

MATERIALS & RESEARCH DIVISION

Reviewed By:

Robert F. Cauley
Materials & Research



Prepared By:

Chad A. Allen
January 25, 1993
Page 1 of 2

RESEARCH UPDATE

Number U93-2

CARBON BLACK MODIFIED PAVEMENT (Interim Report)

REFERENCE: Update U88-1; Update U90-3

HISTORY:

A section of Court Street (US 7) in Middlebury, paved in 1979, began rutting and shoving shortly after placement. By June of 1985, rutting in the wheel paths averaged 10/16," with maximum values of 1-11/16". An investigation in 1985 concluded that the major cause of the pavement distress was instability of the plant mixed base course.

In 1986 two 600' sections of Court Street at the School Street and Charles Avenue intersections were reconstructed to test a method for rehabilitating the entire project. Different thicknesses of the original pavement were removed, stair step fashion, through the intersections to determine the minimum depth of replacement necessary to prevent recurrence of the original distress. The reconstruction used high density, high stability mixes in the School Street intersection and the same mixes modified with carbon black (MICROFIL 8) in the Charles Avenue intersection. Details of the mix designs and thicknesses of the individual courses were previously reported.

COST:

The high stability control mix cost \$35.00 per ton, while the modified mix cost \$78.00 per ton, a 123% increase.

STATUS:

Traffic volumes on Court Street have increased since 1985 and average daily traffic is now approximately 16,000. Both sites were surveyed for pavement distress in 1987, 1988, 1989, and 1992. the results are as follows:

Cracking

Carbon Black (CB) Section
1 diagonal crack

Control Section
no cracks

Ride Quality after one Year

	<u>CB Section</u>	<u>Control Section</u>	<u>Old Pavement</u>
Mays Value			
(inches per	117	111	198
mile at 35 MPH)			

STATUS Continued:Average Rut Depths in 1/16"

Depth Replaced	1 Year (OCT-87)		2 Years (NOV-88)		3 Years (OCT-89)		6 Years (DEC-92)	
	CB	Control	CB	Control	CB	Control	CB	Control
1	3	---	6	---	6	---	10	---
1-1/2	1	3	3	7	3	7	5	11
3	1	2	2	4	2	4	2	5
5-1/2	0.5	1	2	4	2	4	3	6
8	0.5	1	2	4	2	3	3	6

CONCLUSIONS:

Through 6 years, the average rut depth in old pavement has continued to increase, now averaging 17/16" (1-1/16").

Replacement of 1" of the old pavement with 1" of carbon black modified pavement failed to prevent excessive rutting through 6 years.

Replacement of 1-1/2" of the old pavement with 1-1/2" of high density pavement failed to prevent excessive rutting through 6 years.

Replacement of 1-1/2" of the old pavement with 1-1/2" of carbon black modified pavement prevented excessive rutting through 6 years.

Replacement of 3 or more inches of the old pavement with 3 or more inches of carbon black modified pavement or with 3 or more inches of high density pavement prevented excessive rutting through 6 years.

The carbon black modified pavement outperformed the high density pavement. The average measured rut depths in the carbon black modified pavement were approximately one half of the rut depths in the high density pavement at all pavement thicknesses and at all elapsed times.

FOLLOW UP:

Both intersections will remain under observation to further define the long term performance of these mixes.