LTRC

Materials

TECHNICAL SUMMARY

SUMMARY OF REPORT NUMBER 235

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SPRINKLE TREATMENT EXPERIMENTAL PROJECT CONSTRUCTION AND THREE YEAR EVALUATION

INTRODUCTION

Until the 1984 moratorium placed on its use, asphaltic concrete friction course (ACFC) was utilized on roads having paved shoulders with greater than 4000 average daily traffic. Due to the use of nonpolishing, high quality aggregate and an open-graded texture, the ACFCs provided high friction properties, critical hydroplaning speeds and reduced splash and spray. Since the moratorium, however, dense graded mixes have been used. The friction properties of dense graded mixes have been improved by blending a high quality aggregate, but they do not address the hydroplaning needs.

Sprinkle Treatment is the application of a properly graded, pre-coated, nonpolishing aggregate to a hot asphaltic concrete wearing course immediately behind the paving machine. The "sprinkled" chips are embedded into the mat with the initial rolling operation. By embedding expensive imported, nonpolishing aggregates only in the wearing course surface rather than using it in the entire mix, desirable friction properties can be achieved and a substantial conservation of materials and costs can be realized. Depending on the rate of application of chips, it is possible to obtain a surface macrotexture which can also improve hydroplaning characteristics.

This study was initiated to document the construction of a Sprinkle Treatment field trial on a high speed/high volume roadway and present the performance data obtained for three years after construction.

OBJECTIVES

- To demonstrate the constructability.
- To evaluate performance with respect to friction, hydroplaning and retention of aggregate of a sprinkle treatment.

RESEARCH APPROACH

This project was constructed under the auspices of FHWA Demonstration Project Number 50. Sprinkle chip spreading was accomplished with a Bistowes Mk V chip spreader which remained immediately behind the paver throughout laydown operations. The pre-coated chips were uniformly placed at rates of 7 lb/yd^2 and 10 lb/yd^2. The higher rate was used to survey improvements of hydroplaning effects over a three-year period. An ACFC section was used as the control section.

Performance evaluations, which included pavement condition ratings, structural evaluations, friction properties, texture depth from which critical hydroplaning speeds were calculated, and aggregate retention, were conducted on an annual basis. In addition, roadway cores were obtained to determine densification due to traffic, gradation, binder content and properties of the asphalt cement including viscosity, penetration and ductility. An ACFC section was used as the control section.

CONCLUSIONS AND RECOMMENDATIONS

The construction of each section proceeded without problems. There were very few signs of chip ravelling throughout the performance evaluation period. The experimental project demonstrated that the Sprinkle Treatment technique, at both a 7 lb/yd^2 and 10 lb/yd^2 spread rate can perform as well as an ACFC with respect to friction properties. The 10 lb/yd^2 Sprinkle Treatment section has anti-hydroplaning properties similar to the ACFC.

On the basis of the results obtained in this study, it was recommended that Sprinkle Treatment be considered as an alternative to either ACFC or Type 8 dense graded wearing course mixes. It was envisioned that alternatives could be established in the Skid Accident Reduction Program (EDSM I.1.1.5) along the following guide lines.

(1) A 7 lb/yd^2 Sprinkle Treatment could be used on those roadways where frictional properties are needed but anti-hydroplaning is not a concern. Such an alternative could save approximately $10,000 per mile as a substitute for ACFC or reduce the quantity of high quality, nonpolishing Class I aggregate currently being used in Type 8 mixes seven times (50 tons/mile sprinkle chips vs. 350 tons/mile of Class I aggregate).

(2) A 10 lb/yd^2 Sprinkle Treatment could be used as an alternative to ACFC on those roadways where anti-hydroplaning characteristics are desirable.

It was further recommended that prior to full implementation, several additional projects be constructed at each of the two spread rates recommended. In this manner, the Sprinkle Treatment technique could be introduced to the construction industry while gaining additional data to establish traffic volume levels for the different spread rates.

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