DAYLIGHTED DRAINABLE BASE RESEARCH

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RESEARCH

Introduction

Modern highways are built with flat grades and gentle side slopes. The flat grades and shallow ditches that result are not conducive to the construction of edge drains and outlet structures. The Kansas Department of Transportation proposed using a drainable base to enhance the performance of pavements and to evaluate the performance of drainage features such as edge drains and daylighted Bound Drainable Base without edge drains.

Project Objective

The objective of this research project was to study the effects of moisture content and drainage characteristics of the daylighted Bound Drainable Base and edge drain sections on pavement performance under less than ideal conditions.

Project Description

The test sections were constructed on two lane highways with 10' PCC shoulders. The surface was Portland Cement Concrete Pavement (PCCP) that was non-reinforced with doweled joints (NRDJ). Beneath the PCCP was 4" of Bound Drainable Base (BDB) and 6" of Lime Treated Subgrade (LTSG). The LTSG was supposed to act as a separator layer. Four test sections were constructed at each location:

1. Bound Drainable Base with edge drains and outlet pipes
2. partially daylighted Bound Drainable Base using denser aggregate wedge
3. fully daylighted Bound Drainable Base using BDB material for the wedge
4. partially daylighted BDB with a filter fabric above and below the BDB outside of the shoulder.

Project Results

The test section performance indicates that a daylighted drainage system can perform as well as a drainage system using edge drain pipes and outlets. Both types of drainage systems are susceptible to freezing weather causing ice buildup in the drainable material resulting in reduced flow. The vibrating strip piezometers were not reliable for measuring the effectiveness of the drainage layer's ability to remove moisture by measuring pore pressure. Several of the test sections on the US-50 site failed to maintain open drainage when the fines from the stabilized base migrated upward into the drainable base layer. There needs to be a separator layer below the drainable layer to prevent the migration of fines. It is suspected that the stabilized base on the US-50 site was not thoroughly mixed which resulted in incomplete hydration. This weakened the stabilized base and, when exposed to moisture, resulted in the fines migrating upward into the drainable layer.

Report Information

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