EVALUATION OF AN EMULSIFIED ASPHALT SURFACE TREATMENT ON VT 31 IN WELLS & POULTNEY

Final Report 85-6
March, 1985

Reporting On
Work Plan 80-R-5

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

SUSAN C. CRAMPTON, SECRETARY OF TRANSPORTATION
FRANK E. ALDRICH, P.E., CHIEF ENGINEER
R. F. NICHOLSON, P.E., MATERIALS & RESEARCH ENGINEER

Prepared By:

P. E. Corti
Research Specialist

Reviewed By:

R. F. Nicholson

R. F. Nicholson, P.E.
Materials & Research Engineer

Date: 04-01-85

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA-DP-55-5		

4. Title and Subtitle	5. Report Date
Evaluation of an Emulsified Asphalt Surface Treatment	March, 1985
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Paul E. Corti	85-6

9. Performing Organization Name and Address	10. Work Unit No.
Vermont Agency of Transportation Materials & Research Division 133 State St., State Admn.Bldg. Montpelier, Vermont 05602	11. Contract or Grant No. DTFH71-80-55-VT-01
	13. Type of Report and Period Covered Final Report - Performance Aug. 1980 - Sept. 1984
12. Sponsoring Agency Name and Address Federal Highway Administration EDFD, Demonstration Projects Division 2000 North Glebe Road Arlington, Virginia 22201-4799	14. Sponsoring Agency Code HDP-15

15. Supplementary Notes

FHWA Project Manager Stephen Boch

16. Abstract

This report covers conditions found over a three year period on the CRS-2 emulsified asphalt single surface treatment on Vermont Route 31 in the Towns of Wells and Poultney. Stone loss on the surface averaged 10%. The treatment successfully waterproofed the roadway, preventing further raveling of the cold mix surface it was applied on. Friction values averaged 53.6 for the duration of the study.

Overall, the treatment can be considered as a cost effective means of extending the life of a roadway surface.

17. Key Words	18. Distribution Statement
Emulsified Asphalt Surface Treatment Energy Consumption Air Pollution	No Restrictions

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

Form DOT F 1700.7 (8-69)

ACKNOWLEDGMENT

This project was performed in cooperation with the U.S. Department of Transportation, Federal Highway Administration, Region 15, in conjunction with Demonstration Project No. 55, Asphalt Emulsions for Highway Construction under Contract No. DTFH 71-80-55-Vt-01.

INTRODUCTION

In August of 1980, an emulsion single surface treatment was applied to 4.96 miles of Vermont Route 31 in the towns of Wells and Poultney Vermont. The treatment on the asphalt emulsion open graded cold mix surface placed the year before consisted of a CRS-2 emulsion applied at the average rate of 0.33 gallons per square yard and covered with 3/8" crushed gravel. Placement occurred over a two day period at a completed cost of 44.4¢ per square yard. Compaction was accomplished by the combined efforts of pneumatic and steel wheeled rollers. Energy consumption for the project was computed to be 3,705 BTU per square yard or a total of 215,639,769 BTU. Construction of the surface treatment substituting a MC-3000 cutback asphalt at same application rate which is justified in the Asphalt Institute, Asphalt Surface Treatment Handbook, would have cost 9% more, used 241% more energy and caused extensive hydrocarbon air polution.

This report discusses the condition and performance of the roadway since application of the treatment. Detailed information on the construction phase of the experimental treatment is outlined in Initial Report 81-1.

LOSS OF COVER STONE

Three years after initial construction of surface treatment, stone loss for the entire roadway was estimated to be an average of 10 percent. Areas of highest loss were around cracks and high spots on the roadway. The majority of the loss can be attributed to abrasion from snow plowing operation. The amount of stone loss is no greater than would be expected and was in no way detrimental to the overall performance of the surface treatment.

Condition of Surface Treatment

RIDING QUALITY

Riding quality was determined annually by measuring inches of roughness per mile with a Mays Ride Meter.

	1981	1982	1983
Southbound Lane	92.38"	120.74"	*
Northbound Lane	92.88"	97.62"	*

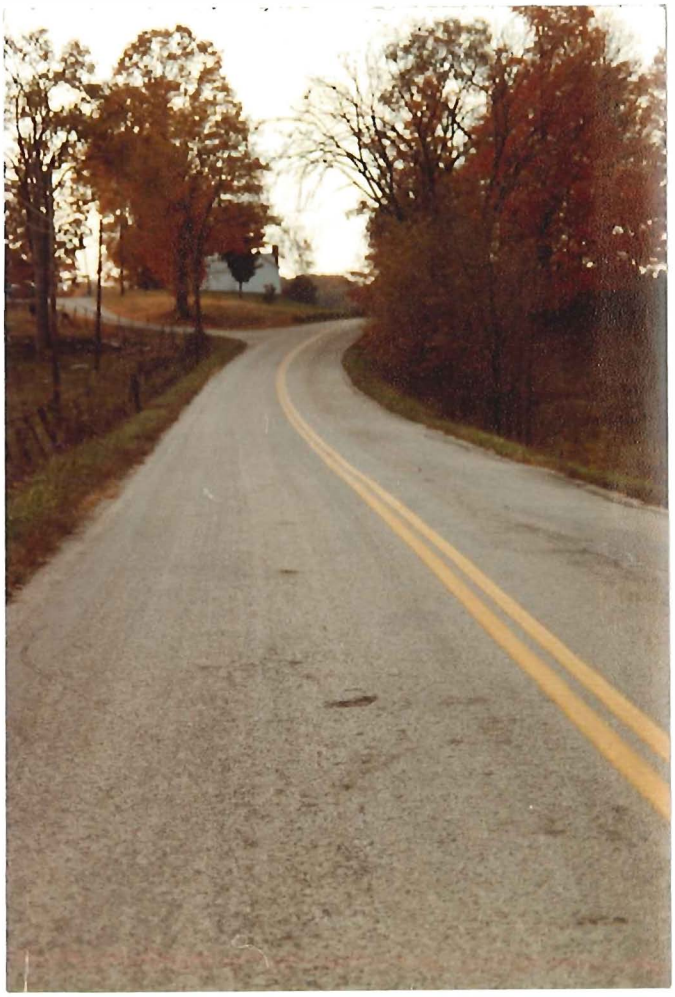
*Not taken

FRICTION VALUES

Values were obtained at 40 mph using a lock wheel friction trailer, in accordance with ASTM test method E 274-79.

	Sn_{40} High	Range Low	Avg.Sn_{40} Value
1980	47	43	45.0
1980	55.6	52.1	53.7
1981	54.2	47.7	54.2
1982	*	*	*
1983	54.0	46.0	53.0

*Not Taken



PAVEMENT RUTTING

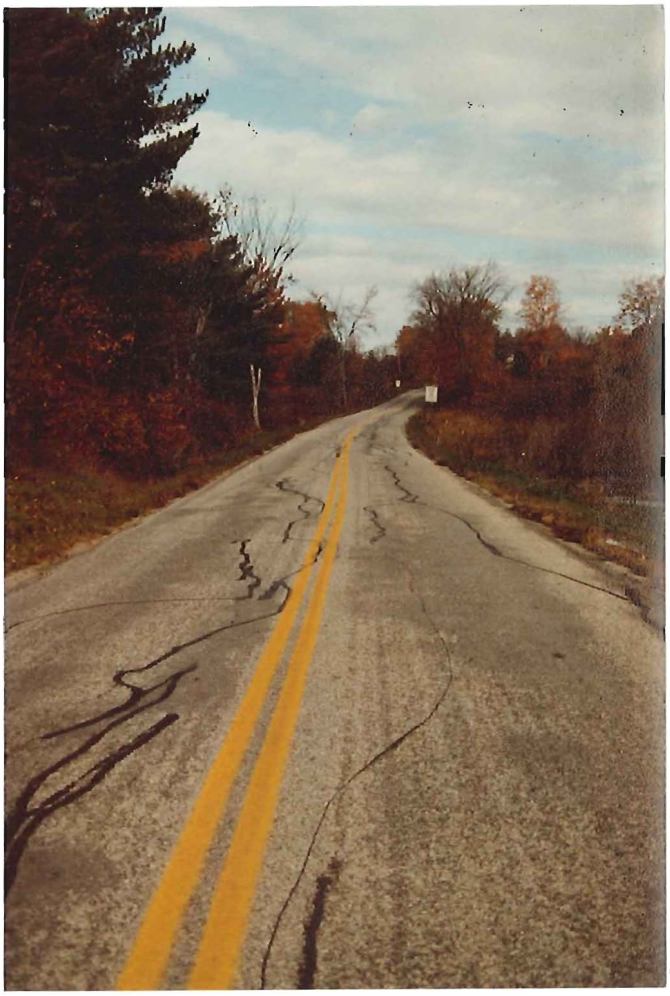
Readings are in wheel paths at predetermined location.

Year	Avg.Rading/ Wheel Paths	Range
**1980	0 - 1/16"	0 - 7/16"
1981	0 - 1/16"	0 - 7/16"
1982	2/16"	0 - 10/16"
1983	2/16"	0 - 10/16"

**Prior to new surface.

REFLECTIVE CRACKING

All cracks reflected through the surface treatment during the first year of service. The surface treatment, however did stop the raveling of the open graded cold mix placed the year before the treatment indicating that it effectively waterproofed the roadway.



SUMMARY

Observations over the past three years on the emulsion single surface treatment applied to the cold mix surface on Vt. 31 in the Towns of Wells-Poultney show that an emulsion can provide a high quality, durable and waterproof surface. Stone loss on the surface was minimal (10%) and as good as expected from a cutback asphalt surface treatment. The treatment provided a surface with commendable friction value. The average Sn_{40} value for the duration of the study was 53.6.

CONCLUSIONS

Results from the initial construction report 81-1 indicate that an emulsion single surface treatment -

Costs less than a similar treatment using cutback asphalt;

Uses substantially less energy to produce and apply than cutback asphalt systems;

Produces limited hydrocarbon air pollution.

After three years of further evaluation, it can be concluded that on roadways with moderate or low ADT's, emulsion single surface treatments can be used -

As a cost effective means of extending the life of a marginal roadway surface.

On surfaces with low friction values to bring values up to an acceptable level;

As a method of waterproofing a roadway surface.

RECOMMENDATIONS

Based on the quality, performance, energy savings, cost savings and environmental factors, it is recommended that emulsified asphalt be used in lieu of cutback asphalts for surface treatments.