CE 441

DESIGN OF PAVEMENT

Fall 2002-2003

HOMEWORK # 3

STRESSES IN RIGID PAVEMENT

1) Given a rigid pavement of 10 inches thick on a poor subgrade with K = 100 pci (modulus of subgrade reaction).

   a. Calculate the warping stresses for a 11 feet wide-slab with various lengths. Plot a curve of stress vs. distance.

   b. Calculate the warping stress for a 36 feet long slab for various widths. Plot a curve of stress vs. distance.

   Comment on the effect of widths and lengths of slabs or stress.

   Given that: $E = 4 \times 10^6$ psi

   $\mu = 0.15$

   Temperature differential 4 F^o per inch.

   Thermal coefficient = 0.000006

2) Determine the stresses due to the three cases of loading (interior, edge, and corner) for 20,000 lbs wheel load, tire pressure is 100 psi given that the pavement is 10 inches thick and the modulus of subgrade reaction is 150 pci. Assume that the tire imprint is a circle.

3) Given a rigid pavement 18 inches thick on a silty clay subgrade with modulus of subgrade reaction of 200 pci. Determine the extreme fiber stresses for the interior load case for the following conditions assume that the tire contact area is the rectangular shape.

   a. Single wheel load 80,000 lbs, 100 psi tire pressure.

   b. Duals wheel 80,000 lbs per wheel, 100 psi tire pressure, wheels spaced 30 inches center to center.

   c. Dual tandem wheels, 80,000 lbs per wheel 100 psi tire pressure, duals 32 inches c-c and tandem 64 inches c-c.

   d. Single wheel 80,000 lbs, 200 psi tire pressure.

   Comment on the effect of load configuration and tire pressure on the stresses in rigid pavement.