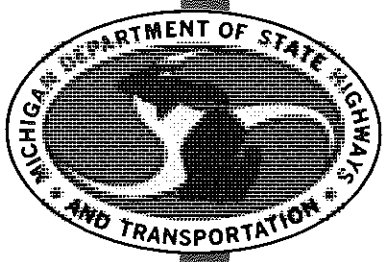
1085

SUMMARIES OF MICHIGAN PAVEMENT SKID RESISTANCE 1976 Test Program

MDSHT REPORT NO. 249



TESTING AND RESEARCH DIVISION
RESEARCH LABORATORY SECTION

SUMMARIES OF MICHIGAN PAVEMENT SKID RESISTANCE 1976 Test Program

MDSHT REPORT NO. 249

Research Laboratory Section
Testing and Research Division
Research Project 54 G-74
Research Report No. R-1085

Michigan State Highway Commission
Peter B. Fletcher, Chairman; Carl V. Pellonpaa,
Vice-Chairman; Hannes Meyers, Jr., Weston E. Vivian
John P. Woodford, Director
Lansing, March 1978

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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

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Section IV (Cont.)

INTRODUCTION

During the 1976 calendar year, over 11,400 skid tests were conducted throughout Michigan. These tests are summarized in this report according to the annual reporting procedure initiated in 1965. Skid levels for seven basic categories are included.

I Initial Skid Test Results for Concrete and Bituminous Pavements

II Five-Year Skid Test Results for Concrete and Bituminous Pavements

III Ten-Year Skid Test Results for Concrete and Bituminous Pavements

IV Experimental Features in Pavement Surfaces

V High-Accident Locations

VI Special Request Tests

VII 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 skid test values are expressed as 40 mph coefficients of wet sliding friction (Wsf). A Wsf value determined from a highly textured concrete pavement would be expected to be 0.60 or higher. Surfaces with coefficients of 0.20 might be as slippery as packed snow[1] and Wsf values below 0.07 will be representative of a glare ice condition.

Reference should be made to Research Report No. R-585 ("Summaries of Michigan Pavement Skid Resistance: 1965 Test Program") and Research Report No. R-747 ("MDSH Equipment for Measuring Pavement Skid Resistance," February 1971) for information regarding operation of the skid test device, selection of test areas, and verification of retests.

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[1] Moyer, Ralph A., "A Review of the Variables Affecting Pavement Slipperiness," Proceedings of the First International Skid Prevention Conference, 1959.

SECTION I

INITIAL SKID TEST RESULTS FOR CONCRETE AND BITUMINOUS PAVEMENTS

Initial Skid Test Results for Concrete and Bituminous Pavements

Section I summarizes skid tests representing 2,235.602 lane miles of trunkline surfaces tested during 1976.

Table 1 - Concrete Pavements Constructed in 1974, 1975, and 1976

1974 Construction

Initial skid test values were obtained on only two 1974 construction projects during the 1976 test year (10 lanes, 16.000 lane miles). Friction levels determined ranged from 0.38 to 0.67 and averaged 0.50. The WBOL of Project I 82021-05125A yielded the lowest average Wsf value (0.38) and represents 14 percent of the total lane mileage tested. This lane was the only lane with a value below 0.40.

1975 Construction

After one service year, 61 lanes (117.102 lane miles) from 11 projects were tested. Friction levels ranged from 0.36 to 0.88 and averaged 0.64. The only average Wsf value below 0.40 was encountered on the WBOL of Project I 82021-05127A. It had an average Wsf value of 0.38 and represents 1 percent of the total lane mileage tested.

1976 Construction

Only three of the concrete projects, which were constructed during 1976, had initial-year skid tests conducted. None of the 15 lanes (24.329 lane miles) had coefficients below 0.40; friction levels ranged from 0.53 to 0.81 and averaged 0.71.

A 1976 pavement texturing specification, calling for use of a steel texturing comb with tines on 1/2-in. centers, was implemented during 1976. Only part of the pavements constructed during 1976 were finished with the metal comb. Full implementation of this specification is expected during the 1977 construction season.

Table 2 - Bituminous Concrete Pavements (4.12) Constructed in 1973, 1974, 1975, and 1976

1973 Construction

Project U 82081-01195A was the only 1973 construction project tested during 1976. Wsf values determined on this 5.2 lane miles of bituminous concrete ranged from 0.45 to 0.53 and averaged 0.49.

1974 Construction

Two bituminous concrete projects were tested after a two-year service period. Wsf values on the six lanes ranged from 0.40 to 0.60 and averaged 0.54.

1975 Construction

Fifty-nine projects (594.566 lane miles) were skid tested at the one-year service level. Coefficients on 203 lanes tested ranged from 0.26 to 0.74 and averaged 0.51. Twenty-one of the lanes, representing 6.3 percent of the total lane miles, yielded Wsf values averaging lower than 0.40. Three lanes averaged lower than 0.30, i.e., the NBOL (0.27) and SBOL (0.26) of Project Mbr 28012-07668A, located on M 37-US 31 south of M 72 in Traverse City and the southbound lane (0.29) of Project Mbr 38051-07683A, located on M 106 north of I 94. These three lanes represent 0.6 percent of the total lane mileage tested.

1976 Construction

During the initial service year 39 projects were tested. Friction levels ranged from 0.22 to 0.70 and averaged 0.50. Sixteen of the 154 lanes, 8.3 percent of the 360.193 lane miles, yielded Wsf values averaging below 0.40. The lowest values were encountered on the M 44 portion of Project Mb 41012-09281A between the M 44 connector and Seven Mile Rd in Control Section 41013. All lanes of this project averaged below 0.40; values as low as 0.22 were determined on this project during tests conducted on June 18th.

Table 3 - Bituminous Aggregate Pavements (4.11) Constructed in 1974, 1975, and 1976

1974 Construction

Six projects, 98.160 lane miles, were tested after two years of service. Coefficients ranged from 0.44 to 0.71 and averaged 0.51.

1975 Construction

During the 1976 test year, 38 bituminous aggregate projects (91 lanes) were skid tested. Coefficients ranged from 0.28 to 0.76 and averaged 0.55. Twelve lanes, 8.2 percent of the 549.630 lane miles, had Wsf values lower than 0.40. The lowest values occurred on M 24 from Columbiaville Rd north to south of M 90 (Mbr 44012-06103A) where friction levels ranged from 0.28 to 0.38 and averaged 0.33.

1976 Construction

Thirty projects were tested during the initial service year. Wsf values ranged from 0.28 to 0.69 and averaged 0.51. Six lanes, 5.1 percent of the 633.388 lane miles, averaged less than 0.40. Coefficients as low as 0.28 were encountered northwest of temporary I 69 on the southbound lanes of M 71 (Project Mb 76041-07719A).

Table 4 - Miscellaneous Bituminous Surfaces Constructed in 1975 and 1976

Two open-graded asphalt friction course projects (8.120 lane miles) were tested after a one-year service period. Friction levels on the 10 lanes tested ranged from 0.44 to 0.64 and averaged 0.54. These same two projects were tested last year, during their initial service year. One-year average coefficients on all lanes of these projects have increased since last year. Friction level increases ranged from 7 to 35 percent. Additional information regarding this surface type may be found in Table 27.

Initial service year tests were conducted on two single seal projects. The four lanes tested (20.714 lane miles) yielded friction levels ranging from 0.35 to 0.62, averaging 0.48.

TABLE 1
CONCRETE PAVEMENTS CONSTRUCTED IN 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1974	I 50061-06522A	M 6 (I 696 Service Rd) from Audrey St (west of Mound Rd) easterly to west of Penn Central RR	Ministrelli Construction Co.	E.C. Levy (Dix Yard)	Pit 50-41	EBOL	0.42	0.46	0.44
						EBIL	0.44	0.45	0.45
						WBOL	0.41	0.44	0.42
						WBIL	0.44	0.46	0.45
	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 Yard)	Pit 81-78	EBOL	0.45	0.48	0.47
						EBCL	0.48	0.53	0.51
						EBIL	0.63	0.67	0.65
						WBOL	0.38	0.39	0.38
						WBCL	0.46	0.47	0.46
						WBIL	0.57	0.59	0.58
1975	RF 18024-06601A	US 10 from 1.2 miles west of Harding Rd easterly on relocation to 0.5 mile east of Old State Rd	L. W. Edison Co.	Pit 67-2	Pit 67-2	EBOL	0.68	0.72	0.69
						EBIL	0.77	0.80	0.79
						WBOL	0.73	0.77	0.75
						WBIL	0.83	0.88	0.86
	DPF 52042-02500A	US 41 from 200 ft north of Carp River southeasterly to 1,600 ft south of M 28	Worth Construction and Aggregate	Pit 52-27	Pit 52-27	NBOL	0.57	0.59	0.58
						NBIL	0.58	0.61	0.60
						SBOL	0.62	0.66	0.64
						SBIL	0.67	0.68	0.68
	I 58151-03867A	I 75 from 2,600 ft southwest of Bay Creek Rd northeasterly to 3,478 ft southwest of South Otter Creek Rd	L. W. Edison Co.	Pit 58-1	Pit 81-50	NBOL	0.58	0.61	0.60
						SBOL	0.56	0.60	0.58
	I 58151-03869A	I 75 from 3,500 ft southwest of South Otter Creek Rd northeasterly to 1,000 ft north of south limits of Monroe	L. W. Edison Co.	Pit 58-1 and E.C. Levy (Trenton Yard)	Pit 81-50	NBOL	0.65	0.68	0.66
						SBOL	0.61	0.66	0.63
	RF 64014-06436A[1]	US 31 relocation from Muskegon County Line (Skeels Rd) northwesterly to McKinley Rd	Eisenhour Construction Co.	Pit 70-9	Pit 64-20	NBOL	0.60	0.60	0.60
						NBIL	0.60	0.65	0.63
						SBOL	0.58	0.60	0.59
						SBIL	0.57	0.59	0.58
	RF 64014-06438A	US 31 relocation from McKinley Rd northerly to 2,700 ft north of Garfield Rd (M 20)	Eisenhour Construction Co.	Pit 70-9	Pit 64-20	NBOL	0.59	0.60	0.60
						NBIL	0.62	0.65	0.64
						SBOL	0.54	0.57	0.56
						SBIL	0.65	0.67	0.66
	SS 64016-00928A	US 31 BR (Polk Rd) from 40 ft east of 64th Ave easterly to State St in Hart, thence northerly to Lincoln St	Sargent Construction Co.	E.C. Levy (Burns Harbor)	Pit 67-2	NBOL	0.43	0.43	0.43
						NBIL	0.38	0.42	0.40
						SBOL	0.50	0.56	0.53
						SBIL	0.44	0.46	0.45

[1]See also Table 25.

TABLE 1 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED IN 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
I 82021-05127A[1]	I 94 from 113 ft west of Morton-Taylor Rd easterly to 542 ft east of Haggerty Rd	Eisenhour Construction Co.	E.C. Levy (Dix Yard)	Pit 81-78	EBOL	0.46	0.48	0.47
					EBCL	0.48	0.52	0.50
					EBIL	0.62	0.65	0.64
					WBOL	0.36	0.40	0.38
					WBCL	0.44	0.46	0.45
					WBIL	0.61	0.64	0.62
BIU 82122-04533A	I 96 from east of US 24 easterly to east of Outer Dr	Eisenhour Construction Co.	E.C. Levy (Dix Yard)	Pit 63-7	EBOL	0.66	0.69	0.68
					EB#3	0.72	0.76	0.74
					EB#2	0.77	0.80	0.78
					EBIL	0.74	0.76	0.75
					WBOL	0.80	0.82	0.81
					WB#4	0.78	0.79	0.79
					WB#3	0.76	0.79	0.78
					WB#2	0.66	0.71	0.68
					WBIL	0.74	0.78	0.76
BIU 82122-04534A[2] (part)	I 96 from east of Outer Dr easterly to Evergreen	Eisenhour Construction Co.	E.C. Levy (Dix Yard)	Pit 63-7	Inside Set of Dual-Dual Roadway			
					EBOL	0.78	0.79	0.78
					EBCL	0.75	0.79	0.77
					EBIL	0.78	0.81	0.80
					WBOL	0.77	0.79	0.78
					WBCL	0.75	0.76	0.76
					WBIL	0.76	0.81	0.79
					Outside Set of Dual-Dual Roadway			
					EBCL	0.79	0.82	0.80
					EBIL	0.79	0.82	0.80
					WBCL	0.75	0.78	0.77
					WBIL	0.77	0.80	0.78
BIU 82123-04229A	I 96 from Southfield Rd (M 39) easterly to St. Marys	Chas. J. Rogers, Inc.	E.C. Levy (Dix Yard)	Pit 63-7	Inside Set of Dual-Dual Roadway			
					EBOL	0.72	0.78	0.75
					EBCL	0.67	0.70	0.69
					EBIL	0.68	0.71	0.70
					WBOL	0.76	0.77	0.76
					WBCL	0.70	0.71	0.71
					WBIL	0.68	0.70	0.69
					Outside Set of Dual-Dual Roadway			
					EBOL	0.63	0.67	0.65
					EB#3	0.71	0.72	0.71
					EB#2	0.69	0.72	0.71
					EBIL	0.71	0.73	0.72
					WB#2	0.69	0.71	0.70
					WBIL	0.70	0.73	0.72

[1] See also Table 25.
[2] See also Table 2.

TABLE 1 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED IN 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1976	M 07012-09166A	US 41 from Mead-Maki Rd northwesterly to Broad St in L'Anse	Bacco Construction Co.	Pit 31-45	Pit 31-45	SBTL	0.53	0.56	0.54
	I 58152-00797A	I 75 from 400 ft north of Sandy Creek Rd northerly to 253 ft north of Post Rd	L. W. Edison Co.	Pit 58-1	Pit 30-35	NBOL	0.69	0.69	0.69
						SBOL	0.63	0.68	0.66
	BIU 82123-01270A	I 96 from St. Mary Ave easterly to 150 ft west of Schafer Rd	Eisenhour Construction Co.	E.C. Levy (Dix Yard)	Pit 63-7	Inside Set of Dual-Dual Roadway			
						EBOL	0.75	0.80	0.77
						EBCL	0.73	0.77	0.75
						EBIL	0.74	0.79	0.76
						WBOL	0.74	0.79	0.77
						WBCL	0.76	0.81	0.78
						WBIL	0.74	0.78	0.75
						Outside Set of Dual-Dual Roadway			
						EBOL	0.74	0.78	0.76
						EBCL	0.68	0.70	0.69
						EBIL	0.73	0.80	0.76
						WBOL	0.69	0.74	0.72
						WBCL	0.73	0.78	0.75
						WBIL	0.68	0.73	0.70

TABLE 2

BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1973	U 82081-01195A [1] (part)	M 153 (Ford Rd) from 330 ft east of Greenfield Rd east to 200 ft east of Appoline St	Bit Con Corp.	Pit 47-3 and E.C. Levy (Trenton Yard)	Pit 47-3 and E.C. Levy (Trenton Yard)	EBOL EB#3 EB#2 EBIL	0.50 0.45 0.49 0.48	0.50 0.47 0.52 0.53	0.50 0.46 0.50 0.50
1974	Mb 63052-07536A	US 10 (Telegraph) from 290 ft southeast of Hood St northwesterly to Rockwell Ave	The Cooke Contracting Co.	Pit 63-4	Pit 50-35	NBOL NBIL SBOL SBIL	0.42 0.47 0.40 0.48	0.46 0.50 0.44 0.50	0.45 0.49 0.42 0.49
	RF 64022-00931A	M 20 from 224 ft east of 64th Ave and Garfield Rd easterly on relocation to 540 ft east of existing US 31-M 20 (Hayes Rd)	Reith-Riley Construction Co.,	Pit 70-9	Pit 70-9	EB WB	0.58 0.58	0.60 0.60	0.59 0.59
1975	Mbr 05072-07630A (Control Section 15091)	US 131 from 2.29 miles north of north junction M 32 northerly to Lynn St in Boyne Falls	Hodgkiss and Douma, Inc.	Pit 45-19	Pit 15-32	NB SB	0.50 0.44	0.52 0.48	0.51 0.46
	Mb 07041-07633A (part)	M 38 from US 41 in Baraga west 0.881 miles	Geo. Hocking Construction Co.	Pit 31-66	Pits 31-65 and 31-69	EB WB	0.51 0.44	0.51 0.49	0.51 0.47
	Mb 07041-07633A (part) (Control Section 31051)	US 41 from 2.88 miles south of south limits of Houghton northerly to Franklin St	Geo. Hocking Construction Co.	Pit 31-66	Pits 31-65 and 31-69	NB SB	0.54 0.58	0.58 0.62	0.56 0.60
	I 11111-05862A	I 196 from I 94 northerly to 550 ft south of Riverside Rd	John G. Yerington Co.	Material Service (Thornton, Ill.)	Pit 11-30	NBOL NBIL SBOL SBIL	0.49 0.66 0.52 0.66	0.52 0.67 0.55 0.68	0.51 0.67 0.53 0.67
	Mb 12061-07641A (part)	M 60 from 539 ft west of M 66 easterly to Branch-Calhoun County Line	Globe Construction Co.	Pits 12-44 and 39-1	Pit 12-44	EB WB	0.53 0.52	0.56 0.59	0.54 0.55
	Mb 12061-07641A (part) (Control Section 13021)	M 60 from Branch-Calhoun County Line northeasterly to old US 27	Globe Construction Co.	Pits 12-44 and 39-1	Pit 12-44	EB WB	0.52 0.46	0.53 0.50	0.52 0.48
	Mb 12061-07641A (part) (Control Section 13022)	M 60 from old US 27 easterly to 17 Mile Rd	Globe Construction Co.	Pits 12-44 and 39-1	Pit 12-44	EB WB	0.41 0.43	0.46 0.46	0.43 0.44
	Mb 13043-07642A (part)	M 99-I 94 BL from Superior St easterly to Clark St in Albion	Tom Robinson and Son, Inc.	Pit 30-35	Pit 30-35	EB WB	0.41 0.44	0.42 0.44	0.41 0.44

[1] See also Table 6 for concrete portion of this project which was surfaced in 1971.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 13043-07642A (part)	I 94 BL from Vine St northerly to Broadwell St in Albion	Tom Robinson and Son, Inc.	Pit 30-35	Pit 30-35	EBOL	0.41	0.44	0.42
					EBIL	0.44	0.49	0.47
					WBOL	0.39	0.42	0.40
					WBIL	0.41	0.42	0.42
Mb 14021-07644A	M 205 from Indiana State Line northerly to US 12	Reith-Riley Construction Co.,	Material Service (Thornton, Ill.)	Pit 14-64	NB	0.48	0.50	0.49
					SB	0.46	0.48	0.47
Mb 14031-07645A	M 62 from north of US 12 northerly to RR crossing south of Cassapolis	Klett Construction Co.	Material Service (Thornton, Ill.)	Pit 51-14	NB	0.51	0.56	0.53
					SB	0.52	0.54	0.53
Mb 14042-07646A	US 12 from 5 Points Rd easterly to east limits of Union	Reith-Riley Construction Co.,	Material Service (Thornton, Ill.)	Pit 14-47	EB	0.48	0.49	0.48
					WB	0.46	0.48	0.47
Mbr 18011-08880A (part)	M 115 from US 10 relocation northwesterly to Clare-Osceola County Line	The Hicks Co.	Pit 45-19	Pit 67-2	EB	0.51	0.56	0.54
					WB	0.51	0.55	0.54
Mbr 18011-08880A (part) (Control Section 67051)	M 115 from Clare-Osceola County Line northwesterly to M 66	The Hicks Co.	Pit 45-19	Pit 67-2	EB	0.55	0.55	0.55
					WB	0.55	0.56	0.55
Ms 25072-01720A	M 54 (Dort Hwy) from 700 ft south of Hemphill Rd northerly to Lippincott	Ann Arbor Construction Co.	Pit 63-47	Pit 63-47	NBOL	0.39	0.43	0.42
					NBIL	0.48	0.51	0.50
					SBOL	0.44	0.44	0.44
					SBIL	0.52	0.52	0.52
Mb 25072-07662A	M 54 from 310 ft south of north limits of Grand Blanc northerly to 670 ft south of M 121	Ann Arbor Construction Co.	Pit 63-88	Pit 63-88	NBOL	0.46	0.48	0.47
					NBIL	0.49	0.52	0.50
					SBOL	0.41	0.45	0.44
					SBIL	0.47	0.50	0.49
Mb 25072-07663A	M 54 from 390 ft north of Thom St northerly to 680 ft south of Carpenter Rd	Ace Asphalt and Paving Co.	Pit 47-3	Pit 67-92	NBOL	0.46	0.47	0.47
					NBIL	0.49	0.51	0.50
					SBOL	0.46	0.48	0.47
					SBIL	0.47	0.50	0.48
Mb 27011-07666A (part)	US 2 BR from Montreal River northeasterly 1.25 miles to US 2	Mathy Construction Co.	Pit 27-12	Pit 27-12	EB	0.60	0.62	0.61
					WB	0.55	0.58	0.57

TABLE 2 (Cont.)

BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 27011-07666A (part) (Control Section 27022)	US 2 from M 28 in Wakefield easterly 0.721 miles to 165 ft east of Bedell Ave	Mathy Construction Co.	Pit 27-12	Pit 27-12	EB	0.56	0.57	0.57
					WB	0.58	0.59	0.58
Mb 28011-09211A	US 31 from Benzie-Grand Traverse County Line easterly to M 37	Peninsula Asphalt Construction Co.	Pit 45-19	Pit 45-19	EB	0.36	0.40	0.38
					WB	0.38	0.41	0.39
Mbr 28012-07668A	M 37-US 31 (Division St) from 180 ft south of 14th St northerly to Grand View Parkway	Peninsula Asphalt Construction Co.	Pit 45-19	Pit 45-19	NBOL	0.26	0.28	0.27
					NBIL	0.30	0.33	0.31
					SBOL	0.26	0.27	0.26
					SBIL	0.33	0.34	0.34
Mbr 30041-07671A	M 99 from 380 ft south of south limits of Hillsdale southeasterly to 475 ft east of intersection with M 34	Cunningham-Gooding	Pit 81-84	Pit 30-58	NB	0.42	0.46	0.44
					SB	0.43	0.44	0.44
Mbr 32011-07532A	M 25 from 275 ft south of south limits of Sebewaing northerly to Sebewaing St	Williams Bros. Asphalt Paving Co.	Pit 32-4	Pit 79-7	NB	0.54	0.55	0.54
					SB	0.52	0.54	0.53
M 33021-06069A	M 36 (Cedar St) from 1,500 ft southeast of US 127 southeasterly to North St in Mason	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NBOL	0.44	0.45	0.44
					NBIL	0.40	0.43	0.41
					SBOL	0.43	0.46	0.45
					SBIL	0.46	0.51	0.49
HHS 33043-05742A	Temporary I 69 (Saginaw St) from 451.5 ft west of Abbott Rd easterly to 883 ft east of northbound Alton Blvd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	EBOL	0.50	0.53	0.51
					EBIL	0.57	0.58	0.58
					WBOL	0.54	0.54	0.54
					WBIL	0.56	0.60	0.58
Mb 33082-07677A	M 43 from west limits of Williamston (Corwin Rd) easterly to 100 ft east of M 52 south	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	EB	0.55	0.57	0.56
					WB	0.57	0.59	0.58
					EBOL	0.48	0.50	0.49
					EBIL	0.54	0.57	0.56
					WBOL	0.48	0.50	0.49
					WBIL	0.54	0.55	0.54
Mb 34032-07678A	M 66 from 71 ft south of old US 16 northerly to the Grand River (B01 of 34032)	Reith-Riley Construction Co.,	Pit 34-26	Pit 34-26	NB	0.53	0.57	0.56
					SB	0.54	0.61	0.57
Mb 34033-07679A	M 66 from Ionia northerly, intermittently to M44	Reith-Riley Construction Co.,	Pit 34-26	Pit 34-26	NB	0.50	0.54	0.52
					SB	0.56	0.58	0.57
Mb 34062-07680A	M 21 from Cook Rd easterly to Ionia-Clinton County Line	Reith-Riley Construction Co.,	Pit 34-26	Pit 34-26	EB	0.63	0.65	0.64
					WB	0.62	0.65	0.64

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
HHS 37011-07794A	US 27 BR (Mission St) from north of Broomfield Rd northerly to north of Preston St in Mt. Pleasant	The Hicks Co.	Pit 37-26	Pit 37-26	NBOL NBIL SBOL SBIL	0.34 0.36 0.39 0.40	0.36 0.37 0.41 0.41	0.35 0.37 0.40 0.41
Mbr 38051-07683A (part)	Northbound M 106 from Michigan Ave northerly to Ganson St	Ajax Paving Industries, Inc.	Pit 58-3	Pit 30-35	NBOL NBCL NBIL	0.43 0.34 0.42	0.48 0.37 0.45	0.46 0.35 0.44
Mbr 38051-07683A (part)	M 106 from LeRoy St northerly to south of Frost St	Ajax Paving Industries, Inc.	Pit 58-3	Pit 30-35	NB SB	0.34 0.28	0.40 0.29	0.37 0.29
Ms 39082-06480A	M 43 from 2,500 ft southwest of Sprinkle Rd northeasterly to 1,300 ft northeast of Sprinkle Rd	Reith-Riley Construction Co.,	Pit 39-2	Pit 39-11	NBOL NBIL SBOL SBIL	0.50 0.54 0.55 0.51	0.54 0.57 0.56 0.55	0.51 0.56 0.55 0.52
Mb 41043-07690A	M 21 from 0.75 miles east of Grand River easterly to Ionia-Kent County Line	Williams Bros. Asphalt Paving Co.	Pit 41-50	Pit 34-45	EB WB	0.55 0.56	0.65 0.66	0.61 0.61
Mb 41061-07691A	M 11 from Riverbend Dr northerly to Remembrance	Grand Rapids Asphalt Paving Co.	Pit 41-50	Pit 41-50	NB SB	0.47 0.49	0.52 0.50	0.50 0.50
Mbr 44012-06103A[2] (part)	M 24 from south of M 90 north to Lapeer-Tuscola County Line	Howell Construction Co.	Pit 63-4	Pit 63-4	NB SB	0.39 0.38	0.49 0.53	0.42 0.44
Mbr 44012-06103A[2] (part) (Control Section 79051)	M 24 from Lapeer-Tuscola County Line north to M 46	Howell Construction Co.	Pit 63-4	Pit 63-4	NB SB	0.46 0.40	0.54 0.55	0.49 0.48
Ms 44012-08772A	M 24 from the Flint River (B01 of 44012) north to Blum Creek (B02 of 44012)	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-4	NB SB	0.48 0.46	0.49 0.51	0.48 0.49
Mb 44031-07692A	M 53 from 100 ft north of Maple St in Almont northerly to 100 ft north of Barland St in Imlay City	Reith-Riley Construction Co.,	Pit 63-4	Pit 63-4	NB SB	0.42 0.42	0.51 0.52	0.47 0.48
Mbr 44031-09308A	M 53 from Lapeer-Macomb County Line (Boardman Rd) northerly to Maple St in Almont	Williams Bros. Asphalt Paving Co.	Pit 63-4	Pit 63-4	NB SB	0.45 0.44	0.47 0.49	0.46 0.47
UM 50022-06609A UM 50022-06610A	M 59 from 650 ft east of M 53 easterly to 1,225 ft east of Hayes Rd	Bit Con Corp.	Pit 63-4	Pit 63-4	EBOL EBIL WBOL WBIL	0.50 0.57 0.43 0.51	0.52 0.60 0.48 0.54	0.51 0.59 0.45 0.53

[2] See also Table 3.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 50051-06082A	M 3 (Gratiot Ave) from M 102 northeasterly to Common St	The Cooke Contracting Co.	Pit 63-4	Pit 50-35	NBOL	0.49	0.49	0.49
					NBCL	0.49	0.50	0.49
					NBIL	0.46	0.49	0.48
					SBOL	0.46	0.49	0.47
					SBCL	0.49	0.51	0.50
					SBIL	0.50	0.51	0.50
Mb 50072-07700A	M 29 from 700 ft east of Baker St easterly 2.09 miles	Peake Asphalt Paving Co., Inc.	Pit 63-4	Pit 50-35	EB	0.43	0.44	0.44
					WB	0.41	0.42	0.42
Mb 52032-07702A	M 35 at four locations between County Road #492 and County Road #480	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-39	NB	0.62	0.66	0.65
					SB	0.62	0.64	0.63
Mb 52041-07703A	US 41-M 28 from 0.4 miles west of the Escanaba River (B02 of 52041) easterly 0.566 miles	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-39	EB	0.59	0.60	0.59
					WB	0.57	0.60	0.58
Mb 58111-07535A	M 50 (Elm St) from M 125 (Monroe St) easterly to Dixie Hwy	Cunningham-Gooding	E.C. Levy (Dix Yd)	E.C. Levy (Dix Yd)	EB	0.47	0.51	0.49
					WB	0.50	0.54	0.52
Mb 62031-07709A	M 37 from 150 ft north of Penoyer Creek in Newaygo northerly to south limits of White Cloud	Reith-Riley Construction Co.,	Pit 41-121	Pit 41-121	NB	0.51	0.55	0.53
					SB	0.48	0.58	0.53
Mb 63051-06083A	Northbound M 1 (Woodward Ave) from Bennett St northwesterly to Trowbridge Rd	The Cooke Contracting Co.	Pit 63-4	Pit 50-35	NBOL	0.40	0.45	0.44
					NB#3	0.40	0.45	0.44
					NB#2	0.44	0.50	0.47
					NBIL	0.46	0.57	0.52
Mbr 63071-07537A	M 15 from US 10 northerly to I 75	Ann Arbor Construction Co.	Pit 63-88	Pit 63-88	NB	0.37	0.40	0.39
					SB	0.39	0.42	0.40
Mbr 63112-07711A	M 24 from 183 ft north of Minnetonka St northwesterly to 130 ft north of Harriet St	Ajax Paving Industries, Inc.	Pit 63-4	Pit 63-4	NBOL	0.40	0.42	0.41
					NBIL	0.42	0.45	0.43
					SBOL	0.44	0.46	0.45
					SBIL	0.42	0.45	0.43
Mb 70013-07715A (part)	Southbound US 31 from 350 ft south of Taylor Rd northwesterly to M 45	Muskegon Asphalt Paving Co.	Pit 70-9	Pit 70-9	SBOL	0.62	0.64	0.63
					SBIL	0.68	0.69	0.68
Mb 70013-07715A (part) (Control Section 70014)	Southbound US 31 from M 45 north to 800 ft south of Ferris St	Muskegon Asphalt Paving Co.	Pit 70-9	Pit 70-9	SBOL	0.60	0.65	0.62
					SBIL	0.63	0.67	0.66
RF 72014-07716A	US 27 from 0.7 miles north of M 55 north 8.23 miles	Saginaw Asphalt Paving Co.	Pits 71-47 and 72-5	Pit 72-5	NBOL	0.48	0.58	0.53
					NBIL	0.64	0.68	0.66
					SBOL	0.51	0.53	0.52
					SBIL	0.65	0.68	0.66

TABLE 2 (Cont.)

BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
M 73033-05289A	M 84 from 320 ft north of Shattuk Rd north of 1,450 ft north of Tittabawassee Rd	Sand and Stone Inc.	Pit 71-47	Pit 71-15	NBOL	0.40	0.43	0.41
					NBIL	0.47	0.49	0.48
					SBOL	0.44	0.46	0.45
					SBIL	0.40	0.43	0.42
Mb 77011-07720A	M 19 from 110 ft south of Emmett north to the Pine River (B02 of 77012)	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	NB	0.37	0.40	0.38
					SB	0.41	0.43	0.42
Mb 78042-07722A	M 60 from Main St easterly and northerly 0.75 miles to 5th St in Three Rivers	John G. Yerington Co.	Pit 41-38	Pit 12-44	EB	0.42	0.45	0.43
					WB	0.44	0.44	0.44
Mtb 81082-06529A	M 17 from US 12 BR south and east to US 12	Thompson-McCully Co.	Pit 47-3	Pit 81-1	EBOL	0.40	0.42	0.41
					EBIL	0.42	0.46	0.43
					WBOL	0.41	0.45	0.43
					WBIL	0.40	0.44	0.42
Mb 82062-07727A (part)	US 12 from 635 ft west of Wyoming easterly to Livernois	Ajax Paving Industries Inc.	Pit 81-28	Pit 47-15	EBOL	0.44	0.48	0.46
					EBCL	0.34	0.37	0.36
					EBIL	0.43	0.44	0.43
					WBOL	0.48	0.48	0.48
					WBCL	0.40	0.41	0.41
					WBIL	0.35	0.37	0.36
Mb 82062-07727A[3] (part)	US 12 from 28th St easterly to Hubbard St	Ajax Paving Industries, Inc.	Pit 81-28	Pit 47-15	EBOL	0.49	0.51	0.50
					EB#3	0.44	0.47	0.45
					EB#2	0.49	0.50	0.49
					EBIL	0.46	0.49	0.48
					WBOL	0.53	0.56	0.55
					WB#3	0.46	0.48	0.47
					WB#2	0.44	0.44	0.44
					WBIL	0.48	0.49	0.49
Mbr 82062-08470A	US 12 (Michigan Ave) from 140 ft west of Jefferson St easterly to 50 ft east of Brady St	Ajax Paving Industries, Inc.	Pit 75-5	Pit 47-47	EBOL	0.37	0.40	0.39
					EBIL	0.40	0.40	0.40
					WBOL	0.40	0.45	0.42
					WBIL	0.38	0.41	0.39
Mb 82071-07730A	US 24 and Connector #3 from 1,020 ft south of West Rd northeasterly to 2,100 ft southwest of I 75	Asphalt Products Co.	E.C. Levy (Dix Yd)	E.C. Levy (Dix Yd)	NBOL	0.54	0.56	0.55
					NBIL	0.56	0.61	0.59
					SBOL	0.55	0.59	0.56
					SBIL	0.62	0.63	0.62
MU 82101-05305A	M 14 from Whitcomb Ave east to Manor Ave	Ajax Paving Industries, Inc.	E.C. Levy (Dix Yd)	Pit 47-47	EB	0.46	0.51	0.48
					WB	0.45	0.45	0.45

[3] Rubberized bituminous-concrete wearing course.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1975 CONT.	MU 82101-07547A	M 14 (Ann Arbor Rd) from 2,000 ft west of Sheldon Rd east to west of I 275 Interchange	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	EBOL	0.43	0.45	0.44
						EBIL	0.44	0.48	0.46
						WBOL	0.43	0.44	0.44
						WBIL	0.46	0.48	0.47
	MU 82101-07548A	M 14 (Ann Arbor Rd) from east of I 275 Interchange east to 1,300 ft west of Newburg Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	EBOL	0.52	0.57	0.54
						EBIL	0.55	0.60	0.57
						WBOL	0.50	0.52	0.51
						WBIL	0.55	0.58	0.56
	BIU 82122-04534A[4] (part)	I 96 from east of Outer Dr easterly to Evergreen	The Cooke Contracting Co.	Pits 47-3 and 63-4	Pits 47-3 and 50-35	EBOL	0.68	0.71	0.69
						WBOL	0.72	0.74	0.73
	Mb 82141-06088A	M 102 from I 96 BS (Grand River) east to US 24	Bit Con Corp.	Pit 47-3	Pit 47-3	EBOL	0.41	0.43	0.42
						EBCL	0.47	0.50	0.49
						EBIL	0.46	0.50	0.48
						WBOL	0.46	0.49	0.47
						WBCL	0.48	0.49	0.49
						WBIL	0.54	0.55	0.55
	MU 82571-05304A	M 14 (Plymouth Ave) from west of Auburn Ave east to west of Sussex Ave	Ajax Paving Industries, Inc.	E.C. Levy (Dix Yd)	E.C. Levy (Dix Yd)	EBOL	0.43	0.47	0.45
						EBIL	0.53	0.54	0.53
						WBOL	0.52	0.53	0.53
						WBIL	0.55	0.58	0.57
	T 98012-08779A (Control Section 77091)	US 25 from Concord St northwesterly to the Black River in St. Clair County	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	NBOL	0.29	0.33	0.31
						NBIL	0.34	0.36	0.35
						SBOL	0.33	0.34	0.33
						SBIL	0.35	0.37	0.36
1976	Mb 03072-09309A	M 40 from I 196 north and west to US 131 in Holland	Michigan Colprovia Co.	Pit 41-22	Pit 41-16	EB	0.36	0.46	0.40
						WB	0.39	0.44	0.41
	Mb 06072-09302A	US 23 from 1,750 ft east of west limits of Omer easterly to M 65	Central Paving Co.	Pit 71-15	Pit 71-15	NB	0.36	0.41	0.38
						SB	0.38	0.39	0.38
	M 07012-08988A	US 41 from 1,700 ft west of west limits L'Anse easterly	Mathy Construction Co.	Pit 52-39	Pit 52-9	NB	0.46	0.48	0.47
						SB	0.56	0.58	0.57
						SBTL	0.46	0.48	0.47
	Mbr 09033-09293A	M 13 from south limits of Pinconning northerly to 650 ft north of south branch of the Pine River	Central Paving Co.	Pits 71-15 and 72-5	Pits 65-2 and 72-5	NBOL	0.38	0.41	0.39
						NBIL	0.45	0.47	0.45
						SBOL	0.41	0.43	0.42
						SBIL	0.47	0.50	0.48

[4]See also Table 1.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mbr 14031-06119A	M 62 from Indiana State Line northerly to US 12	John G. Yerington Co.	Material Service (Thornton, Ill.)	Pit 14-36	NB SB	0.29 0.34	0.35 0.38	0.31 0.36
Mbr 20032-06908A	I 75 BL from M 72-M 93-I 75 BL intersection northerly to 560 ft north of Down River Rd	Lake Construction Co.	Pit 45-19	Pit 72-5	NBOL NBIL SBOL SBIL	0.40 0.43 0.38 0.38	0.44 0.44 0.41 0.42	0.41 0.44 0.40 0.40
M 22021-10842A	US 2-US 141-M 95 from east limits of Iron Mountain northwesterly to Wisconsin State Line	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	Pit 22-69	EB WB EBOL EBIL WBOL WBIL	0.58 0.57 0.50 0.51 0.45 0.50	0.61 0.58 0.58 0.62 0.58 0.63	0.60 0.58 0.55 0.57 0.51 0.57
RS 23092-10122A	M 99 from 1,625 ft north of Holt Rd northeasterly to Waverly Rd	Williams Bros. Asphalt Paving Co.	Pit 34-45	Pit 34-45	NBOL NBIL SBOL SBIL	0.58 0.55 0.56 0.54	0.61 0.57 0.57 0.56	0.60 0.56 0.57 0.55
Mtb 25051-05457A	M 54 BR from 340 ft southeast of Dort Hwy northeasterly to Hemphill Rd	Spartan Asphalt Paving Co.	Pit 75-5	Pit 63-29	NBOL NBIL SBOL SBIL	0.43 0.48 0.43 0.45	0.44 0.48 0.45 0.47	0.44 0.48 0.44 0.46
Mb 25101-07664A	M 57 from 200 ft west of Peterson Rd easterly to 376 ft east of east limits of Clio, omitting from Center St to Mill St	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 63-54	EB WB EBOL EBIL WBOL WBIL	0.33 0.31 0.50 0.51 0.48 0.52	0.38 0.46 0.51 0.57 0.54 0.54	0.35 0.39 0.51 0.53 0.52 0.53
Mb 30041-09328A (part)	M 99 from 390 ft south of south limits of Hillsdale northerly to intersection of Carleton St and Broad St	Richardson Asphalt Corp.	Pit 81-84	Pit 46-30	NBOL NBIL SBOL SBIL	0.51 0.54 0.54 0.59	0.54 0.59 0.56 0.60	0.52 0.57 0.55 0.59
Mb 30041-09328A (part) (Control Section 30032)	M 99 from intersection of Carleton St and Broad St in Hillsdale northerly to Spring St	Richardson Asphalt Corp.	Pit 81-84	Pit 46-30	NBOL NBIL SBOL SBIL	0.43 0.51 0.53 0.58	0.46 0.56 0.54 0.59	0.45 0.53 0.54 0.59
Mb 33032-10719A	I 96 BL from Mt. Hope northerly to GTW RR grade separation	Spartan Asphalt Paving Co.	Pit 63-97	Pit 47-43	NBOL NBIL SBOL SBIL	0.50 0.56 0.56 0.53	0.51 0.59 0.59 0.58	0.51 0.58 0.57 0.55

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 33061-09333A	Eastbound M 43 (Saginaw St) from 70 ft east of Stanley St east to 170 ft west of Logan St	Reith-Riley Construction Co.,	Pit 41-38	Pit 19-33	EBOL	0.47	0.51	0.49
					EB#3	0.45	0.52	0.49
					EB#2	0.53	0.56	0.55
					EBIL	0.50	0.53	0.52
Mb 33062-09330A	M 143 (Michigan) from Cedar St easterly to 130 ft east of Kensington Rd	Williams Bros. Asphalt Paving Co.	Pit 34-45	Pit 34-45	EBOL	0.42	0.53	0.47
					EBCL	0.31	0.54	0.45
					EBIL	0.30	0.53	0.42
					WBOL	0.40	0.56	0.48
					WBCL	0.44	0.47	0.45
					WBIL	0.49	0.56	0.52
Mb 36023-10843A[5] (part)	M 69 from US 2 easterly 1.356 miles in Crystal Falls	Mathy Construction Co.	Pits 22-7, 22-54 and 22-69	Pit 22-69	EBOL	0.60	0.63	0.62
					EBIL	0.63	0.64	0.64
					WBOL	0.56	0.59	0.58
					WBIL	0.63	0.66	0.65
Mb 41012-09281A (part)	M 44 connector from Airway St north-easterly to M 44	Woodland Paving Co.	Pit 41-118	Pit 41-70	NBOL	0.36	0.42	0.39
					NBIL	0.43	0.47	0.45
					SBOL	0.33	0.36	0.35
					SBIL	0.43	0.46	0.44
Mb 41012-09281A (part) (Control Section 41013)	M 44 from M 44 connector northerly to 7 Mile Rd	Woodland Paving Co.	Pit 41-118	Pit 41-70	NBOL	0.22	0.36	0.30
					NBIL	0.27	0.41	0.36
					SBOL	0.25	0.44	0.34
					SBIL	0.35	0.44	0.39
Mb 41063-10802A	M 11 from Bretton St to M 37	Michigan Colprovia Co.	Pit 70-51	Pit 41-16	EBOL	0.40	0.40	0.40
					EBIL	0.41	0.44	0.43
					WBOL	0.46	0.48	0.47
					WBIL	0.49	0.53	0.53
Mbr 46082-07697A[6] (part)	M 50 from west limits of Tecumseh easterly to divided roadway	Cunningham-Gooding	Pit 81-57	Pit 81-84	EB	0.34	0.50	0.40
					WB	0.36	0.50	0.48
Mbr 46082-07697A[6] (part)	M 50 from two lane roadway easterly in Tecumseh to Adrian St	Cunningham-Gooding	Pit 81-57	Pit 81-84	EBOL	0.45	0.51	0.48
					EBIL	0.48	0.49	0.48
					WBOL	0.34	0.50	0.43
					WBIL	0.52	0.59	0.56
Mbr 46082-07697A (part)	M 50 from Adrian St easterly to Wyandotte St	Cunningham-Gooding	Pit 81-57	Pit 81-84	EBOL	0.42	0.60	0.54
					EBIL	0.46	0.59	0.52
					WBOL	0.35	0.53	0.40
					WBIL	0.39	0.50	0.45

[5] See also Table 3.
[6] Crusher dust added to mix design.

TABLE 2 (Cont.)

BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mbr 52041-10469A	US 41-M 28 from 500 ft east of M 95 easterly to North Lake Rd	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-9	EB WB	0.51 0.53	0.59 0.58	0.56 0.56
Mb 56021-09298A	M 20 from 100 ft west of Castor Rd easterly to 200 ft west of 7 Mile Rd	The Hicks Co.	Pit 37-26	Pit 37-26	EB WB	0.48 0.48	0.51 0.53	0.49 0.50
Mb 58051-09329A	US 24 from Ohio State line north 6.875 miles	Thompson-McCully Co.	Pit 47-3	Pit 47-3	NB SB	0.56 0.54	0.59 0.58	0.57 0.55
HHS 58052-04954A	US 24 from 1,100 ft south of 7th St northerly to 500 ft north of M 50	Cunningham-Gooding	E.C. Levy (Dearborn Yd)	E.C. Levy (Dearborn Yd)	NBOL NBIL SBOL SBIL	0.62 0.62 0.54 0.60	0.66 0.65 0.54 0.61	0.64 0.63 0.54 0.60
Mbr 59045-09285A	M 46 from Neff St in Edmore easterly to Vestaburg Rd	The Hicks Co.	Pit 37-26	Pit 37-26	EB WB	0.53 0.54	0.58 0.57	0.56 0.56
Mbr 62011-09276A	M 82 from 586 ft west of Connie St easterly to Mechanic St in Fremont	Woodland Paving Co.	Pit 41-27	Pit 41-90	EBOL EBIL WBOL WBIL	0.38 0.29 0.33 0.43	0.39 0.34 0.37 0.47	0.39 0.32 0.35 0.45
Mbr 62031-07710A	M 37 from 2.27 miles south of Grant northerly to north limits of Grant	Reith-Riley Construction Co.,	Pit 41-38	Pit 41-121	NB SB	0.44 0.44	0.46 0.48	0.45 0.46
HHS 63053-05829A (part)	US 10 from 510 ft southeast of Maybee Rd northwesterly to 1,400 ft northwest of M 15	Ann Arbor Construction Co.	Pit 63-60	Pit 63-60	NBOL NBIL SBOL SBIL	0.45 0.46 0.40 0.50	0.48 0.50 0.42 0.53	0.47 0.49 0.41 0.52
HHS 63053-05829A (part) (Control Section 63071)	M 15 from US 10 northerly 2,100 ft	Ann Arbor Construction Co.	Pit 63-60	Pit 63-60	NB SB	0.41 0.42	0.45 0.46	0.43 0.43
RF 67015-06920A	Northbound US 131 from 621 ft north of Luther Rd northerly to 2,087 ft north of Osceola-Wexford County Line	Globe Construction Co.	Pit 45-19	Pit 67-2	NBOL NBIL	0.49 0.43	0.58 0.56	0.53 0.50
Mb 70012-11085A	US 31 BR (Pine Ave) from 7th St south 700 ft to 9th St, thence east to Columbia Ave in Holland	West Shore Construction Co.	Pit 70-36	Pit 70-36	NBOL NBCL NBIL	0.47 0.47 0.46	0.49 0.48 0.51	0.48 0.47 0.49
Mb 72013-10847A	US 27 from Wolf Creek north to Snowbowl Rd	The Hicks Co.	Pit 72-5	Pit 72-5	NBOL NBIL SBOL SBIL	0.51 0.52 0.49 0.52	0.55 0.56 0.53 0.56	0.53 0.54 0.51 0.55

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12) CONSTRUCTED IN 1973, 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 72031-07717A (part)	M 55 from US 27 east to County Road #305	Central Paving Co.	Pit 72-5	Pit 72-5	EBOL	0.48	0.52	0.50
					EBIL	0.45	0.52	0.49
					WBOL	0.39	0.46	0.42
					WBIL	0.45	0.54	0.50
Mb 72031-07717A (part) (Control Section 72022)	M 55 from County Road #305 east to east junction of M 18	Central Paving Co.	Pit 72-5	Pit 72-5	EBOL	0.40	0.54	0.45
					EBIL	0.33	0.56	0.47
					WBOL	0.29	0.59	0.44
					WBIL	0.32	0.58	0.46
Mb 73031-09296A	M 52 from south of Mickle St north to Wolf Creek Rd	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 63-54	NB	0.47	0.51	0.49
					SB	0.50	0.51	0.51
Mb 74062-09300A	M 46 from Delaware St east to Stoutenberg Rd in Sandusky	Frank Strausberg and Son Co.	Pit 63-4	Pit 74-50	EB	0.43	0.46	0.44
					WB	0.50	0.50	0.50
Mb 78022-11098A	US 12 from Penn Central RR, 4 miles of Sturgis, east to 2,112 ft west of M 66	John G. Yerington Co.	Pit 12-44	Pit 12-44	EB	0.51	0.59	0.55
					WB	0.51	0.53	0.52
Mb 81031-09327A	US 12 from Lenawee-Washtenaw County Line northeasterly to McCollum Rd	Thompson-McCully Co.	Pit 63-97	Pit 81-1	EB	0.50	0.52	0.51
					WB	0.52	0.52	0.52
UM 82053-06459A	US 24 from I 96 BL north to 8 Mile Rd	Bit Con Corp.	Pit 47-3	Pit 47-3	NBOL	0.56	0.57	0.57
					NB#3	0.55	0.57	0.56
					NB#2	0.55	0.58	0.56
					NBIL	0.54	0.57	0.55
					SBOL	0.49	0.51	0.50
					SB#3	0.49	0.53	0.51
					SB#2	0.52	0.53	0.53
					SBIL	0.52	0.54	0.53
Mbr 82071-07731A	M 3 from I 75 interchange southwest and northeast to M 1	Bit Con Corp.	Pit 63-4	Pit 63-97	EBOL	0.44	0.46	0.45
					EBIL	0.45	0.47	0.46
					WBOL	0.49	0.50	0.49
					WBIL	0.43	0.45	0.44
Mb 82131-09336A	M 1 from south to north limits of Highland Park	Asphalt Products	E.C. Levy	E.C. Levy	NBOL	0.49	0.53	0.51
					NBIL	0.53	0.54	0.53
					SBOL	0.47	0.50	0.49
					SBIL	0.50	0.53	0.52
RF 83031-09127A	Proposed northbound US 131 from Wexford-Osceola County Line northerly to existing northbound US 131	Reith-Riley Construction Co.,	Pit 45-19	Pit 67-2	NBOL	0.63	0.67	0.65
					NBIL	0.65	0.70	0.67
Mb 83032-09259A	US 131 from 78 ft south of Boon Rd northerly to south junction with M 42	Globe Construction Co.	Pit 45-19	Pit 67-2	NB	0.42	0.46	0.44
					SB	0.43	0.50	0.47

TABLE 3
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
1974	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	NB	0.45	0.56	0.50
					SB	0.50	0.55	0.54
	Mb 08031-06071A (part) (Control Section 08052)	M 66 from Brumm Dr, in Nashville, north 0.451 miles	Reith-Riley Construction Co.	Pit 8-43	NB	0.50	0.52	0.51
					SB	0.55	0.59	0.57
	Mb 16033-07528A	US 23 from Mackinaw City to Cheboygan	Lake Construction Co.	Pit 16-69	EB	0.56	0.63	0.59
					WB	0.59	0.63	0.61
	Mb 28071-08051A	M 113 from M 186 to US 131	Peninsula Asphalt Corp.	Pit 40-18	NB	0.59	0.60	0.59
					SB	0.52	0.54	0.53
	Mb 41121-07533A	M 46 from M 37 easterly to US 131	William Bros. Asphalt Paving Co.	Pit 41-120	EB	0.44	0.56	0.50
					WB	0.47	0.56	0.52
	Mb 62012-06138A[1] (part) (Control Section 62041)	M 82 from Elm St east to Cottonwood Ave	Reith-Riley Construction Co.	Pit 62-33	EB	0.58	0.61	0.59
					WB	0.60	0.62	0.61
	Mb 79061-06124A (part)	M 81 from 380 ft west of Vassar Rd easterly to 100 ft west of Handy Rd	Midland Contracting Co.	Pits 25-24 and 25-30	EB	0.61	0.65	0.63
					WB	0.64	0.66	0.65
	Mb 79061-06124A (part) (Control Section 09021)	M 138 from M 15 east to Tuscola-Bay Co. line	Midland Contracting Co.	Pits 25-24 and 25-30	EB	0.67	0.71	0.69
					WB	0.64	0.68	0.66
1975	Mb 02031-07625A	M 67 from 2.88 miles east of US 41 northerly to M 94	Payne and Dolan of Wisconsin, Inc.	Pit 2-45	NB	0.64	0.71	0.68
					SB	0.68	0.73	0.70
	DPF 02041-00012A	M 28 from 3.3 miles east of Marquette-Alger Co. line easterly to 1,500 ft east of Deer Lake	Payne and Dolan of Wisconsin, Inc.	Pit 2-45	EB	0.70	0.70	0.70
					EBTL	0.66	0.69	0.68
					WB	0.69	0.70	0.69
	Mb 05072-07629A	US 131 from 1,050 ft north of M 66, north of Mancelona, thence northerly to 144 ft south of north junction M 32	Hodgkiss and Douma, Inc.	Pit 5-74	NB	0.51	0.59	0.55
					SB	0.52	0.59	0.54
	Mb 07011-07632A (part)	US 141 from old US 141 (Milepost 7.9) south 2.197 miles	Mathy Construction Co.	Pits 31-4 and 31-72	NB	0.62	0.66	0.64
					SB	0.62	0.64	0.63
	Mb 07011-07632A (part) (Control Section 07021)	M 28 from Houghton-Baraga Co. line easterly 6.41 miles	Mathy Construction Co.	Pits 31-4 and 31-72	EB	0.45	0.46	0.46
					WB	0.50	0.51	0.51

[1]The other portion of this project was bituminous concrete, constructed in 1974 and reported in Table 2 of MDSHT Report No. 249 (last year's summary).

TABLE 3 (Cont.)

BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 07011-07632A (part) (Control Section 07041)	M 38 from Houghton-Baraga Co. line easterly 0.94 miles	Mathy Construction Co.	Pits 31-4 and 31-72	EB WB	0.59 0.61	0.60 0.64	0.60 0.62
Mb 07011-07632A (part) (Control Section 31011)	M 26 from RR Crossing, east of Houghton-Ontonagon Co. line, northeasterly to Lake Roland	Mathy Construction Co.	Pits 31-4 and 31-72	NB SB	0.52 0.57	0.58 0.62	0.55 0.59
Mb 07011-07632A (part) (Control Section 31021)	M 28 from Sidnaw east to Houghton-Baraga Co. line	Mathy Construction Co.	Pits 31-4 and 31-72	EB WB	0.57 0.56	0.61 0.58	0.59 0.57
Mb 08041-07638A	M 79 from 1,550 ft east of Barryville Rd easterly to M 66	William Bros. Asphalt Paving Co.	Pit 34-52	EB WB	0.62 0.59	0.65 0.64	0.64 0.62
Mtb 09033-07639A	M 13 from 450 ft south of Linwood Rd northerly to south limits of Pinconning	Cnudde Asphalt Paving Co.	Pit 79-55	NBOL NBIL SBOL SBIL	0.50 0.60 0.48 0.56	0.55 0.64 0.53 0.62	0.53 0.62 0.51 0.60
Mb 14051-07647A	M 40 from M 60 north to beginning of curb and gutter in Marcellus	Klett Construction Co.	Pit 14-51	NB SB	0.44 0.52	0.62 0.62	0.53 0.56
Mb 14051-07648A (part)	M 40 from Section St, in Marcellus, north to Cass-Van Buren Co. line	Klett Construction Co.	Pits 14-51 and 80-20	NB SB	0.53 0.56	0.55 0.61	0.54 0.58
Mb 14051-07648A (part) (Control Section 80111)	M 40 from Cass-Van Buren Co. line north to 4th St in Lawton	Klett Construction Co.	Pits 14-51 and 80-20	NB SB	0.45 0.48	0.50 0.50	0.48 0.49
Mb 15012-07649A (Control Section 15051)	M 32 from M 66 easterly and southerly 2.03 miles to east limits of East Jordan	Hodgkiss and Douma, Inc.	Pit 5-74	EB WB	0.42 0.44	0.44 0.45	0.43 0.44
Mb 15071-07651A (part)	M 75 from Jefferson St in Boyne City east 1.17 miles	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.39 0.42	0.41 0.43	0.40 0.42
Mb 15071-07651A (part)	M 75 from Brockway St in Boyne City southeast 1.68 miles	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.34 0.34	0.36 0.36	0.35 0.35
Mb 15091-07652A	US 131 from north junction M 75 north to Charlevoix-Emmet Co. line	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.38 0.37	0.40 0.38	0.39 0.38
Mb 16081-07544A	US 23 from Cheboygan-Presque Isle Co. line west intermittently to east limits of Cheboygan	Lake Construction Co.	Pit 16-69	EB WB	0.47 0.50	0.48 0.55	0.48 0.52

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

1975 CONT.

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 21031-09256A	M 35 from Lake Shore Dr in Escanaba southwesterly to 2,900 ft south of Ford River bridge	Payne and Dolan of Wisconsin, Inc.	Pit 21-77	NB	0.50	0.54	0.52
				SB	0.54	0.56	0.55
Mb 22012-09191A	M 95 from Co. Rd #569 north to 200 ft south of M 69 in Sagola	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	NB	0.65	0.68	0.67
				SB	0.64	0.68	0.66
Mbr 24012-07658A	US 31 from M 68 north 0.72 miles	Hodgkiss and Douma, Inc.	Pit 15-32	NB	0.38	0.41	0.40
				SB	0.42	0.43	0.43
Mb 24012-07659A	US 31 from 700 ft north of South Levering Rd north 3.69 miles	Hodgkiss and Douma, Inc.	Pit 15-32	NB	0.41	0.43	0.42
				SB	0.40	0.41	0.41
Mbr 24051-07660A	M 131 from North State St northwest in Harbor Springs	Hodgkiss and Douma, Inc.	Pit 15-32	NB	0.36	0.40	0.38
				SB	0.39	0.40	0.39
RF 27023-09167A	US 2 from 1.255 miles west of US 45 easterly to US 45	Fox Valley Construction Co.	Pit 27-68	EB	0.69	0.71	0.70
				WB	0.68	0.69	0.68
RF 27024-07048A	US 2 from US 45 southeast to Paint River	A. Lindberg and Sons, Inc.	Pit 27-68	EB	0.63	0.69	0.66
				WB	0.69	0.72	0.70
				WBTL	0.67	0.72	0.69
Mb 27051-07667A	US 45 from US 2, at Watersmeet, northerly to Ontonagon-Gogebic Co. line	Mathy Construction Co.	Pit 27-20	NB	0.55	0.60	0.57
				SB	0.61	0.64	0.63
SS 28021-08049A	M 113 from M 37 east to Penn Central RR in Kingsley	Reith-Riley Construction Co.	Pit 83-6	EB	0.47	0.51	0.49
				WB	0.46	0.48	0.47
SS 28021-08050A	M 113 from Penn Central RR in Kingsley easterly and southerly to M 186	Peninsula Asphalt Construction Co.	Pit 40-18	EB	0.50	0.54	0.53
				WB	0.55	0.57	0.56
Mbr 30033-07670A	M 99 from US 12 north to north limits of Jonesville	Cunningham-Gooding	Pit 30-58	NB	0.38	0.42	0.41
				SB	0.42	0.42	0.42
Mb 31031-07674A	M 203 from 0.6 miles south of Swedetown Creek north to near the entrance to Portage Canal	Geo. Hocking Construction Co.	Pit 31-66 and Mason Stampsand	NB	0.72	0.75	0.73
				SB	0.66	0.71	0.69
RF 36021-07049A	US 2 from 10.768 miles east of Iron-Gogebic Co. line northwest to 0.2 miles west of Iron-Gogebic Co. line	Fox Valley Construction Co.	Pit 36-15	EB	0.71	0.76	0.74
				WB	0.70	0.75	0.72
Mb 38073-07686A	M 50 from Clinton Rd northwesterly to M 99	Richardson Asphalt Paving Co.	Pit 37-78	NB	0.40	0.54	0.48
				SB	0.41	0.48	0.45

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

	Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
1975 CONT.	Mbr 40022-07687A	M 72 from 550 ft east of M 66 easterly to Crawford-Kalkaska Co. line	Reith-Riley Construction Co.	Pit 40-15	EB	0.39	0.50	0.44
					WB	0.40	0.50	0.44
	Mbr 44012-06103A[2] (part)	M 24 from Columbiaville Rd north to south of M 90	Howell Construction Co.	Pit 44-8	NB	0.28	0.36	0.32
					SB	0.30	0.38	0.34
	Mb 47121-07698A	M 155 from Howell State Hospital northeast to 800 ft east of I 96	Howell Construction Co.	Pit 47-26	EB	0.51	0.52	0.51
					WB	0.50	0.52	0.51
	Mb 55031-07706A (part)	M 35 from 16.1 miles northeast of US 41 northeasterly 18.51 miles to Menominee-Delta Co. line, omitting 2.53 miles at Cedar River	Payne and Dolan of Wisconsin, Inc.	Pit 55-105	NB	0.49	0.58	0.53
					SB	0.51	0.60	0.55
	Mb 55031-07706A (part) (Control Section 21031)	M 35 from Menominee-Delta Co. line northeasterly 1.415 miles	Payne and Dolan of Wisconsin, Inc.	Pit 55-105	NB	0.54	0.55	0.55
					SB	0.55	0.57	0.56
	Mb 57022-07707A	M 55 from 240 ft east of M 66 easterly to Missaukee-Roscommon Co. line	Houghton Lake Paving Co.	Pit 73-34	EB	0.46	0.60	0.54
					WB	0.52	0.59	0.56
	Mb 59041-07708A	M 82 from 300 ft west of Newaygo-Mecosta Co. line thence easterly to US 131	Woodland Paving Co.	Pit 41-70	EB	0.44	0.46	0.45
					WB	0.41	0.45	0.43
	Mb 65011-07713A	M 30 from 0.62 miles north of Greenwood Rd northerly, intermittently 3.35 miles	Central Paving Co.	Pit 65-7	NB	0.49	0.53	0.51
					SB	0.50	0.50	0.50
	Mbr 65011-07714A	M 33 from 381 ft south of Maple Ridge Rd northerly to M 55	Central Paving Co.	Pit 65-7	NB	0.49	0.58	0.55
					SB	0.52	0.60	0.56
	Mb 79011-07723A	M 138 from Bay-Tuscola Co. line east and north to 200 ft south of Oakley Rd	Frank Strausberg and Son Co.	Pit 79-10	EB	0.64	0.69	0.67
					WB	0.65	0.69	0.67
	Mb 80072-07724A	M 40 from north limits of Paw Paw north to 280 ft north of Van Buren St in Gobles, omitting 0.3 miles at M 43	Klett Construction Co.	Pit 14-51	NB	0.47	0.58	0.52
					SB	0.49	0.54	0.52
	Mb 83013-07669A (part)	M 37 from M 115 north to Wexford-Grand Traverse Co. line	Peninsula Asphalt Construction Co.	Pit 45-19	NB	0.31	0.44	0.39
					SB	0.38	0.41	0.39
	Mb 83013-07669A (part)	M 37 from Wexford-Grand Traverse Co. line north to M 113	Peninsula Asphalt Construction Co.	Pit 45-19	NB	0.30	0.41	0.36
					SB	0.36	0.43	0.39
1976	Mb 03041-09321A	M 118 from east limits of Allegan easterly to US 131	West Shore Construction Co.	Pit 70-3	EB	0.49	0.56	0.52
					WB	0.48	0.58	0.53

[2] See also Table 2.

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 16032-09263A	M 27 from 2 miles north of Indian River northerly 1.2 miles to start of concrete	Lake Construction Co.	Pit 16-69	NB	0.59	0.59	0.59
				SB	0.53	0.57	0.55
Mb16081-09270A	US 23 from Cheboygan-Presque Isle Co. line west, intermittently to start of curb and gutter in Cheboygan	Lake Construction Co.	Pit 17-37	EB	0.51	0.69	0.59
				WB	0.53	0.64	0.60
Mb 17042-09257A	M 48 from Rudyard south 3.0 miles	Lake Construction Co.	Pit 17-37	NB	0.56	0.59	0.57
				SB	0.54	0.58	0.56
Mb 17071-09258A (part)	M 129 from 400 ft south of Rockview north to north junction M 48	Lake Construction Co.	Pit 17-37	NB	0.55	0.59	0.57
				SB	0.57	0.61	0.60
Mb 17071-09258A (part) (Control Section 17072)	M 129 from north junction M 48 north to 100 ft south of Tone Rd	Lake Construction Co.	Pit 17-37	NB	0.56	0.59	0.57
				SB	0.62	0.65	0.63
Mbr 21032-07656A	M 35 from 0.5 miles south of Perkins northwest to Marquette-Delta Co. line	Payne and Dolan of Wisconsin, Inc.	Pit 21-77	NB	0.54	0.60	0.57
				SB	0.57	0.62	0.60
Mb 24021-10775A (part)	M 68 from US 31 east to Cheboygan-Emmet Co. line	Lake Construction Co.	Pit 15-32	EB	0.37	0.38	0.38
				WB	0.36	0.37	0.37
Mb 24021-10775A (part) (Control Section 16021)	M 68 from Cheboygan-Emmet Co. line east to I 75	Lake Construction Co.	Pit 16-69	EB	0.44	0.54	0.48
				WB	0.39	0.53	0.48
Mb 26011-09294A (part)	M 18 from Woods Rd north to M 61	The Hicks Co.	Pit 26-8	NB	0.42	0.46	0.43
				SB	0.42	0.46	0.44
Mb 26011-09294A (part)	M 18-M 61 from west junction M 18 east to east limits of Gladwin	The Hicks Co.	Pit 26-8	EBOL	0.53	0.58	0.56
				EBIL	0.47	0.47	0.47
				WBOL	0.48	0.53	0.50
				WBIL	0.45	0.51	0.48
Mbr 26012-08708A	M 18 from 75 ft west of Rond Lake Rd westerly and northerly to 90 ft west of Cassidy Rd	The Hicks Co.	Pit 26-8	NB	0.53	0.55	0.54
				SB	0.58	0.59	0.58
Mb 31013-09252A	M 26 from Winona St northerly to US 41	Geo. Hocking Construction Co.	Pit 31-15	NB	0.52	0.56	0.53
				SB	0.53	0.62	0.57
Mbr 31031-09251A	M 203 from east end of 24 ft pavement east of Bear Lake Rd, easterly to Lakeview Cemetery	Geo. Hocking Construction Co.	Pit 31-16	NB	0.58	0.63	0.60
				SB	0.60	0.65	0.62
Mb 31052-10108A	US 41 from 0.9 miles northeast of Hancock northeast to 0.707 miles northeast of Keewenaw-Houghton Co. line	Geo. Hocking Construction Co.	Pit 31-16	NB	0.36	0.52	0.44
				SB	0.33	0.52	0.45

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 34021-10859A	M 50 from Nash Hwy and Thompson Rd, southerly and easterly to Barry-Ionia Co. line	Williams Bros. Asphalt Paving Co.	Pit 34-45	EB WB	0.41 0.42	0.50 0.53	0.46 0.48
Mbr 36011-07738A	M 73 from 50 ft north of Brule River northeasterly to 175 ft south of US 2	Mathy Construction Co.	Pit 36-40	NB SB	0.51 0.50	0.52 0.54	0.52 0.52
Mb 36023-10843A[2] (part)	M 69 from Crystal Falls east to Dickinson-Iron Co. line	Mathy Construction Co.	Pit 36-19	EB WB	0.45 0.41	0.53 0.47	0.49 0.45
Mb 36023-10843A[2] (part) (Control Section 22041)	M 69 from Iron-Dickinson Co. line east to M 95	Mathy Construction Co.	Pit 36-19	EB WB	0.54 0.46	0.58 0.49	0.56 0.48
Mb 36023-10843A[2] (part) (Control Section 36022)	US 2, intermittent patches, west from M 69	Mathy Construction Co.	Pit 36-19	EB WB	0.35 0.45	0.40 0.45	0.37 0.45
Mbr 38051-09323A (part)	M 106 from 0.5 miles north of Portage River northeasterly to Ingham-Jackson Co. line	Richardson Asphalt Corp.	Pit 38-78	NB SB	0.48 0.48	0.58 0.55	0.53 0.51
Mbr 38051-09323A (part) (Control Section 33071)	M 106 from Jackson-Ingham Co. line northeasterly to M 52	Richardson Asphalt Corp.	Pit 38-78	NB SB	0.58 0.55	0.60 0.58	0.59 0.56
Mb 45013-10846A (part)	M 22 from 160 ft north of west junction M 204 northeasterly to M 201, omitting 0.93 miles in Leland	Reith-Riley Construction Co.	Pit 45-2	NB SB	0.40 0.44	0.52 0.53	0.46 0.47
Mb 45013-10846A (part) (Control Section 45012)	M 22 from 1,765 ft east of M 109 northeasterly 0.54 miles	Reith-Riley Construction Co.	Pit 45-2	NB SB	0.45 0.40	0.48 0.44	0.46 0.42
Mb 46011-09325A (part)	US 127 from Hillsdale-Lenawee Co. line north to US 223	Reith-Riley Construction Co.	Pit 30-62	NB SB	0.31 0.37	0.52 0.44	0.42 0.41
Mb 46011-09325A (part) (Control Section 30071)	US 127 from 100 ft south of Penn Central RR, in Hudson, north to Lenawee-Hillsdale Co. line	Reith-Riley Construction Co.	Pit 30-62	NB SB	0.31 0.31	0.41 0.40	0.36 0.35
Mbr 51021-11066A	M 55 from Udell Hills Rd easterly to M 37	Laman Asphalt and Paving Co.	Pit 51-33	EB WB	0.44 0.44	0.50 0.51	0.46 0.47
Mb 53011-09262A	M 116 from north limits of Ludington north to 500 ft north of Big Sable River	Laman Asphalt and Paving Co.	Pit 43-49	NB SB	0.43 0.42	0.44 0.45	0.43 0.43
Mb 65011-09269A (part)	M 30 from Gladwin-Ogemaw Co. line north to south of Wickes Rd (Co. Rd #288)	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.55 0.51	0.57 0.55	0.56 0.53

[2] See also Table 2.

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1974, 1975, AND 1976

1976 CONT.

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 65011-09269A (part)	M 30 from north of Rau Rd (Co. Rd #276) north to Wright Ave	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.48 0.44	0.53 0.47	0.50 0.45
Mbr 71071-09268A	US 23 from Alpena-Presque Isle Co. line north to east 638 Hwy (milepost 11.470)	Saginaw Asphalt Paving Co.	Pit 71-65	NB SB	0.47 0.43	0.52 0.54	0.50 0.48
Mb 71073-09272A	US 23 from 4 miles northwest of Rogers City northwest to Co. Rd #646 (milepost 15.493)	Hodgkiss and Douma, Inc.	Pit 71-6	NB SB	0.50 0.52	0.53 0.54	0.51 0.53
Mb 71073-09273A	US 23 from Co. Rd #646 (milepost 15.493) northwesterly intermittently to Cheboygan-Presque Isle Co. line	Hodgkiss and Douma, Inc.	Pit 71-6	NB SB	0.50 0.49	0.53 0.52	0.52 0.50
Mb 72052-09275A	M 18 from north of I 75 north to Division St in Roscommon	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.44 0.42	0.44 0.46	0.44 0.44
Mb 74023-09299A	M 90 from 373 ft west of George St, in Brown City easterly to M 19	Frank Strausberg and Son Co.	Pit 44-58	EB WB	0.58 0.59	0.65 0.63	0.62 0.60
Mb 76041-07719A	M 71 from 800 ft northwest of temporary I 69 northwest to Shiawassee St in Corunna	Spartan Asphalt Paving Co.	Pit 11-46	NB SB	0.33 0.28	0.52 0.44	0.44 0.37
Mb 78062-09312A (part)	M 86 from north junction M 66 easterly 4.24 miles	Reith-Riley Construction Co.	Pit 78-12	EB WB	0.55 0.53	0.59 0.57	0.57 0.55
Mb 78062-09312A (part) (Control Section 78061)	M 86 from Main St, south of Three Rivers, easterly to south junction M 66	Reith-Riley Construction Co.	Pit 78-12	EB WB	0.45 0.40	0.53 0.50	0.47 0.46
Mb 78062-09312A (part) (Control Section 78054)	M 66 from south junction to north junction of M 86	Reith-Riley Construction Co.	Pit 78-12	NB SB	0.51 0.54	0.52 0.58	0.51 0.56
Mb 80041-09310A (part)	M 43 from 300 ft east of 69th St easterly, intermittently to east of Bangor	Klett Construction Co.	Pit 14-19	EB WB	0.46 0.45	0.49 0.48	0.47 0.46
Mb 80041-09310A (part) (Control Section 80042)	M 43 from east of Bangor east intermittently to 3,800 ft west of M 40	Klett Construction Co.	Pit 14-19	EB WB	0.48 0.39	0.53 0.48	0.50 0.44
Mb 83051-09260A	M 115 from Osceola-Wexford Co. line northwesterly to south junction M 55	Reith-Riley Construction Co.	Pit 83-6	EB WB EBOL EBIL WBOL WBIL	0.46 0.40 0.50 0.45 0.49 0.46	0.48 0.45 0.51 0.49 0.52 0.50	0.47 0.43 0.51 0.47 0.51 0.47

TABLE 4
MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1975 AND 1976

	Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
1975	Open Graded Asphalt Friction Cse.[1]							
	Ms 73112-09446A	I 75 from 120 ft south of M 13 northwesterly to 100 ft south of Adam St	Saginaw Asphalt Paving Co.	Pit 47-3	NBOL	0.56	0.60	0.58
					NBIL	0.61	0.62	0.62
					SBOL	0.62	0.64	0.63
					SBIL	0.60	0.62	0.61
	T 98058-08773A (Control Section 50011)	M 53 from Red Run Drain northerly to 14 Mile Rd	Ajax Paving Industries	Pit 63-5	NBOL	0.45	0.48	0.47
					NBCL	0.49	0.53	0.51
					NBIL	0.47	0.51	0.49
					SBOL	0.48	0.49	0.49
					SBCL	0.44	0.47	0.46
					SBIL	0.45	0.46	0.45
1976	Single Seal							
	Mb 57041-10899A (part)	M 42 from Wexford-Missaukee Co. line east to M 66	Reith-Riley Construction Co.	Pit 57-30	EB	0.35	0.62	0.48
					WB	0.43	0.56	0.50
	Mb 57041-10899A (part) (Control Section 83042)	M 42 from US 131 east to Missaukee-Wexford Co. line	Reith-Riley Construction Co.	Pit 57-30	EB	0.50	0.55	0.53
					WB	0.36	0.42	0.39

[1] See Table 27 for additional open graded asphalt friction courses not included in this summary.

TABLE 5
CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENT
SUMMARY FOR THE 1976 TEST YEAR

Surface Type	Service Year When Tested	Total Lanes Tested	Total Lane Miles Tested	Weighted Average Friction Level
Concrete	Initial	15	24.329	0.71
	1	61	117.102	0.64
	2	10	16.000	0.50
Bituminous Concrete	Initial	154	360.193	0.50
	1	203	594.566	0.51
	2	6	8.200	0.54
	3	4	5.200	0.49
Bituminous Aggregate	Initial	93	633.388	0.51
	1	91	549.630	0.55
	2	16	98.160	0.58
Open-Graded Asphalt Friction Course	1	10	8.120	0.54
Single Seal	Initial	4	20.714	0.48

SECTION II

FIVE-YEAR SKID TEST RESULTS FOR CONCRETE AND BITUMINOUS PAVEMENTS

Five-Year Skid Test Results for Concrete and Bituminous Pavements

Table 6 - Five-Year Review for Concrete Pavements Constructed in 1971

Table 6 contains skid test results for 20 portland cement concrete projects consisting of 101 lanes (160.240 lane miles) which were constructed in 1971. Initial service year tests were conducted on four of these projects and resulting Wsf values averaged 0.50. Twelve of the projects were first tested in 1972, after a one-year service period, and friction levels on these averaged 0.48. Three projects were not initially tested until 1973, the average two-year Wsf value was 0.47. All projects were retested at the five-year service level. Five year Wsf values for the 53 lanes tested ranged from 0.32 to 0.75 and averaged 0.49. Twenty lanes, 18.7 percent of the total lane mileage, had friction levels averaging lower than 0.40. Coefficients on all lanes of M 17 from Carpenter Rd southeasterly 3.5 miles to US 12 BR (Michigan Ave) were below this 0.40 mark.

Table 7 - Five-Year Review for Bituminous Concrete (4.12) Pavements Constructed in 1971

Table 7 lists skid test results of 43 bituminous concrete (4.12) projects constructed during 1971. In all, 147 lanes (390.370 lane miles) were tested. Average coefficients of friction were determined during the initial service year on 13 projects and Wsf values averaged 0.49. Also averaging 0.49 were 19 projects tested after a one-year service period. Ten projects, averaging 0.50 were initially tested after a two-year service period and the remaining project was first tested after three service years; Wsf values averaged 0.40. Skid tests were conducted again in 1976, after five years of service, on all 43 projects. Five-year Wsf values ranged from 0.27 to 0.75 and averaged 0.43. Thirty-three of the lanes, representing 9 percent of the total lane mileage, yielded Wsf values averaging lower than 0.40. Of these, three lanes (2.3 percent of the lane mileage) were lower than 0.30. Two of the three lanes averaging below 0.30 were on Project Mb 28012-03951A located on US 31 in Traverse City.

Table 8 - Five-Year Review for Bituminous Aggregate (4.11) Pavements Constructed in 1971

Table 8 contains skid test results from 20 bituminous aggregate (4.11) projects of which 48 lanes (337.062 lane miles) were tested. Four projects were tested during their initial service year; Wsf values averaged 0.38. Coefficients on 12 projects, tested after a one-year service period, averaged 0.61. Seven projects were not initially tested until 1973 (two-year service level). Friction levels on these averaged 0.51. During 1976, all projects were retested. Five-year Wsf values ranged from 0.36 to 0.72 and averaged 0.53. Only 2.8 percent of the lane mileage (five lanes) yielded average coefficients below 0.40.

Table 9 - Five-Year Review for Miscellaneous Bituminous Surfaces Constructed in 1971

Test results from nine surface treatment projects are shown in Table 9. Five projects (114.800 lane miles) were tested in 1971, during their initial service year; Wsf values averaged 0.42. Coefficients averaged 0.56 on five projects (43.440 lane miles) which were tested after a one-year service period. In 1976, all projects were retested, Wsf values ranged from 0.34 to 0.72, and averaged 0.54. One project (Mm 1SC-4B) located on M 32 between Hillman and Atlanta, was skid tested in 1971, 1972, and again in 1976. In 1971, this project ranked lowest in friction level with values averaging as low as 0.15. Coefficients consistently improved with age through the 1976 tests when coefficients averaging 0.53 were obtained.

Figures 1 through 3 graphically show results of linear regressions on one-year (x) and five-year (y) Wsf values for construction years 1963 through 1971. Departure from a one to one relationship is indicated by the divergency of the regression line from the dashed 45° 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. Five-year Wsf values for construction years 1969, 1970, and 1971 have averaged lower than one-year values on bituminous concrete and bituminous aggregate pavements. This is a reversal of the trend established for the previous five to six construction year period.

TABLE 6
FIVE YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1971	1972	1973	1976
BI 11014-00087A[1]	I 94 from the Michigan-Indiana State Line northeast to Madlin Rd	O'Connor Industries, Inc.	Material Service, Thornton, Illinois	Pit 14-45	NBOL	0.57	--	--	0.52
					NBCL	0.46	--	--	0.55
					NBIL	0.55	--	--	0.69
					SBOL	0.57	--	--	0.50
					SBCL	0.52	--	--	0.57
					SBIL	0.55	--	--	0.63
RF 21025-03548A	US 2 from 1,938 ft west of Inters of US 2 and US 41 easterly to Soo Line RR	Jos. D. Bonness, Inc.	Pits 17-66 and 21-46	Pit 21-12	EBOL	--	0.53	--	0.45
					EBIL	--	0.64	--	0.63
					WBOL	--	0.54	--	0.47
					WBIL	--	0.60	--	0.63
F 21025-00263A	US 2 and US 41 relocation from Soo Line spur track in Gladstone northerly to Soo Line spur in Rapid River	Jos. D. Bonness, Inc.	Pits 17-40 and 21-46	Pit 21-12	EBOL	--	0.60	--	0.38
					EBIL	--	0.69	--	0.61
					WBOL	--	0.60	--	0.41
					WBIL	--	0.66	--	0.50
F 23011-00278A	M 78 relocation from south limits of Bellevue easterly to proposed I 69 interchange	Eisenhour Construction Co.	Pit 8-80	Pit 8-80	EB	--	0.60	--	0.58
					WB	--	0.65	--	0.61
I 23061-00292A	US 27 (Proposed I 69) from 2,600 ft southeast of US 27 BR northeasterly and northerly to 1,000 ft northeast of Charlotte east city limits	Carl Goodwin and Sons, Inc.	Pit 8-80	Pit 8-80	NBOL	--	0.53	--	0.51
					NBIL	--	0.63	--	0.69
					SBOL	--	0.45	--	0.43
					SBIL	--	0.61	--	0.57
U 25084-00351A	M 78 from Dort Hwy east to east of Center Rd, Flint	Chas J. Rogers, Inc. and Chas J. Rogers Construction Co.	Pit 63-54	Pit 63-54	EBOL	--	0.32	--	0.40
					EBCL	--	0.31	--	0.39
					EBIL	--	0.52	--	0.45
					WBOL	--	0.26	--	0.42
					WBCL	--	0.33	--	0.41
					WBIL	--	0.55	--	0.51
U 25084-02804A	M 78 from east of Howard St easterly to Dort Hwy, Flint	John Carlo, Inc.	Pit 63-54	Pit 63-54	EBOL	--	0.28	--	0.46
					EBCL	--	0.46	--	0.52
					EBIL	--	0.56	--	0.55
					WBOL	--	0.38	--	0.42
					WBCL	--	0.32	--	0.48
					WBIL	--	0.43	--	0.49

[1]See also Table 7.

TABLE 6 (Cont.)

FIVE YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1971	1972	1973	1976
I 25132-00372A	I 475 from I 75 north of Grand Blanc Rd north to Maple Rd	Sargent Contracting Co.	Pit 63-54	Pit 63-54	NBOL	--	0.65	--	0.64
					NBIL	--	0.56	--	0.72
					SBOL	--	0.64	--	0.63
					SBIL	--	0.68	--	0.69
M 50051-00676A	US 25 southbound from 504 ft southwest of Holly St northeast to 120 ft southwest of Iroquois St	John Carlo, Inc.	Pits 63-4 and E. C. Levy (Dix)	Pits 50-41 and 63-4	SBOL	0.56	--	--	0.40
					SB#3	0.50	--	--	0.39
					SB#2	0.53	--	--	0.38
					SBIL	0.48	--	--	0.43
SS 50072-00714A	M 29 from 555 ft east of I 94 east to 797 ft east of Baker Rd	The Cooke Contracting Co.	E.C. Levy (Dix)	Pit 50-35	NBOL	--	0.41	--	0.37
					NBfL	--	0.57	--	0.45
					SBOL	--	0.45	--	0.38
					SBIL	--	0.58	--	0.48
F 63041-00859A	M 59 from Williams Lake Rd east to west of Airport Rd	Macomb Concrete Corp.	Pit 63-56	Pit 63-56	EBOL	0.41	--	--	0.41
					EBIL	0.34	--	--	0.44
					WBOL	0.40	--	--	0.43
					WBIL	0.39	--	--	0.43
I 73101-01016A	I 675 from east limits Saginaw westerly to west of 14th St	Sargent Contracting Co.	Pit 71-47	Pit 79-73	NBOL	--	0.44	--	0.44
					NBIL	--	0.61	--	0.62
					SBOL	--	0.37	--	0.45
					SBIL	--	0.62	--	0.62
I 73101-01024A	I 675 from Schust Rd northeast to 1,150 ft north of Michigan Rd	Sargent Contracting Co.	Pit 71-47	Pit 79-73	NBOL	0.47	--	--	0.50
					NBIL	0.57	--	--	0.75
					SBOL	0.56	--	--	0.52
					SBIL	0.54	--	--	0.75
I 73101-01025A	I 675 from 1,150 ft northeast of Michigan Rd northerly to I 75	Sargent Contracting Co.	Pit 71-47	Pit 79-73	NBOL	--	0.51	--	0.54
					NBIL	--	0.65	--	0.74
					SBOL	--	0.59	--	0.53
					SBIL	--	0.58	--	0.75
U 81081-01142A[2]	M 17 (Washtenaw Ave) from Carpenter Rd southeasterly to Hewitt St	W. F. McNally Co.	Pit 81-78	Pit 81-78	EBOL	--	0.32	--	0.36
					EBIL	--	0.40	--	0.36
					WBOL	--	0.25	--	0.38
					WBIL	--	0.31	--	0.37

[2]Transverse grooves were cut in portions of this project; see Control Section 81081 in Table 26.

TABLE 6 (Cont.)
FIVE YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Codfficient of Wet Sliding Friction			
			Coarse	Fine		1971	1972	1973	1976
U 81081-01141A[1][2] (part)	M 17 from Hewitt St east to west of Summit St	Thompson-McCully Co.	Pit 81-78	Pit 81-78	EBOL	--	0.26	--	0.34
					EBIL	--	0.27	--	0.38
					WBOL	--	0.28	--	0.36
					WBIL	--	0.30	--	0.37
U 81081-01141A[1][2] (part)	M 17 from US 12 BR (Michigan Ave) north and west to west of Summit St	Thompson-McCully Co.	Pit 81-78	Pit 81-78	EBOL	--	--	---	0.34
					EBCL	--	--	--	0.33
					EBIL	--	--	--	0.36
					WBOL	--	0.37	--	0.36
					WBCL	--	0.43	--	0.32
					WBIL	--	0.37	--	0.38
U 82081-01193A	M 153 from 60 ft east of Lafayette St east to 200 ft east of Hawthorne St	The Cooke Contracting Co.	E. C. Levy (Dix)	Pit 63-55	EBOL	--	--	--	0.42
					EBCL	--	--	--	0.46
					EBIL	--	--	--	0.45
U 82081-01195A[3] (part)	M 153 from 330 ft east of Greenfield Rd to 200 ft east of Appoline St	Thompson-McCully Co.	Pits 63-9 and E. C. Levy (Trenton)	Pits 63-7, 63-9 and 63-55	EBOL	--	--	0.39	0.49
					EB#3	--	--	0.43	0.45
					EB#2	--	--	0.39	0.46
					EBIL	--	--	0.46	0.47
					WBOL	--	--	0.41	0.41
					WB#3	--	--	0.30	0.43
					WB#2	--	--	0.34	0.44
					WBIL	--	--	0.34	0.45
BI 82123-01259A	I 96 from Wreford to Warren Ave	The Cooke Contracting Co.	E. C. Levy (Dix)	Pit 63-7	EBOL	--	--	0.50	0.46
					EB#3	--	--	0.51	0.50
					EB#2	--	--	0.52	0.50
					EBIL	--	--	0.58	0.58
					WBOL	--	--	0.48	0.50
					WB#3	--	--	0.47	0.53
					WB#2	--	--	0.59	0.50
					WBIL	--	--	0.61	0.63
BI 82123-01265A	I 96 from Fernwood St to Larchmont St	The Cooke Contracting Co.	Pits 63-7 and E. C. Levy (Dix)	Pits 63-7 and 63-55	EBOL	--	--	0.44	0.41
					EB#3	--	--	0.39	0.41
					EB#2	--	--	0.52	0.42
					EBIL	--	--	0.51	0.44
					WBOL	--	--	0.41	0.44
					WB#3	--	--	0.47	0.45
					WB#2	--	--	0.60	0.51
					WBIL	--	--	0.63	0.63

[1] See also Table 7.
[2] Transverse grooves were cut in portions of this project; see Control Section 81081 in Table 26.
[3] See also Table 2 for bituminous concrete portion of this project which was surfaced in 1973.

TABLE 7
FIVE YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1971	1972	1973	1974	1976
F 08051-00061A	M 66 from M 78 (1.443 miles south of Calhoun-Barry Co. line) northerly to 2,800 ft north of Cloverdale Rd	Reith-Riley Construction Co.	Materials Service, Thornton, Ill.	Pit 13-38	NB	--	0.63	--	--	0.65
					SB	--	0.65	--	--	0.62
BI 11014-00087A[1]	I 94 from the Michigan-Indiana State Line northeast to Madlin Rd	Reith-Riley Construction Co.	US Steel Gary, Ind.	Hunt's Pit, Rolling Prairie, Ind.	NBOL	0.57	--	--	--	0.60
					NBCL	0.68	--	--	--	0.65
					NBIL	0.78	--	--	--	0.71
					SBOL	0.64	--	--	--	0.51
					SBCL	0.68	--	--	--	0.65
					SBIL	0.73	--	--	--	0.75
Mb 11021-03668A (part)	US 12 BR from Phillips Rd east to US 31-US 33 in Niles	Reith-Riley Construction Co.	E. C. Levy (Chesterton, Ind.)	Pit 14-36	EB	--	--	0.45	--	0.53
					WB	--	--	0.48	--	0.54
Mb 11021-03668A (part) (Control Section 11091)	M 51 from northeast limits of Niles northeast 0.534 miles	Reith-Riley Construction Co.	E. C. Levy (Chesterton, Ind.	Pit 14-36	NB	--	--	0.43	--	0.33
					SB	--	--	0.42	--	0.37
Mb 11031-01716A (part)	M 139-US 31 from US 33 northerly to bridge over the St. Joseph River	John G. Yerington Co.	Pits 39-1 and 17-66	Pit 11-75	NB	--	0.50	--	--	0.38
					SB	--	0.59	--	--	0.40
Mb 11031-01716A (part) (Control Section 11052)	US 33 from southeast of Scottdale Rd northerly to southeast of Hollywood Rd	John G. Yerington Co.	Pits 39-1 and 17-66	Pit 11-75	NB	--	0.61	--	--	0.55
					SB	--	0.62	--	--	0.54
Mb 12031-01717A	I 69 BL from 0.5 miles north of Fenn Rd north to the Penn Central RR in Coldwater	John G. Yerington Co.	Pit 39-1	Pit 12-31	NB	--	--	0.47	--	0.56
					SB	--	--	0.48	--	0.54
U 14011-01467A	M 51 from Walnut St southeast to Front St in Dowagiac	J. V. Burkett Construction Co., Inc.	Pit 39-1	Pit 80-20	NBOL	--	--	0.41	--	0.44
					NBIL	--	--	0.46	--	0.43
					SBOL	--	--	0.47	--	0.37
					SBIL	--	--	0.47	--	0.41
Mb 14061-01749A	M 60 from 2,630 ft west of Burnlynd Rd northeast and east to M 62	Reith-Riley Construction Co.	Pit 39-1	Pit 14-36	EB	0.46	--	--	--	0.61
					WB	0.47	--	--	--	0.61
Mb 19032-03798A	US 27 from Silverts Rd north, intermittently, to north of Pierce Rd	The Hicks Co.	Pit 17-66	Pit 29-26	NBOL	--	--	0.61	--	0.39
					NBIL	--	--	0.67	--	0.60
Mb 23011-03795A	M 78 (Capital Ave) from west limits of Bellevue (400 ft east of Sand Rd) easterly to proposed M 78 (Main St)	Reith-Riley Construction Co.	Pit 39-1	Pit 13-38	EB	--	0.58	--	--	0.49
					WB	--	0.58	--	--	0.45

[1]See also Table 6.

TABLE 7 (Cont.)
FIVE YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1971	1972	1973	1974	1976
Mb 23031-01781A	US 27 BR from 1,930 ft south of Broadway Hwy north to 50 ft north of Battle Creek River Bridge, City of Charlotte	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	NB SB	0.44 0.40	-- --	-- --	-- --	0.49 0.49
Mb 23072-01779A (Control Section 19011)	M 100 from Eaton-Clinton Co. line north to 240 ft north of I 96	Williams Bros. Asphalt Paving Co.	Pit 34-45	Pit 34-45	NB SB	-- --	-- --	0.55 0.62	-- --	0.63 0.59
Mb 24011-01710A	US 31 from 770 ft east of M 131 northeast to north of south village limits of Alanson	Hodgkiss and Douma, Inc.	Pit 17-30	Pit 15-32	NB SB	0.43 0.44	-- --	-- --	-- --	0.53 0.53
Mb 25061-03669A	M 121 from M 21 easterly to Dort Hwy in in Flint	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-54	EB WB	-- --	0.44 0.41	-- --	-- --	0.42 0.48
Mb 25072-03950A	M 54 from 420 ft north of Mt. Morris Rd northerly to 670 ft north of Dodge Rd	Flint Asphalt and Paving Co.	Pit 32-4	Pit 63-54	NBOL NBCL SB	-- -- --	0.49 0.67 0.51	-- -- --	-- -- --	0.46 0.65 0.45
Mb 28012-03951A	US 31 from Subdivision St northerly to 0.5 miles north of south limits of Traverse City	Peninsula Asphalt Corp.	Pit 45-19	Pit 45-19	NB SB	-- --	0.40 0.40	-- --	-- --	0.27 0.29
Ms 33043-00449A (part)	Temporary I 69 from west of Touraine St west to M 43	Spartan Asphalt Paving Co.	Pit 41-38	Pit 47-43	EBOL EBIL	0.42 0.44	-- --	-- --	-- --	0.34 0.39
Ms 33043-00449A (part) (Control Section 33042)	Temporary I 69-M 43 from temporary I 69-M 43 junction west to Homer St	Spartan Asphalt Paving Co.	Pit 41-38	Pit 47-43	WBOL WB#3 WB#2 WBIL	0.44 0.45 0.47 0.39	-- -- -- --	-- -- -- --	-- -- -- --	0.37 0.38 0.39 0.37
Ms 33082-02585A	M 43 (Grand River) from west of Cowley Ave easterly to east of Evergreen Ave	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	EBOL EBIL WBOL WBIL	-- -- -- --	0.45 0.53 0.49 0.54	-- -- -- --	-- -- -- --	0.41 0.42 0.40 0.43
Mb 34061-01723A	M 21 from west of Turkey Trail east to east of M 66 south junction	Reith-Riley Construction Co.	Pit 41-46	Pit 41-69	EB WB	-- --	-- --	-- --	0.38 0.42	0.59 0.60
Mb 34062-02913A	M 21 from east limits of Ionia east 1.91 miles	Reith-Riley Construction Co.	Pit 41-69	Pits 41-46 and 41-69	EB WB	-- --	-- --	0.58 0.57	-- --	0.53 0.53
SS 34081-00503A	M 44 (Belding Rd) from Lincoln Lake Rd in Kent Co. east to bridge over Flat River in Belding	Reith-Riley Construction Co.	Pit 41-38	Pit 41-46	EB WB	0.58 0.55	-- --	-- --	-- --	0.65 0.63

TABLE 7 (Cont.)
FIVE YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1971	1972	1973	1974	1976
RSS 34081-00502A	M 44 from east of M 91 in Belding east to M 66	Reith-Riley Construction Co.	Pit 41-38	Pit 41-46	EB	0.41	--	--	--	0.65
					WB	0.44	--	--	--	0.66
Mb 38051-03670A	Southbound M 106 from Detroit St north to Ganson Ave in Jackson	Richardson Asphalt Corp.	Pit 38-46	Pit 30-35	SBOL	--	--	0.42	--	0.41
					SBIL	--	--	0.42	--	0.38
I 38101-03584A	I 94 from Lansing Ave east to I 94 BL	Richardson Asphalt Corp.	Pits 30-35 and 38-46	Pit 30-35	EBOL	--	--	0.45	--	0.47
					EBIL	--	--	0.64	--	0.57
					WBOL	--	--	0.41	--	0.41
					WBIL	--	--	0.60	--	0.53
Mb 46062-03954A	US 223 from Raisin River southeasterly to High St in Blissfield	Ayling-Cunningham Asphalt Paving Co.	Pit 47-3	Pit 46-28	EB	--	0.52	--	--	0.46
					WB	--	0.44	--	--	0.49
Mb 46101-01789A	US 12 from 904 ft west of M 50 to 56 ft east of US 127	Ayling-Cunningham Asphalt Paving Co.	Pit 30-35	Pit 46-28	EB	0.45	--	--	--	0.47
					WB	0.42	--	--	--	0.53
Mb 47014-01790A (part)	Southbound US 23 from 790 ft south of Dunham Rd north to 500 ft south of Cook Rd	Lake and Howell Construction Co.	Pits 47-3 and 63-88	Pit 47-3	SBOL	--	--	0.56	--	0.54
					SBIL	--	--	0.66	--	0.64
Mb 47014-01790A (part) (Control Section 47082)	M 59 from 459 ft west of US 23 east to 43 ft west of Tipsico Lake Rd	Lake and Howell Construction Co.	Pits 47-3 and 63-88	Pit 47-3	EB	--	--	0.46	--	0.44
					WB	--	--	0.46	--	0.41
Ms 51011-01740A	US 31 at M 110, Mainstee Co.	Laman Asphalt and Paving Co.	Pit 75-5	Pits 70-9 and 45-19	NBOL	--	0.40	--	--	0.36
					NBIL	--	0.38	--	--	0.37
					SBOL	--	0.35	--	--	0.31
					SBIL	--	0.39	--	--	0.33
Mb 55022-03031A	US 2-US 41 from the Menominee-Delta Co. line west 7.633 miles to 1.2 miles east of Spaulding	Payne and Dolan of Wisconsin, Inc.	Pit 55-76	Pit 55-76	EB	0.54	--	--	--	0.56
					WB	0.52	--	--	--	0.56
Mb 59021-01728A	M 57 (Carson City Rd) from 16 ft west of west city limits of Greenville east to M 91	Reith-Riley Construction Co.	Pit 41-38	Pit 41-38	EBOL	0.43	--	--	--	0.45
					EBIL	0.34	--	--	--	0.49
					WBOL	0.40	--	--	--	0.41
					WBIL	0.40	--	--	--	0.44
F 61023-00824A	M 46 from 360 ft east of Brooks Rd east to 730 ft east of Maple Island Rd	Reith-Riley Construction Co.	Pit 41-38	Pit 75-5	EBOL	0.40	--	--	--	0.55
					EBIL	0.39	--	--	--	0.59
					WBOL	0.38	--	--	--	0.52
					WBIL	0.45	--	--	--	0.56

TABLE 7 (Cont.)
FIVE YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1971	1972	1973	1974	1976
SS 62022-00840A	M 82 (Stewart St) from 300 ft south of south limits of Fremont northerly to M 20 in Fremont	Paul C. Miller Co., Inc.	Pit 70-9	Pit 62-33	NBOL	--	0.58	--	--	0.52
					NBIL	--	0.55	--	--	0.45
					SBOL	--	0.54	--	--	0.48
					SBIL	--	0.57	--	--	0.47
Mb 63131-01701A	M 150 from Big Beaver Rd north to Auburn Rd	Bit Con Corporation	Pit 63-4	Pit 63-4	NB	--	0.37	--	--	0.40
					SB	--	0.35	--	--	0.41
Mb 63151-01619A	US 10 BR-I 75 BL (Woodward Ave) from Square Lake Rd northwest to Widetrack Dr in Pontiac	Ajax Paving Industries, Inc.	Pit 63-4	Pit 63-23	NBOL	0.62	--	--	--	0.54
					NB#3	0.52	--	--	--	0.53
					NB#2	0.51	--	--	--	0.57
					NBIL	0.51	--	--	--	0.60
					SBOL	0.50	--	--	--	0.47
					SB#3	0.45	--	--	--	0.51
					SB#2	0.49	--	--	--	0.54
					SBIL	0.55	--	--	--	0.55
I 72061-00999A	I 75 from northwest of M 18 northwest to north of M 18-M 76 in Roscommon and Crawford Cos.	Globe Construction Co.	Pit 20-33	Pits 20-33 and 27-25	NBOL	0.48	--	--	--	0.59
					NBIL	0.51	--	--	--	0.68
					SBOL	0.53	--	--	--	0.59
					SBIL	0.53	--	--	--	0.71
Mb 73131-03810A	M 83 from 170 ft north of Saginaw Rd northerly to M 15	Saginaw Asphalt Paving Co.	Pit 17-66	Pit 63-54	NB	--	0.57	--	--	0.52
					SB	--	0.55	--	--	0.57
Mb 76062-03811A	M 21 from east limits of Owosso (Gould St) easterly to approximately 550 ft west of Serr Rd, omitting at State St	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-54	EBOL	--	0.56	--	--	--
					EBIL	--	0.56	--	--	--
					WBOL	--	0.49	--	--	--
					WBIL	--	0.55	--	--	--
					EB	--	--	--	--	0.56
					WB	--	--	--	--	0.56
Mb 77052-01803A	M 29 from 954 ft north of Remer Rd north, intermittently to 910 ft north of Trumball St	Molesworth Contracting Co.	Pit 63-4	Pit 81-78	NB	--	--	0.41	--	0.47
					SB	--	--	0.41	--	0.39
Mb 81073-01806A (part)	US 23 BR (N Main) from I 94 BL (Huron St) northerly to Huron River Dr	Ann Arbor Construction Co.	Pit 47-3	Pits 81-78 and 47-3	NBOL	--	0.49	--	--	0.43
					NBIL	--	0.47	--	--	0.40
					SBOL	--	0.45	--	--	0.40
					SBIL	--	0.45	--	--	0.35
Mb 81073-01806A (part) (Control Section 81101)	I 94 BL from Park Lake Rd easterly to Main St in Ann Arbor	Ann Arbor Construction Co.	Pit 47-3	Pits 81-78 and 47-3	EBOL	--	0.48	--	--	0.38
					EBIL	--	0.49	--	--	0.41
					WBOL	--	0.41	--	--	0.37
					WBIL	--	0.47	--	--	0.40

TABLE 7 (Cont.)

FIVE YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1971	1972	1973	1974	1976
U 81081-01141A[1] (part)	M 17 from Washtenaw St southeasterly to US 12 BR (Michigan Ave)	Washtenaw Asphalt Co.	Pit 81-57	Pit 81-84	EBOL	--	0.50	--	--	0.37
					EBCL	--	0.46	--	--	0.40
					EBIL	--	0.49	--	--	0.38
					WBOL	--	0.48	--	--	0.39
					WBCL	--	0.47	--	--	0.36
					WBIL	--	0.52	--	--	0.38
Mb 82081-01705A (part)	M 153 from Napier Rd east to west of Newberg Rd	Thompson-McCully Co.	Pit 47-3	Pit 81-82	EB	--	0.50	--	--	0.47
					WB	--	0.39	--	--	0.47
Mb 82081-01705A (part)	M 153 from west of Newberg Rd east to Vernon Rd	Thompson-McCully Co.	Pit 47-3	Pit 81-82	EBOL	--	0.40	--	--	0.42
					EBIL	--	0.44	--	--	0.42
					WBOL	--	0.44	--	--	0.40
					WBIL	--	0.45	--	--	0.44
U 82081-01193A	M 153 (Ford Rd) from approximately 60 ft east of Lafayette St easterly to approximately 200 ft east of Hawthorne St	The Cooke Contracting Co.	Pit 47-3	Pit 47-3	EBOL	--	0.45	--	--	0.43
					EBCL	--	0.49	--	--	0.44
					EBIL	--	0.54	--	--	0.46
					WBOL	--	0.48	--	--	0.41
					WBCL	--	0.49	--	--	0.47
					WBIL	--	0.53	--	--	0.53
Mb 83012-03826A	M 115-M 37 from east junction M 37 west to A.A. RR crossing in Mesick	Peninsula Asphalt Corp. and Reith-Riley Construction Co.	Pits 45-19 and 54-42	Pits 45-19 and 54-42	EBOL	--	0.53	--	--	0.34
					EBIL	--	0.51	--	--	0.28
					WBOL	--	0.54	--	--	0.35
					WBIL	--	0.50	--	--	0.31
Mb 83022-03967A	M 55 from US 131 in Cadillac east 0.6 miles	Reith-Riley Construction Co.	Pit 54-42	Pit 54-42	EB	--	0.51	--	--	0.33
					WB	--	0.53	--	--	0.34

[1]See also Table 6.

TABLE 8
FIVE YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1971	1972	1973	1976
Mb 02011-03041A	US 41 from 4.734 miles southeast of the Alger-Marquette Co. line northwesterly to the Co. line	Fox Valley Construction Co.	Pit 21-7	Pit 21-65	NB	--	0.79	--	0.67
					SB	--	0.76	--	0.72
F 16032-03946A	M 27 in Cheboygan	Lake Construction Co. and Howell Construction Co.	Pit 16-69	---	NB	--	--	0.43	0.41
					SB	--	--	0.44	0.36
RSS 18041-00236A	M 61 from the Muskegon River east to Fourth St in the City of Harrison	Saginaw Asphalt Paving Co.	Pit 18-7	---	EB	0.46	--	--	0.62
					WB	0.48	--	--	0.62
Mb 21051-03042A	US 41 from US 2 in Rapid River northerly 10.682 miles	Fox Valley Construction Co.	Pit 21-7	Pit 21-65	NB	--	0.72	--	0.64
					SB	--	0.70	--	0.66
Mb 22013-03037A	M 95 from Sagola north to the Michigamme River	Geo. Hocking Construction Co.	Pit 52-61	---	NB	--	0.71	--	0.54
					SB	--	0.72	--	0.60
Mb 27051-03938A	US 45 from the Michigan-Wisconsin State Line north to US 2	Geo. Hocking Construction Co.	Pit 27-20	---	NB	0.24	0.43	--	0.42
					SB	0.22	0.41	--	0.49
Mb 32022-03652A (Control Section 32032)	M 53 from north junction M 142 south to north limits of Bad Ave	Frank Strausberg and Sons	Pit 32-48	---	NB	--	--	0.51	0.42
					SB	--	--	0.51	0.45
Mb 38021-01784A	M 124 from US 12 in Lenawee Co. north and west to M 50 in Jackson Co.	Ayling-Cunningham Asphalt Paving Co.	Pit 38-10	---	EB	0.45	0.56	--	0.43
					WB	0.30	0.46	--	0.39
Mb 44032-01786A	M 53 from 500 ft north of south junction M 90 northerly to south limits of Marlette	Reith-Riley Construction Co.	Pit 44-23	---	NB	--	--	0.54	0.50
					SB	--	--	0.51	0.50
Mb 44061-03953A	M 90 from west to east limits of North Branch	Reith-Riley Construction Co.	Pit 44-23	---	EBOL	--	--	0.52	0.54
					EBIL	--	--	0.47	0.37
					WBOL	--	--	0.51	0.53
					WBIL	--	--	0.42	0.38
Mb 47041-01791A	M 36 from 300 ft west of east limits of Pinckney easterly to US 23	Lake Construction Co. and Howell Construction Co.	Pit 47-26	---	EB	--	0.56	--	0.47
					WB	--	0.58	--	0.47
Ms 49023-03142A	US 2 from 0.7 mile west of I 75 easterly 0.464 mile	Lake Construction Co. and Howell Construction Co.	Pit 49-82	---	EBOL	--	0.46	--	0.37
					EBIL	--	0.68	--	0.64
					WBOL	--	0.61	--	0.45
					WBIL	--	0.58	--	0.48

TABLE 8 (Cont.)

FIVE YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1971	1972	1973	1976
Mb 54022-03671A (part)	M 20 from Big Rapids southeasterly to Remus	Reith-Riley Construction Co.	Pits 54-47 and 54-42	---	EB WB	-- --	0.64 0.64	-- --	0.57 0.59
Mb 54022-03671A (part) (Control Section 54031)	M 66 from M 46 northerly to Remus	Reith-Riley Construction Co.	Pits 54-47 and 54-42	---	NB SB	-- --	0.66 0.67	-- --	0.56 0.57
Mtb 66033-03131A	US 45 from 475 ft west of M 26 northwesterly to Greenland Rd in Ontonagon	Lake Construction Co. and Howell Construction Co.	Pit 66-79	---	NB SB	-- --	0.67 0.70	-- --	0.69 0.67
F 66042-00958A	M 38 from M 26 northwesterly to Steel St in Ontonagon	Fox Valley Construction Co.	Pit 66-62	---	EB WB	-- --	0.66 0.66	-- --	0.66 0.67
Mb 75052-03809A (part) (Control Section 72021)	M 55 from Missaukee-Roscommon Co. Line east to 1,000 ft west of US 27	Hodgkiss and Douma, Inc.	Pit 72-42	---	EB WB	0.41 0.37	0.50 0.49	-- --	0.55 0.48
Mb 72052-03809A (part)	M 18 from M 55 north intermittently to south village limits of Roscommon	Hodgkiss and Douma, Inc.	Pit 72-42	---	NB SB	0.40 0.43	0.49 0.53	-- --	0.58 0.61
Mb 78081-03943A	M 216 from east limits of Marcellus easterly to US 131	Globe Construction Co.	Pit 39-68	---	EB WB	-- --	-- --	0.60 0.66	0.55 0.60
Mb 79081-03815A	M 25 from Bay-Tuscola Co. line northeasterly to west limits of Unionville	Frank Strausberg and Sons	Pits 32-4 and 79-50	---	NB SB	-- --	0.59 0.59	-- --	0.58 0.58
Mb 80051-03944A	M 152 from Berrien-VanBuren Co. line easterly to M 51	Reith-Riley Construction Co.	Pit 14-62	---	EB WB	-- --	-- --	0.58 0.66	0.56 0.54
Mb 81012-03965A	M 52 from Auburn St in Manchester northerly to 1,600 ft north of Pleasant Lake Rd	Thompson-McCully Co.	Pit 81-84	---	NB SB	-- --	-- --	0.34 0.40	0.40 0.43

TABLE 9

FIVE YEAR REVIEW FOR MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1971

Project No.	Location	Paving Contractor	Coarse Aggregate Source	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1971	1972	1976
Surface Treatment							
Mm 1SC-2A (part) (Control Section 21032)	M 35 from 0.5 miles south of Perkins north 7.0 miles	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	NB SB	-- --	0.66 0.68	0.71 0.62
Mm 1SC-2A (part) (Control Section 75031)	M 94 from north limits of Manistique north 9.32 miles	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	NB SB	-- --	0.68 0.69	0.72 0.71
Mm 1SC-4A (Control Section 35012)	M 65 from north limits of Hale south to M 55	Peninsula Asphalt Corp.	Pit 65-7	NB SB	-- --	0.49 0.48	0.53 0.57
Mm 1SC-4B (Control Sections 60021 and 60022)	M 32 at 12 locations between Hillman and Atlanta	Peninsula Asphalt Corp.	Pit 65-7	EB WB	0.15 0.22	0.39 0.39	0.52 0.54
Mm 1SC-4C (Control Section 71091)	US 23 BR from north junction with US 23 east 0.7 miles	Alcona Asphalt Paving Co.	Pit 65-7	NB SB	0.37 0.44	-- --	0.35 0.34
Mm 1SC-4D (Control Section 24051)	M 131 at five locations from Harbor Springs north to Cross Village	Lake and Howell Construction Co.	Pit 17-20	NB SB	0.63 0.61	-- --	0.61 0.60
Mm 1SC-7A (part) (Control Section 08012)	M 43 from Freeport Rd north of Hastings, east to south junction of M 66	Reith-Riley Construction Co.	Pit 34-45	EB WB	0.47 0.38	-- --	0.63 0.65
Mm 1SC-7A (part) (Control Section 08052)	M 66 from north village limits of Nashville north to junction with M 50	Reith-Riley Construction Co.	Pit 34-45	NB SB	0.43 0.40	-- --	0.54 0.57
Mm 1SC-7A (part) (Control Section 08081)	M 50 from Ionia-Barry Co. line south and east to junction with M 66	Reith-Riley Construction Co.	Pit 34-45	EB WB	0.45 0.44	-- --	0.60 0.55
Mm 1SC-7C (Control Section 23111)	M 188 from south limits of Eaton Rapids southeast 4.0 miles	Spartan Asphalt Paving Co.	Pit 81-57	EB WB	-- --	0.53 0.54	0.39 0.42
Mm 1SC-7D (Control Section 03041)	M 118 from east limits of Allegan east 8.66 miles to US 131	Beckman Co.	Pit 3-44	EB WB	-- --	0.56 0.62	0.60 0.60
Mm 1SC-9A (Control Section 77011)	M 19 from north city limits of Memphis north 6 miles to south village limits of Emmet	Ward and Van Nuck, Inc.	Pit 63-4	NB SB	0.47 0.45	-- --	0.34 0.37

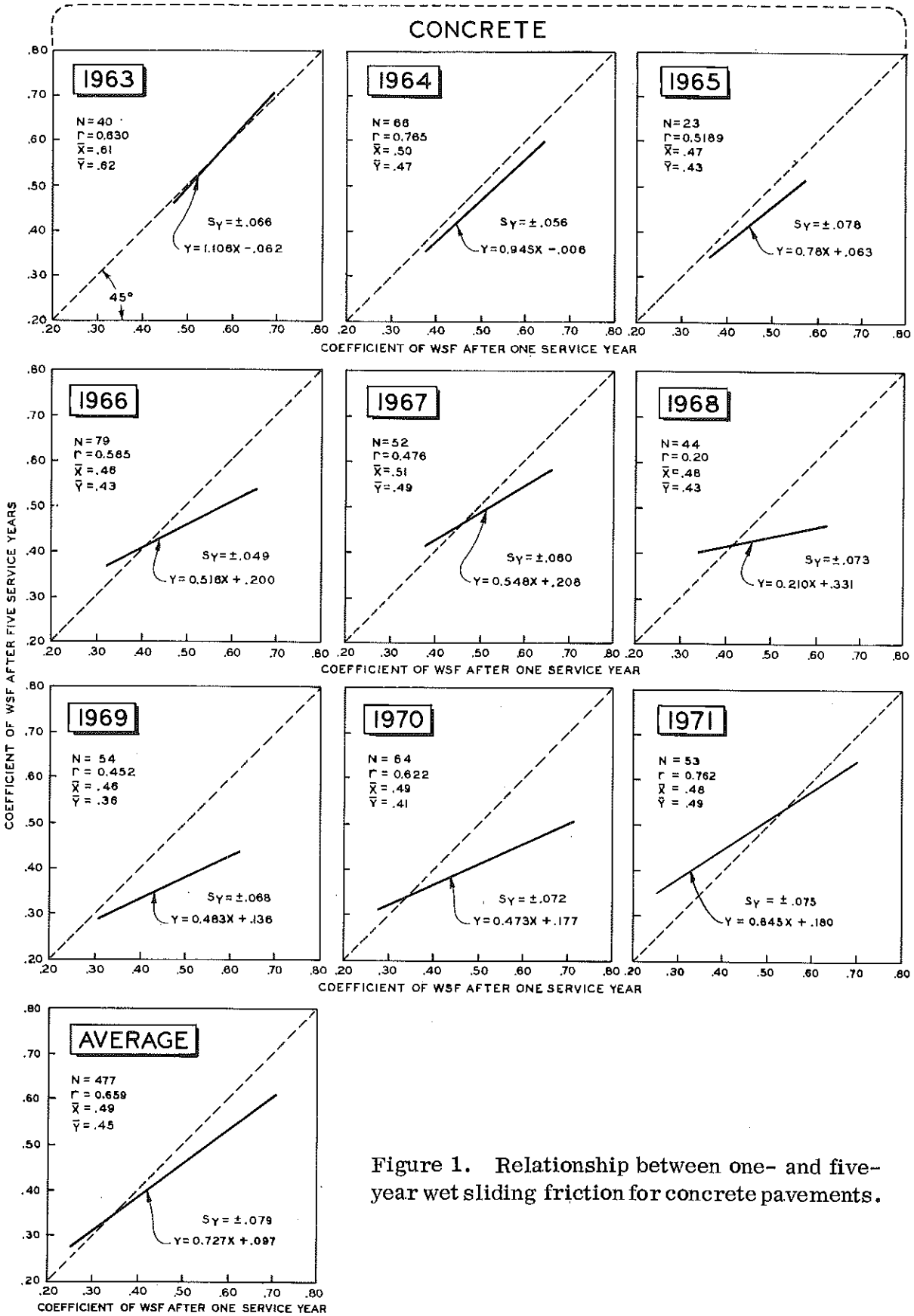


Figure 1. Relationship between one- and five-year wet sliding friction for concrete pavements.

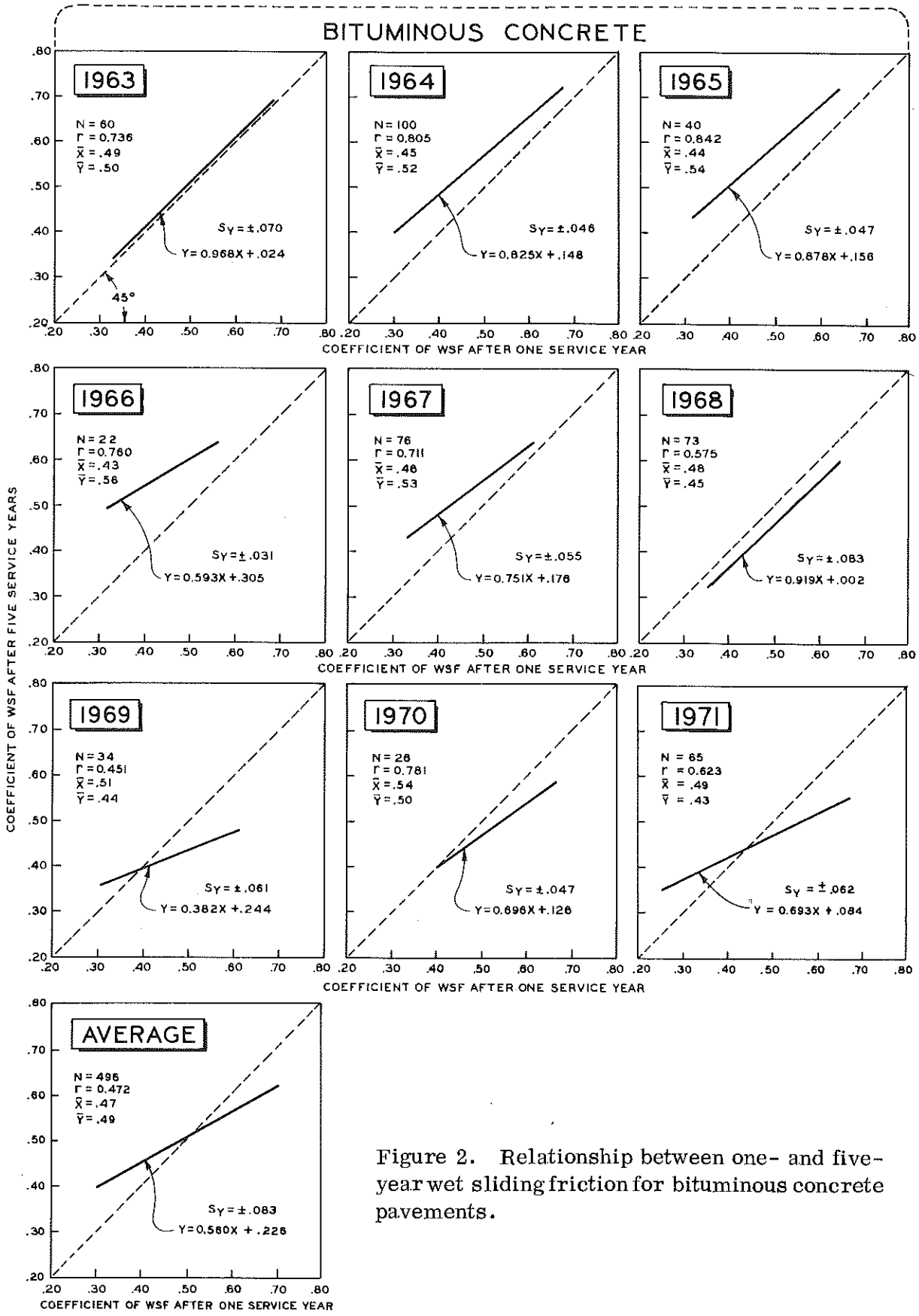


Figure 2. Relationship between one- and five-year wet sliding friction for bituminous concrete pavements.

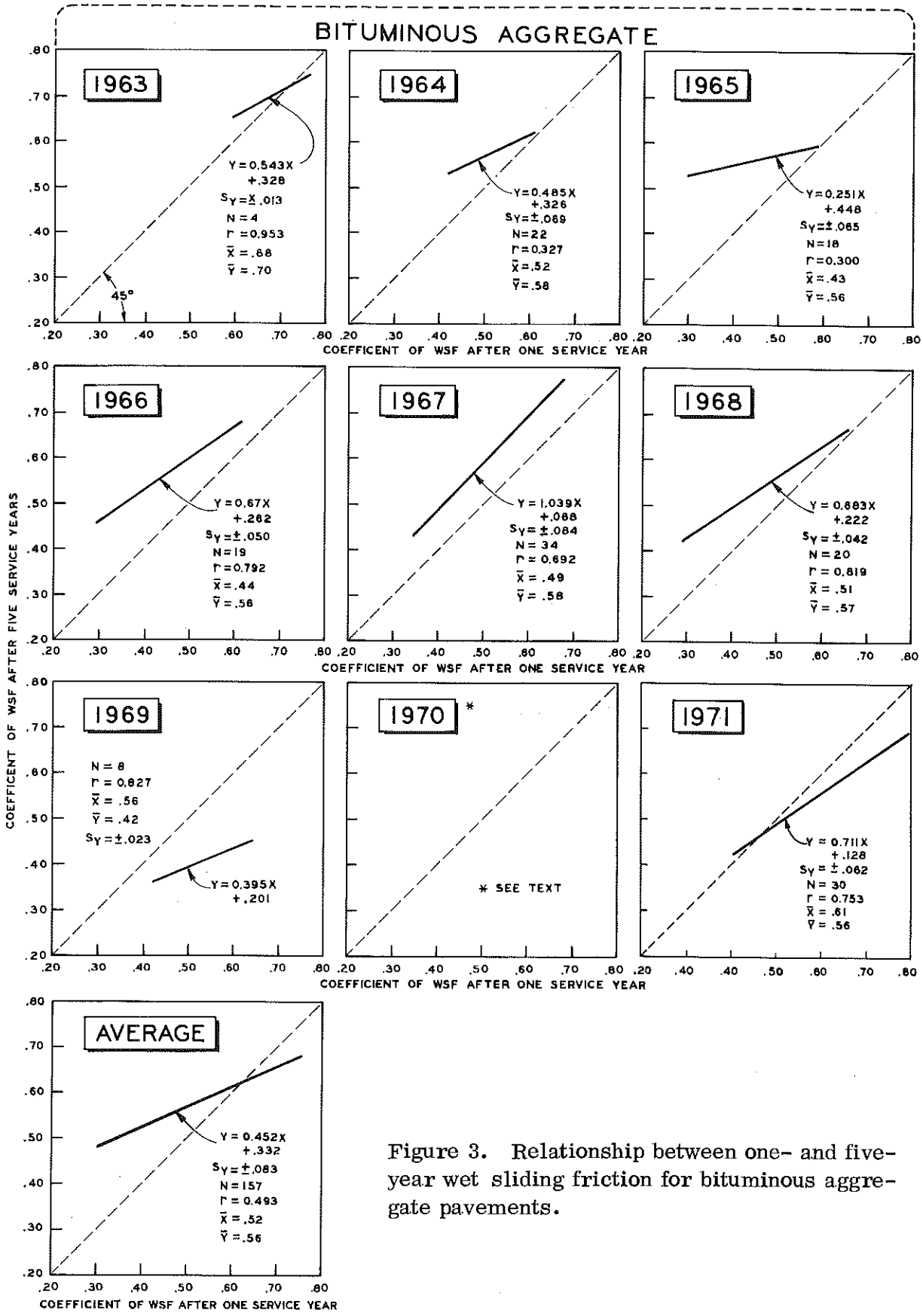


Figure 3. Relationship between one- and five-year wet sliding friction for bituminous aggregate pavements.

SECTION III

TEN-YEAR SKID TEST RESULTS FOR CONCRETE AND BITUMINOUS PAVEMENTS

Ten-Year Skid Test Results for Concrete and Bituminous Pavements

A historical review of coefficients after 10 years of service has been made on 91 projects. During 1976, 732.418 lane miles of concrete and bituminous pavement were skid tested at the 10-year service level and results are contained in Tables 10 through 13.

Table 10 - Ten-Year Wsf Review for Concrete Pavements Constructed in 1966

The 210 lanes, 385.740 lane miles of concrete pavement, tested after a 10-year service period yielded friction levels which averaged 0.46. Average friction levels as low as 0.32 were encountered on Projects 38071A, C1 and 83032A, C6; the highest value (0.69) was on Project 33035A, C6. Thirty lanes representing 11.2 percent of the 10-year lane mileage yielded average Wsf values below 0.40.

Table 11 - Ten-Year Wsf Review for Bituminous Concrete (4.12) Pavements Constructed in 1966

Sixty-eight lanes (171.932 lane miles) of bituminous concrete pavements were skid tested in 1976 after a 10-year service period. Average Wsf values ranged from 0.26 to 0.71 and averaged 0.51. Lowest values were encountered on Project Mb 82121-010, located on I 96 BS between Washington Blvd and Chicago Blvd in Detroit, where friction levels averaging as low as 0.26 were determined. The highest average coefficient (0.71) was on the US 131 portion of Project F 83031A, C6, north of the Osceola-Wexford County line. Overall, 9.3 percent of the total lane mileage tested averaged lower than 0.40.

Table 12 - Ten-Year Wsf Review for Bituminous Aggregate (4.11) Pavements Constructed in 1966

An average Wsf value of 0.48 was determined from tests made on 17 bituminous aggregate pavement projects, after 10 years of service. Coefficients ranged from 0.31 to 0.78 and averaged 0.48. Twelve lanes (31.9 percent of the lane mileage) yielded average friction levels lower than 0.40. Best performance was on Project SS 72071C, C1, located on M 157 between M 18 and M 55, where 10-year average Wsf values as high as 0.78 were encountered. The lowest Wsf value (0.31) was determined on M 115 between Beulah and Benzonia (Project F 10041-2).

Table 13 - Ten-Year Wsf Review for Miscellaneous Bituminous Surfaces Constructed in 1966

Good 10-year performance was determined on the bituminous aggregate (4.09) Project Mb 52032-008, located on M 35 between Gwinn and Aus-

tin. Ten-year coefficients averaged 0.64 on the 29.200 lane miles of this project.

A sheet asphalt (4.13) Project Mb 45021C, C4, located on M 72 east of Empire yielded an average 10-year friction level of 0.40 on the 32 lane miles tested.

Ten-year friction level histories of the projects which had skid tests conducted at the one, five, and again at the 10-year service level are compared in Figure 4 for construction years 1963 through 1966.

Most consistently repeated trends occurred with bituminous aggregate surfaces where the five-year friction levels averaged higher than the one-year and 10-year level for all four construction years.

TABLE 10
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
F 02041B, C5	M 28 from County Rd 801 east to intersection of M 28 and Hickory St	Payne and Dolan of Wisconsin, Inc.	Pit 75-5	Pit 70-9	EBOL	--	0.47	--	0.41	--	0.50
					EBIL	--	0.38	--	0.39	--	0.40
					WBOL	--	0.48	--	0.41	--	0.38
					WBIL	--	0.44	--	0.47	--	0.42
					EB	--	--	--	0.46	--	0.52
					WB	--	--	--	0.54	--	0.50
EBBF 09091A, C4	Southbound M 47 from 3,044 ft north of Salzberg Rd south to Bay-Saginaw Co. line	Sargent Construction Co.	Pits 67-2 and 75-5	Pits 67-2 and 79-21	SBOL	--	0.50	--	0.44	--	0.59
					SBIL	--	0.51	--	0.48	--	0.62
I 12033A, C9	I 69 from north of Copeland Rd to north of Maxon Rd south of Coldwater	Reith-Riley Construction Co.	Pits 12-31 and 12-43	Pit 12-43	NBOL	--	0.64	--	0.41	--	0.42
					NBIL	--	0.66	--	0.57	--	0.65
					SBOL	--	0.63	--	0.38	--	0.50
					SBIL	--	0.63	--	0.63	--	0.63
BI 13033D, C10	I 194 from Golden Ave north to south limits of Battle Creek	Carl Goodwin and Sons, Inc.	Pit 8-80	Pit 8-5	NBOL	--	0.48	--	0.50	--	0.37
					NBIL	--	0.52	--	0.58	--	0.48
					SBOL	--	0.45	--	0.41	--	0.36
					SBIL	--	0.49	--	0.51	--	0.44
BI 13033D, C11	I 194 from south city limits of Battle Creek north to intersection of Division and Jackson Sts	Carl Goodwin and Sons, Inc.	Pit 8-80	Pit 8-5	NBOL	--	0.43	--	0.41	--	0.48
					NBIL	--	0.47	--	0.40	--	0.59
					SBOL	--	0.46	--	0.42	--	0.47
					SBIL	--	0.46	--	0.44	--	0.58
SS 25101C, C8	M 57 from M 13 east to 211 ft west of west limits of Montrose	Sargent Construction Co.	Pit 71-47	Pit 76-1	EB	--	0.50	--	0.42	--	0.37
					WB	--	0.51	--	0.37	--	0.34
F 32011A, C6	M 25 (Conboro Rd) from north limits of Sebewaing northeast on relocation to Lange Rd, thence east along Dutcher Rd to Unionville Rd	Sargent Construction Co.	Pit 79-63	Pit 32-4	NB	--	0.49	--	0.51	--	0.59
					SB	--	0.54	--	0.49	--	0.58
F 33035A, C6	US 127 from 2,000 ft north of Columbia Rd north to 2,000 ft south of Holt Rd	Sargent Construction Co.	Pit 47-3	Pit 33-79	NBOL	--	0.53	--	0.46	--	0.49
					NBIL	--	0.52	--	0.60	--	0.66
					SBOL	--	0.47	--	0.45	--	0.52
					SBIL	--	0.55	--	0.62	--	0.69
U 38071A, C1	M 50-US 127 BR from north of Mansion St northwest to north of East Franklin St in Jackson	Eisenhour Construction Co.	Pit 30-35	Pit 30-35	NBOL	0.48	--	--	0.28	--	0.42
					NBIL	0.53	--	--	0.30	--	0.32
					SBOL	0.49	--	--	0.31	--	0.37
					SBIL	0.54	--	--	0.34	--	0.39

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
U 38083A, C4	M 50-US 127 BR from Blackstone St east to Michigan Ave	Eisenhour Construction Co.	Pit 30-35	Pit 30-35	EBOL	--	--	--	--	0.32	0.35
					EBCL	--	--	--	--	0.31	0.41
					EBIL	--	--	--	--	0.31	0.40
					WBOL	--	--	0.40	--	--	0.37
					WBCL	--	--	0.39	--	--	0.33
					WBIL	--	--	0.37	--	--	0.35
I 47064A, C20	I 96 from east of US 23 east to Oakland-Livingston Co. line	L. W. Edison Co.	Pit 63-7	Pit 63-7	EBIL	0.44	--	--	0.38	--	0.60
					WBIL	0.46	--	--	0.44	--	0.60
U 50051E, C25	Southbound M 3 from Gratiot Ave to Welts St	Anderson and Ruzzin, Inc.	E. C. Levy (Dix Yd)	Pits 50-1 and 50-41	SBOL	--	--	0.42	0.32	--	0.40
					SBCL	--	--	0.42	0.38	--	0.39
					SBIL	--	--	0.46	0.37	--	0.39
BI 50111G, C73	I 94 from 8 Mile Rd north to 10 Mile Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 50-41	NBOL	--	--	0.41	0.42	--	0.41
					NBCL	--	--	0.47	0.45	--	0.44
					NBIL	--	--	0.47	0.44	--	0.46
					SBOL	--	--	0.36	0.39	--	0.44
					SBCL	--	--	0.40	0.48	--	0.44
					SBIL	--	--	0.49	0.50	--	0.48
BI 50111G, C74	I 94 from 10 Mile Rd north to 12 Mile Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 50-41	NBOL	--	--	0.40	0.42	--	0.44
					NBCL	--	--	0.45	0.47	--	0.46
					NBIL	--	--	0.56	0.49	--	0.50
					SBOL	--	--	0.39	0.43	--	0.44
					SBCL	--	--	0.45	0.50	--	0.45
					SBIL	--	--	0.56	0.51	--	0.49
BI 50111G, C75	I 94 from 12 Mile Rd north to 14 Mile Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 50-41	NBOL	--	--	0.39	0.48	--	0.45
					NBCL	--	--	0.44	0.52	--	0.48
					NBIL	--	--	0.60	0.46	--	0.51
					SBOL	--	--	0.41	0.44	--	0.41
					SBCL	--	--	0.52	0.54	--	0.44
					SBIL	--	--	0.58	0.54	--	0.51
F 59045A, C2	M 46 from 488 ft east of M 66 east to Second St in Edmore	Denton Construction Co.	Pits 37-26 and 67-2	Pit 37-26	EB	0.38	--	--	0.33	--	0.48
					WB	0.41	--	--	0.31	--	0.47
I 63022A, C9	I 96 from Beck Rd southeast to I 696	L. W. Edison Co.	Pit 63-7	Pits 47-3 and 63-7	EBIL	0.49	--	--	0.46	--	0.48
					WBIL	0.46	--	--	0.43	--	0.49
I 63022A, C10	I 96 from 0.85 mile east of Kent Lake Rd east to 1,025 ft west of Beck Rd	L. W. Edison Co.	Pit 63-7	Pit 63-7	EBIL	0.51	--	--	0.52	--	0.57
					WBIL	0.50	--	--	0.46	--	0.56

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
I 63022-021	I 96 from the Livingston-Oakland Co. line east 1.70 miles	Sargent Construction Co.	Pit 47-3	Pit 47-3	EBOL	--	0.32	--	0.42	--	0.46
					EBCL	--	0.38	--	0.44	--	0.47
					EBIL	--	0.49	--	0.50	--	0.56
					WBOL	--	0.42	--	0.39	--	0.45
					WBCL	--	0.49	--	0.47	--	0.49
					WBIL	--	0.49	--	0.50	--	0.54
U 63031A, C16 U 82053A, C39	US 24 from 1,287 ft north of Wayne-Oakland Co. line south to 1,913 ft south of Co. line	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 62-55	NBOL	--	--	0.37	--	--	0.50
					NB#3	--	--	0.43	--	--	0.45
					NB#2	--	--	0.36	--	--	0.44
					NBIL	--	--	0.36	--	--	0.49
					SBOL	--	--	0.38	--	--	0.41
					SB#3	--	--	0.33	--	--	0.42
					SB#2	--	--	0.34	--	--	0.46
					SBIL	--	--	0.38	--	--	0.49
F 63043D, C21	M 59 from Mott Rd easterly to Auburn Rd	L. W. Edison Co.	Pit 63-4	Pit 63-4	EBOL	--	0.44	--	0.37	--	0.41
					EBIL	--	0.52	--	0.41	--	0.54
					WBOL	--	0.41	--	0.38	--	0.40
					WBIL	--	0.58	--	0.44	--	0.52
U 63052A, C18	M 24 from Telegraph Rd east to Woodward Ave	Cooke Contracting Co.	Pit 63-4	Pit 63-4	EBOL	--	--	0.30	0.30	--	0.42
					EBCL	--	--	0.34	0.34	--	0.46
					EBIL	--	--	0.45	0.33	--	0.49
					WBOL	--	--	0.27	0.33	--	0.46
					WBCL	--	--	0.32	0.34	--	0.46
					WBIL	--	--	0.37	0.35	--	0.47
I 63174B, C61	I 75 from 6th St north to Sprague St	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pits 82-5 and 50-41	NBOL	--	--	0.42	0.35	--	0.40
					NBCL	--	--	0.39	0.42	--	0.47
					NBIL	--	--	0.53	0.48	--	0.53
					SBOL	--	--	0.38	0.39	--	0.37
					SBCL	--	--	0.46	0.41	--	0.47
					SBIL	--	--	0.63	0.41	--	0.51
I 63174A, C66	I 75 from 100 ft south of Bernhard St north to 100 ft south of Manatee St	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 50-41	NBOL	--	--	0.54	0.40	--	0.47
					NB#3	--	--	0.43	0.42	--	0.45
					NB#2	--	--	0.53	0.46	--	0.47
					NBIL	--	--	0.50	0.48	--	0.54
					SBOL	--	--	0.50	0.40	--	0.48
					SB#3	--	--	0.40	0.42	--	0.48
					SB#2	--	--	0.46	0.43	--	0.49
					SBIL	--	--	0.57	0.43	--	0.53

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
F 67015A, C1	US 131 relocation from 860 ft south of 1 Mile Rd north to 1,717 ft north of Marion Rd	Denton Construction Co.	Pit 67-2	Pit 67-2	NB	0.45	--	--	0.45	--	0.43
					SB	0.42	--	--	0.51	--	0.44
F 67015A, C2	US 131 from 1,717 ft north of Marion Rd north to Osceola-Wexford Co. line	Denton Construction Co.	Pit 67-2	Pit 67-2	NB	0.43	--	--	0.45	--	0.46
					SB	0.40	--	--	0.47	--	0.43
SS 73021C, C11	M 57 from 378 ft west of Stuart Rd east to M 13	Sargent Construction Co.	Pit 71-47	Pit 76-1	EB	--	0.51	--	0.42	--	0.45
					WB	--	0.48	--	0.36	--	0.39
F 73073D, C6	M 47 from Sarle Rd southeast to M 81, west of Saginaw	Denton Construction Co.	Pits 17-40 and 71-47	Pits 67-2 and 79-21	NBOL	--	0.50	--	0.39	--	0.42
					NBIL	--	0.52	--	0.48	--	0.44
					SBOL	--	0.47	--	0.41	--	0.39
					SBIL	--	0.50	--	0.49	--	0.45
EBBF 73075A, C4	Southbound M 47 from 2,268 ft south of Buck Rd north to Saginaw-Bay Co. line	Sargent Construction Co.	Pits 67-2 and 75-5	Pits 67-2 and 79-21	SBOL	--	0.51	--	0.41	--	0.55
					SBIL	--	0.49	--	0.52	--	0.64
F 74061A, C2	M 46 from the west Sanilac Co. line east to M 53	L. W. Edison Co.	Pit 32-4	Pits 79-21 and 79-29	EB	--	0.46	--	0.42	--	0.49
					WB	--	0.51	--	0.42	--	0.43
F 77023A, C2	M 21 relocation from east of Barth Rd east to near Michigan Rd	Denton Construction Co.	Pits 75-5 and 71-47	Pit 50-26	EBOL	--	--	0.55	0.41	--	0.43
					EBIL	--	--	0.66	0.52	--	0.54
					WBOL	--	--	0.49	0.43	--	0.41
					WBIL	--	--	0.61	0.54	--	0.55
U 77023B, C9	M 21 relocation from 40th St east to M 146	Eisenhour Construction Co.	Pit 75-5	Pit 50-26	EBOL	--	--	0.49	0.39	--	0.45
					EBIL	--	--	0.51	0.39	--	0.53
					WBOL	--	--	0.53	0.30	--	0.39
					WBIL	--	--	0.53	0.47	--	0.47
SS 77052A, C4	M 29 relocation from south of Bunce Ave northeast to M 25 in Marysville	Anderson and Ruzzin, Inc.	Pit 75-5	Pit 74-51	NBOL	0.45	--	--	0.40	--	0.43
					NBIL	0.50	--	--	0.36	--	0.41
					SBOL	0.49	--	--	0.35	--	0.42
					SBIL	0.43	--	--	0.40	--	0.39
F 79042A, C3	M 46 from M 24 to the village limits of Kingston	L. W. Edison Co.	Pit 32-4	Pits 79-21 and 79-29	EB	--	0.53	--	0.42	--	0.48
					WB	--	0.56	--	0.43	--	0.48
F 79042A, C4	M 46 from east village limits of Kingston east to Co. line	L. W. Edison Co.	Pit 32-4	Pits 79-21 and 79-29	EB	--	0.53	--	0.48	--	0.51
					WB	--	0.53	--	0.47	--	0.48

TABLE 10 (Cont.)

TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
U 82052E, C31	US 24 from Hayes St north to Cypress St	The Kutchins Co.	E. C. Levy (Trenton Yd)	Pit 47-15	NBD	--	0.39	--	0.41	--	0.40
					NBOL	--	0.41	--	0.38	--	0.36
					NBCL	--	0.43	--	0.41	--	0.39
					NBIL	--	0.45	--	0.38	--	0.40
					SBD	--	0.40	--	0.35	--	0.37
					SBOL	--	0.38	--	0.38	--	0.36
					SBCL	--	0.42	--	0.39	--	0.40
					SBIL	--	0.41	--	0.40	--	0.40
U 82052E, C36	US 24 from Cypress St north to Van Born St	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pit 82-10	NBOL	--	0.43	--	0.36	--	0.38
					NBCL	--	0.42	--	0.37	--	0.40
					NBIL	--	0.43	--	0.38	--	0.39
					SBOL	--	0.35	--	0.38	--	0.33
					SB#3	--	0.36	--	0.37	--	0.35
					SB#2	--	0.44	--	0.35	--	0.41
					SBIL	--	0.41	--	0.37	--	0.42
U 82062-010	US 12 from west of Haigh St west to east of US 24 (westbound only)	Thompson-McCully Co.	Pit 63-7	Pit 63-7	WBOL	--	--	0.34	0.27	--	0.44
					WB#3	--	--	0.29	0.30	--	0.41
					WB#2	--	--	0.37	0.30	--	0.49
					WBIL	--	--	0.34	0.29	--	0.48
I 82191K, C29 I 82191J, C35	I 75 (Seaway Freeway) from north of Dix-Toledo Rd to north of Southfield Rd	The Kutchins Co.	E. C. Levy (Dix and Trenton Yds)	Pits 47-3 and 47-15	NBOL	--	0.39	--	0.38	--	0.49
					NBCL	--	0.43	--	0.42	--	0.44
					NBIL	--	0.46	--	0.45	--	0.41
					SBOL	--	0.37	--	0.38	--	0.44
					SBCL	--	0.44	--	0.44	--	0.45
					SBIL	--	0.48	--	0.45	--	0.50
I 82191J, C44	I 75 (Seaway Freeway) from south of US 25 to north of US 25	Cooke Contracting Co.	E. C. Levy (Dix Yd)	Pits 63-7 63-55 and 82-10	NBOL	--	0.40	--	0.39	--	0.42
					NBCL	--	0.45	--	0.43	--	0.48
					NBIL	--	0.49	--	0.48	--	0.52
					SBOL	--	0.38	--	0.38	--	0.40
					SBCL	--	0.43	--	0.45	--	0.44
					SBIL	--	0.50	--	0.47	--	0.48
BI 82194F, C5	I 75 (Fisher Freeway) from north of Schaefer north to Leonard Ave	The Kutchins Co.	E. C. Levy (Dix Yd)	Pits 47-15 82-5 and 82-10	NBOL	--	--	0.43	0.41	--	0.42
					NBCL	--	--	0.45	0.43	--	0.42
					NBIL	--	--	0.56	0.45	--	0.48
					SBOL	--	--	0.39	0.41	--	0.45
					SBCL	--	--	0.51	0.43	--	0.46
					SBIL	--	--	0.58	0.46	--	0.44

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1966	1967	1968	1971	1972	1976
I 82194A, C12	I 75 from north of Southfield north to Outer Dr	L. A. Davidson	E. C. Levy (Dix and Trenton Yds)	Pits 63-55 and 82-10	NBOL	--	--	--	0.43	--	0.42
					NBCL	--	--	--	0.43	--	0.46
					NBIL	--	--	--	0.48	--	0.52
					SBOL	--	--	--	0.38	--	0.43
					SBCL	--	--	--	0.43	--	0.45
					SBIL	--	--	--	0.46	--	0.52
I 82194B, C13	I 75 from Outer Dr north to north of Gleason Ave	L. A. Davidson	E. C. Levy (Dix and Trenton Yds)	Pits 63-55 and 82-10	NBOL	--	0.40	--	--	--	0.43
					NBCL	--	0.40	--	--	--	0.44
					NBIL	--	0.47	--	--	--	0.47
					SBOL	--	0.33	--	--	--	0.45
					SBCL	--	0.43	--	--	--	0.48
					SBIL	--	0.42	--	--	--	0.52
I 82194D, C14	I 75 from north of Gleason Ave to south of Schaefer Rd	L. A. Davidson	E. C. Levy (Dix and Trenton Yds)	Pits 63-55 and 82-10	NBOL	--	0.47	--	0.41	--	0.40
					NBCL	--	0.42	--	0.43	--	0.45
					NBIL	--	0.37	--	0.49	--	0.51
					SBOL	--	0.33	--	0.40	--	0.44
					SBCL	--	0.41	--	0.43	--	0.47
					SBIL	--	0.47	--	0.49	--	0.46
BI 82194I, C22 BI 82194H, C24	I 75 from west of Green Ave east to west of Livernois Ave	L. A. Davidson	E. C. Levy (Dix Yd)	Pits 82-10 and 63-55	NBOL	--	--	0.45	0.45	--	0.44
					NB#3	--	--	0.50	0.48	--	0.49
					NB#2	--	--	0.53	0.52	--	0.53
					NBIL	--	--	0.58	0.52	--	0.56
					SBOL	--	--	0.45	0.43	--	0.47
					SB#3	--	--	0.49	0.44	--	0.51
					SB#2	--	--	0.59	0.54	--	0.55
					SBIL	--	--	0.61	0.63	--	0.57
BI 82252B, C61	I 75 from 200 ft north of Clay Ave north to 200 ft north of Holbrook Ave	Chas. J. Rogers, Inc.	Pit 63-7	Pit 63-7	NBOL	--	--	--	0.38	--	0.47
					NB#3	--	--	--	0.38	--	0.47
					NB#2	--	--	--	0.46	--	0.49
					NBIL	--	--	--	0.46	--	0.53
					SBOL	--	--	--	0.40	--	0.46
					SB#3	--	--	--	0.41	--	0.49
					SB#2	--	--	--	0.49	--	0.51
					SBIL	--	--	--	0.48	--	0.55
F 83031A, C6	US 131 from Oceola-Wexford Co. line north 0.52 mile	Denton Construction Co.	Pit 67-2	Pit 67-2	NB	--	--	--	0.42	--	0.40
					SB	--	--	--	0.43	--	0.36
U 83032A, C6	US 131 from 13th St north to Boon Rd, north of Cadillac	Hodgkiss and Douma, Inc.	Pit 67-2	Pit 67-2	NBOL	0.49	--	--	0.33	--	0.33
					SBOL	0.44	--	--	0.35	--	0.32

TABLE 11

TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1966	1967	1968	1971	1976
Mb 10012C, C1	M 22 from M 115 (Forest Ave) in Frankfort west and north to 400 ft north of South Shore Rd	Hodgkiss and Douma, Inc.	Pit 67-2	Pit 10-25 and Local Pit	NB	--	0.49	--	0.55	0.40
					SB	--	0.43	--	0.53	0.40
Mb 25021C, C2	US 23 BR (Silver Lake Rd) from US 23 southeast to Beach St in Fenton	Flint Asphalt and Paving Co.	Pit 63-4	Pit 63-54	EB	--	0.36	--	0.50	0.47
					WB	--	0.33	--	0.51	0.40
Mb 29031C, C3	US 27 BR from 2,610 ft south of north limits of Alma, north to M 46	The Hicks Co.	Pit 37-26	Pit 37-26	NB	--	0.37	--	0.56	0.47
					SB	--	0.47	--	0.61	0.48
F 35031C, C2	US 23 from south limits of Tawas City (Townline Rd) north to M 55	Central Paving Co.	Pit 65-7	Pit 71-15	NB	--	0.37	--	0.53	0.52
					SB	--	0.37	--	0.55	0.49
F 35032C, C6	US 23 from M 55 (Hemlock St) northerly to northeast limits of Tawas City	Central Paving Co.	Pit 65-7	Pit 71-15	NBOL	--	0.41	--	0.49	0.51
					NBIL	--	0.44	--	0.51	0.52
					SBOL	--	0.37	--	0.48	0.51
					SBIL	--	0.41	--	0.54	0.51
SS 38011A, C2	M 99 from east village limits of Springport east and north to Crawford Rd	Workman Richardson Asphalt Co.	Pit 38-46	Pit 38-46	NB	--	0.55	--	0.70	0.54
					SB	--	0.56	--	0.65	0.55
F 41122A, C1	M 57 from Ramsdell Dr east to Kent-Montcalm Co. line	Reith-Riley Construction Co.	Pit 41-38	Pit 41-101	EB	--	0.44	--	0.57	0.60
					WB	--	0.48	--	0.54	0.55
F 41122D, C4	M 57 from Teft Ave east to Ramsdell Dr	Reith-Riley Construction Co.	Pit 41-38	Pit 41-101	EB	--	0.47	--	0.59	0.67
					WB	--	0.45	--	0.61	0.61
Mb 50051C, C26	M 3 from Welts St north to north of Patterson Ave	Ward and VanNuck, Inc.	Pit 63-4	Pit 50-35	NBOL	--	--	0.40	0.45	0.36
					NBCL	--	--	0.44	0.49	0.40
					NBIL	--	--	0.44	0.48	0.40
F 55012B, C7	US 41 from north limits of Daggett north to south limits of Powers	Payne and Dolan of Wisconsin, Inc.	Pit 55-119	Pit 55-4	NB	0.46	--	--	0.67	0.62
					SB	0.46	--	--	0.67	0.65
F 59021A, C2	M 57 from Kent-Montcalm Co. line east to Greenville	Reith-Riley Construction Co.	Pit 41-38	Pit 41-101	EB	--	0.31	--	0.54	0.57
					WB	--	0.32	--	0.49	0.55
Mb 61073C, C5	US 31 BR from 90 ft north of Water St in Montague north to Fruitvale Rd	Paul C. Miller	Pits 17-40 and 41-38	Pit 70-9	NB	--	0.44	--	0.55	0.50
					SB	--	0.48	--	0.58	0.50
Mb 70081C, C7	M 104 from 300 ft west of Savidge Rd in Spring Lake east to I 96, omitting from Cutler St to Fruitport St in Spring Lake	Muskegon Asphalt Paving Co.	Pit 70-38	Pit 70-9	EB	--	0.45	--	0.59	0.62
					WB	--	0.42	--	0.56	0.56

TABLE 11 (Cont.)
TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1966	1967	1968	1971	1976
F 74072C, C2	US 25 from north of Huron Ave in Lexington north to south limits of Port Sanilac	Reith-Riley Construction Co.	Pit 32-4	Pit 74-60 and Local Pits	NB	0.49	--	--	0.58	0.40
					SB	0.53	--	--	0.56	0.45
Mb 81031A, C4	US 12 from northeast of Maple Rd, thence northeast 0.707 mile	Washtenaw Asphalt Co.	Pit 47-3	Pit 81-57	EBOL	--	--	0.54	0.57	0.44
					EBIL	--	--	0.59	0.58	0.44
					WBOL	--	--	0.57	0.57	0.48
					WBIL	--	--	0.57	0.61	0.50
Mb 81072C, C6	I 94 BL from west of Arlington Blvd east to west of Chalmers Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 81-57	EBOL	--	--	0.52	0.55	0.46
					EBIL	--	--	0.53	0.58	0.42
					WBOL	--	--	0.51	0.54	0.39
					WBIL	--	--	0.55	0.58	0.39
U 82052E, C36	Northbound US 24 from north of Cypress St north to south of Van Born St	Cooke Contracting Co.	Pit 47-3	Pit 82-5	NBOL	--	0.45	--	0.43	0.43
					NBCL	--	0.44	--	0.50	0.43
					NBIL	--	0.44	--	0.56	0.45
U 82062-010	US 12 from US 24 east to Haigh St	Thompson-McCully Co.	Pit 47-3	Pit 81-82	EBOL	--	--	0.39	0.43	0.45
					EB#3	--	--	0.44	0.44	0.48
					EB#2	--	--	0.46	0.46	0.50
					EBIL	--	--	0.44	0.43	0.53
					WBOL	--	--	0.44	0.45	0.44
					WB#3	--	--	0.42	0.45	0.46
					WB#2	--	--	0.46	0.50	0.47
					WBIL	--	--	0.42	0.50	0.52
Mb 82121-010	I 96 BS from Washington Blvd northwesterly to west Chicago Blvd; omitting at Fisher Fwy, Lodge Exp and from Trumbull to West Grand Blvd	Detroit Asphalt Paving Co.	Pit 47-3	Pit 50-41	EBOL	--	--	0.37	0.38	0.26
					EBIL	--	--	0.35	0.39	0.29
					WBOL	--	--	0.36	0.39	0.31
					WBIL	--	--	0.40	0.40	0.36
F 83031A, C6 (part)	US 131 from 0.52 mile north of Osceola-Wexford Co. line to existing US 131	The Hicks Co.	Pit 67-2	Pit 67-2	NBOL	0.46	--	--	0.70	0.58
					NBIL	0.49	--	--	0.75	0.71
					SBOL	0.42	--	--	0.69	0.59
					SBIL	0.45	--	--	0.75	0.69
F 83031A, C6 (part) (Control Section 83051)	M 115 from old US 131 west 0.7 mile	The Hicks Co.	Pit 67-2	Pit 83-57	EBOL	0.47	--	--	0.57	0.52
					EBIL	0.43	--	--	0.53	0.51
					WBOL	0.44	--	--	0.49	0.53
					WBIL	0.44	--	--	0.54	0.50
U 83032A, C6	US 131 from Clam River in Cadillac north to Boon Rd	Hodgkiss and Douma, Inc.	Pit 67-2	Pit 67-2	NBOL	0.41	--	--	0.50	0.38
					NBIL	0.44	--	--	0.51	0.36
					SBOL	0.44	--	--	0.47	0.35
					SBIL	0.40	--	--	0.52	0.37

TABLE 12
TEN-YEAR WSF REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1966	1967	1968	1971	1976
F 01052A, C2	US 23 from 400 ft northwest of old M 171 northwest to Alcona-Alpena Co. line	Saginaw Asphalt Paving Co.	Pit 4-47	Pit 4-47	NB	--	0.42	--	0.59	0.60
					SB	--	0.46	--	0.60	0.62
F 04031C, C1	US 23 from Alcona-Alpena Co. line north 8.002 miles	Saginaw Asphalt Paving Co.	Pit 4-47	Pit 4-47	NB	--	0.43	--	0.52	0.55
					SB	--	0.45	--	0.57	0.56
Mb 05011A, C8	US 31 from Grand Traverse-Antrim Co. line north 0.92 mile	Peninsula Asphalt and Construction Co.	Pit 45-13	Pit 45-13	NB	--	0.37	--	0.46	0.36
					SB	--	0.37	--	0.46	0.37
F 10041-2 (part)	M 115 (Forest Ave) from M 22 (Lake St) in the city of Frankfort east 4,400 ft	Hodgkiss and Douma, Inc.	Pit 10-21	Pit 45-19	EB	--	0.35	--	0.50	0.34
					WB	--	0.42	--	0.54	0.41
F 10041-2 (part)	M 115 from 3,480 ft northwest of the village limits of Beulah southeast to US 31 (Michigan Ave) in the village of Benzonia	Hodgkiss and Douma, Inc.	Pit 10-21	Pit 45-19	EB	--	0.38	--	0.55	0.34
					WB	--	0.36	--	0.51	0.31
SS 15071B, C4	M 75 from 1.4 miles south of US 131 south 1.4 miles	Hodgkiss and Douma, Inc.	Pit 15-43	---	EB	0.41	--	--	0.49	0.46
					WB	0.40	--	--	0.50	0.46
SS 20031A, C2	M 93 relocation from 800 ft north of Weber Rd, north and east to intersection with existing M 93-M 72	Hodgkiss and Douma, Inc.	Pit 20-28	---	NB	0.32	--	--	0.52	0.52
					SB	0.36	--	--	0.54	0.51
Mb 20031C, C3	M 93 from 344 ft south of Military Rd, north and east 1.13 miles	Hodgkiss and Douma, Inc.	Pit 20-28	---	EB	0.38	--	--	0.52	0.46
					WB	0.43	--	--	0.54	0.54
SS 21032B, C3	M 35 from west of Gladstone west and north to County Rd G-16	Payne and Dolan of Wisconsin, Inc.	Pit 21-62	---	NB	--	0.54	--	0.58	0.58
					SB	--	0.53	--	0.54	0.57
USS 21032A, C4	M 35 from US 2-US 41 west to west limits of Gladstone	Payne and Dolan of Wisconsin, Inc.	Pit 21-62	---	NBOL	--	0.50	--	0.54	0.52
					NBIL	--	0.44	--	0.48	0.42
					SBOL	--	0.55	--	0.54	0.50
					SBIL	--	0.42	--	0.43	0.38
Mb 28012C, C2	US 31-M 37 from 2,824 ft south of Silver Pines Rd north 1.04 miles	Peninsula Asphalt and Construction Co.	Pit 45-13	Pit 45-13	SBTL	--	0.40	--	0.46	0.34
Mb 28013E, C3	US 31 from M 72 junction, in Acme, north to Grand Traverse-Antrim Co. line	Peninsula Asphalt and Construction Co.	Pit 45-13	Pit 45-13	NB	--	0.37	--	0.48	0.34
					SB	--	0.37	--	0.48	0.38
SS 30031A, C4	M 99 from Frontier Rd north to M 34	Ayling-Cunningham Asphalt Paving Co.	Pit 30-54	Pit 30-54	NB	--	--	0.65	0.63	0.54
					SB	--	--	0.66	0.62	0.51
Mb 31031-3	M 203 from west limits of Calumet west 1.587 miles	George Hocking Construction Co.	Pit 31-65	---	EB	0.41	--	--	0.40	0.61
					WB	0.43	--	--	0.45	0.63
Mb 45072C, C2	M 22 from Race St in village of Suttons Bay north to State Rd	Hodgkiss and Douma, Inc.	Pit 45-31	---	NB	--	0.46	--	0.52	0.38
					SB	--	0.48	--	0.50	0.44
F 72023C, C2	M 55 from 550 ft east of M 18 east to 0.69 mile west of Maple Valley Rd	Lake and Howell Construction Co.	Pit 72-40	---	EB	--	0.53	--	0.66	0.60
					WB	--	0.54	--	0.64	0.65
SS 72071C, C1	M 157 from M 18 south to M 55	Lake and Howell Construction Co.	Pit 72-40	---	NB	--	0.61	--	0.76	0.78
					SB	--	0.62	--	0.71	0.75
Mm 6BA-3C	US 131 from south of Reed City north intermittently a distance of 1.19 miles	Reith-Riley Construction Co.	Pit 54-21	---	NB	--	0.29	--	0.51	0.37
					SB	--	0.29	--	0.51	0.37

TABLE 13

TEN-YEAR WSF REVIEW FOR MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1966

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1966	1967	1971	1976
Bituminous Aggregate (4.09)									
Mb 52032-008	M 35 from end of dual roadway in village of Gwinn north to south limits of Palmer omitting through the village of Austin	Payne and Dolan of Wisconsin, Inc.	Pit 52-70	---	NB SB	-- --	0.59 0.60	0.67 0.61	0.68 0.60
Sheet Asphalt (4.13)									
Mb 45021C, C4	M 72 from 6.0 miles east of Empire east to M 22	Peninsula Asphalt and Construction Co.	---	Pit 45-19	EB WB	0.44 0.39	-- --	0.48 0.47	0.40 0.40

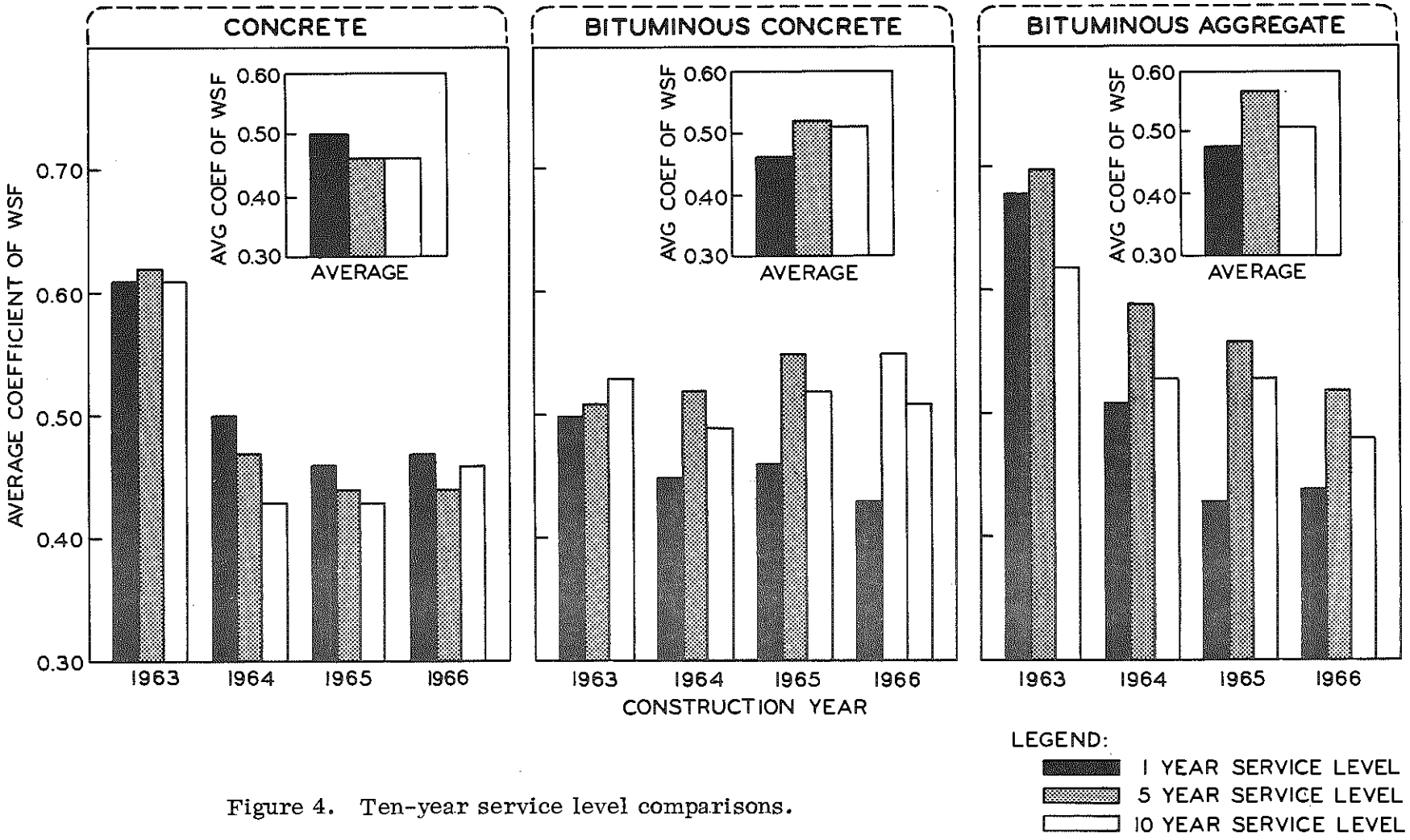


Figure 4. Ten-year service level comparisons.

SECTION IV

EXPERIMENTAL FEATURES IN PAVEMENT SURFACES

Table 14 - Bituminous Concrete Interstate Projects

Traffic wear patterns on Interstate bituminous concrete projects which used limestone and crushed gravel in their mix designs have been under study since constructed in 1961 and 1962.

Friction levels, determined in 1976 on the limestone projects, ranged from 0.29 to 0.70 and averaged 0.48. Outside (traffic) lane Wsf values averaged 31.5 percent lower than those determined on the inside (passing) lanes. The 1976 crushed gravel coefficients ranged from 0.54 to 0.75 and averaged 0.70. Outside lane values averaged 12.5 percent lower than the inside lane values.

Comparing crushed gravel projects with limestone projects, friction level histories indicate:

1) Under basically same ADT (1973 ADT averaging 8,100) the crushed gravel projects are yielding higher average Wsf values.

2) The friction level decay rate, with respect to increases in ADT, is lower for the crushed gravel projects. This is evidenced by comparing Wsf values of the inside lane with the higher traffic density outside lane.

Table 15 - Bridge Deck Surface Coatings

Table 15 summarizes the skid test history of six types of bridge deck surface coatings on 42 structures.

1. Rubberized Bituminous Concrete

Thirty-four lanes coated with rubberized bituminous concrete have been tested annually since their construction in 1967 or 1968. The 1976 tests resulted in friction levels ranging from 0.31 to 0.55 and averaging 0.45.

2. Asbestos Mixtures

A rubberized asbestos and bituminous concrete coating was placed on S05 of 58152 in 1967. The 1976 tests resulted in friction levels ranging from 0.48 to 0.50 and averaging 0.49.

Northbound lanes of X01 of 81075 (US 23 BR over the Huron River, north of Ann Arbor) were coated in 1967 with an asbestos and sand-asphalt mixture. The southbound lanes of this deck were surfaced the same year with a rubberized bituminous concrete and sand-asphalt combination. Annual tests over a 10-year period on this deck indicate a higher resistance

level on the rubberized bituminous concrete sand-asphalt surface. Friction levels for 1976 averaged 0.53 for the northbound lanes and 0.55 for the southbound.

3. Epoxy Coatings

After eight years, skid tests on the Creyts Rd bridge over I 96 yielded respective north half and south half Wsf values averaging 0.54 and 0.59. The surface type for the north half is a E15 Versamid 140 epoxy and the south half has a Guard Kote 250 epoxy application.

An epoxy mortar was applied to the decks of S04 of 33083, I 96 over Cedar St-Pennsylvania Ave access road, in 1971 and to B02 of 73131, the M 83 structure over Cass River, in 1969. Skid tests conducted in 1976 on S04 of 33083 ranged from 0.54 to 0.65 and averaged 0.60; coefficients on B02 of 73131 ranged from 0.64 to 0.68 and averaged 0.66.

4. Latex Modified Mortar

Latex modified mortar is a portland cement mortar with part of the mix water replaced by a latex emulsion to increase the bond and tensile strength of the resulting surface mix. Coefficients ranged from 0.35 to 0.58 and averaged 0.49 on the 37 lanes of latex modified mortar tested during 1976.

5. Latex Concrete

Latex concrete is a portland cement mix. The inclusion of a 25A aggregate in a latex concrete mix design is the basic difference between it and a latex modified mortar mix. Skid tests were conducted on 73 latex concrete lanes during 1976. Surfacing on 43 of these lanes took place in 1975; one-year Wsf values (1976 test results) ranged from 0.33 to 0.61 and averaged 0.58.

Thirty lanes which were surfaced in 1972 were also tested during 1976. The four-year friction levels obtained on these ranged from 0.44 to 0.63 and averaged 0.47.

6. Low Slump Concrete

Low slump concrete coating was placed on the decks of S03 of 33084 and S10 of 47065 during 1975. One-year Wsf values on the six lanes tested ranged from 0.46 to 0.64 and averaged 0.55.

Only four of the bridge deck surface coating lanes tested in 1976 yielded average Wsf values lower than 0.40. B02 of 11052 had respective northbound and southbound Wsf values of 0.35 and 0.31, and S06 of 25031 yielded Wsf values averaging 0.33 on the eastbound and 0.38 on the westbound.

B02 of 11052 has a 1967 rubberized bituminous concrete coating and is the US 31-US 33 structure over the St. Joseph River in Berrien Springs. S06 of 25031, Grand Blanc Rd over US 23, has a 1972 latex concrete deck.

Table 16 - Experimental Skid Resistance Resurfacing

Seven experimental skid resistant resurfacing locations were re-tested again this year. Friction levels obtained in 1976 on the eight to eleven year old surfaces ranged from 0.31 to 0.76 and averaged 0.46. The only lanes which averaged below 0.40 (six lanes) were located on US 24 at the intersection of Fenkell Rd (5 Mile Rd).

Table 17 - Gussasphalt and Mastiphalt Surfaces on US 31, Research Project 72 C-14

In 1972, a 500-ft Gussasphalt surface was placed on US 31 north of the B3 of 53031 structure over the Pere Marquette River. Gussasphalt was also used to resurface the deck of B2 of 64013 (US 31 over north branch of the Pentwater River). Immediately north of the 500-ft Gussasphalt surface, a 500-ft section of Mastiphalt was placed on the US 31 roadway. Similar friction levels were obtained on both surface types during 1976. The Mastiphalt surface yielded an average Wsf of 0.47 and the Gussasphalt surface averaged 0.48.

Table 18 - Spray Grip Surface, US 24 (Telegraph Rd) at 10 Mile Rd, Oakland County

A spray grip surface was initially placed at the intersection of US 24 and 10 Mile Rd in the fall of 1972. Excellent initial friction levels, averaging 0.78, were obtained. However, in 1973, due to a bonding problem, the initial surface was replaced. The 'new' spray grip surface was first tested in 1973. Excellent results were again found, Wsf values ranged from 0.73 to 0.87 and averaged 0.81. In 1976, after three years of service, coefficients ranging from 0.73 to 0.76 and averaging 0.74 were determined.

Table 19 - Epoxy and Natural Emery Seal Coat, Cut River Bridge (B01 of 49023)

Low friction levels were found on B01 of 49023 (US 2 over the Cut River) through the Department's High-Accident Location testing program in 1973. Friction levels at that time, on the concrete deck, ranged from 0.15 to 0.22 and averaged 0.18. An epoxy and natural emery seal coat surface was placed on the structure in July of 1974. Initial year skid test results on this surface ranged from 0.75 to 0.81 and averaged 0.78. The most recent test series was conducted in October 1976, and the average coefficient obtained was 0.60. The current condition of this deck coating is good. Only a few delamination repairs have been required since 1974.

Another similar surface type was placed on the M 44 bridge over the Grand River in 1976. An epoxy resin surface treatment was placed on this deck and skid tests conducted in November 1976 yielded Wsf values averaging 0.69. A historical review of this deck is shown in Section VI as 76 SR-36.

Tables 20 and 21 - Lakelite Aggregate Sections

Lakelite is a lightweight, porous material and was incorporated into the mix designs of two experimental surfaces constructed in 1972.

Project Mbr 62032-04779, located on M 37 in Newaygo County, has variations in percent bitumen, percent Lakelite, and size of material. After four years of service, outstanding friction levels continue to prevail in all areas, even those in which Lakelite was not incorporated into the mix design. Four-year Wsf values ranged from 0.64 to 0.82 and averaged 0.71 in the Lakelite areas; non-Lakelite area test results ranged from 0.63 to 0.68 and averaged 0.64. The test area using a mix design of 9 percent bitumen and 40 percent 31A Lakelite continues to possess the higher Wsf values.

Project Mm 2SC-7A (M 43 in Hastings) also had Lakelite incorporated into its mix design. Friction levels ranged from 0.57 to 0.64 and averaged 0.60 after four years of service.

Table 22 - Trinidad Asphalt Surfacing (Project Mb 72013-06140A), 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, a conventional bituminous concrete surface was also placed as a control device.

Average friction levels have increased in all the Trinidad and control areas since initial year skid tests. This is typical of most bituminous projects, through the five-year service level. Average initial, one and two-year friction levels on the Trinidad were 0.54, 0.60, and 0.66, respectively. The bituminous concrete control area yielded initial, one and two-year average coefficients of 0.56, 0.60, and 0.67.

Table 23 - Napoleon Sandstone Surface, Project Mb 46061-04854A

A 5,000-ft experimental Napoleon sandstone blend was placed at the south end of Project Mb 46061-04854A, located on US 223 from 1,700 ft northwest of Onsted Rd northwesterly to US 127. Six series of skid tests have been performed since construction in 1973. Average friction levels as low as 0.25 were obtained during October of the initial service year.

Higher coefficients have been obtained during all subsequent tests. Coefficients measured July 14, 1976, yielded Wsf values ranging from 0.43 to 0.53 and averaging 0.49.

Table 24 - White Pine Slag, Research Project 72 NM-316

Skid tests were conducted October 2, 1973 on Halfway Rd, running south and east from a point approximately seven miles west of Ontonagon. A mix design employing White Pine slag was used in the surfacing of this roadway. Coefficients averaging above 0.50 have been obtained in this surface in each of the four service years. Test results for 1976 averaged 0.59. Some rounding of the White Pine slag particles has occurred over the three years of service but has not affected pavement friction levels. Traffic volumes on this roadway continue to be low and the surface appearance is still that of a new pavement.

Table 25 - Textured Concrete Pavement Surfaces

Results of skid tests conducted on four different surface finishing methods are shown in Table 25. Friction levels on the transverse combing has consistently out-performed conventional burlap, longitudinal brooming, and transverse brooming over the six-year study of Project 13074-001.

Table 26 - Pavement Grooving

Transverse and longitudinal grooves were cut in the concrete pavement at various statewide locations during 1974. Selection of the locations to be grooved was based on results of the Department's continuing program to skid test high-accident locations. The grooves were cut using five different specifications which varied groove width and spacing. Table 26 shows the three-year history of friction levels determined on the grooved pavement and on the adjacent non-grooved surface at each of 15 locations.

Table 26 comparisons indicate the most positive change in friction level has occurred on sections using the specification calling for 1/8-in. wide transverse grooves, 3/16 in. deep and spaced 3/4 in. apart. Two-year coefficients on the grooved sections using this specification averaged 0.03 higher than adjacent non-grooved sections.

Table 27 - Open-Graded Asphalt Friction Courses

The first open-graded asphalt friction course in Michigan was placed on M 46 between the C&O RR and Williams St in Saginaw. Adjacent to this surface, between the C&O RR and Elm St, a conventional bituminous concrete surface was placed. Both of these surfaces were placed in 1973 as Project 73062-05917. After three service years, the friction levels on the open-graded asphalt have decayed by 4.8 percent while a 9.7 percent decay was determined on the adjacent dense graded bituminous concrete.

Test results from seven other open-graded surfaces are also included in Table 27. Good skid resistance qualities were obtained at all but one of these locations. M 25 between Heavenridge and Sheurman St, in Bay City yielded one-year friction levels averaging only 0.22.

TABLE 14
BITUMINOUS CONCRETE INTERSTATE PROJECTS

Project No.	Length, mi.	Location	Date Paved (Wearing Course)	Paving Contractor	Source of Coarse Aggregate	Lane[1]	Average Coefficient of Wet Sliding Friction																
							Firestone Tire				General Tire												
							1961	1962	Apr. 1963	Aug. 1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
18034, C3	6.758	M 61 to Arnold Rd	May-June 1962	Rieth-Riley	Wallace Stone Co. (Pit 32-4)	IL	0.52[2]	----	----	----	0.58	0.64	0.56	0.59	0.60	0.65	0.57	0.59	0.63	0.62	0.60	0.66	0.70
						OL	0.51[2]	----	----	----	0.47	0.48	0.41	0.42	0.46	0.53	0.44	0.51	0.52	0.46	0.44	0.50	0.52
72014, C4 20016, C1	6.273	0.6 mi. S of Roscommon-Crawford Co. Line to M 18 - M 76	May-June 1962	Thornton Construction	Pickett, Schreur (Merrit Pit)	IL	----	0.51	----	0.58	0.68	0.63	0.56	0.64	0.64	0.72	0.72	0.72	0.73	0.73	0.62	0.73	0.75
						OL	----	0.48	----	0.53	0.59	0.53	0.49	0.54	0.59	0.66	0.63	0.65	0.68	0.65	0.54	0.67	0.67
20015, C3	4.847	Co. Rd 612 to N Crawford Co. Line	Sept. 1961	Thornton Construction	McCready Pit (Pit 60-18)	IL	0.60	0.60	0.61	0.59	0.73	0.66	0.59	0.66	0.65	0.73	0.70	0.72	0.75	0.76	0.65	0.68	0.73
						OL	0.56	0.52	0.56	0.51	0.63	0.59	0.52	0.54	0.60	0.70	0.66	0.66	0.69	0.66	0.60	0.66	0.66
69013, C1	7.665	Otsego Co. Line N	Oct. 1961	Saginaw Asphalt	Afton Quarry (Pit 20-35)	IL	----	----	0.57	0.59	0.70	0.60	0.49	0.58	0.52	0.58	0.55	0.54	0.59	0.57	0.55	0.56	0.54
						OL	----	----	0.49	0.54	0.54	0.44	0.36	0.40	0.41	0.48	0.41	0.46	0.48	0.45	0.39	0.37	0.34
		Marlette Rd to Charles Brink Rd	June 1962	Saginaw Asphalt	Afton Quarry (Pit 20-35)	IL	----	----	0.56	0.59	0.68	0.64	0.48	0.58	0.58	0.62	0.58	0.55	0.60	0.56	0.54	0.56	0.50
						OL	----	----	0.47	0.47	0.48	0.44	0.35	0.37	0.42	0.48	0.46	0.44	0.47	0.42	0.35	0.37	0.29
69013, C2, C5	5.385	Charles Brink Rd N to M 32 (Gaylord)	June 1962	Spartan Asphalt	Lewiston Pit	IL	----	----	0.59	0.63	0.71	0.66	0.60	0.70	0.66	0.73	0.72	0.72	0.74	0.72	0.61	0.68	0.74
						OL	----	----	0.54	0.57	0.62	0.57	0.50	0.56	0.58	0.67	0.66	0.66	0.67	0.63	0.56	0.64	0.64
16091, C9	2.629	0.5 mi. S of M 68 N to MC RR	Aug-Sept 1962	East Shore Asphalt	Big Cut Pit (Pit 71-15)	IL	----	0.62	----	0.63	0.75	0.75	0.70	0.70[3]	0.74	0.74	0.74	0.79	0.73	0.72	0.54	0.65	0.70
						OL	----	0.58	----	0.56	0.58	0.60	0.52	0.52[3]	0.58	0.62	0.63	0.66	0.64	0.59	0.46	0.54	0.54

[1] IL and OL denote passing and traffic lanes.
[2] Tested on leveling course mix.
[3] Average of 2 series of tests in 1967.

TABLE 15
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
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
				SB	0.43	0.36	0.43	0.37	0.36	0.44	0.28	0.38	0.38	0.31
X01 of 19032	US 27 over GTW RR in St. Johns	1967	Rubberized bituminous concrete	NBOL	0.53	0.44	0.50	0.47	0.49	0.51	0.47	0.44	0.44	0.45
				NBIL	0.56	0.50	0.55	0.52	0.55	0.57	0.49	0.48	0.47	0.49
				SBOL	0.53	0.48	0.51	0.49	0.50	0.54	0.50	0.43	0.44	0.47
				SBIL	0.60	0.56	0.57	0.56	0.61	0.61	0.51	0.50	0.48	0.49
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
				SB	0.50	0.48	0.55	0.53	0.55	0.59	0.62	0.61	0.44	0.45
B01 of 61076	M 20 over Muskegon River	1968	Rubberized bituminous concrete	NBOL	--	0.46	0.49	0.49	0.51	0.52	0.47	0.39	0.55	0.46
				NBIL	--	0.48	0.53	0.50	0.55	0.56	0.53	0.46	0.59	0.50
				SBOL	--	0.44	0.49	0.46	0.48	0.49	0.45	0.42	0.53	0.45
				SBIL	--	0.44	0.52	0.49	0.49	0.52	0.49	0.39	0.57	0.46
B02 of 61076	M 20 southbound over Cedar Creek	1968	Rubberized bituminous concrete	SBOL	--	0.44	0.50	0.48	0.46	0.53	0.50	0.44	0.53	0.44
				SBIL	--	0.44	0.55	0.50	0.53	0.58	0.52	0.48	0.57	0.47
B03 of 61076	M 20 northbound over Cedar Creek	1968	Rubberized bituminous concrete	NBOL	--	0.46	0.52	0.49	0.51	0.54	0.48	0.47	0.55	0.49
				NBIL	--	0.45	0.54	0.53	0.52	0.58	0.52	0.48	0.60	0.51
S04 of 61072	M 46 over US 31	1968	Rubberized bituminous concrete	EBOL	--	0.45	0.45	0.43	0.49	0.54	0.48	0.38	0.54	0.40
				EBCL	--	0.43	0.49	0.49	0.52	0.53	0.50	0.40	0.55	0.43
				EBIL	--	0.45	0.54	0.50	0.54	0.55	0.53	0.44	0.53	0.50
				WBOL	--	0.42	0.48	0.43	0.49	0.50	0.43	0.41	0.51	0.35
				WBCL	--	0.43	0.49	0.47	0.54	0.54	0.47	0.40	0.52	0.44
				WBIL	--	0.50	0.55	0.50	0.57	0.55	0.54	0.44	0.53	0.50
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
				EBCL	--	0.44	0.37	0.34	0.39	0.42	0.40	0.36	0.40	0.40
				EBIL	--	0.45	0.40	0.36	0.38	0.45	0.43	0.39	0.41	0.44
				WBOL	--	0.50	0.43	0.40	0.44	0.48	0.40	0.42	0.44	0.49
				WBCL	--	0.44	0.37	0.36	0.40	0.41	0.40	0.39	0.42	0.44
				WBIL	--	0.44	0.39	0.35	0.39	0.43	0.43	0.37	0.44	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
				EBCL	--	0.44	0.43	0.40	0.43	0.44	0.28	0.37	0.37	0.43
				EBIL	--	0.43	0.41	0.41	0.43	0.48	0.33	0.37	0.39	0.43
				WBOL	--	0.49	0.49	0.47	0.46	0.48	0.33	0.42	0.47	0.55
				WBCL	--	0.42	0.39	0.40	0.42	0.39	0.28	0.37	0.38	0.42
				WBIL	--	0.43	0.41	0.41	0.44	0.50	0.35	0.47	0.40	0.42
S05 of 58152	Newport Rd over I 75, Newport	1967	Rubberized asbestos and bituminous concrete	EB	0.46	0.50	0.51	0.49	0.46	0.51	(1)	0.38	0.52	0.48
				WB	0.47	0.50	0.51	0.52	0.49	0.57	(1)	0.43	0.49	0.50

(1) Not tested (approaches torn up)

TABLE 15 (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
X01 of 33034	US 27 over C&O RR and I 96 BL in Lansing	1975	Latex mortar	NBOI[5]	--	--	--	--	--	--	--	--	--	0.51
				NBOL[6]	--	--	--	--	--	--	--	--	--	0.51
			Latex concrete	NBIL	--	--	--	--	--	--	--	--	0.37	0.52
				SBOL	--	--	--	--	--	--	--	--	0.52	0.52
				SBIL	--	--	--	--	--	--	--	--	0.43	0.54
S07 of 38101	Lansing Ave over I 94, Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.62
				NBIL	--	--	--	--	--	--	--	--	--	0.47
				SBOL	--	--	--	--	--	--	--	--	--	0.59
				SBIL	--	--	--	--	--	--	--	--	--	0.45
B04 of 38111	US 127 over Grand River, east of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.52
				NBIL	--	--	--	--	--	--	--	--	--	0.62
				SBOL	--	--	--	--	--	--	--	--	--	0.53
				SBIL	--	--	--	--	--	--	--	--	--	0.63
X01 of 38131	US 127 over NYCRR, north of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.56
				NBIL	--	--	--	--	--	--	--	--	--	0.56
				SBOL	--	--	--	--	--	--	--	--	--	0.58
				SBIL	--	--	--	--	--	--	--	--	--	0.61
S16 of 41131	US 131 over Leonard St, in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.57
				NBCL	--	--	--	--	--	--	--	--	--	0.57
				NBIL	--	--	--	--	--	--	--	--	--	0.62
				SBOL	--	--	--	--	--	--	--	--	--	0.59
				SBCL	--	--	--	--	--	--	--	--	--	0.59
				SBIL	--	--	--	--	--	--	--	--	--	0.60
S17 of 41131	US 131 over Richmond St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.55
				NBCL	--	--	--	--	--	--	--	--	--	0.56
				NBIL	--	--	--	--	--	--	--	--	--	0.62
				SBOL	--	--	--	--	--	--	--	--	--	0.55
				SBCL	--	--	--	--	--	--	--	--	--	0.57
				SBIL	--	--	--	--	--	--	--	--	--	0.60
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.59
				NBCL	--	--	--	--	--	--	--	--	--	0.56
				NBIL	--	--	--	--	--	--	--	--	--	0.60
				SBOL	--	--	--	--	--	--	--	--	--	0.59
				SBCL	--	--	--	--	--	--	--	--	--	0.59
				SBIL	--	--	--	--	--	--	--	--	--	0.60

[5] North end of deck finished with transverse broom.
[6] South end of deck finished with transverse comb.

TABLE 15 (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
S02 of 63022	I 96 over Milford Rd	1971	Latex modified mortar	EBOL	--	--	--	--	--	0.32	0.24	0.33	0.38	0.42
				EBCL	--	--	--	--	--	0.42	0.30	0.42	0.40	0.48
				EBIL	--	--	--	--	--	0.43	0.31	0.46	0.46	0.51
				WBOL	--	--	--	--	--	0.38	0.23	0.37	0.42	0.45
				WBCL	--	--	--	--	--	0.43	0.31	0.42	0.47	0.50
				WBIL	--	--	--	--	--	0.49	0.34	0.48	0.52	0.54
S06 of 82022	Westbound I 94 over Middlebelt Rd	1971	Latex modified mortar	WBOL	--	--	--	--	--	0.38	0.31	0.38	0.36	0.49
				WBCL	--	--	--	--	--	0.40	0.34	0.40	0.42	0.51
				WBIL	--	--	--	--	--	0.42	0.35	0.43	0.38	0.54
S09 of 82022	Eastbound I 94 over Ecorse Rd	1972	Latex modified mortar	EBOL	--	--	--	--	--	0.44	0.35	0.46	0.44	0.53
				EBCL	--	--	--	--	--	0.42	0.39	0.48	0.44	0.56
				EBIL	--	--	--	--	--	0.45	0.38	0.45	0.46	0.55
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
				WBCL	--	--	--	--	--	0.47	0.37	0.41	0.44	0.53
				WBIL	--	--	--	--	--	0.43	0.37	0.43	0.47	0.54
S26 of 82195	John R over I 75	1969	Latex modified mortar	SBOL	--	--	--	--	--	0.60	0.53	0.42	0.45	0.58
				SB#3	--	--	--	--	--	0.53	0.47	0.38	0.40	0.54
				SB#2	--	--	--	--	--	0.47	0.47	0.35	0.35	0.49
				SBIL	--	--	--	--	--	0.48	0.39	--	--	--
S27 of 82195	Brush St over I 75	1969	Latex modified mortar	NBOL	--	--	--	--	--	0.54	0.48	0.39	0.40	0.57
				NBCL	--	--	--	--	--	0.48	0.43	0.34	0.34	0.52
				NBIL	--	--	--	--	--	0.51	0.44	0.34	0.36	0.50
S06 of 25031	Grand Blanc Rd over US 23	1972	Latex concrete	EB	--	--	--	--	--	--	0.27	0.31	0.33	0.33
				WB	--	--	--	--	--	--	0.33	0.32	0.38	0.38
S02 of 25131	Baldwin Rd over I 75 (1.2 miles northwest of Oakland County Line)	1972	Latex concrete	EB	--	--	--	--	--	--	0.47	0.44	0.50	0.51
				WB	--	--	--	--	--	--	0.51	0.44	0.50	0.48
S09 of 25131	Fenton Rd over I 75 (2.4 miles southeast of US 23)	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.35	0.35	0.40	0.42
				NBIL	--	--	--	--	--	--	0.39	0.38	0.46	0.46
				SBOL	--	--	--	--	--	--	0.35	0.33	0.39	0.41
				SBIL	--	--	--	--	--	--	0.38	0.36	0.46	0.46
X01 of 33031	US 127 over NYCRR, south of Leslie	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.62
				NBIL	--	--	--	--	--	--	--	--	--	0.63
				SBOL	--	--	--	--	--	--	--	--	--	0.52
				SBIL	--	--	--	--	--	--	--	--	--	0.62

TABLE 15 (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
X09 of 41131	US 131 over GTW RR and Indian Mill Cr in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	0.56
				NBCL	--	--	--	--	--	--	--	--	--	0.56
				NBIL	--	--	--	--	--	--	--	--	--	0.61
				SBOL	--	--	--	--	--	--	--	--	--	0.58
				SBCL	--	--	--	--	--	--	--	--	--	0.58
				SBIL	--	--	--	--	--	--	--	--	--	0.60
B02 of 73062	M 46 over Tittabawassee River	1972	Latex concrete	EBOL	--	--	--	--	--	--	0.27	0.34	0.32	0.45
				EBIL	--	--	--	--	--	--	0.30	0.32	0.34	0.44
				WBOL	--	--	--	--	--	--	0.27	0.41	0.32	0.47
				WBIL	--	--	--	--	--	--	0.32	0.37	0.39	0.51
S02 of 82022	Eastbound I 94 over Wayne Rd	1972	Latex concrete	EBOL	--	--	--	--	--	--	0.30	0.38	0.38	0.47
				EBCL	--	--	--	--	--	--	0.33	0.39	0.42	0.47
				EBIL	--	--	--	--	--	--	0.38	0.51	0.46	0.53
X01 of 82024	I 94 over DeQuindre Yard	1972	Latex concrete	EBOL	--	--	--	--	--	--	0.39	0.31	0.32	0.47
				EBCL	--	--	--	--	--	--	0.38	0.29	0.34	0.47
				EBIL	--	--	--	--	--	--	0.44	0.28	0.35	0.46
				WBOL	--	--	--	--	--	--	0.41	0.31	0.33	0.47
				WBCL	--	--	--	--	--	--	0.40	0.31	0.35	0.49
				WBIL	--	--	--	--	--	--	0.43	0.32	0.40	0.50
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
				NB#2	--	--	--	--	--	--	0.47	0.46	0.44	0.52
				NBIL	--	--	--	--	--	--	0.53	0.53	0.54	0.59
				SBOL	--	--	--	--	--	--	0.43	0.45	0.40	--
				SB#3	--	--	--	--	--	--	0.41	0.40	0.42	0.46
				SB#2	--	--	--	--	--	--	0.48	0.46	0.45	0.48
				SBIL	--	--	--	--	--	--	0.52	0.52	0.50	0.56
B03 of 82191	I 75 over Goddard Rd	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.40	0.36	0.46	0.45
				NBCL	--	--	--	--	--	--	0.37	0.37	0.44	0.47
				NBIL	--	--	--	--	--	--	0.40	0.44	0.49	0.52
			Concrete	SBOL	--	--	--	--	--	--	0.31	0.37	0.43	0.45
				SBCL	--	--	--	--	--	--	0.35	0.41	0.45	0.47
				SBIL	--	--	--	--	--	--	0.34	0.44	0.48	0.54
S03 of 33084	Southbound I 496 to eastbound I 96 over westbound I 96	1975	Low slump concrete	SBOL	--	--	--	--	--	--	--	--	--	0.54
				SBIL	--	--	--	--	--	--	--	--	--	0.64
S10 of 47065	I 96 over Grand River (Brighton west exit)	1975	Low slump concrete	EBOL	--	--	--	--	--	--	--	--	--	0.46
				EBIL	--	--	--	--	--	--	--	--	--	0.58
				WBOL	--	--	--	--	--	--	--	--	--	0.48
				WBIL	--	--	--	--	--	--	--	--	--	0.59

TABLE 15 (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
X01 of 81075	US 23 BR over Huron River, north of Ann Arbor	1967	Asbestos mix plus sand asphalt	NBRL	0.57	0.52	0.55	0.54	0.58	0.60	0.49	0.41	0.46	0.54
				NBOL	0.58	0.53	0.57	0.56	0.66	0.62	0.51	0.45	0.39	0.50
				NBIL	0.60	0.56	0.66	0.62	0.68	0.68	0.56	0.56	0.52	0.56
			Rubberized bituminous concrete plus sand asphalt	SBRL	0.61	0.50	0.57	0.54	0.64	0.59	0.48	0.42	0.45	0.51
				SBOL	0.59	0.55	0.64	0.59	0.69	0.64	0.52	0.58	0.47	0.51
				SBIL	0.58	0.58	0.64	0.62	0.73	0.72	0.56	0.64	0.57	0.62
S05 of 23081	Creyts Rd over I 496	1969	North half of deck only E 15 Versamid 140	NB	--	--	0.67	0.54	0.37	0.35	0.39[2]	0.34[3]	0.41[4]	0.52[2]
				SB	--	--	0.66	0.54	0.44	0.39	0.44[2]	0.38[3]	0.49[4]	0.55[2]
			South half of deck only Guard Kote 250	NB	--	--	0.75	0.52	0.46	0.50	0.45[2]	0.41[3]	0.65[4]	0.61[2]
				SB	--	--	0.69	0.49	0.36	0.49	0.49[2]	0.36[3]	0.64[4]	0.57[2]
S04 of 33083	I 96 over Cedar St - Penn Ave, Access Rd	1971	Epoxy mortar	EBRL	--	--	--	--	0.68	0.48	0.36	0.63	0.49	0.60
				EBOL	--	--	--	--	0.63	0.39	0.47	0.49	0.52	0.60
				EBIL	--	--	--	--	0.68	0.46	0.47	0.52	0.57	0.65
				WBOL	--	--	--	--	0.63	0.31	0.38	0.52	0.51	0.54
				WBIL	--	--	--	--	0.57	0.47	0.29	0.42	0.43	0.61
B02 of 73131	M 83 over Cass River, Frankenmuth	1969	Epoxy mortar	NBOL	--	--	--	0.57	0.57	0.60	0.58	0.53	0.54	0.66
				NBIL	--	--	--	0.52	0.58	0.58	0.54	0.51	0.54	0.64
				SBOL	--	--	--	0.60	0.63	0.66	0.57	0.54	0.56	0.67
				SBIL	--	--	--	0.56	0.60	0.60	0.56	0.55	0.53	0.68
S04 of 41026	M 37 over eastbound I 96	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.45
				NBIL	--	--	--	--	--	0.46	0.41	0.29	0.46	0.44
				SBOL	--	--	--	--	--	0.37	0.35	0.27	0.40	0.40
				SBIL	--	--	--	--	--	0.41	0.38	0.32	0.41	0.41
				SBRL	--	--	--	--	--	0.40	0.34	0.30	0.39	0.35
S05 of 41026	M 37 over westbound I 96	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.45
				NBIL	--	--	--	--	--	0.44	0.39	0.30	0.43	0.42
				SBOL	--	--	--	--	--	0.33	0.34	0.27	0.40	0.42
				SBIL	--	--	--	--	--	0.47	0.40	0.30	0.45	0.46
				SBRL	--	--	--	--	--	0.46	0.39	0.28	0.45	0.44
S01 of 63022	I 96 over Kent Lake Rd	1972	Latex modified mortar	EBOL	--	--	--	--	--	0.50	0.33	0.41	0.47	0.52
				EBCL	--	--	--	--	--	0.45	0.34	0.42	0.46	0.50
				EBIL	--	--	--	--	--	0.53	0.41	0.51	0.49	0.55
				WBOL	--	--	--	--	--	0.46	0.35	0.43	0.46	0.52
				WBCL	--	--	--	--	--	0.48	0.34	0.42	0.44	0.51
				WBIL	--	--	--	--	--	0.52	0.39	0.50	0.50	0.55

[2] Average of two test series
[3] Fall tests only
[4] Spring tests only

TABLE 16
EXPERIMENTAL SKID RESISTANT RESURFACING

Control Section	Location	Construction Months	Mixture Type	Route	Direction and Lane	Average Coefficient of Wet Sliding Friction												
						1965	1966		1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
							Spring	Fall										
09033	M 13 at Grove St, north of Bay City	Sept.-Oct. 1965	80-lb Sandstone + asphalt	M 13	NBOL	0.73	0.53	0.49	0.59	0.55	0.56	0.55	0.53	0.55	0.53	0.51	0.59	0.64
				M 13	NBIL	0.76	0.61	0.56	0.66	0.62	0.66	0.67	0.66	0.66	0.64	0.62	0.68	0.76
				M 13	SBOL	0.75	0.51	0.44	0.40	--	0.43[1]	0.52[1]	0.45[1]	0.48[1]	0.46[1]	0.53[2]	0.42[1]	0.41[1]
				M 13	SBIL	0.76	0.55	0.51	0.42	---	0.44[1]	0.55[1]	0.50[1]	0.55[1]	0.48[1]	0.51[2]	0.43[1]	0.43[1]
09042	M 25 at Wagner Rd, east of Bay City	Sept. 1965	80-lb Sandstone + asphalt	M 25	EB	0.77	0.53	0.47	0.51	0.54	0.64	0.62	0.55	0.55	0.48	0.52	0.64	0.58
				M 25	WB	0.74	0.54	0.47	0.53	0.55	0.66	0.60	0.57	0.58	0.51	0.55	0.61	0.62
82053	US 24 at Penkell Rd, (Five Mile Rd), Detroit	Sept. 1965	50-lb 3BC + asbestos fiber + asphalt	US 24	NBOL	0.56	0.36	0.34	0.37	0.38	0.42	0.35	0.36	0.42	0.40	0.35	0.31	0.31
				US 24	NB#3	0.53	0.36	0.34	0.41	0.40	0.41	0.38	0.37	0.42	0.39	0.37	0.34	0.34
				US 24	NB#2	0.57	0.36	0.34	0.40	0.41	0.43	0.41	0.37	0.43	0.37	0.40	0.36	0.36
				US 24	NBIL	0.60	--	--	--	--	--	--	--	--	--	0.39	0.35	0.36
				US 24	SBOL	0.52	0.38	0.37	0.41	0.39	0.43	0.38	0.40	0.46	0.44	0.39	0.36	0.37
				US 24	SBCL	0.60	0.37	0.35	0.42	0.42	0.43	0.40	0.42	0.48	0.43	0.43	0.39	0.39
				US 24	SBIL	0.59	0.35	0.34	0.44	0.40	0.42	0.40	0.43	0.49	0.43	0.45	0.41	0.41
				Five Mile Rd	EBOL	0.51	0.37	0.31	0.36	0.38	0.37	0.37	0.38	0.43	0.38	0.42	0.41	0.44
				Five Mile Rd	EBIL	0.55	0.39	0.33	0.41	0.40	0.42	0.41	0.39	0.49	0.37	0.39	0.42	0.44
				Five Mile Rd	WBOL	0.55	0.37	0.33	0.39	0.40	0.44	0.41	0.39	0.49	0.37	0.41	0.40	0.42
				Five Mile Rd	WBIL	0.60	0.39	0.33	0.43	0.44	0.44	0.42	0.42	0.49	0.37	0.47	0.45	0.47
82053	US 24 at Plymouth Rd, Detroit	Sept.-Oct. 1965	50-lb 2MS + asbestos fiber + asphalt	US 24	NBOL	0.59	0.36	0.35	0.42	0.43	0.43	0.43	0.45	0.49	0.44	0.48	0.43	0.47
				US 24	NB#3	0.59	0.37	0.36	0.41	0.43	0.45	0.42	0.47	0.48	0.47	0.51	0.45	0.47
				US 24	NB#2	0.62	0.40	0.36	0.44	0.47	0.48	0.51	0.51	0.57	0.47	0.52	0.46	0.49
				US 24	NBIL	0.62	0.40	0.38	0.45	0.45	0.46	0.55	0.51	0.51	0.46	0.48	0.48	0.54
				US 24	SBOL	0.60	0.37	0.35	0.42	0.40	0.44	0.40	0.44	0.48	0.46	0.44	0.36	0.44
				US 24	SB#3	0.62	0.39	0.35	0.43	0.43	0.46	0.42	0.45	0.47	0.43	0.41	0.40	0.41
				US 24	SB#2	0.61	0.39	0.36	0.45	0.47	0.46	0.45	0.48	0.54	0.45	0.41	0.43	0.47
				US 24	SBIL	0.64	0.42	0.37	0.50	0.52	0.46	0.59	0.51	0.57	0.55	0.56	0.58	0.56
				Plymouth Rd	EBOL	0.62	0.40	0.36	0.41	0.41	0.46	0.48	0.45	0.45	0.46	0.46	0.42	0.47
				Plymouth Rd	EBCL	0.63	0.39	0.36	0.41	0.43	0.44	0.44	0.42	0.49	0.47	0.44	0.48	0.48
				Plymouth Rd	EBIL	0.64	0.39	0.37	0.41	0.44	0.44	0.51	0.48	0.51	0.47	0.48	0.48	0.46
				Plymouth Rd	WBOL	0.63	0.40	0.38	0.46	0.47	0.46	0.49	0.49	0.53	0.48	0.46	0.49	0.49
				Plymouth Rd	WBCL	0.61	0.41	0.37	0.44	0.44	0.46	0.45	0.42	0.50	0.48	0.46	0.44	0.42
				Plymouth Rd	WBIL	0.60	0.40	0.38	0.46	0.48	0.45	0.53	0.49	0.58	0.46	0.47	0.51	0.47
82053	US 24 at west Chicago Rd, Detroit	Oct. 1965	80-lb 2MS + 31AA + asphalt	US 24	NBOL	0.57	0.38	0.37	0.43	0.45	0.44	0.43	0.46	0.49	0.47	0.49	0.44	0.43
				US 24	NB#3	0.58	0.40	0.37	0.43	0.45	0.46	0.43	0.44	0.49	0.45	0.48	0.46	0.44
				US 24	NB#2	0.61	0.41	0.36	0.43	0.47	0.46	0.45	0.47	0.52	0.46	0.49	0.46	0.42
				US 24	NBIL	0.62	0.40	0.37	0.42	0.49	0.46	0.45	0.46	0.52	0.46	0.50	0.44	0.43
				US 24	SBOL	0.56	0.42	0.41	0.44	0.41	0.45	0.42	0.44	0.50	0.42	0.47	0.44	0.41
				US 24	SBCL	0.57	0.41	0.40	0.43	0.46	0.45	0.44	0.44	0.48	0.42	0.45	0.41	0.40
				US 24	SBIL	0.59	0.41	0.40	0.43	0.47	0.46	0.43	0.47	0.50	0.46	0.47	0.43	0.41
				W. Chicago Rd	EBRT	0.63	0.45	0.44	0.48	0.50	0.45	0.45	0.51	0.56	0.42	0.50	0.46	0.47
				W. Chicago Rd	EBIL	0.63	0.44	0.40	0.42	0.46	0.45	0.45	0.47	0.54	0.42	0.48	0.45	0.41
				W. Chicago Rd	WBRT	0.63	0.43	0.41	0.47	0.50	0.46	0.48	0.46	0.52	(3)	(3)	(3)	(3)
				W. Chicago Rd	WBIL	0.63	0.41	0.37	0.47	0.47	0.45	0.45	0.48	0.51	(3)	(3)	(3)	(3)
82052	US 24 at Sibley Rd, Detroit	Oct. 1965	80-lb 3NS + 31AA + asphalt	US 24	NBOL	0.50	0.41	0.34	0.44	0.45	0.49	0.44	0.44	0.44	0.42	0.43	0.44	0.45
				US 24	NBIL	0.52	0.42	0.38	0.47	0.47	0.50	0.48	0.49	0.48	0.51	0.45	0.49	0.47
				US 24	SBOL	0.51	0.43	0.39	0.48	0.47	0.52	0.50	0.47	0.48	0.51	0.42	0.46	0.48
				US 24	SBIL	0.51	0.42	0.38	0.46	0.46	0.50	0.48	0.50	0.48	0.49	0.42	0.48	0.48
				Sibley Rd	EB	0.54	0.39	0.36	0.42	0.43	0.45	0.48	0.47	0.44	0.47	0.42	(4)	0.42[4]
				Sibley Rd	WB	0.52	0.41	0.39	0.45	0.44	0.44	0.43	0.49	0.43	0.48	0.43	(4)	0.46[4]
82053	US 24 northbound (Telegraph Rd) from Joy Rd to West Chicago	Aug. 1968	80-lb crushed fine aggregate	US 24	NBOL	--	--	--	--	0.59	0.44	0.41	0.42	0.48	0.47	0.46	0.45	0.48
				US 24	NB#3	--	--	--	--	0.60	0.48	0.41	0.42	0.48	0.48	0.46	0.47	0.48
				US 24	NB#2	--	--	--	--	0.61	0.46	0.42	0.44	0.50	0.48	0.48	0.45	0.49
				US 24	NBIL	--	--	--	--	0.61	0.45	0.42	0.46	0.49	0.46	0.48	0.50	0.50

[1] Bituminous concrete, non-experimental
[2] Tested on intersection area only
[3] Deleted by new construction
[4] Pavement broken up

TABLE 17
GUSSASPHALT AND MASTIPHALT SURFACES ON US 31
Research Project 72 C-14

Tested Surface	Lane	Coefficient of Wet Sliding Friction																							
		10/27/72			11/10/72			1/18/73			5/10/73			12/3/73			6/4/74			6-19-75			6-18-76		
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
Gussasphalt (C.S. 53031)	NB	0.76	0.82	0.78	--	--	--	0.57	0.62	0.60	0.60	0.61	0.61	--	--	--	0.40	0.45	0.42	0.52	0.55	0.53	0.49	0.50	0.50
	SB	0.79	0.83	0.81	--	--	--	0.63	0.68	0.66	0.55	0.59	0.58	--	--	--	0.42	0.46	0.44	0.51	0.55	0.53	0.46	0.49	0.48
Mastiphalt (C.S. 53031)	NB	0.37	0.50	0.44	--	--	--	0.48	0.49	0.48	0.56	0.58	0.57	--	--	--	0.40	0.45	0.42	0.52	0.54	0.53	0.47	0.47	0.47
	SB	0.37	0.49	0.42	--	--	--	0.54	0.56	0.55	0.55	0.60	0.57	--	--	--	0.45	0.50	0.48	0.52	0.52	0.52	0.46	0.48	0.47
Gussasphalt (B2 of 64013)	NB	--	--	--	0.73	0.76	0.74	0.64	0.68	0.66	0.60	0.64	0.62	0.49	0.53	0.51	0.37	0.41	0.39	0.49	0.52	0.51	0.44	0.48	0.46
	SB	--	--	--	Not Completed			0.63	0.66	0.64	0.58	0.63	0.60	0.45	0.50	0.48	0.38	0.41	0.40	0.48	0.52	0.51	0.46	0.49	0.48

TABLE 18
SPRAY GRIP SURFACE, US 24 (TELEGRAPH ROAD) AT 10 MILE ROAD, OAKLAND COUNTY
Research Project 72 NM-326

Test Location	Direction and Lane	Coefficient of Wet Sliding Friction																					
		Before Spray Grip			After Spray Grip						New Spray Grip Surface												
		9-19-72			11-2-72			6-10-73			10-29-73			8-11-74			7-30-75			7-25-76		
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
US 24 (Telegraph Rd), Immediately north of 10 Mile Rd	SBRT	0.31	0.36	0.34	0.79	0.79	0.79	0.67	0.70	0.69	0.77	0.81	0.79	0.69	0.72	0.70	0.67	0.69	0.68	0.64	0.78	0.73
	SBOL	0.37	0.38	0.37	0.73	0.79	0.77	0.63	0.69	0.66	0.82	0.87	0.85	0.73	0.73	0.73	0.67	0.69	0.68	0.73	0.76	0.74
	SB#3	0.33	0.34	0.33	0.78	0.79	0.79	0.69	0.69	0.69	0.77	0.79	0.78	0.68	0.70	0.69	0.64	0.69	0.67	0.71	0.75	0.73
	SB#2	0.33	0.36	0.34	0.76	0.79	0.78	0.66	0.67	0.66	0.85	0.86	0.85	0.70	0.73	0.72	0.69	0.69	0.69	0.75	0.76	0.76
	SBIL	0.34	0.37	0.36	0.78	0.79	0.79	0.64	0.69	0.66	0.82	0.83	0.83	0.70	0.73	0.72	0.69	0.70	0.69	0.75	0.76	0.76
10 Mile Rd, immediately west of US 24	EB	0.33	0.41	0.38	0.77	0.78	0.78	0.65	0.71	0.68	0.73	0.78	0.75	0.66	0.69	0.67	0.66	0.66	0.66	0.71	0.74	0.73

TABLE 19
EPOXY AND NATURAL EMERY SEAL COAT
CUT RIVER BRIDGE (B01 of 49023)

Test Date	Lane	Coefficient of Wsf		
		Low	High	Avg
9-23-74	EB	0.75	0.81	0.77
	WB	0.78	0.78	0.80
7-7-75	EB	0.60	0.67	0.65
	WB	0.58	0.64	0.62
5-24-76	EB	0.69	0.73	0.71
	WB	0.69	0.70	0.69
10-18-76	EB	0.58	0.61	0.60
	WB	0.58	0.63	0.61

TABLE 20
M 37 LAKELITE AGGREGATE SECTIONS (Project Mbr 63032-04779A)
Research Project 72 NM-347

Section No.	Station to Station	Percent Bitumen	Lakelite Aggregate	Lane	Coefficient of Wet Sliding Friction																	
					11-9-72			5-29-73			11-14-73			6-4-74			7-30-75			6-23-76		
					Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
1	240+00 to 244+75	9.0	30% 31A	NB	0.55	0.59	0.57	0.69	0.74	0.72	0.68	0.73	0.70	0.62	0.65	0.63	0.65	0.68	0.68	0.69	0.71	0.70
2	244+75 to 264+15	9.0	32% 31A	NB	0.60	0.61	0.61	0.73	0.76	0.75	0.69	0.72	0.70	0.65	0.68	0.67	0.66	0.70	0.68	0.70	0.72	0.71
3	264+15 to 290+95	8.0	16% 31A	NB	0.50	0.55	0.52	0.69	0.70	0.69	0.60	0.65	0.63	0.58	0.62	0.60	0.62	0.64	0.63	0.66	0.68	0.67
7	295+00 to 302+50	8.0	25% 31A	NB	0.50	0.61	0.56	0.70	0.74	0.72	0.62	0.68	0.66	0.63	0.68	0.65	0.64	0.68	0.66	0.70	0.75	0.72
8	307+70 to 291+25	9.5	42% 25A	SB	0.66	0.69	0.68	0.78	0.81	0.79	0.69[1] / 0.52[2]	0.73 / 0.62	0.71 / 0.57	0.71	0.73	0.72	0.70	0.72	0.71	0.69	0.74	0.72
9	291+25 to 264+65	8.0	16% 31A	SB	0.55	0.58	0.57	0.68	0.74	0.71	0.61	0.65	0.63	0.63	0.65	0.64	0.62	0.62	0.62	0.64	0.67	0.65
10	264+65 to 254+00	9.0	30% 31A	SB	0.55	0.58	0.56	0.71	0.72	0.72	0.63	0.67	0.65	0.68	0.71	0.69	0.64	0.65	0.64	0.68	0.68	0.68
11	254+00 to 242+15	9.0	35% 31A	SB	0.65	0.66	0.66	0.76	0.80	0.78	0.70	0.74	0.72	0.74	0.75	0.75	0.68	0.71	0.70	0.73	0.74	0.74
12	242+15 to 239+75	9.0	40% 31A	SB	0.66	0.70	0.68	0.84	0.87	0.86	0.79	0.80	0.79	0.76	0.81	0.78	0.73	0.76	0.75	0.81	0.82	0.82
North Control	302+50 North	---	None	NB	0.50	0.51	0.51	0.58	0.70	0.65	0.56	0.67	0.61	0.58	0.70	0.64	0.65	0.67	0.66	0.63	0.65	0.64
	307+70 North	---	None	SB	0.50	0.52	0.51															
South Control	240+00 South	---	None	NB	0.45	0.48	0.47	0.63	0.66	0.65	0.60	0.66	0.63	0.57	0.67	0.62	0.60	0.62	0.61	0.63	0.68	0.65
	239+75 South	---	None	SB	0.49	0.50	0.50															

[1] North of 14 Mile Rd
[2] South of 14 Mile Rd

TABLE 21

M 43 LAKELITE AGGREGATE SECTION (Project Mm 2SC-7A, Control Section 08012)

Research Project 72 NM-347

Location	Surface	Lane	Coefficient of Wet Sliding Friction																	
			9-6-72			5-30-73			11-14-73			5-10-74			6-30-75			5-19-76		
			Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
Coats Grove Rd south (north of Hastings)	28B Agg. Seal	NB	0.59	0.63	0.61	0.64	0.64	0.64	0.49	0.53	0.52	0.53	0.57	0.56	0.57	0.61	0.59	0.54	0.57	0.56
		SB	0.57	0.60	0.59	0.62	0.62	0.62	0.58	0.61	0.60	0.56	0.57	0.57	0.58	0.61	0.59	0.60	0.62	0.61
Coats Grove Rd north 0.5 mile	Light wt. Agg. Seal	NB	0.87	0.88	0.87	0.80	0.85	0.83	0.58	0.69	0.65	0.58	0.62	0.60	0.52	0.53	0.53	0.57	0.62	0.59
		SB	0.90	0.91	0.91	0.78	0.85	0.82	0.56	0.70	0.67	0.58	0.64	0.61	0.58	0.60	0.59	0.60	0.64	0.62
From 0.5 mile north of Coats Grove Rd north	28B Agg. Seal	NB	0.57	0.59	0.58	0.64	0.68	0.66	0.50	0.55	0.52	0.55	0.57	0.56	0.55	0.59	0.56	0.55	0.58	0.57
		SB	0.58	0.60	0.59	0.63	0.68	0.66	0.57	0.59	0.58	0.56	0.58	0.57	0.58	0.60	0.59	0.60	0.61	0.61

TABLE 22
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		
			Low	High	Avg	Low	High	Avg	Low	High	Avg
450+00 - 482+00	6.0 Percent Trinidad Asphalt (Type C)	NBOL	0.48	0.50	0.49	0.57	0.59	0.58	0.62	0.66	0.64
		NBIL	0.56	0.59	0.58	0.61	0.63	0.62	0.67	0.71	0.69
482+00 - 514+00	6.5 Percent Trinidad Asphalt (Type C)	NBOL	--	--	--	0.57	0.58	0.58	0.60	0.62	0.61
		NBIL	--	--	--	0.63	0.65	0.64	0.69	0.70	0.70
514+00 - 563+00	6.5 Percent Trinidad Asphalt (Type M)	NBOL	0.48	0.50	0.49	0.58	0.58	0.58	0.59	0.60	0.60
		NBIL	0.54	0.57	0.56	0.63	0.64	0.64	0.68	0.71	0.69
563+00 - 612+00	6.0 Percent Trinidad Asphalt (Type M)	NBOL	0.51	0.53	0.52	0.59	0.60	0.59	0.60	0.61	0.61
		NBIL	0.58	0.59	0.59	0.63	0.64	0.63	0.69	0.72	0.71
612+00 - 706+00	Bituminous Concrete (Type M)	NBOL	0.51	0.53	0.52	0.57	0.59	0.58	0.64	0.66	0.65
		NBIL	0.58	0.59	0.59	0.64	0.66	0.65	0.69	0.71	0.70
706+00 - 659+00	6.0 Percent Trinidad Asphalt (Type M)	SBOL	0.42	0.46	0.45	0.53	0.54	0.54	0.61	0.62	0.62
		SBIL	0.53	0.56	0.54	0.64	0.65	0.64	0.68	0.70	0.69
659+00 - 612+00	6.5 Percent Trinidad Asphalt (Type M)	SBOL	0.50	0.52	0.51	0.55	0.55	0.55	0.59	0.62	0.60
		SBIL	0.58	0.63	0.60	0.60	0.64	0.62	0.71	0.71	0.71
612+00 - 514+00	Bituminous Concrete (Type M)	SBOL	0.51	0.55	0.53	0.55	0.55	0.55	0.61	0.62	0.61
		SBIL	0.58	0.62	0.60	0.61	0.64	0.63	0.70	0.72	0.71
514+00 - 450+00	Bituminous Concrete (Type C)	SBOL	--	--	--	0.58	0.59	0.58	0.64	0.66	0.65
		SBIL	--	--	--	0.63	0.63	0.63	0.69	0.71	0.70

TABLE 23
NAPOLEON SANDSTONE SURFACE (Project Mb 46061-04845A)

Mix No.	Blend No.	Station to Station	Lane	Coefficient of Wet Sliding Friction																	
				8-23-73			10-17-73			4-4-74			9-16-74			7-15-75			7-14-76		
				Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg
1	II	490+88 to 496+50	NB	0.34	0.38	0.36	0.28	0.34	0.30	0.55	0.59	0.57	0.39	0.42	0.40	0.41	0.45	0.43	0.46	0.50	0.48
2	II	486+50 to 490+88	NB	0.35	0.42	0.38	0.30	0.31	0.30	0.52	0.56	0.53	0.38	0.40	0.39	0.42	0.45	0.44	0.48	0.50	0.49
2	II	492+26 to 496+50	SB	0.50	0.55	0.53	0.37	0.41	0.38	0.58	0.59	0.59	0.42	0.46	0.44	0.44	0.45	0.44	0.46	0.49	0.48
3	II	484+20 to 492+26	SB	0.41	0.45	0.43	0.28	0.33	0.31	0.55	0.59	0.58	0.40	0.43	0.42	0.44	0.46	0.45	0.47	0.51	0.49
5	I	481+10 to 486+50	NB	0.30	0.32	0.31	0.26	0.31	0.29	0.48	0.48	0.48	0.42	0.43	0.42	0.41	0.46	0.43	0.50	0.50	0.50
6	I	476+50 to 481+10	NB	0.34	0.39	0.37	0.26	0.28	0.27	0.50	0.54	0.52	0.39	0.43	0.41	0.42	0.46	0.44	0.46	0.50	0.48
6	I	474+30 to 484+20	SB	0.40	0.42	0.41	0.22	0.26	0.25	0.54	0.56	0.55	0.38	0.41	0.39	0.40	0.44	0.43	0.43	0.45	0.44
7	III	466+50 to 476+50	NB	0.40	0.42	0.41	0.31	0.35	0.32	0.47	0.49	0.48	0.42	0.45	0.44	0.48	0.51	0.49	0.49	0.50	0.50
7	III	466+50 to 474+30	SB	0.37	0.40	0.39	0.25	0.29	0.27	0.51	0.54	0.53	0.39	0.42	0.41	0.46	0.48	0.47	0.48	0.50	0.49
9	IV	456+50 to 466+50	NB	0.45	0.47	0.46	0.31	0.35	0.33	0.49	0.50	0.50	0.43	0.45	0.44	0.48	0.48	0.48	0.46	0.49	0.48
9	IV	456+40 to 466+50	SB	0.46	0.52	0.49	0.32	0.36	0.34	0.54	0.58	0.57	0.43	0.46	0.44	0.49	0.50	0.50	0.49	0.53	0.51
10	V	446+50 to 456+50	NB	0.45	0.51	0.47	0.32	0.37	0.34	0.53	0.56	0.54	0.42	0.44	0.43	0.44	0.48	0.46	0.45	0.49	0.47
10	V	446+50 to 456+40	SB	0.48	0.51	0.49	0.29	0.34	0.32	0.56	0.59	0.58	0.44	0.46	0.45	0.46	0.48	0.47	0.48	0.53	0.51

TABLE 24
WHITE PINE SLAG
Research Project 72 NM-316

Test Date	Coefficient of Wsf		
	Low	High	Avg
10-2-73	0.47	0.58	0.53
9-25-74	0.61	0.71	0.65
7-9-75	0.47	0.66	0.57
9-24-75	0.47	0.59	0.54
10-20-76	0.55	0.65	0.59

TABLE 25
TEXTURED CONCRETE PAVEMENT SURFACES

Project No.	Location	Texture Method	Const. Year	Direction and Lane	Average Coefficient of Wet Sliding Friction						
					1970	1971	1972	1973	1974	1975	1976
13074-001	I 69 from north side of I 94 interchange northerly to 0.5 mile north of "N" Dr	Conventional Burlap	1970	Station 2232 to 2238							
				NBOL	0.61	0.51	0.47	0.35	0.30	0.43	0.43
				NBIL	0.65	0.63	0.61	0.52	0.46	0.65	0.65
		Longitudinal Brooming		Station 2242 to 2248							
				NBOL	0.69	0.56	0.49	0.33	0.32	0.43	0.42
				NBIL	0.72	0.68	0.65	0.52	0.47	0.66	0.64
		Transverse Combing		Station 2253 to 2259							
				NBOL	0.86	0.70	0.60	0.37	0.39	0.49	0.48
				NBIL	0.87	0.86	0.78	0.63	0.54	0.70	0.71
		Transverse Brooming		Station 2272 to 2278							
				NBOL	0.76	0.56	0.48	0.33	0.33	0.44	0.46
				NBIL	0.79	0.74	0.72	0.58	0.51	0.64	0.68
82021-04280A	I 94 from 435 ft east of Haggarty Rd easterly to 1,664 ft east of Ozga Rd	Transverse Brooming	1974	WBOL	--	--	--	--	--	--	0.38
				WBCL	--	--	--	--	--	--	0.43
				WBIL	--	--	--	--	--	--	0.54
82021-05127A	I 94 from 113 ft west of Morton-Taylor Rd easterly to 542 ft east of Haggarty Rd	Transverse Combing	1975	WBOL	--	--	--	--	--	--	0.44
				WBCL	--	--	--	--	--	--	0.48
				WBIL	--	--	--	--	--	--	0.58
64014-06436A	US 31 relocation from Muskegon Co. line (Skeels Rd) northwesterly to McKinley Rd	Transverse Combing	1975	NBOL	--	--	--	--	--	0.70	0.60
				NBIL	--	--	--	--	--	0.65	0.63
		Transverse Brooming		SBOL	--	--	--	--	--	0.64	0.59
				SBIL	--	--	--	--	--	0.66	0.58

TABLE 26
PAVEMENT GROOVING

Control Section	Location	Type of Grooving	Direction and Lane	Average Coefficient of Wet Sliding Friction					
				1974		1975		1976	
				Non-Grooved Control	Grooved Surface	Non-Grooved Control	Grooved Surface	Non-Grooved Control	Grooved Surface
02041	M 28 curve at Hickory St, City of Mnnising	Longitudinal[1]	EBOL	0.43	0.41	0.38	0.37	0.53	0.43
			EBIL	0.43	0.37	0.42	0.33	0.53	0.44
			WBOL	0.42	0.42	0.32	0.31	0.58	0.43
			WBIL	0.38	0.37	0.37	0.37	0.48	0.44
09042	Eastbound M 25 curve at Thomas St, Bay County	Longitudinal[1]	EBOL	0.38	0.36	0.37	0.42	0.46	0.52
			EBCL	0.42	0.45	0.44	0.38	0.57	0.50
50023	M 59 curve between Dequindre and Ryan Rd	Longitudinal[1]	EBOL	0.27	0.30	0.34	0.39	0.36	0.42
			EBIL	0.32	0.40	0.47	0.39	0.45	0.44
			WBOL	0.26	0.31	0.37	0.36	0.38	0.47
			WBIL	0.31	0.32	0.40	0.34	0.43	0.42
62031	M 37 from Jefferson St to River St, City of Newaygo	Longitudinal[1]	NBOL	0.35	0.36	0.34	0.36	0.40	0.39
			NBIL	0.35	0.34	0.33	0.34	0.35	0.41
			SBOL	0.36	0.33	0.31	0.38	0.38	0.40
			SBIL	0.37	0.35	0.33	0.36	0.38	0.39
			NBIL[2]	0.57	0.56	0.45	0.45	0.37	0.43
			SBIL[2]	0.55	0.52	0.51	0.50	0.36	0.41
11053	Northbound I 94 BL-US 23 from Pleasant St to Ship St, City of St. Joseph	Transverse[1]	NBOL	0.22	0.24	0.21	0.24	0.24	0.25
			NBIL	0.31	0.34	0.29	0.33	0.35	0.39
23012 and 33041	US 27 approaches to Waverly Rd, Eaton and Ingham Counties	Transverse[3]	NEBOL	0.33	0.35	0.38	0.36	0.38	0.33
			NEBIL	0.36	0.35	0.35	0.33	0.41	0.37
			SWBOL	0.34	0.36	0.37	0.33	0.37	0.33
			SWBIL	0.31	0.30	0.38	0.36	0.42	0.39
56023	Eastbound M 20 at Ashman St, City of Midland	Transverse[4]	EBOL	0.38	0.35	0.35	0.32	0.43	0.42
			EBCL	0.40	0.37	0.33	0.32	0.40	0.39
			EBIL	0.39	0.36	0.35	0.33	0.40	0.41
56023	Eastbound M 20 at Rodd St, City of Midland	Transverse[4]	EBOL	0.33	0.40	0.32	0.33	0.41	0.42
			EBCL	0.37	0.38	0.31	0.34	0.40	0.40
			EBIL	0.36	0.36	0.32	0.32	0.42	0.41
56023	Eastbound M 20 at Cronkwright, City of Midland	Transverse[4]	EBOL	0.37	0.38	0.33	0.34	0.40	0.42
			EBCL	0.40	0.39	0.34	0.34	0.39	0.41
			EBIL	0.36	0.40	0.36	0.39	0.42	0.44
76021	Temporary Eastbound I 69 at M 52	Transverse[5]	EBOL	0.37	0.38	0.29	0.27	0.38	0.38
			EBIL	0.39	0.38	0.36	0.29	0.43	0.38
81081	M 17 at Golfside, City of Ypsilanti	Transverse[6]	EBOL	0.32	0.38	0.29	0.35	0.34	0.37
			EBIL	0.37	0.39	0.36	0.37	0.34	0.38
			WBOL	0.34	0.42	0.30	0.41	0.34	0.41
			WBIL	0.29	0.37	0.29	0.37	0.34	0.37
81081	M 17 at Hewitt St, City of Ypsilanti	Transverse[6]	EBOL	0.38	0.45	0.29	0.34	0.36	0.37
			EBIL	0.36	0.41	0.30	0.35	0.35	0.38
			WBOL	0.38	0.44	0.31	0.39	0.38	0.41
			WBIL	0.38	0.43	0.33	0.39	0.36	0.41
81081	M 17 at Mansfield, City of Ypsilanti	Transverse[6]	EBOL	0.34	0.40	0.25	0.33	0.31	0.36
			EBIL	0.37	0.40	0.26	0.35	0.35	0.39
			WBOL	0.41	0.43	0.32	0.38	0.36	0.40
			WBIL	0.42	0.45	0.32	0.36	0.39	0.42
81081	M 17 at Oakwood, City of Ypsilanti	Transverse[6]	EBOL	0.34	0.47	0.35	0.41	0.38	0.42
			EBIL	0.46	0.46	0.35	0.40	0.40	0.42
			WBOL	0.36	0.44	0.30	0.39	0.35	0.39
			WBIL	0.35	0.40	0.31	0.35	0.34	0.37
81081	Eastbound M 17 at Summit St, City of Ypsilanti	Transverse[6]	EBOL	0.35	0.35	0.32	0.31	0.34	0.37
			EBCL	0.32	0.35	0.28	0.29	0.33	0.35
			EBIL	0.30	0.33	0.31	0.33	0.36	0.37

[1] 0.095 in. wide, 3/16 in. deep, center to center spacing 3/4 in.
[2] Bituminous surface.
[3] 0.095 in. wide, 3/16 in. deep, center to center spacing 1-1/2 in.
[4] 0.095 in. wide, 3/16 in. deep, center to center spacing 1 in.
[5] 0.095 in. wide, 3/16 in. deep, center to center spacing 1-1/4 in.
[6] 1/8 in. wide, 3/16 in. deep, center to center spacing 3/4 in.

TABLE 27
OPEN GRADED ASPHALT FRICTION COURSES

Project No.	Location	Const. Year	Direction and Lane	Coefficient of Wet Sliding Friction			
				1973	1974	1975	1976
73062-05917	M 46 from C&O RR east to Williams St	1973	EBOL	0.52	0.55[2]	0.48	0.50
			EBIL	--	--	--	0.50
			WBOL	0.51	0.56[2]	0.46	0.48
			WBIL	--	--	--	0.51
	M 46 from Elm St east to C&O RR	1973	EBOL[1]	0.52	0.50[2]	0.45	0.47
			EBIL[1]	--	--	--	0.47
			WBOL[1]	0.51	0.49[2]	0.41	0.46
			WBIL[1]	--	--	--	0.48
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
			NBIL	--	--	0.46	0.62
			SBOL	--	--	0.51	0.63
			SBIL	--	--	0.47	0.61
Control Section 09042	M 25 from Heavenridge to Sheurman St in Bay City	1975	EBOL	--	--	0.41	0.21
			EBIL	--	--	0.42	0.25
			WBOL	--	--	0.45	0.21
			WBIL	--	--	0.42	0.20
58052-07575 58071-07117 (part)	US 24 from Plumb Creek south to Dunbar Rd	1975	NB	--	--	0.53	0.53
			NBLT	--	--	--	0.63
			SB	--	--	0.55	0.50
			SBLT	--	--	0.54	0.63
58071-07117 (part)	M 125, north of Plumb Creek	1975	NBOL	--	--	0.56	0.53
			NBIL	--	--	0.54	0.51
			SBOL	--	--	0.49	0.53
			SBIL	--	--	0.54	0.52
58071-07117 (part)	M 125 at Dunbar Rd	1975	NBLT	--	--	--	0.62
			NB	--	--	0.55	0.44
			NBRT	--	--	0.56	--
			SBLT	--	--	0.54	0.63
			SB	--	--	0.54	0.51
			SBRT	--	--	0.54	0.54
Control Section 44012	M 24, north of M 21	1975	NBOL	--	--	0.49	--
			NBIL	--	--	0.54	--
			SBOL	--	--	0.51	--
			SBIL	--	--	0.53	--
98058-08773 (Control Section 50011)	M 53 from Red Run Drain north to 14 Mile Rd, City of Warren	1975	NBOL	--	--	0.41[2]	0.47
			NBCL	--	--	0.42[2]	0.51
			NBIL	--	--	0.43[2]	0.49
			SBOL	--	--	0.38[2]	0.49
			SBCL	--	--	0.41[2]	0.46
			SBIL	--	--	0.42[2]	0.45

[1]Bituminous concrete control section.
[2]Average of two test series.

SECTION V

HIGH-ACCIDENT LOCATIONS

High-Accident Locations

This section reports the Department's continuing program to reduce skidding accidents on wet pavement at critical locations. High-Accident Locations are skid tested to indicate priorities for resurfacing. In some cases, these locations are used for testing experimental skid-resistant surfacing mixtures.

Selection of high-accident locations for this year was made by the Traffic and Safety Division and are based on 1975 accident data. Skid tests yielded average Wsf values below 0.40 at 37.2 percent of the 121 lanes tested in 1976. The US 31-US 33 south approach to the St. Joseph River in Berrien Springs yielded the lowest friction level with Wsf values averaging 0.20.

During 1976, skid tests were conducted on 14 major highway routes. Testing was dispersed throughout six districts, nine counties, and 24 separate locations. Table 28 summarizes the high-accident skid tests.

TABLE 28
HIGH ACCIDENT LOCATION SUMMARY

	Control Section	Location and Mileage	1975 Accidents Total	1975 Accidents % Wet Surface	Lane Tested	Surface Type	Coefficient of wsf Low	Coefficient of wsf High	Coefficient of wsf Avg
DISTRICT 1		Marquette County							
	52042	US 41 from 0.93 to 1.03 Main St (0.93), Chocolay Township	10	50	NBOL	Concrete	0.36	0.40	0.39
					NBIL		0.38	0.39	0.39
					SBOL		0.52	0.55	0.53
					SBIL		0.58	0.62	0.60
	52042	US 41 from 6.04 to 6.22 at Marquette Mall and approaches to signal, Marquette Township US 41 BR, Washington (6.09)	14	64	EB	Concrete	0.39	0.40	0.40
					WBOL		0.41	0.42	0.42
					WBIL		0.37	0.40	0.39
	52042	US 41 from 6.25 to 6.45 at Marquette Mall, Marquette Township	24	38	EBOL	Concrete	0.41	0.43	0.42
					EBIL		0.39	0.43	0.41
					WBOL	Bituminous	0.43	0.44	0.44
					WBIL		0.46	0.52	0.50
	52042	US 41 from 15.38 to 15.58, Baldwin Ave (15.40), City of Negaunee	12	50	EBOL	Bituminous	0.44	0.48	0.47
					EBIL		0.47	0.50	0.49
					WBOL		0.42	0.44	0.43
					WBIL		0.46	0.49	0.48
	52044	US 41 BR from 0.22 to 0.42, Westwood Rd (0.41), City of Marquette	19	42	EBOL	Bituminous	0.56	0.56	0.56
					EBIL		0.53	0.57	0.54
					WBOL		0.53	0.56	0.55
					WBIL		0.54	0.56	0.55
	52044	US 41 BR, from 0.43 to 0.60, Street S (0.58), City of Marquette	31	39	EBOL	Bituminous	0.54	0.56	0.55
					EBIL		0.53	0.56	0.55
					WBOL		0.54	0.54	0.54
					WBIL		0.54	0.55	0.54
DISTRICT 2		Luce County							
	48032	M 123 from 4.60 to 4.90, Harrie to Avenue "C", City of Newberry	16	62	NBOL	Bituminous	0.48	0.53	0.50
					NBIL		0.34	0.35	0.34
					SBOL		0.48	0.53	0.51
					SBIL		0.34	0.35	0.35
		Mackinac County							
	86000	Mackinac Bridge from 4.02 to 4.22, approaches to toll booths	12	42	NBOL	Concrete	0.55	0.57	0.56
					NBCL		0.40	0.43	0.42
					NBIL		0.50	0.51	0.51
					SBOL		0.49	0.51	0.50
					SBCL		0.37	0.41	0.39
					SBIL		0.47	0.53	0.51
DISTRICT 5		Kent County							
	41063	M 11 from 0.00 to 0.20 at Division (0.00), City of Grand Rapids	53	40	EBOL	Bituminous	0.41	0.43	0.42
					EBIL		0.42	0.46	0.44
					WBOL		0.37	0.40	0.39
					WBIL		0.37	0.40	0.39
	41063	M 11 from 0.25 to 0.45 at Jefferson (0.28), City of Grand Rapids	24	37	EBOL	Bituminous	0.38	0.40	0.39
					EBIL		0.39	0.44	0.42
					WBOL		0.35	0.39	0.37
					WBIL		0.41	0.46	0.44
	41063	M 11 from 0.46 to 0.64, from Madison (0.46) to Union (0.61), City of Grand Rapids	35	46	EBOL	Bituminous	0.38	0.38	0.38
					EBIL		0.38	0.42	0.40
					WBOL		0.38	0.42	0.40
					WBIL		0.42	0.43	0.42

TABLE 28 (Cont.)
HIGH ACCIDENT LOCATION SUMMARY

	Control Section	Location and Mileage	1975 Accidents Total	1975 Accidents % Wet Surface	Lane Tested	Surface Type	Coefficient of wsf Low	Coefficient of wsf High	Coefficient of wsf Avg
DISTRICT 5 CONT.	41063	M 11 from 0.70 to 0.90, over Plaster Creek (0.76), City of Grand Rapids	31	52	EBOL	Bituminous	0.37	0.38	0.37
					EBIL		0.42	0.44	0.43
					WBOL		0.38	0.40	0.39
					WBIL		0.41	0.43	0.42
	Ottawa County								
	70014	US 31 from 6.41 to 6.61, from Pennoyer (6.42) to Columbus (6.60), City of Grand Haven	30	50	NBOL	Concrete	0.31	0.33	0.32
					NBIL		0.34	0.36	0.35
					SBOL		0.32	0.33	0.32
					SBIL		0.33	0.35	0.34
	70014	US 31 from 6.87 to 7.00, from Jackson (6.92) to Monroe (6.99), City of Grand Haven	46	33	NBOL	Bituminous	0.36	0.37	0.36
					NBCL		0.34	0.36	0.35
					NBIL		0.33	0.36	0.35
					SBRT		0.43	0.47	0.46
					SBOL		0.38	0.42	0.40
					SBIL		0.41	0.46	0.43
DISTRICT 7	Berrion County								
	11052	US 31-US 33 from 9.20 to 9.60, St. Joseph River (B02 of 11052) at 9.48. Tested bridge, both approaches and both curves immediately south of bridge. Berrien Township and City of Berrien Springs	29	45	B02 of 11052				
					NB	Bituminous	0.37	0.40	0.39
					SB		0.35	0.36	0.36
					North Bridge Approach				
					SB	Bituminous	0.37	0.39	0.38
					Curve and South Bridge Approach				
					NB	Bituminous	0.20	0.24	0.22
					SB		0.16	0.21	0.18
					Curve at Dean Hill Rd, 0.2 mile South of Bridge				
					NB		0.28	0.33	0.31
					SB		0.29	0.33	0.30
DISTRICT 8	Ingham County								
	33061	M 43 from 1.91 to 2.11, from Princeton (1.92) to south Sycamore (2.11), City of Lansing	28	36	EBOL	Bituminous	0.40	0.41	0.41
					EB#3		0.39	0.42	0.41
					EB#2		0.42	0.46	0.44
					EBIL		0.40	0.41	0.40
					WBOL	Concrete	0.46	0.49	0.48
					WBCL		0.43	0.48	0.45
					WBIL		0.46	0.47	0.47
METRO DISTRICT	Oakland County								
	63041	M 59 from 15.52 to 15.69, Crescent Lake Rd (15.65), Waterford Township	47	49	EBOL	Concrete	0.39	0.41	0.40
					EBIL		0.42	0.44	0.43
					WBOL		0.40	0.42	0.41
					WBIL		0.42	0.43	0.42
					EBIL	Bituminous	0.43	0.46	0.44
					WBIL		0.38	0.43	0.41
	63053	US 10 from 5.57 to 5.77, Silver Lake Rd (5.64), Waterford Township	33	35	NBRT	Concrete	0.47	0.50	0.48
					NBRT	Bituminous	0.38	0.42	0.40
					NBOL		0.32	0.38	0.35
					NBIL		0.40	0.42	0.41
					SBOL		0.39	0.40	0.40
					SBIL		0.39	0.42	0.40

TABLE 28 (Cont.)
HIGH ACCIDENT LOCATION SUMMARY

METRO DISTRICT CONT.

Control Section	Location and Mileage	1975 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
Wayne County								
82052	US 24 from 4.95 to 5.14, Northline (5.11), City of Northline	53	38	NBOL	Bituminous	0.38	0.41	0.39
				NBCL		0.38	0.43	0.41
				NBIL		0.40	0.45	0.42
				SBOL	Concrete	0.39	0.40	0.40
				SBCL		0.38	0.40	0.39
				SBIL		0.39	0.43	0.41
				NBOL	Bituminous [1]	0.53	0.58	0.56
				NBCL		0.54	0.60	0.58
				NBIL		0.58	0.64	0.61
				SBOL	Concrete [1]	0.49	0.54	0.52
				SBCL		0.59	0.60	0.59
				SBIL		0.55	0.58	0.57
82052	US 24 from 6.91 to 7.11, Wisk Rd (7.12), City of Taylor	35	37	NBOL	Bituminous	0.36	0.41	0.38
				NBCL		0.41	0.42	0.42
				NBIL		0.42	0.42	0.42
				SBOL	Concrete	0.38	0.41	0.40
				SBCL		0.40	0.41	0.41
				SBIL		0.37	0.39	0.38
82072	M 3 from 3.70 to 3.90, M 53 (3.86), City of Detroit	60	37	EBOL	Bituminous	0.43	0.48	0.45
				EBCL		0.41	0.42	0.42
				EBIL		0.28	0.32	0.31
				WBOL		0.42	0.48	0.45
				WBCL		0.40	0.42	0.41
				WBIL		0.34	0.35	0.34
82101	M 14 from 8.70 to 8.90, from Laurel Lane (8.71) to Starks (8.80), City of Livonia	55	40	EBOL	Bituminous	0.37	0.39	0.38
				EBIL		0.35	0.40	0.38
				WBOL		0.37	0.39	0.38
				WBIL		0.35	0.38	0.37
82121	BS 96 from 7.16 to 7.34, from Whitcomb (7.17) to North Coyle (7.34), City of Detroit	36	39	EBOL	Bituminous	0.38	0.39	0.38
				EBIL		0.40	0.41	0.40
				WBOL		0.38	0.40	0.39
				WBIL		0.37	0.38	0.37
82121	BS 96 from 13.07 to 13.27, North Lorraine (13.19), City of Detroit	59	44	EBOL	Bituminous	0.37	0.39	0.38
				EBIL		0.37	0.41	0.39
				WBOL		0.36	0.40	0.38
				WBIL		0.38	0.40	0.39

[1] Surface given a "Rotomill" treatment.

SECTION VI

SPECIAL REQUEST TESTS

Special Request Tests

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

OFFICE MEMORANDUM

DATE: July 12, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on US-41 - M-26 at the Houghton-Hancock Bridge
Research Project 54 G-74, 76 SR-1

In accord with your February 26, 1976 request, skid tests have been conducted on US-41 - M-26 at the Houghton-Hancock bridge and its approaches. Friction levels, as determined May 26, 1976 on the bituminous roadway ranged from 0.43 to 0.51 and averaged 0.40; the concrete values ranged from 0.24 to 0.41 and averaged 0.31. The 1976 wsf values are, in most cases, lower than the values determined in this same area in 1969. Attached is a summary of both test series and a diagram denoting test location.

TESTING AND RESEARCH DIVISION

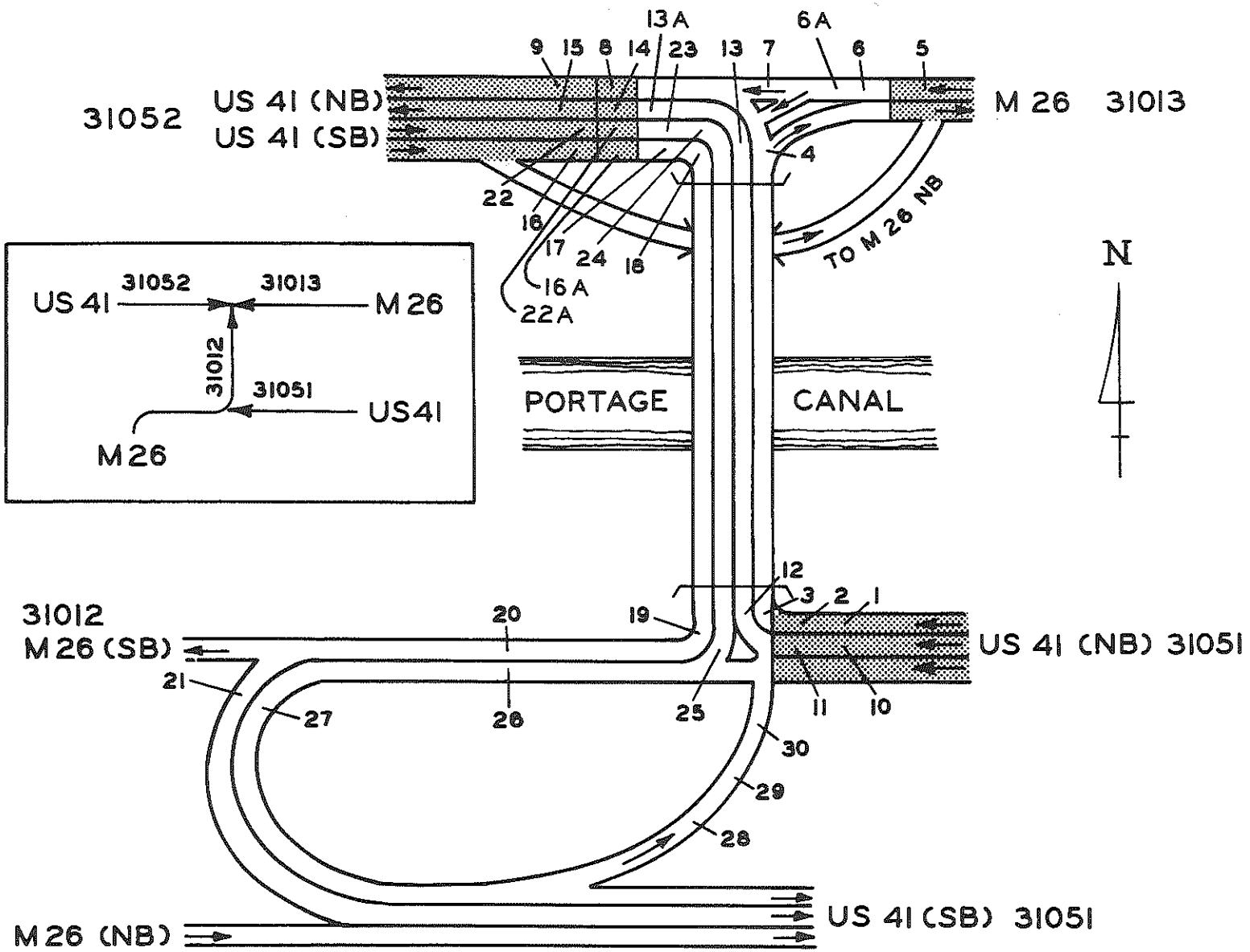
L. Kay T. Oehler
Engineer of Research

LTO:PMS:cgc
Attachments

cc: K. A. Allemeier
E. L. Martin

Location Number	Surface Type	Coefficient of wsf 1969	1976	Location Number	Surface Type	Coefficient of wsf 1969	1976
1	Bit	0.53	0.44	16	Bit	0.55	0.44
2	Bit	0.53	0.46	16a	Bit	----	0.46
3	Conc	0.37	0.24	17	Conc	0.42	----
4	Conc	0.40	0.30	18	Conc	0.42	0.28
5	Bit	0.55	----	19	Conc	0.41	0.25
6	Conc	0.47	0.41	20	Conc	0.45	0.30
6a	Conc	----	0.36	21	Conc	0.39	0.27
7	Conc	0.42	0.36	22	Bit	0.47	0.48
8	Bit	0.50	*	22a	Bit	----	0.51
9	Bit	0.55	*	23	Conc	0.33	----
10	Bit	0.55	0.47	24	Conc	0.38	0.33
11	Bit	0.55	0.44	25	Conc	0.42	0.29
12	Conc	0.44	0.29	26	Conc	0.47	0.32
13	Conc	0.41	0.27	27	Conc	0.38	0.26
13a	Conc	----	0.32	28	Conc	0.43	0.36
14	Bit	0.55	----	29	Conc	0.41	0.31
15	Bit	0.40	0.43	30	Conc	0.48	0.37

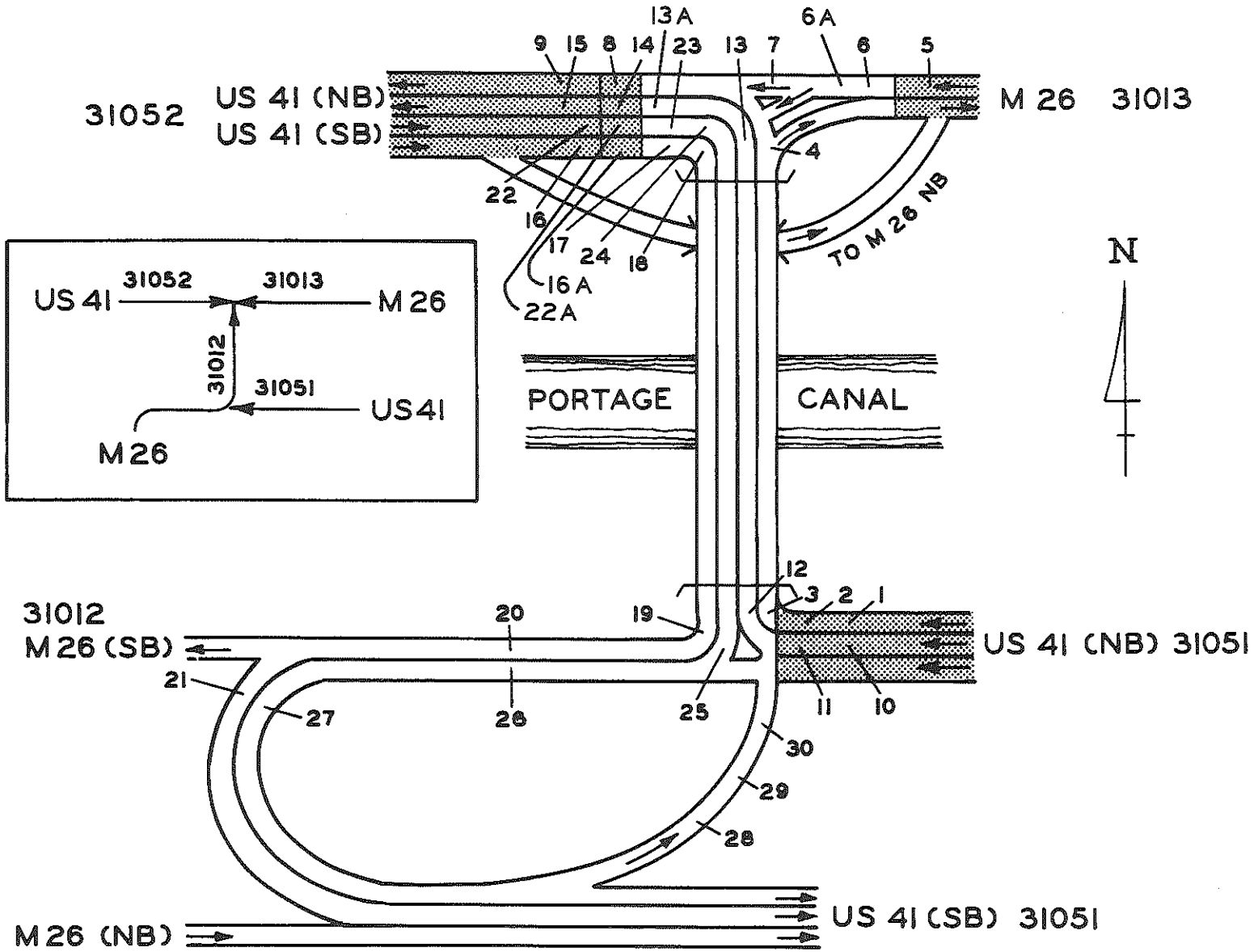
(*) Not tested because roadway was contaminated with gravel.



US 41 - M 26 AT HOUGHTON-HANCOCK BRIDGE
AND ITS APPROACHES IN THE CITIES OF HOUGHTON AND HANCOCK
(Control Sections 31012, 31013, 31051 and 31052)

Location Number	Surface Type	Coefficient of wsf 1969	1976	Location Number	Surface Type	Coefficient of wsf 1969	1976
1	Bit	0.53	0.44	16	Bit	0.55	0.44
2	Bit	0.53	0.46	16a	Bit	----	0.46
3	Conc	0.37	0.24	17	Conc	0.42	----
4	Conc	0.40	0.30	18	Conc	0.42	0.28
5	Bit	0.55	----	19	Conc	0.41	0.25
6	Conc	0.47	0.41	20	Conc	0.45	0.30
6a	Conc	----	0.36	21	Conc	0.39	0.27
7	Conc	0.42	0.36	22	Bit	0.47	0.48
8	Bit	0.50	*	22a	Bit	----	0.51
9	Bit	0.55	*	23	Conc	0.33	----
10	Bit	0.55	0.47	24	Conc	0.38	0.33
11	Bit	0.55	0.44	25	Conc	0.42	0.29
12	Conc	0.44	0.29	26	Conc	0.47	0.32
13	Conc	0.41	0.27	27	Conc	0.38	0.26
13a	Conc	----	0.32	28	Conc	0.43	0.36
14	Bit	0.55	----	29	Conc	0.41	0.31
15	Bit	0.40	0.43	30	Conc	0.48	0.37

(*) Not tested because roadway was contaminated with gravel.



US 41 - M 26 AT HOUGHTON-HANCOCK BRIDGE
AND ITS APPROACHES IN THE CITIES OF HOUGHTON AND HANCOCK
(Control Sections 31012, 31013, 31051 and 31052)

OFFICE MEMORANDUM

DATE: June 2, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at Various Locations in Districts 1, 5, 7, 8 and Metro.
Research Project 54 G-74, 76 SR-2

Skid tests have been conducted at the seven locations you specified in your February 26, 1976 written request. Test results are tabulated on the attachment for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research
Research Laboratory Section

LTO:PMS:nag

cc: K. A. Allemeier

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf Low	High	Avg.
I-96 from 1/2 mile west of to 1/2 mile east of the Kent Lake Road Structure, Control Section 63022. Kent Lake Rd. Structure (S01 of 63022) is located between mile post 0.45 and 0.50.	West of Kent Lake Road Structure					
	4-13-76	Conc	EBOL	0.40	0.41	0.41
			EBCL	0.40	0.44	0.42
			EBIL	0.50	0.54	0.52
			WBOL	0.45	0.47	0.46
			WBCL	0.43	0.44	0.44
			WBIL	0.47	0.49	0.48
	East of Kent Lake Road Structure					
	4-13-76	Conc	EBOL	0.44	0.46	0.45
			EBCL	0.42	0.45	0.44
			EBIL	0.54	0.56	0.55
			WBOL	0.44	0.44	0.44
			WBCL	0.46	0.46	0.46
			WBIL	0.48	0.50	0.49
Also tested the ponding area located at Dip in eastbound I-96 roadway, just beyond the east end of the Kent Lake Road Structure			EBOL	----	----	0.43
			EBCL	----	----	0.41
			EBIL	----	----	0.53
US-24 (Telegraph) at Goddard Rd., tested 600 feet of each trunkline approach and tested the roadway in both directions at the crossovers north and south of Goddard Road, Control Section 82052, milepost 6.01 to 6.24, City of Taylor	At Crossover South of Goddard Road					
	4-13-76	Bit	NBOL	0.41	0.42	0.42
			NBCL	0.41	0.43	0.42
			NBIL	0.45	0.46	0.46
		Conc	SBOL	0.36	0.37	0.37
			SBCL	0.35	0.36	0.36
			SBIL	0.38	0.38	0.38
	Approaching Light at Goddard Road					
	4-13-76	Bit	NBOL	0.38	0.39	0.39
			NBCL	0.36	0.37	0.37
			NBIL	0.39	0.42	0.41
		Conc	SBOL	0.35	0.37	0.36
			SBCL	0.34	0.37	0.36
			SBIL	0.36	0.38	0.37
	At Crossover North of Goddard Road					
	4-13-76	Bit	NBOL	0.35	0.39	0.37
			NBCL	0.38	0.41	0.40
			NBIL	0.42	0.44	0.43
		Conc	SBOL	0.36	0.37	0.37
			SBCL	0.35	0.39	0.37
			SBIL	0.37	0.39	0.38

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf Low	High	Avg.
US-41 at the curve near Agent St., south side of Calumet, Control Section 31052, tested between milepost 11.90 and 12.15	5-26-76	Conc	NB	0.39	0.41	0.40
			SB	0.38	0.39	0.39
Temp. I-69 (Old M-78) at Marsh Road, tested 1,000 feet on each trunkline approach; Control Section 19041, milepost 0.44	4-6-76	Conc	EBOL	0.39	0.41	0.40
			EBIL	0.45	0.47	0.46
		Bit	WBOL	0.43	0.48	0.45
			WBIL	0.51	0.55	0.53
Temp. I-69 (Old M-78) at Lake Lansing Road, tested 1,000 feet on each trunkline approach, Control Section 33043, milepost 3.51	4-6-76	Conc	EBOL	0.40	0.43	0.42
			EBIL	0.52	0.53	0.53
			WBOL	0.43	0.45	0.44
			WBIL	0.50	0.55	0.53
BL-94 at Washington Street, tested 400 feet on each trunkline approach; Control Section 13121, Milepost 7.38, City of Battle Creek	4-9-76	Bit	EBOL	0.36	0.39	0.38
			EBIL	0.30	0.33	0.32
			WBOL	0.23	0.26	0.25
			WBIL	0.24	0.27	0.26
BL-94 (Stadium Road) at Vanda Giessen Road-Howard Street, tested 400 feet on each trunkline approach; Control Section 39041, milepost 2.30, City of Kalamazoo	4-9-76	Conc	EBOL	0.33	0.34	0.34
		Bit	EBIL	0.41	0.44	0.43
		Conc	WBOL	0.34	0.35	0.35
		Bit	WBIL	0.37	0.41	0.39

OFFICE MEMORANDUM

DATE: July 16, 1976

TO: Donald E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Skid Tests on Posted "Slippery When Wet" locations.
Research Project 54 G-74, 76 SR-3

In accord with your March 11, 1976 request, skid tests have been conducted at the posted "slippery when wet" locations you specified. In all, 37 locations were tested during the time period from May 25 to June 29. A wide range of friction levels were encountered, i.e. 0.15 to 0.74. Test results have been arranged in District order and are attached for your review.

TESTING AND RESEARCH DIVISION

Engineer of Research
Research Laboratory Section

LTO:PMSmag

Attachment

cc: E. L. Martin
P. A. Michelin
B. A. Conradson
F. I. Eggan
M. L. Jones
E. H. Miller
P. J. Riley

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
				Low	High	Avg
DISTRICT 1						
M 95 at Hanna Mining Co. RR Spur (X01), Control Section 22012, milepost 8.46	5-25-76	Bit	NB	0.67	0.68	0.68
			SB	0.65	0.68	0.66
US 41 from Carp River Hill Road northwesterly to Jackson St., Control Section 52042, milepost 2.89 to 4.13, City of Marquette	5-26-76	Conc.	NBOL	0.35	0.46	0.41
			NBIL	0.35	0.41	0.37
			SBOL	0.41	0.53	0.48
			SBIL	0.37	0.43	0.40
M 35 over the Middle Branch of the Escanaba River, Control Section 52032, milepost 3.24, Village of Guinn.	5-27-76	Conc.	NB	0.41	0.44	0.42
			SB	0.39	0.44	0.42
US 41 - M 28 (By Pass) at US 41 - M 28 BR (Front Street), Control Section 52042, City of Marquette. Tested 5 areas posted "Slippery when wet".						
1. West of Junction	5-26-76	Conc.	WBOL	0.40	0.40	0.40
			WBIL	0.45	0.48	0.46
2. West of Grove Street	5-26-76	Conc.	WBOL	0.38	0.41	0.39
			WBIL	0.47	0.49	0.48
3. East from West end of by pass	5-26-76	Conc.	EBOL	0.38	0.41	0.39
			EBIL	0.38	0.41	0.40
4. East of Grove Street	5-26-76	Conc.	EBOL	0.41	0.42	0.41
			EBIL	0.41	0.47	0.45
5. South of Junction	5-26-76	Conc.	SBOL	0.39	0.40	0.39
			SBIL	0.38	0.40	0.39
US 45 from the south village limits of Rockland northerly to the south city limits of Ontonagon, Control Section 66033, milepost 1.77 to 12.50 Tested 4 locations.						
1. South of Rockland	5-25-76	Bit	NB	0.68	0.74	0.71
			SB	0.67	0.69	0.68

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
				Low	High	Avg.
2. North of R. R.	5-25-76	Bit	NB	0.66	0.70	0.68
			SB	0.68	0.72	0.70
3. South of Woodspur	5-25-76	Bit	NB	0.72	0.74	0.73
			SB	0.68	0.71	0.69
4. South of Ontonagon	5-25-76	Bit	NB	0.60	0.65	0.63
			SB	0.60	0.61	0.61

DISTRICT 2

M 123 from 0.2 mile northeast of County Rd. #500 Southerly to 0.6 mile south of Camp #7 Rd. Control Section 48034, milepost 5.96 to 7.42. Tested 3 areas

1. Seal Coat patch near Camp #7 Rd.	5-27-76	Bit	NB	0.16	0.23	0.20
			SB	0.15	0.23	0.18
2. Seal Coat patch near entrance to Tahquamenon Falls.	5-27-76	Bit	NB	0.18	0.25	0.20
			SB	0.15	0.23	0.19
3. North of Tahquamenon Falls entrance.	5-27-76	Bit	NB	0.30	0.38	0.35
			SB	0.30	0.33	0.32

M 123 from Milepost 0.68 to 3.38, Control Section 48034. Reference Points: Big Falls Road (milepost 1.43) Red Water Creek (milepost 2.40) and Callum Creek (milepost 3.10) Four locations were tested.

1. @ Callum Creek	5-27-76	Bit	NB	0.47	0.53	0.51
			SB	0.37	0.42	0.40
2. West of Red Water Creek	5-27-76	Bit	NB	0.47	0.54	0.50
			SB	0.37	0.43	0.40
3. West of Falls Road	5-27-76	Bit	NB	0.45	0.47	0.46
			SB	0.39	0.41	0.40
4. East of Falls Road	5-27-76	Bit	NB	0.26	0.33	0.30
			SB	0.33	0.39	0.36

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
				Low	High	Avg.
DISTRICT 3						
US 31 SB (Petoskey Ave.) at the trunkline turn from Petoskey Ave. to Michigan Ave., Control Section 15012, milepost 0.63 to 0.89, City of Charlevoix.	6-17-76	Bit	NBOL	0.33	0.33	0.33
			NBIL	0.28	0.31	0.30
			SBOL	0.32	0.35	0.34
			SBIL	0.31	0.32	0.31
M 37 at approaches to the C & O RR Bridge, Control Section 28051, milepost 11.41			APPROACHES TO BRIDGE			
	6-17-76	Bit	NB	0.32	0.33	0.33
			SB	0.34	0.34	0.34
			TESTS ON BRIDGE DECK			
	6-17-76	Conc.	NB	--	--	0.31
			SB	--	--	0.29
DISTRICT 4						
M 65 from the north junction of M 72 in Alcona County Southerly to the AuSable River in Iosco County, Control Sections 01011, 01022 and 35012			Control Section 01011			
	6-28-76	Bit	NB	0.61	0.68	0.66
			SB	0.64	0.67	0.66
			Control Section 01022			
	6-28-76	Bit	NB	0.63	0.68	0.66
			SB	0.67	0.69	0.68
			Control Section 35012			
	6-28-76	Bit	NB	0.62	0.67	0.65
			SB	0.61	0.64	0.63
US 23 from M 72 in Harrisville northerly to Alpena County Line, Control Section 01052	6-28-76	Bit	NB	0.53	0.67	0.61
			SB	0.56	0.68	0.61
I 75 Southbound at the curve North of Vanderbilt, Control Section 69014	6-29-76	Bit	SBOL	0.57	0.64	0.60
			SBIL	0.71	0.74	0.72

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
				Low	High	Avg.
M 33 from Greenwood Road Northerly to M 55, Control Section 65051, milepost 1.00 to 7.95. Tested 2 locations.						
1. Greenwood Rd. N to Rifle River (Constructed in 1975)	6-28-76	Bit	NB	0.49	0.58	0.55
			SB	0.52	0.60	0.56
2. Rifle River N to M 55 (Constructed in 1972)	6-28-76	Bit	NB	0.58	0.59	0.59
			SB	0.54	0.55	0.55
M 18 (formerly M 144) from old M 76 in Roscommon Easterly 6.36 miles, Control Section 72041	6-29-76	Bit	NB	0.51	0.61	0.55
			SB	0.53	0.61	0.56
M 18 from Knappen's Creek N to M 55, Control Section 72051, Milepost 7.40 to 10.24	6-28-76	Bit	NB	0.60	0.63	0.61
			SB	0.56	0.59	0.57
M 18 from M 55 N to M 157, Control Section 72052, milepost 0.00 to 2.01	6-28-76	Bit	NB	0.52	0.54	0.53
			SB	0.55	0.60	0.57
DISTRICT 7						
M 86 from E Village Limits of Centerville E to M 66, Control Section 78061, milepost 7.32 to 12.70. Tested 4 locations.						
1. W of M 66	6-4-76	New Bit	EB	0.69	0.71	0.70
			WB	0.65	0.70	0.68
2. E of Nottawa	6-4-76	Old Bit	EB	0.60	0.61	0.61
			WB	0.60	0.65	0.62
3. 0.5 mile W of Nottawa	6-4-76	Old Bit	EB	0.60	0.65	0.63
		Bit edge patch	WB	0.42	0.48	0.45
4. E of River	6-4-76	Bit	EB	0.61	0.65	0.63
			WB	0.68	0.72	0.70

Location	Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
				Low	High	Avg.
DISTRICT M						
US 10 SB (Dixie Highway) in the area of Independence Road., Control Section 63053, milepost 0.84	6-9-76	Bit	SBOL	0.44	0.46	0.45
			SBIL	0.48	0.50	0.49

OFFICE MEMORANDUM

DATE: April 23, 1976

TO: P. Milliman, Supervising Engineer
Physical Research Unit

FROM: F. Copple

SUBJECT: Stopping Area Skid Tests on US-27-Temp. I-69 (C.S. 23012) at Canal Road, Research Project 54 G-74, 76 SR-4

In response to your verbal request, skid tests have been conducted on US-27 - Temp. I-69 at the signalized intersection with Canal Road near the State Secondary Complex. Friction levels, measured April 6, 1976 at 56°F ambient temperature, ranged from 0.29 to 0.37 and averaged 0.34. Following is a summary of skid test values.

Test Lane	Surface Type	Route	Coefficient of wsf Low	High	Avg.
NBOL	Concrete	US-27-Temp. I-69	0.29	0.32	0.30
NBIL	"	"	0.33	0.35	0.34
SBOL	"	"	0.33	0.37	0.35
SBIL	"	"	0.33	0.36	0.35

TESTING AND RESEARCH DIVISION

F. Copple

F. Copple - Group Supervisor
Pavement Performance Group

FC:PTL:cgc

cc: L. T. Oehler

OFFICE MEMORANDUM

DATE: April 20, 1976

TO: M. E. Witteveen
Engineer of Testing

FROM: L. T. Oehler

SUBJECT: Skid Tests on EB I 94 Shoulders E of US 24
Research Project 54 G-74, 76 SR-5

In response to a request dated August 8, 1974, initial skid tests were conducted on the "wet bottom slag" bituminous shoulders constructed on I 94 east of Telegraph Rd. and reported in our September 5, 1974 memorandum (74 SR-19) to Mr. P. J. Serafin. A second series of skid tests made on April 15, 1976 are 18% lower than initial levels and range from 0.45 to 0.50, averaging 0.46. Unless requested, no further skid tests are planned for this surface.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PL:nag

OFFICE MEMORANDUM

DATE: June 23, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-46 at Wheeler Street, City of Saginaw, Research Project 54 G-74, 76 SR-6

In accord with your May 5, 1976 request, skid tests have been conducted on M-46 at Wheeler Street in the City of Saginaw. A tight band of friction levels were determined during June 10, 1976 tests. Coefficients ranged from 0.30 to 0.35 and averaged 0.34. For your review, a breakdown of wsf values are shown below.

Lane	40 mph Coefficient of WSF		
	Low	High	Avg.
EBOL	0.32	0.34	0.33
EBIL	0.33	0.35	0.34
WBOL	0.30	0.33	0.32
WBIL	0.35	0.35	0.35

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: K. A. Allemeier

OFFICE MEMORANDUM

DATE: June 11, 1976

TO: K. A. Allemeier
Engineer of Testing and Research

FROM: L. T. Oehler

SUBJECT: Skid Tests on Temporary I 69, City of East Lansing.
Research Project 54 G-74, 76 SR-7.

In accord with a May 18, 1976 request originating from a Testing and Research staff meeting, skid tests have been conducted. The testing was completed June 7, 1976 on Temporary I 69 at a location northeast from the Saginaw St - Grand River Ave junction (adjacent to the Albert Pick Motor Hotel). Wsf values encountered ranged from 0.37 to 0.48 and averaged 0.42. Friction levels are apparently adequate. At times, vehicles entering and exiting from Temporary I 69 in this area create a potential traffic congestion problem. A breakdown of skid test data is afforded below for your review.

Lane	40 mph Coefficient of Wsf		
	Low	High	Avg
EBOL	0.37	0.41	0.39
EBIL	0.41	0.44	0.42
WBOL	0.41	0.42	0.41
WBIL	0.45	0.48	0.46

TESTING AND RESEARCH DIVISION

Engineer of Research

LTO:PMS:bf

OFFICE MEMORANDUM

DATE: June 23, 1976

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

FROM: L. T. Oehler

SUBJECT: Additional Skid Tests on Project Mb 83013-07669A; M-37 from M-115 to M-113. Research Project 54 G-74, 76 SR-8

In accord with your May 24, 1976 request, skid tests have been conducted again on M-37 from M-115 north to M-113 in Wexford and Grand Traverse Counties.

The project was a 1975 bituminous aggregate surfacing contract. Initial skid tests were conducted September 22, 1975. At this time wsf values ranged from 0.23 to 0.41 and averaged 0.31. Additional skid tests were performed June 16, 1976, per your request. Friction levels encountered at this data exhibited a slight increase as wsf values ranged from 0.30 to 0.44 and averaged 0.38.

Attached is a historical review of skid test results on Project Mb 83013-07669A.

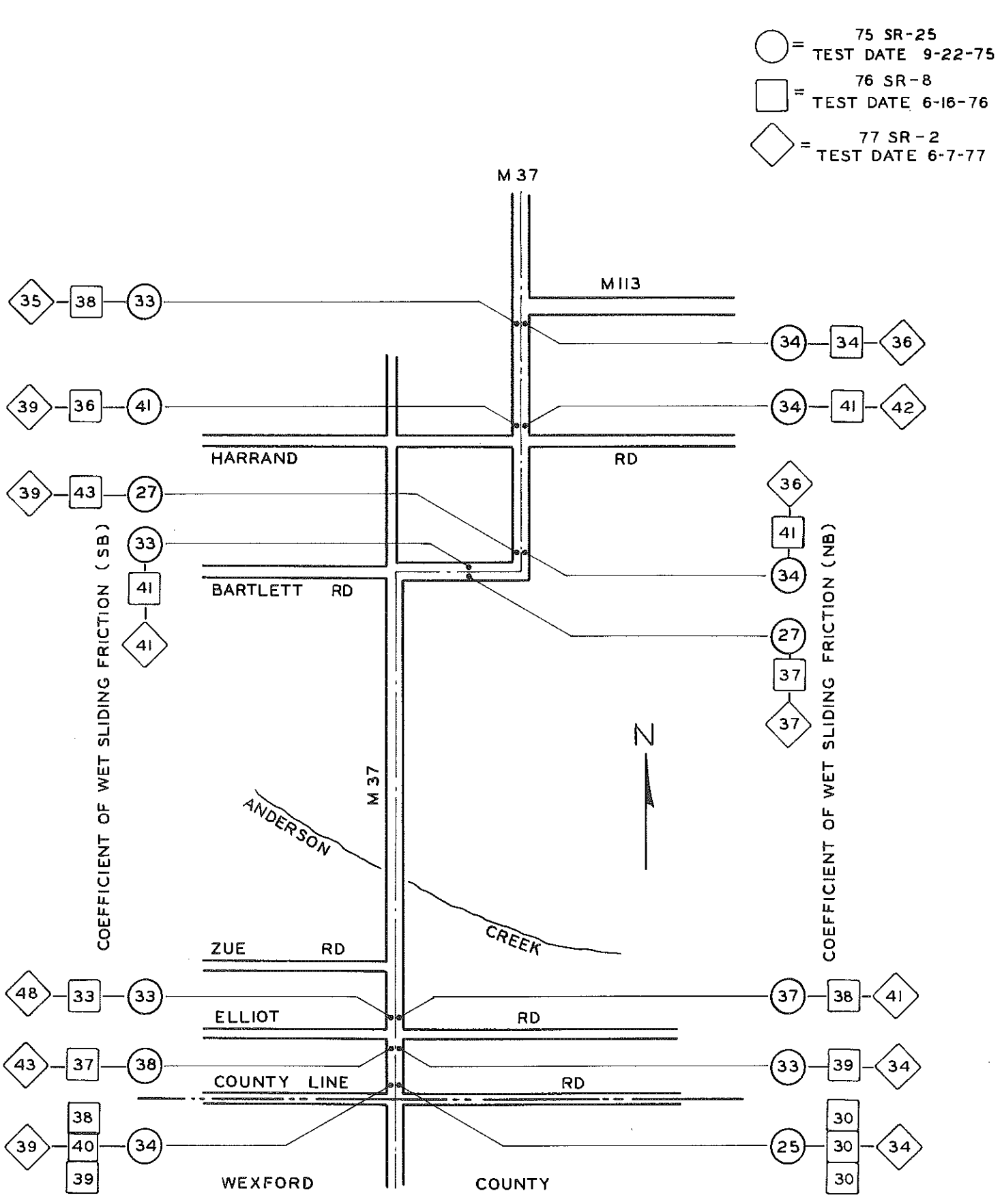
TESTING AND RESEARCH DIVISION

Leroy T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc
Attachment

cc: K. A. Allemeier


75 SR-25
TEST DATE 9-22-75
76 SR-8
TEST DATE 6-16-76
77 SR-2
TEST DATE 6-7-77
M 37
M 113
HARRAND RD
BARTLETT RD
ZUE RD
ELLIOT RD
COUNTY LINE RD
WEXFORD COUNTY
M 37
ANDERSON CREEK
N
COEFFICIENT OF WET SLIDING FRICTION (SB)
COEFFICIENT OF WET SLIDING FRICTION (NB)
35 38 33
39 36 41
39 43 27
33 41 41
48 33 33
43 37 38
39 38 40 39 34
34 34 36
34 41 42
36 41 34
27 37 37
37 38 41
33 39 34
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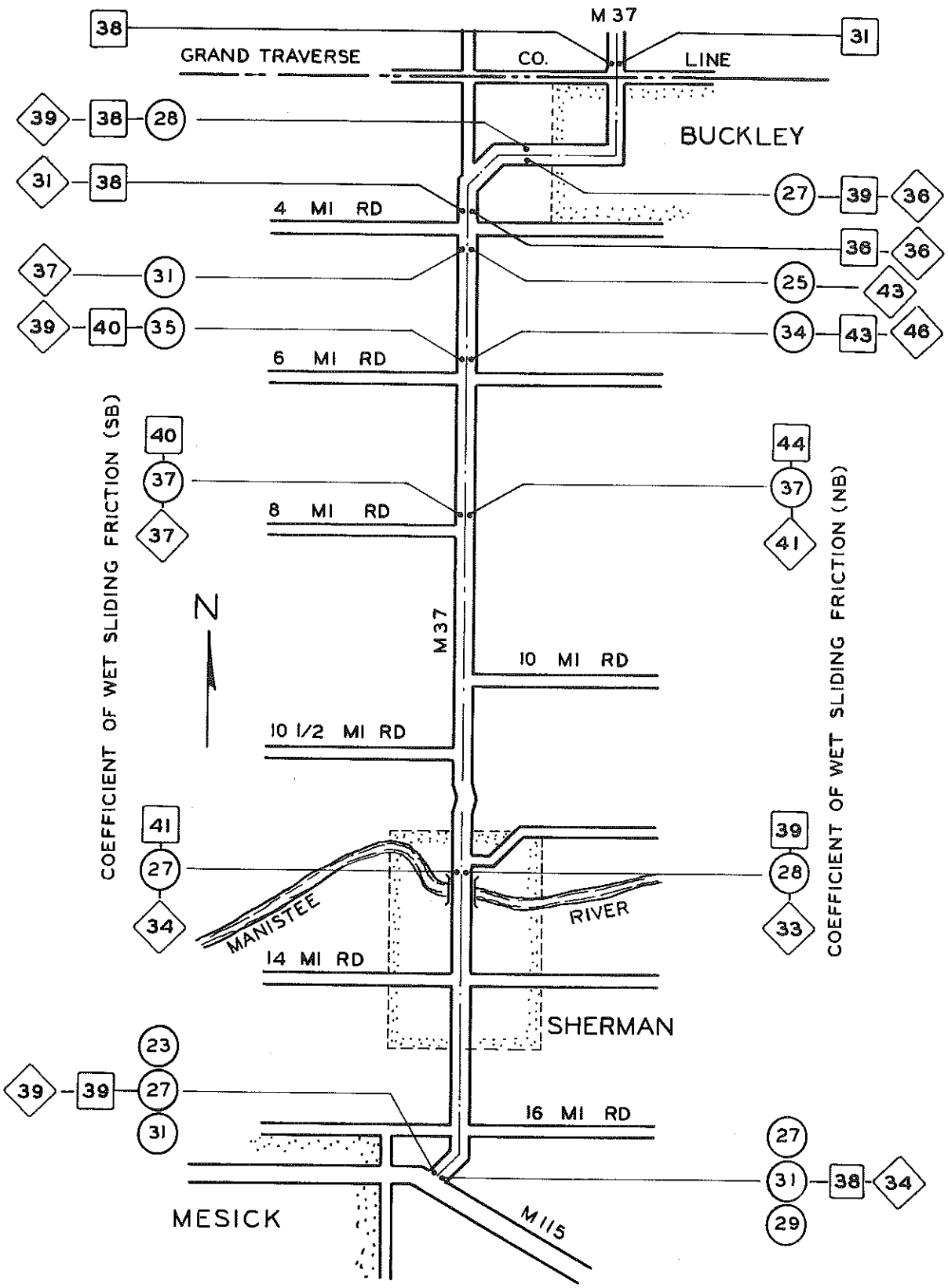

75 SR-25
TEST DATE 9-22-75
76 SR-8
TEST DATE 6-16-76
77 SR-2
TEST DATE 6-7-77
M 37
GRAND TRAVERSE
CO.
LINE
BUCKLEY
4 MI RD
6 MI RD
8 MI RD
10 MI RD
10 1/2 MI RD
14 MI RD
16 MI RD
M37
N
COEFFICIENT OF WET SLIDING FRICTION (SB)
COEFFICIENT OF WET SLIDING FRICTION (NB)
MANISTEE
RIVER
SHERMAN
MESICK
M115

OFFICE MEMORANDUM

DATE: June 15, 1976

TO: M. E. Witteveen
Engineer of Testing Laboratory Section

FROM: L. T. Oehler

SUBJECT: Follow-Up Skid Tests on M 24, North of Lapeer (Project 44012-06103). Research Project 54 G-74, 76 SR-9.

In accord with a May 25, 1976 request from John Norton, skid tests have been conducted on the M 24 project north of Lapeer. Previous skid tests on this project were conducted during 1975 on June 4, July 27, and October 14 and reported in letters dated August 5 and October 27, 1975. Copies of transmittal letters are attached.

The most recent testing occurred on June 7, 1976. At this time wsf values ranged from 0.26 to 0.49 and averaged 0.37. This test series indicates a slight increase in friction levels since the October 14, 1975 series, when coefficients ranged from 0.19 to 0.46 and averaged 0.32.

A breakdown of the most recent testing is attached for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: J. Norton

M 24 Location	Lane	June 9, 1976 Coefficient of Wsf		
		Low	High	Avg
North of Columbiaville Rd	NB	0.26	0.29	0.28
	SB	0.36	0.41	0.39
North of White Rd	NB	0.32	0.34	0.33
	SB	0.37	0.39	0.38
North of Kings Landing	NB	0.32	0.37	0.35
	SB	0.33	0.36	0.34
North of Barnes Rd	NB	0.33	0.37	0.35
	SB	0.35	0.37	0.36
North of Burnside Rd	NB	0.30	0.34	0.32
	SB	0.39	0.44	0.41
South of M 90	NB	0.40	0.42	0.41
	SB	0.33	0.34	0.34
North of M 90	NB	0.44	0.47	0.45
	SB	0.46	0.49	0.48

OFFICE MEMORANDUM

DATE: July 23, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at the US 27-M 21 Intersection in St. Johns.
Research Project 54 G-74, 76 SR-10.

In accord with your July 12, 1976 request, skid tests have been completed at the US 27-M 21 intersection in St. Johns. Wsf values were determined in the stopping areas of all four legs of the intersection and results are shown below.

Roadway	Lane	Coefficient of Wsf		
		Low	High	Avg
US 27	NBOL	0.34	0.37	0.35
	NBIL	0.33	0.40	0.37
	SBOL	0.33	0.34	0.33
	SBIL	0.36	0.40	0.38
M 21	EB	0.34	0.40	0.37
	WB	0.39	0.40	0.40

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: M. L. Jones
R. Welke

OFFICE MEMORANDUM

DATE: July 16, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at the Intersection of 24th Street and Dove Street, City of Port Huron. Research Project 54 G-74, 76 SR-11

In accord with your May 26, 1976 request, skid tests have been conducted at the subject Port Huron intersection. Stopping area coefficients ranged from 0.20 to 0.24 and averaged 0.22 on 24th Street; Dove Street values ranged from 0.34 to 0.53 and averaged 0.45. Skid test results are tabulated below.

Stopping Area Tested	Direction	Surface Type	Coefficient of Wsf Low	High	Avg
24th Street	NB	Bit	0.23	0.24	0.23
	SB	Bit	0.20	0.23	0.21
Dove Street	EB	Conc	0.34	0.41	0.38
	WBOL	Conc	0.48	0.53	0.51
	WBIL	Conc	0.42	0.48	0.46

TESTING AND RESEARCH DIVISION

Engineer of Research

LTO:PMS:cgc

cc: U. L. Savage

OFFICE MEMORANDUM

DATE: July 12, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on M 44 Connector and M 44 From Airway St Northeasterly to 7 Mile Rd.
Research Project 54 G-74, 76 SR-12.

In response to your June 11 request, skid tests have been conducted at the subject location and results discussed with Michael L. Jones, District Traffic and Safety Engineer. Even though the new surface had been treated with sand, initial tests performed June 14, on State Project 41012-09281A, ranged from a low of 0.21 to a high of 0.59.

Because of concern over the continuing flushed condition of this new mat, it was decided to treat the surface by brushing it with sharp grained fines (crusher dust) to provide increased skid resistance. This procedure was tried June 15, at a site selected on the northbound outside lane of M 44 immediately south of the bridge over the Grand River. Skid tests, conducted immediately after the application of crusher fines on June 15, showed intermittent improvements in skid resistance so the treatment was continued. Subsequently a third series of measurements were performed on June 18, 1976. No consistent improvement was detected by these tests as friction levels still range from a low of 0.22 to a high of 0.47. Individual tests and their approximate locations are shown on the attached diagram.

Subsequent to your request, Michael Jones, contacted this office by phone on June 17 and requested that skid tests also be performed on the bridge carrying M 44 over the Grand River (B02 of 41013). These tests were made on June 23, 1976, and the results are tabulated below. It should be noted that these values reflect the condition of the concrete bridge deck surface tracked with bond coat material from the adjacent new bituminous construction. Resultant skid values would be higher if not for this condition.

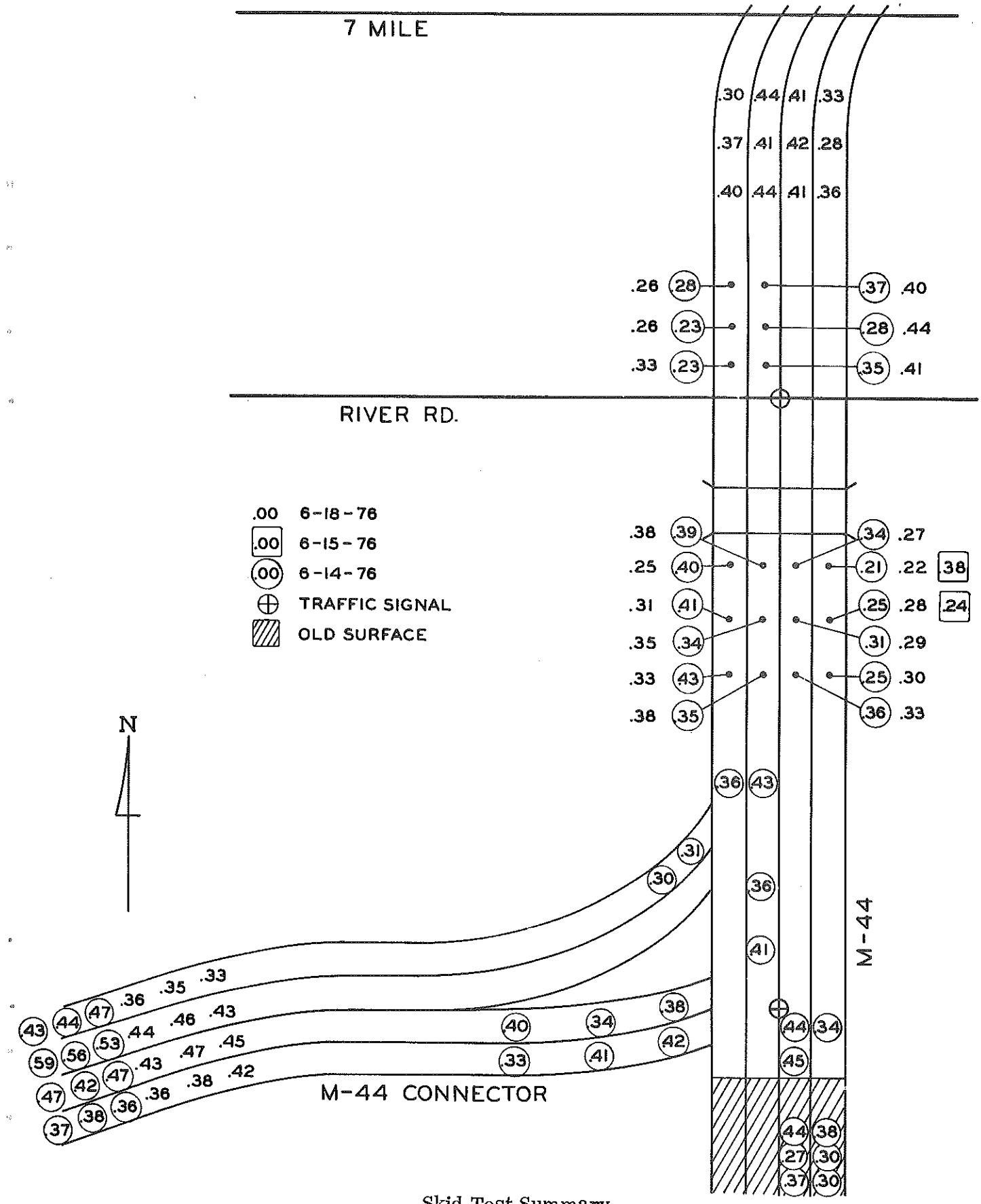
Tested Lane	Bridge Deck Coefficient of Wet Sliding Friction		
	Low	High	Avg
NBOL	0.29	0.30	0.30
NBIL	0.30	0.32	0.31
SBOL	0.33	0.34	0.33
SBIL	0.36	0.39	0.38

TESTING AND RESEARCH DIVISION

Engineer of Research

LTO:PTL:bf

cc: M. L. Jones



Skid Test Summary
Mb 41012-09281A

OFFICE MEMORANDUM

DATE: July 20, 1976

TO: M. G. Brown, Chemical Engineer
Group Supervisor, Concrete & Surface Treatments

FROM: P. M. Schafer

SUBJECT: Skid Tests on Bridge Deck Overlays.
Research Project 54 G-74, 76 SR-13.

In accord with your June 15 verbal request, skid tests have been conducted on the 11 bridge deck overlays you requested. Three overlay types were employed on the structures you selected, i.e., latex mortar, latex concrete and low slump concrete.

1. Latex Mortar - The outside lanes only of X01 of 33034 have a latex mortar coating. Friction levels on these two lanes ranged from 0.49 to 0.53 and averaged 0.51. Although the north end of the NBOL was finished with a transverse broom and the south end with a transverse comb, no significant difference in friction level was encountered, i.e., both portions yielded an average wsf value of 0.51.

2. Latex Concrete - 43 lanes of latex concrete overlayment on 9 structures were skid tested. Coefficients ranged from 0.44 to 0.66 and averaged 0.57.

3. Low Slump Concrete - Two of the structures tested used a "low slump" concrete overlay. Wsf values determined on these ranged from 0.44 to 0.65 and averaged 0.55.

A breakdown of skid test results is attached for your review.

TESTING AND RESEARCH DIVISION

Paul Schafer

Transportation Research Technician
Pavement Performance Group
Research Laboratory Section

PMS:bf

Attachment

Structure No.	Location	Surface Type	Lane	Coefficient of wsf		
				Low	High	Avg.
X01 of 33034	US 27 over C&O RR and I 96 BL in Lansing	Latex Mortar	NBOL*	0.50	0.52	0.51
		Latex Mortar	NBOL**	0.49	0.53	0.51
		Latex Concrete	NBIL	0.52	0.52	0.52
		Latex Mortar	SBOL	0.52	0.52	0.52
		Latex Concrete	SBIL	0.53	0.56	0.54
B04 of 38111	US 127 over the Grand River, E of Jackson	Latex Concrete	NBOL	0.51	0.55	0.52
		Latex Concrete	NBIL	0.61	0.62	0.62
		Latex Concrete	SBOL	0.51	0.56	0.53
		Latex Concrete	SBIL	0.61	0.66	0.63
S16 of 41131	US 131 over Leonard Street, Grand Rapids	Latex Concrete	NBOL	0.56	0.59	0.57
		Latex Concrete	NBCL	0.56	0.57	0.57
		Latex Concrete	NBIL	0.60	0.64	0.62
		Latex Concrete	SBOL	0.58	0.60	0.59
		Latex Concrete	SBCL	0.58	0.59	0.59
		Latex Concrete	SBIL	0.58	0.62	0.60
S17 of 41131	US 131 over Richmond Street, Grand Rapids	Latex Concrete	NBOL	0.53	0.57	0.55
		Latex Concrete	NBCL	0.54	0.57	0.56
		Latex Concrete	NBIL	0.61	0.63	0.62
		Latex Concrete	SBOL	0.54	0.56	0.55
		Latex Concrete	SBCL	0.56	0.58	0.57
		Latex Concrete	SBIL	0.59	0.61	0.60
S18 of 41131	US 131 over Ann Street, Grand Rapids	Latex Concrete	NBOL	0.57	0.62	0.59
		Latex Concrete	NBCL	0.55	0.57	0.56
		Latex Concrete	NBIL	0.59	0.60	0.60
		Latex Concrete	SBOL	0.58	0.60	0.59
		Latex Concrete	SBCL	0.58	0.59	0.59
		Latex Concrete	SBIL	0.58	0.62	0.60
X09 of 41131	US 131 over GTWRR, Grand Rapids	Latex Concrete	NBOL	0.54	0.57	0.56
		Latex Concrete	NBCL	0.54	0.57	0.56
		Latex Concrete	NBIL	0.60	0.62	0.61
		Latex Concrete	SBOL	0.56	0.60	0.58
		Latex Concrete	SBCL	0.57	0.58	0.58
		Latex Concrete	SBIL	0.58	0.62	0.60

* N end of deck finished with transverse broom.

** S end of deck finished with transverse comb.

Structure No.	Location	Surface Type	Lane	Coefficient of wsf		
				Low	High	Avg.
X01 of 33031	US 127 over NYCRR, S of Leslie	Latex Concrete	NBOL	0.60	0.64	0.62
		Latex Concrete	NBIL	0.61	0.65	0.63
		Latex Concrete	SBOL	0.50	0.54	0.52
		Latex Concrete	SBIL	0.62	0.62	0.62
X01 of 38131	US 127 over NYCRR, N of Jackson	Latex Concrete	NBOL	0.56	0.57	0.56
		Latex Concrete	NBIL	0.55	0.58	0.56
		Latex Concrete	SBOL	0.57	0.59	0.58
		Latex Concrete	SBIL	0.59	0.62	0.61
S07 of 38101	Lansing Ave over I 94, Jackson	Latex Concrete	NBOL	0.60	0.64	0.62
		Latex Concrete	NBIL	0.46	0.48	0.47
		Latex Concrete	SBOL	0.56	0.63	0.59
		Latex Concrete	SBIL	0.44	0.47	0.45
S03 of 33084	SB I 496 to EB I 96 over WB I 96	Low Slump Concrete	SBOL	0.53	0.56	0.54
		Low Slump Concrete	SBIL	0.63	0.65	0.64
S10 of 47065	I 96 over Grand River (Brighton W Exit)	Low Slump Concrete	EBOL	0.44	0.48	0.46
		Low Slump Concrete	EBIL	0.57	0.60	0.58
		Low Slump Concrete	WBOL	0.47	0.49	0.48
		Low Slump Concrete	WBIL	0.58	0.60	0.59

OFFICE MEMORANDUM

DATE: July 26, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at Eighteen Non-Trunkline Intersections in the City of Warren. Research Project 54 G-74, 76 SR-14.

In accord with your June 15, 1976 request, skid test values have been obtained at the locations you specified. Three skid tests were conducted in each lane of each intersection. All measurements were made within a 500 ft area approaching the intersection.

Expenses for conducting and processing tests have been charged to Job Number 99412.

Test results are attached for your review.

TESTING AND RESEARCH DIVISION

L. Ray T. Oehler
Engineer of Research

LTO:PMS:bf

Attachment

cc: U. L. Savage

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
Schoenherr at Masonic		Schoenherr			
	Concrete	NBOL	0.30	0.34	0.33
	Concrete	NBIL	0.36	0.40	0.39
	Concrete	SBOL	0.34	0.35	0.35
	Concrete	SBIL	0.37	0.40	0.38
		Masonic			
	Concrete	EB	0.44	0.53	0.49
	Concrete	WB	0.47	0.48	0.47
13 Mile Rd at Hoover Rd		13 Mile Rd			
	Bituminous	EBOL	0.32	0.38	0.35
	Bituminous	EBIL	0.32	0.38	0.35
	Bituminous	EBLT	0.40	0.45	0.43
	Bituminous	WBOL	0.34	0.38	0.36
	Bituminous	WBIL	0.33	0.37	0.35
	Bituminous	WBLT	0.34	0.38	0.37
		Hoover			
	Concrete	NBOL	0.32	0.33	0.32
	*	NBIL	0.35	0.36	0.35
	Bituminous	NBLT	0.39	0.41	0.40
	Concrete	SBOL	0.33	0.36	0.34
	*	SBIL	0.38	0.38	0.38
		SBLT	(too short to test)		
12 Mile Rd at DeQuindre Rd		12 Mile Rd			
	Concrete	EBRT	0.40	0.42	0.41
	Bituminous	EBOL	0.33	0.38	0.35
	Bituminous	EBIL	0.33	0.38	0.36
	Bituminous	EBLT	0.34	0.40	0.38
	Bituminous	WBRT	0.36	0.37	0.36
	Bituminous	WBOL	0.35	0.38	0.37
	Bituminous	WBIL	0.35	0.38	0.36
	Bituminous	WBLT	0.36	0.37	0.36
		DeQuindre Rd			
	Bituminous	NBOL	0.35	0.37	0.36
	Bituminous	NBIL	0.33	0.35	0.34
	Bituminous	NBLT	0.34	0.38	0.36
	Bituminous	SBRT	0.38	0.40	0.39
	Bituminous	SBOL	0.33	0.38	0.36
	Bituminous	SBIL	0.31	0.37	0.35
	Bituminous	SBLT	0.37	0.41	0.39

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
12 Mile Rd at Ryan Rd		12 Mile Rd			
	Concrete	EBOL	0.33	0.36	0.34
	Concrete	EBIL	0.30	0.37	0.34
	Concrete	EBLT	0.37	0.41	0.39
	Concrete	WBOL	0.32	0.34	0.33
	Concrete	WBIL	0.33	0.33	0.33
	Concrete	WBLT	0.37	0.42	0.40
		Ryan Rd			
	Concrete	NBOL	0.34	0.35	0.35
	Concrete	NBIL	0.34	0.36	0.35
	Concrete	NBLT	0.40	0.44	0.41
	Concrete	SBOL	0.33	0.39	0.36
	Concrete	SBIL	0.33	0.40	0.36
	Concrete	SBLT	0.38	0.41	0.40
12 Mile Rd at Mound Rd		12 Mile Rd			
	Bituminous	EBRT	0.34	0.41	0.38
	Bituminous	EBOL	0.34	0.40	0.37
	Bituminous	EBIL	0.38	0.43	0.41
	Concrete	WBRT	0.48	0.54	0.51
	Concrete	WBOL	0.53	0.58	0.55
	Concrete	WBCL	0.41	0.47	0.44
	Concrete	WBIL	0.45	0.47	0.46
		Mound Rd			
	Bituminous	NBRT	0.32	0.38	0.36
	Bituminous	NBOL	0.32	0.36	0.34
	Bituminous	NBIL	0.32	0.38	0.34
	Bituminous	SBRT	0.39	0.40	0.40
	Bituminous	SBOL	0.33	0.34	0.34
	Bituminous	SBIL	0.30	0.32	0.31
12 Mile Rd at Hoover Rd		12 Mile Rd			
	Concrete	EBOL	0.31	0.36	0.33
	Concrete	EBIL	0.31	0.37	0.34
	Concrete	EBLT	0.40	0.44	0.41
	Concrete	WBOL	0.30	0.34	0.32
	Concrete	WBIL	0.33	0.37	0.35
	Concrete	WBLT	0.42	0.47	0.45

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
12 Mile Rd at Hoover Rd (Cont.)		Hoover Rd			
	Concrete	NBOL	0.31	0.36	0.33
	*	NBIL	0.31	0.37	0.35
	Bituminous	NBLT	0.39	0.43	0.42
	Concrete	SBOL	0.34	0.35	0.34
	*	SBIL	0.31	0.35	0.33
	Bituminous	SBLT	0.39	0.42	0.40
12 Mile Rd at Schoenherr		12 Mile Rd			
	Bituminous	EBOL	0.33	0.39	0.35
	Bituminous	EBIL	0.33	0.44	0.39
	Bituminous	EBLT	0.50	0.53	0.52
	Bituminous	WBOL	0.28	0.30	0.29
	Bituminous	WBIL	0.34	0.38	0.36
	Bituminous	WBLT	0.43	0.45	0.44
		Schoenherr			
	Concrete	NBOL	0.33	0.34	0.34
	Concrete	NBIL	0.33	0.36	0.34
	Concrete	NBLT	0.39	0.43	0.41
	Concrete	SBOL	0.35	0.37	0.36
	Concrete	SBIL	0.37	0.40	0.38
	Concrete	SBLT	0.36	0.45	0.40
Schoenherr at Frazho		Schoenherr			
	Concrete	NBOL	0.34	0.36	0.35
	Concrete	NBIL	0.33	0.36	0.35
	Concrete	SBOL	0.29	0.32	0.30
	Concrete	SBIL	0.30	0.34	0.32
		Frazho			
	Concrete	EB	0.40	0.44	0.41
	Concrete	WBOL	0.34	0.38	0.36
	Concrete	WBIL	0.33	0.38	0.35
10 Mile Rd at Ryan Rd		10 Mile Rd			
	Concrete	EBOL	0.33	0.35	0.34
	Concrete	EBIL	0.34	0.36	0.35
	Concrete	EBLT	0.36	0.45	0.41
	Concrete	WBOL	0.32	0.34	0.33
	Concrete	WBIL	0.33	0.34	0.34
	Concrete	WBLT	0.37	0.45	0.41

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
10 Mile Rd at Ryan Rd (Cont.)		Ryan Rd			
	Concrete	NBOL	0.28	0.30	0.29
	Concrete	NBIL	0.30	0.32	0.31
	Concrete	NBLT	0.34	0.40	0.37
	Concrete	SBOL	0.31	0.34	0.32
	Concrete	SBIL	0.34	0.38	0.35
	Concrete	SBLT	0.36	0.40	0.38
10 Mile Rd at Mound Rd		10 Mile Rd			
	Concrete	EBRT	0.34	0.37	0.36
	Concrete	EBOL	0.34	0.36	0.35
	Concrete	EBIL	0.34	0.37	0.36
	Concrete	WBRT	0.32	0.36	0.34
	Concrete	WBOL	0.31	0.32	0.32
	Concrete	WBIL	0.33	0.35	0.34
		Mound Rd			
	Bituminous	NBOL	0.35	0.39	0.38
	Bituminous	NBCL	0.30	0.33	0.32
	Bituminous	NBIL	0.32	0.36	0.34
	Bituminous	SBOL	0.28	0.30	0.29
	Bituminous	SBIL	0.28	0.31	0.29
	Bituminous	SBLT	0.27	0.30	0.28
10 Mile Rd at Hoover Rd		10 Mile Rd			
	Concrete	EBRT	0.36	0.40	0.39
	Concrete	EBOL	0.38	0.40	0.39
	Concrete	EBIL	0.37	0.39	0.38
	Concrete	EBLT	0.42	0.49	0.45
	Concrete	WBRT	0.35	0.40	0.38
	Concrete	WBOL	0.37	0.40	0.38
	Concrete	WBIL	0.36	0.37	0.36
	Concrete	WBLT	0.40	0.47	0.43
		Hoover Rd			
	Concrete	NBRT	0.37	0.40	0.38
	Concrete	NBOL	0.34	0.40	0.36
	*	NBIL	0.36	0.45	0.40
	Bituminous	NBLT	0.37	0.41	0.39
	Concrete	SBOL	0.32	0.39	0.35
	*	SBIL	0.36	0.39	0.37
	Bituminous	SBLT	0.36	0.40	0.37

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
10 Mile Rd at Schoenherr		10 Mile Rd			
	Concrete	EBRT	0.34	0.40	0.38
	Concrete	EBOL	0.37	0.38	0.38
	Concrete	EBIL	0.38	0.39	0.38
	Concrete	EBLT	0.40	0.49	0.45
	Concrete	WBRT	0.32	0.38	0.35
	Concrete	WBOL	0.34	0.36	0.35
	Concrete	WBIL	0.33	0.34	0.34
	Concrete	WBLT	0.46	0.52	0.49
		Schoenherr			
	Concrete	NBOL	0.34	0.37	0.35
	Concrete	NBIL	0.34	0.39	0.36
	Concrete	NBLT	0.38	0.40	0.39
	Concrete	SBOL	0.28	0.32	0.30
	Concrete	SBIL	0.35	0.37	0.36
	Concrete	SBLT	0.39	0.40	0.40
DeQuindre Rd at Woodward Heights		DeQuindre Rd			
	Bituminous	NBOL	0.29	0.32	0.30
	Bituminous	NBIL	0.30	0.34	0.32
	Bituminous	SBOL	0.32	0.33	0.32
	Bituminous	SBIL	0.31	0.34	0.32
		Woodward Heights			
	Bituminous	EBOL	0.30	0.35	0.32
	Bituminous	EBIL	0.40	0.42	0.41
	Concrete	WB	0.41	0.46	0.43
9 Mile Rd at DeQuindre Rd		9 Mile Rd			
	Bituminous	EBOL	0.28	0.29	0.29
	Bituminous	EBIL	0.31	0.34	0.32
	Bituminous	WBOL	0.32	0.33	0.33
	Bituminous	WBIL	0.31	0.36	0.34
		DeQuindre Rd			
	Bituminous	NBOL	0.27	0.31	0.29
	Bituminous	NBIL	0.29	0.32	0.30
	Bituminous	NBLT	0.36	0.39	0.37
	Bituminous	SBOL	0.28	0.31	0.29
	Bituminous	SBIL	0.29	0.34	0.31
	Bituminous	SBLT	0.35	0.41	0.37

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
9 Mile Rd at Ryan Rd		9 Mile Rd			
	Concrete	EBOL	0.32	0.35	0.34
	Concrete	EBIL	0.37	0.40	0.38
	Concrete	EBLT	0.40	0.43	0.41
	Bituminous	WBOL	0.34	0.34	0.34
	Bituminous	WBIL	0.31	0.35	0.33
	Bituminous	WBLT	0.34	0.39	0.36
		Ryan Rd			
	Concrete	NBOL	0.31	0.32	0.31
	Concrete	NBIL	0.30	0.32	0.31
	Concrete	NBLT	0.36	0.39	0.38
	Concrete	SBOL	0.31	0.33	0.32
	Concrete	SBIL	0.32	0.32	0.32
	Concrete	SBLT	0.38	0.39	0.39
9 Mile Rd at Mound Rd		9 Mile Rd			
	Concrete	EBRT	0.36	0.38	0.37
	Concrete	EBOL	0.35	0.38	0.36
	Concrete	EBIL	0.37	0.40	0.38
	Concrete	WBRT	0.36	0.42	0.39
	Concrete	WBOL	0.31	0.36	0.34
	Concrete	WBIL	0.34	0.36	0.35
		Mound Rd			
	Bituminous	NBOL	0.33	0.37	0.35
	Bituminous	NBCL	0.32	0.37	0.35
	Bituminous	NBIL	0.34	0.39	0.36
	Bituminous	SBOL	0.31	0.36	0.34
	Bituminous	SBCL	0.32	0.36	0.34
	Bituminous	SBIL	0.37	0.40	0.39
9 Mile Rd at Hoover Rd		9 Mile Rd			
	Bituminous	EBRT	0.40	0.47	0.44
	Bituminous	EBOL	0.31	0.32	0.32
	Bituminous	EBIL	0.35	0.40	0.37
	Bituminous	EBLT	0.36	0.40	0.38
	Bituminous	WBRT	0.41	0.44	0.42
	Bituminous	WBOL	0.35	0.40	0.38
	Bituminous	WBIL	0.34	0.40	0.37
	Bituminous	WBLT	0.36	0.42	0.40

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
9 Mile Rd at Hoover Rd (Cont.)		Hoover Rd			
	Bituminous	NBRT	0.40	0.44	0.41
	Bituminous	NBOL	0.35	0.40	0.37
	Bituminous	NBIL	0.36	0.40	0.38
	Bituminous	NBLT	0.46	0.49	0.47
	Bituminous	SBRT	0.39	0.46	0.44
	Bituminous	SBOL	0.38	0.40	0.39
	Bituminous	SBIL	0.40	0.42	0.41
	Bituminous	SBLT	0.38	0.46	0.42
9 Mile Rd at Schoenherr		9 Mile Rd			
	Bituminous	EBOL	0.28	0.37	0.32
	Bituminous	EBIL	0.33	0.38	0.35
	Bituminous	EBLT	0.42	0.44	0.43
	Concrete	WBOL	0.34	0.39	0.36
	Concrete	WBIL	0.32	0.38	0.35
	Concrete	WBLT	0.35	0.40	0.38
		Schoenherr			
	Concrete	NBOL	0.35	0.38	0.36
	Concrete	NBIL	0.37	0.40	0.39
	Concrete	NBLT	0.45	0.50	0.47
	Concrete	SBOL	0.31	0.38	0.35
	Concrete	SBIL	0.38	0.39	0.39
	Concrete	SBLT	0.40	0.47	0.43

* Right half concrete and left half bituminous.

OFFICE MEMORANDUM

DATE: July 26, 1976

TO: John Norton, Supervisor
Investigation and Field Inspection Group

FROM: L. T. Oehler

SUBJECT: Skid Tests on M 55 in Roscommon County, Project Mb 72031-07717A.
Research Project 54 G-74, 76 SR-15.

In accord with your June 21, 1976 telephone request to F. Copple, skid tests have been conducted on M 55 from US 27 east to the east junction of M 18.

Friction levels were determined at four locations between US 27 and the west junction of M 18. Wsf values in this area ranged from 0.39 to 0.59 and averaged 0.49.

Skid tests conducted between the west and east junction of M 18 yielded coefficients ranging from 0.29 to 0.44 and averaging 0.37. Wsf values in the EBOL and EBIL averaged 0.41 and 0.40, respectively. A 0.33 coefficient was encountered at an isolated 100 ft long flushed area in the EBIL. Friction levels in the westbound lanes ranged from 0.29 to 0.40 and averaged 0.33.

A breakdown of skid test data by location, is attached for your review.

TESTING AND RESEARCH DIVISION

L. Ray T. Oehler
Engineer of Research

LTO:PMS:bf

Attachment

M 55 Location	Surface Type	Lane Tested	Coefficient of Wsf		
			Low	High	Avg
From US 27 east to west of old US 27	Bit. Conc.	EBOL	0.50	0.51	0.50
	Bit. Conc.	EBIL	0.45	0.50	0.47
	Bit. Conc.	WBOL	0.41	0.46	0.44
	Bit. Conc.	WBIL	0.45	0.48	0.46
East of old US 27	Bit. Conc.	EBOL	0.48	0.52	0.49
	Bit. Conc.	EBIL	0.50	0.52	0.51
	Bit. Conc.	WBOL	0.39	0.43	0.41
	Bit. Conc.	WBIL	0.52	0.54	0.53
East of Tower Hill Rd	Bit. Conc.	EBOL	0.48	0.54	0.51
	Bit. Conc.	EBIL	0.51	0.53	0.52
	Bit. Conc.	WBOL	0.56	0.59	0.57
	Bit. Conc.	WBIL	0.56	0.58	0.57
West of west junction M 18	Bit. Conc.	EBOL	0.41	0.45	0.43
	Bit. Conc.	EBIL	0.53	0.56	0.54
	Bit. Conc.	WBOL	0.43	0.44	0.44
	Bit. Conc.	WBIL	0.48	0.51	0.50
From west junction M 18 to east junction M 18	Bit. Conc.	EBOL	0.40	0.44	0.41
	Bit. Conc.	EBIL	0.33	0.44	0.40
	Bit. Conc.	WBOL	0.29	0.31	0.30
	Bit. Conc.	WBIL	0.32	0.40	0.36

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, GOVERNOR

DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

STATE HIGHWAYS BUILDING — POST OFFICE DRAWER K — LANSING, MICHIGAN 48904

JOHN P. WOODFORD, DIRECTOR

Research Laboratory Section
735 East Saginaw Street
Lansing, Michigan 48906

September 8, 1976

Fred Neils
Engineer-Manager
Allegan County Road Commission
1308 Lincoln Road
Allegan, Michigan 49010

Dear Mr. Neils

Skid Tests on the Blue Star Highway Curve
North of 102nd Ave., Allegan Co.
Research Project: 54 G-74, 76 SR-16

In accord with your June 18, 1976 request, 40 mph skid tests have been conducted on Blue Star Highway (old US 31) in the curve area located north of 102nd Avenue.

A series of 20 tests have been conducted in subject curve area between stations 89+00 and 101+00. Skid tests were spaced at approximately 120 ft intervals. Northbound wet skiding friction values ranged from 0.32 to 0.38 and averaged 0.35; the southbound lanes yielded values ranging from 0.31 to 0.37 and averaging 0.34. Individual coefficients determined throughout the curve area are shown below for your review.

Approximate Station	Coefficient of wsf Sliding Friction NB	SB
89+00	0.32	--
90+20	0.38	0.32
91+40	0.33	0.31
92+60	0.38	0.33
93+80	0.38	0.37
95+00	0.36	0.32
96+20	0.37	0.37
97+40	0.35	0.35
98+60	0.32	0.35
99+80	0.35	0.33
101+00	0.34	--

MICHIGAN
THE GREAT LAKE STATE

Additional tests were also taken at three locations north of the curve and resulting friction levels are tabulated below.

Location	Lane	Coefficient of Wsf Low	High	Avg.
South of 109th Ave.	NB	0.36	0.40	0.37
	SB	0.40	0.42	0.41
North of I 196	NB	0.42	0.47	0.45
	SB	0.51	0.52	0.52
North of Ganges	NB	0.50	0.53	0.52
	SB	0.57	0.62	0.60

Very truly yours,

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler, Engineer of Research
Research Laboratory Section

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, GOVERNOR

DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

STATE HIGHWAYS BUILDING — POST OFFICE DRAWER K — LANSING, MICHIGAN 48904

JOHN P. WOODFORD, DIRECTOR

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Engineer-Manager
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1308 Lincoln Road
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North of 102nd Ave., Allegan Co.
Research Project: 54 G-74, 76 SR-16

In accord with your June 18, 1976 request, 40 mph skid tests have been conducted on Blue Star Highway (old US 31) in the curve area located north of 102nd Avenue.

A series of 20 tests have been conducted in subject curve area between stations 89+00 and 101+00. Skid tests were spaced at approximately 120 ft intervals. Northbound wet skiding friction values ranged from 0.32 to 0.38 and averaged 0.35; the southbound lanes yielded values ranging from 0.31 to 0.37 and averaging 0.34. Individual coefficients determined throughout the curve area are shown below for your review.

Approximate Station	Coefficient of wsf Sliding Friction NB	SB
89+00	0.32	--
90+20	0.38	0.32
91+40	0.33	0.31
92+60	0.38	0.33
93+80	0.38	0.37
95+00	0.36	0.32
96+20	0.37	0.37
97+40	0.35	0.35
98+60	0.32	0.35
99+80	0.35	0.33
101+00	0.34	--

Additional tests were also taken at three locations north of the curve and resulting friction levels are tabulated below.

Location	Lane	Coefficient of Wsf Low	High	Avg.
South of 109th Ave.	NB	0.36	0.40	0.37
	SB	0.40	0.42	0.41
North of I 196	NB	0.42	0.47	0.45
	SB	0.51	0.52	0.52
North of Ganges	NB	0.50	0.53	0.52
	SB	0.57	0.62	0.60

Very truly yours,

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler, Engineer of Research
Research Laboratory Section

OFFICE MEMORANDUM

DATE: November 19, 1976

TO: Donald E. Orne
Engineer of Traffic & Safety

FROM: L. T. Oehler

SUBJECT: Skid Test Results for US-10 at Elizabeth Lake Road in Pontiac
Research Project 54 G-74, 76 SR-17

In accord with your June 21, 1976 request, skid tests have been conducted on US-10 (Telegraph Road) at Elizabeth Lake Road (Project Ms 63052-08776). Surface type at this location is a 110#/sq. yd. open graded friction course placed over a bituminous capped concrete pavement. The stopping areas 400 ft north and south of the intersection were skid tested on July 13, 1976. Resulting friction levels ranged from 0.40 to 0.48 and averaged 0.42. The existance of a relatively uniform distribution of wsf values across the six lanes tested is exhibited in the values shown below.

Lane Tested	Coefficient of Wsf		
	Low	High	Avg
NBOL	0.41	0.43	0.42
NBCL	0.40	0.41	0.40
NBIL	0.42	0.44	0.43
SBOL	0.43	0.48	0.45
SBCL	0.40	0.41	0.40
SBIL	0.41	0.43	0.42

A second part of your request was to skid test a type M 4.12 surface on M-59 between Telegraph Road and Franklin (Project Ms 63041-10067). Per a recent conversation with Tom Wallace, project engineer, the surfacing at this location will not be started before May, 1977. Skid testing has been re-scheduled and will be reported as 77 SR-1 when complete.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: H. B. LaFrance
L. J. Ruest

OFFICE MEMORANDUM

DATE: July 21, 1976

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

FROM: L. T. Oehler

SUBJECT: Special Request for Skid Tests in Muskegon and Gratiot Counties.
Research Project 54 G-74, 76 SR-18

In accord with your July 8, 1976 request, skid tests have been conducted on the US 31 BR approach lanes to Laketon Ave. in Muskegon and on the bituminous portion of southbound US 27 at the Ithaca Curve.

The US 31 BR-Laketon Ave. location has been tested four times since 1969. Historically wsf values have varied slightly during the four test series but have not significantly changed. The most recent skid tests were conducted July 15, 1976. Friction levels ranged from 0.28 to 0.38 and averaged 0.34.

Skid tests were also conducted July 15, 1976 on the bituminous portion of southbound US 27, at Ithaca, in the curve south of Washington Road. Coefficients determined at this time ranged from 0.54 to 0.58 and averaged 0.57. Previous tests were conducted on this surface during 1972 and yielded wsf values averaging 0.69.

A historical review of skid test data at both the above locations is attached for your records.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:mag

Attachment

cc: M. L. Jones

Location	Surface Type	Lane Tested	Average Coefficient of wsf			
			1969	1973	1975	1976
US 31 BR @ Laketon Ave, City of Muskegon	Conc.	SBRT	--	--	--	0.37
		SBOL	0.37	0.38	0.38	0.32
		SBIL	0.37	0.38	0.41	0.30
		NBIL	0.35	0.36	0.40	0.36
		NBOL	0.35	0.37	0.30	0.35
		NBRT	0.35	--	--	0.35

Location	Surface Type	Lane Tested	Average Coefficient of wsf	
			1972	1976
Southbound US 27, at Ithaca, in curve south of Washington Road	Bit.	SBOL	0.63	0.56
		SBIL	0.75	0.57

OFFICE MEMORANDUM

DATE: August 6, 1976

TO: D. L. Wickham
Construction Staff Engineer

FROM: F. Copple

SUBJECT: Texture Altered by Rainfall on I 275 in Monroe County.
Research Project 54 G-74, 76 SR-19.

In response to your phone call of July 1, skid tests were made on the southbound roadway of I 275, Monroe County, between Stations 485 and 510. The inside lane between those stations had been rained on when the concrete was plastic and formed grooves had been obliterated.

Results of skid tests made on the pavement in both rain-damaged and well grooved areas are shown on the attached graph. Tests were made on August 3 with the General Motors skid test unit; values would be somewhat higher if measured with the workhorse unit. Although the rainfall created some texture, it did not provide heavy relief as did the comb-grooved texture. Therefore, as expected, significant loss of friction was observed when measurements were made with a smooth tire.

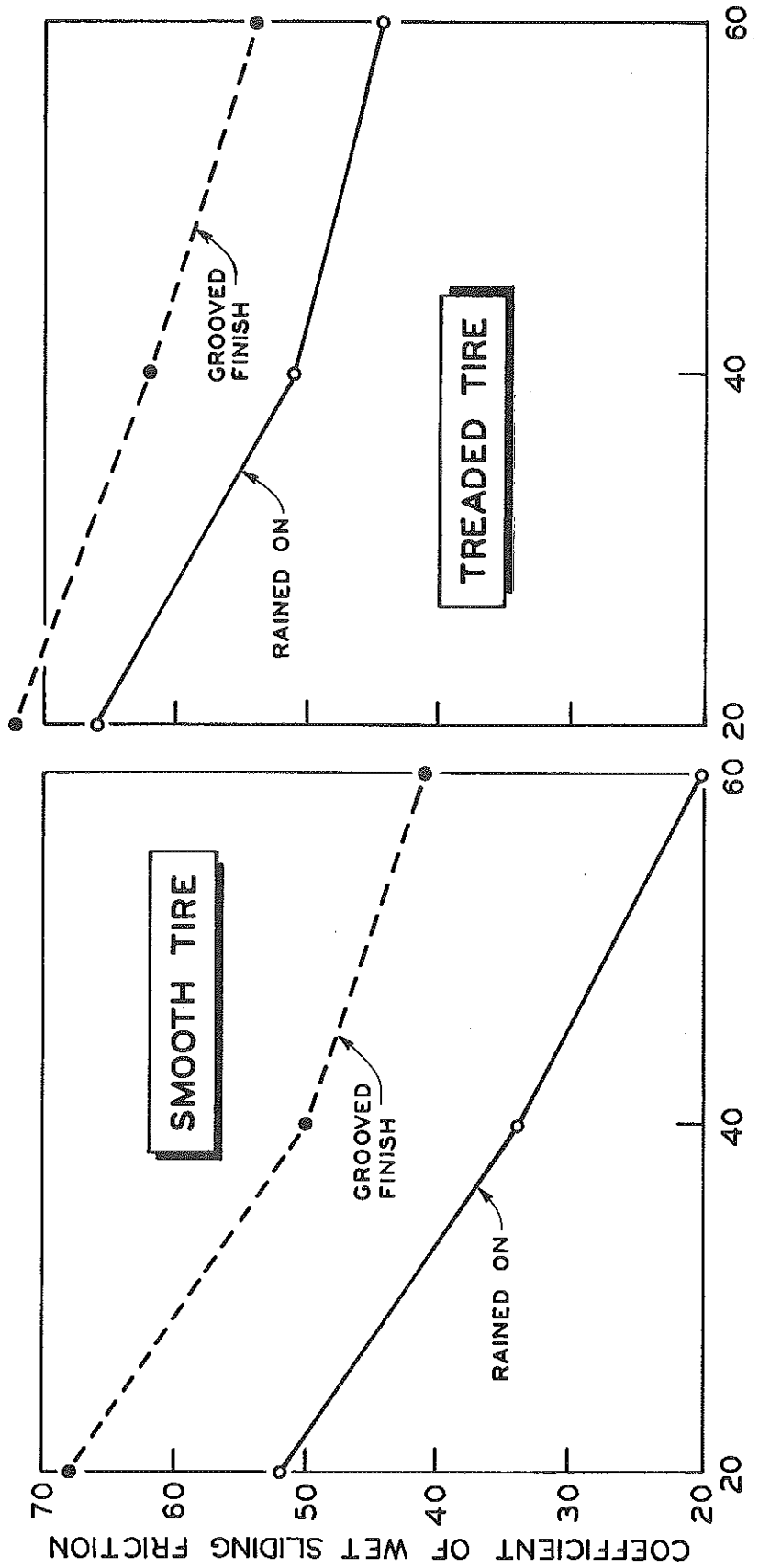
TESTING AND RESEARCH DIVISION

Frank Copple

Supervisor
Pavement Perofrmance Group

FC:bf

cc: K. A. Allemeier
L. T. Oehler



Skid test results, I 275, southbound roadway, Monroe County, Station 485 to 510.

OFFICE MEMORANDUM

DATE: September 13, 1976

TO: Al Chritz
Construction Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-72 in Kalkaska County and on M-40 in Allegan County
Research Project 54 G-74, 76 SR-20

In accord with your July 9, 1976 verbal request skid tests have been completed on the projects listed above.

Project 40022-07687 is located on M-72 from 550 ft east of M-66 easterly to the Crawford-Kalkaska County Line. This project has a bituminous aggregate surface which was placed in 1975. Initial skid tests, conducted during October of 1975, yielded wsf values which ranged from 0.21 to 0.37 and averaged 0.29. Friction levels were measured again during June of 1976; resulting coefficients ranged from 0.39 to 0.50 and averaged 0.44.

Project 03072-09309 has a bituminous concrete surface constructed during 1976. It is located on M-40 from I-196 NW to US-31 in Holland. Initial skid tests were conducted August 11, 1976 and wsf values ranged from 0.36 to 0.46 and averaged 0.41.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

OFFICE MEMORANDUM

DATE: September 13, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-11 in Kent County, Project 41063-10802
Research Project 54 G-74, 76 SR-21

In accord with your August 10, 1976 request, skid tests have been conducted on the bituminous concrete surface of Project 41063-10802. Subject project is located on M-11 (28th St.) between Breton Avenue and M-37 (East Beltline) in the cities of Grand Rapids and Kentwood. Friction measurements conducted during August yielded wsf values ranging from 0.40 to 0.53 and averaging 0.45. Individual lane values are tabulated below for your review:

	Coefficient of Wsf		
Lane	Low	High	Avg.
EBOL	0.40	0.40	0.40
EBIL	0.41	0.44	0.43
WBOL	0.46	0.48	0.47
WBIL	0.49	0.53	0.51

TESTING AND RESEARCH DIVISION

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: M. L. Jones

OFFICE MEMORANDUM

DATE: November 26, 1976

TO: R. Welke, Supervising Engineer
Bituminous Technical Services Unit

FROM: L. T. Oehler

SUBJECT: Skid Test Results on Project Mb 78022-11098.
Research Project 54 G-74, 76 SR-22.

In accord with your November 12, 1976 request, skid tests have been conducted on a portion of Project Mb 78022-11098 located on US 12, west of Sturgis.

Skid tests were made in two areas, i.e., a 2,000 ft control area, paved with a conventional bituminous concrete mix located between 500 and 2,500 ft east of Balk Rd and a experimental area, paved with a bituminous concrete mix having increased stone content, located from 2,500 ft east of Balk Rd to 200 ft west of White School Rd.

Comparable wsf values were determined on both the above surfaces. Coefficients on the conventional bituminous concrete ranged from 0.51 to 0.59 and averaged 0.55. The mix using an increased stone content had values ranging from 0.51 to 0.54 and averaging 0.53.

TESTING AND RESEARCH DIVISION

L T Oehler
Engineer of Research

LTO:PMS:bf

OFFICE MEMORANDUM

DATE: January 10, 1977

TO: P. R. Kamarainen
Construction Staff Engineer

FROM: L. T. Oehler

SUBJECT: Skid Tests on M 42 Sealcoat, State Project Mb 57041-10899A.
Research Project 54 G-74, 76 SR-23.

In response to your verbal request, two series of skid tests were conducted on the single and double sealcoat surface of M 42 between Manton and Lake City.

The first series were measured August 27, 1976. Friction levels on the single seal inside wheel track (IWT) ranged from 0.34 to 0.67, averaging 0.58; friction levels on the double seal outside wheel track (OWT) ranged from 0.24 to 0.65, averaging 0.48.

The second test series were measured November 26, 1976. Friction levels on the single seal (IWT) ranged from 0.42 to 0.65, averaging 0.58; friction levels on the double seal (OWT) ranged from 0.19 to 0.55, averaging 0.39.

Based on first test series average friction levels, no change occurred for the single seal surface during the three month service period between test dates. Friction levels for the double seal surface were 19 percent lower for the same time period.

Friction levels vary dramatically throughout the entire project, primarily on the double seal outside wheel track. One location in particular, the right angle curve at the intersection with Walker Rd, has lost most of its stone for the entire pavement width. While pavement friction levels would have been affected by the stone loss at this location, skid tests could not be performed due to the extremely short radius of curvature.

Attached is a summary of skid test values by location for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf

M 42 SEALCOAT SKID TEST SUMMARY
Construction Project Mb 57041-10899A

Test Location	Tested Lane and Wheelpath	40 mph Coefficients of Wet Sliding Friction					
		8/27/76 Tests			11/26/76 Tests		
		Low	High	Avg	Low	High	Avg
M 66 west to Al Moses Rd	WB OWT	0.48	0.64	0.58	0.36	0.53	0.46
	WB IWT	0.57	0.64	0.60	0.57	0.61	0.60
	EB OWT	0.25	0.37	0.30	0.25	0.29	0.28
	EB IWT	0.53	0.60	0.57	0.54	0.57	0.55
East (south) of Walker Rd	WB OWT	0.49	0.59	0.54	0.33	0.41	0.36
	WB IWT	0.62	0.67	0.64	0.58	0.65	0.61
	EB OWT	0.33	0.42	0.39	0.19	0.34	0.29
	EB IWT	0.41	0.51	0.47	0.42	0.51	0.47
Dickerson Rd west to Blodgett Rd	WB OWT	0.42	0.58	0.48	0.41	0.53	0.47
	WB IWT	0.58	0.64	0.60	0.59	0.64	0.60
	EB OWT	0.24	0.49	0.41	0.27	0.52	0.37
	EB IWT	0.60	0.62	0.61	0.51	0.65	0.59
North 47 Rd west to Maple St	WB OWT	0.34	0.61	0.48	0.33	0.48	0.41
	WB IWT	0.34	0.62	0.55	0.59	0.61	0.60
	EB OWT	0.64	0.65	0.64	0.42	0.55	0.48
	EB IWT	0.57	0.64	0.60	0.58	0.64	0.61

OFFICE MEMORANDUM

DATE: January 6, 1977

TO: D. L. Wickham
Construction Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on I-75 Rain Damaged Concrete Finish, State Project No. I 58151-08413A. Research Project 54 G-74, 76 SR-24

In response to your verbal request skid tests were conducted November 18, 1976 on the southbound center lane of I-75 between Stations 14+25 and 19+29. The pavement finish at this location was altered by rainfall during construction. For comparison, tests were also performed between Stations 20 and 28 in the same southbound center lane which had not been subjected to rainfall.

Testing was performed at speeds of 20, 40 and 60 mph using both treaded and smooth tires. As expected, lowest friction levels occur on the rain affected section as measured with the smooth tire and the condition worsens with increased speed. However, average ranges of coefficients for all test speeds and both test tires are greater for the control section (0.09) than for the rain affected section (0.02). This indicates that a more uniform pavement finish was achieved on the rain altered area.

A summary of skid test values for rain altered and control location is attached for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PTL:cgc
Attachment

Coefficient of Wet Sliding Friction Summary
I-75 Rain Damaged Concrete Finish
SBCL Sta. 14+25 to Sta. 19+29
(Control Comparison, SBCL Sta. 20 to 28)

Surface Tested	Test Speed	Test Tire	Coefficient of Wet Sliding Friction		
			Low	High	Avg
Rained On	20	Treaded	0.62	0.65	0.64
" "	40	"	0.51	0.53	0.52
" "	60	"	0.47	0.48	0.47
" "	20	Smooth	0.53	0.55	0.54
" "	40	"	0.39	0.39	0.39
" "	60	"	0.31	0.40	0.35
Control	20	Treaded	0.54	0.65	0.61
"	40	"	0.47	0.51	0.48
"	60	"	0.38	0.49	0.44
"	20	Smooth	0.45	0.64	0.55
"	40	"	0.40	0.52	0.46
"	60	"	0.38	0.48	0.43

OFFICE MEMORANDUM

DATE: October 1, 1976

TO: A. Chritz
Construction Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-50 and I-94 Crusher Dust Bituminous
Research Project 54 G-74, 76 SR-25

At your request, skid tests were conducted September 24 on two recently constructed bituminous projects where, in part, crusher dust was added to the wearing course mix.

Friction levels measured at 20 mph on the M-50 project range from a low of 0.38 to a high of 0.78 and average 0.65 for 25 tests performed on the dust "treated" mix; 26 tests conducted on the "untreated" mix range from a low of 0.47 to a high of 0.74 and average 0.60.

Friction levels measured at 40 mph on the I-94 project range from 0.36 to 0.49 and average 0.44 for 15 tests performed on the dust "treated" mix; six tests conducted on the adjacent "untreated" mix range from 0.46 to 0.53 and average 0.50.

For these tests, no significant difference in skid resistance was measured which could be attributed to crusher dust in the mix.

Attached is a summary of 97 skid test values for your review.

TESTING AND RESEARCH DIVISION

Lloyd T. Oehler
Engineer of Research
Research Laboratory Section

LTO:PTL:cgc
Attachment

Skid Test Summary
Crusher Dust Bituminous

Project Number	Route	Test Location	Test Lane	Test Speed	No. of Tests	Coefficient of wsf Low	High	Avg.
46082-07697	M-50	W. limits Tecumseh, E. on 3 lane	EB	20	7	0.45	0.63	0.54
			WB	20	7	0.60	0.66	0.62
			EB	40	6	0.34	0.50	0.40
			WB	40	6	0.46	0.50	0.48
			*CTL	40	3	0.58	0.60	0.59
		Transition to 4 Lane Divided	EBOL	20	2	0.67	0.73	0.70
			EBIL	20	3	0.70	0.72	0.71
			WBOL	20	3	0.38	0.68	0.57
			WBIL	20	3	0.76	0.78	0.77
			EBOL	40	2	0.45	0.51	0.48
			EBIL	40	2	0.48	0.49	0.48
			WBOL	40	3	0.34	0.50	0.43
			WBIL	40	3	0.52	0.59	0.56
		E & W of Business District (No Crusher Dust)	EBOL	20	6	0.55	0.74	0.66
			EBIL	20	6	0.59	0.73	0.65
			WBOL	20	8	0.47	0.67	0.52
			WBIL	20	6	0.51	0.63	0.58
38103-01476 (81104)	I-94	W. of Fletcher Rd. W. to Sta. 1959	WBOL	40	9	0.36	0.49	0.42
			WBIL	40	6	0.43	0.48	0.45
		Sta. 1957 W. to E. of M-52 (No Crusher Dust)	WBOL	40	3	0.49	0.53	0.52
			WBIL	40	3	0.46	0.50	0.48

(*) Center Turn Lane, Tested in E'ly Direction.

OFFICE MEMORANDUM

DATE: September 15, 1976

TO: D. F. Malott
Engineer of Soils & Materials
Testing and Research Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on Napoleon Sandstone Surface
Research Project 54 G-74, 76 SR-26

In accord with your recent inquiry about friction levels on the Napoleon Sandstone project, Mb 46061-04845A, we are attaching, for your review, a historical tabulation of skid tests conducted to date.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc
Attachment

cc: A. Chritz

Napoleon Sandstone Surface
Project Mb 46061-04845A

Mix No.	Blend No.	Station to Station	Direction	Average Coefficient of Wsf Sliding Friction					
				8-23-73	10-17-73	4-4-74	9-16-74	7-15-75	7-14-76
1	II	490+88 to 496+50	NB	0.36	0.30	0.57	0.40	0.43	0.48
2	II	486+50 to 490+88	NB	0.38	0.30	0.53	0.39	0.44	0.49
2	II	492+26 to 496+50	SB	0.53	0.38	0.59	0.44	0.44	0.48
3	II	484+20 to 492+26	SB	0.43	0.31	0.58	0.42	0.45	0.49
5	I	481+10 to 486+50	NB	0.31	0.29	0.48	0.42	0.43	0.50
6	I	476+50 to 481+10	NB	0.37	0.27	0.52	0.41	0.44	0.48
6	I	474+30 to 484+20	SB	0.41	0.25	0.55	0.39	0.43	0.44
7	III	466+50 to 476+50	NB	0.41	0.32	0.48	0.44	0.49	0.50
7	III	466+50 to 474+30	SB	0.39	0.27	0.53	0.41	0.47	0.49
9	IV	456+50 to 466+50	NB	0.46	0.33	0.50	0.44	0.48	0.47
9	IV	456+40 to 466+50	SB	0.49	0.34	0.57	0.44	0.50	0.51
10	V	446+50 to 456+50	NB	0.47	0.34	0.54	0.43	0.46	0.47
10	V	446+50 to 456+40	SB	0.49	0.32	0.58	0.45	0.47	0.51

OFFICE MEMORANDUM

DATE: September 15, 1976

TO: A. Chritz
Construction Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on Michigan Avenue, City of Lansing, Project 33062-09330. Research Project 54 G-74, 76 SR-27

In accord with your request, skid tests have been completed on Project 33062-09330, located on M-143 (Michigan Avenue) from Cedar Street east to 130 ft east of Kensington Road. Thirty-eight tests were conducted August 5, 1976 on the subject project. Friction levels ranged from 0.30 to 0.56 and averaged 0.46. Specific test locations and respective wsf values are listed below for your review.

M-143 (Michigan Avenue)

Location	Lane	Coefficient of Wsf Low	High	Avg.
Fairview to Foster	EBOL	0.48	0.53	0.50
	EBIL	0.51	0.53	0.52
	WBOL	0.45	0.47	0.46
	WBIL	0.49	0.52	0.50
Approach to Howard	EBOL	0.42	0.45	0.44
	EBCL	0.31	0.54	0.42
	EBIL	0.30	0.46	0.36
E. of Howard	EBCL	0.48	0.52	0.50
Approach to Homer	WBOL	0.40	0.56	0.50
	WBCL	0.44	0.47	0.45
	WBIL	0.52	0.56	0.54

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

OFFICE MEMORANDUM

DATE: September 23, 1976

TO: R. Welke
Testing Laboratory Section

FROM: L. T. Oehler

SUBJECT: Additional Skid Tests on Project 14031-06119
Research Project 54 G-74, 76 SR-28

In accord with your September 8, 1976 request, a second series of skid tests has been conducted on Project 14031-06119. Subject project has a bituminous concrete surface and was constructed on M-62 between the Indiana State Line and US-12 during 1976. As indicated by the tabulation below, friction levels on both lanes have improved since the July test series.

Test Date	Lane	Coefficient of WSF Low	High	Avg
7-19-76	NB	0.29	0.35	0.31
	SB	0.34	0.38	0.36
9-17-76	NB	0.44	0.51	0.48
	SB	0.38	0.52	0.48

TESTING AND RESEARCH DIVISION

L. Ray T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: D. E. Orne

OFFICE MEMORANDUM

DATE: November 19, 1976

TO: John E. Norton, Asst. Supervising Engineer
Bituminous Technical Services Unit
Testing Laboratory Section

FROM: L. T. Oehler

SUBJECT: Skid Test Results on Seven Upper Peninsula Bituminous Projects
Research Project 54 G-74, 76 SR-29

In accord with your September 17, 1976 request, skid tests have been conducted on the projects you specified. Attached are the test results for your review.

Bituminous Concrete-type C yielded friction levels ranging from 0.45 to 0.63 and averaging 0.56. Similarly, the Bituminous Aggregate pavements averaged 0.55, but had an expanded coefficient range of 0.33 to 0.66. The two lanes of Bituminous Concrete-type C with increased stone content yielded wsf values ranging from 0.35 to 0.45 and averaging 0.41.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler
Engineer of Research
Research Laboratory Section

LTO:PMS:cgc
Attachment

cc: R. Welke
R. Ketola

Project No. and Location	Surface Type	Lane	Coefficient of Wsf Low	High	Avg
22021 - 10842 US-2 - US-141 - M-95 from E. Limits of Iron Mountain NW'ly to Wisconsin State Line	Bit Conc Type C	EBOL	0.50	0.58	0.55
		EBIL	0.51	0.62	0.57
		WBOL	0.45	0.58	0.51
		WBIL	0.50	0.63	0.57
		EB	0.58	0.61	0.60
		WB	0.57	0.58	0.58
31031 - 09251 M-203 from E. end of 24 ft pavement, E. of McLain Park, E'ly to Cemetary	Bit Agg	NB	0.58	0.63	0.60
		SB	0.60	0.65	0.62
31052 - 10108 US-41 from 0.9 mile NE of Hancock City Limits NE to 0.707 mile NE of County Line	Bit Agg	North of Quincy			
		NB	0.48	0.52	0.49
		SB	0.50	0.52	0.51
		1.3 mile S. of Airport Road			
		NB	0.36	0.39	0.38
		SB	0.33	0.37	0.35
		S. from Golf Club			
		NB	0.42	0.48	0.45
		SB	0.44	0.51	0.47
36023 - 10842 M-69 and US-2 in Crystal Falls and E. to M-95	Bit Agg	M-69 from Sagola to Crystal Falls			
		EB	0.45	0.58	0.51
		WB	0.41	0.49	0.46
		EBOL	0.60	0.63	0.62
		EBIL	0.63	0.64	0.64
		WBOL	0.56	0.59	0.58
		WBIL	0.63	0.66	0.65
	Bit Conc Type C (increased stone)	US-2 through Crystall Falls			
		EB	0.35	0.40	0.37
		WB	0.45	0.45	0.45
52041 - 10469 US-41 - M-28 from 500 ft E. of M-95 E. to N. Lake Road, W. of Ishpeming	Bit Conc Type C	EB	0.51	0.59	0.56
		WB	0.53	0.58	0.56
52-48 - 07870 52-48 - 10168 County Road 553 between Marquette and Gwinn	Bit Agg	Sawyer AFB N. 4 miles			
		NB	0.49	0.53	0.51
		SB	0.49	0.56	0.52

Project No. and Location	Surface Type	Lane	Coefficient of Wsf Low	High	Avg
21032 - 07656 M-35 from 0.5 mile S. of Perkins NW'ly to Marquette County Line	Bit Agg	NB SB	0.54 0.57	0.60 0.62	0.57 0.60

OFFICE MEMORANDUM

DATE: October 6, 1976

TO: J. P. Woodford
Director

FROM: G. J. McCarthy

SUBJECT: Skid Tests on Southbound I-75 North of Vanderbilt
Research Project 54 G-74, 76 SR-30

In response to your request noted in the minutes of the August 31 Engineering Operations Committee Meeting, skid tests were performed September 29 on southbound I-75 north of Vanderbilt.

This area of I-75 had received a heater-planer treatment in October, 1975 to correct a slippery condition created by a faulty sealcoat. The heater-planer operation, which was conducted on both NB and SB roadways, began on the SB at the north Otsego County Line and proceeded south towards Gaylord. Apparently, due to improper heating or inadequate planing depth, intermittent "fat" spots occurred during early stages of the operation; primarily in the inner wheelpath of the southbound outside lane. This condition is still evident. However, friction levels at these fat locations are now higher than immediately after the heater-planer treatment. Initial 40 mph wet sliding friction values measured in 1975 in the fat areas were as low as 0.26 and average 0.31; latest values were as low as 0.30 and average 0.35. Tests made in the adjacent SBOL outer wheelpath (not fat spots) range from a low of 0.43 to a high of 0.46 and average 0.45.

Although a differential friction level between wheelpaths is undesirable, the problem seems minimal in this case because there is little difference in friction levels between wheelpaths and fat spots are short and intermittent in length. Therefore, immediate treatment seems unnecessary, especially since resurfacing of the pavement is planned for next year.

G. J. McCarthy
Deputy Director - Highways

TRR:PTL:mkw

cc: M. N. Clyde
K. A. Allemeier
L. T. Oehler

OFFICE MEMORANDUM

DATE: November 26, 1976

TO: K. A. Allemeier
Engineer of Testing and Research

FROM: L. T. Oehler

SUBJECT: Heater-Planer Machine and Kerosene-Sand Treatments.
Research Project 54 G-74, 76 SR-31.

Follow-up skid tests were conducted this year on the I 75 heater-planer area and on the kerosene-sand treated M 50 ramps at Parnell Rd.

Since October 1975, skid tests have intermittently been conducted on an area of I 75, located in Otsego and Cheboygan Counties, which was treated with the heater-planer. Generally, the heater-planer treatment has alleviated the slippery condition which existed prior to the treatment. The treated areas are still effective even though some decay with respect to time exists in wsf values. Most recent coefficients were measured November 2, 1976 and range from 0.40 to 0.48, averaging 0.44.

Friction levels were first measured on the M 50-Parnell Rd ramps October 23, 1975; at this time coefficients ranged from 0.14 to 0.19 and averaged 0.16. A kerosene-sand treatment was applied November 3, 1975 and the ramps were tested again November 6, 1975. Wsf values determined at this time ranged from 0.29 to 0.60 and averaged 0.43. After a one-year service period, November 4, 1976, a 0.37 to 0.63 friction level range, averaging 0.47, was encountered.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf

cc: R. Welke

OFFICE MEMORANDUM

DATE: November 22, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Test Results on Project 20052-001. Research Project 54 G-74, 76 SR-32

In accord with your September 21, 1976 request, skid tests have been conducted on the six year old modified leveling course located on I-75 from US-27 south to the Roscommon County line.

Previously, the subject project had friction level measurements conducted in 1970 and 1975. Average wsf values determined were 0.60 and 0.63, respectively at the one- and five-year service level. These values compare favorably with the one-year and five-year cumulative average friction level (CAμ) for bituminous concrete pavements constructed statewide between 1963 and 1970. The statewide one-year CAμ was 0.50 and the five-year was 0.54. The modified leveling course (20052-001) one-year and five-year average wsf values of 0.60 and 0.63 were 20 and 17 percent higher than the respective CAμ.

Coefficients from 1976 tests on 20052-001 ranged from 0.53 to 0.73 and averaged 0.65, exhibiting a 0.02 increase in friction level since 1975.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: M. E. Witteveen
A.P. Chritz
J. E. Norton

OFFICE MEMORANDUM

DATE: October 29, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-35 at Lake Shore Drive, In Escanaba
Research Project 54 G-74, 76 SR-33

In accord with your September 29, 1976 request, skid tests have been conducted on the M-35 curve at Lake Shore Drive in Escanaba. The bituminous surface at this location yielded friction levels ranging from 0.48 to 0.56 and averaging 0.52. Wsf values on the concrete surface ranged from 0.34 to 0.47 and averaged 0.40. Skid test values were obtained October 19, 1976. A summary of results is shown below, for your review.

Lane	Surface Type	Coefficient of Wsf Low	High	Avg.
NB	Bituminous	0.48	0.51	0.50
SB	Bituminous	0.52	0.56	0.54
NB	Concrete	0.39	0.42	0.40
SBOL	Concrete	0.34	0.36	0.35
SBIL	Concrete	0.45	0.47	0.46

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:cgc

cc: P. A. Michelin

OFFICE MEMORANDUM

DATE: October 29, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at Two Locations in District 1.
Research Project 54 G-74, 76 SR-34

Skid tests have been conducted at the two District 1 locations specified in your October 4, 1976 request.

US-2 - US-141 at the Menominee River Structure (B01 of 22021) was skid tested October 9, 1976 at air and pavement temperatures of 36° and 42°F, respectively. Wsf values ranged from 0.30 to 0.44 and averaged 0.39.

Skid Tests were also conducted on US-41 - M-28 between the Carp River and Hampton Street in Marquette. At this site the roadway surface is concrete. Wsf values were determined October 20, 1976 at air and pavement temperatures of 38° and 40°F, respectively. Coefficients resulting from 22 tests on this surface ranged from 0.35 to 0.52 and averaged 0.42.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:cgc

cc: E. L. Martin

OFFICE MEMORANDUM

DATE: November 26, 1976

TO: J. E. Norton, Asst. Supervising Engineer
Bituminous Technical Services Unit

FROM: L. T. Oehler

SUBJECT: Skid Test Results on 11 Bituminous Projects in District 3 and 4
Research Project 54 G-74, 76 SR-35

In accord with your October 8, 1976 request, skid tests have been conducted on the 11 projects you requested. All values shown on the attached table are initial service year coefficients obtained at 40 mph.

TESTING & RESEARCH DIVISION

L. Ray T. Oehler
Engineer of Research

LTO:PMS:cgc
Attachment

cc: R. Welke
E. Petter

Research Project 54 G-74
76 SR-35

Project Number and Location	Surface Type	Lane	Coefficient of Wsf Low	High	Avg
Mb 16081-09270 US-23 from E. County Line W'ly to beginning of C&G in Cheboygan	Bit Agg	EB	0.51	0.69	0.59
		WB	0.53	0.64	0.60
Mb 24021-10775 M-68 from US-31 in Emmet Co. E'ly to I-75 in Cheboygan Co.		East of Alanson in Emmet County			
	Bit Agg	EB	0.37	0.38	0.38
		WB	0.36	0.37	0.37
		From County Line East in Cheboygan County			
	Bit Agg	EB	0.44	0.54	0.48
		WB	0.39	0.53	0.48
Mb 45013-10846 M-22 from 160 ft N. of W. Junction M-204 NE to M-201 omitting 0.93 mi. in Leland	Bit Agg	NB	0.40	0.52	0.47
		SB	0.44	0.53	0.47
Mbr 51021-11066 M-55 from Udell Hills Road in Manistee County to M-37 in Wexford County	Bit Agg	EB	0.44	0.50	0.46
		WB	0.44	0.51	0.47
65011-09269 M-30 from Gladwin-Ogemaw County Line N. to Wright Ave. in West Branch	Bit Agg	NB	0.48	0.57	0.53
		SB	0.44	0.55	0.49
RF 67015-06920 Northbound US-131 from Luther Rd. N. to the Osceola-Wexford County Line	Bit Conc	NBOL	0.49	0.58	0.53
		SBIL	0.43	0.56	0.50
Mbr 71071-09268 US-23 from Alpena-Presque Isle County Line N. to County Highway 638	Bit Agg	NB	0.47	0.52	0.50
		SB	0.43	0.54	0.48
Mb 72052-09275 M-18 from N. of I-75 North to Division St., In Roscommon	Bit Agg	NB	0.44	0.44	0.44
		SB	0.42	0.46	0.44
Mb 72013-10847 US-27 from Wolf Creek N. to Snowbowl Road	Bit Conc	NBOL	0.51	0.55	0.53
		NBIL	0.52	0.56	0.54
		SBOL	0.49	0.53	0.51
		SBIL	0.52	0.56	0.55

Project Number and Location	Surface Type	Lane	Coefficient of Wsf Low	High	Avg
Mb 83032-09529 US-131 from 78' ft S. of Boon Road, N. to S. Junction of M-42	Bit Conc	NB	0.42	0.46	0.44
		SB	0.43	0.50	0.47
Mb 83051-09260 M-115 from Osceola-Wexford County Line NW to S. Junction M-55	Bit Agg	EB	0.46	0.48	0.47
		WB	0.40	0.45	0.43
		EBOL	0.50	0.51	0.51
		EBIL	0.45	0.49	0.47
		WBOL	0.49	0.52	0.51
		WBIL	0.46	0.50	0.47

OFFICE MEMORANDUM

DATE: November 26, 1976

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on B02 of 41013.
Research Project 54 G-74, 76 SR-36.

Skid tests were conducted on the Grand River Bridge near West River-Cannonsburg Rd (B02 of 41013) June 23, 1976 as a part of the friction level study of Project 41012-09281 and reported on July 12, 1976 as 76 SR-12. The concrete deck surface, at that time, had been tracked with bond coat material; wsf values ranged from 0.29 to 0.39 and averaged 0.33.

In accord with your request dated October 19, 1976 skid tests were again conducted on the B02 of 41013 deck, this time on a newly applied emery-epoxy resin surface treatment. Friction level measurements were conducted November 5, 1976; coefficients ranged from 0.63 to 0.78 and averaged 0.69.

The M 44 bridge surface compares favorably with two similar coating types which have recently been under study, i.e., a spray-grip application at the US 24-10 Mile intersection with a four-year average wsf value of 0.74 and a epoxy-emery surface which was applied to the Cut River Bridge yielding a two-year average of 0.60.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler
Engineer of Research

LTO:PMS:bf

cc: M. L. Jones
R. Welke

OFFICE MEMORANDUM

DATE: November 30, 1976

TO: J. E. Norton, Asst. Supervising Engineer
Bituminous Technical Services Unit
Testing Laboratory Section

FROM: L. T. Oehler

SUBJECT: Skid Test Results. Research Project 54 G-74, 76 SR-37

In accord with your November 1, 1976 request, skid tests have been conducted on the two projects requested.

Project UM 82053-06459A is located on US-24 from Grand River Avenue to 0.3 mile south of Eight Mile Road. The northbound lanes were surfaced with a bituminous concrete mix having an increased stone content; wsf values ranged from 0.54 to 0.58 and averaged 0.56. A conventional bituminous concrete type M mix was used on southbound lanes where coefficients ranging from 0.49 to 0.54 and averaging 0.52 were determined.

Project Mb 78062-09312A has a bituminous aggregate surface and is located on M-86 from south of Three Rivers to west of Colon. Friction level measurements ranging from 0.40 to 0.59 and averaging 0.49 were obtained November 15, 1976.

A breakdown of wsf values for both the above projects is shown below for your review.

Project Number	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
UM 82053-06459A	Bit Conc with increased stone	NBOL	0.56	0.57	0.57
		NB#3	0.55	0.57	0.56
		NB#2	0.55	0.58	0.56
		NBIL	0.54	0.57	0.55
	Bit Conc	SBOL	0.49	0.51	0.50
		SB#3	0.49	0.53	0.51
		SB#2	0.52	0.53	0.53
		SBIL	0.52	0.54	0.53
Mb 78062-09312A	M-86 from Three Rivers to M-66				
	Bit Agg	EB	0.45	0.53	0.47
		WB	0.40	0.50	0.46

Project Number	Surface Type	Lane	Coefficient of Wsf Low	High	Avg
Mb 78062-09312A (continued)	M-66 from S. to N. Junction M-86				
	Bit Agg	NB	0.51	0.52	0.51
		SB	0.54	0.58	0.56
	M-86 from M-66 East				
	Bit Agg	EB	0.55	0.59	0.57
		WB	0.53	0.57	0.55

TESTING AND RESEARCH DIVISION

L Ray T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

SECTION VII

SPECIAL ATTENTION LOCATIONS

Special Attention Locations

Commencing with the 1973 test program all locations with 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.

OFFICE MEMORANDUM

DATE: July 29, 1976

TO: Donald E. Ome
Engineer of Traffic & Safety

FROM: L. T. Oehler

SUBJECT: Report of Pavements with Wsf Values Averaging Below 0.35
Research Project 54 G-74, 76 SA-1

In conformance with our continuing policy of reporting friction levels below 0.35, the attached list of 24 locations is furnished for your review. Listed friction levels were discovered during routine 1976 inventory skid tests at the designated locations.

Commencing with this data report, additional information (construction year and test date) is being supplied, thereby complying with your December 16, 1975 request.

TESTING AND RESEARCH DIVISION

L. Tom T. Oehler
Engineer of Research

LTO:PMS:cgc
Attachment

cc: R. Welke
K. A. Allemeier

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
Mb 82121-010	I-96 BS (Grand River) from Washington Blvd. W'ly to W. Chicago Blvd., omitting at I-75, I-696 and from Trumbull Ave. to E. Grand Blvd.	Bit Conc	1966	6-6-76	EBOL	0.24	0.28	0.26
					EBIL	0.28	0.30	0.29
					WBOL	0.28	0.32	0.31
					WBIL	0.33	0.37	0.36
SS 25101, C8	M-57 from M-13 E'ly to 211 ft W. of W. Limits of Montrose	Conc	1966	6-11-76	EB	0.35	0.38	0.37
					WB	0.34	0.35	0.34
Mb 83022-03967	M-55 E. from US-131 in Cadillac	Bit Conc	1971	6-16-76	EB	0.33	0.34	0.33
					WB	0.34	0.34	0.34
U 83032, C6	US-131 from Clam River to Boone Road in Cadillac	Conc	1966	6-16-76	NBOL	0.33	0.33	0.33
		Bit Conc			NBOL	0.37	0.38	0.38
		Bit Conc			NBIL	0.34	0.38	0.36
		Conc			SBOL	0.32	0.33	0.32
		Bit Conc			SBOL	0.34	0.36	0.35
		Bit Conc			SBIL	0.37	0.37	0.37
Mb 83012-03826	M-115 - M-37 from E. Junction M-37 W'ly to W. Junction M-37 in Mesick	Bit Conc	1971	6-16-76	EB	0.32	0.33	0.32
					WB	0.34	0.35	0.34
					EBOL	0.34	0.34	0.34
					EBIL	0.27	0.30	0.28
					WBOL	0.34	0.37	0.35
					WBIL	0.31	0.32	0.31
Mb 28013, C3	US-31 from M-72 near Acme N'ly 7.03 miles to Antrim County Line	Bit Agg	1966	6-17-76	NB	0.34	0.35	0.34
					SB	0.38	0.39	0.38
Mb 45021, C4	M-72 from 6 miles E. of Empire E'ly to M-22	Sheet Asphalt	1966	6-12-76	W. of Angus Road			
					EB	0.35	0.36	0.35
					WB	0.36	0.40	0.38
		Sheet Asphalt	1966	6-12-76	E. of Cedar Road			
					EB	0.32	0.34	0.33
					WB	0.31	0.34	0.33

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
Mb 45021, C4 (continued)		Sheet Asphalt	1966	6-12-76	E. of Newman Road			
					EB	0.44	0.49	0.47
					WB	0.46	0.49	0.47
		Sheet Asphalt	1966	6-12-76	W. of County Road 669			
					EB	0.41	0.44	0.42
					WB	0.40	0.44	0.42
Mb 28012-03951	US-31 from Subdivision Street N'ly to 0.5 mile N. of S. Limits of Traverse City	Bit Conc	1971	6-17-76	S. from SCL Traverse City			
					NB	0.26	0.28	0.28
					SB	0.26	0.30	0.29
		Bit Conc	1971	6-17-76	N. of Mackey Drive			
					NB	0.24	0.28	0.26
					SB	0.29	0.31	0.31
Mb 28012, C2	US-31 - M-37 from 2841 ft S. of Silver Pines Road N'ly 1.04 mile	Bit Agg	1966	6-17-76	SBTL	0.33	0.34	0.34
F 10041-2	M-115 (Forest Avenue) from M-22 (Lake Street) E'ly 4400 ft., also from 34.8 ft NW of Beulah Limits SE to US-31 (Michigan Avenue) in Benzonia	Bit Agg	1966	6-17-76	From M-22 East			
					EB	0.33	0.34	0.34
					WB	0.40	0.42	0.41
		Bit Agg	1966	6-17-76	From W. of Beulah E. to US-31			
					EB	0.33	0.35	0.34
					WB	0.30	0.32	0.31
Ms 51011-01740	Intersection of US-31 and M-110	Bit Conc	1971	6-18-76	US-31			
					NBOL	0.35	0.37	0.36
					NBIL	0.36	0.38	0.37
					SBOL	0.30	0.31	0.31
					SBIL	0.32	0.33	0.33
S06 of 25031	Grand Blanc Road over US-23	Latex Conc	1972	6-25-76	EB	0.33	0.33	0.33
					WB	0.36	0.39	0.38

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
EBI 69013, C1 (part)	I-75 from Otsego-Crawford County Line N. to Marlette Road	Bit Conc	1961	6-29-76	NBOL	0.35	0.37	0.36
					NBIL	0.52	0.56	0.54
					SBOL	0.30	0.33	0.32
					SBIL	0.54	0.55	0.55
EBI 69013, C1 (part)	I-75 from Marlette Road N. to 840 ft. N. of Charles Brink Road	Bit Conc	1962	6-29-76	NBOL	0.30	0.32	0.31
					NBIL	0.50	0.52	0.51
					SBOL	0.27	0.28	0.28
					SBIL	0.48	0.51	0.50
Mer 38051-07683	M-106 from Michigan Avenue NW'ly to S. of Frost Street, omitting from Ganson Street to LeRoy Street	Bit Conc	1975	7-14-76	S. of Ganson Street			
					NBOL	0.43	0.48	0.46
					NBCL	0.34	0.37	0.35
					NBIL	0.42	0.45	0.44
		Bit Conc	1975	7-14-76	N. of LeRoy Street			
					NB	0.34	0.40	0.37
					SB	0.28	0.29	0.29
U 38071, C1, C4, C5, C6	US-127 BR - M-50 from 700 ft. S. of S. Limits of Jackson N. to 250 ft. N. of Otsego Street	Conc	1966	7-14-76	From Mansion St. N. to Franklin			
					NBOL	0.34	0.38	0.36
					NBIL	0.35	0.40	0.37
					SBOL	0.34	0.38	0.37
					SBIL	0.38	0.40	0.39
		Conc	1966	7-14-76	S. of Mansion Street			
					NBOL	0.33	0.37	0.35
					NBIL	0.32	0.35	0.34
					SBOL	0.39	0.44	0.41
					SBIL	0.38	0.40	0.39
Mbr 14031-06119	M-62 from Indiana State Line N. to US-12	Bit Conc	1976	7-19-76	NB	0.29	0.35	0.31
					SB	0.34	0.38	0.36
Mb 11021-03668 (Part)	US-12 BR from Phillip Road E. to US-31 - US-33 Junction in Niles	Bit Conc	1971	7-20-76	EB	0.52	0.53	0.53
					WB	0.53	0.56	0.54

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
Mb 11021-03668 (Part)	M-51 from NE Limits of Niles NE'ly 0.534 mile	Bit Conc	1971	7-20-76	NB	0.30	0.35	0.33
					SB	0.36	0.40	0.37
B02 of 11052	US-31 - US-33 over St. Joseph River In Berrien Springs	Rubberized Bit Conc	1967	7-20-76	NB	0.32	0.36	0.35
					SB	0.30	0.32	0.31
Control 11053	Northbound US-33 from Pleasant Street to Ship Street, City of St. Joseph	Conc	1953	7-20-76	NBOL	0.23	0.26	0.24
					NBIL	0.34	0.37	0.35
		Tranverse Grooved Conc			NBOL	0.22	0.27	0.25
					NBIL	0.38	0.40	0.39
Mb 76041-07719	M-71 from 800 ft. NW of Temporary I-69 NW'ly to Shiawassee Street in Corunna	Bit Agg	1976	7-21-76	N. of Shiawassee River			
					NB	0.45	0.52	0.48
					SB	0.39	0.44	0.43
		Bit Agg	1976	7-21-76	S. of Shiawassee River			
					NB	0.33	0.44	0.39
					SB	0.28	0.37	0.32
Mbr 44012-06103	M-24 from Columbiaville Road N'ly to M-46	Bit Conc	1975	7-21-76	N. of M-90			
					NB	0.39	0.54	0.47
					SB	0.38	0.55	0.47
		Bit Agg	1975	7-21-76	S. of M-90			
					NB	0.28	0.36	0.32
					SB	0.30	0.38	0.34
Control 82053	US-24 at Fenkell Road (Five Mile Road), Detroit	Bit *	1965	7-25-76	US-24			
					NBOL	0.30	0.32	0.31
					NB#3	0.34	0.35	0.34
					NB#2	0.36	0.37	0.36
					NBIL	0.35	0.37	0.36
					SBOL	0.37	0.37	0.37
					SBCL	0.38	0.40	0.39
					SBIL	0.41	0.42	0.41

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
Control 82053 (continued)		Bit *	1965	7-25-76	Five Mile Road			
					EBOL	0.40	0.46	0.44
					EBIL	0.39	0.48	0.44
					WBOL	0.40	0.43	0.42
					WBIL	0.45	0.49	0.47

(*) Experimental Mixture Type -- 50 lb 3BC + Asbestos Fiber + Asphalt.

OFFICE MEMORANDUM

DATE: November 16, 1976

TO: Donald E. Orne
Engineer of Traffic & Safety

FROM: L. T. Oehler

SUBJECT: Report of Pavements with Wsf Values Averaging Below 0.35
Research Project 54 G-74, 76 SA-2

In conformance with our continuing policy of reporting friction levels below 0.35, the attached list of 9 locations is furnished for your review. Listed friction levels were discovered during routine 1976 skid tests at the designated locations.

Commencing with 1976 data reports, additional information (construction year and test date) is being supplied, thereby complying with your December 16, 1975 request.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:cgc
Attachment

cc: K. A. Allemeier
R. Welke

Project Number	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction Low	High	Avg
Control 82053 (continued)		Bit *	1965	7-25-76	Five Mile Road			
					EBOL	0.40	0.46	0.44
					EBIL	0.39	0.48	0.44
					WBOL	0.40	0.43	0.42
					WBIL	0.45	0.49	0.47

(*) Experimental Mixture Type -- 50 lb 3BC + Asbestos Fiber + Asphalt.

Project Number	Location	Surface Type	Construction Year	Test Date	Direction & Lane	Coefficient of Wsf Low	High	Avg
38071, C6	M-50 - US-127 BR (Milwaukee St.) from 100-ft S. of Wesley Ave., N'ly to 250-ft N. of Otsego Street	Conc	1966	8-31-76	NBOL	0.39	0.46	0.42
					NBIL	0.29	0.35	0.32
					SBOL	0.35	0.38	0.37
					SBIL	0.37	0.40	0.39
38083, C4	M-50 - US-127 BR (Clinton St.) from Blackstone St., E. to Mechanic St.; also, N'ly on Milwaukee St. from Water St. to Michigan Avenue	Blackstone to Mechanic						
		Conc	1966	8-31-76	EBOL	0.34	0.36	0.35
					EBCL	0.38	0.42	0.41
					EBIL	0.40	0.41	0.40
		Water St. to Michigan Ave.						
		Conc	1966	8-31-76	NBOL	0.35	0.38	0.37
					NB#3	0.34	0.38	0.36
					NB#2	0.32	0.35	0.33
					NBIL	0.33	0.36	0.35
46011-09325	US-127 from 100-ft S. of Penn Central Railroad in Hudson N. to US-223	South of US-223						
		Bit Agg	1976	8-31-76	NB	0.50	0.52	0.51
					SB	0.37	0.42	0.40
		North of N. Adams Road						
		Bit Agg	1976	8-31-76	NB	0.31	0.35	0.34
					SB	0.39	0.44	0.41
		North of Quaker Road						
		Bit Agg	1976	8-31-76	NB	0.31	0.34	0.32
					SB	0.31	0.33	0.32
		North of Day Road						
		Bit Agg	1976	8-31-76	NB	0.39	0.41	0.40
					SB	0.36	0.40	0.39
62011-09276	M-82 from 586-ft W.of Connie Street, E'ly to Mechanic St. in Fremont	Bit Conc	1976	9-15-76	EBOL	0.38	0.39	0.39
					EBIL	0.29	0.34	0.32
					WBOL	0.33	0.37	0.35
					WBIL	0.43	0.47	0.45
98012-08779 (Control Section 77091)	US-25 from Concord St., NW'ly to the Black River in St. Clair County	Bit Conc	1975	7-28-76	NBOL	0.29	0.33	0.31
					NBIL	0.34	0.36	0.35
					SBOL	0.33	0.34	0.33
					SBIL	0.35	0.37	0.36