

# **Twin Tunnels Design/Construction Technical Team Meeting #6**

**July 26, 2012  
9:00AM – 12:00PM  
1600 Colorado Blvd  
Elks Lodge  
Idaho Springs**



# Agenda

1. Introductions
2. Other Corridor Project Updates
  - EA hearing summary
  - Master I-70 Project Google calendar
  - CDOT Rockfall program
3. Follow-up
  - Geotech traffic closures
  - Median Shift Considerations
  - Trailhead updates
4. Proposed solutions
  - Signing plan
  - Tunnel Lining
  - Bridge Aesthetics
5. Next Steps

Meeting with Idaho Springs and CCC re 314 wall  
Any new items for enhancement list



**Step 1**  
Define Desired Outcomes  
and Actions

**Step 2**  
Endorse the Process

**Step 3**  
Establish Criteria

**Step 4**  
Develop Alternatives and Options

**Step 5**  
Evaluate, Select, and Refine  
Alternatives and Options

**Step 6**  
Finalize Documentation and  
Evaluation Process



# Other Corridor Project Updates

- Frontage Road
- Twin Tunnels EA
- Westbound Tunnel Repairs
- CDOT Rockfall Program
- Master I-70 Schedule
- AGS Study



# Master I-70 Project Google calendar

Google Calendar

+You Search Images Maps Play YouTube News Gmail Documents Calendar More -

Google

Search

Jason Longsdorf@gmail.com

Your event was updated. [Undo](#)

Calendar

Today Jul 22 - 28, 2012

Day Week Month 4 Days Agenda More -

GMT-07

Sun 7/22 Mon 7/23 Tue 7/24 Wed 7/25 Thu 7/26 Fri 7/27 Sat 7/28

7am

8am

9am

10am

11am

12pm

1pm

2pm

3pm

4pm

5pm

6pm

7pm

8pm

9pm

9 - 12p  
Twin Tunnels Environmental  
Technical Team

9 - 12p  
Twin Tunnels Design  
Construction Technical Team

5:30p - 7:30p  
Twin Tunnels EA Public  
Meeting

CREATE

July 2012

S M T W T F S

24 25 26 27 28 29 30

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30 31 1 2 3 4

My calendars

Other calendars

# Core Values

- **Safety**
- **Mobility**
- **Gateway**
- **Wildlife**
- **The Creek**
- **Destination**
- **History**
- **Constructability**
- **Inclusivity**
- **Schedule**





**TWIN TUNNELS WIDENING**  
**ISSUES FOR TECHNICAL TEAM PRELIMINARY SCHEDULE**

ISSUES	2012														2013												
	MAY		JUNE		JULY		AUG		SEPT		OCT		NOV		DEC		JAN		FEB		MAR		APRIL		MAY		
	2ND WEEK	4TH WEEK																									
NOISE/ VIBRATION	—	*																									
TUNNEL LINING	—					*	●																				
RETAINING WALL RAILING	—	*																									
IMPACTS TO TRAFFIC	—	*	●		●		●		●																		
I-70 RETAINING WALL AESTHETICS	—	*	●	●	●																						
BRIDGE AESTHETICS	—		*		●		●																				
NEPA ANALYSIS OF CONSTRUCTION METHODS	—	*	●																								
ROCKFALL STRUCTURES	—	*	●		●																						
SIGNING			—		*	●																					
ADAPTIVE MITIGATION						*	●		●				●											●			
PUBLIC INFORMATION			—			*	●	●			●											●					
IMPACTS TO RECREATION USERS			—	*	●																	●					
INFRASTRUCTURE IN MEDIAN			—			*	●	●																			
COATINGS (COLOR)			—				*	●																			
LIGHTING			—				*	●																			
LANDSCAPING			—				*		*		*		*											●			
TUNNEL PORTAL AESTHETICS			—				*	●	●	●																	
INCIDENT MANAGEMENT PLAN			—				*	●																			
C.R. 314 FRONTAGE ROAD RETAINING WALL FASCIA					—				*	●	●	●															
SOUTH SIDE OF W.B. BRIDGE OVER CLEAR CREEK							—																				
TRAILHEAD IMPROVEMENTS								*	●				●											●			
ENHANCEMENT OPPORTUNITIES			—					*		*	●		*											●		●	

PACKAGE 1A

PACKAGE 1B

PACKAGE 2

PACKAGE 3

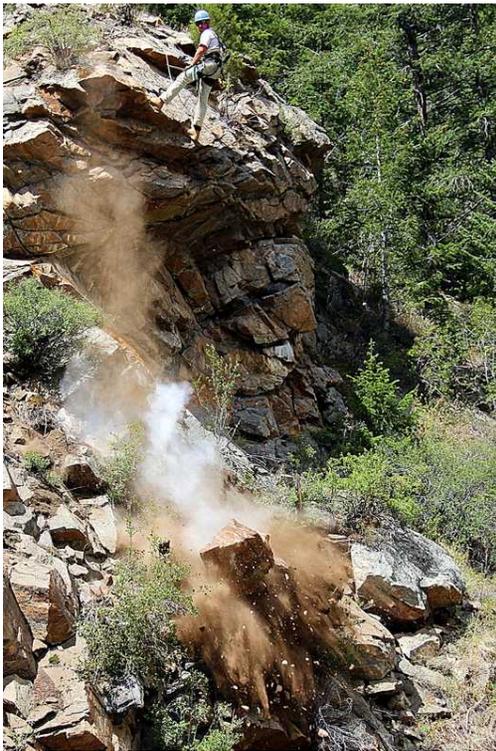
LEGEND:

Shaded Items are Complete	Presentation of Concepts
Discuss Criteria	Follow-up (As Needed)

NOTE: FINAL DESIGN AND CONSTRUCTION WILL CONTINUE THROUGH MARCH 2014. AFTER FEBRUARY 2013, TECHNICAL TEAM MEETINGS WILL OCCUR ON AN AS NEEDED BASIS, LESS THAN ONCE A MONTH

# Follow up: Impacts to traffic

- Geotechnical investigation closures July 24-27 and 30



## TWIN TUNNELS

CONSTRUCTION ALERT  
Week of July 23 – 30

Starting Tuesday, July 24 to Friday, July 27 and Monday, July 30 (if necessary) from 6:00 a.m. to 11:00 a.m., I-70 EASTBOUND AND WESTBOUND WILL BE CLOSED AT THE TWIN TUNNELS for geotechnical investigations above the tunnels.

To protect the safety of the traveling public from possible rockfalls during the investigations, traffic will be halted each day for twenty minutes at approximately:

I-70 Eastbound and Westbound Closures

6:00 a.m.

8:00 a.m.

10:00 a.m.

Eastbound traffic will be stopped just west of the West Idaho Springs exit and westbound traffic will be stopped west of the Hyland Hills exit at the top of Floyd Hill. Local traffic will also be stopped prior to the tunnel portals. Please plan accordingly!



THANK YOU FOR YOUR PATIENCE!

FOR MORE INFORMATION:

[www.coloradodot.info/projects/i70twin tunnels](http://www.coloradodot.info/projects/i70twin tunnels)

Bob Wilson, CDOT Public Relations Manager, 303-757-9431  
Benjamin Acimovic, CDOT Project Manager, 303-612-5814

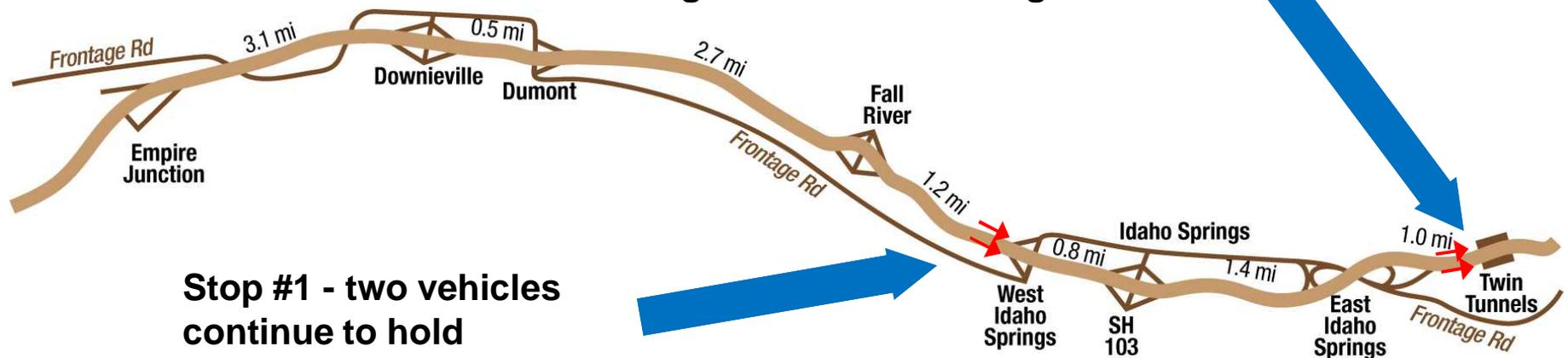


The Twin Tunnels Design and Construction Project is adding one eastbound lane on I-70 from the East Idaho Springs interchange to US 8, including expanding the eastbound tunnel to accommodate three lanes. This is the first project under construction as part of the I-70 Mountain Corridor.



# Eastbound Traffic Control

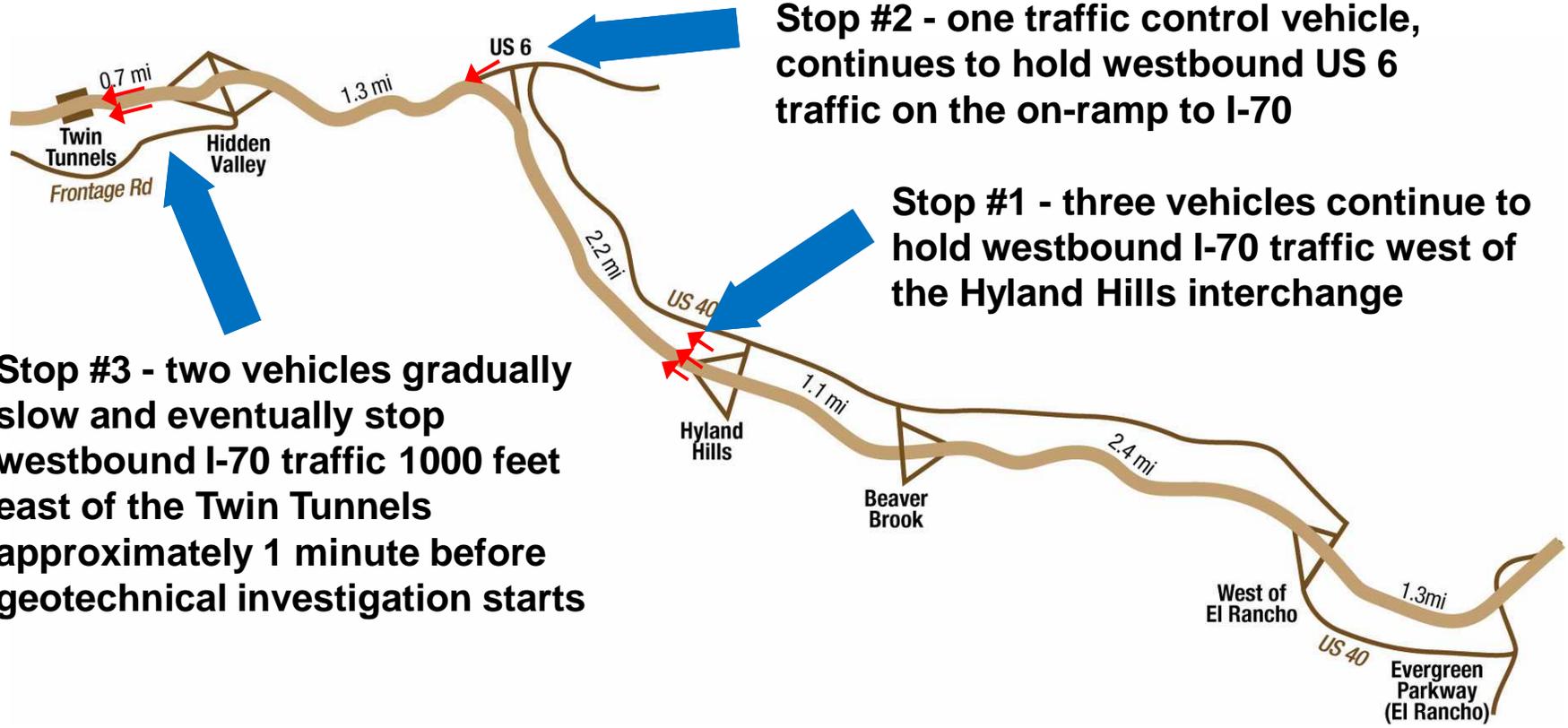
**Stop #2 - two vehicles gradually slow and eventually stop eastbound I-70 traffic 1000 feet west of the Twin Tunnels approximately 1 minute before geotechnical investigation starts**



**Stop #1 - two vehicles continue to hold eastbound I-70 traffic west of the West Idaho Springs interchange**



# Westbound Traffic Control

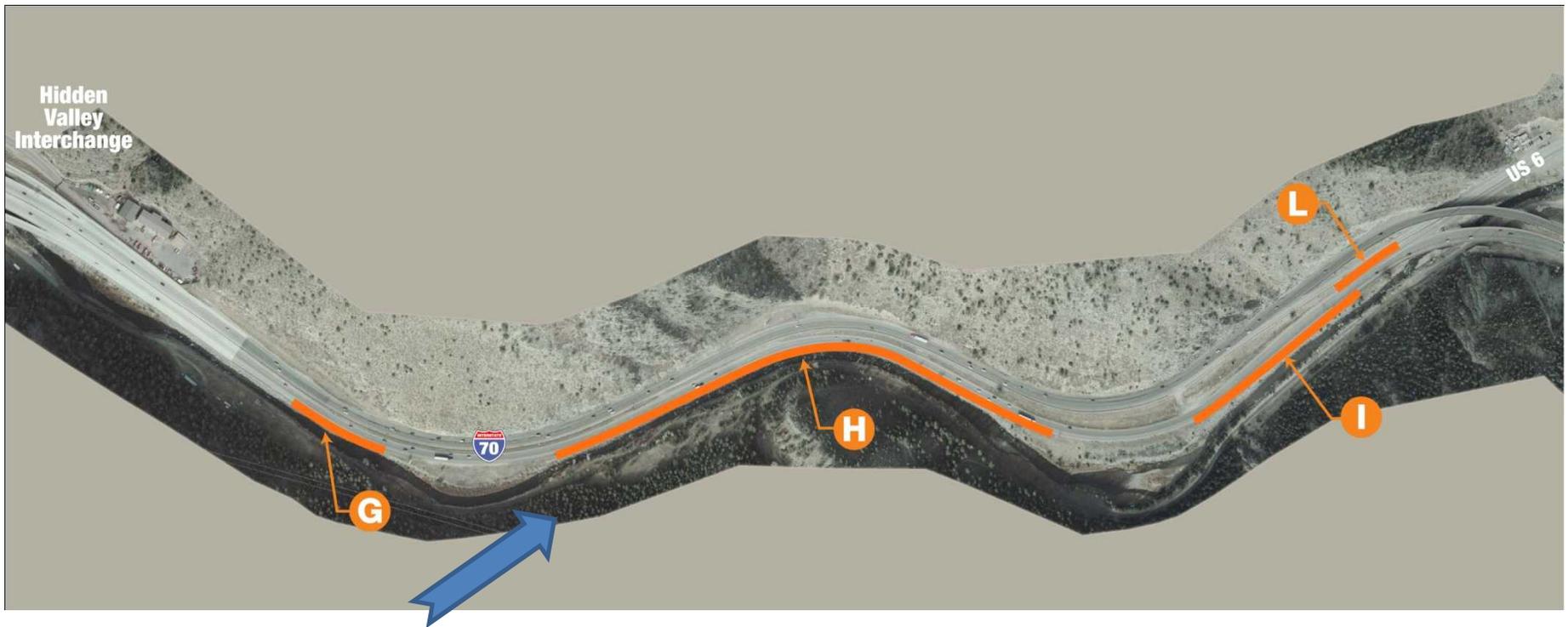


# Follow Up: Median Barrier Aesthetics

- Tunnel to Hidden Valley: Not changing the alignment
- Options to review Hidden Valley to US 6:
  - » Current design staying out of median
  - » Proposal for some median infrastructure and some creek wall
  - » Proposal to make consistent 4 ft inside shoulders and eliminate wall H and I



# Twin Tunnels - CM/GC Design East Wall Locations

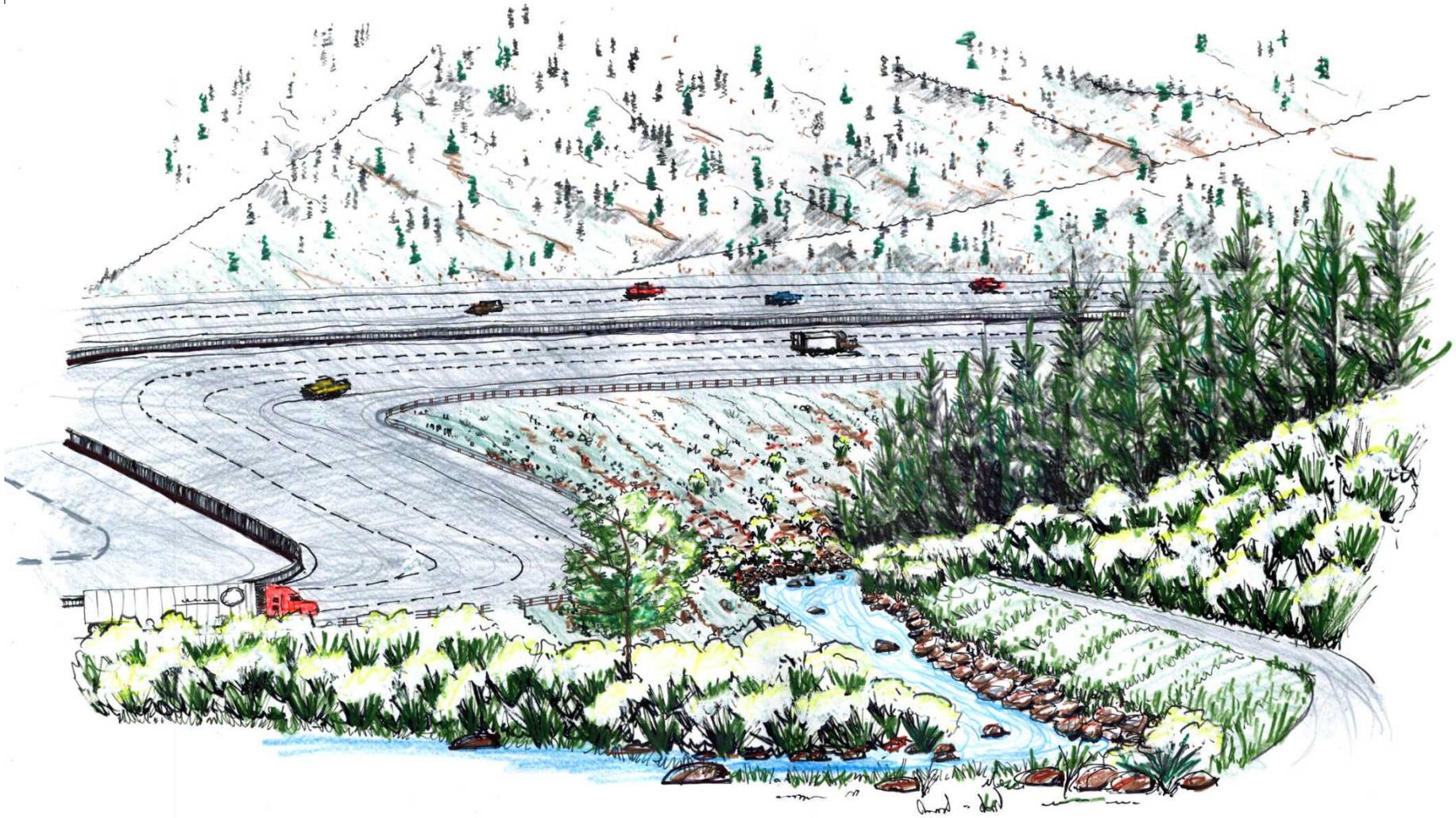




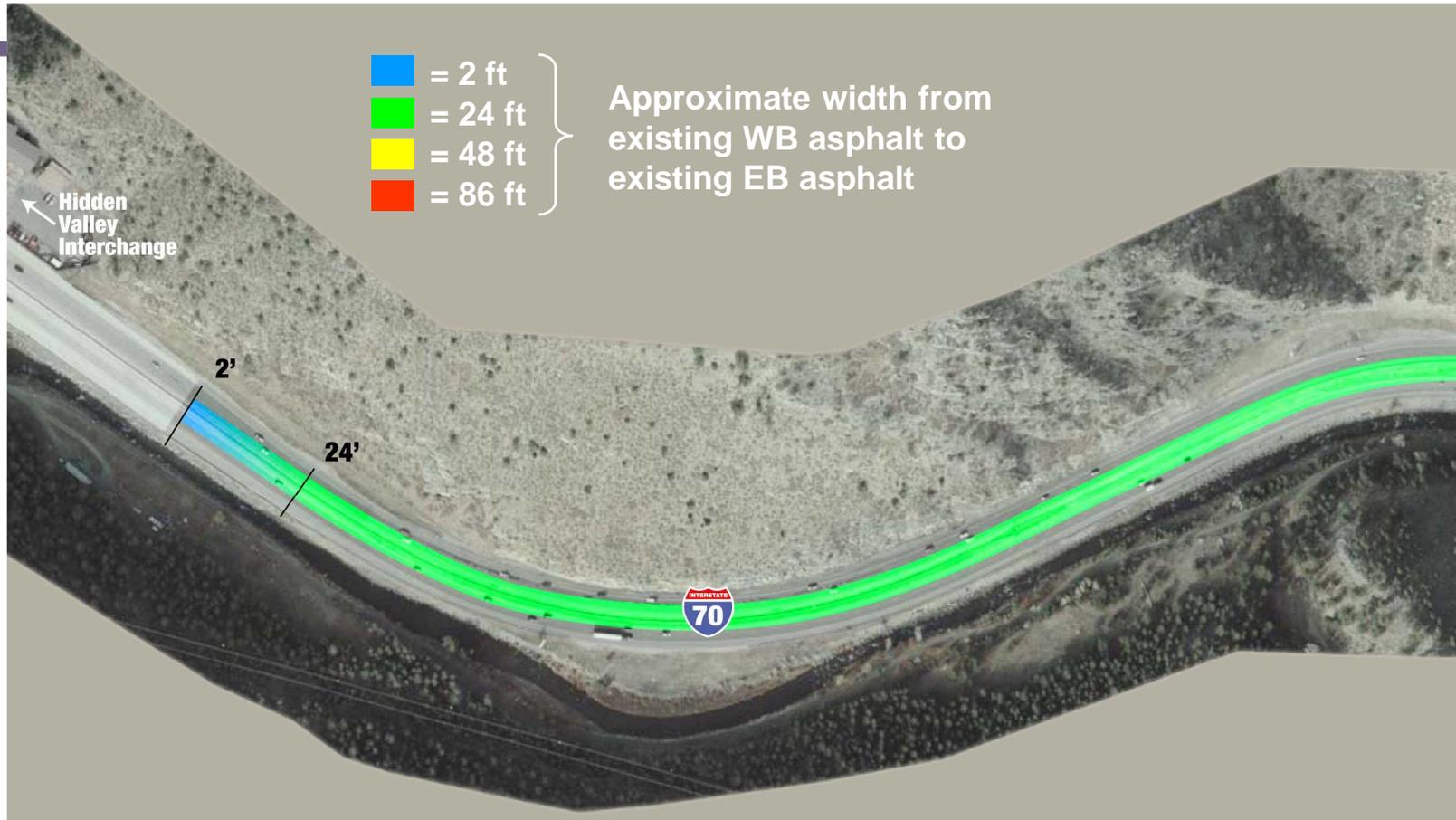
# Current Wall H Perspective



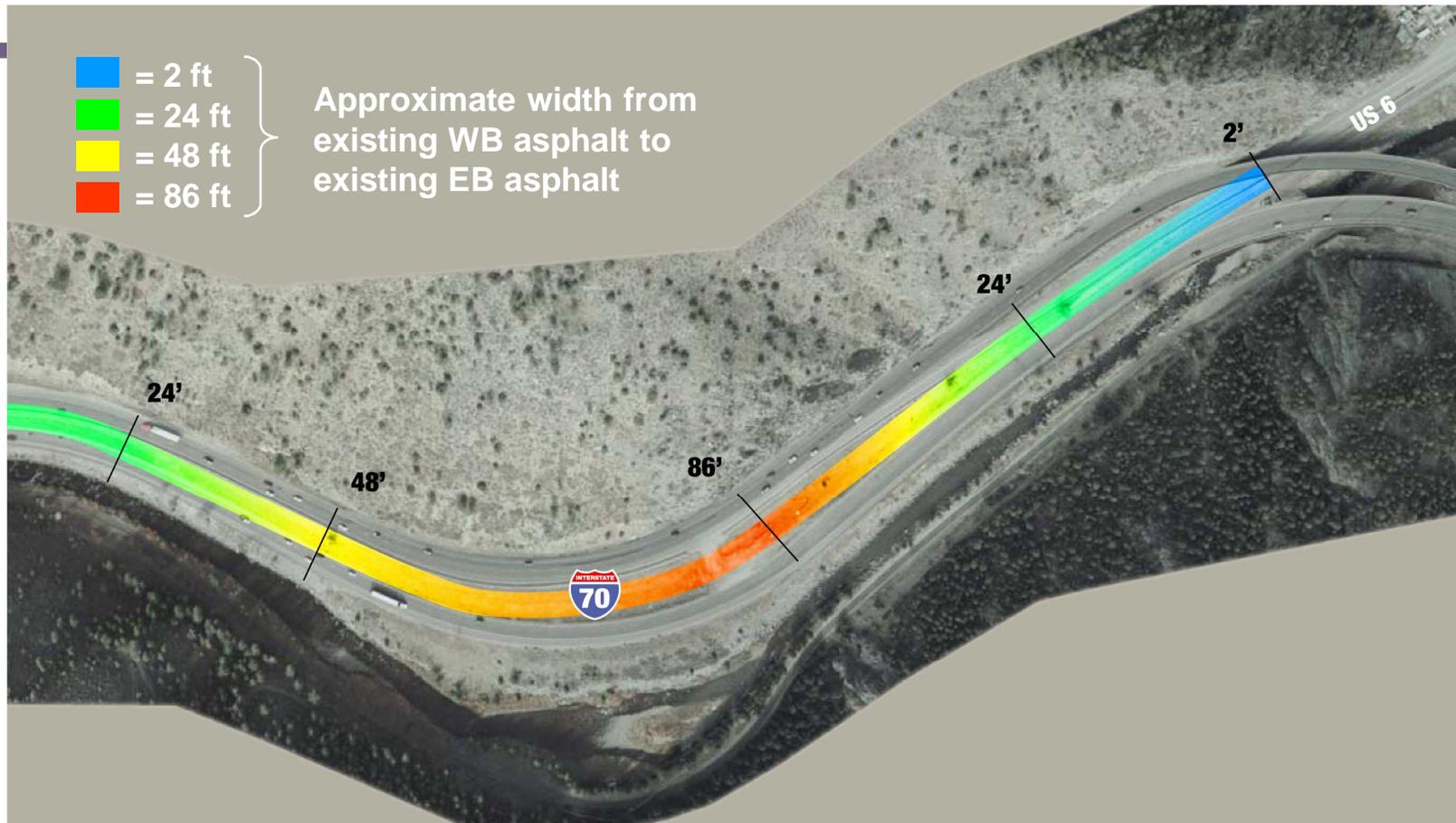
# Median Shift Wall H Perspective



# Existing Median Width



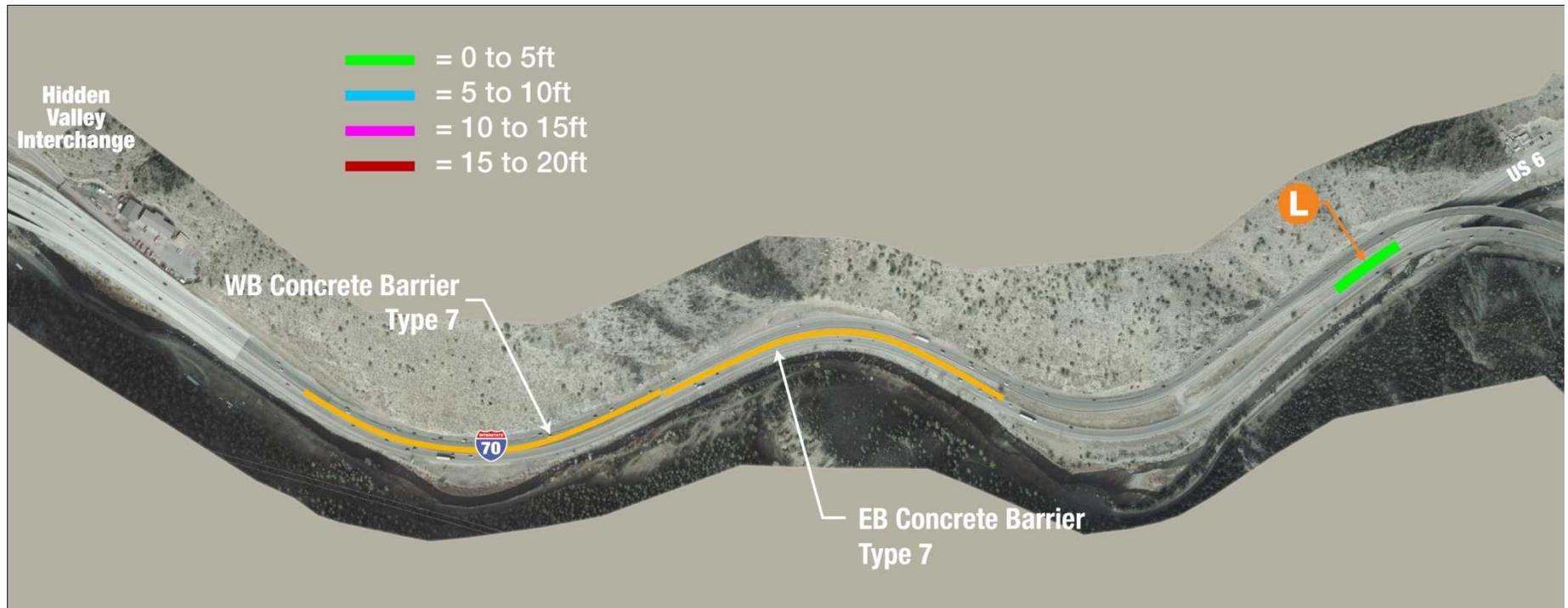
# Existing Median Width



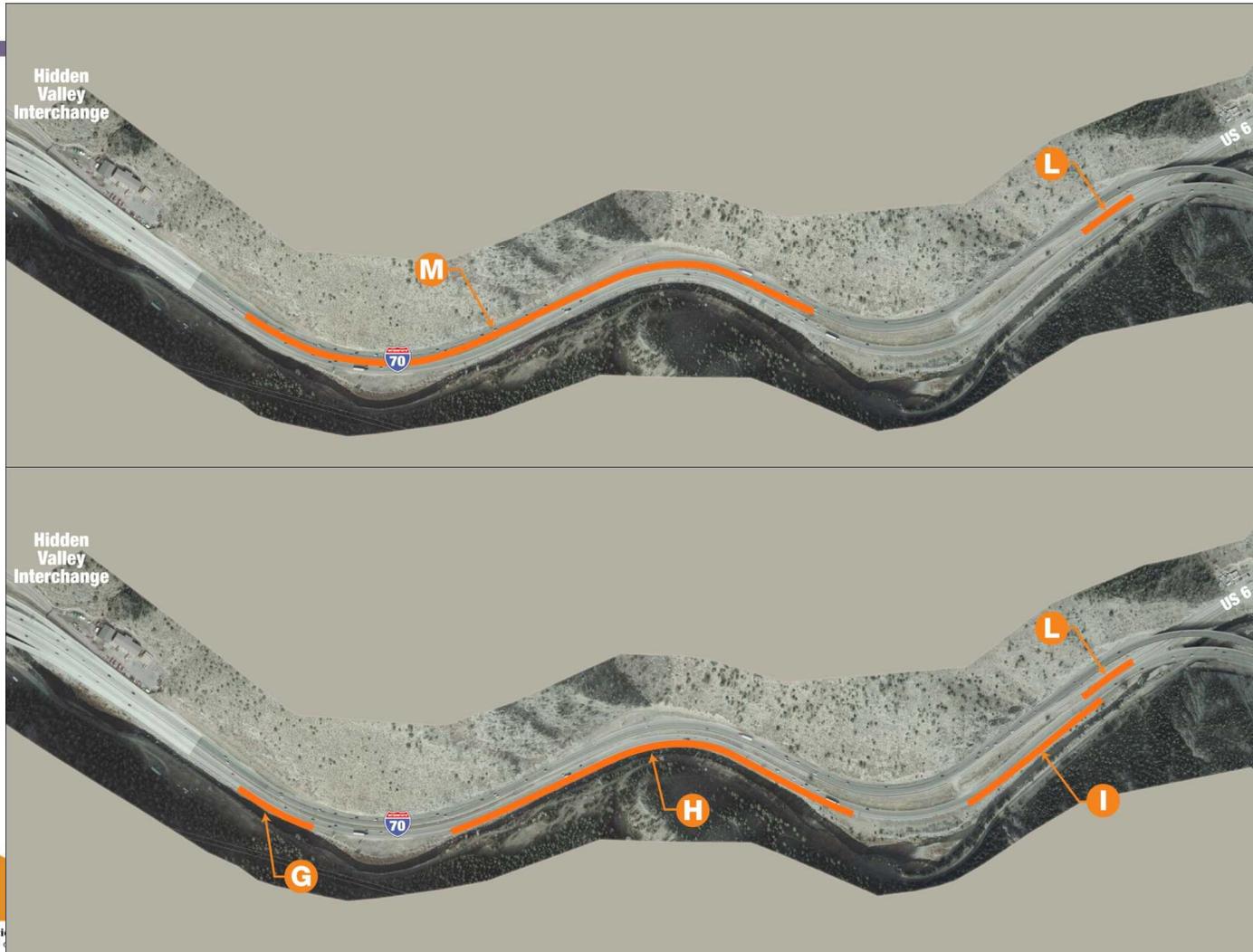
# Twin Tunnels - CM/GC Design Exposed Wall Heights



# Twin Tunnels – Median Shift Analysis Exposed East Wall Heights

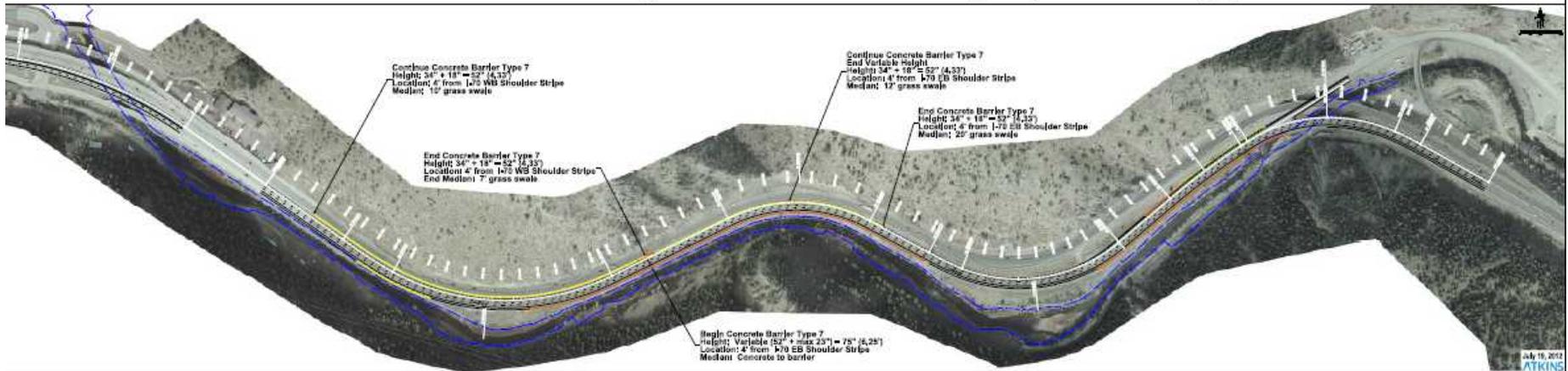


# Twin Tunnels – Median Shift Analysis East Wall Locations

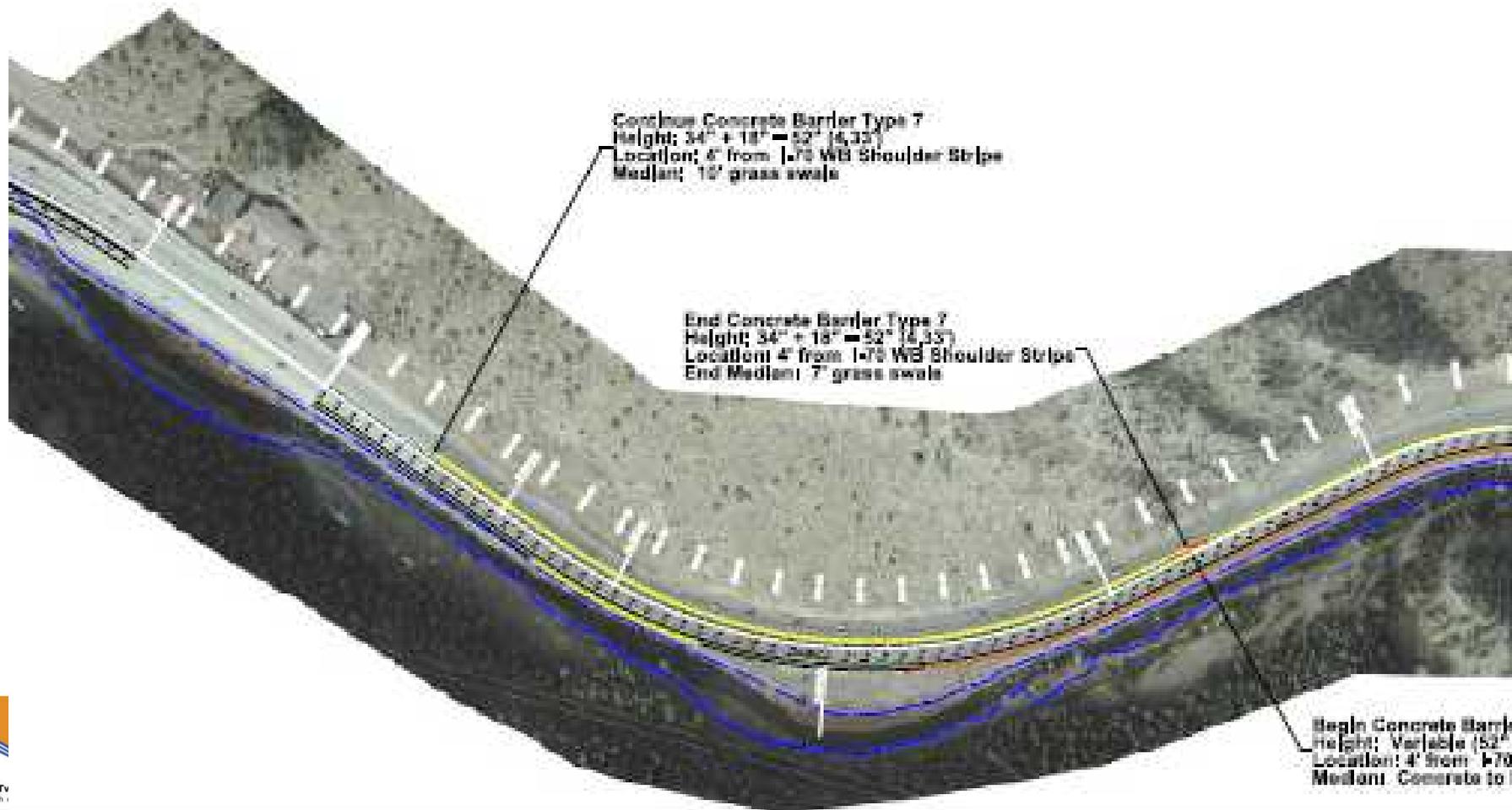


# Median Shift Refinement

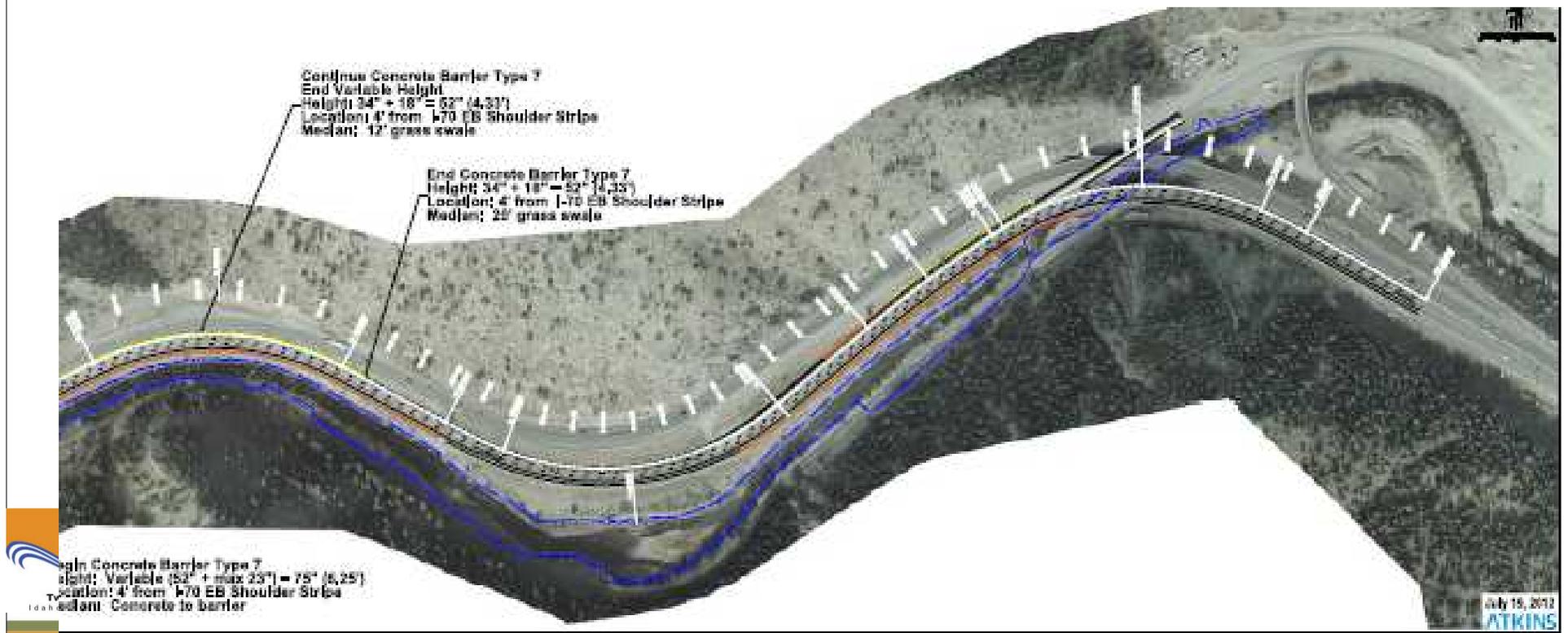
## I-70 Twin Tunnels Design - Median Shift Analysis (Post EA Design)



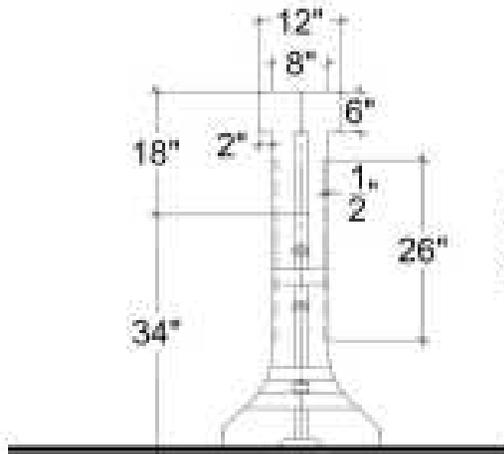
# Median Shift Refinement



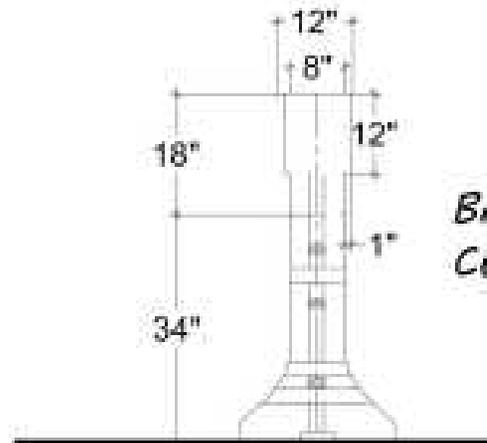
# Median Shift Refinement



# Barrier Wall Concepts

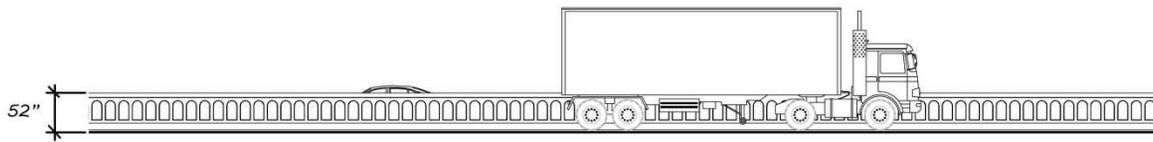


*BARRIER WALL SECTION -  
CONCEPTS ONE AND TWO*

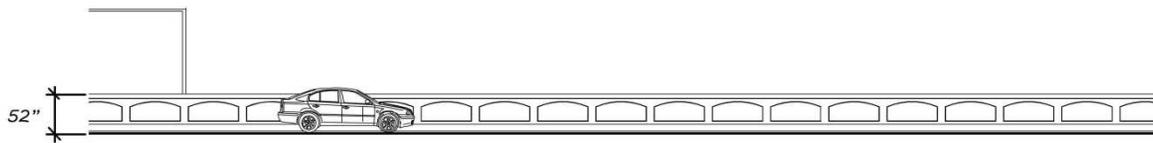


*BARRIER WALL SECTION -  
CONCEPT THREE*

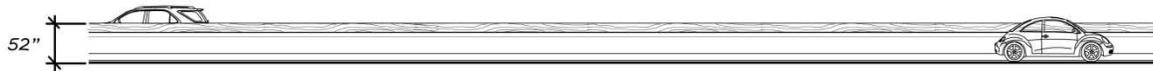
# Barrier Wall Concepts



*BLOW UP - CONCEPT ONE*



*BLOW UP - CONCEPT TWO*

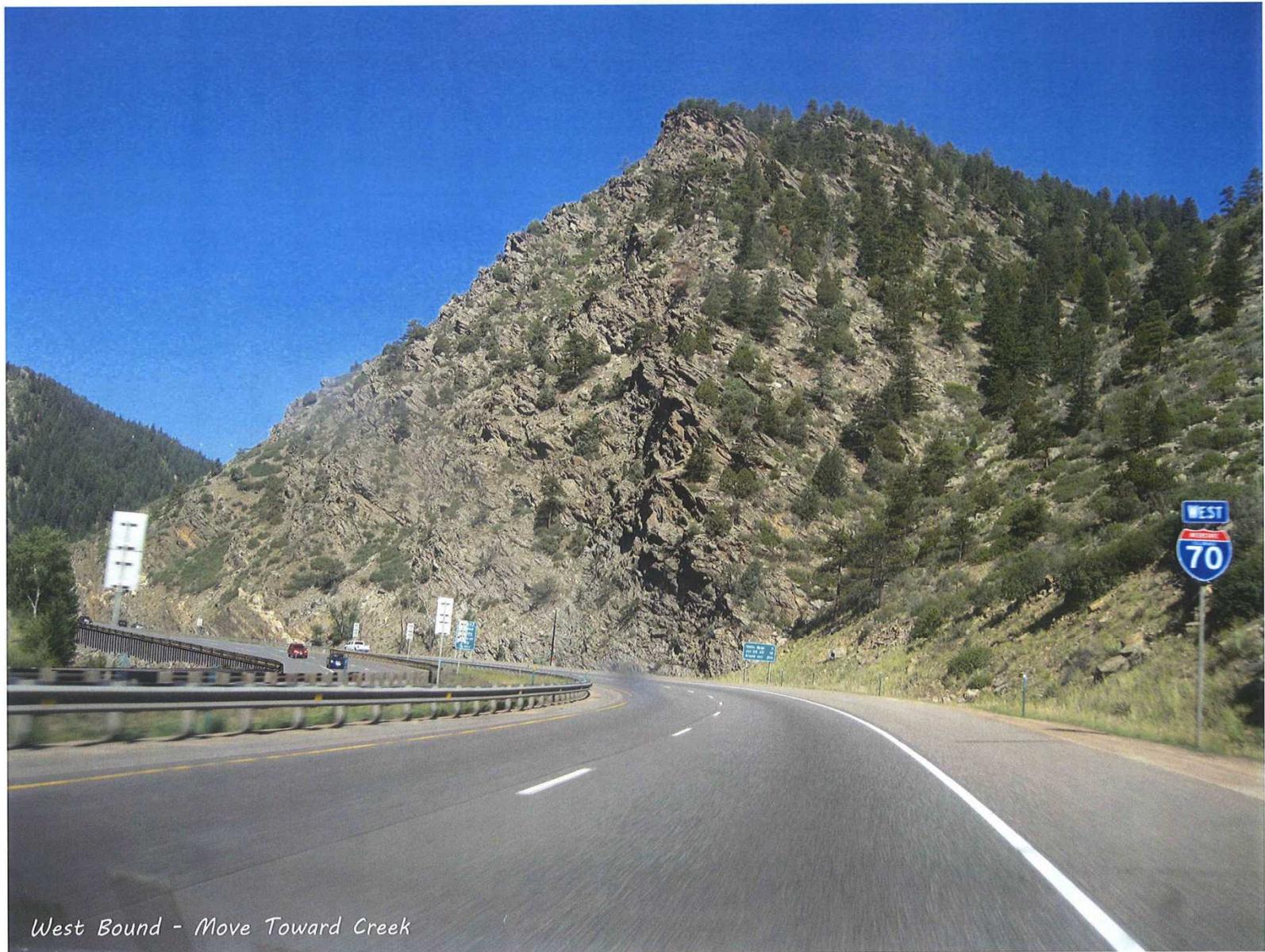


*BLOW UP - CONCEPT THREE*

# Westbound – Shift into Median



# Westbound – shift toward Creek



*West Bound - Move Toward Creek*

# Eastbound – Shift into median



*East Bound - Move Toward Median*

# Eastbound – Shift toward Creek



*East Bound - Move Toward Creek*

# Alignment Option Comparison

## Key differentiators

- EA alignment reduces median encroachment, improves sight lines and is more consistent with the letter of the aesthetic guidance
- Median shift alignment is easier to construct, reduces overall visual impact, prioritizes creek protection and enhancement opportunities



# Follow up: Trailhead updates

- CDOT and Clear Creek County held partnering session on July 18
- Next step is to better define the project scope and partners



# Proposed solutions: Signing plan

## Work Completed to Date

- Sign Inventory
  - Overhead and Ground Signs
- Managed Lane Sign Design
  - Sign Layout
  - Locations
  - Renderings
- Opportunities to consolidate existing and new signs



# Sign Consolidation Options

## Consolidation Opportunities

- Eliminating redundant signs
- Relocating proximate signs to new cantilever structures
- Consolidating US 6 lane assignments on a new sign bridge
- Attaching new managed lanes signs to bridges

## Potential Enhancements

- Consolidate managed lane and other signs on sign bridges



# Sign Consolidation Suggestion Locations



# Sign Consolidation Suggestions

Location 1



1. Two of three messages used in other locations

Location 2



1. This sign will need to be relocated due to the development of the new chain-up station. Given the number of signs in this area and the long warning distance (11 miles), resetting outside of the project area is recommended.

# Sign Consolidation Suggestions

Location 3

Remove 3' x 3' lane use control signs between station 346 and 350 near US 6 interchange

Location 4



Station  
346+90 ±

&

Station  
350+20 ±

1. Replace  
two existing  
cantilevers  
with one sign  
bridge



1. Modifications to the I-70 East Denver sign to address the lane assignment change will require a new sign bridge (integral with the proposed retaining wall); the opportunity exists to add the Exit 244 sign to the new sign bridge

# Sign Consolidation Suggestions

## Investigating ability to attach to bridge



# Sign Consolidation Suggestions

## Investigating ability to attach to bridge



# Proposed solutions: Signing plan

## Upcoming Efforts

- Prepare Preliminary Design Plans
  - New/Removals/Resets
- Sign Cross-Sections
- Power/Communication Design



# Proposed Solutions: Tunnel Linings

Options under consideration as of 18 July 2012:	Option 1	Option 5	Option 8
Option Title	CIP Concrete Full + Strip Drain	Vert. Wall + Thin SC w/Partial Drain	Sealed PCC with CDF and Drainage
Option Description	Cast-in-place concrete arch and wall structure, with geo-composite strip-drains behind the tunnel lining and in some wetter areas with sheets of geo-composite drains, with all geo-composite drains connected to back-drains leading to the portal. Initial support of temporary rock dowels and either shotcrete or wire-mesh support (depending on rock conditions).	Cast-in-place concrete vertical sidewalls, with a thin steel fiber reinforced shotcrete lining which follows the ins-and-outs of the excavated rock of the tunnel arch. Drainage membranes installed where practical. Exposed steel-mesh installed over the shotcrete to catch spalling shotcrete. Additional more maintenance free final lining may be installed in the future.	A pre-cast concrete arch erected beneath the excavated rock with an initial rock support of temporary rock-dowels and either shotcrete or wire-mesh support (depending on rock conditions). Drainage membranes would be installed above the PCC arch to carry seepage water to the backdrains and then to the portals.



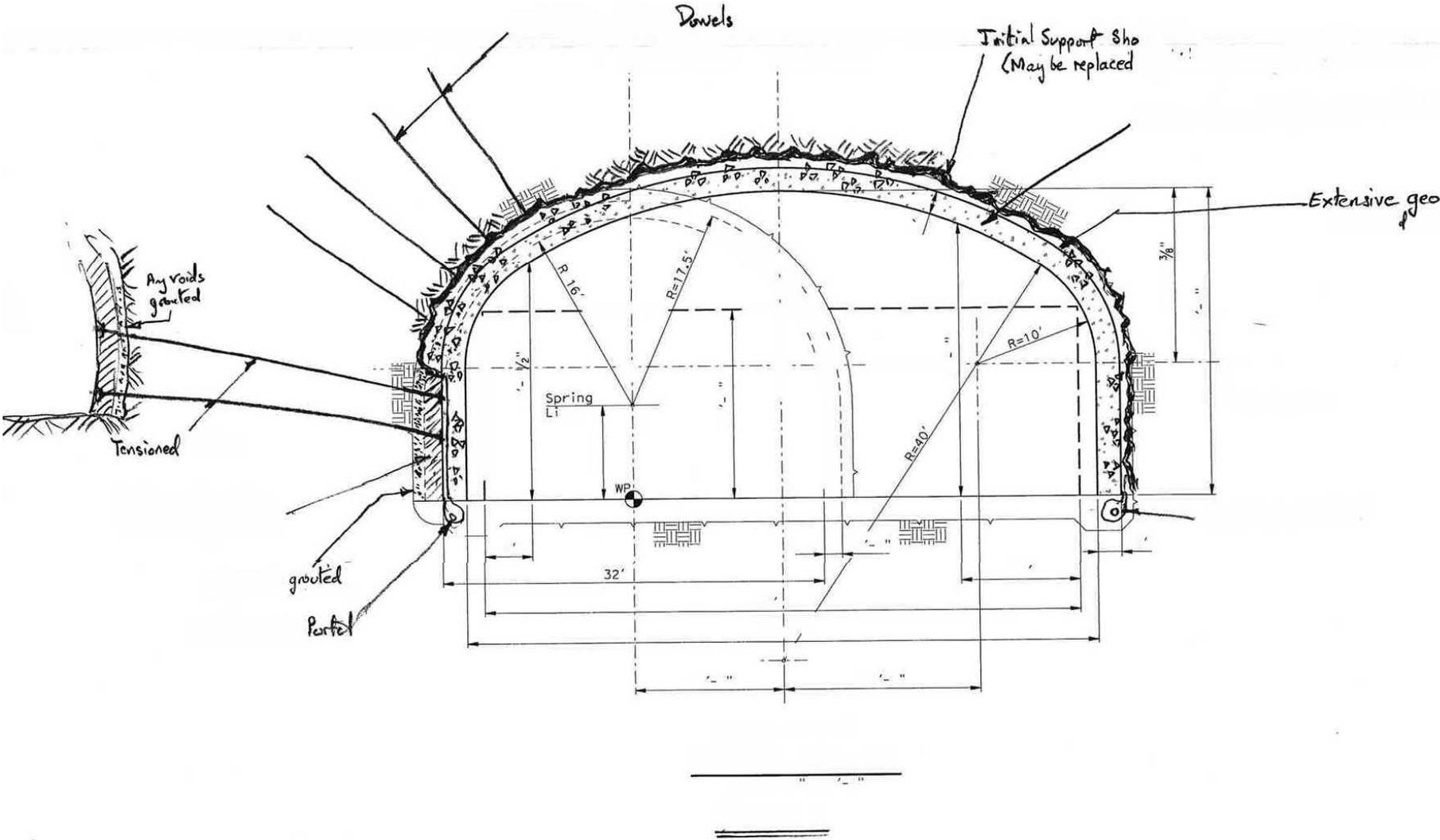
# TUNNEL LINING RECOMMENDATION

## Cast In Place Concrete, Smooth Arch

- Provides greatest safety (rockfall, fire protection)
- Smooth arch promotes improved traffic flow (lighting, driver perception)
- Offers better drainage system = drier tunnel
- Enhanced constructability, reducing schedule and cost risk
- Most durable, requires minimal maintenance
- Reduced maintenance requires fewer traffic impacts



# Cast in Place Concrete: Section Details



# Tunnel Lining Option 5

- Vertical Walls and Shotcrete



# Tunnel Lining Option 8

- Precast Arch - erected in upright position outside tunnel, then use rolled into place on vertical wall supports.



# Proposed solutions: Bridge Aesthetics

Bridge type selected June 28th

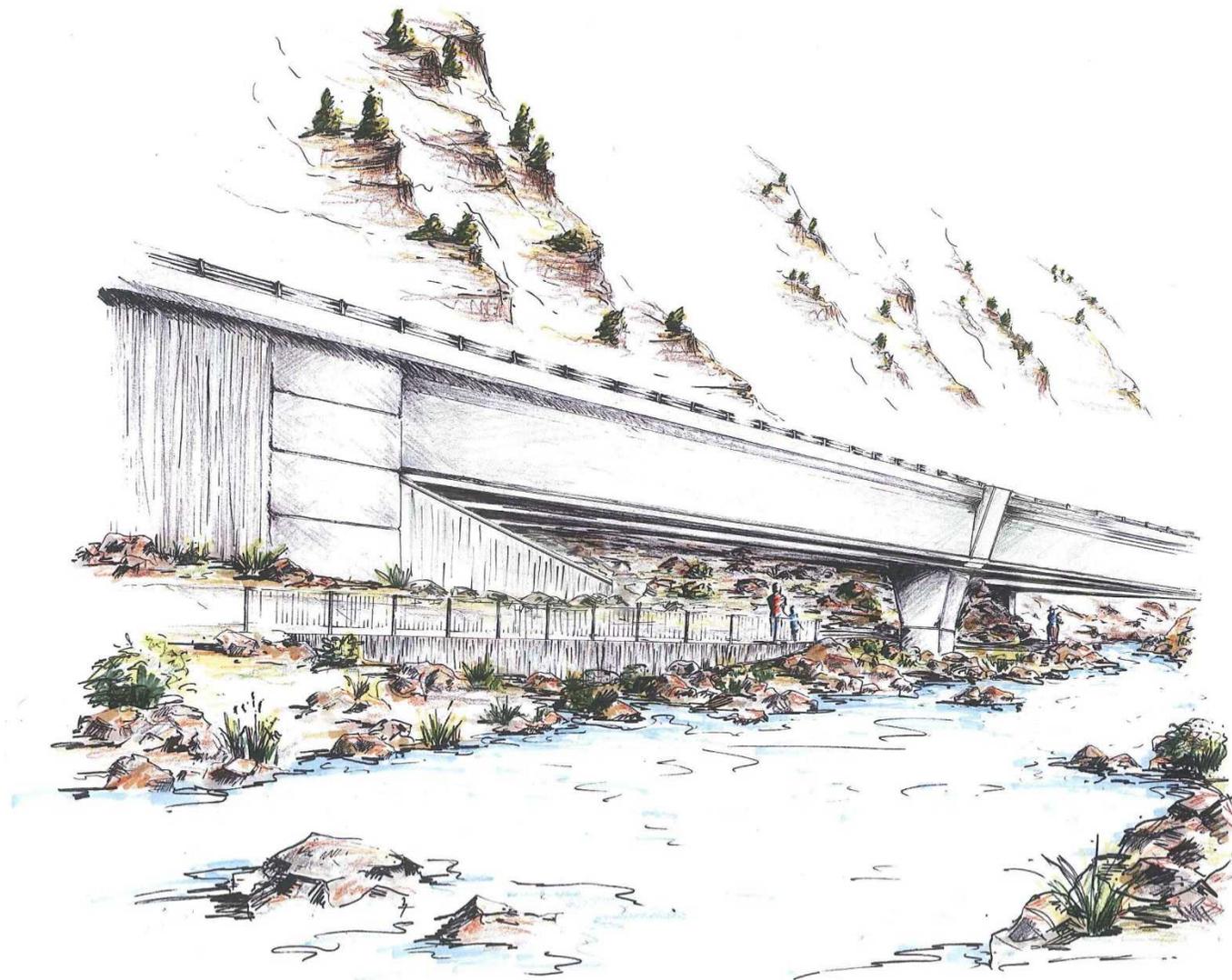
- 3-span concrete girder with integral pier caps

Design selection focused on

- Transitions between the bridge and roadway
- Maintaining an open creek bed

Renderings include trail (to be built by others)







# Next Steps

Meeting with Idaho Springs to clarify review of CR 314 wall aesthetics

Agenda for August 9<sup>th</sup> Technical Team Meeting in Golden

## Presentation of Concepts

- » Public Information
- » Lighting
- » Landscaping
- » Incident Management Plan
- » Adaptive Mitigation

## Follow-up

- » Bridge Aesthetics
- » Median Barriers
- » Signing

## Aesthetics Review

- » Creek walls, railing, landscape



# END OF PRESENTATION

