

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

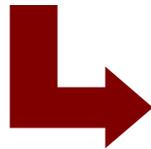
Cracks/Joints

+

Moisture
Infiltration



Subgrade
Softening



Loss of Fines (Pumping)

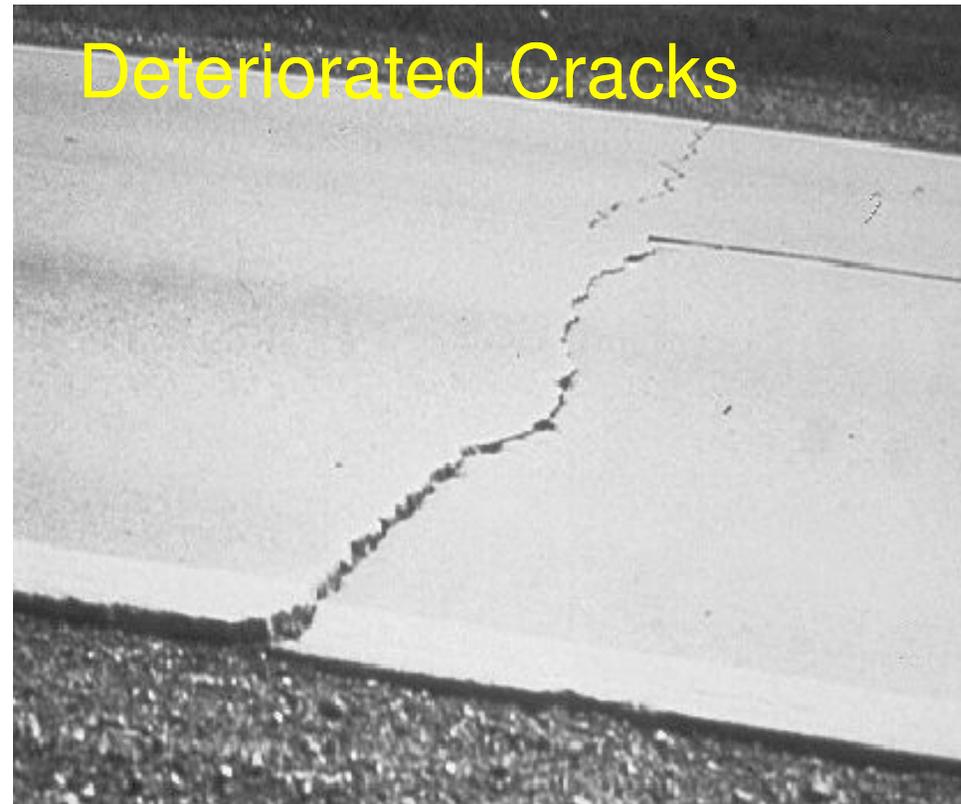
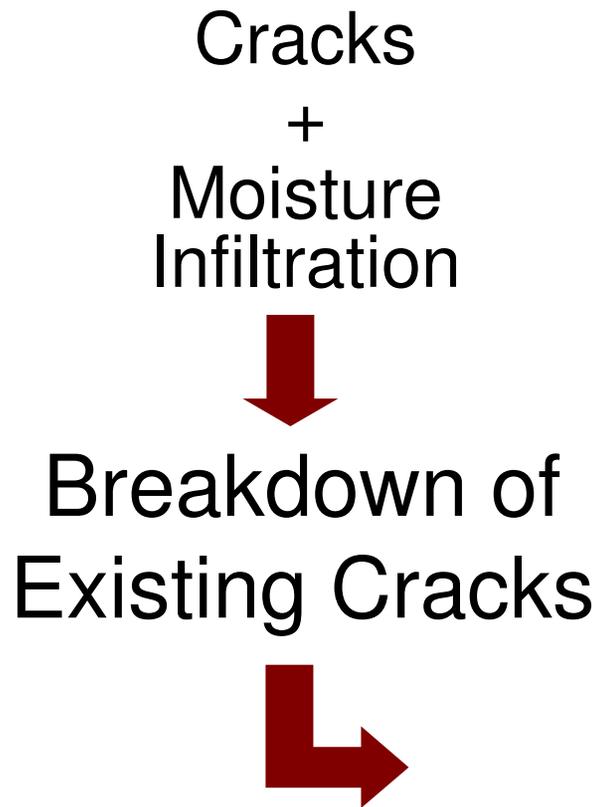
Corner Breaks

Transverse Joint Faulting



PCC Pavement Deterioration

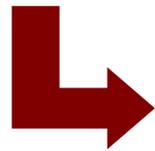
Influence of Moisture Infiltration



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 ≤ 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
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Material Selection

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

Sealant Material

Thermoplastic Materials

- Rubberized asphalt
- Low modulus rubberized asphalt

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

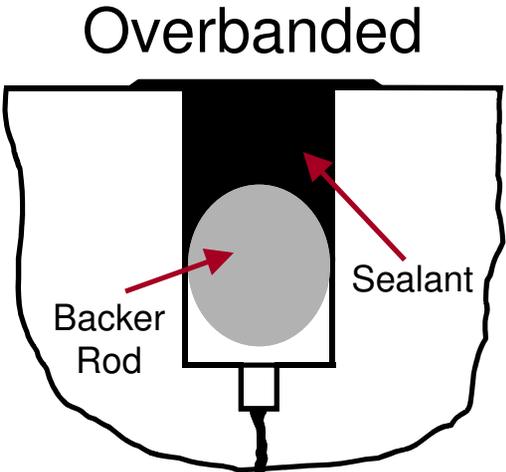
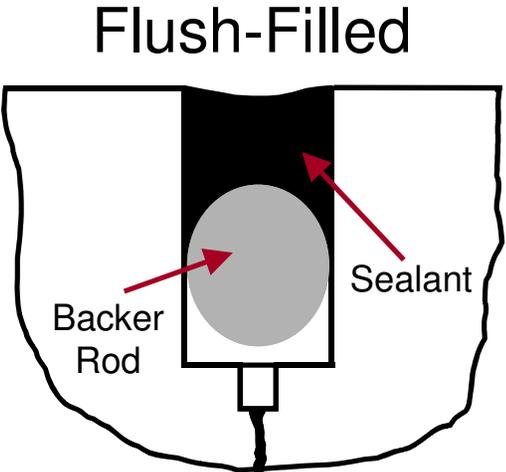
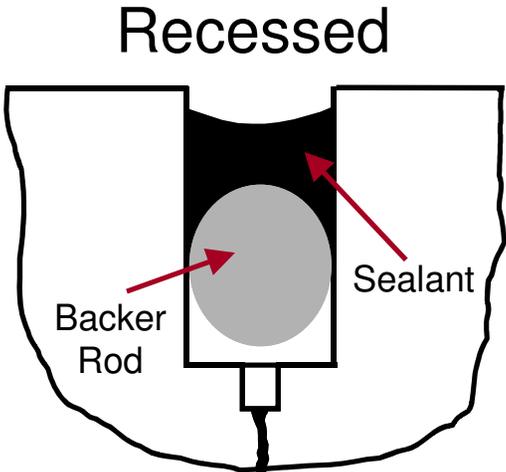
- Varies greatly with material type
- Quality of installation procedures
- Design factors affecting performance:
 - Joint movement
 - Sealant properties
 - Shape factor

Material Selection Factors

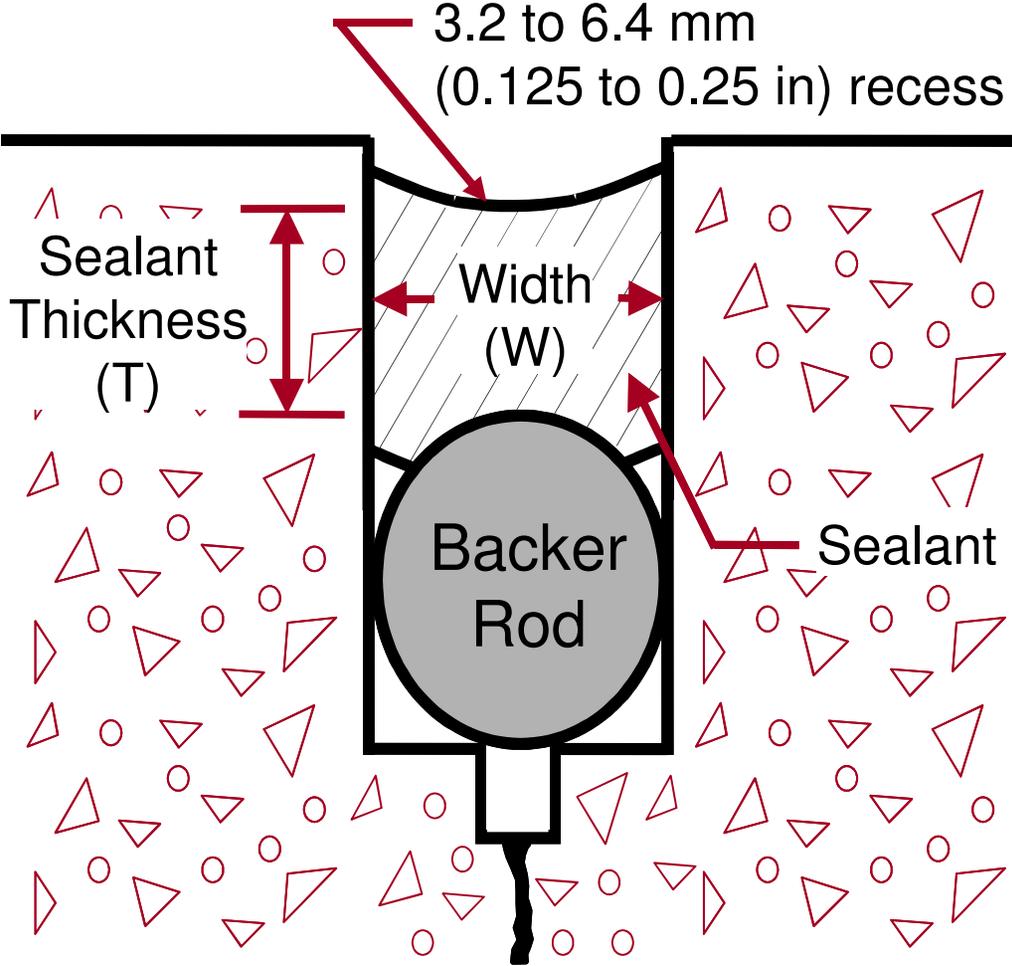
- Climate conditions
- Traffic level and percent trucks
- Crack extent and severity
- Contractor experience
- Safety concerns
- Material availability and cost

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
Polysulfide and Polyurethane	1:1

Sealant and Related Specs

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

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



http://i80.dot.ca.gov/hq/esc/oe/awards/#item_code



Module 4-2

Construction and Inspection

From... Maintenance Technical
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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

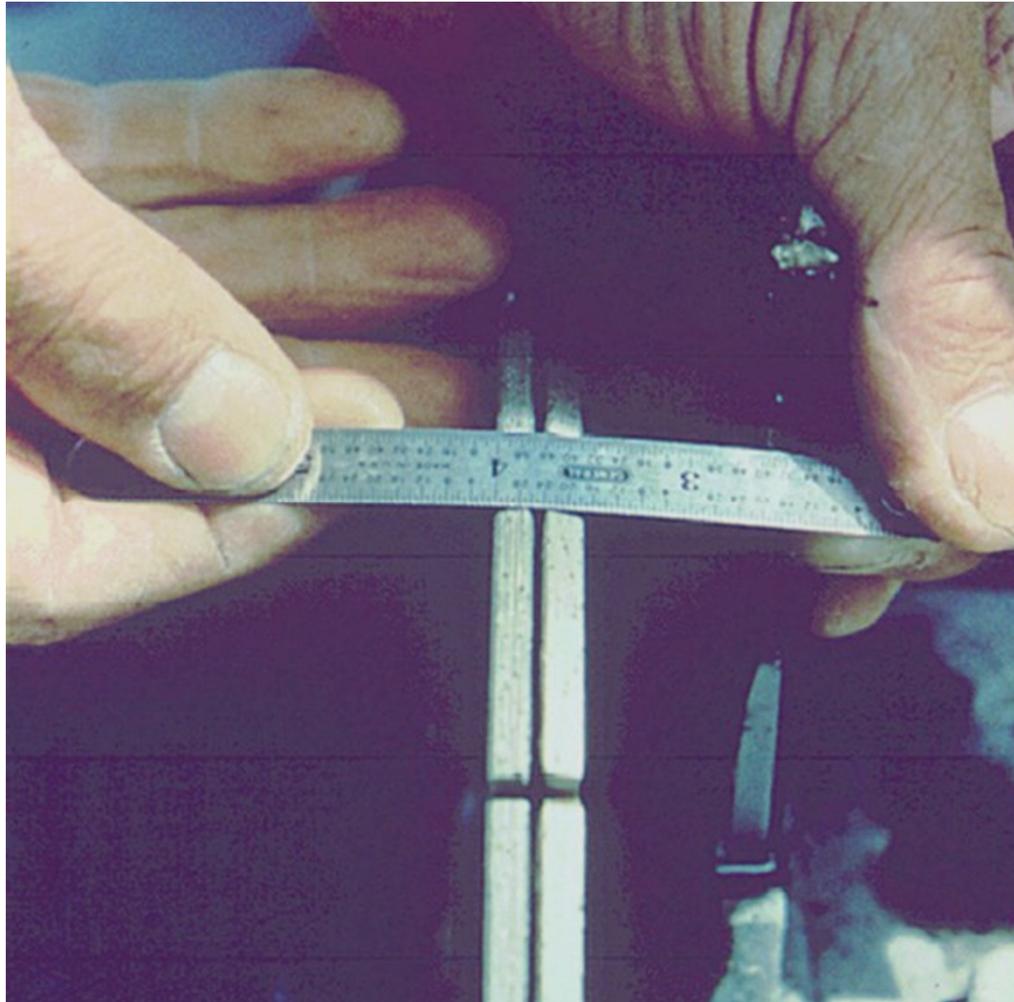


Construction: Joint Resealing

Joint Refacing



Construction: Joint Resealing Refacing Blades



Construction: Joint Resealing

Sandblasting



Construction: Joint Resealing

Waterblasting



Construction: Joint Resealing

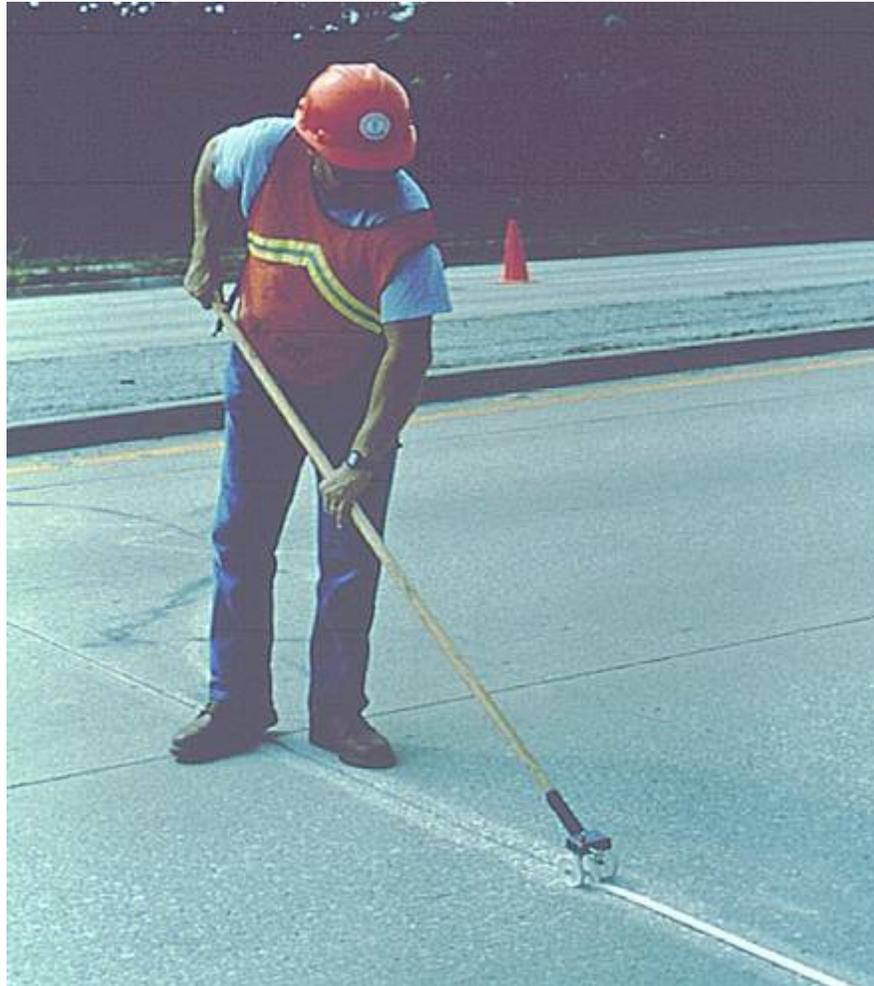
Compressed Air



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



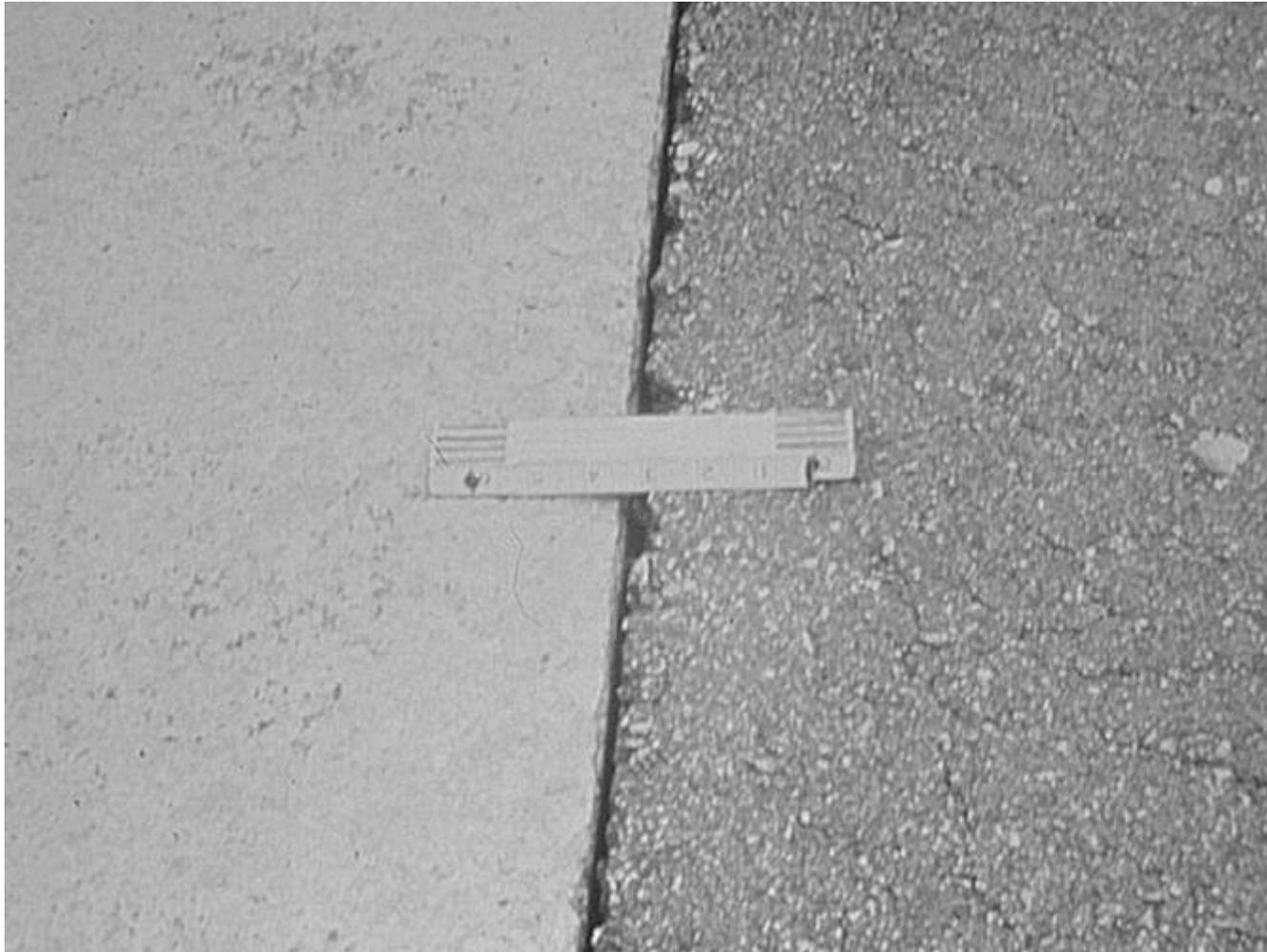
Construction: Joint Resealing

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



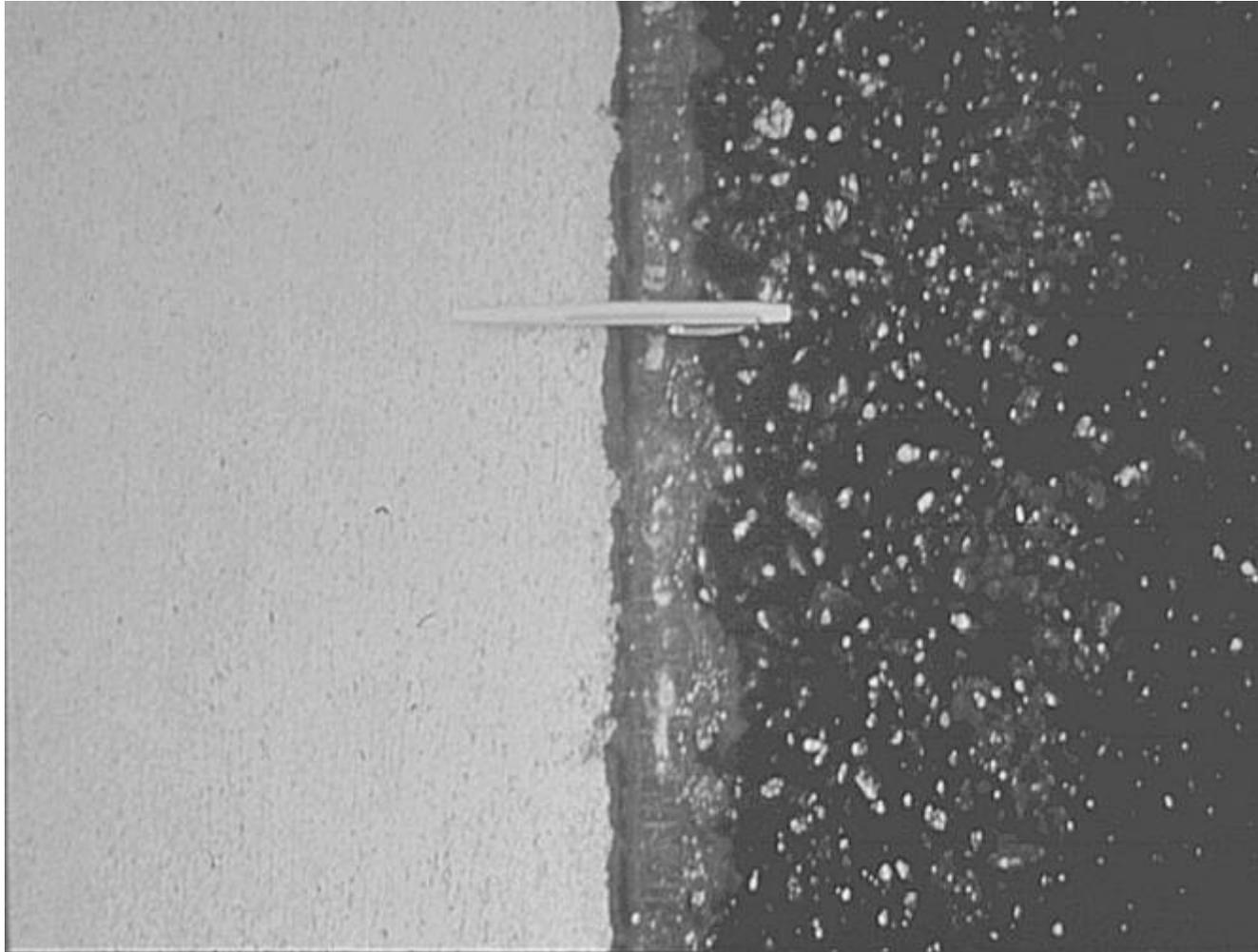
Construction: Joint Resealing

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

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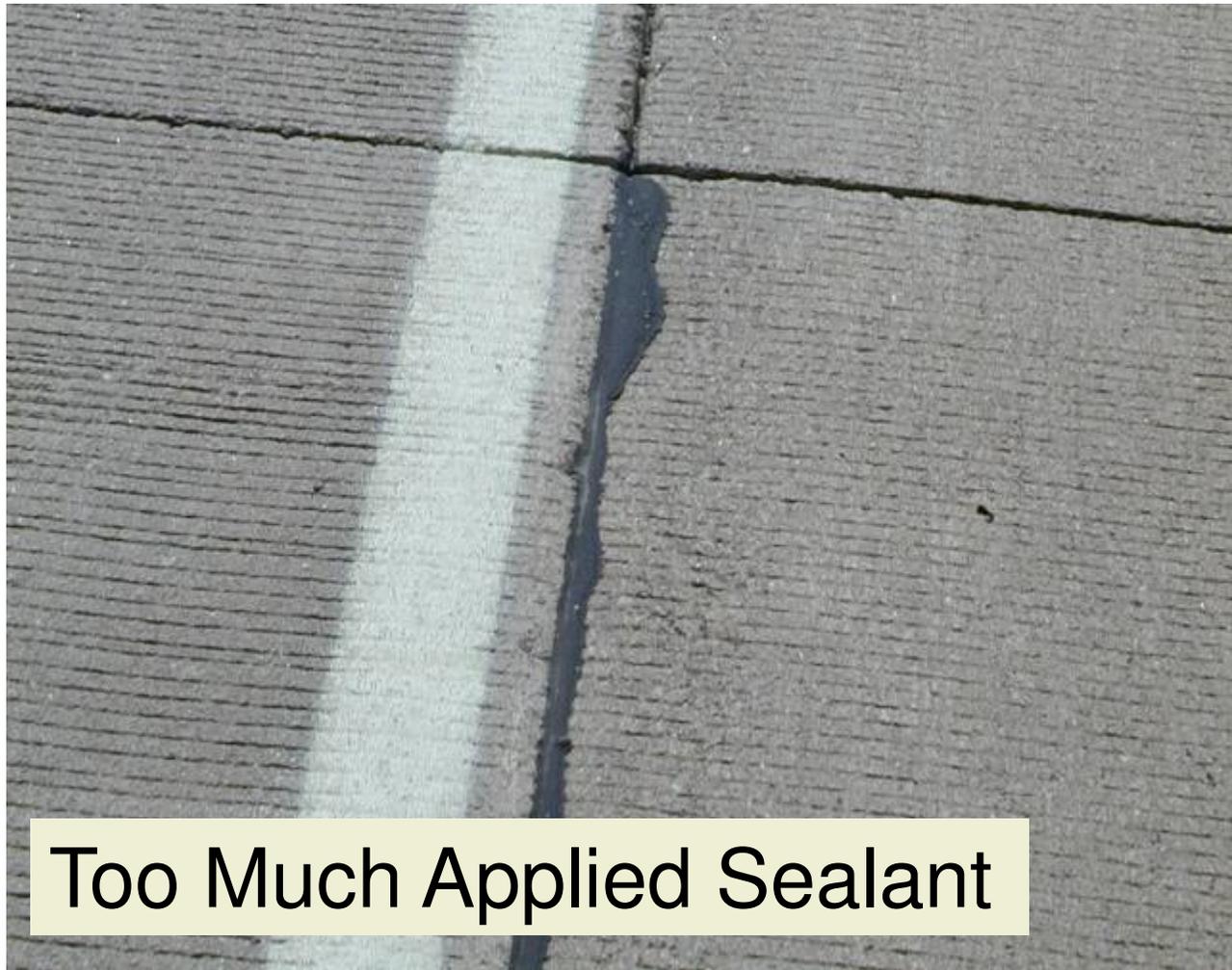
Troubleshooting

- 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.

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Thank You

Questions?



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