



**21685 West Vail Pass Auxiliary Lanes
Technical Team Meeting #2 Final Meeting Minutes**

March 7, 2018

Miller Ranch Community Center, 25 Mill Loft Road, Edwards, CO

Action Items are shown in bold italics.

1. Attendees

- a. TT Members in Attendance
 - i. Joel Barnett, FHWA
 - ii. Martha Miller, Program Engineer, CDOT Region 3
 - iii. John Kronholm, Project Manager, CDOT Region 3
 - iv. Karen Berdoulay, Resident Engineer, CDOT Region 3
 - v. Matt Klein, US Forest Service (by phone)
 - vi. Ben Gerdes, Eagle County
 - vii. Greg Hall, Town of Vail
 - viii. Dick Cleveland, Representing Vail Town Council
 - ix. Tracy Sakaguchi, Colorado Motor Carriers Association
 - x. Kevin Sharkey, ECO Trails
 - xi. Matt Montgomery, US Army Corp of Engineers
 - xii. Craig Wescoatt, Colorado Parks & Wildlife
 - xiii. Michelle Cowardin, Colorado Parks & Wildlife (by phone)
 - xiv. John Stavney, NWCCOG
 - xv. Richard Duran, Colorado State Patrol
 - xvi. Scott Jones, Colorado Snowmobile Association
 - xvii. Siri Roman, ERWSD
 - xviii. Don Connors, Consultant Project Manager, Amec Foster Wheeler
 - xix. Leah Langerman, Consultant Public and Stakeholder Involvement Coordinator, David Evans and Associates
 - xx. Kara Swanson, Consultant Environmental Task Lead, David Evans and Associates
 - xxi. Craig Davis, Vail Fire
- b. Others in Attendance
 - i. Matt Figgs, CDOT Region 3
 - ii. JJ Wierema, Consultant Roadway Designer, Amec Foster Wheeler
 - iii. Stacy Tschour, David Evans and Associates
- c. Introductions & Agenda
 - i. The group did introductions and John presented items that have occurred since the last Technical Team (TT) Meeting.
 - 1. An agency scoping meeting was held with various federal and state agencies, and a public open house was held in Vail.
 - 2. The project team has also been invited to present at the Town of Vail's upcoming Community Meeting on March 13th.
 - ii. John presented the topic for this TT meeting which was to discuss the pros and cons of different lane and shoulder widths for future improvements.



1. Emergency service providers were invited to this TT for their input, but many of them could not make the meeting. There is a scheduled Issue Task Force (ITF) meeting with those personnel to hear their input on this topic.
 - iii. The agenda for today's meeting was presented.
 - iv. The Project Staff asked if the group received the meeting invite, agenda, and presentation materials.
 1. ***The Town of Vail may have not had all their staff on the list. The Project Staff will follow up to make sure all pertinent Town of Vail personnel are on the email distribution list.***
 2. **Wrap Up from TT #1**
 - a. The meeting notes from TT #1 and the Success Factors Flow Chart was sent out to the TT prior to the meeting.
 - i. Following TT #1, only one comment was received from ECO Trails regarding additional safety details for the bike trail.
 - ii. The group agreed that the meeting notes and flow chart successfully captured what was presented and discussed at TT #1.
 - b. The Chartering Agreement was also updated and finalized based on TT #1.
 - i. Bicycle Colorado was contacted about their interest to be a part of this TT and they declined, so they were removed from the TT list.
 1. ECO Trails asked if they could reach out to Bicycle Colorado for their consultation on items and the project team agreed that would be appropriate
 - ii. There are still attempts to reach out to the Summit County Chamber of Commerce to see if they would like to be a part of the TT for future meetings.
 - iii. The Charter Agreement was passed around to the group for signatures.
 1. ***The Project Staff will send a copy of the signed Charter Agreement to the TT.***
 2. The Chartering Agreement and Success Factors Flow chart are part of the I-70 Mountain Corridor CSS process for CDOT.
3. **Alternative and Design Option Process**
 - a. The upcoming TT topics were presented to the group for TT's #2, #3, & #4
 - i. The purpose of the TT meetings is for the project team to receive feedback and insight on different design considerations, not to reach consensus on design details
 - ii. Several ITFs will be held over the coming months as well to get into more detail on specific topics
 - b. Kara talked about the difference between an Alternative and a Design Option
 - i. Alternatives will be screened in a formal process against the Core Values
 - ii. Design Options don't go through the formal process, but will be discussed in the group and informally screened against the Core Values
 - c. The overall schedule of the project was presented and the TT and ITF meetings were highlighted
4. **Detailed Safety and Traffic Operations Discussion**
 - a. Stacy presented detailed safety and traffic data from the West Vail Pass corridor



- i. The top 60 busiest days of the year are all during the summer, with Sundays being typically the busiest day of the week (especially eastbound [EB]) and Friday being the busiest day of the week for westbound (WB)
- ii. Average truck volume is ~11% daily, but it is lower on the peak days
- iii. The term Level of Service (LOS) was described as a nationally recognized definition of delays, density and speed along a corridor and is rated on an A-F scale, with A being best and F being worst (A = free flow, C = traffic is around you but no impact to speed, D= beginning of friction, E = starts of noticeable delays, F = failing conditions)
- iv. It was asked if project specific traffic counts were generated or if CDOT's automatic counter was the only counter used
 1. Stacy replied that specific counters were used and then compared to CDOT's auto counter (the data did correlate)
- v. Another question was asked on if trucks are separately counted and then incorporated into the LOS calculation
 1. Stacy replied that all of that data is counted and included in the rating
- b. The emergency truck ramp usage was shown to the group for the past 3 years
 - i. Those ramps have been used 24 times in the past 3 years
- c. Stacy then presented a series of slides on closures on Vail Pass from CDOT's traffic safety report
 - i. Most of the closures occur during the winter months
 1. 2016 data shows a spike in closures resulting from a bad winter weather year
 - ii. Partial closure (i.e. lane closures but not full closure of I-70) data was also presented to the group
 1. Trend shows average duration per closure has gone down on average from 2014 to 2017
 2. John Kronholm added that CDOT does not include data on planned road closures in this material, just emergency closures
 3. John Stavney commented that he has noticed CDOT has been improving at not doing road work on weekends and holidays the past year
- d. Information on crash locations by milepost was presented to the group. The data shows some areas of higher crash frequency that may be associated with curves, grades, and/or bridges.
 - i. Greg asked if that data was separated between EB & WB directions
 1. Stacy replied that it was in the safety report, but the graph in the slideshow does not show it broken out
 - ii. Stacy stated that the crashes along the corridor primarily occur with icy and/or snowy pavement conditions
 1. Most crashes are in the WB direction, but there are some areas with more crashes in the EB direction
 - iii. Trucks are involved in a higher percentage of crashes from Mile Marker (MM) 182-182.5
 1. Tracy asked if the trucks were at fault for those crashes
 - a. Stacy replied that the safety report does not denote fault in crash data, so that is unknown



2. Capt. Duran stated that the MM 182 area is near the truck ramp and that the truck ramp design is not up to standard and many trucks miss the ramp and crash in this area

5. Roadway Lane and Shoulder Widths

- a. JJ presented the existing roadway conditions of the corridor including the layout of the interstate (i.e. wall in median, bifurcated, etc.), as well as the existing lane and shoulder widths
- b. The goal of the project team in developing design options is to balance safety, cost, and impacts with any improvements to the interstate
 - i. JJ showed a table of potential crash reduction factors which gives data on average national crash reduction factors per number of lanes, lane width, and shoulder width
 1. This data is a national average and not specific to the location of Vail Pass, and that data is not additive if multiple factors are combined in a future design. This data will be used as a guideline and more specific crash reduction factors will be determined as the design progresses
 - ii. JJ showed some slides that show widening and how that would lead to impacts with a larger footprint along the corridor
 1. Several questions were asked by the group about the difference between what the project team characterized as major vs minor widening
 - a. John Kronholm said that adding a third 12' lane would be considered major, but the project team wanted to look at minor widening (i.e. add 12' lane but shrink shoulders) for a comparison. No definitive widths have been determined yet.
 2. Craig asked how much of the corridor is constricted to where major widening would have significant impacts
 - a. The project team replied that most of the corridor is constrained by the terrain
 - b. If a smaller footprint is constructed, the crash reduction factors are lessened, but a bigger footprint leads to more impact and most cost
 3. Karen stated that there are many competing interests and the project team's desire is to gather feedback on those issues so a roadway template for I-70 can be decided.
 - a. Joel asked why the EA couldn't clear a standard roadway template for maximum impacts and then any design options that are less impact would be a benefit and lessen impacts. Why not clear the standard template and then used practical design to refine template with during design process?
 - i. JJ stated that the standard template may vary in different locations due to multiple factors and that the project team wants to understand the varying widths that would be acceptable to the TT
 - ii. Kara also said CDOT wants stakeholder input on this process



- b. Scott added that while wider lanes and shoulders lead to more safety, would that lead to more roadside parking leading to an unsafe condition.
 - i. Per law, FHWA does not allow access off the interstate (drivers can be ticketed for parking on I-70). While roadside parking currently takes place along the corridor, it is an illegal practice
 - ii. State Patrol is typically not ticketing those pulled off of the roadway, only those who are physically on the shoulder
 - iii. Greg asked if the Forest Service easement did not have an access control line and thus did not prevent accessing the forest from I-70
 - 1. John K. was not aware of any provision that would allow that
 - iv. Martha stated that CDOT Region 3 Traffic has expressed interest in addressing this issue
- iii. JJ then talked about the cost considerations of widening. This particularly comes into play at the bridges that are difficult and expensive to widen
- c. JJ stated the starting point for the project is based on the I-70 Mountain Corridor PEIS which stated an auxiliary lane needs to be added in each direction
 - i. The current roadway width as well as the standards for lane width and shoulders were shown to the group
 - 1. Those standards are not set and are variable in different locations
 - ii. Greg asked if the PEIS had a recommended design speed and if the standard widths were from the recommended speed
 - 1. The PEIS recommended a 65-mph design speed. The standard widths do take that speed into account, but also have other factors such as terrain, lane usage, etc. The standards are more for road classification (i.e. interstate, local, etc.), not just the speed of the road
 - 2. John K. stated that CDOT HQ commissioned a speed study to follow up the PEIS and that's where the design speed was set
 - iii. Craig asked if the bridges were pinch points and the standard width can't be obtained, what other options are there
 - 1. Karen stated that CDOT could replace those bridges with a new bridge with a bigger width. That does mean more cost and impacts, but a safer condition.
 - 2. The project team doesn't have a direction on what to do with the bridges yet and wants input from the TT before making a decision
 - iv. Martha stated that shoulder widths give the most impact in safety reduction per the table. She stated her experience recently on the east coast on a highway with wide shoulders that pinch down at the bridges was a safety hazard in the area. She encouraged the TT to look at other roads they drive and compare them to what design options are out there.
 - v. Craig stated that it is important that the wildlife passages under the current bridges remain in place. Any changes to the bridges or location could increase



- vehicle/animal collisions or severely deteriorate the amount of wildlife in the area
- vi. John added that as of now, with the narrow shoulders, when a truck breaks down, CSP & Maintenance will have to close a lane rather than just close the shoulder.
 - vii. Greg stated that if bridges have to be reconstructed, one of the sister bridges should be wide enough to handle 2 lanes in each direction for construction phasing
 - 1. Karen added that a future TT meeting will talk about construction phasing
 - viii. John S. added that for driver feel, changing pavement widths (from wide to narrow at bridges) distracts drivers. He asked if CDOT would narrow leading up to a bridge to give a driver a narrow feeling prior to getting on a bridge on a curve rather than just widening the bridge
 - 1. The project team stated that is a good idea worth looking at
 - 2. John S. added if there was opportunity to pilot a few options (low cost, ITS, signage, etc.) in winter conditions to improve the safety
 - a. Karen replied that construction funding is not identified currently, so no opportunity currently, but could add to an early package if funding comes in waves
 - ix. Capt Duran added that while the crash data doesn't always show crashes on the bridge, the bridges do cause many crashes (constriction and ice). Keeping narrow bridges would keep an unsafe condition. In his opinion the wider and straighter the road, the safe. ITS solutions to help manage traffic will also be a big benefit (not just at the top, but along the whole corridor – VMS boards, lane usage, closure points, etc.)

6. Alignment Corrections

- a. JJ presented on areas of poor existing roadway geometry and examples of what corrections could be made and what impacts they would have
 - i. There is correlation between substandard geometry and peak crash rates in areas. The project team wants to focus on correcting the geometry in these areas of correlation, not in the entire corridor
 - ii. The Narrows (MM 186) was specifically highlighted. Stacy added that this is one of a few locations along the corridor where there is a significant area of summer crashes (not just winter crashes). Don added that this is a compound curve which adds to the difficulty of driving in that location.
 - iii. John Stavney asked how future technology (i.e. V2I & V2V) will improve safety along the corridor especially in areas of substandard geometry
 - 1. John Kronholm replied that while emerging and future technology will improve safety, it can't be practically incorporated into the project at this time
 - 2. John Stavney asked if a tunnel option could be considered especially if it eliminates maintenance (snow and ice removal)
 - a. John Kronholm stated that while tunnels would not solve every issue, there could be an option to construct tunnels in a few locations. There are grade and technical challenges to installing a tunnel that have to be looked at



- b. At the Narrows specifically, with the amount of shade that currently existing on the road, JJ calculated that CDOT would have to remove around 1 million cubic yards of dirt to be able to get direct sunshine on roadway by 11am
 - iv. JJ showed a potential geometry fix at the Narrows location – this is one design and not a recommended alternative, but shown to demonstrate an order of magnitude of impacts in one specific area.
 - 1. Total re-alignments may not be required, just adjustments.
 - 2. The grades cannot necessarily be changed in many areas as a correction in one location would require designers to chase that change along the corridor where the grade is already at the maximum percentage
- b. John K stated that the group will talk about pros and cons related to lane & shoulder widths and alignment corrections
 - i. Siri asked if the LOS presented was the average or just during the peak times
 - 1. The LOS was just during the peaks, not the average
 - ii. Greg asked if traffic forecasting would be done so that this large investment would handle future capacity
 - 1. Stacy stated forecasting would be done
- c. Leah asked what items CDOT should consider in regards to lane widths along the corridor, especially with the Core Values in mind
 - i. Greg asked if the data from Straight Creek was looked at and compared to for alternatives for Vail Pass
 - 1. Stacy replied that the data will be looked at when developing alternatives and specific crash reduction factors for Vail Pass will be developed
 - ii. Craig asked what the minimum roadway section at the bridges could be implemented with minimal widening
 - 1. 1.5' shoulders with three 11' lanes could be done by adding a small amount to the bridges
 - 2. Traffic engineers' initial look at this configuration stated that this would lead to an increase in crashes at the bridges.
 - iii. John Stavney stated that total roadway width is more important than specific lane or shoulder widths as drivers cut lanes on curves, and in the winter drivers drive wherever clear pavement is available during snow storms
 - 1. Capt Duran concurred. If any lane could be reduced in width, the right lane would be the one to reduce as it is the slower lane. Higher speed lanes should be wider
 - a. The differential speed between middle and right lane is low (i.e. A truck passing another truck) but between the left and middle lanes, that differential is high (i.e. a car and passing a truck)
 - 2. Tracy asked to keep 12' lanes for the right lane for trucks. If a reduced lane width for the right lane is considered, a wider shoulder should be included to compensate for the reduced lane width
 - iv. It was asked if there are any studies about driver perception and safety reductions on 11' vs 12' lanes
 - 1. The project team replied that adding a lane has a greater impact than specific lane widths



2. The group discussed the pros and cons of 11' vs 12'
- v. John Stavney asked what CDOT's standpoint was on wider shoulders and trucks using those as climbing lanes
 1. John Kronholm stated "soft" data (data that is not empirically derived) shows 7 trucks per day break down in the summer in the uphill direction, and need that shoulder for breakdowns. In winter, as soon as a truck breaks down, all bets are off as to where that truck goes
 2. Dick said that shoulder width is the important because of snow storage. Narrow shoulders lead to less room to store snow, effectively making corridor narrower
 3. The general consensus was that a wider shoulder is more important than 11' or 12' lanes
- vi. Greg asked that lane widths be evaluated against emerging technology (i.e. the Arrivo test track – if it needs 12' or 13', it would be short sighted to go with a non-standard narrow template)
- vii. John Stavney cautioned that a broad scoped widening across the corridor may not be the best thing as it could increase overall speed. This is not a congestion project, but rather a safety and traffic operations project. Maybe only widening in specific areas would be needed
 1. Dick stated that operational changes would be needed to better maintain the shoulder in the winter rather than install wider lanes or a 3rd lane. He surmised that it was more cost effective to improve maintenance rather than build your way out of an issue.
 - a. Stacy replied that it may help in short term, but would not improve long term safety and traffic operations
- viii. Craig Davis stated with a 10' shoulder, a fire truck could drive up the shoulder in the case of a closure. Any narrower and a fire truck would not fit. Access for emergency services and tow trucks is a big challenge currently
 1. More width would increase the reliability of emergency response. Heavy tow trucks would probably need that same width as emergency responders
 2. Ben asked where the benefit of width diminishes on the shoulder
 - a. Craig replied greater than 12' would not be helpful
- ix. John Stavney asked if lighting was considered a safety improvement
 1. Capt Duran agreed that lighting on bad curves and in shaded areas helps crash rates
 2. John Kronholm responded that the project team will look at lighting
 3. Colorado Parks and Wildlife was asked if lighting affects the wildlife. Craig stated it does impact wildlife, but in areas like the Narrows with no animal crossings it may not be an impact. A review of this should be site specific.
- x. Greg stated sediment and sediment control should be considered in the roadway width discussion. More width means more area for sediment and that wider area will need to be considered in controlling the sediment
 1. Snow storage needs to be considered with something like a linear shoulder drainage system



2. Craig Davis asked where the drainage flows to? If a semi with chemicals spills, the outfall of that spill needs to be known. Craig stated that hazmat spills are a common issue on the pass
 - a. John Kronholm stated this should be discussed further in the SWEEP ITF as it is a good point of consideration
- xi. John Kronholm asked how much difference the width of the inside shoulder would make for emergency services
 1. The consensus was that the insider shoulder width wasn't as important as long as a wider outside shoulder was in place
 2. Wider than 6' actually reduces safety and increases crashes
 3. It was asked if the inside shoulder could be widened only on curves where drivers turn into that insider shoulder (so not widen in the whole corridor, but specific locations only) – and the project team stated that it can be considered
 - a. John Kronholm stated that correcting substandard geometry may mean larger insider shoulders would be needed regardless
 4. Stacy asked if the inside or outside shoulder would be more important to focus on
 - a. The group consensus was that it is more important to put width on the outside shoulder rather than on the inside
 5. Don asked if traffic data showed crashes on the insider shoulder and if there was opportunity to be location specific in insider shoulder width improvements
 - a. Stacy said yes in locations, but it will need to be looked at when determining corridor specific crash reduction factors
 - b. Capt Duran said Vail Pass is unique and 2' wider on the inside won't make a big difference. Other corrections would be better than a wider insider shoulder with the most important being outside shoulder width
 - c. Don added that not all of the corridor has concrete barrier on insider shoulder. Widening in those locations would be easier
- xii. Karen asked if there would be a difference in widths between uphill and downhill directions (mainly for summer considerations)
 1. Capt Duran stated added width to the insider shoulder downhill won't help. Extra width to the outside is better. The group agreed
- xiii. John Kronholm stated that CDOT's heavy tow program stages tow trucks to get the break downs off the road. The heavy tow will get the breakdown to a location where the road can be opened, then it is up to the driver to get down the pass later
 1. Capt Duran stated that an extra wide area (i.e. a safe haven) for heavy tow drop offs would be very beneficial (especially with an emergency turnaround at that location) and would improve response time and reduce closures
- xiv. Capt Duran asked if chain stations will be looked at with this project
 1. John Kronholm replied that it will be looked at as it is within the project limits, and especially if a lane is added impacting the chain station



2. Capt Duran said a wider chain up area, lights, and variable speed limit signs would help in this area
- xv. JJ asked if a narrow shoulder on the bridges would be tolerable (this would be for the entire bottom half of corridor as to not have variable widths)
 1. The group agreed this would be a bad idea and to keep the width on shoulder through the entire corridor is important
 2. Martha pointed out that Glenwood Canyon is a good example of a narrow shoulder and the safety concerns and hazards in the canyon would be carried over to Vail Pass.
- xvi. Greg asked what the minimal typical section in the PEIS was for Vail Pass
 1. **The project team did not know off hand and will need to look at this.**
 2. John Kronholm stated that any width less than the standard would need a design variance from FHWA
- xvii. JJ asked if there were any areas not identified in the alignment slides that should be looked at other than what was already identified
 1. Scott stated that having some place to get broken down vehicles off the road entirely (not just on shoulder) is very important for safety. The Rest Area could be used as a resource as a place of refuge
 - a. John Kronholm replied that the rest area was not looked at initially with the scope of the project, but this should be considered as this is a good point
 - b. Martha wanted to ensure this didn't become scope creep as there is statewide effort to look at rest areas. This should be compared to that effort and not overlap with it
 - c. Tracy added most CMVs use facilities just west of the rest area as it is too hard to get a truck into the rest area
 - i. Capt Duran stated CSP has had to send resources to Rest Area to help with stuck vehicles because it doesn't operate well
- xviii. Greg stated that the project team should evaluate where the widening will take place to prevent large fill slopes and bigger impacts

7. Next Steps

- a. Leah presented the next steps for the TT meetings
 - i. TT #3 is in 2 weeks and will talk about constructability
 - ii. TT #4 will talk about recreation and noise walls
 1. Those meeting invitations have been sent out to TT already
- b. ITFs will be in April and May, with the Emergency Services ITF at end of March
 - i. The Project Team will make sure invitation for Emergency Service ITF has been sent out
- c. **The Project Team will compile the pros and cons, the meeting minutes, and the signed charter and send out to team**
- d. Leah asked if it there was enough time to review documents if they are sent out the Friday before a Wednesday meeting?
 - i. The group agreed that was enough time
- e. Karen asked if the group felt they received enough information from project team prior to this meeting
 - i. The group agreed there was enough information sent



- f. Craig asked how the public open house went
 - i. Karen stated most comments received were in favor of the project. The project team is still compiling comments from the public and will send out to TT at future date.
 - ii. A lot of comments were received about wildlife concerns and protecting wildlife on the pass
 - iii. Greg stated that the Town of Vail was disappointed in the amount of notice for the public open house and would like to see more effort to notify public for future open houses
 - 1. Project team stated they will review their efforts on notification but followed the typical outreach process CDOT has for these open houses. The project team will work with the Town to help get information out in the future
 - 2. Greg stated that the Town's Community Meeting is a good opportunity to get more information out to next week (the project team will be in attendance)
 - 3. The project team is also looking at other public meetings to go to and still accepting public comments for next several months



Summary of Pros & Cons Discussion – Flip chart notes

WIDTH	PROS	CONS
Lane Width		
Narrower		<ul style="list-style-type: none"> • Passing more difficult for passenger vehicles • Possibly precluding future technology • Would require FHWA variance
Outside Shoulder		
Wider	<ul style="list-style-type: none"> • Better safety on curves • More snow storage • Room for pulling over/breakdowns • More emergency response area whether they drive on shoulder or down middle of travel lanes (fire truck fits in 10') • Heavy tows need 10' – Extra wide safe haven for tow drop-offs at top desired 	
Narrower		<ul style="list-style-type: none"> • Less snow storage could result in loss of a travel lane during breakdown • Less room for sediment collection/drainage facility • Less room for pull-overs/breakdowns
Narrower on bottom (6' from 186-180)		<ul style="list-style-type: none"> • Trucks already have issues in this area and could get worse <ul style="list-style-type: none"> • Need to have room for them to cool brakes or increase hazard • Make conditions even worse in an area already of great concern • Could require FHWA variance
Inside Shoulder		
Wider	<ul style="list-style-type: none"> • More snow storage • Moderate/increased potential for crash reduction • Better for safety on curves 	<ul style="list-style-type: none"> • Traffic could feel like they can pull over on inside • Can't see shoulder area in winter/snow anyway • Could take width from outside shoulder



Overall Template - What's important?

- Overall width geometry feel – driver comfort
- Could reduce #3 lane (slower) to 11'
 - CMCA would like standard width or if reduced lane need wide outside shoulder
- Most benefit could come from shoulder
- Not precluding future technology
- Lighting in shaded curves/problem areas
- Drainage and shoulder need to work together
- Outside shoulder seems to be most needed/used
- Exploring methods beyond only widening shoulders to improve safety (incorporate slope of roadway, variable speeds)
- Increasing width could impact wildlife and make crossings more difficult
- Consider amount of cut/fill needed and weigh impacts vs. benefits