MONTANA
Department of Transportation

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Memorandum

To: Distribution

From: Kelly Williams, P.E.
Consultant Design Engineer KMW

Date: November 22, 2022

Subject: STPX 15-5(141)278
Gore Hill Interchange - GTF
UPN 9345001
Work Type 130 - Reconstruction – with added capacity

The Scope of Work Report for this project has been released on 11/22/2022.

We request that those on the distribution review this report and submit your concurrence within two weeks of the above date.

Your comments and recommendations are also requested if you do not concur or concur subject to certain conditions. When all the personnel on the distribution list have concurred, we will submit this report to the Preconstruction Engineer for approval.

I recommend approval:

Approved _____ Date _____

Distribution:
Jim Wingerter, Great Falls District Administrator
Stephanie Brandenberger, Bridge Engineer
Damian Krings, Highways Engineer
Gabe Priebe, Traffic and Safety Engineer
Jason Gilliam, Right-of-Way Bureau Chief
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Rob Stapley, Rail, Transit, & Planning Division Administrator
Jeff Jackson, Geotechnical and Pavement Bureau Chief
Jon Swartz, Maintenance Division Administrator
Tom Martin, Environmental Services Bureau Chief
Joe Green, Construction Bureau – VA Engineer

cc:
Located at the end of this document

Scope of Work

The proposed scope of work for this project is to reconstruct the Gore Hill Interchange including a new overpass structure, ramp roundabouts, frontage road realignment, and an additional interstate lane. The *I-15 Gore Hill to Emerson Junction Corridor Planning Study (I-15 Corridor Study)* conducted in July 2015 identified this area as needing improvements to improve traffic operations and reduce congestion.

Purpose and Need

This project is intended to improve capacity and overall operation of the Gore Hill Interchange, and to remove slow traffic from through lanes between the Gore Hill and 10th Avenue South interchanges to improve safety and mobility.

Context Specific Criteria and Scope Specific Considerations

The existing v-ditch and backslopes along I-15 leading up to, at, and beyond the overpass structure do not meet 70 mph clear zone standards. Non-standard slopes were likely built to avoid rock excavation necessary to lay back the abutment backslope and to decrease the length of the structure. Guardrail is currently installed both north and south of the overpass. To provide clear zone and remove the guardrail, approximately 350’ of slope excavation would be required and the structure would need to be lengthened. To limit rock excavation and blasting, guardrail will be maintained for abutment protection and existing slopes will be maintained.

The existing Gore Hill Interchange ramps have varying degrees of non-compliance with standards as noted below. According to AASHTO, non-compliance with geometric standards should be addressed where current designs are performing poorly or if an improvement is cost-effective. The AASHTO approach is to avoid expenditures that have little or no impact on performance. Crash clusters have been identified at the gores of the southbound off-ramp and on the northbound on-ramp. These clusters have been addressed by the addition of an interstate lane between Gore Hill and 10th Ave. S interchanges and corrected geometry, and a parallel on-ramp and taper, respectively. Performance issues or crash clusters have not been identified at any of the other substandard interstate or ramp locations. Therefore, as the focus of this project is the interchange crossroad and intersections and not interstate or ramp upgrades, these other substandard features will not be corrected with this project. These items are not listed in the Project Context Specific Criteria /Scope Specific Considerations table as they are not considered part of the project.

Southbound on-ramp (Ramp S1):
The existing merge taper rate of ramp is 45:1, MDT and AASHTO recommend 50:1 to 70:1.
Existing ramp width is 24’, required width is 25’. (Widened to 25’ in portion reconstructed with this project).
The acceleration length is not met for trucks.
Substandard vertical curve k-value.

Southbound off-ramp (Ramp S2):
Deceleration length is not met for trucks on the inside lane. (Revised with this project to meet standards).
Exceeds maximum grade of 5.0%.

Northbound on-ramp (Ramp S3):
Gore-area horizontal curve meets a design speed of 40 mph and should be at least 50 mph.
The acceleration length is not met for trucks. (Improved with this project, but does not meet full standards).
The existing merge taper rate of ramp is 45:1, MDT and AASHTO recommend 50:1 to 70:1. (Revised with this project to meet standards).
Existing ramp width is 24’, required width is 25’. (Widened to 25’ in portion reconstructed with this project).

Northbound off-ramp (Ramp S4):
Deceleration length is not met for cars or trucks.
Substandard vertical curve k-value.
Existing ramp width is 24’, required width is 25’. (Widened to 25’ in portion reconstructed with this

project).

Southbound on-ramp at 10th Avenue (Ramp E1):
Gore-area horizontal curve meets a design speed of 40 mph and should be at least 50 mph. (Revised with this project to meet standards).
Acceleration length is not met for cars or trucks. (Improved with this project, does not meet full standards).
Exceeds maximum grade of 5.0%.

I-15 at ramps:
Decision sight distance on I-15 prior to northbound on-ramp merge area is on substandard vertical curve with SSD=728'. (Improved with ramp widening with this project).
Vertical curve at overpass meets a substandard design speed of 65 mph and SSD of 728'.
Horizontal curve on I-15 (at 10th Ave.) with a superelevation of 3% meets a substandard design speed of 60 mph.

Airport Drive is classified as a minor arterial with level terrain. The roadway will be designed in accordance with Urban Minor Arterial standards with a 35 mph minimum design speed. However, a 40 mph design speed is desirable due to the posted speed limit of 40 mph and the suburban environment. The first curve leading out of the roundabout on Airport Road has a 371' radius for 35 mph and ties to the existing 765' radius. The 765' radius is superelevated 7% in accordance with the 40 mph rural roadway standards it was originally built to. Superelevation will transition from the roundabout through the first curve to tie to the 7% cross slope on the second curve. The cross slope transition is appropriate for this location since speeds are low exiting the roundabout and increase as traffic proceeds north. Reducing the 765' radius curve superelevation to meet 40 mph urban standards would require rebuilding the entire curve, which is outside of the current project limits.

31st Street SW is functionally classified as a local road with level terrain. Due to the urban fringe setting, density of accesses, and transitional nature of 31st Street SW within the city limits, this segment will be designed in accordance with Urban Collector standards and have a design speed of 30 mph. All roadways terminating at the interchange (frontage roads, 31st St. SW, Airport Road) will transition in design speed and cross slope when approaching the roundabouts or stop-controlled intersections.

Curb and gutter will be extended down the north side of the SB off-ramp to avoid excavating into the existing cut slope. The existing slope exhibits signs of seepage and may slump or slide when disturbed. A flatter, non-standard ditch will be constructed behind the curb and gutter.

Although not identified at this stage, modifications to standard cut and fill slopes may be utilized to reduce impact and blend with adjacent properties along the frontage of 31st St. SW to the southeast of the interchange and along Airport Road to fit sidewalk sections.

Project Context Specific Criteria /Scope Specific Considerations				
Controlling Element	**Existing Condition**	**Baseline Value**	**Proposed Criteria**	**Location**
Clear zone	V-ditch and backslopes do not meet 70 mph clear zone (meets 50 mph)	20:1 flat bottomed ditch, clear zone width of 32'	Maintain existing slopes and provide guardrail	I-15, 350' in vicinity of overpass
Roadway Classification Determined Design Speed	Excessive superelevation on low speed curve	Rural Local Road @ 60 mph	Urban Collector @ 30 mph	31st St. SW within Great Falls city limits
Cut and Fill Slopes	Rural slopes	Standard rural slopes	Extended curb and gutter, flattened fill ditch	Along SB off-ramp mid-range and at terminal
Superelevation for 371'/765' curves	7% superelevation for 40 mph rural	4% (371' R @ 35 mph), NC (765' R) @ 40	Transition from roundabout to 4% to 7% existing	Airport Drive north of roundabout

		mph		
Cut and Fill Slopes	Modified urban fringe slopes	Standard rural slopes	Modified to fit context, non-standard ditches	Along 31st St. SW southeast of interchange and Airport Drive

Public Summary

MDT identified the Gore Hill Interchange as an area in need of improvements to reduce congestion. This project will replace the existing overpass bridge with a new structure and add single-lane roundabouts at the southbound and northbound ramps. Additionally, the steep grade between the 10th Avenue South and Gore Hill interchanges, combined with a mixture of vehicle types trying to enter and leave the interstate, results in a wide range of vehicle speeds between the intersections which has historically caused safety issues. An additional lane between the interchanges and on the off-ramp at Gore Hill will allow vehicles to safely accelerate and decelerate as needed.

Project Location and Limits

The project is in Cascade County within the urban boundary of Great Falls on I-15. The project begins approximately at RP 277.8 at the south end of the Gore Hill Interchange on-/off-ramps and extends north to the 10th Avenue South Interchange at RP 278.5. The project includes the Gore Hill Interchange (Exit 277) and southbound I-15 between the 10th Avenue South Interchange (Exit 278) and Gore Hill. The project also includes the intersections of 31st Street SW and Tri Hill Frontage Road, and the I-15 ramp terminals at the Gore Hill Interchange.

31st Street SW south of the Gore Hill Interchange is an off system local road. North of the interchange, Airport Drive is a minor arterial urban roadway (U-5212). The I-15 Frontage Road (also called Cascade County Frontage Road-Ulm N) north of I-15 and the Tri Hill Frontage Road south of I-15 are both off-system local roads. The Tri Hill Frontage Road is spelled “Tri Hill” on Great Falls GIS, and “Tri Hil” on the MDT system. The “Tri Hill” spelling is used herein.

According to the 2013 MDT Road Log as-built projects for each roadway section are:

I-15
Reconstruction:
1967, I-15-5(26)271 (north of Gore Hill Interchange)
1970, I 15-5(30)260 (south of Gore Hill Interchange)

Improvements:
1968, I-15-5(36)267
1968, I-15-5(47)269
1980, FAP-FI 15-5(66)277
1988, NH-IR-STPU 315-5(12)1 F (10th Avenue South Interchange)
2001, IM 15-5(95)274
2003, IM 15-5(99)277 (Gore Hill Interchange)
2008, IM 15-5(101)270

Airport Drive (U-5212)
Reconstruction: 1967, County/City Construction
Improvements: Unknown, urban route maintained by MDT.

31st Street SW
Unknown, off system route maintained by the county/city.

I-15 Frontage Road (X-07602)
Unknown, off system route maintained by the MDT.

Tri Hill Frontage Road (X-07541)
Unknown, off system route maintained by the MDT.

Physical Characteristics

Four intersections exist within the immediate vicinity of the Gore Hill Interchange. The southbound off-ramp terminates at a four-legged, stop-controlled intersection with Airport Drive and I-15 Frontage Road. Traffic turning from the off-ramp to Airport Drive has a free-flowing dedicated right-turn lane. This intersection is approximately 60' from the intersection of Airport Drive and the southbound on-ramp.

The intersection of Airport Drive and the northbound on and off-ramps is a typical stop controlled intersection. This intersection is approximately 80' from the intersection of 31st St. SW and Tri-Hill Frontage Road. The distance between the southbound on-ramp and the northbound ramps is approximately 370'.

Existing development north of the interchange includes the Great Falls International Airport, the Air National Guard, US Army Reserve Center, FedEx Shipping Center, Love's Travel Plaza, and other commercial properties within the airport complex. Southeast of the interchange are the Pilot Travel Center, the Flying J Travel Plaza, Jackrabbit Red's Casino, Great Falls Ice Plex, and Crystal Inn Hotel and Suites. The Cascade County Sheriff's Office is located southwest of the Gore Hill Interchange and is accessed off the I-15 Frontage Road. There is some residential property along the south side of I-15 with access from 31st Street SW.

I-15 northbound and southbound are 38' wide, each with two 12' travel lanes in one direction, 10' outside shoulders and 4' inside shoulders. Borings performed in November 2019 recorded approximately 4.8" of plant mix over 8.4" PCCP and 10.8" of gravel base.

The I-15 northbound ramps and the southbound on-ramp are 24' wide with one 14' wide travel lane, 6' outside shoulders, and 4' inside shoulders. The ramps have approximately 4.8" of plant mix over 5" to 24" of gravel base.

The I-15 southbound off-ramp is 26' wide at the gore with one 14' travel lane. The ramp widens at the terminus to include dedicated left-turn lane and through lanes along with a right-turn bypass lane separated by a median island. The ramp is 38' wide left of the raised island which includes a 12' through lane and 14' left-turn lane. Right of the raised island the right turn lane has a 14' wide travel lane. Along the entire length there are 6' outside and 5' inside shoulders. The ramp has approximately 4.8" of plant mix over 36" of gravel base.

Airport Drive is 46' wide with two 12' travel lanes in the northbound direction and one 12' travel lane in the southbound direction with a 6' shoulder on the north and a 4' shoulder on the south. The road has approximately 4.8" of plant mix over 37" of gravel base.

31st St. SW is 24' wide where the Tri-Hill Road realignment will tie in with one 12' travel lane in each direction and no shoulders. As the roadway approaches the commercial businesses to the north it widens to 46' with one 12' lane in each direction, a 14' TWLTL, and 4' shoulders. The road has approximately 4" of plant mix over 6" of gravel base.

I-15 Frontage Road is 24' wide with one 12' travel lane in each direction and 5' shoulders on both sides. The road has 8" of plant mix over 10" base gravels.
Tri Hill Frontage Road is 24' wide with one 12' travel lane in each direction and no shoulders. The road has 8" of plant mix over 6" base gravels.

The *I-15 Corridor Study* documented the following geometric features as not meeting existing standards:

- *Horizontal Alignment: The southbound on- and northbound on-ramps have accelerations lengths of 1,513' and 1,604', respectively, which is less than the existing standard of 1,620'. The northbound off-ramp has a deceleration length of 323', which is less than the existing standard of 340'. The southbound off-ramp meets existing deceleration length standards. The Interstate mainline has a grade of 5.0% between RP 277.9 and RP 278.8.*

- *Vertical Alignment: The southbound on, northbound on, and northbound off-ramps have vertical curves with k-values less than 50 mph standards. The southbound off-ramp has a grade of 5.8%. The Southbound on-ramp at 10th Avenue South has a grade of 5.5%.*

The existing interstate overpass structure at the Gore Hill Interchange is a 28' wide and 240.9' long concrete bridge. The vertical clearance is 16.96.'

Traffic Data

Available data for the study area was supplied by the MDT Traffic Data Collection & Analysis Section.

I-15	RP *277.6* to RP *278.5*
2020 AADT	12,080 – Present
2024 AADT	12,700 – Letting Year
2044 AADT	15,500 – Design Year
DHV	1830
T	6.7%
ESAL	386
AGR	1.0%

31st Street SW	
2020 AADT	10,220 – Present
2024 AADT	10,630 – Letting Year
2044 AADT	12,970 – Design Year
DHV	1480
T	14.0%
ESAL	729
AGR	1.0%

Airport Drive	
2020 AADT	3,520 – Present
2024 AADT	3,660 – Letting Year
2044 AADT	4,460 – Design Year
DHV	560
T	1.8%
ESAL	19
AGR	1.0%

I-15 Frontage Road	
2020 AADT	1,360 – Present
2024 AADT	1,410 – Letting Year
2044 AADT	1,720 – Design Year
DHV	220
T	8.1%
ESAL	31
AGR	1.0%

Tri-Hill Frontage Road	
2020 AADT	2,040 – Present
2024 AADT	2,120 – Letting Year
2044 AADT	2,590 – Design Year
DHV	300
T	9.9%
ESAL	43
AGR	1.0%

Crash Analysis

A safety analysis was completed on a portion of I-15 from RP 277.8 and RP 278.5 for the five-year period from July 1, 2012 to June 30, 2017. According to the MDT crash database, a total of 60 crashes occurred within the study area during this time period.

November through February were the months with the most reported crashes with 52 percent of all crashes occurring in these months. The most crashes were reported on Thursdays, 25 percent, with 23 and 22 percent of crashes occurring on Sunday and Monday, respectively. There are shown to be peaks in crash occurrences corresponding with the morning peak hours (7:00 to 9:00 AM) and evening peak hours (4:00 to 6:00 PM).

Approximately 38 percent of crashes occurred on a clear day, while a combined 51 percent of crashes occurred on a cloudy or snowy day. In 57 percent of crashes, the roadway was dry while 25 percent of crashes list the roadway as ice or frost covered. Nearly half (48 percent) of the crashes occurred in daylight conditions with 43 percent of crashes occurred when it was dark outside.

Approximately half of the crashes involved one vehicle (52 percent), the other 48 percent of crashes involved two or more vehicles. The majority (52 percent) of single vehicle crashes involved a fixed object (i.e., sign, ditch, tree, light post, etc.). Most multi-vehicle crashes were rear end and right-angle crashes, 38 percent and 28 percent of crashes, respectively. These types of crashes are common at intersections with congestion.

Twenty five percent of the rear end crashes occurred on the northbound off-ramp at the intersection with Airport Drive. Another 25 percent of the rear end crashes occurred at the southbound off-ramp intersection. Four of the five sideswipe crashes occurred on northbound I-15 between the two

interchanges and appear to be associated with vehicles merging from the northbound on-ramp. All but one of the 17 fixed object collisions occurred at a non-junction. Eight of those crashes occurred in the southbound direction of I-15 while five crashes occurred in the northbound direction. Eleven of 17 fixed object collisions occurred due to wet, icy, or snowy road surface conditions.

Seventy percent of crashes occurred on the roadway. The majority of crashes did not occur at an intersection with 47 percent occurring at a non-junction. Crashes that occurred at an intersection or were intersection related were 18 percent and 5 percent of crashes, respectively. Of the reported crashes, 30 percent occurred on interchange entrance/exit ramps

The majority of crashes did not cause any type of injury (80 percent). There were no fatalities during the five-year analysis period. Approximately 19 percent of crashes caused some level of injury, with only 1 percent resulting in an incapacitating injury. In 85 percent of the crashes some type of restraint was used (seatbelt, car seat, etc.).

A total of 91 vehicles were involved in the 60 reported crashes. Passenger vehicles accounted for approximately 78 percent of vehicles. There were 17 heavy vehicles involved in crashes (accounting for 19 percent of vehicles) and one snowplow. Non-motorists were not involved in any crashes in the study area over the past five years.

A total of 86 drivers were reported in the 60 crashes. There were slightly more males (65 percent) than females (34 percent) involved in crashes. The gender of the remaining one percent of drivers was reported as unknown.

The average reported driver age was 43 years. The youngest and oldest drivers were reported as 16 and 89, respectively. Drivers aged 21-25 accounted for 12 percent of all drivers, while drivers aged 51-55 accounted for 13 percent.

An additional study was conducted in June 2021 to determine if recent crashes on the NB lane were related to the NB on-ramp and indicate a geometric deficiency. Since July 1, 2012, three crashes directly related to the northbound on-ramp were reported. The severities of these three crashes were reported as possible injury, non-incapacitating injury, and property damage only (PDO). Over the same analysis period, three additional crashes could potentially be related to the on-ramp. All three crashes involved vehicles passing other vehicles between Exit 277 and 278. Two of the crashes involved semi-trucks. Inclement weather and road conditions were reported as factors in one of the crashes. An impaired driver was also reported in one of the crashes.

An additional six crashes occurred near the on-ramp but did not appear to be directly related to the ramp. Of those six crashes, three involved wild animals, and one involved icy road conditions and high speeds. One crash involved a wrong way driver, and another crash involved a southbound driver crossing into the northbound lanes.

Crashes occurring in the project area since the *Preliminary Traffic Engineering Report* were also reviewed to evaluate any recent crash trends. The review included crashes that occurred in the northbound direction of I-15 between Exit 277 and 278 between July 1, 2017, and April 12, 2021, but excluded any crashes involving wild animals.

Of the crashes occurring in the project area since July 1, 2017, three occurred in the vicinity of the northbound on-ramp. One of the crashes was potentially related to the ramp and involved a vehicle passing maneuver while the other two crashes appeared to be unrelated to the ramp. Of the non-ramp-related crashes, one involved a southbound vehicle crossing the median into the northbound lanes and the other crash involved inclement weather/road conditions.

Major Design Features

a. **Design Speed.** The design speed for I-15 (NHS – Interstate functional class, level terrain) is 70 mph. Airport Drive is classified as a minor arterial with level terrain. The roadway will be designed in accordance with Urban Minor Arterial standards with a 35 mph minimum design speed. However, a 40 mph design speed is desirable due to the posted speed limit of 40 mph

and the suburban environment. The frontage roads and 31st Street SW are functionally classified as local roads with level terrain. The frontage roads will be designed in accordance with rural collector standards (AADT > 300 vpd) with 60 mph design speeds. Due to the urban setting, density of accesses, and transitional nature of 31st Street SW within the city limits, this segment will be designed in accordance with Urban Collector standards and have a design speed of 30 mph. The interchange ramps have 60 mph design speeds at the gore, 50 mph mid-range, and 35 mph at the terminal. All roadways terminating at the interchange (frontage roads, 31st St. SW, Airport Road) will transition in design speed when approaching the roundabouts or stop-controlled intersections.

I-15 posted speed limit decreases from 80 mph (65 mph trucks) to 65 mph just south of the Gore Hill Interchange on northbound and remains 65 mph through the project. 31st St. SW is posted 45 mph and Airport Drive is posted at 40 mph. The I-15 frontage Road is posted at 50 mph. The Tri-Hill Frontage Road is posted at 60 mph.

b. **Horizontal Alignment.** The horizontal alignment for 31st St. SW/Airport Drive will remain mostly unchanged except as necessary to accommodate the ramp roundabouts and the shift in the overpass structure. Stationing is from the southeast to northwest. The proposed 31st St. SW will leave the existing PTW through a 533’ radius curve to the left, shifting the road approximately 45’ to the northeast and maintaining that shift over the new structure and into the north roundabout. The new alignment will merge back into existing just past the north roundabout through a 371’ radius curve to the right.

   All other roadways except for the Tri-Hill Frontage Road will also remain unchanged except for transitions to roundabouts, as applicable. The Tri-Hill Frontage Road will be moved from its current position to the south, leaving the existing alignment approximately 2000’ south of the existing intersection with 31st St. SW via a 1200’ radius spiral curve to the right and will continue easterly until the intersection with 31st St. SW.

c. **Vertical Alignment.** The vertical alignment for 31st St. SW will be raised slightly to accommodate the new structure. All grades are relatively flat, with the steepest grade of 0.81%. Grades are steepened to provide at least 0.5% along curb grade lines.

   All other vertical profiles remain largely unchanged from existing except the ramps are all raised slightly to tie into the roundabouts. The Tri-Hill Frontage Road new alignment begins with a long, 0.227% grade to about 217+80. From 217+80 to 222+60 the grade is +3.25, then transitions back to 0.289% to the end.

d. **Typical Sections.** Excluding connections to the PTW, in the roundabout, and on the overpass structures, 31st St. SW will have 2-12’ travel lanes, a 14’ left-turn lane, and 4’ shoulders for a width of 46’ (47’ TBC to TBC). From the north roundabout transition to the end of Airport Drive there will be 2-12’ travel lanes northbound and 1-12’ travel lane southbound with 4’ shoulders for a total top width of 44’.

   Each roundabout will have an 18’ travel lane, 15’ truck apron, and 2’ shoulders.

   I-15 will be unchanged for the northbound width outside of ramp transitions. I-15 southbound will be 56’ wide through the auxiliary lane section, with 3-12’ travel lanes and 10’ shoulders.

   Single-lane ramps will be 25’ wide with one 15’ travel lane and 4’ inside and 6’ outside shoulders. Dual-lane ramps will be 34’ wide, with 2-12’ travel lanes and 4’ inside and 6’ outside shoulders.

   The I-15 Frontage Road will be 32’ wide with 2-12’ travel lanes and 4’ shoulders. The Tri-Hill Frontage Road will be 36’ wide with 2-12’ travel lanes and 6’ shoulders.

e. **Surfacing.** The preliminary surfacing sections for each roadway are listed below:

31st St. SW/Airport Rd., I-15 reconstruction:	0.50' PMS	0.65' CAC	2.00' Special Borrow
Roundabouts:	0.75' PCCP	0.50' CAC	2.00' Special Borrow
I-15 widening:	0.50' PMS	1.80' CAC	
Tri-Hill and I-15 Frontage Roads:	0.30' PMS	0.65' CAC	2.00' Special Borrow
Interchange Ramps:	0.40' PMS	0.65' CAC	2.00' Special Borrow
Interchange Ramps widening:	0.40' PMS	1.80' CAC	

f. **Grading.** Grading will be bid as Unclassified Excavation. Borrow will be needed from elsewhere on the project or off site for 31st St. SW on both sides of the structure. Both frontage roads will have an excess of excavation due to the excavation depth necessary to provide the deep special borrow typical section. There will be excess excavation on I-15 southbound as well as for all ramps except Ramp S4. Excess excavation for the project is expected to be around 25,000 cubic yards.

g. **Slope Design.** Side slopes will be in accordance with the standards for the classification of each roadway, modified in areas to fit with the surrounding area context. The cross slope of all roads will be a 2% crown, with the exception of superelevation areas. All superelevation rates will be in accordance with the standards for the design speed and curve radius.

h. **Geotechnical Considerations.** An Activity 106 preliminary geotechnical and soil survey was performed by a consultant and noted several geotechnical concerns. From the Gore Hill Interchange to MP 278.4, the project extends through a large cut slope, and at about MP 278.4, transitions to a large fill embankment. The fill slope appears to be stable but multiple stability issues have been observed in the cut slope. Significant seepage emanates from the cut slope and hillside and two semi-circular slides were observed. The southern slide area appeared to be active, as evidenced by tension cracks and larger tension gaps. This slide has about a 4' head scarp and a 1' toe bulge and was located about halfway up the cut slope. The slide is estimated to be about 200' by 200' in dimension.

MDT attempted to stabilize the cuts in the 1980s; several landslides were re-graded, and a substantial network of pipes and drains were installed. Many of these horizontal drains can be observed in the cut slope, but only appear to be partially effective and some appear damaged. Information provided by MDT indicates the northern slide area was filled with rubble around 1999, and a riprap lined drainage chute was constructed down to the ditch. This area appears to currently be stable.

Seepage from the cut slope is generally collected in a ditch at the toe of the slope and routed to a culvert that conveys the water to the south side of I-15, into a concrete lined ditch. Slope armoring, interceptor trenches and/or subsurface drains will likely be necessary to better collect and route seepage away from the cut slope.

Widening into the existing cut slope has the potential to cause additional slope instability, potentially impacting the sewer line and existing building near the top of the slope. Curb and gutter on the north side of Ramp S2 with subsurface drains will limit disturbance to the cut slope. If cutting into the existing slope is necessary, interceptor trenches, subsurface drains, retaining walls, and/or additional slope stabilization measures will likely be required.

The cut slope on the south side of I-15 also has seepage emanating from the slope face, but to a lesser degree. The seepage is collected by a similar system consisting of horizontal drains that are routed into the concrete lined ditch on the south side of I-15, paralleling the roadway. The horizontal drains on the south side also appear to only be partially effective and some of the drain outlets are plugged. The south cut slope appears to be stable.

The south embankment sideslope along I-15 northbound is relatively steep at 2:1 or steeper on the immediate downhill side of the concrete lined ditch but appears to be stable. Several small slope failures and erosion channels are present in the sideslope. For widening over the existing fill slope, it is anticipated that a similar 2:1 or 3:1 slope will be suitable. Fill materials for new fill slopes constructed at a 3:1, or flatter, will be unclassified borrow. Steeper slopes

up to 2:1 will be constructed of special embankment consisting of a sand or gravel free of organic and other deleterious materials.

The concrete lined ditch generally parallels I-15 on the south side near the top of the embankment. The ditch lining is cracked in multiple locations and the cracks are allowing water to enter the subsurface, and in some areas, to completely enter into the subsurface. Alternatives to the ditch are being considered and are discussed further in the Hydraulics section.

i. **Hydraulics.** As noted in the Geotechnical section, flows from the south side of the interstate are concentrated into a lined ditch and series of concrete pipes that run along the eastern embankment of I-15. The lined ditch terminates in an RCPA connection to the 14th Street storm drain system. The south drainage ditch is currently at or over capacity and could allow runoff to flow to nearby commercial buildings if overtopped. The recently completed Love's Travel Plaza on Airport Drive also contributes metered flows to the northwest interstate roadside ditch. More detailed information about the lined ditch can be found in the *IM 15-5(101)270 Interstate Ditch Evaluation Report* dated July 7, 2005, and the July 27, 2018, *Gore Hilll Interchange – GTF Outfall Analysis Report.*

Several alternatives were considered to effectively drain the Gore Hill area without inundating the existing system including a storm drain system spanning from the Gore Hill Interchange to the 10th Ave. South Interchange; retention/detention ponds with metered flows; improvements to the existing 14th St. system; and restoration of the concrete-lined ditch. A storm drain system with retention/detention ponds metering flow to the existing 14th St. system will serve as the main drainage outfall for the project.

Montana DEQ monitors storm waters discharged by the City of Great Falls into the Sun River under the Small Municipal Separate Storm Sewer System (MS4) program. The existing storm water drainage system in the project area is a legacy system with no treatment. There are portions of the roadway that connected to the Sun River outfall via concrete and asphalt surfaces, with no stilling or filtration opportunities.

Detention basins will be proposed only in flatter sections of land away from unstable slopes. This may entail treating discharged waters far from their origin on the project. Preliminary communications between project engineers and the City of Great Falls (Paul Skubinna and Mike Upton) have discussed this issue and achieved agreement to the acceptability of displaced treatment.

Under the City's MS4 permit, the Gore Hill Interchange project will be required to use Low Impact Development (LID), treating the runoff generated from the first ½" of rainfall from a 24-hour storm preceded by 48-hours of no measurable precipitation for any *increase in flow attributable to the project* prior to its outfall into the Sun River. A rough estimate of the additional impervious area created by the project is 70,000 SF. Treating the first ½" of rainfall off this area amounts to 3000 cubic feet.

j. **Permanent Erosion and Sediment Control (PESC) Features.** Riprap drainage chutes and concrete-lined ditches have been constructed in previous projects to protect slopes from runoff. Further PESC treatments are expected to be incorporated into this project and could include ditch blocks, check dams, lined ditches, interceptor ditches, channelizing curb in conjunction with a storm drain system, drainage chutes, embankment protectors, outlet protection, slope soil stabilization, and detention/retention basins.

k. **Bridges.** The existing overpass structure will be replaced with a new 45' x 260' 10° skewed, two-span welded steel plate girder superstructure bridge with straight wingwalls, and 2:1 abutment backslopes. The bridge will have 2-12' travel lanes, 8' shoulders and a 6.5' raised sidewalk on the left (south) side. The roadway profile is set to provide the 17.0' minimum clearance over I-15 with 3" of additional vertical clearance for future widening of the structure.

The bridge will be offset from the existing structure to allow traffic on the PTW during construction of the new bridge and roundabouts.

l. **Safety Enhancements.** Existing guardrail impacted by the project will be upgraded to new MASH standards. Wider shoulders on the new overpass structure and non-motorized facilities will improve safety for motorists and pedestrians and bicycle riders. Crosswalks and associated signing will improve safety for pedestrians crossing interstate ramps and 31st St. SW. The lengthened NB on-ramp will improve sight distance and provide more area for entering traffic to merge. Slow moving trucks moving southbound on I-15 or entering the interstate from 10th Avenue S. will have the extra lane to come to speed, or stay out of the main stream of traffic as they traverse to the Gore Hill Interchange.

m. **Context Sensitive Design.** The initial scope of the project was to use the existing overpass structure, with potential widening for shoulders and non-motorized use. During an early public open house, several citizens felt the buildup of snow on the deck created a dangerous situation in the winter. To address those concerns and facilitate traffic during construction, it was determined to replace the existing bridge with a new wider, offset structure.

n. **Traffic.** An initial OT Phase study conducted to identify options to improve operations and capacity of the interchange generated five planning-level concepts. These recommendations were developed by evaluating the four nearby intersections as a network and the resulting concepts aimed to improve the interchange as a whole. The selected option carried forward in the design will provide a passing LOS through its 20-year design life according to the traffic modeling and analysis.

The design vehicle will be a WB-67. Oversized vehicles will be provided for on each side of the structure, with the assumption that oversized vehicles will not cross over the structures since truck stops are available on both sides of the interstate. The design will also accommodate double and triple semi-trucks for access to the adjacent shipping facilities.

Pedestrian/Bicycle/ADA. An 8’ wide pedestrian path will be on the left (south) side of 31st St. SW from the south Town Pump access to the end of the project. The overpass structure will include a 6.5’ sidewalk. A 5’ wide sidewalk will be added to the right (north) side of 31st St. SW from the Crystal Inn approach to a crosswalk across 31st St. SW at the south end of the northbound ramp’s roundabout. Maintenance of the path/sidewalk will be MDT’s responsibility. Maintenance of any additional facilities requested by the City of Great Falls will need to be by agreement with the City of Great Falls.

Design Exceptions and Baseline Variances

DESIGN VARIANCES					
Controlling Element	**Existing Condition**	**Standard**	**Standard Reference**	**Proposed Criteria**	**Location**
Travel Lane Cross Slope	7% superelevation for 40 mph rural roadway	4% (350’ R), NC (765’ R) @ 40 mph urban	BCPG	Transition roundabout to 7% superelevation	Airport Rd. from roundabout to end of project
Justification: The existing roadway was constructed to 40 mph rural standards. The curves from the roundabout to the end of the project are transitional from low speed to existing conditions. Reconstructing the entire 765’ curve is beyond the scope and intent of the project.					
Clear Zone	V-ditch and 50 mph clear zone	70 mph 32’ clear zone	RDM Ex. 9-1	Guardrail	350’ of I-15 at overpass
Justification: Flattening the existing backslopes and providing a 20:1 flat-bottomed ditch to meet 70 mph standards would require rock excavation or blasting and a longer structure. Retaining the slopes and guardrail perpetuates the existing condition and provides a stable base for the new bridge abutments.					

Right-of-Way

The following existing right-of-way widths were determined from right-of-way as-builts:

I-15
At Gore Hill bridge, 280' LT, 365' RT for 1,490' (north), tapers to 230' LT, 255' RT. At the end of the northern ramps R/W tapers to 230' LT, 150' RT for 1,270', tapers to 150' LT, 150' RT for 530' to 150' LT, 170' RT

South of Interchange, 125' LT, 200' RT

Airport Drive
North of interchange, 70' LT, 50' RT

31st Street SW
South of interchange, 70' LT, 50' RT

New right-of-way will be needed. At this early stage in design 11 parcels have been identified for acquisition for a total of 6.6 acres. The preliminary right-of-way cost estimate is around $79,000. A majority of the new right-of-way will be along the relocated Tri-Hill Frontage Road, with a new ~150' width.

The City requested a utility easement and access along the abandoned portion of the Tri-Hill Frontage Road for City access to utilities.

Access Control
The interstate is a full access control facility. None of the other roadways are access controlled. There are no changes to access control with this project.

Utilities/Railroads
Significant utilities are present in the study area due to extensive development on both the north and south sides of the interchange. Overhead power and underground television, water, and gas parallel 31st St. SW; underground fiber, water, power, and overhead power reside in the existing Tri-Hill Frontage Road corridor; and underground power, sanitary sewer, telephone, and gas run along the I-15 frontage road. Telephone and fiber are attached to the existing structure. Access to the utilities along the abandoned portion of the Tri-Hill Frontage Road will need to be perpetuated. Water and sanitary sewer modifications aside from manhole and valve adjustments are not anticipated.

There are no railroads in the vicinity of the project.

Incidental Construction will be necessary. The initial planning estimate of $200,000 will be revised as the project progresses and more information becomes available.

Maintenance Items
The concrete-lined ditch along I-15 Northbound between Gore Hill and 10th Ave. South has long been a maintenance issue, and lack thereof has caused damage to the lining that allows water to escape and seep into the roadway fill. MDT prefers a drainage solution for the project that would eliminate, or at least reduce, their dependance on this ditch and limit maintenance. If any portion of the ditch remains in place after construction, consideration should be given to cleaning out trees and other obstructions. Maintenance efforts would be eased with the installation of trash fence to allow collection of litter at the top of the slope instead of accumulating in the ditch.

Agreements
Maintenance of the sidewalks will be the responsibility of MDT, no agreement with the city of Great Falls will be necessary. Standard utility agreements will be necessary.

Environmental Considerations
The environmental document for the project is a Categorical Exclusion. The Categorical Exclusion was approved on June 23, 2022.

Several resource investigations were conducted for the project with the following conclusions:
Cultural Resource Inventory: The entire inventory area is previously disturbed by construction activity and/or agricultural cultivation. The potential for intact subsurface cultural deposits is highly unlikely within

this disturbed environment. Two sites were identified within the project inventory area, one was determined to be non-contributing in this area and the second was not eligible for NRHP listing.

Screening Noise Analysis: The Screening Noise Analysis estimated traffic noise levels at 18 noise-sensitive receptors located within 500 feet of the project. One traffic noise impact was predicted due to an existing single-family residence located on the northwest side of I-15 and the Gore Hill Interchange. The traffic noise levels were not predicted to increase more than 10 dBA over existing noise levels, which meets the criteria for a Screening Noise Analysis (MDT 2017). Barriers, design modifications (including horizontal alignment shifts), and traffic management measures were evaluated and determined not to be reasonable or feasible.

Biological Resources Report: Three wetlands with a total size of 0.43 acres were identified in the project area. Highway runoff and seepage from these wetlands drains through culverts under I-15 to concrete lined ditches. It appears that flow from the wetlands eventually disperses and infiltrates in fields south of I-15. There does not appear to be a connection to any other streams or waterbodies. At this preliminary stage, 0.12 acres of wetland is anticipated to be impacted by construction. A jurisdictional determination request will be submitted to the COE to determine if 404 permitting will be necessary.

Hazardous Materials: There have been no hazardous materials sites identified within the project vicinity. All past nearby petroleum and LUST sites have been resolved.

Wildlife accommodations will not be considered for the project.

Energy Savings/Eco-Friendly Considerations

Widening for the ramps and I-15 roadways will be used instead of full reconstruction where possible to reduce the amount of new surfacing. LED lights will be used for all new luminaires.

Experimental Features and Proprietary Products

No experimental features or proprietary products are under consideration at this time.

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 limited Public Information (PI) component to address interchange ramp closures, lane 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.

Other Projects

No other projects are programmed in the vicinity that have an impact on this project.

Traffic Control

All traffic control will be in accordance with the Manual on Uniform Traffic Control Devices and MDT procedures. 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.

Traffic issues that will require special consideration are as follows:

- The Gore Hill Interchange bridge must stay open for traffic throughout construction.
- Large trucks must be able to maneuver through the interchange.
- Emergency services need to be able to access the interstate at all times.
- There are no alternate routes/reasonable detours from the airport to Great Falls.
- Airport arrivals/departures cause traffic increases at off peak hours.
- Ramp restrictions or closures will be likely.

TO and PI components will be included to mitigate these impacts to the traveling public. Strategies that will be considered are:

- Retain traffic on existing structure and PTW during new structure and roundabout

construction.
- Provide cross overs for overpass construction and southbound roadway widening.
- Limit work requiring interchange ramp closures to off peak hours or to nighttime.
- Short term limiting of heavy or oversized truck use.
- The contractor must develop and maintain a public advisory program to notify motorists, residents, the airport, the National Guard, and local business of the work schedule and anticipated short-term impacts.

An initial public informational meeting was held during the *I-15 Corridor Study*. A range of improvement options were presented to the public at the meeting. Two additional informational meetings were held during the OT Phase and PE Phase I. There was strong support for a new, wider overpass structure at the OT Phase open house meeting and MDT responded by the addition of a new structure. One additional public open house meeting is anticipated in 2023. Public involvement will continue into construction.

Targeted outreach consisting primarily of individual meetings will continue with City and County officials and other project stakeholders including the airport, the trucking industry representative, the Great Falls TAC, Town Pump, FAA, National Guard, and other landowners.

A project website has been developed and will be maintained throughout project life. The website is administered by MDT. News releases, social media postings, and mailers have been issued prior to informational meetings and will be utilized for future meetings.

A PI consultant will be retained throughout construction as well, and will guide construction public open houses, construction updates, and maintain a project hotline.

Intelligent Transportation Systems (ITS) Features
No ITS features have been identified at this time.

Construction Cost Estimate
This project is not G-Match eligible. The Construction Estimate at Alignment and Grade was $17,032,192

	Estimated cost	Inflation (INF) (from PPMS)	TOTAL costs w/INF + IDC (from PPMS)
NHFP CN	**$12,550,000**	**$1,117,000**	**$ 15,130,000**
NHPB CN	**$2,000,000**	**$178,000**	**$ 2,411,000**
TOTAL CN	**$14,550,000**	**$1,295,000**	**$ 17,541,000**
CE (10%)	**$1,483,000**	**$132,000**	**$ 1,788,000**
Project TOTAL from all of the funding types above:			
Project TOTAL CN+CE	**$16,033,000**	**$1,427,000**	**$ 19,329,000**

The estimate above includes $1,383,900 for traffic control, 30% allowance for contingency, and 8% 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 10.71% for FY 2023.

Preliminary Engineering
The percent PE expended is 62%. A review of the expended preliminary engineering and hours used compared to the anticipated amounts required for completing the project design indicates that a modification isn't needed.

Project and Risk Management
Shaun Sampson of MDT Consultant Design is the Consultant Project Engineer. The design consultant is Robert Peccia & Associates. This project is considered a Project of Division Interest (PoDI) by FHWA.

Although public involvement has been ongoing and public opinion has been generally positive, there is a risk of a major landowner or stakeholder opposing the project. Personnel at the airport have in the past indicated concerns about roundabouts due to large truck traffic. Town Pump has indicated support for the project and the realignment of the Tri-Hill frontage road, but successful acquisition negotiations still represent a risk. Continued conversations with stakeholders and successful public involvement will minimize this risk.

Environmentally there is little risk, the only identified impact is to likely non-jurisdictional roadside ditch wetlands.

Labor and material costs have fluctuated widely in the last two years due to the impacts of COVID and labor shortages. Continued uncertainty in manufacturing and the availability of labor could present a significant risk to the cost of the project. This risk is difficult to mitigate, closely watching the market and bid prices of similar projects in scope and location are likely the best way to be informed of market conditions to accurately estimate this project's cost.

Ready Date

The current estimated ready date shown in the Project Management System is May 1, 2025. The current Letting Date is November 1, 2025. The current PE End Date is 10/31/2025. A review of the remaining EPS schedule, critical path activates, and target letting date indicates that a modification to the PE End Date isn't needed.

Site Map

A project site map is attached.

Scope of Work Report

STPX 15-5(141)278, Gore Hill Interchange - GTF, UPN 9345001
EPS Project Manager: Shaun Sampson

cc:

Shaun Sampson, EPS Project Manager, Great Falls District
Russell Brewer, Great Falls Street Project Engineer
Ken Jorgensen, Great Falls Street and Traffic Manager

Headquarters

Ryan Dahlke, Preconstruction Engineer
Megan Cail, Highways Design Engineer (acting)
Steve Giard, Utilities Engineering Manager
Jonathan Ries, Lands Section Supervisor

Dave Hedstrom, Hydraulics Engineer
Bill Weber, Supervisor, Photogrammetry & Survey
Stanton Brelin, Traffic Operations Engineer
Tyrel Murfitt, Traffic Design Engineer
Patricia Burke, Safety Engineer
Brett Harris, Engineering Cost Analyst
John Pirre, Engineering Information Services
Megan Redmond, Communications Assistant
Natalee Stout, Public Involvement Specialist
Rebecca Ridenour, Research Section Supervisor
Chad DeAustin, Experimental Project Manager
Lisa Hurley, Fiscal Programming Section
David Phillips, Engineering Division
Ed Cohlhepp, Engineering Division
Andy White, Secondary Roads Engineer
Shelby Clark, Bicycle/Pedestrian Coordinator
Joe Radonich, Remediation and Assessment
Joe Green, Construction Bureau – VA Engineer
Darin Reynolds, Engr. Const. Contracting Bureau Chief
Mike Poole, MCS Scale Site Coordinator
JD Buck, Statewide Environmental *Engineering Specialist, (PFR and PFR/SOW only)*

Bob Heiser, Acquisition Section Supervisor
Jon Burnett, R/W Access Management Section Manager
Jim Davies, Materials Bureau Chief
DJ Berg, Pavement Analysis Engineer
Miles Yerger, Surfacing Design Supervisor
Scott Helm, Geotechnical Operations Manager
Paul Johnson, Project Analysis Bureau
Jean Riley, Planner
Tom Gocksch, ESB, Engineering Section Supervisor
Erin Murphy, Fiscal Programming Section
Andy Cullison, Eng. Manager, Bridge Management System
Jeremy Terry, Road Design Engineer (if involved)
Becky Duke, Traffic Data Collection Section Supervisor (WIM)
Doug McBroom, Maintenance Division Operations Mgr (RWIS)
Matt Maze, ADA Coordinator
Bill Semmens, Environmental Resources Section Supervisor
Jon Axline, Historian
Darcy Goodson, Reclamation Specialist
Nathan Haddick, Bridge Design Engineer
Rob Mihalovich, Survey Manager (PFR and *PFR/SOW only)*
Vacant, PvMS Unit Engineer *(PFR and PFR/SOW only)*

Great Falls

James Combs, Preconstruction Engineer
Brian Stremcha, Materials Lab Supervisor
Brandon Olds, Right of Way Supervisor
Richard Hibl, Construction Engineer
Chad Knuth, Hydraulics Engineer
Mike Grover, Traffic Project Engineer
Paul Sturm, Biologist
Chris Ward, Projects Engineer
Brendan Scott, District Utility Agent
Nick Tholt, Signing Designer Supervisor
Zach Moeller, District Traffic Engineer
RJ Snyder, Road Design Area Engineer

Harry Barnett, Maintenance Chief (Great Falls)
Jody Bachini, Maintenance Chief (Havre)
Beth Pointer, Right of Way Design Supervisor
Jay Manuel, Construction Ops Engineer
Vacant, Bridge Area Engineer
Lee Grosch, Geotechnical Manager
Derek Fleming, Project Development Engineer
James Kinsey, District 3 MCS Captain
Mick Brown, Registered Land Surveyor
Tim Hufford, Surfacing Design
Steve McEvoy, Constructability Reviewer