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RESEARCH UPDATE U96-13

RECLAIMED BASE STABILIZATION
BELVIDERE VT 109

REFERENCES:

Work Plan 91-R-7, Report 94-7

INTRODUCTION:

Work Plan 91-R-7 was initiated to determine the beneficial effects gained, if any, by the addition of emulsified asphalt to the reconstituted base as it is reclaimed. At the time the Belvidere project was constructed it was debatable whether the structural strength of the compacted base was improved by the addition of a stabilizer. The evaluation was also undertaken as an opportunity to evaluate yet another full depth reclaimed base project.

PROJECT DESCRIPTION:

Construction on Belvidere Project RS 0282(6) was accomplished during June of 1991. The project was 6.28 km in length, beginning at MM 2.910 and continuing easterly to the intersection of VT 109 with VT 118, all within the town of Belvidere. The improvement included reclaiming to an average depth of approximately 127 mm. An average addition rate of 3.6 L/m^2 of emulsified asphalt was used to stabilize the reclaimed base which was subsequently overlaid with 76 mm of bituminous concrete pavement.

EVALUATION OF THE STABILIZING AGENT:

The project included four test sections to evaluate the effectiveness of adding emulsified asphalt to the reclaimed base material. The test sections were designed so that variations of the emulsified asphalt application rate could be compared directly, in test sections located opposite each other on adjacent lanes. Also, one test section was constructed with a variation of the overlay thickness. The configurations of those test sections, as well as their cumulative performance after five years in service are shown in the table on the following page.

All units in metric. Exceptions: mile markers/mileage references for project location; supplier's costs (presented in dual English/Metric units).

Metric

BELVIDERE RS 0282(6) TEST SECTION LAYOUT			
TEST SECT.	NB LANE	SB LANE	NB&SB OVERLAY
T.S. 4.25 1996 Crackin 1996 Rutting 1996 Ride	NO ASPHALT EMULSION (AE) STRUCTURAL # 4.0* 116 m/100m 0 86	AE Application Rate= 4.46 L/m^2 STRUCTURAL # 3.6* 190 m/100 m 0 60	51 mm
T.S. 4.72 1996 Cracking 1996 Rutting 1996 Ride	AE Application Rate = 4.30 L/m^2 STRUCTURAL # 3.9* 207 m/100 m 0 131	NO ASPHALT EMULSION STRUCTURAL # 3.8* 240 m/100 m 1 150	76 mm
T.S. 5.17 1996 Cracking 1996 Rutting 1996 Ride	AE Application Rate= 8.51 L/m^2 STRUCTURAL # 4.1* 140 m/100 m 0 156	AE Application Rate= 3.25 L/m^2 STRUCTURAL # 4.0* 235 m/100 m 0 59	76 mm
T.S. 6.37 1996 Cracking 1996 Rutting 1996 Ride	NO ASPHALT EMULSION STRUCTURAL # 3.9* 175 m/100 m 0 102	AE Application Rate = 4.56 L/m^2 STRUCTURAL# 3.8* 278 m/100 m 0 120	76 mm

*Structural numbers were measured with the FWD after the pavement wearing course was applied.

COST:

The cost of the full depth reclamation with stabilization and a 76 mm overlay was $8.95/m^2 ($7.48/SY). Without the addition of the emulsified asphalt, the cost of the new reclaimed pavement would have been $7.27/m^2 ($6.08/SY). The costs cited above assume an average application rate of emulsified asphalt of 3.6 L/m^2 and unit weight of the emulsified asphalt of 1 kg/L . For the sake of comparison, the cost of a standard (38 mm) overlay would have been $3.04/m^2 ($2.54/SY).

SUMMARY:

The data shown above not only seems to disprove the view that the addition of an asphalt emulsion to the reclaimed base enhances its structural strength, but tends to negate any benefit whatsoever from the stabilizing agent. The structural numbers derived from falling weight deflectometer testing are greater in two of the above cases where no emulsified asphalt has been added, and in another case, where differing rates of application were utilized, the section with the lesser application rate is the strongest.

Consideration of the other performance indicators in the table also suggests the stabilizing agent has no significant beneficial effects in the retardation of cracking or rutting.

The cost effectiveness of the reclaimed base stabilization for the Belvidere project will continue to be evaluated in conjunction with the Pavement Life Annualized Cost study until the pavement reaches the end of its service life.