INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS

MASS RETENTION OF EMULSIFIED ASPHALTS SUBJECTED TO WATER DROPLETS
ITM No. 598-21

1.0 SCOPE.

1.1 This test method gives a measure of water resistivity and how quickly an applied asphalt emulsion can become water resistant. This test method is used to measure material runoff caused by a rain effect at different time intervals, allowing the method to measure differences in drying times between products of different formulations.

1.2 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 ASTM Standards.

D6934 Test Method for Residue by Evaporation of Emulsified Asphalt
D6997 Test Method for Distillation of Emulsified Asphalt
E1 Standard Specification for ASTM Liquid-in-Glass Thermometers

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. ITM is used to measure the effects of secondary additives in Void Filling Emulsions or modified asphalt emulsions on the ability to dry quickly and become resistant to water droplets simulating rainfall.

5.0 APPARATUS.

5.1 Receiver/pan, two large pans for collection of excess emulsion during application and water runoff during test.

5.2 Water Release Device, 100 mL titration burette with stopcock, able to measure to tolerance of ±1 mL.

5.3 Balance, capable of weighing 10 ± 0.01 g.

5.4 Oven, capable of maintaining a temperature of 50° ± 3°C

5.5 Thermometric Device, thermometer 15C or 15F as prescribed in ASTM E1, or equivalent thermometric device

5.6 Timer, capable of measuring time to ±5 seconds

5.7 Drying Apparatus, wire rack or flat metal pan for drying at room temperature and in conditioning oven

6.0 SAMPLING. Sampling shall be as stated in the referenced ASTM methods.

7.0 PREPARATION OF SAMPLE.

7.1 All emulsified asphalts shall be properly stirred to achieve homogeneity before testing.

7.2 Warm the emulsified asphalt to 50 ± 3°C in an oven or water bath. After the sample reaches 50°C, stir the sample to achieve homogeneity.

7.3 All sandpaper strips should be measured and cut from 8.5”x11” sheets of red P50 grit sandpaper at room temperature.

7.4 For each trial, 4 strips should be cut to 5.5 ± 0.1 in. tall by 2 ± 0.1 in. wide with scissors. Label the top of these strips “A”, “B”, “C”, and “D”.

8.0 PROCEDURE.

8.1 Determine residue of the emulsified asphalt sample by distillation (ASTM D6997) or evaporation for 3 h at 163 ± 3°C. (ASTM D6934).

8.2 Fill titration burette full of RO water

8.3 Prepare your data collection table as shown in *Table 1.*

8.4 Record the dry weight of each sandpaper strips individually into the data table under *Measurement A* to the nearest 0.01 g.

8.5 Lay the strips so they lean against the edge of the pan at an approximate 45-degree angle. Pour your sample across each of the strips, getting full coverage below the top half-inch.

8.6 Allow excess material to drip off the strips and immediately weigh each strip individually, recording under *Measurement B.*

8.7 Allow the strips to dry for 15 minutes. Position the strips in another collection pan below the titration burette. Be sure the burette tip is 1.5 ± 0.1 in. above the sandpaper strip.

8.8 Fully open the burette and drip 10 ± 0.5 mL of water onto the strip at full flow rate. Place the strip into the oven to cure for 2 hours. Repeat for the remaining strips.

8.9 Remove the strips from the oven and cool to room temperature. Weigh the final mass of the strip with dried residue and record under *Measurement C.*

9.0 DATA COLLECTION

Emulsion Name				**Start Time:**		**Tested Asphalt Residue Content (%)**			
Measurement	Trial 1	Trial 2	Trial 3	Trial 4		T1	T2	T3	T4
A =					R_a				
B =					R_c				
C =					$\%R_{Ret}$				

Table 1: Data Collection Table

Where
A = Mass of dry sandpaper strip
B = Mass of sandpaper strip and applied material immediately after application
C = Mass of sandpaper strip and residue after 2 hours curing in 50°C oven
R_a = Residue applied before curing and water resistance test
R_c = Residue leftover after oven curing
$\%R_{Ret}$ = Percent Residue Retained
X = Tested Emulsion Residue percentage by distillation or evaporation

10.0 CALCULATION.

10.1 $\text{Residue Applied} = R_a = (B - A) * X$

10.2 $\text{Residue After Oven Curing} = R_c = (C - A)$

10.3 $\%\ \text{Residue Retention} = \%R_{Ret} = \frac{R_c}{R_a} * 100\%$