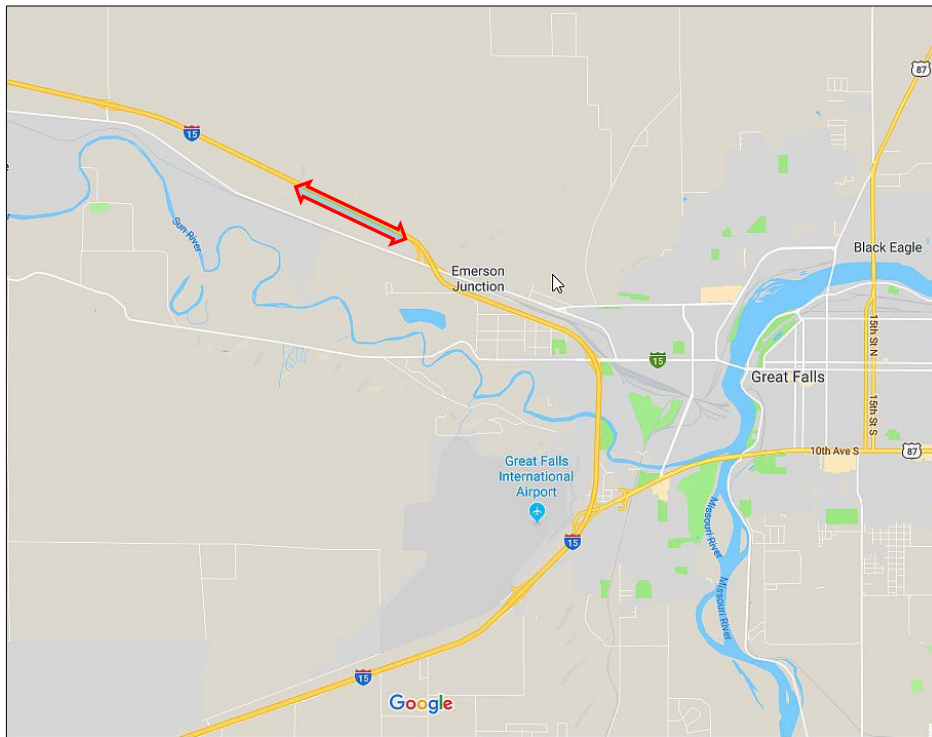


**Experimental Feature Construction Report & Evaluation
 May 2022**

Experimental Feature:	3/8" Plant Mix Surfacing Placement with no Chip Seal
Location:	Great Falls District, Cascade County, Interstate 15, RP 282.2-285.9
MDT Project Name:	Emerson Junction – Manchester
MDT Project Number:	IM 15-5(124)282[7621]
Experimental Project Number:	MT-17-05
Principle Investigator:	Chad DeAustin, Experimental Project Manager (ExPM)
Construction Date:	August 2017
Date of Inspections:	May 2018, January 2019, October 2019, March 2020, September 2021, May 2022

Project Map



↔ Section Length of Project
 *Not to scale; all values approximate



Feature Description & Outline

This project is to determine how a 3/8" plant mix surfacing (PMS) mix design without a chip seal compares with a 3/4" PMS with a conventional chip seal. Emerson Junction – Manchester is considered a grade, gravel, and PMS project on I-15 west of Great Falls. The project will get a full removal of existing PMS and gravel base and replaced with a geofabric, carrying depth of CAC and two lifts of new PMS. The first lift of PMS on mainline will receive .35' using a PG 64-28 asphalt binder and second lift at a depth of .20' using the typical PG 70-28 used for interstate paving. The project limits are from RP 282.2 to 285.9 with the experimental portion of 3/8" PMS in the northbound lanes from RP 283-284 with the remainder of the project being the control.

Evaluation Procedures & Schedule

The measures of effectiveness prevalent with this feature are:

- Construction practices (constructability, construction time, cost effectiveness, etc.),
- Texture characteristics over time,
- Any available ride data.

In accordance with the Department's 'Experimental Project Procedures,' Research will monitor and report on performance for a minimum of five years annually. This includes delivery of a work plan, construction report, annual reports, and final project report.

2017: Installation/Construction Report
2018-2021: Annual Inspections/Evaluation Reports
2022: Final Evaluation Report/Project Conclusion

A dedicated [webpage](#) will display all reporting information for the experimental feature.

Conclusion

Per the data below, the control 3/4" PMS with chip seal preformed similarly to the 3/8" PMS test section. However, with the out of specification volumetric testing results during production, there's a variable of potentially decreased performance. For better information, more evaluation should be done.

Data

Ride data is recorded in IRI, and rut is recorded in inches. The southbound lane is used as control data while the northbound lane is the test section. 2016 data is prior to the new plant mix placement for some additional data.

Year	NBDL Ride	NBPL Ride	NBDL Rut	NBPL Rut
2022	66	62	.136	.126
2021	73	63	.132	.105
2020	70	62	.117	.098
2019	68	63	.118	.109
2018	59	57	.090	.082
2016	111	111	.161	.095
% Change 18-21	11.9%	8.8%	51.1%	53.7%

Year	SBDL Ride	SBPL Ride	SBDL Rut	SBPL Rut
2022	76	66	.138	.093
2021	78	69	.128	.085
2020	77	66	.129	.082
2019	74	66	.115	.093
2018	68	60	.089	.072
2016	113	94	.158	.099
% Change 18-21	11.8%	10%	55.1%	29.2%

Construction Documentation – August 2017

Unfortunately, the ExPM was unable to be on site for construction of the plant mix which was completed in August of 2017. However, with excellent tracking of materials and notes from the construction crew on site, there is no shortage of information about the project. The consultant 3/8" Grade S mix design that was submitted by the contractor failed the hamburg test. The mix design testing by MDT resulted in a marginally passing hamburg. At this point, the decision to proceed was left to the contractor and the acceptance of the material would be based on in-production testing.

Test Result Spec/Target	% Asphalt 6.0	Air Voids 2.4-5.0%	VMA 14.9-19.0	VFA 60-85	D/A Ratio .4-1.6
QA1	5.97	5.3	18.1	71	.8
QA2	6.15	5.4	18.4	70	.7
QA3	6.24	1.6	15.6	90	.8

In the table above, the results for the volumetric evaluation of the in-production 3/8" Grade S plant mix can be seen. Highlighted in red are results that do not meet MDT commercial plant mix specification. All three samples of gyratory compacted bricks were sent to the Mix Design Lab to be used in hamburg testing. In addition, two 6" cores were cut from the mat to be tested as well. The target for a field sample hamburg is less than 13 mm of rut depth at 10,000 passes of the equipment. Below are the results for the 3 volumetric samples and 2 field cores.

Sample	Spec	QA1	QA2	QA3	Core 1	Core 2
Rut @ 10000th Pass (mm)	< 13.0	10.87	17.10	17.99	N/A	N/A
Passes to Failure	> 10000	10460	9408	8796	6768	7966
Total Rut (mm)	N/A	18.82	19.67	21.90	22.86	17.75
Passes Total	N/A	11814	10496	11472	8498	8806

Shown in red are the failing hamburg results. QA1 did pass the hamburg. Paving was completed in August of 2017 which resulted in chip seal application being pushed to May of 2018. Prior to the chip seal placement, a ride was conducted to evaluate road and rutting condition, based on the positive results, the 3/8" Grade S material was accepted by MDT.

Below, on pages 4 and 5 are photos from a post construction site visit in October of 2017.



↕ Representative images of the 3/8" PMS section at approximate RP 283.5. Upper is NB view north. Lower is NB view south.



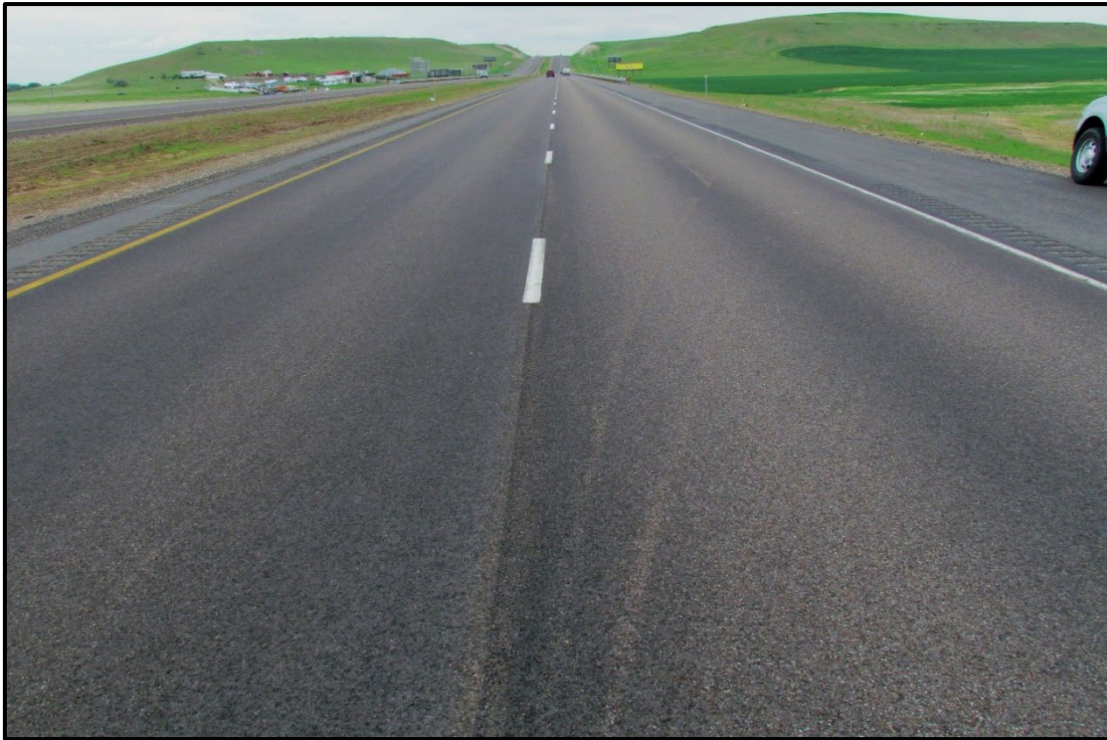


↑↓ Representative images of the 3/8" PMS texture.



Site Inspections

Year 1 – May 2018



↑↓ Representative images of the 3/8" PMS at approximate RP 283.5. Above is NB view north.



Year 2 – January 2019



↕↔ Representative images of the 3/8" PMS at approximate RP 283.5. Above is view north.





↑ Representative close-up of 3/8" PMS texture.

Year 2 – October 2019 (additional site visit)



← RP 283, view north, transition from $\frac{3}{4}$ " PMS with chip seal (control) to $\frac{3}{8}$ " PMS without chip seal (test).



← RP 284, view south, transition between control and test sections.



← RP 283, transverse view of transition point.



↑ Representative close-up of the 3/8" PMS texture.

Year 3 – March 2020



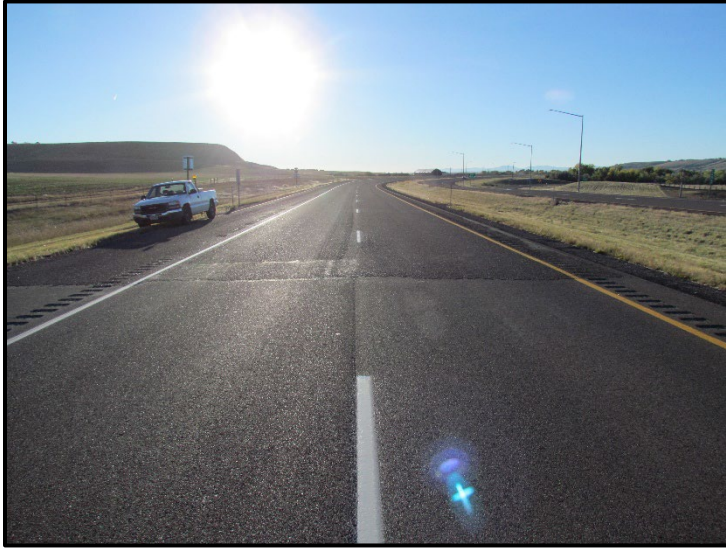
↑ RP 283, view north, transition point of control to test section.
↓ Representative image of the 3/8" PMS texture.





↑ Representative close-up of 3/8" PMS texture.

Year 4 – September 2021

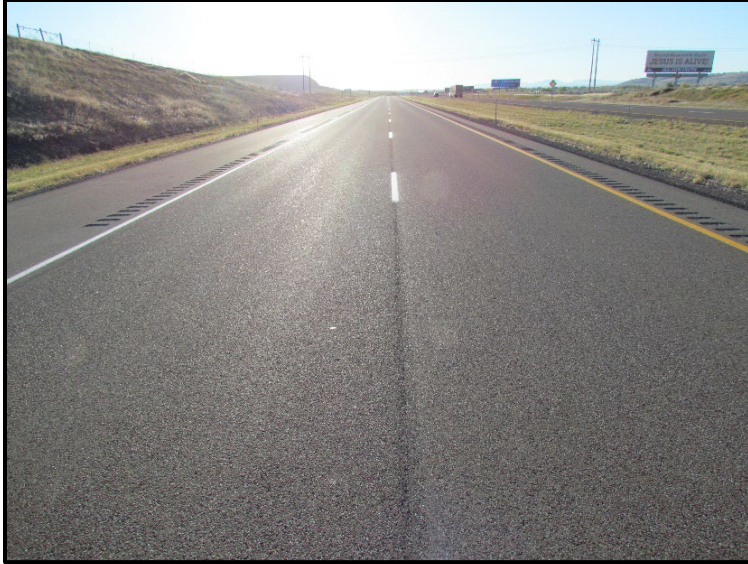


← RP 283, view south. Surface near camera is test section of 3/8" PMS with no chip seal. Transition between the sections can be seen.



← ↓ View of 3/4" PMS with chip seal surface texture at varying distances.





← RP 283.5, view south, representative image of 3/8" PMS section.



← ↓ View of 3/8" PMS surface at varying distance.



Year 5 – May 2022



← RP 283, view south. View of the chip seal on 3/4" PMS.



← RP 283, view north. View of the transition from the 3/4" PMS chip seal section to the 3/8" PMS with no chip seal.



← Close up view of an example of the chip seal texture.



← RP 284, view north. Transition from 3/8" PMS to 3/4" PMS with chip seal.



← RP 284, transverse view. As seen, there is some chip loss at the transition joint possibly from snow removal activities.



← Close up view of an example of the 3/8" PMS texture.

Disclaimer Statement

This document is disseminated under the sponsorship of the Montana Department of Transportation (MDT) and the United States Department of Transportation (USDOT) in the interest of information exchange. The State of Montana and the United States assume no liability for the use or misuse of its contents.

The contents of this document reflect the views of the authors, who are solely responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the views or official policies of MDT or the USDOT.

The State of Montana and the United States do not endorse products of manufacturers.

This document does not constitute a standard, specification, policy, or regulation.

Alternative Format Statement

Alternative accessible formats of this document will be provided on request. Persons who need an alternative format should contact the Office of Civil Rights, Department of Transportation, 2701 Prospect Ave, PO Box 201001, Helena, MT 59620. Telephone 406-444-5416 or Montana Relay Service at 711.

This public document was published in electronic format at no cost for printing and distribution.