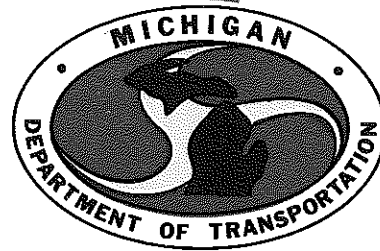


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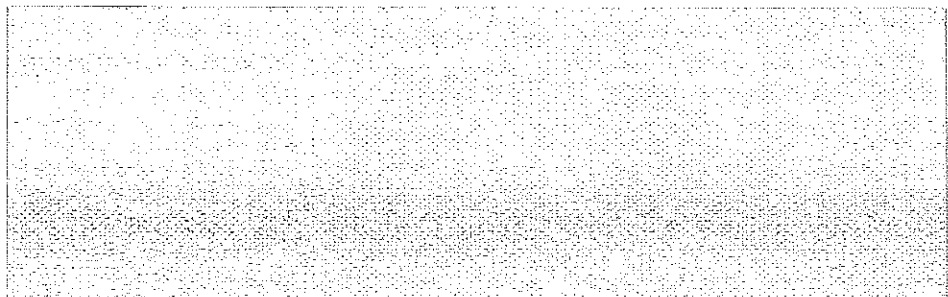
SUMMARIES OF MICHIGAN
PAVEMENT FRICTION MEASUREMENTS
1979 Test Program
MDOT REPORT NO. 249



**TESTING AND RESEARCH DIVISION
RESEARCH LABORATORY SECTION**



0049559



TE450 .S32 1981 c. 2
Summaries of Michigan
pavement friction
measurements : 1979 test
program

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SUMMARIES OF MICHIGAN
PAVEMENT FRICTION MEASUREMENTS
1979 Test Program

MDOT REPORT NO. 249

P. M. Schafer

Research Laboratory Section
Testing and Research Division
Research Project 54 G-74
Research Report No. R-1170

Michigan Transportation Commission
Hannes Meyers, Jr., Chairman; Carl V. Pellonpaa,
Vice-Chairman; Weston E. Vivian, Rodger D. Young,
Lawrence C. Patrick, Jr., William C. Marshall
John P. Woodford, Director
Lansing, May 1981

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LEGEND

Wsf = Wet sliding friction coefficient

Direction of Test Vehicle

NB, SB, EB, WB, etc. = Northbound, Southbound, etc.

Lane Tested (noted following direction of test vehicle)

RT = right turn lane

LT = left turn lane

OL = outer lane

CL = center lane

IL = inner lane

DL = deceleration lane

ML = merging lane

TL = truck lane

RL = ramp lane

3 or 2 = third or second lane from
centerline or median

INTRODUCTION

The Michigan Department of Transportation began reporting pavement friction values in terms of Friction Number (FN) on July 10, 1980. This unit was a direct result of calibration and correlation studies conducted at the Field Test and Evaluation Center in East Liberty, Ohio. Since all data appearing in this year's report were obtained prior to the above date, all friction values are in terms of our previous standard unit, Coefficient of Wet Sliding Friction (Wsf). For informational purposes, the table on the following page relates Wsf values to FN values (which will be used in subsequent reports).

During the 1979 calendar year, over 13,800 pavement friction tests were conducted throughout Michigan. These tests are summarized in this report according to the annual reporting procedure initiated in 1965. Friction levels for nine basic categories are included.

- I. Initial Pavement Friction Test Results for Concrete and Bituminous Pavements,
- II. Five-Year Pavement Friction Test Results for Concrete and Bituminous Pavements,
- III. Ten-Year Pavement Friction Test Results for Concrete and Bituminous Pavements,
- IV. Fifteen-Year Pavement Friction Test Results for Concrete and Bituminous Pavements,
- V. Inventory of Pavement Friction Test Results on Concrete and Bituminous Pavements Constructed Before 1963,
- VI. Experimental Features in Pavement Surfaces,
- VII. High-Accident Locations,
- VIII. Special Request Tests,
- IX. Special Attention Locations.

Explanatory remarks are presented at the beginning of each category. All high-accident location tests, special request tests, and special attention location tests have been previously reported to interested agencies within the Department.

All pavement friction test values are expressed as 40 mph coefficients of wet sliding friction (Wsf). MDOT tests have indicated that on highly textured concrete surfaces, Wsf values of 0.60 or higher would be expected. On the other hand, surfaces with coefficients of less than 0.10 could be representative of ice under certain conditions.

FRICITION TESTER CONVERSION VALUES, 1980

Conversion Values					
Wet Sliding Friction (x 100)	to Friction Number	Wet Sliding Friction (x 100)	to Friction Number	Wet Sliding Friction (x 100)	to Friction Number
10	12	40	33	70	54
11	13	41	34	71	55
12	14	42	35	72	56
13	15	43	36	73	56
14	15	44	36	74	57
15	16	45	37	75	58
16	17	46	38	76	59
17	17	47	38	77	59
18	18	48	39	78	60
19	19	49	40	79	61
20	19	50	40	80	61
21	20	51	41	81	62
22	21	52	42	82	63
23	22	53	42	83	63
24	22	54	43	84	64
25	23	55	44	85	65
26	24	56	45	86	66
27	24	57	45	87	66
28	25	58	46	88	67
29	26	59	47	89	68
30	26	60	47	90	68
31	27	61	48	91	69
32	28	62	49	92	70
33	29	63	49	93	70
34	29	64	50	94	71
35	30	65	51	95	72
36	31	66	52	96	73
37	31	67	52	97	73
38	32	68	53	98	74
39	33	69	54	99	75
				100	75

Reference should be made to Research Report R-585 ("Summaries of Michigan Pavement Skid Resistance: 1965 Test Program") and Research Report R-747, ("MDOT Equipment for Measuring Pavement Skid Resistance") for information regarding operation of the pavement friction measuring equipment, selection of test areas, and verification of retests.

ADT figures have been included for the first time this year in Sections I through V. The figures shown are estimated maximum 1978 ADT encountered within the limits of each project and were supplied by Highway Planning Division's TVM master list.

Generally speaking, pavement friction values obtained on new concrete pavements are a measure of the physical texture mechanically created in the pavement during construction. As this texture is worn away by traffic and environmental action, the quality of aggregates used becomes the major factor in providing friction. Prior to 1977, initial texture was produced by a burlap drag which experience has shown to last less than 10 years. Therefore, concrete pavement friction data presented in this report for service levels of 10 years or more are an indication of aggregate quality.

SECTION I

INITIAL PAVEMENT FRICTION TEST RESULTS FOR
CONCRETE AND BITUMINOUS PAVEMENTS

Initial Pavement Friction Test Results For Concrete and Bituminous Pavements

Section I summarizes pavement friction tests representing over 1,400 lane miles of trunkline surfaces tested during the 1979 calendar year.

Table 1 - Concrete Pavements Constructed in 1976, 1977, 1978, and 1979

1976 Construction

Only one concrete paving project, 50061-00685, was tested at the three-year service level. Coefficients which ranged from 0.55 to 0.75 and had a weighted average of 0.65 were determined during the 1979 test year.

1977 Construction

Project 50061-09394 was tested after a two-year service period. The weighted Wsf value determined during 1979 for this project was 0.66 and the coefficients ranged from 0.60 to 0.74.

1978 Construction

Nine projects were tested at the one-year service level. Coefficients ranged from 0.42 to 0.96 and had a weighted average of 0.67. An unprecedented high Wsf value of 0.96 was encountered on the SBIL of the I 75 widening Project 73112-05723.

1979 Construction

Two projects were tested during their initial service year. Coefficients ranged from 0.57 to 0.88 and had a weighted average of 0.71.

A texturing specification requiring transverse tining of concrete surfaces was implemented during the 1977 construction season. A historical review of 878 concrete pavement lanes, constructed prior to implementation of the 1977 texturing specification, yielded an average one-year friction level of 0.54. Since implementation of this specification, 84 concrete pavement lanes, transversely textured with tines, have been tested at the one-year service level; their average coefficient was 0.61. Normal test schedules will provide friction decay curves for the tined concrete surfaces in the future.

Table 2 - Bituminous Concrete Pavements Constructed in 1977, 1978, and 1979

1977 Construction

This year pavement friction tests were conducted at the two-year service level on two bituminous concrete paving projects. Wsf values for these ranged from 0.30 to 0.56 and had a weighted average of 0.47. The EBIL of the M 59 Project 63041-11079 averaged 0.33 and was the only lane with an average Wsf below 0.40.

1978 Construction

A total of 51 projects were tested after one service year. Coefficients ranged from 0.31 to 0.69 and had a weighted average Wsf value of 0.52. Twelve of 180 lanes tested yielded average friction levels below 0.40. All four lanes of Project 40012-09699 averaged below the 0.40 mark. This project is located on US 131 in Kalkaska County and possessed the two lowest average Wsf values encountered in the 180 one-year old bituminous concrete lanes which were tested during 1979. Nineteen lanes yielded average Wsf values in excess of 0.60. The highest of these were values of 0.65 and 0.66 which were determined on the EB and WB lanes of US 2 in Iron County (Project 36021-10138).

1979 Construction

Twenty projects were tested during their initial service year; Wsf values ranged from 0.24 to 0.69 and had a weighted average of 0.52. The SB lane of Project 54032-11979 had the lowest average coefficient (0.33).

Table 3 - Bituminous Aggregate Pavements Constructed in 1975, 1978, and 1979

1975 Construction

The initial friction levels were conducted on Project 74072-07538 after a four-year service period. Coefficients ranged from 0.44 to 0.51 and averaged 0.46.

1978 Construction

Thirty-one bituminous aggregate projects were surveyed for friction level after a one-year service period. Coefficients ranged from 0.36 to 0.74 and had a weighted average of 0.59. The lowest average Wsf value of 86 lanes tested was 0.37, determined on the NBOL of Project 23012-12671.

Two other lanes also yielded average Wsf values averaging below 0.40; both lanes had average coefficients of 0.39 and were the EBIL and WBIL of Project 79051-12404. At the higher end of the friction scale were the NBIL and SBIL of Project 69014-13814, which yielded average friction values of 0.70 and 0.72, respectively.

1979 Construction

Thirteen bituminous aggregate projects were tested in 1979 during their initial service year. Wsf values ranged from 0.28 to 0.61 and had a weighted average of 0.49. Five of the 33 lanes tested this year yielded average friction levels lower than 0.40. The lowest average (0.32) occurred on the SBOL of Project 57012-14848.

Table 4 - Open Graded Friction Course Pavements Constructed in 1978

1978 Construction

Only one project in this category was tested during 1979. This project, 11014-12607, yielded coefficients ranging from 0.61 to 0.79 and averaging 0.68 after a one-year service period.

TABLE 1
CONCRETE PAVEMENTS CONSTRUCTED IN 1976, 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
I 50061-00685A 1976	I 696 from 108 ft west of Lawrence St east to east of Wagner St	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-56	0*	EBOL	60	61	61
						EB#3	62	67	65
						EB#2	64	66	65
						EBIL	67	72	69
						WBOL	55	58	57
						WB#3	60	64	62
I 50061-09394A 1977	I 696 from I 75 east to east of Haverhill	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-54	0*	EBOL	62	63	62
						EB#3	61	63	62
						EB#2	64	68	66
						EBIL	67	69	68
						WBOL	60	62	61
						WB#3	66	67	66
FR 23092-10729A FU 37022-12144A 1978	M 99 from 100 ft north of Petriville Hwy north to north of Holt Rd M 20 from Mission St east to east of US 27	Sargent Construction Co.	Pit 41-38	Pit 33-105	6,500	SBOL	61	70	65
						SBIL	58	73	67
						EBOL	49	51	50
						EBIL	47	50	49
						WBOL	47	51	49
						WBIL	42	46	44
I 50061-00693A 1978	I 696 from east of Wagner St east to east of Hayes St	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-54	0	EBOL	56	61	59
						EB#3	62	64	63
						EB#2	67	70	68
						EBIL	73	75	74
						WBOL	74	79	76
						WB#3	69	74	72
WB#2	64	67	66						
WBIL	75	80	77						

* Not open to traffic until 1979.

TABLE 1 (Cont.)
 CONCRETE PAVEMENTS CONSTRUCTED IN 1976, 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)			
			Coarse	Fine			Low	High	Avg	
I 50061-04197A	I 696 from east of Haverhill east to east of Liberal St in Centerline	John Carlo, Inc.	E. C. Levy (Dix Yd)	Pit 63-56	0		EBOL	60	62	61
							EB#3	59	63	61
							EB#2	64	69	66
							EBIL	68	73	70
							WBOL	50	52	51
I 50062-00703A	I 696 from east of Hayes St east to Nieman St	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-56	0		EBOL	68	73	70
							EB#3	67	68	67
							EB#2	63	67	65
							EBIL	67	69	68
							WBOL	72	75	74
FR 64015-11535A	US 31 from 0.33 mile north of Polk Rd north to Monroe Rd	Eisenhour Construction Co.	E. C. Levy (Burns Harbor, Ind.)	Pits 43-05 and 64-20	6,400		NBOL	66	67	66
							NBIL	75	78	76
							SBOL	69	72	70
							SBIL	74	78	76
							WBIL	70	75	73
FM 73112-05723A	I 75 widening from north of C&O RR northwest to north of north junction of I 675	Sargent Construction Co.	Pit 32-4	Pit 63-54	34,400		NBIL	81	87	84
							SBIL	87	96	90
FF 82102-08489A	M 14 from 1,657 ft east of Napier Rd east to the C&O RR	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	0		EBOL	62	67	65
							EBIL	70	72	71
							WBOL	61	63	62
							WBIL	67	70	68

1978 (CONT)

TABLE 1 (Cont.)
 CONCRETE PAVEMENTS CONSTRUCTED IN 1976, 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
FF 82102-08498A 1978 (CONT)	M 14 from 0.3 mile west of Sheldon Rd east to 0.18 mile west of Schoolcraft Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	0	EBOL	56	62	60
							52	66	59
							72	74	73
							61	64	62
							60	64	62
FR 11056-10497A 1979	US 31 relocation from 6,100 ft north of Bertrand Rd north to 900 ft north of US 12	L. W. Edison Co.	U.S. Steel, (Gary, Ind.)	Pit 11-56	0	NBOL	80	81	80
							85	88	86
							64	68	66
							80	85	82
							FR 11056-10497A 1979	US 12 from 1,900 ft west of Mayflower Rd east to 2,400 ft east of Portage Rd (Control Section 11021)	L. W. Edison Co.
64	67	66							
57	69	62							
63	75	69							
63	75	69							

TABLE 2
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
1977	RS 38051-05108A M 106 from 1,400 ft south of Cooper Rd north 3,300 ft	Ajax Materials Corp.	Pit 30-85	Pit 30-35	6,400	NB	52	54	53
						SB	54	56	55
1978	Mb 63041-11079A M 59 from 326 ft west of Airport Rd east to 406 ft west of Cass Lake Rd, omitting from Jefferson Dr to Whitney Rd	Bit-Con Corp.	Pit 63-4	Pit 63-4	37,400	EBIL	30	36	33
						WBIL	40	40	40
1978	Mbr 03041-12363A M 118 (Monroe St) from 65 ft east of Cedar St east to the East City Limits of Allegan	Reith-Riley Construction Co.	Pit 3-36	Pit 39-1	9,040	EB	45	49	48
						WB	46	49	48
1978	Mbr 04032-12364A US 23 from 9th St in Alpena north to Long Rapids Rd	Alpena Paving Co., Inc.	Pit 4-13	Pit 4-13	16,500	NBOL	44	48	46
						NBIL	44	49	47
1978	Mbr 04032-12364A US 23 from end of divided highway in Alpena north to the Alpena-Presque Isle County Line	Alpena Paving Co., Inc.	Pit 4-13	Pit 4-13	11,700	NB	44	52	49
						SB	44	52	47
1978	Ms 09011-03552A Mb 09011-11007A (Part) M 84 from Bay-Saginaw County Line northeast to 100 ft east of Broadway in Bay City omitting at I 75 and Salzburg Rd	Midland Contracting Co.	Pit 71-15	Pit 71-15	19,700	NB	45	46	45
						SB	45	49	47
1978	Ms 09011-03552A Mb 09011-11007A (Part) M 84 from 1,400 ft north of Tittabawassee Rd north-east to Bay-Saginaw County Line (Control Section 73073)	Midland Contracting Co.	Pit 71-15	Pit 71-15	37,600	NB	48	49	49
						SB	46	46	46

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	AVG
Mb 11022-12369A	US 12 BR from 122 ft northwest of Maple St southeast to northwest of M 60)	Reith-Riley Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-36	6,900	EB WB	47 50	51 51	49 51
Mb 11041-12370A (Part)	M 60 BR from 18th St in Niles east to 17th St	Reith-Riley Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-36	15,000	EB WB	46 47	49 49	47 48
Mb 11041-12370A (Part)	M 60 BR from Berrien-Cass County Line east to M 60 (Control Section 14061)	Reith-Riley Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-36	6,300	EB WB	48 50	52 53	50 52
Mb 11051-12897A	US 31, US 33 from Indiana State Line north to Lawrence St	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	26,700	NBOL NBIL SBOL SBIL	45 50 50 55	49 55 51 56	47 52 50 56
Mb 11052-11010A	US 31, US 33 from Ferry St north to 260 ft southeast of North Berrien Springs Limits	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	11,500	NBOL NBIL SBOL SBIL	39 41 44 40	42 42 47 44	41 42 46 42
Mbr 11052-13429A	US 33 from 1,500 ft north of I 94, north to 500 ft north of St. Joseph Dr	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	24,000	NB SB	43 37	48 37	45 37
Mb 12012-12667A (Part)	M 66 from M 60 north to Branch-Calhoun County Line	Reith-Riley Construction Co.	Pits 3-36 and 39-69	Pit 13-89	3,000	NB SB	55 60	58 62	57 61
Mb 12012-12667A (Part)	M 66 from Branch-Calhoun County Line north to 'S Drive S" (Control Section 13031)	Reith-Riley Construction Co.	Pits 3-36 and 39-69	Pit 13-89	5,400	NB SB	60 54	61 56	60 55

1978 (CONT.)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mb 12022-12709A	US 12 from West St east to east limits of Quincy	John G. Yerington Co.	Pit 12-44	Pit 12-44	11,500	EBOL	52	53	52
						EBIL	50	55	53
						WBOL	52	54	53
						WBIL	50	53	52
Mb 13022-12668A	M 60 from 17 Mile Rd east to 380 ft west of West Main St in Homer	Reith-Riley Construction Co.	Pits 3-36 and 39-69	Pit 13-89	5,800	EB	54	58	56
						WB	50	62	56
Mb 14062-12642A	M 60 from east limits of Cassopolis east to east of Gards Rd	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	10,000	EB	49	56	52
						WB	54	58	56
Mb 14062-12855A	M 60 from 400 ft east of Gards Rd east to Mills St in Vandalia	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	6,100	EB	57	61	59
						WB	60	60	60
Mb 19061-12660A	M 21 from Clinton-Ionia County Line east to west limits of St. Johns	Reith-Riley Construction Co.	Pit 34-53	Pit 34-53	6,500	EB	51	64	58
						WB	60	62	61
Mb 24051-12375A	M 131 from 375 ft east of Hoyt St, in Harbor Springs, west and north to State St	Hodgkiss and Douma, Inc.	Pit 45-19	Pit 15-32	4,900	NB	48	53	50
						SB	45	47	46
Mb 25073-11030A	M 54 from 620 ft south of Vienna Rd to 185 ft north of Ohio Rd	Spartan Asphalt Paving Co.	Pit 63-97	Pit 63-29	12,500	NBOL	45	48	46
						NBIL	54	55	54
						SBOL	49	51	50
						SBIL	56	57	57
Mb 25091-12676A	M 15 from north of Oakland-Genesee County Line north to M 21	Spartan Asphalt Paving Co.	Pit 63-97	Pit 63-54	15,000	NB	54	58	56
						SB	57	61	59

1978 (CONT)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mbr 28012-11282A	US 31, M 37 from 0.25 mile north of Silver Pines Rd north 0.7 mile	Peninsula Asphalt Paving Co.	Pit 45-19	Pit 45-19	13,800	SRTL	43	45	44
Mbr 31051-14221A	US 41 from the Snake River northwest to south limits of Houghton, omitting 0.7 mile in Chassell	Geo. Hocking Construction Co.	Pit 31-66	Pit 31-69	4,500	NB SB	58 58	61 62	60 60
U 33011-00434A	M 99 from 500 ft south of Victor St north to Kalamazoo St	Spartan Asphalt Paving Co.	Pit 63-97	Pit 33-7	32,000	NBOL NBCL NBIL SBOL SECL SBIL	46 46 53 49 44 51	48 48 54 49 48 53	47 47 54 49 45 52
UM 33082-01860A	M 43 from 900 ft west of Park Lake Rd east to Ardmore	Spartan Asphalt Paving Co.	Pit 63-97	Pit 33-7	28,000	EBOL EBIL WBOL WBIL	48 50 50 50	49 55 55 52	48 52 52 51
M 33082-06524A	M 43 (Grand River Ave) from Michigan Ave east to 150 ft east of Bogue St	Spartan Asphalt Paving Co.	Pit 63-97	Pit 19-4	39,000	EBOL EBCL EBIL WBOL WBCL WBIL	41 46 43 38 43 48	42 51 46 42 45 49	41 49 49 40 44 49
Mb 35032-11044A	US 23 from 966 ft south of Au Sable River north to 918 ft north of County Rd F-41 (Old M 171)	Central Paving Co.	Pit 71-5	Pit 72-5	19,300	NBOL NBIL SBOL SBIL	35 37 39 35	37 40 42 39	36 39 40 37

1978 (CONT.)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
M 36021-10138A	US 2 from 0.5 mile west of Beechwood east to Gibb City Rd	Mathy Construction Co.	Pit 36-40	Pit 36-40	3,400	EB WB	62 63	67 69	65 66
M 36021-10139A	US 2 from Gibb City Rd east to Ninth Ave in Iron River	Mathy Construction Co.	Pit 36-40	Pit 36-40	7,000	EBOL EBIL WBOL WBIL	55 62 58 61	55 67 61 63	55 64 60 62
Mb 37022-11045A	M 20 from 0.3 mile east of US 27 east to County Line Rd	The Hicks Co.	Pit 37-7	Pit 37-7	9,300	EB WB	50 50	55 52	52 51
F 40012-09699A	US 131 from Boardman River north to 880 ft north of M 72	Williams Brothers	Pit 45-19	Pit 45-19	13,800	NBOL NBIL SBOL SBIL	31 34 33 35	35 37 34 37	33 36 34 36
HHS 41062-11664A	M 11 from 0.5 mile east of Byron Center Rd east to east side of US 131 interchange	Michigan Colprovia Co.	Pit 41-22	Pit 41-22	47,310	EBOL EBIL WBOL WBIL	33 43 34 34	40 44 38 37	36 43 38 36
Mb 41063-12307A	M 11 from Division St to Breton Ave, city of Grand Rapids	Michigan Colprovia Co.	Pit 41-22	Pit 41-22	43,000	EBOL EBIL WBOL WBIL	40 38 37 43	40 45 39 45	40 41 38 44
Mb 46061-12387A	US 233 BR from US 223 east to William St in Adrian	Cunningham-Gooding	Pits 81-78 and 63-97	Pit 81-78	12,800	EBOL EBIL WBOL WBIL	44 43 42 44	47 46 46 47	45 44 43 45
M 47082-12266A	M 59 at the US 27 interchange	Ajax Materials Corp.	Pit 47-3	Pit 47-3	12,900	EBOL EBIL WB	50 40 40	54 45 43	51 43 42

1978 (CONT.)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
MU 50031-00673A	M 97 from 950 ft north of 13 Mile Rd north 1.2 miles, city of Fraser	Bit-Con Corp.	Pit 63-4	Pit 63-4	55,600	NBOL	42	45	44
						NBCL	48	49	49
						NBIL	48	49	49
						SBOL	52	55	54
						SBCL	50	52	51
						SBIL	50	52	52
Ms 51011-11065A	US 31 from 400 ft east of M 110 north to 450 ft north of M 55	Laman Asphalt and Paving Co.	VerPlank	Pit 43-5	11,400	NBOL	54	58	57
			Coal and			NBIL	57	61	59
			Dock,			SBOL	48	51	49
			Grand			SBIL	54	57	56
			Haven						
Ms 51011-11375A	US 31 from 450 ft south of First St north to 200 ft east of M 110	Laman Asphalt and Paving Co.	VerPlank	Pit 43-5	14,500	NBOL	46	46	46
			Coal and			NBIL	53	56	54
			Dock,			SBOL	50	52	51
			Grand			SBIL	49	54	51
			Haven						
DPF 52041-11602A	US 41, M 28 from 300 ft west of 2nd St in Ishpeming east to 1,525 ft east of Negaunee	Payne and Dolan of Wisconsin	Pit 52-9	Pit 52-9	11,500	EBOL	57	60	58
						EBIL	62	63	63
						WBOL	57	60	59
						WBIL	62	64	63
DPF 52041-11604A	US 41, M 28 from 1,015 ft west of North Lake Rd east to 350 ft east of M 28 BR	Payne and Dolan of Wisconsin	Pit 52-9	Pit 52-9	8,500	EBOL	60	63	61
						EBIL	60	63	62
						WBOL	58	64	61
						WBIL	61	63	62
Mb 54022-12687A	M 29 from west to south limits of Mecosta	Reith-Riley Construction Co.	Pit 45-19	Pit 54-42	3,400	EB	60	61	60
						WB	46	51	49
Mtb 58071-14903A	M 125 from north of M 50 (Elm St) north to north of Standish Dr	Cunningham-Gooding	Pit 58-1 and France Stone	Pit 81-84	24,900	NB	42	43	42
						SB	39	42	41

1978 (CONT.)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mb 59011-11076A	Old US 131 from Kent-Montcalm County Line north to M 46	Reith-Riley Construction Co.	Pit 41-118	Pit 41-27	Not Available	NB	45	49	47
Mbr 59022-12689A*	M 57 from the Flat River east to M 66	Spartan Asphalt Paving Co.	Pit 37-9	Pit 59-44	9,500	EB WB	49 54	60 58	55 55
Mb 59044-12690A	M 46 from west junction M 66 east to 1,250 ft west of east junction M 66	Reith-Riley Construction Co.	Pit 38-14	Pit 38-14	5,600	EB WB	50 56	52 60	51 58
Mbr 61073-14312A	US 31 BR from Colby St west and north to Hansen St, city of Whitehall	Reith-Riley Construction Co.	Pit 41-38	Pit 70-9	12,900	NBOL NBIL SBOL SBIL	39 42 40 41	42 44 41 45	40 43 40 43
MU 63022-12095A	M 102 from I 696 east to Colgate St in Novi	Bit-Con Corp.	Pit 47-3	Pit 63-48	70,300	EBOL EBIL WBOL WBIL	50 57 49 52	55 60 58 60	53 58 53 57
IS 63022-11321A	I 96 from Livingston-Oakland County Line east 1.25 miles	Ann Arbor Construction	Pit 47-3	Pit 47-3	46,300	EBOL EBCL EBIL WBOL WBCL WBIL	40 49 54 45 48 48	45 54 57 49 49 50	42 51 55 48 49 49
Mb 70016-12704A (Part)	US 31 from M 104 (Third St) in Ferrisburg north to Ottawa-Muskegon County Line	Reith-Riley Construction Co.	Burns Harbor, Ind.	Pit 70-9	23,500	NBOL NBIL SBOL SBIL	48 61 56 63	50 61 58 64	49 61 57 63
Mb 70016-12704A (Part)	US 31 from Ottawa-Muskegon County Line north to south of Hile Rd (Control Section 61074)	Reith-Riley Construction Co.	Burns Harbor, Ind.	Pit 70-9	20,000	NBOL NBIL SBOL SBIL	52 60 46 62	56 63 51 66	54 61 49 63

* Recycled wearing course.

1978 (CONT)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mbr 77052-12403A	M 29 from north limits of St. Clair north to existing 24 ft concrete pavement	Kammer Asphalt Paving Co.	Pit 63-4	Pit 77-2	8,700	NB SB	51 49	54 55	52 53
Mb 78042-12711A (Part)	M 60, M 66 from east limits of Mendon east to St. Joseph-Branch County Line	Reith-Riley Construction Co.	Pits 39-69 and 63-97	Pit 3-44	4,000	EB WB	60 62	64 66	62 64
Mb 78042-12711A (Part)	M 60, M 66 from St. Joseph-Branch County Line east to M 66 north (Control Section 12061)	Reith-Riley Construction Co.	Pits 39-69 and 63-97	Pit 3-44	3,000	EB WB	61 57	63 62	62 59
Mb 81031-12154A	US 12 from east of Mills St east to east of Maple St in Saline	Cunningham-Gooding	Pit 63-97	Pit 81-1	18,000	EBOL EBIL WBOL WBIL	42 44 43 42	45 46 44 45	44 45 43 44
Mbr 82062-11105A (Part)	US 12 (Michigan Ave) from Helen St east to Porath St in Dearborn, omitting from Oakman Blvd to Miller Rd	Asphalt Products Co.	E. C. Levy (Dix Yd) Blast Furnace	E. C. Levy (Dix Yd) Blast Furnace	40,400	EBOL EBCL EBIL WBOL WBCL WBIL	48 47 51 48 45 47	50 48 53 50 49 49	49 48 52 49 48 48
Mbr 82062-11105A (Part)	US 12 from Oakman Blvd northeast to Miller Rd in Dearborn	Asphalt Products Co.	E. C. Levy (Dix Yd) Steel Furnace	E. C. Levy (Dix Yd) Steel Furnace	31,200	EBOL EBCL EBIL WBOL WBCL WBIL	56 58 56 58 55 54	57 58 58 60 56 57	57 58 57 59 56 55
Mbr 83052-12411A (Part)	M 115 from east limits of Mesick southeast to the new bituminous surface	Peninsula Asphalt Corp.	Pit 45-19	Pit 45-19	6,700	EB WB	39 43	45 52	42 48

1978 (CONT)

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
FRR 03112-15156A (Part)	US 131 from Shelbyville interchange north to Bradley interchange	Woodland Paving Co.	Pit 8-18	End Product Job - No added sand	10,830	NBOL NBIL SBOL SBIL	58 50 51 54	61 54 52 55	60 53 52 54
FRR 03112-15156A (Part)	US 131 from 146th Ave north to Allegan-Kent County Line	Woodland Paving Co.	Pit 8-18	End Product Job - No added sand	13,390	NBOL NBIL SBOL SBIL	54 66 49 60	60 67 54 62	56 67 51 61
FR 11056-10497A (Part)	Westbound US 12 at US 12 BR, southwest of Niles (Control Section 11021)	Reith-Riley Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-36	10,000	WBOL WBIL	57 63	58 66	57 64
Mb 13121-15316A	I 94 BL from 32nd St east to Capitol Ave	Richardson Asphalt Corp.	Pit 63-97	Pit 38-82	20,100	EBOL EBIL WBOL WBIL	49 52 45 51	52 54 48 54	50 53 47 52
Mb 14011-13428A (Part)	M 51 from north limits Dowagiac north to Cass-VanBuren County Line	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	7,200	NB SB	52 52	58 57	56 55
Mb 14011-13428A (Part)	M 51 from Cass-VanBuren County Line north and east to County Rd #215 (Control Section 80071)	Klett Construction Co.	U.S. Steel, (Gary, Ind.)	Pit 14-19	4,000	NB SB	58 58	61 63	60 61
Mbr 25072-11029A	M 54 from one block north of Davison Rd (Churchill Ave) north to south of Leith St in Flint	Flint Asphalt Paving Co.	Pit 63-4	Pit 47-35	36,500	NBOL NBIL SBOL SBIL	52 60 53 63	55 61 55 64	54 60 54 63

1979

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)			
			Coarse	Fine			Low	High	Avg	
Mbr 25092-14218A	M 15 from south of north limits of Davison north to south of Coldwater Rd in Otisville	Ace Asphalt and Paving Co.	Pit 63-88	Pit 63-29	10,800	NB		51	54	52
						SB		52	55	54
Ms 28013-10744A	US 31-M 72 from 676 ft west of 3 Mile Rd east 0.86 mile	Reith-Riley Construction Co.	Pit 83-6	Pit 83-6	17,600	NBOL		42	44	43
						NBIL		48	50	49
						SBOL		40	43	42
						SBIL		44	46	45
RRP 33041-12599A	US 27 (Temp. I 69) from Waverly Rd northeast to 438 ft east of GTW RR	Reith-Riley Construction Co.	Pit 63-97	Pit 34-53	18,000	NBOL		60	62	61
						NBIL		68	69	68
						SBOL		62	63	63
						SBIL		60	64	62
Ms 39081-12437A	M 43 from 320 ft west of Kendall St east to Kalamazoo City Limits	Reith-Riley Construction Co.	Pit 39-69	Pit 39-69	26,000	EBOL		32	45	40
						EBIL		36	48	41
						WBOL		30	40	36
						WBIL		38	39	38
Mbr 41051-14817A	M 44 from I 96 north to Plainfield Ave	Reith-Riley Construction Co.	Pit 41-38	Pit 41-46	14,420	NB		52	61	57
						SB		52	58	56
						SBTL		56	58	57
Mb 46041-12682A	M 34 from Maple Grove Ave, in Hudson, east to 690 ft west of Hazen Creek	Cunningham-Gooding	Pits 12-44 and 81-84	Pit 81-84	8,000	EB		46	55	50
						WB		24	58	50
M 50012-14193A	M 53 from 28 Mile Rd north 0.6 mile	National Asphalt Paving Co.	Pit 63-4	Pit 63-4	23,400	NB		38	43	40
						SB		40	45	43
Mb 50091-12685A	M 19 from Gratiot Ave north-west to 655 ft north of Richmond City Limits	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	15,900	NB		36	40	38
						SB		32	38	35

1979 (CONT.)

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1977, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
FU 53021-06792A	US 10 from 600 ft west of Jackson St east to 1,455 ft east of US 31	Laman Asphalt Paving Co.	Pit 45-19	Pit 43-5	17,300	EBOL	40	41	41
						EBIL	43	46	44
						WBOL	38	41	39
						WBIL	44	46	45
Mbr 54032-11979A	M 66 from 150 ft south of Chippewa River (West Branch) north to 155 ft north of Chippewa River	The Hicks Co.	Pit 37-26	Pit 37-26	3,500	NB	29	55	42
						SB	24	46	33
Mb 58052-14849A	M 25 connector from north of I 75 north to Lakewood Rd, thence west to US 24 (on Control Section 58091)	Cunningham-Gooding	Pit 81-84	Pits 81-78 and 81-84	3,100	NBOL	60	66	63
Mb 58091-14850A						NBIL	68	69	68
						SBOL	55	60	57
						SBIL	66	69	68
FRR 71072-15287A (Part)	US 23 from M 68 north to Hoeft Park entrance (Control Section 71073)	Lake Construction Co.	Pit 71-15	Pit 71-15	2,900	NB	42	44	43
						SB	38	43	40
Mb 78052-14853A	M 66 from north of north limits of Sturgis north to north of Wasepi Rd	John G. Yerington Co.	Pit 12-44	Pit 12-44	6,100	NB	40	55	49
						SB	45	57	48
Mbr 82061-14229A	US 12 from Denton Rd east to Canton Center Rd	Asphalt Products Co.	Pit 63-97	Pit 63-55	32,500	EBOL	45	48	47
						EBIL	50	55	52
						WBOL	43	45	44
						WBIL	49	50	49

1979 (CONT.)

TABLE 3
BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
1975 Mb 74072-07538A	M 25 from M 46 to north limits of Port Sanilac (Control Section 74073)	Frank Strausberg and Son, Co.	Pit 44-58	--	2,900	NB SB	44 46	46 51	45 48
Mb 01023-13394A	M 72 from 75 ft west of O'Donnell Rd east to 400 ft east of Hubbard Lake Rd	Central Paving Co.	Pit 35-14	--	830	EB WB	61 63	66 66	63 64
Mb 05031-12663A (Part)	M 88 from 735 ft south of Bellaire north to US 31, omitting from 0.4 mile north of P. O. B. to Hastings Ave	Hodgkiss and Douma, Inc.	Pit 5-60	--	4,650	NB SB	40 45	57 55	51 49
Mb 05031-12663A (Part)	M 66 from Stark Rd, in Green River, north to Lillocks Creek (Control Section 05051)	Hodgkiss and Douma, Inc.	Pit 5-60	--	1,000	NB SB	46 51	55 57	51 53
Mb 07012-12365A	US 41 from 380 ft north of south Baraga Limits southeast to Broad St in L'Anse	Mathy Construction Co.	Pit 7-22	--	7,000	EB WB	57 57	58 63	57 61
Mbr 07023-12366A	US 41 from Baraga-Marquette County Line west intermittently 12.7 miles	Mathy Construction Co.	Pit 7-22	--	3,000	EB WB	62 63	68 70	65 66
Mbr 17042-12372A (Part)	M 48 from County Rd #H-63 (south intersection) east to M 129	Lake Construction Co.	Pit 17-37	--	750	EB WB	62 63	68 70	66 65
Mbr 17042-12372A (Part)	M 48 from M 129 east to Stalwart (Control Section 17043)	Lake Construction Co.	Pit 17-37	--	400	EB WB	64 64	74 69	69 68

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mb 17062-12670A	M 28 from M 123 east 5.64 miles	Fox Valley Construction Co.	Pit 48-6	--	1,500	EB WB	61 62	64 66	63 64
Mb 23012-12671A	I 96 BL (Lawrence St) from Washington St northeast to Ramp B at I 96	Richardson Asphalt Corp.	Pit 38-78	--	13,400	NBOL NBLL SBOL SBLL	36 40 45 40	38 46 50 42	37 43 47 41
Mb 23031-12672A	I 69 BL (Cochran Rd) from 1,430 ft south of Broadway Rd north to M 50	Richardson Asphalt Corp.	Pit 38-78	--	14,200	NB SB	50 46	51 49	51 48
Mb 23091-12674A (Part)	M 99 from Jackson-Eaton County Line north to north of Kimbark St	Richardson Asphalt Corp.	Pit 38-78	--	7,100	NB SB	49 43	51 46	50 44
Mb 23091-12674A (Part)	M 99 from north of Crawford Rd north to Jackson-Eaton County Line (Control Section 38011)	Richardson Asphalt Corp.	Pit 38-78	--	1,700	NB SB	50 49	55 55	52 53
Mb 26012-12677A	M 18 from west of Cassidy Rd west and north to the Gladwin-Roscommon County Line	The Hicks Co.	Pit 18-56	--	1,000	NB SB	56 55	61 60	58 57
Mb 31031-12377A	M 203 from 6.5 miles north of Hancock northeast 1.96 miles	Geo. Hocking Construction Co.	Pit 31-16	--	600	NB SB	62 66	67 67	64 67
Mbr 33021-12680A	M 36 from west of Union St in Dansville east to M 52	Richardson Asphalt Corp.	Pit 38-78	--	2,000	EB WB	48 54	60 61	54 58
Mb 35022-11043A	M 55 from Zephyr Rd east to 0.5 mile east of Sand Lake Rd	Central Paving Co.	Pit 72-5	--	2,300	EB WB	49 55	55 60	52 58

1978 (CONT.)

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mb 41071-12383A (Part)	M 50 from 100 ft north of 84th St, south and east to Kent-Ionia County Line	Reith-Riley Construction Co.	Pit 41-69	--	2,470	EB WB	60 63	63 67	62 64
Mb 41071-12383A (Part)	M 50 from Kent-Ionia County Line east to Nash Hwy (Control Section 34021)	Reith-Riley Construction Co.	Pit 41-69	--	1,080	EB WB	58 61	61 66	60 64
Mb 41101-14854A	M 44 from intersection of Beiding Rd and Wolverine Dr east 0.7 mile	Williams Brothers	Pit 34-45	--	5,480	EB WB	51 50	56 52	54 51
Mb 42021-12385A (Part)	M 26 from US 41 north to Garden City Creek	Geo. Hocking Construction Co.	Pit 31-16	--	500	NB SB	61 60	63 61	62 60
Mb 42021-12385A (Part)	M 26 from 1.5 miles south-west of Eagle Harbor north to 350 ft northeast of Silver River Bridge	Geo. Hocking Construction Co.	Pit 31-16	--	500	NB SB	57 60	60 63	58 62
Mfb 46032-11200A	M 156 from Walnut St north to 300 ft south of Norfolk and Western RR in Morenci	Thomson-McCully Co.	Pit 38-48	--	4,000	NB SB	52 56	53 60	52 58
Mfb 46032-12963A	M 156 from south of Norfolk and Western RR north 0.795 mile	Richardson Asphalt Paving Co.	Pit 38-78	--	1,200	NB SB	58 66	61 68	60 67
Mbr 48034-12683A	M 123 from County Rd H-37 (Four Mile Corner) north-east 11.859 miles	Fox Valley Construction Co.	Pit 48-6	--	700	NB SB	60 58	66 68	63 63
Mbr 48042-12388A (Part)	M 28 from M 123 west 1.0 mile	Fox Valley Construction Co.	Pit 48-6	--	3,460	EB WB	54 47	59 61	57 54

1978 (CONT)

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mbr 48042-12388A (Part)	M 28 from County Rd #397 east to Luce-Chippewa County Line	Fox Valley Construction Co.	Pit 48-6	--	2,000	EB WB	61 56	64 63	62 60
Mb 49041-11062A	M 134 from I 75 east to 1.8 miles west of M 129	Fox Valley Construction Co.	Pit 49-53	--	1,100	EB WB	60 58	68 66	63 62
Mb 65021-12694A (Part)	M 55 from I 75 BL east to M 33	Central Paving Co.	Pit 65-1	--	4,900	EB WB	40 42	45 46	42 44
Mb 65021-12694A (Part)	M 55 from M 33 east to Henderson Lake Rd (Control Section 65022)	Central Paving Co.	Pit 65-1	--	2,900	EB WB	43 46	46 48	45 47
Mb 65052-12697A	M 33 from M 55 north to Rose City	Central Paving Co.	Pit 65-7	--	6,100	NB SB	50 51	56 55	54 53
Mb 66012-12698A (Part)	M 64 from 3.7 miles, north of Bergland, north to White Pine	Mathy Construction Co.	Pit 66-62	--	1,400	NB SB	67 67	72 69	69 68
Mb 66012-12698A (Part)	M 64 from Silver City east to west of Pine Creek (Control Section 66013)	Mathy Construction Co.	Pit 66-62	--	1,300	EB WB	63 64	68 67	66 66
Mb 66012-12698A (Part)	M 28 from east of M 64, in Bergland, east 2.3 miles (Control Section 66022)	Mathy Construction Co.	Pit 66-62	--	1,700	EB WB	64 64	67 68	66 66
Mb 66061-12703A	M 107 from M 64 west to west of Ski Hill Rd	Mathy Construction Co.	Pit 66-62	--	900	EB WB	63 64	66 67	64 66
Mbr 67051-10277A	M 115 from M 66 northwest to Osceola-Wexford County Line	Globe Construction Co.	Pit 67-2	--	4,900	EBTL WBTL	50 55	52 58	51 56

1978 (CONT.)

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
I 69014-13814A	I 75 from 2,700 ft north of M 32 north to 165 ft south of Sturgeon Valley Rd	Lake Construction Co.	Pit 16-52	--	7,700	NBOL	52	60	57
Mb 75031-12707A	US 2 approximately 6.1 miles east of Manistique (patch)	Payne and Dolan of Wisconsin, Inc.	Pit 21-77	--	5,000	EB WB	58 61	63 63	61 62
Mb 75061-12398A	M 28 from M 77 in Seney east to Luce-Schoolcraft County Line	Fox Valley Construction Co.	Pit 48-6	--	2,100	EB WB	60 57	64 62	62 60
SS 77071-07752A	M 154 from the south end of M 154 north to the Ferry Dock on Harson's Island	Molesworth Contracting Co.	Pit 74-26	--	1,600	NB SB	49 49	56 55	53 51
Mbr 79051-12404A	M 81 from southwest to northeast village limits of Caro (Control Section 29061)	Frank Strausberg and Son, Co.	Pit 79-84	--	11,600	EBOL EBIL WBOL WBIL	44 38 44 38	48 40 47 40	46 39 46 39
Mb 13032-15315A	M 66 from Pennfield Rd north to 1,650 ft north of Wanondager Creek (3.5 miles north of Battle Creek)	Reith-Riley Construction Co.	Pit 33-75	--	7,700	NB SB	34 28	40 46	38 38
Mbr 30031-14219A*	M 99 from Michigan-Ohio State Line north to M 34	Spartan Asphalt Paving Co.	Pits 30-54 and 58-1	Pit 2-67	3,050	NB SB	49 50	61 60	56 56
Mb 30033-15321A (Part)	M 99 from M 49, in Litchfield, north to Calhoun-Hillsdale County Line	Richardson Asphalt Corp.	Pits 38-48 and 38-78	--	3,500	NB SB	46 48	50 50	48 49

* Recycled surface course.

1978 (CONT.)

1979

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
Mb 30033-15321A (Part)	M 99 from Calhoun-Hillsdale County Line north to M 69 (Control Section 13091)	Richardson Asphalt Corp.	Pits 38-48 and 38-78	--	3,500	NB SB	39 42	40 46	39 44
Mb 57012-14848A (Part)	M 66 from M 55 (south junction) north to First St in Lake City	Peninsula Asphalt Corp.	Pit 45-19	--	6,170	NB SB	44 43	46 45	45 44
Mb 57012-14848 (Part)	M 66 from First St, in Lake City, north to M 55 (north junction)	Peninsula Asphalt Corp.	Pit 45-19	--	6,200	NBOL NBIL SBOL SBIL	44 40 31 38	47 42 35 42	46 41 32 39
Mb 62031-15347A	M 37-M 82 from 120 ft north of M 82 (south junction) north 0.66 mile	Reith-Riley Construction Co.	Pit 62-6	--	11,500	NBIL SBIL	48 43	50 44	49 43
Mb 62022-15346A (Part)	M 82 from south limits of Fremont, south and east to M 37	Reith-Riley Construction Co.	Pit 62-6	--	6,200	EB WB	52 49	58 56	55 51
Mb 62022-15346A (Part)	M 82 from 1,950 ft east of M 20 east to west limits of Fremont (Control Section 62011)	Reith-Riley Construction Co.	Pit 62-6	--	11,400	EB WB	48 44	52 49	50 46
Mbr 67022-14225A	US 10 from 2.68 miles west of West Ewart Limits east to M 66	The Hicks Co.	Pit 54-45	--	7,000	EB WB	39 40	49 48	44 44
Mb 69022-15360A	M 32 from south of Tuttle Lake Rd east to the Montmorency-Otsego County Line	Lake Construction Co.	Pit 60-18	--	1,800	EB WB	46 48	52 56	50 52

1979 (CONT.)

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1975, 1978, AND 1979

Project No.	Location	Paving Contractor	Aggregate Sources		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
FRR 71072-15287A (Part)	US 23 from M 65 north to M 68	Lake Construction Co.	Pit 71-66	--	2,900	NB	42	46	44
Mbr 71091-11556A	US 23 BR from Friedrich St north to US 23 bypass	Lake Construction Co.	Pit 71-66	--	3,600	NB	41	43	42
Mbr 72093-14851A	I 75 BL from east of I 75 (Ramp A) east to M 18 in Roscommon	Central Paving Co.	Pit 20-3	--	4,600	EB	46	50	48
Mbr 73061-11088A (Part)	M 46 from 350 ft west of St. Marys St, in Hemlock, east to 1,320 ft west of M 52	Carrollton Paving Co.	Pit 79-59	--	10,100	WB	50	55	53
Mbr 83052-13819A	M 115 from 500 ft south of Rd No. 28 northwest 2.23 miles	The Hicks Co.	Pit 54-45	--	3,500	EBTL	51	57	54
							40	56	50
							50	54	52
							50	54	52

1979 (CONT.)

TABLE 4
OPEN GRADED FRICTION COURSE PAVEMENTS CONSTRUCTED IN 1978

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
IR 11014-12607A	Eastbound I 94 from M 239 (LaPorte Rd) east to 1,700 ft north of US 12	Reith-Riley Construction Co.	U.S. Steel (Gary, IN)	Rolling Prairie, IN	24,500	EBOL EBCL EBIL	61 61 74	69 68 79	63 64 77

TABLE 5
 CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENT
 SUMMARY FOR THE 1979 TEST YEAR

Surface Type	Service Year When Tested	Total Lanes Tested	Total Lane-Miles Tested	Weighted Average Friction Level
Concrete	Initial	8	11.2	0.71
	1	46	122.8	0.67
	2	8	11.2	0.66
	3	8	13.6	0.65
Bituminous Concrete	Initial	63	180.0	0.52
	1	180	463.2	0.52
	2	4	2.4	0.47
Bituminous Aggregate	Initial	33	160.0	0.49
	1	86	445.2	0.59
	4	2	1.0	0.46

SECTION II

FIVE-YEAR PAVEMENT FRICTION TEST RESULTS
FOR CONCRETE AND BITUMINOUS PAVEMENTS

Five-Year Pavement Friction Test Results
For Concrete and Bituminous Pavements

Table 6 - Five-Year Review for Concrete Pavements Constructed in 1974

Table 6 contains friction test results for 28 portland cement concrete projects consisting of 153 lanes (363.8 lane miles) which were constructed in 1974. Initial service year tests were conducted in 1974 on 10 of these projects, resulting Wsf values averaged 0.57. After a one-year service period, in 1975, 122 lanes were tested and resulting friction levels averaged 0.59. In 1976, 12 projects had two-year measurements made; coefficients on these averaged 0.50. All projects were retested in 1979 at the five-year mark. Five-year average coefficients on the 153 lanes tested ranged from 0.35 to 0.75 and averaged 0.56. Fourteen of the 153 lanes (7 percent of the lane miles tested) yielded average five-year friction levels lower than 0.40. The lowest five-year lane average (0.35) occurred on the SBIL of Project 63525-05505 and on the NBIL and SBOL of Project 82293-04742. Average friction level for nine lanes was higher than 0.70 after five service years. These nine lanes represent 8 percent of the five-year lane mileage. The highest five-year average values (0.75) occurred on the transverse combed EBIL of Project 18024-00233 and the SBIL of Project 58171-00801.

Table 7 - Five-Year Review for Bituminous Concrete Pavements Constructed in 1974

In Table 7, results of pavement friction tests are shown for 63 bituminous concrete projects. In all, 767.4 lane miles (252 lanes) were tested. Initial year tests were conducted during 1974 on 43 projects; Wsf values ranged from 0.19 to 0.68 and averaged 0.45. At the one-year level, tests were conducted on all but 16 of the 252 lanes; coefficients ranged from 0.29 to 0.70 and averaged 0.46. Only one project was tested after a three-year service period during 1976 and both lanes tested yielded coefficients averaging 0.59. In 1979, all projects were retested at the five-year service level; the coefficients ranged from 0.31 to 0.73 and averaged 0.48. Forty-two of the five-year old lanes yielded Wsf values averaging lower than 0.40 and represent 13 percent of the tested lane mileage. The lowest five-year value encountered, 0.31, was determined on the SBIL of US 131 north of M 55 in Cadillac (Project 83031-07542). Friction levels on three of the lanes tested after five service years exceeded 0.70; these represent 0.4 percent of the lane mileage. The highest average Wsf (0.73) was measured on the WBIL of Project 64022-00931.

Table 8 - Five-Year Review for Bituminous Aggregate Pavements Constructed in 1974

Table 8 contains results of pavement friction tests conducted on 35 bituminous aggregate projects constructed during 1974. In all, tests were conducted on 122 lanes (735.4 lane miles). During 1974, 20 projects were tested, yielding an average Wsf value of 0.46 for their initial service year. All 35 projects were tested in 1975 after one year of service. Wsf values on these averaged 0.52. Eight projects were tested at the two-year service level; their average friction level was 0.59. In 1979 all 35 projects were retested and the measured five-year friction levels ranged from 0.44 to 0.74 and averaged 0.58. Six of the 122 lanes tested at the five-year service level, 3 percent of the lane mileage tested, yielded average Wsf values higher than 0.70. The highest of these, 0.74, was determined on the NB lane of M 144, northeast of the Roscommon-Crawford County line (Project 72041-06141).

Figures 1 through 3 graphically show results of linear regressions on one-year (x) and five-year (y) Wsf values for construction years 1965 through 1974. Departure from a one-to-one relationship is indicated by divergence of the regression line from the dashed 45-degree line shown. In Figure 3, no regression line has been shown for the 1970 construction year because only two lanes were tested at the one-year level.

TABLE 6
FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)									
			Coarse	Fine			1974	1975	1976	1979						
I 03035-00023A	I 196 from north of 142nd St northeasterly to southwest of 144th Ave	L. W. Edison Co.	Pit 70-9	Pit 70-52	3,430	NBOL	--	59	--	53						
							NBIL	--	66	--	68					
							SBOL	--	56	--	57					
							SBIL	--	65	--	72					
I 03035-00024A	I 196 from southwest of 144th Ave northeasterly to 1,100 ft southwest of Allegan-Ottawa County Line	Carl Goodwin and Sons, Inc.	Pits 70-9 and 70-5	Pits 70-9 and 70-39	3,780	NBOL	72	59	--	60						
							NBIL	74	73	--	70					
							SBOL	75	63	--	62					
							SBIL	71	74	--	73					
FM 09034-05683A (Part)	I 75 from I 675 north to US 10	Sargent Construction Co.	Pits 71-47 and 75-05	Pit 63-54	42,320	NBIL	--	63	--	68						
							SBIL	--	64	--	65					
FM 09034-05683A (Part)	I 75 from US 10 north 1.8 miles (Control Section 09035)	Sargent Construction Co.	Pits 71-47 and 75-05	Pit 63-54	31,000	NBIL	--	71	--	66						
F 18024-00233A	US 10 relocation from 0.5 mile east of Old State Rd easterly to US 27	Eisenhour Construction Co.	Pits 37-26 and 67-02	Pits 16-71 and 67-02	3,900	<u>Transverse Broomed Concrete</u>										
						EBOL	--	60	--	65						
						EBIL	--	61	--	68						
						WBOL	--	64	--	67						
						WBIL	--	70	--	72						
						<u>Transverse Combed Concrete</u>										
						EBOL	--	63	--	69						
						EBIL	--	70	--	75						
						WBOL	--	58	--	69						
						WBIL	--	66	--	74						
						I 19043-01930A	Proposed I 69 and US 127 from US 27 east and south to north of State Rd	Holloway Construction Co.	Pit 19-18	Pit 19-4	11,000	NBOL	55	--	--	53
													NBIL	52	--	--
SBOL	58	--	--	47												
SBIL	59	--	--	67												
F 19081-00250A	US 127 from Clinton-Ingham County Line northerly to north of State Rd	Eisenhour Construction Co.	Pits 19-18 and 19-24	Pit 19-4	9,600	NBOL	56	45	--	55						
							NBIL	60	61	--	68					
							SBOL	55	52	--	50					
							SBIL	56	61	--	67					
FM 30032-00406A	M 99 relocation from 50 ft southeast of north limits of Hillsdale northwesterly to US 12	Denton Construction Co.	Pits 13-84, 30-35, France Stone, Waterville, OH	Pit 30-35	15,100	NB	--	47	--	49						
							SB	--	47	--	53					
							NBOL	--	51	--	57					
							NBIL	--	62	--	60					
							SBOL	--	55	--	55					
SBIL	--	58	--	55												
I 41029-00574A	I 196 from 277 ft southwest of Kent-Ottawa County northerly to 1,455 ft north of M 21	Davco, Inc.	Pit 41-16	Pit 70-45	29,580	NBOL	64	60	--	62						
							NBIL	69	67	--	68					
							SBOL	60	51	--	56					
							SBIL	60	67	--	69					
F 58171-00801A	I 275 from I 75 northwesterly to 3,442 ft north of Labo Rd	Denton Construction Co.	E.C. Levy (Trenton Yd)	Pit 61-57	13,800	NBOL	--	70	--	64						
							NBIL	--	70	--	71					
							SBOL	--	62	--	65					
							SBIL	--	62	--	75					
I 58171-00802A	I 275 from 1,980 ft south of Sigler Rd northerly to 2,929 ft south of Carlton-Rockwood Rd	L. W. Edison Co.	E.C. Levy (Trenton Yd)	Pit 61-1	13,800	NBOL	--	68	--	61						
							NBIL	--	65	--	65					
							NBOL	--	61	--	72					
							SBOL	--	60	--	61					
							SBIL	--	58	--	66					
							SBIL	--	61	--	71					
M 63132-05442A	M 150 from 486 ft north of Hamlin Rd, northerly to 630 ft north of Avon Rd	Cooke Contracting Co.	E.C. Levy (Trenton Yd)	Pit 63-47	30,800	NBOL	--	43	--	37						
							NBIL	--	48	--	40					
							SBOL	--	37	--	37					
							SBIL	--	40	--	38					

TABLE 6 (Cont.)
FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)				
			Coarse	Fine			1974	1975	1976	1979	
I 63191-03586A	I 96 from Novi Rd interchange southeasterly to 850 ft south of 9 Mile Rd	Denton Construction Co.	E. C. Levy (Dix Yd)	Pit 63-7	62,900	EBOL	--	68	--	40	
						EB#3	--	74	--	43	
						EB#2	--	76	--	51	
						EBIL	--	75	--	61	
						WBOL	--	72	--	51	
						WB#3	--	73	--	55	
						WB#2	--	69	--	39	
						WBIL	--	71	--	58	
						<u>Ramp Lanes</u>					
						EBOL	--	--	--	37	
						EBIL	--	--	--	46	
WBOL	--	--	--	50							
WBIL	--	--	--	58							
MU 83525-05505A	M 150 from M 59 northerly to 486 ft north of Hamlin Rd (Control Section 63132)	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 63-54	30,000	NBOL	41	30	--	38	
						NBIL	40	37	--	39	
						SBOL	44	30	--	38	
						SBIL	52	38	--	35	
F 70023-00981	I 196 BL, Byron Rd interchange	Carl Goodwin and Sons, Inc.	Pits 70-9 and 75-5	Pits 70-27 and 70-39	12,600	EBOL	--	--	--	57	
						EBIL	--	--	--	62	
						WBOL	--	--	--	64	
						WBIL	--	--	--	68	
F 70024-00983A	I 196 from 3,200 ft south of Byron Rd northeasterly to 300 ft east of 56th Ave	Carl Goodwin and Sons, Inc.	Pits 70-9 and 75-5	Pits 70-27 and 70-39	13,600	NBOL	60	61	--	54	
						NBIL	66	66	--	67	
						SBOL	67	59	--	59	
						SBIL	65	67	--	69	
I 70024-00984A	I 196 from south of the Ottawa-Allegan County northeasterly to south of Byron Rd	Carl Goodwin and Sons, Inc.	Pits 70-9 and 75-5	Pits 70-9 and 70-39	9,000	NBOL	69	63	--	66	
						NBIL	66	67	--	70	
						SBOL	65	61	--	62	
						SBIL	58	72	--	69	
I 70024-00985A	I 196 from 300 ft east of 56th Ave northeasterly to east of 32nd St	L. W. Edison Co.	Pit 41-16	Pit 70-45	14,400	NBOL	61	58	--	60	
						NBIL	69	63	--	67	
						SBOL	59	55	--	57	
						SBIL	58	68	--	67	
FM 73111-06721A	I 75-US 10-US 23 from 3,065 ft north of Dixie Hwy northerly to 830 ft north of Wadsworth Rd	W. F. McNally	Pits 17-66 and 75-5	Pit 25-29	45,200	NBIL	--	67	--	68	
						SBIL	--	65	--	67	
FM 73171-05681A	I 75 from 2,694 ft north of Birch Run Rd northerly to 3,065 ft north of Dixie Hwy	L. W. Edison Co.	Pit 71-47	Pit 63-54	31,700	NBIL	--	65	--	66	
						SBIL	--	64	--	65	
I 82021-05125A	I 94 from 782 ft west of Rawsonville Rd easterly to 872 ft west of Bergman Rd	Eisenhour Construction Co.	Pit 81-78 and E. C. Levy (Dix Yd)	Pit 81-78	68,800	EBOL	--	--	47	46	
						EBCL	--	--	51	44	
						EBIL	--	--	65	56	
						WBOL	--	--	38	48	
						WBCL	--	--	46	53	
I 82021-05126A	I 94 from 968 ft west of Bergman Rd east to 115 ft west of Morton-Taylor Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 81-78	68,800	EBOL	--	--	48	51	
						EBCL	--	--	55	44	
						EBIL	--	--	64	56	
						WBOL	--	--	36	49	
						WBCL	--	--	44	53	
I 82022-04280A (Part)	I 94 from 435 ft east of Haggerty Rd east to Hannan Rd (Control Section 82021)	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 81-1	67,400	<u>Transverse Combed Concrete</u>					
						EBOL	--	38	--	45	
						EBCL	--	48	--	48	
						EBIL	--	57	--	62	
						WBOL	--	43	--	41	
						WBCL	--	50	--	41	
WBIL	--	53	--	50							

TABLE 6 (Cont.)
FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
I 82022-04280A (Part)	I 94 from Hannan Rd east to east of Ozga Rd	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 81-1	67,000	<u>Transverse Broomed Concrete</u>				
						EBOL	--	--	--	45
						EBCL	--	--	--	44
						EBIL	--	--	--	62
						WBOL	--	--	--	42
						WBCL	--	--	--	39
M 82081-03107A	M 153 from 750 ft west of Beech-Daly Rd easterly to 1,030 ft west of north-bound US 24	Chas. J. Rogers, Inc.	Pit 71-47	Pit 63-7	55,100	<u>Transverse Broomed Concrete</u>				
						EBOL	38	41	--	44
						EBCL	37	40	--	48
						EBIL	49	49	--	47
						WBOL	35	38	--	43
						WBCL	41	48	--	49
I 82122-02923A	Interchange of I 275, I 96 and M 14 (also see Project I 82293-02937A)	Denton Construction Co.	E. C. Levy (Dix Yd)	Pits 63-7 and 63-55	*	<u>Transverse Broomed Concrete</u>				
						EBRT	--	--	--	55
						EBOL	--	60	--	49
						EBCL	--	63	--	53
						EBIL	--	60	--	63
						WBRT	--	53	--	53
BUI 82123-01284A	I 96 from Schaefer Rd easterly to Wyoming	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-7	127,000	<u>Inner Roadway</u>				
						EBOL	--	68	--	51
						EBCL	--	64	--	54
						EBIL	--	72	--	62
						WBOL	--	70	--	47
						WBCL	--	71	--	51
						WBIL	--	72	--	59
						<u>Outer Roadway</u>				
						EBOL	--	50	--	43
						EB#3	--	39	--	47
						EB#2	--	55	--	62
						EBIL	--	64	--	58
						WBOL	--	54	--	47
						WB#3	--	53	--	49
WB#2	--	63	--	56						
WBIL	--	67	--	59						
I 82191-02800A	I 75 from Huron River northeasterly to Gibraltar Rd	John Carlos, Inc.	E. C. Levy (Trenton Yd)	Pits 63-55 and 81-57	51,700	NBOL	52	46	--	48
						SBOL	53	43	--	39
I 82293-02937A	Interchange of I 275, I 96 and M 14 (also see Project I 82122-02923A)	Denton Construction Co.	E. C. Levy (Dix Yd)	Pits 63-7 and 63-66	62,100	<u>Transverse Broomed Concrete</u>				
						NBOL	--	70	--	49
						NBCL	--	71	--	51
						NBIL	--	74	--	59
						SBOL	--	72	--	58
						SBCL	--	70	--	54
I 82293-04742A	I 275 from M 153 northberly to Plymouth Rd	Sargent Construction Co.	Pit 63-7	Pit 63-7	68,800	<u>Transverse Broomed Concrete</u>				
						NBOL	--	44	--	56
						NBCL	--	50	--	38
						NBIL	--	66	--	35
						SBOL	--	45	--	35
						SBCL	--	56	--	41
SBIL	--	65	--	57						

* No data available.

TABLE 7
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Slidog Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mbr 01051-06118A (Part)	US 23 from M 72 northerly to 0.475 miles north of Spruce Rd (Control Section 01052)	Central Paving Co.	Pit 71-15	Pit 71-15	2,700	NB SB	53 51	56 57	-- --	53 56
Mb 06072-06123A (Part)	US 23 from 400 ft south of north limits of Standish northeasterly 8.193 miles to 1,500 ft northeast of west limits of Omer	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 71-15	8,500	NB SB	36 41	44 49	-- --	38 40
Mb 06072-06123A (Part)	M 65 from 1,800 ft south of north limits of Twining northeasterly 3.261 miles to the Arenac-Iosco County Line (Control Section 06091)	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 71-15	3,000	NB SB	54 57	53 59	-- --	41 48
Mb 11021-06126A	US 12 from west limits of Three Oaks easterly to east limits of Gallen	John G. Yerington	Material Service, Thornton, IL	Pit 11-75	5,900	EB WB	39 40	49 50	-- --	48 53
M 11051-05491A	US 31-US 33 from Fox St north to M 60 BR	Reith-Riley Construction Co.	Material Service, Thornton, IL	Pit 14-36	24,000	NBOL NBIL SBOL SBIL	40 40 34 39	39 40 32 37	-- -- -- --	35 35 33 32
Mb 11071-06128A (Part)	M 140 from 1,050 ft north of south limits of Watervliet north 0.49 mile to Paw Paw River (Control Section 11072)	Consumers Asphalt Paving Co.	Pit 39-1	Pit 14-19	3,300	NB SB	37 38	36 40	-- --	36 36
Mb 11071-06128A (Part)	US 31-US 33 from 190 ft northwest of Sunset Dr northwesterly 0.52 mile (Control Section 11052)	Consumers Asphalt Paving Co.	Pit 39-1	Pit 14-19	10,500	NB SB	39 38	40 38	-- --	43 47
Mbr 12022-06072A	US 12 from Jefferson St in Coldwater easterly to West St in Quincy, omitting from Wright St east to east of I 69	John G. Yerington	Pits 12-44 and 30-35	Pit 12-44	19,000	EB WB	39 31	37 36	-- --	44 42
Mb 13011-06073A (Part)	M 37 from 350 ft north of M 89 north to south of Swedish Dr	Reith-Riley Construction Co.	Pit 39-1	Pit 13-41	11,500	NBOL NBIL SBOL SBIL	46 47 40 35	48 52 42 48	-- -- -- --	46 49 44 49
Mb 13011-06073A (Part)	M 37 from south of Swedish Dr north to the Calhoun-Barry County Line, omitting from 2,272 ft north of 'S' Dr north to 152 ft north of 'V' Dr	Reith-Riley Construction Co.	Pit 39-1	Pit 13-41	6,200	NB SB	40 26	53 44	-- --	49 57
Mb 13011-06073A (Part)	M 89 from WCL of Battle Creek southeast to M 37, omitting from Avery St to Miller St (Control Section 13061)	Reith-Riley Construction Co.	Pit 39-1	Pit 13-41	20,000	EBOL EBIL WBOL WBIL	43 40 40 51	-- -- -- --	-- -- -- --	45 46 45 46
Mb 13011-06073A (Part)	M 37 from Calhoun-Barry County Line north 1.05 miles (Control Section 08031)	Reith-Riley Construction Co.	Pit 39-1	Pit 13-41	3,800	NB SB	-- --	-- --	-- --	61 58
Mb 13022-06074A (Part)	M 60 from the south branch of Kalamazoo River in Homer easterly to 400 ft west of Calhoun-Jackson County Line, omitting divided highway at M 99	Reith-Riley Construction Co.	Pit 12-44	Pit 12-44	5,800	EB WB	47 42	45 45	-- --	51 55

TABLE 7 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mb 13022-06074A (Part)	M 60 divided portion at M 99	Reith-Riley Construction Co.	Pit 12-44	Pit 12-44	4,400	EBOL	48	49	--	57
						EBIL	67	70	--	72
						WBOL	45	49	--	49
						WBIL	62	70	--	70
Mb 14011-06130A	M 60 from M 62 easterly 1.12 miles to east limits of Cassopolis (Control Section 14062)	Reith-Riley Construction Co.	Material Service, Thornton, IL	Pit 14-36	10,000	EB	36	30	--	33
						WB	34	34	--	35
Mbr 18032-07530A (Part)	US 27 BR from M 61 in Harrison north to NCL of Harrison	The Hicks Co.	Pit 37-26	Pit 37-26	7,500	NBOL	--	42	--	41
						NBIL	--	43	--	42
						SBOL	--	45	--	43
						SBIL	--	45	--	42
Mbr 18032-07530A (Part)	US 27 BR from NCL of Harrison north to US 27	The Hicks Co.	Pit 37-26	Pit 37-26	7,500	NB	--	41	--	40
						SB	--	42	--	38
Mbr 18041-07531A	US 27 BR from US 27 northerly to M 61 in Harrison	The Hicks Co.	Pit 37-26	Pit 37-26	7,500	NB	--	46	--	49
						SB	--	41	--	40
Mb 19062-06132A (Part)	US 27 from north of Sturgis St in St. Johns northerly 0.47 mile to GTWRR (Control Section 19031)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	21,500	NBOL	48	39	--	--
						NBIL	49	47	--	--
						SBOL	49	46	--	--
						SBIL	53	43	--	--
Mb 19062-06132A (Part)	US 27 southbound from 1,000 ft south of Oakland Ave in St. Johns northerly 0.57 mile to north of Walker Ave (Control Section 19032)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	18,800	SBOL	51	42	--	43
						SBIL	54	52	--	51
Mb 19062-05616A (Part)	M 21 from 160 ft east of Scott Rd easterly to Clinton-Shiawassee County Line	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	6,800	EB	48	53	--	56
						WB	47	55	--	54
Mb 23051-05616A (Part)	M 50 from US 27 BR in Charlotte easterly to 1,630 ft east of PCRR	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	4,800	EB	42	39	--	51
						WB	42	40	--	52
Mb 23051-05616A (Part)	M 79 from Wheaton Rd westerly to M 78 in Charlotte (Control Section 23021)	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	12,800	EB	51	50	--	53
						WB	53	47	--	48
Rss 25102-00366A	M 57 from M 54 easterly to Belsay Rd	Saginaw Asphalt Paving Co.	Pit 17-40	Pit 25-29	7,100	EB	--	45	--	55
						WB	--	43	--	56
Mb 30041-06076A	M 94 from 1,790 ft east of Pleasant Rd easterly to to US 127	Ayling-Cunningham Asphalt Paving Co.	Pits 58-3 and 81-84	Pit 58-3	3,350	EB	43	51	--	60
						WB	43	49	--	58
Mb 30061-06077A	US 12 from US 127 southwesterly to 407 ft east of M 99	Ayling-Cunningham Asphalt Paving Co.	Pit 58-3	Pit 46-28	12,500	EB	49	47	--	50
						WB	48	49	--	53
Mb 33033-06079A	US 27 southbound (Cedar St) from 700 ft south of Kalamazoo St north to 200 ft south of Grand River and US 27 northbound (Larch St) from 530 ft south of Kalamazoo St north to 470 ft north of Grand River	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	3,700	NBOL	47	44	--	--
						NB#3	33	41	--	41
						NB#2	34	39	--	42
						NBIL	38	43	--	43
						SBOL	39	40	--	44
						SBCL	35	38	--	40
Mb 33042-05925A	M 43 (Oakland Ave) from Pennsylvania Ave east to Grand River Ave	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	45,000	WBOL	--	43	--	40
						WBCL	--	42	--	41
						WBIL	--	44	--	41

TABLE 7 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mb 33082-06080A	M 43 from 1,000 ft east of Marsh Rd easterly to west limits of Williamston	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	13,700	EB	46	50	--	53
						WB	46	50	--	53
F 37021-00519A (Part)	M 20 from C&O RR, in Remus, east to Isabella-Mecosta County Line	The Hicks Co.	Pit 37-26	Pit 37-26	3,600	EB	51	60	--	63
						WB	51	61	--	66
F 37021-00519A (Part)	M 20 from Isabella-Mecosta County Line east to Gilmore Rd (Control Section 54022)	The Hicks Co.	Pit 37-26	Pit 37-26	3,800	EB	48	61	--	64
						WB	60	64	--	64
US 38081-06915A	M 43 from Sage to Cherry Hill Rd	Reith-Riley Construction Co.	Pit 39-1	Pit 39-1	26,200	EBOL	--	40	--	46
						EBIL	--	44	--	51
						WBOL	--	36	--	45
						WBIL	--	41	--	50
Mb 43011-06134A (Part)	M 37 from Lake-Newaygo County Line northerly to 204 ft south of US 10 in Baldwin	Globe Construction Co.	Pit 75-5	Pit 43-47	10,000	NB	--	44	--	44
						SB	--	46	--	46
Mbr 43012-06424A	Southbound M 37 truck lane from 2.5 miles north of north junction of US 10	Globe Construction Co.	Pit 75-5	Pit 67-2	2,800	SBTL	--	52	--	44
Mb 46062-06081A	US 223 from 200 ft west of Jefferson Ave in Blissfield easterly to Lenawee-Monroe County Line	Cunningham-Gooding	Pit 58-3	Pit 46-28	10,800	EB	43	50	--	49
						WB	40	53	--	55
Mbr 50012-06104A	M 53 from north end of freeway northerly to Macomb-Lapeer County Line	Bit Con Corp.	Pit 63-4	Pit 63-4	23,900	NB	48	48	--	40
						SB	51	49	--	39
Mbr 50022-06105A	M 59 from 1,300 ft east of Hayes Rd easterly to M 97	Bit Con Corp.	Pit 63-4	Pit 63-4	27,200	EB	41	44	--	43
U 50031-00670A	M 97 from M 102 northerly to 1,461 ft southwest of east limits of Warren	Cooke Contracting Co.	Pit 63-4	Pit 50-35	49,400	NBOL	48	51	--	48
						NBCL	52	49	--	50
						NBIL	51	48	--	51
						SBOL	51	47	--	51
						SBCL	54	50	--	54
U 50031-00671A	M 97 from Hayes Rd north-easterly to 200 ft north-east of 13 Mile Rd	Asphalt Products Corp.	E.C. Levy (Dix Yd)	E.C. Levy (Dix Yd)	55,600	NBOL	58	45	--	47
						NBCL	56	48	--	51
						NBIL	63	49	--	50
						SBOL	62	48	--	51
						SBCL	58	45	--	49
Mbr 59045-06782A	M 46 from C&O RR near Lewis St easterly to east limits of Edmore	Reith-Riley Construction Co.	Pit 41-38	Pit 37-26	8,300	EB	26	29	--	33
						WB	26	36	--	35
F 59051-01770A	M 68 from Main St in Stanton north to M 46	Reith-Riley Construction Co.	Pit 41-38	Pit 37-26	7,000	NB	--	62	--	60
						SB	--	62	--	60
Mb 62012-06138A (Part)	M 37 from Bailey Rd in Bailey north to Muskegon-Newaygo County Line (Control Section 61131)	Reith-Riley Construction Co.	Pit 41-38	Pit 62-33	8,850	NB	51	56	--	53
						SB	58	53	--	58
Mb 63053-06084A	US 10 BR (Oakland St) from Cass and Montcalm Sts northwesterly, intermittently, to US 10, thence northerly to 1,723 ft south of M 15	Ann Arbor Construction Co.	Pit 63-60	Pit 63-60	36,900	NBOL	39	44	--	42
						NBIL	41	48	--	45
						SBOL	41	42	--	41
						SBIL	43	46	--	42

TABLE 7 (Cont.)

FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mbr 63091-06106A	I 75 BL (Perry St) from 220 ft northeast of Wide Track Dr northeasterly to I 75, thence north on M 24 to 10.5 miles north of Oplyke Rd.	Ajax Paving Industries, Inc.	Pit 63-4	Pit 63-4	24,200	NBOL	40	41	--	38
						NBIL	47	46	--	39
						SBOL	42	39	--	35
						SBIL	43	43	--	38
RF 64022-00931A	M 20 extension from 224 ft east of 64th and Garfield Rd east to 540 ft east of existing US 31	Reith-Riley Construction Co.	Pit 70-9	Pit 70-9	2,200	EBOL	--	60	59	68
						EBIL	--	63	--	68
						WBOL	--	59	59	66
						WBIL	--	65	--	73
Mb 70041-06085A (Part)	M 45 from 52nd Ave east to east of 26th Ave	Reith-Riley Construction Co.	Pit 41-50	Pit 41-16	10,100	EB	28	37	--	44
						WB	19	35	--	45
Mb 70041-06085A (Part)	M 45 from east of 26th Ave east to Ottawa-Kent County Line	Reith-Riley Construction Co.	Pit 41-50	Pit 41-16	11,300	EBOL	31	41	--	41
						EBIL	35	51	--	48
						WBOL	32	40	--	43
						WBIL	30	49	--	47
Mbr 70041-06107A	M 45 from US 31 east to 52nd St omitting at bridge over Bass Creek	West Shore Construction Co.	Pit 70-45	Pit 70-36	9,900	EB	--	53	--	53
						WB	--	53	--	56
I 70063-06780A	I 96 from west of 68th Ave easterly Intermittently to west of 16th St	Woodland Paving Co.	Pit 41-48	Pit 41-48	18,100	EBOL	45	48	--	62
						EBIL	55	60	--	67
						WBOL	42	48	--	54
						WBIL	55	61	--	68
Mb 72013-06140A	US 27 from Snowbowl Rd northerly 4.901 miles to Crossover north of M 55	Lake Construction Co.	Pit 72-5	Pit 72-5	6,200	NBOL	51	58	--	58
						NBIL	53	63	--	68
						SBOL	50	56	--	57
						SBIL	59	63	--	67
Mbr 73021-05928A	M 57 from M 52 east to Stuart Rd	Frank Strausberg and Son	Pit 63-4	Pit 76-47	98,000	EB	44	55	--	49
						WB	42	55	--	50
Ms 73063-04989A	M 46 from east of C&O RR east to Outer Dr	Saginaw Asphalt Paving Co.	Pit 63-4	Pit 63-29	24,200	EBOL	--	36	--	33
						EBIL	--	39	--	36
						WBOL	--	33	--	33
						WBIL	--	34	--	34
Mb 73063-06142A	M 46 from Towerline Rd east to 1,650 ft east of Portsmouth Rd	Saginaw Asphalt Paving Co.	Pit 71-47	Pit 63-29	26,800	EB	39	47	--	43
						WB	43	45	--	47
Mb 76062-06143A (Part)	M 21 from 581 ft west of Serr Rd east to 948 ft west of M 13	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	8,000	EB	42	52	--	55
						WB	41	51	--	55
Mb 76062-06143A (Part)	M 21 from 75 ft east of Smith Rd east to 53 ft west of Chestnut St (Control Section 76061)	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	15,500	EB	29	36	--	38
						WB	34	37	--	37
Mbr 77021-07539A	M 21 between Breen Rd and Knoll Rd	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	5,700	EB	--	54	--	59
						WB	--	54	--	53
Mbr 77051-04849A	M 29 from 500 ft north of Dyke Rd southerly 3.37 miles	Howell Construction Co.	Pit 71-47	Pit 50-35	12,300	EB	44	40	--	43
						WB	44	45	--	42
Mb 77051-05929A (Part)	M 29 from 1,100 ft west of Pearl Beach Rd southerly and northeasterly to Chartier St in Marine City	Howell Construction Co.	Pit 71-47	Pit 50-35	11,200	NB	46	48	--	44
						SB	45	47	--	45
Mb 77051-05929A (Part)	M 29 from Chartier St in Marine City north to north of Francis St (Control Section 77052)	Howell Construction Co.	Pit 71-47	Pit 50-35	6,100	NB	51	46	--	52
						SB	47	47	--	47

TABLE 7 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mbr 78012-08471A	US 131 from White Pigeon Rd north to the St. Joseph River	Globe Construction Co.	Pit 39-1	Pit 39-1	7,600	NB SB	-- --	41 39	-- --	44 43
Mb 78022-06129A (Part)	US 12 from 150 ft east of Halfway Rd in St. Joseph County east to St. Joseph-Branch County Line	John G. Yerington	Pit 58-3	Pit 12-12	6,200	EB WB	46 46	54 49	-- --	58 58
Mb 78022-06129A (Part)	US 12 from St. Joseph-Branch County Line northeast to west limits of Bronson (Control Section 12021)	John G. Yerington	Pit 58-3	Pit 12-12	6,400	EB WB	44 48	52 44	-- --	61 60
Mb 78022-06129A (Part)	M 66 in Sturgis from US 12 north to Lafayette St (Control Section 78052)	John G. Yerington	Pit 58-3	Pit 12-12	9,100	NBOL NBIL SBOL SBIL	45 43 50 42	37 36 39 39	-- -- -- --	47 43 46 48
M 79062-05506A	M 81 from 600 ft west of west limits of Cass City east to east limits, omitting 0.312 mile in Center of Cass City	Frank Strausberg and Son	Pit 63-4	Pit 25-29	7,100	EB WB	-- --	49 52	-- --	37 36
Mb 80071-06144A (Part)	M 51 from 3,055 ft north of 82nd Ave north to 1,080 ft south of I 94	Klett Construction Co.	Pit 39-1	Pit 14-51	4,800	NB SB	41 35	49 49	-- --	53 55
Mb 80071-06144A (Part)	M 43 from west limits of Bangor east 0.93 mile to east limits (Control Section 80041)	Klett Construction Co.	Pit 39-1	Pit 14-51	8,100	EB WB	41 39	46 45	-- --	39 41
Mb 81011-06145A	M 52 from PCRR in Chelsea northwesterly to 1,350 ft northwest of Roepke Rd	Ayling-Cunningham Asphalt Paving Co.	Pit 81-57	Pit 81-78	13,000	NB SB	37 36	54 53	-- --	55 53
IS 81062-03562A (Part)	I 94 from I 94 BL south to 130 ft south of Liberty Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	38,200	EBOL EBIL WBOL WBIL	-- -- -- --	-- -- -- --	-- -- -- --	42 51 41 54
IS 81062-03562A (Part)	I 94 from 510 ft west of Wagner Rd east and south to I 94 BL (Control Section 81104)	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	31,000	EBOL EBIL WBOL WBIL	42 49 43 44	44 54 44 48	-- -- -- --	47 59 39 49
Mb 81063-06087A (Part)	US 12 from I 94 northeast to Washtenaw-Wayne County Line	Thompson-McCully Co.	Pit 47-3	Pit 47-3	27,500	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	55 52 49 55 57 54 57 68	62 52 51 54 49 56 56 54	-- -- -- -- -- -- -- --	60 53 53 58 53 57 56 53
Mb 81063-06087A (Part)	US 12 from Washtenaw-Wayne County Line northeast to US 12 BR (Control Section 82011)	Thompson-McCully Co.	Pit 47-3	Pit 47-3	15,600	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	-- -- -- -- -- --	-- -- -- -- -- --	60 52 58 52 57 60
Mb 81102-07541A	M 14 from M 163 east to Napier Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	11,600	EB WB	-- --	44 38	-- --	49 52

TABLE 7 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)				
			Coarse	Fine			1974	1975	1976	1979	
I 82022-04950A	I 94 from US 24 east to Rouge River	Ajax Paving Industries, Inc.	E. C. Levy (Dix Yd)	E. C. Levy (Dix Yd)	100,900	EBOL	47	49	--	52	
							EBCL	49	51	--	43
							EBIL	48	52	--	38
							WBOL	47	47	--	33
							WBCL	50	51	--	36
WBIL	50	46	--	48							
I 82022-06491A	I 94 from US 24 north-easterly, intermittently to Gratiot Ave	Ajax Paving Industries, Inc.	E. C. Levy (Dix Yd)	E. C. Levy (Dix Yd)	102,900	EBOL	--	43	--	41	
							EBCL	--	45	--	45
							EBIL	--	48	--	52
							WBOL	--	42	--	38
							WBCL	--	38	--	39
WBIL	--	42	--	48							
U 82143-01317A	M 102 from east of De-Quindre east to Veach St	Bit Con Corp.	Pit 47-3	Pit 47-3	81,100	EBOL	--	42	--	45	
							EB#3	--	42	--	46
							EB#2	--	42	--	46
							EBIL	--	42	--	47
							WBOL	--	40	--	44
							WB#3	--	42	--	47
							WB#2	--	42	--	47
							WBIL	--	42	--	47
U 82143-01318A	M 102 from Veach St east to Brock St (east of M 3)	Cooke Contracting Co.	Pit 63-4	Pit 50-35	63,900	EBOL	--	42	--	46	
							EB#3	--	40	--	46
							EB#2	--	37	--	48
							EBIL	--	41	--	48
							WBOL	--	40	--	43
							WB#3	--	38	--	47
							WB#2	--	40	--	49
							WBIL	--	40	--	49
Mbr 82151-04855A	M 53 from 193 ft north of I 94 northerly to south of M 102	Cooke Contracting Co.	E. C. Levy (Dix Yd)	E. C. Levy (Dix Yd)	39,300	NBOL	55	43	--	48	
							NBIL	55	40	--	41
							SBOL	58	37	--	40
							SBIL	56	45	--	42
UM 82192-06593A	M 39 from southeast of I 94 southeast to Roger St in Allen Park	Ajax Paving Industries, Inc.	E. C. Levy (Dix Yd)	E. C. Levy (Dix Yd)	76,000	NBOL	--	41	--	41	
							NB#3	--	42	--	44
							NB#2	--	45	--	43
							NBIL	--	46	--	47
							SBOL	--	42	--	41
							SB#3	--	42	--	43
							SB#2	--	42	--	51
							SBIL	--	47	--	45
Mb 82192-06988A	M 39 southbound from southeast of Allen Rd southeast to Dix-Toledo Hwy	Ajax Paving Industries, Inc.	E. C. Levy (Dix Yd)	E. C. Levy (Dix Yd)	76,000	SBOL	--	48	--	46	
							SB#3	--	52	--	49
							SB#2	--	53	--	52
							SBIL	--	55	--	50
Mbr 83031-07542A	US 131 in Cadillac from M 55 north to the Clam River (Control Section 83032)	Reith-Riley Construction Co.	Pit 45-19	Pit 67-2	21,800	NBOL	--	39	--	34	
							NBIL	--	40	--	33
							SBOL	--	40	--	32
							SBIL	--	40	--	31
T 98002-04730A	M 56 (Corunna Rd) at Dye Rd (Control Section 25081)	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	17,700	EBOL	33	36	--	39	
							EBIL	43	47	--	43
							WBOL	38	41	--	41
							WBIL	43	46	--	45
T 98004-04607A	M 84 from Deindorfer St north to 300 ft north of Shattuck Rd (Control Section 73033)	Spartan Asphalt Paving Co.	Pit 17-40	Pit 63-29	31,900	NBOL	45	38	--	37	
							NBIL	44	33	--	39
							SBOL	45	30	--	36
							SBIL	40	29	--	38

TABLE 8
FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mb 01011-06122A (Part)	M 65 from Iosco-Alcona County Line north to south junction with M 72	Central Paving Co.	Pit 35-14	--	1,300	NB SB	42	52	--	56
							39	52	--	58
Mb 01011-06122A (Part)	M 72 from Oscoda-Alcona County Line east 1.2 miles (Control Section 01021)	Central Paving Co.	Pit 35-14	--	1,100	EB WB	--	52	--	66
							--	56	--	59
Mb 01011-06122A (Part)	M 65 from Curran south to south junction with M 72 (Control Section 01022)	Central Paving Co.	Pit 35-14	--	1,200	NB SB	47	54	--	60
							44	55	--	57
Mb 01011-06122A (Part)	M 65 from Hale north to Iosco-Alcona County Line (Control Section 35012)	Central Paving Co.	Pit 35-14	--	3,200	NB SB	34	49	--	54
							30	51	--	54
Mb 01011-06122A (Part)	M 33 from Mio north to Fairview (Control Section 68012)	Central Paving Co.	Pit 35-14	--	5,300	EB WB	--	48	--	58
							--	47	--	52
Mbr 02011-06023A (Part)	US 41 from 3.8 miles north of M 67 south to the Alger-Delta County Line	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	--	2,200	NB SB	56	62	--	60
							59	62	--	63
Mbr 02011-06023A (Part)	US 41 from the Alger-Delta County Line south to 10.8 miles north of US 2 (Control Section 21051)	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	--	2,000	NB SB	57	66	--	68
							62	64	--	65
Mb 02021-06024A	M 94 from M 67 east to 3 miles southwest of M 28	Payne and Dolan of Wisconsin, Inc.	Pit 2-1	--	1,500	EB WB	56	62	--	72
							53	62	--	69
Mbr 08011-06100A	M 43 from 200 ft south of Brush St north to 2,200 ft north of Cloverdale Rd	Reith-Riley Construction Co.	Pit 8-43	--	3,200	NB SB	37	38	--	44
							36	38	--	52
Mb 08011-07635A	M 43 from 2,200 ft north of Cloverdale Rd north 3.86 miles to 75 ft south of Schultz Rd	Williams Bros. Asphalt Paving Co.	Pit 34-45	--	2,000	NB SB	--	58	--	63
							--	57	--	62
Mb 08031-06071A (Part)	M 37 from Dowling Rd north intermittently to 500 ft south of south limits of Hastings	Reith-Riley Construction Co.	Pit 8-43	--	7,800	NB SB	--	47	50	44
							--	45	54	45
Mb 08031-06071A (Part)	M 66 from Brum Dr in Nashville north 0.451 miles (Control Section 08052)	Reith-Riley Construction Co.	Pit 8-43	--	4,000	NB SB	--	45	51	50
							--	44	57	52
Mb 10042-06125A (Part)	M 115 from the Benzie-Manistee County Line northwest to US 31	Hodgkiss and Douma, Inc.	Pit 51-8	--	1,350	EB WB	46	53	--	52
							46	55	--	54
Mb 10042-06125A (Part)	M 115 from 520 ft northwest of the Wexford-Manistee County Line northwest to the Manistee-Benzie County Line (Control Section 51041)	Hodgkiss and Douma, Inc.	Pit 51-8	--	1,800	EB WB	47	53	--	53
							47	51	--	55
Mb 11071-06126A (Part)	M 140 from M 62 north 7.46 miles to Napier Ave	Consumers Asphalt Paving Co.	Pit 14-19	--	3,300	NB SB	37	45	--	54
							35	45	--	54
Mbr 14032-05920A	M 62 from M 60 in Cassopolis northwest to east limits of Dowagiac	Reith-Riley Construction Co.	Pit 14-36	--	5,200	NB SB	38	42	--	62
							38	42	--	56
Mb 16033-07526A	US 23 from Mackinac City to Cheboygan	Lake Construction Co.	Pit 16-69	--	6,530	NB SB	--	49	59	56
							--	48	61	59

TABLE 8 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1978
M 17011-05021A	M 123 from Tahquamenon River, north of Emerson, north to Paradise	Fox Valley Construction Co.	Pit 17-55	--	1,000	NB SB	-- --	52 52	-- --	61 61
Mb 17021-06131A (Part)	M 134 from Chippewa-Mackinac County Line, 6.1 miles east of Cedarville, east 1.4 miles to Chippewa-Mackinac County Line	Lake Construction Co.	Pit 49-53	--	600	EB WB	57 54	61 61	-- --	69 69
Mb 17021-06131A (Part)	M 134 from the Chippewa-Mackinac County Line, 7.8 miles east of Cedarville, east 4.8 miles to the Chippewa-Mackinac County Line (Control Section 49042)	Lake Construction Co.	Pit 49-53	--	600	EB WB	57 51	64 66	-- --	70 72
Mb 17021-06131A (Part)	M 134 from the Chippewa-Mackinac County Line, 12.6 miles east of Cedarville, east to Dawson St in Detour (Control Section 17022)	Lake Construction Co.	Pit 49-53	--	600	EB WB	58 55	63 63	-- --	70 70
Mbr 27023-06957A (Part)	US 2 from M 64 (east junction) east to Gogebic Station	Fox Valley Construction Co.	Pit 27-27	--	800	EB WB	-- --	69 68	-- --	68 69
Mbr 27023-06957A (Part)	US 2 from Big Presque Isle River east to east junction with M 64 (Control Section 27022)	Fox Valley Construction Co.	Pit 27-27	--	1,200	EB WB	-- --	-- --	67 66	65 67
Mb 28071-08051A	M 113 from M 186 south 4.208 miles to US 131	Peninsula Asphalt Paving Co.	Pit 40-18	--	1,100	NB SB	-- --	51 45	59 53	57 59
Mbr 30012-05079A (Part)	M 49 from Herring Rd, south limits of Litchfield, north to M 99	Cunningham-Gooding	Pit 30-58	--	3,000	NB SB	-- --	38 42	-- --	47 52
Mbr 30012-05079A (Part)	M 99 from M 49 southeast to Adam Rd, in Litchfield, (Control Section 30033)	Cunningham-Gooding	Pit 30-58	--	4,700	NB SB	-- --	46 40	-- --	51 48
Mb 30012-05924A	M 49 from US 12 north to south limits of Litchfield	Cunningham-Gooding	Pit 30-58	--	2,500	NB SB	-- --	61 58	-- --	60 60
Mbr 32022-06101A	M 142 from 250 ft west of Ruth Rd northeast to M 25, thence north on M 25 to Lytle St	Williams Bros. Asphalt Paving Co.	Pit 32-48	--	5,200	EB WB	53 49	53 54	-- --	61 62
Mb 32031-06078A	M 53 from Huron-Sanilac County Line north and east to north limits of Bad Axe	Williams Bros. Asphalt Paving Co.	Pit 32-48	--	8,800	NB SB	44 46	54 54	-- --	57 56
Mbr 36031-06549A	M 189 from Michigan-Wisconsin State Line north to Division St in Stambaugh	Mathy Construction Co.	Pit 36-47	--	3,500	NB SB	-- --	52 52	-- --	58 59
Mb 41121-07533A	M 46 from M 37 east to US 131	Williams Bros. Asphalt Paving Co.	Pit 41-120	--	2,810	EB WB	-- --	43 45	50 52	49 52
Mb 43012-06135A (Part)	M 37 from Little Manistee River north to Lake-Wexford County Line	Globe Construction Co.	Pit 51-51	--	2,800	NB SB	-- --	59 57	-- --	55 56

TABLE 8 (Cont.)
FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
Mb 43012-06135A (Part)	M 37 from Lake-Wexford County Line north to No. 28 Rd (Control Section 83011)	Globe Construction Co.	Pit 51-51	--	2,200	NB SB	-- --	-- --	61 63	51 52
Mb 43012-06135A (Part)	M 55 from M 37 east 9.43 miles to No. 21 Rd (Control Section 83021)	Globe Construction Co.	Pit 51-51	--	1,900	EB WB	-- --	51 50	-- --	45 49
Mbr 44011-05569A	M 24 from 1.31 miles north of Lapeer-Oakland County Line north to M 21	Howell Construction Co.	Pit 44-8	--	13,000	NB SB	50 47	52 53	-- --	50 51
Mb 52042-06784A (Part)	US 41-M 28 from M 28 BR east to 344 ft east of the west limits of Marquette	Payne and Dolan of Wisconsin, Inc.	Pit 52-68	--	32,000	EBOL EBIL WBOL WBIL	51 56 53 52	52 58 51 60	-- -- -- --	49 58 51 53
Mb 52042-06784A (Part)	US 41-M 28 from 376 ft west of 2nd St in Ishpeming east to M 28 BR (Control Section 52041)	Payne and Dolan of Wisconsin, Inc.	Pit 52-68	--	12,000	EBOL EBIL WBOL WBIL	46 54 50 45	46 50 51 46	-- -- -- --	49 60 50 60
Mb 54032-06136A (Part)	M 66 from M 20 north to the south branch of the Chipewewa River in Barryton	The Hicks Co.	Pit 54-50	--	3,500	NB SB	41 40	53 56	-- --	58 57
Mb 54032-06136A (Part)	M 66 from Montcalm-Mecosta County Line north to M 20 (Control Section 54031)	The Hicks Co.	Pit 54-50	--	2,800	NB SB	41 47	56 59	-- --	57 51
Mb 54032-06136A (Part)	M 66 from M 46 north to the Montcalm-Mecosta County Line (Control Section 59052)	The Hicks Co.	Pit 54-50	--	3,400	NB SB	39 41	-- --	-- --	55 55
SS 57023-00779A	M 55 relocation from the Missaukee-Wexford County Line east to M 66	Reith-Riley Construction Co.	Pit 33-57	--	3,450	EB WB	-- --	59 61	-- --	60 65
Mb 62012-06138A (Part)	M 20 from M 37 east and north to 1,965 ft north of 6 Mile Rd	Reith-Riley Construction Co.	Pit 62-33	--	550	EB WB	46 44	61 60	-- --	66 68
Mb 62012-06138A (Part)	M 82 from Elm St east to Cottonwood Ave (Control Section 62041)	Reith-Riley Construction Co.	Pit 62-33	--	1,900	EB WB	-- --	-- --	59 61	59 57
Mb 67022-06139A (Part)	US 10, east from M 66	The Hicks Co.	Pit 54-45	--	2,600	EB WB	52 41	43 46	-- --	56 52
Mb 67022-06139A (Part)	M 66, intermittently from US 10 to M 115 (Control Section 67031)	The Hicks Co.	Pit 54-45	--	1,600	NB SB	44 43	51 54	-- --	58 56
Mb 67022-06139A (Part)	M 115 from Osceola-Wexford County Line southeast (Control Section 67051)	The Hicks Co.	Pit 54-45	--	4,900	EB WB	-- --	-- --	-- --	55 60
Mb 67022-06139A (Part)	M 115, 1.0 mile east of M 66 (Control Section 67051)	The Hicks Co.	Pit 54-45	--	4,700	EB WB	39 42	46 47	-- --	51 60
SS 67062-00969A (Part)	M 61 relocation from M 115 east to the Clare-Osceola County Line	The Hicks Co.	Pit 54-45	--	1,900	EB WB	-- --	57 59	-- --	66 66

TABLE 8 (Cont.)

FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1974

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1974	1975	1976	1979
SS 67062-00969A (Part)	M 61 relocation from the Clare-Osceola County Line east to the Muskegon River (Control Section 18041)	The Hicks Co.	Pit 54-45	--	4,900	EB WB	-- --	61 64	-- --	71 71
Mbr 69021-05919A (Part)	M 32 from 0.25 mile west of west limits of Gaylord west and north to the Antrim-Otsego County Line	Lake Construction Co.	Pit 69-46	--	6,760	EB WB	-- --	45 46	-- --	52 54
Mbr 69021-05919A (Part)	M 32 from the Antrim-Otsego County Line west to US 131 (Control Section 05022)	Lake Construction Co.	Pit 69-46	--	2,600	EB WB	-- --	47 47	-- --	50 54
Mb 72041-06141A (Part)	M 144 from 1,000 ft northeast of the AuSable River northeast to the Roscommon-Crawford County Line	Lake Construction Co.	Pit 72-12	--	5,800	NB SB	49 47	53 50	-- --	54 62
Mb 72041-06141A (Part)	M 144 from the Roscommon-Crawford County Line northeast 0.9 mile (Control Section 20072)	Lake Construction Co.	Pit 72-12	--	600	NB SB	-- --	-- --	-- --	74 71
Mb 74012-06086A	M 53 from M 46 north to M 81	Frank Strausberg and Son	Pit 74-10	--	3,200	NB SB	43 45	51 53	-- --	55 54
Mbr 79011-05930A	M 138 from 35 ft north of Akron Rd north to 1,050 ft north of Ackerman Rd	Frank Strausberg and Son	Pit 79-49	--	1,400	NB SB	-- --	54 55	-- --	61 61
Mb 79061-06124A (Part)	M 81 from 380 ft west of Vassar Rd east to 100 ft west of Handy Rd	Midland Contracting Co.	Pits 25-30 and 25-54	--	3,700	EB WB	-- --	50 52	63 65	54 58
Mb 79061-06124A (Part)	M 138 from M 15 east to the Bay-Tuscola County Line (Control Section 09021)	Midland Contracting Co.	Pits 25-30 and 25-54	--	5,600	EB WB	-- --	54 50	69 66	50 51
Mb 80071-06144A (Part)	M 40 from north of VanBuren St in Gobles north to 40 ft south of VanBuren-Allegan County Line (Control Section 80072)	Kleit Construction Co.	Pit 80-26	--	7,570	NB SB	30 30	34 32	-- --	53 44
Mb 81013-06146A	M 52 from 100 ft north of US 12 north to 25 ft south of Duncan St in Manchester	Cunningham-Gooding	Pit 81-84	--	2,400	NB SB	40 37	46 44	-- --	57 56

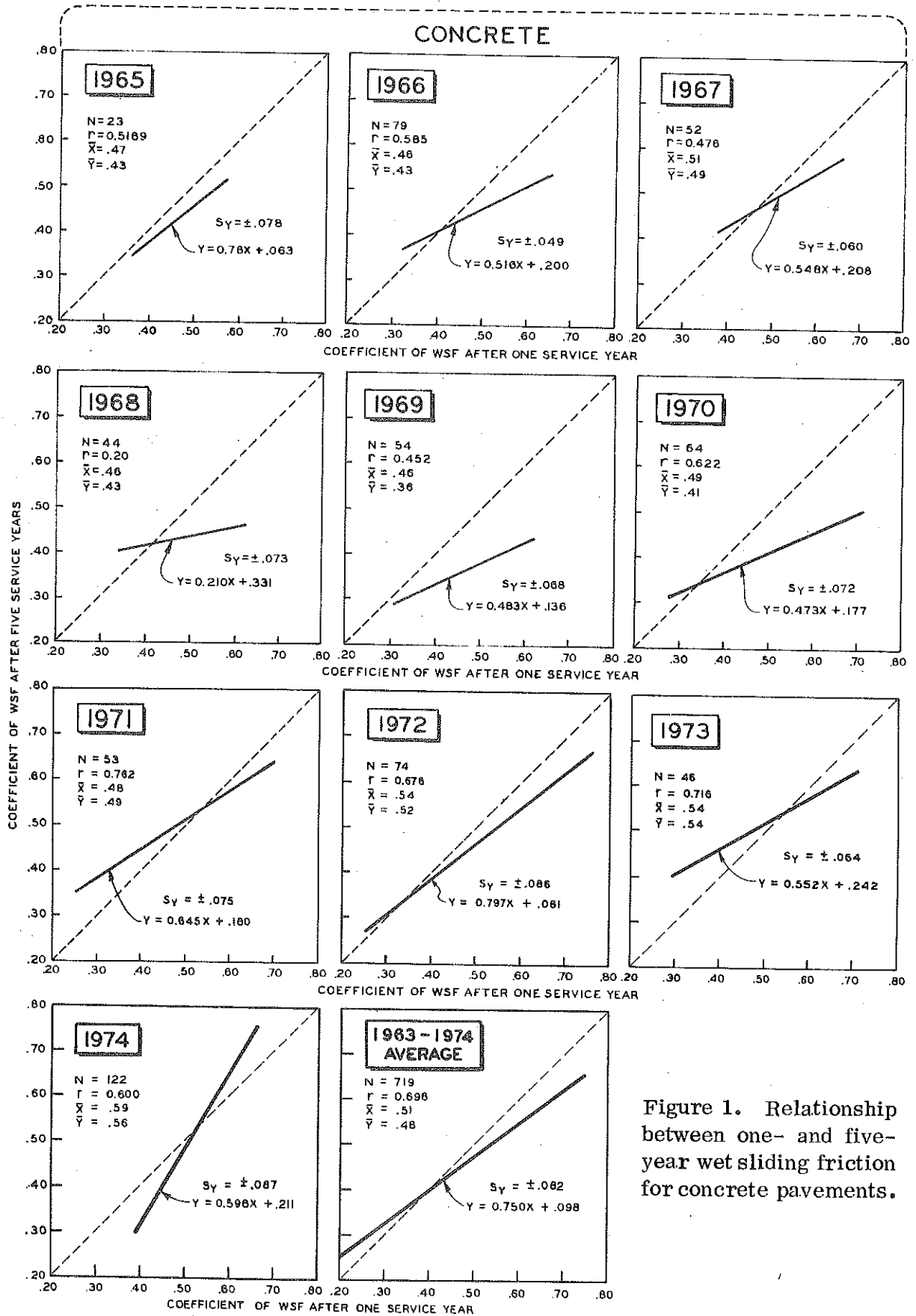


Figure 1. Relationship between one- and five-year wet sliding friction for concrete pavements.

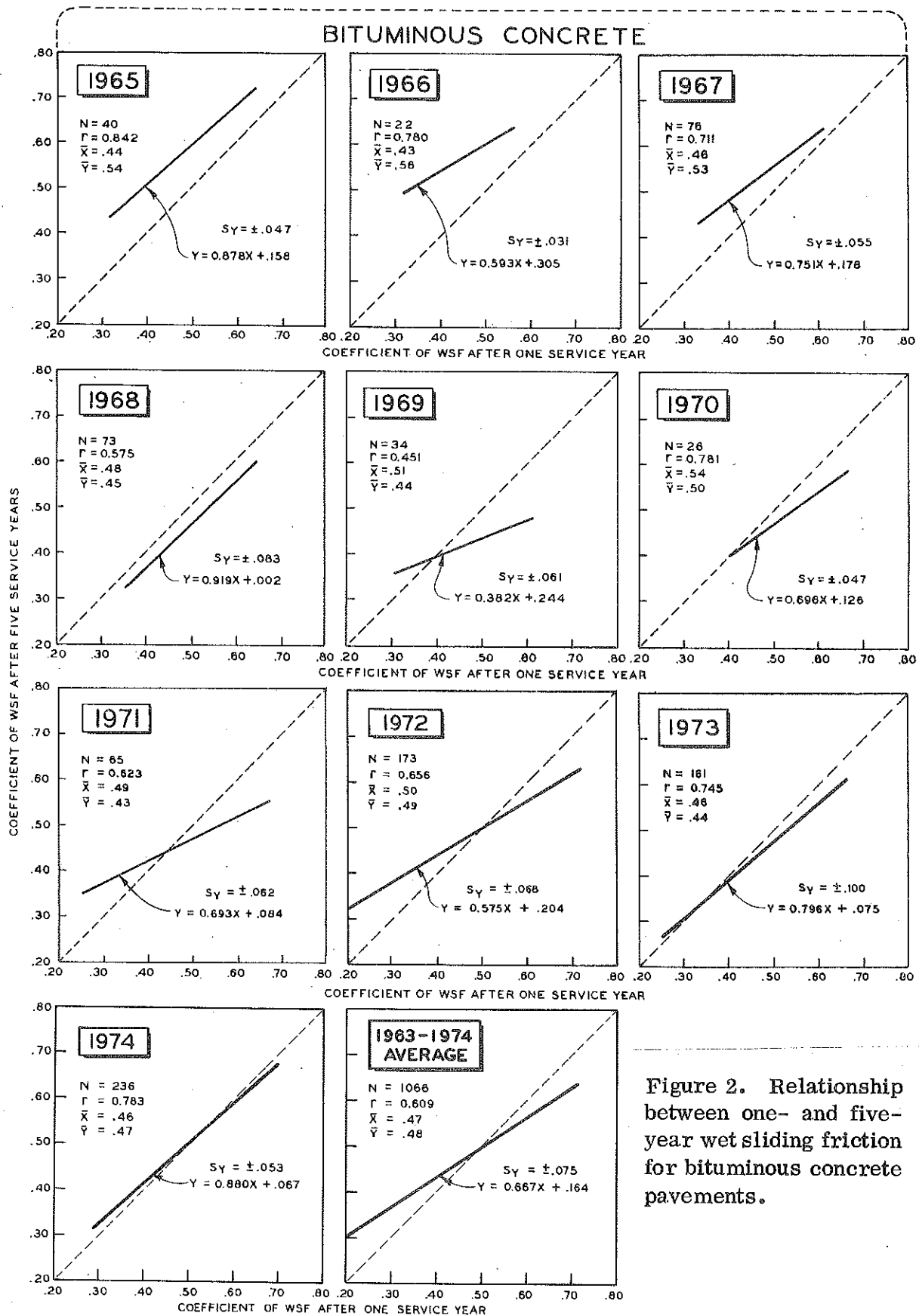


Figure 2. Relationship between one- and five-year wet sliding friction for bituminous concrete pavements.

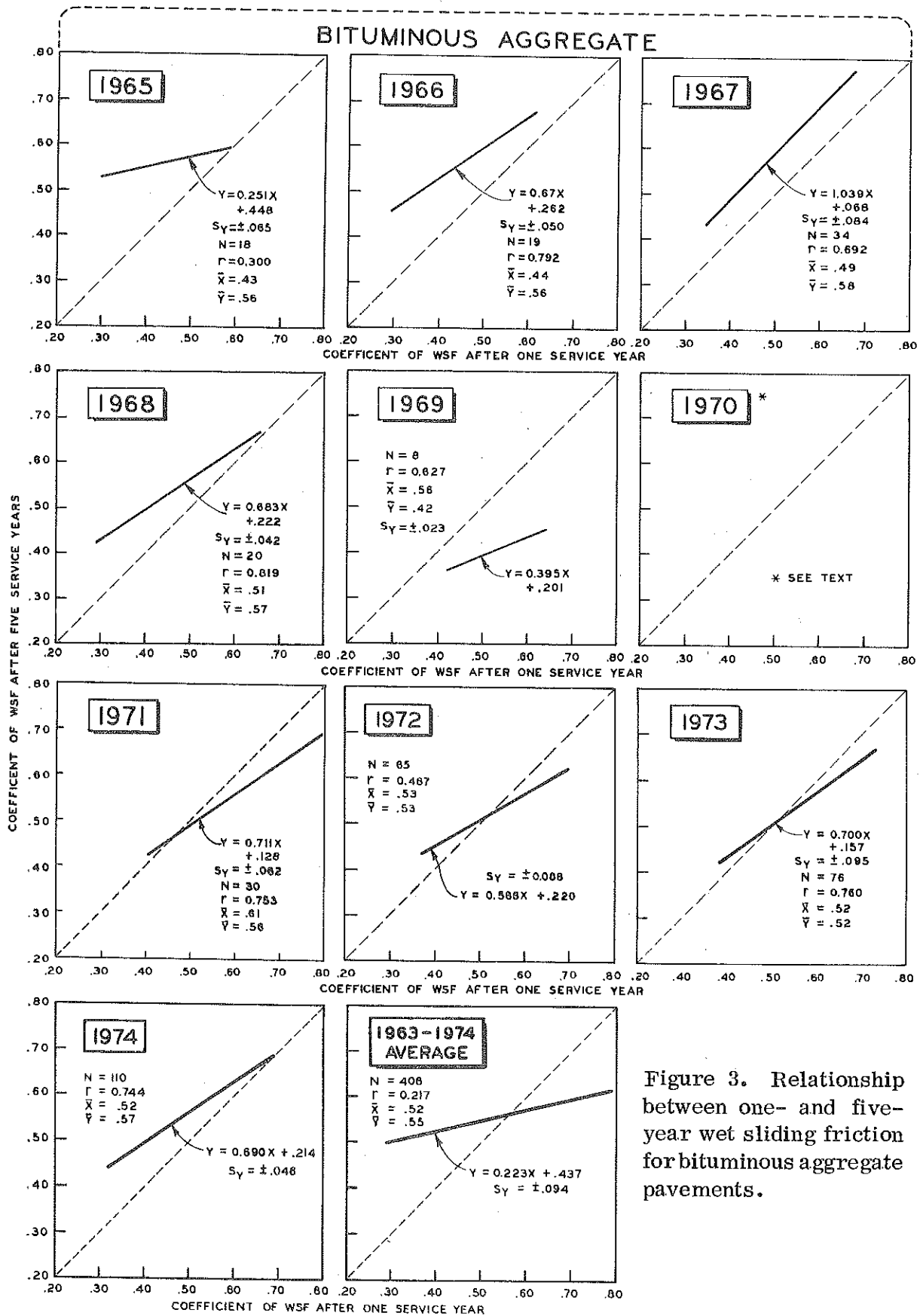


Figure 3. Relationship between one- and five-year wet sliding friction for bituminous aggregate pavements.

SECTION III

TEN-YEAR PAVEMENT FRICTION TEST RESULTS
FOR CONCRETE AND BITUMINOUS PAVEMENTS

**Ten-Year Pavement Friction Test Results
For Concrete and Bituminous Pavements**

A historical review of coefficients after 10 years of service has been made on 55 projects. During 1979, 542.0 lane miles of concrete and bituminous pavement had wet sliding friction tests conducted at the 10-year service level and results are contained in Tables 9 through 12.

Table 9 - Ten-Year Review for Concrete Pavements Constructed in 1969

During 1979, 96 lanes of concrete pavements (19 projects) were tested at the 10-year service level for pavement friction. Wsf values ranged from 0.36 to 0.65 and averaged 0.47. Ten lanes, representing 9 percent of the 147.4 lane miles tested, yielded coefficients averaging lower than 0.40. The lowest average Wsf (0.36) occurred on the SBIL of M 139 north of I 94 in Berrien County (Project 11031-004). Friction levels on three lanes, accounting for 8 percent of the tested lane miles, had 10-year values which averaged higher than 0.60, i.e., 0.62, 0.62, and 0.65. All three lanes were on US 131, north of Grand Rapids (Projects 41132-021 and 41132-022).

Table 10 - Ten-Year Review for Bituminous Concrete Pavements Constructed in 1969

A total of 72 lanes on 19 projects and accounting for 203.8 lane miles of bituminous concrete were tested in 1979, after a 10-year service period. Average Wsf values ranged from 0.37 to 0.68 and averaged 0.52. Three of the 10-year old lanes, amounting to only 1 percent of the lane miles, had friction levels lower than 0.40. The lowest (0.37) was determined on the WBOL of the M 21 Project 25081-008, in Flint. Ten lanes, 30 percent of the lane mileage, yielded average Wsf values greater than 0.60. Average 10-year coefficients as high as 0.68 were measured on Projects 31012-005, 33021-003, and 36051-001.

Table 11 - Ten-Year Review for Bituminous Aggregate Pavements Constructed in 1969

During 1979, 22 lanes on 10 projects (139.2 lane miles) of bituminous aggregate pavements were tested after a 10-year service period. Friction levels ranged from 0.42 to 0.71 and averaged 0.54. Coefficients on 17 percent of the lane miles (four lanes) averaged higher than 0.60; NB and SB lanes of Project 17072-004, located on M 129 in Chippewa County averaged 0.70 and 0.71, respectively.

Table 12 - Ten-Year Review for Stone-Filled Sand-Asphalt Pavements Con-
structed in 1969

Seven projects with 51.6 lane miles of stone-filled sand-asphalt pavement were tested at the 10-year service level during 1979. Ten-year Wsf values ranged from 0.36 to 0.62 and averaged 0.42. Twenty-eight percent of the lane mileage tested at the 10-year service level (15 lanes) yielded friction levels averaging lower than 0.40. The lowest coefficient average, 0.36, was determined on the EBIL of M 21 in Owosso (Project 76041-006). Only one lane had an average friction level greater than 0.60, i. e., the WB lane of US 2 west of Manistique (Project 75021-010) which averaged 0.62.

TABLE 9
TEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1969	1970	1971	1974	1979	
U 11031-004	M 139 from I 94 northerly to Ox Creek and Pennsylvania Central RR	Carl Goodwin and Sons, Inc.	Pit 75-5	Pit 14-45	20,000	NBOL	--	31	--	23	39	
							EBIL	--	30	--	21	38
							SBOL	--	46	--	22	39
							SBIL	--	36	--	27	36
I 23081-002	I 496 commencing at I 96, thence easterly to Waverly Rd	Eisenhour Construction Co.	Pit 41-46	Pit 19-33	17,700	EBOL	55	--	--	31	45	
							EBIL	56	--	--	39	54
							WBOL	52	--	--	32	43
							WBIL	55	--	--	34	47
F 25042-015	M 78 relocation from east of Bristol Rd easterly to west city limits of Flint	Cooke Contracting Co.	Pit 63-54	Pit 63-54	27,500	EBOL	--	53	--	42	52	
							EBCL	--	51	--	39	47
							EBIL	--	60	--	43	56
							WBOL	--	44	--	41	49
							WBCL	--	44	--	40	47
							WBIL	--	55	--	44	55
F 25084-015	M 78 from approximately 500 ft west of Howe Rd easterly to Vassar Rd	Denton Construction Co.	Pits 63-56 and 63-54	Pits 63-56 and 63-54	34,000	EBOL	--	52	--	28	44	
							EBCL	--	50	--	32	43
							EBIL	--	50	--	39	56
							WBOL	--	56	--	26	44
							WBCL	--	56	--	35	43
							WBIL	--	62	--	44	53
F 25084-016 (Part)	M 21 from Vassar Rd east to M 15 (Station 888+00 to 933+63 only)	Denton Construction Co.	Pit 63-54	Pit 63-54	25,500	EBOL	--	47	--	32	45	
							EBCL	--	53	--	34	46
							EBIL	--	56	--	43	58
							WBOL	--	43	--	34	43
							WBCL	--	52	--	37	44
							WBIL	--	56	--	46	58
F 25084-016 (Part)	M 21 from Vassar Rd east to M 15 (Station 933+63 to 1078+00 only)	Sargent Construction Co.	Pit 63-56	Pit 63-56	20,100	EBOL	--	43	--	32	49	
							EBIL	--	52	--	38	53
							WBOL	--	41	--	35	47
							WBIL	--	47	--	36	51
U 25085-002	M 78 relocation from south of Bailenger Hwy easterly to west of Fenton Rd	Cooke Contracting Co.	Pit 63-54	Pit 63-54	54,500	EBOL	--	--	36	27	45	
							EBCL	--	--	50	30	48
							EBIL	--	--	52	34	54
							WBOL	--	--	35	31	44
							WBCL	--	--	43	31	46
							WBIL	--	--	52	33	55
F 25085-015	M 78 relocation from Hammerburg Rd easterly to east of Saginaw St	Cooke Contracting Co.	Pit 63-54	Pit 63-54	54,500	EBOL	--	--	--	32	49	
							EB#3	--	--	39	31	45
							EB#2	--	--	43	29	46
							EBIL	--	--	58	26	48
							WBOL	--	--	45	27	45
							WB#3	--	--	40	27	42
							WB#2	--	--	48	31	48
							WBIL	--	--	59	35	47
U 31051-014	US 41 relocation from 280 ft west of Division St westerly to 270 ft west of Pearl St, City of Houghton	Proksch Construction Co.	Pit 31-45	Pit 31-45	16,000	NBOL	--	45	--	35	41	
							NBIL	--	50	--	38	42
							SBOL	--	52	--	35	38
							SBIL	--	49	--	38	42
U 33171-025	US 127 from Red Cedar River northerly to south of Woodruff Ave	Eisenhour Construction Co.	Pits 34-53 and 41-46	Pit 19-33	33,000	NBOL	--	--	34	42	45	
							NBIL	--	--	48	45	54
							SBOL	--	--	32	34	43
							SBIL	--	--	48	36	46
U 38083-017	I 94 BL-US 27 BR-M 50 (Michigan Ave) from west of Lydia St northeasterly to west of intersection of Clinton St and Jackson St	Denton Construction Co.	Pit 30-35	Pit 30-35	36,200	EBOL	--	38	--	32	38	
							EBCL	--	41	--	35	37
							EBIL	--	41	--	33	39
							WBOL	--	37	--	35	38
							WBCL	--	40	--	33	40
							WBIL	--	42	--	36	41

TABLE 9 (Cont.)
TEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1969	1970	1971	1974	1979	
F 41132-021	US 131 relocation from south of Post Rd to south of 10 Mile Rd	Denton Construction Co.	Pit 41-38	Pit 41-38	15,050	NBOL	63	--	--	36	46	
							NBIL	58	--	--	38	59
							SBOL	63	--	--	39	49
							SBIL	65	--	--	40	62
F 41132-022	US 131 from south of 10 Mile Rd north to 14 Mile Rd	Carl Goodwin and Sons, Inc.	Pits 41-46 and 41-48	Pit 41-46	13,090	NBOL	57	44	--	37	48	
							NBIL	55	61	--	47	62
							SBOL	59	43	--	39	51
							SBIL	55	61	--	44	65
USS 73081-004	M 81 from 20th St to 25th St, City of Saginaw	W. F. McNally	Pit 17-40	Pit 79-73	10,000	EBOL	45	--	--	34	47	
							EBIL	46	--	--	32	45
							WBOL	49	--	--	36	43
							WBIL	45	--	--	34	43
U 73091-005	M 81 from 10th St east and northeast on relocation to 20th St, City of Saginaw	W. F. McNally	Pit 17-40	Pit 79-73	20,700	EBOL	46	--	--	36	44	
							EBCL	45	--	--	38	44
							EBIL	47	--	--	34	42
							WBOL	42	--	--	34	41
							WBCL	41	--	--	35	44
							WBIL	50	--	--	37	45
F 73131-001 (Part)	M 83 from 300 ft north of Townline Rd northwesterly to south limits of Frankenmuth	Titus Construction Co.	Pit 17-66	Pit 63-54	14,000	NB	--	35	--	32	44	
							SB	--	33	--	32	46
F 73131-001 (Part)	M 83 from south limits to north limits of Frankenmuth omitting from 800 ft north of Cass River north to Genesee St	Titus Construction Co.	Pit 17-66	Pit 63-54	14,000	NBOL	--	45	--	49	54	
							NBIL	--	37	--	36	49
							SBOL	--	41	--	50	48
							SBIL	--	39	--	35	45
I 73101-022	I 675 from I 75 westerly to Saginaw City Limits	Sargent Construction Co.	Pit 71-47	Pit 79-73	18,200	EBOL	--	43	--	47	44	
							EBIL	--	53	--	57	59
							WBOL	--	50	--	40	49
							WBIL	--	50	--	53	54
SS 76011-009	M 52 from south of Bennington Rd north to south of Morris Rd	Cooke Contracting Co.	Pit 19-48	Pit 19-48	10,000	NB	52	--	--	43	45	
							SB	52	--	--	41	46
M 76011-010	M 52 from south of Morris Rd north to north of Krouse Rd	Cooke Contracting Co.	Pit 19-48	Pit 19-48	13,000	NBOL	40	--	--	30	38	
							NBIL	49	--	--	34	43
							SBOL	43	--	--	30	43
							SBIL	49	--	--	29	39
U 82081-021	M 153 (Ford Rd) from 620 ft east of M 39 (Southfield Rd) easterly to 600 ft west of Greenfield Rd	T. Angelo Cement Construction Co.	E.C. Levy (Dix Yd)	Pit 63-7	59,100	EBOL	--	49	--	33	45	
							EB#3	--	40	--	37	49
							EB#2	--	42	--	35	54
							EBIL	--	50	--	34	54

TABLE 10
TEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1969	1970	1971	1974	1979	
Ms 19931-007	US 27 from 775 ft north of Northcrest Rd northerly to 449 ft south of Clark Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	19,300	NBOL	46	--	--	41	40	
							NBIL	47	--	--	50	54
							SBOL	43	--	--	36	47
							SBIL	42	--	--	44	54
Mb 23011-005	M 78 from Barry-Eaton County Line northeasterly to west village limits of Bellevue	Reith-Riley Construction Co.	Pit 39-1	Pits 13-30 and 13-79	6,000	EB	45	--	--	65	57	
							WB	46	--	--	62	51
Ms 23042-009	M 43 (Saginaw St) from 1,100 ft east of Creitz Rd easterly to 340 ft east of Theo Ave	Reith-Riley Construction Co.	Pit 47-3	Pit 23-92	36,000	EBOL	51	--	--	40	49	
							EBIL	51	--	--	39	47
							WBOL	55	--	--	42	47
							WBIL	56	--	--	43	47
Mb 25072-013	M 54 (Dort Hwy) from Carpenter Rd northerly to 510 ft north of Mt. Morris Rd omitting 1,185 ft at Carpenter Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 63-54	19,000	NBOL	--	50	--	37	46	
							NBIL	--	58	--	42	50
							SBOL	--	51	--	38	48
							SBIL	--	59	--	44	50
Mb 25081-008	M 21 (Court St) from 274 ft west of Ann Arbor St east to M 54 BR (Saginaw St)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 63-54	23,900	WBOL	41	--	--	37	37	
							WB#3	42	--	--	36	40
							WB#2	43	--	--	44	48
							WBIL	44	--	--	35	43
Mb 31012-005 (Part)	M 26 from County Rd #540 (Kearsarge, in Painesdale) northeast to west limits of Houghton	Mathy Construction Co.	Pit 31-63	Isle Royal Stamp Sand (Shore Sand Houghton Location)	4,500	NB	62	--	--	55	66	
							SB	57	--	--	59	68
Mb 31012-005 (Part)	M 26 from Hancock northeast to Dollar Bay Rd (Control Section 31013)	Mathy Construction Co.	Pit 31-63	Isle Royal Stamp Sand (Shore Sand Houghton Location)	8,000	NB	--	--	--	--	59	
							SB	--	--	--	--	61
F 33021-003	M 52 from 500 ft south of M 36 (south junction) north to M 36 (north junction)	Howell Construction Co.	Pit 47-3	Pit 47-26	2,100	NB	--	--	--	52	68	
							SB	--	--	--	56	65
F 33092-001	M 52 from M 36 (north junction) north to I 96	Howell Construction Co.	Pit 47-3	Pit 47-26	2,100	NB	60	--	--	47	64	
							SB	60	--	--	54	65
Mb 36051-001	US 2 and US 41 from state line north to M 69 in Crystal Falls	Payne and Dolan of Wisconsin, Inc.	Pit 36-10	Pit 36-10	3,600	NB	53	--	--	64	68	
							SB	48	--	--	61	64
U 41012-006	M 44 connector (Plainfield Ave) from I 96 northeasterly to Airway St, City of Grand Rapids	Reith-Riley Construction Co.	Pit 41-46	Pit 41-113	34,750	NBOL	--	55	--	50	48	
							NBIL	--	62	--	49	49
							SBOL	--	55	--	42	48
							SBIL	--	57	--	44	48
F 41122-006	M 57 from US 131 relocation easterly to Teft Ave	Reith-Riley Construction Co.	Pit 41-46	Pit 41-113	4,230	EB	--	56	--	52	58	
							WB	--	57	--	49	56
Mb 50092-005	M 19 from a point north of New Haven Rd thence northerly to north of Main St in the Village of Muttonville	Detroit Concrete Products Corp.	Pit 50-35	Pit 50-35	13,600	NB	49	--	--	46	50	
							SB	48	--	--	45	51
Ms 61022-006	M 46 (Miller Ave and Apple Ave) from US 31 BR (Muskegon Ave) easterly to Getty St, City of Muskegon	Reith-Riley Construction Co.	Pit 70-9	Pit 70-9	24,500	EBOL	--	57	--	40	47	
							EBIL	--	58	--	36	47
							WBOL	--	55	--	40	48
							WBIL	--	59	--	40	48

TABLE 10 (Cont.)
TEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)				
			Coarse	Fine			1969	1970	1971	1974	1979
Mb 63051-031 Ms 63051-032	US 10 (Woodward Ave) from 290 ft southeast of I 75 BL (Square Lake Rd) southeasterly to 75 ft southeast of Oakland Ave	Ajax Asphalt Paving, Inc.	Pit 63-4	Pit 63-4	49,600	SBOL	--	45	--	51	50
						SB#3	--	46	--	53	51
						SB#2	--	54	--	54	52
						SBIL	--	57	--	55	63
Mb 78021-001	US 12 from Mann Rd easterly to 200 ft east of Penn Central RR crossing, omitting from US 131 easterly to 430 ft east of east village limits of White Pigeon	Reith-Riley Construction Co.	Pit 39-1	Pit 78-25	6,300	EB	--	48	--	45	52
						WB	--	50	--	48	59
Ms 81032-009	US 12 at Carpenter Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	13,000	EBOL	--	--	48	37	38
						EBIL	--	--	48	42	39
						WBOL	--	--	50	42	46
						WBIL	--	--	47	36	40
U 82081-021	M 153 (Ford Rd) from 620 ft east of M 39 (Southfield Rd) easterly to 600 ft west of Greenfield Rd	Cooke Contracting Co.	Pit 50-35	Pit 50-35	59,100	WBOL	--	60	--	49	50
						WB#3	--	55	--	47	51
						WB#2	--	58	--	50	51
						WBIL	--	59	--	55	56
Mb 82131-011 (Part 1 of 2)	US 10 (Woodward Ave) commencing at Clairmount St, thence northwesterly to Tuxedo St	Detroit Asphalt Paving Co.	Pit 47-3	Pit 50-41	35,300	NBOL	45	--	--	40	43
						NBIL	48	--	--	41	44
						SBOL	45	--	--	42	43
						SBIL	48	--	--	42	44
Mb 82131-011 (Part 2 of 2)	US 10 commencing at 6 Mile Rd (McNichols Rd) thence northwesterly to approximately 700 ft southeast of 8 Mile Rd	Detroit Asphalt Paving Co.	Pit 47-3	Pit 50-41	40,600	NBOL	48	--	--	37	51
						NB#4	49	--	--	36	51
						NB#3	50	--	--	40	56
						NB#2	58	--	--	41	52
						NBIL	63	--	--	37	58
						SBOL	50	--	--	46	49
						SB#4	51	--	--	42	55
						SB#3	47	--	--	35	56
						SB#2	52	--	--	34	50
						SBIL	53	--	--	33	48
Group	Eastbound M 78 from Clinton-Shiawassee County Line northeasterly 5.1 miles and on westbound M 78 from M 47 southwesterly 2.2 miles in Shiawassee County (Control Section 76021)	Spartan Asphalt Paving Co.	Pit 41-38	Pit 76-43	16,820	EBOL	45	--	--	45	48
						EBIL	54	--	--	55	59
						WBOL	43	--	--	42	44
						WBIL	53	--	--	61	56

TABLE 11
TEN-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)			
			Coarse	Fine			1969	1970	1974	1979
Mb 07041-006	M 38 from 550 ft east of County Rd #651 (Pelke Rd) easterly to 0.3 mile east of east limits of Baraga	Fox Valley Construction Co.	Pits 07-46 and 07-44	Pits 07-46 and 07-44	2,500	EB	53	--	73	67
						WB	55	--	71	64
SS 17072-004	M 129 comm. at Tone Rd, thence northerly to Dafter Rd	Hodgkiss and Douma, Inc.	Pit 17-72	Pit 17-72	2,100	NB	61	--	66	70
						SB	59	--	64	71
Mb 41071-001	M 50 (Alden Nash Rd) from 84th St northerly to 1,770 ft south of I 96	Reith-Riley Construction Co.	Pit 41-46	--	1,950	NB	--	57	43	57
						SB	--	60	46	50
SS 45041-003	M 204 from M 22 easterly to County Rd #641	Peninsula Asphalt Corp.	Pit 45-19	--	2,100	EB	--	42	35	43
						WB	--	42	37	45
Mb 48042-004	M 28 from 0.61 mile east of M 117 to Luce-Chippewa County Line	George Hocking Construction Co.	Pit 48-6	Pit 48-6	3,460	EB	45	--	63	54
						WB	42	--	63	52
M 52031-005	M 35 from southeast of Village of Little Lake westerly to abandoned RR in New Swanzy	Payne and Dolan of Wisconsin, Inc.	Pit 52-9	--	3,000	NB	46	--	57	56
						SB	47	--	54	56
Mb 57011-003 (Part)	M 66 from Osceola-Missaukee County Line north to M 55 (south junction)	The Hicks Co.	Pit 57-29	--	3,400	NB	37	52	53	54
						SB	39	53	50	54
Mb 57011-003 (Part)	M 66 from M 55 (north junction) north to M 42 (Control Section 57013)	The Hicks Co.	Pit 57-29	--	4,400	NB	23	40	33	44
						SB	33	41	37	51
SS 62014-001	M 20 from M 82 in Hesperia east to Crosswell Ave	Reith-Riley Construction Co.	Pit 62-54	--	4,400	EB	47	--	52	51
						WB	47	--	53	54
Mb 67032-003 (Part)	M 66 from M 115 north to Osceola-Missaukee County Line	Reith-Riley Construction Co.	Pit 54-40	Pit 54-40	3,100	NB	28	--	52	57
						SB	25	--	51	58
Mb 68011-004	M 33 from Ogemaw-Oscoda County Line north to Mio	Central Paving Co.	Pit 65-52	--	3,000	NB	--	65	42	47
						SB	--	63	43	42

TABLE 12
TEN-YEAR REVIEW FOR STONE-FILLED SAND-ASPHALT
PAVEMENTS CONSTRUCTED IN 1969

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wet Sliding Friction (x 100)				
			Coarse	Fine			1969	1970	1974	1979	
Ms 11013-010	I 94 BL (Main St) from northbound M 139 (Paw Paw Ave) easterly to southbound M 139 (Fair Ave) Berrien County	John G. Yerington Co.	Material Service, Thornton, IL	Pit 11-30	14,000	EBOL	42	--	48	40	
							42	--	47	38	
							39	--	47	39	
							40	--	46	38	
Mb 38071-010 (Part)	M 50 from Lenawee-Jackson County Line north to Stoney Lake Rd, omitting at divided roadway in Village of Brooklyn	Reith-Riley Construction Co.	Pit 47-3	Pit 42-28	9,700	NB	--	64	44	45	
							SB	--	67	45	55
Mb 38071-010 (Part)	M 59 from 2,400 ft east of Hand Rd west and north to Lenawee-Jackson County Line, omitting at US 12 (Control Section 46081)	Reith-Riley Construction Co.	Pit 47-3	Pit 42-28	4,000	NB	--	--	--	52	
							SB	--	--	--	51
Mb 46061-011	M 52 and US 223 BR west from Nelson St south to Merrick St in Adrian	Ayling-Cunningham Asphalt Paving Co.	France Stone, Waterville, OH	Pit 46-28	20,800	NBOL	--	56	32	37	
							NBIL	--	54	40	37
							SBOL	--	55	35	37
							SBIL	--	58	42	37
Mb 46101-007	US 12 from 150 ft east of Pentcost Hwy east to Lenawee-Washtenaw County Line omitting from 350 ft east of Raisin River in Clinton easterly to east village limits of Clinton	Ayling-Cunningham Asphalt Paving Co.	France Stone, Waterville, OH	Pit 46-28	12,500	EB	44	--	41	43	
							WB	43	--	42	45
Mb 75021-010	US 2 from M 149 to east city limits of Manistique	Lake and Howell Construction Co.	Pit 75-5	Pit 70-9	5,000	EB	43	--	56	57	
							WB	44	--	58	62
Mb 76041-006 (Part)	M 71 (Corunna St) from Washington St, in Owosso, southeast to intersection of Shiawassee and McNeil Sts in Corunna	Saginaw Asphalt Paving Co.	Pit 17-40	Pit 73-5	17,000	NBOL	43	56	46	40	
							NBIL	46	58	45	40
							SBOL	45	54	48	38
							SBIL	46	56	47	38
Mb 76041-006 (Part)	M 21 (Main St) from west limits of Owosso (Chestnut St) east to the Shiawassee River (Control Section 76061)	Saginaw Asphalt Paving Co.	Pit 17-40	Pit 73-5	21,500	EBOL	40	55	44	39	
							EBIL	44	56	43	36
							WBOL	43	58	48	37
							WBIL	44	60	45	39
Mb 76041-006 (Part)	M 21 from Ball St in Owosso east to east limits of Owosso (Control Section 76062)	Saginaw Asphalt Paving Co.	Pit 17-40	Pit 73-5	21,200	EBOL	41	53	48	40	
							EBIL	43	55	47	38
							WBOL	45	55	46	40
							WBIL	44	57	45	43
Mb 79031-007	M 15 (State St) from 400 ft north of south village limits of Millington northerly to 300 ft north of Ellis Rd, Village of Millington	Saginaw Asphalt Paving Co.	Pit 75-5	Pit 79-8	7,000	NB	46	--	39	39	
							SB	46	--	40	45



OFFICE MEMORANDUM

DATE: September 2, 1981

TO: ALL RECIPIENTS OF RESEARCH REPORT R-1170 (MDOT Report No. 249)

FROM: Research Laboratory Section

SUBJECT: Correction of Figure 4, Page 63

A plotting error has been discovered in the five and ten year Wsf average for Concrete Pavements (Figure 4, Page 63 of Research Report R-1170). Please attach this erratum to your copy of the report.

PMS:lve

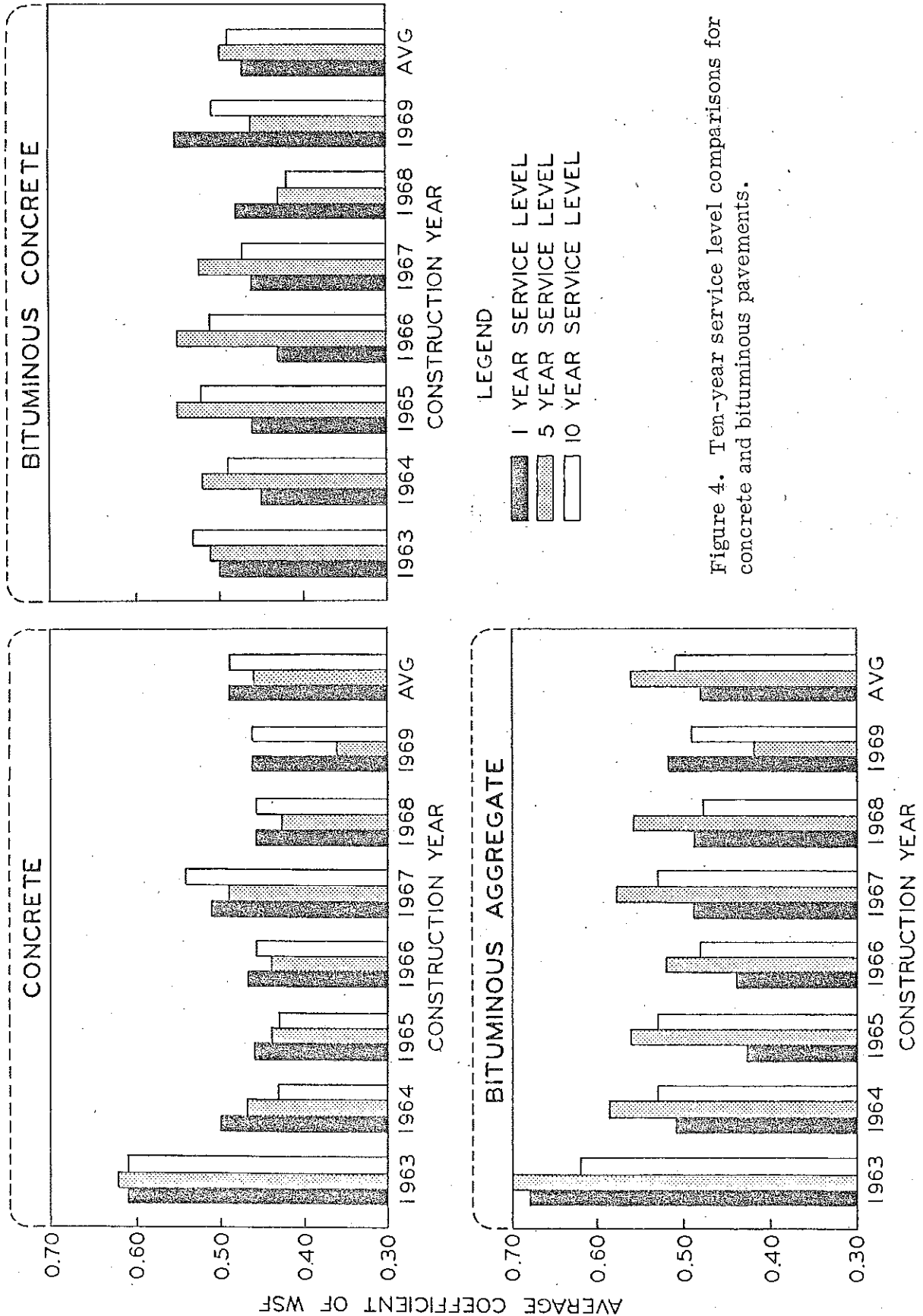


Figure 4. Ten-year service level comparisons for concrete and bituminous pavements.

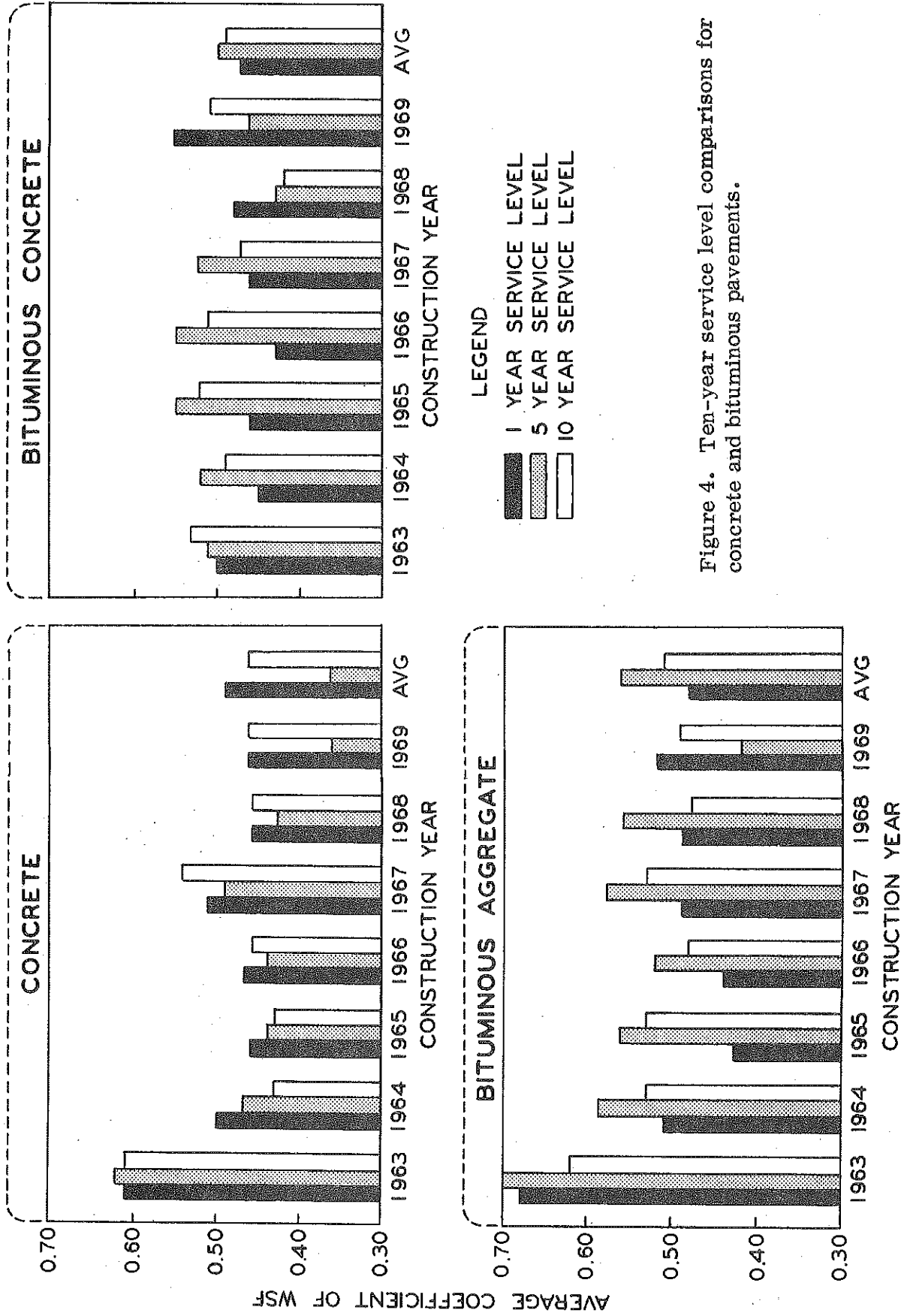


Figure 4. Ten-year service level comparisons for concrete and bituminous pavements.

SECTION IV

**FIFTEEN-YEAR PAVEMENT FRICTION TEST RESULTS
FOR CONCRETE AND BITUMINOUS PAVEMENTS**

Fifteen-Year Pavement Friction Test Results
For Concrete and Bituminous Pavements

Table 13 - Fifteen-Year Review for Concrete Pavements Constructed in
1964

During 1979, 32 projects or 194.4 lane miles of concrete pavement were tested for friction levels after 15 years of service. Coefficients determined at this service level ranged from 0.34 to 0.76 and averaged 0.49. Thirteen percent of the lane mileage (18 lanes) yielded average Wsf values below 0.40. The lowest (0.34) was determined on the EBOL of Project 41027D, C56 and the WBOL of Project 41029F, C8. Friction levels averaging higher than 0.60 were measured on 21 lanes (25 percent of the mileage). The highest average coefficients were measured on the EBIL (0.76) and WBIL (0.74) of Project 39051B, C6.

Table 14 - Fifteen-Year Review for Bituminous Concrete Pavements Constructed in 1964

Thirty bituminous concrete projects, 312.7 lane miles, were tested for pavement friction in 1979 after 15 years of service. Coefficients ranged from 0.30 to 0.75 and averaged 0.46. Coefficients on 27 lanes were lower than 0.40 and accounted for 28 percent of the tested lane mileage. The lowest friction level was determined on Project 73051B, C1, located on M 13 in Saginaw where friction levels on both NB and SB lanes averaged 0.30. Eight of the lanes tested (11 percent of the mileage) yielded friction levels averaging greater than 0.60. Coefficients on two of the lanes averaged higher than 0.70, i. e., 0.71 and 0.75, respectively, on the SBIL and NBIL of US 31 north of Whitehall (Project 61075D, C7).

Table 15 - Fifteen-Year Review for Bituminous Aggregate Pavements Constructed in 1964

Eleven 15-year old bituminous aggregate projects were tested during 1979. Wsf values ranged from 0.40 to 0.70 and averaged 0.56. Sixty-three percent of 158.6 tested lane miles yielded friction levels averaging greater than 0.60 after 15 service years. The highest average Wsf value (0.70) was determined on the NB lane of Project 42012, C5.

TABLE 13
FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)						
			Coarse	Fine			1965	1966	1967	1969	1970	1974	1979
BI 03034B, C9	I 196 from north of Adams Rd north to Washington Rd	Carl Goodwin and Sons, Inc.	Pits 3-65, 17-40 and 70-9	Pits 3-47 and 3-65	10,140	NBOL NBIL SBOL SBIL	55 59 55 60	-- -- -- --	-- -- -- --	56 69 53 66	-- -- -- --	46 61 42 64	51 70 46 69
F 13121B, C1	I 94 BL from Columbia Ave northeast to Dickman Rd	Titus Construction Co.	Pit 8-80	Pit 8-5	12,000	NB SB	56 54	-- --	-- --	52 47	-- --	37 34	52 46
U 33061D, C11	M 43 westbound from Center St west to Logan St in Lansing	Eisenhour Construction Co., Inc.	Pit 47-3	Pit 33-6	44,600	WBOL WBCL WBIL	-- -- --	43 42 41	-- -- --	35 36 37	-- -- --	22 30 27	41 39 42
F 39051B, C6	US 131 BR from US 131 (south of "G" Ave) east to north limits of Kalamazoo	Sargent Construction Co.	Pit 3-44	Pit 3-44	4,500	EBOL EBIL WBOL WBIL	65 65 59 65	-- -- -- --	-- -- -- --	61 70 51 69	-- -- -- --	43 50 39 49	65 76 58 74
I 41027D, C56	I 196 from Broadway Ave east to College Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	44,600	EBOL EBIL WBOL WBIL	50 50 48 49	-- -- -- --	-- -- -- --	45 47 44 44	-- -- -- --	37 37 37 41	34 41 39 47
I 41027E, C58	I 196 from College Ave east to Fuller Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	44,600	EBOL EBIL WBOL WBIL	51 52 49 51	-- -- -- --	-- -- -- --	46 47 42 48	-- -- -- --	36 39 34 40	38 38 43 46
I 41027B, C164	I 196 from the Grand River east to Coit Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	44,600	EBOL EBCL EBIL WBOL WBIL	49 50 53 49 50	-- -- -- -- --	-- -- -- -- --	40 42 47 41 41	-- -- -- -- --	33 37 43 35 37	38 42 63 35 37

TABLE 13 (Cont.)
 FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)						
			Coarse	Fine			1965	1966	1967	1969	1970	1974	1979
I 41029E, C1	I 196 from the Grand River northeast to Sibley Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	22,200	EBOL	53	--	--	42	--	39	40
						EBIL	52	--	--	51	--	44	58
						WBOL	53	--	--	43	--	38	46
						WBIL	56	--	--	52	--	40	51
I 41029F, C6	I 196 from Sibley Ave north-east to Lane Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	22,200	EBOL	44	--	--	38	--	33	37
						EBIL	49	--	--	43	--	36	40
						WBOL	49	--	--	42	--	37	36
						WBCL	49	--	--	46	--	33	48
						WBIL	53	--	--	--	--	50	65
I 41029F, C8	I 196 from Lane Ave north-east to Broadway Ave	Carl Goodwin and Sons, Inc.	Pit 41-46	Pit 41-46	20,760	EBOL	52	--	--	39	--	39	41
						EBIL	51	--	--	39	--	36	41
						WBOL	48	--	--	44	--	35	34
						WBIL	49	--	--	46	--	36	47
I 41029A, C35	I 196 from north of 28th St (M 11) northeast to 0.762 mile southwest of Wyoming	L. W. Edison	Pit 41-16	Pit 41-16	13,920	EBOL	53	--	--	39	--	36	40
						EBIL	55	--	--	50	--	39	55
						WBOL	49	--	--	38	--	32	36
						WBIL	53	--	--	38	--	36	51
I 41029B, C36	I 196 from the Ottawa-Kent County Line northeast 1.779 miles	L. W. Edison	Pit 41-16	Pit 41-16	29,580	EBOL	50	--	--	39	--	37	40
						EBIL	53	--	--	43	--	38	54
						WBOL	52	--	--	39	--	39	46
						WBIL	55	--	--	41	--	39	51
I 41029D, C37	I 196 from west limits of Wyoming northeast to east limits of Grand Rapids	L. W. Edison	Pit 41-16	Pit 41-16	23,700	EBOL	47	--	--	39	--	40	43
						EBIL	52	--	--	51	--	40	56
						WBOL	50	--	--	40	--	38	46
						WBIL	53	--	--	48	--	39	52
I 41029B, C54	I 196 from 0.762 mile southwest of Wyoming northeast to Wyoming City Limits	L. W. Edison	Pit 41-16	Pit 41-16	29,580	EBOL	47	--	--	41	--	37	41
						EBIL	52	--	--	45	--	38	56
						WBOL	49	--	--	39	--	38	46
						WBIL	49	--	--	47	--	40	52

**TABLE 13 (Cont.)
FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1964**

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)						
			Coarse	Fine			1965	1966	1967	1969	1970	1974	1979
F 50092A, C1	M 19 from I 94 northwest to the St. Clair-Macomb County Line	Anderson and Ruzzin, Inc.	E. C. Levy (Dix Yd)	Pit 50-35	6,000	EB WB	58 58	-- --	-- --	51 51	-- --	38 40	53 49
BI 50111H, C11	I 94 from north of 14 Mile Rd north to Clinton River Spitiway	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 50-21	59,000	NBOL NBCL NBIL SBOL SBCL SBIL	47 53 58 44 53 55	-- -- -- -- -- --	-- -- -- -- -- --	43 51 57 41 46 52	-- -- -- -- -- --	48 53 50 45 51 55	52 56 63 50 53 61
BI 50111G, C41	I 94 from Masonic Blvd north to north of 14 Mile Rd, St. Clair Shores	Cooke Contracting Co.	Pit 63-4 and E. C. Levy (Dix Yd)	Pits 50-21 and 63-4	60,400	NBOL NBCL NBIL SBOL SBCL SBIL	45 45 53 47 49 57	-- -- -- -- -- --	-- -- -- -- -- --	40 44 45 41 47 43	-- -- -- -- -- --	44 47 49 44 47 51	49 49 53 50 52 57
F 52043B, C4	US 41 from northwest of M 94 northwest to Green Garden Hill Rd (omitting 0.47 mile at the Choccolay River)	L. W. Brumm	Pits 52-38 and 52-39	Pit 52-9	4,850	NB SB	58 59	-- --	-- --	50 54	-- --	50 45	42 44
F 62031C, C10	M 37-M 46 from south of south limits of Newaygo north to Wood St in Newaygo	Eisenhour Construction Co., Inc.	Pit 67-2	Pits 62-16 and 67-2	13,000	NBOL NBIL SBOL SBIL	46 -- 43 --	-- -- -- --	-- -- -- --	37 33 39 34	-- -- -- --	31 -- 34 --	43 -- 45 --
F 63041E, C7	M 59 from Airport Rd to Elizabeth Lake Rd	Eisenhour Construction Co., Inc., and T. A. Forsberg, Inc.	Pit 63-54	Pit 63-54	41,900	EBOL EBIL WBOL WBIL	38 42 38 42	-- -- -- --	-- -- -- --	31 33 33 32	-- -- -- --	33 34 35 35	36 37 35 38

TABLE 13 (Cont.)
 FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)						
			Coarse	Fine			1965	1966	1967	1969	1970	1974	1979
EBBU 63081B, C2	I 696 from southeast of M 39 northwest to Lee Baker Rd	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	98,600	NBOL	39	--	--	46	--	39	50
							42	--	--	49	--	47	53
							38	--	--	43	--	38	47
							41	--	--	44	--	45	56
EBBU 63081A, C9	I 696 from Northland Dr to Winona St	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	67,800	NBOL	42	--	--	40	--	42	52
							42	--	--	46	--	43	52
							44	--	--	48	--	46	58
							39	--	--	40	--	39	55
M 63201B, C1	M 59 (Widetrack Dr) from intersection of Cass St and Huron St, southeast to south of Wesson St in Pontiac	Anderson and Ruzzin, Inc.	E. C. Levy (Dix Yd)	Pit 63-56	20,000	OL	--	32	--	35	--	40	39
							--	31	--	36	--	38	43
							--	35	--	37	--	38	44
							--	41	--	45	--	40	43
SS 76012B, C2	M 52 from intersection of M 21 in Owosso north to 5th St in Oakley	Sargent Construction Co.	Pit 47-3	Pit 76-36	14,800	NBOL	--	--	36	--	34	38	
							--	--	43	--	36	41	
BI 77111E, C5	I 94 from north of Gratiot north and northeast to north of Range Rd	Sargent Construction Co.	Pit 75-5	Pit 50-26	14,000	NBOL	57	--	--	51	--	53	54
							60	--	--	64	--	58	67
							56	--	--	46	--	52	53
							61	--	--	65	--	63	68
BI 77111F, C6	I 94 from north of Range Rd northeast to north of Griswold Rd	Sargent Construction Co.	Pit 75-5	Pit 50-26	14,000	NBOL	50	--	--	44	--	51	48
							53	--	--	56	--	60	65
							47	--	--	44	--	48	45
							53	--	--	52	--	57	58
BI 77111G, C7	I 94 from north of Griswold Rd northeast to north of Lapeer Rd	Sargent Construction Co.	Pits 17-40 and 75-5	Pits 50-26 and 74-51	14,000	NBOL	49	--	--	50	--	50	50
							53	--	--	56	--	61	62
							49	--	--	45	--	45	48
							52	--	--	55	--	56	62

TABLE 13 (Cont.)
 FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x100)						
			Coarse	Fine			1965	1966	1967	1969	1970	1974	1979
BI 7711H, C8	I 94 from north of Lapeer Rd northeast to north of Water St	Sargent Construction Co.	Pits 17-40 and 75-5	Pits 50-26 and 74-51	28,000	NBOL	52	--	--	48	--	57	49
							54	--	--	57	--	58	61
							48	--	--	41	--	48	45
F 81103B, C7	M 14 from US 23 to Plymouth Rd	L. A. Davidson	Pit 47-3	Pit 47-3	32,200	EBOL	--	53	--	48	--	35	49
							--	56	--	63	--	40	59
							--	44	--	42	--	32	50
F 81121A, C2	M 153 relocation from intersection of M 14 and existing M 14, southeast to intersection of Franks Lake Rd and existing M 153 (Ford Rd)	Eisenhour Construction Co., Inc.	Pits 81-1 and 81-57	Pits 81-1 and 81-57	7,000	NBOL	--	42	--	55	--	34	48
							--	45	--	58	--	49	64
							--	44	--	48	--	34	50
							--	48	--	61	--	44	65
							--	--	--	--	--	--	--
F 82052G, C25	US 24 from Eureka St north to Haskell St	Cooke Contracting Co.	E. C. Levy (Trenton Yd)	Pit 82-10	58,500	SBOL	38	--	--	41	--	34	44
							42	--	--	44	--	37	47
							41	--	--	40	--	37	44
U 82192B, C21	M 39 from south of Outer Dr to north of South Dearborn Rd	L. A. Davidson	E. C. Levy (Trenton Yd)	Pit 63-7	84,200	NBOL	--	30	--	37	--	35	45
							--	36	--	40	--	37	47
							--	37	--	43	--	38	52
						SBOL	--	33	--	38	--	35	46
						SBCL	--	36	--	38	--	37	45
						SBIL	--	40	--	44	--	41	48

TABLE 14
FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1964	1965	1966	1969	1974	1979
F 06073C, C1	US 23 from west of M 65 east to AuGres	Sargent Construction Co.	Pit 17-40	Pit 71-15 and Local Pits	6,000	NB SB	--	50	--	66	66	53
F 06073C, C2	US 23 from east limits of AuGres north to the Iosco-Arenac County Line	Sargent Construction Co.	Pit 17-40	Pit 71-15 and Local Pits	8,500	NB SB	--	49	--	60	47	48
SS 08041A, C10	M 79 from south of Starr Rd east to east of Barryville Rd	Globe Construction Co.	Pit 8-49	Pit 8-58	2,400	EB WB	--	46	--	62	54	63
Mb 11011C, C5	US 12 from Indiana-Michigan State Line northeast to northeast of New Buffalo	John G. Yerrington Co.	Material Services Corp., Chicago, IL	Local pits	9,500	NBOL NBIL SBOL SBIL	--	31	--	34	39	37
F 17062C, C2	M 28 from 2.3 miles east of Strongs Rd east to 1 mile west of the Demond Hill Fire Tower (east and west of Racoe)	Hodgkiss and Douma, Inc.	Pit 75-5	Local pit	1,500	EB WB	--	54	--	49	55	48
F 30033C, C1	M 99 from north limits of Jonesville northwest to east limits of Litchfield	Yerrington and Brown, Inc.	Pit 12-35	National Lime and Stone Co., Findley, OH	6,800	NB SB	--	--	47	58	41	44
F 31051A, C11	US 41 from Baraga-Houghton County Line northwest to the Snake River	Thornton Construction Co.	Pit 31-45	Pit 31-45	2,500	NB SB	--	60	--	66	76	67
F 32091C, C1	US 25 from 500 ft south of Helena Rd north to 1,035 ft north of south limits of Harbor Beach	Lake and Howell Construction Co.	Pit 32-6 and Local pit	Pit 32-4	2,200	NB SB	--	--	49	54	49	53
Mb 34062C, C2	M 21 from Dexter St east to east limits of Ionia	Reith-Riley Construction Co.	Pit 41-46	Pit 41-46	8,850	EB WB	--	41	--	49	38	45

TABLE 14 (Cont.)
FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)						
			Coarse	Fine			1964	1965	1966	1969	1974	1979	
F 35031C, C1	US 23 from Arenac-Iosco County Line north to west limits of Tawas City	Saginaw Asphalt Paving Co.	Pit 17-40	Local pits	5,700	NB SB	--	45 42	--	52	49	40	41
F 35032C, C7	US 23 from east limits of Tawas City north to Mill St	Reith-Riley Construction Co.	Pit 71-15	Pit 71-15	10,600	NB SB	--	47 44	--	54	45	40	38
F 35032C, C8	US 23 from Old M 171, north of Oscoda, north to the Iosco-Alcona County Line	Parnalee and Carpenter	Pit 71-15	Pit 01-56	8,000	NB SB	26	--	--	46	52	39	39
F 35032C, C9	US 23 from east to west limits of Tawas City	Saginaw Asphalt Paving Co.	Pit 17-40	Local pits	15,200	EBOL EBIL WBOL WBIL	--	40 44 42 44	--	46	52	38	38
Mb 41061C, C3	M 11 from north of Fennessey St north to north of Johnson Park entrance	Reith-Riley Construction Co.	Pit 41-50	Pit 70-27	11,070	NBOL NBIL SB	--	44 44 40	--	50	45	43	46
F 50011E, C11	M 53 from 15 Mile Rd to 17-1/2 Mile Rd	Cooke Contracting Co.	Pits 50-35 and 63-4	Pits 50-21 and 50-35	67,000	NBOL NBCL NBIL SBOL SBCL SBIL	--	--	35 30 32 33 31 34	45 41 43 47 44 46	42 34 37 45 43 47	37 32 36 34 35 38	
F 50022D, C3	M 59 from west of M 97 east to east of M 29	Ward and Van Nuck, Inc.	Pit 63-4	Pit 50-21	23,900	EBOL EBIL WBOL WBIL	--	44 42 42 43	--	51	54	56	49
F 52043A, C5	US 41 from 3.5 miles northwest of Alger-Marquette County Line northwest to northwest of M 94	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-9	3,200	NB SB	--	68 68	--	69	75	68	68

TABLE 14 (Cont.)
 FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1964	1965	1966	1969	1974	1979
F 55011A, C7	US 41 from 1 mile south of Ingalls north to south limits of Stevenson	George Hocking Construction	Pit 55-4	Pit 55-4	3,200	NB SB	--	51	--	56	49	51
BU 61075E, C5	US 31 from Marcoux St north to north limits of Muskegon	Spartan Asphalt Paving Co.	Pit 55-4	Pit 55-4	27,200	NBOL NBIL SBOL SBIL	--	--	--	--	34	35
BF 61075D, C7	US 31 from north of Colby Rd northwest to existing US 31, north of Whitehall	Spartan Asphalt Paving Co.	Pit 75-5	Pit 70-9	9,500	NBOL NBIL SBOL SBIL	--	47	--	51	49	54
BU 61075A, C15	US 31 through the US 31 BR interchange area	Spartan Asphalt Paving Co.	Pit 55-4	Pit 55-4	27,200	NBOL NBCL NBIL SBOL SBCL SBIL	--	--	--	--	44	41
BF 61075A, C16	US 31 from the Muskegon River north to River Rd	Spartan Asphalt Paving Co.	Pit 55-4	Pit 55-4	27,000	NBOL NBCL NBIL SBOL SBCL SBIL	--	37	--	43	43	40
F 62031C, C10	M 37-M 46 from north of M 82 to Wood St in Newaygo	Paul C. Miller	Pit 41-22	Pit 70-9	13,000	NBIL SBIL	--	44	--	54	48	43
SS 73031A, C9	M 47 from north limits of St. Charles north to M 46	Saginaw Asphalt Paving Co.	Pit 79-21	Pits 73-5 and 76-32	8,000	NB SB	--	49	--	57	52	52
							--	50	--	61	54	58

TABLE 14 (Cont.)
FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)					
			Coarse	Fine			1964	1965	1966	1969	1974	1979
F 73051B, C1	M 13 from M 57 north to Washington St in Saginaw	Saginaw Asphalt Paving Co.	Pits 17-40 and 75-5	Local pits	7,500	NB SB	--	36 37	--	42 43	35 35	30 30
F 73151C, C1	M 15 from south of M 81 southeast to the Tuscola-Saginaw County Line (Reese Rd)	Bay Asphalt Co.	Pit 79-21	Pits 73-5 and 76-32	3,800	NB SB	--	47 48	--	54 58	54 61	57 51
U 77033C, C4	US 25 from Glenwood Ave northwest to Thomas St (Control Section 77032)	Blue Water Asphalt Co., Inc.	Pit 17-40	Pit 74-51	7,700	NBOL NBIL SBOL SBIL	--	35 32 41 32	--	41 42 39 43	48 45 49 51	35 36 35 37
Fb 79031C, C3	M 15 from Willard Rd north to south limits of Millington	Cooke Contracting Co.	Pit 32-4	Pit 79-53	7,000	NB SB	--	49 50	--	60 56	55 58	51 53
Fb 79031C, C4	M 15 from south of north limits of Millington north to north of south limits of Vassar	Cooke Contracting Co.	Pit 32-4	Pit 79-53	7,000	NB SB	--	48 48	--	58 58	58 60	51 52
F 82052G, C25	US 24 from Eureka St north to Haskell St	Detroit Asphalt Paving Co.	Pit 47-3	Pit 82-11	58,500	NBOL NBCL NBIL	--	34 40 43	--	48 49 51	38 42 42	45 47 49

TABLE 15
FIFTEEN-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1964

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADI, 1978	Direction and Lane	Average Coefficient of Wet Sliding Friction (x 100)				
			Coarse	Fine			1964	1965	1969	1974	1979
Ms 42012C, C5	US 41 from 0.5 mile northeast of FAS #313 east and north-east to southwest of M 26	Thornton Construction Co.	Pit 42-6	--	800	NB SB	--	56 60	69 69	59 59	70 69
F 43022C, C9	US 10 from 0.4 mile west of Hawkins Rd east to the Lake-Osceola County Line	The Hicks Co.	Pit 67-8	--	2,500	EB WB	--	53 53	67 68	56 56	59 59
SS 51031C, C4	M 22 from US 31 northerly to the Manistee-Benzie County Line	Saginaw Asphalt Paving Co.	Pit 51-11	--	4,300	NB SB	32 34	--	58 59	55 57	46 46
F 52011A, C6	M 95 from Michigamme River north	Payne and Dolan of Wisconsin, Inc.	Pit 52-61	--	1,800	NB SB	--	55 54	59 57	56 52	60 61
SS 52032A, C4	M 35 from north of Palmer northeast to County Rd #480	Payne and Dolan of Wisconsin, Inc.	Pit 52-9	--	2,800	NB SB	--	48 49	63 66	66 67	57 59
SS 57012C, C4	M 55-M 66 from 1st St north to Union St in Lake City	The Hicks Co.	Pit 57-20	--	6,170	NBOL NBIL SBOL SBIL	--	47 47 48 46	47 50 47 49	48 42 48 47	53 40 44 42
FFH 64022A, C3	M 82 from US 31 east to Billings Ave	Reith-Riley Construction Co., Inc.	Pit 64-41	--	2,200	EB WB	--	52 50	60 62	52 52	62 62
F 66022B, C2	M 28 from 2.5 miles east of Bergland southeast to Ewen	Mathy Construction Co.	Pit 66-4	--	1,800	EB WB	--	61 60	55 59	61 62	66 66
F 67021C, C3	US 10 from the Lake-Osceola County Line east 1.9 miles	The Hicks Co.	Pit 67-8	--	3,700	EB WB	--	49 50	66 61	50 50	52 49
SS 71011A, C1	M 33 from the Montmorency-Presque Isle County Line north 7.21 miles	Spartan Asphalt Paving Co.	Pit 60-21	--	1,050	NB SB	--	52 53	62 62	60 64	61 61
SS 71011B, C2	M 33 from 7.21 miles north of the Montmorency-Presque-Isle County Line north to M 68	Spartan Asphalt Paving Co.	Pit 60-21	--	2,400	NB SB	--	50 48	61 55	55 56	51 49

SECTION V

INVENTORY OF PAVEMENT FRICTION TEST
RESULTS ON CONCRETE AND BITUMINOUS
PAVEMENTS CONSTRUCTED BEFORE 1963

Inventory of Pavement Friction Test
Results on Concrete and Bituminous
Pavements Constructed Before 1963

A pavement friction inventory was initiated during the 1965 test year. Test results have been reported annually in Sections I, II, III, and IV of the annual "Summaries of Michigan Pavement Friction Measurements" (MDOT Report No. 249). Contained in these four sections of the report have been pavement friction data from trunkline projects at least 0.5 mile in length and constructed since 1963. During 1979, projects which were constructed prior to 1963 were reviewed. It was determined through control section logs that over 600 pre-1963 projects still exist as current trunkline surfaces. Seventy-five of these projects (938 lane miles) were tested for the first time during 1979 and results are contained in Section V, Tables 16, 17, and 18 of this report. Additional future testing of these projects will be scheduled at five-year service intervals.

Table 16 - Concrete Pavements Constructed Before 1963

Results of pavement friction tests on 71 concrete projects which were constructed prior to 1963 are contained in Table 16. These pavements have been in service, on the Michigan trunkline system, for between 17 and 32 years. Their friction levels, as determined during 1979, ranged from 0.34 to 0.73 and averaged 0.51. It might be noted that the average Wsf of 0.51 is higher than the 0.48 average five-year friction level and equal to the average one-year Wsf value of 719 concrete pavement lanes constructed between 1963 and 1974 (Fig. 1). Only 8 percent (13 lanes) of the pre-1963 lane mileage tested this year yielded average coefficients lower than 0.40; 23 percent of the lane mileage averaged higher than 0.60.

Table 17 - Bituminous Concrete Pavements Constructed Before 1963

Table 18 - Miscellaneous Bituminous Surfaces Constructed Before 1963

Tables 17 and 18 contain the 1979 pavement friction results for four bituminous paving projects which were constructed prior to 1963. Friction levels ranged from 0.46 to 0.74 and averaged 0.60.

During 1979, friction testing was completed on less than 15 percent of the pre-1963 projects. After completion of testing on the remaining projects, in 1980, a more detailed look at friction level histories will be conducted.

TABLE 16
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
1947	23-06, C4 M 43 from Mulliken east to Oneida Rd (Control Section 23041)	Carl Goodwin and Sons, Inc.	Pit 34-26	Pit 34-11	5,700	EB WB	40	45	43
							45	50	47
30-04, C3	US 127 from north of Burt Rd north to Hudson (Control Section 30071)	Lewis and Frisinger	Pit 63-4	Pit 46-18	3,900	NB SB	46	49	48
1949	08-08, C2	Carl Goodwin and Sons, Inc.	Pit 34-11	Pit 34-11	2,900	NB SB	40	43	42
	23-06, C5	Carl Goodwin and Sons, Inc.	Pit 34-26	Pit 34-11	3,900	EB WB	43	48	46
	23-06, C6	Carl Goodwin and Sons, Inc.	Pit 34-26	Pit 34-26	4,300	EB WB	43	44	43
	30-04, C5	Loselle Construction Co.	Pit 30-21	Pit 30-21	2,900	NB SB	52	55	54
1953	23-17, C11	Carl Goodwin and Sons, Inc.	Pit 63-4	Pit 63-4	17,600	NBOL NBIL SBOL SBIL	43	45	44
	23-38, C1	Carl Goodwin and Sons, Inc.	Pit 63-4	Pit 63-1	27,000	NBOL NBIL	38	41	40
	33-75, C4	Sargent Construction Co.	Pit 8-5	Pit 33-61	11,500	SBOL SBIL	50	51	51
	38-48, C9	Sargent Construction Co.	Pits 34-26 and 81-8	Pit 81-8	28,500	EBOL EBIL	40	50	44
1955	30-31, C2	Carl Goodwin and Sons, Inc.	Pits 30-35 and 47-3	Pit 30-35	9,100	NB SB	42	43	42
	38-07, C5	Carl Goodwin and Sons, Inc.	Pits 30-35 and 47-3	Pit 30-35	12,000	NB SB	40	45	43
	46-03, C8	Carl Goodwin and Sons, Inc.	Pits 30-35 and 47-3	Pit 30-35	9,100	NB SB	42	45	44
1956	33-75, C1	Eisenhour Construction Co.	Pit 34-49	Pit 33-79	11,500	NBOL NBIL	48	50	49
							64	67	65

TABLE 16 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Waf (x 100)			
			Coarse	Fine			Low	High	Avg	
1956 (CONT)	33-79, C1 US 127 from 3 miles north of Jackson-Ingham County Line south to Jackson (Control Section 33031)	Sargent Construction Co.	Pit 34-32	Pit 33-57	10,700	NBOL	48	50	49	
							NBIL	67	72	70
							SBOL	49	50	49
							SBIL	63	69	67
	38-18, C13 Westbound I 94 from old US 12, west of Parma Rd, east to west of US 127 (Control Section 38101)	Pierson Contracting Co.	Pit 30-35	Pit 30-35	28,500	WBOL	40	45	43	
							WBIL	58	63	60
	81-67, C5 I 94 from I 94 BL south and east to US 23 (Control Section 81062)	Louis Garavaglia Contractors, Inc.	Pit 47-3	Pit 81-54	55,000	EBOL	39	43	41	
							EBIL	46	48	47
							WBOL	40	42	41
WBIL							52	52	52	
1957	19022, C1 I 96 from Ionia-Clinton County Line east to M 100	Carl Goodwin and Sons, Inc.	Pit 33-6	Pit 33-6	21,000	EBOL	49	50	49	
							EBIL	67	70	68
							WBOL	49	51	50
							WBIL	68	72	70
	23-17, C4 (Part) Southbound US 27 from Canal Rd north to Creitz Rd (Control Section 23012)	Carl Goodwin and Sons, Inc.	Pit 63-4	Pit 63-4	24,000	SBOL	40	43	41	
							SBIL	57	58	58
	23-17, C4 (Part) US 27 from east of Charlotte north to Canal Rd, omitting within limits of Potterville (Control Section 23012)	Carl Goodwin and Sons, Inc.	Pit 63-4	Pit 63-4	24,000	NBOL	39	43	41	
							NBIL	51	56	54
							SBOL	40	43	42
							SBIL	54	57	55
	23042, C2 M 43 from M 100 east to Rupp Rd	Denton Construction Co.	Pit 8-5	Pit 8-5	16,000	EBOL	43	43	43	
							EBIL	49	52	51
							WBOL	45	46	45
							WBIL	56	60	58
	33031, C1 US 127 from Jackson-Ingham County Line north 1.0 mile	Holloway Construction Co.	Pit 47-3	Pit 33-63	9,600	NBOL	48	49	49	
							NBIL	67	70	69
							SBOL	48	51	49
							SBIL	68	73	71
	33031, C2 US 127 from 1.0 mile north of Jackson-Ingham County Line north 2.0 miles	Holloway Construction Co.	Pit 47-3	Pit 33-63	10,600	NBOL	45	49	47	
							NBIL	69	73	71
							SBOL	45	49	47
SBIL							64	69	67	
34044, C1 I 96 from east Portland exit east to Clinton-Ionia County Line	Carl Goodwin and Sons, Inc.	Pit 34-26	Pit 34-26	15,580	EBOL	45	49	47		
						EBIL	68	69	69	
						WBOL	44	48	46	
						WBIL	66	70	68	
38131, C1 US 127 from I 94 north to south of NYCRR underpass	L. A. Davidson Co.	Pit 30-35	Pit 30-35	23,900	NBOL	38	40	39		
						NBIL	51	54	52	
						SBOL	38	40	39	
						SBIL	54	58	57	
38131, C2 US 127 from south of NYCRR underpass north to 0.6 mile north of Van Horn Rd	Denton Construction Co.	Pit 30-35	Pit 30-35	15,700	NBOL	43	43	43		
						NBIL	60	62	61	
						SBOL	45	49	48	
						SBIL	66	67	66	
38131, C3 US 127 from 0.6 mile north of Van Horn Rd north to Jackson-Ingham County Line	Holloway Construction Co.	Pit 47-3	Pit 33-63	11,300	NBOL	43	45	44		
						NBIL	57	62	59	
						SBOL	44	48	47	
						SBIL	62	66	64	
81075, C1 US 23 from Territorial Rd north to Livingston-Washtenaw County Line	Denton Construction Co.	Pit 47-3	Pit 47-3	38,500	NBOL	38	39	39		
						NBIL	43	48	45	
						SBOL	40	43	42	
						SBIL	46	50	48	

TABLE 16 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)			
			Coarse	Fine			Low	High	Avg	
81-62, C2	US 23 from south of Warren Rd north to Territorial Rd (Control Section 81075)	Denton Construction Co.	Pit 47-3	Pit 47-3	38,500	NBOL	42	43	43	
							NBIL	48	48	48
							SBOL	40	40	40
							SBIL	45	46	46
34043, C2	I 96 from west of Nash Rd east to 0.5 mile west of M 66	L. W. Edison Co.	Pit 41-46	Pit 41-46	13,020	EBOL	46	49	47	
							EBIL	62	67	65
							WBOL	46	52	49
							WBIL	62	61	63
34043, C3	I 96 from Kent-Ionia County Line east to west of Nash Rd	Sargent Construction Co.	Pit 41-56	Pits 41-1 and 41-56	13,020	EBOL	45	48	46	
							EBIL	62	66	64
							WBOL	48	50	49
							WBIL	67	69	68
34044, C3	I 96 from west Portland exit east to the Grand River	L. A. Davidson Co.	Pit 34-26	Pit 34-26	13,300	EBOL	46	48	47	
							EBIL	62	64	63
							WBOL	49	51	50
							WBIL	64	67	66
34044, C7	I 96 from M 66 east to west Portland exit	Lewis and Frisinger	Pit 34-26	Pit 34-26	12,820	EBOL	43	48	46	
							EBIL	64	70	67
							WBOL	48	52	50
							WBIL	62	67	65
38061, C1	M 60 from McCann Rd northeast to I 94	Denton Construction Co.	Pit 30-35	Pit 30-35	8,650	EBOL	50	51	50	
							EBIL	67	72	69
							WBOL	50	52	51
							WBIL	68	69	68
38111, C1	US 127 from NYCRR north to I 94	Sargent Construction Co.	Pits 30-35 and 47-3	Pit 30-35	14,800	NBOL	39	40	39	
							NBIL	51	55	55
							SBOL	40	43	42
							SBIL	51	54	53
81041, C2	I 94 from US 12 east 1.7 miles	Denton Construction Co.	E. C. Levy	Pit 81-59	63,500	EBOL	44	45	44	
							EBIL	45	49	47
							WBOL	39	40	40
							WBIL	48	51	50
82024, C3	I 94 from Concord St east to M 3	Cooke Contracting Co.	E. C. Levy	Pit 82-5	125,200	EBOL	37	39	38	
							EBCL	38	43	40
							EBIL	38	45	42
							WBOL	38	40	39
							WBCL	38	40	39
							WBIL	43	44	43
82025, C15	I 94 from Conner Ave east to Philip Ave	Cooke Contracting Co.	E. C. Levy	Pits 50-15	116,000	EBOL	43	46	44	
							EBCL	44	45	44
							EBIL	46	49	48
							WBOL	44	45	45
							WBCL	44	46	45
							WBIL	48	49	48
23041, C1	M 43 from Oneida Rd east to west limits of Grand Ledge	Eisenhour Construction Co.	Pit 41-46	Pit 19-33	5,700	EB	45	48	46	
							WB	50	54	52
34044, C5	I 96 from east limits of Portland east to Grand River Ave	L. W. Edison Co.	Pit 34-45	Pit 34-45	15,580	EBOL	48	50	49	
							EBIL	63	68	65
							WBOL	50	52	51
							WBIL	64	67	66
34044, C6	I 96 from west to east limits of Portland	L. W. Edison Co.	Pit 34-45	Pit 34-45	13,300	EBOL	44	46	45	
							EBIL	63	68	65
							WBOL	43	48	46
							WBIL	62	64	63

TABLE 16 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
38102, C1	I 94 from east of M 99 east to old US 12	L. A. Davidson Co.	Pit 30-35	Pit 30-35	18,700	EBOL	42	45	43
						EBIL	60	62	61
						WBOL	46	48	47
						WBIL	60	64	62
38111, C3	US 127 from south of the Grand River north to NYCRR	Sargent Construction Co.	Pit 30-35	Pit 30-35	14,300	NBOL	43	45	44
						NBIL	54	58	55
						SBOL	42	43	43
						SBIL	56	57	57
38111, C4	US 127 from north of Floyd Ave, at transition from two-lane to divided highway north to south of the Grand River	L. A. Davidson Co.	Pit 30-35	Pit 30-35	13,900	NBOL	34	39	37
						NBIL	48	50	49
						SBOL	44	45	44
						SBIL	58	58	58
41024, C2	I 96 from 0.5 mile east of Thornapple River east to Kent-Ionia County Line	L. W. Edison Co.	Pit 41-46	Pit 41-46	14,820	EBOL	44	46	45
						EBIL	62	68	64
						WBOL	45	48	46
						WBIL	63	67	65
38103, C4	Eastbound I 94 from west of rest area (west of Mt. Hope Rd) east to Jackson-Washtenaw County Line	Loselle Construction Co.	Pit 38-56 and E.C. Levy	Pit 38-56	25,200	EBOL	45	45	45
						EBIL	57	62	60
38103, C7	I 94 from Sargent Rd east 4.7 miles	Pierson Contracting Co.	Pit 38-56	Pit 38-56	25,200	EBOL	42	44	43
						EBIL	56	58	57
						WBOL	39	44	42
						WBIL	56	57	56
41024, C7	I 96 from M 11 east to west of Thornapple River Dr	L. W. Edison Co.	Pit 41-46	Pit 41-46	14,820	EBOL	42	43	42
						EBIL	61	62	61
						WBOL	43	46	45
						WBIL	63	67	65
81104, C1	I 94 from old US 12 east to Baker Rd	Sargent Construction Co.	Pit 47-3	Pit 47-3	33,700	EBOL	43	44	43
						EBIL	54	55	55
						WBOL	40	42	41
						WBIL	49	51	50
81104, C3	I 94 from Baker Rd east to M 14	Pierson Contracting Co.	Pit 38-56	Pit 38-56 and E.C. Levy	36,100	EBOL	37	38	38
						EBIL	54	55	54
						WBOL	40	42	41
						WBIL	50	54	52
81104, C5	Eastbound I 94 from Jackson-Washtenaw County Line east to PCRR	Pierson Contracting Co.	Pit 38-56	Pit 38-56	30,000	EBOL	45	46	46
						EBIL	58	58	58
81104, C7	Eastbound I 94 from PCRR east to old US 12	Sargent Construction Co.	Pit 47-3	Pit 47-3	33,000	EBOL	44	45	44
						EBIL	54	55	55
41024, C5	I 96 from west of Thornapple Dr east to 0.5 mile east of the Thornapple River	Pierson Contracting Co.	Pit 41-46	Pit 41-46	12,500	EBOL	46	49	47
						EBIL	61	64	63
						WBOL	48	51	50
						WBIL	66	68	67
41025, C1	I 96 from Coit Rd east to I 196	Pierson Contracting Co.	Pit 41-38	Pit 41-38	24,000	EBOL	45	48	46
						EBIL	62	66	64
						WBOL	46	49	48
						WBIL	64	67	66

TABLE 16 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)			
			Coarse	Fine			Low	High	Avg	
41025, C3	I 96 from I 196 east to north of Cascade Rd	L. W. Edison Co.	Pit 41-46	Pit 41-46	39,350	EBOL	43	45	44	
							EBCL	40	44	43
							EBIL	55	58	56
							WBOL	50	50	50
							WBCL	45	45	45
41025, C5	I 96 from north of Cascade Rd east to north of M 11	Holloway Construction Co.	Pit 41-46	Pit 41-46	20,550	EBOL	44	48	45	
							EBIL	57	57	57
							WBOL	44	48	46
							WBIL	61	62	61
							41025, C7	I 96 from east of US 131 east to Coit Rd	Pierson Contracting Co.	Pit 41-38
EBIL	52	57	55							
WBOL	36	37	37							
WBIL	51	52	51							
41026, C2	I 96 from east of Bristol Rd east to US 131	Sargent Construction Co.	Pits 41-38 and 41-46	Pit 41-46	39,400	EBOL				
							EBIL	57	58	58
							WBOL	43	46	45
							WBIL	62	64	63
							41026, C3	I 96 from Ottawa-Kent County Line east to Bristol Rd	Carl Goodwin and Sons, Inc.	Pit 41-46
EBIL	54	58	56							
WBOL	40	43	41							
WBIL	60	60	60							
47065, C3	I 96 from west Brighton exit east to US 23	L. A. Davidson Co.	Pit 47-3	Pit 47-3	33,600	EBOL				
							EBIL	50	52	51
							WBOL	43	48	45
							WBIL	52	54	53
							19022, C4	I 96 from M 100 east to Clinton-Eaton County Line	Denton Construction Co.	Pit 34-53
EBIL	63	66	64							
WBOL	46	50	48							
WBIL	64	67	65							
23151, C1	I 96 from east of US 27 east to Waverly Rd (Eaton-Ingham County Line)	Pierson Contracting Co.	Pit 34-53	Pit 33-57	23,000	EBOL				
							EBIL	61	63	62
							WBOL	45	48	46
							WBIL	63	64	63
							23152, C1	I 96 from Eaton-Clinton County Line southeast to south of M 43	Pierson Contracting Co.	Pit 34-55
EBIL	62	63	63							
WBOL	45	46	46							
WBIL	63	66	64							
23152, C3	I 96 from south of M 43 east to US 27	Pierson Contracting Co.	Pit 34-53	Pit 33-57	27,000	EBOL				
							EBIL	63	66	65
							WBOL	51	55	53
							WBIL	69	72	70
							33083, C1	I 96 from Waverly Rd (Eaton-Ingham County Line) east to east of M 99	Pierson Contracting Co.	Pit 34-53
EBIL	64	68	65							
WBOL	49	55	51							
WBIL	64	64	64							
33083, C3	I 96 from east of M 99 east 0.6 mile	L. A. Davidson Co.	Pit 34-53	Pit 33-57	22,000	EBOL				
							EBIL	63	63	63
							WBOL	46	46	46
							WBIL	63	64	64
							33083, C5	I 96 from west of Washington Ave east to west of Cedar St	L. A. Davidson Co.	Pit 34-53
EBIL	63	64	64							
WBOL	45	46	46							
WBIL	58	63	61							

TABLE 16 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

1962 (CONT.)

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
47065, C1	I 96 from Chilson Rd east to Brighton	L. A. Davidson Co.	Pit 47-3	Pit 47-3	30,900	EBOL	44	48	45
						EBIL	56	57	56
						WBOL	43	45	44
						WBIL	54	56	55
47065, C5	I 96 from M 59 east to Chilson Rd	Sargent Construction Co.	Pit 47-3	Pit 47-3	24,800	EBOL	42	48	45
						EBIL	49	60	56
						WBOL	40	46	44
						WBIL	51	57	54
81074, C1	US 23 from I 94 north to Geddes Rd	Denton Construction Co.	Pits 47-3 and 81-57	Pits 47-3 and 81-57	37,000	NBOL	42	43	42
						NBIL	46	48	47
						SBOL	42	43	43
						SBIL	52	54	53
81074, C4	US 23 from Geddes Rd north to M 14	Denton Construction Co.	Pits 47-3 and 81-57	Pits 47-3 and 81-57	30,000	NBOL	42	43	43
						NBIL	56	58	57
						SBOL	40	45	43
						SBIL	52	54	53
81103, C3	US 23-M 14 from US 23 (north junction) east to US 23 (south junction)	Denton Construction Co.	Pits 47-3 and 81-57	Pits 47-3 and 81-57	32,200	NBOL	40	43	42
						NBIL	50	54	52
						SBOL	43	44	43
						SBIL	51	54	53

TABLE 17
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)			
			Coarse	Fine			Low	High	Avg	
1961	18034, C3 US 27 from M 61 north to US 27 DR north of Harrison	Mid America Engineering Corp.	Pit 32-4	Pits 18-48 and 67-2	6,100	NBOL	48	50	49	
							NBIL	68	69	69
							SBOL	46	49	48
							SBIL	69	72	70
	18034, C4 US 27 from US 27 BR north of Harrison north to Clare- Roscommon County Line	Mid America Engineering Corp.	Pit 32-4	Pits 18-48 and 67-2	6,100	NBOL	52	54	55	
							NBIL	70	72	71
							SBOL	51	52	52
							SBIL	73	74	74

TABLE 18
MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED BEFORE 1963

Project No.	Location	Paving Contractor	Aggregate Source		Maximum ADT, 1978	Direction and Lane	Coefficient of Wsf (x 100)		
			Coarse	Fine			Low	High	Avg
1960	<u>Prime and Single Seal</u>								
	90-81012-01, C3	M 52 from Pleasant Lake Rd north to I 94	Gilliland Con- struction Co.	Pit 38-46	---	4,600	NB	49	60
1961	<u>Prime and Double Seal</u>								
	23021, C2	M 79 from Barry-Eaton County Line east to Ionia Rd	West Shore Con- struction Co.	Pit 8-5	---	1,900	EB	63	64
						WB	61	63	62

SECTION VI

EXPERIMENTAL FEATURES IN PAVEMENT SURFACES

Experimental Features in Pavement Surfaces

Table 19 - Bridge Deck Surface Coatings

1) Rubberized Bituminous Concrete - Sixteen lanes coated with rubberized bituminous concrete were tested during 1979. After 11 or 12 service years, friction tests yielded coefficients which ranged from 0.36 to 0.50 and averaged 0.43. Only three of the 16 lanes tested in 1979 had Wsf values averaging lower than 0.40; the lowest average Wsf (0.36) was determined on the WBIL of S16 of 82111.

2) Latex Modified Mortar - Nine structures (36 lanes) with a latex modified mortar surface were tested during 1979. Service years on these lanes ranged from four to ten; coefficients ranged from 0.39 to 0.59 and averaged 0.49. Only one lane, the WBOL of I 94 over Middlebelt Rd (S06 of 82022) yielded an average Wsf lower than 0.40, i. e., 0.39.

3) Latex Modified Concrete - One-hundred twenty-seven latex concrete lanes, ranging from one to seven years old, were tested during 1979. Friction levels determined ranged from 0.39 to 0.71 and averaged 0.55. Only two of the 127 lanes yielded average friction levels lower than 0.40; both the EB lane of S06 of 25031 and the WBIL of S24 of 82251 averaged 0.39. Three lanes yielded Wsf values averaging higher than 0.70. The NBIL and SBIL of X01 of 33031 averaged 0.70 and 0.71, respectively, and the EBIL of B01 of 33045 averaged 0.71.

4) Low Slump High Density Concrete - Pavement friction of 16 bridge decks coated with low slump high density concrete ranged from 0.38 to 0.73 and averaged 0.51 in 1979. Two of the 48 lanes tested yielded friction levels below 0.40, i. e., the EBOL's of X01 and X02 of 63022 had Wsf averages of 0.38 and 0.39, respectively. In contrast, average coefficients on the EBOL and WBOL of Carpenter Rd over I 475 (S49 of 25132) were 0.73 and 0.72, respectively.

Table 20 - Open Graded Asphalt Friction Courses

Three open graded friction course projects were tested during 1979. The two projects constructed in 1975 continue to have considerable difference in their friction levels. For the fourth consecutive year, Wsf values on M 25 in Bay City have averaged below 0.30; 1979 coefficients yielded an average four-year friction level of 0.24. The I 75 project (73112-09446), also constructed in 1975, had average four-year friction levels ranging from 0.44 to 0.50 and averaging 0.47. The remaining project was constructed during 1978; average one-year Wsf values ranged from 0.47 to 0.52 and averaged 0.50.

Table 21 - Trinidad Asphalt Surfacing (Project Mb 72013-06140), Research Project 73 C-16

A resurfacing project on US 27 from Snow Bowl Rd north to M 55 used a Trinidad asphalt mix design and was completed August 2, 1974. Within the limits of this project, two conventional bituminous concrete surfaces (Type C and Type M) were placed as control sections.

After five service years, no significant friction level differences have been determined between the Trinidad asphalt and bituminous concrete surface types. Tests conducted in 1979 on the Trinidad surfaces yielded an average Wsf value of 0.63 and the bituminous concrete surfaces had an average Wsf of 0.62.

Table 22 - Cold-Milled Surfaces, Research Project 76 TI-341

Wsf values are being monitored at 14 cold-milled areas (59 lanes) throughout the State. Surfaces at five of the areas were cold-milled in 1976 and the remaining nine areas were cold-milled in 1977. Age of the surface ranged from new to 23 years old at the time they were cold-milled. Tests were conducted on 48 of the lanes prior to cold-milling and resulting Wsf values averaged 0.30. Friction tests conducted in the same year, but after cold-milling, yielded an average coefficient of 0.47. Average friction levels of succeeding service levels of one, two, and three years were 0.42, 0.39, and 0.42, respectively.

Table 23 - Sulfur Modified Bituminous Concrete (Project Mb 26011-11032), Research Project 74 D-29

In June 1977, a sulfur-asphalt surface was placed over an 18-year old bituminous concrete roadway located on M 18, north of the Midland-Gladwin County line. As shown in Table 23, experimental sulfur asphalt mix designs varied sulfur/asphalt ratios. Friction tests have been conducted during the initial, one, and two-year service levels; during this time period, no significant difference in friction level has been determined between the bituminous concrete control sections and the experimental sulfur-asphalt sections.

Table 24 - Bituminous Concrete Containing Arenaceous Limestone (Project Mb 06071-11004A), Research Project 77 C-18

Results from an earlier study compared aggregate polishing characteristics from 16 Michigan and out-of-state sources and indicated that most carbonates possess low resistance to tire polishing. Aggregate samples of

sandy limestone, however, exhibited only slightly lower resistance to polishing than did the crushed gravel. This suggested that the sandy limestone material might serve as a satisfactory substitute for crushed gravel in a bituminous wearing course mix design.

In April 1977, the MDOT Bituminous Advisory Committee recommended that a paving project be selected to include an experimental wearing course containing arenaceous (sandy) limestone from the Bayport formation. Later in 1977, experimental and control wearing courses were constructed on US 23 between M 13 and the Middle Branch of the Pine River in Standish (Project 06071-11004). Results of three sets of annual friction measurements on this project are presented in Table 24. Early results indicate both surfaces are performing essentially the same. Continued evaluation of friction tests have been planned.

Table 25 - Stoney Mix Projects

Friction levels on bituminous aggregate and bituminous concrete projects using experimental mix designs with 5 percent increased stone content (stoney mix projects) have been under study since 1976. Early performance records indicate the stoney mix projects have slightly higher friction characteristics than adjacent conventional pavements through the two-year service periods. Both the adjacent conventional and the stoney mix surfaces yielded average Wsf values of 0.56 after a three-year service period.

Table 26 - Sprinkle Treatment (Project FRR 71072-15287A), Research Project 78 C-19

Limestone aggregate in bituminous paving mixtures tend to become polished by traffic and consequently may result in a surface with lower friction characteristics than mixtures using a more durable aggregate. In July 1979, a section of US 23 north of Rogers City was resurfaced with a Type CM bituminous concrete mixture. The mix design of this surface consisted of a local limestone aggregate and a 85/100 penetration asphalt cement. An asphalt-coated aggregate, which was less susceptible to traffic polishing, was then sprinkled on this surface and rolled in. The rate of application of this sprinkled aggregate varied from 3 lb/sq yd to 10 lb/sq yd as shown in Figure 5. A bituminous concrete and a bituminous aggregate pavement were constructed adjacent to the experimental sprinkle treated surface as control pavements. Both control pavements were constructed with limestone aggregate.

Friction measurements were conducted in July and October 1979 at test speeds of 30, 40, and 55 mph. After three months of service, the sprinkle

TABLE 19
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction														
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979		
B02 of 11052	US 31-US 33 over St. Joseph River in Berrien Springs	1967	Rubberized bituminous concrete	NB	--	0.39	0.47	0.40	0.40	0.45	0.28	0.40	0.40	0.35	0.43	0.29	0.40		
					SB	0.43	0.36	0.43	0.37	0.36	0.44	0.28	0.38	0.38	0.31	0.42	0.26	0.37	
B01 of 79051	M 24 over Cass River in Caro	1967	Rubberized bituminous concrete	NB	0.53	0.48	0.56	0.51	0.54	0.57	0.56	0.59	0.45	0.41	0.50	0.50	0.50		
					SB	0.50	0.49	0.55	0.53	0.55	0.59	0.62	0.61	0.44	0.45	0.50	0.48	0.45	
S17 of 82023	Grand River Ave (I 96 BS) over I 94	1968	Rubberized bituminous concrete	EBOL	--	0.44	0.38	0.35	0.41	0.43	0.41	0.37	0.39	0.41	0.45	0.38	0.47		
				ERCL	--	0.44	0.37	0.34	0.39	0.42	0.40	0.36	0.40	0.40	0.40	0.45	0.36	0.42	
				EBIL	--	0.45	0.40	0.36	0.38	0.45	0.43	0.39	0.41	0.44	0.41	0.38	0.42	0.38	0.42
				WBOL	--	0.50	0.43	0.40	0.44	0.48	0.40	0.42	0.44	0.44	0.49	0.47	0.43	0.46	0.46
				WBCL	--	0.44	0.37	0.36	0.40	0.41	0.40	0.39	0.42	0.44	0.44	0.45	0.45	0.37	0.41
				WBIL	--	0.44	0.38	0.35	0.39	0.43	0.43	0.37	0.44	0.43	0.46	0.42	0.38	0.46	0.46
S16 of 82111	Grand River Ave (I 96 BS) over I 696 BS	1968	Rubberized bituminous concrete	EBOL	--	0.52	0.47	0.46	0.44	0.54	0.48	0.42	0.46	0.54	0.50	0.42	0.45		
				EBCL	--	0.44	0.43	0.40	0.43	0.44	0.28	0.37	0.37	0.43	0.45	0.37	0.41		
				EBIL	--	0.43	0.41	0.41	0.43	0.48	0.33	0.37	0.39	0.43	0.43	0.38	0.44		
				WBOL	--	0.49	0.49	0.47	0.46	0.48	0.33	0.42	0.47	0.55	0.51	0.50	0.50		
				WBCL	--	0.42	0.39	0.40	0.42	0.39	0.28	0.37	0.38	0.42	0.41	0.36	0.39		
				WBIL	--	0.43	0.41	0.41	0.44	0.50	0.35	0.47	0.40	0.42	0.41	0.37	0.36		
S04 of 41026	M 37 over eastbound I 96	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.45	0.47	0.48	0.45		
				NBIL	--	--	--	--	--	0.46	0.41	0.29	0.46	0.44	0.49	0.52	0.48		
				SBOL	--	--	--	--	--	0.37	0.35	0.27	0.40	0.40	0.49	0.45	0.44		
				SBIL	--	--	--	--	--	0.41	0.38	0.32	0.41	0.41	0.50	0.48	0.49		
S05 of 41026	M 37 over westbound I 96	1971	Latex modified mortar	SBRL	--	--	--	--	--	0.40	0.34	0.30	0.39	0.35	0.46	0.45	0.42		
				NBOL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.45	0.47	0.45	0.45		
				NBIL	--	--	--	--	--	0.44	0.39	0.30	0.43	0.42	0.48	0.52	0.49		
				SEOL	--	--	--	--	--	0.33	0.34	0.27	0.40	0.42	0.45	0.51	0.47		
S01 of 63022	I 96 over Kent Lake Rd	1972	Latex modified mortar	SEIL	--	--	--	--	--	0.47	0.40	0.30	0.45	0.46	0.46	0.54	0.50		
				SBRL	--	--	--	--	--	0.46	0.39	0.28	0.45	0.44	0.42	0.51	0.47		
				EBOL	--	--	--	--	--	0.50	0.33	0.41	0.47	0.52	0.43	--	0.51		
				EBCL	--	--	--	--	--	0.45	0.34	0.42	0.46	0.50	0.52	--	0.55		
S02 of 63022	I 96 over Milford Rd	1971	Latex modified mortar	EBIL	--	--	--	--	--	0.53	0.41	0.51	0.49	0.55	0.57	--	0.56		
				WBOL	--	--	--	--	--	0.46	0.35	0.43	0.46	0.52	0.44	--	0.55		
				WBCL	--	--	--	--	--	0.48	0.34	0.42	0.44	0.51	0.54	--	0.56		
				WBIL	--	--	--	--	--	0.52	0.39	0.50	0.50	0.55	0.57	--	0.53		
S06 of 82022	Westbound I 94 over Middlebelt Rd	1971	Latex modified mortar	EBOL	--	--	--	--	--	0.32	0.24	0.33	0.38	0.42	0.50	--	0.45		
				EBCL	--	--	--	--	--	0.42	0.30	0.42	0.40	0.48	0.51	--	0.48		
				EBIL	--	--	--	--	--	0.43	0.31	0.46	0.46	0.51	0.53	--	0.56		
				WBOL	--	--	--	--	--	0.38	0.23	0.37	0.42	0.45	0.52	--	0.52		
				WBCL	--	--	--	--	--	0.43	0.31	0.42	0.47	0.50	0.55	--	0.55		
				WBIL	--	--	--	--	--	0.49	0.34	0.48	0.52	0.54	0.56	--	0.59		

TABLE 19 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction													
					1987	1988	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	
X01 of 82024	I 94 over DeQuindre Yard	1972	Latex concrete	EBOL	--	--	--	--	--	--	0.39	0.31	0.32	0.47	0.42	0.40	0.42	
					EBCL	--	--	--	--	--	0.38	0.29	0.34	0.47	0.43	0.41	0.44	
					EBIL	--	--	--	--	--	0.44	0.28	0.35	0.46	0.41	0.41	0.47	
					WBOL	--	--	--	--	--	0.41	0.31	0.33	0.47	0.44	0.37	0.43	
					WBCL	--	--	--	--	--	0.40	0.31	0.35	0.49	0.46	0.44	0.43	
WBIL	--	--	--	--	--	0.43	0.32	0.40	0.50	0.46	0.42	0.49						
S01 of 82091	Old M 39 over Gate 10 entrance to Ford Plant	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.40	0.40	0.41	--	--	--		
					NB#3	--	--	--	--	--	0.42	0.39	0.43	0.48	0.47	0.46	0.46	
					NB#2	--	--	--	--	--	0.47	0.46	0.44	0.52	0.51	0.50	0.48	
					NBIL	--	--	--	--	--	0.53	0.53	0.54	0.59	0.57	0.54	0.48	
					SBOL	--	--	--	--	--	0.43	0.45	0.40	--	--	--	--	
B03 of 82191	I 75 over Goddard Rd	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.40	0.36	0.46	0.45	0.44	0.51	0.49	
					NBCL	--	--	--	--	--	0.37	0.37	0.44	0.47	0.48	0.45	0.45	
					NBIL	--	--	--	--	--	0.40	0.44	0.49	0.52	0.49	0.50	0.52	
					SBOL	--	--	--	--	--	--	--	--	--	--	0.49	0.50	
					SBCL	--	--	--	--	--	--	--	--	--	--	--	0.50	0.51
SBIL	--	--	--	--	--	--	--	--	--	--	--	0.53	0.61					
S26 of 82195	John R over I 75	1977	Latex concrete	SBOL	--	--	--	--	--	--	--	--	--	--	--	0.50	0.53	
					SB#3	--	--	--	--	--	--	--	--	--	--	0.41	0.48	
					SB#2	--	--	--	--	--	--	--	--	--	--	0.42	0.50	
					SBIL	--	--	--	--	--	--	--	--	--	--	--	--	
S30 of 25132	Selby St over I 475	1978	Low slump high density concrete	SBOL	--	--	--	--	--	--	--	--	--	--	--	0.58		
					SBIL	--	--	--	--	--	--	--	--	--	--	--	0.50	
S31 of 25132	Coldwater Rd over I 475	1977	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.49	
					EBIL	--	--	--	--	--	--	--	--	--	--	--	0.48	
					WBOL	--	--	--	--	--	--	--	--	--	--	--	0.53	
WBIL	--	--	--	--	--	--	--	--	--	--	--	0.51						
S49 of 25132	Carpenter Rd over I 475	1977	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.73	
					EBIL	--	--	--	--	--	--	--	--	--	--	--	0.53	
					WBOL	--	--	--	--	--	--	--	--	--	--	--	0.72	
WBIL	--	--	--	--	--	--	--	--	--	--	--	0.55						
S51 of 25132	Russell St over I 475	1978	Low slump high density concrete	EB	--	--	--	--	--	--	--	--	--	--	--	--	0.46	
					WB	--	--	--	--	--	--	--	--	--	--	--	0.53	
S03 of 33084	Southbound I 496 to eastbound I 96 over westbound I 96	1975	Low slump high density concrete	SBOL	--	--	--	--	--	--	--	--	--	0.54	0.61	0.62	0.62	
					SBIL	--	--	--	--	--	--	--	--	--	0.64	0.68	0.65	0.66

TABLE 19 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction																		
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979						
S05 of 33045	I 496 over Trowbridge Rd	1978	Latex concrete	EBOL EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.65	0.71				
S06 of 33045	I 496 over US 127 southbound	1978	Latex concrete	WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.69	0.68				
S16 of 33045	I 496 over Trowbridge Rd	1978	Latex concrete	WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.67	0.63				
X01 of 33045	I 496 over the Grand River	1978	Latex concrete	EBOL EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.61	0.66				
X02 of 33045	I 496 over the Grand River and Cedar St	1978	Latex concrete	WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.64	0.63				
X09 of 33045	I 496 over NYC RR	1978	Latex concrete	EBOL EBIL WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.63	0.64	0.61	0.62		
X11 of 33045	I 496 over GTW RR and Hosmer St	1978	Latex concrete	EBOL EBIL WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.63	0.61	0.63	0.62		
X12 of 33045	I 496 over C&O RR and Holmes St	1978	Latex concrete	EBOL EBIL WBOL WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.54	0.68	0.56	0.62		
S07 of 38101	Lansing Ave over I 94, Jackson	1975	Latex concrete	NBOL NBIL SBOL SBIL	--	--	--	--	--	--	--	--	--	--	--	0.62	0.50	0.39	0.46	0.47	0.45	0.39	0.47
B04 of 38111	US 127 over Grand River, east of Jackson	1975	Latex concrete	NBOL NBIL SBOL SBIL	--	--	--	--	--	--	--	--	--	--	--	0.59	0.48	0.42	0.47	0.45	0.46	0.39	0.46
X01 of 38131	US 127 over NYC RR, north of Jackson	1975	Latex concrete	NBOL NBIL SBOL SBIL	--	--	--	--	--	--	--	--	--	--	--	0.52	0.49	0.43	0.45	0.62	0.60	0.59	0.62
S16 of 41131	US 131 over Leonard St, in Grand Rapids	1975	Latex concrete	NBOL NBCL NBIL SBOL SBCL SBIL	--	--	--	--	--	--	--	--	--	--	--	0.53	0.53	0.46	0.49	0.53	0.65	0.62	0.66
					--	--	--	--	--	--	--	--	--	--	--	0.56	0.64	0.61	0.62	0.56	0.66	0.65	0.65
					--	--	--	--	--	--	--	--	--	--	--	0.58	0.62	0.62	0.60	0.58	0.62	0.62	0.60
					--	--	--	--	--	--	--	--	--	--	--	0.61	0.67	0.70	0.68	0.61	0.67	0.70	0.68
					--	--	--	--	--	--	--	--	--	--	--	0.57	0.56	0.54	0.55	0.57	0.54	0.55	0.53
					--	--	--	--	--	--	--	--	--	--	--	0.62	0.64	0.62	0.62	0.62	0.64	0.62	0.62
					--	--	--	--	--	--	--	--	--	--	--	0.59	0.58	0.58	0.57	0.59	0.58	0.58	0.57
					--	--	--	--	--	--	--	--	--	--	--	0.59	0.62	0.58	0.57	0.59	0.62	0.58	0.57
					--	--	--	--	--	--	--	--	--	--	--	0.60	0.65	0.63	0.63	0.60	0.65	0.63	0.63

TABLE 19 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction															
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979			
S17 of 41131	US 131 over Richmond St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.55	0.55	0.52	0.52		
				NBCL	--	--	--	--	--	--	--	--	--	--	--	--	0.56	0.55	0.54	0.54
				NBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.62	0.62	0.61	0.59
				SBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.55	0.55	0.52	0.53
				SBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.57	0.59	0.53	0.55
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.59	0.59	0.55	0.57		
				NBCL	--	--	--	--	--	--	--	--	--	--	--	0.56	0.57	0.55	0.55	
				NBIL	--	--	--	--	--	--	--	--	--	--	--	0.60	0.60	0.61	0.59	
				SBOL	--	--	--	--	--	--	--	--	--	--	--	0.59	0.57	0.56	0.53	
				SBIL	--	--	--	--	--	--	--	--	--	--	--	0.60	0.62	0.60	0.60	
X09 of 41131	US 131 over GTW RR and Indian Mill Creek in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.56	0.54	0.53	0.53		
				NBCL	--	--	--	--	--	--	--	--	--	--	--	0.56	0.54	0.53	0.54	
				NBIL	--	--	--	--	--	--	--	--	--	--	--	0.61	0.63	0.60	0.57	
				SBOL	--	--	--	--	--	--	--	--	--	--	--	0.58	0.55	0.56	0.51	
				SBIL	--	--	--	--	--	--	--	--	--	--	--	0.58	0.56	0.54	0.54	
B01 of 63022	I 96 over Huron River	1978	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.51		
				EBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59	
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.52
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B02 of 73062	M 46 over Tittabawassee River	1972	Latex concrete	EBOL	--	--	--	--	--	--	0.27	0.34	0.32	0.45	0.42	0.41	0.42	0.42		
				EBIL	--	--	--	--	--	--	0.30	0.32	0.34	0.44	0.41	0.38	0.42	0.42		
				WBOL	--	--	--	--	--	--	0.27	0.41	0.32	0.47	0.43	0.41	0.41	0.42		
				WBIL	--	--	--	--	--	--	0.32	0.37	0.39	0.51	0.45	0.42	0.49			
				EBOL	--	--	--	--	--	--	0.30	0.38	0.38	0.47	0.47	0.43	0.46			
S02 of 82022	Eastbound I 94 over Wayne Rd	1972	Latex concrete	EBCL	--	--	--	--	--	--	0.33	0.39	0.42	0.47	0.44	0.40	0.42	0.42		
				EBIL	--	--	--	--	--	--	0.38	0.51	0.46	0.53	0.53	0.46	0.53			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.44			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.39			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.49			
S03 of 82022	Westbound I 94 over Wayne Rd	1976	Latex concrete	WBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.47		
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.56			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.44			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.39			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.50			
S24 of 82251	Westbound I 94 to southbound I 75 over I 94	1977	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.49		
				EBCL	--	--	--	--	--	--	--	--	--	--	--	--	0.47			
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.56			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.44			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.39			
X01 of 82022	Eastbound I 94 over C&O RR	1976	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50		
				EBCL	--	--	--	--	--	--	--	--	--	--	--	--	0.49			
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.60			
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.49			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.60			

TABLE 19 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction													
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	
S09 of 82022	Eastbound I 94 over Ecorse Rd	1972	Latex modified mortar	EBOL	--	--	--	--	--	--	0.44	0.35	0.46	0.44	0.53	0.51	0.47	0.51
				EBCL	--	--	--	--	--	--	0.42	0.39	0.38	0.44	0.56	0.53	0.46	0.51
				EBIL	--	--	--	--	--	--	0.45	0.38	0.45	0.46	0.55	0.52	0.45	0.49
S12 of 82022	Westbound I 94 over Beech-Daly Rd	1972	Latex modified mortar	WBOL	--	--	--	--	--	--	0.46	0.33	0.40	0.38	0.47	0.45	0.42	0.45
				WBCL	--	--	--	--	--	--	0.47	0.37	0.41	0.44	0.53	0.52	0.42	0.48
				WBIL	--	--	--	--	--	--	0.43	0.37	0.43	0.47	0.54	0.56	0.47	0.53
S27 of 82195	Brush St over I 75	1969	Latex modified mortar	NBOL	--	--	--	--	--	--	0.54	0.48	0.39	0.40	0.57	0.47	0.42	0.49
				NBCL	--	--	--	--	--	--	0.48	0.43	0.34	0.34	0.52	0.48	0.41	0.48
				NBIL	--	--	--	--	--	--	0.51	0.44	0.34	0.36	0.50	0.47	0.37	0.45
B02 of 25031	US 23 over Swartz Creek	1978	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50
				NBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.58
				SBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.53
				SBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59
S06 of 25031	Grand Blanc Rd over US 23	1972	Latex concrete	EB	--	--	--	--	--	--	0.27	0.31	0.33	0.33	0.39	0.43	0.44	0.39
				WB	--	--	--	--	--	--	0.33	0.32	0.38	0.38	0.43	0.48	0.48	0.42
S02 of 25131	Baldwin Rd over I 75 (1.2 miles northwest of Oakland County Line)	1972	Latex concrete	EB	--	--	--	--	--	--	0.47	0.44	0.44	0.50	0.51	0.51	0.59	0.61
				WB	--	--	--	--	--	--	0.51	0.44	0.44	0.50	0.48	0.48	0.55	0.62
S09 of 25131	Fenton Rd over I 75 (2.4 miles southeast of US 23)	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.35	0.35	0.35	0.40	0.42	0.46	0.47	0.47
				NBIL	--	--	--	--	--	--	0.39	0.38	0.38	0.46	0.46	0.47	0.50	0.46
				SBOL	--	--	--	--	--	--	0.35	0.33	0.39	0.41	0.44	0.44	0.48	0.48
				SBIL	--	--	--	--	--	--	0.38	0.36	0.36	0.46	0.46	0.44	0.52	0.48
X01 of 33031	US 127 over NYC RR, south of Leslie	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.62	0.63	0.61	0.66
				NBIL	--	--	--	--	--	--	--	--	--	--	0.63	0.69	0.66	0.70
				SBOL	--	--	--	--	--	--	--	--	--	--	0.52	0.61	0.60	0.66
				SBIL	--	--	--	--	--	--	--	--	--	--	0.62	0.67	0.67	0.71
X01 of 33034	US 27 over C&O RR and I 96 BL in Lansing	1975	Latex modified mortar	NBOL ¹	--	--	--	--	--	--	--	--	--	--	0.51	0.53	0.50	0.49
				NBOL ²	--	--	--	--	--	--	--	--	--	--	0.51	0.53	0.50	0.50
				NBIL	--	--	--	--	--	--	--	--	--	--	0.37	0.52	0.53	0.51
				SBOL	--	--	--	--	--	--	--	--	--	--	0.52	0.52	0.50	0.48
				SBIL	--	--	--	--	--	--	--	--	--	--	0.43	0.54	0.57	0.50
B01 of 33045	I 496 over Red Cedar River	1978	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.68
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.71
S01 of 33045	I 496 over Cedar St	1978	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.62
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.63
S02 of 33045	I 496 over Pennsylvania Ave	1978	Latex concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.64
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.62
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.62

¹ North end of deck finished with transverse broom.

² South end of deck finished with transverse comb.

TABLE 19 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction															
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979			
S10 of 47065	I 96 over Grand River (Brighton west exit)	1975	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	0.46	0.50	0.47	0.53		
					EBIL	--	--	--	--	--	--	--	--	--	0.58	0.63	0.58	0.64		
					WBOL	--	--	--	--	--	--	--	--	--	0.48	0.56	0.49	0.55		
				WBIL	--	--	--	--	--	--	--	--	--	0.59	0.66	0.59	0.64			
X01 of 63022	I 96 over GTW RR	1978	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.39		
				EBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.45	
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.40
				WBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.50			
X02 of 63022	I 96 over C&O RR, Novi	1978	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	0.39		
				EBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.42	
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.47
				WBOL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.42
				WBCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	0.47			
S04 of 82022	I 94 over Merriman Rd	OL 1977 IL 1978	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.52			
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59	
S05 of 82022	Eastbound I 94 over Middlebelt Rd	OL 1977 IL 1978	Low slump high density concrete	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.44			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.52	
S07 of 82022	Eastbound I 94 over Inkster Rd	OL 1977 IL 1978	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.45			
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.58	
S08 of 82022	Westbound I 94 over Inkster Rd	OL 1977 IL 1978	Low slump high density concrete	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.43			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.61	
S10 of 82022	Westbound I 94 over Ecorse Rd	OL 1977 IL 1978	Low slump high density concrete	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.48			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.62	
S11 of 82022	Eastbound I 94 over Beech-Daly	OL 1977 IL 1978	Low slump high density concrete	EBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.50			
				EBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.51	
S22 of 82251	Westbound I 94 to southbound I 75 ramp over eastbound I 94 to northbound I 75 ramp	1977	Low slump high density concrete	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.42			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.43	
S29 of 82251	Westbound I 94 to southbound I 75 over I 75	1977	Low slump high density concrete	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	0.43			
				WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.43	

TABLE 20
OPEN-GRADED ASPHALT FRICTION COURSES

Project No.	Location	Const. Year	Direction and Lane	Coefficient of Wet Sliding Friction				
				1975	1976	1977	1978	1979
73112-09446	I 75 from 120 ft south of M 13 northwest to 100 ft south of Adam St	1975	NBOL	0.50	0.58	0.47	0.43	0.44
			NBIL	0.46	0.62	0.52	0.46	0.46
			SBOL	0.51	0.63	0.54	0.49	0.50
			SBIL	0.47	0.61	0.49	0.43	0.47
Control Section 09042	M 25 from Heavenridge to Sheurman St in Bay City	1975	EBOL	0.41	0.21	0.26	0.22	0.23
			EBIL	0.42	0.25	0.29	0.23	0.26
			WBOL	0.45	0.21	0.28	0.24	0.24
			WBIL	0.42	0.20	0.25	0.22	0.25
Control Section 63054	US 10 500 ft approaches to White Lake Rd north of M 15	1978	NBOL	--	--	--	--	0.52
			NBIL	--	--	--	--	0.51
			SBOL	--	--	--	--	0.47
			SBIL	--	--	--	--	0.49

TABLE 21
TRINIDAD ASPHALT SURFACING
 (Project Mb 72013-06140A)
 Research Project 73 C-16

Location Station to Station	Surface Type	Direction and Lane	Coefficient of Wet Sliding Friction																	
			8-19-74			9-15-75			7-1-76			10-7-77			9-12-78			10-9-79		
			Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
450+00 - 482+00	6.0 Percent Trinidad Asphalt (Type C)	NBOL NBIL	0.48 0.56	0.50 0.59	0.49 0.58	0.57 0.61	0.59 0.63	0.62 0.67	0.66 0.71	0.62 0.67	0.69 0.73	0.64 0.73	0.67 0.74	0.69 0.73	0.65 0.71	0.66 0.73	0.65 0.71	0.66 0.73	0.65 0.72	0.61 0.68
482+00 - 514+00	6.5 Percent Trinidad Asphalt (Type C)	NBOL NBIL	-- --	-- --	-- --	0.57 0.63	0.58 0.65	0.58 0.64	0.60 0.69	0.62 0.70	0.62 0.76	0.61 0.70	0.67 0.77	0.65 0.76	0.65 0.68	0.67 0.74	0.66 0.68	0.66 0.72	0.66 0.72	0.58 0.69
514+00 - 563+00	6.5 Percent Trinidad Asphalt (Type M)	NBOL NBIL	0.48 0.54	0.50 0.57	0.49 0.56	0.58 0.63	0.58 0.64	0.58 0.64	0.59 0.68	0.60 0.71	0.62 0.72	0.60 0.69	0.65 0.74	0.64 0.73	0.65 0.73	0.66 0.74	0.65 0.73	0.66 0.74	0.66 0.73	0.56 0.69
563+00 - 612+00	6.0 Percent Trinidad Asphalt (Type M)	NBOL NBIL	0.51 0.58	0.53 0.59	0.52 0.59	0.59 0.63	0.60 0.64	0.60 0.63	0.61 0.69	0.62 0.72	0.64 0.73	0.61 0.71	0.65 0.77	0.65 0.75	0.65 0.73	0.67 0.74	0.66 0.73	0.66 0.73	0.66 0.73	0.57 0.68
612+00 - 706+00	Bituminous Concrete (Type M)	NBOL NBIL	0.51 0.58	0.53 0.59	0.52 0.59	0.57 0.64	0.59 0.66	0.58 0.65	0.64 0.69	0.66 0.71	0.64 0.77	0.61 0.70	0.64 0.78	0.62 0.77	0.65 0.72	0.65 0.78	0.65 0.75	0.65 0.75	0.65 0.75	0.60 0.69
706+00 - 659+00	6.0 Percent Trinidad Asphalt (Type M)	SBOL SBIL	0.42 0.53	0.46 0.56	0.45 0.54	0.53 0.64	0.54 0.65	0.54 0.64	0.61 0.68	0.62 0.70	0.62 0.69	0.60 0.72	0.61 0.76	0.61 0.74	0.61 0.72	0.61 0.74	0.61 0.73	0.61 0.74	0.61 0.73	0.56 0.68
659+00 - 612+00	6.5 Percent Trinidad Asphalt (Type M)	SBOL SBIL	0.50 0.58	0.52 0.63	0.51 0.60	0.55 0.60	0.55 0.64	0.55 0.62	0.59 0.71	0.62 0.71	0.62 0.73	0.60 0.71	0.61 0.73	0.61 0.77	0.61 0.75	0.61 0.73	0.61 0.75	0.61 0.75	0.61 0.74	0.56 0.68
612+00 - 514+00	Bituminous Concrete (Type M)	SBOL SBIL	0.51 0.58	0.55 0.62	0.53 0.60	0.55 0.61	0.55 0.64	0.55 0.63	0.61 0.70	0.62 0.72	0.61 0.71	0.61 0.71	0.60 0.74	0.60 0.73	0.59 0.71	0.62 0.71	0.62 0.71	0.62 0.71	0.63 0.72	0.55 0.67
514+00 - 450+00	Bituminous Concrete (Type C)	SBOL SBIL	-- --	-- --	-- --	0.58 0.63	0.59 0.63	0.58 0.63	0.64 0.69	0.66 0.71	0.65 0.70	0.65 0.70	0.65 0.76	0.65 0.74	0.65 0.73	0.65 0.74	0.65 0.74	0.65 0.74	0.65 0.71	0.59 0.66

TABLE 22
COLD-MILLED SURFACES
Research Project 76 TI-341

Control Section	Location	Surface Type	Const. Year	Before Rotomilling			Date Rotomilled	Average Coefficient of Wet Sliding Friction			
				Test Date	Lane Tested	Avg Wsf		1976	1977	1978	1979
73073	M 58 at Weinecke Rd	Conc	1959	9-75	EBOL	0.23	8-76	--	0.42*	0.35	0.38
		Conc			EBIL	0.23		--	0.41*	0.34	0.39
		Conc			WBOL	0.27		--	0.44*	0.35	0.41
		Conc			WBCL	0.24		--	0.46*	0.39	0.45
		Bit	1959	WBIL	0.41	--	0.48*	0.39	0.43		
73073	M 58 at Center Rd	Conc	1959	9-75	EBOL	0.20	8-76	--	0.42*	0.34	0.37
		Conc			EBIL	0.17		--	0.42*	0.34	0.39
		Conc			WBOL	0.15		--	0.40*	0.34	0.38
		Conc			WBCL	0.24		--	0.42*	0.35	0.39
		Bit	1959	WBIL	--	--	0.40*	0.33	0.37		
73073	M 58 at Hemmeter Rd	Conc	1959	9-75	EBOL	0.20	8-76	--	0.42*	0.34	0.40
		Conc			EBIL	0.14		--	0.42*	0.34	0.39
		Conc			WBOL	0.18		--	0.42*	0.34	0.39
		Conc			WBCL	0.20		--	0.43*	0.37	0.39
		Bit	1959	WBIL	0.24	--	0.44*	0.32	0.38		
52042	M 28-US 41 at east end of Marquette Bypass	Conc	1963	5-76	EBOL	0.39	9-77	--	0.50	0.37	0.47
		Conc			EBIL	0.39		--	0.47	0.39	0.48
31051	US 41-M 26 approaches to Houghton-Hancock Bridge	Conc	1960	5-76	NBOL	0.24	9-77	--	0.43	0.47	0.39
		Conc			NBIL	0.29		--	0.42	0.51	0.47
		Conc			SBOL	0.27		--	0.46	0.45	0.41
		Conc			SBIL	0.29		--	0.44	0.49	0.43
31012		Conc			NB	0.35		--	0.47	0.50	0.45
31052		Conc			NBOL	0.30		--	0.55	0.47	0.40
		Conc			NBIL	0.30		--	0.50	0.47	0.42
		Conc			SBOL	0.37		--	0.48	0.42	0.42
		Conc			SBIL	0.33		--	0.51	0.48	0.47
		Conc			SB	0.38		--	0.54	0.55	0.50
		Conc									
55011	US 41-M 35 at 10th St and 10th Ave	Conc	1964	9-75	NBOL	0.26	9-77	--	0.45	0.31	0.34
		Conc			NBIL	0.26		--	0.51	0.35	0.37
		Conc			SBOL	0.26		--	0.41	0.31	0.33
		Conc			SBIL	0.50		--	0.42	0.31	0.33
55011	US 41 from 26th St to south of 37th St	Conc	1954	9-75	NBOL	0.26	9-77	--	0.45	0.39	0.38
		Conc			NBIL	0.27		--	0.46	0.39	0.38
		Conc			SBOL	0.26		--	0.42	0.38	0.37
		Conc			SBIL	0.28		--	0.42	0.38	0.39
55011	US 41 at M 35	Conc	1954	9-75	NBOL	0.48	9-77	--	0.38	0.35	0.33
		Conc			NBIL	0.46		--	0.36	0.33	0.34
		Conc			SBOL	0.44		--	0.36	0.32	0.34
		Conc			SBIL	0.35		--	0.39	0.35	0.37
55031		Conc			SBOL	--		--	0.60	0.50	0.51
		Conc			SBIL	--		--	0.41	0.34	0.35
07012	US 41 at L'Anse truck lane	Conc	1976	10-76	SBOL	0.54	9-77	--	0.60	0.62	0.56**

* Average of two test series.

** Resurfaced after this test series.

TABLE 22 (Cont.)
COLD-MILLED SURFACES
Research Project 76 TI-341

Control Section	Location	Surface Type	Const. Year	Before Rotomilling			Date Rotomilled	Average Coefficient of Wet Sliding Friction			
				Test Date	Lane Tested	Avg Wsf		1976	1977	1978	1979
28013	US 31 in Traverse City	Conc	1956	8-75	NBOL	0.23	9-77	--	0.35	0.35	0.38
		Conc			NBIL	0.21		--	0.37	0.35	0.40
		Conc			SBOL	0.22		--	0.36	0.34	0.39
		Conc			SBIL	0.25		--	0.34	0.38	0.42
41033	M 37 north of I 96	Bit	1967	--	SBOL	--	9-77	--	--	0.32	0.41
		Bit			SBIL	--		--	0.60	0.39	0.46
63041	M 59 at Williams Lake Rd	Conc	1971	6-74	EBOL	0.36	9-77	--	0.48	0.44	0.38
		Conc			EBIL	0.34		--	0.42	0.42	0.36
		Conc			WBOL	0.32		--	0.47	0.43	0.38
		Conc			WBIL	0.29		--	0.49	0.45	0.40
58171	I 275 south of the Wayne-Monroe County line	Conc	1976	7-76	SBIL	0.58	11-76	--	0.71	0.64	0.62
82052	US 24 at Northline Rd	Bit	1964	--	NBOL	--	8-76	0.56	0.39	0.40	0.43
		Bit			NBCL	--		0.58	0.38	0.40	0.45
		Bit			NBIL	--		0.61	0.46	0.41	0.46
		Conc	1964	--	SBOL	--	0.52	0.41	0.43	0.46	
		Conc			SBCL	--	0.59	0.39	0.41	0.48	
		Conc			SBIL	--	0.57	0.38	0.37	0.46	

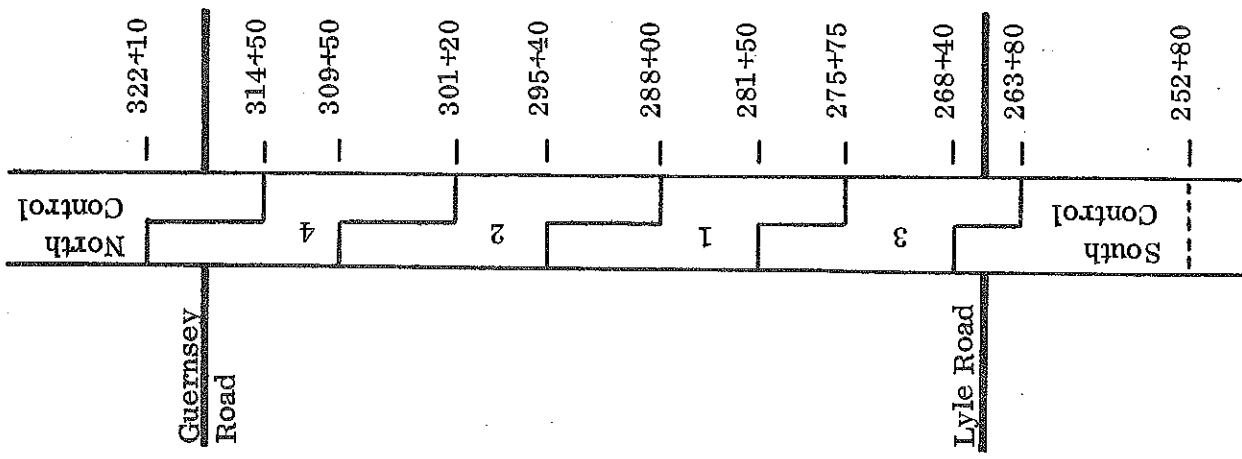


TABLE 23
 SULFUR-MODIFIED BITUMINOUS CONCRETE
 (Project Mb 26011-11032)
 Research Project 74 D-29

Section Designation	Percent Sulphur-Asphalt Mixture in 4.12 Wearing Course	Sulphur/Asphalt Ratio	Lane	Coefficient of Wsf		
				1977	1978	1979
North Control	0	---	NB	0.49	0.51	0.53
			SB	0.45	0.50	0.54
1	6.3	30/70	NB	0.54	0.52	0.56
			SB	0.52	0.53	0.57
2	6.8	30/70	NB	0.52	0.53	0.57
			SB	0.51	0.52	0.56
3	6.7	50/50	NB	0.52	0.53	0.57
			SB	0.53	0.52	0.58
4	7.4	50/50	NB	0.53	0.56	0.57
			SB	0.47	0.48	0.53
South Control	0	---	NB	0.53	0.54	0.57
			SB	0.48	0.52	0.54

TABLE 24
 BITUMINOUS CONCRETE CONTAINING
 ARENACEOUS LIMESTONE
 (Project Mb 06071-11004A)
 Research Project 77 C-18

Surface Type	Lane	Average Coefficient of Wet Sliding Friction (x 100)		
		1977	1978	1979
Bituminous concrete (Type CM) using arenaceous limestone (Station 848 to 894)	NBOL	48	47	50
	NBIL	49	53	54
	SBOL	36	42	43
	SBIL	46	50	56
Bituminous concrete (Type C) using high carbonate gravel (Station 772 to 848)	NBOL	43	41	45
	NBIL	47	46	56
	SBOL	37	42	44
	SBIL	48	49	54

TABLE 25
STONE MIX PROJECTS

Project No.	Location	Const. Year	Surface Type	Lane Tested	Coefficient of Wsf						
					1976	1977	1978	1979			
14031-06119	M 62 from Michigan-Indiana State line north to US 12	1976	SM	NB	0.31	0.42	0.59	0.48			
				SB	0.36	0.40	0.56	0.44			
36023-10843	M 69 in Crystal Falls	1976	SM	EBOL	--	0.50	0.43	0.48			
				EBIL	--	0.57	0.51	0.57			
				WBOL	--	0.48	0.43	0.47			
				WBIL	--	0.59	0.54	0.57			
78022-11098	US 12 from 500 ft to 2,500 ft east of Balk Rd	1976	Bit Conc	EB	0.53	0.51	0.53	0.59			
				WB	0.52	0.44	0.48	0.55			
78062-09312	M 86 from M 66 west	1976	Bit Agg	EB	0.47	0.50	0.56	0.63			
				WB	0.46	0.50	0.54	0.62			
				NB	0.51	0.54	0.60	0.64			
				SB	0.56	0.54	0.59	0.66			
82053-06459	US 24 from I 96 BL to 8 Mile Rd	1976	SM	EB	0.57	0.65	0.64	0.68			
				WB	0.55	0.61	0.66	0.73			
25011-10849	M 13-M 21 from Lennon north to M 56	1977	Bit Conc	NB	--	0.36	0.45	0.43			
				SB	--	0.41	0.47	0.45			
				M 13-M 21 from I 69 north to Lennon	SM	NB	--	0.39	0.48	0.48	
						SB	--	0.41	0.43	0.40	
				M 13-M 21 from I 96 BL to 8 Mile Rd	SM	NBOL	0.57	0.49	0.49	0.51	
						NB#3	0.56	0.46	0.46	0.47	
				M 66-M 86 from M 86 west to M 86 east	SM	NB#2	0.56	0.48	0.49	0.53	
						NBIL	0.55	0.54	0.54	0.57	
				M 86 east of M 66	SM	Bit Conc	SBOL	0.50	0.43	0.47	0.49
							SB#3	0.51	0.48	0.49	0.50
SB#2	0.53	0.49	0.51				0.54				
SBIL	0.53	0.47	0.43				0.52				

TABLE 26
SPRINKLE TREATMENT
(Project FRR 71072-15287A)
Research Project 78 C-19

US 23 Location	Surface Type	Test Speed, mph	Lane	Coefficient of Wsf (x 100)					
				7-24-79			10-9-79		
				Low	High	Avg	Low	High	Avg
M 65 North to US 23A	270 lb/sq yd Bituminous Aggregate	30	NB	67	70	68	60	61	60
			SB	63	67	65	55	56	55
		40	NB	55	60	57	48	51	50
			SB	54	56	55	44	49	46
		55	NB	44	46	45	38	40	39
			SB	39	43	42	36	40	37
US 23A North to Forest Rd	120 lb/sq yd Bituminous Concrete Wearing Course	30	NB	61	67	64	54	57	55
			SB	64	69	67	54	57	56
		40	NB	55	57	56	46	49	48
			SB	50	56	53	45	48	47
		55	NB	40	44	41	38	39	38
			SB	43	46	44	34	38	36
Station 225+00 to 235+00	180 lb/sq yd Bituminous Concrete Wearing Course With 3 lb/sq yd Sprinkle Treatment	30	SB	64	66	65	64	67	66
		40	SB	54	60	57	57	60	58
		55	SB	54	56	55	52	56	54
Station 104+00 to 114+00	180 lb/sq yd Bituminous Concrete Wearing Course with 5 lb/sq yd Sprinkle Treatment	30	NB	55	60	57	63	64	64
		40	NB	50	52	51	51	55	53
		55	NB	40	44	42	44	49	46
Station 114+00 to 225+00	180 lb/sq yd Bituminous Concrete Wearing Course with 7-1/2 lb/sq yd Sprinkle Treatment	30	NB	62	63	62	64	68	66
			SB	64	67	66	66	67	67
		40	NB	50	52	51	57	58	57
			SB	58	60	59	56	57	57
		55	NB	40	44	42	55	56	55
SB	49	49	49	55	56	55			
Station 104+00 to 114+00	180 lb/sq yd Bituminous Concrete Wearing Course with 10 lb/sq yd Sprinkle Treatment	30	SB	62	63	62	66	67	66
		40	SB	54	54	54	58	60	59
		55	SB	48	49	48	54	55	54

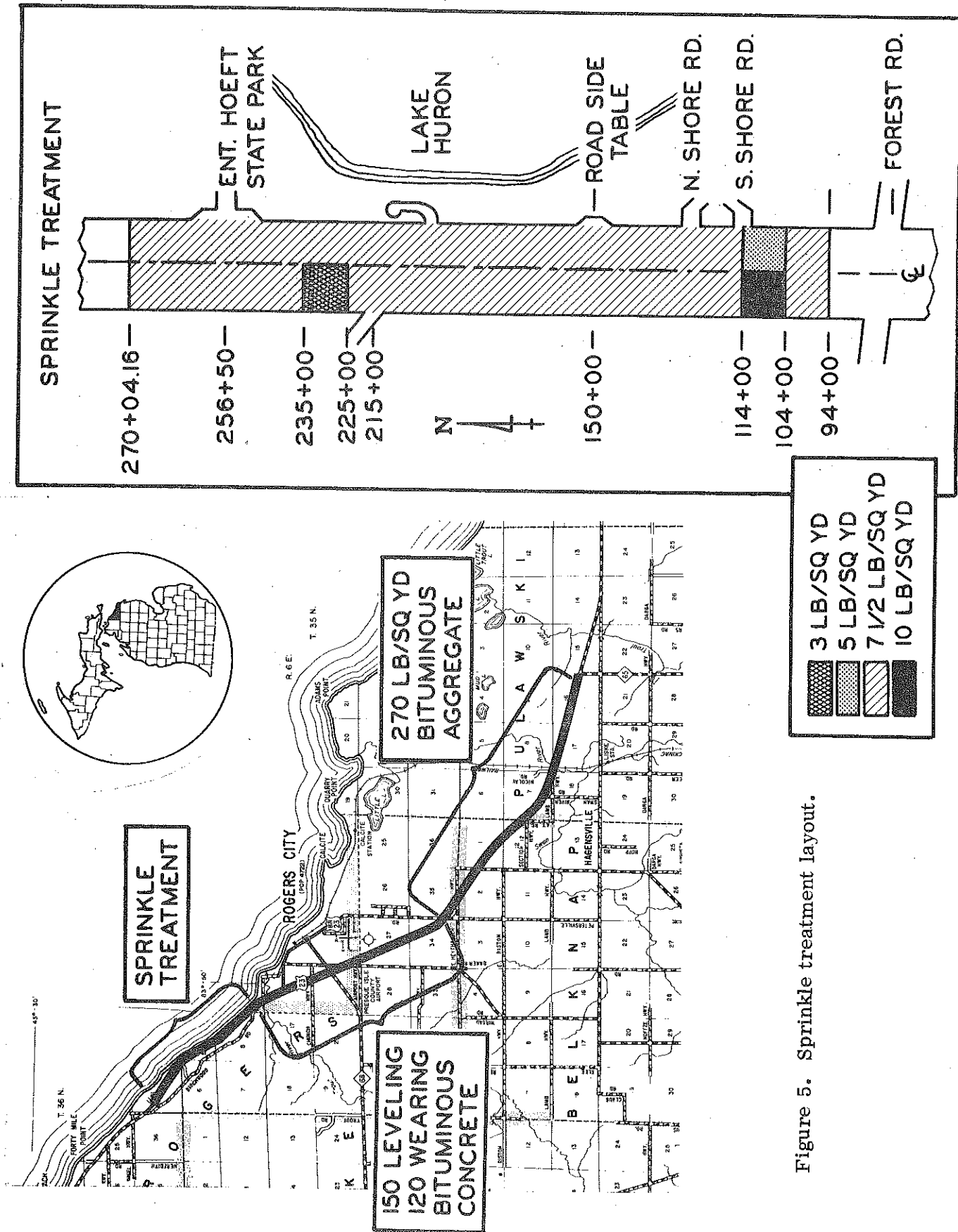


Figure 5. Sprinkle treatment layout.

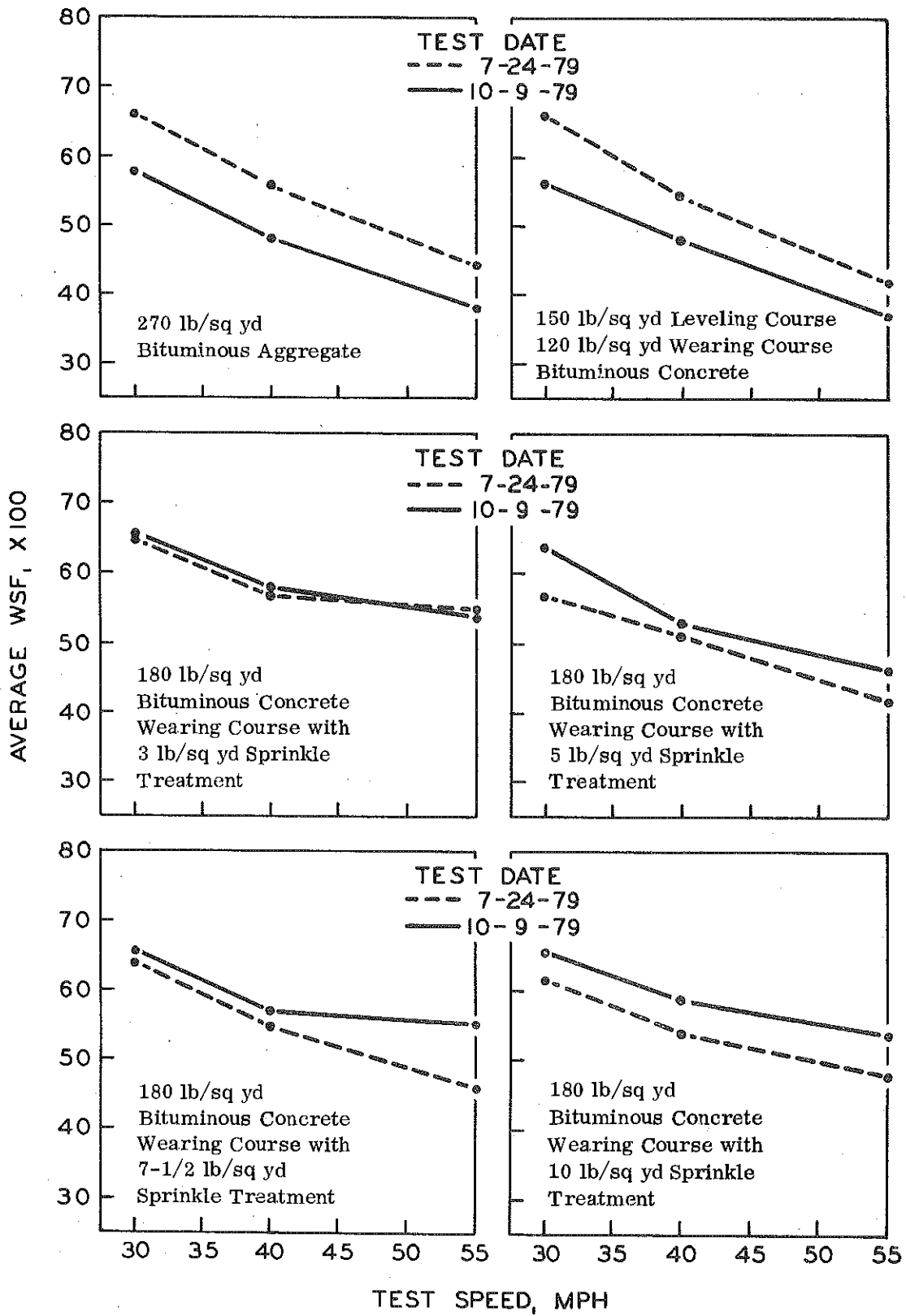


Figure 6. Sprinkle treatment speed gradients.

TABLE 27
RECYCLED BITUMINOUS WEARING COURSES

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wsf (x 100)		
						Low	High	Avg
Mbr 59022-12689A	M 57 from Flat River east to M 66	Recycled Bit. Conc. Wearing Course	1978	10-2-78	EB	51	57	54
					WB	49	57	53
				5-29-79	EB	49	60	58
					WB	54	58	55
Mbr 30031-14219A	M 99 from Michigan-Ohio State Line north to M 34	Recycled Bit. Agg. Surface Course	1979	10-31-79	EB	49	57	53
					WB	49	55	52
				11-21-79	NB	49	61	56
					SB	50	60	56

treated surface is yielding Wsf values higher than the control areas. Long term friction trends will be investigated as future annual tests are conducted. The 1979 test values are summarized in Table 26; speed gradients are graphically shown in Figure 6.

Table 27 - Recycled Bituminous Wearing Courses

Wsf values determined on two bituminous pavements with recycled top courses are shown in Table 27.

Initial and one-year friction levels both averaged 0.54 for the recycled bituminous concrete wearing course. Conventional bituminous concrete lanes tested during 1979 (presented in Table 2) averaged 0.52 at the initial and one-year service level.

Initial year recycled bituminous aggregate tests yielded friction levels averaging 0.56. The conventional bituminous aggregate surface, tested during 1979, averaged 0.49 during the initial service year.

SECTION VII
HIGH-ACCIDENT LOCATIONS

High-Accident Locations

This section reports the Department's continuing program to reduce skidding accidents on wet pavement at critical locations. Pavement friction tests are conducted at high-accident locations to indicate priorities for resurfacing. In some cases, these locations are used for testing promising new skid-resistant surfacing mixtures.

Selection of high-accident locations for this year was made by Traffic and Safety Division and are based on 1978 accident data. Friction level measurements yielded average Wsf values below 0.40 at 27 percent of the 193 lanes tested in 1979.

During 1979, none of the lanes at any of the 36 locations tested yielded average friction levels lower than 0.30. Prior to 1979, all test years have had high-accident locations with test results averaging lower than 0.30.

During 1979, pavement friction tests were conducted on 25 major highway routes. Testing was dispersed throughout seven districts, 15 counties, and 36 separate locations. Table 28 summarizes the high-accident friction tests.

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1978 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
DISTRICT 8 (CONT'D)	<u>Ingham County</u>								
	33011	M 99, Logan St from 2.730 to 2.930 (Jolly Rd = 2.740), City of Lansing	39	31	NBOL	Bit	0.46	0.51	0.48
					NBIL	Bit	0.46	0.49	0.47
					SBOL	Bit	0.48	0.51	0.50
					SBIL	Bit	0.48	0.48	0.47
	33011	M 99, Logan St from 3.700 to 3.900 (Holmes Rd = 3.740), City of Lansing	64	41	NBOL	Conc	0.37	0.42	0.40
					NBIL	Bit	0.51	0.51	0.51
					SBOL	Conc	0.41	0.45	0.43
					SBIL	Bit	0.48	0.51	0.49
	33032	I 96 BL, Cedar St from 6.300 to 6.500 (Hazel St = 6.448), City of Lansing	35	37	NBOL	Bit	0.41	0.46	0.43
					NBIL	Bit	0.41	0.43	0.42
					SBOL	Bit	0.39	0.41	0.40
					SBIL	Bit	0.39	0.41	0.40
	33083	I 96 BL from 2.550 to 2.750 (Gorham St = 2.557), City of Jackson	39	38	EBOL	Bit	0.37	0.42	0.40
					EBIL	Bit	0.41	0.45	0.43
					WBOL	Conc	0.49	0.55	0.52
					WBIL	Bit	0.42	0.48	0.45
	<u>Livingston County</u>								
	47121	M 155 from 0.000 to 0.200 (Grand River Ave = 0.000), City of Howell	25	48	NB	Bit	0.43	0.46	0.45
					SB	Bit	0.43	0.46	0.45
<u>Washtenaw County</u>									
81081	M 17 from 2.290 to 2.490 (Mansfield = 2.390), City of Ypsilanti	44	36	EBOL	Grooved Conc	0.41	0.42	0.41	
				EBIL	Grooved Conc	0.41	0.42	0.41	
				WBOL	Grooved Conc	0.40	0.42	0.41	
				WBIL	Grooved Conc	0.38	0.42	0.40	
DISTRICT M	<u>Macomb County</u>								
	50011	M 53 from 4.740 to 4.940 (13 Mile Rd = 5.060), City of Warren	53	38	NBOL	Bit	0.49	0.50	0.49
					NBCL	Bit	0.47	0.48	0.47
					NBIL	Bit	0.46	0.49	0.47
					SBOL	Bit	0.44	0.48	0.46
					SBCL	Bit	0.48	0.50	0.49
					SBIL	Bit	0.50	0.52	0.51
	50031	M 97 from 12.530 to 12.730 (LaFayette St = 12.680), City of Mt. Clemens	29	28	NBOL	Conc	0.34	0.38	0.36
					NBIL	Conc	0.36	0.36	0.36
					SBOL	Bit	0.31	0.35	0.33
					SBIL	Bit	0.36	0.40	0.38
	<u>Oakland County</u>								
	63031	US 24, Telegraph Rd from 6.990 to 7.190 (Maple Rd = 7.092), Bloomfield Township	101	33	NBRT	Conc	0.42	0.50	0.45
					NBOL	Conc	0.39	0.42	0.40
					NB#3	Conc	0.42	0.44	0.43
					NB#2	Conc	0.44	0.46	0.45
					NBIL	Conc	0.46	0.47	0.47
					SBOL	Conc	0.37	0.45	0.40
					SB#3	Conc	0.36	0.40	0.38
					SB#2	Conc	0.38	0.40	0.39
				SBIL	Conc	0.38	0.40	0.39	
63051	M 1, Woodward Ave from 9.650 to 9.850 (11 Mile Rd = 9.576), City of Royal Oak	25	40	NBOL	Bit	0.42	0.44	0.43	
				NB#3	Bit	0.45	0.46	0.45	
				NB#2	Bit	0.45	0.47	0.46	
				NBIL	Bit	0.44	0.48	0.46	
				SBOL	Bit	0.42	0.46	0.44	
				SB#3	Bit	0.44	0.46	0.45	
				SB#2	Bit	0.43	0.46	0.44	
				SBIL	Bit	0.47	0.49	0.48	
63053	US 10 from 5.570 to 5.770 (Silver Lake Rd = 5.642), Waterford Township	54	41	NBOL	Bit	0.33	0.36	0.35	
				NBIL	Bit	0.36	0.38	0.37	
				SBOL	Bit	0.33	0.35	0.34	
				SBIL	Bit	0.34	0.38	0.36	

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1978 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Oakland County (Cont.)</u>								
63091	I 75 BL from 0.650 to 0.850 (Glenwood = 0.690), City of Pontiac	51	24	NBOL	Bit	0.37	0.39	0.38
				NBIL	Bit	0.37	0.40	0.39
				SBOL	Bit	0.35	0.37	0.36
				SBIL	Bit	0.36	0.38	0.37
63112	M 24 from 6.030 to 6.230 (Clarkston Rd = 6.130), City of Lake Orion	79	34	NBOL	Bit	0.38	0.41	0.40
				NBIL	Bit	0.41	0.44	0.42
				SBOL	Bit	0.39	0.40	0.40
				SBIL	Bit	0.39	0.42	0.41
63131	M 150 from 0.030 to 0.230 (I 75 = 0.000), City of Troy	110	33	NBOL	Conc	0.37	0.40	0.38
				NBIL	Conc	0.35	0.37	0.36
				SBOL	Conc	0.32	0.34	0.33
				SBIL	Conc	0.33	0.38	0.36
<u>Wayne County</u>								
82025	I 94 from 1.170 to 1.370 (northbound Conner Ave = 1.140), City of Detroit	27	44	EBOL	Conc	0.45	0.46	0.46
				EBCL	Conc	0.45	0.46	0.46
				EBIL	Conc	0.48	0.50	0.49
				WBOL	Conc	0.45	0.50	0.48
				WBCL	Conc	0.43	0.45	0.44
				WBIL	Conc	0.48	0.50	0.49
82051	US 24, Telegraph Rd from 2.160 to 2.360 (VanHorn Rd = 2.240), Brownstown Township	24	38	NBOL	Bit	0.37	0.40	0.38
				NBIL	Bit	0.38	0.41	0.40
				SBOL	Bit	0.40	0.41	0.41
				SBIL	Bit	0.41	0.42	0.41
82052	US 24, Telegraph Rd from 6.020 to 6.220 (Goddard Rd = 6.120), Village of Taylor Center	95	35	NBOL	Bit	0.35	0.38	0.36
				NBCL	Bit	0.37	0.38	0.38
				NBIL	Bit	0.34	0.36	0.35
				SBOL	Conc	0.39	0.42	0.40
				SBCL	Conc	0.40	0.43	0.41
				SBIL	Conc	0.39	0.41	0.40
82062	US 12, Michigan Ave from 7.790 to 7.990 (Martin St = 7.880), City of Detroit	46	35	EBOL	Bit	0.39	0.40	0.40
				EBIL	Bit	0.39	0.44	0.42
				WBOL	Bit	0.38	0.40	0.39
				WBIL	Bit	0.38	0.40	0.39
82111	US 10 from 0.130 to 0.330 (Forest Ave = 0.334), City of Detroit	30	47	NBOL	Conc	0.40	0.42	0.41
				NBCL	Conc	0.40	0.40	0.40
				NBIL	Conc	0.39	0.42	0.40
				SBOL	Conc	0.38	0.42	0.40
				SBCL	Conc	0.40	0.42	0.41
				SBIL	Conc	0.42	0.44	0.43
82111	US 10 from 1.830 to 2.030 (US 12, Michigan Ave = 1.833), City of Detroit	35	31	NBOL	Conc	0.39	0.41	0.40
				NBCL	Conc	0.36	0.39	0.37
				NBIL	Conc	0.39	0.41	0.40
				SBOL	Conc	0.36	0.40	0.38
				SBCL	Conc	0.39	0.42	0.41
				SBIL	Conc	0.38	0.41	0.40
82112	US 10 from 6.320 to 6.520 (Glendale Ave = 6.484), City of Detroit	42	40	NBOL	Conc	0.40	0.42	0.41
				NBCL	Conc	0.39	0.40	0.40
				NBIL	Conc	0.40	0.43	0.42
				SBOL	Conc	0.40	0.44	0.42
				SBCL	Conc	0.40	0.40	0.40
				SBIL	Conc	0.44	0.45	0.44
82131	M 1, Woodward Ave from 1.790 to 1.990 (Longwood Ave = 1.986), City of Detroit	55	40	NBOL	Bit	0.42	0.43	0.43
				NB#4	Bit	0.42	0.43	0.42
				NB#3	Bit	0.45	0.46	0.45
				NB#2	Bit	0.44	0.46	0.45
				NBIL	Bit	0.48	0.51	0.49
				SBOL	Bit	0.41	0.42	0.42
				SB#4	Bit	0.40	0.42	0.41
				SB#3	Bit	0.42	0.46	0.43
				SB#2	Bit	0.34	0.40	0.38
				SBIL	Bit	0.31	0.34	0.32

DISTRICT M (CONT)

**TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY**

Control Section	Location and Mileage	1978 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
DISTRICT M (CON'T)	<u>Wayne County (Cont.)</u>								
	82141	M 102, 8 Mile Rd from 4.050 to 4.250 (Evergreen Rd = 4.179), City of Detroit	31	35	EBOL	Bit	0.37	0.40	0.39
					EBCL	Bit	0.40	0.41	0.41
					EBIL	Bit	0.42	0.44	0.43
					WBRT	Bit	0.38	0.43	0.41
					WBOL	Bit	0.40	0.40	0.40
					WBCL	Bit	0.38	0.40	0.39
					WBIL	Bit	0.39	0.40	0.39
	82192	M 39, Southfield Fwy from 9.430 to 9.630 (West Chicago Blvd = 9.531), City of Detroit	52	46	NBOL	Conc	0.37	0.40	0.38
					NBCL	Conc	0.38	0.40	0.39
					NBIL	Conc	0.39	0.40	0.40
					SBOL	Conc	0.38	0.38	0.38
					SBCL	Conc	0.40	0.42	0.41
					SBIL	Conc	0.42	0.43	0.42
	82251	I 75 from 1.230 to 1.430 (Canfield Ave = 1.264), City of Detroit	36	39	NBOL	Conc	0.43	0.43	0.43
					NB#3	Conc	0.44	0.48	0.46
					NB#2	Conc	0.49	0.50	0.49
					NBIL	Conc	0.52	0.56	0.55
					SBOL	Conc	0.43	0.45	0.44
					SB#3	Conc	0.48	0.49	0.48
					SB#2	Conc	0.52	0.52	0.52
					SBIL	Conc	0.51	0.57	0.55
	82251	I 75 from 1.450 to 1.650 (Warren Ave = 1.597), City of Detroit	48	48	NBRL	Bit	0.38	0.42	0.40
					NBOL	Conc	0.40	0.46	0.43
					NBCL	Conc	0.46	0.50	0.48
					NBIL	Conc	0.55	0.57	0.56
					SBOL	Conc	0.44	0.46	0.45
					SB#3	Conc	0.46	0.48	0.47
					SB#2	Conc	0.49	0.50	0.50
					SBIL	Conc	0.57	0.58	0.57
	82252	I 75 from 2.230 to 2.430 (Carpenter Ave = 2.417), City of Detroit	31	39	NBOL	Conc	0.44	0.45	0.44
					NB#3	Conc	0.45	0.46	0.46
					NB#2	Conc	0.45	0.48	0.46
					NBIL	Conc	0.50	0.52	0.51
					SBOL	Conc	0.40	0.45	0.43
					SB#3	Conc	0.44	0.46	0.45
					SB#2	Conc	0.44	0.48	0.46
					SBIL	Conc	0.51	0.54	0.53

SECTION VIII
SPECIAL REQUEST TESTS

Special Request Tests

During the course of the year, requests for pavement friction tests are received from various field personnel or through the Design, Maintenance, Traffic and Safety, or Testing and Research Divisions. These requests receive priority considerations during scheduling of wet sliding friction tests. Results of test data are forwarded to the person or agency initiating the request as soon as possible after completion of field measurements.



OFFICE MEMORANDUM

DATE: July 20, 1979

TO: F. Copple, Supervisor
Pavement Performance Group

FROM: P. M. Schafer

SUBJECT: Additional Pavement Friction Tests at the Dove-Range Road Interchange with I-94 in St. Clair County
Research Project 54 G-74, 79 SR-1

In accord with your verbal request, a second series of friction tests have been conducted at the subject location. The first test series was reported to you in my correspondence dated October 27, 1978 as 78 SR-32. Results of both test series are shown below for your review.

<u>Location</u>	<u>Coefficient of Wsf</u>					
	<u>10-14-78</u>			<u>06-05-79</u>		
	<u>Low</u>	<u>High</u>	<u>Avg.</u>	<u>Low</u>	<u>High</u>	<u>Avg.</u>
Eastbound I-94 Off-Ramp	0.65	0.70	0.67	0.57	0.64	0.61
Westbound I-94 Off-Ramp	0.43	0.47	0.45	0.31	0.49	0.40
Eastbound I-94 On-Ramp	0.47	0.48	0.47	0.37	0.51	0.43
Westbound I-94 On-Ramp	0.65	0.68	0.66	0.61	0.62	0.62

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Group

PMS:Ive

cc: K. A. Allemeier



OFFICE MEMORANDUM

DATE: July 6, 1979

TO: D. E. Orne
Engineer of Traffic and Safety


FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Non-Trunkline Locations
in Calhoun County
Research Project 54 G-74, 79 SR-2

Attached for your review are results of pavement friction measurements which were conducted in accord with your November 28, 1978 request.

In accord with your memorandum, wages, expenses and equipment costs incurred for conducting and processing these non-trunkline tests have been charged to the Community Assistance Subunit (Job No. 99415). The total amount charged was \$224.73.

TESTING AND RESEARCH DIVISION



Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier
T. R. Krycinski
J. Benac
Safety Programs Unit
Finance Division

Pavement Friction Tests
on Columbia Avenue
79 SR-2

Columbia Avenue Location	Lane	Coefficient of Wsf		
		Low	High	Avg.
@ Riverside	EBOL	0.39	0.40	0.39
	EBIL	0.41	0.43	0.42
	WBOL	0.31	0.37	0.34
	WBIL	0.33	0.34	0.33
Riverside to Capital	EBOL	0.43	0.44	0.43
	EBIL	0.40	0.41	0.41
	WBOL	0.42	0.44	0.43
	WBIL	0.43	0.44	0.44
@ Capital	NB	0.39	0.44	0.42
	SB	0.55	0.56	0.55
Capital to LaVista	EBOL	0.28	0.29	0.29
	EBIL	0.30	0.31	0.31
	WBOL	0.31	0.36	0.33
	WBIL	0.31	0.33	0.32
@ LaVista	EBOL	0.29	0.30	0.29
	EBIL	0.31	0.32	0.31
	WBOL	0.30	0.31	0.31
	WBIL	0.31	0.34	0.32
LaVista to 20th Street	EBOL	----	----	0.30
	EBIL	----	----	0.36
	WBOL	----	----	0.31
	WBIL	----	----	0.34
@ 20th Street	EBOL	0.28	0.30	0.29
	EBIL	0.28	0.29	0.29
	WBOL	0.29	0.31	0.30
	WBIL	0.28	0.31	0.29
20th Street to 24th Street	EBOL	----	----	0.28
	EBIL	----	----	0.31
	WBOL	----	----	0.31
	WBIL	----	----	0.31
24th Street to 28th Street	EBOL	----	----	0.43
	EBIL	----	----	0.44
	WBOL	----	----	0.42
	WBIL	----	----	0.40
@ 28th Street	EBOL	0.42	0.48	0.46
	EBIL	0.44	0.48	0.46
	WBOL	0.42	0.45	0.43
	WBIL	0.39	0.43	0.41
28th Street to Helmer Road	EBOL	----	----	0.42
	EBIL	----	----	0.38
	WBOL	----	----	0.44
	WBIL	----	----	0.47
@ Helmer Road	EBOL	0.53	0.59	0.57
	EBIL	0.46	0.48	0.47
	WBOL	0.43	0.48	0.46
	WBIL	0.47	0.48	0.48

STATE OF MICHIGAN



WILLIAM G. MILLIKEN, GOVERNOR
DEPARTMENT OF TRANSPORTATION

TRANSPORTATION BUILDING, 425 WEST OTTAWA PHONE 517-373-2090
POST OFFICE BOX 30050, LANSING, MICHIGAN 48909

JOHN P. WOODFORD, DIRECTOR

July 12, 1979

David L. DeSandre
Road and Bridge Construction Engineer
Macomb County Road Commission
115 Groesbeck Highway
Mount Clemens, Michigan 48843

Dear Mr. DeSandre:

In accord with your January 4, 1979 correspondence, pavement friction tests have been conducted on the four Mound Road surface types you requested. Tests were completed June 3, 1979. Resulting Wsf values have been tabulated and are attached for your review. Charges for conducting tests amounted to \$245.78, for which you will be billed by our Financial Services Division.

Sincerely,

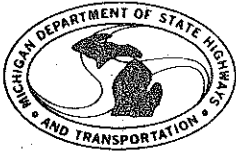
TESTING AND RESEARCH DIVISION

A handwritten signature in cursive script, appearing to read "K. A. Allemeier".

K. A. Allemeier
Engineer of Testing and Research

Pavement Friction Tests on Mound Road
June 3, 1979

<u>Mound Road Location</u>	<u>Surface Type</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
			<u>Low</u>	<u>High</u>	<u>Avg.</u>
8 Mile Road to 9 Mile Road	Latex Modified 4.12 Mix	NBOL	0.45	0.45	0.45
		NBCL	0.43	0.46	0.45
		NBIL	0.45	0.50	0.48
		SBOL	0.42	0.45	0.44
		SBCL	0.46	0.48	0.47
		SBIL	0.48	0.50	0.49
9 Mile Road to 10 Mile Road	Latex Modified 4.12 Mix	NBOL	0.46	0.48	0.47
		NBCL	0.48	0.52	0.50
		NBIL	0.51	0.55	0.53
		SBOL	0.43	0.46	0.45
		SBCL	0.50	0.52	0.51
		SBIL	0.45	0.51	0.49
11 Mile Road to 12 Mile Road	Conventional 4.12 Mix	NBOL	0.38	0.43	0.41
		NBIL	0.45	0.48	0.46
		SBOL	0.43	0.49	0.47
		SBIL	0.46	0.52	0.49
12 Mile Road to 13 Mile Road	Conventional 4.12 Mix	NBOL	0.45	0.48	0.46
		NBIL	0.50	0.55	0.53
		SBOL	0.48	0.48	0.48
		SBIL	0.48	0.54	0.51
13 Mile Road to 14 Mile Road	Conventional 4.12 Mix	NBOL	0.39	0.44	0.42
		NBIL	0.40	0.45	0.43
		SBOL	0.36	0.40	0.38
		SBIL	0.43	0.49	0.46
Sims Street (17-1/2 Mile Road) to 18 Mile Road	Latex Modified 4.11 Mix using Steel Furnace Slag	NB	0.49	0.52	0.51
		SB	0.52	0.55	0.54
18 Mile Road to 19 Mile Road	Latex Modified 4.11 Mix using 22A Steel Furnace Slag	NB	0.52	0.54	0.53
		SB	0.54	0.57	0.55
19 Mile Road to Hall Road	4.11 Mix using 22A Steel Furnace Slag	NB	0.52	0.54	0.53
		SB	0.55	0.56	0.55



OFFICE MEMORANDUM

DATE: July 5, 1979

TO: Donald E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at the M-37 - Four Mile Road Intersection
Research Project 54 G-74, 79 SR-4

Complying with your January 8, 1979 request, pavement friction tests have been conducted at the intersection of M-37 and Four Mile Road in Kent County. Results of friction measurements conducted at this location during 1977 and 1978 have been previously reported to you in memorandums dated November 8, 1977 (77 SR-29) and September 18, 1978 (78 SR-23).

The bituminous concrete at this intersection was constructed at three different time periods. M-37 south of Four Mile Road was constructed in 1973 as Project 41033-03895. North of Four Mile Road, M-37 was constructed during 1977 as Project 41033 -07689. A new bituminous pad has been placed on the SBOL approach to Four Mile Road since August 1978.

Tabulated below are results of pavement friction tests conducted May 4, 1979.

M-37 Location	Construction Year	Lane Tested	Coefficient of Wsf		
			Low	High	Avg.
South of Four Mile Road	1973	NBOL	0.42	0.43	0.42
		NBIL	0.44	0.46	0.45
North of Four Mile Road	Since Aug. 1978	SBOL	0.40	0.43	0.41
North of Four Mile Road	1977	SBIL	0.38	0.43	0.41

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: K. A. Allemeier
M. L. Jones
Safety Programs Unit



OFFICE MEMORANDUM

DATE: August 27, 1979

TO: P. R. Kamarainen
Assistant Construction Engineer

FROM: F. Copple

SUBJECT: M 11 and US 131, Pavement Friction Measurements
Research Project 54 G-74, 79 SR-5

Listed below are results of pavement friction tests made on M 11 and the US 131 "S" curve locations. Locations tested are those inspected by you, P. T. Luce, and I on August 1.

Location	Test Date	Tested Lane	No. of Tests	40 mph Coefficient of Wsf		
				Low	High	Avg
M 11, Textured	July 18, 1979	All Lanes	138	0.19	0.51	0.35
M 11, Untextured	July 18, 1979	All Lanes	39	0.30	0.45	0.38
US 131 "S" Curve	August 2, 1979	NBOL	6	0.37	0.42	0.39
		NBCL	6	0.36	0.45	0.41
		NBIL	6	0.37	0.50	0.46
		SBOL	5	0.30	0.34	0.32
		SBCL	5	0.28	0.34	0.32
		SBIL	5	0.38	0.42	0.40

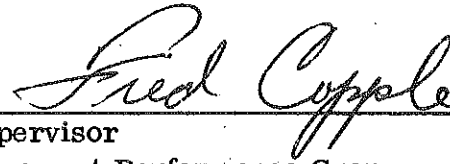
Two lanes of southbound US 131 through the "S" curve had average friction levels lower than 0.35. Although average values on M 11 were 0.35 or greater, several tests showed friction levels well below that value. The lowest values were found within about 200 ft of the intersection, with friction levels generally increasing on textured surfaces outside those areas.

As we observed, rutting and flushing is obvious again in the milled areas of M 11 and because of the plastic nature of the existing wearing surface, it might be expected to continue to deform and perhaps flush through a new overlay. Therefore, if an immediate treatment is desired, the existing wearing surface should be milled off within about 400 ft of intersection and replaced with a new bituminous mix. Turning lanes have not flushed and can be left as they are. The attached table shows how friction values generally decreased as they were measured approaching intersection. Of the 46 lane approaches, 36 (78 percent) showed their lowest friction value within 200 ft of the intersection.

August 27, 1979

There is a good chance that the problem will be cured by simply allowing the existing surface to oxidize over the forthcoming winter. Thus, if treatment cannot be provided until next spring, it would be prudent to wait and see if it is still needed.

TESTING AND RESEARCH DIVISION



Supervisor
Pavement Performance Group

FC:PTL:bf

cc: K. A. Allemeier
C. K. Brooks
J. M. Ritchie
D. E. Orne
L. T. Oehler

7-18-79 Pavement Friction Measurements
 Locations Tabulated from East to West.
 For each intersection, tests are listed
 consecutively as intersection is approached.

<u>Location</u>	<u>Surface</u>	<u>EBOL</u>	<u>EBIL</u>	<u>WBOL</u>	<u>WBIL</u>
Approach to Byron Center	Textured Bit.	.37	.49	---	---
		.38	.42	---	---
		(26)	(31)	---	---
W. of Burlingame	Bit.	.40	.43	.38	.34
		.36	.43	.38	.36
		.33	.44	.34	.37
Appr. to Burlingame	Textured Bit.	.43	.45	.34	.43
		.30	.36	.34	(33)
		(28)	(31)	(25)	.36
Appr. to DeHoop	Textured Bit.	.38	.42	.34	.43
		.28	.38	.27	.39
		(27)	(30)	(26)	(28)
W. of Clyde Park	Bit.	.33	.37	.39	---
		.36	.39	.34	---
		.36	.39	.45	---
Appr. to Clyde Park	Textured Bit.	.34	.48	.27	.44
		.30	(39)	(21)	.37
		(19)	.42	.28	(24)
Appr. to W. US-131 Signal	Textured Bit. (EB) Bit. (WB)	.39	.46	.32	.43
		.38	.43	(30)	(34)
		(27)	(36)	.37	.42
Appr. to Buchanan	Textured Bit.	.30	.43	.34	.37
		.30	.37	(26)	.33
		(25)	(33)	.27	(32)
Appr. to Division	Textured Bit.	.33	.39	.31	(30)
		.30	.28	(26)	.36
		(26)	(25)	.27	.33
Appr. to Madison	Textured Bit.	.40	.48	.36	.38
		.34	.40	.32	(31)
		(24)	(31)	(24)	.31
Appr. to Eastern	Textured Bit.	.49	.40	.37	.50
		.39	(32)	.44	.31
		(25)	.33	(22)	(30)
Appr. to Kalamazoo	Textured Bit.	.51	.38	.38	.45
		.44	.38	.33	(31)
		(24)	(30)	(20)	.34

<u>Location</u>	<u>Surface</u>	<u>EBOL</u>	<u>EBIL</u>	<u>WBOL</u>	<u>WBIL</u>
W. of Englewood	Bit.	.40	.40	.39	.45
		.40	.38	.37	.43
		.40	.45	.38	.43
Appr. to Breton	Textured Bit.	.39	.43	.43	.46
		.27	.38	.42	.38
		(26)	(32)	(32)	(36)
Appr. to Radcliff	Textured Bit.	.45	.48	.43	.49
		.45	.44	.38	.43
		(31)	(38)	(34)	(36)
Appr. to M-37	Textured Bit.	.46	.46	---	---
		.48	(40)	---	---
		(42)	.40	---	---

Circled coeff. of wsf indicates low value at this intersection location.



OFFICE MEMORANDUM

DATE: November 14, 1979

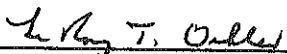
TO: R. L. Blost
Traffic and Safety Division

FROM: L. T. Oehler

SUBJECT: Updated Friction Level Measurements on M 11 and US 131 'S' Curve
in Grand Rapids
Research Project 54 G-74, 79 SR-5A

Periodic friction level measurements have been made on M 11 and the US 131 'S' Curve in Grand Rapids. The most recent tests were conducted October 31, 1979. At this time, friction levels on the M 11 textured surface averaged 0.42 and the non-textured M 11 surface averaged 0.45. Only one wsf value below 0.35 was measured, that being a 0.32 coefficient at the WBOL M 11 approach to Kalamazoo St. The US 131 'S' Curve values averaged 0.42; no values lower than 0.35 were encountered. Coefficients at both locations have improved since September 1979. Attached is a historical review of wsf values.

TESTING AND RESEARCH DIVISION



Engineer of Research

LTO:PMS:bf

Attachments

cc: K. A. Allemeier
R. A. Welke

M 11 Test Location	Lane	Coefficient of Wsf											
		4-23-79			7-18-79			9-26-79			10-31-79		
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
Approach to Byron Center	EBOL	0.49	0.52	0.51	0.26	0.38	0.34	0.26	0.34	0.31	0.39	0.44	0.42
	EBIL	0.56	0.57	0.57	0.31	0.49	0.41	0.28	0.40	0.35	0.39	0.48	0.44
	WBOL	--	--	--	--	--	--	--	--	--	--	--	--
	WBIL	--	--	--	--	--	--	--	--	--	--	--	--
West of Burlingame	EBOL*	--	--	--	0.33	0.40	0.36	0.37	0.38	0.38	0.44	0.46	0.45
	EBIL*	--	--	--	0.43	0.44	0.43	0.38	0.40	0.39	0.46	0.48	0.47
	WBOL*	--	--	--	0.34	0.38	0.37	0.39	0.42	0.40	0.48	0.49	0.48
	WBIL*	--	--	--	0.34	0.37	0.36	0.36	0.43	0.39	0.43	0.45	0.44
Approach to Burlingame	EBOL	0.49	0.52	0.51	0.28	0.43	0.34	0.27	0.42	0.32	0.40	0.43	0.42
	EBIL	0.51	0.58	0.54	0.31	0.45	0.37	0.32	0.43	0.36	0.40	0.49	0.44
	WBOL	0.50	0.52	0.51	0.25	0.34	0.31	0.24	0.32	0.28	0.36	0.42	0.40
	WBIL	0.49	0.57	0.54	0.33	0.43	0.37	0.27	0.39	0.33	0.37	0.42	0.39
Approach to DeHoop	EBOL	0.57	0.62	0.59	0.27	0.38	0.31	0.26	0.34	0.30	0.38	0.44	0.42
	EBIL	0.55	0.57	0.56	0.30	0.42	0.37	0.34	0.38	0.36	0.37	0.45	0.42
	WBOL	0.48	0.56	0.52	0.26	0.34	0.29	0.22	0.34	0.28	0.39	0.49	0.44
	WBIL	0.52	0.58	0.56	0.28	0.43	0.37	0.25	0.36	0.32	0.37	0.45	0.41
West of Clyde Park	EBOL*	--	--	--	0.33	0.36	0.35	0.31	0.33	0.32	0.40	0.43	0.42
	EBIL*	--	--	--	0.37	0.39	0.38	0.32	0.39	0.35	0.40	0.44	0.42
	WBOL*	--	--	--	0.34	0.45	0.39	0.32	0.34	0.33	0.43	0.46	0.44
	WBIL*	--	--	--	--	--	--	0.33	0.34	0.34	0.42	0.48	0.45
Approach to Clyde Park	EBOL	0.51	0.57	0.53	0.19	0.34	0.28	0.27	0.38	0.32	0.39	0.43	0.41
	EBIL	0.57	0.58	0.57	0.39	0.48	0.43	0.33	0.42	0.39	0.44	0.51	0.47
	WBOL	0.49	0.52	0.50	0.21	0.28	0.25	0.28	0.32	0.30	0.36	0.39	0.37
	WBIL	0.51	0.56	0.54	0.24	0.44	0.35	0.25	0.33	0.29	0.35	0.42	0.38

M 11 (Cont.)

M 11 Test Location	Lane	Coefficient of Wsf											
		4-23-79			7-18-79			9-26-79			10-31-79		
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
Approach to West US 131 Signal	EBOL	0.51	0.54	0.52	0.27	0.39	0.35	0.27	0.39	0.31	0.38	0.45	0.41
	EBIL	0.55	0.58	0.56	0.36	0.46	0.42	0.34	0.37	0.36	0.44	0.45	0.44
	WBOL*	--	--	--	0.30	0.37	0.33	--	--	--	--	--	--
	WBIL*	--	--	--	0.34	0.43	0.40	--	--	--	--	--	--
Approach to Buchanan	EBOL	0.48	0.55	0.51	0.25	0.30	0.28	0.24	0.32	0.27	0.37	0.38	0.37
	EBIL	0.52	0.58	0.55	0.33	0.43	0.38	0.32	0.42	0.36	0.38	0.46	0.41
	WBOL	0.49	0.50	0.50	0.26	0.34	0.29	0.25	0.28	0.27	0.38	0.44	0.40
	WBIL	0.54	0.61	0.58	0.32	0.37	0.34	0.32	0.39	0.35	0.38	0.42	0.40
Approach to Division	EBOL	0.50	0.57	0.52	0.26	0.33	0.30	0.28	0.31	0.30	0.44	0.45	0.44
	EBIL	0.56	0.60	0.58	0.25	0.39	0.31	0.24	0.43	0.31	0.38	0.43	0.40
	WBOL	0.46	0.50	0.49	0.26	0.31	0.28	0.24	0.31	0.28	0.38	0.44	0.41
	WBIL	0.56	0.60	0.58	0.30	0.36	0.33	0.31	0.34	0.33	0.38	0.42	0.40
Approach to Madison	EBOL	0.52	0.55	0.53	0.24	0.40	0.33	0.25	0.32	0.29	0.37	0.46	0.42
	EBIL	0.57	0.62	0.59	0.31	0.48	0.40	0.27	0.42	0.34	0.36	0.49	0.43
	WBOL	0.46	0.51	0.49	0.24	0.36	0.31	0.25	0.34	0.30	0.36	0.42	0.39
	WBIL	0.55	0.57	0.56	0.31	0.38	0.33	0.27	0.33	0.30	0.37	0.40	0.39
Approach to Eastern	EBOL	0.56	0.62	0.59	0.25	0.49	0.38	0.26	0.36	0.31	0.38	0.48	0.44
	EBIL	0.54	0.57	0.56	0.32	0.40	0.35	0.28	0.38	0.33	0.38	0.49	0.43
	WBOL	0.50	0.52	0.51	0.22	0.44	0.34	0.26	0.38	0.31	0.36	0.44	0.39
	WBIL	0.55	0.62	0.58	0.30	0.50	0.37	0.30	0.42	0.34	0.36	0.44	0.39
Approach to Kalamazoo	EBOL	0.57	0.62	0.59	0.24	0.51	0.40	0.24	0.43	0.36	0.39	0.51	0.46
	EBIL	0.58	0.61	0.60	0.30	0.38	0.35	0.30	0.37	0.35	0.38	0.46	0.43
	WBOL	0.48	0.56	0.51	0.20	0.38	0.30	0.25	0.37	0.31	0.32	0.44	0.38
	WBIL	0.56	0.60	0.59	0.31	0.45	0.37	0.31	0.37	0.33	0.38	0.46	0.42

M 11 (Cont.)

M 11 Test Location	Lane	Coefficient of Wsf												
		4-23-79			7-18-79			9-26-79			10-31-79			
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	
West of Englewood	EBOL*	--	--	--	0.40	0.40	0.40	0.36	0.37	0.37	0.37	0.43	0.46	0.44
	EBIL*	--	--	--	0.38	0.45	0.41	0.37	0.39	0.38	0.38	0.44	0.48	0.46
	WBOL*	--	--	--	0.37	0.39	0.38	0.30	0.36	0.33	0.33	0.40	0.43	0.42
	WBIL*	--	--	--	0.43	0.45	0.44	0.36	0.40	0.38	0.38	0.44	0.48	0.46
Approach to Breton	EBOL	0.57	0.62	0.59	0.26	0.39	0.31	0.30	0.37	0.33	0.33	0.40	0.45	0.43
	EBIL	0.61	0.62	0.62	0.32	0.43	0.38	0.32	0.37	0.35	0.42	0.46	0.46	0.44
	WBOL	0.52	0.56	0.54	0.32	0.43	0.39	0.25	0.37	0.32	0.38	0.44	0.44	0.42
	WBIL	0.57	0.64	0.60	0.36	0.46	0.40	0.33	0.40	0.37	0.40	0.46	0.46	0.43
Approach to Radcliff	EBOL	0.58	0.60	0.59	0.31	0.45	0.40	0.31	0.42	0.36	0.45	0.50	0.48	0.48
	EBIL	0.61	0.69	0.66	0.38	0.48	0.43	0.34	0.42	0.38	0.44	0.48	0.48	0.46
	WBOL	0.51	0.58	0.55	0.34	0.43	0.38	0.31	0.37	0.34	0.36	0.48	0.48	0.41
	WBIL	0.58	0.67	0.62	0.36	0.49	0.43	0.33	0.42	0.38	0.44	0.50	0.50	0.47
Approach to M 37	EBOL	0.55	0.63	0.60	0.42	0.48	0.45	0.36	0.43	0.39	0.46	0.51	0.49	0.49
	EBIL	0.60	0.62	0.61	0.40	0.46	0.42	0.39	0.44	0.41	0.45	0.46	0.46	0.46
	WBOL	--	--	--	--	--	--	--	--	--	--	--	--	--
	WBIL	--	--	--	--	--	--	--	--	--	--	--	--	--

* Surface has not been textured.

US 131 'S' CURVE

Test Location	Lane	Coefficient of Wsf														
		7-26-78			3-18-79			8-2-79			9-26-79			10-31-79		
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
US 131 'S' Curve	NBOL	0.39	0.45	0.42	0.51	0.55	0.53	0.37	0.42	0.39	0.33	0.39	0.35	0.40	0.44	0.42
	NBCL	0.39	0.49	0.44	0.46	0.56	0.53	0.36	0.45	0.41	0.33	0.39	0.37	0.42	0.46	0.43
	NBIL	0.45	0.51	0.48	0.55	0.61	0.57	0.37	0.50	0.46	0.39	0.45	0.43	0.44	0.50	0.48
	SBOL	0.29	0.40	0.33	0.50	0.54	0.52	0.30	0.34	0.32	0.25	0.33	0.30	0.37	0.43	0.38
	SBCL	0.29	0.37	0.33	0.48	0.55	0.52	0.28	0.34	0.32	0.26	0.32	0.30	0.35	0.43	0.39
	SBIL	0.39	0.45	0.37	0.49	0.58	0.55	0.38	0.42	0.40	0.30	0.37	0.35	0.43	0.44	0.43



OFFICE MEMORANDUM

DATE: July 25, 1979

TO: F. Copple, Supervisor
Pavement Performance Unit

FROM: P. M. Schafer

SUBJECT: Pavement Friction Measurements at Fuel Oil Spill,
Eastbound I-94 @ Carpenter Road
Research Project 54 G-74, 79 SR-6

In accord with your verbal request, pavement friction measurements have been conducted in the vicinity of the eastbound I-94 fuel oil spill at Carpenter Road, east of Ann Arbor. Wsf values determined April 2, 1979 are summarized below for your review.

<u>Eastbound I-94 Location</u>	<u>Lane</u>	<u>No. of Tests</u>	<u>Coefficient of Wsf</u>		
			<u>Low</u>	<u>High</u>	<u>Avg.</u>
Preceding Oil Spill	EBOL	4	0.48	0.49	0.48
	EBIL	4	0.50	0.55	0.53
On Oil Spill	EBOL	4	0.40	0.45	0.42
	EBIL	2	0.40	0.44	0.42
Adjacent to Oil Spill (off oil spill)	EBIL	2	0.46	0.49	0.48
Beyond Oil Spill	EBOL	7	0.40	0.48	0.45
	EBIL	7	0.48	0.50	0.49
0.2 Mile Beyond Oil Spill	EBOL	2	0.46	0.49	0.48

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Group

PMS:Ive

cc: K. A. Allemeier
J. M. Ritchie



OFFICE MEMORANDUM

DATE: July 3, 1979

TO: J. E. Norton
Construction Division

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on Project 82062-11105
Research Project 54 G-74, 79 SR-7

In accord with your phone request, pavement friction tests were conducted May 13, 1979 on US-12 east and west of Oakman Boulevard.


US-12 from Oakman Boulevard east 600 ft is bituminous concrete constructed in 1978. This surface had 22X steel furnace slag incorporated into its mix design. The 1979 wsf values ranged from 0.54 to 0.60 and averaged 0.57.

The control area west of Oakman Boulevard is also bituminous concrete constructed in 1978. Slag was not used in this mix. Friction levels here ranged from 0.45 to 0.53 and averaged 0.49.

A data summary is provided below for your review.

US-12 Location	Lane	Coefficient of WSF		
		Low	High	Avg.
From Oakman Blvd. east 600 ft (1978 BC using 22X Steel Furnace Slag)	EBOL	0.56	0.57	0.57
	EBCL	0.58	0.58	0.58
	EBIL	0.56	0.58	0.57
	WBOL	0.58	0.60	0.59
	WBCL	0.55	0.56	0.56
	WBIL	0.54	0.57	0.55
West of Oakman Blvd. (1978 BC - No Slag)	EBOL	0.48	0.50	0.49
	EBCL	0.47	0.48	0.48
	EBIL	0.51	0.53	0.52
	WBOL	0.48	0.50	0.49
	WBCL	0.45	0.49	0.48
	WBIL	0.47	0.49	0.48

TESTING AND RESEARCH DIVISION


Transportation Research Technician
Pavement Performance Group

PMS:lve

cc: K. A. Allemeier
R. A. Welke



OFFICE MEMORANDUM

DATE: July 18, 1979

TO: D. E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US-31 in Benzonia and Beulah,
Benzie County
Research Project 54 G-74, 79 SR-8

Pavement friction tests were conducted September 5, 1978 on US-31 between the north junction of M-115 in Benzonia and East Street in Beulah. Resulting Wsf values were reported to you September 20, 1978 as 78 SR-26. On March 30, 1979, you reported a seal coat had been placed in this area and requested additional tests to evaluate its performance. Responding to this request, friction measurements were conducted May 31, 1979. Results of both test series are tabulated below for your review.

US-31 Location	Lane	Coefficient of Wsf					
		09-05-78			05-31-79		
		Low	High	Avg.	Low	High	Avg.
North of Severence Street	NB	0.21	0.21	0.21	0.27	0.30	0.29
South of Spring Valley Road	NB	0.16	0.19	0.18	0.24	0.25	0.24
	SB	0.22	0.23	0.22	0.29	0.34	0.32
North of Spring Valley Road	SB	0.24	0.28	0.26	0.26	0.32	0.29
South of R.R.	SBIL	0.25	0.39	0.31	0.31	0.42	0.37
North of R.R.	NB	0.18	0.21	0.20	0.19	0.22	0.21
	SBOL	0.23	0.25	0.24	0.27	0.28	0.28

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier
Safety Programs Unit
C. P. Seufert
B. A. Conradson
A. Chritz



OFFICE MEMORANDUM

DATE: July 20, 1979

TO: D. E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on Recycled I-94 in Berrien County
Research Project 54 G-74, 79 SR-9

In accord with your May 2, 1979 request, pavement friction tests have been conducted on eastbound I-94 between Control Section 11014 milepost 1.445 (M239) and 3.945. This section was reconstructed in 1978 as project 11014-12607. The roadway cross section consists of a 10 inch recycled bituminous base, 130# leveling cse, 120# wearing cse and is capped with a 100# open graded asphalt friction cse. On this job, only the 10 inch base was constructed of recycled material.

July 9, 1979 test results have been broken into two areas and are tabulated below for your review.

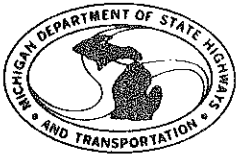
		<u>Coefficient of Wsf</u>		
	<u>Lane</u>	<u>Low</u>	<u>High</u>	<u>Avg.</u>
NE of M-239	EBOL	0.61	0.62	0.61
	EBCL	0.61	0.62	0.62
	EBIL	0.76	0.79	0.78
NE of Truck Scale	EBOL	0.63	0.69	0.65
	EBCL	0.64	0.68	0.66
	EBIL	0.74	0.79	0.76

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier
Safety Programs Unit
E. H. Miller
A. Chritz



OFFICE MEMORANDUM

DATE: July 20, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on LeRoy Street, City of Fenton
Research Project 54 G-74, 79 SR-10

In accord with your May 11, 1979 request, pavement friction measurements have been conducted on LeRoy Street in the City of Fenton. Tests were conducted June 5, 1979; Wsf values determined ranged from 0.30 to 0.44 and averaged 0.39. Test Results have been broken down on the attached table for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:lve

Attachment

cc: K. A. Allemeier
T. R. Krycinski
J. D. Benac

Pavement Friction Tests on LeRoy Street in Fenton
 June 5, 1979
 79 SR-10

<u>LeRoy Street Location</u>	<u>Surface Type</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
			<u>Low</u>	<u>High</u>	<u>Avg.</u>
Stopping Areas @ First	Bit	NB	0.40	0.40	0.40
		SB	0.39	0.42	0.40
Stopping Areas @ Third	Bit	NB	0.38	0.41	0.40
		SB	0.37	0.40	0.38
Stopping Areas @ Fourth	Bit	NB	0.37	0.40	0.39
		SB	0.39	0.42	0.41
Between Fourth and Sixth	Bit	NB	0.36	0.39	0.38
Stopping Areas @ Sixth	Bit	NB	0.40	0.43	0.42
		SB	0.41	0.43	0.42
Between Sixth and Curve @ Granger	Bit	NB	0.39	0.43	0.41
		SB	0.41	0.44	0.42
Curve Area @ Granger	Bit	NB	0.36	0.41	0.39
		SB	0.38	0.44	0.41
Stopping Areas @ North Road	Bit	NBOL	0.39	0.41	0.40
		NBIL	0.40	0.42	0.41
		SBOL	0.38	0.42	0.40
		SBIL	0.37	0.40	0.38
Between Wass Street and Surface Change North of Dauner Road	Bit	NBRT	0.38	0.44	0.40
		NBOL	0.39	0.40	0.39
		NBIL	0.39	0.41	0.40
		SBOL	0.37	0.40	0.38
		SBIL	0.36	0.40	0.39
From North of Dauner Road to Long Lake Road	Bit*	NB	0.30	0.36	0.33
		SB	0.32	0.36	0.34

* Bituminous surface appears to be older than the other areas tested.



OFFICE MEMORANDUM

DATE: July 17, 1979

TO: D. E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements at I-96/M-44 Connector Interchange
City of Grand Rapids
Research Project 54 G-74, 79 SR-11

In accord with your May 15, 1979 request, pavement friction measurements have been conducted at the I-96/M-44 connector interchange. Resulting skid numbers and respective test locations are shown on the attached diagram for your review.

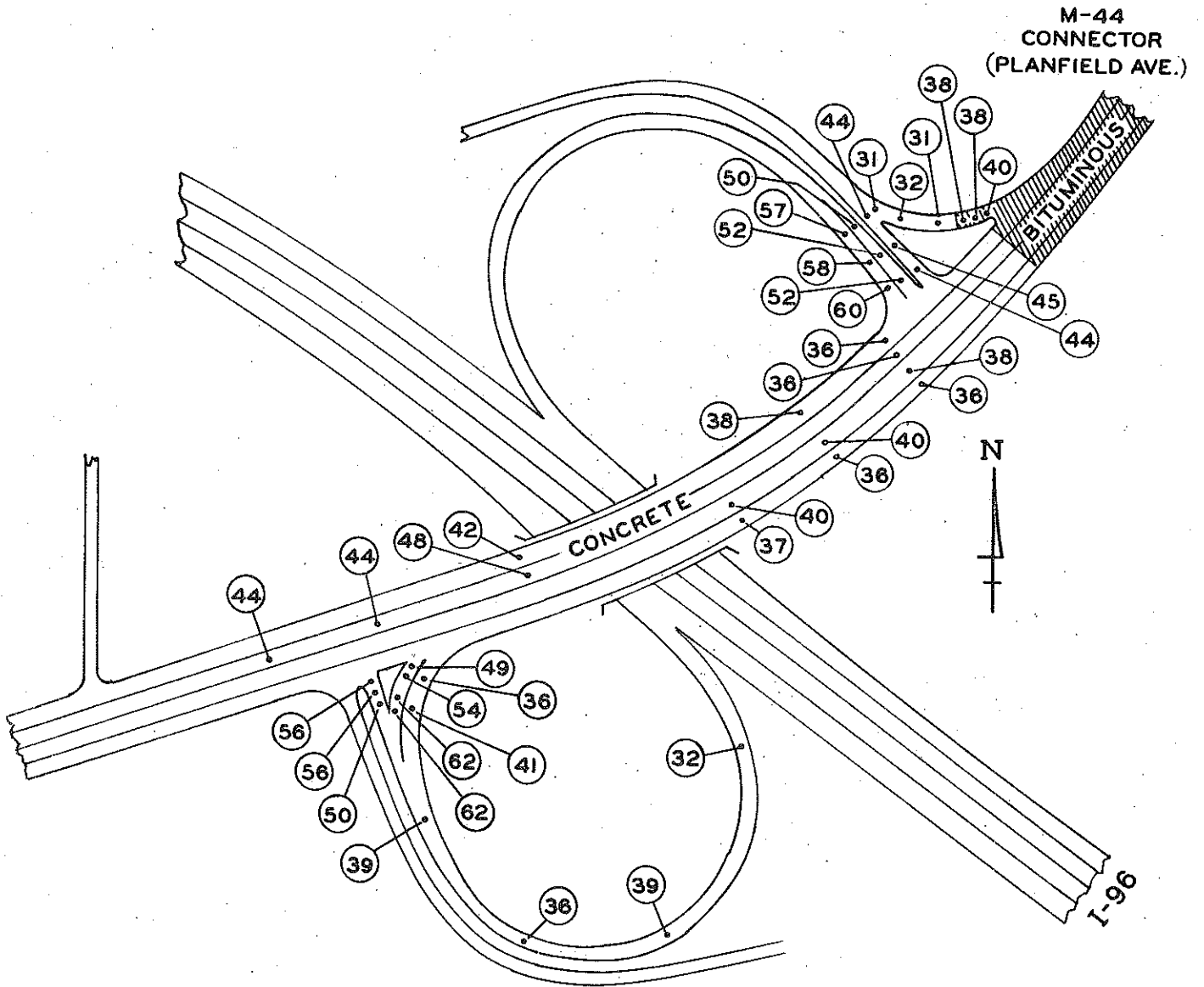
TESTING AND RESEARCH DIVISION

L. Roy T. Oehler
Engineer of Research

LTO:PMS:lve

Attachment

cc: K. A. Allemeier
Safety Programs Unit
M. L. Jones



Skid Number Values for I 96-M 44 Connector Interchange
 Test Date May 31, 1979
 79 SR-11



OFFICE MEMORANDUM

DATE: September 10, 1979

TO: J. P. Rienstra
Assistant Supervising Engineer
Bituminous Technical Services Unit

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on M-43 and US-27, City of Lansing
Research Project 54 G-74, 79 SR-12

In accord with your May 22, 1979 request, pavement friction tests have been conducted on M-43 and US-27 in the City of Lansing. Coefficients determined June 10, 1979 on concrete surfaces at this location ranged from 0.35 to 0.51 and averaged 0.41; bituminous surfaces yielded values which ranged from 0.39 to 0.59 and averaged 0.46. After completion of a skidproofing contract, scheduled for fall in this area, additional tests will be conducted to evaluate effectiveness of the skidproofed surface.

Attached is a breakdown of test results for your review.

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Group

PMS:lve

Attachment

cc: K. A. Allemeier
J. M. Ritchie

M-43 and US-27 Pavement Friction Tests
 Conducted 6-10-79
 79 SR-12

<u>Test Location</u>	<u>Surface Type</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
			<u>Low</u>	<u>High</u>	<u>Average</u>
M-43 (Saginaw Street) West of the Grand River	Conc	EBOL	0.36	0.38	0.37
	Conc	EB#4	0.35	0.40	0.37
	Conc	EB#3	0.37	0.42	0.39
	Conc	EB#2	0.37	0.41	0.39
	Conc	EBIL	0.45	0.47	0.46
M-43 (Saginaw Street) West of Cedar Street	Conc	EBOL	----	----	0.37
	Bit	EBOL	0.39	0.43	0.41
	Conc	EB#4	0.35	0.36	0.36
	Conc	EB#3	0.40	0.43	0.42
	Conc	EB#2	0.39	0.41	0.40
	Conc	EBIL	0.46	0.51	0.48
M-43 (Saginaw Street) West of Larch Street	Conc	EBOL	0.37	0.40	0.39
	Conc	EB#4	0.35	0.37	0.36
	Conc	EB#3	0.40	0.41	0.40
	Conc	EB#2	0.39	0.42	0.40
	Conc	EBIL	0.43	0.48	0.45
M-43 (Oakland Avenue) West of Larch Street	Conc	WBOL	0.39	0.41	0.40
	Conc	WBCL	0.39	0.42	0.40
	Conc	WBIL	0.40	0.44	0.42
US-27 (Larch Street) Approach to Saginaw Street	Bit	NBRT	0.46	0.50	0.47
	Bit	NBOL	0.40	0.45	0.42
	Conc	NBOL	----	----	0.44
	Bit	NBCL	0.44	0.52	0.48
	Conc	NBCL	----	----	0.42
	Bit	NBIL	0.42	0.45	0.44
	Conc	NBIL	----	----	0.42
US-27 (Larch Street) Approach to Oakland Avenue	Bit	NBOL	0.46	0.46	0.46
	Conc	NBOL	----	----	0.41
	Bit	NBCL	0.44	0.46	0.45
	Conc	NBCL	----	----	0.44
	Bit	NBIL	0.45	0.47	0.46
US-27 (Cedar Street) Approach to Oakland Avenue	Bit	SBOL	0.43	0.49	0.46
	Bit	SBCL	0.45	0.51	0.48
	Conc	SBCL	----	----	0.43
	Bit	SBIL	0.44	0.46	0.45
US-27 (Cedar Street) Approach to Saginaw Street	Bit	SBRT	0.53	0.59	0.56
	Bit	SBOL	0.44	0.47	0.46
	Conc	SBOL	----	----	0.48
	Bit	SBCL	0.44	0.48	0.46
	Bit	SBIL	0.44	0.45	0.44



OFFICE MEMORANDUM

DATE: July 10, 1979

TO: D. E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-44 Connector (Plainfield Avenue)
at Woodworth Street, Kent County
Research Project 54 G-74, 79 SR-13

Pavement friction levels have been measured in accord with your May 4, 1979 request. Tests were conducted on the approach legs beginning 500 ft in advance of the subject intersection. Wsf values determined May 4, 1979 at this location ranged from 0.39 to 0.44 and averaged 0.41.

<u>Lane</u>	<u>Coefficient of Wsf</u>		
	<u>Low</u>	<u>High</u>	<u>Avg.</u>
NBOL	0.41	0.41	0.41
NBIL	0.40	0.44	0.42
SBOL	0.39	0.40	0.40
SBIL	0.40	0.42	0.41

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier
Safety Programs Unit
M. L. Jones



OFFICE MEMORANDUM

DATE: July 24, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on Union Lake Road in Oakland County
Research Project 54 G-74, 79 SR-14

Pavement friction tests have been conducted on Union Lake Road between Richardson and Commerce in accord with your June 28, 1979 request. Wsf values determined July 20, 1979 ranged from 0.36 to 0.43 and averaged 0.38. Costs for conducting these tests have been charged to your Community Assistance Subunit (Job No. 99415).

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier
T. R. Krycinski
P. J. Riley
J. M. Ritchie



OFFICE MEMORANDUM

DATE: July 26, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on Stadium Boulevard, City of Ann Arbor
Research Project 54 G-74, 79 SR-15

In accord with your July 17, 1979 request, pavement friction measurements have been conducted on Stadium Boulevard in the City of Ann Arbor. Test locations were selected by Mr. Lee Chizek, who was on the site while July 23, 1979 test were being conducted. Mr. Chizek is Supervisor of Engineers, City of Ann Arbor.

Wsf values and their respective locations are summarized below for your review.

Costs for conducting and processing these tests have been charged to your Community Assistance Subunit (Job No. 99415).

<u>Stadium Blvd. Location</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
South of Pauline St. North to 500 ft South of Liberty St.	NBOL	0.27	0.32	0.30
	NBIL	0.31	0.35	0.33
South of Federal Blvd.	SBOL	0.29	0.38	0.33
	SBIL	0.33	0.36	0.34
@ Federal Blvd.	NBIL	0.25	0.34	0.30
	SBOL	0.35	0.38	0.37
500 ft North of Liberty St. North to Abbott St.	NBOL	0.38	0.43	0.40
	NBIL	0.39	0.41	0.40
	SBOL	0.34	0.39	0.36
	SBIL	0.37	0.40	0.38

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier	L. V. Suboski
J. M. Ritchie	L. Chizek
T. R. Krycinski	P. M. Schafer
P. F. Miller	



OFFICE MEMORANDUM

DATE: November 9, 1979

TO: A. P. Chritz
Construction Staff Engineer

FROM: P. M. Schafer

SUBJECT: Pavement Friction Measurements on M 21 Between Lapeer and Imlay City
Research Project 54 G-74, 79 SR-16

Follow-up pavement friction tests have been completed for the 1979 test year on M 21 between Lapeer and Imlay City. In accord with your May 26, 1978 request, tests have been made at three locations corresponding to ADT figures of 12,000, 6,900, and 7,400 on the map you supplied. Attached, summarized for your review, are results from 1978 and 1979 tests.

TESTING AND RESEARCH DIVISION

A handwritten signature in cursive script, appearing to read "Paul Selge".

Transportation Research Technician

PMS:bf

Attachment

cc: K. A. Allemeier

PAVEMENT FRICTION MEASUREMENTS

Control Section 44042 Milepost	ADT	Lane	Coefficient of Wsf								
			August 4, 1978			July 20, 1979			November 6, 1979		
			Low	High	Avg	Low	High	Avg	Low	High	Avg
1.5	12,000	EB	0.40	0.41	0.41	0.40	0.42	0.41	0.42	0.45	0.44
		WB	0.39	0.42	0.41	0.42	0.42	0.42	0.45	0.46	0.46
7.3	6,900	EB	0.48	0.53	0.51	0.46	0.52	0.50	0.50	0.51	0.50
		WB	0.51	0.52	0.52	0.52	0.55	0.54	0.49	0.51	0.50
10.4	7,400	EB	0.46	0.48	0.47	0.48	0.50	0.49	0.51	0.54	0.52
		WB	0.42	0.46	0.44	0.45	0.45	0.45	0.48	0.49	0.48



OFFICE MEMORANDUM

DATE: August 8, 1979

TO: F. Copple, Supervisor
Pavement Performance Group

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on two Oakland County Slurry Seal Projects
Research Project 54 G-74, 79 SR-17

In accord with your verbal request, pavement friction tests have been conducted on two non-trunkline slurry seal projects in Oakland County. Project limits were defined by Mr. John Wood, who was at the test sites while July 12, 1979 friction measurements were being conducted. The Rochester Road location between Genesee and Ottawa Streets was textured prior to sealing. Below, Wsf values are listed for your review.

<u>Location</u>	<u>Construction Year</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
			<u>Low</u>	<u>High</u>	<u>Avg.</u>
Rochester Road between Genesee Street and Ottawa Street in Royal Oak	1975	NBIL	0.55	0.59	0.57
		SBIL	0.53	0.55	0.54
Evergreen Road between Pond Court and Wellesley Boulevard in Beverly Hills	1976	NB	0.54	0.55	0.54
		SB	0.49	0.57	0.54

TESTING AND RESEARCH DIVISION

Saul Slofer

Transportation Research Technician
Pavement Performance Group

PMS:Ive

cc: K. A. Allemeier
J. Ritchie



OFFICE MEMORANDUM

DATE: October 22, 1979

TO: D. L. Wickham
Construction Staff Engineer

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on US-24 in Oakland County
(Project 63052-01865)
Research Project 54 G-74, 79 SR-18

In accord with your August 20, 1979 memo, the southbound inside lanes of Project 63052-01865 have been tested for pavement friction. Tests were conducted September 20, 1979. The "rained on" area located between station 511 and 515 on the inside 24 ft of southbound US-24, yielded wsf values measured with the ribbed tire which ranged from 0.40 to 0.48 and averaged 0.45. An adjacent control area, which had not been rained on, yielded a coefficient range of 0.42 to 0.55 and averaged 0.48. From this data, no major difference in friction level is indicated between the "rained on" area and the adjacent control area. A breakdown of test results by individual lanes is shown below for your review.

Table with 5 columns: Area Tested, Lane, Coefficient of Wsf (Low, High, Avg.). Rows include Rained On (SB1L, SB#2) and Control (SB1L, SB#2) with corresponding Wsf values.

On the same test date, pavement friction tests were also conducted using the smooth test tire. Wsf value patterns determined were satisfactory in all areas.

TESTING AND RESEARCH DIVISION

Handwritten signature of Paul Schafer

Transportation Research Technician
Pavement Performance Group

FC:PMS:lve

- cc: K. A. Allemeier
J. E. Baxter
R. R. Scriver
A. S. Urbaniak
L. T. Oehler



OFFICE MEMORANDUM

DATE: November 9, 1979

TO: D. L. Wickham
Construction Staff Engineer

FROM: P. M. Schafer

SUBJECT: Additional Pavement Friction Tests on the US 24 Project 63052-01865 in Oakland County.
Research Project 54 G-74, 79 SR-18A

Pavement friction tests for a "rained on" area of Project 63052-01865 were conducted September 20, 1979, and reported to you October 22, 1979, as 79 SR-18. Since then an additional "rained on" area has been brought to our attention, i.e., the NBOL and NB#3 lane of US 24 between Stations 514+75 and 526+25. Tests at this location were conducted November 6, 1979; treaded tire wsf values ranged from 0.55 to 0.66 and averaged 0.60. Test results are listed below for your review.

Lane	Coefficient of Wsf		
	Low	High	Avg
NBOL	0.55	0.66	0.60
NB#3	0.57	0.63	0.61

TESTING AND RESEARCH DIVISION

Saul Selzer
Transportation Research Technician

PMS:bf

cc: K. A. Allemeier
J. E. Baxter
R. R. Scriver
A. S. Urbaniak
L. T. Oehler



OFFICE MEMORANDUM

DATE: September 26, 1979

TO: R. A. Welke, Supervising Engineer
Bituminous Technical Services Unit
Testing Laboratory Section

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on Project Mb 78052-14853
Research Project 54 G-74, 79 SR-19


In accord with your September 6, 1979 request, pavement friction tests have been conducted on Project Mb 78052-14853, located on M-66 from the north limits of Sturgis northerly 7.66 miles to a point north of Wasepi Road.

The high asphalt area you requested tests on is located south of Findley Road. Pavement friction values for this area ranged from 0.40 to 0.52 and averaged 0.46. The remaining portion of the project yielded coefficients ranging from 0.45 to 0.57 and averaging 0.49. All tests were conducted September 19, 1979.

Below for your review is a breakdown of the test results.

M-66 Location	Lane	Coefficient of Wsf		
		Low	High	Avg.
North of Sturgis	NB	0.49	0.55	0.53
	SB	0.45	0.55	0.51
South of Maystead Road	NB	0.45	0.49	0.47
	SB	0.51	0.54	0.52
South of Hackman Road	NB	0.51	0.55	0.53
	SB	0.50	0.52	0.51
South of Findley Road	NB	0.40	0.52	0.45
	SB	0.45	0.49	0.47
South of M-86	NB	0.50	0.51	0.51
	SB	0.46	0.57	0.53

TESTING AND RESEARCH DIVISION


 P. M. Schafer - Research Technician
 Pavement Performance Group
 Research Laboratory Section

PMS:cgc

cc: K. A. Allemeier



OFFICE MEMORANDUM

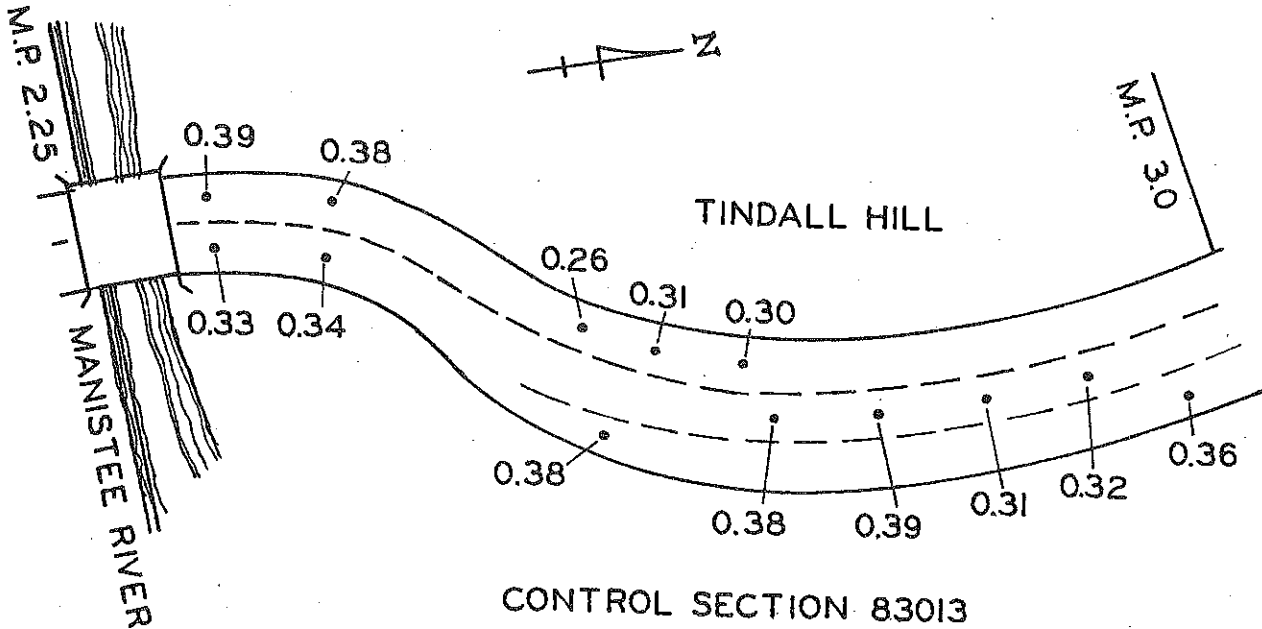
DATE: October 4, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-37 at Tindall (Sherman) Hill
in Wexford County, Control Section 83013
Research Project 54 G-74, 79 SR-20

In accord with a request from D. E. Orne dated September 21, 1979, pavement friction tests have been completed on M-37 at the Sherman Hill location. Tests were conducted September 26 between mileposts 2.25 (Manistee River) and 3.00. Wsf values ranged from 0.26 to 0.39 and averaged 0.34. Individual coefficients are shown below for your review.



TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:lve

cc: K. A. Allemeier



OFFICE MEMORANDUM

DATE: October 19, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit


FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests, City of Warren
Research Project 54 G-74, 79 SR-21

Pavement friction tests have been conducted at the twenty locations requested in your September 26, 1979 letter, and results are attached for your review.

Costs incurred for conducting tests and processing data have been charged to the Community Assistance Subunit, Safety Programs Unit (Job No. 99415).

TESTING AND RESEARCH DIVISION



Engineer of Research

LTO:PMS:lve

Attachments

cc: K. A. Altemeier
T. R. Krycinski
P. J. Riley
J. D. Benac
P. M. Schafer

Test Location	Roadway	Surface Type	Lane	Coefficient of Wsf			
				Low	High	Avg.	
Nine Mile @ Schoenherr	Schoenherr	Conc	NBOL	0.34	0.36	0.35	
			NBIL	0.31	0.37	0.35	
			SBOL	0.36	0.39	0.38	
	Nine Mile	Bit	SBIL	0.40	0.41	0.40	
			EBOL	0.35	0.40	0.38	
			EBIL	0.36	0.41	0.39	
		Conc	WBOL	0.31	0.40	0.36	
			WBIL	0.35	0.39	0.37	
Nine Mile @ Hoover	Hoover	Bit	NBOL	0.37	0.40	0.39	
			NBIL	0.36	0.42	0.40	
			SBOL	0.39	0.42	0.40	
	Nine Mile	Bit	SBIL	0.40	0.41	0.40	
			EBOL	0.36	0.40	0.39	
			EBIL	0.37	0.42	0.39	
		Conc	WBOL	0.36	0.43	0.40	
			WBIL	0.37	0.41	0.39	
Nine Mile @ Mound	Mound	Bit	NBOL	0.40	0.41	0.41	
			NBCL	0.40	0.41	0.40	
			NBIL	0.37	0.45	0.41	
			SBOL	0.36	0.39	0.37	
			SBCL	0.39	0.41	0.40	
	Nine Mile	Conc	SBIL	0.40	0.46	0.43	
			EBRT	0.36	0.45	0.39	
			EBOL	0.35	0.40	0.38	
			EBIL	0.36	0.39	0.37	
			WBRT	0.39	0.51	0.46	
		Bit	WBOL	0.36	0.42	0.39	
			WBIL	0.36	0.36	0.36	
Nine Mile @ Ryan	Ryan	Conc	NBOL	0.35	0.40	0.37	
			NBIL	0.36	0.37	0.36	
			SBOL	0.36	0.37	0.36	
	Nine Mile	Conc	SBIL	0.36	0.40	0.37	
			EBOL	0.36	0.36	0.36	
			EBIL	0.37	0.42	0.40	
		Bit	WBOL	0.36	0.42	0.38	
			WBIL	0.33	0.35	0.35	
Nine Mile @ Dequindre	Dequindre	Bit	NBOL	0.31	0.35	0.33	
			NBIL	0.30	0.34	0.33	
			SBOL	0.31	0.34	0.33	
	Nine Mile	Bit	SBIL	0.33	0.36	0.34	
			EBOL	0.37	0.40	0.39	
			EBIL	0.41	0.45	0.43	
		Conc	WBOL	0.35	0.36	0.35	
			WBIL	0.34	0.37	0.35	

79 SR-21

Test Location	Roadway	Surface Type	Lane	Coefficient of Wsf			
				Low	High	Avg.	
Dequindre @ Stephens	Dequindre	Bit	NBOL	0.31	0.36	0.34	
			NBIL	0.33	0.34	0.33	
			SBOL	0.34	0.35	0.35	
			SBIL	0.33	0.36	0.34	
	Stephens	Bit	EBOL	0.54	0.71	0.63	
			EBIL	0.48	0.59	0.53	
		Conc	WBOL	0.43	0.53	0.47	
			WBIL	0.41	0.54	0.47	
Ten Mile @ Dequindre	Dequindre	Bit	NBRT	0.36	0.46	0.40	
			NBOL	0.33	0.36	0.34	
			NBIL	0.29	0.34	0.31	
		Conc	SBOL	0.39	0.40	0.39	
			SBIL	0.39	0.41	0.40	
	Ten Mile	Bit	EBOL	0.33	0.36	0.34	
			EBIL	0.34	0.40	0.37	
		Conc	WBOL	0.36	0.39	0.37	
			WBOL	0.39	0.39	0.39	
			WBIL	0.37	0.37	0.37	
		Bit	WBIL	0.40	0.45	0.42	
Ten Mile @ Ryan	Ryan	Conc	NBOL	0.31	0.35	0.33	
			NBIL	0.34	0.35	0.34	
			SBOL	0.34	0.36	0.35	
			SBIL	0.36	0.36	0.36	
	Ten Mile	Conc	EBOL	0.34	0.36	0.35	
			EBIL	0.36	0.37	0.36	
			WBOL	0.33	0.36	0.35	
			WBIL	0.35	0.36	0.35	
Ten Mile @ Mound	Mound	Bit	NBOL	0.37	0.43	0.40	
			NBCL	0.37	0.41	0.39	
			NBIL	0.36	0.43	0.41	
			SBOL	0.39	0.42	0.40	
			SBIL	0.37	0.42	0.39	
	Ten Mile	Conc	EBOL	0.36	0.39	0.38	
			EBIL	0.39	0.39	0.39	
			WBOL	0.35	0.40	0.38	
			WBIL	0.34	0.37	0.36	
Ten Mile @ Hoover	Hoover	Conc	NBOL	0.34	0.36	0.35	
			Bit	NBIL	0.33	0.36	0.34
			Conc	SBOL	0.31	0.36	0.34
	Ten Mile	Bit	SBIL	0.35	0.36	0.36	
			Conc	EBOL	0.37	0.42	0.40
		Conc	EBIL	0.40	0.41	0.41	
			WBOL	0.39	0.41	0.40	
			WBIL	0.37	0.41	0.39	

79 SR-21

Test Location	Roadway	Surface Type	Lane	Coefficient of Wsf		
				Low	High	Avg.
Ten Mile @ Schoenherr	Schoenherr	Conc	NBOL	0.36	0.40	0.39
			NBIL	0.39	0.41	0.40
			SBOL	0.30	0.34	0.31
			SBIL	0.35	0.36	0.36
	Ten Mile	Conc	EBOL	0.37	0.42	0.40
			EBIL	0.40	0.46	0.42
			WBOL	0.37	0.41	0.38
			WBIL	0.36	0.40	0.39
Schoenherr @ Frazho	Schoenherr	Conc	NBOL	0.35	0.39	0.37
			NBIL	0.37	0.42	0.40
			SBOL	0.33	0.36	0.34
			SBIL	0.35	0.36	0.36
	Frazho	Conc	EB	0.36	0.39	0.37
			WBOL	0.34	0.42	0.38
			WBIL	0.33	0.35	0.34
Twelve Mile @ Schoenherr	Schoenherr	Conc	NBOL	0.35	0.39	0.37
			NBIL	0.37	0.40	0.38
			SBOL	0.36	0.41	0.39
			SBIL	0.41	0.43	0.42
	Twelve Mile	Bit	EBOL	0.41	0.48	0.45
			EBIL	0.39	0.47	0.44
			WBOL	0.36	0.43	0.39
			WBIL	0.42	0.46	0.43
Twelve Mile @ Hoover	Hoover	Conc	NBOL	0.37	0.40	0.38
			NBIL	0.36	0.43	0.38
		Bit	SBOL	0.36	0.39	0.37
			SBIL	0.35	0.41	0.37
	Twelve Mile	Conc	EBOL	0.34	0.39	0.36
			EBIL	0.36	0.40	0.38
			WBOL	0.35	0.36	0.36
			WBIL	0.39	0.42	0.41
Twelve Mile @ Mound	Mound	Bit	NBOL	0.40	0.46	0.43
			NBIL	0.40	0.48	0.43
			SBOL	0.42	0.51	0.45
			SBIL	0.43	0.46	0.45
	Twelve Mile	Bit	EBOL	0.41	0.47	0.44
			EBIL	0.42	0.48	0.45
		Conc	WBRT	0.47	0.57	0.52
			WBOL	0.64	0.67	0.66
		WBCL	0.42	0.43	0.43	
		WBIL	0.41	0.42	0.41	

79 SR-21

Test Location	Roadway	Surface Type	Lane	Coefficient of Wsf			
				Low	High	Avg.	
Twelve Mile @ Ryan	Ryan	Conc	NBOL	0.36	0.43	0.38	
			NBIL	0.37	0.43	0.40	
	Twelve Mile	Bit	SBOL	0.42	0.48	0.45	
			SBIL	0.43	0.45	0.44	
		Conc	EBOL	0.33	0.35	0.34	
			EBIL	0.35	0.36	0.35	
			WBOL	0.35	0.42	0.37	
			WBIL	0.36	0.39	0.37	
Twelve Mile @ Dequindre	Dequindre	Bit	NBOL	0.34	0.37	0.36	
			NBIL	0.35	0.36	0.36	
			SBOL	0.35	0.36	0.36	
			SBIL	0.33	0.36	0.34	
	Twelve Mile	Bit	EBOL	0.34	0.36	0.35	
			EBIL	0.35	0.36	0.36	
		Bit Patch	WBOL	0.41	0.43	0.42	
			Bit	WBOL	0.34	0.36	0.35
			WBIL	0.35	0.35	0.35	
Thirteen Mile @ Schoenherr	Schoenherr	Conc	NBOL	0.36	0.40	0.38	
			NBIL	0.39	0.45	0.41	
			SBOL	0.39	0.41	0.40	
			SBIL	0.40	0.45	0.42	
	Thirteen Mile	Bit	EBOL	0.41	0.45	0.43	
			EBIL	0.39	0.41	0.40	
			WBOL	0.40	0.41	0.41	
			WBIL	0.39	0.40	0.40	
Thirteen Mile @ Hoover	Hoover	Conc	NBOL	0.40	0.41	0.40	
			NBIL	0.39	0.43	0.41	
		SB	0.45	0.47	0.46		
	Thirteen Mile	Bit	EBOL	0.39	0.42	0.41	
			EBIL	0.40	0.42	0.41	
			WBOL	0.39	0.40	0.39	
			WBIL	0.40	0.41	0.40	
Schoenherr @ Masonic	Schoenherr	Conc	NBOL	0.37	0.39	0.38	
			NBIL	0.41	0.45	0.43	
			SBOL	0.39	0.43	0.41	
			SBIL	0.40	0.41	0.41	
	Masonic	Conc	EB	0.48	0.53	0.51	
			WB	0.48	0.53	0.50	



OFFICE MEMORANDUM

DATE: November 8, 1979

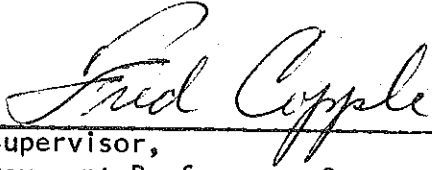
TO: L. J. Cook
Assistant FAS Engineer

FROM: F. Copple

SUBJECT: Pavement Friction Tests at Newaygo County Slag-Seal Locations
Research Project 54 G-74, 79 SR-22

In accord with your October 10, 1979 request, additional pavement friction tests have been conducted at the Newaygo County slag-seal locations. Initial tests were conducted August 16, 1978. Wsf values at that time ranged from 0.66 to 0.82 and averaged 0.75. More than a year later, October 31, 1979, the second test series was conducted. Very little change in friction characteristics had occurred since 1978; the 1979 wsf values ranged from 0.66 to 0.80 and averaged 0.74. Attached for your review is a friction level history of the slag-seal locations.

TESTING AND RESEARCH DIVISION



Supervisor,
Pavement Performance Group

FC:PMS:lve

cc: K. A. Allemeier
C. Lovell (Newaygo CRC)
J. Norton

SLAG-SEAL LOCATIONS

Newaygo County

(79 SR-22)

<u>Surface Type</u>	<u>Location</u>	<u>Coefficient of Wsf</u>					
		<u>8-18-78</u>			<u>10-31-79</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>	<u>Low</u>	<u>High</u>	<u>Avg.</u>
25A Slag Prime and Double Seal on New G & DS	Walnut St. from 32nd St. north to 24th St.	0.72	0.79	0.75	0.74	0.76	0.75
	Walnut St. south from White Cloud	0.71	0.76	0.74	0.69	0.73	0.71
	8th St. from Larch Ave. east to Oak Ave.	0.71	0.72	0.71	0.72	0.74	0.73
	24th St. from Walnut St. west to Evergreen	0.72	0.76	0.74	0.66	0.78	0.72
25A Slag Base Course, 31A Slag Wearing Course Prime and Double Seal on New G & DS	Locust Ave. from 92nd St. south to 96th St.	0.66	0.78	0.73	0.72	0.78	0.75
	Beech St. from 104th St. north to 98th St.	0.74	0.77	0.75	0.74	0.80	0.78
	Butternut Ave. from 128th St. north to 120th St.	0.78	0.82	0.80	0.70	0.75	0.72
31A Slag Reseal	136th St. from Center Ave. to Willow Ave.	0.72	0.77	0.75	0.67	0.79	0.72
	Willow Ave. from 136th St. north to 128th St.	0.74	0.77	0.76	0.74	0.78	0.76



OFFICE MEMORANDUM

DATE: November 5, 1979

TO: J. E. Norton
Construction Staff Engineer
Construction Division

FROM: P. M. Schafer

SUBJECT: Additional Pavement Friction Tests on US-31 in Benzonia and Beulah, Benzie County
Research Project 54 G-74, 79 SR-23

In accord with your request, pavement friction tests have been conducted on the US-31 seal coat in Benzonia and Beulah. Tests were conducted May 31, 1979, shortly after application of the seal coat and results were reported as 79 SR-8. Wsf values at that time ranged from 0.19 to 0.42 and averaged 0.29. Responding to your request, additional friction level measurements were conducted October 31, 1979; coefficients ranged from 0.21 to 0.34 and averaged 0.29. Although the wsf average of both test series is 0.29, the range of friction level values has been reduced by 0.11 since May. Results of both series of tests are shown below for your review.

<u>US-31 Test Location</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>					
		<u>5-31-79</u>			<u>10-31-79</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>	<u>Low</u>	<u>High</u>	<u>Avg.</u>
South of Severance Street	SB				0.30	0.31	0.31
North of Severance Street	NB	0.27	0.30	0.29	0.27	0.31	0.29
	SB				0.29	0.32	0.30
South of Spring Valley Road	NB	0.24	0.25	0.24			
	SB	0.29	0.34	0.32	0.25	0.27	0.26
North of Spring Valley Road	SB	0.26	0.32	0.29			
South of RR	SBIL	0.31	0.42	0.37	0.31	0.34	0.33
North of RR	NB	0.19	0.22	0.21	0.21	0.26	0.23
	SBOL	0.27	0.28	0.28	0.27	0.31	0.29

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Unit

PMS:lve

cc: K. A. Altemeier
Safety Programs Unit
C. P. Seufert
B. A. Conradson
A. P. Chritz



OFFICE MEMORANDUM

DATE: October 30, 1979

TO: R. A. Welke, Supervising Engineer
Bituminous Technical Services Unit
Testing Laboratory Section


FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on Recycled Airport Runway in Iron Mountain
Research Project 54 G-74, 79 SR-24

In accord with your October 19, 1979 request, pavement friction tests have been conducted on the recycled bituminous airport runway at Iron Mountain. Wsf values obtained October 23, 1979 ranged from 0.46 to 0.74 and averaged 0.59. A break-down of test results is shown below for your review.

Location	40 Mph Coefficient of Wsf		
	Low	High	Avg.
Center 5000 ft (E of Centerline)	0.55	0.63	0.59
(W of Centerline)	0.55	0.60	0.58
North 1000 ft (E of Centerline)	0.61	0.74	0.66
(W of Centerline)	0.46	0.60	0.52

Testing and Research Division


Transportation Research Technician
Pavement Performance Group
Research Laboratory Section

PMS:lve

cc: K. A. Allemeier
W. E. Gehman
J. Whiting



OFFICE MEMORANDUM

DATE: November 14, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Texturized Pavement Locations
in Oakland and Wayne Counties
Research Project 54 G-74, 79 SR-25

In accord with your November 2, 1979 request, pavement friction tests have been conducted at certain locations in Oakland and Wayne Counties. Two-year wsf values were measured at seven textured pavement sites between September 24 and November 4, 1979. Resulting wsf values ranged from 0.34 to 0.47 and averaged 0.41. Tests on the SB #3 lane of US-24 @ Plymouth Road yielded a low coefficient of 0.34; this was the only value lower than 0.35. Attached is a breakdown of test results for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:lve

Attachment

cc: K. A. Allemeier
P. J. Riley

79 SR-25

<u>Test Location</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
US-24 @ Van Born	SBOL	0.41	0.44	0.42
	SB#3	0.42	0.43	0.42
	SB#2	0.42	0.45	0.44
	SBIL	0.46	0.47	0.46
US-24 @ Annapolis	SBOL	0.43	0.46	0.44
	SBCL	0.45	0.45	0.45
	SBIL	0.43	0.46	0.45
US-24 @ Ford Road	SBOL	0.39	0.40	0.39
	SBCL	0.37	0.39	0.38
	SBIL	0.39	0.41	0.40
US-24 @ Joy Road	SBOL	0.36	0.40	0.38
	SB#3	0.37	0.39	0.38
	SB#2	0.39	0.46	0.42
US-24 @ West Chicago	SBOL	0.37	0.39	0.38
	SB#3	0.38	0.41	0.39
	SB#2	0.40	0.43	0.41
US-24 @ Plymouth Road	NBOL	0.36	0.40	0.38
	NB#3	0.38	0.39	0.39
	NB#2	0.38	0.40	0.39
	NBIL	0.44	0.46	0.45
	SBOL	0.38	0.38	0.38
	SB#3	0.34	0.40	0.38
	SB#2	0.39	0.42	0.41
M-59 @ Williams Lake Road	SBIL	0.44	0.46	0.45
	EBOL	0.38	0.38	0.38
	EBIL	0.36	0.37	0.36
	WBOL	0.37	0.39	0.38
WBIL	0.40	0.40	0.40	



OFFICE MEMORANDUM

DATE: November 19, 1979

TO: W. E. Gehman, Acting Chief Engineer
Airport Development Division

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements, Kellogg Regional Airport Runways
Research Project 54 G-74, 79 SR-26

In response to your November 2, 1979 request, pavement friction tests were performed November 7 on the Kellogg Regional Airport, runways 13-31 and 22-4.

These runway surfaces have recently been treated by a milling-texturing operation. To obtain a comprehensive view of frictional characteristics for the new surface, tests were performed with treaded and smooth tires at speeds of 40 and 55 mph.

For comparison purposes, tests are summarized for three locations on each runway. Essentially, these locations are through the runway midsection and touchdown areas at each end. Actual measurements were conducted in each direction, right and left of runway centerline, throughout the length of the described locations. Higher speed tests (55 mph) were limited to midsection locations due to the distance required for test equipment to achieve required speed.

Resultant coefficients of wet sliding friction are summarized in the attached table for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PTL:bf

Attachment

cc: D. Weisbaum
K. A. Allemeier

PAVEMENT FRICTION SUMMARY
 KELLOGG REGIONAL AIRPORT

79 SR-26

Tested Runway	Test Location	Test Condition (Tire and Speed)	Coefficient of Wet Sliding Friction		
			Low	High	Avg
13-31	West End	Treaded, 40 mph	0.75	0.82	0.79
		Smooth, 40 mph	0.73	0.81	0.79
	Midsection	Treaded, 40 mph	0.72	0.86	0.79
		Treaded, 55 mph	0.68	0.76	0.73
		Smooth, 40 mph	0.70	0.86	0.77
		Smooth, 55 mph	0.62	0.76	0.70
	East End	Treaded, 40 mph	0.80	0.84	0.82
		Smooth, 40 mph	0.79	0.86	0.83
22-4	South End	Treaded, 40 mph	0.74	0.84	0.80
		Smooth, 40 mph	0.73	0.84	0.78
	Midsection	Treaded, 40 mph	0.67	0.84	0.76
		Treaded, 55 mph	0.55	0.69	0.62
		Smooth, 40 mph	0.62	0.74	0.68
		Smooth, 55 mph	0.43	0.68	0.56
	North End	Treaded, 40 mph	0.70	0.81	0.76
		Smooth, 40 mph	0.70	0.80	0.74



OFFICE MEMORANDUM

DATE: November 8, 1979

TO: R. A. Welke, Supervising Engineer
Bituminous Technical Services Unit
Testing Laboratory Section

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on Project 72093-14851, Roscommon County
Research Project 54 G-74, 79 SR-27

In accord with your October 29, 1979 inquiry, pavement friction tests have been conducted on Project 72093-14851, located on I-75 BL between I-75 and M-18 in Roscommon. Subject project has a bituminous aggregate surface which was constructed during 1979 and is posted with "slippery when wet" signs. Wsf values obtained November 2, 1979 ranged from 0.40 to 0.57 and averaged 0.52; such coefficients do not usually indicate the need for caution signing. Further breakdown of data is shown below for your review.

<u>I-75 BL Location</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
W. of Roscommon	EB	0.52	0.55	0.54
	WB	0.40	0.45	0.43
@ Steele Rd.	EB	0.51	0.57	0.53
	WB	0.49	0.52	0.51
East from I-75	EB	0.52	0.57	0.54
	WB	0.54	0.56	0.55

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Group

PMS:lve

cc: K. A. Allemeier
J. R. Fleishman
F. I. Eggen



OFFICE MEMORANDUM

DATE: December 6, 1979

TO: R. B. Moore
Bituminous Technical Services Unit

FROM: P. M. Schafer

SUBJECT: Pavement Friction and Rut Depth Measurements for Project 30031-14219
Research Projects 77 D-35 and 54 G-74, 79 SR-28

In accord with your November 20, 1979 request, pavement friction tests and rut depth measurements have been conducted on M 99, north of the Michigan-Ohio State Line.

Pavement friction values ranged from 0.49 to 0.61 and averaged 0.56 over the entire length of the wearing course, a hot recycled mix.

Rut depth measurements and pavement friction test data have been broken down into three test areas, per your request, and results are shown below for your review. Another series of measurements has been scheduled for the spring of 1981.

M 99 Location	Lane	Coefficient of Wsf			Rut Depth Measurements, in.	
		Low	High	Avg	OWT	IWT
Michigan-Ohio Line north to Territorial Rd	NB	0.56	0.60	0.57	0.025	0.025
	SB	0.54	0.58	0.56	0.075	0.100
Territorial Rd north to Montgomery	NB	0.54	0.60	0.57	0.025	0.025
	SB	0.55	0.60	0.58	0.075	0.025
Montgomery Rd north to M 34	NB	0.49	0.61	0.54	0.025	0.025
	SB	0.50	0.58	0.54	0.050	0.050

TESTING AND RESEARCH DIVISION

Transportation Research Technician
Pavement Performance Group

PMS:bf

cc: K. A. Allemeier



OFFICE MEMORANDUM

DATE: December 3, 1979

TO: R. L. Blost
Safety Programs Unit
Traffic and Safety Division

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on M-20 at the Dead Stream,
Mecosta County, Control Section 54022 (Milepoint 14.26 to 14.51)
Research Project 54 G-74, 79 SR-29

In response to a November 19, 1979 request from D. E. Orne, pavement friction measurements have been performed at the subject location. November 27, 1979 test results are summarized below for the newly re-surfaced and adjacent old surface of M-20 at the Dead Stream location.

<u>Surface Tested</u>	<u>Lane Tested</u>	<u>40 mph Coefficient of Wet Sliding Friction</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
New	EB	0.42	0.45	0.43
	WB	0.43	0.46	0.45
Old	EB	0.60	0.61	0.60
	WB	0.55	0.58	0.56

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PTL:lve

cc: K. A. Allemeier
M. L. Jones



OFFICE MEMORANDUM

DATE: December 3, 1979

TO: R. L. Blost
Safety Programs Unit
Traffic and Safety Division

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on US-131 from Fillmore Road
Northerly to Jefferson Street in the Village of Stanwood,
Mecosta County, Control Section 54011
Research Project 54 G-74, 79 SR-30

In response to a November 19, 1979 request from D. E. Orne, pavement friction measurements were conducted November 27, 1979 at the subject location. Friction levels for this one mile section of US-131 bituminous surface are summarized below for your review.

<u>Test Location</u>	<u>Lane Tested</u>	<u>40 mph Coefficient of Wet Sliding Friction</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
Curve N. of Fillmore Road	NB	0.40	0.46	0.43
	SB	0.39	0.43	0.41
South of Stanwood	NB	0.45	0.50	0.47
	SB	0.38	0.44	0.42
South of Jefferson Street in Village of Stanwood	NB	0.44	0.46	0.45
	SB	0.45	0.46	0.45

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PTL:lve

cc: K. A. Allemeier
M. L. Jones



OFFICE MEMORANDUM

DATE: December 6, 1979

TO: R. L. Blost, Supervising Engineer
Safety Programs Unit

FROM: L. T. Oehler

SUBJECT: Updated Pavement Friction Tests for Safety Review Study
Research Project 54 G-74, 79 SR-31

In accord with a request from Laurel Painter, of your unit, pavement friction tests have been conducted on eight projects. Test results are attached for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

Attachment

cc: K. A. Allemeier

79 SR-31

Project No. and Location	Construction Year	Test Date	Lane	Coefficient of Wsf		
				Low	High	Avg
81103-08472 M 14 from Voorhies Rd north- easterly to 1,200 ft southwest of Joy Rd	1976	11-26-79	EBOL	0.67	0.72	0.69
			EBIL	0.70	0.74	0.72
			WBOL	0.68	0.69	0.68
			WBIL	0.74	0.75	0.75
81103-08473 M 14 from 1,200 ft southwest of Joy Rd northeasterly to 1,657 ft east of Napier Rd	1976	11-26-79	EBOL	0.70	0.74	0.72
			EBIL	0.69	0.72	0.71
			WBOL	0.67	0.69	0.68
			WBIL	0.72	0.78	0.74
82123-01284 I 96 from Schaefer Rd east to Wyoming	1974	10-28-79	<u>Outer Dual</u>			
			EBOL	0.43	0.43	0.43
			EB#3	0.45	0.49	0.47
			EB#2	0.51	0.52	0.52
			EBIL	0.58	0.58	0.58
			WBOL	0.46	0.48	0.47
			WB#3	0.48	0.50	0.49
			WB#2	0.55	0.58	0.56
			WBIL	0.57	0.63	0.59
			<u>Inner Dual</u>			
			EBOL	0.50	0.52	0.51
			EBCL	0.52	0.56	0.54
			EBIL	0.61	0.64	0.62
			WBOL	0.45	0.48	0.47
WBCL	0.51	0.51	0.51			
WBIL	0.57	0.61	0.59			
23061-021 (00294) I 69 from west of McDonald Rd northeasterly to northeast of Five Point Hwy	1972	11-23-79	NBOL	0.44	0.50	0.48
			NBIL	0.52	0.63	0.60
			SBOL	0.43	0.54	0.49
			SBIL	0.62	0.66	0.64
81081-01142 M 17 (Washtenaw Ave) from Carpenter-Hogback Rd south- easterly to Hewitt Rd	1971	11-26-79	EBOL	0.40	0.44	0.42
			EBIL	0.39	0.44	0.41
			WBOL	0.40	0.44	0.42
			WBIL	0.40	0.44	0.42

79 SR-31 (Cont.)

Project No. and Location	Construction Year	Test Date	Lane	Coefficient of Wsf		
				Low	High	Avg
47065, C5 (part) I 96 from northwest of Millet Rd southeasterly to Pinckney Rd	1962	11-26-79	EBOL	0.44	0.48	0.46
			EBIL	0.49	0.60	0.55
			WBOL	0.44	0.45	0.44
			WBIL	0.52	0.57	0.55
47065, C5 (part) I 96 from Pinckney Rd east to 400 ft west of Chilson Rd	1962	11-26-79	EBOL	0.42	0.45	0.43
			EBIL	0.55	0.58	0.57
			WBOL	0.40	0.45	0.43
			WBIL	0.51	0.55	0.53
47065, C1 I 96 from 400 ft west of Chilson Rd southeasterly 5.796 miles to 2,490 ft west of old US 16	1962	11-26-79	EBOL	0.44	0.48	0.45
			EBIL	0.56	0.57	0.56
			WBOL	0.43	0.45	0.44
			WBIL	0.54	0.56	0.54
47065, C3 I 96 from 2,490 ft west of old US 16 southeasterly to 780 ft west of Canterbury Rd	1961	11-26-79	EBOL	0.42	0.44	0.43
			EBIL	0.50	0.52	0.51
			WBOL	0.43	0.48	0.45
			WBIL	0.52	0.54	0.53

SECTION IX
SPECIAL ATTENTION LOCATIONS

Special Attention Locations

Commencing with the 1973 test program, all locations with resulting friction levels averaging 0.35 or lower have been reported as soon as possible after such friction levels have been determined. This is being accomplished through previously established "high-accident" or "special request" programs, which have always been reported without delay, or through a recently established "special attention" reporting procedure. Reported within this section are the "special attention" locations and their respective Wsf values.

79 SA-2

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg.
11052-06266	US-31 - US-33 @ Pokagon Road, South of Berrien Springs	Bit Conc	1975	09-21-79	NB	0.23	0.28	0.25
					SB	0.25	0.29	0.26
28013, C1	US-31 from 4 Mile Road North to North Jct. M-72	Bit Conc	1960	09-26-79	NB	0.22	0.31	0.25
					SB	0.21	0.24	0.22
63041-11079	M-59 from 326 feet West of Airport Road East to Cass Lake Road, omitting from Jeffwood Drive to Whitney	Bit Conc	1977	10-01-79	EBIL	0.30	0.36	0.33
					WBIL	0.40	0.40	0.40
50011, C11	M-53 from 15 Mile Road North to 17-1/2 Mile Road	Bit Conc	1964	10-01-79	NBOL	0.34	0.40	0.37
					NBCL	0.31	0.35	0.32
					NBIL	0.34	0.37	0.36
					SBOL	0.33	0.36	0.34
					SBCL	0.35	0.36	0.35
					SBIL	0.37	0.39	0.38