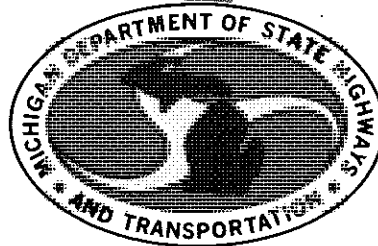


SUMMARIES OF MICHIGAN  
PAVEMENT FRICTION MEASUREMENTS  
1978 Test Program

MDOT REPORT NO. 249



**TESTING AND RESEARCH DIVISION  
RESEARCH LABORATORY SECTION**

SUMMARIES OF MICHIGAN  
PAVEMENT FRICTION MEASUREMENTS  
1978 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-1140

Michigan Transportation Commission  
Hannes Meyers, Jr., Chairman; Carl V. Pellonpaa,  
Vice-Chairman; Weston E. Vivian, Rodger D. Young,  
Lawrence C. Patrick, Jr., William C. Marshall  
John P. Woodford, Director  
Lansing, March 1980

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## LEGEND

Wsf = Wet sliding friction coefficient

Direction of Test Vehicle

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

Lane Tested (noted following direction of test vehicle)

RT = right turn lane

LT = left turn lane

OL = outer lane

CL = center lane

IL = inner lane

DL = deceleration lane

ML = merging lane

TL = truck lane

RL = ramp lane

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

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## INTRODUCTION

During the 1978 calendar year, over 12,200 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 eight basic categories are included.

- I Initial Pavement Friction Test Results for Concrete and Bituminous Pavements
- II Five-Year Pavement Friction Test Results for Concrete and Bituminous Pavements
- III Ten-Year Pavement Friction Test Results for Concrete and Bituminous Pavements
- IV Fifteen-Year Pavement Friction Test Results for Concrete and Bituminous Pavements
- V Experimental Features in Pavement Surfaces
- VI High-Accident Locations
- VII Special Request Tests
- VIII 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 1,774.752 lane miles of trunkline surfaces tested during 1978.

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

### 1976 Construction

Two-year pavement friction values were obtained on three construction projects during the 1978 test year (24 lanes, 29.392 lane miles). Friction levels ranged from 0.42 to 0.65 and had a weighted average<sup>1</sup> of 0.53.

### 1977 Construction

Seven concrete projects were tested this year, after a one-year service period. Wsf values were obtained on 38 lanes (63.348 lane miles). Coefficients ranged from 0.36 to 0.71 and had a weighted average of 0.54.

### 1978 Construction

Only one concrete project was tested during its initial service year. The 20.96 lane miles (four lanes) of Project 64015-11535 yielded initial Wsf values which ranged from 0.60 to 0.72 and had a weighted average of 0.67.

A specification requiring texturing of concrete surfaces with a transverse comb was implemented during the 1977 construction season. To date, only a limited number of projects with the transverse comb texture have been tested. Using the limited sample size of combed projects, friction

---

<sup>1</sup> "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.

level comparisons have been made with projects using two other surface finishing methods, i. e., burlap and transverse broom. As may be seen from the data insert below, initial year Wsf values on the combed surface average 16 to 20 percent higher than burlap and broomed surfaces. At the one-year service level, however, coefficients from combed projects average 13 percent higher than the burlap sample and 4 percent lower than the broomed surfaces. Early indications, drawn from a limited sample of projects, show increased friction levels are being initially obtained through transverse comb finishing methods but approximately 17 percent of the Wsf has decayed after only a one-year service period.

Texture Type	Initial Service Year		After One Year		After Two Years	
	No. of Projects Surveyed	Avg. Wsf	No. of Projects Surveyed	Avg. Wsf	No. of Projects Surveyed	Avg. Wsf
Burlap	30	0.54	66	0.48	72	0.50
Transverse Broom	16	0.56	56	0.56	6	0.52
Transverse Comb	2	0.65	7	0.54	--	--

Table 2 - Bituminous Concrete Pavement (MDOT Specification 4.12) Constructed in 1975, 1976, 1977, and 1978

1975 Construction

Pavement friction tests were conducted on Project 52081-07704 this year. This was the only three-year old bituminous concrete project tested during 1978. Friction levels ranged from 0.45 to 0.51 and had a weighted average of 0.48.

1976 Construction

Three 1976 construction projects were tested after a two-year service period. Wsf values ranged from 0.39 to 0.65; the weighted average was 0.47. The WBOL of US 12 east of Red Arrow Highway in Berrien County yielded an average coefficient of 0.39 and was the only lane to average lower than 0.40; this location is part of Contract 11021-09318.

1977 Construction

Seventy bituminous concrete projects (243 lanes) were tested during 1978 after a one-year service period. Coefficients ranged from 0.21 to 0.77 and had a weighted average value of 0.51. Twenty-three lanes, representing 5 percent of the one-year lane mileage yielded average Wsf values

lower than 0.40. Lowest average friction level was the 0.27 value from the NBOL of the M 54 Project 25072-09295 in Flint. Five lanes, 3 percent of the one-year lane mileage, had friction levels averaging from 0.70 to 0.75. The 0.75 value was from the NBIL of US 27 north from the Roscommon-Crawford County line on Project 20016-11021.

#### 1978 Construction

Twenty-eight projects were tested during their initial service year. The Wsf value range was 0.31 to 0.65 and the weighted average friction level was 0.48. Average coefficients representing 5 percent of the initial year lane mileage were lower than 0.40. The lowest average value, 0.31, was from the SBOL of Project 35032-11044. This project is on US 23 north and south of the Au Sable River in Iosco County. The highest Wsf value, 0.65, was encountered on the SBIL of M 54, north of Flint and also on the eastbound lane of US 12BR in Berrien County, southeast of M 60.

Table 3 - Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1977 and 1978

#### 1977 Construction

Nineteen bituminous aggregate projects were tested at the one-year service level. Wsf values ranged from 0.37 to 0.77 and had a weighted average of 0.55. Although some coefficients lower than 0.40 were determined, no lane average was below the 0.40 mark. Three lanes, 7 percent of the one-year lane mileage, did, however, average higher than 0.70. The highest was a 0.74 value on the westbound lane of M 26 between Eagle River and Eagle Harbor in Keeweenaw County.

#### 1978 Construction

Friction levels ranging from 0.34 to 0.66 and having a weighted average of 0.53 were encountered on the 17 bituminous aggregate projects tested in 1978, during their initial service year. Only one lane averaged lower than 0.40. This lane, however, is 14 miles long and represents 5 percent of the initial year mileage tested. The average Wsf value of this lane was 0.38 and it is located on M 88 south of US 31 in Antrim County (Project 05031-12663). Highest average values were on Project 31031-12377 located on M 203 north of Hancock; northbound and southbound lanes averaged 0.63 and 0.62, respectively.

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

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction			
			Coarse	Fine		Low	High	Avg	
I 82122-01237A	I 96 from west of Warner Ct easterly to east of Inkster Rd	Eisenhour Construction Co.	E.C. Levy (Dix Yd)	Pit 63-55		EBOL	0.43	0.47	0.45
						EB#3	0.47	0.51	0.49
						EB#2	0.57	0.59	0.58
						EBIL	0.60	0.65	0.62
						WBOL	0.45	0.47	0.46
I 82122-01240A	I 96 (Jeffries Fwy) from 612 ft east of Inkster Rd easterly to 474 ft east of Beech-Daly Rd, Wayne County	Eisenhour Construction Co.	Pit 63-7 & E.C. Levy (Dix Yd)	Pit 63-55		EBOL	0.42	0.46	0.44
						EB#3	0.48	0.53	0.51
						EB#2	0.48	0.52	0.50
						EBIL	0.62	0.62	0.62
						WBOL	0.45	0.46	0.46
I 82122-04695A	I 96 from 480 ft east of Beech-Daly Rd easterly to US 24 (Telegraph Rd)	Eisenhour Construction Co.	Pit 63-7 & E.C. Levy (Dix Yd)	Pits 63-7 & 63-55		EBOL	0.51	0.53	0.52
						EB#3	0.48	0.52	0.51
						EB#2	0.57	0.58	0.58
						EBIL	0.58	0.61	0.60
						WBOL	0.45	0.51	0.49
U 17032-03027A	I 75 BS from 3 Mile Rd northeasterly to M 129	Bacco Construction Co.	Pits 17-20 & 17-62	Pit 17-20		EBOL	0.52	0.55	0.54
						EBIL	0.54	0.58	0.57
						SBOL	0.46	0.53	0.49
						SBIL	0.54	0.56	0.55
						WBOL	0.37	0.42	0.39
UM 41051-09598A	M 44-M 37 from 300 ft south of Fulton St northerly to I 96	Kegle Construction Co.	Pit 41-46	Pit 41-62		EBOL	0.54	0.58	0.55
						EBIL	0.47	0.51	0.49
						SBOL	0.49	0.53	0.52
						SBIL	0.49	0.53	0.52
						WBOL	0.54	0.61	0.57
MU 50051-02045A	M 3 southbound relocation from south of Wellington Crescent northerly to northeast of Welts St	John Carlo, Inc.	E.C. Levy (Dix Yd)	Pit 50-41		EBOL	0.54	0.61	0.57
						EB#3	0.40	0.43	0.41
						SB#2	0.36	0.37	0.36
						SBIL	0.49	0.55	0.52
						WBOL	0.64	0.71	0.67
I 78111-11920A	I 75 from 827 ft north of Wadsworth Rd north to 85 ft north of C&O RR	Sargent Construction Co.	Pit 71-47	Pit 63-54		EBOL	0.64	0.71	0.67
						EBIL	0.65	0.67	0.66
						SBOL	0.65	0.67	0.66
						SBIL	0.65	0.67	0.66
						WBOL	0.65	0.67	0.66

1976

1977

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

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
U 82081-03108A	M 153 (Ford Rd) from 631 ft west of Inkster Rd east to 752 ft west of Beech-Daly Rd	Tony Angelo Cement Construction Co.	E. C. Levy (Trenton Yd)	Pit 63-7	EBOL	0.51	0.55	0.53
					EBCL	0.48	0.52	0.50
					EBIL	0.51	0.54	0.53
					WBOL	0.47	0.53	0.51
					WBCL	0.51	0.57	0.54
WBIL	0.55	0.59	0.57					
I 82122-06547A	I 96 from 640 ft west of Newburg Rd east to 84 ft east of Warren Ct	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	EBOL	0.48	0.54	0.52
					EB#3	0.51	0.53	0.52
					EB#2	0.55	0.58	0.56
					EBIL	0.62	0.66	0.64
					WBOL	0.46	0.47	0.46
BU 82122-08444A (part)	I 96 from 490 ft west of Evergreen Rd easterly to 100 ft west of M 39 (dual-dual roadway)	Eisenhour Construction Co.	E. C. Levy (Dix Yd)	Pit 63-55	Inner Dual			
					EBOL	0.52	0.53	0.53
					EBCL	0.47	0.53	0.51
					EBIL	0.58	0.62	0.60
					WBOL	0.55	0.59	0.56
FR 64015-11585A	US 31 from 0.33 mile north of Polk Rd north to Monroe Rd	Eisenhour Construction Co.	E. C. Levy (Burns Harbor, Ind. Yd)	Pits 43-5 & 64-20	Outer Dual			
					EBOL	0.46	0.49	0.47
					EBIL	0.53	0.55	0.54
					WBOL	0.46	0.47	0.47
					WBIL	0.52	0.54	0.53
1978					EBOL	0.60	0.65	0.62
					NBOL	0.65	0.68	0.67
					SBOL	0.65	0.67	0.66
					WBOL	0.71	0.72	0.72
					WBIL	0.71	0.72	0.72

1977 CONT.

**TABLE 2**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
1975	Mb 52081-07704A M 28 BR from 2,290 ft east of west limits of Ishpeming northeasterly to east junction west US 41-M 28	Payne and Dolan of Wisconsin, Inc.	Pit 52-39	Pit 52-39	EB	0.48	0.51	0.49
					WB	0.45	0.49	0.47
1976	Mb 11021-09318A (part) US 12 from Red Arrow Hwy easterly on westbound US 12 1.37 miles	John G. Yerington Construction Co.	Inland Lime & Stone Co. & Material Service, Thornton, Ill.	Pits 11-75 & 14-36	WBOL	0.39	0.40	0.39
					WBIL	0.61	0.65	0.63
1976	Mb 11021-09318A (part) US 12 from 1.63 miles east of Gallen westerly to Gallen	John G. Yerington Construction Co.	Inland Lime & Stone Co. & Material Service, Thornton, Ill.	Pits 11-75 & 14-36	EB	0.47	0.51	0.49
					WB	0.41	0.42	0.42
1976	Mb 29016-09269A (part) US 27 BR (Lincoln) from 554 ft east of Jerome Rd easterly to Main St in Alma (Control Section 29031)	The Hicks Co.	Pit 37-7	Pit 37-7	NB	0.47	0.48	0.47
					SB	0.41	0.43	0.42
1977	Mbr 03023-10614A M 89 from 400 ft west of Grant St easterly to 800 ft east of Otsego east limits, omitting 385 ft at Platt St	John G. Yerington Construction Co.	Pit 39-1	Pit 39-1	EB	0.37	0.42	0.40
					WB	0.36	0.41	0.39
1977	Mbr 03023-11159A M 89 (Lincoln Rd) from 1,000 ft southeast of south limits of Allegan southeasterly to 400 ft west of the west limits of Otsego	Grand Rapids Asphalt Paving Co.	Pit 41-50	Pit 70-50	EB	0.30	0.49	0.41
					WB	0.29	0.51	0.41
1977	Mb 04031-09266A US 23 from 530 ft south of Pohl St northerly to approximately the south city limits of Alpena	Alpena Paving Co.	Pit 71-15	Pit 4-31	NB	0.35	0.39	0.37
					SB	0.33	0.34	0.34
1977	Ms 04032-09619A US 23 from 1,425 ft south of the north limits of Alpena northerly 0.799 mile	Alpena Paving Co.	Pit 71-15	Pit 4-31	NBOL	0.43	0.47	0.45
					NBIL	0.42	0.45	0.43
					SBOL	0.36	0.39	0.38
					SBIL	0.40	0.42	0.41

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 06071-11004A	US 23 from M 13 northerly to Middle-branch of the Pine River in Standish	Central Paving Co.	Pit 71-15	Pit 72-3	Type C			
					NBOL	0.40	0.45	0.41
					NBIL	0.42	0.48	0.46
					SBOL	0.42	0.43	0.42
Ms 09032-06800A	M 13 from 494 ft south of Fisher Rd northerly to 300 ft south of North Union St	Saginaw Asphalt Paving Co.	Pit 71-15	Pits 63-29 & 63-54	Type M			
					NBOL	0.45	0.49	0.47
					NBIL	0.52	0.55	0.53
					SBOL	0.42	0.43	0.42
M 10031-12165A (part)	US 31 from Manistee-Benzie County line northerly 6.8 miles	Peninsula Asphalt Corp.	Pit 45-19	Pit 45-19	NB	0.48	0.52	0.50
					SB	0.43	0.47	0.45
					NB	0.47	0.53	0.50
					SB	0.49	0.53	0.51
M 10031-12165A (part)	US 31 from Lumley Rd north to Manistee-Benzie County line (Control Section 51012)	Peninsula Asphalt Corp.	Pit 45-19	Pit 45-19	NBTL	0.47	0.48	0.48
					NB	0.49	0.51	0.50
					SB	0.40	0.45	0.43
					NB	0.49	0.53	0.51
Mb 11019-12191A	M 239 (LaPorte Rd) from Michigan-Indiana line northerly to north side of I 94 interchange	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill. & U.S. Steel, Gary, Ind.	Hunt Lake, Ind.	NB	0.49	0.53	0.51
					SB	0.54	0.58	0.56
					EB	0.55	0.55	0.55
					WB	0.53	0.55	0.54
Mb 11021-12368A	US 12 from 525 ft west of Hoder Rd easterly to Memorial Dr	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill. & U.S. Steel, Gary, Ind.	Hunt Lake, Ind.	EB	0.55	0.55	0.55
					WB	0.53	0.55	0.54
					EB	0.48	0.57	0.52
					WB	0.49	0.58	0.52
Mb 12021-11012A	US 12 from east limits of Bronson northeasterly to Coldwater River Bridge	John G. Yerington Construction Co.	Pit 12-44	Pit 12-44	EB	0.48	0.57	0.52
					WB	0.49	0.58	0.52

1977 CONT.



**TABLE 2 (Cont.)**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Ms 13061-04941A	M 89 (Michigan Ave) from Cedar Ave easterly to Emerald Ave in Battle Creek	Globe Construction Co.	Pit 13-59	Pit 13-59	EBOL EBIL WBOL WBIL	0.42 0.47 0.46 0.46	0.48 0.52 0.47 0.48	0.46 0.50 0.47 0.47
Mb 14042-11014A	US 12 from 775 ft east of Union Rd easterly to M 103	Reith-Riley Construction Co., Inc.	Pit 3-44	Pit 78-38	EB WB	0.51 0.52	0.58 0.59	0.55 0.56
Mb 14081-09316A	M 216 from Section St easterly to 400 ft east of east limits of Marcellus	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EB WB	0.49 0.54	0.51 0.60	0.50 0.57
Mbr 15011-11015A	US 31 from 370 ft west of Barnard Rd northeasterly to 600 ft southwest of M 66	Hodgkiss and Douma, Inc.	Pit 45-19	Pit 15-32	NB SB	0.39 0.39	0.41 0.41	0.40 0.40
I 16091-05793A (part)	I 75 from Crumley Rd northerly to M 68 (Control Section 16093)	Lake Construction Co.	Pit 16-52	Pit 16-52	NBOL NBIL SBOL SBIL	0.58 0.62 0.54 0.62	0.59 0.65 0.58 0.66	0.59 0.63 0.56 0.64
I 16091-05793A (part)	I 75 from M 68 northerly 2.2 miles	Lake Construction Co.	Pit 16-52	Pit 16-52	NBOL NBIL SBOL SBIL	0.51 0.64 0.57 0.64	0.55 0.65 0.58 0.65	0.54 0.65 0.57 0.65
I 16093-09241A	I 75 from 0.75 mile north of Wolverine Rd northerly to Crumley Rd	Lake Construction Co.	Pit 16-52	Pit 16-52	NBOL NBIL SBOL SBIL	0.53 0.65 0.51 0.62	0.55 0.66 0.53 0.65	0.54 0.66 0.52 0.64
Mb 17032-11017A	I 75 BS from 330 ft south of M 129 northerly to the Canal Bridge in Sault Ste. Marie	Hodgkiss and Douma, Inc.	Pit 17-62	Pit 17-62	NBOL NBIL SBOL SBIL	0.51 0.46 0.53 0.51	0.52 0.49 0.57 0.55	0.51 0.48 0.55 0.53
Mbr 18031-11562A	US 27 BR from 50 ft south of Mineral St westerly and northerly to Wilcox Parkway	The Hicks Co.	Pit 37-26	Pit 18-71	NBOL NBIL SBOL SBIL	0.48 0.46 0.37 0.42	0.52 0.48 0.45 0.46	0.50 0.47 0.41 0.44
RF 20016-11021A (part)	US 27 from Roscommon-Crawford County line northerly to I 75	Central Paving Co.	Pit 72-5	Pit 72-5	NBOL NBIL SBOL SBIL	0.65 0.73 0.61 0.71	0.65 0.77 0.64 0.72	0.65 0.75 0.63 0.72

1977 CONT.

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
RF 20016-11021A (part)	US 27 from 1.5 miles north of Higgins Lake Rd northerly to Roscommon-Crawford County line (Control Section 72014)	Central Paving Co.	Pit 72-5	Pit 72-5	NBOL NBIL SBOL SBIL	0.57 0.70 0.58 0.71	0.60 0.72 0.60 0.72	0.59 0.71 0.59 0.71
U 21022-11240A	US 2-US 41-M 35 from 475 ft south of 5th Ave North, northerly to 575 ft north of 20th Ave in Escanaba	Payne and Dolan of Wisconsin, Inc.	Pit 21-19	Pit 21-19	EBOL EBIL WBOL WBIL	0.42 0.47 0.42 0.48	0.47 0.53 0.45 0.52	0.45 0.51 0.43 0.50
Mbr 23042-07657A	M 43 from 1.6 kilometers east of M 100 easterly to I 96	Reith-Riley Construction Co., Inc.	Pit 41-38	Pits 47-43 & 19-33	EBOL EBIL WBOL WBIL	0.48 0.57 0.49 0.55	0.53 0.59 0.51 0.57	0.50 0.58 0.50 0.56
RF 23092-10728A	M 99 from north limits of Eaton Rapids northerly to 1,000 ft north of Petrieville Rd	Spartan Asphalt Paving Co.	Pit 63-97	Pit 33-7	NBOL NBIL SBOL SBIL	0.48 0.52 0.49 0.52	0.52 0.57 0.53 0.54	0.51 0.54 0.51 0.53
Mb 25011-10849A	M 13-M 31 from north of I 69 northerly to M 56	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	NB SB	0.43 0.42	0.49 0.46	0.46 0.45
Mtb 25071-10409A	M 54 (Saginaw Rd) from 500 ft south of Perry Rd northerly to Center Rd	Bit-Con Corp.	Pit 63-4	Pit 63-4	NBOL NBIL SBOL SBIL	0.45 0.47 0.48 0.46	0.49 0.49 0.52 0.48	0.46 0.48 0.50 0.47
Mbr 25072-09295A	M 54 from 640 ft north of Court St northerly to north of Davison Rd	Flint Asphalt and Paving Co.	Pit 63-4	Pit 63-29	NBOL NBIL SBOL SBIL	0.23 0.36 0.38 0.36	0.30 0.39 0.33 0.37	0.27 0.37 0.30 0.37
Mb 26011-11032A	M 18 from Midland-Gladwin County line northerly to north of Burge Rd	The Hicks Co.	Pit 71-15	Pit 37-38	NB SB	0.49 0.47	0.59 0.55	0.53 0.51
M 27021-12167A	US 2 from Interstate Bridge in Ironwood east Intermittently to Eddy St in Wakefield	Mathy Construction Co.	Pit 27-12	Pit 27-12	EBOL EBIL WBOL WBIL	0.54 0.57 0.53 0.58	0.60 0.59 0.59 0.60	0.57 0.58 0.55 0.59
Mb 31052-09295A	Northbound US 41 (Quincy St) from south approaches to the Houghton-Hancock Bridge northerly to M 203, thence northerly on US 41 (Lincoln St) to White St	Geo. Hocking Construction Co.	Pit 31-63	Pit 31-16	NBOL NBIL SBOL SBIL	0.54 0.53 0.59 0.66	0.62 0.58 0.65 0.73	0.57 0.55 0.63 0.70

1977 CONT

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 34011-09277A	M 91 from north of Ellis Rd north to Ionia-Montcalm County line	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 41-27	NB SB	0.52 0.47	0.53 0.48	0.52 0.47
Mb 38061-10852A	M 60 from south of McCain Rd south westerly to southwest of Allman Rd, omitting 950 ft 1 mile east of Reynolds Rd	Richardson Asphalt Paving Co.	Pits 63-4 & 68-97	Pit 30-35	EB WB	0.45 0.49	0.51 0.53	0.48 0.51
Ms 38063-03597A	I 94 BL from 454 ft west of Ganson St northeasterly to 487 ft east of US 127	Richardson Asphalt Paving Co.	Pit 47-3	Pit 30-35	EBOL EBIL WBOL WBIL	0.36 0.41 0.45 0.41	0.41 0.42 0.46 0.46	0.39 0.41 0.46 0.43
Mb 38063-11049A	I 94 BL from 487 ft east of US 127 north-easterly to I 94	Richardson Asphalt Paving Co.	Pit 47-3	Pit 30-35	EB WB	0.45 0.45	0.46 0.48	0.45 0.47
Ms 39041-09603A (part)	I 94 BL (Michigan) from Stadium Dr south junction northeast 0.39 mile to north junction	Globe Construction Co.	Pit 3-44	Pit 3-44	EBOL EBCI EBIL WBOL WBOL WBIL	0.40 0.36 0.40 0.35 0.35 0.40	0.45 0.41 0.46 0.41 0.41 0.46	0.43 0.38 0.44 0.38 0.38 0.42
Ms 39041-09603A (part)	I 94 BL (Michigan) from Stadium Dr north junction east 0.39 mile to Church St	Globe Construction Co.	Pit 3-44	Pit 3-44	EBOL EB#4 EB#3 EB#2 EBIL	0.36 0.39 0.37 0.36 0.43	0.40 0.43 0.42 0.41 0.46	0.37 0.41 0.40 0.39 0.44
Mbr 39082-10797A	M 43 (Gull Rd) from 0.3 mile east of Sprinkle Rd east 0.53 mile	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EBOL EBIL WBOL WBIL	0.52 0.49 0.59 0.53	0.55 0.51 0.64 0.54	0.53 0.50 0.61 0.53
Mbr 41033-07689A	M 37 from 4 Mile Rd northerly to beginning of divided highway, south of Alpine Church Rd	Woodland Paving Co.	Pit 41-118	Pit 41-27	NBOL NBIL SBOL SBIL	0.30 0.45 0.35 0.41	0.35 0.46 0.37 0.45	0.33 0.45 0.36 0.43
U 41043-02116A	M 21 relocation from I 96 easterly to Grand River, 3.5 miles west of Ada	Reith-Riley Construction Co., Inc.	Pit 41-69	Pit 41-69	EBOL EBIL WBOL WBIL	0.49 0.51 0.43 0.49	0.52 0.55 0.45 0.53	0.51 0.54 0.44 0.51

1977 CONT

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 41063-12307A (part)	M 11 from Buchanan Ave east to Breton Ave	Michigan Colprovia Co.	Pit 41-22	Pit 41-22	EBOL EBIL WBOL WBIL	0.27 0.29 0.21 0.22	0.36 0.37 0.39 0.42	0.32 0.34 0.33 0.32
HHS 41131-10501A	US 131 from 500 ft south of Wealthy St northerly to 100 ft north of Pearl St	Woodland Paving Co.	Pit 41-118	Pit 41-27	NBOL NBCL NBIL SBOL SBCL SBIL	0.43 0.37 0.46 0.31 0.33 0.42	0.46 0.42 0.49 0.36 0.37 0.45	0.44 0.40 0.48 0.34 0.35 0.44
Mb 43022-11056A	US 10 from M 37 easterly to 1,000 ft east of Lincoln Park Rd	Reith-Riley Construction Co., Inc.	Pit 54-22	Pit 54-22	EB WB	0.41 0.45	0.43 0.49	0.42 0.47
Mbr 52041-10858A	US 41-M 28 from 500 ft east of M 95 westerly to the Marquette-Baraga County line	Payne and Dolan of Wisconsin, Inc.	Pit 52-1	Pit 52-1	EB WB	0.51 0.49	0.60 0.57	0.55 0.54
Mb 54012-11069A	US 131 from 350 ft north of Rose Ave in Big Rapids north to Osceola-Mecosta County line	Reith-Riley Construction Co., Inc.	Pit 75-5	Pit 54-22	NB SB	0.49 0.43	0.49 0.47	0.49 0.44
Mb 58052-11072A	M 50 from west limits of Dundee easterly to Lewis Rd	Cunningham-Gooding	E. C. Levy (Dearborn Yd)	Pit 81-57	EB WB	0.48 0.52	0.54 0.58	0.52 0.54
Ms 58052-07140A	US 24 from north Cluster Rd northerly to north of Lorain St	Cunningham-Gooding	E. C. Levy (Dearborn Yd) & Pit 81-84	Pit 81-28	NBOL NBIL SBOL SBIL	0.43 0.43 0.42 0.45	0.49 0.45 0.46 0.46	0.46 0.43 0.44 0.45
Mb 58052-11075A	US 24 from north of Lakewood Rd northeasterly to M 125	Cunningham-Gooding	Pit 81-84	Pit 81-28	NB SB	0.42 0.46	0.54 0.54	0.48 0.50
Mbr 59031-09278A	M 91 from Ionia-Montcalm County line northerly to Benton St in Greenville	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 41-112	NB SB	0.48 0.48	0.52 0.52	0.50 0.50
Mbr 61131-11077A (part)	M 37 from M 46 northerly 3.2 miles	Reith-Riley Construction Co., Inc.	Pits 41-38, 41-118 & 54-22	Pits 41-121 & 62-33	NB SB	0.41 0.41	0.47 0.45	0.43 0.44
Mbr 61131-11077A (part)	M 37 from west limits of Casnovia westerly 0.76 mile (Control Section 61024)	Reith-Riley Construction Co., Inc.	Pits 41-38, 41-118 & 54-22	Pits 41-121 & 62-33	NB SB	0.54 0.46	0.57 0.51	0.55 0.49

1977 CONT

**TABLE 2 (Cont.)**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	AVG
Mbr 61131-11077A (part)	M 37 from south junction M 82 south 2.0 miles (Control Section 52031)	Reith-Riley Construction Co., Inc.	Pits 41-38, 41-118 & 54-22	Pits 41-121 & 62-33	NB SB	0.48 0.47	0.49 0.51	0.48 0.49
Ms 63041-10067A	M 59 (West Huron St) from US 10 east-erly to Wide Track Dr, omitting 200 ft from Franklin Blvd to GTW RR	Ajax Paving Industries, Inc.	Pit 63-4	Pit 63-4	EBOL EBIL WBOL WBCL WBIL	0.41 0.37 0.49 0.43 0.40	0.43 0.41 0.51 0.47 0.43	0.42 0.40 0.50 0.45 0.42
Mb 67011-11468A	US 131 from Mecosta-Osceola County line north to south limits of Reed City	Reith-Riley Construction Co., Inc.	Pit 75-5	Pit 54-22	NB SB	0.48 0.47	0.52 0.49	0.50 0.48
I 69014-09240A (part)	I 75 from 160 ft south of Sturgeon Rd north to Otsego-Cheboygan County line	Lake Construction Co.	Pit 16-52	Pit 16-52	NBOL NBIL SBOL SBIL	0.52 0.62 0.51 0.62	0.53 0.64 0.53 0.65	0.52 0.63 0.52 0.64
I 69014-09240A (part)	I 75 from Otsego-Cheboygan County line north to 4,390 ft north of Wolverine Rd (Control Section 16093)	Lake Construction Co.	Pit 16-52	Pit 16-52	NBOL NBIL SBOL SBIL	0.51 0.60 0.51 0.62	0.51 0.62 0.52 0.64	0.51 0.61 0.52 0.63
Mb 76061-11095A	M 21 from 220 ft east of Smith Rd west-erly to Clinton-Shiawassee County line	Spartan Asphalt Paving Co.	Pit 63-4	Pit 63-29	EB WB	0.49 0.48	0.57 0.53	0.54 0.50
Mb 78012-11096A	US 131 from south junction M 60 northerly to north of US 131 BR into Three Rivers	Klett Construction Co.	Material Service, Thornton, Ill	Pits 14-19 & 14-51	NBOL NBIL SBOL SBIL	0.46 0.48 0.48 0.47	0.51 0.54 0.48 0.49	0.48 0.51 0.48 0.48
Mb 78022-11097A	US 12 from 380 ft west of US 131 east to east limits of White Pigeon	Reith-Riley Construction Co., Inc.	Pits 3-44 & 11-63	Pit 78-12	EBOL EBIL WBOL WBIL	0.41 0.47 0.51 0.46	0.48 0.53 0.54 0.52	0.45 0.50 0.52 0.50
Ms 78051-09602A	M 66 from Fawn River Rd north to US 12	Arco Asphalt Corp.	E.C. Levy (Burns Harbor)	Pit 14-47	NBOL NBIL SBOL SBIL	0.41 0.43 0.41 0.48	0.48 0.46 0.45 0.52	0.44 0.45 0.43 0.50
Mb 78051-12168A	M 66 from Michigan-Indiana State line north to Fawn River Rd	Arco Asphalt Corp.	E.C. Levy (Burns Harbor)	Pit 14-47	NBOL NBIL SBOL SBIL	0.55 0.59 0.60 0.60	0.57 0.64 0.60 0.61	0.56 0.61 0.60 0.60

1977 CONT

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
I 80012-05865A (part)	I 196 from 630 ft south of Riverside Rd northerly to the Berrien-Van Buren County line (Control Section 11111)	Klett Construction Co.	U.S. Steel, Gary, Ind.	Pit 14-51	NBOL	0.57	0.58	0.58
					NBIL	0.62	0.65	0.64
					SBOL	0.57	0.59	0.58
I 80012-05865A (part)	I 196 from Berrien-Van Buren County line northerly to the C&O RR south of 16th Ave	Klett Construction Co.	U.S. Steel, Gary, Ind.	Pit 14-51	NBOL	0.54	0.57	0.55
					NBIL	0.61	0.65	0.63
					SBOL	0.55	0.59	0.58
Mb 80071-09314A	M 51 from I, 250 ft northeast of south limits of Decatur northeasterly to 850 ft north of Wheeler Rd	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	NBOL	0.55	0.57	0.56
					NBIL	0.47	0.51	0.49
					SBOL	0.36	0.41	0.39
MU 82072-11308A	M 3 (Gratiot) from I 94 northeasterly to 8 Mile Rd	Ajax Paving Industries, Inc.	E.C. Levy (Dix Yd)	Pit 81-89	NBOL	0.43	0.45	0.44
					NBCL	0.41	0.46	0.43
					NBIL	0.46	0.48	0.46
MU 82121-11306A	I 96 BS from 8 Mile Rd southeasterly to 150 ft west of Berg St	Asphalt Products Co.	E.C. Levy (Dix Yd)	Pit 63-55	NBOL	0.39	0.42	0.41
					EB#3	0.42	0.46	0.44
					EB#2	0.45	0.46	0.46
Mbr 82121-11307A	I 96 BS from 100 ft west of Colgate St southeasterly to 8 Mile Rd (Control Section 63022)	Asphalt Products Co.	E.C. Levy (Dix Yd)	Pit 63-55	EBIL	0.46	0.51	0.48
					WBOL	0.41	0.43	0.42
					WB#3	0.45	0.48	0.47
BUY 82122-08444A (part)	I 96 ramp lanes from 490 ft west of Evergreen Rd easterly to 1,000 ft west of M 39	Asphalt Products Co.	E.C. Levy (Dix Yd)	Pit 63-55	WB#2	0.46	0.47	0.46
					WBIL	0.42	0.48	0.45
					EBOL	0.48	0.52	0.50
					EB#3	0.49	0.49	0.49
					EB#2	0.41	0.43	0.42
					EBIL	0.43	0.47	0.44
					WBOL	0.41	0.47	0.45
					WB#3	0.45	0.46	0.46
					WB#2	0.40	0.43	0.42
					WBIL	0.46	0.48	0.47
					EBRL	0.53	0.54	0.53
					WBRL	0.54	0.57	0.55

1977 CONT

**TABLE 2 (Cont.)**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mbr 09041-12363A	M 118 (Monroe St) from 65 ft east of Cedar St east to east limits of Allegan	Reith-Riley Construction Co., Inc.	Pit 3-36	Pit 39-1	EB WB	0.43 0.45	0.46 0.49	0.44 0.47
Mbr 04032-12364A (part)	US 23 from 9th St in Alpena north to Long Rapids Rd	Alpena Paving Co.	Pit 4-13	Pit 4-13	NBOL NBIL SBOL SBIL	0.45 0.41 0.37 0.40	0.46 0.42 0.41 0.43	0.46 0.41 0.40 0.41
Mbr 04032-12364A (part)	US 23 from north end of four lane in Alpena north to Alpena-Presque Isle County line	Alpena Paving Co.	Pit 4-13	Pit 4-13	NB SB	0.43 0.43	0.47 0.47	0.45 0.45
Mbr 09011-11007A (part)	M 84 (Bay Rd) from Bay-Saginaw County line northeasterly to 100 ft east of Broadway in Bay City, omit at I 75 and Salzburg Rd	Midland Contracting Co.	Pit 71-15	Pit 71-15	NB SB	0.46 0.41	0.47 0.43	0.47 0.42
Mbr 09011-11007A (part)	M 84 from 1,400 ft north of Tittabawassee Rd northeasterly to Bay-Saginaw County line (Control Section 73033)	Midland Contracting Co.	Pit 71-15	Pit 71-15	NB SB	0.47 0.53	0.48 0.55	0.47 0.54
Mbr 11022-12369A	US 12 BR from 122 ft northwest of Maple St southeasterly to 0.25 mile northwest of M 60 interchange	Reith-Riley Construction Co., Inc.	U.S. Steel, Gary, Ind.	Pit 14-36	EB WB	0.62 0.54	0.65 0.57	0.64 0.56
Mbr 11041-12370A	M 60 BR from 13th St to 17th St in Niles	Reith-Riley Construction Co., Inc.	U.S. Steel, Gary, Ind.	Pit 14-36	EB WB	0.47 0.53	0.49 0.55	0.48 0.54
Mbr 11061-12897A	US 31-US 33 from Michigan-Indiana State line northerly to Lawndale St	Klett Construction Co.	U.S. Steel, Gary, Ind.	Pit 14-19	NBOL NBIL SBOL SBIL	0.43 0.48 0.41 0.46	0.47 0.52 0.46 0.49	0.45 0.50 0.43 0.48
Mbr 12012-12667A (part)	M 66 from M 60 north to Branch-Calhoun County line	Reith-Riley Construction Co., Inc.	Pits 3-36 & 39-69	Pit 13-89	NB SB	0.47 0.48	0.49 0.49	0.48 0.49
Mbr 13022-12668A	M 60 from 17 Mile Rd east to 380 ft west of West Main in Homer	Reith-Riley Construction Co., Inc.	Pits 3-36 & 39-69	Pit 13-89	EB WB	0.47 0.49	0.54 0.53	0.50 0.52
Mbr 14062-12642A	M 60 from east limits of Cassopolis east to east of Cards Rd	Klett Construction Co.	U.S. Steel, Gary, Ind.	Pit 14-19	EB WB	0.53 0.52	0.55 0.53	0.54 0.53

1978

TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
Mb 25073-11030A	M 54 from 620 ft south of Vienna Rd northerly to 185 ft north of Clio Rd	Spartan Asphalt Paving Co.	Pit 63-97	Pit 63-29	NBOL	0.46	0.51	0.48
					NBIL	0.58	0.60	0.59
					SBOL	0.52	0.58	0.56
					SBIL	0.61	0.65	0.64
UM 33082-01860A	M 43 from 900 ft west of Park Lake Rd easterly to Arumore	Spartan Asphalt Paving Co.	Pit 63-97	Pit 33-7	EBOL	0.39	0.40	0.39
					EBIL	0.48	0.48	0.48
					WBOL	0.46	0.47	0.47
					WBIL	0.45	0.46	0.46
Mb 35032-11044A	US 23 from 966 ft south of Ausable River Bridge northerly to 918 ft north of County Rd F 41	Central Paving Co.	Pit 71-5	Pit 72-5	NBOL	0.34	0.36	0.35
					NBIL	0.36	0.39	0.37
					SBOL	0.31	0.33	0.32
					SBIL	0.34	0.39	0.36
M 36021-10138A	US 2 from 0.5 mile west of Beechwood easterly to Gibbs City Rd	Mathy Construction Co.	Pit 36-40	Pit 36-40	EB	0.46	0.48	0.47
					WB	0.57	0.59	0.58
M 36021-10139A	US 2 from Gibbs City Rd easterly to Ninth Ave in Iron River	Mathy Construction Co.	Pit 36-40	Pit 36-40	EBOL	0.57	0.58	0.58
					EBIL	0.57	0.58	0.57
WBOL					WBOL	0.52	0.55	0.53
					WBIL	0.53	0.57	0.54
Mb 37022-11045A	M 20 from 0.3 mile east of US 27 easterly to Isabella-Midland County line	The Hicks Co.	Pit 37-7	Pit 37-7	EB	0.37	0.43	0.40
					WB	0.43	0.48	0.45
F 40012-09699A	US 131 from Boardman River northerly to 880 ft north of M 72, Kalkaska	Williams Bros. Asphalt Paving Co.	Pit 45-19	Pit 45-19	NBOL	0.40	0.45	0.42
					NBIL	0.39	0.43	0.42
					SBOL	0.39	0.41	0.40
					SBIL	0.36	0.36	0.36
Mb 41063-12307A (part)	M 11 from Church St east to Chicago Dr (Control Section 41061)	Michigan Colprovia Co.	Pit 41-22	Pit 41-22	EBOL	0.48	0.52	0.50
					EBIL	0.47	0.53	0.50
					WBOL	0.43	0.43	0.43
					WBIL	0.39	0.46	0.43
Mb 41063-12307A (part)	M 11 from Chicago Dr east to 0.5 mile east of Byron Center Rd (Control Section 41062)	Michigan Colprovia Co.	Pit 41-22	Pit 41-22	EBOL	0.43	0.48	0.46
					EBIL	0.35	0.52	0.46
					WBOL	0.33	0.45	0.39
					WBIL	0.41	0.47	0.44
Mb 46061-12387A	US 223 BR from US 223 east to William St in Adrian	Cunningham-Gooding	Pits 63-97 & 81-78	Pit 81-78	EBOL	0.36	0.41	0.39
					EBIL	0.34	0.36	0.35
					WBOL	0.45	0.46	0.47
					WBIL	0.39	0.41	0.40

1978 CONT



TABLE 2 (Cont.)  
 BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1975, 1976, 1977, AND 1978

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Coefficient of Wet Sliding Friction		
			Coarse	Fine		Low	High	Avg
DPF 52041-11602A	US 41-M 28 from 300 ft west of 2nd St in Ishpeming east to 1,525 ft east of west Negaunee limits	Payne and Dolan of Wisconsin, Inc.	Pit 52-9	Pit 52-9	EBOL EBIL WBOL WBIL	0.51 0.54 0.57 0.58	0.54 0.57 0.59 0.60	0.53 0.55 0.58 0.59
DPF 52041-11604A	US 41-M 28 from 1,015 ft west of North Lake Rd easterly to 350 ft east of M 28 BR	Payne and Dolan of Wisconsin, Inc.	Pit 52-9	Pit 52-9	EBOL EBIL WBOL WBIL	0.55 0.54 0.55 0.54	0.58 0.58 0.58 0.60	0.57 0.56 0.57 0.57
Mb 54022-12687A	M 20 from west limits to south limits of Mecosta	Reith-Riley Construction Co., Inc.	Pit 45-19	Pit 54-42	EB WB	0.48 0.45	0.49 0.45	0.48 0.45
Mbr 59022-12689A	M 57 from Flat River to M 66	Spartan Asphalt Paving Co.	Pit 37-9	Pit 59-44	EB WB	0.50 0.49	0.57 0.57	0.53 0.53
Mbr 61073-14312A	US 31 BR from Colby St west and north to Hanson St in Whitehall	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 70-9	NBOL NBIL SBOL SBIL	0.48 0.51 0.46 0.52	0.55 0.62 0.57 0.58	0.53 0.57 0.51 0.54
IS 63022-11321A	I 96 from Livingston-Oakland County line easterly 1.25 miles	Ann Arbor Construction Co.	Pit 47-3	Pit 47-3	EBOL EBCL EBIL WBOL WBCL WBIL	0.43 0.45 0.49 0.46 0.39 0.42	0.46 0.49 0.53 0.48 0.43 0.45	0.45 0.47 0.51 0.47 0.43 0.43
Mb 70016-12704A (part)	US 31 from M 104 in Ferrysburg north to Ottawa-Muskegon County line	Reith-Riley Construction Co., Inc.	E.C. Levy (Burns Harbor)	Pit 70-9	NBOL NBIL SBOL SBIL	0.41 0.52 0.51 0.54	0.43 0.55 0.53 0.55	0.42 0.54 0.52 0.54
Mb 70016-12704A (part)	US 31 from Ottawa-Muskegon County line north to south of Hile Rd (Control Section 61074)	Reith-Riley Construction Co., Inc.	E.C. Levy (Burns Harbor)	Pit 70-9	NBOL NBIL SBOL SBIL	0.45 0.52 0.42 0.54	0.47 0.58 0.45 0.55	0.46 0.56 0.44 0.55
Mbr 77052-12403A	M 29 from north limits of St. Clair north 2.0 miles to existing 24 ft concrete pavement	Kammer Asphalt Paving Co.	Pit 63-4	Pit 77-2	NB SB	0.43 0.43	0.45 0.47	0.44 0.45
Mb 81031-12154A	US 12 from east of Mill St east to east of Maple St in Saline	Cunningham-Gooding	Pit 63-97	Pit 81-1	EBOL EBIL WBOL WBIL	0.48 0.45 0.41 0.43	0.48 0.47 0.45 0.46	0.48 0.46 0.43 0.44
Mbr 83052-12411A	M 115 from east limits of Mesick southeasterly to northwest of M 55	Peninsula Asphalt Corp.	Pit 45-19	Pit 45-19	EB WB	0.42 0.43	0.49 0.48	0.44 0.46

1978 CONT

**TABLE 3**  
**BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1977 AND 1978**

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 07013-11005A	US 41 from 3.1 miles north of M 38 northerly to the Houghton-Baraga County line	Fox Valley Construction Co.	Pit 31-69	NB SB	0.60 0.58	0.61 0.64	0.61 0.61
Mb 08051-11006A (part)	M 66 from 0.5 mile north of Cloverdale Rd northerly to M 79	Reith-Riley Construction Co., Inc.	Pit 13-30	NB SB	0.48 0.42	0.54 0.47	0.51 0.45
Mb 08051-11006A (part)	M 66 from M 79 northerly to Casgrove Rd in Nashville (Control Section 08052)	Reith-Riley Construction Co., Inc.	Pit 13-30	NB SB	0.47 0.41	0.48 0.46	0.48 0.44
Mb 12041-09313A (part)	M 86 from Branch-St. Joseph County line easterly to US 12	Reith-Riley Construction Co., Inc.	Pit 12-39	EB WB	0.53 0.48	0.57 0.53	0.55 0.50
Mb 12041-09313A (part)	M 86 from 250 ft west of east limits of Colon easterly to Branch-St. Joseph County line (Control Section 78062)	Reith-Riley Construction Co., Inc.	Pit 12-39	EB WB	0.45 0.46	0.47 0.51	0.46 0.49
Mb 17072-11018A	M 129 from 425 ft north of Dafer Rd northerly to 18th Ave in Sault Ste. Marie	Hodgkiss and Douma, Inc.	Pit 17-62	NB SB	0.61 0.58	0.66 0.65	0.64 0.62
Mb 18042-11371A	M 61 from US 27 easterly to the Clare-Gladwin County line	The Hicks Co.	Pit 18-2	EB WB	0.37 0.43	0.53 0.51	0.45 0.47
M 21024-12166A	US 2 from 3,100 ft east of FFH 13 easterly to County Rd #483 (Garden Rd)	Fox Valley Construction Co.	Pit 75-43	EB WB	0.41 0.45	0.62 0.58	0.51 0.51
Mb 23021-11022A	M 79 from Ainger Rd easterly to the GTW RR in Charlotte	Reith-Riley Construction Co., Inc.	Pit 13-30	EB WB	0.49 0.49	0.54 0.52	0.52 0.51
Mb 24051-11023A	M 131 from west limits of Harbor Springs northerly to State Rd in Cross Village	Hodgkiss and Douma, Inc.	Pit 15-32	NB SB	0.49 0.49	0.58 0.59	0.53 0.53
Mb 31031-11037A	M 203 from 2.39 miles west of US 41 easterly to US 41	Geo. Hocking Construction Co.	Pit 31-16	EB WB	0.59 0.66	0.61 0.67	0.60 0.66
Mb 33051-11039A	M 52 from 85 ft south of Rowley Rd northerly to Ingham-Shiawassee County line	Spartan Asphalt Paving Co.	Pit 33-72	NB SB	0.48 0.43	0.53 0.51	0.50 0.47
Mb 33072-11040A (part)	M 106 from Clinton St in Stockbridge easterly to Ingham-Livingston County line	Howell Construction Co.	Pit 47-26	EB WB	0.45 0.48	0.49 0.52	0.47 0.50

1977

TABLE 3 (Cont.)  
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1977 AND 1978

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 33072-11040A (part)	M 106 from Ingham-Livingston County line easterly to M 36 in Gregory (Control Section 47021)	Howell Construction Co.	Pit 47-26	EB WB	0.48 0.52	0.54 0.57	0.50 0.54
Mbr 40023-11679A	M 72 from west Rapid City Rd east, 7 miles west of Kalkaska	Reith-Riley Construction Co., Inc.	Pit 83-6	EBTL	0.46	0.48	0.47
Mb 42021-11055A	M 26 from Garden City Creek at north limits of Eagle River northeasterly to 2 miles southwest of Eagle Harbor, omitting 0.26 mile at Jacobs Creek	Geo. Hocking Construction Co.	Pit 31-16	EB WB	0.62 0.72	0.67 0.77	0.65 0.74
Mb 48034-11932A	M 123 from 10 miles northwest of Newberry northeasterly 14 miles to Chippewa-Luce County line	Fox Valley Construction Co.	Pit 48-25	NB SB	0.64 0.58	0.72 0.66	0.68 0.62
M 52011-11067A	M 95 from 1.9 miles south of Trout Falls Creek northerly to 0.7 miles north of Michigamme River	Payne and Dolan of Wisconsin, Inc.	Pit 52-1	NB SB	0.55 0.59	0.59 0.61	0.57 0.60
Mb 74031-11091A	M 19 from east limits of Peck westerly and northerly to 145 ft south of south limits of Sandusky	Frank Strausberg and Son	Pit 74-62	NB SB	0.43 0.39	0.52 0.54	0.47 0.48
M 75052-10873A (part)	M 77 from Alger-Schoolcraft County line north to Wilson St in Grand Marais (Control Section 02051)	Lake Construction Co.	Pit 49-58	NB SB	0.71 0.70	0.73 0.74	0.72 0.72
M 75052-10873A (part)	M 77 from 3.5 miles north of Seney north to Alger-Schoolcraft County line	Lake Construction Co.	Pit 49-58	NB SB	0.64 0.60	0.65 0.62	0.64 0.61
Mb 75061-10844A (part)	M 28 from southeast of McMillan south-easterly 1.3 miles (Control Section 48041)	Lake Construction Co.	Pit 49-58	EB WB	0.54 0.52	0.59 0.55	0.57 0.53
Mb 75061-10844A (part)	M 28 from Alger-Schoolcraft County line easterly 10.9 miles	Lake Construction Co.	Pit 49-58	EB WB	0.48 0.43	0.54 0.53	0.51 0.48
Mb 77033-10796A	M 25 from north of Carrigan Rd northerly to north of Lakeport	Molesworth Contracting Co.	Pits 74-26 & 77-15	NB SB	0.41 0.41	0.45 0.43	0.42 0.42

1977 CONT.

**TABLE 3 (Cont.)**  
**BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1977 AND 1978**

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 05031-12663A (part)	M 88 from 735 ft south of Bellaire northerly to US 31, omitting from 0.4 mile north of P. O. B. to Hastings Ave	Hodgkiss and Douma, Inc.	Pit 5-60	NB SB	0.34 0.39	0.41 0.47	0.38 0.42
Mb 05031-12663A (part)	M 66 from Stark Rd in Green River northerly 6.45 miles to Lillock Creek (Control Section 05051)	Hodgkiss and Douma, Inc.	Pit 5-60	NB SB	0.41 0.40	0.45 0.45	0.43 0.43
Mbr 17042-12372A (part)	M 48 from south intersection with County Rd H-63 east to M 129	Lake Construction Co.	Pit 17-37	EB WB	0.56 0.51	0.64 0.64	0.61 0.57
Mbr 17042-12372A (part)	M 48 from M 129 easterly to Stalwart (Control Section 17043)	Lake Construction Co.	Pit 17-37	EB WB	0.58 0.54	0.61 0.60	0.60 0.56
Mb 23012-12671A	I 69 BL (Lawrence St) from Washington St northeast to ramp "E" of I 69 connection	Richardson Asphalt Corp.	Pit 38-78	NBOL NBIL SBOL SBIL	0.46 0.51 0.46 0.43	0.47 0.55 0.48 0.46	0.47 0.53 0.47 0.45
Mbr 23031-12672A	I 69 BL (Cochran Rd) from 1,930 ft south of Broadway Rd north to M 50 in Charlotte	Richardson Asphalt Corp.	Pit 38-78	NB SB	0.53 0.49	0.55 0.51	0.54 0.50
Mb 23091-12674A (part)	M 99 from Eaton-Jackson County line north to north of Kimbark St, Eaton Rapids	Richardson Asphalt Corp.	Pit 38-78	NB SB	0.49 0.48	0.53 0.51	0.50 0.49
Mb 23091-12674A (part)	M 99 from northeast of Crawford Rd northerly to Eaton-Jackson County line (Control Section 38011)	Richardson Asphalt Corp.	Pit 38-78	NB SB	0.51 0.51	0.55 0.53	0.54 0.52
Mb 26012-12677A	M 18 from west of Cassidy Rd west and north to the Gladwin-Roscommon County line	The Hicks Co.	Pit 18-56	NB SB	0.52 0.48	0.55 0.49	0.53 0.49
Mb 31031-12377A	M 203 from 6.5 miles north of Hancock northeasterly 1.96 miles	Geo. Hocking Construction Co.	Pit 31-16	NB SB	0.60 0.61	0.66 0.64	0.63 0.62
Mbr 33021-12680A	M 36 from west of Union St in Dansville east to M 52	Richardson Asphalt Corp.	Pit 38-78	EB WB	0.45 0.53	0.54 0.59	0.49 0.57

1978

TABLE 4  
 CONVENTIONAL CONCRETE AND BITUMINOUS PAVEMENT  
 SUMMARY FOR THE 1978 TEST YEAR

Surface Type	Service Year When Tested	Total Lanes Tested	Total Lane Miles Tested	Weighted Average Friction Level
Concrete	Initial	4	20.960	0.67
	1	38	63.348	0.54
	2	24	29.392	0.53
Bituminous Concrete	Initial	102	256.458	0.48
	1	243	787.694	0.51
	2	6	10.360	0.47
	3	2	9.568	0.48
Bituminous Aggregate	Initial	46	276.650	0.53
	1	47	320.322	0.55

TABLE 3 (Cont.)  
 BITUMINOUS AGGREGATE PAVEMENTS (4.11) CONSTRUCTED IN 1977 AND 1978

Project No.	Location	Paving Contractor	Coarse Aggregate Sources	Direction and Lane	Coefficient of Wet Sliding Friction		
					Low	High	Avg
Mb 35022-11043A	M 55 from Zephyr Rd east to 0.5 mile east of Sand Lake Rd	Central Paving Co.	Pit 72-5	EB WB	0.45 0.47	0.48 0.49	0.46 0.48
Mb 42021-12385A (part)	M 26 from US 41 in Phoenix northerly to Garden City Creek	Geo. Hocking Construction Co.	Pit 31-16	NB SB	0.58 0.55	0.62 0.58	0.60 0.57
Mb 42021-12385A (part)	M 26 from 1.5 miles southwest of Eagle Harbor northeasterly to 350 ft northeast of Silver River	Geo. Hocking Construction Co.	Pit 31-16	NB SB	0.55 0.53	0.59 0.55	0.57 0.54
Mbr 48034-12683A	M 123 from County Rd H-37 (Four Mile corner) northeasterly 11.859 miles	Fox Valley Construction Co.	Pit 48-6	NB SB	0.55 0.47	0.61 0.54	0.58 0.51
Mbr 48042-12388A	M 28 from M 117 easterly 16.1 miles to Chippewa-Luce County line	Fox Valley Construction Co.	Pit 48-6	EB WB	0.53 0.47	0.59 0.61	0.57 0.54
Mb 49041-11062A	M 134 from I 75 easterly to 1.8 miles west of M 129	Fox Valley Construction Co.	Pit 49-53	EB WB	0.55 0.55	0.61 0.61	0.58 0.60
I 69014-13814A	I 75 from 2,700 ft north of M 32 north to 165 ft south of Sturgeon Valley Rd	Lake Construction Co.	Pit 16-42	NBOL NBIL SBOL SBIL	0.46 0.52 0.49 0.51	0.49 0.59 0.53 0.64	0.47 0.56 0.51 0.57
Mb 75031-12707A	US 2, 1.3 miles east of Manistique	Payne and Dolan of Wisconsin, Inc.	Pit 21-77	EB WB	0.57 0.55	0.59 0.59	0.58 0.57
Mb 75061-12398A	M 28 from M 77 in Seney easterly to the Luce-Schoolcraft County line	Fox Valley Construction Co.	Pit 48-6	EB WB	0.53 0.54	0.55 0.57	0.54 0.55
SS 77071-07752A	M 154 from the south end north to the ferry dock, Harsen's Island	Molesworth Contracting Co.	Pit 74-26	NB SB	0.43 0.49	0.45 0.52	0.44 0.50

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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 5 - Five-Year Review for Concrete Pavements Constructed in 1973

Table 4 contains friction test results for 15 portland cement concrete projects consisting of 56 lanes (158 lane miles) which were constructed in 1973. Initial service year tests were conducted in 1973 on three of these projects; resulting Wsf values averaged 0.58. Thirteen projects were tested in 1974, after a one-year service period and friction levels averaged 0.54. Two projects were not tested until their two-year service level (1975); these averaged 0.58. All projects were retested after five years of service. Five-year coefficients of 56 lanes tested ranged from 0.37 to 0.74 and averaged 0.55. Only two of the lanes tested at the five-year service level averaged below 0.40. The SBOL of Project 82191-02802 averaged 0.37 and the SBIL of Project 11031-00100 averaged 0.38. Highest average friction level was the 0.70 average Wsf value encountered on the NBIL of Project 33172-00494.

Table 6 - Five-Year Review for Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1973

In Table 6 results of pavement friction tests are shown for 47 bituminous concrete (4.12) projects. In all, 611.26 lane miles (207 lanes) were tested. Initial service year tests were conducted in 1973 on 15 projects; Wsf values ranged from 0.30 to 0.64 and averaged 0.46. At the one-year level, 38 projects were tested and Wsf values also averaged 0.46. The five projects which were tested after a two-year service period had coefficients averaging 0.49. Only one project was tested at the three-year service level during 1976, its average friction level was 0.49. All projects were retested after five service years. The coefficient variation was wide, ranging from 0.21 to 0.74 and averaging 0.45. Four percent of the lanes tested at the five-year level had an average Wsf value below 0.30; 25 percent were between 0.30 and 0.39. The project with the lowest five-year Wsf performance was 24011-03949, located on US 31 in Petoskey, where coefficients averaged 0.23. Only one other average five-year Wsf value lower than the Petoskey value was encountered; that being a 0.21 determined on the NBIL of M 66 (Project 13032-04836) in Calhoun County, contrasting the low values were excellent coefficients ranging from 0.66 to 0.74 and averaging 0.69 on the M 55 connector to I 75 (Project 73023-01703) in Roscommon County.

Table 7 - Five-Year Review for Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1973

Table 7 contains results of pavement friction tests conducted on 33 bituminous aggregate (MDOT Specification 4.11) projects constructed during 1973. In all, tests were conducted on 83 lanes (257.238 lane miles).



During 1973, 11 projects were tested, yielding an average Wsf value of 0.45 for their initial service year. Thirty projects were tested in 1974; after a one-year service period, Wsf values on these averaged 0.52. An average coefficient of 0.62 was determined on the only two-year old bituminous aggregate projects tested in 1975. During 1978, all projects were retested; five-year Wsf values ranged from 0.29 to 0.75 and averaged 0.52. The southbound lane of Project 26011-04773, located on M 18 north of M 61 in Control Section 26012, yielded a five-year average Wsf of 0.27. The only other average coefficient below 0.30 was a 0.29 value determined on the northbound lane of US 131 in Manton (Project 83052-05022). In contrast, three lanes yielded average friction levels above 0.70. The southbound lane of M 203, near McLain State Park in Houghton County, had a five-year average coefficient of 0.72. Eastbound and westbound lanes of M 38 west of the Ontonagon-Houghton County line yielded respective average Wsf values of 0.73 and 0.75.

Figures 1 through 3 graphically show results of linear regressions on one year (X) and five year (Y) Wsf values for construction years 1964 through 1973. Departure from a one-to-one relationship is indicated by 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 5**  
**CONCRETE PAVEMENTS CONSTRUCTED IN 1973**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1978
U 11031-00100A (part)	M 139 relocation from north end of Ox Creek bridge northerly to Main St	John G. Yerington Construction Co.	E. C. Levy, Burns Harbor, Ind.	Pit 11-75	NBOL	0.60	0.42	--	0.44
					NBCL	0.57	0.41	--	0.45
					NBIL	0.72	0.43	--	0.49
					SBOL	0.41	0.29	--	0.40
					SBIL	0.57	0.33	--	0.38
I 25032-04990A	I 75 from 1, 375 ft south of M 57 north to Genesee-Saginaw County line	L. W. Edison Co.	Pit 75-5	Pits 25-8 & 63-54	NBIL	--	0.60	--	0.55
					SBIL	--	0.66	--	0.62
I 25032-04991A (part)	I 75 from Pasadena Rd northerly to 1, 375 ft south of M 57	Eisenhour Construction Co.	Pit 75-5	Pit 25-8	NBIL	--	--	0.55	0.56
					SBIL	--	--	0.56	0.62
I 25132-03077A	I 475 from Maple Rd northerly to south of 12th St, Flint	Sargent Construction Co.	Pit 71-47	Pit 63-54	NBOL	--	0.56	--	0.48
					NBCL	--	0.60	--	0.49
					NBIL	--	0.69	--	0.64
					SBOL	--	0.59	--	0.41
					SBCL	--	0.56	--	0.52
					SBIL	--	0.60	--	0.62
U 33172-00494A	US 127 from 700 ft south of Saginaw St northerly to Ingham-Clinton County line	Davco, Inc.	Pits 19-18, 13-84 & 30-35	Pits 19-4 & 19-24	NBOL	--	0.58	--	0.53
					NBIL	--	0.71	--	0.70
					SBOL	--	0.57	--	0.58
					SBIL	--	0.69	--	0.67
U 52042-03817A	US 41 from 544 ft north of Jackson St south-easterly to 300 ft southeast of Carp River Hill Rd	Bacco Construction Co.	Pit 52-39	Pit 52-9	EBOL	--	0.49	--	0.45
					EBIL	--	0.38	--	0.44
					WBOL	--	0.36	--	0.44
					WBIL	--	0.52	--	0.52
I 58152-04472A	I 75 from 0.689 mile south of Newport Rd northerly to 0.028 mi north of Wayne-Monroe County line	L. W. Edison Co.	France Stone, Waterville, Ohio	Pit 82-18	NBOL	--	0.39	--	0.46
					SBOL	--	0.43	--	0.40
F 59012-03694A (part)	US 131 relocation from Kent-Montcalm County line northerly to 0.5 mile north of Caanonsville Rd	Eisenhour Construction Co.	Pit 54-22	Pit 54-22	NBOL	0.49	0.50	--	0.49
					NBIL	0.67	0.69	--	0.67
					SBOL	0.51	0.52	--	0.51
					SBIL	0.66	0.62	--	0.66

TABLE 5 (Cont.)  
CONCRETE PAVEMENTS CONSTRUCTED IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1978
F 59012-03694A (part)	US 131 relocation from 0.65 mile south of Kent-Montcalm County line north to County line (Control Section 41133)	Eisenhour Construction Co.	Pit 54-22	Pit 54-22	NBOL	--	--	--	0.49
					NBIL	--	--	--	0.55
					SBOL	--	--	--	0.51
					SBIL	--	--	--	0.68
F 59012-03696A	US 131 from north of M 46 north to Edgar Rd	Eisenhour Construction Co.	Pit 41-38	Pit 41-38	NBOL	0.51	0.54	--	0.51
					NBIL	0.66	0.70	--	0.66
					SBOL	0.50	0.60	--	0.50
					SBIL	0.65	0.69	--	0.65
F 61075-01462A	US 31 relocation from 0.4 mile north of Fruitvale Rd northerly to 100 ft south of Skeels Rd	Sargent Construction Co.	Pit 75-5	Pit 70-9	NBOL	--	--	0.60	0.69
					NBIL	--	--	0.58	0.74
					SBOL	--	--	0.59	0.67
					SBIL	--	--	0.59	0.67
F 65032-00935A	M 55 and M 76 from I 75 easterly to WCL West Branch	W. F. McNally Co.	Pit 65-7	Pit 65-7	EB	--	0.36	--	0.57
					WB	--	0.31	--	0.49
I 65041-00947A	I 75 from 0.42 mile east of Ski Park Rd northwesterly to Roscommon-Ogemaw County line	Davco, Inc.	Pit 65-7	Pit 65-7	NBOL	--	0.53	--	0.66
					NBCL	--	0.46	--	0.55
					NBIL	--	0.55	--	0.65
					SBOL	--	0.39	--	0.52
					SBIL	--	0.49	--	0.64
I 70024-00986A	I 196 from east of 32nd St northeasterly to Kenowa Rd	Kammings and Roodvoets, Inc. and Denton Construction Co.	Pit 41-16	Pit 70-45	NBOL	--	0.71	--	0.59
					NBIL	--	0.69	--	0.65
					SBOL	--	0.62	--	0.50
					SBIL	--	0.69	--	0.64
FI 73171-04691A	I 75 from Genesee-Saginaw County line northerly to 2,700 ft north of M 54 and M 83	L. W. Edison Co.	Pit 75-5	Pits 25-8 & 63-54	NBIL	--	0.58	--	0.49
					SBIL	--	0.57	--	0.60
I 82191-02802A	I 75 at Gibraltar Rd	Denton Construction Co.	E.C. Levy, (Trenton Yd)	Pit 63-55	NBOL	--	0.50	--	0.46
					SBOL	--	0.44	--	0.37

**TABLE 6**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1973	1974	1975	1976	1978
Mbr 04021-04856A (part)	M 65 from M 32 northerly 0.94 mile (Control Section 04012)	Alpena Paving Co., Inc.	Pit 71-15	Pit 71-15	NB	--	0.51	--	--	0.41
Mbr 04021-04856A (part)	M 32 from US 23 westerly to 11th Ave in Alpena	Alpena Paving Co., Inc.	Pit 71-15	Pit 71-15	SB	--	0.54	--	--	0.48
Mbr 04021-04956A (part)	US 23 from Grant St north to Chisholm St (Control Section 04031)	Alpena Paving Co., Inc.	Pit 71-15	Pit 71-15	EB	--	0.39	--	--	0.30
Mbr 09033-04835A	M 13 from 1,250 ft north of Beaver Rd northerly to Linwood Rd	Midland Contracting Co.	Pit 75-5	Pits 63-54 & 79-79	WB	--	0.39	--	--	0.27
U 11031-00100A (part)	M 139 relocation from north end of Ox Creek bridge northerly to Main St	John G. Yerington Construction Co.	Pit 39-1	Pit 11-75	NB	--	0.36	--	--	0.37
Mb 11074-05042A (part)	M 51 from NCL Niles northeasterly intermittently to 1,300 ft south of Berrien-Cass County line (Control Section 11091)	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 14-36	SBCL	0.46	0.33	--	--	0.38
Mb 11074-05042A (part)	M 60 from 1,278 ft west of Leet Rd northeasterly 1.28 miles (Control Section 14061)	Reith-Riley Construction Co., Inc.	Material Service, Tbornton, Ill.	Pit 14-36	SB	0.38	0.37	--	--	0.34
Mb 11074-05042A (part)	M 60 from 1,000 ft northeast of Yankee St northeasterly 0.78 mile (Control Section 14061)	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 14-36	EB	--	0.47	--	--	0.47
Mb 13031-04837A	M 66 from south of "S" Dr south, northerly to north of "E" Dr south, omitting from "L" Dr northerly to north of "F" Dr south	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 14-36	WB	--	0.47	--	--	0.49
Mb 13032-04836A (part)	M 66 from Division St northerly to Shell Dr	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 13-8	EBOL	--	0.46	--	--	0.44
Mb 13061-04838A	M 66 from 0.34 mile north of Shell Dr northerly	Reith-Riley Construction Co., Inc.	Pits 39-1 & 39-1	Pit 13-8	EBIL	--	0.60	--	--	0.49
Mb 13061-04838A	M 37 from Bedford Rd southeasterly to Van Buren St	Reith-Riley Construction Co., Inc.	Pits 47-3 & 39-1	Pit 13-8	NB	--	0.47	--	--	0.52
					SB	--	0.46	--	--	0.54
					NBOL	--	0.41	--	--	0.37
					NBIL	--	0.36	--	--	0.21
					SBOL	--	0.46	--	--	0.32
					SBIL	--	0.36	--	--	0.37
					NB	--	0.33	--	--	0.38
					SB	--	0.32	--	--	0.38
					NBOL	0.66	0.41	--	--	0.37
					NBIL	0.64	0.36	--	--	0.31
					SBOL	0.62	0.46	--	--	0.32
					SBIL	0.61	0.36	--	--	0.37

**TABLE 6 (Cont.)**  
**BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1976
Mbr 13121-05171A	I 94 BL (Columbia Ave) from I 94 north-easterly to Skyline Dr	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 13-38	NB SB	0.55 0.46	0.44 0.40	-- --	0.46 0.53
Mbr 18031-04958A (part)	US 27 BR from 50 ft north of Parkway Dr northerly to US 27	The Hicks Co.	Pit 17-66	Pit 37-26	NB SB	-- --	0.36 0.39	-- --	0.34 0.37
Mb 19021-06075A	I 96 BL (North Grand River Ave) from 48 ft northwest of C&O RR grade separation northwesterly to 1, 895 ft southeast of I 96	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 19-33	EB WB	-- --	0.44 0.47	-- --	0.39 0.42
Mb 21022-05203A	US 2, US 41, and M 35 from 250 ft north of C&NW RR intermittently to 1.2 miles north of Escanaba River	Payne and Dolan of Wisconsin, Inc.	Pit 21-46	Pit 21-65	EBOL EBIL WBOL WBIL	0.32 0.42 0.42 0.48	0.44 0.56 0.53 0.61	-- -- -- --	0.40 0.49 0.47 0.62
Mb 22023-06025A (part)	US 8 from 1 mile north of Wisconsin-Michigan line northerly to US 2 (Control Section 22051)	Payne and Dolan of Wisconsin, Inc.	Pit 55-95	Pit 21-65	NB SB	0.48 0.46	-- --	-- --	0.53 0.50
Mb 22023-06025A (part)	US 141 from Menominee River northerly to US 2 (Control Section 22031)	Payne and Dolan of Wisconsin, Inc.	Pit 55-95	Pit 21-65	NB SB	0.41 0.37	-- --	-- --	0.48 0.45
F 24011-00307A	US 31 from Charlevoix-Emmet County line easterly to WCL Petoskey	Hodgkiss and Douma, Inc.	Pit 15-32	Pit 15-32	NB SB	-- --	0.35 0.37	-- --	0.34 0.33
U 24011-00308A	US 31 from WCL Petoskey easterly to US 131	Hodgkiss and Douma, Inc.	Pit 15-32	Pit 15-32	NBOL NBIL SBOL SBIL	-- -- -- --	0.38 0.32 0.34 0.32	-- -- -- --	0.41 0.33 0.37 0.32
Mb 24011-03949A	US 31 from Liberty St westerly and south-erly to US 131, Petoskey	Hodgkiss and Douma, Inc.	Pit 15-32	Pit 15-32	NBOL NBIL SBOL SBIL	-- -- -- --	0.28 0.27 0.27 0.25	-- -- -- --	0.25 0.22 0.22 0.23
FI 25031-04212A	I 75 from near Maple Rd northerly to near Bristol Rd	Ann Arbor Construction Co.	Pit 63-88	Pit 63-88	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.52 0.58 0.66 0.55 0.59 0.65	-- -- -- -- -- --	0.49 0.51 0.58 0.51 0.53 0.62
I 25031-04213A	I 75 from near Bristol Rd northerly to north of Ariene Dr	Ann Arbor Construction Co.	Pit 63-88	Pit 63-88	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.56 0.56 0.59 0.54 0.56 0.65	-- -- -- -- -- --	0.53 0.52 0.58 0.49 0.51 0.60

TABLE 6 (Cont.)  
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1976
FI 25032-04215A	I 75 from south of GTW RR northerly to Pasadena Ave	Bit-Con Corp.	Pit 47-3	Pit 63-4	NBOL	--	0.51	--	0.54
					NBCL	--	0.56	--	0.54
					NBIL	--	0.59	--	0.58
					SBOL	--	0.56	--	0.50
					SBCL	--	0.61	--	0.54
					SBIL	--	0.67	--	0.60
I 25032-04991A (part)	I 75 from Pasadena Ave northerly to 1,375 ft south of M 57	Saginaw Asphalt Paving Co.	Pit 23-4	Pit 25-27	NBOL	--	--	0.54	0.53
					NBCL	--	--	0.58	0.56
					NBIL	--	--	0.62	0.62
					SBOL	--	--	0.52	0.54
					SBCL	--	--	0.57	0.56
					SBIL	--	--	0.62	0.61
Mbr 33081-04974A (part)	Westbound M 43 from 100 ft west of Homer St westerly to 170 ft west of Marshall St (Control Section 33042)	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	WBOL	0.35	0.38	--	0.35
					WB#3	0.33	0.44	--	0.27
					WB#2	0.36	0.42	--	0.34
					WBIL	0.39	0.49	--	0.35
Mbr 33081-04974A (part)	I 96 BL (North Grand River Ave) from 1,350 ft west of Waverly Rd southeasterly to 150 ft east of Capitol Ave	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	EBOL	0.46	0.38	--	0.43
					EBIL	0.51	0.46	--	0.44
					WBOL	0.41	0.36	--	0.41
					WBIL	0.52	0.43	--	0.49
Mb 38061-04776A	M 60 from Jackson-Calhoun County line easterly to 1,260 ft southwest of Allman Rd	Ajax Paving Industries, Inc.	Pit 30-35	Pit 30-35	EB	--	0.38	--	0.52
					WB	--	0.41	--	0.48
Mb 38071-04777A	M 50 from 710 ft south of SCL Jackson southeasterly to 2,450 ft south of the Grand River bridge	Ajax Paving Industries, Inc.	Pit 30-35	Pit 30-35	EB	--	0.38	--	0.39
					WB	--	0.38	--	0.43
I 38101-00531A	I 94-US 127 interchange area	Richardson Asphalt Corp.	Pit 47-3	Pit 30-35	EBOL	--	0.41	--	0.41
					EBIL	--	0.51	--	0.52
					WBOL	--	0.42	--	0.43
					WBIL	--	0.53	--	0.53
RSS 39081-00554A	M 43 (West Main St) from 700 ft east of First St easterly to 10th St	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EBOL	--	0.53	--	0.58
					EBIL	--	0.51	--	0.62
					WBOL	--	0.46	--	0.61
					WBIL	--	0.48	--	0.60
M 39081-02145A	M 43 from Van Buren-Kalamazoo County line easterly 0.68 mile	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EB	--	0.54	--	0.53
					WB	--	0.53	--	0.62

TABLE 6 (Cont.)  
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1973	1974	1975	1976	1978
Mb 41081-04844A	M 45 from Ottawa-Kent County line east to Division St, omitting from Maynard Ave east to 290 ft east of Covell Rd	Reith-Riley Construction Co., Inc.	Pit 41-50	Pit 41-16	EBOL EBIL WBOL WBIL	--	0.43 0.47 0.45 0.47	--	--	0.34 0.38 0.37 0.40
Mb 49031-05208A	US 2 from Soo Line RR (1.27 miles east of Gould City) easterly to M 117	Hodgkiss and Douma, Inc.	Pit 75-5	Pit 49-97	EB WB	0.53 0.53	0.52 0.51	--	--	0.40 0.41
Mb 55021-05212A (part)	US 41 from County Rd 358, in Daggett, north 0.7 miles (Control Section 55012)	Fox Valley Construction Co.	Pit 75-5	Pit 21-65	NB SB	0.43 0.42	0.54 0.56	--	--	0.42 0.49
Mb 55021-05212A (part)	US 2 from Powers west to west of Menominee-Dickinson County line (Control Section 22023)	Payne and Dolan of Wisconsin, Inc.	Pit 75-5	Pit 21-65	EB WB	0.44 0.39	0.61 0.63	--	--	0.47 0.53
Mb 55021-05212A (part)	US 2 from west of Laretto east to Menominee-Dickinson County line	Payne and Dolan of Wisconsin, Inc.	Pit 75-5	Pit 21-65	EB WB	--	0.63 0.65	--	--	0.51 0.57
Mb 55021-05212A (part)	US 41 from East Rd north to US 2 in Powers (Control Section 55012)	Payne and Dolan of Wisconsin, Inc.	Pit 55-95	Pit 55-149	NBOL NBIL SBOL SBIL	0.54 0.40 0.49 0.33	--	--	--	0.49 0.36 0.47 0.39
F 59042-00810A	Connector from US 131 relocation to existing US 131 and M 46	Saginaw Asphalt Paving Co.	Pit 41-69	Pit 62-63	NB SB	0.46 0.47	0.64 0.62	--	--	0.53 0.46
Mbr 62032-05927A	M 37 from Pine Hill Rd in White Cloud northerly to Pierce Rd in Brohman	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 62-33	NB SB	0.43 0.45	--	--	--	0.61 0.60
Mb 63071-04780A	M 15 from Oakland-Genesee County line southerly 8.297 miles	Ann Arbor Construction Co.	Pit 63-4	Pit 63-4	NB SB	0.44 0.46	--	--	--	0.53 0.52
Mb 63071-04948A	M 15 from 614 ft south of Cranberry Lake Rd northerly 1.076 miles	Bit-Con Corp.	Pit 63-88	Pit 63-88	NB SB	--	0.48 0.51	0.39 0.39	--	0.40 0.45
F 69023-00976A	M 33 from 1,723 ft west of Meecher Rd easterly to Turtle Lake Rd	Lake Construction Co.	Pit 67-2	Pit 72-5	EBOL EBIL WBOL WBIL	--	0.47 0.46 0.51 0.50	--	--	0.38 0.36 0.37 0.37
RF 72023-01703A	M 55 connector to I 75	Lake Construction Co.	Pit 65-7	Pit 65-7	EBOL EBIL WBOL WBIL	--	0.51 0.60 0.58 0.66	--	--	0.67 0.74 0.70 0.66
I 72061-00995A	I 75 from Roscommon-Ogemaw County line westerly to 1.2 miles west of County Rd #500	Lake Construction Co.	Pit 65-7	Pit 65-7	NBOL NBIL SBOL SBIL	0.62 0.62 0.57 0.58	--	--	--	0.57 0.66 0.57 0.66

TABLE 6 (Cont.)  
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1976
Mb 73062-04785A (T98004)	M 46 (Gratiot Rd) at Center Rd, 1.0 mile west of Saginaw	A. J. Rehms and Son, Inc.	Pits 71-47 & 71-15	Pit 63-54	EBOL	--	0.42	--	0.30
					EBIL	--	0.48	--	0.34
					WBOL	--	0.37	--	0.33
					WBIL	--	0.45	--	0.37
Mb 76011-04784A	M 52 from 525 ft north of Bath Rd in Perry northerly to 85 ft south of Bennington Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-43	NB	--	0.54	--	0.47
					SB	--	0.52	--	0.51
Mb 78011-04785A (part)	US 131 from Michigan-Indiana State line north to US 12 (Control Section 78031)	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 12-44	NB	0.37	0.30	--	0.38
					SB	0.31	0.31	--	0.36
Mb 78011-04785A (part)	M 103 from Michigan-Ohio State line north to US 12	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 12-44	NB	0.47	0.34	--	0.40
					SB	0.44	0.37	--	0.39
Mb 78011-04785A (part)	US 12 from M 103 easterly to Mann Rd (Control Section 78021)	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 12-44	EB	0.38	0.27	--	0.37
					WB	0.37	0.27	--	0.26
Mb 78011-04785A (part)	M 86 from 650 ft south of south limits of Three Rivers north to M 60	Reith-Riley Construction Co., Inc.	Material Service, Thornton, Ill.	Pit 12-44	NB	0.47	--	--	0.33
					SB	0.52	--	--	0.35
M 80042-01110A	M 43 from 3, 825 ft west of M 40 easterly to Van Buren-Kalamazoo County line	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EB	--	0.54	--	0.62
					WB	--	0.53	--	0.63
Mb 81032-04852A	US 12 and US 12 BR from ECL Ypsilanti easterly to Denton Rd in Wayne County, omitting at Harris Rd	Thompson-McCully Co.	Pit 47-3	Pit 47-3	EBOL	--	0.36	--	0.43
					EBIL	--	0.45	--	0.45
					WBOL	--	0.37	--	0.42
					WBIL	--	0.45	--	0.42
Mb 81121-04853A	M 153 (Ford Rd) from 230 ft east of Fraims Rd easterly to 100 ft west of Napier Rd (Washtenaw-Wayne County line)	Ayling-Cunningham Asphalt Paving Co.	Pit 47-3	Pit 47-3	EB	--	0.55	--	0.52
					WB	--	0.50	--	0.50
Mb 82052-04854A	Various locations on northbound IUS 24 in Dearborn, Dearborn Heights, and Detroit	The Cooke Contracting Co.	Pit 47-3	Pits 81-78 & 47-3	NBOL	--	0.40	--	0.43
					NB#3	--	0.42	--	0.42
					NB#2	--	0.43	--	0.44
					NBIL	--	0.46	--	0.44
Mb 82052-04854A	Various locations on US 24 in Wayne County (Control Section 82053)	The Cooke Contracting Co.	Pit 47-3	Pits 81-78 & 47-3	NBOL	--	0.38	--	0.45
					NB#3	--	0.41	--	0.45
					NB#2	--	0.44	--	0.46
					NBIL	--	0.47	--	0.48



TABLE 6 (Cont.)  
BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1973	1974	1975	1976	1978
U 82081-01195A (part)	M 153 from approximately 330 ft east of Greenfield easterly to 330 ft east of Appoline (Three-Lane Roadway)	Bit-Con Corp.	Pit 47-3 & E.C. Levy (Trenton Yd)	Pit 47-3 & E.C. Levy (Trenton Yd)	EBOL EBCL EBIL	0.31 0.30 0.38	-- -- --	-- -- --	-- -- --	0.50 0.51 0.46
U 82081-01195A (part)	M 153 (Ford Rd) from 330 ft east of Greenfield Rd east to 200 ft east of Appoline St (Four-Lane Roadway)	Bit-Con Corp.	Pit 47-3 & E.C. Levy (Trenton Yd)	Pit 47-3 & E.C. Levy (Trenton Yd)	EBOL EB#3 EB#2 EBIL	-- -- -- --	-- -- -- --	-- -- -- --	0.50 0.46 0.50 0.50	0.50 0.51 0.46 0.48
U 82142-01310A (part)	M 102 from WCL Ferndale easterly to M 1 (Woodward Ave)	Stolaruk Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	0.45 0.46 0.46 0.46 0.48 0.49 0.46 0.45	0.41 0.48 0.49 0.52 0.42 0.41 0.43 0.43	-- -- -- -- -- -- -- --	-- -- -- -- -- -- -- --	0.45 0.46 0.45 0.46 0.48 0.44 0.43 0.47
U 82142-01310A (part)	M 102 from M 1 (Woodward Ave) east to Dequindre (Control Section 82143)	Stolaruk Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	-- -- -- -- -- -- -- --	0.44 0.38 0.48 0.47 0.47 0.47 0.52 0.59	-- -- -- -- -- -- -- --	-- -- -- -- -- -- -- --	0.35 0.40 0.45 0.48 0.44 0.43 0.47
U 82144-01739A	M 102 from west of Brock St easterly to Kelly Rd	Macomb Concrete Corp.	E.C. Levy (Trenton Yd)	Pit 50-35	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	-- -- -- -- -- -- -- --	-- -- -- -- -- -- -- --	0.44 0.43 0.48 0.51 0.46 0.45 0.48 0.49	-- -- -- -- -- -- -- --	0.39 0.42 0.45 0.48 0.45 0.44 0.48
Mb 82192-04787A	M 39 from 50 ft northwest of Wabash RR in Allen Park thence southeasterly intermittently, to 60 ft northwest of Fort St	The Cooke Contracting Co.	Pit 47-3	Pit 47-3	NBOL NB#3 NB#2 NBIL	-- -- -- --	-- -- -- --	0.35 0.38 0.40 0.41	-- -- -- --	0.36 0.37 0.35 0.38
T 98058-01727A	M 53 (Van Dyke) from 14 Mile Rd northerly to 15 Mile Rd (Control Section 50011)	Ajax Paving Industries, Inc.	Pit 63-4	Pit 63-4	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.39 0.43 0.47 0.39 0.42 0.43	-- -- -- -- -- --	-- -- -- -- -- --	0.42 0.42 0.46 0.42 0.42 0.44

**TABLE 7**  
**BITUMINOUS AGGREGATE CONSTRUCTION IN 1973**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1978
RF 02041-00010A	M 28 from Rathfoot roadside park easterly to concrete pavement	Payne and Dolan of Wisconsin, Inc.	Pit 2-45	---	EB	0.45	0.58	--	0.66
					WB	0.40	0.64	--	0.69
					WBTL	--	--	--	0.68
Mb 05071-04834A	US 131 and M 66 from M 72 in Kalkaska northeasterly to M 66 in Mancelona	Hodgkiss and Douma, Inc.	Pit 40-1	---	NB	--	0.42	--	0.47
					SB	--	0.41	--	0.44
Mb 09042-04798A	M 25 from Finn Rd easterly to Bay-Tuscola County line	Saginaw Asphalt Paving Co.	Pit 79-59	---	EB	--	0.44	--	0.45
					WB	--	0.45	--	0.53
Mb 11074-05042A	M 140 from 150 ft north of US 31-US 33 northerly and easterly intermittently to 30 ft east of Preston Rd	Reith-Riley Construction Co., Inc.	Pit 14-55	---	NB	--	0.44	--	0.53
					SB	--	0.42	--	0.55
Mb 13022-04839A	M 99 from eastbound M 60 north to Crandall St in Albion	E. A. Richardson Co.	Pit 38-78	---	NB	--	0.44	--	0.54
					SB	--	0.45	--	0.53
Mb 17061-03947A	M 28 from Iuce-Chippewa County line easterly to 275 ft west of M 123	Hodgkiss and Douma, Inc.	Pit 43-20	Pit 17-10	EB	0.42	0.67	--	0.66
					WB	0.40	0.65	--	0.67
Mb 20022-04840A	M 72 from I 75 east to Stephens Bridge Rd	Lake Construction Co.	Pit 69-46	---	EB	--	0.40	--	0.47
					WB	--	0.40	--	0.49
Mbr 23111-05921A (part)	M 188 from M 99 easterly and southeasterly to 100 ft southeast of Haven St in Eaton Rapids	Ajax Paving Industries, Inc.	Pit 33-9	---	EB	--	0.42	--	0.48
					WB	--	0.43	--	0.47
Mbr 23111-05921A (part)	M 99 from I 94 northerly to SCL Springport (Control Section 38011)	Ajax Paving Industries, Inc.	Pit 38-48	---	NB	--	0.50	--	0.58
					SB	--	0.49	--	0.58
Mb 26011-04773A (part)	M 61 from Clare-Gladwin County line easterly to M 18 west junction (Control Section 26021)	The Hicks Co.	Pit 26-8	---	EB	0.50	0.64	--	0.51
					WB	0.49	0.56	--	0.56
Mb 26011-04773A (part)	M 18 from Burge Rd to 120 ft north of Woods St	The Hicks Co.	Pit 26-8	---	NB	0.54	0.59	--	0.53
					SB	0.52	0.50	--	0.49
Mb 26011-04773A (part)	M 18 from M 61 north to 380 ft north of Clending Rd (Control Section 26012)	The Hicks Co.	Pit 26-8	---	NB	0.42	0.40	--	0.36
					SB	0.43	0.50	--	0.27
Mbr 27022-05922A	US 2 from 3.2 miles southeast of Wakefield southeasterly intermittently to 0.25 mile west of west junction M 64	Mathy Construction Co.	Pit 27-52	---	EB	0.49	0.72	--	0.61
					WB	0.49	0.69	--	0.62
Mbr 31031-02394A	M 203 from 1,050 ft west of east boundary of McLain State Park northeasterly on relocation for 0.909 mile	George Hooking Construction Co.	Pit 31-65	---	NB	--	0.60	--	0.68
					SB	--	0.61	--	0.72

TABLE 7 (Cont.)  
BITUMINOUS AGGREGATE CONSTRUCTION IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1978
Mb 33021-04774A	M 36 from 150 ft northwest of Curtis St in Mason easterly intermittently to 0.5 mile west of M 52	Spartan Asphalt Paving Co.	Pit 19-46	---	EB WB	0.36 0.37	0.42 0.42	-- --	0.37 0.37
Mb 38011-04842A	M 99 from SCL Springport northerly and easterly to ECL	Ajax Paving Industries, Inc.	Pit 38-48	---	NB SB	-- --	0.40 0.41	-- --	0.43 0.46
RF 40022-00559A	M 72 and M 66 relocation from US 131 easterly to M 66 south	Peninsula Asphalt Corp.	Pit 40-18	---	EB WB	-- --	0.42 0.45	-- --	0.48 0.52
Mb 44061-05926A	M 90 from 1,500 ft west of Pleasant Lake Rd easterly to M 53	Williams Bros. Asphalt Paving Co.	Pits 44-40 & 74-62	---	EB WB	-- --	0.69 0.68	-- --	0.60 0.58
Mb 46061-04845A	US 223 from 1,200 ft northwest of Onsted Rd northerly to US 127	Ayling-Cunningham Asphalt Paving Co.	Pit 81-84	---	NB SB	-- --	0.39 0.38	-- --	0.45 0.42
Mbr 49031-05207A	M 117 from US 2 northerly to Engadine	Hodgkiss and Douma, Inc.	Pit 49-74	---	NB SB	-- --	0.57 0.58	-- --	0.55 0.52
Mb 49031-05208A	M 117 from Engadine north to the Mackinac-Luce County line	Hodgkiss and Douma, Inc.	Pit 49-74	---	NB SB	0.54 0.52	0.59 0.62	-- --	0.57 0.68
Mb 49041-05209A	M 134 from 1.96 miles west of M 129 east to Mackinac-Chippewa County line	Lake Construction Co.	Pit 49-53	---	EB WB	0.36 0.36	0.60 0.58	-- --	0.54 0.52
Mbr 53033-05041A (part)	US 31 from US 10 in Scottville north to Hoague Rd	Laman Asphalt and Paving Co.	Pit 62-49	---	NB SB	-- --	0.41 0.47	-- --	0.43 0.44
Mbr 53033-05041A (part)	US 10 from US 31 in Scottville east to ECL (Control Section 53022)	Laman Asphalt and Paving Co.	Pit 62-49	---	EB WB	-- --	0.43 0.39	-- --	0.40 0.41
Mbr 53033-05041A (part)	US 31 from Mason-Oceana County line north to US 10 (Control Section 53031)	Laman Asphalt and Paving Co.	Pit 62-49	---	NB SB	-- --	0.43 0.40	-- --	0.44 0.46
BS 57013-04474A	M 66 from M 43 northerly and northeasterly to Phelps Rd	Reith-Riley Construction Co., Inc.	Pit 57-12	---	NB SB	0.45 0.47	-- --	-- --	0.54 0.53
Mbr 59023-04846A	M 57 from M 66 easterly to Carson City	The Hicks Co.	Pit 59-65	---	EB WB	-- --	0.53 0.52	-- --	0.57 0.55
F 66023-02905A	M 28 from 1,862 ft west of Ontonagon River east to 2,255 ft east of the river near Agate Falls	Fox Valley Construction Co.	Pit 66-79	---	EB WB	-- --	-- --	-- --	0.62 0.63

TABLE 7 (Cont.)  
BITUMINOUS AGGREGATE CONSTRUCTION IN 1973

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1973	1974	1975	1976
Mb 66032-06027A (part)	US 45 from M 28 north to Rockland Rd	Fox Valley Construction Co.	Pit 66-97	---	NB	0.46	0.69	--	0.62
					SB	0.45	0.70	--	0.63
Mb 66032-06027A (part)	M 64 from 230 ft north of M 28 northerly 3.714 miles (Control Section 66012)	Fox Valley Construction Co.	Pit 66-97	---	NB	--	0.65	--	0.63
					SB	--	0.67	--	0.63
Mb 66032-06027A (part)	M 38 from M 26 easterly 6.305 miles to 0.394 mile east of Ontonagon-Houghton County line (Control Section 66041)	Fox Valley Construction Co.	Pit 66-97	---	EB	0.52	0.73	--	0.73
					WB	0.43	0.72	--	0.75
F 69023-00976A	M 32 from 1,723 ft west of Meecher Rd easterly (partly on relocation) to Turtle Lake Rd	Lake Construction Co.	Pits 16-69 & 69-40	---	EB	--	0.56	--	0.52
					WB	--	0.57	--	0.54
Mb 71021-04847A (part)	M 68 from Cheboygan-Presque Isle County line east 6.02 miles	Lake Construction Co.	Pits 71-46 & 71-15	---	EB	--	0.49	--	0.42
					WB	--	0.52	--	0.40
Mb 71021-04847A (part)	M 68 from 680 ft west of Clark St in Tower east intermittently to the Cheboygan- Presque Isle County line (Control Section 16023)	Lake Construction Co.	Pits 71-46 & 71-15	---	EB	--	0.49	--	0.41
					WB	--	0.49	--	0.43
Mb 71021-04848A	M 68 from US 23 westerly 7.15 miles	Lake Construction Co.	Pits 71-46 & 71-15	---	EB	--	0.55	--	0.50
					WB	--	0.55	--	0.51
Mbr 74062-06108A	M 46 from 150 ft west of Ruth Rd easterly to east limits of Carsonville	Williams Bros. Asphalt Paving Co.	Pit 44-40	---	EB	--	0.67	--	0.53
					WB	--	0.66	--	0.50
Mb 79041-04850A	M 46 from 175 ft east of M 15 easterly to 132 ft east of Vassar Rd	Frank Strausberg and Son Co.	Pit 79-81	---	EB	0.48	0.51	--	0.53
					WB	0.48	0.52	--	0.55
Mb 80042-04851A	M 43 from 725 ft west of County Rd #215 easterly to 220 ft east of 41st St, omitting from east of 52nd St to west of 44th St	Klett Construction Co.	Pits 39-1 & 80-26	---	EB	--	0.43	--	0.50
					WB	--	0.41	--	0.51
M 83022-01420A	M 55 from ECL Cadillac easterly to Wexford-Missaukee County line	Reith-Riley Construction Co., Inc.	Pits 57-12 & 83-57	---	EB	--	0.42	--	0.42
					WB	--	0.44	--	0.48
Mb 83022-04799A	M 55 from Carmel St in Cadillac easterly to Crosby Rd (ECL)	Reith-Riley Construction Co., Inc.	Pits 57-12 & 83-57	---	EB	--	0.41	--	0.39
					WB	--	0.41	--	0.43
Mbr 83032-05022A	US 131 from 270 ft south of M 42 north to 340 ft north of north limits of Manton	Johnson-Greene Co.	Pit 83-57	---	NB	0.45	--	--	0.29
					SB	0.36	--	--	0.30

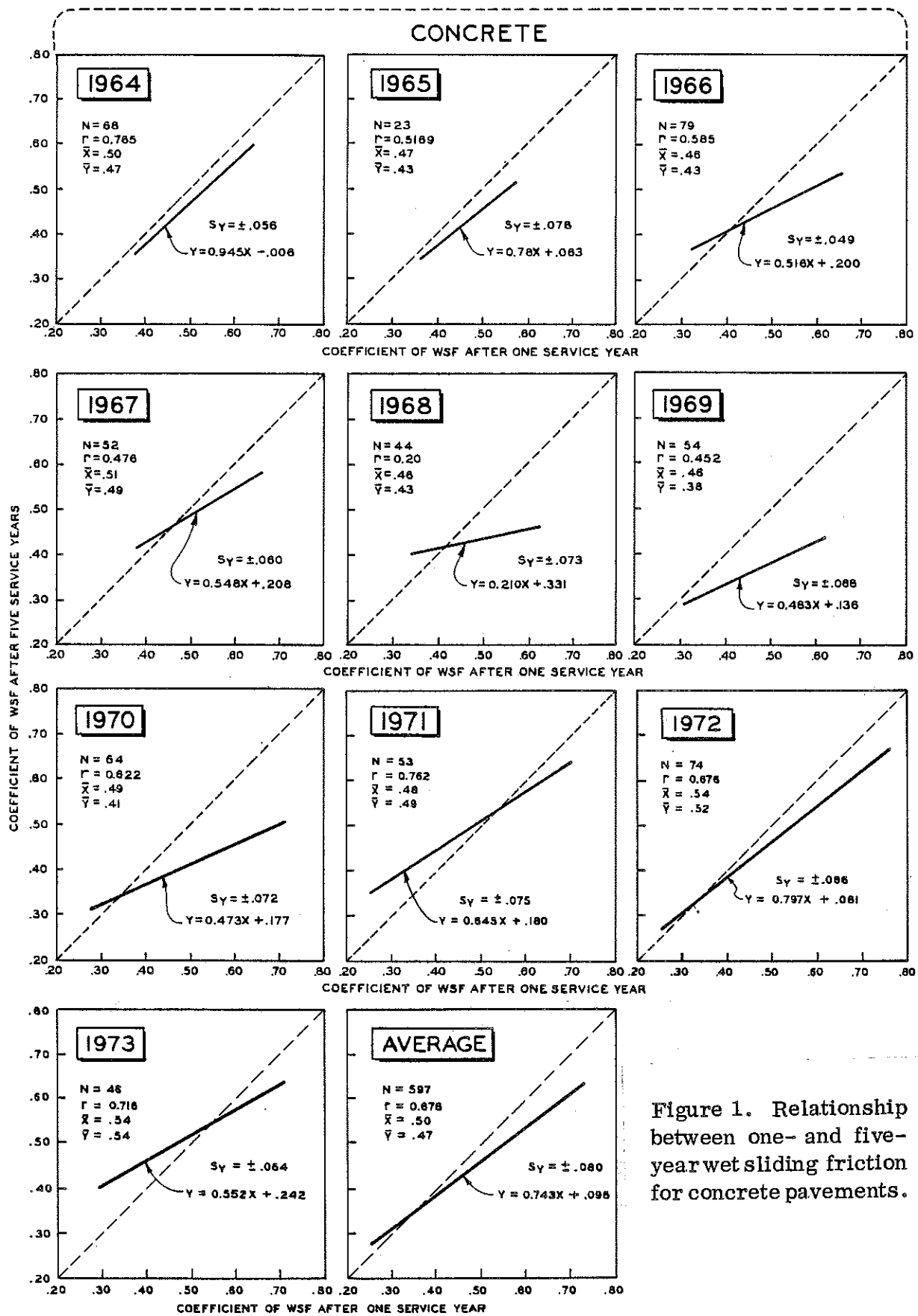


Figure 1. Relationship between one- and five-year wet sliding friction for concrete pavements.

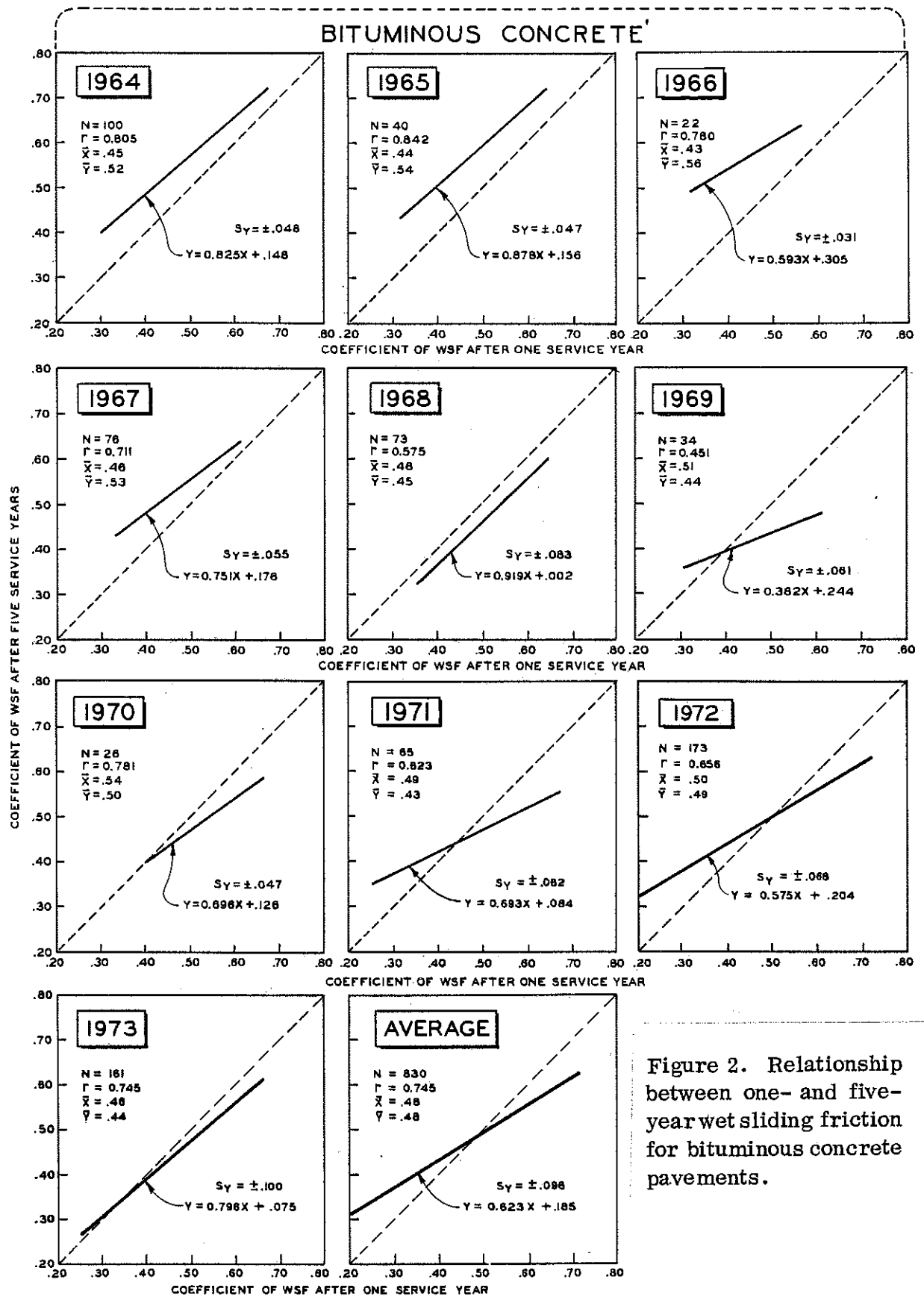


Figure 2. Relationship between one- and five-year wet sliding friction for bituminous concrete pavements.

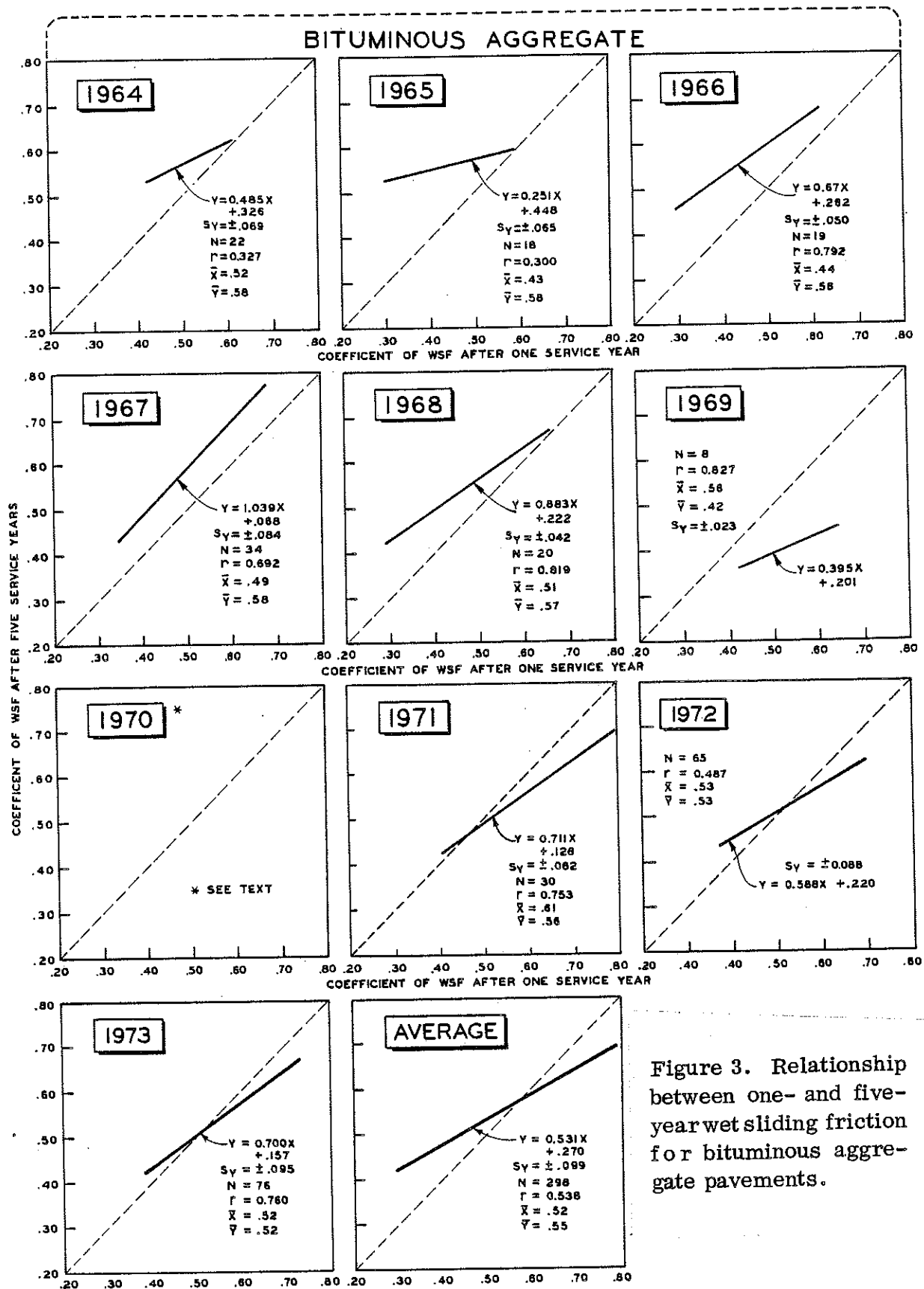


Figure 3. Relationship between one- and five-year wet sliding friction for bituminous aggregate pavements.

SECTION III

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



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

A historical review of coefficients after 10 years of service has been made on 69 projects. During 1978, 860.841 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 8 through 11.

### Table 8 - Ten-Year Wsf Review for Concrete Pavements Constructed in 1968

During 1978, 83 lanes of concrete pavements were tested at the 10-year service level for pavement friction. Average Wsf values ranged from 0.33 to 0.64 and averaged 0.45. Five lanes, representing 3.5 percent of the 151.161 lane miles tested, yielded coefficients averaging lower than 0.40. Lowest of these occurred on M 43, west of Logan St in Lansing (Project 33061-020), where values of 0.33 and 0.37 were determined. The highest 10-year values were 0.63 and 0.64 determined on I 75 south of the Arenac-Ogemaw County line (Project 06111-009).

### Table 9 - Ten-Year Wsf Review for Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1968

A total of 107 lanes on 34 projects and amounting to 410.920 lane miles of bituminous concrete were retested in 1978, after a 10-year service period. Coefficients ranged from 0.23 to 0.62 and averaged 0.44. The lowest average Wsf values were encountered on the 0.5 mile Project 9BA-5A (Control Section 61073). This project is located on US 31BR between Whitehall and Montague; friction levels averaged 0.23 and 0.30, respectively, for southbound and northbound lanes. Of the 107 lanes tested in 1978, 26 yielded Wsf values averaging lower than 0.40 and represent 15.7 percent of the total 10-year lane mileage. Only two lanes yielded Wsf values averaging higher than 0.60. Coefficients of 0.61 and 0.62 were determined, respectively, on the northbound lane of M 40 northeasterly of the Berrien-Cass County line (Project 14011-008) and the southbound lane of M 119 north of the NYCRR in Van Buren County (Project 80111-009).

### Table 10 - Ten-Year Wsf Review for Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1968

During 1978, 203.506 lane miles of bituminous aggregate pavements were tested on 13 projects (33 lanes) after a 10-year service period. Friction levels ranged from 0.35 to 0.71 and averaged 0.53. Six lanes, representing 13 percent of the lane mileage tested, yielded Wsf lower than 0.40. Lowest average value encountered was 0.35, determined on the southbound lane of M 131 north of US 31 (Project 24051-002) and also on the eastbound lane of M 55 east of County Rd 21 in Wexford County (Project 83021-008).

One lane averaged higher than 0.70. The southbound lane of Project 02021-009, located on M 67 north of US 41, had an average friction level of 0.71.

Table 11 - Ten-Year Wsf Review for Miscellaneous Bituminous Surfaces  
Constructed in 1968

Non-Skid Surface Treatment (Single and Double)

Only one NSST project was tested after a 10-year service period. Friction levels on this 44.30 lane mile project ranged from 0.28 to 0.32 and averaged 0.30. The project (Mm 9SC-4A) is located on M 32 west of Atlanta in Control Section 60021.

Stone Filled Sand Asphalt and Similar Surfaces

Four SFSA projects, amounting to 37.702 lane miles, were tested in 1978, at the 10-year service level. Coefficients ranged from 0.39 to 0.55, on the 12 lanes tested, and averaged 0.45. Only one lane yielded a friction level below 0.40, that being a 0.39 value determined on the SBOL of US 25 BR near M 29 in Port Huron. The highest value (0.55) was encountered on the eastbound lane of US 2, west of I 75, in Mackinac County.

Special Hot Emulsion Wearing Course Mixture

Ten-year friction levels on a US 24 project between Carter Rd and Pardee Rd in Wayne County were conducted during 1978. Coefficients on this SHEWCM ranged from 0.44 to 0.55 and averaged 0.50.

Bituminous Non-Skid Resurfacing

A narrow range of friction levels (0.49 to 0.51) were measured in 1978 after 10 years of service on the bituminous non-skid resurfacing Project 82053-044. The average Wsf value was 0.50 for this US 24 project located between Joy Rd and West Chicago Blvd.

Ten-year friction level histories of the projects which have had Wsf measurements conducted at the one, five, and again at the 10-year service level are compared in Figure 4 for construction years 1963 through 1968.

**TABLE 8**  
**TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
I 06111-007	I 75 from north of M 61 north to south of Maple Ridge Rd	Denton Construction Co. and Sargent Contracting Co.	Pit 65-7	Pit 65-7	NBOL	0.45	--	0.43	0.51
					NBIL	0.52	--	0.55	0.56
					SBOL	0.47	--	0.46	0.46
I 06111-009	I 75 commencing approximately 1,400 ft southeast of Maple Ridge Rd, thence northwesterly on I 75 relocation to Arenac-Ogemaw County line	Sargent Contracting Co.	Pit 65-7	Pit 65-7	NBOL	--	0.55	0.47	0.53
					NBIL	--	0.44	0.64	0.63
					SBOL	--	0.54	0.43	0.51
I 33044-037	I 496 from Waverly Rd east to west of Middle St, City of Lansing	Eisenhour Construction Co.	Pit 41-46	Pit 19-33	EBOL	--	0.54	0.27	0.45
					EBIL	--	0.56	0.30	0.55
					WBOL	--	0.46	0.30	0.48
U 33061-020	M 43 from west of Catherine St east to Logan St	Eisenhour Construction Co.	Pit 41-46	Pit 19-33	WBOL	0.48	--	0.28	0.37
					WBCL	0.51	--	0.29	0.33
					WBIL	0.52	--	0.25	0.40
F 41132-004	US 131 relocation commencing approximately 770 ft south of North Park St, thence northerly to Post Rd	L. W. Edison Co.	Pit 41-46	Pit 41-46	NBOL	--	0.42	0.47	0.42
					NBIL	--	0.62	0.45	0.45
					SBOL	--	0.35	0.52	0.41
					SBIL	--	0.53	0.47	0.45
Ms 63031-017	US 24 (Telegraph) from I 686 (Northwest Exp) northerly on US 24 to I, 220 ft north of I 2 Mile Rd, City of Southfield	Anderson and Ruzzin, Inc.	E. C. Levy (Trenton & Dix Yds)	Pit 63-55	NBOL	--	0.40	0.42	0.48
					NE#3	--	0.38	0.37	0.50
					NE#2	--	0.36	0.45	0.47
					NBIL	--	0.47	0.38	0.45
					SBOL	--	0.36	0.33	0.41
					SB#3	--	0.33	0.34	0.45
I 63174-070	I 75 from Oakland-Wayne County line northerly to 100 ft south of Bernhard Ave in Hazel Park	The Cooke Contracting Co.	E. C. Levy (Trenton & Dix Yds)	Pit 63-7	NBOL	0.53	--	0.41	0.42
					NBCL	0.57	--	0.47	0.45
					NBIL	0.58	--	0.50	0.44
					SBOL	--	--	0.44	0.42
					SBCL	--	--	0.51	0.43
					SBIL	--	--	0.50	0.50

**TABLE 8 (Cont.)**  
**TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction								
			Coarse	Fine		1968	1969	1973	1978					
BI 82194K, C31	I 75 from East Grand Blvd northeast to south of Verner Hwy	The Cooke Contracting Co.	E.C. Levy (Trenton & Dix Yds)	E.C. Levy (Trenton & Dix Yds)	NBOL	--	--	0.36	0.41					
					NB#4	--	--	0.32	0.39					
					NB#3	--	--	0.36	0.44					
					NB#2	--	--	0.40	0.40					
					NBIL	--	--	0.45	0.48					
					SBOL	--	--	0.42	0.44					
					SB#4	--	--	0.35	0.43					
					SB#3	--	--	0.35	0.43					
					SB#2	--	--	0.38	0.40					
					SBIL	--	--	0.40	0.45					
BI 82195B, C19 BI 82195D, C20 BI 82251B, C45	I 75 from Lodge Freeway east to St. Antoine	L. A. Davidson Co.	E.C. Levy (Dix Yd)	Pits 63-55 & 47-15	EBOL	0.59	--	0.39	0.40					
					EB#3	0.52	--	0.36	0.39					
					EB#2	0.50	--	0.40	0.43					
					EBIL	0.45	--	0.42	0.45					
					WBOL	0.58	--	0.41	0.45					
					WB#3	0.48	--	0.37	0.41					
					WB#2	0.43	--	0.37	0.40					
					WBIL	0.61	--	0.37	0.42					
					BI 82251-054	On Chrysler Exp from Edsel Ford Exp to Clay Ave	L. A. Davidson Co.	E.C. Levy (Dix Yd)	Pits 47-15, 50-41 & 63-55	NBOL	--	0.48	0.41	0.44
										NB#3	--	0.39	0.37	0.42
NB#2	--	0.44	0.44	0.42										
NBIL	--	0.52	0.48	0.49										
SBOL	--	0.40	0.40	0.42										
SB#3	--	0.42	0.38	0.42										
SB#2	--	0.48	0.42	0.43										
SBIL	--	0.50	0.44	0.52										
I 82252-079 BI 82252-118	I 75 commencing at a point 187.94 ft north of Holbrook Ave thence to a point 142.23 ft north of Carpenter	The Cooke Contracting Co.	E.C. Levy (Trenton & Dix Yds)	Pit 63-7						NBOL	--	0.44	0.44	0.42
										NB#3	--	0.40	0.41	0.39
					NB#2	--	0.51	0.50	0.41					
					NBIL	--	0.53	0.47	0.46					
					SBOL	--	0.46	0.47	0.44					
SB#3	--	0.48	0.44	0.44										
SB#2	--	0.50	0.49	0.39										
SBIL	--	0.50	0.48	0.48										

TABLE 8 (Cont.)  
TEN-YEAR WSF REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1968

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
BI 82252-142	I 75 from Victor Ave northerly to Oakland-Wayne County line	The Cooke Contracting Co.	E. C. Levy (Trenton & Dix Yds)	Pits 63-7 & 82-5	NBOL	--	--	0.42	0.44
					NB#3	--	--	0.41	0.41
					NB#2	--	--	0.47	0.42
					NBIL	--	--	0.53	0.47
					SBOL	--	--	0.39	0.43
					SB#3	--	--	0.43	0.41
					SB#2	--	--	0.50	0.44
SBIL	--	--	0.54	0.50					
BI 82252-173	Chrysler Fwy (I 75) in City of Detroit, from Carpenter to north of Victor	L. A. Davidson Co.	E. C. Levy (Dix Yd)	PR 47-15	NBOL	--	0.44	0.44	0.43
					NB#3	--	0.37	0.39	0.41
					NB#2	--	0.49	0.44	0.42
					NBIL	--	0.47	0.45	0.49
					SBOL	--	0.42	0.45	0.42
					SB#3	--	0.40	0.39	0.44
					SB#2	--	0.42	0.43	0.46
SBIL	--	0.53	0.53	0.51					

**TABLE 9**  
**TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
Mb 08011-003	M 43 from Shultz Rd north to M 37	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 8-58	EB WB	0.50 0.47	-- --	0.61 0.65	0.60 0.60
Mb 08031-007	M 37 from Calhoun-Barry County line northerly to Maple Grove Rd	Reith-Riley Construction Co., Inc.	Pits 39-1 & 41-38	Pit 8-58	NB SB	-- --	0.56 0.54	0.60 0.61	0.52 0.54
Mb 08052-004	M 66 from south limits of Nashville north to north of Greggs Crossing Rd	Williams Bros. Asphalt Paving Co.	Pit 34-51	Pit 34-51	NB SB	0.59 0.62	-- --	0.47 0.45	0.46 0.40
Mb 11052-009 (part)	US 33 from northwest of I 94 north to south limits of St. Joseph	John G. Yerrington Co.	Pit 41-22 & U.S. Steel Gary, Ind.	Pit 11-75	NB SB	0.36 0.35	-- --	0.45 0.59	0.55 0.51
Mb 11052-009 (part)	US 33 from north limits of Benton Harbor northerly to I 196 (Control Section 11053)	John G. Yerrington Co.	Pit 41-22 & U.S. Steel Gary, Ind.	Pit 11-75	NB SB	0.41 0.40	-- --	0.43 0.44	0.39 0.37
U 13042-003	I 94 BL from I 69 east to US 27 in Marshall shall	Reith-Riley Construction Co., Inc.	Pit 39-1	Pit 39-1	EBIL WBOL WBIL	-- -- --	0.45 0.43 0.53	0.42 -- 0.42	0.30 -- 0.35
Mb 13061-010	I 94 BL (Michigan Ave) from Elm St southeasterly to east city limits of Battle Creek	Reith-Riley Construction Co., Inc.	Pit 39-1	Pits 13-30 & 13-79	EB WB	-- --	0.48 0.47	0.47 0.44	0.32 0.33
Mb 14011-008	M 40 from Berrien-Cass County line northeast to west of west city limits of Dowagiac	John G. Yerrington Co.	Pit 70-9	Pit 14-36	NB SB	0.48 0.48	-- --	0.70 0.69	0.61 0.58
Mb 25052-005	M 54 BR from Detroit St and 1st St north to Wager St	Spartan Asphalt Paving Co.	Pit 47-3	Pit 63-54	NBOL NBIL SBOL SBIL	0.41 0.40 0.41 0.41	-- -- -- --	0.44 0.45 0.45 0.46	0.36 0.34 0.36 0.37
Mb 25052-006	M 54 BR (Saginaw St) in City of Flint, from Wager St northerly to Carpenter Rd (north city limits of Flint)	Flint Asphalt and Paving Co.	Pit 47-3	Pit 63-29	NBOL NBIL SBOL SBIL	-- -- -- --	0.44 0.48 0.42 0.44	0.43 0.44 0.43 0.45	0.36 0.37 0.34 0.36

**TABLE 9 (Cont.)**  
**TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
Mb 25073-005	M 54 from 1, 916 ft south of Hollywood Blvd northwesterly to Pine St in Village of Pine Run	Saginaw Asphalt Paving Co.	Pit 71-29	Pit 79-73	NBOL NBIL SBOL SBIL	-- -- -- --	0.51 0.60 0.54 0.50	0.50 0.60 0.40 0.54	0.46 0.46 0.48 0.51
Mb 25091-006	M 15 from south of south limits north to north limits of Davison	Lind Asphalt Paving Co.	Pit 63-4	Pit 63-4	NBOL NBIL SBOL SBIL	-- -- -- 0.46	-- -- -- --	0.50 0.52 0.45 0.47	-- 0.42 -- 0.39
Mb 25101-013	M 57 (State St) from 490 ft west of the west village limits of Montrose easterly to 105 ft west of the east village of Montrose	Saginaw Asphalt Paving Co.	Pit 71-29	Pit 79-73	EBOL EBIL WBOL WBIL	-- -- -- --	0.56 0.47 0.48 0.45	0.46 0.40 0.46 0.48	0.47 0.41 0.47 0.45
SS 32021-005	M 142 from south limits of Pigeon east to west limits of Elkton	Williams Bros. Asphalt Paving Co.	Pit 32-4	Pit 79-78	EB WB	0.50 0.50	-- --	0.59 0.62	0.52 0.46
U 33034-011	US 27 from south of Douglass St north to north of Northcrest Rd	Spartan Asphalt Paving Co.	Pit 17-3	Pit 34-15	NBOL NBIL SBOL SBIL	0.47 0.50 0.52 0.50	-- -- -- --	0.32 0.39 0.34 0.40	0.41 0.44 0.45 0.42
Ms 33082-019	M 43 from east of Hagadorn Rd east to GTW RR	Spartan Asphalt Paving Co.	Pit 47-3	Pits 34-15 & 33-79	EBOL EBIL WBOL WBIL	0.45 0.43 0.47 0.46	-- -- -- --	0.33 0.33 0.36 0.39	0.47 0.43 0.45 0.43
SS 34011-004	M 91 from approximately 411 ft east of M 44, north to approximately 1, 230 ft north of Ellis Rd	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 41-106	NB SB	-- --	0.65 0.60	0.64 0.69	0.56 0.56
Mb 38082-002	I 94 BL from 1, 160 ft west of M 60 easterly to 35 ft west of Brown St (west city limits of Jackson); also on I 94 BL from 30 ft east of East St in City of Jackson easterly to west of US 127	Workman-Richardson Asphalt Co.	Maunee Stone, Findlay, Ohio	Pit 46-28	EBOL EBIL WBOL WBIL	-- -- -- --	0.45 0.42 0.43 0.45	0.31 0.32 0.33 0.33	0.39 0.37 0.42 0.44

**TABLE 9 (Cont.)**  
**TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
Mb 41051-005	M 44 commencing at 26th St thence north, City of Grand Rapids	Michigan Colprovia Co.	Pit 41-22	Pit 41-39	NBOL NBIL SBOL SBIL	-- -- -- --	0.44 0.44 0.41 0.46	0.50 0.49 0.52 0.54	0.40 0.40 0.41 0.39
Mb 47061-012	I 96 BL from M 59 east to I 96	Reith-Riley Construction Co., Inc.	Pit 47-3	Pit 47-3	EBOL EBIL WBOL WBIL	0.47 0.52 0.51 0.54	-- -- -- --	0.39 0.47 0.39 0.46	0.44 0.53 0.45 0.52
Mb 53032-003	US 10-US 31 from east of west junction US 10-US 31 east to Reinburg Ave	Laman Asphalt and Paving Co.	Pit 67-2	Pit 67-2	EB WB	0.44 0.45	-- --	0.54 0.57	0.45 0.41
Mb 54011-005	US 131 from M 46 north intermittently to M 20	Reith-Riley Construction Co., Inc.	Pits 54-42 & 42-38	Pit 54-21	NB SB	0.38 0.40	-- --	0.46 0.52	0.44 0.48
Mb 62011-003	M 20-M 82 from 1,700 ft east of west intersection of M 20-M 82 easterly to 100 ft east of C&O RR	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 62-25	EB WB	0.36 0.37	0.59 0.55	0.63 0.63	0.52 0.46
Mb 62022-001	M 82 from M 37 east to M 20	Reith-Riley Construction Co., Inc.	Pit 41-38	Pit 62-25	EB WB	0.38 0.40	-- --	0.60 0.54	0.48 0.60
Mb 63052-020	US 10 BR (Oakland Ave) from 230 ft south of Clark St northwest 0.956 mile	A & A Asphalt Paving Co.	Pit 63-4	Pit 63-4	NBOL NBCL NBIL	-- -- --	0.42 0.47 0.48	0.34 0.38 0.38	0.44 0.44 0.45
Mb 74073-002	US 25 from Port Sanilac north to Deckerville Rd	Ann Arbor Construction Co.	Pit 63-4	Pit 74-51	NB SB	0.51 0.53	-- --	0.65 0.67	0.55 0.54
Mb 80111-009	M 119 from NYC RR north 2.435 miles	John G. Yerrington Co.	Pit 39-1	Pit 80-20	NB SB	0.47 0.51	-- --	0.70 0.69	0.59 0.62
Mb 81072-005	US 23 BR-I 94 BL from Main St east to Fletcher St and from University Ave east to Tounny Rd	Ann Arbor Construction Co.	Pit 47-3	Pit 81-57	EBOL EBIL WBOL WBIL	0.48 0.48 0.52 0.45	-- -- -- --	0.37 0.38 0.36 0.39	0.42 0.42 0.38 0.37



**TABLE 9 (Cont.)**  
**TEN-YEAR WSF REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
M 82101-013	M 14 commencing on Hines Dr, thence easterly to Mercedes Rd, City of Livonia	A & A Asphalt Paving Co.	Pit 47-3	Pit 63-7	EBOL EBIL WBOL WBIL	-- -- -- --	0.39 0.40 0.35 0.42	0.30 0.34 0.31 0.33	0.43 0.41 0.39 0.42
Mb 82121-011	I 96 BS (Grand River Ave) from I 94 southeast to Trumbull Ave	The Cooks Contracting Co.	Pits 50-35 & 63-4	Pit 63-4	EBOL EBIL	-- --	0.48 0.52	0.29 0.35	0.39 0.42
Mb 82121-013	I 96 BS (Grand River Ave) from Freeland Ave to 190 ft south of Dumdee Ave and from West Grand Blvd to I 94, City of Detroit	Detroit Asphalt Paving Co.	Pit 47-3	Pit 47-3	EBOL EBIL WBOL WBIL	-- -- -- --	0.42 0.45 0.41 0.45	0.47 0.49 0.44 0.50	0.40 0.43 0.39 0.40
Mb 82131-010	US 10 (Woodward Ave) from Adams St northwesterly to West Grand Blvd, City of Detroit	Ajax Asphalt Paving Inc.	E.C. Levy (Dix Yd)	E.C. Levy (Dix Yd)	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.44 0.46 0.46 0.43 0.48 0.50	0.27 0.27 0.29 0.35 0.34 0.33	0.39 0.47 0.49 0.44 0.45 0.46
U 82144-016	M 102-M 29 from Kelly Rd east to I 94	The Cooke Contracting Co.	Pit 50-35	Pits 63-4 & 50-35	EBOL EB#3 EB#2 EBIL WBOL WB#3 WB#2 WBIL	0.54 0.54 0.60 0.61 0.51 0.49 0.54 0.60	-- -- -- -- -- -- -- --	0.43 0.45 0.50 0.52 0.53 0.47 0.55 0.58	0.43 0.46 0.49 0.53 0.46 0.50 0.53
Mb 83021-009	M 55 from the east intersection of M 115 easterly to Balsam St, City of Cadillac	The Hicks Co.	Pit 83-12	Pit 83-12	EB WB	-- --	0.53 0.51	0.58 0.59	0.42 0.41
Group Min 9BA-5A	US 31 BR (Colby St) from C&O RR overpass in Whitehall northerly to the RR tracks in Montague (Control Section 61073)	Reith-Riley Construction Co., Inc.	Pit 75-5	Pit 70-9	NB SB	-- --	0.51 0.51	0.45 0.45	0.30 0.23

**TABLE 10  
TEN-YEAR WSF REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Aggregate Sources			1968	1969	1973	1974	1978
			Coarse	Fine						
SS 01024-002	M 72 from County Rd #171 east to US 23	Central Paving Co.	Pit 1-6	Pit 1-6	EB	0.36	--	0.61	--	0.51
					WB	0.38	--	0.56	--	0.44
Mb 02021-009 (part)	M 94 from east of Marquette-Alger County line east to M 28	Fox Valley Construction Co.	Pit 2-1	Pit 2-1	EB	0.48	--	0.65	--	0.64
					WB	0.56	--	0.64	--	0.68
Mb 02021-009 (part)	M 67 from US 41 north 2.833 miles (Control Section 02031)	Fox Valley Construction Co.	Pit 2-1	Pit 2-1	NB	0.50	--	0.64	--	0.65
					SB	0.56	--	0.64	--	0.71
Mb 14051-002	M 119 from US 12 northerly to M 60, Village of Vandala	John G. Yerington Co.	Pit 14-57	Pit 14-57	NB	--	0.54	0.57	--	0.58
					SB	--	0.51	0.60	--	0.57
Mb 20032-004	I 75 BL-M 93 from north of M 72 north 2.54 miles	Lake Construction Co. and Howell Construction Co.	Pit 20-36	---	NB	0.35	--	0.52	--	0.43
					SB	0.30	--	0.49	--	0.42
F 20012-002	M 95 from US 2 north to County Rd #569	Payne and Dolan of Wisconsin, Inc.	Pit 22-69	---	NB	0.28	--	0.51	--	0.62
					SB	0.23	--	0.48	--	0.63
Mb 23091-003	M 99 commencing at Crawford Rd in Jackson County, thence northerly on M 99 to the north city limits of Eaton Rapids	Workman-Richardson Asphalt Co.	Pit 38-73	Pit 38-73	NB	--	0.52	0.56	--	0.46
					SB	--	0.51	0.52	--	0.42
Mb 24051-002	M 131 from north of US 31 north and west to Zell St	Hodgkiss and Douma, Inc.	Pit 15-32	---	NB	0.32	--	0.45	--	0.39
					SB	0.27	--	0.44	--	0.35
SS 31013-008	M 26 from 10th St northwesterly to Florida St in Laurium	Hocking Construction Co.	Pit 31-45	---	NBOL	0.45	--	--	0.58	0.63
					NBIL	0.48	--	--	0.64	0.68
					SB	0.43	--	--	0.59	0.62
Mb 32051-003	M 19 from Huron-Sanilac County line north to M 142	Ann Arbor Construction Co.	Pit 32-11	Pit 32-11	NB	--	0.61	0.65	--	0.57
					SB	--	0.61	0.64	--	0.49
Mb 48011-002	M 28 from Schoolcraft-Luce County line east to M 123	Lake Construction Co. and Howell Construction Co.	Pit 48-10	Pit 48-10	EB	0.35	--	0.65	--	0.62
					WB	0.34	--	0.62	--	0.62
SS 60011-004	M 33 from approximately 1,200 ft south of County Rd #612 northerly to M 32	Lake Construction Co. and Howell Construction Co.	Pit 60-24	Pit 60-24	NB	--	0.53	0.67	--	0.63
					SB	--	0.52	0.66	--	0.60
Mb 65022-003 (part)	M 55 from M 33 east approximately 5 miles to Henderson Lake Rd	Central Paving Co.	Pit 60-7	Pit 60-7	EB	--	0.29	0.40	--	0.52
					WB	--	0.33	0.44	--	0.51
Mb 65022-003 (part)	M 33-M 72 from M10 north and east to Fairview (Control Section 65012)	Lake Construction Co. and Howell Construction Co.	Pit 60-24	Pit 60-24	NB	--	0.46	0.47	--	0.37
					SB	--	0.46	0.49	--	0.39
Mb 83021-008	M 55 from 160 ft west of County Rd #21 easterly to west intersection of M 115	The Hicks Co.	Pit 63-12	Pit 63-12	East End of Project					
					EB	--	0.45	0.54	--	0.35
					WB	--	0.43	0.52	--	0.37
					West End of Project					
					EB	--	0.52	0.62	--	0.45
					WB	--	0.49	0.62	--	0.41

**TABLE 11  
TEN-YEAR WSF REVIEW FOR MISCELLANEOUS BITUMINOUS SURFACES CONSTRUCTED IN 1968**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1968	1969	1973	1978
<u>NSST (Single and Double)</u>									
Mm 95C-4A	M 32 from 7.8 miles east of Montmorency-Otsego County line easterly to Village of Atlanta (Control Section 60021)	Gilliland Construction Co.	Pit 71-15	Pit 71-15	EB WB	--	0.38 0.29	0.36 0.35	0.32 0.28
<u>Stone Filled Sand Asphalt and Similar Surfaces</u>									
Mb 49023-009 (part)	US 2 from west of County Rd #402 east to west of I 75	Lake Construction Co. and Howell Construction Co.	Pit 75-5	Pit 70-9	EB WB	0.32 0.33	--	0.59 0.50	0.55 0.42
Mb 49023-009 (part)	I 75 BL from Burdette St north to Marquette St (Control Section 49026)	Lake Construction Co. and Howell Construction Co.	Pit 75-5	Pit 70-9	NBOL NBIL SBOL SBIL	0.40 0.41 0.41 0.46	--	0.47 0.50 0.45 0.50	0.40 0.45 0.43 0.43
Ms 77032-007	US 25 BR from 315 ft southwest of M 29 in Marysville northeasterly to Dove-Heid St in Port Huron	Detroit Concrete Products Corp.	Pit 17-40	Pit 74-51	NBOL NBIL SBOL SBIL	--	0.45 0.49 0.43 0.51	0.45 0.51 0.44 0.45	0.43 0.41 0.39 0.42
Mb 79062-003	M 81 from 2,138 ft southwest of Green Rd northeasterly and easterly to M 53, Village of Cass City	Strausberg and Son Co.	Pit 32-4	Pit 79-78	EB WB	--	0.61 0.63	0.66 0.69	0.54 0.51
<u>Special Hot Emulsion Wearing Course Mixture</u>									
Mb 82052-037	US 24 from Carter Rd north to Pardee Rd	Detroit Asphalt Paving Co.	---	Pit 47-15	NBOL NBIL SBOL SBIL	0.44 0.47 0.49 0.48	--	0.42 0.48 0.37 0.44	0.44 0.52 0.50 0.55
<u>Bituminous NS Resurfacing</u>									
Ms 82053-044	US 24 from Joy Rd north to West Chicago Blvd	Stolaruk Asphalt Paving, Inc.	---	Pit 47-3	NBOL NB#3 NB#2 NBIL	0.59 0.60 0.61 0.61	--	0.47 0.47 0.49 0.46	0.50 0.49 0.49 0.51

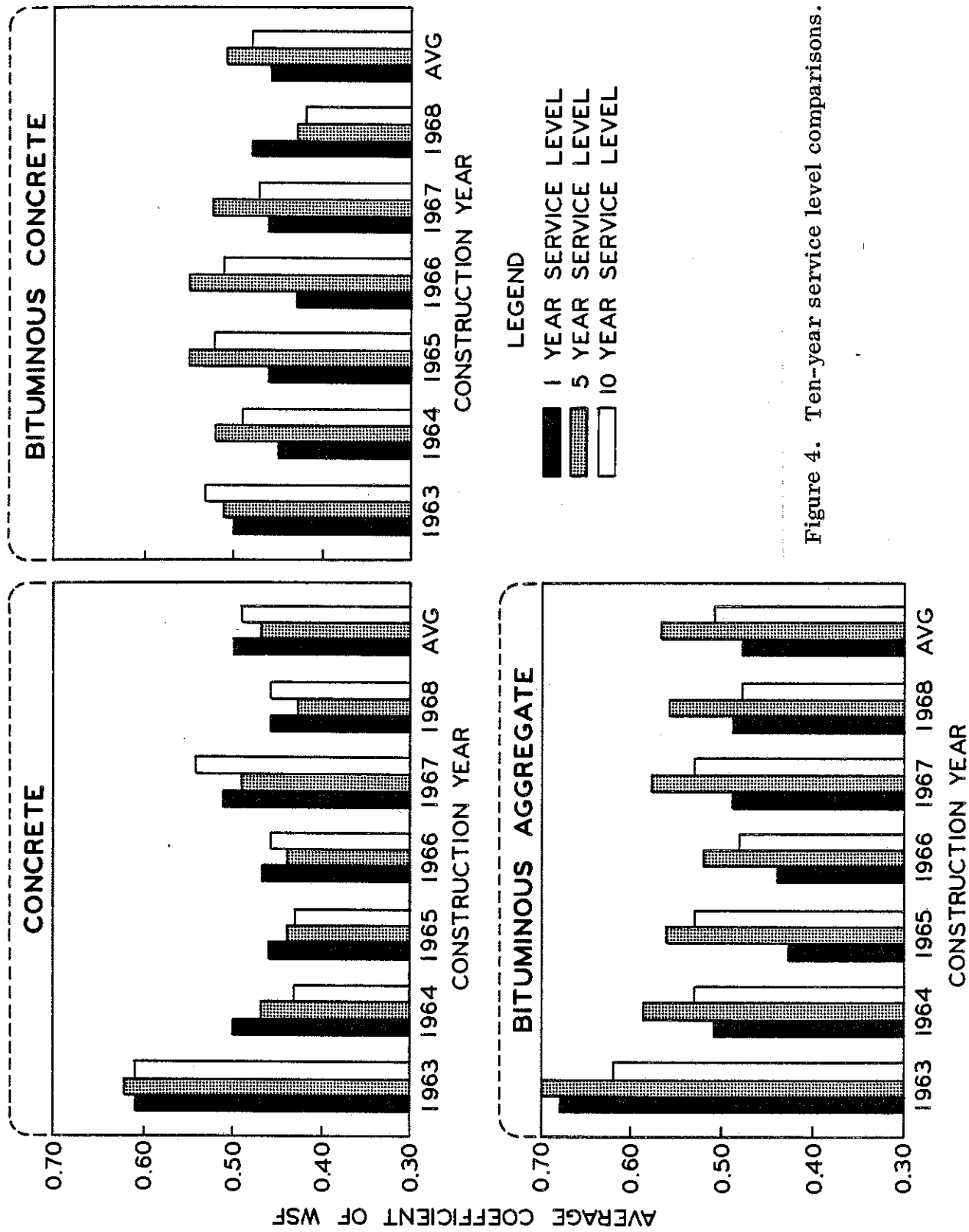


Figure 4. Ten-year service level comparisons.

SECTION IV

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

## Fifteen-Year Pavement Friction Test Results for Concrete and Bituminous Pavements

Section IV is a new section which has been added to the annual summary this year in keeping with our continuing effort to attain a friction level inventory of Michigan's trunkline system. Pavement friction tests have been conducted on 1,044.172 lane miles of concrete and bituminous pavements and results are shown in Tables 12 through 14.

### Table 12 - Fifteen-Year Wsf Review for Concrete Pavements Constructed in 1963

During 1978, 715.788 lane miles of concrete pavement were tested for friction level after 15 years of service. Coefficients determined at this service level ranged from 0.29 to 0.78 and averaged 0.58. The lowest friction was encountered on Project 46061D, C6, located on M 51 south of Adrian where coefficients of 0.27 were determined on the SBOL and SBIL. Highest value was 0.78 on the I 75 Project 49025H, C20, south of the Chippewa-Mackinac County line. Wsf lower than 0.40 was encountered on 58 of the 265 lanes tested accounting for 22.5 percent of the total lane mileage; 3.6 percent of the lane mileage yielded a friction lower than 0.30. Coefficients on 13 of the 15-year old concrete lanes (6.8 percent of the lane mileage) were 0.70 or higher.

### Table 13 - Fifteen-Year Wsf Review for Bituminous Concrete Pavements (MDOT Specification 4.12) Constructed in 1963

Fifteen-year Wsf values were determined on 28 projects (226.244 lane miles) of bituminous concrete pavements during 1978. Coefficients ranged from 0.22 to 0.78 and averaged 0.46. Friction levels below 0.40 were measured on 33 of the 77 lanes and represented 37.4 percent of the lane mileage. Seven lanes, representing 8.7 percent of the lane mileage, yielded coefficients below 0.30. The lowest value, 0.22, was determined on the northbound lane of M 22, north of Cedar Creek in Leelanau County (Project 45071C, C4) and also on the northbound lane of US 31/US 33 east of Berrien Springs (Project 11052C, C6). Fifteen-year Wsf values above 0.70 were measured on two lanes (2.2 percent of the lane mileage). Coefficients of 0.78 and 0.75 were determined on the NBIL and SBIL of Project 61075D, C4 located on US 31 between Burpee Rd and Colby Rd in Muskegon County.

### Table 14 - Fifteen-Year Wsf Review for Bituminous Aggregate Pavements (MDOT Specification 4.11) Constructed in 1963

Six 15-year old bituminous aggregate projects were tested during 1978. Wsf values ranged from 0.34 to 0.70 and averaged 0.52. Two of 10 lanes measured, yielded friction levels below 0.40, i.e., the northbound and southbound lanes of Project 10011C, C2 on M 22 south of M 115. The 0.35

and 0.34 coefficients determined on this project represent 19.2 percent of the 102.140 lane miles of bituminous aggregate tested at the 15-year service level. A 0.70 coefficient, on the eastbound lane of M 48, east of M 129 (Project 17043A, C2) was the highest friction value determined and accounts for 16.6 percent of the tested lane mileage.

**TABLE 12**  
**FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction			
			Coarse	Fine		1964	1965	1968	1973
BF 03032A, C3 BF 03032A, C4	US 31 from south of 61st St northeast to north of 58th St	Titus Construction Co.	Pits 70-9 & 75-5	Pits 3-47 & 70-9	NBOL NBIL SBOL SBIL	--	0.53 0.58 0.51 0.57	0.50 0.67 0.46 0.66	0.49 0.56 0.50 0.66
BI 03033B, C14	I 196 from 101st Ave north to 109th Ave	Carl Goodwin and Sons, Inc.	Pit 3-65	Pit 3-65	NBOL NBIL SBOL SBIL	--	0.52 0.63 0.55 0.62	0.45 0.59 0.45 0.62	0.48 0.64 0.52 0.68
BI 03033D, C16	I 196 from 109th Ave to north of 116th Ave	L. W. Edison Co.	Pit 3-65	Pit 3-65	NBOL NBIL SBOL SBIL	--	0.55 0.63 0.55 0.58	0.53 0.66 0.51 0.64	0.58 0.66 0.56 0.69
BI 03033E, C12	I 196 from north of 116th Ave north to M 89	Carl Goodwin and Sons, Inc.	Pits 3-65 & 75-5	Pits 3-47 & 3-65	NBOL NBIL SBOL SBIL	--	0.57 0.63 0.55 0.61	0.49 0.67 0.50 0.66	0.48 0.66 0.56 0.64
BI 03034A, C7	I 196 from M 89 north to south of Adams Rd	Carl Goodwin and Sons, Inc.	Pits 3-65 & 75-5	Pits 3-47 & 3-65	NBOL NBIL SBOL SBIL	--	0.53 0.61 0.56 0.63	0.53 0.64 0.54 0.64	0.49 0.63 0.50 0.61
BI 03034D, C11	I 196 from north of Washington Rd north to south of 61st St	Titus Construction Co.	Pits 70-9 & 75-5	Pits 3-47 & 70-9	NBOL NBIL SBOL SBIL	--	0.57 0.61 0.55 0.60	0.45 0.62 0.48 0.62	0.50 0.67 0.52 0.69
F 13022C, C7	M 60 from west of Goldup St in Homer to east of the Kalamazoo River	Titus Construction Co.	Pit 30-35	Pit 30-35	EBOL WBOL	--	0.48 0.44	0.46 0.41	0.53 0.52
BI 17033A, C5 RN	I 75 from Chippewa-Mackinac County line north to north of M 48	Hodgkiss and Douma, Inc.	Pit 17-63	Pit 17-63	NBOL NBIL SBOL SBIL	0.61 0.65	-- --	0.65 0.71	0.68 0.79
BI 17033A, C9 RN	I 75 from north of M 48 north 1.886 miles	Hodgkiss and Douma, Inc.	Pit 17-63	Pit 17-63	NBOL NBIL SBOL SBIL	0.60 0.62 0.63	-- --	0.64 0.70 0.64	0.63 0.78 0.65



TABLE 12 (Cont.)  
FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
BI 17033E, C12	I 75 from Old US 2 north to north of M 28 Six Mile Rd	Pierson Contracting Co.	Pit 17-20	Pit 17-20	NBOL NBIL SBOL SBIL	0.60 0.61 0.59 0.64	-- -- -- --	0.59 0.70 0.51 0.70	0.50 0.61 0.54 0.67	0.59 0.69 0.69 0.69
BI 17034A, C14	I 75 from north of M 28 north to south of Six Mile Rd	Hodgkiss and Douma, Inc.	Pit 17-20	Pit 17-20	NBOL NBIL SBOL SBIL	0.65 0.68 0.67 0.68	-- -- -- --	0.56 0.76 0.55 0.73	0.58 0.76 0.50 0.72	0.50 0.72 0.51 0.70
BI 17034B, C15	I 75 from south of Six Mile Rd north to south of Sault Ste. Marie	Hodgkiss and Douma, Inc.	Pit 17-20	Pit 17-20	NBOL NBIL SBOL SBIL	0.66 0.70 0.64 0.64	-- -- -- --	0.52 0.74 0.44 0.68	0.55 0.73 0.50 0.72	0.62 0.72 0.48 0.66
U 21031E, C3	M 35 from south limits of Escanaba northeast and north to US 2-US 41	Fox Valley Construction Co.	Pit 75-5	Pit 21-12	NBOL SBOL	0.51 0.56	-- --	0.44 0.54	0.45 0.45	0.41 0.38
USS 33011B, C3	M 99 from I 96 north to Jolly Rd	Eisenhour Construction Co., Inc.	Pit 34-49	Pit 33-79	NBOL SBOL	-- --	0.43 0.41	0.37 0.38	0.33 0.34	0.41 0.44
USS 33011D, C4	M 99 from Jolly Rd north to north of NYC RR	Eisenhour Construction Co., Inc.	Pit 34-49	Pit 33-79	NBOL SBOL	-- --	0.41 0.40	0.33 0.37	0.38 0.36	0.39 0.40
I 33045D, C1	I 496 from south of Cavanaugh Rd north to north of Cavanaugh Rd	Sargent Construction Co.	Pit 47-3	Pit 33-6	NBOL NBIL SBOL SBIL	-- -- -- --	0.53 0.61 0.44 0.53	0.36 0.56 0.33 0.48	0.33 0.34 0.32 0.40	0.42 0.55 0.41 0.51
I 33045B, C2	I 496 from north of Cavanaugh Rd to south of Mt. Hope	Sargent Construction Co.	Pit 47-3	Pit 33-6	NBOL NBIL SBOL SBIL	-- -- -- --	0.43 0.54 0.42 0.51	0.39 0.45 0.35 0.43	0.30 0.37 0.35 0.40	0.40 0.50 0.35 0.46
I 33045F, C3	I 496 from south of Mt. Hope to north of Mt. Hope	Sargent Construction Co.	Pit 47-3	Pit 33-6	NBOL NBIL SBOL SBIL	-- -- -- --	0.50 0.56 0.39 0.52	0.41 0.50 0.35 0.46	0.35 0.36 0.35 0.42	0.42 0.50 0.39 0.45
I 33045A, C4	I 496 from Mt. Hope north to south of Red Cedar River	Denton Construction Co.	Pit 47-3	Pit 33-81	NBOL NBIL SBOL SBIL	-- -- -- --	0.50 0.57 0.40 0.53	0.34 0.48 0.40 0.46	0.34 0.39 0.40 0.40	0.40 0.52 0.40 0.55

**TABLE 12 (Cont.)  
FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
BF 39014A, C12	US 131 from I 94 northwest to "M" Ave	W. H. Knapp, Inc.	Pit 3-44	Pit 3-44	NBOL NBIL SBOL SBIL	--	0.52 0.55 0.53 0.55	0.47 0.59 0.46 0.56	0.43 0.55 0.46 0.55	0.45 0.60 0.42 0.61
BF 39014A, C23	US 131 from "M" Ave north 2.14 miles	W. H. Knapp, Inc.	Pit 3-44	Pit 3-44	NBOL NBIL SBOL SBIL	--	0.59 0.65 0.55 0.62	0.48 0.62 0.38 0.61	0.48 0.57 0.49 0.57	0.45 0.63 0.48 0.62
U 39041A, C5	US 31 BR (Stadium Dr) from east of US 31 northeast to southwest of Michigan Ave in Kalamazoo	W. H. Knapp, Inc.	Pit 3-44	Pit 3-44	EBOL WBOL	--	0.50 0.50	0.39 0.42	0.41 0.46	0.45 0.42
I 41027F, C69	I 196 from Fuller Ave east to I 96	L. W. Edison Co.	Pit 41-46	Pit 41-46	EBOL EBIL WBOL WBIL	--	0.58 0.58 0.58 0.61	0.48 0.54 0.49 0.49	0.43 0.51 0.46 0.52	0.39 0.46 0.37 0.48
U 46061D, C6	M 52 from Michigan-Ohio State line north to south limits of Adrian	Hertel-Deyo Co.	France Stone, Ohio	Pit 46-16	NBOL NBIL SBOL SBIL	--	0.52 0.47 0.54 0.44	0.32 0.40 0.36 0.37	0.32 0.32 0.27 0.29	0.30 0.30 0.27 0.27
SS 46071A, C1	M 52 from Michigan-Ohio State line north to US 223	Hertel-Deyo Co.	France Stone, Ohio	Pit 46-16	NB SB	--	--	0.42 0.51	0.35 0.39	0.40 0.40
BI 49025E, C18 RN	I 75 from south of M 123 north to north of M 134	Pierson Contracting Co.	Pits 17-63 & 49-86	Pit 17-63	NBOL NBIL SBOL SBIL	0.57	--	0.59 0.63 0.54 0.66	0.54 0.76 0.57 0.76	0.53 0.71 0.51 0.72
BI 49025H, C20 RN	I 75 from south of FAS 1052 north to Chippewa-Mackinac County line	Hodgkiss and Douma, Inc.	Pit 17-63	Pit 17-63	NBOL NBIL SBOL SBIL	0.60	--	0.62 0.71 0.60 0.68	0.65 0.78 0.64 0.80	0.60 0.78 0.55 0.71
BI 49025G, C22 RN	I 75 from north of M 134 north to south of FAS 1052	Pierson Contracting Co.	Pit 17-63	Pit 17-63	NBOL NBIL SBOL SBIL	0.64	--	0.64 0.71 0.60 0.67	0.58 0.75 0.62 0.74	0.62 0.72 0.58 0.76

TABLE 12 (Cont.)  
 FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
BI 50111I, C12	I 94 from the Clinton River Spillway Bridge north to south of Joy Rd	L. A. Davidson	E. C. Levy (Dix Yd)	Pit 50-21	NBOL	--	0.50	0.46	0.40	0.45
					NBCL	--	0.47	0.51	0.48	0.48
					NBIL	--	0.54	0.62	0.47	0.54
					SBOL	--	0.53	0.43	0.39	0.44
					SBCL	--	0.56	0.55	0.42	0.46
					SBIL	--	0.58	0.60	0.44	0.55
BI 50111J, C13	I 94 from south of Joy Rd north to Cotton Rd	Denton Construction Co.	Pits 50-35 & 63-4	Pit 50-35	NBOL	--	0.48	0.41	0.32	0.45
					NBCL	--	0.56	0.48	0.39	0.43
					NBIL	--	0.58	0.60	0.40	0.55
					SBOL	--	0.48	0.46	0.32	0.41
					SBCL	--	0.53	0.43	0.37	0.43
					SBIL	--	0.59	0.62	0.41	0.53
BI 50111K, C22 RN	I 94 from north of Cotton Rd northeast to M 29	Sargent Construction Co.	Pit 75-5	Pit 50-22	NBOL	--	0.51	0.44	0.41	0.41
					NBCL	--	0.54	0.51	0.47	0.48
					NBIL	--	0.59	0.66	0.48	0.52
					SBOL	--	0.43	0.42	0.38	0.43
					SBCL	--	0.51	0.44	0.43	0.43
					SBIL	--	0.59	0.59	0.50	0.56
BI 50112A, C1	I 94 from M 29 to Macomb-St. Clair County line	Sargent Construction Co.	Pit 75-5	Pit 50-22	NBOL	--	0.47	0.44	0.40	0.42
					NBIL	--	0.59	0.53	0.47	0.58
					SBOL	--	0.49	0.48	0.41	0.42
					SBIL	--	0.59	0.58	0.45	0.55
U 52042E, C8	M 28-US 41, Marquette Bypass	Bacco Construction Co.	Pit 52-56	Pit 52-57	EBOL	0.55	--	0.49	0.32	0.33
					EBIL	0.58	--	0.66	0.46	0.37
					WBOL	0.57	--	0.50	0.39	0.34
					WBIL	0.64	--	0.63	0.43	0.41
U 55031A, C9	M 35 from US 41 northeast to north limits of Menominee	Caspian Construction Co.	Pits 55-4 & 55-115	Pit 55-4	NBOL	0.50	--	0.49	0.26	0.31
					SBOL	0.47	--	0.50	0.37	0.43
U 56023A, C10	M 20 (Buttles St) from US 10 BR (Eastman) southeast to 2nd St and on Indian St from US 10 BR (Eastman) southeast to 1st St, in Midland	Titus Construction Co.	Pit 75-5	Pit 37-26	SBOL	--	0.37	0.40	0.33	0.37
					SBCL	--	0.38	0.36	0.33	0.36
					SBIL	--	0.40	0.42	0.37	0.36

TABLE 12 (Cont.)  
 FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
EBBU 63081E, C4	I 696 BS from northeast of Lee Baker Dr northeast to northwest of Lahser Rd	L. A. Davidson	Pits 47-3 & E. C. Levy (Dix Yd & Trenton Yd)	Pits 47-3, 63-7 & 63-48	EBOL	--	0.39	0.39	0.43	0.44
					EBCL	--	0.47	0.43	0.49	0.43
					EBIL	--	0.52	0.48	0.52	0.47
					WBOL	--	0.43	0.41	0.47	0.47
EBBU 63081D, C6	I 696 BS from east of US 24 southeast to west of Lahser Rd	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	WBCL	--	0.47	0.44	0.50	0.47
					WBIL	--	0.51	0.52	0.55	0.50
					EBOL	--	0.35	0.36	0.48	0.44
					EBCL	--	0.40	0.42	0.42	0.42
EBBU 63082A, C3	I 696 BS and Northwestern Hwy from east of 12 Mile Rd southeast to east of US 24	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	EBIL	--	0.40	0.47	0.44	0.44
					WBOL	--	0.37	0.48	0.47	0.49
					WBCL	--	0.42	0.38	0.48	0.47
					WBIL	--	0.43	0.36	0.53	0.49
EBBU 63082A, C3	I 696 BS and Northwestern Hwy from east of 12 Mile Rd southeast to east of US 24	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	NBOL	--	0.46	0.44	0.49	0.47
					NB#4	--	0.45	0.40	0.45	0.47
					NB#3	--	0.43	0.39	0.50	0.54
					SB#3	--	0.32	0.38	0.40	0.36
BI 63101D, C8	I 696 from west of Franklin Rd southeast to west of US 24	The Kutchins Co.	E. C. Levy (Dix Yd)	Pit 63-7	SB#2	--	0.40	0.47	0.44	0.44
					SBIL	--	0.49	0.54	0.49	0.50
					EBOL	--	0.43	0.32	0.38	0.41
					EBIL	--	0.48	0.41	0.41	0.41
U 63171A, C1 BU 82193B, C9	M 39 from Cornell Ave south to Trojan Ave	Cooke Contracting Co.	Pit 47-3	Pit 47-3	WBOL	--	0.38	0.42	0.43	0.43
					WBIL	--	0.45	0.39	0.43	0.42
					NBOL	--	0.49	0.41	0.44	0.46
					NBCL	--	0.50	0.44	0.45	0.38
BI 63172A, C1	I 75 from north of Auburn Rd to south of Walton Blvd	Pierson Contracting Co.	Pit 63-4	Pit 63-4	NBIL	--	0.48	0.39	0.44	0.40
					SBOL	--	0.46	0.32	0.45	0.34
					SBCL	--	0.48	0.38	0.44	0.36
					SBIL	--	0.49	0.37	0.48	0.46
BI 63174E, C2	I 75 from west of M 150 west and north to north of 17 Mile Rd	Cooke Contracting Co.	Pit 63-4	Pit 63-4	NBOL	--	0.46	0.39	0.34	0.33
					NBCL	--	0.52	0.49	0.37	0.41
					SBOL	--	0.46	0.39	0.30	0.32
					SBIL	--	0.57	0.47	0.37	0.37

**TABLE 12 (Cont.)**  
**FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
BI 63174F, C3	I 75 from south of East Long Lake Rd north and west to east of Adams Rd	Sargent Construction Co.	Pits 63-4 & 63-9	Pit 63-4	NBOL, NBCL, NBIL, SBOL, SBCL, SBIL	--	0.46, 0.54, 0.60, 0.47, 0.52, 0.57	0.51, 0.48, 0.59, 0.43, 0.49, 0.57	0.33, 0.39, 0.39, 0.31, 0.35, 0.36	0.35, 0.38, 0.42, 0.34, 0.35, 0.44
BI 63174G, C4	I 75 from east of Adams Rd west and north to Auburn Rd	Sargent Construction Co.	Pit 63-4	Pit 63-4	NBOL, NBCL, NBIL, SBOL, SBCL, SBIL	--	0.50, 0.50, 0.54, 0.46, 0.49, 0.56	0.46, 0.50, 0.51, 0.44, 0.47, 0.55	0.33, 0.34, 0.33, 0.28, 0.31, 0.33	0.35, 0.42, 0.44, 0.39, 0.37, 0.55
BI 63174I, C5 BI 63174D, C14	I 75 from 11 Mile Rd north to north of 13 Mile Rd	Cooke Contracting Co.	Pits 63-4 & E. C. Levy (Dix Yd)	Pits 50-15 & 63-4	NBOL, NBCL, NBIL, SBOL, SBCL, SBIL	--	0.38, 0.46, 0.55, 0.44, 0.50, 0.58	0.39, 0.45, 0.49, 0.36, 0.42, 0.49	0.27, 0.28, 0.32, 0.36, 0.32, 0.41	0.40, 0.36, 0.37, 0.40, 0.36, 0.41
BI 63174I, C6 BI 63174J, C7 BI 63174E, C8	I 75 from north of 13 Mile Rd north and west to west of M 150	Denton Construction Co.	Pit 63-4	Pits 50-35 & 63-4	NBOL, NBCL, NBIL, SBOL, SBCL, SBIL	--	0.44, 0.51, 0.58, 0.46, 0.52, 0.56	0.38, 0.45, 0.51, 0.38, 0.47, 0.52	0.34, 0.37, 0.39, 0.35, 0.37, 0.41	0.36, 0.37, 0.40, 0.36, 0.36, 0.41
U 63201A, C3 U 63201A, C4	I 75 BL-US 10 BR (Widetrack Dr) from Whittemore St south counter-clockwise to West Huron St in Pontiac	Oak Construction Co.	Pit 63-4	Pit 63-4	OL, #3, #2, IL	--	0.38, 0.38, 0.38, 0.40	0.36, 0.39, 0.44	0.20, 0.24, 0.27, 0.28	0.35, 0.29, 0.33, 0.36
SS 77052C, C2	M 29 from Thornapple St north to north city limits of St. Clair	Anderson and Ruzzin, Inc.	Pit 75-5	Pit 50-33	NBOL, NBIL, SBOL, SBIL	--	0.43, 0.40, 0.42, 0.43	0.43, 0.50, 0.49, 0.41	0.44, 0.42, 0.41, 0.41	0.42, 0.44, 0.40, 0.42
BI 77111A, C2	I 94 from Springboard Rd northeast to St. Clair Hwy	Sargent Construction Co.	Pit 75-5	Pits 50-22 & 50-26	NBOL, NBIL, SBOL, SBIL	--	0.53, 0.58, 0.52, 0.57	0.49, 0.60, 0.42, 0.57	0.43, 0.57, 0.39, 0.53	0.42, 0.63, 0.46, 0.64

**TABLE 12 (Cont.)  
FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1978
BI 77111B, C3	I 94 from St. Clair Hwy northeast to Big Hand Rd	Sargent Construction Co.	Pit 75-5	Pit 50-26	NBOL NBIL SBOL SBIL	-- -- -- --	0.51 0.59 0.52 0.59	0.47 0.62 0.40 0.54	0.46 0.58 0.46 0.58	0.47 0.66 0.48 0.66
BI 77111D, C4	I 94 from Big Hand Rd north to existing US 25	Sargent Construction Co.	Pit 75-5	Pit 50-26	NBOL NBIL SBOL SBIL	-- -- -- --	0.54 0.62 0.51 0.60	0.51 0.56 0.46 0.58	0.47 0.60 0.48 0.61	0.45 0.65 0.48 0.65
F 79041C, C3	M 46 from Vassar Rd east to M 24	Denton Construction Co.	Pit 32-4	Pit 79-63	EB WB	-- --	0.50 0.52	0.49 0.49	0.46 0.47	0.50 0.49
BI 82111A, C19 BI 82111D, C22 BI 82251A, C14 BI 82251B, C18	I 75-1 375 from south of Jefferson Ave north to Division	L. A. Davidson	E. C. Levy (Dix Yd)	Pits 47-3, 50-24, 63-7 & 63-48	NBOL NB#3 NB#2 NBIL SBOL SB#3 SB#2	-- -- -- -- -- -- --	0.50 0.43 0.42 0.45 0.46 0.44 0.45	0.46 0.46 0.43 0.50 0.43 0.45 0.49	0.41 0.38 0.42 0.43 0.48 0.46 0.48	-- 0.41 0.42 0.49 0.48 0.48 0.55
BU 82112J, C19U	US 10 from north of Meyers Rd northwest to north of 7 Mile Rd	Denton Construction Co.	Pit 47-3	Pit 47-3	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.45 0.47 0.48 0.46 0.46 0.47	0.38 0.41 0.43 0.40 0.42 0.43	0.45 0.45 0.47 0.45 0.44 0.46	0.40 0.40 0.42 0.42 0.39 0.40
BU 82112K, C21	US 10 from north of 7 Mile Rd northwest to south of Greenfield	Denton Construction Co.	Pit 47-3	Pit 47-3	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.46 0.46 0.48 0.45 0.48 0.51	0.37 0.40 0.41 0.39 0.44 0.41	0.45 0.47 0.49 0.44 0.46 0.46	0.37 0.40 0.42 0.34 0.40 0.46
BU 82112, C29U	US 10 from northwest of Wyoming Ave northwest to northwest of Meyers Rd	Ministrelli Construction Co., Inc.	E. C. Levy (Dix Yd)	Pits 47-3 & 82-15	NBOL NBCL NBIL SBOL SBCL SBIL	-- -- -- -- -- --	0.41 0.42 0.46 0.43 0.45 0.45	0.38 0.42 0.50 0.36 0.39 0.45	0.42 0.47 0.53 0.44 0.46 0.51	0.39 0.38 0.40 0.41 0.38 0.42

**TABLE 12 (Cont.)**  
**FIFTEEN-YEAR REVIEW FOR CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1968	1973	1976
BU 82192G, C17	M 39 from Capitol Ave to Glendale Ave	Denton Construction Co.	Pits 47-3 & E. C. Levy (Trenton Yd)	Pit 47-3	NBOL	--	0.43	0.38	0.40	0.41
					NBCL	--	0.47	0.41	0.40	0.41
					NBIL	--	0.44	0.46	0.43	*
					SBOL	--	0.44	0.37	0.38	0.39
U 82192D, C22	M 39 from south of Rotunda Dr to north of Village Rd and from north of Michigan Ave to south of Ford Rd	Louis Garavaglia Contractors, Inc. and The Kutchins Co.	Pits 47-3 & E. C. Levy (Dix Yd & Trenton Yd)	Pits 47-3, 63-7, 82-5 & 82-10	NBOL	--	0.45	0.37	0.44	0.44
					NBCL	--	0.48	0.41	0.52	0.41
					NBIL	--	0.49	0.46	0.49	0.40
					SBOL	--	0.46	0.35	0.41	0.43
BU 82193B, C8	M 39 from north of McNichojs Rd to north of Trojan Ave	Cooke Contracting Co.	Pit 47-3	Pit 47-3	NBOL	--	0.40	0.37	0.41	0.39
					NBCL	--	0.46	0.40	0.41	0.39
					NBIL	--	0.48	0.43	0.45	0.40
					SBOL	--	0.42	0.36	0.40	0.37
F 82211B, C16 U 82211B, C17	M 85 (Fort St) from Allen Rd northeast to Sibley Rd	Cooke Contracting Co.	E. C. Levy (Trenton Yd) & 82-5	Pits 81-59 & 82-5	NBOL	--	0.42	0.41	0.44	0.43
					NBCL	--	0.46	0.56	0.43	0.50
					NBIL	--	0.44	0.42	0.43	0.39
					SBOL	--	0.44	0.47	0.41	0.40
BI 82251E, C10UN BI 82251F, C12UN	I 75 from Alexandrine to Warren	Cooke Contracting Co.	E. C. Levy (Dix Yd & Trenton Yd)	Pit 63-9	NBOL	--	0.44	0.42	0.43	0.39
					NB#3	--	0.44	0.47	0.41	0.40
					NB#2	--	0.45	0.55	0.49	0.42
					NBIL	--	0.48	0.59	0.49	0.46
					SBOL	--	0.44	0.46	0.44	0.42
					SB#3	--	0.44	0.48	0.46	0.42
					SB#2	--	0.47	0.53	0.51	0.47
					SBIL	--	0.49	0.68	0.53	0.47

**TABLE 13**  
**FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1964	1965	1968	1973	1974	1978
F 07012C, C3	US 41 from old US 41 south and south-east	Thornton Construction Co., Inc.	Pit 7-22	Pit 7-22	NB SB	--	0.51	0.51	0.58	--	0.52
F 07023C, C1	M 28 from west of the Marquette-Baraga County line west to west of DSSA RR	Thornton Construction Co., Inc.	Pit 7-22	Pit 7-22	EB WB	--	0.64	0.53	0.60	--	0.51
F 08032C, C10	M 37 from south of 4th St in Middleville southeast and east to M 43	Reith-Riley Construction Co., Inc.	Pit 41-22	Pit 8-58	NWB SEB	--	0.51	0.49	0.58	--	0.53
Mb 09033C, C5	M 13 from north of Wilder Rd north and northwest to US 23	Midland Contracting Co.	Pit 17-40	Pit 63-4	NBOL NBIL SBOL SBIL	--	0.36	0.46	0.35	--	0.35
F 11052C, C6	US 31-US 33 from east limits of Berrien Springs northeast to College Ave	John G. Yerington Co.	Material Service Corp. Thornton, Ill.	Pit 11-18	NB SB	--	--	0.36	0.32	--	0.22
F 13022C, C7	M 60 from 100 ft west of Goldup St east to east of the Kalamazoo River in Homer	Reith-Riley Construction Co., Inc.	Pit 12-35	Material Service Corp. Thornton, Ill.	EBIL WBIL	--	0.42	0.36	0.52	--	0.34
SS 17042A, C4	M 48 (FAS 1054) from old US 2 east to I 75	Thornton Construction Co., Inc.	Pit 17-31	Pit 17-31	EB WB	0.59	--	0.54	0.56	--	0.58
U 21031E, C3	M 35 from south limits of Escanaba northeast and north to US 2-US 41	Payne and Dolan of Wisconsin, Inc.	Pit 75-5	Pit 21-12	NBIL SBIL	0.44	--	0.37	0.52	--	0.37
F 22022A, C7	US 2 from west limits Norway east to US 8	Payne and Dolan of Wisconsin, Inc.	Pit 22-26	Pits 22-8 & 22-18	EBOL EBIL WBOL WBIL	0.48	--	0.65	0.72	--	0.65
F 22023A, C3	US 2 from US 8 east to east limits of Norway	Payne and Dolan of Wisconsin, Inc.	Pit 22-26	Pits 22-8 & 22-18	EBOL EBIL WBOL WBIL	0.42	--	0.61	0.46	--	0.50
USS 33011B, C3	M 99 from I 96 north to Jolly Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 33-6	NBIL SBIL	--	0.45	0.53	0.47	--	0.45
USS 33011B, C4	M 99 from Jolly Rd north to north of NYC RR	Spartan Asphalt Paving Co.	Pit 47-3	Pit 33-6	NBIL SBIL	--	0.43	0.51	0.49	--	0.49



**TABLE 13 (Cont.)**  
**FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1963**

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1964	1965	1968	1973	1974	1978
SS 33091C, C5	M 52 from 1.2 miles southeast of Boyce Rd north and northwest to M 106	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-3	NB SB	--	0.51 0.49	0.57 0.54	0.54 0.52	--	0.43 0.40
F 37021C, C2	M 20 from Gilmore Rd east to Mt. Pleasant	The Hicks Co.	Pit 37-26	Pit 37-26	EB WB	--	0.49 0.39	0.50 0.55	0.53 0.54	--	0.40 0.38
SS 38141C, C1	M 52 from Jackson-Ingham County line southeasterly to Jackson-Washtenaw County line	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-3	NB SB	--	0.57 0.56	0.61 0.57	0.65 0.59	--	0.50 0.47
U 39041A, C5	US 31 BR (Stadium Dr) northeast from east of US 31 to southwest of Michigan Ave in Kalamazoo	Globe Construction Co.	Material Service Corp. Thornton, Ill.	Pit 39-1	EBIL WBIL	--	0.56 0.54	0.62 0.61	0.52 0.51	--	0.48 0.51
F 45071C, C4	M 22 from south of Cedar Creek north 4.654 miles	Peninsula Asphalt and Construction Co.	Pit 45-13	Pit 45-13	NB SB	--	0.35 0.38	0.36 0.39	0.42 0.42	--	0.22 0.27
U 50011A, C6	M 53 from Wayne-Macomb County line north to north limits of Warren, omitting that portion within limits of Centerline	Cooke Contracting Co.	Pit 63-4	Pit 82-5	NBOL NBCL NBIL SBOL SBCL SBIL	--	0.33 0.34 0.36 0.36 0.35 0.35	0.33 0.36 0.39 0.33 0.35 0.36	0.30 0.31 0.31 0.32 0.31 0.33	--	0.34 0.33 0.38 0.36 0.35 0.35
U 50011A, C7	M 53 from south limits of Centerline north to 11 Mile Rd	Cooke Contracting Co.	Pit 63-4	Pit 82-5	NBOL NBCL NBIL SBOL SBCL SBIL	--	0.35 0.33 0.33 0.34 0.34 0.35	0.34 0.37 0.36 0.36 0.36 0.40	-- -- -- -- -- --	0.38 0.43 0.44 0.44 0.44 0.44	0.35 0.36 0.33 0.36 0.35 0.35
F 50091C, C1	M 19 from Pound Rd north to south limits of Memphis	Cooke Contracting Co.	Pit 63-4	Pit 50-26	NB SB	--	0.47 0.46	0.48 0.51	0.47 0.46	--	0.43 0.45
SS 52081C, C1	M 28 BR from M 35 east to west limits of Ishpeming	George Hocking Construction Co.	Pit 52-39	Pit 52-9	EB WB	0.51 0.47	--	0.51 0.52	0.49 0.55	--	0.48 0.49
F 55031C, C8	M 35 from north limits of Menominee north 4.583 miles	Payne and Dolan of Wisconsin, Inc.	Pit 55-4	Pit 55-4	NB SB	0.45 0.54	--	0.51 0.53	0.47 0.48	--	0.45 0.45
U 55031A, C9	M 35 from US 41 northeast to north limits of Menominee	Payne and Dolan of Wisconsin, Inc.	Pit 55-4	Pit 55-4	NBIL SBIL	0.42 0.42	--	0.46 0.50	0.52 0.54	--	0.41 0.35

TABLE 13 (Cont.)  
 FIFTEEN-YEAR REVIEW FOR BITUMINOUS CONCRETE PAVEMENTS CONSTRUCTED IN 1963

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction					
			Coarse	Fine		1964	1965	1968	1973	1974	1978
F 56023A, C11	US 10 BR-M 20 (Indian St) from Jerome St southeast to First St in Midland	Midland Contracting Co.	Pit 17-40	Pit 63-54	NBOL	--	0.32	0.35	0.42	--	0.29
					NBCL	--	0.34	0.39	0.37	--	0.24
					NBIL	--	0.33	0.37	0.42	--	0.23
BF 61075B, C1	US 31 from M 20 north to north of Burpee Rd	Spartan Asphalt Paving Co.	Pits 17-40 & 75-5	Pit 70-9	NBOL	--	0.45	0.47	0.51	--	0.45
					NBIL	--	0.61	0.63	0.66	--	0.62
					SBOL	--	0.45	0.44	0.47	--	0.45
					SBIL	--	0.61	0.58	0.64	--	0.63
BF 61075D, C4	US 31 from north of Burpee Rd north-west to existing US 31 at Colby Rd	Spartan Asphalt Paving Co.	Pit 17-40	Pit 61-9	NBOL	--	0.44	0.45	0.57	--	0.51
					NBIL	--	0.64	0.66	0.77	--	0.78
					SBOL	--	0.40	0.42	0.49	--	0.39
					SBIL	--	0.60	0.60	0.76	--	0.75
SS 80072B, C7	M 40 from Michigan Ave north to north limits of Paw Paw	John G. Yerington Co.	Material Service Corp. Thornton, Ill.	Pit 80-20	NBOL	0.42	--	0.43	0.41	--	0.32
					NBIL	0.48	--	0.47	0.43	--	0.32
					SBOL	0.54	--	0.47	0.46	--	0.36
					SBIL	0.48	--	0.45	0.39	--	0.27
SS 81011C, C4	M 52 from Jackson-Washtenaw County line southeastly to 6,580 ft south of Boyce Rd	Spartan Asphalt Paving Co.	Pit 47-3	Pit 47-3	NB	--	0.65	0.64	0.69	--	0.58
					SB	--	0.61	0.64	0.65	--	0.53

TABLE 14  
FIFTEEN-YEAR REVIEW FOR BITUMINOUS AGGREGATE PAVEMENTS CONSTRUCTED IN 1963

Project No.	Location	Paving Contractor	Aggregate Sources		Direction and Lane	Average Coefficient of Wet Sliding Friction				
			Coarse	Fine		1964	1965	1966	1973	1978
SS 10011C, C2	M 22 from Manistee-Benzie County line north to M 115	Klett Construction Co.	Pit 10-25	Pit 10-25	NB SB	0.62 0.59	---	0.65 0.66	0.49 0.50	0.35 0.34
M 17043A, C2	M 48 from M 129 east to Goetzville	Thornton Construction Co., Inc.	Pit 17-51	Pit 17-51	EB WB	0.75 0.76	---	0.75 0.73	0.70 0.78	0.70 0.68
F 20021C, C1	M 72 from the Kalkaska-Crawford County line southeast to I 75 BL in Grayling	The Hicks Co.	Pit 20-39	---	EB WB	---	0.50 0.51	0.52 0.54	0.43 0.49	0.45 0.41
FFH 64022B, C1	M 20 from the Newaygo-Oceana County line in Hesperia west 6.3 miles	Spartan Asphalt Paving Co.	Pit 64-35	---	EB WB	---	0.58 0.56	0.61 0.60	0.71 0.73	0.56 0.59
F 66031B, C3 F 66032C, C8	US 45 from 4.9 miles south of M 28 north to M 28	Mahy Construction Co.	Pit 66-33	---	NB SB	---	0.64 0.63	0.60 0.56	0.57 0.51	0.52 0.50

SECTION V

EXPERIMENTAL FEATURES IN PAVEMENT SURFACES

## Experimental Features in Pavement Surfaces

### Table 15 - Bituminous Concrete Interstate Projects

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

Coefficients determined on the limestone projects, in 1978, ranged from 0.34 to 0.70 and averaged 0.48. The 1978 crushed gravel values ranged from 0.59 to 0.72 and averaged 0.66.

Under basically the same ADT (1973 ADT averaging 8,100), the crushed gravel projects have consistently maintained higher friction levels than the limestone projects. The friction level decay, with respect to increases in ADT, is lower for crushed gravel projects. This is evidenced by comparing Wsf values of the inside lane (IL), with the higher traffic density outside lane (OL). In 1978, outside lanes of the crushed gravel projects were only 13 percent lower than the inside lane values while outside lanes of the limestone projects were 24 percent lower than the inside lanes. Figure 5 shows the 18-year history of this comparison.

### Table 16 - Bridge Deck Surface Coatings

#### 1. Rubberized Bituminous Concrete

Thirty-four lanes coated with rubberized bituminous concrete have been tested annually since surfaced in 1967 or 1968. Friction levels determined during 1978 ranged from 0.26 to 0.51 and averaged 0.43. After 10 or 11 years of service, coefficients on 12 of the lanes were lower than 0.40; two lanes yielded values below 0.30. Coefficients on the remaining 23 lanes ranged from 0.40 to 0.51. The lowest friction levels were on the US 31/US 33 structure over St. Joseph River in Berrien Springs (B02 of 11052) where Wsf values averaging 0.29 and 0.26 were determined on the northbound and southbound lanes.

#### 2. Asbestos Mixture

A rubberized asbestos and bituminous concrete coating was placed on the Newport Rd over I 75 structure (S05 of 58152) in 1967. The 1978 tests resulted in 11-year friction levels ranging from 0.47 to 0.50 and averaging 0.48.

#### 3. Epoxy Coatings

Coefficients on the Creyts Rd structure over I 496 (S05 of 23081) have been monitored for nine years. The north half of this bridge deck was surfaced in 1969 with E15 Versamid 140; the south half was surfaced with

Guard Kote 250. Respective north half and south half friction levels of 0.58 and 0.64 were determined in 1978. Several areas where loss of bond between the steel deck and the epoxy coatings have developed; removal of the existing surface has been recommended.

In 1969, an epoxy mortar was applied to the deck of M 83 over Cass River in Frankenmuth (B02 of 73131). After nine years of service, friction levels on this structure range from 0.57 to 0.61 and average 0.58.

#### 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 mix. Six structures (23 lanes) coated with latex modified mortar had Wsf values determined during 1978. Coefficients ranged from 0.37 to 0.54 and averaged 0.46. The only lane yielding a friction level below 0.40 was the NBIL of Brush St over I 75 (S27 of 82195) where a Wsf value of 0.37 was measured.

#### 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.

Seventy-five lanes of bridge decks surfaced during 1972, 1975, and 1978 with latex concrete were tested in 1978. Wsf values determined in 1978 ranged from 0.37 to 0.70 and averaged 0.52. Tests on four lanes yielded friction levels below 0.40. The lowest value encountered was 0.37 on the WBOL of I 94 over DeQuindre Railroad Yard (X01 of 82024). The highest coefficient (0.70) was determined on the SBIL of US 127 over the NYCRR, south of Jackson (X01 of 38131).

#### 6. Low Slump Concrete

Two structures were surfaced with a low slump concrete during 1975. Coefficients on six lanes tested during 1978 ranged from 0.47 to 0.65 and averaged 0.57.

#### Table 17 - Experimental Skid Resistant Resurfacing

Pavement friction tests were conducted again on four experimental skid resistant surfacing types during 1978. The poorest performing of these was the 50-lb 3 BC + asbestos fiber + asphalt mix on US 24 at Fenkle Rd where, after 13 years of service, coefficients ranged from 0.32 to 0.36 and averaged 0.34. The 80-lb sandstone + asphalt mix yielded the highest Wsf values which ranged from 0.51 to 0.68 and averaged 0.57.

Table 18 - 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. Very similar friction levels were determined on both surface types during 1978; Mastiphalt averaged 0.44 and Gussasphalt averaged 0.45.

Table 19 - Spray Grip Surface - US 24 (Telegraph Rd) at 10 Mile Rd, Oakland County

A spray grip surface was initially placed at the intersection of US 24 and 10 Mile Rd in the fall of 1972. Excellent initial friction levels, averaging 0.78 were obtained. However, in 1973, due to a bonding problem, the initial surface was replaced. The 'new' spray grip surface was first tested in 1973. Excellent results were again found, Wsf values ranged from 0.73 to 0.87 and averaged 0.81. In 1978, after being subjected to five years of traffic wear, friction levels range from 0.67 to 0.76 and average 0.74.

Table 20 - Epoxy and Natural Emery Seal Coat, Cut River Bridge (B01 of 49023)

Low friction levels were determined on B01 of 49023, US 2 over the Cut River, through the Department's high-accident location testing program in 1973. Friction levels at that time, on the concrete deck, ranged from 0.15 to 0.22 and averaged 0.18. An epoxy and natural emery seal coat surface was placed on the structure in July of 1974. Initial year pavement friction tests on this surface yielded Wsf values ranging from 0.75 to 0.81 and averaging 0.78. In 1978, after being subjected to five years of traffic wear, coefficients average 0.56.

Table 21 - M 43 Lakelite Aggregate Section (Project Mm 2SC-7A, Control Section 08012), Research Project 72 NM-347

Lakelite is a lightweight porous material and in 1972 was incorporated into the mix design of Project Mm 2SC-7A. A 25B aggregate seal was also placed on this project and is used as a control to study frictional characteristics of the Lakelite.

Through the first three series of pavement friction tests, Lakelite coefficients averaged 0.89, 0.82, and 0.66; the control areas, during the same test period, yielded average Wsf values of 0.59, 0.64, and 0.56. Effects of traffic and time have narrowed the friction level gap between

these two surface types; during 1978, six-year Wsf values averaged 0.57 for the Lakelite and 0.51 for the 25B aggregate seal.

Table 22 - Trinidad Asphalt Resurfacing (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.

Annual pavement friction measurements show a general increase in coefficients for both Trinidad and bituminous concrete surfaces through their fourth service year. Five-year Wsf values leveled off at 0.64 or 0.65 during 1978. No significant friction level differences between Trinidad and bituminous concrete mixtures is evidenced by the five-year history of coefficients on this project.

Table 23 - Napoleon Sandstone Surface (Project Mb 46061-04854A)

In 1973, blends of Napoleon sandstone were incorporated into various mix designs and placed in a 5,000-ft section of the south end of Project 46061-04684A. This 5,000-ft section is located on US 223 from 1,700 ft northwest of Onstead Rd northwest to US 127.

Friction levels averaging as low as 0.25 were encountered early in the service life of the Napoleon sandstone surfaces. Since the fall of 1974, coefficients have continually increased through the 1977 test year when the Wsf value of all Napoleon blends averaged 0.55. 1978 friction levels are 13 percent lower than 1977 values and average 0.48.

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 seven miles west of Ontonagon and an average friction level of 0.53 was determined. A mix design employing White Pine slag was used for the surfacing of this roadway. Average friction levels from all subsequent pavement friction measurements have exceeded the initial test average. In 1978, after five service years, Wsf values ranged from 0.55 to 0.67 and averaged 0.61. Traffic volumes on Halfway Rd have been inadequate, over five service years to effectively evaluate this surface's wear characteristics.

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 determined on burlap dragged, longitudinal broomed, and transverse broomed surfaces over the nine-year study of Project 13074-001.

During the 1977 construction season, a specification, requiring the texturing of concrete surfaces with a transverse comb, was implemented. It is anticipated that friction levels of future concrete pavements will be higher; wear characteristics will be monitored.

#### 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 the groove width and spacing. Table 26 shows the five-year history of friction levels determined on the grooved pavement and also on adjacent non-grooved surface at each of 15 locations.

Considering all 52 lanes under study during a five-year period, the grooved pavement sections have consistently yielded higher average friction levels than adjacent non-grooved pavements. The friction level difference between grooved and non-grooved pavement, however, is not significantly different. The 1978 test results yielded an average Wsf of 0.40 for grooved pavement and 0.39 for the non-grooved.

#### Table 27 - Open-Graded Asphalt Friction Courses

The first open-graded asphalt friction course in Michigan was placed on M 46 between the C&ORR and Williams St in Saginaw. Adjacent to this surface, between the C&ORR and Elm St, a conventional bituminous concrete surface was placed. Construction of both these surfaces occurred during 1973 as Project 73062-05917. Identical friction levels were determined on both surfaces during their initial service year. Although a gradual friction level decay has occurred through the five-year history of pavement friction tests, both surfaces have maintained very similar Wsf values. Coefficients determined during 1978 averaged 0.38 for the open-graded asphalt friction course and 0.36 for the bituminous concrete.

During the 1975 construction season, three other open-graded asphalt friction courses were placed. Coefficients on two followed the pattern found on the M 46 job, i.e., coefficients increased after one year and then decreased after the second service year. The M 25 surface, in Bay City, however, did not follow this pattern. Wsf values on it dropped after the first service year and only averaged 0.22. M 25 test values determined during 1978 ranged from 0.22 to 0.24 and averaged 0.23.

### Table 28 - Stoney Mix Projects

Pavement friction test results for bituminous aggregate and bituminous concrete projects using experimental mix designs with a 5 percent increased stone content (stoney mix projects) are shown in Table 28.

In 1976, a stoney mix bituminous aggregate project was placed on M 86, west of Colon and after two service years, Wsf values ranged from 0.59 to 0.66 and averaged 0.62. Two-year coefficients on an adjacent conventional bituminous aggregate surface ranged from 0.54 to 0.56 and averaged 0.55.

Also constructed during 1976 were four bituminous concrete projects which used mix designed with the increased stone content. Their two-year friction levels ranged from 0.43 to 0.59 and averaged 0.50. Adjacent conventional bituminous concrete lanes yielded coefficients ranging from 0.47 to 0.53 and averaging 0.49.

After a two-year service period, the surfaces with higher stone contents are yielding slightly higher friction levels.

### Table 29 - Rotomilled Surfaces

Wsf values are currently being monitored at 14 rotomilled areas (53 lanes) throughout the state.

Sixteen of the lanes under study were rotomilled in 1976. The average friction level for these prior to rotomilling was 0.25. Wsf values determined one year after rotomilling averaged 0.45, 80 percent higher than test results before rotomilling. The same areas yielded an average coefficient of 0.37 after two service years.

During 1977, 37 additional lanes were rotomilled. 'Before' tests on this set of lanes yielded an average Wsf value of 0.33. Results of initial year tests conducted in 1977, after rotomilling averaged 0.44, indicating an average increase in friction level of 33 percent. After one service year, the same lanes averaged 0.41.

Skid resistance qualities have been improved by rotomilling at the majority of the locations under study. Tests conducted at the one and two-year service levels, however, indicate that a friction level decay, from initial service year test values, will occur as early as one year after rotomilling.

TABLE 15  
BITUMINOUS CONCRETE INTERSTATE PROJECTS

Project No.	Length, mi.	Location	Date Paved (Wearing Course)	Paving Contractor	Source of Course Aggregate	Leads <sup>(1)</sup>	Average Coefficient of Wet Sliding Friction																		
							Firestone Tire				General Tire														
							1961	1962	1963	Avg. 1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
18034, C3	6.758	M 61 to Arnold Rd	May-June 1962	Riech-Riley	Wallace Stone Co. (Pit 32-4)	IL 0.52(2) OL 0.51(2)	---	---	---	0.58	0.64	0.56	0.59	0.60	0.65	0.57	0.59	0.63	0.62	0.60	0.66	0.70	0.73	0.70	
20015, C3	4.847	Co. Rd 612 to N Crawford Co. Lane	Sept. 1961	Thornton Construction	McCready Pit (Pit 60-18)	IL 0.60 OL 0.56	0.60	0.61	0.59	0.73	0.65	0.59	0.66	0.65	0.73	0.70	0.72	0.75	0.76	0.65	0.68	0.73	0.76	0.72	
69013, C1	7.665	Chicago Co. Lane N Marlette Rd to Charles Brink Rd	Oct. 1961 June 1962	Saginaw Asphalt Saginaw Asphalt	Afton Quarry (Pit 20-35) Afton Quarry (Pit 20-35)	IL OL	0.57	0.59	0.58	0.60	0.49	0.49	0.50	0.52	0.58	0.55	0.54	0.50	0.57	0.55	0.56	0.54	0.54	0.53	0.47
69013, C3 C5	5.385	Charles Brink Rd N to M 52 (Gaylord)	June 1962	Spartan Asphalt	Lewiston Pit	IL OL	0.56	0.59	0.63	0.71	0.66	0.60	0.70	0.66	0.73	0.72	0.72	0.74	0.73	0.61	0.68	0.74	0.72	0.68	

(1) IL and OL denote passing and traffic lanes.  
(2) Tested on leveling course mix.

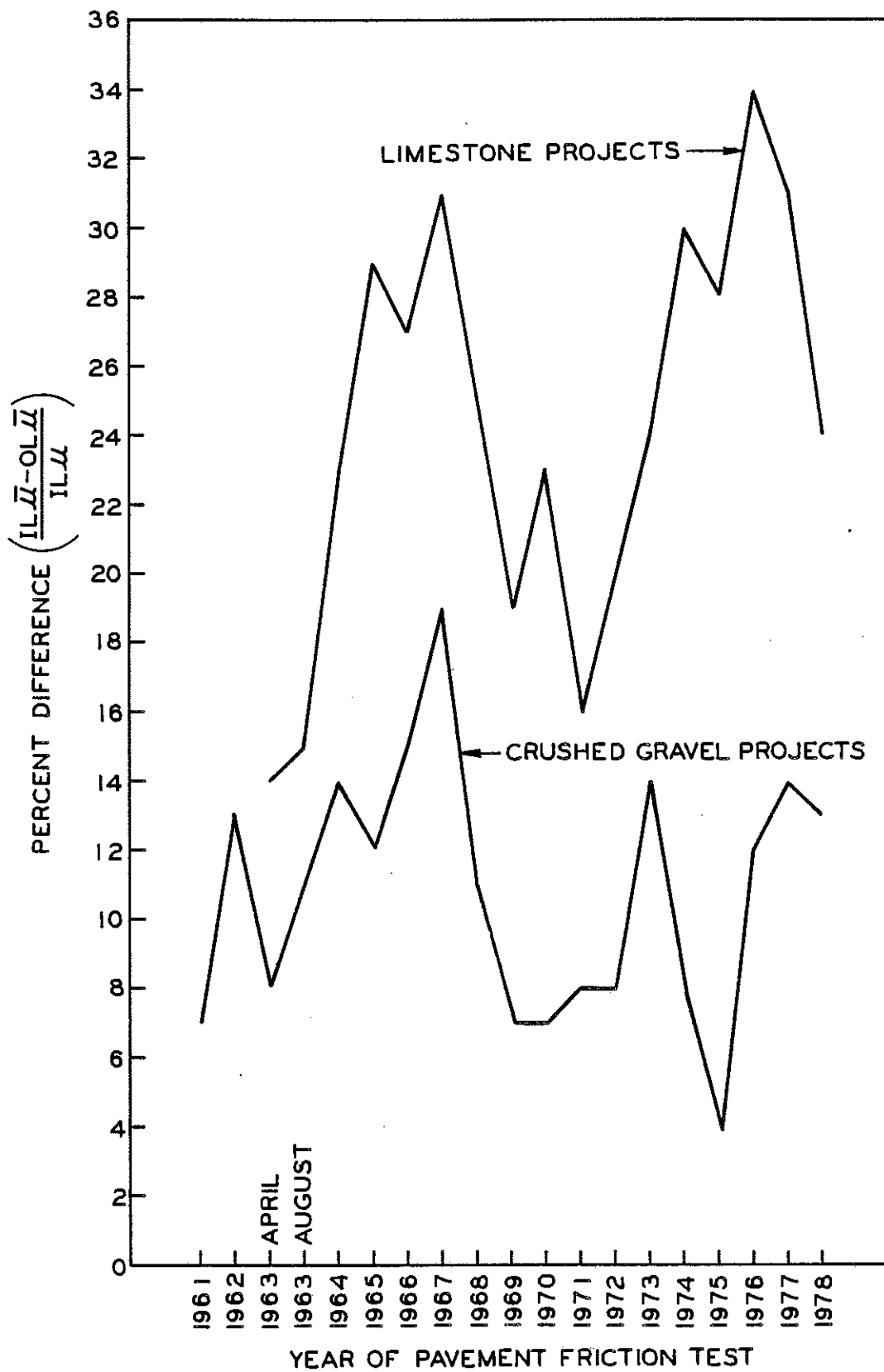


Figure 5. Friction level differences between OL and IL on bituminous concrete interstate projects.

TABLE 16  
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction												
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	
B02 of 11052	US 31-US 33 over St. Joseph River in Berrien Springs	1967	Rubberized bituminous concrete	NB	---	0.39	0.47	0.40	0.40	0.40	0.45	0.28	0.40	0.40	0.35	0.43	0.29
				SB	0.43	0.36	0.43	0.37	0.36	0.44	0.28	0.38	0.38	0.31	0.42	0.26	
X01 of 19032	US 27 over GTW RR in St. Johns	1967	Rubberized bituminous concrete	NBOL	0.53	0.44	0.50	0.47	0.49	0.51	0.47	0.44	0.44	0.44	0.45	0.48	0.45
				NBIL	0.56	0.50	0.55	0.52	0.55	0.57	0.49	0.48	0.47	0.49	0.49	0.47	
				SBOL	0.53	0.48	0.51	0.49	0.50	0.54	0.50	0.48	0.44	0.47	0.44	0.49	0.51
				SBIL	0.60	0.56	0.57	0.56	0.61	0.61	0.51	0.50	0.48	0.49	0.50	0.49	0.50
B01 of 79051	M 24 over Cass River in Caro	1967	Rubberized bituminous concrete	NB	0.53	0.48	0.56	0.51	0.54	0.57	0.56	0.59	0.45	0.41	0.50	0.50	
				SB	0.50	0.48	0.55	0.53	0.55	0.59	0.62	0.61	0.44	0.45	0.50	0.48	
B01 of 61076	M 20 over Muskegon River	1968	Rubberized bituminous concrete	NBOL	---	0.46	0.49	0.49	0.51	0.52	0.47	0.39	0.55	0.46	0.51	0.51	
				NBIL	---	0.48	0.53	0.50	0.55	0.56	0.53	0.46	0.59	0.50	0.53	0.50	
				SBOL	---	0.44	0.49	0.46	0.48	0.49	0.45	0.42	0.53	0.45	0.51	0.49	
				SBIL	---	0.44	0.52	0.49	0.49	0.52	0.49	0.39	0.57	0.46	0.48	0.45	
B02 of 61076	M 20 southbound over Cedar Creek	1968	Rubberized bituminous concrete	SBOL	---	0.44	0.50	0.48	0.46	0.53	0.50	0.44	0.53	0.44	0.51	0.48	
				SBIL	---	0.44	0.55	0.50	0.53	0.58	0.52	0.48	0.57	0.47	0.53	0.44	
B03 of 61076	M 20 northbound over Cedar Creek	1968	Rubberized bituminous concrete	NBOL	---	0.46	0.52	0.49	0.51	0.54	0.48	0.47	0.55	0.49	0.52	0.51	
				NBIL	---	0.45	0.54	0.53	0.52	0.58	0.52	0.48	0.60	0.51	0.55	0.47	
S04 of 61072	M 46 over US 31	1968	Rubberized bituminous concrete	EBOL	---	0.45	0.45	0.43	0.49	0.54	0.48	0.38	0.54	0.40	0.46	0.42	
				EBCL	---	0.43	0.49	0.49	0.52	0.53	0.50	0.40	0.55	0.43	0.47	0.40	
				EBIL	---	0.45	0.54	0.50	0.54	0.55	0.53	0.44	0.53	0.50	0.45	0.49	
				WBOL	---	0.42	0.48	0.43	0.49	0.50	0.43	0.41	0.51	0.35	0.45	0.41	
S17 of 82023	Grand River Ave (I 96 BS) over I 94	1968	Rubberized bituminous concrete	WBCL	---	0.43	0.49	0.47	0.54	0.54	0.47	0.40	0.52	0.44	0.46	0.36	
				WBIL	---	0.50	0.55	0.50	0.57	0.55	0.54	0.44	0.53	0.50	0.46	0.47	
				EBOL	---	0.44	0.38	0.35	0.41	0.43	0.41	0.37	0.39	0.41	0.45	0.38	
				EBCL	---	0.44	0.37	0.34	0.39	0.42	0.40	0.36	0.40	0.40	0.45	0.36	
S16 of 82111	Grand River Ave (I 96 BS) over I 696 BS	1968	Rubberized bituminous concrete	EBIL	---	0.45	0.40	0.36	0.38	0.45	0.43	0.39	0.41	0.44	0.44	0.38	
				WBOL	---	0.50	0.43	0.40	0.44	0.48	0.40	0.42	0.44	0.49	0.47	0.43	
				WBCL	---	0.44	0.37	0.36	0.40	0.41	0.40	0.39	0.42	0.44	0.45	0.37	
				WBIL	---	0.44	0.39	0.35	0.39	0.43	0.43	0.37	0.44	0.46	0.42	0.38	
S05 of 58152	Newport Rd over I 75, Newport	1967	Rubberized asbestos and bituminous concrete	EBOL	---	0.52	0.47	0.46	0.44	0.54	0.48	0.42	0.46	0.54	0.50	0.42	
				EBCL	---	0.44	0.43	0.40	0.43	0.44	0.28	0.37	0.37	0.43	0.45	0.37	
				EBIL	---	0.43	0.41	0.41	0.43	0.48	0.33	0.37	0.39	0.43	0.43	0.38	
				WBOL	---	0.49	0.49	0.47	0.46	0.48	0.33	0.42	0.47	0.55	0.51	0.51	
S05 of 58152	Newport Rd over I 75, Newport	1967	Rubberized asbestos and bituminous concrete	WBCL	---	0.42	0.39	0.40	0.42	0.39	0.28	0.37	0.38	0.42	0.41	0.36	
				WBIL	---	0.43	0.41	0.41	0.44	0.50	0.35	0.47	0.40	0.42	0.44	0.37	
				EB	0.46	0.50	0.51	0.49	0.46	0.51	(1)	0.38	0.52	0.48	0.51	0.50	
				WB	0.47	0.50	0.51	0.52	0.49	0.57	(1)	0.43	0.49	0.50	0.51	0.47	

(1) Not tested (approaches torn up)

TABLE 16 (Cont.)  
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction												
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	
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 <sup>(2)</sup>	0.34 <sup>(3)</sup>	0.41 <sup>(4)</sup>	0.53 <sup>(2)</sup>	0.54	0.56	
				SB	--	--	0.66	0.54	0.44	0.39	0.44 <sup>(2)</sup>	0.38 <sup>(3)</sup>	0.49 <sup>(4)</sup>	0.55 <sup>(2)</sup>	0.58	0.61	
B02 of 73131	M 83 over Cass River, Frankenmuth	1969	Epoxy mortar	NB	--	--	0.75	0.52	0.46	0.50	0.45 <sup>(2)</sup>	0.41 <sup>(3)</sup>	0.65 <sup>(4)</sup>	0.61 <sup>(2)</sup>	0.64		
				SB	--	--	0.69	0.49	0.36	0.49	0.49 <sup>(2)</sup>	0.36 <sup>(3)</sup>	0.64 <sup>(4)</sup>	0.57 <sup>(2)</sup>	0.65		
S04 of 41026	M 37 over eastbound I 96	1971	Latex modified mortar	NBOL	--	--	--	0.57	0.57	0.60	0.58	0.53	0.54	0.66	0.64		
				NBIL	--	--	--	0.52	0.58	0.54	0.51	0.54	0.64	0.62			
				SBOL	--	--	--	0.60	0.63	0.66	0.54	0.56	0.67	0.64	0.61		
				SBIL	--	--	--	0.56	0.60	0.60	0.56	0.55	0.53	0.68	0.62		
S05 of 41026	M 37 over westbound I 96	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.45	0.47		
				NBIL	--	--	--	--	--	0.46	0.41	0.29	0.46	0.44	0.49		
				SBOL	--	--	--	--	--	0.37	0.35	0.27	0.40	0.40	0.49		
				SBIL	--	--	--	--	--	0.41	0.38	0.32	0.41	0.41	0.50		
S06 of 82022	Westbound I 94 over Middle- belt Rd	1971	Latex modified mortar	NBOL	--	--	--	--	--	0.40	0.34	0.30	0.39	0.35	0.46		
				NBIL	--	--	--	--	--	0.42	0.40	0.30	0.43	0.42	0.48		
				SBOL	--	--	--	--	--	0.44	0.39	0.30	0.43	0.42	0.48		
				SBIL	--	--	--	--	--	0.33	0.34	0.27	0.40	0.45	0.51		
S09 of 82022	Eastbound I 94 over Ecorse Rd	1972	Latex modified mortar	NBOL	--	--	--	--	--	0.47	0.40	0.30	0.45	0.46	0.54		
				NBIL	--	--	--	--	--	0.46	0.39	0.28	0.45	0.44	0.51		
				SBOL	--	--	--	--	--	0.38	0.31	0.36	0.36	0.49	0.42		
				SBIL	--	--	--	--	--	0.40	0.34	0.40	0.42	0.51	0.47		
S12 of 82022	Westbound I 94 over Beech- Daly Rd	1972	Latex modified mortar	NBOL	--	--	--	--	--	0.42	0.35	0.43	0.38	0.54	0.46		
				NBIL	--	--	--	--	--	0.44	0.35	0.46	0.44	0.53	0.47		
				SBOL	--	--	--	--	--	0.42	0.39	0.48	0.44	0.56	0.53		
				SBIL	--	--	--	--	--	0.45	0.38	0.45	0.46	0.55	0.52		
S27 of 82195	Brush St over I 75	1969	Latex modified mortar	NBOL	--	--	--	--	--	0.46	0.33	0.40	0.38	0.47	0.45		
				NBIL	--	--	--	--	--	0.47	0.37	0.41	0.44	0.53	0.52		
				SBOL	--	--	--	--	--	0.43	0.37	0.43	0.47	0.54	0.47		
				SBIL	--	--	--	--	--	0.54	0.48	0.39	0.40	0.57	0.47		
S06 of 25031	Grand Blanc Rd over US 23	1972	Latex concrete	NBOL	--	--	--	--	--	0.48	0.43	0.34	0.34	0.38	0.44		
				NBIL	--	--	--	--	--	0.48	0.43	0.34	0.34	0.38	0.44		
				SBOL	--	--	--	--	--	0.51	0.44	0.34	0.36	0.50	0.47		
				SBIL	--	--	--	--	--	0.27	0.31	0.31	0.33	0.33	0.39		
S02 of 25131	Baldwin Rd over I 75 (1.2 miles northwest of Oakland County Line)	1972	Latex concrete	NBOL	--	--	--	--	--	0.33	0.32	0.38	0.38	0.43	0.48		
				NBIL	--	--	--	--	--	0.33	0.32	0.38	0.38	0.43	0.48		
				SBOL	--	--	--	--	--	0.47	0.44	0.44	0.50	0.51	0.59		
				SBIL	--	--	--	--	--	0.51	0.44	0.44	0.50	0.48	0.55		

(2) Average of two test series

(3) Fall tests only

(4) Spring tests only

TABLE 16 (Cont.)  
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction											
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
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	0.47	
				NBIL	--	--	--	--	--	0.39	0.38	0.46	0.45	0.47	0.50	
				SBOL	--	--	--	--	--	0.35	0.33	0.39	0.41	0.44	0.48	
				SBIL	--	--	--	--	--	0.38	0.36	0.46	0.46	0.44	0.52	
X01 of 33031	US 127 over NYCRR, south of Leslie	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.62	0.63	0.61	
				NBIL	--	--	--	--	--	--	--	--	0.63	0.69	0.66	
				SBOL	--	--	--	--	--	--	--	--	0.52	0.61	0.60	
				SBIL	--	--	--	--	--	--	--	--	0.62	0.67	0.67	
X01 of 33034	US 27 over C&O RR and I 96 BL in Lansing	1975	Latex modified mortar Latex concrete	NBOL <sup>(5)</sup>	--	--	--	--	--	--	--	--	0.51	0.53	0.50	
				NBOL <sup>(6)</sup>	--	--	--	--	--	--	--	--	0.51	0.53	0.50	
				NBIL	--	--	--	--	--	--	0.37	0.52	0.53	0.50		
				SBOL	--	--	--	--	--	--	0.52	0.52	0.52	0.50		
S07 of 38101	Lansing Ave over I 94, Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.54	0.57	0.50	
				NBIL	--	--	--	--	--	--	--	--	0.62	0.50	0.39	
				SBOL	--	--	--	--	--	--	--	--	0.47	0.45	0.39	
				SBIL	--	--	--	--	--	--	--	--	0.59	0.48	0.42	
B04 of 38111	US 127 over Grand River, east of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.45	0.46	0.39	
				NBIL	--	--	--	--	--	--	--	--	0.52	0.49	0.43	
				SBOL	--	--	--	--	--	--	--	--	0.62	0.60	0.59	
				SBIL	--	--	--	--	--	--	--	--	0.53	0.53	0.46	
X01 of 38131	US 127 over NYCRR, north of Jackson	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.63	0.65	0.62	
				NBIL	--	--	--	--	--	--	--	--	0.56	0.64	0.61	
				SBOL	--	--	--	--	--	--	--	--	0.56	0.66	0.65	
				SBIL	--	--	--	--	--	--	--	--	0.58	0.62	0.62	
S16 of 41131	US 131 over Leonard St, in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.61	0.67	0.70	
				NBCL	--	--	--	--	--	--	--	--	0.57	0.56	0.54	
				NBIL	--	--	--	--	--	--	--	--	0.57	0.54	0.55	
				SBOL	--	--	--	--	--	--	--	--	0.62	0.64	0.62	
S17 of 41131	US 131 over Richmond St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.59	0.58	0.58	
				NBCL	--	--	--	--	--	--	--	--	0.59	0.62	0.58	
				SBOL	--	--	--	--	--	--	--	--	0.60	0.65	0.63	
				SBCL	--	--	--	--	--	--	--	--	0.55	0.55	0.52	
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.57	0.59	0.53	
				NBCL	--	--	--	--	--	--	--	--	0.60	0.62	0.60	
				NBIL	--	--	--	--	--	--	--	--	0.59	0.59	0.58	
				SBOL	--	--	--	--	--	--	--	--	0.59	0.62	0.60	
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.59	0.59	0.58	
				NBCL	--	--	--	--	--	--	--	--	0.56	0.57	0.55	
				NBIL	--	--	--	--	--	--	--	--	0.60	0.60	0.61	
				SBOL	--	--	--	--	--	--	--	--	0.59	0.57	0.56	
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.59	0.59	0.54	
				NBCL	--	--	--	--	--	--	--	--	0.59	0.62	0.60	
				NBIL	--	--	--	--	--	--	--	--	0.60	0.62	0.60	
				SBOL	--	--	--	--	--	--	--	--	0.59	0.59	0.54	
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.60	0.62	0.60	
				NBCL	--	--	--	--	--	--	--	--	0.59	0.59	0.58	
				NBIL	--	--	--	--	--	--	--	--	0.59	0.57	0.56	
				SBOL	--	--	--	--	--	--	--	--	0.59	0.59	0.54	
S18 of 41131	US 131 over Ann St in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	0.60	0.62	0.60	
				NBCL	--	--	--	--	--	--	--	--	0.59	0.59	0.58	
				NBIL	--	--	--	--	--	--	--	--	0.56	0.57	0.55	
				SBOL	--	--	--	--	--	--	--	--	0.60	0.60	0.61	

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

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

TABLE 16 (Cont.)  
BRIDGE DECK SURFACE COATINGS

Bridge No.	Location	Year Coated	Type of Coating	Direction and Lane	Average Coefficient of Wet Sliding Friction													
					1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978		
X09 of 41131	US 131 over GTW RR and Indian Mill Cr in Grand Rapids	1975	Latex concrete	NBOL	--	--	--	--	--	--	--	--	--	--	0.56	0.54	0.53	
				NBCL	--	--	--	--	--	--	--	--	--	--	--	0.56	0.54	0.53
				NBIL	--	--	--	--	--	--	--	--	--	--	--	0.61	0.63	0.60
				SBOL	--	--	--	--	--	--	--	--	--	--	--	0.58	0.55	0.56
				SBCL	--	--	--	--	--	--	--	--	--	--	--	0.58	0.56	0.54
				SBIL	--	--	--	--	--	--	--	--	--	0.60	0.62	0.60		
E02 of 73062	M 46 over Tittabawassee River	1972	Latex concrete	EBOL	--	--	--	--	--	0.27	0.34	0.32	0.45	0.42	0.42	0.41		
				EBIL	--	--	--	--	--	0.30	0.32	0.34	0.44	0.41	0.38			
				WBOL	--	--	--	--	--	0.27	0.41	0.32	0.47	0.43	0.41			
				WBIL	--	--	--	--	--	0.32	0.37	0.39	0.51	0.45	0.42			
S02 of 82022	Eastbound I 94 over Wayne Rd	1972	Latex concrete	EBOL	--	--	--	--	--	0.30	0.38	0.38	0.47	0.47	0.47	0.43		
				EBCL	--	--	--	--	--	0.33	0.39	0.42	0.47	0.44	0.40			
				EBIL	--	--	--	--	--	0.38	0.51	0.46	0.53	0.53	0.46			
X01 of 82024	I 94 over DeQuindre Yard	1972	Latex concrete	EBOL	--	--	--	--	--	0.39	0.31	0.32	0.47	0.42	0.40			
				EBCL	--	--	--	--	--	0.38	0.29	0.34	0.47	0.43	0.41			
				EBIL	--	--	--	--	--	0.44	0.28	0.35	0.46	0.41	0.41			
				WBOL	--	--	--	--	--	0.41	0.31	0.33	0.47	0.44	0.37			
				WBCL	--	--	--	--	--	0.40	0.31	0.35	0.49	0.46	0.44			
				WBIL	--	--	--	--	--	0.43	0.32	0.40	0.50	0.48	0.42			
S01 of 82091	Old M 39 over Gate 10 entrance to Ford Plant	1972	Latex concrete	NBOL	--	--	--	--	--	0.40	0.40	0.41	--	--	--	--		
				NB#3	--	--	--	--	--	0.42	0.39	0.43	0.48	0.47	0.46			
				NB#2	--	--	--	--	--	0.47	0.46	0.44	0.52	0.51	0.50			
				NBIL	--	--	--	--	--	0.53	0.53	0.54	0.59	0.57	0.54			
				SBOL	--	--	--	--	--	0.43	0.45	0.40	--	--	--			
				SB#3	--	--	--	--	--	0.41	0.40	0.42	0.46	0.43	0.44			
				SB#2	--	--	--	--	--	0.48	0.46	0.45	0.48	0.46	0.45			
				SBIL	--	--	--	--	--	0.52	0.52	0.50	0.56	0.54	0.50			
E03 of 82191	I 75 over Goddard Rd	1972	Latex concrete	NBOL	--	--	--	--	--	0.40	0.36	0.46	0.45	0.44	0.44	0.51		
				NBCL	--	--	--	--	--	0.37	0.37	0.44	0.47	0.48	0.45			
				NBIL	--	--	--	--	--	0.40	0.44	0.49	0.52	0.49	0.50			
				SBOL	--	--	--	--	--	--	--	--	--	--	0.49			
				SBCL	--	--	--	--	--	--	--	--	0.50					
				SBIL	--	--	--	--	--	--	--	--	0.53					
S26 of 82195	John Rover, I 75	1977	Latex concrete	SBOL	--	--	--	--	--	--	--	--	--	--	--	0.50		
				SB#3	--	--	--	--	--	--	--	--	--	--	0.41			
				SB#2	--	--	--	--	--	--	--	--	--	--	0.42			
				SBIL	--	--	--	--	--	--	--	--	--	--	--			
S03 of 33084	Southbound I 496 to eastbound I 96 over westbound I 96	1975	Low slump concrete	SBOL	--	--	--	--	--	--	--	--	--	0.54	0.61	0.62		
				SBIL	--	--	--	--	--	--	--	--	--	0.64	0.68	0.65		
S10 of 47065	I 96 over Grand River (Brighton west exit)	1975	Low slump concrete	EBOL	--	--	--	--	--	--	--	--	--	0.46	0.50	0.47		
				EBIL	--	--	--	--	--	--	--	--	--	0.58	0.63	0.58		
				WBOL	--	--	--	--	--	--	--	--	--	0.48	0.56	0.49		
				WBIL	--	--	--	--	--	--	--	--	0.59	0.66	0.59			



**TABLE 17**  
**EXPERIMENTAL SKID-RESISTANT RESURFACING**

Control Section	Location	Construction Month	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	1978															
							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	0.53	0.51	0.59	0.64	0.65	0.57														
						0.76	0.61	0.56	0.66	0.62	0.66	0.66	0.66	0.64	0.62	0.68	0.76	0.68	0.62	0.68	0.76	0.76	0.68												
						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	0.51	0.62	0.58	0.62	0.51											
						0.74	0.54	0.47	0.53	0.55	0.66	0.60	0.57	0.58	0.51	0.65	0.61	0.62	0.58	0.62	0.51	0.62	0.57	0.62	0.53										
09042	M 25 at Wagner Rd, east of Bay City	Sept. 1965	80-lb Sandstone + asphalt	M 25	EB	0.56	0.36	0.34	0.37	0.38	0.42	0.35	0.36	0.42	0.40	0.35	0.31	0.32	0.32	0.32	0.32	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	0.34	0.34	0.34	0.34	0.34	0.34											
						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	0.36	0.36	0.36	0.36	0.36	0.36											
						0.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--										
						0.52	0.38	0.37	0.41	0.39	0.43	0.38	0.40	0.46	0.44	0.43	0.38	0.40	0.46	0.44	0.39	0.38	0.37	0.36	0.35										
						0.60	0.37	0.35	0.42	0.42	0.43	0.40	0.42	0.48	0.43	0.43	0.39	0.40	0.48	0.43	0.43	0.39	0.39	0.36	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	0.49	0.43	0.41	0.41	0.36	0.36	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	0.38	0.42	0.41	0.36	0.36	0.36										
						0.55	0.39	0.33	0.41	0.40	0.42	0.41	0.39	0.49	0.43	0.42	0.41	0.44	0.49	0.37	0.39	0.42	0.36	0.36	0.36										
						0.55	0.37	0.33	0.39	0.40	0.44	0.41	0.39	0.49	0.43	0.42	0.41	0.44	0.49	0.37	0.41	0.40	0.42	0.36	0.36										
						0.60	0.39	0.33	0.43	0.44	0.44	0.44	0.42	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44										
						82052	US 24 at Sibley Rd, Detroit	Oct. 1965	80-lb 3MS + 31AA + asphalt	US 24	NBOL	0.50	0.41	0.34	0.44	0.45	0.49	0.44	0.44	0.44	0.42	0.43	0.44	0.45	0.47	0.44	0.44								
0.52	0.42	0.38	0.47	0.47	0.50							0.48	0.49	0.48	0.51	0.45	0.49	0.47	0.49	0.47	0.49	0.47	0.49	0.43											
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	0.48	0.48	0.48	0.48	0.48	0.48											
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	0.48	0.48	0.48	0.48	0.48	0.48										
82053	US 24 northbound (Telegraph Rd) from Joy Rd to West Chicago	Avg. 1968	80-lb crushed fine aggregate	US 24	NBOL	0.51	0.42	0.38	0.46	0.46	0.50	0.48	0.50	0.48	0.49	0.46	0.48	0.48	0.48	0.48	0.48														
						0.51	0.42	0.38	0.46	0.46	0.50	0.48	0.50	0.48	0.49	0.46	0.48	0.48	0.48	0.48	0.48	0.48	0.48												
						0.51	0.42	0.38	0.46	0.46	0.50	0.48	0.50	0.48	0.49	0.46	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48											
						0.51	0.42	0.38	0.46	0.46	0.50	0.48	0.50	0.48	0.49	0.46	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48											

**TABLE 18**  
**GUSSASPHALT AND MASTIPHALT SURFACES ON US 31**  
**Research Project 72 C-14**

Tested Surface	Lane	Coefficient of Wet Sliding Friction																															
		10/24/72		11/10/72		1/18/73		5/10/73		12/3/73		6/4/74		6-19-75		6-18-76		10-4-77		7-27-78													
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg											
Gussasphalt (C.S. 53031)	NB	0.76	0.82	0.79	--	--	--	0.57	0.62	0.60	0.60	0.61	0.61	--	--	--	0.40	0.45	0.42	0.52	0.55	0.53	0.49	0.50	0.50	0.48	0.54	0.51	0.48	0.51	0.49		
	SB	0.79	0.83	0.81	--	--	--	0.63	0.68	0.66	0.55	0.59	0.56	--	--	--	0.42	0.46	0.44	0.51	0.55	0.53	0.46	0.49	0.48	0.43	0.51	0.47	0.46	0.49	0.47		
Mastiphalt (C.S. 53031)	NB	0.37	0.50	0.44	--	--	--	0.48	0.49	0.48	0.56	0.58	0.57	--	--	--	0.40	0.45	0.42	0.52	0.54	0.53	0.47	0.47	0.47	0.47	0.49	0.51	0.50	0.43	0.46	0.45	0.43
	SB	0.37	0.49	0.42	--	--	--	0.54	0.56	0.55	0.55	0.60	0.57	--	--	--	0.45	0.50	0.48	0.52	0.52	0.52	0.46	0.46	0.47	0.42	0.48	0.45	0.45	0.42	0.45	0.45	0.44
Gussasphalt (B2 of 64012)	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	0.48	0.49	0.49	0.49	0.43	0.45	0.44	0.45
	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	0.48	0.46	0.39	0.42	0.41	0.41

**TABLE 19**  
**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		6-10-73		10-29-73		8-11-74		7-30-75		7-25-76		10-4-77		10-8-78							
		Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg	Low	High	Avg			
US 24 (Telegraph Rd), Immediately north of 10 Mile Rd	SBRT	0.31	0.36	0.34	0.79	0.79	0.79	0.67	0.70	0.69	0.72	0.70	0.67	0.69	0.68	0.68	0.64	0.78	0.73	0.68	0.74	0.71	0.73	0.77	0.75
	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
SBIL	0.34	0.37	0.36	0.78	0.79	0.79	0.64	0.69	0.66	0.82	0.83	0.83	0.70	0.73	0.72	0.69	0.70	0.69	0.75	0.76	0.76	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	0.78	0.75	0.66	0.69	0.67	0.66	0.71	0.74	0.73	0.70	0.73	0.71	0.66	0.68

TABLE 20  
 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
8-21-78	EB	0.51	0.64	0.59
	WB	0.45	0.62	0.53

TABLE 21  
M 43 LAKE-LITE 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			7-31-78		
			Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave
Coats Grove Rd south (north of Hastings)	29B Agg. Seal	NB	0.59	0.63	0.61	0.64	0.64	0.64	0.49	0.53	0.52	0.57	0.56	0.57	0.61	0.59	0.54	0.57	0.56	0.47	0.49	0.48	0.45	0.46	0.45	0.45
		SB	0.57	0.60	0.59	0.62	0.62	0.58	0.61	0.60	0.56	0.57	0.58	0.61	0.59	0.61	0.59	0.60	0.62	0.61	0.53	0.57	0.55	0.53	0.55	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	0.58	0.65	0.62	0.60	0.52	0.53	0.53	0.57	0.62	0.59	0.41	0.52	0.46	0.51	0.52	0.51	0.51
		SB	0.90	0.91	0.91	0.78	0.85	0.82	0.56	0.58	0.67	0.64	0.61	0.58	0.60	0.59	0.60	0.64	0.62	0.35*	0.61	0.50	0.60	0.65	0.65	0.63
From 0.5 mile north of Coats Grove Rd north	29B Agg. Seal	NB	0.57	0.59	0.58	0.64	0.68	0.66	0.50	0.55	0.52	0.55	0.57	0.56	0.55	0.59	0.56	0.55	0.58	0.57	0.53	0.54	0.53	0.48	0.52	0.50
		SB	0.58	0.60	0.59	0.63	0.68	0.66	0.57	0.59	0.58	0.58	0.57	0.58	0.60	0.60	0.59	0.60	0.61	0.61	0.54	0.54	0.58	0.56	0.51	0.57

\* 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			9-12-78					
			Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave			
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	0.65 0.71	0.66 0.73	0.65 0.72			
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	0.65 0.68	0.67 0.74	0.66 0.72			
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	0.65 0.73	0.66 0.74	0.66 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	0.65 0.73	0.67 0.74	0.66 0.73			
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	0.66 0.77	0.64 0.78	0.62 0.77	0.65 0.72	0.65 0.78	0.65 0.75			
706+00 - 659+00	6.0 Percent Trinidad Asphalt (Type M)	SBOL SBIL	0.42 0.53	0.46 0.56	0.45 0.54	0.53 0.64	0.54 0.65	0.54 0.64	0.61 0.68	0.62 0.70	0.62 0.69	0.60 0.72	0.61 0.76	0.61 0.74	0.61 0.72	0.64 0.74	0.65 0.73			
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	0.60 0.71	0.62 0.71	0.60 0.71	0.61 0.73	0.61 0.77	0.61 0.75	0.61 0.73	0.61 0.76	0.62 0.74			
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	0.62 0.71	0.64 0.74	0.63 0.72			
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	0.64 0.70	0.65 0.72	0.64 0.71			

**TABLE 23**  
**NAPOLEON SANDSTONE SURFACE**  
**Project Mb 46061-04845A**

Mix No.	Blend No.	Station to Station	Lane	Coefficient of Wet Sliding Friction																							
				8-23-73			10-17-73			4-4-74			9-16-74			7-15-75			7-14-76			8-18-77			8-3-78		
				Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave	Low	High	Ave
1	II	490+88 to 496+50	NB	0.34	0.38	0.36	0.28	0.34	0.30	0.55	0.59	0.57	0.39	0.42	0.40	0.41	0.45	0.43	0.46	0.50	0.48	0.53	0.55	0.54	0.46	0.47	0.47
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	0.49	0.49	0.49
2	II	492+26 to 496+50	SB	0.50	0.55	0.53	0.37	0.41	0.38	0.58	0.59	0.59	0.42	0.46	0.44	0.44	0.45	0.44	0.46	0.49	0.48	0.52	0.55	0.53	0.43	0.47	0.45
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	0.42	0.47	0.45
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	0.46	0.52	0.50
6	I	476+50 to 481+10	NB	0.34	0.39	0.37	0.26	0.28	0.27	0.50	0.54	0.52	0.39	0.43	0.41	0.42	0.46	0.44	0.46	0.50	0.48	0.54	0.57	0.56	0.48	0.51	0.49
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	0.42	0.46	0.44
7	III	466+50 to 476+50	NB	0.40	0.42	0.41	0.31	0.35	0.32	0.47	0.49	0.48	0.42	0.45	0.44	0.48	0.51	0.49	0.49	0.50	0.50	0.58	0.60	0.59	0.51	0.54	0.53
7	III	466+50 to 474+30	SB	0.37	0.40	0.39	0.25	0.29	0.27	0.51	0.54	0.53	0.39	0.42	0.41	0.46	0.48	0.47	0.48	0.50	0.49	0.55	0.58	0.57	0.46	0.49	0.47
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	0.57	0.48	0.53	0.51
9	IV	456+40 to 466+50	SB	0.46	0.52	0.49	0.32	0.36	0.34	0.54	0.58	0.57	0.43	0.46	0.44	0.49	0.50	0.50	0.49	0.53	0.51	0.57	0.61	0.60	0.51	0.55	0.52
10	V	446+50 to 456+50	NB	0.45	0.51	0.47	0.32	0.37	0.34	0.53	0.56	0.54	0.42	0.44	0.43	0.44	0.48	0.46	0.45	0.49	0.47	0.55	0.58	0.56	0.48	0.51	0.49
10	V	446+50 to 456+40	SB	0.46	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	0.47	0.51	0.49

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
8-23-78	0.55	0.67	0.61

**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	<u>Station 2232 to 2238</u>								
				NBOL	0.61	0.51	0.47	0.35	0.30	0.43	0.43	0.47
		NBIL	0.65	0.63	0.61	0.52	0.46	0.65	0.65	0.67	0.59	
		Longitudinal Brooming	<u>Station 2242 to 2248</u>									
			NBOL	0.69	0.56	0.49	0.33	0.32	0.43	0.42	0.48	0.47
		NBIL	0.72	0.68	0.65	0.52	0.47	0.66	0.64	0.64	0.60	
82021-04280A	I 94 from 435 ft east of Haggarty Rd easterly to 1,664 ft east of Ozga Rd	Transverse Brooming	1974	<u>Station 2253 to 2259</u>								
				NBOL	0.86	0.70	0.60	0.37	0.39	0.49	0.48	0.50
		NBIL	0.87	0.86	0.78	0.63	0.54	0.70	0.71	0.72	0.66	
		Transverse Brooming	<u>Station 2272 to 2278</u>									
			NBOL	0.76	0.56	0.48	0.33	0.33	0.44	0.46	0.49	0.48
		NBIL	0.79	0.74	0.72	0.58	0.51	0.64	0.68	0.65	0.64	
82021-05127A	I 94 from 113 ft west of Morton-Taylor Rd easterly to 542 ft east of Haggarty Rd	Transverse Brooming	1975	---								
				WBOL	--	--	--	--	--	--	0.38	0.34
		WBCL	--	--	--	--	--	--	0.43	0.42	0.42	
		WBIL	--	--	--	--	--	--	0.54	0.58	0.53	
		Transverse Combing	---									
			WBOL	--	--	--	--	--	0.44	0.47	0.46	
WBCL	--	--	--	--	--	--	0.48	0.52	0.49			
WBIL	--	--	--	--	--	--	0.58	0.60	0.56			



TABLE 26  
PAVEMENT GROOVING

Control Section	Location	Type of Grooving	Direction and Lane	Average Coefficient of Wet Sliding Friction									
				1974		1975		1976		1977		1978	
				Non-Grooved Control	Grooved Surface	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 Nickory St., City of Mounising	Longitudinal <sup>(1)</sup>	EBOL	0.43	0.41	0.38	0.37	0.53	0.43	0.46	0.42	0.46	0.44
			EBIL	0.43	0.37	0.42	0.33	0.53	0.44	0.47	0.39	0.61	0.41
			WBOL	0.42	0.42	0.32	0.31	0.58	0.43	0.34	0.34	0.40	0.42
			WBIL	0.38	0.37	0.37	0.37	0.48	0.44	0.39	0.40	0.40	0.41
09042	Eastbound M 25 curve at Thomas St., Bay County	Longitudinal <sup>(1)</sup>	EBOL	0.38	0.35	0.37	0.42	0.46	0.52	0.47	0.56	0.42	0.49
			EBCL	0.32	0.45	0.44	0.38	0.57	0.50	0.55	0.57	0.53	0.48
50023	M 59 curve between Dequindre and Ryan Rd	Longitudinal <sup>(1)</sup>	EBOL	0.27	0.30	0.34	0.39	0.36	0.42	0.38	0.48	0.36	0.46
			EBIL	0.32	0.40	0.47	0.39	0.45	0.44	0.43	0.46	0.39	0.47
			WBOL	0.28	0.31	0.37	0.36	0.38	0.47	0.38	0.47	0.36	0.43
			WBIL	0.31	0.32	0.40	0.34	0.43	0.42	0.46	0.46	0.38	0.40
62031	M 37 from Jefferson St to River St., City of Newaygo	Longitudinal <sup>(1)</sup>	NBOL	0.35	0.36	0.34	0.36	0.40	0.39	0.45	0.45	0.38	0.42
			NBIL	0.35	0.34	0.33	0.34	0.35	0.41	0.39	0.43	0.40	0.40
			SBOL	0.36	0.33	0.31	0.38	0.38	0.40	0.44	0.46	0.41	0.46
			SBIL	0.37	0.35	0.33	0.36	0.38	0.39	0.42	0.46	0.40	0.45
			NBIL <sup>(2)</sup>	0.67	0.56	0.46	0.45	0.37	0.43	0.44	0.45	0.41	0.42
			SBIL <sup>(2)</sup>	0.55	0.52	0.51	0.50	0.36	0.41	0.46	0.46	0.44	0.43
11053	Northbound I 94 BL-US 23 from Pleasant St to Ship St., City of St. Joseph	Transverse <sup>(3)</sup>	NBOL	0.22	0.24	0.21	0.24	0.24	0.25	0.32	0.34	0.33	0.34
			NBIL	0.31	0.34	0.29	0.33	0.35	0.39	0.36	0.42	0.38	0.42
23012 and 33041	US 27 approaches to and Waverly Rd, Eaton and Ingham Counties	Transverse <sup>(3)</sup>	NEBOL	0.33	0.35	0.38	0.38	0.38	0.33	0.38	0.34	0.36	0.35
			NEBIL	0.36	0.35	0.35	0.33	0.41	0.37	0.37	0.35	0.39	0.36
			SWBOL	0.34	0.38	0.37	0.33	0.37	0.33	0.38	0.37	0.36	0.35
			SWBIL	0.41	0.30	0.38	0.38	0.42	0.39	0.45	0.41	0.41	0.38
56023	Eastbound M 20 at Ashman St., City of Midland	Transverse <sup>(4)</sup>	EBOL	0.38	0.35	0.35	0.32	0.43	0.42	0.43	0.44	0.37	0.37
			EBCL	0.40	0.37	0.33	0.32	0.40	0.39	0.41	0.44	0.35	0.35
			EBIL	0.39	0.36	0.35	0.33	0.40	0.41	0.50	0.46	0.36	0.36
56023	Eastbound M 20 at Rodd St., City of Midland	Transverse <sup>(4)</sup>	EBOL	0.33	0.40	0.32	0.33	0.41	0.42	0.42	0.42	0.37	0.36
			EBCL	0.37	0.38	0.31	0.34	0.40	0.40	0.42	0.44	0.36	0.35
			EBIL	0.36	0.36	0.32	0.32	0.42	0.41	0.39	0.43	0.36	0.36
56023	Eastbound M 20 at Cronkright, City of Midland	Transverse <sup>(4)</sup>	EBOL	0.37	0.38	0.33	0.34	0.40	0.42	0.42	0.42	0.37	0.37
			EBCL	0.40	0.39	0.34	0.34	0.39	0.41	0.42	0.44	0.36	0.36
			EBIL	0.36	0.40	0.36	0.39	0.42	0.44	0.46	0.46	0.26	0.36
76021	Temporary Eastbound I 69 at M 52	Transverse <sup>(5)</sup>	EBOL	0.37	0.38	0.29	0.27	0.38	0.38	0.27	0.31	0.31	0.33
			EBIL	0.39	0.38	0.36	0.29	0.43	0.38	0.27	0.32	0.39	0.36
81081	M 17 at Golliside, City of Ypsilanti	Transverse <sup>(6)</sup>	EBOL	0.32	0.36	0.29	0.35	0.34	0.37	0.35	0.41	0.34	0.38
			EBIL	0.37	0.39	0.36	0.37	0.34	0.38	0.33	0.43	0.36	0.40
			WBOL	0.34	0.42	0.30	0.41	0.34	0.41	0.36	0.46	0.35	0.41
			WBIL	0.29	0.37	0.29	0.37	0.34	0.37	0.32	0.41	0.35	0.30
81081	M 17 at Hewitt St., City of Ypsilanti	Transverse <sup>(6)</sup>	EBOL	0.38	0.45	0.29	0.34	0.36	0.37	0.35	0.42	0.36	0.39
			EBIL	0.35	0.41	0.30	0.35	0.35	0.39	0.33	0.41	0.35	0.39
			WBOL	0.38	0.44	0.34	0.39	0.38	0.41	0.40	0.46	0.41	0.43
			WBIL	0.38	0.43	0.33	0.39	0.36	0.41	0.40	0.46	0.40	0.42
81081	M 17 at Mansfield, City of Ypsilanti	Transverse <sup>(6)</sup>	EBOL	0.34	0.40	0.25	0.33	0.31	0.36	0.33	0.42	0.36	0.40
			EBIL	0.37	0.40	0.26	0.35	0.35	0.39	0.36	0.44	0.39	0.42
			WBOL	0.41	0.43	0.32	0.38	0.36	0.40	0.38	0.47	0.40	0.42
			WBIL	0.42	0.45	0.32	0.36	0.39	0.42	0.40	0.44	0.40	0.43
81081	M 17 at Oakwood, City of Ypsilanti	Transverse <sup>(6)</sup>	EBOL	0.34	0.47	0.35	0.41	0.38	0.42	0.42	0.44	0.38	0.49
			EBIL	0.46	0.46	0.35	0.40	0.40	0.42	0.40	0.48	0.43	0.48
			WBOL	0.36	0.44	0.30	0.39	0.35	0.39	0.37	0.44	0.44	0.45
			WBIL	0.35	0.40	0.31	0.35	0.34	0.37	0.36	0.42	0.40	0.42
81081	Eastbound M 17 at Summit St., City of Ypsilanti	Transverse <sup>(6)</sup>	EBOL	0.35	0.35	0.29	0.31	0.34	0.37	0.39	0.39	0.36	0.40
			EBCL	0.32	0.35	0.29	0.29	0.33	0.35	0.36	0.37	0.36	0.37
			EBIL	0.30	0.33	0.31	0.32	0.36	0.37	0.38	0.41	0.38	0.42

(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	1978
73062-05917	M 46 from C&O RR east to Williams St	1973	EBOL	0.52	0.55 <sup>(2)</sup>	0.48	0.50	0.42	0.37
			EBIL	--	--	--	0.50	0.44	--
			WBOL	0.51	0.56 <sup>(2)</sup>	0.46	0.48	0.42	0.38
			WBIL	--	--	--	0.51	0.44	--
	M 46 from Elm St east to C&O RR	1973	EBOL <sup>(1)</sup>	0.52	0.50 <sup>(2)</sup>	0.45	0.47	0.41	0.35
			EBIL <sup>(1)</sup>	--	--	--	0.47	0.42	--
			WBOL <sup>(1)</sup>	0.51	0.49 <sup>(2)</sup>	0.41	0.46	0.40	0.37
			WBIL <sup>(1)</sup>	--	--	--	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	0.43
			NBIL	--	--	0.46	0.62	0.52	0.46
			SBOL	--	--	0.51	0.63	0.54	0.49
			SBIL	--	--	0.47	0.61	0.49	0.43
Control Section 09042	M 25 from Heavenridge to Sheurman St in Bay City	1975	EBOL	--	--	0.41	0.21	0.26	0.22
			EBIL	--	--	0.42	0.25	0.29	0.23
			WBOL	--	--	0.45	0.21	0.28	0.24
			WBIL	--	--	0.42	0.20	0.25	0.22
98058-08773 Control Section 50011	M 53 from Red Run Drain north to 14 Mile Rd	1975	NBOL	--	--	0.41	0.47	--	0.43
			NBCL	--	--	0.42	0.51	--	0.42
			NBIL	--	--	0.40	0.49	--	0.42
			SBOL	--	--	0.35	0.49	--	0.44
			SBCL	--	--	0.37	0.46	--	0.43
			SBIL	--	--	0.39	0.45	--	0.41

<sup>(1)</sup>Bituminous concrete control section.

<sup>(2)</sup>Average of two test series.

TABLE 28  
STONE MIX PROJECTS

Project No.	Location	Const. Year	Surface Type	Lane Tested	Coefficient of Wsf		
					1976	1977	1978
14031-06119	M 62 from Michigan-Indiana State line north to US 12	1976	SM	NB	0.31	0.42	0.59
				SB	0.36	0.40	0.56
36023-10843	M 69 in Crystal Falls	1976	SM	EBOL	--	0.50	0.43
				EBIL	--	0.57	0.51
				WBOL	--	0.48	0.43
				WBIL	--	0.59	0.54
78022-11098	US 12 from 500 ft to 2,500 ft east of Balk Rd	1976	Bit Conc	EB	0.53	0.51	0.53
				WB	0.52	0.44	0.48
	US 12 from 2,500 ft east of Balk Rd east to 200 ft west of White School Rd		SM	EB	0.57	0.47	0.51
			WB	0.52	0.47	0.45	
78062-09312	M 86 from M 66 west	1976	Bit Agg	EB	0.47	0.50	0.56
				WB	0.46	0.50	0.54
	M 66-M 86 from M 86 west to M 86 east		SM	NB	0.51	0.54	0.60
			SB	0.56	0.54	0.59	
	M 86 east of M 66		SM	EB	0.57	0.65	0.64
			WB	0.55	0.61	0.66	
82053-06459	US 24 from I 96 BL to 8 Mile Rd	1976	SM	NBOL	0.57	0.49	0.49
				NB#3	0.56	0.46	0.46
				NB#2	0.56	0.48	0.49
				NBIL	0.55	0.54	0.54
			Bit Conc	SBOL	0.50	0.43	0.47
				SB#3	0.51	0.48	0.49
				SB#2	0.53	0.49	0.51
				SBIL	0.53	0.47	0.43
25011-10849	M 13-M 21 from Lennon north to M 56	1977	Bit Conc	NB	--	0.36	0.45
				SB	--	0.41	0.47
	M 13-M 21 from I 69 north to Lennon		SM	NB	--	0.39	0.48
			SB	--	0.41	0.43	

TABLE 29  
 ROTOMILLED SURFACES  
 Research Project 76 TI-341

Control Section	Location	Surface Type	Const. Year	Before Rotomilling			Date Rotomilled	Average Coefficient of Wet Sliding Friction		
				Test Date	Lane Tested	Avg Wsf		1976	1977	1978
73073	M 58 at Weinecke Rd	Conc	1959	9-75	EBOL	0.23	8-76	--	0.42*	0.35
		Conc			EBIL	0.23		--	0.41*	0.34
		Conc			WBOL	0.27		--	0.44*	0.35
		Conc			WBCL	0.24		--	0.46*	0.39
		Bit			WBIL	0.41		--	0.48*	0.39
73073	M 58 at Center Rd	Conc	1959	9-75	EBOL	0.20	8-76	--	0.42*	0.34
		Conc			EBIL	0.17		--	0.42*	0.34
		Conc			WBOL	0.15		--	0.40*	0.34
		Conc			WBCL	0.24		--	0.42*	0.35
		Bit			WBIL	--		--	0.40*	0.33
73073	M 58 at Hemmeter Rd	Conc	1959	9-75	EBOL	0.20	8-76	--	0.42*	0.34
		Conc			EBIL	0.14		--	0.42*	0.34
		Conc			WBOL	0.18		--	0.42*	0.34
		Conc			WBCL	0.20		--	0.43*	0.37
		Bit			WBIL	0.24		--	0.44*	0.32
52042	M 28-US 41 at east end of Marquette Bypass	Conc	1963	5-76	EBOL	0.39	9-77	--	0.50	0.37
		Conc			EBIL	0.39		--	0.47	0.39
31051	US 41-M 26 approaches to Houghton-Hancock Bridge	Conc	1960	5-76	NBOL	0.24	9-77	--	0.43	0.47
		Conc			NBIL	0.29		--	0.42	0.51
		Conc			SBOL	0.27		--	0.46	0.45
		Conc			SBIL	0.29		--	0.44	0.49
31012		Conc			NB	0.35		--	0.47	0.50
31052		Conc			NBOL	0.30		--	0.55	0.47
		Conc			NBIL	0.30		--	0.50	0.47
		Conc			SBOL	0.37		--	0.48	0.42
		Conc			SBIL	0.33		--	0.51	0.48
31013		Conc			SB	0.38		--	0.54	0.55
55011	US 41-M 35 at 10th St and 10th Ave	Conc	1954	9-75	NBOL	0.26	9-77	--	0.45	0.31
		Conc			NBIL	0.26		--	0.51	0.35
		Conc			SBOL	0.26		--	0.41	0.31
		Conc			SBIL	0.50		--	0.42	0.31
55011	US 41 from 26th St to south of 37th St	Conc	1954	9-75	NBOL	0.26	9-77	--	0.45	0.39
		Conc			NBIL	0.27		--	0.46	0.39
		Conc			SBOL	0.26		--	0.42	0.38
		Conc			SBIL	0.28		--	0.42	0.38
55011	US 41 at M 35	Conc	1954	9-75	NBOL	0.48	9-77	--	0.38	0.35
		Conc			NBIL	0.46		--	0.36	0.33
		Conc			SBOL	0.44		--	0.36	0.32
		Conc			SBIL	0.35		--	0.39	0.35
55031		Conc			SBOL	--		--	0.60	0.50
		Conc			SBIL	--		--	0.41	0.34
07012	US 41 at L'Anse truck lane	Conc	1976	10-76	SBOL	0.54	9-77	--	0.60	0.62

\* Average of two test series.

TABLE 29 (Cont.)  
 ROTOMILLED SURFACES  
 Research Project 76 TI-341

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

SECTION VI  
HIGH-ACCIDENT LOCATIONS

## High-Accident Locations

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

Selection of high-accident locations for this year was made by Traffic and Safety Division and are based on 1977 accident data. Friction level measurements yielded average Wsf values below 0.40 at 63.2 percent of the 405 lanes tested in 1978. Fifteen of the lanes (3.7 percent) were lower than 0.30. The two lowest average Wsf values (0.22) were determined on M 43 in Kalamazoo Township, Control Section 39082 (milepost 2.8 to 3.0).

During 1978, pavement friction tests were conducted on 31 major highway routes. Testing was dispersed throughout 6 districts, 13 counties, and 76 separate locations. Table 30 summarizes the high-accident friction tests.

**TABLE 30  
HIGH-ACCIDENT LOCATION SUMMARY**

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of waf				
		Total	% Wet Surface			Low	High	Avg		
<b>DISTRICT 3</b>	<u>Grand Traverse County</u>									
	28013	US 31-M 72 from 4.880 to 5.080, 4 Mile Rd (5.283) East Bay Township	17	47	NBOL	Bit	0.29	0.33	0.31	
					NBIL	Bit	0.30	0.33	0.31	
					SBOL	Bit	0.27	0.31	0.29	
					SBIL	Bit	0.27	0.31	0.30	
	28013	US 31-M 72 from 7.020 to 7.220, 5 Mile Rd (7.023) Acme Township	17	47	NB	Bit	0.24	0.28	0.26	
					SB	Bit	0.23	0.27	0.25	
	<b>DISTRICT 5</b>	<u>Kent County</u>								
		41014	US 131 BR from 0.890 to 1.090, Michigan St overpass (1.008), City of Grand Rapids	36	31	NBOL	Bit	0.47	0.51	0.49
						NBIL	Bit	0.36	0.37	0.36
SBOL						Bit	0.43	0.46	0.44	
SBIL						Bit	0.39	0.41	0.40	
41027		I 196 from 0.010 to 0.210, Broadway Ave (0.020), City of Grand Rapids	27	44	EBRR	Conc	0.45	0.47	0.46	
					EBOL	Conc	0.31	0.33	0.32	
					EBIL	Conc	0.39	0.45	0.43	
					EBLR	Conc	0.43	0.51	0.46	
					WBOL	Conc	0.37	0.39	0.38	
					WBIL	Conc	0.47	0.52	0.50	
41027		I 196 from 0.220 to 0.420, Monroe Ave (0.400), City of Grand Rapids	49	35	EBOL	Conc	0.33	0.37	0.35	
					EBIL	Conc	0.36	0.42	0.39	
					EBLR	Conc	0.48	0.55	0.53	
					WBRR	Conc	0.39	0.40	0.40	
					WBOL	Conc	0.33	0.35	0.34	
					WBIL	Conc	0.34	0.37	0.36	
41027		I 196 from 0.740 to 0.940, Lafayette Ave (0.910), City of Grand Rapids	21	52	EBOL	Conc	0.34	0.39	0.37	
					EBIL	Conc	0.36	0.40	0.38	
					EBLR	Conc	0.58	0.64	0.62	
					WBOL	Conc	0.30	0.35	0.32	
41042		I 196 BS from 2.520 to 2.720, Nagel Ave (2.571), City of Wyoming	27	37	NB	Bit	0.27	0.33	0.30	
					SB	Bit	0.27	0.31	0.29	
41131		US 131 from 10.110 to 10.310, 28th St (10.151), City of Wyoming	33	39	NBOL	Conc	0.35	0.39	0.37	
					NBCL	Conc	0.36	0.40	0.38	
					NBIL	Conc	0.45	0.47	0.46	
					SBOL	Conc	0.34	0.36	0.35	
41131		US 131 from 11.240 to 11.440, Burton St Interchange (11.193), City of Grand Rapids	22	50	NBOL	Conc	0.36	0.41	0.38	
					NBCL	Conc	0.34	0.36	0.35	
					NBIL	Conc	0.39	0.40	0.40	
					SBOL	Conc	0.34	0.39	0.36	
41131		US 131 from 12.010 to 12.210, Hall St Interchange (12.175), City of Grand Rapids	38	34	NBOL	Conc	0.34	0.35	0.35	
					NBCL	Conc	0.33	0.36	0.34	
					NBIL	Conc	0.37	0.39	0.38	
					SBOL	Conc	0.36	0.37	0.36	
41131		US 131 from 12.420 to 12.620, Franklin St Interchange (12.690), City of Grand Rapids	18	56	NBOL	Conc	0.31	0.33	0.32	
					NBCL	Conc	0.33	0.33	0.33	
					NBIL	Conc	0.35	0.36	0.36	
					SBOL	Conc	0.35	0.36	0.36	
41131		US 131 from 14.130 to 14.330, Pearl St Interchange (14.163), City of Grand Rapids	42	33	NBOL	Conc	0.36	0.41	0.39	
	NBCL				Conc	0.34	0.36	0.35		
	NBIL				Conc	0.41	0.43	0.42		
	SBOL				Conc	0.41	0.41	0.41		
41131	US 131 from 14.130 to 14.330, Pearl St Interchange (14.163), City of Grand Rapids	42	33	SBCL	Conc	0.31	0.33	0.32		
				SBIL	Conc	0.40	0.42	0.41		



TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
DISTRICT 5 (CONT)	<u>Muskegon County</u>								
	61151	I 96 BS-US 31 BR from 0.380 to 0.580, Southern Ave (0.554), City of Muskegon	25	40	NBOL	Conc	0.36	0.42	0.39
					NBIL	Conc	0.42	0.46	0.44
					SBOL	Conc	0.37	0.39	0.38
					SBIL	Conc	0.45	0.46	0.45
	61151	I 96 BS-US 31 BR from 1.770 to 1.970, Sherman Blvd (1.889), City of Norton Shores	44	45	NBOL	Conc	0.39	0.42	0.40
					NBIL	Conc	0.43	0.46	0.44
					SBOL	Conc	0.40	0.42	0.41
					SBIL	Conc	0.43	0.48	0.46
	61153	US 31 BR from 1.210 to 1.410, Marquette Hwy (1.420), City of Muskegon	29	38	NBOL	Bit	0.31	0.35	0.33
					NB#3	Bit	0.34	0.36	0.35
					NB#2	Bit	0.33	0.34	0.33
					NBIL	Bit	0.36	0.39	0.37
					SBOL	Bit	0.30	0.33	0.31
					SB#3	Bit	0.31	0.34	0.32
				SB#2	Bit	0.31	0.33	0.32	
				SBIL	Bit	0.36	0.37	0.37	
	<u>Ottawa County</u>								
70014	US 31 from 6.180 to 6.380, Waverly Rd (6.118), City of Grand Haven	27	33	NBOL	Conc	0.29	0.33	0.31	
				NBIL	Conc	0.33	0.36	0.35	
				SBOL	Conc	0.28	0.31	0.29	
				SBIL	Conc	0.33	0.34	0.33	
DISTRICT 6	<u>Genesee County</u>								
	25072	M 54 from 8.740 to 8.940, Webster Rd (8.830), City of Flint	15	47	NBOL	Bit	0.30	0.34	0.33
					NBIL	Bit	0.34	0.40	0.37
					SBOL	Bit	0.29	0.35	0.31
					SBIL	Bit	0.30	0.34	0.32
	25081	M 56 from 11.090 to 11.290, Crescent Dr (11.272), City of Flint	21	29	EBOL	Bit	0.35	0.37	0.36
					EBIL	Bit	0.34	0.40	0.37
					WBOL	Bit	0.23	0.25	0.24
					WBIL	Bit	0.28	0.31	0.29
	25081	M 56 from 11.460 to 11.660, Miller Rd (11.484), City of Flint	21	57	EBOL	Bit	0.28	0.29	0.29
					EBIL	Bit	0.22	0.29	0.26
					WBOL	Bit	0.25	0.30	0.28
				WBIL	Bit	0.22	0.27	0.24	
25101	M 57 from 8.090 to 8.290, I 75 (8.162), City of Clio	34	47	EB	Conc	0.34	0.35	0.34	
				WB	Conc	0.33	0.34	0.34	
DISTRICT 7	<u>Berrien County</u>								
	11017	I 94 from 2.800 to 3.000 LaBoyer Rd (2.830), Coloma Township	12	58	EBOL	Conc	0.39	0.40	0.39
					EBIL	Conc	0.53	0.55	0.54
					WBOL	Conc	0.39	0.41	0.40
					WBIL	Conc	0.52	0.52	0.52
	11041	US 12 BR-US 31-US 33-M 60 BR from 0.930 to 1.130, 14th St (0.950), City of Niles	19	42	EB	Bit	0.47	0.57	0.52
					WB	Bit	0.46	0.51	0.48
		<u>Branch County</u>							
	12022	US 12 from 1.970 to 2.170, Lott Rd (2.163), City of Coldwater	29	52	EB	Bit	0.33	0.36	0.34
					WB	Bit	0.34	0.35	0.35
		<u>Kalamazoo County</u>							
	39082	M 43 from 2.800 to 3.000, Saratoga Ave (2.922), Kalamazoo Township	15	73	<u>Milepost 2.800 to 2.882</u>				
				EB	Bit	0.57	0.64	0.60	
				WB	Bit	0.22	0.23	0.22	
				<u>Milepost 2.882 to 3.000</u>					
				EB	Bit	0.22	0.22	0.22	
				WB	Bit	0.39	0.43	0.41	

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf			
		Total	% Wet Surface			Low	High	Avg	
DISTRICT 8	<u>Ingham County</u>								
	33032	I 96 BL from 3.280 to 3.480, Armstrong Rd (3.476), City of Lansing	28	43	NBOL	Bit	0.29	0.30	0.30
					NBIL	Bit	0.30	0.31	0.31
					SBOL	Bit	0.25	0.29	0.27
					SBIL	Bit	0.30	0.33	0.31
	33061	Eastbound M 43 from 2.670 to 2.870, Grand Ave (2.679), City of Lansing	45	51	EBOL	Conc	0.28	0.33	0.31
					EB#4	Conc	0.27	0.30	0.28
					EB#3	Conc	0.30	0.35	0.33
					EB#2	Conc	0.30	0.33	0.31
					EBIL	Conc	0.29	0.33	0.31
	33061	Westbound M 43 from 82.420 to 82.620, Washington Ave (82.588), City of Lansing	37	35	WBOL	Bit	0.36	0.36	0.36
					WB#3	Bit	0.33	0.36	0.35
					WB#2	Bit	0.33	0.34	0.34
					WBIL	Bit	0.36	0.36	0.36
	<u>Jackson County</u>								
	38072	M 50-US 27 BR from 0.390 to 0.590, Monroe St (0.497), City of Jackson	65	37	NBOL	Conc	0.29	0.35	0.31
					NBIL	Bit	0.29	0.33	0.32
					SBOL	Conc	0.30	0.34	0.32
					SBIL	Bit	0.31	0.35	0.33
	<u>Washtenaw County</u>								
81072	I 94 BL from 2.670 to 2.870, Stadium Blvd (2.732), City of Ann Arbor	48	38	EBOL	Bit	0.36	0.39	0.38	
				EBIL	Bit	0.33	0.36	0.35	
				WBOL	Bit	0.37	0.41	0.39	
				WBCL	Bit	0.36	0.40	0.38	
				WBIL	Bit	0.35	0.37	0.36	
DISTRICT M	<u>Macomb County</u>								
	50011	M 53 from 0.560 to 0.760, Studebaker St (0.560), City of Warren	23	43	NBOL	Bit	0.33	0.36	0.35
					NBCL	Bit	0.30	0.33	0.31
					NBIL	Bit	0.31	0.34	0.33
					SBOL	Bit	0.33	0.36	0.35
					SBCL	Bit	0.31	0.35	0.33
					SBIL	Bit	0.33	0.34	0.34
	50011	M 53 from 1.420 to 1.620, Chapp St (1.460), City of Warren	31	46	NBOL	Bit	0.29	0.33	0.31
					NBCL	Bit	0.29	0.33	0.32
					NBIL	Bit	0.28	0.35	0.32
					SBOL	Bit	0.30	0.35	0.33
					SBCL	Bit	0.29	0.35	0.33
					SBIL	Bit	0.29	0.34	0.31
	50022	M 59 from 0.430 to 0.630, Custer St (0.630), City of Sterling Heights	18	56	EBOL	Conc	0.33	0.36	0.34
					EBOL	Bit	0.35	0.36	0.36
					EBIL	Bit	0.36	0.39	0.38
					EBIL	Old Bit	0.30	0.33	0.32
					WBOL	Conc	0.30	0.35	0.33
					WBOL	Bit	0.33	0.34	0.34
					WBIL	Bit	0.36	0.40	0.38
				WBIL	Old Bit	0.34	0.36	0.35	
50022	M 59 from 2.900 to 3.110, Hayes Rd (3.019), City of Sterling Heights	34	35	EBOL	Bit	0.35	0.36	0.35	
				EBIL	Bit	0.34	0.37	0.36	
				WBOL	Bit	0.34	0.36	0.35	
				WBIL	Bit	0.34	0.35	0.35	
50031	M 97 from 6.760 to 6.960, Masonic (6.550), City of Fraser	22	36	NBOL	Conc	0.40	0.45	0.42	
				NBCL	Conc	0.37	0.40	0.38	
				NBIL	Conc	0.39	0.43	0.41	
				SBOL	Conc	0.42	0.45	0.43	
				SBCL	Conc	0.39	0.40	0.39	
				SBIL	Conc	0.39	0.42	0.41	

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Macomb County (Cont.)</u>								
50051	M 3 from 2.140 to 2.340, 10 Mile Rd (2.291), City of East Detroit	49	39	NBOL	Bit	0.34	0.36	0.35
				NBCL	Bit	0.36	0.40	0.37
				NBIL	Bit	0.34	0.36	0.35
				SBOL	Bit	0.29	0.34	0.31
				SBCL	Bit	0.35	0.37	0.38
				SBIL	Bit	0.36	0.39	0.37
50051	M 3 from 9.590 to 9.790, Ulrich St (9.507), Clinton Township	24	50	NBOL	Conc	0.35	0.39	0.37
				NBCL	Conc	0.35	0.36	0.36
				NBIL	Conc	0.37	0.40	0.39
				SBOL	Conc	0.36	0.42	0.38
				SB#3	Conc	0.42	0.46	0.44
				SB#2	Conc	0.42	0.43	0.43
				SBIL	Conc	0.45	0.46	0.45
<u>Wayne County</u>								
82022	I 94 from 10.940 to 11.140, Pelham St (11.097), City of Allen Park	50	32	EBOL	Conc	0.37	0.39	0.38
				EBCL	Conc	0.35	0.41	0.38
				EBIL	Conc	0.41	0.46	0.43
				WBOL	Conc	0.31	0.33	0.32
				WBCL	Conc	0.33	0.37	0.36
				WBIL	Conc	0.35	0.41	0.38
82022	I 94 from 13.230 to 13.430, Oakwood Blvd (13.500), City of Allen Park	11	46	EBOL	Bit	0.29	0.33	0.31
				EBCL	Bit	0.29	0.33	0.31
				EBIL	Bit	0.42	0.48	0.45
				WBOL	Bit	0.30	0.33	0.31
				WBCL	Bit	0.29	0.30	0.30
				WBIL	Bit	0.41	0.42	0.41
82023	I 94 from 2.180 to 2.380, 30th St (2.390), City of Detroit	14	57	EBOL	Conc	0.37	0.42	0.40
				EBCL	Conc	0.37	0.37	0.37
				EBIL	Conc	0.39	0.39	0.39
				WBOL	Conc	0.35	0.39	0.38
				WBCL	Conc	0.36	0.41	0.39
				WBIL	Conc	0.37	0.41	0.39
82023	I 94 from 3.820 to 4.020, 14th St (3.920), City of Detroit	55	40	EBOL	Conc	0.37	0.39	0.38
				EBCL	Conc	0.35	0.40	0.37
				EBIL	Conc	0.39	0.42	0.41
				WBOL	Conc	0.36	0.37	0.36
				WBCL	Conc	0.37	0.42	0.39
				WBIL	Conc	0.36	0.39	0.37
82024	I 94 from 2.060 to 2.260, Mt. Elliot (2.410), City of Detroit	34	29	EBOL	Conc	0.35	0.36	0.35
				EBCL	Conc	0.34	0.36	0.35
				EBIL	Conc	0.33	0.35	0.34
				WBOL	Conc	0.35	0.36	0.38
				WBCL	Conc	0.35	0.36	0.35
				WBIL	Conc	0.37	0.37	0.37
82024	I 94 from 2.300 to 2.500, Mt. Elliot (2.410), City of Detroit	98	31	EBOL	Conc	0.33	0.39	0.35
				EBCL	Conc	0.30	0.34	0.33
				EBIL	Conc	0.34	0.36	0.35
				WBOL	Conc	0.34	0.36	0.35
				WBCL	Conc	0.34	0.36	0.35
				WBIL	Conc	0.34	0.37	0.36
82025	I 94 from 1.870 to 2.070, Dickerson Ave (1.880), City of Detroit	21	29	EBOL	Conc	0.37	0.39	0.38
				EBCL	Conc	0.39	0.41	0.40
				EBIL	Conc	0.44	0.46	0.45
				WBOL	Conc	0.37	0.39	0.38
				WBCL	Conc	0.40	0.42	0.41
				WBIL	Conc	0.45	0.47	0.46

DISTRICT M (CONT)

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf						
		Total	% Wet Surface			Low	High	Avg				
<u>Wayne County (Cont.)</u>												
82052	US 24 from 5.350 to 5.550, Colony Ave (5.350), City of Taylor	15	60	NBOL	Bit	0.40	0.42	0.41				
				NBCL	Bit	0.41	0.46	0.43				
				NBIL	Bit	0.42	0.43	0.42				
				SBOL	Conc	0.37	0.39	0.38				
				SBCL	Conc	0.39	0.39	0.39				
				SBIL	Conc	0.36	0.41	0.39				
82053	US 24 from 0.000 to 0.200, Michigan Ave (0.000), City of Dearborn	19	47	NBOL	Conc	0.36	0.41	0.39				
				NBCL	Conc	0.35	0.37	0.36				
				NBIL	Conc	0.40	0.42	0.41				
				SBOL	Conc	0.30	0.35	0.32				
				SBCL	Conc	0.31	0.35	0.33				
				SBIL	Conc	0.43	0.46	0.46				
82053	US 24 from 2.440 to 2.640, Hass St (2.440), City of Dearborn Heights	54	39	NBOL	Bit	0.39	0.41	0.40				
				NB#3	Bit	0.42	0.46	0.44				
				NB#2	Bit	0.43	0.46	0.44				
				NBIL	Bit	0.47	0.48	0.48				
				SBOL	Conc	0.39	0.41	0.40				
				SBCL	Conc	0.39	0.45	0.41				
				SBIL	Conc	0.39	0.45	0.42				
82053	US 24 from 3.380 to 3.580, Ann Arbor Trail (3.420), City of Dearborn Heights	68	34	NBOL	Bit	0.41	0.46	0.43				
				NB#3	Bit	0.41	0.46	0.43				
				NB#2	Bit	0.42	0.45	0.43				
				NBIL	Bit	0.46	0.49	0.48				
				SBOL	Bit	0.39	0.42	0.40				
				SBCL	Bit	0.39	0.43	0.41				
				SBIL	Bit	0.42	0.46	0.44				
82062	US 12 from 5.580 to 5.780, Oakman Blvd (5.570), City of Detroit	52	29	EBOL	Bit	0.30	0.31	0.30				
				EBCL	Bit	0.27	0.33	0.30				
				EBIL	Bit	0.33	0.41	0.38				
				WBOL	Bit	0.36	0.46	0.41				
				WBCL	Bit	0.36	0.41	0.39				
				WBIL	Bit	0.31	0.40	0.36				
				82081	M 153 from 17.930 to 18.230, Greenfield (18.060), City of Detroit	25	44	<u>Milepost 17.930 to 18.230</u>				
EBOL	Bit	0.51	0.55					0.53				
EBCL	Bit	0.48	0.52					0.50				
EBIL	Bit	0.53	0.59					0.55				
<u>Milepost 17.930 to 18.060</u>												
WBOL	Bit	0.35	0.40					0.37				
WBCL	Bit	0.36	0.42					0.38				
WBIL	Bit	0.41	0.48					0.45				
<u>Milepost 18.060 to 18.230</u>												
WBOL	Bit	0.47	0.51					0.49				
WBCL	Bit	0.48	0.49					0.48				
WBIL	Bit	0.51	0.57					0.53				
82112	US 10 from 1.680 to 1.880, Clairmont Ave (1.840), City of Detroit	17	59					NBOL	Conc	0.36	0.37	0.37
								NBCL	Conc	0.35	0.37	0.36
				NBIL	Conc	0.40	0.41	0.41				
				SBOL	Conc	0.41	0.46	0.43				
				SBCL	Conc	0.37	0.41	0.39				
				SBIL	Conc	0.35	0.41	0.39				
82112	US 10 from 4.490 to 4.690, Linwood Ave (4.490), City of Detroit	59	29	NBOL	Conc	0.39	0.40	0.39				
				NBCL	Conc	0.40	0.41	0.40				
				NBIL	Conc	0.40	0.41	0.40				
				SBOL	Conc	0.39	0.41	0.40				
				SBCL	Conc	0.36	0.39	0.37				
				SBIL	Conc	0.35	0.37	0.36				

DISTRICT M (CONT)

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Wayne County (Cont.)</u>								
82112	US 10 from 5.170 to 5.370, southbound Livernois (5.230), City of Detroit	50	28	NBOL	Conc	0.37	0.41	0.39
				NBCL	Conc	0.37	0.39	0.38
				NBIL	Conc	0.36	0.41	0.39
				SBOL	Conc	0.36	0.41	0.39
				SBCL	Conc	0.37	0.40	0.39
				SBIL	Conc	0.37	0.39	0.38
82112	US 10 from 5.390 to 5.590, southbound Livernois (5.230), City of Detroit	12	42	NBOL	Conc	0.37	0.39	0.38
				NBCL	Conc	0.36	0.39	0.37
				NBIL	Conc	0.39	0.40	0.39
				SBOL	Conc	0.37	0.41	0.39
				SBCL	Conc	0.39	0.40	0.39
				SBIL	Conc	0.37	0.39	0.38
82112	US 10 from 7.190 to 7.390, West McNichols Rd (7.250), City of Detroit	23	30	NBOL	Conc	0.37	0.41	0.39
				NBCL	Conc	0.37	0.40	0.38
				NBIL	Conc	0.39	0.41	0.40
				SBOL	Conc	0.40	0.42	0.41
				SBCL	Conc	0.37	0.40	0.38
				SBIL	Conc	0.41	0.43	0.42
82112	US 10 from 7.920 to 8.120, Schaefer Hwy (7.900), City of Detroit	21	33	NBOL	Conc	0.36	0.42	0.39
				NBCL	Conc	0.39	0.43	0.41
				NBIL	Conc	0.40	0.43	0.42
				SBOL	Conc	0.39	0.42	0.40
				SBCL	Conc	0.36	0.39	0.38
				SBIL	Conc	0.39	0.43	0.41
82112	US 10 from 8.190 to 8.390, Schaefer Hwy (7.900), City of Detroit	34	41	NBOL	Conc	0.42	0.46	0.45
				NBCL	Conc	0.40	0.45	0.42
				NBIL	Conc	0.41	0.45	0.43
				SBOL	Conc	0.43	0.45	0.44
				SBCL	Conc	0.39	0.43	0.41
				SBIL	Conc	0.39	0.43	0.41
82112	US 10 from 9.060 to 9.260, Pembroke Ave (9.020), City of Detroit	21	29	NBOL	Conc	0.37	0.37	0.37
				NBCL	Conc	0.39	0.40	0.40
				NBIL	Conc	0.41	0.43	0.42
				SBOL	Conc	0.34	0.35	0.34
				SBCL	Conc	0.39	0.41	0.40
				SBIL	Conc	0.45	0.47	0.46
82112	US 10 from 9.370 to 9.570, Greenfield Ave (9.440), City of Detroit	47	36	NBOL	Conc	0.47	0.48	0.47
				NBCL	Conc	0.47	0.49	0.48
				NBIL	Conc	0.46	0.49	0.47
				SBOL	Conc	0.48	0.49	0.49
				SBCL	Conc	0.45	0.49	0.47
				SBIL	Conc	0.45	0.51	0.49
82131	M 1 from 6.660 to 6.860, Farnsworth Ave (6.856), City of Detroit	47	32	NBOL	Bit	0.35	0.42	0.39
				NBCL	Bit	0.45	0.49	0.47
				NBIL	Bit	0.47	0.51	0.49
				SBOL	Bit	0.42	0.46	0.44
				SBCL	Bit	0.41	0.48	0.45
				SBIL	Bit	0.45	0.48	0.46
82131	M 1 from 8.470 to 8.670, Adams St (8.476), City of Detroit	40	35	NBOL	Bit	0.35	0.36	0.36
				NBCL	Bit	0.41	0.45	0.43
				NBIL	Bit	0.49	0.51	0.50
				SBOL	Bit	0.36	0.41	0.39
				SBCL	Bit	0.41	0.45	0.43
				SBIL	Bit	0.51	0.55	0.53
82143	M 102 from 0.930 to 1.130, John R St (1.126), City of Detroit	48	33	EBOL	Bit	0.33	0.35	0.34
				EB#3	Bit	0.33	0.40	0.36
				EB#2	Bit	0.37	0.41	0.40
				EBIL	Bit	0.41	0.45	0.43
				WBOL	Bit	0.46	0.46	0.46
				WB#3	Bit	0.45	0.46	0.46
				WB#2	Bit	0.45	0.46	0.45
				WBIL	Bit	0.46	0.49	0.47

DISTRICT M (CONT)

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

DISTRICT M (CONT.)

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf					
		Total	% Wet Surface			Low	High	Avg			
<u>Wayne County (Cont.)</u>											
82191	M 39 from 8.190 to 8.390, Warren Rd (8.078), City of Detroit	27	41	NBOL	Conc	0.37	0.42	0.39			
				NBCL	Conc	0.39	0.43	0.41			
				NBIL	Conc	0.40	0.46	0.44			
				SBOL	Conc	0.36	0.40	0.37			
				SBCL	Conc	0.35	0.37	0.36			
				SBIL	Conc	0.40	0.43	0.41			
82191	M 39 from 9.010 to 9.210, Joy Rd (9.049), City of Detroit	42	40	NBOL	Conc	0.34	0.39	0.36			
				NBCL	Conc	0.36	0.40	0.39			
				NBIL	Conc	0.39	0.40	0.40			
				SBOL	Conc	0.39	0.44	0.41			
				SBCL	Conc	0.37	0.41	0.39			
				SBIL	Conc	0.41	0.46	0.43			
82191	M 39 from 9.250 to 9.450, Fitzpatrick Ave (9.465), City of Detroit	25	32	NBOL	Conc	0.33	0.36	0.35			
				NBCL	Conc	0.36	0.40	0.38			
				NBIL	Conc	0.41	0.45	0.42			
				SBOL	Conc	0.36	0.39	0.38			
				SBCL	Conc	0.36	0.40	0.38			
				SBIL	Conc	0.43	0.45	0.44			
82192	M 39 from 2.480 to 2.680, VanBorn Rd (2.565), City of Allen Park	53	36	NBOL	Bit	0.42	0.43	0.42			
				NBIL	Bit	0.40	0.43	0.42			
				SBOL	Bit	0.42	0.45	0.43			
				SBIL	Bit	0.49	0.53	0.51			
				<u>Ramps</u>							
				SBOL	Bit	0.42	0.46	0.44			
SBIL	Bit	0.41	0.46	0.43							
82192	M 39 from 7.460 to 7.660, Ford Rd (7.111), City of Dearborn	35	37	NBOL	Conc	0.33	0.35	0.34			
				NBCL	Conc	0.35	0.42	0.38			
				NBIL	Conc	0.40	0.41	0.40			
				SBOL	Conc	0.36	0.37	0.36			
				SBCL	Conc	0.36	0.37	0.37			
				SBIL	Conc	0.41	0.42	0.42			
82193	M 39 from 0.370 to 0.570, Lyndon Ave (0.490), City of Detroit	31	58	NBOL	Conc	0.34	0.36	0.35			
				NBCL	Conc	0.36	0.37	0.37			
				NBIL	Conc	0.36	0.39	0.37			
				SBOL	Conc	0.34	0.39	0.36			
				SBCL	Conc	0.46	0.46	0.46			
				SBIL	Conc	0.51	0.53	0.52			
82193	M 39 from 0.890 to 1.090, Fenkell Ave (1.020), City of Detroit	70	37	NBOL	Conc	0.35	0.39	0.37			
				NBCL	Conc	0.34	0.37	0.35			
				NBIL	Conc	0.36	0.39	0.37			
				SBOL	Conc	0.36	0.37	0.37			
				SBCL	Conc	0.35	0.36	0.36			
				SBIL	Conc	0.37	0.39	0.38			
82193	M 39 from 2.420 to 2.620, Curtis Ave (2.520), City of Detroit	18	44	NBOL	Conc	0.36	0.37	0.37			
				NBCL	Conc	0.37	0.39	0.38			
				NBIL	Conc	0.36	0.41	0.38			
				SBOL	Conc	0.34	0.34	0.34			
				SBCL	Conc	0.35	0.36	0.35			
				SBIL	Conc	0.39	0.41	0.40			
82193	M 39 from 3.410 to 3.610, Pembroke Ave (3.530), City of Detroit	69	58	NBOL	Conc	0.34	0.36	0.35			
				NBCL	Conc	0.37	0.39	0.38			
				NBIL	Conc	0.39	0.42	0.41			
				SBOL	Conc	0.31	0.34	0.33			
				SBCL	Conc	0.35	0.39	0.36			
				SBIL	Conc	0.41	0.41	0.41			
82193	M 39 from 3.680 to 3.880, Eight Mile Rd (4.002), City of Detroit	34	50	NBOL	Conc	0.47	0.49	0.48			
				NBCL	Conc	0.39	0.41	0.40			
				NBIL	Conc	0.39	0.43	0.41			
				SBOL	Conc	0.41	0.45	0.43			
				SBCL	Conc	0.37	0.41	0.39			
				SBIL	Conc	0.46	0.49	0.47			

TABLE 30 (Cont.)  
HIGH-ACCIDENT LOCATION SUMMARY

Control Section	Location and Mileage	1977 Accidents		Lane Tested	Surface Type	Coefficient of wsf		
		Total	% Wet Surface			Low	High	Avg
<u>Wayne County (Cont.)</u>								
82194	I 75 from 0.980 to 1.180, Outer Dr (1.123), City of Allen Park	37	30	NBOL	Conc	0.34	0.35	0.34
				NBCL	Conc	0.36	0.40	0.38
				NBIL	Conc	0.42	0.46	0.44
				SBOL	Conc	0.36	0.37	0.36
				SBCL	Conc	0.39	0.41	0.40
				SBIL	Conc	0.43	0.47	0.45
82211	M 85 from 9.640 to 9.840, Veronica (9.638), City of Southgate	44	30	NBOL	Bit	0.39	0.42	0.40
				NB#3	Bit	0.37	0.42	0.40
				NB#2	Bit	0.36	0.39	0.37
				NBIL	Bit	0.40	0.41	0.41
				SBOL	Bit	0.40	0.48	0.43
				SB#3	Bit	0.36	0.41	0.38
				SB#2	Bit	0.33	0.36	0.35
				SBIL	Bit	0.37	0.39	0.38

DISTRICT M (CONT.)

SECTION VII  
SPECIAL REQUEST TESTS



### Special Request Tests

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



# OFFICE MEMORANDUM

DATE: July 20, 1978

TO: P. H. DeCamp, District Engineer  
Saginaw District Office

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on M-24, Kerosene-Sand Treatment  
in Lapeer County; Research Project 54 G-74, 78 SR-1

In July, 1977, a kerosene-sand treatment was placed on a low friction portion of M-24 in Lapeer County, north of Columbiaville Road. Pavement friction tests were conducted in July and October, 1977, and again in June, 1978. Respective average wsf values obtained were 0.49, 0.50, and 0.46. No significant friction level decay is apparent after a one year service period.

Tracking from the kerosene-sand treated area was noticed by field personnel on the surface south of Whites Road during the July, 1977 tests. Average coefficients on this area, since then, have increased from 0.30 to the current level of 0.36.

An untreated control area north of Hickory Place has also been tested since last July. All three test series have yielded an average friction level of 0.39.

Wet friction obtained by treating the area north of Columbiaville Road continues, after one year of service, to be higher than that of the control area.

A data breakdown is attached for your review.

TESTING AND RESEARCH DIVISION

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

LTO:PMS:lve

Attachment

cc: D. Van Hine  
Safety Programs Unit



# OFFICE MEMORANDUM

DATE: August 10, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 25 Between Kraft and Carrigan Rds, St. Clair County. Research Project 54 G-74, 78 SR-2.

In accord with your November 18, 1977 request, pavement friction tests have been conducted on M 25 between Kraft and Carrigan Rds. Subject roadway is concrete and was constructed in 1940. Results of August 4, 1978 tests are listed below for your review.

M 25 Location	Coefficient of Wsf	
	NB	SB
North of Kraft Rd	0.37	0.37
	0.39	0.37
South of Keewahdin Rd	0.39	0.36
North of Keewahdin Rd	0.40	0.36
	0.39	0.39
	0.37	0.37
South of Carrigan Rd	0.39	0.39

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit  
L. Zastrow  
P. J. Riley



# OFFICE MEMORANDUM

DATE: August 8, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Two District 7 Locations  
Research Project 54 G-74, 78 SR-3

Friction level measurements were completed August 1, 1978 at the two locations requested in your January 11, 1978 memorandum.

Wsf values on M 43 at the intersection with 12th - Drake St in Kalamazoo ranged from 0.41 to 0.52 and averaged 0.46.

Coefficients obtained on M 40 from south of Michigan Ave to Elm St in Paw Paw ranged from 0.25 to 0.36 and averaged 0.32.

Below, in tabular form, is a lane breakdown of test data for your review.

Description	Lane	Coefficient of Wsf		
		Low	High	Avg
M 43 at 12th - Drake St	EBOL	0.41	0.47	0.43
Control Section 39081	EBIL	0.45	0.52	0.47
Milepost 6.34 to 6.52	WBOL	0.41	0.46	0.43
City of Kalamazoo	WBIL	0.48	0.49	0.48
M 40 from south of	NBOL	0.30	0.33	0.32
Michigan Ave to Elm St	NBIL	0.30	0.33	0.32
Control Section 80072	SBOL	0.35	0.36	0.36
Milepost 0.695 to 0.970	SBIL	0.25	0.29	0.27
City of Paw Paw				

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit  
E. H. Miller



# OFFICE MEMORANDUM

DATE: September 5, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 46 Between Miller Rd and M 52  
Research Project 54 G-74, 78 SR-4

In accord with your December 5, 1977 request, pavement friction tests have been conducted on M 46 between Miller Rd and M 42. The pavement surface is a "lime-stone" concrete and was constructed in 1959. Outside (traffic) lanes yielded wsf values noticeably lower than the passing lanes. A summary of test results is included below for your review.

M 46 Location	Lane	Coefficient of Wsf		
		Low	High	Avg
West of Miller	EBOL	0.30	0.33	0.31
	EBIL	0.40	0.46	0.43
	WBOL	0.31	0.34	0.33
	WBIL	0.36	0.41	0.39
West of Swan Creek	EBOL	0.29	0.31	0.30
	EBIL	0.45	0.45	0.45
	WBOL	0.29	0.30	0.30
	WBIL	0.45	0.48	0.46

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
D. Van Hine  
Safety Programs Unit



# OFFICE MEMORANDUM

DATE: August 4, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements on M 11 (28th St) and US 131 S-Curve,  
City of Grand Rapids. Research Project 54 G-74, 78 SR-5

Pavement friction tests were completed July 27, 1978 at the three locations requested in your December 13, 1977 letter.

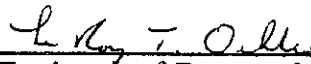
Location 1 - US 131 S-curve from south of Wealthy St to north of Pearl St. Wsf values ranged from 0.29 to 0.51 and averaged 0.40. Crusher dust was rolled into the wearing course of both roadways. Northbound and southbound lanes had different mix designs.

Location 2 - M 11 (28th St) from Division St to Breton Ave. Wsf values ranged from 0.21 to 0.42 and averaged 0.33. Crusher dust was applied prior to the final rolling of the wearing course.

Location 3 - M 11 (28th St) from Breton Ave east to M 37-M 44 (East Beltline). Wsf values ranged from 0.19 to 0.33 and averaged 0.24.

Attached is a lane and location breakdown of individual friction level measurements for your review.

TESTING AND RESEARCH DIVISION

  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

Attachments

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

78 SR-1

M-24 Location	Surface Type	Test Date	Coefficient of Wsf							
			NB			SB			NB & SB	
			Low	High	Avg	Low	High	Avg	Low	Avg
North of Columbiaville Road	Kerosene-Sand Treatment	7-18-77	.47	.57	.53	.34	.51	.45	.49	
		10-21-77	.53	.55	.54	.45	.48	.47	.50	
		6-16-78	.45	.46	.46	.45	.47	.46	.46	
South of Whites Road	Track by Kerosene-Sand Treatment	7-18-77	.24	.27	.26	.34	.37	.35	.30	
		10-21-77	.34	.37	.35	.36	.40	.37	.36	
		6-16-78	.30	.33	.32	.40	.42	.41	.36	
North of Hickory Place	Conventional Bit. Agg.	7-18-77	.34	.40	.38	.39	.41	.40	.39	
		10-21-77	.37	.40	.39	.39	.41	.40	.39	
		6-16-78	.39	.40	.40	.39	.40	.39	.39	

LOCATION 1  
 US 131 (S-Curve) from South of Wealthy St  
 North to Pearl, Control Section 41131,  
 Milepost 13.230 to 14.163

Research Project 54 G-74, 78 SR-5

Location	Coefficient of Wsf					
	NBOL	NBCL	NBIL	SBIL	SBCL	SBOL
South of Wealthy	0.41	0.43	0.49	0.45	0.35	0.34
	0.41	0.41	0.46	--	--	--
	0.45	0.43	0.46	0.39	0.33	0.36
North of Wealthy	0.45	0.39	0.49	0.39	0.31	0.40
	--	--	--	--	--	0.30
	0.43	0.42	--	0.41	0.36	0.29
	--	--	--	--	--	0.35
	0.43	0.45	0.45	0.39	0.37	0.36
North of Market	0.42	0.45	0.46	0.35	0.40	0.35
	0.39	0.49	0.49	0.29	0.39	0.29
	0.40	0.46	--	0.29	--	0.29
	0.43	0.48	0.49	0.29	0.42	0.29
	0.42	0.48	0.51	0.31	0.42	0.31
	--	--	--	0.35	--	0.35
Average Wsf	0.42	0.44	0.48	0.41	0.33	0.33



LOCATION 2

M 11 (28th St) from Division St to  
Breton Ave, Control Section 41063,  
Milepost 0.000 to 2.937

Research Project 54 G-74, 78 SR-5

Location	Coefficient of Wsf			
	EBOL	EBIL	WBIL	WBOL
East of Division St	0.27	0.31	0.22	0.21
	0.31	0.36	0.34	0.33
East of Madison Ave	0.28	0.31	0.27	0.36
East of Plaster Creek	0.33	0.35	0.35	0.34
East of Eastern Ave	0.36	0.29	0.22	0.30
West of Raymond Ave	0.33	0.35	0.42	0.37
East of Vineland Ave	0.35	0.31	0.39	0.36
East of Kalamazoo Ave	0.31	0.35	0.33	0.35
East of Chamberlain Ave	0.34	0.37	0.35	0.39
West of Breton Ave	0.36	0.36	0.34	0.30
Average Wsf	0.32	0.34	0.32	0.33

LOCATION 3

M 11 (28th St) from Breton Ave East to M 37-M 44  
(East Beltline), Control Section 41063,  
Milepost 2.937 to 4.191

Research Project 54 G-74, 78 SR-5

Location	Coefficient of Wsf			
	EBOL	EBIL	WBIL	WBOL
East of Breton Ave	0.24	0.23	0.22	0.22
West of Woodlawn	0.27	0.28	0.25	0.23
West of Radcliff	0.23	0.23	0.22	0.21
West of M 37-M 44	0.23	0.24	0.19	0.33
Average Wsf	0.24	0.24	0.22	0.25



# OFFICE MEMORANDUM

DATE: September 5, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 11 in Grand Rapids  
Research Project 54 G-74, 78 SR-5a

Additional pavement friction tests were conducted August 28, 1978 on M 11 in Grand Rapids, as a follow up to my correspondence dated August 4, 1978 (78 SR-5). Intermittent "fat spots" were observed throughout the area tested, i. e., between M 37 and Byron Center Rd. Some rutting has occurred, indicating surface instability. Forty-four of the 108 tests conducted August 28 yielded wsf values of 0.35 or lower. Of these, 89 percent (39 tests) were located in stopping areas. Wsf values and respective test locations are attached for your review.

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

Attachment

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

AUGUST 20, 1978 PAVEMENT FRICTION TEST RESULTS

78 SR-5a

Project No.	M 11 Location	40 mph Coefficient of Wsf			
		EBOL	EBIL	WBIL	WBOL
41063-12307 (part) (1978)	Approach to Bryon Center Rd	0.25	0.35	0.37	0.43
	West of Avon	0.48	0.49	0.51	0.47
41062-11664 (1978)	West of Hague	0.42	0.53	0.40	0.40
	Approach to Burlingame	0.31	0.41	0.33	0.39
	West of Hook	0.42	0.42	0.42	0.37
	Approach to DeHoop	0.39	0.35	0.34	0.33
	West of Riley	0.45	0.45	0.41	0.36
	Approach to Clyde Park	0.33	0.36	0.34	0.34
	Approach to traffic light west of US 131	0.29	0.48	0.42	0.34
	Approach to traffic light east of US 131	0.29	0.39	0.43	0.47
41063-12307 (part) (1977)	Approach to Buchanan	0.23	0.36	0.34	0.23
	Approach to Division	0.29	0.24	0.36	0.31
	East of NYCRR	0.31	0.43	0.43	0.39
	Approach to Madison	0.29	0.29	0.25	0.30
	West of Plaster Creek	0.36	0.43	0.46	0.35
	Approach to Eastern Ave	0.28	0.27	0.28	0.25
	West of Brooklyn Ave	0.40	0.46	0.46	0.40
	East of Vineland Ave	0.39	0.39	0.43	0.39
	Approach to Kalamazoo Ave	0.31	0.27	0.29	0.27
	West of Englewood	0.39	0.39	0.46	0.42
41063-10802 (1976)	West of Birchcrest	0.43	0.42	0.43	0.35
	Approach to Breton Ave	0.30	0.31	0.34	0.30
	West of Toyota Dealer	0.42	0.41	0.41	0.37
	East of Woodlawn	0.42	0.40	0.43	0.39
	Approach to Radcliff	0.36	0.34	0.34	0.33
	East of Schaffer Ave	0.39	0.41	0.42	0.39
	West of M 37	0.34	0.33	0.41	0.36



# OFFICE MEMORANDUM

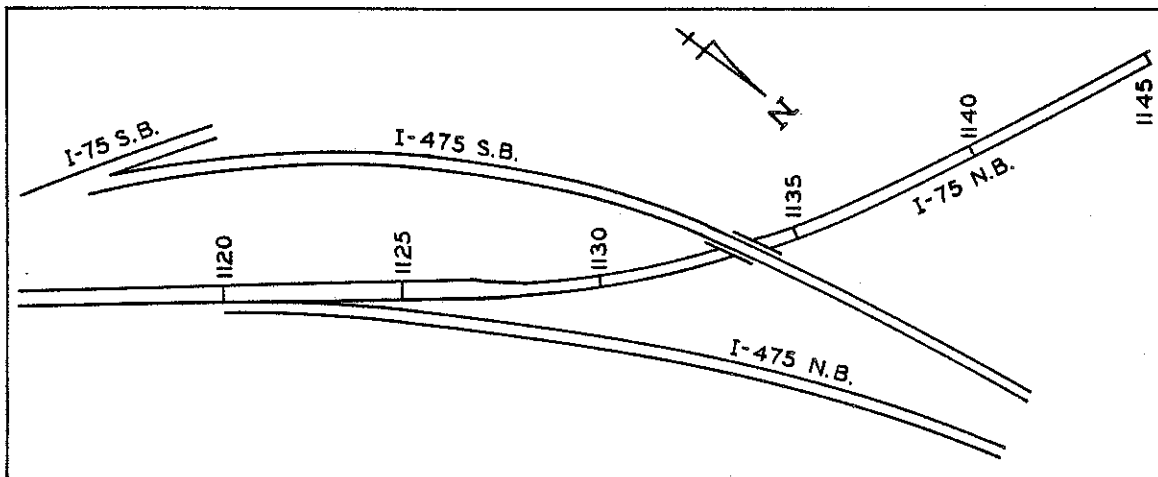
DATE: August 11, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on Northbound I 75 at I 475, Genesee County.  
Research Project 54 G-74, 78 SR-6

In accord with your March 7, 1978 request, pavement friction tests have been conducted on northbound I 75 from the northbound off-ramp to northbound I 475 (Station 1120) northwesterly through the horizontal curve to north of the southbound I 475 bridge structure (Station 1145). Included below are results of August 4, 1978 tests conducted at this location.



Northbound I 75 Location	Northbound I 75 Station	Coefficient of Wsf	
		NBOL	NBIL
North of northbound I 475 off-ramp	1125	0.36	0.55
Entering curve	1130	0.37	0.55
Under southbound I 475 bridge	1135	0.35	0.52
Leaving curve	1140	0.37	0.53

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit  
D. Van Hine



# OFFICE MEMORANDUM

DATE: May 10, 1978

TO: G. J. McCarthy  
Deputy Director  
Bureau of Highways

FROM: K. A. Allemeier


SUBJECT: Skid Test Results on the Houghton - Hancock Bridge,  
Research Project 54 G-74, 78 SR-7

In response to your May 3, 1978 inquiry at the Engineering Operations Meeting, the following data has been compiled.

Concrete approaches to the Houghton - Hancock Bridge were previously tested in 1969 as a high accident location, and again in 1976 as a special request from the Traffic Division. The 1969 coefficients ranged from 0.37 to 0.48 and averaged 0.42. In 1976, values ranged from 0.24 to 0.41 and averaged 0.32. During 1977, approaches to the bridge were rotomilled. Skid tests, conducted September 21, 1977, on the rotomilled concrete ranged from 0.42 to 0.57 and averaged 0.49. Initial wsf values on the rotomilled surface averaged 53 percent higher than the 1976 "before rotomilling" values.

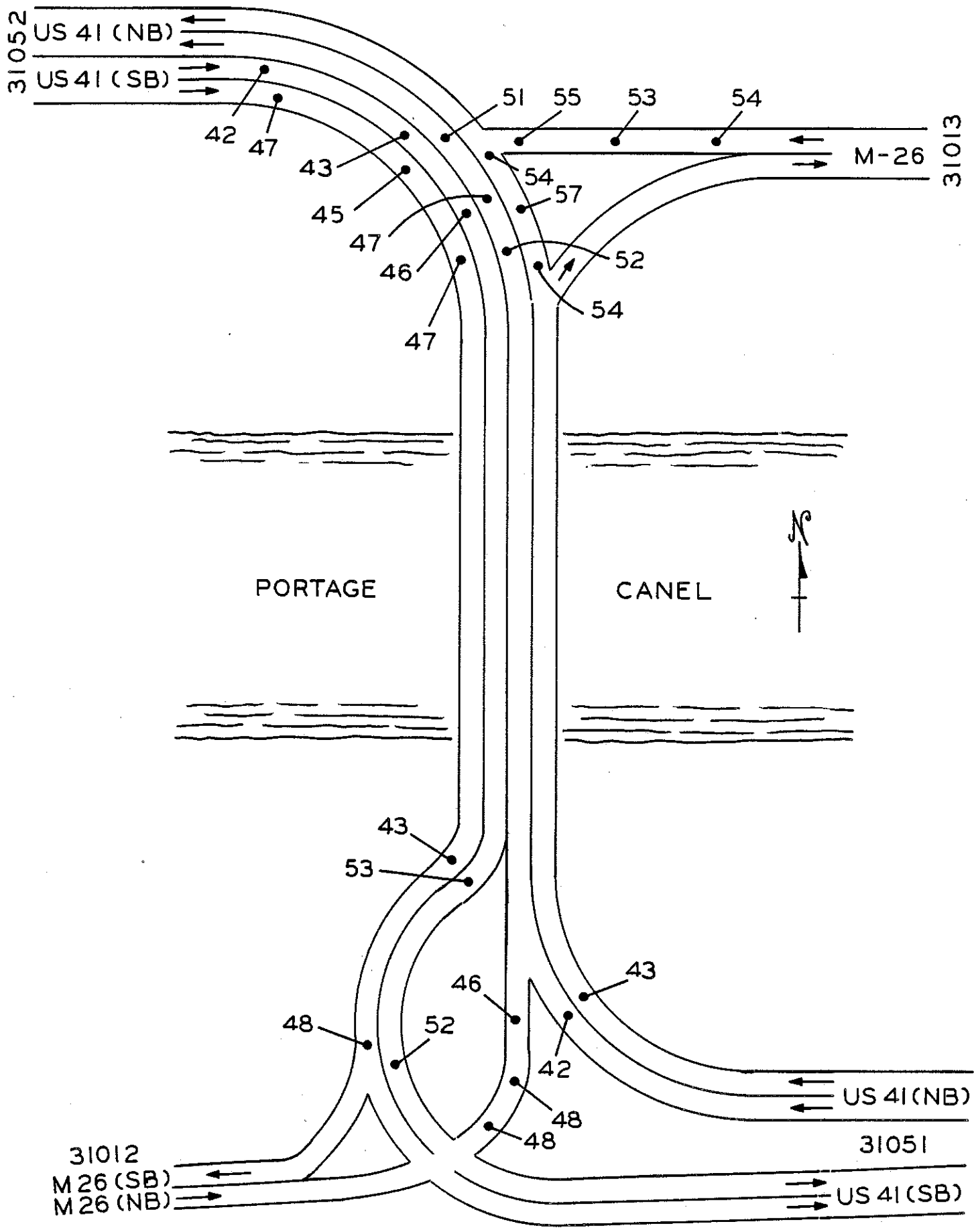
Attached for your review, is a schematic showing the September 21, 1977 rotomill friction levels.

TESTING AND RESEARCH DIVISION

  
\_\_\_\_\_  
Engineer of Testing and Research

KAA:PMS:lve

cc: L. T. Oehler



Skid test results on the Rotomilled approaches to the Houghton-Hancock Bridge (9-21-77), Research Project 54 G-74, 78 SR-7.



# OFFICE MEMORANDUM

DATE: September 13, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US 31 in Charlevoix  
Research Project 54 G-74, 78 SR-8

In accord with your April 11, 1978 request, pavement friction tests have been conducted on US 31 in Charlevoix.

During 1977, a bituminous concrete surface was applied to US 31 between Park Ave and Dixon Ave, omitting the Island Lake Lift Bridge. Pavement friction tests were conducted September 6, 1978 and yielded wsf values ranging from 0.25 to 0.35 and averaging 0.31.

For comparison purposes 1960 and 1961 bituminous concrete surfaces located on US 31, north of Dixon Ave and south of Park Ave were also tested. Wsf values on these ranged from 0.24 to 0.36 and averaged 0.30.

Attached, for your review, is a summary of test results.

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

Attachment

cc: K. A. Allemeier  
B. A. Conradson  
Safety Programs Unit

US 31, CITY OF CHARLEVOIX  
 Test Date September 6, 1978  
 (78 SR-8)

US 31 Location	Construction Year	Lane	Coefficient of Wsf		
			Low	High	Avg
Dixon Ave north	1960	NBOL	0.30	0.35	0.33
		NBIL	0.29	0.31	0.30
		SBOL	0.34	0.36	0.35
		SBIL	0.28	0.34	0.31
Lift Bridge north to Dixon Ave	1977	NBOL	0.31	0.34	0.33
		NBIL	0.29	0.35	0.32
		SBOL	0.30	0.31	0.30
		SBIL	0.31	0.35	0.33
Park Ave north to Lift Bridge	1977	NB	0.25	0.28	0.27
		SB	0.28	0.29	0.28
Park Ave south	1961	NB	0.25	0.27	0.26
		SB	0.24	0.27	0.25





# OFFICE MEMORANDUM

DATE: September 1, 1978

TO: A. P. Chritz  
Construction Staff Engineer

FROM: P. M. Schafer

SUBJECT: Pavement Friction Measurements on M 21 Between Lapeer and Imlay City. Research Project 54 G-74, 78 SR-10

In accord with your May 26, 1978 correspondence, pavement friction tests have been conducted on M 21 between Lapeer and Imlay City. Pavement friction measurements were made at three locations corresponding to ADT figures of 12,000, 6,900, and 7,400 on the map you supplied. Below are results from tests conducted August 4, 1978.

Project: 44042-11130  
Surface Type: Bituminous Aggregate  
Construction Year: 1976  
Location: M 21, Lapeer to Imlay City

Milepost	ADT	Lane	Coefficient of Wsf		
			Low	High	Avg
1.5	12,000	EB	0.40	0.41	0.41
		WB	0.39	0.42	0.41
7.3	6,900	EB	0.48	0.53	0.51
		WB	0.51	0.52	0.52
10.4	7,400	EB	0.46	0.48	0.47
		WB	0.42	0.46	0.44

TESTING AND RESEARCH DIVISION

Research Technician  
Pavement Performance Group

PMS:bf

cc: K. A. Allemeier



# OFFICE MEMORANDUM

DATE: July 20, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US-27, Temporary I-69 at Creyts Road and Temporary I-69 at Lake Lansing Road, Eaton and Ingham Counties Research Project 54 G-74, 78 SR-11

The subject locations are scheduled for installation of stop-and-go signals during the current construction season. In order to document wsf values at these locations, pavement friction tests have been conducted on trunkline approaches, commencing 500 feet in advance of the intersection. Results of these tests are shown below, for your review.

Location	Test Date	Lane	Coefficient of Wsf		
			Low	High	Avg
US-27, Temporary I-69 @ Creyts Road	6-19-78	NBOL	0.39	0.40	0.40
		NBIL	0.40	0.41	0.40
		SBOL	0.35	0.40	0.38
		SBIL	0.40	0.43	0.42
Temporary I-69 @ Lake Lansing Road	7-18-78	EBOL	0.42	0.47	0.44
		EBIL	0.46	0.51	0.49
		WBOL	0.42	0.45	0.43
		WBIL	0.51	0.53	0.52

TESTING AND RESEARCH DIVISION

*[Signature]*  
\_\_\_\_\_  
Engineer of Research  
Research Laboratory Section

LTOPMS:lve

cc: L. V. Suboski  
Safety Programs Unit



# OFFICE MEMORANDUM

DATE: July 24, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US-27 from Waverly Road to Main Street  
Research Project 54 G-74, 78 SR-12

Pavement friction measurements have been conducted at the subject location to document wsf values and for justification of safety improvements. In accord with your June 16, 1978 request, pavement friction tests have been conducted between mileposts 0.000 (Waverly Road) and 0.970, Control Section 33041. Milepost 0.000 to 0.756 is concrete, constructed in 1952, 0.756 to 0.970 is bituminous concrete placed in 1972. July 18, 1978 tests on the concrete yeilded wsf values ranging from 0.36 to 0.45 and averaging 0.41, bituminous concrete wsf values ranged from 0.41 to 0.47 and averaged 0.44.

Below, data is broken down for your review.

Control Section 33041 Milepost	Surface Type	Lane Tested	Coefficient of Wsf		
			Low	High	Avg
0.000 to 0.756	Conc	NBOL	0.39	0.43	0.41
		NBIL	0.41	0.45	0.42
		SBOL	0.36	0.43	0.39
		SBIL	0.39	0.42	0.41
0.756 to 0.970	Bit Conc	NBOL	0.41	0.45	0.43
		NBIL	0.41	0.45	0.44
		SBOL	0.41	0.46	0.43
		SBIL	0.43	0.47	0.45

TESTING AND RESEARCH DIVISION

*L. T. Oehler*

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

LTO:PMS:lve

cc: L. V. Suboski  
Safety Programs Unit



# OFFICE MEMORANDUM

DATE: October 25, 1978

TO: D. L. Wickham  
Construction Staff Engineer

FROM: L. T. Oehler


SUBJECT: Pavement Friction Tests on Territorial, Beck, and Sheldon Rds in Wayne County. Research Project 54 G-74, 78 SR-13

In accord with your request, pavement friction tests have been conducted on the concrete roadways of Territorial, Beck, and Sheldon Rds at their approaches to relocated M 14 in Wayne County. Test results and respective pavement finishing methods are listed below for your review.

Test Location	Const. Year	Finishing Method	Lane	Coefficient of Wsf		
				Low	High	Avg
Territorial Rd approaches to M 14 at S03 of 82102	1977	Burlap	EB	0.48	0.54	0.52
	1977	Burlap	WB	0.51	0.55	0.53
Beck Rd approaches to M 14 at S05 of 82102	1977	Burlap	NBOL	--	--	*
	1977	Burlap	NBIL	0.49	0.57	0.54
	1977	Burlap	SBOL	--	--	*
	1977	Burlap	SBIL	0.39	0.42	0.40
Sheldon Rd approaches to M 14 at S06 of 82102	1977	Transverse Comb	NBOL	0.46	0.49	0.48
	1977	Transverse Comb	NBIL	0.53	0.57	0.54
	**	Burlap	SBOL	0.37	0.41	0.39
	**	Burlap	SBIL	0.42	0.42	0.42

\* Outside lanes were too dirty for valid tests.  
 \*\* Unable to determine, but definitely several years old.

TESTING AND RESEARCH DIVISION

  
 \_\_\_\_\_  
 Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier



# OFFICE MEMORANDUM

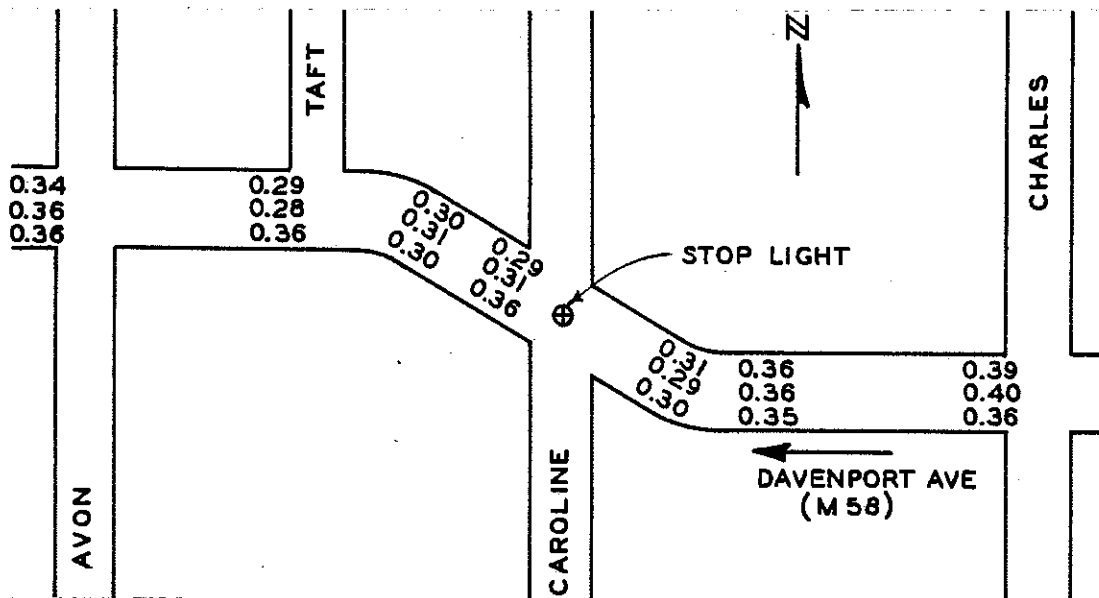
DATE: September 5, 1978

TO: P. H. DeCamp  
District Engineer

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 58 in Saginaw  
Research Project 54 G-74, 78 SR-14

In accord with your June 16, 1978 request, pavement friction tests have been conducted on westbound M 58 at the reverse curve near Carolina St in Saginaw. Pavement friction tests conducted August 15, 1978 yielded wsf values ranging from 0.28 to 0.40 and averaging 0.33. Individual wsf values are plotted below for your review.



TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
D. Van Hine



# OFFICE MEMORANDUM

DATE: September 8, 1978

TO: John J. Michels  
Federal Aid Safety Engineer

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on Ballenger Rd in Flint  
Research Project 54 G-74, 78 SR-15

In accord with your June 22, 1978 request, pavement friction tests have been conducted on Ballenger Rd at the I 69 interchange in Flint. The concrete surface at this location was rotomilled in the fall of 1977. Pavement friction tests conducted August 4, 1978 yielded wsf values ranging from 0.39 to 0.51 and averaging 0.45. Previous tests at this same location were conducted May 22, 1975; coefficients at that time ranged from 0.26 to 0.37 and averaged 0.31. Friction level test results of both test dates are shown below for your review. Attached is a map showing locations of the August 4, 1978 test results.

Test Date	Lane	Coefficient of Wsf		
		Low	High	Avg
May 22, 1975	NBOL	0.27	0.29	0.28
	NBIL	0.32	0.36	0.34
	SBOL	0.26	0.29	0.28
	SBIL	0.33	0.37	0.35
August 4, 1978	NBOL	0.39	0.51	0.44
	NBIL	0.42	0.51	0.45
	SBOL	0.42	0.48	0.46
	SBIL	0.43	0.48	0.46

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
 \_\_\_\_\_  
 Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
Genesee County Road Commission



# OFFICE MEMORANDUM

DATE: August 2, 1978

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

FROM: L. T. Oehler

SUBJECT: Wsf Measurements on M 97 Approaches to 10 Mile Rd, City of Warren.  
Research Project 54 G-74, 78 SR-16

Pavement friction measurements were conducted July 30, 1978 on the M 97 approaches to 10 Mile Rd in the City of Warren. In accord with your June 26, 1978 request, tests were conducted in the stopping areas, commencing 300 ft in advance of the intersection. Wsf values on these bituminous approaches ranged from 0.39 to 0.45 and averaged 0.42. Below is a lane breakdown of the data for your review.

Lane	Coefficient of Wsf		
	Low	High	Avg
NBOL	0.39	0.40	0.39
NBCL	0.42	0.43	0.42
NBIL	0.41	0.45	0.42
SBOL	0.39	0.41	0.40
SBCL	0.41	0.45	0.43
SBIL	0.42	0.45	0.44

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

cc: Safety Programs Unit  
D. Vago  
P. J. Riley



# OFFICE MEMORANDUM

DATE: August 4, 1978

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

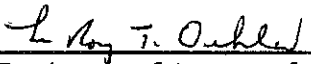
FROM: L. T. Oehler

SUBJECT: Pavement Friction Measurements at US 31-M 120 Interchange, Muskegon County. Research Project 54 G-74, 78 SR-17

Wet sliding friction tests were conducted on the US 31 exit ramps to M 120 and at the M 120 stopping areas to US 31 in accord with your June 28, 1978 memorandum.

Attached is a schematic showing individual test results and their respective locations.

TESTING AND RESEARCH DIVISION

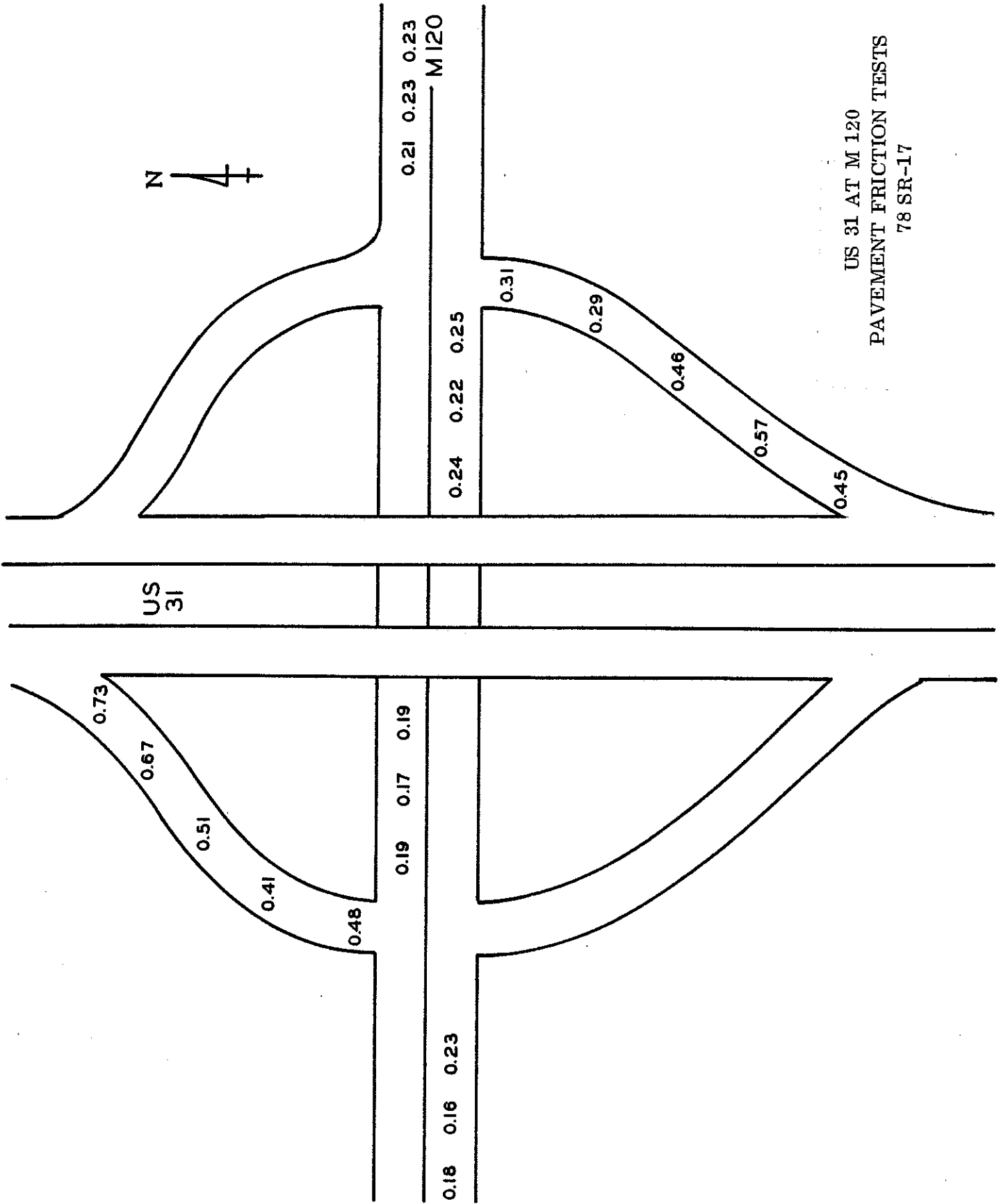
  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

Attachment

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





US 31 AT M 120  
 PAVEMENT FRICTION TESTS  
 78 SR-17



# OFFICE MEMORANDUM

DATE: December 12, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 99 at Two Intersections in Hillsdale  
Research Project 54 G-74, 78 SR-18

An error in data conversion has been discovered for pavement friction tests conducted August 2, 1978, and reported to you August 9, 1978 as 78 SR-18. Below are the corrected wsf values for pavement friction tests conducted at two M 99 intersections in Hillsdale you requested in correspondence dated July 11, 1978. Please destroy your previous copy.

Location	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
M 99 at West St, City of Hillsdale	Bit	NBOL	0.27	0.30	0.29
Control Section 30032 Milepost 0.25	Bit	NBIL	0.29	0.33	0.31
	Bit	SBOL	0.25	0.30	0.28
	Bit	SBIL	0.34	0.36	0.35
M 99 at Fayette St, City of Hillsdale	Conc	NBOL	0.34	0.34	0.34
Control Section 30032 Milepost 0.71	Bit	NBIL	0.30	0.36	0.34
	Conc	SBOL	0.31	0.34	0.33
	Bit	SBIL	0.33	0.36	0.35

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

DATE: July 26, 1978

TO: C. J. Zajac  
Engineer of Road Design

FROM: F. Copple

SUBJECT: Roto-Milled Pavement Surfaces, Research Projects 76 TI-341,  
54 G-74, and 78 SR-19

In response to your request, a history of wet sliding friction (wsf) values for M-58 in Saginaw, the first Michigan pavement surface to be textured by roto-mill, are listed on the attached sheet.

In 1975, friction values averaged 0.20 on the concrete portion of M-58, and 0.32 on the bituminous. In 1976, the intersections noted on the attachment were textured with the roto-mill. One year later, in October, 1977, wsf values averaged 0.42 on the textured concrete, and 0.43 on the textured bituminous.

A section of concrete and bituminous pavement located on M-58, east of Weinecke Road, was selected as a control area to compare friction level decay rates of rotomilled and non-rotomilled surfaces. October, 1977 tests in the control area, yielded average wsf values of 0.39 and 0.38 respectively, for concrete and bituminous.

Pavement friction tests have also been made before and after rotomilling at six other sites (15 lanes) throughout the State. At these locations, wsf values conducted on concrete pavement before rotomilling ranged from 0.25 to 0.58 and averaged 0.35. Friction levels at the same sites after rotomilling ranged from 0.42 to 0.70 and averaged 0.51. The wsf value increase averaged 46 percent.

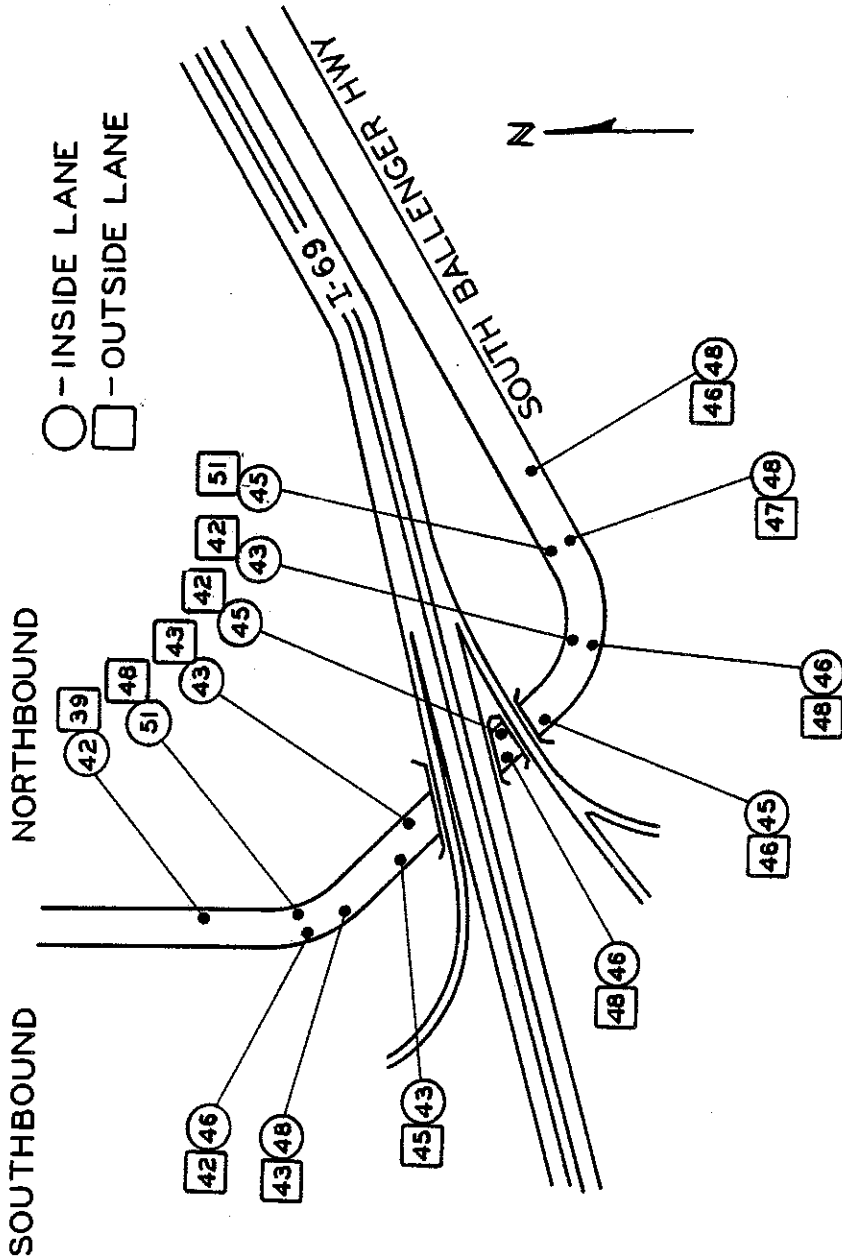
Additional pavement friction tests are scheduled on rotomilled surfaces to investigate the durability of skid resistance qualities.

TESTING AND RESEARCH DIVISION

A handwritten signature in cursive script, appearing to read "F. Copple".

F. Copple, Supervisor  
Pavement Performance Group

FC:PMS:lve



Pavement Friction Tests on Ballenger Rd at I 69 in Flint  
Rotomilled Concrete Surface

78 SR-15  
August 4, 1978

Description	Surface Type	Lane Tested	40 mph Coefficient of Wsf											
			High Accident Tests 9-16-75			Tested 6-3-77			Tested 10-20-77					
			Low	High	Avg	Low	High	Avg	Low	High	Avg			
M-58 @ Weinecke Road Milepost 4, 302 Control Section 73073	Conc	EBOL	0.21	0.25	0.23	0.42	0.43	0.43	0.43	0.41	0.43	0.41	0.43	0.42
	Conc	EBIL	0.21	0.25	0.23	0.42	0.45	0.43	0.43	0.37	0.41	0.39	0.41	0.39
	Conc	WBOL	0.22	0.32	0.27	0.43	0.43	0.43	0.42	0.42	0.51	0.46	0.49	0.48
	Conc	WBCL	0.20	0.26	0.24	0.42	0.46	0.44	0.47	0.49	0.49	0.48	0.49	0.48
	Bit	WBIL	0.38	0.45	0.41	0.48	0.48	0.48	0.46	0.46	0.49	0.48	0.49	0.48
M-58 East of Weinecke Road	Conc	EBOL	---	---	---	0.35	0.36	0.36	0.35	0.39	0.37	0.39	0.37	
	Conc	EBIL	---	---	---	0.34	0.34	0.34	0.35	0.39	0.36	0.39	0.36	
	Conc	WBOL	---	---	---	0.34	0.39	0.36	0.39	0.42	0.41	0.42	0.41	
	Conc	WBCL	---	---	---	0.35	0.40	0.37	0.40	0.42	0.41	0.42	0.41	
	Bit	WBIL	---	---	---	0.36	0.46	0.42	0.37	0.39	0.38	0.39	0.38	
M-58 @ Center Road Milepost 3, 550 Control Section 73073	Conc	EBOL	0.19	0.22	0.20	0.42	0.45	0.43	0.40	0.43	0.41	0.43	0.41	
	Conc	EBIL	0.15	0.19	0.17	0.40	0.45	0.42	0.40	0.42	0.41	0.42	0.41	
	Conc	WBOL	0.10	0.18	0.15	0.40	0.43	0.41	0.39	0.41	0.40	0.41	0.40	
	Conc	WBCL	0.21	0.26	0.24	0.42	0.45	0.43	0.41	0.42	0.41	0.42	0.41	
	Bit	WBIL	---	---	---	0.37	0.41	0.40	0.36	0.43	0.41	0.43	0.41	
M-58 @ Hemmeter Road Milepost 3, 058 Control Section 73073	Conc	EBOL	0.18	0.22	0.20	0.42	0.43	0.43	0.41	0.42	0.42	0.42	0.42	
	Conc	EBIL	0.10	0.18	0.14	0.42	0.45	0.43	0.41	0.42	0.41	0.42	0.41	
	Conc	WBOL	0.15	0.22	0.18	0.43	0.43	0.43	0.39	0.42	0.40	0.42	0.40	
	Conc	WBCL	0.20	0.21	0.20	0.42	0.46	0.44	0.40	0.45	0.42	0.45	0.42	
	Bit	WBIL	0.23	0.26	0.24	0.48	0.48	0.48	0.39	0.43	0.43	0.43	0.41	



# OFFICE MEMORANDUM

DATE: September 13, 1978

TO: L. J. Cook  
Assistant FAS Engineer

FROM: F. Copple

SUBJECT: Pavement Friction Tests at Newaygo County, Slag-Seal Locations  
Research Project 54 G-74, 78 SR-21

In accord with our July 21, 1978 conversation, pavement friction tests have been conducted at the Newaygo County slag-seal locations. Initial friction tests at these locations yielded wsf values which ranged from 0.66 to 0.82 and averaged 0.75. Attached is a summary of August 16, 1978 test results for your review.

TESTING AND RESEARCH DIVISION

A handwritten signature in cursive script that reads "Fred Copple".

Supervisor - Pavement/Performance  
Group

FC:PMS:bf

Attachment

cc: K. A. Allemeier  
C. Lovell (Newaygo County Road Commission)



# OFFICE MEMORANDUM

DATE: September 8, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on BL 75 at Montcalm-East Boulevard Street in Pontiac. Research Project 54 G-74, 78 SR-20

In accord with your July 14, 1978 request, pavement friction tests have been conducted on BL 75 (Perry St) in 300 ft stopping areas approaching Montcalm-East Boulevard Street in Pontiac. Stopping area coefficients determined August 18, 1978 ranged from 0.25 to 0.33 and averaged 0.30. The last 20 ft of northbound stopping areas have a newer bituminous surface and were tested separately. On this surface a wsf value of 0.34 was determined in both the NBOL and NBIL stopping area. A lane breakdown of test results is shown below for your review.

Lane	Coefficient of Wsf		
	Low	High	Avg
NBOL	0.25	0.30	0.28
NBIL	0.28	0.30	0.29
SBOL	0.31	0.33	0.32
SBIL	0.31	0.33	0.32
NBOL	New Surface		0.34
NBIL	New Surface		0.34

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
P. J. Riley  
J. Bassil  
Safety Programs Unit

SLAG-SEAL LOCATIONS  
Newaygo County  
(78 SR-21)

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





# OFFICE MEMORANDUM

DATE: September 13, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Three Non-Trunkline Locations  
Research Project 54 G-74, 78 SR-22

Pavement friction tests have been conducted in accord with your August 4, 1978 request and wsf values are listed below for your review. Particularly noteworthy are coefficients obtained on the southwest approach of Brockway St to M 46 in Saginaw; values range from 0.10 to 0.12 and average 0.11.

Location	Lane	Coefficient of Wsf		
		Low	High	Avg
1) M 46 at Brockway St, City of Saginaw	EBOL	0.28	0.34	0.32
	EBIL	0.33	0.35	0.34
	WBOL	0.27	0.31	0.29
	WBIL	0.28	0.34	0.32
Southeast approach of Brockway St to M 46, City of Saginaw	SEBOL	0.10	0.12	0.11
	SEBIL	0.10	0.11	0.10
2) Columbia Ave approaches to Capital Ave, City of Battle Creek	EBOL	0.19	0.24	0.22
	EBIL	0.15	0.22	0.19
	WBOL	0.29	0.35	0.32
	WBIL	0.30	0.31	0.30
3) Sprinkle Rd approaches to Centre Ave, City of Portage	NBOL	0.41	0.43	0.42
	NBIL	0.40	0.46	0.44
	SBOL	0.40	0.45	0.42
	SBIL	0.42	0.43	0.42

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
J. Benac  
Safety Programs Unit



# OFFICE MEMORANDUM

DATE: September 18, 1978

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

FROM: L. T. Oehler

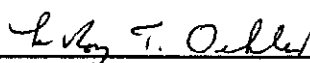
SUBJECT: Pavement Friction Tests on M 37 North of Four Mile Rd in Kent County  
Research Project 54 G-74, 78 SR-23

In 1977 a bituminous concrete surface was applied to M 37 between Four Mile Rd and Alpine Church Rd as Project 41033-07689. Pavement friction tests were initially conducted October 4, 1977 and reported to you November 8, 1977 as 77 SR-29. Friction tests at this time yielded coefficients ranging from 0.23 to 0.55 and averaging 0.48. Additional tests were conducted on August 17, 1978 in accord with your August 8, 1978 request. After a one-year service period, friction levels range from 0.22 to 0.46 and average 0.33. This represents an average friction decay of 0.15 since 1977. The least amount of change in coefficients between 1977 and 1978 tests has occurred on the inside lanes (not in stopping areas) between Four Mile Rd and Lamoreaux Dr. A summary of both series of tests is shown below for your review.

M 37 Location	Lane	Coefficient of Wsf					
		October 4, 1977			August 17, 1978		
		Low	High	Avg	Low	High	Avg
Approaches to Lamoreaux Dr	NBOL	0.47	0.48	0.48	0.22	0.30	0.25
	NBIL	0.52	0.53	0.53	0.31	0.31	0.31
	SBOL	0.45	0.49	0.47	0.25	0.28	0.26
	SBIL	0.47	0.51	0.50	0.30	0.33	0.31
North of Four Mile Rd	NBOL	0.47	0.49	0.48	0.30	0.35	0.33
	NBIL	0.49	0.55	0.52	0.45	0.46	0.45
	SBOL	0.48	0.51	0.50	0.35	0.37	0.36
	SBIL	0.39	0.45	0.42	0.41	0.45	0.43
Approaches to Four Mile Rd	NBOL*	--	--	--	0.40	0.43	0.42
	NBIL*	--	--	--	0.41	0.42	0.42
	SBOL	--	--	--	0.27	0.35	0.30
	SBIL	0.23	0.51	0.38	0.28	0.34	0.31

\* 1973 Bituminous concrete surface.

TESTING AND RESEARCH DIVISION

  
 \_\_\_\_\_  
 Engineer of Research

LTO:PMS:bf

cc: M. L. Jones

Safety Programs Unit  
K. A. Allemeier



# OFFICE MEMORANDUM

DATE: September 13, 1978

TO: J. E. Norton  
Testing Laboratory Section

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on Project 82062-11105  
Research Project 54 G-74, 78 SR-24

In accord with your August 14, 1978 request, pavement friction tests have been conducted on US 12 east and west of Oakman Blvd.

US 12 from Oakman Blvd. east 600-ft has a bituminous concrete surface and was constructed during 1978 using 22x steel furnace slag. Wsf values determined August 27, 1978 ranged from 0.41 to 0.57 and averaged 0.48.

US 12, west of Oakman Blvd. also has a 1978 bituminous concrete surface but slag was not employed in its mix design. Similar wsf values were determined on this surface, i. e., coefficients ranged from 0.41 to 0.51 and averaged 0.46.

A data summary is provided below for your review.

US 12 Location	Lane	Coefficient of Wsf		
		Low	High	Avg
West of Oakman Blvd	EBOL	0.46	0.49	0.48
	EBCL	0.46	0.46	0.46
	EBIL	0.47	0.51	0.49
	WBOL	0.48	0.57	0.53
	WBCL	0.41	0.46	0.44
	WBIL	0.48	0.52	0.50
Oakman Blvd east 600 ft	EBOL	0.45	0.48	0.47
	EBCL	0.45	0.49	0.47
	EBIL	0.46	0.49	0.47
	WBOL	0.45	0.51	0.47
	WBCL	0.41	0.51	0.46
	WBIL	0.43	0.46	0.45

TESTING AND RESEARCH DIVISION

  
Transportation Research Technician

PMS:bf

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



# OFFICE MEMORANDUM

DATE: September 21, 1978

TO: J. Badaluco  
District Maintenance Engineer

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on the Industrial Bridge (X01 of 11053) in St. Joseph. Research Project 54 G-74, 78 SR-25

In accord with your August 25, 1978 request, pavement friction tests were conducted on the US 31-US 33 bridge over the C&O RR in St. Joseph (X01 of 11053). The bridge deck is concrete containing limestone coarse aggregate and it has been intermittently patched with asphalt emulsion. The deck is scheduled for resurfacing during 1979. Wsf values obtained on this deck August 28, 1978 ranged from 0.13 to 0.41 and averaged 0.30. The lower coefficients in this range were obtained on the bituminous patches.

Subsequent to the tests, as an immediate and temporary treatment, the patches were treated by heating, scraping and rolling in crushed aggregate.

After this treatment had been completed, laboratory personnel inspected the deck surface and observed that the crushed aggregate had been embedded in the patches. Another series of friction tests, conducted September 14, 1978, verified the existence of improved friction levels on the treated patches; coefficients ranging from 0.34 to 0.59 and averaging 0.45 were determined.

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier



# OFFICE MEMORANDUM

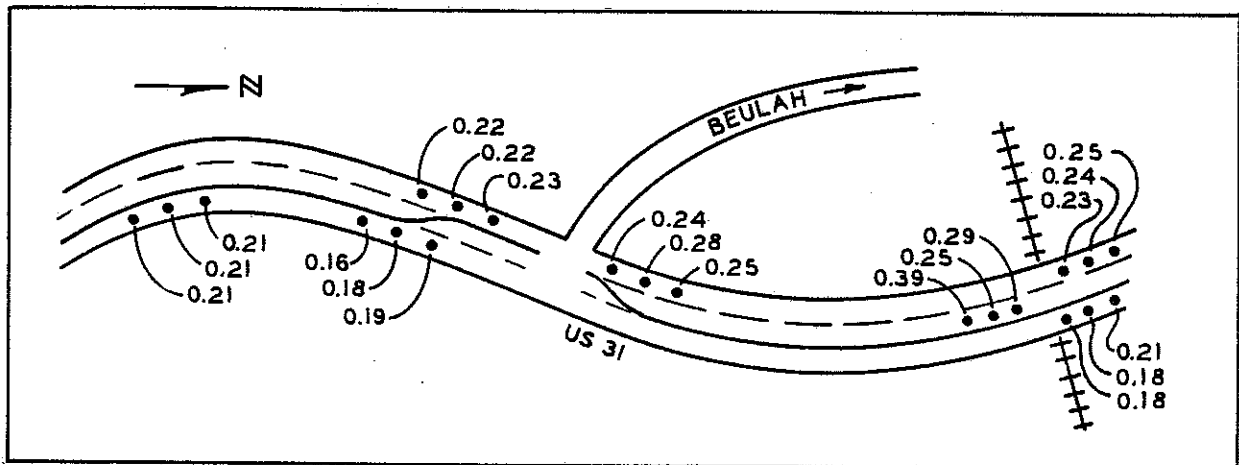
DATE: September 20, 1978

TO: D. E. Orne  
Engineer of Testing and Research

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US 31 in Benzonia and Beulah  
Research Project 54 G-74, 78 SR-26

In accord with your August 25, 1978 request, pavement friction tests have been conducted on US 31 between the north junction of M 115 in Benzonia and East St in Beulah. Friction levels determined September 5, 1978 in this area ranged from 0.16 to 0.39 and averaged 0.23. Locations and respective wsf values are shown below for your review.



TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

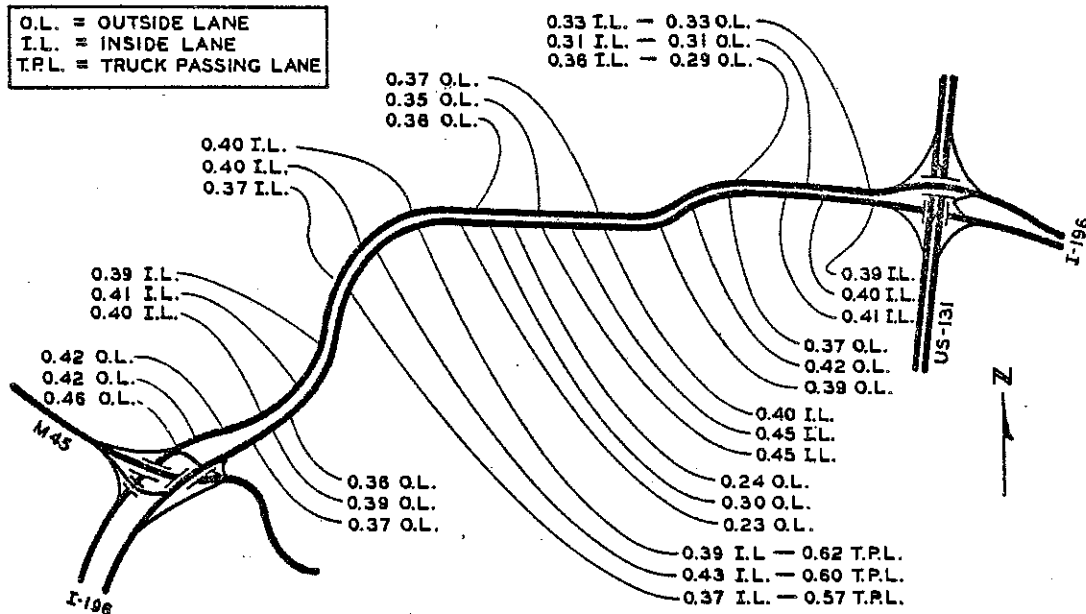
DATE: September 21, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on I 196 from M 45 to US 131 in Grand Rapids  
Research Project 54 G-74, 78 SR-27

In accord with your August 30, 1978 request, pavement friction tests have been conducted on I 196 between M 45 and the US 131 interchange in Grand Rapids. Tests conducted September 7, 1978, on the mainline roadway, yielded wsf values ranging from 0.23 to 0.46 and averaging 0.37. A northbound I 196 truck passing lane near Valley Ave, however, yielded coefficients ranging from 0.57 to 0.62, averaging 0.60. Below for your review is a layout showing approximated locations of the September 7 friction values.



TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

DATE: September 22, 1978

TO: W. J. MacCreery  
Engineer of Design

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on I 496, City of East Lansing  
Research Project 54 G-74, 78 SR-28

In accord with your September 18, 1978 request, pavement friction tests have been conducted on I 496 at the locations you specified. Coefficients determined September 19, 1978 on mainline I 496 ranged from 0.39 to 0.54 and averaged 0.46. Friction level measurements were also conducted on two ramps. Trowbridge Rd to southbound I 496 ramp yielded wsf values which ranged from 0.36 to 0.43 and averaged 0.39; Trowbridge Rd to westbound I 496 ramp values ranged from 0.43 to 0.49 and averaged 0.47 (tested September 21). Attached is a map showing test locations and respective wsf values.

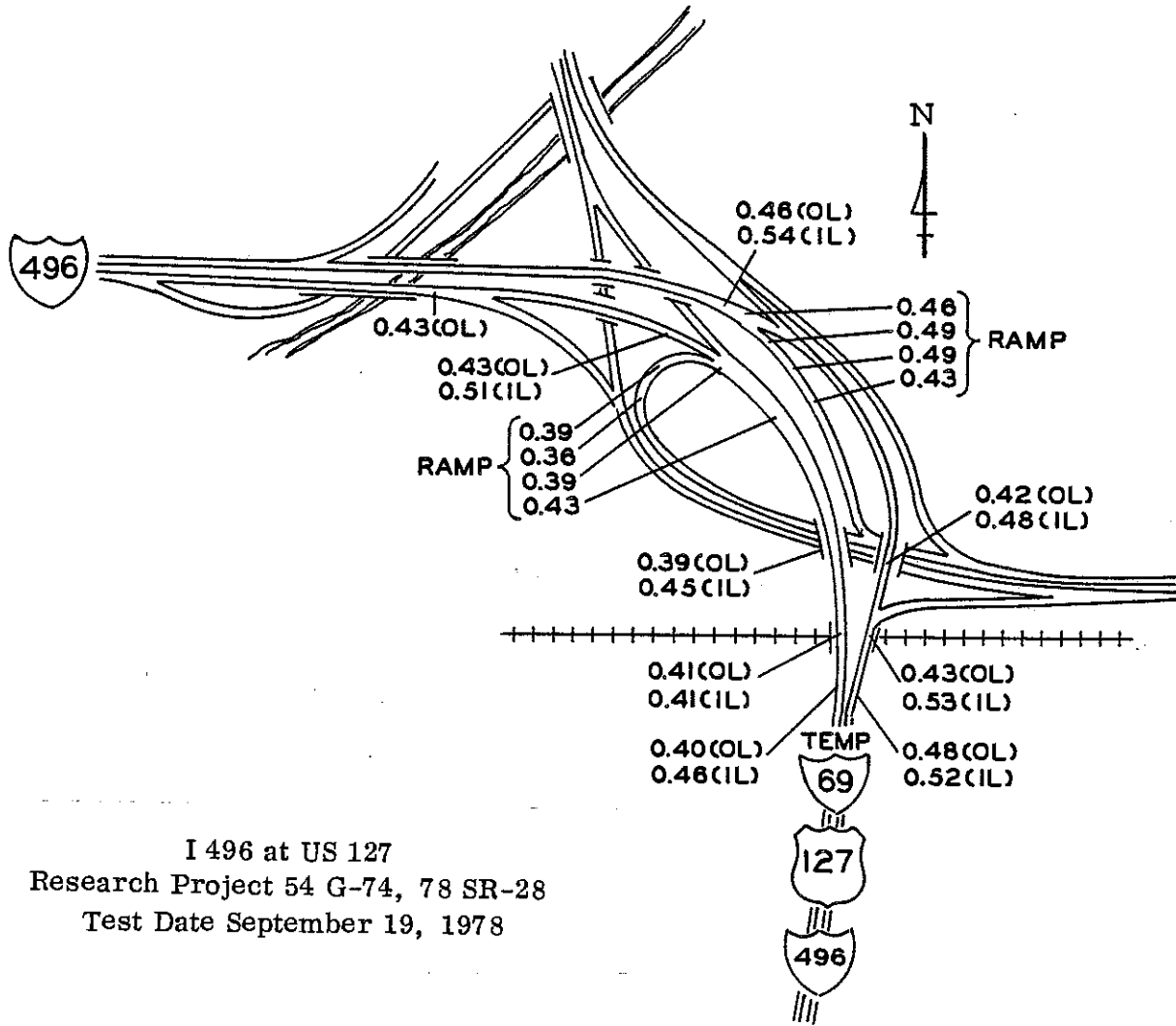
TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

Attachment

cc: K. A. Allemeier  
C. J. Zajac



I 496 at US 127  
 Research Project 54 G-74, 78 SR-28  
 Test Date September 19, 1978





# OFFICE MEMORANDUM

DATE: September 20, 1978

TO: R. W. Muethel, Geologist  
Petrography and Hydrology Group

FROM: P. T. Luce

SUBJECT: Pavement Friction Measurements, State Project Mb 06071-11004  
Research Projects 77 C-18 and 54 G-74, 78 SR-29

In response to your August 2, 1977 request, pavement friction measurements have been scheduled annually for the subject bituminous surfacing project, located on US 23 near Standish.

Initial friction levels, obtained August 9, 1977, were reported to you in our October 6, 1977 memorandum, 77 SR-18. The first of a series of annual follow-up tests, measured August 10, 1978, is summarized below for your review. Initial test values have also been included for your convenience.

Test Section	Direction and Lane	Coefficient of Wsf					
		August 9, 1977			August 10, 1978		
		Low	High	Avg	Low	High	Avg
Sandy Limestone (894+51 to 848+00)	NBOL	0.46	0.51	0.48	0.45	0.49	0.47
	NBIL	0.48	0.49	0.49	0.52	0.55	0.53
	SBOL	0.33	0.39	0.36	0.42	0.43	0.42
	SBIL	0.43	0.49	0.46	0.48	0.52	0.50
Control (848+00 to 772+50)	NBOL	0.41	0.45	0.43	0.40	0.45	0.42
	NBIL	0.45	0.48	0.47	0.42	0.48	0.46
	SBOL	0.34	0.39	0.37	0.42	0.43	0.42
	SBIL	0.46	0.51	0.48	0.46	0.51	0.49

TESTING AND RESEARCH DIVISION

*P. T. Luce*

Transportation Research Technician

PTL:bf



# OFFICE MEMORANDUM

DATE: October 26, 1978

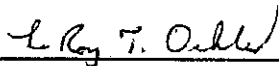
TO: D. E. Orne  
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 66 Between Sheridan and Stanton  
Research Project 54 G-74, 78 SR-30

In accord with your September 27, 1978 request, pavement friction tests have been conducted on M 66 between Sheridan and Stanton. In 1965 this area was resurfaced with bituminous concrete. Intermittently slurry seal has recently been applied to wheel tracks, covering "fat" spots from a crack sealing operation. In some of the areas where the crack seal material was particularly heavy, the slurry seal stone did not bond. As a result of the varying surface conditions present, friction tests produced a wide range of wsf values. Coefficients on the bituminous concrete surface ranged from 0.28 to 0.60 and averaged 0.53; the slurry seal yielded values ranging from 0.33 to 0.52 and averaging 0.47.

TESTING AND RESEARCH DIVISION

  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

DATE: October 25, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at the M 50-M 52 Intersection in Lenawee County. Research Project 54 G-74, 78 SR-31

In accord with your September 28, 1978 request, pavement friction tests have been conducted in stopping areas of the M 50-M 52 intersection. Test results are listed below for your review.

Route	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
M 50	Concrete	EB	0.29	0.31	0.30
	Concrete	WB	0.31	0.34	0.33
M 52	Bituminous	NB	0.36	0.41	0.38
	Concrete	SB	0.34	0.37	0.35

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

DATE: October 27, 1978

TO: F. Copple - Supervisor  
Pavement Performance Group

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests at the Dove-Range Rd interchange with I 94 in St. Clair County. Research Project 54 G-74, 78 SR-32

In accord with your October 2, 1978 request, pavement friction tests have been conducted on the seal coated ramps at the Dove-Range Rd interchange with I 94. Test results are listed below.

Location	Coefficient of Wsf		
	Low	High	Avg
Eastbound I 94 off-ramp	0.65	0.70	0.67
Westbound I 94 off-ramp*	0.43	0.47	0.45
Eastbound I 94 on-ramp*	0.47	0.48	0.47
Westbound I 94 on-ramp	0.65	0.68	0.66

\* Wheel tracks are bleeding through.

TESTING AND RESEARCH DIVISION

  
Transportation Research Technician

PMS:bf

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



# OFFICE MEMORANDUM

DATE: October 25, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at the M 50-M 52 Intersection in Lenawee County. Research Project 54 G-74, 78 SR-31

In accord with your September 28, 1978 request, pavement friction tests have been conducted in stopping areas of the M 50-M 52 intersection. Test results are listed below for your review.

Route	Surface Type	Lane	Coefficient of Wsf		
			Low	High	Avg
M 50	Concrete	EB	0.29	0.31	0.30
	Concrete	WB	0.31	0.34	0.33
M 52	Bituminous	NB	0.36	0.41	0.38
	Concrete	SB	0.34	0.37	0.35

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

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



# OFFICE MEMORANDUM

DATE: October 27, 1978

TO: F. Copple - Supervisor  
Pavement Performance Group

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests at the Dove-Range Rd interchange with I 94 in St. Clair County. Research Project 54 G-74, 78 SR-32

In accord with your October 2, 1978 request, pavement friction tests have been conducted on the seal coated ramps at the Dove-Range Rd interchange with I 94. Test results are listed below.

Location	Coefficient of Wsf		
	Low	High	Avg
Eastbound I 94 off-ramp	0.65	0.70	0.67
Westbound I 94 off-ramp*	0.43	0.47	0.45
Eastbound I 94 on-ramp*	0.47	0.48	0.47
Westbound I 94 on-ramp	0.65	0.68	0.66

\* Wheel tracks are bleeding through.

TESTING AND RESEARCH DIVISION

  
Transportation Research Technician

PMS:bf

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



# OFFICE MEMORANDUM

DATE: November 9, 1978

TO: A. P. Chritz  
Construction Staff Engineer

FROM: P. M. Schafer

SUBJECT: Pavement Friction Tests on US 31 BR in Whitehall  
Research Project 54 G-74, 78 SR-33

Pavement friction tests have been completed on Project 61073-14312, located on US 31 BR from Colby St. west to Hansen St. in Whitehall. This 0.6 mile bituminous concrete resurfacing contract was completed in October 1978. Crusher dust was applied to the surface, directly behind the paver and before rolling, in stopping areas approaching the Mears-Colby St. traffic light. Crusher dust was applied to the remainder of the bituminous concrete after the pavement had been rolled. Results of friction tests conducted October 26, 1978 are listed below for your evaluation.

Test Location	Crusher Dust Application	Lane	Coefficient of Wsf		
			Low	High	Avg
East of Baldwin St	After Rolling	NBOL	0.48	0.53	0.51
		NBIL	0.51	0.53	0.52
		SBOL	0.46	0.46	0.46
		SBIL	0.52	0.54	0.53
Stopping area at the Mears-Colby St traffic light	Before Rolling	NBOL	0.52	0.54	0.53
		NBIL	0.54	0.60	0.57
		SBOL	0.51	0.57	0.54
		SBIL	0.53	0.55	0.54
Stopping area at Thompson-Colby St intersection	After Rolling	NBOL	0.54	0.55	0.55
		NBIL	0.58	0.62	0.60
		SBOL	0.54	0.55	0.54
		SBIL	0.52	0.58	0.56

TESTING AND RESEARCH DIVISION

  
Transportation Research Technician

PMS:bf

cc: K. A. Allemeier



# OFFICE MEMORANDUM

DATE: October 26, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on M 59 at Paddock St, City of Pontiac  
Research Project 54 G-74, 78 SR-34

In accord with your October 12, 1978 request, pavement friction tests have been completed on M 59 at Paddock St in the city of Pontiac. Friction levels on the concrete surface at this location ranged from 0.33 to 0.37 and averaged 0.35. Individual lane values are listed below for your review.

Lane	Coefficient of Wsf		
	Low	High	Avg
EBOL	0.34	0.35	0.35
EB#3	0.34	0.35	0.35
EB#2	0.35	0.36	0.35
EBIL	0.33	0.37	0.35
WBOL	0.36	0.37	0.37
WB#3	0.34	0.36	0.35
WB#2	0.34	0.36	0.35
WBIL	0.34	0.35	0.35

TESTING AND RESEARCH DIVISION

*[Signature]*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
P. J. Riley  
J. Bassil  
Safety Programs Unit





# OFFICE MEMORANDUM

DATE: December 11, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Non-Trunkline Locations in Oakland County  
Research Project 54 G-74, 78 SR-35

Attached for your review are results from pavement friction measurements which were conducted in accord with your October 23, 1978 request. Per attachment to your memo, wages, expenses, and equipment costs incurred for conducting and processing these non-trunkline tests have been charged to Job No. 99415, Activity Code 650. The total amount charged was \$580.25.

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier  
R. A. Cunard, TIA of Oakland County  
G. Holmberg, Oakland County Road  
Commission  
P. J. Riley  
Safety Programs Unit

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction			
			Low	High	Avg	
Greenfield at Lincoln		<u>Greenfield</u>				
	Conc	NBOL	0.36	0.40	0.38	
	Conc	NBCL	0.39	0.40	0.40	
	Conc	NBIL	0.34	0.35	0.35	
	Conc	SBOL	0.36	0.40	0.38	
	Conc	SBCL	0.34	0.34	0.34	
	Bit	SBIL	0.33	0.35	0.34	
			<u>Lincoln</u>			
	Conc	EB	0.36	0.51	0.45	
	Conc	EBRT	0.42	0.46	0.44	
	Conc	WB	0.30	0.36	0.33	
	Livernois at Walton Blvd		<u>Livernois</u>			
		Bit	NBOL	0.36	0.39	0.37
Bit		NBIL	0.36	0.39	0.37	
Conc		SB	0.36	0.42	0.39	
			<u>Walton Blvd</u>			
Conc		EBOL	0.36	0.42	0.38	
Conc		EBIL	0.40	0.45	0.42	
Conc		WBOL	0.36	0.41	0.39	
Conc		WBIL	0.43	0.48	0.46	
Rochester at Big Beaver			<u>Rochester</u>			
	Conc	NBRT	0.30	0.36	0.32	
	Conc	NBOL	0.25	0.33	0.30	
	Conc	NBIL	0.25	0.29	0.28	
	Conc	SBRT	0.39	0.40	0.39	
	Conc	SBOL	0.34	0.36	0.35	
	Conc	SBIL	0.33	0.36	0.35	
			<u>Big Beaver</u>			
	Conc	EBOL	0.34	0.36	0.35	
	Conc	EBIL	0.33	0.35	0.34	
Bit	WBOL	0.34	0.40	0.37		
Bit	WBIL	0.31	0.33	0.32		
Crooks at Big Beaver		<u>Crooks</u>				
	Bit	NBOL	0.33	0.34	0.33	
	Bit	NBIL	0.30	0.31	0.31	
	Bit	SBOL	0.33	0.34	0.33	
	Bit	SBIL	0.29	0.33	0.31	

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction		
			Low	High	Avg
Crooks at Big Beaver (cont.)		<u>Big Beaver</u>			
	Conc	EBOL	0.28	0.28	0.28
	Conc	EBIL	0.30	0.31	0.30
	Conc	WBOL	0.36	0.36	0.36
	Conc	WBIL	0.28	0.31	0.30
Greenfield at 10 Mile Rd		<u>Greenfield</u>			
	Conc	NBOL	0.36	0.37	0.37
	Conc	NBCL	0.35	0.36	0.36
	Bit	NBCL	0.29	0.29	0.29
	Conc	NBIL	0.34	0.36	0.35
	Bit	NBIL	0.34	0.34	0.34
	Conc	SBOL	0.29	0.31	0.30
	Conc	SBCL	0.29	0.33	0.31
	Conc	SBIL	0.30	0.36	0.32
		<u>10 Mile Rd</u>			
	Conc	EBOL	0.34	0.36	0.35
	Conc	EBIL	0.35	0.39	0.37
	Conc	WBOL	0.31	0.35	0.33
	Conc	WBIL	0.33	0.36	0.35
Lahser at Eleven Mile Rd		<u>Lahser</u>			
	Conc	NBRT	0.31	0.36	0.33
	Conc	NBOL	0.33	0.36	0.35
	Conc	NBIL	0.33	0.36	0.34
	Conc	SBOL	0.25	0.27	0.26
	Conc	SBIL	0.27	0.29	0.28
		<u>Eleven Mile Rd</u>			
	Conc	EBOL	0.33	0.36	0.35
	Conc	EBIL	0.35	0.39	0.37
	Conc	WBOL	0.34	0.37	0.35
	Conc	WBIL	0.30	0.33	0.32
John R at Woodward Heights		<u>John R</u>			
	Bit	NBOL	0.33	0.36	0.35
	Bit	NBIL	0.33	0.37	0.35
	Conc	SBOL	0.25	0.31	0.28
	Bit	SBIL	0.33	0.37	0.35
		<u>Woodward Heights</u>			
	Bit	EBOL	0.35	0.39	0.37
	Bit	EBIL	0.37	0.42	0.40
	Bit	WBOL	0.41	0.47	0.45
	Bit	WBIL	0.36	0.42	0.40

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction			
			Low	High	Avg	
Orchard Lake at Middlebelt		<u>Middlebelt</u>				
	Conc	NB	0.30	0.34	0.33	
		<u>Inverness</u>				
	Conc	SB	0.33	0.34	0.33	
		<u>Orchard Lake</u>				
	Conc	EBOL	0.31	0.34	0.33	
	Conc	EBIL	0.35	0.36	0.35	
	Conc	WBOL	0.35	0.36	0.36	
	Conc	WBIL	0.35	0.36	0.36	
	Farmington at Nine Mile Rd		<u>Farmington Rd</u>			
		Conc	NBOL	0.31	0.33	0.32
		Conc	NBIL	0.33	0.35	0.34
Bit		NBIL	0.28	0.31	0.30	
Conc		SBOL	0.30	0.35	0.33	
Bit		SBIL	0.27	0.30	0.29	
		<u>Nine Mile Rd</u>				
Conc		EB	0.25	0.27	0.26	
Conc		WB	0.33	0.36	0.35	
Pontiac Trail at West Maple			<u>Pontiac Trail</u>			
		Bit	NBRT	0.28	0.31	0.29
		Bit	NB	0.23	0.30	0.26
	Bit	SBOL	0.24	0.25	0.25	
	Bit	SBIL	0.23	0.29	0.25	
		<u>West Maple</u>				
	Bit	WBRT	0.28	0.31	0.29	
	Bit	WBLT	0.23	0.30	0.27	
Southfield at 10 Mile Rd		<u>Southfield</u>				
	Conc	NBOL	0.36	0.40	0.37	
	Conc	NBCL	0.35	0.36	0.36	
	Conc	NBIL	0.36	0.37	0.37	
	Conc	SBOL	0.33	0.36	0.35	
	Conc	SBCL	0.36	0.37	0.36	
	Conc	SBIL	0.37	0.39	0.38	
		<u>10 Mile Rd</u>				
	Conc	EBOL	0.34	0.36	0.35	
	Conc	EBIL	0.36	0.36	0.36	
	Conc	WBOL	0.35	0.36	0.35	
	Conc	WBIL	0.36	0.39	0.37	

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction			
			Low	High	Avg	
Orchard Lake Rd from Maple to Walnut Lake		<u>North of Maple Rd</u>				
	Bit	NBOL	--	--	0.40	
	Bit	NBIL	--	--	0.40	
	Bit	SBOL	--	--	0.42	
	Bit	SBIL	--	--	0.40	
			<u>South of Pinehurst</u>			
	Bit	NB	--	--	0.37	
	Bit	SB	--	--	0.39	
			<u>North of Cherry Crest</u>			
	Bit	NB	--	--	0.39	
	Bit	SB	--	--	0.40	
			<u>South of Walnut Lake</u>			
	Bit	NB	--	--	0.43	
	Bit	SB	--	--	0.34	
	Orchard Lake Rd from 12 Mile Rd to Northwestern Highway		<u>North of 12 Mile Rd</u>			
		Conc	NBOL	--	--	0.41
Conc		NBIL	--	--	0.33	
Conc		SBOL	0.35	0.37	0.36	
Conc		SBIL	0.31	0.33	0.32	
			<u>North of Parkhill</u>			
Bit		NB	--	--	0.41	
Bit		SB	--	--	0.36	
			<u>North of 13 Mile Rd</u>			
Bit		NB	--	--	0.39	
Bit		SB	--	--	0.35	
			<u>North of Ravine</u>			
Bit		NB	--	--	0.37	
Bit		SB	--	--	0.34	
			<u>South of 14 Mile Rd</u>			
Bit		NBOL	--	--	0.46	
Bit	NBIL	--	--	0.41		
Bit	SBOL	--	--	0.41		
Bit	SBIL	--	--	0.39		

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction			
			Low	High	Avg	
Commerce from Indian Trail to Hiller		<u>East of Walma Rd</u>				
	Bit	EB	--	--	0.40	
	Bit	WB	--	--	0.39	
			<u>West of Leroy Rd</u>			
	Bit	EB	--	--	0.37	
	Bit	WB	--	--	0.37	
			<u>East of Orchard Pl</u>			
	Bit	EB	--	--	0.40	
	Bit	WB	--	--	0.40	
			<u>West of Dow Ridge Rd</u>			
	Bit	EB	--	--	0.34	
	Bit	WB	--	--	0.39	
			<u>West of 3 Lakes Rd</u>			
	Bit	EB	--	--	0.33	
	Bit	WB	--	--	0.36	
			<u>West of Indian Trail</u>			
	Bit	EB	0.35	0.40	0.38	
	Bit	WB	0.39	0.42	0.40	
	Dequindre from 14 Mile Rd to Big Beaver		<u>North of 14 Mile Rd</u>			
		Bit	NB	--	--	0.39
Bit		SB	--	--	0.36	
			<u>North of Dashwood St</u>			
Bit		NB	--	--	0.37	
Bit		SB	--	--	0.37	
			<u>North of Iowa St</u>			
Bit		NB	--	--	0.33	
Bit		SB	--	--	0.39	
			<u>North of Maple Rd</u>			
Bit		NB	--	--	0.36	
Bit		SB	--	--	0.35	
			<u>North of Hempsted St</u>			
Bit		NB	--	--	0.35	
Bit		SB	--	--	0.43	

Location	Surface Type	Direction and Lane	40 mph Coefficient of Wet Sliding Friction		
			Low	High	Avg
Dequindre from 14 Mile Rd (cont.)		<u>South of Parliament St</u>			
	Bit	NB	--	--	0.36
		SB	--	--	0.40
Hospital from Cooley Lake to Elizabeth Lake Rd		<u>North of Villa</u>			
	Bit	NB	--	--	0.41
	Bit	SB	--	--	0.42
		<u>South of Pershing</u>			
	Bit	NB	--	--	0.46
	Bit	SB	--	--	0.48
		<u>North of Redmond</u>			
	Bit	NB	--	--	0.40
	Bit	SB	--	--	0.45
		<u>North of Mathers</u>			
	Bit	NB	--	--	0.41
	Bit	SB	--	--	0.42
		<u>South of Elizabeth Lake Rd</u>			
	Bit	NB	--	--	0.42
	Bit	SB	--	--	0.41



# OFFICE MEMORANDUM

DATE: November 14, 1978

TO: L. Swanson  
District Design Squad Leader

FROM: F. Cople

SUBJECT: Pavement Friction Tests on Bridge Structure in Village of Paris  
Research Project 54 G-74, 78 SR-36

In accord with your October 30, 1978 request, pavement friction tests have been conducted on the Hoover Rd. Bridge over Muskegon River (Bl of 54-9-20, Job No. 12780) in Paris. This five span structure was constructed during 1978. The entire concrete deck was transversely broomed, however, span 2 was rained on before the concrete had set. Results of October 31, 1978 friction measurements are listed below for your review.

Span No.	Lane	Coefficient of Wsf (40 mph)		
		Low	High	Avg
1	EB	0.23	0.25	0.24
	WB	--	--	--
2	EB	0.33	0.36	0.35
	WB	0.33	0.36	0.34
3 and 4	EB	0.33	0.37	0.35
	WB	--	--	--
5	EB	0.27	0.30	0.28
	WB	0.19	0.23	0.21

TESTING AND RESEARCH DIVISION

Supervisor - Pavement Performance Group

FC:PMS:bf

cc: K. A. Allemeier





# OFFICE MEMORANDUM

DATE: November 15, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests on US 131 at I 196, City of Grand Rapids  
Research Project 54 G-74, 78 SR-37

In accord with your October 26, 1978 memorandum, pavement friction tests have been conducted on US 131 through the interchange with I 196. Wsf values obtained November 3, 1978 on this concrete surface ranged from 0.31 to 0.48 and averaged 0.38. Below is a breakdown of coefficients for your review.

US 131 Location	Coefficient of Wsf (40 mph)					
	SBOL	SBCL	SBIL	NBIL	NBCL	NBOL
North of 1977 bit-conc (south of Bridge St)	0.35	0.33	0.42	0.39	0.34	0.39
South of structure over southbound US 131	0.37	0.33	0.47	0.45	0.35	0.40
North of structure over southbound US 131	0.37	0.35	0.47	0.48	0.36	0.37
Over and under I 196	0.31	0.31	0.46	0.43	0.33	0.34
South of 6th St	0.34	0.33	0.47	0.48	0.34	0.33

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier



# OFFICE MEMORANDUM

DATE: November 15, 1978

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

FROM: L. T. Oehler

SUBJECT: Pavement Friction Tests at Intersection of M 153 and Middlebelt Rd  
Research Project 54 G-74, 78 SR-38

In accord with your October 27, 1978 request, pavement friction tests have been conducted on all legs of the M 153 (Ford Rd.) intersection with Middlebelt Rd. in Garden City. Coefficients obtained November 5, 1978 ranged from 0.27 to 0.39 and averaged 0.33. Below test results are provided for each leg of the intersection.

Roadway	Surface Type	Lane	Coefficient of Wsf (40 mph)		
			Low	High	Avg
M 153 (Ford Rd)	Bit	EBOL	0.33	0.35	0.34
	Bit	EBIL	0.29	0.35	0.32
	Bit	WBOL	0.31	0.33	0.32
	Bit	WBIL	0.28	0.33	0.30
Middlebelt Rd	Bit	NBOL	0.34	0.39	0.36
	Bit	NBIL	0.33	0.36	0.35
	Conc	SBOL	0.27	0.31	0.29
	Bit	SBIL	0.31	0.36	0.34

TESTING AND RESEARCH DIVISION

L. T. Oehler  
Engineer of Research

LTO:PMS:bf

cc: K. A. Allemeier

SECTION VIII

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 17, 1978

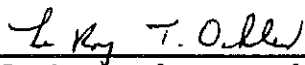
TO: D. E. Orne  
Engineer of Traffic and Safety

FROM: L. T. Oehler

SUBJECT: Report of Pavements with Wsf Values Averaging Below 0.35.  
Research Project 54 G-74, 78 SA-1.

In conformance with our continuing policy of reporting friction levels averaging below 0.35, the attached list of 21 locations is furnished for your review. Wsf values listed were determined from routine inventory pavement friction tests conducted between July 25, 1978 and August 10, 1978.

TESTING AND RESEARCH DIVISION

  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

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
33081-04974 (Control Section 33042)	Westbound M 43 (east Grand River) from 100 ft west of Homer St west 0.833 mile to 170 ft west of Marshall St	Bit Conc	1973	7-25-78	WBOL	0.34	0.36	0.35
					WB#3	0.24	0.28	0.27
					WB#2	0.31	0.36	0.34
					WBIL	0.35	0.36	0.35
33061-020	Westbound M 43 from west of Catherine St east to Logan St	Conc	1968	7-25-78	WBOL	0.36	0.39	0.37
					WBCL	0.33	0.34	0.33
					WBIL	0.37	0.42	0.40
41131-10501	US 131 from 500 ft south of Wealthy St north to 100 ft north of Pearl St	Bit Conc	1977	7-26-78	NBOL	0.43	0.46	0.44
					NBCL	0.37	0.42	0.40
					NBIL	0.46	0.49	0.48
					SBOL	0.31	0.36	0.34
					SBCL	0.33	0.37	0.35
9 BA-5A (Control Section 61073)	US 31 BR (Colby St) from C&O RR overpass in Whitehall north to the railroad tracks in Montague	Bit Conc	1968	7-27-78	NB	0.29	0.30	0.30
					SB	0.21	0.25	0.23
10011, C2	M 22 from Benzie-Manistee County Line north to M 115	Bit Agg	1963	7-27-78	NB	0.34	0.36	0.35
					SB	0.31	0.36	0.34
45071, C4	M 22 from 850 ft south of Cedar Creek north 4.654 miles	Bit Conc	1963	7-27-78	NB	0.28	0.31	0.29
					SB	0.27	0.27	0.27
50011, C6	M 53 from Macomb-Wayne County Line north to north limits of Warren, omitting within limits of Centerline	Bit Conc	1963	7-30-78	NBOL	0.29	0.36	0.33
					NBCL	0.29	0.35	0.32
					NBIL	0.28	0.43	0.36
					SBOL	0.30	0.39	0.35
					SBCL	0.29	0.36	0.34
					SBIL	0.29	0.37	0.34

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
50011, C7	M 53 from south limits of Centerline north to 11 Mile Rd	Bit Conc	1963	7-30-78	NBOL NBCL NBIL SBOL SBCL SBIL	0.34 0.35 0.30 0.35 0.33 0.34	0.35 0.36 0.35 0.36 0.35 0.36	0.35 0.36 0.33 0.36 0.34 0.35
13032-04836	M 66 from intersection of Capital Ave and Division St in Battle Creek, north 5.71 miles, omitting from Shell Dr north 0.34 mile	Bit Conc	1973	7-31-78	<u>In Battle Creek</u> NBOL NBIL SBOL SBIL	0.37 0.29 0.30 0.36	0.37 0.34 0.34 0.40	0.37 0.31 0.32 0.37
13061-010	I 94 BL (Michigan Ave) from Elm St southeast and east to east limits of Battle Creek	Bit Conc	1968	7-31-78	EB WB	0.30 0.31	0.34 0.34	0.32 0.33
11074-05042 (Control Section 11091)	M 51 from north limits of Niles north to 1,300 ft south of the Berrien-Cass County Line	Bit Conc	1973	8-1-78	NB SB	0.35 0.33	0.40 0.35	0.38 0.34
78011-04785 (Control Section 78061)	M 86 from 650 ft south of south limits of Three Rivers north to M 60	Bit Conc	1973	8-2-78	NB SB	0.30 0.34	0.36 0.36	0.33 0.35
40-11031-21-C2	Southbound M 139 from Britain St north to I 94 BL (Main St) in Benton Harbor	Bit Conc	1961	8-2-78	SBOL SBCL SBIL	0.22 0.22 0.21	0.27 0.22 0.27	0.24 0.22 0.24

Project No.	Location	Surface Type	Construction Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
11052, C6	US 31-US 33 from east limits of Berrien Springs east to College Ave	Bit Conc	1963	8-2-78	NB SB	0.22 0.27	0.23 0.31	0.22 0.29
13042-003	I 94 BL from I 69 east to US 27 in Marshall	Bit Conc	1968	8-3-78	EBIL WBIL	0.29 0.33	0.33 0.37	0.30 0.35
13022, C7	M 60 from 100 ft west of Goldup St east to 300 ft east of the Kalamazoo River in Homer	Bit Conc	1963	8-3-78	EBOL EBIL WBOL WBIL	0.36 0.33 0.36 0.30	0.37 0.34 0.40 0.33	0.36 0.34 0.39 0.31
46061, C6 (1963) 40-38, C8 (1951)	M 52 from US 223 north to south limits of Adrian	Conc Bit Conc Conc Bit Conc	1963 1951 1963 1951	8-3-78	NBOL NBIL SBOL SBIL	0.28 0.27 0.24 0.24	0.33 0.34 0.29 0.29	0.30 0.30 0.27 0.27
73062-04738	M 46 (Gratiot Rd at Center Rd) 1 mile west of Saginaw	Bit Conc	1973	8-9-78	EBOL EBIL WBOL WBIL	0.29 0.34 0.33 0.35	0.31 0.35 0.34 0.39	0.30 0.34 0.33 0.37
18031-04958	US 27 BR from 50 ft north of Parkway Dr north to US 27	Bit Conc	1973	8-9-78	NB SB	0.33 0.36	0.35 0.39	0.34 0.37
26011-04773	M 18 from M 61 north to 380 ft north of Blending Rd	Bit Agg	1973	8-9-78	NB SB	0.36 0.27	0.37 0.28	0.36 0.27
09032-06800	M 13 from 494 ft south of Fisher Rd north to 300 ft south of Union St in Bay City	Bit Conc	1977	8-10-78	NBOL NBIL SBOL SBIL	0.36 0.33 0.30 0.33	0.39 0.36 0.36 0.34	0.37 0.34 0.34 0.33





# OFFICE MEMORANDUM

DATE: September 22, 1978

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, 78 SA-2

In conformance with our continuing policy of reporting friction levels averaging below 0.35, the attached list of 21 locations is furnished for your review. Wsf values listed were determined from routine inventory pavement friction tests conducted between August 17, 1978 and September 13, 1978.

TESTING AND RESEARCH DIVISION

*L. T. Oehler*  
\_\_\_\_\_  
Engineer of Research

LTO:PMS:bf

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

Project No.	Location	Surface Type	Const. Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
70041-06107	M 45 (Lake Michigan Dr) from US 131 east to 52nd St	Bit Conc	1974	8-17-78	EBOL	0.33	0.37	0.35
					EBIL	0.36	0.36	0.36
					WBOL	0.30	0.34	0.32
					WBIL	0.30	0.33	0.31
41081-04844	M 45 from Ottawa-Kent County Line east to Division St, omitting from Maynard Ave east to 290 ft east of Covell Rd	Bit Conc	1973	8-17-78	<u>West of Maynard Ave</u>			
					EBOL	0.31	0.35	0.34
					EBIL	0.36	0.39	0.38
					WBOL	0.36	0.37	0.37
					WBIL	0.36	0.42	0.40
					<u>West of I 96</u>			
					EB	0.33	0.35	0.34
					WB	0.43	0.46	0.44
21031, C3	M 35 from south limits of Escanaba north to US 2 and US 41	Conc Bit Conc Conc Bit Conc	1963	8-22-78	NBOL	0.39	0.43	0.41
					NBIL	0.36	0.39	0.37
					SBOL	0.36	0.40	0.38
					SBIL	0.30	0.36	0.34
55031, C9	M 35 from US 41 north to north limits of Menominee	Conc Bit Conc Conc Bit Conc	1963	8-22-78	NBOL	0.30	0.33	0.31
					NBIL	0.40	0.42	0.41
					SBOL	0.42	0.45	0.43
					SBIL	0.34	0.36	0.35
52042, C8	US 41-M 29, Marquette Bypass	Conc	1963	8-23-78	EBOL	0.33	0.34	0.33
					EBIL	0.36	0.39	0.37
					WBOL	0.34	0.35	0.34
					WBIL	0.40	0.42	0.41
78011-04785 (part) (Control Section 78021)	US 12 from M 103 east to Mann Rd	Bit Conc	1973	8-28-78	EB	0.36	0.39	0.37
					WB	0.24	0.28	0.26
25072-09295	M 54 from 640 ft north of Court St north to 568 ft north of Davison Rd	Bit Conc	1977	8-29-78	NBOL	0.23	0.30	0.27
					NBIL	0.36	0.39	0.37
					SBOL	0.28	0.33	0.30
					SBIL	0.36	0.37	0.37
25052-005	M 54 BR (Saginaw St) from Detroit St north to Wager St in Flint	Bit Conc	1968	8-29-78	NBOL	0.34	0.39	0.36
					NBIL	0.33	0.36	0.34
					SBOL	0.36	0.37	0.36
					SBIL	0.36	0.39	0.37
25052-006	M 54 BR (Saginaw St) from Wager St to Carpenter Rd (north limits of Flint)	Bit Conc	1968	8-29-78	NBOL	0.36	0.36	0.36
					NBIL	0.36	0.40	0.37
					SBOL	0.31	0.35	0.34
					SBIL	0.34	0.39	0.36
33021-04774	M 36 from 150 ft northwest of Curtiss St in Mason south and east, intermittently, to 0.5 mile west of M 52	Bit Agg	1973	9-1-78	EB	0.28	0.55	0.37
					WB	0.28	0.42	0.37
81072-005	US 23 BR-I 94 BL (Huron St) from 79 ft west of Main St east to 250 ft east of Fletcher St and on Washtenaw Ave from 113 ft southeast of S. University Ave southeast to 30 ft southeast of Toumy Ave	Bit Conc	1968	9-1-78	<u>East of Main St</u>			
					EBOL	0.39	0.41	0.40
					EBIL	0.37	0.43	0.40
					WBOL	0.30	0.35	0.33
					WBIL	0.33	0.35	0.34

Project No.	Location	Surface Type	Const. Year	Test Date	Direction and Lane	Coefficient of Wet Sliding Friction		
						Low	High	Avg
81072-005					<u>West of Toumy Ave</u>			
					EBOL	0.43	0.46	0.45
					EBIL	0.42	0.46	0.44
					WBOL	0.42	0.46	0.44
					WBIL	0.36	0.42	0.39
83032-05022	US 131 from 270 ft south of south junction with M 42 north to 340 ft north of north city limits of Manton	Bit Agg	1973	9-5-78	NB	0.29	0.30	0.29
					SB	0.28	0.33	0.30
24011-00307	US 31 from Charlevoix-Emmet County Line east to west city limits of Petoskey	Bit Conc	1973	9-6-78	<u>North of County Line</u>			
					NB	0.36	0.36	0.36
					SB	0.36	0.37	0.36
					<u>South of Parkview Rd</u>			
					NB	0.30	0.33	0.32
					SB	0.29	0.30	0.30
24011-00308	US 31 from west city limits of Petoskey east to US 131	Bit Conc	1973	9-6-78	NBOL	0.40	0.42	0.41
					NBIL	0.31	0.34	0.33
					SBOL	0.35	0.39	0.37
					SBIL	0.31	0.33	0.32
24011-03949	US 31 from Liberty St south to US 131 in Petoskey	Bit Conc	1973	9-6-78	NBOL	0.24	0.27	0.25
					NBIL	0.21	0.22	0.22
					SBOL	0.19	0.24	0.22
					SBIL	0.22	0.24	0.23
04021-04956 (part)	M 32 from US 23 west to 11th St in Alpena	Bit Conc	1973	9-6-78	EB	0.29	0.30	0.30
					WB	0.27	0.28	0.27
04021-04956 (part) (Control Section 04031)	US 23 from Grant St north to Chisholm St	Bit Conc	1973	9-6-78	NB	0.29	0.30	0.30
					SB	0.25	0.28	0.26
04031-09266	US 23 from 530 ft south of Pohl Rd north to Alpena City Limits	Bit Conc	1977	9-6-78	NB	0.35	0.39	0.37
					SB	0.33	0.34	0.34
63172, C1	I 75 from north of Auburn Rd to south of Walton Blvd	Conc	1963	9-11-78	NBOL	0.31	0.34	0.33
					NBIL	0.40	0.42	0.41
					SBOL	0.30	0.36	0.32
					SBIL	0.36	0.37	0.37
63201, C3, C4	US 10 BR (Widetrack Dr in Pontiac) from Huron St north, east, south and west to Whittemore St	Conc	1963	9-11-78	OL	0.35	0.35	0.35
					#3	0.28	0.30	0.29
					#2	0.33	0.34	0.33
					IL	0.35	0.37	0.36
9SC-4A (Control Section 60021)	M 32 from 7.8 miles east of Otsego-Montmorency County Line east to Atlanta	NSST (dbl seal)	1968	9-13-78	<u>0.5 mile west of Manier Rd</u>			
					EB	0.23	0.31	0.27
					WB	0.21	0.28	0.25
					<u>East of Thornton Rd</u>			
					EB	0.35	0.37	0.36
					WB	0.28	0.34	0.32