Montana Department of Transportation
Research Programs
Revised September 2011

EXPERIMENTAL PROJECT WORK PLAN

EVALUATION OF WARM MIX ASPHALT (WMA) PAVEMENT ON A HIGHWAY CONSTRUCTION PROJECT

Project Name	Project Number	Project Location	Project Length
Monida-Lima (SB)	IM 15-1(109)0	Interstate 15, Beaverhead County, Butte District- approximate RP 0.0 to RP 17.1	17.1 miles

FHWA Project Number: MT 10-02

Project Type: Evaluation of warm mix asphalt (WMA) pavement on a highway construction project using three different WMA technologies,

Principal Investigators: Kris Christensen, Research Project Manager

Objective

Determine the effectiveness of Warm Mix Asphalt (WMA) using three WMA additives and technologies compared to MDT's standard Hot Mix Asphalt (HMA) surfacing.

Goals:

1. Construction of three sections using Evotherm additive, Sasobit additive, and foaming technology- as well as, a control section of conventional HMA.
2. Collection of material during construction and documentation of construction activities, conditions and products; as well as, materials testing of construction material during construction and long term monitoring of pavement performance.
3. Document materials testing results with explanation of result's definitions.
4. Technology transfer including documentation of pre-construction evaluation and materials testing results of I 15 project before and during construction.

Experimental Design

This experimental project originally consists of three different WMA projects throughout the state. The project has been revised to include only the I 15 project.

The Monida-Lima (SB), I 15 project will consist of placing the three types of warm mix additives and technologies (Evotherm, Sasobit, and foaming) and HMA control section. Each section length will be approximately a quarter of the project length. The beginning and ending point of each section and the product used will be clearly defined.

Evaluation Procedures

All materials testing will be performed as with a hot mix asphalt project with some additions (see attachment A for tests and frequencies). Research or a designated representative will be onsite during construction to document the production and placement of the WMA. Any anomalies during construction that may affect performance will be documented and marked out on site and will be reflected in the construction report.

After project completion, the test/control sites will be re-delineated for continued performance evaluation. Data collection will include rut and ride measurement, crack mapping, core data, and documentation of visual distress. Research will receive materials testing results with explanation of results to include in experimental construction report or as a supplement to annual reports.

Evaluation Schedule

Research will monitor performance for a period of five years annually, with every year up to *ten years (informally/optional). This is in accordance with the Department's "Experimental Project Procedures." Delivery of a construction/installation report, interim, annual or semi-annual reports is required as well as a final project report (responsibility of Research). All products will be distributed internally to appropriate staff and posted to the Departments intra/internet site.

2010:	Research Installation/Construction Report
20011-2014:	Annual Evaluation/Annual Reports
2015:	Final Evaluation/Final Report (annual if elected to continue the evaluation)
*2015-2020:	Annual Evaluation/Reports (Informal)

Key Contacts

People involved with the development of this experimental project.

Matt Strizich- Materials Engineer and Bureau Chief
Dan Hill- Materials Project Engineering Engineer

Gene Kaufman- FHWA
Geno Liva- Construction Operations Engineer, Butte District
Mark Snow- Materials Construction Reviewer
Dave Johnson- Asphalt Institute
Mike Arvish- Engineering Project Manager, Butte District
Engineering Project Manager- John Starcevich, Butte District

Attachment A

Task	Frequency of Sampling	Responsibility
Pre-Construction Survey		
Perform FWD analysis	Before and after	Materials-Pavement Analysis
Lab Work on Mix Design		
Sieve analysis of combined aggregate	Standard operating procedure	Materials- HQ
Angularity of coarse aggregate		
Wear of coarse aggregate		
Flat and elongated particles of coarse aggregate		
Absorption of coarse aggregate		
Angularity of fine aggregate		
Sand Equivalent of fine aggregate	Standard operating procedure	Materials- HQ
Volume swell of fine aggregate		
Atterburg limits of fine aggregate		
Hydrated lime: verify type and percent added		
Asphalt binder PG tests		
Verify compliance with WMA manufacturer's recommendations regarding incorporation of additives and/or processes, receiving, storage and delivery of additives (to be defined)		
Hamburg wheel track tests on proposed mix design	3 on each section of WMA	Butte District lab
Mixture resistance to moisture induced damage on proposed mix design	Standard operating procedure	Materials- HQ
Lab Work on Production Mix		
Volumetrics (VMA, VFA, VTM) on production mix	First lot- several tests Then every 1,000 tons	Butte District lab
Hamburg wheel tracking tests on production mix	1 per lot	Butte District lab
Dust/Asphalt ratio on production mix	Standard operating procedure	Butte District lab
Asphalt content on production mix	Standard operating procedure	Butte District lab
Mixture resistance to moisture induced damage on production mix	Standard operating procedure	Butte District lab
Maximum specific gravity of production mix	Standard operating procedure	Butte District lab
Gradation of aggregate recovered on production mix	Standard operating procedure	Butte District lab
Plant Operation		
Verify required mixing plant modifications		supplier
Verify accuracy of weigh systems	Standard operating procedure	

Record of weights and measures during plant production	Standard operating procedure	
Verify flow rate meter	Standard operating procedure	
Temperature of mix discharge at plant	hourly	MDT plant person
Construction		
Record haul time of delivery trucks	daily	MDT construction
Inspect condition of prepared surface	Standard operating procedure	MDT construction
Verify correct tack coat application	Standard operating procedure	MDT construction
Record of air temperature during construction	Standard operating procedure	MDT construction
Record of precipitation during construction	Standard operating procedure	MDT construction
Monitor operation of traffic on compacted roadway during cooling	Standard operating procedure	MDT construction
Record location of construction joints	Standard operating procedure	MDT construction
Measure mix lay down temperature		MDT construction
Record compactive effort (number of passes)	Standard operating procedure	MDT construction
Measure compacted density of roadway	Standard operating procedure	MDT construction
Collect cores for density measurement	2-5 years after completion of project	Materials- Pavement Analysis
Post-Construction		
Verify surface tolerances and record any corrected areas	Standard operating procedure	
Perform ride quality analysis	Standard operating procedure	
Perform FWD analysis		
Long-Term Evaluations		
Perform ride quality analysis		
Develop crack map/distress survey	Standard operating procedure	Research
Perform FWD analysis		