

**US 550 CONNECTION TO US 160
AT FARMINGTON HILL**

DRAFT SECTION 4(f) EVALUATION

CDOT Project #FC-NH(CX)162-2(048)

March 21, 2011

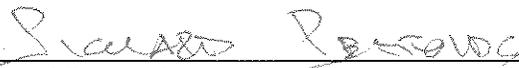
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CDOT Project #FC-NH(CX)162-2(048)

Submitted Pursuant to:
49 USC 303
by the
U.S. Department of Transportation, Federal Highway Administration
and
Colorado Department of Transportation

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TABLE OF CONTENTS

	Page No.
1.0 Introduction	1
1.1 Project Background	2
1.2 Purpose and Need	5
1.3 Project Alternatives	6
2.0 Description of Section 4(f) Properties.....	18
2.1 Historic Ranches	18
2.1.1 Webb Ranch.....	18
2.1.2 Craig Limousin Ranch	20
2.1.3 Schaeferhoff-Cowan Ranch	22
2.1.4 Clark Property	24
2.2 Historic Irrigation Ditches	24
2.2.1 Webb-Hotter Lateral	24
2.2.2 Co-op Ditch	27
3.0 Archaeological Sites.....	29
4.0 Avoidance Alternatives Analysis.....	30
4.1 Corridor Avoidance Alternatives.....	31
4.1.1 No Action Alternative.....	32
4.1.2 Transportation System Management Alternative	32
4.1.3 Transportation Demand Management Alternative.....	32
4.1.4 Alignment Shifts of the US 550 Corridor	33
4.2 Feasibility and Preliminary Alternatives	35
4.3 Alternatives Considered	35
4.3.1 US 550 at US 160 At-Grade Intersection Alternative	37
4.3.2 Partial Interchange at the US 550/US 160 Existing Intersection Alternative	37
4.3.3 Revised Preliminary Alternative A	38
4.3.4 Revised G Modified Alternative	38
4.3.5 Revised F Modified Alternative.....	38
4.3.6 Eastern Realignment Alternative.....	38
4.3.7 Western Realignment Alternative.....	39
4.4 Section 4(f) Avoidance Alternatives Summary	41
5.0 Use of Section 4(f) Properties.....	43
5.1 Description of Use, Webb Ranch (5LP6481)	43
5.1.1 Revised F Modified Alternative.....	43
5.1.2 Revised G Modified Alternative	44
5.1.3 Avoidance Alternatives.....	44
5.2 Description of Use, Craig Limousin Ranch (5LP9307).....	44
5.2.1 Revised F Modified Alternative.....	44
5.2.2 Eastern Realignment Alternative.....	44
5.2.3 Revised G Modified Alternative	44
5.2.4 Avoidance Alternatives.....	44
5.3 Description of Use, Schaeferhoff-Cowan Ranch (5LP9306)	44
5.3.1 Revised F Modified Alternative.....	45
5.3.2 Eastern Realignment Alternative.....	45
5.3.3 Avoidance Alternatives.....	45

5.4	Description of Use, Clark Property (5LP9310)	45
5.4.1	The Clark Property is used by one alternative. Revised F Modified Alternative.....	45
5.4.2	Avoidance Alternatives.....	45
5.5	Description of Use, Webb-Hotter Lateral Ditch (5LP9256.1 and 5LP9256.2)	45
5.5.1	Revised F Modified Alternative.....	45
5.5.2	Eastern Realignment Alternative.....	45
5.5.3	Avoidance Alternatives.....	46
5.6	Description of Use, Co-op Ditch (5LP9257)	46
5.6.1	Eastern Realignment Alternative.....	46
5.6.2	Revised F Modified Alternative and Revised G Modified Alternative	46
5.6.3	Avoidance Alternatives.....	46
6.0	Least Overall Harm Analysis for Alternatives Considered in the Section 4(f) Evaluation	46
6.1	Quantitative Impact Assessment for Section 4(f) Alternatives	47
6.1.1	Eastern Realignment Alternative Use of Section 4(f) Properties.....	47
6.1.2	Revised F Modified Alternative Uses of Section 4(f) Properties.....	47
6.1.3	Revised G Modified Alternative Uses of Section 4(f) Properties	49
6.2	Summary of Least Harm Factors for Ability to Mitigate, Severity, Significance, and Views of the Officials with Jurisdiction	49
6.2.1	Ability to Mitigate	49
6.2.2	Relative Severity of the Remaining Harm	50
6.2.3	Relative Significance of Each Section 4(f) Property	51
6.2.4	Views of the Officials with Jurisdiction over the Section 4(f) Properties.....	51
6.3	Degree to Which Each Alternative Meets Project Purpose and Need	51
6.3.1	Access.....	51
6.3.2	Safety	52
6.3.3	Capacity	52
6.4	Impacts to Other Social and Environmental Resources.....	53
6.5	Cost Comparison Among Section 4(f) Alternatives.....	55
6.6	Summary of Least Overall Harm Analysis	56
7.0	All Possible Planning to Minimize Harm.....	57
8.0	Record of Coordination	59
9.0	References.....	59

ATTACHMENTS

Attachment A: Section 106 Documentation

Attachment B: Independent Functionality of the Grandview Interchange

Attachment C: Traffic Memoranda and Analyses

Attachment D: Engineering Technical Memoranda

LIST OF FIGURES

Figure 1. EIS Preferred Alternative: Grandview Section	3
Figure 2. Alignment Alternatives and Section 4(f) Properties in the Grandview Section	7
Figure 3. US 550 at US 160 At-Grade Intersection Alternative	9
Figure 4. Partial Interchange at the Existing US 550/US 160 Intersection Alternative	10
Figure 5. Revised Preliminary Alternative A	12
Figure 6. Revised G Modified Alternative	13
Figure 7. Revised F Modified Alternative	15
Figure 8. Eastern Realignment Alternative	16
Figure 9. Western Realignment Alternative	17
Figure 10. Webb Ranch	19
Figure 11. Craig Limousin Ranch	21
Figure 12. Schaeferhoff-Cowan Ranch	23
Figure 13. Clark Property	25
Figure 14. Webb-Hotter Lateral Ditch	26
Figure 15. Co-op Ditch location	28
Figure 16. Animas River Corridor Alternative	34
Figure 17. Alignment Alternatives	36
Figure 18. Florida Mesa's Severe Topographic Constraint	40
Figure 19. Detailed Engineering Layouts of the Three Section 4(f) Alternatives	48

LIST OF TABLES

	Page No.
Table 1. Summary of Section 4(f) Properties Within Project Area	18
Table 2. Previously Recorded Sites in Close Proximity of the Survey Corridor	30
Table 3. NRHP Eligible Archaeological Sites Within the Eastern Realignment Alternative Project Area	30
Table 4. NRHP Eligible Archaeological Sites Within the Western Portion Webb Ranch Complex	30
Table 5. Summary of Prudent and Feasible Screening Criteria	42
Table 6. Direct Uses (and Section 106 Effects) of Section 4(f) Properties	43
Table 7. Quantitative Impact Summary	47
Table 8. Summary of Impacts to Social and Environmental Resources by Alternative	54
Table 9. Relative Costs for US 550/US 160 Connection Alternatives	55
Table 10. Summary of Least Overall Harm by Alternative	58

1.0 Introduction

Section 4(f) was created when the United States Department of Transportation (USDOT) was formed in 1966. It is codified at Title 49 United States Code (U.S.C.) Section 1653(f) (Section 4(f) of the USDOT Act of 1966) and Title 23 U.S.C. Section 138. Section 138 states:

“The Secretary shall not approve any program or project (other than any project for a park road or parkway under Section 204 of this title) which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, State, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use.”

A Section 4(f) "use" occurs when:

1. Land from a Section 4(f) property is permanently incorporated into a transportation facility; land will be considered permanently incorporated into a transportation project when it has been purchased as right-of-way or sufficient property interests have been otherwise acquired for the purpose of project implementation; or.
2. There is a temporary occupancy of land that is adverse in terms of the Section 4(f) statute's preservation purposes. Under the FHWA/FTA regulations, a temporary occupancy of property *does not* constitute a use of a Section 4(f) property when the following conditions are satisfied:
 - ▶ The occupancy must be of temporary duration (i.e., shorter than the period of construction) and not involve a change in ownership of the property.
 - ▶ The scope of work must be minor, with only minimal changes to the protected resource.
 - ▶ There are no permanent adverse physical effects to the protected resource, or will there be temporary or permanent interference with activities, features or attributes of the property.
 - ▶ The land being used must be fully restored to a condition that is at least as good as that which existed prior to the proposed project.
 - ▶ There must be documented agreement of the officials with jurisdiction over the Section 4(f) resource regarding the above conditions; or
3. There is no permanent incorporation of land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection are substantially impaired. This is called a constructive use of the property.

Section 4(f) further requires consultation with the Department of the Interior and, as appropriate, involving the offices of the Departments of Agriculture and Housing and Urban Development in developing transportation projects and programs which use lands protected by Section 4(f). Section 4(f) applies only to the actions of agencies within the USDOT. The USDOT is responsible for applicability determinations, evaluations, findings and overall compliance.

This Draft Section 4(f) evaluation addresses the potential uses of Section 4(f) properties that occur as a result of improvements to the US 550 connection to US 160 east of Durango, Colorado. This document includes the purpose and need for the proposed project, a discussion of alternatives including avoidance alternatives, a description of the Section 4(f) use that occurs with each alternative considered, and a least overall harm analysis if all the alternatives use Section 4(f) properties. This evaluation provides information and supporting documentation for a Final Section 4(f) evaluation within which the Federal Highway Administration (FHWA) will make a determination of whether there are feasible and prudent avoidance alternatives, and if not, approve the alternative that causes the least overall harm in light of the statute's preservation purpose.

1.1 Project Background

This Section 4(f) evaluation has been prepared because a reassessment of environmental conditions during the design process for the US Highway 160, Durango to Bayfield, project identified an eligible historic property, the Webb Ranch, that would be impacted. A brief history of the project is provided in the following discussion.

A Feasibility Study that included the US 160 corridor from Durango to Bayfield and US 550 from the New Mexico Stateline to Durango was completed in 1999. The Feasibility Study was a planning level study that identified broad recommendations and strategies. The Feasibility Study recommended widening US 160 between Durango and Bayfield to four lanes, and constructing an interchange for the connection of US 550 to US 160. The study recommended the interchange be constructed generally near the existing location of the US 160/US 550 (south) intersection also known as Farmington Hill. These recommendations were carried into the subsequent National Environmental Policy Act (NEPA) processes for US 160 between Durango and Bayfield, and US 550 south of Durango.

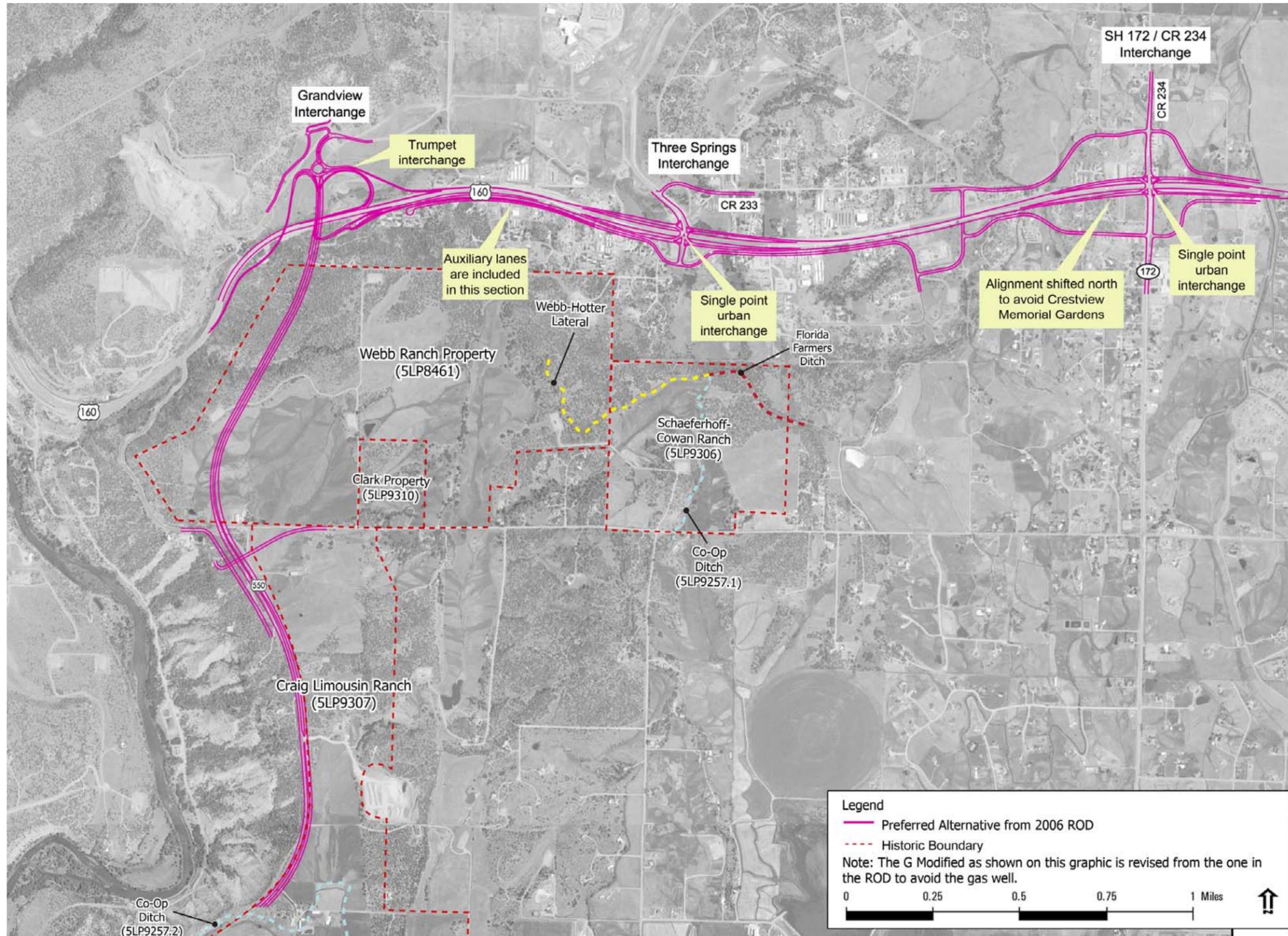
Between February 1999 and January 2002 a preliminary Environmental Assessment (EA) was prepared for the US 160 corridor between Durango and Bayfield. The study area for this corridor included the connection of US 550 to US 160 east of Durango. Based on the preliminary EA and the environmental impacts, the Federal Highway Administration (FHWA) determined that an Environmental Impact Statement (EIS) was the appropriate level of NEPA documentation for this project.

The EIS process commenced with a publishing of the notice of intent to prepare an EIS in the Federal Register on December 24, 2002. A public and agency scoping meeting was held on March 5, 2003 to identify public and agency issues. On September 23, 2005, the Draft EIS/Draft Section 4(f) evaluation was made available to the public. A public hearing was held on the Draft EIS/Draft Section 4(f) evaluation on October 13, 2005. The *US Highway 160 Durango to Bayfield Final Environmental Impact Statement (FEIS)/Final Section 4(f) Evaluation* was signed in May 2006. The FEIS was made available for public review on May 26, 2006 with a public hearing on June 7, 2006. The Record of Decision (ROD) was signed by FHWA on November 7, 2006. *The Final EIS/Final Section 4(f) Evaluation* and the ROD are available at <http://www.coloradodot.info/projects/us160eis>.

Based on the approved ROD, the US 160 corridor will receive phased improvements to a 16.2 mile segment of US 160 between Durango and Bayfield in La Plata County, Colorado (see Figure 1). The selected alternative in the ROD includes four lanes on US 160 between Durango and Bayfield, generally along the existing alignment. The corridor was divided into four sections:

1

Figure 1. EIS Preferred Alternative: Grandview Section



2

Grandview, Florida Mesa and Valley, Dry Creek and Gem Village, and Bayfield. The Grandview Section is located in the western part of the corridor on US 160 from MP 88.0 west of the Farmington Hill intersection to SH 172/CR 234 (i.e. Elmore's Corner) including a segment of US 550 that extends from just south of CR 220 to US 160 (i.e., US 550/US160 connection). The preferred alternative in the Grandview Section, G Modified, includes a trumpet interchange of US 160 and US 550 approximately 0.6 mile east of the current US 160/US 550 (south) intersection, and single-point urban interchanges at Three Springs (CR 233 west) and SH 172/CR 234 (see Figure 1).

After the ROD was completed, CDOT began design and construction of the trumpet interchange approximately 0.6 mile east of Farmington Hill on US 160. This interchange was planned in phases. During project development for the connection of US 550 to US 160, a gas well was discovered within the alignment selected in the ROD. The US 550 connection was redesigned to avoid this gas well.

As part of the design for the US 550 connection to US 160, CDOT re-assessed environmental impacts and conditions. In 2008, a portion of the Marie J. Webb Ranch (Webb Ranch) was identified as an eligible historic resource under Section 106 of the National Historic Preservation Act (NHPA) (Attachment A). In addition, an independent cultural resources inventory was conducted on behalf of the Webb family on the western portion of the ranch that identified a number of previously unrecorded archaeological sites (SEAS, 2008). Based on the SEAS Report, a formal inventory of these sites was conducted, as described in Section 3.0. Under the Preferred Alternative for the US 160 EIS, the historic Webb Ranch is intersected by the US 550 connection to US 160, which is a use of the property and triggered the requirement to prepare a Section 4(f) evaluation. In consultation with the State Historic Preservation Officer (SHPO), CDOT determined that the Preferred Alternative results in an adverse effect to the Webb Ranch as defined in 36 CFR 800.5. Because of this new information, the Preferred Alternative (at the US 550 Connection) from the US 160 EIS is being reevaluated along with other alternatives in the vicinity of the US 550 connection to US 160.

Construction on the interchange located approximately 0.6 mile east of the existing US 160/US 550 (south) intersection is expected to be completed in 2012. The interchange ("Grandview Interchange") is being completed primarily to provide safe and direct access to existing and planned development (including a regional retail center, three schools, a 5,467 unit residential development, and a park) to the north. It will not have a connection to US 550. It also accommodates future projected traffic volumes on US 160 (of 87,000 vehicles a day), facilitates east-west travel and provides safe and direct access to current and future development (including two banks and a several-hundred unit residential development) south of US 160 at Three Springs Boulevard signal (as well as north of US 160). Documentation of the need for the Grandview Interchange even without a US 550 connection is provided in an FHWA memorandum from Doug Bennett to Karla Petty dated December 12, 2008 (in Attachment B) and in the *Year 2030 Traffic Operations Analysis for Alternatives of the US 160 FEIS* (SEH, 2010) provided in Attachment C.

This Section 4(f) evaluation has been prepared to analyze whether there are feasible and prudent avoidance alternatives to use of the Webb Ranch and other Section 4(f) properties in the vicinity of the US 550/US 160 connection, develop measures to minimize and mitigate impacts to Section 4(f) properties, and identify an alternative that causes the least overall harm to Section 4(f) properties. This evaluation is not intended to reanalyze the alternatives for the entire Grandview Section where the majority of the Preferred Alternative components identified

in the ROD still remain valid, and impacts are the same as those identified in the ROD. The evaluation also is not intended to replace or change the analysis in the *2006 Final Section 4(f) Evaluation* of the other Section 4(f) properties in the Grandview Section, for which Section 4(f) uses do not change.

Each of the alternatives being evaluated in this Section 4(f) evaluation can be built and can operate with the Grandview Interchange in its form as described in the September 3, 2008, memo in Attachment B. Two of the alternatives would not connect to this interchange but would connect to the Three Springs Interchange instead.

1.2 Purpose and Need

Proposed improvements to the US 160 Durango to Bayfield corridor were analyzed in the EIS in accordance with FHWA regulations (23 CFR §771) as a means to improve conditions for the traveling public within the corridor. The purpose of the project is to:

- ▶ Increase travel efficiency/capacity to meet current and future needs.
- ▶ Improve safety for the traveling public by reducing the number and severity of accidents.
- ▶ Control access to the highway in order to reduce future conflicts with the proposed highway improvements.

Specific elements of project need include:

- ▶ Historical, existing and future demands placed on highway capacity and efficiency as a result of growth in La Plata County and growth in tourist travel to the Four Corners Region. Traffic volumes along the US 160 corridor are expected to more than double over the next twenty years. These volumes exceed the capacity of the highway and intersections along the corridor.
- ▶ A higher than average number and severity of accidents in the state, compared to other similar highways in the state. This higher number and severity of accidents is attributed to a lack of highway shoulders, turning lanes, clear zones and wildlife crossings—and steep grades with insufficient lanes for passing. In addition, many of the intersections include steep grades, limited sight distance, sharp angles and lack of left turn storage lanes and acceleration/deceleration lanes. The accident data from the EIS have been updated as documented in Attachment C. The same safety issues and trends have occurred in the last few years (2004 to 2008) as were the case between 1996 and 2001.
- ▶ Uncontrolled access as a result of a high density of undefined business and private accesses, terrain features that affect sight distance, areas with poorly defined accesses and anticipated future density of development along the corridor. All of these features contribute to the accident rates.

Supporting documentation and detailed descriptions of the purpose and need for the corridor project are found in Chapter 1 of the EIS.

Since the EIS was completed, traffic volumes and analyses have been updated. These are documented in Attachment C. Traffic analyses were conducted to determine the following: (1) confirm traffic modeling results for Grandview Section alternatives evaluated in the EIS to the year 2025; (2) evaluate alternatives from the EIS in the Grandview Section and determine if they meet the capacity requirement for the purpose and need in the year 2030; (3) determine if three

interchanges are necessary in the Grandview Section based on 2030 traffic volumes; and (4) evaluate alternatives being considered for the Section 4(f) evaluation to determine if they meet the capacity requirement of the purpose and need in the year 2030. Traffic analyses and results are included in Attachment C.

Traffic analyses indicate that alternatives in the Grandview Section require auxiliary lanes in each direction to extend from the west limit of the Grandview Section to the CR 233 (Three Springs) Interchange (see Attachment C). The auxiliary lanes can be added within the right-of-way and identified footprint of the alternatives in the EIS and do not create additional impacts that have not been disclosed in the EIS.

Traffic and engineering analyses also demonstrate the need for three interchanges in the Grandview Section regardless of the location of the US 550/ US 160 connection (see Attachments B, C and D). In the EIS, interchanges were identified at US 160/SH 172 (Elmore's Corner Interchange), US 160/CR 233 (Three Springs Blvd. Interchange), and the US 550/US 160 connection. The location of these Interchanges is shown on Figure 1.

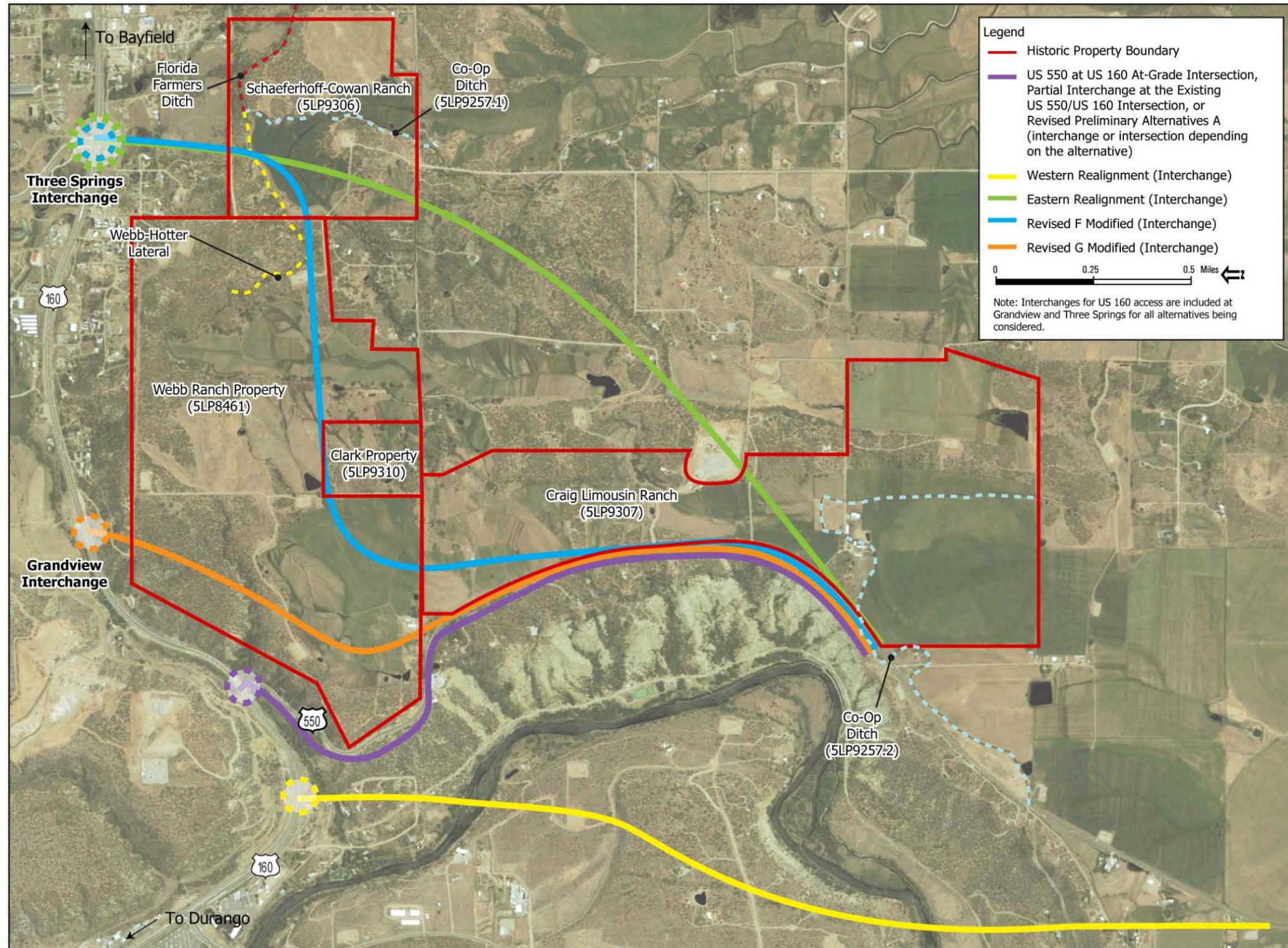
1.3 Project Alternatives

The connection of US 550 to US 160 is in the Grandview Section. The Grandview Section includes US 160 from the west project limit at approximately mile marker 88 west of the US 160/ US 550 (south) intersection to the SH 172/CR 234 intersection, and US 550 from south of CR 220 to US 160 (see Figure 1). All the alternatives in the Grandview Section include four lanes on US 160 with auxiliary lanes between the west project limit and the interchange at CR 233 (Three Springs). US 160 remains on the existing alignment except near the SH 172/CR 234 intersection, where it is shifted north to avoid Crestview Memorial Gardens. US 550 will be four lanes throughout the entire project area addressed in this evaluation. All of the alternatives include the existing Grandview Interchange, a trumpet interchange approximately 0.6 mile east of the existing US 160/US 550 (south) intersection and approximately 600 feet north of US 160, and single point urban interchanges (SPUIs) at CR 233 (Three Springs) and SH 172/CR 234.

The Section 4(f) evaluation specifically focuses on the connection of US 550 to US 160. The evaluation does not reanalyze project alternatives for the Florida Mesa and Valley Section, the Dry Creek and Gem Village Section or the Bayfield Section. In addition, it does not reanalyze avoidance alternatives or impacts for the entire Grandview Section where the majority of the Preferred Alternative components identified in the ROD and Final Section 4(f) still remain valid. The following describes the alternatives being considered for the Section 4(f) analysis with a focus on the US 550 to US 160 connection.

Alternatives considered in this evaluation include those advanced for consideration in the EIS as well as other alternatives that avoid or minimize the use of Section 4(f) properties. In a letter from FHWA to the federal Advisory Council on Historic Preservation (ACHP) dated April 27, 2009, FHWA identified alternatives subject to further study including alignments designed to avoid the historic Webb Ranch. During development of these alternatives, additional Section 4(f) properties were identified that fall within the alignments being considered. Figure 2 shows alternatives being considered for the location of the US 550/ US 160 connection and the Section 4(f) properties in the vicinity of this connection.

Figure 2. Alignment Alternatives and Section 4(f) Properties in the Grandview Section



The following project alternatives are being considered for the Grandview Section and were analyzed in the EIS:

US 550 at US 160 At-Grade Intersection Alternative. This alternative includes a revised US 550 at US 160 signalized intersection at its current location in the year 2030 (Feasibility Alternative 1B in the FEIS) with the Grandview Interchange east of the intersection and SPUIs at CR 233 (Three Springs) and SH 172/CR 234. The intersection includes double turn lanes from US 160 westbound to US 550 southbound, triple turn lanes from US 550 northbound to US 160 westbound and single turn lanes from US 160 eastbound to US 550 southbound and US 550 northbound to US 160 eastbound (see Figure 3).

This alternative is being reexamined in light of new information, including proposals submitted by attorney Thomas McNeill on behalf of the Webb Ranch owners. In particular, a October 28, 2008 letter to FHWA from Mr. McNeill provided seven design variations along the existing US 550 alignment with several of them including at-grade intersections. .

This alternative includes these at-grade design variations: T.1.4, T.1.6, and T.4.4. Each design variation illustrates US 550 intersecting US 160 as an at-grade intersection at the existing US 550/US 160 intersection location. The intersection geometry is also the same for T.1.4, T.1.6 and T.4.4 as illustrated on Figure 3. The differences occur approximately 500 feet away from the US 550/US 160 intersection where the horizontal curvature and grade varies. The design variations are described as follows:

- ▶ **Design Variation T.1.4** includes a 1050-foot radius and a 4 percent grade.
- ▶ **Design Variation T.1.6** includes a 925-foot radius and a 6 percent grade.
- ▶ **Design Variation T.4.4** includes a 1250-foot radius and a 4 percent grade.

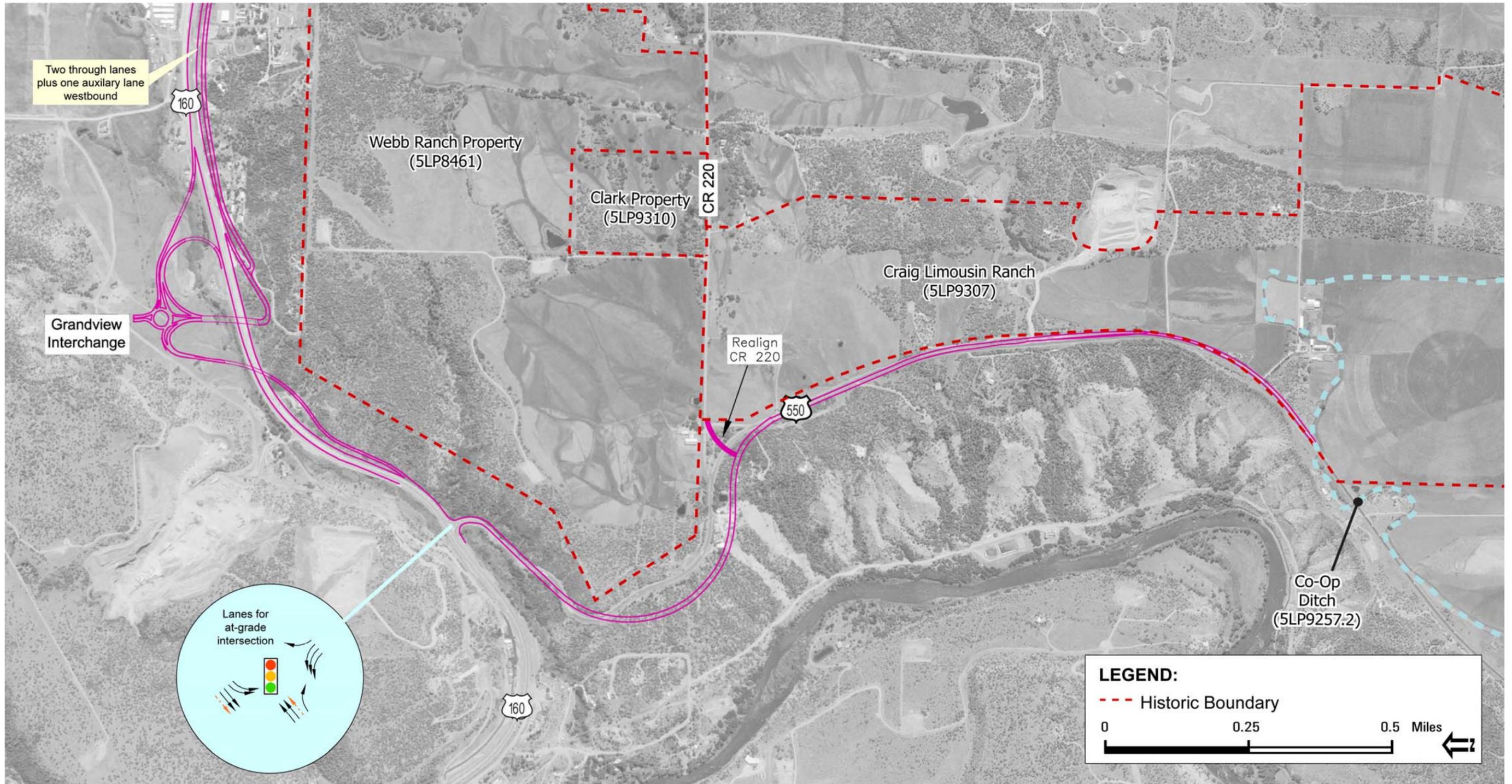
More details about the alternatives are contained in the technical memoranda in Attachment D.

Partial Interchange at the Existing US 550/US 160 Intersection. This alternative includes a partial interchange at the existing US 550/US 160 location, the Grandview Interchange east of the partial interchange and SPUIs at CR 233 (Three Springs) and SH 172/CR 234. This alternative proposes to modify the signalized intersection at US 160/US 550 by eliminating the left turn movement from northbound US 550 to westbound US 160 and replacing it with a loop ramp to service the left turn volumes at the intersection. To accommodate the through volumes, US 160 has two through lanes and one auxiliary lane westbound from the CR 233 (Three Springs) interchange through the US 550 intersection. US 160 eastbound has two through lanes and one climbing lane from west of the US 550 intersection to the CR 233/ Three Springs interchange.

This alternative (illustrated on Figure 4) includes several design variations submitted to FHWA on behalf of the Webb Ranch: T.2.4, T.2.6, T.3.4, and T.3.6. Each design variation illustrates US 550 intersecting US 160 as an at-grade intersection at the existing US 550/US 160 intersection location but with a flyover to accommodate the northbound left turn movement. The differences occur approximately 500 feet away from the US 550/US 160 intersection where the horizontal curvature and grade varies, and in the location and radius of the flyover. The design variations are described as follows:

1

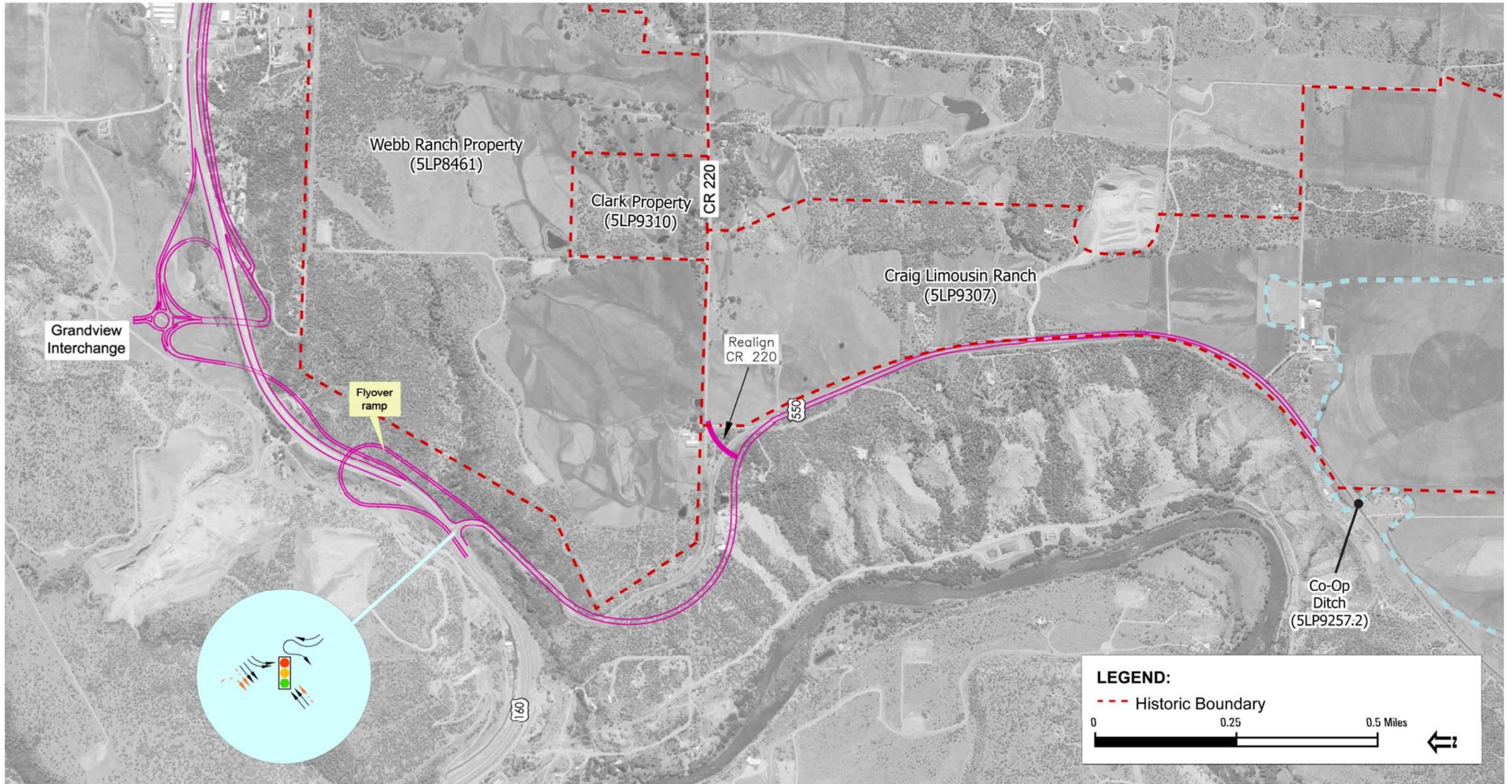
Figure 3. US 550 at US 160 At-Grade Intersection Alternative



2

1

Figure 4. Partial Interchange at the Existing US 550/US 160 Intersection Alternative



2

- ▶ **Design Variation T.2.4** includes a 1050-foot radius and a four percent grade. The location of the flyover has half of the loop on each the north and south side of US 160 and traffic flow is in a counterclockwise direction with the flyover crossing US 160 approximately 1,300 feet east of the US 550/US 160 intersection.
- ▶ **Design Variation T.2.6** includes a 925-foot radius and six percent grade. The location of the flyover has half of the loop on each the north and south side of US 160 and traffic flow is in a counterclockwise direction with the flyover crossing US 160 approximately 1,300 feet east of the US 550/US 160 intersection.
- ▶ **Design Variation T.3.4** includes a 1050-foot radius and a four percent grade. The location of the flyover loop is entirely on the north side of US 160 and traffic flow is in a clockwise direction with the flyover crossing US 160 approximately 500 feet east of the US 550/US 160 intersection.
- ▶ **Design Variation T.3.6** includes a 925-foot radius and a six percent grade. The location of the flyover loop is entirely on the north side of US 160 and traffic flow is in a clockwise direction with the flyover crossing US 160 approximately 500 feet east of the US 550/US 160 intersection.

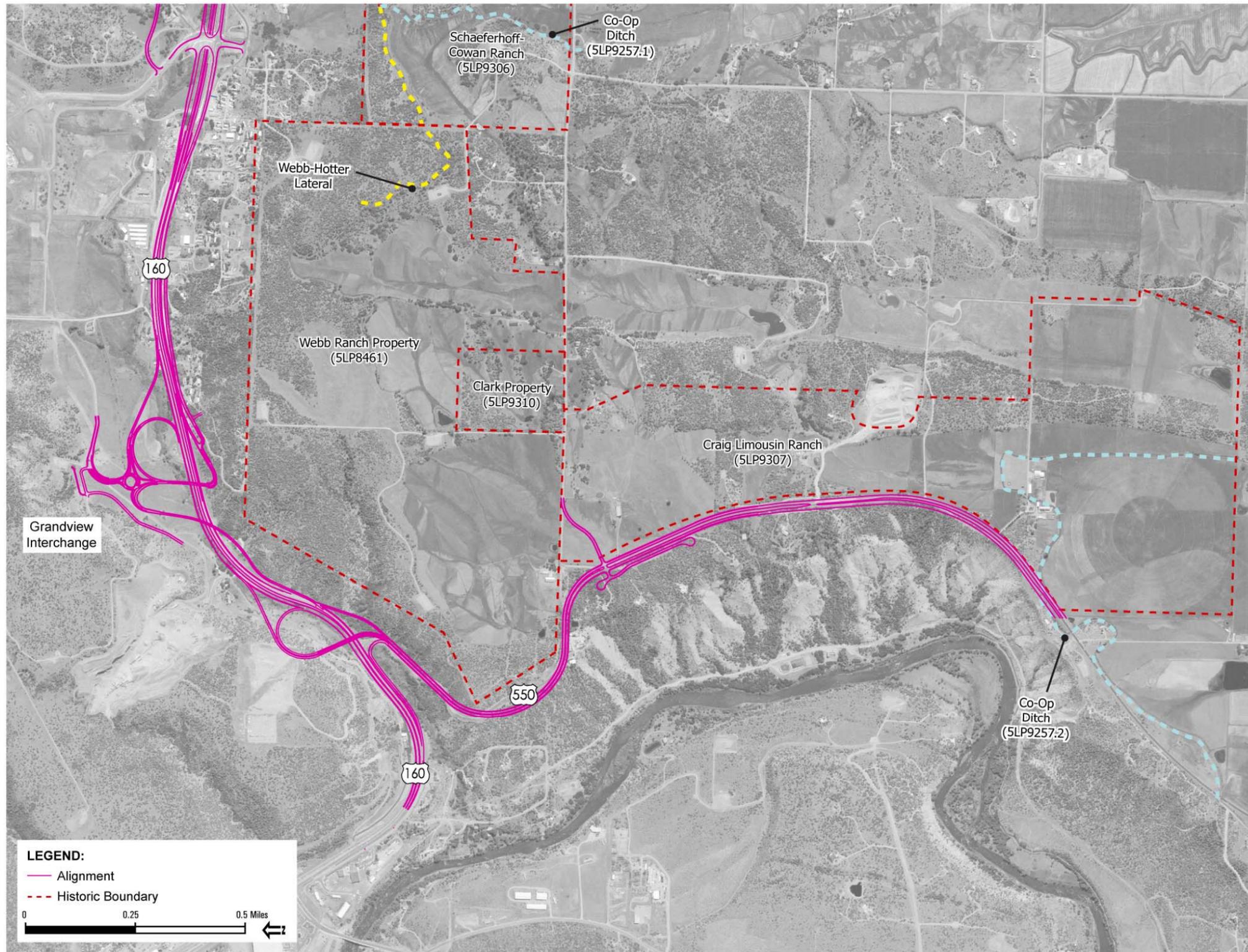
Revised Preliminary Alternative A. The Revised Preliminary Alternative A is illustrated on Figure 5. It contains SPUIs at SH 172/CR 234 and CR 233 (Three Springs) with a grade separated trumpet interchange at the existing US 550/US 160 connection and a trumpet interchange (Grandview Interchange) east of the existing US 550/US 160 intersection. To accommodate the through volumes, US 160 has two through lanes and one auxiliary lane westbound from the CR 233 (Three Springs) interchange through the US 550 interchange. US 160 eastbound has two through lanes and one climbing lane from west of the US 550 interchange to the CR 233 (Three Springs) interchange.

Revised Preliminary Alternative A is the same as in the EIS except it includes the Grandview Interchange and auxiliary lanes in each direction from the west limit of the Grandview Section to the CR 233 (Three Springs) Interchange. For these reasons, "Revised" has been added to the title of this alternative.

Revised G Modified Alternative. This alternative is illustrated on Figure 6. It connects US 550 to US 160 via the Grandview trumpet interchange, and CR 233 (Three Springs) and SH 172/CR 234 are SPUI interchanges. This alternative includes two through lanes in each direction through the Grandview Section with eastbound and westbound auxiliary lanes from the CR 233 (Three Springs) interchange to the west end of the section. The alignment of US 550 for Revised G Modified has been revised slightly from the alternative in the EIS to avoid a natural gas well installed after preliminary alignment designs were completed.

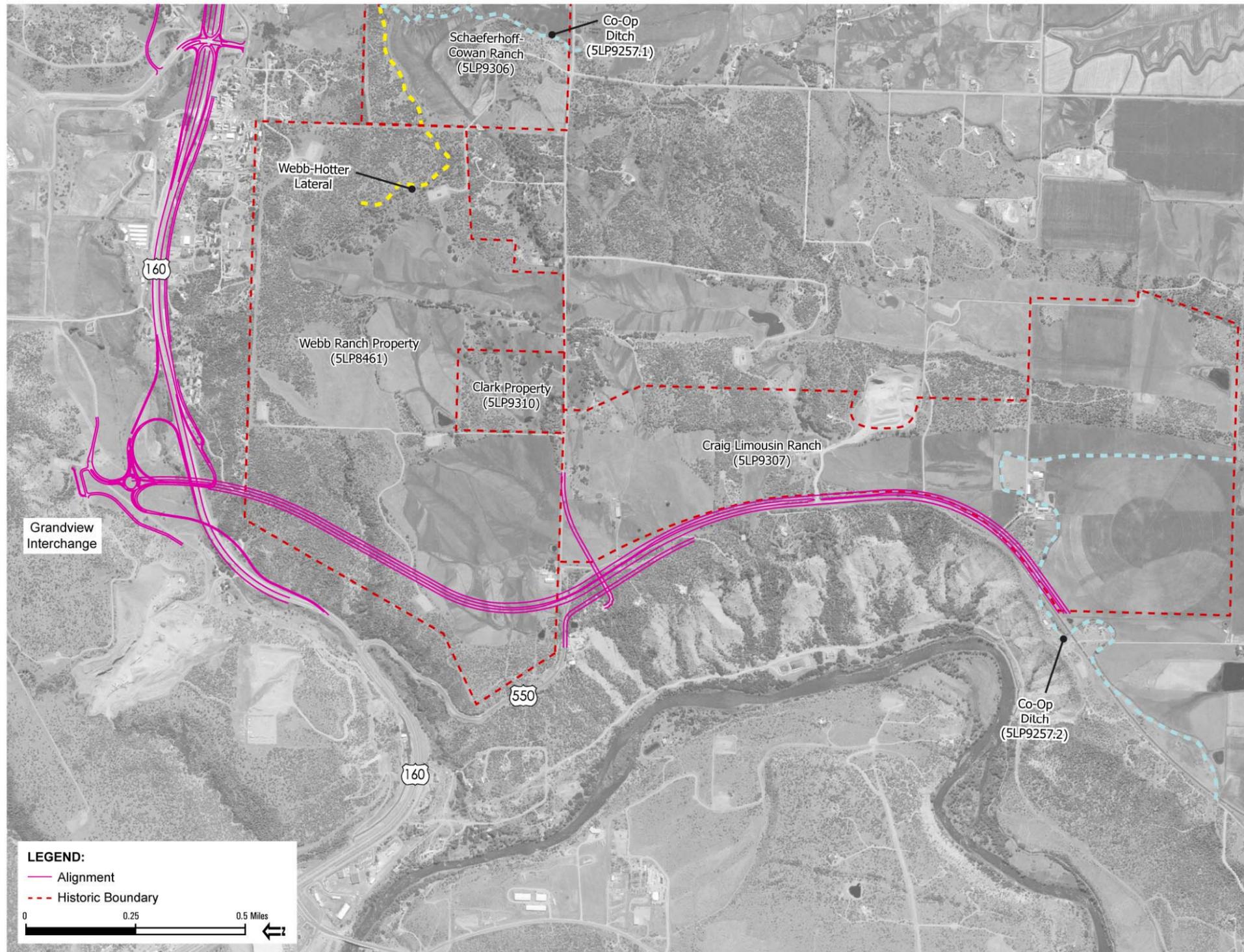
Revised Alternative G Modified is the same as in the FEIS except it includes auxiliary lanes in each direction from the west limit of the Grandview Section to the Three Springs Interchange and a slight shift of the alignment to avoid a gas well. For these reasons, "Revised" has been added to the title of this alternative.

Figure 5. Revised Preliminary Alternative A



1

Figure 6. Revised G Modified Alternative



2

1 **Revised F Modified Alternative.** The Revised F Modified Alternative is illustrated on Figure 7.
2 It includes an additional trumpet interchange at the Grandview Interchange, and SPUI
3 interchanges at CR 233 (Three Springs) and SH 172/CR 234. US 550 connects to US 160 at
4 CR 233 (Three Springs) interchange. Frontage roads parallel the alignment from US 160 to CR
5 220. These roads provide local access to the properties south of US 160. US 160 has two
6 through lanes and one auxiliary lane in each direction from the west ramps of the Grandview
7 Interchange to the west ramps of the CR 233 (Three Springs) interchange.

8
9 Revised F Modified Alternative is the same as in the FEIS except it includes the Grandview
10 Interchange and auxiliary lanes in each direction from the west limit of the Grandview Section to
11 the CR 233 (Three Springs) Interchange. For these reasons, "Revised" has been added to the
12 title of this alternative.

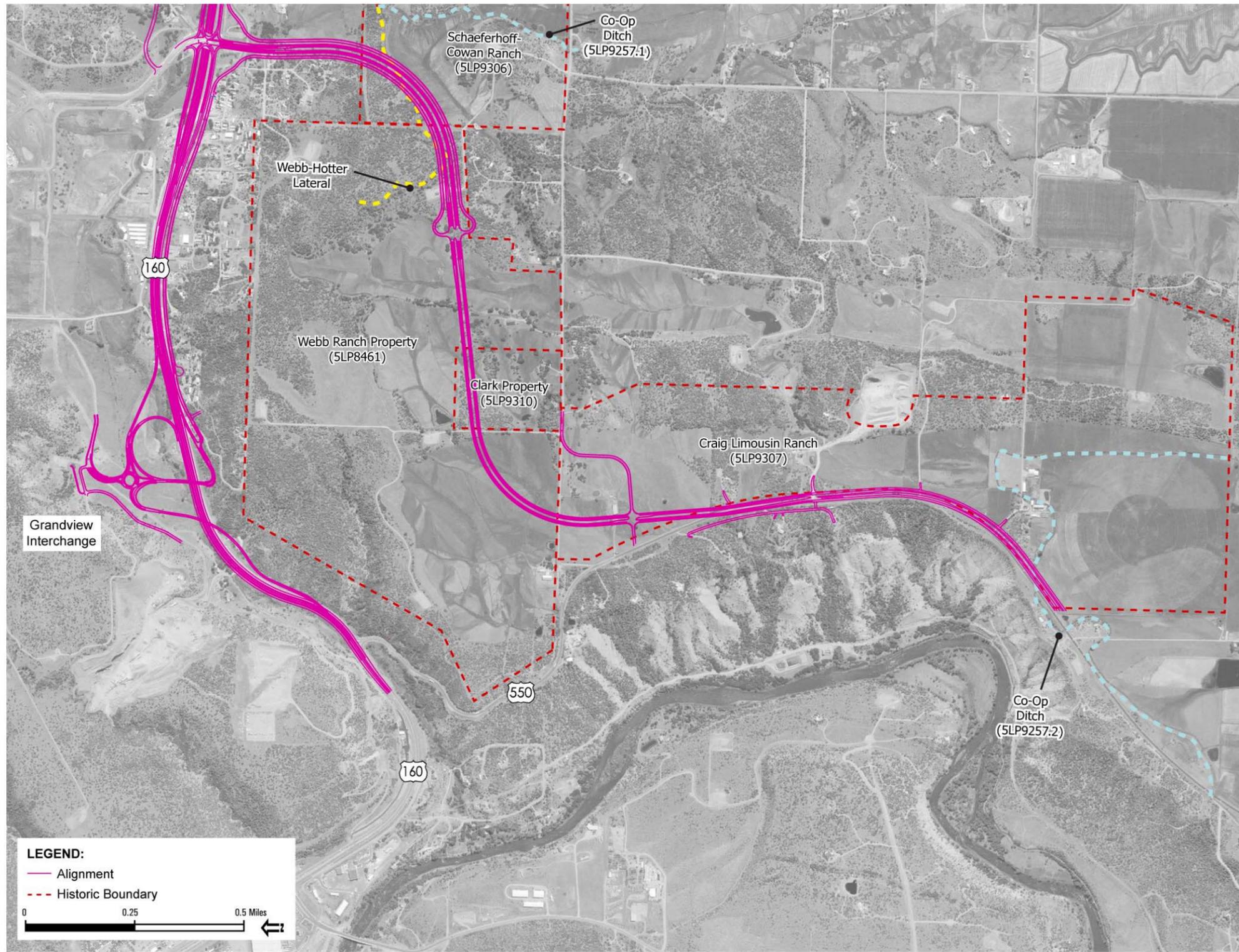
13
14 The following alternatives were developed specifically for this Section 4(f) evaluation:

15
16 **Eastern Realignment Alternative.** The Eastern Realignment Alternative is shown on Figure 8.
17 It includes a trumpet interchange at the Grandview Interchange, and SPUI interchanges at
18 CR 233 (Three Springs) and SH 172/CR 234. US 550 connects to US 160 at CR 233 (Three
19 Springs) interchange but has a different US 550 alignment when compared to the Revised F
20 Modified Alternative. Frontage roads parallels the alignment from US 160 to CR 220. These
21 roads provide local access to the properties south of US 160. US 160 has two through lanes
22 and one auxiliary lane in each direction from the west ramps of the Grandview Interchange to
23 the west ramps of the CR 233 (Three Springs) interchange.

24
25 **Western Realignment Alternative.** This alternative is shown on Figure 9 relocates the existing
26 US 550/ US 160 intersection to the west where it currently intersects US 160 with a directional
27 interchange. This alternative diverges from the current US 550 at approximately milepost 13.17
28 on the top of Florida Mesa before descending into the Animas Valley where it parallels the
29 Animas River to the north and connects to US 160 at approximately milepost 88.0,
30 approximately 0.5 mile west of the existing US 160/US 550 (south) intersection.

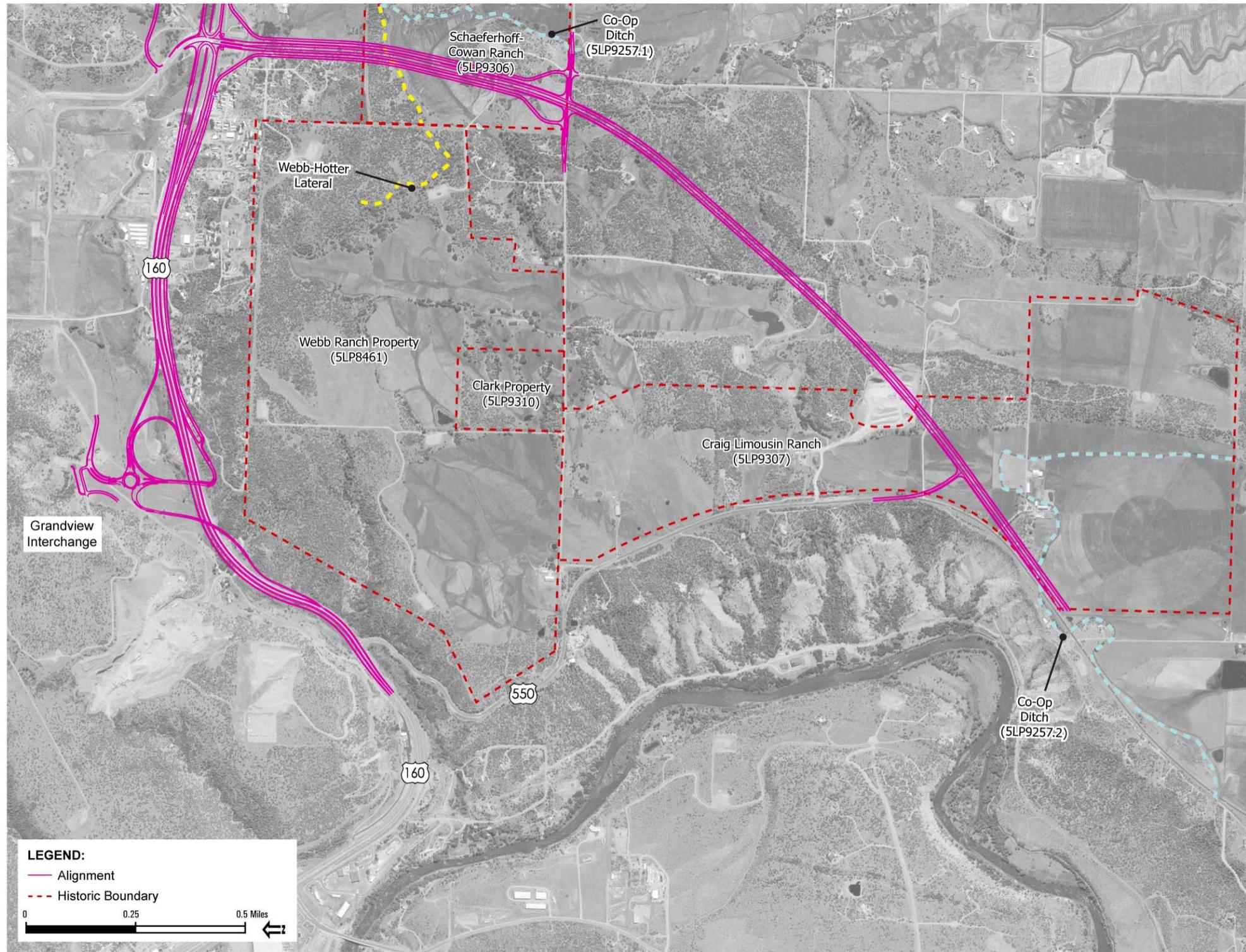
31
32 This alternative includes the Grandview trumpet interchange and SPUIs at CR 233 (Three
33 Springs) and SH 172/CR 234.

Figure 7. Revised F Modified Alternative



1

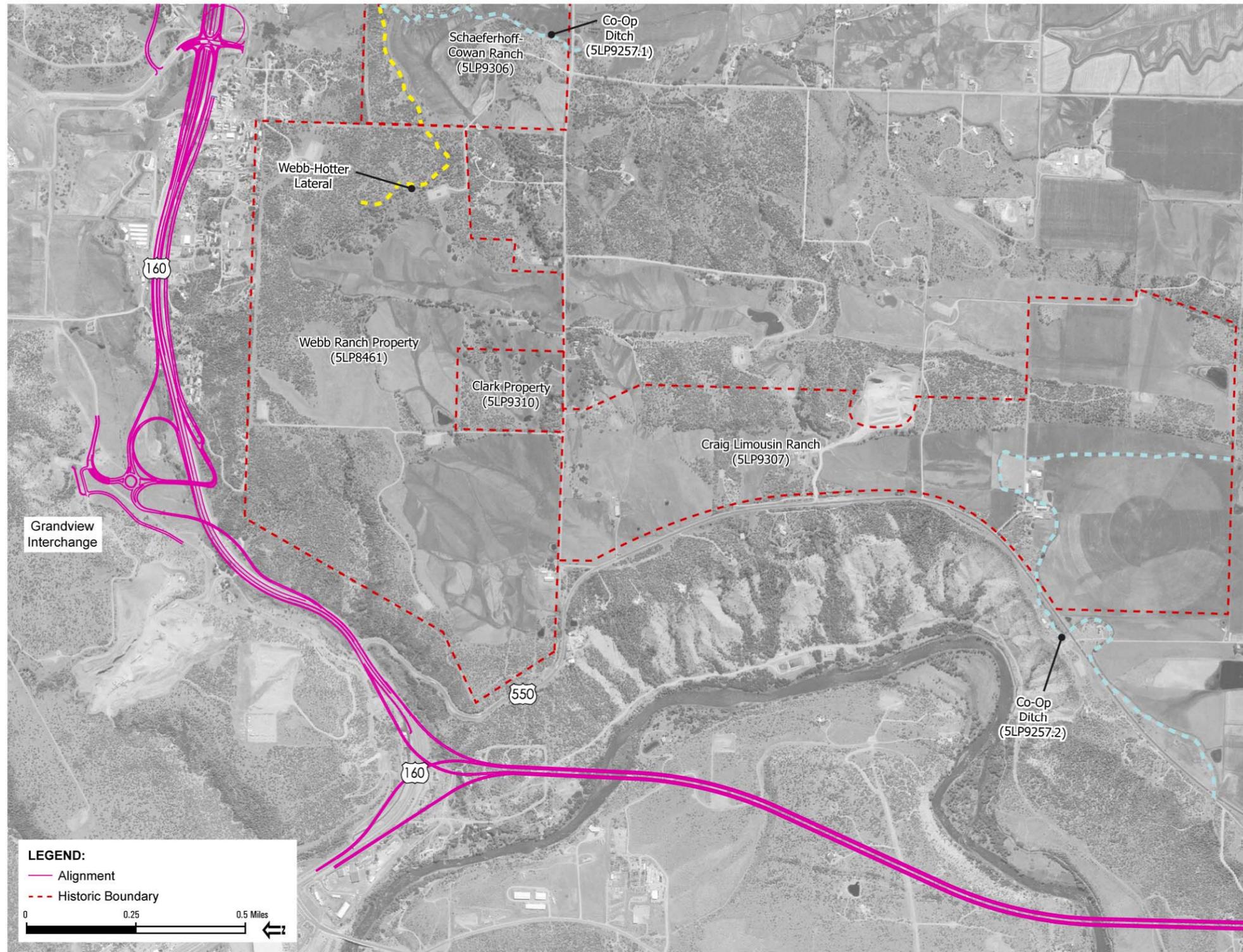
Figure 8. Eastern Realignment Alternative



2

1

Figure 9. Western Realignment Alternative



2

2.0 Description of Section 4(f) Properties

The Section 4(f) properties for this evaluation include historic ranches and historic ditches. Archaeological sites are not considered Section 4(f) properties where a determination has been made that their importance is chiefly because of what can be learned by data recovery and have minimal value for preservation in place (23 CFR 774.13(b)(1)). All of the archaeological sites within the project area fall into this category, so none of them are considered Section 4(f) properties. [See letters dated November 9, 2009 and August 6, 2010 from CDOT and response letters from SHPO dated December 1 and 11, 2009 and August 25, 2010 documenting this finding (Attachment A)].

The Section 4(f) properties described below fall within the alternative alignments in the project area identified on Figure 2. A summary of Section 4(f) properties within the project area is provided in Table 1.

Table 1. Summary of Section 4(f) Properties Within Project Area

Resource Name and Number*	Basis for Section 4(f) Eligibility	Important Activities, Features, and Attributes
Webb Ranch 5LP8461	Historic	Integrity of barn, loafing sheds, corrals, and chutes represent an example of ranch architecture in La Plata County eligible under Criteria A and C.
Craig Limousin Ranch 5LP9307	Historic	Barn, loafing shed, silo, saddle shed, residence, and landscape convey the property's significance as a working ranch on Florida Mesa eligible under Criteria A and C.
Schaeferhoff-Cowan Ranch 5LP9306	Historic	Hay barn/milk shed are examples of ranching architecture common in this region of the state, granary is an example of a ranch-related outbuilding association with ranching on Florida Mesa eligible under Criteria A and C.
Clark Ranch 5LP9310	Historic	Important role as a social gathering place. Eligible under Criteria A and C.
Hotter-Webb Lateral Ditch (2 segments) 5LP9256.1/5LP9256.2	Historic	Important role in the irrigation network on the Webb Ranch and Schaeferhoff-Cowan Ranch properties. Eligible under Criterion A.
Co-op Ditch (2 segments) 5LP9257.1/5LP9257.2	Historic	Important role in providing irrigation water to lands under the Desert Land Act and association with the settlement and irrigation of marginal lands on Florida Mesa eligible under Criterion C.

* The resource number is an identification number (called a Smithsonian number) assigned by the Office of Archaeology and Historic Preservation.

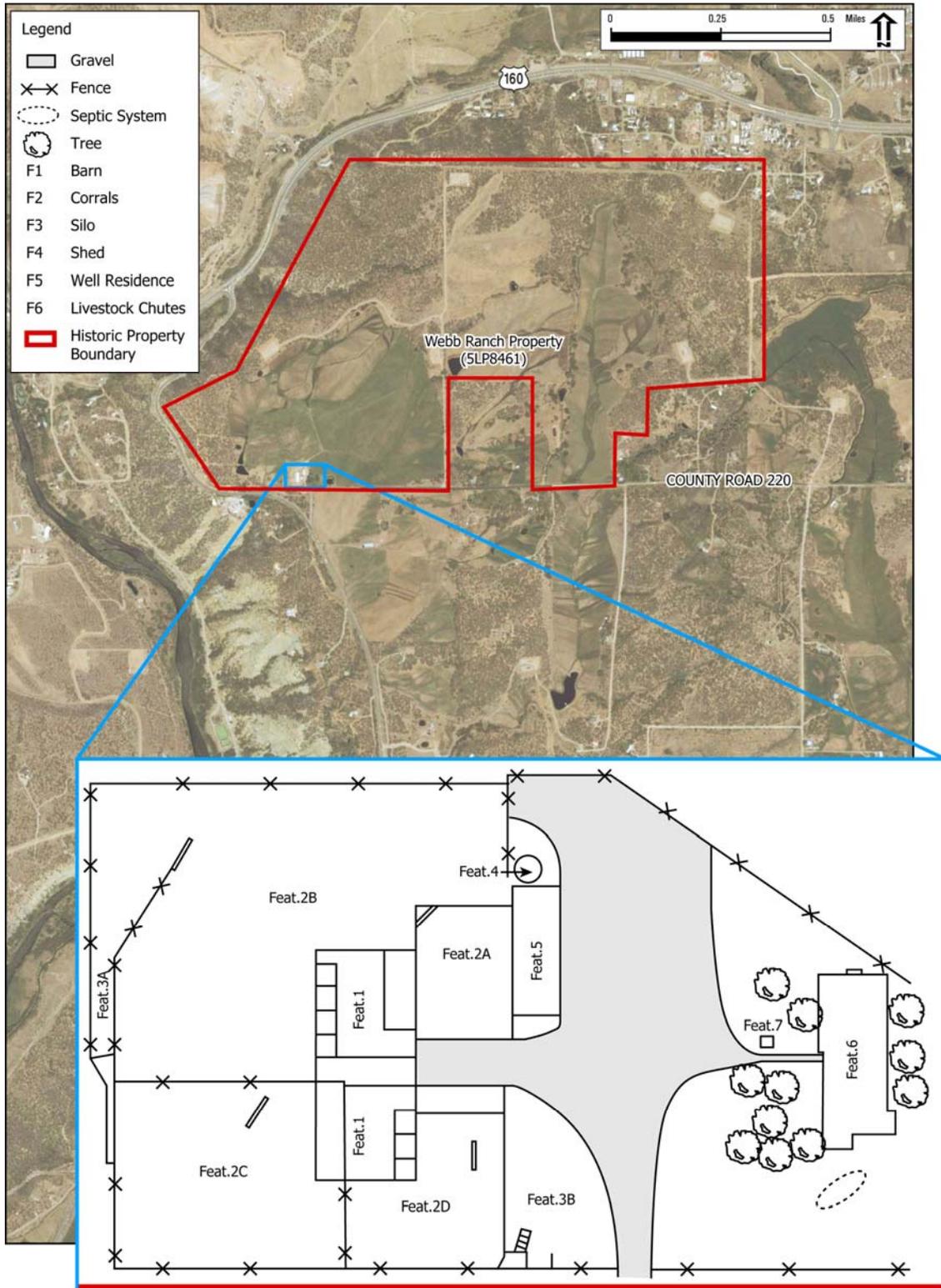
2.1 Historic Ranches

Four historic ranches within the project area have been identified as eligible for NRHP. These are described in the following sections.

2.1.1 Webb Ranch

Site 5LP8461 is the historic Webb Ranch complex on private land at an elevation of 6,800 feet (2,073 meters) as shown on Figure 10. It is approximately 515 acres in size. The ranch is

Figure 10. Webb Ranch



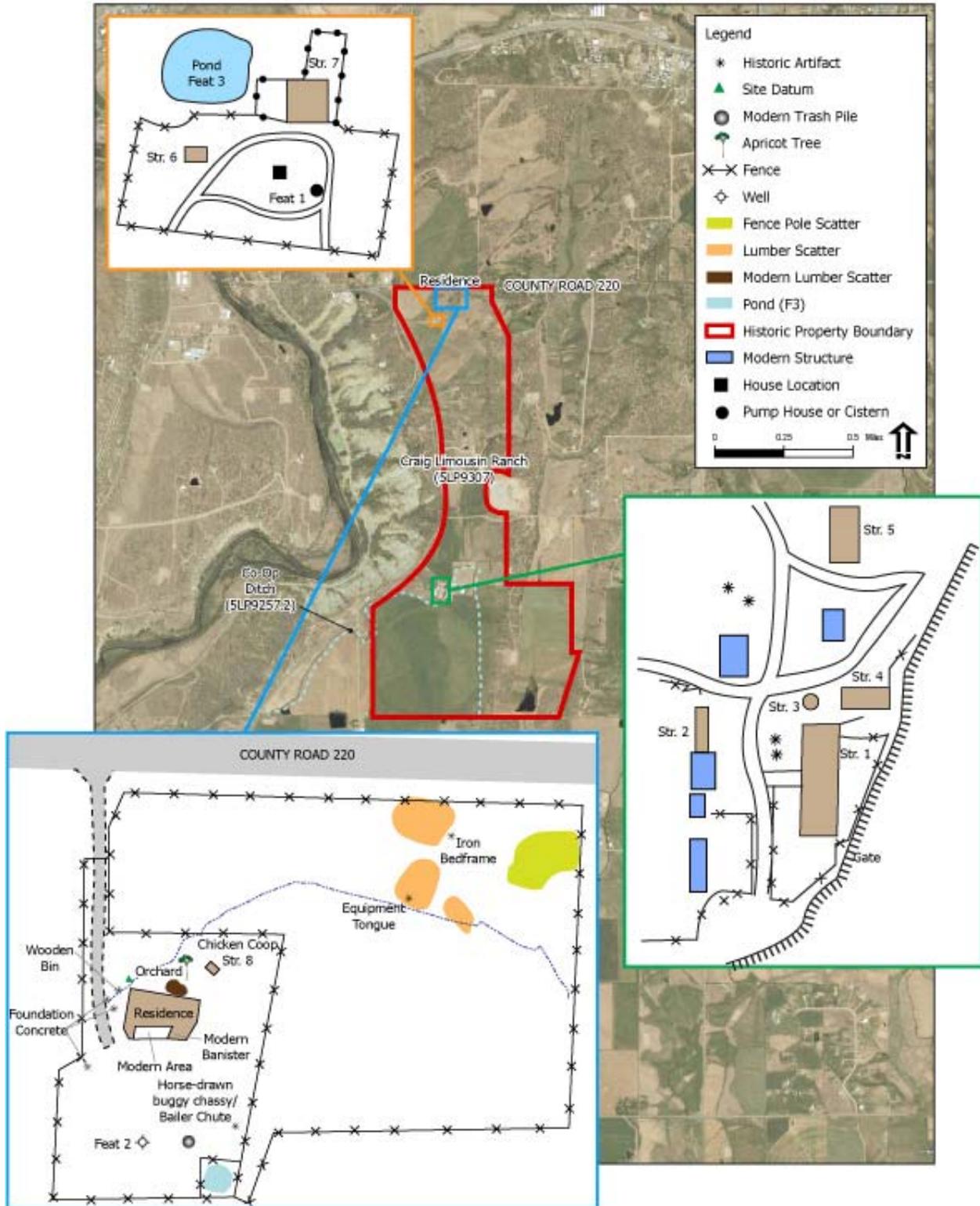
located northeast of the intersection of US 550 and County Road 220. Growing from a patchwork compilation of ranch properties, the Webb Ranch's period of significance ranges from 1910-1957. The land where the ranch buildings sit was originally patented by Gamaliel Hoskinson in 1891 as a cash sale entry. The property that now comprises the ranch was owned by several different people over time. Portions of the property were patented in 1891, 1892 and 1911 while others were not patented until 1916 and 1956. In the mid 1900s, the ranch property passed through several family owners, eventually coming into the hands of the Webb's in 1963. The Webb family still maintains ownership today. The Webb Ranch is eligible under NRHP Criterion C for representing ranch architecture in La Plata County. The large barn is an unmodified, excellent example of a ranching barn. The barn retains character-defining features such as the built-in loafing sheds, and qualifies for inclusion on the NRHP. The associated corrals, chutes and loafing shed also retain excellent integrity and contribute to the site's architectural significance. The other historic outbuildings and residence are nondescript or have been altered to a degree that they no longer contribute to the site's architectural significance.

2.1.2 Craig Limousin Ranch

Site 5LP9307 is the historic Craig Limousin Ranch complex on private land at an elevation of 6,660 feet (2,030 meters) as shown on Figure 11. It is approximately 378 acres in size. The site is southwest of Highway 550 on a level to slightly sloping area on the western edge of Florida Mesa. The site soils are a reddish brown silty loam supporting stands of pinyon and juniper mainly along the rim of the mesa. Much of the complex grounds have been cleared, leaving sparse trees along the western edge of the complex and the occasional tree that is part of the ornamental landscaping. The ranching complex consists of several buildings, of which only three of the structures (Structures 1 through 3) are known to meet the 50-year age criterion. Two additional structures (Structures 4 and 5) are possibly 50 years old. The period of significance for the Craig Limousin Ranch was 1929-1959.

The Craig Limousin Ranch was originally documented in 2009 during the inventory of the Eastern Realignment Alternative. At the time, several buildings (Structures 1-5) at the Craig Limousin Ranch headquarters were recorded, including a large barn, a shed, a grain silo, a milk shed, and a stucco-clad residence. Additionally, another building complex located to the north of the ranch headquarters was also recorded. As a result of the recording, two structures (Structures 6 and 7) and one feature, including a saddle shed, a post-and-beam barn, and a pump house, were documented. Structures 1 through 5 at the Craig Limousin Ranch retain the integrity to convey the property's significance under Criteria A and C. The barn (Structure 1) is in good structural condition and has remained largely unmodified. It still conveys its original function. It has been part of the ranching landscape of Florida Mesa since it was built in the late 1920s or early 1930s and is highly visible from US 550, making it an important and recognizable symbol of past ranching activities on the mesa. Although the silo (Structure 3) has been modified, it still has the integrity to convey the significance of the property under Criteria A and C. The loafing shed (Structure 2) is a good example of ranching architecture. The structural integrity of the shed is considered good with no visible modifications made to the structure. Considering its integrity and function, the shed also conveys the significance of the property under Criteria A and C. The cinderblock milk shed (Structure 4) and the ranch style residence (Structure 5) appear to be over 50 years old and are being treated as contributing elements to the overall ranch. The saddle shed (Structure 6) and barn (Structure 7) also retain sufficient integrity to convey the significance of the Craig Limousin Ranch. The landscape features, including the open agricultural fields, also retain integrity and convey the property's significance as a working ranch.

Figure 11. Craig Limousin Ranch



An additional complex associated with the ranch was identified in 2010 during the inventory for the Revised F Modified Alternative alignment. The complex is not on land owned by the Craig family, but is within the original historic boundary of the Craig Limousin Ranch. The complex was the site of the original homestead structure for the ranch, which burned down in 1974. The remains of the site are minimal, consisting of a chicken coop (Structure 8), a well (Feature 2), a small irrigation pond (Feature 3), a sparse scatter of historic artifacts and implements, and a level area where the house was once located, all within a fenced enclosure. After the house burned, a trailer house was put in the same place as the house. The second occupation of the site dates from the late 1970s to 2001, when the trailer was removed (Phillip Craig, personal communication to Jack Pfertsh, May 23, 2010). A moderate density of modern artifacts is present on the site from this later occupation but was not documented as part of the site recording. An orchard is also considered part of the complex and is to the east. It is within a fenced pasture with several apple and apricot trees still present and is watered by an irrigation ditch.

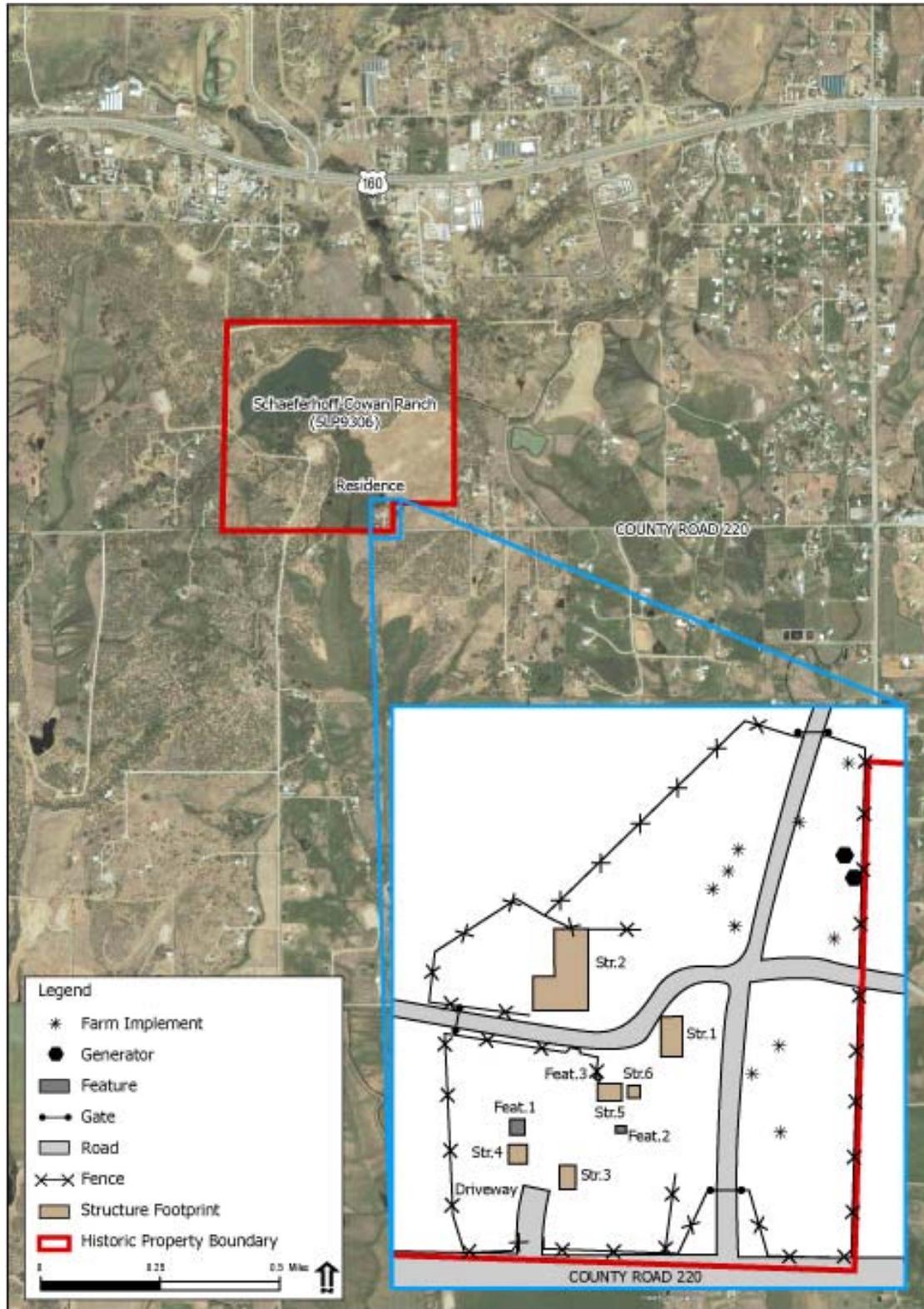
In 2009 the Craig Limousin Ranch as a whole was evaluated as eligible for inclusion on the NRHP under Criteria A and C for its importance to the ranching landscape of Florida Mesa. Although the above described complex is not currently part of the Craig Limousin Ranch, it was the original homestead for the property and is, therefore, considered part of the ranch's historic boundary. Structure 8 (chicken coop), Feature 2 (well), and Feature 3 (irrigation pond) at the Craig Limousin Ranch retain the integrity to convey the property's significance. The chicken coop (Structure 8) is in good structural condition and has remained largely unmodified. It still conveys its original function. The structural integrity of the coop is considered good, with no visible modifications made to the structure. Considering its integrity and function, it also conveys the significance of the property under Criteria A and C. The well was purportedly dug in 1902 and is one of the first wells dug on the mesa. It is associated with the early history of the ranch and is a contributing element to the overall ranch. The orchard is a landscape feature of the complex and also retains integrity and conveys the property's significance as a working ranch. These features and property together with the currently owned Craig Limousin ranching property are included in the historic ranch boundary.

2.1.3 Schaeferhoff-Cowan Ranch

Site 5LP9306 is the historic Schaeferhoff-Cowan Ranch complex on private land at an elevation of 6,930 feet (2,112 meters) as shown on Figure 12. It is approximately 160 acres in size. The complex is located north of County Road 220 on a southwest-facing slope of a low hill that is along the eastern edge of a shallow drainage valley. The complex of ranch buildings is within a fenced-in area demarking it from the adjacent and more recent structures to the east. The complex encompasses a 336- by 271-foot area with several pieces of farm equipment in the fenced compound. Many of these are haying equipment, including tractors, balers, and a hay elevator. Other implements noted in the compound were plows, generators, wooden wagons, and various implement parts. One of the wagons is the only implement in the compound that appears to have antiquity. It is a hay wagon with a wood-plank deck and wooden-spoke wheels from a 1930s model Hudson automobile. The period of significance for the Schaeferhoff-Cowan Ranch was 1900-1959.

Six standing structures (Structure 1-6) and three features were recorded as part of the ranch compound. Site 5LP9306 is recommended as eligible for inclusion on the NRHP under Criteria A and C. The Schaeferhoff-Cowan Ranch is significant under Criterion A for its association with ranching on Florida Mesa and under Criterion C for its examples of ranching architecture. In particular, the hay barn/milk shed (Structure 2) is a good example of a barn type that appears to

Figure 12. Schaeferhoff-Cowan Ranch



be common in this region of the state, and the grain shed (Structure 1) is also a good example of a ranch-related outbuilding.

2.1.4 Clark Property

Site 5LP9310 is the historic Clark Property on private land at an elevation of 6,805 feet (2,074 meters), as shown on Figure 13. The property fronts County Road 220 along its southern boundary and extends north where the fence boundaries of the property encompass a moderately dense pinyon and juniper woodland. The Clark Property consists of two standing structures (Structures 1 and 2), a pump house, wagon parts, two wagons, a train bell and an ore cart.

The Clark Property is on land originally acquired as a 160-acre homestead entry patent by Henry Sheldon on March 26, 1892. However, the property's period of significance begins when the property was purchased in 1947 by Marguerite Jackson Clark. Its current historic boundary encompasses 29 acres. Shortly after moving to her new home, Marguerite added the Big Room, which became legendary to the people of Durango and Florida Mesa as the entertainment and social center of the valley, when Marguerite threw parties at her house with most of the valley in attendance. By way of a guest book, many of Marguerite's guests signed their names in lipstick on the white walls in her kitchen.

The Clark Property is eligible for inclusion on the NRHP under Criteria A and C. Under Criterion A, the Clark home functioned as a social gathering place for the residences of Durango and Florida Mesa with a period of significance from 1947 to 1960. The Clark property appears as it did during its period of significance and continues to convey its significance through integrity of design, materials, workmanship, location, setting and feeling. Under Criterion C, the property is a good example of a residence modified for use as a social and recreational center. The house fronts the county road with landscaping that is aesthetically pleasing, utilizing elements of the old west, such as wagons, ore carts and a locomotive bell. The design and overall layout of the property convey its function as a social center. Additionally, the recreational function of the house is reflected in the architecture with the addition of the "Big Room" where social gatherings were held. The integrity of the property is good and continues to be maintained as it was originally designed and constructed during its period of significance.

2.2 Historic Irrigation Ditches

Two historic ditches within the project area have been recommended as eligible for NRHP. The Webb-Hotter Lateral ditch is important for its association with two historic ranches. The Co-op Ditch has also been recommended as eligible for NRHP listing. Two separate areas of the Co-op Ditch were recorded in conjunction with the analysis of avoidance alternatives to support the overall eligibility of the ditch.

2.2.1 Webb-Hotter Lateral

5LP9256 is the Webb/Hotter Lateral, which is significant for its association with two separate historic ranches. This is a lateral of the ditch that was referred to in the 2006 EIS as the Florida Farmers Ditch (5LP5661). The recorded segments of the lateral extend across private lands at an elevation of 6,900 feet (2,103 meters). The ditch crosses the project corridor east to west on the northern end of a hay field just south of the northwestern end of Florida Mesa as shown on Figure 14. The vegetation along the recorded segment of the ditch includes a variety of grasses and willow.

Figure 13. Clark Property

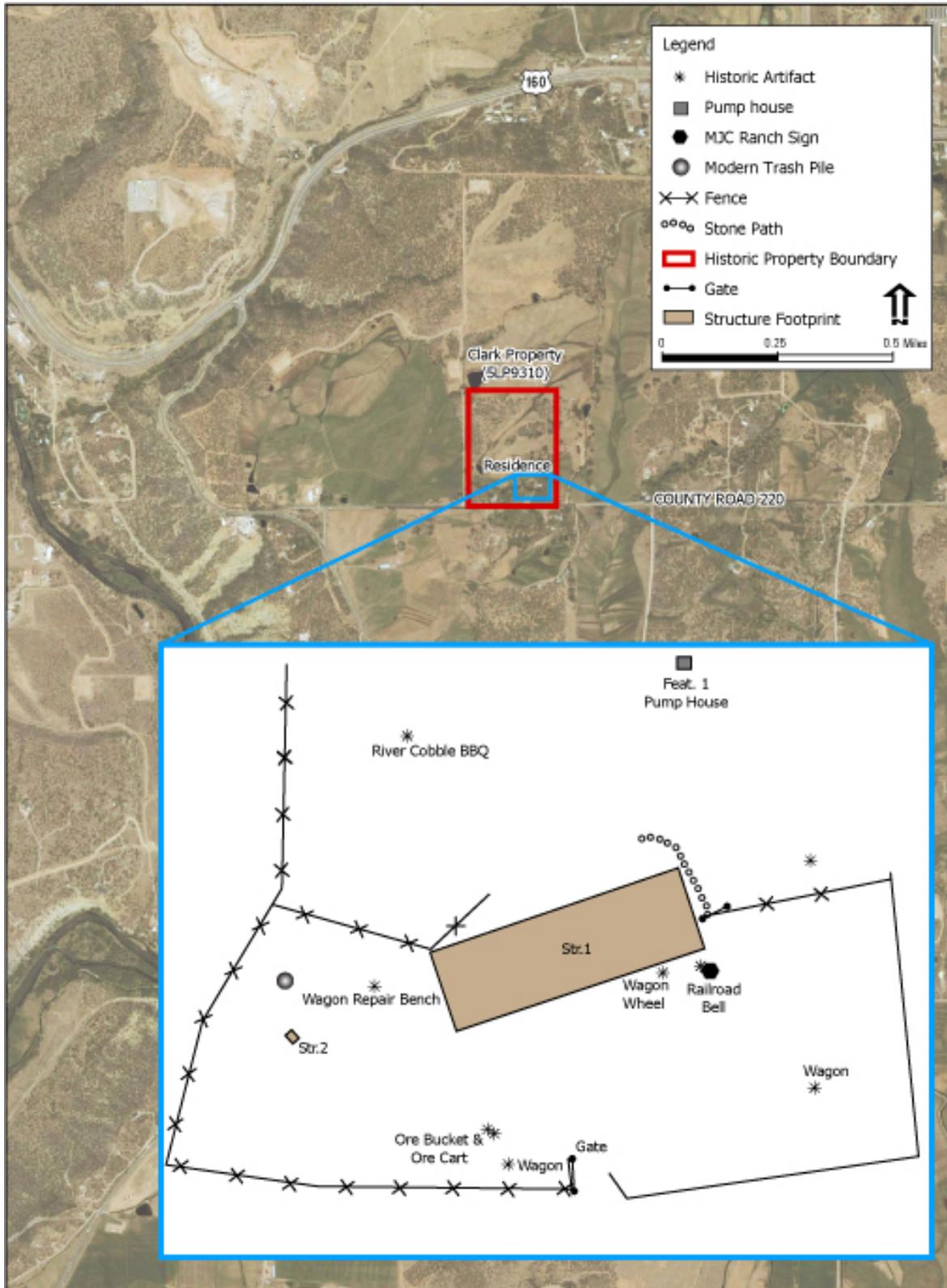
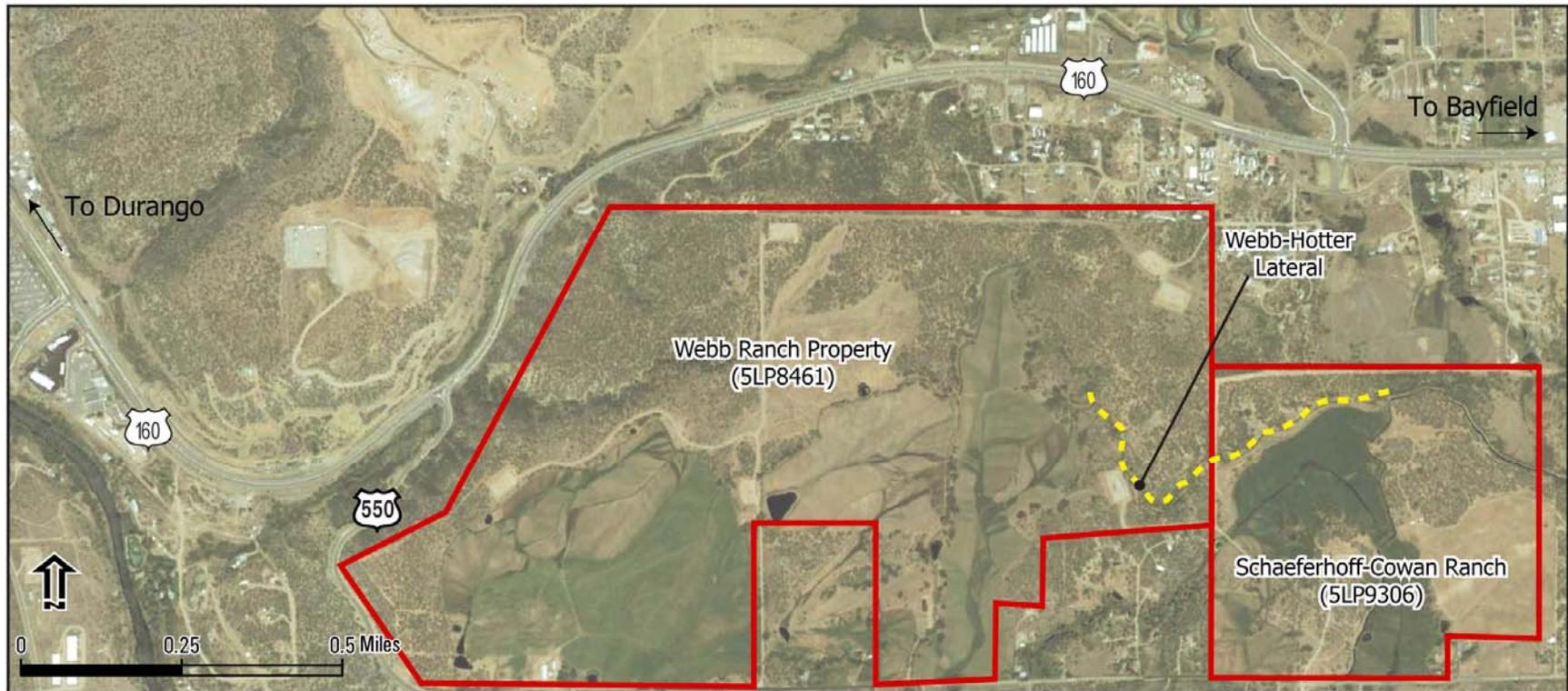


Figure 14. Webb-Hotter Lateral Ditch



1

The Webb/Hotter Lateral extends westward from the intersection of the Florida Farmers Ditch and the Co-op Ditch (Charlie McCoy, Florida Farmers and Cooperative Ditch Company, personal communication to Jack Pfertsh, September 3, 2009). The lateral was documented as two segments. Segment 5LP9256.1 is a 1,643-foot-long segment that extends from its intersection with the Co-op ditch through the Schaeferhoff-Cowan Ranch (5LP9306). Segment 5LP9256.2 extends from the west boundary of the Schaeferhoff-Cowan Ranch into the historic Webb Ranch for 1,786 feet before it is split by a diversion structure into two sublateral ditches—one that flows to the east and irrigates the middle and western ranch pastures, and one that flows to the west and irrigates the eastern pastures. These two sublateral ditches are connected to an elaborate 11-mile irrigation network that contains laterals, diversion structures, and storage ponds.

It is not clear when the Webb/Hotter Lateral was built, who was responsible for its construction, or when it was first used to irrigate the Schaeferhoff-Cowan or Webb Ranch properties. Based on a November 3, 2010 contact with Peggy Cooley, who grew up on the Schaeferhoff-Cowan Ranch, the ditch is at least 65 years old.

2.2.2 Co-op Ditch

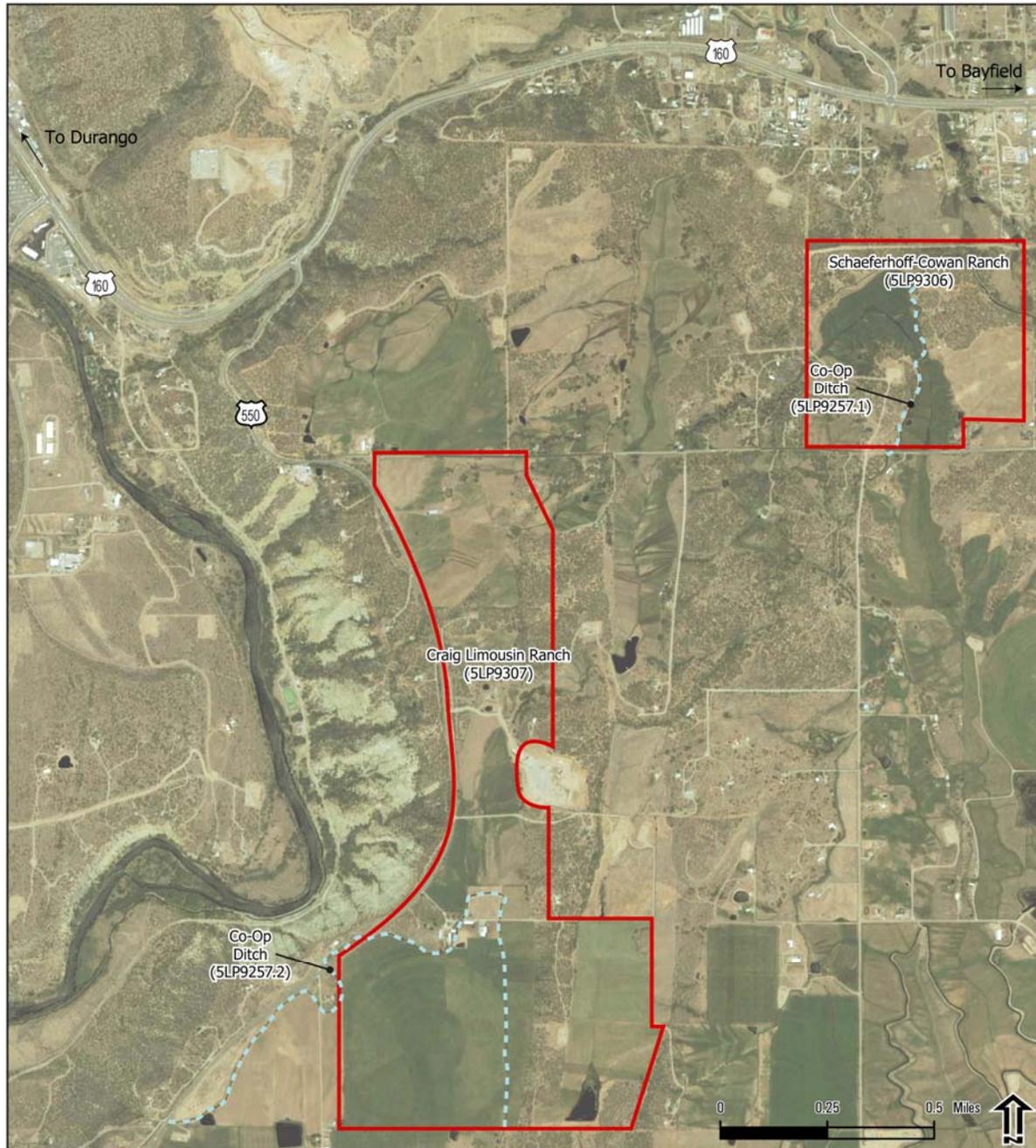
Sites 5LP9257.1 and 5LP9257.2 represent two segments of the Co-op Ditch on private lands between elevations of 6,670 feet (2,060 meters) and 6,660 feet (2,012 meters) as shown on Figure 15. The ditch runs roughly north to south along the western edge of a small valley south of the northwestern edge of Florida Mesa. The ditch passes along the eastern edge of a pinyon and juniper forest with a variety of grasses growing along its length and willow growing along its banks.

Site 5LP9257.1 is a 1,295-foot-long (395-meters) segment of the Co-op Ditch. The segment begins at County Road 220 on its southern end and continues north to a pronounced bend in the ditch. The ditch is an unlined, earthen ditch with sloping walls and an overall U-shaped cross section. From bank crest to bank crest, the ditch measures just under 22 feet, and from wall to wall it has a width of just over 14 feet. From the base of the ditch to the top of the bank it is just under 4 feet deep, but from the base of the ditch to its high-water mark the depth is just over 2 feet. The only features recorded as part of the ditch segment are a modern culvert with concrete headwalls, which serves as an access route over the ditch, and an additional modern culvert that passes under the county road.

Also recorded as part of the Co-op Ditch in this section was a narrow, shallow linear depression that parallels the length of the recorded segment of the ditch on its west side. The linear depression appears to be another smaller ditch that is no longer in use. The abandoned ditch continues south of County Road 220 and is far more visible as it continues south of the road.

On average, the abandoned ditch is four feet to six feet wide and approximately five inches deep. It is suspected that the abandoned ditch represents an informal, secondary irrigation ditch that once carried irrigation water southwestward from the Co-op Ditch. The historic research for the Co-op Ditch was completed at the La Plata County Courthouse and through water rights data obtained from the Colorado Division of Water Resources website. Additional research was carried out through an oral interview with the Co-op Ditch rider, Charlie McCoy, who also provided historic documents concerning the ditch.

Figure 15. Co-op Ditch location



Segment 5LP9257.2 is 7,984 feet long and enters the Craig Limousin Ranch at its southeast boundary and flows north along the base of a low ridge on the eastern edge of the ranch's hay fields. As it flows north, the ditch enters the livestock corrals on the eastern extent of the ranch complex before making a sharp turn west and again south, passing next to the barn. Once the ditch exits the ranch complex, it follows along the north end of the hay fields and passes under U.S. Highway 550 at the west boundary of the ranch. On the west side of the highway, the ditch parallels the highway, crossing it again as it follows the western contour of Florida Mesa. On

average, the width of the ditch is 6 feet, but it increases to a width of nearly 10 feet to 12 feet in the livestock corrals. The depth varies from just over 1 foot to nearly 2½ feet in some places. Four galvanized culverts and one headgate were also noted along the ditch. Two of the culverts were encountered at points where the ditch crosses under the highway. The remaining two culverts were on the Craig Limousin Ranch crossing under a gravel road. The single headgate was also on the Craig Limousin Ranch. The culverts and the headgate appear to be modern.

The Co-op Ditch was constructed by the Florida Co-operative Ditch Company after its incorporation in October 1910. The purpose of the company's formation was to enlarge the Florida Farmers Ditch and build the Co-op Ditch south from the end of the Florida Farmers Ditch (1912 Certificate of Incorporation for the Florida Co-operative Ditch Company, on file at the Florida Cooperative Ditch Company). Based on the Colorado Division of Water Resources water rights data, a substantial increase in the volume of water passing through the Florida Farmers Ditch occurred in November 1910, suggesting that the construction of the Co-op Ditch had been completed by that time. Research performed on the GLO website suggests that ditch may have been constructed to provide water to several Desert Land Entries that were being patented south of the terminus of the Florida Farmers Ditch on the interior portion of Florida Mesa about 1910. Desert Land Entries were prompted by the Desert Land Act passed by Congress in 1877. The intent of the act was to promote the development of arid and semiarid public lands. Under the act, individuals were allowed to apply for large tracts of land with a promise to irrigate and cultivate the lands within a three year period. Once proof of irrigation was provided, the individual could purchase the land at a nominal cost per acre.

It also appears, based on the water rights data, that a second substantial increase to the water volume also occurred in June 1946. This increase might coincide with the enlargement of the Co-op Ditch as it is currently built.

3.0 Archaeological Sites

Numerous archaeological sites are located in the project area. Information about these is included in this evaluation because they were evaluated for their possible Section 4(f) status.

The first step in determining their possible Section 4(f) status was to evaluate their eligibility for the NRHP. Eligible sites are listed in Table 2, Table 3, and Table 4. The sites identified in Table 4 include some of those identified in the SEAS 2008 Report that fall within the proposed alignments being considered under the Section 4(f) evaluation. Data for the Revised G Modified Alternative relied on previous inventories conducted for the US 160 EIS and the SEAS Report. Data for the Revised F Modified Alternative were derived from field inventories conducted for the US 160 EIS and additional supplemental studies. Archaeological resources are included in this evaluation and provide information relative to Section 6.0 (Least Overall Harm Analysis for Alternatives Considered in the Section 4(f) Evaluation).

The final step in determining their possible Section 4(f) status is to identify their value or importance for preservation in place. The archaeological sites listed below (in all three tables) are not considered Section 4(f) properties because FHWA has determined that their importance is chiefly because of what can be learned by data recovery and they have minimal value for preservation in place. For this reason, these sites fit within the category of an exception to Section 4(f) protection, as defined in 23 CFR 774.13(b)(1). (See Attachment A for details.)

Table 2. Previously Recorded Sites in Close Proximity of the Survey Corridor

Site No.	Site Type	Cultural Affiliation	NRHP Status
5LP6670	Prehistoric Artifact Scatter/ Historic Sweat Lodge	Basketmaker III/Pueblo I/ Historic Native American	Officially Eligible
5LP6671*	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Site form indicated Officially Not Eligible, Compass database indicates Officially Eligible
5LP6673*	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible

*Sites within the Eastern Realignment Alternative APE and re-evaluated during the current project.

Table 3. NRHP Eligible Archaeological Sites Within the Eastern Realignment Alternative Project Area

Site No.	Temporary Site No.	Site Type	Cultural Affiliation	NRHP Status
5LP6665	—	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP6671	—	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP6673	—	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP9236	AAC-1062	Open Camp	Pueblo II	Officially Eligible
5LP9241	AAC-557	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP9242	AAC-556	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP9244	AAC-4000	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Prehistoric Officially Eligible/ Historic Not Eligible
5LP9245	AAC-500	Prehistoric Artifact Scatter	Ancestral Puebloan	Officially Eligible

Table 4. NRHP Eligible Archaeological Sites Within the Western Portion Webb Ranch Complex

Site No.	Site Type	Cultural Affiliation	NRHP Status
REVISED F MODIFIED ALTERNATIVE INVENTORY			
5LP9308	Prehistoric Artifact Scatter	Unknown Prehistoric	Officially Eligible
5LP9309	Prehistoric Habitation/Historic Artifact Scatter	Pueblo I/Pueblo II/Historic	Officially Eligible (prehistoric component only)
5LP9581	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP9582	Prehistoric Artifact Scatter	Basketmaker III/Pueblo I	Officially Eligible
5LP9583	Prehistoric Artifact Scatter	Pueblo I	Officially Eligible
5LP9584	Prehistoric Habitation/Historic Habitation	Basketmaker III/Pueblo I/Historic	Officially Eligible
REVISED G MODIFIED ALTERNATIVE SITE DOCUMENTATION			
5LP2223	Prehistoric Artifact Scatter/Habitation	Basketmaker III/Pueblo I	Officially Eligible (2000)
5LP9587	Prehistoric Artifact Scatter	Unknown Prehistoric	Officially Eligible
5LP9588	Prehistoric Artifact Scatter	Unknown Prehistoric	Officially Eligible
5LP9589	Prehistoric Artifact Scatter	Unknown Prehistoric	Officially Eligible
5LP9590	Prehistoric Artifact Scatter/Habitation	Basketmaker III/Pueblo I/Pueblo II	Officially Eligible

4.0 Avoidance Alternatives Analysis

The six Section 4(f) properties illustrated on Figure 2 could be used by the alternatives described in Section 1.3. These Section 4(f) properties are described in more detail in Section 2.0. The intent of Section 4(f) is to avoid use of these properties unless there is no feasible and prudent alternative to the use of the land. Therefore, the first step is to determine whether there are feasible and prudent alternatives that avoid these properties. According to 23 CFR 774.17,

an alternative is not feasible if it cannot be constructed as a matter of sound engineering judgment. An alternative is not prudent if:

1. It compromises the project to a degree that it is unreasonable to proceed with the project in light of the stated purpose and need.
2. It results in unacceptable safety or operational problems.
3. After reasonable mitigation it still causes:
 - a. Severe social, economic, or environmental impacts.
 - b. Severe disruption to established communities.
 - c. Severe disproportionate impacts to minority or low income populations.
 - d. Severe impacts to environmental resources protected under other federal statutes.
4. It results in additional construction, maintenance, or operational costs of an extraordinary magnitude.
5. It causes other unique problems or unusual factors.
6. It involves multiple factors (listed above) that while individually minor, collectively cause unique problems or impacts of extraordinary magnitude.

Avoidance alternatives and whether those are feasible and prudent are evaluated for alternatives screened out and advanced in the EIS, and new alternatives developed as part of this evaluation. In the EIS, several screening levels were used to arrive at the advanced alternatives including a Corridor Screening level, a Feasibility Alternatives Screening level and a Preliminary Alternatives screening level. The criteria used to screen these alternatives are documented in Chapter 2 of the EIS. Alternatives in these screening levels were evaluated for whether they avoid the Section 4(f) properties in the vicinity of the US 550/US 160 connection and if they are prudent and feasible. In addition, the advanced alternatives in the EIS were evaluated for whether they avoid 4(f) properties in the vicinity of the US 550/US 160 connection and whether they are prudent and feasible. Two additional alternatives developed to avoid the Webb Ranch, the Western Realignment Alternative and Eastern Realignment Alternative are also considered. A discussion of avoidance alternatives and whether they are prudent and feasible is provided below.

4.1 Corridor Avoidance Alternatives

This section describes corridor alternatives that avoid the use of the Section 4(f) properties identified in this evaluation. None of these alternatives are feasible and prudent avoidance alternatives as described below.

Corridor alternatives that avoid the Section 4(f) properties in the vicinity of the US 550/US 160 connection include the No Action Alternative, Transportation System Management and Transportation Demand Management Alternatives, and a Western Corridor Alignment shift. These are the same alternatives as those considered in the EIS except that alignment shifts for this evaluation focus on shifting the US 550 connection to the west instead of the US 160 north or south alignment shift. A west shift of US 550 is evaluated because it is the alignment of US 550 that could avoid a use of the Section 4(f) properties near the connection with US 160.

4.1.1 No Action Alternative

The No Action Alternative avoids use of all six Section 4(f) properties. The No Action Alternative assumes completion of the US 160 project as defined in the Record of Decision with the exception of the connection of US 550 to US 160. The Grandview Interchange addresses development along US 160 without the connection of US 550. The No Action Alternative does not address the capacity or safety components of the project purpose and need as it relates to the connection to US 550. US 550 remains on its current alignment where poor geometry, low design speeds and two lane capacity, on a north facing steep grade presents capacity and safety issues. This alternative is prudent.

4.1.2 Transportation System Management Alternative

The 2006 EIS identified Transportation System Management (TSM) strategies that would minimize the capital investment along US 160 by implementation of strategies to smooth traffic flow and make efficient use of existing transportation facilities, such as signal coordination, intersection improvements, and access control.

Intersection improvements that were considered in the Grandview Section included improvements at CR 220, US 550, CR 232, CR 233, and SH 172/CR 234. At these intersections minor improvements were considered, such as right or left turn lanes, signalization and side road approach reconstruction. Other intersection improvements assumed grade-separated interchanges.

Access control strategies were developed, including constructing access or frontage roads parallel to US 160, regulating the location, spacing and design of driveways, limiting the number of driveways per lot, locating driveways away from intersections, connecting parking lots and consolidating driveways, providing residential access through neighborhood streets, increasing minimum lot frontage on major streets, promoting a connected street system and encouraging internal access to parcels not located on major streets.

Future projected traffic volumes on US 160 warrant a four lane roadway to achieve an acceptable level of flow. As such, capacity improvements along US 160 are required even with the most optimistic assumptions for trip diversion due to TSM implementation.

These strategies avoid use of the six Section 4(f) properties addressed in this evaluation. These strategies provide modest improvements in traffic flow and safety along the US 160 corridor. Additional capacity improvements would still be needed in order to meet the purpose and need for the project. They do not address the purpose and need requirements of increasing capacity nor do they address the primary safety issues of narrow shoulders, insufficient clear zones, poor sight distance or steep grades. Intersection improvements and access control features have been incorporated into the Feasibility and Preliminary Alternatives discussed in Section 4.2 and the Alternatives Considered, as discussed in Section 4.3, as appropriate. By themselves, TSM strategies are not prudent because they do not meet the project purpose and need.

4.1.3 Transportation Demand Management Alternative

The 2006 EIS identified several Transportation Demand Management (TDM) strategies, intended to reduce peak hour demand on US 160 by altering the time or means by which trips occur. These strategies include promoting transit and rideshare programs, creating multi-modal routes, encouraging staggered work hours, and creating high occupancy vehicle (HOV) lanes.

Transit improvements included adding or improving bus service, providing bus stop amenities, providing park-n-ride facilities and offering reduced rate bus passes. Bus service in the corridor is provided by the City of Durango and the Southern Ute Community Action Program.

Rideshare programs that were evaluated include promoting car and vanpooling through a joint City of Durango/La Plata County marketing program, involving major local employers in a ridesharing program, establishing park-n-ride lots at key locations, establishing computer kiosks at park-n-ride lots for individuals to seek carpooling matches and encouraging employers to establish an employer-based and financed ridesharing program.

Multi-modal routes are paved paths that can be used by a variety of non-motorized users. They may be constructed as separate facilities or as part of the US 160 reconstruction.

Staggered work hours reduce peak hour demand by distributing the vehicles over a longer time period. Incentives such as tax benefits and reduced overhead costs for equipment, office space and parking could be provided to area employers.

HOV lanes increase vehicle occupancy by requiring at least two people in a vehicle and thereby reducing the number of vehicles on US 160. The lanes could be constructed in the median or outside the existing lanes on US 160.

Future projected traffic volumes on US 160 warrant a four lane roadway to achieve an acceptable level of flow. As such, capacity improvements along US 160 are required even with the most optimistic assumptions for trip diversion due to TDM implementation.

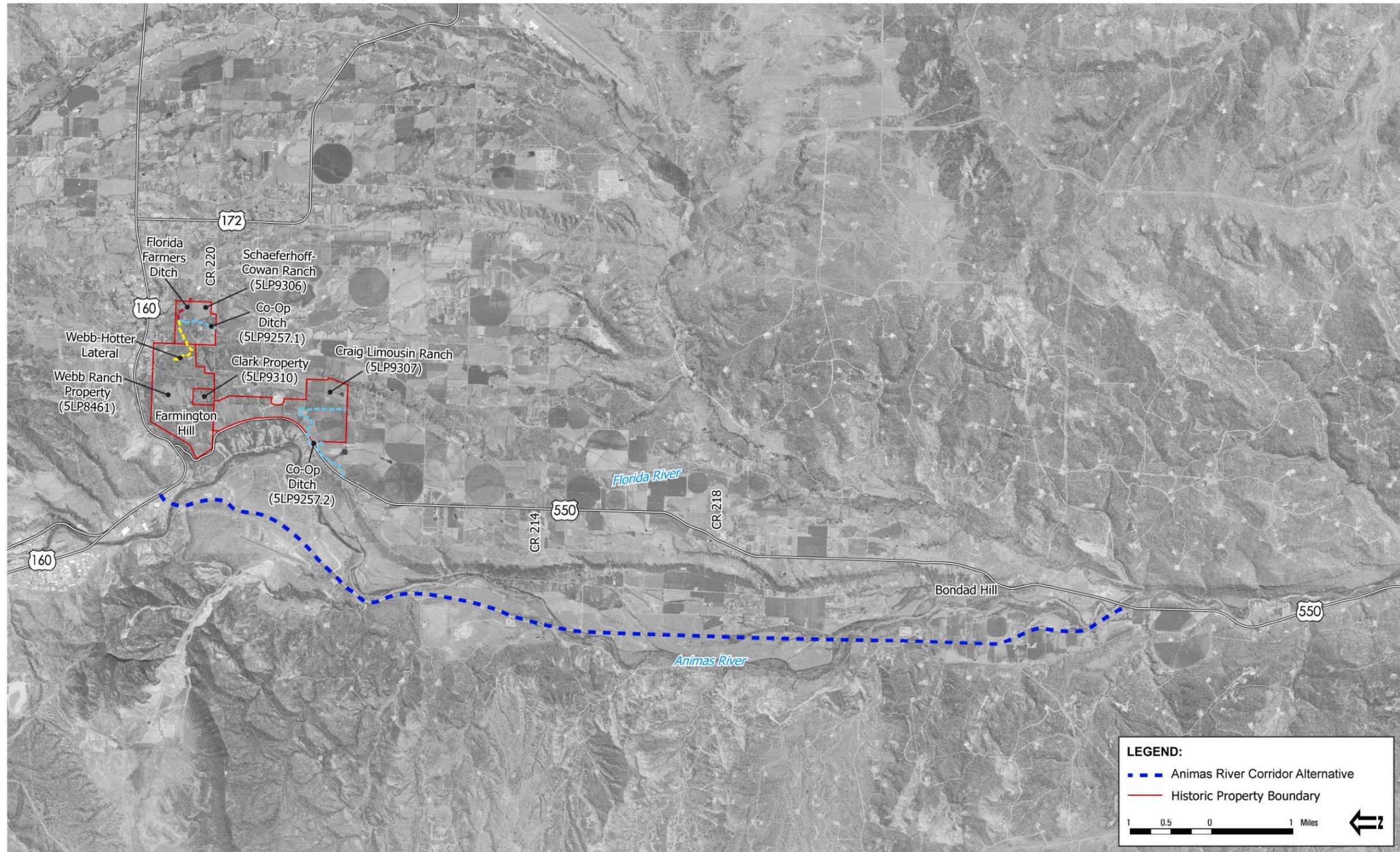
These TDM strategies avoid use of the six Section 4(f) properties addressed in this evaluation. They do not address the purpose and need requirements of increasing capacity nor do they address the primary safety issues of narrow shoulders, insufficient clear zones, poor sight distance or steep grades. TDM strategies are not prudent because they do not meet the project purpose and need.

4.1.4 Alignment Shifts of the US 550 Corridor

The six Section 4(f) properties in the vicinity of the US 550/US 160 connection could be avoided if the US 550 corridor was located to the west of these properties. An entire corridor shift of US 550 to the west was considered in the *US 550 Environmental Assessment (EA)* (CDOT, July 2005). This corridor shift is illustrated on Figure 16. It is approximately 13 miles long, would be much more costly than widening the existing US 550, (\$125 million compared to \$90 million) and would use another likely historic property, the abandoned Farmington Branch of the Denver & Rio Grande Western railroad grade. (For more detail about the likely eligibility of this property, see Attachment A.) This alternative, the Animas River Corridor, does not meet the purpose and need because the existing US 550 roadway still needs to be maintained (to provide access to existing properties), and therefore the safety and access issues remain.

In addition, this alternative requires three crossings of the Animas River, has much greater impacts to wetlands, impacts habitat for the southwestern willow flycatcher, an endangered species, other cultural resources, and wildlife habitat compared to keeping the alignment along the existing US 550 corridor (*US 550 Corridor Scoping Memo*, URS 2002). It was eliminated during the US 550 Environmental Assessment process, and based on this decision to widen

Figure 16. Animas River Corridor Alternative



US 550 on the existing alignment, property acquisition, corridor preservation, and US 550 widening construction have been underway. For these multiple factors, this is not a prudent avoidance alternative.

4.2 Feasibility and Preliminary Alternatives

Feasibility Alternatives were identified during the Feasibility Study and were defined and evaluated as “Feasibility Alternatives” during the NEPA process for the 2006 EIS. The project corridor was divided into 12 numbered sections to address the wide range of conditions along the US 160 roadway. Section 1 includes the US 550 alignment north of CR 220 and the connection of US 550 to US 160. Eight Feasibility Alternatives were considered for the US 550 alignment and connection to US 160: 1A, 1B, 1C, 1D, 1F and 1G. These alternatives cross the Webb Ranch at various locations and connect to US 160 at or east of the current US 160/US 550 (south) intersection. The Feasibility Alternatives are not complete corridor avoidance alternatives because they would use portions of the Webb Ranch, Craig Limousin Ranch and Co-op Ditch. Except for 1F, these alternatives would avoid use of the Schaeferhoff-Cowan Ranch. Because these alternatives are an avoidance alternative for the Schaeferhoff-Cowan Ranch, they are evaluated further to determine if they are feasible and prudent.

Feasibility Alternatives 1A and 1B would remain on the existing US 550 alignment with 1A being an interchange and 1B being an intersection. These alternatives were not advanced for detailed consideration in the EIS and are not complete corridor avoidance alternatives. Additional design information for these alternatives, however, was submitted by Mr. Thomas McNeill on behalf of the Webb Ranch owners in a October 28, 2008 letter to FHWA. Because of this new information, these alternatives have been retained for further consideration and included as the “Revised Preliminary Alternative A” and “At Grade Intersection Alternative” in Section 4.3.

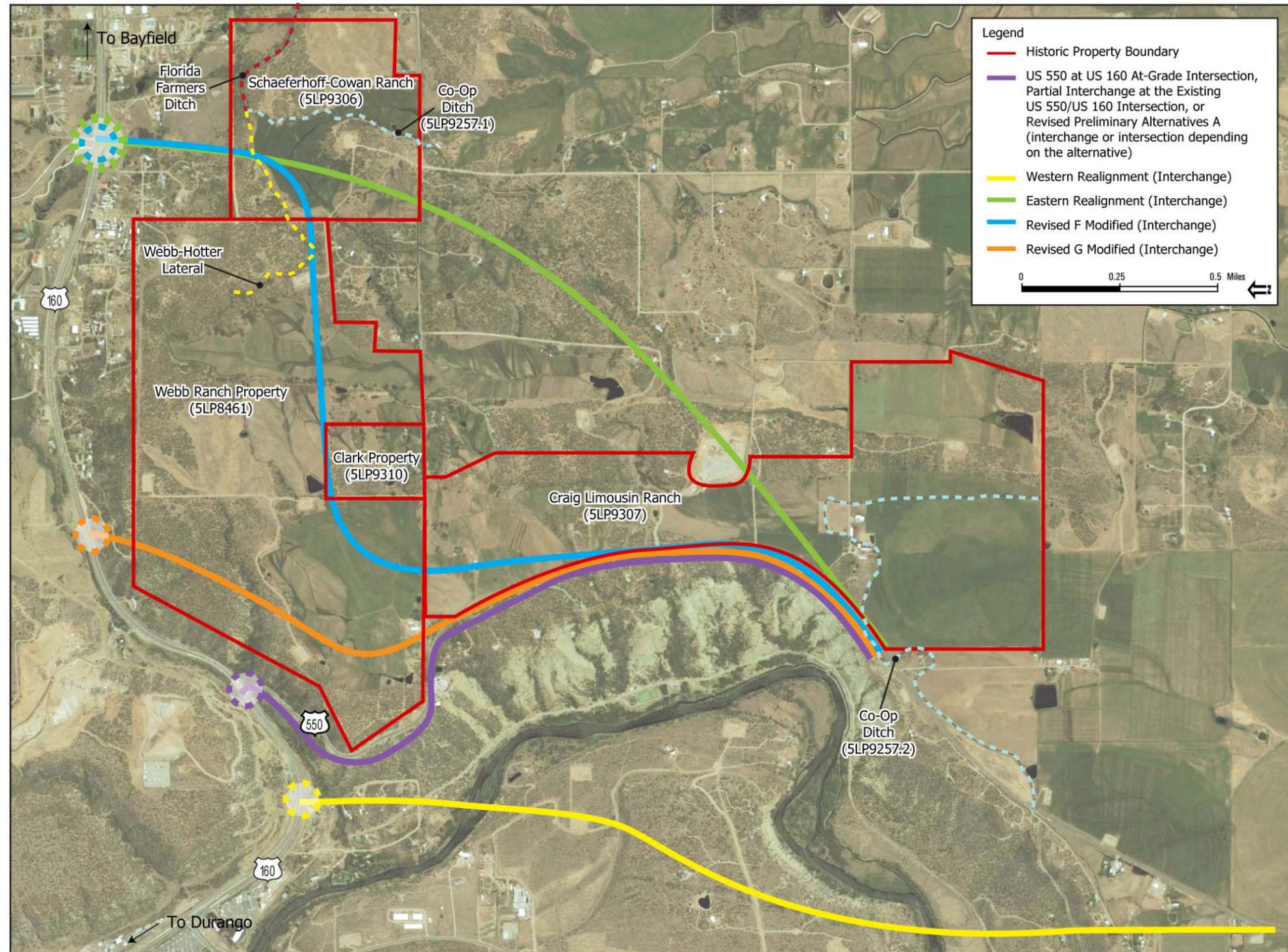
Feasibility Alternatives 1C, 1D, and 1F do not meet the safety requirements of the purpose and need because they place the US 550/US 160 interchange in a location that conflicts with the CR 233 (Three Springs) intersection, where conflicting vehicle movements from the US 550 eastbound ramp, the Three Springs intersection, and traffic exiting to Grandview create an unsafe condition. These Feasibility Alternatives are not prudent alternatives because they do not meet the capacity or safety requirements of the project purpose and need.

Alternatives 1F and 1G were modified with better approach grades, a safer alignment and to minimize impacts. These modifications allowed Alternative 1F to meet the safety requirement of the purpose and need. These alternatives were carried forward in the EIS as G Modified and F Modified and included in the preliminary and advanced alternatives for the Grandview Section.

4.3 Alternatives Considered

Section 1.3 describes the project alternatives including those advanced for consideration in the EIS as well as those that have been developed specifically to avoid or minimize the use of Section 4(f) properties in the vicinity of the US 550/US 160 connection. The project alternatives advanced in the EIS include the US 550 at US 160 At-Grade Intersection Alternative, the Partial Interchange at the Existing US 550/US 160 Intersection Alternative, Revised Preliminary Alternative A, Revised G Modified Alternative, and the Revised F Modified Alternative. Alternatives developed for the resources identified in vicinity of the US550/US160 connection include the Eastern Realignment Alternative and the Western Realignment Alternative. These are all illustrated on Figure 17. This section evaluates each of these alternatives to assess whether they are prudent and feasible.

Figure 17. Alignment Alternatives



None of these avoid all six Section 4(f) properties.

4.3.1 US 550 at US 160 At-Grade Intersection Alternative

The US 550 at US 160 At-Grade Intersection Alternative generally follows the existing alignment and connects US 550 to US 160 as an intersection at the current location (Feasibility Alternative 1B in the FEIS). The US 550 at US 160 At-Grade Intersection Alternative is not a complete avoidance alternative since it uses portions of the Webb Ranch, Craig Limousin Ranch and Co-op Ditch. This alternative, however, avoids use of the Schaeferhoff-Cowan Ranch and the Clark Ranch.

Attachment C includes the traffic analysis for this alternative which was developed to determine the feasibility of various at-grade intersections which take the place of the proposed connection between US 160 and US 550. The *Year 2030 Traffic Operations Analysis for the US 550 at US 160 Section 4(f) Alternatives* Memorandum (SEH, 2010) concludes that at-grade intersection alternatives including design variations T.1.4, T.1.6, T.4.4 fail to meet the capacity requirements for the project purpose and need (Attachment C). Because of unacceptable safety and operational problems and inability to meet the project purpose and need, these at-grade intersection alternatives are not prudent.

4.3.2 Partial Interchange at the US 550/US 160 Existing Intersection Alternative

The Partial Interchange at the US 550/US 160 Existing Intersection Alternative includes a partial interchange that connects US 550 to US 160 at the existing intersection location. This alternative is not a complete corridor avoidance alternative because it uses portions of the Webb Ranch, Craig Limousin Ranch and Co-op Ditch. This alternative does, however, avoid use of the Schaeferhoff-Cowan Ranch and the Clark Ranch. Design variations T.2.4, T.2.6, T.3.4, and T.3.6 are included in this analysis.

As discussed in Attachment D in a Memorandum from the CDOT Region 5 Program Engineer to FHWA, this on- alignment alternative has a combination of a dramatic reduction in design speeds on a rural road (from 60 miles per hour to 25 miles per hour), sharp curves, an eight percent cross-slope as the roadway curves, four percent vertical grades and north facing steep slopes, all of which combine to produce unacceptable safety problems, particularly in the winter. All of these safety problems will continue to worsen as traffic volumes grow.

The Partial Interchange at the US 550/US 160 Existing Intersection Alternative also has challenging geotechnical issues with known subsurface water problems (springs) which create drainage and slope stability problems. Constructing retaining walls in these difficult conditions requires retaining walls with heights of up to 85 feet and is therefore technically challenging. This also results in wetland and riparian habitat impacts which exceed those of two of the three alternatives considered feasible and prudent. Almost 2.5 acres of wetland impacts occur as a result of implementation of this alternative. These wetlands are protected by the Clean Water Act.

Temporary detours during construction are required, rerouting US 550 traffic onto CR 220 for a period of two years. This forces Durango bound traffic, including emergency service providers, to travel nearly seven miles out of direction for each trip into or out of Durango. CR 220 is a narrow county road with poor sight distance, no shoulders, and numerous access points for residential driveways. The two year detour results in socio-economic costs to drivers, access restrictions and disruptions to the residents and farming operations along CR 220, delays to the provision of emergency services, notable congestion at the Three Springs interchange and

safety problems along CR 220, which was not designed to carry large amounts of traffic. If improvements are needed to upgrade CR 220 so it can safely carry additional traffic, those improvements likely result in additional use of other Section 4(f) properties which abut CR 220 (such as Craig Limousin Ranch, the Schaeferhoff-Cowan Ranch and the Clark Property). These multiple factors (unacceptable safety problems, disruption to established communities because of the access difficulties along CR 220 during construction, greater impacts to resources protected by the Clean Water Act, unique and challenging geotechnical issues with springs and unstable slopes) cumulatively cause unique problems and impacts of extraordinary magnitude. For these reasons, the Partial Interchange Alternative is not prudent.

4.3.3 Revised Preliminary Alternative A

Revised Preliminary Alternative A includes a grade separated trumpet interchange at the existing US 550/US 160 intersection location. This alternative is not a complete corridor avoidance alternative because it uses portions of the Webb Ranch, Craig Limousin Ranch and the Co-op Ditch. It is, however, an avoidance alternative for Schaeferhoff-Cowan and Clark Ranches. The reasons this alternative is not prudent are identical to the Partial Interchange Alternative because they are both on the same alignment. For these reasons, Revised Preliminary Alternative A is not prudent.

4.3.4 Revised G Modified Alternative

The Revised G Modified Alternative connects US 550 to US 160 via the Grandview trumpet interchange. The Revised G Modified Alternative is not a corridor avoidance alternative because it uses portions of the Webb Ranch, Craig Limousin Ranch and Co-op Ditch. This alternative, however, avoids use of the Schaeferhoff-Cowan Ranch and the Clark Property. This alternative has been revised several times to minimize impacts. During the EIS process, the alternative was modified to follow the western edge of the Webb Ranch to minimize impacts to the ranch. Additionally, it was revised after completion of the ROD to avoid a gas well installed in the alignment. The modified alignment ("Revised G Modified Alternative") has fewer resource impacts to wetlands, wildlife habitat, and irrigated farmlands compared to G Modified from the EIS while managing to avoid the natural gas well. This alternative is carried forward for further analysis in this evaluation.

4.3.5 Revised F Modified Alternative

The Revised F Modified Alternative connects US 550 to US 160 via the SPUI interchange at CR 233 (Three Springs). The Revised F Modified Alternative is not a corridor avoidance alternative because it uses portions of all the Section 4(f) properties in the vicinity of the US 550/US 160 connection. Like G Modified, Revised F Modified Alternative also impacts a gas well on the Webb Ranch so design adjustments to avoid the gas well were considered. The feasibility of avoiding the gas well was explored and not incorporated into this alternative because a shift to the north results in the acquisition of four additional residences and a shift to the south requires acquisition of two additional residences. This alternative is carried forward for further analysis in this evaluation.

4.3.6 Eastern Realignment Alternative

The Eastern Realignment Alternative connects US 550 to US 160 via the SPUI at CR 233 (Three Springs). The Eastern Realignment Alternative is not a corridor avoidance alternative as it uses portions of the Craig Limousin Ranch, Schaeferhoff-Cowan Ranch, the Co-op Ditch and the Webb-Hotter Lateral. This alternative does, however, diverge from US 550 south of CR 220 and avoids the Webb Ranch and Clark Ranch. The Traffic Operations Memorandum in

Attachment C concludes that the Eastern Realignment Alternative meets the capacity requirements for 2030 traffic projections. This alternative is carried forward for further analysis in this evaluation.

4.3.7 Western Realignment Alternative

The Western Realignment Alternative diverges from the current US 550 at approximately milepost 13.17 on the top of Florida Mesa (approximately two miles south of where the Eastern Realignment Alternative diverges from US 550) before descending into the Animas Valley where it parallels the Animas River to the north and connects to US 160 at approximately milepost 88.0, approximately 0.5 mile west of the existing US 160/US 550 (south) intersection. This alternative avoids the six Section 4(f) properties described in this evaluation but is not considered to be an avoidance alternative because it would use the Farmington Branch of the Denver & Rio Grande Western Railroad. (For more detail about the likely eligibility of this property, see Attachment A.) Figure 18 illustrates the severe topographic constraints associated with this alternative. Two new bridge crossings of the Animas River (see Figure 16) are required in addition to an interchange at the US 160 connection and an intersection or interchange at the southern US 550 connection. Two of the ramps from the interchange terminate approximately 700 feet from the existing River Road signalized intersection on US 160.

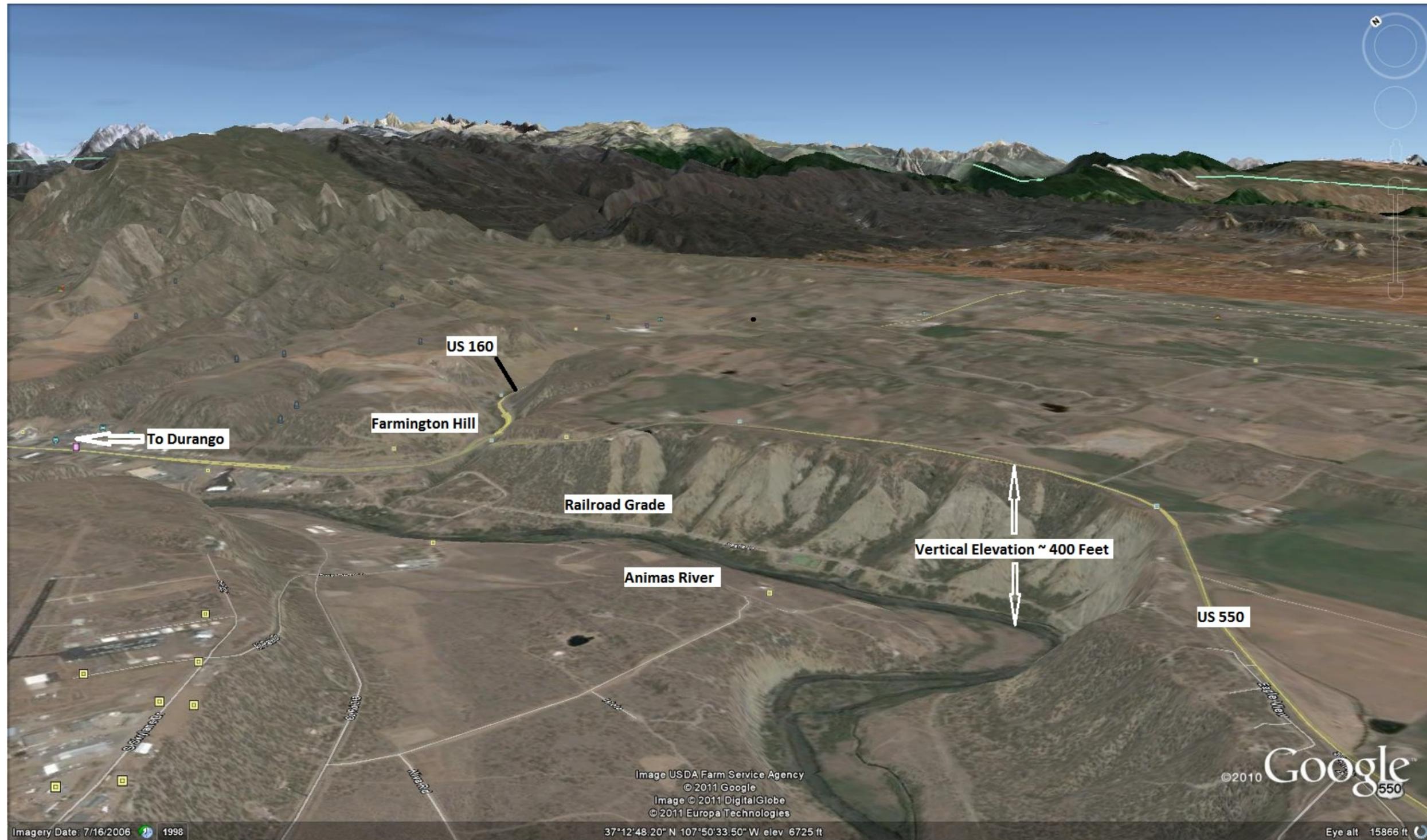
The US 550 connection to US 160 presents safety and operational problems that do not meet the project purpose and need (*Year 2030 Traffic Operations Analysis for the US 550 at US 160 Section 4(f) Alternatives*, SEH, 2010, Attachment C). Existing intersections north of the proposed interchange at River Road create queue conflicts, congestion, and backups at the westbound interchange on-ramp. River Road is the first intersection encountered when entering Durango from the south where Home Depot and a large subdivision along the Animas River already contribute to traffic conflicts. These conflicts create unacceptable traffic and safety conditions inconsistent with the project purpose and need. A detailed explanation of traffic and safety problems associated with the Western Realignment Alternative is provided in Attachments C and D (see *Year 2030 Traffic Operations Analysis for the US 550 at US 160 Section 4(f) Alternatives Memorandum* (SEH, 2010)).

The US 550 Western Realignment Alternative will require a large amount of excavation and fill. This alignment cuts through the Florida Mesa where it has an upper elevation of 6,631 feet and a bottom elevation of 6,330 feet. This elevation difference of 301 feet occurs within less than a half of a mile.

In referring to the 2004 *American Association of State Highway and Transportation Officials Policy on Design*, Chapter 8, page 505 discusses maximum grades for freeways. Exhibit 8.1 states that for a design speed of 65 mph, rolling terrain, the maximum grade is four percent. A sub note allows a one percent steeper grade than the four percent value shown in Exhibit 8.1. This steeper grade may be provided in mountainous or urban areas with crucial right-of-way controls.

To achieve a grade of five percent, approximately 3,541,000 cubic yards would need to be removed from the hillside. This equates to approximately 236,000 truck equivalents at 15 cubic yards per truck. If it is assumed that the material is removed and placed in the fill section, and that the material could be moved at a rate of 10 truckloads per hour, at 8 hours per day for a 5-day workweek, it would take 197 workdays or 9.5 months to move all this material. This compares to approximately 1,600,000 cubic yards of material that would need to be removed for

Figure 18. Florida Mesa's Severe Topographic Constraint



Revised G Modified Alternative and 2,742,000 cubic yards for the Revised Eastern Realignment Alternative.

In addition to the large amount of excavation and fill required for this alternative, it requires more bridge structures than any of the other alternatives being considered. This alternative requires three bridges with a total bridge deck area of 287,000 square feet. In comparison, Revised G Modified Alternative has a total bridge deck area of 85,990 square feet and the Revised Eastern Realignment Alternative has no bridges. The longest bridge structure required for the US 550 Western Realignment Alternative is 1,750 feet, which is 3.3 times longer than the bridge recently constructed across US 160 as part of the Grandview Interchange. The three structures do not include those structures needed for the interchange connection at US 160.

The estimated cost for the different alternatives is included in the memorandum *US 550 at US 160 Re-Evaluation, Cost Estimates for Section 4(f) Alternatives: Updated on December 22, 2010* (Powers, 2010). The costs for the alternatives are estimated as follows:

- ▶ Western Realignment Alternative: \$326,931,000
- ▶ Revised Preliminary Alternative A: \$232,874,000
- ▶ Partial Interchange at the Existing US 550/US 160 Intersection: \$230,790,000
- ▶ Revised G Modified: \$79,680,000
- ▶ Revised F Modified: \$78,394,000
- ▶ Eastern Realignment Alternative: \$92,753,000

Based on the unacceptable safety and operational problems, construction challenges and costs described above and further supported in Attachments C and D, the Western Realignment Alternative does not meet purpose and need and is not a prudent alternative.

4.4 Section 4(f) Avoidance Alternatives Summary

For the US 550 connection to US 160 there are no feasible and prudent corridor avoidance alternatives. Corridor avoidance alternatives in this location include the No Action Alternative, Corridor Alternatives including TSM, TDM and alignment shifts, and the Western Realignment Alternative. None of these alternatives are feasible and prudent. Table 5 provides a summary of alternatives that were considered and how each has been evaluated against the prudent and feasible criteria.

Alternatives that are carried forward for further analysis under this Section 4(f) evaluation include the following:

- ▶ Eastern Realignment Alternative
- ▶ Revised F Modified Alternative
- ▶ Revised G Modified Alternative

Table 5. Summary of Prudent and Feasible Screening Criteria

Alternative	Section 4(f) Property Use	Prudent and Feasible	Explanation
No Action	No	No	Not feasible and prudent, does not meet Purpose and Need (see Section 4.1.1).
Transportation System Management and Transportation Demand Management	No	No	Not feasible and prudent; does not meet purpose and need (see Section 4.1.2 and Section 4.1.3).
Alignment Shift of the US 550 Corridor to the west	No	No	Not feasible and prudent, does not meet Purpose and Need (see Section 4.1.4).
Feasibility and Preliminary Avoidance Alternatives 1C, 1D and 1F	Yes	No	Not feasible and prudent, does not meet safety requirements of the purpose and need (see Section 4.2).
US 550 at US 160 At-Grade Intersections (Alternative 1B) (including T.1.4, T.1.6, and T.4.4)	Yes	No	Not feasible and prudent; does not meet capacity requirement to maintain LOS D in evening peak hour (see Attachment C memorandum)
Partial interchange at the US 550/US 160 Existing Intersection Alternative (including T.2.4, T.2.6, T.3.4, and T.3.6)	Yes	No	Unacceptable safety and operational problems due to dramatic decreases in design speeds, sharp curves and north facing slopes which are subject to icing problems in the winter. For this reason, partial interchange alternatives are not feasible and prudent (see Attachment D).
Revised Preliminary Alternative A	Yes	No	Not feasible and prudent because of unacceptable safety and operational problems, community disruption along CR 220 during construction, greater wetland impacts and unusual problems with springs and unstable slopes. It has low design speeds, sharp curves, 8 percent super elevation, 4 percent vertical grades, north facing steep slopes, geotechnical issues with springs and unstable slopes, constructability and out of direction travel (see Attachment D Memorandum).
Revised G Modified Alternative	Yes	Yes	Feasible and prudent, but results in a use of Webb Ranch, Craig Limousin Ranch and the Co-op Ditch.
Revised F Modified Alternative	Yes	Yes	Feasible and prudent, but results in a use of Webb Ranch, Craig Limousin Ranch, the Clark Property, the Schaeferhoff-Cowan Ranch, the Webb-Hotter Lateral, and the Co-op Ditch.
Eastern Realignment Alternative	Yes	Yes	Feasible and prudent, but intersects the Craig Limousin Ranch, Schaeferhoff-Cowan Ranch, the Co-op Ditch and the Webb-Hotter Lateral (See Figure 2).
Western Realignment Alternative	No	No	Not feasible and prudent because of unacceptable safety and operational, construction challenges and costs. (See Attachment D, Western Alignment Memorandum).

5.0 Use of Section 4(f) Properties

As defined in 23 CFR Part 774.17, the use of a Section 4(f) property occurs when:

- ▶ Land is permanently incorporated into a transportation facility.
- ▶ There is a temporary occupancy of the land that is adverse in terms of the statute's preservation purposes.
- ▶ There is no permanent incorporation of land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features or attributes that qualify the property for protection are substantially impaired. This type of use is called a constructive use.

The following section describes each Section 4(f) property, the use by alternative associated with each property and which alternatives constitute avoidance alternatives. All uses described for the Section 4(f) properties are considered to be direct uses. There are no additional temporary occupancies of land in the project area that are expected to be adverse in terms of the preservation purpose of Section 4(f). Similarly, there are no additional proximity impacts that are so severe that the attributes or features that qualify the Section 4(f) property for protection are substantially impaired. In all cases, if an alternative does not have a direct use of a particular Section 4(f) property, that alternative is located far enough away from that property so that the alternative's noise, visual or access impacts are not severe and would not affect the features or attributes that made that property eligible for inclusion on the NRHP, thus qualifying it for Section 4(f) protection.

Table 6 provides a summary of Section 4(f) property use by alternative.

Table 6. Direct Uses (and Section 106 Effects) of Section 4(f) Properties

Alternatives	Section 4(f) Properties: Direct Uses/Section 106 Effect Determination					
	Webb Ranch	Craig Limousin Ranch	Schaeferhoff-Cowan Ranch	Clark Property	Webb-Hotter Lateral Ditch	Co-op Ditch
Eastern Realignment Alternative	No	Yes/Adverse	Yes/Adverse	No	Yes/Adverse	Yes/Not Adverse
Revised F Modified Alternative	Yes/Adverse	Yes/Adverse	Yes/Adverse	Yes/Adverse	Yes/Adverse	Yes/Not Adverse
Revised G Modified Alternative	Yes/Adverse	Yes/Adverse	No	No	No	Yes/Not Adverse

5.1 Description of Use, Webb Ranch (5LP6481)

Webb Ranch is used by two of the alternatives.

5.1.1 Revised F Modified Alternative

This alternative enters the historic boundary of the Webb Ranch around 400 feet east of the ranch building and structures. The structures are not physically impacted. The alignment curves toward the east and stays on the ranch property for a distance of approximately three

miles, requiring that approximately 32.6 acres of right of way be transferred to a transportation use.

5.1.2 Revised G Modified Alternative

This alternative enters the Webb Ranch property approximately 115 feet from the toe of slope to the main barn, then proceeds along the western edge of Florida Mesa along a northerly track through mostly forested land before leaving the Webb property and descending the mesa to connect with the Grandview Interchange. Some minor improvements to CR 220 also result in a use. Approximately 41.5 acres of right-of-way is transferred to a transportation use for Revised G Modified Alternative.

5.1.3 Avoidance Alternatives

Avoidance alternatives include the No-Action Alternative, which does not meet the purpose and need for the project and is thus not feasible and prudent and the Eastern Realignment Alternative, which avoids use of the Webb Ranch but uses four other Section 4(f) properties as indicated in Table 6.

5.2 Description of Use, Craig Limousin Ranch (5LP9307)

The Craig Limousin Ranch is used by all three of the Section 4(f) alternatives.

5.2.1 Revised F Modified Alternative

This alternative uses the western boundary along an expanded US 550 and the northwest corner of the Craig Limousin Ranch, resulting in the need to convert 35.6 acres to a transportation use. Some minor improvements to CR 220 also result in a use. This use occurs well away from the main complex of buildings. Part of this alignment may also cross a small area of the original homestead site (now in ruins) which is a contributing element to the overall ranch property.

5.2.2 Eastern Realignment Alternative

This alternative enters the Craig Limousin Ranch property at the point where it diverges from US 550. It separates the main ranch complex (including the dairy barn and outbuildings) from the saddle shop and barn in the northern section of the ranch. It brings the new highway alignment closer to the building complex and introduces a significant visual element to the property. Approximately 21.0 acres of Craig Limousin Ranch is converted to a transportation use.

5.2.3 Revised G Modified Alternative

This alternative uses 22.7 acres of Craig Limousin Ranch along the far western edge because it requires widening of US 550. Minor use also occurs to accommodate minor improvements to CR 220.

5.2.4 Avoidance Alternatives

Avoidance alternatives include the No-Action Alternative and the Western Realignment Alternative, neither of which meets the project purpose and need and thus are not feasible and prudent.

5.3 Description of Use, Schaeferhoff-Cowan Ranch (5LP9306)

The Schaeferhoff-Cowan Ranch is used by two of the Section 4(f) alternatives.

5.3.1 Revised F Modified Alternative

This alternative enters the ranch property on its western edge and then turns north. Approximately 20.7 acres of ranch property are converted to a transportation use.

5.3.2 Eastern Realignment Alternative

This alternative traverses through the western half of the property and includes some improvements along CR 220. None of the buildings are directly affected, but the new highway alignment extends through open agricultural land which contributes to the significance of this ranch property. Approximately 42.7 acres of ranch property are converted to a transportation use.

5.3.3 Avoidance Alternatives

Avoidance alternatives for the Schaeferhoff-Cowan Ranch include the No-Action Alternative and the Revised G Modified Alternative. The No-Action Alternative does not meet the project purpose and need so is thus not feasible and prudent. The Revised G Modified Alternative uses three other Section 4(f) properties, as indicated in Table 6.

5.4 Description of Use, Clark Property (5LP9310)

5.4.1 The Clark Property is used by one alternative. Revised F Modified Alternative

This alternative extends through the northern end of the property boundary. The main house on the Clark Property is approximately 725 feet south of the conceptual right-of-way for US 550 and about 190 feet north of the improvements associated with CR 220. Approximately 2.0 acres of historic Clark Property are converted to a transportation use with this alternative.

5.4.2 Avoidance Alternatives

Avoidance alternatives include the No-Action Alternative, the Eastern Realignment Alternative and the Revised G Modified Alternative. The No-Action Alternative does not meet the project purpose and need and is thus not feasible and prudent. The Eastern Realignment Alternative uses four other Section 4(f) properties. The Revised G Modified Alternative uses three other Section 4(f) properties.

5.5 Description of Use, Webb-Hotter Lateral Ditch (5LP9256.1 and 5LP9256.2)

The Webb-Hotter Lateral Ditch is used by two alternatives. Revised G Modified Alternative does not impact the Webb-Hotter Lateral.

5.5.1 Revised F Modified Alternative

This alternative touches or crosses the ditch in two locations. There is a use of 1,423 feet of segment 5LP9256.1, which crosses the Schaeferhoff-Cowan Ranch, and a use of 1,096 feet of segment 5LP9256.2, which extends onto the Webb Ranch. Portions of the ditch will likely be placed in a siphon structure (a closed conduit placed underground).

5.5.2 Eastern Realignment Alternative

This alternative directly impacts approximately 1,423 feet of segment 5LP9256.1 of the lateral on the Schaeferhoff-Cowan Ranch. The water in this section of the ditch will be relocated to a siphon structure.

5.5.3 Avoidance Alternatives

Avoidance alternatives include the No-Action Alternative, and the Revised G Modified Alternative. The No-Action Alternative is not feasible and prudent because it does not address the project purpose and need. The Revised G Modified Alternative uses three other Section 4(f) properties: the Webb Ranch the Craig Limousin Ranch and the Co-op Ditch.

5.6 Description of Use, Co-op Ditch (5LP9257)

The Co-op Ditch is used by all three alternatives that require widening of US 550 as shown on Figure 19 (on page 48): Revised G Modified Alternative, Revised F Modified Alternative and the Eastern Realignment Alternative.

In addition, one alternative, the Eastern Realignment Alternative, uses segments of the ditch located on the Schaeferhoff-Cowan Ranch farther east. Approximately 190 feet of 5LP9257.1 is directly impacted, including a thirty foot existing structure under CR 220. Due to the angle of the pipe in this location, the water will likely be placed in a new longer pipe and not in an extension of the existing pipe. In addition, approximately 488 feet of segment 5LP9257.2 is impacted where there are two existing structures that run beneath US 550. These are replaced with longer structures and 645 feet of ditch will need to be re-graded to address issues with slopes.

5.6.1 Eastern Realignment Alternative

The Eastern Realignment Alternative uses the most lineal feet of the Co-op Ditch: 678.

5.6.2 Revised F Modified Alternative and Revised G Modified Alternative

Revised F Modified Alternative and Revised G Modified Alternative use the same amount, which is 488 lineal feet.

5.6.3 Avoidance Alternatives

Avoidance alternatives include the No-Action Alternative, which is not feasible and prudent because it does not address the project purpose and need. The Western Realignment Alternative is an avoidance alternative which is not feasible and prudent because of unacceptable safety and operational problems, construction challenges and cost.

6.0 Least Overall Harm Analysis for Alternatives Considered in the Section 4(f) Evaluation

As demonstrated in Section 4.0 there are no feasible and prudent avoidance alternatives to the use of land from the Section 4(f) properties in the vicinity of the US 550/US 160 connection. Therefore, FHWA may approve only the alternative that causes the least overall harm in accordance with 23 CFR §774.3(c)(1). Three alternatives identified in Section 3 Summary are compared in the least harm analysis. The least overall harm is determined by balancing the following factors in light of the statute's preservation purpose:

- ▶ The ability to mitigate adverse impacts to each Section 4(f) property.
- ▶ The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection.
- ▶ The relative significance of each Section 4(f) property.
- ▶ The views of the officials with jurisdiction of each Section 4(f) property.

- ▶ The degree to which each alternative meets the purpose and need for the project.
- ▶ The magnitude, after reasonable mitigation, of any adverse impacts to resources not protected by Section 4(f).
- ▶ Substantial differences in costs among the alternatives.

A discussion of each alternative being considered with respect to the least harm factors is provided in the following sections.

6.1 Quantitative Impact Assessment for Section 4(f) Alternatives

The following subsections provide a description by alternative of the use of the various Section 4(f) properties. These quantified impacts provide the basis for subsequent least overall harm discussions in Sections 6.2, 6.3, 6.4, and 0 that assess the various factors considered to determine least overall harm. Section 6.3 and 6.4 discuss additional information relative to balancing factors for selecting the least overall harm alternative including social and environmental impacts and relative costs.

Table 7 provides a quantitative assessment of uses to Section 4(f) properties for each alternative. More detailed engineering layouts of the three build alternatives are provided on Figure 19.

Table 7. Quantitative Impact Summary

Alternatives	Section 4(f) Properties Impacts					
	Webb Ranch (~ 515 acres) (acres)	Craig Limousin Ranch (~ 378 acres) (acres)	Schaeferhoff- Cowan Ranch (~ 160 acres) (acres)	Clark Property (29 acres) (acres)	Webb-Hotter Lateral Ditch (3429 linear feet)	Co-op Ditch (9279 linear feet)
Eastern Realignment Alternative	0.0	21.0	42.7	0.0	1,423	678
Revised F Modified Alternative	32.6	35.6	20.7	6.5	2519	488
Revised G Modified Alternative	41.5	22.7	0.0	0.0	0	488

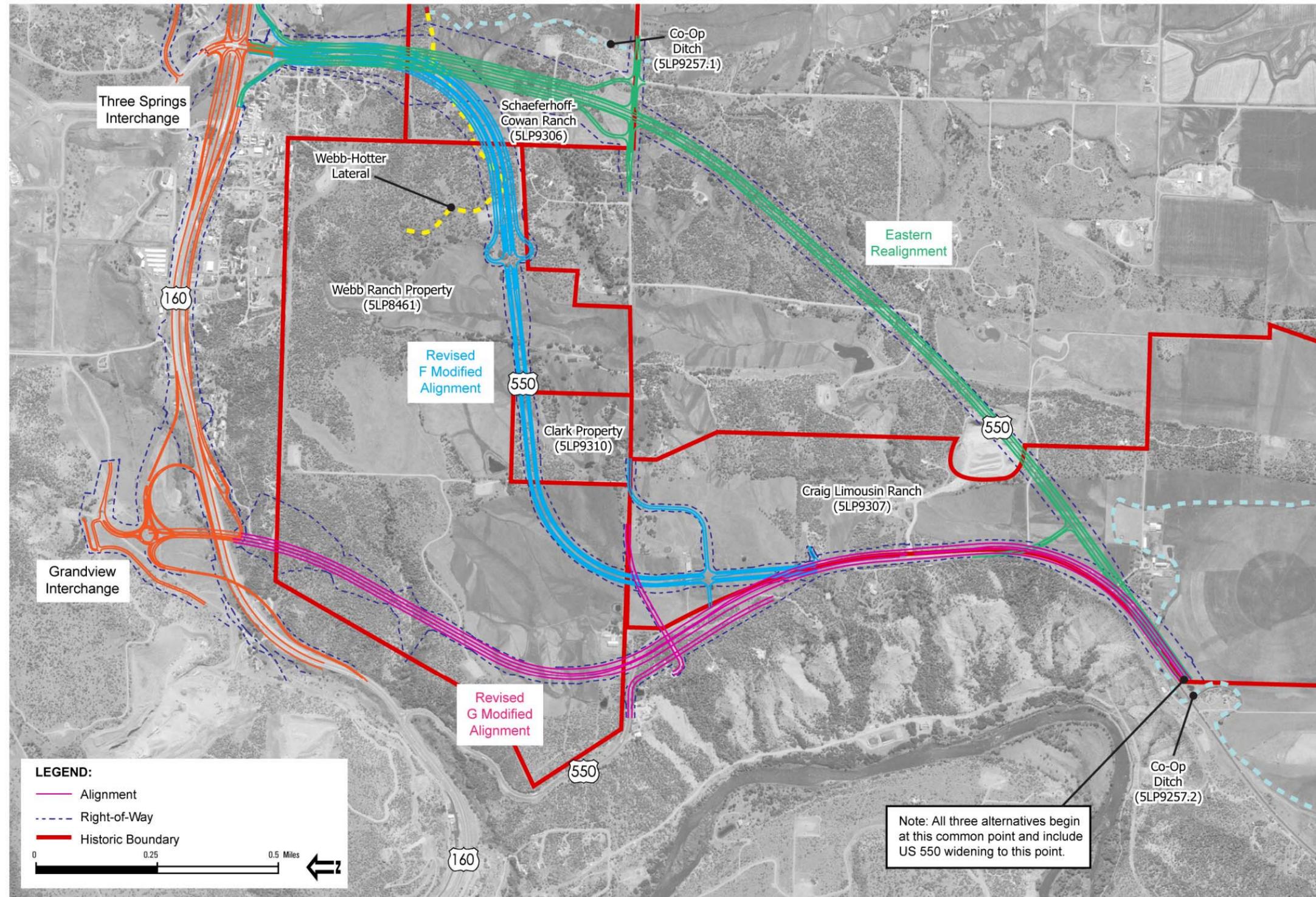
6.1.1 Eastern Realignment Alternative Use of Section 4(f) Properties

This alternative uses four Section 4(f) properties, including the historic Craig and Schaeferhoff-Cowan Ranches and the Co-op and Webb-Hotter Lateral ditches. Quantities of land required are greatest from the Schaeferhoff-Cowan Ranch. Total acreage used from the two ranches is 63.6 acres. Lineal feet of ditches used is 2,101.

6.1.2 Revised F Modified Alternative Uses of Section 4(f) Properties

This alternative uses 95.4 acres of four historic ranches and 3,007 lineal feet of two historic ditches. This alternative uses the most acreage from the Craig Limousin Ranch and is the only alternative to use the Clark Property.

Figure 19. Detailed Engineering Layouts of the Three Section 4(f) Alternatives



6.1.3 Revised G Modified Alternative Uses of Section 4(f) Properties

This alternative uses three Section 4(f) properties: the Webb Ranch, the Craig Limousin Ranch and the Co-op Ditch. This alternative uses the most acreage from the Webb Ranch. Total acreage used from the Webb Ranch and the Craig Limousin Ranch is 64.13 acres. Lineal feet of the Co-op Ditch used is 488.

6.2 Summary of Least Harm Factors for Ability to Mitigate, Severity, Significance, and Views of the Officials with Jurisdiction

The historic features of the Webb, Craig, Clark Limousin, and Schaeferhoff-Cowan Ranches, including the historic buildings and structures, the functional irrigation systems, and the majority of the properties' acreage remain intact regardless of the selected alternative. The character, setting, feeling, and association that contributes to each ranch's historic eligibility would, however, be compromised by aligning the US 550/US 160 highway connection through any of these historic properties, as described below.

6.2.1 Ability to Mitigate

The following information describes the ability of each of the alternatives to mitigate adverse impacts to the various Section 4(f) properties which are used by that particular alternative.

Mitigation for the ranches and ditches includes measures to be taken during final design, such as possible retaining walls, underpass and irrigation design, and steeper slopes. Functional irrigation systems will be restored during construction with no interruption of service. The irrigation system is important to the historic function of the ranch. Any temporary inability to maintain irrigation service will be compensated for the lost value of the crops affected. A farm equipment/livestock underpass will be installed to provide passage for continued farming and ranching operations and livestock.

Revised G Modified Alternative

Revised G Modified Alternative uses three Section 4(f) properties: two ranches and the Co-op Ditch. For the two ranches (Webb Ranch and Craig Limousin Ranch) the ability to mitigate is difficult, due to the permanency of the loss, which is 41.5 acres for Webb Ranch and 22.7 acres for Craig Limousin Ranch. The ranches could still function and the buildings and other structures are retained, but some of the historic attributes, including integrity of setting, feeling and association, are permanently lost. Mitigation of impacts to the Co-op Ditch is easier, because ditch functions can be restored and a small percentage of the overall resource is impacted.

Revised F Modified Alternative

Revised F Modified Alternative uses six Section 4(f) properties: four ranches and two ditches. As with Revised G Modified Alternative, the ability of this alternative to mitigate the impact to the four ranches is difficult, due to the permanency of the loss. The loss amounts to 32.6 acres for Webb Ranch, 35.6 acres for Craig Limousin Ranch, 20.7 acres to Schaeferhoff-Cowan Ranch, and 6.5 acres to the Clark Property. Each of the four ranches (Webb Ranch, Craig Limousin Ranch, Schaeferhoff-Cowan Ranch, and the Clark Property) could continue to function and the buildings and other structures are retained, but some of the historic attributes, including their integrity of setting, feeling and association, are permanently lost. Mitigation of the impacts to the Co-op Ditch are identical to those of Revised G Modified Alternative, since the lineal feet impacted is identical, as are the portions and locations of the impacted ditches. Mitigation of

impacts to the Webb-Hotter Lateral are more difficult since Revised F Modified Alternative touches or crosses the ditch in two locations, one location as it crosses the Webb Ranch and a second as it crosses the Schaeferhoff- Cowan Ranch. Although ditch functions can be restored, because over 3,000 lineal feet (of both ditches) are impacted, the historic attributes are difficult to restore.

Eastern Realignment Alternative

The Eastern Realignment Alternative uses four Section 4(f) properties: two ranches and the two ditches. As with Revised G Modified Alternative and Revised F Modified Alternative, the ability of this alternative to mitigate the impact to the ranch properties (Craig Limousin Ranch and Schaeferhoff-Cowan Ranch) is difficult. The amount of property used is 21.0 acres from the Craig Limousin Ranch and 42.7 acres from the Schaeferhoff-Cowan Ranch. These two ranches would continue to function, but some of their historic attributes, including the integrity of setting, feeling and association, are permanently lost. Mitigation of impacts to the Co-op Ditch are similar to those of the other two alternatives, even though the lineal feet impacted by this alternative is greater. Mitigation of impacts to the Webb-Hotter Lateral are easier with this alternative than with the Revised F Modified Alternative since only one segment is impacted, on the Schaeferhoff-Cowan Ranch. Ditch functions can be restored, but historic attributes are difficult to restore.

6.2.2 Relative Severity of the Remaining Harm

Information is included below, for each alternative, describing the relative severity of the remaining harm, after mitigation, to the protected activities, attributes or features that qualify each Section 4(f) property for protection.

Revised G Modified Alternative

The relative severity of the remaining harm to the two ranches is similar to each other and similar to the Eastern Realignment Alternative, which also uses two ranches. Some of their historic attributes, including setting, feeling and association, are permanently lost. This alternative and the Eastern Realignment Alternative also are similar in the relative severity of remaining harm to the Co-op Ditch. In both cases, ditch functions can be restored and historic attributes are retained. Compared to the other two alternatives, this alternative results in the least relative severity of remaining harm to the stand-alone segment of the Webb-Hotter Lateral, since it has no effect to this Section 4(f) property.

Revised F Modified Alternative

The relative severity of remaining harm to the affected ranches is similar as a result of this alternative, when compared to the other two alternatives. However, since this alternative uses the most ranches: four instead of two, the relative severity is greater because some of the historic attributes, including setting, feeling and association of four ranches are permanently lost. This alternative is also the only alternative to adversely affect the Clark Property.

The relative severity of remaining harm to the Co-op Ditch is similar to the other alternatives. This alternative has the greatest relative severity of remaining harm to the two Webb-Hotter Lateral segments, since it touches or crosses the ditch in two locations. Although ditch functions can be restored, the historic attributes of the stand-alone segment are difficult to restore.

Eastern Realignment Alternative

The relative severity of the remaining harm to the two ranches is similar to each other and similar to the Revised G Modified Alternative, which also uses two ranches. Some of their historic attributes, including setting, feeling and association, are permanently lost. This alternative and the Revised G Modified Alternative also are similar in the relative severity of remaining harm to the Co-op Ditch. In both cases, ditch functions can be restored and historic attributes are retained. Compared to the other two alternatives, this alternative results in the least relative severity of remaining harm to the stand-alone segment of the Webb-Hotter Lateral, since it has no effect to this Section 4(f) property.

6.2.3 Relative Significance of Each Section 4(f) Property

The six Section 4(f) properties that are evaluated in this document are not noticeably different from each other in terms of their relative significance. Each of the four ranches has similar importance in terms of their historic associations with ranching in the Florida Mesa area and their intact examples of ranching-related architecture and other features. Similarly, the two ditches are similar in relative significance to each other: each was important in the development of the historical ranching communities on Florida Mesa.

6.2.4 Views of the Officials with Jurisdiction over the Section 4(f) Properties

The State Historic Preservation Officer has concurred with the effect determinations of adverse for all ranches and for the Webb-Hotter Lateral and of not adverse for the Co-op Ditch. The SHPO has not indicated any differing opinion relative to the significance of any of the properties or the significance of the use associated with any particular alternative.

6.3 Degree to Which Each Alternative Meets Project Purpose and Need

The following information describes the degree to which each of the three alternatives evaluated for least harm meets the project purpose and need. To summarize, all three alternatives satisfactorily meet project purpose and need and are able to meet the projected 2030 traffic volumes at Level of Service D or better. In order to determine which alternative best meets the project purpose and need, various factors were compared to identify how well each alternative achieves this criteria. Access, safety, and capacity components of the purpose and need are each addressed in the following sections. Additional analyses and documentation are provided in Attachment C, Traffic Memoranda and Analyses.

6.3.1 Access

Access control was evaluated to determine which alternative better promotes an access management system that meets the expectations of a high-speed, high volume highway through appropriate control of access frequency and spacing.

All three alternatives include two through lanes in each direction through the Grandview Section with interchanges at the Grandview location, CR 233 (Three Springs) and SH 172/CR 234. Local access within this corridor will be managed with a local frontage road system to limit direct access to the highway only at the interchanges. Additionally, each alternative includes establishing an access line along the corridor to preclude future additional accesses. Within the Grandview Section, there are no other accesses proposed other than the three interchanges. The approximate distances between the interchanges are tabulated below:

- ▶ Between Grandview Interchange and Three Springs Interchange = 5,600 feet
- ▶ Between Three Springs Interchange and SH 172/CR 234 = 7,150 feet

The analysis shows that access for the three alternatives exhibit the same frequency and spacing between interchanges. Regardless of where US 550 connects to US 160, local access to US 160 is managed by a frontage road system to minimize access to US 160 only at the planned interchanges. Therefore, the degree with which the alternatives meet purpose and need for access is the same for all three alternatives.

6.3.2 Safety

Safety was evaluated to determine which alternative more safely accommodates the traffic volumes associated with the connection of US 550 to US 160.

Revised G Modified Alternative connects US 550 to US 160 via the Grandview trumpet interchange and traffic on US 550 is accommodated at its intersection with US 160 by a roundabout that is expected to operate at an acceptable level of service in the year 2030.

Alternatives Revised F Modified Alternative and the Eastern Realignment Alternative connect US 550 to US 160 via the Three Springs SPUI interchange. Traffic on US 550 is accommodated at its intersection with US 160 by a SPUI and controlled by a traffic signal that is expected to operate at an acceptable level of service in the year 2030.

Roundabouts have specific benefits over intersections from a safety standpoint including the following:

- ▶ Lower speeds and lower speed differential. Lower speeds associated with roundabouts allow drivers more time to react to potential conflicts.
- ▶ Fewer number of driver decisions. Drivers only need to be aware of vehicles to their left at entry of roundabouts. Drivers at traffic signals need to be aware of traffic coming from as many as three directions at any time. In addition the driver must remain aware of the signal indication while monitoring the vehicle movements through the intersection.
- ▶ Less severe crashes. Severity of crashes is based on the relative speed and angle of the conflicting streams. Most vehicles travel at similar speeds through roundabouts with a small angle between the vehicle paths. The potential for hazardous conflicts, such as right angle and left turn head-on crashes is eliminated in roundabout use.

The analysis shows that a roundabout controlled intersection is more likely to provide safer operations than a conventional traffic signal due to the lower speeds, fewer conflicting movements and the elimination of head-on and broad-side crashes that are typically associated with injury crashes. Based on these factors, the Revised G Modified Alternative has a higher degree of safety benefit compared to Revised F Modified Alternative and the Eastern Realignment Alternative.

6.3.3 Capacity

The capacity analysis evaluates the connection of US 550 to US 160 to determine which alternative can accommodate more future traffic volume growth beyond the year 2030 forecasted volumes. The year 2030 volumes and traffic represent the basis for which the reserve capacity is measured in the additional analysis. The procedure involved in evaluating the alternatives consists of:

- ▶ Begin with the Year 2030 traffic volumes and report results.
- ▶ Inflate the traffic volumes at the intersection of US 550/US 160 in two percent increments until an intersection or individual movement for an alternative fails.
- ▶ For the traffic signal operations, the signal phasing and cycle length is then optimized to see if a timing solution could extend the capability of the traffic operations to have capacity for more volume.
- ▶ After optimization of the signal phasing and cycle length, the volumes are increased to the point where a movement cannot meet LOS D or better, the alternative is considered to fail.
- ▶ The last alternative that continues to meet the purpose and need for capacity is considered to have the most reserve capacity.

Under Revised G Modified Alternative for the Year 2030, the roundabout overall and each approach are expected to operate well at LOS A during the morning and evening peak periods. The merge from Ramp C is expected to operate at LOS B during the morning peak period and LOS C during the evening peak period. Inflating the traffic volumes by two percent, the roundabout as well as each approach is expected to operate well at LOS A during the morning and evening peak periods. The merge from Ramp C is expected to operate at LOS B during the morning peak period and LOS C during the evening peak period.

Under Revised F Modified Alternative and the Eastern Realignment Alternative for the year 2030, the signalized intersection at the Three Springs SPUI is expected to operate at LOS C during the morning and evening peak periods and all of individual movements are expected to operate at LOS D or better during both peak periods. Inflating the traffic volumes by two percent to determine if the intersection is able to absorb this level of volume increase beyond the year 2030, the signalized intersection at Three Springs is expected to operate at acceptable LOS C during the morning and evening peak periods, but the northbound left turn is expected to operate at LOS E during the evening peak period due to a failing northbound left turn movement.

The analysis shows that for Revised F Modified Alternative and the Eastern Realignment Alternative, a traffic signal at Three Springs intersection fails if traffic volumes were increased by two percent beyond the year 2030 projected traffic volumes. Increasing traffic volumes by two percent beyond the year 2030 for Revised G Modified Alternative results in a LOS A with more reserve capacity for the roundabout. Based on these projections, the roundabout at the Grandview Interchange (Revised G Modified Alternative) has more reserve capacity and a better LOS beyond year 2030 demonstrating a higher degree of meeting the purpose and need for capacity than a signalized intersection at the Three Springs Interchange (Revised F Modified Alternative and Eastern Realignment Alternative).

6.4 Impacts to Other Social and Environmental Resources

Impacts to environmental and social resources were quantified for each alternative using a combination on the ground reconnaissance, aerial photography interpretation, and available mapping data from agency GIS files. Archaeological resource surveys were completed for the Eastern Realignment Alternative, Revised F Modified Alternative, and Revised G Modified Alternative alignments. Table 8 provides a summary of impacts to social and environmental resources by alternative.

Table 8. Summary of Impacts to Social and Environmental Resources by Alternative

Alternative	Irrigated Farmland (acres)	Wildlife Habitat (acres)	Elk Winter Range (acres)	Elk Severe Winter Range (acres)	Elk Winter Conc. Area (acres)	Deer Winter Range (acres)	Deer Severe Winter Range (acres)	SWWF Habitat (acres)	Bald Eagle Winter Range (acres)	Bald Eagle Winter Conc. Area (acres)	Wetlands (acres)	Eligible Archaeological Sites	ROW Impacts No. of Residences	ROW Impacts Total Acres	Commercial Use Impacts
Eastern Realignment Alternative	33.7	49.1	114.4	114.4	0.0	114.4	114.4	1.1	114.4	19.6	3.2	8 sites	6	133.0	Gravel pit
Revised F Modified Alternative	38.2	42.2	109.2	109.2	0.0	109.2	109.2	0.0	109.2	38.5	1.8	6 sites	4	106.2	Gas well
Revised G Modified Alternative	18.4	42.5	81.4	81.4	26.2	81.4	81.4	0.0	81.4	51.3	0.1	3 sites	0	71.6	None

Abbreviations:

SWWF = Southwestern willow flycatcher

The Revised G Modified Alternative has the least amount of impact to twelve of the fifteen environmental resources: irrigated farmlands, deer and elk winter and severe winter range, southwestern willow flycatcher habitat, Bald eagle winter range, wetlands, eligible archaeological sites, number of residences, total right-of-way needed, and commercial use impacts. Quantities of impact are noticeably lower for irrigated farmland, elk winter range, elk severe winter range, deer winter range, deer severe winter range and bald eagle winter range. For the southwestern willow flycatcher habitat, Revised F Modified also has no impact, along with the Revised G Modified Alternative.

The Revised G Modified Alternative has noticeably fewer wetland impacts compared to the other alternatives. Approximately 0.1 acre of wetlands is likely impacted by Revised G Modified Alternative, which is an order of magnitude lower in impacts compared to Revised F Modified Alternative (1.8 acres) and the Eastern Realignment Alternative (3.2 acres).

The Revised G Modified Alternative results in adverse effect determinations to only three archaeological sites. The Revised F Modified Alternative results in adverse effect determinations to six archaeological sites. The Eastern Realignment Alternative results in adverse effect determinations to the most archaeological sites (eight). None of these archaeological sites are afforded protection under Section 4(f); however, they are all eligible properties and protected under Section 106 of the National Historic Preservation Act.

Impacts to elk and bald eagle winter concentration areas are highest for the Revised G Modified Alternative. Within winter concentration areas for elk, Revised G Modified Alternative impacts approximately 26 acres of habitat while alternatives further to the east (Eastern Realignment Alternative and Revised F Modified Alternative) do not impact this habitat. Bald eagle winter concentration area impacts are higher for Revised G Modified Alternative compared to Revised F Modified Alternative and the Eastern Realignment Alternative, with the Eastern Realignment Alternative having the least impact of approximately 19.6 acres versus 51.3 acres for Revised G Modified Alternative and 38.5 acres for the Revised F Modified Alternative.

None of the alternatives would restrict the continuation of commercial ranching operations on the four historic ranches. Both Revised F Modified Alternative and Eastern Realignment Alternative have other commercial impacts, namely the replacement of a gas well and removal from production of a gravel pit, respectively.

6.5 Cost Comparison Among Section 4(f) Alternatives

Estimated costs for all alternatives considered under the Section 4(f) evaluation are documented in Attachment E in a Memorandum from the CDOT Program Engineer to FHWA. Estimated costs for alternatives included in the Section 4(f) evaluation are presented in Table 9.

Table 9. Relative Costs for US 550/US 160 Connection Alternatives

Alternative	Estimated Cost	Comments
Eastern Realignment Alternative	\$92,753,000	ROW estimated at \$20,000/acre residential and \$100,000/acre commercial; does not include costs for Grandview, Three Springs, and Elmore's Corner Interchange
Revised F Modified Alternative	\$78,394,000	ROW estimated at \$14,000/acre of agricultural land; includes farm access, wildlife crossings, bridges and ramps at Grandview Interchange; does not include costs for Grandview, Three Springs, and Elmore's Corner Interchange
Revised G Modified Alternative	\$79,680,000	ROW estimated at \$14,000/acre of agricultural land; includes additional ramps and bridges at Grandview Interchange for US 550 connection; does not include costs for the Three Springs and Elmore's Corner Interchanges

Alternatives evaluated in the least harm analysis have comparable costs with a 20 percent disparity between the lowest cost (Revised F Modified Alternative) and highest cost (Eastern Realignment Alternative).

The relative difference in costs among the alternatives that were eliminated as not feasible and prudent range from approximately 250 to 400 percent higher than the least harm alternatives. Although costs were not considered in the prudent and feasible determination because of other outstanding factors that rendered certain alternatives not feasible and prudent, the large discrepancy in costs between the least harm alternatives compared to the eliminated alternative is substantial enough to warrant additional support for their elimination.

6.6 Summary of Least Overall Harm Analysis

Revised G Modified Alternative has less overall harm to Section 4(f) properties because it uses three Section 4(f) properties: the Webb Ranch, Craig Limousin Ranch and Co-op Ditch. Revised F Modified Alternative uses the Webb, Craig Limousin and Schaeferhoff-Cowan Ranches, the Clark Property and the Webb-Hotter Lateral ditch at three locations. The Eastern Realignment Alternative results in a use of two historic ranches including the Schaeferhoff-Cowan Ranch and the Craig Limousin Ranch Property, as well as uses to segments of the Webb-Hotter Lateral and Co-op ditches.

Quantitative comparison of impacts provided in Table 7 shows the relative magnitude of associated impacts to the ranches and ditches for consideration. Revised G Modified Alternative and Revised F Modified Alternative have the least impacts to the Co-op Ditch and Revised G Modified Alternative has no impacts to the Webb-Hotter Lateral Ditch.

Use of historic ranches weighs heavily in the least harm analysis because the magnitude of impacts from highway construction cannot be easily mitigated. The severity of harm cannot be directly compared based on acreages of impact alone due to the inability to mitigate the character, setting, feeling, and association that contributes to each ranch's historic eligibility. For example, the relatively smaller size of the Schaeferhoff-Cowan Ranch, or the lower percentage of use of land on the Webb Ranch does not necessarily justify any of these three alternatives as having the least harm.

The relative severity of remaining harm to the two segments of the Webb-Hotter Lateral is worse with the Eastern Realignment Alternative and with Revised F Modified Alternative, simply because Revised G Modified Alternative does not affect this property.

For the least harm analysis, all four ranches are considered to be similarly important as historic properties based on their historic associations with ranching in the Florida Mesa area and their intact examples of ranching-related architecture and other features. Protection of structures and aligning the highway along the property boundaries would provide a measure of separation for continued ranching operations thus lessening the harm. However, these measures provide only minor considerations in the least harm analysis because the historic integrity of any of the ranches would be irreparably harmed by highway construction. Revised F Modified Alternative uses four ranches. The Eastern Realignment Alternative and Revised G Modified Alternative each use only two ranches.

Revised G Modified Alternative better responds to both the safety and capacity components of the project purpose and need.

Comparison of impacts to environmental and social resources for the three alternatives on the Webb Ranch provides additional factors to consider in the least harm analysis. Fewer impacts to irrigated farmland, deer and elk winter and severe winter range, bald eagle winter range, wetlands, eligible archaeological sites, residential, commercial and total right-of way-use provide support for Revised G Modified Alternative as the least harm alternative. Lower relative costs for Revised F Modified Alternative is more favorable over the other alternatives.

In summary, Revised G Modified Alternative is considered to be the least overall harm alternative based on the following:

- ▶ This alternative uses three Section 4(f) properties; all other feasible and prudent alternatives use more than three Section 4(f) properties.
- ▶ This alternative better responds to both the safety and the capacity elements of the project purpose and need.
- ▶ This alternative results in adverse effect determinations to three archaeological sites. Revised F Modified Alternative results in adverse effect determinations to six archaeological sites. The Eastern Realignment Alternative results in adverse effect determinations to the most archaeological sites (eight).
- ▶ This alternative has noticeably fewer wetland impacts compared to the other alternatives.
- ▶ This alternative has the least impacts to irrigated farmlands, elk winter range, elk severe winter range, deer winter range, deer severe winter range, south western willow flycatcher habitat, and bald eagle winter range.
- ▶ This alternative has the least impacts to existing land uses: number of residences, number of commercial uses, and total right-of-way required.

Table 10 provides a summary of the three alternatives and their relative responsiveness to the seven least overall harm factors.

7.0 All Possible Planning to Minimize Harm

Section 4(f) requires all possible planning to minimize harm as defined in CFR 774.3(a)(2). In addition to the mitigation measures discussed in Section 6.2, other measures to minimize harm include design options, such as narrower roadway width, retaining walls, underpass and irrigation designs, and steeper slopes will be considered during final design of the roadway. Mitigation measures specific to Section 4(f) properties addressed in this Section 4(f) evaluation are outlined below:

- ▶ To mitigate historic ditch impacts in general, a Public Information Notice will be published. This would consist of a one-page, tri-fold interpretive brochure that includes a description of the role of irrigation in the settlement of the region, a map showing the irrigation ditches crossed by the highway, and a brief history of each ditch.
- ▶ In the event that previously unknown cultural deposits are discovered during construction, work will cease in the area of discovery and the CDOT archaeologist will be notified. The CDOT archaeologist, or a designated representative, will evaluate any such discovery, (including their possible protection under Section 4(f)), and in consultation with SHPO, will complete appropriate mitigation measures before construction activities resume. Further, the construction contractor will be responsible for

Table 10. Summary of Least Overall Harm by Alternative

Alternative	Summary of Section 4(f) Use	Ability to Mitigate	Severity of Remaining Harm	Significance of Properties	Views of Officials with Jurisdiction	Purpose and Need Responsiveness	Impacts to other Resources	Substantial Differences in Cost
Eastern Realignment	2 ranches Total acreage: 63.6 2 ditches Total lineal feet: 2,101	Easier to mitigate than Revised F Modified.	Remaining harm is not as severe.	Neutral	Neutral	Not as responsive to safety and capacity elements.	Most impact to 12 of 15 resources evaluated. Least impact to 1 resource.	Most costly
Revised F Modified	4 ranches Total acreage: 95.4 2 ditches Lineal feet: 3,007	Most difficult to mitigate.	Greatest remaining harm.	Neutral	Neutral	Not as responsive to safety and capacity elements.	Most impact to 2 resources. Moderate impacts to 10 resources. Least impact to 3 resources.	Lowest cost
Revised G Modified	2 ranches Total acreage: 64.13 1 ditch Lineal feet: 488	Easier to mitigate than Revised F Modified.	Remaining harm is not as severe.	Neutral	Neutral	Most responsive to safety and capacity elements.	Least impact to 12 of 15 resources evaluated. Most impact to 2 resources.	Moderate costs

informing all persons associated with this project that they would be subject to prosecution for knowingly disturbing any historic properties or for collecting artifacts.

- ▶ The affected irrigation ditch segments would be recorded in accordance with Colorado Historical Society's standards for Level II documentation as compensation for these losses. Functional irrigation systems will be restored during construction with no interruption of services that may hinder continued farming and ranching operations. The temporary inability to maintain irrigation service will require compensation for lost value of crops.
- ▶ Detailed recording of each affected ranch in accordance with Colorado Historical Society's standards for Level II documentation will be conducted.
- ▶ A farm equipment/wildlife underpass will be installed beneath the highway to provide passage for continued farming and ranching operations, wildlife and livestock.

Historic features that contribute to the ranches' eligibility will be protected during construction and avoided to the extent practicable. Any features that require modification for construction (fences, corrals, land features, etc.) will be restored to their current condition.

8.0 Record of Coordination

Coordination with the appropriate agencies for eligibility and determination of effects has occurred. The coordination effort included submittal of site forms, recommendation of eligibility and effects, and the mitigation measures to the SHPO and La Plata County Historical Society on January 4, 2008, and again on November 9, 2009 and August 6, 2010, with written concurrence from the SHPO dated January 18, 2008, December 1 and 11, 2009, and August 25, 2010 (see Attachment A). Supplemental correspondence with the SHPO occurred on December 8, 2010 with concurrence received on December 16, 2010. SHPO will be included in future coordination with the local government agency as requested in the concurrence letters.

In addition, six Section 106 consulting parties have received the letters with recommendations of eligibility and effects. These consulting parties include the Webb Ranch/family, Peggy Cooley (Cowan Ranch), Shannon Bennett (Clark Property), the Southern Ute Indian Tribe, the Pueblo of Laguna and the Hopi Tribe. Letters received from the consulting parties are in Attachment A.

The Advisory Council on Historic Preservation has elected to participate in the project and has been provided with the Section 106 consultation documentation.

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