Memorandum

Date:	Monday, February 21, 2022
Project:	Lockwood Interchange – Billings STPX 90-8(191)450 UPN 9588000
To:	Mark Studt, PE, MDT Project Manager
From:	Jon Schick, CEP, HDR Environmental Planner Tim Erickson, PE, HDR Project Manager
Subject:	Consultant Activity 180 - Air Quality Conformity Analysis

Introduction

This memorandum provides the information necessary to demonstrate project-level conformity with applicable air quality provisions of the Clean Air Act (CAA) and demonstrate compliance with the National Environmental Policy Act (NEPA) for the proposed Lockwood Interchange – Billings Project. The goal of transportation conformity is to ensure that Federal Highway Administration (FHWA) funding and approvals are given to transportation projects that are consistent with air quality goals. Transportation conformity must be demonstrated because the proposed Lockwood Interchange – Billings Project intersects with a National Ambient Air Quality Standards (NAAQS) nonattainment or maintenance area for transportation-related criteria pollutants. Moreover, the proposed project is not a project type exempt from conformity per Table 2 of 40 CFR 93.126. This memorandum provides additional information and analysis to supplement Section C, Air Quality, of the Initial Site Assessment (ISA) form and Part 6.2, Air Quality, of the Categorical Exclusion Documentation Form NEPA document.

Project Description

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 allow 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.

Previously completed preliminary design activities resulted in the identification and recommendation of two interchange alternatives to be further evaluated. The alternatives included a diamond interchange with improvements and a new bridge, and a diverging diamond interchange (DDI). Both intersection alternatives were evaluated in detail within the Tier II Preliminary Design Report completed in June 2020. The Tier II analysis recommended carrying the DDI interchange into final design as the preferred alternative.

Project Location

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. The project is located in Sections 25, 26, and 35 of Township 1 North, Range 26 East and Sections 19 and 30 of Township 1 North, Range 27 East. The project area and location are shown in Figure 1 below.

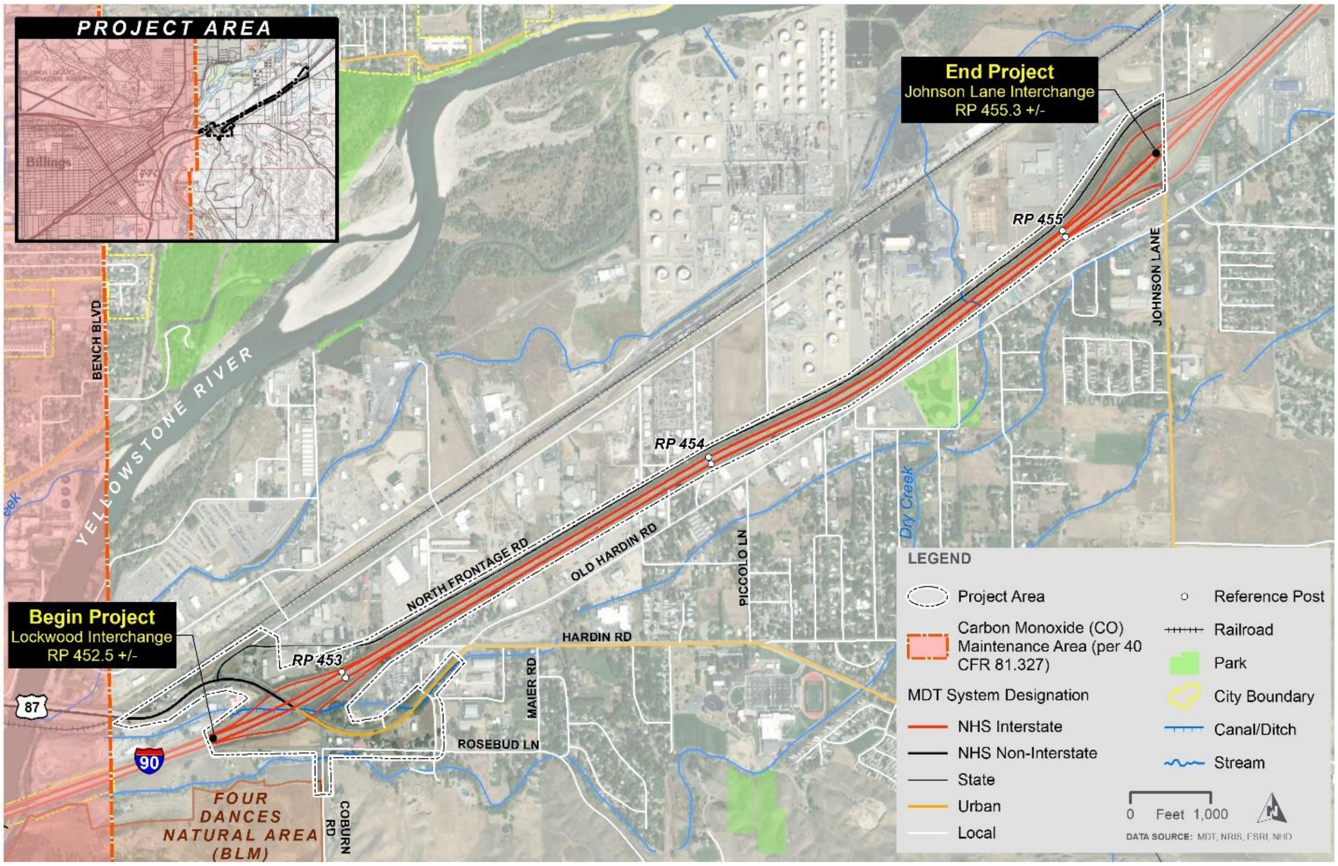

Figure 1. Project Location and Overview Map

The proposed project is immediately adjacent to the Billings carbon monoxide (CO) maintenance area (see Figure 1) and a portion of the project area (that portion south of the I-90 centerline in the vicinity of the Lockwood interchange) is within the sulfur dioxide (SO_2) 1-hour NAAQS maintenance area. Note that SO_2 is not a pollutant of concern for Transportation Conformity purposes, so it is not addressed further in this memorandum.

Traffic Volumes and Operational Analysis Results

Information within this section has been summarized from two existing technical reports that have been completed for the project. They include:

- *Activity 112 – Preliminary Traffic Report* prepared on July 2020, by Sanderson Stewart; and

- *Lockwood Interchange Alternative Analysis, Tier II Preliminary Design Report* prepared on June 2, 2020, by HDR Engineering.

Existing Traffic Conditions

Traffic volumes and turning movements at the study intersections within the project limits were collected in 2019. Additional traffic data was collected from three previous projects, including I-90 Yellowstone R, Exposition Dr & 1st Ave N, and the Lockwood High School Traffic Impact Study. Traffic data was then used to compute annual average daily traffic (AADT) volumes, as summarized in Figure 2.

The highest traffic volumes were found at the intersection of Old US-87 and the I-90 Frontage Road, with an AADT of 23,550 on the west leg. The number of heavy vehicles at this intersection was found to average 1,380 vehicles per day (vpd). The AADT on Old US-87 is 20,818 vpd north of I-90, and 10,488 vpd south of I-90. The AADT on I-90 is 27,151 vpd west of Old US-87, and 22,764 vpd east of Old US-87.

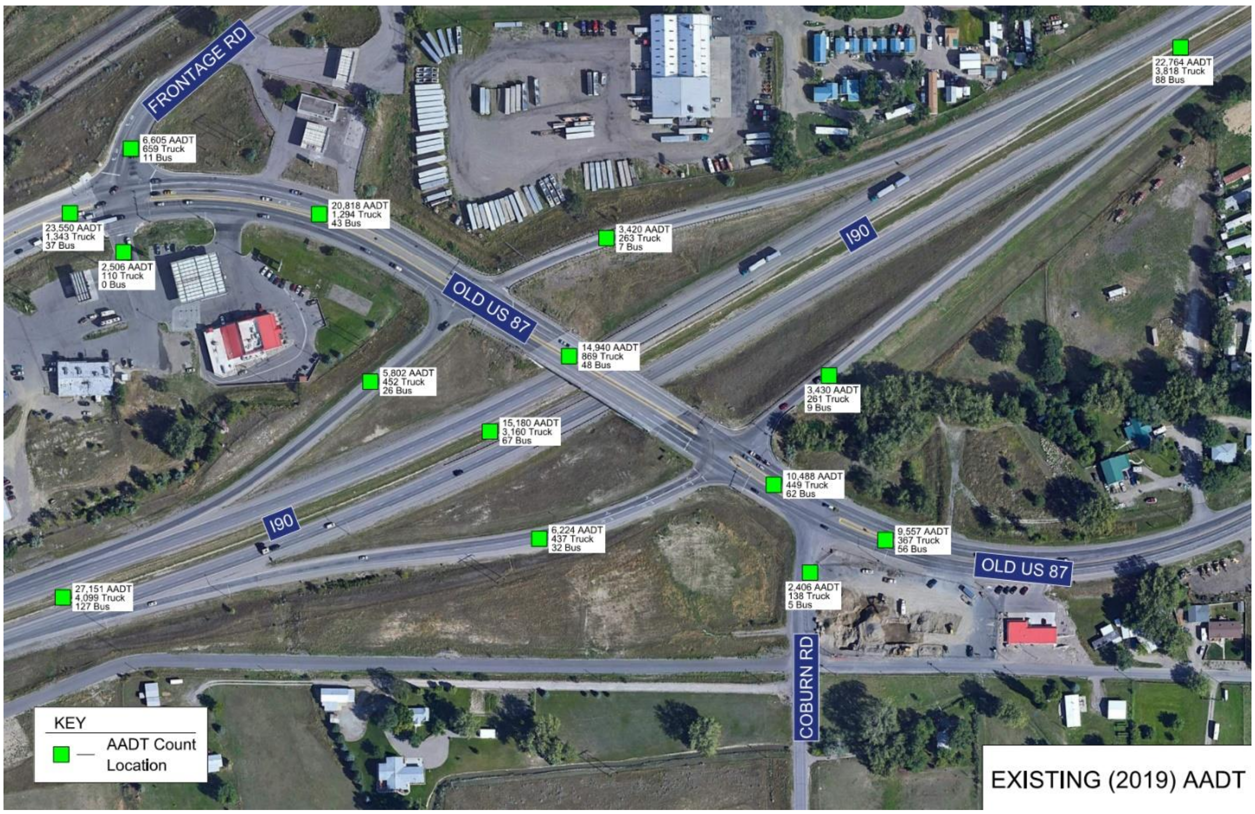

Figure 2. Existing (2019) AADT

Future Traffic Conditions

Travel demand forecasts for the study area were developed by applying annual growth rates to existing traffic volumes to estimate future 2044 traffic volumes. The difference in connectivity and operational characteristics between the No-Build and build alternatives is insignificant and was not anticipated to change the travel demand forecasts. Therefore, the forecasts are identical for both the No-Build and build alternatives. Forecast travel volumes for the No-Build alternative is shown in Figure 3.

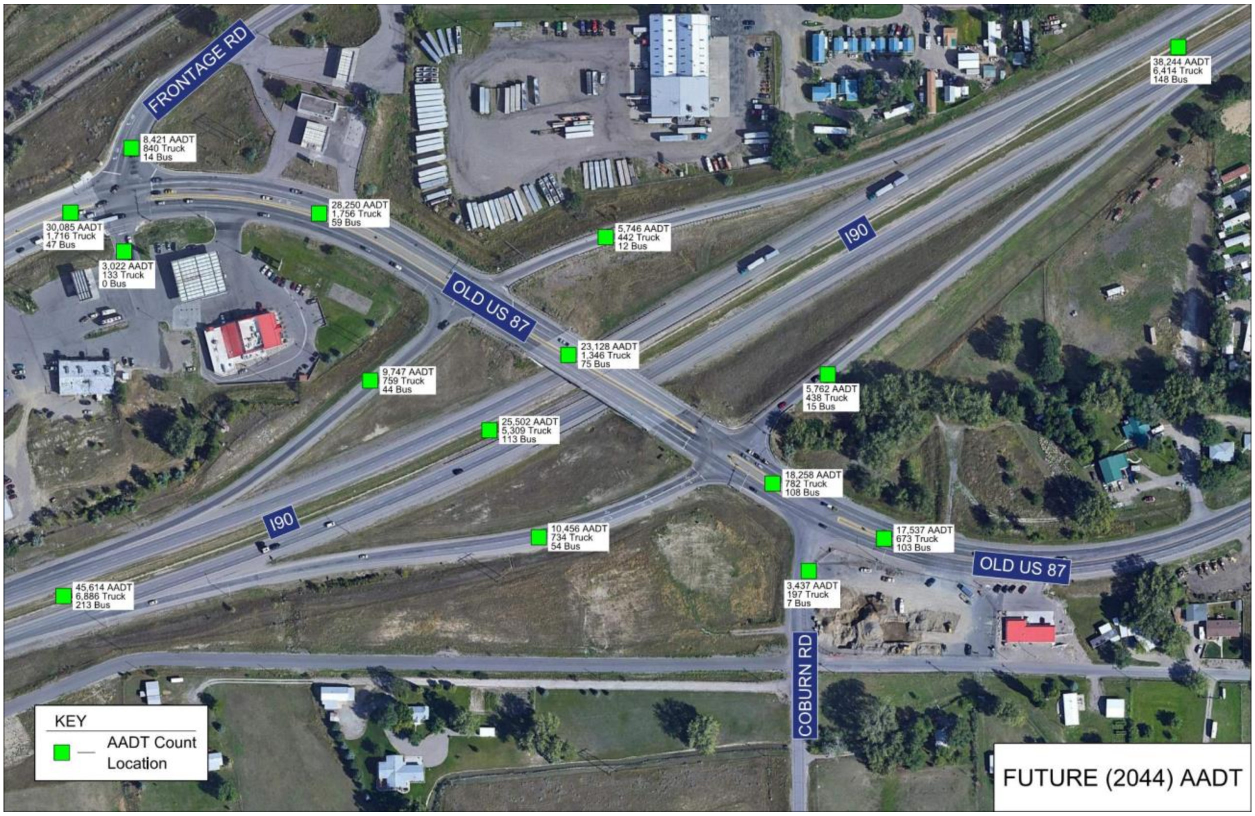

Figure 3. Future (2044) AADT

Existing and Future No-Build Operational & Capacity Analysis

Both the existing 2019 and the future 2044 No-Build scenarios were analyzed to provide a baseline reference for comparison of the two new interchange design alternatives that were evaluated in the Tier II Preliminary Design Report. The results showed that all the study intersections for the current year (2019) are performing at level of service (LOS) C or better in both the a.m. and p.m. peak hours with short delays and acceptable queue lengths. The capacity analysis results with future peak hour traffic volumes (No-Build scenario) estimate that all the study intersections have approaches that will operate below LOS C. In addition, the analysis showed high delay and excessive queues at several study intersections. In many cases the queues were too long to be accommodated in the existing storage lanes and resulted in blockage to through lanes and turn bays. A traffic signal analysis for the Old US-87/Coburn Road intersection showed that the intersection currently meets the signal warrants. Table 1 describes the existing and future capacity analysis results for the No-Build scenario, with substandard capacity results highlighted in yellow.

Table 1. Existing (2019) and Future (2044) No-Build Capacity Analysis

Intersection	Approach	Existing (2019)						Future (2044) – No-Build					
		AM Peak			PM Peak			AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		*Signalized*						*Signalized*					
US-87/ Frontage Road & Private Entrance	EB	18.5	B	2	20.5	C	3	31.4	C	3	124.3	F	3
	WB	23.4	C	3	28.9	C	8	47.9	D	3	104.0	F	16[#]
	NB	11.8	B	10	24.1	C	15	36.3	D	20[#]	37.3	D	17[#]
	SB	11.6	B	9	19.6	B	13	19.8	B	12[#]	26.4	C	14
	Intersection	12.9	B	----	23.3	C	----	30.0	C	----	50.5	D	----
Intersection Control		*Signalized*						*Signalized*					
US-87/ I-90 Westbound Off-Ramp	WB	45.5	D	6	40.1	D	4	126.9	F	23[#]	78.1	E	12[#]
	NB	6.9	A	5	7.7	A	4	30.5	C	11[#m]	16.5	B	8[m]
	SB	10.9	B	9	10.6	B	14	28.8	C	5[m]	20.1	C	24
	Intersection	15.8	B	----	12.9	B	----	48.5	D	----	25.4	C	----
Intersection Control		*Signalized*						*Signalized*					
US-87/ I-90 Eastbound Off-Ramp	EB	24.3	C	10	24.1	C	14	38.5	D	20[#]	79.5	E	34[#]
	NB	33.7	C	12	37.0	D	9[#]	58.5	E	22[#]	73.1	E	19[#]
	SB	19.6	B	6	24.3	C	10	32.9	C	9[#m]	59.5	E	26[#m]
	Intersection	27.0	C	----	27.4	C	----	45.4	D	----	70.1	E	----
Intersection Control		*One-Way Stop-Control (EB)*						*One-Way Stop-Control (EB)*					
US-87/ Coburn Road	EB	18.2	C	2	18.2	C	1	63.6	F	6	93.2	F	5
	NB	8.4	A	0	8.9	A	0	9.2	A	1	11.0	A	0
	SB	0.0	A	0	0	A	0	0.0	A	0	0	A	0

[#] 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
[m] Volume for 95th percentile queue is metered by upstream signal.

Microsimulation Analysis of Future Conditions

Four interchange alternatives were evaluated in a Tier 1 analysis. The screening process resulted in the identification and recommendation of two interchange alternatives to be evaluated further in a Tier 2 analysis. The interchange alternatives included a diamond interchange with improvements (e.g., turn lanes, signal modifications) and a new bridge, and the second alternative being a diverging diamond interchange (DDI). for these two alternatives are provided Table 2 below.

Because the Old US 87/Coburn Road intersection cannot be signalized due to its proximity to the Lockwood Interchange, four improvement alternatives for this intersection were developed and evaluated in the Tier 2 analysis. Capacity calculations shown in Table 2 are based on a ¾ movement restriction at the intersection.

VISSIM software was utilized by project team members Sanderson Stewart to model and analyze the interchange alternatives using forecasted 2044 traffic volumes. VISSIM models the interaction between individual vehicles as they travel through the network to create a microsimulation resulting in LOS and delay values. Operational analyses results are summarized below in Table 2 for both interchange alternatives as well as the No-Build scenario with the existing diamond interchange configuration. The results of the Tier 2 analysis (Table 2) demonstrate the DDI alternative modeled the best operations (and reserve capacity) for the project limits especially at the ramp intersections, and thus is the preferred alternative to move into final design.

Table 2. Design Year (2044) Alternatives Comparison

Intersection	Leg/Direction	Measures of Effectiveness	Diamond Interchange No Build		Diamond Interchange W/ Improvements & New Bridge		Diverging Diamond Interchange (DDI)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
US 87 & WB Off-Ramp	Off-Ramp(WB)	Level of Service (LOS)	D	C	D	D	B	B
		Delay (s/veh)	47.8	31.9	40.4	41.1	19.4	17.2
		Max 95th Percentile Queue (veh)	42	9	14	12	9	7
	US 87(NB)	Level of Service (LOS)	C	F	C	C	B	A
		Delay (s/veh)	34.0	108.3	21.3	25.2	12.2	9.0
		Max 95th Percentile Queue (veh)	27	27	11	21	17	15
	US 87(SB)	Level of Service (LOS)	C	F	C	B	B	B
		Delay (s/veh)	24.9	94.4	23.4	16.0	17.8	13.3
		Max 95th Percentile Queue (veh)	22	36	15	21	23	14
	Total Intersection	LOS/ Control Delay	C/34.1	F/87.5	C/25.9	C/29.2	B/15.8	B/12.1
US 87 & EB Off-Ramp	Off-Ramp(EB)	Level of Service (LOS)	C	F	C	C	B	B
		Delay (s/veh)	26.1	276.6	23.1	25.1	10.9	10.9
		Max 95th Percentile Queue (veh)	23	62	11	13	7	10
	US 87(NB)	Level of Service (LOS)	D	F	B	B	B	B
		Delay (s/veh)	48.4	101.9	12.8	18.6	19.9	13.1
		Max 95th Percentile Queue (veh)	13	13	8	9	20	10
	US 87(SB)	Level of Service (LOS)	D	D	C	C	A	A
		Delay (s/veh)	42.8	49.0	28.9	25.0	1.7	3.4
		Max 95th Percentile Queue (veh)	14	26	13	17	5	10
	Total Intersection	LOS/ Control Delay	D/41.4	F/127.1	B/19.7	C/23.5	B/12.1	A/8.5
US 87 & Frontage Rd	Private Entrance(EB)	Level of Service (LOS)	D	D	D	D	C	C
		Delay (s/veh)	41.4	43.7	37.1	35.8	32.1	22.9
		Max 95th Percentile Queue (veh)	7	10	6	11	7	7
	Frontage Rd(WB)	Level of Service (LOS)	C	D	B	C	B	C
		Delay (s/veh)	22.4	41.9	18.9	27.2	19.0	30.2
		Max 95th Percentile Queue (veh)	9	23	6	21	7	20
	US 87(NB)	Level of Service (LOS)	B	C	B	C	A	C
		Delay (s/veh)	11.3	26.8	15.9	28.1	8.7	22.6
		Max 95th Percentile Queue (veh)	30	26	17	22	14	19
	US 87(SB)	Level of Service (LOS)	B	F	C	C	B	B
		Delay (s/veh)	11.4	77.0	20.5	26.6	11.1	17.2
		Max 95th Percentile Queue (veh)	14	31	18	22	14	15
	Total Intersection	LOS/ Control Delay	B/14.9	D/43.7	B/18.3	C/25.4	B/10.5	C/21.3
US 87 & Coburn Rd	Coburn Rd(EB)	Level of Service (LOS)	F	F	A	A	A	A
		Delay (s/veh)	607.6	884	4.9	8.7	6.4	5.9
		Max 95th Percentile Queue (veh)	14	14	2	5	6	4
	US 87(NB)	Level of Service (LOS)	E	F	A	A	A	A
		Delay (s/veh)	58.9	194.8	0.2	0.2	0.1	0.1
		Max 95th Percentile Queue (veh)	26	14	2	2	12	3
	US 87(SB)	Level of Service (LOS)	A	A	A	A	A	A
		Delay (s/veh)	0.5	1.4	0.7	0.0	0.4	0.6
		Max 95th Percentile Queue (veh)	2	5	1	1	3	5
	Total Intersection	LOS/ Control Delay	E/61.5	F/111.0	A/0.8	A/7.2	A/0.7	A/0.6

Air Quality Conformity Determination

Information reported within this section was taken from the following publication:

- *2018 Billings Urban Area Long Range Transportation Plan* prepared on January 11, 2019, by Kittleson & Associations for the Billings MPO.

The 2018 Billings Long Range Transportation Plan (LRTP) received approval for adoption from the Billings City Council on October 22, 2018, from the Yellowstone County Commissioners on October 16, 2018, from the Yellowstone County Board of Planning on October 23, 2018, and from the Policy Coordinating Committee (PCC) on October 30, 2018. The adopted 2018 LRTP includes the proposed Lockwood Interchange project in its list of committed roadway projects that have been included in the regional travel demand model and subsequently evaluated for air quality conformity.

The 2018 LRTP conformity determination included interagency consultations conducted in accordance with consultation guidance found in the State of Montana Air Quality Rules on Conformity (ARM Chapter 17 Chapter 8 Subchapter 13). The consultation process involved a coordinated process including the Montana Department of Transportation, Montana DEQ, and Yellowstone County Planning Board.

The 2018 LRTP concluded that the plan was found to be in conformance with the applicable provisions of Section 176(c) of the Clean Air Act, 40 CFR 93 Subpart A, and the Billings CO Limited Maintenance Plan element of State Implementation Plan for the State of Montana. Because the proposed Lockwood Interchange Project is included in the conforming 2018 LRTP and current approved Transportation Improvement Program (TIP), the project meets this criterion for conformity with the State Implementation Plan. It is important to note that the concept and scope of the proposed project has not changed since the conformity determination was made within the 2018 LRTP. Also, as explained below, because the proposed project will not negatively affect LOS "D" or worse intersections within the CO maintenance area, quantitative CO hot-spot analysis is not required, and therefore the project meets this criterion for conformity with the State Implementation Plan.

Hot Spot Determination

Per the Montana Department of Transportation Project-Level Conformity Work Flow for Hot Spot Determinations, because the proposed project is in or immediately adjacent to a CO Maintenance Area, a hot-spot analysis is required to demonstrate project-level conformity. Per 40 CFR 93.123(a)(1), a quantitative CO hot-spot analysis is necessary for the following types of projects:

- Projects that impact a location identified in the SIP as a site of actual or possible violations
- Projects that affect intersections that are at LOS D or worse, or those that will change to LOS D or worse because of increased traffic volumes related to the project
- Projects affecting one of the 3 worst intersections in the area in terms of traffic volume or LOS

Billings' first recorded violations of federal CO standards occurred in 1978. Initiatives such as EPA's motor vehicle emissions standards, fleet improvements, and transportation improvements have since reduced CO emissions. In 2002, Billings was redesignated as in attainment for CO and currently is a maintenance area for CO. Billings is currently in its second 10-year CO maintenance plan period. The CO maintenance area will revert to normal attainment status, meaning maintenance status will end, after April 22, 2022, barring any measured violations of the NAAQS before that date.

As it relates to project types identified in 40 CFR 93.123(a), the proposed project: (1) is not expected to be a site of actual or possible CO violation given no CO violations in over 20 years; (2) does not adversely affect any intersections that are currently or projected to operate at LOS D or worse; and (3) does not adversely affect any of the top three worst intersections in the area in terms of traffic volume or LOS.

The regulation further describes in 40 CFR 93.123(a)(2) that a qualitative analysis is appropriate provided the requirements of 40 CFR 93.116 are met. In accordance with 40 CFR 93.116, the proposed project would not cause or contribute to any new localized CO violations, increase the severity or frequency of any existing CO violations, or delay the timely attainment of any NAAQS or other emission reductions. Because the proposed project is estimated to reduce delay and congestion at all project area intersections, it is logical to conclude that there would be a corresponding reduction in CO emissions due to less vehicle idling and delay.

Requirements in 40 CFR 93.116 are satisfied because it has been demonstrated, as evidenced from the air quality conformity determination documented in the conforming 2018 LRTP, that during the timeframe of the LRTP, no new local violations will be created and the severity or number of existing violations will not be increased as a result of the project, and the project has been included in a regional emissions analysis that meets applicable regulations.

The proposed project is not located within a PM-10 or PM-2.5 Nonattainment or Maintenance Area (Billings area has not violated the NAAQS for PM-10 or PM2.5 concentrations and therefore, the project is not subject to transportation conformity requirements for PM-10 or PM-2.5). Regardless, a brief discussion of potential project effects on PM-10 and PM2.5 is provided below for NEPA compliance purposes.

Because of the estimated reduction in delay and congestion, the proposed project is not expected to cause or contribute to any new localized PM-10 or PM-2.5 violations. Further, the proposed project is not a project type that would trigger a PM hot-spot analysis if it were subject to 40 CFR 93.116, which identifies the following project types:

- New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles;
- Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and,
- Projects in or affecting locations, areas, or categories of sites which are identified in the PM10 or PM2.5 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

While the above analysis triggers from the transportation conformity rules do not apply to the project given the attainment status of the project area, they have been evaluated here for NEPA purposes only to help assess whether quantitative analysis should be considered. Given the project does not fit any of the project types listed, a PM-10 or PM-2.5 hot-spot analysis was not conducted for NEPA purposes.

Mobile Source Air Toxics (MSATs)

The proposed project was evaluated for its potential for having effects on emissions of Mobile Source Air Toxics (MSATs). The MSATs of concern for roadway projects include 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. Assessing air toxic emissions is done in accordance with FHWA guidance on factoring these emissions into project-level decision-making within the context of NEPA per the 2016 *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. The proposed project is anticipated to meet the criteria to be classified as a listed Categorical Exclusion under 23 CFR 771.117(c) and is therefore an exempt project per FHWA's 2016 guidance and is not required to analyze potential effects of MSATs. Should the project class of action determination change, the requirement to evaluate MSAT effects will be reevaluated accordingly.

Interagency Consultation

The Administrative Rules of Montana (ARM) found at ARM 17.8.1305 through 17.8.1306 describe state-level transportation conformity consultation requirements and procedures. This memo will be distributed to federal, state, and local air quality agencies to comply with the state consultation requirements. Agency comments will be documented and included in the administrative record to demonstrate compliance with NEPA and the CAA.

Public Review Process

Project-level conformity requires public review and opportunity for public comment on the conformity determination for the proposed project. To meet this requirement, this memorandum will be made available to the public through the project website found at https://www.mdt.mt.gov/pubinvolve/i90lockwood/. Opportunity for public comment is available through the website.