

# Chapter 4

## Joint Resealing and Crack Sealing

From... Maintenance Technical  
Advisory Guide (MTAG)

# Learning Objectives

1. List the benefits of joint resealing and crack sealing
2. List the desirable sealant properties and characteristics
3. Describe recommended installation procedures
4. List important quality control activities
5. Describe potential construction and performance problems
6. Identify troubleshooting solutions

# Presentation Outline

- Introduction
- Material selection and reservoir design
- Construction
- Quality control
- Troubleshooting

# Introduction

*Placement of an approved sealant material in an existing joint or crack to reduce moisture infiltration and prevent intrusion of incompressibles*

# PCC Pavement Deterioration

## Influence of Moisture Infiltration

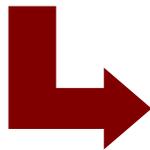
Cracks/Joints

+

Moisture  
Infiltration



Subgrade  
Softening



**Loss of Fines (Pumping)**

**Corner Breaks**

**Transverse Joint Faulting**

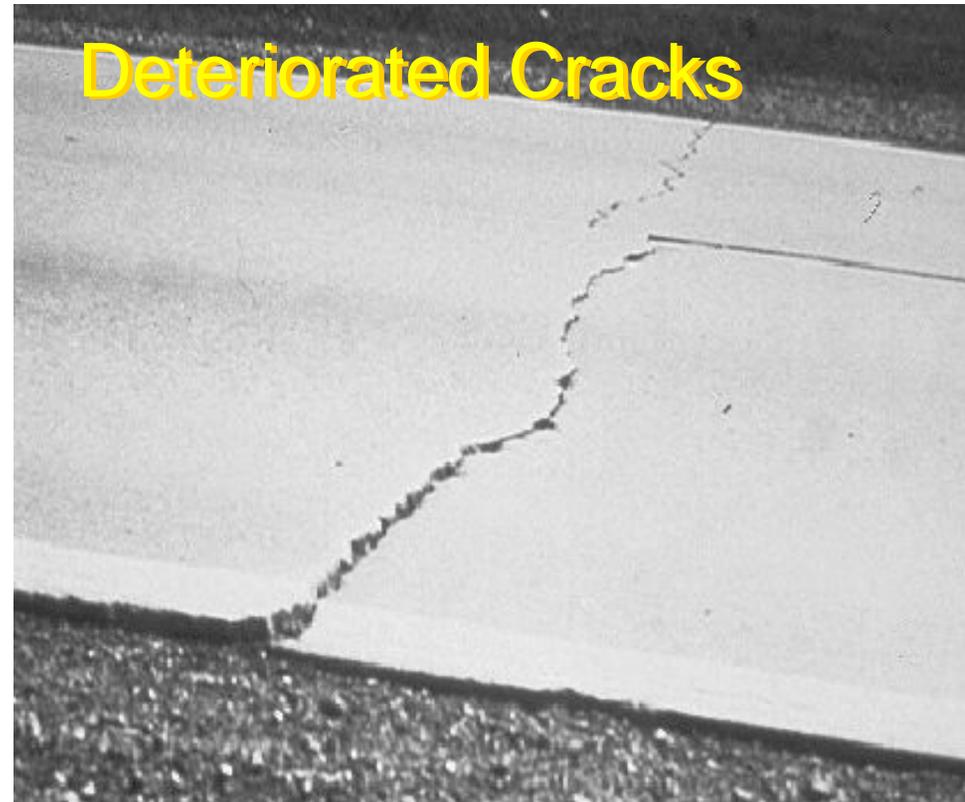
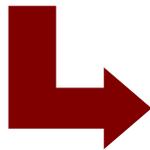
# PCC Pavement Deterioration

## Influence of Moisture Infiltration

Cracks  
+  
Moisture  
Infiltration



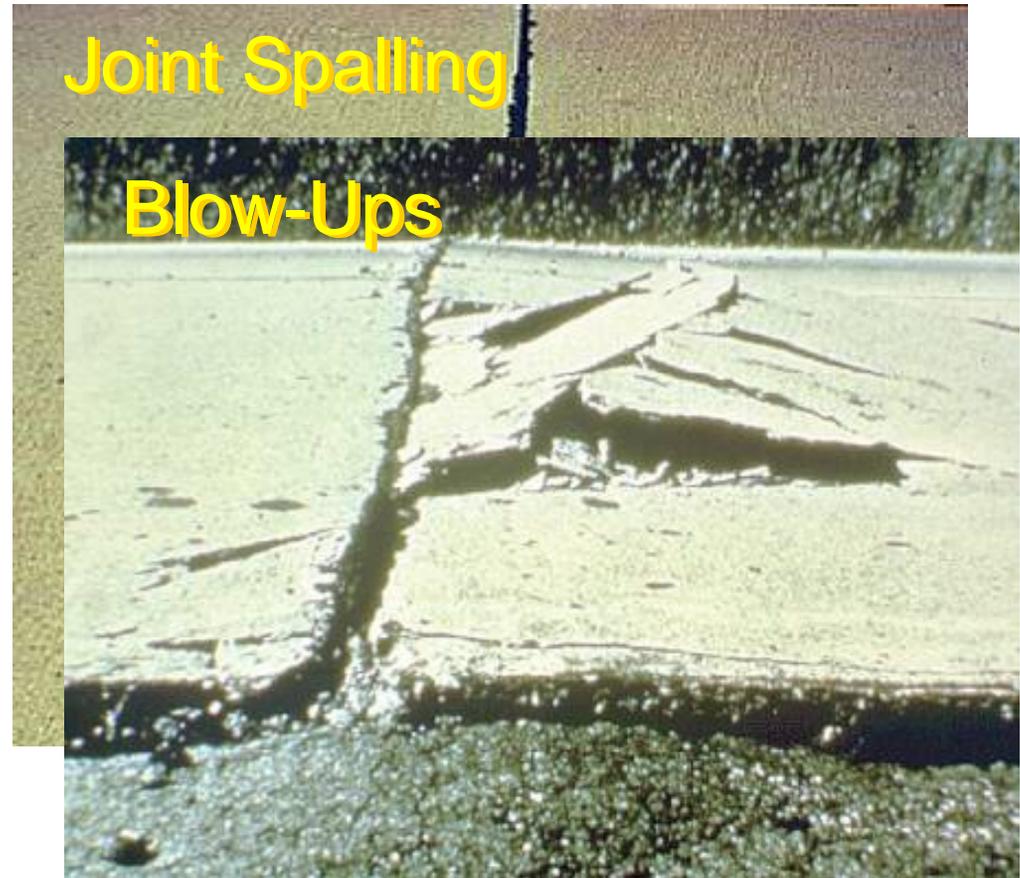
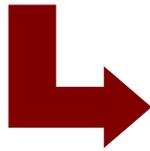
Breakdown of  
Existing Cracks



# PCC Pavement Deterioration

## Influence of Incompressibles

Cracks/Joints  
+  
Incompressible  
Material



# PCC Joint Resealing

## Current Practice

- Debate: to seal or not to seal
- Some believe the benefits do not offset the costs
- Most states seal transverse joints
- Recommendation: continue to reseal joints if they were originally sealed!

# Guidelines for Resealing Joints

- Sealant no longer functional
- Pavement not severely deteriorated
- Performed with other CPR activities
- Moderate installation temperatures
- Proper material selection and joint preparation is essential

# Guidelines for Sealing Cracks

- Seal working transverse cracks
- Can seal cracks  $\leq 13$  mm (0.5 in) wide
- Use special crack-sawing blades
- Same general *joint* resealing procedures apply to *crack* sealing

# Module 4-1

## Design, Materials & Specifications

From... Maintenance Technical  
Advisory Guide (MTAG)

# Material Selection

- Sealant
  - Thermoplastic materials
  - Chemically cured materials
- Backer rod

# Sealant Material

## Thermoplastic Materials

- Rubberized asphalt
- Low modulus rubberized asphalt
- PVC coal tar

# Sealant Material

## Chemically Cured Materials

- Polysulfide
- Polyurethane
- Silicone (non-sag)
- Silicone (self-leveling)

# Sealant Material

## Desirable Sealant Properties

Durability	Resistance to traffic, moisture, sunshine, and climatic variation
Extensibility	Deformation without rupturing
Resilience	Recovery from deformation and resist stone intrusion
Adhesiveness	Adherence to joint/crack walls
Cohesiveness	Resistance to internal stresses (rupturing from elongation)

# Sealant Material Performance

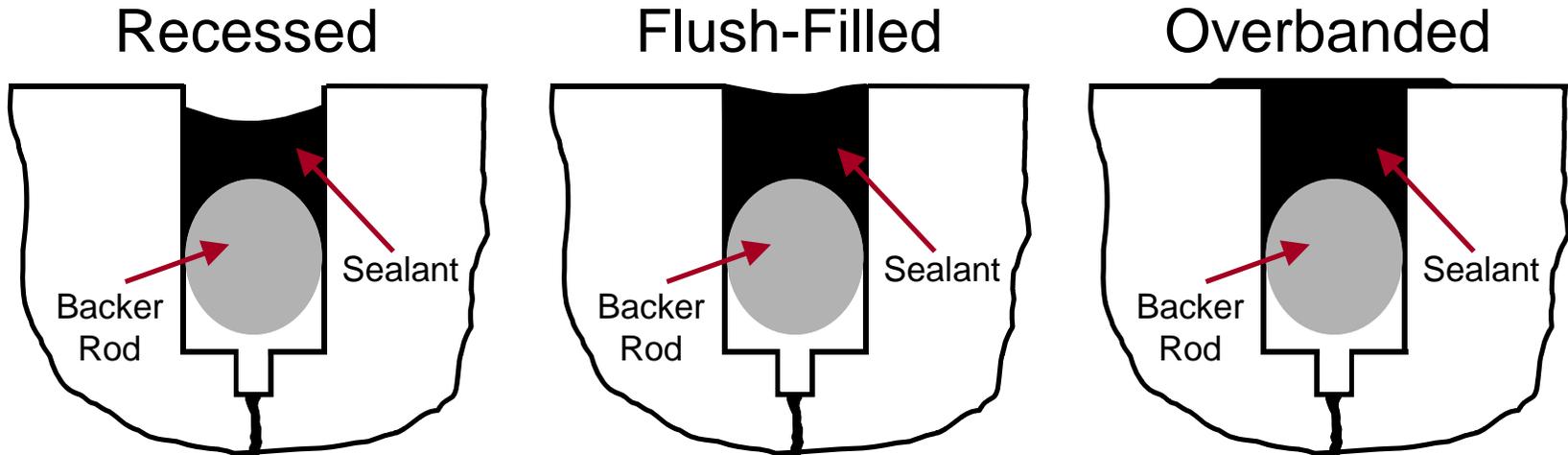
- Varies greatly with material type
- Quality of installation procedures
- Design factors affecting performance:
  - Joint movement
  - Sealant properties
  - Shape factor

# Material Selection Factors

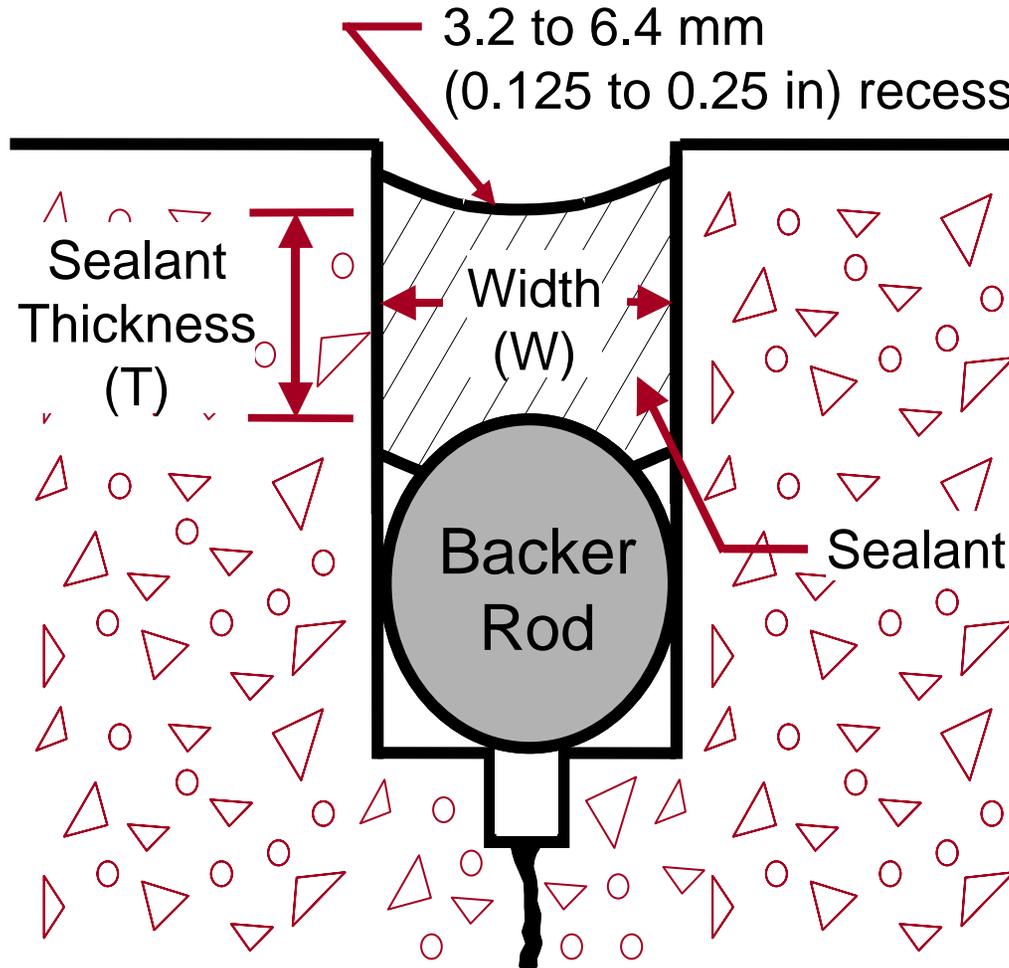
- Climate conditions
- Traffic level and percent trucks
- Crack extent and severity
- Contractor experience
- Safety concerns
- Material availability and cost

# Joint Reservoir Design

## Common Configurations



# Joint Reservoir Design



# Joint Reservoir Design

## Recommended Shape Factors

Sealant Material Type	Typical Shape Factor (W:D)
Rubberized Asphalt	1:1
Silicone	2:1
PVC Coal Tar	1:2
Polysulfide and Polyurethane	1:1

# Sealant and Related Specs

<b>Sealant Type</b>	<b>Specifications</b>	<b>Description</b>
<b>Silicone Joint Sealant*</b>	Caltrans SSP 41-200, SSP 41-210	Low modulus
<b>Asphalt Rubber Joint Sealant*</b>	Caltrans SSP 41-200, SSP 41-210	A mixture of paving asphalt and ground runner
<b>Backer Rods*</b>	ASTM D 5249	An expanded, closed-cell polyethylene form compatible with the joint sealant

<http://www.dot.ca.gov/hq/esc/oe/specifications/SSPs/2006-SSPs/>

# Typical Item Codes

Item Code	Description
120090	Construction area signs
120100	Traffic control system
128650	Portable changeable message sign
413111	Repair spalled joints
413114	Replace joint seal (existing concrete pavements)
413115	Seal joint (existing concrete pavements)
414091	Seal longitudinal joint
414101	Seal transverse joint
414111	Rout and seal random cracks

# Module 4-2

## Construction and Inspection

From... Maintenance Technical  
Advisory Guide (MTAG)

# Construction: Joint Resealing



# Construction: Joint Resealing Procedure

1. Sealant removal
2. Joint refacing
3. Joint cleaning
4. Backer rod installation
5. New sealant installation

# Construction: Joint Resealing

## Sealant Removal with Joint Plow

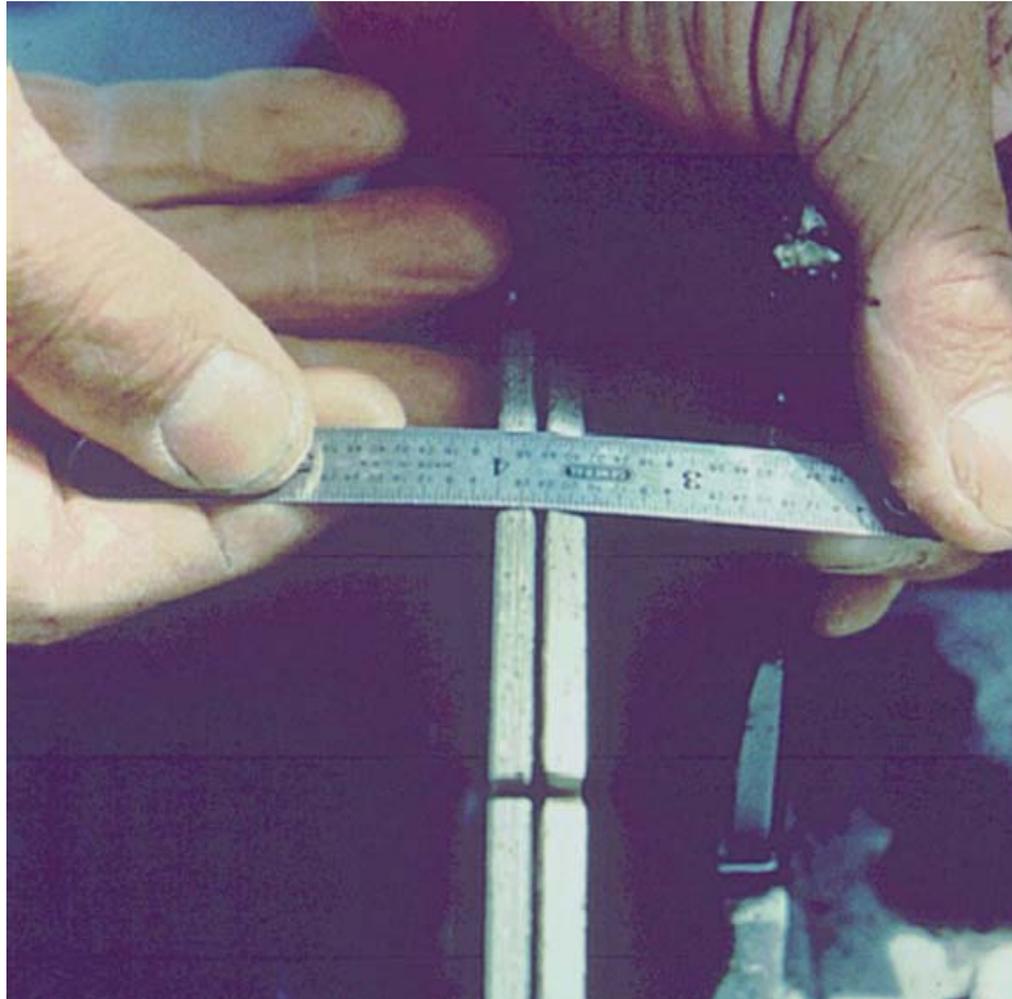


# Construction: Joint Resealing

## Joint Refacing



# Construction: Joint Resealing Refacing Blades



# Construction: Joint Resealing

## Sandblasting



# Construction: Joint Resealing

## Waterblasting



# Construction: Joint Resealing

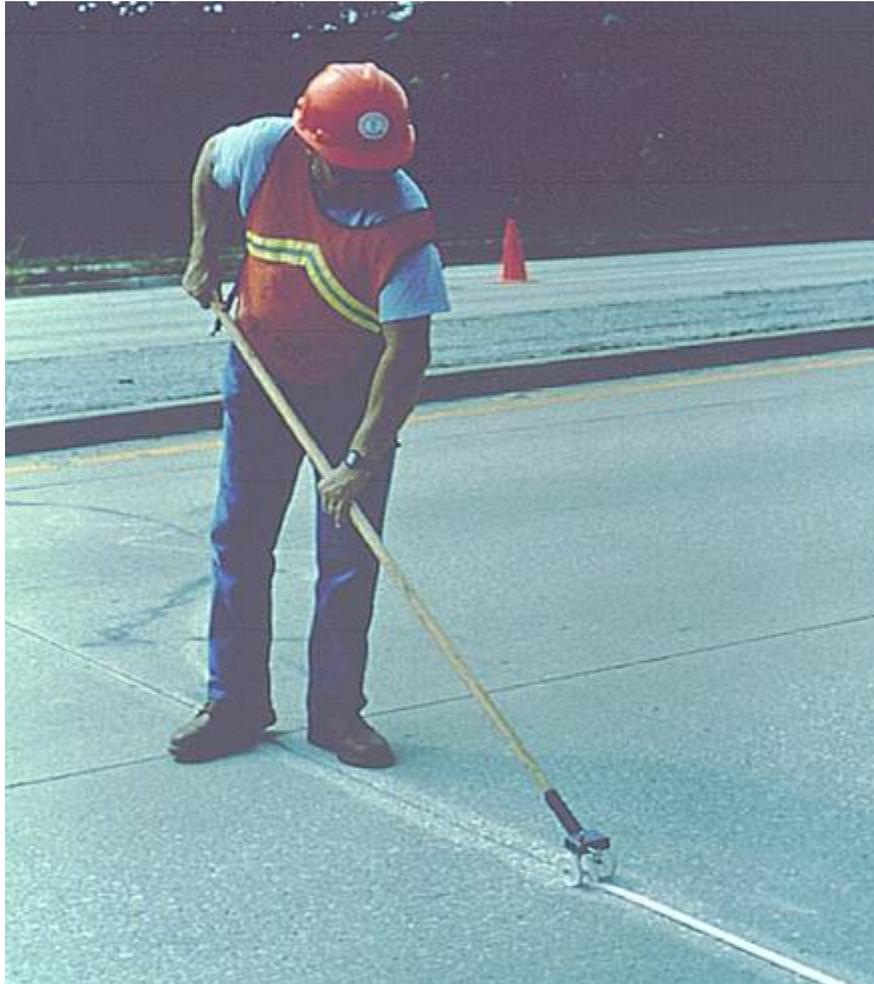
## Compressed Air



# Construction: Joint Resealing Backer Rod



# Construction: Joint Resealing Backer Rod Installation



# Construction: Joint Resealing

## Installed Backer Rod



# Construction: Joint Resealing

## Thermoplastic Sealant Installation



# Construction: Joint Resealing Silicone Sealant Installation



# Construction: Joint Resealing

## Longitudinal PCC/PCC Joints

- Tied non-working joint
- Hot-poured thermoplastic materials
- Reservoir not always formed

# Construction: Joint Resealing

## Longitudinal PCC/PCC Joints



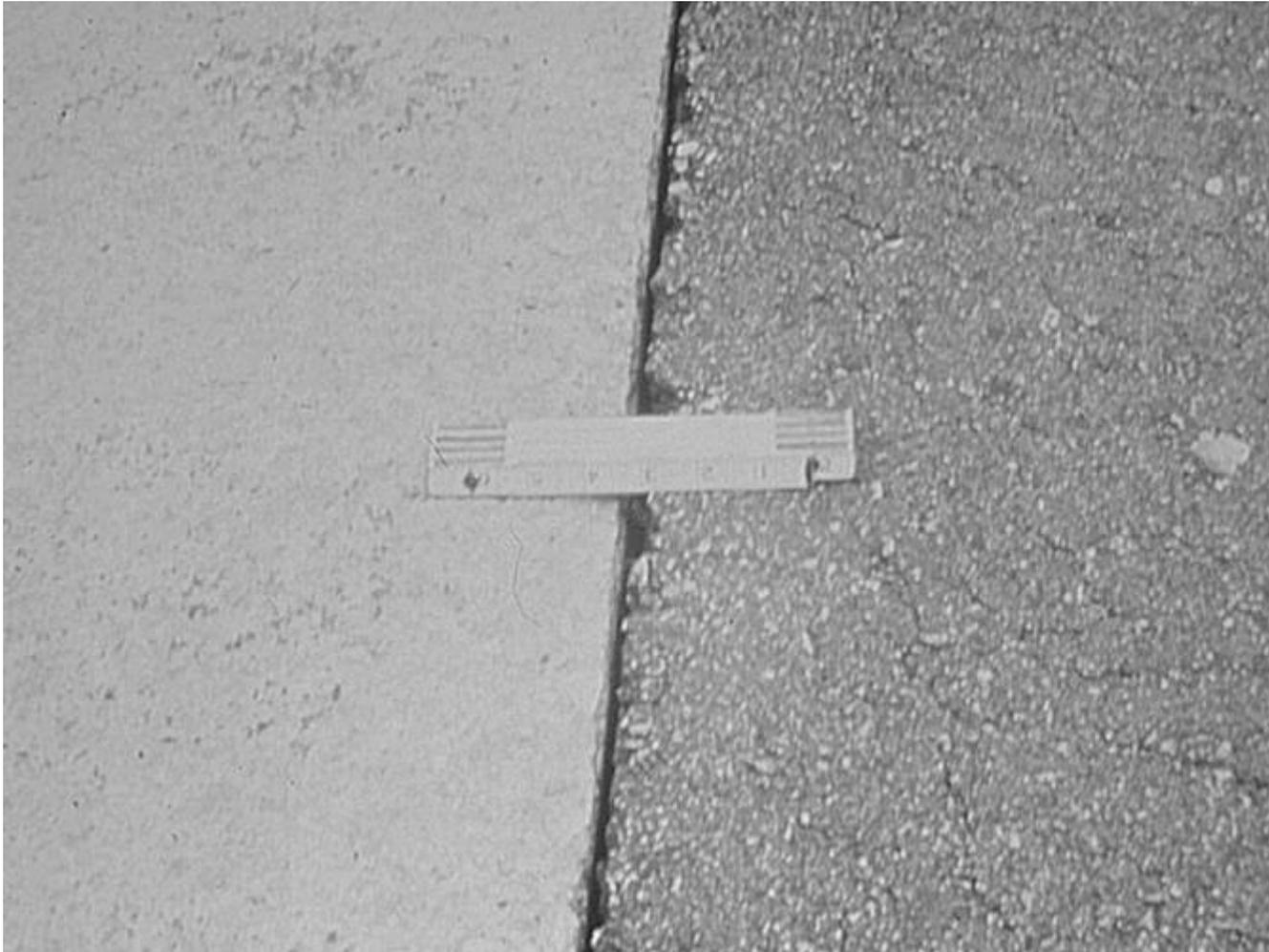
# Construction: Joint Resealing

## Longitudinal PCC/HMA Joints

- 25-mm (1-in) width (min.) and depth
- No backer rod required
- Hot-pour and silicone sealants

# Construction: Joint Resealing

## Longitudinal PCC/HMA Joints



# Construction: Joint Resealing

## Longitudinal Sawcutting



# Construction: Joint Resealing

## Sawed Longitudinal Joint Reservoir



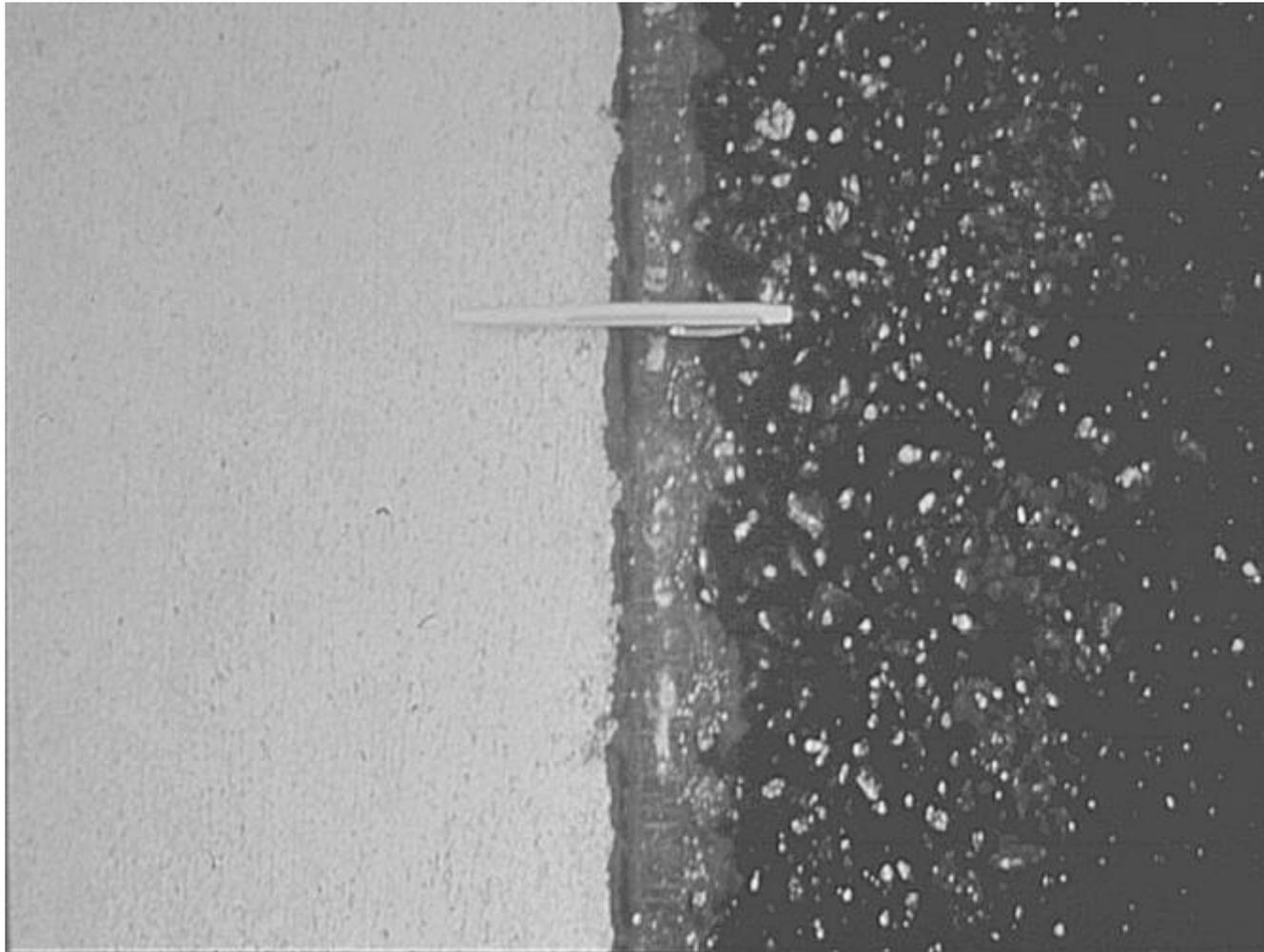
# Construction: Joint Resealing

## Installation of Sealant



# Construction: Joint Resealing

## Sealed PCC/HMA Longitudinal Joint



# Construction: Crack Sealing



# Construction: Crack Sealing Procedure

1. Crack sawing
2. Cleaning
3. Backer rod Installation
4. Sealant installation

# Construction: Crack Sealing Crack Sawing



# Construction: Crack Sealing

## Completed Crack Seal



# Quality Control

- Sealant preparation
- Surface preparation
- Placement conditions
- Method of application
- Curing
- Opening to traffic

# Project Checklist

- Preliminary Responsibilities
  - Project review
  - Document review
- Materials Checks
  - Sealant
  - Primer
  - Backer rod
  - General

# Project Checklist

- Equipment Inspections
  - Hot-applied sealant melters
  - Cold-applied sealant pumps
  - Joint cleaning equipment
  - Other equipment
- Others
  - Weather requirements
  - Traffic control

# Project Checklist

- Project Inspection Responsibilities
  - Joint preparation
  - Backer material installation
  - Hot-applied sealant installation
  - Cold-applied sealant installation
  - Opening the pavement to traffic
- Cleanup Responsibilities

# Presentation Outline

- Introduction
- Material selection and reservoir design
- Construction
- Quality control
- Troubleshooting

# Troubleshooting

- Construction quality and performance problems
- Approach:



# Troubleshooting

What is wrong here?



Too Much Applied Sealant

# Troubleshooting

What is wrong here?

Dirt on Refaced Surfaces



# Troubleshooting

## Possible Construction Problems

- Problem:  
*Bubbles in hot applied sealant material*
- Potential causes?

# Troubleshooting

## Possible Construction Problems

- Problem:  
*Irregularities in surface of tooled sealant*
- Potential causes?

# Troubleshooting

## Possible Construction Problems

- Problem:  
*Tracking of material*
- Potential causes?

# Troubleshooting

## Possible Construction Problems

- Problem:  
*Punctured or stretched backer rod*
- Potential impact on performance?

# Troubleshooting

## Possible Construction Problems

- Problem:  
*Burrs along sawed edge*
- Potential impact on performance?

# Troubleshooting Guide – Causes and Solutions

- Dust, dirt, or contamination on refaced joint or crack surfaces.
- Bubbles in hot-applied sealant material.
- Punctured or stretched backer rod.
- Raveling, spalling, or other irregularities of the joint walls prior to sealant application.
- Difficulty in installing sealant material.
- Tracking of material (i.e., the transfer of sealant material onto unwanted areas of the surface area via shoes, tires, and so on).
- Bumps or irregularities in surface of tooled sealant application.

# Presentation Outline

- Introduction
- Material selection and reservoir design
- Construction
- Quality control
- Troubleshooting

# Review: Learning Objectives

1. List the benefits of joint resealing and crack sealing
2. List the desirable sealant properties and characteristics
3. Describe recommended installation procedures
4. List important quality control activities
5. Describe potential construction and performance problems
6. Identify troubleshooting solutions

# Thank You

## Questions?