

Plusride[®] Asphalt Pavement

Final Evaluation Report
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16. Abstract This is the final report of PlusRide® being used as the wearing course on a bridge deck overlay. A Class D Asphalt Concrete pavement which is an open graded friction course was used on an adjacent bridge as a control for the PlusRide®. The PlusRide® claims were high friction resistance, reduced noise, increased fatigue properties and deicing characteristics. The PlusRide® cost 50 percent more than the Class D and the friction resistance, noise levels and fatigue properties were the same for the PlusRide® and Class D. The deicing characteristics could not be confirmed due to the absence of surface icing on highways in the Yakima area.			
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PLUSRIDE® ASPHALT PAVEMENT

**SR-82, Contract 2318
Bridge No. 82/205 et al.**

**by
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**Experimental Feature WA-82-01
Final Evaluation Report**

Prepared for

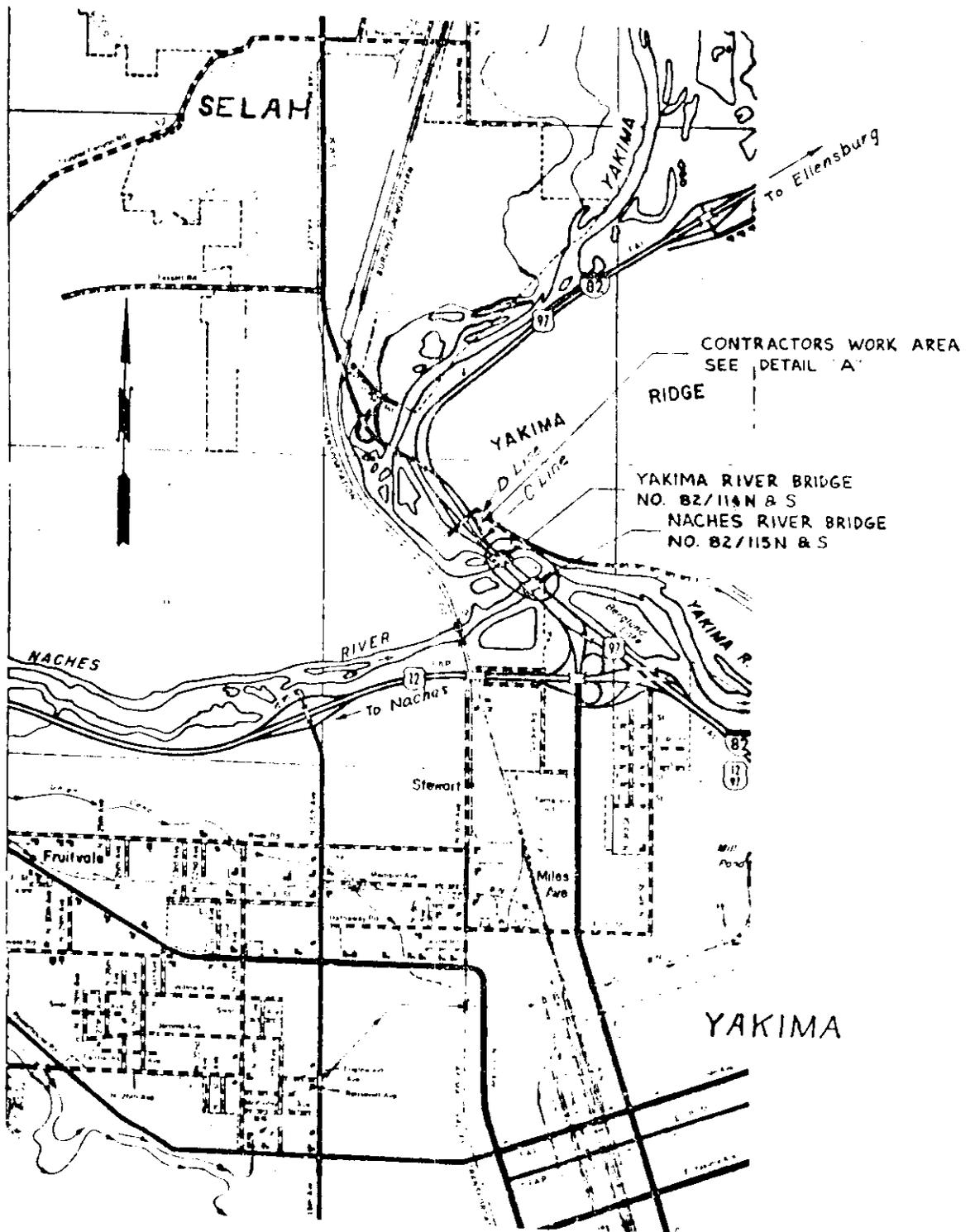
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FEDERAL HIGHWAY ADMINISTRATION**

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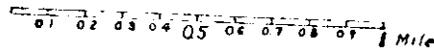
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VICINITY MAP



INTRODUCTION

PlusRide® asphalt was placed as the wearing course on the Yakima River Bridge located just north of Yakima on SR-82. A conventional overlay of Class D Asphalt Concrete Pavement (ACP) was placed under the same contract on the Naches River Bridge located one-tenth of a mile south of the Yakima River Bridge. The Class D section provides a reference control for judging the performance of the Plus Ride® asphalt.

The resurfacing design for both bridges involved the removal of an existing 0.12-foot lift of ACP, the repair of the deck if necessary, the application of a Petromat asphalt rubber waterproofing membrane, and the placement of either the PlusRide® asphalt or Class D ACP. The original design called for a 0.06-ft lift for both materials, but construction problems with the PlusRide® asphalt forced a change to a 0.09-ft lift.

The PlusRide® asphalt is claimed to have the following list of benefits:

1. Safety - Ensures high friction resistance.
2. Noise Resistance - Reduced decibel noise levels.
3. Increased Road Life - Increased fatigue properties compared to conventional pavements.
4. Deicing Characteristics - Flexible surface causes break up of accumulated ice.

The friction resistance and deicing characteristics are the primary qualities that were to be evaluated on this installation.

STUDY SITE

The two bridges are located on the northbound lanes of SR-82 approximately one-half mile north of the junction of SR-12 and SR-82 as shown on the accompanying vicinity map. The Naches River Bridge No. 82/115N is 276 feet long and carries three lanes of one-way traffic. The Yakima River Bridge No. 82/114N is 316 feet long and also carries three lanes of one-way traffic. The southbound bridges in the same locations were not involved in this contract.

POST CONSTRUCTION SUMMARY

A post construction report was written in January 1983. The paving was done by Yakima Asphalt Paving Co., as the subcontractor to Structures, Inc. of Yakima. All Seasons Surfacing Corporation of Bellevue, WA, the licensed representative for PlusRide® Asphalt, provided the technical expertise on the project.

The job mix formula recommended by All Seasons is listed below along with the extraction results for the mix actually produced for the overlay.

Aggregate Gradation

Sieve Size	Design Mix % Passing	Extraction Results % Passing	Contract Specification
3/8"	100	100	100
1/4"	80	82	60-80
#10	28	24	23-38
#30	27	21	15-27
#200	9.6	11.4	7-11
Rubber Content	3.0%	2.9%	3%
Asphalt Cement Content	7.8%	7.7%	5.0-9.5

The granulated rubber was added at the pug mill by hand. This was mixed for 15 seconds with the aggregate before the adding of the AR-4000W. A normal mixing time of 30 seconds was then commenced. The temperature of the mix was kept between 315° and 325°F. A Blaw-Knox PF 500 Paver placed the material on the bridge. Compaction was accomplished with a 10-ton Hyster vibrator roller in the static mode for breakdown and a 3-ton Layton steel-wheeled roller for finish rolling. Only two and a half lanes were paved with PlusRide® asphalt on the Yakima River Bridge because of the lack of material caused by the increased thickness. The remaining portion of the third lane was finished with Class D ACP.

Both the Class D and the PlusRide® asphalt were placed in one day, August 3, 1982. The weather was clear with a high temperature of 95°F and a low of 67°F.

Costs

The PlusRide® asphalt was bid at \$75.00/ton and the Class D at \$50.00/ton. Structures, Inc. chose not to mark up the price given to them by Yakima Asphalt Paving Company, so the bid price was the subcontractor cost. The Engineer's estimate for the additional cost of the Plus-Ride® asphalt was \$1,000.00. The actual additional cost amounted to \$1,525.00, or 53 percent over the original cost due to the increased quantities and higher bid price of the PlusRide® asphalt.

Construction Problems

Testing is quite time consuming for this mix. For example, to determine the gradation, all the rubber must be removed from the mix. The rubber granules float on the extraction solvent and need to be skimmed off before drying and gradation testing of the aggregate. The mix was very sticky and globules of very rich mix built up on the augers of the paver and periodically dropped into the mat. These had to be

removed by hand to avoid rich areas in the mat. There were such small amounts of the mix that they were unable to troubleshoot this problem. Feathering the mat is very difficult because the mix is very sticky. Feathering is also a problem with Class D only because there are no fines. Attempts to lay a 0.06-ft lift caused tearing of the mat. The lift thickness was increased to 0.09 ft which solves this problem (this problem the mix designer contended was only a temperature problem), but created another. Because of the experimental nature of the material, the contractor only purchased plan quantities of granulated rubber and, therefore, when the change was made to a 0.09-foot lift, there wasn't enough material to pave the entire bridge. A plan map in Appendix A shows the limits of each type of asphalt used on the deck.

FINAL EVALUATION

The bridge decks were reviewed during the winter of 1983, 1984, 1986, and 1987 to assess the performance based on the stated benefits attributed to PlusRide®.

1. The friction testing was done according to ASTM E-274 on March 6, 1984, September 17, 1986, and April 7, 1987. The friction numbers on the Class D were 53, 55, and 54. The friction numbers on the PlusRide® were 53, 54, and 54. The friction resistance is no different from the control mix.
2. Noise level readings were taken on March 6, 1984 and March 31, 1987 inside a state car travelling at the posted speed limit. No discernible reduction in noise levels could be detected between the control mix and the Plus Ride.

3. Annual visual inspections indicate the control mix is wearing as well as the PlusRide® mix. Rut measurements in the outside lane show the same amount of wear in the control mix as the PlusRide®. There is no cracking or spalling except in two panel joints on the PlusRide® section that have failed in the concrete substrate in the outside lane (apparently not related to PlusRide®.)
4. Throughout the life of this evaluation the deicing characteristics of the two mixes have not been confirmed due to the absence of surface icing on highways in the Yakima area.

CONCLUSION

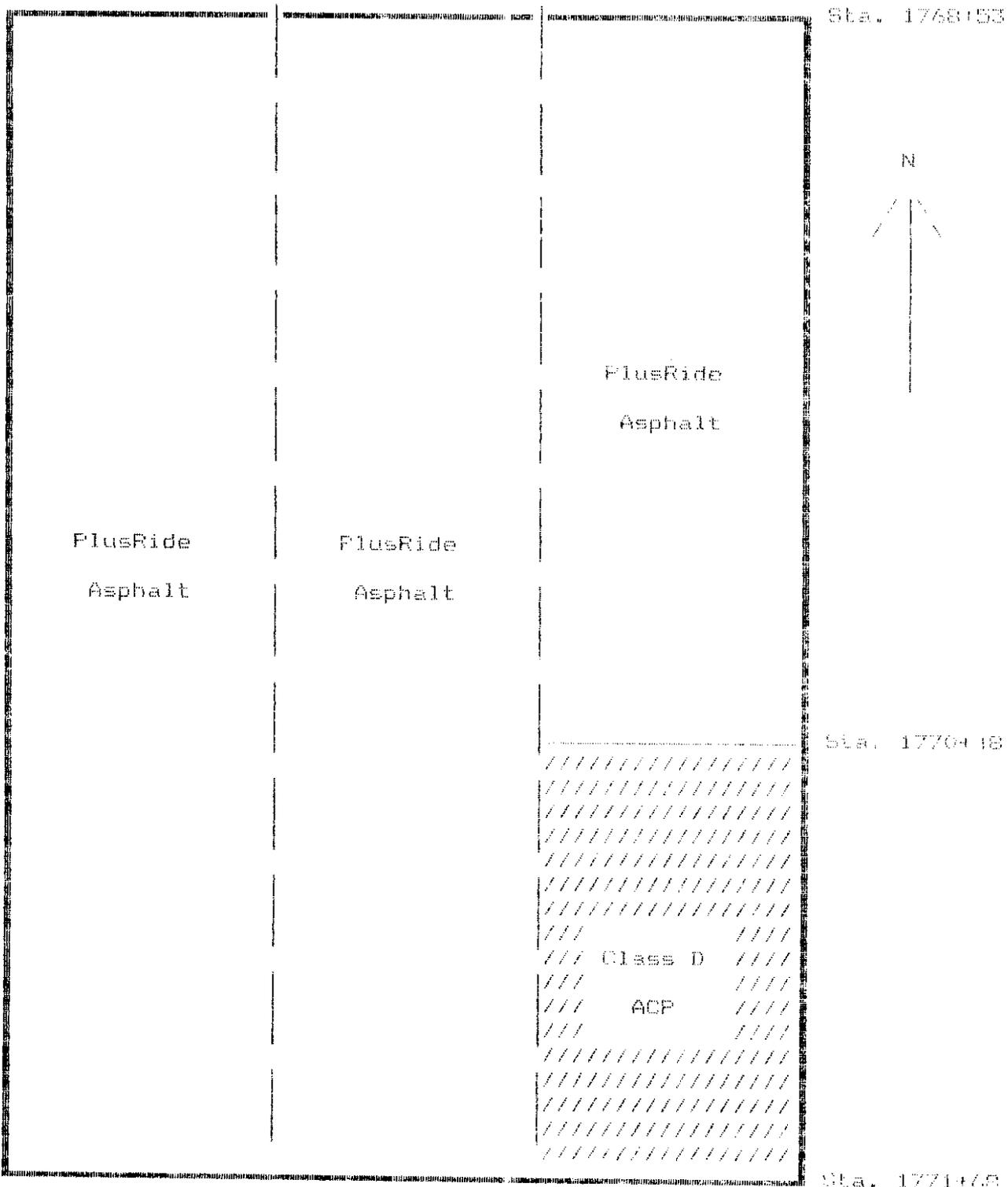
There has been no measurable improved performance of PlusRide® compared to the control mix.

APPENDIX A

AS-BUILT PAVING LIMITS

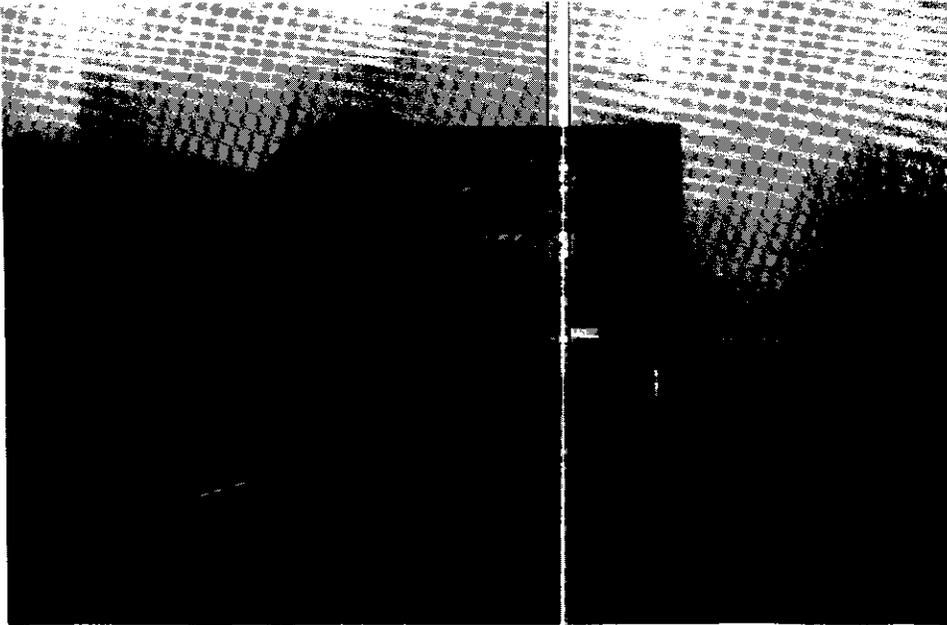
YAKIMA RIVER BRIDGE
82/111N

Final Paving Limits



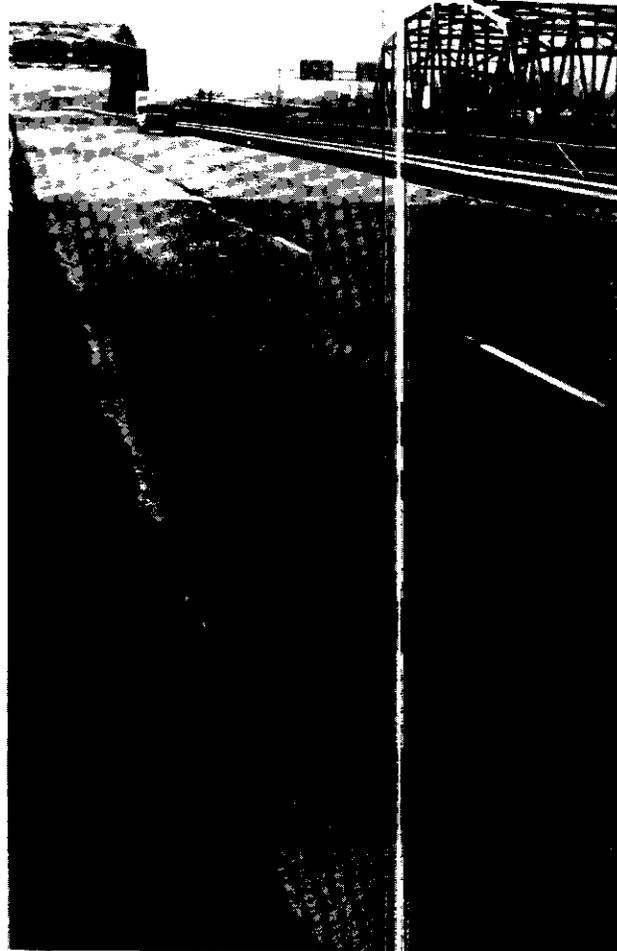
APPENDIX B

PHOTOGRAPHS



Yakima River Bridge 82/114S
SR-82 M.P. 30.81
Northbound Bridge

Shows truss bridge with PlusRide roadway surface.

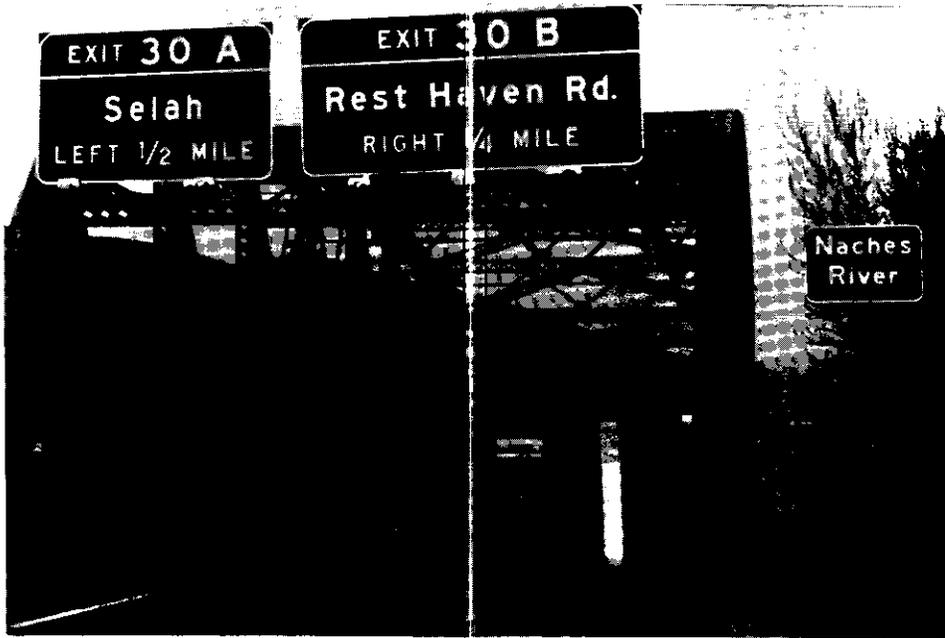


Yakima River Bridge
82/114S
SR-82 M.P. 30.81
Northbound Bridge

Foreground shows PlusRide

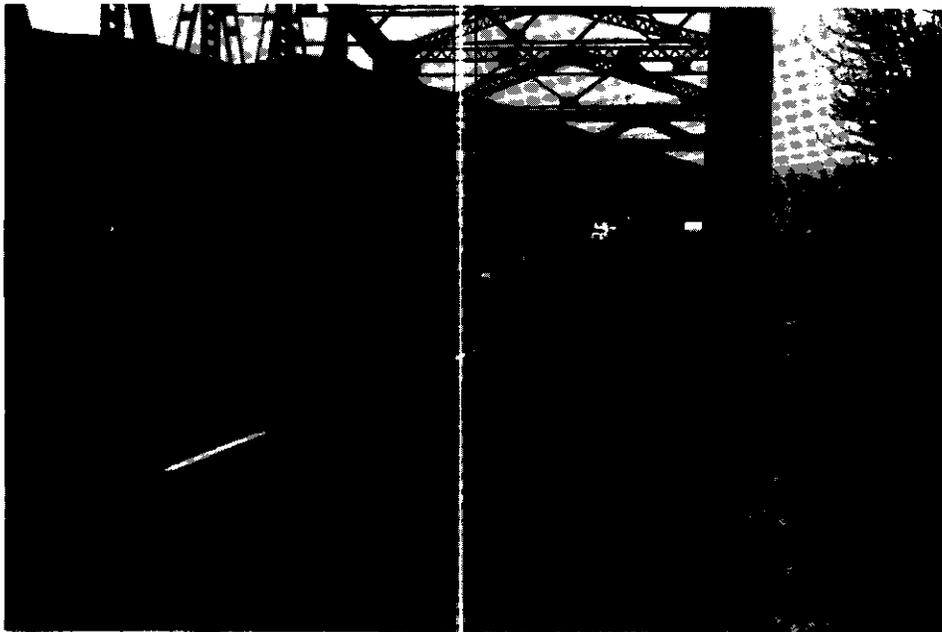
Background shows Class B
ACP

5/5/87



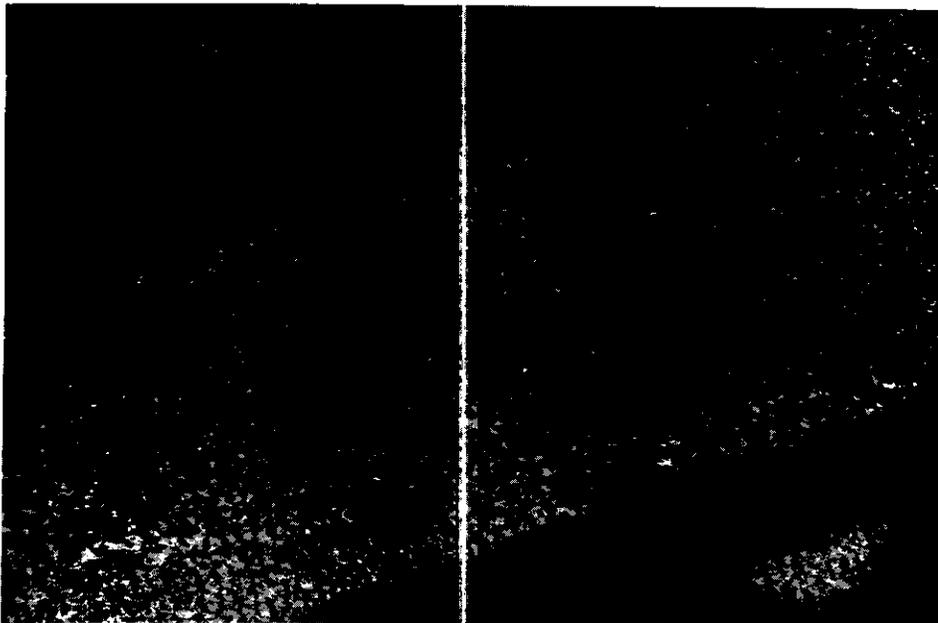
82/115
Naches River Br.
SR-82
Northbound

Shows the Class
open graded
concrete pavement.
5/5/87



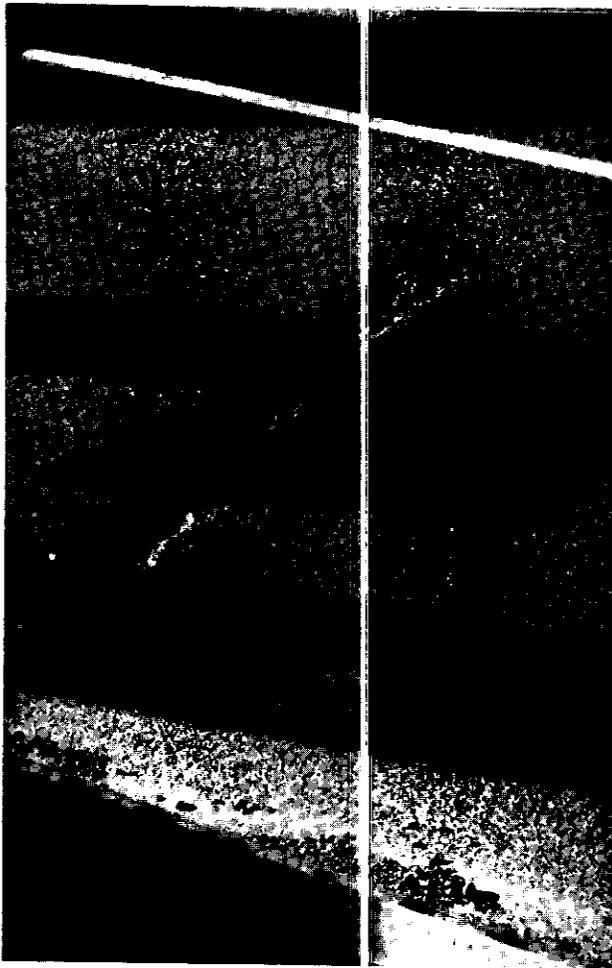
82/115
Naches River Br.
SR-82
M.P. 30.93
Northbound

Surface is Class D
open graded
asphalt pavement
5/5/87



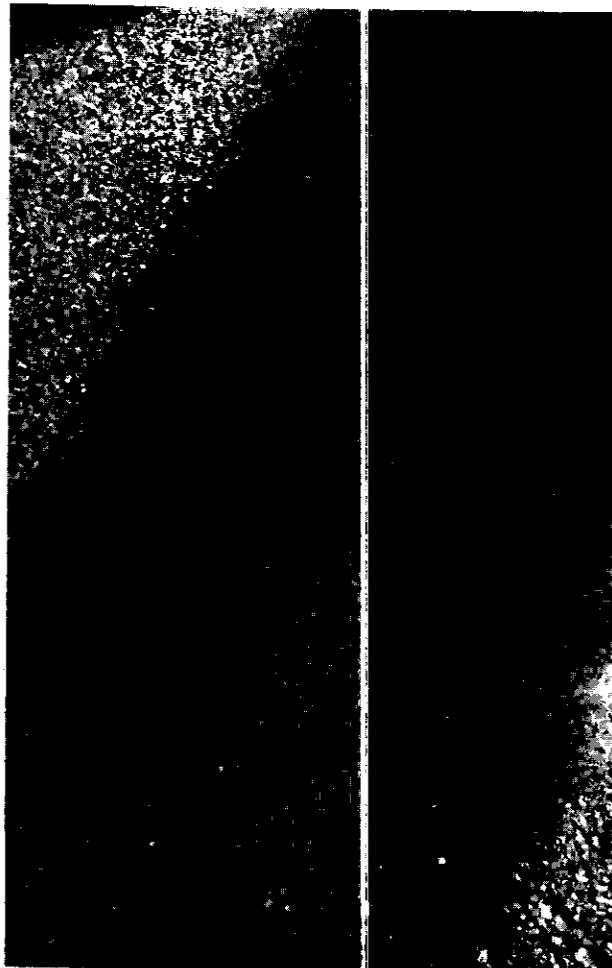
82/115
Naches River Br.
SR-82
Northbound

Shows Close up of
Class D open
graded asphalt
concrete pavement.
5/5/87



Yakima River Bridge
82/114S
SR-82 M.P. 30.81

Shows a spalled joint.
5/5/87



Yakima River Bridge
82/114S
SR-82 M.P. 30.81

Photo shows the
PlusRide surface with
the rubber granules
exposed.