Montana Department of Transportation
PO Box 201001
Helena, MT 59620-1001

MASTER FILE COPY

Memorandum

To: Lesly Tribelhorn, PE
Highways Engineer

From: Ben Nunnallee, PE
Missoula District Projects Engineer

Date: July 30, 2018

Subject: IM 90-1(227)0
Taft - West
UPN 9487000
Work Type 140 - Reconstruction – without added capacity

Please approve the attached Preliminary Field Review Report.

Approved _____ Date July 31, 2018
Lesly Tribelhorn, P.E.
Highways Engineer

We are requesting comments from those on the distribution list. We will assume their concurrence if we receive no comments within two weeks of the approval date.

Distribution:
Ed Toavs, Missoula District Administrator
Stephanie Brandenberger, Bridge Engineer
Lesly Tribelhorn, Highways Engineer
Roy Peterson, Traffic and Safety Engineer
Robert Stapley, Right-of-Way Bureau Chief
Lynn Zanto, Rail, Transit, & Planning Division Administrator
Kevin Christensen, Construction Engineer
Jeff Jackson, Acting Materials Engineer
Jon Swartz, Maintenance Division Administrator

Distribution (electronic only)
Tom Martin, Environmental Services Bureau Chief

cc:
Nathaniel R. Walters, EPS Project Manager, Missoula District
Ben Nunnallee, District Projects Engineer
Bill Squires, Missoula District Road Design Area Engineer

e-copies:
Located at the end of this document

Introduction

A field review was held on December 6, 2017. The following people attended:

Ben Nunnallee – District Projects Engineer – Missoula
Nate Walters – District Road Design Supervisor – Missoula
Mike Dodge – District Materials Supervisor – Missoula
Tanya Gates – Road Design – Missoula
Hunter Dow – Road Design – Missoula
Andy White – Pavement Analysis Section – Helena

An office review was held on April 23, 2018. The following people attended:

Ed Toavs – Missoula District Administrator
Shane Stack – Missoula Preconstruction Engineer
Steve Felix – Missoula Area Maintenance Chief
Robert Vosen – Missoula Construction Engineer
Donny Pfeifer – Missoula Construction Ops. Engineer
Susan Kilcrease – Missoula Project Development Engineer
John Benda – Missoula Engineering Project Manager
Mark Roedel – Missoula Area Surveyor
Nate Walters – Missoula District Road Design Supervisor
Tanya Gates – Missoula Road Design
Wayne Dykstra – St. Regis Maintenance Superintendent
Mike Dodge – Missoula Materials Lab – via phone
Slokm Burnham – Lost Trail Section Supervisor – via phone

Via Skype or phone in Helena:
Darin Reynolds – Surfacing Design Engineer
Andy White – Pavement Analysis Section
Jim Davies – Pavement Analysis Engineer
Ben Schendel – Hydraulics Engineer
Bret Boundy – Geotechnical Engineer
Chris Hardan – Bridge Area Engineer
Joe Weigand – Biologist
Jake Goettle – Construction Bureau – VA Engineer
Bethany Kappes – Innovative Contracting Engineer

Proposed Scope of Work

The proposed project will reconstruct the Interstate to current MDT design standards and replace the existing plant mix bituminous surface with PCCP. The project will also include drainage, environmental, traffic and safety improvements. The project will look into whether realigning the Lookout Pass Interchange ramps is feasible and will also look at the possibility of installing new wildlife crossings.

The project was originally nominated as a mill/fill pavement preservation, however the District decided to increase the scope of this project to a reconstruction when they were notified that they could nominate a capital improvement project on the Interstate. This scope change was approved by the Transportation Commission in April 2018.

This project will be designed in enhanced workspace as agreed during the review.

Needs and Objectives

The purpose of this project is to remove the existing plant mix bituminous surface that is deteriorating due to the harsh weather environment in this area. The plant mix will be replaced with a more durable concrete surface. Additional improvements to interchange layout, drainage, and wildlife crossing opportunities will be evaluated.

Public Summary

The purpose of this project on I-90 east of Lookout Pass is to replace the existing pavement and provide a new much more durable concrete highway. The project will evaluate additional improvements to the Lookout Pass Interchange ramp alignments, wildlife crossing facilities, roadside geometry, and other

miscellaneous safety improvements. The project begins on the Montana and Idaho border at reference post (RP) 0.0 and extends 5.7 miles easterly to the Taft interchange at RP 5.7.

Project Location and Limits

- Route: I-90, Principal Arterial - Interstate
- County: Mineral County
- Begin Project: Reference Post (RP) 0.0, at the Idaho - Montana border
  English as-built station 1+09.45
- End Project: RP 5.7, east end of the Taft Interchange bridge
- English as-built station 302+63.00
- Project Length: 5.7 miles
- Location: Township 20 N, Range 32 W, Section 32
  Township 19 N, Range 32 W, Sections 2, 3, 4, 5, 11 & 12

See the attached location map.

Work Zone Safety and Mobility

At this time, Level 1 construction zone impacts are anticipated for this project as defined in the Work Zone Safety and Mobility (WZSM) guidance. The plans package will include a Transportation Management Plan (TMP) consisting mainly of a Traffic Control Plan (TCP). A Transportation Operations (TO) component and a Public Information (PI) component to address interchange ramp closures and wide load detours will also be included in the plan package. These issues are discussed in more detail under the Traffic Control and Public Involvement sections.

Physical Characteristics

This section of I-90 is located in rugged, mountainous terrain within the Lolo National Forest. The project roughly parallels the upper reaches of the St. Regis River from RP 1.7 to RP 5.7. The adjacent terrain is heavily forested and sparsely populated. Local access is provided at two interchanges: Lookout Pass (RP 0.206) and Taft (RP 5.687). The Dena Mora Rest Area is located at RP 4.7.

The first 3.4 miles of the project has an undivided four-lane interstate typical section which consists of 4 – 12-foot lanes, a 10-foot flush median, and 2 – 10-foot shoulders. For about 600 feet at the Lookout Pass Interchange (RP 0.206), the shoulders are 14’ wide. The median has concrete barrier rail (varies back and forth from tall to regular height) installed throughout the section. The Lookout Pass – Interchange has one bridge crossing over the old railroad grade and crosses the St. Regis River twice using large culverts (15’ and 2 – 9’). There are ten horizontal curves and four vertical curves in this first 3.4 miles.

In the section of Interstate from RP 3.4 to 4.8 the Interstate divides into two independent alignments, eastbound and westbound. The typical section for both the eastbound and westbound sides is 2 – 12-foot lanes, a 4-foot inside shoulder, and a 10-foot outside shoulder. There is roughly a 200-foot wide median between the two alignments through the majority of this section. The median has a mixture of open grassy areas and forested areas with mature trees. There is one authorized-vehicle-only turnaround at RP 4.2, and Chippy Creek runs in the median for about 2,400 feet from RP 3.8 to RP 4.3. This section includes the Dena Mora Rest Area (RP 4.7), and a westbound chain-up area from RP 3.5 to 3.9 and an eastbound chain removal area from RP 4.4 to 4.6. There are three horizontal curves for both eastbound and westbound. There are four vertical curves and one PVI for eastbound and five vertical curves for westbound. This section ends within the middle of a horizontal and vertical curve for both alignments.

The last section of Interstate from RP 4.8 to 5.7 once again has an undivided alignment with 4 – 12-foot lanes, a 10-foot flush median, and 2 – 10-foot shoulders. The median has concrete barrier rail (both tall and regular height) installed throughout the section. This section ends at the Taft – Interchange and has two bridges. One bridge crosses over the old railroad grade and the other bridge is the I-90 overpass at the Taft Interchange. There are two horizontal curves and two vertical curves in this section.

Summary of the as-built horizontal curve data:

Combined Interstate sections (RP 0.0 to RP 3.4)							
PI Station	Rc (FT)	Lc / L (FT)	Ls (FT)	As-Built Super (%)	Super (%) (meeting current standards)	Design Speed Provided (mph)	Remarks
662+19.34	1,528.00	811.41	200	6%	7%	50	Idaho Curve Data, Ends on P.O.C. 664+49.4
662+19.34	1,528.00	811.41	375	6%	7%	50	Montana Curve Data, Starts on P.O.C 1+09.45
16+27.36	5,730.00	1,467.50		2%	3%	49	
33+00.00	2,292.00	697.60	250	4%	5%	46	
54+28.52	2,292.00	1,061.60	250	4%	5%	46	
68+61.10	2,292.00	409.80	250	4%	5%	46	
84+52.40	3,820.00	1,308.60	200	3%	4%	50	
113+84.80	1,432.50	509.90	400	6%	7%	48	
130+55.00	1,348.00	214.80	400	8%	7%	62	
150+22.20	1,091.00	1,315.90	500	8%	8%	58	
166+40.40	1,146.00	460.00	500	8%	8%	59	

Eastbound Interstate section (RP 3.4 to RP 4.8)							
PI Station	Rc (FT)	Lc / L (FT)	Ls (FT)	S.E.	Super (%) (meeting current standards)	Design Speed Provided (mph)	Remarks
191+51.20	1,637.00	1,110.70	350	7%	6%	57	
220+48.60	3,820.00	1,781.10	150	5%	4%	69	Spiral Curve(BK) - Simple Curve (AH)
264+02.60	1,654.00	1,104.20	350	7%	6%	58	Ends on S.C. 257+98.3

Westbound Interstate Section (RP 3.4 to 4.8)							
PI Station	Rc (FT)	Lc / L (FT)	Ls (FT)	S.E.	Super (%) (meeting current standards)	Design Speed Provided (mph)	Remarks
194+67.79	1,637.00	1,209.50	350	7%	6%	57	
222+14.50	4,584.00	2,842.50		3%	3%	55	
263+10.10	1,620.00	1,306.70	350	7%	6%	57	Ends on P.O.C. 258+03.7

Combined Interstate sections (RP 4.8 to RP 5.7)							
PI Station	Rc (FT)	Lc / L (FT)	Ls (FT)	S.E.	Super (%) (meeting current standards)	Design Speed Provided (mph)	Remarks
300+67.06	1,637.00	1,324.10	350	7%	6%	57	
300+68.06	1,146.00	865.20	500	8%	8%	59	EOP on P.O.C. 302+63.00

For this project, the horizontal curve design criteria for Rural Freeway (NHS – Interstate) will be used using a design speed of 50 mph in mountainous terrain:

- Minimum Radii – All curves meet the minimum required 760 feet radius.
- Superelevation Runoff lengths - Based off the as-builts, the existing superelevation runoff was placed within the spiral curves between the TS to SC and CS to ST. Comparing the as-built spiral curve lengths to the minimum design criteria, all curves meet the minimum requirements except for the two spiral lengths between two back-to-back reverse curves (PI Sta. 130+55.00, PI Sta. 150+22.20, and PI Sta. 166+40.40).
- Superelevation Rates – There are seven curves 1% too low based off their radii and current MDT design criteria. There are six additional curves that are 1% higher than required based off their radii and current MDT design criteria. From the previous SOW Report for the UPN 5830000, Taft – West project, it was noted that a survey crew measured the superelevations on five of these seven curves and determined they were indeed insufficient. The following is a summary of the five curves that were measured, along with their required superelevation rates for a 50-mph design speed, as-built superelevation, and field-measured superelevation.

PI Station	Required Superelevation	As-Built Superelevation	Measured Superelevation
16+27.36	3%	2%	2%
33+00.00	5%	4%	3%
54+28.52	5%	4%	3%
68+61.10	5%	4%	4%
113+84.80	7%	6%	6%

The existing vertical alignment meets or exceeds current MDT design criteria for a Rural Freeway (NHS – Interstate) with a 50-mph design speed in mountainous terrain. The maximum existing vertical grade is 6.00% from RP 0.21 to RP 2.23, which is less than the 7% maximum allowable (7% maximum allowable with approval by the Preconstruction Engineer, otherwise 5% desired maximum) for mountainous terrain.

The 1000-ft long crest vertical curve near the top of Lookout Pass (RP 0.13) provides desirable stopping sight distance (SSD) at 50 mph based on a 2-ft. object height. All other vertical curves provide desirable SSD for well over 50 mph.

The existing project surfacing inslopes are at 6:1 on all existing asphalt and there are varying slopes from the toe of asphalt to where they tie into the originally constructed 6:1 inslopes. Fill sections vary from 1½:1 (max) to 6:1, but the majority are on 1½:1 fills. Cut sections vary from vertical rock cuts to 6:1. The section of roadway from RP 3.4 to 4.9 has moderate cut and fill slopes. The rest of the project (4.2 miles) consist of steep cut and fill slopes. Large stretches of the project have concrete barrier rail on the outside of the paved shoulders in order to protect against the steep roadside slopes. The existing ditch sections consist of V-ditches and don't meet MDT geometric design standards which recommend 10-foot flat-bottomed ditches.

This section of I-90 was constructed by several projects:

1973 – I-IG 90-1(48)0, Lookout Pass – Saltese (RP 0.0 to 4.235): This project was the first stage surfacing for a two-stage project. The plant mix surface was placed wide enough to accommodate the second stage PCCP surfacing. The entire subgrade was cut on a 2% normal crown as well as the gravel grade for the driving lanes and median. The gravel grade on the shoulders was cut on a 3.75% which gave the gravel a tapering thickness. The following is a summary of the as-built typical sections (all noted shoulder measurements are the max thickness):

Station		NET	Shoulders (NC=3.75%)						Driving Lanes (NC=2%)						Median			TOTAL FINISH TOP
			Left (NC)			Right (NC)			Westbound			Eastbound						
From	To		Width (EXCLUDES SOME SHLD)	PMS	CAC	Width (EXCLUDES SOME SHLD)	PMS	CAC	Width (INCLUDES SOME SHLD)	PMS	CAC	Width (INCLUDES SOME SHLD)	PMS	CAC	Width	PMS	CAC	
1+09.45	5+86.80	477.35	12.80'	0.15'	0.70'	12.80'	0.15'	0.70'	26.00'	0.55'	0.30'	26.00'	0.55'	0.30'	10.00'	0.55'	0.30'	87.60'
5+86.80	12+00.00	613.20	17.10'	0.15'	0.70'	17.10'	0.15'	0.70'	26.00'	0.55'	0.30'	26.00'	0.55'	0.30'	10.00'	0.55'	0.30'	96.20'
12+00.00	44+00.00	3,200.00	12.80'	0.15'	0.70'	12.80'	0.15'	0.70'	26.00'	0.55'	0.30'	26.00'	0.55'	0.30'	10.00'	0.55'	0.30'	87.60'
44+00.00	181+40.50	13,606.80	12.80'	0.15'	0.40'	12.80'	0.15'	0.40'	26.00'	0.55'	0.00'	26.00'	0.55'	0.00'	10.00'	0.55'	0.00'	87.60'
181+40.50	200+02.40	1,861.90	6.40'	0.15'	0.40'	12.80'	0.15'	0.40'				26.00'	0.55'	0.00'				45.20'
200+02.40	224+00.00	2,397.60	6.40'	0.15'	0.40'	12.80'	0.15'	0.40'				26.00'	0.35'	0.20'				45.20'
181+40.50	225+00.00	4,359.50	12.80'	0.15'	0.40'	6.40'	0.15'	0.40'	26.00'	0.55'	0.00'							45.20'

1972 – I-IG 90-1(49)4, Saltese – West (RP 4.235 to 10.934): This project was the first stage surfacing for a two-stage project. The plant mix surface was placed wide enough to accommodate the second stage Portland Cement Concrete Pavement (PCCP) surfacing. The entire subgrade was cut on a 2% normal crown as well as the gravel grade for the driving lanes and median. The gravel grade on the shoulders was cut on a 3.75% which gave the gravel a tapering thickness. The following is a summary of the as-built typical sections (all noted shoulder measurements are the max thickness):

Station		NET	Shoulders (NC=3.75%)						Driving Lanes (NC=2%)						Median			TOTAL FINISH TOP
			Left (NC)			Right (NC)			Westbound			Eastbound						
From	To		Width (EXCLUDES SOME SHLD)	PMS	CAC	Width (EXCLUDES SOME SHLD)	PMS	CAC	Width (INCLUDES SOME SHLD)	PMS	CAC	Width (INCLUDES SOME SHLD)	PMS	CAC	Width	PMS	CAC	
225+00.00	257+60.60	3,303.70	12.80'	0.15'	0.40'	6.40'	0.15'	0.40'	26.00'	0.35'	0.20'							45.20'
224+00.00	257+60.60	3,398.30	6.40'	0.15'	0.40'	12.80'	0.15'	0.40'				26.00'	0.35'	0.20'				45.20'
257+60.60	302+63.00	3,909.91	12.80'	0.15'	0.40'	12.80'	0.15'	0.40'	26.00'	0.35'	0.20'	26.00'	0.35'	0.20'	10.00'	0.35'	0.20'	87.60'

1976 – I 90-1(80)0, Lookout Pass – Saltese (RP 0 to 10.934): This project was the second stage surfacing which placed 8 inches of Portland Cement Concrete Pavement (PCCP) in the driving and passing lanes. An additional 8 inches of plant mix was placed in the flush median and the inside and outside shoulders.

1988 – IR 90-1(107)0, Lookout Pass – Drexel [UPN 1000]: Silicone joint seal.

1996 – IM 90-1(124)0, Lookout Pass – Guardrail [UPN 2803]:
PCCP Grooving, replace guardrail with concrete barrier rail.

1999 – IM 90-1(136)0, Lookout Pass – Saltese [UPN 3850]:
The plant mix shoulders and flush median were milled 0.18' and filled 0.15' to the following widths:

Outside shoulder: 6' on 6-ft. shoulders, 6.56' on shoulders that were 10+ feet wide
Flush Median: full width (10')
Inside shoulder: full width (4')

All plant mix shoulders and medians were then chip sealed full width. Overlay and S&C the ramps at the Lookout Pass Interchange. Chip seal the ramps at the Taft Interchange.

2000 – IM 90-1(134)0, Median Rail – Lookout Pass [UPN 3585]:
Median concrete barrier rail, snow plow turnarounds and storm drains.

2001 – IM 90-1(135)0, Misc. Safety – Lookout Pass [UPN 3585000 (A585)]:
New changeable message sign.

2003 – IM 90-1(141)0, Lookout Pass – East [UPN 2703000]:
Intermittent slab replacement, PCCP grinding, dowel bar retrofit, crack and joint sealing, bridge deck overlay, replace approach slabs, guardrail end upgrades, and signing.

2007 – IM 90-1(142)2, Henderson – West [UPN 2703001]:
Replace bridge decks, replace approach slabs, drainage inlets and outfall culverts.

2011/12 – IM 90-1(184)0, Taft – West [UPN 5830001]: Crack & Seat the PCCP, overlay with 0.40' of plant mix surfacing, and followed by a full width seal & cover. Regrade the shoulders at a 2% grade. Reconstruct project tie-ins and bridge ends. Overlay and S&C the ramps at the Lookout Pass Interchange, Dena Mora Rest Area (partial length), and Taft Interchange. Replace median concrete barrier rail and other guardrail upgrades.

2015 – IM 90-1(216)0, Taft – West [UPN 8769000]: Seal & cover, fog seal WB (RP 0 – 3.4), fog seal EB (RP 3.4 – 5.7).

The Pavement Management System generated the following performance indices for the survey year 2017 and treatment recommendations for the years 2018 and 2020:

BEG MP	END MP	RIDE	RUT	ACI	MCI	CONSTRUCTION 2018	CONSTRUCTION 2020
0.0 (EB)	5.7	74.5 (fair)	74.5 (good)	87.4 (good)	98.2 (good)	None	Do Nothing
0.0 (WB)	5.7	78.6 (fair)	66.6 (good)	91.1 (good)	98.9 (good)	None	Do Nothing

There are four bridges within the project limits:

Structure Name	Identification No.	Length	Width	Remarks
Lookout Pass Interchange	L31174000+02001	274.9'	40.2'	Over I-90 Min. Clearance 17.41'
1.9M E Lookout Pass	I00090001+09821	157.6'	88.3'	
5M E Lookout Pass	I000900005+01481	304.4'	83.9'	Skew 68%
Taft Interchange	I000900005+06861	133.0'	82.0'	

Traffic Data

RP 0.0 to RP 5.7:

2017 AADT	7,520 – Present
2020 AADT	7,790 – Letting Year
2040 AADT	9,890 – Design Year
DHV	1,570
T	28.7%
EAL	1,155
AGR	1.2%

Crash Analysis

A safety analysis was completed on Interstate 90 (I-90) from reference post 0 to RP 5.7 for the 5-year period from January 1, 2012 through December 31, 2016. The analysis evaluates the project from a corridor-wide perspective. The entire project limits were evaluated using the safety performance functions (SPF's) and Level of Service of Safety (LOSS) models developed for rural mountainous 4-lane divided freeways. Non-intersection/non-interchange related crashes were utilized for this analysis.

Montana Highway Patrol records show 104 total crashes along this section of roadway for the dates January 1, 2012 through December 31, 2016. Of the total crashes, 102 were non-junction crashes, one crash was coded as an intersection related and 1 crash was coded as an entrance/exit ramp crash. The non-junction crashes included one fatal crash, twelve incapacitating injury crashes, ten non-incapacitating injury accidents, twelve possible injury crashes, sixty-three property-damage-only crashes and four crashes were coded as "unknown" severity. The crash patterns observed include: injury accidents, two vehicles, on road, concrete barrier, fixed objects, snow sleet or hail, snowy road, and icy road. There is also a concentration of wild animal crashes in the vicinity of RP 4.0 which is the section of the Interstate that is divided with a wide forested median and doesn't have the median concrete barrier rail that is located in the undivided sections.

Recommendations:

Based on the scope of this project and the crash analysis, it is recommended that linear delineation be installed on the eastbound curve at RP 5.0 and upgraded for westbound traffic to address a higher severity crash trend through this curve. Additional linear delineation of the outside of curves should be considered throughout the project limits.

Major Design Features

a. **Design Speed.** The geometric design criteria for Rural Freeways (National Highway System – Interstate) indicate that the design speed should be 50 mph based on the mountainous terrain. The existing posted speed limit is 75 mph (for trucks it is 65 mph).

b. **Horizontal Alignment**. This project will for the most part perpetuate the existing horizontal alignment. However, slight changes to the existing horizontal alignment may be made to better follow current design criteria, improve safety, and to allow for a larger chain-up area. The project will also evaluate potential additional improvements to the Lookout Pass Interchange ramp alignments. The interchange is configured as a partial cloverleaf interchange with loops in two quadrants (northeast & southeast). The loops are for the eastbound on-ramp and the westbound off-ramp and they both have an extremely tight radius

of about 70' which doesn't meet the design criteria at any design speed. There are also insufficient deceleration lengths, and other design features that don't follow current design standards. If additional improvements to these ramps are infeasible, design exceptions will be required. Revisions to the horizontal alignment may be necessary if new wildlife crossing structures are determined to be warranted and feasible.

The horizontal alignment will not be altered in the following locations due to existing structures which are to remain. The locations are as follows:

- Lookout Pass Interchange: Interchange cross-road overpass bridge.
- Bridge at RP 1.9: I-90 crossing over the old Northern Pacific Railroad which is now used for recreational access.
- Bridge at RP 5.1: I-90 crossing over the old Northern Pacific Railroad which is now used for recreational access.
- Taft Interchange: I-90 crossing over the Interchange cross-road.

c. **Vertical Alignment**. This project will for the most part perpetuate the existing vertical alignment. As previously stated in this report, the vertical alignment meets the design criteria with approval by the Preconstruction Engineer of the 6% grade. Slight changes to the existing vertical alignment will be needed if there are any changes to the horizontal alignment. However, the alignment will not be altered at the existing structures noted in the previous section. The project will also evaluate potential additional improvements to the Lookout Pass Interchange ramp alignments. As stated above in the previous Horizontal Alignment section of this report, the Lookout Pass Interchange ramps do not meet current design standards. The vertical alignments for the ramps will need to be adjusted if the horizontal alignments are modified. Revisions to the vertical alignment may be necessary if new wildlife crossing structures are determined to be warranted and feasible.

d. **Typical Sections and Surfacing**. The current typical lane configurations and widths will remain unchanged for this project. The current lane width configurations meet geometric design standards for Rural Freeway (NHS – Interstate) within mountainous terrain.

Due to the present AADT of 7,520, the extreme weather conditions at this location, and the lack of abundant pit sources, this project will replace the existing plant mix surface with PCCP. Further investigation will be done to determine the PCCP depth and base and subgrade layer sections. Asphalt pavement underlayment and subbase from rubberized existing material will be considered.

The superelevation of the new surface in the horizontal curves and transitions will be revised to follow current design criteria.

The roadside slopes and ditches will be regraded to accommodate the new roadway and the existing drainage will be perpetuated. Improvements will be made to the ditch sections from a v-ditch configuration to a flat-bottomed ditch where possible.

All the interchanges, the Dena Mora Rest Area, and the associated ramps are in much better shape as compared to mainline. Of these locations, the Taft Interchange and Dena Mora Rest Area are in the best shape and the Lookout Pass Interchange is in worse shape. The existing ramp connections to the new mainline alignment will be made with little need for modification. The ramps will receive a 0.20' mill/fill where necessary and a seal and cover.

The Pavement Management System lists "Do Nothing" treatments, however the treatment recommendation produced from the computer model decision trees is not truly indicative of the pavement condition in this area that has been observed by District staff and MDT Maintenance personnel responsible for this section of the Interstate. This section is in an extremely harsh weather environment area which receives a very large amount of moisture (both snowfall and rainfall) with numerous freeze/thaw cycles every year. The crack & seat and overlay project that was constructed in 2011/12 has just not held up nearly as well as it was hoped that it would. MDT had to come back and chip seal it once again with a pavement

preservation project only 3 years later in 2015, and the pavement is still today rapidly deteriorating based on field observations and input from MDT Maintenance personnel. A mill/fill pavement preservation project was nominated initially but the design team in coordination with MDT Surfacing and MDT Maintenance during the PFR process noted that the harsh conditions on Lookout Pass were rapidly degrading the recent pavement treatments. It was determined that the mill/fill scope would likely fail much earlier than it would on other roadways. Additional analysis indicated that the most appropriate and cost-effective treatment would be to replace the existing roadway with a concrete surface similar to the recent improvements made to the Interstate on the Idaho side of Lookout Pass. MDT's Pavement Analysis Section reviewed the scope change proposal and concurred with the recommendation. MDT's Planning Division also agreed that the proposed modification of the scope from mill/fill to reconstruction with a concrete surface is consistent with the goals and objectives identified in the Performance Programming Process (P3) as well as the policy direction established in TranPlanMT. The scope change was presented to the Transportation Commission and approved in April 2018.

e. **Geotechnical Considerations**. Minimal geotechnical investigation will be required associated with replacing the plant mix highway with PCCP which will generally be on the same horizontal and vertical alignment. According to MDT Surfacing, for the proposed concrete pavement design, it will be important to have uniformity in the base material below the new PCCP. MDT Surfacing and the District Materials Lab do not believe extensive soil borings will be required. They will evaluate the existing surfacing material and will design a new section that will utilize the existing material to create a new uniform base layer for the PCCP. Geotechnical investigation will be required if new wildlife crossing structures are determined to be warranted and feasible. Rockfall hazard mitigation will be evaluated and considered with this project as well.

f. **Hydraulics**. The condition of the existing culverts, rock drain chutes and drop inlets will be investigated to determine if they need repair or replacement with this project. There are several cross drains within the project which are 45+ years old. The numerous rock drain shoots throughout the project were principally installed with the original PCCP surfacing in 1976 resulting in the structures being approximately 42+ years old. In addition to the cross drains and rock drain shoots, there are several Type 3 drop inlets between RP 0.0 and 3.5. The drop inlets are connected to 18" RCP pipes with FETS end treatments and either an energy dissipater or rock drain chute. The drop inlets were installed with a project in 2000 and are approximately 18+ years old. All pipes will be evaluated in the Location Hydraulics Study Report.

g. **Bridges.** A summary of the bridges within the project limits is listed in the Physical Characteristics section of this report. The Interstate bridge decks were replaced in 2007 according the Structural Management System, except for the Lookout Pass Interchange bridge. At this time, other than deck sealing, there will not be any bridge work done with this project.

h. **Traffic.** The existing pavement marking layout will be used to re-stripe the roadway and all existing roadway signing will be replaced where needed on this project. Traffic Engineering will provide the quantities, details, plans and specification for the striping and signing. The pavement marking quantities will be included in the roadway plans. The conduit and wiring to the changeable message sign located in the median concrete barrier rail at Lookout Pass may need to be replaced due to replacement of the pavement and potential median concrete barrier rail replacement. There is also existing lighting along the chain-up area on the westbound side from RP 3.5 to 3.9 and along the chain removal area on the eastbound side from RP 4.4 to 4.6. This lighting won't likely be impacted by the construction of this project.

i. **Pedestrian/Bicycle/ADA**. There are no dedicated pedestrian or bicycle facilities. The outside shoulders which are 10 feet wide can accommodate bicycle traffic. Due to the nature of this reconstruction project, no new accommodations will be added. In the past, the Forest Service has indicated that they would like to see a pedestrian crossing between the

campground and rest area facilities on both sides of the Interstate at Dena Mora. A crossing structure would be nice, but the low anticipated use just does not justify the large additional expense of a long grade-separated structure at this time. A pedestrian crossing at Dena Mora will not be pursued with this project.

j. **Miscellaneous Features**. Rumble Strips: Shoulder rumble strips will be installed with this project.

Guardrail: Guardrail warrants will be investigated as the design progresses and existing guardrail will be updated to the new MASH standards.

Concrete Barrier Rail: Existing median concrete barrier rail will be evaluated and either reused or replaced depending on its condition. It was installed in 2011 and should generally be in pretty good shape. The existing two-loop concrete barrier rail where located on the shoulders will all need to be replaced with 3-loop CBR.

RWIS: An existing Roadway Weather Information System (RWIS) with cameras is located at RP 0.2. The reconstruct will disturb the RWIS sensors in the roadway which will need to be removed and replaced.

Chain-up/removal areas: The chain-up area is located along the outside westbound shoulder from RP 3.4 to 3.9 and the chain removal area is located along the outside eastbound shoulder from RP 4.4 to 4.6. The chain-up/removal areas have a surfacing section which consists of 0.65’ of PMS and 0.42’ of CAC with an average of 15.3’ of additional finished top width beyond the outside paved shoulder. The chain-up/removal areas will be reconstructed in concrete with the new project.

Turnouts: The turnout areas are located RP 0.50 (EB)., RP 1.6 (WB). and RP 2.3 (EB). The turnouts have a surfacing depth consisting of 0.20’ of PMS and 1.00’ of CAC. The turnouts will be assessed as to whether they will be left in place or replaced with a new plant mix section with the project.

Dena Mora Rest Area: The rest area facilities on either side of the Interstate were rebuilt and the parking areas expanded in 2003 under project IM 90-1(138)5 [UPN 3206]. The asphalt surface ramps and parking areas were last chip sealed in 2015. No further improvements will be made with this project.

k. **Context Sensitive Design Issues**. No specific context sensitive design issues were raised at the preliminary field review. The project will be designed with the intent of minimizing impacts as much as practicable in order to replace the asphalt Interstate with a new concrete roadway.

The project will look at the feasibility of new wildlife crossings and weigh whether the impacts and additional costs are justified by the potential reduction in wild animal collisions with vehicles and improvement to wildlife movements and connectivity in the area.

l. **Permanent Erosion and Sediment Control (PESC) Features**. There is evidence of roadside erosion along this corridor due to the adverse climate conditions that occur in this area. The soil of the adjacent forested mountains appears to be moderately fertile. However, the roadside grasses are quite thin on both sides of the highway due to sanding material and the steep roadside grades. There are existing erosion control features at culvert ends (energy dissipaters and rock drain chutes).

The Lookout Pass area has a relatively harsh overall climate. The weather ranges from short, moderately dry summers with typical daytime Fahrenheit temperatures in the 70s, an extremely wet climate in the fall and spring with numerous freeze/thaw cycles, and a very snowy climate in the winter. Daytime winter temperatures are in the 20s. About 23.70 inches

of annual Snow Water Equivalent occurs at the SNOTEL site at Lookout Pass. Winds are moderate in the corridor, although afternoon breezes and occasional gusty winds are not uncommon.

Other Projects
There are two other projects planned in the Lookout Pass to Taft area.

- UPN 9432000, Dena Mora Rest Area Evaluation, I-90, RP 4.4 to 4.8, Wastewater Study (Const. Date TBD)
- UPN 9366000, SF 169 - Mineral Cnty Sfty Imprv, I-90, RP 4.7 to 4.8, Curve Signing (Const. Date TBD)

There are several other projects planned along the Interstate in Mineral County. We'll evaluate construction traffic impacts along the corridor and opportunities to tie projects when the schedule of this project, and other nearby projects, become more definite.

Location Hydraulics Study Report
The Location Hydraulics Study Report will be prepared by the Hydraulics Section.

Design Exceptions
We anticipate design exceptions will be needed for the following design elements, primarily to avoid or minimize excessive infeasible construction costs, environmental impacts, or right-of-way impacts.

- Perpetuating the steep cut and fill slopes which are mostly protected by concrete barrier rail
- Perpetuating V-Ditches
- Perpetuating Lookout Pass Interchange horizontal and vertical alignments.

Perpetuating the 6% vertical grade will require an approval from the Preconstruction Engineer, but not a design exception. Other design exceptions may be identified as the design develops.

Right-of-Way
No new right-of-way acquisition, easements, or construction permits are anticipated, as the existing right-of-way should be adequate.

Access Control
The Interstate is a full access-controlled facility.

Utilities/Railroads
Railroads: There are no railroads in the vicinity of this project. No railroad involvement will be required for this project.

Utilities: Fiber optic cable, overhead transmission power lines near the Idaho border, and underground power exist along the roadway. The changeable message sign in the median at RP 0.0 has power supplied to it underneath the eastbound lanes. The Dena Mora Rest Area has underground power and sanitary sewer lines located underneath I-90 connecting the two facilities. The existing luminaries along the chain-up and removal areas have underground power.

The extent of the utility impacts will not be known until the design progresses. An effort will be made to avoid these utilities as much as possible, but it is likely that some of these utilities will need to be relocated. A field survey will be required to locate underground utilities.

Maintenance Items
At this time, it is not anticipated that any specific work will be required by MDT Maintenance forces in association with this project. Maintenance will receive the salvaged barrier rail and millings that is not being used for this project.

Intelligent Transportation Systems (ITS) Features
There is an existing overhead Variable Message Sign (VMS) located at the top of Lookout Pass at RP

0.03 for eastbound traffic. The sign pole is located within the median concrete barrier rail. It will be impacted by this project and will need to be removed and replaced. Implementation of additional ITS solutions are not anticipated at this time.

Experimental Features
There are no experimental features identified for this project.

Survey
A control survey, a Lidar photogrammetry aerial survey, as well as requested pickup surveys will be required. We are currently working with a Consultant to provide the control and aerial surveys in late summer of 2018.

Public Involvement
Level B is the appropriate level of public involvement at this time and may include some or all of the following:

Level B

1. News release explaining the project and including a department point of contact. Alternatively, contact with a newspaper or papers serving the area to develop a story and graphics that explain and illustrate the proposal. Radio and TV contacts.
2. Personal contacts with local government officials, interest groups.
3. Personal contacts with adjacent landowners explaining final design.
4. Construction notification and information during construction.

There could be a negative perception by some of the travelling public about “continually” doing construction on the pass seeing as we did the crack & seat of the concrete surface and asphalt overlay project in 2011, the project’s associated chip seal in 2012, another chip seal in 2015, and now this project to replace that asphalt surface once again to a concrete surface. However, it is not anticipated that this perception would be very predominant, and we likely wouldn’t receive much actual feedback due to the regional, not local, nature of the vehicles passing through this area. We’ve also been hearing from some travelers that they like the new concrete surface that has been recently constructed on the Idaho side of Lookout Pass and them wondering why Montana doesn’t do the same thing. There is frustration that the condition of the “new” asphalt surface on our side of the pass is noticeably not holding up and replacing it with a much more durable concrete surface would also be well received. As with many MDT projects, there will likely be differing perceptions by the travelling public - either positive, negative, or indifferent.

Environmental Considerations
As confirmed with Environmental Services, the appropriate level of Environmental Document is expected to be a Categorical Exclusion. No cultural or historical impacts are anticipated. A cultural resources survey will not be necessary for this project. Impacts to wetlands, streams, or irrigation considered ‘waters of the United States’ are possible; therefore, a Clean Water Act Section 404 permit from the US Army Corps of Engineers may be necessary. Stream Protection Act 124 notification is anticipated. The wildlife accommodations recommendation process will be followed. As stated previously in the Context Sensitive Design Issues portion of this report, this project will look at the feasibility of new wildlife crossings.

Energy Savings/Eco-Friendly Considerations
MDT will salvage the millings and any removed concrete barrier rail from this project for future maintenance activities. MDT Surfacing will evaluate whether existing plant mix and PCCP can be reused in the surfacing section beneath the new PCCP surface.

Traffic Control
Traffic will be maintained through the construction of the project with appropriate crossover detours, signing, etc. in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and MDT Standard Detailed Drawings. The work zone will require traffic to be merged into just one travel lane in each direction and all traffic will be detoured onto one half of the Interstate so that the other half may be constructed. Then the traffic will be detoured similarly to the newly constructed side so that the remaining half of the Interstate may be constructed.

A closed median detour crossover could be located at RP 73.5 in Idaho and east of the Taft Interchange at approximately RP 5.8. Coordination with the Idaho Transportation Department will be required to help locate the crossover on the Idaho side of Lookout Pass and get permission to construct and remove the detour.

Preliminary Construction Cost Estimate
The funding type for this project is IM with partial G-Match funding.

The nomination cost estimate (without IDC) that was originally programmed for this project was $4,675,000 (CN = $4,250,000 and CE = $425,000). The total nomination cost estimate including IDC was $6,061,334.

	Estimated cost	Inflation (INF) (from PPMS)	TOTAL costs w/INF + IDC (from PPMS)
(IM) CN	**$26,357,000**	**$945,632**	**$30,166,678**
G-Match CN	**$3,787,000**	**$135,869**	**$4,334,377**
TOTAL CN	**$30,144,000**	**$1,081,501**	**$34,501,055**
CE (8%)	**$2,412,000**	**$86,537**	**$2,760,633**
Project TOTAL from all of the funding types above:			
Project TOTAL CN+CE	**$32,556,000**	**$1,168,038**	**$37,261,688**

The estimate above includes $138,000 for traffic control, 15% allowance for contingency, and 9% for mobilization. The pro-rata estimates are applied to the sum total of all bid items and included in the non-G-match CN line. Traffic control, contingency, and mobilization are not applied to G-match bid items during project development. The Contract Plans Bureau will apply traffic control and mobilization pro-rata (as appropriate) when preparing the Engineer's Estimate for programming CN and advertising for bids.

Note: Inflation is calculated in PPMS to the letting date. If there is no letting date, the project is assumed to be inside the current TCP and is given a maximum of 5 years until letting. IDC is calculated at 10.49% for FY 2019.

The project cost has increased significantly due to the project scope being changed from pavement preservation to reconstruction.

Preliminary Engineering
The anticipated level of Preliminary Engineering for this project will be moderate as opposed to high seeing as this reconstruction project is on the Interstate, will for the most part follow the existing alignment, and there aren't any conflicts and constraints like there typically are on National Highway, Primary, and Secondary highway facilities. However, the design will be complicated if revisions are made to the Lookout Pass Interchange ramps or if wildlife crossings are included. Approximately 36% of the PE budget has been expended to this point. The project will require a modification (addition) to the current federal aid agreement for PE. The current PE budget programmed was for when the project was only a pavement preservation project. Now that the project scope has changed to a reconstruction project, the PE budget needs to be adjusted accordingly.

Project and Risk Management
The Missoula District Design Crew will be responsible for developing the plans. Nathaniel R. Walters will manage the design of this project. See contact information below:

Nathaniel R. Walters
Montana Department of Transportation
2100 West Broadway, PO Box 7039
Missoula, MT 59807-7039
(406) 523-5833

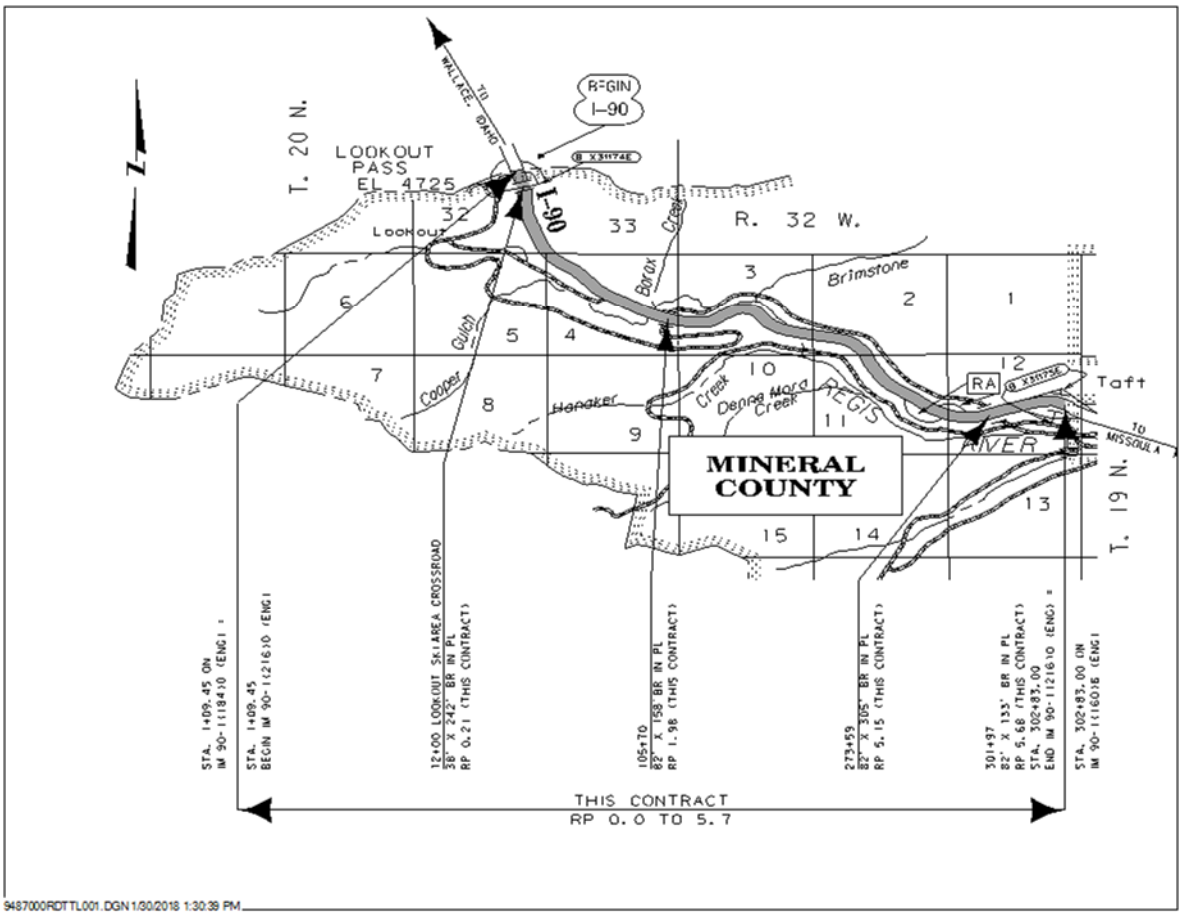
e-mail: nwalters@mt.gov

This project is not considered a Project of Division Interest (PoDI) by FHWA.

According to the Project Risk Documentation worksheet, this is a Medium Risk project. As far as reconstruction projects go, this project will be substantially easier than most to design due to it being on the Interstate and the alignment will not be changed except to make minor alterations. The improvements will stay within the existing right-of-way. Therefore, this significant risk factor to both project development time and to project cost is eliminated. The only unknowns that have the potential to significantly impact the project schedule or cost are revisions to the Lookout Pass Interchange ramps or addition of wildlife crossings.

Ready Date
A Ready Date will be established once the project overrides are complete and a schedule has been established in EPS. The Letting Date has not yet been established either. The current PE End Date is 12/31/2022. This project is not currently in the Tentative Construction Plan but the District would like to construct this project as soon as the project can be developed.

Site Map
The project site map is attached.



e-copies:

Dustin Rouse, Preconstruction Engineer
James Combs, Highways Design Engineer
Dave Hedstrom, Hydraulics Engineer
Bryce Larsen, Supervisor, Photogrammetry & Survey
Danielle Bolan, Traffic Operations Engineer
Ivan Ulberg, Traffic Design Engineer
Gabe Priebe, Utilities Engineering Manager
David Hoerning, Lands Section Supervisor
Jerilee Weibel, Acquisition Section Supervisor
Joe Zody, R/W Access Management Section Manager
Jim Davies, Pavement Analysis Engineer
Vacant, Surfacing Design Supervisor

Patricia Burke, Safety Engineer
Chad Richards, Engineering Cost Analyst
John Pirre, Engineering Information Services
Jan Nesset, Public Involvement Officer
Sue Sillick, Research Section Supervisor
Lisa Hurley, Fiscal Programming Section
Kurtis Miros, Engineering Division
Jeff Nehring, Engineering Division
Sheila Ludlow, Bicycle/Pedestrian Coordinator
Michelle Wheat, Bicycle/Pedestrian Coordinator
Tom Martin, Environmental Services Bureau Chief
Joe Radonich, Remediation and Assessment
Darin Reynolds, Construction Bureau – VA Engineer

Jeff Jackson, Geotechnical Engineer
Paul Johnson, Project Analysis Bureau
Jean Riley, Planner
Tom Gocksch, ESB, Engineering Section Supervisor
Dawn Stratton, Fiscal Programming Section
Amanda Jackson, Eng. Manager, Bridge Management System
Damian Krings, Road Design Engineer
Doug McBroom, Maintenance Division Operations Mgr (RWIS)
Bill Semmens, Environmental Resources Section Supervisor
Jon Axline, Historian
Vacant, Reclamation Specialist

Shane Stack, Preconstruction Engineer
Mike Dodge, Materials Lab
Maureen Walsh, Right of Way Supervisor
Robert Vosen, Construction Engineer
Ben Schendel, Hydraulics Engineer
Scott Gerken, Traffic Project Engineer
Joe Weigand, Biologist
Benjamin Nunnallee, Projects Engineer

Steve Felix, Maintenance Chief
Donny Pfeifer, Construction Ops Engineer
Christopher Hardan, Bridge Area Engineer
Bret Boundy, Geotechnical Manager
Susan Kilcrease, Project Development Engineer
Pat Metzger, District MCS Captain
Andrew White, Surfacing Design
Patricia Hogan, District Utility Agent
Ray Sacks, Constructability Reviewer