

I-70 FRONTAGE ROAD IMPROVEMENTS

CONCEPT DEVELOPMENT AND SCREENING REPORT

JANUARY 2012

Concept Development and Screening Report

for the

I-70 Frontage Road Improvements

Idaho Springs, Colorado

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CDOT Region 1

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1 INTRODUCTION

1.1 Purpose of this Report

This *Concept Development and Screening Report* provides supporting documentation for the *I-70 Frontage Road Improvements Categorical Exclusion (Cat Ex)*. Section 2 presents an overview of the initial concepts developed. Section 3 summarizes the development of the evaluation criteria and screening of concepts. This evaluation process led to the development and screening of a variety of options, which resulted in the identification and refinement of a Preferred Alternative (Section 4).

As concepts were developed and presented to the Project Leadership Team/Technical Team (PLT/TT), these concepts were screened against criteria to identify the concepts that best met the project purpose and need and minimized environmental impacts. The impacts calculated for each of the concepts were based on conceptual design developed for the Field Inspection Review Plans (FIR) as of December 1, 2011. Design will continue to be revised and developed; as such, impacts and descriptions in this report may differ from conditions represented in the Cat Ex and other project documents.

1.2 Project Overview

The Colorado Department of Transportation (CDOT) has initiated the I-70 Frontage Road Improvements Project as part of the commitments from the I-70 Mountain Corridor Programmatic Environmental Impact Statement (PEIS) Record of Decision (ROD). The purpose of this project is to provide enhanced safety and mobility for vehicles, pedestrians, and bicyclists between eastern Idaho Springs (I-70 Exit 241) and the Hidden Valley/Central City Interchange (Exit 243). This project is entirely state funded, with no federal transportation funding. Project concepts will be developed and studied in coordination with the Project Leadership Team (PLT) and will be evaluated for environmental impacts in a state process similar to a Cat Ex and will be documented on CDOT Form 128, which is the same form used to document federal Cat Exs.

CR 314 between Idaho Springs and Hidden Valley serves both local and through traffic. Current traffic volumes range from 100 to 1,300 average daily traffic (ADT), with higher volumes reflecting seasonal and weekend traffic corresponding with peak travel on I-70. The local connectivity provides access to residents, businesses, recreational opportunities and emergency access. CR 314 also serves as an alternative to travel on I-70, especially during accidents, peak travel times, severe weather, and construction or maintenance on I-70.

CR 314 between Idaho Spring and Hidden Valley lacks consistent lane and shoulder widths. Additionally, it has a narrow gravel section for approximately 1,000 feet. Within this corridor, a majority of the Scott Lancaster Memorial Trail is also located on the shoulder of CR 314, providing bicycle and pedestrian connectivity and recreational opportunities. Clear Creek is north of existing CR 314 and is heavily used by anglers and rafters.

1.3 Recommendations from the I-70 PEIS

Improvements for CR 314 were identified in the I-70 PEIS Preferred Alternative recommendation. In addition to the six-lane component on I-70 from Floyd Hill through the Twin Tunnels, the PEIS Preferred Alternative includes improvements to the frontage road and bike trail from Idaho Springs to Hidden Valley and Hidden Valley to US 6.

1.4 Project Purpose and Need

Consistent with the recommendations from the I-70 PEIS ROD, the purpose of this project is to provide enhanced safety and mobility for vehicles, pedestrians, and bicyclists between eastern Idaho Springs (I-70 Exit 241) and the Hidden Valley/Central City Interchange (Exit 243). Project needs include the following:

- Provide pavement and widths that consistently meet Clear Creek County standards.
- Serve as an alternative to travel on I-70 for local traffic and emergency response, especially during accidents, construction, or maintenance on I-70.
- Improve consistency with the facilities proposed in the Clear Creek County Greenway Plan, including bicycle, pedestrian, and recreational access.

1.5 Independent Utility and Logical Termini

The PEIS Preferred Alternative identified improvements to the frontage road and bike trail from Idaho Springs to Hidden Valley and Hidden Valley to US 6. The frontage road currently extends on the south side of Clear Creek along CR 314 between Idaho Springs (I-70 Exit 241) and the Hidden Valley/Central City Interchange (Exit 243). A frontage road does not currently extend between Hidden Valley and US 6.

The section of the existing frontage road between Idaho Spring and Hidden Valley lacks consistent lane and shoulder widths. Additionally, it has a narrow gravel section for approximately 1,000 feet. The existing frontage road serves local access, emergency response, recreation access (rafting and fishing along Clear Creek), and bicycle and pedestrian mobility. CR 314 between Idaho Springs and Hidden Valley also serves as an alternate route during accidents, construction, and other delays on I-70 near the Twin Tunnels. The Scott Lancaster Memorial Trail runs parallel with the frontage road and a portion of the trail is shared with the existing roadway.

Proposed improvements to CR 314 are anticipated in the same location as the existing roadway. Changes to vertical or horizontal alignment were not planned or evaluated, with a possible exception in the Gravel/Doghouse Bridge area. The frontage road project has been in close coordination with other on-going studies and plans including the I-70 Twin Tunnels EA, Advanced Guideway System (AGS) study, Clear Creek County Greenway Plan, Department of Revenue's Port of Entry at Dumont, City of Idaho Springs, Clear Creek County, and local land owners. The project does not restrict consideration of alternatives for other reasonably foreseeable actions and in the case of the Clear Creek County Greenway allows additional options for implementation.

Shoulder and trail improvements to CR 314 between Idaho Springs and Hidden Valley have independent utility and will provide improved safety, local connectivity and emergency response even if no other transportation improvements are made in this area.

The Frontage Road Improvements Project does not automatically trigger any other actions. It is not dependent on the Twin Tunnels Project. It can proceed independently of the Twin Tunnels Project. It is also not an interdependent part of a larger action. It has a separate Purpose and Need which is not dependent on any of the other I-70 PEIS improvements which were identified in the ROD.

1.6 Funding and Timing

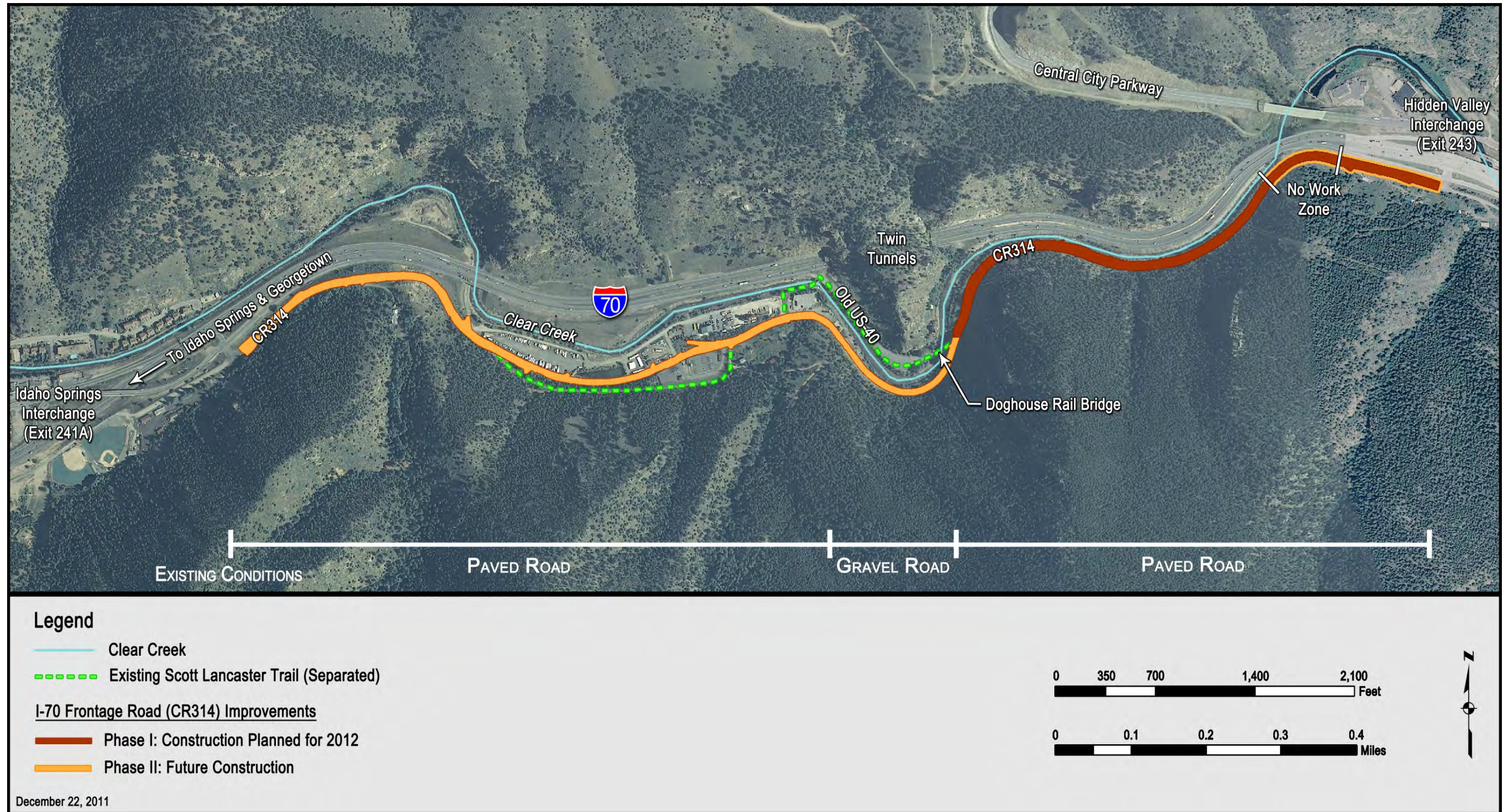
The frontage road project will be developed in two phases:

- **Phase I** – State funds are immediately available to provide improvements to a portion of the frontage road. Both local and through traffic will benefit from these improvements planned for construction in the summer of 2012. Approximately \$6 million dollars are available for the design and construction. CDOT is working with the I-70 Frontage Project Leadership and Technical Teams (PLT/TT) to identify locations of the immediate improvements. The Phase I immediate improvements are anticipated to begin near the gravel section of CR 314 and extend to the Hidden Valley/Central City Interchange (Exit 243). No federal funds will be used on this phase.
- **Phase II** – Funding for future construction has not been identified. Phase II will include the remaining frontage road and Greenway construction or reconstruction to full width between eastern Idaho Springs (I-70 Exit 241) and the Hidden Valley/Central City Interchange (Exit 243). Phase II of the frontage road improvements will be developed as funding becomes available for roadway and trail improvements. As cost estimates are being developed, project partners for additional funding are currently being identified.

Throughout project development, the extent of Phase I and II have been revised in coordination with the PLT/TT and Federal Highway Administration (FHWA). Both Phase I and Phase II construction can be completed while maintaining a single lane of traffic for local connectivity, but options to limit vehicle traffic during construction are being evaluated with the PLT/TT to improve safety and reduce construction duration. **Figure 1** shows the Frontage Road Project location and phases.

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Figure 1: Project Location and Phases



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1.7 CSS process

CDOT has committed to following a context sensitive solutions (CSS) process on the I-70 Mountain Corridor. As part of this commitment, CDOT integrates a six-step process in all I-70 Mountain Corridor projects **to ensure collaboration with stakeholders**. CDOT's CSS framework is described in detail on CDOT's CSS website (i70mntncorridorcss.com). Consistent with this process, the I-70 Frontage Road Improvements project integrates the I-70 Mountain Corridor context statement and core values developed and endorsed by the Project Leadership Team and Technical Team (PLT/TT). These attributes are summarized in the call-out box at right.

Step 1 of the CSS process calls for **defining desired outcomes and actions** for the project. This effort was undertaken during a PLT/TT meeting on August 30, 2011. Desired outcomes and actions for the project include:

- Improving emergency access
- Enhancing alternatives for bicyclists, pedestrians, and non-motorized transportation users
- Providing interconnectivity with Idaho Springs
- Improving safety for all users
- Providing detours for I-70 closures resulting from inclement weather, traffic accidents, and construction

This project will be considered successful if the project team develops a widely accepted solution that serves as an effective detour, preserves rafting and fishing access, enhances wetlands and improves commercial infrastructure. This project must be consistent with plans for other I-70 improvements, connect existing frontage roads and must produce little to no impact on adjacent businesses.

Step 2 of the CSS process calls for **endorsing the process**. Federal Highway Administration (FHWA), CDOT, and the project team are committed to close collaboration with potentially affected individuals and entities and other interested parties. Stakeholders for this project include Clear Creek County, Idaho Springs, rafting businesses, other businesses, residents, and the I-70 Mountain Corridor Project Leadership and Technical Teams. CDOT has initiated coordination with stakeholders

Context Statement:

I-70 is Colorado's only east-west Interstate. The adjacent frontage road (CR 314) provides access to local businesses, recreation, and residences and an alternate east west connection for vehicles, bikes, and pedestrians.

Between Idaho Springs and Hidden Valley, the frontage road is parallel to I-70 and Clear Creek. It provides a natural crossing for wildlife and connects local communities to regional services, recreation, and I-70.

Core values:

sustainability | collaborative decision making | safety | healthy environment | historic context | community respect | mobility/accessibility | aesthetics

and will continue that commitment throughout the project. Step 3 *establish criteria* and Step 4 *develop alternatives and options* are summarized in the following sections this report.

The CSS process will continue through the duration of the project. A project website, monthly newsletters, PLT/TT meetings, Issue Task Force meetings, and one-on-one meetings provide opportunities for open communication as part of the CSS process. PLT/TT presentations, meeting minutes, and newsletters are available on the project website (<http://www.coloradodot.info/projects/i7ofrontageroad-idahosprings>). PLT/TT meetings held to date include:

- PLT/TT Kick-off – August 31, 2011
- PLT/TT #2 – October 26, 2011
- PLT/TT #2.5 – November 1, 2011
- PLT/TT invited to participate in Field Inspection Review (FIR) meeting – December 1, 2011
- PLT/TT #3 – December 15, 2011
- PLT/TT #4 – January 18, 2012
- PLT/TT #5 – February 2, 2012
- Additional PLT/TT meetings including Final Office Review (FOR) of Phase I will continue to be held as the project progresses

2 CONCEPT DEVELOPMENT

2.1 Cross Sections

Initial concepts were developed in coordination with comments provided at the first PLT/TT meeting and existing CDOT, Clear Creek County, and Idaho Springs standards and plans. Physical constraints along existing CR 314 include limited pavement width, steep slopes, Clear Creek, commercial and residential driveways, and utilities. Due to the physical constraints along existing CR 314, six typical cross sections were developed to provide a comparison of concepts along the frontage road.

These cross sections were developed and applied along the project area to develop the FIR level plans (roughly 30% level of design). It was anticipated that these cross sections and overall design will continue to be revised as the project progresses based on continued PLT/TT coordination, refined understanding of site conditions (topographic survey and geotechnical evaluation), and minimization of environmental impacts. Cross sections evaluated prior to FIR plan development include the following:

2.1.1 Summary of Cross Sections Considered

The following cross sections were initially developed to address project purpose and need and physical constraints. A single cross section or combination may be used in each of the decision areas.

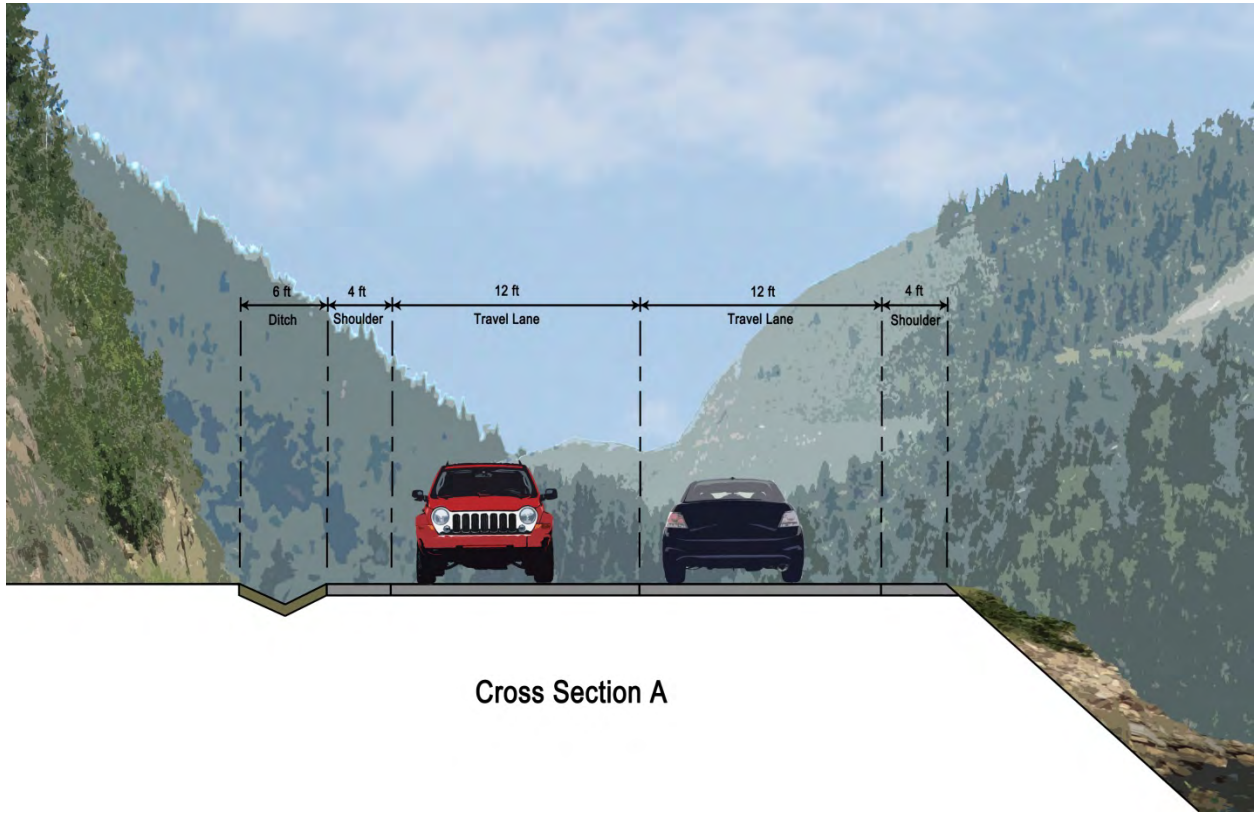
Table 1: Cross Sections

Cross Section	Description	Total Width	Greenway Trail Accommodation
Cross Section A	Clear Creek County Collector section	38'	On road
Cross Section B	Clear Creek County Collector section with trail	50'	Trail separated with barrier
Cross Section C	Clear Creek County Collector section with trail on cantilever and wall	46'	Trail separated with barrier
Cross Section D	Clear Creek County Collector section with trail and boulder rock wall	50'	Trail separated with barrier
Cross Section E	Clear Creek County Collector section with detached trail	Varies	Detached trail
Cross Section F	Clear Creek County Local Access section	32'	On road

2.1.2 Cross Section A – 38'

This is the standard section for a Clear Creek County roadway of this type. In areas where the greenway trail is separated from the roadway, this is the baseline section. This typical section includes a 6' ditch, 4' shoulder, two 12' lanes, and 4' shoulder. **Figure 2** Illustrates Cross Section A.

Figure 2: Cross Section A

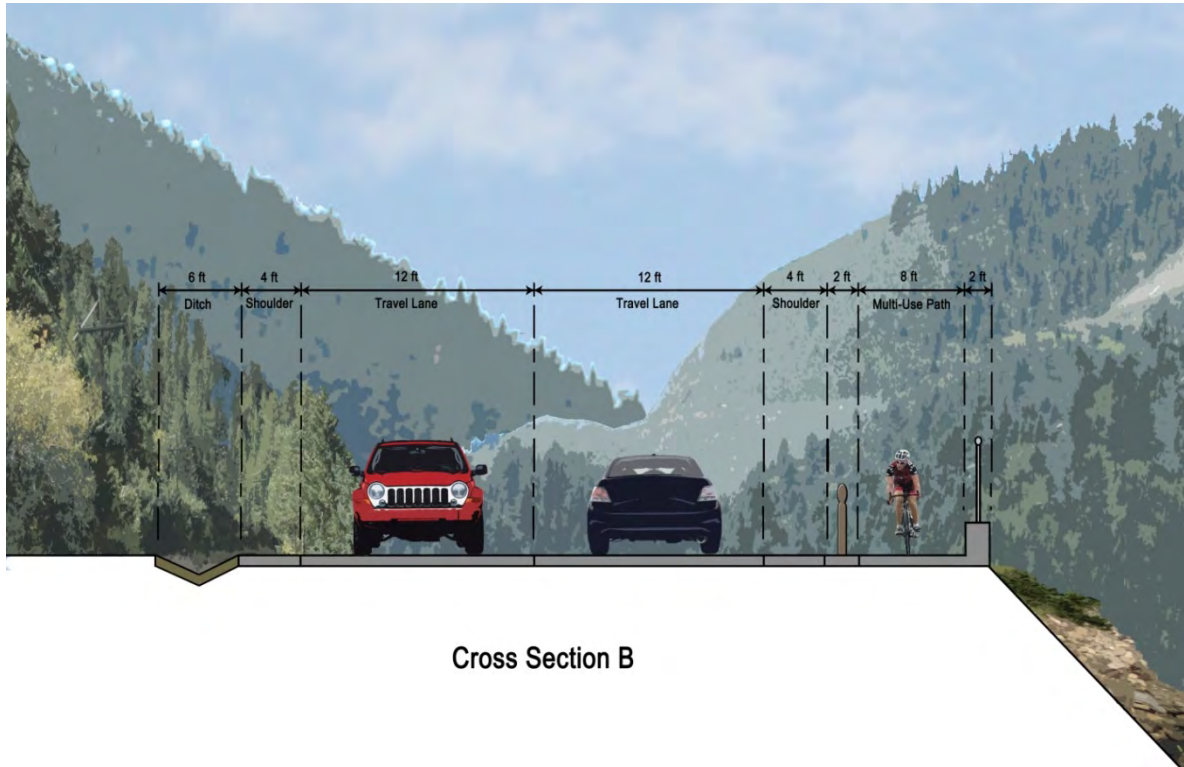


Cross Section A

2.1.3 Cross Section B – 50'

Some portions of existing CR 314 are currently wide enough to accommodate a wider cross section for both vehicle lanes and a connected, but barrier separated greenway trail. The Clear Creek County Greenway Plan (November 2005) identifies design preferences that were incorporated into this trail design. This typical cross section includes 6' ditch, 4' shoulder, two 12' lanes, 4' shoulder, 2' barrier, 8' paved trail, and 2' barrier.

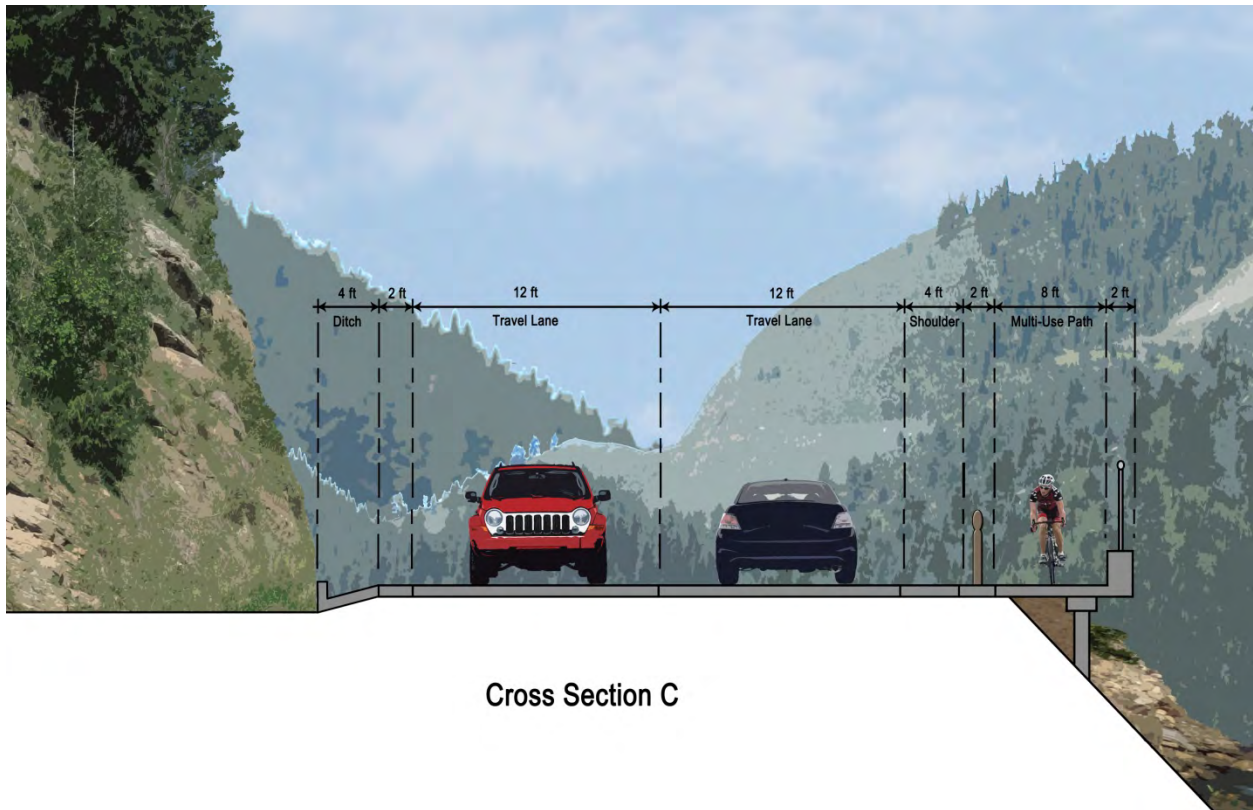
Figure 3: Cross Section B



2.1.4 Cross Section C – 46’ with cantilever

Where the physical bench along CR 314 is limited, one option is to extend the proposed trail or roadway over the Clear Creek slope with a cantilever and wall. While the cantilever and wall may be designed to accommodate vehicle or bicycle/pedestrian loads, it was assumed for this cross section that the cantilever and wall structures would be designed to accommodate only bicycle and pedestrian loads to reduce cost and potential construction impact on Clear Creek. This typical cross section includes 4’ paved ditch, 2’ shoulder, two 12’ lanes, 4’ shoulder, 2’ barrier, 8’ paved trail, and 2’ barrier.

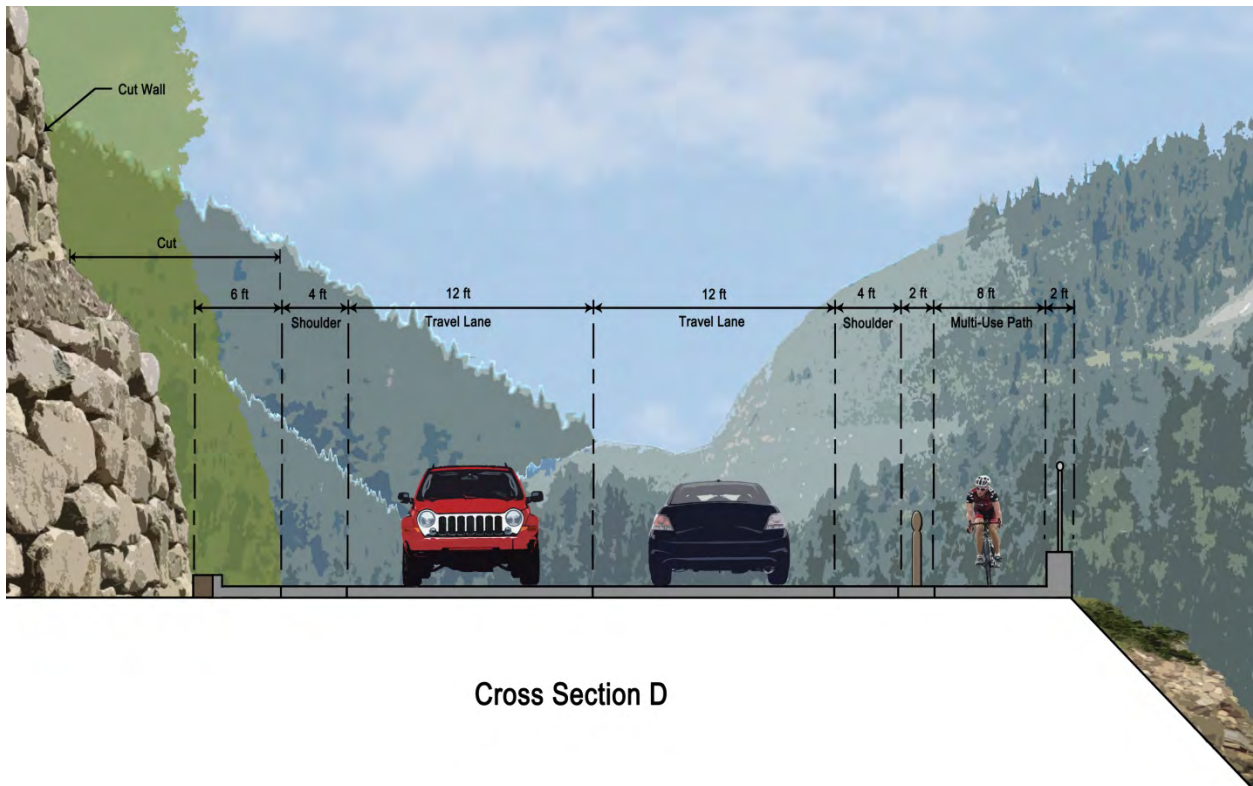
Figure 4: Cross Section C



2.1.5 Cross Section D – 50' cut wall

Where the physical bench along CR 314 is limited, another option is to cut into the upslope and add a wall. The material and geological history of the hillside will dictate the type of wall that will be used. A rockery wall is shown in the figure as it is the most likely wall that will be used on this project. It is assumed that all traffic – vehicles and trail are on existing grade. This typical cross section includes a 6' offset to shoulder for rock fall, 4' shoulder, two 12' lanes, 4' shoulder, 2' barrier, 8' paved trail, and 2' barrier. **Figure 5** illustrates Cross Section D.

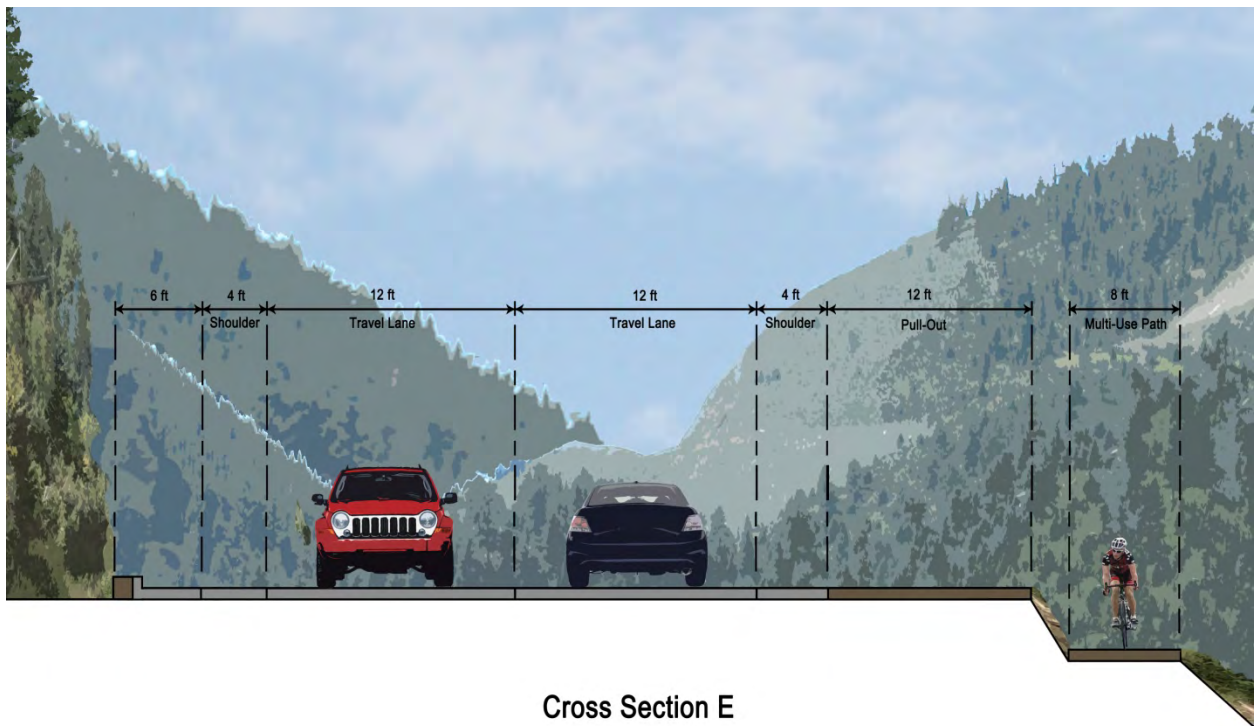
Figure 5: Cross Section D



2.1.6 Cross Section E – detached trail

The PLT requested concepts be developed that provided separation between CR 314 and the greenway trail where space was available. Additionally, the Clear Creek County Greenway Plan identified parking (pullout) locations for fishing and rafting. This section was designed to accommodate these multiple uses where space was available. This section may vary in total width, but at a minimum would include 34’ of roadway, 12’ paved pullout for rafting, fishing and trail access, and 8’ greenway. This section may also provide the multi-use path at the same grade as the roadway and pullout. This typical cross section includes 6’ offset to shoulder for rockfall, 4’ shoulder, two 12’ lanes, 4’ shoulder, 12’ pullout, varying natural ground width, 8’ paved trail. **Figure 6** illustrates Cross Section E.

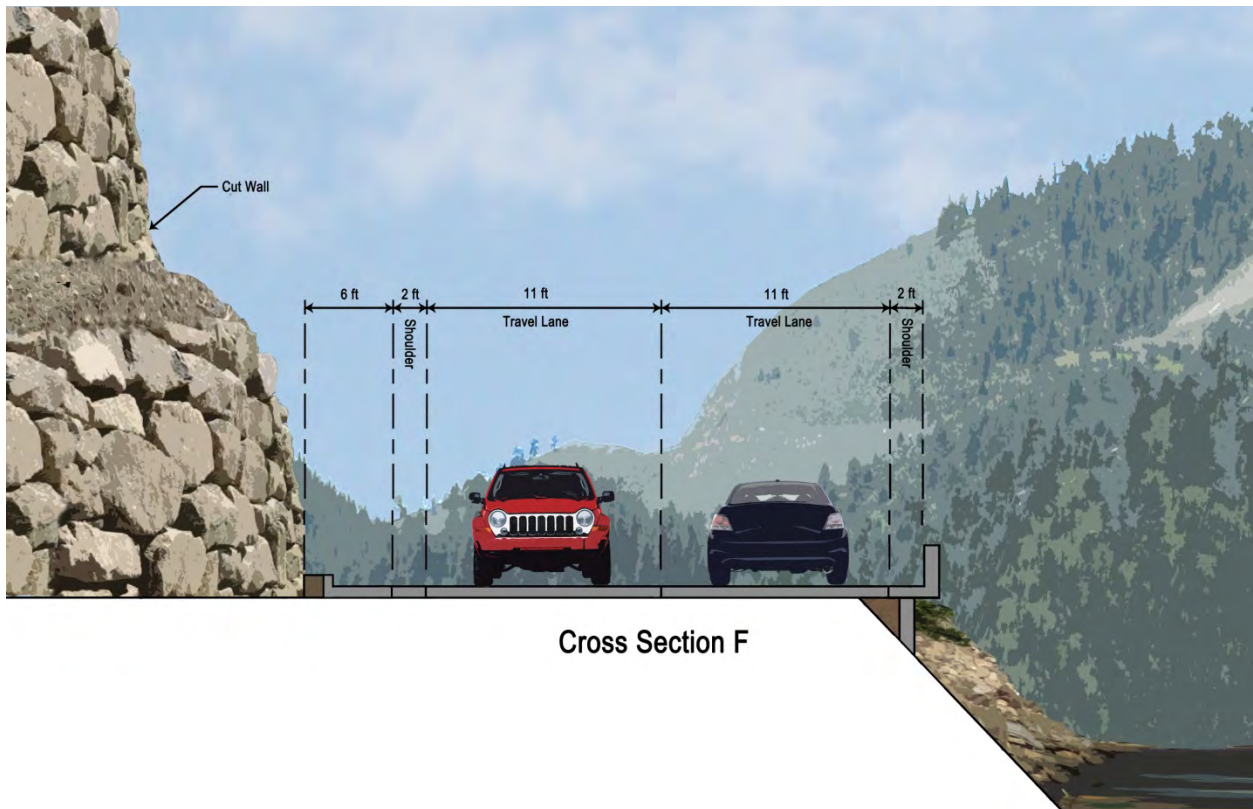
Figure 6: Cross Section E



2.1.7 Cross Section F – narrow

In some locations due to severe right-of-way or physical constraints, it may be preferred to have a narrower cross section. This cross section is designed for vehicle traffic and assumes the trail will be accommodated in a separate location on the existing Scott Lancaster Memorial Trail or on road. Depending on specific conditions, this section may or may not include wall cuts (rockeries) and/or minor cantilever and wall. This typical cross section includes 6' paved ditch, 2' shoulder, two 11' lanes, and 2' shoulder for a total of 32' **Figure 7** illustrates Cross Section F.

Figure 7: Cross Section F



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2.2 Decision Areas

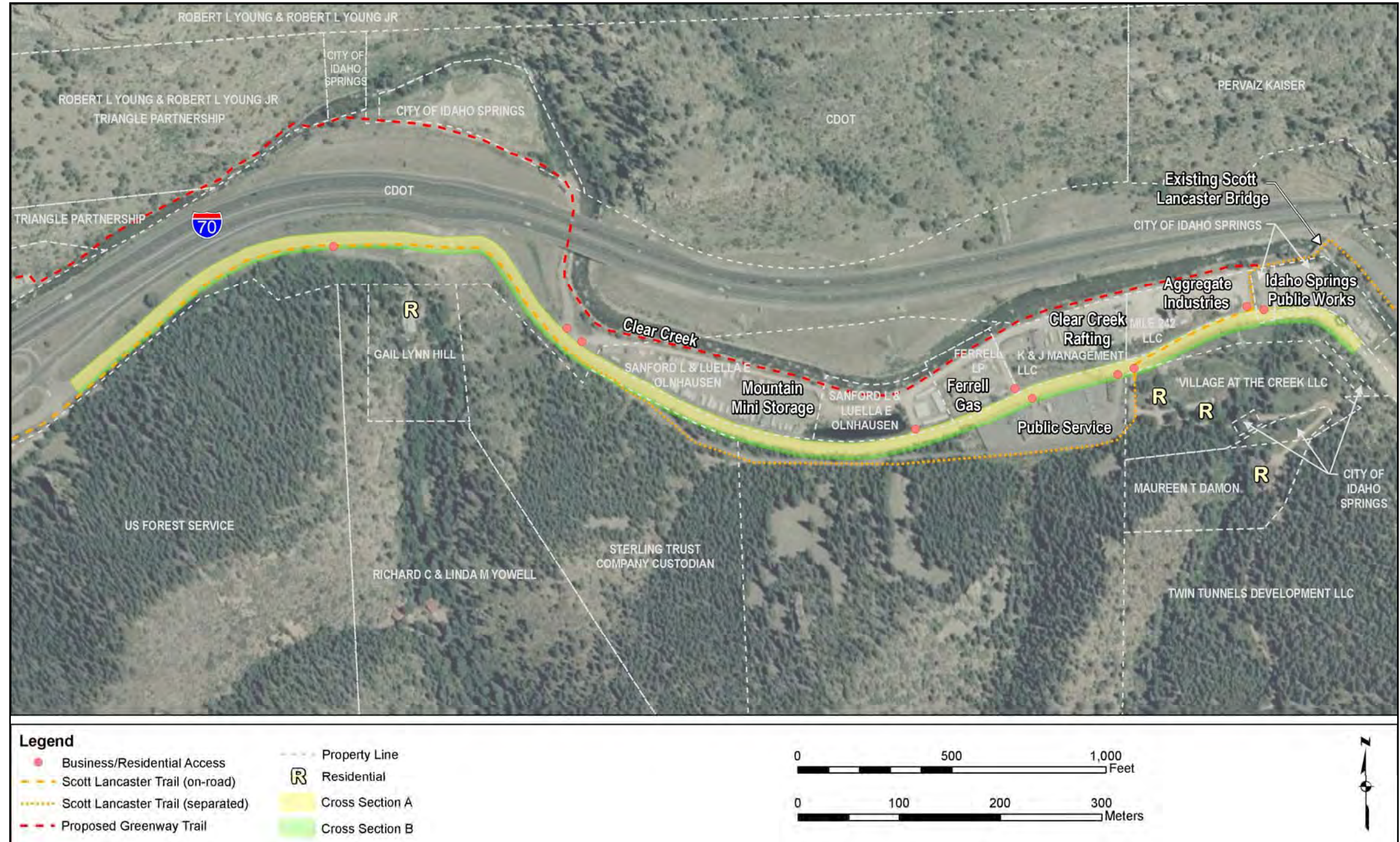
CR 314 current traffic volumes range from 100 to 1,300 average daily traffic (ADT) along this corridor. Peak hour traffic is anticipated to increase from 275 vehicles per hour in existing conditions to 451 vehicles per hour in 2035 on CR 314 near Idaho Springs. In addition to the vehicular traffic, the corridor has heavy recreational use by bicyclists, pedestrians, rafters, and fishermen. Along the two-mile corridor, one or more cross sections have been applied to determine the most suitable design. These comparisons are broken down into four decision areas: Concepts have been applied to the following decision areas:

2.2.1 Western Decision Area

The Western Decision Area is located between Eastern Idaho Springs (I-70 Exit 241) to the gravel section of CR 314. This 0.9 mile area is characterized by 2 residential access, 6 business accesses, and a major utility substation. Existing pavement ranging from 24' to 32' and existing right-of-way ranges from 40' to 100'. In this location, the Scott Lancaster Memorial Trail is located on road as well as on two separate trail facilities. Long range plans for the Clear Creek County Greenway also identifies a route just south of Clear Creek on the private access road. Slopes associated with Clear Creek or rock outcrops are not a major constraint in this area.

The Western Decision Area will be constructed as part of Phase II as funding is identified. Cross sections considered in this decision area include: Cross Sections A and Cross Section B.

Figure 8: Western Decision Area



2.2.2 Gravel/Doghouse Bridge Decision Area

The Gravel/Doghouse Bridge Decision Area currently includes a 1,000 foot unimproved section of CR314 south and upslope of Clear Creek which accommodates through vehicle traffic. This 0.30 mile area also includes the existing Doghouse Bridge crossing of Clear Creek connecting Old US 40 (game check area) with CR 314. A single residential access is located just west of the Doghouse Bridge. PLT/TT identified the Gem Power Plant as an important local historic resource that should be avoided in this area. The Scott Lancaster Memorial Trail is accommodated as a separate facility behind the Idaho Spring Public Works parcel, on the covered bridge, along Old US 40, and on the Doghouse Bridge. Options considered in this decision area include:

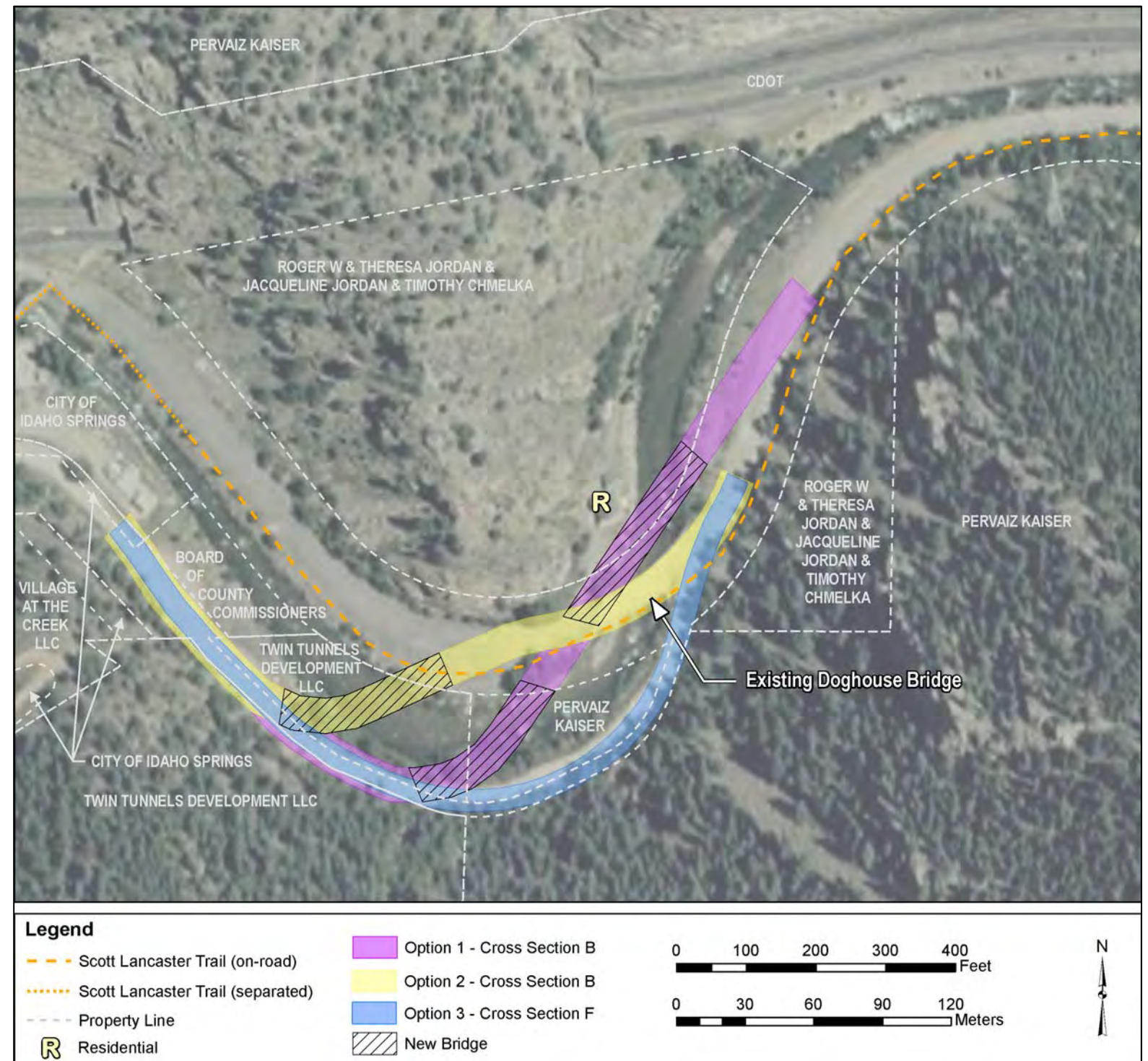
- Option 1 – Build two new bridges and abandon Doghouse Bridge and gravel section.
- Option 2 – Improve Doghouse Bridge and build new bridge and abandon gravel section.
- Option 3 – Improve existing gravel road (cross section F).

In Options 1 and 2, the trail may be attached to the roadway and bridges or an alternate route along the north side of Clear Creek may be evaluated. There is no change to existing trail conditions in Option 3.

Members of the PLT/TT also identified an additional concept for consideration prior to PLT/TT meeting #3. This concept will evaluate a new crossing of Clear Creek in a more east/west orientation than the options shown in Figure 9. This concept was developed to avoid impacts to the Twin Tunnels Development LLC property.

The Gravel/Doghouse Bridge Decision Area will be constructed as part of Phase II as funding is identified.

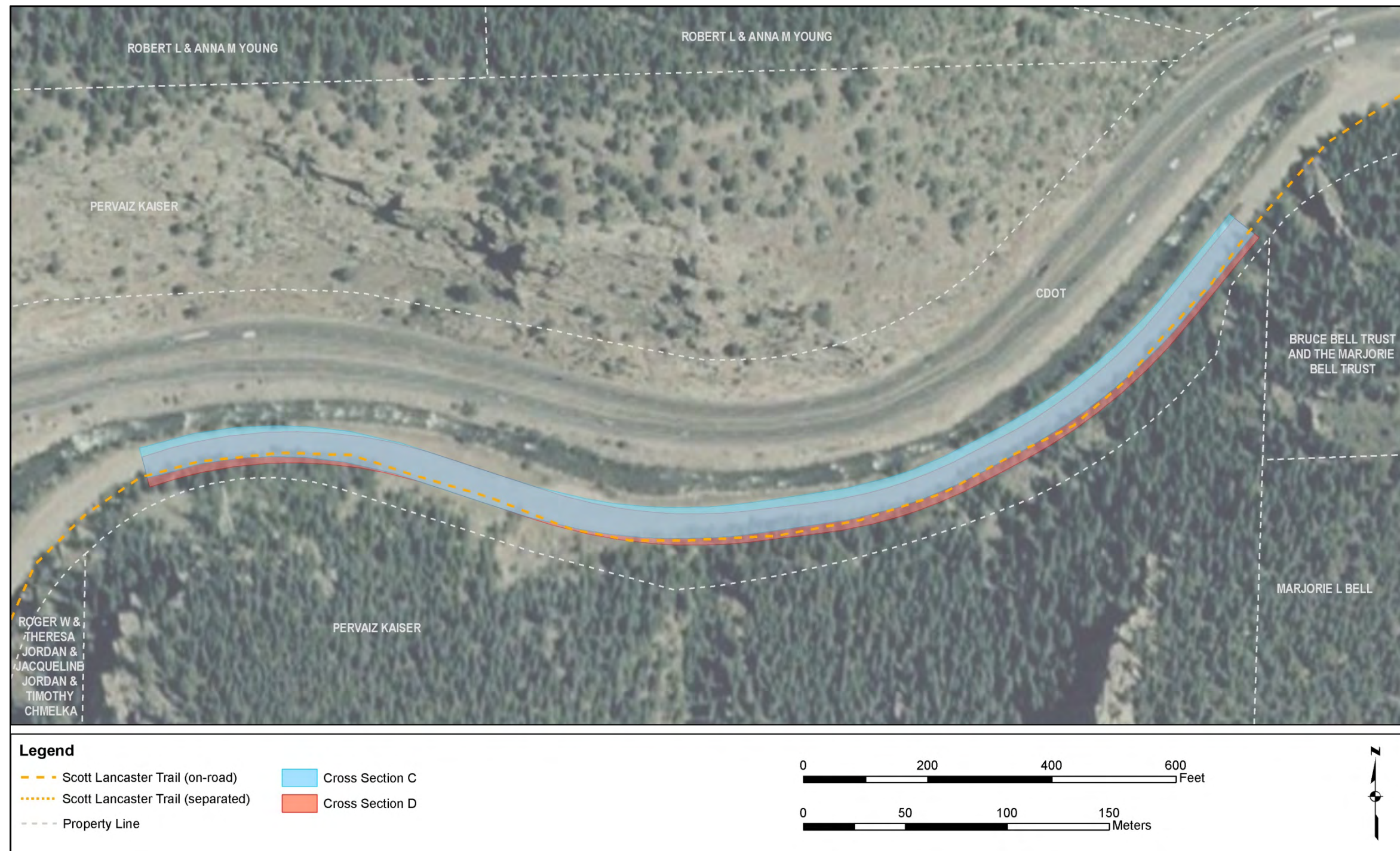
Figure 9: Gravel/Doghouse Bridge Decision Area



2.2.3 Phase I Decision Area

The Phase I Decision area is located just east of the Doghouse bridge/gravel road and west of the Hidden Valley/ Central City Interchange. This 0.4 mile area is characterized by steep slopes above Clear Creek to the north and rock outcrops and rock slide slopes to the south. No residents or businesses are located along this area, but it provides direct recreational access for rafting and fishing. In this location, the Scott Lancaster Memorial Trail is located on road. Existing pavement ranging from 24' to 30' and existing right-of-way ranges from 70' to 125'. Cross sections considered in this decision area include: Cross Section C or D. Recreation access pullouts may be added by utilizing Cross Section E at wider locations.

Figure 10: Phase I Decision Area



2.2.4 Eastern Decision Area

The Eastern Decision Area is located east of Phase I and connects to the Hidden Valley/Central City Interchange (Exit 243). This 0.3 mile area bends away from Clear Creek with steep grades, crests on top of a large retaining wall for the I-70 Hidden Valley interchange ramps, and then descends into a signalized intersection just south of the Hidden Valley interchange. This section is characterized with steep rock outcrops and two residential access points to the south. Currently, the Scott Lancaster Memorial Trail is located on road. Existing pavement ranging from 20' to 26' and existing right-of-way ranges from 70' to 120'. Cross sections considered in this decision area include: Cross Section B.

Figure 11: Eastern Decision Area



3 EVALUATION CRITERIA

3.1 Development of Evaluation Criteria

Step 3 of the CSS process includes the development of evaluation criteria. Building upon previous CSS efforts in the corridor, the design team reviewed the suggested evaluation criteria from the Idaho Springs Area of Special Attention Report (IS ASA, March 2011). **Table 2** summarizes the suggested criteria from the IS ASA grouped by the core values of **mobility, healthy town, environmental, and sustainability**. The IS ASA includes 27 criteria to address the core values for improvements to I-70, AGS, and/or the frontage road.

The project team reviewed the criteria for applicability to the frontage road and eliminated non-applicable criteria. Applicable criteria were then revised with metrics specific to the Frontage Road. The following adjustments were made to the original criteria by the project team:

- Criteria displayed in gray text are not applicable to the Frontage Road
- Criteria with an “*” were added based on PLT/TT comments and additional concerns identified at the August 30, 2011 PLT/TT meeting
- It is recommended that a total of 17 criteria be evaluated for each Frontage Road design concept; including 5 mobility, 6 healthy town, 5 environmental, and 1 sustainable criteria.

These criteria were presented to the I-70 Frontage Road PLT/TT on October 26, 2011 for endorsement.

Table 2: Initial Evaluation Criteria

Idaho Springs ASA Values	Criteria for Evaluation of Alternatives (IS ASA)	Applicable to I-70 Frontage Road Options	Metric
Mobility	Increase throughput on the I-70 Mountain Corridor, reduce congestion	Increase vehicle mobility on the I-70 Mountain Corridor and throughout Idaho Springs and maintain local nature of roadway for traffic calming.	Evaluate adequate lane widths and shoulders – maintained or improved compared to existing conditions.
	Traffic volumes on Colorado Boulevard with and without the improvements	NA	NA
	Number of access points with and without the improvements	Changes in residential and commercial access points	Business/residential access impacts
	Rate construction impacts as high/medium/low for all alternatives	Minimize construction impacts	Duration and phasing of construction impacts - high/medium/low

Table 2: Initial Evaluation Criteria (cont.)

Idaho Springs ASA Values	Criteria for Evaluation of Alternatives (IS ASA)	Applicable to I-70 Frontage Road Options	Metric
Mobility (cont.)	Calculate Level of Service for key in-town intersections with and without the improvements	NA	NA
	Measure length of new trails and access points with and without the improvements	Improve the bike and pedestrian trails	Length/access of trail improvements
	Rate access as good/fair/poor for each alternative	NA	NA
	Safety – how well does the alternative element provide safety measures* <i>(added from PEIS)</i>	Crashes Emergency response (width and access)	Change in crash rating high/medium/low Total roadway width to accommodate emergency response Maintain or increase opportunities for emergency response access
Healthy Town	Lay out sightlines from the AGS to Idaho Springs for each alternative alignment	NA	NA
	Complete an economic/land use assessment with and without the improvements	Increase economic health, vitality, and redevelopment opportunities	Change in redevelopment opportunity - high/medium/low
	Include transit stop in the economic/land use assessment	NA	NA
	Lay out transit and pedestrian access routes for each alternative	NA	NA
	Rate access as good/fair/poor based on these three elements of the alternative: more than one interchange, access at east end of town, access downtown/gateway)	NA	NA
	Ask the question: “Does this alternative provide opportunities for additional downtown parking?”	NA	NA
	Ask the question: “Can the design of the highway and AGS meet the Aesthetic Guidelines?”	Can the design of the frontage road meet the Aesthetic Guidelines?	Change in aesthetics - high/medium/low

Table 2: Initial Evaluation Criteria (cont.)

Idaho Springs ASA Values	Criteria for Evaluation of Alternatives (IS ASA)	Applicable to I-70 Frontage Road Options	Metric
Healthy Town (cont.)	Ask the question: "Can business access be maintained during construction?"	Minimize construction impacts on businesses	Impacts to business access during construction - high/medium/low
	Ask the question: "Does this alternative acceptably accommodate the Water Wheel?"	NA	NA
	Ask the question: "Is this alternative consistent with a Clear Creek greenway? (Trail Access)"	Flexibility to safely accommodate trail during detour/construction.	Trail accommodation - high/medium/low
	Ask the questions: "Is this alternative consistent with a Clear Creek greenway? (Facility Access)"	Does design accommodate other greenway facilities like parking, boat ramp, restrooms, etc.?	Facility accommodation - high/medium/low
	Ask the question "Are there reasonable accommodations for current and future utilities?"* (PLT/TT)	Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/no
Environmental	Compare air quality with and without the improvements	<p>The project is exempt from air quality conformity requirements that are applicable to transportation projects in nonattainment areas because it is located in Clear Creek County, at least three miles outside of the nonattainment area boundaries for the Denver metro area.</p> <p>The project would improve an existing two-lane frontage road, not adding capacity. Air quality impacts of this proposed improvement would be negligible. (Doug Eberhart 12/7/2011)</p>	NA

Table 2: Initial Evaluation Criteria (cont.)

Idaho Springs ASA Values	Criteria for Evaluation of Alternatives (IS ASA)	Applicable to I-70 Frontage Road Options	Metric
Environmental (cont.)	Compare noise levels with and without the improvements	The frontage road will be resurfacing/reconstruction without capacity increase or negative alignment or profile effect on noise environment – qualifying as a Type III project, which requires no noise analysis (Jill Schlaefer, CDOT, 12/7/2011)	NA
	Ask the question: "Does this alternative provide for wildlife crossings and protect habitat?"	Would any options preclude/provide wildlife crossing (at grade)? Stream shading/wetlands	Habitat impact - high/medium/low
	Map lighting impacts from AGS and roadway improvements	NA	NA
	Ask the question: "Does this alternative improve the Clear Creek water quality?"	Enhance Clear Creek	Water quality enhancement opportunities - high/medium/low
	Minimize ROW impacts* (from PLT/TT)	Private property impacts	# private parcels affected
	Minimize impacts to historic resources* (from PLT/TT)	Both 106 eligible and locally important as identified by PLT/TT	Identify potential impacts to historic resources
Sustainability	Provide life cycle costs that include maintenance costs for all alternatives	Minimize maintenance by design (Maintenance of rockery vs. cantilever) Snow removal	High, medium, low construction costs High, medium, low maintenance costs

3.1.1 Evaluation of Cross Sections within Decision Areas

Step 5 of the CSS process includes the evaluation, selection, and refinement of options. Options were presented and discussed with the PLT/TT and stakeholders at the PLT/TT #2 (October 26, 2011), PLT/TT #2.5 (November 1, 2011), and Greenway Issue Task Force (November 22, 2011).

Tables 3 through 6 provide a comparison of options at each of the four decision areas consistent with the criteria established at PLT #2. Evaluation of options is based on GIS and aerial analysis of conceptual design and feedback provided at the stakeholder meetings noted above. A summary of the evaluations and recommended alternative is found in Section 4 of this report.

Table 3: Evaluation of Options in Western Decision Area

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Cross Section A	Cross Section B
Increase vehicle mobility on the I-70 Mountain Corridor and throughout Idaho Springs	Evaluate adequate lane widths and shoulders – maintained or improved compared to existing conditions. At narrowest 24' existing pavement and 40' ROW	Existing ROW conditions can accommodate Cross Section A, but would require additional pavement	Would require additional ROW and pavement for improved widths and shoulders (32 ft) plus barrier separated 8 ft trail
Changes in residential and commercial access points	Business/residential access impacts 10 existing access points	No changes	Up to 10 accesses may be impacted
Minimize construction impacts	Duration and phasing of construction impacts - high/medium/low Condition of existing pavement – TBD	Low – widening Medium – reconstruct (one lane remains open)	Low – widening Medium – reconstruct (one lane remains open)
Improve the bike and pedestrian trails	Length/access of trail improvements Trail is accommodated both on-street and separated. Greenway planned to extend along business road access between Clear Creek and businesses.	No improvements to trails. Bike/peds accommodated on improved and consistent shoulders.	0.44 miles of barrier separated trail
Crashes Emergency response (width and access)	Change in crash rating high/medium/low Low crash history (per Cindy Condon, Idaho Springs City Administrator one accident within the last 3 or 4 years on CR 314) Total roadway width to accommodate emergency response - maintain or increase width	No change in crash rating. 32 ft total roadway width for emergency response maintain opportunity for emergency response access	No change in crash rating. 32 ft total roadway width for emergency response maintain opportunity for emergency response access

Table 3: Evaluation of Options in Western Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Cross Section A	Cross Section B
Increase economic health, vitality, and redevelopment opportunities	Change in redevelopment opportunity - high/medium/low	low	low
Can the design of the frontage road meet the Aesthetic Guidelines?	Consistent with aesthetic guidelines – improved, consistent, or inconsistent	consistent	Consistent with aesthetic treatment of barrier Inconsistent with Type 7 barrier
Minimize construction impacts on businesses	Impacts to business access during construction - high/medium/low	Low – widening Medium – reconstruct (one lane remains open)	Low – widening Medium – reconstruct (one lane remains open)
Flexibility to safely accommodate trail during detour/construction.	Trail accommodation - high/medium/low	Medium – bike/peds accommodated within one lane of traffic	Medium – bike/peds accommodated within one lane of traffic
Does design accommodate other greenway facilities like parking, boat ramp, restrooms, etc.?	Facility accommodation - high/medium/low	NA	NA
Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/No	Public Service substation cannot be affected. Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction	Public Service substation cannot be affected. Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction
Would any options preclude/provide wildlife crossing (at grade)? Stream shading/wetlands	Habitat impact - high/medium/low	Wildlife crossing: low Stream/wetland: No impacts to wetland by Mountain Mini Storage or two wetlands on the west end, south side of Frontage Road.	Wildlife crossing: TBD based on barrier type selected Stream/wetland: No impacts to wetland by Mountain Mini Storage and 0.004 acres of impacts to the two wetlands on the west end, south side of Frontage Road.

Table 3: Evaluation of Options in Western Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Cross Section A	Cross Section B
Enhance Clear Creek	Water quality enhancement opportunities - high/medium/low	Ditch to convey drainage added	Ditch to convey drainage added
Private property impacts	# private parcels affected	0	Up to 8
Minimize impacts to historic resources* (from PLT/TT)	Identify potential impacts to historic resources	NA	NA
Minimize maintenance by design	High, medium, low construction costs High, medium, low maintenance costs	Low Similar to existing	Low + additional pavement width Additional costs to remove snow along trail

Table 4: Evaluation of Options in Gravel/Doghouse Bridge Decision Area

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Option 1 (Cross Section B)	Option 2 (Cross Section B)	Option 3 (Cross Section F)
Increase vehicle mobility on the I-70 Mountain Corridor and throughout Idaho Springs	Evaluate adequate lane widths and shoulders – maintained or improved compared to existing conditions. At minimum, existing pavement on gravel section 20' and doghouse bridge width 38'	Widened lanes and shoulders (32') on new alignment	Widened lanes and shoulders (32') on new alignment	Widened lanes and shoulders (26') on existing alignment
Changes in residential and commercial access points	Business/residential access impacts	0	0	0
Minimize construction impacts	Duration and phasing of construction impacts - high/medium/low	Low – construction on new alignment	Low – construction on new alignment	Medium/High – difficult to maintain a lane of traffic on narrow section

Table 4: Evaluation of Options in Gravel/Doghouse Bridge Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Option 1 (Cross Section B)	Option 2 (Cross Section B)	Option 3 (Cross Section F)
Improve the bike and pedestrian trails	Length/access of trail improvements	500' new attached trail	375' new attached trail	No change, trail remains on doghouse bridge
Crashes Emergency response (width and access)	Change in crash rating high/medium/low Low crash history -one accident within the last 3 or 4 years on CR 314. Total roadway width to accommodate emergency response - maintain or increase width	No change in crash rating. 32 ft total roadway width for emergency response	No change in crash rating. 32 ft total roadway width for emergency response	No change in crash rating. 26 ft total roadway width for emergency response
Increase economic health, vitality, and redevelopment opportunities	Change in redevelopment opportunity - high/medium/low	Low – impacts to developable parcel at doghouse bridge	Low – impacts to developable parcel at doghouse bridge and Twin Tunnels LLC (esp. Gem Power plant site)	Low – impacts to Twin Tunnels LLC
Can the design of the frontage road meet the Aesthetic Guidelines?	Consistent with aesthetic guidelines – improved, consistent, or inconsistent	TBD based on bridge design	TBD based on bridge design	Consistent – boulder rock walls in some locations
Minimize construction impacts on businesses	Impacts to business access during construction - high/medium/low	low	low	low
Flexibility to safely accommodate trail during detour/construction.	Trail accommodation - high/medium/low	High – could use gravel road	High – could use gravel road	High – no impact to existing trail at doghouse bridge
Does design accommodate other greenway facilities like parking, boat ramp, restrooms, etc.?	Facility accommodation - high/medium/low	Moderate – direct access to game check bridge area	Moderate – direct access to game check bridge area	Moderate – direct access to game check bridge area

Table 4: Evaluation of Options in Gravel/Doghouse Bridge Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric Existing Conditions	Option 1 (Cross Section B)	Option 2 (Cross Section B)	Option 3 (Cross Section F)
Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/no	Number and type of utilities TBD with utility coordination. Not as likely to be extended on new structure.	Number and type of utilities TBD with utility coordination. Not as likely to be extended on new structure.	Number and type of utilities TBD with utility coordination. Yes during reconstruction.
Would any options preclude/provide wildlife crossing (at grade)? Stream shading/wetlands	Habitat impact - high/medium/low	Wildlife crossing – TBD based on barrier type selected Stream shading/wetlands – medium Riparian: 0.277 ac Wetland: 0.017 ac Stream Shading: 0.382 ac	Wildlife crossing – low TBD based on barrier type selected Stream shading/wetlands – medium Riparian: 0.097 ac Wetland: 0.013 ac Stream Shading: 0.11 ac	Wildlife crossing – TBD based on wall or cantilever design Stream shading/wetlands – No Impacts
Enhance Clear Creek	Water quality enhancement opportunities - high/medium/low	NA	NA	Medium – ditch to convey drainage added
Private property impacts	# private parcels affected	3	2	2
Minimize impacts to historic resources* (from PLT/TT)	Identify potential impacts to historic resources	Crosses over Gem Power site	Crosses over Gem Power site	Concerns regarding access or preservation of Gem Power site
Minimize maintenance by design (Maintenance of rockery vs. cantilever) Snow removal	High, medium, low construction costs High, medium, low maintenance costs	TBD	TBD	TBD

Table 5: Evaluation of Options in Phase I Decision Area

Applicable to I-70 Frontage Road Options	Metric	Cross Section C	Cross Section D
Increase vehicle mobility on the I-70 Mountain Corridor and throughout Idaho Springs	Evaluate adequate lane widths and shoulders – maintained or improved compared to existing conditions. At narrowest 24' existing pavement and 70' ROW	Improved widths and shoulders (32 ft)	Improved widths and shoulders (32 ft)
Changes in residential and commercial access points	Business/residential access impacts	0	0
Minimize construction impacts	Duration and phasing of construction impacts - high/medium/low Condition of existing pavement – TBD	Medium – reconstruct (one lane remains open)	Medium – reconstruct (one lane remains open)
Improve the bike and pedestrian trails	Length/access of trail improvements	0.37 miles of barrier separated trail	0.37 miles of barrier separated trail
Crashes Emergency response (width and access)	Change in crash rating high/medium/low Low crash history - one accident within the last 3 or 4 years on CR 314 Total roadway width to accommodate emergency response - maintain or increase width	No change in crash rating. 32 ft total roadway width for emergency response	No change in crash rating. 32 ft total roadway width for emergency response
Increase economic health, vitality, and redevelopment opportunities	Change in redevelopment opportunity - high/medium/low	NA	NA
Can the design of the frontage road meet the Aesthetic Guidelines?	Consistent with aesthetic guidelines – improved, consistent, or inconsistent	Consistent/inconsistent – cantilevers	consistent –boulder rock walls
Minimize construction impacts on businesses	Impacts to business access during construction - high/medium/low	NA	NA
Flexibility to safely accommodate trail during detour/construction.	Trail accommodation - high/medium/low	Low – cantilever not designed to handle vehicle traffic loads	High – can be restriped and barrier shifted to accommodate bike/ped

Table 5: Evaluation of Options in Phase I Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric	Cross Section C	Cross Section D
Does design accommodate other greenway facilities like parking, boat ramp, restrooms, etc.?	Facility accommodation - high/medium/low	Low High - Integration of Cross Section E in some locations	Moderate High - Integration of Cross Section E in some locations
Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/no	Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction	Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction
Would any options preclude/provide wildlife crossing (at grade)? Stream shading/wetlands	Habitat impact - high/medium/low	Wildlife crossing: TBD based on cantilever and barrier design Stream/wetland: Wetland: No impacts Stream: TBD extent of overhang	Wildlife crossing: TBD based on barrier selected Stream/wetland: No Impacts
Enhance Clear Creek	Water quality enhancement opportunities - high/medium/low	Medium – ditch to convey drainage added. Additional opportunity at western end.	Medium – ditch to convey drainage added. Additional opportunity at western end.
Private property impacts	# private parcels affected	0	0
Minimize impacts to historic resources* (from PLT/TT)	Identify potential impacts to historic resources	NA	NA
Minimize maintenance by design	High, medium, low construction costs High, medium, low maintenance costs	Estimated construction cost \$2.8 M Maintenance costs TBD	Estimated construction cost \$3.8 M Maintenance costs TBD

Table 6: Evaluation of Options in Eastern Decision Area

Applicable to I-70 Frontage Road Options	Metric	Cross Section B
Increase vehicle mobility on the I-70 Mountain Corridor and throughout Idaho Springs	Evaluate adequate lane widths and shoulders – maintained or improved compared to existing conditions. At narrowest 20' existing pavement and 70' ROW	Would require additional ROW and pavement for improved widths and shoulders (32 ft) plus barrier separated 8 ft trail
Changes in residential and commercial access points	Business/residential access impacts	2 residential access points
Minimize construction impacts	Duration and phasing of construction impacts - high/medium/low Condition of existing pavement - TBD	Low – widening Medium – reconstruct (one lane remains open)
Improve the bike and pedestrian trails	Length/access of trail improvements	0.25 miles of barrier separated trail
Crashes Emergency response (width and access)	Change in crash rating high/medium/low Low crash history -one accident within the last 3 or 4 years on CR 314) Total roadway width to accommodate emergency response - maintain or increase width	No change in crash rating. 32 ft total roadway width for emergency response
Increase economic health, vitality, and redevelopment opportunities	Change in redevelopment opportunity - high/medium/low	Low/NA
Can the design of the frontage road meet the Aesthetic Guidelines?	Consistent with aesthetic guidelines – improved, consistent, or inconsistent	Inconsistent – Cross Section B if widened along existing centerline would extend over existing wall. Requires realignment to south or other cross section.
Minimize construction impacts on businesses	Impacts to business access during construction - high/medium/low	NA
Flexibility to safely accommodate trail during detour/construction.	Trail accommodation - high/medium/low	Medium – bike/peds accommodated within one lane of traffic
Does design accommodate other greenway facilities like parking, boat ramp, restrooms, etc.?	Facility accommodation - high/medium/low	NA
Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/No	Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction

Table 6: Evaluation of Options in Eastern Decision Area (cont.)

Applicable to I-70 Frontage Road Options	Metric	Cross Section B
Utility accommodations along CR 314	Number and type of utilities affected. Can other utilities be extended during construction? Yes/No	Number and type of utilities TBD with utility coordination. Utility extension with widening and/or reconstruction
Would any options preclude/provide wildlife crossing (at grade)? Stream shading/wetlands	Habitat impact - high/medium/low	Wildlife crossing: TBD based on barrier selected Stream/wetland: No impacts
Enhance Clear Creek	Water quality enhancement opportunities - high/medium/low	Ditch to convey drainage added
Private property impacts	# private parcels affected	0
Minimize impacts to historic resources* (from PLT/TT)	Identify potential impacts to historic resources	Impacts to local historic resources - water line and Bell residence unknown at this time
Minimize maintenance by design (Maintenance of rockery vs. cantilever) Snow removal	High, medium, low construction costs High, medium, low maintenance costs	Low + additional pavement width Additional costs to remove snow along trail

4 SELECTION AND REFINEMENT OF PREFERRED ALTERNATIVE

The preferred alternative for the project was developed as a result of the concept screening and evaluation process. Table 7 identifies the preferred cross section options for each decision area and a brief summary of benefits and drawbacks identified in Section 3. Evaluation Criteria. As the design has been revised throughout the project development process, the cost estimates have also been adjusted to reflect the design changes. Two “snapshots” of total cost estimates are also provided in Table 7. These reflect the initial cost estimate presented at PLT/TT #2 and #2.5 and revised cost estimate presented at PLT/TT #5.

The summary of the initial Preferred Alternative was presented and discussed with the PLT/TT and stakeholders at PLT Meeting #2.5 (November 1, 2011). Team members and stakeholders were given the opportunity to view and comment on the frontage road preferred alternative that was incorporated into the December 1, 2012 FIR plans.

As part of the FIR plan meeting and PLT/TT meetings PLT #3 (December 15, 2011) and #4 (January 18, 2012), project stakeholders provided comments on the Preferred Alternative. Design was also revised based on updated site conditions including topographic survey and preliminary geotechnical information. An example of design revision based on updated site conditions includes the removal of the upslope cut wall within the Gravel/Doghouse Decision Area.

Additional refinements to reduce environmental impacts and wall heights were specifically discussed at PLT #4. Refinements incorporated into design based on comments include:

- 10-foot travel lane width
- 2-foot shoulders
- 5-foot buffer (instead of barrier) between CR 314 and shared use path
- Consideration of alternatives to boulder rock walls
- Extension of Phase I improvement to Hidden Valley
- Exclusion of improvement in no work zone of Phase I

As design progresses, CDOT will continue to coordinate with the PLT/TT to minimize impacts while meeting project goals. It is anticipated that design revisions will be consistent with the Mountain Mineral Belt Design Guidelines. Figure 12 illustrates the preferred alternative and the revised cross sections evaluated in the Cat Ex and carried forward in design plans.

Table 7: Summary of Preferred Alternative

Decision Area	Option	Summary of Benefit/Drawback	Initial Estimated Total Cost* (\$ millions)	Revised Estimated Total cost** (\$ millions)
Western	Combination of CS A and B	Impact to accesses and private property Consistent separated trail (new and existing) Potential wetland impacts – 0.004ac	\$5.83	\$4.33
Gravel/Doghouse Bridge	Option 1 or 2 (New bridge(s))	New trail attached to bridge(s) Lower economic/redevelopment Lower utility coordination/extension Medium stream/wetland impacts:	\$4.66	
Gravel/Doghouse Bridge	Option 3 (CS F)	Narrowest cross section Trail remains in current location along Doghouse Bridge Low stream/wetland impacts	\$3.43	\$1.76
Phase I	Combination of CS B, D, E	High flexibility to accommodate trail during detour/construction (vehicle loads on cantilever) High accommodation of other greenway facilities No stream/wetland impacts	\$6.67	\$6.21
	CS C	Low flexibility to accommodate trail during detour/construction (vehicle loads on cantilever) Low accommodation of other greenway facilities Low potential stream/wetland impacts	\$4.85	
Eastern	CS B	Impact to accesses and private property Consistent separated trail No stream/wetland impacts	\$3.52	\$2.95

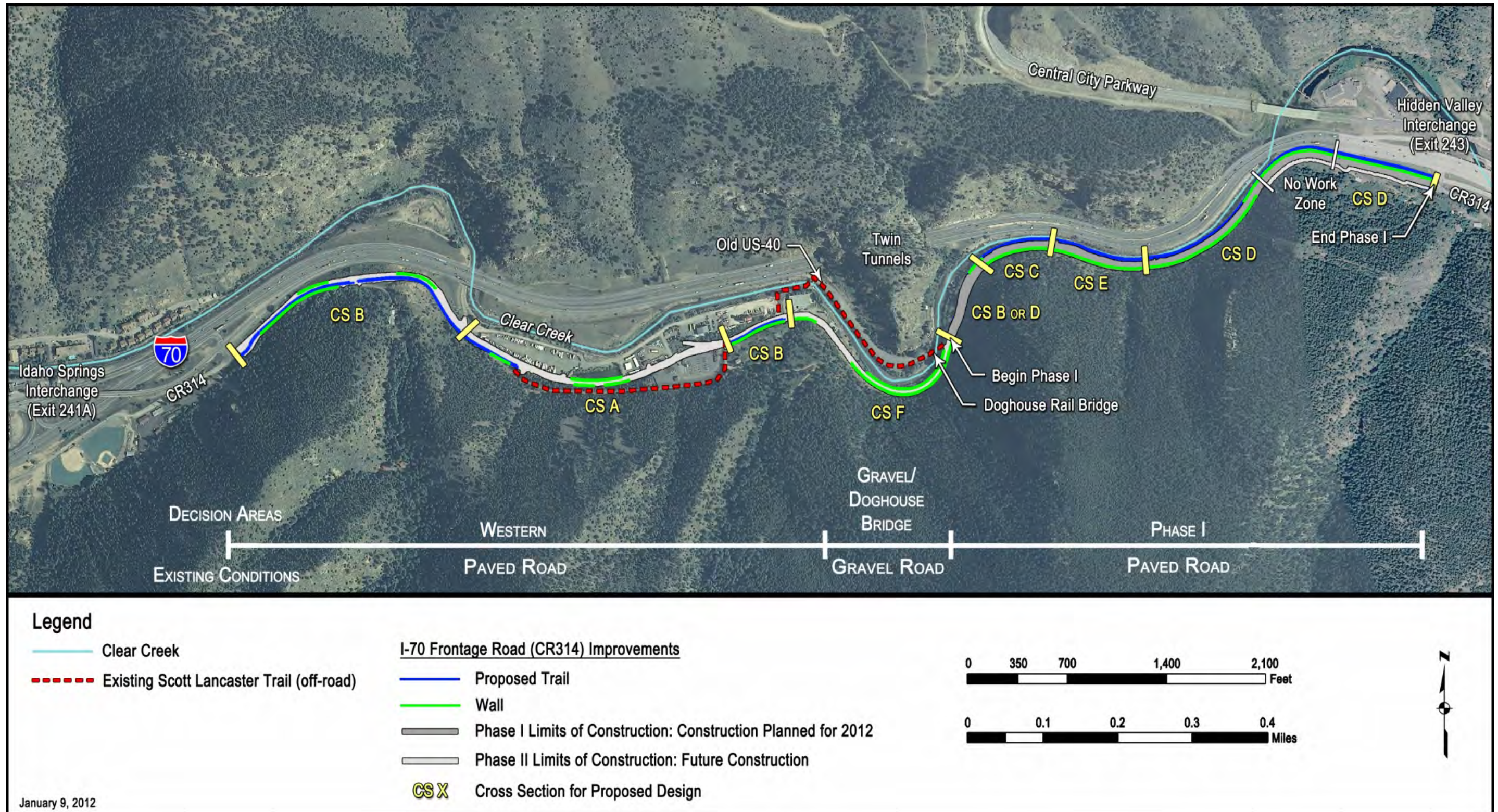
Preferred Alternative for each Decision Area noted in bold. Cost estimates change over the life of the project as the design is refined.

*11/2/11 design estimate - total costs based on initial conceptual design

**1/13/12 design estimate – total costs based on revised FIR plan design, new survey information, changes include reduction to 11' lanes and 2' shoulders, reduction of wall heights, and for eastern section does not include TT EA design within no work zone.

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Figure 12: Refined Cross Sections of the Preferred Alternative



January 9, 2012

