

TE
205
.P68
1982

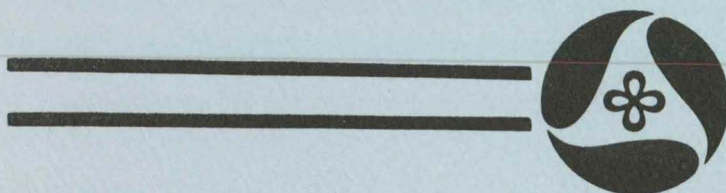
AUG 12 1983

1982 PAVEMENT SMOOTHNESS MEASUREMENTS

HIGHWAY DIVISION
OFFICE OF MATERIALS

MAY 1983

STATE LIBRARY OF IOWA
Historical Building
DES MOINES, IOWA 50319



Iowa Department
of Transportation

DISCLAIMER

The contents of this report reflect the views of the author and do not necessarily reflect the official view or policy of the Iowa Department of Transportation. This report does not constitute a standard, specification or regulation.

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Pavement Smoothness Measuring Equipment	2
1982 Pavement Smoothness Compared to Past Years	9
Iowa-Johannsen-Kirk (IJK) Roadmeter Compared to Bureau of Public Roads (BPR) Roughometer on 1982 Paving and Resurfacing	14
Average Pavement Smoothness By Class and Type of Construction	18
Average Pavement Smoothness By Contractor For Each Class and Type of Construction	19
Pavement Smoothness By Individual Project For Each Class and Type of Construction	24



1982 PAVEMENT SMOOTHNESS
MEASUREMENTS

By

C. J. Potter, P.E.

Special Investigations Engineer

May 1983

Iowa Department of Transportation

Highway Division

Office of Materials

Ames, Iowa, 50010

515-239-1232

1982 PAVEMENT SMOOTHNESS
MEASUREMENTS

INTRODUCTION

The Special Investigations Section of the Office of Materials tested approximately nine hundred and five (905) miles of new paving and resurfacing for smoothness in 1982 on two hundred and thirty-four (234) individual projects. The Bureau of Public Roads (BPR) Roughometer, Iowa-Johannsen-Kirk (IJK) Roadmeter and 25-Foot Profilograph were used for 1982 smoothness testing, and test results are tabulated and summarized in this report.

PAVEMENT SMOOTHNESS MEASURING
EQUIPMENT

Bureau of Public Roads (BPR) Roughometer:

The Roughometer was developed by the Bureau of Public Roads in 1941, and the Iowa State Highway Commission built its first Roughometer according to Bureau of Public Roads plans in 1953. The BPR Roughometer consists of a single-wheeled trailer towed behind a test van at 20 m.p.h. An integrator accumulates vertical movement in one direction only of the test wheel axle relative to the BPR trailer frame. When one inch of movement is accumulated, the integrator sends an electrical impulse to counters in the test van. The resulting Road Roughness Index (R.R.I.) is reported in Inches/Mile; lower BPR Roughometer numbers indicate smoother paving or resurfacing.



Figure 1
BPR Roughometer
Test Van

The integrator on the BPR Roughometer detects and accumulates short wavelength bumps up to 14 feet and minor surface deviations such as marks caused by screed settlement, straightedges, mops, vibratory rollers, stop-go movement of astro-turf drags, etc.

The effect of longer wavelength bumps from 14 feet to 18 feet may be exaggerated, and long wavelength bumps over 22 feet are relatively ignored by the BPR Roughometer at 20 m.p.h. The BPR Roughometer is repeatable, rugged and reliable, but does not detect long wavelength bumps and can be affected by excessively deep or coarse transverse grooving on p.c.c. paving and sprinkle treatment on a.c. resurfacing.

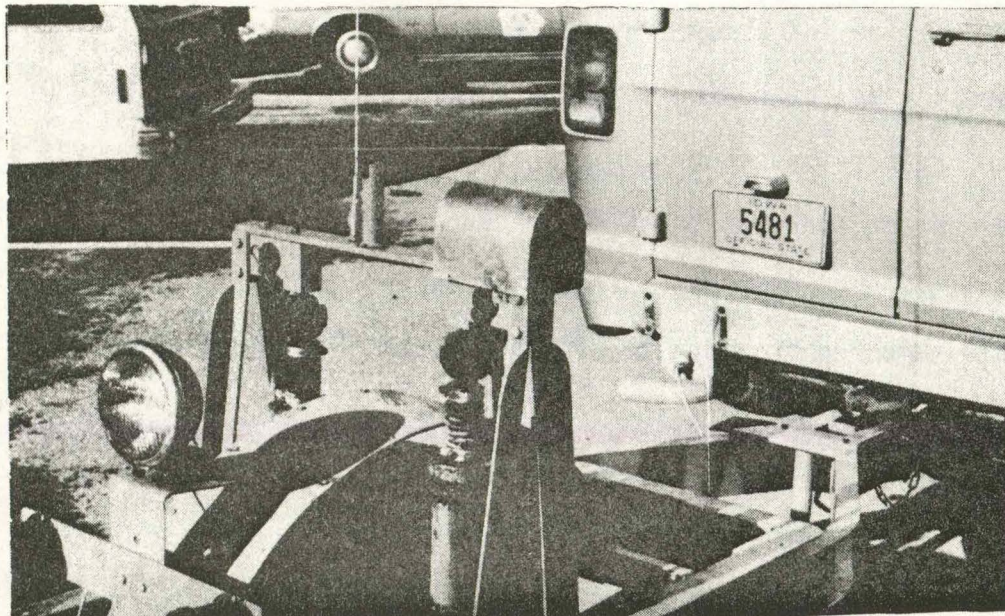


Figure 2

Closeup of BPR Roughometer

The Materials Department of the Iowa State Highway Commission began pavement smoothness testing with the BPR Roughometer in 1955 and performed this inventory of new construction yearly until 1972 when it was discontinued. Pavement smoothness testing of new construction with the BPR Roughometer resumed in 1978 and has been conducted yearly to date.

Iowa-Johannsen-Kirk (IJK) Roadmeter:

The IJK Roadmeter was developed in the Iowa State Highway Commission Materials Laboratory in 1971. It operates at 50 m.p.h. and replaces the old PCA type roadmeter which was sensitive to wind. The IJK Roadmeter consists of an electro-mechanical sensing device bolted directly to the differential housing of an ordinary passenger car. A cantilevered sprung mass moves along a contact board as bumps are encountered and sends electrical impulses to counter banks in the passenger compartment. Counters are numbered from one to ten and record the frequency and magnitude of bumps. The resulting sum/length value is converted to a Present Serviceability Index (PSI) for reporting purposes. Higher PSI's indicate smoother paving.



Figure 3

IJK Roadmeter Vehicle

The IJK Roadmeter is more sensitive to long wavelength bumps than to short wavelength bumps and minor surface deviations. IJK Roadmeter data is fast and economical to obtain and simulates what the traveling public feels at 50 m.p.h. The problem with roadmeters has historically been poor repeatability. Trunk access to check the oil level in the IJK Roadmeter dampening mechanism several times daily has improved repeatability since 1979 to about $\pm 2\%$ (± 0.08 PSI) throughout the entire testing season.

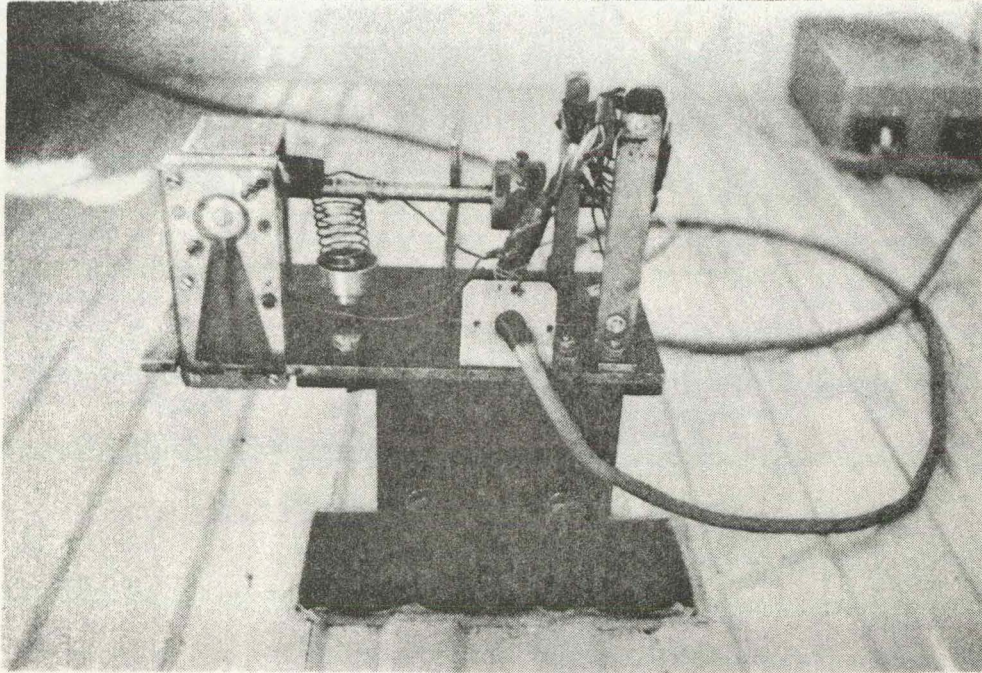


Figure 4

IJK Roadmeter Sensing Device

The IJK Roadmeter will read about 0.45 PSI lower on a.c. paving and resurfacing than on p.c.c. paving of comparable smoothness due to equations developed during the AASHO Road Test in the late 1950's.

The IJK Roadmeter is presently used to determine the Present Serviceability Index (PSI) of the Primary and Interstate road systems on a three-year cycle and to test all new construction yearly, which has been conducted since 1980.

California 25 Foot Profilograph (Profilometer):

The 25-Foot Profilograph consists of a lightweight aluminum truss supported at the end points by six (6) averaging wheels and pushed at walking speed. A bicycle wheel measures deviations from a 25 foot reference plane and is connected to a graphical recording box. The resulting 25-Foot Profilograph trace has a scale of 1 inch = 25 feet horizontally, and 1 inch = 1 inch or full scale vertically.

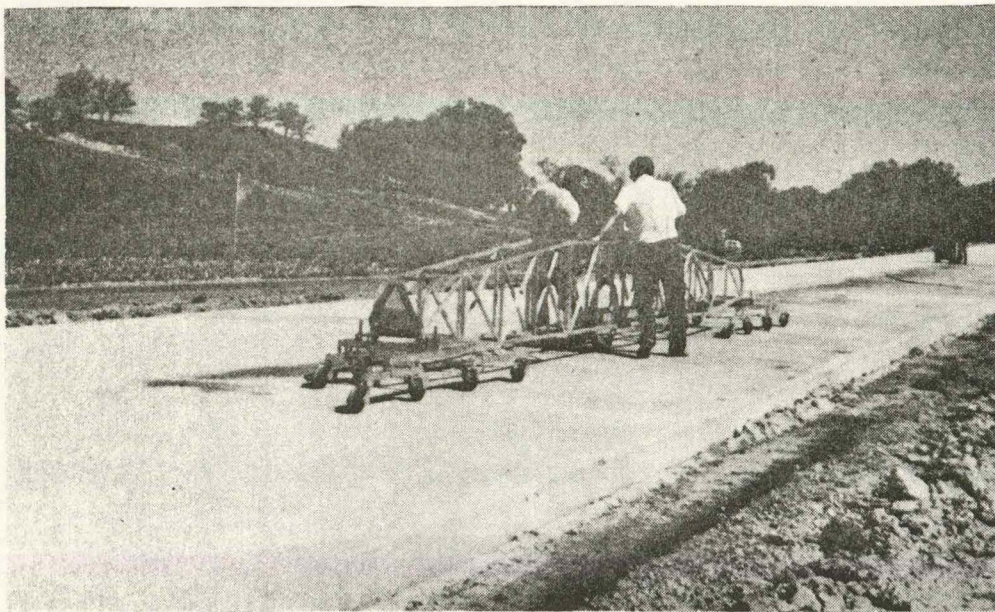


Figure 5

25-Foot Profilograph

Minor deviations less than 0.20" are "blanked out" on the 25-Foot Profilograph trace and discounted. 25-Foot Profilograph results are reported in Inches/Mile; lower 25-Foot Profilograph readings indicate smoother paving.

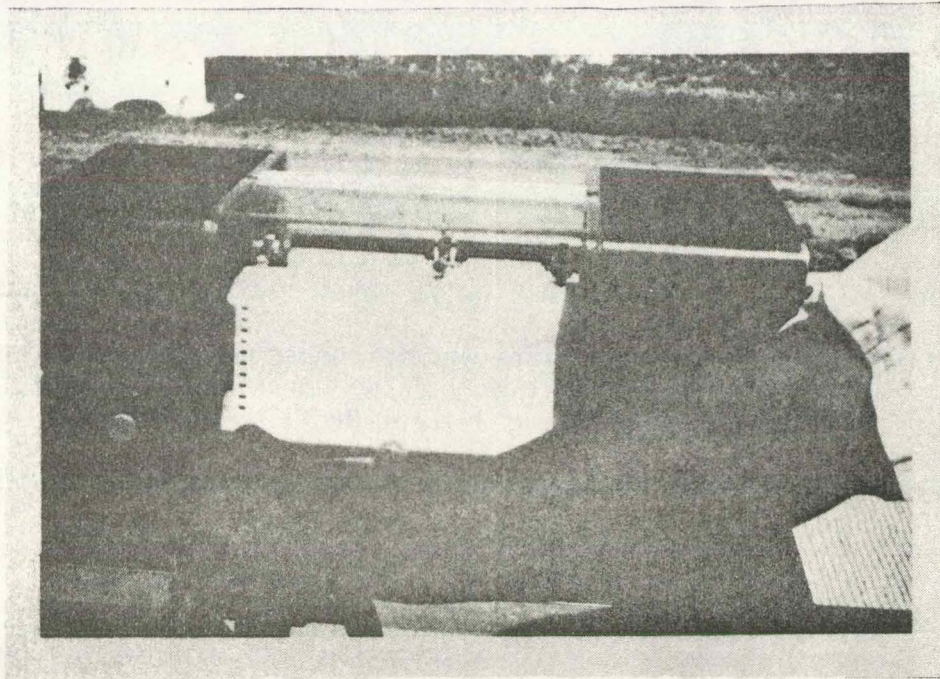


Figure 6

25-Foot Profilograph Recording Box

The 25-Foot Profilograph was used in 1982 to test all Primary and Interstate mainline pavement for compliance with Iowa DOT Specification #895 entitled "Supplemental Specification for Pavement Smoothness, December 5, 1981."

The Iowa DOT has six (6) 25-Foot Profilographs, one in each District, which were operated by District Materials' personnel during the 1982 construction season. Most 25-Foot Profilograph readings in this report represent the entire project length, although a few secondary projects were tested for information only and represent part of the project length.

1982 PAVEMENT SMOOTHNESS
COMPARED TO PAST YEARS

Figure #7 illustrates pavement smoothness trends from 1955 thru 1982 as measured by the BPR Roughometer for new portland cement concrete slipform paving, asphaltic concrete paving, and asphaltic concrete resurfacing. Portland cement concrete slipform paving has increased 29 inches/mile, asphaltic concrete paving has increased 20 inches/mile, and asphaltic concrete resurfacing has increased 19 inches/mile, respectively, since 1972.

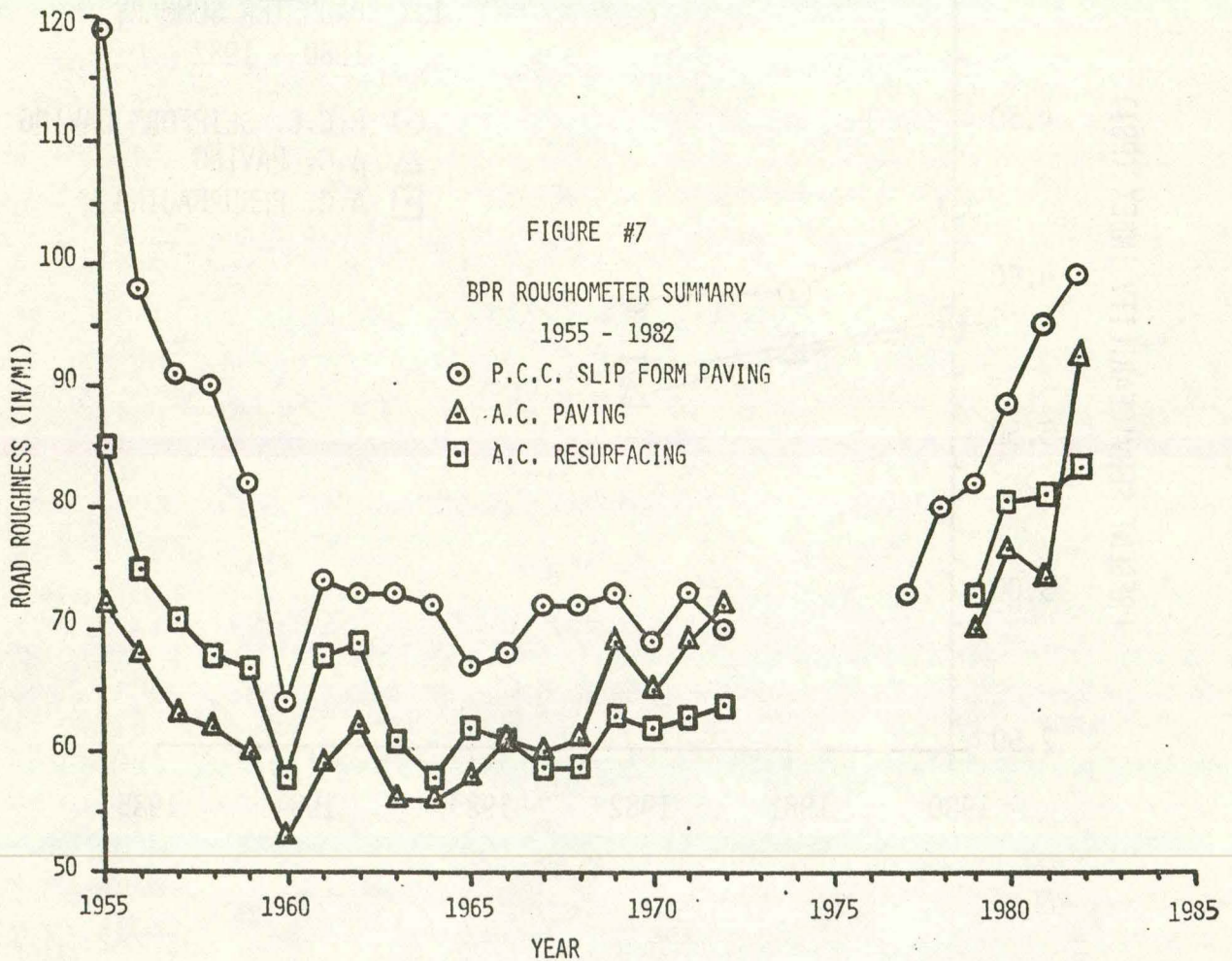
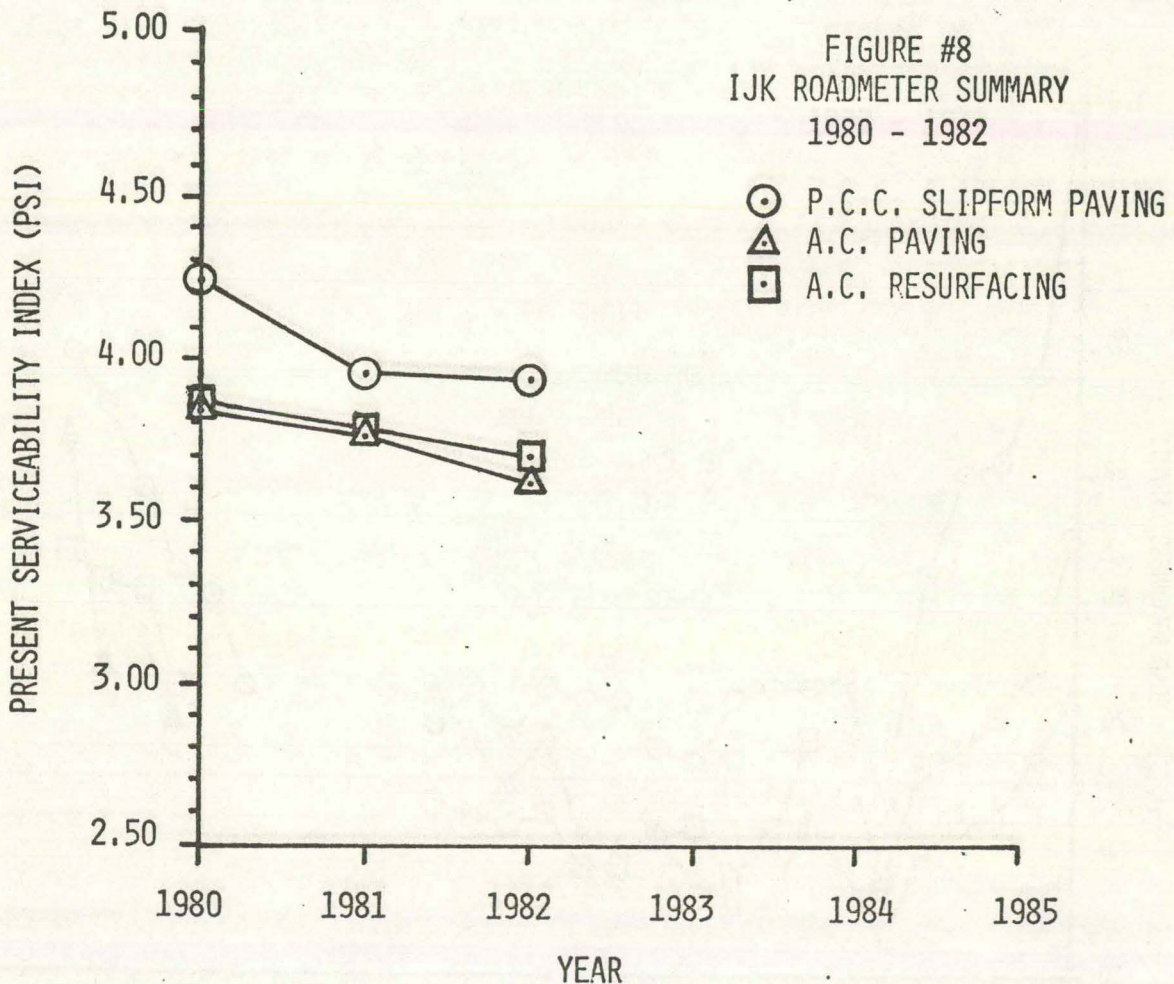


Figure #8 illustrates pavement smoothness trends between 1980 and 1982 as measured by the IJK Roadmeter for new portland cement concrete slipform paving, asphaltic concrete paving, and asphaltic concrete resurfacing. Portland cement concrete slipform paving decreased 0.04 PSI in smoothness between 1981 and 1982, while asphaltic concrete paving decreased 0.15 PSI and asphaltic concrete resurfacing decreased 0.07 PSI during the same period.



Increased roughness on new portland cement concrete slipform paving and primary asphaltic concrete resurfacing may be due in part to transverse grooving and sprinkle treatment, respectively. These texturing methods are specified for improved wet weather pavement frictional qualities. Although a study of 1977 and 1978 p.c.c. paving projects with and without transverse grooving indicated that transverse grooving has no apparent effect on pavement smoothness, increased roughness on new p.c.c. slipform paving in recent years has corresponded chronologically with the introduction of transverse grooving. One 1977 transversely grooved paving project tested as low as 46 inches/mile, and while the uniform texture of transverse grooving need not cause a problem, it can affect pavement smoothness when it is excessively coarse. Other factors affecting p.c.c. slipform paving smoothness in recent years may include:

1. Poor subgrade conditions.
2. Insufficient stringline tension.
3. Stop-go paving machine operation resulting in screed settlement and stop-go movement of astroturf drags.
4. New paving machines, such as the Rex Town and Country and slipform Pave-Saver Citipave, having not worked as well from a pavement smoothness standpoint as the old Rex STR-type paver. This is probably due to the lighter weight and shorter track length of new paving machines.
5. Placing new p.c.c. paving over old a.c. pavement or over old broken concrete without using a track line cut by CMI fine-grading machine.

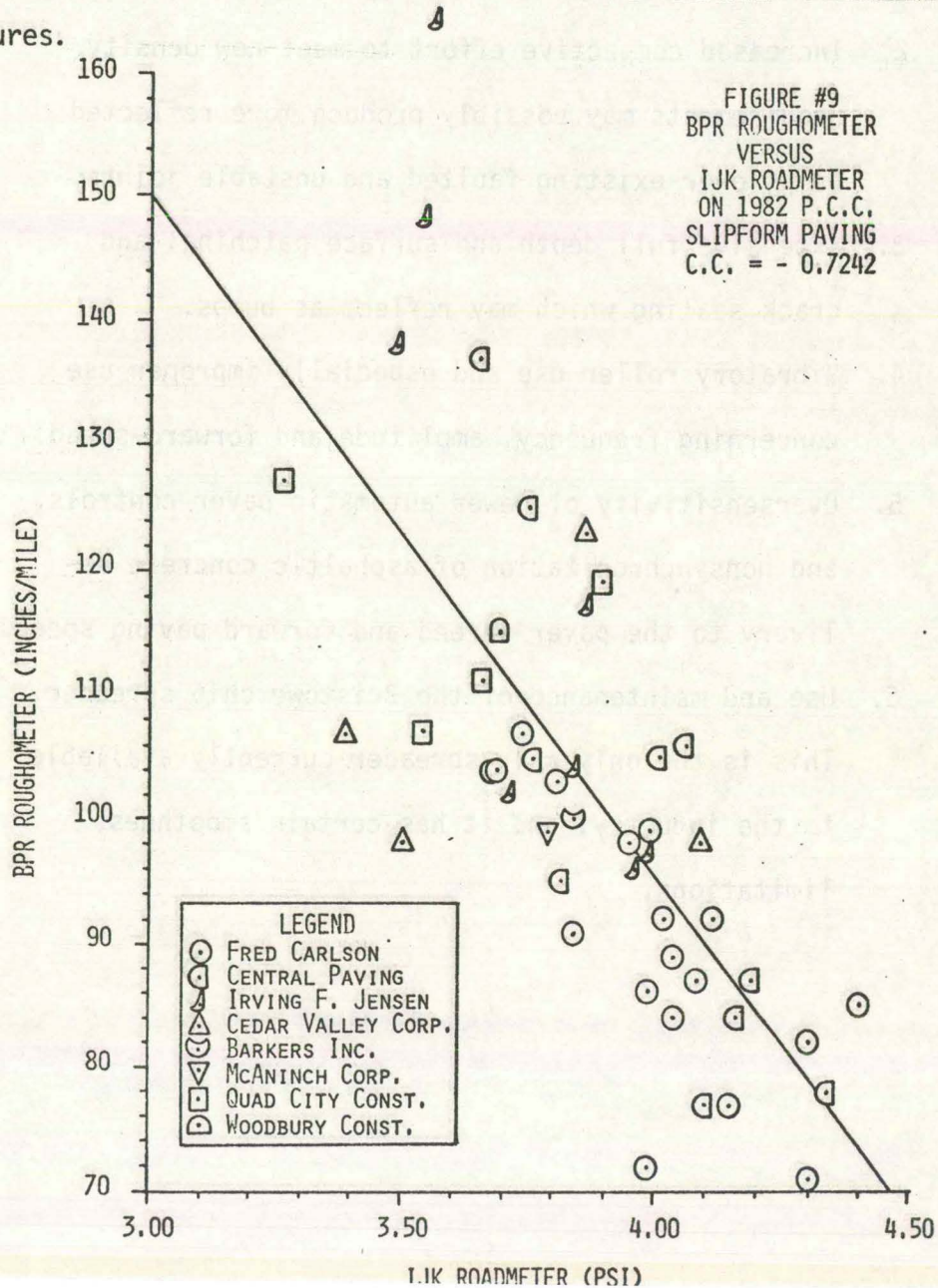
6. Non-uniform placement of concrete in front of paving machines. Piles of concrete tend to lift the new lighter paving machines.
7. Malfunctioning of paving machine sensors.

Sprinkle-treated primary rural asphaltic concrete resurfacing projects have averaged approximately 15 inches/mile rougher than nonsprinkle-treated projects in recent years. This is due to the random chip placement which is detected and integrated by the BPR Roughometer. Other factors affecting a.c. paving and resurfacing smoothness in recent years may include:

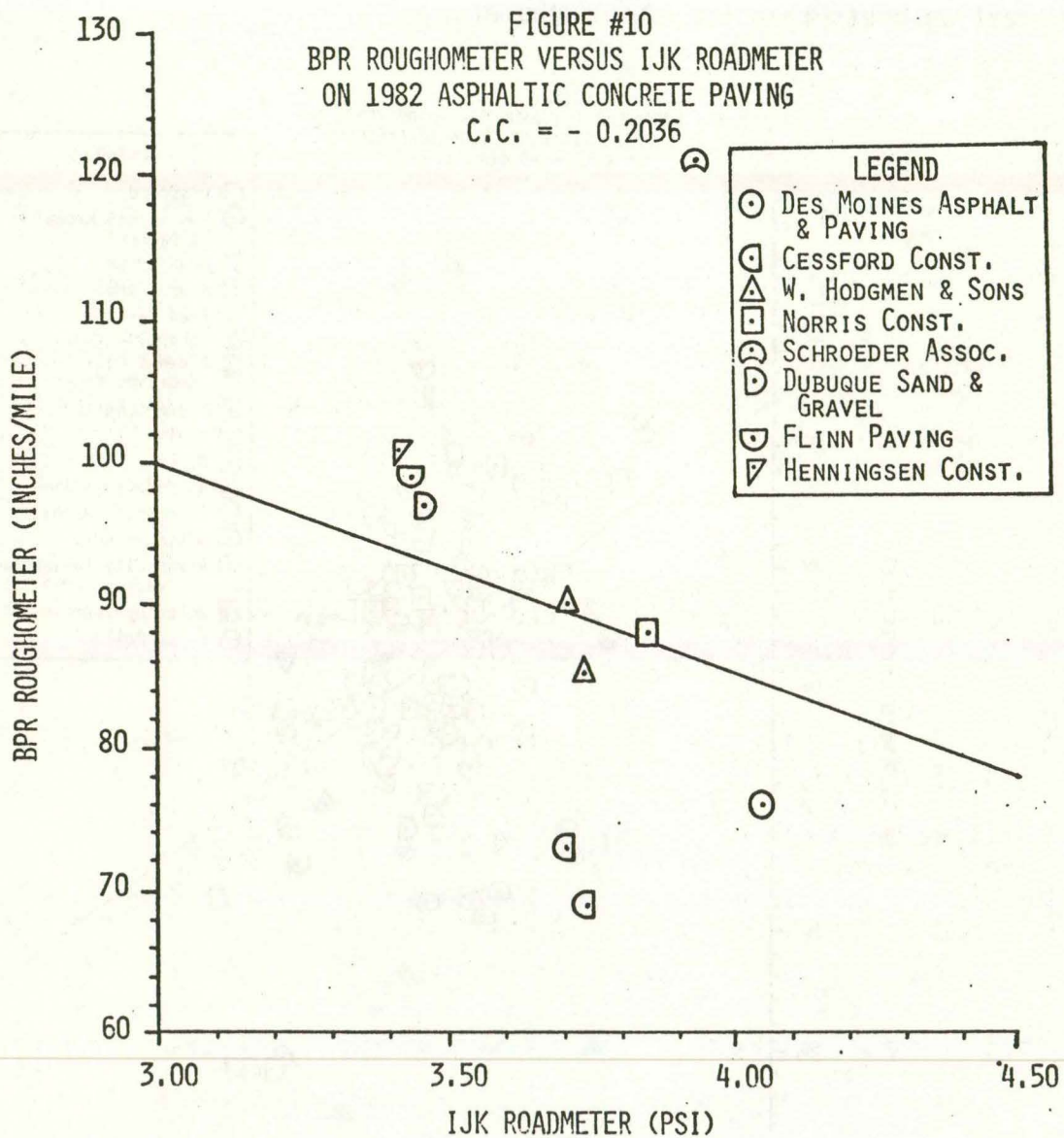
1. More single lift and thin lift a.c. overlays to stretch roadway funding as compared to multiple lift a.c. overlays or reconstruction in past years.
2. Increased compactive effort to meet new density requirements may possibly produce more reflected bumps over existing faulted and unstable joints.
3. Extensive full depth and surface patching, and crack sealing which may reflect as bumps.
4. Vibratory roller use and especially improper use concerning frequency, amplitude and forward speed.
5. Oversensitivity of newer automatic paver controls, and nonsynchronization of asphaltic concrete delivery to the paver screed and forward paving speed.
6. Use and maintenance of the Bristowe chip spreader. This is the only chip spreader currently available to the industry, and it has certain smoothness limitations.

IOWA-JOHANNSEN-KIRK (IJK) ROADMETER
COMPARED TO BUREAU OF PUBLIC
ROADS (BPR) ROUGHOMETER ON
1982 PAVING AND RESURFACING

The relationship between the IJK Roadmeter and BPR Roughometer on 1982 p.c.c. slipform paving, 1982 a.c. paving, and 1982 a.c. resurfacing is illustrated in Figure Number 9, Figure Number 10, and Figure Number 11, respectively. The correlation coefficients were generally poor since these machines work on different operating principles, test at different operating speeds, and are sensitive to different types of roughness. Projects with the best pavement rideability are located at the lower right-hand corner of these figures.

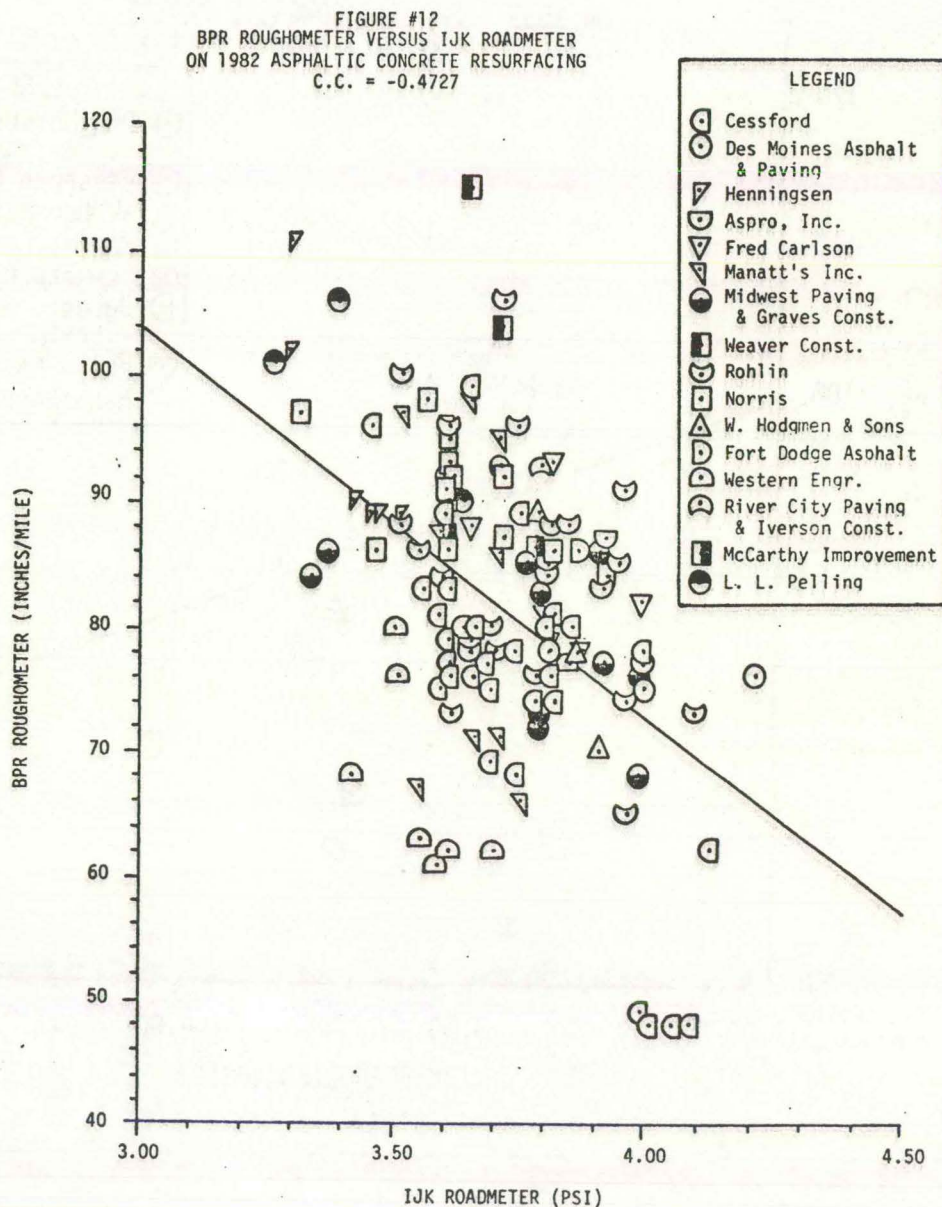


Since the IJK Roadmeter works on an inertia principle, operates at 50 m.p.h. and is sensitive to long wavelength bumps such as "dips" and "swells," it provides a better smoothness indication as felt by the travelling public than the BPR Roughometer, which operates at 20 m.p.h. and is sensitive to short wavelength bumps or "chatter."



IJK Roadmeter testing costs about \$10 per two-lane mile, requires two people and utilizes an ordinary passenger car. BPR Roughometer testing costs about \$45 per two-lane mile, requires three people and utilizes a test van and one safety vehicle.

It is desirable to use both the IJK Roadmeter and BPR Roughometer to test new construction for pavement smoothness since these machines test for different types of roughness. If only one machine must be selected, however, the best choice would be the IJK Roadmeter since it provides an initial PSI for pavement management purposes and also has lower testing costs than the BPR Roughometer.



Projects and contractors are listed in descending order in the following tabulations as ranked by the IJK Roadmeter. When projects or contractors have identical smoothness as measured by the IJK Roadmeter, they are ranked by the BPR Roughometer. All projects could not be tested with the IJK Roadmeter due to speed zones or their extremely short lengths. These projects were inserted in tabulations by inspection based on BPR Roughometer readings.

AVERAGE PAVEMENT SMOOTHNESS BY CLASS
AND TYPE OF CONSTRUCTION

<u>Class of Construction</u>	<u>Type of Pavement</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
Primary Rural	P.C.C. Slip Form	8	24.02	3.78	109	10.2
Primary Urban & Urban	P.C.C. Slip Form	5	4.46	3.81	133	16.4
Primary Urban & Urban	P.C.C. Fixed Form	4	1.91	-	135	21.9
Secondary	P.C.C. Slip Form	45	136.89	3.96	96	11.4
Primary Rural	A.C. Paving	1	13.71	3.42	101	9.5
Primary Rural	A.C. Re-surfacing	30	241.57	3.66	88	5.6
Primary Urban & Urban	A.C. Re-surfacing	9	7.78	-	108	-
Secondary	A.C. Paving	13	32.34	3.69	88	-
Secondary	A.C. Re-surfacing	<u>119</u>	<u>442.71</u>	3.72	80	-
		234	905.39			

P.C.C. - Portland Cement Concrete

A.C. - Asphaltic Concrete

AVERAGE PAVEMENT SMOOTHNESS BY
CONTRACTOR FOR EACH CLASS AND TYPE
OF CONSTRUCTION

PRIMARY RURAL PORTLAND CEMENT
CONCRETE SLIPFORM PAVING

<u>Contractor</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
Barkers, Inc.	1	1.02	3.84	100	-
Quad City Const.	2	11.25	3.80	116	-
McAninch Corp.	1	0.94	3.79	99	18.8
Fred Carlson	<u>4</u>	<u>10.81</u>	<u>3.76</u>	<u>103</u>	<u>9.2</u>
	8	24.02	3.78	109	10.2

PRIMARY URBAN & URBAN PORTLAND
CEMENT CONCRETE SLIPFORM PAVING

Cedar Valley Corp.	1	0.72	-	90	20.8
Quad City Const.	1	2.26	3.81	120	8.5
Christensen Bros.	1	0.50	-	121	19.9
Herberger Const.	1	0.38	-	158	22.0
Allied Const.	<u>1</u>	<u>0.60</u>	<u>-</u>	<u>167</u>	<u>34.7</u>
	5	4.46	3.81	133	16.4

PRIMARY URBAN & URBAN PORTLAND
CEMENT CONCRETE FIXED FORM PAVING

Cedar Valley Corp.	1	0.50	-	116	-
Van Buskirk Const.	2	0.61	-	127	21.9
Tschiggfrie Excav.	<u>1</u>	<u>0.80</u>	<u>-</u>	<u>152</u>	<u>-</u>
	4	1.91	-	135	21.9

AVERAGE PAVEMENT SMOOTHNESS BY
CONTRACTOR FOR EACH CLASS AND TYPE
OF CONSTRUCTION

SECONDARY PORTLAND CEMENT CONCRETE
SLIPFORM PAVING

<u>Contractor</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
Fred Carlson	14	49.00	4.12	84	-
Central Paving	11	39.73	4.05	87	6.1
Manatt's Inc.	2	1.10	-	93	-
Cedar Valley Corp.	7	6.70	3.83	103	29.1
Irving F. Jensen	8	30.21	3.74	117	13.0
Woodbury Contracting Corp.	1	5.75	3.69	115	11.7
Quad City Const.	<u>2</u>	<u>4.40</u>	<u>3.45</u>	<u>113</u>	<u>-</u>
	45	136.89	3.96	96	11.4

PRIMARY RURAL ASPHALTIC CONCRETE PAVING

Henningsen Const.	<u>1</u>	<u>13.71</u>	<u>3.42</u>	<u>101</u>	<u>9.5</u>
	1	13.71	3.42	101	9.5

AVERAGE PAVEMENT SMOOTHNESS BY
CONTRACTOR FOR EACH CLASS AND TYPE
OF CONSTRUCTION

PRIMARY RURAL ASPHALTIC CONCRETE RESURFACING

<u>Contractor</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
Aspro, Inc.	2	8.88	3.87	86	4.8
Fort Dodge Asphalt	1	13.27	3.86	86	4.1
Cessford Const.	5	53.92	3.84	78	3.3
Western Engr.	2	2.33	3.84	81	7.6
Des Moines Asphalt & Paving Co.	1	2.52	-	73	6.8
F. O. Blue Const.	1	3.19	-	77	-
Rohlin Const.	5	50.18	3.80	92	3.8
Norris Const.	2	10.52	3.79	86	4.7
W. Hodgman & Sons	1	14.42	3.78	89	-
River City Paving & Iverson Const.	1	15.44	3.78	93	4.6
Fred Carlson	2	24.54	3.75	91	7.9
Manatt's Inc.	4	16.51	3.64	95	11.0
Brower Const. Co.	1	10.60	3.62	92	7.9
Henningsen Const.	<u>2</u>	<u>15.25</u>	<u>3.29</u>	<u>110</u>	<u>16.1</u>
	30	241.57	3.66	88	5.6

AVERAGE PAVEMENT SMOOTHNESS BY
CONTRACTOR FOR EACH CLASS AND TYPE
OF CONSTRUCTION

PRIMARY URBAN & URBAN ASPHALTIC
CONCRETE RESURFACING

<u>Contractor</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
L. L. Pelling Co.	1	0.35	-	91	-
Aspro, Inc.	1	0.66	-	92	-
Cessford Const.	1	0.35	-	96	-
Manatt's Inc.	1	0.47	-	99	-
Des Moines Asphalt & Paving Co.	1	0.92	-	108	-
Fred Carlson	1	2.26	-	112	-
Norris Const.	2	2.07	-	112	-
Rohlin Const.	<u>1</u>	<u>0.70</u>	<u>-</u>	<u>120</u>	<u>-</u>
	9	7.78	-	108	-

SECONDARY ASPHALTIC CONCRETE PAVING

Des Moines Asphalt & Paving	3	3.63	4.05	80	-
Schroeder Assoc.	1	.72	3.94	121	-
Norris Const.	3	8.89	3.85	90	-
Cessford Const.	2	5.56	3.72	72	-
W. Hodgman & Sons	2	5.81	3.72	87	-
Dubuque Sand & Gravel Company	1	4.70	3.46	97	-
Flinn Paving Co.	<u>1</u>	<u>3.03</u>	<u>3.44</u>	<u>99</u>	<u>-</u>
	13	32.34	3.69	88	-

AVERAGE PAVEMENT SMOOTHNESS BY
CONTRACTOR FOR EACH CLASS AND TYPE
OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING

<u>Contractor</u>	<u>No. of Projects</u>	<u>Length (Miles)</u>	<u>IJK Roadmeter Wtd. Avg. (PSI)</u>	<u>BPR Roughometer Wtd. Avg. R.R.I. (In/Mi)</u>	<u>25 Foot Profilograph Wtd. Avg. (In/Mi)</u>
Des Moines Asphalt & Paving Co.	5	8.30	4.03	78	-
Fred Carlson	3	9.05	3.89	80	-
W. Hodgman & Sons	3	9.90	3.88	75	-
Cessford Const.	15	67.77	3.86	68	-
Midwest Paving & Graves Const.	12	65.67	3.79	81	-
Rohlin Const.	20	75.36	3.74	82	-
Manatt's Inc.	12	35.27	3.71	82	-
Weaver Const.	3	7.04	3.67	110	-
McCarthy Improvement	4	11.27	3.66	90	-
Rohlin & Cessford	13	49.83	3.63	78	-
Western Engr.	11	26.97	3.58	67	-
Norris Const	14	46.42	3.58	92	-
L.L. Pelling	3	10.11	3.53	97	-
Henningsen	<u>4</u>	<u>19.75</u>	<u>3.47</u>	<u>88</u>	<u>-</u>
	119	442.71	3.72	80	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY RURAL PORTLAND CEMENT CONCRETE SLIPFORM PAVING

Project No.	County	Length (Miles)	Contractor	IJK Roadmeter (PSI)	BPR Roughometer R.R.I. (In./Mi.)	25 Foot Profilegraph Pr. Inde: (In./Mi.)
F-518-3(12)-- 20-92	Washington	1.44	Fred Carlson	4.12	92	8.7
FFD-561-1(7)-- 2N-82	Scott	6.88	Quad City Const.	3.89	119	-
BRF-21-3(6)-- 38-48	Iowa	1.02	Barkers, Inc.	3.84	100	-
FN-22-2(17)-- 21-92	Washington	0.94	McAninch Corp.	3.79	99	18.8
FN-67-2(12)-- 21-23	Clinton	3.19	Fred Carlson	3.74	107	12.5
FFD-561-2(4)-- 2N-23	Clinton	2.79	Fred Carlson	3.69	104	-
F-518-4(10)-- 20-52	Johnson	3.39	Fred Carlson	3.68	104	6.4
FFD-561-1(6)-- 2N-82	Scott	<u>4.37</u>	Quad City Const.	<u>3.66</u>	<u>111</u>	<u>-</u>
		24.02		3.78	109	10.2

PRIMARY URBAN & URBAN PORTLAND
CEMENT CONCRETE SLIPFORM PAVING

FN-5-1(19)-- 21-04	Appanoose	0.72	Cedar Valley Corp.	-	90	20.8
I-F-380-5(114) 266- OF-57	Linn	2.26	Quad City	3.81	120	8.5
BRF-F-50-1(11)-- 2P-18	Cherokee	0.50	Christensen Bros.	-	121	19.9
FN-92-5(16)-- 21-04	Warren	0.38	Herberger Const.	-	158	22.0
M-0166(3)--81-84	Story	<u>0.60</u>	Allied Const.	<u>-</u>	<u>167</u>	<u>34.7</u>
		4.46		3.81	133	16.4

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY URBAN & URBAN PORTLAND CEMENT
CONCRETE FIXED FORM PAVING

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In/Mi.)</u>	<u>25 Foot Profilograph Pr. Index (In./Mi.)</u>
BRF-9-1(20)--38-60	Lyon	0.35	Van Buskirk	-	109	18.6
F-6-1(32)--20-78	Pott	0.50	Cedar Valley Corp.	-	116	-
M-2961(2)--81-31	Dubuque	0.80	Tschiggfrie Excav.	-	152	-
BRF-75-3(9)--38-84	Sioux	<u>0.26</u>	Van Buskirk Const.	<u>-</u>	<u>152</u>	<u>26.4</u>
		1.91		-	135	21.9

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY PORTLAND CEMENT CONCRETE
SLIPFORM PAVING

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Index (In./Mi.)</u>
FM-17(5)--55-17	Cerro Gordo	4.97	Fred Carlson	4.40	85	-
SN-3298(4)--51-05	Audubon	6.39	Central Paving	4.34	78	7.3
RS-1680(3)--61-33	Fayette	9.16	Fred Carlson	4.30	71	-
FM-35(8)--55-35	Franklin	1.14	Fred Carlson	4.30	82	-
RS-205(2)--61-35	Franklin	5.02	Central Paving	4.19	87	-
FN-28(3)--55-28	Delaware	2.73	Central Paving	4.16	84	4.9
FM-92(3)--55-92	Washington	5.50	Fred Carlson	4.15	77	-
RS-4717(5)--61-57	Linn	3.01	Fred Carlson	4.12	92	-
FM-15(4)--55-15	Cass	5.96	Central Paving	4.10	77	6.0
SN-8016(1)--51-29	Des Moines	2.31	Cedar Valley Corp.	4.09	98	-
SN-1655(3)--51-22	Clayton	2.23	Fred Carlson	4.08	87	-
FM-53(3)--55-53	Jones	3.60	Central Paving	4.06	106	-
FM-96(8)--55-96	Winneshiek	2.63	Fred Carlson	4.04	84	-
RS-4717(6)--61-53	Jones	2.20	Fred Carlson	4.04	89	-
RS-7569(4)--61-70	Muscatine	4.29	Central Paving	4.01	105	5.2
RS-7825(3)--61-27	Decatur	4.04	Fred Carlson	3.99	72	-
SN-1509(3)--51-96	Winneshiek	2.92	Fred Carlson	3.99	86	-
RS-1784(4)--61-22	Clayton	3.57	Fred Carlson	3.99	99	-
L-530(1)	Osceola	3.89	Irving F. Jensen	3.98	97	8.1
SN-3630(1)--51-79	Poweshiek	0.51	Manatt's Inc.	-	89	-
SN-3125(4)--51-97	Woodbury	4.90	Irving F. Jensen	3.96*	96	6.7

*P.C.C. Overlays

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY PORTLAND CEMENT CONCRETE
SLIPFORM PAVING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profile-graph Pr. Index (In./Mi.)</u>
RS-4729(6)--61-49	Jackson	4.79	Fred Carlson	3.95	98	-
L-P-1182--73-74	Palo Alto	0.74	Cedar Valley Corp.	-	94	28.8
L-P-1282--73-74	Palo Alto	0.56	Cedar Valley Corp.	-	95	27.4
SN-3069(1)--51-81	Sac	3.02	Irving F. Jensen	3.86*	117	13.1
FM-29(1)--55-29	Des Moines	1.03	Cedar Valley Corp.	3.86	123	-
SN-3661(1)--51-79	Poweshiek	0.59	Manatt's Inc.	-	97	-
SN-1804(7)--51-03	Allamakee	1.70	Fred Carlson	3.84*	91	-
L-1284--73-07	Boone	1.98	Irving F. Jensen	3.84*	104	16.7
RS-4949(8)--61-50	Jasper	3.13	Central Paving	3.82	95	-
RS-4890(1)--61-53	Jones	1.14	Fred Carlson	3.81	103	-
L-2180--73-53	Jones	1.50	Central Paving	-	100	-
FM-28(4)--55-28	Delaware	2.73	Central Paving	3.76	105	-
FM-57(6)--55-57	Linn	1.72	Central Paving	3.75	125	-
SN-3201(2)--51-08	Boone	5.75	Irving F. Jensen	3.72*	102	17.1
L-PCC-182	Plymouth	5.75	Woodbury Contr.Corp	3.69	115	11.7
FM-91(1)--55-91	Warren	0.40	Cedar Valley Corp.	-	118	-
RS-4834(6)--61-57	Linn	2.66	Central Paving	3.65	137	-
L-3258(3)--73-81	Sac	2.64	Irving F. Jensen	3.56*	164	8.4
FM-82(4)--55-82	Scott	3.03	Quad City Const.	3.54	107	-
P-114(3) & P-24(1)	Des Moines	1.47	Irving F. Jensen	3.54	148	-

*P.C.C. Overlays

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY PORTLAND CEMENT CONCRETE
SLIPFORM PAVING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Inde: (In./Mi.)</u>
FM-74(20)--55-74	Palo Alto	0.98	Cedar Valley Corp.	3.50	98	27.5
RS-3210(8)--61-24	Crawford	6.56	Irving F. Jensen	3.48	138	17.9
L-P-1082--73-74	Palo Alto	0.68	Cedar Valley Corp.	3.38	107	32.5
SN-5022(1)--51-82	Scott	<u>1.37</u>	Quad City Const.	<u>3.26</u>	<u>127</u>	-
		136.89		3.84	97	11.4

* P.C.C. Overlays

PRIMARY RURAL ASPHALTIC
CONCRETE PAVING

IR-80-2(91)86--12-01	Adair	<u>13.71</u>	Henningsen Const.	<u>3.42</u> (S)	<u>101</u>	<u>9.5</u>
		13.71		3.42	101	9.5

(S) Sprinkle Treatment

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY RURAL ASPHALTIC
CONCRETE RESURFACING

Project No.	County	Length (Miles)	Contractor	IJK Roadmeter (PSI)	BPR Roughometer R.R.I. (In./Mi.)	25 Foot Profile-graph Pr. Index (In./Mi.)
EACIR-29-5(42) 78--0C-43	Harrison	14.10	Cessford Const.	4.12	62	1.12
FR-9-6(25)-- 2G-98	Worth	14.05	Rohlin Const.	4.09	73	3.23
FN-61-1(38)-- 21-56	Lee	3.69	Norris Const.	3.92 S	84	5.5
FN-20-6(31)-- 21-07	Black Hawk	4.89	Aspro, Inc.	3.92 (S)(I)	87	4.8
MP-1667--69-D1	Webster/ Hamilton	13.27	Fort Dodge Asphalt	3.86 (S)(H)	86	4.1
MP-2681--69-99	Wright	11.54	Cessford Const.	3.85 (S)(H)	80	6.6
FN-173-1(9)--21-15	Cass	1.83	Western Engr.	3.84	77	7.6
MP-1690--69-77	Polk	2.52	Des Moines Asphalt & Paving Co.	- (H)	73	6.8
FN-224-1(5)--21-50	Jasper	1.77	Cessford Const.	3.81	76	6.4
I-29-3(29)54-- 01-78	Pott	3.19	F.O. Blue Const.	-	77	-
FN-63-6(38)--21-07	Black Hawk	5.59	Rohlin Const.	3.81(S)	88	5.0
FR-3-7(15)-- 2G-33	Fayette	15.22	Fred Carlson	3.81(S)(H)	93	8.4
FR-151-4(31)-- 2G-53	Jones	17.85	Cessford Const.	3.80 (S)	80	2.6
FN-105-2(6)-- 21-98	Worth	0.96	Rohlin Const.	3.80	84	6.45
MP-2683--69-D2	Butler/Bremer	3.99	Aspro, Inc.	3.80(S)(H)	85	-

(S) Sprinkle Treatment

(S)(I) Sprinkle Treatment 4.4 Mi. Only

(H) Heater Scarification With Thin Overlay

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY RURAL ASPHALTIC
CONCRETE RESURFACING CONT'D

Project No.	County	Length (Miles)	Contractor	IJK Roadmeter (PSI)	BPR Roughometer R.R.I. (In./Mi.)	25 Foot Profilegraph Pr. Index (In./Mi.)
FN-169-8(24)-- 21-55	Kossuth	14.42	W. Hodgman & Sons	3.78 (S)	89	-
FN-61-7(25)-- 21-39	Jackson	15.44	River City Paving & Iverson Const.	3.78 (S)	93	4.6
FN-34-7(28)-- 21-90	Wapello	6.83	Norris Const.	3.72 (S)(H)	87	4.2
F-60-2(9)-- 20-84	Sioux	15.44	Rohlin Const.	3.72 (S)(H)	106	3.7
FN-65-3(10) 21-91	Warren	0.74	Manatt's Inc.	3.71	71	12.4
FR-3-8(11)-- 2G-22	Clayton	9.32	Fred Carlson	3.65 (S)(H)	88	7.2
FN-163-2(5)-- 21-50	Jasper/Marion	12.23	Manatt's Inc.	3.65 (S)	98	-
FN-48-3(7)-- 21-15	Cass	0.50	Western Engr.	-	95	-
FR-30-2(42)-- 2G-24	Crawford	10.60	Brower Const. Co.	3.62 (S)(H)	92	7.9
F-18-2(39)-- 20-21	Clay	14.14	Rohlin Const.	3.61 (S)(H)	96	4.0
FN-163-3(8)-- 21-63	Marion	2.92	Manatt's Inc.	3.61 (S)	96	-
FN-65-3(7)-- 21-91	Warren	0.62	Manatt's Inc.	3.55	67	9.3
FN-1-5(22)-- 21-52	Johnson	8.66	Cessford Const.	3.45 (S)	96	-

(S) Sprinkle Treatment

(H) Heater Scarification With Thin Overlay

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY RURAL ASPHALTIC
CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Constructor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilograph Pr. Index (In./Mi.)</u>
P-925-0(1)-- 30-25	Dallas	2.25	Henningsen Const.	3.29	102	-
FN-6-3(36)-- 21-15	Dallas	<u>13.00</u>	Henningsen Const.	<u>3.29</u>	<u>111</u>	<u>16.1</u>
		241.57		3.66	88	5.6

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

PRIMARY URBAN & URBAN ASPHALTIC
CONCRETE RESURFACING

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilograph Pr. Inde. (In./Mi.)</u>
Iowa City	Johnson	0.35	L. L. Pelling Co	-	91	-
M-1241(1)-- 81-34	Floyd	0.66	Aspro, Inc.	-	92	-
Marshalltown	Marshall	0.35	Cessford Const.	-	96	-
Pella	Marion	0.47	Manatt's Inc.	-	99	-
Windsor Heights	Polk	0.92	Des Moines Asphalt & Paving Co.	-	108	-
FN-218-1(27)-- 21-56	Lee	1.69	Norris Const. Co.	-	111	-
FN-13-2(19)-- 21-28	Delaware	2.26	Fred Carlson	-	112	-
Washington	Washington	0.38	Norris Const. Co.	-	118	-
Spencer	Clay	<u>0.70</u> 7.78	Rohlin Const. Co.	-	<u>120</u> 108	- -

SECONDARY ASPHALTIC CONCRETE PAVING

FM-77(10)-- 55-77	Polk	1.81	Des Moines Asphalt & Paving Co.	4.05	76	-
RRS-30-2(37)-- 46-14	Carroll	0.72	Schroeder Assoc.	3.94	121	-
SN-7678(1)-- 51-04	Appanoose	3.47	Norris Const.	3.85	88	-
FM-38(9)-- 55-38	Grundy	1.56	Cessford Const.	3.74	69	-
FM-60(19)-- 55-60	Lyon	2.91	W. Hodgman & Sons	3.74	85	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALT CONCRETE PAVING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilograph Pr. Index (In./Mi.)</u>
SN-4573(1)-- 51-38	Grundy	4.00	Cessford Const.	3.71	73	-
FM-60-(20)-- 55-60	Lyon	2.90	W. Hodgman & Sons	3.71	90	-
FM-RS77(11)-- 55-77	Polk	0.51	Des Moines Asphalt	-	83	-
FM-RS77(13)-- 55-77	Polk	1.31	Des Moines Asphalt & Paving Co.	-	84	-
LS-30-81	Davis	0.50	Norris Const.	-	90	-
SN-4825(3)-- 51-06	Benton	4.92	Norris Const.	-	91	-
SN-4557(2)-- 51-31	Duquque	4.70	Dubuque Sand & Gravel Co.	3.46	97	-
FM-65(3)-- 55-65	Mills	<u>3.03</u>	Flinn Paving Co.	<u>3.44</u>	<u>99</u>	<u>-</u>
		32.34		3.69	88	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilograph Pr. Inde (In./Mi.)</u>
SN-3536(1)-- 51-77	Polk	2.27	Des Moines Asphalt & Paving Co.	4.21	76	-
SR-342(2)-- 5G-99	Wright	3.14	Cessford Const.	4.08	48	-
SN-358(1)-- 51-99	Wright	4.59	Cessford Const.	4.05	48	-
SR-237(2)-- 5G-99	Wright	12.97	Cessford Const.	4.01	48	-
SR-338(1)-- 5G-99	Wright	6.08	Cessford Const.	3.99	49	-
SN-7501(1)-- 51-77	Polk	2.52	Des Moines Asphalt & Paving Co.	3.99	75	-
SR-230(3)-- 5G-32	Emmet	3.97	Rohlin Const.	3.99	77	-
SR-390(1)-- 5G-41	Hancock	5.57	Cessford Const.	3.99	78	-
SN-1672(2)-- 51-19	Chickasaw	3.01	Fred Carlson	3.99	82	-
SN-7542(1)-- 51-77	Polk	1.12	Des Moines Asphalt & Paving Co.	-	72	-
L-1551-82-- 73-66	Mitchell	0.99	W. Hodgman & Sons	-	76	-
SN-4927(1)-- 51-82	Scott	3.02	McCarthy Improvement	-	77	-
L-BV-2-82-73-11	Buena Vista	3.00	Midwest Paving & Graves Const.	3.98	68	-
SN-3310(1)-- 51-13	Calhoun	5.95	Midwest Paving & Graves Const.	3.98	76	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

Project No.	County	Length (Miles)	Contractor	IJK Roadmeter (PSI)	BPR Roughometer R.R.I. (In./Mi.)	25 Foot Profile-graph Pr. Index (In./Mi.)
SN-4738(2)-- 21-07	Black Hawk	7.90	Rohlin Const.	3.96	65	-
L-FM-782-- 73-32	Emmet	1.69	Rohlin Const.	3.96	74	-
L-82-53-- 73-70	Muscatine	0.46	Manatt's Inc.	-	80	-
LFM-82(2)-- 73-55	Kossuth	2.30	Rohlin Const.	3.95	91	-
L-FM-882-- 73-32	Emmet	1.77	Rohlin Const.	3.94	85	-
L-BV-3-82-- 73-11	Buena Vista	1.87	Midwest Paving & Graves Const.	3.92	77	-
L-FM-382-- 73-32	Emmet	4.95	Rohlin Const.	3.91	83	-
L-1563-82-- 73-66	Mitchell	3.98	W. Hodgman & Sons	3.90	70	-
SN-3310(3)-- 51-81	Sac	14.83	Midwest Paving & Graves Const.	3.90	86	-
SN-1600(2)-- 51-66	Mitchell	4.93	W. Hodgman & Sons	3.86	78	-
SN-1676(1)-- 51-19	Chickasaw	3.05	Fred Carlson Co.	3.86	78	-
SN-3221(1)-- 51-14	Carroll	1.94	Rohlin Const.	3.84	88	-
FM-41(10)-- 55-41	Hancock	5.98	Cessford Const.	3.82	74	-
P-174(2)	Des Moines	2.23	Cessford Const.	3.82	81	-
SN-7829(3)-- 51-04	Appanoose	0.99	Norris Const.	3.82	86	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profile-graph Pr. Index (In./Mi.)</u>
SN-7529(3)-- 51-77	Polk	1.32	Des Moines Asphalt & Paving Co.	3.81	78	-
SN-1668(1)-- 51-19	Chickasaw	2.99	Fred Carlson co.	3.81	79	-
RS-8028(8)-- 61-70	Muscatine	1.64	Manatt's Inc.	3.80	78	-
SR-3185(2)-- 5G-40	Hamilton	4.33	Manatt's Inc.	3.80	85	-
L-BV-1-82-- 73-11	Buena Vista	8.51	Midwest Paving & Graves Const.	3.79	73	-
L-BV-5-82-- 73-11	Buena Vista	3.51	Midwest Paving & Graves Const.	3.79	74	-
L-1982-1-- 73-40	Hamilton	1.11	Manatt's Inc.	3.79	81	-
SN-3053(1)-- 51-11	Buena Vista	4.84	Midwest Paving & Graves Const.	3.79	83	-
SN-2406(1)-- 51-82	Scott	1.22	McCarthy Improvement	3.79	86	-
L-BV-6--82-- 73-11	Buena Vista	3.02	Midwest Paving & Graves Const.	3.78	72	-
SR-7721(4)-- 5G-51	Jefferson	4.94	Cessford Const.	3.78	74	-
FM-51-(2)-- 55-51	Jefferson	3.48	Cessford Const.	3.78	74	-
SN-282(1)-- 51-55	Kossuth	5.99	Rohlin Const.	3.78	76	-
SN-217(4)-- 51-75	Plymouth	7.39	Midwest Paving & Graves Const.	3.76	85	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Index (In./Mi.)</u>
RS-8020(1)-- 61-70	Muscatine	4.11	Manatt's Inc.	3.75	66	-
SR-4865(4)-- 5G-64	Marshall	0.50	Cessford Const.	3.75	89	-
FM-84(16)-- 55-84	Sioux	2.96	Rohlin & Cessford	3.74	68	-
SR-7773(2)-- 5G-51	Jefferson	2.09	Cessford Const.	3.74	78	-
SN-3258(2)-- 51-14	Carroll	8.09	Rohlin Const.	3.74	96	-
SR-3189(1)-- 5G-40	Hamilton	3.40	Manatt's Inc.	3.72	78	-
SR-4689(5)-- 5G-40	Hamilton	5.33	Manatt's Inc.	3.72	86	-
FM-26(5)-- 55-26	Davis	1.51	Norris Const.	3.72	92	-
SN-26(1)-- 51-75	Plymouth	5.91	Midwest Paving & Graves Const.	3.72	93	-
SR-4677(3)-- 5G-40	Hamilton	4.06	Manatt's Inc.	3.72	95	-
SN-418(1)-- 51-17	Cerro Gordo	2.49	Weaver Const.	3.71	104	-
SN-6027(1)-- 51-78	Pott	1.51	Western Engr.	3.70	62	-
L-FM-82(1)-- 73-55	Kossuth	5.33	Rohlin Const	3.70	78	-
SN-3042(1)-- 51-97	Woodbury	4.90	Rohlin & Cessford	3.69	69	-
SN-3125(5)-- 51-97	Woodbury	1.00	Rohlin & Cessford	3.69	75	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Inde (In./Mi.)</u>
SN-1529(1)-- 51-98	Worth	1.00	Rohlin Const.	3.69	80	-
SN-3042(2)-- 51-97	Woodbury	2.97	Rohlin & Cessford	3.68	77	-
SN-7525(3)-- 51-53	Johnson	5.31	L. L. Pelling	3.68	90	-
FM-63(21)-- 55-63	Marion	5.36	Manatt's Inc	3.66	71	-
FM-84(15)-- 55-84	Sioux	4.94	Rohlin & Cessford	3.66	76	-
SR-4614(1)-- 5G-64	Marshall	4.53	Cessford Const.	3.66	80	-
SN-1528(1)-- 51-98	Worth	4.73	Rohlin Const	3.65	78	-
FM-78(30)-- 55-78	Pott	3.77	Western Engr.	3.65	79	-
SN-4706(4)-- 51-86	Tama	1.70	Cessford Const.	3.65	99	-
SR-3009(1)-- 5G-46	Humboldt	3.99	Weaver Const.	3.65	115	-
SN-129(6)-- 51-84	Sioux	3.96	Rohlin & Cessford	3.64	80	-
SN-146(5)-- 51-30	Dickinson	2.14	Rohlin Const.	3.62	73	-
SN-4873(3)-- 51-86	Tama	0.45	Cessford Const.	3.62	76	-
L-2-82-73-84	Sioux	3.15	Rohlin & Cessford	3.62	77	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilograph Pr. Index (In./Mi.)</u>
SN-129(5)-- 51-84	Sioux	2.63	Rohlin & Cessford	3.62	79	-
FM-97(10)-- 55-97	Woodbury	6.12	Rohlin & Cessford	3.62	83	-
SN-3129(1)-- 51-97	Woodbury	3.16	Rohlin & Cessford	3.62	83	-
SN-5006(1)-- 51-82	Scott	4.23	McCarthy Improve- ment	3.62	87	-
SN-7765(1)-- 51-90	Wapello	2.16	Norris Const.	3.62	92	-
SN-6070(1)-- 51-78	Pott	6.46	Western Engr.	3.61	62	-
SN-1529(2)-- 51-98	Worth	4.31	Rohlin Const.	3.61	79	-
SN-7765(2)-- 51-90	Wapello	4.37	Norris Const.	3.61	90	-
SN-7837(4)-- 51-26	Davis	1.21	Norris Const.	3.61	93	-
SN-4921(1)-- 51-16	Cedar	6.15	Norris Const.	3.61	95	-
FM-67(6)-- 57-67	Monona	5.60	Rohlin Const.	3.60	84	-
SN-4742(1)-- 51-06	Benton	9.33	Norris Const.	3.60	86	-
SN-3476(2)-- 51-40	Hamilton	1.08	Manatt's Inc.	3.60	87	-
SN-4646(8)-- 51-38	Grundy	9.52	Cessford Const.	3.60	89	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profile-graph Pr. Index (In./Mi.)</u>
SN-7721(3)-- 51-44	Henry	9.05	Norris Const.	3.60	91	-
SN-3046(1)-- 51-97	Woodbury	5.13	Rohlin & Cessford	3.59	75	-
SN-6066(1)-- 51-78	Pott	4.34	Western Engr.	3.58	61	-
L-1-82--73-84	Sioux	4.96	Rohlin & Cessford	3.58	81	-
L-T-582--73-97	Woodbury	3.95	Rohlin & Cessford	3.56	83	-
SN-7980(1)-- 51-16	Cedar	4.51	Norris Const.	3.56	98	-
FM-78(31)-- 55-78	Pott	4.79	Western Engr.	3.55	63	-
FM-30(1)--55-30	Dickinson	3.28	Rohlin Const.	3.55	86	-
SN-7534(4)-- 51-20	Clarke	1.07	Des Moines Asphalt & Paving Co.	-	93	-
SN-6302(1)-- 51-80	Ringgold	7.12	Henningsen	3.52	87	-
SN-4749(1)-- 51-85	Story	3.57	Manatt's Inc.	3.52	97	-
L-326--73-30	Dickinson	1.48	Rohlin Const.	3.52	100	-
SN-406(1)--51-17	Cerro Gordo	0.56	Weaver Const	-	95	-
FM-85-9--55-85	Story	0.82	Manatt's Inc.	-	96	-
L-82-51	Muscatine	1.23	Norris Const.	-	97	-
FM-4(7)-- 55-04	Appanoose	0.99	Norris Const.	-	98	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Index (In./Mi.)</u>
SN-6130(1)-- 51-78	Pott	3.48	Western Engr.	3.51	76	-
SN-1524(1)-- 51-98	Worth	7.06	Rohlin Const.	3.51	88	-
SN-6029(1)-- 51-78	Pott	1.02	Western Engr.	3.50	80	-
SN-7865(1)-- 51-04	Appanoose	1.67	Norris Const.	3.46	86	-
SN-618(1)-- 51-87	Taylor	4.88	Henningsen	3.46	89	-
SN-6217(4)-- 51- 87	Taylor	5.41	Henningsen	3.45	89	-
SN-6117(1)-- 51-78	Pott	1.60	Western Engr.	3.42	68	-
SN-6198(3)-- 51-87	Taylor	2.34	Henningsen	3.42	90	-
SN-7849(1)-- 51-04	Appanoose	0.37	Norris Const.	-	101	-
L-332--73-30	Dickinson	1.03	Rohlin Const.	-	102	-
SN-7932(3)-- 51-52	Johnson	4.03	L.L. Pelling	3.38	106	-
FM-75(8)-- 55-75	Plymouth	5.36	Midwest Paving & Graves Const.	3.37	86	-
SN-3025(8)-- 51-75	Plymouth	1.48	Midwest Paving Graves Const.	3.34	84	-
FM-4(4)--55-04	Appanoose	2.88	Norris Const.	3.31	97	-

PAVEMENT SMOOTHNESS BY INDIVIDUAL PROJECT
FOR EACH CLASS AND TYPE OF CONSTRUCTION

SECONDARY ASPHALTIC CONCRETE RESURFACING CONT'D

<u>Project No.</u>	<u>County</u>	<u>Length (Miles)</u>	<u>Contractor</u>	<u>IJK Roadmeter (PSI)</u>	<u>BPR Roughometer R.R.I. (In./Mi.)</u>	<u>25 Foot Profilegraph Pr. Inde (In./Mi.)</u>
SN-4897(4)-- 51-52	Johnson	0.77	L.L. Pelling	3.26	101	-
SN-1524(2)-- 51- 17	Cerro Gordo	0.80	Rohlin Const.	-	105	-
TJ-984-0(1)-- 2M-82	Scott	<u>2.80</u>	McCarthy Imp.	<u>-</u>	<u>111</u>	<u>-</u>
		442.71		3.72	80	-

