

PROFILOMETER MEASUREMENT OF BRIDGE ROUGHNESS
Third Progress Report

Research Laboratory Division
Office of Testing and Research
Research Project R-61 F-65
Research Report No. R-443

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Michigan State Highway Department
John C. Mackie, Commissioner
Lansing, November 1963

PROFILOMETER MEASUREMENT OF BRIDGE ROUGHNESS
Third Progress Report

This is the third publication in a series on profilometer measurement of the roughness of bridge decks. The first (Research Report No. R-421) described the profilometer equipment, the test procedure and data analysis, and included measurements for 35 bridge projects. The second (Research Report No. R-430) reported measurements for an additional 22 bridge projects. This third progress report presents results for a new group of 34 bridge projects (38 separate structures), 27 of which were hand finished and 7 machine finished. In reporting riding quality, the following tentative roughness classification system based on "span-runs" (see glossary) is being used, expressed in terms of inches-per-mile:

"Good" = less than 100
"Average" = 100 to 160
"Poor" = over 160

Using these categories, the 761 span-runs included in the 34 bridge projects for which test result forms are presented in this report may be classified as follows:

Finishing Method	Riding Quality			Marginal Totals
	Good	Average	Poor	
1. Hand	122	333	163	628
2. Transverse machine	20	31	17	68
3. Transverse machine with rail adjustment after loading	13	24	28	65
Total Span-Runs	155	388	218	761

A special evaluation has been completed of roughness values obtained for the decks of the first 67 bridge projects included in this research program. The purposes of this evaluation were: 1) to update comparison of hand and machine finishing techniques; 2) to compare the relative

precision of three alternative units of roughness measurement -- "bridge projects," "structure runs," or "span runs" (see glossary); and 3) to check out a computer frequency distribution program now in experimental use by the Department's Data Processing Section.

First, two normal frequency distribution curves including means and standard deviations are shown in Fig. 1, indicating that as data have been obtained on more bridge projects the apparent difference in roughness of machine finished and hand finished surfaces has diminished to the point that it is clearly statistically insignificant. Specifically, the difference between mean values for hand and machine finishing has declined from 7.6 to 1.2 in. per mi.

Second, Fig. 2 illustrates that of three possible units of data presentation, the "span run" curve gives greatest dispersion or spread of values, while the curve based on overall bridge project roughness values gives the least dispersion.

Third, use of the normal frequency distribution computer program in conjunction with paper-tape-punch equipment has proved to be of great value in reduction and analysis of field data. Further, the likelihood of human error in such evaluations is greatly diminished.

GLOSSARY

BRIDGE PROJECT: the Department's bridge identification unit, in terms of construction project number, sometimes involving more than one structure. In terms of roughness values, the overall figure computed from all span-run or structure-run figures for a particular structure.

CLASS INTERVAL: the grouping increment used in forming the frequency distribution; for this study 20 in. per mi.

IWP: inner wheel path, in relation to the structure's centerline.

OWP: outer wheel path, in relation to the structure's centerline.

ROUGHNESS: riding quality of the deck lane surfaces, measured in accumulated inches and converted or prorated to inches per mile (in. per mi).

SPAN RUN VALUE: roughness figure for one wheel path on a given span.

STANDARD DEVIATION: the measure of spread or dispersion of roughness values, as used in this study. For "normally" distributed roughness values, one standard deviation on either side of the mean includes approximately 66 percent of the data.

STRUCTURE RUN VALUE: roughness measurement computed from values obtained from all spans comprising a single wheel path pass, always two per lane in both inner and outer wheel paths.

UNWEIGHTED MEAN: for this study the arithmetic mean excluding considerations of deck lengths.

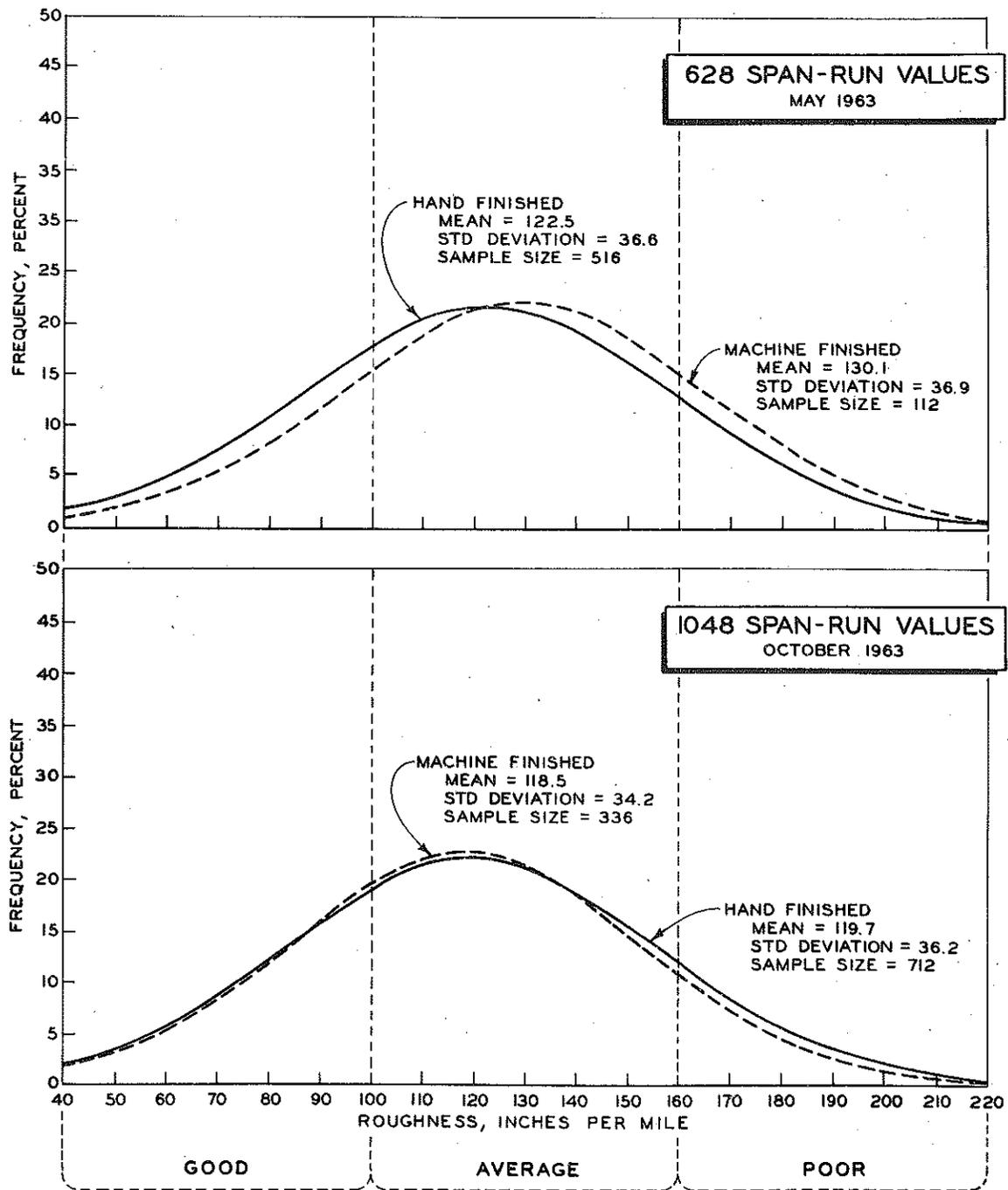


Figure 1. Span-run roughness frequency distributions for two deck finishing methods, indicating decrease in apparent difference between methods as quantity of bridge span-run measurements increases.

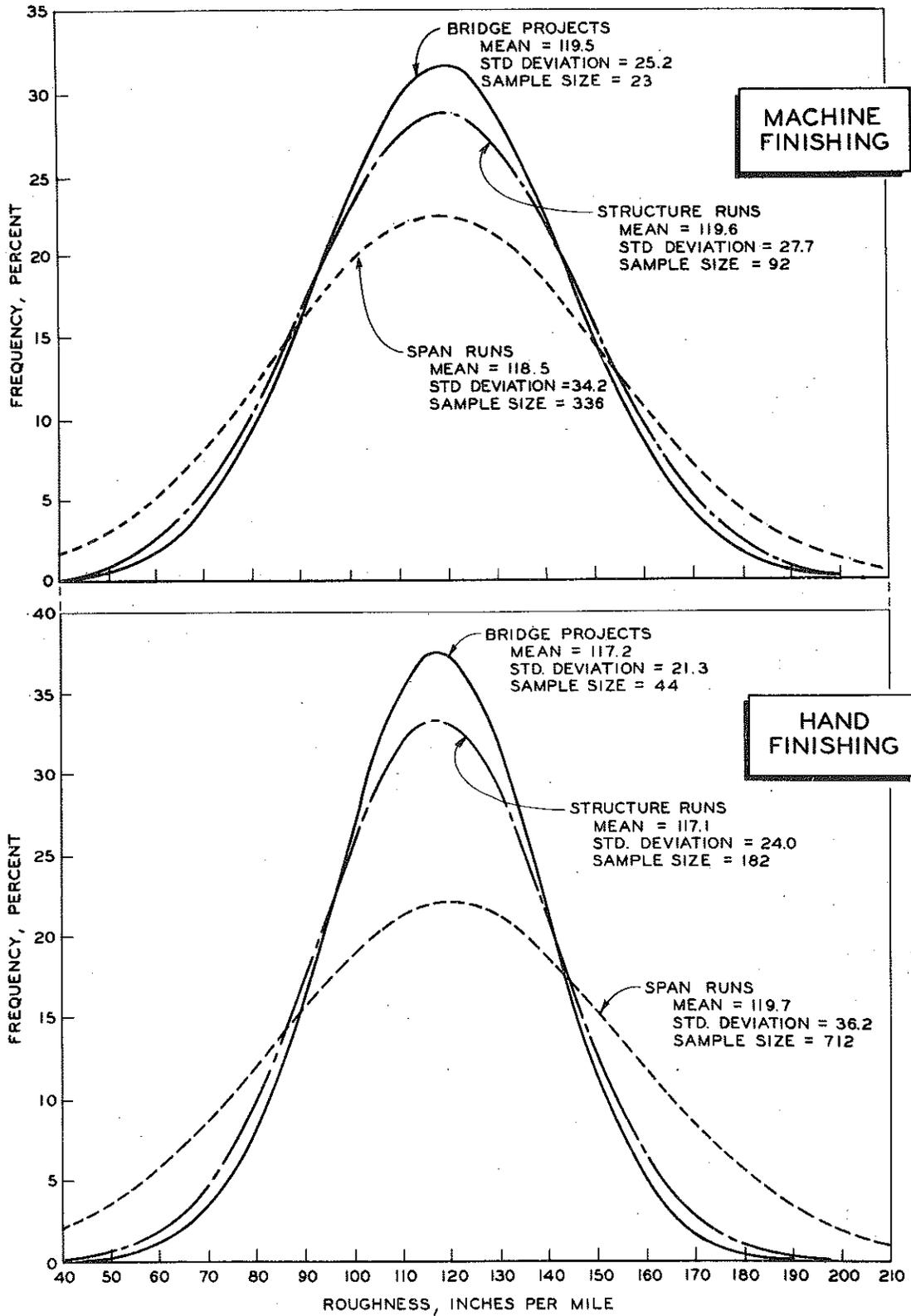


Figure 2. Frequency distributions based on three units of data presentation.

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S01 of 17033, Location M-48 over I-75
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 12 Machine Finished (*) Yes No

E Bound Roadway

Date Measured 6/19/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span 1	53.1	238.2	160.0			199.1
2	52.7	231.9	242.0			237.0
3	53.7	188.2	184.8			186.5
4	52.7	237.4	192.4			214.9
5	53.1	269.0	223.2			246.1
6	72.4	149.2	114.5			131.8
<u>E</u> Approach						
Average						

W Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span 1	53.1	134.8	150.8			142.8
2	52.7	155.8	241.0			198.4
3	53.7	243.8	295.4			269.6
4	52.7	151.3	129.7			140.5
5	53.1	221.2	212.8			217.0
6	72.4	151.3	144.4			147.8
<u>E</u> Approach						
Average						

Remarks Joints and spans numbered from West to East. Joint #1 - Steel Expansion; #2 - Expansion; #3 - Steel Expansion; #4, 5 - Expansion; #6 - Steel Expansion; #7, 8 - Expansion; #9 - Steel Expansion; #10 - Expansion; #11 - Steel Expansion. Approaches not installed as yet.
 * Spans 1 thru 6 transverse machine finished with rail adjustment after loading.
 Spans 7 thru 12 hand strike and finish.

Previously reported in special report to C. B. Laird on June 25, 1963.

Third Progress Report - October 1963

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S01 of 17033, Location M-48 over I-75

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 12 Machine Finished (*) Yes No

E Bound Roadway

Date Measured 6/19/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span <u>1</u> (7)	71.1	221.6	159.3			190.4
<u>2</u> (8)	53.2	132.5	152.8			142.6
<u>3</u> (9)	52.8	280.0	181.0			230.5
<u>4</u> (10)	53.6	190.2	185.7			188.0
<u>5</u> (11)	52.8	185.0	168.0			176.5
<u>6</u> (12)	53.0	129.6	119.6			124.6
<u>E</u> Approach						
Average	674.2	203.9	172.6			188.3

W Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span <u>1</u> (7)	71.1	118.0	145.2			131.6
<u>2</u> (8)	53.2	116.6	96.2			106.4
<u>3</u> (9)	52.8	184.0	175.5			179.8
<u>4</u> (10)	53.6	194.0	223.6			208.8
<u>5</u> (11)	52.8	107.5	99.5			103.5
<u>6</u> (12)	53.0	191.8	162.2			177.0
<u>E</u> Approach						
Average	674.2	162.8	172.2			167.7

Remarks See preceding page.

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S02 of 17033, Location FAS Route 1054 over I 75 Form 511
Dual Structures (separate for each roadway) Yes No
Single Structure Yes No
Number of Spans 12 Machine Finished (*) Yes No

E Bound Roadway

Date Measured 6/20/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	102.4	89.2			95.8
Span 1	53.1	142.2	98.9			120.6
2	52.6	177.7	137.0			157.4
3	53.7	166.1	150.4			158.2
4	52.5	152.9	115.2			134.0
5	53.0	198.2	142.4			170.2
6	72.2	163.0	159.7			161.4
<u>E</u> Approach						
Average						

W Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	87.1	79.2			83.2
Span 1	53.1	120.3	94.9			107.6
2	52.6	170.6	159.1			164.8
3	53.7	161.7	190.2			176.0
4	52.5	195.6	132.3			164.0
5	53.0	143.9	162.4			153.2
6	72.2	152.0	141.2			146.6
<u>E</u> Approach						
Average						

Remarks All spans and joints numbered from West to East. #1 - Construction; #2 - Steel Expansion; #3 - Expansion; #4 - Steel Expansion; #5, 6 - Expansion; #7 - Steel Expansion; #8, 9 - Expansion; #10 - Steel Expansion; #11 - Expansion; #12 - Steel Expansion; #13 - Construction. Tarspots on deck. Bituminous approaches.

* Spans 1 and 7 transverse mechanical strike with rail adjustment after loading. Other 10 spans transverse mechanical strike only.

Previously reported in special report to C. B. Laird on June 25, 1963

Third Progress Report - October 1963

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S02 of 17033, Location FAS Route 1054 over I 75
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 12 Machine Finished (*) Yes No

E Bound Roadway

Date Measured 6/20/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span X (7)	71.1	145.6	169.4			157.5
X (8)	53.2	229.2	193.8			211.5
X (9)	52.5	206.2	130.8			168.4
X (10)	53.6	143.8	131.5			137.6
X (11)	52.6	120.0	132.6			126.3
X (12)	53.0	180.8	183.4			182.1
<u>E</u> Approach	50.0	107.7	76.6			92.2
Average	773.1	159.9	138.2			149.1

W Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span X (7)	71.1	124.4	124.4			124.4
X (8)	53.2	242.0	185.0			213.5
X (9)	52.5	158.0	142.8			150.4
X (10)	53.6	136.4	120.2			128.3
X (11)	52.6	112.0	130.0			121.0
X (12)	53.0	158.4	164.3			161.4
<u>E</u> Approach	50.0	72.4	71.8			72.1
Average	773.1	145.5	136.2			140.8

Remarks See preceding page.

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S04 of 17033, Location US-2 over I-75

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 4 Transverse Machine Finished with rail adjustment after loading Yes No

N Bound Roadway

Date Measured 6/20/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	100.0	229.5	337.2			283.4
Span 1	75.4	264.4	239.2			251.8
2	101.6	200.6	151.0			175.8
3	99.7	152.6	139.8			146.2
4	75.3	173.6	173.2			173.4
5						
6						
<u>N</u> Approach	100.0	195.4	249.8			222.6
Average	552.0	200.8	215.8			208.3

S Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	100.0	217.2	292.0			254.6
Span 1	75.4	183.2	198.9			191.1
2	101.6	180.8	144.2			162.5
3	99.7	140.6	143.8			142.2
4	75.3	144.8	165.8			155.3
5						
6						
<u>N</u> Approach	100.0	219.4	232.6			226.0
Average	552.0	182.6	197.4			190.0

Remarks Joints numbered from south to north. Joint #1 & 2 - expansion; #3 - construction; #4 - expansion; #5 - steel expansion; #6 - expansion; #7 - Construction; #8, 9 - expansion.

Concrete approaches.

Previously reported in special report to C. B. Laird on June 25, 1963.

Third Progress Report - October 1963

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number B01 of 49025, Location I-75 SB over Carp River

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Transverse Machine Finished with rail adjustment after loading Yes No

S Bound Roadway Date Measured 6/21/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach						
Span 1	68.7	111.9	249.1	122.3	113.7	149.2
2	67.7	143.9	116.2	123.6	117.0	125.2
3	68.0	95.4	92.2	122.8	127.4	109.4
4						
5						
6						
<u>N</u> Approach						
Average	204.4	118.6	151.0	123.0	119.2	128.0

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from south to north. Joint #1 - steel expansion; #2 - expansion. Approaches not yet installed. Concrete globs hardened on deck.

Previously reported in special report to C. B. Laird on June 25, 1963.

Third Progress Report - October 1963

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number B02 of 49025, Location I-75 NB over Carp River

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Transverse Machine Finished with rail adjustment after loading Yes No

N Bound Roadway Date Measured 6/21/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach						
Span 1	68.0	101.0	106.0	68.0	66.2	85.3
2	67.1	138.8	162.1	94.0	98.0	123.2
3	67.8	97.2	90.8	88.0	80.2	89.0
4						
5						
6						
<u>N</u> Approach						
Average	202.9	113.7	121.8	83.9	82.3	100.4

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from south to north. Joint #1 - steel expansion; Joint #2 - expansion. Approaches have not yet been completed. Started runs with Profilometer on bridge.

Previously reported in special report to C. B. Laird on June 25, 1963.

Third Progress Report - October 1963

District 2
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S04 of 49025, Location M-123 over I-75
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Transverse Machine Finished Yes No

W Bound Roadway

Date Measured 6/20/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span 1	37.0	91.6	65.0			78.3
2	60.5	125.2	85.6			105.4
3	61.5	131.0	127.0			129.0
4	37.0	78.8	38.4			58.6
5						
6						
<u>E</u> Approach						
Average	196.0	115.0	89.8			102.4

E Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach						
Span 1	37.0	87.7	91.6			89.7
2	60.5	84.7	91.6			88.2
3	61.5	91.4	100.4			95.9
4	37.0	77.8	64.0			70.9
5						
6						
<u>E</u> Approach						
Average	196.0	86.4	90.5			88.5

Remarks Joints and spans numbered from west to east. Joint #1 - expansion; #2 - steel expansion; #3 - expansion. Approaches not yet installed.

Previously reported in special report to C. B. Laird on June 25, 1963.

Third Progress Report - October 1963

District 4
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S05 of 16091, Location I 75 NB over M 27

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

N Bound Roadway Date Measured 6-25-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>S</u> Approach	100.0	81.4	95.8	107.4	109.8	98.6
Span 1	67.0	105.2	120.2	96.8	95.4	104.4
2	95.0	138.8	103.2	92.3	93.1	106.8
3	68.0	133.8	103.4	139.7	163.6	135.1
4						
5						
6						
<u>N</u> Approach	100.0	81.9	91.0	86.0	121.4	95.1
Average	430.0	106.2	101.4	102.6	115.1	106.3

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from South to North. Joint #1, 2, 3 - Expansion;
#4 - Construction; #5 - Steel Expansion; #6 - Expansion; #7 - Construction; #8, 9, & 10 -
Expansion.

Concrete approaches.

District 4
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S01 of 20014, Location I 75 SB over US NB Relocation
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 3 Machine Finished Special* Yes No

S Bound Roadway

Date Measured 6-24-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>S</u> Approach	50.0	159.4	127.0	110.7	103.4	125.1
Span 1	97.0	113.6	112.6	86.2	84.7	99.3
2	109.0	89.2	82.6	87.0	125.6	96.1
3	96.9	96.8	79.4	102.8	81.7	90.2
4						
5						
6						
<u>N</u> Approach	50.0	165.4	165.4	156.8	165.5	163.3
Average	402.9	115.1	104.8	102.2	107.4	107.4

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from South to North. Joint #1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Construction.

Bituminous approaches.

* Johnson - Greene Modified-powered Strike

District 4
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S06 of 69013, Location I 75 SB over M 32
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 3 Machine Finished Yes No

S Bound Roadway

Date Measured 6-24-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>S</u> Approach	50.0	156.6	152.2	97.2	75.0	120.2
Span 1	34.0	217.1	171.4	87.7	139.0	153.8
2	65.3	121.0	108.6	91.2	99.9	105.2
3	34.0	122.0	163.2	156.5	86.2	132.0
4						
5						
6						
<u>N</u> Approach	50.0	138.4	120.8	121.1	94.0	118.6
Average	233.3	146.6	137.6	107.8	97.0	122.2

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from South to North. Joint #1 - Construction; #2 -
& 3 - Expansion; #4 - Construction.
Bituminous approaches.

District #6
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S03 of 25131, Location Holly Road over I-75
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

N Bound Roadway

Date Measured 4-29-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	258.8	232.8			245.8
Span 1	66.4	149.5	131.2			140.4
2	83.1	165.8	137.8			151.8
3	80.7	110.2	109.3			109.8
4	59.4	119.1	132.4			125.8
5						
6						
<u>N</u> Approach	50.0	191.2	166.3			178.8
Average	389.6	159.6	146.0			152.8

S Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	193.8	203.8			198.8
Span 1	66.4	143.5	123.3			133.4
2	83.1	141.1	121.7			131.4
3	80.7	145.6	122.7			134.2
4	59.4	88.4	97.8			93.1
5						
6						
<u>N</u> Approach	50.0	131.5	107.2			119.4
Average	389.6	139.9	127.2			133.6

Remarks Joints and spans numbered from south to north.

Joint #1 - construction; #2 - steel expansion; #3 - expansion; #4 - steel expansion;

#5 - construction

Bituminous Approaches.

Bridge on super elevated curve.

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S04 of 47065, Location Mason Road (M 55) over I 96 Form 511
Dual Structures (separate for each roadway) Yes No
Single Structure Yes No
Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 7-25-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	140.2	118.5			129.4
Span 1	73.6	106.1	106.1			106.1
2	96.6	104.7	95.1			99.9
3	98.4	105.6	96.6			101.1
4	79.8	105.8	89.0			97.4
5						
6						
<u>E</u> Approach	50.0	118.4	103.6			111.0
Average	448.4	110.8	99.8			105.3

E Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	135.6	124.9			130.2
Span 1	73.6	113.6	124.6			119.1
2	96.6	99.6	76.1			87.8
3	98.4	106.6	86.2			96.4
4	79.8	124.0	108.2			116.1
5						
6						
<u>E</u> Approach	50.0	97.2	96.5			96.8
Average	448.4	111.6	99.7			105.6

Remarks Joints and spans numbered from West to East. Joint #1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Expansion; #5 - Construction.

Sharp drop just into approach at each end of bridge.

Bituminous approaches.

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S06 of 47065, Location Pinckney Road over I 96
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

N Bound Roadway Date Measured 7-24-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	118.5	108.8			113.6
Span 1	60.7	140.0	113.6			126.8
2	78.0	108.6	106.4			107.5
3	86.8	85.4	75.4			80.4
4	61.5	97.0	59.7			78.4
5						
6						
<u>N</u> Approach	50.0	107.9	134.6			121.2
Average	387.0	107.7	97.1			102.4

S Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	106.4	110.8			108.6
Span 1	60.7	112.2	130.5			121.4
2	78.0	119.2	84.0			101.6
3	86.8	102.0	77.8			89.9
4	61.5	152.4	127.2			139.8
5						
6						
<u>N</u> Approach	50.0	167.8	100.4			134.1
Average	387.0	124.2	102.4			113.3

Remarks Joints and spans numbered from south to north. Joint #1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Expansion; #5 - Construction.

Bituminous approaches.

Sharp drop-off in approach close to bridge.

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S07 of 47065, Location Chilson Road over I 96

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 4 Machine Finished Yes No

S Bound Roadway

Date Measured 7-24-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	99.8	121.0	110.6	90.3	105.4
Span 1	54.4	150.7	156.4	154.7	162.6	156.1
2	106.9	103.2	126.0	166.0	112.2	126.8
3	105.0	129.0	137.5	147.5	135.2	137.3
4	51.0	141.8	148.9	119.3	163.0	143.2
5						
6						
<u>N</u> Approach	50.0	161.2	120.7	135.6	147.8	141.3
Average	417.3	127.2	134.4	144.0	132.4	134.5

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from South to North. Joint # 1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Expansion; #5 - Construction.

Bituminous approaches.

Sharp drop-off in approach near bridge.

Third Progress Report - October 1963

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S08 of 81062, Location US 23 over I 94

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 5 Machine Finished Yes No

N Bound Roadway Date Measured 5-16-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach						
Span 1	31.8*	126.9	73.0	124.6	138.8	115.8
2	42.5	148.4	166.6	121.8	100.7	134.4
3	56.2	115.6	77.6	124.2	164.8	120.6
4	63.9	143.4	102.8	115.4	149.6	127.8
5	46.7	109.4	94.8	158.4	152.8	128.8
6						
<u>N</u> Approach	100.0	113.6	93.2	94.6	109.8	102.8
Average	341.1	124.5	99.9	118.3	133.8	119.1

S Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	100.0	179.8	170.4	162.8	137.0	162.5
Span 1	41.3	145.0	169.6	90.8	146.4	138.0
2	43.5	137.6	152.2	169.0	176.0	158.7
3	56.3	132.4	102.9	126.4	146.0	126.9
4	66.8	107.1	129.6	115.0	154.7	126.6
5	43.3	111.6	144.0	154.4	155.5	141.4
6						
<u>N</u> Approach	100.0	161.9	172.0	205.6	199.2	184.7
Average	451.2	145.4	151.9	153.8	161.0	153.0

Remarks Joints and spans numbered from South to North. Joint #1, 2, 3- Expansion;
#4 - Construction; #5, 6 - Expansion; #7 - Steel Expansion; #8 - Expansion; #9 - Construct-
ion; #10, 11, 12 - Expansion.

Dip at S. edge of northbound bridge too deep to allow operation of profilometer.

Concrete approaches.

* 10.2' shorter than actual due to starting on bridge

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S08 of 81062, Location US 23 over I 94 Form 511

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 5 Machine Finished Yes No

N Bound Roadway (Deceleration)

Date Measured 5-16-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	100.0	248.7	205.0	244.3	223.0	230.2
Span 1	42.7	129.4	111.0	141.0	192.0	143.4
2	42.6	159.2	147.4	119.2	95.4	130.3
3	59.0	106.7	103.8	132.6	150.7	123.4
4	61.3	161.6	148.6	119.2	156.0	146.4
5	47.3	173.0	147.2	95.6	173.0	147.2
6						
<u>N</u> Approach	100.0	183.2	161.8	180.8	219.4	186.3
Average	452.9	176.4	154.3	161.8	183.6	169.0

S Bound Roadway (Deceleration)

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	100.0	121.1	141.0	169.4	227.5	164.8
Span 1	41.3	178.8	150.5	103.2	136.8	142.3
2	43.0	198.0	162.2	137.7	160.4	164.6
3	59.0	109.4	76.7	121.2	96.1	100.8
4	64.0	108.4	144.8	93.4	93.6	110.0
5	43.3	129.2	109.4	80.8	140.6	115.0
6						
<u>N</u> Approach	100.0	174.0	146.8	146.6	147.2	153.6
Average	450.6	142.9	134.2	129.6	150.4	139.3

Remarks Joints and spans numbered from South to North. Joint #1 & 2 - Expansion; #3 - Construction; #4 & 5 - Expansion; #6 - Steel Expansion; #7 - Expansion; #8 - Construction; #9 & 10 - Expansion.

Concrete approaches.

District 8
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S06 of 81076, Location US 12 over US 23

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 4 Machine Finished Yes No

E Bound Roadway

Date Measured 5-24-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	100.0	185.1	175.0			180.0
Span 1	41.3	119.4	99.1			109.2
2	95.3	93.2	78.8			86.0
3	94.2	119.2	102.8			111.0
4	40.0	185.8	159.6			172.7
5						
6						
<u>E</u> Approach	100.0	214.8	189.6			202.2
Average	470.8	153.9	136.2			145.0

W Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	100.0	191.0	200.9			196.0
Span 1	41.3	152.1	112.2			132.2
2	95.3	152.2	101.4			126.8
3	94.2	167.6	128.5			148.0
4	40.0	185.8	113.6			149.7
5						
6						
<u>E</u> Approach	100.0	212.4	217.7			215.0
Average	470.8	179.2	154.6			166.9

Remarks Joints and spans numbered from West to East. Joint #1 -, 2, & 3 - Expansion; #4 - Construction, #5 - Steel Expansion; #6 - Expansion; #7 - Construction; #8, 9, & 10 - Expansion.

Concrete approaches.

Occasional tar spots on deck, some grinding corrugations on deck.

Third Progress Report - October 1963

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number X01 of 82022, Location I 94 (EB) over Shook Rd & C & O RR
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

E Bound Roadway

Date Measured 5-27-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	187.7	154.5	220.1	250.1	203.1
Span 1	50.0	140.2	152.6	266.9	227.8	196.9
2	69.7	146.9	205.0	275.8	256.3	221.0
3	69.4	189.2	175.5	179.2	186.0	182.5
4	50.0	192.2	248.5	257.2	268.9	241.7
5						
6						
Approach	50.0	123.2	114.8	175.0	231.0	161.0
Average	339.1	163.7	176.9	228.9	234.9	201.1

Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
Approach						
Span 1						
2						
3						
4						
5						
6						
Approach						
Average						

Remarks Joints and spans numbered from West to East. Joint #1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Expansion; #5 - Construction.
Bituminous approaches.
Some spawling and rough patches on deck.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number X02 of 82022, Location I 94 (WB) over Shook Rd. & C&ORR Form 511
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 5/27/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	86.2	78.8	115.4	174.2	113.6
Span 1	50.0	129.8	180.7	210.2	160.4	170.3
2	69.7	99.3	121.4	221.6	208.4	162.7
3	70.9	157.2	153.0	192.8	158.0	165.2
4	50.0	172.3	143.6	220.1	210.2	186.6
5						
6						
<u>E</u> Approach	50.0	102.9	128.4	168.9	143.2	135.8
Average	340.6	125.2	134.6	190.4	176.5	156.7

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction;
#2 - expansion; #3 - steel expansion; #4 - expansion; #5 - construction.
Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S02 of 82022, Location I 94 (EB) over Wayne Road
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 3 Machine Finished Yes No

E Bound Roadway

Date Measured 5-28-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	93.8	109.0	188.7	182.6	143.5
Span 1	41.2	93.3	147.4	176.5	137.6	138.7
2	57.8	105.2	136.8	147.4	64.9	113.6
3	41.0	116.0	121.6	99.0	93.2	107.4
4						
5						
6						
<u>E</u> Approach	50.0	111.6	80.0	140.2	123.0	113.7
Average	240.0	104.0	118.4	151.2	118.8	123.1

_____ Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
_____ Approach						
Span 1						
2						
3						
4						
5						
6						
_____ Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - Construction; #2 - Steel Expansion; #3 - Expansion; #4 - Construction.

Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S03 of 82022, Location I 94 (WB) over Wayne Road

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

W Bound Roadway Date Measured 5-27-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	141.0	119.3	156.3	228.6	161.3
Span 1	42.9	139.0	241.8	139.0	115.1	158.7
2	57.9	87.1	110.8	164.2	125.4	121.9
3	41.2	88.4	107.6	203.8	121.8	130.4
4						
5						
6						
<u>E</u> Approach	50.0	168.4	123.0	157.4	174.2	155.8
Average	242.0	124.5	137.8	163.4	154.4	145.0

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction, # 2 - steel expansion, #3 - expansion, #4 - construction.

Bituminous approaches.

Large popouts, Spans 1 and 3, near center of bridge.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S05 of 82022, Location I 94 (EB) over Middlebelt Road Form 511
Dual Structures (separate for each roadway) Yes No
Single Structure Yes No
Number of Spans 4 Machine Finished Yes No

E Bound Roadway

Date Measured 5-28-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	93.4	107.2	146.8	151.0	124.6
Span 1	31.0	128.6	126.0	115.8	122.6	123.2
2	42.3	161.6	132.3	126.0	136.0	139.0
3	42.8	99.3	102.4	101.2	86.4	97.3
4	31.8	95.5	107.1	133.6	75.6	103.0
5						
6						
<u>E</u> Approach	50.0	125.7	120.9	120.4	101.4	117.1
Average	247.9	117.2	115.8	124.5	114.1	117.9

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from West to east.

Joint # 1 - construction; #2 - expansion; #3 - steel expansion; #4 - expansion;
#5 - construction.

Bituminous approaches.

Tar spots on deck.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S06 of 82022, Location I 94(WB) over Middlebelt Road
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 5/28/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	136.1	160.4	110.4	146.4	138.3
Span 1	30.8	168.4	185.6	79.6	74.7	127.1
2	42.1	219.4	151.1	175.0	133.7	169.8
3	41.0	162.5	162.0	175.0	163.2	165.7
4	31.0	257.9	261.6	132.3	80.6	183.1
5						
6						
<u>E</u> Approach	50.0	74.2	115.4	97.6	146.6	108.4
Average	244.9	161.6	165.8	128.6	129.8	146.4

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction;
#2 - expansion; #3 - steel expansion; #4 - expansion; #5 - construction.
Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S07 of 82022, Location I 94 (EB) over Inkster Road Form 511

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

E Bound Roadway

Date Measured 5/29/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	207.2	253.6	269.6	211.8	235.6
Span 1	43.0	123.9	88.2	99.7	99.7	102.9
2	59.2	60.9	73.8	99.0	111.5	86.3
3	43.0	67.0	118.6	85.6	189.8	115.2
4						
5						
6						
<u>E</u> Approach	50.0	162.0	205.4	259.2	201.6	207.0
Average	245.2	123.4	147.7	164.2	162.0	149.3

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction;
#2 - steel expansion; #3 - expansion; #4 - construction.

Bituminous approaches.

Bituminous deck.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number 508 of 82022, Location I 94 (WB) over Inkster Road

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

W Bound Roadway

Date Measured 6/5/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	208.2	231.4	198.0	212.3	212.5
Span 1	56.2	71.8	104.6	174.2	260.8	152.8
2	79.0	61.0	92.2	174.2	212.4	135.0
3	56.4	112.4	154.8	172.7	285.0	181.2
4						
5						
6						
<u>E</u> Approach	50.0	272.5	256.1	269.4	225.4	255.8
Average	291.6	134.6	158.6	194.3	238.0	181.4

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered west to east. Joint #1 - construction; #2 - expansion; #3 - steel expansion; #4 - construction.

Black Top deck on bridge.

Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S09 of 82022, Location I 94 (EB) over Ecorse Rd. (M 17)

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 4 Machine Finished Yes No

E Bound Roadway

Date Measured 5-29-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	219.6	266.6	240.2	208.0	233.6
Span 1	53.7	73.8	116.0	88.0	114.6	98.1
2	65.0	136.9	178.3	105.2	146.2	141.6
3	66.0	116.4	138.8	154.4	165.2	143.7
4	52.0	84.8	96.5	110.2	114.7	101.6
5						
6						
<u>E</u> Approach	50.0	320.0	278.8	400.8	258.2	314.4
Average	336.7	154.2	176.0	176.8	165.8	168.2

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction.

#2 - steel expansion, #3 - expansion, #4 - steel expansion, #5 - construction.

Bituminous approaches.

East approaches badly cracked.

Joints 2 and 4 not over piers.

Third Progress Report - October 1963

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S10 of 82022, Location I 94 (WB) over Ecorse Road (M 17) Form 511

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 5-29-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	180.0	156.2	201.7	193.2	182.8
Span 1	53.0	148.4	137.5	162.9	210.7	164.3
2	65.2	172.8	191.6	152.6	157.5	168.6
3	65.9	150.2	209.5	139.0	171.9	167.6
4	52.5	119.2	116.7	263.0	230.3	182.3
5						
6						
<u>E</u> Approach	50.0	153.2	193.2	241.8	192.2	195.1
Average	336.6	154.4	170.0	188.9	190.6	176.0

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east.

Joint # 1 - construction; #2 - steel expansion; #3 - expansion; #4 - steel expansion;
#5 - construction.

Bituminous approaches.

Popouts in span #2.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S11 of 82022, Location I 94 (EB) over Beech-Daly Road Form 511

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

E Bound Roadway

Date Measured 6/5/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	313.9	296.0	247.5	218.8	269.0
Span 1	47.0	161.6	224.0	167.7	202.4	188.9
2	65.5	190.9	169.0	174.2	231.0	191.3
3	46.0	145.0	189.7	215.4	234.6	196.2
4						
5						
6						
<u>E</u> Approach	50.0	310.7	273.1	291.1	183.7	264.6
Average	258.5	224.4	227.4	217.2	214.9	221.0

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east. Joint #1 - construction; #2 - steel expansion; #3 - expansion; #4 - construction.

Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S12 of 82022, Location I 94 (WB) over Beech-Daly Road

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

W Bound Roadway

Date Measured 6/7/63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	141.4	184.9	120.2	145.7	148.0
Span 1	45.4	235.5	250.2	183.2	155.5	206.1
2	63.3	176.1	179.8	243.8	119.6	179.8
3	46.0	230.5	203.8	205.8	200.8	210.2
4						
5						
6						
<u>E</u> Approach	50.0	200.1	182.0	169.7	241.4	198.3
Average	254.7	194.4	198.1	187.3	169.7	187.4

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from west to east, Joint #1 - construction;

No. 2 - steel expansion; No. 3 - expansion; No. 4 - construction

Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S13 of 82022, Location I 94 (EB) over Telegraph Road (US 24) ^{Form 511}
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

E Bound Roadway

Date Measured 6-5-63

Item	Length	Profilometer Roughness Value - R inches per mile						Avg.
		Traffic Lane		Passing Lane		Center Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	213.8	212.8	224.8	181.4	165.5	149.1	191.2
Span 1	47.2	105.6	103.2	143.2	145.1	109.7	152.9	126.6
2	71.3	104.2	103.1	124.2	130.1	125.2	161.4	124.7
3	66.0	164.6	150.0	123.4	112.0	126.1	139.6	136.0
4	47.1	98.1	137.1	132.3	153.0	144.2	154.6	136.6
5								
6								
<u>E</u> Approach	50.0	142.2	172.6	204.8	171.3	157.6	165.0	168.9
Average	331.6	137.8	144.3	155.2	145.8	136.8	153.6	145.6

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints numbered from West to East. Joint #1 - Construction; #2 - Steel Expansion; #3 - Expansion; #4 - Steel Expansion; #5 - Construction.

Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number S14 of 82022, Location I 94 (WB) over Telegraph Road (US 24)^{F211} 511
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 6-6-63

Item	Length	Profilometer Roughness Value - R inches per mile						Avg.
		Traffic Lane		Passing Lane		Center Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	273.0	273.6	393.8	255.7	184.8	139.6	253.4
Span 1	47.9	123.1	132.4	142.2	234.0	140.0	135.9	151.3
2	70.8	125.2	111.0	121.9	201.2	91.1	224.0	145.7
3	66.3	127.0	113.0	141.5	102.1	81.8	130.2	115.9
4	47.7	188.9	195.4	107.7	83.7	156.7	141.6	145.7
5								
6								
<u>E</u> Approach	50.0	112.0	174.6	175.0	181.1	186.1	157.6	164.4
Average	332.7	154.6	160.6	175.6	174.5	134.0	158.1	159.6

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from West to East. Joint #1 - Construction; #2 - Steel Expansion; #3 - Expansion; #4 - Steel Expansion; #5 - Construction.

Bituminous approaches.

Pop-out span 2, center lane, inner wheel path.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S25 of 82022, Location I 94 (EB) over Oakwood Blvd.
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 3 Machine Finished Yes No

E Bound Roadway

Date Measured 6-11-63

Item	Length	Profilometer Roughness Value - R inches per mile						Avg.
		Traffic Lane		Passing Lane		Center Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	97.4	83.4	87.8	111.6	95.0	87.6	93.8
Span 1	42.4	57.6	43.1	93.7	98.8	51.8	65.4	68.4
2	58.8	59.0	65.2	63.9	47.0	33.2	29.3	49.6
3	42.0	51.5	48.5	84.2	50.4	49.0	50.0	55.6
4								
5								
6								
<u>E</u> Approach	50.0	79.4	107.6	82.4	111.3	155.0	87.2	103.8
Average	243.2	69.6	70.9	81.3	83.1	77.0	63.0	74.2

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Bituminous - no joints
Black top deck.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S26 of 82022, Location I 94 (WB) over Oakwood Blvd.

Dual Structures (separate for each roadway) Yes No

Single Structure Yes No

Number of Spans 3 Machine Finished Yes No

W Bound Roadway

Date Measured 6-11-63

Item	Length	Profilometer Roughness Value - R inches per mile						Avg.
		Traffic Lane		Passing Lane		Center Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>W</u> Approach	50.0	325.4	351.0	264.2	294.4	479.6	291.6	334.4
Span 1	43.4	98.2	100.1	130.2	124.1	142.2	122.9	119.6
2	58.0	124.0	79.0	111.6	130.2	88.6	92.4	104.3
3	42.4	130.2	128.4	107.0	134.4	88.6	78.0	111.1
4								
5								
6								
<u>E</u> Approach	50.0	140.0	185.2	126.4	175.2	388.8	95.5	185.2
Average	243.8	165.0	168.9	148.4	172.8	239.9	136.8	172.0

 Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u> </u> Approach						
Span 1						
2						
3						
4						
5						
6						
<u> </u> Approach						
Average						

Remarks Joints and spans numbered from West to East. Joine #1 - Construction; #2 - Expansion; #3 - Steel Expansion; #4 - Construction.
Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number S30 of 82022, Location Rotunda Drive over I 94
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans 4 Machine Finished Yes No

W Bound Roadway

Date Measured 6-12-63

Item	Length	Profilometer Roughness Value - R inches per mile						
		Traffic Lane		Passing Lane		Center Lane		Avg.
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	216.4	277.2	195.0	325.0	232.4	212.4	243.1
Span 1	52.3	220.2	178.3	146.2	155.0	176.2	207.6	180.6
2	90.0	206.1	129.0	215.2	202.6	154.6	189.1	182.8
3	90.0	180.8	249.4	167.6	170.8	149.0	167.0	180.8
4	51.0	254.0	203.0	205.0	177.2	161.6	175.6	196.1
5								
6								
<u>E</u> Approach	50.0	296.4	272.7	223.4	198.2	163.1	172.7	221.1
Average	383.3	221.6	211.9	191.7	200.6	168.4	185.6	196.6

E Bound Roadway

Item	Length	Profilometer Roughness Value - R inches per mile						
		Traffic Lane		Passing Lane		Center Lane		Avg.
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>W</u> Approach	50.0	166.0	203.8	249.2	274.4	154.6	247.0	215.8
Span 1	52.3	168.2	162.3	180.2	147.4	124.8	128.2	151.8
2	90.0	133.6	112.4	180.7	155.8	145.4	148.8	146.1
3	90.0	106.5	157.7	140.9	169.8	144.8	148.6	144.7
4	51.0	93.5	144.0	172.2	171.8	228.8	167.7	163.0
5								
6								
<u>E</u> Approach	50.0	252.8	187.2	215.6	167.9	222.9	198.8	207.5
Average	383.3	146.4	155.8	183.7	177.1	164.8	167.8	165.9

Remarks Joints and spans number from West to East. Joint #1 - Construction; #2 - Steel Expansion; #3 - Expansion; #4 - Steel Expansion; #5 - Construction.
Bituminous approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number X01 of 82024, Location Addition to I 94 Bridge over DeQuindre Yards Form 511
 Dual Structures (separate for each roadway) Yes No
 Single Structure Yes No
 Number of Spans total - 32 Machine Finished Yes No

E Bound Roadway

Date Measured 6-2-63

Item	Profilometer Roughness Value-R inches per Mile				
	Deceleration Lane				Average
	O. W. P.		I. W. P.		
	Length	R	Length	R	
Span 7	56.6	224.4	56.9	258.4	241.4
8	56.8	181.2	56.0	165.6	173.4
9	113.4	145.8	112.3	159.2	152.5
10	62.4	95.0	61.3	142.1	118.6
11	76.0	106.1	76.8	136.0	121.0
12	75.0	107.4	72.4	109.1	108.2
13	87.8	121.2	87.8	127.0	124.1
14	175.1	117.2	175.4	128.2	122.7
15	87.4	114.0	88.8	112.3	113.2
16	38.2	187.8	40.7	125.4	156.6
17	59.2	74.2	59.2	79.3	76.8
18	59.2	97.2	59.2	93.8	95.5
19	59.2	99.6	59.2	110.4	105.0
20	49.5	88.0	49.5	78.2	83.1
21	40.5	86.1	40.5	97.4	91.8
22	102.0	80.5	102.0	80.1	80.3
23	77.5	102.0	77.5	95.1	98.6
24	56.0	106.4	56.0	118.6	112.5
25	59.1	153.7	59.1	195.1	174.4
26	59.1	102.7	59.1	103.2	103.0
27	59.1	89.2	59.1	96.0	92.6
28	59.1	168.0	59.1	141.9	155.0
29	60.7	171.4	60.7	134.8	153.1
30	60.1	107.0	60.1	140.7	123.8
31	45.0	114.2	45.0	135.1	124.6
32	45.0	203.4	45.0	131.7	167.6
Average	1779.0	122.2	1778.7	126.4	124.3

Remarks Spans and joints numbered from West to East. Joint #1, 2, 15-19, 22-30 -
Espansion; #3, 6 - False Joint; #4, 7, 9, 12, 14, 20 - Metal Expansion; #5, 8, 10, 11, 13,
21 - Construction.
Wheel paths different lengths due to change of pier angles. Cantilevered at span # 10 &
#14 (suspended spans).

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Bridge Number B02 of 82192D, Location Southfield (M 39) over Rouge River Form 511
Dual Structures (separate for each roadway) Yes No
Single Structure Yes No
Number of Spans 5 Machine Finished Yes No

S Bound Roadway (Outside Bridge) Date Measured 6-10-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>S</u> Approach	50.0	255.3	138.9	221.4	255.2	217.7
Span 1	61.5	108.8	123.4	211.4	121.4	141.2
2	66.0	130.1	115.5	169.6	116.8	133.0
3	90.7	74.3	101.4	92.1	76.6	86.1
4	66.0	87.8	96.8	97.4	79.7	90.4
5	62.3	125.2	104.8	85.6	126.6	110.6
6						
<u>N</u> Approach	50.0	217.8	178.0	259.4	148.0	200.8
Average	446.5	132.8	121.2	153.0	123.6	132.6

S Bound Roadway (Inside Bridge)

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O.W.P.	I.W.P.	O.W.P.	I.W.P.	
<u>S</u> Approach	50.0	190.1	193.8	138.3	185.3	176.9
Span 1	61.4	79.2	130.2	133.2	105.3	112.0
2	66.0	98.4	116.4	170.0	155.6	135.1
3	89.2	102.1	95.9	136.8	107.4	110.6
4	66.2	115.2	133.6	151.5	139.2	134.9
5	61.3	171.8	141.3	157.6	152.0	155.7
6						
<u>N</u> Approach	50.0	220.7	134.6	186.9	165.2	176.8
Average	444.1	133.2	131.0	152.2	139.8	139.0

Remarks Joints and spans numbered from South to North. Joint #1 & 2 - Expansion
3 - Construction; #4 & 5 - Steel Expansion; #6 - Construction; #7 - Expansion.

Concrete approaches.

District 10
PROFILOMETER BRIDGE ROUGHNESS MEASUREMENTS
TEST RESULT TABULATION
Research Project 61 F-65

Form 511

Bridge Number B02 of 82192D, Location Southfield (M 39) over Rouge River
Dual Structures (separate for each roadway) Yes No
Single Structure Yes No
Number of Spans 5 Machine Finished Yes No

N Bound Roadway (Outside Bridge) Date Measured 6-10-63

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
<u>S</u> Approach	50.0	265.7	255.8	330.4	247.2	274.8
Span 1	61.4	209.9	170.2	157.4	180.4	179.5
2	65.8	104.4	145.8	145.0	213.4	152.2
3	90.6	77.4	91.0	132.3	118.2	104.7
4	66.0	107.1	119.6	146.1	150.3	130.8
5	62.4	86.6	117.4	145.0	164.8	128.4
6						
<u>N</u> Approach	50.0	188.9	156.8	304.9	308.8	239.8
Average	446.2	138.9	143.8	183.0	188.0	163.4

N Bound Roadway (Inside Bridge)

Item	Length	Profilometer Roughness Value - R inches per mile				Average
		Traffic Lane		Passing Lane		
		O. W. P.	I. W. P.	O. W. P.	I. W. P.	
Approach						
Span 1						
2						
3						
4						
5						
6						
Approach						
Average						

Remarks Joints and spans numbered from South to North. Joint #1 & 2 - Expansion;
#3 - Construction; #4 & 5 - Steel Expansion; #6 - Construction; #7 - Expansion.

Concrete approaches.

Inside Bridge being used as construction route and could not be measured at this time.