



## **Floyd Hill Design Technical Team Meeting Summary**

January 27, 2023, 9:00 AM to 12:00 PM

CDOT Golden Office – Lookout Mountain Conference Room and Virtual (Zoom)

### **1. Introductions, Meeting Purpose and Project Updates**

CDR Associates opened the meeting and reviewed the agenda.

The purpose of the meeting was to discuss:

- *Project Updates*
- *Discuss/Confirm:* Central Section Alignment Update and Central Section Bridges
- *Introduce:* East Section Drainage Structures and East Section Overview
- *Next TT Agenda & Next Steps*

TT members confirmed the meeting agenda with a request to discuss traffic safety considerations at the Hidden Valley Intersection, building off of last meeting's discussion.

The Project Team acknowledged this concern and said there would be time to discuss it in future meetings or individually. Maintenance concerns have been noted as a future ITF discussion.

### **2. Project Updates**

- **Early Projects:**
  - Genesee Wildlife Crossing: the project is building shoring in place to establish a detour around bridge construction. The detour is set to shift traffic in February to allow for construction to begin.
  - Homestead Roundabout: this project is currently focused on utilities issues. The timeline is dependent on weather. .
  - Empire Wildlife Crossing: this project is in the final planning stages including cost estimates. The goal is to get started in the late spring/early summer of this year.
  - **TT Question:** there is a Variable Message Board with messaging about early projects that does not seem to be in the right place at Homestead and US 40.



- **Response:** Thank you for bringing this to our attention. The Project Team will take a look to ensure correct messaging.
  
- **Public Meeting (3/7):** The upcoming public meeting will be held at Clear Creek High School from 6-8pm. The Project Team will present at 6:30pm. For now, the team is considering not having a formal Q&A afterwards, but rather, time for informal discussion. If community members have questions, they can talk directly to the Project Team. This will be discussed during the next PLT meeting.
  
- **1041 Submittal:** The 1041 was turned in to Clear Creek County earlier this week. For those not familiar with 1041 permits, they allow counties to have agency around local construction projects and last throughout the duration of the construction project. This permit is conditional, not requiring a full design in light of the CSS and CM/GC processes. The Project Team aims to present at the Clear Creek Board of Commissioners meeting in late March after the Public Meeting to receive this conditional 1041 permit.
  
- **Air Quality Monitors:** The monitors have been installed and are operational. The Project Team will be meeting on Monday to discuss a dashboard interface. They will consider the commitments in the EA to decide whether to display continuous/raw data or a summary for reporting.
  
- **FONSI:** Was signed on January 12th and has been posted on the project website. The team will be sending an email blast to alert email contacts. The team reiterated that this is a significant milestone for the project and appreciates all the work the FONSI represents.
  
- **Additional Updates:** The project has reached 90% FOR review for the East Section. On Feb 7th, the Project Team and technical experts will be meeting to review the East Section designs and refine them to reach the 90% design. This is not a required meeting for the TT, as it will be highly technical, but the TT is welcome to join virtually and observe.
  
- **SWEEP Meeting:** Representatives from SWEEP provided an overview of their most recent meeting. The major topic of discussion was the recent refinement in the Central Section, which removes the need to relocate a section of the creek. SWEEP members as well as CO Parks and Wildlife were supportive of this refinement, as it avoids the 4-6 years required to restore stream health after relocation. There are a number of spawning beds in this area and the project will

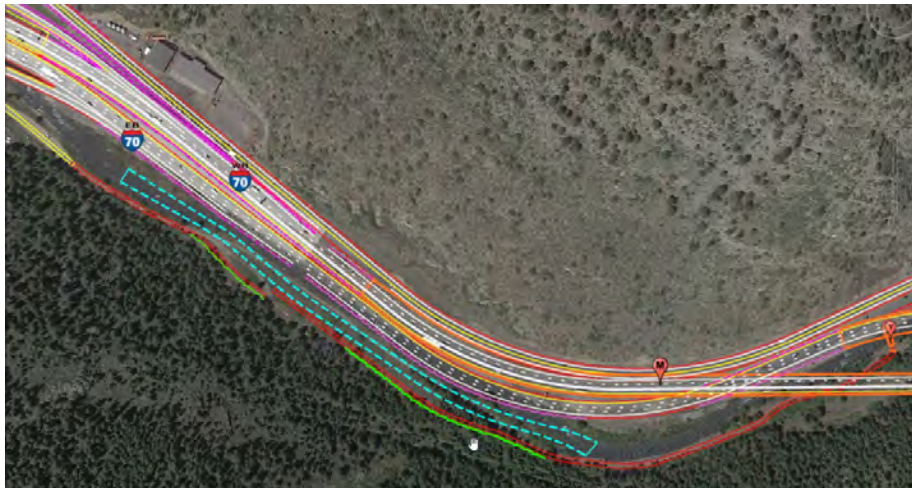


still capitalize on opportunities to improve existing stream function. Avoiding creek relocation impacts does not change the overall mitigation plan. Additionally, during construction, SWEEP will still work with the construction team to protect fisheries to the extent possible during certain spawning seasons.

### 3. **Confirm: Central Section Alignment**

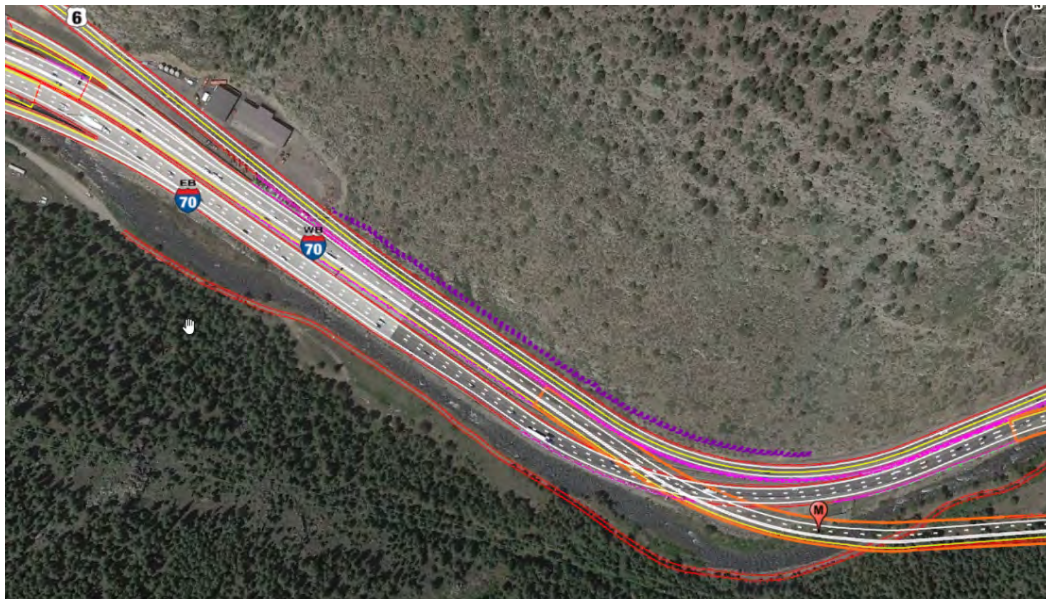
In light of the support from SWEEP and CPW, the TT transitioned to the next agenda topic: confirming the Central Section alignment shift. The objective for this topic was to review and confirm the direction to move forward with revised Central Section alignment that does not relocate creek.

**Previous alignment (KMZ and Lumen model below):** includes creek relocation (highlighted by blue dotted line below) as well as 20 ft walls along Greenway (green line below). Challenges with creek relocation led the team to consider other options.

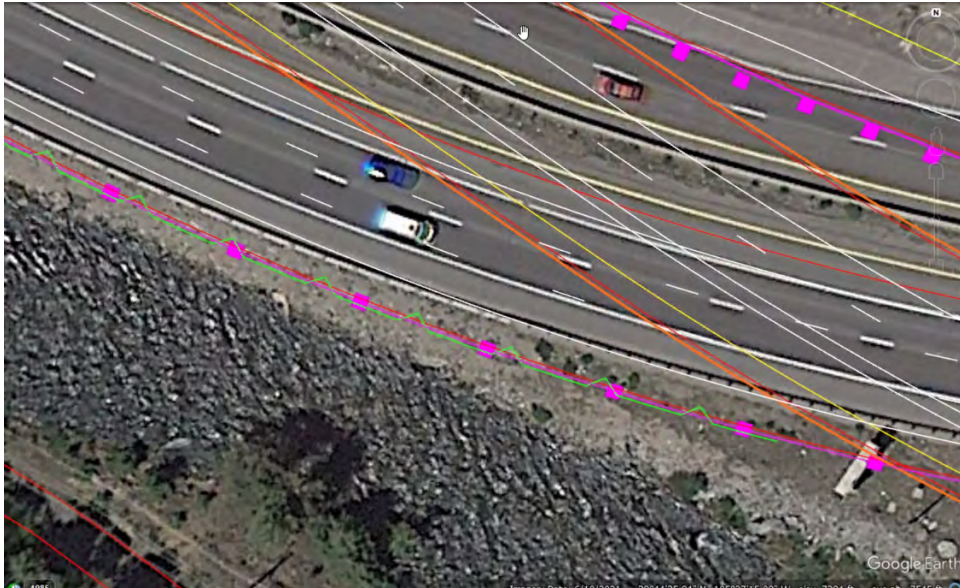




**New alignment:** Through further exploration, the Project Team developed an alignment that does not require creek relocation. This also reduced walls along the Greenway Trail. The team determined that the North side of highway would require excavation rather than significant rock cut, as initially expected. This alignment opens up the Greenway corridor and still provides opportunities for enhancements along the creek.



- **TT Question:** Where would the new alignment require a wall?
- **Response:** A short wall (~3 ft) would be required at the pinch point between the road and the creek. (Below: the pink and green lines represent the wall.)



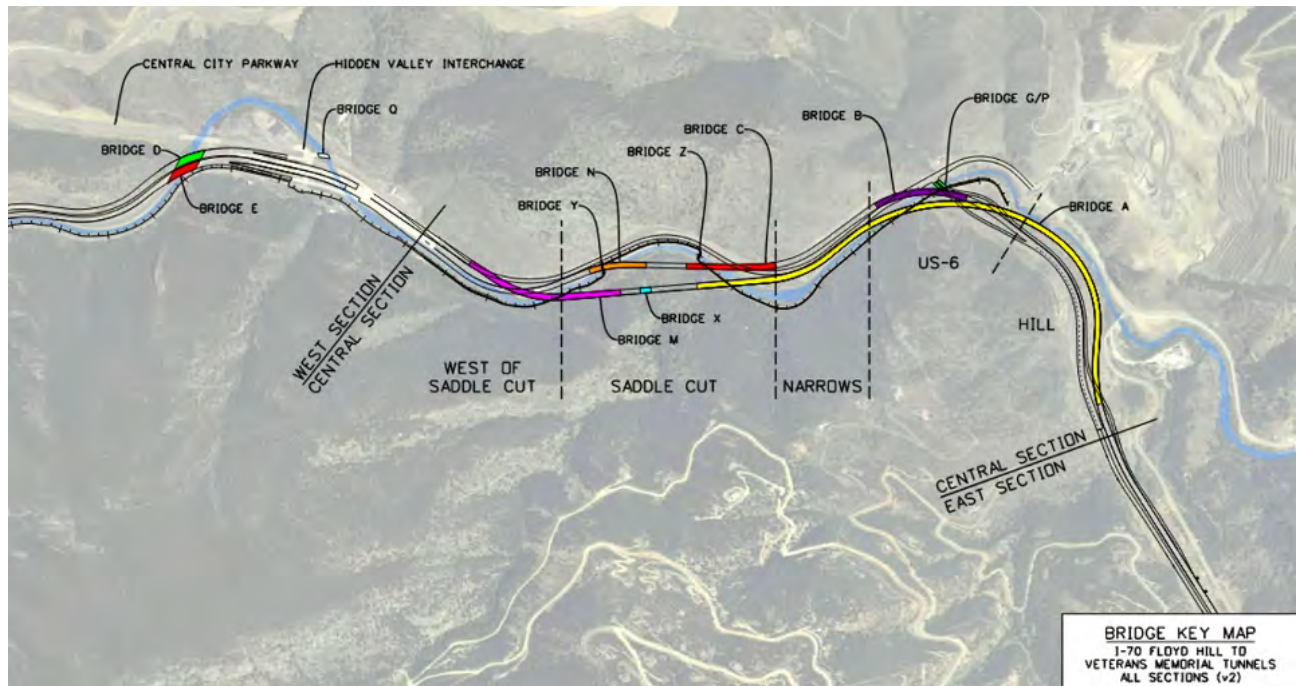
- **TT Question:** how much of the North side would actually require rock cut?
- **Response:** Most of the section West of the curve will only require excavation of gravel and dirt. There will be rock cut at the curve but not as much as in the original PA '21. We will look at wall types as we gather geotechnical information.
- **Question:** This seems consistent with information presented last TT meeting. Are there any new considerations for this alignment shift?
- **Response:** Correct, there is no new information. The Project Team just wants to ensure clear confirmation to continue in this direction.
- **Question:** What is the elevation of the greenway vs. roadway in this alignment?
- **Response:** The roadway will be above the greenway: WB will be lifted above the current elevation and EB will be similar to existing WB. This has benefits for reducing sound and improving the experience along the Greenway.

**TT Decision:** Confirm support for the Project Team to proceed with the improved alignment that does not require creek relocation.



### 3. Discuss: Central Section Bridges

#### Bridge Key Map *for reference*



**Central Section Bridge A:** the Project Team is evaluating two primary options for Bridge A and would benefit from TT consideration and input.

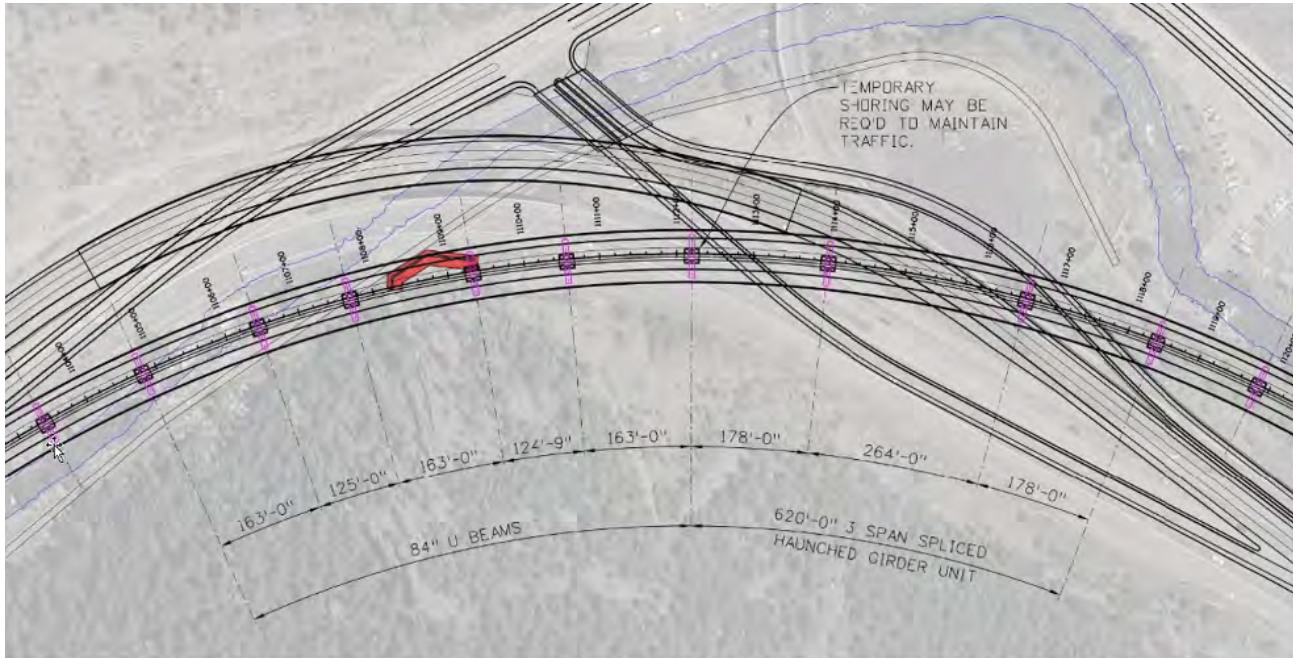


- **Bridge A at US 6:** Bridge A is the longest bridge in this project. The designs presented today will focus on the section (pictured above) that goes over the US 6 interchange (1300 ft section).
- There are many considerations at this intersection that will impact construction including the WB off ramp, EB on ramp, rock fall hazard area, an existing wall/buttruss, the creek, and the Greenway trail.
- **Question:** Do the design options have differing impacts on erosion/managing debris that comes down onto the Greenway?
- **Response:** Maintenance is always a consideration, but specific discussions of maintenance will be tabled for the maintenance ITF. The options presented today would not have differing impacts on maintenance considerations.

HDR then presented the two options for this section of Bridge A. These were narrowed down by the design team from ~10 options.

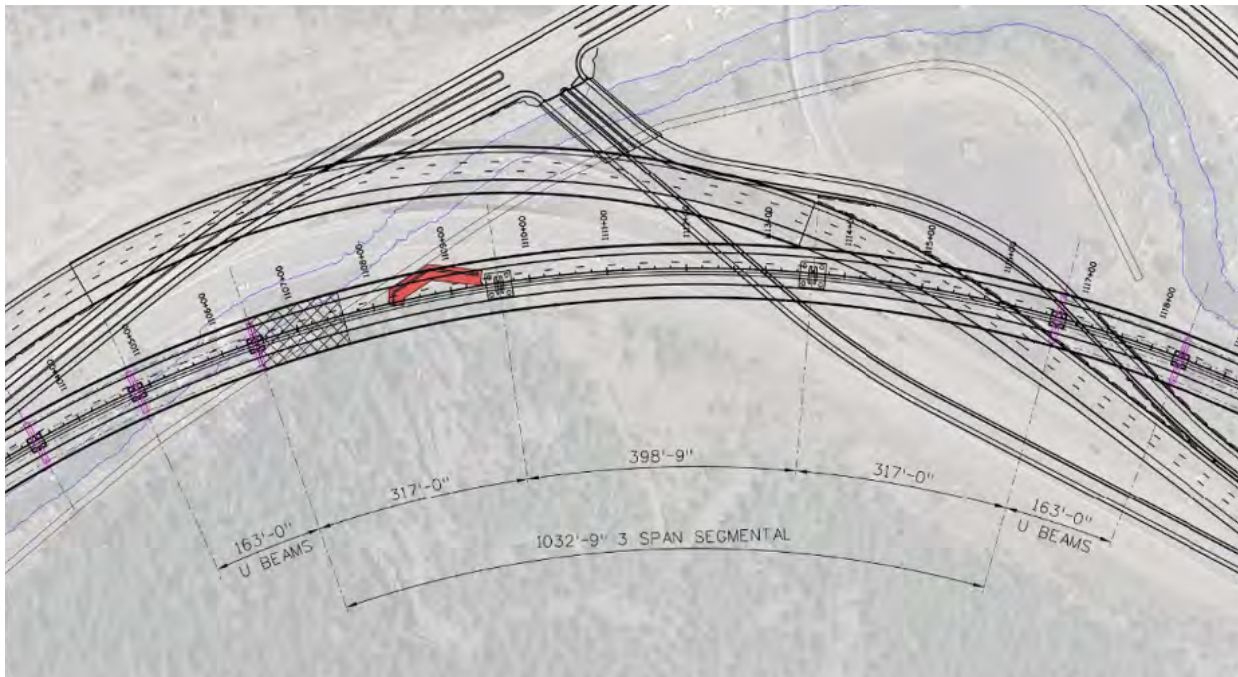
#### **Bridge A at US 6- Option 4: Spliced U Girders**

As pictured below, this option combines U Beams to the West side of the interchange with Spliced Haunched Girder Units to the East of the interchange. This option includes shorter spans between columns, spanning over areas of conflict.



**Bridge A at US 6- Option 5B: Segmental (CIP)**

This option is the same length with the same start and end locations, but incorporates longer spans. This means fewer structures on the ground. This requires much different constructibility and has a deeper structure above the columns.





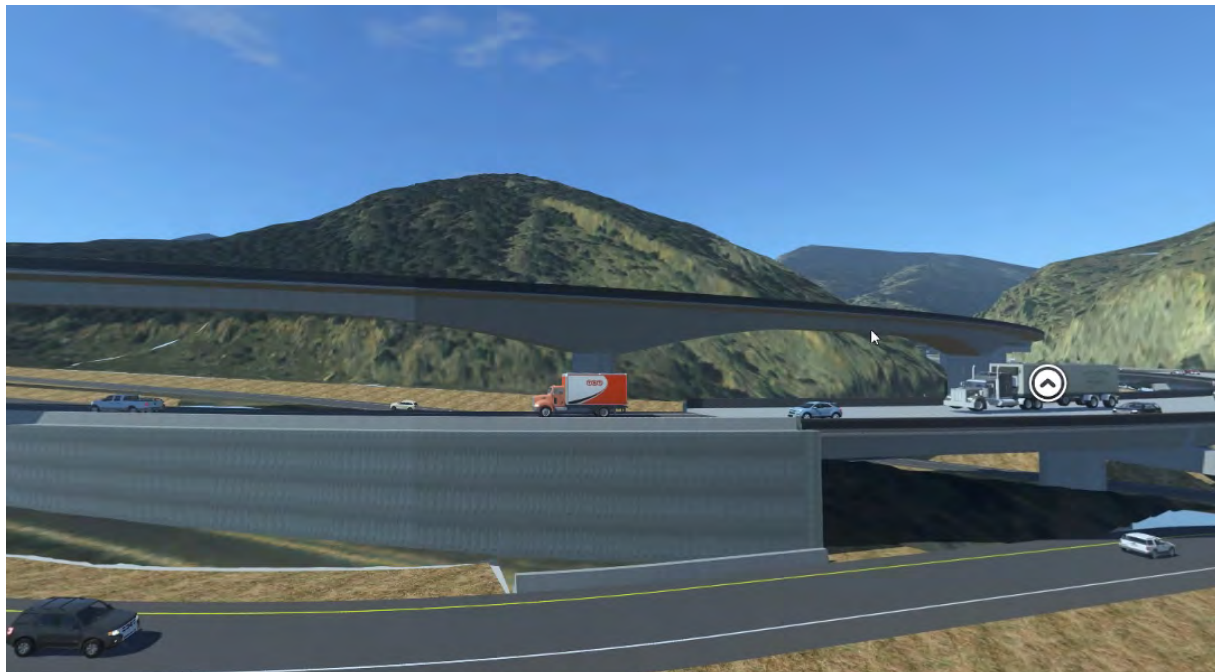


## Lumen Model Renderings:

- Option 4



- Option 5B



**Bridge A Evaluation Criteria:** through the design process, the Project Team developed a comparison of these two options based on key criteria listed below.



Criteria	Option 4: Variable Depth Spliced U Girders – Pretensioned U Girders adjacent	Option 5B: Segmental
Roadway safety & MOT	<ul style="list-style-type: none"> <li>Complex temporary supports adjacent to and over I-70</li> <li>Requires 30-50 night-time closures/detours</li> </ul>	<ul style="list-style-type: none"> <li>More construction over traffic within formwork</li> <li>Need CDOT traffic input regarding any restrictions</li> <li>More construction deliveries</li> </ul>
Cost	~\$25.4M	~\$31.7M
Schedule	~ 12 months	~ 13 months
Constructability	<ul style="list-style-type: none"> <li>More night construction/closures</li> <li>Girder/span layout do not allow for flexibility as design and construction challenges develop</li> </ul>	<ul style="list-style-type: none"> <li>Less night closures/closures</li> <li>Requires ~2x manhours on site</li> </ul>
Construction Quality	<ul style="list-style-type: none"> <li>Precast elements can improve quality</li> <li>More familiar structure type</li> </ul>	<ul style="list-style-type: none"> <li>Concrete strength requirements are more stringent</li> <li>More specialized structure type</li> </ul>
Engineering Criteria	<ul style="list-style-type: none"> <li>More girders requiring precamber</li> </ul>	<ul style="list-style-type: none"> <li>Less girders requiring precamber</li> </ul>
Geological hazard proximity	<ul style="list-style-type: none"> <li>More piers and foundation construction within geological hazard area</li> </ul>	<ul style="list-style-type: none"> <li>Less piers and construction within geological hazard area</li> <li>Falsework at west end near rock slope</li> </ul>
Resiliency of Infrastructure	Less resilient <ul style="list-style-type: none"> <li>5-6 expansion joints</li> <li>Non-standard pier foundation at existing buttress location</li> </ul>	More resilient <ul style="list-style-type: none"> <li>4 expansion joints</li> <li>Post-tensioned deck and superstructure</li> </ul>

- **TT Question:** as the TT, would you like us to provide input on the aesthetic impacts of the alternatives?
- **Response:** Yes, as well as considering risks. We will look at renderings of both options in a moment to get a better sense of aesthetics.
- **TT Question:** What is the red shape in both maps?
- **Response:** Old buttress wall that we want to maintain in place.
- **TT Question:** Will there be any rock blasting in this area?
- **Response:** No.
- **TT Comment:** Option 5B, although less consistent with other bridges, is more adapted to landscape. There is not a major visual difference at this location because traffic is moving quickly and this bridge is blocked from view from the Greenway.
- **TT Question:** Is there a significant difference in constructability?
- **Response:** There is not a significant difference in schedule (1 month longer for 5B) but construction is quite different.

HDR provided additional details on the construction of each option. Option 4 would require temporary shoring towers to support the girders. Option 5B will not require towers as everything is built out from the pier. Option 5B will require more truck traffic to deliver concrete. Segmental bridges like Option 5B are not typical in Colorado because there are not many large bridges with access challenges.

- **TT Question:** How long will temp towers be up?



- **Response:** 4-5 months.
- **TT Question:** Will the shoring towers be in the rockfall area?
- **Response:** No, they will be on the East section of the curve, the rock fall area is to the West of the curve.
- **Question:** Can you describe nighttime closures and why that applies to Option 4 but not Option 5?
- **Response:** The temporary supports require bringing in concrete pieces with cranes, which require road closures. Those closures would be at night and a detour would send traffic to US 6. The team believes that Option 5B, segmental bridge construction, will not require road closures. It will require more deliveries which may increase congestion.

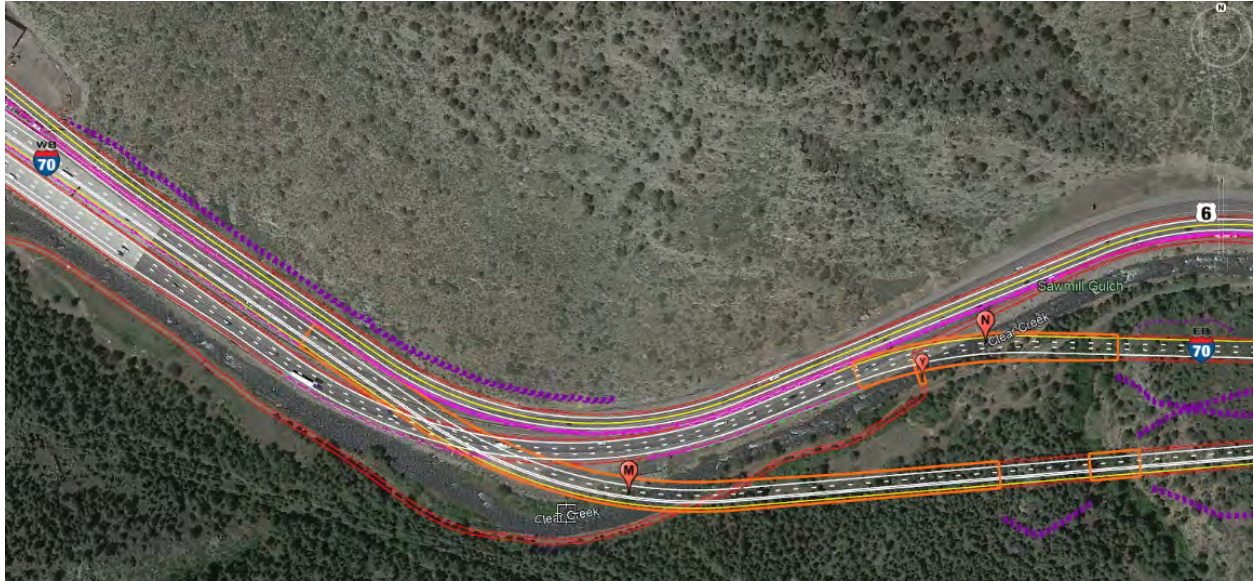
**Notably:** Option 5B does incur a significant price difference (\$10 million) due to being a more specialized structure. This option requires 2x construction team hours on site. Option 4 has less construction flexibility but is a more familiar bridge type and precast elements can improve quality.

- **TT Question:** Are there any maintenance differences/challenges over time?
- **Response:** Option 5B is more resilient over time- it incorporates fewer expansion devices, which can be prone to leaking, and need to be replaced every 10-20 years.
- **TT Comment:** As the TT, we do not have the technical expertise to make this decision. As far as we have discussed, neither option has an outsized effect on the aesthetic impact to the area, so this decision belongs to the professionals.

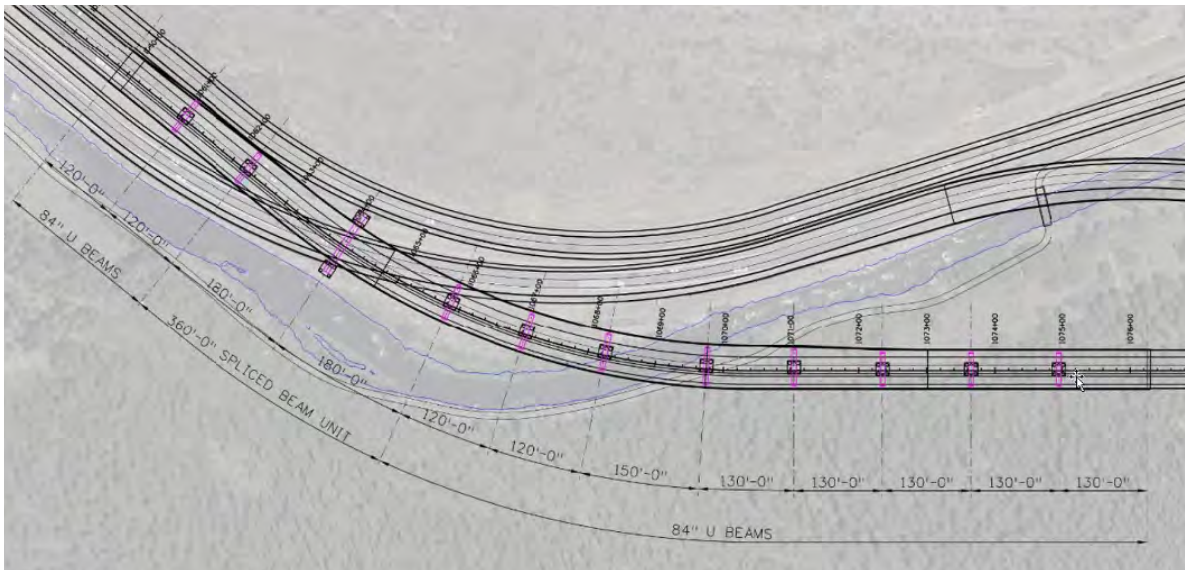
**TT Agreement:** Through consideration of the materials presented today, Option 4 or 5B do not have significant aesthetic impacts to the area. This decision should be made by the technical professionals on the Project Team.

### **Central Section Bridge M (West of Saddle Cut)**

Similar to the options presented for Bridge A at US 6, the Project Team presented two options of many considered for Bridge M (area pictured below).

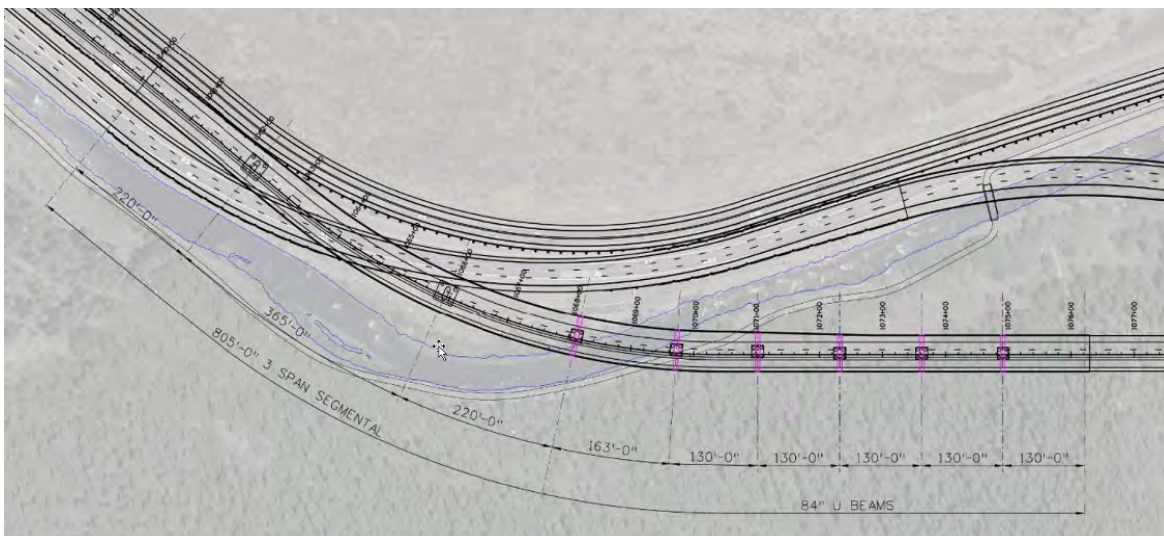


- **Bridge M- Option 1: Spliced U Girders**
  - Shorter spans, two columns on either side of bridge as EB drivers pass under bridge.



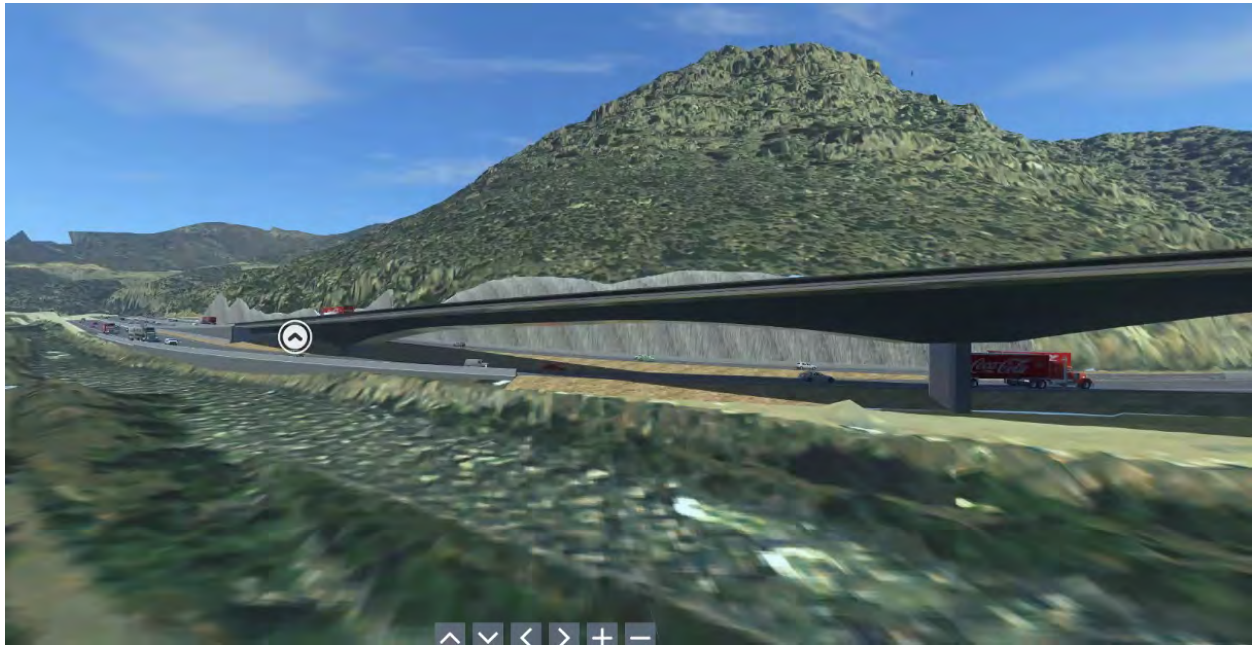


- **Bridge M- Option 2: Segmental (CIP)**
  - Longer spans





**Comparison of Option 1: Spliced U Girders (Above) and Bottom: Segmental Bridge (Below)**



- **TT Comment:** At this location, the visual difference is somewhat more pronounced. The Segmental bridge blocks more visually due to deeper concrete over the piers. The Spliced U Girder bridge appears more open.

**Bridge M: Evaluation Criteria:** through the design process, the Project Team developed a comparison of these two options based on key criteria listed below.

Criteria	Spliced U Girders on Straddle Bent	Segmental
Roadway safety & MOT	<ul style="list-style-type: none"> <li>• Complex temporary supports adjacent to and over I-70</li> <li>• Requires lane closures/detours for 27 nights</li> </ul>	<ul style="list-style-type: none"> <li>• More construction over traffic within formwork</li> <li>• Need CDOT traffic input regarding any restrictions</li> <li>• More construction deliveries</li> </ul>
Cost	~\$12.3M	~\$17.2M
Schedule (critical path bridge)	~ 7-month schedule	~ 10-month schedule
Constructability	<ul style="list-style-type: none"> <li>• More night construction</li> </ul>	<ul style="list-style-type: none"> <li>• Requires less night closures</li> <li>• Requires ~2x manhours on site</li> </ul>
Construction Quality	<ul style="list-style-type: none"> <li>• Precast elements can improve quality</li> <li>• More familiar structure type</li> </ul>	<ul style="list-style-type: none"> <li>• Concrete strength requirements are more stringent</li> <li>• More specialized structure type</li> </ul>
Resiliency of Infrastructure	Less resilient <ul style="list-style-type: none"> <li>• 10 expansion joints</li> <li>• Spliced girders supported on straddle bent</li> </ul>	More resilient <ul style="list-style-type: none"> <li>• 5 expansion joints</li> <li>• Post-tensioned deck and superstructure</li> </ul>
Aesthetics	<ul style="list-style-type: none"> <li>• Consistent tub-girder shape (5-96" next to 4-84" U girders)</li> <li>• Inconsistent substructure type with straddle bent</li> <li>• May require variance from aesthetic guidelines (straddle bent)</li> </ul>	<ul style="list-style-type: none"> <li>• Girder shape differs from adjacent spans (segmental next to 4-84" U girders)</li> <li>• Consistent single-column substructure type</li> <li>• Meets corridor aesthetic guidelines</li> </ul>



Similar to the options presented for Bridge A, the options for Bridge M have some key differences including: cost, construction team hours on site, night closures, and resiliency.

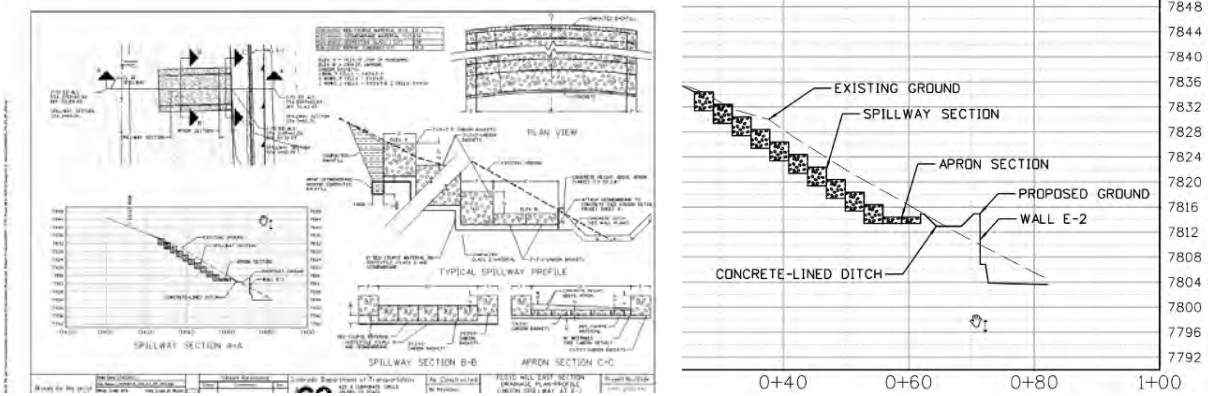
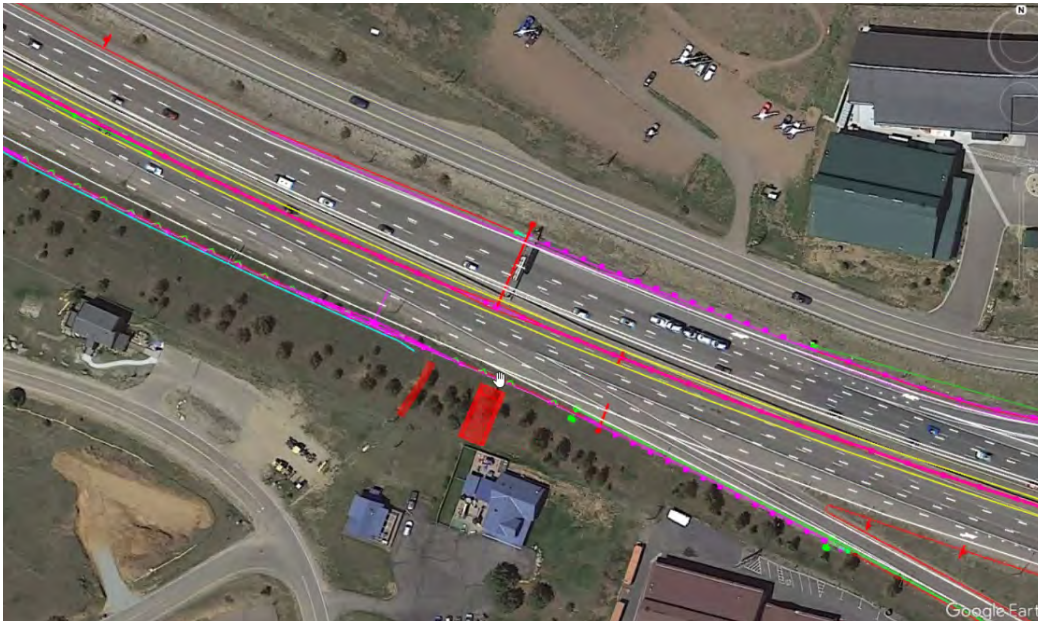
**TT Agreement:** There is some visual preference for the Spliced U Girder bridge option, however, the TT will leave the final decision to the technical experts.

#### **4. Introduce: East Section Drainage Structures and East Section Overview**

With the approaching FOR (90%) review, the Project Team wanted to share some clarified **East section details:**

- **Drainage Structures:** The Project Team outlined the need for drainage structures in the East Section in a previous TT meeting. Since then, the team has recognized the need for additional infrastructure. The drainage in certain locations (on site pictured below near the Homestead Roundabout) is directed towards walls along the roadway. In order to protect the walls from water damage, these areas will require Gabion Spillways to mitigate erosion flows. The stepwise design of a Gabion Spillway is pictured below.

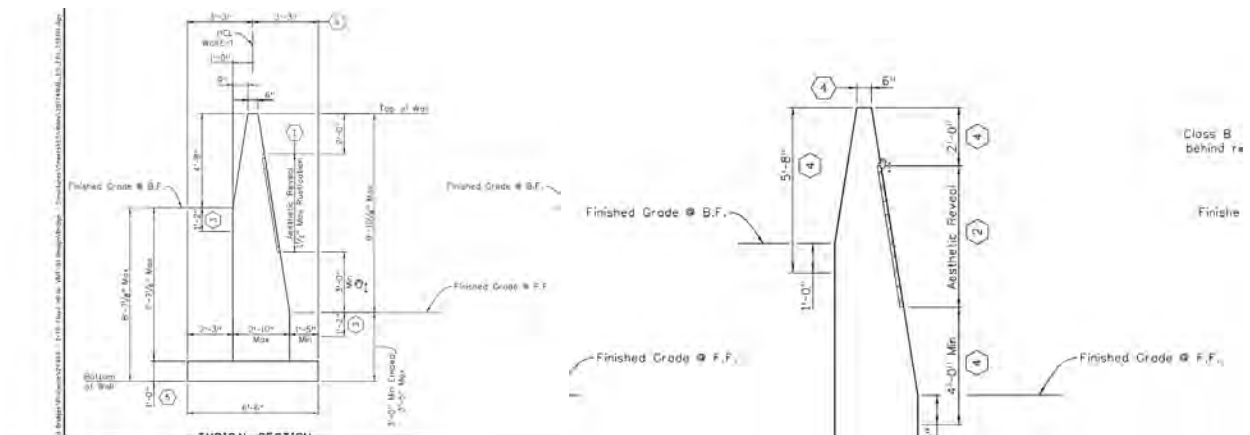




- Wall E1:** This median wall separates EB and WB mainlines in the East section. There is not enough space to include a guardrail + 3 ft of space next to the wall, so the design team has adjusted this wall to incorporate an additional safety shape alongside the wall. EB lanes will see a regular wall while WB will see a taller wall (8ft). CO Random Reveal will create a stark line on the top and bottom of the safety barrier. Image of the original wall is pictured below, and designs for the adapted wall are pictured below.



**I-70 Floyd Hill to Veterans Memorial Tunnel**  
Retaining Wall E-1 - Existing example of treatment to be used.



- **East Section Overview Package:** A Google Drive link has been sent out to all TT members. Please look through those materials and provide your comments in the comment matrix. There are no surprises from what we have covered in this group. The matrix provides a clear and organized place to record thoughts, comments, or questions that the Project Team can address by the 90% design phase.

**ACTION:** TT Members to review East Section Overview package and provide comments in the comment matrix.



## 5. Next Steps

The consultant team thanked all participants for joining and indicated a forthcoming agenda for the next meeting on 2/10.

### Summary of Action Items, Agreements, & Decisions:

**TT Decision:** Confirm support for the Project Team to proceed with the improved alignment that does not require creek relocation.

**TT Agreement:** Through consideration of the materials presented today for Bridge A, Option 4 or 5B do not have significant aesthetic impacts to the area. This decision should be made by the technical professionals on the Project Team.

**TT Agreement:** Through consideration of the materials presented today for Bridge M, there is some visual preference for the Spliced U Girder bridge option, however, the TT will leave the final decision to the technical experts.

**ACTION:** TT Members to review East Section Overview package and provide comments in the comment matrix.

## 6. Attendees

Cindy Neely, Amy Saxton (Clear Creek County); Jessica North (Clear Creek County School District); Mike Raber (Clear Creek Bicycle User Group); Sam Hoover (Central City); Margaret Bowes (I-70 Coalition); Brian Dabling (FHWA); John Curtis (Upper Clear Creek Watershed Association (SWEEP)); Gary Frey (Trout Unlimited); Jonathan Cain (Idaho Springs); Lisa Wolff, Bill Coffin (Floyd Hill POA); Paul Winkle (CPW); James Proctor (Bridge Enterprise/AECOM); Tracy Sakaguchi (CMCA); Steve Cook (DRCOG); Kurt Kionka, Jeff Hampton, Tyler Brady, Margo Mcinnis, Ryan Sullivan (CDOT, CTIO); Anthony Pisano, Matt Aguirre, Alan Carter (Atkins); Matt Hogan, Koichiro Shimomura, Tim Maloney, Brandon Simano (Kraemer); Mandy Whorton (PEAK Facilitation); Tammy Hefron (HDR); Kevin Shanks (THK Associates); Jonathan Bartsch, Daniel Estes, Cara Potter (CDR Associates)