

Appendix B
PLT Meeting Minutes

I-70 Mountain Corridor Design Speed Study

Purpose:	Progress Meeting		
Day:	Thursday	Date:	April 16, 2015 from 1:00 pm - 3:00 pm
Location:	Location change to CDOT Golden Office due to weather		

Attendee	Representing	Attendee	Representing
Derek Schuler (phone)	Jefferson County	Eva Wilson (phone)	Eagle County
David Singer	CDOT R 1	Mandy Whorton	CH2M HILL
Ben Acimovic	CDOT R 1	Rachel Saunders	CH2M HILL
Neil Ogden	CDOT R 1	Zeke Lynch	CH2M HILL
Melinda Urban	FHWA		

Introductions

Jefferson County was represented by Derek Schuler (attending the meeting for Steve Durian). Eagle County was represented by Eva Wilson. CDOT, FHWA, and CH2M HILL staff were present at the CDOT Golden office.

I-70 Mountain Corridor Updates

David Singer gave background about the corridor, explaining that it is a 144 miles long, through Jefferson, Clear Creek, Eagle, Summit and Garfield Counties. The PEIS set the vision for corridor and need to balance community and environmental values with safety and needs. Several projects have been implemented using the 6-step Context Sensitive Solutions (CSS) process outlined in the PEIS. These include several projects in the Twin Tunnels area, a couple of resurfacing projects west of Eisenhower Tunnels, and corridor-wide studies for the Advanced Guideway System (AGS), an unsolicited proposal for roadway and transit improvements, and various traffic management studies and pilot tests. This study is focused on design speeds and the challenges faced for roadway improvements in the corridor because of horizontal and vertical curves.

Study Purpose

David explained why CDOT and FHWA were initiating this design speed planning study. In the Tier 1 process, the decision about a corridor-wide design speed was deferred; both 55mph and 65mph design speeds were evaluated in the PEIS. So, as it is now, the ROD requires Tier 2 projects be designed to accommodate both 55 and 65 mph design speeds or that a corridor-wide design speed be specified in a Tier 2 process. CDOT and FHWA determined that it would be more efficient for upcoming projects to have direction on design speed and that investing upfront in decision making will make later decisions easier. This is a planning study and will not lead to design or construction of any projects.

This study will: 1) Establish design speed vision and recommendation for entire corridor, with a focus on the areas where roadway improvements are planned or approved by the PEIS; 2) Identify speed concerns within the corridor exist based on vertical and horizontal curves; 3) Outline criteria, processes, and mitigation considerations for future Tier 2 roadway improvement projects where design speed is an issue.

David reviewed existing corridor speeds and provided a map graphic, which was also emailed to participants. The data gathered to date show posted speeds (speed limit signs in the corridor) and prevailing speeds (the speed that 85% of drivers are traveling in free flow conditions) are very similar, indicating that the corridor is posted for about as fast as what people can comfortably drive given the roadway conditions (especially the curves and steep grades). Mandy Whorton explained some of the speed terms, including posted and prevailing speeds. About 15 miles of the corridor is posted 55 mph or lower; about 45 miles of the corridor is between 55 and under 65; the majority, 228 miles are 65 and higher. (The total corridor length is 288 miles, which accounts for 144 miles in the westbound direction and 144 miles in the eastbound direction.) Zeke Lynch mentioned that another relevant speed term is Inferred Speed, which is what drivers feel a level of comfort driving. This study focuses on areas where improvements are planned and where speeds are less than 65 mph. This narrows the focus considerably, and it continues to be refined. The study team is refining the data collection and will be adding additional metrics as data are available. These data will help with performance measures and criteria.

Scope and Approach

The study includes four primary tasks: 1) Compiled existing data; 2) Develop criteria for design speed decisions for PEIS approved roadway improvements; 3) Develop design speed context – building on the map graphic handed out at this meeting – as a tool for future Tier 2 projects; 4) Document these findings into a report and submit to FHWA for approval and recordation.

Team Members

- CDOT representatives: Neil Ogden and David Singer, Region 1 (east); Steve Olsen, Region 3 (west)
- USFS: Carol Kruse
- Eagle County: Eva Wilson
- Jefferson County: Steve Durian
- Clear Creek County: Jo Ann Sorensen
- I-70 Coalition: Margaret Bowes
- Colorado Motor Carriers: Tracy Sakaguchi
- FHWA: Melinda Urban

David noted that others from these organizations would or could participate in the study either on the PLT or on a Technical Team. For instance, David is working with CDOT Regions 1 and 3 traffic engineers, headquarters traffic management staff, and other CDOT headquarters staff.

Schedule

The schedule for the planning study is 6 to 8 months, with milestones in April (this meeting), June, August, and September. The study schedule is coordinated with the westbound improvement project at Floyd Hill, a project that CDOT anticipated issuing an RFQ for a consultant competition in the fall of 2015. PLT meetings are planned around the milestones shown in the presentation and in the work plan schedule. This first meeting is intended to cover the first two of the 6-step CSS process: defining desired outcomes and endorsing the process. Mandy explained that the work plan, which was distributed by David ahead of the meeting and again this morning with the meeting materials, documents the study approach, scope, schedule, and organization. She requested that if the PLT members had questions or comments about the process or the outcomes, providing comments on the work plan would be the best avenue. The next PLT meeting in June will focus on Step 3, establishing criteria. The third PLT meeting will review options and alternatives, and the last PLT will focus on selecting an alternative and documenting the study.

Comments or Questions

Melinda Urban asked if CDOT planned to host a website for the design speed study. David said a website had not been planned but could be easily done. The group agreed that a notice on the I-70 Mountain Corridor website with contacts would be helpful, and David said he would work with CDOT's website staff to add a page related to the study.

	ACTION ITEMS	Responsibility	Due
1.	Review Project Work Plan	PLT	April 30
2.	Follow up with PLT members who did not make the meeting	David Singer, Ben Acimovic	Week of April 20
3.	Develop website page with short description of design speed study on CDOT's website.	David	April 30
4.	Continue collecting and compiling data and develop draft criteria for PLT input	Study Team	June

PLT Meeting

Purpose:	PLT Meeting Number 2		
Location:	CDOT Region 1 – Golden	Date:	June 24, 2015 10:00 – 12:00

Participants

Attendee	Representing	Attendee	Representing
David Singer	CDOT R1	Melinda Urban	FHWA
Ben Acimovic	CDOT T1	JoAnn Sorensen	Clear Creek County
Steve Durian	Jefferson County	Eva Wilson (on phone)	Eagle County
Tracy Sakaguchi	CMCA	Mandy Whorton	CH2M
Shae Kosmalski	Forest Service	Zeke Lynch	CH2M
Carol Kruse	Forest Service	Rachel Saunders	CH2M

NOTES

Decisions are shown in gray highlight; **action items are shown in bold.**

Agenda Items

Design Speed Study Background, Purpose, and Evaluation Criteria

David Singer discussed the background and purpose of the project. He encouraged the PLT members to actively engage in the discussion and to provide feedback.

Carol Kruse asked for the team to clarify what exactly high speed differential means. It is a large difference between speeds among traveling vehicles, not necessarily vehicles traveling at high speeds.

Concern was expressed that not enough groups are represented in the PLT, including corridor counties, retail groups farther west, and environmental interest groups. David explained that CDOT contacted a number of different stakeholders, and Jefferson, Clear Creek, and Eagle Counties, the Colorado Motor Carriers Association, Forest Service, and CDOT Region 3 and Traffic staff agreed to be members of the PLT. David also reached out at the collaborative effort meeting to recruit interested members. He also emphasized that just because people were not present at the meeting did not indicate that they weren't involved or hadn't provided input.

Mandy Whorton presented some background information on the existing conditions and scope of the design speed study (see attached PowerPoint). Zeke Lynch presented traffic and safety data, first reviewing a map that was created to illustrate the speed limits and prevailing speeds in the areas where

roadway improvements are planned. Steve Durian asked if there was a way to break up the speeds by type of car, trucks vs. automobiles, to look at non-truck speeds vs. truck speeds. Steve thought there was some information in the Genesee area. Zeke said CDOT had collected some data regarding speeds by lane that could be indicative of the speeds of slow moving vehicles, which often travel in the right lanes, but not necessarily just trucks. **Zeke will determine if separate vehicle class speeds can be obtained from the data that are available.** Carol questioned the prevailing speeds that are less than 65 mph, which does not match with her observations. Zeke said the overall speeds could be affected by slow moving vehicles.

Regarding safety comparisons to other Colorado interstates, the question was raised if there are similar interstates to I-70 in Colorado or even in the nation. With the exception of some portions of I-25 (Monument Hill and Raton Pass), no other interstates in Colorado traverse through mountains similar to I-70. It has long been recognized that I-70 through the mountains is unique, with a number of geometric, weather, and trip purposes that are very different from typical interstates.

During the meeting, information was presented that stated the severe crash proportion on the I-70 Mountain Corridor was nearly twice that of the statewide interstate average in Colorado. This conclusion was based on comparing the severity proportion obtained from the dataset used for this analysis to information presented in the historic crash rate books published on CDOT's website.

Correction to notes: After this meeting, it was determined through consultation with CDOT safety staff that the dataset provided for this analysis used a different methodology for classifying crashes with the lowest injury severity (complaint of injury) than was used in the compilation of the historic crash rate books. CDOT safety staff provided additional data for the analysis years of 2009 – 2012 that indicates that the severity proportion on this segment of I-70 is actually slightly lower than the annual statewide average for Colorado interstates. This revelation does not change the conclusions drawn from the analysis of the crash patterns and causal factors.

Mandy suggested that the crash data may be further filtered to isolate crashes that occur under free flow conditions. Of the 2,500 total crashes, most occurred in congested conditions. Generally, Zeke explained more crashes that are less severe (rear ends at slower speeds) occur when there is congestion. On the other hand, when there are free flow conditions, people drive faster and tend to have more severe crashes. **Jacqueline Dowds-Bennett, the consultant safety engineer will determine if looking at mid-week crashes would provide additional context to the crash trends and patterns.**

The group discussed the issue of speed dispersion (speed differential). Tracy Sakaguchi explained that speed differentials between trucks traveling in the right lanes and faster cars either coming up quickly upon trucks or darting around to pass them created a big safety concern – primarily for the passenger vehicles. She said that the bigger the difference in speeds, the more significant the concerns. She said the CMCA supports a situation where trucks can move at consistent speeds and where they can travel at similar speeds to other vehicles, which often involves other vehicles slowing down since trucks cannot maneuver steep grades easily. This is true in both the uphill and downhill stretches. As speed limits have been increased, the use of runaway truck ramps have also increased.

The group also discussed effects of changes in speeds throughout the corridor (for all vehicles), such as through curves or between more straight sections and curves. Zeke said that technologies like variable speed limits and queue warning systems are options for helping out with changes in speeds. He also said that national research indicates that 2 miles is an accepted length where speed limits can change in a rural road condition – less than 2 miles is viewed as too short to transition speed limits. However, these data are from more typical highways (fast and straight) so may not be applicable to the mountain corridor.

The group discussed the possibility of distracted driving (using a cell phone, looking at the scenery, wildlife etc.) as cause of crashes. Melinda Urban said that her conversations with state patrol indicated that it is very hard to measure this as a cause of crashes because officers only report this on the crash reports if they observe that behavior first-hand, which is rare, or if people volunteer that information to officers, which does happen but not often. Mandy said overall the conclusion that the safety engineer had come to in a big picture was that the mountain corridor presented difficult conditions for drivers and that the consequences of bad decisions was often more severe than for other interstates.

Mandy noted that the team had reviewed environmental data from the PEIS and confirmed that important resources were present in all the improvement locations. JoAnn Sorenson asked about impacts to corridor communities, which were not shown on the map. Mandy explained that the map was showing more natural resources but that community resources were a significant consideration in all decisions on the corridor and are reflected in the criteria table. **Rachel Saunders can add communities and other social resources to the map.** The group transitioned to the discussion of criteria. Mandy noted that the criteria table (attached) represented the categories of needs and accommodations that were used to evaluate all alternatives in the PEIS and that the team felt that they were appropriate to this study as well. Unlike some of the recent Tier 2 efforts, the criteria are more qualitative and general for this planning study since no construction or impacts will result from this study. The study is primarily trying to inform the future projects what criteria are differentiators when making design speed decisions.

Mobility criteria are related to capacity, congestion, and travel times come from the measures used in the PEIS and available in existing traffic models. The initial review of the mobility measures suggests little to no difference in these measures between a 55 mph and 65 mph design. Zeke explained that the primary benefits are from the increased lanes (travel or auxiliary lanes) but that the design speed for those segments made little difference in corridor travel times.

Safety criteria are related primarily to speed differential. Research supports that high speed differentials do create safety concerns, both in frequency and severity of crashes. The feeling is that weather and congestion may exacerbate issues with speed differentials so there are two recommended measures related to speed differentials. Carol suggested the team investigate specific types of vehicle crashes particularly the animal vehicle collisions (AVCs). Mandy said AVC were being evaluated as environmental factors but could be added for safety as well. If added, it should probably be broadened to include all crashes. However, Mandy said that the team had discussed whether design speed might affect crashes, and Jacqueline did not feel the data would be conclusive; however, **Mandy said she would check and report back if crashes would be a meaningful measure and also ask Jacqueline to look at the crash data for AVCs.** (After the meeting, Mandy discussed with Jacqueline, and the reason that crashes were not evaluated is that the data did not indicate that speed was a factor in crashes since most occurred below the posted speed.)

In addition to the PEIS criteria for transportation and other improvements, the team felt it was important to consider the effect that design speeds for roadway improvements might have on other elements of the PEIS Preferred Alternative, specifically the AGS and the non-infrastructure improvements. Mandy noted that since the PEIS, the AGS feasibility study had been completed, and that alignments were now better understood. Carol requested that the AGS alignments be shown on the maps. Mandy said David Krutsinger had provided the CAD files, and that **Kelly Fredell, the consultant roadway engineer, will add the AGS hybrid, high speed mag lev, and high speed train to the map to show how they interact with the 55/65 alignments.** Carol said she thought the high speed train was not feasible. Mandy said her understanding from David Krutsinger was that all of the AGS options could be feasible, but only the hybrid option had much interaction with the alignment. This may not be shown

corridor-wide but rather on individual detailed maps where the AGS and highway coincide. Carol pointed out that tunnels might conflict with AGS and so she wanted to be sure that the team considered this.

There was a clarification about what is included in non-infrastructure improvements identified in the PEIS. The non-infrastructure improvements are primarily behavioral or policy changes like encouraging overnight stays at resorts or carpooling to minimal changes to the highway such as peak period shoulder running or ramp metering.

The Environmental Sensitivity criteria are intended to be a qualitative measure of impacts to important resources. As noted previously, important resources are present in each of the improvement areas. Carol and Shae Kosmalski requested some additions to the environmental criteria, including adding specific mention of T&E species and their habitat. The criteria should also include water quality, which is not specifically covered currently. **Rachel and/or Colleen will make these changes.** It is important to the Forest Service to include landscape restoration and watershed connectivity. **Shea will look more into these and talk to other Forest Service staff and get back to the team on if and how they would like these issues included in the evaluation.**

Regarding respecting community values, JoAnn suggested adding noise. Corridor communities will also be added to the list. **Mandy will make these changes.**

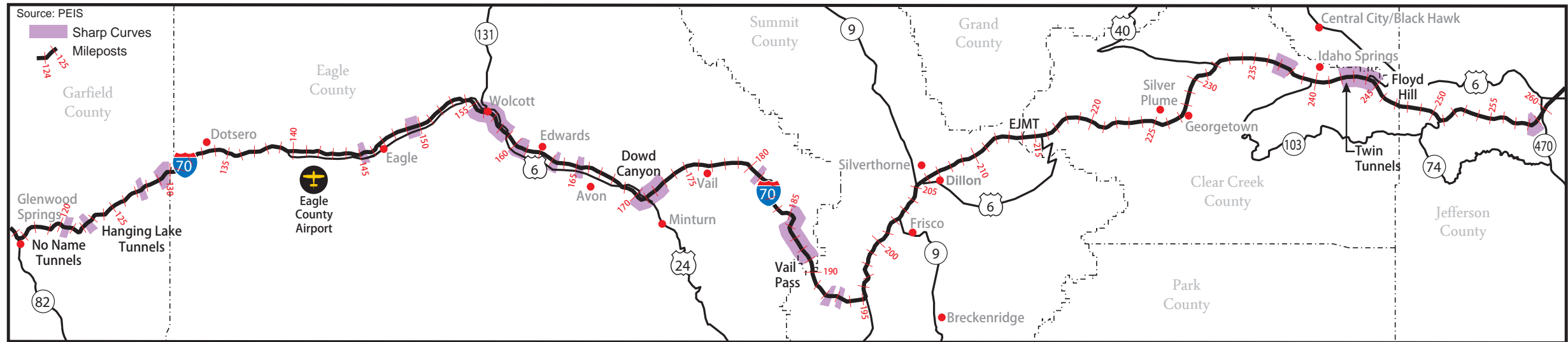
Mandy clarified that the ability to implement criterion focuses on the cost-benefits of implementing improvements. In addition to the technical feasibility and costs, this criterion also includes environmental costs. Although referred to in the PEIS as environmental mitigation costs, the costs are more accurately presented as the long-term costs to the environment, rather than the cost of mitigating impacts. The group agreed to remove the word “mitigation” from the table. **Mandy will make this change.**

The meeting was adjourned. David thanked the group for their participation and providing feedback. He asked that any additional suggestions be sent to him in the next two weeks. He indicated that the August PLT meeting agenda will include the evaluation of alternatives using the final criteria table.

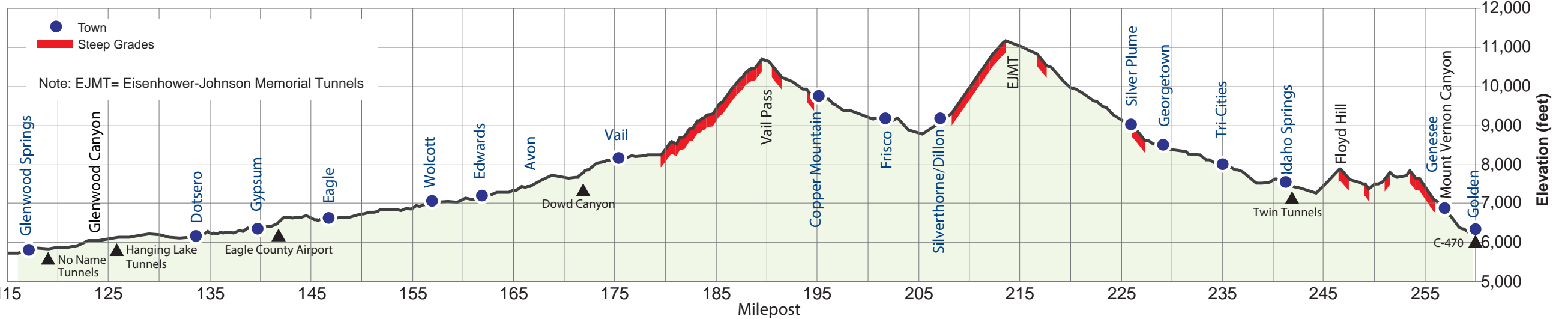
Action Items

	ACTION ITEMS	Responsibility	Status
1.	Determine if “crash trends and patterns” can be further filtered to be compared more easily in addition to reporting all crashes in the corridor.	Jacqueline	
2.	Add communities as an important sensitive resource to the criteria table and map.	Rachel	
3.	Add AGS hybrid, high speed mag lev, and high speed train to the map to show how they interact with the alignments.	Kelly	
4.	Discuss whether criteria related to crash frequency or severity could be added to safety criteria.	Mandy / Jacqueline	Complete. After the meeting, Mandy discussed with Jacqueline, and the reason that crashes were not evaluated is

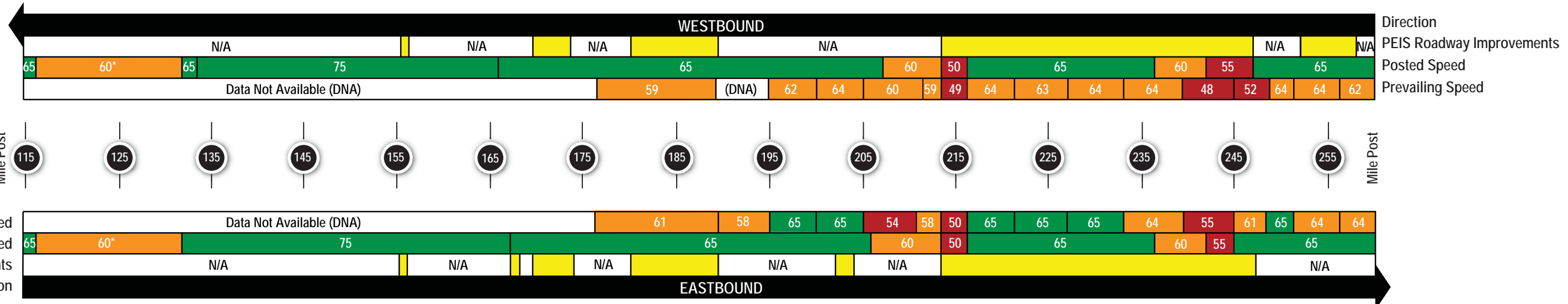
	ACTION ITEMS	Responsibility	Status
			that the data did not indicate that speed was a factor in crashes since most occurred below the posted speed.
5.	Investigate the animal vehicle crashes and where they are occurring and determine how, if at all, a 55mph or 65 mph design speed would change these crashes.	Jacqueline	
6.	Include T&E, sensitive species, and their habitat in addition to wildlife to the Environmental Sensitivity criteria.	Colleen/Rachel	
7.	Add water quality to the Environmental Sensitivity criteria.	Colleen/Rachel	
8.	Discuss with Forest Service staff to determine if landscape restoration and watershed connectivity should be included in the criteria.	Shea Kosmalski	
9.	Add Noise as a resource in Respect for Community Values.	Mandy	
10.	In the "Ability to Implement" category, remove "mitigation" from environmental mitigation costs.	Mandy	



Source: PEIS



■ 65mph or greater
 ■ 64-56mph
 ■ 55mph or less
 Data Not Available
 *60 mph autos 50 mph trucks
 PEIS Roadway Improvements
 N/A - Not applicable. No roadway improvements included in the PEIS Preferred Alternative





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I-70 Mountain Corridor Programmatic EIS: Tier 2 Design Speed Study



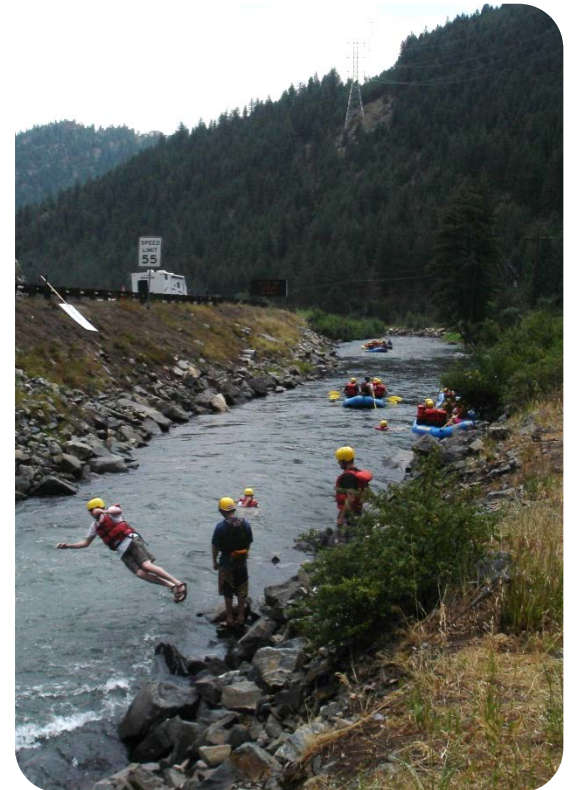
Agenda

- Introductions
- Design Speed Study Background and Purpose
- I-70 Mountain Corridor Existing Conditions
- Design Speed Alternatives Evaluation Criteria
- Discussion



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Background

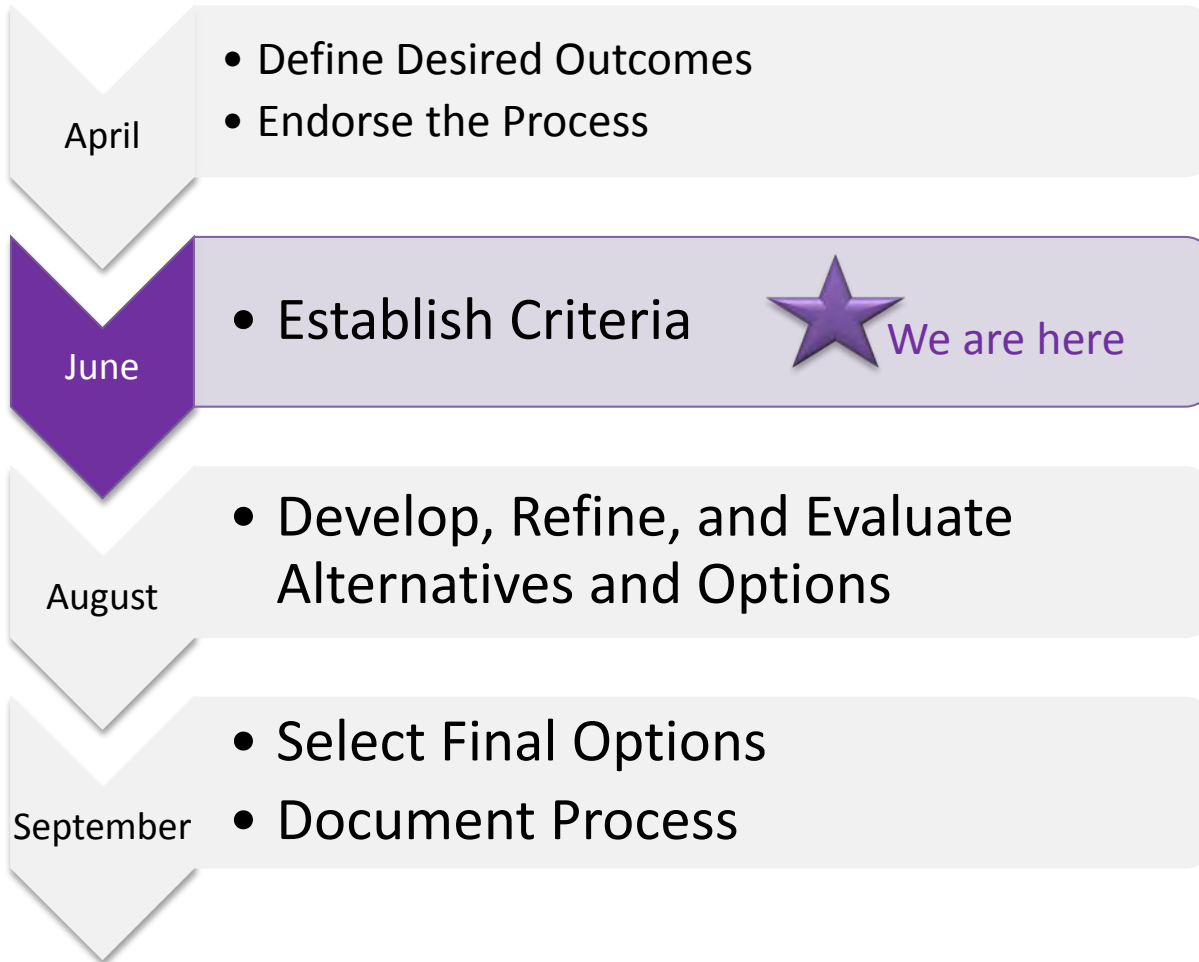


Design Speed Study Purpose

- Establish a design speed vision and recommendation for the entire corridor
 - With focus on those areas where roadway improvements are planned/approved by PEIS
- Identify locations of speed concerns
 - Such as areas of lower speeds or high speed differential
- Outline a process, criteria, and mitigation for which future projects can assess tradeoffs of location-specific design speed decisions



Study Schedule



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



Speed Definitions

- Speed limit or posted speed
 - Maximum lawful vehicle speed as displayed on a regulatory sign in 5 mph increments.
- Prevailing speed, or 85th-percentile speed
 - Speed at or below which 85 percent of motor vehicles travel
- Design speed
 - A selected speed used to design various geometric features of the roadway.



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Existing Conditions



Roadway Improvement Locations

- Approximately 50 miles of improvements over 144 miles
 - Mile Post 155 - 156
 - Wolcott
 - Mile Post 167 - 168
 - Avon (EB Only)
 - Mile Post 170 - 173
 - Dowd Canyon
 - Mile Post 180 - 190
 - Vail Pass
 - Mile Post 202.7 - 205.1
 - Frisco (EB only)
 - Mile Post 213.5 - 247*
 - Floyd Hill to EJMT
(Maximum Program)
 - Mile Post 253 - 259
 - Genesee (WB only)

*Within Clear Creek County, the Minimum Program includes only capacity improvements at Floyd Hill (east of the Twin Tunnels) and auxiliary lanes east of the EJMT (Herman Gulch/Bakersville).



Roadway Design

- Interstate projects must meet established design criteria or seek a formal design exception
- FHWA defines thirteen controlling criteria for roadway design, including design speed
- Design speed acts more as a design control than a design criterion
 - Design speeds should be consistent with driver expectations
 - Lower design speeds are often appropriate in mountainous terrain



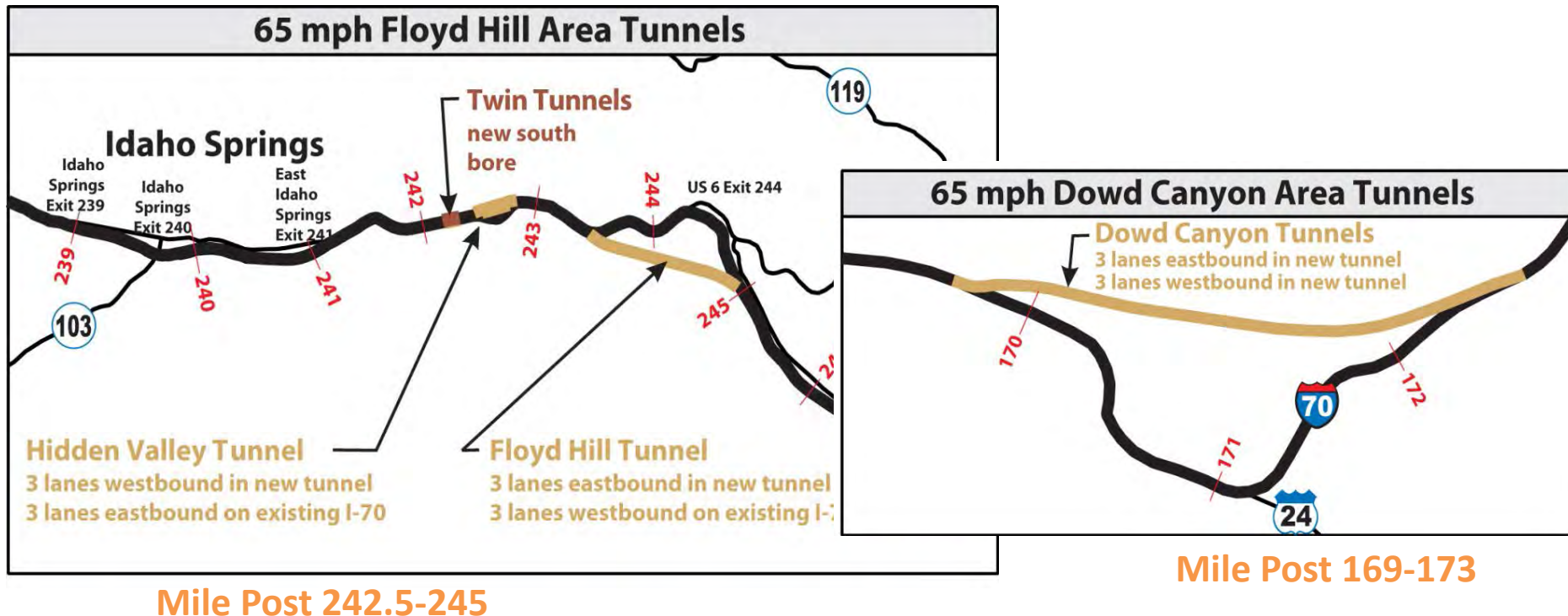
Primary Geometric Constraints for 55 mph vs 65 mph Design Speeds

- Geometric Element Considered
 - Horizontal Alignment
 - Existing Sharp Curve Locations
 - Vertical Grade
 - Existing Steep Grade Locations



Design Constraints Identified in PEIS

- PEIS identified locations where tunnels would be needed for 65 mph alternative





Setting Speed Limits

- Statutory requirements define how speed limits are set
- CDOT determines and sets reasonable and safe speed limits based on:
 - Traffic investigation, survey, and design standards.
- Prevailing speed is a primary factor used to determine appropriate speed limits
- Other factors
 - Roadside development / surrounding activity
 - Crash history
 - Road characteristics



Speeds in the Corridor

- Posted speeds range from 50 mph to 75 mph
 - Majority posted at or above 65 mph
 - Posted 75 mph between Avon and Dotsero
 - Below 65 mph three locations:
 - Floyd Hill to the Twin Tunnels (55 mph)
 - Twin Tunnels to Idaho Springs (60 mph)
 - EJMT to Silverthorne (60 mph)
- Prevailing speeds generally less than or equal to posted speeds



Safety Analysis

- Review current crash data (2009 to 2014)
 - Dowd Canyon, west of EJMT, and between EJMT and Floyd Hill
- 2,538 crashes in CDOT database
- Determine if speed or speed dispersion (variance among vehicles) contributes to crashes



Crash trends and pattern

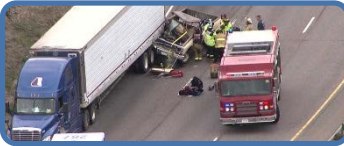
Updated data received after meeting (based on different methodology currently used by CDOT) indicates that severity is actually slightly lower than the annual statewide average; this does not change the conclusions of the crash patterns analysis.



Proportion of fatalities (20 to 22 percent) is twice that for all Colorado interstates in same period



Most crashes are fixed object (run off road) and rear end



Crashes occur nearly equally on wet and dry roadway surfaces (not typical)



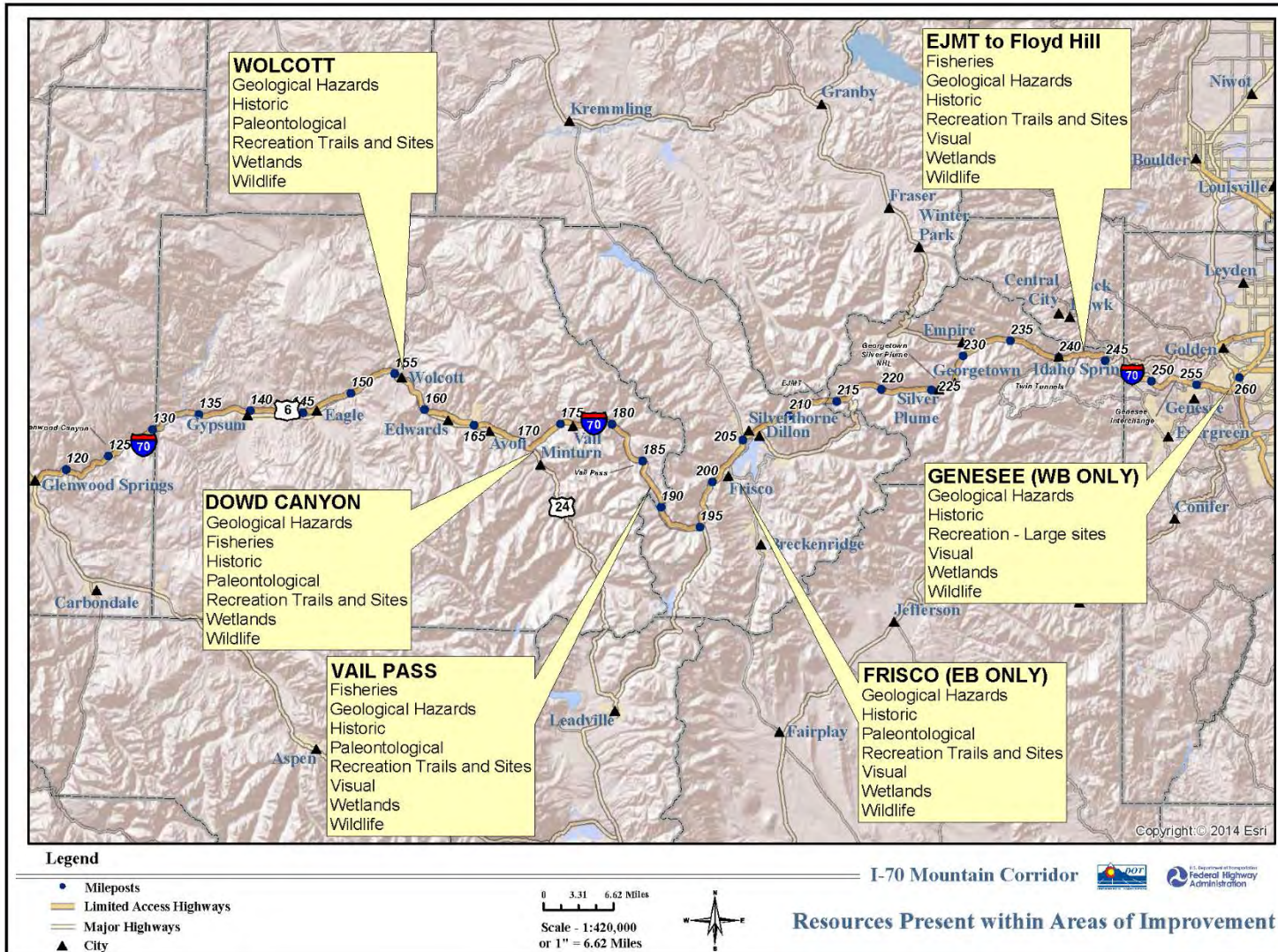
Nearly half of the crashes (47 percent) occurred on a curved section of I-70



Vehicles traveling below posted speeds in most cases



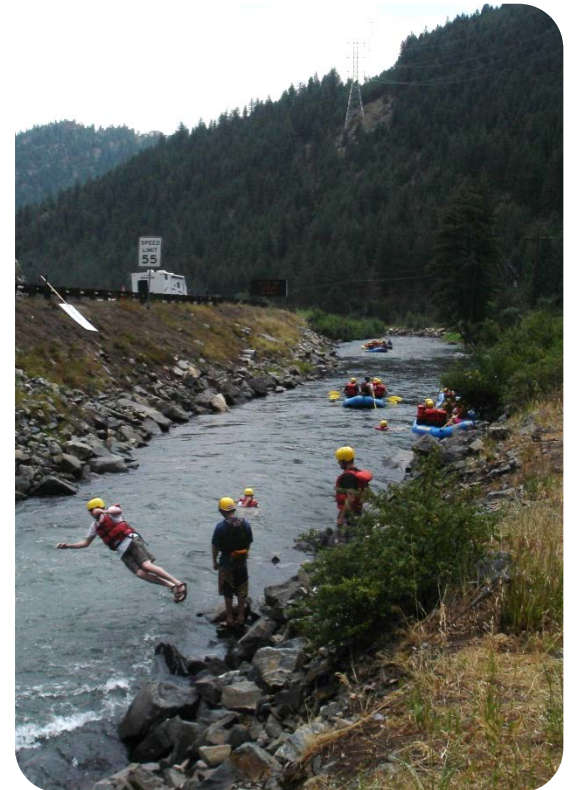
Important Resources Present in all Improvement Locations





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Criteria Considerations



Alternatives Evaluation in PEIS

- Meets purpose and need for transportation improvements
 - Increase capacity
 - Improve mobility and accessibility
 - Decrease congestion
- Provides for and accommodates
 - Environmental sensitivity
 - Respect for community values
 - Safer travel
 - Ability to implement



Criteria for Evaluating Design Speeds

- Traffic and roadway geometry
 - Mobility
 - Capacity
 - Congestion
 - Safety
- Footprint (based on design criteria)
 - Environmental impacts
 - Community impacts
 - Ability to implement and constructability
- Compatibility with AGS and non-infrastructure components



Initial Observations

- Traffic modeling suggests no difference between 55 mph and 65 mph for mobility
 - # of person trips supported
 - Travel times
 - Annual hours of congestion
- Safety analysis suggests
 - Crash patterns are not distinguished by posted speeds
 - Mountainous terrain and weather conditions contribute to crashes regardless of posted speeds
 - Speed dispersion is likely a contributing factor to crashes



Initial Observations (cont.)

- Environmental and community impacts likely different between 55 mph and 65 mph templates
 - Resources are present in all locations
 - Proposing a comparative review of severity
- Ability to implement also likely distinguishing factor
 - Cost
 - Duration and complexity of construction



Goals for Next PLT Meeting

- Next Steps
 - Develop Alternatives
 - Evaluate Alternatives Against Criteria
 - Refine Alternatives and Options



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Discussion

I-70 Mountain Corridor Design Speed Study – Evaluation Criteria DRAFT

Note: These criteria represent the first phase of evaluation of design speeds in areas of the I-70 Mountain Corridor where PEIS Preferred Alternative roadway improvements are planned. A second set of refined criteria and performance measures will be recommended for use in future Tier 2 projects to focus on the criteria that differentiate among design speeds.

Criteria	Performance Measure	55 mph Design Speed	65 mph Design Speed	Hybrid Design Speed
Increase capacity	# person trips in peak period # person trips in off peak period			
Improve mobility and accessibility	Travel time during peak period Travel times during off-peak period			
Decrease congestion	Annual hours of congestion			
Compatibility with non-roadway elements of PEIS Preferred Alternative	Compatibility with AGS component (good, fair, poor) Compatibility with non-infrastructure component (good, fair, poor)			
Safety	Potential speed differential between cars and trucks on steep up and down grades (low, medium, high) Amount of potential speed differential among vehicles during inclement conditions or congested periods (low, medium, high)			
Environmental sensitivity	Severity of impacts to natural resources, such as creek encroachments, wetlands and fens, fisheries, sensitive species habitat, linkage interference zones (LIZs), geologic hazards, and paleontological features (low, moderate, high)			
Respect for community values	Severity of impacts to communities and social resources, such as recreation sites, visual impacts, residential and business relocations,			

Criteria	Performance Measure	55 mph Design Speed	65 mph Design Speed	Hybrid Design Speed
	economic resources, and historic resources and districts (low, moderate, high)			
Constructability (short-term)	Complexity, difficulty, and duration of construction, such as ability to phase, address geologic hazards, maintain access, comply with seasonal restrictions, impacts to mobility of corridor communities, etc. (low, moderate, high)			
Ability to implement (long-term)	Complexity and technical feasibility of engineering solutions; affordability, including capital costs, O&M costs, and environmental mitigation costs (low, moderate, high)			

I-70 Mountain Corridor Design Speed Study PLT Meeting

Purpose:	PLT Meeting No 3		
Location:	CDOT Golden Office	Date:	September 30, 2015 10:00 - 12:00

NOTES

Decisions are shown in gray highlight; **action items are shown in bold.**

Participants

Attendee	Representing
David Singer	CDOT R1
Steve Durian	Jefferson County
JoAnn Sorensen	Clear Creek County
Melinda Urban	FHWA
Carol Kruse	US Forest Service
Jacqueline Dowds Bennett	CH2M

Attendee	Representing
Kelly Fredell	CH2M
Zeke Lynch	CH2M
Colleen Roberts	CH2M
Rachel Saunders	CH2M
Mandy Whorton	CH2M

PLT updates

David Singer gave a summary of the purpose of this meeting: to discuss design speed alternative evaluation results (using the evaluation criteria discussed at the June PLT meeting) and preliminary corridor design speed recommendations. The team would like to have PLT input on the recommendation and then plans to recommend mitigation options for the recommended alternative only.

This study was originally timed for completion prior to commencement of the Floyd Hill project. The Floyd Hill project has been put on hold until the Peak Period Shoulder Lane (PPSL) is operational. Although not tied to the Floyd Hill project, this design speed study will be complete within the next several months.

JoAnn Sorenson provided an update from a PPSL meeting the night before (September 29) in Idaho Springs. The public expressed their concern about how much construction is going on in the area, and business owners were concerned about the lack of intermediate egress from the managed lane.

Refined Scope of Design Speed Study

The corridor is 144 miles long, with approximately 50 miles identified as areas of PEIS highway improvements. Although not intuitive from the naming convention, the PEIS 55 mph and 65 mph alternatives are the same design speed (65 mph) for most of the corridor. There are only two locations where the PEIS design is different for the 55 mph and 65 mph alternatives: Floyd Hill and Dowd Canyon. Therefore, these are the only two locations where a design speed decision must be made. In all other locations of roadway improvements, the design is at 65 mph.

Design Speed Alternatives Evaluation Results

Dowd Canyon

In this area, the 55 mph alternative mostly follows the existing alignment and flattens existing lower speed curves. Due to the topography of the area, there is no way to construct a 65 mph alternative without a tunnel. The two alternatives are illustrated on the map that was provided ahead of the

meeting and attached to these notes. **In the figure, the colors of the 55 mph and 65 mph footprints overlap. Revised figures will be provided for side by side comparison of these areas of difference at Dowd Canyon and Floyd Hill.**

The group reviewed the evaluation matrix, also provided ahead of the meeting and attached to these notes. The corridor capacity, mobility and accessibility are not different between the two alternatives at Dowd Canyon. The primary reason the alternatives perform the same for mobility criteria is that travel times and capacity needs are for long distances, and the difference in 55 mph and 65 mph design speed at Dowd Canyon and Floyd Hill are too short of distances to make a difference in corridor travel times. Further, it is unclear that the 65 mph tunnel would actually operate at 65 mph because tunnel operations would likely require reduced speeds (as with other tunnels in the corridor)..

Initially, the 65 mph tunnel appeared to have a smaller footprint than the 55 mph alternative. However, after looking at it further, the team concluded that additional footprint, beyond that shown in the PEIS design, would be required for the 65 mph alternative. The existing I-70 alignment would need to remain in place to provide access to US 24 and an emergency bypass during tunnel closures. A split interchange would be required on each side of the tunnel to provide access to the existing I-70 alignment. Construction staging areas and haul roads for tunnel wastes would be required as well.

The team concluded that the safety criteria did not apply. The first safety performance measure regarding speed differential on steep grades does not apply in this location because vertical grades are not substantial in this location (2 to 4 percent). The second safety performance measure regarding speed differential during inclement weather or congested conditions does not present an accurate comparison between the alternatives either (reasons are provided in evaluation matrix). Although the matrix discusses the factors for both alternatives, the PLT recommended that the matrix include separate discussions of the two alternatives (instead of the single column) to clarify the differences. **In the matrix, the team will present the evaluation of the second safety performance measure in separate columns, labeling them each N/A but for different reasons, to clarify why there is not a comparison between them and why the concerns are different.**

JoAnn asked if other safety performance measures should be applied to this area. Jacqueline Dowds-Bennett explained that safety is not a differentiating factor here; the PEIS already recommended curve safety improvements at Dowd Canyon to address the existing safety issues.

Both alternatives would result in substantial impacts to environmental resources. Carol Kruse mentioned that the Forest Service does not like to see rock cuts because of the visual impacts. This is also true for CDOT. The Forest Service will want to see mitigation efforts for rock cuts on Forest Service land. For community values, the 55 mph alternative would perform better than the 65 mph alternative because the construction duration would be shorter, and therefore impacts to the community would be less. Staging and construction of the tunnel could result in business and residential relocations and impacts to trails and historic and cultural sites at the tunnel approaches. Even though the 65 mph alternative could be largely constructed offline (after the approaches were constructed), haul roads would need to operate continuously, continuing to cause traffic disruption throughout the schedule. Also, constructing the tunnel would be a long, complex process and the overall constructability would be worse for the 65 mph alternative. **In the matrix, the team will quantify the amount of tunnel waste in cubic yards at this location.**

The ability to implement would also be more difficult for the 65 mph alternative because the tunnel and associated maintenance of the existing I-70 roadway add new highway miles and introduce new infrastructure to maintain. **Cost is a major factor that should be included with constructability and ability to implement; exact costs are unknown, and the cost will be discussed as an order of magnitude.**

The overall performance of the 55 mph alternative against the evaluation criteria is slightly better, and its impacts are easier to mitigate, than the 65 mph alternative.

Floyd Hill

Similar to Dowd Canyon, the 65 mph alternative at Floyd Hill would require additional footprint, beyond that shown in the PEIS design, as illustrated on the map that was provided ahead of the meeting and attached to these notes. The existing I-70 alignment would need to remain in place to provide access to US 6 for eastbound traffic and an emergency bypass during tunnel closures. A split interchange would be required on each side of the tunnel to provide access to the existing I-70 alignment. Construction staging areas would be required as well. **In the figure, the boxes labeling the existing “less than 55 mph curves” should state their approximate design speed.**

The group reviewed the evaluation matrix, also provided ahead of the meeting and attached to these notes. The mobility evaluation is the same for this area as at Dowd Canyon, for the same reasons.

For the first safety performance measure, the steep grade at Floyd Hill results in more than 20 mph or speed differential between trucks and cars under both design speeds. Jacqueline noted research studies show that maximum truck operating speed is approximately 25 mph on uphill grades of 6 percent or more. Braking on downhill grades also requires trucks to operate at lower speeds. This speed differential is validated by the truck speed data that Zeke Lynch compiled and presented at the previous PLT meeting (and reflected in the revised design speed map). Flattening of grades is not proposed at Floyd Hill, but both alternatives would add another lane, improving safety of passing conditions when trucks are traveling slowly.

For environmental criteria, both alternatives would have substantial impacts. **JoAnn said that people who live in the Floyd Hill area want it to be noted that the entire area is on well and septic systems and they are concerned about the impact of tunnel and construction debris on these systems. This should be added to community values in the matrix.** Melinda mentioned that prior studies indicated this area has the potential for rockfall, and rock cuts should be avoided. **The team should look into the previous findings about rockfall/landslide hazards in the area and determine if rock cuts would merely increase the potential for hazards, or should be avoided entirely.** The figures should help to explain the tunnel and especially the need for rock cuts at the tunnel entrances. **The team will provide a smaller scale figure to show this detail.**

The 65 mph alternative includes a tunnel for eastbound traffic plus surface roadway for westbound traffic. For constructability, this alternative would require the construction of the tunnel first, and then the roadway, so traffic can travel through the tunnel while the roadway construction occurs. This would be a very long construction process.

For clarity in the Ability to Implement discussion, **in the Floyd Hill matrix, the team will change roadway “prism” to roadway “footprint.”**

The overall performance of the 55 mph alternative against the evaluation criteria is better, and its impacts are easier to mitigate than the 65 mph alternative.

Recommendations and Presentation of Recommendations

After examining the figures and alternative evaluation matrices, the PLT agreed the 55 mph alternative in Dowd Canyon and Floyd Hill was preferred because the 65 mph alternative has more impacts and fewer or similar benefits.

The PLT discussed the wording of the design speed recommendation for the corridor. The recommendation will be a corridor design speed of 65 mph with the exception of Floyd Hill and Dowd Canyon, which will have a lower design speed. The PLT agreed to recommend a “lower design speed” in these areas rather than a “55 mph design speed” to provide flexibility for future projects.

Next Steps

The PLT group should share any thoughts about the design speed recommendation over the next few weeks.

The team will go forward in writing up the final documentation and will send it to the PLT to review and provide comments. If the PLT wants to talk about the documentation and recommended mitigation measures in person, another PLT meeting can be scheduled either in person or by conference call; but this is not necessary and the PLT can share thoughts electronically if preferred. The team plans to have a final document for the PLT to at the end of November. This would allow for time to finalize the study by the end of the year.

Action Item Review

Action Items

	ACTION ITEMS	Responsibility	Status
1.	In the matrix, the team will present the evaluation of the second safety performance measure in separate columns, labeling them each N/A but for different reasons, to clarify why there is not a comparison between them and why the concerns are different.	Jacqueline	
2.	Cost is a major factor that should be included with constructability and ability to implement; exact costs are unknown, and the cost will be discussed as an order of magnitude	Kelly	Complete
3.	In the matrix, quantify the amount of tunnel waste in cubic yards at this location.	Kelly	Complete
4.	In the figures, 55mph and 65mph designs will be shown on separate figures in the locations of difference (i.e., Dowd Canyon and Floyd Hill)		
5.	In the figure, the boxes labeling the existing less than 55 mph curves should state their approximate design speed.	Rachel	
6.	Include community's concern about the impact of the tunnel construction debris on the well and septic systems in the community values criteria in the matrix.	Rachel	
7.	Look into the previous findings about rockfall/landslide hazards in the area and determine if the rock cuts would merely increase the potential for hazards, or should be avoided entirely.		
8.	Provide a smaller scale figure to show rock cut detail.	Rachel	
9.	In the Floyd Hill matrix, change roadway prism to roadway footprint.	Kelly	Complete