SHOULDER EXPERIENCE IN ILLINOIS

John E. Burke, State of Illinois

Illinois' theory has been that the shoulder structure, called upon to carry only occasional traffic, should not need to cost as much as the mainline heavy-duty pavement. However, these lower costs have not been realized. While the shoulder structure itself can be of lighter section, durability requirements and underdrainage requirements are such that no important savings can accrue through reductions in these areas.

During Illinois' early experience with CAM, PAM and BAM stabilized shoulders, a dense-graded trenched granular subbase was used under the pavement. In some instances, it was extended under the shoulders, and on a few sections carried out to the side slope for drainage.

Winter heaving of the shoulders above the pavement has been a problem where designs include the use of stabilized mixtures in the shoulders in combination with the granular subbase under the pavement, especially in the northern portion of the State. CAM and PAM shoulders have also experienced major durability problems at the pavement edge.

A change from the use of unstabilized dense-graded granular material to the use of cemented subbase under the pavement partially alleviated the shoulder heave problem. The use of open-graded granular material as subbase in the shoulder area and extending to the side slope has further improved the situation. The durability problem associated with PAM and CAM mixtures as shoulder bases has not been solved; accordingly, only the BAM mixture is now used in shoulder base construction.

Illinois has come to believe lately that longitudinal pipe underdrains placed at the pavement edge (actually at the edge of the pavement subbase which extends 18- to 24-inches beyond the pavement edge) may serve as an acceptable alternate for the open-graded subbase in removing unwanted water. The State is presently preparing plans offering these two systems as alternates. Neither alternate has appeared on a letting, costs are unknown, although estimated to be close.

Experimentation during the past few years with portland cement concrete shoulders adjacent to concrete pavements has convinced Illinois that this type shoulder should not be overlooked as an alternative. The opportunity to tie these shoulders to the pavement offers a unique feature that removes the sometimes troublesome problem of open longitudinal joints that resist sealing.

All of the experiences with special shoulder treatments described are concerned principally with shoulders placed in conjunction with portland cement concrete pavements on new construction. For bituminous concrete resurfacing work, of which there has been a considerable amount, the State has for many years used a gravel or crushed stone wedge at the pavement edge to bring the shoulder up to the desired grade. Recently, Illinois has included an 18-inch overhang of bituminous concrete 3 inches thick to move the unpaved shoulder

area out further from the mainline wheelpaths. Edge-striping is used to help retain traffic in the pavement area. Experience soon showed that the 3-inch thickness was not sufficient to serve without early distress, and this thickness was increased to 6 inches, which appears adequate.

SHOULDER PRACTICES AND PERFORMANCE IN TEXAS

John F. Nixon, Texas Highway Department

Since 1954, when traffic volumes justify, it has been a general policy of the Texas Highway Department to provide wide paved shoulders wherever possible. Specifically, the policy requires that two-lane facilities with an existing ADT of 1,000 vehicles or more be constructed with either 13-foot lanes and 9-foot paved shoulders or 12-foot lanes with 10-foot paved shoulders.

On Interstate Highways where Federal-aid participation is limited to paving only 4 feet of the inside shoulder, it has been the Texas practice to pave an additional 2 feet of shoulder with State funds to provide 6 feet of paved interior shoulder. On divided highways where shoulder paving is eligible for Federal-aid participation, the State has always practiced paving the entire 10-foot outside shoulder and the entire width of the inside shoulder.

In addition, to reduce the hazardous transition at approach guardrail installations and structures, Texas has encouraged the use of crown-width bridge structures which provide full shoulders plus offset for continuous guard fence installations. Thus, a two-lane roadway with 12-foot lanes would have two 10-foot shoulders, each with an additional 2-foot offset to yield a clear roadway width of 48-feet across structures. On a divided four-lane facility, a 6-foot inside shoulder and a 10-foot outside shoulder are provided with an additional 2-foot offset on the outside shoulder for the positioning of continuous guard-rail producing a crown width total of 42 feet.

Until recently the use of edge striping to delineate the edge of the pavement has been used very rarely in the State. Instead, the shoulder has been differentiated by the use of aggregate with contrasting color and texture. The construction of shoulders in Texas employs the same structural section as do the main lanes. Supplemental benefits derived from the full depth shoulder section are:

1. It enables two-lane facilities, which through the years have become congested and unable to accommodate the increase in traffic volumes to be very simply converted to four-lane facilities. With a seal coat application or overlay and lane striping, the two-lane road is transformed into what is commonly referred to as a four-lane "poorboy" design.

2. It enables the shoulder to be used intermittently by slow moving vehicles to allow faster vehicles an opportunity to overtake and pass. Through the years this courtesy has become widespread in rural areas of Texas and has gained legal acceptance.

On multi-lane facilities use of the shoulder by slow-moving vehicles is discouraged and this is accomplished by signing, contrasting color and texture, and other methods. As a result, the State has had very little difficulty with traffic misusing shoulders on divided highways.