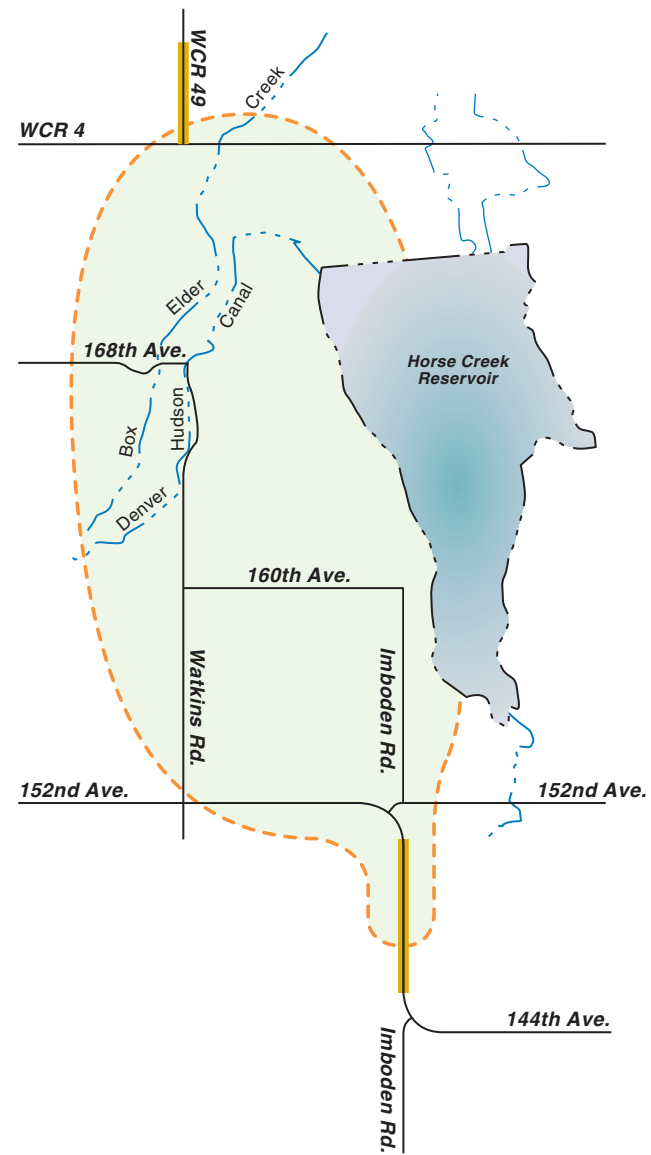
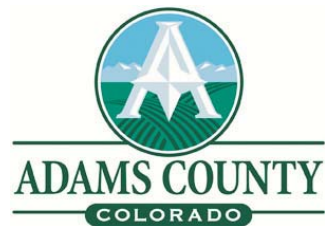


# Weld County Road 49/Imboden Road Alignment Study



April 2009



## Weld County Road 49/Imboden Road Alignment Study

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FHU Reference No. 08-209  
April 2009



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# Weld County Road 49/Imboden Road Alignment Study

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# Weld County Road 49/Imboden Road Alignment Study

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## I. INTRODUCTION

### Project Background

Weld County Road 49 is one of seven roadways identified as a strategic corridor in Weld County. Imboden Road has been identified in Adams County as a major regional arterial that connects Interstate 70 to Weld County. Due to the significance of Weld County Road 49 and Imboden Road in both counties, and the need to connect these two roads to improve regional mobility, this study serves as part of the coordination and planning that needs to occur between Weld County and Adams County.

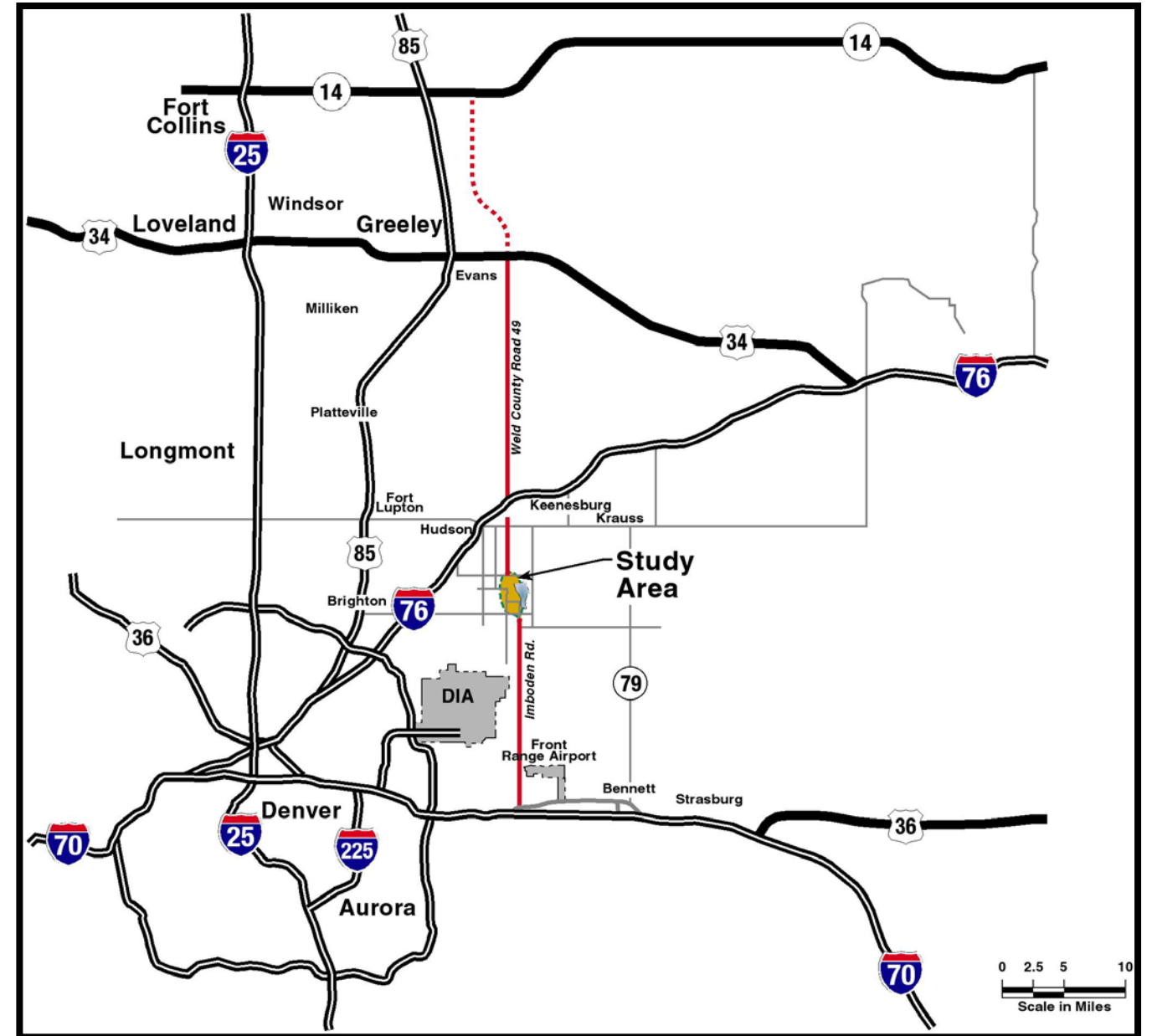
### Study Purpose

The purpose of this study is to identify a preferred alignment that will connect Weld County Road 49 in Weld County to Imboden Road in Adams County. The preferred arterial alignment will establish an important link for regional mobility between State Highway 14 from the north to Interstate 70 to the south as shown in **Figure 1**.

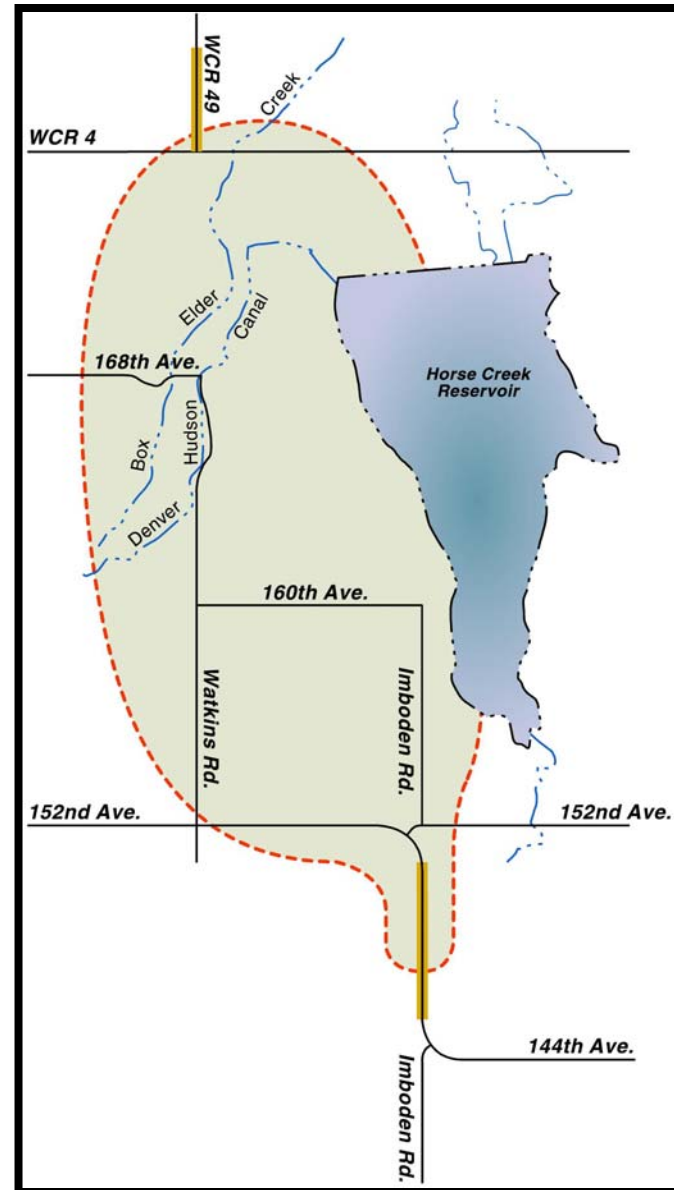
The preferred arterial alignment will improve the connectivity between the jurisdictions so that future traffic demands can be accommodated with planned improvements. By identifying a preferred alignment at this time, this study will serve as a guide for Weld County and Adams County to preserve rights-of-way for the alignment so it can be constructed as needed. Planning now will allow the improvements to be implemented in an orderly fashion and will allow for minimized disruption in the future. The corridor study area is shown graphically in **Figure 2**.

It is important to realize that this effort is a planning effort. The intent is to conduct just enough schematic design to assess alignment alternatives for the sake of preserving right-of-way. There is currently no funding to construct this roadway, and the necessary funds may not come to fruition for many years.

**Figure 1. Regional Transportation Network**



**Figure 2. Corridor Study Area**



## Study Process

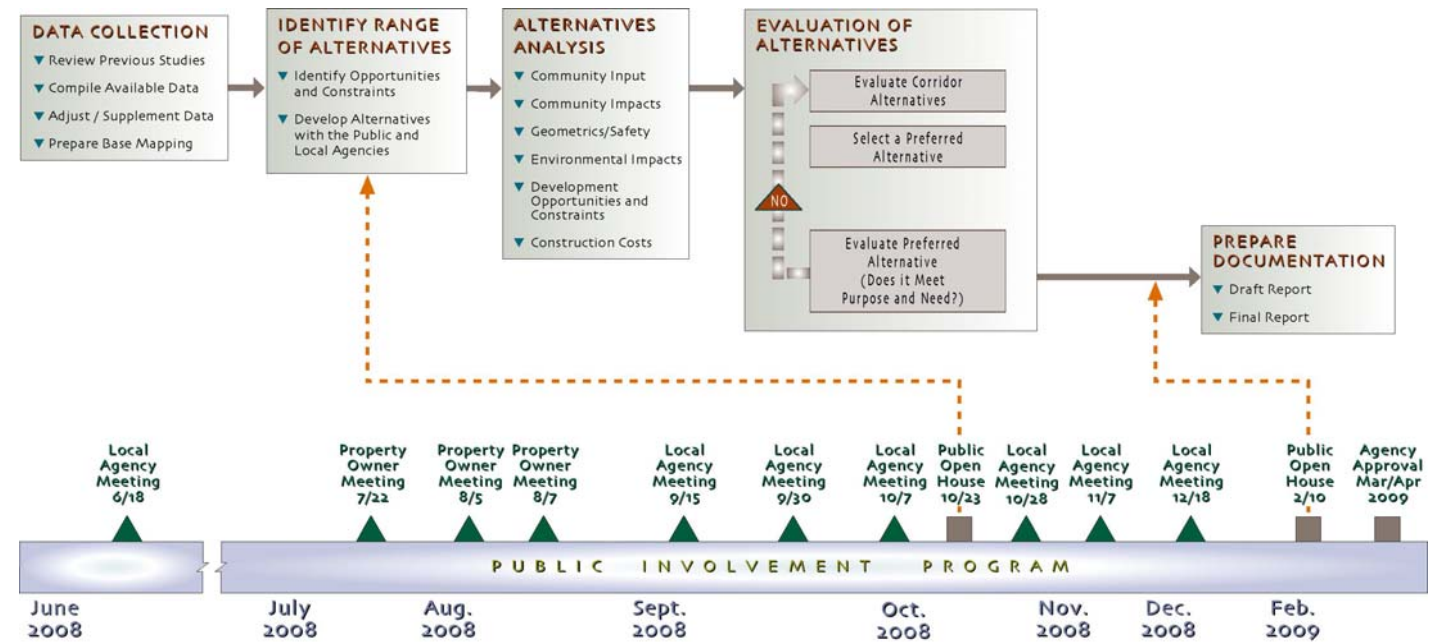
The study was initiated with an extensive data collection effort to better understand the opportunities and the constraints within the corridor study area. Parcel ownership, proposed development plans, and other relevant information was collected by the Counties. Including but not limited to ecological assessment

reports, bald eagle data, and riparian data. With the collected data and with input from the public (including representatives of the local entities), a number of alternatives were identified within the corridor study area. These alternatives were then evaluated based on a number of factors including:

- ▶ Community Input
- ▶ Community Impacts
- ▶ Geometrics / Safety
- ▶ Environmental Impacts
- ▶ Development Opportunities and Constraints
- ▶ Construction Costs

The results of this evaluation process were then discussed with the local entity representatives, and a preliminary preferred arterial alignment was identified. The preliminary preferred arterial alignment was presented to the public for comment at a final public open house. The results of the study were then assembled into this Report. The study process is shown graphically in **Figure 3**.

**Figure 3. Work Plan**





## Public Input

Weld County and Adams County have been actively involved throughout this planning process. A Local Agency Advisory Group, comprised of representatives of the local governments, met seven times throughout the study to provide input on data needs, the identification of alternatives and the evaluation of those alternatives. Input from the Local Agency Advisory Group has been instrumental in selecting the preferred alternative for the corridor study area.

The public has also been an integral part of this process. An initial open house for the project was held in October 2008 to solicit input from the public on concerns, issues, and opportunities for the alternatives within the corridor study area. The public was asked to participate by “voting” for their preferred alternative. Over 61 residents attended the initial open house for the project. A second and final open house for the project was held in February 2009 to receive input from the public on the preliminary preferred alternative; over 48 residents attended.

In order to ensure maximum public involvement for both open house meetings, notification was sent to all of the property owners within the study area (over 600 total notices were mailed) and a notice was posted on Weld County’s web site.

Both the Estates at Bromley Homeowners Association (HOA) and the Boxelder Creek Homeowners Association (HOA) were notified of the final open house. After the first open house, Adams County staff had several conversations with residents of the Estates at Bromley and offered to attend any of their meetings or meet separately with the residents prior to the final open house.



## II. EXISTING AND FUTURE CONDITIONS

The information that was collected during the data collection process served as the basis for creating and evaluating alternative alignments. The sources of the data collection were Weld County, Adams County and other sites such as the National Wetland Inventory. Existing land use plans, transportation plans and specific development plans were compiled as well as aerial photography, right-of-way and parcel ownership information, environmental considerations and USGS topographic information. All of this information, along with numerous site visits, was assembled to determine the physical characteristics of the corridor study area.

As part of the data collection effort, information from Weld County's and Adams County's Geographic Information System (GIS) departments, as well as, the Adams County Comprehensive Plan (Completed January 2004) and Adams County Transportation Plan (Adopted April 1996).

This chapter summarizes the information extracted from these plans and the information received from Weld County's and Adams County's Geographic Information System (GIS) departments.

### Collected Data Information

GIS information obtained from the Counties includes the following:

- ▶ Parcel Boundaries
- ▶ Planned Land Uses
- ▶ Existing Floodplain Limits
- ▶ Jurisdictional Boundaries
- ▶ Aerial Photography (Flown in April – June 2006)

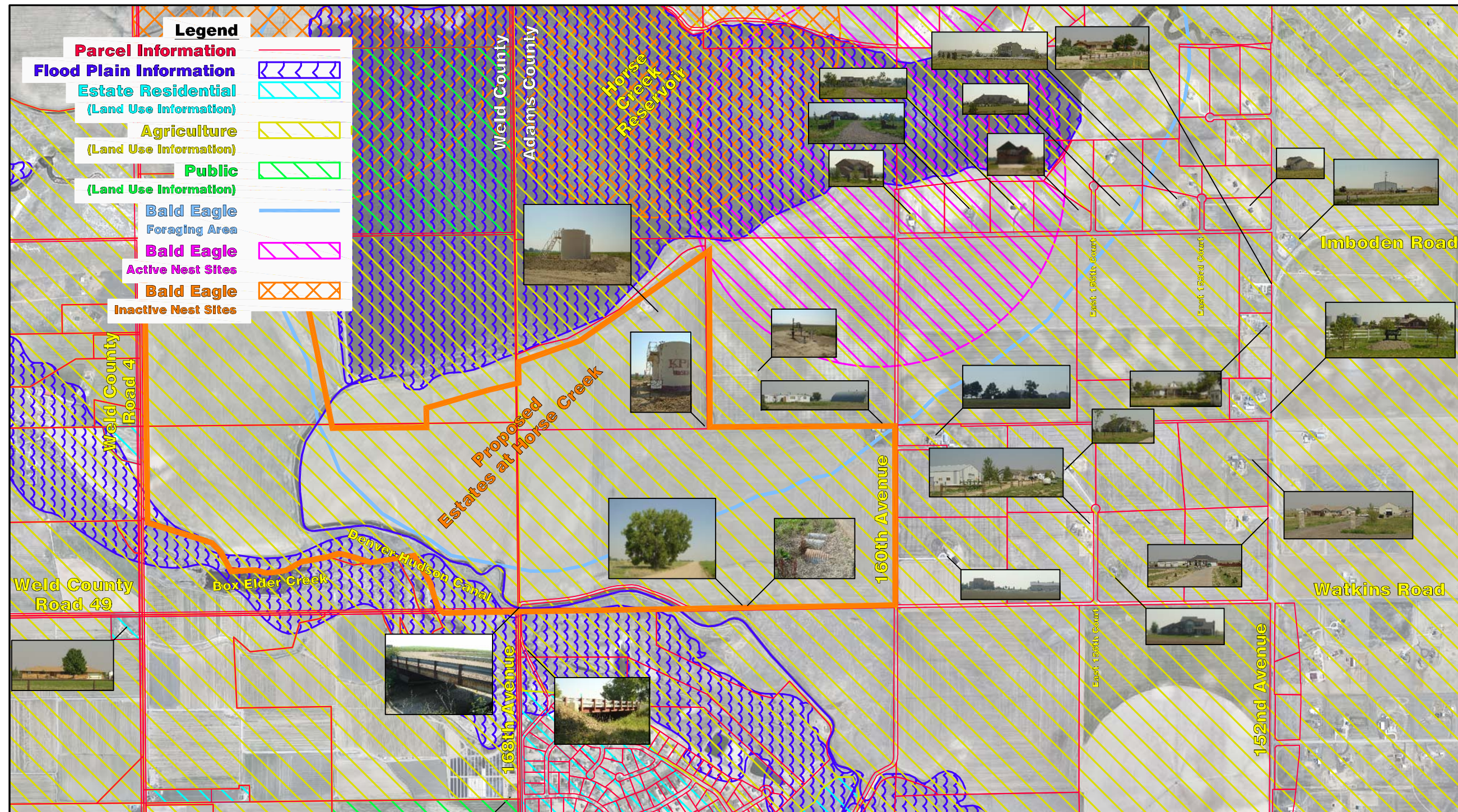
This information was subsidized with site observations to collect other pertinent data required for this study such as:

- ▶ Existing Utility Information
- ▶ Residence and Other Structure Locations
- ▶ Drainageways and Drainage Facilities (Ditches, Pipes, etc.)
- ▶ Gas and Oil Features

The above information is shown graphically in **Figure 4**.



## Existing Features



Aerial Flown April-June 2006

Figure 4



## III. IDENTIFICATION OF ALTERNATIVES

### Design Parameters

Before any alternatives for the corridor study area could be developed, basic design parameters had to be established that could serve as a guideline for the future development of the preferred arterial alignment. Once the design parameter information was gathered from the respective agencies, this information was compiled and approved by the local agencies, and preferred design parameters were established for the corridor study area. It was noted that these design parameters might have to be flexible for certain areas within the study area as the nature of the surrounding area changes. The final design parameters for the proposed improvements should adhere to current approved design criteria from the applicable agencies or to criteria as established by the current version of American Association of State Highway and Transportation Officials (AASHTO) guidelines.

Table 1. Weld County Road 49 / Imboden Road Design Parameters

Design Element		Units
Roadway Classification	Major Arterial	
Posted Speed Limit	55	Mph
Minimum Design Speed	60	Mph
Minimum Lane Width	12	Feet
Minimum Drive Lanes	4	
Minimum Right-of-Way Width	140	Feet
<b>Horizontal Alignment</b>		
Minimum Curve Radius	1,500	Feet
Minimum Stopping Sight Distance	600	Feet
Minimum Length of Tangents Between All Curves	200	Feet
Minimum Clear Zone Distance	32 to 44	Feet
Superelevation (e-max)	4%	
Typical Median Width	17	Feet
Typical Minimum Median Width with Left Turn Lane	5	Feet

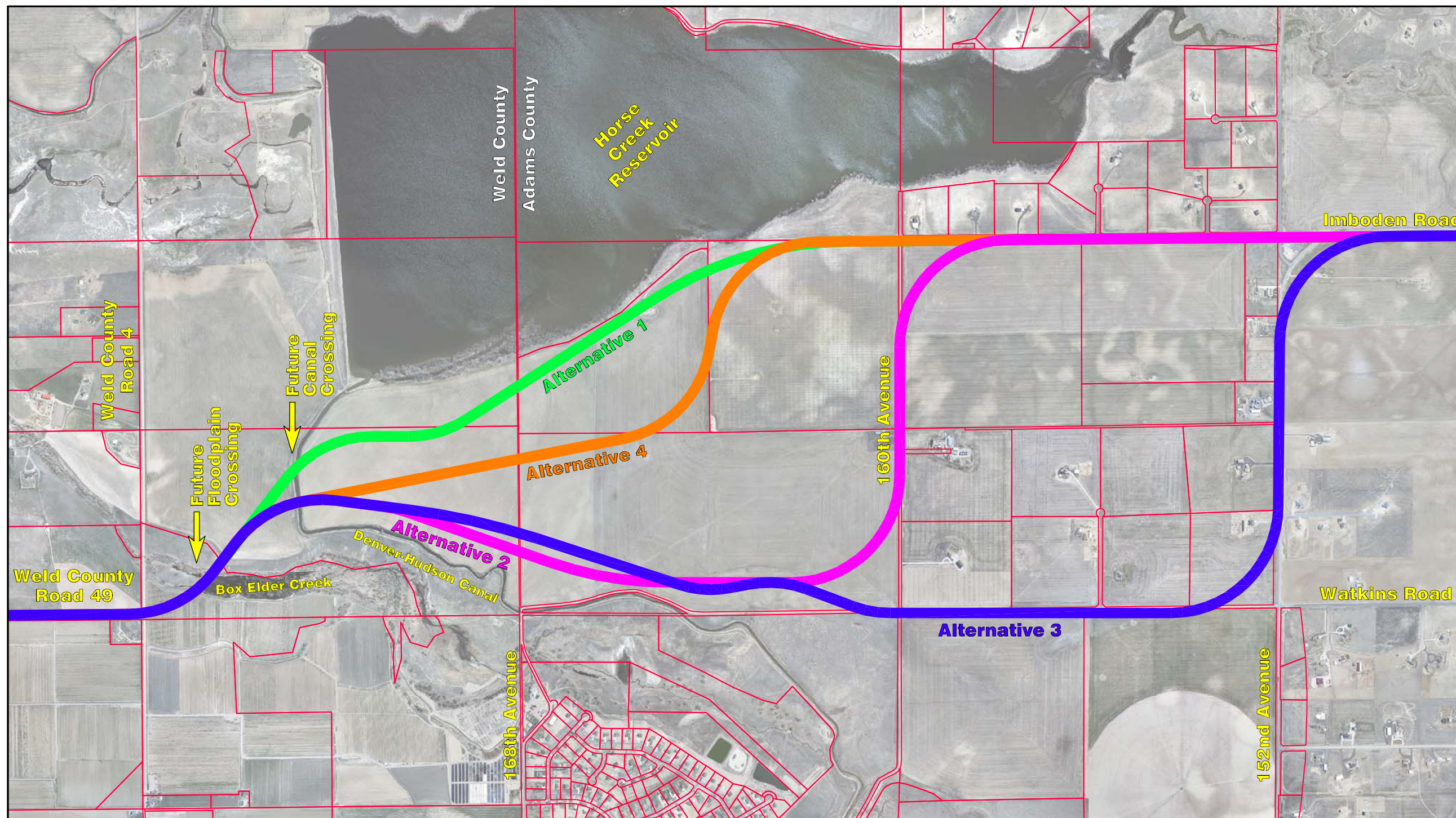
### Construction and Right-of-way Schedule

At the time of writing this Report, no specific schedule has been identified for purchasing rights-of-way and constructing any of the preferred arterial alignment identified within the corridor study area. The construction schedule for any of the designated improvements will be highly dependent on the growth patterns in the corridor study area. The jurisdictional local agencies within the project corridor will use this study as a basis to obtain rights-of-way for the improvements as development occurs. Rights-of-way not obtained through the development process will be purchased as needed. Furthermore, as development occurs, it is anticipated that developments adjacent to the preferred arterial alignment will be responsible for the construction of the improvements as a means to mitigate their traffic impacts. The Counties within the project corridor will ultimately be responsible for those portions not funded by adjacent developments.

### Generation of Alternatives

After the data collection process, several alternatives were generated for the corridor study area. The alternatives were generated based on input received from the public, adjacent developments and the local agencies. The alternatives that were initially generated were sent to the local agencies for comments, and were refined after comments were received. New alternatives and refinements of existing alternatives has been an ongoing effort with additional input from the public and the local agencies. The different alternatives that were evaluated for this study are shown on **Figure 5**.

## Corridor Alternatives



Aerial Flown April-June 2006

Figure 5

## IV. EVALUATION OF ALTERNATIVES

The alternatives within the corridor study area were evaluated based on the criterion listed below:

### Community Input

- ▶ Refers to the general public opinion for the alternative alignments simply measured as favorable or not.

### Community Impacts

- ▶ Access is a measure of the level of convenience and clarity of access to existing developments and adjacent property owners.
- ▶ *Right-of-way Impacts* is a measure of the amount and number of severed parcels, proximity impacts, and/or displaced residences that would be required in order to construct the alternative.

### Geometrics / Safety

- ▶ *Geometrics* are a measure on how well the alternative achieves the preferred design criteria established by the local agencies.
- ▶ *Safety*: Safety is measured by how well the alternative can be designed to meet current design standards with consideration of existing and future conditions. Safety is also a measure of how well roadside obstacles such as the barrier of proposed bridges, the headwall and wingwalls of proposed box culverts and the location of existing and proposed intersections or access locations compliment the alignment of the proposed arterial.

### Environmental Impacts

- ▶ Refers to unfavorable impacts to known environmental conditions. This would include a measure of each alternative's impact on the existing flood plain and/or existing drainage facilities. This would also include any impacts to known wildlife habitat areas such as bald eagles and prairie dogs.

### Construction Costs

- ▶ *Construction Cost* is a relative comparison of costs to construct the alternative.

These criterion were incorporated into an evaluation matrix as shown in **Figure 6**. Each alternative was then evaluated and compared to the other alternatives in order to determine the preferred arterial alternative that scored the best for the corridor study area. The Local Agency Advisory Group consisted of representatives from Weld County and Adams County and a representative from Felsburg Holt & Ullevig. After the preferred arterial alternative was determined, the preferred arterial alternative was then presented to the public at the project's final open house.

**Figure 6. Example Evaluation Matrix**

Weld County Road 49/Imboden Road Alignment Study

---

**Evaluation Matrix**

Submitted by:  
<Insert Name Here>

Evaluation Criteria	Alternative 1 (Green Alignment) Scoring (1 - 5, 1 best)	Alternative 2 (Purple Alignment) Scoring (1 - 5, 1 best)	Alternative 3 (Blue Alignment) Scoring (1 - 5, 1 best)	Alternative 4 (Orange Alignment) Scoring (1 - 5, 1 best)
<b>Community Input</b>				
<i>General Public Opinion of Alternative</i>				
<i>Votes Received at Public Open House</i>	26	0	12	5
<b>Community Impacts</b>				
<i>Access</i>				
<i>Right-of-way Impacts</i>				
<b>Average for Community Impacts</b>	0.00	0.00	0.00	0.00
<b>Geometrics / Safety</b>				
<i>Design Criteria Achieved</i>				
<i>Safety</i>				
<b>Average for Geometrics / Safety</b>	0.00	0.00	0.00	0.00
<b>Environmental Impacts</b>				
<i>Flood Plain/Drainage Facilities/Historical Buildings/Mining Hazards</i>				
<b>Development Opportunities and Constraints</b>				
<i>Proposed Access Locations</i>				
<i>Number of Non-developable Parcels</i>				
<b>Average for Development Opportunities and Constraints</b>	0.00	0.00	0.00	0.00
<b>Construction Cost</b>				
<i>Construction Cost</i>	\$27,174,000	\$29,475,000	\$31,199,000	\$27,210,000
<b>Total (lowest score is preferred)</b>	0.00	0.00	0.00	0.00

The criteria are scored from 1 to 5 with 1 being the best.

This chapter describes the features associated with each alternative in detail.

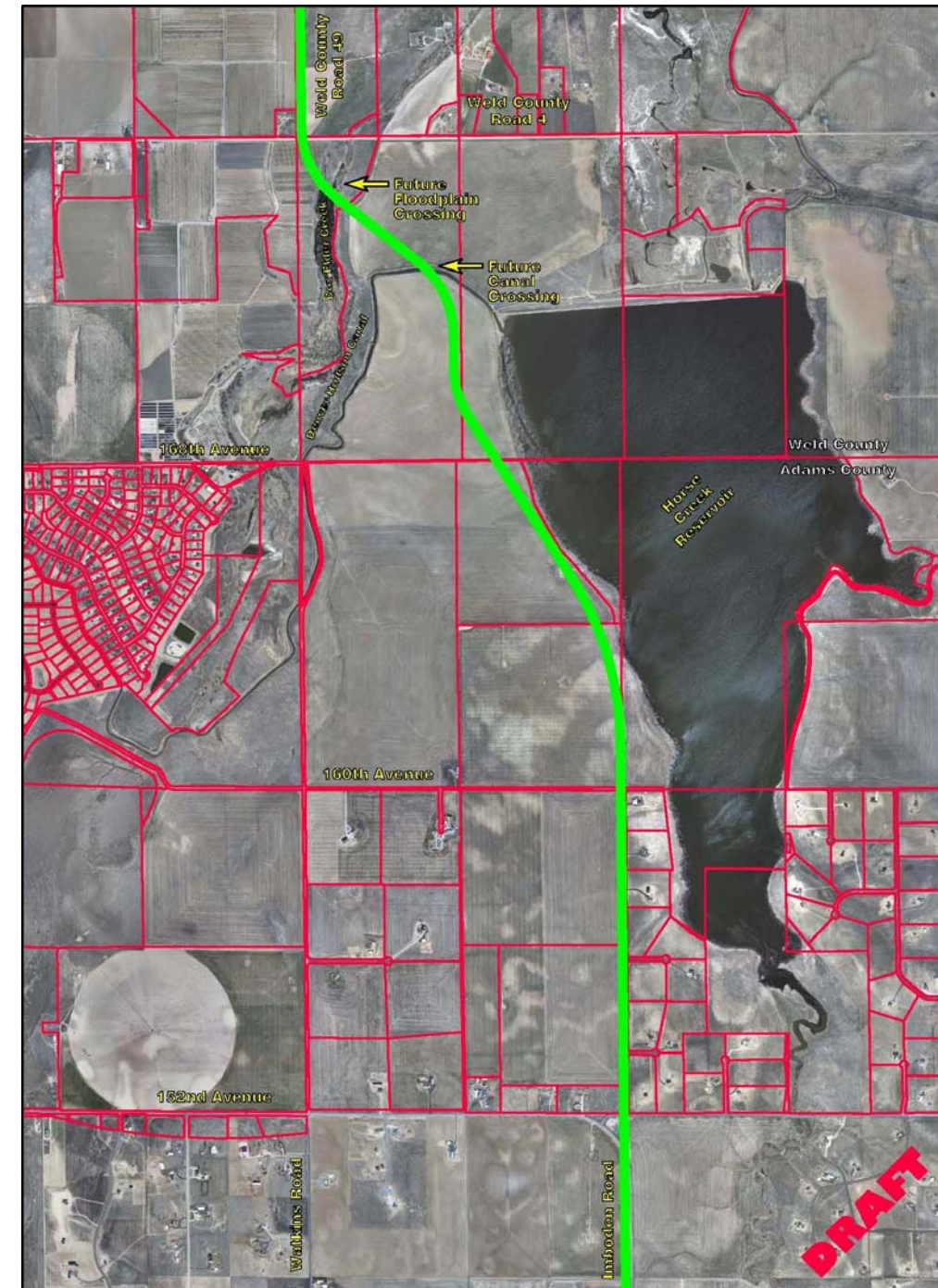
## Alternative 1

Alternative 1 commences south from the Weld County Road 4 and Weld County Road 49 intersection, crosses Box Elder Creek downstream from a man-made dam and shifts to the east before crossing the Denver-Hudson Canal. After crossing the canal, the alignment continues to shift eastward adjacent to Horse Creek Reservoir as it lines up with Imboden Road proceeding south. Discussion has occurred concerning the construction of a frontage road adjacent to Imboden Road south of East 160<sup>th</sup> Avenue. By constructing a frontage road on the east side of Imboden Road, accesses from the individual properties east of Imboden Road can be combined and a natural buffer would be created for the existing residences. The details and final configuration of a frontage road will need to be further analyzed and investigated during the final design process.

### Features of Alternative 1:

- ▶ “Straight Line” Approach Minimizes Overall Length of the Roadway
- ▶ Creates a Separation between Horse Creek Reservoir and Proposed Development
- ▶ Widening of Imboden Road south of East 160<sup>th</sup> Avenue can occur to the West
- ▶ Maintains East 152<sup>nd</sup> Avenue as a East-West thoroughfare without adding North-South Traffic
- ▶ Impacts Existing Residences East of Imboden Road that have Direct Access onto Imboden Road
- ▶ Requires Reconfiguration of the Roadways and Intersection at East 152<sup>nd</sup> Avenue and Imboden Road

Figure 7. Alternative 1



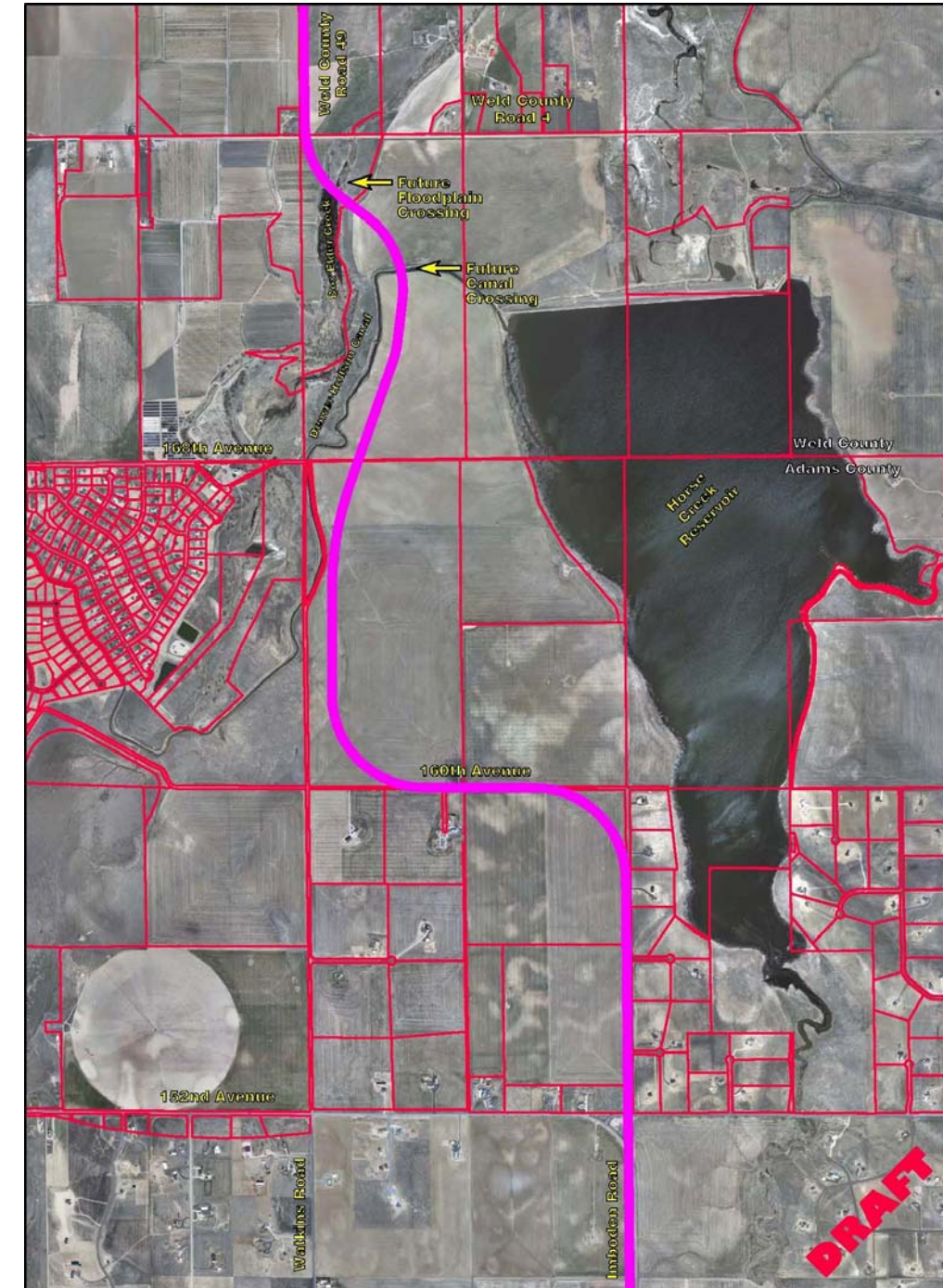
## Alternative 2

Alternative 2 commences south from the Weld County Road 4 and Weld County Road 49 intersection, crosses Box Elder Creek downstream from a man-made dam and shifts to the east before crossing the Denver-Hudson Canal. After crossing the canal, the alignment shifts back to the west and runs adjacent to the Denver-Hudson Canal and existing Watkins Road. This alternative shifts eastward at East 160<sup>th</sup> Avenue and utilizes the existing roadway before shifting southward at Imboden Road. Discussion has occurred concerning the construction of a frontage road adjacent to Imboden Road south of East 160<sup>th</sup> Avenue. By constructing a frontage road on the east side of Imboden Road, accesses from the individual properties east of Imboden Road can be combined and a natural buffer would be created for the existing residences. The details and final configuration of a frontage road will need to be further analyzed and investigated during the final design process.

### Features of Alternative 2:

- ▶ Widening of Imboden Road south of East 160<sup>th</sup> Avenue can occur to the West
- ▶ Maintains East 152<sup>nd</sup> Avenue as a East-West thoroughfare without adding North-South Traffic
- ▶ Curvilinear Roadway Increases Overall Length of Roadway
- ▶ Impacts Existing Residences East of Imboden Road that have Direct Access onto Imboden Road
- ▶ Requires Reconfiguration of the Roadways and Intersection at East 152<sup>nd</sup> Avenue and Imboden Road
- ▶ Crosses the Denver-Hudson Canal Perpendicularly to Minimize Box Culvert Size and Canal Disruption

Figure 8. Alternative 2



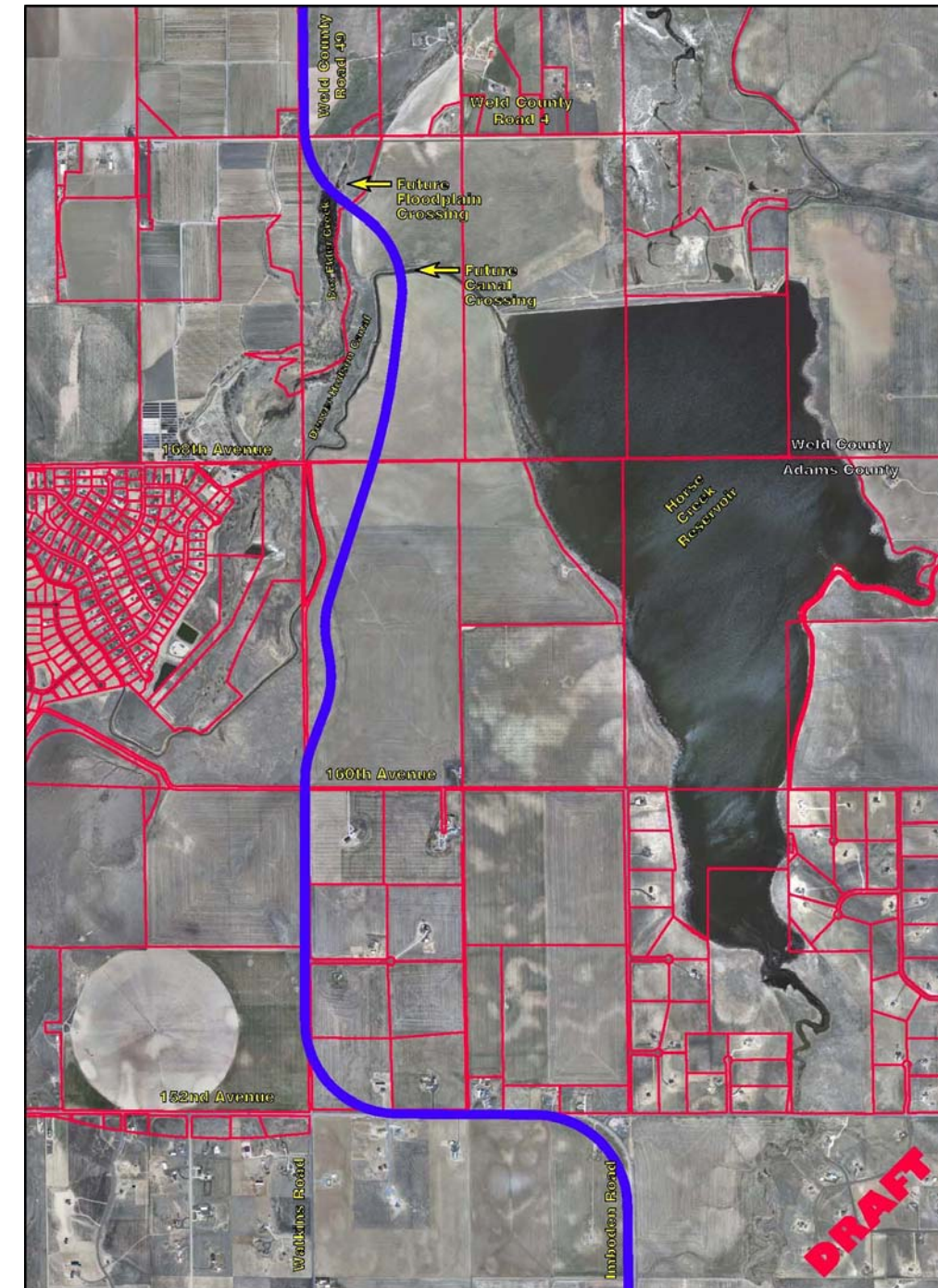
## Alternative 3

Alternative 3 commences south from the Weld County Road 4 and Weld County Road 49 intersection, crosses Box Elder Creek downstream from a man-made dam and shifts to the east before crossing the Denver-Hudson Canal. After crossing the canal, the alignment shifts back to the west and runs adjacent to the Denver-Hudson Canal and existing Watkins Road. This alternative stays on the existing Watkins Road alignment before shifting to the east at East 152<sup>nd</sup> Avenue. The alternative then utilizes existing East 152<sup>nd</sup> Avenue and shifts to Imboden Road similar to the existing shift in the roadway as seen today.

### Features of Alternative 3:

- ▶ Utilizes Existing Roads at Watkins Road and East 152<sup>nd</sup> Avenue
- ▶ Crosses the Denver-Hudson Canal Perpendicularly to Minimize Box Culvert Size and Canal Disruption
- ▶ Impacts Existing Residences that have Direct Access onto East 152<sup>nd</sup> Avenue
- ▶ Adds Additional Traffic to East 152<sup>nd</sup> Avenue
- ▶ Existing Curve at East 152<sup>nd</sup> Avenue and Imboden Road would Require Modifications to Achieve Design Speed
- ▶ Maximizes the Area Available for Future Development West of the Horse Creek Reservoir

**Figure 9. Alternative 3**



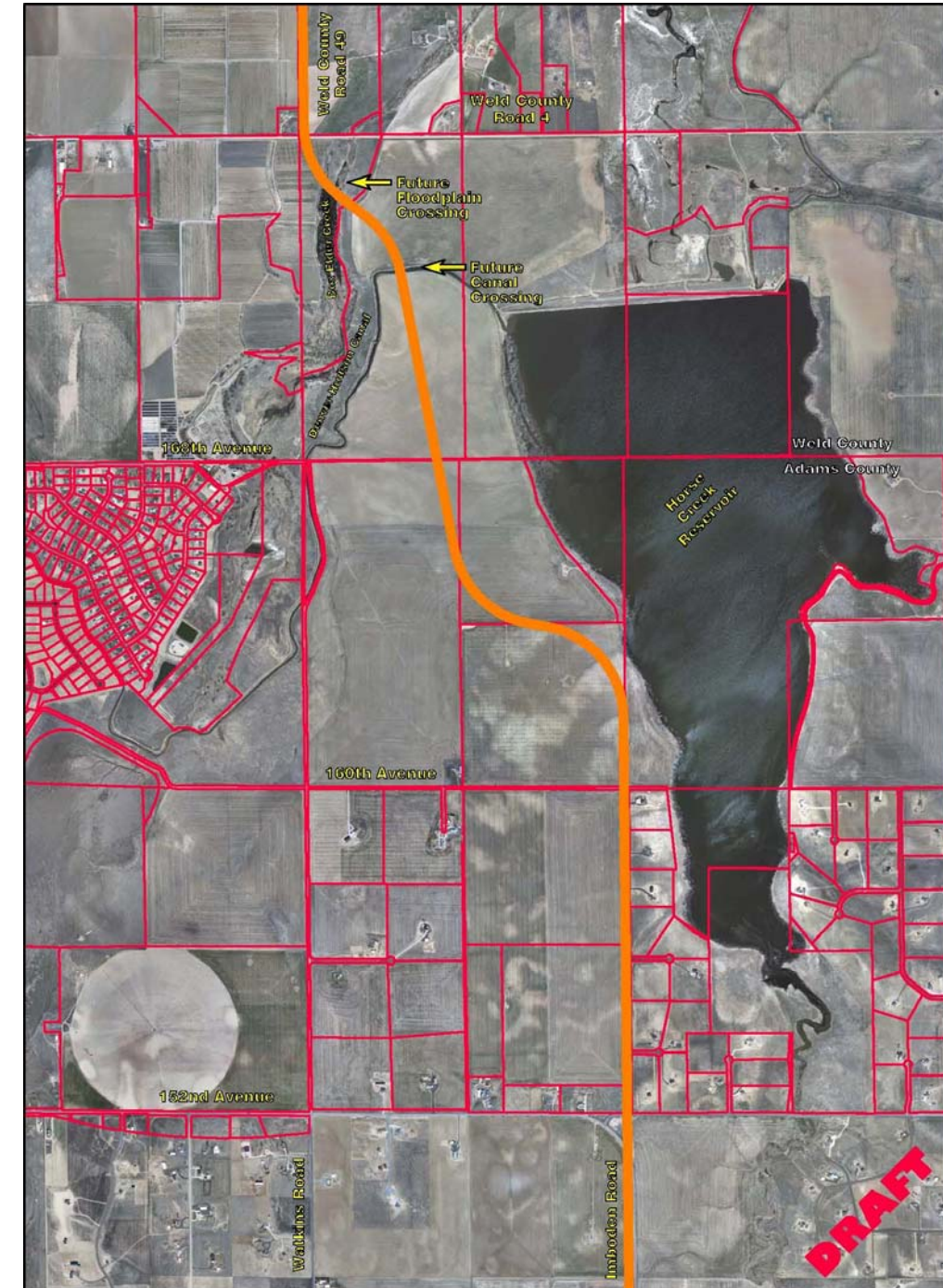
## Alternative 4

Alternative 4 commences south from the Weld County Road 4 and Weld County Road 49 intersection, crosses Box Elder Creek downstream from a man-made dam and shifts to the east before crossing the Denver-Hudson Canal. After crossing the canal, the alignment continues southward before shifting eastward at a parcel boundary line. The alternative does shift southward again near Horse Creek Reservoir as it lines up with Imboden Road proceeding south. Discussion has occurred concerning the construction of a frontage road adjacent to Imboden Road south of East 160<sup>th</sup> Avenue. By constructing a frontage road on the east side of Imboden Road, accesses from the individual properties east of Imboden Road can be combined and a natural buffer would be created for the existing residences. The details and final configuration of a frontage road will need to be further analyzed and investigated during the final design process.

### Features of Alternative 4:

- ▶ “Out of Direction” Travel is Minimized
- ▶ Widening of Imboden Road South of East 160<sup>th</sup> Avenue can Occur to the West
- ▶ Maintains East 152<sup>nd</sup> Avenue as a East-West Thoroughfare without adding North-South Traffic
- ▶ Impacts Existing Residences East of Imboden Road that have Direct Access onto Imboden Road
- ▶ Requires Reconfiguration of the Roadways and Intersection at East 152<sup>nd</sup> Avenue and Imboden Road
- ▶ Maximizes Driver Safety with Less Curves and Longer Straight-aways
- ▶ Crosses the Denver-Hudson Canal Perpendicularly to Minimize Box Culvert Size and Canal Disruption

Figure 10. Alternative 4







# Weld County Road 49/Imboden Road Alignment Study

## Summary of Evaluation

The Local Agency Advisory Group considered all of the above points as well as others in their deliberations, in choosing a preferred alternative. From these proceedings, members were asked to rank their alternative preference. **Table 2** shows the results of this process. From this, Alternative 1 was identified by the Local Agency Advisory Group to be the preferred alignment. However, since Alternative 1 and Alternative 4 scored very similar within the evaluation process, the current development (Estates at Horse Creek) was provided the opportunity to evaluate both alternatives and assist in the decision of selecting a preferred alternative between the two alternatives. The result of this effort was that Alternative 1 was identified as the preferred arterial alignment for the study. The letter received from Land Architects on behalf of The Estates at Horse Creek can be found in the front of the Appendix for this Report.

**Table 2. Evaluation Matrix Rankings (1st, 2nd, 3rd, 4th)**

	<i>Alternative 1 (Green Alignment)</i>	<i>Alternative 2 (Purple Alignment)</i>	<i>Alternative 3 (Blue Alignment)</i>	<i>Alternative 4 (Orange Alignment)</i>
<i>Local Agency Advisory Group Member 1</i>	1	3	4	2
<i>Local Agency Advisory Group Member 2</i>	2	3	4	1
<i>Local Agency Advisory Group Member 3</i>	1	3	4	2
<i>Local Agency Advisory Group Member 4</i>	1	4	3	2
<i>Local Agency Advisory Group Member 5</i>	2	4	3	1
<i>Local Agency Advisory Group Member 6</i>	1	4	3	2
<b>Average Ranking (lowest score is preferred)</b>	<b>1.33</b>	<b>3.50</b>	<b>3.50</b>	<b>1.67</b>
	<b>1<sup>st</sup></b>	<b>3<sup>rd</sup></b>	<b>3<sup>rd</sup></b>	<b>2<sup>nd</sup></b>
	<b>Preferred Alternative</b>			



## V. CONCLUSION/RECOMMENDATIONS

### Alignment

The layout of the preferred arterial alignment was modified prior to the final public open house in order to address concerns identified by the public. The modified alignment helps mitigate for impacts to wildlife along Horse Creek Reservoir as well as the residents along Imboden Road between East 152<sup>nd</sup> Avenue and East 160<sup>th</sup> Avenue.

- ▶ Mitigating for Residential Impacts:
  - ✓ From East 152<sup>nd</sup> Avenue north to East 160<sup>th</sup> Avenue - show the 140-foot FROM the western edge of the existing right-of-way west, for a TOTAL of 210 feet of right-of-way. The right-of-way for this section of the corridor provides the following:
    - Preserves adequate right-of-way width to accommodate potential future frontage road and Imboden alignment.
    - Allows Adams County the opportunity to consider turning the existing Imboden Road into a frontage/local access road for the existing residences fronting Imboden Road.
    - Allows Adams County the opportunity to consider installing a buffer or berm between the proposed frontage road and the new alignment of Imboden Road to mitigate for noise and traffic impacts.
    - Eliminates individual access points onto the major regional arterial.
- ▶ Mitigating for Impacts to the Horse Creek Reservoir and Wildlife, and the Proposed Estates at Horse Creek Development:
  - ✓ From East 160<sup>th</sup> Avenue north through the Estates at Horse Creek development skirting the Horse Creek Reservoir, begin the WESTERN edge of the road right-of-way, 660-feet from the edge of the maximum high water line, completely on the Estates at Horse Creek development's property. The reasons for this are:
    - Provides for, and acknowledges a minimum wildlife buffer between development and wildlife along the Horse Creek Reservoir in the Report.
    - Developer will be allowed to claim this wildlife buffer for all, or a portion of the open space requirements, and in lieu of the Public Land Dedication Fee for Adams County, contingent on the development's metro district maintaining the open space.
    - Allows the roadway right-of-way to be subtracted from the wildlife buffer in the future, thereby reducing impacts to the developable area of the property.

Adams County will further consider the build out of the east half of the preferred arterial alignment first in order to establish the eastern boundary of the wildlife buffer. The decision to build which half (i.e., either the east half or the west half) first will be made in coordination with future development and other stakeholders. This revised alignment is still approximate in the capacity that the alignment can shift subtly in order to better fit the planned developments and existing features within the corridor study area; however, the overall functionality of the arterial should not be compromised as a result of any modifications. It is envisioned that the preferred arterial alignment will be constructed as 2 lanes plus

auxiliary lanes where required in an initial phase with the ultimate roadway width being constructed when traffic demands warrant additional lanes. The Local Agency Advisory Group's preferred alignment is shown in **Figure 11**. Typical cross-sections are shown in **Figure 12**. These typical sections were derived from a combination of Adams County's standards and Weld County's standards.

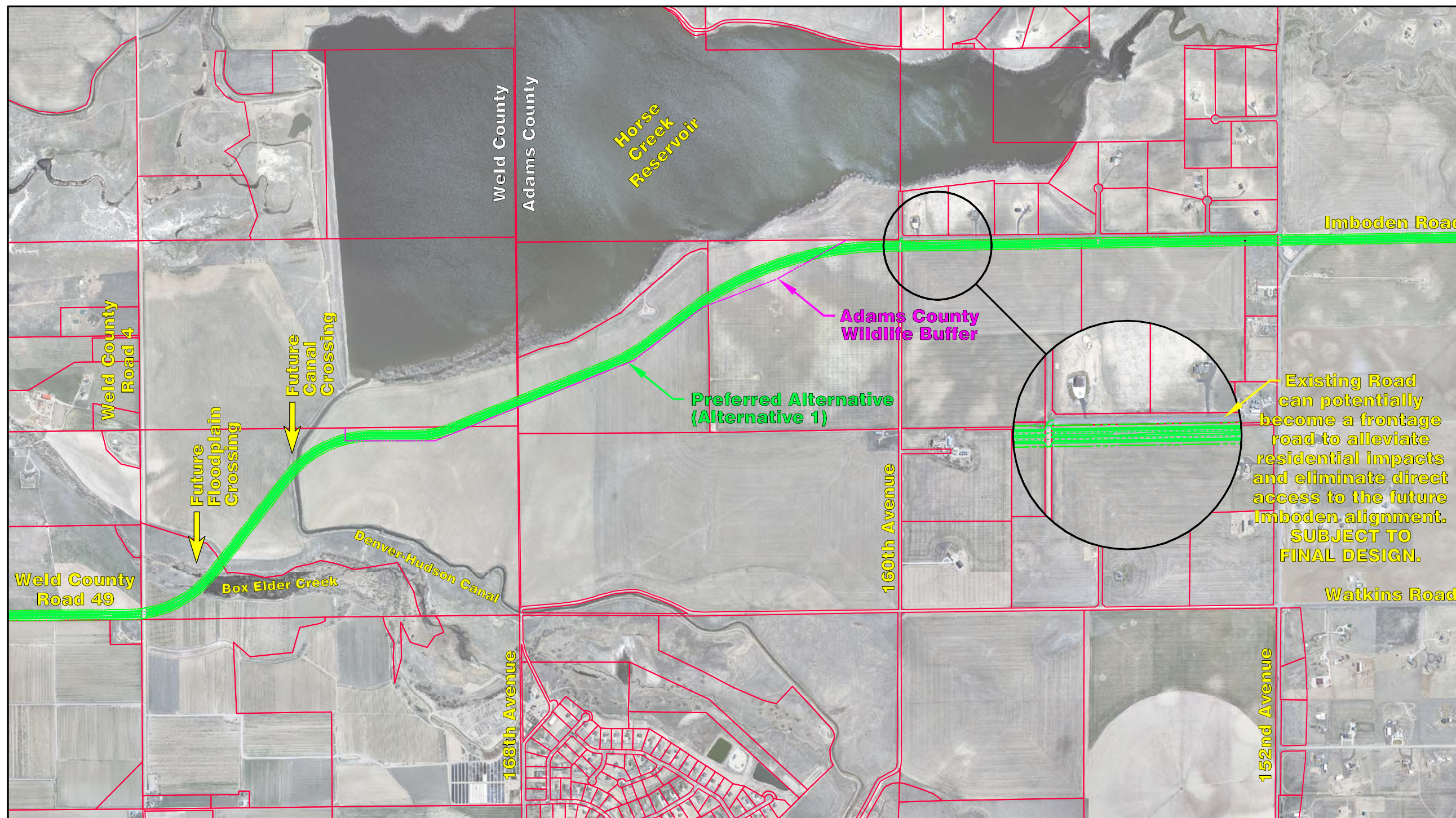
### Study Implementation Process

When the study is complete, it is anticipated that the involved agencies will have a different approval and implementation process. Weld County staff will present the findings of the study to the Board of County Commissioners for consideration and approval at a public hearing. Adams County will amend the County's transportation plan to include the preferred arterial alignment and designate classifications and ultimate build-out widths for the preferred arterial alignment. In order to confirm that the involved agencies are planning the preferred arterial alignment cooperatively, Intergovernmental Agreements (IGAs) between the involved agencies may be pursued to ensure that the required rights-of-way are preserved for future implementation.

### Preferred Alignment Implementation Process

Presently, there is no specific schedule for the construction of this arterial. The construction schedule will be highly dependent on the growth and development that occurs within the corridor study area. Weld County and Adams County will use this study as a basis to preserve rights-of-way for the arterial as development in the area occurs. Rights-of-way not preserved through the development process may be purchased as needed. Furthermore, as development occurs, it is anticipated that developments adjacent to the arterial will be responsible for the construction as a means to mitigate their impacts. For the preferred arterial alignment that is located north of East 160<sup>th</sup> Avenue, it is anticipated that the eastern half of the roadway will be constructed first so that the eastern boundary limits of the required wildlife buffer can be established. Based on conceptual cost estimates that were prepared for this study, it is anticipated that construction of the ultimate configuration of the preferred arterial alignment could be approximately \$3 to \$4 million per mile with the construction cost of the ultimate bridge configuration over Box Elder Creek anticipated to be an additional \$4 to \$5 million. The jurisdictional agencies within the corridor study area will be responsible for the improvements not funded by developments.

## Recommended Arterial Alignment



Aerial Flown April-June 2006

Figure 11

## Urban Typical Sections

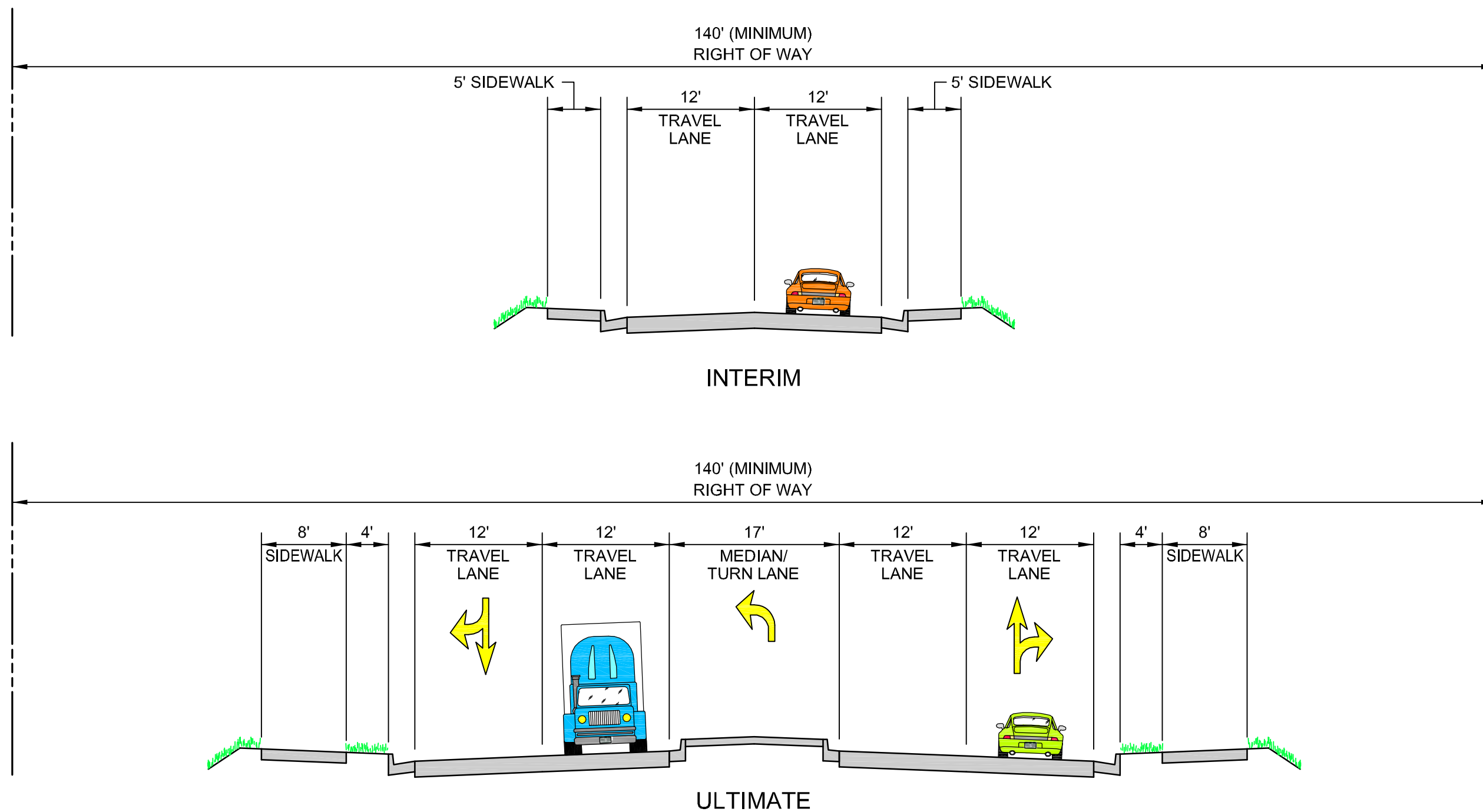


Figure 12

## Rural Typical Sections

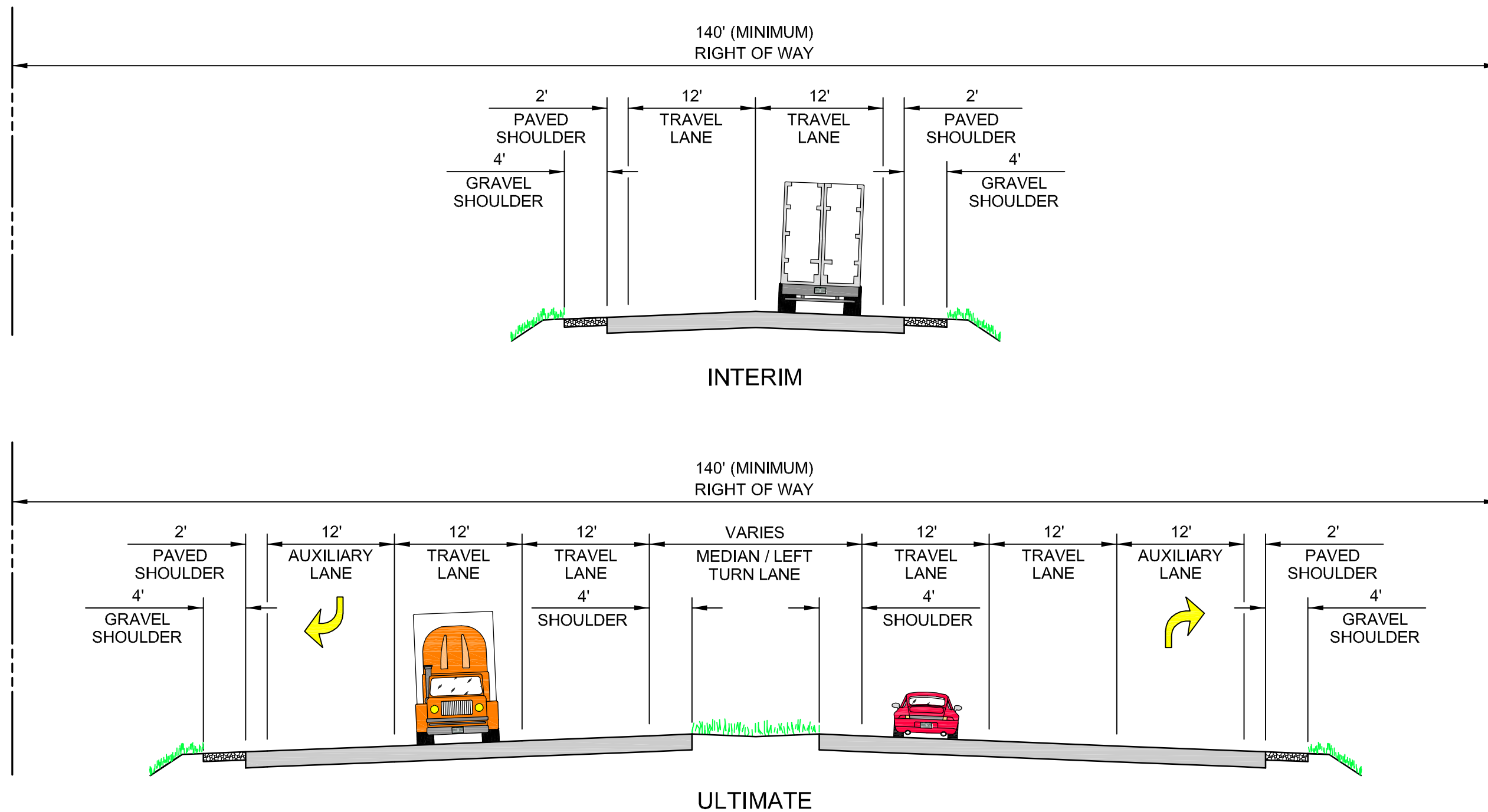


Figure 13



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