

SUMMARIES OF MICHIGAN PAVEMENT ROUGHNESS  
1965 Test Program

Prepared for the Road Construction Division

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## INFORMATION RETRIEVAL DATA

REFERENCE: Luce, Philip T. "Summaries of Michigan Pavement Roughness: 1965 Test Program." Michigan Department of State Highways Research Report No. R-570. June 1966.

ABSTRACT: Test results for the fifteenth 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  
1965 Test Program\*

This report summarizes 1965 roughness measurements of 572 lane miles of standard rigid pavement (two-lane pours), 146 lane miles of flexible pavement, and 123 lane miles of rigid pavement widening (one-lane pours).

As is customary, the two methods of roughness measurement used were correlated on the basis of data obtained for rigid pavement two-lane and one-lane pours. The equation derived from correlating 1965 Integrator data with 1965 Acceleration Level Indicator data is:

$$y = 6.371 x - 351.624$$

where  $y$  = Acceleration Level Indicator readings in g's per mile, and  $x$  = Integrator readings in accumulated inches per mile. The correlation coefficient for this equation is 0.894 and the standard error is  $\pm 92.7$  g's per mile.

Rigid Pavement Construction (Two-Lane Pours)

Individual rigid pavement projects constructed as standard two-lane pours, and their roughness values as determined in the 1965 test program, are listed in Table 1, grouped by year of construction, and ranked within these years according to accumulated inches per mile roughness by Integrator measurements; where two or more projects have the same Integrator count, they are ranked by Level Indicator count. During the 15 years of roughness surveys, these Integrator values have ranged from a low (smooth) of 93 to a high (rough) of 282. For 1965 the range was from 111 to 221.

On the basis of riding quality, the Laboratory classifies projects in three Integrator-count categories:

- "good" (0 to 130 accumulated inch per mi)
- "average" (131 to 174)
- "poor" (175 or more)

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\* 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.

Table 2 shows that since 1951, with a total of 449 rigid pavement projects tested, 40, 48, and 12 percent of this total have been good, average, and poor, respectively. In the 1965 test year 21, 60, and 19 percent of the 52 projects measured were good, average, and poor, respectively. The weighted arithmetic mean for roughness of all projects tested during the 1965 test year was 140 accumulated inches per mile. Table 2 shows that the two-lane pours measured in 1965 were not as smooth as those measured in the 1963-64 test period. However, this decrease in measured smoothness involved numerous 1962, 1963, and 1964 construction projects with varying terms of actual service under traffic, and only nine "new" 1965 projects.

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

In addition to the usual surveys of roughness on newly constructed standard rigid pavements (two-lane pours), the 1965 measurements included 30 rigid pavement widening projects (one-lane pours), with the results shown in Table 3.

The testing and reporting procedures used for these projects are the same as those for standard rigid pavements. However, due to somewhat different construction procedures required in pours of one-lane width, the range of roughness values varies from that for standard rigid pavements. For this reason, widening projects are reported and tabulated separately from standard rigid construction. Table 4, which summarizes test data obtained during the eight years in which this type of construction has been under study, shows that the one-lane pour pavements measured in 1965 were smoother than those measured in 1963-64.

#### Flexible Pavement Construction

As in the case of rigid pavement widening, this type of roughness measurement represents a supplement and extension of the Department's rigid pavement roughness program, and is being included in the annual reports as construction warrants. Normally, only flexible pavements of expressway quality are included in the surveys, although other bituminous projects may be measured when construction procedures or special roughness conditions make this desirable.

Nine flexible pavement projects were surveyed in the 1965 test year. The accumulated inches per mile figures presented in Table 5 and the average of separate wheel track tests in all vehicle lanes.

TABLE 1  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT  
(TWO-LANE POURS)

Project	District	Length, mile	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
EBACI 63101A, C1RN	9	5.408	24 ft (dual)	I 896 east from I 96 to east of Orchard Lake Rd.	136	468	Sargent Construction Co.
EBACI 63101B, C3RN, C6UN	9	2.49	24 ft (dual)	I 696 east from east of Orchard Lake Rd. to west of Franklin Rd.	149	640	Sargent Construction Co. (1)
EU 82198A, C10U*	10	1.886	36 ft (dual)	M 39 (Southfield Expressway) north from north of Schoolcraft Ave. to north of McNichols Rd.	190	858	Cooke Contracting Co. (2)
U 82192A, C20	10	0.982	24 & 36 ft (dual)	M 39 (Southfield Expressway) north from Pinecrest to south of Outer Drive.	197	1018	The Kutchins Co. (3)
1962 CONSTRUCTION							
Weighted Arithmetic Mean for 1962 Construction Tested During 1965 Test Year.							
BI 50111K, C22RN*	9	7.178	24 & 36 ft (dual)	I 94 northeast from 600 ft north of Cotton Rd. to 1000 ft northeast of Macomb--St. Clair County Line.	111	529	Sargent Construction Co. (4)
BI 50112A, C1RN							
BF 03032A, C3	7	5.590	24 ft (dual)	US 31-I 196 south from existing US 31 to Washington Rd.	115	440	Titus Construction Co. (5)
EU 03032A, C4							
BI 03034D, C11							
BI 63172A, C1	9	2.999	24 ft (dual)	I 75 north from north of Auburn Rd. to south of Walton Blvd.	118	379	Pierson Contracting Co. (6)
BI 03033E, C12	7	6.588	24 ft (dual)	US 31-I 196 from Adams Rd. south to 629.07 ft north of 116th Ave.	119	406	Carl Goodwin & Sons, Inc.
BI 03034A, C7							
BI 63174I, C6*	9	3.09	36 ft (dual)	I 75 north and west from north of 13 Mile Rd. to west of M 150.	130	488	Denton Construction Co. (6)
BI 63174J, C7							
BI 63174E, C8							
BI 77111D, C4	9	6.322	24 ft (dual)	I 94 north from Big Hand Rd. to 1860 ft north of Gratiot Ave.	133	535	Sargent Construction Co. (6)
BI 50111J, C13*	9	4.225	36 ft (dual)	I 94 north from 1180 ft south of Henry E. Joy Rd. to 600 ft north of Cotton Rd.	133	559	Denton Construction Co. (7)
BI 82191D, C9RN*	10	3.937	24 & 36 ft (dual)	I 75 & I 75 Connector to Telegraph Rd. north and west from south of Shibley Rd. to intersection of Telegraph & Eureka Rds.	144	618	L. A. Davidson
F 82271A, C2R							
BI 63174G, C4*	9	2.788	24 & 36 ft (dual)	I 75 west and north from east of Adams Rd. to Auburn Rd.	148	494	Sargent Construction Co. (4)

\*For additional data, see Table 3.  
 (1) Contract awarded to Western Construction Co.  
 (2) Contract awarded to Chas. J. Rogers, Inc., Cooke Contracting Co. & Jutton-Kelly Co.  
 (3) Subcontract from Louis Garavaglia Contractors, Inc.  
 (4) Subcontract from Canonic Construction Co.  
 (5) Subcontract from S. D. Solomon & Sons.  
 (6) Subcontract from Holloway Construction Co.  
 (7) Subcontract from Hentel-Deyo Co. & Blue Water Excavating Co., Inc.

**TABLE 1 (Cont.)**  
**ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT**  
**(TWO-LANE POURS)**

Project	District	Length mile	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
I 41027F, C59	5	1.876	24 ft (dual)	I 196 west from I 96 to Fuller Ave.	143	532	L. W. Edison Co.
F 82211B, C16 U 82211B, C17	10	5.255	24 ft	M 85 (NB) northeast from Allen Rd. to Sibley Rd.	148	760	Cooke Contracting Co.
BI 63174F, C3*	9	3.284	36 ft (dual)	I 75 north and west from south of East Long Lake Rd. to east of Adams Rd.	149	485	Sargent Construction Co. (4)
BI 50111I, C12*	9	2.428	35 ft (dual) & 36 ft	I 94 north from the Clinton River Spillway to 1180 ft south of Henry E. Joy Rd.	149	630	L. A. Davidson
BI 63174E, C2*	9	2.92	36 ft (dual)	I 75 north from west of M 150 to north of 17 Mile Rd.	157	627	Cooke Contracting Co.
BI 63174I, C3* BI 63174D, C14	9	2.40	36 ft (dual)	I 75 north from Sprague Ave. to north of 13 Mile Rd.	158	689	Cooke Contracting Co. (2)
BU 82193B, C8*	10	1.723	36 ft (dual)	M 39 (Southfield Expressway) north from north of McNichols Rd. to north of Trojan Ave.	162	626	Cooke Contracting Co. (2)
U 39041A, C5*	7	0.566	24 ft	US 131BR (SB) north from the NYC RR to Michigan Ave.	166	783	W. H. Knapp, Inc.
U 82192D, C22*	10	1.664	36 ft (dual)	M 39 (Southfield Expressway) north from south of Rokunda Dr. to north of Village Rd.; also M 39 (Southfield Expressway) north from north of Michigan Ave. to south of Ford Rd.	171	718	The Kutchins Co. (3)
U 63201A, C3, C4*	9	1.832	44-72 ft (variable)	Saginaw St. - US 10BR Reloc. - I 75BI - Cass Ave. (Widetrack Drive) southeast, north, west, and south from Whittemore St. to W. Huron St.	178	988	Oak Construction Co.
USS 63011C, C14	9	2.025	44 ft	M 218 (Orchard Lake Rd.) north and east from south of Commerce Rd. to Pontiac Dr.	181	888	Anderson & Ruzzin, Inc.
F 226022A, C7	1	0.757	24 ft	US 2 (WB) west from start of dual roadway in Norway to approx. 0.3 mile east of west city limits of Norway.	186	751	Bacco Construction Co.
Weighted Arithmetic Mean for 1963 Construction Tested During 1965 Test Year.					137	560	

\*For additional data, see Table 3.

(2) Contract awarded to Chas. J. Rogers, Inc., Cooke Contracting Co. & Jutton-Kelly Co.

(3) Subcontract from Louis Garavaglia Contractors, Inc.

(4) Subcontract from Canonic Construction Co.

TABLE 1 (Cont.)  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT  
(TWO-LANE POURS)

Project	District	Length, mile	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
BI 7711LE, C5 BI 7711LF, C6	9	4.129	24 ft (dual)	I 94 northeast from 1860 ft north of Gratiot Ave. to 113 ft north of Griswold Rd.	114	454	Sargent Construction Co. (8)
BI 03034B, C9	7	4.771	24 ft (dual)	US 31 Reloc.-I 196 south from Washington Rd. to Adams Rd.	122	464	Carl Goodwin & Sons, Inc.
BI 7711LG, C7 BI 7711LH, C8	9	3.133	24 ft (dual)	I 94 northeast from 113 ft north of Griswold Rd. to 695 ft north of Water St.	129	566	Sargent Construction Co. (9)
I 41029E, C3 I 41029D, C37 I 41029B, C54	5	2.463	24 ft (dual)	I 196 north from 0.762 mile southwest of south city limits of Wyoming to the Grand River.	132	456	L. W. Edison Co.
I 41027A, C24 I 41027D, C56 I 41027E, C58 I 41027A, C163 I 41027B, C164 I 41029E, C1 I 41029F, C6, C8	5	4.908	24 ft (dual)	I 196 northeast from the Grand River to Fuller Ave.	135	469	Carl Goodwin & Sons, Inc.
I 41029A, C35 I 41029B, C36	5	2.264	24 ft (dual)	I 196 northeast from the Ottawa-Kent Co. Line to 0.762 mile southwest of south city limits of Wyoming.	136	554	L. W. Edison Co.
F 13121B, C1	7	2.941	24 ft	I 94BL northeast from Columbia Ave. to Dickman Rd.	137	510	Titus Construction Co. (10)
BI 50111G, C41*	9	1.116	36 ft (dual) & 36 ft	I 94 north from Masonic Blvd. to north of 14 Mile Rd.	137	528	Cooke Contracting Co. (2)
F 81102B, C7	8	3.632	24 ft (dual)	M 14 Reloc. east from US 23 to Plymouth Rd.	141	558	L. A. Davidson (11)
F 82025G, C25*	10	3.225	36 ft	US 24 (SB) south from Haskell St. to Eureka Rd.	141	645	Cooke Contracting Co. (2)
F 50092A, C1	9	1.37	24 ft	M 19 northwest from I 94 to Gratiot Ave.	142	645	Anderson & Ruzzin, Inc. (12)
U 39051D, C5 F 39051B, C6	7	4.709	24 ft (dual)	US 131BR northwest from Hopkins St. to US 131.	145	535	Sargent Construction Co. (6)
BI 50111H, C11*	9	2.497	36 ft (dual)	I 94 north from north of 14 Mile Rd. to the Clinton River Spillway.	147	577	Cooke Contracting Co. (2)
U 82192B, C21* U 82192A, C35 U 82192D, C36	10	1.662	36 ft (dual)	M 39 (Southfield Expressway) north from south of Outer Drive to north of Dearborn Rd.	158	630	L. A. Davidson
U 33061D, C11* U 33061E, C12	8	0.923	36 & 48 ft	M 43 (WB) west from Center St. to Logan St.	175	816	Eisenhour Construction Co., Inc. (13)

\* For additional data, see Table 3.

(2) Contract awarded to Chas. J. Rogers, Inc., Cooke Contracting Co. & Jutton-Kelly Co.

(6) Subcontract from Holloway Construction Co.

(8) Subcontract from A. Lindberg & Sons, Inc.

(9) Subcontract from K. G. Marks, Inc. & Blue Water Excavating Co., Inc.

(10) Subcontract from Carl Goodwin & Sons, Inc.

(11) Contract awarded to S. D. Solomon & Sons and L. A. Davidson

(12) Contract awarded to Anderson & Ruzzin, Inc. & Sterling Garret Contracting Co., Inc.

(13) Contract awarded to Eisenhour Construction Co., Inc. & Walter Foebe & Co.

TABLE 1 (Cont.)  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT  
(TWO-LANE POURS)

Project	District	Length, mile	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
F 81121A, C2	8	0.874	24 ft (dual)	M 153 Reloc. southeast from Plymouth--Ann Arbor Rd. to Franks Lake & Ford Rds.	176	775	Eisenhour Construction Co., Inc. (14)
M 63201B, C1	9	0.541	48 & 60 ft	M 59--Cass St. (Widetrack Dr.) southeast from W. Huron St. to south of Wesson St.	176	985	Anderson & Fuzzin, Inc.
F 52043B, C4	1	6.708	24 ft	US 41 northwest from 1587 ft northwest of M 94 to Green Garden Hill Rd., omitting 0.47 mile at the Chocolate River.	221	1165	L. W. Brumm (8)
Weighted Arithmetic Mean for 1964 Construction Tested During 1965 Test Year					143	585	
MB 58021A, C1	10	9.177	22 ft	M 151 (8-in., non-reinforced slabs with 12-ft joint spacing) east from 1113 ft east of US 23 to US 24, omitting bit. surf in village of Samaria.	116	415	L. W. Edison Co.
F 50013A, C2	9	3.567	24 ft (dual)	M 53 Reloc. north from south of 25 Mile Rd. to existing M 53.	119	513	Sargent Construction Co. (6)
F 50013A, C1	9	3.768	24 ft (dual)	M 53 Reloc. north from south of 21 Mile Rd. to south of 25 Mile Rd.	128	523	Sargent Construction Co. (6)
U 63043B, C2 U 63043F C3 BH 63172A, C13	9	1.434	24 ft (dual)	M 59 Reloc. east from proposed GTW RR grade separation to Mott Rd.	181	573	L. W. Edison Co.
F 50011F, C12	9	3.250	24 ft (dual)	M 53 Reloc. north from 17-1/2 Mile Rd. to south of 21 Mile Rd.	133	554	Sargent Construction Co. (6)
BH 81104A, C18 U 81105A, C1 U 81105B, C2	8	3.708	24 ft (dual)	M 14 Reloc. northeast from 0.83 mile west of Wagner Rd. to US 23ER.	149	705	Sargent Construction Co. (6)
I 39022C, C11	7	0.779	24 ft (dual)	I 94 east from the Penn. RR crossing to Sprinkle Rd.	158	719	Carl Goodwin & Sons, Inc.
I 39022C, C12	7	0.777	24 ft (dual)	I 94 east from Westledge Ave. to Lovers Lane.	162	778	Carl Goodwin & Sons, Inc.
U 82061E, C7	10	1.064	48 ft	US 12 Reloc. (EB) east from Heywood St. to intersection of 4th St. & Michigan Ave.	196	1056	L. A. Davidson
Weighted Arithmetic Mean for 1965 Construction Tested During 1965 Test Year.					134	577	
WEIGHTED ARITHMETIC MEAN FOR 1965 ROUGHNESS TEST YEAR.					140	875	

(6) Subcontract from Holloway Construction Co.

(8) Subcontract from A. Lindberg & Sons, Inc.

(14) Contract awarded to O. E. Gooding & Co. & Eisenhour Construction Co., Inc.



TABLE 2  
 FIFTEEN-YEAR ROUGHNESS SUMMARY FOR RIGID PAVEMENT  
 (TWO-LANE POURS)

Test Year	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963-1964	1965	1951-1965
Total Projects	17	25	40	17	22	21	33	34	45	35	37	36	35	52	449
Percent Good 0-130 in./mi.	47	4	17	29	36	19	61	74	51	83	38	25	40	21	40
Percent Average 131-174 in./mi.	29	68	68	42	64	62	36	26	42	14	49	61	51	60	48
Percent Poor 175 or more in./mi.	24	28	15	29	0	19	3	0	7	3	13	14	9	19	12
Weighted Arithmetic Mean	144	154	146	147	140	141	126	114	124	117	133	137	131	140	131
Project Mileage*	48.327	70.615	98.791	41.271	52.690	32.473	165.086	140.506	168.882	154.333	133.043	140.128	167.040	159.679	1622.874
Lane Mileage**	109.318	172.900	250.062	116.838	145.723	241.866	520.200	487.352	660.744	558.866	477.087	511.668	606.852	572.206	5426.702

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

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

**TABLE 3**  
**ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT WIDENING**  
**(ONE-LANE POURS)\***

Project	District	Length, miles	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator in/mile	Level Indicator f's/mile	
BU 82193A, C10U*	10	1.886	12 ft	M 39-Southfield Expressway (median and shoulder sides SB roadway, median side NB roadway) north from north of Schoolcraft Ave. to north of McNichols Rd.	175	769	Cooke Contracting Co. (1)
SS 50012, C8	9	0.615	11 ft	M 53 (shoulder side, both roadways) north from M 59 to Utica north city limits.	276	1752	Western Construction Co.
1962 CONSTR.					200	1011	
Weighted Arithmetic Mean for 1962 Construction Tested During 1965 Test Year							
BI 50111J, C13*	9	4.225	12 ft	I 94 (median side, both roadways) north from I180 ft south of Henry B. Joy Rd. to 600 ft north of Cotton Rd.	142	548	Denton Construction Co. (2)
BI 68174E, C2*	9	2.92	12 ft	I 75 (median side, both roadways) north from west of M 150 to north of 17 Mile Rd.	142	561	Cooke Contracting Co.
BI 82191D, C9RN*	10	1.431	12 ft	I 75 (median side, both roadways) north from north of Sibley Rd. to north of Pennsylvania Rd.	151	558	L. A. Davidson
BI 63174F, C3*	9	3.284	12 ft	I 75 (median side, both roadways) north and west from south of East Long Lake Rd. to east of Adams Rd.	180	646	Sargent Construction Co. (3)
U 82192D, C22*	10	1.664	12 ft	M 39 (median side, both roadways) north from south of Rotunda Dr. to north of Village Rd; also M 39 (median side, both roadways) north from north of Michigan Ave. to south of Ford Rd.	161	659	The Kutchins Co. (4)
BU 82193B, C8*	10	1.723	12 ft	M 39 (median side, both roadways) north from north of McNichols Rd. to north of Trojan Ave.	162	626	Cooke Contracting Co. (1)
BI 63174I, C9*	9	2.40	12 ft	I 75 (median side, both roadways) north from Sprague Ave. to north of 13 Mile Rd.	162	649	Cooke Contracting Co. (1)
BI 63174J, C7	9	3.09	12 ft	I 75 (median side, both roadways) north and west from north of 13 Mile Rd. to west of M 150.	163	646	Denton Construction Co. (5)
BI 63174E, C8							

\*All construction is "third-lane" widening to projects reported in Table 1.

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

(2) Subcontract from Hertel-Deyo Co. & Blue Water Excavating Co., Inc.

(3) Subcontract from Canonic Construction Co.

(4) Contract awarded to Louis Garavaglia Contractors, Inc.

(5) Subcontract from Holloway Construction Co.

TABLE 3 (Cont.)  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT WIDENING  
(ONE-LANE POURS)\*

Project	District	Length mile	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
BI 50111I, C12*	9	2.428	12 ft	I 94 (median side, both roadways) north from the Clinton River Spillway to 1180 ft south of Henry B. Joy Rd.	163	752	L. A. Davidson
BI 50111K, C22RN*	9	0.819	12 ft	I 94 (median side, both roadways) northeast from 800 ft north of Cotton Rd. to M 29.	166	738	Sargent Construction Co. (3)
BI 50112A, C1RN							
U 39041A, C5*	7	2.415	12 ft	US 131RR (shoulder side, both roadways) northeast from the west limits of Kalamazoo to the NYC RR	167	815	W. H. Knapp, Inc.
U 62201A, C3, C4*	9	0.944	12 ft	Saginaw St. - US 10RR Reloc-1 75BL-Cass Ave. (single-lane pour) southeast, north, west, and south from Whittenmore St. to W. Huron St.	186	977	Oak Construction Co.
BI 63174G, C4*	9	1.385	12 ft	I 75 (median side, both roadways) northwest from east of Adams Rd. to east of Squirrel Rd.	219	778	Sargent Construction Co. (3)
Weighted Arithmetic Mean for 1963 Construction Tested During 1966 Test Year.					160	656	
F 63041E, C7	9	2.680	12 & 60 ft	M 59 (constructed longitudinal joints) east from east of Airport Rd. to Elizabeth Lake Rd.	149	728	Eisenhour Construction Co., Inc. & T. A. Forsberg, Inc. (6)
U 82192B, C21*	10	1.662	12 ft	M 39 (median side, both roadways) north from south of Outer Drive to north of Dearborn Rd.	156	620	L. A. Davidson
U 82192A, C35							
U 82192D, C36							
BI 50111G, C41*	9	1.118	12 ft	I 94 (median side, both roadways) north from Masonic Blvd. to north of 14 Mile Rd.	160	710	Cooke Contracting Co. (1)
F 82052G, C25*	10	3.226	12 ft	US 24 (median side, SB roadway) south from Haskell St. to Eureka Rd.	165	701	Cooke Contracting Co. (1)
F 62031C, C9, C10	5	1.213	12 & 48 ft	M 37 (constructed longitudinal joints) north from south of M 46 (north junction) to Wood St.	166	596	Eisenhour Construction Co., Inc. (7)
BI 50111H, C11*	9	2.497	12 ft	I 94 (median side, both roadways) north from north of 14 Mile Rd. to the Clinton River Spillway.	176	773	Cooke Contracting Co. (1)

\*All construction is "third-lane" widening to projects reported in Table 1.

(1) Contract awarded to Chas. J. Rogers, Inc., Cooke Contracting Co. & Jutson-Kelly Co.

(2) Subcontract from Canome Construction Co.

(3) Subcontract from S. D. Solomon & Sons.

(7) Subcontract from Paul C. Miller

TABLE 3 (Cont.)  
ROUGHNESS DATA SUMMARY FOR RIGID PAVEMENT WIDENING  
(ONE-LANE POURS)\*

Project	District	Length, miles	Type	Route and Project Location	Roughness		Paving Contractor
					Integrator, in/mile	Level Indicator, g's/mile	
U 1312E, C2, C3	7	0.869	24 ft	I 94BL EB (constructed longitudinal joint) east from 20th St. to Upton Ave.	187	764	Titus Construction Co. (8)
U 33061D, C11*	8	0.923	12 ft	M 43 WB west from Center St. to Logan	192	752	Eisenhour Construction Co., Inc. (9)
U 33061E, C12					163	704	
Weighted Arithmetic Mean for 1964 Construction Tested During 1965 Test Year.							
I 11016A, C17	7	7.42	12 ft	I 94 (median side, both roadways) west from I 196 to US 31-US 33.	117	568	Denton Construction Co.
I 11015B, C36 (Part)	7	3.99	12 ft	I 94 (median side, both roadways) west from US 31-US 33 to bituminous concrete surface change.	126	517	Denton Construction Co. (10)
U 73073B, C9	6	1.014	36 ft	M 61 WB (constructed longitudinal joints) west from Schaefer St. to Carolina St.	151	559	W. F. McNally Co.
F 50022A, C5	9	0.676	12 ft	M 59 (shoulder side, both roadways) east from existing M 53 to M 53 Reloc.	159	692	Sargent Construction Co. (11)
U 70012B, C2	5	0.546	60 ft	M 21-US 31BR (constructed longitudinal joints) east and north from Fairbanks St. to Clover St.	168	846	Neil & Al Construction Co.
USS 33011A, C5	8	1.062	12 ft	M 99 (shoulder side, both roadways) north from Waverly Rd. to Bishop Rd.	189	642	Eisenhour Construction Co., Inc
U 30032A, C1	8	1.285	12 ft	M 99 (shoulder side, both roadways) north from Spring St. to the north city limits of Hillside.	213	1133	Titus Construction Co. (12)
Weighted Arithmetic Mean for 1965 Construction Tested During 1965 Test Year.							
WEIGHTED ARITHMETIC MEAN FOR 1965 ROUGHNESS TEST YEAR							
					156	672	

\*All construction is "third-lane" widening to projects reported in Table 1.

(8) Subcontract from Hoffman Bros.

(9) Contract awarded to Eisenhour Construction Co., Inc. & Walter Toebe & Co.

(10) Contract awarded to Denton Construction Co. & Reith-Riley Construction Co., Inc

(11) Subcontract from Holloway Construction Co.

(12) Contract awarded to Titus Construction Co. & T. A. Forsberg, Inc.

TABLE 4  
SEVEN-YEAR ROUGHNESS SUMMARY  
FOR RIGID PAVEMENT WIDENING  
(ONE-LANE POURS)

Test Year	1958	1959	1960	1961	1962	1963-1964	1965	1958-1965
Total Projects	3	2	5	10	4	14	30	68
Percent Good 0-130 in./mi	33.3	0	20	0	0	0	7	6
Percent Average 131-174 in./mi	33.3	50	60	70	75	64	63	63
Percent Poor 175 or more in./mi	33.3	50	20	30	25	36	30	31
Weighted Arithmetic Mean	122	194	138	162	169	163	156	157
Project Mileage*	5.403	3.092	13.925	17.704	10.006	27.093	61.360	138.583
Lane Mileage**	11.176	6.184	24.152	31.995	20.012	57.940	122.508	273.967

\* As given in Contract Division monthly "Report of Awards"  
\*\* Total mileage of 11- or 12-ft wide lanes

**TABLE 5**  
**ROUGHNESS DATA SUMMARY FOR FLEXIBLE PAVEMENT**

Project	District	Length, miles	Type	Route and Project Location	Roughness		Paving Contractor
					Level Integrator, in./mile	Level Indicator, g's/mile	
1963 CONSTRUCTION							
BF 61075B, C1	5	7.424	24 ft (dual)	US 31 Reloc. north from M 20 to north of Burpee Rd.	72	135	Spartan Asphalt Paving Co. (1)
BI 61075D, C4	5	2.454	24 ft (dual)	US 31 Reloc. north from north of Burpee Rd. to north of Colby Rd.	82	207	Spartan Asphalt Paving Co. (2)
BF 27021B, C3	1	3.033	24 ft (dual)	US 2 east from the east city limits of Ironwood to the west city limits of Bessemer (omitting bridge over Powder Mill Creek).	119	275	Matly Construction Co. (3)
Weighted Arithmetic Mean for 1963 Construction Tested During 1965 Test Year.					85	182	
1964 CONSTRUCTION							
BI 61075D, C7	5	3.349	24 ft (dual)	US 31 Reloc. north from north of Colby Rd. to existing US 31.	75	181	Spartan Asphalt Paving Co. (4)
BU 61075E, C5	5	3.403	24 ft & 36 ft	US 31 Reloc. north from Marcoux St. to River Rd.	78	173	Spartan Asphalt Paving Co. (5)
BF 61075A, C16			(dual)				
Mb 73031A, C8	6	8.496	24 ft	M 47 north from Bell Ave. to M 46	80	130	Saginaw Asphalt Paving Co. (6)
SS 73031A, C9			(dual)				
Weighted Arithmetic Mean for 1964 Construction Tested During 1965 Test Year.					78	160	
1965 CONSTRUCTION							
F 27023D, C4	1	7.830	24 ft	US 2 Reloc. east from 8.416 miles east of Gogebic Station to 1.25 miles west of Watersmeet.	90	156	Matly Construction Co. (7)
F 27023B, C3	1	8.416	24 ft	US 2 Reloc. east 8.416 miles from Gogebic Station.	96	184	Matly Construction Co. (8)
BU 61153A, C1	5	2.485	24 ft & 48 ft	US 31BR northeast from Spring St. to US 31 Reloc.	101	347	Reith-Riley Construction Co. (6)
BU 61153B, C2			(dual)				
Weighted Arithmetic Mean for 1965 Construction Tested During 1965 Test Year.					96	226	
WEIGHTED ARITHMETIC MEAN FOR 1965 ROUGHNESS TEST YEAR					86	189	

(1) Subcontract from Pierson Contracting Co.  
(2) Subcontract from Johnson-Greene Co.  
(3) Subcontract from Proksch Construction Co.  
(4) Subcontract from Maclean Construction Co. & Raff & Dexter Contractors  
(5) Subcontract from Raff & Dexter Contractors & Pierson Contracting Co.  
(6) Subcontract from Sargent Construction Co.  
(7) Subcontract from Bacco Construction Co.  
(8) Subcontract from Holloway Construction Co.