

十二、 AC Patching, Joint & Crack Sealing

參考資料：

1. Darter, M. I. "Techniques for Pavement Rehabilitation," Training Course, FHWA, 1987. (Block 3 Restoration, Module C and I)

◎Module 3C - Patching with Bituminous Mixtures

※Introduction

※Materials

1. Cold Mixes
2. Hot Mixes

※Need for Patching

1. Replacement of PCC
2. Pothole Repair

Flexible / Concrete Pavement

3. Repair of AC Fatigue Cracking
4. Spot Patching and Level-Up

※Properties Needed

1. All Mixes: Stability, Cohesiveness, Resistance to Water Action, Durability
2. Cold Mixtures: Workability, Storability

※Establishing Patching Boundaries

※Patching Mixtures

1. Hot Mix Asphalt Concrete
2. Stockpiled Patching Mixtures (Binders & Aggregates)

※ Patching Techniques and Procedures

1. Marking
2. Cutting Boundaries
3. Cleaning and Repairing Foundation
4. Tack Coat
5. Filling
6. Compaction
7. Cleanup

◎ Module 3I - Joint and Crack Sealing

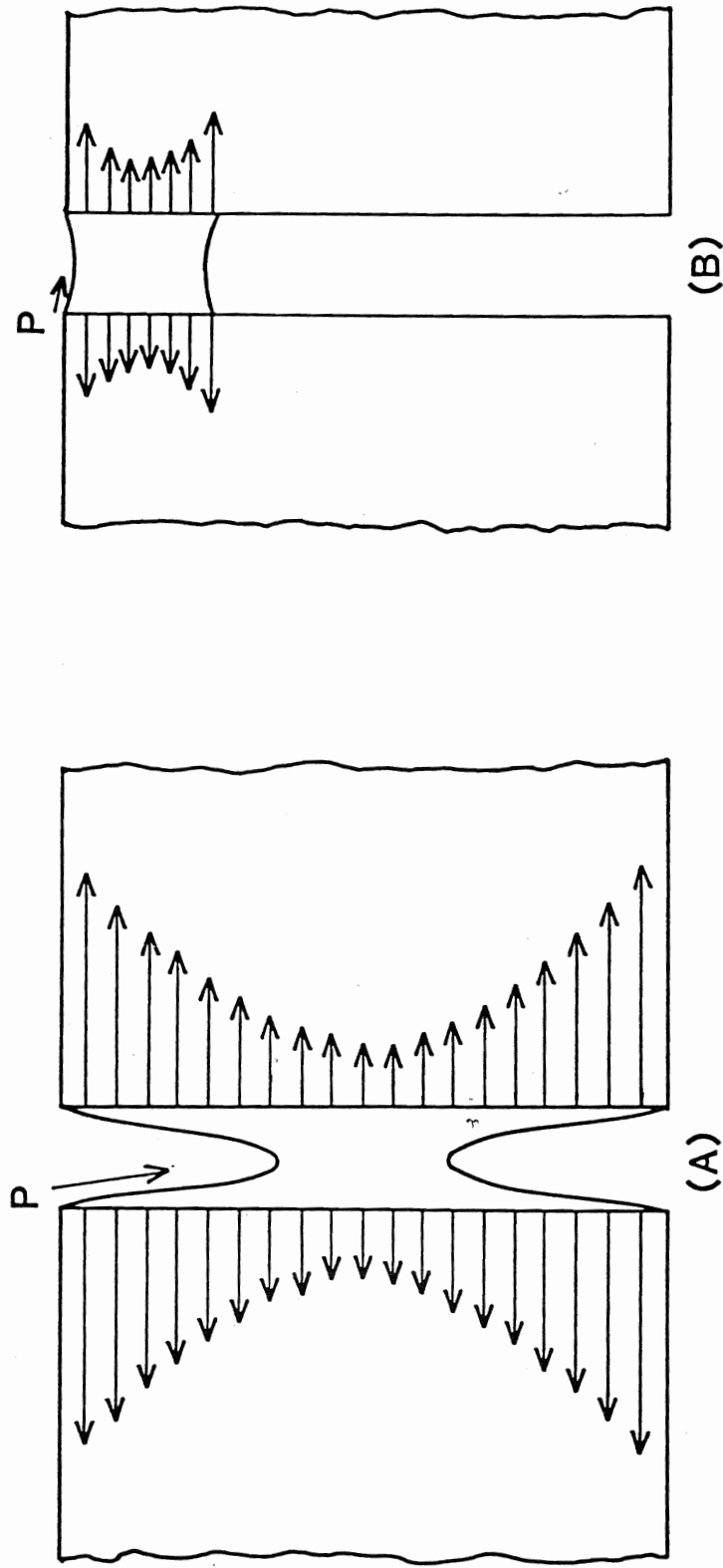
※ Introduction

1. Removal of incompressibles and prevention of further intrusion
2. Reduction of water infiltration and chemical intrusion
3. Types of damage
4. Types of Sealants:
 - a. Field-Poured Self-Leveling Sealants (Hot or Cold Poured)
 - b. Preformed Compression Seals
 - c. Field-Poured Non-Self-Leveling Sealants

※ Factors Affecting Sealant Performance

1. Movement
2. Field-Poured Liquid Sealants
Shape factor = $0.67 \sim 1.0$ (Figure 3 and Figure 4)
3. Preformed Compression Seals (Fig. 6)

Comparison of Substrate Stresses



2 in - Deep Seal

1/2 in - Deep Seal

Figure 3. Illustration of the Relative Effect of Joint Shape Factor on Sealant Stresses.

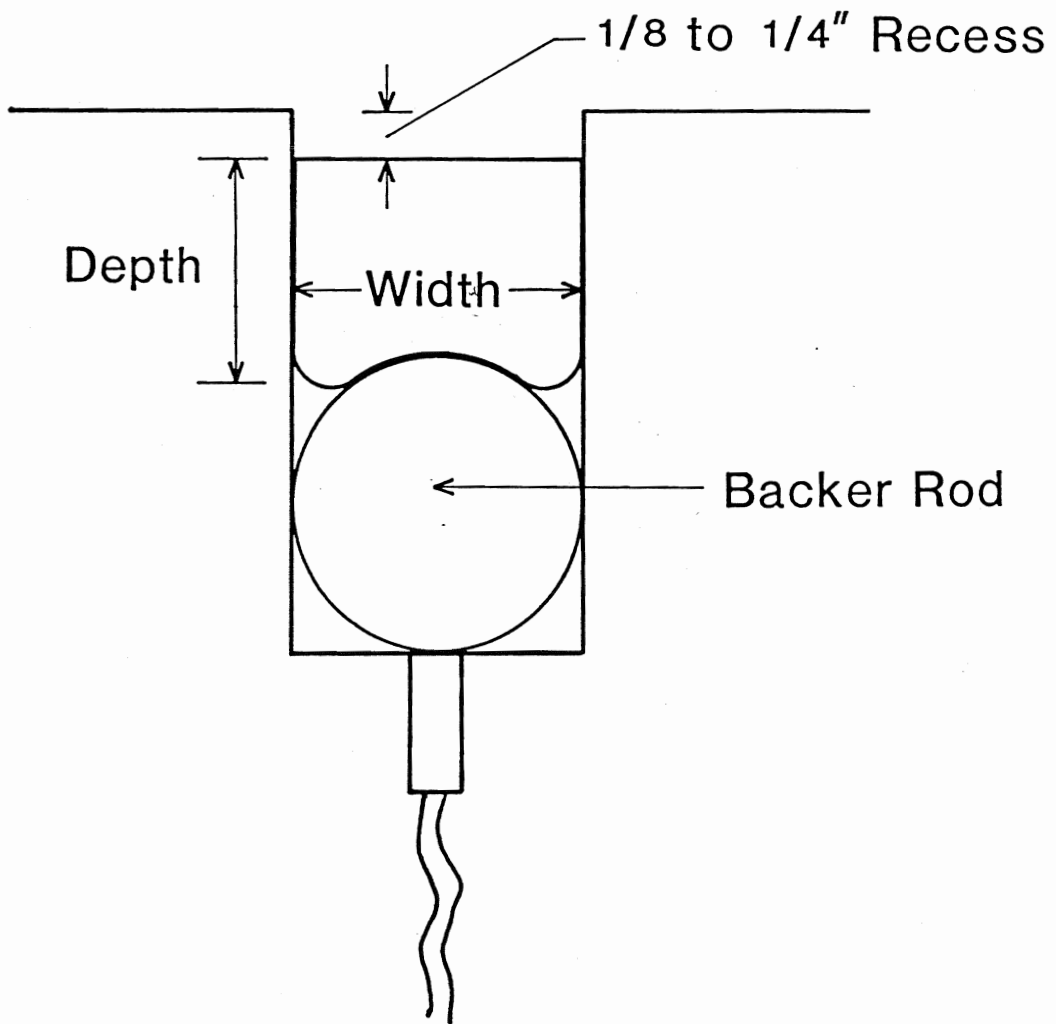


Figure 4. Correctly Sealed Joint Reservoir.

4. Sealant Properties

※ Sealing Joints

1. Sealant Removal
2. Refacing for Shape Factor
3. Cleaning
4. Sealant Installation
5. Special Considerations
 - a. Compression Seals
 - b. Low-Modulus Silicone Sealants
 - c. Polymer Sealants
6. Construction, Longitudinal, and Expansion Joints
7. Sealant Specifications

※ Crack Sealing

1. Concrete Pavements
 - a. Sealant Removal
 - b. Routing or Sawing
 - c. Crack Reservoir Design
 - d. Crack Repair
 - e. Cleaning
 - f. Sealant Types
2. Flexible Pavements
 - a. Sealant Removal
 - b. Crack Repair
 - c. Cleaning
 - d. Sealant Types

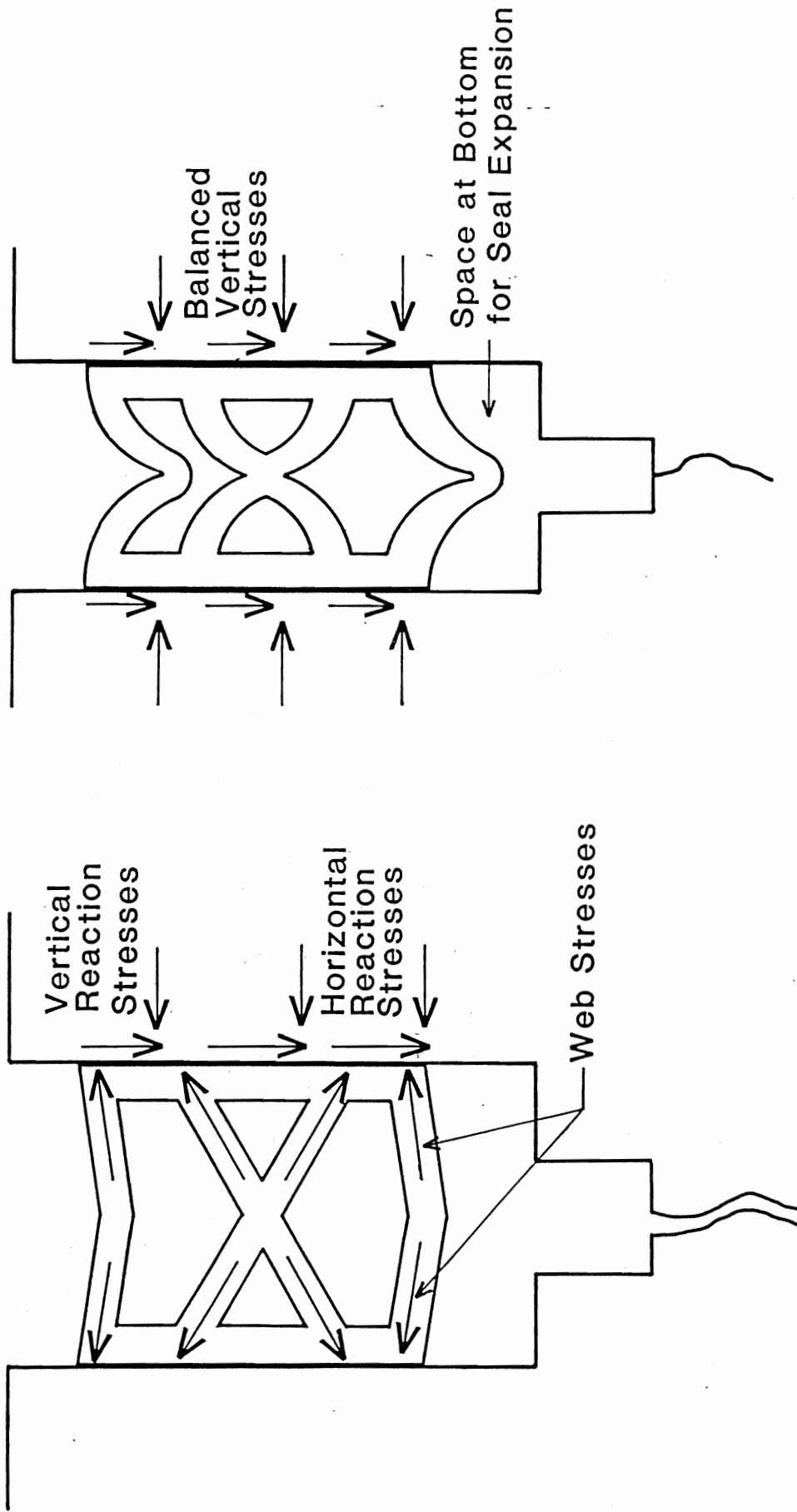


Figure 6. Stresses in Preformed Elastomeric Compression Seals.

十三、 Slab Stabilization, Diamond Grinding, Grooving, Cold Milling

參考資料：

1. Darter, M. I. "Techniques for Pavement Rehabilitation," Training Course, FHWA, 1987. (Block 3 Restoration, Module E, F)

◎Module 3E - Slab Stabilization and Slab Jacking

※Introduction

1. Loss of Support
2. "Slab Stabilization" = insertion by pressure of a material beneath the slab and/or subbase to both fill voids and to provide a thin layer that should reduce deflection and resist pumping action.
3. "Slab Jacking" = lifting of the slab at a depression to its original smooth profile.

※Materials

1. Cement Grouts (used more extensively)
2. Asphalt Cement
3. Silicone Rubber Foam Material

※Cement Grout Mixtures

※Asphalt Cement

※Equipment for Cement Grouts

※Equipment for Asphalt Cement

※Cement Grout Slab Stabilization Procedures

1. Location of Areas Needing Slab Stabilization

2. Slab Stabilization Procedures
 - JCP and CRCP (Figure 7)
3. Effectiveness of Slab Stabilization
4. Estimation of Slab Stabilization Quantities
- ※ Asphalt Cement Slab Stabilization Procedures
 1. Location of Areas Needing Slab Stabilization
 2. Hole Patterns
 3. Stabilization Operations
 4. Typical Quantities of Asphalt Pumped
- ※ Concurrent Work with Slab Stabilization
- ※ Slab Jacking
 1. Location of Holes
 2. Slab Jacking Procedures

©Module 3F - Diamond Grinding, Grooving, and Cold Milling

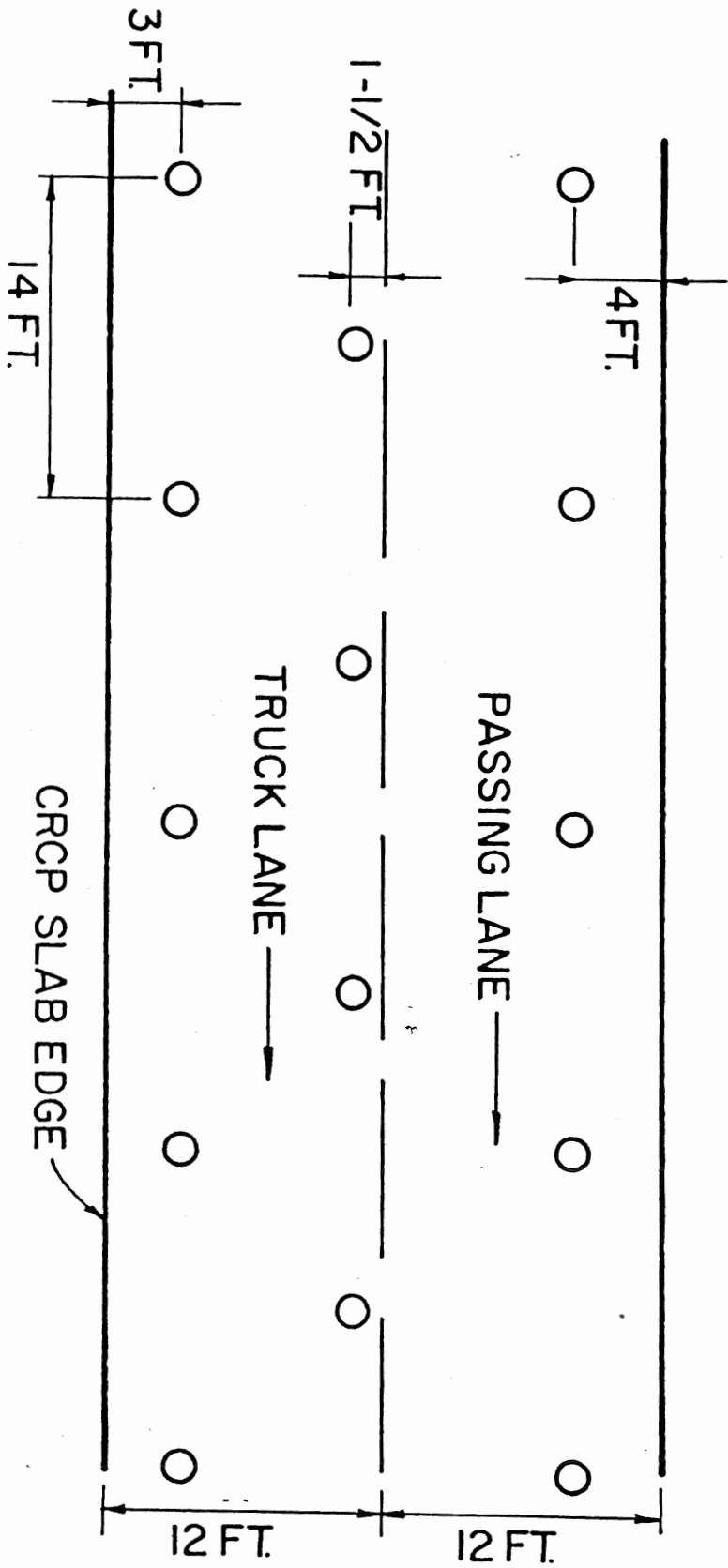
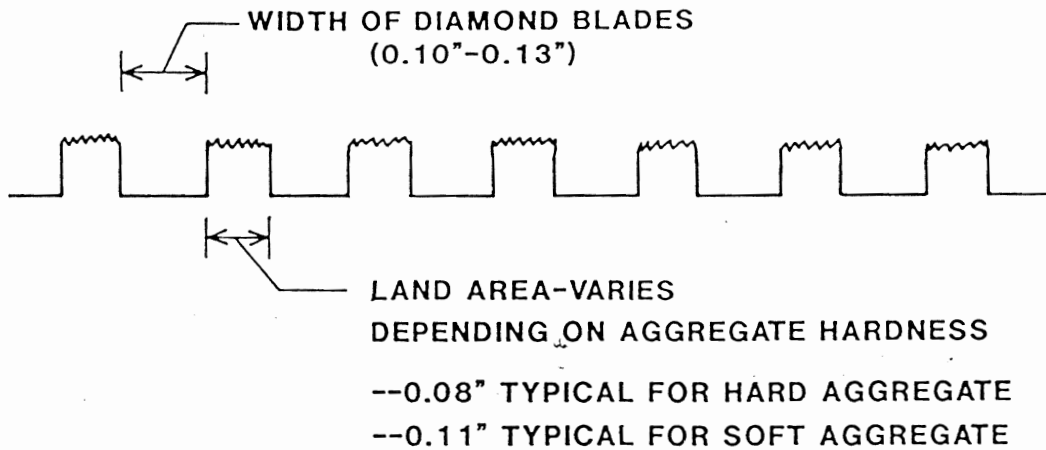


Figure 7. Hole Pattern Used on a Cement-Limestone Dust Grout CRCP Project (3).

GRINDING



GROOVING

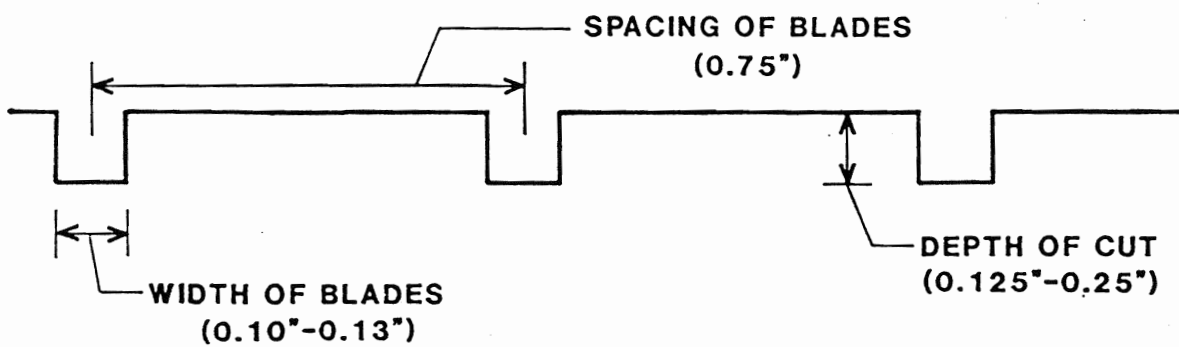


Figure 3. Grinding and Grooving Typical Dimensions.

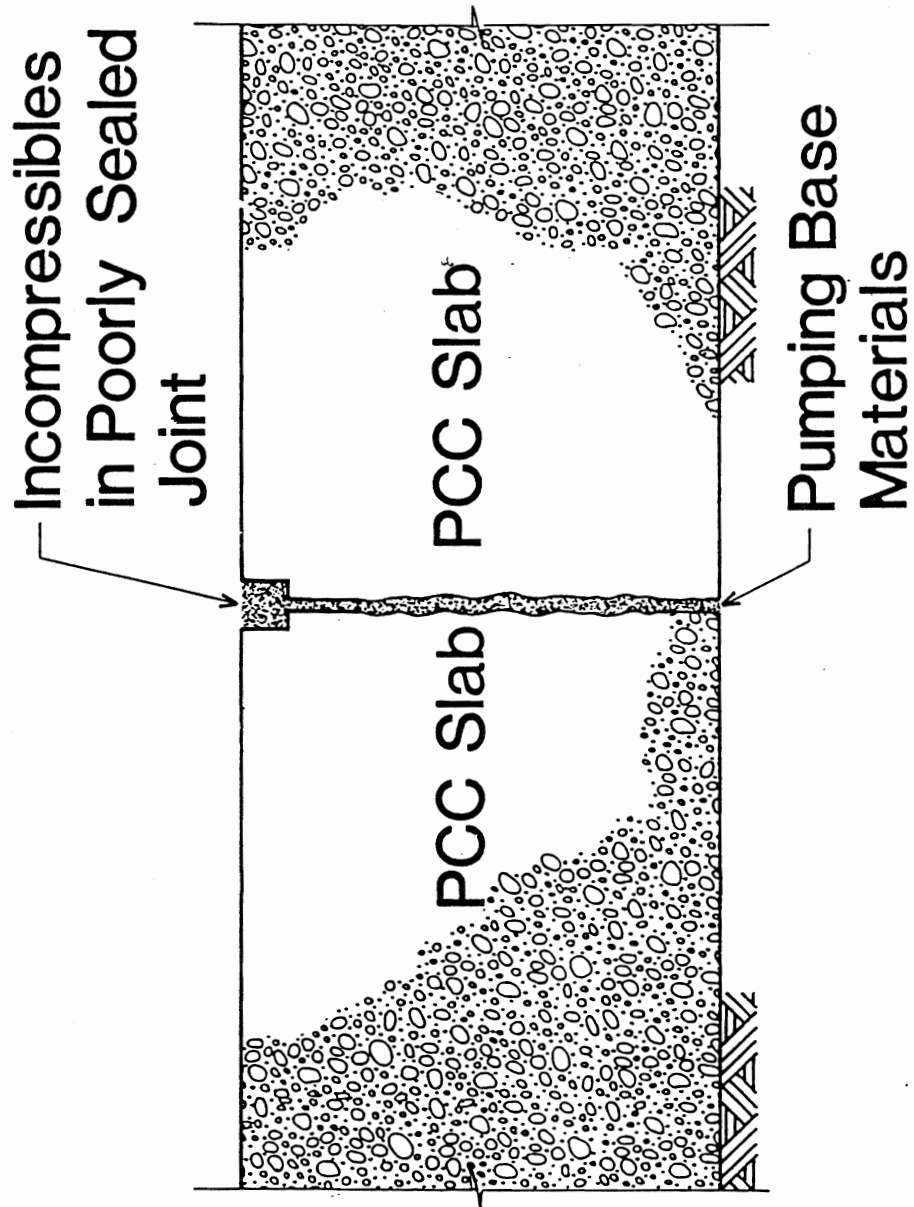


Figure 1. Intrusion of Incompressibles into Transverse Joint Through Poorly Sealed Joint and Pumping of Base.

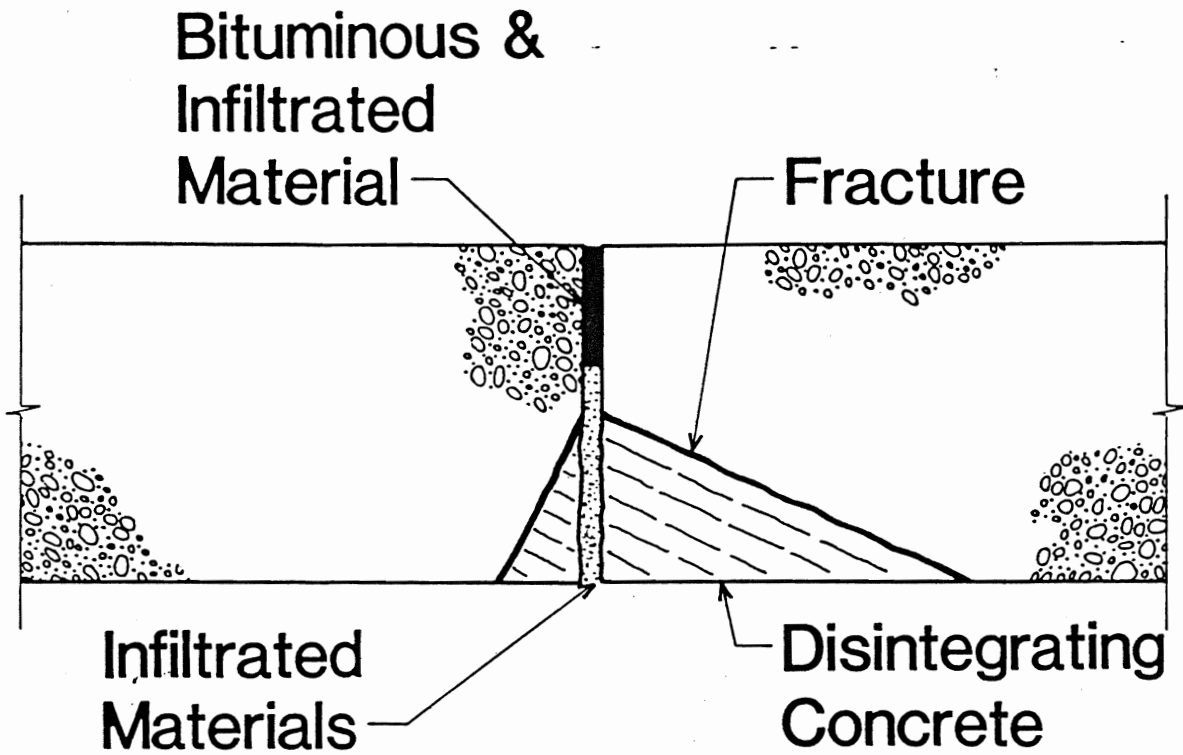


Figure 4a. Fracture of Lower Portion of Slab Due to Infiltrated Materials.

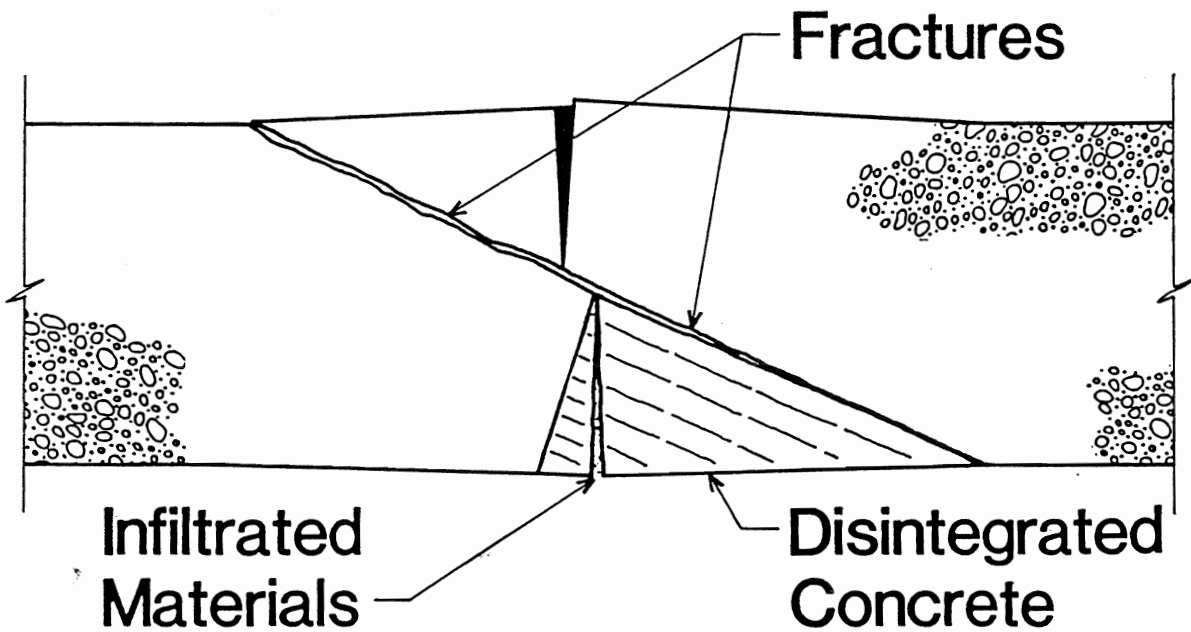


Figure 4b. Development of Blowup Along Inclined Plane of Fracture.

TYPICAL PRESSURE RELIEF JOINT DETAIL

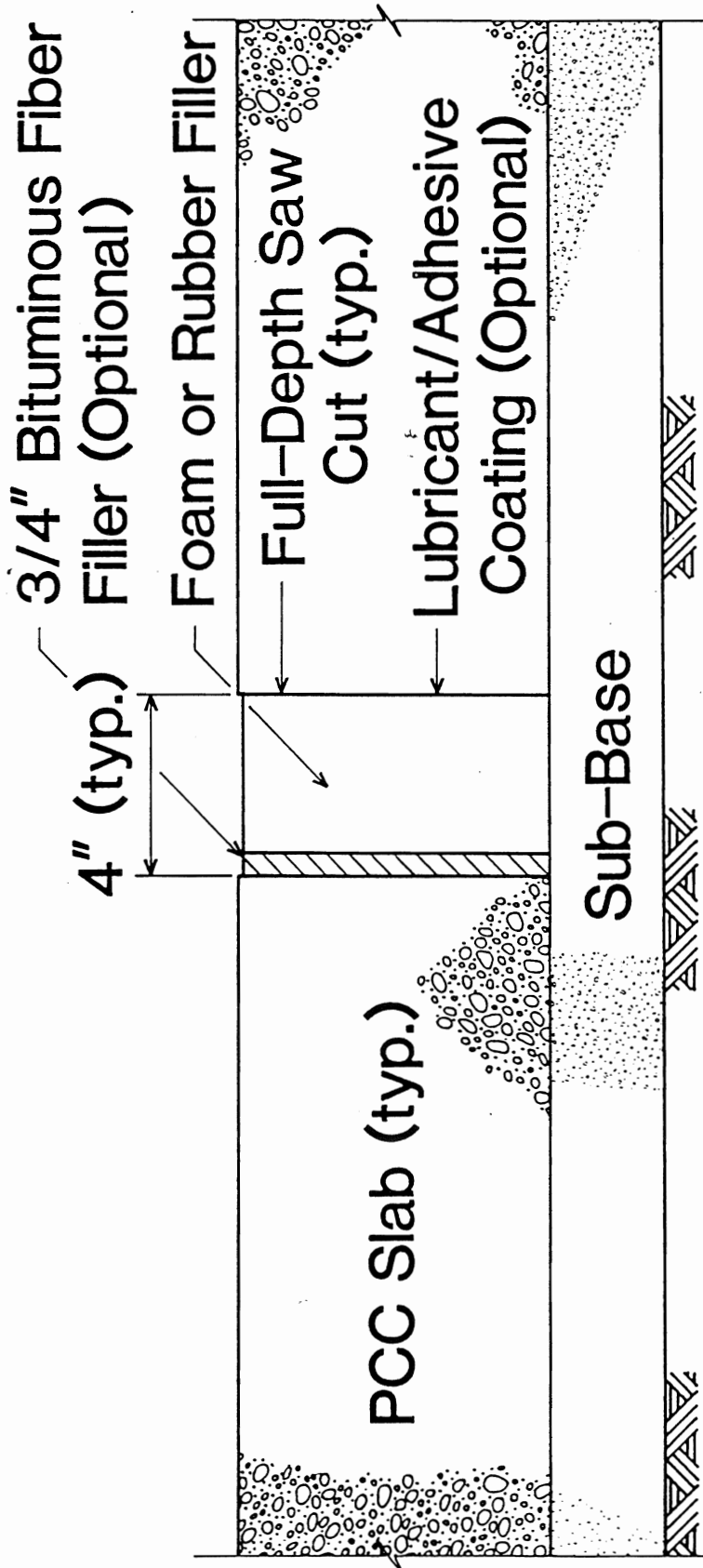


Figure 7. Cross-Section of a Typical Nonbituminous-Filled Relief Joint Without Load Transfer.

ILLINOIS SPECIAL EXPANSION JOINT

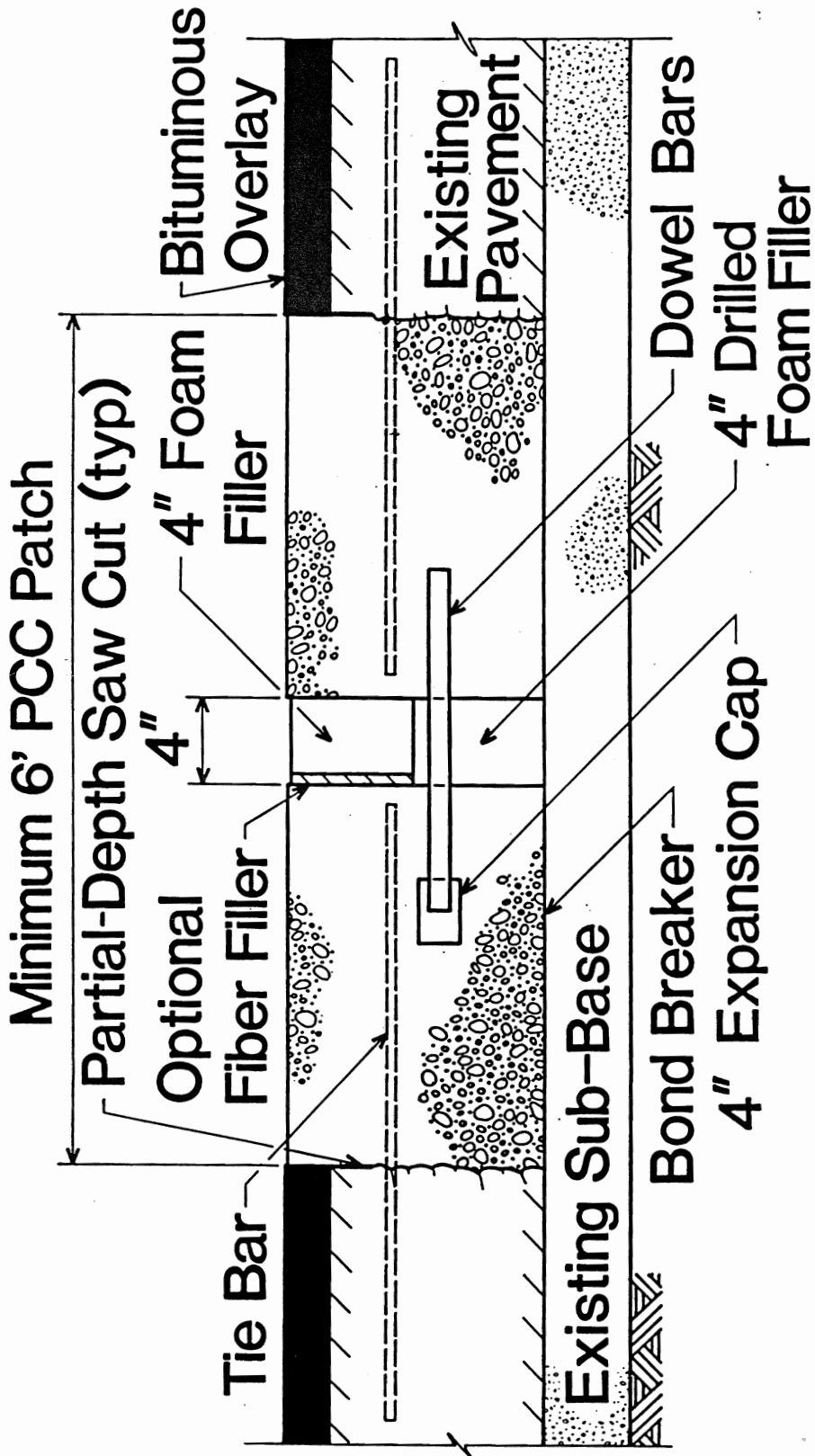


Figure 9. Illinois DOT Heavy-Duty Pressure Relief Joint Design.

DOWEL PLACEMENT DETAILS

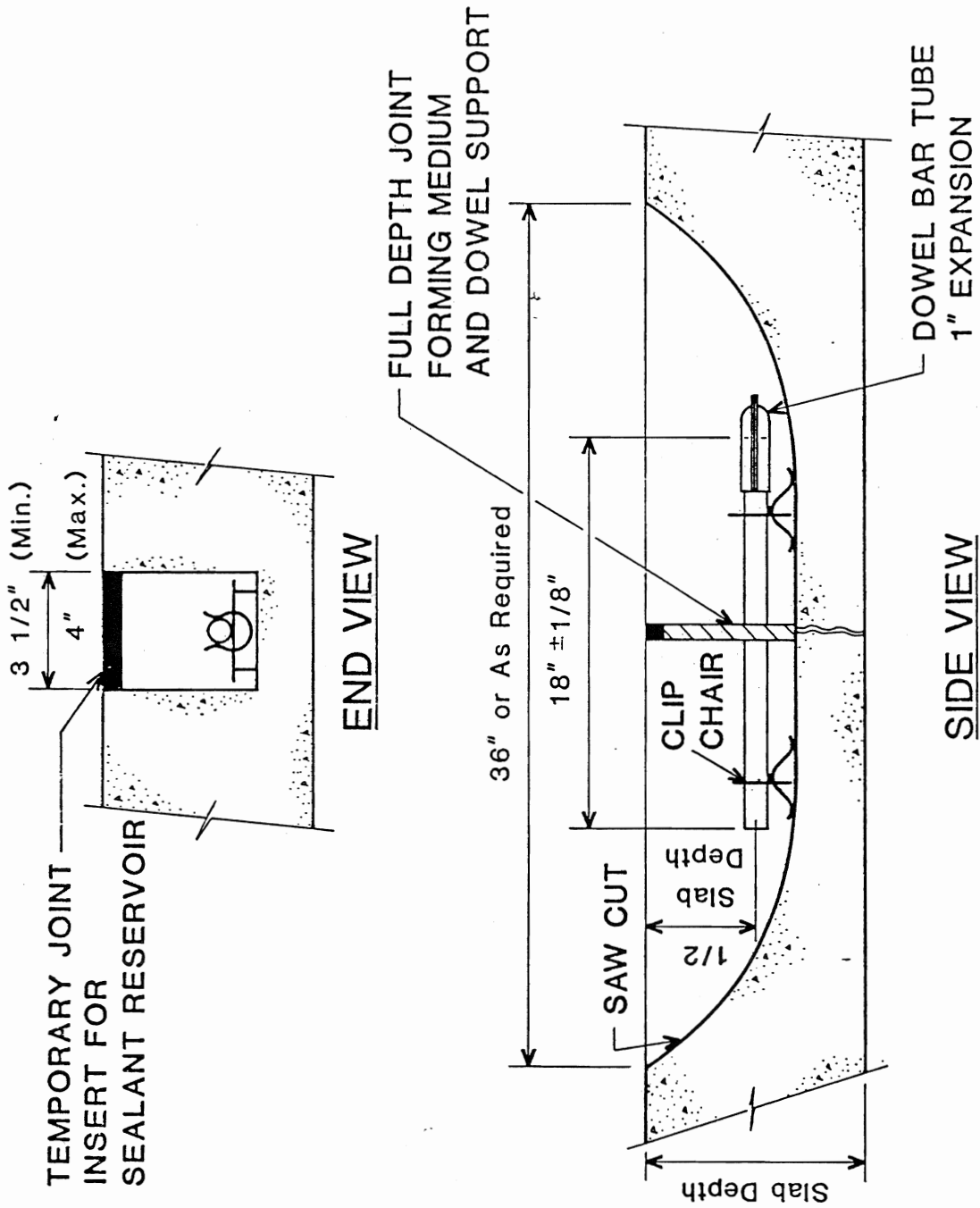
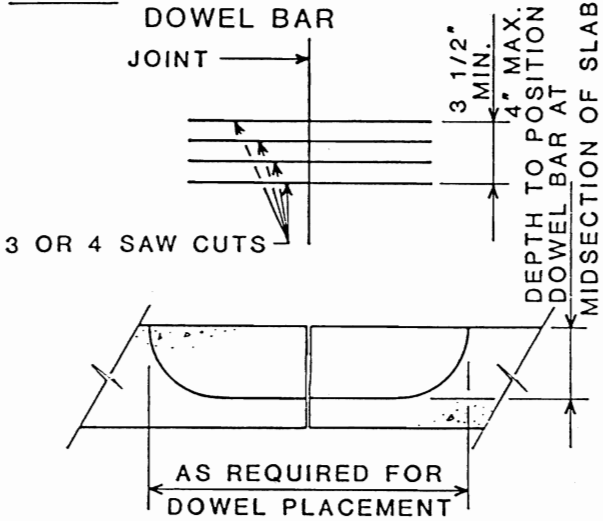
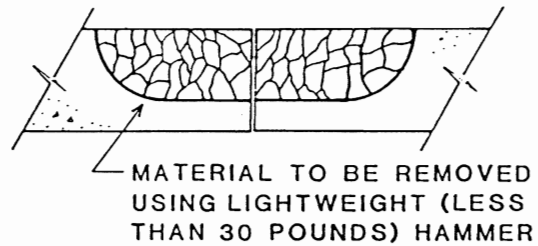


Figure 7. Dowel Bar Load Transfer Device (Ref. 7).

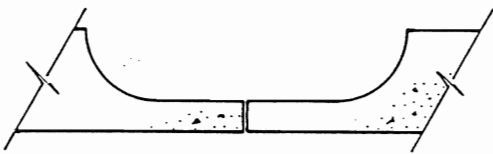
STEP 1-SAW SLOT FOR EACH DOWEL BAR



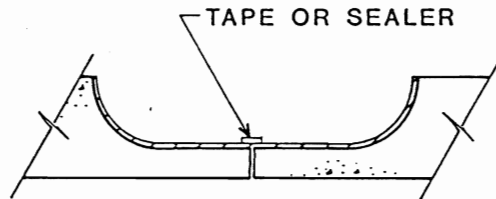
STEP 2-REMOVE CONCRETE TO FORM KERF AND RINSE WITH WATER



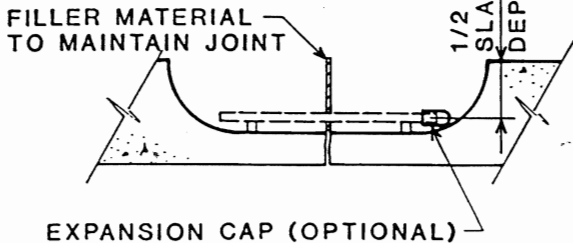
STEP 3-SANDBLAST AND VACUUM CLEAN SLOT



STEP 4-SEAL OR PRIME ALL THREE SIDES OF SLOT. TAPE OR SEAL CRACKS AND JOINTS



STEP 5-PLACE AND ALIGN DOWEL BARS AND JOINT FILLER MATERIAL



STEP 6-PLACE REPAIR MATERIAL

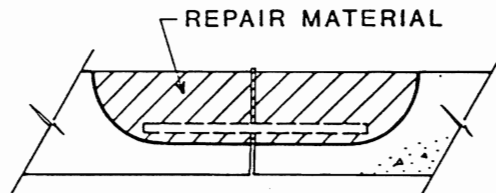
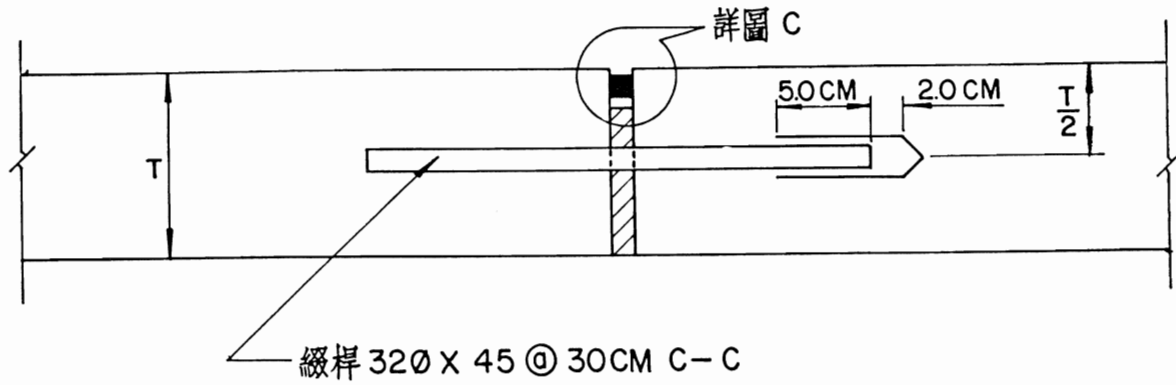
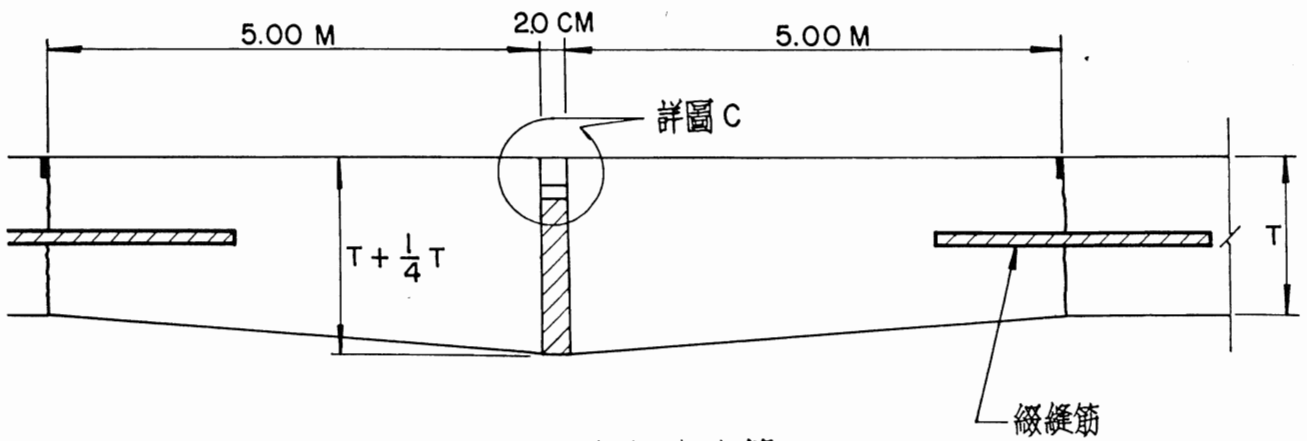


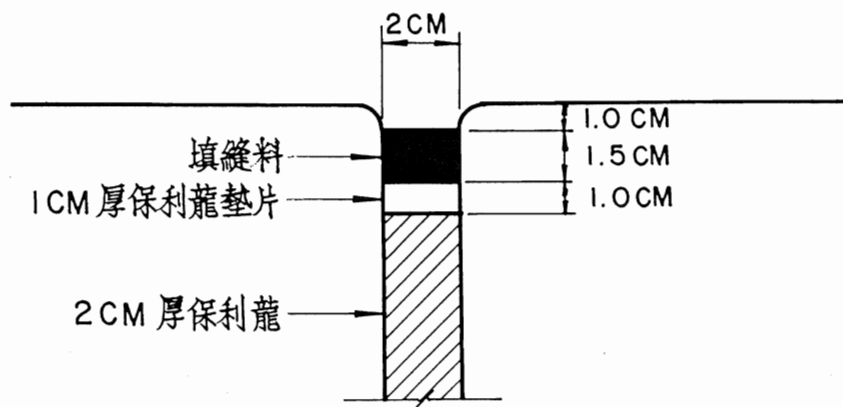
Figure 15. Construction Procedures for Dowel Bar Installation.



(a) 綴縫筋伸縫



(b) 加厚伸縮縫



(c) 伸縫填縫詳圖

圖 2.3 剛性路面伸縮

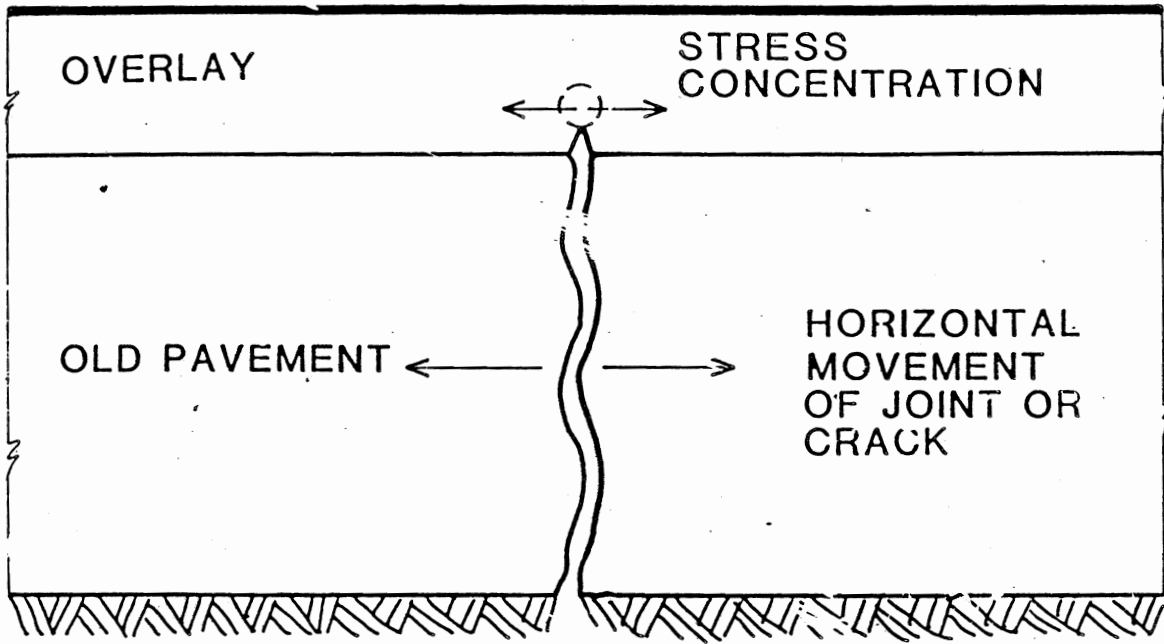


Figure 1. Horizontal Deformations Due to Temperature Change in the Old Pavement.

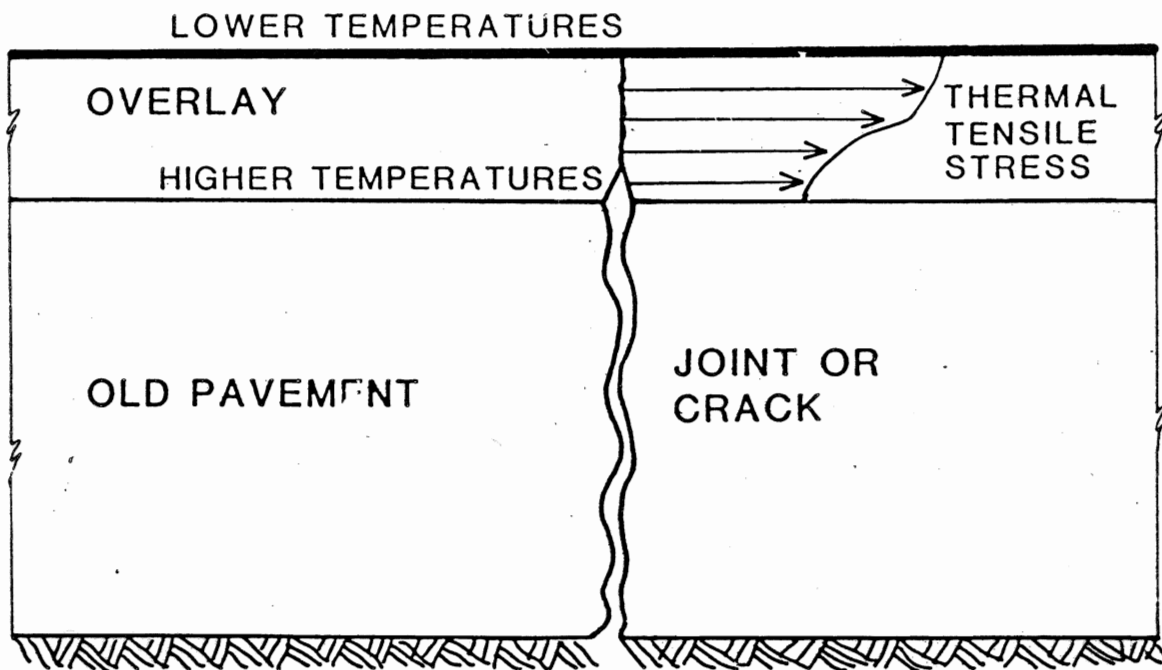
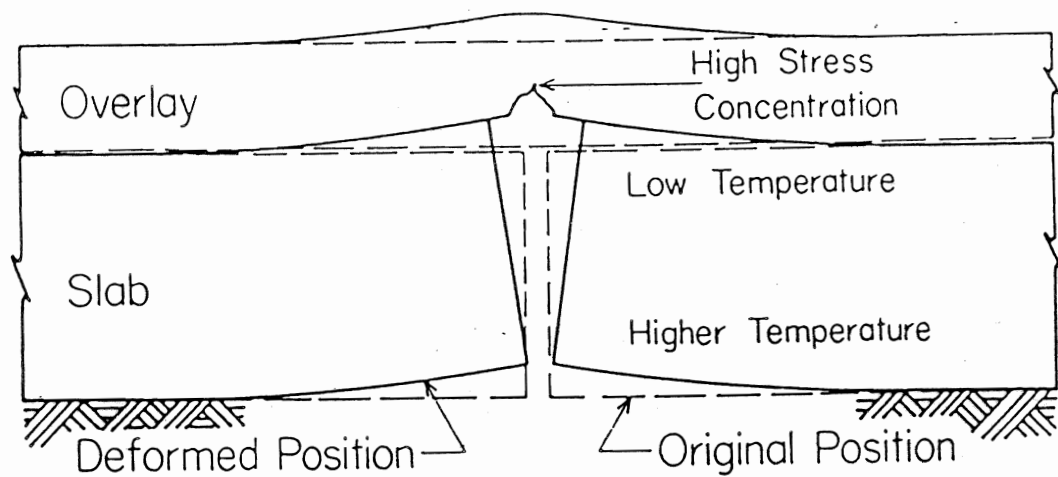


Figure 2. Action of Thermal Stress in Overlay Producing a Crack Above the Crack or Joint.



Note: This is not a thermal stress in the overlay.

Figure 3. Thermal Curling of the Pavement Slab
Caused by Temperature Differential
Across the Pavement Slab.

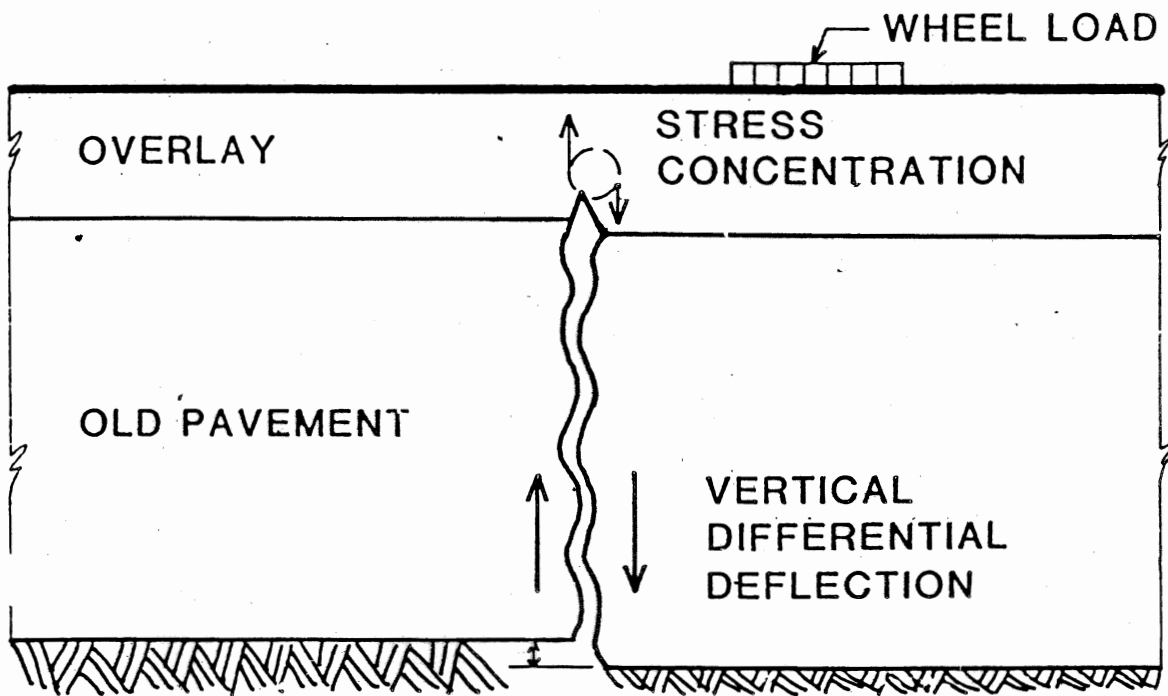


Figure 4. Stress Concentration due to the Vertical Differential Deflection Caused by Traffic Loading.

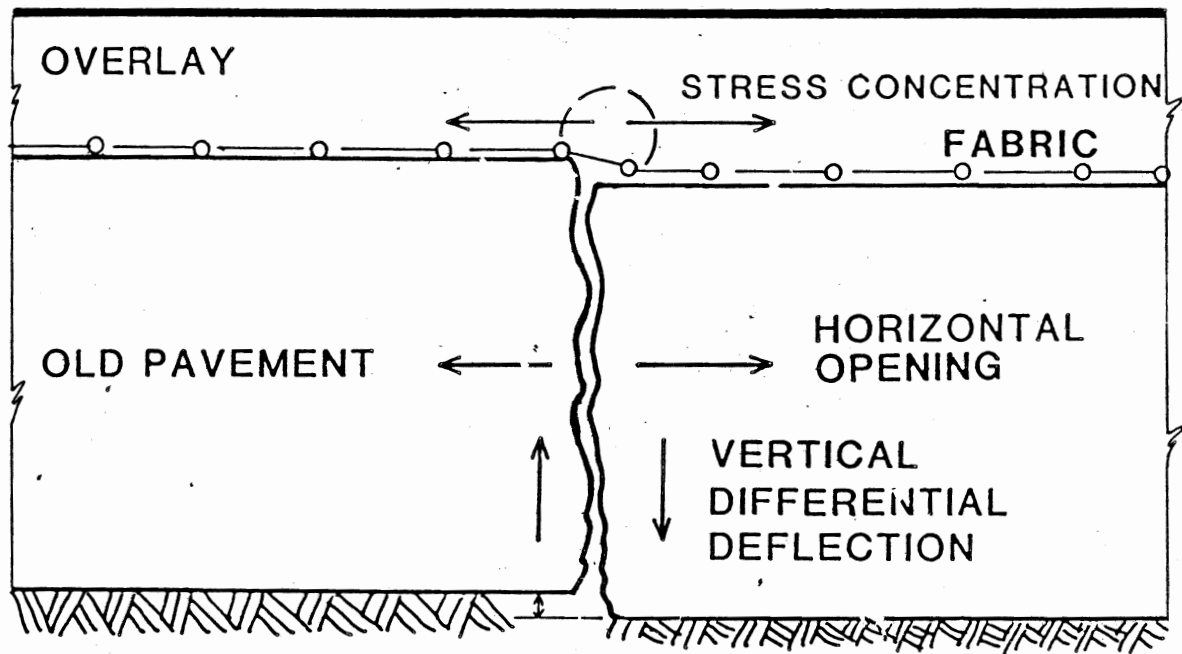


Figure 6. Improper Placement of Geotextible Fabric.

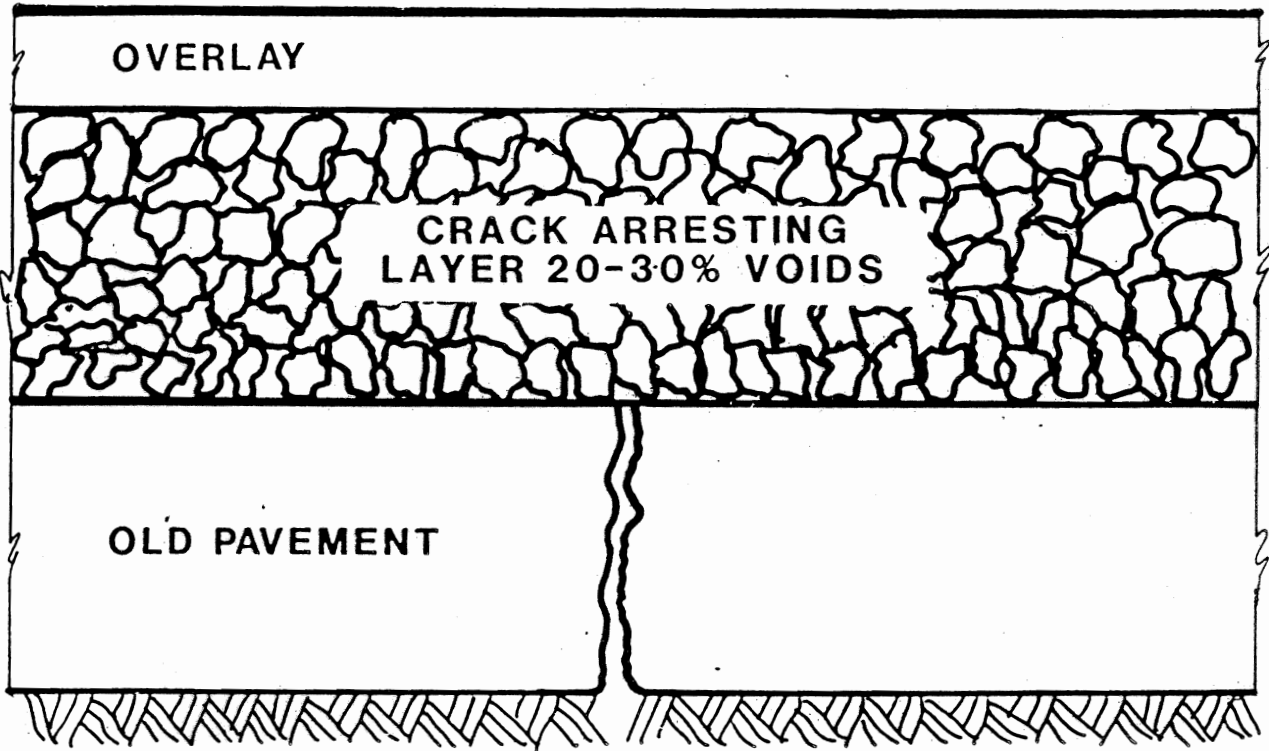


Figure 10. Schematic of Crack Arresting Interlayer.
(Bituminous-Treated Large Aggregate)

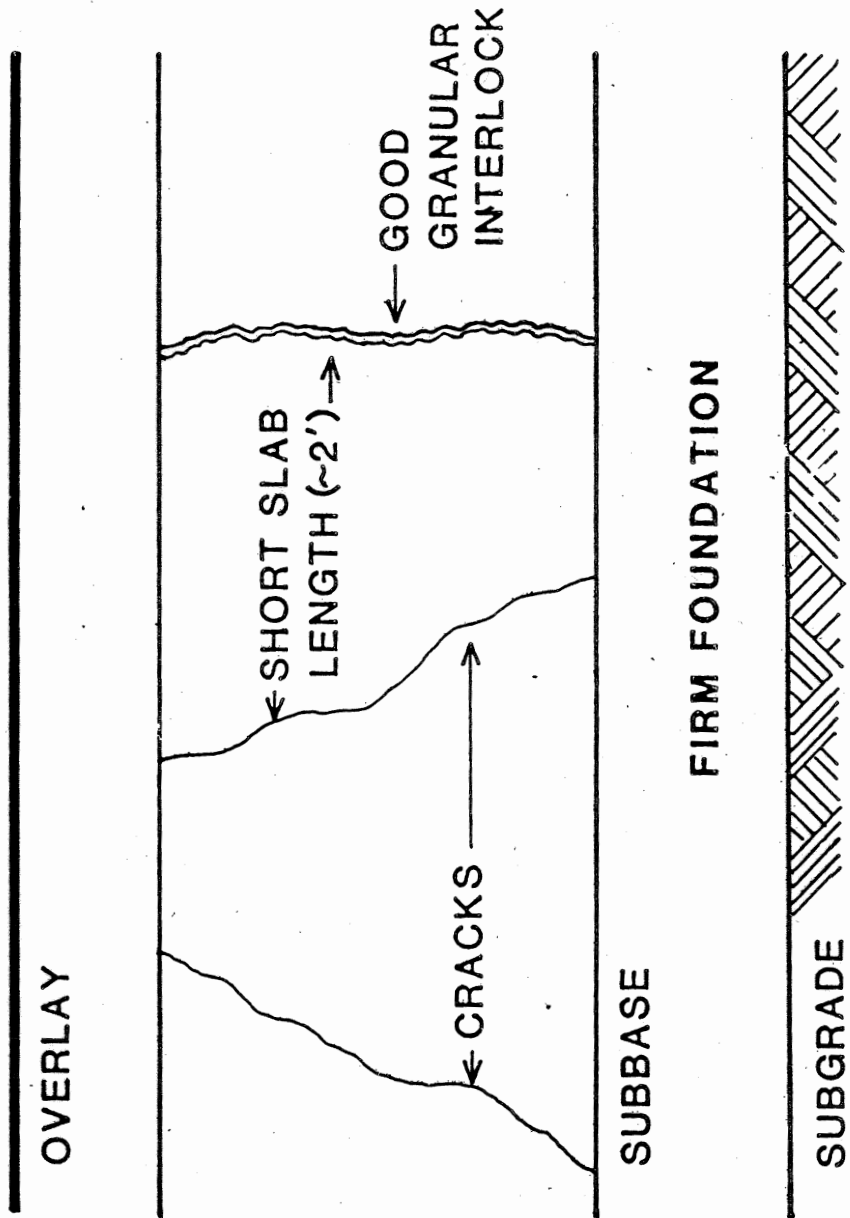


Figure 11. Schematic of Crack and Seat.

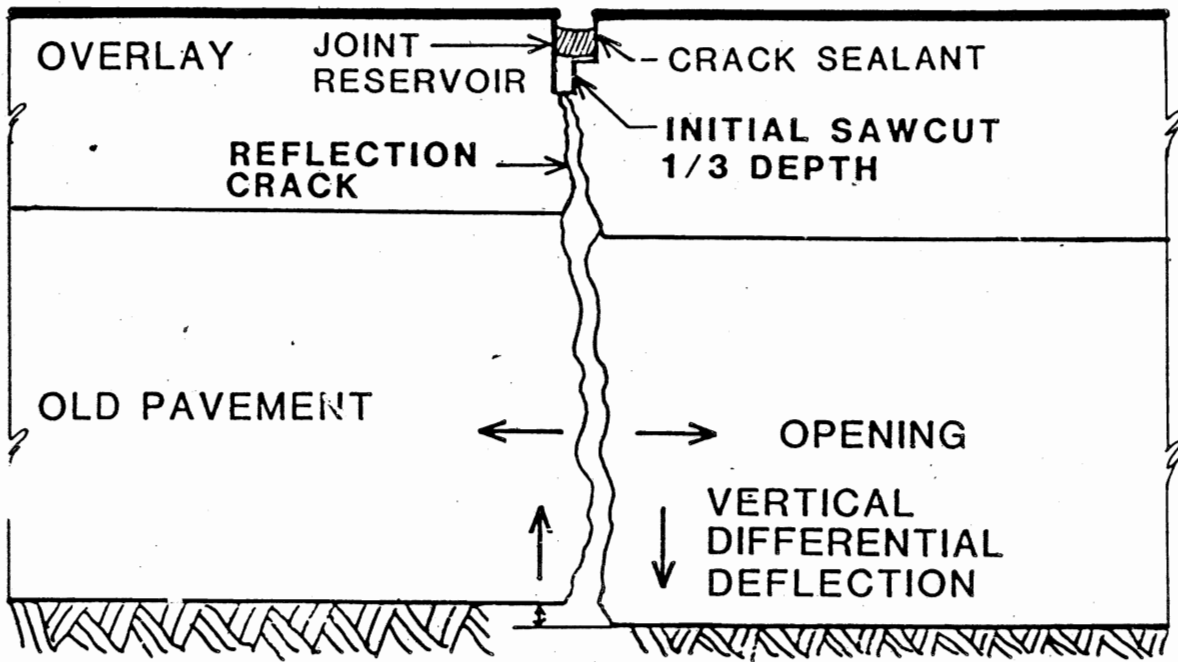
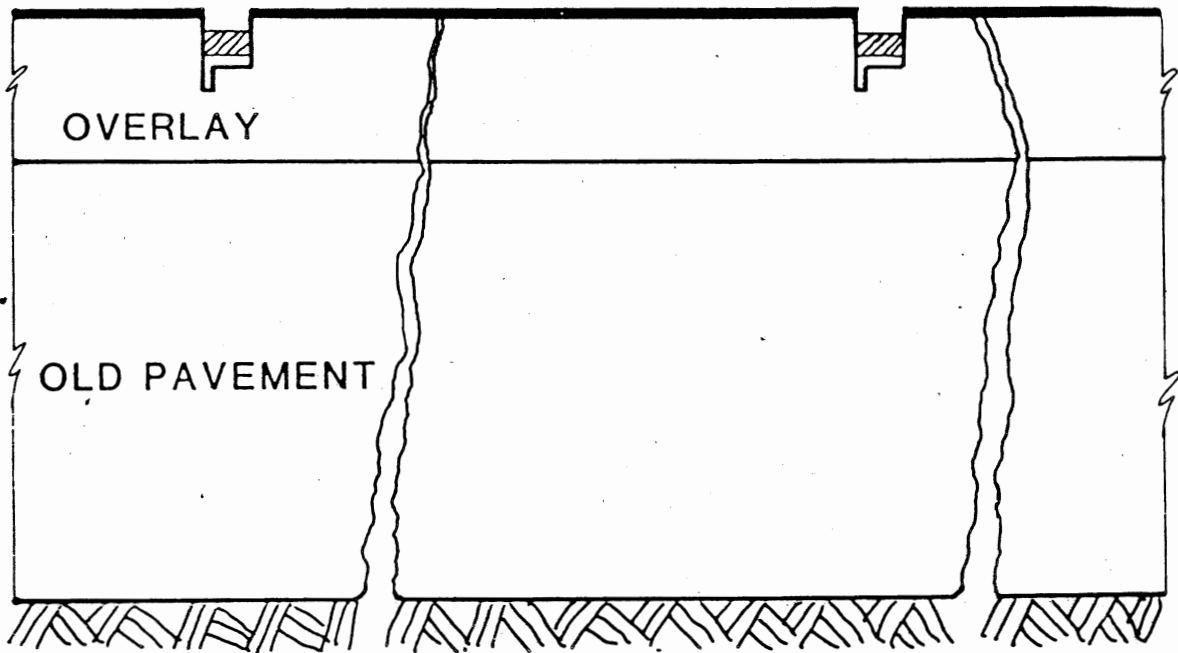


Figure 12. Schematic of Sawing and Sealing of Bituminous Overlays.



MISMATCHED JOINTS

Figure 13. Schematic of Sawing and Sealing of Bituminous Overlay with Mismatched Joints.

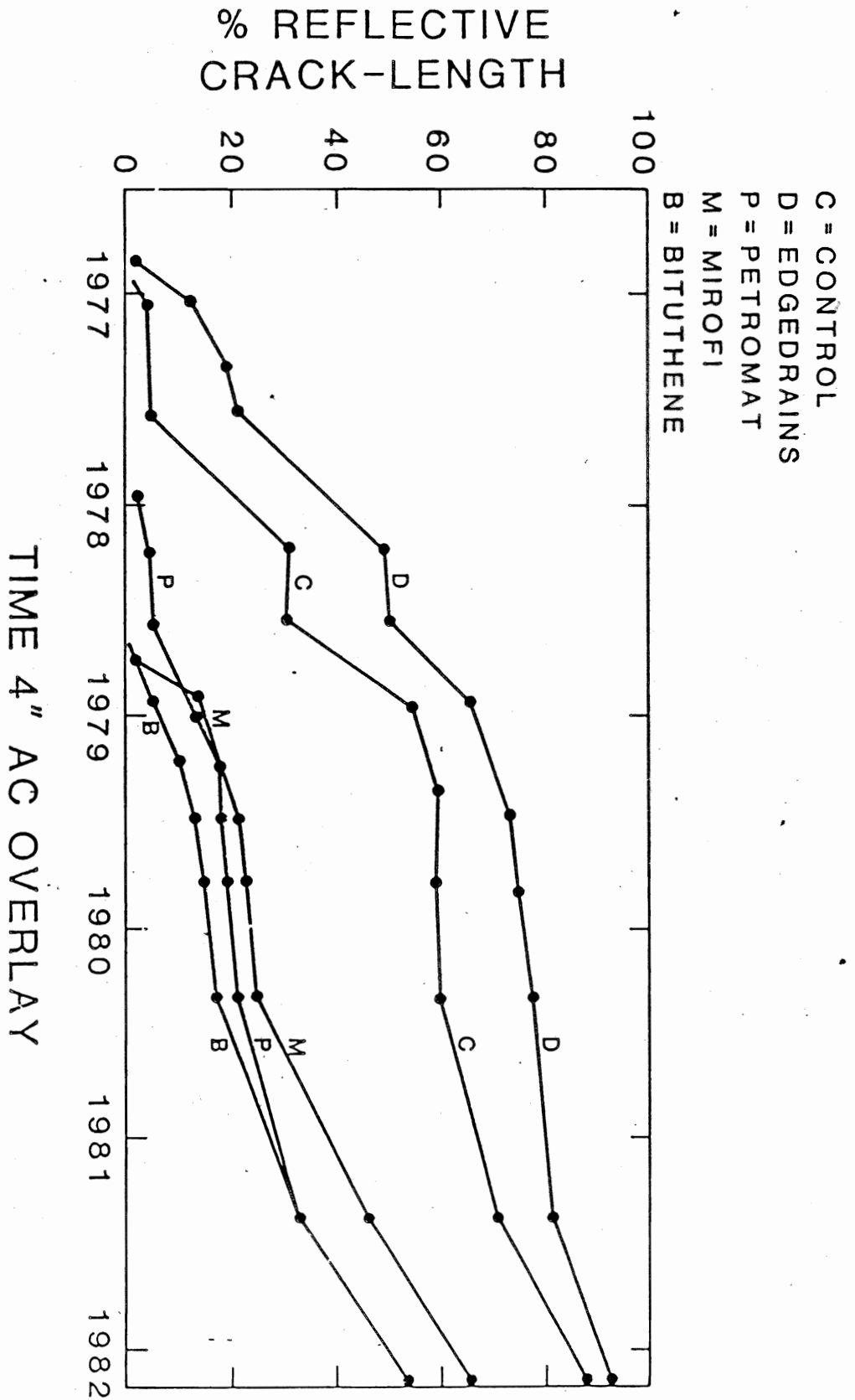


Figure 15. Reflective Cracking in 4-inch Overlays with Various Treatments (Georgia DOT).