PO Box 201001 Helena, MT 59620-1001

Memorandum

To: Ryan Dahlke, P.E.

Consultant Design Engineer

From: Bryan Miller, P.E. BLM

Consultant Plans Engineer

Date: March 12, 2021

Subject: STPX 90-8(191)450

Lockwood Interchange - Billings

UPN 9588000

Work Type 130 - Reconstruction - with added capacity

Please Approve the Alignment and Grade Review for this project.

Approved _____ Date ____

Ryan Dahlke

Consultant Design 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 (electronic only):

Rod Nelson, Billings District Administrator Stephanie Brandenberger, Bridge Engineer Damian Krings, Highways Engineer Gabe Priebe, Traffic and Safety Engineer Robert Stapley, Right-of-Way Bureau Chief Jake Goettle, Construction Engineer Carol Strizich, Acting Rail, Transit, & Planning Division Administrator Jeff Jackson, Geotechnical and Pavement Bureau Chief Tom Martin, Environmental Services Bureau Chief

Alan Woodmansey FHWA - Operations Engineer (PODI) Jon Swartz, Maintenance Division Administrator (MDT maintained)

CC:

Mark Studt EPS Project Manager, Billings District Consultant Design Master file (if different from Bureau Chief copy) Jeremy Terry, Road Design Engineer HDR Billings and Missoula Sanderson Stewart Billings and Bozeman Debi Melling, City of Billings Erin Claunch, City of Billings

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Introduction

An alignment and grade meeting was held via Zoom Virtual meeting on January 26, 2021 at 1:00 pm. A field visit was not held. The following personnel attended the meeting.

Mark Studt – MDT Consultant Design Alan Woodmansev - FHWA Andrew Harmon – MDT District Utilities Susan Lenard – MDT Environmental Kurtis Schnieber – MDT Billings District Marc Wotring - MDT Hydraulics Tommy Griffeth – MDT Environmental Damian Krings – MDT Roadway TJ Ramaeker – MDT District Construction Jacob Brotzler - MDT Roadway Design Robert Padmos – MDT Consultant Design David Schroeder - MDT Bridge Ted Thronson – MDT District Construction LeRoy Wosoba – MDT Traffic Safety Kevin Atkins - MDT Maintenance Michael Fabricius – MDT Right of Way Daniel Kluth – MDT Geotechnical Miles Yerger – MDT Pavement Analysis

Christopher Trautmann – MDT District Construction

Tim Erickson – HDR PM Lisa Fischer – HDR Roadway Dustin Hirose - HDR Bridge Brittany Martishius – HDR Roadway Joel Horn – HDR Roadway Josh Springer – HDR Bridge Lisa Gray – HDR Public Involvement Leif Sande – HDR Hydraulics Shilpa Mallem - HDR Traffic Jon Schick – HDR Environmental Brandon Angell - HDR Roadway Kirk Spalding - Sanderson Stewart Traffic/Roadway Joey Staszcuk - Sanderson Stewart Traffic Cory Rice – SK Geotechnical Dustin H. – SK Geotechnical Brandon Western - SK Geotechnical Nathan Greer - UMSI

Scope of Work

The proposed scope of work for the project is to reconstruct and reconfigure the Lockwood Interchange over I-90 to better accommodate traffic patterns and provide a more efficient interchange. The project also includes widening I-90 to the inside, to provide three lanes in each direction between the Lockwood and Johnson Lane Interchanges. I-90 will remain two lanes in each direction under the Lockwood overpass; however, full reconstruction of the bridge is proposed with the project to provide a longer service life for the structure and to accommodate for future interstate widening under the bridge. The project addresses future traffic patterns, ramp functionality, operational issues on I-90 and connecting routes, proposed interstate modifications, safety considerations and bridge construction options. The project will include evaluation for environmental, right-of-way, utilities and hydraulic improvements.

The project is split into two phases. The first phase of the project is an OT Phase which includes work through the Alignment and Grade milestone (ACT 264 as shown in the current MDT Consultant Design Flowchart), including Activity 930 and 935. The first phase included a tiered approach including multiple interchange alternatives for improvements to Lockwood Interchange and two alternatives for widening of I-90. Ultimately, the alternative analysis determined a Diverging Diamond Interchange and widening I-90 to the inside as the preferred alternatives to move forward to the AGR milestone.

Scoping for the second phase will begin following completion of Activities 930 and 935.

Project Location and Limits

The project is located along I-90 from the Lockwood Interchange to the Johnson Lane Interchange east of Billings in Yellowstone County. The project is located outside the city limit boundary of the City of Billings and is approximately 1.5 miles from Downtown Billings. The Lockwood Interchange is within the Census-Designated Place for Lockwood, MT.

I-90 work will be from approximately RP 450.0 +/- to RP 453.5 +/-, which extends from just west of the Lockwood Interchange to Johnson Lane Interchange. US-87 reconstruction limits extend

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just beyond the N Frontage Rd intersection to the north, with the southern limits extending to approximately RP 0.35 +/-. Reconstruction of N Frontage Rd will be from its intersection with US-87 at RP 0 to approximately RP 0.1 +/-. Coburn Road access improvements will likely require improvements for approximately 500 feet along Coburn Road. Coordination with Yellowstone County will be required to determine potential improvements to Rosebud Lane and Lockview Lane to provide access from Coburn Road area to US-87.

I-90 is classified as an Urban Freeway (NHS – Interstate) and US-87 is classified as an Urban Principal Arterial.

The as-built project numbers are summarized in the table below.

Project ID	Location	Year Built	Description
I-IG 90-8(23) 447 Unit 2	27 th St to Lockwood	1966	Construction
I 90-8(70)388	Int Lockwood I 90 - Billings	1998	Bridge Rehab
IM 90-8(131)450	27 th St to Lockwood	2000	Overlay
IR90-8(102)455	Johnson Lane Interchange	1986	Construction
IR 90-8(118)453	Lockwood-Pinehill Interchange	1990	Construction

There are two adjacent projects that exist and are listed in the table below.

Project ID	From (RP)	To (RP)	Construction Year	Description
NCPD 56(55) UPN 4199	455+/-	456+/-	2022	Billings Bypass (Johnson Lane)
NHPB 90-8(176)450 UPN 7972	450.09	452.73	2021	I-90 Yellowstone R – Billings

The direction of this project is from west to east and stationing increases in the direction of the reference posts along I-90. The direction of US-87 will be from North to South.

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 limited 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

The existing US 87 roadway is comprised of 2-12' travel lanes, 6' outside shoulders and 2' inside shoulders in each direction with a raised median. The raised median width varies from 2' to 16' and provides left turn access at major intersections. Old Hwy 87/Old Hardin Rd south of the interchange transitions from the US 87 existing roadway section to a single 12' lane with 6' shoulders in each direction.

The existing I-90 mainline consists of 2-12' travel lanes, 10' outside shoulders and 4' inside shoulders in each direction for a total pavement width of 38' in each direction. The existing interchange ramps consist of 14' travel lanes, 6' outside shoulders and 4' inside shoulders for a total pavement width of 24'. The existing median width varies within the project limits with an average width of 40'.

The general terrain of the area is level and is within the Billings Urban Boundary.

The existing bridge data is given below:

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RP 450.52 (Int Lockwood I-90 - Billings)

Bridge Inventory Number P00016000+00001

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Year Built 1966
Year Reconstructed 1998
Length 275.9'
Deck Width (out-to-out) 82.1'
Bridge Rail Type SBR T7

Superstructure Type PS concrete girders

Sufficiency Rating 95.0
Deck Rating 6

Structure Status Not Deficient

Design Speed

The design speed for I-90 mainline is 70 MPH. The posted speed limit is 65 MPH for all vehicles. Formal design speeds are not assigned but the ramp geometric features are designed for speeds between 35 and 60 MPH. The posted speed limit along US 87 is 45 MPH within the project limits. The design speed for US 87 is 40 MPH following the MDT geometric design standards for Urban Principal Arterial.

Horizontal Alignment

The existing I-90 alignments meet current geometric standards and no horizontal adjustments are proposed for most of the project. The US 87 alignment was revised to accommodate the proposed interchange configuration. However, it still generally follows the existing alignment.

There are 4 existing horizontal curves along I-90 mainline within the project limits that will be maintained, with 5,730', 5,800', 5,800' and 11,459' radii respectively.

US 87 has 2 horizontal curves within the current project limits along the median. The first is a 750' radii and the second is a 930' radii. There are separate northbound and southbound alignments controlling the DDI cross overs. The minimum radius for the DDI cross over is 289' which meets the urban geometric standards for 30 MPH.

Vertical Alignment

Independent vertical profiles were set for both the EB and WB I-90 roadways to control the surface drainage of the median and match the existing normal crown cross slope. In general, the profile of I-90 will match existing. However, existing superelevations on I-90 within the project limits do not meet current design standards and need to be increased by 1% cross slope. Locations with revisions to superelevation will include pavement pulverization and a revised profile to provide appropriate elevations for the concrete barrier rail in the median.

The vertical alignment of US87 will be flattened across the bridge, which raises the profile over I-90 providing proper vertical clearance and improves safety of the roadway, especially during inclement weather. On either side of the interchange, the vertical alignment of US 87 generally matches the existing roadway profile.

The maximum gradient on the project is 3.0% on I-90 and 4.7% on N Frontage Rd. The minimum gradient on the project is 0.2% on I-90.

Surfacing and Typical Section

A third 12' auxiliary lane will be added between the Lockwood and Johnson Lane Interchanges in each direction of I-90. For the reconstruction portions of I-90, 0.6' of PMS over 0.9' of crushed aggregate course over 2' of special borrow is proposed. Where pavement preservation is

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appropriate, a 0.25' mill/fill is proposed. The proposed finished top width for I-90 in the 3-lane section is 59' in each direction.

US 87 will be reconstructed to accommodate the new interchange configuration and will carry 3 through lanes north of N Frontage Rd. The remaining segments of US 87 will include two 12' travel lanes in each direction with 6' outside shoulders and variable width raised median. Left and right turn lanes will be provided where applicable. Where US 87 will be reconstructed with PCCP, 0.65' of PCCP over 0.5' of crushed aggregate course over 2' of special borrow is proposed. The finished surface width from the beginning of US 87 to the Frontage intersection is 92 feet. Where US 87 will be reconstructed with PMS, 0.4' of PMS over 0.8' of crushed aggregate course, over 2' of special borrow is proposed. US 87 from Frontage to the end varies from 92 feet, as wide as 112 feet within the DDI, and 36 feet at the end to tie to existing.

Ramp improvements will be necessary to accommodate the auxiliary lanes and DDI configuration. Ramps A and B will be 0.4' PMS over 0.75' crushed aggregate course over 2' special borrow. Ramps C and D will be 0.4' PMS over 0.9' crushed aggregate course over 2' special borrow.

The finished top width for Ramp A varies from 25 feet to 46 feet. Ramp B finished top width is 25 feet. Ramp C finished top width varies from 34 feet to 46 feet. Ramp D finished top width varies from 27 feet to 37 feet.

The proposed structure will be 87'-2" (out to out) deck width with a recommended girder type of steel.

Most of the project is in fill condition with a cut located just west of the Lockwood Interchange. Proposed cross slopes and side slopes meet current geometric design standard recommendations.

Grading

Most of the grading along I-90 will be in the median where a 2' special borrow is recommended underneath the widening for the additional lane in each direction. The superelevation will be corrected for the existing horizontal curves to meet current design standards, requiring some additional grading work. Most of the grading for US 87 will be removal of existing roadway, curb and gutter and small amounts of sidewalk. The profile of US 87 is revised to accommodate vertical clearance for the bridge and additional safety with the north side of the bridge being raised while the south end lowers slightly. The new ramp configurations and connections will require grading to accommodate the new interchange geometrics. The overall project will be an excess excavation job with no balance points.

Geotechnical Considerations

The geotechnical approach to this project will be similar to the I-90 Yellowstone R – Billings project, with the intent of utilizing as much of the existing pavement as possible along I-90 through mill/overlay and pavement pulverization. It is recommended to sub-excavate the existing clay soils and place a 2' special borrow in its place within the median widening construction. The new bridge will likely be constructed with drilled shafts or steel piles. There is a potential need for retaining walls along Ramp A and Ramp C depending on private property impacts.

Hydraulics

Existing drainage patterns within the project limits generally flows toward the Yellowstone River. The interchange modifications will include curb and gutter and a larger impervious area along US 87, requiring detention facilities and the addition of a storm drain system. The addition of an auxiliary lane in both directions of I-90 between the Lockwood and Johnson Lane interchanges

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will increase the storm drainage compared to existing conditions and inlet structures with outfalls will be necessary along the median. The project will be subject to local MS4 requirements.

Draining the I-90 median along the concrete barrier rail will require careful attention to vertical profiles and cross slopes along the eastbound and westbound roadways. One major irrigation crossing exists withing the project limits, crossing I-90 within the Lockwood Interchange and underneath Ramp C. Special care will be given to reduce/eliminate impacts to this irrigation crossing.

Permanent Erosion and Sediment Control (PESC) Features

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Disturbed areas will be replanted with native grasses. Permanent erosion control measures may be required to accommodate bridge drainage. Embankment protectors will be considered for steep embankments near the interchange.

Bridges

The interchange improvements will require reconstruction of the existing Lockwood Interchange structure. Horizontal and vertical curvature will remain off the bridge to allow for a constant cross slope of 2% across the bridge. Appropriate vertical clearance will be provided to accommodate future overlays of I-90 as well as a potential widening of I-90 to three lanes in each direction under the bridge. The grade across the bridge will be flattened from the existing grade of nearly 4% to approximately 2% to improve the safety of the interchange, especially during inclement weather.

Traffic

The existing diamond interchange will be replaced with a Diverging Diamond Interchange, requiring modifications to the existing ramps and US 87 connections to tie into the new interchange configuration. New signing will be necessary to guide traffic through the revised interchange. The traffic signals at the ramp termini will be replaced. A dedicated left turn lane off N Frontage Rd onto US 87 will be added as well as lengthening the right turn lane off N Frontage Rd onto US 87. Coburn Rd will be converted to a ¾ access from its original full access operation, requiring improvements downstream of Coburn Rd to accommodate the NB left movements.

The project includes lighting at the interchange to meet current design standard with LED luminaires. Cantilever or overhead sign structures for ITS/VMS will be considered with the project.

Intelligent Transportation Systems (ITS) Features

ITS will be considered with the project, including variable message boards to identify road closures, event traffic or other related items.

<u>Miscellaneous</u>

Existing guardrail, concrete barrier and end treatments will be evaluated and upgraded with this project. Existing and new traffic control devices will be replaced to meet current design standards, as applicable. Cable rail is located along the I-90 median between the Lockwood and Johnson Lane interchanges. Widening of I-90 towards the median will require the cable rail to be replaced with concrete barrier rail. Cable rail will be replaced on the east end of the project when the auxiliary lane is dropped and the project transitions to match the existing median near the Johnson Lane Interchange. Fencing within the project limits will be replaced following right-of-way boundaries. For raised medians within the new interchange, sloped median curb will be considered to better accommodate snowplows.

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Design Exceptions

At this stage no design exceptions are anticipated for horizontal or vertical alignments. However, design exceptions may be required for proposed ditch widths or side slopes.

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Right-of-Way

Widening to the inside along I-90 will not require right-of-way acquisition along I-90. Interchange modifications for the diverging diamond interchange on US 87 will require right-of-way, particularly along the ramps, near the intersections with US 87. Improvements along US 87 will require additional right-of-way to accommodate the additional third northbound lane north of I-90. Retaining walls could reduce the amount of right-of-way along the ramps and will be reviewed as part of the design phase of the project. The total approximate right-of-way acquisition is 2 acres. Proposed right-of-way will be refined as design progresses.

Property impacts identified as part of the PFR are consistent with current proposed impacts.

Utilities/Railroads

With the Exxon refinery located on the north side of the interstate between the Lockwood Interchange and the Johnson Lane Interchange, there are buried pipelines within the project limits. Numerous overhead and underground telephone, fiber optic, power, and natural gas lines exist within the project limits. A Phase I SUE survey was performed to locate both overhead and underground utilities. As the design phases are further developed, a Phase II SUE may be necessary to obtain depths and other additional information of existing utilities. There is no railroad involvement anticipated with this project.

Utility impacts identified as part of the preliminary alternative analysis are consistent with the current proposed impacts.

Maintenance Items

Consideration of emergency services median turnarounds on I-90 will be included with this project. Consideration for maintenance, or agreements for maintenance of additional pedestrian/bicycle/ADA facilities will be determined, if appropriate.

Environmental Considerations

Preliminary environmental documentation has been completed during the OT phase that includes the following activities: 111, 177, 178, 181, 182, and 185. A summary of environmental determinations and concerns is provided by the following bullets.

- A cultural resources survey and report have been completed wherein one site, an
 historic residence at 1305 US Highway 87 East (Site 24YL2232), has been
 recommended as eligible for the National Register of Historic Places. It is unknown if
 SHPO has concurred with this recommendation. Site 24YL2232 is located outside of
 existing right-of-way and beyond the potential area of highway improvements and no
 impact to this site is anticipated.
- The proposed project is not anticipated to impact any public park, recreation lands, or wildlife and waterfowl refuges protected under Section 4(f). Because there are no Section 6(f) properties within the project limits, the project as currently proposed is not anticipated to result in the permanent conversion of any LWCF properties.
- The Preliminary Biological Assessment identified that the proposed project would have no effect on any federally listed threatened or endangered species and preparation of a final Biological Assessment is not necessary.
- A single wetland measuring 0.24-acre was delineated within the project area located between the eastbound off-ramp and interstate at the Johnson Lane interchange.
 Modifications to the Johnson Lane interchange are planned with an adjacent project and

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no wetland impacts would occur as a result of this project.

- The project was evaluated for potential wildlife accommodation needs. The Biological Resource Report (BRR) concluded that, based on the evaluation in the BRR and the limited scope of work, no wildlife accommodations are recommended for consideration with this project. Preparation of a WARM is not necessary.
- A noise analysis has been completed that identified impacted receptors throughout the project corridor. The draft report did not include noise abatement evaluation. If the project moves into a final design phase, noise wall configurations and other potential abatement methods will need to be evaluated and the noise report updated to include this analysis.
- The Lockwood Solvent Ground Water Plume NPL Site is located east of the Yellowstone River bridges on the north side of the interstate and the solvent plume is within existing MDT R/W. Depths of contaminated groundwater are documented by several nearby monitoring wells and past investigative work. Additional evaluation will be necessary moving forward to determine if project implementation would encounter known contamination.
- The following environmental permits and authorizations have preliminarily been determined as necessary or will be determined at a later phase if a project is advanced:
 - o A Section 404 permit is anticipated if modifications to the Lockwood Irrigation Ditch are proposed.
 - The proposed project is located within the Billings Urbanized Area and is subject to MS4 requirements. A LID Practice Analysis Form will be included.
 - Coverage under the MPDES Construction Storm Water General Permit will be necessary.
- Should a project be advanced from this study, a Categorical Exclusion appears to be the appropriate level of environmental document and significant impacts are not anticipated.
- Environmental special provisions, if necessary, would be developed at a later phase in project development.

Experimental Features and Proprietary Products

No experimental features are planned for this project. The use of Proprietary Products is not anticipated for this project.

Traffic Control

Traffic and access will be maintained throughout the project during construction. Work on the I-90 portion and overpass structure will require median crossovers, lane closures, and closing EB or WB roadway to traffic. Lane shifting and reductions during construction will be required on US87 and the ramps for interchange improvements. Innovative traffic control and construction sequencing techniques will be considered to reduce the total duration of lane reductions to maintain safety and mobility throughout the project corridor. It is currently assumed that the existing bridge can be deconstructed in halves to allow for two lane - two-way traffic across the bridge during construction.

Project specific detailed traffic control plans will be developed to identify the construction phasing methods assumed for the project.

A Transportation Management Plan (TMP) consisting of a Traffic Control Plan (TCP), a limited Transportation Operations (TO) component and a limited Public Information (PI) component is appropriate for this project.

Wide loads will be detoured where practicable, or if necessary, a plan to stage and pilot wide loads through the project construction site at specific times will be developed. Coordination with the trucking community will be necessary to understand the needs through the corridor during REV 12/10/2020

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construction.

Certain work requiring ramp closures, or other lane closures will be considered for off-peak hours, or during nighttime work. Advanced signage will be utilized to inform the traveling public of the construction activities and potential delays.

Coordination with the adjoining projects will be necessary to utilize existing crossovers where possible and phasing if construction seasons overlap.

Public Involvement

The project Level of Impact (LOI) has been determined to be Substantial, and level of public involvement C, as defined by MDT's Public Involvement Plan. No changes to the public involvement plan have taken place since the PFR report.

A public meeting will be held March 25th, 2021. Two virtual public meetings will be held on the same day.

Stakeholder outreach will be necessary to identify pedestrian facilities and access requirements as well as coordination with Yellowstone County to determine Coburn Road access improvement feasibility.

Coordination will be necessary for oversize and overweight vehicles to aid in the development of sequence of operations and the traffic control plan.

Preliminary Construction Cost Estimate

Project TOTAL CN+CE	\$35,200,000	\$5,400,000	\$45,100,000
CE (10%)	\$3,200,000	\$500,000	\$4,100,000
CN	\$32,000,000	\$4,900,000	\$41,000,000
	Estimated cost	Inflation (INF) (from PPMS)	TOTAL costs w/INF + IDC (from PPMS)

The estimate above includes \$1,500,000 for traffic control, 20% allowance for contingency, and 7.5% for mobilization.

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 10.99% for FY 2021.

Preliminary Engineering

The percent OT expended is 81%,. A review of current progress indicates a modification is not required to complete OT Phase activities. PE will need to be programmed if the project continues with design and right-of-way phase activities.

The target ready date for the project is tentative for the Fall of 2023. A letting date has not been determined in the Tentative Construction Program at this time.

A review of the remaining EPS schedule for OT Phase activities indicates that a modification to the current OT End Date isn't needed.

Alignment and Grade Report

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