Screenlines	Alternative Alignment		SH 93		Indiana/McIntyre		Wadsworth		
		Volumes	Volumes	v/c	Volumes	v/c	Volumes	v/c	Volumes	v/c	
TRB (BRT)	*N*	N/A	2,500 Total Daily Passengers		N/A	N/A	N/A	N/A	N/A	N/A	***No***
	M	N/A			N/A	N/A	N/A	N/A	N/A	N/A	
	S	N/A			N/A	N/A	N/A	N/A	N/A	N/A	
TRC (LRT)	*N*	N/A	3,800 Total Daily Passengers		N/A	N/A	N/A	N/A	N/A	N/A	***No***
	M	N/A			N/A	N/A	N/A	N/A	N/A	N/A	
	S	N/A			N/A	N/A	N/A	N/A	N/A	N/A	
No Action	*N*	102,000	N/A	N/A	20,000	1.17	23,000	1.55	52,000	0.95	Carried Forward Per NEPA
	M	133,000	N/A	N/A	24,000	1.25	22,000	1.34	65,000	1.03	
	S	183,000	N/A	N/A	26,000	1.40	21,000	1.28	62,000	<0.85	
Metro Vision 2030	*N*	146,000	51,000	<0.85	21,000	1.22	25,000	<0.85	46,000	0.85	N/A
	M	165,000	45,000	<0.85	27,000	<0.85	22,000	<0.85	56,000	0.88	
	S	223,000	68,000	<0.85	68,000	0.90	26,000	1.47	54,000	<0.85	

Key: **F**-Freeway
T-Tollway
R-Regional Arterial

N-north screenline
M-middle screenline
S-south screenline

Volume-daily volume
v/c - peak hour volume/capacity ration

Table B.8-4 Level 3A(ii) Comparative Evaluation—Purpose and Need—System Connectivity/Local Access, Mobility, and Modal Travel

Purpose and Need						
Alternative	System Connectivity/Local Access		Mobility		Modal Travel	Acceptable for Purpose and Need?
	Connectivity & Functionality[1]	Peak Travel Time Savings vs. No Action – Sum of 5 Travel Paths[2]	Regional VMT difference vs. No Action	Regional VHT difference vs. No Action	Opportunities to Expand Regional Transit System[3]	
FB (via SH 93)	1	189.0	769,310	(3,789)	Moderate	Yes
TB (via SH 93)	1	207.4	539,413	9,314	Moderate	Yes
FG (via SH 93)	1	189.0	769,310	(3,789)	Low	Yes
FH (via McIntyre)	2	163.4	555,017	(8,843)	Low	Yes
RA (via SH 128/SH 93)	3	60.8	355,771	80	Low	***No***
RB (via SH 93)	3	56.2	307,178	(2,620)	Low	Yes
RC (via McIntyre)	4	92.4	318,215	(5,109)	Low	Yes
RD (via Wadsworth)	5	45.6	221,126	3,220	Low	***No***
FC (via McIntyre)	2	163.4	555,017	(8,843)	Moderate	Yes
TC (via McIntyre)	2	184.4	1	(1,576)	Moderate	Yes
FF (via Ward)	4	152.5	1	(5,380)	Yes	Yes

Purpose and Need						
Alternative	System Connectivity/Local Access		Mobility		Modal Travel	Acceptable for Purpose and Need?
	Connectivity & Functionality[1]	Peak Travel Time Savings vs. No Action – Sum of 5 Travel Paths[2]	Regional VMT difference vs. No Action	Regional VHT difference vs. No Action	Opportunities to Expand Regional Transit System[3]	
FI (via Ward)	4	152.5	564,868	(5,380)	Moderate	Yes
NW Quadrant	5	87.8	681,585	(5,074)	Yes	***No***
TRB (BRT)	N/A	N/A	N/A	N/A	High	***No***
TRC (LRT)	N/A	N/A	N/A	N/A	High	***No***
No Action	5	0.0	0	0	No	Carried Forward Per NEPA
Metro Vision 2030	1	218.6	2,373,307	(43,213)	Yes	NA

Notes: [1]Rated 1 (best) to 5 (worst) based on connectivity, functionality, and mainline continuity
[2]Total of minutes saved vs. No Action for each of 5 travel paths, AM and PM peaks, NB & SB = total of 20 trips; No Action total = 904.8 minutes
[3]Rapid Transit Enhancement ratings: high = transit system expanded; moderate = opportunity for expansion, low = constrained opportunity for expansion

Key:
F-Freeway
T-Tollway
R-Regional Arterial

N-north screenline
M-middle screenline
S-south screenline

Volume-daily volume
v/c - peak hour volume/capacity ration
Volume-daily volume
VMT - daily vehicle miles of travel
VHT - daily vehicle hours of travel

B.8.2.3 LEVEL 3A(II) LEDPA ANALYSIS

Table B.8-5 Level 3a(ii) Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis

Alternatives	Level 3a(ii) -- Initial Transportation Performance Modeling										
	Purpose and Need Assessment	Practicability Assessment	Wetlands & Potential Waters of the U.S.		Water Supplies						Is Alignment Carried Forward?
					Sensitive Creeks and Canals/Ditches Crossed					Distance to Nearest Potable Water Source (Linear Feet)	
					Creeks		Canals/Ditches				
			Preliminary Wetlands in ROW (Acres)	Streams and Rivers Crossed (Number)	Number	Linear Feet	Number	Linear Feet	Total Linear Feet		
RD	Does not meet P&N		2.91	5	1	227	0	0	227	6700	**No**
TRC	Does not meet P&N		9.38	24	5	602	12	3,683	3,650	1300	**No**
RC	Meets P&N	Not Considered in the Initial Transportation Performance Screening	10.69	17	3	999	13	4,677	5,676	2700	Yes
TB	Meets P&N		19.47	27	8	4,906	2	343	5,250	550	Yes
FI	Meets P&N		19.68	31	5	1,443	5	1,786	3,229	1100	Yes
FG	Meets P&N		19.96	26	8	4,714	2	499	5,213	600	Yes
FH	Meets P&N		19.98	26	4	1,413	13	4,182	5,595	1100	Yes
RB	Meets P&N		20.19	25	8	4,556	2	448	5,357	300	Yes
FF	Meets P&N		20.56	31	5	1,557	5	1,699	3,256	1100	Yes
FB	Meets P&N		21.24	27	8	4,920	2	499	5,419	600	Yes
TC	Meets P&N		21.27	26	4	1,527	13	4,409	5,936	1200	Yes
FC	Meets P&N		21.27	26	4	1,527	13	4,409	5,936	1100	Yes
TRB	Does not meet P&N		22.59	26	9	4,588	4	1,127	5,714	275	**No**
RA	Does not meet P&N		23.21	30	12	5,643	4	1,059	6,702	850	**No**
NWQ	Does not meet P&N		Was not be calculated because of large area impacted by this alternative								**No**

Increasing Potential Impacts to Aquatic Environment

Note: Alternative removed from further analysis based on Purpose and Need criteria.

B.8.3 LEVEL 3A(III)–FULL ALTERNATIVES COMPARISON SCREENING

Level 3aiii Screening

Screening Goal:	**Approach:**	**Evaluation Criteria:**	**Decisions:**
Determine if remaining alternatives have comparative impacts that are not reasonably balanced by transportation performance benefits.	Using numeric data to consider and compare the impacts to the Natural Environment and Built and Social Environment, as well as practicability and engineering feasibility considerations for the entire length of each alternative. Compare these impacts with projected transportation benefits, as modeled using the DRCOG 2030 Model.	Increasingly more detailed, site-specific information data on: • Transportation (DRCOG 2030 Modeling results) • Practicability • Natural Environment • Build and Social Environment	**Alternatives Removed:** • 1 Freeway with Transit Envelope • 3 Freeway without Transit Envelope A total of 4 alternatives were removed & 7 alternatives - including the No Action - were carried forward.

B.8.3.1 LEVEL 3A(III) APPROACH

The Level 3A(iii) screening step used transportation performance, practicability, natural environment, and built/social environment criteria to determine if certain alternatives have comparative impacts that are not reasonably balanced by transportation performance benefits, and can therefore be screened out (see **Table B.8-6**). For example, if a particular freeway alternative has significant social and/or natural environmental impacts compared with other alternatives, while its transportation benefits are similar or only slightly greater, it could be screened out because there were no significant benefits that out-weighed impacts to the natural and built and social environments.

B.8.3.2 LEVEL 3A(III) DECISION

Level 3A(iii) analysis showed that while there are differences between alternatives for transportation and natural environmental measures, these metrics were not specific enough to justify screening one alternative from another. Comparative evaluations of the built and social environment and social feasibility as a component of practicability logistics, however, did reveal clear rationale for screening alternatives. The evaluation of social feasibility considers the potential for alternatives to negatively affect communities that they traverse. Those alternatives having greater impacts can disrupt community cohesion and potentially change the social character of affected communities. Also included is a brief description of whether or not each alternative adequately meets the purpose and need. The transportation criteria and results used in Level 3A(iii) are the same as those criteria used in Level 3A(ii).

Ten build alternatives were evaluated during Level 3A(iii) screening and four alternatives were eliminated from further consideration (see **Table B.8-6**). An analysis to determine if the apparent LEDPA was eliminated during this screening step concluded that an apparent LEDPA still remained as an alternative (see **Table B.8-7**). Those eliminated are discussed briefly below.

FF AND FI ALTERNATIVES–EVALUATION SUMMARY

These freeway alternatives going down Ward Road would impact a significantly greater number of buildings and homes and for this reason are judged to be impracticable based on social feasibility criteria. Certain difficulties in fulfilling project purpose and need were also evident. These alternatives are therefore screened from further consideration.

FG AND FH ALTERNATIVES–EVALUATION SUMMARY

The FG and FH Alternatives, which are freeways without transit envelopes down SH 93 and McIntyre Street, are screened out because of the constraint for multimodal expansion opportunities. This constraint results in decreased performance related to project purpose and need compared to other alternatives. These alternatives are virtually indistinguishable from the FB and FC Alternatives other than the extra right of way preservation, so this screening decision was an opportunity to reduce the number of remaining alternatives to be studied.

Table B.8-6 Level 3A(iii) Screening—Comparative Evaluation

Level 3A(iii) Screening Table -- Comparative Evaluation														
Alternative	Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
	2030 Demand & Demand/Capacity (Screenlines)		Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
FB (via SH 93)	N	136,000	(3,789)	1	Moderate	**Low**	**Moderate**	**High**	**High**	**Moderate**	**Moderate**	**Yes**	Based on current analysis, this alternative provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alternative.
	M	187,000				16	22 acres	20,985 Linear Feet	21.2 Acres	5,419 Total Linear Ft. traversed	138 Homes		
	S	224,000							19 Streams Crossed	4 Difficult Crossings	31 Commercial Buildings		
TB (via SH 93)	N	121,000	9,314	1	Moderate	**Low**	**Moderate**	**High**	**High**	**Moderate**	**Moderate**	**Yes**	Based on current analysis, this alternative provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alt.
	M	161,000				13	21 acres	20,388 Linear Feet	19.5 Acres	5,250 Total Linear Ft. traversed	142 Homes		
	S	206,000							19 Streams Crossed	4 Difficult Crossings	31 Commercial Buildings		

Level 3A(iii) Screening Table -- Comparative Evaluation

Alternative		Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
		2030 Demand & Demand/Capacity (Screenlines)	Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
FG (via SH 93)	N	132,000	(3,789)	1	Low	**Low**	**Moderate**	**High**	**High**	**Moderate**	**Moderate**	**No**	Constrains opportunities for intermodal expansion compared with the wider footprint facility of **FB**. The alternative is practicable and has a reasonable level of impacts to the natural environment compared with other alternatives. Screened out as a stand-alone alternative.
	M	181,000				15	21 acres	21,471 Linear Feet	20.0 Acres	5,213 Total Linear Ft. traversed	138 Homes		
	S	218,000							18 Streams Crossed	6 Difficult Crossings	31 Commercial Buildings		
FH (via McIntyre)	N	141,000	(8,843)	2	Low	**Moderate**	**High**	**Low**	**High**	**Moderate**	**High**	**No**	Constrains opportunities for intermodal expansion compared with the wider footprint facility of **FC**. The alternative is practicable and has a reasonable level of impacts to the natural environment compared with other alternatives. Screened out as a stand-alone alternative.
	M	183,000				54	30 acres	5,930 Linear Feet	20.0 Acres	5,595 Total Linear Ft. traversed	270 Homes		
	S	220,000							22 Streams Crossed	4 Difficult Crossings	115 Commercial Buildings		

Level 3A(iii) Screening Table -- Comparative Evaluation

Alternative		Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
		2030 Demand & Demand/Capacity (Screenlines)	Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
RB (via SH 93)	N	132,000	(2,620)	3	Low	**Low**	**Moderate**	**Moderate**	**High**	**Low**	**Moderate**	**Yes**	Constrains opportunities for intermodal expansion but provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alternative.
	M	150,000				10	19 acres	14,538 Linear Feet	20.2 Acres	5,357 Total Linear Ft. traversed	120 Homes		
	S	203,000							17 Streams Crossed	3 Difficult Crossings	44 Commercial Buildings		
RC (via McIntyre)	N	134,000	(5,109)	4	Low	**Moderate**	**Low**	**Low**	**Low**	**Moderate**	**Low**	**Yes**	Constrains opportunities for intermodal expansion but provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alternative.
	M	155,000				56	11 acres	6,560 Linear Feet	10.7 Acres	5,676 Total Linear Ft. traversed	84 Homes		
	S	213,000							14 Streams Crossed	6 Difficult Crossings	37 Commercial Buildings		

Level 3A(iii) Screening Table -- Comparative Evaluation														
Alternative	Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
	2030 Demand & Demand/Capacity (Screenlines)		Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
FC (via McIntyre)	N	141,000	(8,843)	2	Moderate	**Moderate**	**High**	**Low**	**High**	**High**	**High**	**Yes**	Based on current analysis, this alternative provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alternative.
	M	183,000				59	31 acres	8,005 Linear Feet	21.3 Acres	5,936 Total Linear Ft. traversed	267 Homes		
	S	220,000							22 Streams Crossed	6 Difficult Crossings	114 Commercial Buildings		
TC (via McIntyre)	N	122,000	(1,576)	2	Moderate	**Moderate**	**High**	**Low**	**High**	**High**	**High**	**Yes**	Based on current analysis, this alternative provides a reasonable level of transportation performance, is practicable, and has a reasonable level of impacts to the natural environment compared with other alternatives. Retained as a reasonable stand-alone alternative.
	M	162,000				58	31 acres	7,452 Linear Feet	21.3 Acres	5,936 Total Linear Ft. traversed	264 Homes		
	S	206,000							22 Streams Crossed	4 Difficult Crossings	116 Commercial Buildings		

Level 3A(iii) Screening Table -- Comparative Evaluation													
Alternative	Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
	2030 Demand & Demand/Capacity (Screenlines)		Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
FF (via Ward)	N	145,000	(5,380)	4	Moderate	High	High	Moderate	High	Moderate	High	No	This alternative is not logistically practicable because of the unreasonably large number of building removals required (245) which greatly increases project complexity and cost and causes adverse effects to community cohesion. Transportation performance is not significantly better than other alternatives that are retained. Screened out as an unreasonable alternative and will not be considered further.
	M	184,000				245	32 acres	10,825 Linear Feet	20.6 Acres	3,256 Total Linear Ft. traversed	367 Homes		
	S	224,000							26 Streams Crossed	8 Difficult Crossings	108 Commercial Buildings		

Level 3A(iii) Screening Table -- Comparative Evaluation														
Alternative	Purpose and Need				Practicability	Natural Environment					Alternative Carried Forward?	Comments/Explanation
	2030 Demand & Demand/Capacity (Screenlines)		Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity	Social Feasibility (Building Takes & Community Cohesion)	Threatened & Endangered Species	Wildlife Corridors	Wetlands & Waters of the U. S.	Water Supply Reservoirs, Streams and Canals	Noise and Air (300 Ft. Proximity)		
FI (via Ward)	N	145,000	(5,380)	4	Low	**High**	**High**	**Moderate**	**High**	**Low**	**High**	**No**	This alternative is not logistically practicable because of the unreasonably large number of building removals required (244) which greatly increases project complexity and cost and causes adverse effects to community cohesion. Transportation performance is not significantly better than other alternatives that are retained and the alternative constrains intermodal expansion. Screened out as an unreasonable alternative and will not be considered further.
	M	184,000				244	31 acres	10,376 Linear Feet	19.7 Acres	3,229 Total Linear Ft. traversed	367 Homes		
	S	224,000							26 Streams Crossed	6 Difficult Crossings	108 Commercial Buildings		

Level 3A(iii) Screening Table						
Alternative	Purpose and Need					
		2030 Demand & Demand/Capacity (Screenlines)		Mobility (VHT Compared to No Action)	System Connectivity & Local Access	Modal Travel Opportunity
No Action	N	102,000		3,683,967 (Total)	5	Low
	M	133,000				
	S	185,000				
Metro Vision 2030	N	146,000		(43,213)	1	High
	M	165,000				
	S	223,000				

Notes: Alternatives removed during the Level 3A(ii) Screening include Regional Arterial alternatives RA and RD; Transit alternatives TRB and TRC; and the Northwest Quadrant Feasibility Study alternative NQA.

Green -Alternative removed from further analysis based on purpose and need or practicability criteria.

Key:
F-Freeway
T-Tollway
R-Regional Arterial
N-north screenline
M-middle screenline
S-south screenline
High-transit system expanded
Moderate-opportunity for transit expansion
Low-constrained opportunity for transit expansion

B.8.3.3 LEVEL 3A(III) LEDPA ANALYSIS

Table B.8-7 Level 3a(iii) Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis

Level 3a(iii) -- Full Alignment Evaluation											
Alternatives	Purpose and Need Assessment	Practicability Assessment	Wetlands & Potential Waters of the U.S.		Water Supplies						Is Alignment Carried Forward?
					Sensitive Creeks and Canals/Ditches Crossed					Distance to Nearest Potable Water Source (Linear Feet)	
					Creeks		Canals/Ditches				
			Preliminary Wetlands in ROW (Acres)	Streams and Rivers Crossed (Number)	Number	Linear Feet	Number	Linear Feet	Total Linear Feet		
RC	Meets P&N	Practicable	10.69	17	3	999	13	4,677	5,676	2700	Yes
TB	Meets P&N	Practicable	19.47	27	8	4,906	2	343	5,250	550	Yes
FI	Meets P&N	Not Practicable*	19.68	31	5	1,443	5	1,786	3,229	1100	**No**
FG	Does not meet P&N	Practicable	19.96	26	8	4,714	2	499	5,213	600	**No**
FH	Does not meet P&N	Practicable	19.98	26	4	1,413	13	4,182	5,595	1100	**No**
RB	Meets P&N	Practicable	20.19	25	8	4,556	2	448	5,357	300	Yes
FF	Meets P&N	Not Practicable*	20.56	31	5	1,557	5	1,699	3,256	1100	**No**
FB	Meets P&N	Practicable	21.24	27	8	4,920	2	499	5,419	600	Yes
TC	Meets P&N	Practicable	21.27	26	4	1,527	13	4,409	5,936	1200	Yes
FC	Meets P&N	Practicable	21.27	26	4	1,527	13	4,409	5,936	1100	Yes

Increasing Potential Impacts to Aquatic Environment

Notes: Alternative removed from further analysis based on Purpose and Need or Practicability criteria.
*The FI and FF alternatives were removed from further analysis because they are not logistically practicable based on social feasibility criteria. The FI and FF alternatives require removal of 244 and 245 buildings, respectively.

B.9 LEVEL 3B–PACKAGING ALTERNATIVE DEVELOPMENT

Level 3B Screening			
Screening Goal: Not a screening step, but an alternative development step.	**Approach:** Through collaborative efforts with project stakeholders, identify portions of individual alternatives to be merged or packaged into a single alternative.	**Evaluation Criteria:** Use of previous screening data for: • Purpose and Need • Practicability • Natural Environment • Built and Social Environment	**Decisions:** ***Alternatives Added:*** • Merged and Packaged Tollway, Regional Arterial, and Principal Arterial • Packaging of two Regional Arterials A total of 2 alternatives were added & 9 alternatives - including the No Action - were carried forward.

Level 3B was not a screening step; rather it was a step where new alternatives were considered and developed. In the 3B process, the remaining six alternatives were reviewed to determine if new combined alternatives could be identified. Combined alternatives utilized attributes of the other six alternatives and combined them into a new alternative. This process was conducted during meetings (occurring on May 3, 12, and 13, 2005) with elected officials and public works staff from the various cities and counties of the study area. The group identified nearly a dozen potential combined alternatives. After lengthy discussions, two of the alternatives identified were supported by a favorable consensus opinion. The two alternatives are called TB/RB & PC and RB & RC (see **Figure B.9-1**). These alternatives were included with the other six alternatives for further screening analysis in the 3C screening process. A LEDPA analysis was not conducted during this screening level because no alternatives were eliminated.

B.9.1 COMBINED ALTERNATIVES

These alternatives include portions of the stand-alone alternatives. They were developed through a collaborative process with the CCC/TSC and represent an expansion of the range of alternatives beyond the stand-alone alternatives evaluated in Level 3 screening.

B.9.1.1 TB/RB & PC ALTERNATIVE

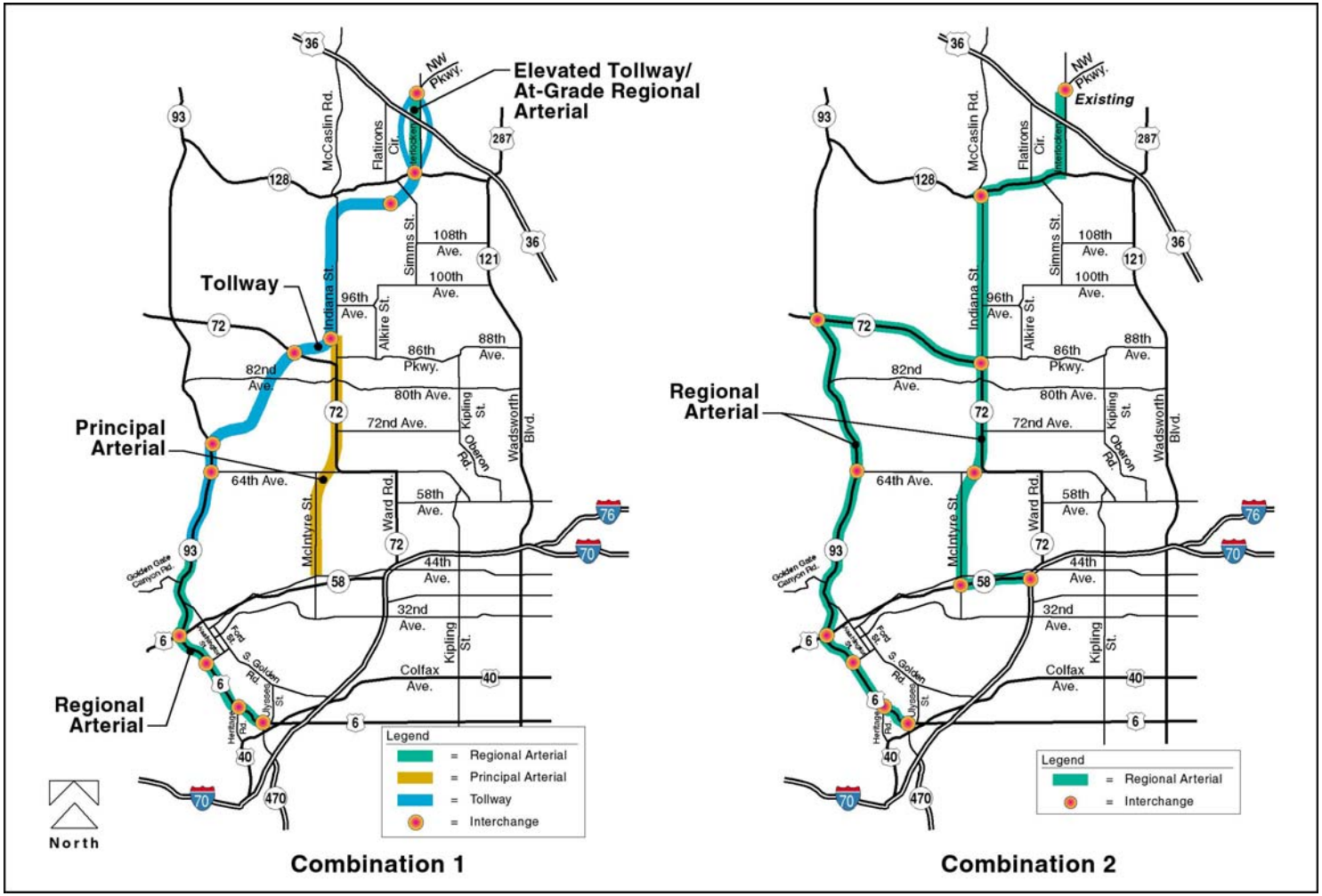
This alternative is a four-lane toll facility beginning at the terminus of the Northwest Parkway. It proceeds south along 96th Street through the US 36/Interlocken Interchange on elevated structures. The route parallels Interlocken Loop, crosses SH 128, proceeds southwest across undeveloped land, then turns south along Indiana Street just south of SH 128. At this point, the TB portion of the alternative continues south along Indiana Street and turns west at approximately 98th 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. Alternative TB continues south along SH 93 to approximately 56th 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 the C-470/I-70 Interchange.

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

B.9.1.2 RB & RC ALTERNATIVE

This four- or six-lane alternative includes the attributes of the RB & RC Alternative. The northern portion of the alternative from the Northwest Parkway to SH 72 was identical for both the RB and RC components. From that point south, the alternative follows the RB Alternative along SH 72 and then south on SH 93. The RC Alternative follows Indiana and McIntyre Streets south of 86th Parkway at Indiana Street.

Figure B.9-1 Combined Alternatives for Level 3B



Source: Compiled by FHU, 2007.

B.10 LEVEL 3C EVALUATION AND SCREENING PROCESS

Level 3C Screening

Screening Goal:	Approach:	Evaluation Criteria:	Decisions:
Identify the "Reasonable Range of Alternatives for Detailed Analysis" in the Draft EIS.	Using more detailed numeric data, identify the most desirable alternatives when considering and comparing impacts to the Natural Environment and Built and Social Environment, as well as practicability and engineering feasibility considerations for each alternative. Compare these impacts with projected transportation benefits, as modeled using the DRCOG 2030 Model.	Increasingly more detailed, site-specific information data on: • Transportation (DRCOG 2030 Modeling results) • Practicability • Natural Environment • Build and Social Environment	**Alternatives Removed:** • 1 Freeway with Transit Envelope • 1 Tollway with Transit Envelope • 1 Regional Arterial • 1 Combination of two Regional Arterials ***Alternatives to be Analyzed in Draft EIS:*** • 1 Freeway with Transit Envelope • 1 Tollway with Transit Envelope • 1 Regional Arterial • 1 Combination Tollway, Regional Arterial, and Principal Arterial • No Action Alternative

The Level 3C screening process continued the evaluation of alternatives and concluded with the reasonable range of representative alternatives to be studied in detail. The previous Level 3A and 3B screening processes resulted in eight build alternatives consisting of four families of improvements: freeways with a transit envelope, tollways with a transit envelope, major regional arterials, and combined alternatives from Level 3B. Within each family there are two basic alternatives locations, one along Indiana Street and SH 93 (B alternatives) and the other along Indiana Street and McIntyre Street (C alternatives).

B.10.1 LEVEL 3C SCREENING APPROACH

The 3C alternative evaluation process further developed numeric and descriptive information regarding the benefits and impacts of each alternative. The data was used to determine each alternative's transportation merits relative to purpose and need goals and potential impacts to the natural environment, social feasibility (a logistical component of practicability for the USACE), and built and social environment. The alternatives were examined in a comparative evaluation process. A brief summary of the criteria used to evaluate each area and comparative observations of the data are included below.

B.10.1.1 PURPOSE AND NEED EVALUATION

The purpose and need evaluation of alternatives considered six categories of data to assess how well the alternatives address transportation needs in the area. Traffic modeling (utilizing DRCOG 2030 traffic model as a base) formed the basis of projecting traffic conditions in 2030. Purpose and need criteria include the following measures:

- **System Connectivity and Functionality** (see **Table B.10-1**)–The ability of an alternative to connect directly to the Northwest Parkway at the northern limits of the study area and C-470 or I-70 at the southern limits of the study area was an important consideration in the evaluation of alternatives' connectivity. Functional classification (e.g., freeway, tollway, etc) was a major consideration as to how well the connectivity can be achieved. The driver expectancy for an alternative also was considered. Driver expectancy is based on previous experiences and training of drivers. For instance, exit ramps are typically on the right side of the roadway, drivers expect to be able to access all directions of travel in an interchange, and there should be a reasonable level of mainline continuity. The B alternatives perform better in this category because of their mainline continuity. Alternatives along the C alignment require travel through interchange ramps that result in out-of-direction travel, which is contrary to driver expectancy. Additionally, freeways and tollways better maintain functionality than the regional or principal arterials.

- **Interregional, Regional and Local Travel Demand** (see **Table B.10-2** and **Table B.10-3**)–Criteria used to evaluate how well each of the alternatives would accommodate a representative set of projected trips. Trip types included internal (within the study area), internal to external (within the study area to outside the study area), or external to external (trips that start outside the study area, pass through the area, and conclude outside the study area). Those alternatives that efficiently handled the most trips with external originations or end points and allowed for the most total trips were considered the more desirable alternatives.
- **Corridor Capacity** (see **Table B.10-4**)–The capacity of the study area to move anticipated traffic in 2030 was measured by two factors: (1) the ability to accommodate regional and inter-regional trips and (2) the ratio of volume to capacity (v/c). The first factor considers the number of regional, inter-regional, and local trips accommodated with the alternative. When considering the total trips, the freeways perform better than the tollways and combined alternatives. The second factor considers the ratio of traffic volume demand to roadway capacity (v/c) at four points along three different roads (SH 93, Indiana Street/McIntyre Street, and Wadsworth Boulevard). Those measurement points where v/c was less than 1.0 (v/c equal to 1.0 is a condition where the traffic volume equals the capacity of the road to efficiently move the traffic) and a 10 percent improvement in the v/c were considered a desirable improvement. When considering those changes in v/c, the B alternatives and the combined alternatives perform better than the C alternatives. When considering both the total trip characteristics and v/c, the higher functional classification facilities along the B alignment best support future corridor demands.
- **Mobility and Reliability** (see **Table B.10-1**)–The regional total VMT and the regional total VHT in one day as compared with the No Action Alternative provide a measure of the benefit each alternative has on the entire metro system. Reduced VHT indicates that an alternative reduces overall travel times. The combination of larger VMT and smaller VHT are favorable attributes for an alternative and an indication of system efficiency. The measure of travel reliability was based principally on the functional classification of the alternative. Normally, better travel reliability was achieved with higher functional classification roadways. Alternatives with higher functional classifications such as freeways and tollways with their higher VMT and lower VHT are considered more favorable alternatives.
- **Travel Time Savings** (see **Table B.10-1**)–The measure of the travel time savings was calculated by summing the reduction of time for five different trips between various locations that traverse the study area, during peak travel times with and without the alternative in place under projected 2030 conditions. Those alternatives with greatest reductions or lowest total travel times are considered the most favorable alternatives. The freeways and tollways and the TB/RB & PC Alternative perform better in this category.
- **Modal Travel** (see **Table B.10-1**)–Alternatives that connect with known transit corridors and have the capability to accommodate some form of transit expansion are considered to enhance multi-modal travel. Some of the alternatives identified for this study have areas (primarily in the median) that specifically provide for either future roadway expansion or accommodation of transit. Those alternatives having the most capability to accommodate transit and improve the connectivity to programmed transit corridors are considered more favorable alternatives. Freeways, tollways, and the TB/RB & PC Alternative perform better in this category than the regional arterials and the RB & RC Alternative.

In summary, many transportation performance measures indicate better performance results from higher functional classifications—freeways perform better than tollways and packages, which are better than regional arterials. The FB, FC, TB, TC, and TB/RB & PC Alternatives perform significantly better than the RB Alternative, RC Alternative, and the RB & RC Alternative. For other purpose and need criteria, ratings between the pairs of alternatives in each family show that the B alignments rate better than the C alignment alternatives. The TB/RB & PC Alternative is also superior to the RB & RC Alternative.

Table B.10-1 Level 3C Purpose and Need Data—Connectivity, Mobility, Travel Time, & Modal Travel

Alternative	System Connectivity	Mobility and Traffic Flow						
		Mobility				Reliability	Travel Time Savings	Modal Travel
	Connectivity & Functionality[1]	Regional VMT difference vs. No Action (total: 109,294,289)	Percent Change from Total	Regional VHT difference vs. No Action (total: 3,683,968)	Percent Change from Total	Functional Class	Peak Travel Time Savings vs. No Action - Sum of 5 Travel Paths[2]	Opportunities to Expand Regional Transit System[3]
FB (via SH 93)	1	769,310	0.70%	(3,789)	-0.10%	High	189.0	Moderate
FC (via McIntyre)	2	651,316	0.60%	(8,718)	-0.24%	High	185.0	Moderate
TB (via SH 93)	1	417,230	0.38%	(1,225)	-0.03%	High	181.1	Moderate
TC (via McIntyre)	2	494,451	0.45%	580	0.02%	High	208.3	Moderate
RB (via SH 93)	3	317,899	0.29%	(3,770)	-0.10%	Moderate	60.4	Low
RC (via McIntyre)	4	320,954	0.29%	(3,792)	-0.10%	Moderate	92.5	Low
TB/RB & PC Package	2	485,410	0.44%	(3,538)	-0.10%	High	176.3	Moderate / Low
RB & RC Package	3	555,411	0.51%	843	0.02%	Moderate	95.1	Low
No Action	5	0	0.00%	0	0.00%	Low	0.0	Low

Notes: [1]Ratings of 1 indicate favorable, while ratings of 5 have unfavorable connectivity.
[2]Total of Minutes Saved vs. No Action for each of five travel paths, AM and PM peaks. No Action total = 904.8 minutes
[3]High = transit system expanded; Moderate = opportunity for expansion, Low = constrained opportunity for expansion.

Table B.10-2 Level 3C Purpose and Need Data–Inter-regional &Regional Demand (Trip Percentages)

Inter-regional and Regional Demand–Trip Percentages Types of Trips on Selected Links							
Travel Zones	Local Trips	Inter-regional & Regional Trips					Total Trips
	Internal - Internal	Internal – External (North)	Internal – External (South)	External - External	Subtotal Inter-regional & Regional Trips		
					Number	Percentage of Total Trips	
SH 93, South of 64th Avenue	9,120	12,160	13,680	41,040	66,880	88%	76,000
	4,160	4,160	3,380	14,300	21,840	84%	26,000
	9,900	9,350	8,800	26,950	45,100	82%	55,000
	4,160	3,900	3,640	14,300	21,840	84%	26,000
	8,100	6,750	8,100	22,050	36,900	82%	45,000
	4,160	4,160	3,640	14,040	21,840	84%	26,000
	9,860	8,700	9,860	29,580	48,140	83%	58,000
	7,030	5,550	6,290	18,130	29,970	81%	37,000
	4,160	3,900	4,160	13,780	21,840	84%	26,000
McIntyre Street, South of 64th Avenue	11,550	2,850	600	0	3,450	23%	15,000
	22,330	16,170	13,090	25,410	54,670	71%	77,000
	11,730	3,570	1,020	680	5,270	31%	17,000
	24,200	9,900	9,900	11,000	30,800	56%	55,000
	12,160	4,180	950	1,710	6,840	36%	19,000
	23,780	11,020	8,700	14,500	34,220	59%	58,000
	14,750	5,000	2,250	3,000	10,250	41%	25,000
	23,100	11,000	7,150	13,750	31,900	58%	55,000
	13,860	3,780	1,470	1,890	7,140	34%	21,000

Inter-regional and Regional Demand–Trip Percentages Types of Trips on Selected Links							
Travel Zones	Local Trips	Inter-regional & Regional Trips					Total Trips
	Internal - Internal	Internal – External (North)	Internal – External (South)	External - External	Subtotal Inter-regional & Regional Trips		
					Number	Percentage of Total Trips	
Total SH 93 & McIntyre Street, South of 64th Avenue	20,670	15,010	14,280	41,040	70,330	77%	91,000
	26,490	20,330	16,470	39,710	76,510	74%	103,000
	21,630	12,920	9,820	27,630	50,370	70%	72,000
	28,360	13,800	13,540	25,300	52,640	65%	81,000
	20,260	10,930	9,050	23,760	43,740	68%	64,000
	27,940	15,180	12,340	28,540	56,060	67%	84,000
	24,610	13,700	12,110	32,580	58,390	70%	83,000
	30,130	16,550	13,440	31,880	61,870	67%	92,000
	18,020	7,680	5,630	15,670	28,980	62%	47,000

Note: Green highlight areas represent where the alignment contains the alternative and the non-highlighted areas do not have the alternative in the alignment.

Table B.10-3 Level 3C Purpose and Need Data–Inter-regional &Regional Demand (Volumes)

			Inter-regional and Regional Demand–Volumes					
			Screenlines		Alternative Alignment/Location			
					Four Lanes		Six Lanes	
Alternative	Point*	Link Length (miles)	Volumes 4 Lanes	Volumes 6 Lanes	Volumes	V/C	Volumes	V/C
FB (via SH 93)	N	7.2	156,000	159,000	54,000	<0.85	57,000	<0.85
	M	5.1	179,000	183,000	57,000	<0.85	63,000	<0.85
	M-S	4.7	218,000	224,000	76,000	1.01	84,000	<0.85
	S	2.7	152,000	165,000	109,000	1.18	122,000	0.88
	Alt Total	19.7	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	67,563	0.90	73,904	0.80
FC (via McIntyre)	N	8.2	156,000	158,000	57,000	<0.85	59,000	<0.85
	M	2.5	184,000	184,000	68,000	0.85	70,000	<0.85
	M-S	2.8	224,000	223,000	53,000	<0.85	55,000	<0.85
	S	1.7	160,000	160,000	97,000	0.89	98,000	<0.85
	Alt Total	15.2	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	62,546	0.81	64,434	0.80
TB (via SH 93)	N	7.2	133,000	N/A	33,000	<0.85	N/A	N/A
	M	5.1	154,000	N/A	30,000	<0.85	N/A	N/A
	M-S	4.7	202,000	N/A	39,000	<0.85	N/A	N/A
	S	2.7	124,000	N/A	38,000	<0.85	N/A	N/A
	Alt Total	19.7	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	34,340	0.80	N/A	N/A

			Inter-regional and Regional Demand–Volumes					
			Screenlines		Alternative Alignment/Location			
					Four Lanes		Six Lanes	
Alternative	Point*	Link Length (miles)	Volumes 4 Lanes	Volumes 6 Lanes	Volumes	V/C	Volumes	V/C
TC (via McIntyre)	N	8.2	138,000	N/A	37,000	<0.85	N/A	N/A
	M	2.5	162,000	N/A	42,000	<0.85	N/A	N/A
	M-S	2.8	206,000	N/A	32,000	<0.85	N/A	N/A
	S	1.7	141,000	N/A	75,000	<0.85	N/A	N/A
	Alt Total	15.2	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	41,151	0.80	N/A	N/A
RB (via SH 93)	N	8.4	130,000	132,000	41,000	0.91	43,000	<0.85
	M	7.1	147,000	149,000	38,000	<0.85	41,000	<0.85
	M-S	4.7	198,000	200,000	45,000	0.85	48,000	<0.85
	S	2.7	121,000	127,000	75,000	1.20	81,000	0.86
	Alt Total	22.9	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	44,900	0.86	47,886	0.81
RC (via McIntyre)	N	8.7	134,000	142,000	50,000	1.13	57,000	0.85
	M	2.5	156,000	162,000	53,000	1.18	60,000	0.90
	M-S	2.8	208,000	214,000	58,000	1.06	65,000	0.87
	S	1.7	128,000	132,000	58,000	<0.85	60,000	<0.85
	Alt Total	15.7	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	52,771	1.09	59,229	0.86
TB/RB & PC Package	N	7.2	132,000	N/A	31,000	<0.85	N/A	N/A
	M	5.1	162,000	N/A	29,000	<0.85	N/A	N/A
	M_1	5.3	—	N/A	30,000	0.96	N/A	N/A

			Inter-regional and Regional Demand–Volumes					
			Screenlines		Alternative Alignment/Location			
					Four Lanes		Six Lanes	
Alternative	**Point***	**Link Length (miles)**	**Volumes 4 Lanes**	**Volumes 6 Lanes**	**Volumes**	**V/C**	**Volumes**	**V/C**
TB/RB & PC Package (continued)	M-S	4.7	210,000	N/A	45,000	<0.85	N/A	N/A
	S	2.7	137,000	N/A	91,000	0.97	N/A	N/A
	S_1	1.7	N/A	N/A	46,000	<0.85	N/A	N/A
	Alt Total	26.7	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	39,906	0.85	N/A	N/A
RB & RC Package	N	8.4	139,000	143,000	52,000	1.17	56,000	0.85
	M	7.1	163,000	169,000	30,000	<0.85	29,000	<0.85
	M_1	5.2	N/A	N/A	53,000	<0.85	61,000	0.92
	M-S	4.7	216,000	225,000	37,000	<0.85	38,000	<0.85
	S	2.7	133,000	142,000	75,000	1.19	83,000	0.89
	S_1	1.7	N/A	N/A	58,000	<0.85	59,000	<0.85
	Alt Total	29.8	N/A	N/A	N/A	N/A	N/A	N/A
	Composite Avg.	N/A	N/A	N/A	46,993	0.94	N/A	N/A
No Action	N	N/A	102,000	N/A	N/A	N/A	N/A	N/A
	M	N/A	133,000	N/A	N/A	N/A	N/A	N/A
	M-S	N/A	183,000	N/A	N/A	N/A	N/A	N/A
	S	N/A	112,000	N/A	N/A	N/A	N/A	N/A

Notes: *Points N = North part of study area, south of SH 128
M = Middle part of study area, south of SH 72/80th Avenue
M-S = Middle/south part of corridor, south of 64th Avenue
S = South part of corridor, at 19th Street along US 6 and on SH 58 between McIntyre and I-70
V/C = Ratio of traffic volumes over the capacity of the roadway
M_1 = Middle portion of study area on Indiana Street
S_1 = Southern portion of study area on McIntyre Street

Table B.10-4 Level 3C Purpose and Need Data–Corridor Capacity

		Corridor Capacity									
		SH 93			Indiana/McIntyre			Wadsworth			Regional/ Interregional System
Alternative	Point*	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	Miles and Percent of System Mileage with V/C > 1.0
FB (via SH 93)	N	1.19	0.02	No	1.22	-0.33	—	0.85	-0.10	—	23.1 miles
	M	0.96	-0.29	Yes	1.30	-0.04	—	0.96	-0.07	—	
	M-S	1.01	-0.39	—	0.97	-0.31	Yes	0.91	-0.06	—	26.4 % of system
	S	1.18	0.14	No	<0.85	No Change	—	—	—	—	
FC (via McIntyre)	N	1.08	-0.09	—	1.26	***-0.29***	—	<0.85	***-0.15***	—	26.6 miles
	M	1.18	-0.07	—	0.98	***-0.36***	***Yes***	0.94	-0.09	—	
	M-S	1.35	-0.05	—	1.30	0.02	No	0.89	-0.08	—	29.6 % of system
	S	1.00	-0.04	—	0.89	0.09	No	—	—	—	
TB (via SH 93)	N	1.13	-0.04	—	1.28	***-0.27***	—	0.87	-0.08	—	28.9 miles
	M	1.11	***-0.14***	—	1.26	-0.08	—	0.98	-0.05	—	
	M-S	0.87	***-0.53***	***Yes***	1.07	***-0.21***	—	0.92	-0.05	—	30.2% of system
	S	0.91	***-0.13***	***Yes***	<0.85	No Change	—	—	—	—	

		Corridor Capacity									
		SH 93			Indiana/McIntyre			Wadsworth			Regional/ Interregional System
Alternative	Point*	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	V/C with Alt.	Difference of V/C With Alternative and No Action V/C	Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)	Miles and Percent of System Mileage with V/C > 1.0
TC (via McIntyre)	N	1.11	-0.06	—	1.31	***-0.24***	—	0.85	-0.10	—	31.0 miles
	M	1.21	-0.04	—	0.99	***-0.35***	***Yes***	0.96	-0.07	—	
	M-S	1.38	-0.02	—	1.14	***-0.14***	—	0.91	-0.06	—	34.4 % of system
	S	1.05	0.01	No	<0.85	No Change	—	—	—	—	
RB (via SH 93)	N	1.25	0.08	No	0.91	***-0.64***	***Yes***	<0.85	***-0.15***	—	22.7 miles
	M	***0.8***	***-0.45***	***Yes***	1.46	0.12	No	1.01	-0.02	—	
	M-S	0.85	***-0.55***	***Yes***	1.13	***-0.15***	—	0.95	-0.02	—	29.3% of system
	S	1.20	0.16	No	<0.85	No Change	—	—	—	—	
RC (via McIntyre)	N	1.11	-0.06	—	1.13	***-0.42***	—	<0.85	***-0.15***	—	36.7 miles
	M	1.19	-0.06	—	1.18	***-0.16***	—	0.98	-0.05	—	
	M-S	1.35	-0.05	—	1.06	***-0.22***	—	0.92	-0.05	—	45.6 % of system
	S	1.13	0.09	No	<0.85	No Change	—	—	—	—	
TB/RB & PC Package	N	1.16	-0.01	—	1.38	***-0.17***	—	<0.85	***-0.15***	—	24.8 miles
	M	1.14	***-0.11***	—	0.96	***-0.38***	***Yes***	0.97	-0.06	—	

		Corridor Capacity									
		SH 93			Indiana/McIntyre			Wadsworth			Regional/ Interregional System
Alternative	**Point***	**V/C with Alt.**	**Difference of V/C With Alternative and No Action V/C**	**Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)**	**V/C with Alt.**	**Difference of V/C With Alternative and No Action V/C**	**Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)**	**V/C with Alt.**	**Difference of V/C With Alternative and No Action V/C**	**Does Alternative Result in Volume < Capacity? (V/C >1.0 → <1.0 and Δ>10%)**	**Miles and Percent of System Mileage with V/C > 1.0**
TB/RB & PC Package	M-S	***0.8***	***-0.60***	***Yes***	<0.85	***-0.48***	***Yes***	0.91	-0.06	—	27.4% of system
	S	0.97	-0.07	--	<0.85	No Change	—	—	—	—	
RB & RC Package	N	1.21	0.04	No	1.17	***-0.38***	—	0.88	-0.07	—	25.6 miles
	M	***0.8***	***-0.45***	***Yes***	1.18	***-0.16***	—	0.98	-0.05	—	
	M-S	***0.8***	***-0.60***	***Yes***	1.01	***-0.27***	—	0.91	-0.06	—	31.9 % of system
	S	1.19	0.15	No	<0.85	No Change	—	—	—	—	
No Action	N	1.17	—	—	1.55	—	—	0.95	—	—	38.0 miles
	M	1.25	—	—	1.34	—	—	1.03	—	—	
	M-S	1.40	—	—	1.28	—	—	0.97	—	—	49.1 % of system
	S	1.04	—	—	<0.85	—	—	—	—	—	

Notes: *Points **N** = North part of study area, south of SH 128
M = Middle part of study area, south of SH 72/80th Avenue
M-S = Middle/south part of corridor, south of 64th Avenue
S = South part of corridor, at 19th Street along US 6 and on SH 58 between McIntyre and I-70
V/C = Ratio of traffic volumes over the capacity of the roadway
Red text denotes an increased v/c ratio.
Blue italic text denotes where a v/c ratio is reduced by at least 10 percent

B.10.1.2 NATURAL ENVIRONMENT

The evaluation of the natural environment considers the comparative impacts of each alternative on biological resources, wetlands, and potential waters of the United States, water supplies, and physical resources. The various resources found in the study area were collected from federal, state, and local data sources, all of which were subjected to field verification to assure current status for this study. These natural resource locations were entered into a geographic information system (GIS) where all the resources are identified along the roadway alternatives being considered. Those resources that fall within the footprint of an alternative are considered impacted, without consideration of the potential for mitigation to reduce the impact. For the evaluation, either the number of resources (e.g., number of streams crossed by an alternative) or the total area of the resource (e.g., acres of wetlands falling within an alternative's right-of-way) was calculated to allow comparison between the alternatives. As with the purpose and need evaluation, the No Action Alternative was also considered in the natural environment evaluation and was considered the most favorable alternative for the natural environment. The natural environment criteria include the following measures (see **Table B.10-5** and **Table B.10-6**):

- **Biological Resources**–The measures of potential impact to biological resources include criteria focused on species known to exist in the study area that are considered threatened or endangered by State or Federal agencies. An additional criterion considered the effect a roadway would have on the free movement of wildlife along travel corridors known to exist in the corridor. The data include the distance between the alternatives and the only known eagle nesting site in the project area. Prairie dog colonies exist in the study area and are a food supply for eagles as well as other carnivores. Prairie dog colonies (measured in acres) within the footprint of an alternative are separated into those in proximity to the eagle's nest and all other prairie dog impacts. The Preble's Meadow Jumping Mouse, a threatened species, is known to live within the study area and the amount of occupied habitat within the right-of-way was identified for each alternative. The Ute Ladies-tresses Orchid, a threatened species, can be found along Clear Creek. The area (measured in acres) of the orchid's habitat falling within an alternative's right of way was measured and tabulated. The final measures of potential impact to biological resources consider the linear distance an alternative crosses a known wildlife crossing area. Considering the six biological resource criteria, the data indicate that the No Action Alternative has the least impacts to the biological resources while most of the other alternatives negatively affect biological resources in a similar manner (see **Table B.10-5**).
- **Wetlands and Potential Waters of the United States**–The area of potential wetlands occurring within the right of way of each alternative was measured by GIS methods and tabulated for comparison. Because most of the streams and creeks of the study area flow in an easterly direction and the alternatives are aligned in a north / south direction, there are many stream crossings for each alternative. Considering the potential wetlands and stream crossing criteria together, all of the stand-alone alternatives are found to impact wetlands, rivers, and streams in a similar manner. The combined alternatives have the potential for more impacts than the stand-alone alternatives because they have a greater total length (see **Table B.10-5**).
- **Water Supplies**–The study area contains water service facilities for storing and conveying potable water to the Metropolitan Denver Area. Impacts to this system of reservoirs, creeks, canals, and ditches are considered. In this category, the two combined alternatives are less desirable than the stand-alone alternatives because their greater total length requires more stream crossings. However, there was no discernable difference between the stand-alone alternatives (see **Table B.10-5**).

- **Physical Resources**–Evaluations aspects of the physical resources include locations where mineral extraction has occurred or potentially harmful chemicals exist in soil or water from human activities. Most of the alternatives cross or come very close to hazardous waste sites, mines, oil and gas wells, and landfills, all of which can create special working conditions or require construction mitigation. Alternatives that have more hazardous waste sites in the right of way are considered to be less favorable. The other physical resource criteria were considered less important in the selection process. This results in the RC Alternative and the two combined alternatives being less desirable than the other stand-alone alternatives (see **Table B.10-6**).

In the natural environment category, relative differences are not readily apparent and there is little discernable difference between alternatives, except for the expected additional impacts anticipated with the combined alternatives because of their greater lengths. The relative performance within each family on the natural environment ratings is equal in every case except that of the Regional Arterial family, where the RB Alternative rates slightly better than the RC Alternative.

Table B.10-5 Level 3C Natural Environment Evaluation–Biological Resources & Water

	Threatened & Endangered Species					Wildlife Crossings	Wetlands & Waters of the U.S.		Water Supplies		
Alternative	Distance to Bald Eagle Nest Site (Linear Feet)	Eagle food supply/ Prairie Dog Colony within 3 miles of Nest (Acres)	Eagle food supply/ Prairie Dog Colony Outside 3-mile Radius (Acres)	Prebles Meadow Jumping Mouse Occupied Habitat within ROW (Acres)	Ute Ladies-tresses Orchid Occupied Habitat in ROW (Acres)	Portion of Crossing in ROW (Linear Feet)	Preliminary Wetlands in ROW (Acres)	Streams And Rivers Crossed (Number)	Sensitive Creeks and Canals/Ditches Crossed		Distance to Nearest Potable Water Source (Linear Feet)
									Creeks (Number)	Canals / Ditches (Number)	
FB	6,800	49.6	40.4	13.7	8.6	21,259	19.3	35	13	2	310
FC	6,800	49.6	9.2	13.7	17.4	7,461	21.3	42	7	15	1040
TB	6,800	49.6	44.1	13.7	7.5	21,231	19.5	35	13	2	310
TC	6,800	49.6	9.2	13.7	17.4	7,461	21.3	42	7	15	1040
RB	6,800	32.2	21.3	10.4	8.6	13,250	21.2	38	16	2	80
RC	6,800	33.1	9.2	10.4	8.0	8,308	16.4	42	7	17	5330
TB/RB & PC	6,800	50.0	43.99	13.7	16.7	28,087	28.0	57	17	15	310
RB & RC	6,800	33.5	21.3	10.4	16.6	19,062	34.9	60	19	16	80
No Action	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table B.10-6 Level 3C Natural Environment Evaluation–Noise/Air & Hazardous Materials

Alternative	Noise/Air		Hazardous Materials											
	Receivers Potentially within NAC Zone[1]		Hazardous Waste Sites		Inactive Surface Mines in ROW (Acres)	Inactive Under-ground Mines in ROW (Acres)	Active Surface Mines in ROW (Acres)	Oil and Gas Sites in ROW (Number)	Soil Radionuclide		Landfills			
	Category B Units (Number)	Category C Units (Number)	In ROW (Number)	In 300 ft. Buffer (Acres)					Above Back-ground (Acres)[2]	Above Risk Thresh old (Acres)[3]	Active In ROW (Acres)	Active In 300 ft. Buffer (Acres)	In-Active In ROW (Acres)	In-Active In 300 ft. Buffer (Acres)
FB	146	8	4	2	3.2	109.8	0	2	336.6	0.0	0.0	0.0	8.0	4.6
FC	250	36	5	18	1.8	57.4	0	0	332.2	0.0	0.0	0.0	9.4	8.1
TB	158	8	4	2	2.3	110.7	0	2	384.7	0.0	0.0	0.0	6.1	6.5
TC	253	40	3	18	1.8	57.4	0	0	332.2	0.0	0.0	0.0	9.4	8.1
RB	78	6	5	9	3.2	57.4	0	0	429.8	0.0	1.0	0.1	7.9	5.7
RC	103	26	13	1	0.7	57.4	0	0	314.9	0.0	0.0	0.0	4.6	5.5
TB/RB & PC	140	12	16	4	3.9	110.7	0	2	427.2	0.0	0.0	0.0	9.7	9.7
RB & RC	154	17	16	5	3.9	57.4	0	0	526.0	0.0	1.0	0.1	12.6	9.1
No Action	—	—	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: [1]Receivers within a zone potentially meeting or exceeding the CDOT Noise Abatement Criteria (NAC).
[2]CDPHE general guidance for background of plutonium in surface soils (0.04 pCi/g to 0.09 pCi/g).
[3]Rocky Flats Cleanup Agreement (rev. 5/03) soil plutonium at 50 pCi/g and americium at 76 pCi/g.
Category B = Residential Receptors (Individual homes or units)
Category C = Commercial Receptors (Individual businesses

B.10.1.3 SOCIAL FEASIBILITY (ELEMENT OF PRACTICABILITY)

The evaluation of social feasibility considers the potential for alternatives to negatively affect communities that they traverse. Those alternatives having greater impacts can disrupt community cohesion and potentially change the social character of affected communities. The evaluation was supported by GIS analysis where local features falling within each alternative's right of way are enumerated. As with the purpose and need evaluation, the No Action Alternative was also considered in the social feasibility evaluation and was considered to have both negative and positive attributes. The community cohesion aspect of the social feasibility criteria included measures of the number of buildings within or in proximity to the right-of-way necessary for the alternative. Those alternatives having more required purchases of residential, commercial and public buildings (schools, churches, meeting halls, etc.), are considered to have greater impacts to the communities. The number of residential, park, and business receptors likely to be impacted by roadway noise was also considered. Alternatives with appreciably fewer buildings taken and less noise impacts are more favorable. Those alternatives that have appreciably greater right-of-way takes of residential and commercial buildings and more potential noise impacts to nearby residents were determined to be socially infeasible and are therefore impracticable. In the social feasibility category, which the USACE also defines as an element of practicability, the FB, TB, RB, and the TB/RB & PC Alternatives will have significantly less impact on community cohesion than the FC, TC, RC, and RB & RC Alternatives (see **Table B.10-7**).

Table B.10-7 Level 3C Social Feasibility

Alternative	Community Cohesion								Noise	
	Residences and Businesses in ROW				Proximity to Schools, Churches, Meeting Halls, Senior Centers		Proximity to Private Meeting Halls		Receivers Potentially within NAC Zone*	
	Residential Units in ROW (Number)	Commercial Businesses in ROW (Number)	Parcels in ROW (No Building) (Number)	Commercial Buildings in ROW (Number)	Within ROW (Number)	Within 300 ft. (Number)	Within ROW (Number)	Within 300 ft. (Number)	Category B Units (Number)	Category C Units (Number)
FB (via 93)	16	8	316	8	0	1	0	0	146	8
FC (via McIntyre)	52	22	808	12	0	3	0	1	250	36
TB (via 93)	5	13	290	10	0	1	0	0	158	8
TC (via McIntyre)	52	22	830	12	0	3	0	1	253	40
RB (via 93)	18	12	459	11	0	1	0	0	78	6
RC (via McIntyre)	43	17	458	17	0	1	0	0	103	26
TB/RB & PC Package	32	16	649	16	1	2	0	0	140	12
RB & RC Package	61	27	810	26	0	2	0	0	154	17
No Action	—	—	—	—	—	—	—	—	—	—

Note: *Receivers within a zone potentially meeting or exceeding the CDOT Noise Abatement Criteria (NAC).

B.10.1.4 BUILT AND SOCIAL ENVIRONMENT

The evaluation of potential impacts to the built and social environment considers various topics including potential impacts to parks and recreational lands, archeological and historic resources, effects on low-income and minority communities, and changes in the aesthetic character of the area. Traffic data and an evaluation of the transportation planning documents developed for the study area were also considered to assess the potential effect of each alternative on the adjacent communities. Geographical data on these various resources were entered into the GIS for use in the evaluation. Additionally, information from the 2000 census regarding the locations of higher density minority and lower-income households was entered into the GIS. The footprint of each alternative was then used in the GIS to enumerate residences taken. The No Action Alternative was also considered and had the most favorable rating for the built and social environment. The built and social environment criteria include the following measures (see **Table B.10-8** and **Table B.10-9**):

- **Traffic and Transportation Plans**–A component of the potential impact to the built and social environment was the amount of traffic change created by a particular alternative and whether or not the volume of traffic anticipated for each of the alternatives was consistent with the transportation planning by agencies within the study area. Because improved traffic flow along an alternative draws travel from within the study area, an effect (usually a reduction in traffic) was expected to occur in other portions of the study area. An assessment of the change in traffic along the two alignments (B and C) allows comparison of that change. Additionally, because regional and local transportation planning efforts by federal, state, DRCOG, and local governments (county and city) consider future traffic needs, the degree to which each of the alternatives relates to the plans was assessed (eight different transportation planning documents were considered in this analysis). Those alternatives that are more consistent with the community planning context and with compatible traffic intensity (volume and speed) are more desirable. Those alternatives following the C alignment that are of a higher functional classification with their greater traffic intensity create more impacts to the built and social environment (see **Table B.10-9**).
- **Parks and Recreation Lands**–The criteria used in the evaluation of parks and recreational lands include parks, recreational areas, open space lands, dedicated trail systems, and wildlife refuges (including local, state or federal refuges) in the study area. This information was obtained from local agencies with the responsibility for managing those lands to assure an accurate database of information with which to complete the evaluation. The amount of land falling within the right-of-way of each of the alternatives (expressed as acres or linear feet) was determined by GIS methods and identified for each alternative. The alternatives having less potential impacts to the lands under consideration in this category were rated more favorably than those alternatives having greater impacts. Therefore, the B alignment alternatives are rated lower than the C alignment alternatives (see **Table B.10-8**).
- **Archeological and Historical Resources**–Impacts to historical properties and archeological sites eligible for or listed on the National Register of Historic Places (NRHP) are considered undesirable. Alternatives utilizing the B alignment have fewer such impacts and are more desirable than those alternatives utilizing the C alignment (see **Table B.10-8**).
- **Communities of Low-Income or Minority Populations**–The potential impact to minority and low-income populations was considered under these criteria. The analysis focused on residences within the footprint of an alternative, residences located in low-income census-block groups, and residences located in census blocks with high percentages of minority residents. No discernable difference was found between alternatives and they are all considered potentially equivalent for their impact on low income and minority communities (see **Table B.10-9**).

- **Visual Resources**–The potential impact of alternatives on the aesthetic character of the area was considered using three criteria. The potential impacts were addressed through field reconnaissance, where the corridor character, visual quality, and density of viewshed receptors were assessed along each of the alternatives. Corridor character refers to compatibility of the alternative with the adjacent land use. Visual quality refers to whether or not the alternatives affect sensitive viewsheds. The impacts to potential receptors assesses whether a substantial number of people will be viewing the alternative, particularly from prominent vantage points. When considering all three criteria, those alternatives having the least total potential impact and those alternatives that did not receive a severe impact rating, are considered more favorable. Those alternatives along the C alignment (except for the "PC" portion of one combined alternative) have greater aesthetic impacts because of their contextual setting (see **Table B.10-9**).

The built and social environment category data indicate that the FB, TB, and the RB Alternatives will have far less impact than the FC, TC, RC, RB & RC, and TB/RB & PC Alternatives. A comparison of the built and social environment category ratings between the pairs of alternatives within each family shows that the B alignment alternatives rate higher than the C alignment alternatives. There was also less impact associated with the TB/RB & PC Alternative than with the RB & RC Alternative.

Table B.10-8 Built and Social Environment Evaluation–Public & Historic Impacts

Alternatives	Parks, Open Space, Recreation Areas, Historic, and Archaeological Resources									
	Parks and Recreation Areas in ROW (Acres)[1]	Open Space Lands (Acres)[2]	Dedicated Trails in ROW (Feet)	Areas in ROW Requiring Additional Information (Acres)[3]	Local, State, National Wildlife Refuges (Acres)[4]	Officially NRHP-Eligible or Listed Historical Sites in ROW (Number)	Field Surveyed Potentially Eligible Historical Sites in ROW (Number)	Amount of Eligible or Potentially Eligible Linear Sites in ROW (Linear Feet)	Officially NRHP-Eligible or Listed Archaeological Sites in ROW (Number)	Field Surveyed Potentially Eligible Arch-aeological Sites in ROW (Number)
FB	24	186.2	29,527	0	0	2	2	1,248	0	0
FC	1	31.5	13,925	0	0	1	7	3,389	0	0
TB	25	224.6	31,000	0	0	2	2	1,487	0	0
TC	1	31.5	13,925	0	0	1	7	3,389	0	0
RB	24	105.4	31,585	0	0	2	4	1,611	0	0
RC	3	12.7	28,832	0	0	1	9	3,371	0	0
TB/RB & PC	26.7	221.1	43,322	0	0	3	9	2,979	0	0
RB/RC	26.4	111.5	46,465	0	0	3	11	4,397	0	0
No Action	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: [1]Designated recreational lands with public access and identifiable park and/or recreational amenities.
[2]Areas with incidental, secondary, occasional, or dispersed park, recreational, or refuge activities.
[3]Areas where the current use is undetermined. Awaiting additional information from jurisdictions with ownership.
[4]Areas that are designated or managed for the conservation of wildlife and/or habitat under the purview of a management plan.

Table B.10-9 Built and Social Environment Evaluation–Community & Visual Impacts

Alternatives	Community Cohesion													Environmental Justice				Aesthetics and Viewshed Imapcts[2]		
	Residences and Businesses In ROW				Percent Change in Traffic Volumes Intensity[1]		Conforms with Transportation Planning			Proximity to Schools, Churches, Meeting Halls, Senior Centers		Proximity to Private, Meeting Halls		Takes in High Percentage Low-income Block Groups (Number)	Percentage of Total Takes	Takes in High Percentage Minority Census Blocks (Number)	Percentage of Total Takes	Aesthetics	Viewshed	
	Residential Units in ROW (Number)	Parcels in ROW (No Building) (Number)	Commercial Businesses in ROW (Number)	Commercial Buildings in ROW (Number)	B Alignment (US 6)	C Alignment (McIntyre)	State/Federal	DRCOG	Local	Within ROW (Number)	Within 300 ft. ROW (Number)	Within ROW (Number)	Within 300 ft. ROW (Number)					Corridor Character Impacts	Visual Quality Impacts	Impacts to Potential Receptors
FB	16	8	316	8	68% to 88%	-29%	High	High	Moderate	0	1	0	0	10	42%	2	8%	2.60	2.25	1.25
FC	52	22	808	12	3% to 5%	267% to 276%	Moderate-Low	Moderate-High	Low	0	3	0	1	0	0%	1	1%	2.50	2.50	1.75

Alternatives	Community Cohesion													Environmental Justice				Aesthetics and Viewshed Imapcts[2]		
	Residences and Businesses In ROW				Percent Change in Traffic Volumes Intensity[1]		Conforms with Transportation Planning			Proximity to Schools, Churches, Meeting Halls, Senior Centers		Proximity to Private, Meeting Halls								
	Residential Units in ROW (Number)	Parcels in ROW (No Building) (Number)	Commercial Businesses in ROW (Number)	Commercial Buildings in ROW (Number)	B Alignment (US 6)	C Alignment (McIntyre)	State/Federal	DRCOG	Local	Within ROW (Number)	Within 300 ft. ROW (Number)	Within ROW (Number)	Within 300 ft. ROW (Number)	Takes in High Percentage Low-income Block Groups (Number)	Percentage of Total Takes	Takes in High Percentage Minority Census Blocks (Number)	Percentage of Total Takes	Aesthetics	Viewshed	
																		Corridor Character Impacts	Visual Quality Impacts	Impacts to Potential Receptors
TB	5	13	290	10	20%	-19%	Moderate	Moderate	High	0	1	0	0	1	6%	1	6%	2.87	2.25	1.25
TC	52	22	830	12	2%	162%	Moderate-Low	Moderate-High	Low	0	3	0	1	0	0%	1	1%	3.00	2.50	1.75
RB	18	12	459	11	15% to 25%	-10%	Moderate	Moderate	High	0	1	0	0	10	33%	3	10%	1.38	1.88	1.25

Alternatives	Community Cohesion													Environmental Justice				Aesthetics and Viewshed Imapcts[2]		
	Residences and Businesses In ROW				Percent Change in Traffic Volumes Intensity[1]		Conforms with Transportation Planning			Proximity to Schools, Churches, Meeting Halls, Senior Centers		Proximity to Private, Meeting Halls		Takes in High Percentage Low-income Block Groups (Number)	Percentage of Total Takes	Takes in High Percentage Minority Census Blocks (Number)	Percentage of Total Takes	Aesthetics	Viewshed	
	Residential Units in ROW (Number)	Parcels in ROW (No Building) (Number)	Commercial Businesses in ROW (Number)	Commercial Buildings in ROW (Number)	B Alignment (US 6)	C Alignment (McIntyre)	State/Federal	DRCOG	Local	Within ROW (Number)	Within 300 ft. ROW (Number)	Within ROW (Number)	Within 300 ft. ROW (Number)					Corridor Character Impacts	Visual Quality Impacts	Impacts to Potential Receptors
RC	43	17	458	17	8% to 11%	176% to 209%	Low	Moderate	Low	0	1	0	0	0	0%	9	15%	2.20	2.60	1.75
TB/RB & PC	32	16	649	16	40%	19%	Moderate	High	High	1	2	0	0	10	21%	2	4%	2.20	2.00	1.30
RB/RC	61	27	810	26	15%	162%	Moderate	Moderate	Moderate	0	2	0	0	10	11%	14	16%	1.90	2.30	1.60

Alternatives	Community Cohesion													Environmental Justice				Aesthetics and Viewshed Imapcts[2]		
	Residences and Businesses In ROW				Percent Change in Traffic Volumes Intensity[1]		Conforms with Transportation Planning			Proximity to Schools, Churches, Meeting Halls, Senior Centers		Proximity to Private, Meeting Halls		Takes in High Percentage Low-income Block Groups (Number)	Percentage of Total Takes	Takes in High Percentage Minority Census Blocks (Number)	Percentage of Total Takes	Aesthetics	Viewshed	
	Residential Units in ROW (Number)	Parcels in ROW (No Building) (Number)	Commercial Businesses in ROW (Number)	Commercial Buildings in ROW (Number)	B Alignment (US 6)	C Alignment (McIntyre)	State/Federal	DRCOG	Local	Within ROW (Number)	Within 300 ft. ROW (Number)	Within ROW (Number)	Within 300 ft. ROW (Number)					Corridor Character Impacts	Visual Quality Impacts	Impacts to Potential Receptors
No Action	N/A	N/A	N/A	N/A	0	0	Low	Low	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: [1]Heavily populated areas were used for this analysis.
[2]Impacts determined on a segment by segment basis using 1= Low, 2=Moderate, 3=High and 4=Severe to derive a numerical average. The average is a relative scale for Level 3C comparison purposes only.

B.10.2 LEVEL 3C SCREENING DECISIONS

The Level 3C screening process indicated that the impacts among alternatives are relatively similar north of SH 72, particularly between similarly functioning facilities. The primary discernable differences between alternatives are therefore south of SH 72 where B alignments include a new facility over Leyden Valley to SH 93 and through Golden and C alignments travel down existing Indiana Street/McIntyre Street to SH 58. This section discusses general evaluation observations as well as detailed information and rationale for each alternative screening decision.

After reviewing the data, the project team, including the decision makers and transportation/environmental professionals, determined it would be more readily manageable to assign relative significance of such differences. Therefore all data results were assigned relative grades ranging from (++) to (--). Those alternatives that performed better than other alternatives were given plusses (+) while those alternatives that had lower performance were given minuses (-). A zero value (0) was given for alternatives that fell between the plus and minus ratings. For categories where there was appreciable data separation between alternatives, the project team identified the need to expand the range of ratings by utilizing double plus (++) or a double minus (-)(-) values. Then, the derivation of a final screening score was completed by summing the pluses and minuses. A double plus (++) was given a rating of 2; a single plus a rating of 1; a minus was given a rating of -1 and a double minus was given a rating of - 2. A score of zero (0) has no effect on the rating. Summing the ratings provides a comparative assessment of how well each alternative performed for all transportation criteria and how well each alternative avoided impacts to the environmental and social categories. No attempt was made to sum all ratings across both the purpose and need categories and the environmental and social categories. Therefore, neither the numerical magnitude of a category rating nor the number of categories considered increases a category's influence on the overall screening evaluations. Instead, each category (purpose and need, natural environment, social feasibility, and built and social environment) was considered individually to assess if discernable differences between the alternatives was apparent within each category (see **Table B.10-10**). An analysis to determine if the apparent LEDPA was eliminated during this screening step concluded that an apparent LEDPA still remained as an alternative (see **Table B.10-11**).

Table B.10-10 Level 3C Screening Summary

Alternative	Purpose and Need								Natural Environment					Social Feasibility (Practicability -- Logistics)		Built and Social Environment						
	System Connectivity (Table 2.10-1)	Interregional and Regional Demand		Corridor Capacity (Table 2.10-4)	Mobility and Traffic Flow (Table 2.10-1)	Travel Time Savings (Table 2.10-1)	Modal Travel (Table 2.10-1)	*Purpose and Need Screening Comparison*	Biological Resources (Table 2.10-5)	Wetlands and Potential Waters of the US (Table 2.10-5)	Water Supplies (Table 2.10-5)	Physical Resources (Table 2.10-6)	*Natural Environment Screening Score*	Community Cohesion (Table 2.10-9)	*Social Feasibility Screening Score*	Community Cohesion--Traffic (Table 2.10-9)	Parks and Recreation Lands (Table 2.10-8)	Archeological and Historical Resources (Table 2.10-8)	Low Income and Minority Communities (Table 2.10-9)	Visual Resources (Table 2.10-9)	*Built and Social Environment Screening Score*
		Trip Percentages (Table 2.10-2)	Volumes (Table 2.10-3)																			
FB (via 93)	++	+	+	+	+	+	+	++	(–)	0	0	0	0	+	+	+	(-)(-)	0	0	0	0
FC (via McIntyre)	+	+	+	0	++	+	+	++	(–)	0	0	0	0	(-)	(-)	(-)(-)	0	(-)	0	(-)	(-)(-)
TB (via 93)	++	(–)	0	0	+	+	+	+	(–)	0	0	0	0	+	+	+	(-)(-)	0	0	0	0
TC (via McIntyre)	+	(–)	0	0	0	+	+	0	(–)	0	0	0	0	(-)	(-)	(-)	0	(-)	0	(-)	(-)(-)
RB (via 93)	0	(–)	0	+	0	0	0	0	(–)	0	0	0	0	+	+	+	(-)(-)	0	0	+	+

Alternative	Purpose and Need							*Purpose and Need Screening Comparison*	Natural Environment				*Natural Environment Screening Score*	Social Feasibility (Practicability -- Logistics)	*Social Feasibility Screening Score*	Built and Social Environment					*Built and Social Environment Screening Score*
	System Connectivity (Table 2.10-1)	Interregional and Regional Demand		Corridor Capacity (Table 2.10-4)	Mobility and Traffic Flow (Table 2.10-1)	Travel Time Savings (Table 2.10-1)	Modal Travel (Table 2.10-1)		Biological Resources (Table 2.10-5)	Wetlands and Potential Waters of the US (Table 2.10-5)	Water Supplies (Table 2.10-5)	Physical Resources (Table 2.10-6)		Community Cohesion (Table 2.10-9)		Community Cohesion--Traffic (Table 2.10-9)	Parks and Recreation Lands (Table 2.10-8)	Archeological and Historical Resources (Table 2.10-8)	Low Income and Minority Communities (Table 2.10-9)	Visual Resources (Table 2.10-9)	
		Trip Percentages (Table 2.10-2)	Volumes (Table 2.10-3)																		
RC (via McIntyre)	(–)	(–)	0	(-)	0	0	0	(–)	0	0	0	(–)	0	(-)	(-)	(-)(-)	0	(-)	0	(-)	(-)(-)
TB/RB & PC Package	+	0	0	+	+	+	+	+	(–)	(–)	(–)	(–)	(–)(–)	0	0	++	(-)(-)	(-)	0	0	0
RB & RC Package	0	0	+	+	0	0	0	0	(–)	(–)	(–)	(–)	(–)(–)	(-)(-)	(-)(-)	0	(-)(-)	(-)	0	(-)	(-)(-)
No Action	(–)(–)	(–)(–)	(–)(–)	(–)	(–)	(–)	0	(–)(–)	+	+	+	+	++	++	++	(-)	+	+	0	++	++

Note: Green shaded alternatives were removed based on practicability considerations.

B.10.2.1 FINAL SCREENING TO DETERMINE FINAL FOUR BUILD ALTERNATIVES

As a result of the alternatives evaluation 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 solely along Indiana Street/McIntyre Street (Alignment C) and the Combination 2—had greater environmental impacts without providing additional purpose and need benefits compared to the alternatives that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1. These four alternatives were removed from further analysis. The following describes the rationale for eliminating each of these alternatives along Alignment C.

FC ALTERNATIVE

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 that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1. 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. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street through interchanges ramps 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 issues 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
- 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
- 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

TC ALTERNATIVE

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 that provide connectivity from Northwest Parkway to C-470 exclusively utilizing Alignment B and the Combination 1. 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. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street through interchanges ramps 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 issues 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
- 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
- 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

RC ALTERNATIVE

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. This alternative would require a driver to transfer from the Indiana Street/McIntyre Street through interchanges ramps 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 issues 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
- 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
- Is the worst in reducing overall system congestion. It improves congestion over the No Action Alternative by only 4 percent. All other alternatives improve system congestion by 15 to 23 percent.

RB & RC ALTERNATIVE

Two four- to six-lane regional arterials along both Alignment B (SH 93 through Golden) and Alignment C (Indiana Street/McIntyre Street) would cause greater community impacts. The Combination 2 alternative would be unacceptable because it:

- Has the most residential displacements (61), 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

- Has the most business displacements (27), 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
- Has the greatest increase in regional VHT compared to all other alternatives

B.10.2.2 ALTERNATIVES RETAINED

For the final selection, the FB, TB, RB, and TB/RB & PC Alternatives are the choices for more detailed analysis. In general, alternatives that utilize the B alignment consistently demonstrated better traffic performance, equal or slightly less environmental impacts, and considerably less intense disruption to community cohesion when compared to the C alignment alternatives. Furthermore, the context of the area where these lesser impacts would occur, in largely established transportation corridors or lightly developed areas would result in far less significant impacts. The same holds true when comparing the combined TB/RB & PC Alternative to the RB & RC Alternative.

B.10.3 LEVEL 3C SUMMARY

The representative range of alternatives to be analyzed in detail has been selected—the FB, TB, RB, and TB/RB & PC Alternatives—includes one alternative from each functional classification family in order to consider the full spectrum of corridor transportation alternatives, and to preserve opportunities for minimizing impacts. This is important to recognize because the RB Alternative, while not performing well in purpose and need measures, will be considered as a narrower alternative in some places to lessen impact in critical areas. One additional aspect to recognize is that while all alternatives utilize the B alignment, one of the alternatives (TB/RB & PC Alternative) also utilizes the C alignment. This principal arterial has a lesser cross section than regional arterials and no grade-separated interchanges, which would cause less impact to the natural and social conditions found along Indiana Street and McIntyre Street and may provide necessary benefit, which will be determined in the analysis.

B.10.4 LEVEL 3C SCREENING LEDPA ANALYSIS

Table B.10-11 Level 3C Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis

Goal Avoid or minimize impacts to the aquatic resources.

Objective To advance, an alternative must avoid and minimize direct, indirect and cumulative impacts to the aquatic ecosystem.

Criteria Definition Potential impacts to Wetlands and Potential Waters of the US in the study corridor.

	Wetlands & Potential Waters of the U.S.			
Alternative	**Preliminary Wetlands in ROW (acres)**	**Streams and Rivers Crossed (number)**	Increasing Potential Impacts to Aquatic Environment	**Rationale for Removal**
No Action	na	na		na
RC (via McIntyre)	16.4	42		Does not meet Purpose and Need
FB (via SH 93)	19.3	35		na
TB (via SH 93)	19.5	35		na
RB (via SH 93)	21.2	38		na
FC (via McIntyre)	21.3	42		Not practical because socially infeasible
TC (via McIntyre)	21.3	42		Not practical because socially infeasible
TB/RB & PC Package	28.0	57		na
RB & RC Package	34.9	60		Does not meet Purpose and Need

Notes: Alternative were removed based on practicable considerations.

Decision Logic with Key Measures/Data: The acres of wetlands in an alternative's right-of-way, and streams and rivers crossed are measures of potential impacts regulated under Section 404 of the Clean Water Act. Therefore, both measurements were considered during the decision making process. The streams and rivers crossed criteria is a proxy measurement of the potential unmitigated impacts to waters of the U.S.

B.11 CONGESTION MANAGEMENT SYSTEM (CMS) ALTERNATIVE

This alternative includes strategies for fulfilling 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 considered 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 congested conditions in the discontinuous street network, making travel time savings (reliability) less likely

Managing congestion can take alternative approaches: reducing vehicles on the road, or improving traffic flows by reducing obstructions or choke points that cause delay. Each approach can be implemented through a variety of methods that may have a general or very specific target area. Some of the congestion management strategies listed below have already been implemented in the corridor. However, there could be additional benefits to either increasing the service level that is being offered, or by increasing the locations where they have been implemented.

B.12 ADDITIONAL AVOIDANCE AND MITIGATION MEASURES

After the completion of the Level 3 screening process, each alternative alignment was examined to determine if any context sensitive design elements, such as reducing wetland impacts, could be incorporated into the engineering prior to detailed analysis. An interdisciplinary group consisting of resource specialists and roadway engineers analyzed whether or not alternative alignments could be manipulated to avoid or minimize impacts to the natural environment and built and social environment—including Section 4(f) resources known at that time. The group considered concerns expressed during public meetings and during other meetings with local and state officials. This analysis resulted in changes to the alternatives.

Specific changes that were made as a result of the avoidance and minimization refinements included:

- **Wetlands and Water Resources**–Wetland impacts throughout the alignment were avoided or minimized by using bridges at major drainages and shifting the roadway alignment to the extent practical. Additionally, some wetland impacts were avoided or minimized through the use of retaining walls in areas north of Sun Microsystems (west of 96th Street), along Ralston Creek, and in the Van Bibber Creek drainage tributaries.
- **Wildlife Corridor Accommodation**–Critical wildlife corridors were identified and accommodations made in the highway design to provide wildlife crossings at major bridges (Leyden Gulch, Ralston Creek and North Table Mountain). In addition, smaller mammals would be able to cross the highway at some secondary drainages through enlarged culverts.
- **Adjacent Property Impacts**–These impacts were minimized as much as possible, especially at the Heritage Road/10th Street area and at 19th Street in Golden. In these areas, an interchange configuration called a single point urban interchange was chosen which had less of an impact to adjacent properties. These interchanges also were refined to incorporate a configuration of the new or widened highway going under the cross streets, which would reduce noise and visual impacts.

- **Section 4(f) Resources**– The area adjacent to SH 93 and US 6 contains numerous properties that are determined as Section 4(f) properties. Section 4(f) properties 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 very 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). Adjustments were made to the alternative alignments to avoid these resources or achieve *de minimis* use of the properties.

  The Freeway Alternative, Regional Arterial Alternative, and Combined Alternative alignments were modified to avoid impacts to all the Section 4(f) designated parcels in the Golden area. The Tollway Alternative was not able to be modified in a prudent and feasible manner to avoid the White Ash Mine Park.

  The consultation process for Section 4(f) resources along the Indiana Street/McIntyre Street principal arterial alignment is ongoing. Consultations with the municipalities along this corridor have developed features (such as retaining walls and design shifts) that are anticipated to result in *de minimis* use of Section 4(f) resources.

  It should be noted that the adjustments made to the alternative alignments to avoid Section 4(f) resources resulted in a slight decrease in impacts to wetlands and other waters of the U.S.

B.13 FINAL FOUR BUILD ALTERNATIVES

After completing the various levels of screening and refinements, four build alternatives were identified for detailed analysis. The four include a freeway, a tollway, and a major regional arterial that follow the SH 93 alignment, as well as an alternative that combines features of a tollway, regional arterial, and a principal arterial. The four build alternatives advanced represent a reasonable range of alternatives for consideration in the document. 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 with which the other build alternatives are compared.

Conceptual engineering drawings of each build alternative were prepared.. 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 build alternatives is included in this document (see **Chapter 2**, **Section 2.4**). 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 with the other alternatives. Each portion has attributes that make it unique compared to the other portions. 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 desirable shoulder widths, enhancing the ability to clear incidents from travel lanes.
- Intelligent Transportation System Measures–New traffic signal systems implemented with build alternatives would accommodate intelligent transportation system measures such as enhanced signal coordination on and across alternative roadways and advanced vehicle detection.

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

B.14 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 State Transportation Plan (CDOT, 2004). The State has developed a process to prioritize the funding of statewide transportation improvements. The sources available for CDOT to fund all of its activities, including the Northwest Corridor have been considered, but no specific source of funding has been identified for the complete construction of any alternative.

B.14.1 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 B.14-1**).

Table B.14-1 Probable Costs for Construction and ROW Revenues (2005 dollars) for the Build Alternatives

Alternative	Construction Cost (in millions)	ROW Cost (in millions)	Total Cost (in millions)
Freeway Alternative	$1,095	$62	**$1,157**
Tollway Alternative	$1,104	$72	**$1,176**
Regional Arterial Alternative	$617	$55	**$672**
Combined Alternative	$827	$95	**$922**

B.14.2 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.

B.14.3 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 considered in this project have different tolled lengths and will 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 B.14-2**).

Table B.14-2 Alternatives Probable Remaining Costs after Bond Allocations

Alternative	Total Cost (in millions)	Projected Bond Proceeds Available for Construction (in millions)	Probable Remaining Costs (in millions)
Freeway Alternative	$1,157	$0	**$1,157**
Tollway Alternative	$1,176	$390-510*	**$666-786**
Regional Arterial Alternative	$672	$0	**$672**
Combined Alternative	$922	$135-230*	**$692-787**

Note: *Projected Bond Proceeds discounted to 2005 dollars.

B.15 WETLAND ASSESSMENT

Based on the detailed wetland determination studies within 100 feet of the proposed right-of-way, 173 wetland sites totaling approximately 61 acres are present. Wetlands are located throughout the landscape in association with natural drainages, seep areas, ponded sites, and irrigation and roadside ditches (see **Figure B.15-1**, **Figure B.15-2**, and **Figure B.15-3**). The wetlands are distributed among five groupings of CNHP wetland plant associations, although some wetlands encompass several associations. From most to least common, the wetland plant associations are sandbar willow, cattail/bulrush, grass, sedge/rush, and peach-leaved willow. All of the wetland plant associations are in the Cowardin palustrine system (non-tidal wetlands dominated by trees, shrubs, and emergent vegetation). Wetland classes within the palustrine system include emergent (cattail/bulrush, grass, sedge/rush) and scrub-shrub (sandbar willow, peach-leaved willow). Some wetlands have areas of aquatic bed vegetation (algae, duckweed).

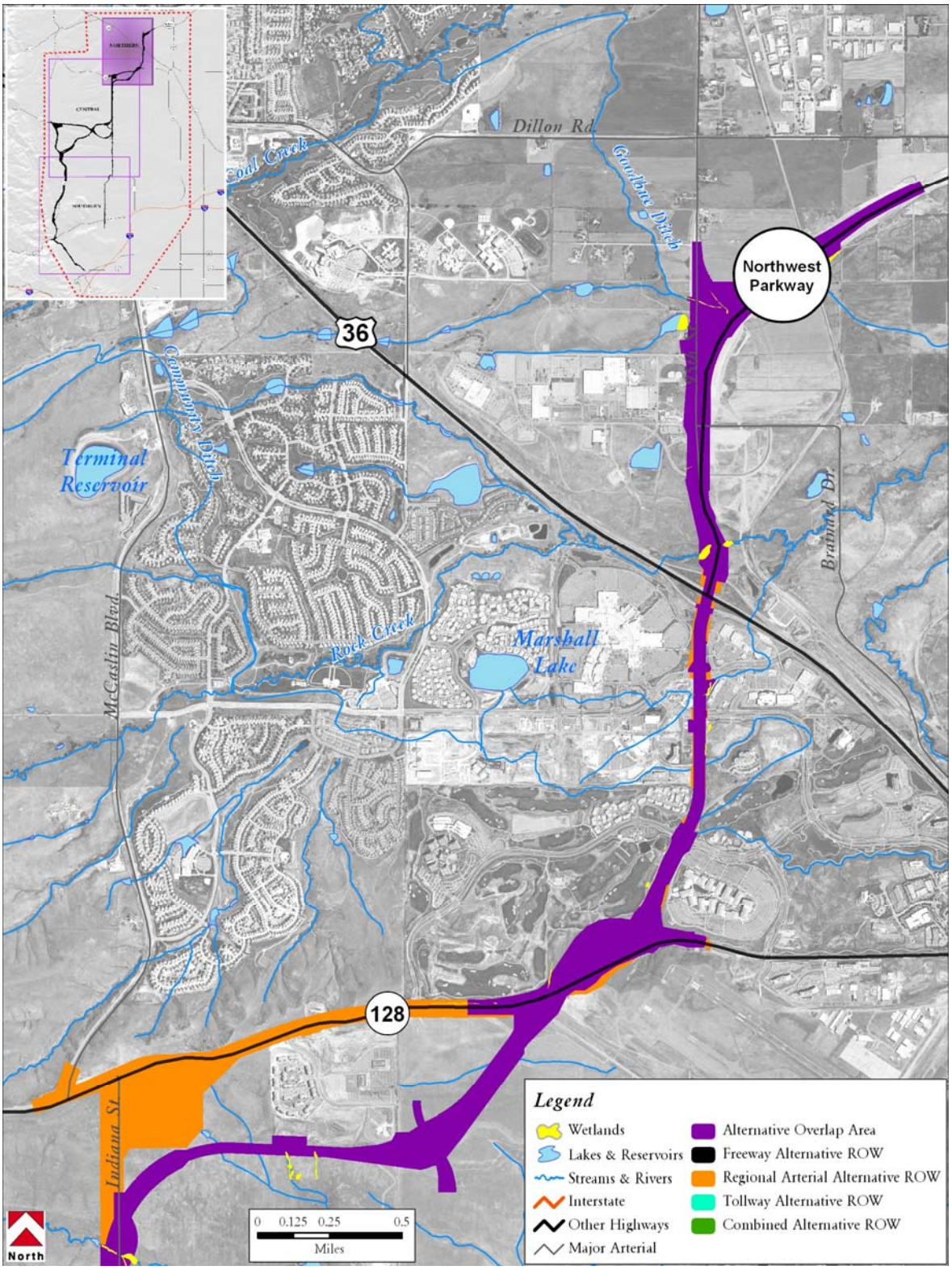
Although CDOT is working to develop and implement a functional assessment method specific to Colorado, there is not a currently agreed upon quantitative assessment system for Colorado wetland functions and values. For the purposes of the Northwest Corridor study, scientists used the Montana Wetland Field Evaluation Form and Instructions (Berglund 1999) to evaluate functions of wetlands in the study area. The "Montana Method" uses a classification system that combines the USFWS wetland classification system (Cowardin et al., 1979) with a hydrogeomorphic (landscape) approach (Brinson 1993). The Montana Method provides a landscape context for the USFWS classification. It is a rapid functional assessment process designed primarily to address wetland resources associated with highways and other linear projects. Before beginning the study, CDOT and FHWA received approval from USACE's Denver Regulatory Office to use the Montana Method.

For each evaluated wetland, the method scores each function on a scale of 0.1 (lowest) to 1.0 (highest) "functional points." The maximum number of functional points is 12, or a score of 1.0 for each function and value evaluated. Typically, wetlands that are larger and more diverse receive more points.

Once the total functional points for each wetlands was calculated, each wetland was assigned to one of four categories described in the Montana Method. The number of functional points ranges from 0.5 points to 8.9 points. Wetlands are assigned to the following categories based on total functional points and other criteria:

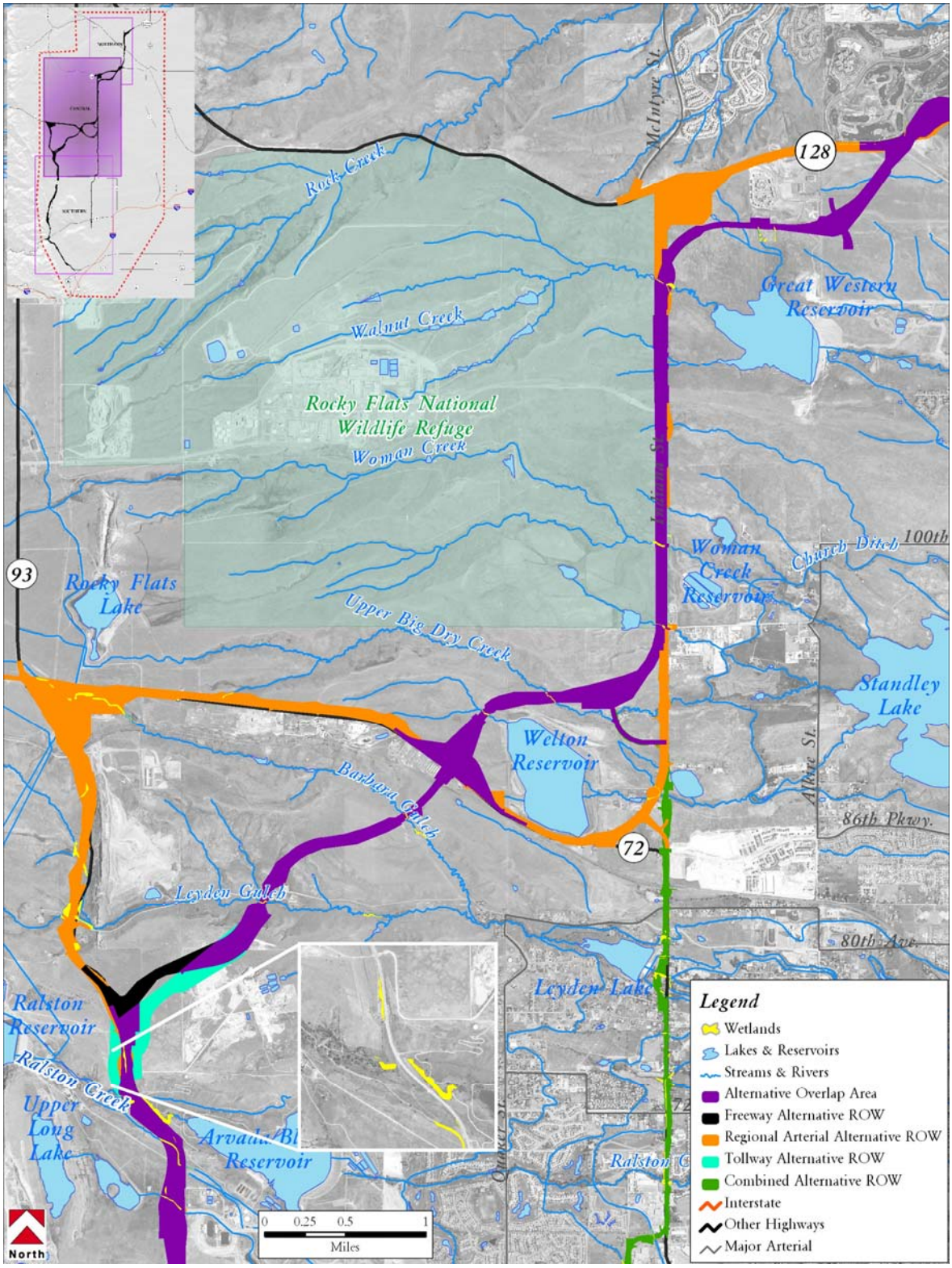
- Category I: Wetlands of exceptionally high quality that are generally rare in the state. Category I wetlands can provide primary habitat for federally listed threatened or endangered species; represent a high quality example of a rare wetlands type; provide irreplaceable ecological functions (for example, are not replaceable within a human lifetime, if at all); exhibit exceptionally high flood attenuation capability; or are assigned high ratings for most of the assessed functions and values.
- Category II: Wetlands that are more common than those in Category I provide habitat for sensitive plants or animals, function at very high levels for wildlife/fish habitat, are unique in a given area, or are assigned high ratings for many of the assessed functions and values.
- Category III: Wetlands that are more common, generally less diverse, and often smaller and more isolated than those in Category I and II. They can provided many functions and values, although they may not be assigned high ratings for as many parameters as are Category I and II wetlands.
- Category IV: Wetlands that are generally small, isolated, and lack vegetative diversity. These sites provide little in the way of wildlife habitat and are often directly or indirectly disturbed.

Figure B.15-1 Wetlands in Study Area-Northern Portion



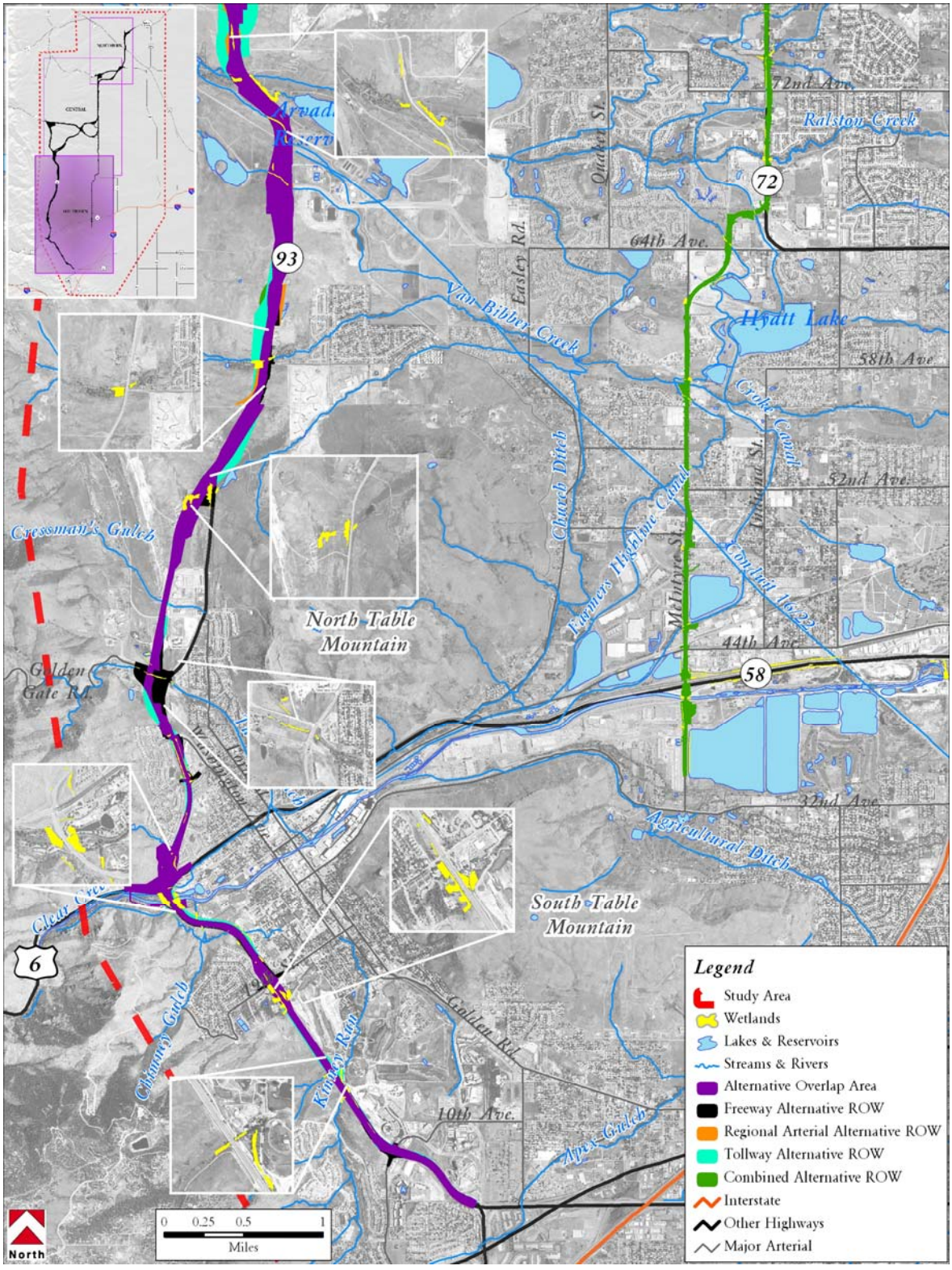
Source: Compiled by FHU, 2006.

Figure B.15-2 Wetlands in Study Area-Central Portion



Source: Compiled by FHU, 2006.

Figure B.15-3 Wetlands in Study Area-Southern Portion



Source: Compiled by FHU, 2006.

Impacts to wetlands, open water, and riparian areas were based on impacts within 100 feet of the proposed right-of-way for each build alternative. Total direct impacts to wetlands are 15.98 acres for the Freeway Alternative, 15.60 acres for the Tollway Alternative, 20.69 acres for the Regional Arterial Alternative, and 19.00 acres for the Combined Alternative. These wetland impacts include minor areas of open water that are likely waters of the United States, for example, at stream crossings. Major areas of open water that are likely waters of the United States are tabulated separately. Wetland impacts are higher for the Regional Arterial Alternative and Combined Alternative, which include a higher number of stream crossings. Direct impacts to wetlands, major areas of open water, other waters of the United States, and riparian areas are summarized and details on wetland impacts are presented (see **Table B.15-1** and the **Northwest Corridor Supporting Technical Document-Initial Wetland Delineation Report**). Since USACE requires a Clean Water Act Section 404 Individual Permit for impacts to waters of the United States and adjacent wetlands greater than 0.5 acre, any of the four build alternatives would require an Individual Permit.

Table B.15-1 Summary of Direct Impacts to Wetlands, Open Waters of the United States and Riparian Areas

Alternative	Direct Impacts to Jurisdictional and Nonjurisdictional Wetlands	Direct Impacts to Areas of Jurisdictional and Nonjurisdictional Open Waters	Direct Impacts to Riparian Areas
Total Freeway Alternative	15.98 acres	0.67 acre	10.61 acres
Total Tollway Alternative	15.60 acres	0.84 acre	10.59 acres
Total Regional Arterial Alternative	20.69 acres	0.02 acre	9.48 acres
Total Combined Alternative	19.00 acres	0.94 acre	10.89 acres

Note: The wetlands category also includes some assumed wetlands, based upon aerial photography areas that could not be ground surveyed.

Source: Felsburg Holt & Ullevig, 2007.

Assessing the build alternatives using only the acreage of direct impacts to wetlands does not take into account differences in the functional quality of the impacted wetlands. Using direct impacts means that impacts to high quality (Category I) wetlands are considered the same as impacts to low quality (Category IV) wetlands. For example, an acre of impacts to a solid stand of cattails in a roadside ditch is considered equivalent to an acre of impacts to a diverse wetland that provides habitat for a threatened species. This approach could result in a situation where the alternative with the fewest acres of impacts actually has the greatest adverse effect on wetland functions. A second way to assess wetland impacts is to weight the acres of impacts to reflect functional differences between wetlands.

One method to weight functional impacts is to use the functional points calculated by the Montana Method. For the weighted impact assessment, a functional assessment was done for each wetland that would be impacted by any of the build alternatives. The total functional points for each wetland was divided by the total possible functional points.This generated the percentage of possible functional points for each wetland, which was then used as the weighting factor. For example, a wetland with 5 functional points out of 12 possible points has 41 percent of the possible points. If 0.25 acres of the wetland would be impacted by one of the build alternatives, the weighting factor of 0.41 is multiplied by 0.25, for a weighted impact of 0.10 acres. The same area of impact (0.25 acres) to a wetland with 8 out of 12 functional points (66%) would result in 0.16 acres of weighted impacts. The percent of functional points ranged from 0.1 to 1.0. As a conservative measure, all Category I wetlands were weighted 1.0, even if their actual percentage of functional points was less than one. Weighted wetland impacts were calculated for each build alternative (see **Table B.15-2)**.

Table B.15-2 Summary of Weighted Impacts to Wetlands for Each Build Alternative

Alternative	Weighted Wetland Impacts
Freeway Alternative	5.25 acres
Tollway Alternative	5.20 acre
Regional Arterial Alternative	7.14 acres
Combined Alternative	6.32 acres

Source: Compiled by Felsburg Holt and Ullevig, 2007.

The large difference between the acres of direct wetland impacts and weighted impacts for each build alternative reflects that the majority of wetlands in the reduced wetland assessment area and wetlands that would be impacted are lower quality Category III wetlands.

Impacts associated with the No Action Alternative, impacts common to the build alternatives, and impacts unique to each build alternative were determined.

B.15.1 NO ACTION ALTERNATIVE

Some of the transportation projects identified as occurring under the No Action Alternative would result in direct and indirect impacts to wetlands and open water. Although the extent of these impacts is unknown, given the likely size of the footprints of these projects in relation to the proposed build alternatives, it is reasonable to assume that total impacts from the No Action Alternative would be less than the build alternatives.

B.15.2 IMPACTS ASSOCIATED WITH ALL BUILD ALTERNATIVES

All build alternatives would cause direct impacts to wetlands and bodies of open water within the alternative footprint as a result of fill placement caused by construction of transportation improvements such as roadway widening and realignment, new alignments, and intersection improvements. Roadside ditches, wet meadows, creeks, irrigation canal and ditches, and their associated wetlands would be impacted.

From north to south, the following major irrigation ditches and streams would be directly impacted by the proposed alignments for all build alternatives: Goodhue Ditch, Rock Creek, Walnut Creek, Woman Creek, Tucker Ditch, South Boulder Diversion Canal, streambanks adjacent to Ralston and Van Bibber creeks, Tucker Gulch, Church Ditch, Welch Ditch, streambanks adjacent to Clear Creek, Chimney Gulch, an unnamed tributary to Clear Creek, and Kinney Run. The amount of impact in each segment would vary among the build alternatives.

Although the acres of impacts to open water range from 0.02 acres to 0.94 acres, none of the alternatives would impact more than an acre of open water, an insignificant amount in relation to 3,263 acres open water estimated to be present in the entire study area. There would be little difference between alternatives in the acres of impacts to riparian areas (9.49 acres to 10.89 acres).

Because impacts to open water and riparian areas are not significant discriminating factors between alternatives, the following discussion of impacts associated with each alternative focuses on wetland impacts.

B.15.3 FREEWAY ALTERNATIVE

Based on preliminary design plans, the Freeway Alternative would directly impact approximately 15.98 acres of wetlands, 0.67 acre of open waters, and 10.61 acres of riparian areas. Considering wetland functions, the Freeway Alterative would impact 5.25 weighted acres.

The Freeway Alternative has the second lowest direct impacts to wetlands, 0.438 acres more than the Tollway Alternative. The Freeway Alternative also has the second lowest weighted impacts.

In addition to impacts common to all of the build alternatives, impacts to streams and major irrigation ditches associated with the Freeway Alternative would include new crossings of Barbara Gulch and Leyden Gulch.

B.15.4 TOLLWAY ALTERNATIVE

Based on preliminary design plans, the Tollway Alternative would directly impact approximately 15.6 acres of wetlands, 0.84 acre of open waters, and 10.59 acres of riparian areas. Considering wetland functions, the Tollway Alternative would impact 5.20 weighted acres.

The Tollway Alternative has the least direct and weighted impacts on wetlands.

In addition to impacts common to all of the build alternatives, impacts to streams and major irrigation ditches associated with the Tollway Alternative would include new crossings of Barbara Gulch and Leyden Gulch.

B.15.5 REGIONAL ARTERIAL ALTERNATIVE

Based on preliminary design plans, the Regional Arterial Alternative would directly impact approximately 20.69 acres of wetlands, 0.02 acre of open water, and 9.48 acres of riparian areas. Considering wetland functions, the Regional Arterial Alternative would impact 7.14 weighted acres.

The Regional Arterial Alternative has the most direct and weighted impacts on wetlands.

In addition to impacts common to all of the build alternatives, impacts to streams and major irrigation ditches associated with the Regional Arterial Alternative would include disturbance to Barbara Gulch near the SH 72/SH 93 interchange and impacts to Leyden Gulch and its tributaries along SH 93.

B.15.5 COMBINED ALTERNATIVE

Based on preliminary design plans, the Combined Alternative would directly impact approximately 19.00 acres of wetlands, 0.94 acre of open waters, and 10.89 acres of riparian areas. Taking wetland functions into consideration, the Combined Alternative would impact 6.32 weighted acres.

The Combined Alternative has the second highest direct and weighted impacts on wetlands.

In addition to impacts common to all of the build alternatives, impacts to streams and major irrigation ditches associated with the Combined Alternative would include new crossings of Barbara Gulch and Leyden Gulch, and widening along Indiana and McIntyre streets would impact Leyden Gulch below Leyden Reservoir, Farmers' Highline Canal, Croke Canal, Ralston Creek, Van Bibber Creek, and Clear Creek.

B.16 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 64th Avenue and Indiana Street/McIntyre Street. 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 section compares the major advantages and disadvantages of the final alternatives considered by FHWA and CDOT.

The Freeway Alternative and Combined Alternatives satisfy the study'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 B.14-2**). 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 portions.

B.17 Least Environmentally Damaging and Practicable Alternative

Section 404(b)(1) of the CWA required the Administrator of EPA to develop guidelines on how permitting authorities (USACE in the case of the Northwest Corridor Study) specify sites into which discharge of fill material is allowed (33 U.S.C 1344). Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Par 230) (Guidelines) outline general procedures for USACE to follow in its evaluation of applications to place fill material into waters of the U.S., including adjacent wetlands. The Guidelines are binding regulations to which USACE must adhere. The focus of the Guidelines is to restore and maintain the integrity of the aquatic ecosystem of waters of the U.S. As a result, a major principal of the Guidelines is that dredged or fill material should not be discharged into the aquatic ecosystem, unless the project proponent can demonstrate that the discharge will not result in unacceptable adverse impacts to the aquatic ecosystem. The Guidelines further restrict discharges into the aquatic ecosystem if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem. Therefore, when USACE evaluates which alternative to permit, it looks for the least environmentally damaging practicable alternative (LEDPA). As part of identifying the LEDPA, the Guidelines require USACE to determine the potential short-term or long-term effects of proposed alternatives on the physical, chemical, and biological components of the aquatic environment, including special aquatic sites such as wetlands.

In 1993, EPA issued Regulatory Guidance Letter (RGL) 93-02, which clarified the flexibility available to USACE when it is evaluating proposed alternatives to identify the LEDPA. The RGL made clear that the Guidelines allow room for a reasonable, common sense approach in identifying the LEDPA. The RGL further states that it is clear the Guidelines intend that when USACE is evaluating alternatives, reasonable direction should be applied based on the nature of the aquatic resource and on potential impacts of a proposed alternative. Because of the flexibility allowed, if USACE determines that there is no significant difference in adverse impact on the environment between the applicant's recommended alternative and all other practicable alternatives, even if the recommended alternative does not have the least impacts, then the applicant's recommended alternative can be considered as satisfying the requirements of the Guidelines and can be permitted.

When considering impacts to wetlands that would result from the build alternatives, there is little to differentiate between the alternatives. The build alternatives would result in the same types of direct and indirect impacts and the physical, chemical, and biological components of the aquatic ecosystem would be affected similarly. The build alternatives would also have similar acreages of functionally-weighted direct impacts. The Combined Alternative (Recommended Alternative) would impact 1.12 acres more than the alternative with the least acres of weighted impacts. As a result, even though the Combined Alternative (Recommended Alternative) does not have the least functionally-weighted impacts, it may be considered by USACE as having met the requirements of the Guidelines of the RGL 93-02.

B.18 SUMMARY

Under the merger agreement between FHWA and the USACE, CDOT conducted a LEDPA analysis following Section 404 of the Clean Water Act. If an alternative was considered to be impracticable, it was also considered to be unreasonable. Practicability, under Section 404 of the Clean Water Act, considers cost, existing technology, and logistics in light of the overall project purpose.

After consideration of all NEPA impacts for all alternatives, CDOT has determined that the Combined Alternative (Recommended Alternative) effectively meets the project's purpose and need. The addition of the principal arterial alignment provides additional transportation benefits to the entire study area because it relieves future congestion along two alignments. Additionally, this principal arterial is consistent with local transportation plans. The Combined Alternative (Recommended Alternative) does not have the same community concerns as the Freeway Alternative and Tollway Alternative because it best fits the context of its location through populated areas in the north and south and would not create as much of a disturbance to the communities. Finally, when considering the weighted wetland impacts based on functionality, the Combined Alternative (Recommended Alternative) does not cause substantially greater adverse impact on the aquatic ecosystem than the other alternatives.

Concurrence with the USACE was reached for each stage except for the final concurrence that the recommended alternative was also the LEDPA. This was never reached because the NEPA process was ended.

REFERENCES

Colorado Department of Transportation (CDOT). 2003. *Environmental Stewardship Guide* (March).

Denver Regional Council of Governments (DRCOG). 2004. *2003 Metro Vision Regional Transportation Plan* (November 15).

CDOT, U.S. Army Corps of Engineers, FHWA. 2005. National Environmental Policy Act/Clean Water Act Section 404 (NEPA/404) merger process and agreement for transportation projects in Colorado.