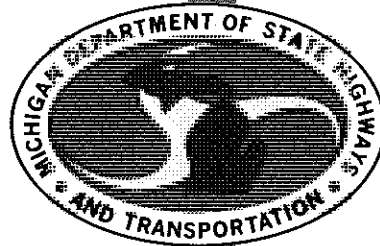


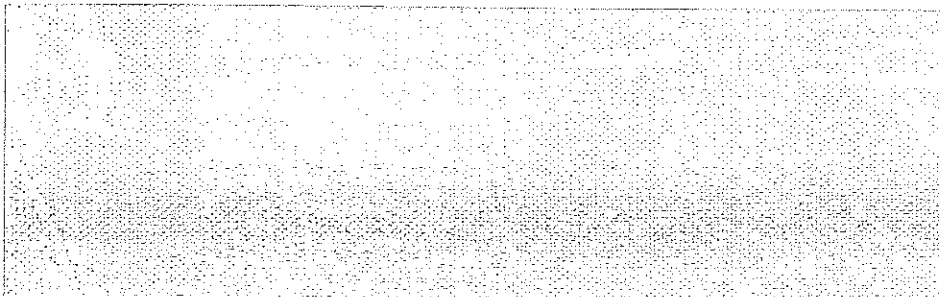
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SUMMARIES OF MICHIGAN
PAVEMENT FRICTION MEASUREMENTS
1977 Test Program

MDOT REPORT NO. 249



**TESTING AND RESEARCH DIVISION
RESEARCH LABORATORY SECTION**



TE450 .S95 1979 c.1 c. 4
Summaries of Michigan
pavement friction
measurements : 1977 test
program

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SUMMARIES OF MICHIGAN
PAVEMENT FRICTION MEASUREMENTS
1977 Test Program

MDOT REPORT NO. 249

P. M. Schafer

Research Laboratory Section
Testing and Research Division
Research Project 54 G-74
Research Report No. R-1109

Michigan Department of Transportation
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John P. Woodford, Director
Lansing, April 1979

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TABLE OF CONTENTS

	Page
Introduction	1
Section I Initial Pavement Friction Test Results for Concrete and Bituminous Pavements	3
Table 1 - Concrete Pavements Constructed in 1976 and 1977	5
Table 2 - Bituminous Concrete Pavements (MDOT Specifica- tion 4.12) Constructed in 1975, 1976, and 1977. . .	6
Table 3 - Bituminous Aggregate Pavements (MDOT Specifi- cation 4.11) Constructed in 1975, 1976, and 1977 .	6
Table 4 - Miscellaneous Bituminous Surfaces Constructed in 1976	7
Table 5 - Conventional Concrete and Bituminous Pavement Summary for the 1977 Test Year	24
Section II Five-Year Pavement Friction Test Results for Concrete and Bituminous Pavements	25
Table 6 - Five-Year Review for Concrete Pavements Con- structed in 1972	27
Table 7 - Five-Year Review for Bituminous Concrete Pave- ments (MDOT Specification 4.12) Constructed in 1972	27
Table 8 - Five-Year Review for Bituminous Aggregate Pave- ments (MDOT Specification 4.11) Constructed in 1972	27
Table 9 - Five-Year Review for Miscellaneous Bituminous Surfaces Constructed in 1972	28
Figure 1 - Relationship Between One- and Five-Year Wet Slid- ing Friction for Concrete Pavements	44
Figure 2 - Relationship Between One- and Five-Year Wet Slid- ing Friction for Bituminous Concrete	45
Figure 3 - Relationship Between One- and Five-Year Wet Slid- ing Friction for Bituminous Aggregate	46

Section III	Ten-Year Pavement Friction Test Results for Concrete and Bituminous Pavements	47
Table 10	- Ten-Year Wsf Review for Concrete Pavements Constructed in 1967	49
Table 11	- Ten-Year Wsf Review for Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1967	49
Table 12	- Ten-Year Wsf Review for Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1967	49
Table 13	- Ten-Year Wsf Review for Miscellaneous Bituminous Pavements Constructed in 1967	50
Figure 4	- Ten-Year Service Level Comparisons	61
Section IV	Experimental Features in Pavement Surfaces	63
Table 14	- Bituminous Concrete Interstate Projects	65
Table 15	- Bridge Deck Surface Coatings	65
	1. Rubberized Bituminous Concrete	65
	2. Asbestos Mixture	65
	3. Epoxy Coatings	66
	4. Latex Modified Mortar	66
	5. Latex Concrete	66
	6. Low Slump Concrete	66
Table 16	- Experimental Skid Resistant Resurfacing	67
Table 17	- Gussasphalt and Mastiphalt Surfaces on US 31, Research Project 72 C-14	67
Table 18	- Spray Grip Surface, US 24 (Telegraph Rd) at 10 Mile Rd, Oakland County	67
Table 19	- Epoxy and Natural Emery Seal Coat, Cut River Bridge (B01 of 49023)	67
Tables 20 and 21	- Lakelite Aggregate Sections	68
Table 22	- Trinidad Asphalt Surfacing (Project Mb 72013-06140A), Research Project 73 C-16	68
Table 23	- Napoleon Sandstone Surface, Project 46061-04854A	68

Table 24 - White Pine Slag, Research Project 72 NM-315 . . .	69
Table 25 - Textured Concrete Pavement Surfaces	69
Table 26 - Pavement Grooving	69
Table 27 - Open-Graded Asphalt Friction Courses	69
Section V High-Accident Locations	87
Table 28 - High-Accident Location Summary	90
Section VI Special Request Tests.	97
Section VII Special Attention Locations	157

LEGEND

Wsf = Wet sliding friction coefficient

Direction of Test Vehicle

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

Lane Tested (noted following direction of test vehicle)

RT = right turn lane	3 or 2 = third or second lane from
LT = left turn lane	centerline or median
OL = outer lane	
CL = center lane	
IL = inner lane	
DL = deceleration lane	
ML = merging lane	
TL = truck lane	
RL = ramp lane	

INTRODUCTION

During the 1977 calendar year, over 10,300 pavement friction tests were conducted throughout Michigan. These tests are summarized in this report according to the annual reporting procedure initiated in 1965. Friction levels for seven basic categories are included.

- I Initial Pavement Friction Test Results for Concrete and Bituminous Pavements
- II Five-Year Pavement Friction Test Results for Concrete and Bituminous Pavements
- III Ten-Year Pavement Friction Test Results for Concrete and Bituminous Pavements
- IV Experimental Features in Pavement Surfaces
- V High-Accident Locations
- VI Special Request Tests
- VII Special Attention Locations

Explanatory remarks are presented at the beginning of each category. All High-Accident Location tests, Special Request tests, and Special Attention Location tests have been previously reported to interested agencies within the Department.

All pavement friction test values are expressed as 40 mph coefficients of wet sliding friction (Wsf). MDOT tests have indicated that wet sliding friction (Wsf) values on a highly textured concrete surface would be 0.60 or higher. On the other hand, surfaces with coefficients of about 0.10 would be representative of a glare ice condition.

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

SECTION I
INITIAL PAVEMENT FRICTION TEST RESULTS FOR
CONCRETE AND BITUMINOUS PAVEMENTS

Initial Pavement Friction Test Results for Concrete and Bituminous Pavements

Section I summarizes pavement friction tests representing 2,664.086 lane miles of trunkline surfaces tested during 1977.

Table 1 - Concrete Pavements Constructed in 1976 and 1977

1976 Construction

One-year pavement friction values were obtained on 21 1976 construction projects during the 1977 test year (98 lanes, 309.591 lane miles). Friction levels ranged from 0.42 to 0.88 and had a weighted average¹ of 0.66.

1977 Construction

Only one project, 73111-11920, was tested during the initial service year. Wsf values ranging from 0.60 to 0.67 and having a weighted average of 0.63 were determined for the 1.2 lane miles (two lanes) of this project.

The concrete pavements constructed during 1976 and tested in 1977 used either a transverse broom or a transverse comb to texture the surface. The average¹ one-year coefficients for these projects were 0.59 and 0.66, respectively. Outstanding coefficients averaging 0.86 and 0.84 were determined on the NBOL and NBCL of Project 58171-06463, located on I 275 between Carleton-Rockwood Rd and Newburg Rd in Monroe County. This

¹ "Weighted average" friction level (\bar{x}) is defined as
$$\bar{x} = \frac{\sum_{i=1}^n x_i L_i}{\sum_{i=1}^n L_i}$$

"Average" friction level (\bar{y}) is defined as
$$\bar{y} = \frac{\sum_{i=1}^n x_i}{n}$$

where x_i = mean friction value for lane i

L_i = construction project length in miles of lane i

n = total number of lanes tested

project was textured with the transverse comb. Further study of wearing effects with respect to time for this texture type will be made.

Table 2 - Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1975, 1976, and 1977

1975 Construction

Nine bituminous concrete projects (46.840 lane miles) of pavement were tested during 1977, after a two-year service period. Friction levels on the 24 lanes tested ranged from 0.22 to 0.54 and produced a weighted average of 0.47. The lowest values, averaging 0.26 and 0.28, were on the EBOL and WBOL, respectively, of Project 44042-07693 located east of Lapeer on M 21.

1976 Construction

One-year tests were conducted on 59 projects during this test year. The 1977 values ranged from 0.25 to 0.78 and had a weighted average of 0.52. Wsf values on the low end of this range occurred in the SBOL of Project 41012-09281 located on M 44 connector in Grand Rapids. A bituminous concrete friction level of 0.78 was encountered on the NBIL of US 131, north of the Osceola-Wexford County line (Project 67015-06920).

1977 Construction

During 1977, initial service year tests were conducted on 333.696 lane miles of bituminous concrete pavement. The range in Wsf values for 113 lanes (26 projects) was 0.22 to 0.65; the weighted average coefficient was 0.50. Only one test value was lower than 0.30. It was a 0.22 Wsf value and was encountered on the southbound lane of M 37, north of the north M 46 junction in Muskegon County (Project 61131-11077). The highest of nine coefficients equaling or exceeding 0.60 was the 0.65 value determined on the northbound lane of M 91 north of the Ionia-Montcalm County line. This area, although on Control Section 59031, was constructed as Project 34011-09277.

Table 3 - Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1975, 1976, and 1977

1975 Construction

Pavement friction tests conducted after a two-year service period on four projects (eight lanes) of bituminous aggregate pavement yielded friction levels ranging from 0.33 to 0.65 and having a weighted average of 0.50. Lowest values of the 41.080 lane miles tested occurred on Project 15051-07650 where both eastbound and westbound lanes averaged 0.34. This project is located on M 32 southeast of East Jordan.

1976 Construction

One-year Wsf values obtained on 45 bituminous aggregate projects (669.336 lane miles) ranged from 0.33 to 0.70 and had a weighted average of 0.56. Highest Wsf value of the 121 lanes tested was on the northbound lane of Project 21032-07656 which had a coefficient of 0.70. This project is located on M 35 south of the Delta-Marquette County line.

1977 Construction

Fourteen projects (263.120 lane miles) of bituminous aggregate were tested in 1977 during the initial year of service. The lowest pavement friction value of the 36 lanes tested occurred on the Control Section 08052 portion of Project 08051-11006, located on M 66 north of Casgrove Rd in Nashville. This section yielded Wsf values as low as 0.22 although the entire project's average friction level was 0.32. In contrast, a friction level of 0.70 was determined on the eastbound lane of M 26 southwest of Eagle Harbor (Project 42021-11055). Wsf values on the entire 263.120 lane miles tested during 1977 ranged from 0.22 to 0.70 and produced a weighted average of 0.51.

Table 4 - Miscellaneous Bituminous Surfaces Constructed in 1976

1976 Construction

The only surfacing in this category was the single seal Project 57041-10899 located on M 42, east and west of the Wexford-Missaukee County line. Wsf values on the 20.500 lane miles after a one-year service period ranged from 0.24 to 0.58 and had a weighted average of 0.41.

TABLE 1
CONCRETE PAVEMENTS CONSTRUCTED IN 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
M 07012-09166A	US 41 from Mead-Maki Rd north to Broad St in L'Anse	Bacco Construction Co.	Pit 31-45	Pit 31-45	SBTL	0.57	0.61	0.59
U 11051-05492A ¹ (part)	US 31-US 33 from 765 ft south of US 12-M 60 north 0.3 mile	Arco Engineering Construction Corp.	Material Service (Thornton, Ill.)	Kuerte Concrete (South Bend, Ind.)	NBOL NBIL SBOL SBIL	0.55 0.55 0.54 0.58	0.59 0.57 0.58 0.59	0.57 0.56 0.56 0.58
RF 58021-00783A	US 223 from Lenawee-Monroe County Line east to US 23	Ministrelli Construction Co.	Pit 58-3	Pit 30-35	EB WB	0.49 0.49	0.60 0.61	0.54 0.57
I 58151-07685A	I 75 from 7,980 ft south of M 50 north to 400 ft north of Sandy Creek Rd	L. W. Edison Co.	Pit 58-1 and E. C. Levy (Trenton Yd)	Pit 30-35	NBOL SBOL	0.54 0.51	0.58 0.55	0.56 0.53
I 58151-08413A ¹ (part)	Southbound I 75 from 1.4 miles north of Michigan-Ohio State Line north to 0.5 mile south of Bay Creek Rd	Macomb Contracting Co.	Pit 58-3	Pit 30-35	SBOL SBCL SBIL	0.57 0.51 0.67	0.60 0.55 0.68	0.59 0.53 0.67
I 58151-09678A	I 75 from Michigan-Ohio State Line north to 0.37 mile north of Sterns Rd	L. W. Edison Co.	E. C. Levy (Trenton Yd) and France Stone	Pit 30-35	NBOL SBOL	0.61 0.61	0.65 0.64	0.63 0.62
I 58152-00797A	I 75 from 400 ft north of Sandy Creek Rd north to 253 ft north of Post Rd	L. W. Edison Co.	Pit 58-1	Pit 30-35	NBOL SBOL	0.53 0.58	0.55 0.58	0.54 0.58
I 58171-06468A	I 275 from 0.55 mile south of Carlton-Rockwood Rd north to 0.55 mile north of Newburg Rd	Eisenhour Construction Co.	E. C. Levy (Trenton Yd)	Pit 81-57	NBOL NBCL NBIL SBOL SBCL SBEL	0.83 0.82 0.72 0.66 0.71 0.71	0.88 0.88 0.76 0.70 0.72 0.76	0.86 0.84 0.74 0.68 0.71 0.74
U 63041-04913A ¹ (part)	M 59 from Elizabeth Lake Rd east to US 10	Ministrelli Construction Co.	Pit 63-56	Pit 63-56	EBOL EBIL WBOL WBIL	0.42 0.49 0.51 0.48	0.48 0.51 0.52 0.53	0.44 0.50 0.52 0.50
F 64015-06526A	US 31 from 2,700 ft north of M 20 north to 620 ft north of Buchanan Rd	Sargent Contracting Co.	E. C. Levy (Burns Harbor)	Pit 62-33	NBOL NBIL SBOL SBIL	0.66 0.71 0.66 0.73	0.73 0.76 0.68 0.76	0.70 0.73 0.67 0.74

¹ See also Table 2.

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

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
RF 64015-06909A	US 31 from 620 ft north of Buchanan Rd north to 1,760 ft north of Polk Rd	Sargent Contracting Co.	E. C. Levy (Burns Harbor)	Pit 67-2	NBOL NBIL SBOL SBIL	0.67 0.71 0.66 0.71	0.70 0.71 0.66 0.74	0.68 0.71 0.66 0.73
F 81103-08472A	M 14 from Voorhies Rd northeast to 1,200 ft southwest of Joy Rd	Sargent Contracting Co.	E. C. Levy (Dix Yd)	Pit 47-32	EBOL EBIL WBOL WBIL	0.73 0.82 0.70 0.73	0.77 0.83 0.74 0.82	0.75 0.82 0.72 0.79
F 81103-08473A	M 14 from 1,200 ft southwest of Joy Rd northeast to 1,657 ft east of Napier Rd	Sargent Contracting Co.	Pit 81-72 and E. C. Levy (Dix Yd)	Pit 47-32	EBOL EBIL WBOL WBIL	0.77 0.70 0.72 0.72	0.77 0.74 0.77 0.78	0.77 0.72 0.74 0.74
BIU 82123-01270A	I 96 from St. Mary Ave east to 150 ft west of Schaefer Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-7	<u>Outer Dual Roadway</u>			
					EBOL EBCL EBIL WBOL WBCL WBIL	0.60 0.52 0.59 0.48 0.53 0.61	0.62 0.58 0.62 0.51 0.59 0.65	0.61 0.55 0.60 0.49 0.56 0.63
					<u>Inner Dual Roadway</u>			
					EBOL EBCL EBIL WBOL WBCL WBIL	0.55 0.59 0.65 0.60 0.57 0.67	0.60 0.62 0.67 0.62 0.60 0.72	0.58 0.60 0.66 0.61 0.58 0.70
I 82125-06772A	I 96-I 275 from north of 5 Mile Rd north to 9 Mile Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-7	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2 SBIL	0.62 0.61 0.61 0.71 0.57 0.62 0.66 0.66	0.64 0.65 0.65 0.73 0.58 0.65 0.67 0.71	0.63 0.63 0.63 0.72 0.57 0.63 0.67 0.68

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

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
I 82291-09901A	I 275 from 2,811 ft south of Monroe-Wayne County Line north to 2,631 ft south of West Rd	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	NBOL NBCL NBIL SBOL SBCL SBIL	0.64 0.68 0.73 0.65 0.70 0.77	0.66 0.71 0.78 0.70 0.71 0.79	0.65 0.70 0.76 0.67 0.70 0.78
I 82291-09902A	I 275 from 2,631 ft south of West Rd north to 0.5 mile north of Sibley Rd	Eisenhour Construction Co.	E. C. Levy (Trenton Yd)	Pit 81-57	NBOL NBCL NBIL SBOL SBCL SBIL	0.67 0.68 0.74 0.61 0.67 0.71	0.70 0.71 0.78 0.66 0.70 0.77	0.68 0.70 0.76 0.64 0.69 0.75
I 82291-09903A	I 275 from 0.5 mile north of Sibley Rd north to C&O RR in Romulus	Thompson-McCully Co.	E. C. Levy (Dix Yd)	Pit 81-1	NBOL NBCL NBIL SBOL SBCL SBIL	0.59 0.61 0.73 0.55 0.67 0.68	0.60 0.64 0.79 0.62 0.72 0.71	0.59 0.63 0.77 0.59 0.70 0.70
I 82291-09904A	I 275 from C&O RR north to 700 ft south of Haman Rd in Romulus	Ministrelli Construction Co.	E. C. Levy (Dix Yd) and 81-57	Pits 81-1 and 81-57	NBOL NBCL NBIL SBOL SBCL SBIL	0.58 0.62 0.70 0.60 0.67 0.66	0.61 0.64 0.74 0.60 0.73 0.71	0.59 0.63 0.72 0.70 0.70 0.69
I 82292-06537A	I 275 from 700 ft south of Haman Rd north to Penn Central RR	Eisenhour Construction Co.	Pit 63-7 and E. C. Levy (Dix Yd)	Pit 63-7	NBOL NBCL NBIL SBOL SBCL SBIL	0.59 0.60 0.66 0.54 0.62 0.66	0.61 0.65 0.72 0.55 0.64 0.68	0.60 0.64 0.68 0.54 0.63 0.67
I 82292-06733A	I 275 from Penn Central RR north to M 153	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	NBOL NBCL NBIL SBOL SBCL SBIL	0.59 0.64 0.68 0.55 0.66 0.73	0.62 0.65 0.73 0.60 0.68 0.77	0.60 0.65 0.71 0.58 0.67 0.75
I 73111-11920A	I 75 from 0.6 mile north of M 31 north to C&O RR (Station 452+70)	Sargent Contracting Co.	Pit 71-47	Pit 63-54	NBIL SBIL	0.60 0.62	0.66 0.67	0.62 0.64

TABLE 2
BITUMINOUS CONCRETE PAVEMENTS (4.12)
CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction			
			Coarse	Fine		Low	High	Avg	
1975	Mb 11013-07640A	I 94 DL (Main St) from 490 ft east of River St east to Paw Paw St, omitting from 10th St to Colfax Ave	John G. Yerington Co.	Pit 75-5	Pit 11-75	EBOL EBIL WBOL WBIL	0.35 0.36 0.31 0.33	0.36 0.39 0.35 0.36	0.36 0.37 0.32 0.34
	Mb 22011-09192A	M 95 from Woodward Ave, in Iron Mountain, north to "D" St	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	Pit 22-69	NB SB	0.42 0.42	0.47 0.46	0.45 0.44
	Mb 44042-07693A	M 21 from 232 ft east of Washington St east to 50 ft east of Flint River	Williams Eros. Asphalt Paving Co.	Pit 63-4	Pit 63-4	EDOL EBIL WBOL WBIL	0.22 0.37 0.27 0.35	0.28 0.41 0.29 0.39	0.26 0.36 0.28 0.37
	Mb 46041-07694A	M 34 from Hazen Creek east to 260 ft west of Madison St	Cunningham-Gooding	Pit 81-84	Pit 46-28	ED WE	0.52 0.48	0.54 0.52	0.53 0.50
	Mh 46072-07695A	M 52 from north of Valley Rd north to M 60	Cunningham-Gooding	Pit 47-3	Pit 46-28	NB SB	0.46 0.43	0.51 0.49	0.49 0.46
	Mb 46081-07696A	M 60 from east of Nortley Rd east to M 52	Cunningham-Gooding	Pit 47-3	Pit 46-28	EB WB	0.51 0.49	0.53 0.53	0.52 0.51
	Mb 73032-07718A	M 47 from 1,225 ft north of M 46 north to 580 ft north of State Rd	Spartan Asphalt Paving Co.	Pit 71-47	Pit 79-7	NB SB	0.43 0.43	0.46 0.43	0.45 0.43
	Mb 77022-07540A	M 21 from Goodells Rd east to Eekles Rd	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	ED WB	0.43 0.52	0.49 0.54	0.46 0.53
	T 98016-08775A	M 125 from 305 ft south of 8th St north to 90 ft north of Elm St (Control Section 68071)	Cunningham-Gooding	E.C. Levy (Dix Yard)	E.C. Levy (Dix Yard)	NBOL NBIL SBOL SBIL	0.43 0.41 0.40 0.47	0.49 0.46 0.41 0.48	0.46 0.43 0.41 0.48
	1976	Mb 03072-09309A	M 40 from I 196 northwest to US 31	Michigan Colprovia Co.	Pit 41-22	Pit 41-16	EB WD	0.36 0.42	0.41 0.46
Mb 03112-09320A		Northbound US 131 from 0.81 mile south of 120th Ave north to 820 ft north of 124th Ave	Reith-Riley Construction Co.	Pit 39-1	Pit 39-1	NBOL NBIL	0.53 0.61	0.54 0.64	0.53 0.62
Mb 06072-09302A		US 23 from 1,750 ft east of west limits of Omer east to M 65	Central Paving Co.	Pit 71-15	Pit 71-15	NB SB	0.54 0.57	0.55 0.59	0.55 0.58
M 07012-08988A		US 41 from 1,700 ft west of west limits of L'Anse east	Mathy Construction Co.	Pit 52-39	Pit 52-9	NB SB SBTL	0.54 0.65 0.59	0.54 0.65 0.61	0.54 0.65 0.60
Mbr 09033-09293A (part)		M 13 from south limits of Pinconning north to Bay-Arenac County line	Central Paving Co.	Pits 71-15 and 72-5	Pits 65-7 and 72-5	NBOL NDIL SBOL SBIL	0.54 0.65 0.55 0.66	0.57 0.67 0.58 0.67	0.56 0.66 0.56 0.66
Mbr 09033-09293A (part)		M 13 from Bay-Arenac County line north to 650 ft north of South Branch of Pine River (Control Section 06071)	Central Paving Co.	Pits 71-15 and 72-5	Pits 65-7 and 72-5	NBOL NBIL SBOL SBIL	0.53 0.64 0.52 0.57	0.55 0.67 0.54 0.62	0.54 0.66 0.53 0.59
Is 11015-09510A		Westbound I 94 from Peutz Rd west	John G. Yerington Co.	U.S. Steel (Gary, Ind.)	Pit 11-30	WDOL WECL WBIL	0.58 0.59 0.65	0.61 0.61 0.68	0.60 0.60 0.66
U 11051-05492A ¹ (part)		US 31-US 33 from 0.2 mile north of US 12-M 60 north to 145 ft south of Port St	Reith-Riley Construction Co.	Material Service (Thornton, Ill.)	Pit 14-47	NBOL NBIL SBOL SBIL	0.46 0.51 0.46 0.51	0.47 0.52 0.52 0.53	0.47 0.51 0.49 0.52
Mbr 13061-09317A (part)		M 37 (Michigan Ave) from 400 ft west of Battle Creek west city limits east to Angell St	Globe Construction Co.	Pit 39-1	Pit 13-59	EDOL EDIL WB	0.53 0.51 0.57	0.51 0.55 0.57	0.54 0.52 0.57
Mbr 13061-09317A (part)		Eastbound M 37 (Jackson St) from Angell St east to the Penn Central RR	Globe Construction Co.	Pit 39-1	Pit 13-59	EBOL EBCL EBIL	0.41 0.45 0.59	0.47 0.49 0.60	0.44 0.48 0.59
Mbr 14031-06119A		M 62 from Michigan-Indiana State Line north to US 12	John G. Yerington Co.	Material Service (Thornton, Ill.)	Pit 14-36	NE ² SE ²	0.31 0.35	0.53 0.45	0.42 0.40
Mbr 20032-06908A		I 75 BL from M 72-M 93 north to 560 ft north of North Down River Rd	Lake Construction Co.	Pit 45-19	Pit 72-5	NBOL NBIL SBOL SBIL	0.45 0.48 0.49 0.47	0.49 0.52 0.53 0.52	0.47 0.50 0.51 0.49
M 22021-10842A (part)		US 2 from Michigan-Wisconsin State Line east to M 95	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	Pit 22-69	EB WB	0.54 0.57	0.61 0.59	0.58 0.58

¹ See also Table 1.

² Bituminous concrete with increased stone content.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12)
CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
M 22021-10842A (part)	US 2-M 95-US 141 from west junction, M 95 east to east city limits of Iron Mountain	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	Pit 22-69	EBOL	0.59	0.60	0.60
					EBIL	0.55	0.59	0.58
					WBOL	0.47	0.48	0.47
					WBIL	0.61	0.64	0.62
Rs 23092-10122A	M 99 from 1,625 ft north of Holt Rd north to Waverly Rd	Williams Bros. Asphalt Paving Co.	Pit 34-45	Pit 34-45	NBOL	0.61	0.64	0.62
					NBIL	0.65	0.66	0.65
					SBOL	0.62	0.65	0.64
					SBIL	0.66	0.67	0.67
Mtb 25051-05457A	M 54 DB from 340 ft south of M 54 (Dort Hwy) north to Hemphill Rd	Spartan Asphalt Paving Co.	Pit 75-5	Pit 63-29	NBOL	0.46	0.46	0.46
					NBIL	0.43	0.45	0.44
					SBOL	0.43	0.45	0.44
					SBIL	0.46	0.47	0.47
Mb 25101-07664A (part)	M 57 from 200 ft west of Peterson Rd east to Center St in Clip	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 63-54	EB	0.37	0.42	0.39
					WD	0.39	0.45	0.42
Mb 25101-07664A (part)	M 57 from Center St east to 376 ft east of east limits of Clip	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 63-54	EBOL	0.37	0.40	0.38
					EBIL	0.41	0.45	0.43
					WBOL	0.41	0.46	0.44
					WBIL	0.40	0.45	0.43
Mb 29016-09289A (part)	US 27 DR from Lincoln Rd north to C&O RR in St. Louis	The Hicks Co.	Pit 37-7	Pit 37-7	NB	0.49	0.52	0.51
					SB	0.48	0.49	0.48
Mb 29016-09289A (part)	M 46 from Main St east to Hubbard St in St. Louis (Control Section 29042)	The Hicks Co.	Pit 37-7	Pit 37-7	EBOL	0.42	0.47	0.45
					EBIL	0.47	0.51	0.49
					WBOL	0.42	0.48	0.46
					WBIL	0.45	0.47	0.46
Mb 30041-09328A (part)	M 99 from 390 ft south of south limits of Hillsdale north to Broad St	Richardson Asphalt Paving Co.	Pit 81-84	Pit 46-30	NBOL	0.51	0.52	0.52
					NBIL	0.48	0.55	0.52
					SBOI	0.45	0.48	0.47
					SBIL	0.43	0.51	0.47
Mb 30041-09328A (part)	M 99 from Broad St north to Spring St in Hillsdale (Control Section 30032)	Richardson Asphalt Paving Co.	Pit 81-84	Pit 46-30	NBOL	0.37	0.40	0.38
					NBIL	0.39	0.41	0.40
					SBOI	0.35	0.40	0.38
					SBIL	0.43	0.45	0.44
Mb 33032-10719A	I 96 DL from Mt. Hope north to GTW RR grade separation	Spartan Asphalt Paving Co.	Pit 63-97	Pit 47-43	NBOL	0.40	0.35	0.42
					NBIL	0.45	0.49	0.47
					SBOL	0.36	0.43	0.40
					SBIL	0.46	0.47	0.46
Mb 33061-09333A	M 43 (Saginaw St) from 70 ft east of Stanley St east to 170 ft west of Logan St	Reith-Riley Construction Co.	Pit 41-38	Pit 19-33	EBOL	0.40	0.43	0.42
					EB#3	0.45	0.47	0.46
					EB#2	0.41	0.45	0.43
					EBIL	0.43	0.49	0.46
Mb 33062-09330A	M 143 (Michigan Ave) from Cedar St east to 130 ft east of Kensington Rd	Williams Bros. Asphalt Paving Co.	Pit 34-45	Pit 34-45	EBOL	0.36	0.40	0.38
					EBIL	0.37	0.43	0.40
					WBOL	0.36	0.45	0.40
					WBIL	0.42	0.47	0.45
Mb 36023-10843A ³ (part)	M 69 (Superior Ave) from US 2-US 141 in Crystal Falls east	Mathy Construction Co.	Pits 22-7, 22-54 and 22-69	Pit 22-69	EBOL	0.47	0.52	0.50
					EBIL	0.57	0.58	0.57
					WBOL	0.46	0.52	0.48
					WBIL	0.54	0.62	0.59
I 38103-01476A (part)	Westbound I 94 from the Washtenaw-Jackson County Line west to Michigan Ave	Macomb Contracting Corp.	Pit 81-84	Pit 81-84	WBOL	0.45	0.49	0.47
					WBIL	0.51	0.55	0.53
I 38103-01476A (part)	Westbound I 94 from Liberty Rd west to the Washtenaw-Jackson County Line (Control Section 81104)	Macomb Contracting Corp.	Pit 81-84	Pit 81-84	WBOL	0.41	0.47	0.44
					WBIL	0.46	0.57	0.52
Mb 39102-11052A (part)	M 89 from 0.38 mile west of 42nd St east to Kalamazoo-Calhoun County Line	Reith-Riley Construction Co.	Pit 39-21	Pit 13-43	EB	0.52	0.53	0.52
					WB	0.54	0.59	0.57
Mb 39102-11052A (part)	M 89 from Kalamazoo-Calhoun County Line east to west limits of Battle Creek (Control Section 13061)	Reith-Riley Construction Co.	Pit 39-21	Pit 13-43	EB	0.46	0.53	0.50
					WB	0.52	0.55	0.53
					LT	0.61	0.64	0.62
Mb 41012-09281A (part)	M 44 connector from Airway St northeast to M 44	Woodland Paving Co.	Pit 41-118	Pit 41-70	NBOL	0.42	0.43	0.43
					NBIL	0.52	0.53	0.53
					SBOL	0.25	0.31	0.30
					SBIL	0.51	0.55	0.53
Mb 41012-09281A (part)	M 44 from M 44 connector north to 7 Mile Rd (Control Section 41013)	Woodland Paving Co.	Pit 41-118	Pit 41-70	NBOL	0.30	0.41	0.36
					NBIL	0.31	0.49	0.41
					SBOL	0.33	0.41	0.36
					SBIL	0.43	0.52	0.48

1976 CONT.

³ See also Table 3.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12)
CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Course	Fine		Low	High	Avg
Mb 41063-10802A	M 11 from Bretton St east to M 37	Michigan Colprovia Co.	Pit 70-51	Pit 41-16	EBOL	0.39	0.41	0.40
					EBIL	0.40	0.43	0.41
					WBOL	0.39	0.40	0.39
					WBIL	0.39	0.42	0.41
Mbr 46082-07697A ⁴ (part)	M 50 from west limits of Tecumseh east to four-lane pavement	Cunningham-Gooding	Pit 81-57	Pit 81-84	EB	0.29	0.34	0.31
					WB	0.35	0.39	0.37
Mbr 46082-07697A (part)	M 50 from Wyandotte St west to two-lane pavement in Tecumseh	Cunningham-Gooding	Pit 81-57	Pit 81-84	EBOL	0.39	0.41	0.40
					EDIL	0.39	0.43	0.41
					WBOL	0.30	0.36	0.33
					WBIL	0.36	0.41	0.39
Mbr 52041-10469A	US 41-M 28 from 500 ft east of M 95 east to M 95 east to North Lake Rd	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-09	EB	0.49	0.60	0.55
					WB	0.57	0.61	0.59
Mbr 54011-07705A	US 131 from 850 ft south of 14 Mile Rd. north to M 20	Reith-Riley Construction Co.	Pit 54-21	Pit 54-21	NBOL	0.49	0.53	0.51
					NBIL	0.49	0.53	0.52
					SBOL	0.47	0.49	0.48
					SBIL	0.53	0.54	0.53
Mb 56021-09298A	M 20 from 100 ft west of Castor Rd east to 200 ft west of 7 Mile Rd	The Hicks Co.	Pit 37-26	Pit 37-26	EB	0.52	0.58	0.55
					WB	0.51	0.55	0.53
Mb 58042-11074A	M 50 from 513 ft east of US 24 east to 73 ft west of US 25	Cunningham-Gooding	E.C. Levy (Dearborn Yard)	E.C. Levy (Dearborn Yard)	EB	0.45	0.46	0.46
Mb 58051-09329A	US 24 from Michigan-Ohio State Line north 6.875 miles	Thompson-McCully Co.	Pit 47-3	Pit 47-3	NB	0.55	0.61	0.59
					SB	0.55	0.62	0.59
HHS 58052-04954A	US 24 from 1,100 ft south of 7th St north to 500 ft north of M 50	Cunningham-Gooding	E.C. Levy (Dearborn Yard)	E.C. Levy (Dearborn Yard)	NBOL	0.48	0.52	0.51
					NBIL	0.52	0.57	0.54
					SBOL	0.52	0.54	0.53
					SBIL	0.52	0.57	0.54
I 58151-08413A ¹ (part)	Northbound I 75 from 1.4 miles north of Michigan-Ohio State Line north to 0.5 mile south of Bay Creek Rd	Cunningham-Gooding	Pit 58-3	Pit 81-78	NBOL	0.46	0.49	0.48
					NBCL	0.49	0.54	0.52
					NBIL	0.59	0.64	0.61
Mbr 59045-09285A	M 46 from Neff St in Edmore east to Vestaburg Rd	The Hicks Co.	Pit 37-26	Pit 37-26	EB	0.49	0.53	0.51
					WB	0.54	0.55	0.54
Mbr 62011-09276A	M 82 from 586 ft west of Connie St east to Mechanic St in Fremont	Woodland Paving Co.	Pit 41-27	Pit 41-90	EBOL	0.35	0.40	0.37
					EBIL	0.34	0.35	0.35
					WBOL	0.31	0.36	0.34
					WBIL	0.37	0.39	0.38
M 62021-10094A	M 82 from 300 ft north of M 120 north to Garfield Rd	Reith-Riley Construction Co.	Pit 41-69	Pit 64-20	NB	0.54	0.58	0.56
					SB	0.55	0.59	0.57
Mbr 62031-07710A	M 37 from the Muskegon-Newaygo County Line north to north limits of Grant	Reith-Riley Construction Co.	Pit 41-38	Pit 41-121	NB	0.47	0.49	0.48
Mth 63021-09517A	I 96 DL from 330 ft west of Halstead Rd east to Drake Rd	Detroit Concrete Products Co.	Pit 63-1	Pit 63-7	EBOL	0.47	0.51	0.49
					EBIL	0.42	0.45	0.43
					WBOL	0.43	0.47	0.44
					WBIL	0.42	0.46	0.44
Mth 63021-09518A	I 96 BL from Drake Rd southeast to I 96 BS	Detroit Concrete Products Co.	Pit 63-4	Pit 63-7	EBOL	0.36	0.40	0.38
					EBIL	0.43	0.46	0.44
					WBOL	0.42	0.46	0.44
					WBIL	0.45	0.46	0.46
I 63041-04913A ¹ (part)	M 59 from 300 ft west of Cass Lake Rd east to Elizabeth Lake Rd	Bit Con Corp.	Pit 63-1	Pit 63-4	EBOL	0.42	0.48	0.45
					EBIL	0.41	0.47	0.43
					WBOL	0.48	0.49	0.48
					WBIL	0.40	0.46	0.43
Mbr 63051-09212A (part)	Southbound M 1 from Oakland Ave in Birmingham southeast to Webster Rd in Royal Oak	Ajax Paving Industries	Pit 63-4	Pit 63-4	SBOL	0.52	0.58	0.56
					SB-3	0.49	0.54	0.52
					SB-2	0.53	0.55	0.54
					SBIL	0.46	0.53	0.50
Mbr 63051-09212A (part)	Southbound M 1 from Harrison St in Pleasant Ridge southeast to Oakridge Rd	Ajax Paving Industries	Pit 63-4	Pit 63-4	SBOL	0.49	0.55	0.52
					SB-3	0.49	0.55	0.52
					SB-2	0.51	0.53	0.52
					SBIL	0.49	0.55	0.52
HHS 63053-05829A (part)	US 10 from 510 ft southeast of Maybee Rd northwest to 1,460 ft northwest of M 15	Ann Arbor Construction Co.	Pit 63-60	Pit 63-60	NBOL	0.39	0.42	0.41
					NBIL	0.46	0.48	0.47
					SBOL	0.39	0.40	0.39
					SBIL	0.46	0.48	0.47
HHS 63053-05829A (part)	M 15 from US 10 north 2,100 ft (Control Section 63071)	Ann Arbor Construction Co.	Pit 63-60	Pit 63-60	NB	0.37	0.42	0.40
					SB	0.40	0.42	0.41

1976 CONT.

⁴ Crusher dust added.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12)
CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
RF 67015-06920A	Northbound US 131 from 621 ft north of Luther Rd north to 2,087 ft north of the Osceola-Wexford County Line	Globe Construction Co.	Pit 45-19	Pit 67-2	NBOL NBIL	0.57 0.62	0.64 0.78	0.60 0.70
Mb 70012-11085A	US 31 DR from 7th St south to 9th St thence east to Columbia Ave in Holland	West Shore Construction Co.	Pit 70-36	Pit 70-36	NBOL NBCL NBIL	0.45 0.39 0.48	0.48 0.45 0.53	0.46 0.42 0.51
Mb 72013-10847A	US 27 from Wolf Creek Rd north to Snow Bowl Rd	The Hooks Co.	Pit 72-5	Pit 72-5	NBOL NBIL SBOL SBIL	0.59 0.67 0.57 0.64	0.62 0.68 0.60 0.70	0.60 0.68 0.58 0.67
Mb 72031-07717A (part)	M 55 from US 27 east to Houghton Lake Village	Central Paving Co.	Pit 72-5	Pit 72-5	EBOL EBIL WBOL WBIL	0.47 0.57 0.53 0.61	0.51 0.61 0.55 0.64	0.49 0.58 0.54 0.62
Mb 72031-07717A (part)	M 55 from Houghton Lake Village east to east junction of M 18 (Control Section 72022)	Central Paving Co.	Pit 72-5	Pit 72-5	EBOL EBIL WBOL WBIL	0.47 0.51 0.48 0.48	0.49 0.54 0.52 0.54	0.48 0.52 0.50 0.52
Mb 73031-09296A	M 52 from 230 ft south of Mickle St north to Wolf Creek Rd	Saginaw Asphalt Paving Co.	Pit 71-15	Pit 63-54	NB SB	0.46 0.42	0.49 0.46	0.46 0.45
Mb 73063-09301A	M 46 from Genesee St east to Cumberland St	Saginaw Asphalt Paving Co.	Pit 71-47	Pit 63-29	EBOL EBCL EBIL WBOL WBIL	0.49 0.42 0.51 0.36 0.36	0.45 0.45 0.52 0.37 0.42	0.42 0.43 0.51 0.36 0.40
Mbr 73081-11089A	M 81 from Wolf Rd east to 250 ft east of Indiantown Rd	Saginaw Asphalt Paving Co.	Pit 75-5	Pit 63-29	EB WB	0.58 0.53	0.54 0.58	0.54 0.55
Mb 74062-09300A	M 46 from Delaware St east to Stoutenberg Rd in Sandusky	Frank Strausberg and Son Co.	Pit 63-4	Pit 74-50	EB WB	0.42 0.48	0.45 0.53	0.43 0.51
Mb 78022-11098A (part)	US 12 from 1,575 ft east of Vinewood St east to west of Halfway Rd	John G. Yerington Co.	Pit 12-44	Pit 12-44	EB WB	0.48 0.52	0.48 0.55	0.48 0.50
Mb 78022-11098A (part)	US 12 from Penn Central RR, 1 mile west of Sturgis, east to 2,112 ft west of M 66	John G. Yerington Co.	Pit 12-44	Pit 12-44	EB WB	0.46 0.39	0.55 0.54	0.53 0.46
Mb 81031-09327A	US 12 from Lenawee-Washtenaw County Line northeast to McCollum Rd	Thompson-McCully Co.	Pit 63-97	Pit 81-01	EB WB	0.53 0.49	0.55 0.55	0.54 0.52
I 81062-01123A	I 94 from US 23 east to 1,484 ft east of west junction of US 12	Thompson-McCully Co.	Pit 63-97	Pit 81-01	EBOL EBCL EBIL WBOL WBCL WBIL	0.54 0.53 0.57 0.54 0.52 0.58	0.55 0.54 0.68 0.55 0.63 0.69	0.55 0.53 0.57 0.55 0.53 0.58
Mbr 81072-10885A	I 94 BI (Washtenaw St) from Stadium Dr east to US 23	Cunningham-Gooding	Pit 81-84	Pit 81-01	EBOL EBIL WBOL WBIL	0.37 0.39 0.35 0.37	0.40 0.42 0.36 0.42	0.39 0.40 0.36 0.39
UM 82053-06459A	US 24 from I 96 BI north to M 102	Bit Con Corp.	Pit 47-3	Pit 47-3	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2 SBIL	0.48 0.42 0.46 0.53 0.43 0.47 0.48 0.45	0.51 0.49 0.51 0.54 0.43 0.49 0.51 0.48	0.49 0.46 0.48 0.54 0.43 0.48 0.49 0.47
Mbr 82071-07731A	M 3 from I 75 east to M 1 (Woodward Ave)	Bit Con Corp.	Pit 63-4	Pit 63-97	EBOL EBIL WBOL WBIL	0.36 0.36 0.29 0.40	0.39 0.45 0.34 0.41	0.37 0.40 0.32 0.40
Mbr 82101-11107A	M 14 from 180 ft west of McClumpha Rd east to 720 ft east of Canton Center Rd	Cooke Contracting Co.	Pit 47-3	Pit 63-93	EB WB	0.41 0.42	0.46 0.46	0.43 0.41
Mb 82131-09336A	M 1 from south to north limits of Highland Park	Asphalt Products Co.	E.C. Levv (Dix Yard)	E.C. Levv (Dix Yard)	NBOL NBIL SBOL SBIL	0.36 0.39 0.36 0.40	0.36 0.41 0.39 0.43	0.36 0.40 0.37 0.42
RF 83031-09127A	Northbound US 131 relocation from Osceola-Wexford County Line north to existing northbound US 131	Reith-Riley Construction Co.	Pit 45-19	Pit 67-02	NBOL NBIL	0.64 0.73	0.67 0.74	0.66 0.73
Mb 83032-09259A	US 131 from 78 ft south of Boon Rd north to south junction with M 42	Globe Construction Co.	Pit 45-19	Pit 67-02	NB SB	0.51 0.33	0.56 0.7	0.53 0.57

1976 CONT.

TABLE 2 (Cont.)
BITUMINOUS CONCRETE PAVEMENTS (4.12)
CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mbr 03023-11159A	M 89 from 1,000 ft southeast of Allegan southeast to 400 ft west of Otsego	Grand Rapids Asphalt	Pit 41-50	Pit 70-50	EB WB	0.39 0.36	0.45 0.47	0.42 0.42
Mb 04031-09266A	US 23 from 530 ft south of Pohl Rd north to the south limits of Alpena	Alpena Paving Co.	Pit 71-15	Pit 4-31	NE SB	0.43 0.31	0.46 0.40	0.45 0.36
Mb 06071-11004A (part)	US 23 from M 13 north to 0.1 mile south of Standish	Central Paving Co.	Pit 71-15	Pit 72-3	NBOL ⁵ NBIL ⁵ SBOL ⁵ SBIL ⁵	0.41 0.45 0.34 0.46	0.45 0.48 0.39 0.51	0.43 0.47 0.37 0.48
Mb 06071-11004A (part)	US 23 from 0.1 mile south of Standish north to Middle Branch of the Pine River	Central Paving Co.	Pit 6-23	Pit 72-3	NBOL ⁶ NBIL ⁶ SBOL ⁶ SBIL ⁶	0.46 0.48 0.33 0.43	0.51 0.49 0.39 0.49	0.49 0.49 0.36 0.46
Ms 09032-06800A	M 13 from 494 ft south of Fisher Rd north to 300 ft south of North Union St	Saginaw Asphalt Paving Co.	Pit 71-15	Pits 63-29 and 63-54	NBOL NBIL SBOL SBIL	0.42 0.42 0.43 0.41	0.49 0.47 0.45 0.46	0.45 0.44 0.44 0.43
Ms 13061-04941A	M 89 (Michigan Ave) from Cedar Ave east to Emerald Ave in Battle Creek	Globe Construction Co.	Pit 13-59	Pit 13-59	WBOL	0.36	0.37	0.37
RF 20016-11021A	US 27 from 1.5 miles north of Higgins Lake Rd north to I 75	Central Paving Co.	Pit 72-5	Pit 72-5	NBOL NBIL SBOL SBIL	0.53 0.60 0.55 0.59	0.55 0.62 0.58 0.64	0.54 0.61 0.56 0.61
Mbr 23042-07657A	M 43 from 0.96 mile east of M 100 east to I 96	Reith-Riley Construction Co.	Pit 41-38	Pits 19-33 and 47-43	EBOL EBIL WBOL WBIL	0.43 0.48 0.46 0.47	0.46 0.51 0.48 0.48	0.45 0.49 0.47 0.47
RF 23092-10728A	M 99 from north limits of Eaton Rapids north to 1,000 ft north of Petrieville Rd	Spartan Asphalt Paving Co.	Pit 63-97	Pit 33-7	NBOL NBIL SBOL SBIL	0.51 0.55 0.51 0.54	0.55 0.58 0.55 0.60	0.52 0.57 0.53 0.57
Mb 25011-10849A (part)	M 13-M 21 from north of I 69 north to Lennon	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	NE SB	0.37 0.40	0.40 0.42	0.39 0.41
Mb 25011-10849A (part)	M 13-M 21 from Lennon north to M 56	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	NB SB	0.34 0.37	0.40 0.42	0.36 0.41
Mb 26011-11032A	M 18 from Midland-Gladwin County Line north to Burge Rd	The Hicks Co.	Pit 71-15	Pit 37-38	NR SB	0.49 0.45	0.54 0.53	0.52 0.49
M 27021-12167A	US 2 Intermittently from the Interstate bridges over Montreal River (B01 and B07 of 27021) east to Eddy St in Wakefield	Mathy Construction Co.	Pit 27-12	Pit 27-12	EBOL EBIL WBOL WBIL	0.59 0.59 0.55 0.59	0.60 0.64 0.55 0.60	0.59 0.61 0.65 0.59
Mb 34011-09277A (part)	M 91 from north of Ellis Rd north to Ionia-Montcalm County Line	Reith-Riley Construction Co.	Pit 41-38	Pit 41-27	NE SB	0.47 0.49	0.57 0.53	0.52 0.51
Mb 34011-09277A (part)	M 91 from Ionia-Montcalm County Line north (Control Section 59031)	Reith-Riley Construction Co.	Pit 41-38	Pit 41-27	NB SB	0.60 0.48	0.65 0.51	0.63 0.49
Ms 38093-03597A	I 94 DL from 494 ft west of Ganson St east to 487 ft east of US 127	Richardson Asphalt Paving Co.	Pit 47-3	Pit 30-35	EBOL EBIL WBOL WBIL	0.45 0.55 0.51 0.51	0.48 0.55 0.53 0.51	0.46 0.55 0.52 0.51
Ms 39041-09603A (part)	I 94 BL (Michigan Ave) from Stadium Dr northeast to west junction with M 43	Globe Construction Co.	Pit 3-44	Pit 3-44	EBOL EBCL EBIL WBOL WBCL WBIL	0.37 0.39 0.43 0.40 0.40 0.47	0.41 0.42 0.48 0.42 0.42 0.49	0.39 0.41 0.45 0.41 0.41 0.48
Ms 39041-09603A (part)	Eastbound I 94 DL from west junction with M 43 east to Church St	Globe Construction Co.	Pit 3-44	Pit 3-44	EBOL ED=4 EB=3 EB=2 EBIL	0.45 0.49 0.46 0.46 0.51	0.49 0.51 0.48 0.48 0.57	0.47 0.50 0.47 0.47 0.55
Mbr 41033-07689A	M 37 from 4 Mile Rd north to divided roadway south of Alpine Church Rd	Woodland Paving Co.	Pit 41-118	Pit 41-27	NEOL NBIL SBOL SBIL	0.42 0.49 0.45 0.47	0.49 0.55 0.49 0.51	0.48 0.52 0.46 0.49
Mb 43022-11056A	US 10 from M 37 east to 1,000 ft east of Lincoln Park Rd	Reith-Riley Construction Co.	Pit 54-22	Pit 54-42	EB WB	0.37 0.48	0.40 0.52	0.39 0.50

1977

⁵ Type C mix.
⁶ Type CM mix.

TABLE 2 (Cont.)
 BITUMINOUS CONCRETE PAVEMENTS (4.12)
 CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mbr 52041-10866A	US 41-M 28 from 500 ft east of M 95 west to Baraga-Marquette County Line	Payne and Dolan of Wisconsin, Inc.	Pit 52-1	Pit 52-1	EB WB	0.49 0.47	0.57 0.53	0.53 0.50
Ms 58052-07140A	US 24 (Telegraph Rd) from north Cluster Rd north to north of Lorisin St	Cunningham-Gooding	Pit 81-84 and E. C. Levy (Dearborn Yard)	Pit 81-28	NBOL NBIL SBOL SBIL	0.42 0.46 0.42 0.42	0.48 0.49 0.46 0.47	0.45 0.48 0.44 0.45
Mbr 61131-11077A (part)	M 37 from north junction with M 46 north	Reith-Riley Construction Co.	Pits 41-38 41-118 and 54-22	Pits 41-121 and 62-33	NB SD	0.36 0.22	0.51 0.41	0.46 0.28
Mbr 61131-11077A (part)	M 37 from Casnovia west to M 46 (Control Section 61024)	Reith-Riley Construction Co.	Pits 41-38 41-118 and 54-22	Pits 41-121 and 62-33	NB SB	0.53 0.46	0.55 0.48	0.54 0.47
Mbr 61131-11077A (part)	M 37 from south junction with M 82 south 2.0 miles (Control Section 62031)	Reith-Riley Construction Co.	Pits 41-38 41-118 and 54-22	Pits 41-121 and 62-33	NB SB	0.41 0.42	0.45 0.43	0.43 0.43
Ms 63041-10067A	M 59 from US 10 east to Wide Track Dr. omitting 200 ft from Franklin Blvd to GTW RR	Ajax Paving Industries	Pit 63-4	Pit 63-4	EBOL EBIL WBOL WBCL WBIL	0.37 0.30 0.39 0.42 0.41	0.42 0.37 0.54 0.48 0.49	0.40 0.34 0.46 0.44 0.45
Mb 78061-11095A	M 21 from 220 ft east of Smith Rd west to Shiawassee-Clinton County Line	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	EB WB	0.46 0.48	0.49 0.53	0.47 0.50
Mb 78012-11096A	US 131 from south junction of M 60, south-west of Three Rivers, north to 140 ft north of US 131 BR, north of Three Rivers	Klett Construction Co.	Material Service (Thornton, Ill.)	Pits 14-19 and 14-51	NBOL NBIL SBOL SBIL	0.49 0.51 0.52 0.55	0.52 0.60 0.55 0.60	0.51 0.56 0.53 0.58
Mb 78022-11097A	US 12 from 380 ft west of US 121 east to east limits of White Pigeon	Reith-Riley Construction Co.	Pits 3-44 and 11-63	Pit 78-12	EBOL EBIL WBOL WBIL	0.51 0.53 0.53 0.52	0.54 0.57 0.58 0.55	0.53 0.54 0.56 0.54
MU 82072-11308A	M 3 from I 94 northeast to 8 Mile Rd	Ajax Paving Industries	E. C. Levy (Dix Yard)	Pit 81-80	NBOL NBCL NBIL SBOL SBCL SBIL	0.46 0.46 0.47 0.51 0.49 0.48	0.52 0.51 0.51 0.53 0.55 0.52	0.50 0.49 0.49 0.52 0.52 0.49
MU 82121-11306A	I 96 BS from 8 Mile Rd southeast to 150 ft west of Berg St	Asphalt Products Co.	E. C. Levy (Dix Yard)	Pit 63-55	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	0.45 0.45 0.45 0.41 0.42 0.46 0.47 0.46	0.49 0.46 0.46 0.47 0.48 0.53 0.54 0.49	0.47 0.46 0.46 0.44 0.45 0.49 0.51 0.47
Mbr 82121-11307A	I 96 BS from 160 ft west of Colgate St southeast to 8 Mile Rd (Control Section 63022)	Asphalt Products Co.	E. C. Levy (Dix Yard)	Pit 63-55	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	0.46 0.52 0.51 0.49 0.39 0.51 0.45 0.48	0.53 0.53 0.53 0.52 0.57 0.54 0.54 0.57	0.50 0.52 0.52 0.50 0.47 0.53 0.51 0.53

1977 CONT.

TABLE 3
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources Coarse	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 05011-07628A	US 31 from 370 ft north of Sutter Rd north to 686 ft north of Hjelte Rd	Hodgkiss and Douma, Inc.	Pit 5-74	NB	0.47	0.53	0.51
Mb 15051-07650A	M 32 from east limits of East Jordan south-east 2.25 miles	Hodgkiss and Douma, Inc.	Pit 15-32	EB	0.34	0.35	0.34
Mb 26012-07665A	M 18 from 550 ft north of Gladwin north to 75 ft west of Round Lake Rd	The Hicks Co.	Pit 26-8	NB	0.48	0.51	0.49
Mb 34011-09248A	M 91 from the Kent-Ionia County Line east and north to the south limits of Belding	Rieth-Riley Construction Co.	Pit 41-113	NB	0.40	0.65	0.50
DPF 02041-00011A	M 28 from west side of Shelter Bay east to 1.0 mile east of Auflrain	Payne and Dolan of Wisconsin, Inc.	Pit 2-45	EB	0.65	0.68	0.66
Mb 03041-09321A	M 118 from east limits of Allegan east to US 131	West Shore Construction Co.	Pit 70-3	EB	0.46	0.58	0.52
Mb 16032-09263A	M 27 from 2.0 miles north of Indian River north to concrete pavement	Lake Construction Co.	Pit 16-69	NB	0.55	0.58	0.57
Mb 16071-09271A	M 108 from 2,000 ft south of Mackinaw City north to 90 ft north of northbound I 75 off-ramp to RR Ave	Lake Construction Co.	Pit 16-69	NB	0.51	0.55	0.53
Mb 16081-09270A	US 23 from the Presque Isle-Cheboygan County Line west to curb and gutter in Cheboygan	Lake Construction Co.	Pit 17-37	NB	0.60	0.66	0.63
Mb 17042-09257A	M 48 from south to north junction with County Rd H-63	Lake Construction Co.	Pit 17-37	NB	0.46	0.48	0.47
Mb 17071-09258A (part)	M 129 from 400 ft south of Rockview north to north junction with M 48	Lake Construction Co.	Pit 17-37	NB	0.48	0.53	0.50
Mb 17071-09258A (part)	M 129 from north junction with M 48 north to 100 ft south of Tone Rd (Control Section 17072)	Lake Construction Co.	Pit 17-37	NB	0.55	0.60	0.58
Mbr 17081-06955A	M 123 from Luce-Chippewa County Line east to Paradise, omitting 0.14 mile at lower Tahquamenon Falls Rd	Hodgkiss and Douma, Inc.	Pit 17-55	EB	0.59	0.60	0.60
Mb 20012-11020A	Southbound I 75 BL from I 75 north to M 72	The Hicks Co.	Pit 72-5	SBOL	0.41	0.46	0.43
				SBIL	0.53	0.54	0.54

1975

1976

TABLE 3 (Cont.)
BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mbr 21032-07656A	M 35 from 0.5 mile south of Perkins north to the Delta-Marquette County Line	Payne and Dolan of Wisconsin, Inc.	Pit 21-77	NB SB	0.59 0.58	0.70 0.68	0.64 0.64
Mb 24021-10775A (part)	M 68 from US 31 east to the Emmet-Cheboygan County Line	Lake Construction Co.	Pit 15-32	EB WB	0.52 0.52	0.57 0.54	0.54 0.53
Mb 24021-10775A (part)	M 68 from Emmet-Cheboygan County Line east to I 75 (Control Section 16021)	Lake Construction Co.	Pit 15-32	EB WB	0.55 0.54	0.60 0.62	0.57 0.58
Mb 26011-09294A (part)	M 18 from Woods Rd north to M 61	The Hicks Co.	Pit 26-8	NB SB	0.57 0.55	0.60 0.58	0.59 0.57
Mb 26011-09294A (part)	M 18-M 61 from west junction with M 18 east to 470 ft west of east limits of Gladwin	The Hicks Co.	Pit 26-8	EBOL EBIL WBOL WBIL	0.44 0.41 0.51 0.51	0.47 0.46 0.51 0.52	0.45 0.43 0.51 0.52
Mbr 26012-08708	M 18 from 75 ft west of Round Lake Rd west and north to 90 ft west of Cassidy Rd	The Hicks Co.	Pit 26-8	NB SB	0.61 0.58	0.62 0.58	0.62 0.58
Mb 31013-09252A	M 26 from Winona St north to US 41	Geo. Hocking Construction Co.	Pit 31-15	NB SB	0.43 0.48	0.53 0.54	0.48 0.52
Mbr 31031-09251A	M 203 from east of McLaine Park (5.7 miles west of Calumet) east 4.3 miles to the cemetery (1.4 miles west of Calumet)	Geo. Hocking Construction Co.	Pit 31-16	NB SB	0.61 0.51	0.65 0.57	0.63 0.55
Mb 31052-10108A	US 41 from 0.9 mile northeast of Hancock northeast to 0.707 mile northeast of Houghton-Keweenaw County Line	Geo. Hocking Construction Co.	Pit 31-16	NB SB	0.42 0.49	0.59 0.58	0.51 0.52
Mb 34021-10859A	M 50 from Nash Hwy and Thompson Rd south and east to the Ionia-Barry County Line	Williams Bros. Asphalt Paving Co.	Pit 34-45	EB WB	0.52 0.49	0.57 0.59	0.54 0.54
Mbr 36011-07738A	M 73 from 50 ft north of Brule River northeast to 175 ft south of US 2	Mathy Construction Co.	Pit 36-40	NB SB	0.58 0.61	0.59 0.62	0.59 0.62
Mb 36023-10843A ¹ (part)	M 69 from Crystal Falls east to the Iron-Dickinson County Line	Mathy Construction Co.	Pit 36-19	EB WB	0.55 0.55	0.61 0.58	0.59 0.57
Mb 36023-10843A ¹ (part)	M 69 from the Iron-Dickinson County Line east to Sagola (Control Section 22041)	Mathy Construction Co.	Pit 36-19	EB WB	0.58 0.55	0.61 0.58	0.60 0.56
Mb 36023-10843A ¹ (part)	US 2 from Crystal Falls west intermittently 4.3 miles (Control Section 36022)	Mathy Construction Co.	Pit 36-19	EB WB	0.39 0.51	0.46 0.52	0.43 0.52

¹ See

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mbr 38051-09323A (part)	M 106 from 0.5 mile north of Portage River northeast to the Jackson-Ingham County Line	Richardson Asphalt Paving Co.	Pit 38-78	NB SB	0.51 0.46	0.57 0.51	0.53 0.48
Mbr 38051-09323A (part)	M 106 from the Jackson-Ingham County Line northeast to M 52 (Control Section 38071)	Richardson Asphalt Paving Co.	Pit 38-78	NB SB	0.53 0.46	0.57 0.49	0.54 0.47
Mb 38071-09326A	M 50 from east of US 127 southeast to Napoleon	Richardson Asphalt Paving Co.	Pits 38-48 and 38-78	EB WB	0.46 0.46	0.54 0.53	0.50 0.49
Mb 44012-11057A	M 24 from 470 ft north of M 21 in Lapeer north intermittently 1.11 miles to Penn Central RR	Barrett Asphalt Paving Co.	Pit 44-53	NBOL NBIL SBOL SBIL	0.43 0.46 0.41 0.42	0.46 0.48 0.46 0.45	0.45 0.47 0.43 0.43
Mbr 44042-11130A	M 21 from 420 ft east of Penn Central RR in Lapeer east to 675 ft east of Main St in Imlay City	Barrett Asphalt Paving Co.	Pit 44-53	EB WB	0.43 0.43	0.52 0.55	0.48 0.50
Mb 45013-10846A (part)	M 22 from 160 ft north of west junction with M 204 northeast to M 201, omitting 0.43 mile in Leland	Rieth-Riley Construction Co.	Pit 45-2	NB SB	0.47 0.51	0.53 0.54	0.51 0.52
Mb 45013-10846A (part)	M 22 from 1,765 ft east of north junction with M 109 northeast 0.54 mile (Control Section 45012)	Rieth-Riley Construction Co.	Pit 45-2	NB SB	0.46 0.45	0.48 0.51	0.47 0.49
Mbr 45021-10982A	Westbound M 72 truck lane from 743 ft west of M 22 west to crest of grade	Peninsula Asphalt Corp.	Pit 45-19	WBTL	0.47	0.47	0.47
Mb 46011-09325A (part)	US 127 from Hillsdale-Lenawee County Line northeast and north to US 223	Rieth-Riley Construction Co.	Pit 30-62	NB SB	0.49 0.47	0.53 0.57	0.51 0.52
Mb 46011-09325A (part)	US 127 from 100 ft south of Penn Central RR in Hudson north to the Hillsdale-Lenawee County Line (Control Section 30071)	Rieth-Riley Construction Co.	Pit 30-62	NB SB	0.46 0.53	0.52 0.60	0.49 0.56
Mfb 46032-11199A	M 156 from Michigan-Ohio State Line north to 140 ft south of Conrail Crossing in Morenci	Cunningham-Gooding	Pit 81-84	NB SB	0.60 0.55	0.62 0.59	0.61 0.57
Mbr 51021-11066A	M 55 from Udeell Hills Rd east to M 37	Laman Asphalt and Paving Co.	Pit 51-33	EB WB	0.52 0.45	0.59 0.55	0.56 0.49

1976 CONT

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 53011-09262A	M 116 from north limits of Ludington north to 500 ft north of Big Sable River	Laman Asphalt and Paving Co.	Pit 43-49	NB SB	0.51 0.47	0.52 0.51	0.51 0.48
Mb 65011-09269A (part)	M 30 from the Gladwin-Ogemaw County Line north to County Rd #288	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.58 0.58	0.61 0.60	0.60 0.59
Mb 65011-09269A (part)	M 30 from County Rd #276 north to north of Wright Ave in West Branch	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.57 0.80	0.59 0.65	0.58 0.63
Mb 71021-11087A	M 68 from 100 ft east of 4th St in Onaway east and north to 740 ft north of Millersburg Rd	Lake Construction Co.	Pit 16-69	EB WB	0.55 0.60	0.61 0.62	0.59 0.61
Mbr 71071-09268A	US 23 from the Alpena-Presque Isle County Line north to East County Hwy #638	Saginaw Asphalt Paving Co.	Pit 71-65	NB SB	0.59 0.52	0.62 0.64	0.61 0.57
Mb 71073-09272A	US 23 from 4 miles northwest of Rogers City northwest to County Hwy #646	Hodgkiss and Douma, Inc.	Pit 71-6	NB SB	0.61 0.51	0.65 0.58	0.64 0.60
Mb 71073-09273A	US 23 from County Hwy #646 northwest intermittently to the Presque Isle-Cheboygan County Line	Hodgkiss and Douma, Inc.	Pit 71-6	NB SB	0.62 0.64	0.62 0.65	0.62 0.64
Mb 72052-09275A	M 18 from north of I 75 north to Division St in Roscommon	Central Paving Co.	Pits 65-7 and 72-5	NB SB	0.54 0.55	0.55 0.59	0.55 0.56
Mb 74011-10850A	M 53 from 500 ft south of Marlette north to 250 ft north of M 46	Frank Strausberg and Son Co.	Pit 74-10	NB SB	0.57 0.55	0.60 0.59	0.58 0.57
Mb 74023-09299A	M 90 from 373 ft west of George St in Brown City east to M 19	Frank Strausberg and Son Co.	Pit 44-58	EB WB	0.48 0.53	0.61 0.61	0.56 0.58
Mbr 74072-09979A	M 25 from Hyde Rd (south limits of Port Sanilac) north 0.51 mile	Frank Strausberg and Son Co.	Pit 44-58	NB SB	0.61 0.58	0.61 0.59	0.61 0.58
Mb 75051-10845A	M 77 from US 2 north 1.3 miles	Lake Construction Co.	Pit 49-58	NB SB	0.48 0.58	0.52 0.60	0.50 0.59
Mb 75052-10872A	M 77 from M 28 north 3.5 miles	Lake Construction Co.	Pit 49-58	NB SB	0.54 0.55	0.59 0.59	0.56 0.57
Mb 76041-07719A	M 71 from 800 ft northwest of temporary I 69 northwest to Shiawassee St in Corunna	Spartan Asphalt Paving Co.	Pit 11-46	NB SB	0.41 0.33	0.47 0.48	0.43 0.41
Mb 78062-09312A (part)	M 86 from M 66 east 4.24 miles	Rieth-Riley Construction Co.	Pit 78-12	EB 2 WB 2	0.64 0.60	0.65 0.62	0.65 0.61

² Bituminous aggregate with increased stone content.

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Coarse	Low	High
Mb 78062-09312A (part)	M 86 from Main St, south of Three Rivers, east to M 66 (Control Section 78061)	Rieth-Riley Construction Co.	Pit 78-12	EB WB	0.42 0.45	0.55 0.57	0.50 0.50
Mb 78062-09312A (part)	M 66 from south junction of M 86 north to north junction of M 86 (Control Section 78054)	Rieth-Riley Construction Co.	Pit 78-12	NB ² SB 2	0.54 0.53	0.55 0.55	0.54 0.54
Mb 80041-09310A (part)	M 43 from 300 ft east of 69th St east to 1.5 miles east of east limits of Bangor	Klett Construction Co.	Pit 14-19	EB WB	0.53 0.49	0.55 0.53	0.54 0.51
Mb 80041-09310A (part)	M 43 from 3.0 miles east of Bangor east intermittently to 3,800 ft west of M 40 (Control Section 80072)	Klett Construction Co.	Pit 14-19	EB WB	0.52 0.49	0.57 0.60	0.54 0.55
Mb 83051-09260A (part)	M 115 from Osceola-Wexford County Line northwest to south junction of M 55, omitting at US 131	Rieth-Riley Construction Co.	Pit 83-6	EB WB	0.47 0.51	0.51 0.53	0.49 0.52
Mb 83051-09260A (part)	M 115 from east of US 131 northwest to west of US 131	Rieth-Riley Construction Co.	Pit 83-6	EBOL EBIL WBOL WBIL	0.51 0.53 0.45 0.53	0.58 0.55 0.49 0.54	0.54 0.54 0.47 0.54
Mb 83052-09261A	M 115 from west limits of Cadillac north-west	Rieth-Riley Construction Co.	Pit 83-6	EB WB	0.48 0.45	0.51 0.49	0.50 0.47
Mb 07013-11005A	US 41 from 3.1 miles north of M 38 thence north to the Baraga-Houghton County Line	Fox Valley Construction Co.	Pit 31-69	NB SB	0.40 0.45	0.53 0.57	0.48 0.53
Mb 08051-11006A (part)	M 66 from 0.5 mile north of Cloverdale Rd north to M 79	Rieth-Riley Construction Co.	Pit 13-30	NB SB	0.22 0.27	0.40 0.36	0.33 0.31
Mb 08051-11006A (part)	M 66 from M 79 north to Casgrove Rd in Nashville (Control Section 08052)	Rieth-Riley Construction Co.	Pit 13-30	NB SB	0.33 0.31	0.41 0.39	0.37 0.36
Mb 12041-09313A (part)	M 86 from the St. Joseph-Branch County Line east to US 12	Rieth-Riley Construction Co.	Pit 12-39	EB WB	0.51 0.49	0.55 0.54	0.53 0.51
Mb 12041-09313A (part)	M 86 from 250 ft west of east limits of Colon east to the St. Joseph-Branch County Line (Control Section 78062)	Rieth-Riley Construction Co.	Pit 12-39	EB WB	0.41 0.58	0.47 0.61	0.45 0.59
Mb 17072-11018A	M 129 from 425 ft north of Dafter Rd north to 18th Ave in Sault Ste. Marie	Hodgkiss and Douma, Inc.	Pit 17-62	NB SB	0.64 0.58	0.67 0.65	0.65 0.61

1976 CONT.

1977

TABLE 3 (Cont.)
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1975, 1976 AND 1977

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Coarse	Low	High
Mb 18042-11371A	M 61 from US 27 east to the Clare-Gladwin County Line	The Hicks Co.	Pit 18-2	EB WB	0.47 0.51	0.53 0.55	0.50 0.53
Mb 23021-11022A	M 79 from Ainger Rd east to Cochran St in Charlotte, omitting from Wheaton Rd to Lincoln St	Rietz-Riley Construction Co.	Pit 13-30	EB WB	0.48 0.48	0.49 0.51	0.49 0.49
Mb 24051-11023A	M 131 from west limits of Harbor Springs north to State Rd in Cross Village	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.46 0.45	0.52 0.54	0.49 0.49
Mb 31031-11037A	M 203 from 2.39 miles west of US 41 east to US 41	Geo. Hocking Construction Co.	Pit 31-16	EB WB	0.51 0.49	0.51 0.51	0.51 0.50
Mb 33072-11040A	M 106 from Clinton St in Stockbridge east to M 36 in Gregory (Control Sections 33072 and 47021)	Howell Construction Co.	Pit 47-26	EB WB	0.43 0.47	0.46 0.49	0.45 0.48
Mb 42021-11055A	M 26 from Garden City Creek at north limits of Eagle River northeast to 2.0 miles southwest of Eagle Harbor	Geo. Hocking Construction Co.	Pit 31-16	EB WB	0.66 0.55	0.70 0.56	0.69 0.55
M 52011-11067A	M 95 from 1.9 miles south of Trout Falls Creek north to 0.7 mile north of Michigamme River	Payne and Dolan of Wisconsin, Inc.	Pit 52-1	NB SB	0.59 0.61	0.62 0.62	0.60 0.61
M 75052-10873A (part)	M 77 from 3.5 miles north of Seney north intermittently to the Schoolcraft-Alger County Line	Lake Construction Co.	Pit 49-58	NB SB	0.52 0.49	0.59 0.59	0.54 0.54
M 75052-10873A (part)	M 77 from the Schoolcraft-Alger County Line north intermittently to Wilson St in Grand Marais (Control Section 02051)	Lake Construction Co.	Pit 49-58	NB SB	0.57 0.53	0.59 0.55	0.58 0.54
Mb 75061-10844A (part)	M 28 from the Alger-Schoolcraft County Line east	Lake Construction Co.	Pit 49-58	EB WB	0.42 0.42	0.53 0.53	0.47 0.49
Mb 75061-10844A (part)	M 28 from 1.2 miles southeast of McMillan southeast (Control Section 43041)	Lake Construction Co.	Pit 49-58	EB WB	0.53 0.45	0.54 0.47	0.54 0.46
Mb 77033-10796A	M 25 from north of Carrigan Rd north to north of Lakeport	Molesworth Construction Co.	Pits 74-26 and 77-15	NB SB	0.37 0.37	0.37 0.37	0.37 0.37

TABLE 4
MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1976

Project No.	Location	Paving Contractor	Aggregate Sources Coarse	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
<u>Surface Treatment (Single Seal)</u>							
Mb 57041-10899A (part)*	M 42 from the Wexford-Missaukee County Line east to M 66	Reith-Riley Construction Co., Inc.	Pit 57-30	EB WB	0.39 0.34	0.58 0.41	0.49 0.37
Mb 57041-10899A (part)*	M 42 from US 131 east to the Wexford- Missaukee County Line (Control Section 83042)	Reith-Riley Construction Co., Inc.	Pit 57-30	EB WB	0.42 0.24	0.45 0.36	0.43 0.30

* See also 77 SR-26 in Section VI.

TABLE 5
 CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENT
 SUMMARY FOR THE 1977 TEST YEAR

Surface Type	Service Year When Tested	Total Lanes Tested	Total Lane Miles Tested	Weighted Average Friction Level
Concrete	Initial	2	0.756	0.63
	1	98	309.591	0.66
Bituminous Concrete	Initial	113	333.696	0.50
	1	234	579.167	0.52
	2	24	46.840	0.47
Bituminous Aggregate	Initial	36	263.120	0.51
	1	121	669.336	0.56
	2	8	41.080	0.50
Single Seal	1	4	20.500	0.41

SECTION II

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

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

Table 6 - Five-Year Review for Concrete Pavements Constructed in 1972

Table 6 contains pavement friction tests for 19 portland cement concrete projects consisting of 90 lanes (174.7 lane miles) which were constructed in 1972. Initial service year tests were conducted on two of these projects and resulting Wsf values averaged 0.58. Fifteen of the projects were first tested in 1973, after a one-year service period; friction levels on these also averaged 0.58. Two projects were not initially tested until 1974; the average Wsf value was 0.42. All projects were retested at the five-year service level. Five-year Wsf values for the 88 lanes tested ranged from 0.30 to 0.75 and averaged 0.54. Eleven percent of the lane mileage tested after five years of service (11 lanes) yielded coefficients averaging lower than 0.40. The lowest five-year friction level encountered was the 0.30 value on the westbound lane of Project 08034-03128. This project is located on M 37/M 43, west of Hastings. Contrasting to the low Wsf values were 11 lanes with coefficients averaging 0.70 or higher (17 percent of the total lane mileage tested). Three of these 11 lanes were on the I 75 Project 65041-00945 north of M 30 in Ogemaw County.

Table 7 - Five-Year Review for Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1972

Table 7 lists pavement friction test results of 53 bituminous concrete (4.12) projects constructed during 1972. In all 201 lanes (252.456 lane miles) were tested. Average coefficients of friction were determined during the initial service year on three projects and Wsf values averaged 0.50. In 1973, after a one-year period, 48 projects were tested; resulting Wsf values averaged 0.51. One project was not initially tested until 1974, after two years of service. Friction level on this project averaged 0.36. Pavement friction tests were conducted again in 1977, after five years of service, on all 201 lanes; Wsf values ranged from 0.33 to 0.72 and averaged 0.51. Twenty-eight of the lanes, representing 30 percent of the lane mileage, yielded five-year coefficients averaging lower than 0.40. The lowest (0.33) was encountered on southbound M 52 between old US 12 and the Penn Central RR in Washtenaw County (Project 81011-03848). Three lanes, 5.5 percent of the lane mileage, had five-year friction levels equal to or above the 0.70 mark. Two of the four lanes of Project 72061-00997, located on I 75 north of the Ogemaw-Roscommon County line, averaged 0.72.

Table 8 - Five-Year Review for Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1972

Table 8 contains pavement friction test results from 30 bituminous aggregate projects of which 85 lanes (418.776 lane miles) were tested.

Eight projects were tested during their initial service year; Wsf values averaged 0.50. Coefficients on 22 projects tested after a one-year service period averaged 0.55. During 1977, all projects were retested. Five-year Wsf values ranged from 0.28 to 0.73 and averaged 0.57. Nine lanes, representing 3.5 percent of the total five-year lane mileage yielded Wsf values averaging below 0.40. The M 75 portion of Project 05072-03828 located north of the north junction of M 32 on Control Section 15071 possessed the lowest coefficients; southbound averaged 0.28 and the northbound average was 0.30. Only three lanes averaged 0.70 or higher. These three lanes represent 6.8 percent of the tested lane mileage. Both lanes of Project 02021-03939 were in this category as the eastbound averaged 0.73 and the westbound lanes averaged 0.70. This project is located on M 94 between US 41 and Chatham in Alger County.

Table 9 - Five-Year Review for Miscellaneous Bituminous Surfaces Constructed in 1972

Test results from three surface treatment projects are shown in Table 9. Two projects (47.0 lane miles) were initially tested in 1973 after a one-year service period; the average Wsf value was 0.49. The remaining project was not initially tested until 1974, after a two year service period. Average Wsf value on this project was 0.75. During 1977, at the five-year service level, coefficients on the three projects ranged from 0.38 to 0.68 and averaged 0.61.

Figures 1 through 3 graphically show results of linear regressions on one-year (x) and five-year (y) Wsf values for construction years 1963 through 1972. Departure from a one to one relationship is indicated by the divergency of the regression line from the dashed 45 degree line shown. In Figure 3, no regression line has been shown for the 1970 construction year, because only two lanes were tested at the one-year level.

TABLE 6
FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
U 08084-03127A	M 37-M 43 from the west city limits of Hastings easterly to Broadway St in Hastings	Carl Goodwin and Sons, Inc.	Pit 8-80	Pit 8-80	EBOL EBIL WBOL WBIL	--	0.56 0.59 0.50 0.55	--	0.44 0.37 0.41 0.36
F 08084-03128A	M 37-M 43 from west of Heath Rd easterly to west city limits of Hastings	Carl Goodwin and Sons, Inc.	Pit 8-80	Pit 8-80	EB WB	--	0.47 0.45	--	0.35 0.30
I 23061-020 (00293A)	I 69 from Eaton-Calhoun County Line northerly and easterly to east of Ainger Rd	Davco, Inc.	Pits 12-44 and 13-84	Pit 13-84	NBOL NBIL SBOL SBIL	--	0.50 0.61 0.47 0.61	--	0.43 0.66 0.43 0.67
I 23061-021 (00294A)	I 69 from west of McDonald Rd northeast to northeast of Five Point Hwy	Davco, Inc.	Pit 12-44	Pit 13-84	NBOL NBIL SBOL SBIL	--	0.41 0.63 0.41 0.60	--	0.49 0.70 0.48 0.66
I 25132-03576A	I 475 from west of Clito Rd westerly to I 75	C. J. Rogers, Inc.	Pit 63-54	Pit 63-54	NBOL NBIL SBOL SBIL	--	0.63 0.63 0.65 0.72	--	0.43 0.55 0.44 0.68
I 25132-03883A	I 475 from south of 12th St northerly to north of Court St	Sargent Contracting Co.	Pit 63-54	Pit 63-54	NBOL NBIL SBOL SBIL	--	-- -- -- --	0.64 0.64 0.65 0.64	0.60 0.64 0.71 0.72
F 41133-00607A	US 131 from 600 ft north of 14 Mile Rd (M 57 east) northerly to 2,600 ft north of 17 Mile Rd (M 57 west)	Eisenhour Construction Co.	Pit 41-69	Pit 41-69	NBOL NBIL SBOL SBIL	--	0.71 0.76 0.65 0.65	--	0.58 0.69 0.55 0.70
F 41133-00608A	US 131 from 2,600 ft north of 17 Mile Rd (M 57 west) northeasterly to Grimes St	Eisenhour Construction Co.	Pit 41-69	Pit 41-69	NBOL NBIL SBOL SBIL	--	0.67 0.63 0.68 0.67	--	0.55 0.67 0.48 0.72

TABLE 6 (Cont.)
FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
F 50023-00665A	M 59 relocation from 3,020 ft west of Oak-land-Macomb County Line easterly to Mound Rd	L. W. Edison Co.	Pit 63-56 and E.C. Levy (Dix Yard)	Pit 63-56	EBOL EBIL WBOL WBIL	0.57 0.56 0.62 0.60	-- -- -- --	-- -- -- --	0.38 0.43 0.38 0.45
M 50051-03955A	Southbound US 25 (Gratiot Ave) from 400 ft south of Iroquis Ave northeasterly to Wellington Crescent	Sullivan Brothers Co.	E.C. Levy (Trenton Yard)	Pit 50-41	SBOL SB#3 SB#2 SBIL	-- -- -- --	0.34 0.31 0.39 0.38	-- -- -- --	0.31 0.36 0.35 0.41
F 59012-03695A	US 131 relocation from 0.53 mile north of Cannonsville Rd northerly to 0.58 mile north of M 46	Eisenhour Construction Co.	Pit 41-38	Pit 41-38	NBOL NBIL SBOL SBIL	-- -- -- --	0.69 0.72 0.66 0.64	-- -- -- --	0.50 0.71 0.47 0.70
F 63043-034 (00861A)	M 59 from Auburn Rd southeasterly and easterly to west of Dequindre Rd (Oak-land-Macomb County Line)	Cooke Contracting Co.	Pit 63-56 and E.C. Levy (Dix Yard)	Pit 63-56	EBOL EBIL WBOL WBIL	0.55 0.55 0.57 0.58	-- -- -- --	-- -- -- --	0.40 0.45 0.41 0.46
I 65041-00944A	I 75 from Cook Rd northwesterly to south of M 55	Eisenhour Construction Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	-- -- -- --	0.59 0.61 0.64 0.66	-- -- -- --	0.58 0.65 0.62 0.71
I 65041-00945A	I 75 from north of M 30 northwesterly to north of M 55	Eisenhour Construction Co.	Pit 65-7	Pit 65-7	NBOL NBCL NBIL SBOL SBIL	-- -- -- -- --	0.60 0.59 0.56 0.50 0.57	-- -- -- -- --	0.65 0.71 0.73 0.59 0.75
U 82081-03030A	M 153 (Ford Rd) from Hawthorn St east to approximately 350 ft west of the South-field interchange	Cooke Contracting Co.	E.C. Levy (Dix Yard) and 63-55	Pits 63-7 and 63-55	EBOL EB#3 EB#2 EBIL WBOL WBCL WBIL	-- -- -- -- -- -- --	0.42 0.46 0.45 0.48 0.38 0.45 0.54	-- -- -- -- -- -- --	0.45 0.46 0.49 0.43 0.48 0.48 0.51

TABLE 6 (Cont.)
 FIVE-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
BI 82123-043 (01263A)	I 96 (Jeffries Freeway) from Seebolt to Wreford Ave	K. G. Marks, Inc.	Pit 63-7	Pit 63-7	EBOL	--	0.43	--	0.46
					EB#3	--	0.52	--	0.44
					EB#2	--	0.53	--	0.42
					EBfL	--	0.59	--	0.57
					WBOL	--	0.51	--	0.40
					WB#3	--	0.45	--	0.44
					WB#2	--	0.58	--	0.50
WBfL	--	0.63	--	0.59					
BI 82123-050 (01293A)	I 96 (Jeffries Freeway) from Grand River to Woodside in the City of Detroit	Cooke Contracting Co.	E. C. Levy Pits 63-55, (Dix Yard) 63-56 and 81-1		EBOL	--	0.52	--	0.48
					EB#3	--	0.48	--	0.47
					EB#2	--	0.46	--	0.41
					EBfL	--	0.53	--	0.48
					WBOL	--	0.42	--	0.49
					WB#3	--	0.53	--	0.45
					WB#2	--	0.58	--	0.48
WBfL	--	0.54	--	0.62					
BI 82123-053 (01296A)	I 96 (Jeffries Freeway) from Woodside to Fernwood in the City of Detroit	Cooke Contracting Co.	E. C. Levy Pits 63-7 (Dix Yard) and 63-56		EBOL	--	0.47	--	0.45
					EB#3	--	0.45	--	0.40
					EB#2	--	0.43	--	0.41
					EBfL	--	0.51	--	0.49
					WBOL	--	0.49	--	0.41
					WB#3	--	0.48	--	0.40
					WB#2	--	0.53	--	0.47
WBfL	--	0.58	--	0.58					
I 82191-01326A	I 75 from 0.25 mile north of Gibraltar Rd northerly to Sibley Rd (widening)	Denton Construction Co.	Pit 63-48 and 82-10	Pits 81-57 and 82-10	NBOL	--	--	0.37	0.37
					SBOL	--	--	0.36	0.39
			E. C. Levy (Dix and Trenton Yards)						

TABLE 7
FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972			
						1972	1973	1974	1977
Mb 03023-04952A	M 89 from Michigan Ave southeast to Main St in Plainwell	Rieth-Riley Construction Co.	Pit 39-1	Pit 39-1	EBOL EBIL WBOL WBIL	-- -- -- --	0.62 0.58 0.56 0.57	-- -- -- --	-- 0.35 -- 0.34
Mb 11012-03757A	I 94 BL from 600 ft northeast of C&O RR northeast to 700 ft north of Murphy Ct	John G. Yerington Construction Co.	Pit 17-66	Pit 11-75	NBOL NBIL SBOL SBIL	-- -- -- --	0.43 0.51 0.42 0.52	-- -- -- --	0.41 0.46 0.40 0.42
Mb 12022-03799A (part)	US 12 from east limits of Quincy east to the Branch-Hillsdale County Line	John G. Yerington Construction Co.	Pit 30-58	Pit 30-58	EB WB	-- --	0.46 0.51	-- --	0.58 0.57
Mb 12022-03799A (part)	US 12 from the Branch-Hillsdale County Line east to Drayton St in Jonesville	Aylington-Cunningham Asphalt Paving	Pit 30-58	Pit 30-58	EB WB	-- --	0.42 0.50	-- --	0.46 0.52
Mb 13043-04117A	I 94 BL (Michigan Ave) from east limits of Albion northeast to 0.5 mile east of Calhoun-Jackson County Line	Rieth-Riley Construction Co.	Material Service, Thornton, Ill.	Pit 13-38	EB WB	-- --	0.51 0.50	-- --	0.41 0.38
Mb 13044-03941A	I 94 BL (Michigan Ave) from Marshall St in Marshall east to old US 12	Rieth-Riley Construction Co.	Material Service, Thornton, Ill.	Pit 13-38	EB WB	-- --	0.47 0.50	-- --	0.37 0.38
Mb 13061-01718A	M 37 (Van Buren St) from Michigan Ave in Springfield southeast to Kendall St in Battle Creek	Rieth-Riley Construction Co.	Pit 39-1	Pit 13-38	WBOL WBCL WBIL	-- -- --	0.49 0.50 0.53	-- -- --	0.43 0.46 0.52
M 13131-04259A	M 96 (Dickman Rd) from Kalamazoo-Calhoun County Line east and southeast 2.46 miles	Rieth-Riley Construction Co.	Pit 39-1	Pit 8-80	EBOL EBIL WBOL WBIL	-- -- -- --	0.61 0.65 0.57 0.66	-- -- -- --	0.61 0.68 0.63 0.67
Mb 14041-03794A	US 12 from 0.39 mile southeast of M 60 southeast and east to east village limits of Edwardsburg, omitting at M 62	Rieth-Riley Construction Co.	Material Service, Thornton, Ill.	Pit 14-36 and Kuerte Inc., S. Bend, Ind.	EB WB	-- --	0.54 0.56	-- --	0.58 0.59
Mb 19031-04821A	Northbound US 27 from 580 ft north of Price Rd north to 670 ft south of Townsend Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NBOL NBIL	-- --	0.54 0.63	-- --	0.53 0.64

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
F 21024-00262A	US 2 from west of County Rd J 31 east to east of Sturgeon	Payne and Dolan of Wisconsin, Inc.	Pit 75-2	Pit 21-73	EB WB	--	0.63 0.63	--	0.39 0.38
M 23042-04618A	M 43 (Saginaw Hwy) from 1,365 ft east of Canal Rd east to 681 ft west of Creyts Rd	T. A. Forsberg, Inc.	Pit 41-38	Pit 19-33	EBOL EBIL WBOL WBIL	--	0.60 0.68 0.60 0.66	--	0.51 0.61 0.53 0.67
Ms 23042-03762A	M 43 (Saginaw Hwy) at Creyts Rd	Brown Brothers, Inc.	Pit 41-38	Pit 19-33	EBOL EBIL WBOL WBIL	--	0.51 0.60 0.54 0.54	--	0.47 0.52 0.47 0.48
Mb 25072-03797A	M 54 (Dort Hwy) from 700 ft south of Mohawk St north to 650 ft north of Mitchell St also from 60 ft south of GIW RR overpass north to 535 ft south of Court St and from 50 ft north of Davison St north to 200 ft north of Marland St	Barrett Asphalt Paving Co.	Pit 63-4	Pit 63-4	NBOL NBIL SBOL SBIL	--	0.44 0.50 0.46 0.50	--	0.44 0.49 0.45 0.46
Mb 25081-01782A (part)	M 21 from 940 ft east of Morrish Rd east to 165 ft east of Dye Rd	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-54	EB WB	--	0.59 0.58	--	0.50 0.50
Mb 25081-01782A (part)	M 71 from 650 ft west of Norton St east and south to McNeil St in Corunna (Control Section 76041)	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-54	EB WB	--	0.44 0.49	--	0.42 0.39
Mb 25091-04772A	M 15 from Oakland-Genesee County Line north to 1,600 ft north of Maple Ave, omitting from north of Hadley Rd north to south of Maple Ave	Bit Con Corp.	Pit 47-3	Pit 63-4	NB SB	--	0.52 0.51	--	0.47 0.44
Mb 33032-03800A	I 96 BL (Cedar St) from 980 ft north of Jolly Rd north to 60 ft north of Mt. Hope	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NBOL NBIL SBOL SBIL	--	0.42 0.47 0.45 0.48	--	0.39 0.41 0.40 0.41
Mb 33043-03847A (part)	Westbound M 78 from 1,000 ft northeast of Lake Lansing Rd northeast to 2,200 ft northeast of Peacock Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	WBOL WBIL	--	0.35 0.43	--	0.52 0.60

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
Mb 33043-03847A (part)	M 52 from 2,000 ft north of Noble Rd north to 2,000 ft north of Lovejoy Rd (Ingham-Shiawassee County Line) omitting Grand River Ave (Control Section 33051)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NB SB	--	0.42 0.44	--	0.53 0.50
M 36021-04636A	US 2 from 9th Ave east on Adams St to River Ave thence south on River Ave to East Genessee St, thence east and north-east on East Genessee St to East Adams St, City of Iron River (Control Sections 36021 and 36022)	Mathy Construction Co.	Pit 22-69	Pit 36-40	EB WB	--	0.55 0.52	--	0.44 0.49
Ms 38082-03003A	I 94 Bl (Washington Ave) from approximately 600 ft northwest of Main St intersection southeast to Higby St	Richardson Asphalt Corp. Paving Co.	Pits 30-35 and 47-3	Pit 30-35	EBOL EBIL WBOL WBIL	--	0.41 0.42 0.49 0.48	--	0.41 0.45 0.48 0.46
M 39032-04260A	M 96 from 0.14 mile west of Webster St in Village of Augusta east to Kalamazoo-Calhoun County Line	Rieth-Riley Construction Co.	Pit 39-1	Pit 8-80	EBOL EBIL WBOL WBIL	--	0.61 0.64 0.62 0.66	--	0.65 0.69 0.61 0.69
Mb 39102-03801A (part)	M 89 from 1,350 ft west of East Village Limits of Richland east 4.29 miles	Rieth-Riley Construction Co.	Pit 3-61	Pit 39-1	EB WB	--	0.58 0.60	--	0.48 0.51
Mb 39102-03801A (part)	M 37 from 200 ft south of T Dr N (Marvin Rd) north to 75 ft north of V Dr N (Hamilton Rd) (Control Section 13011)	Rieth-Riley Construction Co.	Pit 3-61	Pit 13-38	NB SB	--	0.59 0.65	--	0.51 0.54
Mb 44012-04789A	M 24 from 210 ft north of Daley Rd north to 100 ft north of Columbiaville Rd	Williams Bros. Asphalt Paving Co.	Pit 32-4	Pit 63-88	NB SB	--	0.51 0.51	--	0.41 0.44
Mb 49021-04336A	US 2 from Schoolcraft-Mackinac County Line east to Soo Line RR structure, 1.27 miles east of Gould City	Lake Construction Co.	Pit 75-5	Pit 70-9	EB WB	--	0.60 0.61	--	0.52 0.53
Mb 49022-04337A	US 2 from M 117 east to Naubinway	Lake Construction Co.	Pit 75-5	Pit 70-9	EB WB	--	0.58 0.57	--	0.51 0.50
Mb 50052-03804A	US 25-M 59 (Gratiot Ave) from 150 ft north of 21 Mile Rd northeast to 590 ft south of 23 Mile Rd	The Cooke Contracting Co.	Pit 63-4	Pit 50-35	NBOL NBIL SBOL SBIL	--	0.41 0.43 0.32 0.41	--	0.42 0.45 0.40 0.42

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
Mb 52043-03039A	US 41 BR in Marquette from East St east to 100 ft east of Third St	Payne and Dolan of Wisconsin, Inc.	Pit 52-9	Pit 52-9	EB WB	--	0.54 0.50	--	0.65 0.64
Mb 61023-03805A	M 46 (Apple Ave) from 700 ft east of Maple Island Rd east to 1,450 ft west of Ravenna Rd	Kalamazoo Asphalt Construction Co.	Pit 41-16	Pit 70-9	EB WB	--	0.58 0.62	--	0.60 0.59
Mb 61073-02995A (part)	US 31 BR (Colby St) from 140 ft west of Franklin St east to southeast limits of Whitehall	Muskegon Asphalt Paving Co.	Pits 41-16 and 41-38	Pit 70-9	NB SB	--	0.26 0.26	--	0.46 0.42
Mb 61073-02995A (part)	US 31 BR from southeast limits of Whitehall east to US 31	Muskegon Asphalt Paving Co.	Pits 41-16 and 41-38	Pit 70-9	NBOL NBIL SBOL SBIL	--	0.36 0.36 0.32 0.34	--	0.44 0.40 0.39 0.39
Mbr 62032-04779A	M 37 from Pierce Rd north to Newaygo-Lake County Line	Rieth-Riley Construction Co.	Pit 41-16	Pit 62-33	NB SB	--	0.60 0.61	--	0.57 0.63
Mb 63051-03806A	Northbound M 1 (Woodward Ave) from 100 ft south of Trowbridge Rd in Bloomfield Hills northwest to 300 ft south of US 10 BR (Square Lake Rd)	Ann Arbor Construction Co.	Pit 63-88	Pit 63-88	NBOL NB#3 NB#2 NBIL	--	0.54 0.52 0.52 0.53	--	0.58 0.55 0.58 0.60
Mb 70011-04782A (part)	M 40 from US 31 in Allegan County north and northeast to US 31 in Ottawa County (Control Sections 03072 and 70031)	Westshore Construction Co.	Pit 70-36	Pit 70-39	EB WB	--	0.42 0.40	--	0.49 0.53
Mb 70011-04782A (part)	US 31 BR from 28th St north to 13th St, all in Ottawa County	Westshore Construction Co.	Pit 70-36	Pit 70-39	NBOL NBIL SBOL SBIL	--	0.44 0.52 0.47 0.50	--	0.38 0.40 0.36 0.41
I 72061-00997A	I 75 from 1.2 miles west of County Rd 500 northwest to 0.1 mile north of 9 Mile Rd	The Hicks Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	--	0.69 0.68 0.72 0.70	--	0.67 0.72 0.65 0.72
Mb 73151-03960A	Northbound M 15 from M 81 northwest to Saginaw-Bay County Line	Midland Contracting Co.	Pit 75-5	Pit 63-54	NBOL NBIL	--	0.47 0.60	--	0.41 0.70
Mb 75022-04338A	US 2 from 0.54 mile southwest of M 77, east to Schoolcraft-Mackinac County Line	Lake Construction Co.	Pit 75-5	Pit 70-9	EB WB	--	0.61 0.61	--	0.49 0.48

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
Mb 77032-03812A	US 25 BR (Military St and Electric St) from Reid St northeast and east to Court St, omitting bridge over the RR	Molesworth Contracting Co.	Pit 63-4	Pit 74-51	NBOL NBIL SBOL SBIL	-- -- -- --	0.50 0.47 0.51 0.51	-- -- -- --	0.53 0.52 0.49 0.54
Mb 78042-03813A (part)	M 86 (Control Section 78061) from M 66 west to east limits of Centerville, omitting 0+00 to 7+75, 65+25 to 169+00, and 203+00 to 232+00	Rieth-Riley Construction Co. Thornton, Ill.	Material Service,	Pit 78-12	EB WB	-- --	0.64 0.63	-- --	0.60 0.60
SS 78062-01086A	M 86 (South St, Blackstone St and State St) from 681 ft west of intersection of South St and Bowman St east to east of State St-Burr Oak Rd intersection in Colon	John G. Yerington Construction Co.	Pit 12-44	Pit 12-44	EBOL EBIL WBOL WBIL	-- -- -- --	0.66 0.55 0.61 0.58	-- -- -- --	0.63 0.53 0.61 0.55
Mb 79032-03864A	M 15 from 165 ft southeast of Saginaw-Tuscola County Line southeast to West St in Vassar	Saginaw Asphalt Paving Co. and Midland Contracting Co.	Pit 32-4	Pit 25-4	NB SB	-- --	0.48 0.48	-- --	0.53 0.59
Mb 79061-03814A (part)	M 81 from Handy Rd northeast to south limits of Caro	Frank Strausburg and Son	Pit 63-4	Pit 25-8	EB WB	-- --	0.55 0.57	-- --	0.50 0.50
Mb 79061-03814A (part)	M 24 from Gun Club Rd north to Frank St in Caro (Control Section 79051)	Frank Strausburg and Son	Pit 63-4	Pit 25-8	NB SB	-- --	0.51 0.53	-- --	0.52 0.46
Mb 81011-03848A	M 52 from 90 ft south of old US 12 north to 35 ft south of Penn Central RR crossing	Thompson McCully Co. and Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	NB SB	-- --	0.40 0.38	-- --	0.36 0.33
I 81063-024 (01128A)	I 94 from 1,484 ft east of west junction of US 12 east to the Ford Lake inlet structure	Washtenaw Asphalt Paving Co.	Pit 47-3	Pit 81-78	EBOL EBCL EBIL WBOL WBCL WBIL	0.47 0.58 0.65 0.47 0.57 0.63	-- -- -- -- -- --	-- -- -- -- -- --	0.50 0.54 0.60 0.54 0.53 0.61
I 81063-01129A	I 94 from the Ford Lake inlet structure east to 1,334 ft east of Harris Rd	Washtenaw Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.47 0.49 0.53 0.48 0.50 0.57	-- -- -- -- -- --	0.51 0.54 0.60 0.57 0.55 0.65

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1972	1973	1974	1977	
U 82061-01183A	US 12 (Michigan Ave) from between Beech Daly Rd and Gullely Rd in Dearborn Heights east to US 24 (Telegraph Rd)	C. J. Rogers, Inc.	E.C. Levy (Dix Yard)	E.C. Levy (Dix Yard)	EBOL	--	0.50	--	--	0.47
					EB#3	--	0.52	--	--	0.43
					EB#2	--	0.60	--	--	0.43
					EBIL	--	0.61	--	--	0.57
					WBOL	--	0.54	--	--	0.46
					WB#3	--	0.52	--	--	0.47
Mb 82061-03987A	US 12 (Michigan Ave) from 250 ft west of Denton Rd east to Weithoff Rd in Inkster, omitting from the C&O RR overpass at the west city limits of Wayne to 4th St in Wayne	Detroit Asphalt Paving Co.	E.C. Levy (Trenton and Detroit)	E.C. Levy (Dix and Detroit)	EBOL	--	0.31	--	--	0.37
					EBIL	--	0.38	--	--	0.38
					WBOL	--	0.34	--	--	0.39
					WBIL	--	0.42	--	--	0.41
					In Wayne	--	--	--	--	--
					WBOL	--	0.42	--	--	--
Mb 82061-03988A	US 12 from Wiethoff St in Inkster east to west of Gullely Rd in Dearborn Heights	Chas. J. Rogers, Inc.	E.C. Levy (Dix Yard)	E.C. Levy (Dix Yard)	EBOL	--	0.30	--	--	0.39
					EBIL	--	0.35	--	--	0.43
					WBOL	--	0.35	--	--	0.50
					WBCL	--	0.33	--	--	0.45
					WBIL	--	0.38	--	--	0.44
					East of Wayne	--	--	--	--	--
					EBOL	--	0.36	--	0.36	0.45
					EBCL	--	0.34	--	0.34	0.45
					EBIL	--	0.38	--	0.38	0.41
					WBOL	--	0.33	--	0.33	0.42
Mb 82062-04786A	US 12 from 1,470 ft east of M 39 (Southfield Expressway) east to Chavin St omitting at Greenfield Rd	The Cooke Contracting Co.	Pit 47-3	Pit 47-3	EBOL	--	0.47	--	--	0.43
					EB#3	--	0.45	--	--	0.51
					EB#2	--	0.52	--	--	0.47
					EBIL	--	0.53	--	--	0.49
					WBOL	--	0.49	--	--	0.51
					WBCL	--	0.51	--	--	0.46
WBIL	--	0.56	--	--	0.56					

TABLE 7 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1972	1973	1974	1977
Mb 82141-03986A	M 102 (8 Mile Rd) from Garfield St east to M 39	Stolaruk Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL	--	0.27	--	0.35
					EBCL	--	0.26	--	0.37
					EBIL	--	0.31	--	0.38
					WBOL	--	0.18	--	0.38
					WBCL	--	0.26	--	0.37
					WBIL	--	0.31	--	0.34
U 82142-009 (01308A)	M 102 from east side John Lodge interchange east to west limits of Ferndale	Stolaruk Asphalt Paving Co.	Pits 47-3 and 63-48	Pits 47-3 and 63-48	EBOL	0.48	--	--	0.46
					EB#3	0.49	--	--	0.45
					EB#2	0.49	--	--	0.43
					EBIL	0.51	--	--	0.45
					WBOL	0.48	--	--	0.45
					WB#3	0.51	--	--	0.44
					WB#2	0.49	--	--	0.45
					WBIL	0.48	--	--	0.51
Mb 82211-01807A	M 85 (Fort St) from Sibley Rd in River-view north and northeast to I 75-US 25 (Fisher Freeway)	Detroit Asphalt Paving Co.	Pit 47-3	Pit 47-3	NBOL	--	0.37	--	0.45
					NBIL	--	0.44	--	0.46
					SBOL	--	0.35	--	0.43
					SBIL	--	0.43	--	0.42
T 98003-04172A	I 96 BL (Cedar St) from 660 ft south of Miller Rd north to 515 ft south of Jolly Rd (Control Section 33032)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NBOL	--	0.43	--	0.44
					NBIL	--	0.46	--	0.45
					SBOL	--	0.42	--	0.44
					SBIL	--	0.47	--	0.47
T 98003-04173A	M 43 (Saginaw St) from Theo St east to west of Waverly Rd (Control Section 23042)	Rieth-Riley Construction Co.	Pit 41-38	Pit 19-33	EBOL	--	0.53	--	0.46
					EBIL	--	0.53	--	0.48
					WBOL	--	0.53	--	0.44
					WBIL	--	0.54	--	0.47
T 98003-04174A	M 43 (Saginaw St) from east of Waverly Rd (Eaton-Ingham County Line) east to Catherine St (Control Section 33061)	Rieth-Riley Construction Co.	Pit 41-38	Pit 19-33	EBOL	--	--	--	0.48
					EBIL	--	--	--	0.48
					WBOL	--	--	--	0.45
					WBIL	--	--	--	0.46
Mm 2 BA-7A	M 89 east from M 40 in Allegan (Control Section 03023)	Rieth-Riley Construction Co.	Pit 3-61	Pit 3-44	EBOL	0.47	--	--	0.41
					EBIL	0.42	--	--	0.37
					WBOL	0.46	--	--	0.36
					WBIL	0.42	--	--	0.34

TABLE 8
FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources Coarse	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1972	1973	1977
Mb 02021-03839A	M 94 from US 41 east to Chatham	Payne and Dolan of Wisconsin, Inc.	Pit 2-1	EB WB	0.56 0.63	-- --	0.73 0.70
Mb 03021-03792A	M 89 from west limits of Fennville east to M 40	West Shore Construction Co.	Pit 70-24	EB WB	-- --	0.49 0.50	0.61 0.60
Mb 03071-03793A	M 40 from Van Buren-Allegan County Line north to M 89	Rieth-Riley Construction Co.	Pit 80-42	NB SB	0.38 0.40	-- --	0.54 0.53
Mb 05072-03828A (part)	US 131 from north junction M 32 north approximately 2 miles	Peninsula Asphalt Co.	Pit 5-47	NB SBTL SBIL	-- -- --	0.59 0.57 0.64	0.35 0.36 0.34
Mb 05072-03828A (part)	M 75 from north junction US 131 south 1.3 miles in Charlevoix County (Control Section 15071)	Peninsula Asphalt Co.	Pit 5-47	NB SB	-- --	0.46 0.45	0.30 0.28
Mb 07023-04331A	US 41-M 28 from Marquette-Baraga County Line west intermittently 8.483 miles	Fox Valley Construction Co.	Pit 52-1	EB WB	0.52 0.52	-- --	0.53 0.41
Mb 10032-03829A (part)	US 31 from Platte River west and south intermittently to Benzonia	Peninsula Asphalt Co.	Pit 45-19	NB SB	0.38 0.38	-- --	0.40 0.35
Mb 10032-03829A (part)	US 31 north from Betsie River to Benzonia	Peninsula Asphalt Co.	Pit 45-19	NBOL NBIL SB	0.41 0.45 0.41	-- -- --	0.38 0.50 0.33
Mb 10032-04771A	US 31 from 0.5 mile west of Pioneer Rd east to Benzie-Grand Traverse County Line	Peninsula Asphalt Co.	Pit 45-19	EB WB	-- --	0.54 0.55	0.40 0.43
F 16032-00205A	M 27 from 143 ft northeast of Penn Central RR northeast to 440 ft north of M 33	Lake Construction Co.	Pit 16-69	NB SB	-- --	0.62 0.62	0.58 0.50
Mb 23071-03796A	M 100 from US 27 and M 78 north to 465 ft south of M 43, omitting at GTW RR crossing in Pottersville	Rieth-Riley Construction Co.	Pit 33-99	NB SB	-- --	0.48 0.48	0.51 0.48

TABLE 8 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1972	1973	1977
Mb 30011-02755A	M 49 from Ohio-Michigan Line north to US 12	Ayling-Cunningham Asphalt Paving	Pit 30-48	NB SB	-- --	0.57 0.54	0.57 0.66
Mb 30071-03802A (part)	M 34 from 310 ft east of US 127 east to 55 ft east of Maplegrove St (Control Section 46041)	Ayling-Cunningham Asphalt Paving	Pit 30-58	EB WB	-- --	0.39 0.37	0.60 0.59
Mb 30071-03802A (part)	US 127 from 565 ft north of Cincinnati RR north to 3,735 ft north of M 34	Ayling-Cunningham Asphalt Paving	Pit 30-58	NB SB	-- --	0.35 0.38	0.48 0.45
Mb 31021-04332A	M 28 from Ontonagon-Houghton County Line east 3.290 miles	Fox Valley Construction Co.	Pit 52-1	EB WB	0.60 0.58	-- --	0.65 0.61
Mb 33091-04775A (part)	M 52 from M 106 north to south junction of M 36	Ann Arbor Construction Co. and Howell Construction Co.	Pits 81-77 and 47-26	NB SB	-- --	0.56 0.58	0.56 0.54
Mb 33091-04775A (part)	M 36 from M 52 east and south to M 106 (Control Section 33021)	Ann Arbor Construction Co. and Howell Construction Co.	Pits 81-77 and 47-26	EB WB	-- --	0.61 0.67	0.65 0.65
RF 36052-01459A	US 141 relocation from US 2 north to near Gilbert Lake	Mathy Construction Co.	Pit 36-53	NB NBTL SB	0.55 -- 0.56	-- -- --	0.66 0.55 0.64
F 36052-01460A	US 141 relocation from near Gilbert Lake north to north of Amasa Village	Mathy Construction Co.	Pit 36-53	NB SB	0.49 0.46	-- --	0.64 0.62
Mb 39103-04770A (part)	M 43 from north limits of Richland north to Bush St in Denton (Control Section 08011)	Rieth-Riley Construction Co.	Pit 39-1	NB SB	-- --	0.60 0.53	0.54 0.50
Mb 39103-04770A (part)	M 89 from 27th St east 2.84 miles to M 43	Rieth-Riley Construction Co.	Pit 39-1	EB WB	-- --	0.58 0.63	0.61 0.59
Mb 43012-03827A	M 37 from US 10 in Baldwin north to B01 of 43012	Rieth-Riley Construction Co.	Pit 62-49	NB SB	-- --	0.50 0.55	0.53 0.51

TABLE 8 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources Coarse	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1972	1973	1977
Mb 47041-03803A	M 36 from M 106 in Gregory east to Pinckney	Howell Construction Co.	Pit 47-26	EB WB	-- --	0.57 0.49	0.57 0.60
Mb 52011-04333A	M 95 from approximately 1.0 mile north of Republic north to M 28-US 41	Fox Valley Construction Co.	Pit 52-1	NB SB	0.50 0.51	-- --	0.44 0.43
Mb 52043-03039A (part)	US 41 from Alger-Marquette County Line northwest to County Rd 496	Payne and Dolan of Wisconsin, Inc.	Pit 2-1	NB SB	-- --	0.68 0.66	0.64 0.65
Mb 62012-04778A	M 20 from 11.4 miles southwest of Newaygo-Mecosta County Line north and east to 3.5 miles east of County Line	Rteth-Riley Construction Co.	Pit 62-3	EB WB	-- --	0.60 0.62	0.66 0.72
Mb 65032-04781A (part)	M 76 from I 75 BL northwest and west to Second St in West Branch	Central Paving Co.	Pit 65-7	EBOL EBIL WBOL WBIL	-- -- -- --	0.51 0.50 0.51 0.48	0.46 0.44 0.46 0.48
Mb 65032-04781A (part)	M 33 from 300 ft south of the west branch of the Rifle River north to M 55 (Control Section 65051)	Central Paving Co.	Pit 65-7	NB SB	-- --	0.57 0.54	0.65 0.60
F 66023-00955A	M 28 from 926 ft east of US 45 in Bruce Crossing east and south to approximately 1 mile west of Trout Creek	Fox Valley Construction Co. and George Hocking Construction Co.	Pit 66-33	EB WB	-- --	0.59 0.60	0.65 0.61
Mb 71051-03808A (part)	M 65 from 475 ft south of State St, in Posen, north to US 23	Lake Construction Co.	Pit 71-40	NB SB	-- --	0.64 0.65	0.61 0.66
Mb 71051-03808A (part)	US 23 from 1,820 ft north of Mail Trail Creek north and west to 75 ft west of M 65, omitting from 1,000 ft south of Presque Isle Rd southeast 6.23 miles (Control Section 71071)	Lake Construction Co.	Pit 71-40	NB SB	-- --	0.65 0.67	0.65 0.65

TABLE 8 (Cont.)
 FIVE-YEAR REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1972	1973	1977
Mb 71051-03808A (part)	US 23 BR from US 23 north to Clair Ave in Rogers City (Control Section 71091)	Lake Construction Co.	Pit 71-40	NB SB	-- --	0.61 0.58	0.56 0.65
Mb 74071-03961A	US 25 (Lakeshore Dr) from Galbraith Line Rd north and northwest to Wall St	Molesworth Contracting Co.	Pit 77-15	NB SB	-- --	0.42 0.47	0.54 0.47
Mb 77012-03962A	M 19 from 920 ft north of Mill Creek in Brockway north and west to 1,180 ft north of C&O RR crossing in Yale	Molesworth Contracting Co.	Pit 77-15	NB SB	-- --	0.50 0.52	0.54 0.45
Mb 79011-03963A	M 138 from 320 ft south of Oakley Rd north and east to Unionville Rd	Midland Contracting Co.	Pit 79-42	EB WB	-- --	0.55 0.55	0.60 0.65
Mb 80041-03816A	M 43 from 210 ft northwest of 73rd St southeast to 740 ft southeast of 69th St	Klett Construction Co.	Pit 80-26	EB WB	-- --	0.48 0.50	0.54 0.51
Ms 83012-04995A	M 37-M 115 east and west of Mesick	Laman Asphalt Paving Co.	Pit 43-47	<u>East Limits of Mesick</u>			
				EB WB	-- --	0.47 0.48	0.37 0.44
				<u>West Limits of Mesick</u>			
				EBOL EBIL WBOL WBIL	-- -- -- --	0.39 0.39 0.44 0.34	0.43 0.41 0.46 0.41
Mb 83053-04788A	M 115 from 250 ft northwest of west junction of M 37 northwest to the Wexford-Manistee County Line	Laman Asphalt Paving Co.	Pit 43-47	EB WB	-- --	0.56 0.50	0.54 0.55

TABLE 9
FIVE-YEAR REVIEW FOR MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1972

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Average Coefficient of Wet Sliding Friction		
					1973	1974	1977
<u>Single Seal</u>							
Mm 2SC-5B	M 37 from approximately 1.00 ft south of 108th St north 4.87 miles to approximately 267 ft south of Kraft Rd (Control Section 41031)	Rieth-Riley Construction Co.	Pit 41-22	South of Kraft Rd			
				NB	0.42	--	0.38
				SB	0.35	--	0.45
				<u>North of Caledonia</u>			
				NB	0.43	--	0.42
				SB	0.45	--	0.44
Mm 2SC-6C	M 19 from M 46 north to the Sanilac-Huron County Line (Control Section 74032)	C. R. Hunt Construction Co.	Pit 63-4	NB	0.66	--	0.68
				SB	0.65	--	0.66
Mm 2SC-6D	M 90 from M 24 east to Lapeer-Sanilac County Line, omitting from 1,550 ft west of Jefferson St in North Branch east and south to south junction of M 90 and M 53 (Control Section 44061)	C. R. Hunt Construction Co.	Pit 63-4	EB	--	0.76	0.58
				WB	--	0.73	0.60

CONCRETE

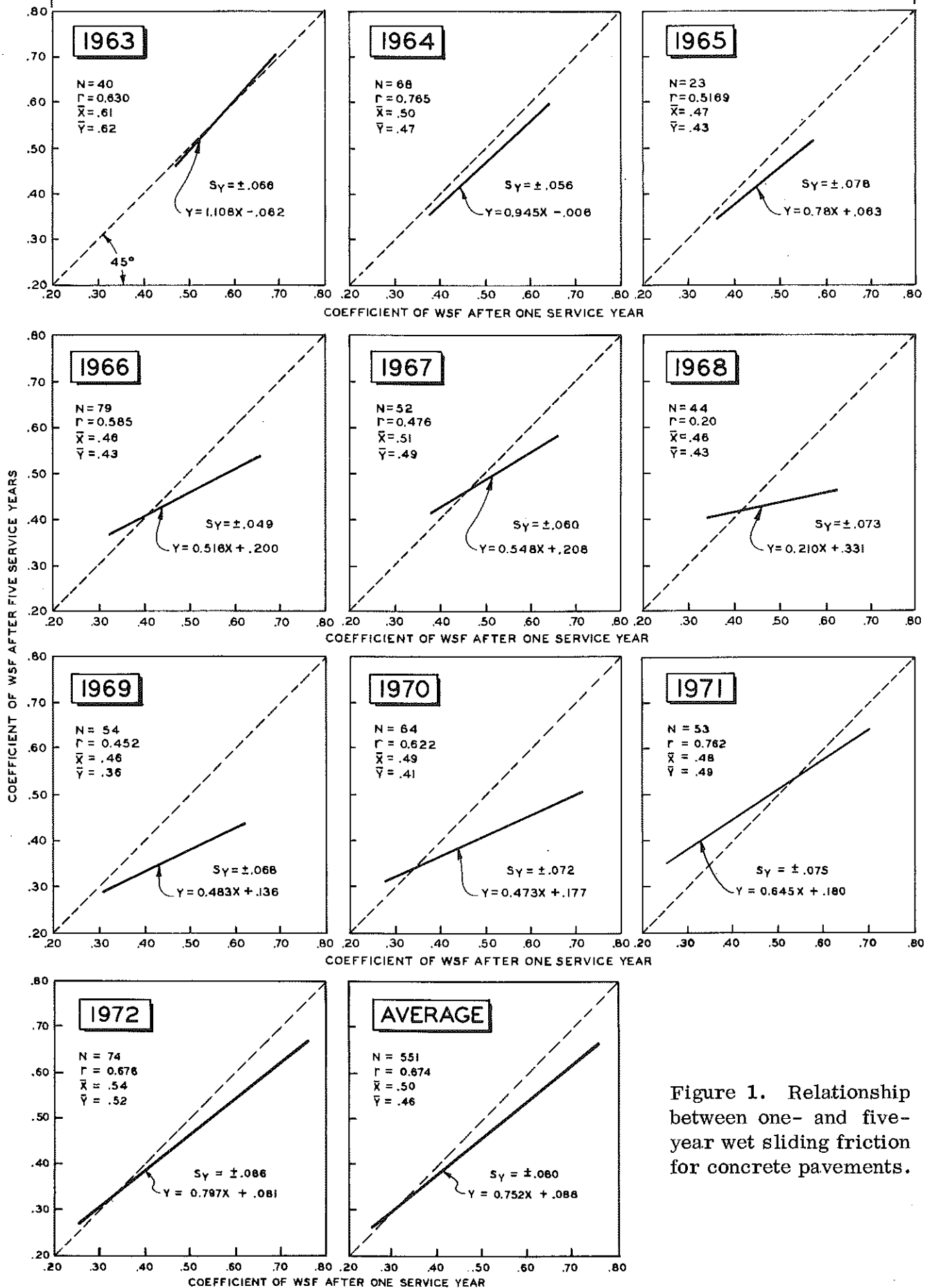


Figure 1. Relationship between one- and five-year wet sliding friction for concrete pavements.

BITUMINOUS CONCRETE

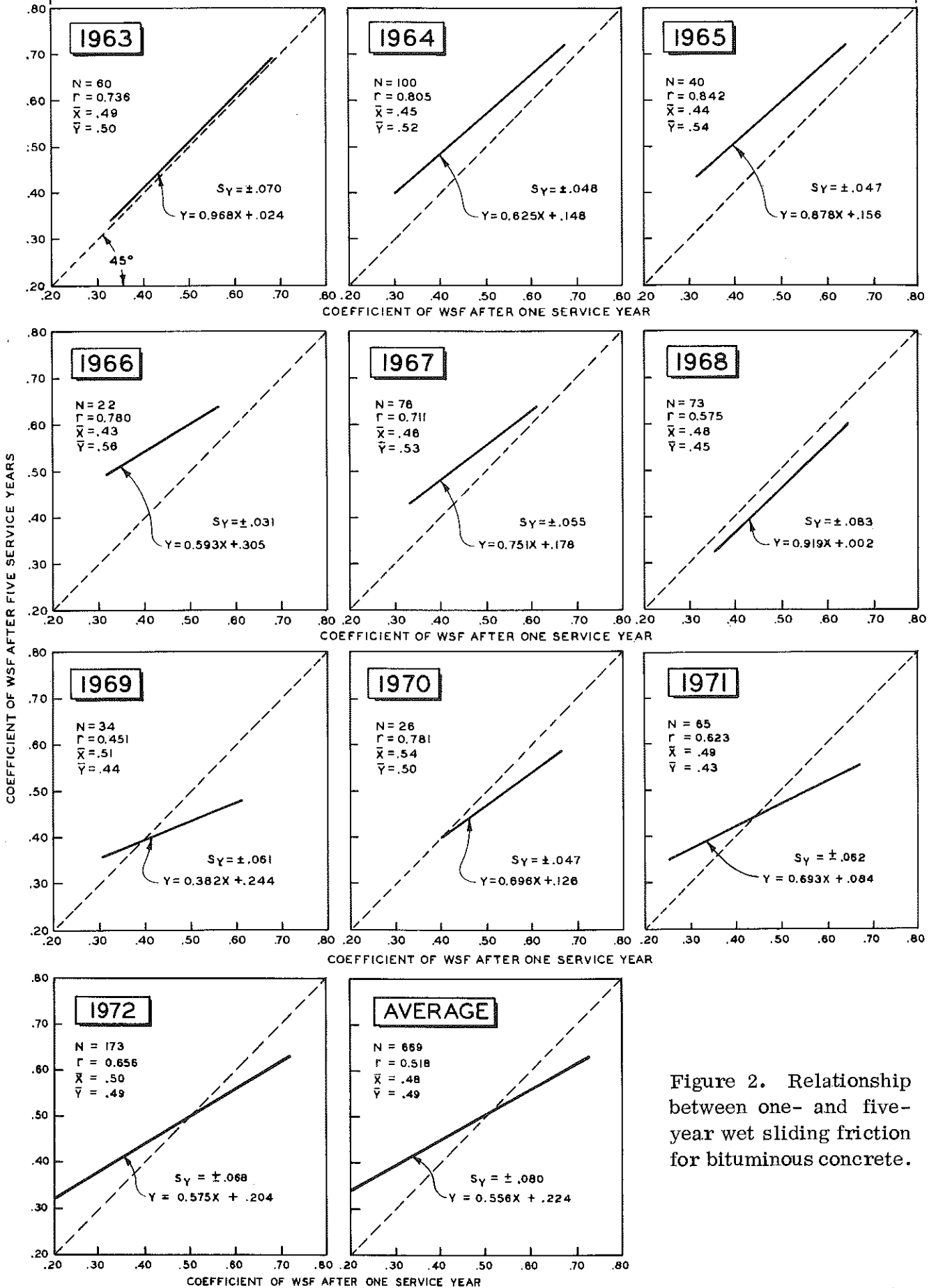


Figure 2. Relationship between one- and five-year wet sliding friction for bituminous concrete.

BITUMINOUS AGGREGATE

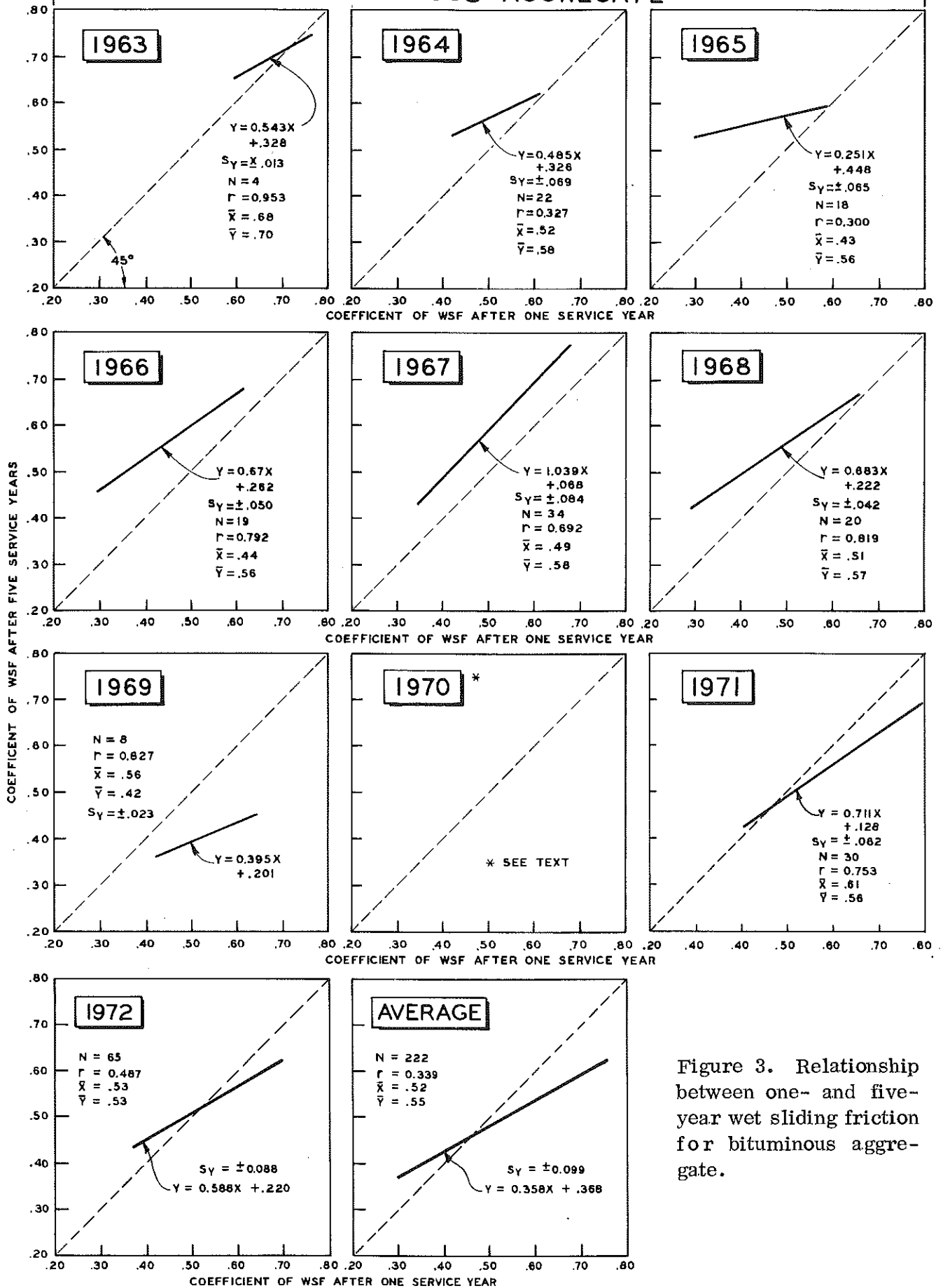


Figure 3. Relationship between one- and five-year wet sliding friction for bituminous aggregate.

SECTION III

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

Ten-Year Pavement Friction Test Results for Concrete and Bituminous Pavements

A historical review of coefficients after 10 years of service has been made on 77 projects. During 1977, 776.294 lane miles of concrete and bituminous pavement had wet sliding friction tests conducted at the 10-year service level and results are contained in Tables 10 through 13.

Table 10 - Ten-Year Wsf Review for Concrete Pavements Constructed in
1967

Ninety lanes (282.3 lane miles) of concrete pavements had pavement friction tests conducted in 1977 after a 10-year service period. Average Wsf values ranged from 0.36 to 0.73 and averaged 0.57. Less than 1 percent of the total lane mileage tested at the 10-year service level (three lanes) produced friction levels averaging lower than 0.40. The westbound outside lane of Project 82062-011 yielded the lowest average (0.36). This project is located on US 12 between Brady St and the Rouge River in Dearborn. On the other end of this 10-year friction level scale were three lanes which averaged above 0.70. These three lanes account for 3.3 percent of the total lane mileage. Two of the three lanes were the inside lanes of Project 06041-001 located on the 1.9 mile US 23 connector south of Standish.

Table 11 - Ten-Year Wsf Review for Bituminous Concrete Pavements
(MDOT Specification 4.12) Constructed in 1967

The 82 lanes, 170.786 lane miles of bituminous concrete pavement, tested after a 10-year service period yielded friction levels ranging from 0.33 to 0.62 and averaging 0.48. This surface type had the lowest weighted average friction level of the four surface types tested at the 10-year service level. Thirteen of the 82 lanes tested, 6.2 percent of the total lane mileage, had coefficients averaging lower than 0.40. Both northbound and southbound lanes of Project 77031-004, US 25 BR at Marysville, were in this category. The highest 10-year average friction level obtained was 0.62. Two lanes had this value, the southbound outside lane of M 116 on Project 53011-006 in Ludington and the southbound lane of M 90, Project 74022-008, between Crosswell and Lexington in Sanilac County. The three lanes above 0.60 accounted for 3.2 percent of the total lane mileage.

Table 12 - Ten-Year Wsf Review for Bituminous Aggregate Pavements
(MDOT Specification 4.11) Constructed in 1967

An average Wsf value of 0.57 was determined from tests made on 28 bituminous aggregate pavement projects, after 10 years of service. The coefficient range was 0.32 to 0.75. Thirteen lanes (11.4 percent of the lane mileage) yielded average friction levels lower than 0.40. Average Wsf values as low as 0.32 were determined on the M 123 Projects 17012-005

and 17012-004, and also on a M 201 Project 45091-004. Although coefficients on only three lanes averaged, equal to or above 0.70, they accounted for 12.9 percent of the lane mileage. Both lanes of Project 11012-002, located on M 22 south of the Benzie-Leelanau County line were higher than 0.70.

Table 13 - Ten-Year Wsf Review for Miscellaneous Bituminous Pavements
Constructed in 1967

Five stone-filled sand asphalt projects (40.598 lane miles) were re-tested during 1977 after 10 years of service. Not one of the 12 lanes tested yielded a friction level below 0.40. Highest value of the 0.42 to 0.66 coefficient range encountered was on the M 142 Project 32021-004, located between M 25 and Pigeon in Huron County. Average Wsf values of 0.61 and 0.66 were determined on this project.

Ten-year friction level histories of the projects which have had Wsf measurements conducted at the one, five, and again at the ten-year service level are compared in Figure 4 for construction years 1963 through 1967.

TABLE 10
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
F 06041-001	US 23 connector from Melita Rd east to existing US 23	L. W. Edison Co. (westbound) Hodgkiss and Douma, Inc. (eastbound)	Pit 65-7	Pit 65-7	EBOL EBIL WBOL WBIL	--	0.45 0.51 0.37 0.49	0.42 0.55 0.41 0.56	0.62 0.78 0.55 0.73
I 06111-001	I 75 from Knickerbocker Rd north to north of M 61	L. W. Edison Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	--	0.48 0.53 0.46 0.54	0.50 0.52 0.47 0.44	0.59 0.72 0.59 0.69
I 09035B, C8	I 75 from Union Rd north to north of Beaver Rd	Kutchins Co., Inc.	Pits 71-15 and 63-4	Pit 71-15	NBOL NBIL SBOL SBIL	--	0.49 0.52 0.48 0.58	0.41 0.50 0.38 0.45	0.48 0.59 0.51 0.55
I 09035D, C9	I 75 from Beaver Rd north to Anderson Rd	Sargent Contracting Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	--	0.46 0.51 0.48 0.52	0.47 0.48 0.49 0.50	0.55 0.65 0.55 0.66
I 09035E, C10	I 75 from Anderson Rd north to Neuman Rd	Sargent Contracting Co.	Pits 65-7 and 71-47	Pit 65-7	NBOL NBIL SBOL SBIL	--	0.44 0.49 0.46 0.50	0.47 0.49 0.46 0.47	0.57 0.61 0.57 0.62
I 09035F, C14	I 75 from Newnan Rd north to Bay-Arenac County Line	Sargent Contracting Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	--	0.52 0.56 0.46 0.52	0.47 0.50 0.49 0.46	0.54 0.59 0.54 0.63
F 12031A, C8	I 69 BL (Fenn Rd) from 1,890 ft east of existing US 27 west on Fenn Rd to US 27, thence north on US 27 2, 675 ft	L. W. Edison Co.	Pits 12-31, 12-44 and 30-35	Pits 12-43 and 12-44	EB WB	0.58 0.57	-- --	0.34 0.35	0.44 0.40
I 12033D, C5	I 69 from 2,882 ft north of Fenn Rd north to 1,540 ft north of US 12	L. W. Edison Co.	Pits 12-31, 12-43 and 30-35	Pits 12-43 and 12-44	NBOL NBIL SBOL SBIL	0.59 0.58 0.60 0.59	-- -- -- --	0.52 0.64 0.47 0.54	0.53 0.64 0.51 0.61

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
I 12033B, C7	I 69 from 160 ft south of Lake Warren Rd north to 2,882 ft north of Fenn Rd	L. W. Edison Co.	Pits 12-31, 12-43, and 12-44	Pits 12-43 and 12-44	NBOL	0.59	--	0.50	0.51
			12-44 and 30-35		NBIL	0.58	--	0.69	0.66
					SBOL	0.60	--	0.48	0.51
					SBIL	0.56	--	0.69	0.63
I 12033A, C10	I 69 from Michigan-Indiana State Line north to north of Copeland Rd	L. A. Davidson Co.	Pits 12-31, 12-43 and 12-44	Pit 12-43 and State Line	NBOL	0.56	--	0.42	0.50
			12-44	Sand and Gravel	NBIL	0.64	--	0.66	0.69
					SBOL	0.54	--	0.46	0.53
					SBIL	0.61	--	0.68	0.67
I 12034B, C1	I 69 from 1,047 ft north of Newton Rd north to Wagner Rd	Rieth-Riley Construction Co.	Pit 12-43	Pit 12-43	NBOL	0.61	--	0.49	0.50
					NBIL	0.56	--	0.61	0.63
					SBOL	0.57	--	0.50	0.50
					SBIL	0.60	--	0.63	0.63
I 12034A, C4	I 69 from 1,540 ft north of US 12 north to 1,047 ft north of Newton Rd	A Lindberg and Sons, Inc.	Pit 30-35	Pit 12-44	NBOL	0.60	--	0.47	0.53
					NBIL	0.56	--	0.56	0.61
					SBOL	0.60	--	0.45	0.59
					SBIL	0.63	--	0.70	0.68
I 13073-001	I 69 from south of Kalamazoo River north to I 94	Carl Goodwin and Sons, Inc.	Pits 12-43 and 8-80	Pits 12-43 and 8-80	NBOL	--	0.52	0.40	0.51
					NBIL	--	0.57	0.72	0.69
					SBOL	--	0.53	0.48	0.47
					SBIL	--	0.53	0.61	0.60
I 13073A, C6	I 69 from Branch-Calhoun County Line north to north of M 60 near the Village of Tekonsha	Carl Goodwin and Sons, Inc.	Pit 12-43	Pit 12-43	NBOL	0.57	--	0.44	0.46
					NBIL	0.60	--	0.70	0.66
					SBOL	0.64	--	0.53	0.49
					SBIL	0.67	--	0.62	0.58
I 13073-007	I 69 from north of M 60 north to "J" Dr	L. A. Davidson Co.	Pits 12-31, 12-44, 30-35 and 8-80	Pit 12-44	NBOL	--	0.51	0.48	0.52
					NBIL	--	0.56	0.61	0.61
					SBOL	--	0.51	0.47	0.52
					SBIL	--	0.50	0.65	0.66
U 25042-005	M 78 relocation from Miller Rd east to Bristol Rd	Chas. J. Rogers Construction Co. and Kutchins Co., Inc.	Pit 63-54	Pit 63-54	EBOL	--	0.51	0.45	0.48
					EBIL	--	0.55	0.56	0.55
					WBOL	--	0.52	0.48	0.49
					WBIL	--	0.56	0.45	0.61

TABLE 10 (Cont.)
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1972	1977	
U 63043A, C1	M 59 relocation from Pontiac Loop east to GTW RR	The Cooke Contracting Co.	Pit 63-4	Pit 63-4	EBOL	0.44	--	0.36	0.41
					EB#3	0.48	--	0.36	0.41
					EB#2	0.48	--	0.36	0.40
					EBIL	0.52	--	0.35	0.45
					WBOL	0.49	--	0.32	0.41
F 79032-001	M 15 from West St east to Huron and Goodrich Sts	T. A. Forsberg, Inc. and W. F. McNally Co.	Pit 75-5	Pit 79-73	WB#3	0.41	--	0.32	0.45
					WB#2	0.48	--	0.42	0.42
					WBIL	0.52	--	0.44	0.48
					NBOL	--	0.39	0.43	0.46
U 82062-011	US 12 from Brady St east to Rouge River	Kutchins Co., Inc.	E. C. Levy (Trenton and Dix Yards)	Pit 47-15	NBIL	--	0.42	0.35	0.38
					SBOL	--	0.50	0.54	0.56
					SBIL	--	0.38	0.36	0.41
					EBOL	--	0.50	0.44	0.42
					EB#3	--	0.48	0.45	0.43
BI 82194J, C28 BI 82194K, C29	I 75 from Junction Ave area east to east of West Grand Blvd	Kutchins Co., Inc.	E. C. Levy (Dix Yard)	Pits 63-7 and 63-55	EB#2	--	0.51	0.51	0.45
					EBIL	--	0.47	0.54	0.48
					WBOL	--	--	0.47	0.36
					WB#3	--	--	0.46	0.41
					WB#2	--	--	0.50	0.45
					WBIL	--	--	0.47	0.49
					EBOL	--	0.47	0.46	0.41

TABLE 11
TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
Mb 09031-008	M 13 from McGraw Ave north to Lafayette Ave	Midland Contracting Co.	Pit 79-21	Pit 79-73	NBOL NBIL SBOL SBIL	-- -- -- --	0.48 0.43 0.51 0.45	-- 0.48 -- 0.50	-- 0.44 -- 0.42
Ms 13032-010	M 66 from 3.5 miles north of Battle Creek and 0.11 mile south and west of Huntington Rd northeast to the Wanodoger Creek Bridge	Rieth-Riley Construction Co.	Pit 39-1	Pit 13-38	NB SB	0.43 0.42	-- --	0.69 0.68	0.52 0.51
Mb 25081-007	M 21 from Meida St east to Court St	Spartan Asphalt Paving Co.	Pit 47-3	Pit 63-91	EBOL EBIL WBOL WBIL	-- -- -- --	0.41 0.44 0.46 0.43	0.45 0.50 0.53 0.49	0.40 0.42 0.42 0.44
SS 25101C, C7	M 57 from east limits of Montrose east to I 75	Ann Arbor Construction Co.	Pit 47-3	Pit 65-54	EB WB	0.41 0.39	-- --	0.65 0.61	0.57 0.53
Mb 29031-005 (part)	US 27 BR (Superior St) from east city limits of Alma west to Prospect St	Lake and Howell Construction Co.	Pit 37-26	Pit 37-26	EBOL EBIL WBOL WBIL	-- -- -- --	-- -- -- --	0.42 0.41 0.45 0.48	0.42 0.47 0.51 0.43
Mb 29031-005 (part)	US 27 BR (Wright Ave) from 500 ft north of Superior St north to West End St in Alma	Lake and Howell Construction Co.	Pit 37-26	Pit 37-26	NB SB	-- --	-- --	0.48 0.48	0.41 0.44
Mb 38051-008	M 106 from north limits of Jackson north 2.2 miles	Workman-Richardson Asphalt Co.	Pit 38-46	Pit 38-56	NB SB	-- --	-- --	0.46 0.43	0.44 0.36
Mb 39042-014	I 94 BL-M 43 (Michigan Ave) from Rose St east and northeast to Kings Hwy, Kalamazoo	Globe Construction Co.	Pit 39-1	Pit 39-4	EBOL EB#3 EB#2 EBIL	0.38 0.39 0.40 0.40	-- -- -- --	0.46 0.44 0.44 0.52	0.40 0.34 0.35 0.39
Mb 46061-010 (part)	US 223 from west of Onsted Rd east to west of Wolf Creek Rd	Ayling-Cunningham Asphalt Paving Co.	Pit 47-3 and Maumee Stone Co., Maumee, OH	Pit 81-57	EB WB	-- --	0.57 0.55	0.59 0.58	0.54 0.54
Mb 46061-010 (part)	US 12 from M 50 east to east of M 124 (Control Section 46101)	Ayling-Cunningham Asphalt Paving Co.	Pit 47-3 and Maumee Stone Co., Maumee, OH	Pit 81-57	EB WB	-- --	0.48 0.52	0.57 0.62	0.56 0.57

TABLE 11 (Cont.)
TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
Mb 53011-006	M 116 from US 10 north to Bryant Ave	Laman Asphalt and Paving Co.	Pit 67-2	Pit 67-2	NBOL NBIL SBOL SBIL	-- -- -- --	0.50 0.53 0.55 0.54	0.52 0.54 0.58 0.59	0.48 0.49 0.62 0.55
Mb 53021-001	US 10 from Emily St east to 700 ft east of Meyers Rd (Control Sections 53021 and 53022)	Laman Asphalt and Paving Co.	Pit 67-2	Pit 67-2	EBOL EBIL WBOL WBIL	-- -- -- --	-- -- -- --	0.56 0.57 0.50 0.50	0.44 0.41 0.35 0.43
Ms 54011-004 (part)	US 131 from Big Rapids north 0.9 mile	Rieth-Riley Construction Co.	Pit 54-42	Pit 54-42	NB SB	0.35 0.36	0.56 0.51	0.58 0.58	-- --
Ms 54011-004 (part)	US 131 at Filmore Rd	Rieth-Riley Construction Co.	Pit 54-42	Pit 54-42	NB SB	0.42 0.41	0.57 0.58	0.64 0.61	0.53 0.43
Ms 54011-004 (part)	US 131 at Four Mile Rd	Rieth-Riley Construction Co.	Pit 54-42	Pit 54-42	NB SB	0.41 0.44	0.59 0.57	0.57 0.59	0.44 0.49
F 55012-009	US 41 from south limits to north limits of Stephenson	George Hocking Construction Co.	Pit 52-39	Pit 55-4	NB SB	-- --	0.49 0.46	0.61 0.62	0.48 0.50
F 61023A, C4	M 46 from Sheridan Dr east to Brooks Rd	Rieth-Riley Construction Co.	Pit 75-5 and US Steel, Gary, IN	Pit 70-9	EBOL EBIL WBOL WBIL	0.31 0.45 0.38 0.42	0.33 0.39 0.33 0.36	0.42 0.56 0.46 0.58	0.43 0.54 0.50 0.54
U 61023A, C6	M 46 (Apple St) from Shonot St east to Sheridan Dr	Rieth-Riley Construction Co.	Pit 75-5	Pit 70-9	EBOL EBIL WBOL WBIL	0.33 0.37 0.33 0.36	0.35 0.41 0.38 0.42	0.39 0.47 0.44 0.48	0.36 0.44 0.39 0.54
Ms 61076-001	M 20 from Muskegon River north to south of M 213	Rieth-Riley Construction Co.	Pit 70-9	Pit 70-9	NBOL NBIL SBOL SBIL	0.38 0.43 0.38 0.41	0.54 0.51 0.51 0.51	0.55 0.63 0.55 0.59	0.48 0.60 0.50 0.53
Ms 63041-012	US 10 from Voorhies Rd north to Watkins Lake Rd	Lind Asphalt Paving Co.	Pit 63-4	Pit 63-4	NBOL NBCL NBUL SBOL SBCIL SBIL	-- -- -- -- -- --	0.43 0.35 0.45 0.36 0.34 0.39	0.42 0.49 0.48 0.37 0.41 0.48	0.44 0.41 0.44 0.43 0.37 0.44

TABLE 11 (Cont.)
TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE (4.12) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
SS 74022-008	M 90 from Wildcat Rd east to US 25	Blue Water Asphalt Co., Inc.	Pit 63-4	Pit 74-51	EB WB	-- --	0.61 0.53	0.64 0.67	0.62 0.58
Mb 77031-004	US 25 BR from west limits of Marysville northeast to 360 ft southeast of M 29	Blue Water Asphalt Co., Inc.	Pit 17-40	Pit 74-4	NB SB	0.48 0.50	0.40 0.41	0.38 0.43	0.33 0.37
F 79032-001	M 15 from west of West St east to south of Huron and Goodrich Sts	Saginaw Asphalt Paving Co.	Pit 79-21	Pit 79-73	NBOL* NBIL SBOL* SBIL	-- -- -- --	-- 0.34 -- 0.36	-- 0.47 -- 0.48	0.46 0.38 0.56 0.41
M 79042A, C5	M 46 from west limits of Kingston east to east limits	Rieth-Riley Construction Co.	Pit 79-21	Pit 79-21	EBIL WBIL	-- --	0.43 0.39	0.47 0.52	0.41 0.49
Mb 81031-005	US 12 from Neblo Rd northeast to Johnson St	Ann Arbor Construction Co.	Pit 47-3	Pit 81-57	EB WB	-- --	0.50 0.52	0.47 0.52	0.53 0.48
I 82022A, C29	I 94 from east of Ozga Rd east to Beech-Daly Rd	Thompson-McCully Asphalt Paving Co.	Pit 47-3	Pit 81-82	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.36 0.44 0.52 0.34 0.44 0.53	0.45 0.50 0.61 0.44 0.51 0.58	0.42 0.46 0.50 0.42 0.43 0.50
U 82062-011	US 12 from Brady St east to Rouge River	Detroit Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.45 0.46 0.53 0.46 0.41 0.47	0.49 0.54 0.59 0.59 0.56 0.54	0.41 0.39 0.48 0.45 0.39 0.42

* Formerly used as parking lane but have been converted to traffic bearing lanes since 1972.

TABLE 12
TEN-YEAR WSF REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources Coarse	Direction and Lane	Average Coefficient of Wet Sliding Friction			
					1967	1968	1972	1977
F 02041D, C4 F 52061C, C2	M 28 from US 41 southeast to 900 ft east of Laughing Whitefish River	Payne and Dolan of Wisconsin, Inc.	Pit 52-7	EB WB	0.46 0.47	0.58 0.61	0.73 0.72	0.69 0.69
Mb 05012-004	US 31 from 2.08 miles south of the Charlevoix-Antrim County Line north 0.37 mile	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.28 0.29	--	0.54 0.52	0.45 0.39
F 05012-005 (part)	US 31 from 1.71 miles south of the Charlevoix-Antrim County Line north to the County Line	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.33 0.28	--	0.49 0.47	0.53 0.45
F 05012-005 (part)	US 31 from the Charlevoix-Antrim County Line north 1.41 miles (Control Section 15011)	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	--	--	--	0.51 0.45
Mb 10012-002	M 22 from 400 ft north of North Shore Rd north to Benzie-Leelanau County Line	Rieth-Riley Construction Co.	Pit 10-21	NB SB	0.40 0.40	--	0.59 0.60	0.72 0.75
F 15011-003	US 31 from 706 ft southwest of State St northeast to Carpenter St, City of Charlevoix	Hodgkiss and Douma, Inc.	Pit 15-32	NBOL NBIL SBOL SBIL	0.37 0.29 0.31 0.28	--	0.45 0.49 0.45 0.47	-- -- -- --
SS 15031-002	M 66 from Wickersham Rd northwest to US 31 in the City of Charlevoix	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.42 0.38	--	0.51 0.49	0.42 0.39
SS 17012-005	M 123 from Chippewa-Mackinac County Line north to old M 48	Hodgkiss and Douma, Inc.	Pit 17-6	NB SB	0.52 0.49	--	0.76 0.76	0.37 0.32
SS 17012-006	M 123 from old M 48 north to 1,600 ft northwest of Trout Lake Cemetery	Hodgkiss and Douma, Inc.	Pit 17-6	NB SB	0.47 0.51	--	0.64 0.65	0.37 0.32
Ms 20012-004	I 75 B.L.-M 72 from RR crossing near south limits Grayling northwest to M 93	Lake and Howell Construction Co.	Pit 69-14	NBOL NBIL SBOL SBIL	--	0.44 0.45 0.46 0.46	0.48 0.48 0.47 0.50	0.37 0.42 0.36 0.39
M 26022-003	M 61 intermittently from Bay-Gladwin County Line west 7 miles	Central Paving Co.	Pit 65-7	EB WB	0.38 0.36	--	0.62 0.67	0.66 0.70

TABLE 12 (Cont.)
TEN-YEAR WSF REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
SS 28042A, C1	M 72 from US 31 east to Grand Traverse-Kalkaska County Line	Peninsula Asphalt Co.	Pit 45-13		EB	0.29	--	0.33	0.35
					WB	0.28	--	0.36	0.34
M 31031-004	M 203 from north of Anthony Ave southeast to US 41	George Hocking Construction Co.	Pit 31-45		EB	--	0.48	0.56	0.49
					WB	--	0.48	0.58	0.47
Mb 31051-013	US 41 from south limits of Chassel north to 800 ft south of Pilgrim River Bridge, omitting 1.4 miles of existing concrete pavement	George Hocking Construction Co.	Pit 31-45		NB	0.22	--	0.54	0.45
					SB	0.22	--	0.53	0.54
U 31052-011	Eastbound US 41 from Lincoln Ave east to Reservation St	George Hocking Construction Co.	Pit 31-45		EBOL	--	0.36	0.31	0.51
					EBIL	--	0.34	0.50	0.47
Mb 35011-003	M 65 from 60 ft south of Iosco-Arenac County Line north to south limits of Whittemore	Saginaw Asphalt Paving Co.	Pit 1-56		NB	0.24	--	0.53	0.54
					SB	0.33	--	0.50	0.55
Mb 45091-004	M 201 from M 22 north and east to County Rd #640	Peninsula Asphalt Co.	Pit 45-19		NB	--	0.42	0.41	0.34
					SB	--	0.47	0.38	0.32
Mb 47041-002	M 36 from Pettysville Rd east on relocation to east of Henry Rd	Lake and Howell Construction Co.	Pit 47-26		EB	--	0.38	0.42	0.48
					WB	--	0.36	0.41	0.48
SS 52031-002	M 35 from Delta-Marquette County Line northwest to south of Little Lake	Payne and Dolan of Wisconsin, Inc.	Pit 52-36		NB	--	0.65	0.76	0.63
					SB	--	0.68	0.76	0.62
SS 52032-009	M 35 relocation from County Rd EER thence east 0.521 mile	Payne and Dolan of Wisconsin, Inc.	Pit 52-9		NB	--	0.44	0.67	0.42
					SB	--	0.39	0.67	0.44
Mb 59022-004 (part)	M 31 from 204 ft north of Colby Rd north to 757 ft south of M 46 (Control Section 59032)	Rieth-Riley Construction Co.	Pit 59-55		NB	0.31	0.51	0.62	0.53
					SB	0.32	0.51	0.61	0.56
Mb 65021-001	M 55 from West Branch east to M 33	Saginaw Asphalt Paving Co.	Pit 65-47		EB	--	0.53	0.57	0.61
					WB	--	0.51	0.59	0.59
Mb 66012-004 (part)	M 64 from Mineral River north to M 107	Fox Valley Construction Co.	Pit 66-63		NB	--	0.56	0.62	0.50
					SB	--	0.54	0.63	0.64

TABLE 12 (Cont.)
TEN-YEAR WSF REVIEW FOR BITUMINOUS AGGREGATE (4.11) PAVEMENTS CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources	Direction and Lane	Average Coefficient of Wet Sliding Friction			
					Coarse	1967	1968	1972
Mb 66012-004 (part)	M 64 from M 107 east to Stoney Creek (Control Section 66013)	Fox Valley Construction Co.	Pit 66-63	EB	--	0.50	0.62	0.66
				WB	--	0.59	0.71	0.62
SS 66013C, C3	M 64 from Stoney Creek east to 1.0 mile west of west city limits of Ontonagon	George Hocking Construction Co.	Pit 66-63	EB	--	0.47	0.68	0.64
				WB	--	0.50	0.59	0.68
SS 66013A, C4	M 64 from 1.0 mile west of west city limits of Ontonagon east to US 45	George Hocking Construction Co.	Pit 66-63	EB	--	0.46	0.68	0.65
				WB	--	0.46	0.71	0.61
F 66022D, C7	M 28 from 3,400 ft west of Baltimore River east to US 45 in the Village of Bruce Crossing	George Hocking Construction Co.	Pit 66-33	EB	0.19	--	0.38	0.65
				WB	0.20	--	0.52	0.62
Mb 67014-005 (part)	US 131 from Reed City north 8.527 miles	The Hicks Co.	Pits 67-2 and 54-45	NB	--	0.51	0.63	0.43
				SB	--	0.53	0.63	0.54
Mb 67014-005 (part)	M 66 from Mecosta-Osceola County Line north 6.013 miles (Control Section 67031)	The Hicks Co.	Pits 67-2 and 54-45	NB	--	0.53	0.68	0.60
				SB	--	0.50	0.71	0.64
Mb 68012-004	M 33 from M 72 north to south of County RD #612	Rieth-Riley Construction Co.	Pit 68-14	NB	--	0.52	0.47	0.52
				SB	--	0.58	0.50	0.54

TABLE 13
TEN-YEAR WSF REVIEW FOR MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1967

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1967	1968	1972	1977
<u>Stone-Filled Sand-Asphalt</u>									
Ms 21024-008 (part)	US 2 from the Soo Line RR east 4.429 miles	Payne and Dolan of Wisconsin, Inc.	Pit 75-5	Pit 21-12	EB WB	-- --	0.60 0.61	0.63 0.66	0.43 0.42
Ms 25081-006	M 21 from east of Dye Rd east to Meida St	Ann Arbor Construction Co.	Pit 63-4	Pit 63-54	EBOL EBIL WBOL WBIL	-- -- -- --	0.43 0.58 0.43 0.48	0.52 0.56 0.54 0.56	0.51 0.53 0.50 0.54
M 32021-004	M 142 from M 25 east to Pigeon	Saginaw Asphalt Paving Co.	Pit 32-4	Pit 79-73	EB WB	0.45 0.47	-- --	0.70 0.71	0.66 0.61
Ms 46072-007	M 52 from Adrian northeast to north of Raisin River Bridge	Ayling-Cunningham Asphalt Paving Co.	Pit 47-3	Pit 81-57	NB SB	-- --	0.47 0.47	0.49 0.56	0.47 0.49
Mb 79051-007	M 24 from M 46 north to Frank St in village of Caro	Spartan Asphalt Paving Co.	Pit 17-40	Pit 79-73	NB SB	0.48 0.43	0.53 0.51	0.65 0.64	0.59 0.63

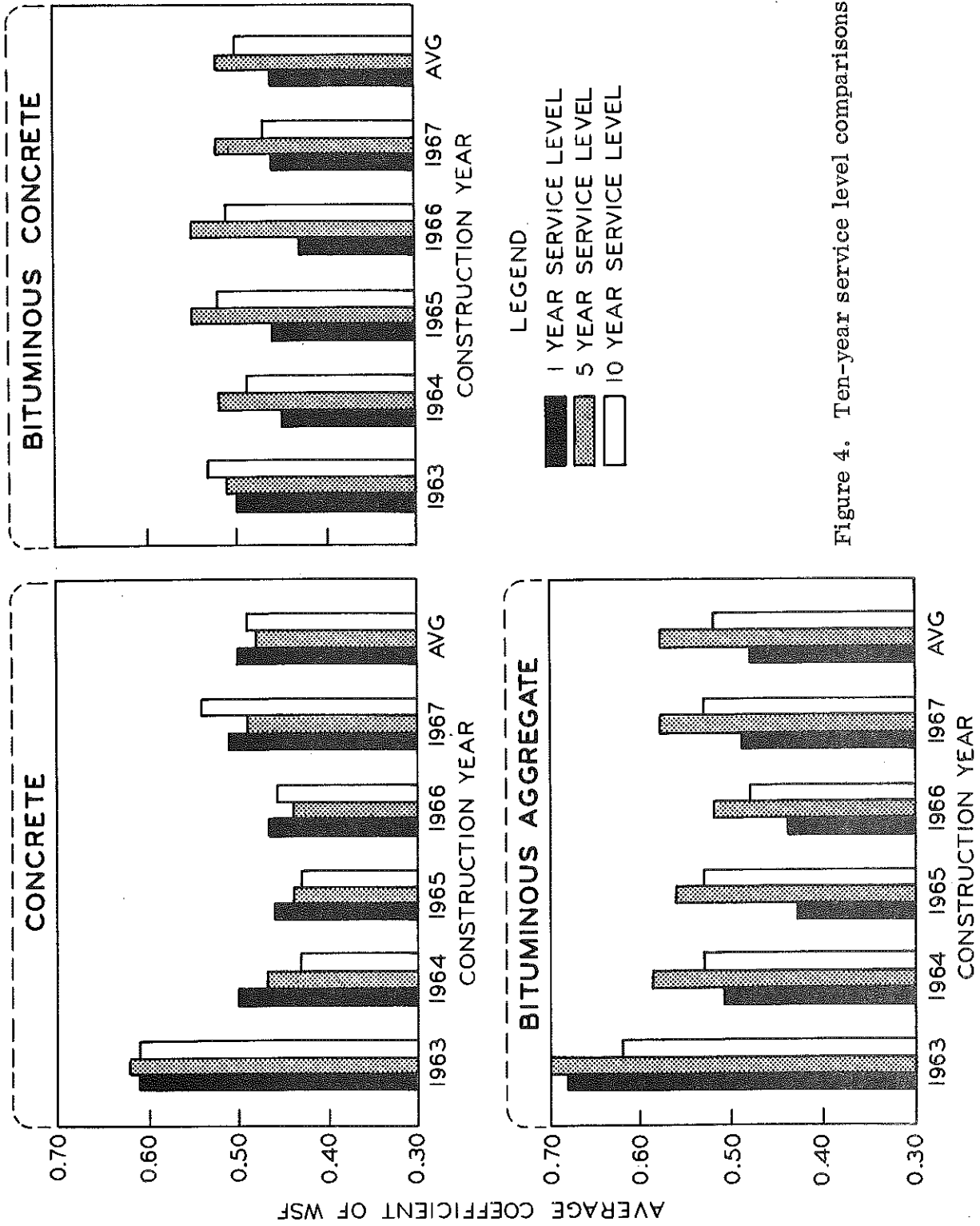


Figure 4. Ten-year service level comparisons.

SECTION IV

EXPERIMENTAL FEATURES IN PAVEMENT SURFACES

Experimental Features in Pavement Surfaces

Table 14 - Bituminous Concrete Interstate Projects

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

Average friction levels, determined in 1977 on the limestone projects, ranged from 0.41 to 0.62 and averaged 0.51. Outside (traffic) lane Wsf values averaged 24.1 percent lower than those determined on the inside (passing) lanes. The 1977 crushed gravel coefficients ranged from 0.61 to 0.70 and averaged 0.66. Outside lane values averaged only 11.4 percent lower than the inside lane values.

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

1) Under basically the same ADT (1973 ADT averaging 8,100) the crushed gravel projects are yielding higher Wsf values; e. g., in 1977 crushed gravel averaged 0.66 and limestone averaged 0.51.

2) The friction level decay rate, with respect to increases in ADT, is lower for crushed gravel projects. This is evidenced by comparing Wsf values of the inside lane with the higher traffic density outside lane. Outside lanes of the crushed gravel were 11.4 percent lower than the inside lane values while outside lanes of the limestone lanes were 24.1 percent lower than inside lanes.

Table 15 - Bridge Deck Surface Coatings

Table 15 summarizes friction level histories of six types of bridge deck surface coatings on 41 structures.

1. Rubberized Bituminous Concrete

Thirty-four lanes coated with rubberized bituminous concrete have been tested annually since their construction in 1967 or 1968. The 1977 tests resulted in friction levels ranging from 0.41 to 0.56 and averaging 0.48.

2. Asbestos Mixture

A rubberized asbestos and bituminous concrete coating was placed on the Newport Rd over the I 75 structure (S05 of 58152) in 1967. The 1977 tests resulted in an average friction level of 0.51 on both lanes tested.

Northbound lanes of X01 of 81075 (US 23 BR over the Huron River, north of Ann Arbor) were coated in 1967 with an asbestos and sand-asphalt mixture. The southbound lanes of this deck were surfaced the same year with a rubberized bituminous concrete and sand-asphalt combination. After 10 years of service, tests on the asbestos and sand-asphalt mixture average 0.54 and the rubberized bituminous concrete and sand-asphalt lanes average 0.55.

3. Epoxy Coatings

After eight service years pavement friction tests on the Creyts Rd bridge over I 96 yielded respective north half and south half Wsf values averaging 0.56 and 0.62. The surface type for the north half is an E15 Versamid 140 epoxy and the south half has a Guard Kote 250 epoxy application. Several areas have developed where the epoxy coatings have become unbonded from the steel deck plate. Removal of these two coatings and a new type surface coating has been recommended for remedial construction.

In 1969 an epoxy mortar was applied to the deck of B02 of 73131, the M 83 structure over Cass River. This surface type continues to possess good skid resistance after eight service years; the 1977 Wsf values ranged from 0.62 to 0.64 and averaged 0.63.

4. Latex Modified Mortar

Latex modified mortar is a portland cement mortar with part of the mix water replaced by a latex emulsion to increase the bond and tensile strength of the resulting surface mix. The 1977 coefficients on 37 lanes of this surfacing type ranged from 0.42 to 0.57 and averaged 0.49.

5. Latex Concrete

Latex concrete is a portland cement mix. The inclusion of a 25A aggregate in a latex concrete mix design is the basic difference between it and a latex modified mortar mix. Pavement friction tests have been conducted on eight structures (30 lanes) which were surfaced in 1972.

A comparison made between friction levels at the two-year service level on eight structures surfaced in 1972 and nine structures surfaced in 1975 shows a marked difference in finishing methods. The 1972 surfaces were textured similar to a burlap drag finish and yielded two-year Wsf values averaging 0.38; the 1975 surfaces were textured with steel tines and their Wsf values averaged 0.58.

6. Low Slump Concrete

The decks of two structures, S03 of 33084 and S10 of 47065 were surfaced in 1975 with low slump concrete. Average Wsf values after two years of service ranged from 0.50 to 0.68 and averaged 0.61.

The only bridge deck surface coating lane with a 1977 average friction level lower than 0.40 was the eastbound lane of S06 of 25031, Grand Blanc Rd over US 23. A latex concrete coating was applied to this deck in 1972; the 1977 Wsf value for the eastbound lane was 0.39.

Table 16 - Experimental Skid Resistant Resurfacing.

Five experimental skid resistant resurfacing locations were tested again this year. Friction levels obtained in 1977 on the 9 to 13-year old surfaces ranged from 0.31 to 0.76 and averaged 0.45. Eleven lanes had average coefficients below 0.40; all 11 lanes were the 50-lb 3 BC + asbestos + fiber and asphalt surface on US 24 at Five Mile Rd in Detroit. Best performing were the two 80 lb sandstone + asphalt surfaces located on M 13 at Grove St and on M 25 at Wagner Rd near Bay City; friction levels ranged from 0.62 to 0.76 and averaged 0.68.

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

In 1972, a 500-ft Gussasphalt surface was placed on US 31 north of the B3 of 53031 structure over the Pere Marquette River. Gussasphalt was also used to resurface the deck of B2 of 64013 (US 31 over the north branch of the Pentwater River). Immediately north of the 500-ft Gussasphalt surface, a 500-ft section of Mastiphalt was placed on the US 31 roadway. Similar friction levels were obtained on both surface types during 1977. The Mastiphalt surface yielded an average Wsf of 0.48 and the Gussasphalt surface averaged 0.49.

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

A spray grip surface was initially placed at the intersection of US 24 and 10 Mile Rd in the fall of 1972. Excellent initial friction levels, averaging 0.78 were obtained. However, in 1973, due to a bonding problem, the initial surface was replaced. The "new" spray grip surface was first tested in 1973. Excellent results were again found, Wsf values ranged from 0.73 to 0.87 and averaged 0.81. Currently, after four years of service, Wsf values range from 0.71 to 0.74 and average 0.72.

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

Low friction levels were found on B01 of 49023 (US 2 over the Cut River Bridge) through the Department's high-accident location testing program in 1973. Friction levels at that time, on the concrete deck, ranged from 0.15 to 0.22 and averaged 0.18. An epoxy and natural emery seal coat surface was placed on the structure in July of 1974. Initial year pavement friction

tests on this surface yielded Wsf values ranging from 0.75 to 0.81 and averaging 0.78. Delamination repairs of this surface have been made and have not held. The epoxy-natural emery seal coat surface, however, possesses good skid resistance qualities after three years of service with 1977 Wsf values ranging from 0.55 to 0.64 and averaging 0.59.

Tables 20 and 21 - Lakelite Aggregate Sections

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

Project Mbr 62032-04779, located on M 37 in Newaygo County, has variations in percent bitumen, percent Lakelite, and size of material. After five years of service, Wsf values ranged from 0.65 to 0.77 and averaged 0.71 in the Lakelite areas; non-Lakelite area test results ranged from 0.52 to 0.66 and averaged 0.60.

Project Mm 2SC-7A (M 43 in Hastings) also had Lakelite incorporated into its mix design. Friction levels ranged from 0.35 to 0.61 and averaged 0.48 after five years of service. Currently, portions of this project are showing signs of surface deterioration.

Table 22 - Trinidad Asphalt Surfacing (Project Mb 72013-06140A), Research Project 73 C-16

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

Average coefficients have increased each year in all the Trinidad and conventional bituminous concrete mix types since initial year tests. This is typical of most bituminous projects, through the five-year service level. Annual friction level averages, commencing with initial year tests, on the Trinidad surfaces were 0.54, 0.60, 0.66, and 0.69. Bituminous concrete Type M for the same time periods yielded averages of 0.56, 0.59, 0.66, and 0.66. Annual Wsf values on the Type C mix, commencing at the one-year service level, were 0.60, 0.68, and 0.69.

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

A 5,000-ft experimental Napoleon sandstone blend was placed at the south end of Project 46061-04854A, located on US 223 from 1,700 ft northwest of Onstead Rd northwesterly to US 127. A general trend of improved friction levels has occurred with all blends since the fall of 1974 tests. Most recent pavement friction tests were conducted in August 1977, and average Wsf values on the various blends ranged from 0.52 to 0.60 and averaged 0.55.

Table 24 - White Pine Slag, Research Project 72 NM-315

Pavement friction tests were initially conducted October 2, 1973 on Halfway Rd, running south and east from a point approximately 7 miles west of Ontonagon and an average friction level of 0.53 was determined. A mix design employing White Pine slag was used in the surfacing of this roadway. Average coefficients of all subsequent pavement friction measurements conducted on this surface have exceeded the initial average Wsf value. In 1977, after four service years friction levels ranged from 0.53 to 0.66 and averaged 0.58. Low traffic volumes on Halfway Rd have not been adequate for evaluating effects of wear. Weather effects over the four years of service have not affected performance or appearance; the surface could still pass as a 1977 construction project.

Table 25 - Textured Concrete Pavement Surfaces

Results of pavement friction tests conducted on four different surface finishing methods are shown in Table 25. Friction levels on the transverse combed surface have consistently produced higher average Wsf values than those determined on burlap dragged, longitudinal broomed, and transverse broomed surfaces over the eight-year study of Project 13074-001.

As a result, a specification requiring texturing concrete surfaces with a transverse comb has been implemented during the 1977 construction season (see text for Table 1 for additional friction level information).

Table 26 - Pavement Grooving

Transverse and longitudinal grooves were cut in the concrete pavement at various statewide locations during 1974. Selection of the locations to be grooved was based on results of wet sliding friction values obtained at high-accident locations. The grooves were cut using five different specifications which varied groove width and spacing. Table 26 shows the four-year history of friction levels determined on the grooved pavement and on the adjacent non-grooved surface at each of 15 locations. Wsf values obtained during 1977 ranged from 0.31 to 0.57 and averaged 0.43. Coefficients averaging 0.31 and 0.32 were determined on temporary I 69 at M 52 location (Perry Corners).

Table 27 - Open-Graded Asphalt Friction Courses

The first open-graded asphalt friction course in Michigan was placed on M 46 between the C&O RR and Williams St in Saginaw. Adjacent to this surface, between the C&O RR and Elm St, a conventional bituminous concrete surface was placed. Construction of both of these surfaces occurred during 1973 as Project 73062-05917. After four service years friction levels on both surfaces have decayed a similar amount; decay in friction level at the four year service level is not normal for bituminous pavements.

Two-year average friction levels are also lower than initial values at the other two open-graded asphalt friction course locations as shown in Table 27. Coefficients on the M 25 project, in Bay City, had one-year Wsf values averaging 49 percent lower than those determined during the initial service year. A slight friction level increase occurred at the two-year level when Wsf values averaged 0.27, 37 percent lower than initial coefficients.

TABLE 14
BITUMINOUS CONCRETE INTERSTATE PROJECTS

Project No.	Length, mi.	Location	Date Paved (Wearing Course)	Paving Contractor	Source of Course Aggregate	Lang ⁽¹⁾	Average Coefficient of Wet Sliding Friction																	
							Firestone Tire			General Tire														
							1961	1962	Apr. 1963	Apr. 1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
18034, C3	6.758	M 61 to Arnold Rd	May-June 1962	Rieth-Riley Construction	Wallace Stone Co. (Pit 32-4)	IL	0.52 ^(a)	0.64	0.58	0.58	0.47	0.48	0.56	0.59	0.60	0.65	0.57	0.59	0.63	0.62	0.60	0.66	0.70	0.73
20015, C3	4.847	Co. Rd #12 to N Crawford Co. Line	Sept. 1961	Thornton Construction	McCready Pit (Pit 60-18)	OL	0.60	0.60	0.61	0.59	0.73	0.66	0.68	0.66	0.42	0.46	0.53	0.44	0.51	0.52	0.46	0.44	0.50	0.52
69013, C1	7.685	Osteo Co. Line N Mariette Rd to Charles Brink Rd	Oct. 1961	Saginaw Asphalt	Afcon Quarry (Pit 26-35)	OL	0.56	0.52	0.56	0.51	0.63	0.59	0.62	0.54	0.60	0.70	0.66	0.70	0.66	0.66	0.66	0.69	0.66	0.66
69013, C3, C5	5.385	Charles Brink Rd N to M 32 (Cavilord)	June 1962	Spartan Asphalt	Lewiston Pit	IL	0.57	0.59	0.70	0.59	0.70	0.60	0.49	0.58	0.52	0.58	0.53	0.54	0.59	0.57	0.55	0.59	0.55	0.50
						OL	0.54	0.49	0.54	0.47	0.48	0.44	0.36	0.40	0.41	0.46	0.41	0.46	0.48	0.45	0.39	0.37	0.34	0.37
						IL	0.59	0.63	0.71	0.66	0.68	0.64	0.48	0.58	0.58	0.62	0.58	0.55	0.60	0.56	0.54	0.55	0.50	0.51
						OL	0.54	0.57	0.62	0.57	0.62	0.66	0.60	0.70	0.66	0.73	0.72	0.72	0.74	0.72	0.61	0.68	0.74	0.72
							0.54	0.57	0.62	0.57	0.62	0.57	0.50	0.56	0.58	0.67	0.66	0.66	0.67	0.63	0.66	0.64	0.64	0.61

(1) IL and OL denote passing and traffic lanes.

(2) Tested on leveling course mix.

TABLE 15
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction											
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	
B02 of 11052	US 31-US 33 over St. Joseph River in Berrien Springs	1967	Rubberized bituminous concrete	NB SB	-- 0.43	0.39 0.36	0.47 0.43	0.40 0.37	0.40 0.36	0.45 0.44	0.28 0.28	0.40 0.38	0.40 0.38	0.40 0.38	0.35 0.31	0.43 0.42
X01 of 19032	US 27 over GTW RR in St. Johns	1967	Rubberized bituminous concrete	NBOL NBIL SBOL SBIL	0.53 0.56 0.53 0.60	0.44 0.50 0.48 0.56	0.50 0.55 0.51 0.57	0.47 0.52 0.49 0.56	0.49 0.55 0.50 0.61	0.51 0.57 0.54 0.61	0.47 0.49 0.50 0.51	0.44 0.48 0.43 0.50	0.44 0.47 0.44 0.50	0.44 0.47 0.44 0.48	0.45 0.49 0.47 0.49	0.48 0.49 0.49 0.50
B01 of 79051	M 24 over Cass River in Caro	1967	Rubberized bituminous concrete	NB SB	0.53 0.50	0.48 0.48	0.56 0.55	0.51 0.53	0.54 0.55	0.57 0.59	0.56 0.62	0.59 0.61	0.45 0.44	0.45 0.44	0.41 0.45	0.50 0.50
B01 of 61076	M 20 over Muskegon River	1968	Rubberized bituminous concrete	NBOL NBIL SBOL SBIL	-- -- -- --	0.46 0.48 0.44 0.44	0.49 0.53 0.49 0.49	0.49 0.50 0.46 0.49	0.51 0.55 0.48 0.49	0.52 0.56 0.49 0.52	0.47 0.53 0.45 0.49	0.39 0.46 0.42 0.39	0.39 0.46 0.42 0.57	0.55 0.59 0.53 0.57	0.46 0.50 0.45 0.46	0.51 0.53 0.51 0.48
B02 of 61076	M 20 southbound over Cedar Creek	1968	Rubberized bituminous concrete	SBOL SBIL	-- --	0.44 0.44	0.50 0.55	0.48 0.50	0.46 0.53	0.53 0.58	0.50 0.52	0.44 0.48	0.44 0.48	0.53 0.57	0.44 0.47	0.51 0.53
B03 of 61076	M 20 northbound over Cedar Creek	1968	Rubberized bituminous concrete	NBOL NBIL	-- --	0.46 0.45	0.52 0.54	0.49 0.53	0.51 0.52	0.54 0.58	0.48 0.52	0.47 0.48	0.47 0.48	0.55 0.60	0.49 0.51	0.52 0.55
S04 of 61072	M 46 over US 31	1968	Rubberized bituminous concrete	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.45 0.43 0.45 0.42 0.43 0.50	0.45 0.49 0.54 0.48 0.49 0.55	0.43 0.49 0.50 0.43 0.47 0.50	0.49 0.52 0.54 0.49 0.54 0.57	0.54 0.53 0.55 0.50 0.54 0.55	0.48 0.50 0.53 0.43 0.47 0.54	0.38 0.40 0.44 0.41 0.40 0.44	0.38 0.40 0.44 0.51 0.52 0.53	0.54 0.55 0.53 0.51 0.52 0.53	0.40 0.43 0.50 0.35 0.44 0.50	0.46 0.47 0.54 0.45 0.46 0.46
S17 of 82023	Grand River Ave (I 96 BS) over I 94	1968	Rubberized bituminous concrete	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.44 0.44 0.45 0.50 0.44 0.44	0.38 0.37 0.40 0.43 0.37 0.39	0.35 0.34 0.36 0.40 0.36 0.35	0.41 0.39 0.38 0.44 0.40 0.39	0.43 0.42 0.45 0.48 0.41 0.43	0.41 0.40 0.43 0.40 0.40 0.43	0.37 0.36 0.39 0.42 0.39 0.37	0.37 0.40 0.41 0.44 0.42 0.44	0.39 0.40 0.41 0.44 0.42 0.44	0.41 0.40 0.40 0.44 0.42 0.44	0.45 0.45 0.44 0.47 0.45 0.46
S16 of 82111	Grand River Ave (I 96 BS) over I 696 BS	1968	Rubberized bituminous concrete	EBOL EBCL EBIL WBOL WBCL WBIL	-- -- -- -- -- --	0.52 0.44 0.43 0.49 0.42 0.43	0.47 0.43 0.41 0.49 0.40 0.41	0.46 0.40 0.41 0.47 0.40 0.40	0.44 0.43 0.43 0.46 0.42 0.44	0.54 0.44 0.48 0.48 0.39 0.43	0.48 0.28 0.33 0.33 0.28 0.35	0.42 0.37 0.37 0.42 0.39 0.37	0.42 0.37 0.39 0.42 0.38 0.43	0.46 0.37 0.39 0.47 0.38 0.40	0.54 0.43 0.43 0.55 0.55 0.42	0.50 0.45 0.43 0.43 0.41 0.44
S05 of 58152	Newport Rd over I 75, Newport	1967	Rubberized asbestos and bituminous concrete	EB WB	0.46 0.47	0.50 0.50	0.51 0.51	0.49 0.52	0.46 0.49	0.51 0.57	0.51 0.57	0.38 0.43	0.38 0.43	0.52 0.49	0.48 0.50	0.51 0.51

(1) Not tested (approaches torn up)

TABLE 15 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction											
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	
X01 of 81075	US 23 BR over Huron River, north of Ann Arbor	1967	Asbestos mix plus sand asphalt	NBRL	0.57	0.52	0.55	0.54	0.58	0.60	0.49	0.41	0.46	0.54	0.56	
					0.58	0.53	0.57	0.56	0.66	0.62	0.51	0.45	0.39	0.50	0.49	
					0.60	0.56	0.66	0.62	0.68	0.68	0.56	0.52	0.52	0.56	0.56	
			Rubberized bituminous concrete plus sand asphalt	SBRL	0.61	0.50	0.57	0.54	0.64	0.59	0.48	0.42	0.45	0.51	0.53	
					0.59	0.55	0.64	0.59	0.69	0.64	0.52	0.58	0.47	0.51	0.54	
					0.58	0.58	0.64	0.62	0.73	0.72	0.56	0.64	0.57	0.62	0.59	
S05 of 23081	Creyts Rd over I 496	1969	North half of deck only E 15 Versamid 140	NB	--	--	0.67	0.54	0.37	0.35	0.39 ⁽²⁾	0.34 ⁽³⁾	0.41 ⁽⁴⁾	0.52 ⁽²⁾	0.54	
					--	--	0.66	0.54	0.44	0.39	0.44 ⁽²⁾	0.38 ⁽³⁾	0.49 ⁽⁴⁾	0.55 ⁽²⁾	0.58	
					--	--	0.75	0.52	0.46	0.50	0.45 ⁽²⁾	0.41 ⁽³⁾	0.65 ⁽⁴⁾	0.61 ⁽²⁾	0.62	
B02 of 73131	M 83 over Cass River, Frankenmuth	1969	Epoxy mortar	SB	--	--	0.69	0.49	0.36	0.49	0.43 ⁽²⁾	0.36 ⁽³⁾	0.64 ⁽⁴⁾	0.57 ⁽²⁾	0.63	
					--	--	0.56	0.57	0.57	0.60	0.58	0.53	0.54	0.66	0.64	
					--	--	0.52	0.58	0.58	0.58	0.54	0.51	0.54	0.64	0.62	
S04 of 41026	M 37 over eastbound I 96	1971	Latex modified mortar	SBOL	--	--	--	0.60	0.63	0.66	0.57	0.54	0.56	0.67	0.64	
					--	--	--	0.56	0.60	0.60	0.56	0.55	0.53	0.68	0.62	
					--	--	--	0.42	0.42	0.40	0.30	0.43	0.45	0.47	0.49	
S05 of 41026	M 37 over westbound I 96	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.46	0.41	0.29	0.46	0.44	0.49	
					--	--	--	--	--	0.37	0.35	0.40	0.40	0.40	0.49	
					--	--	--	--	--	0.41	0.38	0.32	0.41	0.41	0.50	
S01 of 63022	I 96 over Kent Lake Rd	1972	Latex modified mortar	SBIL	--	--	--	--	--	0.40	0.34	0.30	0.39	0.35	0.46	
					--	--	--	--	--	0.46	0.39	0.28	0.45	0.44	0.42	
					--	--	--	--	--	0.42	0.40	0.30	0.43	0.45	0.47	
			Latex modified mortar	EBOL	--	--	--	--	--	0.44	0.39	0.30	0.43	0.42	0.48	
					--	--	--	--	--	0.38	0.34	0.27	0.40	0.42	0.45	
					--	--	--	--	--	0.47	0.40	0.30	0.45	0.46	0.46	
			Latex modified mortar	WBOL	--	--	--	--	--	0.46	0.39	0.28	0.45	0.44	0.42	
					--	--	--	--	--	0.50	0.33	0.41	0.47	0.52	0.43	
					--	--	--	--	--	0.45	0.34	0.42	0.46	0.50	0.52	
			Latex modified mortar	WBCL	--	--	--	--	--	0.53	0.41	0.51	0.49	0.55	0.57	
					--	--	--	--	--	0.46	0.35	0.43	0.46	0.52	0.44	
					--	--	--	--	--	0.48	0.34	0.42	0.46	0.51	0.54	
			Latex modified mortar	WBIL	--	--	--	--	--	0.52	0.39	0.50	0.50	0.55	0.57	
					--	--	--	--	--	0.52	0.39	0.50	0.50	0.55	0.57	
					--	--	--	--	--	0.52	0.39	0.50	0.50	0.55	0.57	

(2) Average of two test series
(3) Fall tests only
(4) Spring tests only

TABLE 15 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction										
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
S02 of 63022	I 96 over Milford Rd	1971	Latex modified mortar	EBOL	--	--	--	--	--	0.32	0.24	0.33	0.38	0.42	0.50
				EBCL	--	--	--	--	--	0.42	0.30	0.42	0.40	0.48	0.51
				EBIL	--	--	--	--	--	0.43	0.31	0.46	0.46	0.51	0.53
				WBOL	--	--	--	--	--	0.38	0.23	0.37	0.42	0.45	0.52
				WBCL	--	--	--	--	--	0.43	0.31	0.42	0.47	0.50	0.55
				WBIL	--	--	--	--	--	0.49	0.34	0.48	0.52	0.54	0.56
S06 of 82022	Westbound I 94 over Middle-belt Rd	1971	Latex modified mortar	WBOL	--	--	--	--	--	0.38	0.31	0.38	0.36	0.49	0.42
				WBCL	--	--	--	--	--	0.40	0.34	0.40	0.42	0.51	0.47
				WBIL	--	--	--	--	--	0.42	0.35	0.43	0.38	0.54	0.51
S09 of 82022	Eastbound I 94 over Ecorse Rd	1972	Latex modified mortar	EBOL	--	--	--	--	--	0.44	0.35	0.46	0.44	0.53	0.51
				EBCL	--	--	--	--	--	0.42	0.39	0.46	0.44	0.56	0.53
				EBIL	--	--	--	--	--	0.45	0.38	0.45	0.46	0.55	0.52
S12 of 82022	Westbound I 94 over Beech-Daly Rd	1972	Latex modified mortar	WBOL	--	--	--	--	--	0.46	0.33	0.40	0.38	0.47	0.45
				WBCL	--	--	--	--	--	0.47	0.37	0.41	0.44	0.53	0.52
				WBIL	--	--	--	--	--	0.43	0.37	0.43	0.47	0.54	0.56
S26 of 82195	John R over I 75	1969	Latex modified mortar	SBOL	--	--	--	--	--	0.60	0.53	0.42	0.45	0.58	0.52
				SB#3	--	--	--	--	--	0.53	0.47	0.38	0.40	0.54	0.47
				SB#2	--	--	--	--	--	0.47	0.47	0.35	0.35	0.49	0.48
				SBIL	--	--	--	--	--	0.48	0.39	--	--	--	--
				NBOL	--	--	--	--	--	0.54	0.48	0.39	0.40	0.57	0.47
				NBCL	--	--	--	--	--	0.48	0.43	0.34	0.34	0.52	0.48
S27 of 82195	Brush St over I 75	1969	Latex modified mortar	NBIL	--	--	--	--	--	0.51	0.44	0.34	0.36	0.50	0.47
				EB	--	--	--	--	--	--	--	0.27	0.31	0.33	0.39
				WB	--	--	--	--	--	--	--	0.33	0.32	0.38	0.43
S06 of 25031	Grand Blanc Rd over US 23	1972	Latex concrete	EB	--	--	--	--	--	--	--	--	--	--	--
				WB	--	--	--	--	--	--	--	--	--	--	--
				EB	--	--	--	--	--	--	--	0.47	0.44	0.50	0.51
S02 of 25131	Baldwin Rd over I 75 (1.2 miles northwest of Oakland County Line)	1972	Latex concrete	WB	--	--	--	--	--	--	--	--	--	0.48	0.48
				EB	--	--	--	--	--	--	--	--	--	--	--
				WB	--	--	--	--	--	--	--	0.51	0.44	0.50	0.48
S09 of 25131	Fenton Rd over I 75 (2.4 miles southeast of US 23)	1972	Latex concrete	NBOL	--	--	--	--	--	--	0.35	0.35	0.40	0.42	0.46
				NBIL	--	--	--	--	--	--	0.39	0.38	0.46	0.46	0.47
				SBOL	--	--	--	--	--	0.35	0.33	0.33	0.39	0.41	0.44
				SBIL	--	--	--	--	--	--	0.38	0.36	0.46	0.46	0.44
				NBOL	--	--	--	--	--	--	--	--	--	0.62	0.63
				NBIL	--	--	--	--	--	--	--	--	--	0.63	0.69
X01 of 33031	US 127 over NYCRR, south of Leslie	1975	Latex concrete	SBOL	--	--	--	--	--	--	--	--	--	0.52	0.61
				SBIL	--	--	--	--	--	--	--	--	--	0.62	0.67
				SBOL	--	--	--	--	--	--	--	--	--	--	--

TABLE 15 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction											
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	
X09 of 41131	US 131 over GTW RR and Indian Mill Cr in Grand Rapids	1975	Latex concrete	NBOL NBCL NBIL SBOL SBCL SBIL	--	--	--	--	--	--	--	--	--	--	0.56	0.54
E02 of 73062	M 46 over Tittabawassee River	1972	Latex concrete	EBOL EBCL WBOL WBIL	--	--	--	--	--	--	0.27	0.34	0.32	0.32	0.45	0.42
S02 of 82022	Eastbound I 94 over Wayne Rd	1972	Latex concrete	EBOL EBCL EBIL	--	--	--	--	--	--	0.30	0.38	0.38	0.42	0.47	0.47
X01 of 82024	I 94 over DeQuindre Yard	1972	Latex concrete	EBOL EBCL EBIL WBOL WBCL WBIL	--	--	--	--	--	--	0.39	0.31	0.32	0.47	0.47	0.42
S01 of 82091	Old M 39 over Gate 10 entrance to Ford Plant	1972	Latex concrete	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2 SBIL	--	--	--	--	--	--	0.40	0.40	0.41	--	--	--
E03 of 82191	I 75 over Goddard Rd	1972	Latex concrete	NBOL NBCL NBIL SBOL SBCL SBIL	--	--	--	--	--	--	0.40	0.39	0.43	0.46	0.45	0.44
S03 of 33084	Southbound I 496 to eastbound I 96 over westbound I 96	1975	Low slump concrete	EBOL EBIL WBOL WBIL	--	--	--	--	--	--	0.37	0.37	0.44	0.47	0.48	0.48
S10 of 47065	I 96 over Grand River (Brighton west exit)	1975	Low slump concrete	EBOL EBIL WBOL WBIL	--	--	--	--	--	--	0.40	0.44	0.49	0.52	0.49	0.49

TABLE 15 (Cont.)
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction													
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977			
X01 of 33034	US 27 over C&O RR and I 96 BL in Lansing	1975	Latex mortar	NBOL ⁽⁵⁾	--	--	--	--	--	--	--	--	--	--	0.51	0.53		
					--	--	--	--	--	--	--	--	--	--	0.51	0.53		
					--	--	--	--	--	--	--	--	0.37	--	--	--	0.52	0.53
					--	--	--	--	--	--	--	--	0.52	0.43	--	--	--	0.52
S07 of 38101	Lansing Ave over I 94, Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.62	0.50		
					--	--	--	--	--	--	--	--	--	--	0.47	0.45		
					--	--	--	--	--	--	--	--	--	--	0.59	0.48		
					--	--	--	--	--	--	--	--	--	--	0.45	0.46		
B04 of 38111	US 127 over Grand River, east of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.52	0.49		
					--	--	--	--	--	--	--	--	--	--	0.62	0.60		
					--	--	--	--	--	--	--	--	--	--	0.53	0.53		
					--	--	--	--	--	--	--	--	--	--	0.63	0.65		
X01 of 38131	US 127 over NYCHRR, north of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.56	0.64		
					--	--	--	--	--	--	--	--	--	--	0.56	0.66		
					--	--	--	--	--	--	--	--	--	--	0.58	0.62		
					--	--	--	--	--	--	--	--	--	--	0.61	0.67		
S16 of 41131	US 131 over Leonard St, in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.57	0.56		
					--	--	--	--	--	--	--	--	--	--	0.57	0.54		
					--	--	--	--	--	--	--	--	--	--	0.62	0.64		
					--	--	--	--	--	--	--	--	--	--	0.59	0.58		
S17 of 41131	US 131 over Richmond St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.59	0.62		
					--	--	--	--	--	--	--	--	--	--	0.60	0.65		
					--	--	--	--	--	--	--	--	--	--	0.55	0.55		
					--	--	--	--	--	--	--	--	--	--	0.56	0.55		
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.62	0.62		
					--	--	--	--	--	--	--	--	--	--	0.55	0.55		
					--	--	--	--	--	--	--	--	--	--	0.57	0.59		
					--	--	--	--	--	--	--	--	--	--	0.60	0.62		
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.59	0.59		
					--	--	--	--	--	--	--	--	--	--	0.56	0.57		
					--	--	--	--	--	--	--	--	--	--	0.60	0.60		
					--	--	--	--	--	--	--	--	--	--	0.59	0.57		
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.59	0.59		
					--	--	--	--	--	--	--	--	--	--	0.60	0.62		
					--	--	--	--	--	--	--	--	--	--	0.59	0.59		
					--	--	--	--	--	--	--	--	--	--	0.60	0.62		

(5) North end of deck finished with transverse broom.
(6) South end of deck finished with transverse comb.

TABLE 16
EXPERIMENTAL SKID RESISTANCE RESURFACING

Control Section	Location	Construction Months	Mixture Type	Route	Direction and Lane	Average Coefficient of Wet Sliding Friction															
						1965	1966		1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977		
						Spring	Fall														
09033	M 13 at Grove St, north of Bay City	Sept.-Oct. 1965	80-lb Sandstone + asphalt	M 13	NBOL	0.73	0.53	0.49	0.59	0.55	0.56	0.55	0.53	0.55	0.53	0.51	0.59	0.64	0.65		
						0.76	0.61	0.56	0.66	0.62	0.66	0.67	0.66	0.66	0.64	0.62	0.68	0.76	0.76		
09042	M 25 at Wagner Rd, east of Bay City	Sept. 1965	80-lb Sandstone + asphalt	M 25	EB	0.77	0.53	0.47	0.51	0.54	0.64	0.62	0.55	0.55	0.48	0.52	0.64	0.58	0.62		
						0.74	0.64	0.47	0.53	0.55	0.66	0.60	0.57	0.58	0.51	0.55	0.61	0.62	0.67		
82053	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	0.35	0.36	0.42	0.40	0.35	0.31	0.31	0.32		
						0.53	0.36	0.34	0.41	0.40	0.41	0.38	0.37	0.42	0.39	0.37	0.34	0.34	0.32		
						0.57	0.36	0.34	0.40	0.41	0.43	0.41	0.37	0.43	0.37	0.40	0.36	0.36	0.31	0.31	
						0.60	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
						0.52	0.38	0.37	0.41	0.39	0.43	0.38	0.40	0.46	0.44	0.39	0.36	0.37	0.36	0.34	0.36
						0.60	0.37	0.35	0.42	0.42	0.43	0.40	0.42	0.48	0.43	0.39	0.39	0.39	0.36	0.34	0.36
						0.59	0.35	0.34	0.44	0.40	0.42	0.40	0.43	0.49	0.43	0.45	0.41	0.41	0.41	0.41	0.36
						0.51	0.37	0.31	0.36	0.38	0.37	0.37	0.38	0.43	0.38	0.42	0.41	0.44	0.44	0.44	0.34
						0.55	0.39	0.33	0.41	0.40	0.42	0.41	0.39	0.49	0.37	0.39	0.42	0.44	0.44	0.44	0.36
						0.55	0.37	0.33	0.39	0.40	0.44	0.41	0.39	0.49	0.37	0.41	0.40	0.42	0.44	0.44	0.34
						0.60	0.39	0.33	0.43	0.44	0.44	0.42	0.42	0.49	0.37	0.41	0.40	0.42	0.44	0.44	0.36
						82052	US 24 at Sibley Rd, Detroit	Oct. 1965	80-lb 3NS + 31AA + asphalt	US 24	NBOL	0.50	0.41	0.34	0.44	0.45	0.49	0.44	0.44	0.44	0.42
0.52	0.42	0.38	0.47	0.50	0.48							0.49	0.48	0.48	0.51	0.45	0.49	0.47	0.49		
0.51	0.43	0.39	0.46	0.47	0.52							0.50	0.47	0.48	0.51	0.42	0.46	0.48	0.53	0.53	
0.51	0.42	0.38	0.46	0.46	0.50							0.48	0.50	0.48	0.49	0.42	0.48	0.48	0.48	0.47	
82053	US 24 northbound (Telegraph Rd) from Joy Rd to West Chicago	Aug. 1968	80-lb crushed fine aggregate	US 24	NBOL	---	---	---	---	0.59	0.44	0.41	0.42	0.48	0.47	0.46	0.45	0.48			
						---	---	---	---	0.60	0.48	0.41	0.42	0.48	0.48	0.46	0.47	0.48			
						---	---	---	---	0.61	0.46	0.42	0.44	0.50	0.48	0.48	0.45	0.49	0.47		
						---	---	---	---	0.61	0.45	0.42	0.46	0.49	0.46	0.48	0.50	0.50	0.45		

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

Tested Surface	Lane	Coefficient of Wet Sliding Friction																							
		10/27/72		11/10/72		1/18/73		5/10/73		12/3/73		6/4/74		6-19-75		6-18-76		10-4-77							
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg						
Gussasphalt (C.S. 53031)	NB	0.76	0.82	0.78	---	---	---	0.60	0.61	0.61	---	---	---	0.40	0.45	0.42	0.52	0.55	0.53	0.49	0.50	0.50	0.48	0.54	0.51
	SB	0.79	0.83	0.81	---	---	---	0.55	0.59	0.58	---	---	---	0.42	0.46	0.44	0.51	0.55	0.53	0.48	0.49	0.48	0.43	0.51	0.47
Mastiphalt (C.S. 53031)	NB	0.37	0.50	0.44	---	---	---	0.48	0.49	0.48	---	---	---	0.40	0.45	0.42	0.52	0.54	0.53	0.47	0.47	0.47	0.47	0.49	0.51
	SB	0.37	0.49	0.42	---	---	---	0.54	0.56	0.55	---	---	---	0.45	0.50	0.48	0.52	0.52	0.52	0.46	0.48	0.47	0.42	0.48	0.45
Gussasphalt (B2 of 64013)	NB	---	---	---	0.73	0.76	0.74	0.64	0.68	0.66	0.60	0.64	0.62	0.49	0.53	0.51	0.37	0.41	0.39	0.49	0.52	0.51	0.44	0.48	0.46
	SB	---	---	---	Not Completed	0.63	0.66	0.64	0.58	0.63	0.60	0.45	0.50	0.48	0.38	0.41	0.40	0.48	0.52	0.51	0.46	0.49	0.48	0.46	0.51

TABLE 18
SPRAY GRIP SURFACE, US 24 (TELEGRAPH RD) AT 10 MILE RD, OAKLAND COUNTY

Test Location	Direction and Lane	Coefficient of Wet Sliding Friction																							
		Before Spray Grip						After Spray Grip						New Spray Grip Surface											
		9-19-72		11-2-72		6-10-73		10-29-73		8-11-74		7-30-75		7-25-76		10-4-77									
Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave		
US 24 (Telegraph Rd), Immediately north of 10 Mile Rd	SBRT	0.31	0.36	0.34	0.79	0.79	0.79	0.67	0.70	0.69	0.77	0.81	0.79	0.69	0.72	0.70	0.67	0.69	0.68	0.64	0.78	0.73	0.68	0.74	0.71
	SBOL	0.37	0.38	0.37	0.73	0.79	0.77	0.63	0.69	0.66	0.82	0.87	0.85	0.73	0.73	0.73	0.67	0.69	0.68	0.73	0.76	0.74	0.71	0.72	0.71
	SB#3	0.33	0.34	0.33	0.78	0.79	0.79	0.69	0.69	0.69	0.77	0.79	0.78	0.68	0.70	0.69	0.64	0.69	0.67	0.71	0.75	0.73	0.73	0.74	0.73
	SB#2	0.33	0.36	0.34	0.76	0.79	0.78	0.66	0.67	0.66	0.85	0.86	0.85	0.70	0.73	0.72	0.69	0.69	0.69	0.75	0.76	0.76	0.72	0.74	0.73
	SB#1	0.34	0.37	0.36	0.78	0.79	0.79	0.64	0.69	0.66	0.82	0.83	0.83	0.70	0.73	0.72	0.69	0.70	0.69	0.75	0.76	0.76	0.73	0.74	0.74
10 Mile Rd, immediately west of US 24	EB	0.33	0.41	0.38	0.77	0.78	0.78	0.65	0.71	0.68	0.73	0.75	0.75	0.66	0.69	0.67	0.66	0.66	0.71	0.74	0.73	0.70	0.73	0.71	0.71

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

Test Date	Lane	Coefficient of Wsf		
		Low	High	Avg
9-23-74	EB	0.75	0.81	0.77
	WB	0.78	0.78	0.80
7-7-75	EB	0.60	0.67	0.65
	WB	0.58	0.64	0.62
5-24-76	EB	0.69	0.73	0.71
	WB	0.69	0.70	0.69
10-18-76	EB	0.58	0.61	0.60
	WB	0.58	0.63	0.61
9-19-77	EB	0.57	0.64	0.60
	WB	0.55	0.62	0.58

TABLE 20
M 37 LAKELITE AGGREGATE SECTIONS (PROJECT Mbr 62032-04779A)
Research Project 72 NM-347

Section No.	Station to Station	Percent Bituman	Lakelite Aggregate	Lane	Coefficient of Wet Sliding Friction																					
					11-9-72		5-29-73		11-14-73		6-4-74		7-30-75		6-23-76		9-7-77									
					Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave							
1	240+00 to 244+75	9.0	30%	31A	NB	0.55	0.59	0.57	0.69	0.74	0.72	0.68	0.73	0.70	0.62	0.65	0.63	0.65	0.68	0.69	0.71	0.70	0.70	0.71	0.70	
2	244+75 to 264+15	9.0	32%	31A	NB	0.60	0.61	0.61	0.73	0.76	0.75	0.69	0.72	0.70	0.65	0.68	0.67	0.66	0.70	0.68	0.70	0.72	0.71	0.68	0.72	0.70
3	264+15 to 290+95	8.0	16%	31A	NB	0.50	0.55	0.52	0.69	0.70	0.69	0.60	0.65	0.63	0.58	0.62	0.60	0.62	0.64	0.63	0.66	0.68	0.67	0.66	0.67	0.67
7	295+00 to 302+50	8.0	25%	31A	NB	0.50	0.61	0.56	0.70	0.74	0.72	0.62	0.68	0.66	0.63	0.68	0.65	0.64	0.68	0.66	0.70	0.75	0.72	0.73	0.77	0.74
8	307+70 to 231+25	9.5	42%	25A	SB	0.65	0.69	0.68	0.75	0.81	0.79	0.69 ¹	0.73	0.71	0.71	0.73	0.72	0.70	0.72	0.71	0.69	0.74	0.72	0.71	0.71	0.71
												0.52 ²	0.62	0.57												
9	291+25 to 264+85	8.0	16%	31A	SB	0.55	0.53	0.57	0.68	0.74	0.71	0.61	0.65	0.63	0.63	0.65	0.64	0.62	0.62	0.62	0.64	0.67	0.65	0.65	0.67	0.66
10	264+85 to 254+00	9.0	30%	31A	SB	0.55	0.58	0.56	0.71	0.72	0.72	0.63	0.67	0.65	0.68	0.71	0.69	0.64	0.65	0.64	0.68	0.68	0.68	0.67	0.71	0.70
11	254+00 to 242+15	9.0	35%	31A	SB	0.65	0.66	0.66	0.76	0.80	0.78	0.70	0.74	0.72	0.74	0.75	0.75	0.68	0.71	0.70	0.73	0.74	0.74	0.71	0.76	0.73
12	242+15 to 239+75	9.0	40%	31A	SB	0.65	0.70	0.68	0.84	0.87	0.86	0.79	0.80	0.79	0.76	0.81	0.78	0.73	0.76	0.75	0.81	0.82	0.82	0.73	0.76	0.74
North Control	302+50 North	---	None	None	None	0.50	0.51	0.51	0.59	0.70	0.65	0.56	0.67	0.61	0.58	0.70	0.64	0.65	0.67	0.66	0.63	0.65	0.64	0.60	0.65	0.62
South Control	307+70 North	---	None	None	None	0.50	0.52	0.51																		
	240+00 South	---	None	None	None	0.45	0.48	0.47																		
	239+75 South	---	None	None	None	0.49	0.50	0.50																		

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

TABLE 21
M 43 LAKELITE AGGREGATE SECTION (Project Mm 2SC-7A, Control Section 08012)
Research Project 72 NM-347

Location	Surface	Lane	Coefficient of Wet Sliding Friction																			
			9-6-72		5-30-73		11-14-73		5-10-74		6-30-75		5-19-76		6-27-77							
			Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave					
Coats Grove Rd south (north of Hastings)	26B Agg. Seal	NB	0.59	0.63	0.61	0.64	0.64	0.49	0.53	0.52	0.53	0.57	0.56	0.57	0.54	0.57	0.56	0.47	0.49	0.48		
		SB	0.57	0.60	0.59	0.62	0.62	0.58	0.61	0.60	0.56	0.57	0.57	0.58	0.61	0.59	0.62	0.61	0.53	0.57	0.55	
Coats Grove Rd north 0.5 mile	Light wt. Agg. Seal	NB	0.87	0.88	0.87	0.80	0.85	0.83	0.58	0.69	0.65	0.58	0.62	0.60	0.52	0.53	0.57	0.62	0.59	0.41	0.52	0.46
		SB	0.90	0.91	0.91	0.78	0.85	0.82	0.56	0.70	0.67	0.58	0.64	0.61	0.58	0.60	0.59	0.60	0.64	0.62	0.35*	0.61
From 0.5 mile north of Coats Grove Rd north	28B Agg. Seal	NB	0.57	0.59	0.58	0.64	0.68	0.66	0.50	0.55	0.52	0.55	0.57	0.56	0.55	0.59	0.56	0.58	0.57	0.53	0.54	0.53
		SB	0.58	0.60	0.59	0.63	0.68	0.66	0.57	0.59	0.58	0.56	0.58	0.57	0.58	0.60	0.59	0.60	0.61	0.61	0.54	0.58

* Surface deteriorating

TABLE 22
 TRINIDAD ASPHALT SURFACING (Project Mb 72013-06140A)
 Research Project 73 C-16

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

TABLE 23
NAPOLEON SANDSTONE SURFACE (Project Mb 46061-04854A)

Mix No.	Blend No.	Station to Station	Lane	Coefficient of Wet Sliding Friction																							
				8-23-73			10-17-73			4-4-74			9-16-74			7-15-75			7-11-76			8-18-77					
				Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg			
1	II	450+88 to 456+50	NB	0.34	0.38	0.36	0.28	0.34	0.30	0.55	0.59	0.57	0.39	0.42	0.40	0.41	0.45	0.43	0.46	0.50	0.48	0.53	0.55	0.54			
2	II	486+50 to 490+88	NB	0.35	0.42	0.38	0.30	0.31	0.30	0.52	0.56	0.53	0.38	0.40	0.39	0.42	0.45	0.44	0.48	0.50	0.49	0.52	0.55	0.53			
2	II	492+26 to 496+50	SB	0.50	0.55	0.53	0.37	0.41	0.38	0.58	0.59	0.59	0.42	0.46	0.44	0.44	0.45	0.44	0.46	0.49	0.48	0.52	0.55	0.53			
3	II	484+20 to 492+26	SB	0.41	0.45	0.43	0.28	0.33	0.31	0.55	0.59	0.58	0.40	0.43	0.42	0.44	0.46	0.45	0.47	0.51	0.49	0.52	0.53	0.53			
5	I	481+10 to 486+50	NB	0.30	0.32	0.31	0.26	0.31	0.29	0.48	0.48	0.48	0.42	0.43	0.42	0.41	0.46	0.43	0.50	0.50	0.50	0.55	0.57	0.56			
6	I	476+50 to 481+10	NB	0.34	0.39	0.37	0.26	0.28	0.27	0.50	0.54	0.52	0.39	0.43	0.41	0.42	0.46	0.44	0.46	0.50	0.48	0.51	0.57	0.56			
6	I	474+30 to 484+20	SB	0.40	0.42	0.41	0.22	0.26	0.25	0.54	0.56	0.55	0.38	0.41	0.39	0.40	0.44	0.43	0.43	0.45	0.44	0.51	0.54	0.52			
7	III	486+50 to 476+50	NB	0.40	0.42	0.41	0.31	0.35	0.32	0.47	0.49	0.48	0.42	0.45	0.44	0.48	0.51	0.49	0.49	0.50	0.50	0.58	0.60	0.59			
7	III	466+50 to 474+30	SB	0.37	0.40	0.39	0.25	0.29	0.27	0.51	0.54	0.53	0.39	0.42	0.41	0.46	0.46	0.47	0.48	0.50	0.49	0.55	0.58	0.57			
9	IV	456+50 to 466+50	NB	0.45	0.47	0.46	0.31	0.35	0.33	0.49	0.50	0.50	0.43	0.45	0.44	0.48	0.48	0.48	0.46	0.49	0.48	0.57	0.57	0.60			
10	V	446+50 to 456+50	SB	0.45	0.51	0.47	0.32	0.37	0.34	0.53	0.56	0.54	0.42	0.44	0.43	0.44	0.48	0.46	0.45	0.49	0.47	0.55	0.58	0.56			
10	V	446+50 to 456+40	SB	0.48	0.51	0.49	0.29	0.34	0.32	0.56	0.59	0.58	0.44	0.46	0.45	0.46	0.48	0.47	0.48	0.53	0.51	0.52	0.55	0.53			

TABLE 24
 WHITE PINE SLAG
 Research Project 72 NM-316

Test Date	Coefficient of Wsf		
	Low	High	Avg
10-2-73	0.47	0.58	0.53
9-25-74	0.61	0.71	0.65
7-9-75	0.47	0.66	0.57
9-24-75	0.47	0.59	0.54
10-20-76	0.55	0.65	0.59
9-20-77	0.53	0.66	0.58

TABLE 25
TEXTURED CONCRETE PAVEMENT SURFACES

Project No.	Location	Texture Method	Const. Year	Direction and Lane	Average Coefficient of Wet Sliding Friction							
					1970	1971	1972	1973	1974	1975	1976	1977
13074-001	I 94 from north side of I 94 interchange northerly to 0.5 mile north of "N" Dr	Conventional	1970	Station 2232 to 2238								
				NBOL	0.61	0.51	0.47	0.35	0.30	0.43	0.43	0.47
		Burlap		NBIL	0.65	0.63	0.61	0.52	0.46	0.65	0.65	0.67
		Longitudinal Brooming		Station 2242 to 2248								
		Longitudinal Brooming		Station 2253 to 2259								
				NBOL	0.69	0.56	0.49	0.33	0.32	0.43	0.42	0.48
		Transverse Combing		NBIL	0.72	0.68	0.65	0.52	0.47	0.66	0.64	0.64
		Transverse Brooming		Station 2272 to 2278								
82021-04280A	I 94 from 435 ft east of Haggarty Rd easterly to 1,664 ft east of Ozga Rd	Transverse Brooming	1974	Station 2272 to 2278								
				NBOL	0.76	0.56	0.48	0.33	0.33	0.44	0.46	0.49
		WBOL	--	--	--	--	--	--	--	0.38	0.34	
		WBCL	--	--	--	--	--	--	--	0.43	0.42	
82021-05127A	I 94 from 113 ft west of Morton-Taylor Rd easterly to 542 ft east of Haggarty Rd	Transverse Brooming	1975	Station 2272 to 2278								
				NBOL	0.79	0.74	0.72	0.58	0.51	0.64	0.68	0.65
		WBOL	--	--	--	--	--	--	--	0.54	0.58	
		WBCL	--	--	--	--	--	--	--	0.44	0.47	
		WBIL	--	--	--	--	--	--	0.48	0.52		
									0.58	0.60		

TABLE 26
PAVEMENT GROOVING

Control Section	Location	Type of Grooving	Direction and Lane	Average Coefficient of Wet Sliding Friction							
				1974		1975		1976		1977	
				Non-Grooved Control	Grooved Surface	Non-Grooved Control	Grooved Surface	Non-Grooved Control	Grooved Surface	Non-Grooved Control	Grooved Surface
02041	M 28 curve at Hickory St, City of Munising	Longitudinal ⁽¹⁾	EBOL	0.43	0.41	0.38	0.37	0.53	0.43	0.46	0.42
			EBIL	0.43	0.37	0.42	0.33	0.53	0.44	0.47	0.39
			WBOL	0.42	0.42	0.32	0.31	0.58	0.43	0.34	0.34
			WBIL	0.38	0.37	0.37	0.37	0.48	0.44	0.39	0.40
09042	Eastbound M 25 curve at Thomas St, Bay County	Longitudinal ⁽¹⁾	EBOL	0.38	0.36	0.37	0.42	0.46	0.52	0.47	0.55
			EBCL	0.42	0.45	0.44	0.38	0.57	0.50	0.55	0.57
56023	M 59 curve between Dequindre and Ryan Rd	Longitudinal ⁽¹⁾	EBOL	0.27	0.30	0.34	0.39	0.36	0.42	0.38	0.48
			EBIL	0.32	0.40	0.47	0.39	0.45	0.44	0.43	0.46
			WBOL	0.26	0.31	0.37	0.36	0.38	0.47	0.38	0.47
			WBIL	0.31	0.32	0.40	0.34	0.43	0.42	0.45	0.46
62031	M 37 from Jefferson St to River St, City of Newaygo	Longitudinal ⁽¹⁾	NBOL	0.35	0.36	0.34	0.36	0.40	0.39	0.45	0.45
			NBIL	0.35	0.34	0.33	0.34	0.35	0.41	0.39	0.43
			SBOL	0.36	0.33	0.31	0.38	0.38	0.40	0.44	0.45
			SBIL	0.37	0.35	0.33	0.36	0.38	0.39	0.42	0.46
			NBIL ⁽²⁾	0.57	0.56	0.45	0.45	0.37	0.43	0.44	0.45
			SBIL ⁽²⁾	0.55	0.52	0.51	0.50	0.36	0.41	0.46	0.46
11053	Northbound I 94 BL-US 23 from Pleasant St to Shtp St, City of St. Joseph	Transverse ⁽³⁾	NBOL	0.22	0.24	0.21	0.24	0.24	0.25	0.32	0.34
			NBIL	0.31	0.34	0.29	0.33	0.35	0.39	0.36	0.42
23012 and 33041	US 27 approaches to Waverly Rd, Eaton and Ingham Counties	Transverse ⁽³⁾	NEBOL	0.33	0.35	0.38	0.36	0.38	0.33	0.38	0.34
			NEBIL	0.36	0.35	0.35	0.33	0.41	0.37	0.37	0.35
			SWBOL	0.34	0.36	0.37	0.33	0.37	0.33	0.36	0.37
			SWBIL	0.31	0.30	0.38	0.36	0.42	0.39	0.45	0.41
56023	Eastbound M 20 at Ashman St, City of Midland	Transverse ⁽⁴⁾	EBOL	0.38	0.35	0.35	0.32	0.43	0.42	0.43	0.44
			EBCL	0.40	0.37	0.33	0.32	0.40	0.39	0.41	0.44
			EBIL	0.39	0.36	0.35	0.33	0.40	0.41	0.50	0.46
56023	Eastbound M 20 at Dodd St, City of Midland	Transverse ⁽⁴⁾	EBOL	0.33	0.40	0.32	0.33	0.41	0.42	0.42	0.42
			EBCL	0.37	0.38	0.31	0.34	0.40	0.40	0.42	0.44
			EBIL	0.36	0.36	0.32	0.32	0.42	0.41	0.39	0.43
56023	Eastbound M 20 at Cronkright, City of Midland	Transverse ⁽⁴⁾	EBOL	0.37	0.38	0.33	0.34	0.40	0.42	0.42	0.43
			EBCL	0.40	0.39	0.34	0.34	0.39	0.41	0.42	0.44
			EBIL	0.36	0.40	0.36	0.39	0.42	0.44	0.46	0.46
76021	Temporary Eastbound I 69 at M 52	Transverse ⁽⁵⁾	EBOL	0.37	0.38	0.29	0.27	0.38	0.38	0.27	0.31
			EBIL	0.39	0.38	0.36	0.29	0.43	0.38	0.27	0.32
81081	M 17 at Golfside, City of Ypsilanti	Transverse ⁽⁶⁾	EBOL	0.32	0.38	0.29	0.35	0.34	0.37	0.35	0.41
			EBIL	0.37	0.39	0.36	0.37	0.34	0.38	0.33	0.43
			WBOL	0.34	0.42	0.30	0.41	0.34	0.41	0.36	0.45
			WBIL	0.29	0.37	0.29	0.37	0.34	0.37	0.32	0.41
81081	M 17 at Hewitt St, City of Ypsilanti	Transverse ⁽⁶⁾	EBOL	0.38	0.45	0.29	0.34	0.36	0.37	0.35	0.42
			EBIL	0.36	0.41	0.30	0.35	0.35	0.38	0.33	0.41
			WBOL	0.38	0.44	0.31	0.39	0.38	0.41	0.40	0.46
			WBIL	0.38	0.43	0.33	0.39	0.36	0.41	0.40	0.46
81081	M 17 at Mansfield, City of Ypsilanti	Transverse ⁽⁶⁾	EBOL	0.34	0.40	0.25	0.33	0.31	0.36	0.33	0.42
			EBIL	0.37	0.40	0.26	0.35	0.35	0.39	0.36	0.44
			WBOL	0.41	0.43	0.32	0.38	0.35	0.40	0.38	0.47
			WBIL	0.42	0.45	0.32	0.36	0.39	0.42	0.40	0.44
81081	M 17 at Oakwood, City of Ypsilanti	Transverse ⁽⁶⁾	EBOL	0.34	0.47	0.35	0.41	0.38	0.42	0.42	0.46
			EBIL	0.46	0.46	0.35	0.40	0.40	0.42	0.40	0.48
			WBOL	0.36	0.44	0.30	0.39	0.35	0.39	0.37	0.44
			WBIL	0.35	0.40	0.31	0.35	0.34	0.37	0.36	0.42
81081	Eastbound M 17 at Summit St, City of Ypsilanti	Transverse ⁽⁶⁾	EBOL	0.35	0.35	0.32	0.31	0.34	0.37	0.39	0.39
			EBCL	0.32	0.35	0.28	0.29	0.33	0.35	0.36	0.37
			EBIL	0.30	0.33	0.31	0.33	0.36	0.37	0.38	0.41

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

TABLE 27
OPEN-GRADED ASPHALT FRICTION COURSES

Project No.	Location	Const. Year	Direction and Lane	Coefficient of Wet Sliding Friction				
				1973	1974	1975	1976	1977
73062-05917	M 46 from C&O RR east to Williams St	1973	EBOL	0.52	0.55 ⁽²⁾	0.48	0.50	0.42
			EBIL	--	--	--	0.50	0.44
			WBOL	0.51	0.56 ⁽²⁾	0.46	0.48	0.42
			WBIL	--	--	--	0.51	0.44
	M 46 from Elm St east to C&O RR	1973	EBOL ⁽¹⁾	0.52	0.50 ⁽²⁾	0.45	0.47	0.41
			EBIL ⁽¹⁾	--	--	--	0.47	0.42
			WBOL ⁽¹⁾	0.51	0.49 ⁽²⁾	0.41	0.46	0.40
			WBIL ⁽¹⁾	--	--	--	0.48	0.45
73112-09446	I 75 from 120 ft south of M 13 northwest to 100 ft south of Adam St	1975	NBOL	--	--	0.50	0.58	0.47
			NBIL	--	--	0.46	0.62	0.52
			SBOL	--	--	0.51	0.63	0.54
			SBIL	--	--	0.47	0.61	0.49
Control Section 09042	M 25 from Heavenridge to Sheurman St in Bay City	1975	EBOL	--	--	0.41	0.21	0.26
			EBIL	--	--	0.42	0.25	0.29
			WBOL	--	--	0.45	0.21	0.28
			WBIL	--	--	0.42	0.20	0.25

⁽¹⁾Bituminous concrete control section.

⁽²⁾Average of two test series.

SECTION V
HIGH-ACCIDENT LOCATIONS

High-Accident Locations

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

Selection of high-accident locations for this year was made by Traffic and Safety Division and are based on 1976 accident data. Friction level measurements yielded average Wsf values below 0.40 at 54.6 percent of the 344 lanes tested in 1977. Fifteen of the lanes (4.4 percent) were lower than 0.30. The lowest values, ranging from 0.23 to 0.26 were on M 43/M 89 (Michigan Ave) at Mill St in Kalamazoo.

During 1977, pavement friction tests were conducted on 30 major highway routes. Testing was dispersed throughout five districts, 24 counties, and 75 separate locations. Table 28 summarizes the high-accident friction tests.

**TABLE 28
HIGH-ACCIDENT LOCATION SUMMARY**

Control Section	Location and Mileage	1978 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
DISTRICT 5	<u>Mecosta County</u>								
	54012	US 131-M 20 from 0.570 to 0.760 Oak St (0.630) City of Big Rapids	22	41	NB SB	Bit	0.36	0.39	0.37
							0.36	0.37	0.36
	54012	US 131-M 20 from 0.810 to 1.500 Mill St (0.953) City of Big Rapids	113	22	NB SB NBOL NBIL SBOL SBIL	Bit Conc	0.33	0.35	0.33
							0.35	0.36	0.36
							0.34	0.35	0.34
							0.33	0.35	0.34
							0.34	0.36	0.35
							0.33	0.39	0.36
	<u>Montcalm County</u>								
	59032	M 91 from 0.820 to 1.020 North St (0.960) Eureka Township	22	32	NBOL NBIL SBOL SBIL	Bit	0.33	0.36	0.35
							0.31	0.34	0.32
							0.31	0.33	0.32
							0.23	0.27	0.26
	<u>Muskegon County</u>								
	61151	US 31 BR-I 96 BS from 2.180 to 2.380 Summit Ave (2.383) City of Muskegon	23	30	EBOL EBIL WBOL WBIL	Conc	0.39	0.46	0.40
							0.45	0.48	0.47
							0.42	0.46	0.44
							0.43	0.48	0.46
	<u>Ottawa County</u>								
	70014	US 31 from 5.410 to 5.510 Robbins Rd (5.415) City of Grand Haven	22	32	NBOL NBIL SBOL SBIL	Conc	0.36	0.39	0.37
							0.45	0.48	0.46
							0.41	0.43	0.42
							0.43	0.48	0.46
	70014	US 31 from 5.720 to 5.920 Taylor Rd (5.910) City of Grand Haven	20	50	NBOL NBIL SBOL SBIL	Conc	0.37	0.39	0.38
							0.39	0.45	0.42
							0.39	0.42	0.41
							0.42	0.43	0.42
70014	US 31 from 7.010 to 7.210 Monroe St (6.090) City of Grand Haven	23	30	<u>South of Monroe St</u>					
				NBOL	Bit	0.43	0.46	0.45	
				NBCL		0.40	0.41	0.40	
				NBIL		0.47	0.52	0.49	
				SBOL		0.47	0.53	0.50	
				SBCL		0.40	0.43	0.41	
				SBIL		0.42	0.47	0.45	
				<u>North of Monroe St</u>					
				NBOL	Conc	0.39	0.41	0.40	
				NBCL		0.35	0.39	0.37	
				NBIL		0.46	0.49	0.47	
				SBOL		0.39	0.41	0.40	
				SBCL		0.35	0.37	0.36	
				SBIL		0.36	0.40	0.39	
DISTRICT 6	<u>Bay County</u>								
	09042	M 15-1 75 BL-M 25 from 1.960 to 2.160 Wenona St (2.090) City of Bay City	21	43	EBOL EBCL EBIL WBOL WBCL WBIL	Conc	0.37	0.40	0.39
							0.35	0.42	0.38
							0.43	0.46	0.44
							0.41	0.43	0.42
							0.39	0.40	0.40
							0.36	0.39	0.37
	<u>Genesee County</u>								
	25051	M 54 BR from 2.070 to 2.260 Bristol Rd, M 121 (2.261) City of Flint	26	31	NBOL NBIL SBOL SBIL	Bit	0.53	0.55	0.54
							0.49	0.53	0.51
							0.46	0.51	0.48
							0.51	0.51	0.51

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

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
<u>Genesee County (Cont.)</u>									
25071	M 54 from 5.770 to 5.970 Hill Rd (5.941) Burton Township	38	29	NBOL	Bit	0.49	0.57	0.53	
						NBIL	0.51	0.55	0.53
						SBOL	0.45	0.51	0.48
						SBIL	0.48	0.55	0.50
25072	M 54 from 2.880 to 3.100 Atherton Rd (3.001) City of Flint	32	31	NBOL	Bit	0.47	0.48	0.48	
						NBIL	0.46	0.46	0.46
						SBOL	0.41	0.43	0.42
						SBIL	0.42	0.47	0.44
25072	M 54 from 3.100 to 3.300 Manitou Ave (3.280) City of Flint	28	43	NBOL	Bit	0.42	0.45	0.43	
						NBIL	0.39	0.43	0.40
						SBOL	0.43	0.51	0.46
						SBIL	0.43	0.47	0.45
25072	M 54 from 4.180 to 4.380 Lapeer Rd (4.374) City of Flint	38	34	NBOL	Bit	0.46	0.51	0.49	
						NBIL	0.46	0.47	0.46
						SBOL	0.51	0.52	0.51
						SBCL	0.45	0.47	0.46
						SBIL	0.48	0.48	0.48
25072	M 54 from 4.390 to 4.590 Lapeer Rd (4.374) City of Flint	26	35	NBOL	Bit	0.47	0.49	0.48	
						NBCL	0.45	0.49	0.47
						NBIL	0.46	0.46	0.46
						SBOL	0.54	0.57	0.56
						SBCL	0.47	0.53	0.49
SBIL	0.41	0.47	0.45						
<u>Midland County</u>									
56021	M 20 from 17.980 to 18.180 Main St (18.260) City of Midland	31	35	EB	Conc	0.29	0.34	0.31	
				WB		0.29	0.30	0.30	
<u>Saginaw County</u>									
73032	M 47 from 0.000 to 0.050 M 46 (0.000) Saginaw Township	No Accident	Patterns*	NB	Bit	0.28	0.34	0.31	
						SB	0.34	0.41	0.38
						SBRT	0.33	0.46	0.39
73062	M 46 from 4.610 to 4.850 M 47 (4.652) Saginaw Township	26*	42	EBOL	Bit	0.30	0.34	0.31	
						EBIL	0.27	0.37	0.33
						WBOL	0.29	0.34	0.31
						WBIL	0.30	0.35	0.33
* Data for 1976 is unavailable at this time, information based on 1975 accidents.									
<u>Branch County</u>									
12021	US 12 from 16.580 to 16.750 Chicago Rd west (16.388) City of Coldwater	27	26	EBOL	Conc	0.43	0.45	0.44	
						EBIL	0.37	0.40	0.39
						WBOL	0.46	0.52	0.49
						WBIL	0.35	0.37	0.36
<u>Calhoun County</u>									
13121	I 94 BL from 6.800 to 6.870 Upton St (6.810) City of Springfield	22	41	EBOL	Conc	0.49	0.51	0.50	
						EBIL	0.42	0.48	0.45
						WBOL	0.47	0.51	0.49
						WBIL	0.51	0.57	0.55
13121	I 94 BL from 7.220 to 7.910 Washington St (7.380) City of Battle Creek	33	42	EBOL	Bit	0.35	0.42	0.39	
						EBIL	0.43	0.48	0.46
						WBOL	0.31	0.34	0.32
						WBIL	0.47	0.53	0.49
<u>Kalamazoo County</u>									
39042	BL 94-M 96-M 43 from 0.630 to 0.830 Harrison St (0.833) City of Kalamazoo	31	26	EBOL	Bit	0.39	0.40	0.40	
						EBIL	0.37	0.41	0.40
						WBOL	0.39	0.45	0.42
						WBIL	0.41	0.47	0.44

DISTRICT 6 (CONT)

DISTRICT 7

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf						
		Total	% Wet Surface			Low	High	Avg				
<u>Kalamazoo County (Cont.)</u>												
39042	BL 94-M 96-M 43 from 0.840 to 0.970 King Hwy' (0.952) City of Kalamazoo	47	36	EBOL	Bit	0.40	0.45	0.42				
						EBIL	0.41	0.47	0.45			
						WBOL	0.40	0.43	0.42			
						WBIL	0.42	0.46	0.44			
39081	M 43 from 6.340 to 6.520 Northampton Rd (6.441) City of Kalamazoo	69	33	EBOL	Bit	0.42	0.47	0.44				
						EBIL	0.43	0.43	0.43			
						WBOL	0.41	0.43	0.42			
						WBIL	0.42	0.43	0.42			
39081	M 43 from 8.260 to 8.460 Monroe St (8.387) City of Kalamazoo	47	34	EBOL	Bit	0.41	0.45	0.43				
						EBIL	0.37	0.42	0.39			
						WBOL	0.40	0.42	0.41			
						WBIL	0.40	0.43	0.42			
39081	M 43 from 8.450 to 8.670 southbound Douglas Ave M 43 (8.579) City of Kalamazoo	43	33	EBOL	Bit	0.39	0.41	0.40				
						EBIL	0.41	0.42	0.42			
						WBOL	0.35	0.41	0.37			
						WBIL	0.41	0.47	0.45			
39082	M 43-M 89 from 0.010 to 0.210 Michigan at Mill (0.152) City of Kalamazoo	52	35	EBOL	Bit	0.23	0.25	0.24				
						EBIL	0.25	0.27	0.26			
						WBOL	0.22	0.25	0.23			
						WBIL	0.22	0.25	0.23			
39082	M 43-M 89 from 2.500 to 2.610 Nazareth at Gull (2.598) City of Kalamazoo	26	38	<u>West of Nazareth Dr</u>								
				EB	Bit	0.49	0.54	0.51				
				WB		0.54	0.61	0.57				
				<u>East of Nazareth Dr</u>								
				EB	Bit	0.25	0.31	0.28				
				WB		0.29	0.33	0.31				
				<u>St. Joseph County</u>								
				78022	US 12-M 66 from 12.440 to 12.640 Monroe St (12.762) City of Sturgis	43	30	EBOL	Conc	0.36	0.40	0.37
EBIL	0.35	0.41	0.37									
WBOL	0.36	0.36	0.36									
WBIL	0.39	0.42	0.41									
78022	US 12-M 66 from 12.650 to 12.820 Maple Ave (12.815) City of Sturgis	48	29	EBOL	Conc	0.41	0.45	0.42				
						EBIL	0.40	0.42	0.41			
						WBOL	0.36	0.37	0.36			
						WBIL	0.37	0.40	0.39			
78022	US 12-M 66 from 12.830 to 13.100 Fourth St (12.883) City of Sturgis	21	57	EBOL	Conc	0.37	0.41	0.38				
						EBIL	0.37	0.39	0.38			
						WBOL	0.35	0.36	0.36			
						WBIL	0.36	0.39	0.37			
78022	US 12-M 66 from 13.100 to 13.300 Virginia Ave (13.157) City of Sturgis	39	38	EBOL	Conc	0.36	0.40	0.39				
						EBIL	0.41	0.43	0.42			
						WBOL	0.35	0.36	0.36			
						WBIL	0.39	0.42	0.40			
<u>Eaton County</u>												
23042	M 43 from 6.230 to 6.430 Julian St (6.311) Delta Township	23	43	EBOL	Bit	0.39	0.40	0.39				
						EBIL	0.36	0.39	0.37			
						WBOL	0.36	0.37	0.37			
						WBIL	0.36	0.37	0.37			
23042	M 43 from 6.440 to 6.620 Renker/Clark (6.650) Delta Township	23	52	EBOL	Bit	0.39	0.40	0.40				
						EBIL	0.39	0.41	0.40			
						WBOL	0.36	0.37	0.37			
						WBIL	0.39	0.40	0.39			

DISTRICT 7 (CONT)

DISTRICT 8

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Eaton County (Cont.)</u>								
23042	M 43 from 6.650 to 6.990 Thomas L. Parkway (6.771) Waverly Rd (6.991) Delta Township	42	31	EBOL EBIL WBOL WBIL	Bit	0.39 0.35 0.35 0.40	0.39 0.40 0.36 0.40	0.39 0.37 0.36 0.40
<u>Hillsdale County</u>								
30032	M 99 from 0.000 to 0.170 Manning St (0.070) City of Hillsdale	31	39	NBOL NBIL SBOL SBIL	Bit	0.34 0.33 0.33 0.35	0.36 0.36 0.35 0.39	0.35 0.35 0.34 0.38
30032	M 99 from 0.470 to 0.670 Lewis St (0.530) City of Hillsdale	31	43	NBOL NBIL SBOL SBIL	Conc Bit Conc Bit	0.36 0.34 0.37 0.36	0.41 0.41 0.39 0.42	0.38 0.38 0.38 0.39
<u>Ingham County</u>								
33011	M 99 from 3.460 to 3.660 Holmes Rd (3.660) City of Lansing	54	33	NBOL NBIL SBOL SBIL	Conc Bit Conc Bit	0.36 0.39 0.36 0.42	0.41 0.41 0.41 0.47	0.39 0.40 0.38 0.45
33032	I 96 BL from 2.540 to 2.740 Miller Rd (2.744) City of Lansing	40	35	NBOL NBIL SBOL SBIL	Bit	0.36 0.35 0.35 0.41	0.40 0.39 0.36 0.43	0.38 0.37 0.36 0.42
33032	I 96 BL from 3.560 to 3.730 Jolly Rd (3.670) City of Lansing	58	28	NBOL NBIL SBOL SBIL	Bit	0.40 0.37 0.36 0.36	0.43 0.41 0.39 0.37	0.42 0.39 0.37 0.37
33032	I 96 BL from 4.000 to 4.200 (Cavanaugh St) (4.160) City of Lansing	39	28	NBOL NBIL SBOL SBIL	Bit	0.42 0.39 0.41 0.42	0.43 0.41 0.43 0.43	0.42 0.40 0.42 0.43
33032	I 96 BL from 4.260 to 4.460 Maplehill/Mason (4.340) City of Lansing	22	41	NBOL NBIL SBOL SBIL	Bit	0.39 0.41 0.39 0.39	0.42 0.42 0.41 0.41	0.41 0.41 0.40 0.41
33032	I 96 BL from 4.530 to 4.720 Holmes Rd (4.663) City of Lansing	38	42	NBOL NBIL SBOL SBIL	Bit	0.37 0.40 0.41 0.36	0.40 0.42 0.41 0.43	0.39 0.41 0.41 0.40
33032	I 96 BL from 4.980 to 5.180 Denver St (5.030) City of Lansing	24	38	NBOL NBIL SBOL SBIL	Bit	0.41 0.40 0.42 0.42	0.42 0.42 0.46 0.44	0.41 0.41 0.44 0.44
33034	US 27 from 60.010 to 60.210 Oakland St (60.214) City of Lansing	23	35	NBOL NBCL NBIL SBOL SBCL SBIL	Bit Bit	0.37 0.35 0.34 0.37 0.36 0.34	0.39 0.36 0.36 0.40 0.36 0.36	0.38 0.35 0.35 0.39 0.36 0.35
33061	M 43 from 0.000 to 0.200 Waverly Rd (0.000) Lansing Township	57	28	EBOL EBIL WBRT WBOL WBIL	Bit	0.35 0.37 0.41 0.31 0.33	0.41 0.39 0.45 0.33 0.36	0.38 0.38 0.43 0.32 0.34

DISTRICT 8 (CONT)

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

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Ingham County (Cont.)</u>								
33061	M 43 from 0.690 to 0.880 Rosemary St (0.810) Lansing Township	28	32	EBOL EBCL EBIL WBOL WBCL WBIL	Conc	0.39 0.39 0.41 0.43 0.33 0.42	0.42 0.40 0.41 0.48 0.36 0.44	0.41 0.40 0.41 0.46 0.35 0.43
33061	M 43 from 2.340 to 2.510 Seymour St (2.435) City of Lansing	55	44	EBOL EB#3 EB#2 EBIL WBOL WBCL WBIL	Bit Conc	0.37 0.35 0.36 0.35 0.41 0.37 0.36	0.39 0.36 0.37 0.36 0.43 0.40 0.39	0.38 0.36 0.37 0.36 0.42 0.39 0.37
33061	M 43 from 2.830 to 3.000 US 27 Cedar St (2.920) City of Lansing	29	34	EBOL EB#4 EB#3 EB#2 EBIL WBOL WBCL WBIL	Conc	0.36 0.29 0.36 0.37 0.39 0.34 0.36 0.37	0.39 0.36 0.39 0.39 0.42 0.36 0.36 0.39	0.37 0.33 0.37 0.38 0.40 0.35 0.36 0.38
33082	M 43 from 0.410 to 0.610 University Dr (0.530) City of East Lansing	28	29	EBOL EBIL WBOL WBIL	Bit	0.36 0.36 0.33 0.39	0.40 0.39 0.36 0.40	0.38 0.37 0.35 0.39
<u>Jackson County</u>								
38072	M 50 from 1.340 to 1.540 Wildwood Ave (1.543) City of Jackson	25	40	NB SB	Bit	0.39 0.42	0.45 0.46	0.42 0.44
38083	I 94 BL from 1.580 to 1.760 East Ave (1.722) City of Jackson	49	35	<u>West of East Ave</u>				
				EBOL EBIL WBOL WBIL	Bit	0.41 0.64 0.41 0.54	0.49 0.68 0.55 0.68	0.46 0.66 0.49 0.57
				<u>East of East Ave</u>				
				EBOL EBIL WBOL WBIL	Bit	0.31 0.34 0.29 0.28	0.34 0.36 0.33 0.34	0.33 0.35 0.31 0.31
38083	I 94 BL from 2.100 to 2.300 Summit St (2.106) City of Jackson	48	25	EBOL EBIL WBOL WBIL	Bit	0.35 0.36 0.30 0.36	0.36 0.36 0.31 0.39	0.35 0.36 0.31 0.37
<u>Monroe County</u>								
58071	M 125 from 18.300 to 18.500 Nadeau Rd (18.400) Frenchtown Township	22	64	NBOL NBIL SBOL SBIL	Bit	0.24 0.29 0.29 0.29	0.30 0.31 0.30 0.30	0.27 0.30 0.29 0.30
<u>Washtenaw County</u>								
81072	I 94 BL from 1.460 to 1.660 Hill St (1.500) City of Ann Arbor	23	48	EBOL EBIL WBOL WBIL	Bit	0.42 0.42 0.45 0.41	0.45 0.46 0.46 0.45	0.43 0.45 0.46 0.43

DISTRICT 8 (CONT)

TABLE 28 (Cont.)
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Washtenaw County (Cont.)</u>								
81072	I 94 BL from 3.480 to 3.670 Huron Parkway (3.550) City of Ann Arbor	80	27	EBOL	Bit	0.39	0.41	0.40
				EBIL		0.34	0.37	0.36
				WBOL		0.37	0.41	0.39
				WBIL		0.36	0.41	0.39
81081	M 17 from 0.840 to 1.020 Foster Ave (0.880) Pittfield Township	31	52	EBOL	Conc	0.36	0.40	0.38
				EBIL		0.39	0.41	0.40
				WBOL		0.39	0.41	0.40
				WBIL		0.36	0.39	0.38
<u>Macomb County</u>								
50011	M 53 from 0.010 to 0.210 Fisher St (0.140) City of Warren	38	37	NBOL	Bit	0.35	0.39	0.37
				NBCL		0.30	0.36	0.33
				NBIL		0.35	0.36	0.36
				SBOL		0.33	0.35	0.34
				SBCL		0.35	0.36	0.36
				SBIL		0.35	0.36	0.35
50011	M 53 from 4.010 to 4.210 12 Mile Rd (4.010) City of Warren	44	29	NBOL	Bit	0.34	0.42	0.39
				NBCL		0.43	0.46	0.45
				NBIL		0.41	0.46	0.44
				SBOL		0.43	0.48	0.46
				SBCL		0.42	0.47	0.45
				SBIL		0.41	0.45	0.43
50011	M 53 from 4.710 to 4.910 Racine Rd (4.220) City of Warren	29	38	NBOL	Conc	0.31	0.34	0.33
				NBCL		0.34	0.35	0.35
				NBIL		0.36	0.40	0.37
				SBOL		0.36	0.40	0.38
				SBCL		0.34	0.35	0.35
				SBIL		0.35	0.40	0.37
50022	M 59 from 0.210 to 0.370 Engel St (0.280) City of Utica	26	35	EBOL	Conc	0.31	0.36	0.34
				EBIL		0.30	0.34	0.32
				WBOL		0.33	0.35	0.34
				WBIL		0.33	0.35	0.34
50031	M 97 from 1.010 to 1.180 9 Mile Rd (1.160) City of Warren	51	27	NBOL	Bit	0.43	0.46	0.44
				NBCL		0.42	0.43	0.42
				NBIL		0.46	0.47	0.47
				SBOL		0.42	0.49	0.46
				SBCL		0.48	0.51	0.49
				SBIL		0.49	0.51	0.50
50031	M 97 from 1.540 to 1.740 Stephens Rd east out-off (1.640) City of Warren	32	38	NBOL	Bit	0.43	0.46	0.45
				NBCL		0.40	0.42	0.41
				NBIL		0.43	0.45	0.44
				SBOL		0.41	0.43	0.42
				SBCL		0.45	0.46	0.46
				SBIL		0.45	0.47	0.46
50031	M 97 from 7.650 to 9.000 15 Mile Rd (8.280) City of Frazer	83	33	NBOL	Conc	0.29	0.36	0.34
				NBIL		0.33	0.41	0.36
				SBOL	Bit	0.33	0.36	0.35
				SBIL		0.33	0.41	0.35
50051	M 3 from 0.600 to 0.770 East Crescentwood St (0.711) City of East Detroit	20	35	NBOL	Bit	0.41	0.43	0.42
				NBCL		0.41	0.43	0.42
				NBIL		0.39	0.42	0.41
				SBOL		0.43	0.46	0.44
				SBCL		0.42	0.45	0.43
				SBIL		0.42	0.46	0.44

DISTRICT 8 (CONT)

METRO DISTRICT

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

Control Section	Location and Mileage	1976 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Oakland County</u>								
63031	US 24 from 1.900 to 2.820 10 Mile Rd (2.040) City of Southfield	73*	26	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2 SBIL	Conc	0.37 0.34 0.31 0.35 0.37 0.39 0.38 0.43	0.40 0.36 0.36 0.40 0.40 0.41 0.46	0.38 0.35 0.34 0.36 0.39 0.39 0.39 0.45
63052	US 10 from 2.700 to 2.800 Voorheis St (2.772) City of Pontiac	30*	27	NBOL NBCL NBIL SBOL SBCL SBIL	Bit	0.37 0.34 0.35 0.33 0.35 0.36	0.41 0.37 0.36 0.35 0.37	0.39 0.36 0.36 0.34 0.36 0.37
<u>St. Clair County</u>								
77032	M 25 from 5.060 to 5.250 Willow St (5.130) City of Port Huron	34	32	NBOL NBIL SBOL SBIL	Bit	0.29 0.30 0.36 0.30	0.35 0.35 0.37 0.34	0.32 0.33 0.37 0.31
77091	M 25 from 0.150 to 0.370 10th Ave (0.352) City of Port Huron	56	27	NBOL NBIL SBOL SBIL	Bit	0.34 0.24 0.27 0.34	0.35 0.27 0.31 0.36	0.34 0.25 0.29 0.35
77091	M 25 from 0.800 to 0.990 Hancock St (0.840) City of Port Huron	40	43	NBOL NBIL SBOL SBIL	Bit	0.28 0.25 0.28 0.25	0.31 0.28 0.35 0.31	0.30 0.27 0.31 0.28
77091	M 25 from 1.010 to 1.210 Garfield St (1.030) City of Port Huron	43	40	NBOL NBIL SBOL SBIL	Bit	0.28 0.30 0.27 0.27	0.29 0.31 0.33 0.34	0.28 0.31 0.29 0.31
<u>Wayne County</u>								
82023	I 94 from 2.590 to 3.750 Linwood Ave (3.657) City of Detroit	119*	45	EBOL EBCL EBIL WBOL WBCL WBIL	Conc	0.42 0.36 0.40 0.22 0.39 0.39	0.47 0.42 0.45 0.27 0.40 0.39	0.44 0.38 0.43 0.25 0.39 0.39
82023	I 94 from 4.120 to 4.520 Trumbell Ave (4.370) City of Detroit	61*	36	EBOL EBCL EBIL WBOL WBCL WBIL	Conc	0.34 0.36 0.40 0.28 0.39 0.39	0.37 0.40 0.41 0.29 0.41 0.39	0.35 0.38 0.40 0.29 0.40 0.39
82024	I 94 from 0.140 to 0.560 Woodward Ave (0.241) City of Detroit	92*	42	EBOL EBCL EBIL WBOL WBCL WBIL	Conc	0.40 0.37 0.39 0.34 0.37 0.36	0.40 0.40 0.41 0.37 0.37 0.37	0.40 0.39 0.40 0.35 0.37 0.36
82081	M 153 from 13.190 to 14.050 southbound US 24 (14.011) City of Detroit	30*	40	EBOL EBCL EBIL WBOL WBCL WBIL	Bit	0.36 0.37 0.36 0.37 0.40 0.41	0.40 0.43 0.37 0.42 0.40 0.42	0.38 0.40 0.36 0.40 0.40 0.41
82121	I 96 BS from 13.090 to 13.150 westbound I 94 (13.120) City of Detroit	48*	54	EBOL EBCL EBIL WBOL WBCL WBIL	Bit	0.41 0.42 0.39 0.41 0.40 0.37	0.43 0.45 0.42 0.46 0.40 0.42	0.42 0.43 0.40 0.43 0.40 0.42

METRO DISTRICT (CONT)

* Data for 1976 is unavailable at this time, information based on 1975 accidents.

SECTION VI
SPECIAL REQUEST TESTS

Special Request Tests

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



OFFICE MEMORANDUM

DATE: July 12, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on Ms 63041-10067, M 59 from Telegraph Rd East to Franklin St, Oakland County. Research Project 54 G-74, 77 SR-1.

In your June 21, 1976 memorandum, skid tests were requested for two Ms skid-proofing projects. Only one of the two locations was completed during the 1976 construction season, i.e., Project Ms 63052-08776, located on US 10 at Elizabeth Lake Rd. Skid tests were conducted at this location July 13, 1976 and results transmitted to you November 19, 1976 as 76 SR-17.

Surfacing of the second location, M 59 from Telegraph Rd east to Franklin St (Project Ms 63041-10067) has just recently been completed. Skid tests were performed July 7, 1977. Friction levels ranged from 0.30 to 0.54 and averaged 0.42. A data breakdown by lane is shown below for your review.

Table with 4 columns: Lane Tested, Coefficient of Wsf (Low, High, Avg). Rows include EBOL, EBIL, WBOL, WBCL, and WBIL with corresponding friction values.

It might be noted that, although friction levels at both locations averaged 0.42, the second location (reported above) does not have the uniform distribution of wsf values that were determined at the US 10 location. For your convenience, a copy of the US 10 test results are attached.

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf
Attachment

- cc: W. J. MacCreery
H. B. LaFrance
P. J. Riley
P. Christy
H. Goetsch
D. A. Bell
L. J. Ruest



OFFICE MEMORANDUM

DATE: June 10, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on Project Mb 83013-07669A; M 37 from M 115 to M 113. Research Project 54 G-74, 77 SR-2.

In accord with your January 17, 1977 request, friction level measurements have been conducted on M 37 from M 115 north to M 113 in Wexford and Grand Traverse Counties. This area was first skid tested in 1975, during the initial service year of its bituminous aggregate surface. Coefficients determined at this time ranged from 0.23 to 0.41 and averaged 0.31. A second series of tests were conducted in 1976, when wsf values ranged from 0.30 to 0.44 and averaged 0.38. The most recent skid tests were conducted June 7, 1977. Coefficients averaged 0.38, the same as for last year's tests, and ranged from 0.31 to 0.48.

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

TESTING AND RESEARCH DIVISION

L. T. Oehler

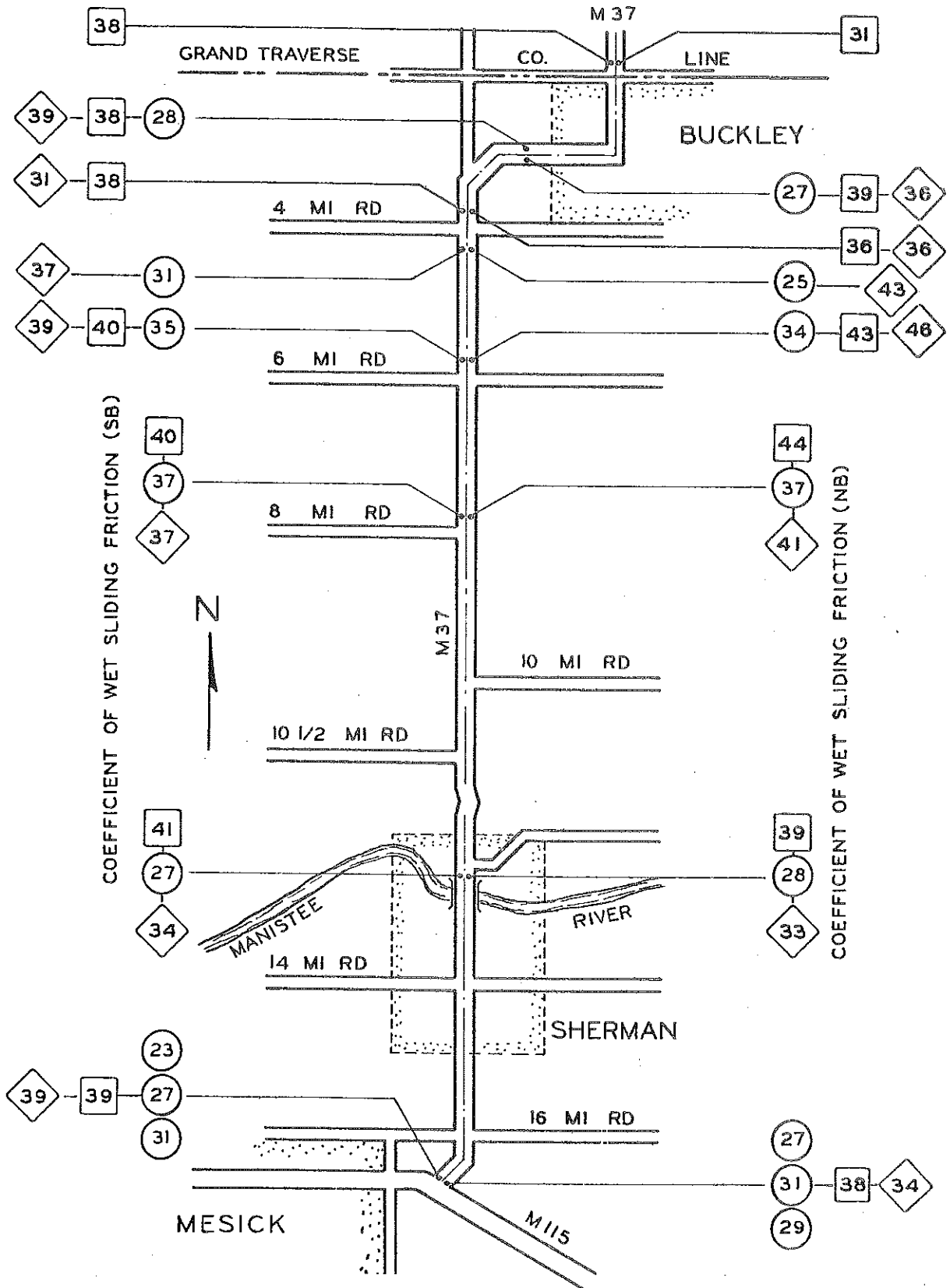
Engineer of Research

LTO:PMS:bf

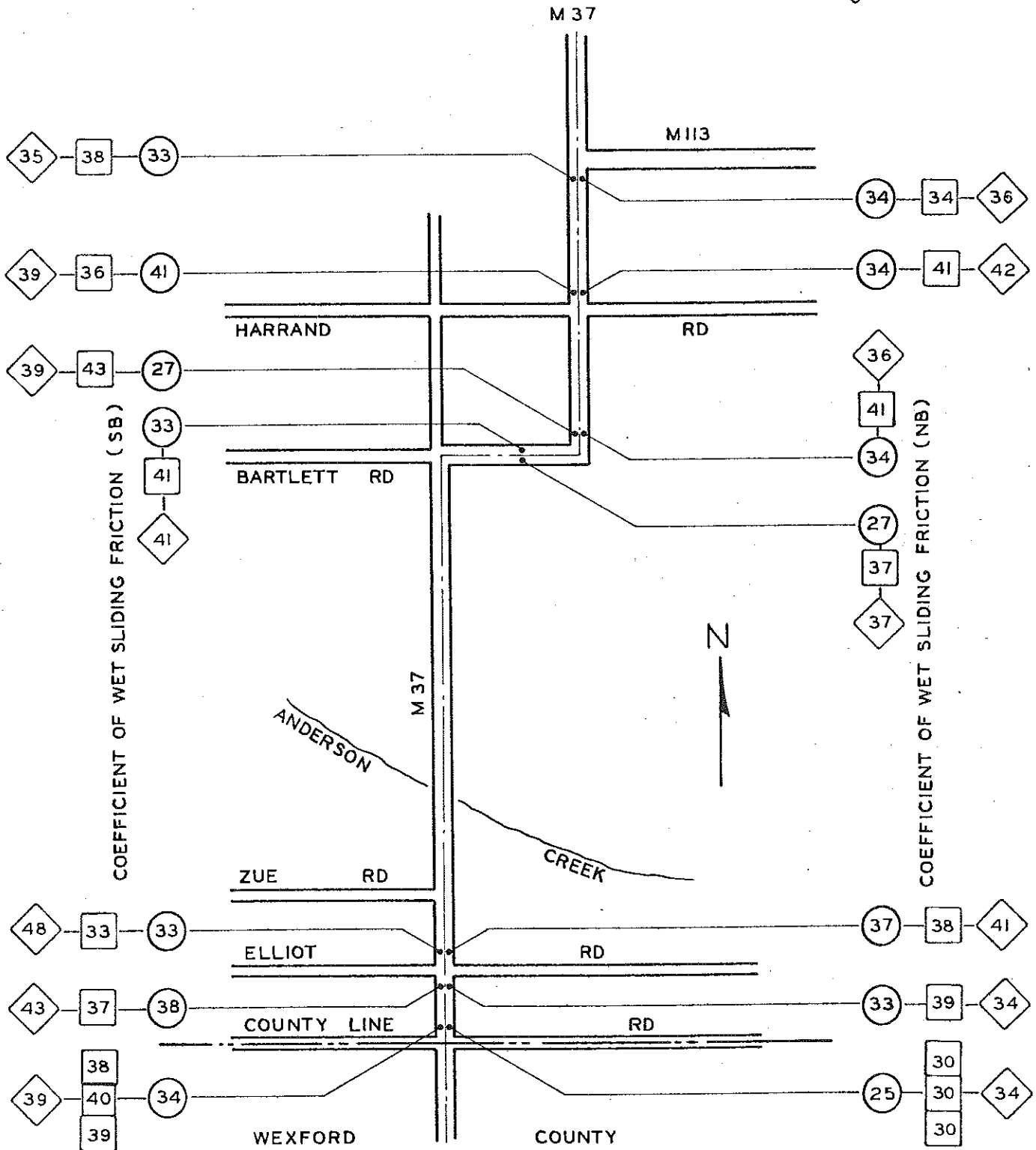
Attachment

cc: B. A. Conradson
R. A. Welke
Safety Programs Unit

- = 75 SR-25
TEST DATE 9-22-75
- = 76 SR-8
TEST DATE 6-16-76
- ◇ = 77 SR-2
TEST DATE 6-7-77



- = 75 SR-25
TEST DATE 9-22-75
- = 76 SR-8
TEST DATE 6-16-76
- ◇ = 77 SR-2
TEST DATE 6-7-77





OFFICE MEMORANDUM

DATE: May 4, 1977

TO: Max N. Clyde
Assistant Deputy Director

FROM: K. A. Allemeier

SUBJECT: Pavement Skid Resistance at SB M-39 Off Ramp
Research Project 54 G-74, 77 SR-3

In response to the recommendation noted on page 10 of the Highway Surveillance Committee Report Number 3, August 25, 1976, pavement friction measurements were conducted April 11, 1977 along the requested M-39 southbound off ramp. Eight coefficients of wet sliding friction measured at this location range from 0.49 to 0.61 and average 0.55.

Pavement friction measurements were also performed at or along remaining ramp locations in the M-39 - I-96 interchange which were open to traffic. Results of these tests are tabulated below for your review.

Test Location	No. Tests	40 mph Coefficient of wsf		
		Low	High	Avg
NB M-39 Exit to EB I-96	6	0.46	0.59	0.53
WB I-96 Entrance to SB M-39	6	0.46	0.66	0.59
WB I-96 Entrance to NB M-39	3	0.49	0.51	0.50
SB & NB Entrance to EB I-96 (Dual)	6	0.52	0.58	0.55
WB I-96 (Dual) Exit to SB & NB M-39	5	0.46	0.55	0.51

TESTING AND RESEARCH DIVISION

K. A. Allemeier
Engineer of Testing and Research

KAA:PTL:cgc

cc: L. T. Oehler
D. E. Orne



OFFICE MEMORANDUM

DATE: April 28, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at Proposed Signal Location, West of Lansing
Research Project 54 G-74, 77 SR-4

Friction level measurements have been conducted on 500-ft legs approaching the intersection of Grand River Avenue (BL 96) and Airport Road, west of Lansing. Coefficients, determined April 13, 1977, ranged from 0.36 to 0.53 and averaged 0.45. The bituminous concrete surface at this location was constructed in 1973 under project Mb 19021-06075. A lane breakdown of skid tests is shown below for your review.

Lane	40 mph Coefficient of Wsf		
	Low	High	Avg.
(BL 96)			
EBOL	0.42	0.44	0.43
EBIL	0.49	0.51	0.50
WBOL	0.40	0.42	0.41
WBIL	0.48	0.53	0.50
(Airport Road)			
SB	0.36	0.42	0.39

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: R. L. Blost
W. F. Savage
R. E. Maki
Safety Programs Unit
M. L. Jones
R. Welke



OFFICE MEMORANDUM

DATE: April 28, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at the Intersection of US-27 with Canal Road and Crowner Drive, Eaton County. Research Project 54 G-74, 77 SR-5

Friction level measurements were conducted April 13, 1977 at two US-27 intersections SW of Lansing. Both intersections have a concrete surface which was constructed in 1957 under project 23-17, C14.

At the intersection of US-27 and Canal Road, coefficients ranged from 0.29 to 0.36 and averaged 0.32. Individual lane values are shown below.

Lane	40 mph Coefficient of Wsf		
	Low	High	Avg
NBOL	0.29	0.31	0.30
NBIL	0.31	0.34	0.33
SBOL	0.31	0.35	0.33
SBIL	0.31	0.36	0.33

At the intersection of US-27 and Crowner Drive, coefficients ranged from 0.32 to 0.44 and averaged 0.37. Data is broken down by lane below, for your review.

Lane	40 mph Coefficient of Wsf		
	Low	High	Avg
NBOL	0.35	0.37	0.36
NBIL	0.43	0.44	0.43
SBOL	0.32	0.36	0.34
SBIL	0.35	0.36	0.35

One additional skid test was conducted in the Crowner Drive, US-27 intersection. It was taken in a polished area where Crowner Drive traffic turns left to the NBIL of US-27. The resulting wsf value was 0.35.

TESTING AND RESEARCH DIVISION

L. Roy T. Oubler

Engineer of Research

Research Laboratory Section

LTO:PMS:cgc

cc: R. L. Blost
V. M. Jarvi
Safety Programs Unit
L. V. Suboski
W. F. Savage



OFFICE MEMORANDUM

DATE: May 18, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on I 496, Control Sections 33044 and 33045. Research Project 54 G-74, 77 SR-6.


In response to your April 13 request, pavement friction measurements were conducted on I 496 between Waverly and Trowbridge Roads.

The attached tables summarize results of 222 tests performed May 3, 1977 at that location. Mainline I 496 tests are listed by stationing in order of direction of traffic flow. Other locations (ramps) are listed in approximate order from west to east.

Had these tests been performed during later summer or fall months it is likely resultant values would be lower.

Pavement friction levels are normally optimum (high) during spring months. Statewide seasonal variations in friction levels average ± 0.11 and can be almost zero or can exceed 0.33.

TESTING AND RESEARCH DIVISION



Engineer of Research

LTO:PTL:bf

cc: K. A. Allemeier
W. J. MacCreery
L. V. Suboski
Safety Programs Unit

PAVEMENT FRICTION SUMMARY

I 496 - Mainline, Waverly Rd East to Trowbridge Rd

Test Location Station to Station (Control Section)	Lane Tested	No. of Tests	Coefficient of Wet Sliding Friction		
			Low	High	Avg
<u>(33044)</u>					
Sta. 305 - Sta. 315	EBOL	3	0.47	0.48	0.47
	EBIL	3	0.55	0.57	0.56
Sta. 340 - Sta. 350	EBOL	3	0.39	0.43	0.41
	EBIL	3	0.40	0.47	0.44
Sta. 363 - Sta. 370	EBOL	3	0.44	0.49	0.46
	EBIL	3	0.49	0.52	0.51
Sta. 373 - Sta. 435	EBOL	10	0.40	0.46	0.43
	EBIL	9	0.47	0.52	0.49
<u>(33045)</u>					
Sta. 488 - Sta. 545	EBOL	8	0.40	0.48	0.45
	EBIL	8	0.44	0.62	0.52
Sta. 545 - Sta. 488	WBOL	6	0.42	0.45	0.44
	WBIL	6	0.42	0.51	0.46
<u>(33044)</u>					
Sta. 435 - Sta. 373	WBOL	9	0.45	0.49	0.46
	WBIL	9	0.49	0.55	0.52
Sta. 369 - Sta. 363	WBOL	2	0.42	0.46	0.44
	WBIL	2	0.48	0.51	0.50
Sta. 352 - Sta. 346	WBOL	2	0.48	0.48	0.48
	WBIL	2	0.52	0.53	0.52
Sta. 317 - Sta. 309	WBOL	2	0.47	0.49	0.48
	WBIL	2	0.52	0.53	0.52
Sta. 293 - Sta. 285	WBOL	3	0.46	0.51	0.48
	WBIL	3	0.55	0.60	0.58

PAVEMENT FRICTION SUMMARY

I 496 - Ramps, Waverly Rd East to Trowbridge Rd

Test Location Station to Station (Control Section)	Lane Tested	No. of Tests	Coefficient of Wet Sliding Friction		
			Low	High	Avg
Northbound Waverly Rd entrance to eastbound I 496	Ramp	5	0.43	0.59	0.50
Northbound Waverly Rd entrance to westbound I 496	Ramp	3	0.42	0.52	0.47
Westbound I 496 exit to Waverly Rd	Ramp	5	0.42	0.55	0.48
Westbound I 496 exit to south- bound US 27 (temp. I 69)	Ramp	6	0.36	0.44	0.41
St. Joseph St (at Hungerford St) to southbound US 27 (temp. I 69)	Ramp	6	0.39	0.44	0.42
Northbound US 27 (temp. I 69) entrance to eastbound I 496	Ramp	3	0.39	0.41	0.38
Eastbound I 496 exit to Logan St (M 99)	Ramp	3	0.47	0.51	0.49
St. Joseph (at Middle St) en- trance to westbound I 496	Ramp	3	0.41	0.42	0.41
Main St (at Butler) entrance to eastbound I 496	Ramp	3	0.36	0.43	0.40
Eastbound I 496 exit to Pine- Walnut St	Ramp	3	0.37	0.49	0.44
St. Joseph (at Pine) entrance to westbound I 496	Ramp	3	0.39	0.43	0.41
Westbound I 496 exit to Logan St (M 99)	Ramp	3	0.37	0.47	0.41
Main St (at Walnut) entrance to eastbound I 496	Ramp	3	0.40	0.43	0.42
Westbound I 496 exit to Walnut St	Ramp	3	0.42	0.52	0.47
Eastbound I 496 (Main St) exit to southbound Cedar St	Ramp	3	0.43	0.48	0.46
Eastbound I 496 (Main St) exit to northbound Larch St	Ramp	3	0.34	0.39	0.36

Test Location Station to Station (Control Section)	Lane Tested	No. of Tests	Coefficient of Wet Sliding Friction		
			Low	High	Avg
Northbound Cedar St entrance to eastbound I 496 (Main St)	Ramp	3	0.42	0.43	0.43
Southbound Cedar St entrance to westbound I 496 (St. Joseph St)	Ramp	3	0.46	0.51	0.48
Northbound Larch St entrance to westbound I 496 (St. Joseph St)	Ramp	3	0.36	0.41	0.39
Pennsylvania Ave access to northbound Larch St	Ramp	7	0.35	0.44	0.41
Pennsylvania Ave access to westbound I 496 (St. Joseph St)	Ramp	2	0.39	0.41	0.40
Eastbound I 496, Main St, C.D. approach to Pennsylvania Ave	EBOL	3	0.39	0.43	0.41
	EBCL	3	0.41	0.48	0.44
	EBIL	3	0.41	0.45	0.44
Eastbound I 496 entrance (at Pennsylvania Ave)	Ramp	6	0.39	0.47	0.44
Pennsylvania Ave access to Main St	EB	1	--	--	0.43
Main St access and westbound I 496 exit approach to Pennsyl- vania Ave	WBOL	1	--	--	0.51
	WB#3	1	--	--	0.47
	WB#2	1	--	--	0.47
	WBIL	1	--	--	0.37
Westbound I 496 exit to Pennsylvania Ave	Ramp	4	0.43	0.52	0.48
Eastbound I 496 exit to East Lansing and northbound US 127	Ramp	4	0.37	0.43	0.41
Eastbound I 496 exit to Trow- bridge Rd	Ramp	4	0.42	0.54	0.46
Southbound US 127 exit to west- bound I 496	Ramp	3	0.39	0.42	0.41
Northbound US 127 exit to Trow- bridge Rd	Ramp	3	0.42	0.59	0.51
Westbound Trowbridge Rd en- trance to westbound I 496	Ramp	4	0.42	0.53	0.46
Westbound Trowbridge Rd en- trance to southbound US 127	Ramp	3	0.41	0.52	0.45



OFFICE MEMORANDUM

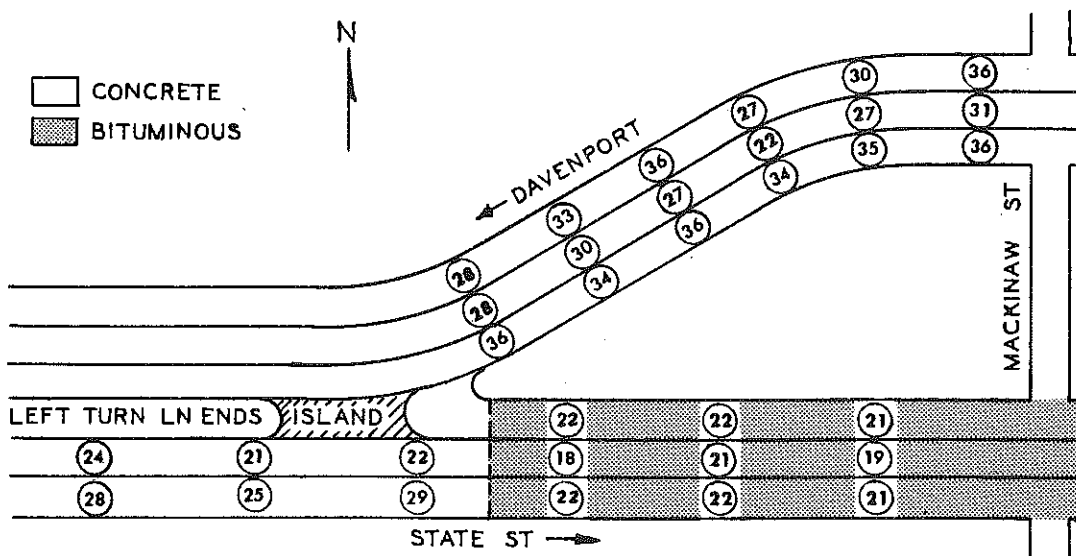
DATE: June 21, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on M 58 (Davenport Ave) from Mackinaw St west in Saginaw County. Research Project 54 G-74, 77 SR-7.

In accord with your April 19, 1977 request, skid tests have been conducted on M 58 through the curved portion of Davenport Ave (westbound M 58), west of Mackinaw St in Saginaw County. Eighteen westbound tests were conducted June 9, 1977. Coefficients ranged from 0.22 to 0.36 and averaged 0.31. Skid tests were also conducted on the adjacent eastbound lanes (State St). Coefficients on the concrete pavement ranged from 0.21 to 0.29 and averaged 0.25; bituminous values ranged from 0.18 to 0.22 and averaged 0.21. Below for your review, is a schematic diagram showing wsf values and approximated test locations.



TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier
V. M. Jarvi
Safety Programs Unit
D. Van Hine
R. A. Welke



OFFICE MEMORANDUM

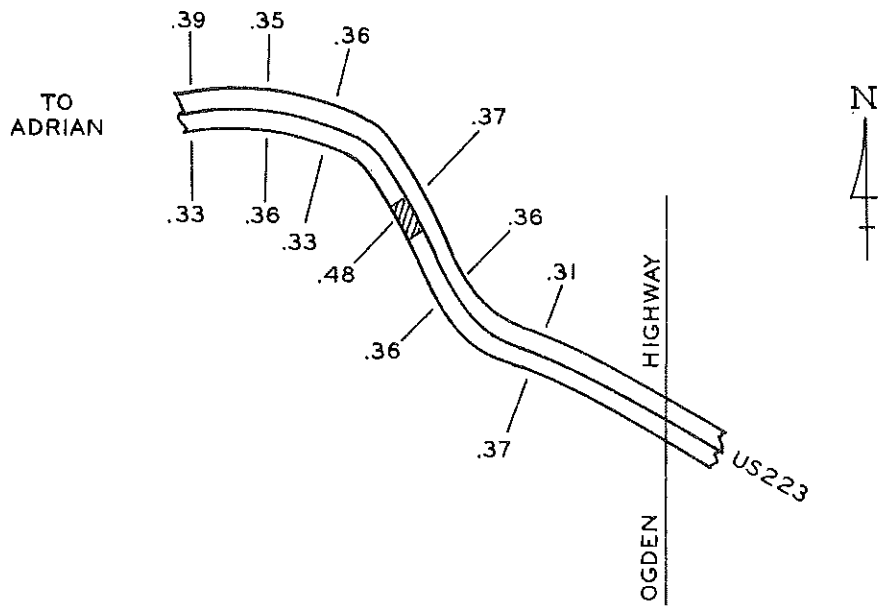
DATE: June 9, 1977

TO: T. R. Wiseman
Engineer of Maintenance

FROM: L. T. Oehler

SUBJECT: Skid Tests on US 223, East of Adrian.
Research Project 54 G-74, 77 SR-8.

In accord with your May 16, 1977 request; skid tests have been conducted in the US 223 curve area, west of Ogden Highway in Lenawee County. A series of 12 tests were made June 6, 1977. Eleven yielded friction levels ranging from 0.31 to 0.37 and averaging 0.36. The 12th test was on a 50 ft patch in the eastbound roadway and had a wsf value of 0.48. Below, for your review, is a diagram showing the layout of skid test results.



TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: G. E. Langen
R. Maki
J. Norton



OFFICE MEMORANDUM

DATE: June 21, 1977

TO: E. L. Upson
District Engineer

FROM: L. T. Oehler

SUBJECT: Skid Tests of Seven Locations in District 6.
Research Project 54 G-74, 77 SR-9.

Skid tests have been completed at the seven locations requested in your June 1, 1977 teletype to F. Copple. A summary is attached for your review.

For this group of tests, lowest friction levels were encountered at two locations:

- 1) The northbound lane of M 24, north of Columbiaville Rd. yielded coefficients ranging from 0.17 to 0.27 and averaging 0.33.
- 2) Westbound Pierce Rd., west of Center Rd., had wsf values ranging from 0.15 to 0.49 and averaging 0.36. This area had scattered spots where the limestone chip seal coat was no longer evident. As a result of this surface condition, a wide wsf value range has been encountered.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler

Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier
R. A. Welke
Safety Programs Unit

PAVEMENT FRICTION SUMMARY
 Research Project 54 G-74, 77 SR-9

Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
			Low	High	Avg
<u>1. M 13 from M 21 South 500 ft (Control Section 25011)</u>					
6-3-77	Bit	NB	0.33	0.36	0.35
	Bit	SB	0.27	0.34	0.30
<u>2. M 58 Retexturing Project on State Street, West of Saginaw Between Warwick and Weineke Street (Control Section 73073)</u>					
6-5-77					
<u>East and West of Hemmeter Street</u>					
	Conc ¹	EBOL	0.42	0.47	0.44
	Conc ¹	EBIL	0.41	0.43	0.42
	Conc ¹	WBOL	0.43	0.46	0.45
	Conc ¹	WBCL	0.41	0.47	0.44
	Bit ¹	WBIL	0.42	0.46	0.43
<u>East and West of Center Street</u>					
	Conc ¹	EBOL	0.42	0.45	0.43
	Conc ¹	EBIL	0.40	0.45	0.42
	Conc ¹	WBOL	0.40	0.43	0.41
	Conc ¹	WBCL	0.42	0.45	0.43
	Bit ¹	WBIL	0.37	0.41	0.40
<u>Between Center Street and Weineke Street</u>					
	Conc	EBOL	0.35	0.36	0.36
	Conc	EBIL	0.34	0.34	0.34
	Conc	WBOL	0.34	0.39	0.36
	Conc	WBCL	0.35	0.40	0.37
	Bit	WBIL	0.36	0.46	0.42
<u>East and West of Weineke Street</u>					
	Conc ¹	EBOL	0.42	0.43	0.43
	Conc ¹	EBIL	0.42	0.45	0.43
	Conc ¹	WBOL	0.43	0.43	0.43
	Conc ¹	WBCL	0.42	0.46	0.44
	Bit ¹	WBIL	0.48	0.48	0.48

¹ Surface has been textured with the Rotomill.

Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
			Low	High	Avg
3. M 84 (Bay Road) from Weiss Street (Saginaw City Limits)					
<u>North to Shattuck Street (Control Section 73033)</u>					
6-5-77	Bit	NBOL	0.35	0.40	0.37
		NBIL	0.35	0.37	0.36
		SBOL	0.35	0.36	0.36
		SBIL	0.34	0.36	0.35
4. <u>M 24, Columbiaville Road North to M 90 (Control Section 44012)</u>					
6-3-77					
<u>North of Columbiaville Road</u>					
	Bit	NB	0.17	0.27	0.23
	Bit	SB	0.31	0.39	0.35
<u>North of White Road</u>					
	Bit	NB	0.29	0.39	0.33
	Bit	SB	0.31	0.35	0.33
<u>North of Miller Lake Road</u>					
	Bit	NB	0.29	0.36	0.33
	Bit	SB	0.34	0.36	0.35
<u>North of Barnes Lake Road</u>					
	Bit	NB	0.34	0.40	0.38
	Bit	SB	0.33	0.39	0.35
<u>North of Burnside Road</u>					
	Bit	NB	0.27	0.31	0.29
	Bit	SB	0.37	0.48	0.42
<u>North of M 90</u>					
	Bit	NB	0.41	0.46	0.44
	Bit	SB	0.42	0.48	0.46

Test Date	Surface Type	Direction and Lane	Coefficient of Wsf		
			Low	High	Avg
5. <u>Pierce Road (5 Miles North of M 58) from Center Road West 2 Miles</u>					
6-5-77					
<u>West from Center Road</u>					
	Bit ²	EB	0.52	0.60	0.56
	Bit ³	WB	0.15	0.49	0.36
<u>West from Lawndale Road</u>					
	Bit ²	EB	0.22	0.31	0.27
	Bit ³	WB	0.27	0.43	0.39
6. <u>Eastbound Temporary I 69 at M 52, North of Perry (Control Section 76021)</u>					
6-3-77	Transverse Grooved Concrete	EBOL	0.27	0.35	0.31
		EBIL	0.30	0.35	0.32
	Conc	EBOL	0.24	0.31	0.27
	Conc	EBIL	0.36	0.39	0.37
7. <u>M 25-BL 75 at Approaches to Veterans Bridge (Control Section 09042)</u>					
6-5-77	Conc	EBOL	0.29	0.30	0.30
	Conc	EBIL	0.29	0.33	0.31
	Conc	WBOL	0.22	0.31	0.28
	Conc	WBIL	0.31	0.34	0.33

² Bituminous surface with sand.

³ Bituminous surface with limestone chips.



OFFICE MEMORANDUM

DATE: July 12, 1977

TO: E. L. Upson
District Engineer

FROM: L. T. Oehler

SUBJECT: Follow-Up Skid Tests on M 13 South of M 21.
Research Project 54 G-74, 77 SR-10.

In accord with your June 13, 1977 telephone conversation with F. Copple, follow up skid tests have been conducted on M 13 between M 21 and I 69 in Genesee County.

Initially, the 500 ft area south of M 21 was tested June 3, 1977 and reported to you June 21, 1977 as a part of 77 SR-9. At this time northbound wsf values ranged from 0.33 to 0.36 and averaged 0.35; southbound values ranged from 0.27 to 0.34 and averaged 0.30.

Follow up tests were conducted July 7, 1977 in the 500 ft area south of M 21 and at two additional locations north of I 69. Resulting friction levels are shown below.

Test Area	Lane	Coefficient of Wsf		
		Low	High	Avg
500 ft area south of M 21	NB	0.35	0.40	0.38
	SB	0.40	0.42	0.41
North of Lennon	NB	0.34	0.36	0.35
	SB	0.37	0.42	0.40
North of I 69	NB	0.37	0.40	0.39
	SB	0.40	0.42	0.41

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf

cc: J. Norton



OFFICE MEMORANDUM

DATE: October 6, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on Stoney Mix Projects; Research Project 54-G-74
77 SR-11

In accord with your request, skid tests have been conducted on five projects which were constructed during 1976, and one which was constructed in 1977. All or a portion of these projects used an experimental mix design with increased stone content. In comparing initial skid test values of 1976 with the one-year service level values of 1977, fourteen bituminous concrete lanes tested had an average friction level decay of .07 at the one-year service period. Contrastingly, skid resistance on the four bituminous aggregate lanes had an average increase of .04 at the one-year level. Results from skid resistance measurements on adjacent conventionally mixed bituminous concrete and bituminous aggregate followed a similar pattern at the one-year service level. Bituminous concrete values averaged .05 lower after one year and bituminous aggregate values averaged .07 higher.

As may be seen on the attached table, coefficients as low as 0.31 were encountered on the increased stone projects. This indicates the change in mix design alone will not guarantee the production of a high skid resistant surface.

Attached, for your review, is a table of all friction level measurements.

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: Safety Programs Unit

STONE MIX PROJECTS
77 SR-11

Project	Construction Year	Surface Type	Test Date	Lane	Coefficient of Wsf		
					Low	High	Avg
14031-06119	1976	Bit Conc with 52 percent stone passing #8 sieve			<u>North of State Line</u>		
M 62 from Indiana State Line north to US 12			9-17-76	NB	0.47	0.51	0.49
			7-15-77	SB	0.50	0.52	0.51
				NB	0.51	0.53	0.52
				SB	0.42	0.45	0.43
					<u>South of US 12</u>		
			7-19-76	NB	0.29	0.35	0.31
				SB	0.34	0.38	0.36
			9-17-76	NB	0.44	0.49	0.47
				SB	0.38	0.43	0.40
			7-15-77	NB	0.31	0.37	0.33
				SB	0.35	0.37	0.36
36023-10843	1976	Bit Conc with 5 percent increased stone			<u>In Crystal Falls</u>		
M 69 intermittently west of Crystal Falls, thence easterly through Crystal Falls to M 95			10-19-76	EBOL	0.60	0.63	0.62
				EBIL	0.63	0.64	0.64
				WBOL	0.56	0.59	0.58
				WBIL	0.63	0.66	0.65
			7-12-77	EBOL	0.47	0.52	0.50
				EBIL	0.57	0.58	0.57
				WBOL	0.46	0.52	0.48
				WBIL	0.54	0.62	0.59
					<u>Crystal Falls to Sagola</u>		
		Bit Agg	10-19-76	EB	0.45	0.58	0.51
				WB	0.41	0.49	0.46
			7-12-77	EB	0.55	0.61	0.59
				WB	0.55	0.58	0.57

STONEY MIX PROJECTS (Cont.)

77 SR-11

Project	Construction Year	Surface Type	Test Date	Lane	Coefficient of Wsf		
					Low	High	Avg
78022-11098 US 12 from Penn Central Railroad, 4 miles west of Sturgis, easterly 3.94 miles to 2,112 ft west of M 66 and from 1,575 ft east of Vine-wood St easterly 4.35 miles to west of Half-Way Rd	1976	Bit Conc	500 ft to 2,500 ft East of Balk Rd				
			11-15-76	EB	0.51	0.54	0.53
			7-21-77	WB	0.52	0.53	0.52
				EB	0.50	0.52	0.51
				WB	0.43	0.47	0.44
			2,500 ft East of Balk Rd to 200 ft West of White School Rd				
			11-15-76	EB	0.55	0.59	0.57
			7-21-77	WB	0.51	0.53	0.52
				EB	0.46	0.48	0.47
				WB	0.46	0.49	0.47
78062-09312 M 86 from Main St south of Three Rivers, easterly to M 66, thence northerly 2 miles and easterly 4.24 miles	1976	Bit Agg	M 86 from Three Rivers to M 66				
			11-15-76	EB	0.45	0.53	0.47
			7-15-77	WB	0.40	0.50	0.46
				EB	0.42	0.55	0.50
				WB	0.45	0.57	0.50
			M 66 from South to North Junction M 86				
			11-15-76	NB	0.51	0.52	0.51
			7-15-77	SB	0.54	0.58	0.56
				NB	0.54	0.55	0.54
				SB	0.53	0.55	0.54
		Bit Agg with 5 percent increased stone	M 86 from M 66 East				
			11-15-76	EB	0.55	0.59	0.57
			7-15-77	WB	0.53	0.57	0.55
				EB	0.64	0.65	0.65
			WB	0.60	0.62	0.61	

STONEY MIX PROJECTS (Cont.)

77 SR-11

Project	Construction Year	Surface Type	Test Date	Lane	Coefficient of Wsf			
					Low	High	Avg	
82053-06459 US 24 from I 96 BL to 8 Mile Rd	1976	Type M	11-16-76	NBOL	0.56	0.57	0.57	
		Bit Conc with 5 percent increased stone		NB#3	0.55	0.57	0.56	
				NB#2	0.55	0.58	0.56	
				NBIL	0.54	0.57	0.55	
			7-7-77	NBOL	0.48	0.51	0.49	
				NB#3	0.42	0.49	0.46	
				NB#2	0.46	0.51	0.48	
				NBIL	0.53	0.54	0.54	
				SBOL	0.49	0.51	0.50	
				SB#3	0.49	0.53	0.51	
25011-10849 M 13-M 21 from I 69 North to M 56	1977	Type M	11-16-76	SBOL	0.52	0.53	0.53	
		Bit Conc		SB#2	0.52	0.54	0.53	
				SBIL	0.43	0.43	0.43	
			7-7-77	SBOL	0.47	0.49	0.48	
				SB#3	0.48	0.51	0.49	
				SB#2	0.45	0.48	0.47	
				SBIL				
				Bit Conc with 5 percent increased stone				
				Bit Conc				
I 69 North to Lemmon				NB	0.37	0.40	0.39	
				SB	0.40	0.42	0.41	
				<u>Lemmon North to M 56</u>				
				NB	0.33	0.36	0.35	
				SB	0.27	0.34	0.30	
				NB	0.34	0.40	0.36	
Lemmon North to M 56				SB	0.37	0.42	0.41	



OFFICE MEMORANDUM

DATE: July 12, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests on US-23 S. of Six Mile Road in Washtenaw County
(Control Section 81075). Research Project 54 G-74, 77 SR-12

In accord with your June 28, 1977 request, skid tests have been conducted on US-23, S. of Six Mile Road between Stations 530+00 and 551+25. Subject location was resurfaced in the fall of 1976. Complaints of slippery pavement prompted the installation of "slippery when wet" signs in January, 1977. Results of our recent skid tests indicate no apparent necessity for the continuation of "slippery when wet" signs. Results of July 6, 1977 tests are shown below for your review.

Lane	Coefficient of Wsf		Avg
	Low	High	
NBOL	0.46	0.47	0.46
NBIL	0.53	0.59	0.56
SBOL	0.43	0.48	0.46
SBIL	0.57	0.60	0.58

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: M. E. Witteveen
Safety Programs Unit
L. V. Suboski



OFFICE MEMORANDUM

DATE: July 19, 1977

TO: H. B. LaFrance
Engineer of Construction

FROM: L. T. Oehler

SUBJECT: High-Air Content on M-14 in Washtenaw Co. (Project 81103-08473)
Research Projects 77 TI-402 and 54 G-74, 77 SR-13

In your correspondence dated May 13, 1977, you requested a series of skid tests on Project 81103-08473 to monitor a potential loss of texture in an excessive air content area. The area in question is the WBIL between Stations 227 and 255.

On June 27, 1977, a visual inspection of texture in the "high air" area (Station 227 to 255) and in a "control" area (WBIL Station 175+93 to 220+00) was made. Texture at both locations was documented with photographs. Both areas appeared to possess excellent texture.

Skid tests were conducted July 6, 1977 in both areas. Tests were made with a treaded tire and with a smooth tire. Both areas yielded higher than average wsf values as may be seen below.

Area Tested	Test Tire	Coefficient of wsf		
		Low	High	Avg.
High Air	Treaded Tire	0.76	0.82	0.78
	Smooth Tire	0.67	0.79	0.74
Control	Treaded Tire	0.71	0.78	0.74
	Smooth Tire	0.55	0.73	0.65

Subject roadway is currently not open to traffic nor is it expected to be until 1979. Additional skid tests will be conducted shortly before the open-to-traffic date and again at approximately one-year intervals thereafter for a period of at least three years. Photographs will also be taken to supply additional documentation of the texture's endurance when under a traffic bearing condition.

TESTING AND RESEARCH DIVISION

LTO:PMS:cgc

cc: K. A. Allemeier
D. L. Wickham
E. Rohacz
F. Copple

L. T. Oehler
Engineer of Research
Research Laboratory Section



OFFICE MEMORANDUM

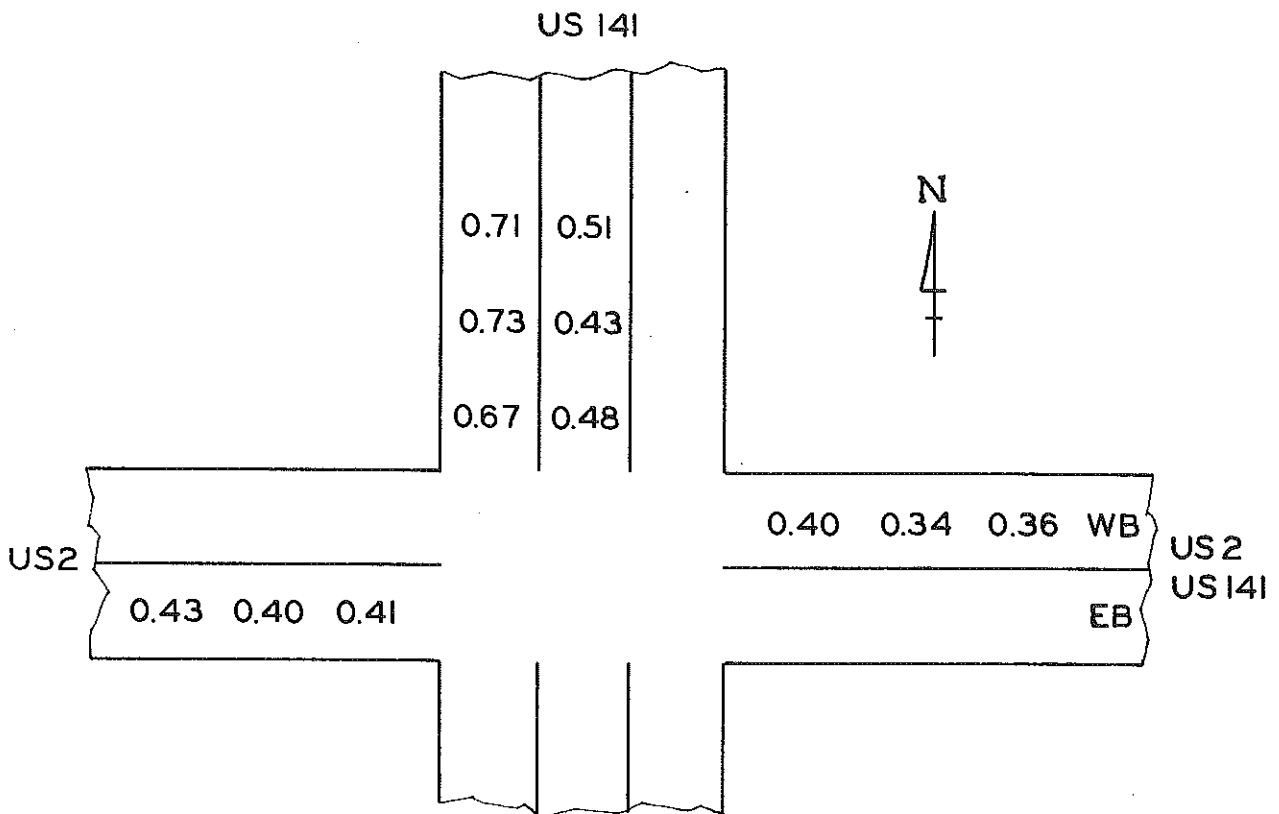
DATE: July 21, 1977

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

FROM: L. T. Oehler

SUBJECT: Skid Tests at West Junction of US 2-US 141, West of Crystal Falls, Iron County. Research Project 54 G-74, 77 SR-14.

In accord with your June 29, 1977 request, skid tests have been completed at the west junction of US 2 and US 141, west of Crystal Falls. All tests were conducted on the approach legs, within 500 ft of the junction. Wsf values are shown in the schematic diagram below for your review.



TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: V. M. Jarvi
E. L. Martin
Safety Programs Unit



OFFICE MEMORANDUM

DATE: July 20, 1977

TO: E. L. Upson, District Engineer
Saginaw District Office

FROM: L. T. Oehler

SUBJECT: Kerosene-Sand Treatment on M-24 North of Columbiaville Road,
Lapeer County. Research Project 54 G-74, 77 SR-15

In accord with your June 23, 1977 phone conversation with F. Cople, skid tests have been completed on the M-24 Kerosene-Sand (K&S) treated area north of Columbiaville Road. Skid tests were conducted June 3, 1977 and reported to you in correspondence dated June 21, 1977 (77 SR-9); NB wsf values, at that time, averaged 0.23; SB values averaged 0.35.

Additional tests were conducted July 18, 1977, after the K&S treatment had been applied. Resulting average coefficients were 0.53 on the NB and 0.45 on the SB, indicating a marked improvement. Our test personnel, however, noticed that Kerosene had been tracked on the NB lanes onto an area immediately north of the treated area. July 18th skid tests made in the tracked area (South of White Road) averaged 0.26 NB and 0.35 SB.

To monitor the continued effectiveness of the K&S treatment, a site north of Miller Lake Road was selected as a "Control" area. June 3, 1977 tests in this area had wsf values ranging from 0.29 to 0.36 and averaging 0.34. July 18, 1977 measurements yielded friction levels ranging from 0.34 to 0.41 and averaging 0.39. Although the control tests showed a small seasonal improvement in skid values, the K&S treated areas had much greater improvements.

Additional skid tests will be conducted this fall and results will be forwarded to you.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: R. Welke



OFFICE MEMORANDUM

DATE: November 8, 1977

TO: E. L. Upson, District Engineer
Saginaw District Office

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on Kerosene-Sand Treatment and on Roto Milled Pavement. Research Project 54 G-74, 77 SR-16

Initial pavement friction tests were conducted July 18, 1977 on a Kerosene-sand treated portion of M-24 north of Columbiaville Road in Lapeer County. Respective NB and SB average wsf values of 0.53 and 0.45 were determined. Follow-up tests have since been made on this same surface and no significant change in friction level has transpired during the 3 month service period as October 21, 1977 tests averaged 0.54 on NB and 0.47 on SB.

Additional pavement friction tests have also been conducted on an area south of White Road where tracking from the Kerosene-sand application occurred. In July wsf values averaged 0.30; October tests averaged 0.36. Indications are that some of the tracking has worn off and friction has improved.

An untreated control area north of Hickory Place Road yielded nearly identical coefficients in July and October; both averaging 0.39.

A third test series has been scheduled for Spring of 1978, at which time a further evaluation of the durability of the Kerosene-sand treatment will be made.

M-58, in Saginaw, between Warwick and Weinecke Streets was tested in 1975 as a high accident area and coefficients ranged from 0.14 to 0.41. During August 1976 this area was textured with the Rotomill under Project 73073-11424. Excellent initial wsf values ranging from 0.51 to 0.79 were measured immediately after the rotomilling. Ten months later (June 1977) a second series of pavement friction measurements were conducted and values, although still averaging above 0.40, had decayed, in some areas by as much as 49 percent. June coefficients ranged from 0.40 to 0.48. Breaking off and rounding of some of the sharp edges created by the Rotomill is attributed for this friction level drop. At the 14 month service level (October 1977) another test series was conducted. No continuation of the wsf decay was evidenced between June 1977 and October 1977 tests. The October test results ranged from 0.39 to 0.48. It appears that the major friction level decay took place during the initial 10 month service period. As a control device, a non-textured

area between Center and Weinecke Road was selected for comparative tests. Control area test results of August 1976 and October 1977 were almost identical.

Attached is a historical review of the Rotomill area wsf values for your review.

TESTING AND RESEARCH DIVISION

L. Roy T. O'Neil

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc
Attachment

cc: D. VanHine
Safety Programs Unit

M-58, Rotomill Section

77 SR-16

M-58 Test Location	Lane	Surface	Avg Coefficient of Wsf			
			Sept.* 1975	Aug. 1976	June 1977	Oct. 1977
At Weinecke Street	EBOL	Conc	0.23	0.51	0.43	0.42
	EBIL	Conc	0.23	0.57	0.43	0.39
	WBOL	Conc	0.27	0.52	0.43	0.46
	WBCL	Conc	0.24	0.60	0.44	0.48
	WBIL	Conc	0.41	0.74	0.48	0.47
At Center Street	EBOL	Conc	0.20	0.54	0.43	0.41
	EBIL	Conc	0.17	0.53	0.42	0.41
	WBOL	Conc	0.15	0.59	0.41	0.40
	WBCL	Conc	0.24	0.56	0.43	0.41
	WBIL	Bit	0.30	0.79	0.40	0.41
At Hemmeter Street	EBOL	Conc	0.20	0.58	0.44	0.42
	EBIL	Conc	0.14	0.59	0.42	0.41
	WBOL	Conc	0.18	0.59	0.45	0.40
	WBCL	Conc	0.20	0.62	0.44	0.42
	WBIL	Bit	0.24	0.79	0.43	0.41
Non-Textured Control Area Between Center and Weinecke Streets	EBOL	Conc		0.37	0.36	0.37
	EBIL	Conc		0.36	0.34	0.36
	WBOL	Conc		0.36	0.36	0.41
	WBCL	Conc		0.41	0.37	0.41
	WBIL	Bit		0.38	0.42	0.38

(*) Before Rotomilling



OFFICE MEMORANDUM

DATE: July 29, 1977

TO: H. B. LaFrance
Engineer of Construction

FROM: L. T. Oehler

SUBJECT: Skid Tests on Project 08051-11006, M 66, South of Nashville.
Research Project 54 G-74, 77 SR-17.

Project 08051-11006 is located on M 66 from 0.5 miles north of Cloverdale Rd north to the south limits of Nashville, in Barry County. Flushing of the bituminous aggregate surface was observed by F. Copple, A. P. Chritz, and M. L. O'Toole, July 21, while the mat was still being placed. On July 26, skid tests were conducted. Coefficients ranged from 0.22 to 0.41 and averaged 0.34. Wsf values were conducted at five locations throughout the project and are shown below for your review.

Another inspection of this surface was made July 28. Wheel track flushing was still evident over the entire length of the project.

Location	Direction and Lane	Coefficient of Wsf		
		Low	High	Avg
South of Maple Grove Rd	NB	0.22	0.28	0.26
	SB	0.31	0.36	0.34
North of Maple Grove Rd	NB	0.34	0.40	0.37
	SB	0.27	0.31	0.29
North of Guy Rd	NB	0.34	0.37	0.35
	SB	0.27	0.34	0.31
North of M 79	NB	0.33	0.41	0.36
	SB	0.31	0.35	0.33
South of Nashville	NB	0.36	0.40	0.39
	SB	0.36	0.39	0.38

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier
M. L. O'Toole
M. E. Witteveen
Safety Programs Unit

D. E. Orne
A. P. Chritz
R. A. Welke



OFFICE MEMORANDUM

DATE: October 6, 1977

TO: R. W. Muethel, Geologist
Materials Research Unit

FROM: P. Schafer

SUBJECT: Skid Tests of US-23 in Standish; Research Projects 77 C-18 and 54 G-74,
77 SR-18

Project Mb 06071-11004 has been selected to evaluate the performance of a bituminous concrete wearing course containing sandy limestone. This project was constructed during 1977 and is located on US-23 between M-13 and the Middle Branch of the Pine River in Standish.

The sandy limestone is from Glancy Pit (6-23) and was used in a CM Special mix between Stations 894+51 and 848+00. Skid tests were conducted August 9, 1977. Coefficients ranged from 0.33 to 0.51 and averaged 0.45.

A section between Stations 848+00 and 772+50 was used as a control area. Crushed gravel from the Big Cut Pit (71-15) was the aggregate source for a type C bituminous concrete mix in this area. Friction levels here ranged from 0.34 to 0.51 and averaged 0.44.

Initial skid test results do not indicate a significant difference in friction level. A breakdown of the initial test results are attached for your review.

Unless otherwise instructed, the next series of skid tests will be conducted in 1978.

TESTING AND RESEARCH DIVISION

P. M. Schafer

Transportation Research Technician
Pavement Performance Group

PMS:lve

<u>Test Section</u>	<u>Lane and Direction</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
Sandy Limestone (894+51 to 848+00)	NBOL	0.46	0.51	0.48
	NBIL	0.48	0.49	0.49
	SBOL	0.33	0.39	0.36
	SBIL	0.43	0.49	0.46
Control (848+00 to 772+50)	NBOL	0.41	0.45	0.43
	NBIL	0.45	0.48	0.47
	SBOL	0.34	0.39	0.37
	SBIL	0.46	0.51	0.48



OFFICE MEMORANDUM

DATE: October 11, 1977

TO: M. L. Jones
District Traffic & Safety Engineer

FROM: L. T. Oehler

SUBJECT: Skid Tests on M-120 between Holton and Twin Lake, Muskegon
County; Research Project 54 G-74, 77 SR-19

In accord with a request from D. E. Orne, skid tests have been conducted on M-120 between Holton and Twin Lake. Friction level measurements conducted in the curve areas adjacent to Ewing Road yielded wsf values ranging from 0.31 to 0.42 and averaging 0.37. Wsf values obtained north and south of the curves ranged from 0.34 and 0.45 and averaged 0.39.

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: D. E. Orne
Safety Programs Unit



OFFICE MEMORANDUM

DATE: August 23, 1977

TO: H. B. LaFrance
Engineer of Construction

FROM: L. T. Oehler

SUBJECT: Additional Skid Tests 08051-11006, M-66 S. of Nashville
Research Project 54 G-74, 77 SR-20

A spot check of friction levels was made August 17, 1977 on M-66 S. of Nashville. At the request of Al Chritz, during this test series, only one skid test was recorded in each lane in each of the five sections shown below. The tests were made at a location which had the appearance of affording the least skid resistance. Test results are not intended to represent the high, low and average friction levels for project 08051-11006. The intended purpose of this test series is merely to determine if areas where lowest friction levels were encountered on July 26 had improved. The lowest July 26 wsf values ranged from 0.22 to 0.36 and averaged 0.31; lowest August 17 values ranged from 0.29 to 0.46 and averaged 0.36. Based on these figures, and visual inspections, the M-66 bituminous aggregate surface does appear to be "healing." The lowest coefficients have increased by 16 percent in the three week period since July 26. Below for your review is a tabulation of the lowest wsf values at the five test locations.

M-66 Test Location	Lane	Lowest Wsf Values	
		7-26-77	8-17-77
S. of Maple Grove Road	NB	0.22	0.29
	SB	0.31	0.30
N. of Maple Grove Road	NB	0.34	0.40
	SB	0.27	0.36
N. of Guy Road	NB	0.34	0.35
	SB	0.27	0.39
N. of M-79 Junction	NB	0.33	0.33
	SB	0.31	0.29
S. of Nashville	NB	0.36	0.46
	SB	0.36	0.43

LTO:PMS:cgc

TESTING AND RESEARCH DIVISION

cc: K. A. Allemeier
M. L. O'Toole
M. E. Witteveen
Safety Programs Unit
D. E. Orne
A. P. Chritz

R. A. Welke

L. T. Oehler

Engineer of Research
Research Laboratory Section



OFFICE MEMORANDUM

DATE: October 13, 1977

TO: A. P. Chritz
Construction Staff Engineer
Construction Division

FROM: L. T. Oehler

SUBJECT: Skid Tests on Project 07013-11005
Research Project 54 G-74, 77 SR-21

Skid tests you requested on the bituminous aggregate Project 07013-11005 were completed September 21, 1977. This project was constructed during 1977 using 6-1/2 percent AC and is located on US-41 from 3.1 miles N. of M-38 N. to the Houghton-Baraga County Line. Wsf values ranged from 0.40 to 0.57 and averaged 0.50. As a result of encountering some variation in friction levels throughout the 8.7 mile length of the project, skid test results have been separated into three areas, below, for your review.

Area of Test	Lane	Coefficient of Wsf		
		Low	High	Avg.
S. of Houghton-Baraga Co. Line	NB	0.47	0.49	0.48
	SB	0.45	0.52	0.48
S. of Kelsey Road	NB	0.52	0.53	0.53
	SB	0.53	0.55	0.54
S. of Keewenaw Bay	NB	0.40	0.46	0.44
	SB	0.54	0.57	0.55

TESTING AND RESEARCH DIVISION

L. T. Oehler

 Engineer of Research
 Research Laboratory Section

LTO:PMS:cgc

cc: R. Welke



OFFICE MEMORANDUM

DATE: October 11, 1977

TO: A. P. Chritz
Construction Staff Engineer

FROM: L. T. Oehler

SUBJECT: Additional Skid Tests on M-37, west of Casnovia; Research Project 54G-74, 77SR-22

Additional skid tests have been conducted on Project 61131-11077. This project has a bituminous concrete surface and was constructed during 1977. It is located on M-37 from the west limits of Casnovia W and N to the south junction with M-82.

Initial skid tests were conducted July 25, 1977 and reported to you on August 8 as 77SA-1. The area of concern at this time was between 2nd and Hall Streets where SB coefficients ranged from 0.22 to 0.41 and averaged 0.28.

In accord with your August 12, 1977 phone request, this area was re-tested. The SB coefficients remained about the same, ranging from 0.23 to 0.36 and averaging 0.29.

Both sets of test values are broken down below, for your review.

<u>Test Date</u>	<u>Lane and Direction</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
7-25-77	NB	0.36	0.51	0.46
	SB	0.22	0.41	0.28
8-22-77	NB	0.32	0.40	0.37
	SB	0.23	0.36	0.29

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: R. Welke



OFFICE MEMORANDUM

DATE: October 19, 1977

TO: A. P. Chritz
Construction Staff Engineer

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-91 between Belding and Greenville;
Research Project 54G-74, 77SR-23

In accord with your request, pavement friction tests have been conducted on M-91 for the purpose of evaluating performance of two surface treatments. Both treatments were applied to the NB lanes of project 34011-09277 etc. This project has a bituminous concrete surface which was constructed during 1977 and is located on M-91 between Belding and Greenville. Precoated 3CS sand and crusher dust were the variables used; both were rolled into the existing bituminous concrete surface. Five separate areas have been tested twice, approximately 6 weeks apart. Two of the areas were experimental and 3 were controls (Conventional). No significant change in friction level occurred during the period although coefficients in the crusher dust area and its adjacent control decayed the most.

Attached is a summary of all pavement friction tests for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: R. Welke
P. Kamaranien

Research Project 54G-74

77SR-23

<u>M-91 Location</u>	<u>Surface Type</u>	<u>Test Date</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
				<u>Low</u>	<u>High</u>	<u>Avg.</u>
540' S. of Fisk Road to 1140' S. of Fisk Road	Bit. Conc. with	8-29-77	NB	0.54	0.55	0.54
	Precoated 3CS Sand	10-13-77	NB	0.55	0.57	0.56
	Conventional Bit. Conc.	8-29-77	SB	0.47	0.51	0.50
		10-13-77	SB	0.49	0.53	0.51
300' N. of Fisk Road	Conventional Bit. Conc.	8-29-77	NB	0.48	0.52	0.50
		10-13-77	NB	0.47	0.48	0.48
125' N. of Brickner Road (N. Ionia Co. Line) to 725' N. of Brickner Road	Bit. Conc. with	8-29-77	NB	0.68	0.73	0.71
	Crusher Dust	10-13-77	NB	0.60	0.65	0.63
	Conventional Bit. Conc.	8-29-77	SB	0.53	0.58	0.55
		10-13-77	SB	0.48	0.51	0.49



OFFICE MEMORANDUM

DATE: October 14, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements requested by Calhoun County
Road Commission; Research Project 54G-74, 77SR-24

In accord with a September 7, 1977 request from R. Walsh, Calhoun County Maintenance Superintendant, pavement friction measurements have been completed at six locations. Test results indicate that all but one location have average or above average friction levels. Low coefficients were on the 11 Mile Road approaches to I-94 and range from 0.18 to 0.23 and averaged 0.22.

Prior to testing, an estimated cost figure of \$26.31 per hour was given by P. Luce to Mr. Walsh. Based on this figure plus data processing, our charges are:

3.5 hours @ 26.31:	\$ 92.08
1 hour @ 12.10:	<u>12.10</u>
	\$104.18

A complete summary of test results and respective locations are attached.

TESTING AND RESEARCH DIVISION

L.T.O.

L. T. Oehler
Engineer of Research

LTO:PMS:lve

Pavement Friction Measurements
Calhoun County Road Commission

Research Project 54G-74, 77SR-24

<u>Test Location</u>	<u>Lane</u>	<u>Coefficient of Wsf</u>		
		<u>Low</u>	<u>High</u>	<u>Avg.</u>
11 Mile Road approaches to I-94 overpass	NB	0.18	0.23	0.21
	SB	0.22	0.22	0.22
15-1/2 Mile Road, South of H Drive	NB	0.58	0.61	0.59
	SB	0.57	0.61	0.59
K Drive, West of 15-1/2 Mile Road	EB	0.58	0.60	0.59
	WB	0.57	0.58	0.58
F Drive South, East of 21 Mile Road	EB	0.50	0.66	0.61
	WB	0.58	0.64	0.61
R Drive South, East of 22 Mile Road	EB	0.71	0.72	0.71
	WB	0.66	0.73	0.70
7 Mile Road, South of P Drive	NB	0.54	0.58	0.55
	SB	0.48	0.51	0.50



OFFICE MEMORANDUM

DATE: October 17, 1977

TO: A. P. Chritz
Construction Staff Engineer

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on "S" Curve in Grand Rapids;
Research Project 54G-74, 77SR-25

In accord with your request, pavement friction tests were conducted September 7, 1977 on the US-131 "S" curve in Grand Rapids. Only the SB lanes were tested; NB roadway had not been paved yet. Southbound wsf values ranged from 0.40 to 0.58 and averaged 0.48. Individual lane values are shown below.

	<u>Coefficient of Wsf</u>		
	<u>Low</u>	<u>High</u>	<u>Avg.</u>
SBOL	0.46	0.51	0.48
SBOL	0.40	0.48	0.45
SBOL	0.47	0.58	0.52

TESTING AND RESEARCH DIVISION

L.T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: R. Welke



OFFICE MEMORANDUM

DATE: October 20, 1977

TO: Donald E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-42; Research Project
54G-74, 77SR-26

In accord with your request, pavement friction tests have been completed on the 10.25 mile section of M-42 between M-66 and US-131. Single and double seal coat surfacing was applied to this roadway during 1976 as project 57041-10899. The single seal was applied to the inside wheel track (IWT) and double seal was applied to the outside wheel track (OWT).

Wsf values were obtained September 13, 1977 and varied considerably throughout the length of this project. Because of the extensive variance, we were not able to separate limits of high or low friction by areas. Instead, ranges of coefficients encountered are reported. Double seal (OWT) values ranged from 0.24 to 0.41 and single seal (IWT) values ranged from 0.39 to 0.58. Of perhaps even more importance than the individual values, are the differential friction levels between outside and inside wheel tracks.

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

CC: P. Kamarainen
B. A. Conradson
R. Welke
Safety Programs Unit



OFFICE MEMORANDUM

DATE: October 24, 1977

TO: Donald E. Orne
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements at Various Upper Penninsula Locations. Research Project 54G-74, 77SR-27

In accord with your September 8, 1977 request, pavement friction measurements have been conducted at four upper penninsula locations.

Location 1 US-2 and US-41 on the bridge over Menominee River (BOI of 22021).

Coefficients ranged from 0.42 to 0.48 and averaged 0.45 on this bituminous capped structure.

Location 2 US-2, east of Manistique and in the area of Manistique River Road (Control Section 75022).

A retest of the low friction area east of Manistique showed a marked improvement in coefficients, with values averaging 0.47 and 0.40 respectively for the EB and WB lanes. However, east and west of Manistique River Road friction levels as low as 0.33 were encountered.

Location 3 US-41 - M-28, west of Marquette County Line (Control Section 07023).

Tracking from adjacent new construction on the WB lanes has been worn off leaving improved coefficients, averaging 0.41. EB values averaged 0.53, similar to the July test results.

Location 4 M-28, in the curve area W of Blacksmith Road (Control Section 66023).

Excellent and poor friction levels were obtained in this area; coefficients as high as 0.70 and as low as 0.31 were measured. Bleeding on this roadway is intermittent and confined to short areas, not long enough for a complete test cycle of the pavement friction measuring equipment.

Donald E. Orne
Page 2
October 24, 1977

Attached, for your review, is a complete summary of friction tests conducted at all four locations.

TESTING AND RESEARCH DIVISION

L. T. Oehler

L. T. Oehler
Engineer of Research

LTO:PMS:lve

Attachment

CC: E. L. Martin
R. Welke
Safety Programs Unit

Research Project 54G-74
77SR-27

Location	Test Date	Lane	Coefficient of Wsf		
			Low	High	Avg.
US-2 - US-41 over Menominee River (BOI of 22021)	9-20-77	EB	0.43	0.45	0.44
		WB	0.42	0.48	0.45
US-2, East of Manistique (Control Section 75022)	9-19-77	EB	0.46	0.48	0.47
		WB	0.39	0.41	0.40
			<u>RR overpass to Manistique River Rd.</u>		
		EB	0.40	0.42	0.41
		WB	0.33	0.37	0.35
			<u>East of Manistique River Rd.</u>		
		EB	0.34	0.42	0.38
		WB	0.36	0.45	0.41
			<u>@ Airport Road</u>		
		EB	0.53	0.54	0.54
		WB	0.48	0.52	0.50
US-41 - M-28 West of Marquette County Line (Control Section 07023)	9-22-77	EB	0.53	0.53	0.53
		WB	0.37	0.46	0.41
M-28 Curve Area, West of Blacksmith Road (Control Section 66023)	9-21-77	EB	0.64	0.70	0.67
		WB	0.31	0.67	0.48



OFFICE MEMORANDUM

DATE: November 3, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on I-196 at Stocking Avenue in Grand Rapids.
Research Project 54 G-74, 77 SR-28

In accord with your October 3, 1977 request, wsf values have been determined on I-196 at Stocking Avenue in Grand Rapids. The location tested is between mileposts 9.193 and 9.372 in Control Section 41029 and the surface tested was concrete. Coefficients were measured October 4, 1977 and resulting wsf values are shown below for your review.

Lane	Coefficient of wsf		
	Low	High	Avg
EBOL	0.39	0.40	0.40
EBIL	0.39	0.42	0.40
WBOL	0.31	0.35	0.33
WBIL	0.37	0.46	0.43

TESTING AND RESEARCH DIVISION

L. T. Oehler

 Engineer of Research
 Research Laboratory Section

LTO:PMS:cgc

cc: M. L. Jones
Safety Programs Unit



OFFICE MEMORANDUM

DATE: November 8, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-37 N and S of Four Mile Road in Kent County. Research Project 54 G-74, 77 SR-29

Friction level tests have been conducted on the 1977 bituminous concrete project 41033-07689, in accord with your request of October 5.

A visual inconsistency in pavement friction was noticed by field personnel in the outside wheeltrack of the SBIL as it approaches Four Mile Road from the north. This inconsistency was verified by tests in this wheeltrack which yielded a wide range of wsf values from 0.23 to 0.51 and averaging 0.38. This wide coefficient range, 0.28, can be directly compared with adjacent outside wheeltrack tests of the SBIL which were conducted on the same surface and had a coefficient range of only 0.06.

Tests on an older bituminous surface south of Four Mile Road were also conducted in accord with your request. As indicated by the test summary shown below, pavement friction levels on this surface are very similar to those of the new surface.

M-37 Location	Lane	Coefficient of Wsf		
		Low	High	Avg.
Approaches to Lamoreaux Road (1977 Bit Conc)	NBOL	0.47	0.48	0.48
	NBIL	0.52	0.53	0.53
	SBOL	0.45	0.49	0.47
	SBIL	0.47	0.51	0.50
North of Four Mile Road (1977 Bit Conc)	NBOL	0.47	0.49	0.48
	NBIL	0.49	0.55	0.52
	SBOL	0.48	0.51	0.50
	SBIL	0.39	0.45	0.42
Approach to Four Mile Road (1977 Bit Conc)	SBIL-OWT	0.23	0.51	0.38
South of Four Mile Road (1973 Bit Conc)	NBOL	0.46	0.46	0.46
	NBIL	0.49	0.52	0.51
	SBOL	0.45	0.46	0.46
	SBIL	0.48	0.51	0.49

TESTING AND RESEARCH DIVISION

LTO:PMS:cgc
cc: M. L. Jones
Safety Programs Unit

- 147 -

L. T. Oehler

Engineer of Research
Research Laboratory Section



OFFICE MEMORANDUM

DATE: November 9, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 89, Southeast of Allegan.
Research Project 54 G-74, 77 SR-30.

In accord with your September 22, 1977 phone request to F. Copple, friction level measurements have been conducted on M 89, Project 03023-11159, located southeast of Allegan. This 1977 bituminous concrete surface was initially tested August 3, 1977 and wsf values ranging from 0.28 to 0.43, averaging 0.38 were transmitted to you as 77 SA-1. A second test series was conducted 10 weeks later, October 18, and wsf ranging from 0.36 to 0.48 were determined. The low friction area, measured during August, on the eastbound lanes southeast of Allegan yielded improved coefficients in October which ranged from 0.40 to 0.48 and averaged 0.44. Contributing factors such as traffic, weathering and curing have evidently flushed the pavement and improved its skid resistant qualities. Complete test results are shown below for your review.

M 89 Location	Lane	Coefficient of Wsf					
		August 3, 1977			October 18, 1977		
		Low	High	Avg	Low	High	Avg
Southeast of Allegan	EB	0.28	0.35	0.32	0.40	0.48	0.44
	WB	0.36	0.43	0.40	0.36	0.42	0.40
East of 23rd Street	EB	0.41	0.42	0.41	0.39	0.45	0.41
	WB	0.36	0.42	0.39	0.41	0.47	0.44

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit



OFFICE MEMORANDUM

DATE: November 9, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on US 12 in the Village of Quincy.
Research Project 54 G-74, 77 SR-31.

In accord with your September 26, 1977 request, friction level measurements have been conducted on US 12, near Brown Street, in the Village of Quincy. The pavement in this area is bituminous concrete which was constructed in 1962. Wsf values, obtained October 18, 1977, ranged from 0.28 to 0.41 and averaged 0.35. Individual lane values are shown below.

Lane	Coefficient of Wsf		
	Low	High	Avg
EBOL	0.39	0.41	0.40
EBIL	0.30	0.36	0.33
WBOL	0.35	0.37	0.36
WBIL	0.28	0.36	0.32

TESTING AND RESEARCH DIVISION

L. T. Oehler
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit
E. H. Miller
R. A. Welke



OFFICE MEMORANDUM

DATE: November 14, 1977

TO: E. L. Upson, District Engineer
Saginaw District Office

FROM: L. T. Oehler

SUBJECT: Friction Level Measurements on Sand-Slag Seal Locations in Saginaw County. Research Project 54 G-74, 77 SR-32

In accord with your teletype request to F. Copple, dated November 7, 1977, pavement friction measurements have been completed at four Saginaw County locations. A sand-slag seal was applied at all four locations during June, 1977. Coefficients encountered during October 20, 1977 friction level measurements at these locations ranged from 0.18 to 0.52, and averaged 0.33. Only Center Road, north of Tittabawassee Road, yielded wsf values averaging above 0.40. According to County Engineer Gordon Ely, high traffic volumes on the seals soon after application was a contributing factor in lower wsf values encountered.

Below, is a tabulation of test results for your review.

Location	Lane	Coefficient of Wsf		
		Low	High	Avg
Tittabawassee Road between Venoy Road and Westervelt	EB	0.27	0.31	0.29
	WB	0.18	0.21	0.19
Center Road north of Tittabawassee Road	NB	0.45	0.52	0.48
	SB	0.42	0.48	0.44
Freeland Road between Mackinaw and Hospital	EB	0.29	0.48	0.39
	WB	0.24	0.49	0.35
Carrolton Road north of Hickory	NB	0.19	0.25	0.22
	SB	0.24	0.24	0.24

TESTING AND RESEARCH DIVISION

L. T. Oehler

 Engineer of Research
 Research Laboratory Section

LTO:PMS:cgc

cc: G. Ely



OFFICE MEMORANDUM

DATE: November 14, 1977

TO: K. R. Rock
District Maintenance Engineer
Alpena District Office

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M-32, West of Atlanta
Research Project 54 G-74, 77 SR-33

In accord with your October 3, 1977 request, pavement friction tests have been completed on a kerosene-sand treated surface location on M-32, five miles west of Atlanta. Wsf values on this treated area ranged from 0.42 to 0.54 and averaged 0.49. An adjacent untreated area was also tested; wsf values ranged from 0.36 to 0.47, averaging 0.42. At both locations, WB values were slightly lower than those encountered on the EB. A summary of pavement friction tests is shown below for your review.

Pavement Surface	Lane	Coefficients of Wsf		
		Low	High	Avg
Kerosene-Sand Treated	EB	0.52	0.54	0.53
	WB	0.42	0.47	0.45
Untreated	EB	0.41	0.47	0.45
	WB	0.36	0.41	0.39

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: D. Gouin

STATE OF MICHIGAN



HIGHWAY COMMISSION

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DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

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

JOHN P. WOODFORD, DIRECTOR

December 2, 1977

Mr. David A. Merchant
Division Administrator
Federal Highway Administration
211 Federal Building
Lansing, Michigan 48901

Re: Pavement Friction Tests on I 94,
City of Allen Park.
Research Project 54 G-74, 77 SR-34

Dear Mr. Merchant:

In accord with your October 20, 1977 request, pavement friction tests have been conducted at the site of a recent bus accident, i. e., eastbound I 94 approximately 2,280 ft east of Oakwood Blvd. Friction level measurements were conducted at this location November 20, 1977 using a trailer type pavement friction tester equipped with ASTM ribbed test tires and at a test speed of 40 mph. Wet sliding friction (wsf) values ranged from 0.39 to 0.54 and averaged 0.43.

Additional tests were also made west and east of the accident site. Coefficients west of the site ranged from 0.40 to 0.54 and averaged 0.44. Similar values were determined east of the accident site where coefficients ranging from 0.41 to 0.48 and averaging 0.44 were determined. The pavement surface at all locations tested is bituminous concrete, constructed in 1974 as Project 82022-04950. The following is a summary of wsf values for your review.



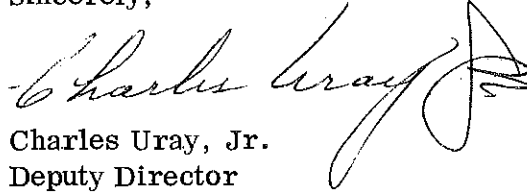
D. A. Merchant

- 2 -

December 2, 1977

Approximated I 94 Location	Lane	Coefficient of Wsf		
		Low	High	Avg
West of accident site	EBOL	0.41	0.43	0.42
	EBCL	0.40	0.43	0.42
	EBIL	0.41	0.54	0.50
At accident site	EBOL	0.39	0.41	0.40
	EBCL	0.40	0.43	0.41
	EBIL	0.41	0.54	0.47
East of accident site	EBOL	--	--	0.41
	EBCL	0.41	0.47	0.44
	EBIL	0.48	0.48	0.48

Sincerely,



Charles Uray, Jr.
Deputy Director



OFFICE MEMORANDUM

DATE: November 14, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on M-50, City of Monroe
Research Project 54 G-74, 77 SR-35

In accord with your October 25, 1977 request, friction level measurements have been conducted on the M-50 curve at Spaulding Road, in the City of Monroe. The concrete surface at this location was constructed in 1959 as Project 58111, CI. Wsf measurements were conducted November 2, 1977. Coefficients ranged from 0.39 to 0.42 and averaged 0.40. Individual lane values are listed below for your review.

Lane	Coefficient of Wsf		
	Low	High	Avg
EBOL	0.39	0.41	0.40
EBIL	0.39	0.42	0.40
WBOL	0.39	0.40	0.39
WBIL	0.40	0.42	0.41

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc

cc: L. V. Suboski
Safety Programs Unit



OFFICE MEMORANDUM

DATE: November 15, 1977

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on M-66 Between Sheridan and Stanton. Research Project 54 G-74, 77 SR-36

In accord with your November 4, 1977 request, pavement friction tests have been conducted on a section of M-66 in Montcalm County.

A recent maintenance repair placed smooth strips of seal throughout the entire length of M-66 between Sheridan and Stanton. A wide range of coefficients were encountered during November 9, 1977 pavement friction measurements as a result of these strips meandering in and out of wheeltracks. Coefficients ranged from 0.09 to 0.58 and averaged 0.44. Low friction levels were obtained in all wheeltracks except the SB-OWT where the lowest value encountered was 0.42.

Attached is a summary of coefficients for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler

Engineer of Research
Research Laboratory Section

LTO:PMS:cgc
Attachment

cc: M. L. Jones
R. A. Welke
Safety Programs Unit

77 SR-36

M-66 Location	Coefficient of Wsf			
	SB-OWT	SB-IWT	NB-IWT	NB-OWT
N. of Sheridan	0.58	0.46	0.48	0.47
N. of Ruby Road	0.55	0.54	0.43	0.47
N. of Holland Lake Road	0.53	0.42	0.49	0.49
N. of Woods Road	0.52	0.55	0.48	0.51
N. of Sidney Road	0.55	0.29	0.30	0.13
1/2 Mile N. of Sidney Road	0.58	0.13	0.49	0.45
S. of Colby Road	0.57	0.35	0.34	0.57
N. of Colby Road	0.58	0.43	0.52	0.51
At Pakes Road	0.53	0.45	0.30	0.40
N. of S. Limits of Stanton	0.52	0.45	0.18	0.09
At E. Lake Street	0.42	0.33	0.45	0.45

SECTION VII
SPECIAL ATTENTION LOCATIONS

Special Attention Locations

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



OFFICE MEMORANDUM

DATE: August 8, 1977

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

FROM: L. T. Oehler

SUBJECT: Report of Pavements with Wsf Values Averaging Below 0.35.
Research Project 54 G-74, 77 SA-1.

In conformance with our continuing policy of reporting friction levels below 0.35, the attached list of 20 locations is furnished for your review. Listed friction levels were determined from routine inventory skid tests which were conducted between March 30, 1977 and August 4, 1977.

TESTING AND RESEARCH DIVISION

L. Roy T. Oehler

Engineer of Research

LTO:PMS:bf

Attachment

cc: K. A. Allemeier
R. A. Welke
A. P. Chritz
Safety Programs Unit

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
08034-03128	M 37-M 43 from west of Heath Rd easterly to west city limits of Hastings	Conc	1972	6-27-77	EB WB	0.34 0.28	0.36 0.33	0.35 0.30
81011-03848	M 52 from 90 ft south of old US 12 north-erly to Penn Central RR	Bit Conc	1972	7-5-77	NB SB	0.34 0.31	0.39 0.35	0.36 0.33
75022-005	US 2 from east limits of Manistique east-erly to Gulliver	Bit Agg	1967		<u>West of Gulliver</u>			
				7-11-77	EB WB	0.46 0.41	0.49 0.43	0.48 0.42
					<u>West of Manistique River Rd</u>			
				7-11-77	EB WB	0.34 0.45	0.41 0.47	0.37 0.46
					<u>East of Manistique</u>			
				7-11-77	EB WB	0.23 0.34	0.25 0.40	0.24 0.36
07023-04331	US 41-M 28 from Marquette County Line westerly intermittently 8.483 miles	Bit Agg	1972	7-13-77	EB ¹ WB	0.51 0.22	0.57 0.23	0.54 0.22
02-41, C1 (02041)	M 28 curve at Hickory St, City of Munising	Conc	1961	7-13-77	EBOL EBIL WBOL WBIL EBOL EBIL WBOL WBIL	0.43 0.46 0.31 0.37 0.41 0.36 0.33 0.36	0.48 0.47 0.37 0.41 0.43 0.41 0.36 0.45	0.46 0.47 0.34 0.39 0.42 0.39 0.34 0.40
		L.G. Conc ²						

¹ Tracking from adjacent new construction.
² Longitudinally grooved concrete.

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
17012-005 and 17012-006	M 123 from south Chippewa County Line northwesterly to 1,600 ft northwest of Trout Lake Cemetery	Bit Agg	1967	7-14-77	NB SB	0.36 0.31	0.37 0.34	0.37 0.32
44042-07693	M 21 from 232 ft east of Washington St easterly to 50 ft east of the Flint River in Lapeer	Bit Conc	1975	7-18-77	EBOL EBIL WBOL WBIL	0.22 0.37 0.27 0.35	0.28 0.41 0.29 0.39	0.26 0.38 0.28 0.37
82071-07731	M 3 from I 75 southeast and northeast to M 1	Bit Conc	1976	7-24-77	EBOL EBIL WBOL WBIL	0.36 0.36 0.29 0.40	0.39 0.43 0.34 0.41	0.37 0.40 0.32 0.40
61131-11077	M 37-M 46 from west limits of Casnovia westerly 0.76 miles to M 46 junction, thence northerly on M 37 to south junction M 82	Bit Conc	1977	7-25-77	NB SB	0.53 0.46	0.55 0.48	0.54 0.47
62011-09276A	M 82 from 586 ft west of Connie St easterly to Mechanic St in Fremont	Bit Conc	1976	7-25-77	NB SB	0.36 0.41	0.51 0.45	0.46 0.43

³ Flushed in wheel tracks.

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction								
						Low	High	Avg						
41012-09281	M 44 connector from Airway St northeast- erly and northerly on M 44 to 7 Mile Rd	Bit Conc	1976	7-27-77	Southwest from M 44 on M 44 Connector	NBOL	0.42	0.43	0.43					
						NBIL	0.52	0.53	0.53					
						SBOL	0.25	0.34	0.30					
						SBIL	0.51	0.55	0.53					
						<u>North of M 44 Connector</u>								
						NBOL	0.37	0.40	0.39					
						NBIL	0.35	0.43	0.39					
						<u>South of River</u>								
						NBOL	0.30	0.34	0.33					
						NBIL	0.31	0.42	0.37					
						SBOL	0.33	0.39	0.35					
						SBIL	0.49	0.52	0.51					
						<u>North of River Rd</u>								
23-17, C1 (23012) 33-26, C7 (33041)	US 27 approaches to Waverly Rd	T. G. Conc ⁴	1953	7-27-77	North of River Rd	NBOL	0.34	0.41	0.36					
						NBIL	0.42	0.47	0.45					
						SBOL	0.35	0.41	0.38					
						SBIL	0.43	0.48	0.45					
						<u>North of River Rd</u>								
						NBOL	0.33	0.34	0.34					
						NBIL	0.33	0.36	0.35					
						WBOL	0.35	0.39	0.37					
						WBIL	0.40	0.43	0.41					
						EBOL	0.36	0.40	0.38					
						EBIL	0.34	0.39	0.37					
						WBOL	0.36	0.36	0.36					
						WBIL	0.42	0.46	0.45					

⁴ Transverse grooved concrete.

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
82022-04280	I 94 from 435 ft east of Haggerty Rd east- erly to 1,664 ft east of Ozga Rd	T. B. Conc ⁵	1974	7-31-77	WBOL	0.33	0.36	0.34
					WBCL	0.37	0.45	0.42
					WBIL	0.57	0.60	0.58
76041-07719	M 71 from 800 ft northwest of temporary I 69 northwesterly to Shiawassee St in Corunna	Bit Agg	1976	8-2-77	<u>Northwest of Corunna South</u>			
					<u>City Limits</u>			
					NB	0.41	0.46	0.44
					SB	0.43	0.46	0.44
					<u>North of River</u>			
					NB	0.41	0.47	0.43
SB	0.42	0.48	0.45					
39042-014	I 94 BL-M 43 (Michigan Ave) from Rose St easterly and northeasterly to Kings Highway in Kalamazoo	Bit Conc	1967	8-2-77	<u>South of Bennington Rd</u>			
					NB	0.41	0.43	0.42
					SB	0.33	0.35	0.34
					<u>North of I 69</u>			
					NB	0.41	0.43	0.42
					SB	0.37	0.41	0.39
2 BA-7A (03023)	M 89 from intersection of Bridge Rd and Marshal St northwest to intersection of Marne St and Cedar St, all in Allegan	Bit Conc	1972	8-3-77	<u>North of I 69</u>			
					NB	0.41	0.43	0.42
					SB	0.37	0.41	0.39
					<u>South of Bennington Rd</u>			
					EBOL	0.36	0.43	0.40
					EB#3	0.34	0.34	0.34
EB#2	0.34	0.37	0.35					
EBIL	0.36	0.42	0.39					
2 BA-7A (03023)	M 89 from intersection of Bridge Rd and Marshal St northwest to intersection of Marne St and Cedar St, all in Allegan	Bit Conc	1972	8-3-77	<u>North of I 69</u>			
					NB	0.41	0.43	0.42
					SB	0.37	0.41	0.39
					<u>South of Bennington Rd</u>			
EBOL	0.36	0.43	0.40					
EB#3	0.34	0.34	0.34					
EB#2	0.34	0.37	0.35					
EBIL	0.36	0.42	0.39					

⁵ Transverse broomed concrete.

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
03023-11159	M 89 from southeast of south limits of Allegan southeasterly to 400 ft west of west limits of Otsego	Bit Conc	1977	8-3-77	East of Allegan			
					EB	0.28	0.35	0.32
					WB	0.36	0.43	0.40
					<u>East of 23rd Street</u>			
				8-3-77	EB	0.41	0.42	0.41
					WB	0.36	0.42	0.39
03023-04952	M 89 from Michigan Ave southeasterly to Main St in Plainwell	Bit Conc	1972	8-3-77	EB	0.33	0.36	0.35
					WB	0.31	0.36	0.34
46082-07697	M 50 from west limits of Tecumseh east to Wyandotte St	Bit Conc	1976	8-4-77	EBOL	0.39	0.41	0.40
					EBIL	0.39	0.43	0.41
					WBOL	0.30	0.36	0.33
					WBIL	0.36	0.41	0.39
		Bit Conc ⁶			EB	0.29	0.34	0.31
					WB	0.35	0.39	0.37
46-20, C1 (46072)	M 52 from North Adrian Dr northerly to Valley Rd, north of Adrian	Bit Conc	1959	8-4-77	NB	0.22	0.29	0.25
					SB	0.21	0.27	0.24

⁶ Bituminous concrete using crusher dust as filler.