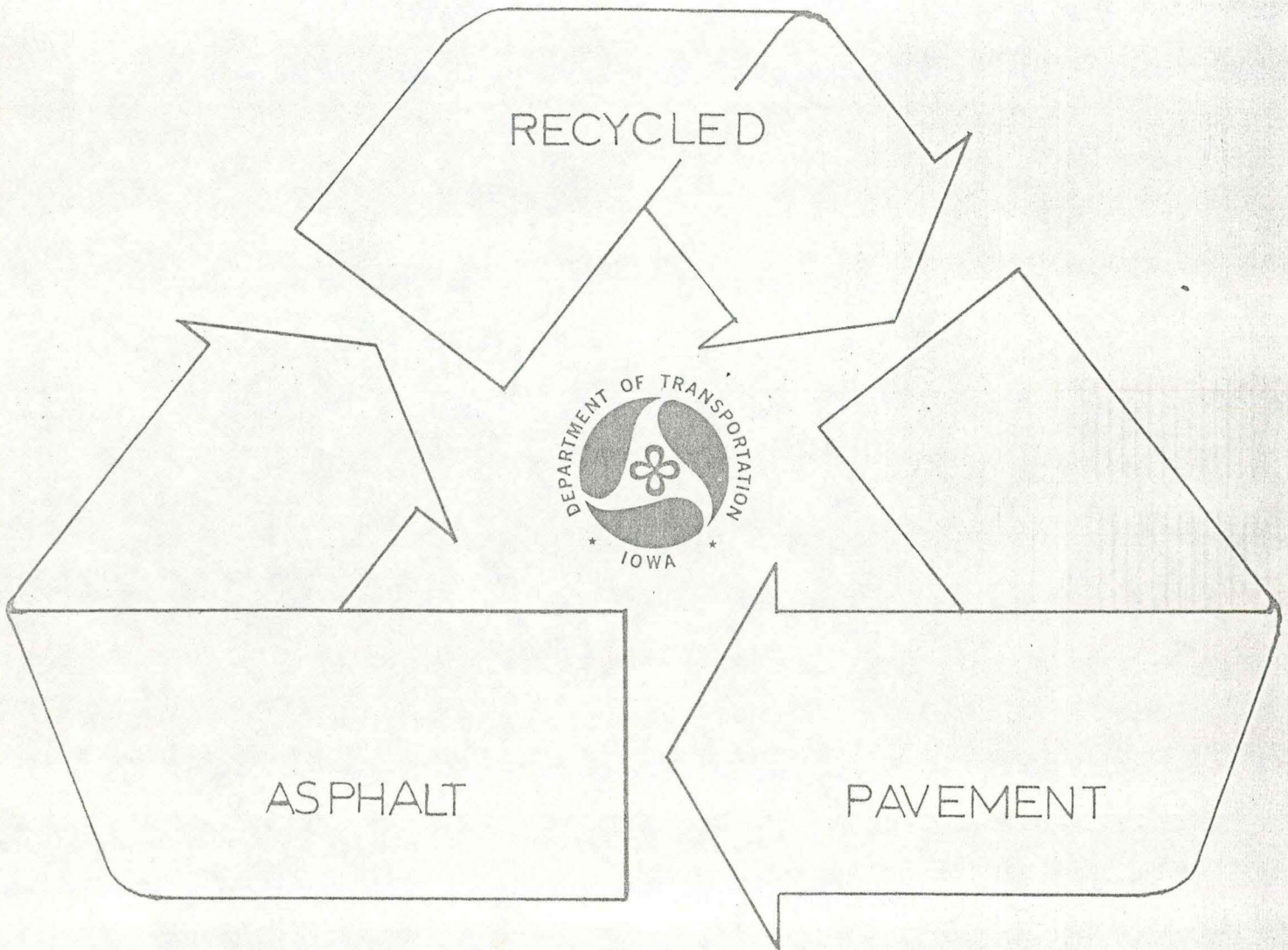


HK-188

KOSSUTH COUNTY

IOWA



OPEN HOUSE

AUGUST 10 & 11, 1977

Work began July 22nd on asphalt recycling projects in Kossuth County, Iowa. This is the third attempt to use conventional drum mixing equipment with minor modifications to process recycled asphalt pavement. Thus far, the work has progressed very well; production rates of 300 tons per hour of 50 percent recycled mix have been achieved. The process which utilizes a "drum within a drum" concept was developed by the Iowa Manufacturing Company of Cedar Rapids, Iowa. The system precludes the development of blue smoke completely; particulate matter discharged during the operation is being removed by a wet scrubber unit.

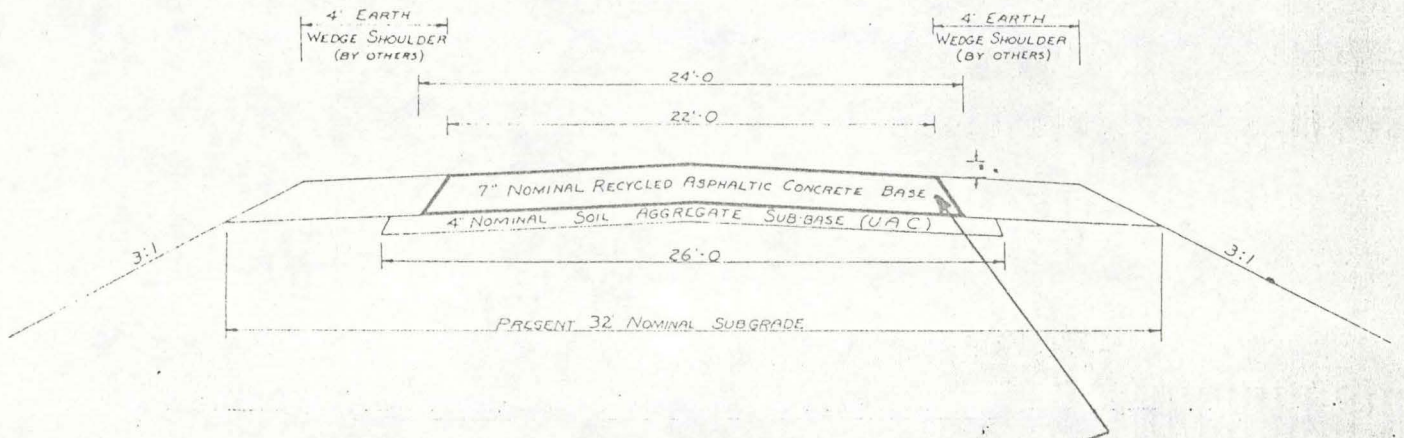
Formal pollution control testing is underway; preliminary results indicate that all requirements will be met. Additional tests will be performed at other production rates and recycled material percentages.

The recycled mixture is being placed as full depth pavement on a 2 mile secondary road and as resurfacing on 13 miles of existing asphalt secondary road. Approximately 43,000 tons of mix are being placed; total project costs are in excess of \$537,000.

The work is being conducted by Kossuth County under the direction of County Engineer Richard Henely. This is a Iowa Highway Research Board project; \$50,000 of research funds have been made available to the county for this work. The prime contractor is the Rohlin Construction Company of Estherville, Iowa. Technical services are being provided by the Iowa Department of Transportation through the Offices of Materials and Construction.

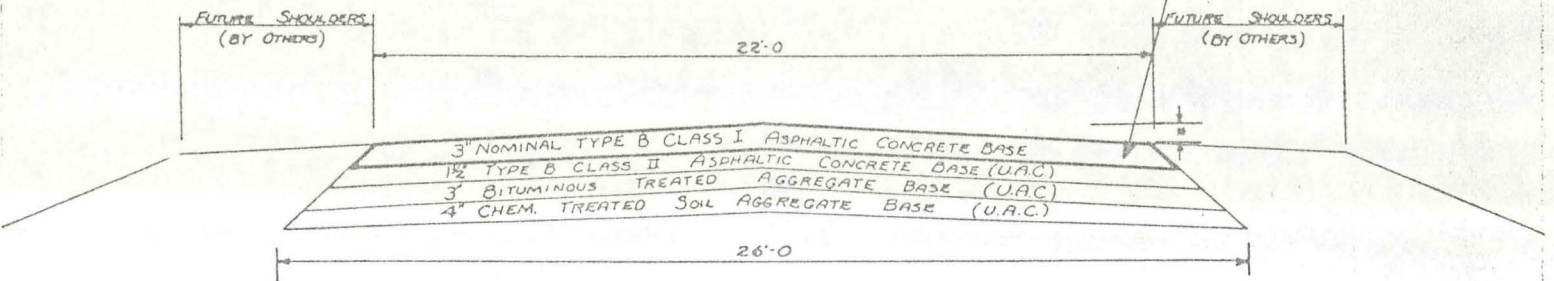
Test data obtained thus far indicate the mixture produced by this process is acceptable in all respects. Typical results are displayed in the following tables.

TYPICAL CROSS SECTION
NEW CONSTRUCTION



RECYCLED MATERIAL

TYPICAL CROSS SECTION
RESURFACING



Research Project HR-188
Kossuth County Recycling Project
July 1977

Typical Mixture Analyses*
50% Recycled Mix - 50% Virgin Aggregate

Sieve Size	% Passing	Extracted Gradations		
		% Passing	% Passing	% Passing
3/4	100	100	100	100
1/2	98	97	97	98
3/8	92	93	92	93
No. 4	82	82	83	82
No. 8	70	71	71	70
No. 16	55	56	56	55
No. 30	37	37	36	36
No. 50	19	18	18	19
No. 100	9.4	8.2	8.6	9.2
No. 200	7.0	5.9	6.4	6.8
Extr. % A.C.	8.1	8.1	7.7	7.4
50 Blow-Marshall Sp. Gr.	2.23	2.21	2.22	2.22
Rice Solid Sp.Gr.	2.296	2.307	2.305	2.306
Percent Voids	2.9	4.3	3.7	3.7
Marshall Stability	2780	2517	2238	2433
Marshall Flow	10	10	9	10

*Ames Laboratory

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: RECYCLED ASPH. CONC. LAB NO. ABD7-146

INTENDED USE:

SIZE 3/4" SPEC. NO. 803 & DATE REPORTED 7-19-77
PLANS L-FM-1142--73-55
COUNTY KOSSUTH PROJECT L-RS-329--73-55
CONTRACTOR ROHLIN ~~L-RS-507--73-55~~
L-RS-575--73-55
HR-188

PROJ. LOCATION

AGG. SOURCES RECYCLED MATL. CONTAINING 7.5% ASPH.; GRAVEL-
DOLE CONST. -NE 1/4 -11-94-29, KOSSUTH CO.

JOB MIX FORMULA AGGREGATE PROPORTIONS: 50% ABC7-164(RECYCLED) 50% AAT7-372(GRAVE

JOB MIX FORMULA - COMBINED GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
		100	96	89	78	65	51	33	15	7.9	6.3

TOLERANCE:

75 BLOW MARSHALL DENSITY	2.04
ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 306 POISES (200-300PEN.)
PLASTICITY INDEX	
% ASPH. IN MIX (TOTAL)	6.0 8.0 9.0
NUMBER OF MARSHALL BLOWS	50 50 50
MARSHALL STABILITY - LBS.	2378 2430 1868
FLOW - 0.01 IN.	10 9 8
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.02 2.11 2.16
BULK SP. GR. COMB. DRY AGG.	2.552 2.552 2.552
SP. GR. ASPH. @ 77 F.	1.021 1.021 1.021
CALC. SOLID SP.GR.	2.39 2.32 2.29
% VOIDS - CALC.	15.4 9.2 5.7
RICE SP. GR.	2.45 2.33 2.31
% VOIDS - RICE	17.5 9.5 6.5
% WATER ABSORPTION - AGGREGATE	1.84 1.84 1.84
% VOIDS IN THE MINERAL AGGREGATE	25.6 23.9 23.0
% V.M.A. FILLED WITH ASPHALT	39.7 61.8 75.2
CALCULATED ASPH.FILM THICKNESS(MICRONS)	7.7 11.0 12.6

A CONTENT OF 9.0 % ASPHALT IS RECOMMENDED TO START THE JOB.
THIS IS AN ADDITION OF 5.5 % ASPHALT.

COPIES:

- ASPH. MIX DESIGN
- PROJECTS LISTED ABOVE
- R. I. BORTLE
- R. C. HENELY
- B. ORTGIES
- C. HUISMAN
- L. ZEARLEY
- ROHLIN
- V. MARKS
- DON HINES C. JONES

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: RECYCLED ASPHALT CONC. LAB NO. ABD7-145

INTENDED USE:

SIZE 3/4"	SPEC. NO. 802 & PLANS	DATE REPORTED 7-26-77
COUNTY KOSSUTH	PROJECT L-FM-1142--73-55	L-RS-329--73-55
CONTRACTOR ROHLIN	L-RS-507--73-55	L-RS-575--73-55
PROJ. LOCATION	HR-188, KOSSUTH	

AGG. SOURCES RECYCLED MATL. CONTAINING 7.5% ASPH.; GRAVEL-
DOLE CONST.-NE 1/4 11-94-29, KOSSUTH CO.

JOB MIX FORMULA AGGREGATE PROPORTIONS: 70% ABC7-167(RECYCLED)30% AAT7-374(GRAVEL)

JOB MIX FORMULA - COMBINED GRADATION											
1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
		100	97	90	79	67	53	35	17	9.5	7.6

TOLERANCE:

75 BLOW MARSHALL DENSITY	2.13		
ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 306 POISES (200 - 300 PEN.)		
PLASTICITY INDEX			
% ASPH. IN MIX	8.0	9.0	10.0
NUMBER OF MARSHALL BLOWS	50	50	50
MARSHALL STABILITY - LBS.	3350	2517	2925
FLOW - 0.01 IN.	10	10	10
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.14	2.22	2.20
BULK SP. GR. COMB. DRY AGG.	2.566	2.566	2.566
SP. GR. ASPH. @ 77 F.	1.021	1.021	1.021
CALC. SOLID SP.GR.	2.32	2.29	2.26
% VOIDS - CALC.	7.9	3.2	2.7
RICE SP. GR.	2.39	2.34	2.30
% VOIDS - RICE	10.4	5.3	4.5
% WATER ABSORPTION - AGGREGATE	1.46	1.46	1.46
% VOIDS IN THE MINERAL AGGREGATE	23.3	21.3	21.7
% V.M.A. FILLED WITH ASPHALT	66.0	85.2	88.2
CALCULATED ASPH.FILM THICKNESS(MICRONS)	10.0	11.5	13.1

A CONTENT OF 8.75% ASPHALT IS RECOMMENDED TO START THE JOB.
THIS IS AN ADDITION OF 3.75% ASPHALT.

COPIES:

- ASPH. MIX DESIGN
- PROJECTS LISTED ABOVE
- R. I. BORTLE
- R. C. HENELY
- B. ORTGIES
- C. HUISMAN
- L. ZEARLEY
- ROHLIN
- MARKS

- C. Jones
- D. Hines

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL ASPHALT 200/300 AC LAB NO. AB7-136
INTENDED USE RECYCLED ASPHALT
COUNTY KOSSUTH PROJ NO. L-RS-575--73-55
DESIGN CONTRACT NO.
PRODUCER BIT. MATLS. SUPPLY CONTRACTOR ROHLIN CONST.
SOURCE NE 1/4 11-94-29, CO. 55
UNIT OF MATERIAL
SAMPLED BY MIKE PARSONS SENDER'S NO. 55-7-22-8
DATE SAMPLED 7-22-77 REC'D 7-28-77 REPORTED 8-4-77

SPECIFIC GRAVITY AT 60 F/60 F.

SOFT. POINT: METHOD (R & B)

PENTRATION AT 77 F. 100 GMS. 5 SEC. 267

FLASH POINT

SOLUBLE IN TRICHLOROETHYLENE 99.62%

DUCTILITY AT 77 F. 102 CMS.

SPOT TEST

THIN FILM LOSS ON HEATING 5 HRS AT 325 F. 0.90 %

% ORIGINAL PENETRATION (THIN FILM RES.) 45

PENETRATION OF RES. AT 77 F. 100 GMS. 5 SEC. 119

DUCTILITY AT 77 F. (THIN FILM RES.) 130+ CMS.

ABSOLUTE VISCOSITY ORIGINAL 140 F. 30 CM HG 325 POISES

ABSOLUTE VISCOSITY THIN FILM RES. 140 F. 30 CM HG 904 POISES

KIN. VISCOSITY ORIGINAL @ 275 F. 171 CENTISTOKES

COPIES:

R. I. BORTLE

R. P. HENELY

L-RS-575--73-55, KOSSUTH

DISPOSITION: COMPLIES WITH AASHTO M20

- 6 -

SIGNED: BERNARD C. BROWN

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