



7.0 ALTERNATIVE EVALUATION – ALTERNATE ROUTES

In addition to non-route based strategies, the Northern Colorado Truck Mobility/State Highway (SH) 14 Relocation Study developed and analyzed alternate truck routes. As stated in Ballot Initiative 200, the alternate truck routes evaluated in this study must be located at least 2 miles north of the City of Fort Collins growth management area (GMA). This requirement means that the southernmost alternate route that was evaluated in this study was County Road (CR) 58. Figure 7.1 shows the major roadway network in the study area. The alternate truck routes developed through the alternative evaluation process were refined by working closely with various stakeholders and affected agencies.

7.1 ALTERNATE ROUTE EVALUATION CRITERIA

The same process used to develop the non-route based strategy evaluation criteria was used to develop criteria for the alternate route evaluation.

As stated in Section 6.1, each of the individual criterion was given a measure of effectiveness that was used to assess the benefits and potential impacts of the alternate routes. The criteria was then separated by whether it was used for the unrealistic or comparative screening analysis. The unrealistic screening was the first phase of the screening process and was used to eliminate alternatives that were unfeasible or unrealistic. The second phase of the screening process was a comparative analysis that was used to provide a route-to-route comparison of the remaining alternate routes.

As seen in Table 7.1, the criteria used to screen unrealistic alternate routes included safety and length of route. If any of the routes violated established design criteria or added excessive miles as compared to the existing route, they were removed from further consideration. Alternate routes removed from further consideration as part of the first phase, elimination of unrealistic alternatives, are shown in Section 7.3.

**Table 7.1
Alternate Route
Unrealistic Screening Evaluation Criteria**

Criterion	Measure of Effectiveness
Safety	Does the alternate route meet the established design criteria?
Length of route	What is the length of the alternate route in comparison to the existing route? What is the length of the alternate route in comparison with the SH 14 portion of the existing route?

Table 7.2 shows the evaluation criteria used to evaluate the remaining alternate routes. The second phase, comparative screening analysis, involved the evaluation of each alternative on the basis of cost, traffic operations, route utilization, environmental resources, ROW and relocations, directly affected properties, community planning and land use, and length of route. Information from the comparative screening analysis can be found in Section 7.4.

Table 7.2
Alternate Route
Comparative Screening Evaluation Criteria

Criterion	Measure of Effectiveness
Cost	What is the capital cost of the alternate route (including right-of-way [ROW], environmental studies, engineering, construction management)? What is the cost per traffic utilization of the alternate route?
Traffic operations	Will the alternate route provide the appropriate level of service and traffic flow? What is the change in vehicle miles traveled?
Route utilization	How many through trucks and other vehicles will use the alternate route?
Environmental resources	What are the potential regional farming resource impacts? What are the potential threatened/endangered species and wildlife habitat impacts? What are the potential wetland impacts? What are the potential noise impacts? What are the potential air quality impacts? What are the potential water resource impacts? What are the potential historical impacts?
ROW/ Relocations	How many property relocations will be required? How many acres of ROW will be required?
Directly affected properties	How many businesses and residences have direct access to the alternate route?
Community planning/Land use	Is the route consistent with County and Regional transportation and master planning efforts? Is the route consistent with local zoning and land uses?
Length of route	What is the length of the alternate route in comparison to the SH 14 portion of existing route and other routes?

7.2 INITIAL LIST OF ALTERNATE ROUTES

The development of the initial list of alternate routes included routes analyzed in previous studies in addition to new alignments in the study area. Major constraints in the study area include: the hogback (mountains) on the west side of the study area, interchange connections to I-25 on the east side of the study area, and bodies of water and development in the center of the study area. Possible connections to US 287 through the hogback were identified including existing CR 80 and CR 72, breaks in the hogback at the Colorado Lien Plant, Horsethief Pass, a pass north of CR 66, and the existing connection through the mining operation at the Holnam strip mine. The existing interchanges and possible interchange locations were then matched up with the possible connections through to US 287 and alignment options were developed that avoided major water bodies and development in the center of the study area.

Schematic alternate route diagrams were developed based on the various constraints in the study area as seen in Figure 7.2. Some existing roads were utilized for the routes as shown by the solid lines in the figure. Portions of the proposed routes that require new roadways are shown by a dashed line. Route designations are grouped by corridors and include: CR 80/82, CR 76/78, CR 70/72, CR 66/68, CR 62/64, and CR 58. Each corridor has a number of different route options designated by the point where it connects to US 287. These options are designated by a letter (A thru D).

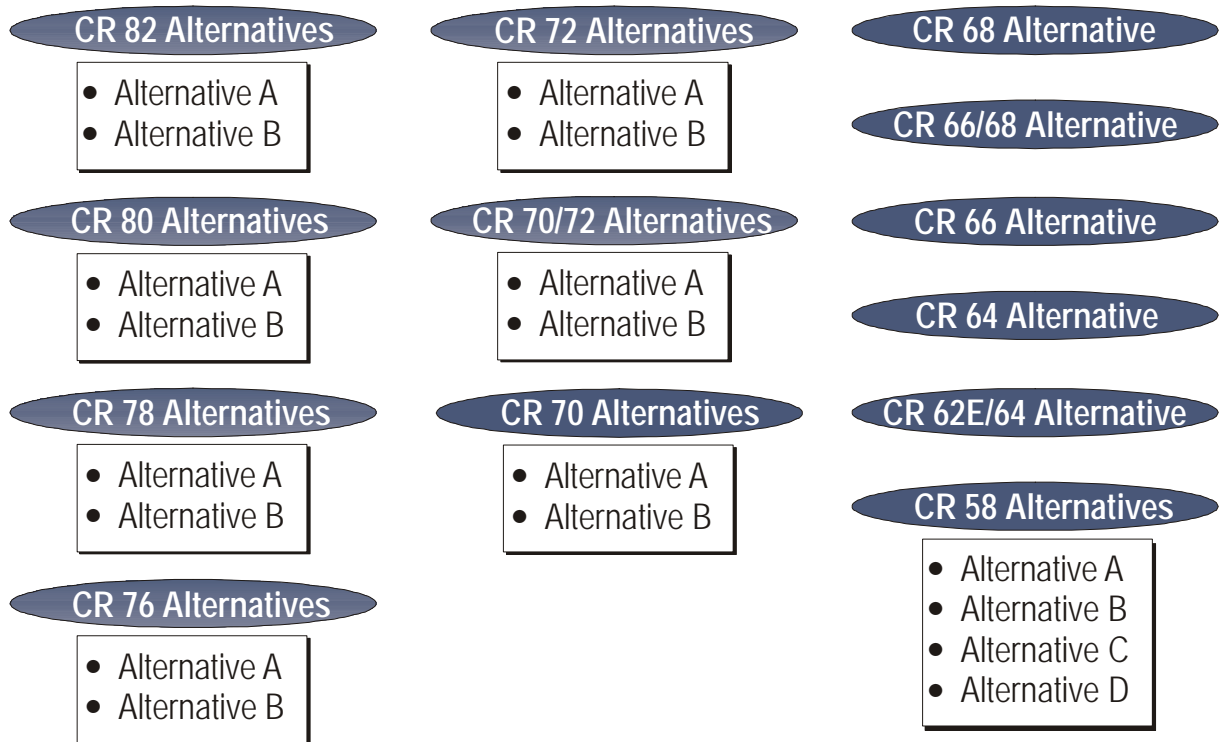
Figure 7.1
Major Roadway Network

Figure 7.2
Initial Alternate Routes Map

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The initial alternate routes represent the basic concept of the alternate route alignment and were refined as the evaluation process continued and increased in level of detail. The initial list of alternate routes is shown in Figure 7.3 and a description of each route follows.

Figure 7.3
Initial Alternate Routes List



County Road 82 Alternatives A and B. The CR 82 alternatives use the existing interchange at I-25 and follow the current alignment from I-25 to CR 15. From CR 15, the alignment continues southwest along a new alignment to the CR 80 and CR 19 intersection. The alignment then follows existing CR 80 near Park Creek Reservoir to connect with US 287. Two alternatives exist for the connection to US 287:

- Alternative A follows the current CR 80 alignment and reconfigures the intersection to a new location on US 287.
- Alternative B follows a new alignment and connects to US 287 at a new intersection north of Alternative A.

County Road 80 Alternatives A and B. The CR 80 alternatives require a new interchange at I-25 and follow a new alignment from I-25 to CR 17. From CR 17, the alignment follows existing CR 80 near Park Creek Reservoir to connect with US 287. Two alternatives exist for the connection to US 287:

- Alternative A follows the current CR 80 alignment and reconfigures the intersection to a new location on US 287.
- Alternative B follows a new alignment and connects to US 287 at a new intersection north of Alternative A.

County Road 78 Alternatives A and B. The CR 78 alternatives require a new interchange at I-25, and follow a new alignment from I-25 to CR 15. From CR 15 to west of CR 17, the alignment follows the existing roadway. West of CR 17, a new alignment continues northwest to CR 80. At CR 80, the alignment follows existing CR 80 near Park Creek Reservoir to connect with US 287. Two alternatives exist for the connection to US 287:

- Alternative A follows the current CR 80 alignment and reconfigures the intersection to a new location on US 287.
- Alternative B follows a new alignment and connects to US 287 at a new intersection north of Alternative A.

County Road 76 Alternatives A and B. The CR 76 alternatives require a new interchange at I-25 and follow a new alignment from I-25 to CR 7. From CR 7, the alignment follows existing CR 76 to CR 9. From CR 9, a new alignment continues west to CR 11 and then along the existing roadway to CR 17. From CR 17, a new alignment continues southwest to CR 72 north of the North Poudre Reservoir. Two alternatives exist for the connection to US 287:

- Alternative A follows a new alignment northwest to an existing break in the hogback at the Colorado Lien plant and continues west to a new intersection at US 287.
- Alternative B follows the existing CR 72 alignment and reconfigures the intersection to a new location on US 287.

County Road 72 Alternatives A and B. The CR 72 alternatives require a new interchange at I-25 and follow a new alignment to CR 7. The alignment continues along existing CR 72 to CR 9 and then along a new alignment west to CR 11. West of CR 11, the alignment follows existing CR 72. Two alternatives exist for the connection to US 287:

- Alternative A follows a new alignment northwest to an existing break in the hogback at the Colorado Lien plant and continues west to a new intersection at US 287.
- Alternative B follows the existing CR 72 alignment and reconfigures the intersection to a new location on US 287.

County Road 70/72 Alternatives A and B. The CR 70/72 alternatives use the existing interchange at I-25 and follow the existing alignment to west of CR 9. West of CR 9, a new alignment continues northwest to east of CR 11. East of CR 11, the alignment follows existing CR 72. Two alternatives exist for the connection to US 287:

- Alternative A follows a new alignment northwest to an existing break in the hogback at the Colorado Lien plant and continues west to a new intersection at US 287.
- Alternative B follows the existing CR 72 alignment and reconfigures the intersection to a new location on US 287.

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County Road 70 Alternatives A and B. The CR 70 alternatives use the existing interchange at I-25 and follow the existing roadway to east of CR 21. Two alternatives exist for the connection to US 287:

- Alternative A follows a new alignment west through Horsethief Pass to a new intersection at US 287.
- Alternative B follows existing CR 21 to the existing CR 72 alignment and reconfigures the intersection to a new location on US 287.

County Road 68 Alternative. The CR 68 alternative requires a new interchange at I-25 and follows the existing alignment from I-25 to CR 11. From CR 11, the alignment follows a new alignment curving north around the reservoir to CR 13 and then follows the existing alignment to CR 15. From CR 15, the alignment continues west to US 287 along a new alignment through Horsethief Pass to a new intersection at US 287.

County Road 66/68 Alternative. The CR 66/68 alternative requires a new interchange at I-25 and follows the existing alignment to CR 13. West of CR 13, the alignment continues northwest on a new alignment to CR 68 at CR 15. From CR 15, the alignment continues west to US 287 along a new alignment through Horsethief Pass to a new intersection at US 287.

County Road 66 Alternative. The CR 66 alternative requires a new interchange at I-25 and follows the existing alignment to CR 13. West of CR 13, the alignment follows a new alignment to CR 15, connecting back to existing CR 66 at CR 15 by curving around the reservoir. From CR 15, the alignment continues west along a new alignment through the hogback to a new intersection at US 287.

County Road 64 Alternative. The CR 64 alternative requires a new interchange at I-25 a half-mile north of the existing CR 62E interchange. The alignment follows existing CR 64 from I-25 west to CR 15. The alignment continues northwest along CR 15 to CR 66. The alignment then follows existing CR 66 to CR 21. West of CR 21, the alignment continues west along a new alignment through the hogback to a new intersection at US 287.

County Road 62E/64 Alternative. The CR 62E/64 alternative uses the existing interchange at I-25 and follows the existing alignment to CR 9. From CR 9, the alignment continues northwest on new alignment to CR 64 at CR 11. From CR 11, the alignment follows existing CR 64 and then continues northwest along CR 15 to CR 66. The alignment then follows existing CR 66 to CR 21. West of CR 21, the alignment continues west along a new alignment through the hogback to a new intersection at US 287.

County Road 62E Alternative. The CR 62E alternative uses the existing interchange at I-25 and follows the existing alignment through Wellington to CR 11. From CR 11, a new alignment continues northwest to CR 64 east of CR 15. The alignment then follows CR 64 to CR 15. The alignment continues northwest along CR 15 to CR 66. The alignment then follows existing CR 66 to CR 21. West of CR 21, the alignment continues west along a new alignment through the hogback to a new intersection at US 287.

County Road 58 Alternatives A, B, C, and D. The CR 58 alternatives require a new interchange at I-25 and follow the existing alignment to CR 15. From CR 15, a new alignment continues west around Rocky Ridge Lake to CR 19. Four alternatives exist for the connection to US 287:

- Alternative A follows a new alignment through an existing break in the Holnam strip mine and continues south to a new intersection at US 287.
- Alternative B follows a new alignment west through an existing break in the Holnam strip mine and continues west to a new intersection at US 287.
- Alternative C follows a new alignment north along the east side of the Holnam strip mine and connects to the CR 70/72 alternatives at CR 21.
- Alternative D follows a new alignment north to CR 21 and then continues along existing CR 21 to CR 66. From CR 66, the alignment continues northwest along a new alignment through Horsethief Pass to a new intersection at US 287.

7.3 UNREALISTIC SCREENING ANALYSIS FOR ALTERNATE ROUTES

The first phase, unrealistic alternate route screening, was completed based on safety and length of route evaluation criteria. The safety criteria reflected the ability to reasonably construct the alternate route to meet minimum design criteria based on the Colorado Department of Transportation (CDOT) standards. The length of route evaluation assessed the length of the proposed route compared to the existing SH 14/US 287 route.

7.3.1 Alternate Route Design Criteria

Alternate route design criteria was developed to establish design minimums and maximums as defined by CDOT design standards. The design criteria features are shown in Table 7.3 and discussed below in more detail.

Table 7.3
Alternate Route Design Criteria

Design Criteria	Alternate Route Criteria
Roadway Classification	Expressway (EX) for new roadways Regional Highway (RA) for improved roadways
Access Location	Expressway (EX) – Desired – 1 mile; Permitted - ½ mile Regional Highway (RA) – Desired – ½ mile
Design Speed	Level terrain– 70 mph Rolling terrain– 60 mph Mountainous terrain– 50 mph
Maximum Vertical Grades	Level terrain – 3 percent Rolling terrain – 4-5 percent Mountainous terrain – 6-7 percent
Vertical Clearance Minimums	Roadway Overpass/Underpass – 16.5 feet Railroad Underpass – 23.5 feet Railroad Overpass – 16.5 feet

Table 7.3 (cont'd)
Alternate Route Design Criteria

Design Criteria	Alternate Route Criteria
Cross Section Features	Lane Widths – 12 feet Shoulder Widths – 8-10 feet Median Width – 30 feet Clear Zone - 20-30 feet
Minimum Right-of Way Requirements	2-lane Facility – 84 feet 3-lane Facility – 100 feet 4-lane Facility – 154 feet

Source: Colorado Department of Transportation Design Manual
 State Highway Access Code

Roadway Classification. Roadways are classified as certain types based on the function they provide. The following is a description of functional classifications for some typical roadway types as defined by the *State Highway Access Code*:

- **Interstate/Freeway.** This functional classification is for use on highways that have the capacity for high speed and relatively high traffic volumes over medium or long distances in a safe and efficient manner. They provide for interstate, interregional, intra-regional, and intercity travel.
- **Expressway.** This category is appropriate for use on highways that have the capacity for high speed and relatively high traffic volumes in an effective and safe manner. They provide for interstate, interregional, intra-regional, and intercity travel needs.
- **Regional Highway.** This category is appropriate for use on highways that have the capacity for medium to high speed. They also accommodate relatively medium to high traffic volumes over medium to long distances in a safe and efficient manner. They provide for interregional, intra-regional, and intercity travel. This category is normally assigned to National Highway System routes, significant regional routes in rural areas, and other routes of regional or state significance.
- **Arterial.** This category is primarily to provide mobility between two points. They can be two to six lanes wide, typically carrying significant traffic volumes at higher speeds for longer distances.
- **Collector.** This category serves both access and mobility functions. They can be either two or four lanes wide, typically carrying traffic volumes and speeds less than an arterial street but greater than a local street.
- **Local.** This category serves as a means of providing access to adjacent land uses, whether residential, business, or industrial uses. They are typically lower in speed, two to three lanes wide, and carry low traffic volumes.

For the purpose of this study, the classification of any portion of the route on a new roadway was an expressway and any improvement of existing roadways was classified as a regional highway. All additional design criteria such as access location and speed was based on the roadway classification.

Access Location. Access to the roadway is established based on the roadway classification and is permitted at half-mile increments for either an expressway or regional highway classification. While this access spacing is ideal, historical access to the roadway has to be maintained, but it may be modified or consolidated.

Design Speed. Design speed is the maximum safe speed that can be maintained under ideal conditions for a given section of highway. A desired design speed is typically set to determine particular design criteria for highway geometry. The design speed is ideally 10 miles per hour (mph) greater than the intended posted speed limit as a margin of safety. For this study, the design speed for level terrain was 70 mph, rolling terrain was 60 mph, and mountainous terrain was 50 mph. The definitions of the various terrain categories is provided under the maximum vertical grade discussion.

Maximum Vertical Grades. The topography of the land has an influence on the alignment of the roads and streets. Terrain categories are defined by three categories under *A Policy on Geometric Design of Highways and Streets*.

- **Level.** In level terrain, highway distances are generally long or can be made so without construction difficulty or major expense.
- **Rolling.** In rolling terrain, natural slopes consistently rise above and fall below the road or street grade, and occasionally steep slopes offer some restriction to normal horizontal and vertical roadway alignment.
- **Mountainous.** In mountainous terrain, changes in elevation of the ground in relation to the road are abrupt, and side hill excavation is frequently needed to obtain acceptable horizontal and vertical alignment.

For the purposes of this study, level or flat areas assume a maximum vertical grade of 3 percent that represents 3 feet of vertical rise over a 100-foot horizontal length. For rolling or slight inclines, 4 to 5 percent is the maximum vertical grade, and for mountainous terrain 6 to 7 percent is the maximum. Most of the study area is considered level or rolling terrain except along the hogback east of US 287 that is considered mountainous.

Vertical Clearance Minimums. Vertical clearance is the distance between the roadway and the bottom of an overhead structure. For this study, the minimum vertical clearance for roadway overpasses or underpasses was 16.5 feet. The minimum clearance for railroad underpasses was 23.5 feet, while railroad overpasses require a minimum 16.5-foot vertical clearance.

Cross Section Features. Roadway cross section features include lane widths of 12 feet, shoulder widths of 8 to 10 feet, median widths of 30 feet, and a clear zone of 20 to 30 feet. Clear zone is defined as the area between the edges of the traveled way to a potential obstruction such as a mailbox. Typical roadway sections for the alternate routes are provided in Section 7.3.1.

Minimum Right-of-Way (ROW) Requirements. Minimum ROW requirements vary based on the number of lanes required. A 2-lane facility requires 84 feet, a 3-lane facility requires 100 feet, and a 4-lane facility requires 154 feet. These requirements include the minimum clear zone needs.

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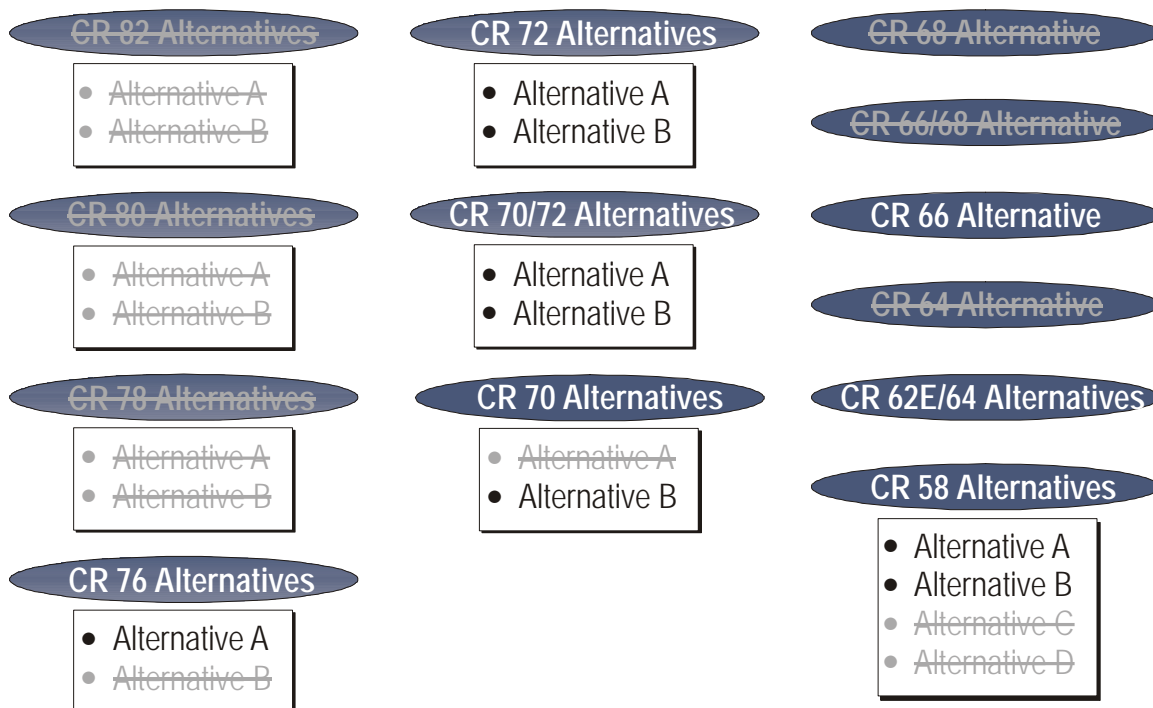
7.3.2 Length of Route

Along with safety, length of route evaluation criteria was used to eliminate alternate routes during the unrealistic screening analysis. Alternate routes that were significantly longer (5 or more miles) than the existing route were eliminated during the first screening phase.

7.3.3 Unrealistic Screening Results for Alternate Routes

Based on the unrealistic screening analysis, the routes that were removed from further consideration are shown in gray with a line through them in Figure 7.4. The remaining routes in the study area are also shown in color in Figure 7.5 and the routes shown in gray were removed from further consideration. The basis for the elimination of the various routes is discussed below.

Figure 7.4
Alternate Route
Unrealistic Screening Results



Note: Alternate routes eliminated from further consideration in the unrealistic screening analysis are shown in gray with a single line through them.

County Road 82 Alternatives A and B. The CR 82 alternatives were eliminated from further consideration based on both safety and length of route criterion. Both alternatives require more than 3 miles of sustained vertical grades in excess of 9 percent, are approximately 7 miles longer than the existing SH 14/US 287 route, and create out of direction travel.

County Road 80 Alternatives A and B. The CR 80 alternatives were eliminated from further consideration based on both safety and length of route criterion. Both alternatives require more than 4 miles of sustained vertical grades in excess of 6 percent, are approximately 5 miles longer than the existing SH 14/US 287 route, and create out of direction travel.

County Road 78 Alternatives A and B. The CR 78 alternatives were eliminated from further consideration based on both safety and length of route criterion. Both alternatives require more than 4 miles of sustained vertical grades in excess of 6 percent, are approximately 5 miles longer than the existing SH 14/US 287 route, and create out of direction travel.

County Road 76 Alternative B. The CR 76 B alternative was eliminated from further consideration based on length of route criteria, because it is 5 miles longer than the existing SH 14/US 287 route, and because it creates out of direction travel.

County Road 70 Alternative A The CR 70 A alternative was eliminated from further consideration based on safety criteria because it requires sustained vertical grades in excess of 7 percent over Horsethief Pass.

County Road 68 Alternative The CR 68 alternative was eliminated from further consideration based on safety criteria because it requires sustained vertical grades in excess of 7 percent over Horsethief Pass.

County Road 66/68 Alternative. The CR 66/68 alternative was eliminated from further consideration based on safety criteria because it requires sustained vertical grades in excess of 7 percent over Horsethief Pass.

County Road 64 Alternative. The CR 64 alternative was eliminated from further consideration based on safety criteria because of the close spacing of a new interchange to the existing CR 62E interchange near Wellington.

County Road 58 Alternatives C and D. The CR 58 C alternative was eliminated from further consideration based on length of route criteria because it is 14 miles longer than the SH 14 portion of the existing route. The CR 58 D alternative was eliminated from further consideration based on safety and length of route criteria because it requires sustained vertical grades in excess of 7 percent over Horsethief Pass and is 10 miles longer than the SH 14 portion of the existing route.

7.4 ALTERNATE ROUTE REFINEMENT

Following the unrealistic alternate route screening, the remaining routes were refined to show the number of lanes required, any grade separations required for the railroad, and any special features of the routes. As the remaining routes were developed in more detail, it was determined that the CR 62E/64 and CR 62E routes through downtown Wellington were not feasible. Maintaining the required number lanes and shoulders would dramatically impact the businesses in the downtown area. These potential impacts include loss of all on-street parking and major relocations. Based on these issues, the CR 62E/64 and CR 62E alternate routes were removed from further consideration. Figure 7.6 reflects the alternate routes that were evaluated in more detail in the comparative screening analysis. The remaining alternate routes are described in more detail in the following sections.

Figure 7.5
Remaining Alternate Routes Following Unrealistic Screening Analysis

Figure 7.6
Alternate Routes Evaluated in Comparative Screening Analysis

**Figure 7.7
County Road 76 Alternate Route**

Figure 7.8
County Road 72, 70/72 and 70 Alternate Routes

**Figure 7.9
County Road 66 Alternate Route**

Figure 7.10
County Road 58 Alternate Routes

7.5 COMPARATIVE SCREENING ANALYSIS FOR ALTERNATE ROUTES

Following the unrealistic screening, the remaining alternate routes were refined to provide the necessary detail to complete the second level of screening, the comparative screening analysis. The comparative screening analysis was conducted to determine the relative benefits and potential impacts of the alternate routes in relation to one another. The analysis was based on the established criterion shown in Section 7.1 and included cost, traffic operations, route utilization, environmental resources, ROW and relocations, directly affected properties, and community planning and land use, and length of route.

7.5.1 Alternate Route Cost

Various costs were developed for each alternate route including capital cost and cost per traffic utilization measures. Comparative evaluation information for cost can be found in Table 7.5.

7.5.1.1. Capital Cost

Conceptual cost estimates for the alternate routes were developed based on total construction cost in 2001 dollars including engineering, construction management, environmental studies (environmental assessment [EA], environmental impact statement [EIS]), legal fees, ROW requirements, and potential relocations. Similar assumptions were used for each alternate route, and a 30 percent contingency was added to the overall cost in determining the capital cost. Table 7.4 shows the capital cost assumptions that were used and additional cost information for each route can be found in Appendix D.

**Table 7.4
Capital Cost Assumptions**

Capital Cost Items	Cost Assumption	
Material Costs (per CDOT Cost data in 2001 dollars)	Asphalt	\$45 per ton
	Aggregate Base Course	\$12 per cubic yard
	Earthwork	\$6 per cubic yard – complete in place
	Major Earthwork	\$4 per cubic yard – complete in place
	Curb, Gutter and Sidewalk	\$12 per linear foot
	Box Culverts	\$450 per linear foot
	Bridges	\$120 per square foot
Roadway Typical Section Costs	3 lane section (on existing alignment)	\$900,000 per mile
	3 lane section (on new alignment)	\$1,300,000 per mile
	4 lane section (on existing alignment)	\$1,100,000 per mile
	4 lane widening for SH 1 portion of CR 58 routes	\$850,000 per mile
I-25 Interchange Options	New Diamond Interchange (no existing structures)	\$17,000,000
	New Diamond Interchange (existing overpass)	\$15,000,000
	Interchange Modifications	\$10,000,000

Table 7.4 (cont'd)
Capital Cost Assumptions

Capital Cost Items		Cost Assumption
Railroad Grade Separation		\$4,000,000 each
Engineering and Construction Fees	Environmental Evaluation Process	\$5,000,000
	Engineering	5 percent of total construction cost
	Construction	10 percent of total construction cost
	Insurance and Legal	3 percent of total construction cost
Other Miscellaneous Cost Items	Mobilization and Traffic Control	7 percent of total construction cost
	Utility Relocation	\$580,000 per mile
	Allowance for Unlisted Items	30 percent of construction item costs
	Improvements to US 287 intersection	\$300,000 to \$500,000 based on existing intersection configuration

Source: Colorado Department of Transportation 1999 Cost Data Book

7.5.1.2. Cost per Traffic Utilization Measures

Cost per total traffic utilization represents the capital cost divided by the future (2020) projected average daily traffic (ADT) volumes on the various alternate routes. ADT volumes came from the travel demand model as described in Section 7.5.3 and include all types of vehicles. The cost per through truck represents the capital cost divided by the future (2020) projected through truck volumes. Future (2020) projected traffic volumes are shown in Table 7.9 for both through trucks and all vehicle types. Sample calculations for CR 76 are provided below and the various costs are reflected in Table 7.5.

$$\text{Cost per vehicle} : \frac{\$94,000,000}{6,000 \text{ total traffic on route/day}} = \$15,667 / \text{total daily traffic on route}$$

$$\text{Cost per through trucks} : \frac{\$94,000,000}{1,300 \text{ through trucks on route/day}} = \$72,308 / \text{through trucks on route}$$

Table 7.5
Alternate Route Cost Comparison

Evaluation Criterion		Alternate Route								
		76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Capital cost (millions)		\$94.0	\$92.3	\$63.5	\$68.3	\$56.9	\$60.9	\$68.4	\$62.2	\$69.1
Cost per traffic utilization (\$/vehicle)	Cost per vehicle on proposed route (thousands) ^(a)	\$15.7	\$14.2	\$9.8	\$10.2	\$8.5	\$9.1	\$7.9	\$5.5	\$6.6
	Cost per through truck on proposed route (thousands) ^(b)	\$72.3	\$71.0	\$48.8	\$52.5	\$43.8	\$46.8	\$52.6	\$47.8	\$53.2

Note: Cost values represent 2001 dollars and future (2020) projected traffic volumes

(a) Example calculation for CR 76A - Capital Cost (\$94,000,000) / Total Traffic on route (6,000 vehicles per day) = \$15,667 per vehicle

(b) Example calculation for CR 76A - Capital Cost (\$94,000,000) / Through Trucks on route (1,300 vehicles per day) = \$72,308 per through truck

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7.5.2 Traffic Operations

Traffic operations for each alternate route were evaluated using level of service, change in vehicle miles traveled (VMT), and travel time from I-25 and SH 14 to US 287 and I-80. Comparative evaluation information for traffic operations can be found in Table 7.6. All traffic volumes (explained in Section 7.5.3) are based on future (2020) projections generated by the travel demand model.

7.5.2.1. Number of Lanes Required for Level of Service C

Based on projected future (2020) traffic volumes, the number of lanes required to support the volumes was determined. The number of lanes was based on maintaining a level of service (LOS) C as recommended by CDOT for all routes. LOS refers to the congestion and operation of a roadway or intersection. LOS ranges from A to F, with A being the best and F being the worst. The level of service analysis for each of the alternate routes was completed using the *Highway Capacity Manual*. Output data from the level of service analysis is included in Appendix D.

7.5.2.2. Change in Vehicle Miles Traveled

The daily change in VMT was calculated for the entire region (including Longmont, Fort Collins, Greeley, and north to Wyoming) using the travel demand model. The change in VMT for each route is based on the change in regional VMT for future (2020) traffic volumes with the route minus total projected VMT in 2020 without the route. The total projected regional VMT for 2020 is 23,575,000 miles.

7.5.2.3. Travel Time from I-25 and SH 14 to US 287 and I-80

Projected travel times for each route were calculated assuming the speed of travel was equal to the designated speed limit and using the length of the various routes. An example calculation for CR 76 is shown below.

$$\left(15 \text{ miles} / 75 \frac{\text{miles}}{\text{hour}}\right) + \left((8.8 + 44) \text{ miles} / 65 \frac{\text{miles}}{\text{hour}}\right) + \left(3.0 \text{ miles} / 55 \frac{\text{miles}}{\text{hour}}\right) = 1.07 \text{ hour} = 64.0 \text{ minutes}$$

Table 7.6
Traffic Operations Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Number of lanes required (LOS C) ^(a)	3 lane	3 lane	3 lane	3 lane	3 lane	3 lane	3 lane	3/4 lane	4 lane
Change in vehicle miles traveled (miles) ^(b)	30,000	15,000	15,000	15,000	15,000	15,000	10,000	20,000	15,000
Travel time from I-25/SH 14 to US 287/I-80 (minutes) ^(c)	64.0	61.6	64.0	60.9	63.4	63.6	61.7	65.2	62.1

(a) Based on future (2020) projected traffic volumes

(b) Based on change in regional VMT for future (2020) traffic volumes - Total projected vehicle miles traveled is 23,575,000 miles in 2020

(c) Example calculation for CR 76A - $((15 \text{ mi.})/(60/75\text{mph}) + (8.8 \text{ mi.})/(60/65\text{mph}) + (3.0 \text{ mi.})/(60/55\text{mph}) + (44 \text{ mi.})/(60/65\text{mph})) = 64.0 \text{ minutes}$

7.5.3 Route Utilization

Route utilization was evaluated by the future (2020) projected number of total vehicles and through trucks on the proposed route. Traffic volumes were generated by the travel demand model as described below. Comparative evaluation information for route utilization is shown in Table 7.9.

Model Discussion. A travel demand model is a widely accepted planning tool used to gauge the relative effectiveness of different roadway scenarios in terms of estimated traffic volumes and travel patterns. For this study, the TransCAD travel demand model maintained by the City of Fort Collins was used to develop future (2020) projected traffic volumes. The primary inputs of the travel model were forecasts of year 2020 population and employment, distributed geographically, and a planned future roadway network based on the North Front Range Transportation and Air Quality Planning Council (NFRTAQPC) adopted 2020 Regional Transportation Plan. A detailed discussion of the modeling process is included in the *Route Utilization Analysis* in Appendix D. The travel model takes into account a variety of factors, including:

- Trip purpose
- Number of trips made per day
- Trip length
- Roadway speed and capacity
- Availability of transit
- Time-of-day travel characteristics (peak-period travel versus off-peak travel)
- Roadway congestion

Information from the *Truck Origin and Destination Survey* was used to verify the traffic estimates provided by the model. Table 7.7 shows a comparison between total traffic volumes of all types in the year 2000 versus year 2020 forecasts for various locations in the study area.

Table 7.7
Existing (2000) and Future (2020) Projected
Traffic Volume Comparison

Location	Year 2000	Year 2020 Forecast
US 287 North of Owl Canyon Road – Total Daily Traffic Volume	5,500	12,000 – 13,000
US 287 North of Owl Canyon Road – Daily Through Truck Traffic Volume	600	1,200 – 1,300
Jefferson Street - Total Daily Traffic Volume	17,000 – 18,000	24,000 – 25,000
Jefferson Street – Daily Vehicles to/from US 287	3,500	7,000 – 8,000

Source: *Route Utilization Analysis*

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Summary of Model Results. Almost all of the through trucks would be expected to use any of the alternate routes because they are much less congested and have higher speeds than the existing SH 14/US 287 route. In addition, other local and regional trucks (non-through) would use the various alternate routes. Total projected traffic volumes are higher on the more southern alternate routes due to population in the City of Fort Collins, Wellington, and Laporte areas using the route to access north I-25 and other areas.

A key link on the current SH 14/US 287 route is Jefferson Street. The potential impact of each alternate route on Jefferson Street is presented in Table 7.8. The alternate routes result in a reduction of total traffic on Jefferson Street. The amount of reduction does not directly equate to the amount of traffic that is transferred to the alternate route. This is primarily because without an alternate route, traffic demand for Jefferson Street exceeds capacity. The presence of an alternate route allows other traffic to use Jefferson Street that otherwise avoided Jefferson Street due to congestion.

Table 7.8
Route Utilization
Future (2020) Projected Daily Traffic Volumes

Alternate Route	Total Traffic on Route	Total Traffic on Route near I-25	Through Trucks on Route	Total Vehicles on Jefferson	Reduction of Vehicles on Jefferson
CR 76 A	5,500 – 6,000	5,500 – 6,000	1,200 – 1,300	22,000 – 23,000	2,000
CR 72 A	6,000 – 6,500	7,500 – 8,000	1,200 – 1,300	21,500 – 22,500	2,500
CR 72 B	6,000 – 6,500	7,500 – 8,000	1,200 – 1,300	21,500 – 22,500	2,500
CR 70/72 A	6,000 – 6,500	7,500 – 8,000	1,200 – 1,300	21,500 – 22,500	2,500
CR 70/72 B	6,000 – 6,500	7,500 – 8,000	1,200 – 1,300	21,500 – 22,500	2,500
CR 70 B	6,000 – 6,500	7,500 – 8,000	1,200 – 1,300	21,500 – 22,500	2,500
CR 66	8,700	8,700	1,200 – 1,300	20,000 – 21,000	4,000
CR 62E/64	9,100	15,000 – 17,000	1,200 – 1,300	20,000 – 21,000	4,000
CR 62E	9,100	15,000 – 17,000	1,200 – 1,300	20,000 – 21,000	4,000
CR 58A	8,800	14,000 – 15,000	1,200 – 1,300	20,000 – 21,000	4,000
CR 58B	9,900	14,000 – 15,000	1,200 – 1,300	20,000 – 21,000	4,000

Source: Route Utilization Analysis

7.5.3.1. Through Trucks on Proposed Route

For the comparative analysis, the number of through trucks on each proposed route was assumed to be 1,300 trucks per day based on the results of the travel demand model. As stated previously, all of the alternate routes attract the majority of the through truck traffic because of the congestion on the existing SH 14/US 287 route.

7.5.3.2. Total Vehicles on Proposed Route

The total projected future (2020) traffic that would use each alternate route is shown in Table 7.8. The higher number of vehicles given in the range was used in the comparative analysis.

A weighted average of the traffic utilization numbers was used for CR 70/72 A, 70/72 B, CR 70 B, CR 58 A, and CR 58 B due to the larger amounts of traffic on each of these routes near I-25. An example calculation of the weighted traffic average for CR 70/72 A is shown below:

$$\frac{\frac{8,000 \text{ vehicles near I-25}}{\text{day}} \times 1.5 \text{ miles} + \frac{6,500 \text{ vehicles on route}}{\text{day}} \times 9.6 \text{ miles}}{\text{total route length of 11.1 miles}} = 6,702 \text{ vehicles/day on route}$$

Table 7.9
Route Utilization Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Through trucks on proposed route (vehicles per day)	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Total vehicles on proposed route (vehicles per day)	6,000	6,500	6,500	6,700*	6,700*	6,700*	8,700	11,300*	10,400*

Note: Based on projected future (2020) traffic volumes

* Weighted average of future (2020) vehicles per day on route near I-25

7.5.4 Environmental Resources

Potential environmental resource impacts for each alternate route were evaluated based on established evaluation criteria including farming resources, threatened or endangered species (T&E) and wildlife, wetlands and riparian areas, noise, air quality, water resources, and historic resources. The acres of potential effect were developed using the proposed ROW (200 foot minimum) minus the existing ROW (60 feet for county roads and 100 feet for SH 1). An example calculation for a typical acres of potential effect is shown below.

$$500 \text{ ft of effect along existing roadway} \times (200 \text{ ft proposed ROW} - 60 \text{ ft existing ROW}) = 70,000 \text{ ft}^2$$

$$70,000 \text{ ft}^2 \div \frac{43,560 \text{ ft}^2}{\text{acre}} = 1.6 \text{ acres of potential effect}$$

7.5.4.1 Farming Resources

An analysis of potential impacts to farming resources was completed using components of the Larimer County Land Evaluation and Site Assessment (LESA). The framework for LESA was developed by the United States Department of Agriculture Natural Resources Conservation Service to identify important agricultural resources. A committee of local landowners and citizens developed Larimer County's LESA system.

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Three elements of the Larimer County LESA system were used to evaluate impact on agricultural resources for each route. While this represents a departure from an official application of the LESA system, this approach was considered the most reasonable approach for a study of this scope. Members of the Larimer County LESA Committee reviewed the results and reported that while the analysis fell short of a true LESA analysis, it was superior to an analysis that considered only soil resources.

An agricultural resource impact score was developed for each route. Soils were evaluated according to the point system used in the Land Evaluation (LE) portion of Larimer County's LESA system. The analysis assigns a point value for each soil type based on the soil's ability to grow crops. Dryland soil types I thru III (the most productive soils) are shown in Figure 7.10. There were no type I or II dryland soils located in the study area.

Farm size and distance to annexed boundary was also evaluated. Large farms score more points because their economy of scale contributes to their economic sustainability. Farms far from an annexed boundary receive more points because they experience less development pressure and are more likely to remain in business. Farm size and distance to annexed boundary are components of the site assessment (SA) portion Larimer County's LESA system.

The soil, farm size and distance to annexed boundary analyses were combined to develop the agricultural resource impact score. The maximum possible score is 200. Higher scores indicate better farming resources that may be impacted. Table 7.10 shows the farming resources comparison.

Table 7.10
Farming Resources Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Agricultural resource impact score ^(a)	167	137	122	135	118	103	107	131	117
Soils score ^(b)	67	64	66	68	68	70	74	100	86
Farm size and distance to annexed boundary score ^(c)	100	73	56	67	50	33	33	31	31

(a) Larimer County Land Evaluation Site Assessment (LESA) - Example calculation for CR 76A - Soils score (67) + Farm size and distance score (100) = 167

(b) Based on seven soil classes which are weighted by ability to grow crops and summed for each alternate route. The better the soil classification, the higher percentage of the total acreage is included in the scoring. The final score is based on a maximum of 100 with each route shown as a percentage of the maximum. For the soils score, the CR 58A route has the highest value.

(c) Based on farm/ranch size and distance to nearest annex boundary. Larger farms/ranches are given a higher value and then multiplied by the distance to nearest annex boundary. All individual property scores are summed for each alternate route. The final score is based on a maximum of 100 with each route shown as a percentage of the maximum. For the farm size and distance score, the CR 76A route has the highest value.

**Figure 7.11
Dryland Soils**

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7.5.4.2. Threatened and Endangered (T&E) Species and Wildlife

Potential impacts to T&E species and wildlife were evaluated for each alternate route. T&E species lists were obtained from the Colorado Division of Wildlife (CDOW) and the U.S. Fish and Wildlife Service (USFWS). Habitat was mapped for state and Federally listed species that potentially occur within the study area. This habitat is shown in Figure 7.12 and is generally found near water resources. In some cases, information obtained from the CDOW and USFWS revealed known occurrences for T&E species. Figure 7.12 illustrates areas where the Preble's Meadow Jumping Mouse, Peregrine falcon, and bald eagles are known to occur. According to USFWS, there is no "Critical Habitat" (physical or biological features associated with an area that are essential to the conservation of a species) for any listed species in the study area.

Potential T&E species habitat, T&E known occurrences, and Colorado National Heritage Program (CNHP) conservation sites were also evaluated based on the acres of potential effect. The results are shown in Table 7.11. More information about protected species impacts would become available as field surveys are initiated as part of a detailed environmental resource assessment.

Table 7.11
Threatened and Endangered Species and Wildlife Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Federal and State protected species (acres of potential effect)	53	44	52	47	55	51	30	21	22
CNHP conservation sites (acres of potential effect)	28	21	7	21	7	0	11	10	10

Source: Colorado Division of Wildlife
United States Fish and Wildlife Service
Colorado National Heritage Program

Figure 7.12
Federal and State Protected Species and CNHP Conservation Sites

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7.5.4.3. Wetlands and Riparian Areas

Potential impacts to wetlands were evaluated for each alternate route. Riparian ecosystems are vegetated areas found between wetlands and uplands, and were identified based on information from CDOW as shown in Figure 7.13. These areas are important for their flood control function and habitat value. The acres of potential effect were developed and potential wetland and riparian area impacts are shown in Table 7.12.

Wetlands and deepwater habitats were identified based on information from the National Wetlands Inventory (NWI) as shown in Figure 7.13. Deepwater habitats include lakes, creeks, and rivers, while wetlands include areas like marshes that are generally vegetated with willows, rushes, and sedges. The acres of potential effect were also developed for wetlands and deepwater habitat. More information about potential wetland, deepwater habitat, and riparian impacts would become available as field surveys are initiated as part of a detailed environmental assessment.

Table 7.12
Wetlands and Riparian Areas Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Riparian Areas (acres of potential effect)	1	0	0	1	1	3	2	6	5
Potential wetland impacts (acres of potential effect)	1	3	3	3	3	5	10	12	12

Source: National Wetland Inventory
Colorado Division of Wildlife

Figure 7.13
Riparian and Wetland Areas

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7.5.4.4. Noise Impacts

Potential noise impacts were evaluated for each alternate route. Traffic noise levels are affected by traffic volume, traffic speeds, and vehicle types. The Federal Highway Administration (FHWA) has established guidelines defining noise abatement criteria for the upper limits of acceptable traffic noise levels based on land use and activities. These levels represent a balance between a desirable noise level and an achievable noise level. Noise levels are measured in L_{eq} , which represents the average noise level fluctuations over one hour. The units are in decibels (dB) on the “A” weighted scale (dBA). The “A” weighted scale approximates the range of sound frequencies humans can hear.

FHWA’s maximum allowable noise level (23 CFR 772) is 67 dBA for residential use, hotels, and museums (Category B) and 72 dBA for commercial business land use (Category C). CDOT defines noise levels 1 dBA below FHWA’s maximum allowable levels (66 dBA for residential use, hotels, and museums and 71 dBA for commercial use) as approaching noise abatement criteria and mitigation must be evaluated. An increase of 10 dBA or more from the existing noise level also requires the evaluation of mitigation. Mitigation is only required by FHWA where it is “reasonable and feasible”.

FHWA’s computerized noise prediction model, STAMINA 2.0 (using Colorado emission data) was utilized to determine the extent of traffic noise impacts. This program evaluates the noise energy produced by traffic in a segment of roadway based on the traffic volume, speed, and type of vehicles using the roadway. Future (2020) projected traffic volumes were obtained from the travel demand model and were used to predict where noise levels would equal or exceed the 66 dBA and 71 dBA impact thresholds. The number of residences and commercial businesses were then identified within these impact areas as shown in Table 7.13. More information about involvement with noise will become available once detailed noise modeling is initiated in a detailed environmental assessment.

**Table 7.13
Noise Comparison**

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Residences within 66 dBA range (without relocations)	14	8	8	7	7	11	10	15	14
Commercial Businesses within 71 dBA range	0	0	0	0	0	0	0	0	0

Note: Potential noise impacts include receivers within CDOT and FHWA accepted approaching noise criteria (66 dBA for residential, 71 dBA for businesses)

7.5.4.5. Air Quality

Potential impacts to air quality were evaluated for each alternate route using year 2015 carbon monoxide (CO) and diesel emissions obtained from the Colorado Department of Public Health and Environment (CDPHE). Detailed air quality models were not used in this analysis, but predictions of CO and diesel pollution were estimated as seen in Table 7.14 using the future (2020) projected traffic volumes. In order to address air quality effects associated with the project, guidance from Dr. Roger A. Pielke Sr. was sought. Dr. Pielke is a Professor and State Climatologist with the Department of Atmospheric Science, Colorado State University. His input helped structure the qualitative analysis that provided the basis for the air quality impact assessment. He also provided important information on mixing heights in the project area.

Based on the air quality analysis for this study, if the model predicted 16 percent of the traffic would relocate to CR 58 A, then 16 percent of the CO/diesel pollution was assumed to be taken off of the existing SH 14/US 287 route. More information about air quality will become available once detailed air quality modeling is initiated in a certified environmental assessment. Example calculations for how the air quality values were calculated are provided below for CR 76 A.

$$\text{Additional CO on route: } \frac{2.76 \frac{\text{tons}}{\text{day}} \text{ CO on SH 14} \times (2000 \text{ vehicles relocated})}{25,000 \text{ ADT in 2020}} = 0.22 \frac{\text{tons}}{\text{day}}$$

$$\text{Additional diesel on route: } \frac{0.0006 \frac{\text{tons}}{\text{day}} \text{ diesel on SH 14} \times (2000 \text{ vehicles relocated})}{25,000 \text{ ADT in 2020}} = 0.00005 \frac{\text{tons}}{\text{day}}$$

Table 7.14
Air Quality Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Additional CO on route (tons per day) ^(a)	0.22	0.28	0.28	0.28	0.28	0.28	0.44	0.44	0.44
CO on existing SH 14 after relocation (tons per day)	2.54	2.48	2.48	2.48	2.48	2.48	2.32	2.32	2.32
Additional diesel on route (tons per day) ^(b)	0.000048	0.000060	0.000060	0.000060	0.000060	0.000060	0.000096	0.000096	0.000096
Diesel on existing SH 14 after relocation (tons/day)	0.00055	0.00054	0.00054	0.00054	0.00054	0.00054	0.00050	0.00050	0.00050

Note: Based on 2020 VMT and CO and diesel emissions provided by the Colorado Department of Health

(a) Additional CO on route (CR 76) = (2.76 tons per day CO on SH 14 in 2015)(2000 vehicles relocated)/(25,000 ADT 2020) = .22 tons per day

(b) Additional diesel on route (CR 76) = (0.0006 tons per day diesel on SH 14 in 2015)(2000 vehicles relocated)/(25,000 ADT 2020) = 0.00005 tons/day

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7.5.4.6. Water Resources

Potential impacts to water resources were evaluated for each alternate route. Water resource information was obtained from the Larimer County Land Use and Site Inventory Assessment (LUSIA), the U.S Census Bureau, and the Federal Emergency Management Agency (FEMA). In particular, this study gave attention to two water resources: ditch/canal crossings and floodplains.

As part of the route selection process, roadway construction impacts to irrigation ditches and canals was calculated. This was important to factor into this route determination process since agriculture plays a major role in the economy of the study area. Ditch and canals are shown in Figure 7.14 and impacts (numbers of ditches/canals) were determined wherever an alternate route bisected an irrigation resource.

Impacts to floodplains were also investigated. This study analyzed impacts to FEMA’s 100 year floodplains that correspond to Zone A on FEMA maps as shown in Figure 7.14. The acres of potential effect to the FEMA floodplain were then developed for the comparison. Table 7.15 shows the water resource comparison for the alternate routes.

Table 7.15
Water Resources Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Number of ditch/canal crossings	6	6	6	7	7	13	7	9	8
Acres of proposed route in FEMA floodplain*	8	20	20	40	40	11	10	2	2

Source: Larimer County Land Use and Site Inventory Assessment (LUSIA)
United States Census Bureau
Federal Emergency Management Agency (FEMA)

Figure 7.14
Water Resources

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7.5.4.7. Historic Resources

Potential impacts to historical resources were evaluated for each alternate route. Information regarding known historic resources was obtained from the State Historic Preservation Office (SHPO). Resources include: archeological sites, paleontological sites, and historic structures. These resources are protected under the National Historic Preservation Act of 1966. SHPO provided information on historic resources listed on the National Register of Historic Places (NRHP) and for National Register “eligible” resources. Both categories (listed resources and eligible resources) were treated with the same importance and SHPO also disclosed information about historic resources in the study area that need more research before a formal determination on historic status can be made. These resources are listed in Table 7.16 as “Possible significant resources”.

More information about involvement with historic resources will become available once field surveys are initiated in a detailed environmental assessment. Potential historical resource impacts are shown in Table 7.16 and in Figure 7.15.

Table 7.16
Historic Resources Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Registered or potentially eligible site impacts	0	0	0	0	0	0	0	1	0
Possible significant resource impacts	2	5	4	5	4	4	1	1	1

Source: State Historic Preservation Office (SHPO)

7.5.5 Right-of Way/ Relocations

ROW and relocation impacts were evaluated for each alternate route based on the additional ROW needed and the number of potential relocations for residential, business, farming, and ranching properties. Comparative analysis information for ROW and relocations is shown in Table 7.17.

7.5.5.1. Additional Right of Way (ROW) Required

Additional required ROW required represents the difference between the existing ROW and the proposed 200-foot minimum ROW required for a new route. Existing ROW is typically 60 feet on county roads and 100 feet on SH 1. In areas where large cuts or fills were required, additional ROW beyond the 200-foot minimum was assumed.

7.5.5.2. Potential Relocations

Potential relocations included any structure within the proposed 200-foot ROW. Property records and aerial photography were used to identify farms and ranches. Businesses were identified based on site visits. Barns or sheds within the ROW were not considered as potential relocations. These minor relocations would be handled as part of the ROW acquisition process based on CDOT’s policies.

Figure 7.15
Historical Resources

Table 7.17
Right-of-Way and Relocations Comparison

Evaluation Criterion		Alternate Route								
		76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Additional ROW needed (acres)		336	307	221	234	200	195	225	209	224
Potential relocations	Residential	5	1	1	2	2	4	2	7	7
	Business	1	2*	1	2*	1	0	0	1	1
	Farming	4	2	2	3	3	3	3	2	2
	Ranching	0	0	0	0	0	0	1	1	1
	Total relocations	10	3	4	5	6	7	6	11	11

Note: Current (2001) potential relocations based on existing conditions

7.5.6 Directly Affected Properties

The number of directly affected properties for each alternate route was evaluated based on potential impacts to residential, business, farming, and ranching properties. Directly affected properties refer to any property that will have direct access or a driveway along the proposed route. Driveways were identified on site visits and checked with aerial photography. Properties with direct access to proposed routes on new alignments were identified using aerial photography. Comparative analysis information for directly affected properties is shown in Table 7.18.

Table 7.18
Directly Affected Property Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Residential	16	46	46	41	41	32	27	56	48
Business	2	2	1	2	1	0	0	1	1
Farming	8	7	7	11	11	8	5	14	14
Ranching	4	4	6	5	7	9	9	2	6
Farming and ranching	12	11	13	16	18	17	14	16	20

Note: Current (2001) directly affected properties based on existing conditions

7.5.7 Community Planning/Land Use

Potential community planning and land use impacts were evaluated for each alternate route. Community planning was evaluated by comparing Larimer County present and future road designations to determine route compatibility. Land use compatibility was assessed based on the adjacent land uses along the various alternate routes. Comparative analysis information for community planning and land use is shown in Table 7.16.

7.5.7.1. Larimer County Present and Future Road Designation

Larimer County present and future road designations, found in the Larimer County Transportation Plan, were used to determine compatibility with County and regional transportation planning. Present and future road designations for alternate routes can be found in Table 7.19. Roadway designations include highways, freeways, arterials, major and minor collectors, and local roads.

7.5.7.2. Land Use Information

Parcel data was obtained from Larimer County Assessor records in the LUSIA database. Based on the parcel data, the percentages of the routes adjacent to specific land uses were developed. Land use categories are based on Larimer County designations. The land use map for the alternate route study area is shown in Figure 7.16.

Table 7.19
Community Planning and Land Use Comparison

Evaluation Criterion		Alternate Route								
		76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Larimer County present road designation		Local road	Minor collector	Minor collector	Minor/major collector	Minor/major collector	Minor/major collector	Local road/minor collector	Minor collector/SH 1	Minor collector/SH 1
Larimer County future (2020) road designation		Local road	Minor collector	Minor collector	Minor/major collector	Minor/major collector	Minor/major collector	Minor/major collector	Minor collector/SH 1	Minor collector/SH 1
Compatibility with County and Regional transportation planning		not compatible	not compatible	not compatible	compatible with	compatible with	compatible with	compatible with	compatible with	compatible with
Percent of total land use	Exempt	11	15	8	14	13	10	3	4	8
	Commercial	2	0	0	0	0	0	0	0	0
	Not defined	9	7	9	15	18	12	14	8	4
	Agricultural	70	57	62	53	50	58	67	73	63
	Residential improved	4	11	11	7	7	8	12	12	13
	Residential unimproved	1	2	2	1	1	0	2	3	3
	Mobile home	3	6	6	7	8	12	2	0	9
	Mineral	0	2	2	3	3	0	0	0	0

Source: Larimer County Transportation Plan
Larimer County Master Plan
Larimer County GIS Department

Figure 7.16
Larimer County Land Use

7.5.8 Length of Route

The length of each alternate route was evaluated by comparing the length of the proposed route to the length of the existing SH 14/US 287 route, and the shortest alternate route. Additional state highway lane mile requirements were also analyzed. Comparative analysis information for length of route is shown in Table 7.20.

7.5.8.1. Total Route Length

Total length of route from I-25 and SH 14 east of Fort Collins to US 287 and I-80 in Laramie, Wyoming was evaluated in comparison to the 69-mile SH 14/US 287 route.

7.5.8.2. Alternate Route Length

The proposed alternate route length from I-25 to US 287 was also evaluated in comparison to the other alternate routes (based on the shortest alternate route, CR 58 A). Another measurement of proposed route length was the comparison of proposed total lane miles and additional state highway lane miles. Lane miles represent the number of miles on a proposed route times the number of lanes on the proposed route. Additional state highway lane miles were evaluated to determine the additional CDOT lane miles that each route would require. Existing lane miles were calculated based on 3 miles of 6-lane roadway on SH 14 and 4 miles of 4-lane roadway on Jefferson Street/Riverside Avenue for a total of 27 existing lane miles. Example calculations for proposed route lane miles and additional state highway lane miles are provided below for CR 76 A.

Lane miles on route : 11.8 miles × 3 lane typical section = 35 lane miles

State highway lane miles on route :

35 lane miles - 22 existing state highway lane miles = 13 additional state highway lane miles

Table 7.20
Alternate Route Length Comparison

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Total length of proposed route (miles) ^(a)	70.8	67.9	71.1	67.1	70.3	69.5	67.8	71.4	67.8
Length of proposed route compared to existing route (miles) ^(b)	1.8	-1.1	2.1	-1.9	1.3	0.5	-1.2	2.4	1.2
Length of proposed route (miles) ^(c)	11.8	10.9	11.1	11.1	11.3	11.5	9.8	9.4	9.8
Length of proposed route compared to shortest route (miles)	2.4	1.5	1.7	1.7	1.9	2.1	0.4	0.0	0.4
Proposed route lane miles ^(d)	35	33	33	33	34	35	29	38	33
Additional state highway lane miles ^(e)	13	11	11	11	12	13	7	5*	10*

(a) Length of proposed route from I-25 and SH 14 in Fort Collins to US 287 and I-80 in Laramie

(b) Difference between length of proposed route and existing 69-mile route along SH 14 and US 287 corridors from Fort Collins to Laramie

(c) Length of proposed route from I-25 to US 287

(d) Example calculation for CR 76A - Proposed route length (11.8 miles) * 3 lane typical section = 35 lane miles

(e) Difference between proposed lane miles and 22 existing state highway lane miles - state highway lane miles include 18 miles on Mulberry (3 miles with six lanes) and 4 miles on Jefferson/Riverside (1 mile with four lanes) - Example calculation for CR 76A - Proposed lane miles (35) - existing state highway lane miles (22) = 13 additional lane miles

* CR 58A and CR 58 B routes have 6 additional existing state highway lane miles for the SH 14 portion along CR 58

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7.6 ALTERNATE ROUTE MATRIX EVALUATION

The data that was collected for the alternate routes as part of the comparative screening analysis was rated against one another based on the alternate route evaluation criteria. Categories were established to conduct a matrix evaluation that shows whether the alternate route is least favorable, moderate, or most favorable in terms of how effectively it addresses each of the criteria. A least favorable category is represented by an open circle, a moderate category is represented by a half circle, and a most favorable category is represented by a full circle as shown in Figure 7.17.

Figure 7.17
Matrix Evaluation Categories

Least Favorable	Moderate	Most Favorable
1	3	5

Some of the criteria were not used in the matrix evaluation because they either did not reflect a clear difference between alternate routes or they restated another evaluation measure. The criteria were not weighted differently as part of the evaluation, the results were used as a tool in developing the recommendations. The matrix evaluation of the different criteria is shown in Tables 7.21 thru 7.34.

7.6.1 Alternate Route Cost

Alternate route costs were evaluated for capital cost and cost per total traffic on each route. Cost per through truck on proposed route was not evaluated because the same amount of through trucks will use all of the routes so cost per through truck is a direct representation of the capital cost comparison. As shown in Table 7.21, CR 76 A and CR 72 A are the least favorable in addressing both the capital cost and the cost per total traffic criteria.

Table 7.21
Alternate Route Cost Matrix Evaluation
(2001 dollars)

Evaluation Criterion		Alternate Route								
		76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Capital cost (millions)		\$94.0	\$92.3	\$63.5	\$68.3	\$56.9	\$60.9	\$68.4	\$62.2	\$69.1
		1	1	3	3	5	5	3	5	3
Cost per traffic utilization (\$/vehicle)	Cost per total traffic on proposed route (thousands)	\$15.7	\$14.2	\$9.8	\$10.2	\$8.5	\$9.1	\$7.9	\$5.5	\$6.6
		1	1	3	1	3	3	3	5	5
	Cost per through truck on proposed route (thousands)	\$72.3	\$71.0	\$48.8	\$52.5	\$43.8	\$46.8	\$52.6	\$47.8	\$53.2
		Not used in the evaluation because the same amount of through trucks will use all of the routes so cost per through truck is a direct representation of capital cost.								

Legend

	Least Favorable	Moderate	Most Favorable
Capital cost (millions)	1	= 90	3 63 - 90 5 = 63
Cost per total traffic on proposed route (thousands)	1	= 10	3 7 - 10 5 < 7

7.6.2 Traffic Operations

Traffic operations was evaluated for the change in vehicle miles traveled only. The number of lanes required was not evaluated because it provided information only, and travel time was not evaluated because all times were within a range of 4.3 minutes. As shown in Table 7.22, CR 76 A and CR 58 A are the least favorable in terms of vehicle miles traveled.

Table 7.22
Traffic Operations Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Number of lanes required (LOS C)	3 lane	3 lane	3 lane	3 lane	3 lane	3 lane	3 lane	3/4 lane	4 lane
	Not evaluated because it provides information only								
Change in vehicle miles traveled (miles)	30,000	15,000	15,000	15,000	15,000	15,000	10,000	20,000	15,000
	1	3	3	3	3	3	3	1	3
Travel time from I-25/SH 14 to US 287/I-80 (minutes)	64.0	61.6	64.0	60.9	63.4	63.6	61.7	65.2	62.1
	Not evaluated because all times are within 4.3 minutes								

Legend

	Least Favorable		Moderate		Most Favorable	
Change in vehicle miles traveled (miles)	1	> 15,000	3	= 15,000	5	N/A

7.6.3 Route Utilization

Route utilization measures were evaluated for the number of total vehicles on the proposed route per day. The number of through trucks on the proposed route was not evaluated because all of the numbers are the same. As shown in Table 7.23, CR 58 A and B are the most favorable in terms of route utilization.

Table 7.23
Route Utilization Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Through trucks on proposed route (vehicles per day)	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
	Not evaluated because all of the numbers are the same								
Total vehicles on proposed route (vehicles per day)	6,000	6,500	6,500	6,700*	6,700*	6,700*	8,700	11,300*	10,400*
	1	1	1	1	1	1	3	5	5

Legend

	Least Favorable		Moderate		Most Favorable	
Total vehicles on proposed route (vehicles per day)	1	< 7,000	3	7,000 – 9,000	5	> 9,000

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7.6.4 Farming Resources

Farming resources were evaluated based on the agricultural resource impact score. The farm size and distance to annexed boundary score and soils score were not evaluated separately because they show a similar comparison as the agricultural resource impact score. As shown in Table 7.24, CR 70 B and CR 66 are the most favorable in terms of minimizing potential agricultural resource impacts.

Table 7.24
Farming Resources Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Agricultural resource impact score	167	137	122	135	118	103	107	131	117
	1	1	3	1	3	5	5	1	3
Soils score	67	64	66	68	68	70	74	100	86
Farm size and distance to annexed boundary score	100	73	56	67	50	33	33	31	31
Farm size and distance to annexed boundary score and soils score were not evaluated as separate measures									

Legend

	Least Favorable		Moderate		Most Favorable	
Regional farming impacts (agricultural resource impact score)	1	= 130	3	115 - 130	5	< 115

7.6.5 Threatened and Endangered (T&E) Species and Wildlife

T&E species and wildlife habitat were evaluated based on acres of potential affect on Federal and state protected species and for CHNP conservation sites. As shown in Table 7.25, CR 58 A and B are most favorable in terms of Federal and State protected species and CR 70 is the most favorable in terms of CHNP conservation sites.

Table 7.25
Threatened/ Endangered Species and Wildlife Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Federal and State protected species (acres of potential effect)	53	44	52	47	55	51	30	21	22
	1	3	1	3	1	1	3	5	5
CNHP conservation sites (acres of potential effect)	28	21	7	21	7	0	11	10	10
	1	1	3	1	3	5	3	3	3

Legend

	Least Favorable		Moderate		Most Favorable	
Federal and State protected species (acres)	1	= 50	3	25 - 50	5	< 25
CNHP conservation sites (acres)	1	= 15	3	1 - 15	5	0

7.6.6 Wetlands and Riparian Areas

Wetlands and riparian areas were evaluated based on acres of potential effect. As shown in Table 7.26, CR 72 A and B are the most favorable in terms of riparian areas and CR 76 A is the most favorable in terms of wetlands.

Table 7.26
Wetlands and Riparian Areas Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Riparian areas (acres of potential effect)	1	0	0	1	1	3	2	6	5
	3	5	5	3	3	3	3	1	1
Potential wetland impacts (acres of potential effect)	1	3	3	3	3	5	10	12	12
	5	3	3	3	3	3	1	1	1

Legend

	Least Favorable		Moderate		Most Favorable	
Riparian Areas (acres)	1	> 3	3	1 - 3	5	0
Wetlands (acres)	1	= 10	3	3 - 10	5	< 3

7.6.7 Noise

Noise impacts were evaluated based on residences within 66 dBA threshold, not including the relocated properties. Commercial businesses were not included in the comparative analysis because there were no potential impacts to businesses. Table 7.27 shows the moderate and least favorable alternate routes based on potential noise impacts.

Table 7.27
Noise Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Residences within 66 dBA range (without relocations)	14	8	8	7	7	11	10	15	14
	1	3	3	3	3	1	1	1	1
Commercial businesses within 71 dBA range	0	0	0	0	0	0	0	0	0
	Not evaluated because all of the numbers are the same								

Legend

	Least Favorable		Moderate		Most Favorable	
Residences within 66 dBA range (without relocations)	1	= 10	3	< 10	5	N/A

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7.6.8 Air Quality

Air quality was evaluated based on the amount of additional CO per day on the route. The amount of CO on the existing route after relocation was not evaluated because it is not a comparison of the proposed alternate routes. The amount of diesel on the existing route and the additional diesel on the proposed routes were not evaluated because they provide the same information as the comparison of CO. As seen in Table 7.28, CR 66, CR 58 A, and CR 58 B are the least favorable in terms of air quality in the comparative analysis.

**Table 7.28
Air Quality Matrix Evaluation**

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Additional CO on route (tons per day)	0.22	0.28	0.28	0.28	0.28	0.28	0.44	0.44	0.44
	3	3	3	3	3	3	1	1	1
CO on existing SH 14 after relocation (tons per day)	2.54	2.48	2.48	2.48	2.48	2.48	2.32	2.32	2.32
	Not evaluated, the focus is on potential impacts to the proposed route								
Additional diesel on route (tons per day)	0.000048	0.000060	0.000060	0.000060	0.000060	0.000060	0.000096	0.000096	0.000096
	Not evaluated separately, it provides the same information as the additional CO on the route								
Diesel on existing SH 14 after relocation (tons per day)	0.00055	0.00054	0.00054	0.00054	0.00054	0.00054	0.00050	0.00050	0.00050
	Not evaluated, the focus is on potential impacts to the proposed route								

Legend

	Least Favorable		Moderate		Most Favorable	
Additional CO and Diesel on route	1	= 0.30	3	> 0.30	5	N/A

7.6.9 Water Resources

Water resources were evaluated based on the number of ditch and canal crossings of each route, and the number of acres of potential impact to the FEMA floodplains. As shown in Table 7.29, CR 70 B is the least favorable in terms of ditch and canal crossings, and CR 58 A and B are the most favorable in terms of acres of the proposed route in the FEMA floodplain.

**Table 7.29
Water Resources Matrix Evaluation**

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Number of ditch/canal crossings	6	6	6	7	7	13	7	9	8
	3	3	3	3	3	1	3	3	3
Acres of proposed route in FEMA floodplain	8	20	20	40	40	11	10	2	2
	3	1	1	1	1	3	3	5	5

Legend

	Least Favorable		Moderate		Most Favorable	
Ditch/ canal crossings	1	= 10	3	< 10	5	N/A
FEMA floodplain impact (acres)	1	= 15	3	5 - 15	5	< 5

7.6.10 Historical Resources

Historical resources were evaluated in terms of registered or potentially eligible sites and for possible significant resource impacts. Table 7.30 shows moderate and least favorable categories for the various alternate routes.

Table 7.30
Historic Resources Matrix Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Registered or potentially eligible site impacts	0	0	0	0	0	0	0	1	0
	3	3	3	3	3	3	3	1	3
Possible significant resource impacts	2	5	4	5	4	4	1	1	1
	3	1	1	1	1	1	3	3	3

Legend

	Least Favorable		Moderate		Most Favorable	
Registered or eligible historic site impacts	1	1	3	0	5	N/A
Possible significant resource impacts	1	= 3	3	< 3	5	N/A

7.6.11 Right-of-Way and Relocations

ROW and relocations were evaluated based on the additional acres of ROW needed and the number of total potential relocations. The individual relocations for residential, business, farming, and ranching properties were not evaluated separately. As shown in Table 7.31, CR 70/72 B and CR 70 B are the most favorable in terms of additional ROW and CR 76 A, CR 58 A, and CR 58 B are the least favorable in terms of potential relocations.

Table 7.31
Right-of-Way and Relocations Matrix Evaluation

Evaluation Criterion	Alternate Route									
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B	
Additional ROW needed (acres)	336	307	221	234	200	195	225	209	224	
	1	1	3	3	5	5	3	3	3	
Potential relocations	Residential	5	1	1	2	2	4	2	7	7
	Business	1	2*	1	2*	1	0	0	1	1
	Farming	4	2	2	3	3	3	3	2	2
	Ranching	0	0	0	0	0	0	1	1	1
	Residential, business, farming, and ranching relocations were not evaluated as separate measures									
Total relocations	10	3	4	5	6	7	6	11	11	
	1	3	3	3	3	3	3	1	1	

Legend

	Least Favorable		Moderate		Most Favorable	
Additional ROW needed (acres)	1	= 300	3	200 - 300	5	= 200
Potential relocations	1	= 10	3	1 - 10	5	0

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7.6.12 Directly Affected Properties

Directly affected properties were evaluated for residential, business, and a combination of farming and ranching properties. Farming and ranching properties were not evaluated separately. Table 7.32 shows the various categories of the alternate routes in terms of residential properties, businesses, and farming and ranching interests.

**Table 7.32
Directly Affected Property Matrix Evaluation**

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Residential	16	46	46	41	41	32	27	56	48
	5	1	1	3	3	3	3	1	1
Business	2	2	1	2	1	0	0	1	1
	3	3	3	3	3	5	5	3	3
Farming	8	7	7	11	11	8	5	14	14
Ranching	4	4	6	5	7	9	9	2	6
Farming and ranching properties with direct access were not evaluated as separate measures									
Farming and ranching	12	11	13	16	18	17	14	16	20
	3	3	3	1	1	1	3	1	1

Legend

	Least Favorable		Moderate		Most Favorable	
Number of residential properties	1	> 45	3	20 - 45	5	< 20
Number of businesses	1	N/A	3	> 0	5	0
Number of farms and ranches	1	= 15	3	1 - 14	5	0

7.6.13 Community Planning and Land Use

Compatibility with regional and county transportation planning was evaluated for County and Regional planning. Road designations were not evaluated because the information was used to determine compatibility. Percent of land use data was also not evaluated because all routes were similar in terms of adjacent land uses. Table 7.33 shows the moderate and least favorable routes in terms of compatibility with county and regional transportation planning.

Table 7.33
Community Planning and Land Use
Matrix Evaluation

Evaluation Criterion		Alternate Route								
		76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Larimer County present road designation		Local road	Minor collector	Minor collector	Minor/major collector	Minor/major collector	Minor/major collector	Local road/minor collector	Minor collector/SH 1	Minor collector/SH 1
Larimer County future (2020) road designation		Local road	Minor collector	Minor collector	Minor/major collector	Minor/major collector	Minor/major collector	Minor/major collector	Minor collector/SH 1	Minor collector/SH 1
Compatibility with County and Regional transportation planning		not compatible	not compatible	not compatible	compatible with	compatible with	compatible with	compatible with	compatible with	compatible with
		1	1	1	3	3	3	3	3	3
Percent of total land use	Exempt	11	15	8	14	13	10	3	4	8
	Commercial	2	0	0	0	0	0	0	0	0
	Not defined	9	7	9	15	18	12	14	8	4
	Agricultural	70	57	62	53	50	58	67	73	63
	Residential improved	4	11	11	7	7	8	12	12	13
	Residential unimproved	1	2	2	1	1	0	2	3	3
	Mobile home	3	6	6	7	8	12	2	0	9
	Mineral	0	2	2	3	3	0	0	0	0
Not evaluated because routes are similar in relation to existing land uses										

Legend

	Least Favorable		Moderate		Most Favorable	
Compatibility with County and Regional planned transportation improvements	1	not compatible	3	compatible with	5	consistent with

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7.6.14 Alternate Route Length

Alternate route lengths were evaluated based on the amount of additional state highway lane miles on route. The total length of proposed route between the City of Fort Collins and Laramie, the length of proposed route between I-25 and US 287, and proposed route lane miles were not evaluated because they provide information only. Length of proposed route compared to existing route and compared to shortest route were not evaluated because of the small range between the routes. As shown in Table 7.34, CR 66 and CR 58 A are the only moderate routes in terms of additional state highway lane miles that would be required.

**Table 7.34
Alternate Route Length
Matrix Evaluation**

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Total length of proposed route (miles)	70.8	67.9	71.1	67.1	70.3	69.5	67.8	71.4	67.8
	Not evaluated, provides information only								
Length of proposed route compared to existing route (miles)	1.8	-1.1	2.1	-1.9	1.3	0.5	-1.2	2.4	1.2
	Not evaluated, the range is close to the existing route								
Length of proposed route (miles)	11.8	10.9	11.1	11.1	11.3	11.5	9.8	9.4	9.8
	Not evaluated, provides information only								
Length of proposed route compared to shortest route (miles)	2.4	1.5	1.7	1.7	1.9	2.1	0.4	0.0	0.4
	Not evaluated, the range is close to the existing route								
Proposed route lane miles	35	33	33	33	34	35	29	38	33
	Not evaluated, provides information only								
Additional state highway lane miles	13	11	11	11	12	13	7	5	10
	1	1	1	1	1	1	3	3	1

Legend

	Least Favorable		Moderate		Most Favorable	
Additional state highway lane miles	1	= 10	3	< 10	5	N/A

7.6.15 Comparative Screening Analysis and Matrix Evaluation Results

The categorized evaluation criteria for each route was combined into an overall comparative evaluation matrix as shown in Table 7.35. This table shows the summarized matrix evaluation for all criteria used in the comparative analysis. Based on the comparative screening analysis and matrix evaluation, certain routes were eliminated from further consideration. The results of the comparative screening analysis are discussed below along with the reasons certain alternate routes were eliminated. Figure 7.18 shows the alternate routes that remain after the comparative screening analysis. In Figure 7.19, the alternate routes shown in gray were removed from further consideration while the alternate routes shown in color were used to develop the final study recommendations.

Table 7.35
Matrix Comparative Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Cost									
Capital cost	1	1	3	3	5	5	3	5	3
Cost per total traffic utilization	1	1	3	1	3	3	3	5	5
Traffic Operations									
Change in vehicle miles traveled	1	3	3	3	3	3	3	1	3
Route Utilization									
Total vehicles on route	1	1	1	1	1	1	3	5	5
Farming									
Regional farming impacts	1	1	3	1	3	5	5	1	3
T & E									
Federal and State protected species	1	3	1	3	1	1	3	5	5
CNHP conservation sites	1	1	3	1	3	5	3	3	3
Wetlands									
	3	5	5	3	3	3	3	1	1
Riparian Areas									
	5	3	3	3	3	3	1	1	1
Noise									
Residences within 66 dBA range	1	3	3	3	3	1	1	1	1
Air Quality									
Additional CO on route	3	3	3	3	3	3	1	1	1
Water resources									
Ditch/canal crossings	3	3	3	3	3	1	3	3	3
FEMA floodplain impact	3	1	1	1	1	3	3	5	5

Table 7.35 (cont'd)
Matrix Comparative Evaluation

Evaluation Criterion	Alternate Route								
	76 A	72 A	72 B	70/72 A	70/72 B	70 B	66	58 A	58 B
Historical									
Registered or eligible site impacts	3	3	3	3	3	3	3	1	3
Possible significant resource impacts	3	1	1	1	1	1	3	3	3
Right-of-Way/Relocations									
Additional Right-of-way needed	1	1	3	3	5	5	3	3	3
Potential relocations	1	3	3	3	3	3	3	1	1
Directly Affected Properties									
Number of residential properties	5	1	1	3	3	3	3	1	1
Number of businesses	3	3	3	3	3	5	5	3	3
Number of farms and ranches	3	3	3	1	1	1	3	1	1
Community Planning/Land Use									
Compatibility with County and Regional transportation planning	1	1	1	3	3	3	3	3	3
Length of Route									
Additional state highway lane miles	1	1	1	1	1	1	3	3	1

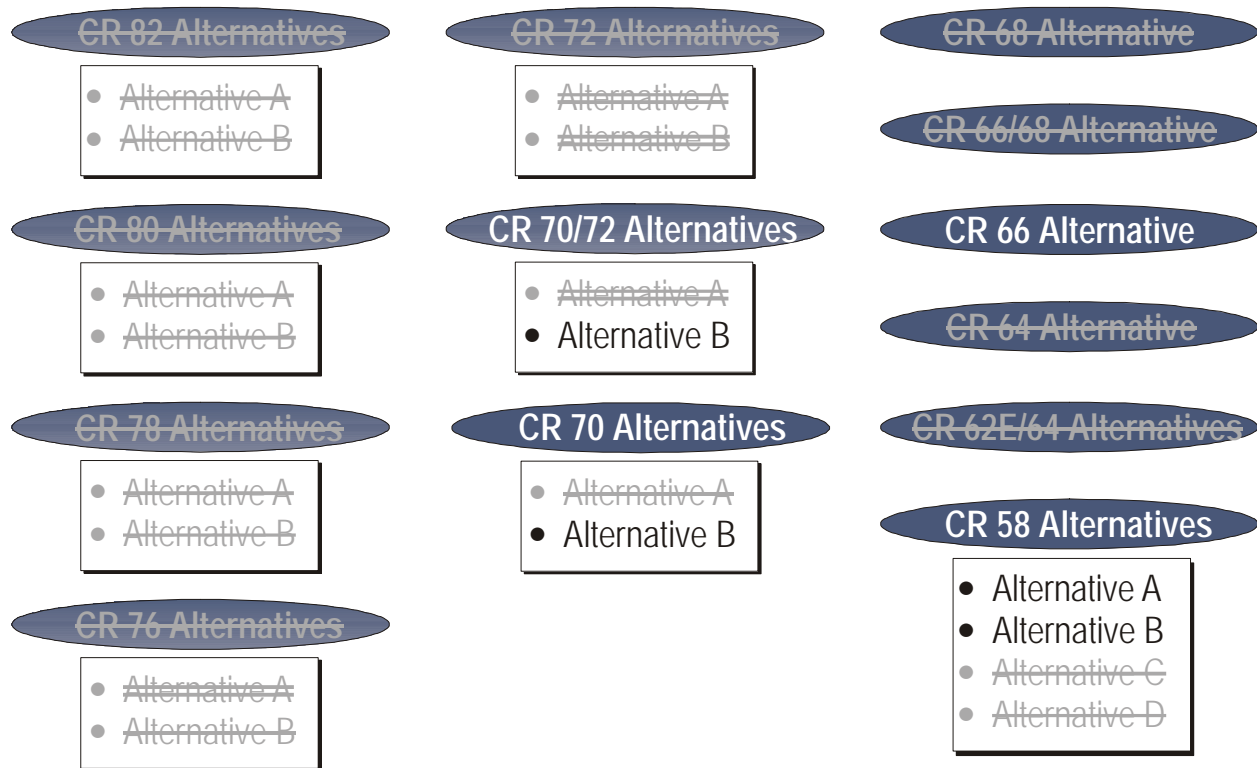
County Road 76 Alternative A. The CR 76 A alternative was eliminated from further consideration based on the high cost and issues with access through the Colorado Lien plant.

County Road 72 Alternative A. The CR 72 A alternative was eliminated from further consideration based on the high cost and issues with access through the Colorado Lien plant. The

County Road 72 Alternative B. The CR 72 B alternative was eliminated from further consideration based on its potential impacts in relation to other CR 70/72 and CR 70 alternatives including cost, ROW, directly affected properties, compatibility with planning, and the proximity of a new interchange at CR 72 to the existing interchange at CR 70.

County Road 70/72 Alternative A. The CR 70/72 A alternative was eliminated from further consideration based on its potential impacts in relation to other CR 70/72 and CR 70 alternatives including cost, ROW, and issues with access through the Colorado Lien plant.

Figure 7.18
Comparative Screening Results of Alternate Routes



7.7 ALTERNATE ROUTE RECOMMENDATION INFORMATION

Figure 7.19 shows the alternate routes that remain in the study area after the screening process. A discussion of the pros and cons related to the numerous issues in the study area for the remaining alternate routes is shown in Table 7.36. These remaining routes helped form the basis for the study recommendations discussed in Section 9.2 and include:

- County Road 70/72 B
- County Road 70 B
- County Road 66
- County Road 58 A
- County Road 58 B

Figure 7.19
Alternate Routes Remaining After Comparative Screening Analysis

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**Table 7.36
Alternate Route Pros and Cons**

Pros	Cons
County Road 70/72 B	
<ul style="list-style-type: none"> + Existing connections at I-25 and US 287 (both require modification) + No maximum vertical grade requirements + Construction cost (\$56.9 million) + Number of potential noise impacts (7 residences) + ROW/relocations (200 acres/6 total) 	<ul style="list-style-type: none"> – Future (2020) projected traffic utilization (6,700 vehicles per day) – Potential threatened and endangered species impacts (55 acres of potential effect) – Potential Federal Emergency Management Agency floodplain impacts (40 acres of potential effect) – Length of proposed route to other routes between I-25 and US 287 (1.9 miles longer) – Additional state highway lane miles (12 miles)
County Road 70 B	
<ul style="list-style-type: none"> + Existing connections at I-25 and US 287 (both require modification) + No maximum vertical grade requirements + Construction cost (\$60.9 million) + Potential regional farming resource impacts (Agricultural resource impact score 103) + ROW/relocations (195 acres/7 total) 	<ul style="list-style-type: none"> – Future (2020) projected traffic utilization (6,700 vehicles per day) – Potential threatened and endangered species impacts (51 acres of potential effect) – Number of ditch crossings (13 locations) – Length of proposed route to other routes between I-25 and US 287 (2.1 miles longer) – Additional state highway lane miles (13 miles)
County Road 66	
<ul style="list-style-type: none"> + Future (2020) projected traffic utilization (8,700 vehicles per day) + Potential regional farming resource impacts (Agricultural resource impact score 107) + Directly affected properties (41 total) + Length of proposed route compared to existing SH 14/US 287 route (1.2 miles less) + Additional state highway lane miles (7 miles) 	<ul style="list-style-type: none"> – New interchange at I-25 – New connection at US 287 – Construction cost (\$68.4 million) – Potential wetland impacts (10 acres of potential effect) – Potential Colorado Natural Heritage Program resource impacts (11 acres of potential effect)
County Road 58 A	
<ul style="list-style-type: none"> + Construction cost (\$62.2 million) + No maximum vertical grade requirements + Future (2020) projected traffic utilization (11,300 vehicles per day) + Potential threatened and endangered species impacts (21 acres of potential effect) + Potential Federal Emergency Management Agency floodplain impacts (2 acres of potential effect) 	<ul style="list-style-type: none"> – New interchange at I-25 – New connection at US 287 – Amount of new roadway required (5.7 miles) – Potential regional farming resource impacts (Agricultural resource impact score 131) – Directly affected properties (73 total)
County Road 58 B	
<ul style="list-style-type: none"> + Future (2020) projected traffic utilization (10,400 vehicles per day) + Potential threatened and endangered species impacts (22 acres of potential effect) + Potential Federal Emergency Management Agency floodplain impacts (2 acres of potential effect) + Length of proposed route from Fort Collins to Laramie as compared to existing SH 14/US 287 route (1.2 miles less) + Additional state highway lane miles (5 miles) 	<ul style="list-style-type: none"> – New interchange at I-25 – New connection at US 287 – Amount of new roadway required (6.1 miles) – Construction cost (\$69.1 million) – Directly affected properties (69 total)