PlusRide® Asphalt Pavement

SR 405, Contract 2768
S Curve/Cedar River Bridge and RR Bridge

Post Construction Report
WA-RD 130.1

August 1987

Washington State Department of Transportation
Planning, Research and Public Transportation Division
in cooperation with the
United States Department of Transportation
Federal Highway Administration
This study was conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

This is the post construction and one year evaluation Report of PlusRide® being used as the wearing course on a bridge deck overlay under very high traffic volumes.

A rubberized Class D Asphalt Concrete Pavement friction course was used on an adjacent bridge to compare against the PlusRide®. The properties evaluated were friction resistance, noise, fatigue properties and deicing characteristics. The friction and noise properties are the same. The PlusRide® has deeper ruts and large areas in the traveled lane have delaminated. The deicing characteristics have not been confirmed. The rubberized class D ACP is performing better than the PlusRide®.
PlusRide® Asphalt Pavement  
SR-405, Contract 2768  
S Curve/Cedar river Bridge and RR Bridge

by

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Special Projects Engineer  
Washington State Department of Transportation  
Materials Laboratory

Post-Construction Report  
and  
One Year Evaluation

Experimental Project WA 84-01

Prepared For

Washington State Department of Transportation  
and in cooperation with  
U.S. Department of Transportation  
Federal Highway Administration

August: 1987
Disclaimer

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.
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<th>Page</th>
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</thead>
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</table>
SYNOPSIS

PlusRide® was used as an 0.08 ft maintenance overlay on SR-405 from M.P. 3.51 to M.P. 3.81 on the northbound structure. The project was titled S Curve/Cedar River Bridge and RR Bridge. A Rubberized Asphalt Concrete pavement Class D was used on the southbound structure within the same limits. The contract plans called for planing off the existing asphalt system down to the bare concrete surface and placing the above materials as a new roadway surface.

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

All of the features will be evaluated on this installation.

STUDY SITE

The project is located within the city limits of the city of Renton, Washington on the I-405 corridor, as shown on the accompanying vicinity map. The S Curve/Cedar R. Br. No. 405/18 E & W are located between M.P. 3.51 and M.P. 3.81 of I-405.

CONSTRUCTION SUMMARY

The paving of both the PlusRide® and the Rubberized Class D ACP was done by Hi-Line Paving Asphalt Co. Inc. of Seattle, Washington. Hi-Line Paving was both the prime and the paving contractor. Bob Linden of All Seasons Surfacing Corporation, Bellevue, Washington was the technical representative for PlusRide® and was present for both the plant and street operations.

The job mixes recommended by All Seasons (PlusRide®) and Arizona Refining (Rubberized Class D) are listed below along with the extraction results for the mixes that were produced for the overlay.

Aggregate Gradation

<table>
<thead>
<tr>
<th>PlusRide®</th>
<th>Mix Design % Passing</th>
<th>Extraction Results % Passing</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1/4</td>
<td>73.6</td>
<td>73</td>
<td>60-80</td>
</tr>
<tr>
<td>#10</td>
<td>32.4</td>
<td>25</td>
<td>23-38</td>
</tr>
<tr>
<td>#30</td>
<td>18.6</td>
<td>16</td>
<td>15-27</td>
</tr>
<tr>
<td>#200</td>
<td>9.5</td>
<td>9.3</td>
<td>8-12</td>
</tr>
<tr>
<td>Asphalt</td>
<td>8.5</td>
<td>8.2</td>
<td></td>
</tr>
</tbody>
</table>

1
RUBBERIZED CLASS D

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Mix Design % Passing</th>
<th>Extraction Results % Passing</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>100</td>
<td>100</td>
<td>97-100</td>
</tr>
<tr>
<td>#4</td>
<td>36</td>
<td>38</td>
<td>30-50</td>
</tr>
<tr>
<td>#8</td>
<td>12</td>
<td>14</td>
<td>5-15</td>
</tr>
<tr>
<td>#200</td>
<td>2.5</td>
<td>3.5</td>
<td>2-5</td>
</tr>
<tr>
<td>Asphalt</td>
<td>8.5</td>
<td>8.7</td>
<td></td>
</tr>
</tbody>
</table>

CSS-1 was used for both tack coat and a fog seal on the Class D. An average coverage of 0.87 Gal/sqy was distributed by a 1979 Ford F-700 with a 1,500 gallon tank and 10 ft bar powered by a 7½ HP Hercules engine. This coverage represented a heavy tack coat and light fog seal.

For the PlusRide®, the rubber granules were added to the aggregate at the 10,000 pound batch plant and dry-mixed for 15 seconds. The AR-4000W was then added and mixed for 25 seconds. The temperature of the mix was maintained between 290º-330ºF.

For the Class D Asphalt, the rubber granules were added to the AR-4000W which had been heated to 400º-450ºF. This mixture was then agitated and heated for one hour. This mixture was pumped into the aggregate after 7 seconds of dry-mixing. The rubberized asphalt and aggregate were then mixed for 32 seconds. The temperature of the mix was maintained between 280º-305ºF.

A Barber Green SA-145 Track Paver placed both types of mix. Compaction was accomplished by a compaction train consisting of a 16 ton Dynapac CC-50 Vibratory Roller (used statically) for breakdown and an 8 ton, steel wheel, Hyster C-340 roller for finish rolling.

The following mat temperatures were observed at rolling:

**PLUSRIDE®**

<table>
<thead>
<tr>
<th>Breakdown 290º-330ºF</th>
<th>Intermediate 220º-290ºF</th>
<th>Finish 170º-220ºF</th>
</tr>
</thead>
<tbody>
<tr>
<td>275º-300ºF</td>
<td>225º-275ºF</td>
<td>175º-225ºF</td>
</tr>
</tbody>
</table>

Compaction on the PlusRide® was monitored by Nuclear Densometer. And after the first two passes with the Dynapac roller the density was checked and after each additional pass until breakover which occurred between the 6th and 7th pass.

The rubberized Class D compaction was done to the satisfaction of the Engineer, as there was no required density level for this material.

On September 15, 1984 the outside northbound lane was paved with PlusRide® and the outside southbound lane paved with Rubberized Class D. On September 16 the inside northbound lane was paved with PlusRide® and the inside southbound lane paved with Rubberized Class D.

The paving was done at night as required by Contract Traffic Control Provisions. The weather both nights was clear and warm with temperatures between 60ºF and 69ºF.
The paving was originally scheduled to be done in one night but due to a plant breakdown an additional night was needed to complete the project.

**COST**

The unit contract bid cost was $50/ton (334 tons) for PlusRide® and $86.85/ton (354 tons) for the Rubberized Class D ACP.

**Performance Evaluation**

**FRICTION**

The initial friction tests were done November 1984 which was 2 months after the completion of the paving. The friction values on the PlusRide® ranged from 33 to 40 with an average of 38. The friction values for the Rubberized Class D ranged from 31 to 40 with an average of 37. The tests were run again May 1987 and the range for the PlusRide® was 35 to 43 with an average of 40. The values for the Rubberized Class D ranged from 35 to 42 with an average of 39. There is no difference between the two when looking at the friction number. We would usually expect to see numbers in the 50 range when tested after 2 years of use.

**NOISE**

Noise measurements were made on the inside of an auto traveling at the posted speed limit and the PlusRide® was 1 db noisier than the Rubberized Class D. These measurements were done in 1984 and 1987. The concrete at the south end of the bridge was 6 to 7 db noisier than both the asphalt mixes. There is no discernable difference between the two asphalts but there is between the asphalt and the concrete.

**FATIGUE**

Rut measurements were not taken at the completion of the contract but measurements were taken on May 19, 1987. The rut measurement in the outside wheel path on the PlusRide® was 3/8" deep. The rut measurement in the Rubberized Class "D" was 3/16" deep in the outside wheel path. A small area on the north end of the Rubberized Class D is showing signs of raveling. This area is roughly representative of one truck load of mix. Large areas of the PlusRide® have delaminated in the left wheel path of the outside lane all the way through the job. These areas have been patched back with regular Class B Asphalt Concrete pavement. These areas are shown in the pictures in Appendix A.

**DENSITY**

The Rubberized Class D had a specification to be compacted to the satisfaction of the Engineer. The PlusRide® had a specification to be compacted to 95% to 98% of maximum density (rice density) determined by WSDOT Test Method 705. This density specification was recommended by the Technical Representative at the design stage. The PlusRide® densities were 88% of the required rice density. This could be one of the factors that contributed to why the large areas in the traveled lane had to be patched.
DE-ICING

We have not been able to confirm any de-icing characteristics of the PlusRide® materials as claimed by the manufacturers.

CONCLUSION

Because of the large areas of delamination and patching in the outside lane paved with PlusRide®, one would conclude the Rubberized Class D is performing better than the PlusRide®.
Appendix A

Photographs
SR 405
S Curve/Cedar River Br. & RR Br. northbound between first & second expansion joint on Plus Ride
Fall 1984

SR 405
S Curve/Cedar river Br. & RR Br. northbound first expansion joint, northbound on Plus Ride
Fall 1984

SR 405
S Curve/Cedar River Br. & RR Br. northbound start of Plus Ride
Fall 1984
SR 405
S Curve/Cedar River
Br. & RR Br. northbound
approaching end of Plus
Ride
Fall 1984

SR 405
S Curve/Cedar River
Br. & RR Br. northbound
end of the Br. in back-
ground Plus Ride in
foreground
Fall 1984

SR 405
S Curve/Cedar River
Br. & RR Br. northbound
second expansion joint
on Plus Ride northbound
Fall 1984
SR 405

S Curve/Cedar River Br. & RR Br. northbound third expansion join on Plus Ride
Spring 1987
Shows patching in outside lane

SR 405

S Curve/Cedar River Br. & RR Br. northbound just past third expansion joints on Plus Ride
Spring 1987
Shows large area that has been patched

SR 405

S Curve/Cedar River Br. & RR Br. northbound approaching end of Br. on Plus Ride
Spring 1987
Shows patched areas
SR 405
S Curve/Cedar River
Br. & RR Br. southbound
approaching the south end of the Rubberized
Class D
Fall 1984

SR 405
S Curve/Cedar River
Br. & RR Br. southbound
middle of Br. on Rubberized
Class D
Fall 1984

SR 405
S Curve/Cedar River
Br. & RR Br. southbound
second expansion joint on Rubberized
Class D
Fall 1984
Spring 1987

Shape rubberized class D in the Good expansion joint. Shows the bridge southbound, lower S Curve/Cedar River Dr. A.

SR 405

Spring 1987

Outside lane rubberized class D in the bridge southbound, upper. Before rear expansion joint. SR Bridge southbound, just S Curve/Cedar River Dr. A.

SR 405

Spring 1987

Class D beginning of rubberized bridge southbound, lower. S Curve/Cedar River Dr. A.

SR 405
When placing tack coat, procedures shall be utilized that will prevent the material from entering the Cedar River. Temporary plugging of bridge drains will be required to conform to the requirement.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading equipment impractical, the paving may be done with other equipment or by hand.

**Compaction**

The acceptable level of compaction shall average between 95 percent and 98 percent of the maximum density as determined by WSDOT Test Method 705. Control shall be per section 5-04.3(10B) of the standard specifications.

**Measurement**

Section 5-04.4 of the standard specifications is supplemented with the following:

Measurement of the rubber modified asphalt concrete will be by the ton and will include the granulated rubber, the asphalt cement and any other component of the mix.

**Payment**

Section 5-04.5 of the standard specifications is supplemented with the following:

The unit contract price per ton for "Rubber Modified ACP Including Paving Asphalt" and the estimated cost for "Mineral Filler" shall be full compensation for furnishing all labor, equipment, materials, and royalties required in the construction of this material as specified.

---

**RUBBERIZED ASPHALT CONCRETE PAVEMENT CLASS D**

This special provision covers the modification of the standard specifications for Class D asphalt concrete to include granulated rubber in the binder phase of the mixture.

The standard specifications for asphalt concrete Class D shall be applicable except for the following changes:

Section 9-02 of the standard specifications is supplemented by the following:

**Asphalt**

Asphalt shall be AR-4000W conforming to section 9-02.1(4) of the standard specifications.
Granulated Rubber
Granulated rubber shall be free from fabric, wire, or other contaminated materials except that up to four percent of calcium carbonate may be included to prevent particles from sticking together. The rubber shall meet one of the following gradations and shall be at the option of the Contractor:

1. 100% ground vulcanized rubber:

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 16</td>
<td>95-100</td>
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<tr>
<td>No. 25</td>
<td>0-10</td>
</tr>
</tbody>
</table>

All percentages are by weight.

2. 40% powdered reclaimed devulcanized rubber and 60% ground vulcanized rubber scrap:

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8</td>
<td>100</td>
</tr>
<tr>
<td>No. 30</td>
<td>60-80</td>
</tr>
<tr>
<td>No. 50</td>
<td>15-40</td>
</tr>
<tr>
<td>No. 100</td>
<td>0-15</td>
</tr>
</tbody>
</table>

All percentages are by weight.

Section 5-04.3 of the standard specifications is supplemented by the following:

Mixing Asphalt and Rubber
The asphalt and rubber shall be combined as rapidly as possible in the proportions of a minimum of two pounds of rubber to one gallon of asphalt (standard at 400 degrees F), then held for such a time and temperature that the consistency of the mix approaches that of a semi-fluid material. The temperature of the asphalt shall be between 400 degrees F and 450 degrees F prior to mixing. The use of up to nine percent diluent to assist in the mixing of rubber will be permitted. If a diluent is used, it shall have a boiling point of at least 350 degrees F. After reaching the proper consistency, the use of the material shall proceed immediately, and in no case shall the material be held at temperatures in excess of 350 degrees F for more than one hour after reaching that point.

The method and equipment for combining the rubber and asphalt shall be so designed and accessible that the Engineer can
readily determine the percentages, by weight, of each of the two materials being incorporated into the mixture.

For the rubberized asphalt concrete Class D only, the first sentence in the third paragraph of section 5-04.3(8) of the standard specifications is deleted and replaced by the following:

When discharged, the temperature of the mix shall not exceed 325 degrees F.

Section 5-04.5 of the standard specifications is supplemented by the following:

Rubberized asphalt will be measured by the ton in accordance with section 1-09 of the standard specifications and shall include the rubber and diluent. Any conversions from volume to weight shall be calculated on the basis of 7.5 pounds per gallon at 60 degrees F of asphalt rubber material.

Rubberized asphalt concrete will be measured by the ton with no deduction being made for the weight of liquid asphalt, rubber, diluent, blend sand, mineral filler, or any other component of the mixture.

Section 5-04.5 of the standard specifications is supplemented by the following:


The unit contract price per ton for "Rubberized ACP Class D Including Paving Asphalt" shall be full compensation for furnishing all labor, tools, materials, and equipment necessary to complete the work as specified.

AVERAGE REFINERY PRICES
(JANUARY 31, 1983)
Within 10 days following award of contract, the Contractor shall provide the State with the name of a single asphalt cement supplier from whom he intends to obtain his asphalt cement for this project. At the end of each month, the State will obtain quoted prices for each day of that month for asphalt cement FOB at the refinery from major suppliers so that a statewide average can be determined.

It shall be the Contractor's responsibility to determine that his proposed supplier has regularly furnished information to the Department's Project Development Office regarding his previous month's daily refinery prices. These prices will be used in accordance with these specifications for determining a statewide average refinery price and information for the previous month must be received by the Department no later than the seventh of each month. Suppliers not
APPENDIX C

ROADWAY SECTIONS
APPENDIX D

TEST REPORTS
**No. 13804**

**MATERIALS LABORATORY**

**Material:** RUBBERIZED CL. D

**Contract No.:** 276B

**F.A. No.:** 26-405-5 (50B)

**C.S. No.:**

**County:** KING

**Contractor:** HI-LINE ASPHALT

**Subcontractor:**

**Place:** SEATTLE

**Date:** 9-15-84

**Organization Code:** 412344

**Forwarded by:** STATE CAR

**Mix Design Desired:**

- Acceptance
- Rejection
- Other

**Field Test Results - Report all screens used:**

<table>
<thead>
<tr>
<th>Screen</th>
<th>Field</th>
<th>% Pass</th>
<th>Spec.</th>
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</thead>
<tbody>
<tr>
<td>4.75</td>
<td>2A</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td>2.36</td>
<td>3A</td>
<td>38</td>
<td>14.5</td>
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<tr>
<td>1.18</td>
<td>2B</td>
<td>14</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Asphalt in Mix:**

- Design 8.5% Plan
- 8.5% Extract 1.7%

**Remarks:**

**Project Engineer:** MILLER

---

**OF ASPHALT MIXTURE**

**CL. D**

**PROJ. ENGR. MILLER**

**Lab No. 91015-4**

**EXTRACTION ANALYSIS**

**RUBBERIZED**

<table>
<thead>
<tr>
<th>Sieves</th>
<th>% Pass</th>
<th>Class B</th>
<th>Class D</th>
<th>Class</th>
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<tbody>
<tr>
<td>4.75</td>
<td></td>
<td>100</td>
<td>90-100</td>
<td></td>
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<tr>
<td>2.36</td>
<td>67-60</td>
<td>100</td>
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<tr>
<td>1.18</td>
<td>60-60</td>
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<tr>
<td>0.88</td>
<td>33</td>
<td>40-63</td>
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<tr>
<td>0.47</td>
<td>9</td>
<td>25-49</td>
<td>30-50</td>
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<td>0.25</td>
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<td>0.030</td>
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<td>0.015</td>
<td>0.6</td>
<td>0.7</td>
<td>2-5</td>
<td></td>
</tr>
</tbody>
</table>

**Stabilometer:**

**Calender:**

**Voids Treated:**

**Voids Calculated:**

**G/S Ratio:**

**P/W/Gr. Fl.**

**Max. Density:**

<table>
<thead>
<tr>
<th><strong>RECOMMENDED RANGE</strong></th>
</tr>
</thead>
</table>

---

**INSTRUCTIONS:**

- meets specification requirements - except where marked

---

**RECEIVED OCT 1, 1984**

**A. J. PETERS, P.E.**

**Materials Engineer**

**Date:** 9-26-84

---

**13804**

**78OT-2**

---
No. 13806

Material: PINE

Contract No.: 2768

ID No.: SR No.: 405

Field Test No.: Produced to Date:

Certificate No.: Truck/Cr. No.:

Quarter Represented:

Aggregates: Washed

Stockpile No.: Ph No.:

Used at Sta. to Sta.:

Sampled/Tested by:

Sampled at: BATCH PLANT

Date: Sampled 9-16-84 Tested 9-16-84

Mix Design Desired: 

Field: Acceptance Rejection Other

Based on Field Test No.:

Field Test Results - Report all screens used:

Screen 3/8 1/4 1/2 3/4 2 00

Field % Pass 100 75 27 16 93

Dist. Lab. % Pass 100 94 66 57 96

Spec. 100 90 66 57 96

Grams/Lbs. Removed by District Lab:

Asphalt in Mix: Design 8.2% Plan 8.2% Extract 8.3%

Sieve Analysis

<table>
<thead>
<tr>
<th>Material</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieves</td>
<td>% Pass</td>
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<td></td>
</tr>
<tr>
<td>1/4&quot; Square</td>
<td>100</td>
<td>90-100</td>
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<td>27</td>
<td>18-21</td>
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<td>50-75</td>
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<tr>
<td>1 1/2&quot; Square</td>
<td>15</td>
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<td>15-27</td>
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<tr>
<td>2&quot; Square</td>
<td>10</td>
<td>6-10</td>
<td>8-12</td>
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<tr>
<td>3&quot; Square</td>
<td>3</td>
<td>2-3</td>
<td>8-12</td>
</tr>
</tbody>
</table>

Gravel Element %

Material meets specification requirements - except as marked.

Date 9-26-84

A. J. PETERS, P.E.

Materials Engineer

1807-1

DISTRICT OF ASPHALT MIXTURE

ELD LABORATORY

EXTRACTION ANALYSIS

LABORATORY COMPACTION

RESULTS RECOMMENDED RANGE

<table>
<thead>
<tr>
<th>Test</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>1. SOFTENING POINT</td>
<td></td>
</tr>
<tr>
<td>2. COHESION</td>
<td></td>
</tr>
<tr>
<td>3. VOLUME TESTED</td>
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</tr>
<tr>
<td>4. VOLUME CALCULATED</td>
<td></td>
</tr>
<tr>
<td>5. RATIO</td>
<td></td>
</tr>
<tr>
<td>6. W/C OR FL.</td>
<td></td>
</tr>
<tr>
<td>7. MAX. DENSITY</td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATIONS

- Material: PINE
- Contract No.: 2768
- District No.: 405
- Field Test No.: 1
- Sampled: 9-16-84
- Tested: 9-16-84

Project Engineer: MILLER/LM

DOT FORM 398-588

White Copy with Sample

Yellow Copy for Proj. Files

REVISION 9/90

DISTRICT OF ASPHALT MIXTURE

ELD LABORATORY

EXTRACTION ANALYSIS

LABORATORY COMPACTION

RESULTS RECOMMENDED RANGE

<table>
<thead>
<tr>
<th>Test</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>1. SOFTENING POINT</td>
<td></td>
</tr>
<tr>
<td>2. COHESION</td>
<td></td>
</tr>
<tr>
<td>3. VOLUME TESTED</td>
<td></td>
</tr>
<tr>
<td>4. VOLUME CALCULATED</td>
<td></td>
</tr>
<tr>
<td>5. RATIO</td>
<td></td>
</tr>
<tr>
<td>6. W/C OR FL.</td>
<td></td>
</tr>
<tr>
<td>7. MAX. DENSITY</td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATIONS

- Material: PINE
- Contract No.: 2768
- District No.: 405
- Field Test No.: 1
- Sampled: 9-16-84
- Tested: 9-16-84

Project Engineer: MILLER/LM

DOT FORM 398-588

White Copy with Sample

Yellow Copy for Proj. Files

REVISION 9/90

DISTRICT OF ASPHALT MIXTURE

ELD LABORATORY

EXTRACTION ANALYSIS

LABORATORY COMPACTION

RESULTS RECOMMENDED RANGE

<table>
<thead>
<tr>
<th>Test</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SOFTENING POINT</td>
<td></td>
</tr>
<tr>
<td>2. COHESION</td>
<td></td>
</tr>
<tr>
<td>3. VOLUME TESTED</td>
<td></td>
</tr>
<tr>
<td>4. VOLUME CALCULATED</td>
<td></td>
</tr>
<tr>
<td>5. RATIO</td>
<td></td>
</tr>
<tr>
<td>6. W/C OR FL.</td>
<td></td>
</tr>
<tr>
<td>7. MAX. DENSITY</td>
<td></td>
</tr>
</tbody>
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- Material: PINE
- Contract No.: 2768
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- Field Test No.: 1
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REVISION 9/90

DISTRICT OF ASPHALT MIXTURE

ELD LABORATORY

EXTRACTION ANALYSIS

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<table>
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<th>Results</th>
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</thead>
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<td></td>
</tr>
<tr>
<td>2. COHESION</td>
<td></td>
</tr>
<tr>
<td>3. VOLUME TESTED</td>
<td></td>
</tr>
<tr>
<td>4. VOLUME CALCULATED</td>
<td></td>
</tr>
<tr>
<td>5. RATIO</td>
<td></td>
</tr>
<tr>
<td>6. W/C OR FL.</td>
<td></td>
</tr>
<tr>
<td>7. MAX. DENSITY</td>
<td></td>
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</tbody>
</table>

SPECIFICATIONS

- Material: PINE
- Contract No.: 2768
- District No.: 405
- Field Test No.: 1
- Sampled: 9-16-84
- Tested: 9-16-84

Project Engineer: MILLER/LM

DATE 9-26-84

A. J. PETERS, P.E.

Materials Engineer
To: MATERIALS LABORATORY

Material: C.L. D W/RUBBER (20%)

Contract No.: 276B

Section: 5 CULMLE/CEDAR R. BR.

F.A. No.: F-405-3 (50A)

C.S. No.: 

County: KING

Contractor: H1-LINE ASPHALT

Subcontractor: 

Place: SEATTLE

Organization Code: 412,44

Date: Sampled 9-16-84 Tested 9-16-84

Mix Design Desired: Based on Field Test No.: 

Field: Acceptance X Rejection Other

Field Test Results - Report all screens used:

Asphalt in Mix: Design 0.5 % Plan 8.5 % Extract 9.1 %

Screen | Field % Pass | Dist. Lab. % Pass | S/S |
--------|-------------|------------------|----|
| 1/4" | 94 | 32 | 28 |

Field Fracture Fine: 
Fracture Course: 
Sand Equivalent: 
Sieving: Wet Dry

Grams/Lbs. Removed by District Lab: 

Remarks: 

Project Engineer: MILLER/Ka

DOT FORM 390-016

TEST OF ASPHALT MIXTURE

FIELD LABORATORY

EXTRACTION ANALYSIS

SIEVES | % PASS | CLASS E | CLASS B | CLASS D |
-------|--------|---------|---------|---------|
| 1/4" | 100 | 90-100 | 80-90 | 70-80 |
| 3" | 66-60 | 40-50 | 30-40 | 50-60 |
| 6" | 100 | 60-70 | 10-20 | 0-10 |
| 8" | 15 | 25-40 | 10-15 | 0-10 |
| 10" | 2 | 6-10 | 6-10 | 0-10 |
| 20" | 1-2 | 0-10 | 0-10 | 0-10 |

Lab No. 81-1011-4

LABORATORY COMPACTION

RESULTS | RECOMMENDED RANGE
---------|---------------------
Stabilometer | 
Coalescer | 
Voids Tapped | 
Voids Calculated | 
G/C Ratio | 
Wt./Cu. Ft. | 
Max. Density (Rsd) |

Material meets specification requirements - except where marked.

T887-2

A. J. PETERS, P.E.

Date 9-26-84

MATERIALS ENGINEER

Date 9-26-84

MATERIALS ENGINEER

For: MATERIALS LABORATORY

Date 9-26-84

MATERIALS ENGINEER
RIDE

Material:

Contract No. 2768
Section: S CURVE ICE CREEK R, RP.
SR No. 405

F.A. No. 5-405-2(528)
C.S. No.:
County: KING
Contractor: HI-LINE ASPHALT
Subcontractor:
Place: SEATTLE Date: 9-16-84
Organization Code: 41234
Forwarded By: STATE CAR

No. 13808
To: MATERIALS LABORATORY

Dist. Lab. No.: B1-1013-4
Headqtrs. Lab. No.:

Control Sample No.: 2
Field Test No.:
Certifcate No.: Truck/Car No.:
Quant. Represented: Produced to Date:
Aggregates: Washed Scalded
Stockpile No.: Pit No.: A-318
to Sta

Used at: Sta

Sampled/Tested by: EM
Sampled at: RATCHET PLANT
Date: Sampled 9-14-84 Tested 9-16-84

Mix Design Desired:

Field: Acceptance X Rejection Other

Based on Field Test No.:

Field Test Results - Report all screens used:
Asphalt in Mix: Design 8.2% Plan 8.2% Extract 8.4%

Screen

Field % Pass

Dist. Lab. % Pass

Spec's

Grams/Lbs. Removed by District Lab.

OT FORM 300-096 REVISED 8/88
White Copy with Sample
Yellow Copy for Proj. Files

Remarks:

Project Engineer: MILLER/EM
Phone: (SCAN)

TEST OF ASPHALT MIXTURE

EXTRACTION ANALYSIS

      SIEVES     % PASS      CLASS I     CLASS II     CLASS

  1/16th Square     100
  3/32nd Square      90-100
  1/8 Square         67-68
  3/16 Square        60-60
  1/4 Square         40-42
  3 No. 10           25-40
  1/2 No. 10         20-23
  3 No. 20           15-18
  1/4 No. 200        10-14
  Asphalt Content %  8.3

meets
class as-tested

specification requirements - except where noted

LABORATORY COMPACTION

RESULTS

Stabitymeter
Cohesionmeter
Voids Tested
Voids Calculated
S/R Ratio
W/C or PL
Max. Density (AASHTO)

RECOMMENDED RANGE

100
50-80
20-38
15-27

A. J. PETERS, P.E.
Materials Engineer

Date: 9-16-84

LAB. MATERIALS ENG.
## REQUEST FOR APPROVAL OF MATERIAL SOURCES

### DEPARTMENT OF TRANSPORTATION

**Form No.** 39694

**Section** MP 1.05 to 3.81 S CURVE/CLENCH PE. BE. & RR. BE.

<table>
<thead>
<tr>
<th>No.</th>
<th>DESCRIPTION OF MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>A/C FOR JACK CSS-1</td>
</tr>
<tr>
<td>6</td>
<td>RUBBER MODIFIED ASP</td>
</tr>
<tr>
<td></td>
<td>Aggregate CL &quot;B&quot;</td>
</tr>
<tr>
<td></td>
<td>Aggregate CL &quot;G&quot;</td>
</tr>
<tr>
<td></td>
<td>1/4&quot; MIVAS</td>
</tr>
<tr>
<td>7</td>
<td>RUBBERIZED ASP CL &quot;D&quot;</td>
</tr>
<tr>
<td></td>
<td>CLASS &quot;O&quot; AGGREGATES</td>
</tr>
</tbody>
</table>

### SOURCES OF SUPPLY

<table>
<thead>
<tr>
<th>Local Supplier</th>
<th>Manufacturer's Brand or P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CADRON ASPHALT</td>
<td>Richmond Beach</td>
</tr>
<tr>
<td>STONEWAY 5&quot;4</td>
<td>LEPRE SHORES</td>
</tr>
<tr>
<td>STONEWAY 5&quot;4</td>
<td>AS88</td>
</tr>
<tr>
<td>CITY TIMBER, Etc.</td>
<td>DICKEN PITS</td>
</tr>
<tr>
<td>STONEWAY 5&quot;4</td>
<td>LEPRE SHORES</td>
</tr>
<tr>
<td>CHEVRON ASPHALT</td>
<td>RICHMOND BEACH</td>
</tr>
<tr>
<td>EVADOX GRANITES</td>
<td>EVADOX</td>
</tr>
<tr>
<td>STONEWAY 5&quot;4</td>
<td>LEPRE SHORES</td>
</tr>
<tr>
<td></td>
<td>AS88</td>
</tr>
</tbody>
</table>

**RECEIVED**

OCT 1 1984

PROJ. ENGR. MILLER

**RECEIVED**

AUG 3 1984

PROJ. ENGR. MILLER

---

**Contractor:**

**Submitted by:**

*Highline Asphalt Paving Co., Inc.*

**Michael J. Ferguson**

---

1. I understand this form is an approved form for contractor use as allowed by the construction manual.

---

**Date:**

9/19/84

**Signature:**

*De Patton*

**Materials Engineer**
## REQUEST FOR APPROVAL OF MATERIAL SOURCES

**Date:** 8/22/84  
**Contract No.:** 2768  
**F.A. No.:** IR-405-3(S05)  
**City/County or S.R. No.:** T-405  
**Section:** S. CURVE/CEDAR RIVER BY. & R.R. BRIDGE

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Sources of Supply</th>
<th>Approval Action</th>
</tr>
</thead>
</table>
| **7** RUBBERIZED ACP CLASS 'C' INCL. PAVING ASPHALT AR 4000 W | U.S. Oil  
Arizona Refining  
Arizona Enfing | ✔  |
| **6** RUBBER MODIFIED ASPHALT CONCRETE PAVEMENT | TACOMA  
COHELEX  
Tensitar  
C100 & C112  
Spartan TBM 24 | ✔  |

**Contractor:**  
Hi-Line Asphalt  
Submitted by: Michael J. Reman

1. Foreign materials that do not meet the requirements of the Specifications, have been reviewed all items above for conformance to contract specifications and requirements and I recommend approval as these items conform thereto ( ) do not concur (Attach comments).

ANY ITEMS FOR WHICH APPROVAL IS BEING Sought AS EQUIVALENT TO SPECIFIED MATERIAL OR PRODUCT HAVE BEEN CIRCLED. ITEMS FULFILLING A SPECIFICATION OTHER THAN THE APPlicable STANDARD SPECIFICATIONS IS AMENDED HAVE BEEN UNDERLINED.

---

**DEPARTMENT OF TRANSPORTATION MATERIALS LABORATORY USE ONLY**

- Sources of supply for all items checked ( ) in approval column are approved for use so the above improvement provided the materials delivered comply with specifications.
- Items checked by number in the approval column is identified as per the following code:
  1. Source Approved. Approval for Change of Source must be secured from the Headquarter Materials Engineer per Chapter 3-1.7 of the Construction Manual.
  2. Approval withheld; submit samples for preliminary evaluation.
  3. Approval withheld; submit brand name, name of manufacturer, or treating plant.
  4. Approval withheld; submit Transportation Department pit number (if known) and type description.
  5. Approval withheld; please submit catalog, cuts and/or shop drawings.
  6. Approval withheld.

**Project Engineer:**   
M. H. Miller  
**Reviewed by:**   
M. H. Miller  
**Phone No.:** 3134 2173  
**Date:** 9/12/84

**Materials Engineer:**   
D. D. Jordan  
**Date:** 9/12/84
### Request for Approval of Material Sources

**Date:** August 20, 1984

**Contractor:** Hi-Line Asphat

**Submitted by:** Michael J. LeMarr

---

**Action:** SR 405 S Curve / Cedar River Bridge

**Sources of Supply**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description of Material</th>
<th>Local Supplier</th>
<th>Manufacturer's Brand or P/N No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Paint stripe</td>
<td>Norris Paint Co., Salem, OR</td>
<td>Wash. spec.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Traffic Control Sign Co., Tacoma, WA</td>
<td>Wash. spec/</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>Safety Sign Inc., Woodinville, WA</td>
<td>Wash. spec</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>Stimsonite Corp., Santa Fe Springs, CA</td>
<td>Wash. spec</td>
</tr>
<tr>
<td>11</td>
<td>Type I lane markers</td>
<td>RAY-O-Lite Corp., Hunting beach, CA</td>
<td>Wash. spec/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QMC Company, Kent, WA</td>
<td>Wash. spec</td>
</tr>
<tr>
<td>12</td>
<td>Type II lane markers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Epoxy to install lane markers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Note:** Any items for which approval is being sought are equivalent to a specified material or product have been circled. Items fulfilling a specification other than the applicable standard specifications as amended have been underlined.

---

**Received:** Oct 1, 1984

**Fabricated by:**

**Reviewed by:**

**Checked:**

**Date:** 8-17-84

---

**Department of Transportation Materials Laboratory Use Only**

---

**Source:**

- Source Approved: Approval for Change of Source must be secured from the Headquarters Materials Engineer per Chapter 3-1.7 of the Construction Manual.
- Approval with held: Submit samples for preliminary evaluation.
- Approval with held: Submit brand name, name of manufacturer, or treating plant.
- Approval with held: Submit Transportation Department Permit number (if have) and legal description.
- Approval with held: Please send catalog and/or shop drawings.
- Approval with held: Acceptance of Materials for project use is to be conditional upon certification of either 100 percent American manufacture or identification of foreign manufacturer and materials cost within the permissible limits for the project (See Special Provisions).

---

**Date:** 8-21-84

**Project Engineer:**

**Materials Engineer:**

---

**Distribution:**

- White - Headquarters Materials Lab
- PIBK - District Administrator
**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DAILY REPORT OF ASPHALT PLANT OPERATIONS**

**Sr.** 405  **Section** S CURVE/CEDAR R. RR.  **Contract No.** 2768

**LANT**
- **Date:** 9-13-84  **Class Mix:** D  **Report No.:** 1
- **Batch:** Continuous  **Drum:**  **Manufacturer:** STANDARD  **Capacity:** 10,000

**9X COMPOSITION**

<table>
<thead>
<tr>
<th>Bin #</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Filler</th>
<th>Asphalt</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.5%</td>
<td>100%</td>
<td>9.5</td>
</tr>
<tr>
<td>Wt. Lbs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3660</td>
<td></td>
<td>4000</td>
</tr>
</tbody>
</table>

**Average % Blending Sand Included**

| Particle Coating (WSDOT Test 714) | 100% |

**9X ANALYSIS**

- **Indicate Method:** Extraction or Quick Wash With or Without Vacuum Extraction
- **Hot or Cold Bin Analysis**

<table>
<thead>
<tr>
<th>Test #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Screen Size</th>
<th>% Passing</th>
<th>Screen Size</th>
<th>% Passing</th>
<th>Screen Size</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9:50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp. Mix °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp. Asph. °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>355</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q.P.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % Passing 1½ | | | | | | | | | | | |
| 1” | | | | | | | | | | | |
| 5/8” | | | | | | | | | | | |
| 1” | | | | | | | | | | | |
| 3/8” | | | | | | | | | | | |
| 2” | | | | | | | | | | | |
| 3” | | | | | | | | | | | |
| 5/4” | | | | | | | | | | | |

| % Asph. | | | | | | | | | | | |
| Sand/Silt Ratio | | | | | | | | | | | |
| % Moisture | | | | | | | | | | | |

**ASPHALT PERCENTAGES**

| Original Design | 8.5 |
| Order | 8.5 |
| Calculated from Production | 8.7 |
| By Extraction Test | 8.7 |

| Mix sample sent to Lab today represents | 180 |
| Tones Total Production | |

**AGGREGATE WASTED**

<table>
<thead>
<tr>
<th>Bin No.</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCTION**

| Plant Started | 7:30 A.M. |
| Plant Stopped | 3:00 P.M. |
| Air Temp. | 68 °F |

**NOTES:**
- PLANT BROKE BINN AT 5:00 A.M.
- Weather: **clear**
- **R. Mitchell** 9-15-84
DAILY REPORT OF ASPHALT PLANT OPERATIONS

District 1

SR 405 Section S CURVE /CEDAR R. BR. Contract No. 2768

Date 9-16-84 Class Mix "D" Report No. 2

Batch Continuous Drum Manufacturer STANDB4 Capacity 10,000

% COMPOSITION

Bin # 4 3 2 1
% of Total Mix 36.6
Wt. Lbs. 3660
Average % Blending Sand Included 10.0%

% ANALYSIS

Indicate Method - Extraction or Quick Wash With or Without Vacuum Extraction

Test # 1 2 3 4 5 Screen Size % Passing Screen Size % Passing Screen Size % Passing

Time 9:00
Temp. Mix °F 320
Temp. Asph. °F 350
Method Q.E.

% Passing 1¼".
1" 100
5/8" 42
¼" 19
3/8" 100
#18 42
#40 11
#80 3.9
% Asph. 9.1

Job Std. Speca. Design

% Frac. Cl. "D" Cl. "B" Cl. "G"

Aggregates Wasted

Bin No. Tons

PRODUCTION

Plant Started 8:30 a.m.
Plant Stopped 11:00 P.M.
Air Temp. 66°F P.M.

SHALL PERCENTAGES

Original Design 8.5%
Ordered 8.5%
Calculated from Production 9.1%
By Extraction Test 8.5%
Mix sample sent to Lab today represents 168 Tons Total Production

Our complete analysis is shown by Test # 1

OTES:

R. Mitchell 9-16-84

Signed by:  

Date: 
DAILY REPORT OF ASPHALT PLANT OPERATIONS

District 1

SR 405 Section S CURVE/CEASAR R. BE.
Contract No. 2748

PLANT
Date 9-15-84 Class Mix STD 1
Batch [X] Continuous [ ] Drum [ ] Manufacture: STANDARD
[ ] Fillers [ ] Asphahlt Total
Capacity 14,000

X COMPOSITION

| Bin # | Rubb. | MINERAL FILLER | % of Total Mix | Wt. Lbs. | 120 200 3350
|-------|-------|----------------|----------------|----------|-----------------|

X ANALYSIS

Indicate Method — Extraction or Quick Wash With or Without Vacuum Extraction

Hot or Cold Bin Analysis

<table>
<thead>
<tr>
<th>Test #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Screen Size</th>
<th>% Passing</th>
<th>Screen Size</th>
<th>% Passing</th>
<th>Screen Size</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>1:00</td>
<td>5:30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp. Mix °F</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp. Asph. °F</td>
<td>325</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Q.E.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % Passing 1" | | | | | |
| 1" | | | | | |
| 5/8" | | | | | |
| 1" | | | | | |
| 3/8" | 100 | 100 | | | |
| 1" | 79 | 73 | | | |
| #10 | 27 | 25 | | | |
| #3 | 16 | 16 | | | |
| #80 | 94 | 93 | | | |
| % Asph | 8.3 | 8.2 | | | |

| Sand/Silt Ratio | | | | | |
| % Moisture | | | | | |

ASPHALT PERCENTAGES

| Original Design | 8.2 | |
| Ordered | 8.2 | % |
| Calculated from Production | | % |

| By Extraction Test | 8.3 | % |

Mix sample sent to Lab today represents 168 Tons Total Production

Our complete analysis is shown by Test # 1

AGGREGATE WASTED

<table>
<thead>
<tr>
<th>Bin No.</th>
<th>Tones</th>
</tr>
</thead>
</table>

PRODUCTION

Plant Started 11:50 AM
Plant Stopped 3:00 AM
Air Temp. 59 A.M. P.M.

Notes: SAME #2 TAKEN 9-19-84 FOR INFORMATION
PLANT BEARS DOWN AT 3:00 A.M.

Weather clear, fairly dry

R. Mitchell 9-15-84
DAILY REPORT OF ASPHALT PLANT OPERATIONS

District: 1

SR: 405  Section: S CURVE / CEDAR R. BL.
Contract No.: 2768

PLANT
Batch: X  Continuous: X  Drum: X
Manufacturer: STANDARD
Class Mix: A-338

Date: 9-16-84  Class Mix: A-338
Class Mix: 14.75

MIX COMPOSITION
Bin # 1 2 3 4 5
% of Total Mix 120 200 3350
Wt. Lbs. 120 200 3350
Average % Blending Sand Included __________

MIX ANALYSIS
Bin #1  Bin #2  Bin #3
Time 11:45
Temp. Mix °F 330
Temp. Asph. °F 375
Method Q.E.

Hot or Cold Bin Analysis

<table>
<thead>
<tr>
<th>Test #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Screen Size</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11:45</td>
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<tr>
<td>Temp. Mix °F</td>
<td>330</td>
<td></td>
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<tr>
<td>Temp. Asph. °F</td>
<td>375</td>
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<tr>
<td>Method</td>
<td>Q.E.</td>
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Total Batch Wt. or Lbs./Rev. 8.2 4000
Particle Coating (WSDOT Test 714) 1.0 %

MIX PERCENTAGES

<table>
<thead>
<tr>
<th>% Passing 1 1/4&quot;</th>
<th>1&quot;</th>
<th>5/8&quot;</th>
<th>1/4&quot;</th>
<th>3/8&quot;</th>
<th>1/8&quot;</th>
<th>#10</th>
<th>#18</th>
<th>#20</th>
<th>#200</th>
<th>% Asph</th>
<th>Sand/Silt Ratio</th>
<th>% Moisture</th>
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AGGREGATE WASTED

<table>
<thead>
<tr>
<th>Bin No.</th>
<th>Tons</th>
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PRODUCTION

Plant Started 11:00 AM
Plant Stopped 1:30 PM
Air Temp. 60° F.

DESCRIPTION

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<th>PRODUCTION</th>
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NOTES:

Our complete analysis is shown by Test # 1

Date: 9-16-84

R. Mitchell
Noise measurements were made on the repaved Renton SR 405 S Curves, October 5, 1984. These measurements were made inside car 1A1-202, Ford Fairlane (front seat) travelling the speed limit both north and southbound. These measurements were made to see if there was an interior difference in noise level between the plus ride (northbound) and rubberized open graded (southbound) lanes.

The results showed the same dBA levels both northbound and southbound. Going 50 mph, the noise level inside the car was 68 dBA on the right lanes north and southbound and 67 dBA on the left lanes. Several runs were made in each direction in each lane. This noise level was 4 to 6 dBA less than that measured on the worn and grooved concrete pavement on either side of the S Curves, and the differences in noise level was readily noticeable.

These results are not meant to be conclusive. A study in cooperation with the University of Washington is planned to extensively evaluate the tire-pavement noise for a variety of different pavement surface and wear conditions.