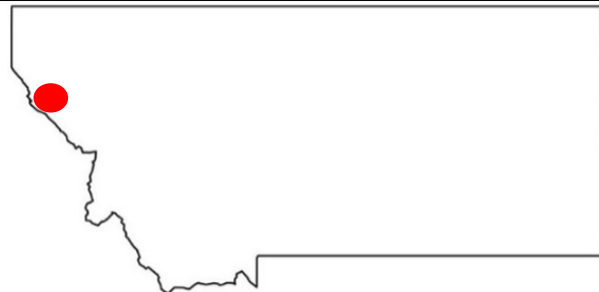
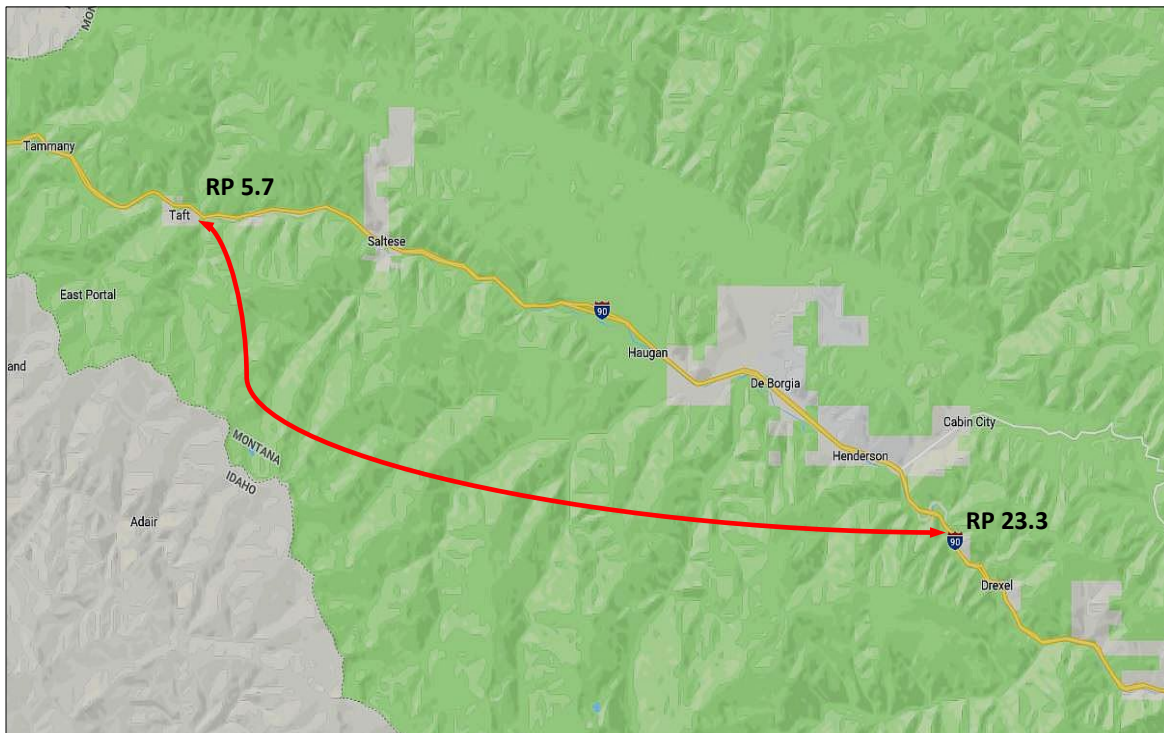


**Experimental Feature Final Report
 January 2023**

Experimental Feature:	Fog Seal on Chip Seal (FSCS)
Location:	Missoula District, Mineral County, Interstate 90, RP 5.7-23.3
MDT Project Name:	Exit 5 – East
MDT Project Number:	IM 90-1(220)6[8954]
Experimental Project Number:	MT-18-01
Principle Investigator:	Chad DeAustin, Experimental Project Manager (ExPM)
Technical Contact:	Jim Davies
Construction Date:	July 2017
Date of Inspections:	October 2017, April 2018, October 2018, May 2019, April 2020, September 2021, August 2022

Project Map



Feature Description & Outline

This feature was implemented to determine if an applied fog seal to chip seal (FSCS) would extend the service life of the pavement treatment (chip retention) compared to the conventional practice of a chip seal (seal and cover). The chip seal application used CHFRS-2P emulsion and MDT type 3 chips. The fog seal applied was a CSS-1H. There was no planned control, however Taft – West, the section to the west of Exit 5 – East, was constructed the year prior with CRS-2P and MDT type 2 chips.

The evaluation location is a tight canyon through the mountains and experiences extreme weather conditions that increases maintenance activities and limits the effectiveness of past pavement preservation treatments.

Evaluation Procedures & Schedule

The measure of effectiveness prevalent with this project are:

- Construction practices (constructability, construction time, cost effectiveness, etc.),
- Effectiveness of fog seal in additional chip retention,
- Visual inspection of residual bitumen binder duration.

In accordance with MDT's Experimental Features Procedures, the Experimental Project Manager 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

Conclusion

This chip seal surface is in excellent condition even with high traffic levels and significant winter weather and snowplow activity. This feature does not have a control section for comparison which makes it difficult to determine which variable or variables attributed to the durability of the application. The section of roadway to the west, project name Taft – West, was also an experimental feature evaluating a chip seal with and without fog seal. This section performed much better than Taft – West. The variability in materials used for these evaluations resulted in indeterminate results when comparing the two sections but the combination of CHFRS-2P emulsion, MDT type 3 chips, and CSS-1H fog seal was a successful combination for this roadway.

A dedicated [webpage](#) provides all reporting for the experimental feature.

Construction Documentation – July 2017



← Representative image of FSCS application in progress.



← Close-up of chip seal using MDT Type III aggregate with CHFRS-2p emulsion.



← Close-up of completed FSCS application with CSS-1h emulsion.



↑ Both lanes with completed FSCS application. Driving lane has active traffic while passing lane is allowed to completely cure.

Site Inspections

Year 0 – October 2017 (Fall of construction year)



↑ FSCS surface, unknown RP, view west.

← Fog seal layer shows slight topical wear on surface aggregate. Chip retention is tight with no visible distress.

Year 1 – April 2018



↑ FSCS surface, RP 14,
transverse view.

← Fog seal of CSS-1h has
worn off the surface
aggregate but visually
chips are viable within the
emulsion matrix.

Year 1 – October 2018



← FSCS surface near RP 15 EB, view east. Visually the FSCS application shows good pavement texture and solid chip embedment.



←↓ Close-ups of the FSCS representative of current condition of the pavement surface.



Year 2 – May 2019



← FSCS surface near RP 8 EB, view east. Visually the FSCS application continues to show good pavement texture and solid chip embedment.



←↓ Close-ups of the FSCS representative of current condition of the pavement surface.



Year 3 – April 2020



← FSCS surface near RP 20 EB, view east. Visually the FSCS application continues to show good pavement texture and solid chip embedment.



←↓ Close-ups of the FSCS representative of the current condition of the pavement surface.





↑ Noticed are areas of the project which have exhibited chip loss mainly at the crown as seen here at RP 20 EB lane most likely caused by plow activity. Also seen at bridge deck approaches but this is minor and not indicative of performance to date.

Year 4 – September 2021



← FSCS surface near RP 12 in the WB lane, view east.

Visually the chip seal is working effectively and is in good condition with some exception on the crown due to snowplow damage (see next page).



←↓ Close-ups of the FSCS representative of the current condition of the pavement surface.





↑ Referenced in the 2020 site visit section, page 10, snowplow activity has stripped some chips at the crown. Shown here is a close-up near RP 12 in eastbound lane. The white paint seen is striping showing through from the previous surface.

Year 5 – August 2022



← RP 8, eastbound, view east.



← RP 8, westbound, view east.



← RP 8, close-up view of the chip seal surface.



← RP 12, westbound, view west.



← RP 12, close-up view of the chip seal condition at the fog line.



← RP 12, close-up of the chip seal surface.

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