Montana Department of Transportation
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Helena, MT 59620-1001

Memorandum

To: Lesly Tribelhorn, P.E.
Highways Engineer

From: Damian Krings, P.E.
Road Design Engineer

Date: June 23, 2015

cc'd Road Dept

Subject: STPS 203-1(15)4
North of Stevensville-North
UPN 6138000
Project Work Type 140 – Reconstruction without added capacity

Please approve the Alignment and Grade Review for this project.

Approved _____ Date June 26, 2015
Lesly Tribelhorn, P.E.
Highways Engineer

We are requesting comments from the below distribution. If no comments are received within two weeks of the release date we will assume concurrence.

Distribution:
Ed Toavs, District Administrator
Kent Barnes, Bridge Engineer
Lesly Tribelhorn, P.E, Highways Engineer
Roy Peterson, Traffic and Safety Engineer
Robert Stapley, Right-of-Way Bureau Chief
Tom Martin, Environmental Services Bureau Chief
Lynn Zanto, Rail, Transit, & Planning Division Administrator
Jake Goettle, Construction Engineering Services Bureau
Matt Strizich, Materials Engineer
Jon Swartz, Maintenance Division Administrator

cc:
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Susan Kilcrease, District Project Development Engineer
Danielle Bolan, Traffic Operations Engineer
Ivan Ulberg, Traffic Design Engineer
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Joe Zody, R/W Access Management Section Manager
Matt Strizich, Materials Engineer
Jeff Jackson, Geotechnical Engineer
Jim Davies, Pavement Analysis Engineer

DOUBLE SIDED

John Pirre, Engineering Information Services
Paul Grant, Public Involvement Officer
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John McClafferty, Engineering Division
Wayne Noem, Secondary Roads Engineer
David Jacobs, Transit Section Supervisor

Darin Reynolds, Surfacing Design Supervisor
Bret Boundy, District Geotechnical Manager
Paul Johnson, Project Analysis Bureau
Jean Riley, Planner
Matt Maze, ADA Coordinator

Introduction

The office review was in Helena and Missoula via Polycom on March 18, 2015, followed by the field review on the 19th. The following MDT staff attended one or both reviews:

William M. Squires, Project Design Manager, Missoula Road Design crew	Helena
Chad Richards, CE Spec III, Missoula Road Design crew	Helena
Joshua Dold, Design Supervisor, Missoula Road Design crew	Helena
Joseph Weigand, Missoula District Biologist, Resources Section, ESB	Helena
John Sharkey, Engineering Specialist, Geotechnical Section	Helena
Shane Stack, District Preconstruction Engineer #	Missoula
Ben Nunnallee, District Projects Engineer	Missoula
Dean Jones, District Operations Engineer #	Missoula
Susan Kilcrease, District Project Development Engineer, Engineering Section, ESB #	Missoula
Darrell Williams, Field Project Manager, District Construction #	Missoula
Tyrone Cavanaugh, CE Specialist III, District Construction *	Victor

\# attended office review only
* attended field review only

Scope of Work

The proposed scope is to reconstruct the horizontal and vertical alignments to meet 60 mph design criteria, with the exception of two horizontal curves. The northerly 4.7 miles of the project was originally scoped as pulverization, but the design team agreed to revise the scope from a partial reconstruction and partial major rehabilitation to a total reconstruction in August 2013. The change to total reconstruction allows more flexibility to alter the horizontal and vertical alignments to provide acceptable connections to public road intersections and to avoid/minimize impacts to sensitive features identified during the design process.

The work will include clearing, grading, drainage, gravel, plant mix surfacing, signing, striping, fencing, and other miscellaneous items. Extensive right-of-way acquisition and utility relocation will be required.

Project Location and Limits

Secondary-203 is in Ravalli County and begins at the junction with Secondary 269 in Stevensville and ends in Florence at US 93. The project begins at RP 4.075, about four miles north of Stevensville, and about 200 feet south of the intersection of Wildfowl Lane and Moiese Lane. It extends northerly 5.85± miles to RP 10.145±, about 300 feet north of the intersection of Huckleberry Lane. The end of this project will tie to the beginning of BR-STPS 203 1-(11)10 Florence – East [4854], construction of which should be substantially completed in 2015.

The project length does not correlate to the difference in mileposts because the length of the proposed reconstruction segment from RP 3.89± to RP 5.46± is approximately 1.11 miles, about 0.4 miles shorter than the PTW segment it would replace.

Work Zone Safety and Mobility

At this time, Level 2 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 limited Transportation Operations (TO) component and a limited Public Information (PI) component to address user delays during peak hours will also be considered. These issues are discussed in more detail under the Traffic Control and Public Involvement sections.

Physical Characteristics

Secondary-203 (Eastside Highway) is functionally classified as a Major Collector. It passes through level to rolling rural terrain. The adjacent land use is generally agricultural and residential. There are numerous county roads, private roads, and private approaches intersecting S-203 within the project limits.

The Lee Metcalf National Wildlife Refuge is located west of S-203 between the highway and the Bitterroot River. The refuge is directly adjacent to S-203 between RP 6.2± and 7.1±.

As-built plan information is not readily available from RP 3.032 to RP 4.808, a county construction project reportedly built in 1945. The as-built plan information we do have is listed below:

Reference Post (RP)	As-Built Stationing	Project Number	Year
4.961 to 5.495	255+86.5 to 286+79.9	S-120(1)	1955
5.495 to 9.90	286+79.9 to 517+00±	S-170(1)	1955

According to the TIS Roadlog, the original surfacing on the county-constructed segment consisted of 0.25' of base course. It was subsequently covered with road mix bituminous surfacing. For the rest of the project, the original surfacing included 0.58' of compacted select borrow base course, 0.25' of top cushion course, 0.17'of road mix bituminous surfacing, and seal and cover.

Thin-lift overlays (< 0.20') were placed on Secondary 203 in1993 from RP 0 to 4.808 under RTS 203-1(2)0, Stevensville Northeast [2227], and in 1995 from RP 4.808 to 11.963 under RTS 203-1(3)5, Florence –South [2664.]

The current roadway width is 24 feet consisting of two 12-ft. travel lanes and no shoulders. Surfacing inslopes are 4:1.

Existing fill slopes less than 5 feet are 4:1, and fills greater than 5 feet have 1.5:1 slopes. Embankments 5 to 10 feet high were widened about 4 feet and those over 10 feet were widened 5 feet. Gravel was placed atop the widened embankments flush with the top of the cushion course.

Existing ditch sections have 4:1 inslopes that extend to 12 feet beyond the edge of driving lane, and a 10:1 ditch bottom 10 to 20 feet wide. Backslopes for cuts less than 5 feet are 5:1, cuts between 5 and 10 feet have 3:1 backslopes, and backslopes for cuts over 10 feet are 1.5:1.

All of the horizontal curves, except the two curves at RP 4.6 and RP 5.1, have radii well above the 60 mph design speed minimum of 1200 feet. None of the curves have spiral transitions. We do not have as-builts for the horizontal curve at RP 4.6, but graphical inspection of the photogrammetric mapping and cross-sections indicates its radius is about 210 feet and its superelevation is 8%. The 210-ft. radius is slightly less than the minimum radius of 220 feet for a 30 mph design (see Fig. 9.3A of RDM). The curve at RP 5.1 has a radius of 114.6 feet and 8% superelevation, which corresponds to a design speed of 24± mph (based on Equation 9.2-1 of the RDM: $V = [15R(e+f)]^{½} = [15*114.6(.08+.25)]^{½} = 23.8$ mph). Each of these two curves has warning signs with flashers and 20 MPH advisory speed plates.

The maximum grade is -4.522% at as-built station 483+00 (RP 9.25±), compared to the maximum grade of 5% for a rural collector in level terrain. All of the crest vertical curves meet 60 mph design speed criteria. The three sag vertical curves that do not provide 60 mph design speed stopping sight distance (SSD) are summarized below:

PI Station	(MP)	Length (ft)	SSD (ft) (570' min.)	Design Speed
320+97	(6.14)	400	462	53 mph
456+00	(8.70)	400	442	56 mph
486+80	(9.28)	400	317	41 mph

Horizontal Alignment *(updated plan & profile sheets discussed herein are* here *)*

The proposed horizontal alignment of S-203 generally follows the existing alignment, except for the two curves at RP 4.6 and 5.1, and except for a few deviations to avoid sensitive areas. The proposed alignment described below meets 60 mph design criteria, except as noted:

From (Approx. Sta.)	To (Approx. Sta.)	Alignment Feature (radius)	Remarks
POT 212+80	TS 234+61	2,181' tangent, with angle point at P.I. 215+62.06, Δ = 0°18'58" RT	Nominally matches PTW centerline, then gradually shifts to the east north of the PI..
TS 234+61	ST 245+66	590' curve (8% super), 176' spirals, Δ = 90°15'49" RT	Replaces 30 mph curve with **45 mph** curve. Diverges up to 162' SE of PTW. Will likely require complete acquisition of one parcel (with dwelling), and about 25% of the parcel to the east
ST 245+66	TS 257+29	1,163' tangent	Follows PTW centerline.
TS 257+29	ST 263+75	590' curve (8% super), 176' spirals, Δ = 45°38'15" LT	This pair of **45 mph** "broken-back" curves (8%) is connected by a 56' tangent (2% super) at the Ambrose Creek Road intersection. Replaces a 24 mph curve, and diverges up to 300' NE of PTW. The 2% superelevation on the short tangent will enhance left-turning maneuvers for towing vehicles at this high volume junction. A roundabout is also being considered at this intersection. See **Traffic**.
ST 263+75	TS 264+32	56' tangent	
TS 264+32	ST 270+65	590' curve (8% super), 176' spirals, Δ = 44°27'10" LT	
ST 270+65	PC 324+52	5,387' tangent	Follows PTW centerline.
PC 324+52	PT 334+61	3,000' curve (5% super), Δ = 19°15'16" RT	Transitions centerline from PTW to 15' right
PT 334+61	PC 349+95	1,535' tangent	Continues 15' offset right to avoid impact to Lee Metcalf National Wildlife Refuge. The east side of the road in this section is currently a farm field slated for development as a large residential subdivision.
PC 349+95	PT 358+20	6,000' simple curve (3% super), Δ = 7°52'34" RT	Transitions centerline back to PTW
PT 358+20	PC 386+90	2,870' tangent	Follows PTW centerline.
PC 386+90	PT 394+97	11,460' simple curve (2% super), Δ = 4°02'02" LT	Follows PTW centerline.
PT 394+97	TS 442+99	4,802' tangent	Heading projected easterly to move centerline 10± feet right to avoid high sliver fills and wetlands at the toe from 434± to 437±. This fill slope would also require retaining walls to stabilize the toe of the slope, per the Geotechnical report.
TS 442+99	*ST 460+95*	*2,865' curve (6% super), 162' spirals, After the AGR review we decided to increase the Δ from 32°34'19" to 32°44'11" LT*	Gradually shifts back to within 2' right of PTW centerline. Offset is still about 10' from 447± to 452± so that a short frontage road for the mobile home settlement can be perpetuated.

ST 460+89±	*PI 470+22*	*933' tangent. An angle point (Δ = 0°16"04" RT) was inserted at PI 470+22±. The centerline at this point will be 2' to 4' west of the AGR tangent.*	*This segment was revised from the AGR plans to reduce the easterly projection so that the centerline nominally matches the PTW centerline at 470+23. This will enhance avoidance of the scar tree, which is about 56' east of PTW centerline. The revision still allows acceptable grades for the Log Cabin Lane approach at 475+50, along with several other approaches on the west side .*
PI 470+22	*PC 494+64*	*2,442' tangent*	*Gradual shifts centerline to about 6 feet east of PTW to avoid undesirable impacts on the west, and also to generate excavation from hillside to the east.*
PC 494+64	*PT 504+09*	*11,460' simple curve (2% super), Δ = 4°43'37"RT*	Transitions centerline back to PTW
PT 504+09	521+43± BK = 518+62.8 AH	1,734' tangent	Follows PTW centerline, ties into 44' top on Florence – East project.

Vertical Alignment

The alignment described below meets the criteria for a 60 mph design speed. The grades range from +0.167% to -4.022%.

From (Approx. Sta.)	To (Approx. Sta.)	Alignment Feature	Remarks
BOP 212+80	VPC 276+00	Three grades: +0.264%, +0.523%, and +0.167%, connected by a 1,200' sag and a 1,200 ' crest	Where the centerline matches PTW, the profile is 1' to 2' above it. The profile is up to 4' above ground along the first flattened horizontal curve, and ranges from 3' below to 3' above it along the second flattened horizontal curve.
VPC 276+00	*VPC 306+75*	*Three grades: +0.167%, +1.100%, and - 0.571%, connected by an 800' sag, and a 1,000' crest.*	*After AGR review, the sag was added at VPI 280+00 and the crest VPI was shifted south 300' to 290+00. This reduced the grade raise at 280+80 (Three Mile Creek crossing) from 4' to 1.7'. The profile is still about 1.9' above the minimum that Hydraulics calculated in their preliminary recommendation. The lower grade reduces impacts to the adjacent properties and approaches.* However, the profile may change, pending final Hydraulic recommendations. Environmental Services has requested that the structure accommodate wildlife crossings, if it can be done at a reasonable cost.
VPC 306+75	VPT 388+00	Six grades of -0.571%, -3.040%, -0.825%, +0.802%, -0.929%, and +0.227% are connected by an 850' crest, a 1,300' sag, an 1,100' sag, a 1,200' crest, and a 1,000' sag.	The profile is raised about 4' at 321+00 to provide clearance for the SUP tunnel. Along the rest of the section, the profile ranges from 1' below to 2' above the PTW.
VPT 388+00	VPT 492+75	Six grades: +0.227%, +0.940%, -3.091%, +0.934%, -4.022, and +1.462% are connected by a 1,500' sag, a 1,000' crest, a 1,000' sag, an 1,100' crest, and an 850' sag.	The profile is generally 2' below PTW, but increases to 4' to 5' below it from 476+00 to 486+00 to increase the sight distance from school bus turnaround at Sta. 474+50±
VPT 492+75	EOP 521+43	Two grades: +1.462% &+0.449% connected by a 1,400' crest	Generally 2' below PTW up to 503+00, then nominally matches PTW to the end of project.

Surfacing and Typical Section

Surfacing Design's recommendation for a 20-year design life is 0.30' plant mix surfacing and 0.65' crushed aggregate course for the reconstruction surfacing section. The recommended plant mix is ¾" Grade S, and the binder is PG 64-28. Surfacing design was based on 2006 traffic data projecting 56 ESALs and a subgrade with an R value of 30. The 2014 traffic data updated the projected ESALS to 116, but this does not affect the recommendation.

A seal coat with Type I cover material and CRS-2P seal oil will be placed full width atop the pavement.

We propose a top width of 44 feet, which will accommodate a 12-ft. through lane and a 4-ft. shoulder in each direction, along with a 12-ft. two-way-left-turn lane/dedicated left turn lane that will straddle the centerline. The 44-ft. top width was determined several years ago through the Roadway Width Decision process.

The top width was re-evaluated after the most recent public meeting in October 2014. The 44-ft. top is still valid, given the current and projected traffic volumes (2014 AADT = 3500, 2037 AADT = 7320); the number and spacing of public approaches (five of which warranted a left turn lane in the 2007 study); and the private approach density. The 44-ft top will generally be striped as a TWLTL or a dedicated left turn lane. We agreed that at least for the initial construction, the TWLTL section from RP 6.2± to 6.9± (Sta. 320 to 380) could be eliminated, and the road striped for passing where appropriate.

An additional 12 feet of widening is proposed on the right side from Station 257+85± to 263+35± for an eastbound right-turn deceleration lane for the Ambrose Creek Road approach.

The shoulder width will be increased from four feet to ten feet for mailbox turnouts at various locations throughout the project.

The proposed Shared Use Path (SUP) will generally be 10 feet wide, and will consist of 0.20 feet of plant mix and 0.50 feet of crushed aggregate course. We may reduce the width to 8 feet for short segments in constrained areas. We will generally strive to maintain an offset of about 12 feet from the edge of mainline pavement to the near edge of the SUP. The SUP will be chicaned in and out of approaches, and will be pulled in closer to the mainline pavement as needed in constrained areas.

Standard 6:1 surfacing inslopes are proposed. The subgrade shoulder will extend 6.5 feet beyond the edge of paved shoulder. As the project develops the standard 20:1 ditch 10 feet wide will likely be reduced or eliminated along some segments to reduce right-of-way impacts. Where v-ditches are proposed, we'll strive to provide a recoverable ditch section (i.e. 6:1 inslope with 4:1 or flatter backslope within the clear zone (30 feet from edge of driving lane).

In ditch sections that include the SUP, the inslope between the subgrade shoulder and the edge of SUP will generally be 4:1 or flatter. A v-ditch about one foot deep with a 6:1 inslope and a variable backslope is proposed beyond the SUP. This design has nominally the same right-of-way impact as a standard ditch section (6:1 inslope with 20:1 flat bottom).

Standard fill slopes are proposed, although we have identified several segments where we expect to steepen fill slopes to avoid/reduce the impact to cultural sites, wetlands, stream channels, and the frontage of residential home sites. We'll try to avoid steepening fill slopes to the extent that guardrail would be warranted, but that may not be possible along some segments.

Grading

The greatest impact on the grading is the widening of the road from 25 feet to 44 feet.
Virtually all of the excavation should be unclassified, with a shrink factor of 17 to 20 percent.

Although it is always desirable to achieve a balanced earthwork, that will be a secondary consideration. Our primary concern will be balancing the impacts to the roadside properties.

There may be opportunities for fairly short (10 to 30 stations) intermediate balance points. Much of the excavation will come from the large cuts to the east from Station 473+60 to 485+00 and from 487+50 to 505+00. We propose flat-bottom ditches along these segments to reduce the volume of unclassified borrow required. The preliminary quantities show 194,000 cubic yards of excavation and 216,000 cubic yards of adjusted embankment (20% shrink), resulting in 22,000 cubic yards of borrow.

Hydraulics

The major drainage that affects the roadway alignment is the Three-Mile Creek crossing at Station 280+85±. A very preliminary recommendation from Hydraulics called for a 14'-2" span x 9'-10" rise SSPPA set down two feet, plus a 6-ft. CSP overflow culvert. The minimum road grade elevation for this proposal is 3299.63 feet, which virtually matches the PTW profile.

Ideally, we'd like to limit the grade raise through this area to minimize impacts to the roadside properties. The 4-ft grade raise shown over the creek on the AGR plans is about as high as we could go without major impacts to the three approaches south of the creek (Fawn Lane – 277+78 Rt, private - 279+21 Lt, private - 279+50 Rt) and one approach north of it (281+71 Rt). Even with just a 4-ft. grade raise, these approaches will have to be rebuilt for 100 to 150 feet off the highway.

If we can justify the cost of a bigger structure to provide wildlife passage, the AGR profile appears to be high enough to accommodate an SSPPA as big as 18'-1" x 11'10'. We will consider lowering the profile along this segment to the minimum grade the recommended structure will allow. This will likely be done by inserting another VPI just north of the crossing.

The only other crossing that will be a controlling feature for the profile is the proposed tunnel for the Shared-Use-Path (SUP) at Station 319+82. The grade over the structure was raised slightly from the AGR plans so that the elevation of the box culvert could be raised enough to allow a maximum grade of 5% for the SUP as it descends from the crest at Station 312+50 to the tunnel.

The rest of the cross drains are 60" diameter and smaller (except for a 72" unused stockpass that provides a small drainage function). We are exploring the possibility of upsizing a few pipes that are in high fills to provide critter crossings. None of the upsized pipes will require revising the profile at any given location.

There are scattered irrigated fields adjacent to the highway, along with associated irrigation facilities, adjacent to and/or crossing under the road along the southerly 3.4 miles, and along the northerly 0.2 miles of the project. The as-built plans showed eight 18" irrigation pipe crossings, but some have been abandoned. Irrigation facilities that are being used will be perpetuated; those that are not will be abandoned.

Generally, the impact to irrigation facilities will be relatively minor, and will not be a controlling factor in the selection of the horizontal and vertical alignments. Most of the impact will occur along the southerly 0.4 miles, where an irrigation ditch on the east side will have to be relocated, and at RP 5.1, where the proposed curve flattening will affect several irrigation crossings and an irrigated hayfield.

There is a large irrigation pivot centered about 1,400 feet east of Station 347+00 (RP 6.7). The proposed 15-ft. centerline shift along this section may impact the operation of the pivot from Station 342 to 354. If not, there is a chance the spray from the pivot could hit the SUP and/or the highway.

The delineated floodplain for the Bitterroot River is nominally adjacent to the west side of the highway at

Station 337+70, Station 349+30 to 362+70, Station 372+65, and Station 419+70 to 429+40. At all four locations the NAVD 88 Q_{100} elevation is well below any of our proposed slopes, so a floodplain permit will not be required.

Bridges

There are currently no bridges within the project limits. A bridge has been mentioned as a potential option for the Three Mile Creek crossing. However, a bridge built on existing centerline would have to be built in stages, and might still require a constructed detour to maintain even single lane traffic. A detour would likely cause undesirable, albeit temporary, impacts to the residences on either side of the road less than 100 feet south of the creek. Unless new information arises that indicates a bridge could be built with less roadside impacts than a large culvert, there will be no bridges.

Traffic

Traffic Engineering evaluated the public road intersections several years ago and determined that six intersections warranted a dedicated southbound turn lane. One of them (Ambrose Creek Road) also warranted a northbound right turn lane. For the left turn lanes, the total paved width will remain at 44 feet, so the grade and alignment will not be impacted by an increased pavement width. Our primary concern will be to provide adequate intersection sight distance at each of the intersections.

Traffic Engineering has developed a preliminary design for a 3-legged roundabout at the Ambrose Creek/Moiese Lane Intersection at RP 5.1. The southwest and northeast legs would access S-203, while the southeast leg would connect to Ambrose Creek Road. Moiese Lane would connect to the west side of the Ambrose Creek Road leg about 260 feet south of the roundabout. We will evaluate the two options for overall operation, right-of-way impacts, public perception, safety, and cost. The decision on which design will be advanced will be documented in the scope of work report.

Intelligent Transportation Systems (ITS) Features

No ITS features are proposed.

Miscellaneous

We propose to construct a shared use path (SUP) along the full length of the project.
The SUP will have a 10-ft. top width, 6:1 surfacing inslopes, and surfacing that consists of 0.20 ft. Plant Mix Surfacing and 0.50 ft. Crushed Aggregate Course. There may be a few short, intermittent segments where the width will be reduced to 8 feet to avoid/reduce impacts to cultural features and sensitive right-of-way properties. The SUP will nominally parallel the highway at a distance of about 12.5 feet (edge-to-edge of pavement). The offset distance will be reduced at public approaches and major private approaches through the installation of chicanes that will reduce path users' approach speeds and increase their visibility to motor vehicle operators on the approaches. As the design progresses, we may have to reduce the offset distance to a minimum of five feet along short, constricted segments.

We propose to begin the SUP at the north side of Wild Fowl Lane at RP 4.11 on the west side of S-203 (Sta. 215+00 LT). The path will remain on the west/north side through the curves at RP 5.1 and RP 5.6, and on to RP 6.18± (Sta. 319+85±). At that point the path will cross under the highway via a 10' x 10' concrete box culvert. The length of the SUP between Station 315+65 and 319+85 will be increased by introducing a series of four reverse curves that will allow the grade of the SUP to be no steeper than 5% as the elevation drops about 27 feet between the approach at Sta. 315+50 Lt and the tunnel opening.

On the east side of the tunnel, the SUP will gradually converge to parallel the highway via a pair of horizontal curves and a gentle grade. The SUP will stay on the east side of the highway to the end of the project. The southerly 410± feet of the SUP built under Florence – East (current Station 517+33 to 521+43) was built adjacent to a transition where the shoulder width increased from 0.6 to 4.0 feet. This section of SUP will have to be rebuilt to accommodate the constant 4-ft. shoulder proposed for

[6138000].

We propose to construct a school bus turnaround along the east side of the road in the vicinity of Station 475+50. This site is near the top of a crest vertical curve that will be lengthened to increase sight distance.

Mailbox turnouts will be constructed throughout the project as needed. We will look for opportunities to combine or shift turnouts to reduce impacts to the front yards of sensitive residential properties (see Environmental Considerations).

Design Exceptions

Design exception approval will be pursued for the following horizontal curves, each with a 590-ft. radius, compared to the minimum radius of 1,200 feet for a 60 mph design speed:

The curve Right at RP 4.6.

The pair of curves Left at RP 5.1, separated by a 56-ft. tangent section.

All three curves will be superelevated at 8%, which yields a 45 mph design speed. If a roundabout is advanced at RP 5.1, the design exception would not apply.

We are not proposing any vertical alignment elements that would require a design exception.

Other design exceptions that will likely be pursued and documented in the scope of work report include the following:

Roadway width (travel lanes &shoulders): We propose a combined travel lane and shoulder width of 32 feet, which will provide a 12-ft. travel lane and a 4-ft. shoulder in each direction. The current ADT (> 3000) and the DHV (> 400) require a 40-ft. top (i.e. 8-ft shoulders). The total paved width of 44 feet will include the 12-ft. two-way-left-turn lane/dedicated left turn lane, which splits the travel lane/shoulder in each direction.

Various fill slopes: As design progresses we expect design exceptions will be pursued for intermittent embankments:

Fill height 0 to 10 feet: steeper than 6:1
Fill height 10 to 20 feet: steeper than 4:1
Fill height 20 to 30 feet: steeper than 3:1

Various ditch configurations that could include v-ditches, inslopes steeper than 6:1, and backslopes steeper that standard for a given height of cut.

Right-of-Way

Right-of-way widths are typically 20 to 60 feet per side throughout the project. There are several sections where the right-of-way widths are 100 to 150 feet to accommodate large cut or fill sections. Proposed right-of-way widths will generally be 60 to 80 feet per side with several sections extending to 100 to 110 feet. We anticipate we will need to acquire approximately 35 to 40 acres to accommodate our proposed widened roadway and generally standard cut and fill slopes.

Along some sections, a grade raise combined with a centerline shift toward the uphill side can substantially reduce the impacts to the uphill (cut) side without severely impacting properties on the downhill (fill) side. Conversely, lowering the grade combined with a centerline shift toward the fill side can equalize the impacts on the fill side and cut side.

Although it is desirable to achieve consistent corridor width for the right-of-way, along some constrained segments we may have to acquire to just 10 feet beyond the construction limits.

As stated in the Location Study Hydraulics Report, the as-built plans show eight 18" irrigation crossings. Maintenance says most of these aren't being used since the agricultural land has been subdivided for housing. During the right-of-way appraisal process, Right-of-Way should determine which irrigation facilities can be abandoned.

Utilities/Railroads

There will be substantial utility impacts along virtually the entire length of the project.
An overhead power line parallels the east/south side from RP 4.0 to RP 5.1, where it crosses and parallels the west side from RP 5.1 to 9.1, and from RP 9.3 to the end of project. Another overhead power line parallels the east side from RP 9.2 to the end of the project. There are numerous service poles scattered throughout the project that are potentially in conflict. Notions to shift the centerline to avoid a given stretch of power line are not realistic because the impact to residential properties on the opposite side is likely not acceptable.

There are also buried telephone and fiber optic lines throughout the project, many will be in conflict.

There are no active railroad facilities in the project vicinity. However, right-of-way acquisition will be required from a parcel owned by Montana Rail Link (Station 228+20± to 238+20± Left).

Environmental Considerations

The major environmental concern is the Lee Metcalf National Wildlife Refuge, directly adjacent to the west side S-203 between RP 6.2± and 7.1±. The proposed horizontal alignment shift to the east will avoid impact to the refuge.

There are four features along the project which have been recommended eligible for placement on the National Register of Historic Places.

Station 220+70± to 222+90 LT±: The front of this residential structure is about 73 feet from the PTW centerline. Opportunities to avoid the property are limited due to the proximity of the structure to the beginning of the project limit, which precludes a major shift in the horizontal alignment. The angle point at P.I. Station 215+62.06 does shift the proposed centerline slightly away from the property. We will also minimize the distance from the edge of shared use path to the edge of highway shoulder.

Station 289+46± to 291+11 RT±: This property is on the northeast corner of the Eastside Highway and Three Mile Creek Road. The front of the residential structure is about 70 feet from the proposed centerline, which nominally matches the PTW along this constricted segment with residences fairly close to the highway on both sides. After AGR, we raised the profile so it nearly matches the PTW. This eliminated the ditch on the right, which pulled in the construction limits and reduced the impacts. We will also explore relocating the mailbox to the property's approach onto Three Mile Creek Road, about 240 feet east of the highway. This would eliminate the need for six additional feet of pavement along the highway frontage for a mailbox turnout.

Station 312+21± to 314+31± RT: The front of this residential structure is about 51 feet from the proposed centerline, which virtually matches PTW. The profile shown in the AGR plans was up to 1.4 feet below the PTW along this segment, and required a v-ditch along the right side. Subsequently, we raised the grade to nearly match PTW through this area to reduce extent of ditch excavation along the right side.

Station 470+22 RT±: A Ponderosa Pine tree that has been culturally modified ("scar tree") is located

about 56 feet east of PTW centerline, about 15 feet beyond the toe of a 13-ft. embankment. After AGR, the horizontal alignment was shifted about a foot west. This change, along with the lowered grade and reduced offset from shoulder to the SUP, will enable avoidance of the scar tree. However, a non-standard fill slope (possibly a 1:1 RSS) will be required instead of a standard 4:1 fill to maintain an acceptable distance (8 feet) from the toe of embankment to the tree.

Wetlands ("WL") have been delineated at the following locations:

Sta. 253+52± RT: 1a & LT: 1b
Sta. 3+50± to 4+20± LT (Moiese Lane): 2a
Sta. 264+50± to 266+40± RT: 2b
Sta. 263+00± LT to 266+10± RT: 2c
Sta. 280+60± RT: 3a & LT: 3b
Sta. 305+25± RT: 4a & LT: 4b
Sta. 379+00± RT: 5a & LT: 5b
Sta. 406+10± LT: 6a
Sta. 403+10± to 406+10± RT: 6b
Sta. 414+90± to 415+45± RT: 7a
Sta. 414+00± to 414+25± LT: 7b
Sta. 422+80± to 424+20± RT: 8a
Sta. 422+30± to 423+10± LT: 8b

All of the wetlands are adjacent to natural drainages or irrigation ditches that either cross under the highway or parallel it. Preliminary design indicates all but WL-2b will be impacted by roadway widening. Efforts to avoid/reduce impact to a given wetland by shifting the alignment would generally be futile because there would be increased impact to the wetland on the opposite side. There are a few sites where steepened fill slopes could provide a slight decrease in impact. If we pursue the roundabout concept at the Moiese Lane intersection, there could be slightly more impact to WL 2c and a small impact to WL-2b.

We anticipate a categorical exclusion will provide the required evaluation and documentation for the environmental document. Also, a 4(f) document will be prepared to address the impacts to the affected properties that are eligible for the National Register of Historic Places.

Traffic Control

The proposed subgrade is wide enough (59 feet) to enable stage construction techniques along most of the project such that traffic can generally be carried on the PTW while the subgrade is partially built along the side. Traffic can then be shifted to the completed subgrade portion while the rest of it is built. In the deepest cuts (3' to 5' from Sta. 474 to 486) it will be difficult to maintain two lanes of traffic, so single lane operation will be required.

Short single lane detours will likely be required around the bigger culvert installations, especially those in high fills.

Motorists will be encouraged to seek alternate routes to avoid work zones. There are county roads in the vicinity, especially east of Highway 203, that provide a relatively short detour along much of the project length. We will likely include a provision that traffic control that impedes traffic flow cannot be set up until after the morning peak volume.

Public Involvement

A news release was distributed in November, 2007. The first public meeting was held in March 2009. Some of the major concerns expressed were the limited sight distance from the school bus turnaround at

RP 9.256 (Station 474+50 Rt., a crest vertical curve); a desire for design speed consistency for the two curves to be flattened at RP 4.6 and RP 5.1; and the realignment of Ambrose Creek Road and Moiese Lane at RP 5.1 (consider a roundabout).

Other comments were offered regarding irrigated field impacts; the desire for a bike/ped path; the approaches to El Capitan (South), Log Cabin Road (South), Eagle Watch, Fawn Lane, Mountain Springs Road, houses close to the highway, and historic structures.

A second public meeting was held in October 2014. Regrettably, the venue was changed to a much smaller one while we were enroute to the project area. The room could not handle the overflow crowd; many attendees had to stand outside and strain to hear the presentation through the open windows.

We presented the preliminary plans with the 44-ft. top as described above, and revealed we were considering a shared use path. We showed a conceptual design for a roundabout at the Ambrose Creek Road intersection, but explained it was not necessarily our preferred option. After the presentation, MDT staff met one-on-one with adjacent landowners to hear specific concerns and answer questions.

We tabulated the written comments received. Adjacent landowners and others generally favored left turn lanes at major intersections, but opposed a continuous two-way-left-turn lane. A roundabout was almost unanimously opposed. Landowners were evenly split on the shared use path, while others heavily favored it.

We will schedule another open house focused on providing information to adjacent landowners and getting their input.

Since AGR, we have been requested by County officials and local legislators to keep the roundabout as a design option at the Ambrose Creek Road intersection.

We anticipate there may be need to alert the traveling public that they may want to seek alternate routes to avoid long delays during some stages of construction.

Construction Cost Estimate

The cost estimate from the April 2007 Preliminary Field Review Report is listed below. It was based on a 32-ft. top and no shared use path or wildlife structures:

	Estimated cost	Inflation (INF) (6 yrs @ 3%)	TOTAL costs w/INF + 10.91% IDC
Road Work	$ 3,252,100		
New Structure	--		
Remove Structure	--		
Detour	--		
Traffic Control	$227,700		
Subtotal	**$ 3,479,800**		
Mobilization (10%)	$ 348,000		
Subtotal	**$ 3,827,800**		
Contingencies (10%)	$ 382,800		
Total CN	**$ 4,210,600**	**$817,000**	**$5,576,111**
CE (10%)	$421,100	$81,700	$ 557,655
TOTAL CN+CE	**$4,631,700**	**$ 898,100**	**$6,133,766**

Here is the current cost estimate:

	Estimated cost	Inflation (INF) (from PPMS)	TOTAL costs w/INF + IDC (from PPMS)
Road Work#	$ 5,335,000		
SUP (incl. tunnel)	$ 653,000		
Detour	--		
Traffic Control	$ 400,000		
Subtotal	$ 6,388,000		
Mobilization (10%)	$ 607,000		
Subtotal	$ 6,995,000		
Contingencies (9%)*	$ 630,000		
Total CN	$ 7,625,000	$ 327,472	$ 8,055,854
CE (10%)	$ 763,000	$ 32,747	$ 805,585
TOTAL CN+CE	$ 8,388,000	$ 360,219	$ 8,861,169

Includes larger culverts at three locations to enhance wildlife connectivity.

* A roundabout at the Ambrose Creek Road intersection would increase the base estimate by about $430,000, using up most of the contingency shown.

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 9.13% for FY 2015.

Ready Date

The current ready date shown in OPX2 is December 1, 2016, with a letting date of January 25, 2017. The letting date will have to be moved out to March 2017 to coincide with the ready date.
The project is about four months behind schedule. There is a good chance that more design time may be needed to evaluate additional reductions in impacts to wetlands, cultural sites, and private property. It appears the 125 hours and 60 days allotted for Activity 824 is woefully inadequate, given that acquisition will likely be required from over 100 parcels.