

# **HR-509 USE OF LONGITUDINAL SUBDRAINS IN THE 3R PROGRAM CONCLUSIONS**

## **INTRODUCTION AND PROBLEM STATEMENT**

U.S. network of highways consists of more than 41,000 miles with 790 miles in Iowa. There have been many benefits of the controlled access roadway, but probably the most significant is the improved safety for the motorist.

In Iowa, we have always endeavored to utilize quality locally available materials in our construction using the most economical or cost effective methods. Obviously when the effort is to build a cost effective system, there will be some portion of the network that will not perform as well as expected. In the design of our interstate, the main consideration for base construction under the pavement was structural capacity. The material was dense graded with the aim of supporting the pavement and distributing the load as it is transferred to the underlying grade. The drainage characteristic of the base was apparently not given adequate consideration.

On jointed Portland Cement Concrete (PCC) pavement, the water that is trapped immediately beneath the pavement causes severe problems. The traffic causes rapid movement of the water resulting in the hydraulic pressures or "pumping" (movement and redeposit of base fine material) resulting in faulting between individual slabs. Recognizing the need for maintaining this large national highway network, the Federal Highway Administration has initiated a funding program for resurfacing, restoration and rehabilitation (3R).

Many miles of the system are more than 20 years old and in need of major maintenance. This new 3R program necessitated a complete inventory of the Iowa interstate system to establish priorities and to identify those sections in need of immediate remedial treatments.

## **CONCLUSIONS**

It is evident from this experimental project that:

1. The subdrains were beneficial by removing water from beneath the pavement and providing improved shoulder stability.
2. The subdrains were not effective in reducing the rate of deterioration on this project.
3. The subbase material on this project does not have adequate permeability to allow for rapid removal of water.
4. The longitudinal subdrains on this project were not placed deep enough.
5. Patching procedures at the time of this project resulted in pumping of fine material and in some cases resulted in plugging of the subdrain pipe.

## **RECOMMENDATIONS**

1. Longitudinal subdrains should be deeper than the design used on this project.
2. Longitudinal subdrains should be considered on all projects and especially those with evidence of water or drainage problems.
3. Crushed stone bases/subbases should have a permeability sufficient to allow water to drain relatively rapidly.
4. Porous bedding over a layer of filter fabric should be placed beneath pavement patches.
5. Standards and specifications to improve patching procedures should continue to be developed.