Comments on Laboratory Mix Design Tests for the SHRP H101, SPS-3 (Slurry Seal) 1991 Projects

By C. Robert Benedict, Consultant

For Presentation at the R&D Technical Session at the 29th Annual ISSA Convention, Feb. 17-25, 1991 at New Orleans.

This past season, the SHRP H101, SPS-3 Program, "Maintenance Effectiveness of Surface Treatments", was completed in the four climatic regions across the US and Southern Canada. 80 plus sections of "generic or conventional slurry" are in place.

Each of the four contractors were required to submit simple mix designs which did not include many of the tests we routinely perform. With the cooperation of the SHRP people, Roger Smith and Tom Freeman as well as the consultants for each project, we received all the actual job materials. We then performed most of the mix design lab tests in accordance with our procedures using the actual field materials. The high temperature wheel tracking tests remain to be completed using retained samples. An abbreviated summary of our results is attached.

Extensive field evaluations of each project will be made during the next several years. We hope to compare the results of these evaluations with our more extensive data to help determine the relative value of our lab tests with field performance.

Comments

1. In general, the SHRP people got what they asked for; i.e., "generic slurry seal".

2. Based on field reports from the contractors and others, our lab tests generally conformed with the initial field experience.

3. There were 2 pairs of materials combinations, very good and relatively poor as indicated by our tests throughout our testing program. One system experienced poor emulsion stability which caused application difficulties. In many cases, the systems were used for rut filling which should not have been done with the generic systems specified. Our LWT multilayer displacement tests advised against rut filling.

4. The wet cohesion test gave a rather accurate description of field performance except when high and low field temperatures were encountered. Lab design should probably be expanded to include the range of expected field temperatures. 2 materials did not meet the SHRP criteria of 20kg-cm in 120'.

5. The loaded wheel sand adhesion test did not reliably indicate reasonable maximum emulsion contents.

6. There was a correlation in the LWT displacement with the compacted voids in the mineral aggregate; i.e., the densest aggregate had the least ambient displacement.

7. The Marshall Stabilities and flows were run as a matter of interest. We note the values as high, higher in fact than many polymer modified microsurfaces. A comparison with our high temperature wheel tracking tests should prove interesting.

8. The Schulze-Breuer compatibilities correlate well with our other test results; i.e., good S/B's = good results, poor S/B's = poor results.

9. In one instance, we observed one project north of Albany, NY where a polymer modified microsurface had been placed for comparison. The slurry placed in multilayers, was compacting, had become smooth and was beginning to re-rut while the microsurface had not budged.

10. The designs submitted by the 4 contractors ranged from a ¼ page simple recommendation with no supporting data to a complete design including emulsion formulation optimization with all supporting data and photographs--30 some pages; from woefully inadequate to over kill.

We hope to complete the high temperature Wheel Tracking Tests this spring and complete our reports this year, perhaps to include the initial field evaluations after one year. At that point we could present our findings to the Research and Specifications Committee for their action for any revisions that may be indicated and a recommendation for a standard design procedure and format.

SHRP H101, SPS-3, SLURRY SEAL
LAB MIX TESTS ON SLURRY MATERIALS, 1990
ALPHA LABS, C.R. BENEDICT 2/91

	WEST COAST	SOUTH	N. CENTRAL	N. ATLANTIC
AGGREGATE				
Type	Mixed Siliceous	Slag	Granite	Dolomite
0/200	11.0	8.7	9.6	8.5
S.E.	59.4	88.6	59.5	71.4
Methylene Blue	4.0	1.6	13.0	2.5
Blue Factor	41.3	7.7	85.3	e4.0
VMA	23.4	34.0	30.9	29.4
TRIAL MIX				
60'Wet Cohesion @ 15%AE	24.9pc	24.35	12.5(2 pc)	14.1
" " " w/additive	10.6(al)	29.9	16.0(1 hl)	-
" " " @ 12%AE	9.9	23.1	10.0(pc)	9.8
" " " w/additive	16.0(al)	22.85	12.0(1.5hl)	-
60C Cured Cohesion @ 15%		23.6	14.5(2pc)	-
" " " w/additive	23.0	25.6	15.0(1.2hl)	-
" " " @ 12%	20.1	18.7	-	15.4(pc)
" " " w/additive	22.2	23.4	-	21.5(hl)
Compatibility Adhesion	nc	100+	5%pc 85+hl	low @ hi pc
WTAT				
AE% @ 75g loss 1 hour soak	6 to 8	8-	12 (pc)	8 (pc)
" w/additive	9-	6	10 (hl)	-
AE% @ 75g loss 6 day soak	13-	12	19 (pc)	18.0(pc)
" w/additive	12.5	10	12 (hl)	-
LWT				
Sand Adhesion,AE @50g/SF	21.0(?)	14.7%AE	20.5(?)	19.5(?)
LWT Displacement, best				
--Vertical	14@13	30@13%	30%@16%	38@13%AE
--Lateral	2@13%	9@13%	27%@16%	19.5@13%AE
Compact SG.	2.06	2.05@13%	2.25@15%	2.35@13%
SCHULZE-BREUER	AAA=12 Alum	CAO=6	*DOC=3(2pc)	*DBO=4(pc)
	*AAC=10 Alum			
	AAD= 9 (pc)	*AAD=9w/add	OBB=6(1hl)	BBO=8(hl)
MARSHALL STAB	4200 @ 12%	3000 @ 13%	-	2900 @ 11.5
Flow	16 @ 12%	11 @ 13%	-	13 @ 11.5
AC Penetration	ca. 50	ca. 80	99	-
HIGH TEMP WHEEL TRACKING	-	-	-	-
DESIGN	e12	13.2	15%	11%