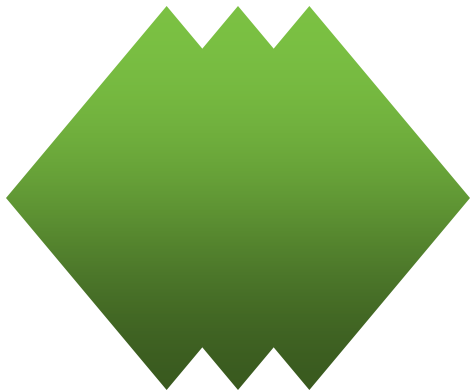




Maintenance of Asphalt Airfield Pavements

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Presentation Overview

- Crack sealing
- Patching
- Selected surface treatments

Purpose of Crack Sealing

- Reducing moisture infiltration
 - Stripping
 - Cupping
 - Delamination
- Reducing incompressibles filling cracks
- Providing support to adjacent pavement
- Preparing existing pavement for HMA overlay

Is Crack Sealing Effective?

- When do you seal cracks?
- What sealant is most effective for your climate, materials, and traffic?
- How do you pick candidate projects?
- What is the effect on pavement life?

Design Considerations

- Pavement use
- Aircraft volume
- Pavement condition and planned rehabilitation
- Crack characteristics
- Materials and placement configuration
- Procedures, equipment, and safety

Would You Seal This?



Would You Seal This?



Design Considerations

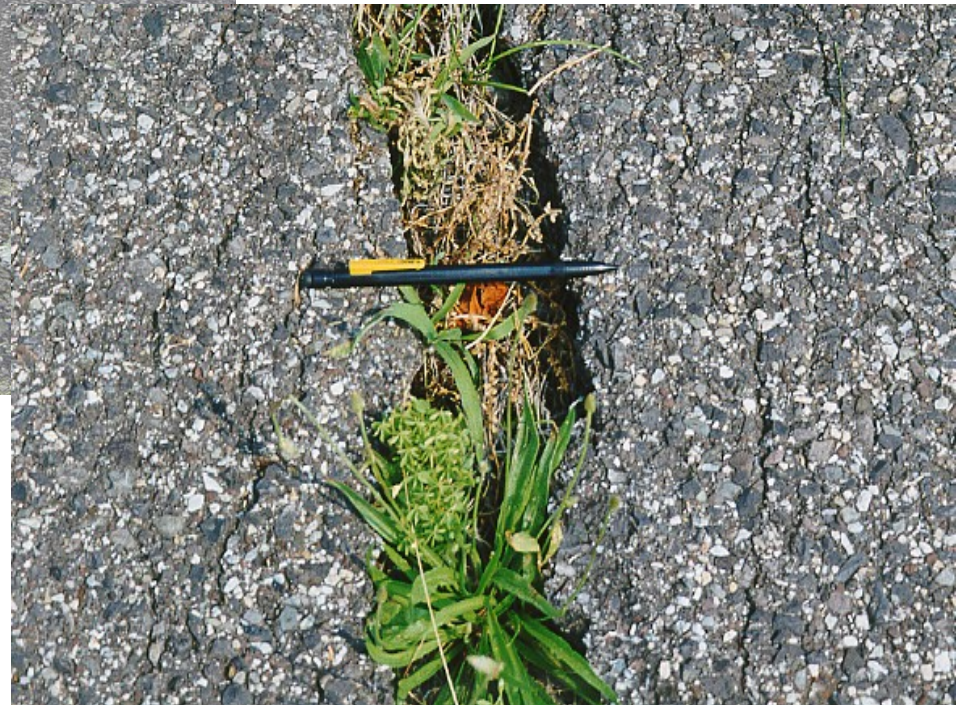
Two different approaches:

- Crack sealing, for working cracks with movement ≥ 0.1 in
- Crack filling, for nonworking cracks

Candidate for Crack Filling



Candidates for Crack Sealing?



Factors Affecting Crack Sealing Performance

- Candidate pavement
- Sealant
- Configuration
- Preparation
- Application
- Quality control

Ideal Application Conditions

- New or recently rehabilitated surface
- Good base support
- Little or no secondary cracking
- Little or no raveling at crack face
- Moderate temperatures
- Proper preparation (clean and dry)

Desirable Sealant Properties

- Cohesiveness
- Adhesiveness
- Durability
- Resilience
- Extensibility

New guidelines being developed for matching materials with applications

Construction Sequence

1. Crack preparation
2. Crack cleaning and drying
3. Material application
4. Material finishing/shaping
5. Blotting

Crack Preparation

Rotary Impact Router



Crack Cleaning

Air Blasting



Crack Cleaning

Crack Vacuum



Crack Drying

Hot Compressed Air Lance



TECHNOLOGY

providing engineering solutions to improve pavement performance

Crack Drying

Excessive Hot Air Lance



Material Application

Squeegeed Sealant



Finished Product



Finished Product



Blotting

Blotting Agents

- Screened sand
- Cement
- Flyash
- Toilet paper



Inspection

- Reservoir dimensions, if routed
- Cleanliness
- Dry
- Final surface level
- Secondary spalling
- Adhesion
- Bubbles

Patching Overview

- Conditions that require patching
- Patching materials properties
 - Hot-mix
 - Cold-mix
 - Proprietary-mix
- Procedures for semi-permanent patching

Purpose of Patching

- Reduces FOD potential of localized defects
- Slows deterioration and extends service life of existing HMA
- Prepares existing pavement for an HMA overlay
- More cost-effective than other strategies

Patching Applications

Potholes

Moderate Severity



High Severity



Patching Applications

More Likely



Bituminous Patching Materials

- Hot-mix asphalt (HMA)
 - Placed immediately while hot
 - Standard, dense-graded HMA
- Cold-mix
 - Often used as temporary patches
 - Placed in stockpile and used over a period of time (emulsion binders)
 - Special open-graded mixes

Desirable Mix Properties Bituminous Patching

- Stability
- Adhesiveness
- Resistance to stripping
- Durability
- Workability (cold-mix)
- Storability (cold-mix)

Limitations and Effectiveness

Patching may not be appropriate for all applications

- Temporary patches are temporary
- Structural design may not be adequate
- Principal problem may not be corrected



Limitations and Effectiveness

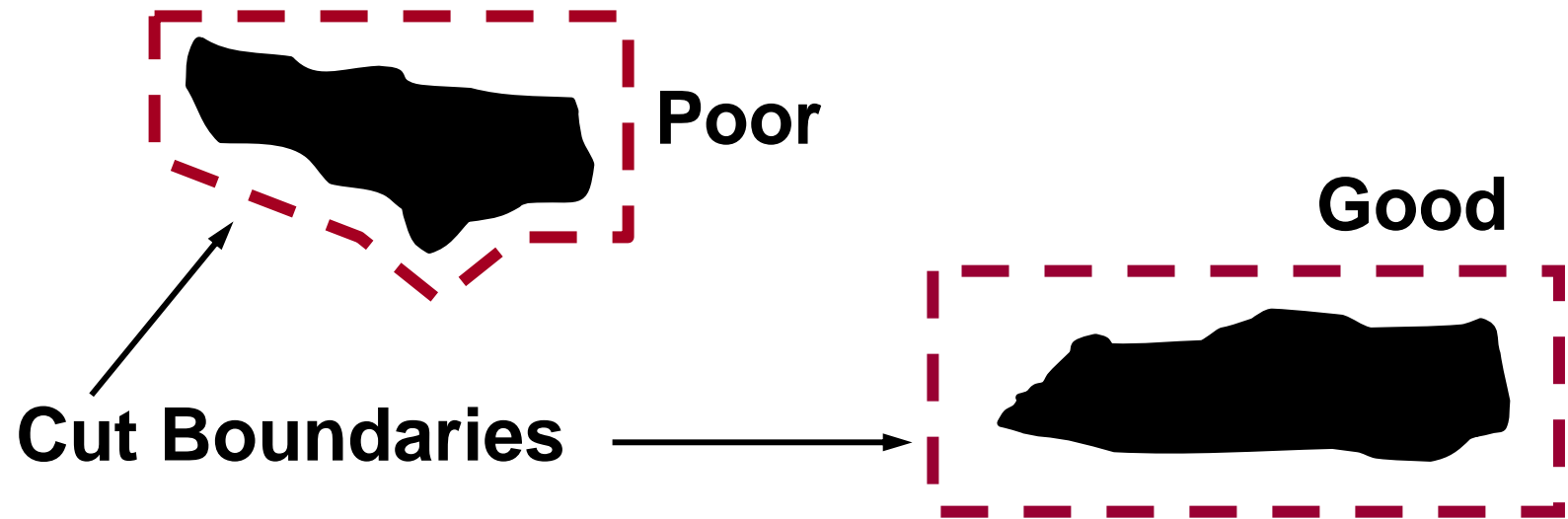
- Bituminous patching is not recommended for permanent repair of rigid pavements
- Hot-mix, full-depth patches provide maximum effectiveness
- Not cost-effective when pavement is extensively deteriorated

Construction Steps

Semi-Permanent Patch

- Mark patch boundaries
- Cut boundaries
- Clean and repair foundation
- Apply tack coat
- Fill the hole with patching material
- Compact the patch
- Cleanup

Mark Patch Boundaries



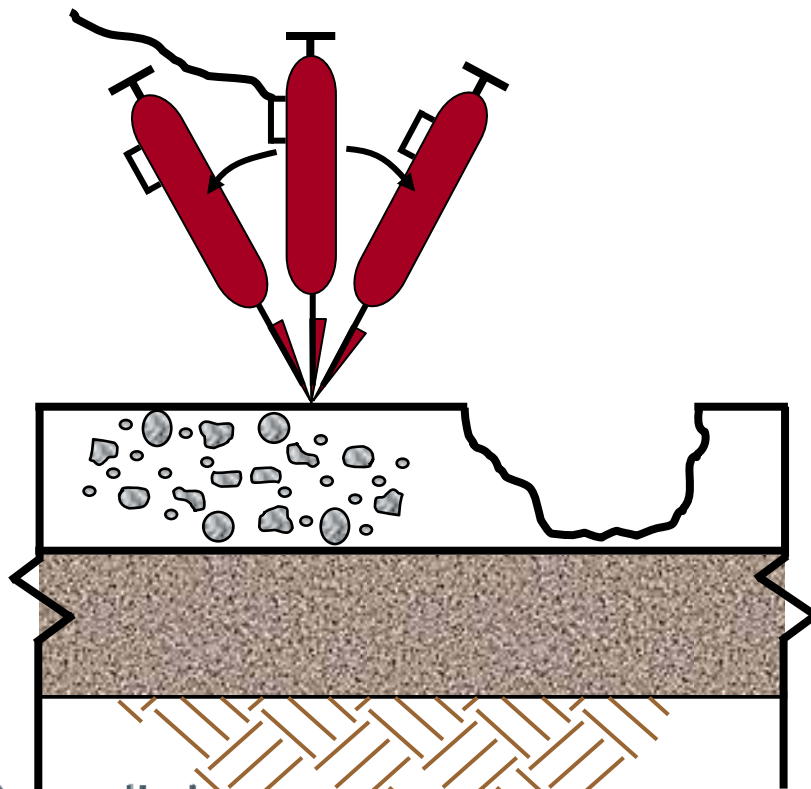
Straight boundaries, recommended rectangular
Consider width of compaction equipment
Adjacent area-sound pavement

Mark Patch Boundaries

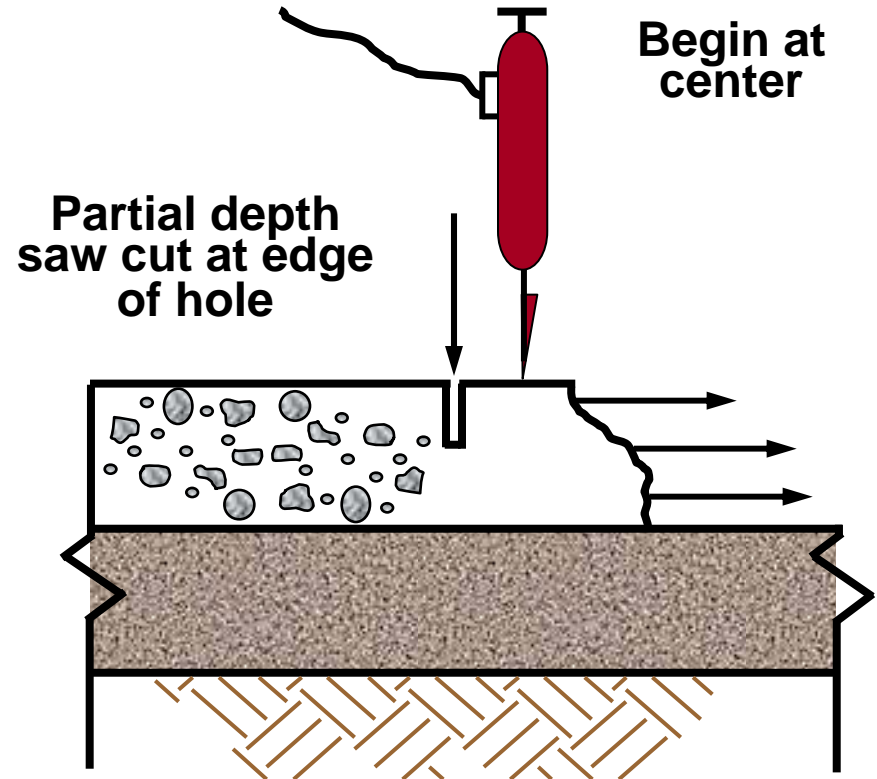


Cut Boundaries

Do not rock



Begin at center



Cut Boundaries



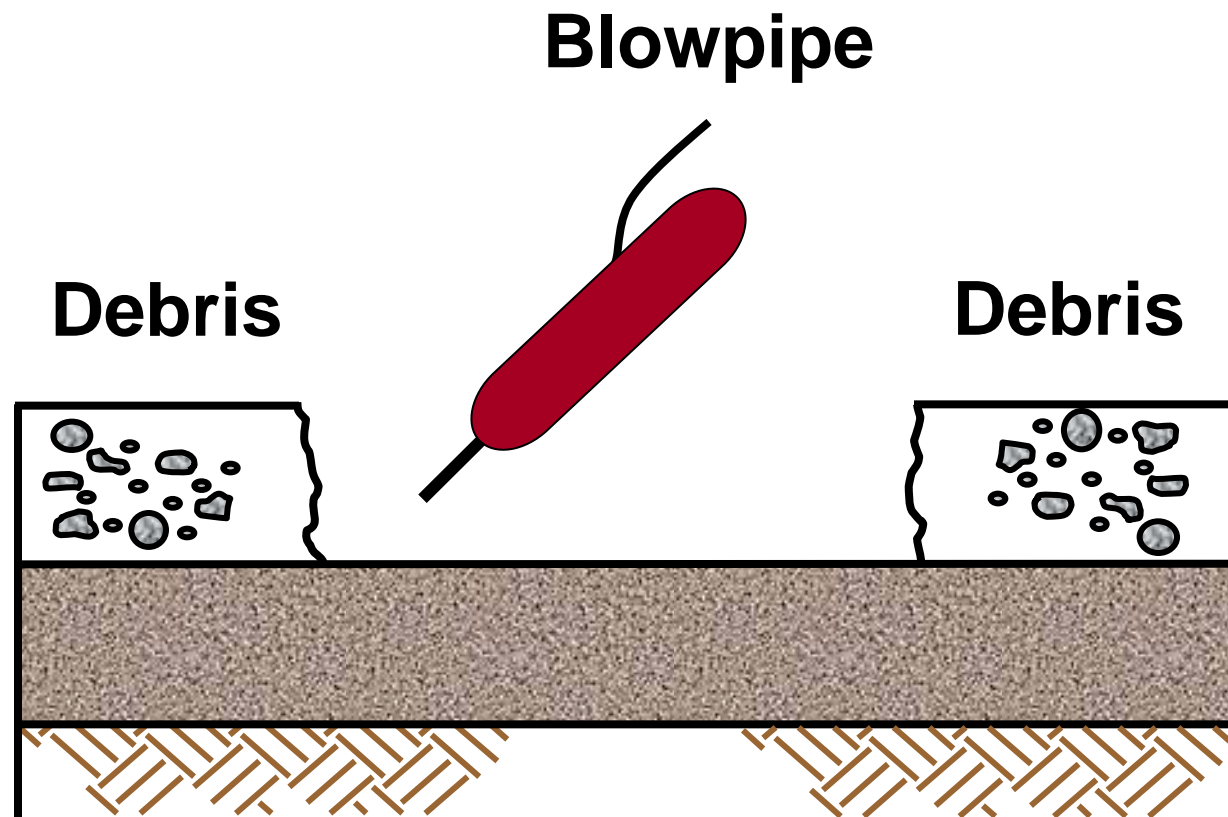
Remove Material



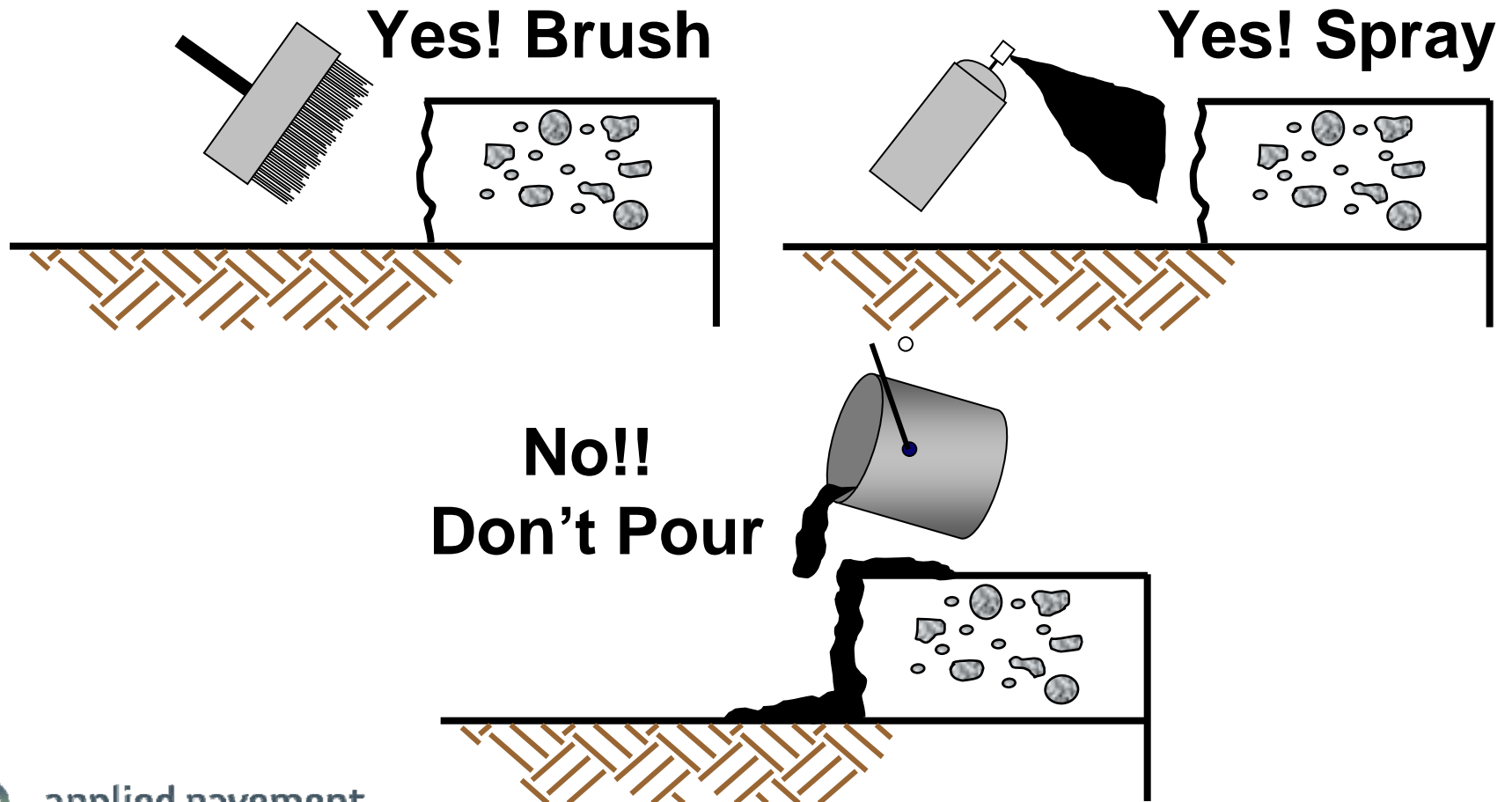
Remove Material



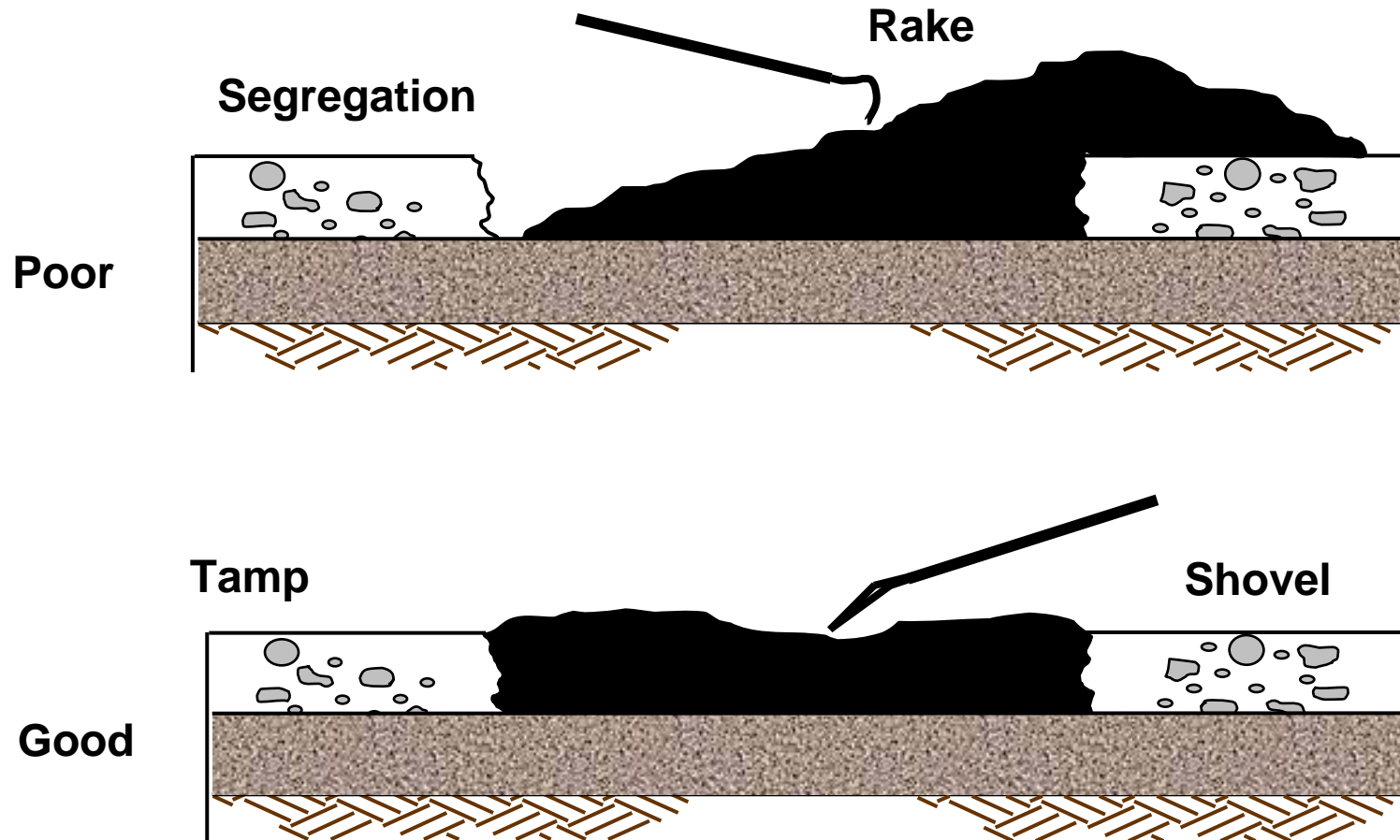
Clean Debris



Seal Edges

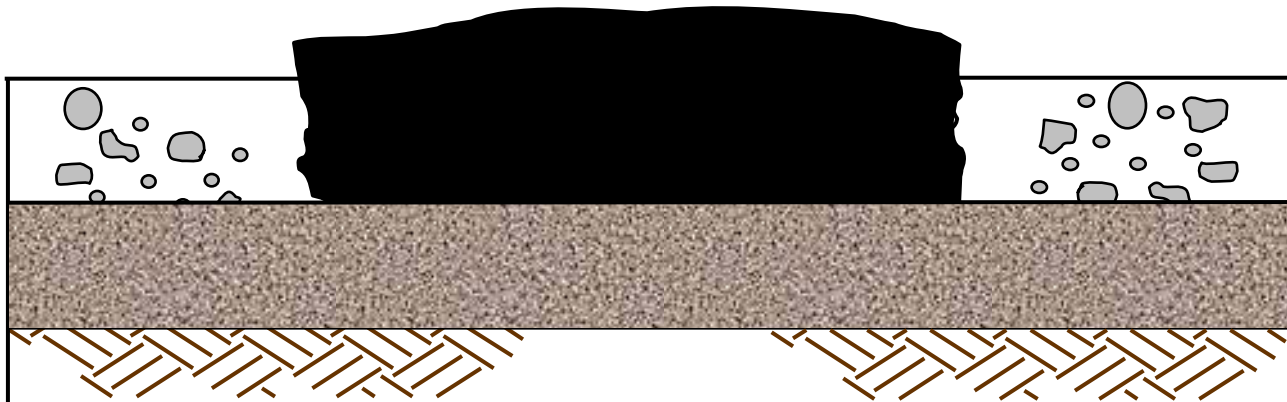


Material Placement

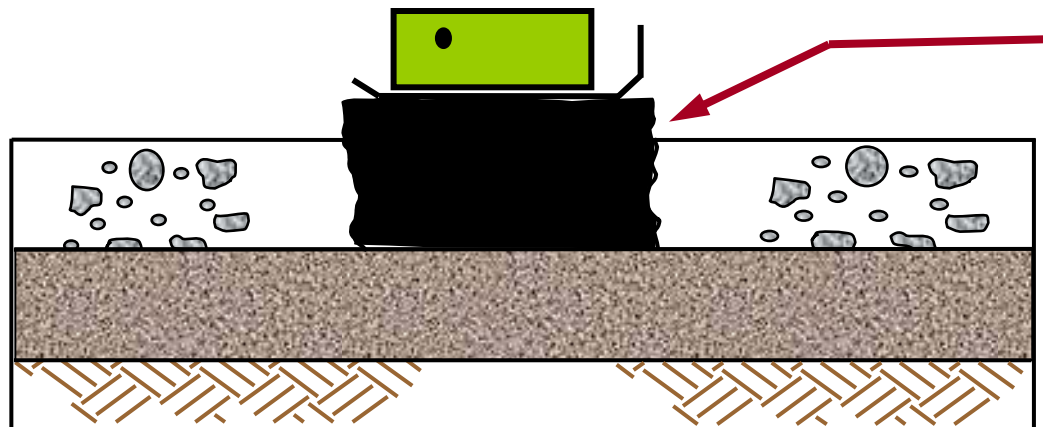


Sufficient Material for Compaction

Max lift – 150 mm

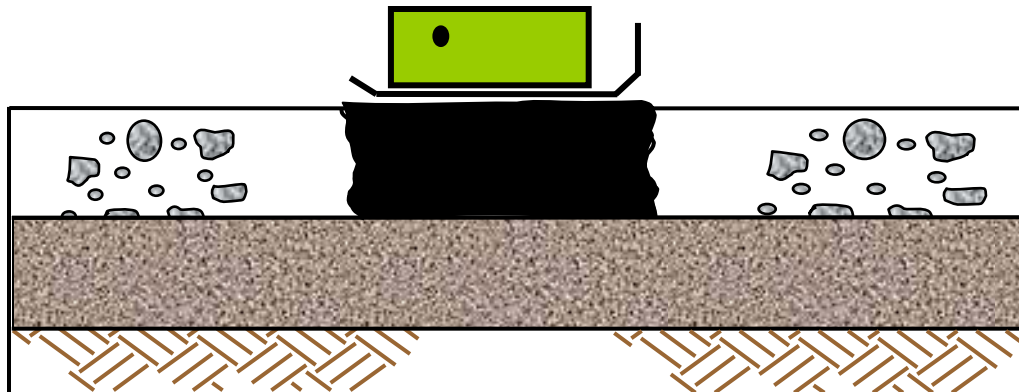


Compacting the Patch



Overfill by 25% to
account for volume
reduction

Good



Poor

Compaction Equipment



Finished Patch



What's Wrong Here?



What's Wrong Here?



Introduction to Selected Surface Treatments

- Application of asphalt emulsion (mostly) with or without aggregate
- Treatment differences
 - Emulsion type
 - Use of aggregate
 - Method of embedment
- Application rate, timing, and construction quality are critical

Fog Seals



Fog Seals

Description

- Light application of diluted slow-setting asphalt emulsion
- Common uses
 - Seal aged surface
 - Improve visibility
- Typical treatment life: 1 to 2 years

Fog Seals

Application Considerations

- Seal must penetrate surface voids
- Environment affects both break and future performance
- Allowing traffic before break is hazardous!

Fog Seals

Suitable Surfaces



**Heavily aged,
dense-graded HMA**



Open-graded HMA

Fog Seals

Unsuitable Surface



**Dense-graded HMA
with closed surface**

Fog Seals

Before and After



Fog seal over existing chip seal

Rejuvenators

- Emulsions that include asphalt, polymer latex, and other additives
- Soften and penetrate existing binder
- Trade names, e.g.:
 - Reclamite
 - PASS
 - Topien C

Slurries

Description

- Mixtures of bituminous material, aggregates, and additives
- Typically ≤ 13 mm (0.5 in) thick
- Do not improve structural capacity
- Placed and cured fairly quickly
- Forms thin, rigid wearing course

Why Slurries?

- Weatherproof surface
- Fill surface voids
- Seal multiple, small non-working cracks
- Increase friction
- Improve appearance

Slurry Seals

- Mixture of fine aggregate, mineral filler, emulsified asphalt, and water
- Set controlled by environment
- Treatment life: 4 to 7 years

Slurry Seals

Good Candidate Projects

- No unstable rutting
- No fatigue cracking
- No severe bleeding
- Cracks with minimal movement

Microsurfacing Differences

- Always polymer modified/higher quality aggregate
- Chemically sets: quicker
- Designed to be placed up to several stone thicknesses
- Can be applied under broader range of environmental conditions

Why Microsurface?

Same applications as a slurry, and...

- Fill ruts
- Use in higher traffic volume conditions
- Apply at night if necessary
- Extended construction seasons

Summary

- Review of selected maintenance treatments
- Proper project selection critical
- Quality materials and construction practices key to successful application

Questions?

Thank you!

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