一、鋪面評估與維修簡介

Readings: Training Course - Block 1

◎ Introduction:

Pavement Management: Overall Network Level, Individual Project Level (This Course)

◎Course Objectives and Description:

* Objectives:
    1. Understand pavement deterioration
    2. Perform evaluation - collect data
    3. Evaluate results - existing pavements
    4. Knowledge about rehabilitation / maintenance techniques
    5. Develop alternatives
    6. Cost analysis - LCC(Life-Cycle-Cost)
    7. Pavement management (network level)
* 3R = Resurfacing, Restoration, Rehabilitation
* 4R = Rehabilitation (Resurfacing, Restoration, and Recycling) + Reconstruction
* Figure 2 - Flow charts of pavement rehabilitation process
* Describe typical performance of each pavement type (key types of deterioration)

◎Performance of Pavement Design Types:

* Types: AC, AC/PCC, JPCP, JRCP, CRCP
* Figure 1-2.3 Difference between flexible and Rigid Pavements
* Critical stress locations in AC pavements Pavements

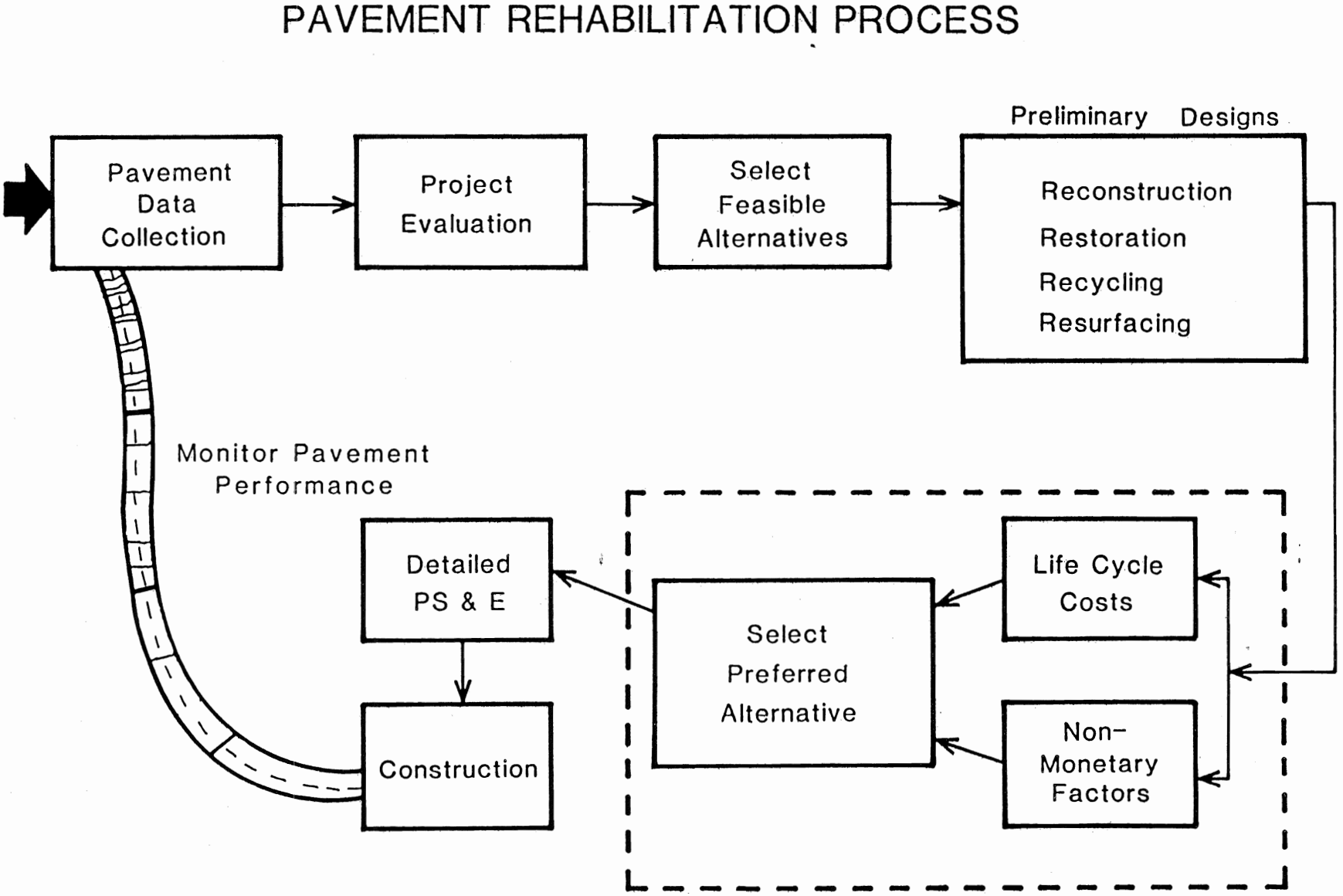


Figure 2. Steps in the Pavement Rehabilitation Process.

◎Performance of Pavement Design Types:

* Types: AC, AC/PCC, JPCP, JRCP, CRCP
  - AC - Permanent deformation (rutting), fatigue cracking
  - AC/PCC - Reflective cracking
  - JPCP & JRCP - Cracking, joint deterioration, faulting
  - CRCP - Punchout, Cracking

* Figure 1-2.3 Difference between flexible and rigid pavements
* Figure 3-1.1 Generalized multilayer elastic system
* Figure 2 Typical tensile strain and compressive subgrade stress
* Figure 1 Critical stress locations in AC pavements (granular base)
* Figure 3 Critical stress locations in AC pavements (stabilized base)
* Figure 3-1.6 Standard pavement for sensitivity analysis
* Figure 4 Typical distress functions of JCP
* Figure 6 Critical tensile stress in CRCP
* Figure 7 Illustration of Edge punchout in CRCP
* Figure 8 Cumulative damage (patching) vs. cumulative ESALs on Illinois I-57 CRCP

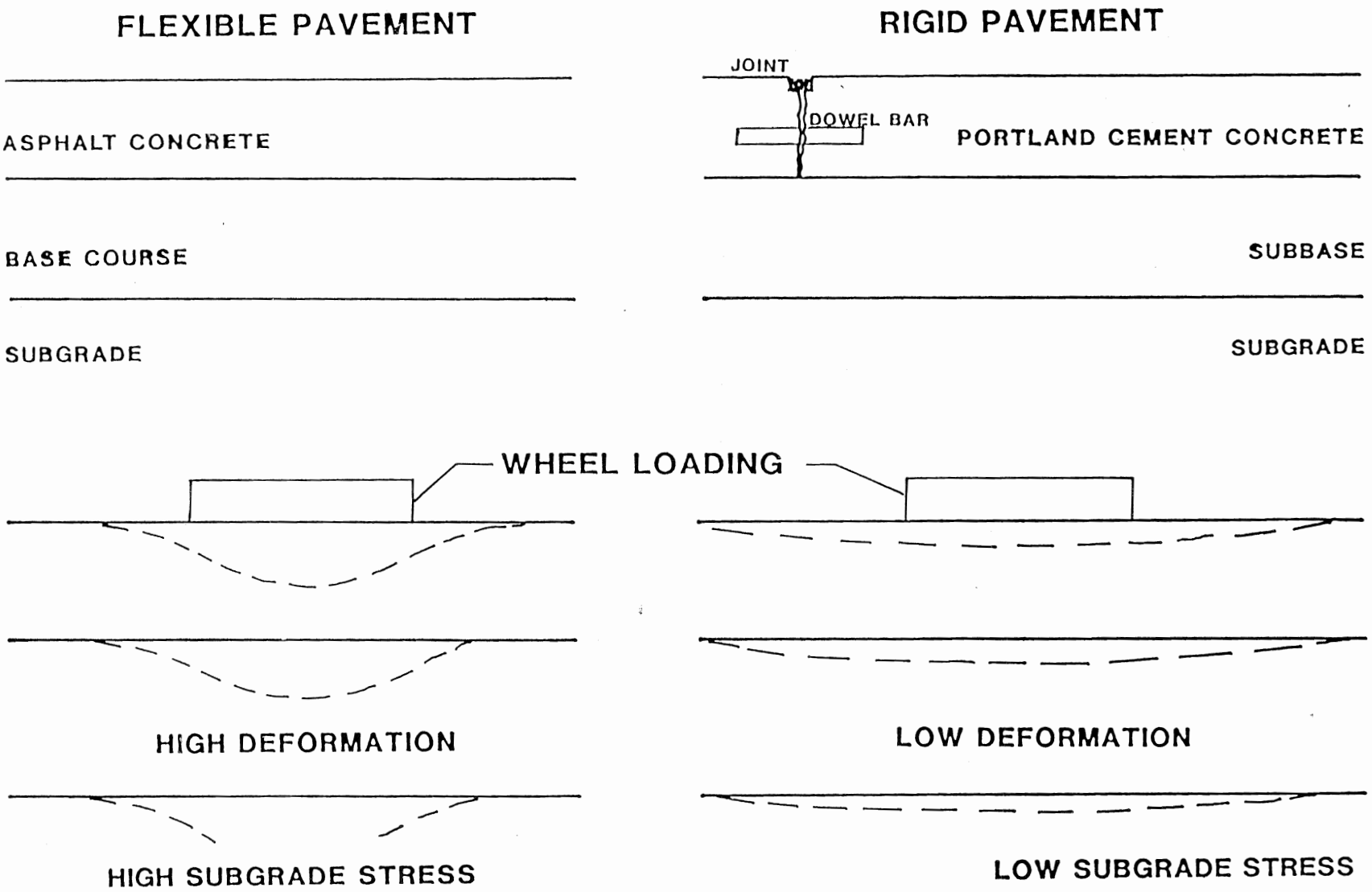
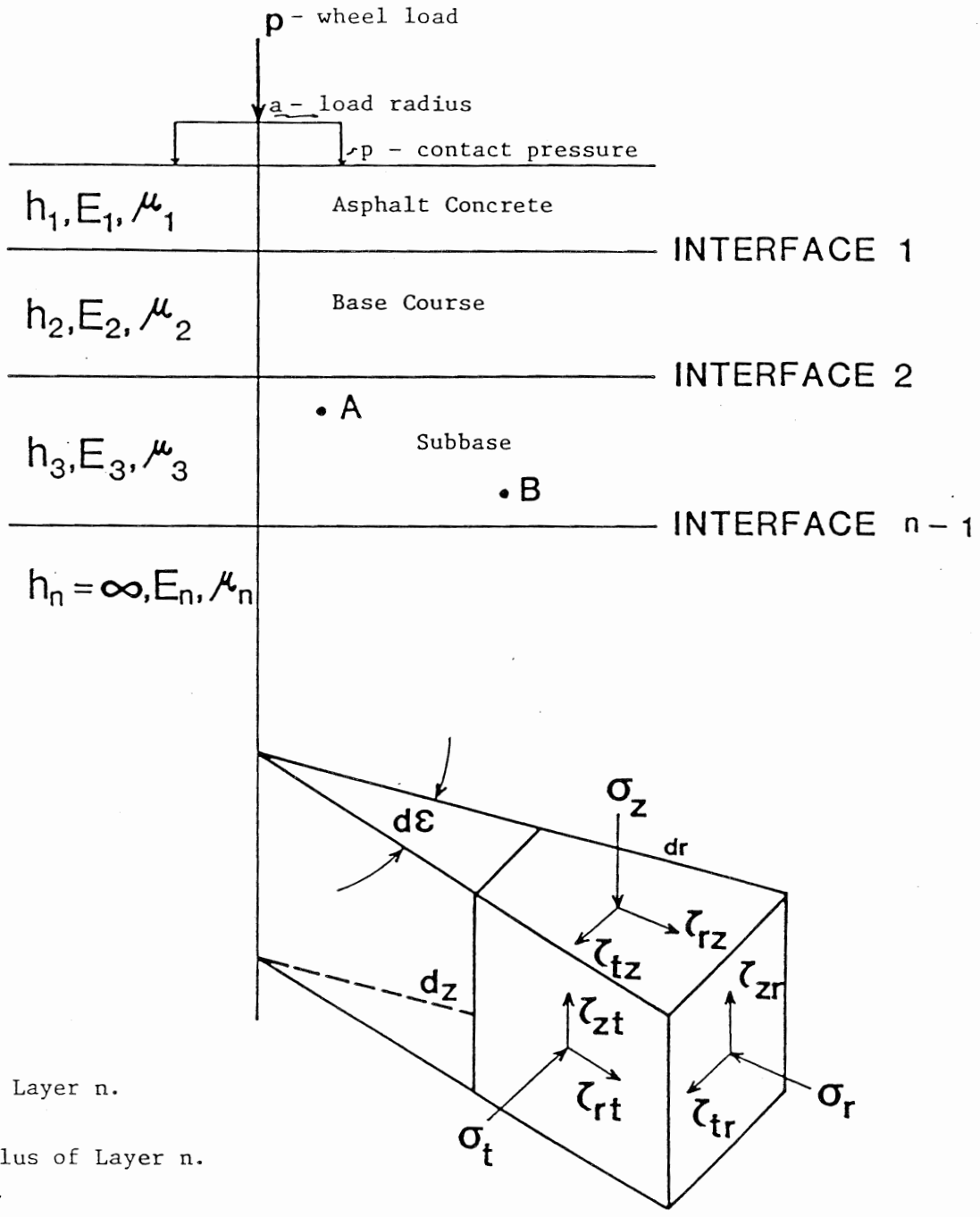


Figure I-2.3. Differences Between Flexible and Rigid Pavement Under Load.



Where:

h_n = Thickness of Layer n.

E_n = Elastic Modulus of Layer n.

μ_n = Poisson's Ratio of Layer n.

σ_i = Stress Component in the i^{th} Direction.

τ_{ij} = Shear Stress Component in the i^{th} Direction in the Plane ij.

Figure 3-1.1. Generalized Multilayer Elastic System.

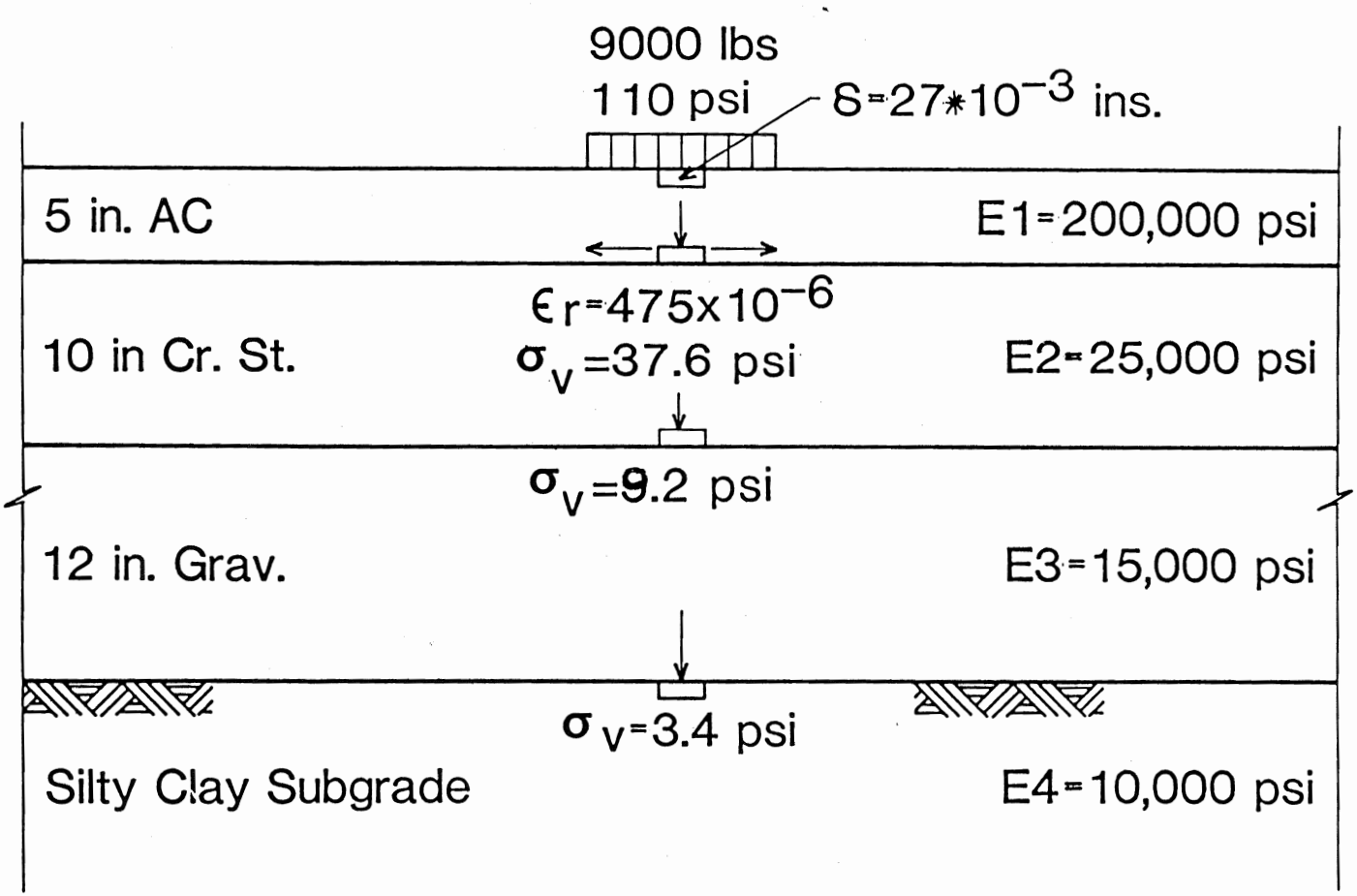


Figure 2. Typical Tensile Strain and Compressive Subgrade Stress in "Strong" Pavement Section.

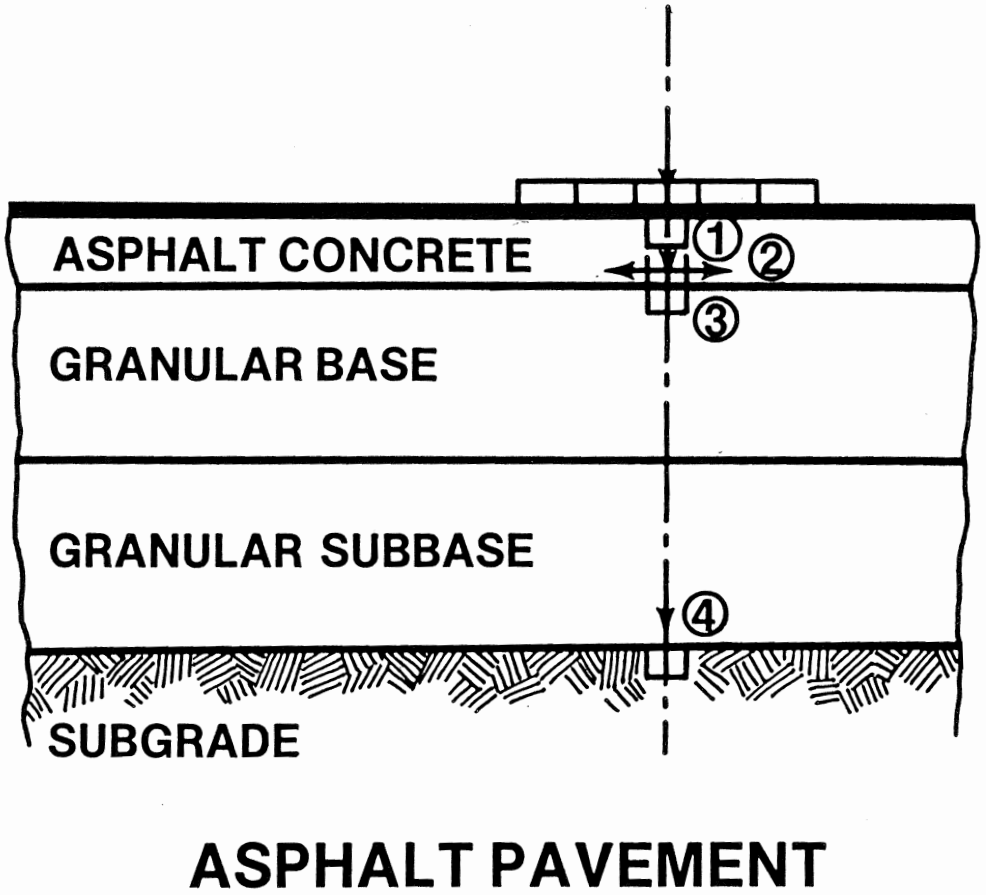


Figure 1. Critical Stress Locations in Asphalt Pavement with Granular Base.

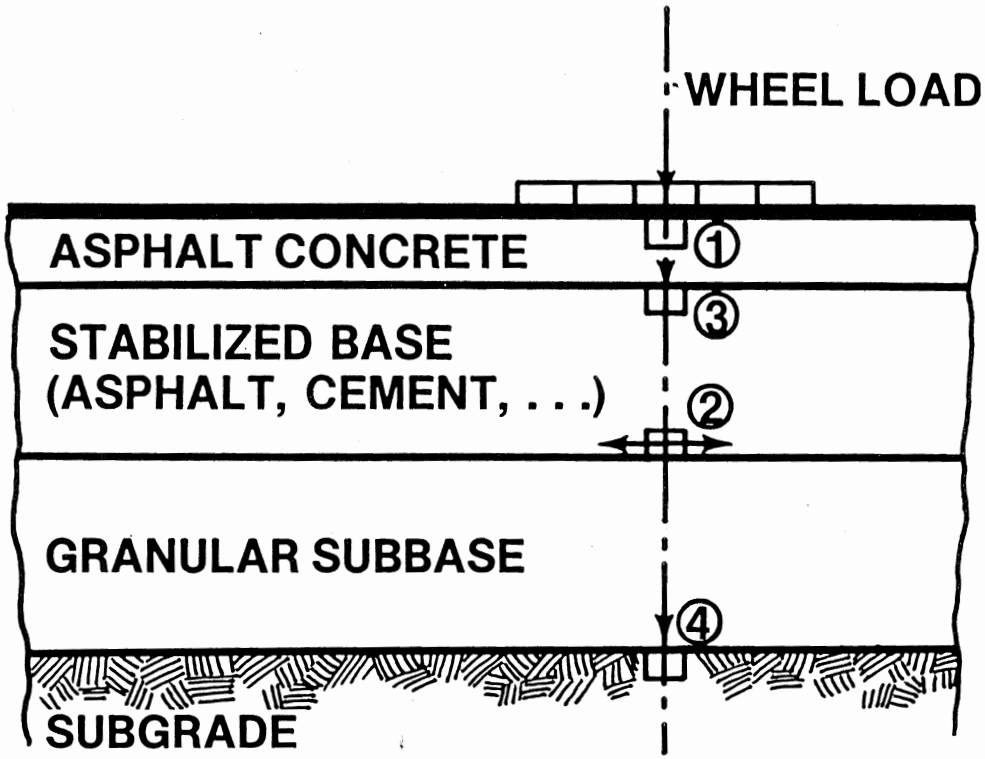
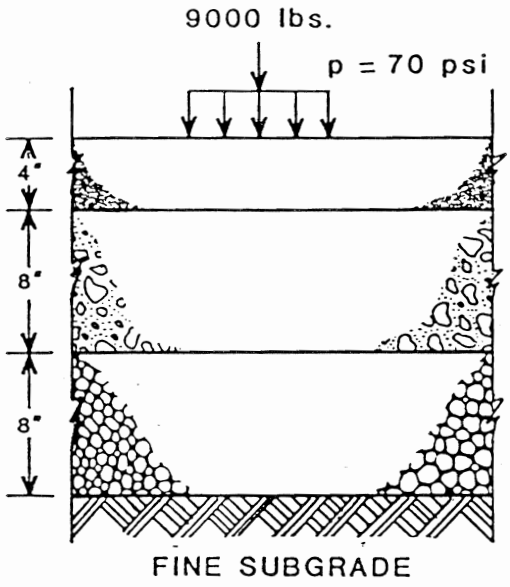


Figure 3. Critical Stress Locations in Asphalt Pavement with Stabilized Base.

STANDARD PAVEMENT



$E1 = 500{,}000$ psi
$\mu_1 = 0.30$
$E2 = 25{,}000$ psi
$\mu_2 = 0.35$
$E3 = 15{,}000$ psi
$\mu_3 = 0.35$
$E4 = 5000$ psi
$\mu_4 = 0.45$

SENSITIVITY TO:

TIRE PRESSURE = 140 psi

SUBGRADE STRENGTH -E4 = 15,000 psi

POISSON'S RATIO -μ = 0.5 FOR ALL LAYERS

LIME STABILIZE TOP 6" OF SUBGRADE -E4 = 50,000 psi

(SUBGRADE) -E5 = 5000 psi

ASPHALT STABILIZED BASE -E2 = 300,000 psi

CEMENT STABILIZED BASE -E2 = 1,000,000 psi

Figure 3-1.6. Standard Pavement for Sensitivity Analysis.

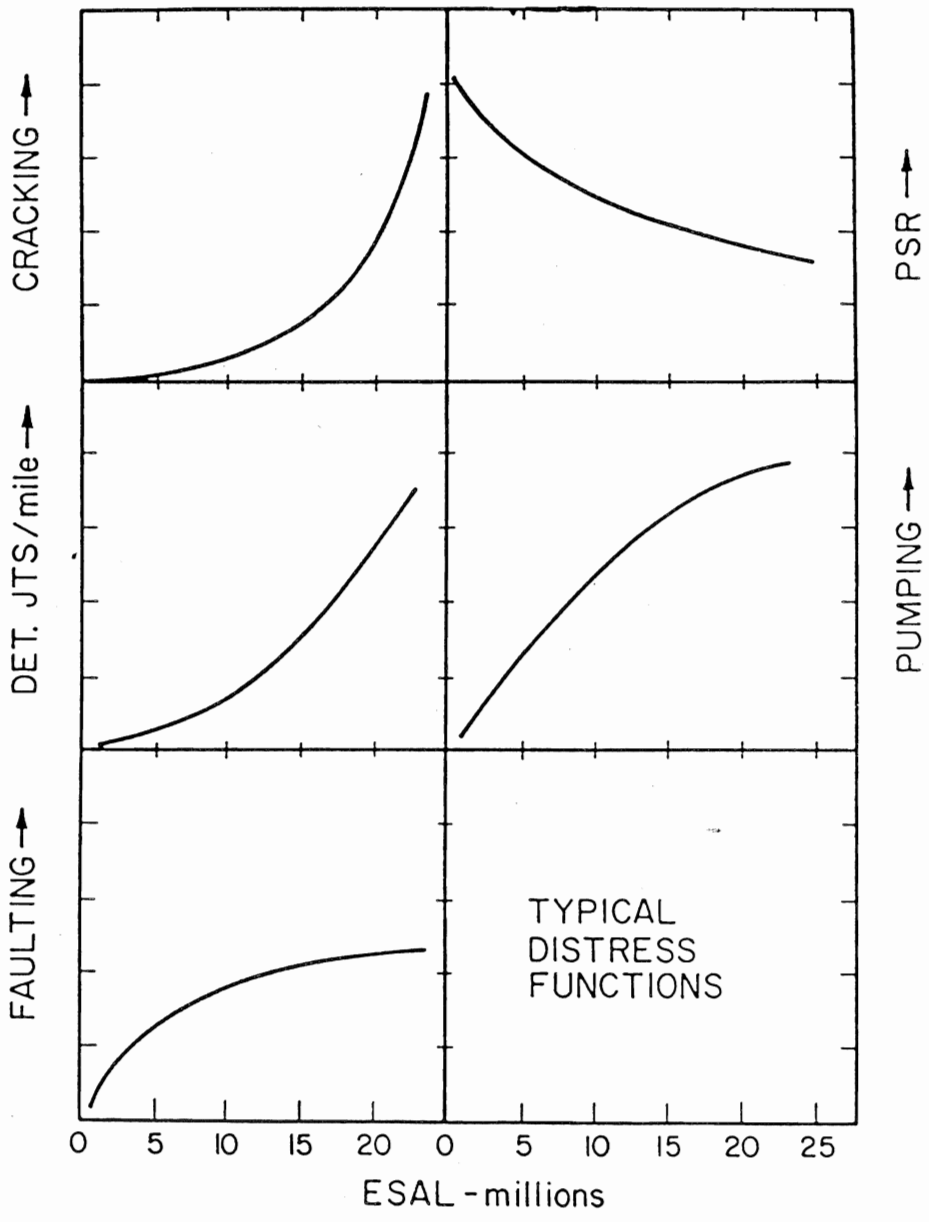


Figure 4. Progression of Key Distresses and Loss of Serviceability in Jointed Concrete Pavement (13).

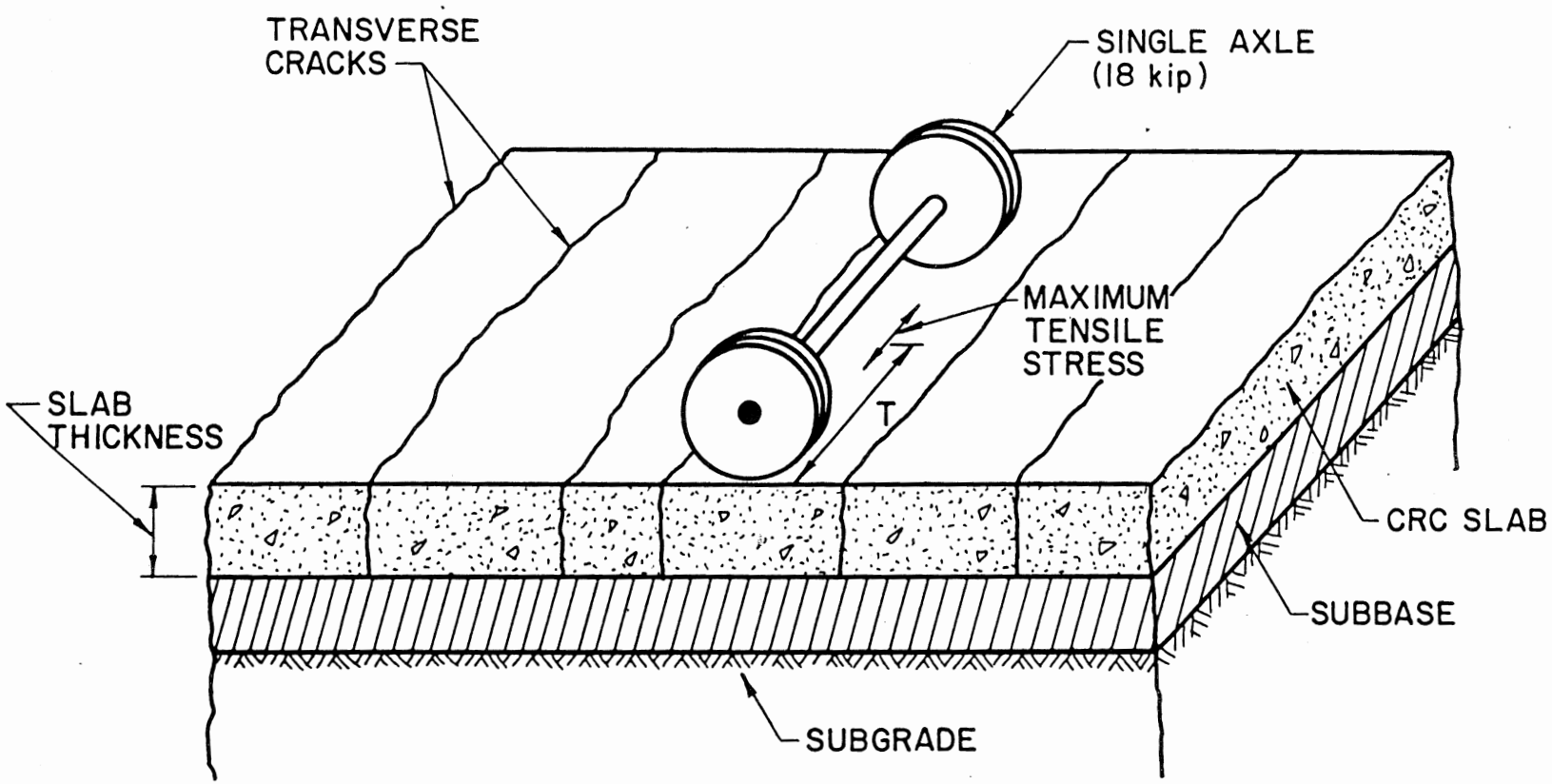


Figure 6. Diagram of Truck Loading Situation Producing Critical Tensile Stress in Top of CRCP Slab (8).

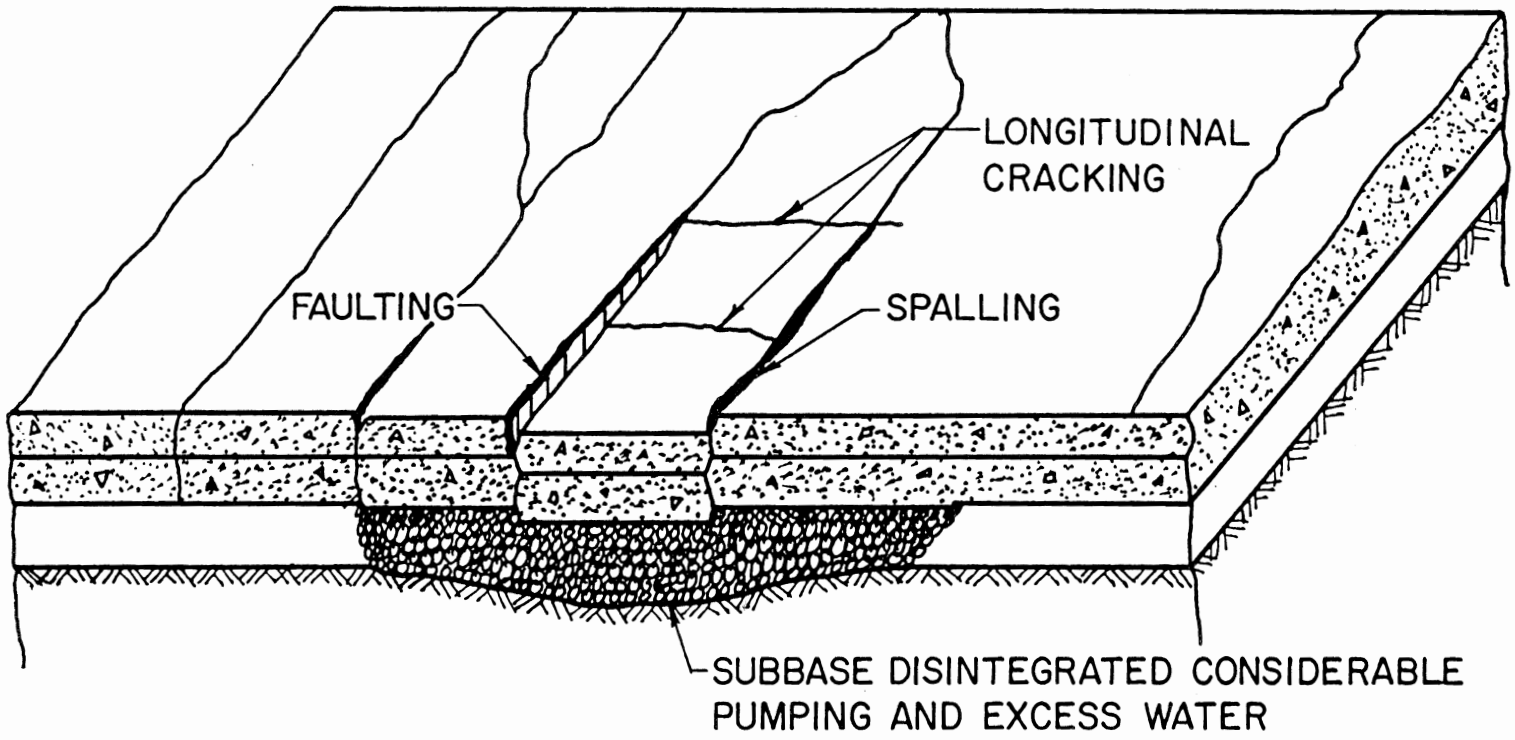


Figure 7. Illustration of Edge Punchout that Develops from Repeated Application of Heavy Truck Loads (8).

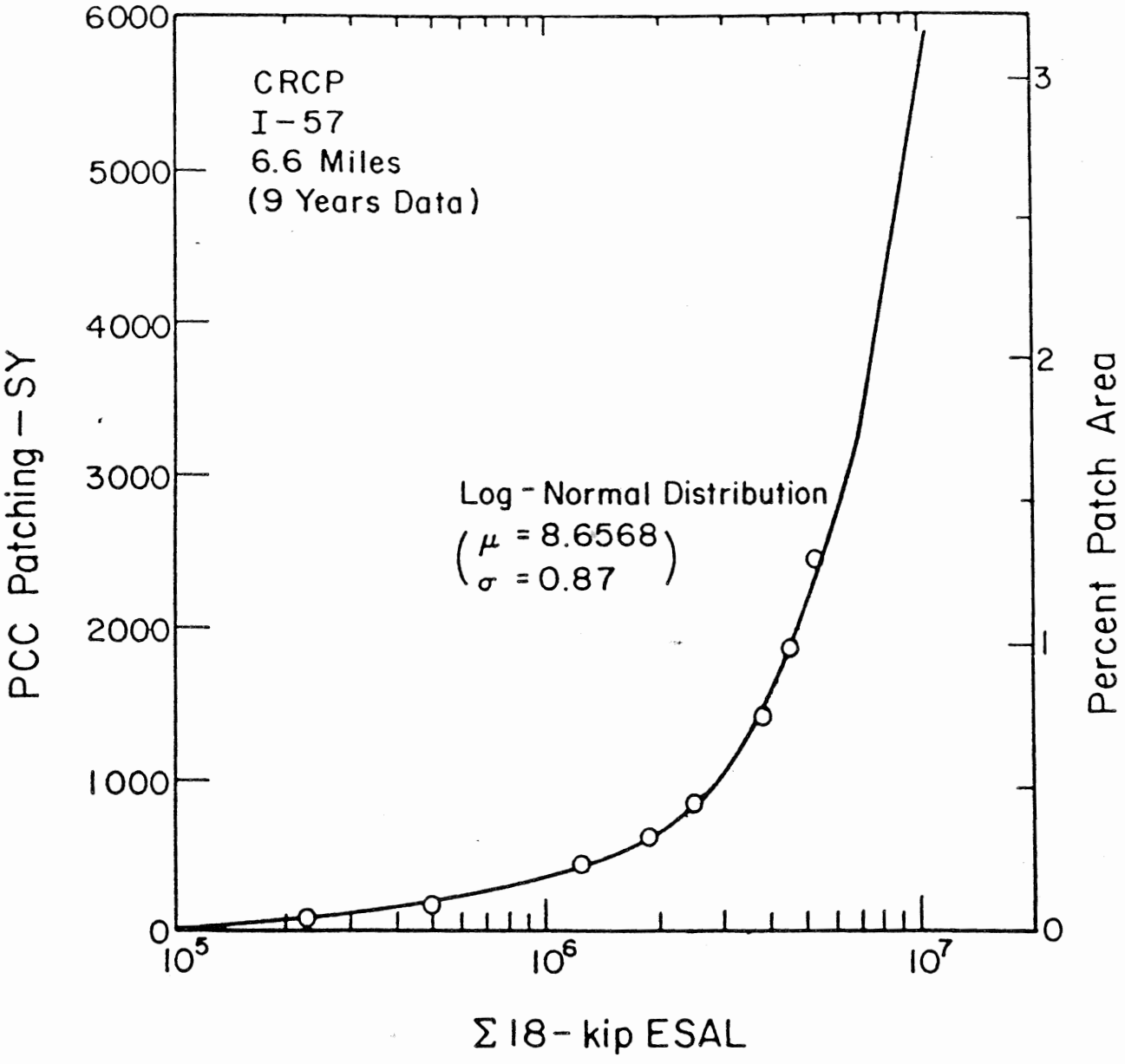


Figure 8. Cumulative Patching Requirements Versus Cumulative 18-kip ESALs on Illinois CRCP (8-inch slab, fine-grained soil, asphalt concrete shoulders) (8).