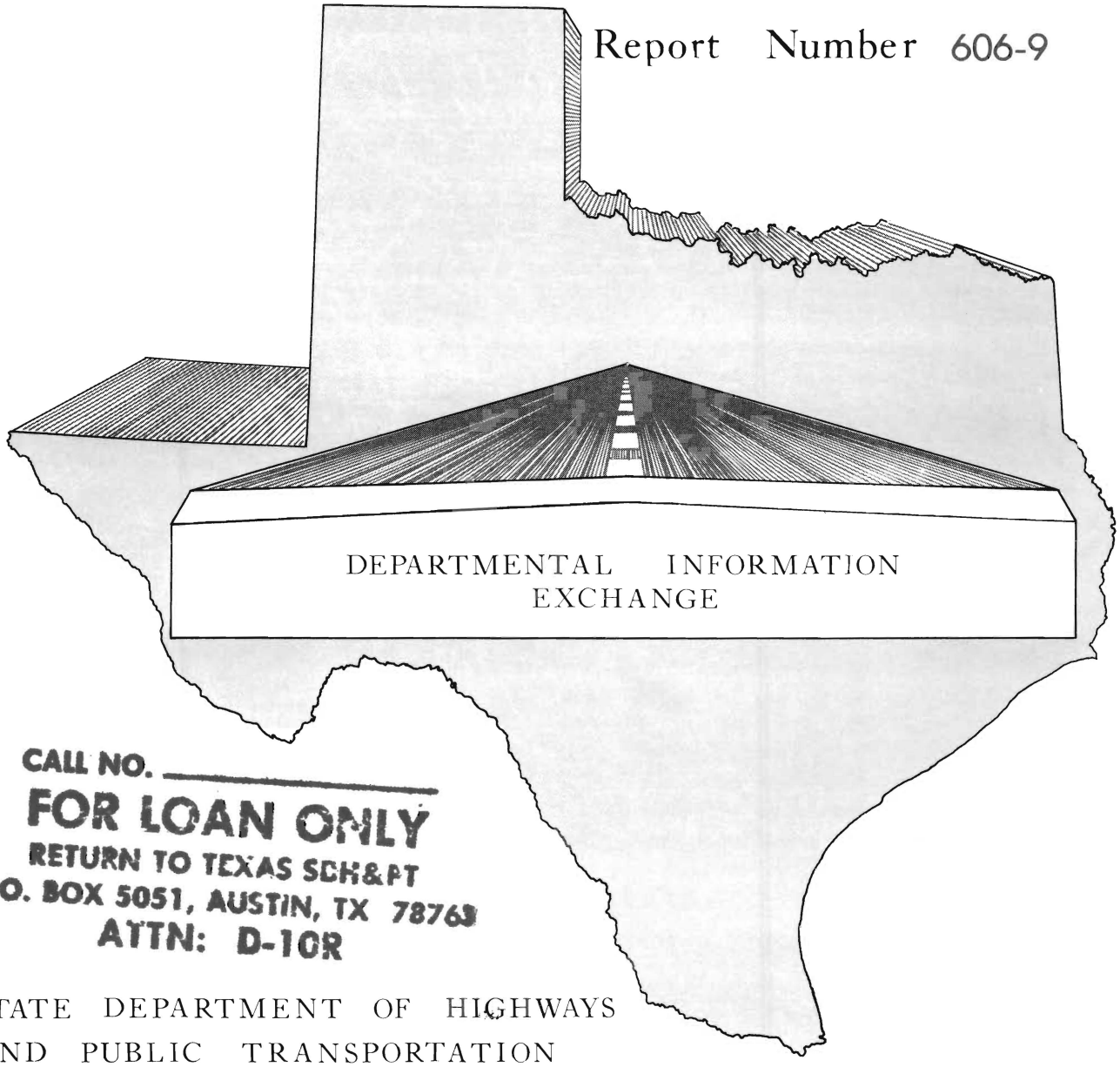
EXPERIMENTAL PROJECTS

POLY-FABRIC UNDERSEALS AS REFLECTIVE CRACK RETARDANTS

Report Number 606-9



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TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2.	3. Recipient's Catalog No.
Exp. Proj. 606-9	FHWA Exp. Proj. TX 79-01C	

4. Title and Subtitle	5. Report Date
The Effectiveness of Poly-fab as a Reflective Crack Retardant	Dec. 1979 to April 1984
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Windell D. Clark	
9. Performing Organization Name and Address State Department of Highways and Public Transportation District 4 Amarillo, Texas	10. Work Unit No.
	11. Contract or Grant No.
	13. Type of Report and Period Covered Initial through fourth annual
12. Sponsoring Agency Name and Address State Department of Highways and Public Transportation District 4 Amarillo, Texas	14. Sponsoring Agency Code

15. Supplementary Notes

This project was done in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

16. Abstract

In this project, one mile east of Vega and 0.3 miles west of the Oldham-Potter County line, five different poly-fabrics were tested to determine their effectiveness in retarding reflective cracking in new overlay. Monsanto Bidim 4 ounce, Monsanto Bidim 8 ounce, Phillips Petromat 4 ounce (new), Phillips Petromat 8 ounce (new), and Phillips Petromat 4 ounce (old) were the poly-fabrics tested in the 1320 foot long test sections. Two control sections without any poly-fabrics were also laid, one in the eastbound lane and one in the westbound lane.

A background history of climatic and existing road conditions is given, as well as sections on construction and design.

The report concludes that none of the poly-fabrics seem to significantly retard reflective cracking.

17. Key Words	18. Distribution Statement
Monsanto Bidim, Phillips Petromat Poly-fab, Reflective Cracking, Engineering Fabric, Underseals.	This document is available from: State Department of Highways and Public Transportation Transportation Planning Division P.O.Box 5051; Austin, TX 78763

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	17	

Form DOT F 1700.7 (8-69)

THE EFFECTIVENESS OF POLY-FAB AS A REFLECTIVE CRACK RETARDANT

INITIAL THROUGH FOURTH ANNUAL REPORTS

EVALUATION OF EXPERIMENTAL

CONSTRUCTION PROJECT

ON

INTERSTATE HIGHWAY 40

OLDHAM COUNTY

TEXAS

CONTROL: 90-4-40

FROM: ONE MILE EAST OF VEGA

TO: 0.3 MILE WEST OF OLDHAM-POTTER LINE

PROJECT SUPERVISION
GEORGE J. CANNON, SUPERVISING RESIDENT ENGINEER

REPORT PREPARED BY
WINDELL D. CLARK, ENGINEERING TECHNICIAN V

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DISTRICT 4

AMARILLO, TEXAS

IN COOPERATION WITH

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

DATES OF CONSTRUCTION:

AUGUST 23, 1979 TO DECEMBER 15, 1979

The material contained in this report is experimental in nature and is published for informational purposes only. Any discrepancies with official views or policies of the DHT should be discussed with the appropiate Austin Division prior to implementation of the procedures or results.

OBJECTIVES

A major problem encountered in overlaying a distressed pavement with asphalt concrete pavement concerns the retardation of reflective cracks in the new pavement. The original objective of this experimental project on IH-40 in Oldham County, one mile east of Vega to .3 west of Potter County line, was to evaluate the performance of a poly-fabric underseal in retarding reflective cracking. A field change to the plans provided for:

1. A surface sealing system in conjunction with the asphaltic concrete pavement consisting of an underseal containing different poly-fabrics of various weights and manufactures.

2. A resurfacing system for control purposes consisting of asphaltic concrete pavement and no poly-fab underseal.

PROJECT BACKGROUND

This project is located 21 miles west of Amarillo. The roadway is at an elevation of 4000 feet and orients west-northwest to east-southeast. The soil is Pullman clay loam with a Plasticity Index (P.I.) between 21 and 27 and a Triaxial Class of 4.3 to 5.0.

The average annual rainfall is 18.23 inches with an average of 13 inches of snow. The mean annual temperature is 59°F with an average minimum temperature of 20.9°F in January. The lowest recorded temperature is -8°F and daily variation of 30° to 40°F are common. Hard freezes for several days followed by rapid thaws are not unusual.

The project was originally upgraded to interstate standards in 1963. The main lanes consist of two 12 ft. lanes, 5 ft. inside shoulders, and 10 ft. outside shoulders. The roadway and shoulders are constructed of 19 inch compacted flexible base. One course surface treatment (base preservative) and 250 lbs/sq yd of ACP were placed on the main lanes and a two course surface treatment was applied to the shoulders. The roadway slopes 3/16 inch per foot from the center lanes to the shoulders.

The project was overlaid in 1970 with 300 lbs/sq yd of asphalt concrete pavement Type "A" and 150 lbs/sq yd asphalt concrete pavement Type "D". A seal coat was applied to this project in 1978.

DESIGN

The design of the roadway used the concept of placing asphalt and poly-fab underseal in direct contact with the existing pavement. This was to be overlaid with 200 lbs/sq yd of asphalt concrete pavement. A field change was implemented modifying the above design to a level-up course of approximately 75 lbs/sq yd of Type "D" asphalt concrete pavement, next the poly-fab underseal with asphalt, and last approximately 125 lbs/sq yd Type "D" asphalt concrete pavement. The field change was sought because of anticipated problems with the poly-fab underseal due to the coarse texture, depressed wheel paths and shrinkage and stress cracks on the existing pavement. The shoulders were overlaid with 200 lbs/sq yd of asphalt concrete pavement.

A field change was implemented, providing for a test section to evaluate different weights and manufactures of poly-fab underseal. See Figure No. II for typical section and poly-fabric underseal test sections.

The geometrics of the job remained the same as the original 1963 project.

CONSTRUCTION PHASE

The placing of the poly-fab underseal was the only construction procedure unique to the otherwise normal overlay projects; therefore it will be the only construction feature discussed.

The poly-fabric is made exclusively of man-made thermoplastic fibers and is mildew resistant, rot proof, and compatible with asphalt cements. Phillips Fiber Corporation manufactures a machine for the placement of the fabric. The contractor purchased two of these machines for this purpose.

A level-up course of 78.5 lbs/sq yd was laid because the rough texture and deep wheel path depressions of the existing pavement were anticipated to cause problems with the poly-fab underseal. The fabric underseal was lapped 6 to 12 inches (with the traffic) at the transverse joints and 6 inches at the longitudinal joints. The wind caused slight problems in placing the fabric. The average application of AC-10 asphalt with the poly-fab was .17 gal/sq yd. The air temperature varied from 65°F to 105°F during construction operations.

The traffic was carried on the main lanes through the new construction except during actual construction operations. The longest period of time traffic was on the fabric surface was four days, with one day being the norm. No damage or difficulty was noted. The average daily traffic count was 7300 vehicles.

Field change number two was instituted to observe the comparative merits of various materials as to placement and effectiveness in the prevention of reflective cracking through a new hot mix overlay. (See Figure Number 1 for the location, types, and asphalt rates.) The only problem noted was that the heavier fabrics were harder to handle and needed to be rolled sooner to assure bonding.

EVALUATION

The purpose of this experimental project primarily was to evaluate performance of a surface sealing system of fabric underseal and asphalt concrete pavement in stopping reflective cracking and restoring structural integrity to the pavement surfaces in climatic conditions that exist in the Panhandle of Texas.

The performance of the roadway, along with the test sections noted in Figure No. 1, will be watched regularly by the maintenance foreman. Any unusual changes in the surface will be called to the attention of the district engineer. The cost per square yard for this system is $3.71. The cost of the fabric underseal is $1.26 per square yard or 34% of the cost.

SUMMARY

The evaluation of the performance of this surface sealing system is initiated with the January 1980 report. No cracks have been observed and there has been no evidence of failure in the pavement structure.

EVALUATION 1980

A visual inspection was made in November 1980. The following observations were made: the project looked good; no visible differences were noted in any of the test sections; minor fine cracks had appeared, although no fine aggregates had pumped up through the cracks.

SUMMARY 1980

This first annual report is submitted in accordance with the procedures set out in the evaluation program for this experimental project. This project has been continuously monitored since it was constructed in the late summer and fall of 1979. There is no evidence of failure. No maintenance has been necessary. The volume and type of traffic have not changed significantly since construction. The observed changes are minor and no conclusions can be made at this time.

EVALUATION 1982

A visual inspection of the project was made in February 1982. The following observations were made: wearing has occurred throughout the project and fine aggregates have been flushed from the surface leaving the mat with a rough, open texture.

The seven test sections shown in Figure No. 1 will be discussed separately below. Each test section is 1320 feet long.

Test section 1, consisting of asphalt concrete pavement with no poly-fabric underseal, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 17 transverse cracks.

Test section 2, consisting of Monsanto Bidim 8 ounce poly-fab underseal and ACP, is showing slight wheel path depressions in the outside lanes; a fairly open surface, probably caused by loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 17 transverse cracks.

Test section 3, consisting of Monsanto Bidim 4 ounce poly-fab and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by loss of fine aggregates; an intermittent longitudinal crack 8 feet right of the center of the roadway; and 23 transverse cracks.

Test section 4, consisting of Phillips Petromat 4 ounce (new) and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 27 transverse cracks.

Test section 5, consisting of Phillips Petromat 8 ounce (new) and ACP, is showing a longitudinal crack 6 feet right of the center of the roadway; a dry, open mat in the passing lane; and 26 transverse cracks.

Test section 6, consisting of Phillips Petromat 4 ounce (old) and ACP, is showing a longitudinal crack 6 feet right of the center of the

roadway; a dry, open mat in the passing lane; and 27 transverse cracks.

Test section 7, consisting of asphalt concrete pavement and no poly-fab underseal, shows very slight longitudinal cracking; a dry, open mat in the passing lane; and 35 transverse cracks.

SUMMARY 1982

This second annual report is submitted in accordance with the procedures set out in the Evaluation Program for this experimental project. This project has been continuously monitored since it was constructed in the late summer and fall of 1979. The volume and type of traffic has not changed significantly since construction.

The maintenance to date has been to fill the longitudinal and transverse cracks in the outside lanes with asphalt and to apply a fog seal with asphalt EA-11M to the outside lanes.

Although it is too early to make conclusions, the effectiveness of the poly-fab underseal to retard reflective cracking seems to be slight.

EVALUATION 1983

A visual inspection of the project was made in April 1983. The following observations were made: wearing has occurred throughout the project and fine aggregates have been flushed from the surface leaving the mat with a rough, open texture.

The seven test sections shown in figure 1 will be discussed separately below. Each test section 1320 feet long.

Test section 1, consisting of asphalt concrete pavement with no poly-fabric underseal, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 32 transverse cracks.

Test section 2, consisting of Monsanto Bidim 8 ounce fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 25 transverse cracks.

Test section 3, consisting of Monsanto Bidim 4 ounce fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; an intermittent longitudinal crack 8 feet right of the center of the roadway; and 28 transverse cracks.

Test section 4, consisting of Phillips Petromat 4 ounce (new) fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 36 transverse cracks.

Test section 5, consisting of Phillips Petromat 8 ounce (new) and ACP, is showing a longitudinal crack 6 feet right of the center of the roadway; a dry, open mat in the passing lane; and 29 transverse cracks.

Test section 6, consisting of Phillips Petromat 4 ounce (old) and asphalt, is showing a longitudinal crack 6 feet right of the center of

the roadway; a dry, open mat in the passing lane; and 27 transverse cracks .

Test seciton 7, consisting of ACP and no poly-fab underseal, shows very slight longitudinal cracking; a dry, open mat in the passing lane; and 35 transverse cracks.

SUMMARY 1983

This third annual report is submitted in accordance with the procedures set out in the evaluation program for this experimental project. This project has been continuously monitored since it was constructed in the late summer and fall of 1979. The volume and type of traffic have not changed significantly since construction.

The maintenance to date has been to fill the longitudinal and transverse cracks in the outside lanes with asphalt and to apply a fog seal with asphalt EA-11M to the outside lanes.

Although it is too early to make conclusions, the poly-fab underseals do not seem to be retarding reflective cracking, but do seem to cause raveling at the transverse cracks.

EVALUATION 1984

A visual inspection of the project was made in April 1984. The following observations were made: wearing has occurred throughout the project and fine aggregates have been flushed from the surface leaving the mat with a rough, open texture.

The seven test sections shown in Figure No. 1 will be discussed separately below. Each test section 1320 feet long.

Test section 1, consisting of asphalt concrete pavement with no poly-fabric underseal, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 32 plus transverse cracks.

Test section 2, consisting of Monsanto Bidim 8 ounce fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 25 plus transverse cracks.

Test section 3, consisting of Monsanto Bidim 4 ounce fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; an intermittent longitudinal crack 8 feet right of the center of the roadway; and 28 plus transverse cracks.

Test section 4, consisting of Phillips Petromat 4 ounce (new) fabric underseal and ACP, is showing slight wheel path depressions in the outside lane; a fairly open surface, probably caused by a loss of fine aggregates; a continuous longitudinal crack 8 feet right of the center of the roadway; and 36 plus transverse cracks.

Test section 5, consisting of Phillips Petromat 8 ounce (new) and ACP, is showing a longitudinal crack 6 feet right of the center of the roadway; a dry, open mat in the passing lane; and 29 plus transverse cracks.

Test section 6, consisting of Phillips Petromat 4 ounce (old) and ACP, is showing a longitudinal crack 6 feet right of the center of

the roadway; a dry, open mat in the passing lane; and 27 plus transverse cracks .

Test section 7, consisting of ACP and no poly-fab underseal, shows very slight longitudinal cracking; a dry, open mat in the passing lane; and 35 plus transverse cracks.

SUMMARY 1984

This fourth annual report is submitted in accordance with the procedures set out in the evaluation program for this experimental project. This project has been continuously monitored since it was constructed in the late summer and fall of 1979. The volume and type of traffic have not changed significantly since construction.

The maintenance to date has been to fill the longitudinal and transverse cracks with a rubber asphalt sealing crack compound (CRAFCO AR2) and to apply a fog seal with asphalt EA-11M to the outside lanes.

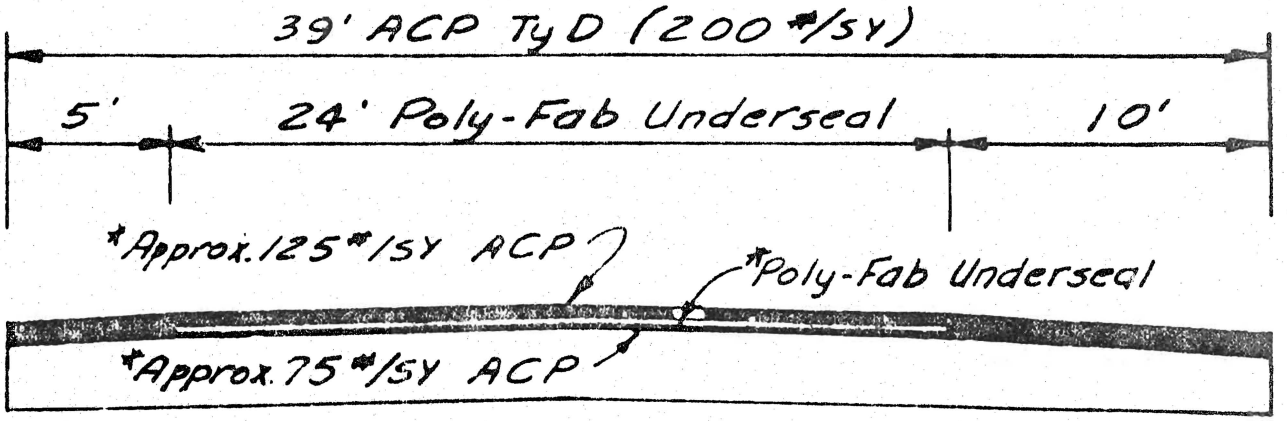
The poly-fab underseals did not retard reflective cracking on this project. Since plans have been prepared and submitted for an asphalt concrete overlay on this project, this will be the final evaluation report.

TEST SECTION IDENT.	LANE LIMITS	MATERIAL APPLICATION DATE	ASPHALT AC-10 *	ACP TYPE RATE APPLICATION DATE TY D
1	EAST BOUND 422+20 - 435+40	NO FABRIC Control Section	NONE	1. 124.4#/SY - 270 D 2. 124.3#/SY - 300 D 1. 9-20-79, 2.9-15-79
2	EAST BOUND 435+40 - 448+60	MONSANTO BIDIM (8 oz) (C-34) 9-13-79	1. .168 Gal/SY 350 D 2. .214 Gal/SY 350 D	1. 124.4#/SY - 270 D 2. 124.3#/SY - 300 D 1. 9-20-79 2. 9-15-79
3	EAST BOUND 448+60 - 461+80	MONSANTO BIDIM (4 oz) (C-22) 9-13-79	1. .184 Gal/SY 360 D 2. .131 Gal/SY 350 D	1. 124.4#/SY - 295 D 2. 124.3#/SY - 300 D 1. 9-20-79 2. 9-15-79
4	EAST BOUND 461+80 - 475+00	PHILLIPS PETROMAT (4 oz) (NEW) 1. 9-12-79 2. 9-11-79	1. .154 Gal/SY 360 D 2. .148 Gal/SY 360 D	1. 124.4#/SY - 295 D 2. 124.3#/SY - 300 D 1. 9-20-79 2. 9-15-79
5	WEST BOUND 435+40 - 448+60	PHILLIPS PETROMAT (8 oz) (NEW) 1. 9-27-79 2. 9-26-79	1. .199 Gal/SY 355 D 2. .152 Gal/SY 350 D	1. 125.4#SY - 265 D 2. 126.2#/SY - 265 D 1. 10-4-79 2. 10-2-79
6	WEST BOUND 448+60 - 461+80	PHILLIPS PETROMAT (4 oz) (OLD) 1. 9-27-79 2. 9-26-79	1. .147 Gal/SY 355 D 2. .131 Gal/SY 360 D	1. 125.4#/SY - 265 D 2. 126.2#/SY - 265 D 1. 10-4-79 2. 10-2-79
7	WEST BOUND 461+80 - 475+00	NO FABRIC Control Section	NONE	1. 125.4#/SY - 265 D 2. 126.2#/SY - 265 D 1. 10-4-79 2. 10-2-79

* 1 = Inside Lane

2 = Outside Lane

FIGURE I



*Due to Field Change #1

FABRIC UNDERSEAL TEST SECTIONS

E.B.L.	422+20 to 435+40	No Fabric Underseal
	435+40 to 448+60	Monsanto C 34
	448+60 to 461+80	" C 22
	461+80 to 475+00	Phillips Petromat (R)
W.B.L.	435+40 to 448+60	" " (8 oz.)
	448+60 to 461+80	" " (R)
	461+80 to 475+00	No Fabric Underseal

FIGURE 11