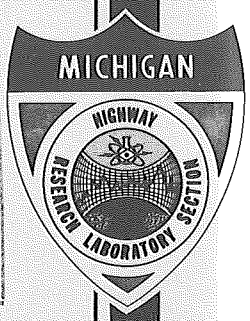
SUMMARIES OF MICHIGAN PAVEMENT SKID RESISTANCE 1969 TEST PROGRAM



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

MDSH REPORT NO. 249
TESTING AND RESEARCH DIVISION

SUMMARIES OF MICHIGAN PAVEMENT SKID RESISTANCE 1969 TEST PROGRAM

Physical Research Unit
Research Laboratory Section
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Research Project 54 G-74
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Michigan State Highway Commission
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CONTENTS

LEGEND

Direction of Test Vehicle

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

Lane Tested (noted following direction of test vehicle)

RT = right turn lane
OL = outer lane (traffic lane)
CL = center lane
IL = inner lane (passing lane)
LT = left turn lane
D = deceleration lane

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

SUMMARIES OF MICHIGAN PAVEMENT SKID RESISTANCE 1969 TEST PROGRAM

INTRODUCTION

During the 1969 calendar year, nearly 8,100 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 five basic categories are included:

I Conventional Concrete and Bituminous Pavements

II Pavements After Five Years of Service

III Experimental Pavement Surfaces

IV High-Accident Locations

V Special Request Tests

Explanatory remarks are presented at the beginning of each category of tabulated data. All High-Accident Location tests and Special Request 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 of 0.40 is generally considered the dividing point between "satisfactory" and "unsatisfactory" pavement surfaces and this has been arbitrarily defined as the Departmental Safety Standard. Surfaces with coefficient values of 0.35 to 0.40 are in a "transitional" or "questionable" range. Projects below 0.35 could be dangerous under wet conditions, depending on prevailing speeds, road alignment, and geometrics. Surfaces with coefficients of 0.20 or less are as slippery as packed snow.[1] Reference should be made to Research Report No. R-585 ("Summaries of Michigan Pavement Skid Resistance: 1965 Test Program") for information regarding operation of the skid-test device, selection of test areas, and verification retests.

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

SECTION I

CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENTS

CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENTS

Summarized in Section I are skid-tests representing over 1,000 lane miles of trunkline surfaces tested during 1969.

TABLE 1 -- Concrete Pavements Constructed in 1967, 1968, and 1969

1967 Construction

Initial skid tests were conducted on Project U 13042-003 after a two-year service period. Wet sliding friction (wsf) values ranged from 0.33 to 0.55. The only lane to average below the Departmental Safety Standard of 0.40 on this 1967 construction project was the EBOL with a value of 0.38.

1968 Construction

After one year of service, 44 lanes (63.352 lane miles) of 1968 concrete pavement construction were skid tested this year. Coefficients ranged from 0.32 to 0.64. Eight lanes, representing 17.3 percent of the total lane mileage, yielded average wsf values below 0.40, one of which was below 0.35. Five of the low friction level lanes were from Project Ms 63031-017.

1969 Construction

Twenty-two lanes (61.118 lane miles) of concrete pavement constructed during 1969 were tested during their initial service year. All lanes had average friction levels above 0.40 with values ranging from 0.39 to 0.67.

TABLE 2 -- Bituminous Concrete 4.12 Constructed in 1967, 1968, and 1969.

1967 Construction

Initial skid tests were conducted on Project Mb 63052-020 during 1969. All lanes were found to average above 0.40 during this project's second service year. Wsf values ranged from 0.39 to 0.54.

1968 Construction

One-year service coefficients were determined on 78 lanes (176.793 lane miles) of bituminous concrete pavement constructed during 1968. Of the lane miles tested, 94.4 percent (all but two lanes) were found to average above the Departmental Safety Standard. The two lanes below 0.40 were the EBOL and WBOL of Project M 82101-013 with respective average friction levels of 0.39 and 0.35.

1969 Construction

Seventy-two lanes (281.204 lane miles) of bituminous concrete pavement were skid tested during their initial year of service. Nine of the lanes, representing 14.6 percent of the lane miles tested, yielded average wsf values below 0.40. Most serious of the low friction level lanes were the NB and SB lanes of Project Mtb 41013-014 where friction levels ranging from 0.18 to 0.28 and averaging 0.21 were determined. Project Mtb 41013-014 represents only 1.1 percent of the 281.204 lane miles and is located on US 131 between M 44 and M 57. Other lanes with average wsf values below 0.40 ranged from 0.31 to 0.41 and were constructed as projects Mtb 11032-001, Mer 41051-007, and M 82021-018

TABLE 3 -- Bituminous Aggregate 4.11 Constructed in 1968 and 1969

1968 Construction

Twenty-two lanes of 1968 construction bituminous aggregate were tested after one year of service. Northbound and southbound lanes of M 55, east of M 33 (Part 1 of 2 of Project Mb 65022-003) yielded friction levels ranging from 0.27 to 0.35. These two lanes represent 8.6 percent of the total 138.776 lane miles tested and were the only lanes averaging below the Departmental Safety Standard.

1969 Construction

During the initial year of service, 18 lanes (119.606 lane miles) of bituminous aggregate surface course 4.11 were skid tested in 1969. Of these, five lanes, representing 35 percent of the lane mileage tested, had average wsf values below 0.40. Both lanes of M 66, South of the Osceola-Missaukee County Line, yielded low friction levels with wsf values ranging from 0.19 to 0.35.

TABLE 4 -- Miscellaneous Bituminous Surfaces Constructed in 1968 and 1969

NON-SKID SURFACE TREATMENT

1968 Construction

Three of the six non-skid surface treatment lanes (67 percent of the lane mileage) tested this year, after a two-year service period, had average friction levels below 0.40, with wsf values ranging from 0.22 to 0.48. The remaining three lanes yielded average friction levels of 0.40, 0.43, and 0.46.

1969 Construction

Eight lanes, 38.060 lane miles, of NSST were tested in their initial service year during 1969. All lanes indicated above average skid resistance qualities with coefficients ranging from 0.49 to 0.67.

STONE-FILLED SAND-ASPHALT AND SIMILAR SURFACES

1968 Construction

Wet sliding friction coefficients were determined on six sand-asphalt surfaces in 1969, during their second service year. Wsf values ranged from 0.42 to 0.66. Average values for all 32.170 lane miles tested were above the Departmental Safety Standard.

1969 Construction

During 1969 all but one of the 22 sand-asphalt lanes tested during their initial service year had average friction levels equal to or above the 0.40 Safety Standard. The one lane represents less than one percent of the 63.608 lane miles tested and had an average friction level of 0.39. The overall range of coefficients was 0.37 to 0.53.

The average of the average coefficients for each surface type are all above 0.40 except non-skid surface treatment tested during the first service year. Outstanding friction level averages were determined on concrete and non-skid surface treatment projects tested during initial service year and on bituminous aggregate and stone-filled sand-asphalt projects tested during the first service year. All yielded average friction levels of 0.50 or higher.

Surface Type	Service Year When Tested	Total Lanes Tested	Total Lane Miles Tested	Average Friction Level
Concrete	2	3	3.159	0.44
Concrete	1	44	63.352	0.46
Concrete	Initial	22	61.118	0.52
Bituminous concrete	2	4	3.520	0.48
Bituminous concrete	1	78	176.793	0.49
Bituminous concrete	Initial	72	281.204	0.48
Bituminous aggregate	1	22	138.776	0.50
Bituminous aggregate	Initial	18	119.606	0.47
NSST	1	6	51.600	0.39
NSST	Initial	8	38.060	0.59
Stone-filled sand-asphalt	1	6	32.170	0.52
Stone-filled sand-asphalt	Initial	22	63.608	0.44

TABLE 1
CONCRETE PAVEMENTS CONSTRUCTED IN 1967, 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1967	U 13042-003	I 94 BL comm. at I 69 thence E to US 27 in Marshall	Carl Goodwin & Son, Inc.	8-80 & 12-43	8-80 & 12-43	EBOL	0.33	0.43	0.38
						EBIL	0.50	0.55	0.52
						WBOL	0.39	0.42	0.41
1968	I 06111-009	I 75 comm. approx. 1400' SE of Maple Ridge Rd, thence NW'ly on I 75 reloc to Arenac-Ogemaw Co. Line	Sargent Constr. Co.	65-7	65-7	NBOL	0.54	0.56	0.55
						NBIL	0.54	0.56	0.55
						SBOL	0.53	0.55	0.54
						SBIL	0.54	0.55	0.54
	I 33044-037	I 496 from Waverly Rd E to W of Middle St, City of Lansing	Eisenhour Constr. Co.	41-46	19-33	EBOL	0.52	0.56	0.54
						EBIL	0.55	0.56	0.56
						WBOL	0.44	0.48	0.46
						WBIL	0.59	0.62	0.60
	F 41132-004	US 131 reloc comm. approx. 770' S of N Park St, thence N'ly to Post Rd	L. W. Edison	41-46	41-46	NBOL	0.41	0.42	0.42
						NBIL	0.59	0.64	0.62
						SBOL	0.35	0.35	0.35
						SBIL	0.51	0.55	0.53
	Ms 63031-017	Comm. on US 24 (Telegraph) at I 696 (NW exp.) thence N'ly on US 24 to 1220' N of 12 Mile Rd, City of Southfield	Anderson & Ruzzin, Inc.	E. C. Levy (Trenton & Dix)	63-55	NBOL	0.37	0.42	0.40
						NB#3	0.36	0.39	0.38
						NB#2	0.35	0.37	0.36
						NBIL	0.45	0.51	0.47
						SBOL	0.36	0.37	0.36
						SB#3	0.32	0.34	0.33
						SB#2	0.35	0.40	0.37
						SBIL	0.40	0.41	0.41
	BI 82251-054	On Chrysler Exp. from Edsel Ford Exp. to Clay Ave	L. A. Davidson	E. C. Levy (Dix)	47-15, 50-41 & 63-55	NBOL	0.47	0.48	0.48
						NB#3	0.38	0.40	0.39
						NB#2	0.43	0.44	0.44
						NBIL	0.52	0.52	0.52
						SBOL	0.38	0.41	0.40
						SB#3	0.40	0.43	0.42
						SB#2	0.47	0.51	0.48
						SBIL	0.47	0.52	0.50
	I 82252-079 BI 82252-118	I 75 comm. at a point 187.94' N of Holbrook Ave thence to a point 142.23' N of Carpenter	The Cooke Cont. Co.	E. C. Levy (Trenton & Dix)	63-7	NBOL	0.40	0.47	0.44
						NB#3	0.38	0.43	0.40
						NB#2	0.48	0.54	0.51
						NBIL	0.50	0.55	0.53
						SBOL	0.45	0.47	0.46
						SB#3	0.47	0.50	0.48
						SB#2	0.47	0.53	0.50
						SBIL	0.53	0.56	0.55

TABLE 1 (Cont.)
CONCRETE PAVEMENTS CONSTRUCTED IN 1967, 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1968 (CONT.)	BI 82252-173	Chrysler Fwy (I 75) in City of Detroit, from Carpenter to N of Victor	L. A. Davidson	E. C. Levy (Dix)	47-15	NBOL	0.40	0.47	0.44
						NB#3	0.36	0.38	0.37
						NB#2	0.48	0.50	0.49
						NBIL	0.41	0.52	0.47
						SBOL	0.40	0.46	0.42
						SB#3	0.36	0.43	0.40
						SB#2	0.40	0.43	0.42
						SBIL	0.51	0.55	0.53
1969	I 23081-002	I 496 comm. at I 96 thence E'ly to Waverly Rd	Eisenhour Constr. Co.	41-46	19-33	EBOL	0.54	0.56	0.55
						EBIL	0.54	0.58	0.56
						WBOL	0.52	0.53	0.52
						WBIL	0.54	0.56	0.55
	F 41132-021	US 131 reloc from S of Post Rd to S of 10 Mile Rd	Denton Constr. Co.	41-38	41-38	NBOL	0.61	0.65	0.63
						NBIL	0.56	0.62	0.58
						SBOL	0.63	0.64	0.63
						SBIL	0.64	0.67	0.65
	F 41132-022	US 131 reloc comm. S of 10 Mile Rd, thence NE'ly to N of 14 Mile Rd	Carl Goodwin & Sons, Inc. & L. W. Edison	41-46 & 41-48	41-46	NBOL	0.55	0.60	0.57
						NBIL	0.54	0.56	0.55
						SBOL	0.57	0.60	0.59
						SBIL	0.52	0.57	0.55
	USS 73081-004 U 73091-005	M 81 from 10th St E'ly and NE'ly on reloc reloc to 25th St, City of Saginaw	W. F. McNally	17-40	79-73	EBOL	0.43	0.47	0.45
						EBCL	0.44	0.47	0.45
						EBIL	0.44	0.50	0.47
						WBOL	0.41	0.50	0.46
						WBCL	0.40	0.43	0.41
						WBIL	0.43	0.50	0.47
	SS 76011-009 M 76011-010	M 52 (formerly M 47) comm. approx. 224' S of Bennington Rd, thence NE'ly to approx 330' N of Krouse Rd, S of Owosso	The Cooke Cont. Co.	19-48	19-48	NBOL	0.39	0.53	0.46
						NBIL	0.47	0.51	0.49
						SBOL	0.41	0.53	0.48
						SBIL	0.47	0.50	0.49

TABLE 2
BITUMINOUS CONCRETE (4.12) CONSTRUCTED IN 1967, 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1967	Mb 63052-020 Part 1 of 3	US 10 (Telegraph Rd) from 1550' N of Pontiac Lake Rd N to GTWRR	A & A Asphalt Paving Co.	63-4	63-4	NBOL	0.45	0.48	0.47
						NBIL	0.51	0.54	0.52
						SBOL	0.39	0.47	0.43
						SBIL	0.52	0.52	0.52
1968	Mb 08031-007	M 37 comm. at Calhoun-Barry Co. Line thence N'ly to Maple Grove Rd	Reith-Riley Const. Co., Inc.	39-1 & 41-38	8-58	NB	0.54	0.58	0.56
						SB	0.52	0.55	0.54
	Mb 12022-008 (Part 1 of 2)	US 12 E of Coldwater	John G. Yerington	Mat. Serivces Thornton, Ill	12-35	EB	0.51	0.53	0.52
						WB	0.52	0.57	0.55
	Mb 12022-008 (Part 2 of 2)	US 27 in Coldwater	John G. Yerington	Mat. Serivces Thornton, Ill	12-35	NBOL	0.40	0.42	0.41
						NBIL	0.42	0.48	0.45
						SBOL	0.38	0.41	0.40
						SBIL	0.41	0.45	0.43
	U 13042-003	WB I 94 BL comm. at I 69 thence E to US 27 in Marshall	Reith-Riley Const. Co., Inc.	39-1	39-1	EBIL	0.43	0.48	0.45
						WBOL	0.41	0.44	0.43
						WBIL	0.44	0.50	0.53
	Mb 13061-010	I 94 BL (Michigan Ave) from Elm St SE'ly to East City Limits of Battle Creek	Reith-Riley Const. Co., Inc.	39-1	13-30 & 13-79	EB	0.47	0.49	0.48
						WB	0.45	0.48	0.47
	Mtb 25052-006	M 54 BR (Saginaw St) in City of Flint, from Wager St N'ly to Carpenter Rd (N City Limits of Flint)	Flint Asphalt & Paving Co.	47-3	63-29	NBOL	0.44	0.45	0.44
						NBIL	0.47	0.48	0.48
						SBOL	0.41	0.43	0.42
						SBIL	0.44	0.44	0.44
	Mb 25073-005	M 54 from 1916' S of Hollywood Blvd NW'ly to Pine St in village of Pine Run	Saginaw Asphalt Paving Co.	71-29	79-73	NBOL	0.49	0.53	0.51
						NBIL	0.58	0.62	0.60
						SBOL	0.50	0.56	0.54
						SBIL	0.59	0.60	0.60
	Mb 25101-013	M 57 (State St) from 490' W of the W Village Limits of Montrose E'ly to 105' W of the E Village Limits of Montrose	Saginaw Asphalt Paving Co.	71-29	79-73	EBOL	0.54	0.58	0.56
						EBIL	0.45	0.48	0.47
						WBOL	0.45	0.50	0.48
						WBIL	0.44	0.47	0.45
	SS 34011-004	M 91 (Reloc) comm. approx. 411' E of M 44, thence N to approx. 1230' N of Ellis Rd	Reith-Riley Const. Co., Inc.	41-38	41-106	NB	0.64	0.66	0.65
						SB	0.58	0.61	0.60
	Mb 38082-002	I 94 BL from 1160' W of M 60 E'ly to 35' W of Brown St (W City Limits of Jackson) Also on I 94 BL from 30' E of East St in City of Jackson E'ly to W of US 127	Workman Richardson Asphalt Co.	Maumee Stone Findlay, Ohio	46-28	EBOL	0.41	0.47	0.45
						EBIL	0.38	0.45	0.42
						WBOL	0.37	0.50	0.43
						WBIL	0.43	0.46	0.45

1968 (CONT.)

TABLE 2 (Cont.)
BITUMINOUS CONCRETE (4.12) CONSTRUCTED IN 1967, 1968 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
M 41051-005	M 44 comm. at 28th St thence N, City of Grand Rapids	Michigan Colprovia	41-22	41-39	NBOL	0.43	0.45	0.44
					NBIL	0.43	0.45	0.44
					SBOL	0.40	0.44	0.41
					SBIL	0.44	0.48	0.46
Mb 44011-005	M 24 from S of Braur Rd N'ly to 3684' S of Turrill Rd	Ayling-Cunningham Asphalt Paving Co.	63-4	63-4	NB	0.59	0.60	0.60
					SB	0.56	0.59	0.58
Mb 44031-003	M 53 from the Macomb-Lapeer Co. Line N'ly to 250' N of Water St in the Village of Almont	Ayling-Cunningham Asphalt Paving Co.	63-4	63-4	NB	0.55	0.58	0.57
					SB	0.52	0.54	0.53
Mb 62011-003	M 20 & M 82 from 1700' E of W intersection of M 20 & M 82 E'ly to 100' E of C & O RR Tracks in City of Fremont	Reith-Riley Const. Co., Inc.	41-38	62-25	EB	0.58	0.60	0.59
					WB	0.54	0.55	0.55
Mb 63052-020 (Part 2 of 3)	US 10 BR (Oakland Ave) from 230' S of Clark St NW 0.956 mi	A & A Asphalt Paving Co.	63-4	63-4	NBOL	0.42	0.42	0.42
					NBCL	0.46	0.48	0.47
					NBIL	0.48	0.49	0.48
Mb 63052-020 (Part 3 of 3)	US 10 BR from 835' NW of Cass Ave & Montcalm St NW 0.950 mi	A & A Asphalt Paving Co.	63-4	63-4	NBOL	0.41	0.43	0.42
					NBIL	0.44	0.48	0.46
					SBOL	0.39	0.42	0.41
					SBIL	0.42	0.42	0.42
Mb 64011-008	US 131 from the Muskegon-Oceana Co. Line N'ly 2 mi	Laman Asphalt Paving Co.	67-2	67-2	NB	0.58	0.59	0.58
					SB	0.57	0.59	0.58
Ms 78022-008	US 12 from 0.5 mi W of White School Rd E'ly to M 66 in Sturgis	John G. Yerington Co.	39-1	12-35	EB	0.54	0.58	0.56
					WB	0.52	0.53	0.52
Mtb 82071-015	US 25 & M 17 (Oakwood Blvd) from 90' W of Schaefer Hwy in Melvindale NE'ly to Denmark Ave in City of Detroit	Ajax Asphalt Paving Inc.	47-3	47-3	NBOL	0.46	0.49	0.48
					NBIL	0.51	0.54	0.53
					SBOL	0.50	0.53	0.51
					SBIL	0.53	0.54	0.53
M 82101-013	M 14 comm. on Hines Drive, thence E'ly to Morcedes Rd, City of Livonia	A & A Asphalt Paving Co.	47-3	63-7	EBOL	0.37	0.40	0.39
					EBIL	0.39	0.41	0.40
					WBOL	0.35	0.36	0.35
					WBIL	0.42	0.43	0.42

TABLE 2 (Cont.)
BITUMINOUS CONCRETE (4.12) CONSTRUCTED IN 1967, 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1968 (CONT.)	Mb 82121-011	I 96 BS (Grand River Ave) from I 94 SE to Trumbull Ave	The Cooke Contracting Co.	50-35 & 63-4	63-4	EBOL	0.48	0.49	0.48
						EBIL	0.52	0.53	0.52
						WBOL	0.48	0.49	0.49
						WBIL	0.47	0.51	0.49
	Mb 82121-013	I 96 BS (Grand River Ave) from Freeland Ave to 190' S of Dundee Ave & from W Grand Blvd to I 94, City of Detroit	Detroit Asphalt Paving Co.	47-3	47-3	EBOL	0.41	0.42	0.42
						EBIL	0.44	0.47	0.45
						WBOL	0.40	0.42	0.41
						WBIL	0.44	0.46	0.45
	Mb 82131-010	US 10 (Woodward Ave) from Adams St NW'ly to West Grand Blvd, City of Detroit	Ajax Asphalt Paving Inc.	E. C. Levy (Dix)	E. C. Levy (Dix)	NBOL	0.44	0.45	0.44
						NBCL	0.44	0.48	0.46
						NBIL	0.44	0.48	0.46
						SBOL	0.43	0.44	0.43
						SBCL	0.48	0.49	0.48
						SBIL	0.48	0.51	0.50
	Mb 83021-009[1]	M 55 from the E intersection of M 115 E'ly to Balsam St, City of Cadillac	The Hicks Co.	83-12	83-12	EB	0.51	0.54	0.53
						WB	0.48	0.53	0.51
	Group Mm 9BA-5A	US 31 BR (Colby St) from C&O RR overpass in Whitehall N'ly to the RR track in Montague in cities of Whitehall & Montague	Rieth-Riley Const. Co., Inc.	75-5	70-9	NB	0.50	0.51	0.51
						SB	0.50	0.51	0.51
1969	F 07013-004	US 41 from 400' S of old US 41 (N of Asinnins) N'ly to the Baraga-Houghton Co. Line	Geo. Hocking Construction Co.	31-30	Isle Royal #4 Stump Sand (Shore Sand-Houghton Location)	NB	0.58	0.68	0.63
						SB	0.60	0.67	0.63
	Mtb 11032-001	M 139 (Paw Paw Ave) from I 94 BL (Main St) N'ly to US 31 & US 33, City of Benton Harbor	John G. Yerington	Mat. Services Thornton, Ill	11-30	NB	0.37	0.41	0.39
						SB	0.33	0.36	0.35
	Mtb 12031-013	Old US 27 from the Indiana State Line N'ly intermittenly to the Branch-Calhoun Co. Line	Rieth-Riley Const. Co., Inc.	Mat. Services Thornton, Ill	12-35	NB	0.50	0.61	0.54
						SB	0.46	0.60	0.54
	Mtb 13071-010	US 27 from the Branch-Calhoun Co. Line N'ly to City of Marshall	Rieth-Riley Const. Co., Inc.	Mat. Services Thornton, Ill	12-31 & 12-35	NB	0.50	0.53	0.51
						SB	0.47	0.49	0.48

[1] See also Bit Agg. 83021-008

TABLE 2 (Cont.)
BITUMINOUS CONCRETE (4.12) CONSTRUCTED IN 1967, 1968 AND 1969

1969 (CONT.)

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Ms 19031-007	US 27 from 775' N of Northcrest Rd N'ly to 449' S of Clark Rd	Spartan Asphalt Paving Co.	47-3	47-43	NBOL	0.45	0.46	0.46
					NBIL	0.47	0.48	0.47
					SBOL	0.41	0.44	0.43
					SBIL	0.41	0.43	0.42
Mb 23011-005	M 78 from Barry-Eaton Co. Line NE'ly to West Village Limits of Bellevue	Rieth-Riley Const. Co., Inc.	39-1	13-30 & 13-79	EB	0.43	0.47	0.45
					WB	0.44	0.47	0.46
Ms 23042-009	M 43 (Saginaw St) from 1100' E of Creitz Rd E'ly to 340' E of Theo Ave	Rieth-Riley Const. Co., Inc.	47-3	23-92	EBOL	0.50	0.52	0.51
					EBIL	0.50	0.52	0.51
					WBOL	0.53	0.56	0.55
					WBIL	0.54	0.57	0.56
Mtb 25052-007	M 54 BR (Saginaw St) from Carpenter Rd (N City Limits of Flint) N'ly to the S City Limits of Mt. Morris	Flint Asphalt & Paving Co.	63-4	63-54	NBOL	0.52	0.55	0.53
					NBIL	0.54	0.55	0.55
					SBOL	0.55	0.55	0.55
					SBIL	0.56	0.57	0.57
Mtb 25052-008	M 54 BR (Saginaw St) from the S City Limits of Mt. Morris N'ly to M 54 (Dort Hwy)	Flint Asphalt & Paving Co.	47-3	63-54	NBOL	0.57	0.59	0.58
					NBIL	0.53	0.57	0.55
					SBOL	0.54	0.56	0.55
					SBIL	0.52	0.53	0.52
Mb 25081-008	M21 (Court St) from 274' W of Ann Arbor St E'ly to M 54 BR (Saginaw St)	Spartan Asphalt Paving Co.	47-3	63-54	EBOL	0.43	0.45	0.44
					EBIL	0.42	0.44	0.43
					WBOL	0.41	0.41	0.41
					WBIL	0.41	0.45	0.42
Mb 31012-005 (Part 1 of 2)[2]	M 25 from Co. Rd #540 (Kearsarge in Painesdale) NE'ly to Dollar Bay Rd, omitting Cities of Houghton & Hancock	Mathy Const. Co. LaCrosse, Wisconsin	31-63	Isle Royal #4 Stamp Sand (Shore Sand-Houghton Location)	NB	0.61	0.63	0.62
					SB	0.56	0.58	0.57
F 33021-003 & F 33092-001	M 52 comm. 500' S of M 36 Eastbound (Topping Rd) thence N to I 96	Howell Const. Co.	47-3	47-26	NB	0.58	0.62	0.60
					SB	0.58	0.61	0.60
Mtb 33032-016	Old US 127 (Cedar St) from 631' S of Miller Rd S'ly to 1913' N of Howell Rd	Spartan Asphalt Paving Co.	47-3	47-43	NBOL	0.48	0.52	0.49
					NBIL	0.55	0.56	0.55
					SBOL	0.51	0.54	0.52
					SBIL	0.55	0.58	0.57
Mtb 41013-014[3]	US 131 from M 44 N'ly to M 57	Rieth-Riley Const. Co., Inc.	41-38	41-50	NB	0.18	0.28	0.21
					SB	0.18	0.25	0.21

[2] Part 2 of 2 is a Bit Agg. project

[3] See also 69 SR-8

TABLE 2 (Cont.)
BITUMINOUS CONCRETE (4.12) CONSTRUCTED IN 1967, 1968 AND 1969

1969 (CONT.)

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mer 41051-007	M 44 from 345' S of Cascade Rd N'ly intermittently to 250' N of Knapp St	Woodland Paving Co., Inc.	41-38	41-27	NB	0.34	0.39	0.37
					SB	0.37	0.39	0.38
Mb 50061-001	11 Mile Rd from 500' E of Dequindre Rd E'ly to 642' W of M 97 (Groesbeck Hwy) Cities of Warren & Centerline	The Cooke Contracting Co.	50-35	50-35	EB	0.41	0.44	0.43
					WB	0.43	0.46	0.45
Mb 50092-005	M 19 from a point N of New Haven Rd thence N'ly to N of Main St in Village of Muttonville	Detroit Conc. Products Corp.	50-35	50-35	NB	0.46	0.53	0.49
					SB	0.47	0.50	0.48
Mb 78012-004 (Part 1 of 2)	US 131 from US 12 N'ly to M 60 omitting 0.82 miles in Village of Constantine	Rieth-Riley Const. Co., Inc.	39-1	78-25	NB	0.42	0.46	0.44
					SB	0.42	0.45	0.43
Mb 78012-004 (Part 2 of 2)	US 131 BL from Portage St in City of Three Rivers N'ly to US 131	Globe Const. Co.	39-1	39-4	NB	0.42	0.46	0.44
					SB	0.46	0.48	0.47
M 82021-018	I 94 comm. 0.588 mi W of the Wayne-Washtenaw Co. Line thence E'ly 7.859 mi	The Cooke Contracting Co.	47-3	47-3	EBOL	0.31	0.35	0.33
					EBIL	0.34	0.38	0.35
					WBOL	0.34	0.36	0.35
					WBIL	0.46	0.48	0.47
Mb 82131-011 (Part 1 of 2)	US 10 (Woodward Ave) comm. at Clairmount St, thence NW'ly to Tuxedo St	Detroit Asphalt Paving Co.	47-3	50-41	NBOL	0.43	0.46	0.45
					NBIL	0.47	0.49	0.48
					SBOL	0.44	0.47	0.45
					SBIL	0.47	0.48	0.48
Mb 82131-011 (Part 2 of 2)	US 10 comm. at 6 Mile Rd (McNichols Rd) thence NW'ly to approx. 700' SE of 8 Mile Rd	Detroit Asphalt Paving Co.	47-3	50-41	NBOL	0.45	0.51	0.48
					NB#4	0.48	0.51	0.49
					NB#3	0.48	0.51	0.50
					NB#2	0.55	0.60	0.58
					NBIL	0.61	0.65	0.63
					SBOL	0.48	0.51	0.50
					SB#4	0.50	0.51	0.51
					SB#3	0.46	0.50	0.47
					SB#2	0.52	0.53	0.52
					SBIL	0.50	0.56	0.53
Group Mm 9BC-6A	EB M 78 from Clinton-Shiawassee Co. Line NE'ly 5.1 mi & on WB M 78 from M 47 SW'ly 2.2 mi in Shiawassee Co.	Spartan Asphalt Paving Co.	41-38	76-43	EBOL	0.42	0.46	0.45
					EBIL	0.51	0.55	0.54
					WBOL	0.43	0.44	0.43
					WBIL	0.51	0.55	0.53

TABLE 3
BITUMINOUS AGGREGATE (4.11) CONSTRUCTED IN 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1968	Mb 11074-003	M 62 from Berrien-Cass Co. Line E to M 40, W of Dowagiac	Klett Constr. Co.	23-84	23-84	EB	0.51	0.53	0.52
						WB	0.54	0.57	0.56
	Mb 14051-002	M 119 from US 12 N'ly to M 60 Village of Vandalia	John G. Yerington Co.	14-57	14-57	NB	0.51	0.56	0.54
						SB	0.50	0.54	0.51
	Mb 23091-003	M 99 comm. at Crawford Rd in Jackson Co., thence N'ly on M 99 to the N City Limits of Eaton Rapids	Workman-Richardson Asphalt Co.	38-73	38-73	NB	0.50	0.54	0.52
						SB	0.50	0.52	0.51
	M 27022-003	US 2 from approx. 3000' SE of Jackson Creek SE'ly intermittently on existing trunkline to approx. 2300' SE of Slate River (Six patches)	Payne & Dolan	27-67	27-67	EB	0.60	0.65	0.63
						WB	0.62	0.68	0.66
	Mb 32051-003	M 19 from Huron Line Rd N to M 142	Ann Arbor Constr. Co.	32-11	32-11	NB	0.56	0.67	0.61
						SB	0.54	0.67	0.61
	SS 60011-004	M 33 comm. approx. 1200' S of Co. Rd 612 thence N'ly to M 32	Lake & Howell Const. Co.	60-24	60-24	NB	0.52	0.53	0.53
						SB	0.50	0.53	0.52
	Mb 65022-003 (Part 1 of 2)	M 55 from M 33 E approx. 6 mi. to Henderson Lake Rd	Central Paving Co.	60-7	60-7	EB	0.27	0.32	0.29
						WB	0.32	0.35	0.33
	Mb 65022-003 (Part 2 of 2)	M 33 and M 72 from Mio N and E to Fairview	Lake & Howell Const. Co.	60-24	60-24	NB	0.40	0.51	0.46
						SB	0.37	0.55	0.46
	Mtb 77022-008	Old M 21 (Lapeer St) from M 21 reloc E'ly to the W City Limits of Port Huron	Blue Water Asphalt Co., Inc.	77-25	77-25	EB	0.36	0.49	0.42
						WB	0.34	0.50	0.43
	Mb 83021-008	M 55 from 180' W of Co. Rd 21 E'ly to W intersection of M 115	The Hicks Co.	83-12	83-12	East End of Project[1]			
						EB	0.45	0.46	0.45
						WB	0.42	0.45	0.43
						West End of Project[1]			
						EB	0.50	0.54	0.52
						WB	0.48	0.51	0.49

[1] See 69 SR-1

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE (4.11) CONSTRUCTED IN 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
1969	Mb 07041-006	M 38 from 550' E of Co. Rd #651 (Pelke Rd) E'ly to 0.3 mi E of E Limits of Baraga	Fox Valley Constr. Co.	07-46 & 07-44	07-46 & 07-44	EB WB	0.51 0.55	0.55 0.56	0.53 0.55
	SS 17072-004	M 129 comm. at Tone Rd, thence N'ly to Dafter Rd	Hodgkiss & Douma	17-72	17-72	NB SB	0.60 0.58	0.64 0.61	0.61 0.59
	Mb 31012-005 (Part 2 of 2)[2]	M 203 from Calumet S'ly to US 41	Mathy Construction Co.	31-63	Isle Royal #4 Stamp Sand (Shore Sand-Houghton Location)	NB SB	0.61 0.60	0.62 0.62	0.61 0.61
	Mb 48042-004	M 28 from 0.61 mi E of M 117 to Luce-Chippewa Co. Line, on M 28 0.5 mi and 2.0 mi E of Luce-Chippewa Co. Line	Geo. Hocking Constr. Co.	48-6	48-6	EB WB	0.34 0.35	0.57 0.47	0.45 0.42
	Mb 57011-003	M 66 from Osceola-Missaukee Co. Line N'ly and W'ly to M 42 omit from WB M 55 to EB M 55	The Hicks Co.	57-29 & 57-2	57-29 & 57-2	NB SB	0.21 0.31	0.45 0.45	0.33 0.37
	SS 62014-001	On proposed M 20 comm. at M 82 in Hesperia E'ly to Crosswell Ave	Rieth-Riley Constr. Co., Inc.	62-54	----	EB WB	0.44 0.45	0.50 0.44	0.47 0.47
	F 62032-003	M 37 comm 900' N of N Limits of White Cloud thence N 2400'	Rieth-Riley Constr. Co., Inc.	54-21	54-21	NB SB	0.51 0.54	0.54 0.57	0.52 0.56
	Mb 67032-003 (Part 1 of 2)	M 66 from M 115 N'ly to Osceola-Missaukee Co. Line	Rieth-Riley Constr. Co., Inc.	54-40	54-40	NB SB	0.25 0.19	0.34 0.35	0.28 0.25
	Mb 67032-003 (Part 2 of 2)	M 115 1.5 mi SE of M 66 and 1.0 mi NW of M 61	Rieth-Riley Constr. Co., Inc.	54-40	54-40	EB WB	0.37 0.41	0.43 0.46	0.39 0.44

[2] Part 1 of 2 is a Bit Conc project

TABLE 4
MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1968 AND 1969

	Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
				Coarse	Fine		Low	High	Avg
	NSST (SINGLE AND DOUBLE)								
1968	Mm 9SC-3A	M 61 from Clare-Osceola Co. Line - E 2.1 mi. Also on M 61 from Clare-Osceola Co. Line - W 2.5 mi.	Comstock Constr. Co.	71-15	----	EB	0.42	0.44	0.43
						WB	0.36	0.37	0.37
	Mm 9SC-4A	M 32 from 7.8 mi E of Montmorency-Otsego Co. Line E'ly to village of Atlanta	Gilland Constr. Co.	71-15	71-15	EB	0.22	0.48	0.38
						WB	0.24	0.37	0.29
	Mm 9SC-4B	M 72 from 0.5 mi E of I 75 BL E'ly 6.2 mi, Grayling Twp., Crawford Co.	Yockey Constr., Inc.	71-15	71-15	EB	0.34	0.45	0.40
						WB	0.42	0.49	0.46
1969	Mm 0SC-8A	M 52 from Jct. with US 12 Northerly to intersection of Austin Rd, Washtenaw Co.	Detroit Concrete Products Corp.	47-3	----	NB	0.62	0.63	0.63
						SB	0.65	0.66	0.66
	Mm 9SC-7C Part 1 of 2	On WB M 60 at E Jct. of M 99	Spartan Asphalt Paving Co.	12-31	----	WBOL	0.49	0.50	0.50
						WBIL	0.55	0.59	0.57
	Mm 9SC-7C Part 2 of 2	M 79 from W City Limits of Charlotte W'ly 4.2 miles, Calhoun & Eaton Cos.	Spartan Asphalt Paving Co.	12-31	----	EB	0.52	0.54	0.53
						WB	0.54	0.55	0.54
	Mm 9SC-9A	M 154 from Ferry landing, S'ly to Bates Highway on Harsens Island in St. Clair Co.	Sheldon Contr. Inc.	47-3	----	NB	0.60	0.66	0.63
						SB	0.60	0.67	0.63
	STONE FILLED SAND ASPHALT AND SIMILAR SURFACES								
1968	Ms 77032-007	US 25 BR from 315' SW of M 29 in Marysville NE'ly to Dove St in Port Huron . Cities of Marysville & Port Huron	Detroit Conc. Products Corp.	17-40	74-51	NBOL	0.44	0.45	0.45
						NBIL	0.48	0.50	0.49
						SBOL	0.42	0.44	0.43
						SBIL	0.49	0.53	0.51
	Mb 79062-003	M 81 from 2138' SW of Green Rd NE'ly & E'ly to M 53. Village of Cass City.	Strausberg & Son Co.	32-4	79-78	EB	0.58	0.63	0.61
						WB	0.60	0.66	0.63
1969	Ms 11013-010	I 94 BL (Main St) from NB M 139 (Paw Paw Ave) E'ly to SB M 139 (Fair Ave) Berrien Co.	J. G. Yerington Co.	Material Service Thornton, Ill	11-30	EBOL	0.40	0.44	0.42
						EBIL	0.41	0.43	0.42
						WBOL	0.37	0.41	0.39
						WBIL	0.39	0.41	0.40
	Mb 46062-007	US 223 from bridge over Raisin River in Palmyra SE to 85' SE of North Lane St in City of Blissfield.	Ayling-Cunningham Asphalt Paving Co., et al	----	46-28	EB	0.49	0.51	0.50
						WB	0.48	0.50	0.49
	Mb 46101-007	US 12 from 150' E of Pentecost Hwy E to Lenawee-Washtenaw Co. Line omitting from 350' E of Raisin River in Clinton E'ly to E village limits of Clinton	Ayling-Cunningham Asphalt Paving Co., et al	France Stone Co Waterville, Ohio	46-28	EB	0.43	0.44	0.44
						WB	0.41	0.44	0.43
	Ms 69014-012	SB I 75 from 2400' N of Old US 27 N'ly 2800' (N of Vanderbilt)	Lake & Howell Const., Co.	71-15	72-5	SBOL	0.47	0.49	0.48
						SBIL	0.51	0.53	0.52
	Mb 75021-010	US 2 from M 149 to E City Limits of Manistique	Lake & Howell Const., Co.	75-5	70-9	EB	0.41	0.46	0.43
						WB	0.42	0.46	0.44
	Mb 76041-006 Part 1 of 2	M 21 (Main St) from W city of Owosso (Chestnut St) E'ly to E city Limits of Owosso (Gould St) omitting from Shiawassee River to Ball St	Saginaw Asphalt Paving Co.	17-40	73-5	EBOL	0.40	0.42	0.41
						EBIL	0.42	0.44	0.44
						WBOL	0.39	0.44	0.42
						WBIL	0.41	0.46	0.44
	Mb 76041-006 Part 2 of 2	M 71 (Corunna St) from Washington St in Owosso SE'ly & S'ly to intersection of Shiawassee St & McNeil St in Corunna	Saginaw Asphalt Paving Co.	17-40	73-5	NBOL	0.43	0.44	0.43
						NBIL	0.45	0.48	0.46
						SBOL	0.44	0.46	0.45
						SBIL	0.45	0.47	0.46
	MB 79031-007	M 15 (State St) from 400' N of S village limits of Millington N'ly to 300' N of Ellis Rd. Village of Millington	Saginaw Asphalt Paving Co.	75-5	79-8	NB	0.46	0.47	0.46
						SB	0.45	0.47	0.46

SECTION II

FRICTION LEVELS DETERMINED FOR PAVEMENTS AFTER FIVE YEARS OF SERVICE

FRICTION LEVELS DETERMINED FOR PAVEMENTS AFTER FIVE YEARS OF SERVICE

Tables 5 and 6 contain skid test results from 38 portland cement concrete projects consisting of 93 lanes which were constructed during 1964. Thirty-two of these projects, tested in 1965 after one year's service, had an average wsf coefficient of 0.50 with friction levels on the outer (traffic) lanes averaging 0.03 lower than the inner (passing) lanes. The remaining six projects were not initially tested until 1966, their second year of service. Friction levels determined on those averaged 0.41 with the outer lanes' friction level averaging 0.04 lower than the inner lanes' level. These same 38 projects were retested in 1969 after five years of service and friction levels on 23 lanes tested (16.0 percent of the total lane miles) were below the Departmental Safety Standard. The average coefficient of friction as determined during the fifth service year was 0.46, 0.02 lower than the average initially tested value.

Tables 7, 8, and 9 contain wsf values representing the performance of 53 bituminous concrete projects which were constructed during 1964. In 1964, initial year skid tests were conducted on one project and yielded average wsf values of 0.26 and 0.28. Forty-nine projects were tested during their first service year, 1965. No significant difference was apparent between inside and outside lanes as friction levels averaged 0.45 for both. Three projects were not initially tested until their second year of service. Of these, four outside (traffic) lanes averaged 0.43 while two inside (passing) lanes averaged 0.33. During 1969, all 53 projects were retested. Friction levels as tested at the five-year service level average 0.09 higher than the initially tested values determined in 1964, 1965, and 1966.

Contained in Tables 10 and 11 are results of skid tests performed on 13 bituminous aggregate projects (24 lanes) constructed during 1964. Two lanes were initially tested in 1964 and at that time yielded average friction levels of 0.32 and 0.34, well below the Departmental Safety Standard. Twenty-two lanes were initially tested during 1965, their first service year. Average coefficients on these ranged from 0.41 to 0.61 and averaged 0.52. Departing from normal trends the outer lane friction levels averaged 0.05 higher than the inner lanes. Skid tests conducted after five service years yielded average wsf values ranging from 0.47 to 0.69, indicating excellent performance on the 163.154 lane miles tested.

Table 12 contains results of skid tests conducted in 1965 and 1969 on the prime and single seal project F 04021 B, C2 constructed in 1964. In 1965, after one year of service, friction levels of 0.42 and 0.45 were determined. Retests at the five-year level show increased skid resistance in both lanes with average wsf values of 0.44 and 0.51.

Tables 13, 14, and 15 summarize skid data for portland cement concrete, bituminous concrete, and bituminous aggregate projects, respectively.

Portland cement concrete, bituminous concrete, and bituminous aggregate pavements constructed in 1963 and 1964, which had skid tests conducted at the one- and five-year service level, were selected for further study. Good correlation was found between one- and five-year coefficients; making it possible to predict, within certain confidence limits, a five-year friction level from a one-year value. Following is a summary of determinations made from 253 lanes studied.

Portland Cement Concrete

One hundred and four portland cement concrete lanes yielded an average one-year coefficient of 0.54 The average five-year value was 0.52, or 0.02 lower.

60/70 Penetration Bituminous Concrete

The average one-year friction level determined on 55 lanes of 60/70 penetration bituminous concrete was 0.45. The average five-year level was 0.50, thereby indicating an increase of 0.05 in skid resistance after five years of service.

85/100 Penetration Bituminous Concrete

At the one- and five-year service level, average coefficients of 0.48 and 0.52, respectively, were determined on 78 lanes of 85/100 penetration bituminous concrete. An average increase of 0.04 is indicated for this surface type.

150/175 Penetration Bituminous Aggregate

To date, only 16 lanes of 150/175 penetration bituminous aggregate have had one- and five-year skid tests conducted. Test results show an

average increase in skid resistance of 0.07 after five years of service. The one- and five-year coefficients averaged 0.56 and 0.63, respectively.

In general it appears that traffic and the elements tend to polish portland cement concrete surfaces and slightly reduce the skid resistance qualities after five years of service. Bituminous pavements have had surface oils flushed away and, in general, show an increase in skid resistance at the five year level. Once surface oils have been removed from bituminous surfaces, skid coefficients will probably decrease as exposed aggregates polish.

TABLE 5
CONCRETE PAVEMENTS TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1965	1969
BI 03034B, C9	I 196 from N of Adams Rd. N to Washington Rd.	Carl Goodman & Sons, Inc.	Pits 3-65, 17-40 & 70-9	Pits 3-47 & 3-65	NBOL	0.55	0.56
					NBIL	0.59	0.69
					SBOL	0.55	0.53
					SBIL	0.60	0.66
F 13121B, C1	I 94 BL from Columbia Ave. NE to Dickman Rd.	Titus Construction Co.	Pit 8-80	Pit 8-5	NB	0.56	0.52
					SB	0.54	0.47
U 13121E, C2 U 13121E, C3	I 94 BL from 20th St. in Springfield E to Upton Ave. in Battle Creek	Titus Construction Co.	Pits 8-20 & 8-80	Pit 8-5	EBOL	0.42	0.31
					EBIL	0.47	0.34
F 39051B, C6	US 131 BR from US 131 (S of "G" Ave.) E to N limits of Kalamazoo	Sargent Construction Co.	Pit 3-44	Pit 3-44	EBOL	0.65	0.61
					EBIL	0.65	0.70
					WBOL	0.59	0.51
					WBIL	0.65	0.69
I 41027A, C24 I 41027D, C56 I 41027E, C58 I 41027A, C163 I 41027B, C164 I 41029 E, C1 I 41029F, C6 I 41029F, C8	I 196 from Fuller Ave. SW to Turner Ave.	Carl Goodwin & Sons, Inc.	Pit 41-46	Pit 41-46	NEBOL	0.50	0.42
					NEBCL	0.50	0.42
					NEBIL	0.51	0.46
					SWBOL	0.49	0.43
					SWBCL	0.49	*
					SWBIL	0.51	0.46
I 41029E, C3 I 41029D, C37 I 41029B, C54	I 196 from 0.762 mi SW of Wyoming NE to the Grand River in Grand Rapids	L. W. Edison	Pit 41-16	Pit 41-16	NBOL	0.47	0.40
					NBIL	0.52	0.48
					SBOL	0.50	0.39
					SBIL	0.51	0.47
I 41029A, C35 I 41029B, C36	I 196 from the Ottawa-Kent Co. Line NE to 0.762 mi SW of Wyoming	L. W. Edison	Pit 41-16	Pit 41-16	NBOL	0.51	0.39
					NBIL	0.54	0.46
					SBOL	0.51	0.39
					SBIL	0.54	0.40
Mb 50091A, C2 F 50092A, C1	M 19 from I 94 NW to the St. Clair-Macomb Co. Line	Anderson & Ruzzin, Inc.	E. C. Levy (Dix Yd.)	Pit 50-35	EB	0.58	0.51
					WB	0.58	0.51
BI 50111H, C11	I 94 from N of 14 Mile Rd. N to Clinton River Spillway	Cooke Contracting Co.	E. C. Levy (Dix Yd.)	Pit 50-21	NBOL	0.47	0.43
					NBCL	0.53	0.51
					NBIL	0.58	0.57
					SBOL	0.44	0.41
					SBCL	0.53	0.46
					SBIL	0.55	0.52

* Not Tested

TABLE 5 (Cont.)
CONCRETE PAVEMENTS TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1965	1969
BI 50111G, C41	I 94 from Masonic Blvd. N to N of 14 Mile Rd., St. Clair Shores	Cooke Contracting Co.	Pit 63-4 & E. C. Levy (Dix Yd.)	Pits 50-21 & 63-4	NBOL	0.45	0.40
					NBCL	0.45	0.44
					NBIL	0.53	0.45
					SBOL	0.47	0.41
					SBCL	0.49	0.47
					SBIL	0.57	0.43
F 52043B, C4	US 41 from NW of M 94 NW to Green Garden Hill Rd. (omitting 0.47 mi at the Chocolay River)	L. W. Brumm	Pits 52-38 & 52-39	Pit 52-9	NB	0.58	0.50
					SB	0.59	0.54
F 62031C, C10	M 37 - M 46 from S of S Limits of Newaygo N to Wood St. in Newaygo	Eisenhour Construction Co., Inc.	Pit 67-2	Pits 62-16 & 67-2	NBOL	0.46	0.37
					NBIL	*	0.33
					SBOL	0.43	0.39
					SBIL	*	0.34
F 63041E, C7	M 59 from Airport Rd. to Elizabeth Lake Rd.	Eisenhour Construction Co., Inc. & T. A. Forsberg, Inc.	Pit 63-54	Pit 63-54	EBOL	0.38	0.31
					EBIL	0.42	0.33
					WBOL	0.38	0.33
					WBIL	0.42	0.32
EBBU 63081B, C2	I 696 from SE of M 39 NW to Lee Baker Rd.	The Kutchins Co.	E. C. Levy (Dix Yd.)	Pit 63-7	NBOL	0.39	0.46
					NBIL	0.42	0.49
					SBOL	0.38	0.43
					SBIL	0.41	0.44
EBBU 63081A, C9	I 696 from Northland Drive to Winona St.	The Kutchins Co.	E. C. Levy (Dix Yd.)	Pit 63-7	NBOL	0.42	0.40
					NBCL	0.42	0.46
					NBIL	0.44	0.48
					SBOL	0.39	0.40
					SBCL	0.42	0.44
					SBIL	0.45	0.46
BI 77111E, C5 BI 77111F, C6	I 94 from N of Gratiot N & NE to N of Griswold Rd.	Sargent Construction Co.	Pit 75-5	Pit 50-26	NBOL	0.54	0.47
					NBIL	0.56	0.60
					SBOL	0.52	0.45
					SBIL	0.57	0.59
BI 77111G, C7 BI 77111H, C8	I 94 from N of Griswold Rd. NE to N of Water St.	Sargent Construction Co.	Pits 17-40 & 75-5	Pits 50-26 & 74-51	NBOL	0.51	0.49
					NBIL	0.53	0.57
					SBOL	0.48	0.43
					SBIL	0.52	0.56
F 82052G, C25	US 24 from Eureka St. N to Haskell St.	Cooke Contracting Co.	E. C. Levy (Trenton Yd.)	Pit 82-10	SBOL	0.38	0.41
					SBCL	0.42	0.44
					SBIL	0.41	0.40

TABLE 6
CONCRETE PAVEMENTS TESTED DURING 1966 AND 1969

Project No.	Location	Paving Contractor	Aggregate Source		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1966	1969
U 33061D, C11 U 33061E, C12	M 43 WB from Center St. W to Logan St. in Lansing	Eisenhour Construction Co., Inc.	Pit 47-3	Pit 33-6	WBOL WBCL WBIL	0.43 0.42 0.41	0.35 0.36 0.37
M 63201B, C1	M 59 (Widetrack Dr.) from intersection of Cass St. and Huron St., SE to S of Wesson St. in Pontiac	Anderson & Ruzzin, Inc.	E. C. Levy (Dix Yd.)	Pit 63-56	OL #4 #3 #2 IL	0.32 0.31 0.35 0.41 0.36	0.35 0.36 0.37 0.45 0.35
F 81103B, C7	M 14 from US 23 to Plymouth Rd.	L. A. Davidson	Pit 47-3	Pit 47-3	EBOL EBIL WBOL WBIL	0.53 0.56 0.44 0.51	0.48 0.63 0.42 0.55
F 81121A, C2	M 153 relocation from intersection of M 14 relocation and existing M 14, SE to intersection of Franks Lake Rd. and existing M 153 (Ford Rd.)	Eisenhour Construction Co., Inc.	Pits 81-1 & 81-57	Pits 81-1 & 81-57	NWBOL NWBIL SEBOL SEBIL	0.42 0.45 0.44 0.48	0.55 0.58 0.48 0.61
U 82192B, C21	M 39 from S of Outer Drive to N of South Dearborn Rd.	L. A. Davidson	E. C. Levy (Trenton Yd)	63-7	NBOL NBCL NBIL SBOL SBCL SBIL	0.30 0.36 0.37 0.33 0.36 0.40	0.37 0.40 0.43 0.38 0.38 0.44

TABLE 7
BITUMINOUS CONCRETE PAVEMENT (4.12) TESTED DURING 1964 AND 1969

Project No.	Location	Paving Contractor	Aggregate Source		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1964	1969
F 35032C, C8	US 23 from Old M 171, N of Oscoda, N to the Iosco-Alcona County Line	Parmalee & Carpenter	71-15	01-56	NB SB	0.26 0.28	0.46 0.44

TABLE 8
BITUMINOUS CONCRETE PAVEMENT (4.12) TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1965	1969
F 06073C, C1 F 06073C, C2 F 06073C, C3	US 23 from W of M 65 E and N to the Iosco-Arenac Co. Line, omitting that portion between Michigan Ave. and Water St. in AuGres	Sargent Construction Co.	Pit 17-40	Pit 71-15 & Local pits	EB WB	0.47 0.46	0.58 0.59
F 08031C, C5	M 37 from S of Quimby Rd. N to S of Starr Rd.	Globe Construction Co.	Pit 8-49	Pit 8-58	NB SB	0.45 0.42	0.50 0.50
SS 08041A, C10	M 79 from S of Starr Rd. E to E of Barryville Rd.	Globe Construction Co.	Pit 8-49	Pit 8-58	EB WB	0.46 0.52	0.62 0.64
U 09032C, C9	M 13 from S of Union St. N to N of Wilder Rd	Carrollton Paving Co., Inc.	Pit 17-40	Pit 25-8	NBOL NBIL SBOL SBIL	0.30 0.36 0.35 0.32	0.46 0.50 0.45 0.51
Mb 11011C, C5	US 12 from Indiana-Michigan State Line NE to NE of New Buffalo	John G. Yerington Co.	Material Services Corp., Chicago, Ill.	Local pits	NBOL NBIL SBOL SBIL	0.31 0.39 0.33 0.42	0.34 0.53 0.42 0.44
F 11051A, C4	US 31 from Indiana-Michigan State Line N to M 60	Klett Construction Co.	Material Services Corp., Chicago, Ill.	Pit 14-45	NBOL NBIL SBOL SBIL	0.42 0.48 0.41 0.48	0.46 0.52 0.47 0.51
Mb 11054C, C1 Mb 80011C, C3	US 31 from N of Hagar Shore Rd. NE and N to SW of M 140	Rieth-Riley Construction Co., Inc.	Pit 75-5	Pit 3-47	NB SB	0.35 0.38	0.50 0.51
U 13121E, C2 U 13121E, C3	I 94 BL from 20th St. in Springfield Ex to Upton Ave. in Battle Creek	Rieth-Riley Construction Co., Inc.	Pit 39-1	Pit 13-38	WBOL WBIL	0.43 0.48	0.50 0.53
F 17062C, C2	M 28 from 2.3 mi. E of Stronge Rd. E to 1 mi. W of the Demond Hill Fire Tower (E and W of Raco)	Hodgkiss & Douma, Inc.	Pit 75-5	Local pit	EB WB	0.54 0.54	0.49 0.49
F 19031C, C6	US 27 NB from N of Price Rd. N to S of St. Johns	Ayling-Cunningham Asphalt Paving Co.	Pit 34-53	Pit 19-4	NBOL NBIL	0.53 0.64	0.64 0.71
F 28012A, C1 F 28051B, C2	M 37 from M 113 N to 0.8 mi. N of Silver Lake Shore Rd.	Peninsula Asphalt & Construction Co.	Pit 45-13	Pit 45-13	NB SB	0.50 0.49	0.50 0.51
Mb 28021C, C2	M 113 E and W of Knight Rd. (3.8 mi. of Kingsley)	Peninsula Asphalt & Construction Co.	Pit 45-13	Pit 45-13	EB WB	0.49 0.47	0.61 0.62
F 31051A, C11	US 41 from Baraga-Houghton Co. Line NW to the Snake River	Thornton Construction Co.	Pit 31-45	Pit 31-45	NB SB	0.60 0.60	0.66 0.66
Mb 34062C, C2	M 21 from Dexter St. E to E Limits of Ionia	Rieth-Riley Construction Co., Inc.	Pit 41-46	Pit 41-46	EB WB	0.41 0.37	0.49 0.49
F 35031C, C1	US 23 from Arenac-Iosco Co. Line N to W Limits of Tawas City	Saginaw Asphalt Paving Co.	Pit 17-40	Local pits	NB SB	0.45 0.42	0.52 0.52
F 35032C, C7	US 23 from E Limits of Tawas City N to Mill St.	Rieth-Riley Construction Co., Inc.	Pit 71-15	Pit 71-15	NB SB	0.47 0.44	0.54 0.54
F 35032C, C9	US 23 from E to W Limits of Tawas City	Saginaw Asphalt Paving Co.	Pit 17-40	Local pits	EBOL EBIL WBOL WBIL	0.40 0.44 0.42 0.44	0.46 0.55 0.52 0.52
Mb 39041C, C7	I 94 BL from 9 Mile Rd. in Oshtemo NE to US 131	Globe Construction Co.	Material Service Corp., Chicago, Ill.	Pit 39-04	EB WB	0.38 0.44	0.40 0.46
Mb 41061C, C3	M 11 from N of Fennessey St. N to N of Johnson Park Entrance	Rieth-Riley Construction Co., Inc.	Pit 41-50	Pit 70-27	NBOL NBIL SB	0.44 0.44 0.40	0.50 0.58 0.52

TABLE 8 (Cont.)
BITUMINOUS CONCRETE PAVEMENT (4.12) TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1965	1969
U 41063A, C5 U 41063D, C6 U 41063E, C7 F 41063B, C8	M 11 from Division St. E to I 96	Michigan Colprovia Co.	Pit 41-14	Pit 70-27	EBOL EBIL WBOL WBIL	0.43 0.46 0.45 0.47	0.46 0.52 0.46 0.52
F 50022D, C3	M 59 from W of M 97 E to E of M 29	Ward & Van Nuck, Inc.	Pit 63-4	Pit 50-21	EBOL EBIL WBOL WBIL	0.44 0.42 0.42 0.43	0.51 0.54 0.51 0.54
U 50051A, C20	US 25 from Common Rd. N to 14 Mile Rd.	Asphalt Products	E. C. Levy	E. C. Levy	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2 SBIL	0.48 0.48 0.44 0.46 0.45 0.40 0.43 0.43	0.51 0.48 0.52 0.54 0.44 0.44 0.49 0.54
F 52043A, C5	US 41 from 3.5 mi. NW of Alger-Marquette Co. Line NW to NW of M 94	Payne & Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-9	NB SB	0.68 0.68	0.69 0.70
F 55011A, C7 F 55012A, C5 F 55012B, C6	US 41 from 1 mi. S of Ingalls N to N Limits of Daggett, omitting that portion within the Stevenson Limits	George Hocking Construction Co.	Pit 55-4	Pit 55-4	NB SB	0.51 0.51	0.56 0.53
BF 61075D, C7	US 31 from N of Colby Rd. NW to existing US 31, N of Whitehall	Spartan Asphalt Paving Co.	Pit 75-5	Pit 70-9	NBOL NBIL SBOL SBIL	0.47 0.62 0.50 0.63	0.51 0.68 0.53 0.68
BF 61075A, C16	US 31 from Muskegon River N to River Rd.	Spartan Asphalt Paving Co.	Pit 75-5	Pit 70-9	NBOL NBCL NBIL SBOL SBCL SBIL	0.37 0.45 0.51 0.42 0.40 0.53	0.41 0.47 0.61 0.43 0.42 0.60
F 62031C, C9 F 62031C, C10	M 37 - M 46 from S of 96th St. to Wood St. in Newaygo	Paul C. Miller	Pit 41-22	Pit 70-9	NBIL SBIL	0.46 0.44	0.55 0.54
F 63041E, C7	M 59 from Airport Rd. to Elizabeth Lake Rd.	Kline Construction Co.	Pit 63-4	Pit 63-54	EBIL WBIL	0.42 0.42	0.48 0.49
Mb 73031A, C8 SS 73031A, C9	M 47 from Bell Ave. in St. Charles N to M 46	Saginaw Asphalt Paving Co.	Pit 79-21	Pits 73-5 & 76-32	NB SB	0.49 0.50	0.57 0.61
F 73051B, C1 F 73051D, C2	M 13 from M 57 N to Washington St. in Saginaw	Saginaw Asphalt Paving Co.	Pit 17-40 & 75-5	Local pits	NB SB	0.36 0.37	0.42 0.43
F 73151C, C1	M 15 from S of M 81 SE to the Tuscola-Saginaw Co. Line (Reese Rd.)	Bay Asphalt Co.	Pit 79-21	Pits 73-5 & 76-32	NB SB	0.47 0.48	0.54 0.58
U 77033C, C4	US 25 from the Glenwood Ave. NW to Thomas St.	Blue Water Asphalt Co., Inc.	Pit 17-40	Pit 74-51	NBOL NBIL SBOL SBIL	0.35 0.32 0.41 0.32	0.41 0.42 0.39 0.43
Fb 79031C, C3	M 15 from Willard Rd. N to S Limits of Millington	Cooke Contracting Co.	Pit 32-4	Pit 79-53	NB SB	0.49 0.50	0.60 0.56
Fb 79031C, C4	M 15 from S of N Limits of Millington N to N of S Limits of Vassar	Cooke Contracting Co.	Pit 32-4	Pit 79-53	NB SB	0.48 0.48	0.58 0.58
Mb 80032C, C2	US 31 BR from Dyckman Ave. NE to Allegan-Van Buren Co. Line	Rieth-Riley Construction Co., Inc.	Pit 75-5	Pit 3-47	NB SB	0.37 0.36	0.34 0.34
F 82052G, C25	US 24 from Eureka St. N to Haskell St.	Detroit Asphalt Paving Co.	Pit 47-3	Pit 82-11	NBOL NBCL NBIL	0.34 0.40 0.43	0.48 0.49 0.51

TABLE 9
BITUMINOUS CONCRETE PAVEMENTS (4.12) TESTED DURING 1966 AND 1969

Project No.	Location	Paving Contractor	Aggregate Source		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Coarse	Fine		1966	1969
F 30033C, C1	M 99 from N limits of Jonesville NW to E limits of Litchfield	Yerington & Brown, Inc.	Pit 12-35	National Lime & Stone Co. Findley, Ohio	NB SB	0.47 0.47	0.58 0.61
F 32091C, C1	US 25 from 500 ft S of Helena Rd. N to 1035 ft N of S limits of Harbor Beach	Lake & Howell Construction Co.	Pit 32-6 & Local pit	Pit 32-4	NB SB	0.49 0.48	0.54 0.54
F 50011E, C11	M 53 from 15 Mile Rd. to 17-1/2 Mile Rd.	Cooke Contracting Co.	Pits 50-35 & 63-4	Pits 50-21 & 50-35	NBOL NBCL NBIL SBOL SBCL SBIL	0.35 0.30 0.32 0.33 0.31 0.34	0.45 0.41 0.43 0.47 0.44 0.46

TABLE 10
BITUMINOUS AGGREGATE PAVEMENT (4.11) TESTED DURING 1964 AND 1969

Project No.	Location	Paving Contractor	Aggregate Source		Direction and Lane	Avg. Coefficient of Wet Sliding Firction	
			Coarse	Fine		1964	1969
SS 51031C, C4	M 22 from US 31 N'ly to the Manistee-Benzie County Line	Saginaw Asphalt Paving Co.	Pit 51-11	----	NB SB	0.32 0.34	0.58 0.59

TABLE 11
BITUMINOUS AGGREGATE PAVEMENT (4.11) TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Fine	Coarse		1965	1969
Mb 20012C, C2	I 175 BL (Southbound only) from 0.7 mi. S of M 72 N to S Limits of Grayling	Central Paving Co.	----	Pit 20-30	SBOL SBIL	0.41 0.49	0.48 0.61
Mb 42012C, C5	US 41 from 0.5 mi. NE of FAS #313 E and NE to SW of M 26	Thornton Construction Co.	----	Pit 42-6	NB SB	0.56 0.60	0.69 0.69
F 43022C, C9 F 67021C, C3	US 10 from 0.4 mi W of Hawkins Rd. E to 1.9 mi. E of the Lake-Osceola Co. Line	The Hicks Co.	----	Pit 67-8	EBOL WBOL	0.51 0.51	0.67 0.65
F 52011A, C6	M 95 from Michigamme River N	Payne & Dolan of Wisconsin, Inc.	----	Pit 52-61	NB SB	0.55 0.54	0.59 0.57
SS 52032A, C4	M 35 from N of Palmer NE to Co. Rd. #480	Payne & Dolan of Wisconsin, Inc.	----	Pit 52-9	NB SB	0.48 0.49	0.63 0.66
SS 57012C, C4	M 55 - M 66 from 1st St. N to Union St. in Lake City	The Hicks Co.	----	Pit 57-20	NBOL NBIL SBOL SBIL	0.47 0.47 0.48 0.46	0.47 0.50 0.47 0.49
FFH 64022A, C3	M 82 from US 31 E to Billings Ave.	Rieth-Riley Construction Co., Inc.	----	Pit 64-41	EB WB	0.52 0.50	0.60 0.62
F 66022B, C2	M 28 from 2.5 mi. E of Bergland SE to Ewen	Mathy Construction Co.	----	Pit 66-4	EB WB	0.61 0.60	0.55 0.59
Mb 69022C, C3	M 32 from E of Gaylord E to E of Big Lake Rd.	Central Paving Co.	----	Pit 69-29	EB WB	0.55 0.57	0.47 0.50
SS 71011A, C1 SS 71011B, C2	M 33 from the Montmorency-Presque Isle Co. Line N to M 68 in Onaway	Spartan Asphalt Paving Co.	----	Pit 60-21	NBOL SBOL	0.51 0.50	0.62 0.58

TABLE 12
PRIME AND SINGLE SEAL PAVEMENT TESTED DURING 1965 AND 1969

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Avg. Coefficient of Wet Sliding Friction	
			Fine	Coarse		1965	1969
F 04021B, C2	M 32 from Bean Creek Rd. E to W Limits of Alpena	Yockey Construction Co., Inc.	Pit 71-15	----	EB WB	0.42 0.45	0.44 0.51

TABLE 13
PORTLAND CEMENT CONCRETE PAVEMENTS
CONSTRUCTED DURING 1964

Test Year	No. of Projects	No. of Lanes	Average Wsf Values			Range of Wsf Values
			OL	IL	All Lanes	
1965	32	69	0.49	0.52	0.50	0.38 to 0.65
1966	6	22	0.40	0.44	0.41	0.30 to 0.56
1969(1)	32	70	0.44	0.49	0.46	0.31 to 0.70
1969(2)	6	22	0.42	0.50	0.44	0.35 to 0.63

(1) Initial tests conducted in 1965.
(2) Initial tests conducted in 1966.

TABLE 14
BITUMINOUS CONCRETE PAVEMENTS
CONSTRUCTED DURING 1964

Test Year	No. of Projects	No. of Lanes	Average Wsf Values			Range of Wsf Values
			OL	IL	All Lanes	
1964	1	2	0.27	----	0.27	0.26 to 0.28
1965	49	100	0.45	0.45	0.45	0.30 to 0.68
1966	3	10	0.43	0.33	0.39	0.30 to 0.49
1969(1)	1	2	0.45	----	0.45	0.44 to 0.46
1969(2)	49	100	0.51	0.52	0.52	0.34 to 0.71
1969(3)	3	10	0.53	0.44	0.49	0.41 to 0.61

(1) Initial tests conducted in 1964.
(2) Initial tests conducted in 1965.
(3) Initial tests conducted in 1966.

TABLE 15
BITUMINOUS AGGREGATE PAVEMENTS
CONSTRUCTED DURING 1964

Test Year	No. of Projects	No. of Lanes	Average Wsf Values			Range of Wsf Values
			OL	IL	All Lanes	
1964	1	2	0.33	----	0.33	0.32 to 0.34
1965	12	22	0.52	0.47	0.52	0.41 to 0.61
1969(1)	1	2	0.58	----	0.58	0.58 to 0.59
1969(2)	12	22	0.58	0.53	0.58	0.47 to 0.69

(1) Initial tests conducted in 1964.
(2) Initial tests conducted in 1965.

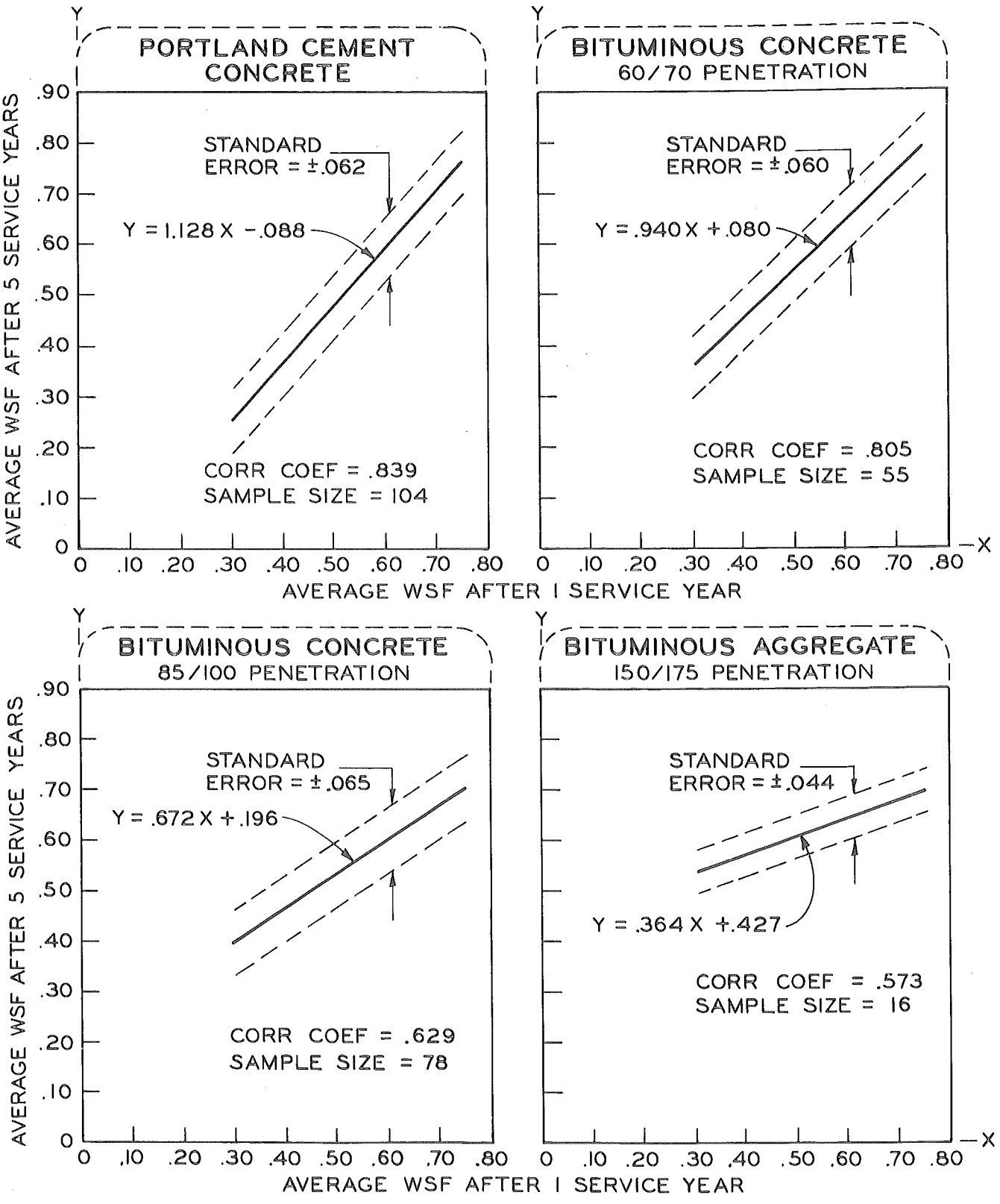


Figure 1. Relation between 1 and 5 year wet sliding friction values.

SECTION III

EXPERIMENTAL FEATURES IN PAVEMENT SURFACES

TABLE 16 -- Rubberized Sand-Asphalt; US 31, City of Charlevoix

Except for 1962, skid tests have been conducted annually on the rubberized sand-asphalt surface which was placed on US 31 in October of 1960. Table 16 summarizes these tests. The 1968 coefficients indicated an increased friction level over the 1967 values. During 1969, the friction level dropped 0.05 to a level identical to that determined initially in 1960.

TABLE 17 -- Asphalt Emulsion Hot-Mix Surface Course; Lansing Intersections (Project Mob 33032 C, C6).

Table 17 summarizes six years of annually conducted skid tests at the Cedar St (formerly US 127) intersections with Holmes St and with Baker St.

At Holmes St, the average friction level on the sand emulsified hot-mix surface course repeated results determined in 1968, i.e., an average friction level of 0.41 was determined. The 0.41 friction level is lower than, but within, 12.7 percent of the initial friction level determined in 1964.

At Baker St, the average friction level on the bituminous concrete emulsified hot-mix surface course, for all practical purposes, matched the 1968 level. An insignificant 0.01 increase in the average coefficient was indicated with the 1969 tests.

Intersection areas at both the above locations are worn to the original surface; however, stopping areas still have the emulsified surface courses. Wsf values determined since initial tests do not show a distinguishable differential between surface types.

TABLE 18 -- 3 BC Sand-Asphalt Resurfacing, US 131: North and South of Alba (Project Mm 4BC-3A, Control Section 05072).

Good skid resistance qualities have existed on Project Mm 4BC-3A since the 3 BC sand-asphalt surface was placed in 1964 and these qualities continued during the 1969 tests. Average wsf values, determined after five years of service, ranged from 0.56 to 0.60. Friction levels still do not indicate a significant difference in performance of the 85/100 penetration sand-asphalt using 6.9 percent bitumen and the 150/175 penetration sand-asphalt using 6.4 percent bitumen; both have performed well.

TABLE 19 -- Bituminous Concrete Interstate Projects

This table presents the results of skid tests taken on a representative sample of Interstate bituminous concrete projects which were constructed during 1961 and 1962. The 1969 wsf values ranged from 0.48 to 0.74 and averaged 0.64, well above the Departmental Safety Standard. Previously established trends were continued this year as the inside (passing) lanes yield average friction levels 15.1 percent higher than the outside (traffic) lanes.

TABLE 20 -- Bridge Deck Surface Coatings

Table 20 summarizes skid tests on 20 structures. Four structures, which were tested and reported last year, have been deleted from the Bridge Deck Surface Coating Study. Three of these, S24 of 63174, S27 of 63174, and S10 of 82252 compared Euco treatments with linseed oil and naphtha and with a white membrane curing compound treatment. Bridge X01 of 11031 was also deleted. Part of its deck was surfaced with 31A bituminous concrete and part with a rubberized sand-asphalt.

1. Coal-Tar Epoxy Coatings

Average friction level on X01 of 11016, after a six-year service period is 0.31. The average coefficient of friction on this structure has dropped considerably during the last two service years. The 0.31 average friction level, determined this year, is 16 percent lower than the 1968 level and 37 percent lower than the 1967 level.

Skid tests conducted after a five-year service period on B01 of 45041 yielded an average coefficient of friction of 0.39, 33.9 percent lower than the initial coefficients determined at the one-year service level and 7.1 percent lower than last year's values.

Two structures, B01 of 35032 and B04 of 06073, were tested again this year after a four-year service period. Coefficients on these indicate a slight increase in friction level since last year. The 1969 average coefficient is 0.42 as opposed to last year's value of 0.38.

In 1968 northbound lanes of B02 of 61151 were coated with flexible coal-tar epoxy and sand. Outside and inside lanes exhibited good performance in their initial service year with average friction levels of 0.57 and 0.59, respectively. After one year of service, however, the outside lane has dropped to a dangerously low friction level of 0.26. The inside lane, although the friction level dropped 0.17, has maintained a one-year average wsf value of 0.42.

2. Rubberized Bituminous Concrete

Five structures which were surfaced with rubberized bituminous concrete in 1967 were tested again in 1969 and yielded an average wsf value of 0.52. This figure is 10.6 percent higher than the average coefficient determined last year. Friction levels after the second service year have increased on all but one of the 16 lanes tested. Friction level increases ranged from 0.01 to 0.08 while the only decrease in skid resistance amounted to a 0.02 drop in friction level.

Six structures surfaced in 1968 were skid tested in their initial service year and again in 1969. Initially friction levels ranged from 0.42 to 0.52 and averaged 0.45. After being subjected to traffic and weathering for one year, wsf values ranged from 0.37 to 0.55 and averaged 0.46. Average coefficients at the one- and two-year service level are similar, but by separating the structures into two categories based on traffic volume a difference is apparent. Structures in category 1 bear an average daily traffic volume 20 percent lower than category 2 structures. Category 1 (Structures B01 of 61076, B02 of 61076, B03 of 61076, and S04 of 71072) yield average wsf values 15 percent higher at the two-year service level and category 2 (Structures S16 of 82111 and S17 of 82023) yield average wsf values 10 percent higher at the one-year service level.

3. Asbestos Mixtures

Two structures coated with bituminous mixtures containing asbestos were tested for the third consecutive year in 1969; both structures were coated in 1967. Bridge B05 of 58152 had a rubberized asbestos and bituminous concrete mixture applied to its deck. Wsf values obtained this year averaged 0.51, continuing to increase in friction level after the second service year. The northbound lanes of X01 of 81075 have been coated with a mix design comprised of asbestos and sand-asphalt, while the southbound employed a mixture of rubberized bituminous concrete and sand asphalt. Lanes in both directions have increased friction levels this year. Average wsf values determined in 1969 were 0.59 and 0.62, respectively, for the northbound and southbound lanes of X01 of 81075.

4. Polyurethane Coating

Bridge S18 of 82025 was coated with a special thin coating of Polyurethane in 1968. Outside lanes average 0.49 after one year of service but inside lanes have dropped to a dangerously low average friction level of 0.18. This serious condition was reported for consideration as to resurfacing as special request number 2 (Table 31).

5. Epoxy Coatings

The Crietz Rd structure over I 496 (S05 of 23081) was added to this study in 1969. The north half of the deck was surfaced with E15 Versamid 140 and the south half with Guard Kote 250, during 1969. Both surfaces, on this low traffic volume structure, tested well above the Departmental Safety Standard in their initial year of service with coefficients ranging from 0.66 to 0.75.

TABLE 21 -- Experimental Skid-Resistant Resurfacing

Skid tests were continued this year at 16 experimental skid-resistant resurfacing locations which were constructed in 1965. An 80-lb 3NS (P-4) Trinidad sheet asphalt surface located on M 139 at Napier Rd has been resurfaced and was deleted from the study in 1969.

Only two of the 91 lanes tested yield average wsf values below 0.40 after their fourth year of service. Coefficients determined on these 91 lanes ranged from 0.37 to 0.66 and averaged 0.49.

For the third consecutive year, four of the experimental surface types exhibit outstanding friction levels with average wsf values on all lanes exceeding 0.50. Included in this outstanding performance category are:

1) 80-lb/sq yd sandstone plus asphalt, in control sections 09033 and 09042

2) 50-lb/sq yd quartzite plus asphalt, in control sections 25072 and 25073

3) 50-lb/sq yd 3BC sand plus hot asphalt emulsion, in control section 81031

4) 50-lb/sq yd 2 MS sand plus hot asphalt emulsion, in control section 81031.

The eight other mixture types have average wsf values ranging from 0.42 to 0.52.

An 80-lb crushed fine aggregate mixture was added to this study in 1968. This mixture type was applied to northbound US 24 lanes between Joy Rd and West Chicago in control section 82053. Outstanding initial wsf

values ranging from 0.59 to 0.61 and averaging 0.60 were determined in 1968. Although the 1969 tests are still above the Safety Standard, coefficients have decreased since last year by 23.3 percent.

TABLE 22 -- Sand-Asphalt Skid-Resistant Resurfacing at Intersections

Skid tests were continued in 1969 on six sand-asphalt skid-resistant resurfacing projects which were initially tested in 1965. All 19 lanes yield four-year service level friction values averaging above the Departmental Safety Standard. Coefficients, as determined in 1969, ranged from 0.43 to 0.62 and averaged 0.51, thus exhibiting good skid-resistant qualities.

TABLE 23 -- Bituminous Concrete Surfaces with 31A Slag Aggregate

Project 82091 C, C5, constructed in 1961 using open hearth and blast furnace slag, continues to exhibit excellent skid resistance. Coefficients determined during 1969, after nine years of service, ranged from 0.51 to 0.56 and averaged 0.53. No apparent difference in skid resistance is discernible between usage of open hearth slag and usage of blast furnace slag. The other project employing slag in its mix design yielded ten-year coefficients ranging from 0.39 to 0.43 and averaging 0.41.

TABLE 24 -- Sheet Asphalt Resurfacing; US 131: Rockford to Cedar Springs (Project Mb 41013 C, C12)

This 3 BC sand-asphalt surface was placed in 1963 to correct a slippery condition. The 1969 skid resistance coefficients range from 0.45 to 0.56 and average 0.51. Different percent bitumen and dust combinations used here in mix designs are not readily distinguishable after six service years.

TABLE 25 -- Wyton Synthetic Binder Surface Course Mixture

A remarkable increase in friction level has occurred on Project 25-75, C1 since last year. Coefficients, on the average, have increased 33.8 percent since last year, to a point 10.7 percent above the skid resistance level determined initially in 1963.

TABLE 26 -- Special Emulsion Projects

Skid tests were continued on four special emulsion projects in 1969. Average wsf values obtained this year ranged from 0.37 to 0.48 and averaged 0.42.

Southbound John Lodge at Wyoming had been resurfaced by the county at the time the 1969 skid tests were conducted and has been removed from this study. Northbound lanes at this location now show signs of breakup. Coefficients on the northbound lanes, however, show a remarkable increase since the 1968 tests. Wsf values determined in 1969 averaged 0.48, a level 0.18 higher than determined in 1968 and 0.11 higher than determined initially in 1967.

Average wsf values on the remaining three special emulsion projects also increased during 1969, to a level 11 percent above their initially tested values.

TABLE 27 -- Test Areas for Analysis of Effects of Using Tungsten Carbide Cutting Edges for Snow Removal

Skid tests were conducted at eight locations on October 21, 1967 as a part of Research Project 66 G-151, "Evaluation of Grader Blades for Snow Removal." Subsequent skid tests were performed in 1968 and 1969. The wsf values on pavements where conventional grader blades were used have been compared with wsf values on pavements where grader blades with tungsten carbide cutting edges were used. No significant difference has occurred after two years of snow removal. Since tungsten carbide grader blades are now being used statewide, no future skid tests will be made for Research Project 66 G-151.

TABLE 16
RUBBERIZED SAND-ASPHALT US 31, CITY OF CHARLEVOIX

Test Year	Average Coefficient of Wet Sliding Friction	
	Firestone Tire	General Tire
1958*	0.19	----
1959**	0.48	----
1960	0.52	----
1961	0.40	----
1963	0.38	----
1964	----	0.46
1965	----	0.44
1966	----	0.40
1967	----	0.40
1968	----	0.57
1969	----	0.52

* Initial tests on polished portland cement surface.

** Tests conducted on temporary seal coat applied in summer 1959, with surfacing in October 1960.

TABLE 17
ASPHALT EMULSION HOT-MIX SURFACE COURSES LANSING INTERSECTIONS (Project Mob 33032 C, C6)

Intersection	Surface Type	Route	Direction and Lane	Average Coefficient of Wet Sliding Friction						
				1964*	1964**	1965	1966	1967	1968	1969
Cedar Street at Holmes Road	Sand emulsified asphalt hot mix surface course	US 127	NBOL	0.19	0.49	0.42	0.34	0.36	0.40	0.44
		US 127	NBIL	0.20	0.47	0.41	0.33	0.37	0.44	0.45
		US 127	SBOL	0.23	0.45	0.40	0.29	0.36	0.37	0.37
		US 127	SBIL	0.22	0.47	0.40	0.32	0.36	0.44	0.40
			Avg.	0.21	0.47	0.41	0.32	0.36	0.41	0.41
Cedar Street at Baker Street	Bituminous concrete emulsified hot mix surface	US 127	NBOL	0.24	0.48	0.38	0.34	0.35	0.37	0.40
		US 127	NBIL	0.31	0.56	0.47	0.37	0.35	0.41	0.42
		US 127	SBOL	0.33	0.47	0.39	0.35	0.34	0.40	0.39
		US 127	SBIL	0.32	0.55	0.39	0.35	0.35	0.42	0.42
			Avg.	0.30	0.52	0.41	0.35	0.35	0.40	0.41

* Tests conducted prior to resurfacing.

** Initial tests after resurfacing.

TABLE 18
3 BC SAND-ASPHALT RESURFACING; US 131: NORTH AND SOUTH OF ALBA (Project MM 4BC-3A, Control Section 05072)

Test Area Locations	Asphalt Cement	Aggregate	Mineral Filler	Direction and Lane	Average Coefficient of Wet Sliding Friction						
					July 1964	Oct. 1964	June 1965	Sept. 1966	Aug 1967	June 1968	July 1969
Mancelona to S of Alba	85/100 penetration (6.9-percent bitumen)	1:1 mixture from Polous and Gerstenberger Pits	fly ash (Detroit Edison)	SBOL/SB*	0.51	0.54	0.56	0.50	0.54	0.56	0.56
				SBIL/NB*	0.68	0.66	0.68	0.62	0.65	0.63	0.59
N of Alba to M32	150/175 penetration (6.4-percent bitumen)			SBOL/SB*	0.50	0.60	0.56	0.52	0.55	0.56	0.59
				SBIL/NB*	0.63	0.68	0.68	0.64	0.67	0.62	0.60

* Effective 11-12-68, US 131 has been returned to a two-lane roadway, with the elimination of the former NB lanes between M 66 and M 32. Consequently future traffic flow over the test area will carry north and southbound traffic.

TABLE 19
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
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
						OL	0.51[2]	----	----	----	0.47	0.48	0.41	0.42	0.46	0.53
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
						OL	----	0.48	----	0.53	0.59	0.53	0.49	0.54	0.59	0.66
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
						OL	0.56	0.52	0.56	0.51	0.63	0.59	0.52	0.54	0.60	0.70
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
						OL	----	----	0.49	0.54	0.54	0.44	0.36	0.40	0.41	0.48
		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
						OL	----	----	0.47	0.47	0.48	0.44	0.35	0.37	0.42	0.48
69013, C3, 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
						OL	----	----	0.54	0.57	0.62	0.57	0.50	0.56	0.58	0.67
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
						OL	----	0.58	----	0.56	0.58	0.60	0.52	0.52[3]	0.58	0.62

(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 20
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction				
					1965	1966	1967	1968	1969
X01 of 11016	I 94 over NYCRR	1963	Coal tar epoxy plus crushed quartz	EBOL	0.50	0.41	0.46	0.34	0.30
				EBCL	*	0.45	0.53	0.42	0.35
				WBOL	0.44	0.36	0.42	0.32	0.27
				WBCL	*	0.44	0.55	0.40	0.32
B01 of 45041	M 204 over Lake Leelanau Narrows	1964	Coal tar epoxy plus quartz	EB	0.59	0.45	0.45	0.42	0.40
				WB	0.60	0.45	0.48	0.43	0.39
B01 of 35032	US 23 over Au Sable River, Oscoda	1965	Coal tar epoxy membrane and rubberized sand asphalt surface	NB	0.51	0.41	0.47	0.40	0.45
				SB	0.48	0.39	0.48	0.37	0.46
B04 of 06073	US 23 over Whitney Drain	1965	Coal tar epoxy plus quartz	NB	0.59	0.36	0.38	0.38	0.40
				SB	0.63	0.39	0.38	0.35	0.37
B02 of61151	I 96 BS, US 31 BR over Black Creek	1968	Flexible coal tar epoxy & sand	NBOL	----	----	----	0.67	0.26
				NBIL	----	----	----	0.59	0.42
B01 of 09042	I 75 BL over Saginaw River in Bay City	1967	Rubberized bituminous concrete	EBOL	----	----	*	0.45	0.49
				EBIL	----	----	*	0.50	0.56
				WBOL	----	----	0.48	0.43	0.41
				WBIL	----	----	0.51	0.49	0.54
B02 of 11052	US 31 - US 33 over St. Joseph River in Berrien Springs	1967	Rubberized bituminous concrete	NB	----	----	*	0.39	0.47
				SB	----	----	0.43	0.36	0.43
X01 of 19032	US 27 over GTWRR in St. Johns	1967	Rubberized bituminous concrete	NBOL	----	----	0.53	0.44	0.50
				NBIL	----	----	0.56	0.50	0.55
				SBOL	----	----	0.53	0.48	0.51
				SBIL	----	----	0.60	0.56	0.57
X01 of 38101	I 94 over Grand River and NYCRR, Jackson	1967	Rubberized bituminous concrete	EBOL	----	----	0.52	0.49	0.55
				EBIL	----	----	0.59	0.55	0.63
				WBOL	----	----	0.54	0.43	0.51
				WBIL	----	----	0.55	0.53	0.56
B01 of 79051	M 24 over Cass River in Caro	1967	Rubberized bituminous concrete	NB	----	----	0.53	0.48	0.56
				SB	----	----	0.50	0.48	0.55
B01 of 61076	M 20 over Muskegon River	1968	Rubberized bituminous concrete	NBOL	----	----	----	0.46	0.49
				NBIL	----	----	----	0.48	0.53
				SBOL	----	----	----	0.44	0.49
				SBIL	----	----	----	0.44	0.52
B02 of 61076	M 20 SB over Cedar Creek	1968	Rubberized bituminous concrete	SBOL	----	----	----	0.44	0.50
				SBIL	----	----	----	0.44	0.55
B03 of 61076	M 20 NB over Cedar Creek	1968	Rubberized bituminous concrete	NBOL	----	----	----	0.46	0.52
				NBIL	----	----	----	0.45	0.54
S04 of 61072	M 46 over US 131	1968	Rubberized bituminous concrete	EBOL	----	----	----	0.45	0.45
				EBCL	----	----	----	0.43	0.49
				EBIL	----	----	----	0.45	0.54
				WBOL	----	----	----	0.42	0.48
				WBCL	----	----	----	0.43	0.49
				WBIL	----	----	----	0.50	0.55
S16 of 82111	Grand River Ave (I 96 BS) over I 696 BS	1968	Rubberized bituminous concrete	EBOL	----	----	----	0.52	0.47
				EBCL	----	----	----	0.44	0.43
				EBIL	----	----	----	0.43	0.41
				WBOL	----	----	----	0.49	0.49
				WBCL	----	----	----	0.42	0.39
				WBIL	----	----	----	0.43	0.41
S17 of 82023	Grand River Ave (I 96 BS) over I 94	1968	Rubberized bituminous concrete	EBOL	----	----	----	0.44	0.38
				EBCL	----	----	----	0.44	0.37
				EBIL	----	----	----	0.45	0.40
				WBOL	----	----	----	0.50	0.43
				WBCL	----	----	----	0.44	0.37
				WBIL	----	----	----	0.44	0.39
S05 of 58152	I 75 under Newport Rd, Newport	1967	Rubberized asbestos and bituminous concrete	EB	----	----	0.46	0.50	0.51
				WB	----	----	0.47	0.50	0.51
X01 of 81075	US 23 BR over Huron River, North of Ann Arbor	1967	Asbestos mix plus sand asphalt	NBOL	----	----	0.57	0.52	0.55
				NBCL	----	----	0.58	0.53	0.57
				NBIL	----	----	0.60	0.56	0.66
		1967	Rubberized bituminous concrete plus sand asphalt	SBOL	----	----	0.61	0.50	0.57
				SBCL	----	----	0.59	0.55	0.64
				SBIL	----	----	0.58	0.58	0.64
S18 of 82025	Allard Ave over I 94	1968	Special thin polyurethane coating	EBOL	----	----	----	0.46	0.42
				EBIL	----	----	----	0.40	0.16
				WBOL	----	----	----	0.55	0.45
				WBIL	----	----	----	0.44	0.20
S05 of 23081	Crietz Rd over I 496	1969	North half of deck only E 15 Versamid 140	NB	----	----	----	----	0.67
				SB	----	----	----	----	0.66
			South half of deck only Guard Kote 250	NB	----	----	----	----	0.75
				SB	----	----	----	----	0.69

TABLE 21
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
							Spring	Fall			
09033	US 23 at Linwood Rd, N of Bay City	Oct. 1965	80-lb Sandstone + asphalt	US 23	NBOL	0.71	0.49	0.43	0.50	0.51	0.51
				US 23	NBIL	0.72	0.52	0.46	0.57	0.59	0.60
				US 23	SBOL	0.73	0.49	0.45	0.54	0.54	0.53
				US 23	SBIL	0.74	0.58	0.49	0.62	0.63	0.63
09033	US 23 at Grove St, N of Bay City	Sept.-Oct 1965	80-lb Sandstone + asphalt	US 23	NBOL	0.73	0.53	0.49	0.59	0.55	0.56
				US 23	NBIL	0.76	0.61	0.56	0.66	0.62	0.66
				US 23	SBOL	0.75	0.51	0.44	0.40	*	0.43(1)
				US 23	SBIL	0.76	0.55	0.51	0.42	*	0.44(1)
09042	M 25 at Wagner Rd, E of Bay City	Sept. 1965	80-lb Sandstone + asphalt	M 25	EB	0.77	0.53	0.47	0.51	0.54	0.64
				M 25	WB	0.74	0.54	0.47	0.53	0.55	0.66
25072	M 54 at Carpenter Rd, N of Flint	Oct. 1965	50-lb Quartzite + asphalt	M 54	NBOL	0.74	0.51	0.53	0.56	0.54	0.51(2)
				M 54	NBIL	0.78	0.55	0.54	0.59	0.62	0.61
				M 54	SBOL	0.73	0.50	0.53	0.55	0.50	0.57
				M 54	SBIL	0.76	0.56	0.54	0.52	0.60	0.62
25072	M 54 at Coldwater Rd, N of Flint	Oct. 1965	50-lb Quartzite + asphalt	M 54	NBOL	0.67	0.50	0.51	0.55	0.54	0.54
				M 54	NBIL	0.77	0.54	0.52	0.61	0.62	0.61
				M 54	SBOL	0.70	0.51	0.51	0.55	0.57	0.58
				M 54	SBIL	0.76	0.53	0.53	0.60	0.60	0.63
25073	M 54 at M 57, N of Flint	Sept. 1965	50-lb Quartzite + asphalt + additive	M 54BR	NBOL	0.70	0.48	0.43	0.53	0.56	0.61
				M 54BR	NBIL	0.71	0.53	0.47	0.55	0.58	0.61
				M 54BR	SBOL	0.65	0.50	0.44	0.52	0.55	(3)
				M 54BR	SBIL	0.71	0.52	0.49	0.58	0.61	(3)
				M 57	EB	0.70	0.51	0.45	0.55	0.56	0.55
				M 57	WB	0.72	0.53	0.48	0.55	0.56	0.57
25072	M 54 at M 54BR (S Jct.) S of Flint	Oct. 1965	50-lb crushed beach pebbles + asphalt	M 54	NBOL	0.60	0.49	0.43	0.42	0.43	0.48
				M 54	NBIL	0.66	0.47	0.41	0.44	0.45	0.52
				M 54BR	SBOL	0.62	0.47	0.46	0.40	0.44	0.48
				M 54BR	SBIL	0.66	0.47	0.41	0.41	0.48	0.54
				M 54 (Dort)	WBOL	0.62	0.45	0.45	0.46	0.50	0.54
				M 54 (Dort)	WBIL	0.62	0.45	0.47	0.48	0.52	0.55
81031	US 12, W from Neblo Rd, NW of Clinton	Sept. 1965	50-lb 3BC + hot asphalt emulsion	US 12	EB	0.60	0.49	0.49	0.49	0.52	0.51
				US 12	WB	0.62	0.47	0.45	0.49	0.55	0.52
81031	US 12, E from Lima Center Rd, NW of Clinton	Sept. 1965	50-lb 2MS + hot asphalt emulsion	US 12	EB	0.58	0.48	0.44	0.55	0.55	0.57
				US 12	WB	0.60	0.49	0.47	0.54	0.54	0.57
82052	US 24 at Fenkell 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
				US 24	NB#3	0.53	0.36	0.34	0.41	0.40	0.41
				US 24	NB#2	0.57	0.36	0.34	0.40	0.41	0.43
				US 24	NBIL	0.60	*	*	*	*	*
				US 24	SBOL	0.52	0.38	0.37	0.41	0.39	0.43
				US 24	SBCL	0.60	0.37	0.35	0.42	0.42	0.43
				US 24	SBIL	0.59	0.35	0.34	0.44	0.40	0.42
				Five Mile Rd	EBOL	0.51	0.37	0.31	0.36	0.38	0.37
				Five Mile Rd	EBIL	0.55	0.39	0.33	0.41	0.40	0.42
				Five Mile Rd	WBOL	0.55	0.37	0.33	0.39	0.40	0.44
				Five Mile Rd	WBIL	0.60	0.39	0.33	0.43	0.44	0.44

* Not tested.
(1) Bituminous Concrete - non-experimental
(2) NBOL IWT (entire pad) and stopping area worn to original surface.
(3) Work being done at intersection -- SB too dirty to test.

TABLE 21 (Cont.)
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
							Spring	Fall			
82053	US 24 at Schoolcraft Rd, Detroit	Sept. 1965	50-lb 3BC + asbestos fiber + asphalt	US 24	NBOL	0.54	0.38	0.33	0.39	0.40	0.43
				US 24	NBCL	0.53	0.40	0.35	0.41	0.43	0.43
				US 24	NBIL	0.55	0.37	0.34	0.42	0.42	0.45
				US 24	SBOL	0.48	0.34	0.33	0.41	0.39	0.43
				US 24	SBCL	0.51	0.37	0.33	0.40	0.41	0.43
				US 24	SBIL	0.52	0.37	0.33	0.41	0.43	0.44
				Schoolcraft Rd	EBRT	0.55	0.41	0.35	0.44	0.41	0.44
				Schoolcraft Rd	EB#3	0.52	0.38	0.36	0.44	0.41	0.43
				Schoolcraft Rd	EB#2	0.54	0.38	0.34	0.45	0.43	0.46
				Schoolcraft Rd	EBIL	0.56	0.43	0.39	0.49	0.49	0.47
				Schoolcraft Rd	WBRT	0.55	*	0.37	*	*	0.38
				Schoolcraft Rd	WB#3	0.55	0.43	0.34	0.45	0.41	0.42
				Schoolcraft Rd	WB#2	0.51	0.39	0.34	0.45	0.41	0.42
				Schoolcraft Rd	WBIL	0.55	0.46	0.36	0.47	0.47	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
				US 24	NB#3	0.59	0.37	0.36	0.41	0.43	0.45
				US 24	NB#2	0.62	0.40	0.36	0.44	0.47	0.48
				US 24	NBIL	0.62	0.40	0.38	0.45	0.45	0.46
				US 24	SBOL	0.60	0.37	0.35	0.42	0.40	0.44
				US 24	SB#3	0.62	0.39	0.35	0.43	0.43	0.46
				US 24	SB#2	0.61	0.39	0.36	0.45	0.47	0.46
				US 24	SBIL	0.64	0.42	0.37	0.50	0.52	0.46
				Plymouth Rd	EBOL	0.62	0.40	0.36	0.41	0.41	0.46
				Plymouth Rd	EBCL	0.63	0.39	0.36	0.41	0.43	0.44
				Plymouth Rd	EBIL	0.64	0.39	0.37	0.41	0.44	0.44
				Plymouth Rd	WBOL	0.63	0.40	0.38	0.46	0.47	0.46
				Plymouth Rd	WBCL	0.61	0.41	0.37	0.44	0.44	0.46
				Plymouth Rd	WBIL	0.60	0.40	0.38	0.46	0.48	0.45
82053	US 24 at W. 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
				US 24	NB#3	0.58	0.40	0.37	0.43	0.45	0.46
				US 24	NB#2	0.61	0.41	0.36	0.43	0.47	0.46
				US 24	NBIL	0.62	0.40	0.37	0.42	0.49	0.46
				US 24	NBLT	0.62	*	*	*	*	*
				US 24	SBOL	0.56	0.42	0.41	0.44	0.41	0.45
				US 24	SBCL	0.57	0.41	0.40	0.43	0.46	0.45
				US 24	SBIL	0.59	0.41	0.40	0.43	0.47	0.46
				W. Chicago Rd	EBRT	0.63	0.45	0.44	0.48	0.50	0.45
				W. Chicago Rd	EBIL	0.63	0.44	0.40	0.42	0.46	0.45
				W. Chicago Rd	WBRT	0.63	0.43	0.41	0.47	0.50	0.46
				W. Chicago Rd	WBIL	0.63	0.41	0.37	0.47	0.47	0.45
82071	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
				US 24	NBIL	0.52	0.42	0.38	0.47	0.47	0.50
				US 24	SBOL	0.51	0.43	0.39	0.46	0.47	0.52
				US 24	SBIL	0.51	0.42	0.38	0.46	0.46	0.50
				Sibley Rd	EB	0.54	0.39	0.36	0.42	0.43	0.45
				Sibley Rd	WB	0.52	0.41	0.39	0.45	0.44	0.44
11031	M 139 NB at Empire Rd, Benton Harbor	Oct. 1965	80-lb 3NS (P-4) + Synopal + asphalt	M 139	NBOL	0.44	0.40	0.39	0.56	0.42	0.45
				M 139	NBIL	0.50	0.42	0.38	0.51	0.52	0.52
11031	M 139 SB at Empire Rd, Benton Harbor	Oct. 1965	80-lb 3NS (P-4) + asphalt	M 139	SBOL	0.45	0.38	0.40	0.51	0.43	0.47
				M 139	SBIL	0.48	0.44	0.41	0.52	0.51	0.50
82053	US 24 NB (Telegraph Rd) from Joy Rd to West Chicago	Aug. 1968	80-lb crushed fine aggregate	US 24	NBOL	----	----	----	----	0.59	0.44
				US 24	NB#3	----	----	----	----	0.60	0.46
				US 24	NB#2	----	----	----	----	0.61	0.46
				US 24	NBIL	----	----	----	----	0.61	0.45

TABLE 22

SAND-ASPHALT SKID-RESISTANT RESURFACING OF INTERSECTIONS

Control Section	Location	Route	Direction and Lane	Average Coefficient of Wet Sliding Friction				
				1965	1966	1967	1968	1969
13061	M 89 (formerly M 96) at Hussey Ave	M 89	EB	0.49	0.44	0.47	0.53	0.54
		M 89	WB	0.50	0.42	0.44	0.48	0.53
25072	M 54 at Mt. Morris Rd	M 54	NBOL	0.63	0.40	0.47	0.46	0.45(1)
		M 54	NBIL	0.70	0.42	0.53	0.52	0.55(1)
		M 54	SBRT	0.72	0.43	0.47	0.45	0.51
		M 54	SBIL	0.71	0.47	0.56	0.60	0.62
33042	M 43 WB (Grand River Ave) at Foster St	M 43	WBOL	0.50	0.37	0.42	0.39	0.45
		M 43	WB#3	0.52	0.40	0.42	0.41	0.43
		M 43	WB#2	0.49	0.40	0.42	0.42	0.46
		M 43	WBIL	0.53	0.39	0.43	0.45	0.52
39042	M 96 at River St	M 96	EBOL	0.50	0.46	0.47	0.60	0.58
		M 96	EBIL	0.50	0.44	0.48	0.51	0.51
		M 96	WBIL	0.50	0.38	0.48	0.51	0.44
47082	M 59 at Old US 23	M 59	EB	0.72	0.41	0.52	0.54	0.57
		M 59	WB	0.72	0.42	0.48	0.50	0.54
81081	M 17 at Carpenter Rd	M 17	EBOL	0.53	0.39	0.52	0.45	0.52
		M 17	EBIL	0.50	0.36	0.54	0.44	0.52
		M 17	WBOL	0.52	0.34	0.52	*	*
		M 17	WBIL	*	0.38	0.56	0.45	0.52
		Carpenter Rd	NBOL	*	*	0.58	*	*
		Carpenter Rd	NBIL	0.53	0.36	0.59	0.43	0.49

* Not Tested

(1) NB lanes (OL particularly) are worn to original surface in the IWT and stopping areas

TABLE 23

BITUMINOUS CONCRETE SURFACES WITH 31A SLAG AGGREGATE

Project No.	Location	Year Paved	Type of Material	Direction and Lane	Average Coefficient of Wet Sliding Friction							
					Firestone Tire			General Tire				
					1960	1961	1962	1964	1965	1967	1968	1969
82121, C1	Grand River (Old US 16) from 6 Mile Rd to Berg Rd	1960	31A slag coarse	EBOL	0.44	0.40	0.38	0.34	0.36	0.36	0.46	0.42
			3BCS slag sand	EBCL	0.46	0.45	0.38	0.36	0.38	0.36	0.46	0.41
			60/70 pen. AC	EBIL	0.47	0.43	0.40	0.39	0.37	0.40	0.51	0.43
				WBOL	0.49	0.44	0.39	0.36	0.38	0.36	0.53	0.42
				WBCL	0.46	0.44	0.39	0.39	0.40	0.39	0.57	0.39
				WBIL	0.52	0.45	0.40	0.35	0.44	0.37	0.56	0.40
82091C, C5	Schaefer Rd from Gate 4 (Ford Motor Co.) to Mellon Rd, Dearborn	1961	31A open hearth slag	NBOL	----	0.59	0.41	0.30	0.51	0.52	*	0.52
			3BCS open hearth slag	NBCL	----	0.65	0.45	0.38	0.48	0.51	0.50	0.53
			open hearth slag	NBIL	----	0.64	0.49	0.48	0.53	0.53	0.52	0.55
			31A blast furnace slag	SBOL	----	0.62	0.51	0.45	0.42	0.48	0.43	0.51
			3BCS blast furnace slag	SBCL	----	0.66	0.49	0.46	0.46	0.48	0.47	0.52
			blast furnace slag	SBIL	----	0.64	0.53	0.51	0.50	0.49	0.53	0.56

* NBOL contaminated with sand--no tests conducted.

TABLE 24
SHEET ASPHALT RESURFACING
US 131: Rockford to Cedar Springs (Project Mb 41013C, C12)

Location			Materials		Average Coefficient of Wet Sliding Friction										
					Firestone Tire			Avg. of Both Tires	Firestone Tire	General Tire					
Section Designation(1)	Stationing	Lane	Percent Bitumen	Dust	Sept. 20 1963	Sept. 25 1963	Oct. 24 1963	Dec. 5 1963	May 12 1964	May 12 1964	Sept. 4 1964	May 25 1965	Sept. 25 1967	July 26 1968	Aug 5 1969
A	323+90 to 299+25	SB	7.5	3.5	.35	.33	.31	.38	.45	.43	.40	.39	.42	.42	.48
	323+79 to 314+94	NB	7.5	3.5	.35	.32	.36	.38	.45	.46	.42	.39	.45	.45	.48
	Average				.35	.33	.33	.38	.45	.44	.41	.39	.44	.43	.48
B	314+94 to 297+20	NB	6.5	3.5	.38	.37	.38	.42	.47	.46	.46	.39	.48	.46	.51
C	299+25 to 281+80	SB	6.5	4.5	.41	.40	.36	.42	.45	.45	.45	.38	.45	.43	.45
	297+20 to 281+94	NB	6.5	4.5	.38	.38	.36	.45	.45	.45	.46	.41	.48	.46	.52
	Average				.40	.38	.36	.44	.45	.45	.46	.39	.46	.45	.48
D	281+80 to 264+97	SB	5.5	4.5	.44	.44	.42	.49	.49	.47	.47	.38	.47	.47	.51
	281+94 to 268+93	NB	5.5	4.5	.44	.45	.44	.46	.51	.49	.49	.43	.49	.56	.56
	Average				.44	.44	.43	.48	.50	.46	.46	.40	.48	.51	.54
Kent County Resurfacing (1962)	138+88 to 156+92	SB	31A, Grand Rapids Gravel Co. No. 8 (Pit 41-16)		.35	.34	.35	.44	.37	.36	.36	.36	.36	.45	.54
	138+88 to 156+92	NB			.38	.35	.35	.44	.40	.39	.39	.39	.39	.46	.53
	Average				.36	.34	.35	.44	.38	.38	.38	.38	.37	.46	.54
Balance of Project	90+00 South	SB	6.5	4.5	.46	.40	.39	.47	.50	.47	.47	.40	.45	.51	.52
	90+00 South	NB	6.5	4.5	.47	.40	.43	.46	.49	.47	.47	.41	.48	.50	.55
	Average				.46	.40	.41	.46	.50	.47	.47	.40	.46	.50	.54

(1) Test areas designated in P. J. Serafin's letter to E. A. Finney, September 16, 1963. Sheet asphalt surfacing placed September 9-13, 1963.

TABLE 25
WYTON SYNTHETIC BINDER SURFACE COURSE MIXTURE

Project No.	Route	Location	Surface Applied	Aggregate	Percent Wyton	Mineral Filler	Direction and Lane	Average Coefficient of Wet Sliding Friction				
								General Tire				
								1963	1964	1965	1967	1969
25-75, C1	Bristol Rd	From M 15 West	Sept. 1963	(2NS) Local Pit - (31A) Wallace	6.0	Fly Ash	EB WB	0.47 0.46	0.48* 0.47*	0.46 0.44	0.38 0.39	0.53 0.50

* Average of two 1964 test series.

TABLE 26
SPECIAL EMULSION PROJECTS

Route	Location	Surface Applied	Aggregate	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1967	1968	1969
I 696 BR	John Lodge at Wyoming	Fall 1966	(3NS) Berlin Pit Pit No. 81-82	NBOL	0.38	0.27	0.48
				NBCL	0.36	0.29	0.48
				NBIL	0.38	0.33	0.48
M 85	Fort St at Sibley Rd(1)	Fall 1966	(3NS) Berlin Pit Pit No. 81-82	NBOL	0.42	0.35	0.41
				NBIL	0.39	0.38	0.42
				SBOL	0.38	0.36	0.40
				SBIL	0.40	0.35	0.42
M 153	Ford Rd at Middlebelt	Fall 1966	(3NS) Berlin Pit Pit No. 81-82	EBOL	0.36	0.37	0.37
				EBIL	0.37	0.39	0.40
				WBOL	0.35	0.34	0.37
				WBIL	0.38	0.38	0.41
US 12	Michigan Ave at Miller	Fall 1966	(3NS) Berlin Pit Pit No. 81-82	EBOL	0.35	0.36	0.42
				EBCL	0.36	0.36	0.41
				EBIL	0.36	0.37	0.42
				WBOL	0.35	0.34	0.41
				WBCL	0.37	0.35	0.42
				WBIL	0.36	0.35	0.44
				WBRTL	----	----	0.43

(1) Also tested as a high-accident intersection in Table 23

TABLE 27

TEST AREAS FOR ANALYSIS OF EFFECTS OF USING TUNGSTEN CARBIDE CUTTING EDGES FOR SNOW REMOVAL

Location	Control Section	Surface Type and Construction Year	Type of Snow Removal Blade	Direction and Lane	Average Coefficient of Wet Sliding Friction			
					Oct 1967[1]	May 1968	Aug 1968	June 1969
I 196 commencing N of I 94 at Mile Post 1, thence N 1000 ft on NB rdwy	11111	Bituminous Concrete 1963	Conventional	NBOL NBIL	0.51 0.75	0.51 0.71	0.46 0.70	0.62 0.81
I 94 from Roslyn Rd Bridge, E of I 196, W 1000 ft on WB rdwy	11017	Concrete 1960	Conventional	WBOL WBIL	0.47 0.55	0.36 0.46	0.37 0.53	0.45 0.53
US 131, S 1000 ft from 110th Ave on SB rdwy, south of M 118	03111	Concrete 1960	Conventional	SBOL SBIL	0.63 0.63	0.41 0.51	0.41 0.58	0.56 0.60
M 89 from 8th St, SE of Plainwell E 1000 ft on EB rdwy	03024	Bituminous Concrete 1962	Conventional	EB	0.47	0.51	0.48	0.55
I 94, W 1000 ft from Empire Ave, on WB rdwy, W of I 196	11016	Concrete 1960	Tungsten Carbide	WBOL WBCL WBIL	0.49 0.59 0.60	0.42 0.52 0.59	0.40 0.51 0.64	0.47 0.53 0.65
I 196, commencing N of I 94, at Mile Post 11, thence N 1000 ft on NB rdwy	80012	Bituminous Concrete 1963	Tungsten Carbide	NBOL NBIL	0.45 0.74	0.51 0.73	0.45 0.73	0.56 0.83
I 196, commencing N of South Haven at Mile Post 31, thence N 1000 ft on NB rdwy	03033	Concrete 1963	Tungsten Carbide	NBOL NBIL	0.57 0.65	0.50 0.66	0.51 0.66	0.50 0.74
M 89, E 1000 ft from 59th St on EB rdwy, West of Fennville	03021	Bituminous Concrete 1960	Tungsten Carbide	EB	0.37	0.41	0.36	0.49

(1) Control skid tests conducted before using the experimental blade.

SECTION IV

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 of experimental skid-resistant resurfacing mixtures.

Selection of this year's high-accident locations was made by the Traffic Division and is based on 1968 accident data. Skid tests yielded average wsf values below 0.40 at 46 percent of the 627 lanes tested in 1969. Friction levels for seven percent of the lanes averaged below 0.30. None of the 627 high-accident lanes tested this year yielded average coefficients below 0.20.

During 1969, skid tests were conducted on 53 different major highway routes. Testing was dispersed throughout 10 districts, 40 counties, and 128 separate locations. Table 28 summarizes the high-accident skid tests.

TABLE 28

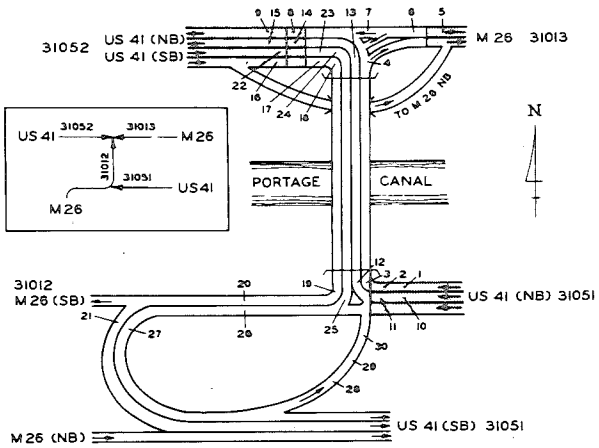
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 1

Location	1968 Accidents: Wet Surface	1968 Accidents: Total	Test Location	Surface Type	Average Coefficient
Baraga					
US 41 from north county line southerly for 8-1/2 miles in Baraga County (Control Section 07013)	NA		US 41, NB US 41, SB	BIT BIT	0.63 0.63
M 38 from west limits of Barage W'ly to Pelkie Rd. in Barage County (Control Section 07041)	NA		M 38, EB M 38, WB	BIT BIT	0.53 0.55
Houghton					
M 26 from County Rd 540 to west limits of Houghton in Houghton Co. (Control Section 31012)	NA		M 26, NB M 26, SB	BIT BIT	0.62 0.57
US 41 - M 26 at Houghton-Hancock Bridge and its approaches in the cities of Houghton and Hancock in Houghton County (Control Sections 31012, 31013, 31051 and 31052)	23		See Schematic 1 for test locations and coefficients of wet sliding friction.		
M 26 from 0.2 mile SE of Lake Linden north 3.36 miles in Houghton County (Control Section 31013)	NA		M 26, NBOL M 26, NBIL M 26, SB	BIT BIT BIT	0.59 0.66 0.56
M 203, 0.5 mile long patch, south of Coast Guard Station in Houghton County (Control Section 31031)	NA		M 203, NB M 203, SB	BIT BIT	0.61 0.61
Iron					
US 2, 0.5 mile long patch from Gibbs City Rd (approximately 1 mile W of Iron River) W'ly in Iron County (Control Section 36021)	NA		US 2, EB US 2, WB	BIT BIT	0.52 0.51
US 2, 0.5 mile long patch, approximately 0.5 mile E of Emily Lake Rd. (W of Crystal Falls) in Iron County (Control Section 36022)	NA		US 2, EB US 2, WB	BIT BIT	0.54 0.55
M 189, 0.5 mile long patch approximately 1.5 mile N of State Line in Iron County (Control Section 36031)	NA		M 189, NB M 189, SB	BIT BIT	0.57 0.55
US 2 - US 141 from junction of M 69 S'ly to State Line in Iron County (Control Section 36051)	NA		US 2 - US 141, NB US 2 - US 141, SB	BIT BIT	0.53 0.48

DISTRICT 1 (CONT.)

Location	1968 Accidents: Wet Surface	1968 Accidents: Total	Test Location	Surface Type	Average Coefficient
Marquette					
M 35 from Little Lake W'ly to Gwinn in Marquette County (Control Sections 52031 and 52032)	NA		M 35, NB M 35, SB	BIT BIT	0.46 0.47
US 41 - M 28 at Hampton, in Marquette (Control Section 52042)	11		US 41 - M 28, NBOL US 41 - M 28, NBIL US 41 - M 28, SBOL US 41 - M 28, SBIL	BIT BIT BIT BIT	0.54 0.54 0.53 0.54



Test No.	Coefficient of Waf	Surface Type	Test No.	Coefficient of Waf	Surface Type
1	0.53	BIT	16	0.55	BIT
2	0.53	BIT	17	0.42	CONC
3	0.37	CONC	18	0.42	CONC
4	0.40	CONC	19	0.41	CONC
5	0.55	BIT	20	0.45	CONC
6	0.47	CONC	21	0.39	CONC
7	0.42	CONC	22	0.47	BIT
8	0.50	BIT	23	0.33	CONC
9	0.55	BIT	24	0.38	CONC
10	0.55	BIT	25	0.42	CONC
11	0.55	BIT	26	0.47	CONC
12	0.44	CONC	27	0.38	CONC
13	0.41	CONC	28	0.43	CONC
14	0.55	BIT	29	0.41	CONC
15	0.40	BIT	30	0.48	CONC

Schematic 1. High-accident test location showing 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).

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

	Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
		Wet Surface	Total			
DISTRICT 2	**Delta**					
	US 2 - US 41 from N city limits of Gladstone to intersection of US 2 - US 41 in Rapid River, Delta County (Control Section 21023)		NA	US 2 - US 41, EB	BIT	0.44
				US 2 - US 41, WB	BIT	0.42
	Luce					
	M 28, on entire curve area at County Rd. 413 (Wiertella Rd.) in Luce County (Control Section 48041)		NA	M 28, EB	BIT	0.52
				M 28, WB	BIT	0.53
DISTRICT 3	**Benzie**					
	US 31 from east limits of Honor easterly to County Line in Benzie County (Control Section 10032)		NA	US 31, NB	BIT	0.56
				US 31, SB	BIT	0.58
				US 31, SB	BIT [1]	0.55
	Charlevoix					
	US 31 (Michigan) from Charlevoix Bridge northerly to junction US 31 (Petoskey) in Charlevoix (Control Section 15012)		14	US 31, NBOL	BIT	0.48
				US 31, NBIL	BIT	0.54
				US 31, SBOL	BIT	0.51
				US 31, SBIL	BIT	0.53
				US 31, NBOL	CONC	0.30
				US 31, NBIL	CONC	0.33
				US 31, SBOL	CONC	0.30
				US 31, SBIL	CONC	0.28
	Clare					
	M 115 at junction US 10 (3 legs) in Clare County (Control Section 18011)		9	US 10, EB	BIT	0.45
				US 10, WB	BIT	0.44
				M 115, EB	BIT	0.33
	Grand Traverse					
	US 31 - M 72 (Grandview) at US 31 - M 72 - M 37 (Front), in Traverse City (Control Section 28013)		17	US 31 - M 72 (Grandview)EBOL	CONC	0.40
				US 31 - M 72 (Grandview)EBIL	CONC	0.36
				US 31 - M 72 (Front) WBOL	CONC	0.36
				US 31 - M 72 (Front) WBIL	CONC	0.36
	US 31 - M 72 (Front) from Peninsula to Gilbert in Traverse City (Control Section 28013)		18	US 31 - M 72, EBOL	CONC	0.38
				US 31 - M 72, EBIL	CONC	0.38
				US 31 - M 72, WBOL	CONC	0.37
				US 31 - M 72, WBIL	CONC	0.37
	US 31 (Front) at US 31 (Garfield) in Traverse City (Control Section 28013)		24	US 31, EBOL	CONC	0.33
				US 31, EBIL	CONC	0.37
				US 31, WBOL	CONC	0.35
				US 31, WBIL	CONC	0.37

	Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
		Wet Surface	Total			
DISTRICT 3 (CONT)	**Grand Traverse Cont.**					
	US 31 - M 72 (Munson) at 8th St., in Traverse City (Control Section 28013)		23	US 31 - M 72, EBOL	CONC	0.33
				US 31 - M 72, EBIL	CONC	0.35
				US 31 - M 72, WBOL	CONC	0.35
				US 31 - M 72, WBIL	CONC	0.35
	Lake					
	M 37 at US 10, in Baldwin (Control Sections 43011 and 43022)		NA	M 37, NBOL	BIT	0.43
				M 37, NBIL	BIT	0.37
				US 10 - M 37, SB	BIT	0.41
				US 10 - M 37 (S of US 10 WB to US 10 NB ramp) NB	BIT	0.39
				US 10 WB to US 10 NB ramp	BIT	0.48
				US 10 WB	BIT	0.41
	Manistee					
	US 31 (Cypress) at River, in Manistee (Control Section 51051)		9	US 31, NBOL	CONC	0.34
				US 31, NBIL	CONC	0.36
				US 31, SBOL	BIT	0.33
				US 31, SBIL	BIT	0.34
	Mason					
	US 10 at US 31 in Mason County (Control Sections 53011, 53031 and 53032)		NA	US 10, EBRT	BIT	0.43
				US 10, EB	BIT	0.39
				US 10 - US 31, WBOL	BIT	0.44
				US 10 - US 31, WBIL	BIT	0.42
				US 31, NBRT	BIT	0.49
				US 31, NB	BIT	0.43
	Wexford					
	M 37 at both junctions with M 115 in Mesick (Control Sections 83011, 83012, 83052 & 83053)		NA	East M 37-M 115 Junction		
				M 37, SB	BIT	0.38
				M 37 - M 115, EB	BIT [1]	0.31
				M 115, WB	BIT	0.27
				West M 37 - M 115 Junction		
				M 37, NB	BIT [1]	0.25
				M 115, EBIL	BIT	0.48
				M 115, EBRT	BIT	0.35
				M 37 - M 115, WBOL	BIT	0.54
				M 37 - M 115, WBIL	BIT	0.42

[1] Surface treatment in outside wheel track.

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 3 (CONT.)

Location	1968 Accidents: Wet Surface	1968 Accidents: Total	Test Location	Surface Type	Average Coefficient
Wexford Cont.					
US 31 at M 55, in Cadillac (Control Section 83021 and 83031)		13	US 131, NBOL	BIT	0.40
			US 131, NBIL	BIT	0.43
			US 131, SBOL	BIT	0.43
			US 131, SBIL	BIT	0.43
			M 55, EB	BIT	0.27
M 55 at M 115, in Cadillac (Control Sections 83021 and 83052)		NA	M 55, EBOL	BIT	0.44
			M 55, EBIL	BIT	0.46
			M 115, EB	BIT	0.43
			M 55 - M 115, WBOL	BIT	0.46
			M 55 - M 115, WBIL	BIT	0.41
US 131 from North limits of Manton northerly for 2 miles in curve area (Control Section 83032)		NA	US 131, NB	BIT	0.29
			US 131, SB	BIT	0.28
			US 131, NB	CONC	0.43
			US 131, SB	CONC	0.42

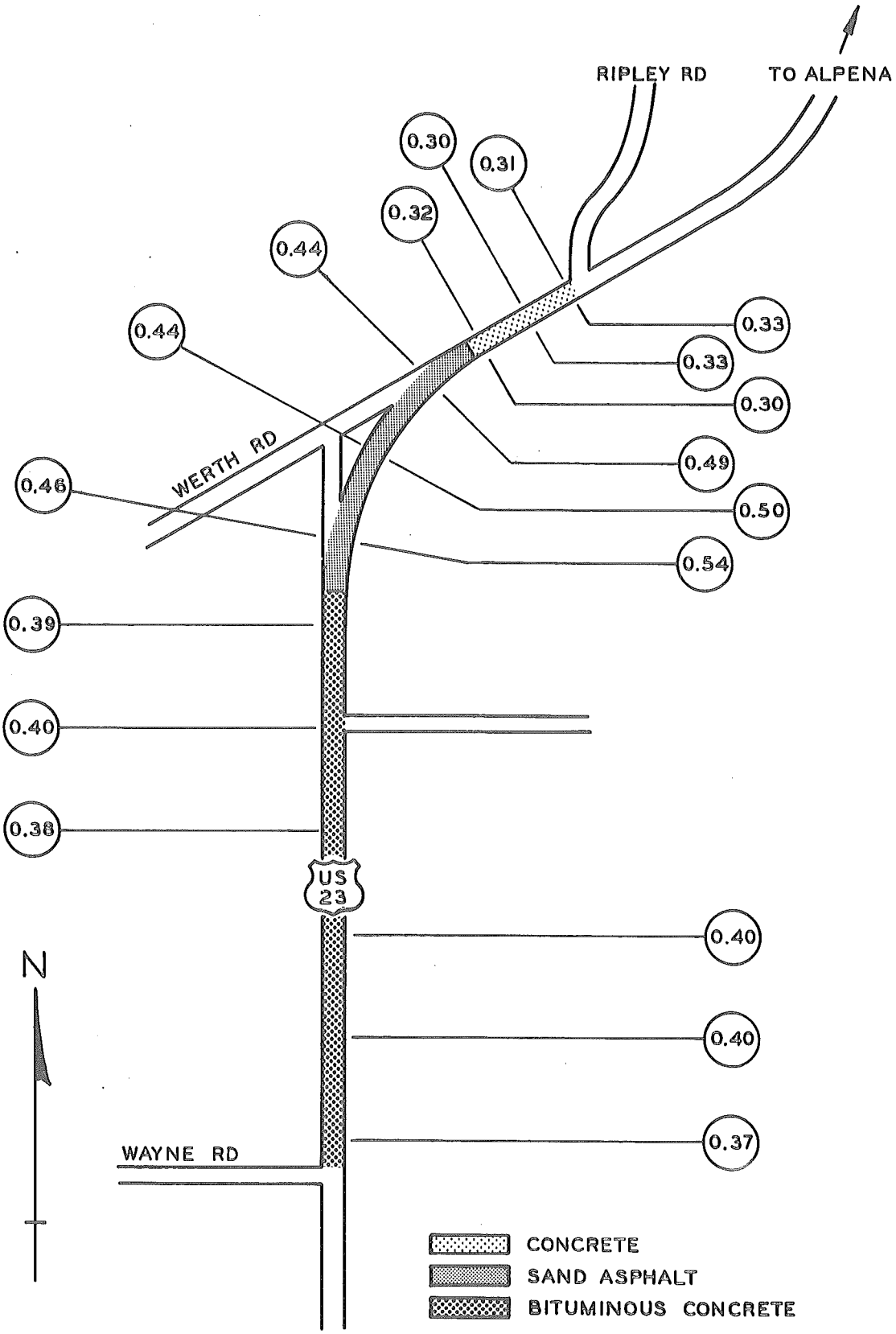
DISTRICT 4

Location	1968 Accidents: Wet Surface	1968 Accidents: Total	Test Location	Surface Type	Average Coefficient
Alpena					
US 23 from Wayne Rd. northerly to Ripley Rd. in Alpena (Control Section 04031) [2]		NA	US 23, NB	CONC	0.32
			US 23, SB	CONC	0.31
			US 23, NB	BIT [3]	0.51
			US 23, SB	BIT [3]	0.45
			US 23, NB	BIT [4]	0.39
Emmet			US 23, SB	BIT [4]	0.39
US 131 - M 131 - M 68 from Ingals to Lake in Petoskey (Control Section 24011)		26	Ingals St N to Liberty St		
			US 131 - M 131 - M 68, NB	BIT	0.34
			US 131 - M 131 - M 68, SB	BIT	0.37
			Liberty St N to Bridge		
			US 131 - M 131 - M 68, NB	BIT	0.36
			US 131 - M 131 - M 68, SB	BIT	0.39
			Bridge N to Lake St		
			US 131 - M 131 - M 68, NBOL	CONC	0.36
			US 131 - M 131 - M 68, NBIL	CONC	0.30
			US 131 - M 131 - M 68, SBOL	CONC	0.30
			US 131 - M 131 - M 68, SBIL	CONC	0.34

[2] See Schematic 2.
[3] Sand asphalt surface
[4] Bituminous concrete surface.

DISTRICT 5

Location	1968 Accidents: Wet Surface	1968 Accidents: Total	Test Location	Surface Type	Average Coefficient
Ionia					
M 66 from I 96 northerly to South limits of Ionia, in Ionia Co. (Control Section 34032)		NA	I 96 to N. of Nicholas Rd		
			M 66, NB	BIT	0.32
			M 66, SB	BIT	0.35
			N. of Nicholas Rd to S. of David Rd		
			M 66, NB	BIT	0.38
			M 66, SB	BIT	0.43
			S. of David Rd to N. of Sprague Rd		
			M 66, NB	BIT	0.35
			M 66, SB	BIT	0.35
			N. of Sprague Rd to N of State Police Post		
			M 66, NB	BIT	0.55
			M 66, SB	BIT	0.58
Kent					
US 131 - M 44 at Cannonburg Rd; in Kent Co. (Control Section 41013)		17	US 131 - M 44, NBOL	CONC	0.28
			US 131 - M 44, NBIL	CONC	0.30
			US 131 - M 44, SBOL	CONC	0.32
			US 131 - M 44, SBIL	CONC	0.34
M 37 at I 96 (exit and entrance ramps) in Grand Rapids (Control Section 41033)		NA	M 37, ramp	CONC	0.48
			M 37, NBOL	CONC	0.35
			M 37, NBIL	CONC	0.35
			M 37, SBRT	BIT	0.41
			M 37, SBCL	BIT	0.37
			M 37, SBIL	BIT	0.46
M 11 (28th St.) at Michael DeHoop, in Wyoming (Control Section 41062)		61	M 11 EBOL	CONC	0.35
			M 11, EBIL	CONC	0.33
			M 11, WBOL	CONC	0.36
			M 11, WBIL	BIT	0.44
M 11 (28th St.) at Buchanan, in Wyoming (Control Section 41062)		84	M 11, EBOL	BIT	0.41
			M 11, EBIL	BIT	0.43
			M 11, WBOL	BIT	0.39
			M 11, WBIL	BIT	0.42
M 11 (28th St.) at Eastern, in Grand Rapids (Control Section 41063)		25	M 11, EBOL	BIT	0.43
			M 11, EBIL	BIT	0.41
			M 11, WBOL	BIT	0.41
			M 11, WBIL	BIT	0.43
M 11 (28th St.) at Kalamazoo, in Grand Rapids (Control Section 41063)		NA	M 11, EBOL	BIT	0.39
			M 11, EBIL	BIT	0.40
			M 11, WBOL	BIT	0.39
			M 11, WBIL	BIT	0.41



Schematic 2. High-accident test location showing US 23 from Wayne Rd N'ly to Ripley Rd (Control Section 04031).

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 5 (CONT.)

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Muskegon					
BS 96 (Seaway) at Laketon, in Muskegon (Control Section 61151)		58	BS 96, NBRT	CONC	0.35
			BS 96, NBOL	CONC	0.35
			BS 96, NBIL	CONC	0.35
			BS 96, SBOL	CONC	0.37
			BS 96, SBIL	CONC	0.37
BS 96 (Seaway) at Sherman, in Muskegon (Control Section 61151)		NA	BS 96, NBOL	CONC	0.37
			BS 96, NBIL	CONC	0.38
			BS 96, SBOL	CONC	0.37
			BS 96, SBIL	CONC	0.36
Oceana					
US 31, north and south of Clay Rd. (approx. 1 mile in each direction) in Oceana Co. (Control Section 64011)		NA	North of Clay Rd		
			US 31, NB	CONC	0.40
			US 31, SB	CONC	0.39
			At Clay Rd		
			US 31, NB	BIT	0.42
			US 31, SB	BIT	0.37
			South of Clay Rd		
			US 31, NB	CONC	0.40
			US 31, SB	CONC	0.41
Ottawa					
US 31 BR (8th St.) from River St. easterly to Fairbanks, in Holland (Control Sections 70011 and 70012		220	River St. east to College		
			US 31 BR, EBOL	BIT	0.41
			US 31 BR, EBIL	BIT	0.43
			US 31 BR, WBOL	BIT	0.40
			US 31 BR, WBIL	BIT	0.41
			College east to Lincoln		
			US 31 BR, EB	BIT	0.43
			US 31 BR, WB	BIT	0.44
			Lincoln east to Fairbanks		
			US 31 BR, EBOL	BIT	0.42
			US 31 BR, EBIL	BIT	0.43
			US 31 BR, WBOL	BIT	0.44
			US 31 BR, WBIL	BIT	0.45
US 31 over the Grand River (B02 of 70014)		NA	North of Steel Grating		
			US 31, NBRT	CONC	0.37
			US 31, NBCL	CONC	0.37
			US 31, NBIL	CONC	0.48
			US 31, SBOL (ramp merge)	CONC	0.35
			US 31, SBCL	CONC	0.41
			US 31, SBIL	CONC	0.51

DISTRICT 5 (CONT.)

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Ottawa Cont					
US 31 over the Grand River (B02 of 70014) Cont.			South of Steel Grating		
			US 31, NBRT	CONC	0.39
			US 31, NBCL	CONC	0.36
			US 31, NBIL	CONC	0.46
			US 31, SBOL (ramp merge)	CONC	0.37
			US 31, SBCL	CONC	0.40
			US 31, SBIL	CONC	0.48
			NB US 31 to M 104 (ramp)	BIT	0.44
			NB US 31 to M 104 (ramp)	CONC	0.37
			SB US 31 to M 104 (ramp)	CONC	0.54
			WB M 104 to SB US 31 (ramp)	CONC	0.34
US 31 over GTWRR Spur (G01 of 70016)		NA	US 31, NBOL	CONC	0.45
			US 31, NBIL	CONC	0.45
			US 31, SBOL	CONC	0.45
			US 31, SBIL	CONC	0.54

DISTRICT 6

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Genesee					
M 13 at M 21, in Genesee Co. (Control Sections 25011, 25081 & 76062)		21	M 13 NBRT	BIT	0.41
			M 13 NBIL	BIT	0.25
			M 13 SBRT	BIT	0.43
			M 13 SBIL	BIT	0.25
			M 21 EBOL	CONC	0.41
			M 21 EBIL	CONC	0.50
			M 21 EBLT	CONC	0.46
			M 21 WBOL	CONC	0.41
			M 21 WBIL	CONC	0.51
			M 21 WBLT	CONC	0.40
M 21 at Belsay Rd., in Genesee Co. (Control Section 25083)		NA	M 21 EBRT	CONC	0.38
			M 21 EB	BIT	0.45
			M 21 EBLT	BIT	0.52
			M 21 WBRT	BIT	0.61
			M 21 WB	CONC	0.33
			M 21 WBLT	BIT	0.50
M 15 at Dodge Rd in Genessee County (Control Section 25092)		7	M 15, NB	BIT	0.32
			M 15, SB	BIT	0.25
Huron					
M 53 from south limits of Port Austin southerly approximately 2 miles including S-curve in Huron County (Control Section 32032)		NA	Air Base entrance north to south limits of Port Austin		
			M 53, NB	BIT	0.51
			M 53, SB	BIT	0.45
			South leg of S-curve		
			M 53, NB	BIT	0.62
			North leg of S-curve		
			M 53, SB	BIT	0.49

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 6 (CONT.)

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Lapeer					
M 24 from south limits of Lapeer southerly for 1 mile in Lapeer County (Control Section 44011)		NA	M 24, NB	CONC	0.28
			M 24, SB	CONC	0.27
Saginaw					
M 84 (Bay) at Shattuck, in Saginaw Co. (Control Section 73033		13	M 84 NBRT	BIT	0.33
			M 84 NBIL	BIT	0.30
			M 84 SBRT	BIT	0.30
			M 84 SBIL	BIT	0.33
M 84 (Bay) at Schust, in Saginaw Co. (Control Section 73033)		12	M 84 NB	BIT	0.32
			M 84 SB	BIT	0.35
M 84 (Bay) at Tittabawassee, in Saginaw Co. (Control Section 73033)		15	M 84 NB	BIT	0.44
			M 84 SB	BIT	0.38
M 81 at Hemmeter, in Saginaw (Control Section 73073)		NA	M 81 EBOL	CONC	0.31
			M 81 EBCL	CONC	0.30
			M 81 EBIL	BIT	0.25
			M 81 WBOL	CONC	0.29
			M 81 WBCL	CONC	0.28
			M 81 WBIL	BIT	0.24
Sanilac					
M 19 at S-curve just south of Marlette Rd in Sanilac County (Control Section 74031)		NA	M 19, NB	CONC	0.40
			M 19, SB	CONC	0.38
			M 19, NB	BIT	0.52
			M 19, SB	BIT	0.51
Tuscola					
M 81 (State) at Burnside, in Caro (Control Section 79061)		17	M 81 EB	BIT	0.51
			M 81 WB	BIT	0.51

DISTRICT 7

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Allegan					
M 40 at 48th St., in Holland (Control Section 03072)		13	M 40 NB (E. Intersection)	BIT	0.34
			M 40 SB (E. Intersection)	BIT	0.36
			M 40 NB (W. Intersection)	BIT	0.38
			M 40 SB (W. Intersection)	BIT	0.34
Berrien					
BL 94 at State, in St. Joseph (Control Section 11012)		10	BL 94 NBOL	BIT	0.35
			BL 94 NBIL	BIT	0.32
			BL 94 SBOL	BIT	0.32
			BL 94 SBIL	BIT	0.34

DISTRICT 7 (CONT.)

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Berrien Cont.					
BL 94 at State, in St. Joseph (Control Section 11012) Cont.			BL 94 SBOL (N. of Intersection)	BIT	0.50
			BL 94 SBIL (N. of Intersection)	BIT	0.52
Calhoun					
M 66 (Capital) at Union, in Battle Creek (Control Section 13032)		21	M 66 NBOL	BIT	0.34
			M 66 NBIL	BIT	0.27
			M 66 SBIL	BIT	0.30
Cass					
M 60 at Pine Lake Rd., in Cass Co. (Control Section 14061)		NA	M 60 EB (W. of curve)	BIT	0.46
			M 60 WB (E. of curve)	BIT	0.39
			M 60 EB	BIT	0.50
			M 60 WB	BIT	0.51
Kalamazoo					
M 89 from M 43 westerly 2.8 miles in Kalamazoo County (Control Section 39013)		NA	M 89 EB	BIT	0.20
			M 89 WB	BIT	0.29
BL 94 (Michigan) at Lovell, in Kalamazoo (Control Section 39041)		30	BL 94 NBOL	BIT	0.27
			BL 94 NBIL	BIT	0.26
			BL 94 SBOL	BIT	0.33
			BL 94 SBIL	BIT	0.32
BL 94 (Michigan) at Park in Kalamazoo (Control Section 39042)		34	BL 94 EBOL	BIT	0.32
			BL 94 EB#4	BIT	0.34
			BL 94 EB#3	BIT	0.34
			BL 94 EB#2	BIT	0.33
			BL 94 EBLT	BIT	0.29
BL 94 (Kings Hwy) at Mill, in Kalamazoo (Control Section 39042)		NA	BL 94 EBOL	BIT	0.37
			BL 94 EBIL	BIT	0.42
			BL 94 WBOL	BIT	0.35
			BL 94 WBIL	BIT	0.39
M 43 (Michigan) at Mill, in Kalamazoo (Control Section 39082)		16	M 43 EBOL	BIT	0.33
			M 43 EBIL	BIT	0.30
			M 43 WBOL	BIT	0.29
			M 43 WBIL	BIT	0.32
			M 43 WBLT	BIT	0.30

DIST. 8

Location	1968 Accidents Wet Surface	1968 Accidents Total	Test Location	Surface Type	Average Coefficient
Ingham					
M 99 (Logan) at Mt. Hope, in Lansing (Control Section 33011)		50	M 99, NBOL	BIT	0.38
			M 99, NBIL	BIT	0.42
			M 99, SBOL	BIT	0.38
			M 99, SBIL	BIT	0.46

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 8 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Ingham Cont.					
BL 96 (Cedar) at Miller, in Lansing (Control Section 33032)		14	BL 96, NBOL	BIT	0.37
			BL 96, NBIL	BIT	0.40
			BL 96, NBRT	CONC	0.43
			BL 96, SBOL	BIT	0.40
			BL 96, SBIL	BIT	0.37
BL 96 (Cedar) at Mt. Hope, in Lansing (Control Section 33032)		48	BL 96, NBOL	BIT	0.27
			BL 96, NBIL	BIT	0.26
			BL 96, SBOL	CONC	0.33(6)
			BL 96, SBOL	BIT	0.25(8)
			BL 96, SBIL	CONC	0.34(6)
			BL 96, SBIL	BIT	0.33(6)
BL 96 (Cedar) at Holmes, in Lansing (Control Section 33032)		NA	BL 96, NBOL	BIT	0.44
			BL 96, NBIL	BIT	0.45
			BL 96, SBOL	BIT	0.37
			BL 96, SBIL	BIT	0.40
BL 96 (Cedar) at Greenlawn, in Lansing (Control Section 33032)		17	BL 96, NBOL	BIT	0.38
			BL 96, NBIL	BIT	0.42
			BL 96, SBOL	BIT	0.36
			BL 96, SBIL	BIT	0.41
BL 96 (Cedar) at Hazel, in Lansing (Control Section 33032)		41	BL 96, NBOL	CONC	0.39
			BL 96, NBIL	CONC	0.40
			BL 96, SBOL	CONC	0.35
			BL 96, SBIL	CONC	0.36
M 143 (Michigan) at Harrison, in East Lansing (Control Section 33062)		33	M 143, EBOL	BIT	0.37
			M 143, EBCL	BIT	0.39
			M 143, EBIL	BIT	0.44
			M 143, WBOL	BIT	0.30
			M 143, WBCL	BIT	0.29
			M 143, WBIL	BIT	0.30
M 143 (Michigan) at Delta, in East Lansing (Control Section 33062)		11	M 143, EBOL	BIT	0.42
			M 143, EBIL	BIT	0.40
			M 143, WBOL	BIT	0.36
			M 143, WBCL	BIT	0.36
			M 143, WBIL	BIT	0.43
M 43 (Grand River) from Delta to Bogue, in East Lansing (Control Section 33082)		NA	Delta to Mich Ave (7)		
			M 43, EBOL	BIT	0.33
			M 43, EBIL	BIT	0.29
			M 43, WBOL	BIT	0.36
			M 43, WBIL	BIT	0.30
			Abbott to Division (7)		
			M 43, EBOL	BIT	0.41
			M 43, EBCL	BIT	0.35
			M 43, EBIL	BIT	0.27
			M 43, WBOL	BIT	0.37
			M 43, WBCL	BIT	0.42
			M 43, WBIL	BIT	0.38

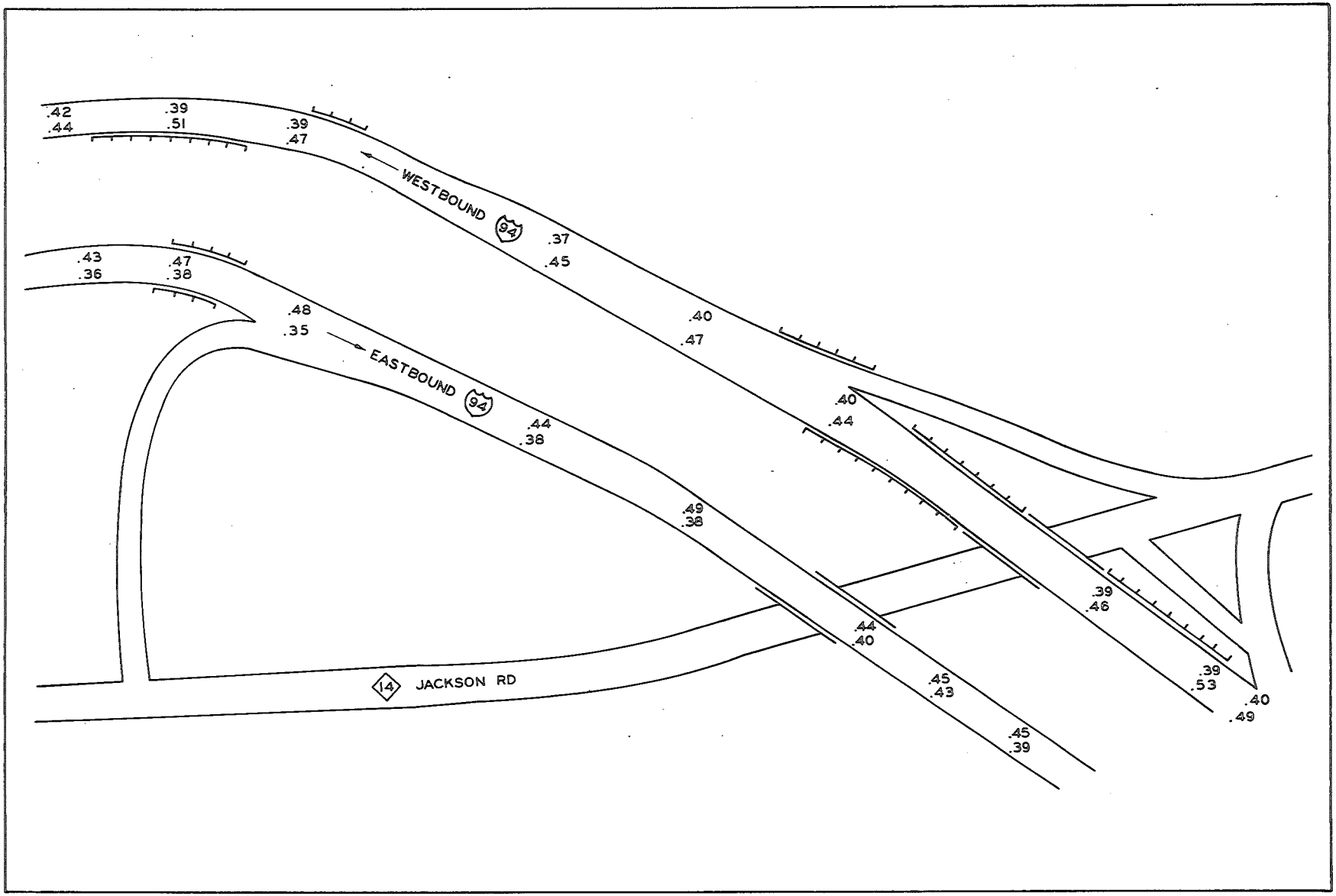
DISTRICT 8 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Ingham Cont.					
			Division to Bogue (7)		
M 43 (Grand River) from Delta to Bogue, in East Lansing (Control Section 33082) Cont.			M 43, EBOL	BIT	0.34
			M 43, EBCL	BIT	0.33
			M 43, EBIL	BIT	0.32
			M 43, WBOL	BIT	0.29
			M 43, WBCL	BIT	0.28
			M 43, WBIL	BIT	0.37
Lenawee					
US 127 at US 12 in Lenawee Co. (Control Sections 46011, 46012 and 46101)		19	US 127, NB	BIT	0.26
			US 127, NB	BIT	0.34(8)
			US 127, SB	CONC	0.32
			US 12, EBRT	BIT	0.38
			US 12, EBIL	BIT	0.31
			US 12, WB	BIT	0.32
Washtenaw					
I 94 (EB & WB) one-quarter mile either side and across structure over Jackson Ave. (Control Sections 81062 and 81104) (9)		NA	I 94, EBOL	CONC	0.38
			I 94, EBIL	CONC	0.46
			I 94, WBOL	CONC	0.39
			I 94, WBIL	CONC	0.47
I 94 (EB only) from Kalmbach Rd to Pierce Rd (Control Section 81104)		NA	East of RR Crossing		
			I 94, EBOL	CONC	0.34
			I 94, EBIL	CONC	0.47
			West of RR Crossing		
			I 94, EBOL	CONC	0.36
			I 94, EBIL	CONC	0.47

DISTRICT 9

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Macomb					
M 97 at 15 Mile Rd, Macomb Co. (Control Section 50031)		NA	M 97, NBOL	CONC	0.31
			M 97, NBIL	BIT	0.37
			M 97, SBOL	CONC	0.31
			M 97, SBIL	BIT	0.36
US 25 at Remick NB, City of Mt. Clemens, Macomb Co. (Control Section 50051)		NA	US 25, NBOL	CONC	0.32
			US 25, NBCL	CONC	0.34
			US 25, NBIL	CONC	0.33
US 25 at Toepfer Ave in East Detroit (Control Section 50051)		36	US 25, NBOL	BIT	0.41
			US 25, NBCL	BIT	0.39
			US 25, NBIL	CONC	0.38
			US 25, SBOL	CONC	0.35
			US 25, SBCL	CONC	0.36
			US 25, SBIL	CONC	0.36

(6) Avg. of two tests.
(8) Only one test conducted
(7) Tests conducted outside stopping areas.
(8) Tests conducted before stopping area.
(9) See Schematic 3.



Schematic 3. High-accident test location showing I 94 at M 14 (Jackson Rd) interchange, City of Ann Arbor, May 27, 1969.

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 9 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Macomb Cont.					
US 25 at Nine Mile in East Detroit (Control Section 50051)		70	US 25, NBOL	BIT	0.41
			US 25, NBCL	BIT	0.40
			US 25, NBIL	BIT	0.41
			US 25, SBOL	CONC	0.35
			US 25, SBCL	CONC	0.34
			US 25, SBIL	CONC	0.35
US 25 at Stephen Drive in East Detroit (Control Section 50051)		36	US 25, NBOL	BIT	0.37
			US 25, NBCL	BIT	0.40
			US 25, NBIL	CONC	0.35
			US 25, SBOL	CONC	0.32
			US 25, SBCL	CONC	0.35
			US 25, SBIL	CONC	0.35
US 25 at Ten Mile Rd in East Detroit and Roseville (Control Section 50051)		50	US 25, NBOL	BIT	0.38
			US 25, NBCL	BIT	0.39
			US 25, NBIL	CONC	0.34
			US 25, SBOL	CONC	0.32
			US 25, SBCL	CONC	0.34
			US 25, SBIL	CONC	0.34
US 25 at Frazho Rd in Roseville (Control Section 50051)		48	US 25, NBOL	BIT	0.38
			US 25, NBCL	BIT	0.38
			US 25, NBIL	CONC	0.32[10]
			US 25, NBIL	BIT	0.35[11]
			US 25, SBOL	CONC	0.31
			US 25, SBCL	CONC	0.31
			US 25, SBIL	CONC	0.31
US 25 at Martin Rd in Roseville (Control Section 50051)		53	US 25, NBOL	BIT	0.42
			US 25, NBCL	BIT	0.43
			US 25, NBIL	BIT	0.41
			US 25, SBOL	BIT	0.41
			US 25, SBCL	BIT	0.41
			US 25, SBIL	BIT	0.41
US 25 at Twelve Mile Rd in Roseville (Control Section 50051)		62	US 25, NBRT	BIT	0.42
			US 25, NBOL	BIT	0.41
			US 25, NBCL	BIT	0.41
			US 25, NBIL	BIT	0.41
			US 25, SBOL	BIT	0.40
			US 25, SBCL	BIT	0.42
			US 25, SBIL	BIT	0.43
US 25 at Thirteen Mile Rd in Roseville (Control Section 50051)		41	US 25, NBOL	BIT	0.44
			US 25, NB#3	BIT	0.41
			US 25, NB#2	BIT	0.43
			US 25, NBIL	BIT	0.42
			US 25, SBOL	BIT	0.40
			US 25, SB#3	BIT	0.40
			US 25, SB#2	BIT	0.41
			US 25, SBIL	BIT	0.44
US 25 at Masonic in Roseville (Control Section 50051)		70	US 25, NBOL	BIT	0.49
			US 25, NB#3	BIT	0.43
			US 25, NB#2	BIT	0.42
			US 25, NBIL	BIT	0.43
			US 25, SBOL	BIT	0.41
			US 25, SB#3	BIT	0.41
			US 25, SB#2	BIT	0.42
			US 25, SBIL	BIT	0.44

DISTRICT 9 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Macomb Cont.					
US 25 at 23 Mile Rd, NB & SB, Macomb Co. (Control Section 50052)		NA	US 25, NBRT	BIT	0.40
			US 25, NBOL	BIT	0.42
			US 25, NBIL	BIT	0.40
			Gratiot, SBOL	BIT	0.40
			Gratiot, SBIL	BIT	0.39
			US 25 - M 59 - 23 Mile Rd, WBOL	BIT	0.42
			US 25 - M 59 - 23 Mile Rd, WBIL	BIT	0.40
US 25 at Twenty One Mile Rd (Control Section 50052)		NA	US 25, NBOL	BIT	0.46
			US 25, NBIL	BIT	0.46
			US 25, SBOL	BIT	0.30
			US 25, SBIL	BIT	0.31
Oakland					
I 96 at C & ORR west of Novi Rd. one-half mile each way EB & WB, Oakland Co. (Control Section 63022)		NA	East of Tracks		
			I 96, EBOL	CONC	0.43
			I 96, EBCL	CONC	0.54
			I 96, EBIL	CONC	0.51
			I 96, WBOL	CONC	0.41
			I 96, WBCL	CONC	0.52
			I 96, WBIL	CONC	0.51
			West of Tracks		
			I 96, EBOL	CONC	0.44
			I 96, EBCL	CONC	0.49
			I 96, EBIL	CONC	0.50
			I 96, WBOL	CONC	0.43
			I 96, WBCL	CONC	0.54
			I 96, WBIL	CONC	0.48
US 24 at 13 Mile Rd, Oakland Co. (Control Section 63031)		NA	US 24, NBOL	BIT	0.46
			US 24, NBIL	BIT	0.50
			US 24, SBOL	BIT	0.45
			US 24, SBIL	BIT	0.47
US 24 at 14 Mile Rd, Oakland Co. (Control Section 63031)		NA	US 24, NBOL	BIT	0.41
			US 24, NBIL	BIT	0.47
			US 24, SBOL	BIT	0.39
			US 24, SBIL	BIT	0.42
M 59 at Ormond Rd, Oakland Co. (Control Section 63041)		NA	M 59, EB	BIT	0.49
			M 59, WB	BIT	0.47
M 59 at Porter Rd, Oakland Co. (Control Section 63041)		NA	M 59, EB	BIT	0.44
			M 59, WB	BIT	0.41

[10] Avg. of two tests.
[11] Only one skid test conducted.

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 9 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Oakland Cont.					
US 10 (Dixie) at Silver Lake Rd, in Oakland Co. (Control Section 63053)		34	US 10, NBRT	BIT	Not Tested
			US 10, NBOL	BIT	0.37
			US 10, NBIL	BIT	0.41
			US 10, SBRT	BIT	Not Tested
			US 10, SBOL	BIT	0.40
			US 10, SBIL	BIT	0.37
US 10 (Dixie) at Sashabaw, Oakland Co. (Control Section 63053)		13	US 10, NBRT	BIT	Not Tested
			US 10, NBOL	BIT	0.36
			US 10, NBIL	BIT	0.37
			US 10, SBOL	BIT	0.39
			US 10, SBIL	BIT	0.38
M 15 from US 10 northerly 1/4 mile in Oakland Co. (Control Section 63072)		NA	M 15, NB	BIT	0.39
			M 15, SB	BIT	0.38
M 24 at Clarkston Rd, Oakland Co. (Control Section 63112)		NA	M 24, NBOL	CONC	0.34
			M 24, NBIL	CONC	0.34
			M 24, SBOL	CONC	0.35
			M 24, SBIL	CONC	0.32
I 75 NB from Auburn Rd S one-half mile, Oakland Co. (Control Section 63172)		NA	I 75, NBOL	CONC	0.43
			I 75, NBIL	CONC	0.50
Wide Track Dr. between Oakland and LaFayette, City of Pontiac, Oakland Co. (Control Section 63201)		NA	US 10 BR - M 59, WBOL	CONC	0.31
			US 10 BR - M 59, WBCL	CONC	0.33
			US 10 BR - M 59, WBIL	CONC	0.35
St. Clair					
US 25 BR at Quay, in Port Huron (Control Section 77032)		21	US 25 BR, NBOL	BIT	0.29
			US 25 BR, NBIL	BIT	0.28
			US 25 BR, SBOL	BIT	0.26
			US 25 BR, SBIL	BIT	0.27
US 25 BR at Grand River, in Port Huron (Control Section 77032)		10	US 25 BR, NBOL	BIT	0.28
			US 25 BR, NBIL	BIT	0.29
			US 25 BR, SBOL	BIT	0.29
			US 25 BR, SBIL	BIT	0.30
US 25 at Andrew Murphy, in Port Huron (Control Section 77032)		9	US 25 BR, NBOL	BIT	0.29
			US 25 BR, NBIL	BIT	0.31
			US 25 BR, SBOL	BIT	0.32
			US 25 BR, SBIL	BIT	0.31
US 25 BR at Glenwood-Huron, in Port Huron (Control Section 77032)		12	US 25 BR, NBOL	BIT	0.27
			US 25 BR, NBIL	BIT	0.28
			US 25 BR, SBOL	BIT	0.35
			US 25 BR, SBIL	BIT	0.29

DISTRICT 10

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Monroe					
US 25 (Dixie Hwy) from South city limits of Monroe to 0.5 mile south of Dunbar Rd, Monroe County (Control Section 58071)		NA	2 lane pavement south of Dunbar Rd		
			US 25, NB	BIT	0.27
			US 25, SB	BIT	0.33
			2 lane pavement north of Dunbar Rd		
			US 25, NB	BIT	0.32
			US 25, SB	BIT	0.30
			4 lane pavement south from south limits of Monroe		
			US 25, NBOL	BIT	0.31
			US 25, NBIL	BIT	0.35
			US 25, SBOL	BIT	0.35
			US 25, SBIL	BIT	0.30
I 75 at Sandy Creek overpass, Monroe County (Control Section 58152)		NA	I 75, NBOL	CONC	0.41
			I 75, NBIL	CONC	0.45
			I 75, SBOL	CONC	0.42
			I 75, SBIL	CONC	0.49
Wayne					
Ecorse Rd (formerly M 17) from west of Pardee Rd west to Birch St. in Wayne County (Control Section 82041)[12]		NA	Ecorse Rd, EBOL	BIT	0.35
			Ecorse Rd, EBIL	BIT	0.40
			Ecorse Rd, WBOL	BIT	0.35
			Ecorse Rd, WBIL	BIT	0.35
Ecorse Rd (formerly M 17) at Monroe, in Wayne County (Control Section 82041)		NA	Ecorse Rd, EBOL	BIT	0.39
			Ecorse Rd, EBIL	BIT	0.40
			Ecorse Rd, WBOL	BIT	0.36
			Ecorse Rd, WBIL	BIT	0.41
US 24 (Telegraph) at 6 Mile Rd, in Detroit (Control Section 82053)		NA	US 24, NBOL	BIT	0.41
			US 24, NB#3	BIT	0.40
			US 24, NB#2	BIT	0.43
			US 24, NBIL	BIT	0.42
			US 24, SBOL	CONC	0.34
			US 24, SBCL	CONC	0.36
			US 24, SBIL	CONC	0.32
US 12 (Michigan) at Newburgh, in Wayne (Control Section 82061)		NA	US 12, EBRT	CONC	0.44
			US 12, EBOL	BIT	0.43
			US 12, EBIL	BIT	0.37
			US 12, WBRT	CONC	0.47
			US 12, WBOL	BIT	0.52
			US 12, WBIL	BIT	0.50
			US 12, WBLT	BIT	0.52
US 12 (Michigan) from Mason easterly to Monroe in Dearborn (Control Section 82062		NA	US 12, EBOL	BIT	0.47
			US 12, EBIL	BIT	0.44
			US 12, WBOL	BIT	0.47
			US 12, WBIL	BIT	0.44

[12] This control section was abandoned from the trunkline system December 27, 1968.

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATIONS FOR DISTRICTS 1 THROUGH 10

DISTRICT 10 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Wayne Cont.					
US 12 (Michigan) at Maple (north and south) in Dearborn (Control Section 82062)		NA	US 12, EBOL	BIT	0.45
			US 12, EBIL	BIT	0.44
			US 12, WBOL	BIT	0.43
			US 12, WBIL	BIT	0.45
BS 96 (Grand River)at M 102 (8 Mile) in Wayne County (Control Section 82121)		NA	BS 96, EBOL	BIT	0.52
			BS 96, EB#3	BIT	0.51
			BS 96, EB#2	BIT	0.54
			BS 96, EBIL	BIT	0.51
			BS 96, WBOL	BIT	0.54
			BS 96, WB#3	BIT	0.53
			BS 96, WB#2	BIT	0.51
			BS 96, WBIL	BIT	0.52
			M 102, WBOL	BIT	0.54
			M 102, WB#3	BIT	0.55
			M 102, WB#2	BIT	0.50
			M 102, WBIL	BIT	0.45
BS 96 (Grand River) at Inkster, in Wayne County (Control Section 82121)		NA	BS 96, EBOL	BIT	0.32
			BS 96, EB#3	BIT	0.31
			BS 96, EB#2	BIT	0.35
			BS 96, EBIL	BIT	0.39
			BS 96, WBOL	BIT	0.40
			BS 96, WB#3	BIT	0.32
			BS 96, WB#2	BIT	0.35
			BS 96, WBIL	BIT	0.37
US 10 (Woodward Ave) at approaches to upper level of bridge to M 102 (8 Mile), in Detroit (Control Section 82131)		NA	US 10, NBOL	CONC	0.51
			US 10, NBCL	CONC	0.49
			US 10, NBIL	CONC	0.51
			US 10, SBOL	CONC	0.50
			US 10, SBCL	CONC	0.50
			US 10, SBIL	CONC	0.49
M 102 (8 Mile) at Lahser, in Wayne County (Control Section 82142)		NA	M 102, EBOL	CONC	0.45
			M 102, EBCL	CONC	0.44
			M 102, EBIL	CONC	0.45
			M 102, WBOL	CONC	0.45
			M 102, WBCL	CONC	0.44
			M 102, WBIL	CONC	0.45
M 102 (8 Mile) at Livernois, in Detroit (Control Section 82142)		NA	M 102, EBOL	CONC	0.48
			M 102, EBCL	CONC	0.50
			M 102, EBIL	CONC	0.51
			M 102, WBOL	CONC	0.44
			M 102, WBCL	CONC	0.43
			M 102, WBIL	CONC	0.44
M 102 (8 Mile) at Fair St, in Detroit (Control Section 82143)		NA	M 102, EBOL	CONC	0.45
			M 102, EBCL	CONC	0.44
			M 102, EBIL	CONC	0.46
			M 102, WBOL	CONC	0.45
			M 102, WBCL	CONC	0.46
			M 102, WBIL	CONC	0.46
M 29 (Vernier) at Kelley, in Detroit (Control Section 82144)		NA	M 29, EBOL	CONC	0.34
			M 29, EBCL	CONC	0.35
			M 29, EBIL	CONC	0.35
			M 29, WBOL	BIT	0.48
			M 29, WB#3	BIT	0.45
			M 29, WB#2	BIT	0.48
			M 29, WBIL	BIT	0.50

DISTRICT 10 (CONT.)

Location	1968 Accidents		Test Location	Surface Type	Average Coefficient
	Wet Surface	Total			
Wayne Cont.					
I 75 at Goddard, in Southgate and Allen Park (Control Section 82191)		NA	I 75, NBOL	CONC	0.39
			I 75, NBCL	CONC	0.41
			I 75, NBIL	CONC	0.39
			I 75, SBOL	CONC	0.40
			I 75, SBCL	CONC	0.43
			I 75, SBIL	CONC	0.44
I 75 at exit ramps to west in Woodhaven (Control Section 82191)		NA	I 75, NBOL	CONC	0.45
			I 75, NBIL	CONC	0.53
			I 75, SBOL	CONC	0.47
			I 75, SBIL	CONC	0.58
I 75 at Van Horn, in Woodhaven (Control Section 82191)		NA	Before overpass		
			I 75, NBOL	CONC	0.48
			I 75, NBIL	CONC	0.55
			I 75, SBOL	CONC	0.47
			I 75, SBIL	CONC	0.54
			After overpass		
			I 75, NBOL	CONC	0.49
			I 75, NBIL	CONC	0.56
			I 75, SBOL	CONC	0.47
			I 75, SBIL	CONC	0.55
M 39 at Allen Rd, in Allen Park (Control Section 82192)		NA	M 39, NBOL	CONC	0.40
			M 39, NBOL	BIT	0.40[13]
			M 39, NB=3	CONC	0.40
			M 39, NB=3	BIT	0.39[13]
			M 39, NB=2	CONC	0.38
			M 39, NB=2	BIT	0.40[13]
			M 39, NBIL	CONC	0.40
			M 39, NBIL	BIT	0.39[13]
			M 39, SBOL	BIT	0.43
			M 39, SB=3	BIT	0.42
			M 39, SB=2	BIT	0.42
			M 39, SBIL	BIT	0.42
M 39 at Village, in Dearborn (Control Section 82192)		NA	M 39, NBOL	CONC	0.45
			M 39, NBCL	CONC	0.50
			M 39, NBIL	CONC	0.52
			M 39, SBOL		Not Tested[14]
			M 39, SBCL	CONC	0.46
			M 39, SBIL	CONC	0.57
M 85 (Fort) at Stanley and West Crossover, in Trenton (Control Section 82211)		NA	M 85, NBOL	CONC	0.45
			M 85, NBIL	CONC	0.48
			M 85, SBOL	CONC	0.42
			M 85, SBIL	CONC	0.43
M 85 (Fort) at King Rd, in Woodhaven (Control Section 82211)		NA	M 85, NBOL	CONC	0.43
			M 85, NBIL	CONC	0.42
			M 85, SBOL	CONC	0.40
			M 85, SBIL	CONC	0.41

[13] Only one skid test conducted.
[14] Ramp separated from main roadway.

SECTION V

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, or Testing and Research Divisions. These requests receive priority considerations during scheduling of skid tests. Friction levels are forwarded to the person or agency initiating the request as soon as possible after completion of field measurements. Table 29 contains skid test data resulting from special requests received during 1969.

TABLE 29
SPECIAL REQUEST TESTS

Special Request No. *	Project or Control Section No.	Location	Surface Type	Direction and Lane	Avg. Coefficient of Wet Sliding Friction
1	Mb 18022-006	US 10 from the W City Limits of Farwell to M 115 intersection	Bit Agg	EB WB	0.40 0.43
1	Mb 20032-004	I75 BL - M 93 from 167 ft N of M 72, in Grayling N'ly a distance of 2.54 miles	Bit Agg	NB SB	0.39 0.44
1	Mb 20032-004	M 93 from 2.95 miles S of County Rd 612 N to County Rd 612	Bit Agg	NB SB	0.62 0.54
1	Mb 24051-002	M 131 from 500 ft N of US 31 N and W to Zoll St. in Harbor Springs	Bit Agg	NB SB	0.42 0.41
1	Mb 49023-009	US 2 from 500 ft W of County Rd 402 E to 500 ft W of I 75	Stone-Filled Sand-Asphalt	EB WB	0.53 0.48
1	Mb 49023-009	I 75 BL from Burdette St N to Marquette St. in the City of St. Ignace	Stone-Filled Sand-Asphalt	NBOL NBIL SBOL SBIL	0.44 0.50 0.45 0.49
1	Mb 48041-002	M 28 from the Schoolcraft-Luce County Line E to M 123	Bit Agg	EB WB	0.50 0.52
1	Mb 83021-008	M 55 from 180 ft W of County Rd 21 E to M 115. East end of project (East 1.5 miles)	Bit Agg	EB WB	0.45 0.43
		West end of project	Bit Agg	EB WB	0.52 0.49
2	S18 of 82025	Allard Ave. over I 94	Polyurethane	EBOL EBIL WBOL WBIL	0.42 0.16 0.45 0.20
2	S 17 of 82023	I 96 BS over I 94	Rubberized Bit Conc	EBOL EBCL EBIL WBOL WBCL WBIL	0.38 0.37 0.39 0.43 0.37 0.39
2	S 16 of 82111	I 96 BS over I 696 BS	Rubberized Bit Conc	EBOL EBCL EBIL WBOL WBCL WBIL	0.47 0.42 0.41 0.49 0.39 0.41
3	29011, C2RN	US 27 at the left hand curve 0.5 miles S of Washington St., Ithaca	Conc	NBOL NBIL SBOL SBIL	0.50 0.64 0.43 0.56

* Numbered in order received from Traffic Division or other sources.

TABLE 29 (Cont.)
SPECIAL REQUEST TESTS

Special Request No. *	Project or Control Section No.	Location	Surface Type	Direction and Lane	Avg. Coefficient of Wet Sliding Friction
4	81062 and 81104	I 94 at M 14 (Jackson Rd.) in Ann Arbor	Conc	EBOL	0.46
				EBIL	0.38
				WBOL	0.39
				WBIL	0.47
5	29011, C2RN	US 27, N of Washington St., Ithaca	Conc	NBOL	0.52
				NBIL	0.52
				SBOL	0.44
				SBIL	0.62
5	29011, C2RN	US 27 on Washington St. overpass, Ithaca	Conc	NBOL	0.55
				NBIL	0.59
				SBOL	0.55
				SBIL	0.66
5	29011, C2RN	US 27 between Washington St. and railroad overpass, Ithaca	Conc	NBOL	0.47
				NBIL	0.61
				SBOL	0.44
				SBIL	0.58
5	29011, C2RN	US 27, on railroad overpass, Ithaca	Conc	NBOL	0.43
				NBIL	0.59
				SBOL	0.45
				SBIL	0.59
5	29011, C2RN	US 27, S of railroad overpass, Ithaca	Conc	NBOL	0.43
				NBIL	0.58
				SBOL	0.36
				SBIL	0.49
6	B01 of 82194	I 75 over Rouge River, City of Detroit	Conc	NBOL	0.44
				NB#3	0.45
				NB#2	0.50
				NBIL	0.55
				SBOL	0.38
				SB#3	0.43
				SB#2	0.49
				SBIL	0.55
7	62031C, C10	M 37 from S Limits of Newaygo N to Washington St.	Conc	NBOL	0.42
				NBIL	0.52
				SBOL	0.42
				SBIL	0.53
7	62031C, C10	M 37 from Washington St. N to River St. (tests conducted in vertical curve)	Conc	NBOL	0.31
				NBIL	0.34
				SBOL	0.37
				SBIL	0.34
7	62031C, C10	M 37 from Washington St. N to River St. (tests conducted at base of vertical curve)	Conc	NBOL	0.34
				NBIL	0.31
				SBOL	0.33
				SBIL	0.33
8	41013-014	US 131 between Rockford and Cedar Springs	Bit Conc	NB	0.32
				SB	0.32
9	69014-012	I 75 Southbound, N of the Vanderbilt Interchange	Stone-Filled Sand-Asphalt	SBOL	0.48
				SBIL	0.52