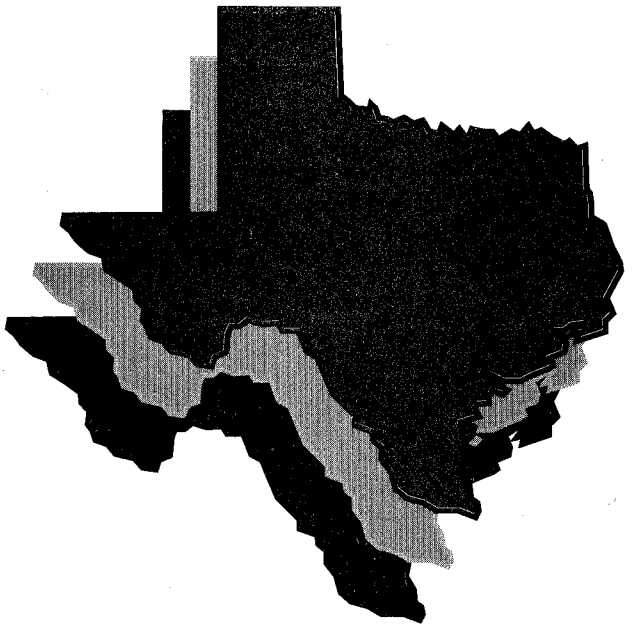
MICROSURFACING IN TEXAS

DHT — 25.2



DEPARTMENTAL RESEARCH

STATE DEPARTMENT OF HIGHWAYS
AND
PUBLIC TRANSPORTATION

RESEARCH SECTION, FILE D10-R, P.O. BOX 5051 AUSTIN, TX 78763-5051, 512-465-7403, TexAn 241-7403

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DHT-25.2		

4. Title and Subtitle	5. Report Date
"MICROSURFACING IN TEXAS"	January, 1991
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Lisa Lukefahr, Research Engineer Assistant III	DHT-25.2

9. Performing Organization Name and Address	10. Work Unit No.
State Department of Highways and Public Transportation Transportation Planning Division, Research Section P. O. Box 5051 Austin, Texas 78763	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address State Department of Highways and Public Transportation 11th and Brazos Austin, Texas 78701	14. Sponsoring Agency Code

15. Supplementary Notes

This is the second in-house report on the usage of microsurfacing in Texas. Future reports will be conducted on a yearly basis.

16. Abstract

Two-thirds of the districts in Texas have used polymer-modified slurry seals (also called microsurfacing). Seven of the eight districts that have not yet used this kind of seal will do so at some future time.

The performance of the microsurfacing seal in Texas has generally been promising. The use of this seal to correct rutting and flushing and to improve ride quality and skid resistance has been very good. The availability of materials and equipment for placing slurry seal has improved but is still not ideal. The cost effectiveness of slurry seals older than one year was ranked very high by the districts. The cost of this seal coat has risen 15% within the last year to an average of $1.26 per square yard.

17. Key Words	18. Distribution Statement
Microsurfacing, slurry seal, Ralumac, Seal coat, polymer-modified seal coat	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	16	

Form DOT F 1700.7 (8-69)

MICROSURFACING IN TEXAS

Prepared by the

Transportation Planning Division (D-10R)

of the

Texas State Department of Highways
and Public Transportation

* The use of brand or trade names is for informational purposes only and does not constitute an endorsement by the Texas State Department of Highways and Public Transportation.

Introduction

A district survey was conducted in November of 1990 to assess the usage of slurry seals in Texas. Three forms were distributed to each district. Form-A (page A-1) was to be completed by those districts that had never used slurry seals. Form-B (page A-2) was to be filled out by districts that had completed slurry seals projects within the last twelve months. Form-C (page A-4) was completed for each existing slurry seal over twelve months in age. The following report is a brief summary of the findings.

Background

A conventional slurry seal is a mixture of well-graded fine aggregate, mineral filler, emulsified asphalt and water applied to a pavement as a surface treatment. Polymer-modified slurry seals differ from conventional slurry seals in the following ways:

- a coarser aggregate may be used,
- the slurry seal can be placed in greater thickness, and
- the slurry cures and strengthens faster because of the polymer-modified asphalt base used in making the emulsion.

The term "microsurfacing" will be used in this report to distinguish polymer-modified slurry seals from conventional slurry seals.

For additional information about microsurfacing, please refer to the October 1989 issue of the Technical Quarterly (Vol. 5, Issue 2).

Presentation of Survey Results

In 1989, eleven districts reported they had used microsurfacing. In the last year, the number of districts using this kind of seal has risen to sixteen (Figure 1). Seven of the eight districts that have not yet used microsurfacing will do so at some time in the future (four districts have definite plans to use microsurfacing in FY '91).

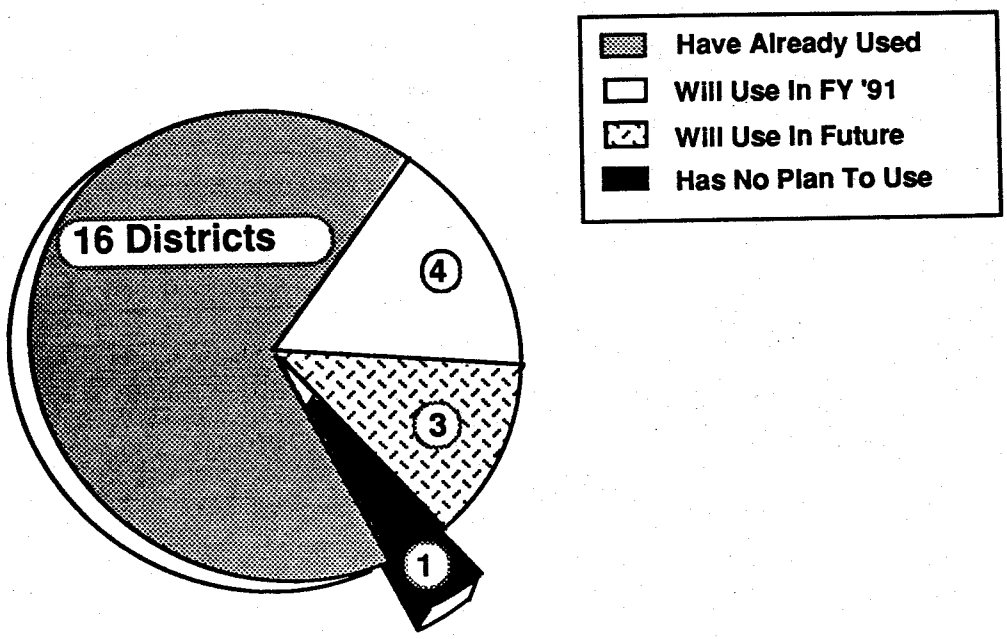


FIGURE 1: DISTRICT USAGE OF MICROSURFACING SEALS

The more widespread use of microsurfacing by districts may indicate that this kind of seal has gained acceptance for certain types of applications. The most common reason listed in the survey for applying a new microsurfacing layer was to correct rutting (Figure 2).

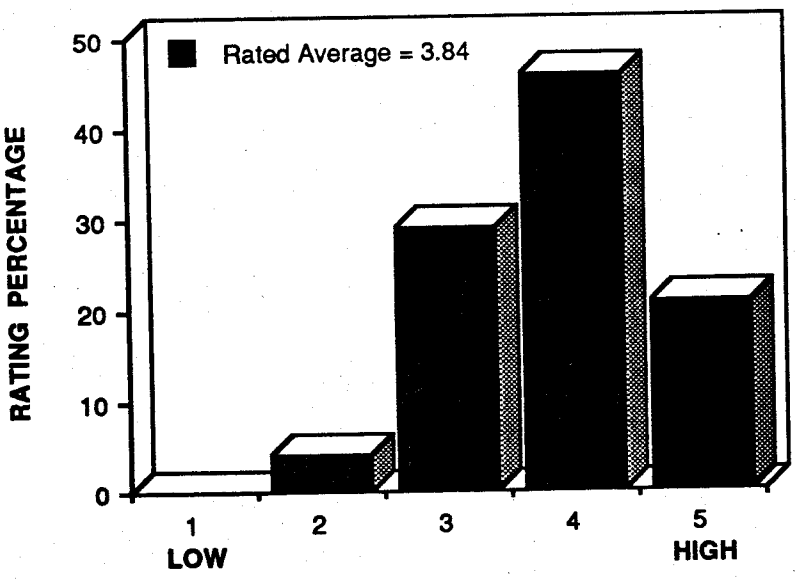


FIGURE 2: RUTTING PERFORMANCE

The next two most frequent applications were to improve skid resistance and to correct flushing. The survey results for these categories are shown in Figures 3 and 4. For these specific applications, the results are generally very good. Microsurfacing seals were also successfully used to improve ride quality and to overlay dry pavement.

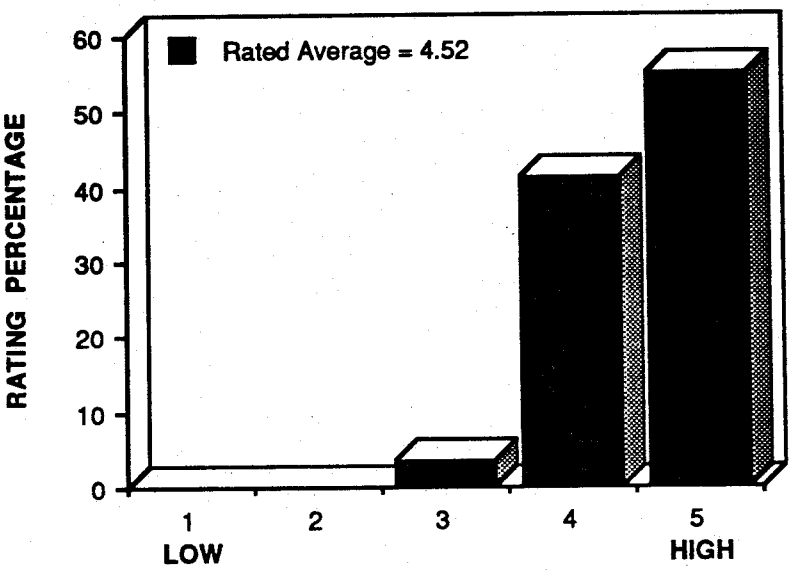


FIGURE 3: SKID RESISTANCE PERFORMANCE

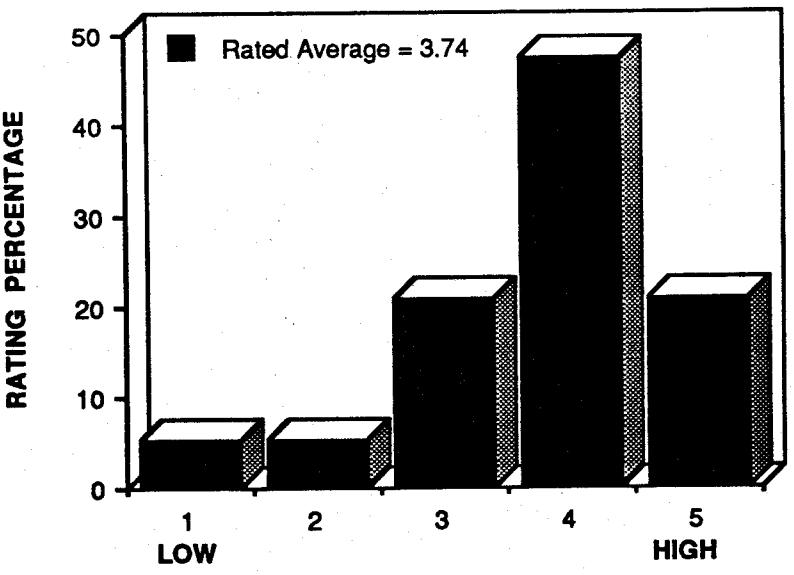


FIGURE 4: FLUSHING PERFORMANCE

The inability of the microsurfacing seal to prevent reflective cracking was documented by virtually every district (Figure 5); however, when the cracks were sealed prior to the overlay, the microsurfacing generally had no further problem with cracking. The performance of the microsurfacing seal itself in effectively sealing the surface of the roadway was less than satisfactory (Figure 6).

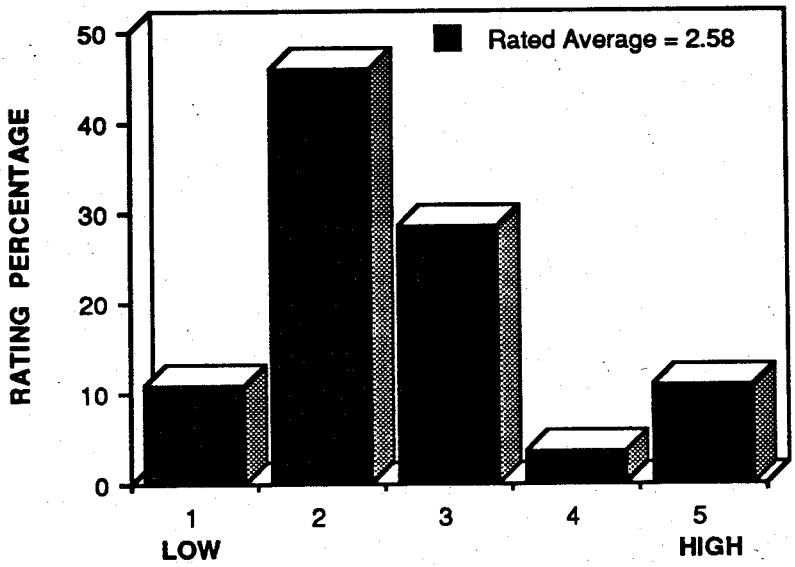


FIGURE 5: REFLECTIVE CRACKING PERFORMANCE

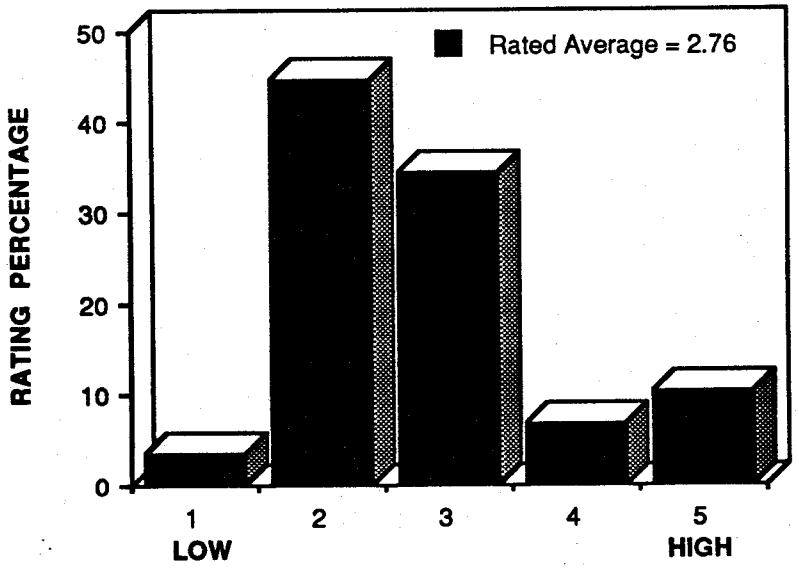


FIGURE 6: SEALING PERFORMANCE

Several districts used microsurfacing to repair potholes. This practice yielded mixed results. The microsurfacing overlay itself, however, had very few problems with potholes (Figure 7).

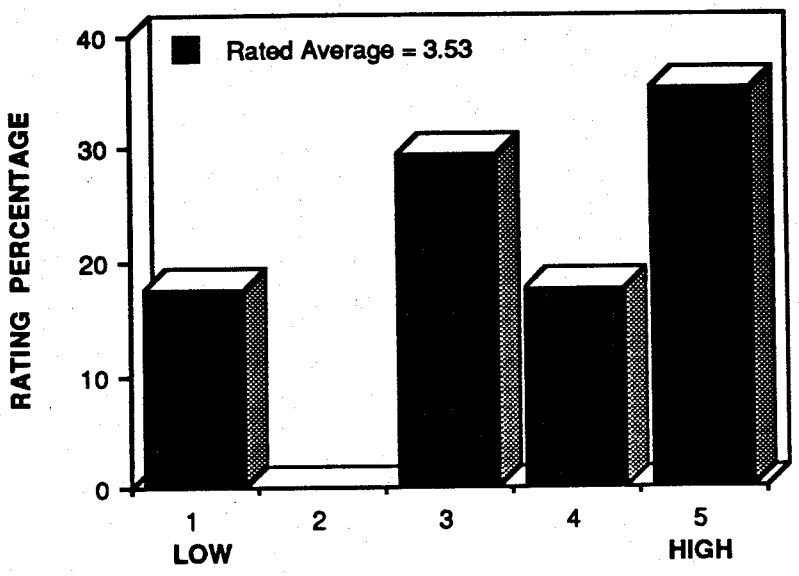


FIGURE 7: POTHOLE RESISTANCE

The general consensus of the survey respondents was that microsurfacing seals improve ride quality (average rating of 3.74 out of a possible 5), they experience very little shelling or ravelling (3.6 out of 5), and they are not susceptible to freeze-thaw action (3.74 out of 5).

Materials and Equipment

Ralumac was used in 32 out of the 34 microsurfacing projects within the last twelve months. The lack of local source materials was a common complaint in the slurry seal survey performed last year. This problem seems to have been alleviated. All the aggregate used for microsurfacing projects within the last twelve months was obtained from local sources. The most common aggregate used was crushed sandstone. Rhyolite and limestone were often used, as well.

The availability of equipment is still below ideal conditions. The rated average for this category was 2.9 out of a possible score of 5. The installation of the microsurfacing seal was agreed to be fairly easy (average rating of 3.7 out of 5).

Overall Performance

The overall performance of the microsurfacing seals was very good (Figure 8). An interesting result of the survey concerns the rated cost effectiveness of the seal. The rated average of the cost effectiveness for a seal older than 12 months was 4.0 (out of 5) while a new seal rated only 3.2. Very little maintenance of the slurry seals was documented in the survey. This might explain the difference between the short-term and long-term cost effectiveness of the seal. The average cost of microsurfacing was $1.26 per square yard (with a low of $0.83/S.Y. and a high of $1.74/S.Y.). This is up 15% from last year's average of $1.07/S.Y.

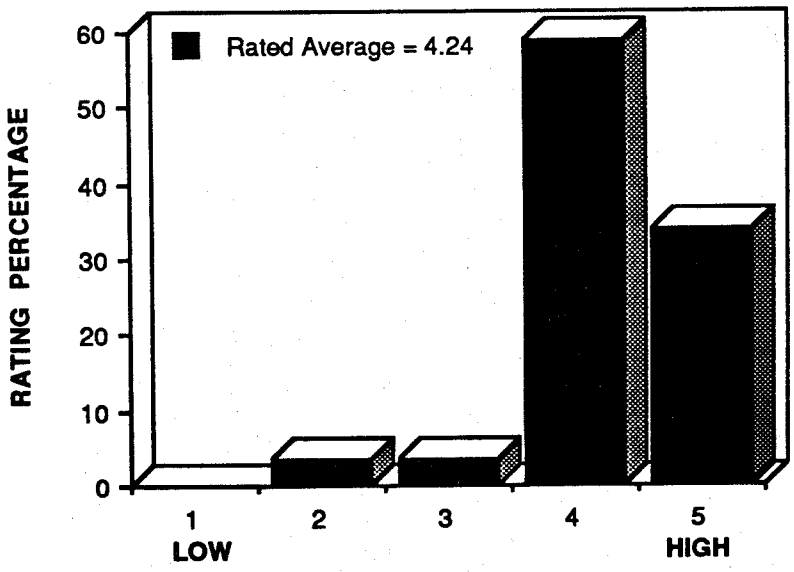


FIGURE 8: OVERALL PERFORMANCE

Case History

There may be some value to reviewing the performance history of the oldest existing microsurfacing seal in Texas. District 25 has a seal that was 75 months old at the time of this evaluation. Ralumac was used in a Demonstration Project to correct rutting on US 287. Since that time, very little maintenance has been required. The ratings for each applicable category are as follows.

Overall Performance	4
Cost Effectiveness	3
Rutting	3
Sealing	3
Ride Quality	4
Skid Resistance	4

Conclusions

The use of microsurfacing seals has become fairly common in Texas. In the twelve-month period from November 1989 to October 1990, approximately nine million dollars were spent on microsurfacing projects. This survey has helped document that microsurfacing seals will perform very well if they are used in the applications for which they were intended, but they also perform moderately well for a variety of other uses.

D-10 Research would like to thank each district for their cooperation in completing the survey questionnaires. Many excellent comments and recommendations were received; a condensed list is included in Appendix B.

APPENDIX A

SURVEY QUESTIONNAIRE FORMS

SLURRY SEAL QUESTIONNAIRE

District _____ has not tried slurry seals at this time.

1) What type of seals do you use most often?

2) Do you plan on trying slurry seals in the future?

3) If yes, when and where?

FORM-A

SLURRY SEAL QUESTIONNAIRE

District: County:

Project Description

Highway:_____ # of lanes:_____

Cntrl-Sec or Location Description:

Length of Project:

TRAFFIC DATA

AADT: % Truck Traffic:

WEATHER CONDITIONS

Ambient Temperature:____ Road Surface Temperature:____

Dry/Humid:

Surface condition before application of slurry seal (and/or reason for application):

Work done to surface before application:

Problems with construction and possible solutions:

Are more slurry seal projects planned? If so, when and where?

FORM-B.1

Slurry Seal Information

Is it Ralumac? yes ____ no ____
Item Number:
Material used (tons):
Cost ($/sq. yd.):
Total seal project cost:

AGGREGATE

Type:

Source:

ASPHALT

Type:
Grade:
Additives:
Source:
Content (%):

How long before given to traffic?

Please rate the seal for each relevant category						
CATEGORY	LOW				HIGH	
Overall Performance	1	2	3	4	5	N/A
Cost Effectiveness	1	2	3	4	5	N/A
Ease of Installation	1	2	3	4	5	N/A
Availability of materials/equipment	1	2	3	4	5	N/A
Rutting	1	2	3	4	5	N/A
Reflective Cracking	1	2	3	4	5	N/A
Flushing and Bleeding	1	2	3	4	5	N/A
Sealing	1	2	3	4	5	N/A
Ride Quality	1	2	3	4	5	N/A
Skid Resistance	1	2	3	4	5	N/A
Potholes	1	2	3	4	5	N/A
Shelling or Raveling	1	2	3	4	5	N/A
Freeze-Thaw	1	2	3	4	5	N/A
Other _____	1	2	3	4	5	N/A

Additional comments or suggestions (special procedures, etc) (use separate page if necessary).

FORM-B.2

SLURRY SEAL FOLLOW-UP QUESTIONNAIRE

District: County: Highway:

Cntrl-Sec or Location Description:

Age of Seal (in months):

Describe maintenance activities pertaining to this particular seal:

Please rate the seal for each relevant category							
CATEGORY	LOW					HIGH	
Overall Performance	1	2	3	4	5	N/A	
Cost Effectiveness	1	2	3	4	5	N/A	
Rutting	1	2	3	4	5	N/A	
Reflective Cracking	1	2	3	4	5	N/A	
Flushing and Bleeding	1	2	3	4	5	N/A	
Sealing	1	2	3	4	5	N/A	
Ride Quality	1	2	3	4	5	N/A	
Skid Resistance	1	2	3	4	5	N/A	
Potholes	1	2	3	4	5	N/A	
Shelling or Raveling	1	2	3	4	5	N/A	
Freeze-Thaw	1	2	3	4	5	N/A	
Other_____	1	2	3	4	5	N/A	

Would you use this type of slurry seal again? Please explain.

FORM-C

APPENDIX B

SURVEY QUESTIONNAIRE COMMENTS

SURVEY COMMENTS

This is a condensed list of the comments given by questionnaire participants. These comments are representative of some problems encountered in the districts; they do not constitute official SDHPT guidelines.

1. When rutting is present, place the seal in two courses, one at 18# to 20# per S.Y. and the second at 15# to 18#. This may prevent the aggregate from settling and flushing, as it might in a single, thicker layer.

1a. A level-up of ACP should be placed prior to the microsurfacing seal.

2. Use a steel screed instead of a rubber screed; however, this may make the surface rougher and less attractive.

3. Seal all cracks before applying the microsurfacing seal.

4. Flushed asphalt must have all the volatiles gone before applying the microsurfacing seal or it will flush through the new seal.

5. This kind of seal is particularly good for areas with high truck traffic.

6. This kind of seal is appropriate for situations where minimal buildup is desired.

7. To have better control of the percent asphalt in the mix, a half-day check (minimum) should be required. The specifications governing sampling, testing, and quality control need to be revised.

8. Do not place too fast. A pulled or rippled surface can result.

9. The machine should be stopped as few times as possible. Because the setting time is low, it is difficult to tie in at joints. When the machine is stopped, the rear strike off plate should be cleaned to prevent drag marks.

10. Proper adjustment of the spreader box and a regular, smooth-milled surface are required for the seal to have good riding surface.

11. Surface preparation should be the responsibility of the contractor.

12. A variable drag box is needed for pavements of irregular widths.

13. A stringline should be used to alleviate alignment and edgeline difficulties.

14. The mix took too long to cure.

15. The stability and Magnesium Sulfate Soundness (MSS) test requirements need to be revised.[1]

---

[1] D-9 and the Center for Transportation Research are currently engaged in a study which includes evaluating current 4 - Cycle MSS requirements for microsurfacing seals.