

MnROAD Paving Materials and Locations – 2008

Cells	Mixture	Binder	Pb Target, %	RAP Type
20	Wear	PG 58-28	5.2	30% Crushed Milled
20	NonWear	PG 58-28	5.5	30% Crushed Milled
21	Wear	PG 58-28	5.2	20% Fine 10% Coarse RAP
21	NonWear	PG 58-28	5.5	20% Fine 10% Coarse RAP
22	Wear	PG 58-34	5.2	20% Fine 10% Coarse RAP
22	NonWear	PG 58-34	5.5	20% Fine 10% Coarse RAP
15-19, 23	Wear	PG 58-34	5.2	20% Crushed Milled
15-19, 23	NonWear	PG 58-34	5.5	20% Crushed Milled

General Observations and Trends

Dynamic Modulus, E*

Wear mixes had higher E* values than the Non-Wear mixes; attributable to a lower asphalt binder content.

Dynamic modulus tests conducted at 54.4° C proved to be problematic during onsite testing. The LVDT mounting studs which are glued to the test specimens were falling off and had to be reattached. Additional mixture was taken during sampling and stored in 5 gallon buckets. Unfortunately, insufficient quantity of extra material was available to remanufacture all of the cells and test specimens. Only cells 21 and 22 Wear mixes were available. This material was reheated and new test specimens were manufactured and tested at 45° C.

Cells 20-21 – E* values for the Wear mixtures of these cells was higher due to a lower asphalt binder content (5.2%) as compared to the Non-Wear mixes. The binder grade and total RAP quantities were the same. The type of RAP (milled verses fractionated) did not appear to have any significant impact on E*.

Cell 22 – This cell had a softer binder grade than cells 20 and 21. The binder grade was a PG 58-34 and exhibited lower E* values than did cells 20 and 21 and also incorporated 30% fractionated RAP.

Cells 15-19, 23 – The WMA cells with 20% milled RAP had the lowest E* values of all cells. The Wear mixture had higher E* values than the Non-Wear mixture.

Flow Number, Fn

The Flow Number test should exhibit similar trends as the dynamic modulus test in response to the mixture's asphalt binder content. The Wear mixes were designed to have less asphalt binder than the Non-Wear mixes.

As a result of the binder content we would expect:

- The Fn value to be higher for the Wear mixes than the Fn for Non-Wear mixes
- The measured strain at the Fn would be lower for the Wear mixes than the Non-Wear mixes
- The total cycles to 5% strain would be higher for the Wear mixes than the Non-Wear mixes.

If the above assumptions are correct, each cell in the Table below is marked with a T for True. If the assumptions were not correct they are marked with an F for False.

Also, included are the results of the new algorithm for computing Fn values, referred to as "Francken".

Fn		
Cell		Francken
20	F	F
21	T	T
22	F	F
15-19,23	F	F
Strain @ Fn		
Cell		Francken
20	T	T
21	F	F
22	F	T
15-19,23	T	T
Total Cycles ~ 5% Strain		
Cell		
20	T	
21	T	
22	F	
15-19, 23	T	