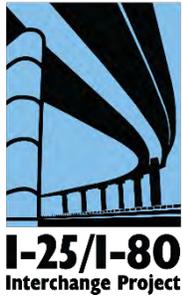




## Design Refinement Workshop Summary



# WYOMING DEPARTMENT OF TRANSPORTATION I-25 & I-80 INTERCHANGE CONCEPT WORKSHOP PROJECT No. 1806212 LARAMIE COUNTY



## Introduction

## Purpose

The purpose of the workshop was to review and finalize the project concept prior to starting design efforts. The expected outcome of the workshop was to develop any appropriate concept updates, and minimize potential backtracking as the project design proceeds. The following methodology was developed to maximize the potential workshop success and quickly engage the appropriate participants.

## Methodology

A Concept Refinement Workshop was held May 7 – 9, 2019, at the WyDOT offices in Cheyenne, Wyoming, to discuss the conceptual design of the I-80/I-25 System Interchange project. The discussions were based on the Preferred Alternative from the 2008 I-25/I-80 Interchange Feasibility Study as well as the 2018 Reconnaissance Report issued by WyDOT. The workshop was attended by WyDOT Traffic, Bridge, Project Development, Maintenance, Construction, Environmental Services, Geology, Highway Patrol, Utilities, and Management staff, along with Jacobs design team members. The three-day workshop included a tour of the project site, sharing of previous efforts and design concepts, an update on current state of the project and funding mechanisms, brainstorming of refinement concepts, and comprehensive analysis with executive presentation. The team weighed in on refinements that impacted the scope, cost, constructability, and traffic mobility of the ultimate buildout. The agenda and attendees list for each day are in Appendix A. Figure 1 shows a breakout session to evaluate the Lincolnway refinement concept by a team of WyDOT and consultant staff.



Figure 1 – Workshop Refinement - WS-02 Lincolnway Interchange Breakout Session

## Baseline Project

The I-25/I-80 System Interchange baseline project design includes replacing both the westbound (WB) to southbound (SB) and eastbound (EB) to northbound (NB) clover leaf loop ramps with directional ramps. This will remove weaving and provide higher levels of service for traffic through the interchange. The radii of the two remaining loop ramps will be increased to meet design speeds and capacity requirements. The existing directional ramps in each of the four quadrants will be reconstructed, as needed, to fit the new ramp alignments. See Figure 2 for baseline project.

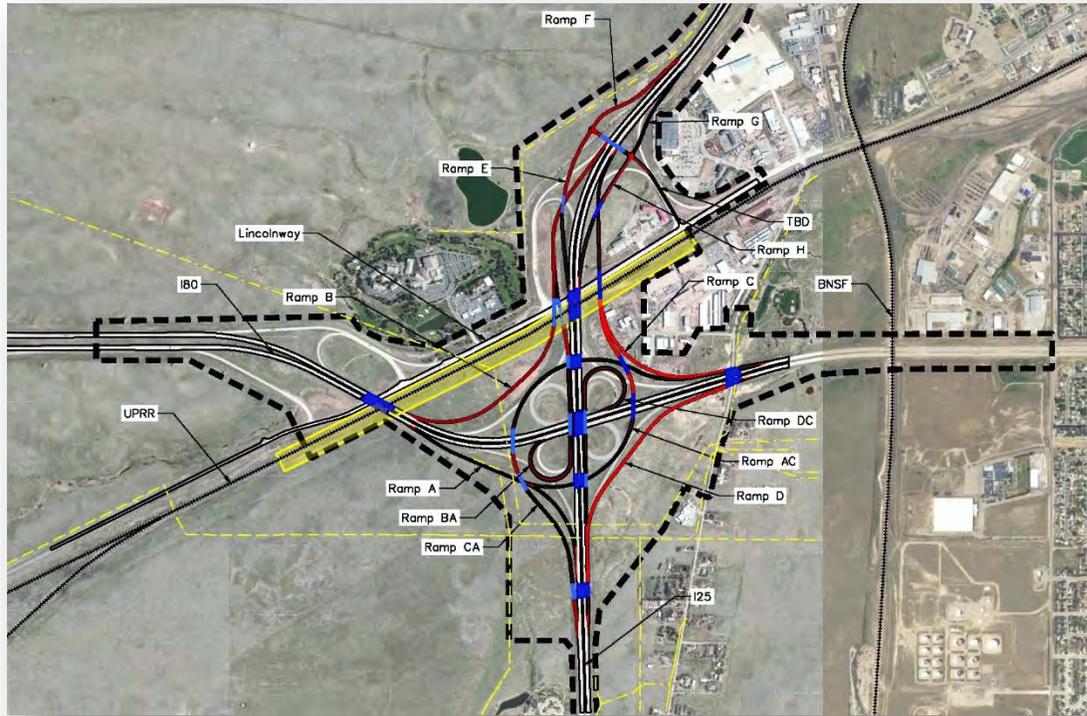


Figure 2 – Baseline Project

The existing service interchange (I-25 and Lincolnway) is tightly spaced just north of the I-25/I-80 system interchange and will be impacted by the reconfiguration of the system interchange. A new diamond service interchange will be included at Lincolnway as part of the project. To isolate service and system traffic, basket weave ramps will be required between Lincolnway and the system interchange.

The structural baseline assumptions included new ramp bridges as well as mainline structures to accommodate the directional ramps. The existing mainline bridges on I-25 over I-80, as well as the I-80 and I-25 bridges over the Union Pacific Railroad were originally assumed to be rehabilitated and widened.

The baseline project assumptions from the Preferred Alternative defined Phase I as the construction of the EB to NB flyover ramp with rebuilding of the WB to NB, EB to SB, and NB to EB directional ramps. Phase I also included portions of the Lincolnway interchange to the north.

Phase II included the WB to SB flyover ramp, SB to WB directional ramp, and reconstruction of the SB to EB and NB to WB loop ramps and incorporated structures. Phase II would also include completing the diamond service interchange ramps, forming a basket weave with the system interchange ramps.

Phase III is a separate concept outside the scope of this project and will include improvements to adjacent service interchanges west of the system interchange. Phase III will, however, complete the full buildout of the ultimate design concept to optimize improvements to traffic capacity, circulation, mobility, and safety.

## Tour of Project Site

On the first day, after introductions and a safety moment, the workshop team toured the project site. WyDOT arranged for van transportation for the workshop team and provided detailed information of existing conditions and previous project work. The tour began driving all the ramps of the I-25/I-80 interchange, followed by a stop on Lincolnway under the I-25 bridges (see Figure 3), a drive through the business park in the NE quadrant, a stop on Southwest Drive under the I-80 bridges in the SW quadrant, and Little America in the NW quadrant.



Figure 3 – Site Visit – I-25 Bridges Over Lincolnway

## Project Overview and Design Team Presentations

In the afternoon on the first day of the workshop, project leadership provided an overview discussing the following topics:

- Project Purpose and Need
- Overview of Existing Facilities
- What WyDOT would like from the Workshop
- Project Funding/Constraints
- Scheduling Requirements/Commitments
- Community Concerns
- Sensitive Issues

Following the overview, the design team presented the work that went into the 2008 Feasibility Study and 2018 Reconnaissance Report, see Figure 4 for document covers. Tom Ragland and Chris Angleman worked on the Feasibility Study and were able to highlight critical elements of the study and elements that were

purposefully not included. Several elements like utilities and the weaving between I-80 and College were determined to require study in the preliminary design phase as more project information is gathered.

Andrea Allen presented the 2018 Reconnaissance Report, covering WyDOT's approach to determining the scope elements. It included discussion on a few elements that were left to the design team to determine an approach, such as reconstruction or rehabilitation of the bridge structures. See the 2018 Reconnaissance Report in Appendix B.

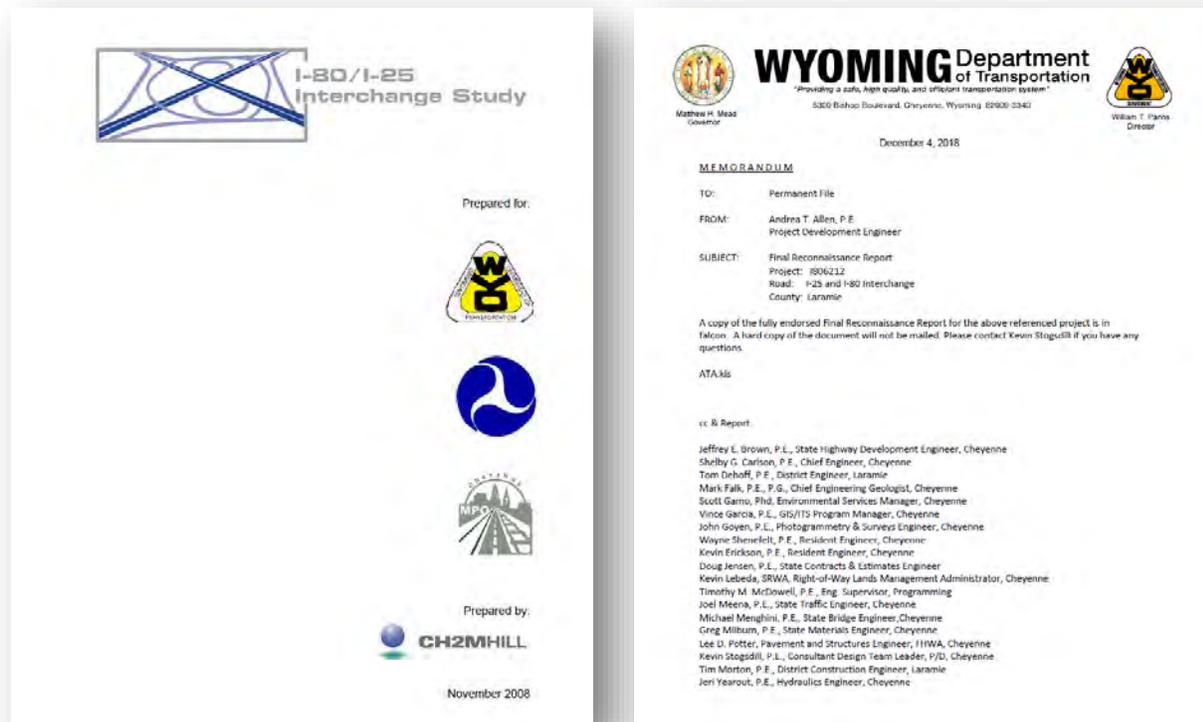


Figure 4 – 2008 Feasibility Report and 2018 Reconnaissance Report

## Concept Refinement Brainstorming

Several critical topics surfaced during the discussions that warranted detailed analysis and consideration to be included in refinements prior to advancing the design. These design components had major impacts to construction phasing, traffic mobility, level of service, and cost. Ten refinements were identified and divided into three Tiers. Tier 1 refinements are those that have a significant impact to concept design influencing whole aspects of the project. Tier 2 refinements have a limited impact to concept design influencing portions of the project. Tier 3 refinements have a minor impact to concept design and can be addressed independently of other project aspects. The team broke out into small groups to assess the proposed concept refinement versus the baseline project assumptions in the categories of impacts to construction phasing, traffic control, and Phase III.

The critical concept refinements that were analyzed during the workshop included the following (listed in order of critical importance):

#### Tier 1

1. WS-04: Ultimate Mainline Roadway Section
2. WS-01: I-25 Offset Alignment West
3. WS-03: I-80 Horizontal Shift and Curve
4. WS-02: Lincolnway Interchange Refinement

#### Tier 2

5. WS-06: EB I-80 to NB I-25 over I-25 South Leg
6. WS-07: Mainline Bridge (Reconstruct/Widen versus Replace)
7. WS-10: Mainline Bridge (Clear Span I-80 and UPRR)
8. WS-05: Phase I WB I-80 to SB I-25

#### Tier 3

9. WS-09: I-25/I-80 Interchange to College Weaves
10. WS-08: Traffic Control, Construction Phasing, and Phase III Considerations (*incorporated in all refinement analyses*)

Detailed analyses have been documented and are included in Appendix C of this document. General descriptions of each refinement and the team's concluding recommendations are presented below including a "Pass" or "Fail" designation.

### **WS-04: Ultimate Mainline Roadway Section – Pass**

The first topic evaluated was the mainline roadway cross section for both I-25 and I-80. This was the starting point before discussing all other design refinement considerations. The existing I-25 and I-80 mainline cross-sections consist of two through lanes with an open median. WyDOT has long-term plans to increase I-80 to a six-lane configuration in the future and wants to make sure the system interchange improvements to the ramps and structures accommodate future widening. I-25 has less of a need for adding lanes; however, future widening to a six-lane configuration should be accommodated.

The refinement recommendation is to design both I-25 and I-80 to the future lane capacity of three lanes in each direction so the ramp improvements can be designed to facilitate future widening. The outside lanes can be constructed with appropriate merge lengths and auxiliary lanes and future widening can be added in the median. The refinement also evaluated an open median against a closed median. Though structures will need to lengthen due to the widened pavement section, an open median would force the structures to be even longer. To limit costs and because this section on interstate is within the City of Cheyenne, the more urban closed median section was selected. The recommended mainline section will consist of the configuration shown in Figure 5:

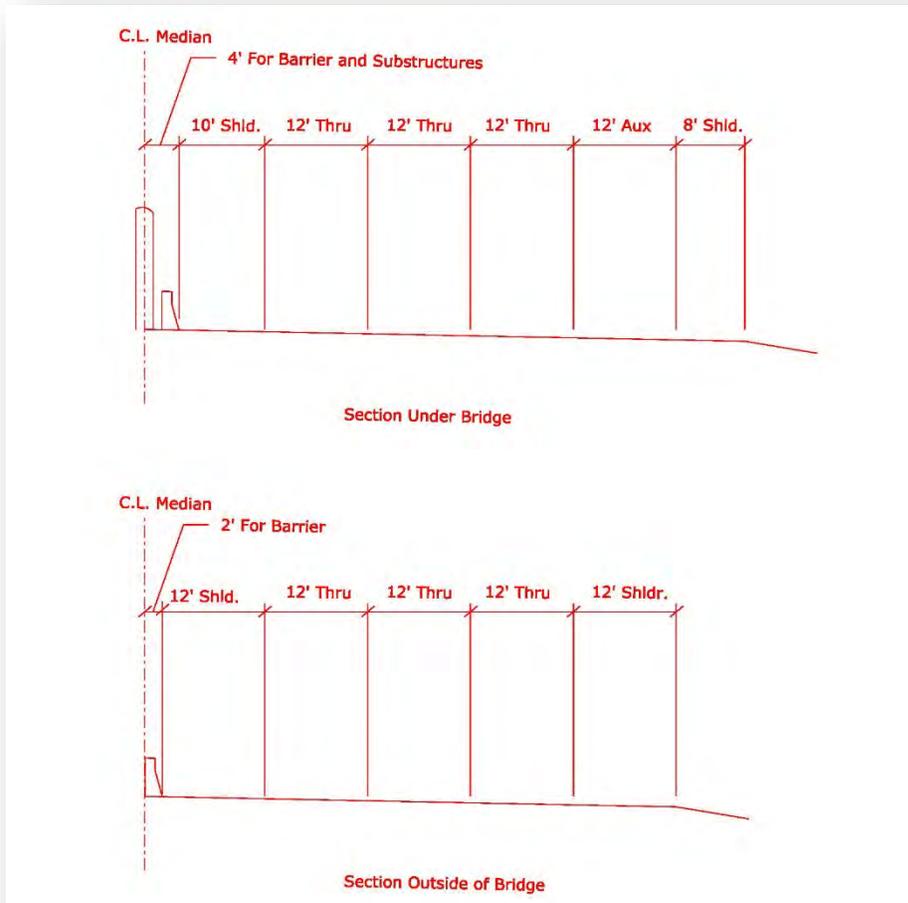


Figure 5 – Ultimate Mainline Typical Section

## WS-01: I-25 Offset Alignment West – Pass

The original concept from the Preferred Alternative in the 2008 Feasibility Study was to maintain the existing I-25 centerline and widen to accommodate standard lanes and shoulders. Widening I-25 would also include implementing bridge rehabilitation measures to extend the structures' useful service life. With the useful life of the I-25 bridges over I-80 and the UPRR reaching a practical limit, reconstruction of bridges are included in this refinement.

The workshop team recommended this design refinement to shift the I-25 alignment to the west to facilitate offline construction of the mainline bridges and reducing impacts to right-of-way (ROW) in the northeast quadrant of the interchange. Shifting the alignment simplifies construction staging, minimizes construction duration, maintains existing number of lanes through construction, improves safety by isolating construction from traffic, facilitates bridge replacement, removes bridge rehabilitation and repair costs, and increases project's life expectancy while minimizing long-term bridge maintenance costs. Conceptual construction staging is shown in Figure 6a through 6b.

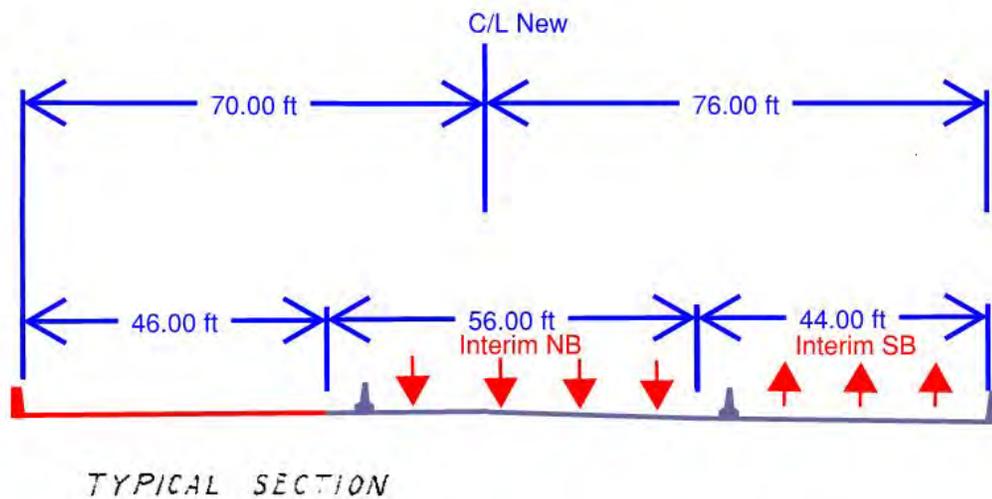


Figure 6c – Stage 3 Offline Bridge Construction

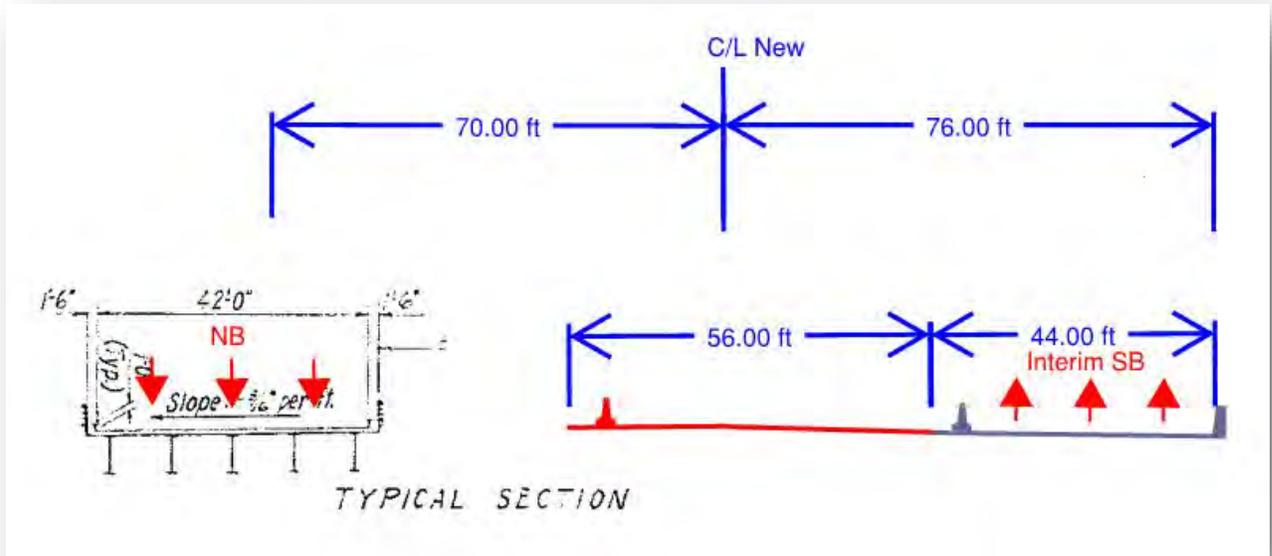


Figure 6b – Stage 2 Offline Bridge Construction

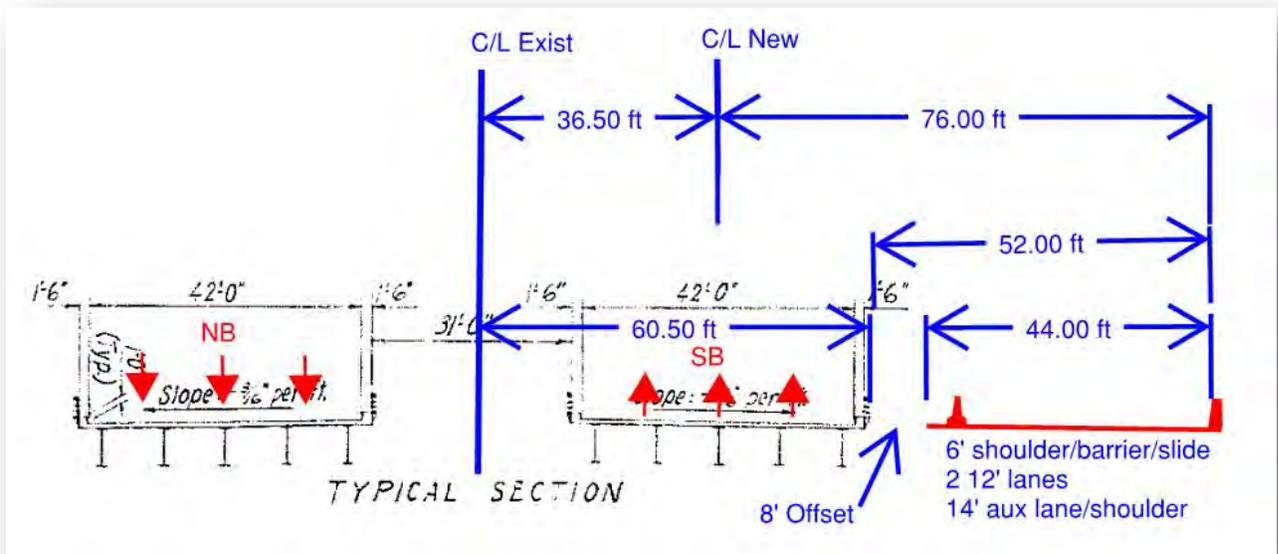


Figure 6a – Stage 1 Offline Bridge Construction

### WS-03: I-80 Horizontal Shift and Curve – Pass

The existing I-80 alignment has a substandard curve radius of 2,000 feet just west of the I-25 over I-80 bridge section, which falls short of the American Association of State Highway Transportation Officials (AASHTO) recommended curve radius for a speed of 75 mph. There is also a crash hotspot on EB I-80 approaching the I-25 bridges. Wyoming Highway Patrol and WyDOT Maintenance have expressed concerns about the EB lane curve combined with the I-25 South exit ramp and grade coming into the I-25/I-80 interchange. In addition, WB traffic on I-80 has a crash history, as the Highway Patrol representative said, from the setting sun glare, combined with the uphill grade of the interstate, makes the curve a very risky location for pulling vehicles over.

This refinement considered shifting I-80 to the southwest while correcting the substandard curve to facilitate construction phasing of the bridge over UPRR. In combination with the I-25 shift to the west this refinement effectively reduces impacts to the northeast quadrant of the interchange, and allow vehicles to make a smoother exit using the off-ramp from EB I-80 to SB I-25 with a standard curve for the speed limit. Other advantages of this concept include the alignment of operation speed and posted speed with corrected geometry, providing mobility during construction with offline construction, providing opportunity to shorten I-80 west to I-25 south flyover structure, accommodating grade changes due to bridge replacement, and limiting impact to the NW quadrant wetlands. Figure 7 shows the layout:



Figure 7 – I-80 Alignment Shift and Corrected Curve

## WS-02: Lincolnway Interchange Refinement – Fail

The original Preferred Alternative from the 2008 Feasibility Study proposed a grade separated basket-weave of the system ramps to I-80 with the service ramps to Lincolnway from I-25. The concept design separated the service and system traffic flow of these closely spaced interchanges. Access from Lincolnway to EB I-80 will no longer be accommodated. Given additional access points in the immediate area, the loss of this maneuver will not have significant operational impacts.

This refinement considered an alternative using a loop on-ramp to SB I-25 with successive off-ramps to I-80, providing the downtown area of Cheyenne with direct access to I-80 WB and EB using Lincolnway. The advantages of this refinement included providing direct access from Lincolnway to I-80 EB and WB, eliminating long system ramps and structures, improving SB to WB ramp alignment to avoid wetlands, and increasing the weave length on I-80 WB to the west. However, there were greater disadvantages which ultimately led to this refinement proposal failing and not being recommended to be included as part of the project design. This refinement would introduce operational issues such as poor weaving operations on the I-25 mainline near the system interchange, eliminate single-exit design, increase potential for wrong-way movements at the loop ramp, and mix local service traffic with heavy system interchange traffic. In addition, the refinement would require additional ROW and land impacts to the NW of the interchange. One element of this refinement that will move forward is a design change to tuck the I-25 SB to I-80 WB directional ramp closer to the interchange mainline. This refinement maximizes weave length between the service interchange to the west and avoids a poor soil area between the UPRR and existing ramps. Figure 8 shows a sketch from the Lincolnway breakout session:

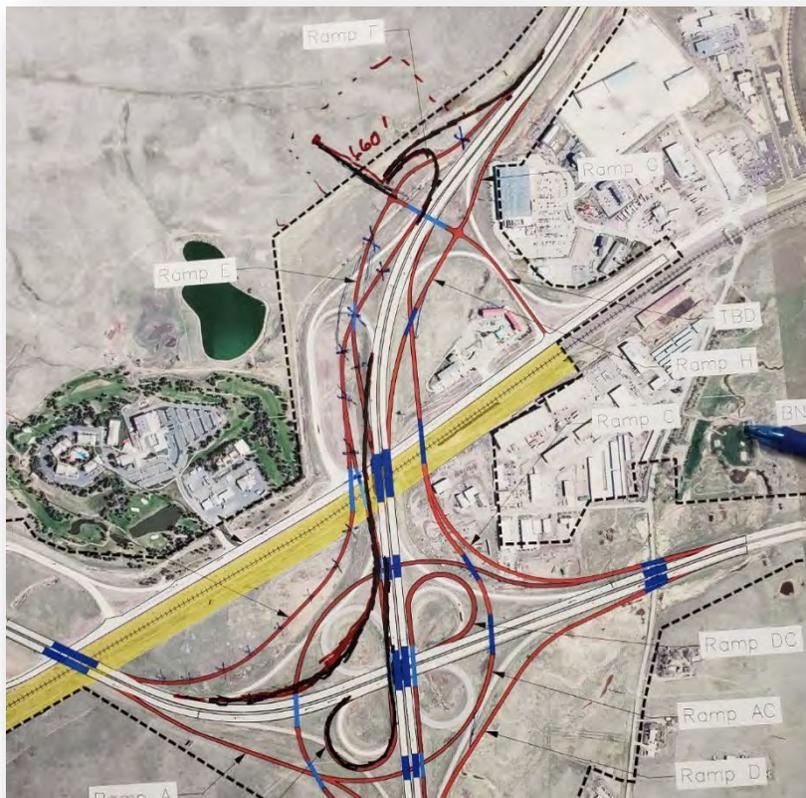


Figure 8 – Lincolnway Interchange Alternative Refinement

## WS-06: EB I-80 to NB I-25 over I-25 South Leg – Pass

The 2008 Feasibility Study and Preferred Alternative included the EB I-80 to NB I-25 flyover ramp aligned under I-25.

The refinement explored the impacts of raising the ramp over I-25 instead of under due to the high-water table in the area. Benefits to constructing the flyover ramp over I-25 include:

- construction phasing not interrupting existing traffic on I-25,
- limiting mixing I-25 traffic with traffic using the new flyover,
- allowing the grade to steepen prior to the center of the curve where the most superelevation would occur,
- limiting new structures to one for the flyover instead of three for I-25 over the flyover ramp,
- maintaining similar profile of I-25 to existing, and
- avoiding in-water construction that would result in future subsurface drainage concerns.

Though going over I-25 may cause the opposing WB to SB flyover grade to raise significantly, the team recommended that the EB to NB flyover ramp be constructed over I-25 due to the large number of operational and construction benefits. **Figure 9** shows the flyover over I-25:



Figure 9 – EB to NB Flyover Ramp over I-25

## WS-07: Mainline Bridge (Reconstruct/Widen versus Replace) – Pass

The original proposed section in the 2018 WyDOT Reconnaissance Report included widening/rehabilitating the bridges over I-80 and UPRR instead of replacing them.

This refinement evaluated the cost/benefit of rehabilitating the existing bridges or replacing the bridges by considering impacts to traffic, construction phasing, railroad coordination, and maintenance costs. Based on other concept refinements described in the workshop, it is advantageous to replace all the bridges in the proposed interchange design. It was expected that rehabilitating the existing bridges would not gain UPRR approval due to perpetuating and widening existing supports near the tracks, while replacement would likely facilitate railroad coordination and approval. The cost of rehabilitating and widening the bridges in addition to the cost of long-term maintenance would approach the same cost as replacement. Replacement would also provide greater safety and life expectancy to the ultimate project. Other refinements such as realigning I-25 to the west and correcting the substandard curve on I-80 accommodate the replacement of the bridges, positively impacting maintenance of traffic during construction, construction staging, and a shorter construction duration. The team determined replacing all existing bridges in the project. Figure 10 shows the bridge over UPRR which would require significant cost to meet UPRR requirements and to extend its service life:

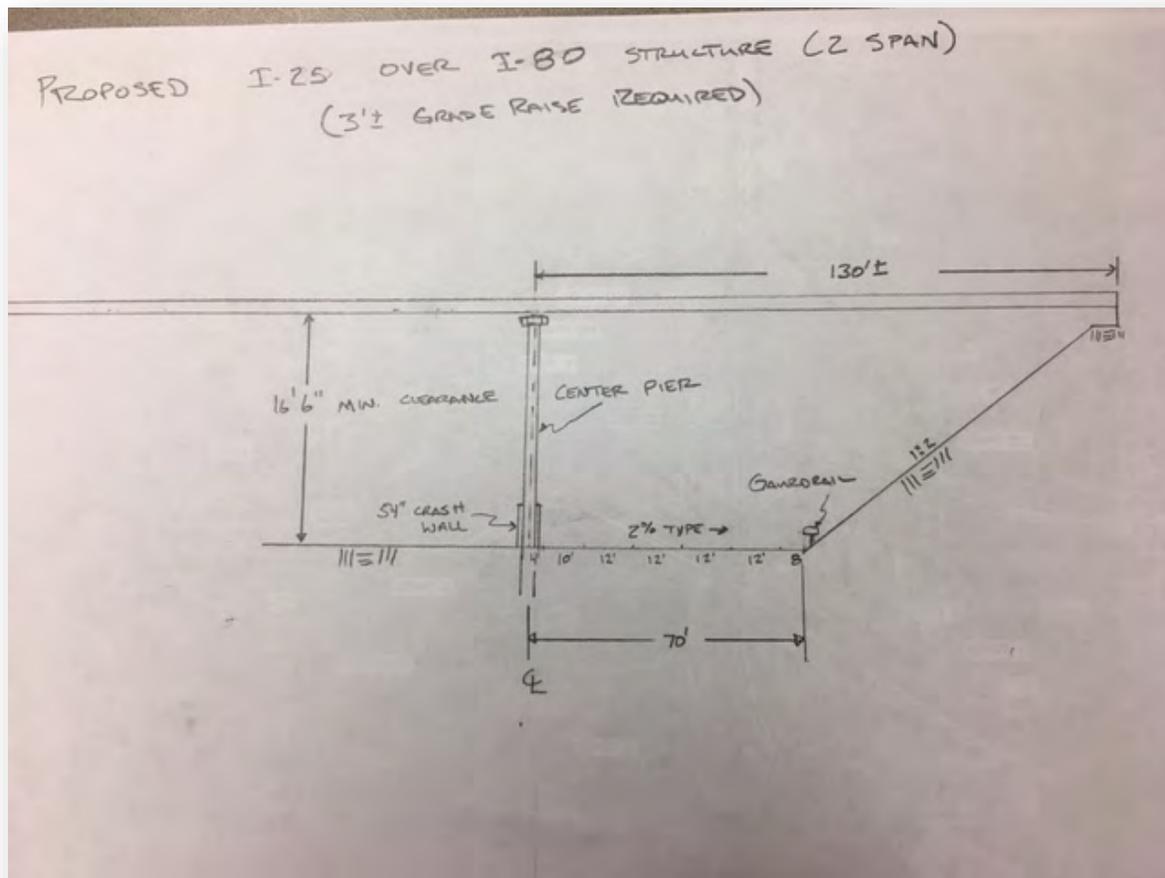


Figure 10 – Existing I-25 Bridges over UPRR

## WS-10: Mainline Bridge (Clear Span I-80 and UPRR) – Fail

Existing I-25 bridges over I-80 and UPRR have piers in the center of the interstate and within the UPRR ROW, respectively. A center pier in the median presents a potential road side hazard and it is expected that UPRR may require any new bridge to span the full length of its ROW.

The refinement evaluated the practicality of the mainline bridges clear spanning I-80 and the UPRR ROW to improve safety and avoid encroachment into railroad ROW. It was noted that the approach should limit UPRR coordination and potential schedule impacts. The Preferred Alternative in the 2008 Feasibility Study and the 2018 WyDOT Reconnaissance Report proposed rehabilitating and widening the existing structures rather than replacement. This refinement was evaluated based on the assumption that all mainline structures were to be replaced (WS-07). Clear spanning would avoid having supports in the UPRR ROW and within the I-80 corridor, but clear spanning would also complicate construction due to erecting larger bridge components. The bridge depths required for clear span would adversely affect traffic during construction due to the significant profile grade raise requirements. In addition, there is no crash history to indicate that the existing piers in the I-80 median have been hit, while there is significant data showing the concrete barrier protecting the slope and abutment faces on the outside shoulders of the interstate are regularly damaged, particularly in the eastbound direction. A center pier in I-80 would allow spanning both directions of the interstate. The team determined that the I-25 bridges over I-80 will have two spans and will require an approximate 3-foot grade raise on I-25, and the I-80 and I-25 bridges over UPRR would be three spans and require over 5 feet of mainline grade raise. Coordination with UPRR will be a critical component for early action to get clearance to have piers in the UPRR ROW. The proposed refinement to clear span the railroad ROW failed. Figure 11 shows sketches from the clear span breakout session:



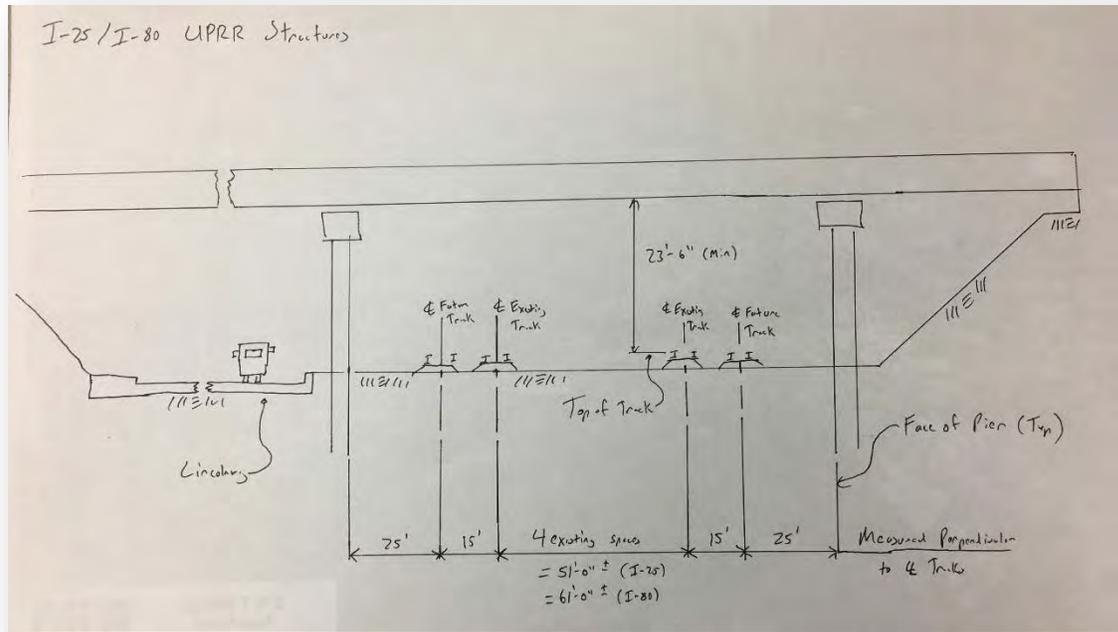


Figure 11 – Clear Span I-80 and Proposed Three-Span Bridges over UPRR

## WS-05: Modify Phase I to be WB I-80 to SB I-25 – Pass

The original baseline assumptions defined Phase I and Phase II design components. Phase I includes constructing the EB I-80 to NB I-25 directional ramp and partial improvements to the east side of the Lincolnway service interchange. Phase II includes all the remaining construction to complete the system interchange and service interchange. This was proposed in the original concept to start the project with an implementable low cost phase.

The refinement evaluated the strategy behind the original phasing concept because the proposed improvement removed the lowest volume loop and did not provide proportional operational improvement for the cost. This refinement first considered building the WB to SB flyover instead of the EB to NB flyover as part of Phase I to provide more operational benefit for the investment, as this would remove the highest volume loop from the cloverleaf. However, shifting I-25 to the west and reconstructing the I-80 geometry caused ripple effects in the phasing, which would require more than 80 percent of the ultimate buildout to be included in Phase I with the WB to SB flyover being built first. The refinements discussed at this workshop completely change the original phasing rationale, and the team recommends WyDOT seek funding for full buildout so phases can eventually be determined to optimally facilitate constructability and mobility. Figure 12 shows the original Phase I:

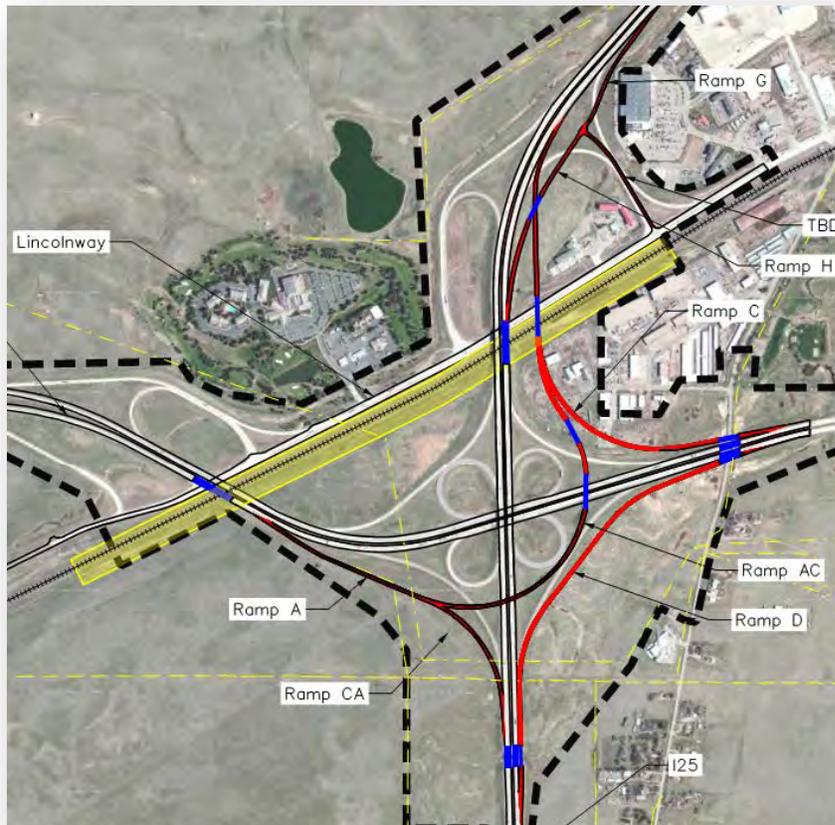


Figure 12 – Previous Configuration of Phase I from 2008

## WS-09: I-25/I-80 Interchange to College Weaves – Pass

The 2008 I-25/I-80 Interchange Feasibility Study deferred evaluating the weaving areas between the proposed system interchange and the existing College Drive Interchange because it was outside of the project area, and did not drive selection of a preferred alternative. Existing weave lengths are shortened by the proposed system interchange configuration and may require improvements to accommodate future volumes.

This refinement documented the need for further analysis of the weave areas and the need for potential mitigation strategies. Any improvements to the weaving in this area would add cost to the Reconnaissance Report baseline. The team recommended further analysis to confirm that the project should include widening the SB off-ramp to College Drive to two lanes. This change would maximize the weave length for the I-80 WB to I-25 SB movement by revising the ramp geometrics, and splitting the off-ramp from I-80 EB to allow traffic headed to I-25 SB to merge prior to the mainline section through parallel entrances.

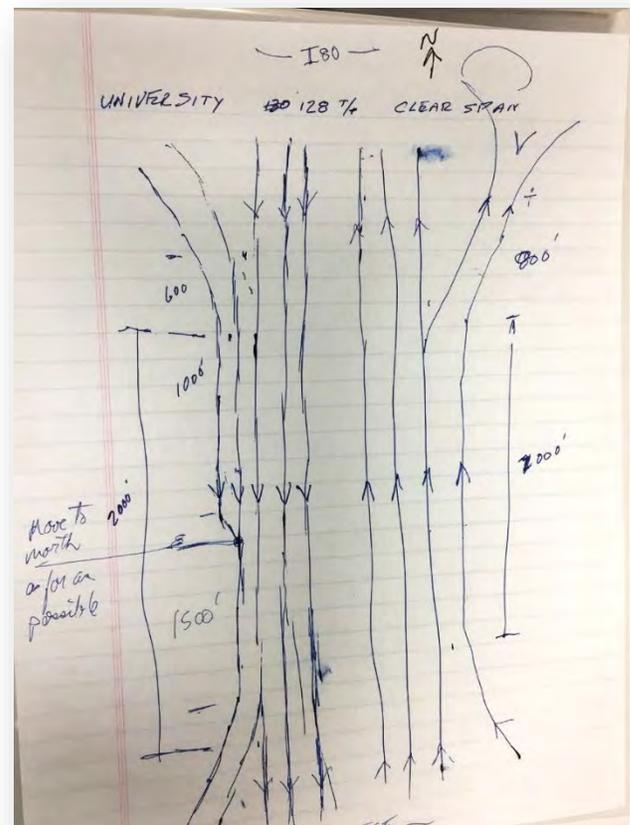


Figure 13 – I-80 to College Drive Weaving on I-25

## **WS-08: Traffic Control, Construction Phasing, and Phase III Considerations – Included in all refinements**

Traffic control, construction phasing, and facilitating Phase III construction are critical considerations for each and every refinement that is proposed. These governing considerations need to be discussed and evaluated for each refinement developed in the workshop.

The refinement is important but not exclusive to one recommendation. Instead of having a stand-alone discussion, these three considerations were incorporated into all of the other refinements to prioritize each option's impacts to traffic control, construction phasing, and how each refinement may impact Phase III in future construction outside the scope of this project.

## **Conclusion**

The final day of the Workshop included preparation of an Executive Summary presentation. The presentation is included in Appendix D and was presented by the Workshop Team to WyDOT Leadership on May 9, 2019.

The workshop provided a platform for all design team members to document the discussions and decisions to optimize the I-25/I-80 interchange project concept and adjacent service interchanges, independent of funding availability. Through the research and efforts previously done in the 2008 Feasibility Study, the 2018 Reconnaissance Report, and this workshop, the team will be able to design and construct an efficient and reliable project without having to backtrack or question design decisions. This document serves as a record of why the team did or did not recommend certain refinements, and it shows the many options were explored, even if not ultimately recommended. This document will be a reference throughout the life cycle of project design so that efforts are consistent through final design. The team has reviewed and approved all recommendations described in this report and will advance these refinements into the design moving forward.



## APPENDIX A – Agenda and Sign In

# Agenda and Coordination Information for Concept Refinement Workshop

May 7-9, 2019

Wyoming Department of Transportation  
Cheyenne Wyoming  
Project No. 1806212, Agreement No. 68673  
I-25 & I-80 Interchange  
Laramie County

Pre-Study Workshop, Orientation, Site Tour, Download Date: Tuesday, May 7  
Workshop Study Dates: Wednesday and Thursday, May 8 and 9  
Executive Summary Presentation on Thursday afternoon, May 9, 2019, 1:00 to 2:00 p.m.  
in Cheyenne, WY

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## Pre-Workshop and Orientation Meeting

Tuesday, May 7 (Cheyenne, WY)

Step 1 - Information

8:00 a.m. to 8:20 p.m.

### INTRODUCTIONS AND SAFETY MOMENT

**Workshop Team:** Chris Angleman, Mike Cooper, Tim Eversoll, Aaron Swafford, Erin James, WyDOT Staff including District.

**Location:** Resident Engineer's Conference Room (5300 Bishop Blvd, Cheyenne, WY 82009)

8:20 a.m. to 11:00 a.m.

### TOUR OF PROJECT SITE

WyDOT will arrange van transportation for the Workshop team.

WyDOT will drive a van for the Workshop team. WyDOT Workshop participants are requested to bring their own reflective vests, safety glasses, and any other safety gear required for a site tour. All Workshop team, agency and design team members participating on the site tour are asked to dress appropriately for a site tour, including boots or sturdy shoes. Bottled water will be provided for the tour.

*Lunch, 11:00 a.m. to 12:00 p.m.*

**Location:** Wyoming Game and Fish Building - Trout Room (5400 Bishop Blvd, Cheyenne, WY 82009)

12:20 p.m. to 12:50 p.m.

**OVERVIEW OF AGENDA AND WORKSHOP PROCESS -**  
Aaron Swafford, Workshop Team Leader

12:50 p.m. to 1:30 p.m.

**OVERVIEW OF THE PROJECT (Andrea Allen, Tim Eversoll)**

- Project Inception and Need
- Overview of Existing Facilities
- What WyDOT would like from the Workshop
- Design Objectives
- Project Funding/Constraints
- Scheduling Requirements/Commitments
- Community Concerns
- Other Sensitive Issues
- General Comments

1:30 p.m. to 3:00 p.m.

**DESIGN TEAM PRESENTATION** – by WyDOT, Tom Ragland and Chris Angleman (Recon Report and Feasibility Study Team Members)

*(Including Q/A for each topic)*

- Project Location
- Overview of 2008 Intersection Study,
- Review Reconnaissance Report (Baseline Project Assumptions)
- Project Phasing and Schedule
- Budget/Estimate
- Environmental Requirements/Commitments
- Roadway Alignment and Lane Widths, Ramps, and Tie-Ins at Bridges
- Utilities (if applicable)
- Safety Criteria in Design
- Adjacent Improvements
- Roadway Structures/Bridges/Interchange (as applicable)
- Geotechnical, and Structural (if applicable), Evaluations
- Bike/Pedestrian/Paths and Crossings (if applicable)
- Other Major Design Components
- Summary of High Cost Areas
- Traffic Study
- Community
- Environmental (Flood, Drainage, River)
- Right-of-Way
- Construction Phasing/Scheduling/Traffic Control
- Photographs
- ConceptStation
- Sensitive Issues

3:00 p.m. to 5:00 p.m.

**REVIEW OF PROJECT INFORMATION (self-study)**

# Workshop Study Agenda

Wednesday, May 8

8:00 a.m. to 8:15 a.m.

8:15 a.m. to 8:30 a.m.

8:30 a.m. to 9:30 a.m.

9:30 a.m. to 12:00 p.m.

*Break, 10:30 a.m. to 10:45 a.m.*

*Lunch, 12:00 p.m. to 1:00 p.m.*

1:00 p.m. to 3:15 p.m.

*Break, 3:15 p.m. to 3:30 p.m.*

3:30 p.m. to 4:30 p.m.

4:30 p.m. to 5:00 p.m.

## Step 1 - Information - Continued

**Participants:** Workshop Team

**Location:** Wyoming Game and Fish Building - Trout Room  
(5400 Bishop Blvd, Cheyenne, WY 82009)

### **INTRODUCTIONS AND SAFETY MOMENT**

### **REVIEW OF AGENDA AND WORKSHOP PROCESS**

Aaron Swafford, Workshop Team Leader

### **TEAM FOCUS QUESTIONS AND ANSWERS**

- What is the opportunity we are about to discuss?
- Why do we consider this an opportunity?
- Why do we believe a change is necessary?
- What are the highest cost components of the project?
- What are the highest risk issues associated with the project?
- What are the expected outcomes from the Workshop study?

## Step 2 - Creative

### **BRAINSTORMING**

- Generate refinements to current Phase I and II designs
- Construction and traffic control evaluation

### **BRAINSTORMING (Continued)**

- Construction and traffic control evaluation

## Step 3 - Analysis

**PASS/FAIL OF REFINEMENTS** (Discussion of advantages and disadvantages)

### **SELECTION AND PROMISING REFINEMENTS**

**Thursday, May 9**

**Step 4 - Development**

**Participants:** Workshop Team only

**Location:** Wyoming Game and Fish Building - Trout Room  
(5400 Bishop Blvd, Cheyenne, WY 82009)

8:00 a.m. to 10:30 p.m.

*Break, 10:30 a.m. to 10:45 a.m.*

**WRITE-UPS, ECONOMIC CALCULATIONS, SKETCHES  
FOR COST PROPOSALS**

10:45 a.m. to 12:00 p.m.

*Lunch from 12:00 p.m. to 1:00 p.m.*

**COMPLETE WRITE-UPS, AND CROSS CHECK  
PROPOSALS; PREPARE EXECUTIVE SUMMARY  
PRESENTATION**

1:00 p.m. to 2:00 p.m.

**Step 5 - Presentation**

**Participants:** WyDOT and all Workshop Team members

**Location:** Wyoming Game and Fish Building - Trout Room  
(5400 Bishop Blvd, Cheyenne, WY 82009)

**EXECUTIVE SUMMARY PRESENTATION TO WYDOT  
AND DESIGN TEAM** (This Presentation will conclude the  
Workshop Study.)

The Preliminary Workshop Report will be prepared following the Workshop study. It will be distributed to WyDOT, Design Team, and Workshop participants in electronic PDF format.

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**Follow-up**

**Step 6 - Implementation**

The Implementation Phase will be subsequent to the Workshop Study, following WyDOT's and other participants' review of the Preliminary Workshop Report. Jacobs suggests that a conference call be held with appropriate WyDOT and design team members to determine acceptance, rejection, or modification of the Workshop proposals for incorporation into the design as appropriate. WyDOT will notify Jacobs of the results. Jacobs will follow-up with a Final Workshop Report summarizing the Workshop methodology and the final disposition of the Workshop proposals. An electronic PDF copy of the Final Workshop Report will be sent to the WyDOT and saved in the project files.

	<b>Attendees Name</b>	<b>Signature</b>	<b>Corrections</b>
1	Allen, Andrea / WyDOT Project Manager <a href="mailto:andrea.allen@wyo.gov">andrea.allen@wyo.gov</a> Office: 307.777.4135		
2	Stogsdill, Kevin / WyDOT Design Team Leader <a href="mailto:kevin.stogsdill@wyo.gov">kevin.stogsdill@wyo.gov</a> Office: 307.777.3887		
3	Dehoff, Tom / WyDOT District Engineer <a href="mailto:tom.dehoff@wyo.gov">tom.dehoff@wyo.gov</a> Office: 307.745.2100		
4	Morton, Tim / WyDOT District Construction Engineer <a href="mailto:timothy.morton@wyo.gov">timothy.morton@wyo.gov</a> Office: 307.745.2117		
5	Erickson, Kevin / WyDOT Resident Engineer <a href="mailto:kevin.erickson@wyo.gov">kevin.erickson@wyo.gov</a> Office: 307.777.415		
6	Tarango, Ralph / WyDOT District Maintenance Engineer <a href="mailto:ralph.tarango@wyo.gov">ralph.tarango@wyo.gov</a> Office: 307.745.2124		
7	Eversoll, Tim / Jacobs Project Manager <a href="mailto:tim.eversoll@jacobs.com">tim.eversoll@jacobs.com</a> Office: 720.286.5137 Cell: 720.244.9117		
8	Swafford, Aaron / Jacobs Design Manager <a href="mailto:aaron.swafford@jacobs.com">aaron.swafford@jacobs.com</a> Office: 720.286.5340 Cell: 303.912.2716		



NAME	ORGANIZATION	EMAIL	ATTENDED SITE VISIT?
ERIN JAMES	JACOBS	ERIN.JAMES@JACOBS.COM	✓
RYAN SHIELDS	WYDOT TRAFFIC	RYAN.SHIELDS@WYO.GOV	✓
JEFF MELLOR	WYDOT - TRAFFIC	JEFFERY.MELLOR@WYO.GOV	✓
Jeff BOOHER	WYDOT - BRIDGE	jeff.boohar@wyo.gov	✓
KEVIN STOGSDILL	WYDOT - PROJ. DEV.	KEVIN.STOGSDILL@WYO.GOV	✓
Carolyn Moore	<del>WYDOT PROJ DEV.</del> Carolyn.A.	Carolyn.moore@wyo.gov	✓
TOM RAGLAND	JACOBS	THOMASRAGLAND@GMAIL.COM	✓
Tim Marton	WYDOT	Timothy.Marton@wyo.gov	
CHRIS ANGLEMAN	JACOBS	CHRIS.ANGLEMAN@JACOBS.COM	✓
TIM EVERSOLL	JACOBS	TIM.EVERSOLLO@JACOBS.COM	✓
Andrea Allen	WYDOT - PD	andrea.allen@wyo.gov	✓
Don, B. d'g	WYDOT maint	Don.Bridge@wyo.gov	✓
KEVIN ERICKSON	WYDOT	Kevin.erickson@wyo.gov	
WAYNE SHENEFELT	WYDOT - CONST.	WAYNE.SHENEFELT@WYO.GOV	
RALPH TARANGO	WYDOT - MAINT	ralph.tarango@wyo.gov	
Keith Fulton	WYDOT	Keith.fulton@wyo.gov	
MIKE COOPER	JACOBS	mike.cooper@jacobs.com	
JEFF BROWN	WYDOT	jeff.brown@wyo.gov	
RANDY GRIESBACH	WYDOT	randy.griesbach@wyo.gov	

5/8/19

NAME

ARZON SWAFFORN

TIM EVERSON

Jeff Booher

Tim Morton

RANDY GRIESBACH

RALPH TARANGO

KENNETH KEEL

JEFF BROWN

Tom DeHoff

JEFF MELLER

RYAN SHIELDS

KEVIN GRICKSON

WAYNE SHENEFELT

Don Bridges

KEVIN STOGSDILL

MIKE COOPER

Carolyn Moore

Andrea Alle

ERIN JAMES

NAME	ROLE	BIGGEST OPPORTUNITY OR SUCCESS FACTOR
Andrea Allen	Project Development	Safety
Jeff Booher	Bridge / WYDOT	
TIM EVERSON	JACOBS	WYDOT IS HAPPY
RALPH TARANGO	WYDOT	MAINTENANCE
Tim Marton	WYDOT	CONSTRUCTION OF LARGE PROJECT
RANDY GRIESBACH	WYDOT	SAFETY
ERIN JAMES	ROADWAY / JACOBS	TIME IN SCHEDULE TO DO IT RIGHT
<del>Jeff Booher</del>	<del>WYDOT HD</del>	
Mike Menghini	WYDOT Bridge	
James Bahill	WYDOT - Geology	
Mark Falk	WYDOT - Geology	
Roy WEBER	WYDOT - RIGHT OF WAY	SAFETY
CHRIS REHM	WYDOT - RIGHT OF WAY	
Scott Gano	WYDOT Env. Services	safety
Jeff Mellow	WYDOT TRAFFIC	SAFETY, MOBILITY
RYAN SHIELDS	WYDOT TRAFFIC	SAFETY, GROWTH
TOM RAGLAND	JACOBS TRAFFIC	IMPLEMENTATION
MIKE COOPER	JACOBS STRUCTURES	EFFICIENT / SAFE IMPLEMENTATION
Carolyn Moore	WYDOT Presider.	SAFETY for people going for medical care
KEVIN STOGSDILL	WYDOT PROJ. DEV.	MOBILITY + SAFETY
WAYNE SHENEFEELT	WYDOT - CONSTRUCTION	SAFETY - CONSTRUCTION
KEVIN ERICKSON	WYDOT - CONSTRUCTION	CONSTRUCTION - MOBILITY
CHRIS ANGLEMAN	JACOBS	ROADWAY DESIGN

## **APPENDIX B – WyDOT Reconnaissance Report (December 4, 2018)**



Matthew H. Mead  
Governor

# WYOMING Department of Transportation

*"Providing a safe, high quality, and efficient transportation system"*

5300 Bishop Boulevard, Cheyenne, Wyoming 82009-3340



William T. Panos  
Director

December 4, 2018

## MEMORANDUM

TO: Permanent File

FROM: Andrea T. Allen, P.E.  
Project Development Engineer

SUBJECT: Final Reconnaissance Report  
Project: I806212  
Road: I-25 and I-80 Interchange  
County: Laramie

A copy of the fully endorsed Final Reconnaissance Report for the above referenced project is in falcon. A hard copy of the document will not be mailed. Please contact Kevin Stogsdill if you have any questions.

ATA:cls

### cc & Report:

Jeffrey E. Brown, P.E., State Highway Development Engineer, Cheyenne  
Shelby G. Carlson, P.E., Chief Engineer, Cheyenne  
Tom Dehoff, P.E., District Engineer, Laramie  
Mark Falk, P.E., P.G., Chief Engineering Geologist, Cheyenne  
Scott Gamo, Phd, Environmental Services Manager, Cheyenne  
Vince Garcia, P.E., GIS/ITS Program Manager, Cheyenne  
John Goyen, P.E., Photogrammetry & Surveys Engineer, Cheyenne  
Wayne Shenefeld, P.E., Resident Engineer, Cheyenne  
Kevin Erickson, P.E., Resident Engineer, Cheyenne  
Doug Jensen, P.E., State Contracts & Estimates Engineer  
Kevin Lebeda, SRWA, Right-of-Way Lands Management Administrator, Cheyenne  
Timothy M. McDowell, P.E., Eng. Supervisor, Programming  
Joel Meena, P.E., State Traffic Engineer, Cheyenne  
Michael Menghini, P.E., State Bridge Engineer, Cheyenne  
Greg Milburn, P.E., State Materials Engineer, Cheyenne  
Lee D. Potter, Pavement and Structures Engineer, FHWA, Cheyenne  
Kevin Stogsdill, P.E., Consultant Design Team Leader, P/D, Cheyenne  
Tim Morton, P.E., District Construction Engineer, Laramie  
Jeri Yearout, P.E., Hydraulics Engineer, Cheyenne

**WYOMING DEPARTMENT OF TRANSPORTATION  
CHEYENNE WYOMING**

**RECONNAISSANCE REPORT**

**Project I806212**

**I-25 & I-80 Interchange**

**Laramie County**

**LOCATION and DESCRIPTION:** The project is located in Cheyenne at the system interchange between Interstates 25 and 80. This project will upgrade the interchange to more efficiently and safely accommodate the existing and future traffic.

**FIELD INSPECTION:** April 20, 2018

**INSPECTION PERSONNEL:**

Tom DeHoff, P.E., District Engineer, Laramie  
Tim Morton, P.E., District Construction Engineer, Laramie  
Ralph Tarango, P.E., District Maintenance Engineer, Laramie  
Randy Griesbach, P.E., District Traffic Engineer, Laramie  
Wayne Shenefelt, P.E., Resident Engineer, Cheyenne  
Kevin Erickson, P.E., Resident Engineer, Cheyenne  
Jeff Brown, P.E., Highway Development Engineer, Cheyenne  
Andrea Allen, P.E., Project Development Engineer, Cheyenne  
Phil Pratt, P.E., FHWA, Cheyenne  
Kevin Stogsdill, P.E., Design Squad Leader, Cheyenne  
Wes Bay, P.E., Assistant Design Squad Leader, Cheyenne  
Jeff Booher, P.E., Assistant State Bridge Engineer, Cheyenne  
James Dahill, P.G., Assistant State Chief Engineering Geologist, Cheyenne  
Curtis Clabaugh, P.E., Photogrammetry & Surveys Engineer, Cheyenne  
Jeff Mellor, P.E., Assistant State Traffic Engineer, Cheyenne  
Craig Alexander, Right-of-Way Manager  
Scott Gamo, Ph.D., Environmental Services Manager, Cheyenne  
Bob Rothwell, P.E., Assistant State Materials Engineer, Cheyenne  
Tony Laird, P.E., Consulting Engineer

**DRAFT RECONNAISSANCE REPORT:** July 7, 2018

**FINAL RECONNAISSANCE REPORT:** October 23, 2018

**ROUTES:** Interstate 80, Interstate 25, and Lincolnway (US 30, I-80 Business)

**HIGHWAY DISTRICT:** District 1

**PROJECT LIMITS AND LENGTH OF PROJECT:** The work will likely impact I-80 from approximately RM 359.00 (west end of the bridge over West Lincolnway) to approximately RM 360.50 (including box culvert); I-25 from approximately RM 8.40 (just south of the bridge over Clear Creek) to approximately RM 10.00, and Lincolnway from approximately RM 359.50 to approximately RM 360.70. The limits will need to be revised once the various ramp tie-ins are designed.

**FUNCTIONAL CLASSIFICATION:** I-80 and I-25 are classified as Urban Principal Arterial – Interstate; Lincolnway is classified as Urban Minor Collector west of RM 359.55 and Urban Principal Arterial elsewhere.

**HIGHWAY SYSTEM:** I-80 and I-25 are on the National Highway System – Interstate; Lincolnway is a State Highway on the Non-National Highway System west of RM 359.55 and on the National Highway System elsewhere.

**CHARACTER OF WORK:** Modify the system interchange between Interstates 25 and 80.

**PROGRAMMED FUNDING:** NHPPI - Federal

**PROGRAMMED CONSTRUCTION YEAR:** 2024 (assumed)

**PURPOSE AND NEED:** The I-25/I-80 interchange and adjacent highway facilities are the largest and most heavily used in the state of Wyoming. This segment of the Federal Interstate System serves local, regional, state, and national travel needs and is the primary interchange in Wyoming for interstate commerce from border to border and coast to coast.

Because of the facilities' age and change in vehicular demands and characteristic over the last 40 plus years, there is a pressing need for infrastructure improvements. This need is driven by high crash rates and operational deficiencies. This need is also driven by increasing travel demands of private autos and heavy trucks. These needs are developed extensively in the I-80/I-25 Interchange Study (November 2008) with an update in the I-80 Corridor Study (March 2018).

Local development is contributing to the need for defining improvements, and the preservation of right of way for their implementation.

**EXISTING FACILITIES:**

**Construction History:**

Project No.	RM	RM	Year	Work Type
I-25-1(12)	9.8	10.39	1958	Grading
I-25-1(20)*	9.14	9.67	1962	Grading
I-80-6(20)*	359.05	359.98	1962	Grading
IR-80-6(127)359	358.44	360.06	1991	Reconstruction
IM-I025-01(138)	7.36	10.80	2000	Reconstruction

\*Combined project to build I-80/I-25 Interchange

**Traffic Data:** Traffic volumes for 2008 and 30 year projections are presented in the I-80/I-25 Interchange Study (November 2008). They will be updated during design.

**Posted Speed Limit:** Interstate 80 is posted 75 MPH; I-25 is posted 65 mph; Lincolnway is posted 45 mph.

**Highway Geometrics - Roadway Widths:**

Interstate Mainline: Both I-80 and I-25 have overall roadway widths of 38' providing, in each direction, two 12' travel lanes, a 10' outside shoulder, and a 4' inside shoulder. This roadway section is through the project limits and adjacent sections of both interstates.

Interchange Ramps: Existing ramps are various widths but are all proposed to be reconstructed on different alignments in accordance with the I-80/I-25 Interchange Study (November 2008).

**Highway Geometrics - Horizontal Alignment (superelevation rates not available):**

Location RM PI	Length (ft)	Spiral Lengths In & Out( ft)	Delta (incl. spirals)	Radius (ft)	Design Speed* (mph)
I-80 EBL 359.439	1080	420	45°00'	1889.86	71
I-80 WBL 359.439	1080	420	45°00'	1929.86	72
I-80 360.307	1658	--	16°34'48"	5729.60	80+
I-25 9.392	1876	281	43°00'	2864.79	80+
I-25 10.09	3330	--	33°18'	5729.60	80+

\* Assuming adequate superelevation.

**Highway Geometrics - Vertical Alignment (from Highway Features File or As-constructed Plans):**

RM VPI	Type	Length (ft)	K Factor	Design Speed (mph)
I-80 EBL 359.127	Crest	1400	319	75
I-80 EBL 359.727	Sag	800	255	80+
I-80 EBL 360.035	Crest	1100	330	76
I-80 EBL 360.209	Sag	900	239	80+
I-80 EBL 360.426	Crest	1000	585	80+
I-80 WBL 359.203	Crest	1400	325	76
I-80 WBL 359.827	Sag	800	260	80+
I-80 WBL 360.121	Crest	1100	345	77
I-80 WBL 360.307	Sag	900	251	80+
I-80 WBL 360.526	Crest	1000	586	80+
I-25 SBL 10.11	Crest	1129	370	70+
I-25 SBL 9.769	Sag	2034	1437	70+
I-25 SBL 9.481	Sag	997	315	70+
I-25 SBL 9.179	Crest	1470	264	70+
I-25 SBL 8.557	Sag	1598	392	70+
I-25 NBL 10.113	Crest	978	339	70+
I-25 NBL 9.807	Sag	1401	1390	70+
I-25 NBL 9.654	Sag	33	131	70+
I-25 NBL 9.491	Sag	1079	336	70+
I-25 NBL 9.185	Crest	1611	289	70+
I-25 NBL 8.557	Sag	1585	384	70+

The maximum grade on I-80 and I-25, respectively, within the proposed project limits, is 2.72% and 3.89%.

**Roadside Geometrics:**

Median Width: The median is 40' throughout the project limits on both Interstates.

**Major Structures:**

Structure No.	RM	Type	Length (ft)	Width out to out (ft)	Year Built
AYU	EBL 359.08	Steel Girder	387.00	42.60	1963
AYV	WBL 359.08	Steel Girder	387.00	42.60	1963
AYZ	I-80 EBL 359.88	Steel Girder	112.00	50.70	1965
AZA	I-80 WBL 359.88	Steel Girder	112.00	50.70	1965
AZB	I-80 360.06	Box Culvert	22.00	146.00	1965

Structure No.	RM		Length (ft)	Width out to out (ft)	Year Built
AAN	I-25 NBL 8.43	Steel Girder	84.00	49.08	1964
AAO	I-25 SBL 8.43	Steel Girder	84.00	50.67	1964
AAR	I-25 NBL 8.83	Steel Girder	172.00	44.88	1963
AAS	I-25 SBL 8.83	Steel Girder	172.00	44.88	1963
AAV	I-25 NBL 9.09	Steel Girder	335.00	44.88	1963
AAW	I-25 SBL 9.09	Steel Girder	335.00	44.88	1963

**Minor Structures:** There are 14 minor structures within the project limits on I-80, including 27 high mast towers, 10 overhead signs, and 1 large pipe culvert; there are 18 minor structures within the project limits on I-25, including 12 high mast towers, and 6 overhead signs.

**Pavements:** Both I-80 and I-25 have full width concrete pavement within the project limits.

**Right-of-Way:** The existing right-of-way on both I-80 and I-25, within the project limits, is very irregular due to the alignment of ramps. The conceptual design of the new ramps will require additional rights-of-way throughout the project.

**Utilities:** A Utilities Database report is attached.

**Land Use:** Current land use surrounding the project area is largely rural/agricultural west and south of the I-25/I-80 interchange. Limited development in the form of commercial and industrial land use is present adjacent to the interstates and at interchanges. A small area of low density residential use parallels I-25 southeast of the interchange.

**Environmental Concerns:** Environmental concerns are minimal. Wetlands and cultural surveys will be performed.

**Safety Management System - Safety Screening, Evaluations, and Recommendations:**

I-80: Safety Index Rating is 2 for the EBL and 4 for the WBL. An evaluation of safety improvements/countermeasures, per the WYDOT, *Guide for Interstate Highways, 2014*, is not necessary since the improvement of the ramps' geometry, especially eliminating some of the cloverleaf loops, will be a significant safety enhancement.

I-25: Safety Index Rating is 4 for the NBL and 2 for the SBL. An evaluation of safety improvements/countermeasures, per the WYDOT, *Guide for Interstate Highways, 2014*, is not necessary since the improvement of the ramps' geometry,

especially eliminating some of the cloverleaf loops, will be a significant safety enhancement.

**RECONNAISSANCE REPORT RECOMMENDED PROJECT TYPE:** The selection of a project type is based on the application criteria presented in the WYDOT, *Guide for Interstate Highways, 2014*. Two project types, Rehabilitation and Reconstruction, were evaluated at the reconnaissance inspection for the proposed work since both allow for modifications to existing interchanges. Reconstruction was selected since all the ramps will be replaced in new configurations, even though the mainline changes will be less extensive.

**RECONNAISSANCE REPORT RECOMMENDATIONS:** The WYDOT *Guide* was used to identify applicable criteria and design values, based on project type for I-80, I-25, and the I-80/I-25 Interchange.

The selected project will construct Phase 1 and Phase 2 as presented on page ES-7 in the I-80/I-25 Interchange Study, except that the expanded I-25/I-80 loop ramps shown in Phase 3 will also be constructed in Phase 2. Mainline I-80 will be reconstructed with three through lanes.

1. Recommended Project Type/Character of Work: A project type of Reconstruction was selected at the inspection. The character of work is the modification of an existing interchange.
2. Project Limits: The work will likely impact I-80 from approximately RM 359.00 to approximately RM 360.50; I-25 from approximately RM 8.40 to approximately RM 10.00, and Lincolnway from approximately RM 359.50 to approximately RM 360.70. The limits will need to be revised once the various ramp tie-ins are designed.
3. Posted Speed Limit:
  - I-80: 75 MPH
  - I-25: 65 MPH
  - Lincolnway: 45 MPH
4. Design Speed:
  - I-80: 75 MPH
  - I-25: 65 MPH
  - Lincolnway: N/A (Intersections tie-ins only)
5. Roadway Section Type: I-80 and I-25 will be designed as a rural-ditch section consistent with the existing roadway design but the ramps will transition to curb & gutter design as appropriate to connect to other streets; the cross road for the new diamond interchange shall include curb & gutter.

6. Roadway Widths: Considering the adjacent project programmed in a similar time frame, I805182, which will expand I-80 to three through lanes beginning around RM 323, this project should construct three through lanes also.

- I-80: 3 Travel Lanes
  - 12' Lane Widths
  - 10' Left and 10' Right Paved Shoulder Widths
  - 10' Left and 12' Right Subgrade Shoulder Width

- I-25: 2 Travel Lanes
  - 12' Lane Widths
  - 4' Left and 10' Right Shoulder Widths

Ramps: Ramp design criteria per WYDOT Road Design Memorandum #05.

*AASHTO, A Policy on Geometric Design of Highways and Streets (Green Book)* indicates that a 12' outside shoulder should be considered when the DDHV (directional design hourly volume) for trucks exceeds 250 veh/h. Traffic determined that the DDHV does exceed 250 veh/h in both the east and west bound lanes in the design year, 2038. Although the 250 veh/h threshold is exceeded, it was decided to initially build only the subgrade for the 12' Outside Shoulder on I-80.

7. Roadway cross-slope on I-80: Interstate sections are traditionally designed to drain the entire roadway top to the outside. Some other states construct a crown between two of the travel lanes to reduce the amount of drainage sheet flowing across the roadway during intense rainfall events. Since Wyoming experiences relatively low rainfall amounts in this area and no significant sheet flow problems have occurred with our existing 3 lane sections a crown will not be introduced between the lanes. District indicated that there are several sections (interstate climbing lanes) that are three lanes wide within District 1 and sheet flow related problems have not been noted.

Bridge indicated that introducing a crown to an existing bridge, with a constant cross slope, when widening, is challenging. If this is desired, it would be best if the roadway crown was located to align with one of the curb lines on the existing bridge.

8. Interchange Type: A double-loop turbine interchange in accordance with the I-80/I-25 Interchange Study (November 2008).
9. Interchange Lighting: To be evaluated and determined by Traffic.
10. Intersection/Ramp Control: To be evaluated and determined by Traffic.

11. Structures:

Mainline bridges should be evaluated for widening or replacement based on the mainline widening (for acceleration or deceleration lanes). The structural capacity should be HL 93. Vertical clearance requirements are presented in Table 4 (Reconstruction) in the *Guide*.

Ramp bridges will all be new on new alignments so should match the ramp widths and have HL 93 structural capacity. Vertical clearance requirements are presented in Table 4 (Reconstruction) in the *Guide for Interstate Highways, 2014*.

12. Horizontal Alignment: The roadway will meet the selected design speed for combination of curve radius, superelevation, and sight distance.

13. Vertical Alignment: Vertical alignment will meet the selected design speed for combination of curve length, and grades (K-factor) and sight distance.

14. Surfacing:

I-80 Mainline: Reconstruct with a rigid section of 11" dowelled PCCP over 6" crushed base.

Ramps: Reconstruct with a rigid section of 10" dowelled PCCP over 6" crushed base.

Temporary Crossovers: 8" hot plant mix (PG 64-22) over 12" crushed base (this recommendation was not provided directly by the Materials Program for this project but was recommended for the I805182 project immediately to the west).

15. Roadside Side Slopes and Grading: In accordance with the WYDOT Road Design Manual.

16. Drainage Structures,  $\leq 20'$ : Design new drainage structures on ramps. Evaluate mainline structures for extensions or replacement. The age of the existing pipes was noted along with the recommendation that pipe lining be considered as an option where viable.

17. Right-of-Way: Acquire additional right-of-way or construction permits as needed.

18. Land Use: Current land use surrounding the project area is largely rural/agricultural west and south of the I-25/I-80 interchange. Limited development in the form of commercial and industrial land use is present adjacent to the interstates and at interchanges. A small area of low density residential use parallels I-25 southeast of the interchange.

19. Access Controls: Full access control on I-80 and I-25 will be maintained but fence lines may be modified where new right-of-way is needed.

20. Environmental:

The Environmental Services Section requires the following studies and documents.

Cultural: Survey to be completed

Threatened and Endangered Species: Programmatic Biological Opinion

Wetlands: Wetlands are likely and will be delineated. Avoidance, minimization, and mitigation strategies will need to be employed as appropriate.

Document Type: Environmental Assessment

21. Utilities: Utility locations will be mapped; utilities will be accommodated when in conflict with proposed work.

22. Truck Parking Facilities: No additional facilities are planned.

23. ITS: Needs should be determined and facilities designed. In particular, new measures for managing trucks during strong wind events may necessitate ITS devices on this project.

24. Traffic Signing, Signals, and Roadway Lighting: Permanent traffic signing, including new panels and supports will be installed, reset or reconstructed, as needed due to the interchange modification. Signing changes will be significant.

25. Fencing: Fencing will be replaced where new right-of-way is acquired.

26. Construction and Traffic Control:

Significant Project: Yes

Maintenance of Traffic/Traffic Control Plan: Yes

Standard Plans: Yes

Road Closures: To be evaluated

Detours: To be evaluated

Crossovers: Assume the I-80 west crossover will utilize the crossover at RM 359 for phase 4 of the I805182 project and the east crossover will utilize the crossover at RM 360.8. New crossovers will likely be needed at the north and south end of the work on I-25.

Slip Ramps: It is uncertain if any slip ramps will be needed since the conceptual plan calls for most ramps to be built away from existing ramps.

27. Material Sources:

Contractor furnished for surfacing

It is not yet known if borrow will be made available for the bidding of the project or if it will be designated as contractor furnished.

28. Transportation Enhancements and Context Sensitive Amenities: Funding of up to 3% of the estimated construction costs, based on the reconnaissance report, will be provided for context sensitive amenities to the City of Cheyenne, especially to make the various bridges more aesthetically attractive.
29. Funding: NHPPI (Federal)
30. Cooperative Agreements: With the City of Cheyenne for context sensitive amenities as noted above.

**RECONNAISSANCE REPORT RECOMMENDED SCHEDULE: FY 2024**

**CONSTRUCTION COST ESTIMATE BASED ON RECONNAISSANCE REPORT RECOMMENDATIONS:**

For purposes of construction, the project will be split into two phases. Phase I will be I-25/I-80 eastbound to northbound flyover ramp, and the east side of the Lincolnway interchange. Phase II will be I-25/I-80 westbound to southbound flyover ramp, the west side of the Lincolnway interchange, and the expanded I-25/I-80 loop ramps. The reconstruction of I-80 to three through lanes will be included in Phase I. Reference Exhibit A attached.

The 25% contingency was selected due to the unusually large number of unknown items of work in the detailed estimate including guardrail, barriers, drainage pipes, lighting, signing, ITS devices such as dynamic message signs, landscaping, traffic signals, and retaining walls.

	Phase 1	Phase 2	Total
Roadway	\$14,774,962	\$9,921,380	\$24,696,342
Bridge	\$12,559,879	\$20,919,411	\$33,479,290
25% Contingency	\$6,833,710	\$7,710,198	\$14,543,908
3% Context Sensitive Amenities	\$820,045	\$925,224	\$1,745,269
Current (2018)	\$34,988,596	\$39,476,212	\$74,464,809
Future (2024)	\$42,568,977	\$48,028,848	\$90,597,826
CE (10% @ 2024)	\$4,256,898	\$4,802,885	\$9,059,783
<b>SUBTOTAL FOR STIP</b>	<b>\$46,825,875</b>	<b>\$52,831,733</b>	<b>\$99,657,609</b>
PE (10% @ 2019)	\$3,498,860	\$3,947,621	\$7,446,481
<b>GRAND TOTAL</b>	<b>\$50,324,735</b>	<b>\$56,779,355</b>	<b>\$107,104,089</b>

## **SURVEY AND WORK PLAN REQUIREMENTS AND SCHEDULE:**

A separate effort is currently ongoing to select a design consultant to design this project through Preliminary Plans and Grading Plans. This consultant will be utilized to perform some other survey and preliminary engineering tasks as described below.

1. **Photogrammetry and Survey Section:** The P&S Section will work in coordination with the design consultant to provide survey and mapping based on aerial photography.
2. **Property Surveys:** The Right-of-Way Program will utilize a consultant to complete a Level II property survey.
3. **Utility surveys:** The design consultant will identify utility locations on mapping.
4. **Planning Program and FHWA:** The preparation of an Interchange Justification Study and Report will be required. Access control changes will also need to be approved by the FHWA. FHWA considers this project a Project of Divisional Interest (PoDI) so it will exercise a somewhat higher level of stewardship and oversight.
5. **Environmental Services:** The Environmental Services Section, in coordination with the design consultant, requires the following studies and documents.  
Cultural: Survey to be completed  
Threatened and Endangered Species: Programmatic Biological Opinion  
Wetlands: Wetlands will be delineated  
Document Type: Environmental Assessment
6. **Public Involvement: Level C.** The design consultant will lead a series of meetings and focus group meetings to present the design concepts and gather public and stakeholder feedback. A 3D visualization model will be required for the public meetings to help communicate the project design and alternatives to stakeholders and the public.
7. **Geology Program Surveys:** Geology Program, in conjunction with the design consultant, will complete the preliminary geotechnical investigations. Geology will complete all other geotechnical investigations for structure foundations, including ITS facilities.
8. **Materials Program Pavement Surfacing:** The preliminary and final pavement thickness designs will be provided by the Materials Program.
9. **Hydraulics Report:** Hydraulic analyses and the Hydraulic Report will be provided as required by the design consultant.

10. Bridge Program Structures: The design consultant will prepare the preliminary design, Structure Selection Report, and Preliminary Layout for all structures including bridges, retaining walls, and reinforced concrete (RC) box culverts. The design consultant will prepare the Preliminary Geology Layout for each bridge and RC box culvert. The Bridge Program will decide at a later date on the preparation of the final bridge plans.
11. Traffic Program Roadway lighting, striping, permanent signing, traffic control: The design consultant will provide updated traffic volume forecasts and will prepare a preliminary signing plan. Traffic Program, in conjunction with the design consultant, will prepare final striping, signing, and lighting plans. Minor structures, especially overhead signs, may require modifications.
12. Right-of-Way Program: Right-of-Way Program will acquire any needed additional right-of-way and construction permits.
13. Project Development: Project Development, in conjunction with the design consultant, will prepare road design plans, cross sections, plans for minor drainage structures, typical sections, and quantity summaries.
14. Utilities: The Utilities Section will be responsible for utility adjustments and for acquiring electric service as needed.
15. ITS: The ITS Program will provide recommendations for adjustments of ITS facilities and for new facilities.
16. A Value Engineering Study will be performed at the appropriate stage of design.

**DESIGN VALUES:**

	<b>I-80</b>	<b>I-25</b>
Type of Area:	Urban	Urban
Section Type:	Rural	Rural
Type of Terrain:	Level	Level
Level of Service:	LOS C	LOS C
Number of Lanes:	6	4
Selected Posted Speed:	75 MPH	65 MPH
Selected Design Speed:	75 MPH	65 MPH
Travel Lane Widths:	12'	12'

Shoulder Widths:	Outside	10'	10'
	Inside	10'	4'
Maximum Grades:		5%	5%
Clear Zone Width:		Per AASHTO Roadside Design Guide	
Surface Type:		PCCP	PCCP

**REFERENCE DOCUMENTS:**

*AASHTO, A Policy on Design Standards Interstate System*

<sup>1</sup> *WYDOT, Guide for Interstate Highways, 2014*

<sup>2</sup> *WYDOT, Guide for Non-NHS State Highways, 2014*

*WYDOT, Road Design Manual*

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Prepared By:  
Anthony Laird, P.E.  
Consulting Engineer

Anthony Laird 7/7/2018  
Date

Reviewed By:  
Andrea Allen, P.E.  
Project Development Engineer

Andrea Allen 8/14/18  
Date

Approved By:  
Jeffrey Brown, P.E.  
Highway Development Engineer

Jeffrey Brown 9-12-18  
Date

Approved By:  
Thomas DeHoff, P.E.  
District Engineer

Thomas DeHoff 8.23.2018  
Date

Concurred By:  
Keith Fulton, P.E.  
Assistant Chief Engineer for Planning and Engineering

Keith R. Fulton 12-3-2018  
Date

Route (ML)	Milepost	Folder No.	Dist. Ref. No.	Util ID	Company	Company Ref. No.	Facil. Type	Encr Type
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**I-80**

ML80	359	31749		AFML	MAGELLAN		OILT	XING
ML80	359	24042		AKAI	CHEYENNE		WATT	XING
ML80	359	15677		AKTV	CENLINK		TELB	XING
ML80	359	17284		ALHH	BHE-CLFP		POWA	XING
ML80	359	51913	C-1188	BXBE	AT&T		FIOP	XING
ML80	359	31749		CVGW	SINCLR-T		OILT	XING
ML80	359.08	47385		BQGV	SPRINT		FIOP	XING
ML80	359.08	65420	C1762	CSPD	ACT	130501	FIOP	ENCR
ML80	359.08	50280		BUVQ	ZAYOGRP		FIOP	XING
ML80	359.08	65414		CSQE	ACT	130501	FIOP	ENCR
ML80	359.08	49601		BTFV	BHE-CLFP		POWB	XING
ML80	359.08	51825	C-1185	BWWB	AT&T		FIOP	XING
ML80	359.08	15598		AVWI	UP-RR		RR-V	XING
ML80	359.08	52561	C-1212	BXVB	ENRON-CO WYDOT-		FIOP	XING
ML80	359.08	60752	C-1598	CKWV	TRA		XXXX	ENCR
ML80	359.1	42513		BLJY	AT&T		FIOP	XING
ML80	359.1	44243		BMYQ	UP-RR		RR-V	XING
ML80	359.12	59453	C-1545	CJGG	BHE-CLFP WYDOT-		POWA	ENCR
ML80	359.18	57909	C-1477	CHFG	TRA		XXXX	ENCR
ML80	359.19	55834	C-1413	CEMB	SINCLR-T		OILT	XING
ML80	359.29	13669		AHXH	MAGELLAN		OILT	XING
ML80	359.4	13905		AJQX	PRVT		STOS	ENCR
ML80	359.43	13899		AJQY	PRVT		STOS	ENCR
ML80	359.5	13166		AHWO	WAPA WYDOT-		POWA	XING
ML80	359.54	57909	C-1477	CHFH	TRA		XXXX	ENCR
ML80	359.59	18047		AJN	BHE-CLFP		POWA	XING
ML80	359.59	15050		AKBG	CENLINK		TELA	XING
ML80	359.59	13815		AJRO	CENLINK WYDOT-		TELB	XING
ML80	359.6	60752	C-1598	CKWW	TRA		XXXX	ENCR
<b>Route (ML)</b>	<b>Milepost</b>	<b>Folder No.</b>	<b>Dist. Ref. No.</b>	<b>Util ID</b>	<b>Company</b>	<b>Company Ref. No.</b>	<b>Facil. Type</b>	<b>Encr Type</b>
ML80	359.99	13655		AHXG	BHE-CLFP		POWA	XING
ML80	359.99	46402		BPGA	CHEY-BPU		SANS	XING
ML80	359.99	54100	C-1328	CBEN	MCLEOD		TELA	XING

ML80	359.99	31984		AICM	CENLINK	R/W 21295	TELB	ENCR
ML80	359.992	13640		AHXQ	CENLINK	R/W 5774	TELA	XING
ML80	360	63824	C-1685	CPBG	CHARTER		FIOP	XING
ML80	360	65420	C1762	CSPE	ACT	130501	FIOP	ENCR
ML80	360.11	62690	C-1648	CNOL	WYDOT-D1		XXXX	ENCR
ML80	360.16	17322		ALCN	AT&T		TELB	XING
ML80	360.276	13704		AHWY	WAPA		POWA	XING
ML80	360.3	48254		BRCP	WAPA		POWA	XING
ML80	360.37	13841		AKZY	BHE-CLFP		GASD	XING
ML80	360.39	17306		BBRZ	BNSF		RR-V	XING
ML80	360.39	17509		AVYY	BNSF		RR-V	XING
ML80	360.5	17514		CBMC	BHE-CLFP		GAST	XING

### I-25

ML25	8	26703		AKSI	CENLINK		TELA	XING
ML25	8	16096		AKTE	HIWESTEN		POWA	XING
ML25	8	4355		AYFG	WAPA		POWB	XING
ML25	8	42243		BLFI	BHE-CLFP		POWB	ENCR
ML25	8	11989		AYSE	WAPA		POWA	XING
ML25	8	61202	C-1610	CLNQ	CHARTER		FIOP	ENCR
ML25	8	65729	C1767	CTNR	EAGLE-NET	13051	FIOP	ENCR
ML25	8	65416	C1767	CSOH	ACT	130501	FIOP	ENCR
ML25	8	26529		AVGC	HIWESTEN		POWA	XING
ML25	8.1	26499		AJOB	BHE-CLFP		POWB	XING
ML25	8.13	59454	C-1544	CJGC	BHE-CLFP		POWB	ENCR
ML25	8.15	62681	C-1649	CNNV	WYDOT-D1		XXXX	ENCR
ML25	8.17	65416	C1767	CSOI	ACT	130501	FIOP	ENCR
ML25	8.38	62681	C-1649	CNNW	WYDOT-D1		XXXX	ENCR
ML25	8.44	46402		BPGB	CHEY-BPU WYDOT-		SANS	XING
ML25	8.46	57910	C-1478	CHFL	TRA		XXXX	ENCR
ML25	8.5	62768	C-1652	CNRI	HIWESTEN		POWA	XING
ML25	8.56	63033	C-1665	CNZV	CHARTER		FIOP	XING
ML25	8.573	13677		AHXE	BHE-CLFP		POWA	XING
ML25	8.59	65420	C1762	CSPA	ACT	130501	FIOP	XING
ML25	8.59	65729	C1765	CTND	EAGLE-NET	13051	FIOP	XING
ML25	8.59	65416	C1767	CSNP	ACT	130501	FIOP	XING
<b>Route (ML)</b>	<b>Milepost</b>	<b>Folder No.</b>	<b>Dist. Ref. No.</b>	<b>Util ID</b>	<b>Company</b>	<b>Company Ref. No.</b>	<b>Facil. Type</b>	<b>Encr Type</b>
ML25	8.64	55832	C-1411	CELZ	SINCLR-T		OILT	XING
ML25	8.64	13166		AKKY	WAPA		POWA	XING
ML25	8.64	13669		AHXI	MAGELLAN		OILT	XING

ML25	8.75	57910	C-1478	CHFM	WYDOT-TRA		XXXX	ENCR
ML25	8.75	60753	C-1596	CKWY	WYDOT-TRA		XXXX	ENCR
ML25	8.8	37600		BHGE	BHE-CLFP		GAST	ENCR
ML25	8.84	60752	C-1598	CKWU	WYDOT-TRA		XXXX	ENCR
ML25	8.84	16340		AKYG	WAPA		POWA	XING
ML25	8.84	18931		AJKU	BHE-CLFP		GAST	XING
ML25	8.84	18047		AJJM	BHE-CLFP		POWA	XING
ML25	8.84	18047		AJL	BHE-CLFP		POWA	XING
ML25	8.86	59454	C-1544	CJGD	BHE-CLFP		POWB	ENCR
ML25	8.9	60753	C-1596	CKWZ	WYDOT-TRA		XXXX	ENCR
ML25	9	31255		AHRT	CHARTER		CTVA	XING
ML25	9	13652		AHXL	BHE-CLFP		POWA	XING
ML25	9	11975		ALBR	WAPA		POWA	XING
ML25	9	13896		AJQZ	PRVT		STOS	ENCR
ML25	9	5815		BBEC	BHE-CLFP		GASD	ENCR
ML25	9	13970		AJRF	BHE-CLFP		POWA	XING
ML25	9.03	57910	C-1478	CHFN	WYDOT-TRA		XXXX	ENCR
ML25	9.14	15954		AKTQ	KANEB		OILT	XING
ML25	9.14	60753	C-1596	CKXA	WYDOT-TRA		XXXX	ENCR
ML25	9.14	58874		CPID	WYDOT-D1		STRL	ENCR
ML25	9.14	58874		CPIC	BHE-CLFP		POWA	ENCR
ML25	9.14	54659		CCRV	CHEY-BPU		SANS	ENCR
ML25	9.14	54658		CCRU	CHEY-BPU		WATD	ENCR
ML25	9.14	50281		BUVR	ZAYOGRP		FIOP	XING
ML25	9.14	47037		BPWE	CABLE-TV		CTVB	ENCR
ML25	9.14	47386		BQGW	SPRINT		FIOP	XING
ML25	9.14	15599		AVWD	UP-RR		RR-V	XING
ML25	9.14	32279		AMLC	CENLINK		TELB	ENCR
ML25	9.14	14883		AJYB	BHE-CLFP		POWA	ENCR
ML25	9.15	61152	C-1609	CLLM	CHEY-BPU		WATT	XING
ML25	9.15	52561	C-1212	BXVA	ENRON-CO		FIOP	XING
ML25	9.155	15678		AKTU	AT&T		TELB	XING
ML25	9.2	42513		BLJX	AT&T		FIOP	XING
<b>Route (ML)</b>	<b>Milepost</b>	<b>Folder No.</b>	<b>Dist. Ref. No.</b>	<b>Util ID</b>	<b>Company</b>	<b>Company Ref. No.</b>	<b>Facil. Type</b>	<b>Encr Type</b>
ML25	9.22	65804	C1780	CTYY	BHE-CLFP		POWB	XING
ML25	9.28	13906		BDVL	PRVT		WATI	ENCR
ML25	9.28	59454	C-1544	CJGA	BHE-CLFP		POWB	ENCR

ML25	9.29	57910	C-1478	CHFO	WYDOT-TRA	XXXX	ENCR
ML25	9.29	11384		ALCV	BHE-CLFP	POWA	XING
ML25	9.29	11143		ALFN	AT&T	TELB	XING
ML25	9.401	13328		AHZA	CENLINK	TELB	XING
ML25	9.5	52600	C-1225	BXYT	CHEY-BPU	SANS	ENCR
ML25	9.57	59454	C-1544	CJFZ	BHE-CLFP	POWB	ENCR
ML25	9.59	57910	C-1478	CHFP	WYDOT-TRA	XXXX	ENCR
ML25	9.75	13705		AHWZ	BHE-CLFP	GASD	XING
ML25	9.81	58717	C-1505	CIJP	CHEY-BPU	SANS	XING
ML25	9.84	59454	C-1544	CJFY	BHE-CLFP	POWB	ENCR
ML25	9.988	29953		AIAJ	CHEYENNE	WATD	ENCR
ML25	10	14161		AYTI	CENLINK	TELB	XING
ML25	10	11079		AYPB	BHE-CLFP	GASD	ENCR
ML25	10	11042		AYOZ	BHE-CLFP	GASD	ENCR
ML25	10	10829		AYOS	PRVT	GASD	XING
ML25	10	10595		AYOR	BHE-CLFP	POWA	ENCR
ML25	10.002	29795		AIAU	BHE-CLFP	POWA	ENCR
ML25	10.18	48972		BRYK	CHEY-BPU	WATT	ENCR
ML25	10.203	51221	C-1146	BWDY	AT&T	FIOP	ENCR
ML25	10.23	40235		BJNT	BHE-CLFP	GASD	XING
ML25	10.23	11082		ALFM	CENLINK	TELA	XING
ML25	10.23	13458		AHYH	BHE-CLFP	GASD	XING
ML25	10.25	49253		BSMQ	BHE-CLFP	GAST	ENCR
ML25	10.25	53767	C-1314	CALJ	LEVEL 3	FIOP	XING
ML25	10.3	64931	C1729	CSGF	ZAYOGRP	FIOP	XING
ML25	10.332	51221	C-1146	BWEA	AT&T	FIOP	ENCR
ML25	10.332	51221	C-1146	BWDZ	AT&T	FIOP	XING
ML25	10.35	57910	C-1478	CHFQ	WYDOT-TRA	XXXX	ENCR
ML25	10.35	10989		ALFO	BHE-CLFP	POWA	XING
ML25	10.5	49823		BTVE	BHE-CLFP	POWA	XING

TOTAL ESTIMATED QUANTITIES -- PHASE 1									
ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES		COST		RM	RM	Length
			ROADWAY	STRUCTURE	UNIT PRICE	EXTENSION			
			CODE 06	CODE 11					
105.09000	CONTRACTOR SURVEYING	MI	7		\$ 5,000.00	\$ 35,000	359.00	360.06	1.06
106.05100	FIELD LABORATORY	EA	1		\$ 10,000.00	\$ 10,000			
106.05200	CONTRACTOR TESTING	LS	1		\$ 170,850.41	\$ 170,850			
109.04000	FORCE ACCOUNT WORK	\$\$	\$ 50,000		\$ 1.00	\$ 50,000			
109.08000	MOBILIZATION	LS	1		\$ 2,500,000.00	\$ 2,500,000			
202.03415	REMOVAL OF CONCRETE PAVEMENT	SY	40427		\$ 5.00	\$ 202,135			
203.02500	UNCLASSIFIED EXCAVATION	CY	257293		\$ 5.00	\$ 1,286,465			
207.03100	TOPSOIL STORING	CY	19501		\$ 1.90	\$ 37,052			
207.03200	TOPSOIL PLACING	CY	19501		\$ 2.20	\$ 42,902			
209.01000	WATER	MG	13951		\$ 8.00	\$ 111,608			
215.01000	CONTRACTOR STORM WATER CONTROL	LS	1		\$ 50,000.00	\$ 50,000			
301.01085	CRUSHED BASE	CY	32959		\$ 30.00	\$ 988,783			
401.02000	HOT PLANT MIX	TON	3200		\$ 45.00	\$ 144,000			
401.03329	ASPHALT BINDER (PG 76-28)	TON	179		\$ 525.00	\$ 94,080			
413.01000	HYDRATED LIME	TON	30		\$ 160.00	\$ 4,779			
414.01050	CONCRETE PVMT (10 in)	SY	38636		\$ 70.00	\$ 2,704,489			
414.01060	CONCRETE PVMT (11 in)	SY	61704		\$ 75.00	\$ 4,627,820			
500.10000	NEW BRIDGES INCL REMOVAL OF EXISTING BRIDGE	SF		44250	\$ 170.00	\$ 7,522,500			
500.20000	BRIDGE WIDENING	SF		15345.83	\$ 325.00	\$ 4,987,395			
502.10000	DOUBLE 10' X 10' BOX CULVERT PLUS WING WALLS	FT		32	\$ 1,562.00	\$ 49,984			
603.01012	PIPE 12 in	LF		1600	\$ 25.00	\$ 40,000			
703.03100	FLAGGING	HR		5000	\$ 35.00	\$ 175,000			
703.03115	TEMPORARY TRAFFIC CONTROL	LS		1	\$ 1,500,000.00	\$ 1,500,000			
					Total	\$ 27,334,841			
					Roadway	\$ 14,774,962			
					Structure	\$ 12,559,879			
					25% Contingency	\$ 6,833,710			

TOTAL ESTIMATED QUANTITIES -- PHASE 2										
ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES		COST			RM	RM	Length
			ROADWAY CODE 06	STRUCTURE CODE 11	UNIT PRICE	EXTENSION				
105.09000	CONTRACTOR SURVEYING	MI	8		\$ 5,000.00	\$ 40,000		359.00	360.06	1.06
106.05100	FIELD LABORATORY	EA	1		\$ 10,000.00	\$ 10,000		8.40	10.00	1.60
106.05200	CONTRACTOR TESTING	LS	1		\$ 68,958.15	\$ 68,958				
109.04000	FORCE ACCOUNT WORK	\$\$	\$ 50,000		\$ 1.00	\$ 50,000				
109.08000	MOBILIZATION	LS	1		\$ 2,500,000.00	\$ 2,500,000				
202.03415	REMOVAL OF CONCRETE PAVEMENT	SY	1856		\$ 5.00	\$ 9,278				
203.02500	UNCLASSIFIED EXCAVATION	CY	222235		\$ 5.00	\$ 1,111,174				
207.03100	TOPSOIL STORING	CY	15098		\$ 1.90	\$ 28,686				
207.03200	TOPSOIL PLACING	CY	15098		\$ 2.20	\$ 33,216				
209.01000	WATER	MG	11697		\$ 8.00	\$ 93,576				
215.01000	CONTRACTOR STORM WATER CONTROL	LS	1		\$ 50,000.00	\$ 50,000				
301.01085	CRUSHED BASE	CY	16992		\$ 30.00	\$ 509,761				
414.01050	CONCRETE PVMT (10 in)	SY	26458		\$ 70.00	\$ 1,852,044				
414.01060	CONCRETE PVMT (11 in)	SY	4082		\$ 75.00	\$ 306,167				
500.10000	NEW BRIDGES INCL. REMOVAL OF EXISTING BRIDGE	SF		110360	\$ 170.00	\$ 18,761,200				
500.20000	BRIDGE WIDENING	SF		11620.71	\$ 325.00	\$ 3,776,731				
703.03100	FLAGGING	HR	4000		\$ 35.00	\$ 140,000				
703.03115	TEMPORARY TRAFFIC CONTROL	LS	1		\$ 1,500,000.00	\$ 1,500,000				
					Total	\$ 30,840,792				
					Roadway	\$ 9,921,380				
					Structure	\$ 20,919,411				
					25% Contingency	\$ 7,710,198				

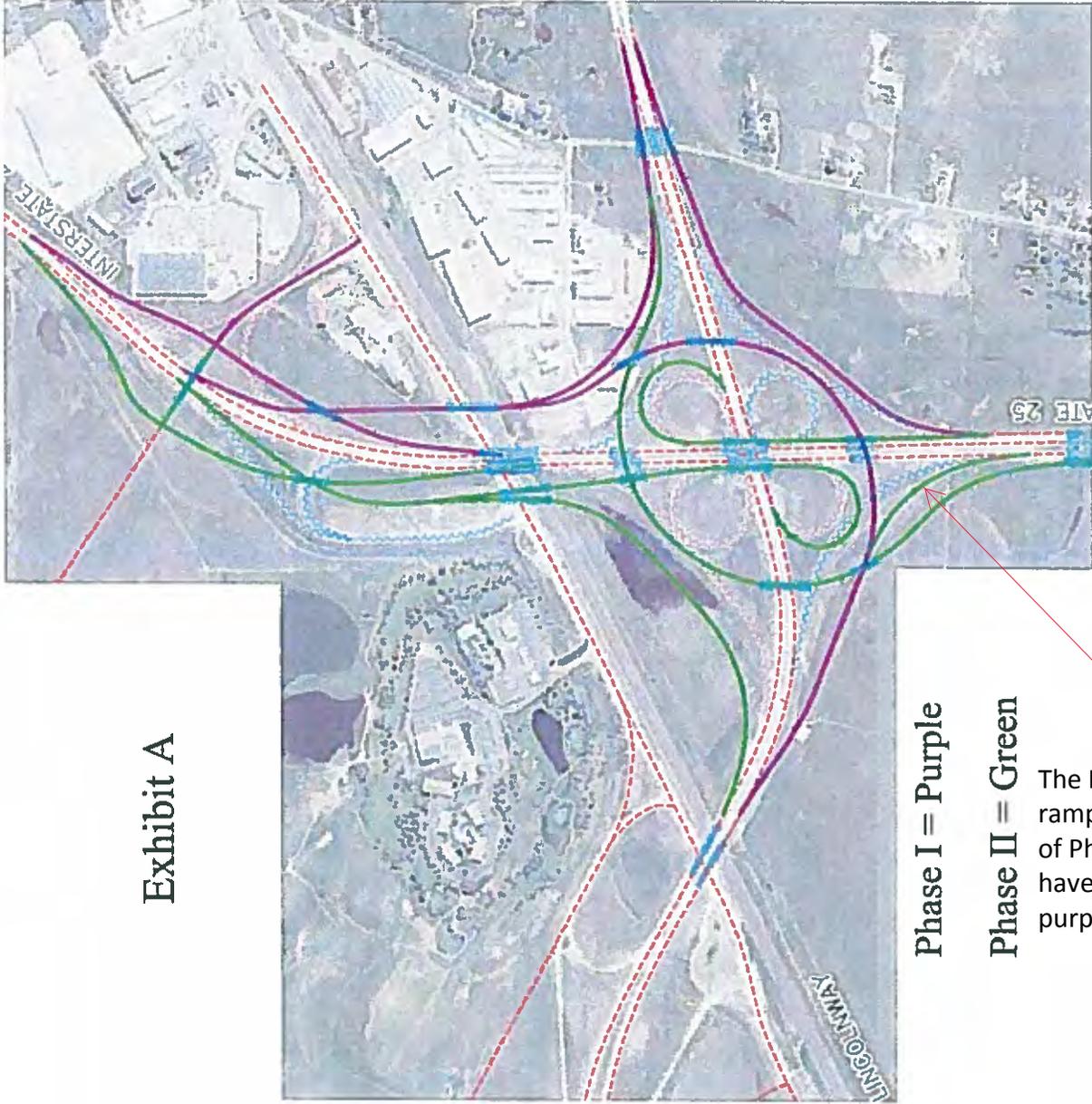


Exhibit A

Phase I = Purple

Phase II = Green

The I-80 EB to I-25 SB ramp has to be part of Phase I, so should have been shown in purple. (Tony Laird)



## APPENDIX C – Workshop Refinements



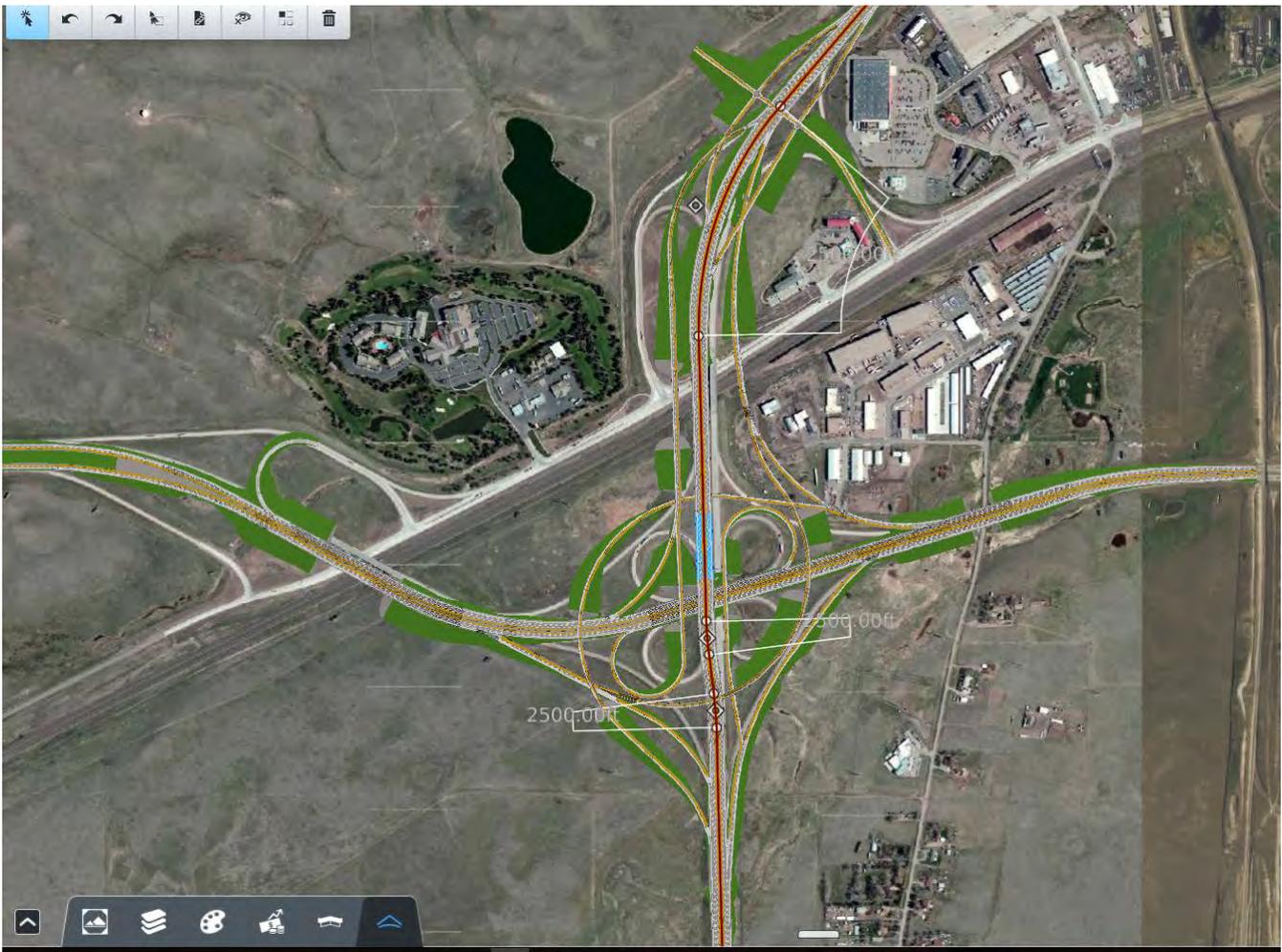
# WS-01: I-25 Offset Alignment West – Pass

## Proposal Description

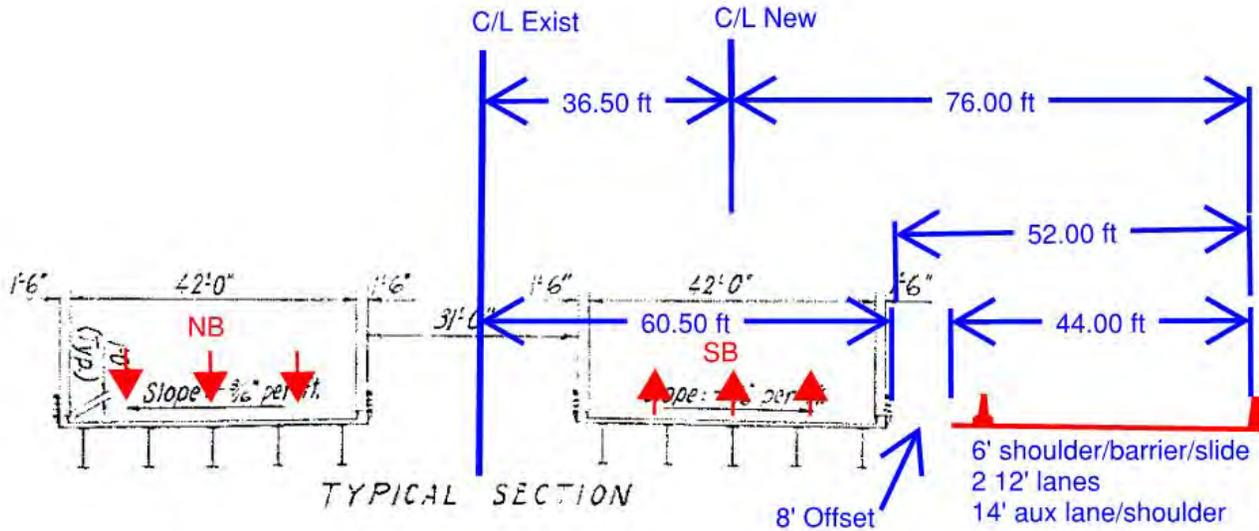
### *Workshop Team's Understanding of the Current Design Concept:*

The recommended improvement concept from the Preferred Alternative in the 2008 Feasibility Study was to maintain the existing I-25 centerline and to widen to accommodate standard lanes and shoulders. Widening would also include bridge rehabilitation measures to extend the structures' useful service life. Bridge rehabilitation includes deck replacement and other rehab and repair measures.

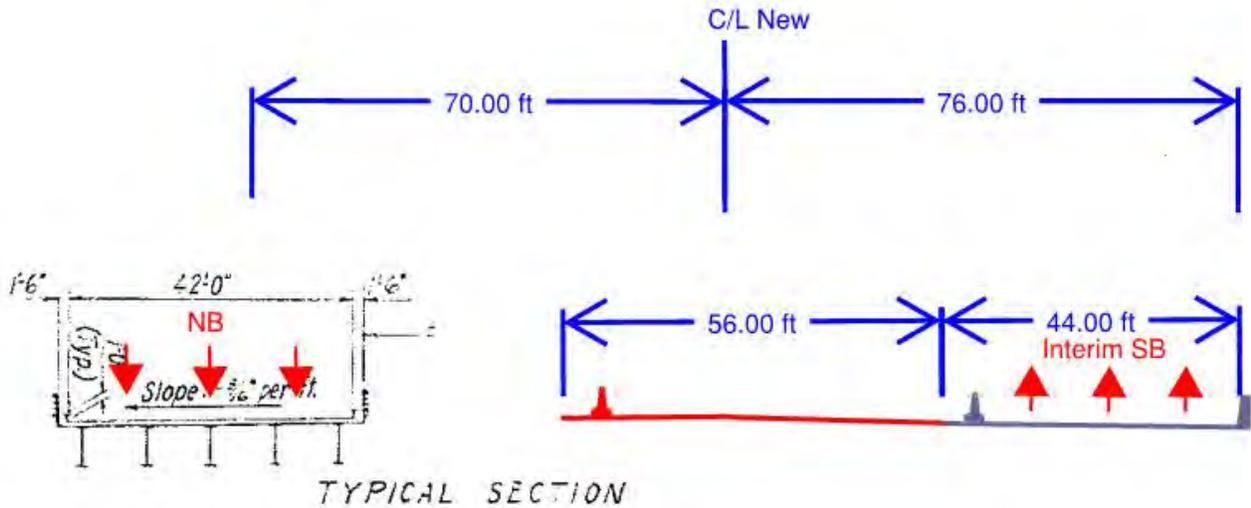
This workshop refinement considers options for constructing the I-25 bridges over I-80 and UPRR to facilitate maintenance of traffic and constructability. Bridge replacement is assumed in this refinement (WS-07).



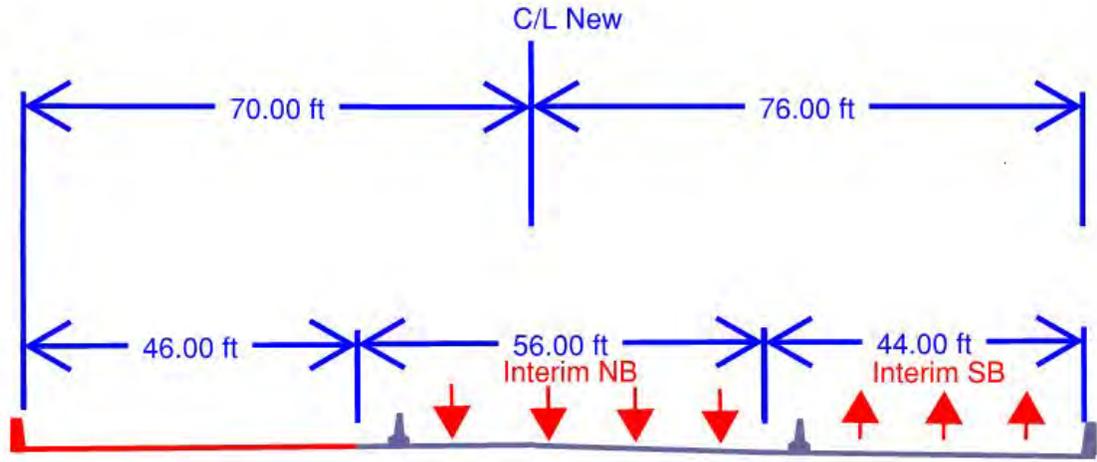
In shifting the I-25 alignment to the west, bridge construction can occur in three stages without reducing the number of traffic lanes on the bridge crossings, thereby minimizing the impacts to traffic operations during construction. In the first stage, a new southbound bridge would be built west of the existing alignment, leaving an offset between new and existing structures to facilitate construction. The first-stage southbound bridge would feature a 6-foot inside shoulder (2-foot shoulder, 2-foot barrier and 2-foot deflection/slide width), two 12-foot through lanes, and a 14-foot auxiliary lane/shoulder on the outside, totaling 44 feet wide. The 14-foot auxiliary lane/shoulder results in a 6-foot overbuild of the ultimate southbound shoulder. The figures below depict the I25 bridge over UPRR. The I-25 crossing of I-80 presents a similar condition with separated existing northbound and southbound bridges.



In the second construction stage, I-25 southbound traffic would be shifted to the new southbound bridge, allowing removal of the existing southbound bridge and construction of the middle portion of the new bridge. Northbound I-25 traffic is unchanged during the first and second stages of construction.



The third and final stage of bridge construction shifts the I-25 northbound traffic to the portion of the bridge built in the second stage. The existing northbound bridge would be removed, and both directions of I-25 traffic would be operating on the partially constructed new bridge. The dimensions shown in the exhibits are based on the as-builts of I-25 over the UPRR bridge and a possible lane configuration that would provide off-alignment construction of the bridges with minimal impact to existing traffic. The second and third stages will require further design refinements to specify the exact lane widths and how much deck can be built in each stage. The ultimate centerline offset is expected to be offset 35 to 40 feet west of existing, but will be refined in design based on the offset required to accommodate grade changes between the interim/final conditions and existing conditions.



TYPICAL SECTION



The realignment of I-25 is expected to tie back into existing south of I-80 before Clear Creek and north of UPRR near the new service interchange.

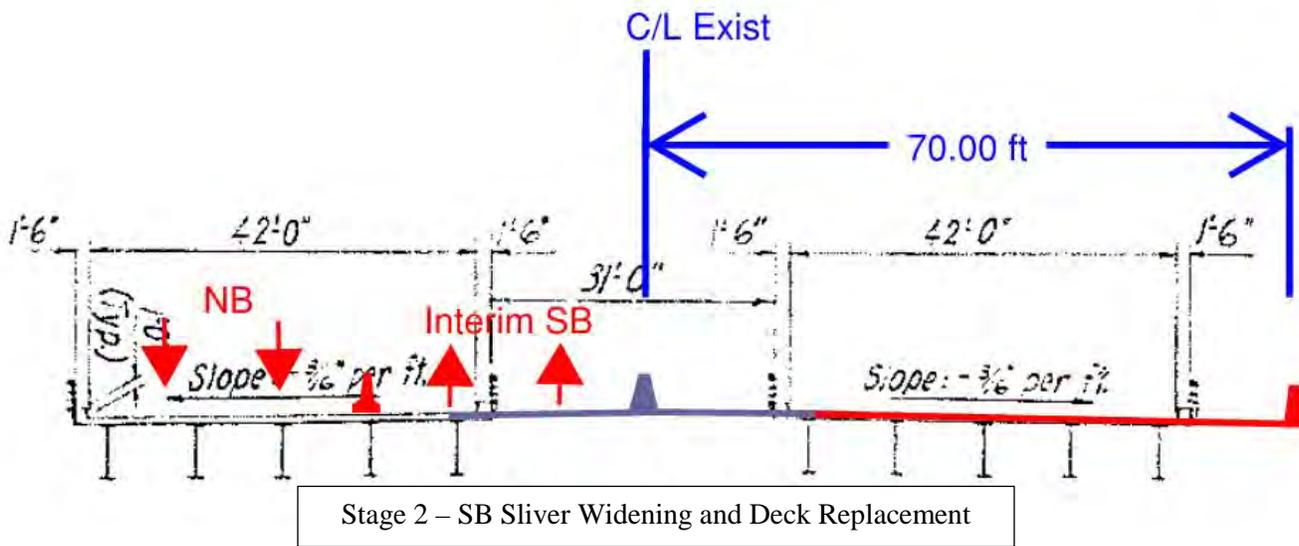
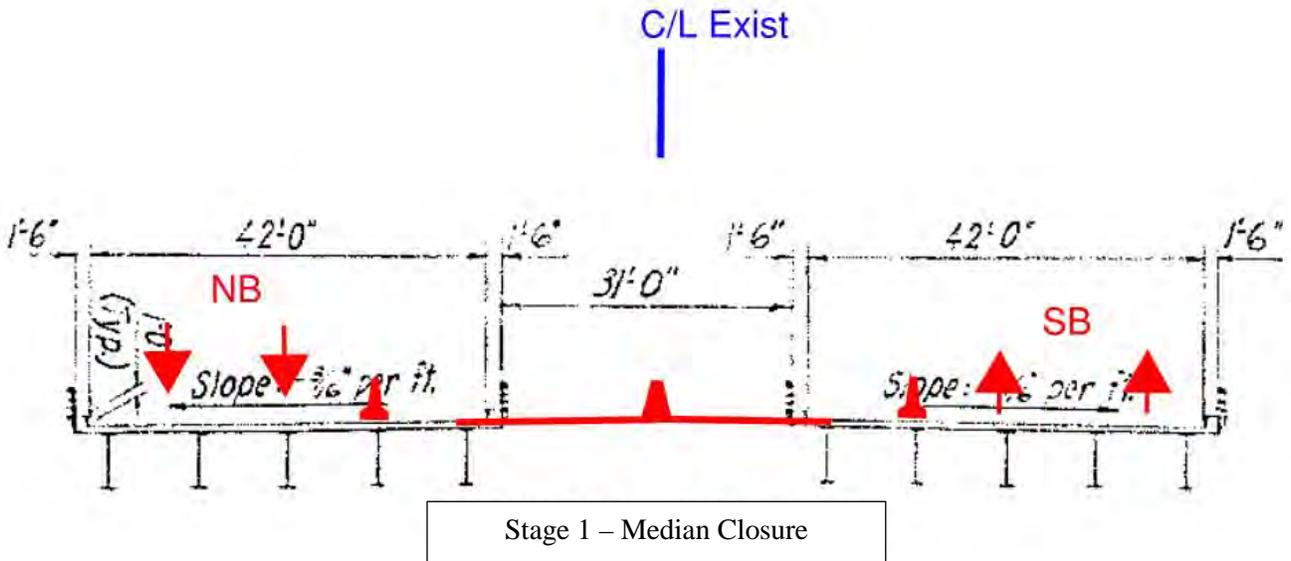
This workshop refinement will require a significant portion of the total project cost be expended initially due to the extent of infrastructure needed to be in place to accommodate the alignment shift. However, traffic control is greatly improved during construction with this refinement. Additionally, there are right-of-way benefits with reduced impact to the properties on the northeast quadrant by shifting I-25 to the west.

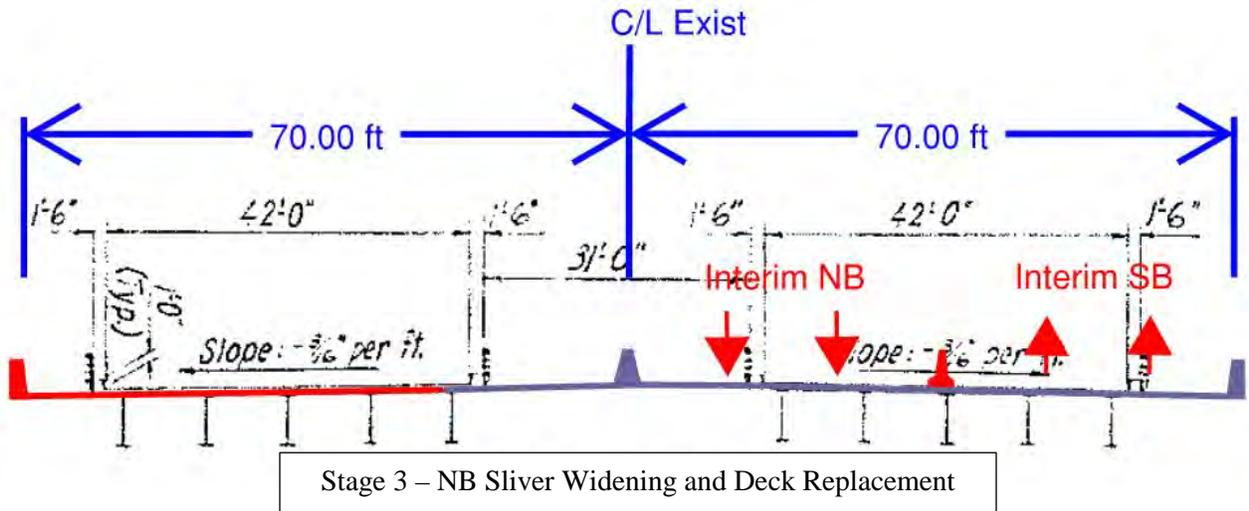
### Construction Staging Impact

This refinement aides in the mainline construction staging, allowing the existing number of lanes to continue to be serviceable throughout construction without lane reductions.

Safety is also improved due to the construction of the bridges offline. However, there may also be some construction safety concerns with building the third stage in the median area between directions of traffic.

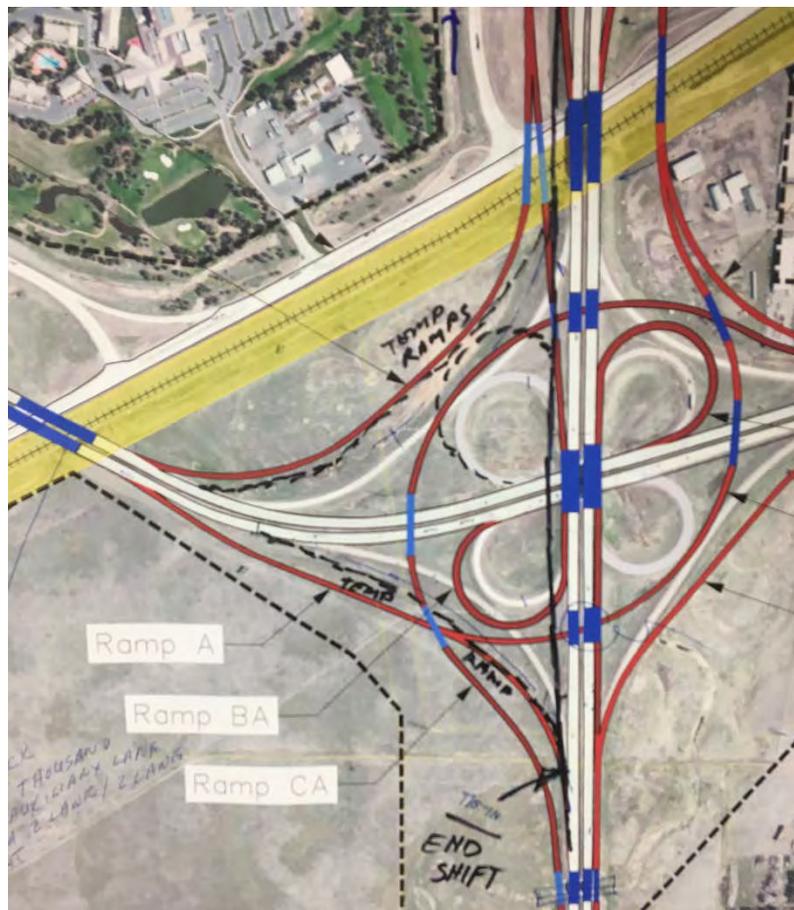
For comparison, bridge construction for the Reconnaissance Report Baseline is also expected to require three stages. However, the number of lanes would be reduced to two lanes in each direction for the duration. The following figures depict first stage (median closure), second stage (southbound sliver widening and deck replacement) and third stage (northbound sliver widening and deck replacement). Three major traffic shifts are necessary to facilitate widening and rehab construction activities.





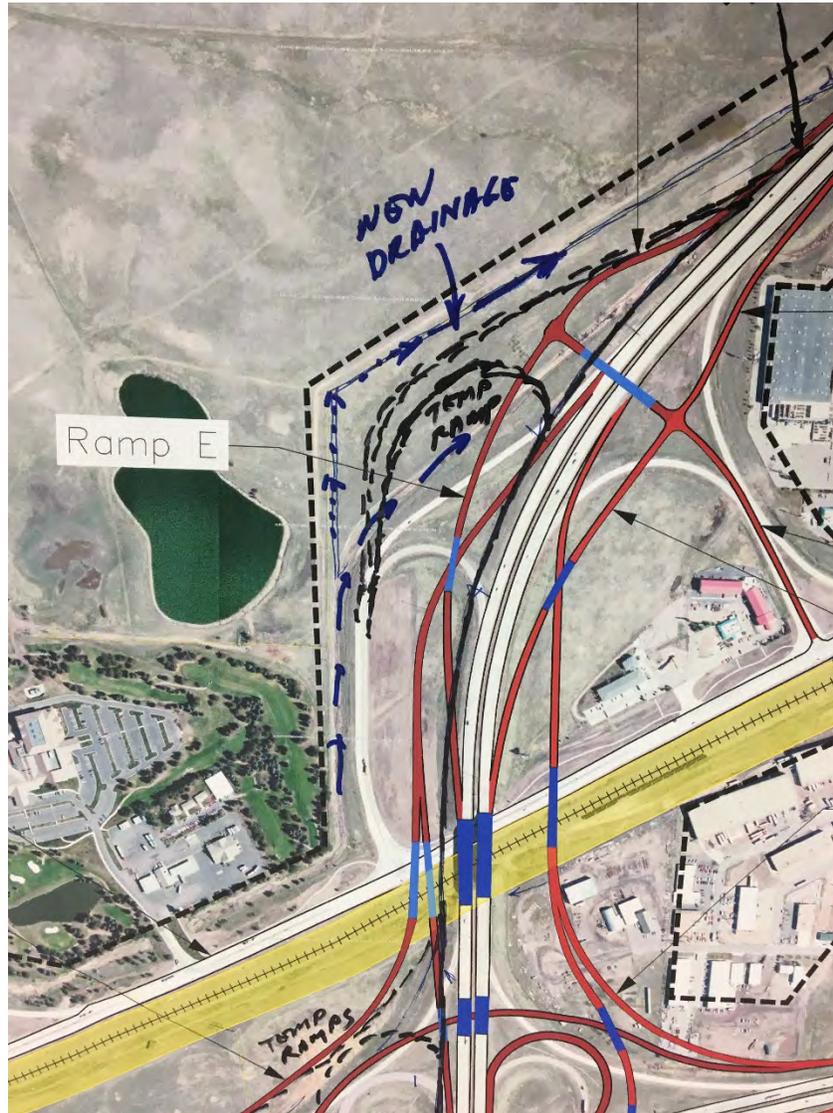
### Secondary Design Impact

There are options for the direct ramps that need additional design consideration due to shifting I-25 off its existing alignment. The southbound I-25 to westbound I-80 ramp and the shifted I-25 alignment could split from one another closer to the I-25/I-80 bridge in order to save an extra structure over UPRR, as well as to limit impacts to the wetland area in the NW quadrant.



There are also concerns during traffic staging of the Lincolnway loop on-ramp to SB I-25. This existing loop on-ramp is already very steep and raising the grade of I-25 and shifting it further to the west will only steepen the connecting grades. There may be the need to realign this on ramp in addition to the SB I-25 to Lincolnway off

ramp. The proposed alignments of these on- and off-ramps between Lincolnway and I-25 are shown in the figure below. There is potential for the realigned ramps to interfere with the existing drainage channel in the area. Additional design coordination is needed to properly accommodate traffic and drainage in this refinement.



The loop ramp in the SW corner of the interchange will also need to be shifted to the west, which will limit space for the I-25 SB to I-80EB loop ramp, the I--80EB to I25SB ramp, and the I-80WB to I-25SB flyover ramp.

**Phase III Impact**

No impacts anticipated.

**Cost Impact (Increase/Decrease from Reconnaissance Report Baseline)**

With the I-25 bridges being replaced rather than widened, the overall project cost is expected to be greater than anticipated in the Reconnaissance Report, which considered widening the I-25 bridges. However, bridge rehabilitation costs associated with widening will be significant regardless and are expected to be close to the cost of replacement.

This refinement will require a significant portion of the overall project cost to be funded in the initial construction phase due to the extent of project infrastructure necessary to facilitate the alignment shift.

## Evaluation

*Workshop Team’s Proposal – Shift I-25 Alignment to the West:*

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Simplifies construction staging, requires only one major traffic shift.</li> <li>2. Minimizes overall construction duration.</li> <li>3. Aside from temporary short-term off-peak lane closures, maintains the existing number of traffic lanes throughout construction.</li> <li>4. Improves traffic operations by isolating most construction activities from adjacent traffic.</li> <li>5. Facilitates bridge replacement and removes older, less reliable structures from the State’s inventory.</li> <li>6. Removes bridge rehabilitation and repair costs from the project which are often not fully understood until after construction begins.</li> <li>7. Increases the project’s life expectancy and minimizes long-term bridge maintenance costs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Requires a larger portion of project infrastructure to be implemented in the initial construction phase.</li> <li>2. Increases initial phase and overall project costs.</li> <li>3. Design must assess impacts on existing ramps which could result in temporary ramp configurations to accommodate interim and final conditions.</li> <li>4. Requires +/- 6-foot overbuild in southbound direction.</li> </ol>

*Recon Report Baseline – Maintain existing I-25 Alignment:*

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Reduces initial phase and overall project costs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduces the number of traffic lanes throughout construction.</li> <li>2. Increases the number of construction stages required to both widen and rehabilitate bridge structures and increases overall construction duration.</li> <li>3. Requires the implementation of bridge rehabilitation and repair measures, the cost for which is often not fully understood until after construction begins.</li> <li>4. Retains potentially vulnerable steel girder details (in-span pin hangers) and increases bridge inspection frequency.</li> <li>5. Reduces long-term reliability and increases long-term maintenance costs.</li> </ol>

## Workshop Team Recommendation

The workshop team recommends incorporating the WS-01 I-25 Offset Alignment proposal into the design.



Prepared By: Kevin Stogsdill, WYDOT  
Carolyn Moore, WYDOT  
Kevin Erickson, WYDOT  
Mike Cooper, Jacobs

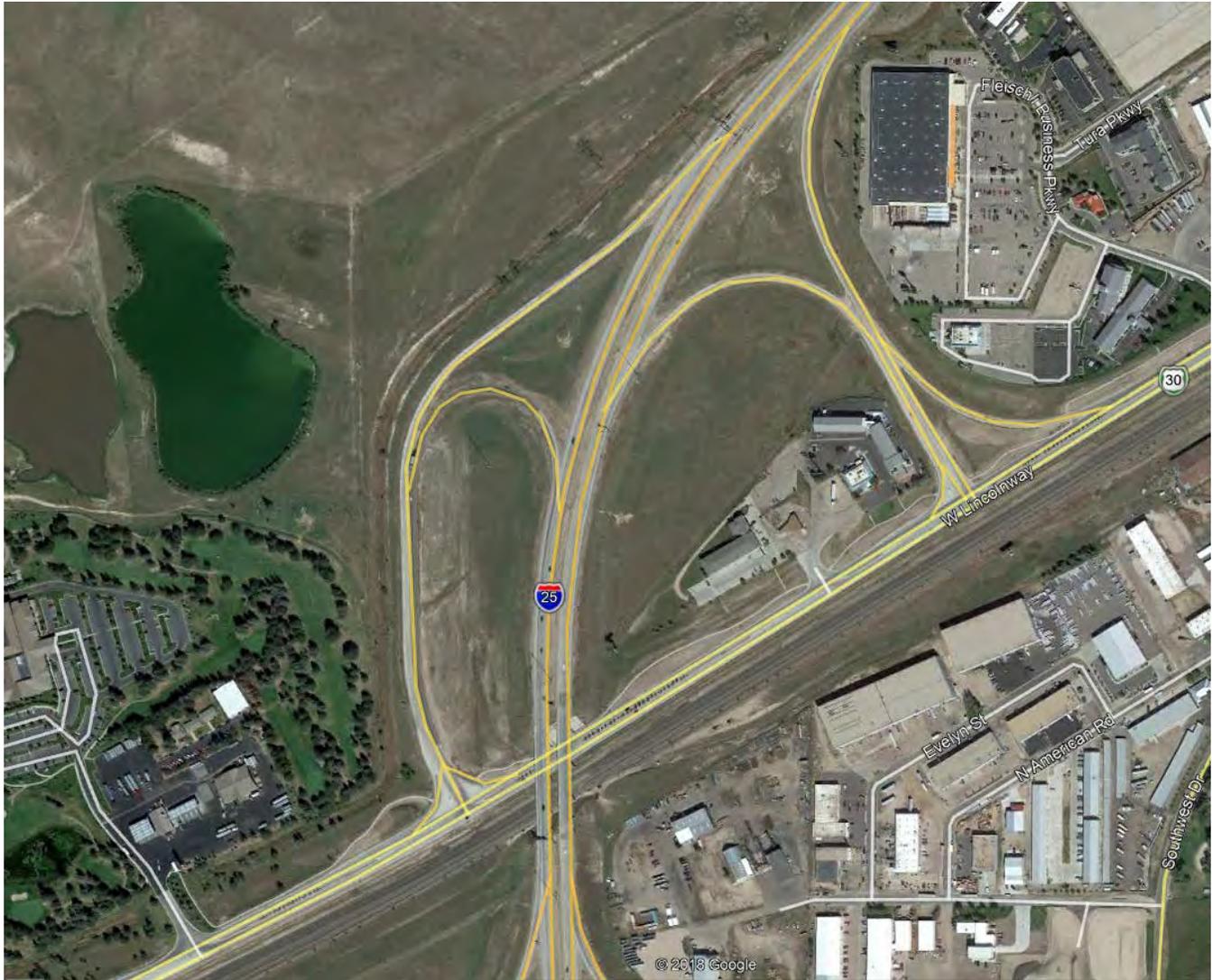
Presented By: Kevin Stogsdill, WYDOT  
Mike Cooper, Jacobs

# WS-02: I-25/Lincolnway Interchange Refinement – Fail

## Proposal Description

The original preferred alternative from the 2008 Feasibility Study proposed a basket-weave (grade separated) of the system SB off-ramp to I-80 with the access from Lincolnway entrance to SB I-25. The concept eliminated the access from Lincolnway to I-80.

This workshop refinement considers an alternative using a loop on-ramp to SB I-25 with successive off-ramps to I-80, providing the downtown area of Cheyenne with direct access to I-80 through the interchange system. Existing conditions provide local traffic access to I-80 through the clover loop ramps from Lincolnway.



### Traffic Control Impact

There is potential for increased construction activity adjacent to existing mainline traffic. However, the ramps could be built off of I-25 without impacting current traffic.

### Construction Phasing Impact

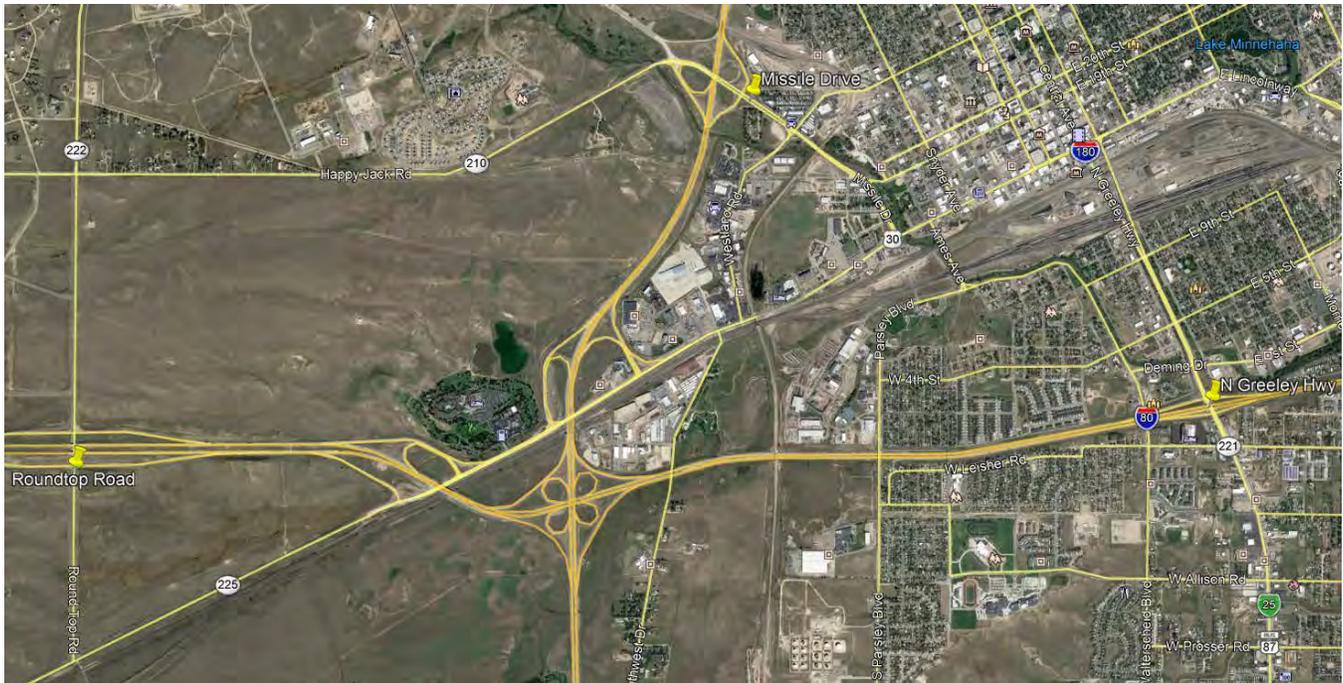
No impacts to construction phasing are anticipated with this refinement.

### Secondary Design Impact

This would introduce a weaving section on the SB I-25 mainline with the on-ramp from Lincolnway to SB I-25, followed by the off-ramp from SB I-25 to I-80. However, it eliminates the grade-separated basket-wave and long system ramps, reducing overall construction costs due to less structures.

### Phase III Impact

No impacts to Phase III anticipated. Local traffic can still access I-80 via Route 180 (N Greeley Highway) 1.9 miles east of the proposed project area, as well as the Route 222 (Round Top Road) and I-80 diamond interchange 2.4 miles west of the project area.



### Cost Impact (Increase/Decrease from Reconnaissance Report Baseline)

The overall cost impact would be reduced from the Reconnaissance Report baseline due to two less structures in the basket-weave section that would be eliminated. There would also be significant cost savings with retaining walls on the I-25/ Lincolnway ramps.

### Evaluation

The table below lists the advantages and disadvantages of changing the I-25/Lincolnway interchange design to accommodate I-80 access from Lincolnway traffic.

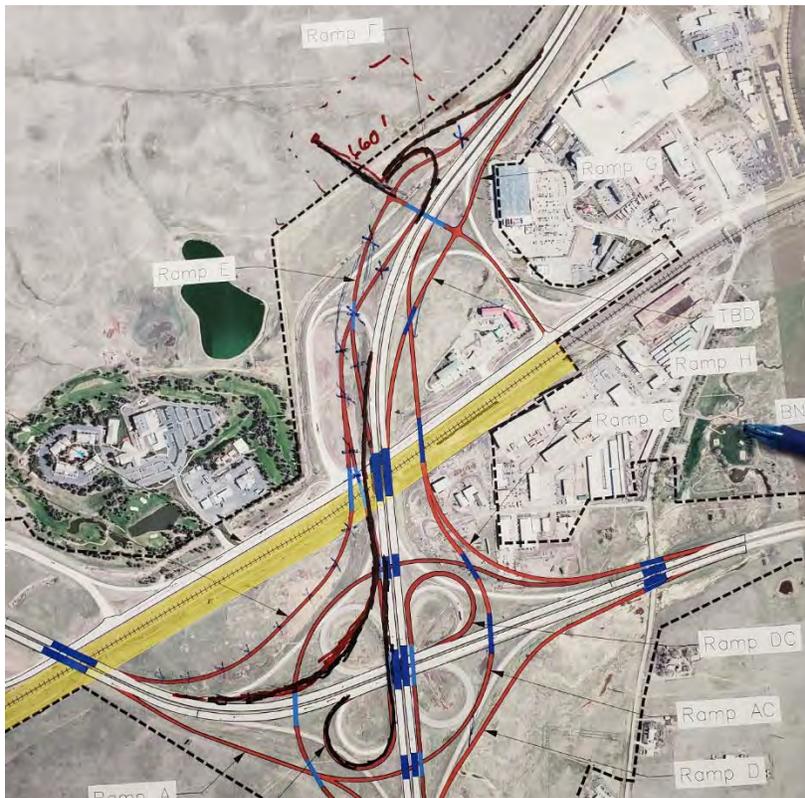
Advantages	Disadvantages
<ol style="list-style-type: none"> <li>Provides direct access from Lincolnway to I-80 EB and WB.</li> <li>Eliminates long system ramps and retaining walls and two bridges; one at the basket-weave and one</li> </ol>	<ol style="list-style-type: none"> <li>Introduces weaving on mainline I-25 SB near the system interchange. Approximate 1,500-foot weave length, which results in a poor level of service.</li> </ol>

<p>over the railroad. Potential for significant cost savings.</p> <ol style="list-style-type: none"> <li>3. Improves ramp alignment for I-25 SB to I-80 WB eliminating potential issues with questionable soils/wetlands.</li> <li>4. Increases weave length on I-80 WB to the West Lincolnway interchange.</li> </ol>	<ol style="list-style-type: none"> <li>2. Eliminates single-exit design. Requires multiple accesses to I-80; increases sign complexity and potential for driver confusion.</li> <li>3. Increases right-of-way impacts north of proposed Lincolnway interchange.</li> <li>4. Potential for wrong-way movements at loop ramp. May violate driver expectancy.</li> <li>5. Extends Lincolnway interchange footprint to the NW, lengthening distance required for access protection.</li> <li>6. Mixes local traffic with heavy interchange through traffic.</li> </ol>
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The proposed design from the Preferred Alternative provided standard diamond ramps and access to Lincolnway. The SB on-ramp was grade separated with the SB off-ramp to I-80. The grade separation eliminates the potential weaving conflicts from the entrance ramp from Lincolnway and the system on-ramp. The design provides a single exit to I-80, which simplifies signing and eliminates potential driver confusion. The single exit then splits and provides access to either EB or WB I-80 away from mainline. This configuration does not provide for direct access to I-80 from Lincolnway.



The proposed refinement introduces a loop on-ramp to SB I-25 at Lincolnway, which accesses the mainline north of the interchange, requiring separate exits to I-80 from the southbound. There is an approximately 1,500-foot weaving length on I-25 between the Lincolnway on-ramp and the diverge to I-80 WB, and then another 1,500 feet to the diverge to I-80 EB. The proposal reduces the construction footprint and construction costs associated with ramp lengths, retaining walls, and two bridge structures. This alternative provides direct access from Lincolnway to I-80.



**Workshop Team Recommendation**

After consideration, the workshop team eliminated this proposal from consideration due to unacceptable weaving operations, multiple exits to I-80, and potential for wrong-way movements associated with the loop ramp design. However, the SB I-25 to WB I-80 ramp adjustment will be incorporated into the design.

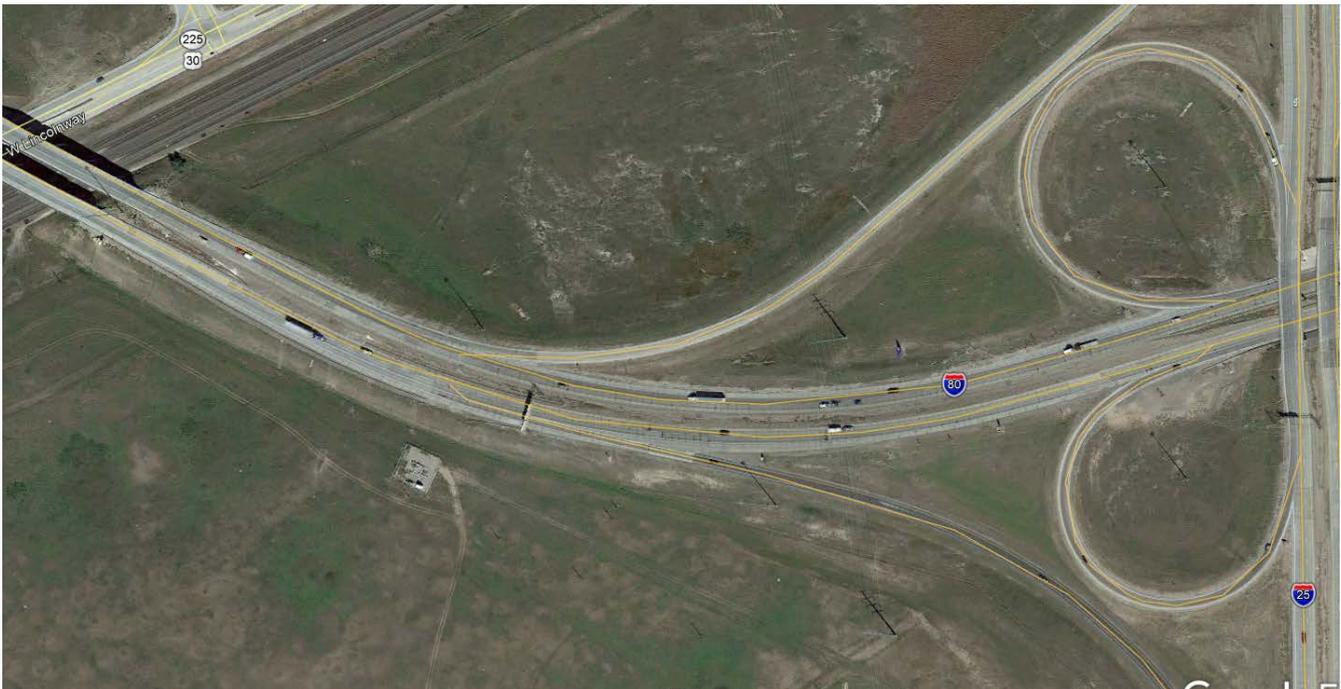
Prepared By: Jeff Mellor, WYDOT  
 Ryan Shields, WYDOT  
 Chris Angleman, Jacobs

Presented By: Jeff Mellor, WYDOT  
 Ryan Shields, WYDOT

## WS-03: I-80 Horizontal Shift and Curve – Pass

### I-80 Roadway Alignment Shift South and Horizontal Curve Adjustment

The Preferred Alternative from the 2008 Feasibility Study proposed widening I-80 to three lanes through the project limits, with no change to the existing speed limit of 75 mph. The existing I-80 alignment has a substandard curve radius of 2,000 feet just west of the I-25 over I-80 bridge section, with a curve geometry meeting 71 mph. The curve is recommended to have a minimum curve radius of 2,500 feet for a design speed of 75 mph, according to the American Association of State Highway Transportation Officials (AASHTO) 2018 Green Book. There is also a crash hotspot on eastbound I-80 approaching the I-25 bridges. Wyoming Highway Patrol and WyDOT Maintenance have expressed concerns about the eastbound lane curve combined with the I-25 South exit ramp and grade coming into the I-25/I-80 interchange. Vehicles travelling down the hill over the I-80 Union Pacific Railroad (UPRR) in the eastbound lanes are subjected to the sub-standard curve, and several crashes have been reported in the eastbound lane at the south abutment of the I-25 bridge.



### Traffic Control Impact

Shifting the I-80 alignment allows for bridge construction over UPRR and Lincolnway to occur offline, minimizing effects to the traveling public. Additional pavement will be constructed outside of the existing I-80 roadway bench to widen the horizontal curve.

### Construction Phasing Impact

Coinciding with the logic of the WS-01: I-25 Offset Alignment Refinement as well as replacing the bridges in the interchange (WS-07 and WS-10), this refinement considers correcting the sub-standard curve while shifting the I-80 alignment to the southwest to facilitate staging construction of the bridge over UPRR.

### Secondary Design Impact

This refinement will allow vehicles to make a smoother exit using the off-ramp from EB I-80 to SB I-25 with a standard curve for the speed limit.



A wider curve will shift the WB I-80 lanes slightly to the north, which may impact the SB I-25 to WB I-80 on-ramp connection. The refinement will shorten the available weaving distance between the SB I-25 to WB I-80 on-ramp to the WB I-80 to Lincolnway off-ramp.



**Phase III Impact**

The refinement may shift the western project limits further west to transition between the widened three-lane I-80 mainline section back to the existing two-lane section west of the proposed project limits. Shifting the alignment south at the I-80 bridge over UPRR impacts the preceding curve to the west, which will change the curvature and tie-in location of the alignment to existing. Refinement WS-10 suggests the I-80 bridge over UPRR will need to

be raised approximately 5.5 feet due to widening and the skew of the bridge, and there may be profile tie-in adjustments that will also impact the western project limits. None of these changes are anticipated to impact the functionality or design feasibility of Phase III.

**Cost Impact (Increase/Decrease from Recon Report Baseline)**

This refinement adds cost to the project to adjust the horizontal curvature of the roadway. However, since I-80 was proposed to be widened as part of the Reconnaissance Report, pavement costs would not vary greatly from original estimates. The grading and additional work needed to realign I-80, in addition to traffic control, account for the rise in cost from the Reconnaissance Report.

The two options for consideration are:

1. Maintain the existing alignment as proposed in the 2008 Feasibility Study and 2018 WyDOT Reconnaissance Report but reduce the speed limit so that curve meets driver expectations, or
2. Shift the I-80 alignment to the south to improve bridge construction phasing and to widen the substandard curve to meet 75 mph speed limit.

*Option 1: Lower Speed Limit to 65 MPH, No Shift in Alignment*

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Staying on existing alignment may reduce earthwork costs (no significant profile change).</li> <li>2. Less subgrade work.</li> <li>3. Lowering speed limit maintains existing alignment, which will not decrease weave lengths of SB I-25 to WB I-80 on-ramp and WB I-80 to Lincolnway off-ramp.</li> </ol>	<ol style="list-style-type: none"> <li>1. Would require online construction or head to head configuration during construction.</li> <li>2. Lowering speed limit will not correct deficient curve, drivers are expected to continue to drive the section at 75 mph.</li> <li>3. Operating speeds typically remain at 75 MPH and may not improve crash hot spot.                         <ul style="list-style-type: none"> <li>- Profile would need to rise with I-80 over UPRR bridge replacement, which steepens the eastbound downhill grade into the substandard curve and EB I-80 to SB I-25 off-ramp.</li> </ul> </li> <li>4. Current geometry does not encourage slower speeds.</li> <li>5. Interchange still has impacts to the NW quadrant with limited right-of-way.</li> </ol>

*Option 2: Reconstruct Curve and Shift Alignment on I-80*

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Operation speed and posted speed would align.</li> <li>2. Smoother transition for trucks for I-80 EBL to I-25 SBL (off-ramp could be closer to the I-80 tangent section and not in the middle of the curve)</li> <li>3. Provides mobility during construction and offline construction of EBL structure.</li> <li>4. Improves safety of construction workers and roadway users by maintaining them in their current location during construction.</li> <li>5. Opportunity to shorten I-80 west to I-25 South flyover structure by modifying the EB I-80 to SB I-25 exit ramp departure point toward the west.</li> <li>6. Bridge reconstruction and elevation change (+5 feet) will be facilitated by the shift and not steepen existing conditions.</li> <li>7. Reduces impact to the NW quadrant, where there are wetlands.</li> <li>8. Reduces the impact to the NE quadrant, where there is limited right-of-way.</li> </ol>	<ol style="list-style-type: none"> <li>1. Cost will be higher to build off alignment.</li> <li>2. I-80 alignment shift south moves the western project limits further west to transition from three-lane section back to existing two-lane section (increases project footprint).</li> <li>3. Welcome to Cheyenne Sign would need to be relocated.</li> </ol>

## Workshop Team Recommendation

The workshop team recommends Option 2 for reasons listed above. Considering the other concept refinements from the workshop, is it advantageous to correct this sub-standard curve if all bridges are to be replaced and the mainline section is to be widened to three lanes. This refinement limits impacts to traffic during construction and will allow for a design that improves traffic operations and design.



Prepared By: Andrea Allen, WYDOT  
Randy Griesbach, WYDOT  
Tim Morton, WYDOT  
Wayne Shenefelt, WYDOT  
Chris Angleman, Jacobs  
Erin James, Jacobs

Presented By: Randy Griesbach, WYDOT  
Chris Angleman, Jacobs



## WS-04: Ultimate Mainline Roadway Section – Pass

### Ultimate Mainline Roadway Section for I-25 and I-80

This workshop refinement effort was to establish a mainline cross section to serve as the ultimate section to layout all ramp alignments for the proposed interchange. This proposed section would be for both I-25 and I-80.

In the 2018 Reconnaissance Report issued by WyDOT, the proposed improvements included widening I-80 to three lanes. Widening of I-25 was not included as part of the project. The preferred alternative from the 2008 Feasibility Study did not include widening of either I-80 or I-25.



### Proposal Description

#### *Workshop Team's Understanding of the Design Issue:*

The existing I-25 and I-80 mainline cross-sections consist of two through lanes with an open median. The existing median guardrail is a combination of TL3 box-beam type and cable barrier to provide protection between opposing traffic. The median width (edge of travel lane to edge of travel lane) on I-25 is 40 feet north and south of the interchange. The median width on I-80 is 40 feet east of the interchange, and it has a wider rural width of 126 feet west of the interchange.



WyDOT has long-term plans to increase both I-25 and I-80 to a six-lane configuration. Therefore, it was determined to establish a baseline cross-section that will accommodate the plans for a widened six-lane section on I-25 and I-80. Bridge lengths will be established to span ultimate configurations.

The two basic options considered in this refinement option include open median and closed median configurations.

The recommendation needs to be able to accommodate three through lanes in each direction, and both options need to accommodate centerline piers for main bridge crossings. The inside shoulder width should be increased to accommodate inside pull-offs due to three-lane through lane section. The pavement cross slope would be standard 2 percent across the full pavement width.

### **Construction Phasing Impact**

A wider pavement section than existing would positively impact construction phasing by into the existing open median as well as adding pavement width to the outside of the roadway section. Widening the existing lane configuration will supplement building I-25 and I-80 bridges offline, as described in Workshop Refinement WS-01.



**Secondary Design Impact**

By widening I-25 and I-80 to three through lanes, all structures will need to increase span lengths and be wider than existing structures to accommodate the lane configuration.

**Phase III Impact**

The limits of Phase I and Phase II will be moved to provide standard lane shifts to two through lanes from the proposed three through lane section. There are no other anticipated impacts to Phase III.

**Cost Impact (Increase/Decrease from Recon Report Baseline)**

This refinement adds significant costs compared to the Reconnaissance Report baseline due to adding a third through lane on I-25 in both directions. The analysis below compares two options to either widen to the inside and outside with a closed median or widen to the outside by maintaining an open median.

*Workshop Team’s Proposal – Option 1 Open Median:*

An open median consists of a graded depressed median to separate opposing traffic. Narrow open medians require guardrail protection (box beam or cable barrier) as protection against cross-over movements. Typical application is for rural configurations where right-of-way constraints are minimal.

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Matches existing conditions.</li> <li>2. Potential for additional lateral space for emergency pull offs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Requires continual accommodation for median drainage (inlets, culverts, etc.).</li> <li>2. Results in wider overall roadway section (longer bridge lengths).</li> </ol>

*Workshop Team’s Proposal – Option 2 Closed Median:*

A closed median consists of a center rigid barrier (concrete) to separate opposing traffic. Paved shoulders are adjacent to the center barrier. Typical for urban configurations where it is desired to reduce the overall width of the full roadway section and minimize right-of-way impacts.

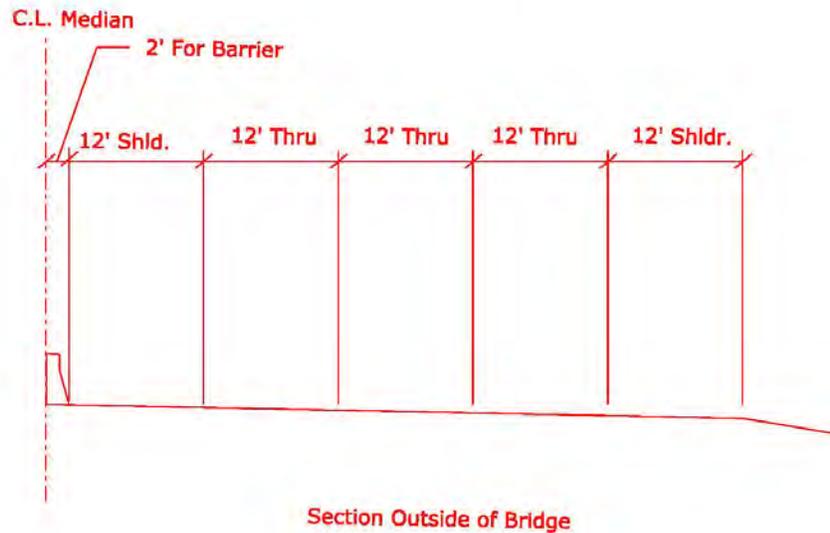
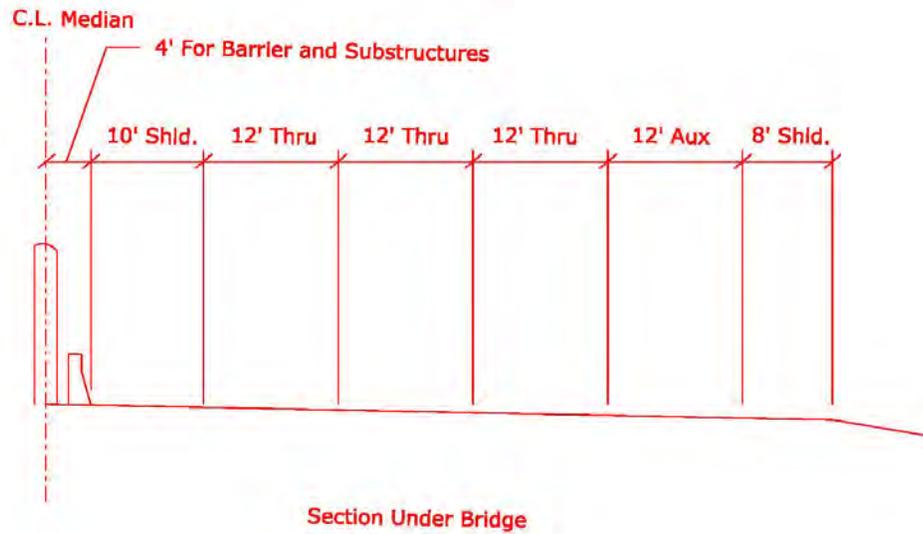
<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. Minimizes overall width of roadway section.</li> <li>2. Shorter bridge lengths.</li> <li>3. Reduces need for median drainage systems.</li> <li>4. Eliminates need for mowing maintenance within the median.</li> </ol>	<ol style="list-style-type: none"> <li>1. Super-elevated sections require median drainage systems (inlets, culverts, etc.).</li> <li>2. Access to bridge inspection with on-deck snooper vehicle is hindered by a closed median, however, inspector group feels they can still gain access from below with lift.</li> </ol>

### **Workshop Team Recommendation**

The workshop team recommends use of a closed median cross-section with three through lanes in each direction as part of the ultimate mainline section. Proposed dimensions include:

- Under structures: 2' ½ pier + 2' barrier + 10' shoulder + 3 thru lanes @ 12' + 12' accel/aux + 8' outside shoulder (70' total width)
- Outside structures: 2' barrier + 12' shoulder + 3 thru lanes @ 12' + 12' outside shoulder (62' total width)

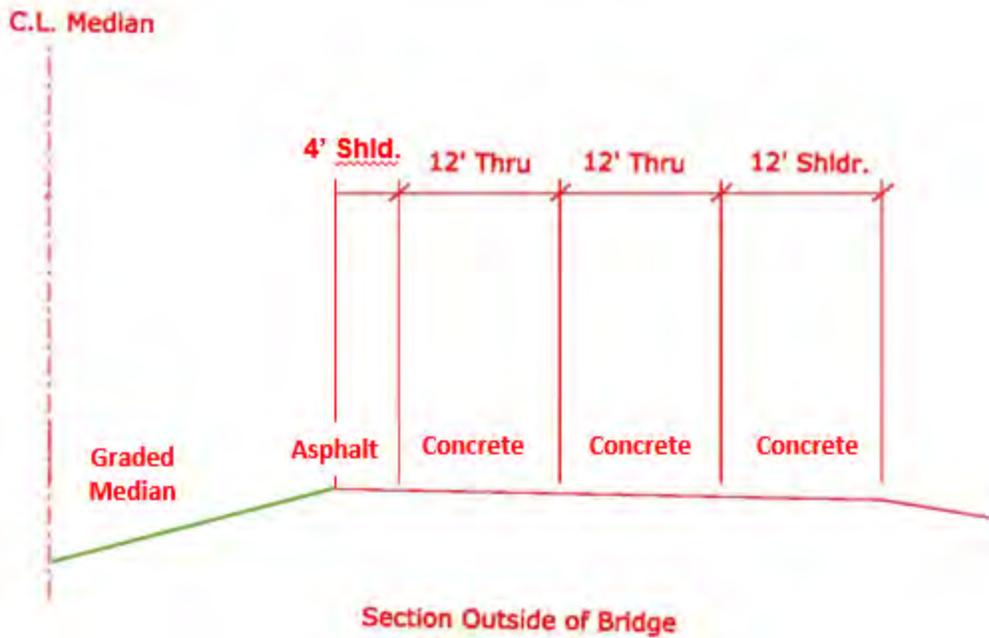
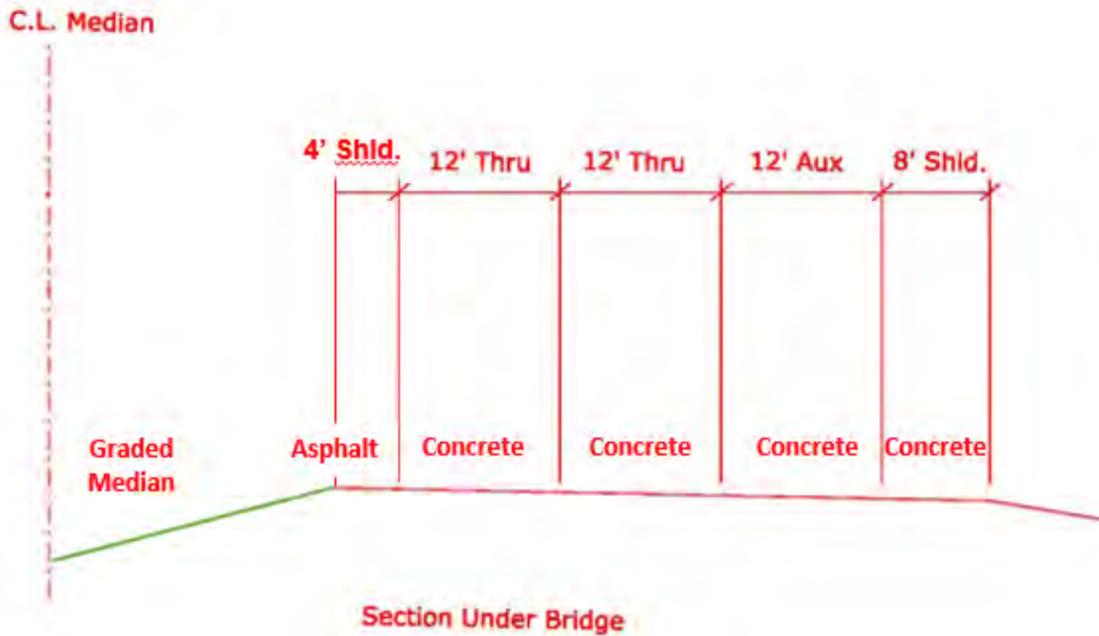
The figures below show the proposed cross-section for the team’s recommendation in the ultimate configuration.



**Closed Median Section**  
(WyDOT source – Project Design Team)

**Proposal No. WS-04**  
**Exhibit 1**  
**I-25 / I-80 Interchange**

Based on a design team meeting on May 28, 2019, WyDOT and Jacobs decided that the interim mainline configuration would resemble the configuration presented in Exhibit 2 (prior to the added third lane on both I-25 and I-80). This configuration would allow the added third through lane to be built in the median area in order to not impact ramp tie-ins and aid construction phasing.



**Interim Open Median Section**  
(WyDOT source – Project Design Team)

**Proposal No. WS-04**  
**Exhibit 2**

I-25 / I-80 Interchange



**Proposed Mainline Sections**  
(WyDOT source – Project Design Team)

**Proposal No. WS-04**  
**Exhibit 3**  
I-25 / I-80 Interchange

Prepared By: Jeff Booher, WyDOT  
Ralph Tarango, WyDOT  
Tim Eversoll, Jacobs

Presented By: Tim Eversoll, Jacobs



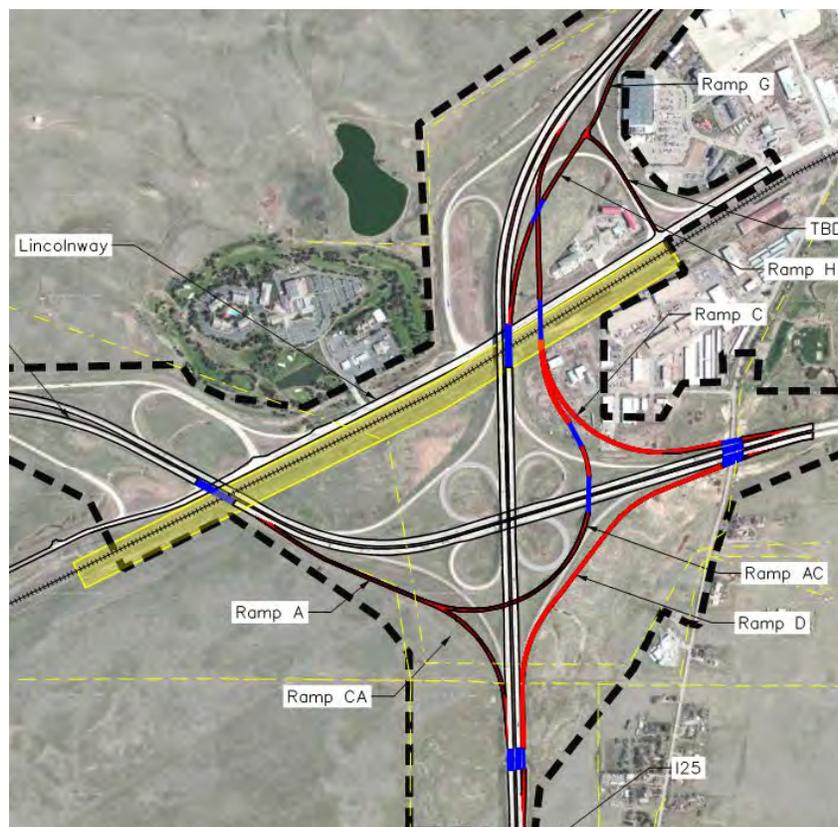
## WS-05: Change Phase I from East Bound I-80 to Northbound I-25, to Westbound I-80 to Southbound I-25 – Pass

### Switch Phase I to Westbound I-80 to Southbound I-25

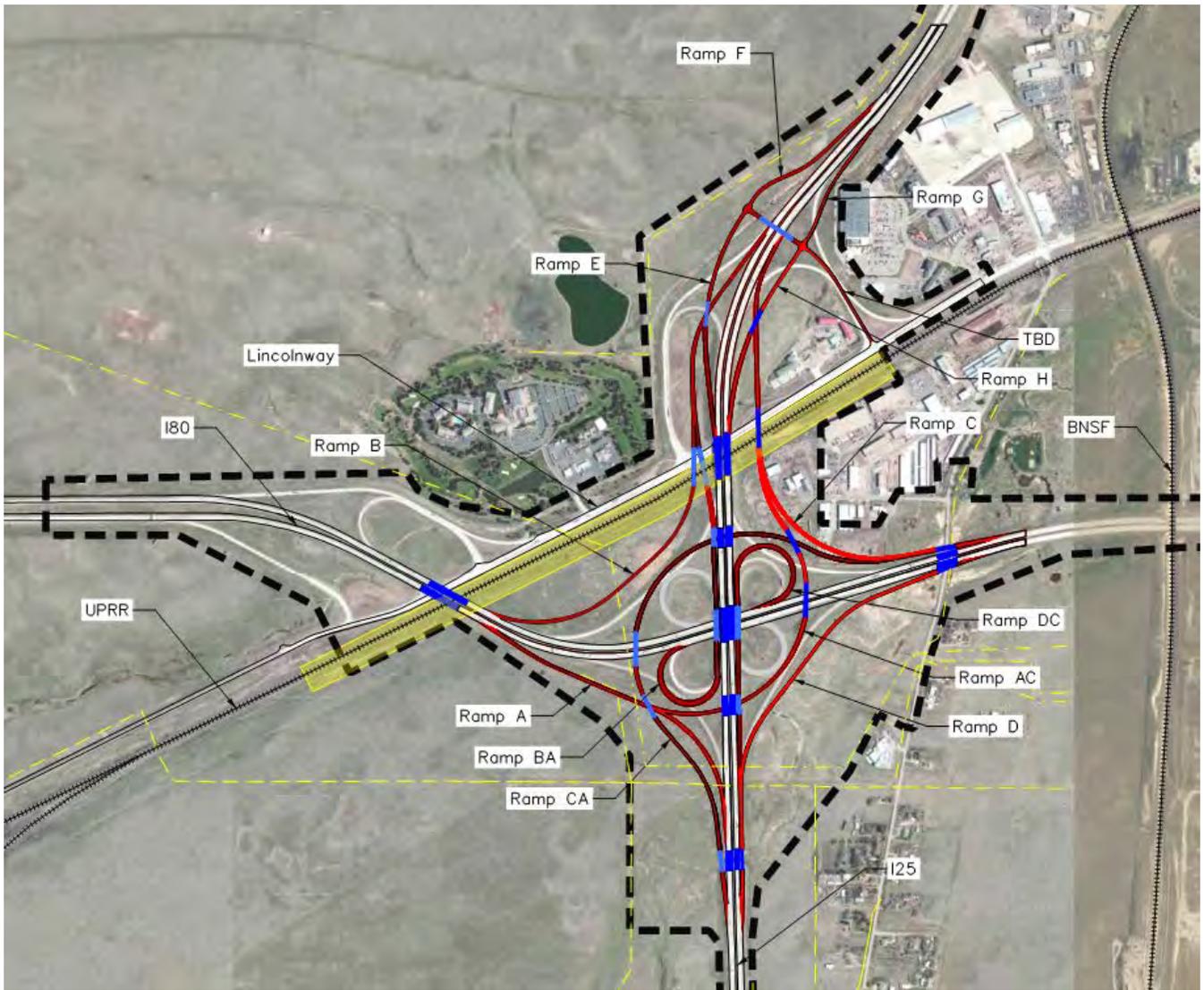
The original design proposed constructing the EB I-80 to NB I-25 described as Phase 1.

This workshop refinement is to consider building WB I-80 to SB I-25 as part of Phase I instead of EB I-80 to NB I-25. As described in this analysis, this ramp cannot be easily interchanged with the EB I-80 to NB I-25 flyover ramp due to all of the other design elements that are impacted.

The original intent was to switch the connectors to provide more operational benefit for Phase I (as defined in the 2008 Feasibility Study's Preferred Alternative).



However, the connectors are not interchangeable in scope without new I-25 structures and relocation of the ultimate design ramps. Building the WB I-80 flyover to SB I-25 first will cause a ripple effect of impacted design elements, thus Phase I must include more than 80 percent of the ultimate design. Since funding may be intermittent and components may sit on the shelf for periods of time, it is recommended to seek funding to implement the complete project so that phases can facilitate constructability and maintenance of traffic.





## Traffic Control Impact

Up to 80 percent of the ultimate design would be constructed with Phase II, building I-25 south off alignment with new structures, which facilitates traffic mobility during construction.

## Construction Phasing Impact

Phases are typically broken out due to funding and are defined based on constructability and improvements. The original phasing was based on a much simpler project. The construction of the flyover connectors was previously independent of mainline construction. This proposal for ultimate plan incorporates realignment and reconstruction of both mainlines. Construction of the WB to SB connector must include the reconstruction of the I-25 mainline. The original Phase II is no longer an independent phase and will require up to 80 percent of the ultimate design, due to the realignment and reconstruction of I-25.

## Recommendations:

The team recommends seeking funding for the entire project, and then re-phasing the project based on constructability and maintenance of traffic.

### Disadvantages:

- Revised plan would significantly increase initial cost of the project
- Eliminates the potential for independent projects
- Large-scale project may limit opportunity for in-state contractors

### Advantages:

- Reduces cost for the ultimate build

- Reduces maintenance cost due to the age of existing infrastructure (rehab older bridges)
- Reduces construction duration and impacts to traveling public
- Provides significant operational benefits earlier
- Reduces crash potential

### **Phase III Impact**

Depending on the funding and determined phases, there may be minor impacts to what is built as part of Phase III. However, no impacts to Phase III are anticipated.

### **Cost Impact (Increase/Decrease from Reconnaissance Report Baseline)**

These design concept changes significantly increase construction costs from previous assumptions. Phase I could still be considered an independent phase. Phase I does, however, have limited operational benefits and will require additional improvements in the future.

### **Workshop Team Recommendation**

The workshop team recommends seeking funding for the entire project before determining construction phasing. The WB to SB flyover cannot be built instead of the EB to NB flyover with the same level of effort and related costs as in the original Phase I.

Prepared By: Tim Morton, WyDOT  
Kevin Stogsdill, WyDOT  
Chris Angleman, Jacobs  
Tom Ragland, Jacobs

Presented By: Tim Morton, WyDOT  
Chris Angleman, Jacobs

## WS-06: Eastbound I-80 to Northbound I-25 Over I-25 – Pass

### Eastbound I-80 to Northbound I-25 Over I-25

The 2008 Feasibility Study and Preferred Alternative included the eastbound I-80 to northbound I-25 flyover ramp (hereby referred to as the WS-06 Flyover Ramp in this document) aligned under I-25. This workshop refinement explores the impacts of raising the ramp over I-25.



### Traffic Control Impact

The concept refinement proposal to shift I-25 to the west (WS-01) could be separately constructed from the construction of the WS-06 Flyover Ramp, and impacts to traffic control would be reduced because I-25 traffic would not be mixed with traffic from the new WS-06 Flyover Ramp.

### Construction Phasing Impact

Construction phasing would benefit from maintaining a similar profile to existing conditions of I-25 and constructing the WS-06 Flyover Ramp over the I-25 mainline section. This allows the WS-06 Flyover Ramp bridge to be constructed offline and separates construction activities between the ramp and the I-25 mainline.

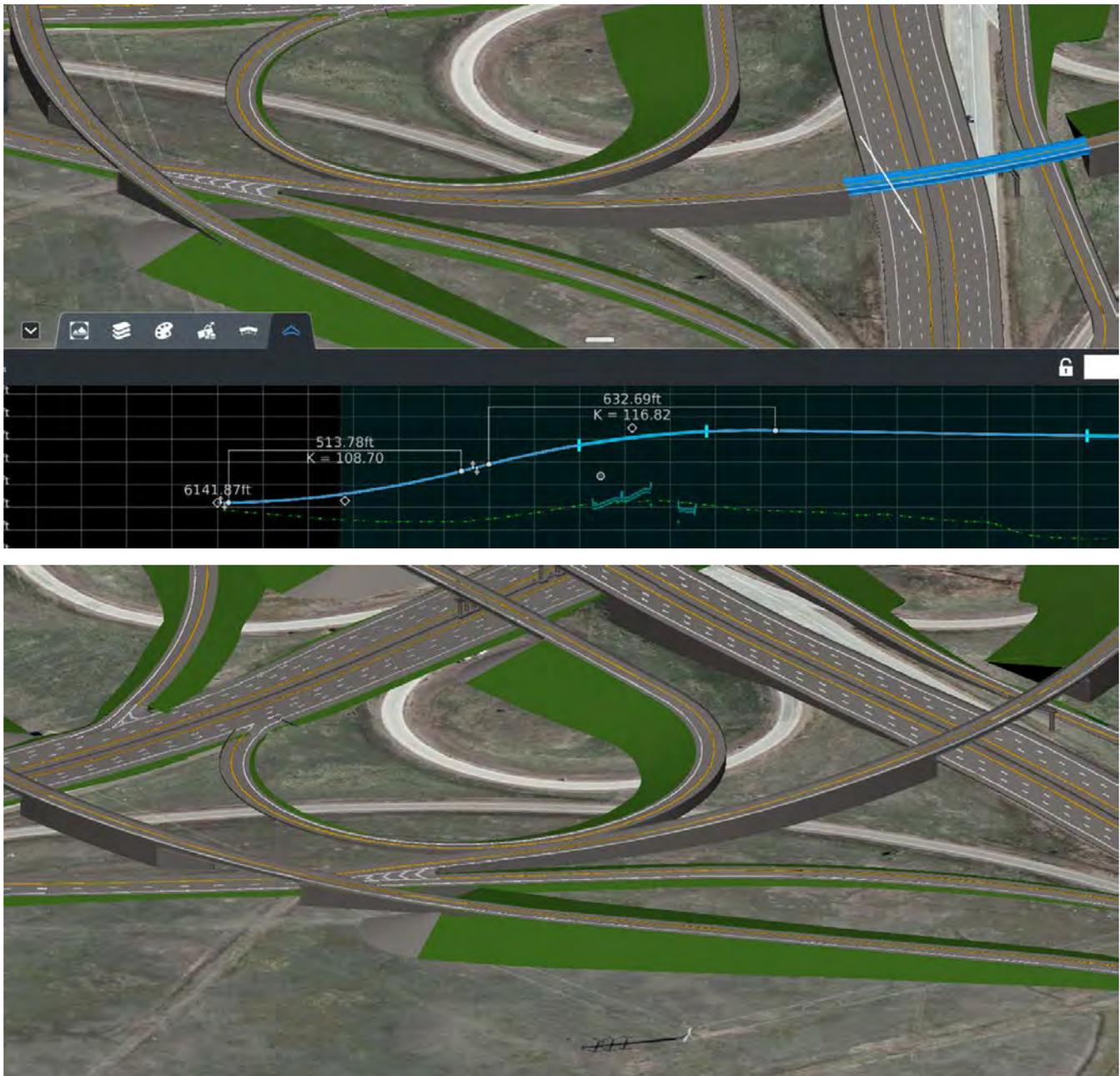


## Secondary Design Impact

The following concept refinements from the workshop directly impact the feasibility of the WS-06 Flyover Ramp over I-25:

- WS-01: Shifting I-25 alignment to the west to aid in construction phasing and building the new bridges offline
  - o This causes I-25 to be shifted slightly to the west at the proposed overcrossing of the WS-06 Flyover Ramp to tie back into the existing I-25 mainline before the College Drive interchange to the south. Shifting I-25 to the west causes a steep profile of the proposed WS-06 Flyover Ramp.
- WS-04: Widening I-25 and I-80 to three through lanes (ultimate mainline section)
  - o The widened section of I-25 causes the WS-06 Flyover Ramp bridge span to increase.
- WS-07: Replacing all mainline bridges on I-80 and I-25

The I-80 westbound to I-25 southbound flyover ramp has a proposed bridge over I-80 and the eastbound off ramps to I-25 south and I-25 north. Because the WS-06 Flyover Ramp is proposed over I-25, there is a short distance where the flyover ramp needs to go under the opposing flyover ramp and over I-25, which results in a steep profile as well as a very tall I-80 WB to I-25 SB flyover structure (upwards of 40 feet).



**Phase III Impact**

No Phase III impacts are anticipated with this option.

**Cost Impact (Increase/Decrease from Recon Report Baseline)**

This refinement may increase expected costs from the Reconnaissance Report due to the tall I-80 westbound to I-25 southbound flyover structure. The structure needs to be raised higher than anticipated so the WS-06 Flyover Ramp can have enough clearance to span I-25. This refinement also can reduce expected costs because one structure spanning over I-25 is less costly than three structures on I-25 spanning over the flyover ramp.

*Workshop Team’s Proposal – Option 1: Align the WS-06 Flyover Ramp over I-25*

Advantages	Disadvantages
<ol style="list-style-type: none"> <li>1. Cost would be reduced by building one ramp bridge versus three mainline structures.</li> <li>2. More consistent grades throughout the ramp as a whole                             <ul style="list-style-type: none"> <li>- After an initial steep profile grade to span I-25, the WS-06 Flyover Ramp would have adequate height to clear I-80 and the UPRR on its alignment. The majority of bridge overcrossings on this alignment occur as the alignment is super-elevated on the 1,000-foot curve, so introducing dramatic profile grades combined with super-elevation would traffic operations and driver comfort.</li> <li>- Grade changes would occur in tangent sections of the alignment.</li> </ul> </li> <li>3. I-25 mainline would not need to vary substantially from its existing profile due to the flyover ramp alignment</li> </ol>	<ol style="list-style-type: none"> <li>1. Would force the I-80 WB to I-25 SB flyover higher in the air, possibly conflicting with powerlines and increasing structure costs.</li> <li>2. Semitrucks at high elevation on I-80 WB to I-25 SB flyover ramp would be introduced to higher wind speeds, and the super-elevation around the flyover ramp curve would exacerbate the effects from the wind, possibly resulting in destabilization of trucks.</li> </ol>

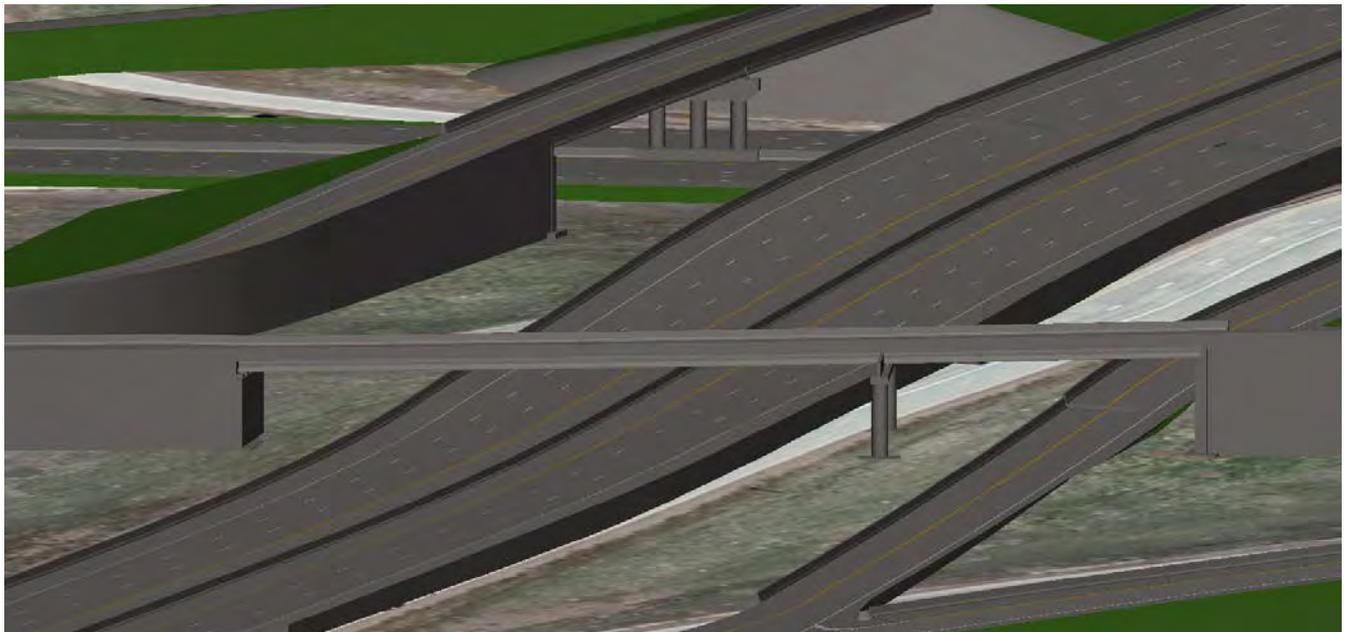
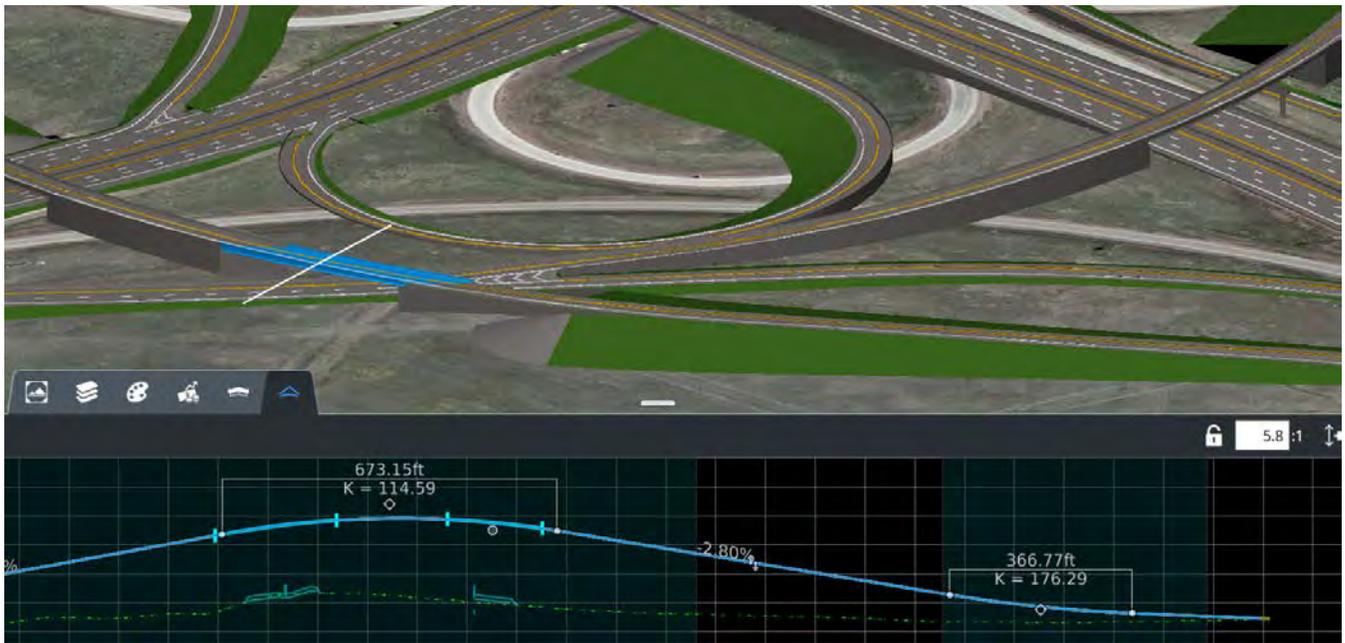
*Workshop Team’s Proposal – Option 2: Align the WS-06 Flyover Ramp under I-25 (to match Preferred Alternative from the 2008 Feasibility Study and the 2018 WYDOT Reconnaissance Report)*

Advantages	Disadvantages
<ol style="list-style-type: none"> <li>1. Less variation on profile grades.</li> <li>2. Less earthwork and retaining structures.</li> <li>3. Would lower flyover ramp alignment height.</li> </ol>	<ol style="list-style-type: none"> <li>1. Potential for poor soil conditions in southeast quadrant of the interchange</li> <li>2. Wetlands could be impacted more.</li> <li>3. More mainline structures to build on I-25 (three I-25 structures versus one flyover structure).</li> <li>4. Introduces a vertical grade change during a super-elevated horizontal curve.</li> <li>5. Ramp alignment would be in a sag under the mainline of I-25, resulting in future maintenance issues.</li> <li>6. Drainage would be challenging and may require pump station</li> </ol>

### Workshop Team Recommendation

The team recommends Option 2, building the I-80 eastbound to I-25 northbound flyover ramp (WS-06 Flyover Ramp) over the I-25 mainline. The primary reasons for this recommendation are construction phasing and traffic control benefits, and to limit impacts to existing drainage patterns.

The initial cost evaluation shows that crossing the WS-06 Flyover Ramp over I-25 has the potential to lower cost in the several million-dollar range. These costs are most likely from the reduction of structure cost. This proposal verified that the profiles could likely be designed while meeting roadway design criteria, and while meeting vertical clearances. Building this ramp under the I-25 mainline could have environmental, drainage, and poor soil conditions impacts.



Prepared By: Andrea Allen, WYDOT  
Carolyn Moore, WYDOT  
Wayne Shenefelt, WYDOT  
Kevin Erickson, WYDOT  
Erin James, Jacobs

Presented By: Wayne Shenefelt, WYDOT  
Kevin Erickson, WYDOT



## WS-07: Mainline Bridge (Recon/Widen versus Replacement) – Pass

### Mainline Bridge Evaluation between Recon/Widening and Replacement

The original proposed section in the 2018 WYDOT Reconnaissance Report included widening/ rehabilitating the bridges over I-80 and UPRR.

The existing bridges, built in the 1960s, are reaching the end of their useful life. There are anticipated complexities of widening and rehabilitating the existing bridges due to the impacts to traffic during construction.



Based on other concept refinements, it is advantageous to replace all the bridges in the proposed interchange design. WS-01 describes the benefits to shifting I-25 to the west to accommodate the offline construction of I-25 bridges and traffic control. In shifting the alignment, the bridges would need to be replaced and additionally would need to have higher grades than the existing structures.

Widening the existing bridges over the railroad would likely not gain UPRR approval with supports near the tracks. The full replacement of the bridges is anticipated to facilitate railroad coordination and approval.

The cost to rehabilitate and widen the bridges, in addition to higher long-term maintenance, are significant and could approach the cost of replacement.

WYDOT has stated that the necessary bridge maintenance and rehabilitation work has been increasing over time.

### Traffic Control Impact

Traffic control would improve during construction if the bridges were replaced verses rehabilitated. See WS-01 for additional information on traffic control benefits.

### Construction Phasing Impact

Construction phasing would also greatly improve. See WS-01 for additional information on construction phasing benefits.



### Secondary Design Impact

Replacing the bridges offline has significant impacts to the design in shifting alignments. However, there are many advantages, in addition to traffic mobility and construction staging, that support building offline.

### Phase III Impact

No impacts to Phase III would occur due to the replacement of the bridges.

### Cost Impact (Increase/Decrease from Recon Report Baseline)

The structure cost difference for replacing the bridges verses widening/rehabbing the bridges is not significant. Due to the poor condition of the existing bridges and cost of maintenance, the two options are similar in cost expectations. However, there will be cost increases due to shifting I-25 to the west off its existing alignment.

### Evaluation

*Workshop Team’s Proposal – Option 1 Reconstruct/Rehabilitate Bridges:*

Advantages	Disadvantages
<ol style="list-style-type: none"> <li>1. Maintain existing I-25 alignment</li> <li>2. No impacts to proposed Preferred Alternative design concept.</li> </ol>	<ol style="list-style-type: none"> <li>1. Significant construction challenges in maintaining traffic through work zone.</li> <li>2. Poor condition of structures – poses safety hazard and impact to traffic mobility due to substandard shoulders.</li> </ol>

	<ol style="list-style-type: none"> <li>3. Increased maintenance costs.</li> <li>4. UPRR may not approve widening over tracks.</li> </ol>
--	--

*Workshop Team’s Proposal – Option 2 Replace Bridges:*

<b>Advantages</b>	<b>Disadvantages</b>
<ol style="list-style-type: none"> <li>1. UPRR Approval.</li> <li>2. Accommodates traffic during construction.</li> <li>3. Aids construction phasing with room to build offline.</li> <li>4. Accommodates grade changes necessary in replacing bridges and building off alignment.</li> <li>5. New condition of bridges, less maintenance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Increased cost to re-align I-25 and I-80.</li> <li>2. Impacts many other design elements from Preferred Alternative, shifts ramp connections.</li> </ol>

**Workshop Team Recommendation**

The Workshop team recommends replacing the bridges to improve safety, traffic mobility, and provide benefits to construction phasing.



Prepared By: Jeff Booher, WYDOT  
 Ralph Tarango, WYDOT  
 Tim Eversoll, Jacobs  
 Mike Cooper, Jacobs

Presented By: Jeff Booher, WYDOT  
 Mike Cooper, Jacobs

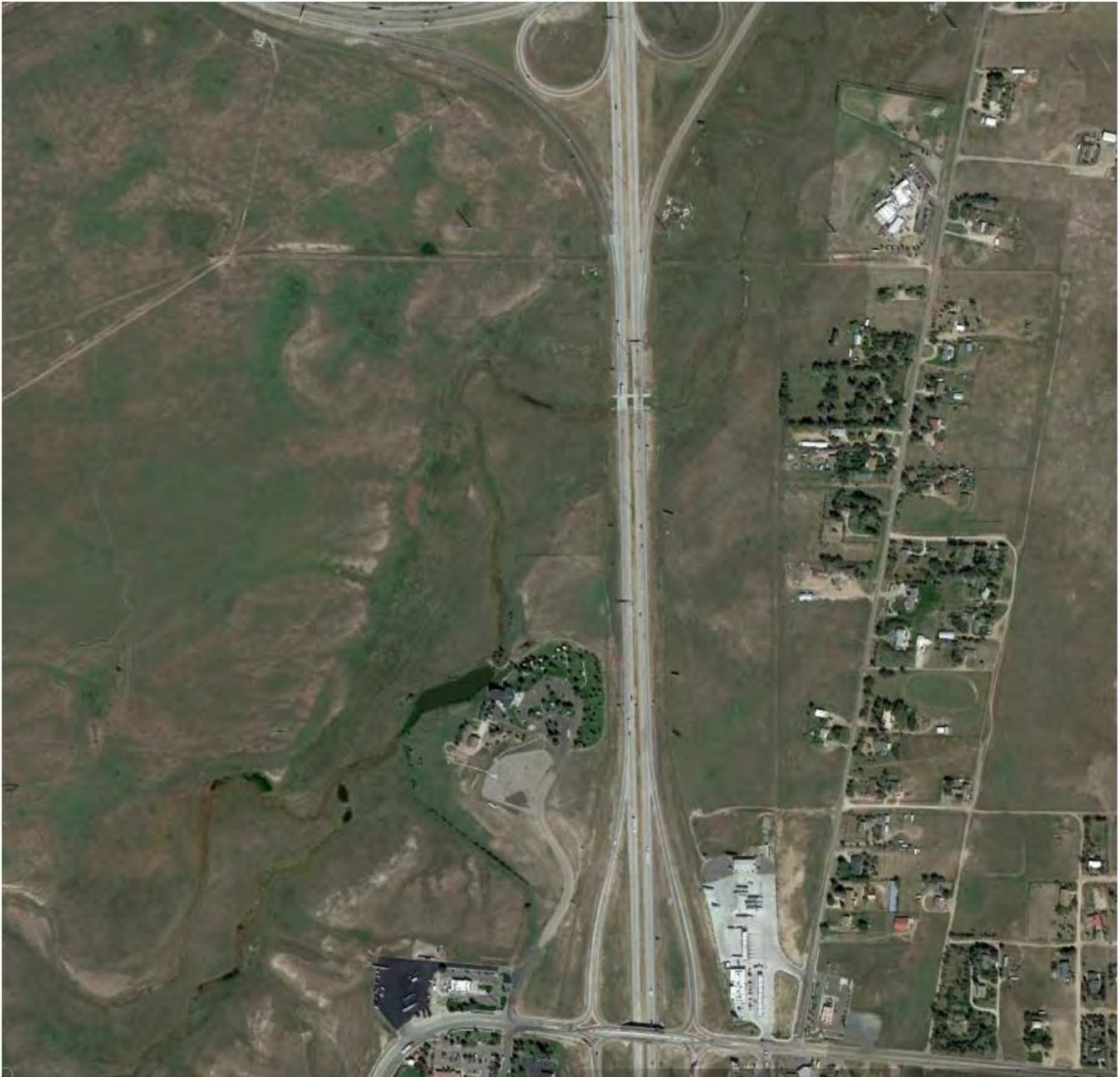


# WS-09: College Drive Intersection Weaves – Pass

## Ramp Weave Between I-80 and College Drive Ramps

The 2018 WYDOT Recon Report does not account for impacts to the weaving areas between the proposed system interchange and the existing College Drive Interchange to the south. Existing weave lengths are shortened by the proposed system interchange configuration and may not accommodate future volumes.

This workshop refinement documents the need for further analysis of the weave areas and the need for potential mitigation strategies.



## Traffic Control Impact

Traffic control at the College Drive Interchange ramps may be required due to spacing of the southbound on-ramps to I-25.

## Construction Phasing Impact

No construction phasing impacts are anticipated as part of this refinement.

## Secondary Design Impact

Concept Refinement WS-04, which proposes to widen the I-25 and I-80 mainlines to three through lanes, has potential to help the weaving patterns between southbound I-25 and College Drive. The mainline reconstruction could introduce auxiliary lanes to help keep trucks who regularly fill up their tanks at the College Drive gas station separate from I-25 southbound mainline traffic.



## Phase III Impact

Construction of Phase III may draw local traffic away from mainline and reduce weaving volumes.

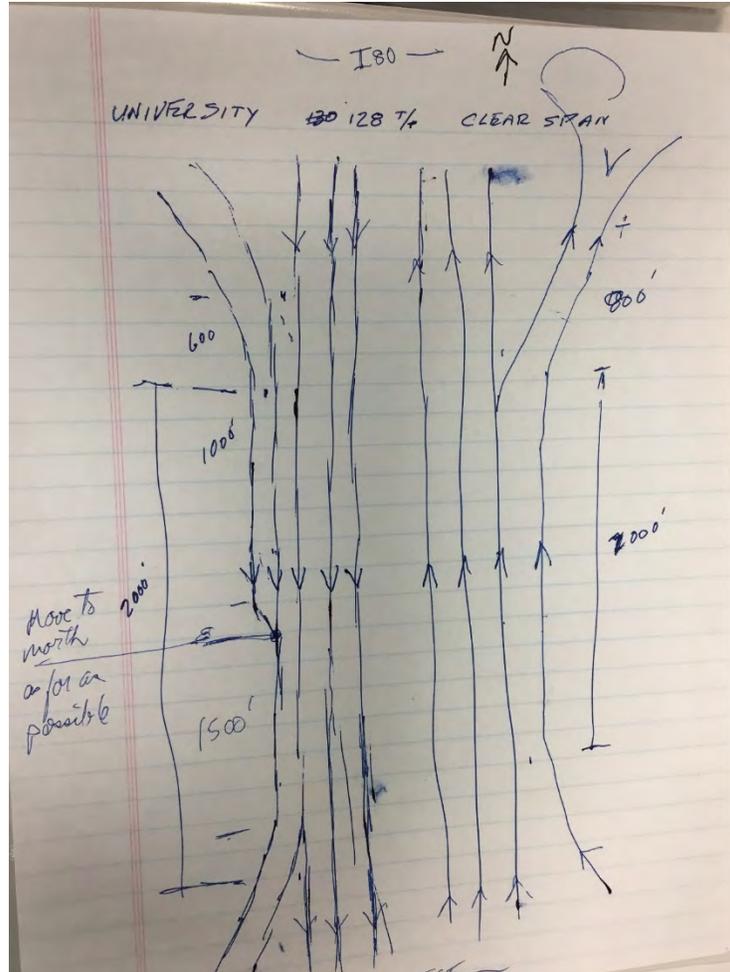
## Cost Impact (Increase/Decrease from Recon Report Baseline)

Any improvements to the weaving in this area would be added cost from the Reconnaissance Report baseline.

The proposed concept shortens the existing weave lengths between the system interchange and the College Drive interchange. Preliminary estimates of future weaving volumes indicate a need for additional lanes and/or modification of the proposed ramp geometrics. Refined analyses are recommended to identify deficiencies and evaluate potential mitigation options.

Potential options that should be evaluated include:

- Widening the SB off-ramp to College Drive to two lanes.
- Maximizing the weave length for the I-80 WB to I-25 SB movement by revising the ramp geometrics.
- Splitting the off-ramp from I-80 EB to allow traffic headed to I-25 SB to merge prior to the mainline. This would require this portion of the ramp to be elevated to merge with the I-80 WB to I-25 SB ramp in a parallel entrance.



### Workshop Team Recommendation

The workshop team recommends further evaluation of the weave areas and required mitigation strategies.

Prepared By: Jeff Mellor, WYDOT  
 Ryan Shields, WYDOT  
 Randy Griesbach, WYDOT  
 Tom Ragland, Jacobs

Presented By: Jeff Mellor, WYDOT  
 Ryan Shields, WYDOT  
 Randy Griesbach, WYDOT



# WS-10: Mainline Bridge (Clear Span I-80 and UPRR) – Fail

## Mainline Bridge Clear Span I-80 and UPRR

The Preferred Alternative in the 2008 Feasibility Study and the 2018 WYDOT Reconnaissance Report included widening the existing bridges over I-80 and UPRR.

This refinement considers clear spanning with new bridges to avoid encroaching on UPRR right-of-way (ROW) and limiting required UPRR coordination. This refinement also considers the clear spanning of I-80 to keep bridge supports away from the roadway.

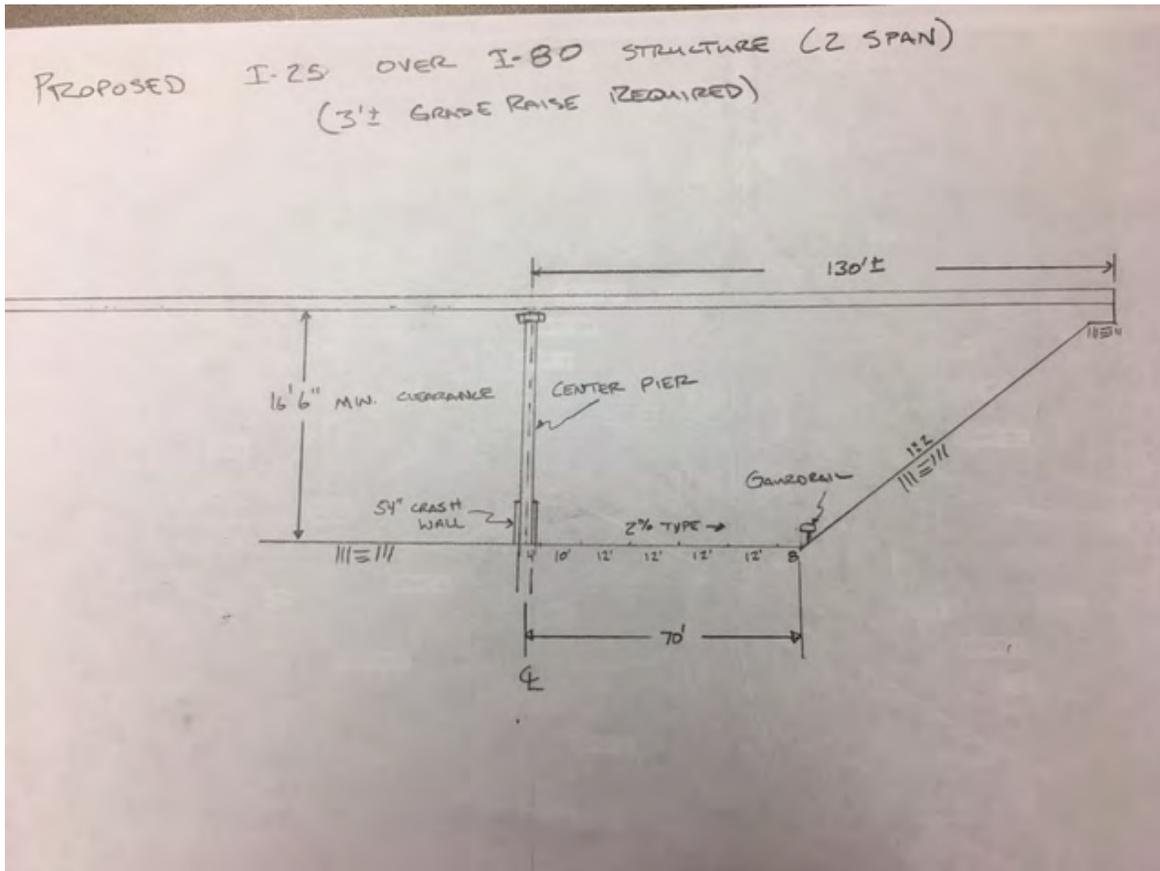
The required depths of structures to clear span would be significant.

For the I-25 over UPRR Bridge, a preliminary estimate of the UPRR ROW indicates a 250-foot width. Considering a 30 degree skew, a 300-foot span is anticipated, beyond the range for a conventional girder-type bridge. With a deck truss or other non-conventional bridge type, a grade raise of 10 feet or more would be anticipated on I-25.

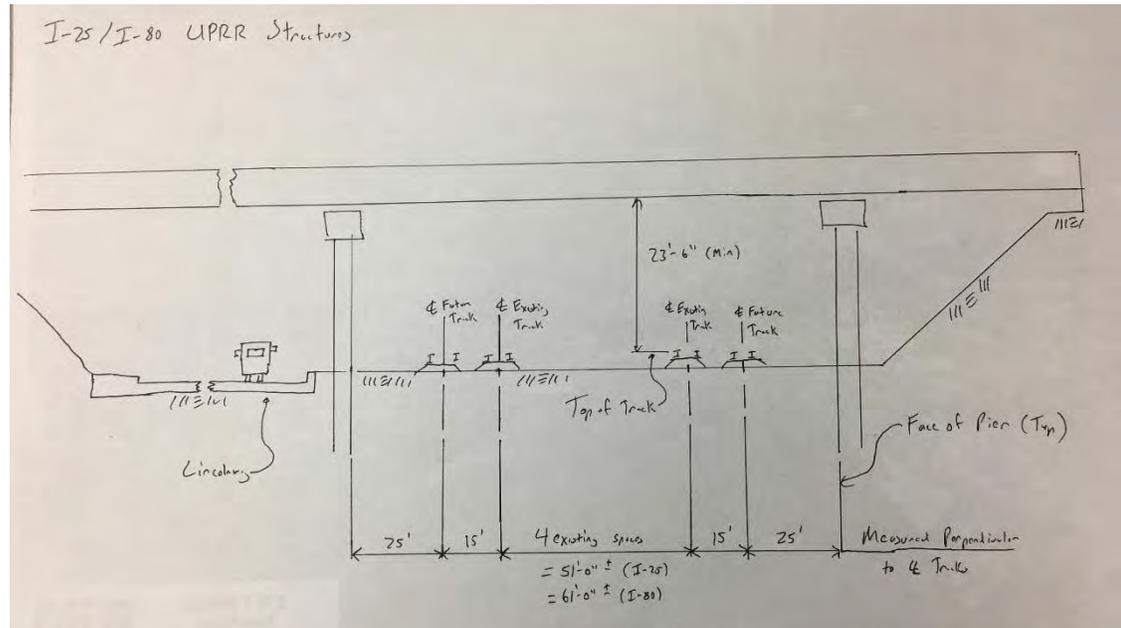
The span of the I-80 bridge over UPRR would be even longer due to the skew at that crossing.

Rather than clear spanning the railroad, interior supports were considered to reduce span lengths and allow for shallower deck section and conventional girder-type bridges. The I-25 and I-80 bridges over UPRR would require supports placed relative to tracks following UPRR Grade Separation Guidelines, resulting in a 3-foot grade raise on I-25 and 5.5-foot grade raise on I-80.

For I-25 over I-80, a two-span bridge with span lengths of 130 feet will require a 3-foot grade raise on I-25:



A two-span bridge was considered for I-25 over I-80 with a median pier and sloped abutments. Span lengths of 130 feet would require a 3.5-foot grade raise. A three-span bridge was considered with supports straddling the I-80 typical section and would require a +/- 150-foot span with a 5.5-ft grade raise on I-25. The three-span configuration places a support along I-80 East where there is a history of errant eastbound vehicles leaving the roadway.



For design team reference, bridge spans, depths, and grade raises were calculated and included at the end of this document.

### Traffic Control Impact

The bridge depths required for clear span adversely impact traffic control due to significant profile grade change.

### Construction Phasing Impact

Clear spanning would avoid supports within the UPRR ROW and within the I-80 corridor, but clear spanning would complicate construction due to handling/erecting larger bridge components.

### Secondary Design Impact

Interacting with the UPRR ROW and coordinating the placement of supports will raise the profiles of I-25 and I-80 and will impact tie-ins of the profiles on either end of the proposed refinements. Raising the profile of the I-80 bridge over UPRR may shift the I-80 West tie-in more to the west.

### Phase III Impact

No impacts are anticipated to Phase III with the adoption of this refinement proposal.

### Cost Impact (Increase/Decrease from Recon Report Baseline)

This refinement adds cost to the expected construction cost in the Reconnaissance Report due to added supports and raising profiles of I-25 and I-80.

### Workshop Team Recommendation

The workshop team acknowledges that clear spanning UPRR is not an option after this analysis has been completed. Additional coordination with UPRR is required, and the roadway design will include profile adjustments to support the new bridge elevations.



Prepared By: Jeff Booher, WYDOT  
Ralph Tarango, WYDOT  
Tim Eversoll, Jacobs  
Mike Cooper, Jacobs

Presented By: Jeff Booher, WYDOT  
Mike Cooper, Jacobs

**Grade Raise Calculation I-25 UPRR Bridge**

**I-25 UPRR Structure (Structure AAW and AAV)**

Existing Clearance from Railroad Tracks to Girder=	22.5	Feet
Existing Girder Depth=	5.83	Feet
Existing Slab Depth=	0.67	Feet
Existing Top of Tracks to Finish Grade=	29	Feet (Ignoring Cross Slope)
Assumed Span, see I-25/I-80 UPRR Structure Sketch	131	Feet (Perpendicular to Centerline Tracks)
Bridge Skew=	30	Degrees
Estimated Span Along Skew=	160.0	Feet
Assumed Girder Depth/Span Ratio=	0.04	
Assumed Girder Depth=	6.40	Feet
New Slab Depth=	0.67	Feet
Correction for New Cross Slope=	1.4	Feet (Assuming 140 foot wide structure at 2%)
New Clearance from Railroad Tracks to Girders=	23.5	Feet
Proposed Top of Track to Finish Grade=	31.97	Feet
Grade Raise=	2.97	Feet
Say	3	Feet

**Grade Raise Calculation I-80 UPRR Bridge**

**I-80 UPRR Structure (Structure AYV AYU)**

Existing Clearance from Railroad Tracks to Girder=	22.5	Feet
Existing Girder Depth=	4.33	Feet
Existing Slab Depth=	0.67	Feet
Existing Top of Tracks to Finish Grade=	27.5	Feet (Ignoring Cross Slope)
Assumed Span, see I-25/I-80 UPRR Structure Sketch	131	Feet (Perpendicular to Centerline Tracks)
Bridge Skew=	35	Degrees
Estimated Span Along Skew=	160.0	Feet
Assumed Girder Depth/Span Ratio=	0.04	
Assumed Girder Depth=	6.40	Feet
New Slab Depth=	0.67	Feet
Correction for New Cross Slope=	1.4	Feet (Assuming 140 foot wide structure at 2%)
New Clearance from Railroad Tracks to Girders=	23.5	Feet
Proposed Top of Track to Finish Grade=	31.97	Feet
Grade Raise=	4.47	Feet
Say	5	Feet

**Grade Raise Calculation I-25 Over I-80 Structure**

Bridge Skew=	0	Degrees
Estimated Span Along Skew=	0.0	Feet
Existing Clearance=	16.5	-For two span structure
Existing Girder Depth=	4.50	Feet
Existing Slab Depth=	0.67	Feet
New Clearance from Railroad Tracks to Girders=	16.5	Feet (Min)
Existing Top of Cross Road to Finish Grade=	21.67	Feet
Assumed Span, see Proposed I-25 over I-80 Structure Sketch	130	Feet (Perpendicular to Centerline Tracks)
Bridge Skew=	0	Degrees
Estimated Span Along Skew=	130.0	Feet
Assumed Girder Depth/Span Ratio=	0.05	-For two span structure
Assumed Girder Depth=	6.50	Feet
New Slab Depth=	0.67	Feet
Correction for New Cross Slope=	1.4	Feet (Assuming 140 foot wide structure at 2%)
New Clearance from Railroad Tracks to Girders=	16.5	Feet (Min)
Proposed Top of Cross Road to Finish Grade=	25.07	Feet
Grade Raise=	3.40	Feet
Say	3.5	Feet



## **APPENDIX D – Executive Presentation**





**I-25/I-80**  
Interchange Project

# WYDOT

**I-25 / I-80 Interchange  
Environmental Assessment and  
Preliminary Design**

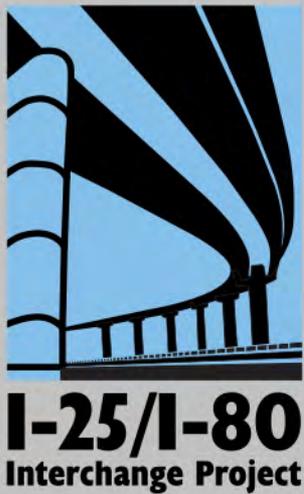
*Concept Refinement Workshop*

*EXECUTIVE SUMMARY*

*PRESENTATION*

*May 9, 2019*





# Agenda

- Safety Moment and Introduction
- Overview of Workshop Process
- Workshop Design Refinements
- Design Refinement Presentation
  - » Workshop (WS) Refinements 01 thru 10
- Questions and Comments
- Next Steps



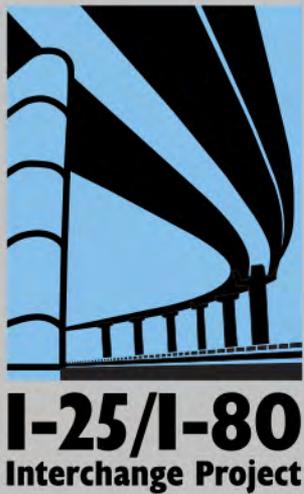


**I-25/I-80**  
Interchange Project

# Safety & Introductions

- Safety Moment - Ralph
- Sign In Sheet
- Name
- Role
- Biggest Opportunity or Success Factor





# Overview of Workshop Process

- Refine the Preferred Alternative
- Tuesday am – Site Visit/Project Download
- Wednesday all day – Design Refinement Brainstorm and Pass/Fail
- Thursday am – Document and Summarize Refinements
- Thursday pm – Executive Summary Presentation
- After Workshop – Report (Draft/Final)





**I-25/I-80**  
Interchange Project

# Workshop Design Refinements

- **WS-04: Ultimate Mainline Roadway Section - Pass**
- **WS-01: I25 Offset Alignment West - Pass**
- **WS-03: I80 Horizontal Shift and Curve - Pass**
- WS-02: Lincolnway Interchange Refinement – Fail
- Tier
- **WS-06: EB I80 to NB I25 over I25 South Leg - Pass**
- **WS-07: Mainline Bridge (Recon/Widen vs Replace) - Pass**
- WS-10: Mainline Bridge (Clear Span I80 and UPRR) - Fail
- **WS-05: Phase I WB I80 to SB I25 - Pass**
- Tier
- **WS-09: I25/I80 Interchange to College Weaves - Pass**
- **WS-08: Traffic Control, Construction Phasing, and Phase III Considerations – Pass** (*Incorporated in all refinements*)





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-04: Ultimate Mainline Roadway Section

- **Pass**
- **Tier 1 (Significant Impact to Concept)**
- Closed median vs Open median.
  - » Write-Up Team: Jeff Booher, Ralph Tarango, Tim Eversoll
  - » Presenters: Tim





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

## WS-04: Ultimate Mainline Roadway Section

### ■ Option 1 Open Median

#### Advantages

1. Matches existing conditions.
2. Potential for additional lateral space for emergency pull offs.

#### Disadvantages

1. Requires continual accommodation for median drainage (inlets, culverts, etc).
2. Results in wider overall roadway section (longer bridge lengths).





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

## WS-04: Ultimate Mainline Roadway Section

### ■ Option 2 Closed Median

#### Advantages

1. Minimizes overall width of roadway section.
2. Shorter bridge lengths.
3. Reduces need for median drainage systems.
4. Eliminates need for mowing maintenance within the median.

#### Disadvantages

1. Superelevated sections require median drainage systems (inlets, culverts, etc).
2. Access to bridge inspection with on-deck snooper vehicle is hindered by a closed median, however, inspector group feels they can still gain access from below with lift.

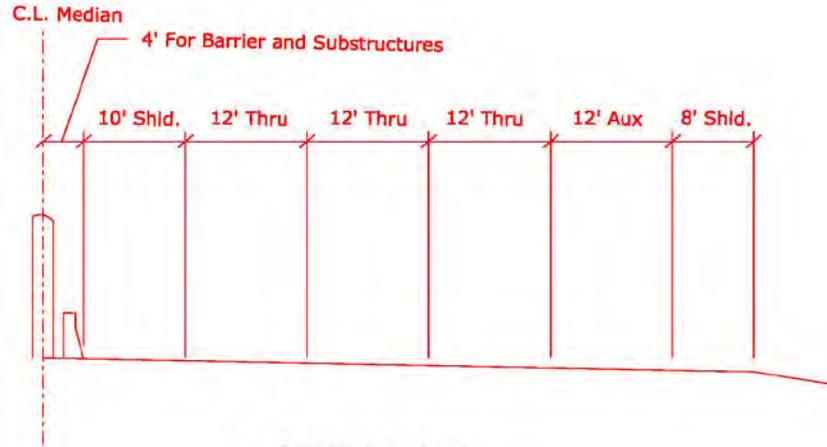




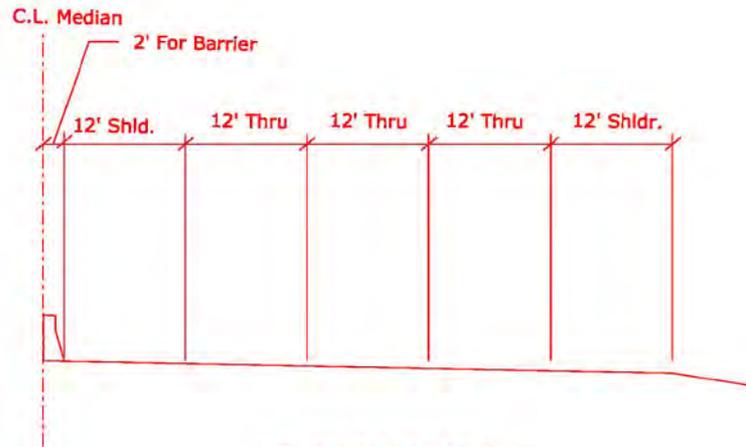
# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-04: Ultimate Mainline Roadway Section



Section Under Bridge



Section Outside of Bridge





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-01: I25 Offset Alignment West - Pass

- **Pass**
- **Tier 1 (Significant Impact to Concept)**
- Shift West to build structures off alignment
  - » Write-Up Team: Kevin Stogsdill, Kevin Erickson, Mike Cooper, Carolyn Moore
  - » Presenters: Mike and Kevin S.

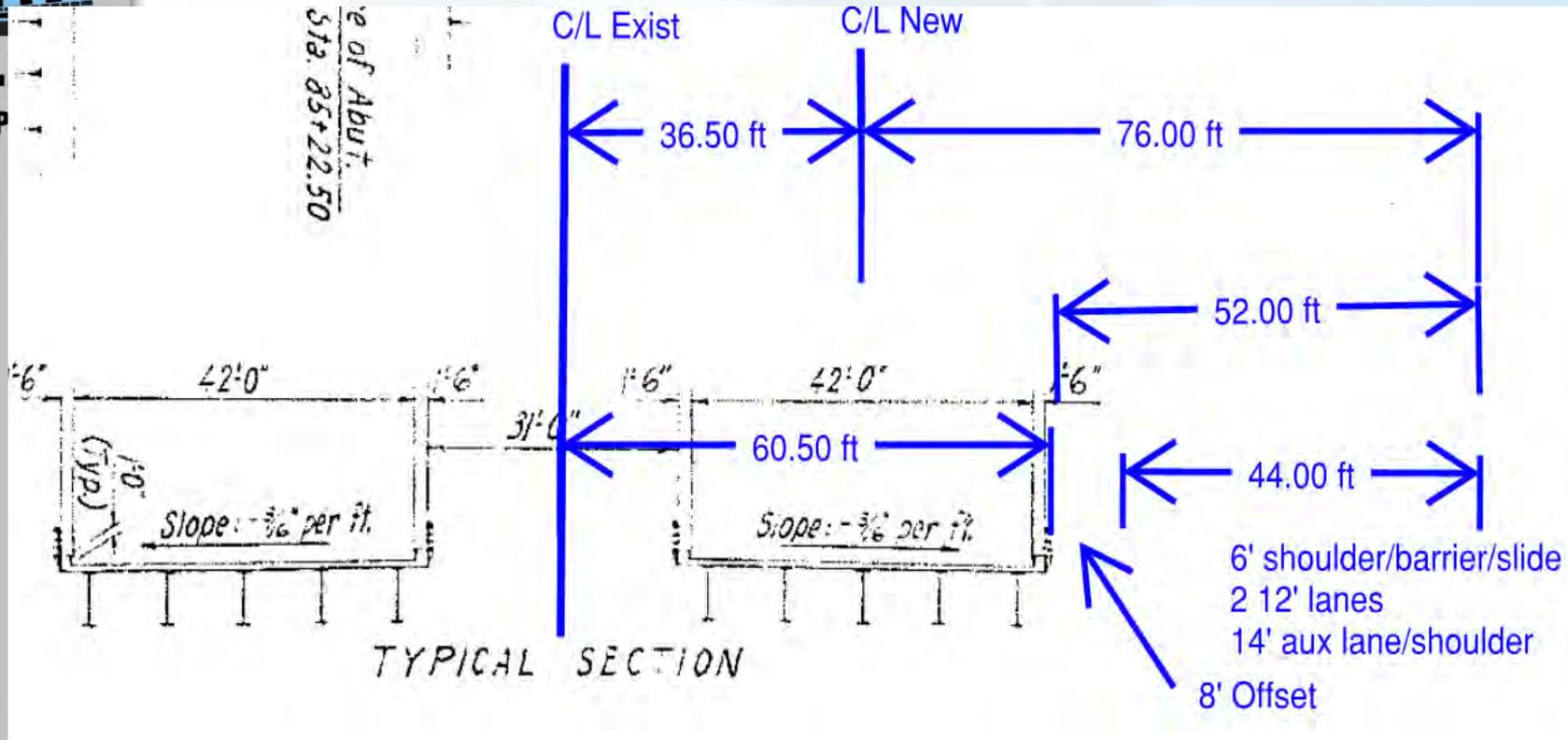




I-25/I-  
Interchange P

# Design Refinement Presentation

## WS-01: I25 Offset Alignment West - Pass

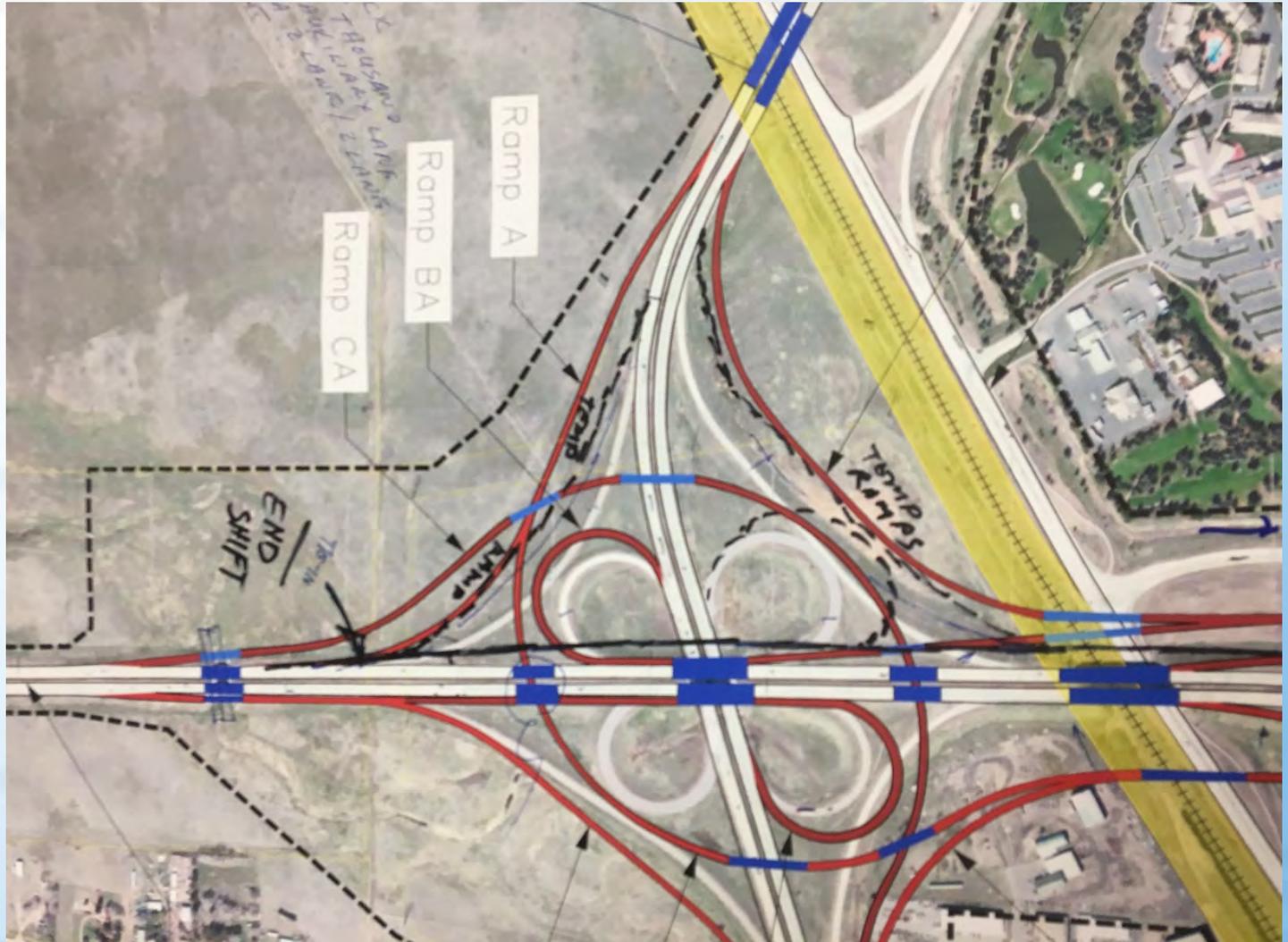




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-01: I25 Offset Alignment West - Pass

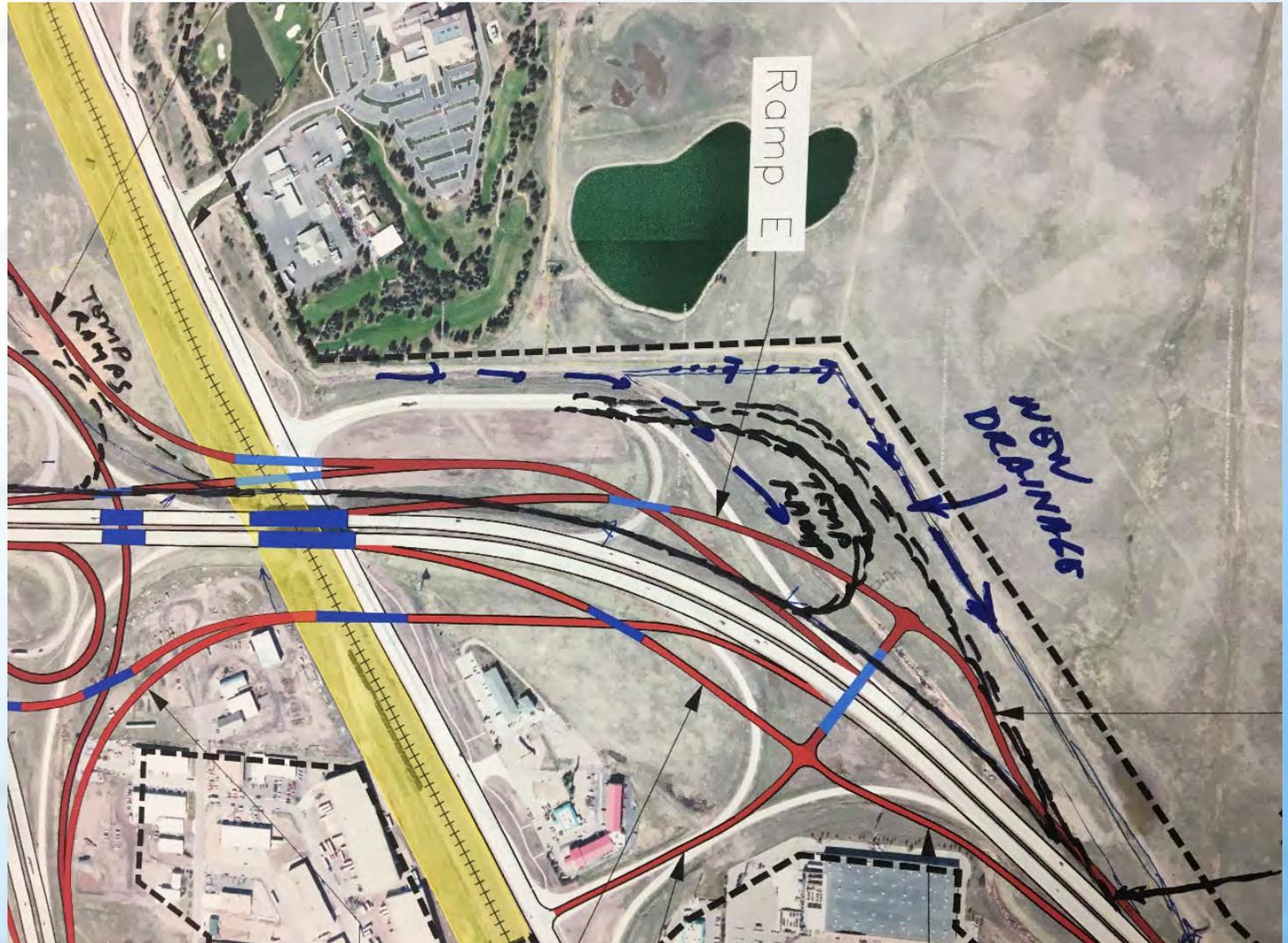


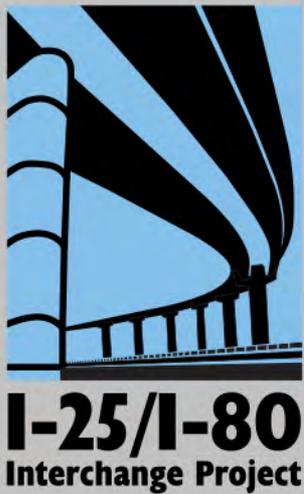


# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-01: I25 Offset Alignment West - Pass





# Design Refinement Presentation

## WS-03: 180 Horizontal Shift and Curve

- **Pass**
- **Tier 1 (Significant Impact to Concept)**
- Shift South for off alignment structure construction,
- Correct substandard horizontal curve
- Discuss design speed change to 65 mph.
  - » Write-Up Team: Randy Griesbach, Tim Morton, Erin James, Andrea Allen, Wayne Shenefelt, Chris Angleman
  - » Presenters: Randy and Chris

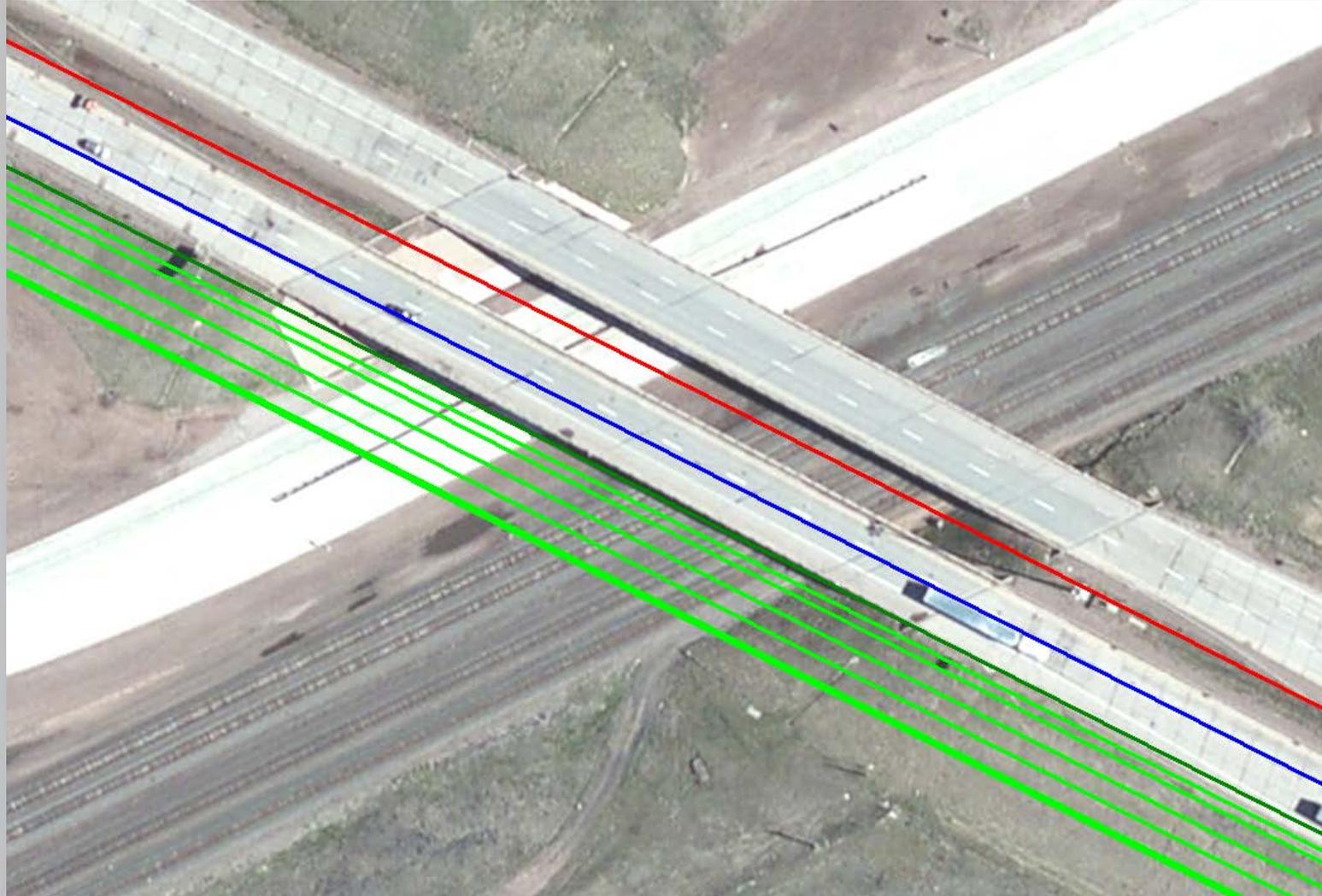




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-03: 180 Horizontal Shift and Curve

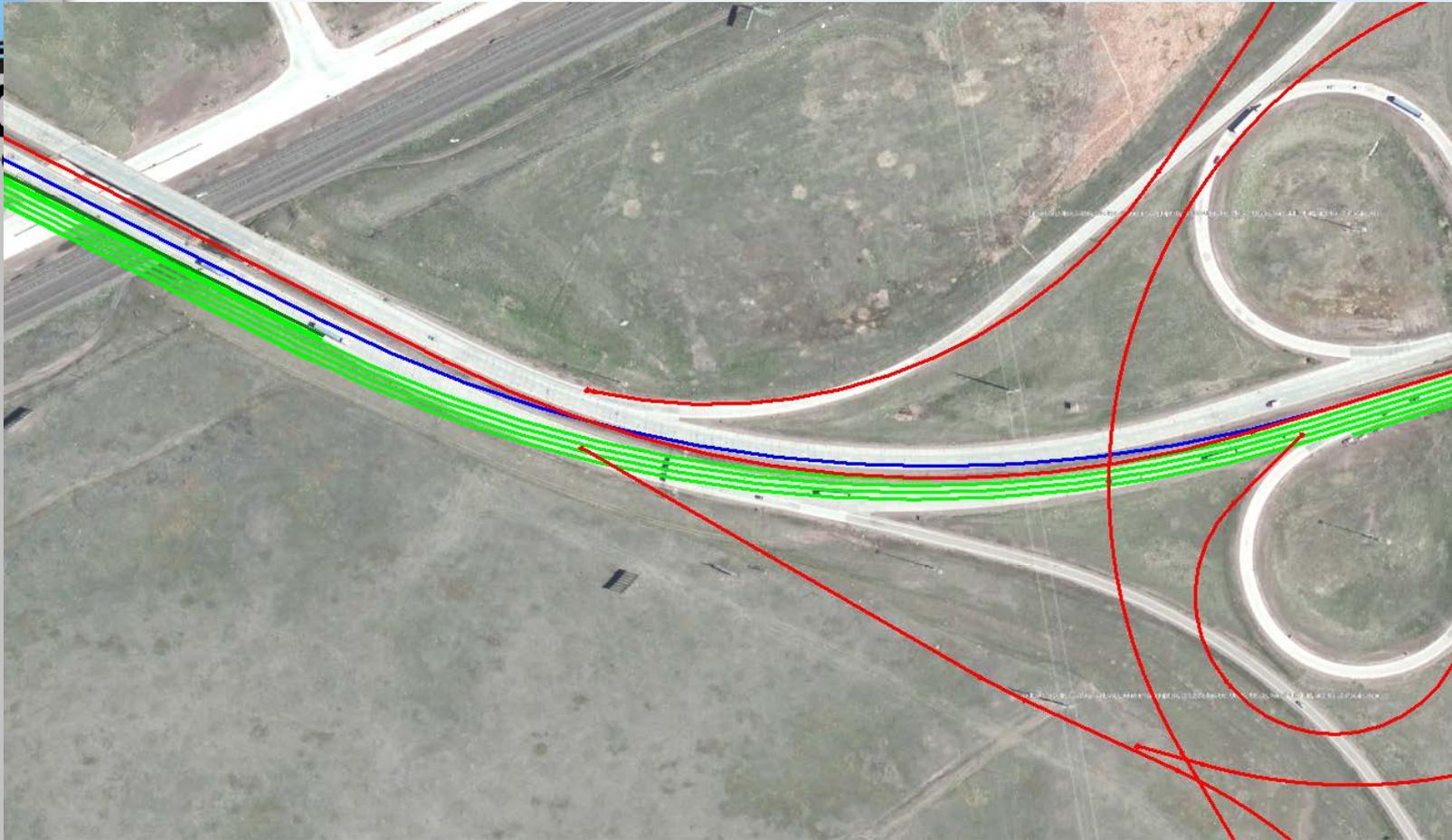


# Design Refinement Presentation

## WS-03: 180 Horizontal Shift and Curve



**I-25/I-80**  
Interchange Project

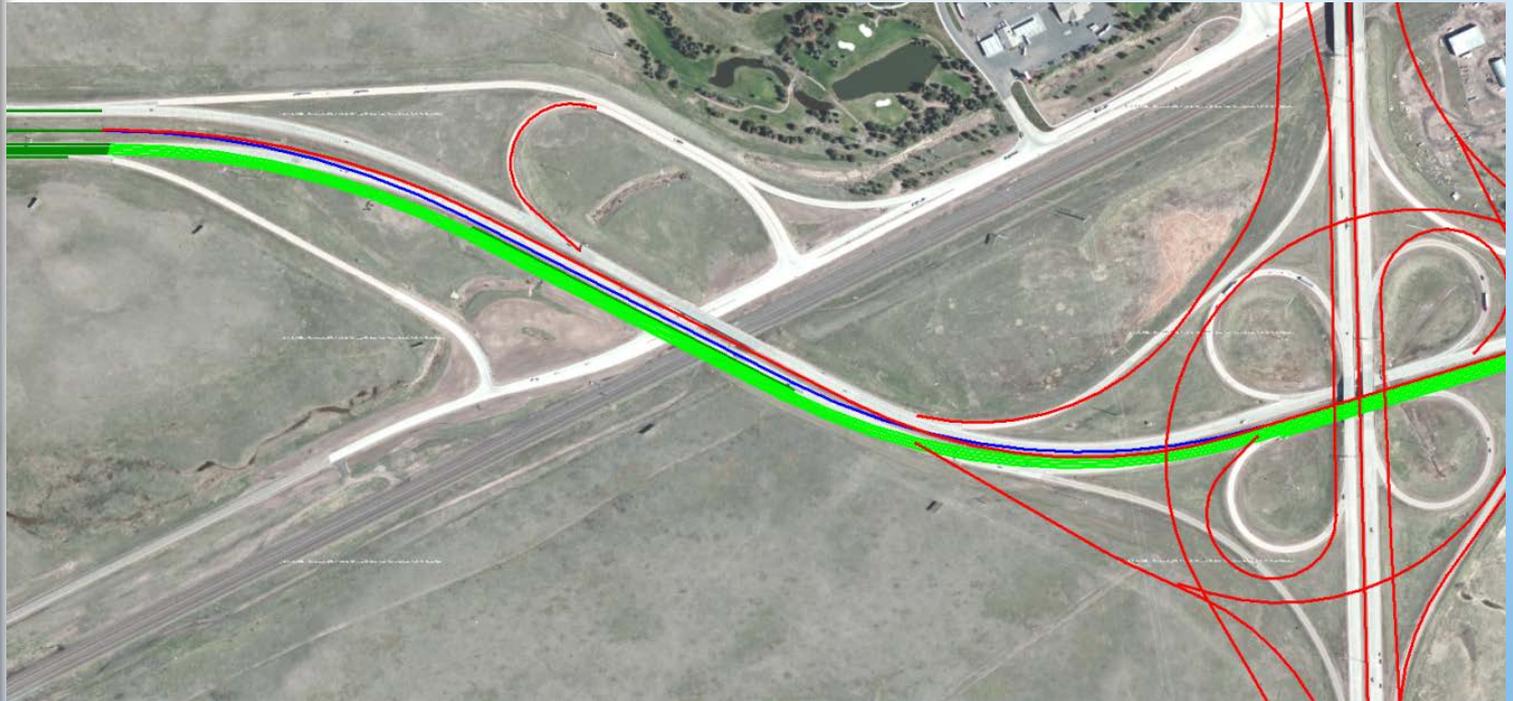




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-03: 180 Horizontal Shift and Curve





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-02: Lincolnway Interchange Refinement

- **Fail**
- **Tier 1 (Significant Impact to Concept)**
- Evaluate providing eastbound I80 access from I25 Lincolnway Interchange.
  - » Write-Up Team: Ryan Shields, Chris Angleman, Jeff Mellor
  - » Presenters: Jeff and Ryan





# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-02: Lincolnway Interchange Refinement





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

## WS-02: Lincolnway Interchange Refinement

### ■ Advantages

1. Provides direct access from Lincolnway to I-80 EB and WB.
2. Eliminates long system ramps and retaining walls and two bridges; one at the basket-weave and one over the railroad. Potential for significant cost savings.
3. Improves ramp alignment for I-25 SB to I-80 WB eliminating potential issues with questionable soils/wetlands.
4. Increases weave length on I-80 WB to the W. Lincolnway interchange.





## **I-25/I-80** Interchange Project

# Design Refinement Presentation

## WS-02: Lincolnway Interchange Refinement

### ■ **Disadvantages**

1. Introduces weaving on mainline I-25 SB near the system interchange. Approximate 1500' weave length.
2. Eliminates single-exit design. Requires multiple accesses to I-80; increases sign complexity and potential for driver confusion.
3. Increases right-of-way impacts north of proposed Lincolnway interchange.
4. Potential for wrong way movements at loop ramp. May violate driver expectancy.
5. Extends Lincolnway interchange footprint to the NW, lengthening distance required for access protection.





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-06: EB I80 to NB I25 over I25 South Leg

- **Pass**
- **Tier 2 (Limited Impact to Concept)**
- Evaluate taking direct ramp over I25 South Leg.
  - » Write-Up Team: Andrea Allen, Carolyn Moore, Kevin Erickson, Wayne Shenefelt, Erin James
  - » Presenters: Wayne and Kevin





# I-25/I-80 Interchange Project

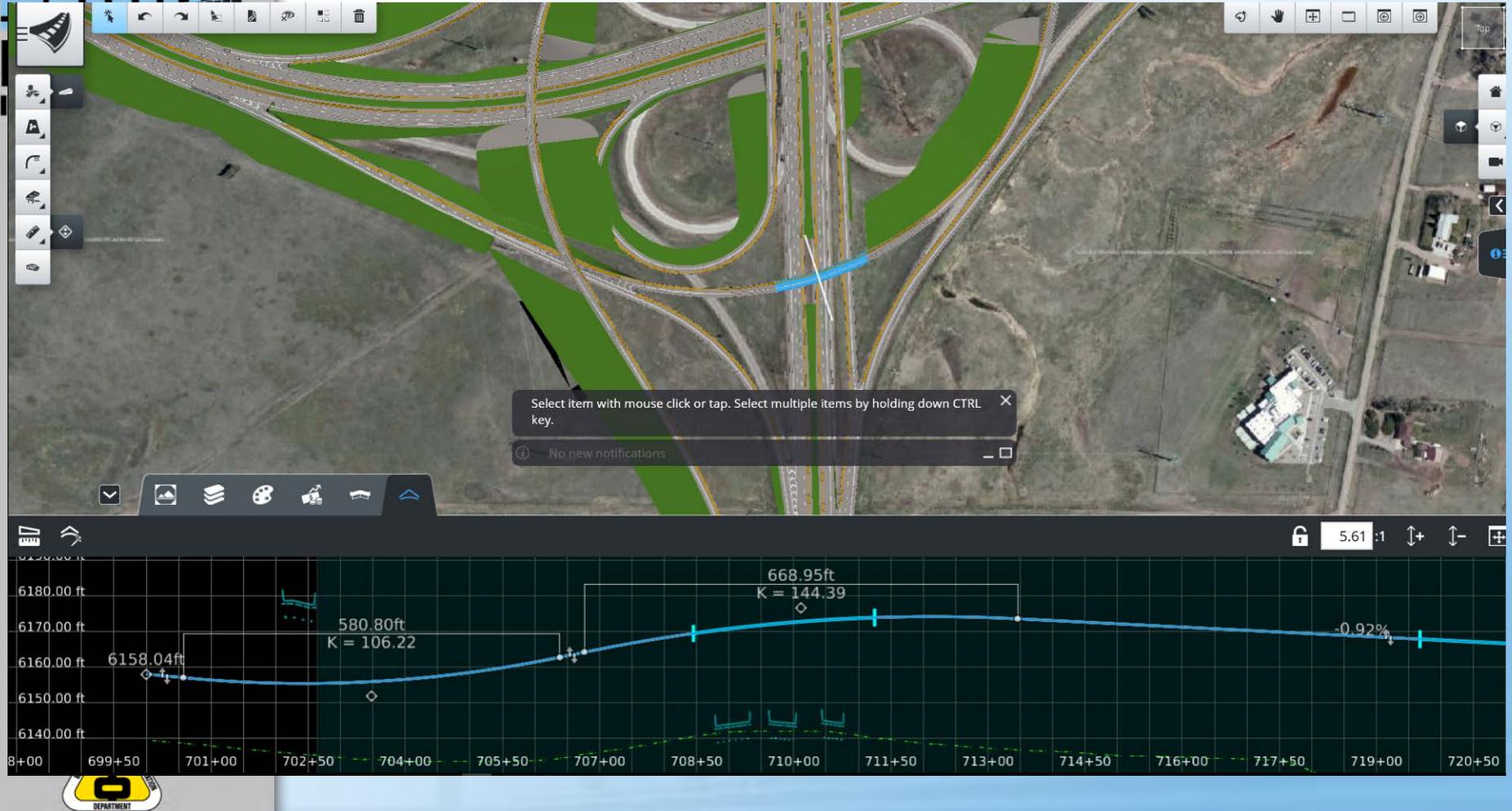
# Design Refinement Presentation

WS-06: EB I80 to NB I25 over I25 South Leg



# Design Refinement Presentation

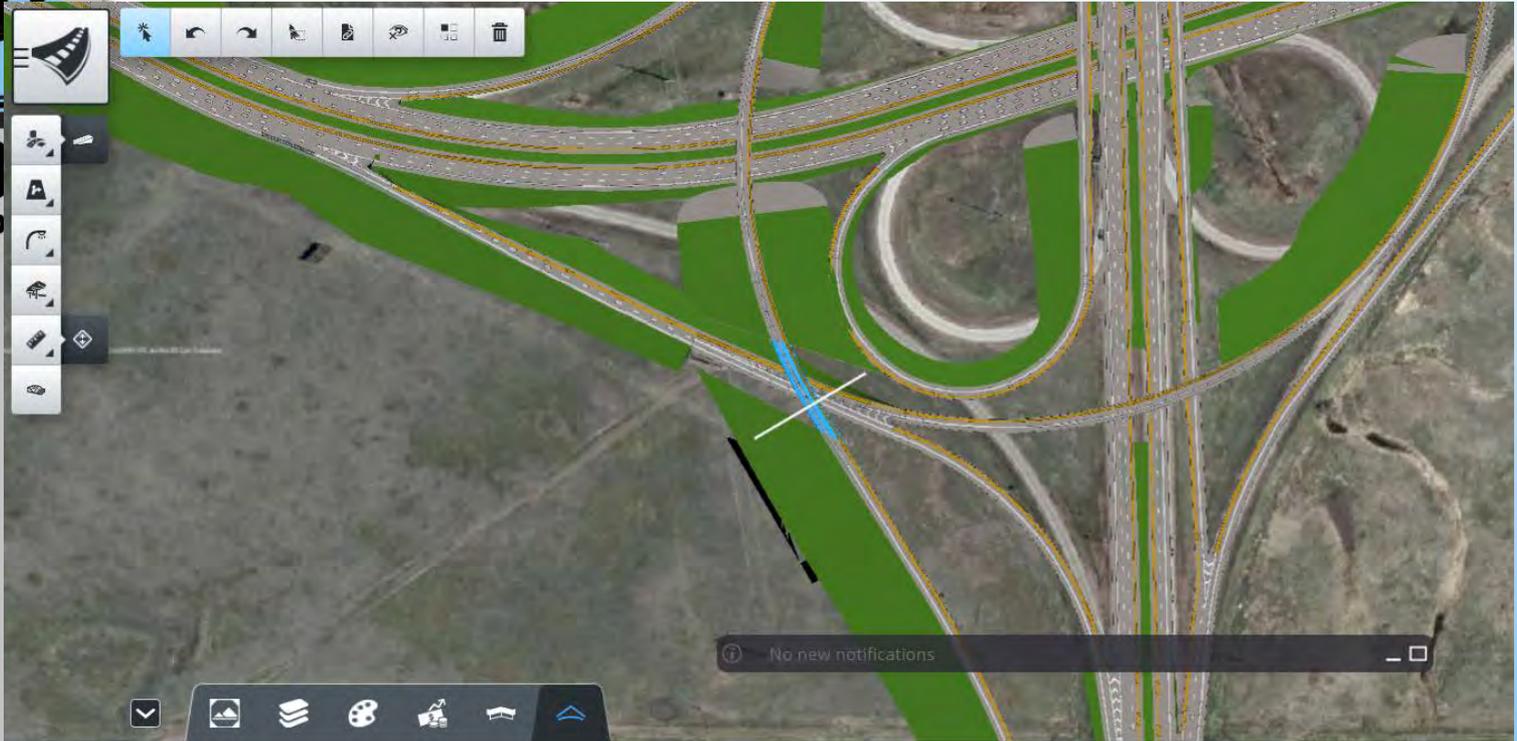
## WS-06: EB I80 to NB I25 over I25 South Leg



# Design Refinement Presentation

## WS-06: EB I80 to NB I25 over I25 South Leg

**I-25/I-80**  
Interchange Pro



No new notifications

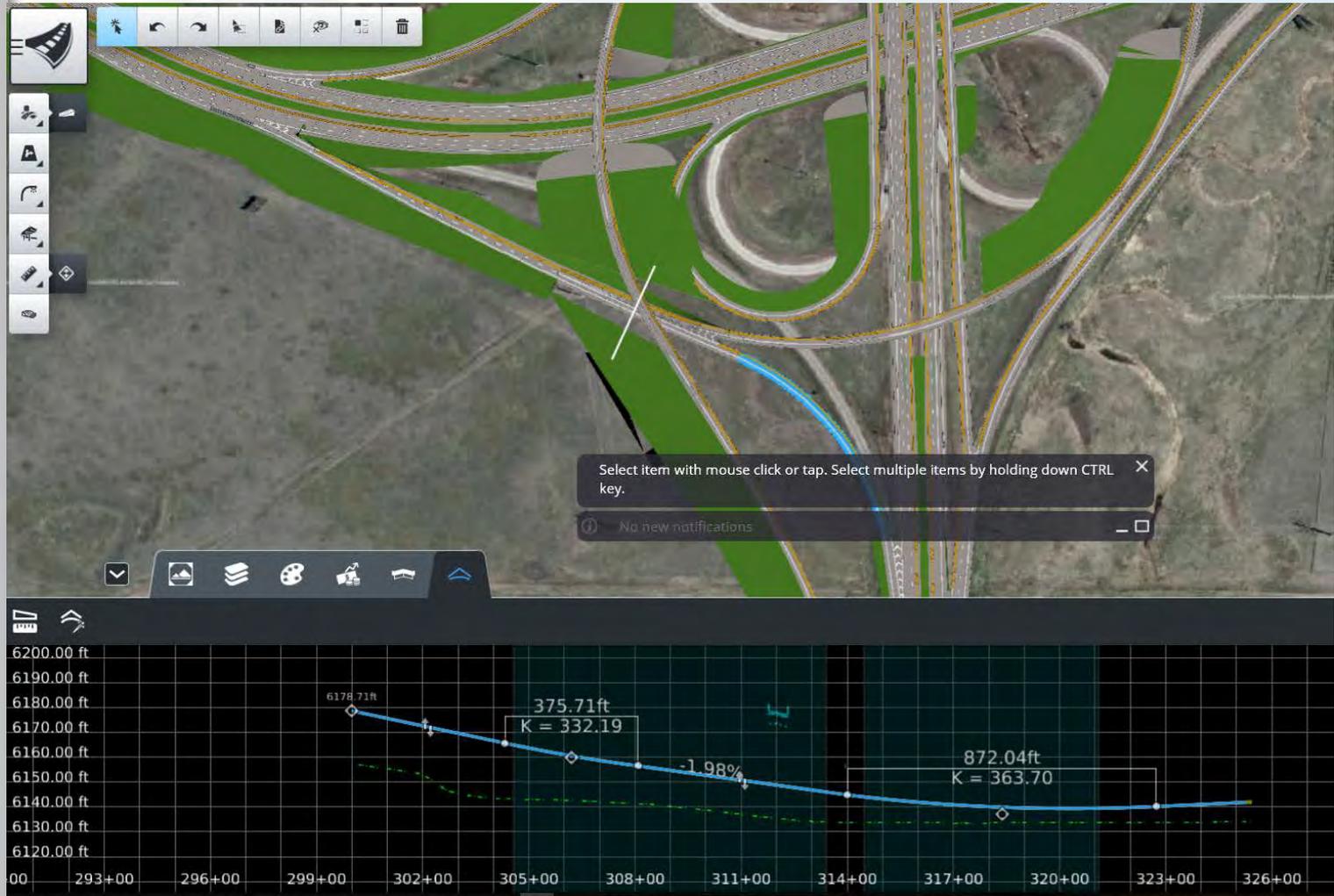




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-06: EB I80 to NB I25 over I25 South Leg





# I-25/I-80 Interchange Project

# Design Refinement Presentation

WS-06: EB I80 to NB I25 over I25 South Leg





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-07: Mainline Bridge (Recon/Widen vs Replace)

- **Pass**
- **Tier 2 (Limited Impact to Concept)**
- Cost for replacement vs recon/widen.
  - » Write-Up Team: Jeff Booher, Ralph Tarango, Mike Cooper, Tim Eversoll
  - » Presenters: Jeff and Mike





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

## WS-07: Mainline Bridge (Recon/Widen vs Replace)

The original proposed section included widening/rehabbing bridges over 80 and UPRR.

- Alignment shift and its advantages lead to bridge replacement consideration. Offline construction accommodates grade changes from existing.
- Bridges are reaching end of their useful life (1960s vintage). Complexities of widenings and rehab results in significant impacts to traffic during construction.
- Widening over railroad will be difficult to get UPRR approvals with supports near tracks. Replacement anticipated to facilitate railroad coordination and approval.
- Cost of rehab, widening, higher long-term maintenance costs are significant and could approach the cost of replacement.
- Frequency of bridge rehab work has been increasing over time.





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

## WS-07: Mainline Bridge (Recon/Widen vs Replace)

- **Traffic Control Impact**
  - » Traffic control improvement on mainline (see WS-01)
- **Construction Phasing Impact**
  - » Construction phasing improved (see WS-01)
- **Phase III Impact**
  - » No impact





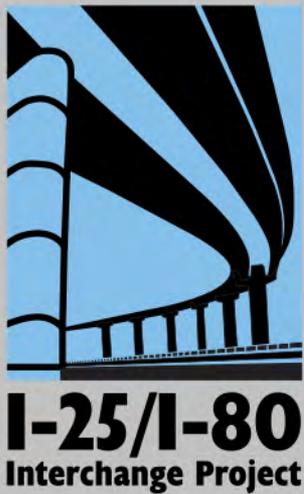
**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-10: Mainline Bridge (Clear Span I80 and UPRR)

- **Fail**
- **Tier 2 (Limited Impact to Concept)**
- Evaluate clear spanning I80 with I25 bridge and clear spanning the UPRR ROW with both I25 and I80.
  - » Write-Up Team: Jeff Booher, Ralph Tarango, Mike Cooper, Tim Eversoll
  - » Presenters: Jeff and Mike





# Design Refinement Presentation

## WS-10: Mainline Bridge (Clear Span I80 and UPRR)

- Depths of structures to clear span are significant:
  - » I-25 over UPRR: preliminary estimate of RR ROW indicates 250-ft width. Considering 30 deg skew, a 300-ft span is anticipated, beyond the range for a conventional girder-type bridge. With a deck truss or other non-conventional bridge type, a grade raise of 10 feet or more would be anticipated on I-25.
  - » I-80 over UPRR would be larger due to the skew.



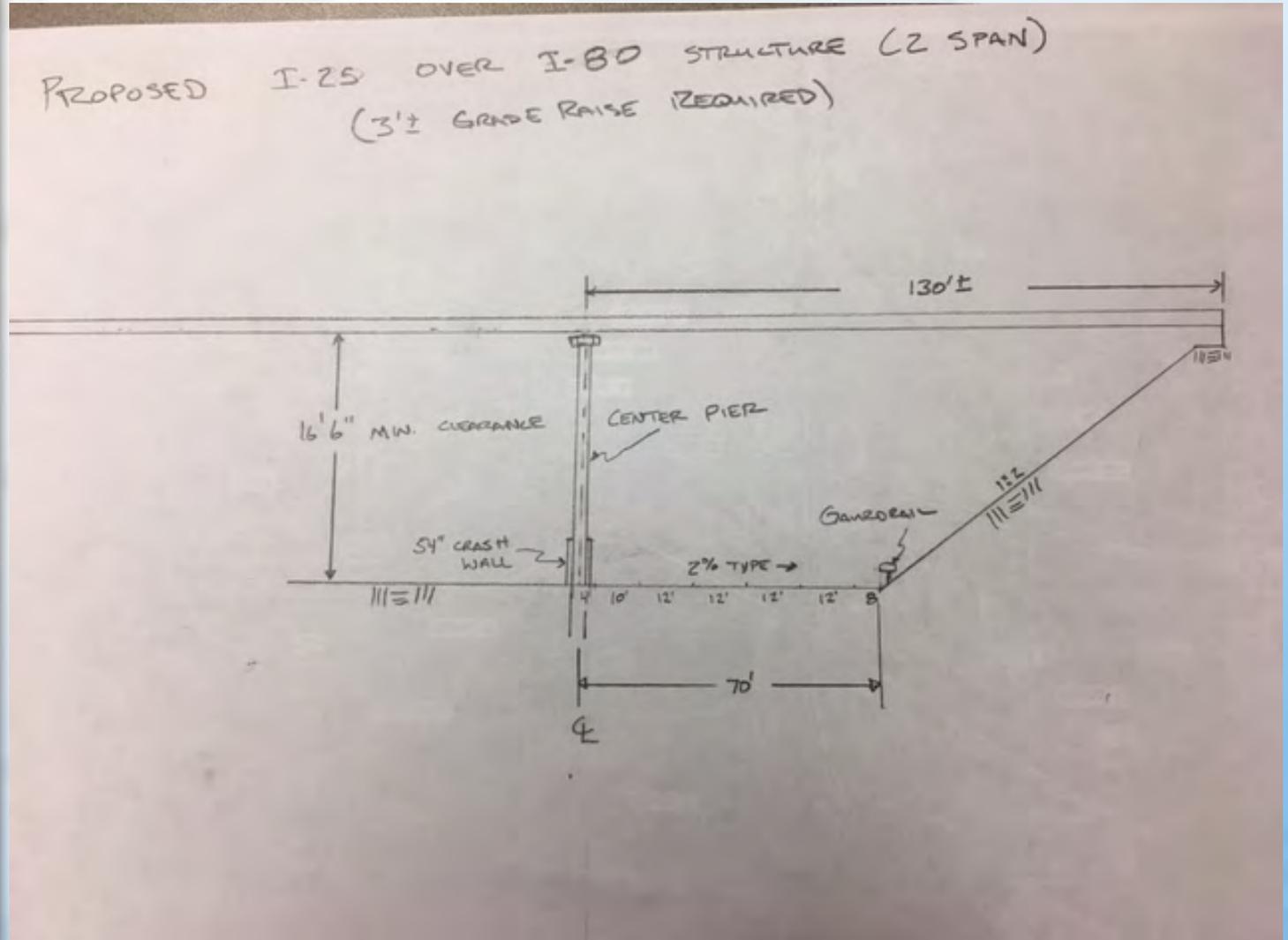




**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-10: Mainline Bridge (Clear Span 180 and UPRR)





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-05: Phase I WB I80 to SB I25

- **Pass**
- **Tier 2 (Limited Impact to Concept)**
- Evaluate initial cost investment of changing Phase I to WB to SB direct connect ramp
  - » Write-Up Team: Tom Ragland, Kevin Stogsdill, Chris Angleman, Tim Morton
  - » Presenters: Tim and Chris



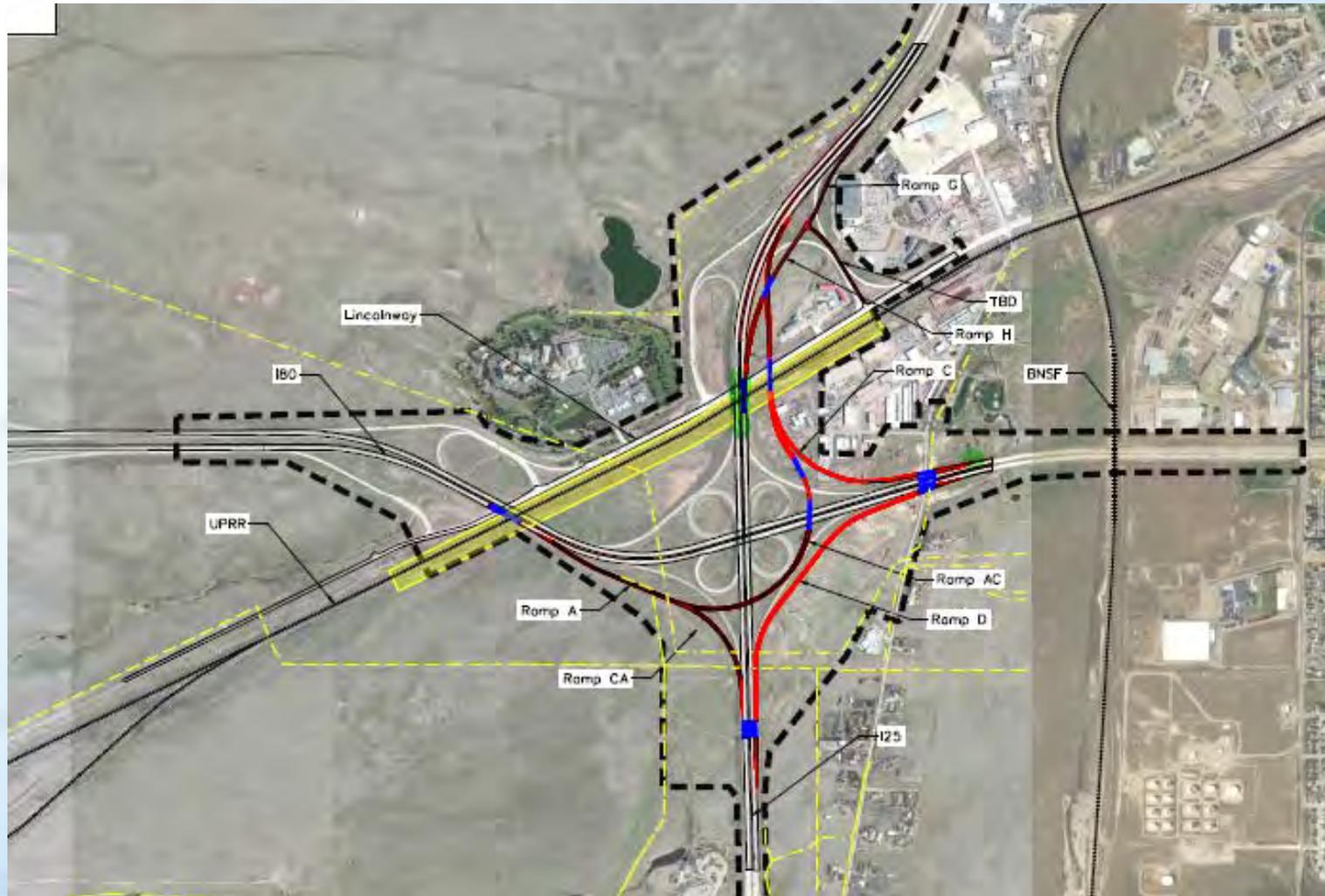


# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-05: Phase I WB I80 to SB I25

- Phase I



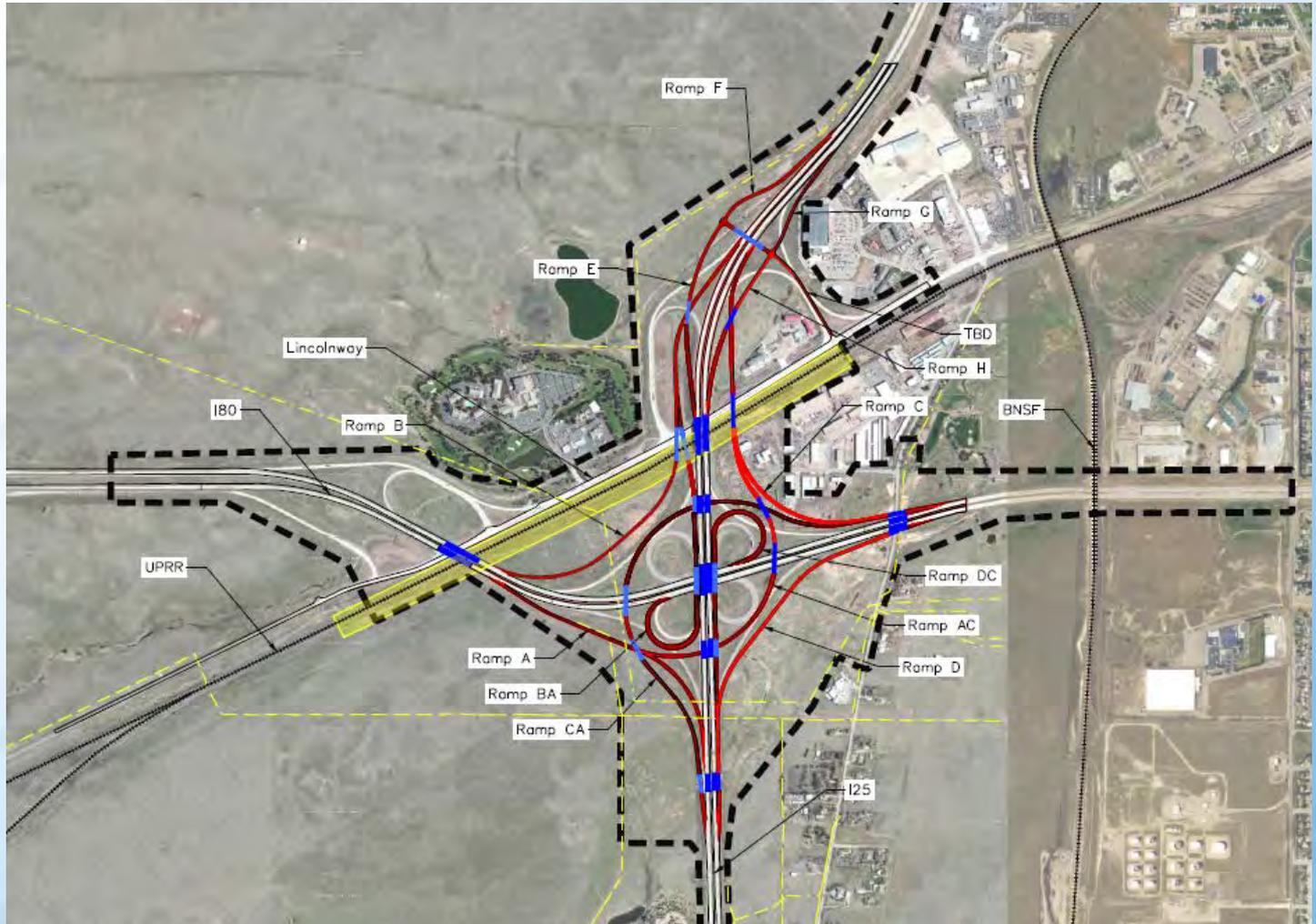


# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-05: Phase I WB I80 to SB I25

- Phase I and II





## I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-05: Phase I WB I80 to SB I25

- Construction of the west bound to south bound connector requires or must include reconstruction of I25 mainline
- The original phase II is no longer an independent phase and will require up to 80% of the ultimate design, due to the realignment and reconstruction of I-25
- Phase 1 does has limited operational benefits and additional improvements need to follow.
- Seek funding for the entire project, rephrase the project based on constructability and traffic maintenance





**I-25/I-80**  
Interchange Project

# Design Refinement Presentation

WS-09: I25/I80 Interchange to College Weaves

- **Pass**
- **Tier 3 (Minor Impact to Concept)**
- Evaluate the weave and lane operations between the system interchange and service interchange
  - » Write-Up Team: Jeff Mellor, Ryan Shields, Randy Griesbach, Tom Ragland
  - » Presenters: Jeff, Randy and Ryan





# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-09: I25/I80 Interchange to College Weaves

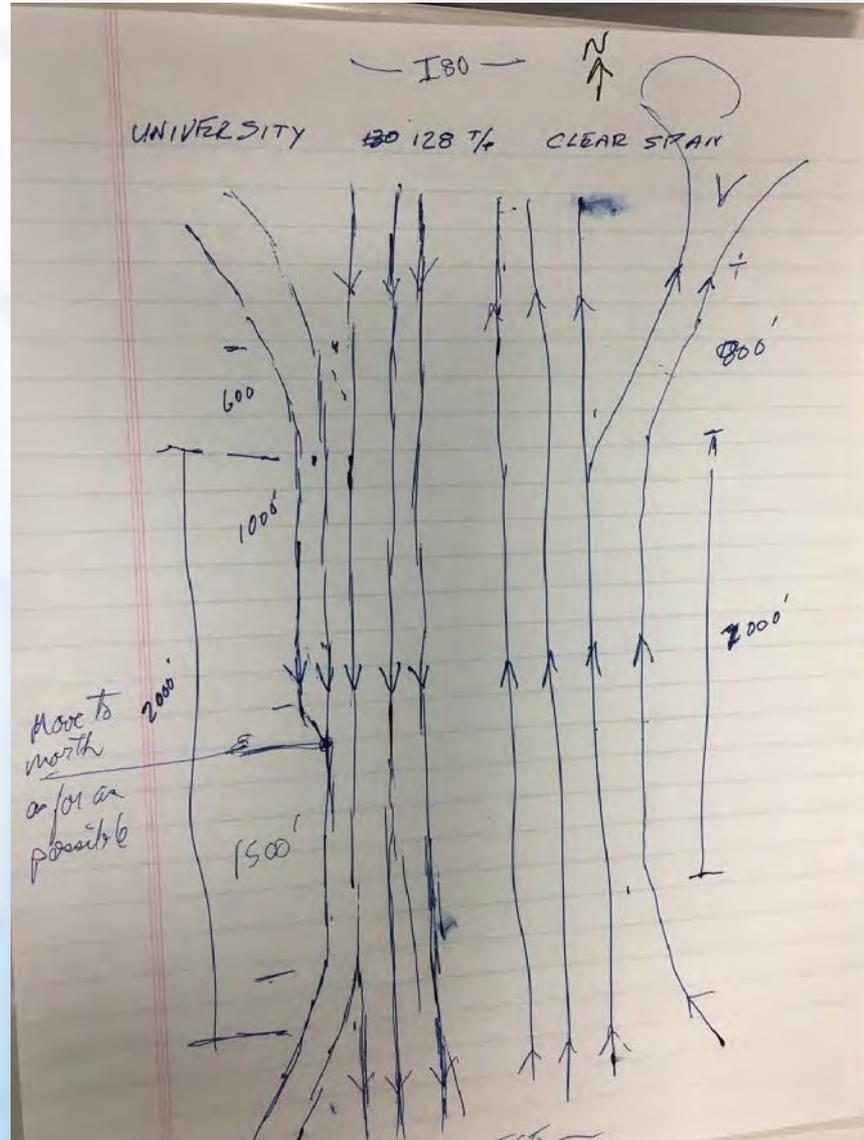




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-09: I25/I80 Interchange to College Weaves

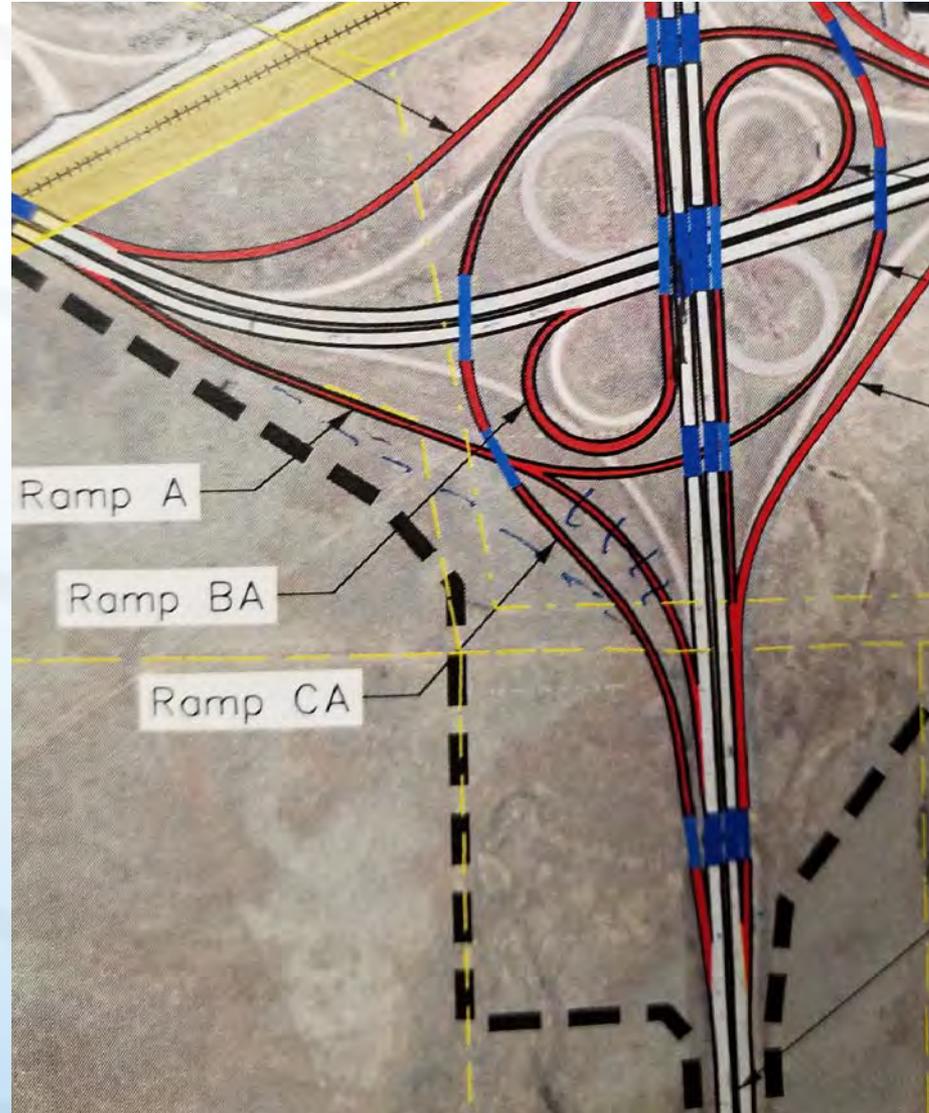




# I-25/I-80 Interchange Project

# Design Refinement Presentation

## WS-09: I25/I80 Interchange to College Weaves

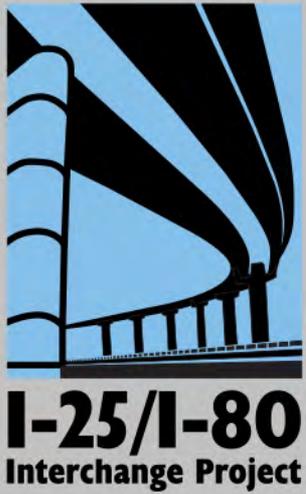




**I-25/I-80**  
Interchange Project

**Questions?**





# Next Project Steps

**Draft Report**  
**Final Report**  
**May-Aug 2019**

Workshop Team Review  
Submit for Distribution  
RR and Utility Meeting  
Refinement Effort

**Early 2020**  
**Summer 2020**  
**Fall/Winter 2020**  
**2021/2022**

Preliminary Design Plans  
EA Public Comment Period  
Complete EA Process  
Final Grading Plans





**I-25/I-80**  
Interchange Project

**Thank You**

