

**Los Angeles County Department of Public Works Asphalt
Rubber Chip Seal with Warm Mix Additive Demonstration
Project**



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**California Pavement Preservation Center
25 Main Street, Suite 202
California State University
Chico, California 98929-0930
(530) 898-5981**



PROJECT SUMMARY PAGE	Tech Report: 2010 – 106
<p>Title: Los Angeles County Department of Public Works Asphalt Rubber Chip Seal with Warm Mix Additive Demonstration Project</p>	
<p>Authors: Dragos Andrei, Erik Updyke, R Gary Hicks, Ding Cheng,</p>	
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<p>Abstract:</p> <p>The Los Angeles County Department of Public Works placed an asphalt rubber warm mix chip seal demonstration on Smith Avenue in the unincorporated community of Acton on August 26, 2010. This was the second project of this type placed in California in the summer of 2010 by Intermountain Slurry Seal, Inc. The first was in the City of Roseville placed in June 2010 and reported in the Center’s June newsletter. The placement temperature of the warm mix asphalt rubber spray application used in LA County was 335 °F, considerably lower than the application temperature of 400 °F when no warm mix additive is used. The additive supplied was manufactured by Engineered Additives blended at 1.5 % by weight of the asphalt rubber binder.</p> <p>Observations included the following:</p> <ul style="list-style-type: none"> o There appeared to be less smoke coming from the spray bar when using the warm mix additive than from around a distributor equipped with a smoke reduction device observed with conventional asphalt rubber. o The viscosities were on the lower side, 1500 and 1700 centipoise, but were within the specification range. o When walking beside the distributor, perhaps 5 feet to the side, for over 50% of the project, the affect of smoke was not felt. The smoke appeared to be white with a blue tint. <p>Overall, the project was considered a success.</p>	
<p>Keywords: chip seal, warm mix, asphalt rubber, spread application</p>	

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Disclaimer

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The content does not necessarily reflect the official views or policies of the California Department of Resource Recycling and Recovery, and the State of California.

Table of Contents

List of Figures.....	v
List of Tables.....	v
1.0 Introduction.....	1
1.1 Background.....	1
1.2 Project Objective.....	1
1.3 Project Scope.....	1
2.0 Pre-construction.....	2
2.1 Existing Pavement Condition Survey.....	2
2.2 Existing Pavement Structure.....	3
2.3 Materials for the AR Chip Seal with Warm Mix.....	3
3.0 Construction.....	3
3.1 Construction observations.....	3
3.2 QC data.....	6
3.3 Application of Microsurfacing.....	8
4.0 Preliminary Conclusions and Recommendations.....	10
5.0 References.....	11

List of Figures

Figure 1 Aerial photograph and project location.....	1
Figure 2 Longitudinal and transverse cracking on Smith Avenue.....	2
Figure 3 High severity alligator cracking on Smith Avenue before Soledad Canyon Road.....	3
Figure 4 Sweeping the existing surface before laydown of AR chip seal.....	4
Figure 5 Tarp being used under the spray bar at the beginning of a new section.....	4
Figure 6 Chips placed on the asphalt rubber binder with warm mix additive.....	5
Figure 7 Compaction.....	6
Figure 8 Visible emissions during binder application.....	7
Figure 9 Emissions during binder application.....	7
Figure 10 Finished chip seal.....	8
Figure 11 Microsurfacing applied over chip seal.....	9
Figure 12 Finished cape seal on Smith Avenue.....	9
Figure 13 Smith Avenue after striping.....	10

List of Tables

Table 1 Temperatures.....	6
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1.0 Introduction

1.1 Background

On August 26, 2010, Intermountain Slurry Seal Inc., a member of the Granite Construction Incorporated family of companies, performed an asphalt rubber chip seal demonstration project on approximately 0.4 miles of Smith Avenue in Acton, California. The asphalt rubber binder was modified with a warm mix additive (WMA) provided by Engineering Additives to allow placement of the binder at lower temperatures which equates with reduced emissions and energy consumption. Approximately one week after the chip seal, a type II microsurfacing was placed over the chip seal. This combination of chip seal and micro-surfacing is also known as a cape seal.

1.2 Project Objective

The objective of the demonstration project was to visually evaluate the reduction in emissions due to the use of WMA in the asphalt rubber binder.

1.3 Project Scope

The project was performed on Smith Avenue, a two lane residential street oriented East-West in the unincorporated community of Acton, California. The project location, highlighted in red, is shown in Figure 1. The project limits are Soledad Canyon Road to the East and the end of the County maintained road to the West, approximately 300 feet past Bartlett Street.



Figure 1 Aerial photograph and project location

2.0 Pre-construction

2.1 Existing Pavement Condition Survey

Smith Avenue is an asphalt concrete surfaced pavement showing high severity longitudinal and transverse cracking throughout the entire project. Longitudinal cracking is not necessarily located in the wheel paths, an indication that the distress is not load-associated. Transverse cracking was found, on average, every 15 to 20 feet. Both longitudinal and transverse cracks were about one inch wide and the sides of the cracks were slightly raised. Traces of crack sealant were observed along few of the wider cracks. No significant rutting was observed. Few large patches were noticed throughout the entire project. A snapshot of the typical distresses found is shown in Figure 2.



Figure 2 Longitudinal and transverse cracking on Smith Avenue

The portion of Smith Avenue from Soledad Canyon Road to Crown Valley Road had considerably more distress, with more frequent transverse cracks and several areas of high severity alligator cracking, as illustrated in Figure 3. Due to its location between two collectors (Soledad Canyon Road and Crown Valley Road) this segment of Smith Avenue is probably subject to more frequent and heavier traffic. The alligator cracking occurred only in certain areas of the pavement.



Figure 3 High severity alligator cracking on Smith Avenue before Soledad Canyon Road

2.2 Existing Pavement Structure

The pavement appears to be a thin 1 to 1.5 inch asphalt concrete surface over sandy subgrade, probably the natural surficial soil in Acton. While the application of the cape seal will result in a temporary improvement in appearance, the treatment will not significantly affect the structural capacity of the pavement and reflective cracking should be expected. No cores were taken and no deflection testing was performed on the project prior to construction.

2.3 Materials for the AR Chip Seal with Warm Mix

The asphalt rubber binder was provided by Granite Construction from their Littlerock plant. The binder was modified at the plant with 1.5% WMA by total weight of the asphalt rubber binder. The WMA was added after the 45 minute reaction period. The viscosity prior to the addition of the WMA was 2,000 centipoise at 400°F. The rubber content was 18% by weight of binder.

The 3/8 inch hot coated chip was also provided by Granite Construction.

3.0 Construction

3.1 Construction observations

Preparation for laydown operations started around 10:00 AM. The entire pavement surface was initially swept as illustrated in Figure 4. The chip seal was then placed on the westbound lane of Smith Avenue starting from Crown Valley Road and going West, in four segments. The binder was placed first, using a binder distributor with a spray bar. A tarp was used before each start as illustrated in Figure 5.



Figure 4 Sweeping the existing surface before laydown of AR chip seal



Figure 5 Tarp being used under the spray bar at the beginning of a new section

The pre-coated chips were placed shortly after the binder with a chip spreader, as illustrated in Figure 6. Aggregate was supplied to the spreader from a haul truck. Two pneumatic rollers were used for compaction as shown in Figure 7.



Figure 6 Chips placed on the asphalt rubber binder with warm mix additive



Figure 7 Compaction

3.2 QC data

Temperature readings taken during construction are summarized in Table 1:

Table 1 Temperatures

Measurement	Average Temperature
Ambient	100°F
Pavement surface before chip seal	120°F
Binder	335°F
Chip	240°F

The binder application rate was 0.64 gallons per square yard between Soledad Canyon and Crown Valley and 0.66 gallons per square yard on the section from Crown Valley to the end. Binder viscosity measurements taken on site ranged from 1500 to 1700 centipoise, which is on the lower side of the specification. The chip was placed at 32 to 34 pounds per square yard.

LADPW representatives were especially interested to see whether the use of the warm mix additive will result in reduced emissions during construction. Indeed, fumes were visibly less than what would be

expected from a conventional asphalt rubber chip seal project. This is further illustrated in Figures 8 and 9.



Figure 8 Visible emissions during binder application



Figure 4 Emissions during binder application

The finished chip seal is shown in Figure 10.



Figure 50 Finished chip seal

3.3 Application of Microsurfacing

One week after construction, a Type II micro-surfacing was placed over the chip seal. This combination of chip seal and microsurfacing is also known as cape seal. Placing of the micro-surfacing is illustrated in Figure 11. The finished cape seal can be seen in Figure 12. The brownish color on the left side of Figure 12 indicates that water was still present in the microsurfacing at the time the photograph was taken.



Figure 6 Microsurfacing applied over chip seal



Figure 7 Finished cape seal on Smith Avenue

A photograph of Smith Avenue after striping and opening to traffic is shown in Figure 13.



Figure 13 Smith Avenue after striping

4.0 Preliminary Conclusions and Recommendations

The asphalt rubber chip seal with warm mix additive demonstration project showed that the warm mix additive was effective in reducing emissions normally associated with this type of projects. Lower emissions and reduced energy consumption are the obvious advantages of this technology.

It is recommended that the project be visited again 3 to 5 years from the time of construction to document its condition after several years of service. Comparison of this project with the conventional AR chip seal projects will help evaluate the effect of WMA on long term pavement performance.

5.0 References

1. Email correspondence with Erik Updyke, Los Angeles County Department of Public Works; Marc Bertsch, Steve Olsen, Intermountain Slurry Seal Inc.
2. Material Test Report, RMA Group, Job No. 10-487-01, September 9, 2010