SLURRY SEAL DESIGN FOR:
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
CONTRACT NO. D-542-501-177
"RESURFACE ROADWAY & SHOULDERS USING SLURRY SEAL ON MD SR16"

PREPARED FOR:

SLURRY PAVERS, INC.
1277 MOUNTAIN ROAD
GLEN ALLEN, VIRGINIA 23060
PHONE: 804-264-0707
FAX: 804-264-0219
ATTN: FRED DABNEY/PHIL TARSOVICH

PREPARED BY:

C. ROBERT BENEDICT, CONSULTANT
C/O ALPHA LABORATORIES
P.O. BOX 74 ALPHA, OH 45301
PHONE: 513-298-6647
FAX: 513-426-3368

DATE:

MAY 11, 1990

CONTENTS:

MATERIALS

AGGREGATE Received from client April 25, 1990 four, 5 gallon pails of a Type 3 aggregate identified as Arundel Havre de Grace Diabase/Granite TRAP ROCK. Our Lab No. 266.

GRADATION

PERCENT PASSING

SIEVE#	SURFACE AREA FACTOR	0/#4 USED (DRY)	0-3/8" FOUND (DRY)	WASHED	SA	SPECS Md."C"
3/8	.02	100	100	100	2.00	100
1/4	-	-	95.4	94.9	-	-
#4	.02	100	85.7	85.5	1.71	70-90
8	.04	73.4	62.9	60.7	2.43	45-70
16	.08	53.7	46.0	43.8	3.50	32-54
30	.14	38.6	33.1	32.2	4.51	23-38
50	.30	25.7	22.0	23.1	6.93	16-29
100	.60	15.8	13.5	16.0	9.60	9-20
200	1.60	9.1	7.8	11.0	17.60	5-15
325	-	2.7	2.30	-	-	-

Simple Surface Area		48.28
Corrected SA (2.65/2.75)		46.52ft²/lb.
Sand Equivalent		73.0
Methylene Blue Absorbtion mg/g 0/#325		4.0 mg
Blue Factor		10.4
pH 10:1		8.96-8.22
Specific Gravity Dry		2.74-2.75*
Specific Gravity SSD		2.71 (2.40)
Absorbtion %		2.90
Unit Weight, Loose	1.577 (98.42)	1.652(103.09)
Unit Weight, Compacted	1.999(124.09)	2.012(125.55)
Compacted Voids %	27.7	26.83
Loose Voids %	42.7	39.92
Total Liquids Capacity Loose, % added	27.0	24.15
Reaction w/HCl		Very Slightly Soluble

*Quarry Reports 2.80. We note that larger particles seemed light.

MOISTURE CONTENT BULKING EFFECT, DRY BASIS:

% Moisture	Wt. Compacted	Wt. Loose	
0	125.6	103.1	(lbs./CF)
.8	119.0	97.3	
1.6	115.4	86.3	
4.3	111.8	74.6	
6.2	115.0	77.5	

ASPHALT EMULSION

Received from client April 25, 1990 two, 1-gallon bottles identified as Slurry Pavers CSS1-h 4-23-90 T-2. Our Lab No. 00425-1.

TEST	FOUND	SPECS
Sieve, %	Trace	0.10 MAX
Residue, %	65.36	57.0 MIN
pH	3.36	-
R&B Softening Pt.	-	-

CHEMICAL FILLERS

Received from client August 29, 1989 identified as "LIME" (Hydrated) APG Lime, Inc. Ripplemead, VA.

Hydrated Lime, National Limestone Co. Findlay, OH
Identified as "DOLOMITIC HYDRATED LIME" (30%MgO) Current production 4/28/90

Type I Portland Cement from Southwestern Portland Cement Co., Fairborn, OH Current production.

K-3 Proprietary Additive, 1% solution

WATER

Softened well water, 556 N. Valley Rd. Xenia, OH.

TRIAL MIXES FOR MIXING & SETTING CHARACTERISTICS, WET COHESION, CURED COHESION & COMPATABILITY

ISSA Technical Bulletins 102, 113, 114, 115, 139

Wet Cohesion - 0/#4 #266 Aggregate vs. 00425-1 AE

Formula, %					COHESION - kg-cm				ADHESION		
#	FLR	H20	AE	MIX" SET'	30'	60'	120'	APPEAR	(1)	(2)	(3)
82	0	9	12	10 BUST	-	-	-		-	-	-
83	0	12	12	25 BUST	10.2	10.9	-		-	-	-
84	.25pc	18	12	180+ 10	10.0	10.9	-	Bl Tf	E	G	98
85	.5pc	16	12 sl wet	180+ 5	9.9	11.0	-	Bl Tf	E	G	-
86	.75	12	12	180+ 5	8.0	11.0	-	Bl Tf	E	G	-
87	1.0	9	12	160 3	9.0	11.0	-	Bl Tf	G	P	98
88	1.5	9	12	150 5	9.0	12.0	-	Bl Tf	G	P	-
89	2.0	10	12	160 4	9.5	9.2	-	Dl Tf	G	F	-
90	3.0	11	12	160 5	9.0	11.5	-	Dl Sl cr	G	P	98
91	.25hl	10	12	100 -	13.6	13.2	-	Dl Tf	G	G	-
92	.5	12	12	100 -	15.3	14.7	-	Dl Br Tf	G	G	-
93	.75	15	12 foamy	180+ -	15.0	14.5	-	Dl Tf	G	F	-
94	1.0	16	12	180+ -	13.6	14.2	-	Dl Tf	G	F	-
95	.25hl	10	15	180+ -	17.9	17.2 s	-	Bl Tf	G	G	-
96	.5hl	12	15 foamy	180+ -	15.9	16.7	-	Rch Tf	E	E	98+
97	.75hl	12	15	180+ -	13.9	18.0	-	Rch Tf	G	G	99+
104	0	12/1k3	12	20 BUST	-	-	-	-	-	-	-
105	0	14/4k3	12	60 -	20.2	21.0 s	20.0s	Rch Tf	E	E	-
106	.25hl	9/1k3	12	100 -	18.1	16.2	20.0	Bl Tf	G	G	-
107	.25	7/4k3	12	100 -	16.6	17.2	19.5	Bl Tf	G	G	-
108	.5	12/1k3	12	100 -	17.6	18.0	18.0	Bl Tf	G	G	-
109	.5	10/4k3	12	100 -	15.0	17.0	18.3	Sl Sz Tf	F	G	-
110	.25	10	12	100 -	15.5	17.0	15.0	Bl Tf	F	G	-
111	.5	12	12	100 -	15.0	16.9	18.9	Bl Tf	F	G	-
112	.15	10	12	100 -	-	18.0ns	18.2	Bl Tf	G	G	-
113	.15	9/1k3	12	110 -	-	17.0	21.3ns	Bl Tf	G	E	99+
114	.15	10	15	180+ -	-	20.0ns	24.2s	Rch Tf	E	E	98+
115	.15	9/1k3	15	180 -	-	21.8s	22.0nss	Bl Tf	Vg	Vg	-

12 kg-cm = "Set"
20 kg-cm = "Early Rolling Traffic"

ns = Near Spin
s = Spin
nss = Near Solid Spin
ss = Solid Spin

(1) = Wet Surface Adhesion
(2) = Substrate Adhesion
(3) = Boiling Water Adhesion - ISSA TB 114

60C CURED COHESION ISSA TB No. 139

				1	2	3	
98	.25 hl	10	12	15.0	17.5	17.1	16.5 Rch Tf 99+
99	.5	12	12	13.9	17.0	18.0	16.3 Rch Tf 99+
100	.75	14	12	18.2	14.9	17.0	16.7 Rch Tf 99+
101	.25	10	15	18.7	17.2	16.9	17.6 Rch Tf
102	.5	11	15	17.5	18.4	16.9	17.6 Rch Tf
103	.75	12	15	16.0	18.5	18.8	17.8 Rch Tf
141	.15hl	10	12	16.2	14.0	13.8	14.7 Rch Tf
142	.15	9/1K3	12	21.2	16.2	18.8	18.7 Rch Tf
143	.15	7/4K3	12	18.2	21.0	21.3	20.2 Rch Tf
144	.15	9	15	19.2	20.9	21.3	20.5 Rch Tf
145	.15	8/1K3	15	21.2	19.2	21.8	20.7 Rch Tf
146	.15	6/4K3	15	20.3	22.5	24.0	22.3 Rch Tf

SCHULZE-BREUER-RUCK COMPATIBILITY CLASSIFICATION, ISSA TB No. 144
--0/#10 AGGREGATE GRADATION - AVERAGE OF 4 SAMPLES EACH:

		Density	Absorbtion g.	Loss g.	Adhesion %	Integrity %	Grade
A(4)	0-16-12.5	2.15	.69	.14	99+	98.2	AAA=12
B(4)	.15 hl 10-12.5	2.16	.66	.34	99+	98.5	AAA=12
C(4)	.15hl 10/1K3-12.5	2.16	.81	.34	99+	98.3	AAA=12

CONSISTENCY ISSA Tech. Bull. 106
Consisting tests to determine total liquids - mix viscosity characteristics were not performed; the relatively short mix times and quick setting characteristics at the optimum set and traffic times precluded accurate results from the consistency test. However, the total liquids capacity of both the 0-3/8" type 3 and 0/#4 type 2 gradations were determined at 24.15% and 27.04% respectively. Mixes at estimated consistencies of 3.0 to 3.5 cm. were easily achieved at optimum filler contents at less than the total liquids capacity of the loose aggregate.

FIELD SIMULATION TESTS

WET TRACK ABRASION TEST: ONE HOUR SOAK

	FLR	H2O	AE	Before g	After g	Loss g	Loss, g/ft^2 (f=3.06)
1A	.15hl	11/1K3	9	767.9	751.5	16.4	
1B	.15	11/1K3	9	760.0	748.1	11.9	
				AVERAGE:		14.5	43.30
2A	.15hl	10/1K3	12	837.3	825.9	11.4	
3A	.15hl	10/1K3	12	829.4	819.4	10.0	
				AVERAGE:		10.7	32.74
3A	.15hl	8.5/1K3	15	854.5	846.8	7.7	
3B	.15hl	8.5/1K3	15	799.1	792.8	6.3	
				AVERAGE:		7.0	21.42

WET TRACK ABRASION TEST: SIX DAY SOAK

1C	.15hl	11/1K3	9	792.7	779.7	13.0	39.8
2C	.15hl	10/1K3	12	808.0	797.8	10.2	31.2
3C	.15hl	8.5/1K3	15	813.4	808.7	4.7	14.4

MONOLAYER LOADED WHEEL TEST, C109 FINE SAND ADHESION - 0/#4
ISSA TECHNICAL BULLETIN 109

COMPACTED 1000, 125 pound LWT cycles:

		Before	After	Sand g	Sand.g/ft^2(f=6.6)
1b .15hl 11/1K3	9	320.46	325.81	5.35	35.3
2b .15hl 10/1K3	12	314.67	320.97	6.30	41.6
3b .15hl 8.5/1K3	15	322.62	329.50	6.88	45.4

UNCOMPACTED

1a .15hl 11/1K3	9	306.24	314.12	7.88	52.0
2a .15hl 10/1K3	12	322.90	331.38	8.48	56.0
3a .15hl 8.5/1K3	15	343.22	352.50	9.28	61.2

MULTILAYER LOADWHEEL SAND ADHESION - 0-3/8" AGG.
(COMPACTED SAMPLE FROM MULTILAYER DISPLACEMENT TEST)

4 .15hl 11/1K3	9	559.37	566.00	6.63	43.8
5 .15hl 10/1K3	12	574.67	582.02	7.35	48.5
6 .15hl 8.5/1K3	15	584.04	592.32	8.28	54.7

MULTILAYER UNCONFINED LOADED WHEEL DISPLACEMENT TEST
ISSA TECHNICAL BULLETIN 147A

1/2" Specimen Thickness - 0/#4 agg:

			% Displacement		Compacted Density	Remarks
			Vertical	Lateral		
1 .15hl 11/1K3	9	24.9	9.4	2.29	Ends & Edge Split	
2 .15hl 10/1K3	12	22.2	9.2	2.26	Sl Ends Split, Sl Edge Split	
3 .15hl 8.5/1K3	15	29.5	11.7	2.42	OK - Sl Rich	

1/2" Specimen Thickness - 0-3/8" Agg:

4 .15hl 11/1K3	9	21.8	9.0	2.25	End Split, Sl Edge Split
5 .15hl 10/1K3	12	20.3	6.7	2.30	One End Split, Sl Rich
6 .15hl 8.5/1K3	15	20.2	9.8	2.31	OK - Rich

SURFACE AREA CALCULATION ISSA TECHNICAL BULLETIN #118
(US ARMY, WES "INSTRUCTION REPORT S-75-1")

Corrected surface area (washed) is 46.52ft¨/lb.
Assume bitumen specific gravity 1.03
Assume CKE(Centrifuge Kerosene Equivalent) (2.90 Water Absorbtion)
(e2.40 CKE)

FORMULA: BR = SAB + KA
SAB= CSA x t x 0.02047 x SGB
WHERE: BR = Bitumen Requirement
SAB= Surface area bitumen, % agg. dry weight
CSA= Corrected surface area (2.65/2.75)
t = Bitumen film thickness, microns
SGB= Specific gravity of bitumen
KA = Centrifuge kerosene equivalent (absorbtion)
THEN: BR = (CSA x t x 0.02047 x SGB) + KA
BR = (46.52 x 6.5 x 0.02047 x 1.03) + 2.90 [2.40]
= 6.375 + 2.90 [2.40]
= 9.275 [8.775] Bitumen added to aggregate
= 8.488 [8.07]% Bitumen in total mix
= 12.97% [12.34]% emulsion (@65.4% residue) included
= 14.27 [13.42]% emulsion (@65.4% residue) added

VOIDS CALCULATION

Compacted #266 0-3/8" aggregate voids are 26.8% at a compacted unit weight of 125.55 lbs/ft¨ (2.012) and dry specific gravity of 2.75. Bitumen requirement of 8.775% (from surface area calculation) which, at 1.03 sp.gr., is 8.52% water equivalent or 8.52/62.4 = 13.65 volume%

Unit Volume	100.0%
less Agg. Volume	73.2%
=Voids Volume	26.8%
less Bitumen Volume	13.7
=Voids in Total Mix	13.1
% Voids Filled	48.9
Agg Weight	125.6
Bit Weight	11.0
	136.6 lbs/ft3

DISCUSSION

Materials submitted for this design met the requirements for the Maryland DOT specification in so far as tested.

Trial mixes for estimating total liquids contents, mixing characteristics, set and traffic time wet cohesion tests were performed using a series of chemical filler and additive contents. Type I Portland cement retarded the set to greater than one hour and would not meet the 2-hour minimum traffic time requirement. Use of Portland cement is rejected.

Mixes could not be made without either cement, hydrated lime or retarder. Small amounts of lime with low levels of retarder produced satisfactory mixes. .15% hydrated lime with 1% K3 retarder produced the required 2 minute mix times and 2-hour traffic times at 12% emulsion contents and total liquid contents of less than loose aggregate voids or liquid capacity.

60°C cured cohesion tests are improved with the addition of retarder. Boiling water adhesion is quite good in all cases. Hydrated lime above .5% is not recommended because of slight tackiness. The system selected for testing is compatible.

Schulze-Breuer-Ruck Compatibility tests were all excellent. The results found are a rare occurance in our experience for unmodified systems. Each of the three formulations tested were rated AAA or 12 grade points; the best possible. These results confirm our trial mix compatabilities.

For design purposes, we selected .15% hydrated lime with 1% of K-3 additive.

Both the one hour and six-day soak Wet Track Abrasion Tests were excellent. Both tests yielded nearly identical results. The six-day soak test was slightly better than the one-hour soak indicating excellent wet weather adhesion. A reasonable minimum emulsion content cannot be established here with these WTAT test results.

The Monolayer Loaded Wheel fine sand adhesion test applied to the 0/#4 aggregate fraction indicates maximum emulsion content for this fraction of 15.9% AE. Corrected for 0-3/8" (85% 0/#4) the indicated maximum emulsion content is 13.5%.

The Multilayer Loaded Wheel Displacement tests for the 0/#4 fraction and 0-3/8" aggregate are greater than our recommended multilayer limits of 10-12% vertical and 5% lateral displacements. Projected compacted densities also substantially exceeded our limits for multilayered applications of 2.10-2.15.

However, maximum stabilities do occur at about 12% AE. This system while quite suitable for monolayer application is not recommended for multilayer applications such as rut filling.

Surface area designs as practiced are frequently unreliable, but we performed a surface area design for 6.5 micron coatings for confirmation. Our results based on washed gradation indicated an optimum emulsion content of 13.42% AE, which conforms to our found 13.5%AE from the corrected LWT 0/#4 sand adhesion test (above).

Voids calculation at 13.42% AE added yields 13.1% voids in the total compacted mix and 48.9% voids filled for a compacted unit weight of 136.6 lbs/ft3. These values are in line with general field experience.

Finally, we subjected the Compacted Multilayer Loaded Wheel 0-3/8" specimens to the fine sand adhesion test. Based on these test results, the maximum emulsion content for heavy traffic is 13.0% AE added to the aggregate.

We recommend a **MAXIMUM** emulsion content of 13.0% with a field tolerance of ± 1.1%; or an **OPTIMUM** of 11.9% ± 1.1% AE (.75%AC).

JOB MIX FORMULA RECOMMENDATION

Aggregate	100%
Hydrated Lime	.15% (0-.5%)
K-3 Additive (1% Solution)	1% (.5-4%)
CQS1h Emulsifion (65.4%AC res)	11.9% ± 1.1%
AC Extracted from Total Dry Mix	7.8% ± .75%
Water	not to exceed 24% total liquids

SPREAD RATE

The spread rate for normal surfaces is estimated by ISSA Technical Bulletin No.112 at 18.9 ± 3 lbs/SY.

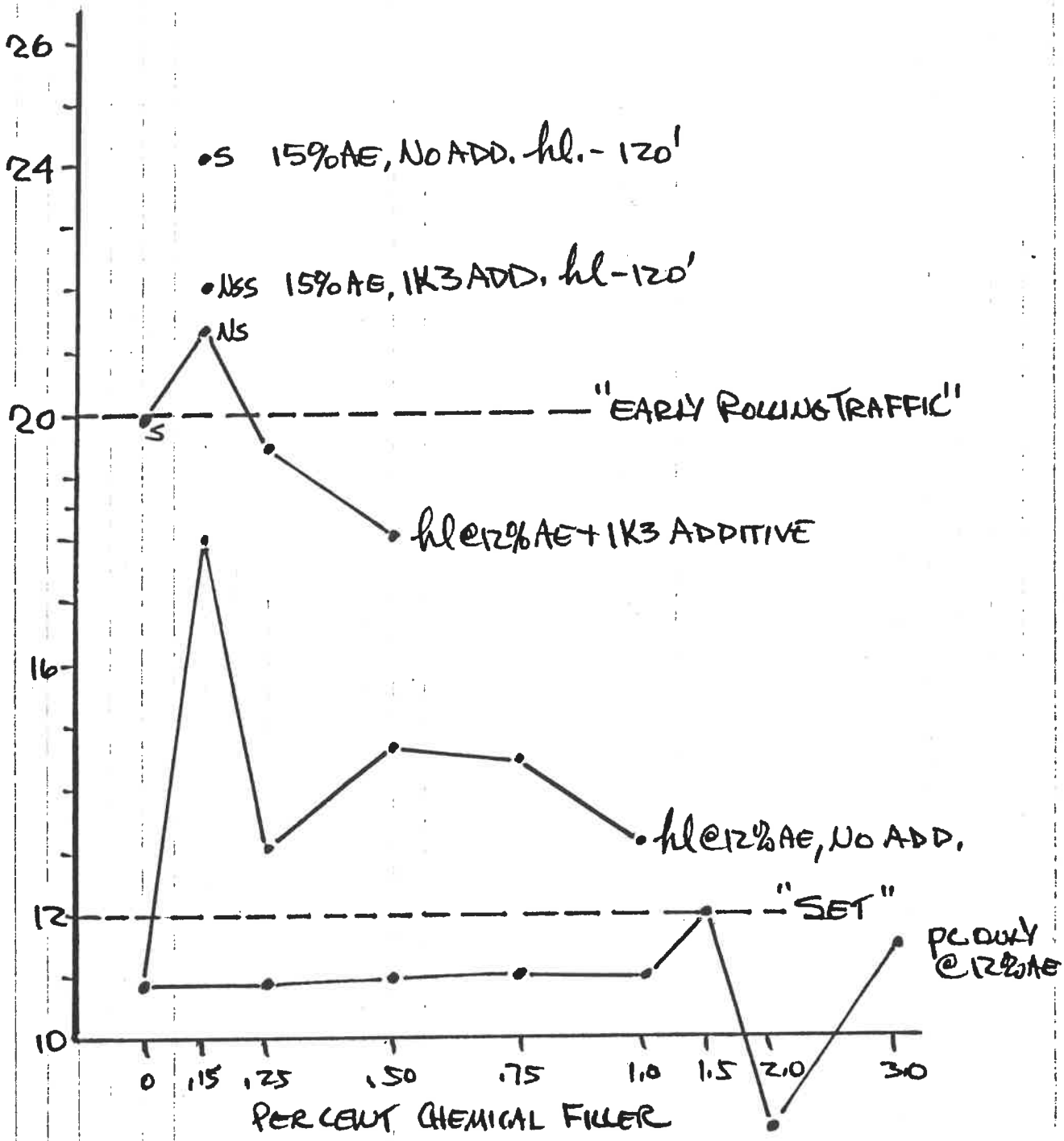
Please call if there are questions.

Respectfully submitted,

C. Robert Benedict, Consultant

Phone: 513-298-6647
FAX : 513-426-3368

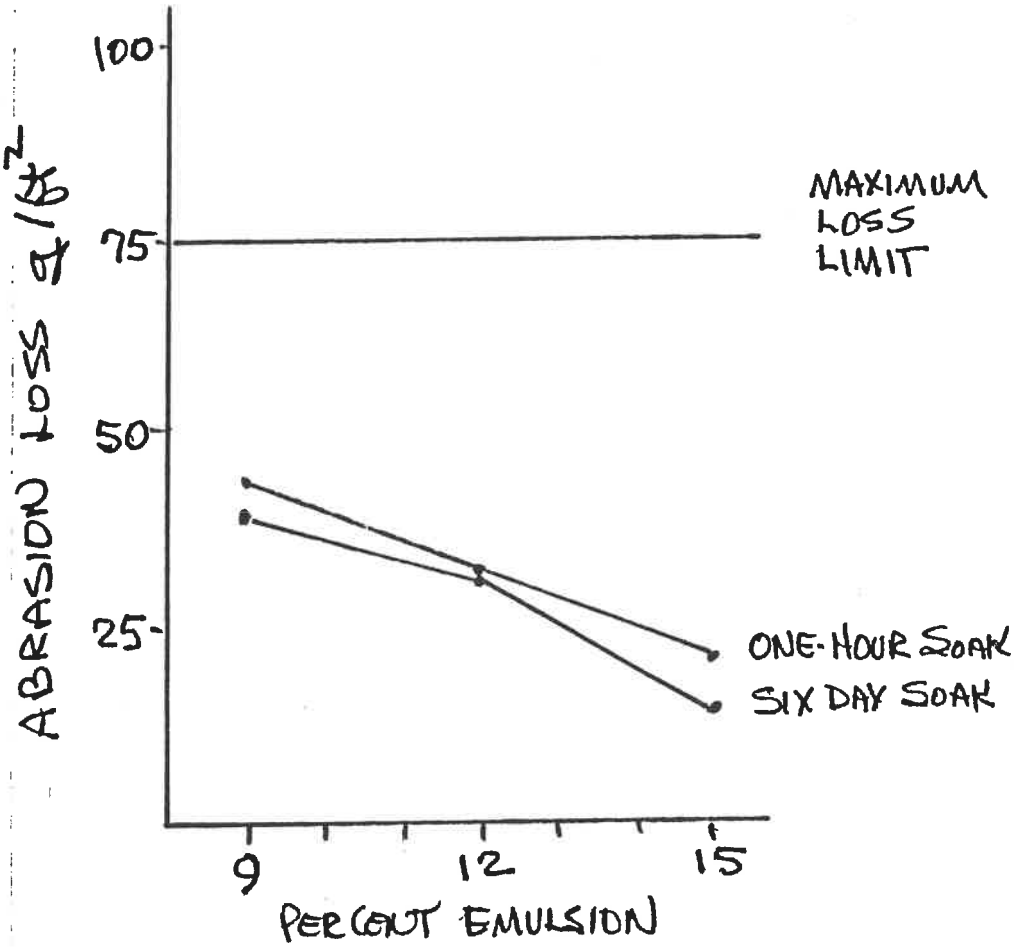
CRB/pr



60 MINUTE WET COHESION FOR FILLER-ADDITIVE & TRAFFIC TIME OPTIMIZATION

AE# 00425-1 NJ. Abb. # 266

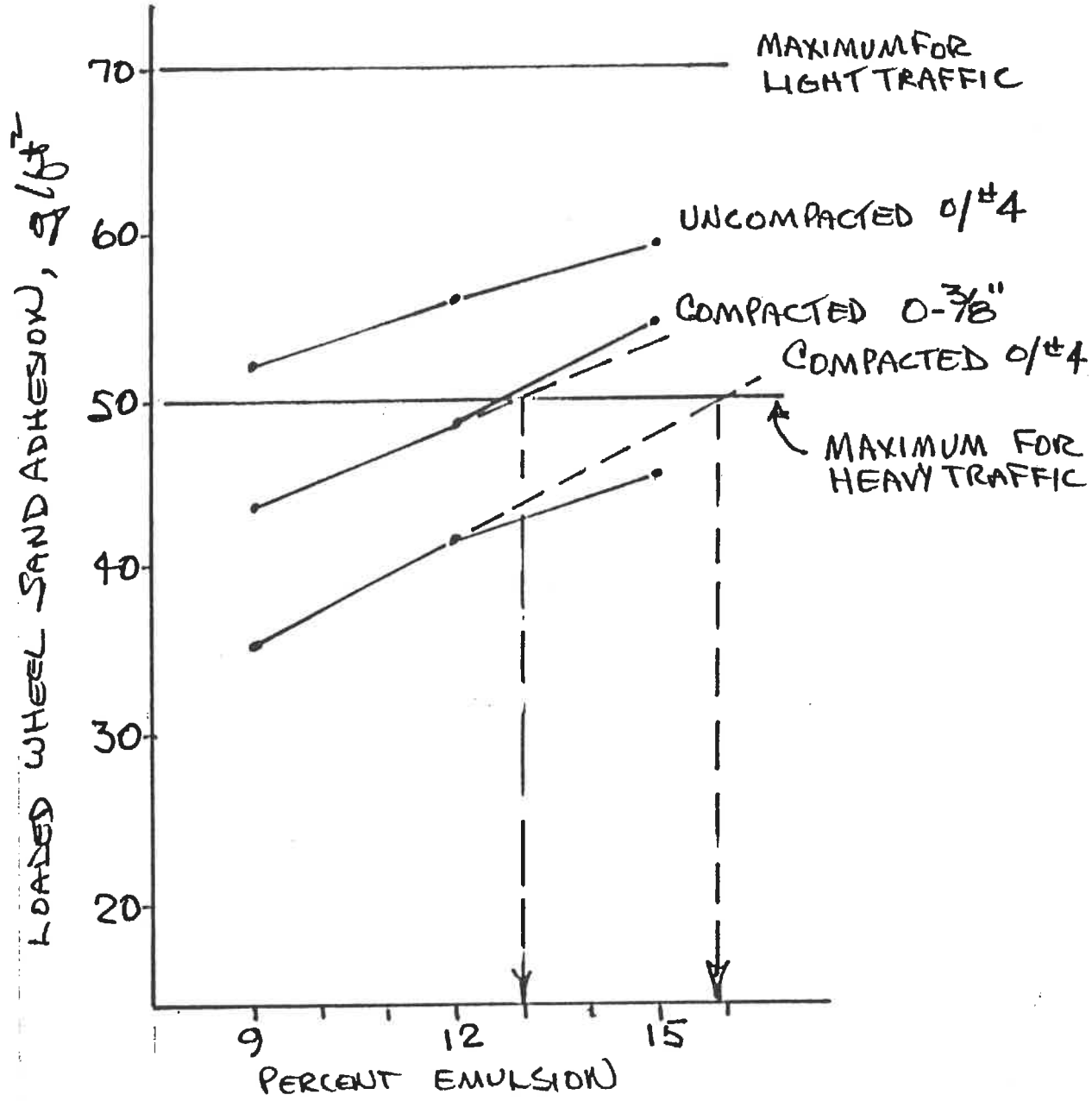
5/11/90-CRB



WET TRACK ABRASION TEST

AE#00425-1 CQSIH vs AGG#266

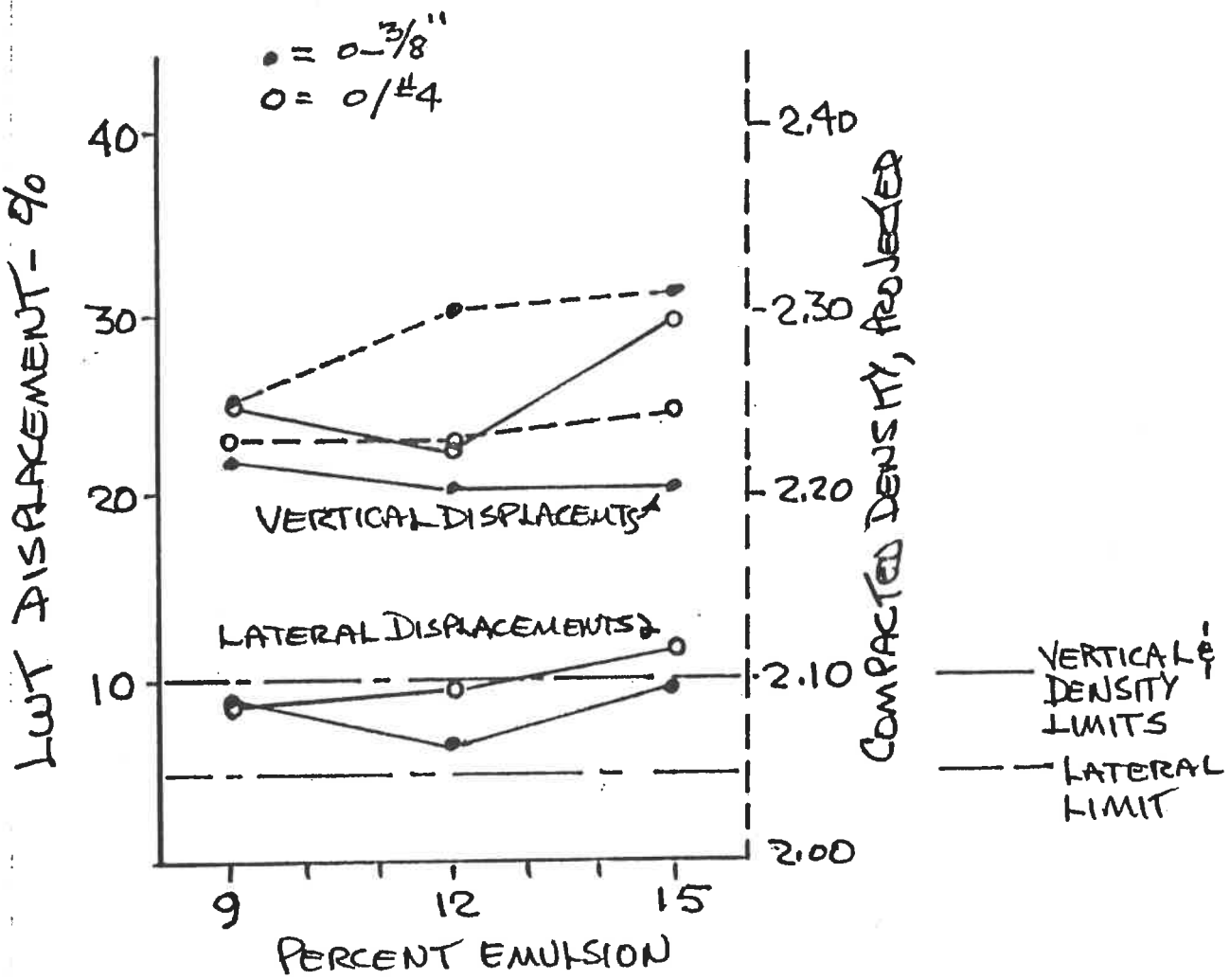
5/11/90 - @RB



LOADED WHEEL FINE SAND ADHESION TEST

AE# 00425-1 CQS1h MN. #266 A66.

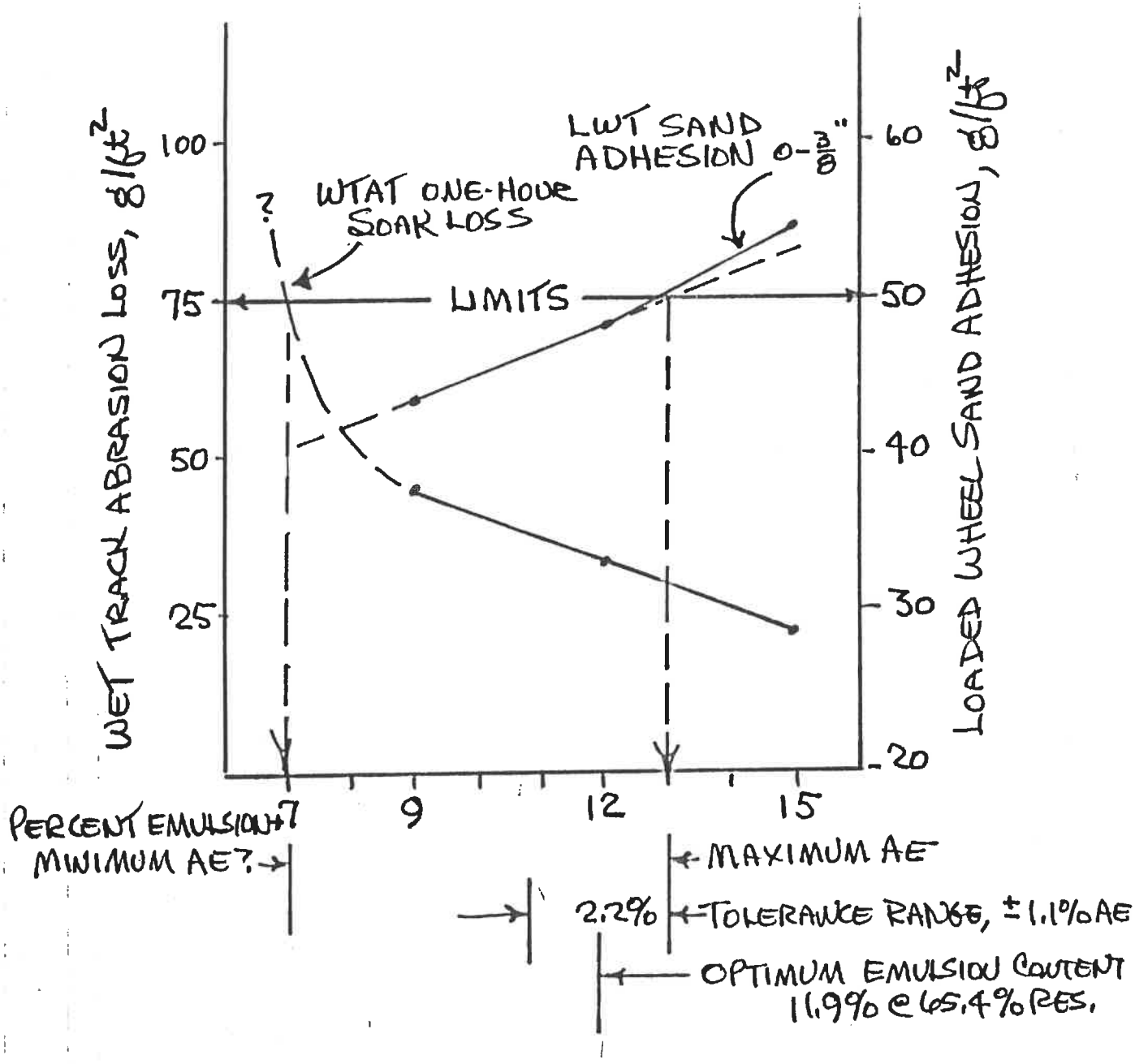
5/11/90-CRB



MULTILAYER LOADED WHEEL DISPLACEMENT TEST

AE#00425-1 CQSIH NO.#266 AGG.

5/11/90 - CRB



GRAPHICAL DETERMINATION OF OPTIMUM EMULSION CONTENT

AE#00425-1 CQS1h vs. AGG.#2606, 0-3/8"

5/11/90 - CEB

Assuming a moderate squeegee contact pressure, a slurry consistency of 2.5 to 3 cm. and a slurry depth of 5 to 6 inches, basic spread rates applied to smooth surfaces may be selected from the 1st table. The quantity of slurry required to fill surface texture may be added to the basic rate along with an estimate of requirements due to cross sectional irregularity and for joint cracks and laps. These increments may be added to give an estimate of the spread rate.

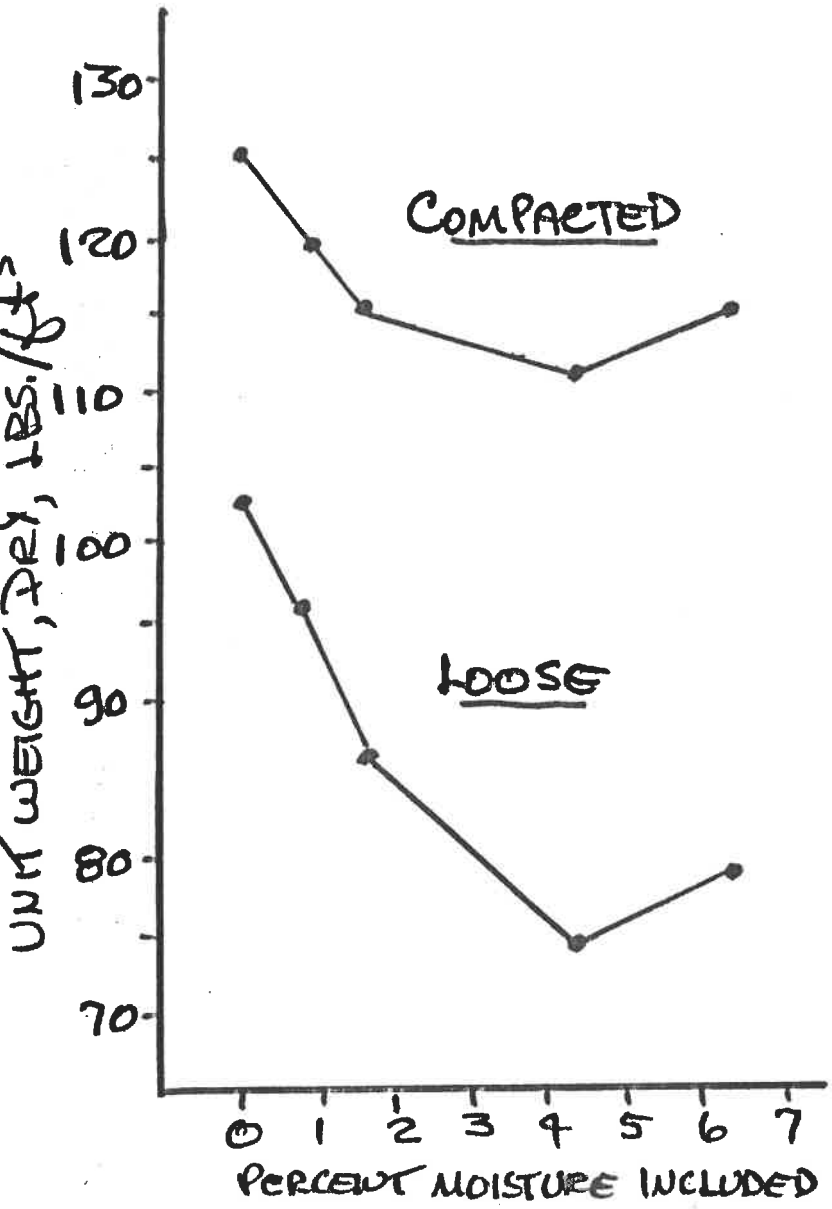
APPROXIMATE SPREAD RATE CALCULATION*
(Under study In 1977...Subject to revision)

BASIC MONOLAYER SPREAD RATES FOR SMOOTH SURFACES
(McLeod "S" or 60cc Sand Box Spread of 16-18'- ASG=2.65)

GRADATION	TYPE I		TYPE II		TYPE III	
	%+16	lb/SY	%+16	lb/SY	%+16	lb/SY
FINE	10	5	30	9	50	14
MEDIAN	22.5	6	42.5	10.5	61	15.5
COARSE	35	7	55	12	72	17

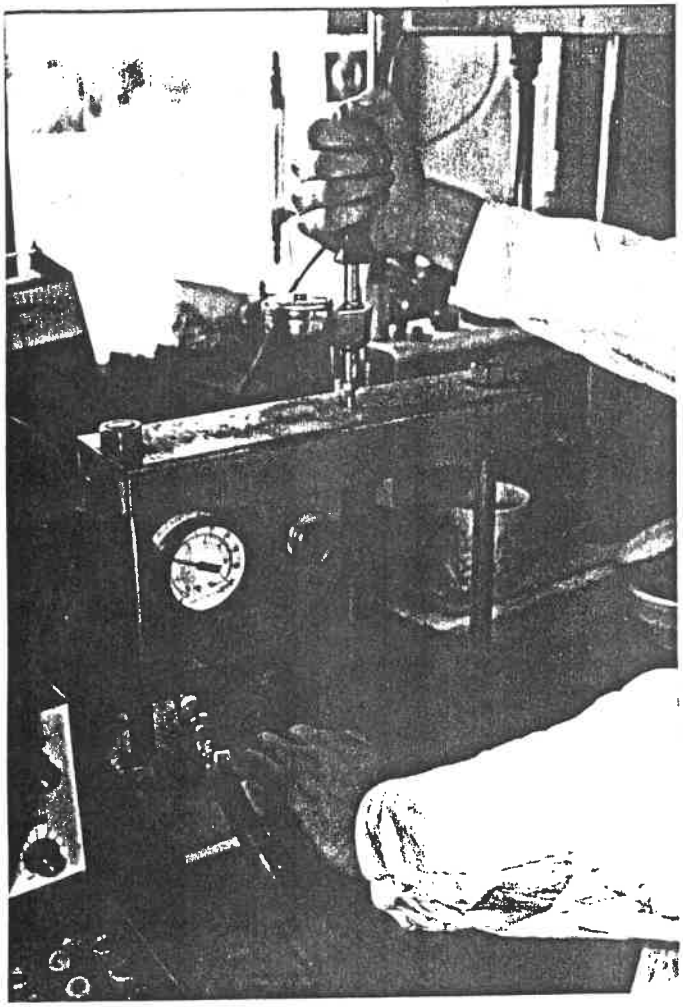
FACTORS:	McLeod Rating	Sand Box Texture	Add lb/SY	TOTAL
BASIC RATE	S	16-18'		14.9
ADD FOR SURFACE TEXTURE	H-1	10-12'	1	2
	H-2	8-10'	2	
	H-3	5-7'	3	
		2-4'	4	
ADD FOR CROSS SECTIONAL IRREGULARITY	Nominal - 3/8"		1	1
	Moderate - 1/2-3/4"		2	
	Severe - 1-1-1/2"		3	
ADD FOR JOINT CRACKS & LAPS (Calculate)				1
APPROXIMATE SPREAD RATE - TOTAL				18.9

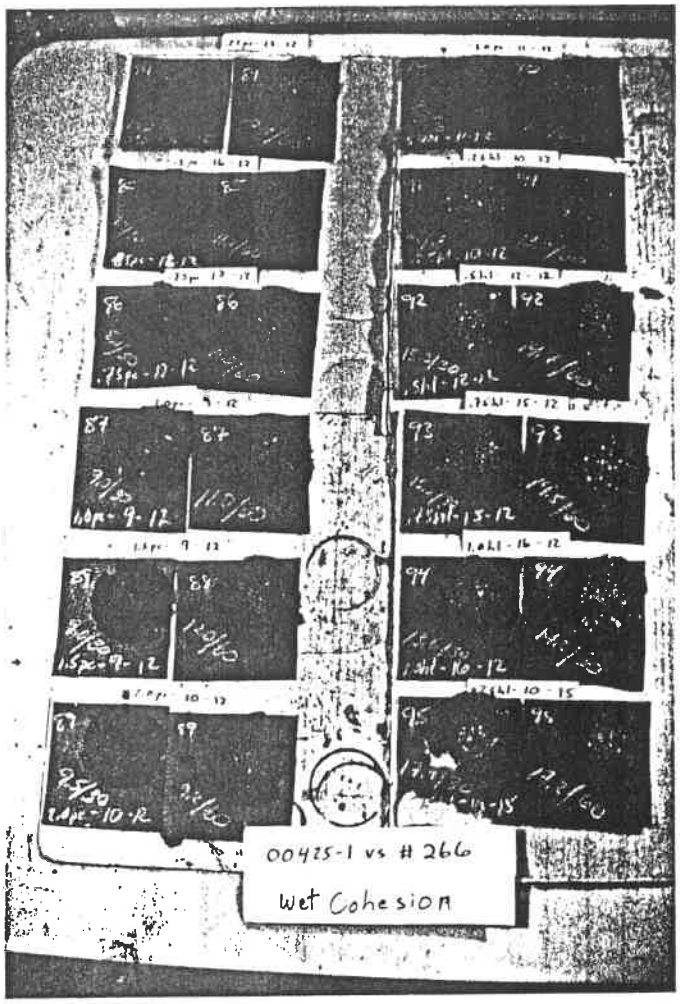
* Variables of Particle Shape, Dimensions, Matrix Volumes, Void Content, Screen Ratios, All Affect the Spread Rate. Use these tables as a GUIDE only.

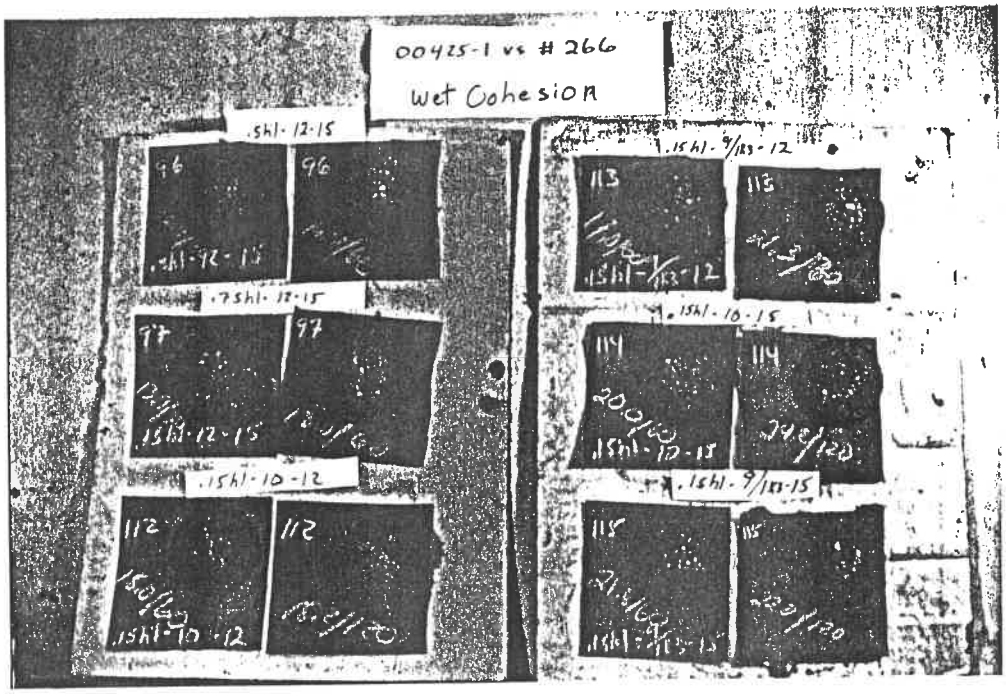


BULKING-EFFECT OF MOISTURE CONTENT
#266, 0-3/8" AGGREGATE

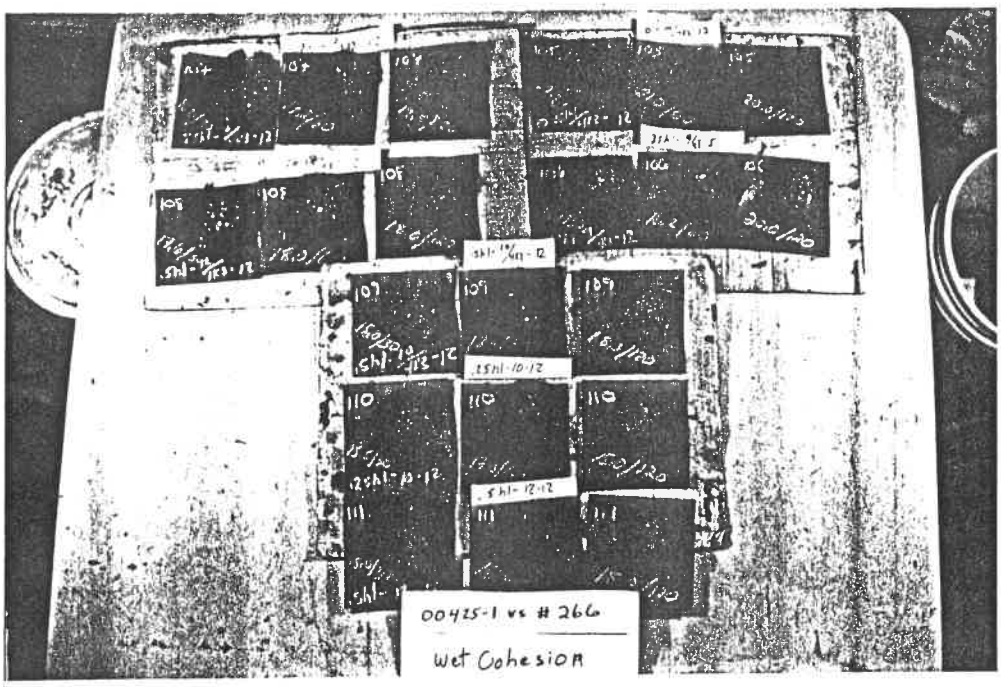
5/11/90-CRB

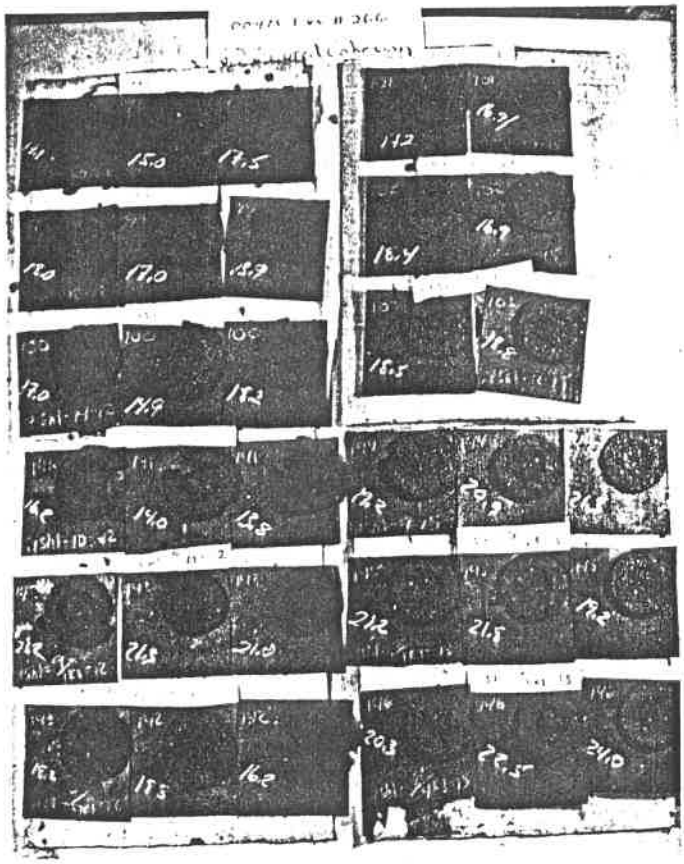




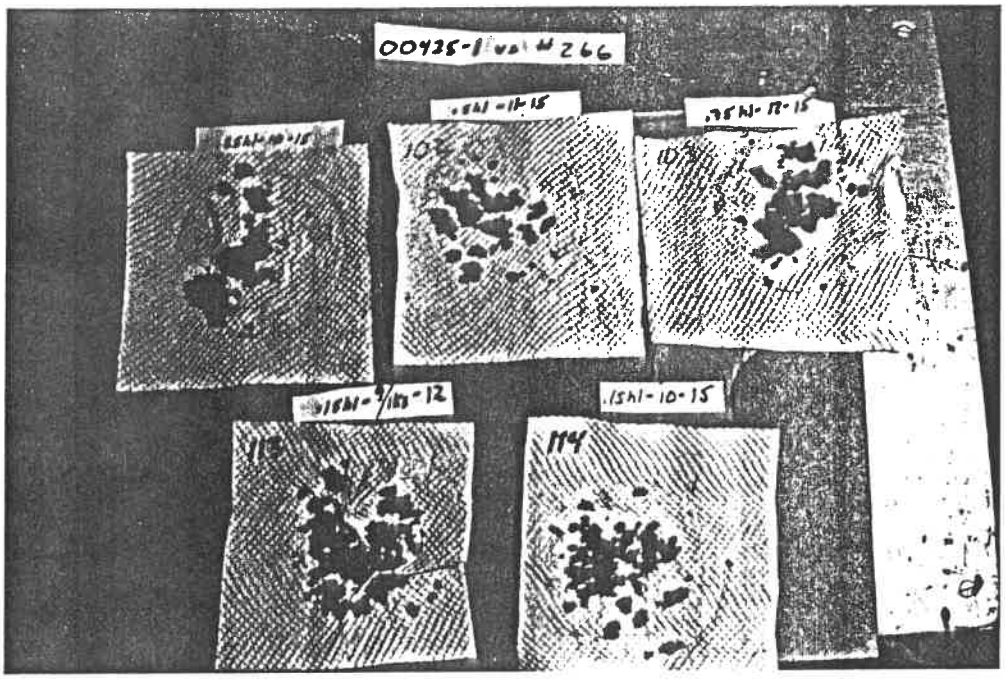


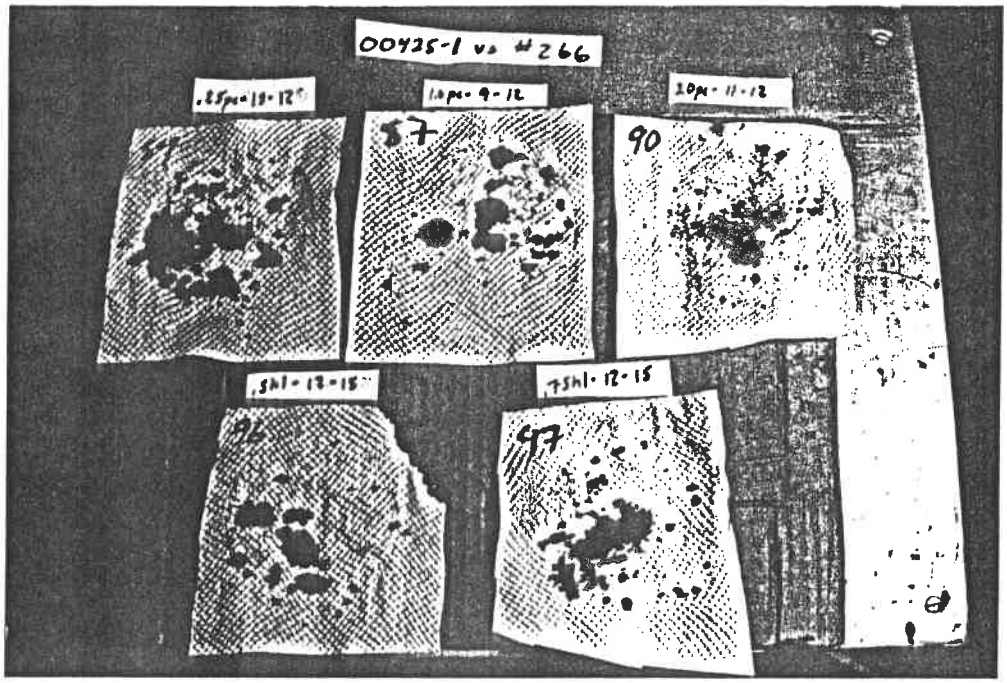
WET COHESION TEST DETERMINES THE RATE OF SET AND EARLY ROLLING TRAFFIC TIME. A POWER STEERING SIMULATOR, THE kg-cm TORQUE AT 200 kPa PRESSURE AT PEAK COHESION VALVES MAY INDICATE OPTIMUM CHEMICAL FILLER AND ADDITIVE CONTENTS.



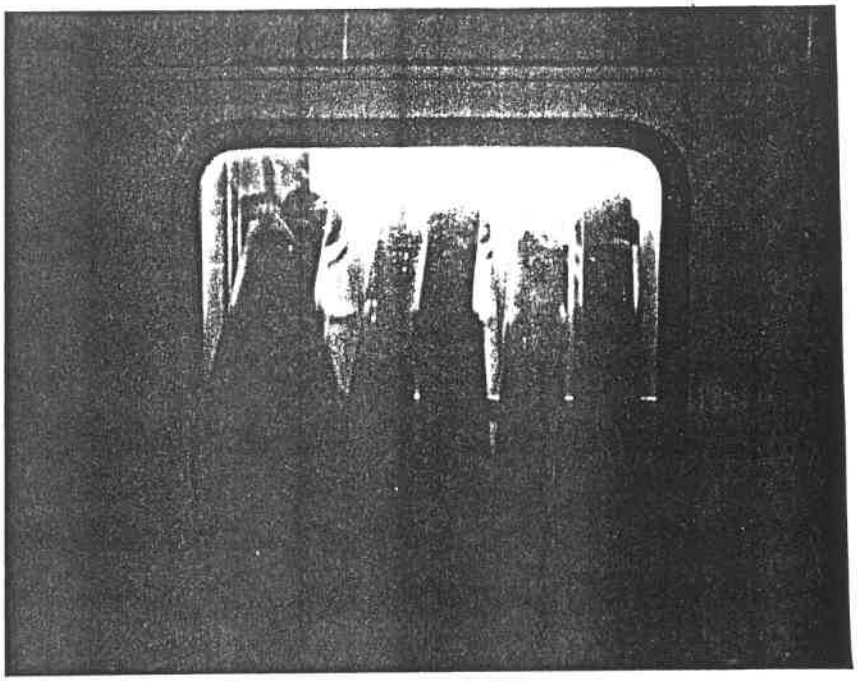


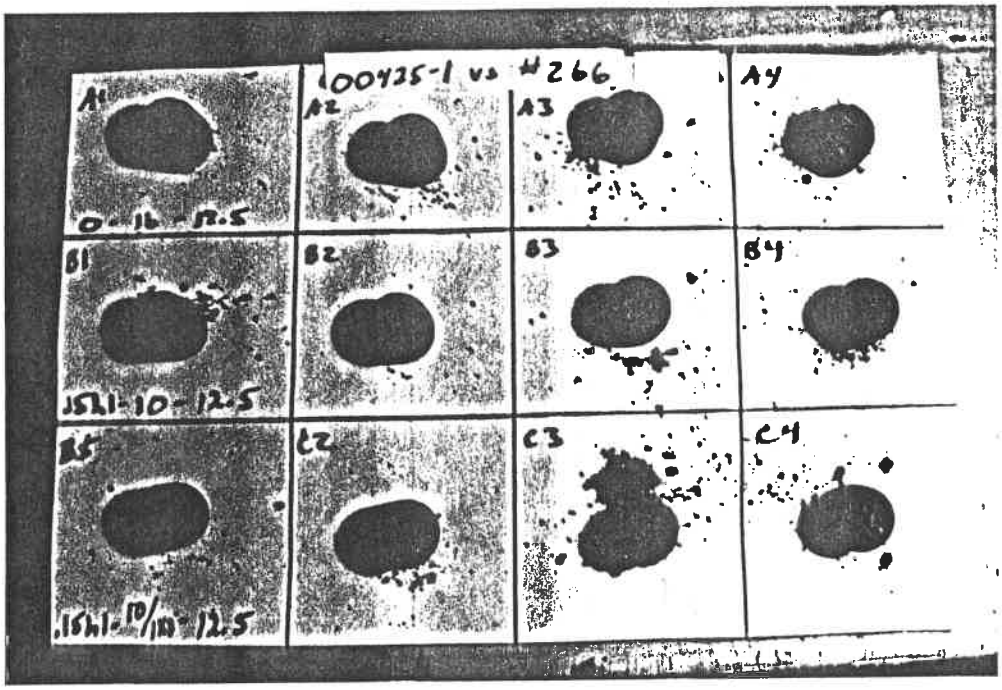
60C (140F) CURED COHESION MEASURES HIGH TEMPERATURE COHESION AND CONFIRMS THE WET COHESION ADDITIVE CONCENTRATIONS AS WELL AS CLASSIFYING THE QUALITY OF THE SYSTEM COMPONENTS: BITUMEN, AGGREGATE, EMULSIFIER.





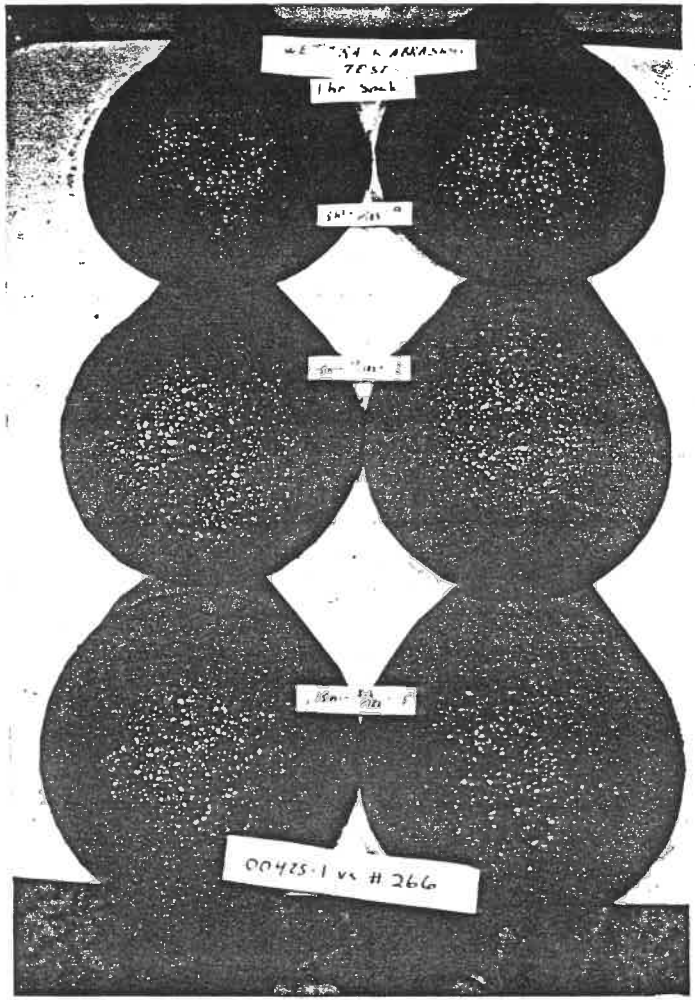
THREE MINUTE BOILING WATER ADHESION TEST.
ABOUT 10 GRAMS OF 48-HOUR AIR CURED WET COHESION SPECIMENS ARE IMMERSED IN BOILING WATER, DECANTED AND DRIED ON ABSORBTIVE PAPER. AN ESTIMATE OF % COATING IS MADE. HERE, ALL SAMPLES ARE EXCELLENT AT 98%+.

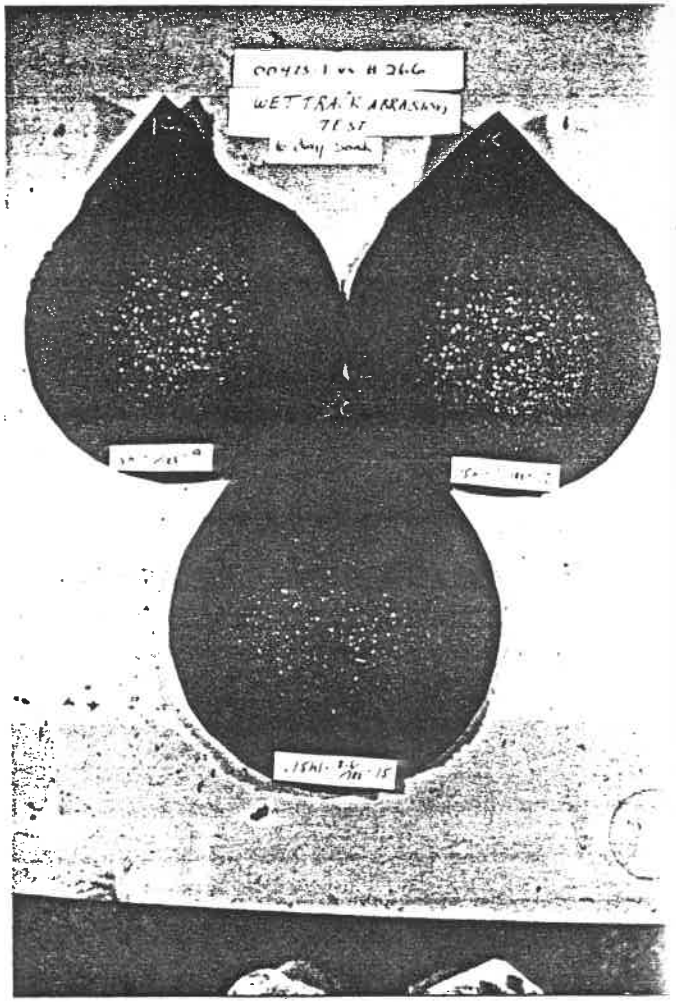




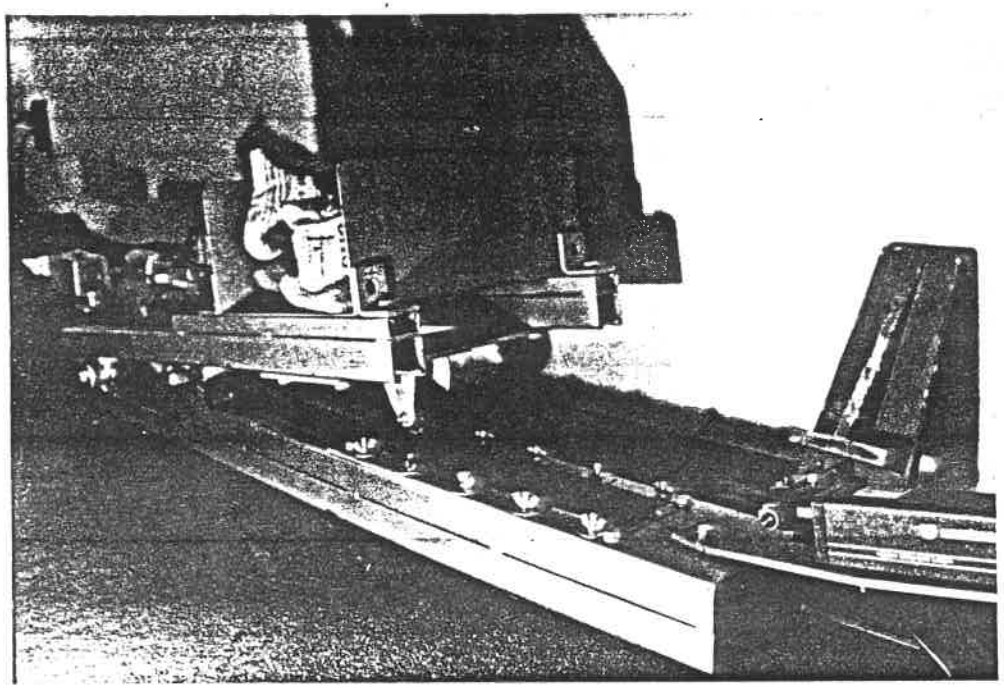
SCHULZE-BREUER-RUCK COMPATIBILITY CLASSIFICATION.

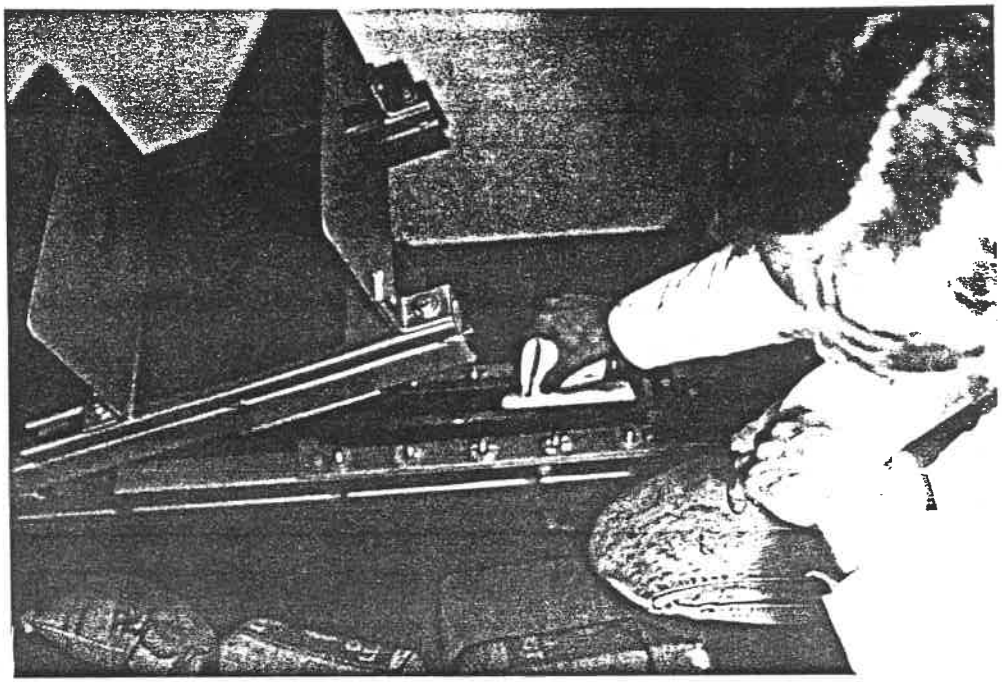
0/#10 STANDARD MIXES ARE CURED AND PRESSED IN TO QUADRUPLICATE 40-GRAM PILLS AT 140F AND 1 TON FORCE FOR 1 MINUTE. THE SPECIMENS ARE SOAKED FOR 6 DAYS, WET TUMBLED IN SHUTTLE CYLINDERS FOR 3600 CYCLES, THEN IMMERSED IN BOILING WATER FOR 30 MINUTES. DENSITY, ABSORBTION, ABRASION LOSS, ADHESION COATING AND PERCENT REMAINING (INTEGRITY) ARE DETERMINED. COMPARATIVE GRADE POINTS ARE GIVEN. HERE, ALL SAMPLES ARE EXCELLENT AND COMPLETELY COMPATIBLE AT 12-AAA RATINGS.

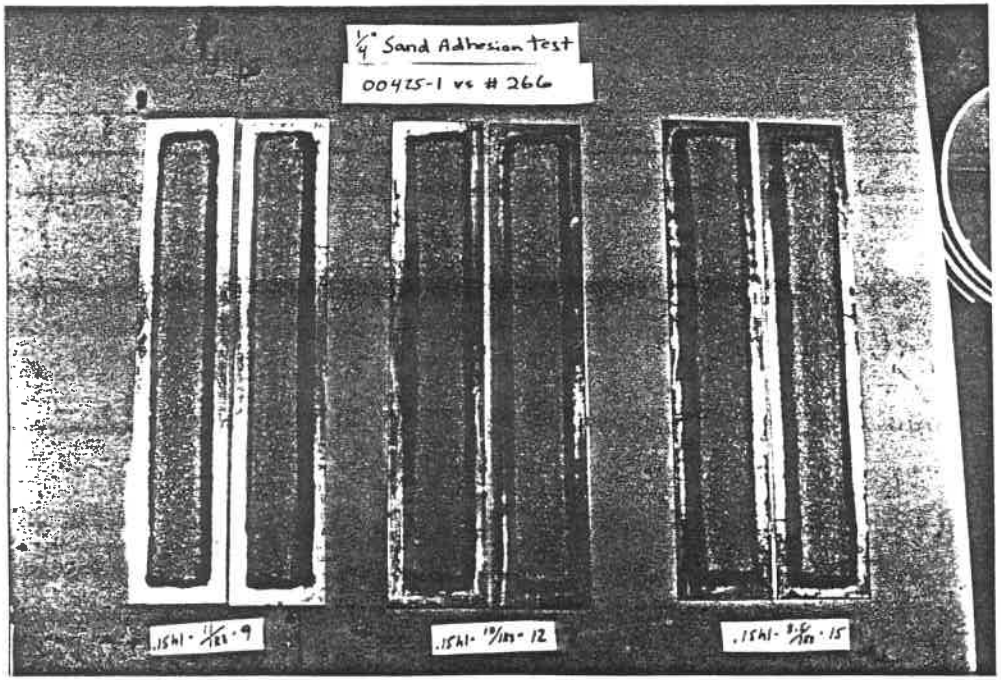




WET TRACK ABRASION TEST DETERMINES THE MINIMUM EMULSION CONTENT ASTM D 3910 PROCEDURE USES ONLY 0/#4 GRADATION AND ONE HOUR SOAK WHILE ISSA TECH BULLETIN #100 MAY ALSO USE LARGER GRADATIONS AS WELL AS A SIX-DAY SOAK. A 5-lb. WEIGHTED RUBBER HOSE SCRUBS THE IMMERSED SPECIMEN SURFACE FOR 5-MINUTES AND THE LOSS REPORTED AS GRAMS OR GRAMS PER UNIT AREA (SQUARE FOOT OR METRES). A MAXIMUM LOSS OF 75 GRAMS PER SQ. FT., DETERMINES THE MINIMUM BITUMEN CONTENT. THE EMULSION REQUIRED TO REACH A 75 GRAM/SF & LOSS WITH A 6-DAY SOAK COMPARATIVELY CLASSIFIES THE SYSTEM; IN THIS CASE, EXCELLENT AT LESS THAN A PROJECTED 8% EMULSION!

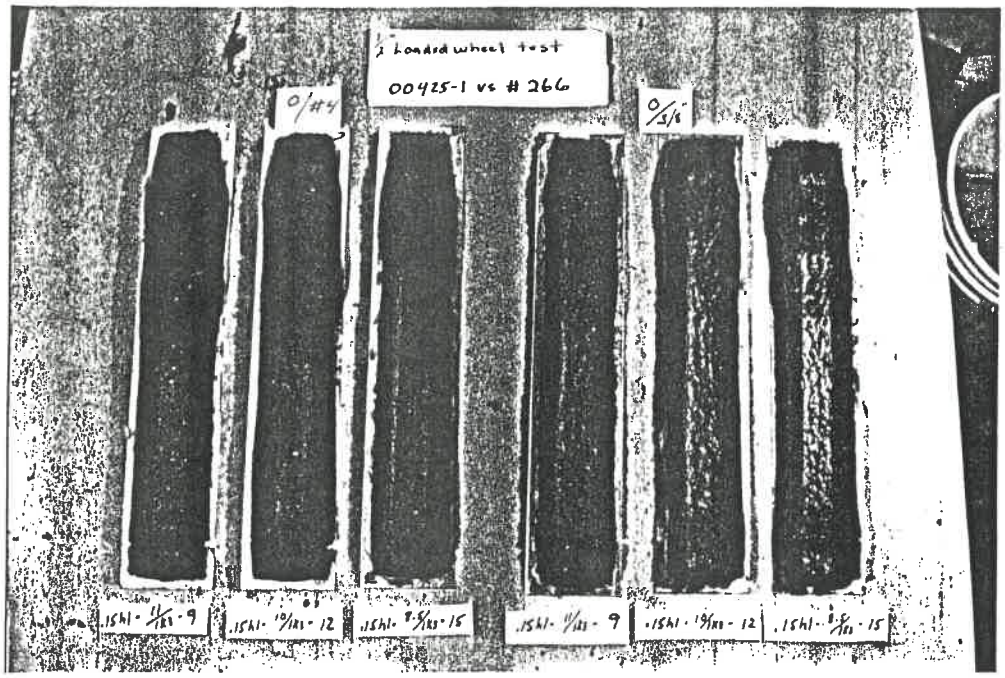


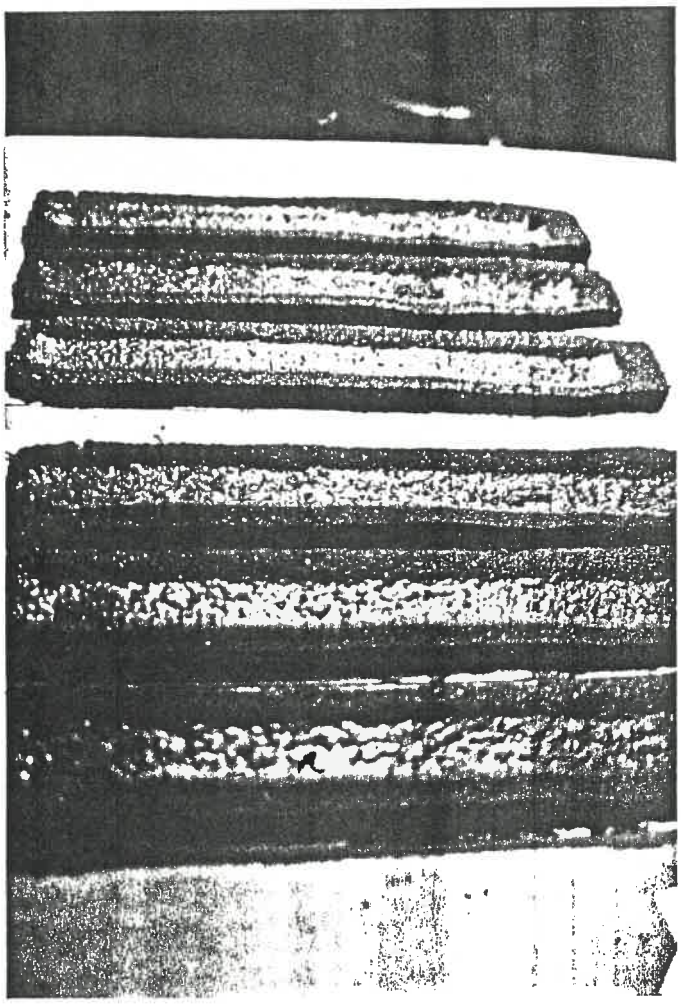




MONOLAYER LOADED WHEEL FINE SAND ADHESION TEST MEASURES THE RELATIVE BITUMEN FILM THICKNESS ON THE SURFACE OF A FULLY COMPACTED 0/#4 SPECIMEN.

THE MAXIMUM BITUMEN CONTENT FOR HEAVY TRAFFIC IS DETERMINED AT 50 GRAMS PER SQUARE FOOT ADHERED SAND.





MULTILAYER UNCONFINED LOADED WHEEL DISPLACEMENT TEST @ AMBIENT.

BOTH 0/#4 AND 0-3/8" GRADATIONS, EACH AT 3 LEVELS OF EMULSION, ARE SUBJECTED TO 1000, 125-lb LWT CYCLES. VERTICAL AND LATERAL DISPLACEMENTS AND COMPACTED DENSITIES ARE DETERMINED. NOTE THE EXCESSIVE RICHNESS ON THE 0-3/8" 15% AE SPECIMEN. HERE, THE SAND ADHESION TESTS INDICATE THE MAXIMUM PERMISSABLE AE CONTENT AT 13%.