Module 4-1

Rigid Pavement Overview

Objectives

Identify rigid pavement layers

Describe the rigid pavement responses

Describe fundamental materials

- **New construction**
- **Rehabilitation**

PCC Composition

Coarse aggregate
Fine aggregate
} **Separated by 4.75 mm sieve**

Portland cement
Water
} **Control water-cement ratio**

Admixtures

Types of Rigid Pavement

Jointed plain concrete pavement (JPCP)
- **No reinforcement**
- **Short joint spacing (4 to 6 meters)**

Jointed reinforced concrete pavement (JRCP)
- **Wire or mesh reinforcement (0.1 to 0.3%)**
- **Long joint spacing (7 to 30 m)**

Continuously reinforced concrete pavement (CRCP)
- **Continuous reinforcement (0.6 to 0.8%)**
- **No contraction joints**

Transverse (Mid-panel) Crack

Faulting

Pumping

Joint Spalling

Punchout

Rigid Pavement Responses

Rigid structures (high modulus)

Distribute applied loads over wide area

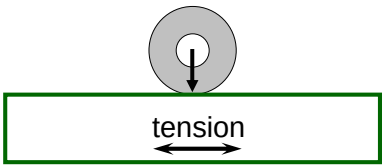
About 10 times stronger in compression than in tension

Most concerned with tensile strength

Traffic Related Stress

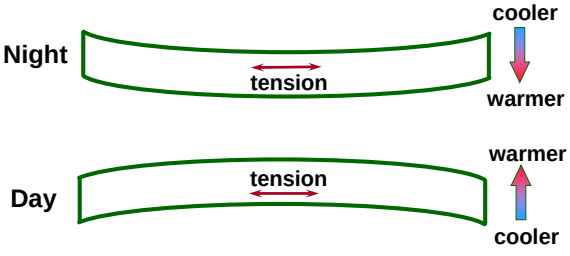
Most critical at mid-panel edge and corner

If tensile stress > tensile strength, a crack occurs



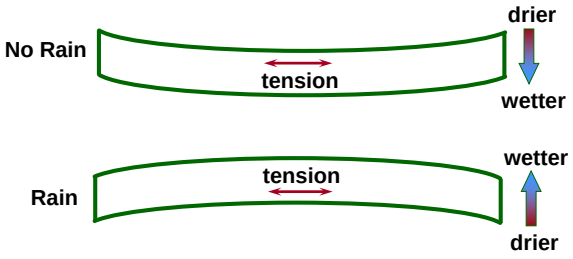
Thermal-Gradient Related Stresses

Temperature differential between the top and bottom of the slab



Moisture-Gradient Related Stresses

Variations in moisture content between top and bottom of slab



Other Stresses

Shrinkage stresses

Internal stresses

- Durability cracking
- Alkali-silica reactivity

D-Cracking

D-Cracking

Concrete Pavement Materials

Type I (a).....Normal
Type II (a).....Moderate heat of hydration
Moderate sulfate resistance
Type III (a).....High early strength
Type IV.....Low heat of hydration
Low strength gain
Type V.....High sulfate resistance

a = air entraining agent

Summary

PCC is a rigid, durable material

Composition of aggregates (coarse and fine), cement, water, and admixtures

Tensile stresses are most critical

Stresses caused by several mechanisms