NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

MATERIALS AND RESEARCH DIVISION

Experimental Study ND 97-03

Performance of Different Classes of Hot Bituminous Pavement Used in the Overlay of an Interstate Concrete Pavement

Final Report

Project IM-1-094(040)193

January 2003

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

EXPERIMENTAL PROJECT REPORT

EXPERIMENTAL PROJECT

EXPERIMENTAL PROJECT NO.	STATE	YEAR		NUMBER	SURF	CONSTRUCTION PROJ NO	LOCATION
1	ND	97	-	03		IM-1-094(040)193 8	BURLEIGH COUNTY 28

EVALUATION FUNDING					NEEP NO.	PROPRIETARY FEATURE?
48	1 X HP&R	2 CONSTRUCTION	3 DEMONSTRATION	4 IMPLEMENTATION	49	51 Yes / No

SHORT TITLE

TITLE 52: Performance of Difference Classes of Hot Bituminous Pavement used in the Overlay of an Interstate Concrete Pavement

THIS FORM

DATE	MO.		YR.	REPORTING
140	06	--	97	1 INITIAL 2 ANNUAL 3 X FINAL

KEY WORDS

KEY WORD 1	KEY WORD 2
145 Bituminous	167 Pavement
KEY WORD 3	**KEY WORD 4**
189 Overlay	211 Concrete
UNIQUE WORD	**PROPRIETARY FEATURE NAME**
233 Classes	255

CHRONOLOGY

Date Work Plan Approved	Date Feature Constructed:	Evaluation Scheduled Until:	Evaluation Extended Until:	Date Evaluation Terminated:
05-97	06-97	2002		2002
277	281	285	289	293

QUANTITY AND COST

QUANTITY OF UNITS (ROUNDED TO WHOLE NUMBERS)	UNITS		UNIT COST (*Dollars, Cents*)
97553	1 LIN. FT 2 SY 3 SY-IN 4 CY	5 TON 6 LBS 7 EACH 8 LUMP SUM	
297	305		306

AVAILABLE EVALUATION REPORTS

CONSTRUCTION X	PERFORMANCE X	FINAL **X**
315		

EVALUATION

CONSTRUCTION PROBLEMS	PERFORMANCE
1 NONE 2 X SLIGHT 3 MODERATE 4 SIGNIFICANT 5 SEVERE	1 X EXCELLENT 2 GOOD 3 SATISFACTORY 4 MARGINAL 5 UNSATISFACTORY
318	319

APPLICATION

320

1	ADOPTED AS PRIMARY STD.	4	X PENDING
2	PERMITTED ALTERNATIVE	5	REJECTED
3	ADOPTED CONDITIONALLY	6	NOT CONSTRUCTED

(Explain in remarks if 3, 4, 5, or 6 is checked)

REMARKS

321

The Project time limit was short because that section of roadway was overlayed. An evaluation that involves a failing section should be conducted before there is an application of this research used in construction.

Experimental Study ND 97-03

Performance of Different Classes of Hot Bitiminous Pavemant

Project IM-1-094(040)193

January 2003

Written by

Kyle Evert

Disclaimer

The contents of this report reflect the views of the author or authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not reflect the official views of the North Dakota Department of Transportation or the Federal highway Administration. This report does not constitute a standard, specification, or regulation.

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Performance of Different Classes of Hot Bituminous Pavement

Purpose and Need

The purpose of the study is to determine how the performance of Class 27, 29, 31, and 33 are different due to their various percentages of fractured faces. The classes of aggregates will be compared to each other to determine if lower classes of aggregates should be allowed for high volume highways under heavy loads.

Objective

Availability of good quality aggregate is becoming scarce in areas within the state of North Dakota. Current specifications require different percentages of fractured faces depending on the class of Hot Bituminous Pavement (HBP). The objective of this research project is to evaluate performance of Class 27, 29, 33 aggregates and an experimental mix when used on high volume roads.

Scope

The North Dakota Department of Transportation (NDDOT) will construct test sections comprised of several different classes of HBP. These test sections will be used to evaluate the performance of different HBP under heavy loads.

Location

The test sections will be part of the project IM-1-094(040)193. This project is located on Interstate 94 from the west Kidder County line to just east of the Dawson Interchange. The test sections will be constructed on the westbound lanes. The westbound lanes will be overlaid from Reference Point (RP) 193.111 to RP 195.000, RP 197.000 to RP 203.000, and RP 208.000 to RP 209.359 for a length of 9.248 miles. The map in Figure 1 identifies the project location.

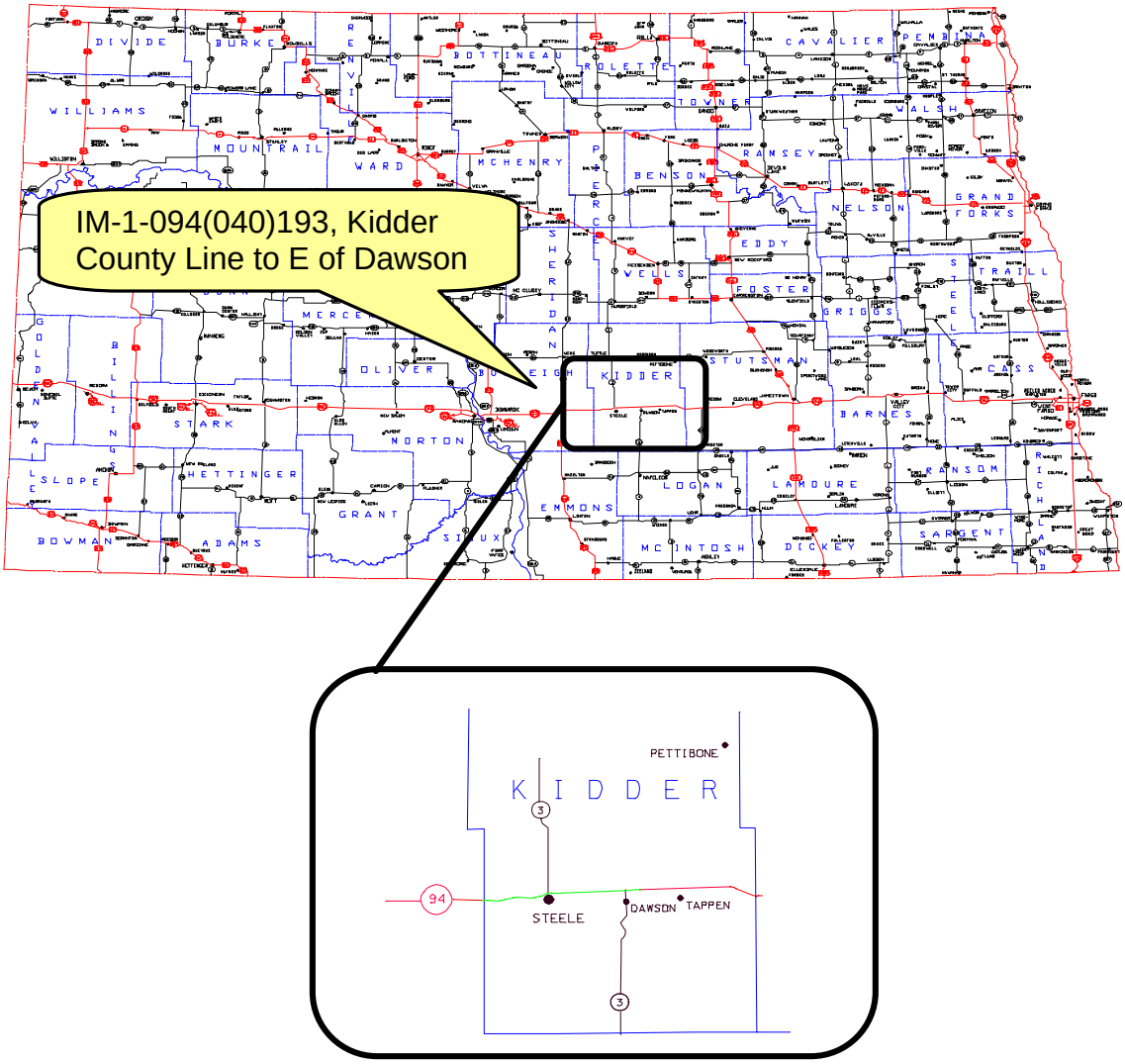

Figure 1 – Project Location

Project Historical Information

RIMS Data

RP 193.1110 to RP 195.0000 and RP 197.0000 to 203.0000						
Surface Components	Left Shld. Width	Roadway Width	Right Shld. Width	Year	Material	Depth
Grade	-	48.0	-	1965	-	-
Aggregate Base	-	27.0	-	1966	-	3.0
Cont - Reinforced PCC	-	24.0	-	1966	-	7.0
Aggregate Base	13.1	-	7.7	1966	-	3.7
Plant Mix Bit Base	11.9	-	5.8	1966	120-150	2.0
HBP	10.0	-	3.0	1966	120-150	3.0
Contract Chip Seal	10.0	-	3.0	1981	MC-3000	-
Concrete Pavement Rep	-	-	-	1983	-	-
Maintenance Gravel SE	-	-	3.0	1987	-	-
Concrete Pavement Rep	-	-	-	1988	-	-
District Sand Seal	10.0	-	3.0	1992	RCLMITE	-
HBP	-	24.0	3.0	1997	120-150	3.7
HBP	10.0	-	-	1997	120-150	2.4
Safety Enhancements	-	-	-	1997	-	-
Federal Aid Chip Seal	-	27.0	-	1999	MC-3000P	-
Federal Aid Chip Seal	-	-	10.0	1999	MC-3000P	-

Table 1

Design

All of the test sections were designed with identical asphalt thickness and applied over existing continuously reinforced concrete pavement (CRCP). All of the test sections are two miles long and located in the westbound driving lane. Test section 1 is located from RP 197 to RP 199. Test section 2 is located from RP 199 to RP 201. Test section 3 is located from RP 201 to RP 203. The control section was used for the remainder of the project. A typical cross-section is shown below.

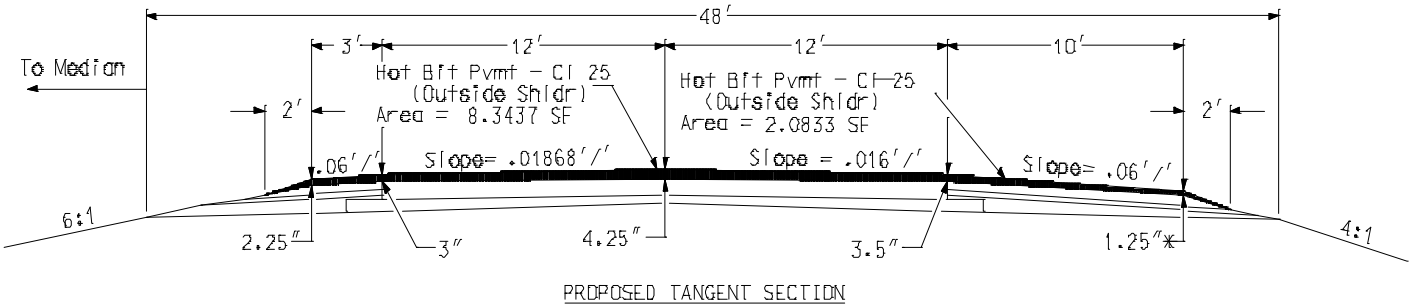

Figure 2 – Typical Section

Test section one is a standard Class 27 HBP (no additional crusher fines will be added to the mix). Test section two is a standard Class 29 HBP. Test section three is an experimental mix where eighty percent of the total mix shall be produced by a mechanical crushing process (the gradation tolerances allowed for in Section 409.04 P.2 of the NDDOT specifications will be in effect). Each test section is two miles long only in the driving lane of the roadway. Class 33 HBP was used on the reminder of the project as a control section.

Mix Designs

The Bismarck District developed the mix design for test sections one, two and the control section. The Contractor developed the mix design for test section three. The Contractor submitted a complete mix design to the Materials and Research lab for section three. The Materials and Research lab verified the Contractors mix design. The aggregate was separated on each sieve and batched back by weight retained on each sieve.

Aggregate Gradation

The gradation requirements for Classes 27, 29, Experimental Mix, and 33 are shown in Table 2.

Percent Passing	Test Section 1 (Class 27)	Test Section 2 (Class 29)	Test Section 3 (Experimental mix)	Control Section (Class 33)
3/4"	100	100	100	100
5/8"	100	100	-	100
1/2"	70-100	70-100	-	70-100
3/8"	-	-	-	-
No.4	40-70	40-70	20-80	40-70
No.8	33-55	33-55	15-65	33-55
No.16	25-45	25-45	-	25-45
No.30	15-35	15-35	-	15-35
No.50	10-30	10-30	-	10-30
No.200	2.0-9.0	2.0-9.0	2.0-8.0	2.0-9.0
Shale	5%	5%	5%	5%
L.A. Abrasion	40%	40%	40%	40%
Plasticity Index	3	3	3	N.P.
Fractured Faces[1]	50%	50%	80% of total mix	95%
Crushed Fines[2]	-	50%		80%

[1]Mininum weight percentage allowable for the portion of the aggregate retained on a No. 4 sieve having at least 1 fractured face for Class 33 and 2 fractured faces for Class 27 and 29.

[2]Minimum percentage of material passing a No. 4 sieve that is composed of fractured material produced by a crushing process. The Contractor shall demonstrate that the crushing operation produces this result.

Table 2

Asphalt Mix Properties

The laboratory mix design with aggregate and asphalt proposed for the project shall have the following properties:

Number of Blows:	50
Air Voids:	4.0
Stability (lbs):	1800
Flow (0.01 in):	8 -16
V.M.A. (% min if % passing No.4 > 45):	15
V.M.A. (% min if % passing No.4 **#** 45):	14.5
Percent Passing No. 200 Sieve/ Effective Asphalt Cement Ratio	0.6 – 1.3

Construction

Project IM-1-094(040)193 was constructed in Kidder County in 1997. The project Engineer was Doug Fercho and the prime contractor was Anderson Western, Inc. The project bid price was $3,153,950 for Alternate #2.

The project underwent its construction without problems other than one change order. Section 3 originally was designed with Class 33. Change Order 3P 3C was established because the A.C. content was too low. The aggregate blend would need to allow for more A.C. without adversely affecting voids and reducing the P_{200} material would accomplish this. The VMA was at 12.1% well below the desired 14%. Reducing the P_{200} would increase the voids and allow for more A.C. at the required 4% air voids. The P_{200} material was reduced by adding washed crusher dust to the mix design. After the washed crusher dust was added the P_{200} material was reduced from 8.5% to 6.2%, and a new mix design was developed. The new mix design consisted of 80% total that a mechanical crushing process produced for the mix. The gradation specifications applied to this mix design follows the North Dakota Department of Transportation Specifications 409.04 P.2.

Evaluation

The evaluation period for this project was to be five years. The items to be evaluated are:

1. Accumulated ESALs versus rut depth
2. Ride
3. Cracking Pattern

The traffic for each year can be seen in the Tables 3 and 4.

Reference Point 193.1081 to 201.1790			
Year	***ESAL's**	****AADT**	**Truck AADT**
2002	2060	6621	1630
2001	2030	7100	1678
2000	1827	7005	1654
1999	1607	5752	1451
1998	1625	5652	1278
* Equivalent Single Axle Load			
** Average Annual Daily Traffic			

Table 3

Reference Point 201.1790 to 208.0000			
Year	***ESAL's**	****AADT**	**Truck AADT**
2002	2070	7100	1725
2001	2070	7100	1725
2000	1770	6700	1475
1999	1590	6600	1325
1998	1625	6880	1250
* Equivalent Single Axle Load			
** Average Annual Daily Traffic			

Table 4

The rutting score may be one of the most important factors determining the success of the research project. The differences in fractured faces will effect how the asphalt ruts under existing traffic.

The difference in rut from the 1997 RIMS data to the 2002 RIMS data can be seen in Chart 1. From Chart 1 it can be seen that the rut from the lower classes of HBP is higher then the rut of the higher classes of HBP. This evaluation of rut depth corresponds to how the differences in HBP classes behave. Below in Chart 2 through 5 the rut for each year can be seen for each section. It appears the initial traffic after construction effected the rutting the most. The rut for each section did not change much after the first year of traffic. Chart 1 will show the average depth difference, in rut from 1997 to 2002, between the three experimental sections and control section.

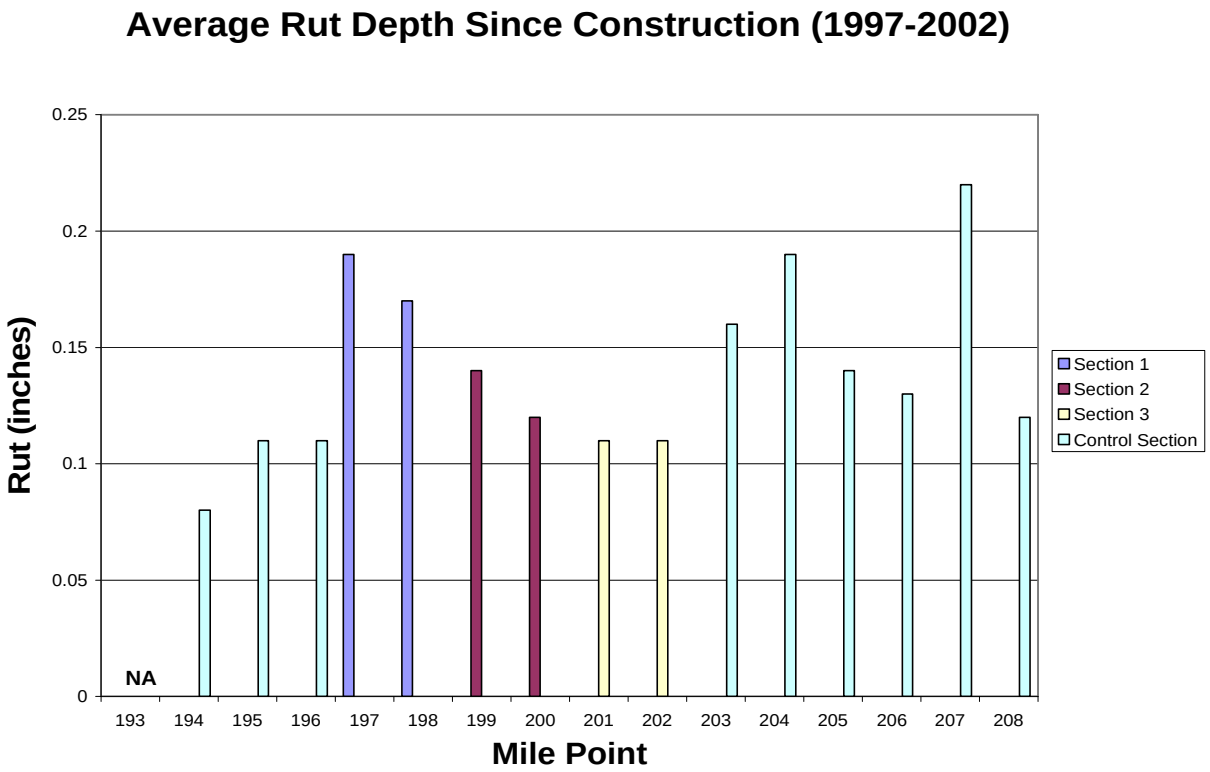

Chart 1 – Average rut in 2002

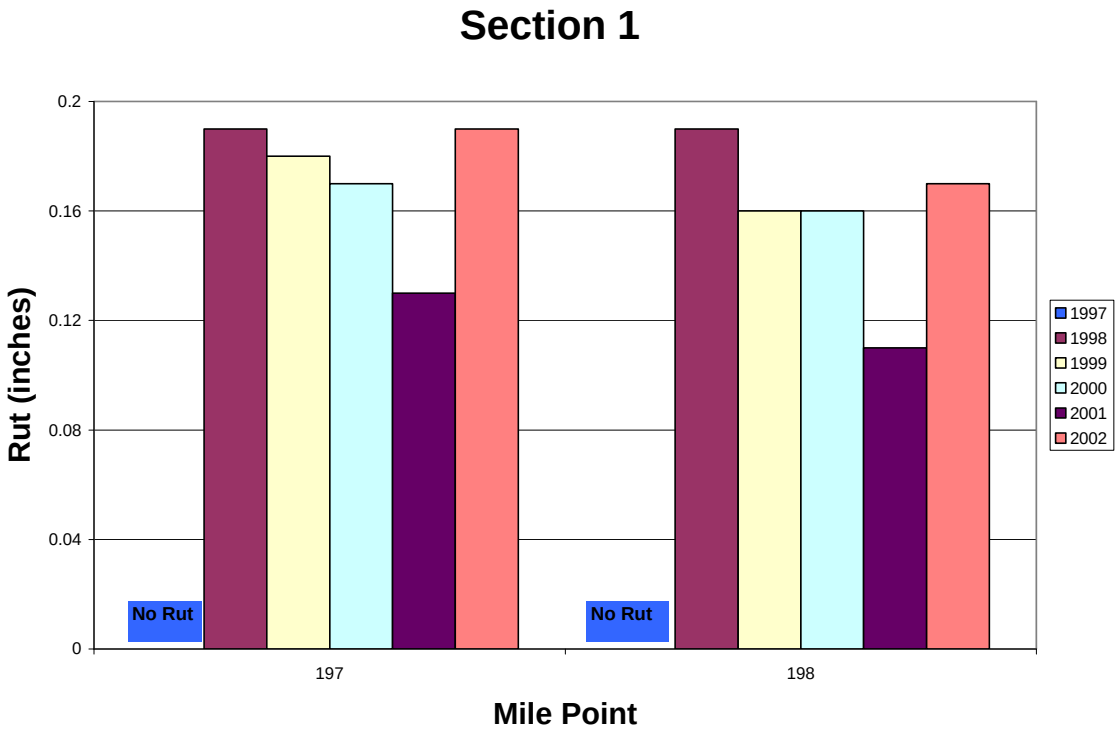

Chart 2 – Average annual rut for Section 1 (Class 27)

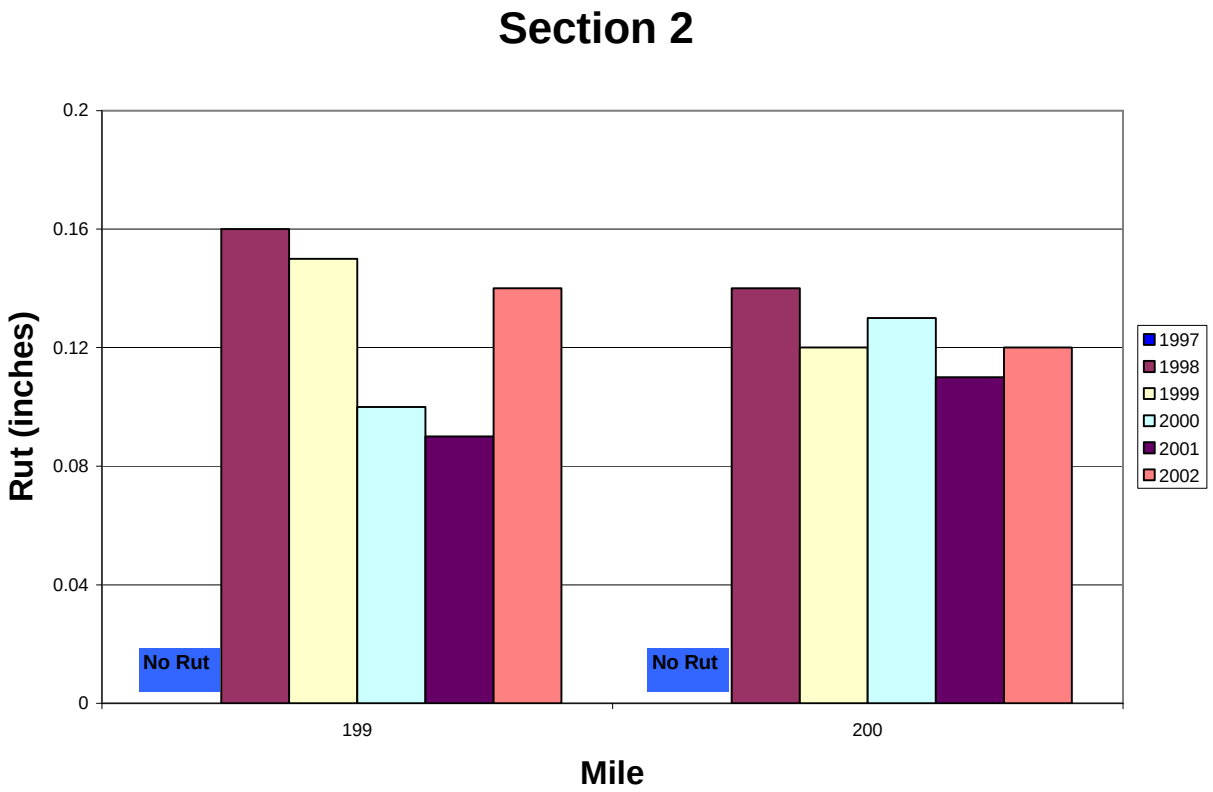

Chart 3 – Average annual rut for Section 2 (Class 29)

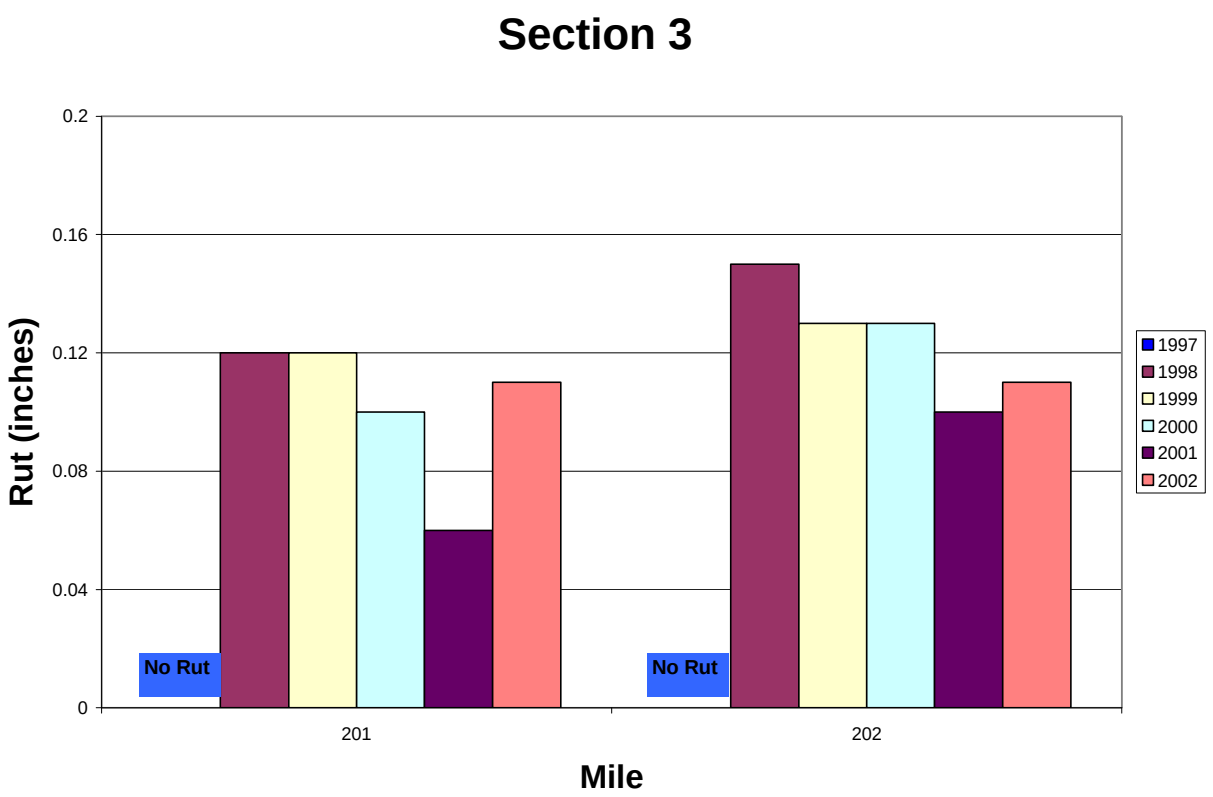

Chart 4 – Average annual rut for Section 3 (Experimental Mix)

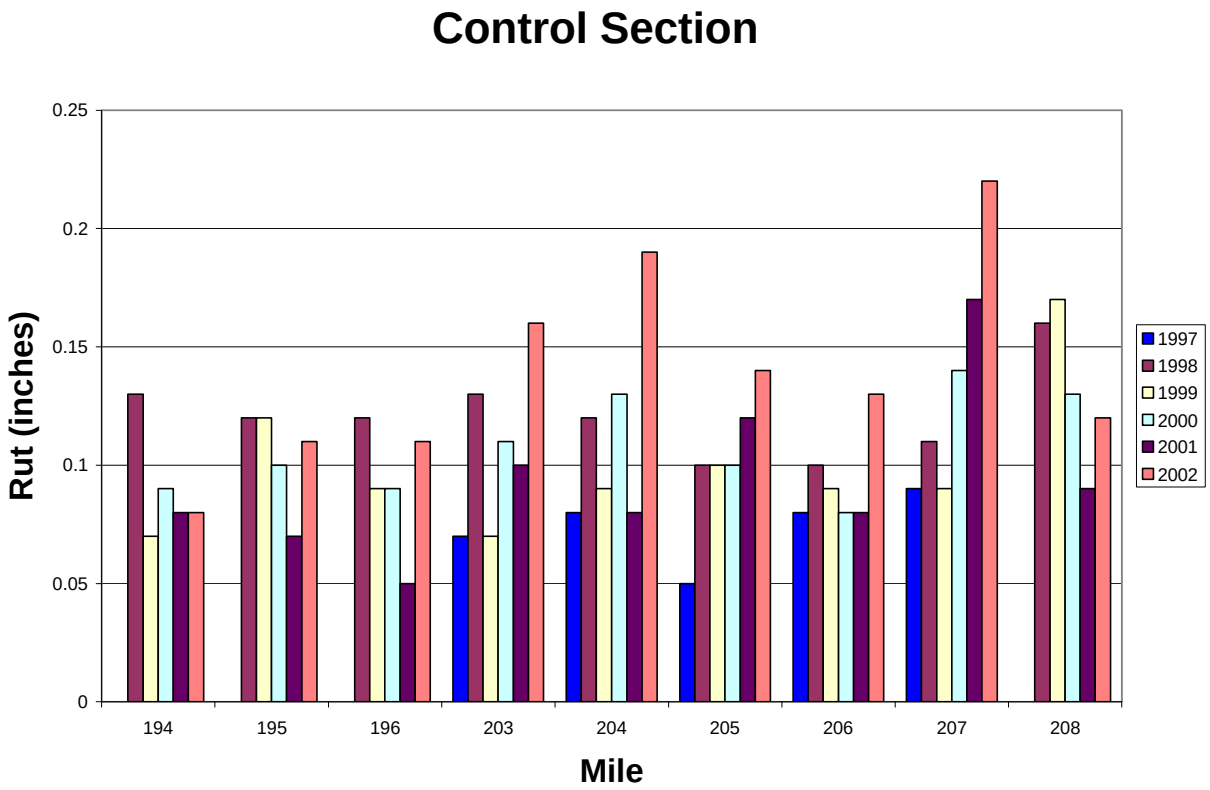

Chart 5 – Average annual rut for the Control Section (Class 33)

The ride scores for each mile of this project were categorized as Good in 2002. The scores for the test sections and control sections scored well in RIDE, International Roughness Index (IRI), Distress, Rut, and Public Ride Perception Index (PRPI) can be seen in Tables 4 and 5. The different scores can be seen in the tables below and Appendix B. Table 5 is a scoring chart for IRI and RIDE scores.

	RIDE 1997 to Present	IRI In/Mile
Excellent	4.01 - 5.00	0 - 60
Good	3.25 - 4.00	61 - 95
Fair	2.50 - 3.24	96 - 132
Poor	0.00 - 2.49	133 - >

Table 5

Reference Point	1997 Section	Aggregate Mix	Ride	IRI (in/mi)	Distress Score	Average Rut per Mile (in)	Public Ride Perception Index (PRPI)
197	1	Class 27	4.45	41	96	0.00	Excl
198	1	Class 27	4.55	36	99	0.00	Excl
199	2	Class 29	4.65	32	99	0.00	Excl
200	2	Class 29	4.71	29	99	0.00	Excl
201	3	Experimental mix	4.59	34	99	0.00	Excl
202	3	Experimental mix	4.53	37	99	0.00	Excl
194	Control	Class 33	4.48	39	99	0.00	Excl
195	Control	Class 33	3.81	69	99	0.00	Good
196	Control	Class 33	4.02	60	98	0.00	Good
203	Control	Class 33	4.33	46	89	0.07	Good
204	Control	Class 33	4.15	54	93	0.08	Good
205	Control	Class 33	4.13	55	93	0.05	Good
206	Control	Class 33	4.15	54	89	0.08	Good
207	Control	Class 33	4.06	58	89	0.09	Good
208	Control	Class 33	4.55	36	99	0.00	Excl

Table 6

Reference Point	2002 Section	Aggregate Mix	Ride	IRI (in/mi)	Distress Score	Average Rut per Mile (in)	Public Ride Perception Index (PRPI)
197	1	Class 27	4.37	44	96	0.19	Good
198	1	Class 27	4.50	39	98	0.17	Good
199	2	Class 29	4.50	39	97	0.14	Excl
200	2	Class 29	4.47	39	97	0.12	Good
201	3	Experimental mix	4.42	42	94	0.11	Good
202	3	Experimental mix	4.38	43	91	0.11	Good
194	Control	Class 40	4.28	48	97	0.08	Good
195	Control	Class 40	3.53	82	95	0.11	Fair
196	Control	Class 41	3.76	72	97	0.11	Good
203	Control	Class 42	4.17	53	82	0.16	Good
204	Control	Class 43	4.07	58	90	0.19	Good
205	Control	Class 44	3.88	66	89	0.14	Good
206	Control	Class 45	4.01	60	86	0.13	Good
207	Control	Class 46	4.00	60	91	0.22	Good
208	Control	Class 47	4.33	46	97	0.12	Good

Table 7

The cracking in this section is very minimal. Most of the cracks are transverse cracks running the whole width of the roadway, which can be seen in photo 1. There were no signs of alligator or block cracking. The different sections appeared to have the same type of cracking throughout the project. The pavement is being overlaid to extend the service life of the existing pavement

Photo 1

Summary

With the evaluation of this research project there was no significant difference in the performance of the different sections, except for the rut. Chart 1 displays the rut data from RIMS that has occurred since the pavement was overlaid in 1997. This chart displays how the rut decreases as the class of aggregate increases. The RIDE, IRI, Distress, and PRPI scores have not changed much during the 5 year period of the evaluation. Most of the PRPI scores remain in the GOOD category.

With the accumulated ESALs uniform throughout the project, the differences in the section properties reveal, for the evaluation period, that the lower class aggregate experienced more rutting then the higher classes of aggregate. Based on the abbreviated evaluation period the control section with Class 33 and experimental mix in section 3 performed better then the other classes of aggregate. With only 5 years of evaluation the performance of the asphalt after 20 years can not be predicted. The research project was ended since that section of roadway was scheduled for a HBP overlay.

Recommendation

The objective to evaluate the performance of different classes of HBP for high volume roadways is somewhat inconclusive given the short evaluation period of 5 years. Class 33 rut scores performed better than the other classes of aggregate. Class 27, 29, and the experimental mix rut scores were not that much worse than Class 33 however, the service life of flexible pavements does not track on a linear scale. It is recommended that a similar study be conducted over a longer evaluation period. An extended evaluation until “first failure” would help establish the economic cost/benefit for using lower class aggregate in HBP for high volume roads

Appendix A

Bismarck Dist.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SFN 11570 CHANGE ORDER SHEET 1

CHANGE: 1P
ORDER NO: 1C

PROJECT: IM-1-094(040)193
COUNTY: KIDDER COUNTY
FOR: HOT BITUMINOUS OVERLAY & INCIDENTALS

CONTRACTOR: ANDERSON WESTERN, INC.
PO BOX 2319
BISMARCK, ND 58502

ORIGINAL CONTRACT AMOUNT
$ 2,311,312.85

DATE: 05/20/97

SPEC NO	CODE NO	ITEM OF WORK	UNIT	ORIG + OR - PREVIOUS CHG QUANTITY	+ OR - QUANTITY	UNIT PRICE	INCREASE AMOUNT	DECREASE AMOUNT
		ADDED CONTRACT ITEM						
		PARTICIPATING (IM FEDERAL FUNDS)						
409	101	TEST SECTIONS	L.S.	0.000	97,552.780	1.000	97,552.78	

NET INCREASE OR DECREASE TO DATE	97,552.78	PART	0.00	NON-PART	TOTALS	97,552.78	0.00
					NON-PARTICIPATING	0.00	0.00
					PARTICIPATING	97,552.78	0.00

DUE TO THIS CHANGE, THE CONTRACT TIME:
IS NOT CHANGED.

EXPLANATION OF CHANGE IN PLAN RECOMMENDED

SEE ATTACHMENTS.

CONTRACTOR — DATE 5-21-97

PROJECT ENGINEER — DATE 5-20-97

EMPLOYER NDDOT

CITY/COUNTY/OTHER OFFICIAL — DATE

DISTRICT ENGINEER ASF 5-27-97 — DATE 5-28-97

CONSTRUCTION ENGINEER — DATE

FHWA

ASS'T CHIEF ENGINEER — DATE 6/9/97

West Region

APPROVED CONTINGENT UPON FUNDS BEING AVAILABLE UNDER THE EXISTING PROJECT AGREEMENT OR UPON ADDITIONAL FEDERAL AID FUNDS BEING MADE AVAILABLE BY MODIFIED PROJECT AGREEMENT.

APPROVED

DATE FOR DIVISION ADMINISTRATOR FEDERAL HIGHWAY ADMINISTRATION

APR 1 1998

FEDERAL HIGHWAY ADMINISTRATION

NA (NOT APPLICABLE) SHOULD BE NOTED ON THE SIGNATURE BLOCKS WHERE SIGNATURES ARE NOT REQUIRED

IM-1-094(040)193
Change Order #1P-1C

EXPLANATION OF CHANGE IN PLAN RECOMMENDED

409/0101 Test Sections
In February of 1997, a DAPA (Dakota Asphalt Paving Association) meeting was held concerning asphalt pavement specification and constructibility problems. Some of the specific concerns addressed at this meeting were.

- Are the gradation bands specified for all classes of aggregate too restrictive? Sometimes the producer is pressured to crush aggregate on the fine side of the maximum density line.
- Are the fracture face requirements too restrictive for North Dakota traffic levels?
- The traffic levels experienced in North Dakota may not require the high class of aggregates specified.
- Fine mixes versus coarse mixes need to be investigated to determine which will produce the best asphalt pavement.

It was proposed at this meeting to set up test sections on an upcoming project to address some of these concerns

Several other meetings were held to identify specific criteria for the test sections. Modifications and changes were made until the following three sections were agreed upon:

Test Section IM-1-094(040)193 Mix Properties

Each test section will be two miles long in the driving lane of the roadway

A 486 computer with fax/modem and printer will be required in the Contractor's lab to record and document test section data.

Test Section 1:
Class 27 with a note specifying that no crusher fines will be added to the mix.
R.P. 197 to 199

Test Section 2:
Standard Class 29
R.P. 199 to 201

Test Section 3: R.P. 201 to 203

80% of the total mix shall be produced by a mechanical crushing process The gradation tolerances allowed for in section 409 04 P 2 will be in effect. The gradations will be as follows

Sieve	% Passing
¾"	100
No 4	20-80
No 8	15-65
No. 200	2.0-8 0

The Laboratory mix design, made with aggregate and asphalt proposed for the project, shall have the following properties:

No Blows	50
Air Voids (%)	4.0
Stability (lbs. min.)	1800
Flow (0.01 in)	8-16
VMA (% min. if % passing No 4 >45)	15 0
VMA (% min. if % passing No. 4 ≤45)	14 5
Percent Passing No. 200 Sieve/ Effective Asphalt Cement Ratio	0 6-1.3

Mix Designs:

The Bismarck District will do the mix designs for test sections one and two The Contractor will do a mix design for test section three. The Contractor will submit to the Materials and Research Lab a completed mix design in addition to the aggregate and asphalt proposed for use on test section three. The Materials and Research Lab will verify the Contractor's mix design. The aggregate will be separated on each sieve and batched back by weight retained on each sieve.

A letter dated April 30, 1997 from Anderson Western, Inc. details a breakdown of extra costs above and beyond the original production and laydown costs for the three test sections Note that the cost for a 28 ton pneumatic roller is subtracted from the total cost. This was originally included in the costs for a large stone mix that was dropped from the proposed test sections Total costs for the test sections are

$101,552 78 - $4,000.00 = $97,552.78

The testing costs include Anderson Western, Inc. supplying the aggregate production

sampling. This will enhance the reliability of the existing testing by Fisher Sand & Gravel and the NDDOT Anderson Western, Inc. will also perform mix designs with properties information for comparison with the NDDOT They will have full time personnel on the project from aggregate production start up to completion of the project for continuity and accountability

The crushing and mix production costs include screen switching, miscellaneous moving, pile loss and an extra loader

Miscellaneous costs include the computer, training, software, fax capabilities, a project duration QC/QA lab, extra labor and miscellaneous items associated with producing and tracking test data Anderson Western, Inc will give the "Asphalt It" software from Atser Systems to the NDDOT upon completion of the project. This software will be used for comparison results

ANDERSON WESTERN

ANDERSON WESTERN, INC.
GENERAL HIGHWAY CONTRACTORS
P O Box 2319 Bismarck, ND 58502
Telephone 701-222-3550 Fax 701-222-3516

30 April 199

Ron Horner, Maintenance Engineer
North Dakota Dept. of Transportation
608 East Boulevard Avenue
Bismarck ND 58505-0700

RE: Test Sections on I-94 Kidder Co. IM-1-094(040)193

Ron,

Based on the new test section format of three test sections in the driving lane containing 3000 ton each, the following revisions are made to the costs of doing said work.

SECTION 1 TESTING

This item is strictly people, including my staff and a consulting firm.

$23,233.33 in aggregate production testing and mix design work-up.
$12,558.56 in additional mix production sampling and testing, consultant

Total Cost for Section 1	$23,233.33
	$12,558.56
	$35,791.89

SECTION 2 CRUSHING AND MIX PRODUCTION

Aggregate production requires an additional $15,000 for screen switching, miscellaneous moving and pile loss.

Anderson Western Inc. bid the mix and laydown at $2.98 x 75.406 = $224,709.88.

66,406 original mix x $2.98 =	$197,889.88
9,000 test section x $4.98 =	$ 44,820.00
	$242,709.88
	-$224 709.88
Extra production costs	$ 18,000.00

Feeding the plant we are anticipating extra loader help for a portion of the project due to the spread of materials. $8290.00

Total Cost for Section 2	$15.000.00
	$18,000.00
	$ 8.290 00
	$41.290.00

SECTION 3 MISCELLANEOUS

This section contains the following·

Computer/Training	$ 3,000.00
Computer Program	$ 3,470.89
Telephone/Fax	$ 1,500.00
Roller	$ 4.000.00
Pickup/Extra labor	$ 4,500.00
QC/QA Extra Lab	$ 3,000.00
Extra Traffic Control	$ 5.000.00
	$24,470.89

Total Cost for Section 3	$24,470.89
Total Cost	$101.552.78

Thank you for your consideration.

Sincerely,

ANDERSON WESTERN INC.

John V. Erickson
President

Appendix B

D	HWY	S	D	FROM REF PT	FROM OFFSET (MI)	TO REF PT	TO OFFSET (MI)	LENGTH (MI)	LEFT SHLDR WIDTH	DRVNG LANE WIDTH	RIGHT SHLDR WIDTH	SURF DPTH	BASE DPTH	GRAD WDTH	FIN WDTH	TAADT	AADT	ESALS	PAV AGE	EFF PAV AGE	LAST YEAR SEAL	PVMT TYPE	PVMT DESC	HWY PTY SYS	INTL CONS	PREV CONS	LTST CONS	LTST REHAB
1	94	W	193	000 0	1110	201	000 0	1790	8 0709	10 0	24 0	3 0	7 0	3 0	48 0	37 0	1678	7100 2002	2060	38	26		COMPO	AOCRC	RI	1966	1983	1988	CPR_ONLY

BURL COUNTY LINE TO LONG LAKE

BOTH SHOULDERS SEALED 1966 AND 1981 JOINTS REPAIRED IN 1983 RESTORING CONTINUITY "D" CRACKING IS APPEARING QUITE RAPIDLY 3 FOOT SHOULDER SHOT WITH MC-3000 (NO CHIPS ORSAND) 1987 RESTORED CONTINUITY AGAIN IN 1988 BOTH SHOULDERS SEALED WITH REINFORCED RECLAMITE IN 1992 1995-R/P 195 & 196 3 3" OVERLAY 1997- R/P 193 TO 195 DR LN 3" TO 4 25" OVERLAY, PA LN 3 0 TO 4 25" OVERLAY, 1997- R/P 197 TO 201 12FT PA LN 3 0 TO 4 25" 12FT DR LN 4 25 TO 3 5" OVERLAY (1997 TEST SECTIONS) 12FT DR LN ONLY-2MI SECTNS R/P197 TO 199 CLASS 27 R/P199TO 201 CLASS 29 --PCN-14082-SIGNING RP97 188 TO RP208 702

1994	DIST	86	RIDE	3	91	PRPI	N/A	IRI	88	1999	TOT	MTC	47	11
1995	DIST	87	RIDE	3	93	PRPI	N/A	IRI	86	1999	AVG	MTC	5	89
1996	DIST	88	RIDE	4	06	PRPI	N/A	IRI	78	2000	TOT	MTC	670	74
1997	DIST	88	RIDE	3	76	PRPI	N/A	IRI	71	2000	AVG	MTC	83	84
1998	DIST	99	RIDE	4	41	PRPI	N/A	IRI	43	2001	TOT	MTC	709	85
1999	DIST	98	RIDE	4	33	PRPI	POOR	IRI	46	2001	AVG	MTC	88	73
2000	DIST	98	RIDE	4	14	PRPI	POOR	IRI	54	2002	TOT	MTC	4,257	80
2001	DIST	98	RIDE	4	06	PRPI	POOR	IRI	58	2002	AVG	MTC	532	23
2002	DIST	97	RIDE	4	18	PRPI	GOOD	IRI	53	2003	TOT	MTC	3,994	25
2003	DIST	96	RIDE	4	23	PRPI	GOOD	IRI	51	2003	AVG	MTC	499	28

REF PT	RIDE	DST	RUT (IN)	IRI IN/MI	PRPI	AVG FLT	NUM (2003) FLT	AC	BLD	LC	TC	BC	RW	BP	RT	(2003) MAINTENANCE COSTS TO DATE MAINT	BPC	HPC	SPC	CPC	RFC	SCC	SHC	CRC	RMC	ROC	BOC
194	4 28	97	0 08	48 79	GOOD	0 00	0	0	0	1	1	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
195	3 53	95	0 11	82 37	FAIR	0 00	0	2	0	1	1	0	0	0	0	3,400 16	0	56	3,325	19	0	0	0	0	0	0	0
196	3 76	97	0 11	72 23	GOOD	0 00	0	0	0	1	1	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
197	4 37	96	0 19	44 35	GOOD	0 00	0	0	0	1	1	0	1	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
198	4 50	98	0 17	39 28	GOOD	0 00	0	0	0	0	1	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
199	4 50	97	0 14	39 28	EXCL	0 00	0	0	0	1	1	0	0	0	0	317 57	0	298	0	19	0	0	0	0	0	0	0
200	4 47	97	0 12	39 92	GOOD	0 00	0	0	0	1	1	0	0	0	0	146 77	0	6	0	139	0	0	0	0	0	0	0
201	4 42	94	0 11	42 45	GOOD	0 00	0	0	0	1	4	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
AVG	4 23	96	0 13	51 08	GOOD	0 00	0	0	0	1	1	0	0	0	0	499 28	0	49	416	34	0	0	0	0	0	0	0

12 OCCURS

DPTH (IN)	COMPONENTS	LSHL WDTH (FT)	RDWY WDTH (FT)	RSHL WDTH (FT)	OIL/CON TYPE	CLS AGG	YEAR	COST THOUS	DSN LFE	PCN	SUB	H
	GRADE		48 0				1965	226				
	C-C 84 FEET						1965					
3 0	AGGREGATE BASE		27 0				1966					
7 0	CONT - REINF PCC		24 0				1966	811	20			
3 7	AGGREGATE BASE	13 1		7 7			1966					
2 0	PLANT MIX BIT BASE	11 9		5 8	120-150		1966					
3 0	HOT BIT PAVEMENT	10 0		3 0	120-150		1966	167				
	CONTRACT CHIP SEAL	10 0		3 0	MC-3000		1981	12				
	CONCRETE PAVEMENT REPAIR						1983	21	10			
	MAINTENANCE GRAVEL SEAL			3 0	MC-3000		1987	40				
	CONCRETE PAVEMENT REPAIR						1988	69	10			
	DISTRICT SAND SEAL	10 0		3 0	RCLMITE		1992					

D	HWY	S	D	FROM REF PT	FROM OFFSET (MI)	TO REF PT	TO OFFSET (MI)	LENGTH (MI)	LEFT SHLDR WIDTH	DRVNG LANE WIDTH	RIGHT SHLDR WIDTH	SURF DPTH	BASE DPTH	GRAD WDTH	FIN WDTH	TAADT	AADT	ESALS	PAV AGE	EFF PAV AGE	LAST YEAR SEAL	PVMT TYPE	PVMT DESC	HWY PTY SYS	INTL CONS	PREV CONS	LTST CONS	LTST REHAB
1	94	W	201	000 0	1790	203	000 0	0000 1 8084	10 0	24 0	3 0	10 7	3 0	48 0	37 0	1725	7100 2002	2070	7	7	1999	COMPO	AOCRC	RI	1997	1997	1997	1 25"C_PATCH

E STEELE TO 1 0 MI E STEELE INTR

BOTH SHOULDERS SEALED 1966 AND 1981 JOINTS REPAIRED IN 1983 RESTORING
CONTINUITY 3 FOOT SHOULDER SHOT WITH MC-3000 (NO CHIPS OR SAND) 1987
RESTORED CONTINUITY AGAIN IN 1988 A NUMBER OF SMALL FAILURES IN
DAWSON AREA BOTH SHOULDERS SEALED WITH REINFORCED RECLAMITE IN 1992
MP 201 TO MP 202=CONTROL SECTION-1992
(1997 PAVEMENT DEPTHS) 3FT SHLD 2 25" TO 3", 12FT PASS LN 3" TO 4 25",
12FT DRV LN 4 25" TO 3 5", 10FT SHLD 3 5" TO 1 25"
(1997 TEST SECTION) 12FT DRIVING LANE ONLY-80% CRUSHED ON ALL SIEVES
FROM RP 201 TO RP 203 --PCN-14082-RP97 118 TO RP208 702, 2001-$6,137

1994	DIST	86	RIDE	3	68	PRPI	N/A	IRI	104	1999	TOT	MTC	1	43
1995	DIST	90	RIDE	3	76	PRPI	N/A	IRI	98	1999	AVG	MTC	1	43
1996	DIST	89	RIDE	3	90	PRPI	N/A	IRI	88	2000	TOT	MTC	48	67
1997	DIST	89	RIDE	3	50	PRPI	N/A	IRI	83	2000	AVG	MTC	48	67
1998	DIST	99	RIDE	4	53	PRPI	N/A	IRI	37	2001	TOT	MTC	40	97
1999	DIST	99	RIDE	4	44	PRPI	GOOD	IRI	41	2001	AVG	MTC	40	97
2000	DIST	99	RIDE	4	35	PRPI	GOOD	IRI	45	2002	TOT	MTC	331	98
2001	DIST	98	RIDE	4	11	PRPI	GOOD	IRI	55	2002	AVG	MTC	331	98
2002	DIST	97	RIDE	4	36	PRPI	GOOD	IRI	44	2003	TOT	MTC	25	95
2003	DIST	91	RIDE	4	38	PRPI	GOOD	IRI	43	2003	AVG	MTC	25	95

REF PT	RIDE	DST	RUT (IN)	IRI IN/MI	PRPI	AVG FLT	NUM FLT	(2003) AVERAGE RIDE, DISTRESS & RUT AC	BLD	LC	TC	BC	RW	BP	RT	(2003) MAINTENANCE COSTS TO DATE MAINT	BPC	HPC	SPC	CPC	RFC	SCC	SHC	CRC	RMC	ROC	BOC
202	4	38	91 0 11	43 72	GOOD	0 00	0	0	0	4	4	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
AVG	4	38	91 0 11	43 72	GOOD	0 00	0	0	0	4	4	0	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0

18 OCCURS

DPTH (IN)	COMPONENTS	LSHL WDTH (FT)	RDWY WDTH (FT)	RSHL WDTH (FT)	OIL/CON TYPE	CLS AGG	YEAR	COST THOUS	DSN LFE	PCN	SUB	H
	GRADE		48 0				1965	26				
	C-C 84 FEET						1965					
3 0	AGGREGATE BASE		27 0				1966					
7 0	CONT - REINF PCC		24 0				1966	76	20			
3 7	AGGREGATE BASE	13 1		7 7			1966					
2 0	PLANT MIX BIT BASE	11 9		5 8	120-150		1966					
3 0	HOT BIT PAVEMENT	10 0		3 0	120-150		1966	14				
	DISTRICT CHIP SEAL	10 0		3 0	MC-3000		1981	1				
	CONCRETE PAVEMENT REPAIR						1983	2	10			
	MAINTENANCE GRAVEL SEAL			3 0	MC-3000		1987	6				
	CONCRETE PAVEMENT REPAIR						1988	7	10			
	DISTRICT SAND SEAL	10 0		3 0	RCLMITE		1992					
3 7	HOT BIT PAVEMENT		24 0	3 0	120-150	33	1997	75	20	307	1	
2 4	HOT BIT PAVEMENT	10 0			120-150	25	1997	15	20	307	1	
	SAFETY ENHANCEMENTS 90-1						1997			307	1	
	FEDERAL AID CHIP SEAL		27 0		MC-3000P	43	1999	30		12523	1	
	FEDERAL AID CHIP SEAL			10 0	MC-3000P	45	1999			12523	1	
1 5	INT CONT PATCH-1 25"		24 0		PG 58-28	33	2003			15207	1	

D	HWY	S	D	FROM REF PT	FROM OFFSET (MI)	TO REF PT	TO OFFSET (MI)	LENGTH (MI)	LEFT SHLDR WIDTH	DRVNG LANE WIDTH	RIGHT SHLDR WIDTH	SURF DPTH	BASE DPTH	GRAD WDTH	FIN WDTH	TAADT	AADT	ESALS	PAV AGE	EFF PAV AGE	LAST YEAR SEAL	PVMT TYPE	PVMT DESC	HWY PTY SYS	INTL CONS	PREV CONS	LTST CONS	LTST REHAB
1	94	W	203	000 0	0000	208	000 0	0000	5 0034	10 0	24 0	3 0	10 0	3 0	48 0	37 0	1725	7100 2002	2070	12	12	1999	COMPO	AOCRC	RI	1992	1992	1992	1 25"C_PATCH

1 0 MI E STEELE INTR E TO W DAWSON

MP 202 TO 203=SILANE TREATMENT 1992 MP 203 TO 205=4" HBP 24' 1992 INSIDE SHOULDER 3 75"-4' OUTSIDE SOULDER 3"-10' MP 205 TO 206=3" HBP 24' 1992 INSIDE SHOULDER 2 75"-3' OUTISE SHOULDER 2 1"-10' MP 206 TO 207=2 5" HBP 24' 1992 INSIDE SHOULDER 2 5"-3' OUTISDE SHOULDER 1 9"-10' MP 207 TO 208=2" HBP 24' 1992 INSIDE SHOULDER 1 75"-3' OUTSIDE SHOULDER 1 6"-10' CRS-2LM-1995 SEAL
PCN-14082-SIGNING RP 97 188 TO RP 208 702, 2001-$16,981

1994	DIST	97	RIDE	4	18	PRPI	N/A	IRI	70	1999	TOT	MTC	7	15
1995	DIST	95	RIDE	4	15	PRPI	N/A	IRI	72	1999	AVG	MTC	1	43
1996	DIST	97	RIDE	4	11	PRPI	N/A	IRI	75	2000	TOT	MTC	982	22
1997	DIST	94	RIDE	3	87	PRPI	N/A	IRI	66	2000	AVG	MTC	196	44
1998	DIST	91	RIDE	4	16	PRPI	N/A	IRI	53	2001	TOT	MTC	204	85
1999	DIST	89	RIDE	4	19	PRPI	GOOD	IRI	52	2001	AVG	MTC	40	97
2000	DIST	89	RIDE	4	05	PRPI	GOOD	IRI	58	2002	TOT	MTC	3,637	57
2001	DIST	87	RIDE	3	56	PRPI	FAIR	IRI	80	2002	AVG	MTC	727	51
2002	DIST	87	RIDE	3	98	PRPI	GOOD	IRI	61	2003	TOT	MTC	122	52
2003	DIST	88	RIDE	4	03	PRPI	GOOD	IRI	59	2003	AVG	MTC	24	50

REF PT	RIDE	DST	RUT (IN)	IRI IN/MI	PRPI	AVG FLT	NUM (2003) FLT	AC	BLD	LC	TC	BC	RW	BP	RT	(2003) MAINTENANCE COSTS TO DATE MAINT	BPC	HPC	SPC	CPC	RFC	SCC	SHC	CRC	RMC	ROC	BOC
203	4 17	82	0 16	53 22	GOOD	0 00	0	2	0	4	7	4	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
204	4 07	90	0 19	58 29	GOOD	0 00	0	0	0	4	4	1	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
205	3 88	89	0 14	66 53	GOOD	0 00	0	0	0	4	4	2	0	0	0	25 95	0	6	0	19	0	0	0	0	0	0	0
206	4 01	86	0 13	60 19	GOOD	0 00	0	2	0	4	4	3	0	0	0	25 72	0	6	0	19	0	0	0	0	0	0	0
207	4 00	91	0 22	60 83	GOOD	0 00	0	0	0	4	4	0	0	0	0	18 95	0	0	0	18	0	0	0	0	0	0	0
AVG	4 03	88	0 17	59 81	GOOD	0 00	0	1	0	4	5	2	0	0	0	24 50	0	5	0	19	0	0	0	0	0	0	0

18 OCCURS

DPTH (IN)	COMPONENTS	LSHL WDTH (FT)	RDWY WDTH (FT)	RSHL WDTH (FT)	OIL/CON TYPE	CLS AGG	YEAR	COST THOUS	DSN LFE	PCN	SUB	H
	GRADE		48 0				1965	198				
	C-C 84 FEET						1965					
3 0	AGGREGATE BASE		27 0				1966					
7 0	CONT - REINF PCC		24 0				1966	588	20			
3 7	AGGREGATE BASE	13 1		7 7			1966					
2 0	PLANT MIX BIT BASE	11 9		5 8	120-150		1966					
3 0	HOT BIT PAVEMENT	10 0		3 0	120-150		1966	120				
	DISTRICT CHIP SEAL	10 0		3 0	MC-3000		1981	10				
	CONCRETE PAVEMENT REPAIR						1983	17	10			
	MAINTENANCE GRAVEL SEAL			3 0	MC-3000		1987	31				
	CONCRETE PAVEMENT REPAIR						1988	51	10			
	SILANE TREATMENT						1992					
3 0	HOT BIT PAVEMENT		24 0		120-150	33	1992		20			
	CONTRACT CHIP SEAL		24 0				1995	81				
	SAFETY ENHANCEMENTS 90-1						1997					
	FEDERAL AID CHIP SEAL		27 0		MC-3000P	43	1999	82		12523	1	
	FEDERAL AID CHIP SEAL			10 0	MC-3000P	45	1999			12523	1	
1 5	INT CONT PATCH-1 25"		24 0		PG 58-28	33	2003			15207	1	

D	HWY	S	D	FROM REF PT	FROM OFFSET (MI)	TO REF PT	TO OFFSET (MI)	LENGTH (MI)	LEFT SHLDR WIDTH	DRVNG LANE WIDTH	RIGHT SHLDR WIDTH	SURF DPTH	BASE DPTH	GRAD WDTH	FIN WDTH	TAADT	AADT	ESALS	PAV AGE	EFF PAV AGE	LAST YEAR SEAL	PVMT TYPE	PVMT DESC	HWY PTY SYS	INTL CONS	PREV CONS	LTST CONS	LTST REHAB
1	94	W	208	000 0	0000	208	702 0 0000	0 6913	10 0	24 0	3 0	10 7	3 0	48 0	37 0	1725	7100 2002	2070	7	7	1999	COMPO	AOCRC	RI	1997	1997	1997	F CHIP SEAL

W DAWSON INTR E TO DISTRICT BOUNDARY

(1997 PAVEMENT DEPTHS) 3FT SHLD 2 25" TO 3", 12FT PASS LN 3" TO 4 25",
12FT DRV LN 4 25" TO 3 5", 10FT SHLD 3 5" TO 1 25"
PCN-14082-SIGNING RP 97 188 TO RP 208 702, 2001-$2346

1994	DIST 71	RIDE 3 83	PRPI	N/A	IRI	93	1999	TOT	MTC	239	31
1995	DIST 78	RIDE 3 90	PRPI	N/A	IRI	88	1999	AVG	MTC	239	31
1996	DIST 75	RIDE 3 98	PRPI	N/A	IRI	83	2000	TOT	MTC	35	28
1997	DIST 75	RIDE 3 69	PRPI	N/A	IRI	74	2000	AVG	MTC	35	28
1998	DIST 99	RIDE 4 55	PRPI	N/A	IRI	36	2001	TOT	MTC	144	31
1999	DIST 99	RIDE 4 51	PRPI	EXCL	IRI	38	2001	AVG	MTC	144	31
2000	DIST 99	RIDE 4 24	PRPI	GOOD	IRI	50	2002	TOT	MTC	528	15
2001	DIST 98	RIDE 4 26	PRPI	GOOD	IRI	49	2002	AVG	MTC	528	15
2002	DIST 98	RIDE 4 29	PRPI	GOOD	IRI	48	2003	TOT	MTC	254	29
2003	DIST 97	RIDE 4 33	PRPI	GOOD	IRI	46	2003	AVG	MTC	254	29

REF PT	RIDE	DST	RUT (IN)	IRI IN/MI	PRPI	AVG FLT	NUM (2003) FLT	AC	BLD	LC	TC	BC	RW	BP	RT	(2003) MAINTENANCE COSTS TO DATE MAINT	BPC	HPC	SPC	CPC	RFC	SCC	SHC	CRC	RMC	ROC	BOC
208	4	33	97 0 12	46	25 GOOD	0 00	0	0	0	1	1	0	0	0	0	254 29	0	241	0	13	0	0	0	0	0	0	0
AVG	4	33	97 0 12	46	25 GOOD	0 00	0	0	0	1	1	0	0	0	0	254 29	0	241	0	13	0	0	0	0	0	0	0

17 OCCURS

DPTH (IN)	COMPONENTS	LSHL WDTH (FT)	RDWY WDTH (FT)	RSHL WDTH (FT)	OIL/CON TYPE	CLS AGG	YEAR	COST THOUS	DSN LFE	PCN	SUB	H
	GRADE		48 0				1965	23				
	C-C 84 FEET						1965					
3 0	AGGREGATE BASE		27 0				1966					
3 7	AGGREGATE BASE	13 1		7 7			1966					
2 0	PLANT MIX BIT BASE	11 9		5 8	120-150		1966					
3 0	HOT BIT PAVEMENT	10 0		3 0	120-150		1966	14				
7 0	CONT - REINF PCC		24 0				1968	68	20			
	DISTRICT CHIP SEAL	10 0		3 0	MC-3000		1981	1				
	CONCRETE PAVEMENT REPAIR						1983	2	10			
	MAINTENANCE GRAVEL SEAL			3 0	MC-3000		1987	3				
	CONCRETE PAVEMENT REPAIR						1988	6	10			
	DISTRICT SAND SEAL	10 0		3 0	RCLMITE		1992					
3 7	HOT BIT PAVEMENT		24 0	3 0	120-150	33	1997	64	20	307	1	
2 4	HOT BIT PAVEMENT	10 0			120-150	25	1997	12	20	307	1	
	SAFETY ENHANCEMENTS 90-1						1997			307	1	
	FEDERAL AID CHIP SEAL		27 0		MC-3000P	43	1999	11		12523	1	
	FEDERAL AID CHIP SEAL			10 0	MC-3000P	45	1999			12523	1	