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SUMMARIES OF MICHIGAN PAVEMENT ROUGHNESS  
1968 Test Program



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

SUMMARIES OF MICHIGAN PAVEMENT ROUGHNESS  
1968 Test Program

Prepared for the Construction Division

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REFERENCE: Felter, R. L. Summaries of Michigan Pavement Roughness: 1968 Test Program. Michigan Department of State Highways Research Report No. R-697. April 1968.

ABSTRACT: Test results for the eighteenth year of this long-term study of riding quality of newly constructed or opened Michigan pavements are tabulated, with full identification of projects; their lengths, routes, and locations; and contractors responsible for paving.

KEY WORDS: roughness, riding quality.

SUMMARIES OF MICHIGAN PAVEMENT ROUGHNESS  
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This report summarizes 1968 roughness measurements of 161 lane miles of standard rigid pavement (two-lane pours) and 1 lane mile of rigid pavement widening (one-lane pours).

From 1959 through 1965, pavement roughness indices were recorded using two measuring methods: (1) The integrator method, measuring units of roughness as accumulated inches per mile, and (2) The level indicator method measuring units of roughness as accumulated g's per mile. In late 1966 repeated electronic problems with the level indicator instrument resulted in deletion of the values from the 1966 report. Because of these persistent problems, consideration was given to discontinuing measurements using the level indicator. This consideration was influenced by one phase of a current Research Laboratory project, "Interpretation of Roughness with GMRT Profilometer," which compared roughness readings from both the integrator and level indicator with subjective ratings of a panel of observers. Correlation analysis resulted in nearly equal coefficients for each system, indicating that the two systems constitute a duplication of efforts. Therefore, continued maintenance on the level indicator does not appear justified and this system will be discontinued for future roughness testing.

Rigid Pavement Construction (Two-Lane Pours)

Individual rigid pavement projects constructed as standard two-lane pours, and their roughness values as determined in the 1968 test program, are listed in Table 1. These projects are grouped by year of construction and ranked within these years according to accumulated inches per mile roughness by integrator measurements. During the 18 years of roughness surveys, these integrator values have ranged from a low (smooth) of 93 to a high (rough) of 282. For 1968 the range was from 129 to 172.

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(1) Throughout this report, the terms "construction year" and "test year" are specifically used to distinguish between the period of construction operations, and the time when measurements were conducted by the Research Laboratory. Further, the term "project mileage" refers to length given by the Contract Division, and "lane mile" to length given in terms of individual vehicle lanes.

On the basis of riding quality, the Laboratory classified projects in three integrator-count categories:

"good"	(0 to 130 accumulated inches per mile)
"average"	(131 to 174)
"poor"	(175 or more)

Table 2 shows that since 1951, with a total of 508 rigid pavement projects tested, 38, 51, and 11 percent of this total have been rated good, average, and poor, respectively. In the 1968 test year 9, 91, and 0 percent of the 11 projects tested were rated good, average, and poor respectively. The weighted arithmetic mean for roughness of all projects tested during the 1968 test year was 150 accumulated inches per mile. This represents a 14 percent increase in measured roughness for two-lane pours tested in 1968 over those tested in 1967.

#### Rigid Pavement Construction (One-Lane Pours)

In addition to the usual surveys of roughness on newly constructed standard rigid pavement (two-lane pours), the 1968 measurements include 1 rigid pavement widening project (one-lane pours), with results shown in Table 3.

The testing procedure for these projects is the same as for the standard rigid pavements. However, due to somewhat different construction procedures required for pours of one-lane width, the range of roughness values to be expected varies from standard rigid pavements. Table 4 summarizes test data obtained during the 11 years in which this type of construction has been under study.

#### Flexible Pavement Construction

As in the case of rigid pavement widening, measurements on flexible pavement construction represent a supplement and extension of the Research Laboratory's pavement roughness program, and is included in the annual reports as construction warrants. Normally, only flexible pavements of freeway specifications are included in the surveys. There were no projects of this type completed during the 1968 test year and consequently no data are available.

**TABLE 1**  
**ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT (Two-Lane Pours)**

Project	District	Test Length, mi.	Type	Route and Project Location	Roughness Integrator (in./mile)	Paving Contractor	
1967 CONSTRUCTION	U 82062-011	10	0.767	48 ft (Dual)	US 12 (Mich. Ave) commencing at Brady St, east on US 12 to the Rouge River, City of Dearborn	165	The Kutchins Co. and Kutchins Company, Inc. <sup>1</sup>
	F 06041-001	6	1.930	24 ft (Dual)	US 23 connector, commencing at a point approx. 300 ft E of Melita Rd, east 1.930 miles to existing US 23 just S of Sagatoo Rd	138	L. W. Edison Co. (WB) Hodgkiss and Douma, Inc. (EB) <sup>2</sup>
	U 25042-005	6	2.800	24 ft (Dual)	M 78 relocation commencing at Miller Rd, east to E of Bristol Rd	152	Chas. J. Rogers, Inc. and Chas. J. Rogers, Construction Co. <sup>3</sup> The Kutchins Co. <sup>3</sup> and Kutchins Company, Inc. <sup>3</sup>
	I 13073-001	7	3.342	24 ft (Dual)	I 69 commencing at a point S of Kalamazoo River, north to I 94	149	Carl Goodwin and Sons, Inc.
	BI 82194J, C28 BI 82194K, C29	10	0.924	48 ft (Dual)	I 75 (Fisher Freeway) commencing at Junction Ave, northeast to E of W Grand Blvd, City of Detroit	158	The Kutchins Co. and Kutchins Company, Inc. <sup>4</sup>
Weighted arithmetic mean for 1967 construction tested in 1968					151		
1968 CONSTRUCTION	BI 82195B, C19 BI 82195D, C20 BI 82251B, C45	10	1.070	48 ft (Dual)	I 75 (Fisher Freeway) commencing at Lodge Freeway, northeast to St. Antoine, City of Detroit	140	L. A. Davidson, and L. A. Davidson, Inc.
	I 63174-070 BI 82252-142*	9, 10	2.836	36 & 48 ft (Dual)	I 75 commencing at Victor Ave, north to a point approx. 100 ft S of Berhard Ave, Hazel Park	172	Cooke Contracting Co. <sup>5</sup>
	I 33044-037	8	1.567	24 ft (Dual)	I 496 commencing at Waverly Rd, east to W of Middle St, City of Lansing	161	Eisenhour Construction Co., Inc. <sup>6</sup>
	I 06111-007	6	11.990	24 ft (Dual)	I 75 commencing N of M 61, north to S of Maple Ridge Rd	143	Denton Construction Co, Sargent Contracting Co. and Sargent Machinery & Equipment Co. <sup>7</sup>
	I 82252-079 BI 82252-118	10	1.227	48 ft (Dual)	I 75 commencing N of Holbrook Ave, north to Carpenter Ave.	168	Cooke Contracting Co. <sup>4</sup>
	F 41132-004	5	4.987	24 ft (Dual)	US 131 relocation commencing S of N Park St, north to Post Rd	129	L. W. Edison Co.
Weighted arithmetic mean for 1968 construction tested in 1968					149		
Weighted arithmetic mean for 1968 test year (two-lane pours)					150		

1 Subcontract from Sugden, Inc. and D & K Corporation.

2 Subcontract from O. E. Gooding and Company.

3 Contract awarded to Chas. J. Rogers, Inc. and Chas. J. Rogers Construction Co.

4 Subcontract from Greenfield Construction Co., Inc.

5 Contract awarded to Cooke Contracting Co., Jutton-Kelly Company, Chas. J. Rogers, Inc., and Chas. J. Rogers Construction Co.

6 Subcontract from Johnson-Greene Company.

7 Subcontract from Holloway Construction Company.

\* For additional data, see Table 3.

TABLE 2  
EIGHTEEN-YEAR ROUGHNESS SUMMARY FOR RIGID PAVEMENT (Two-Lane Pours)

Test Year	Total Projects	Project Mileage	Lane Mileage	Percent of Total Projects			Weighted Arithmetic Mean in./mi
				Good (0-130 in./mi)	Average (131-174 in./mi)	Poor (175 or more in./mi)	
1951	17	48.327	109.318	47	29	24	144
1952	25	70.615	173.900	4	68	28	154
1953	40	98.791	250.082	17	68	15	146
1954	17	41.271	110.838	29	42	29	147
1955	22	52.690	145.723	36	64	0	140
1956	21	82.473	241.866	19	62	19	141
1957	33	165.086	520.200	61	36	3	126
1958	34	140.506	487.352	74	26	0	114
1959	45	168.892	660.744	51	42	7	124
1960	35	154.333	558.866	83	14	3	117
1961	37	133.043	477.087	38	49	13	133
1962	36	140.128	511.668	25	61	14	137
1963							
	35	167.040	606.852	40	51	9	131
1964							
1965	52	159.679	572.206	21	60	19	140
1966	25	70.586	216.644	16	84	0	143
1967	23	99.570	367.912	35	61	4	132
1968	11	33.440	161.056	9	91	0	150
1951-1968	508	1826.470	6172.314	38	51	11	132

TABLE 3  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT WIDENING (One-Lane Pours)

Project	District	Test Length, mi.	Type	Route and Project Location	Roughness Integrator (in./mile)	Paving Contractor
I 63174-070 BI 82252-142*	9, 10	0.70	12 ft	On I 75 commencing at Victor Ave, north to a point approx. 100 ft S of Berhard Ave, Hazel Park	153	Cooke Contracting Co. <sup>1</sup>

(1) Contract awarded to Cooke Contracting Co., Jutton-Kelly Company, Chas. J. Rogers, Inc., and Chas. J. Rogers Construction Co.

\* For additional data, see Table 1.

TABLE 4  
ELEVEN-YEAR ROUGHNESS SUMMARY FOR RIGID PAVEMENT WIDENING (One-Lane Pours)

Test Year	Total Projects	Project Mileage*	Lane Mileage**	Percent of Total Projects			Weighted Arithmetic Mean in./mi
				Good (0-130 in./mi)	Average (131-174 in./mi)	Poor (175 or more in./mi)	
1958	3	5.403	11.176	33.3	33.3	33.3	122
1959	2	3.092	6.184	0	50	50	194
1960	5	13.925	24.152	20	60	20	138
1961	10	17.704	31.995	0	70	30	162
1962	4	10.006	20.012	0	75	25	169
1963-1964	14	27.093	57.940	0	64	36	163
1965	30	61.360	122.508	7	63	30	156
1966	13	27.252	54.173	0	100	0	147
1967	6	13.306	25.212	17	66	17	153
1968	1	2.836	0.700	0	100	0	153
1958-1968	88	181.977	354.052	6	69	25	155

\* As given in Contract Division monthly "Report of Awards"

\*\* Total mileage of 11- or 12-ft wide lanes