AASHTO ETF MICHIGAN CHIP AND FOG SEAL TRIAL

- **Date of Trial**

  June 9, 2020

- **Project Scope**
  - **Location**

    Ironwood Dr. from 48th Ave to 40th Ave. Coopersville, MI

  - **Participating Organizations**

    - Agency – Ottawa County Road Commission
    - Contractor – Strawser Construction, Inc.
    - Emulsion Supplier and Support Laboratory – Michigan Paving & Materials Co. – Alma, MI Terminal

  - **Project Overview & Location History**

    Ironwood Dr. is a rural county primary road with an ADT of 100 to 200 near Coopersville, MI. An approximately 1-mile section from 48th Avenue to 40th Avenue totaling 12,320 square yards was completed. 5 days prior to the trial; June 4, 2020 minor crack sealing was completed. Very little crack sealing was required in the lanes and most of the center line joint was crack sealed.

    This section of roadway received a two course; 3" total; overlay in 2017. The agency has recently rated the section with a PASER rating of 7. Comparing it to data and pictures from RoadResource.org I rate the road as an A-/B or in number 85.

The West Bound lane was chosen as the Michigan Specification Section and was applied first; beginning at 7:15 AM. The East Bound Lane was chosen as the AASHTO ETF section and was applied beginning at 09:40 AM. It was slightly delayed due to a mechanical problem that occurred right after the first lane was completed.

The fog seal was applied in midafternoon after brooming and released to traffic in less than 45 minutes.

Two pre-construction meetings were completed. One on May 28, 2020 with the project manager in an office setting and one on June 8, 2020 with the project manager and crew foreman at the project site.

Application rate targets were 0.40 gallons per square yard of binder and 18#'s per square yard of aggregate. The fog seal was applied at 0.10 gallons per square yard.

- **Materials, Specifications, and Testing**
    - Emulsion

      CRS-2M – Michigan Lane, CRS-2L AASHTO Lane

      Final volume applied = 4,928 gallons on 12,320 square yards

Michigan Lane WB

Test	Production Test Result	AASHTO ETF Spec	Michigan Spec
Viscosity, Saybolt	140 Sec	100-400 Sec	75-300 Sec
Storage Stability 24 hr.	0.19%	1.0%	1.0%
Demulsibility	80	40 Min	50 Min
Sieve	0.00	0.10%	0.10%
Residue by Dist	70.41%	65%	65%
Penetration	119 dmm	90-150 dmm	80-150 dmm
Elastic RecoveryT-301	70% @ 10C	60% min @ 25C	60% @ 10C
Toughness 25C	8.42 Nm	NA	4.5 Nm
Tenacity 25C	7.39 Nm	NA	3.5 Nm

AASHTO Lane EB

Test	Production Test Result	AASHTO ETF Spec	Michigan Spec
Viscosity, Saybolt	248 Sec	100-400 Sec	75-300 Sec
Storage Stability 24 hr.	0.17%	1.0%	1.0%
Demulsibility	70	40 Min	50 Min
Sieve	0.008	0.10%	0.10%
Residue by Dist	68.64%	65%	65%
Penetration	127 dmm	90-150 dmm	80-150 dmm
Elastic RecoveryT-301	70% @ 10C	60% min @ 25C	60% @ 10C
Toughness 25C	10.75 Nm	NA	4.5 Nm
Tenacity 25C	9.27 Nm	NA	3.5 Nm

Distributor Sample from Michigan Lane (No distributor sample was obtained for the AASHTO Lane)

Test	Distributor Test Result	AASHTO ETF Spec	Michigan Spec
Viscosity, Saybolt	100 Sec	100-400 Sec	75-300 Sec
Storage Stability 24 hr.	0.11%	1.0%	1.0%
Demulsibility	75	40 Min	50 Min
Sieve	0.00	0.10%	0.10%
Residue by Dist	69.8%	65%	65%
Penetration	130 dmm	90-150 dmm	80-150 dmm
Elastic RecoveryT-301	65% @ 10C	60% min @ 25C	60% @ 10C
Toughness 25C	7.40 Nm	NA	4.5 Nm
Tenacity 25C	6.26 Nm	NA	3.5 Nm

The distributor was previously calibrated and longitudinal checks were completed at 1,000 and 2,500 feet during the first pass on the WB lane. These checks confirmed the distributor calibration to be in synch with on board set point of 0.40 gallons per square yard.

- Aggregate – 34 CS Blast Furnace Slag, Air Cooled.

Test	Stockpile Result	AASHTO ETF Type B Spec	Michigan 34 CS Spec
Passing 3/8	91.8	90-100	90-100
Passing No. 4	6.9	5-30	0-10
Passing No. 8	3.4	0-10	0-5
Passing No. 30		0-2	0
Passing No. 200	1.6	0-1	</= 2
Fracture 1 Class I		70	95
Fracture 2 Class I		60	85
LA Abrasion Class I		40 max	45 max
Flakiness		35 max	15 max

The chip spreader was calibrated at the staging yard the morning of the trial.

Final volume applied = 110.88 tons on 12,320 square yards.

- **Rollers**

  The contractor only had two rollers on hand, so the two rollers were staggered to provide full lane width rolling with two complete passes on each square yard. The rollers were BOMAG 6-ton pneumatic rollers.

- **Brooming**

  We did a small section of the WB Michigan lane after 1 hour of cure and the new chip seal experienced no loss of embedded chips. The remainder of the brooming occurred starting between 11 AM and 12 PM.

- **Weather Conditions**

Parameter	Start of WB MI Lane	Start of AASHTO ETF EB Lane	Range of Day
Ambient Temp	62 F	75 F	62-94 F
Roadbed Temp	71.6 in sun 70.5 in shade	86.5 in sun No shaded areas	71.6-110 F
Humidity	73%	48%	38%-73%
Overall Conditions	Mostly sunny with Light wispy clouds	Mostly sunny with Light wispy clouds	same to mostly cloudy Rain overnight

Prior to Fog

Complete Prior to Striping

- **Conclusion**

  Trial went very well and completed with a great application of chip and fog seal. Michigan specifications meet or exceed the AASHTO ETF Chip Seal Material Specifications and plenty of study material is available on the DOT and local agency level. Michigan's reputable contractors also meet or exceed best practices and the Construction Guidelines that the AASHTO ETF developed. Therefore; we could note that Michigan state and many local agencies are already using the specification.

  On the other hand, it was important to take the time to document and ensure that all of the material and construction guideline specifications were realized and documentation provided for a location specifically designated for long term monitoring. While we can point to many other examples in Michigan this one can provide a specific story for further messaging and implementation throughout the country.