Airport Pavements & Maintenance

Michael W. Buening, PE
Chief Airport Engineer, INDOT
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Presentation Outline

- **Airport Pavement**
  - Typical Pavement Sections
  - Aggregates
  - HMA
  - Concrete
  - Soils
  - Construction Considerations

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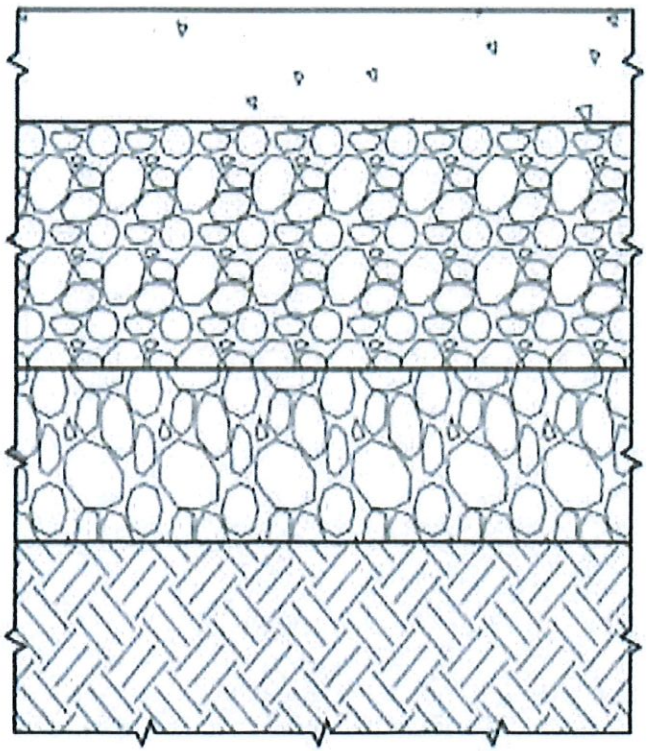
Pavement Section

- Pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade.
- A pavement is a structure composed of structural elements, whose function is to protect the natural subgrade and to carry the traffic safety and economically.

Pavement Section

The essential difference between Flexible pavement and Rigid pavement is the manner in which they distribute the load. Flexible pavement can adjust its position to the shape of the underlying layers. Rigid pavement tends to distribute the load over a relatively wide area (works as a slab).

Typical Section



	FLEXIBLE	RIGID
SURFACE COURSE	P401	P501
BASE COURSE	P403** P209 P208	P403** P304** P306** P209 P208
SUBBASE	P219* P154	P219* P154
SUBGRADE		

* P219 MAY BE USED AS BASE DEPENDING ON QUALITY OF MATERIALS AND GRADATION

** MAY BE USED AS STABILIZED BASE

NOTE: P-SPECS IN AC 150/5370-10 OR EQUIVALENT STATE DOT MATERIALS

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HMA Construction Topics

- FAA Spec P-401 & P-403
- Segregation
- Material Temperature
- Cleanliness & Tack Coat
- Surface Milling
- Compaction, Roller Pattern, Speed
- Joint Construction

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PCC Construction Topics

- FAA Spec P-501
- Multiple full depth cuts for removal
- Subgrade & forms prepared before placing
- Consolidation without Air Entraining loss
- Finishing without added water
- Curing surface and edges
- Timing for joint sawing
- No traffic until 550 psi flexural strength

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Drainage Considerations

- Keep moisture out of pavement and subgrade
- Pavement sloped to avoid any ponding
- Joints and Cracks Sealed
- Turf build up at pavement edge removed
- Storm drains all intact and flowing properly
- Subsurface drains not blocked and flowing properly. Rodent screens all in place

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Presentation Outline

- **Pavement Maintenance**
  - General Discussion
  - Pavement Distresses
  - Pavement Maintenance Treatments
  - FAA Pavement Preventative Maintenance Plan
  - FAA Specifications
  - Joint & Crack Sealing
- **Questions or Comments**

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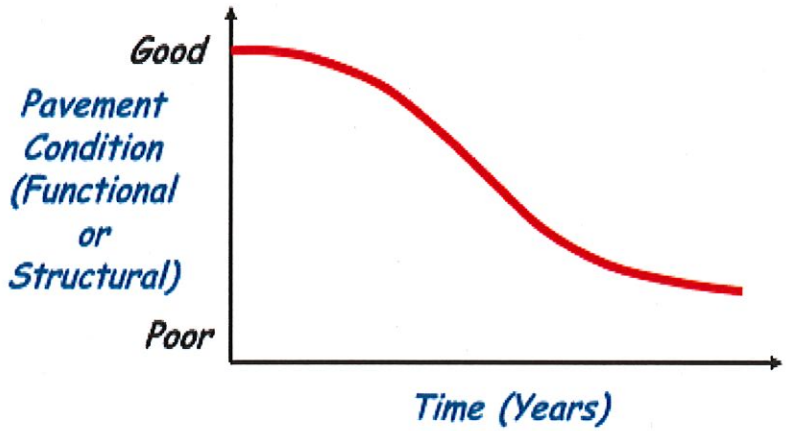
General Maintenance

- What is Pavement Maintenance?
- Pavement Performance

Typical Pavement Performance Curve



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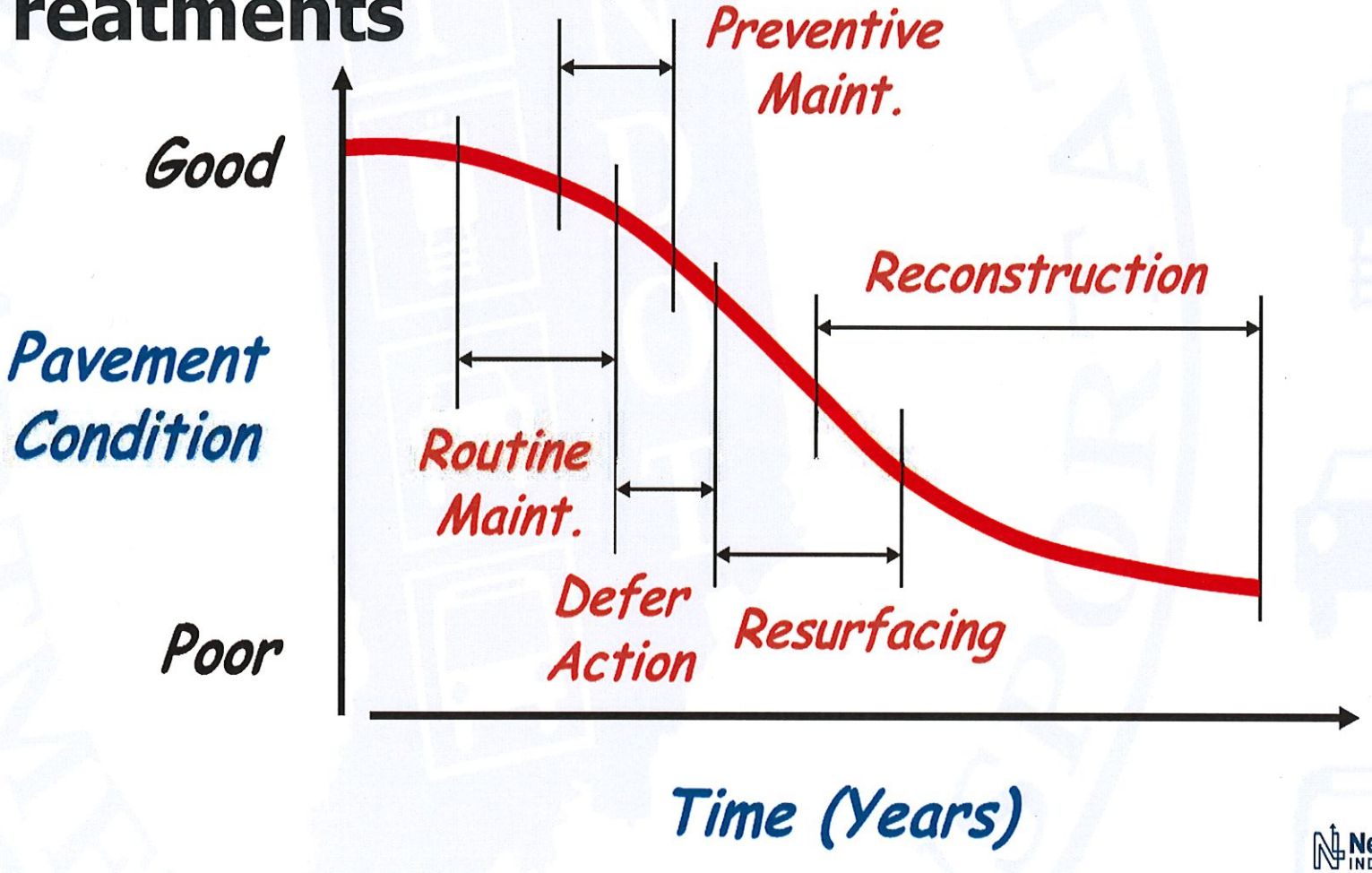
General Maintenance

- **Pavement Performance Curve Treatments**



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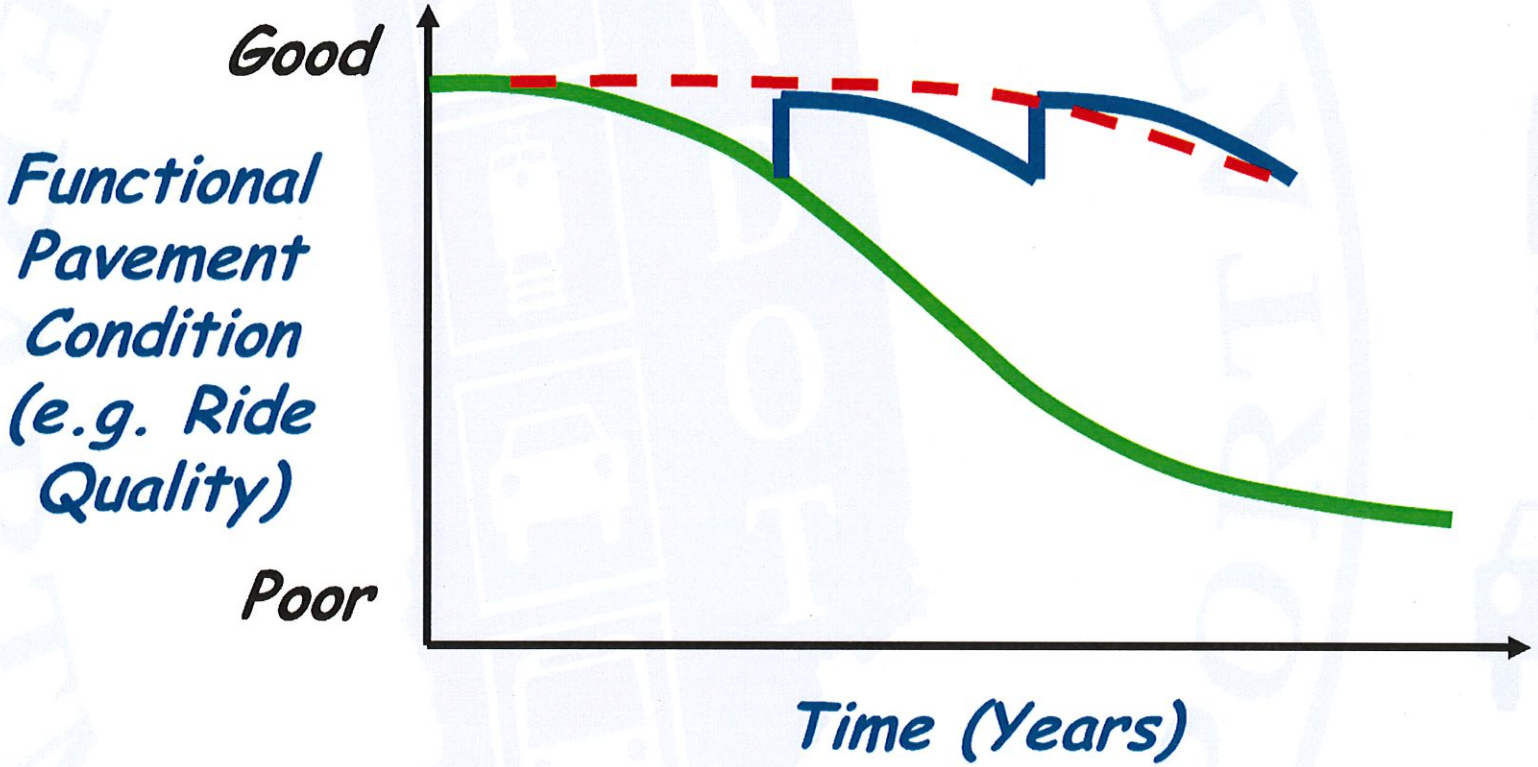
General Maintenance

- **Pavement Maintenance Benefits**



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Treatable Distresses HMA

- Rutting

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Treatable Distresses HMA

- Raveling, Roughness

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Treatable Distresses HMA

- **Bleeding Flushing**

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Treatable Distresses HMA

- **Block Cracking, Oxidation**

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Treatable Distresses HMA

- Thermal Cracking, Crack Deterioration

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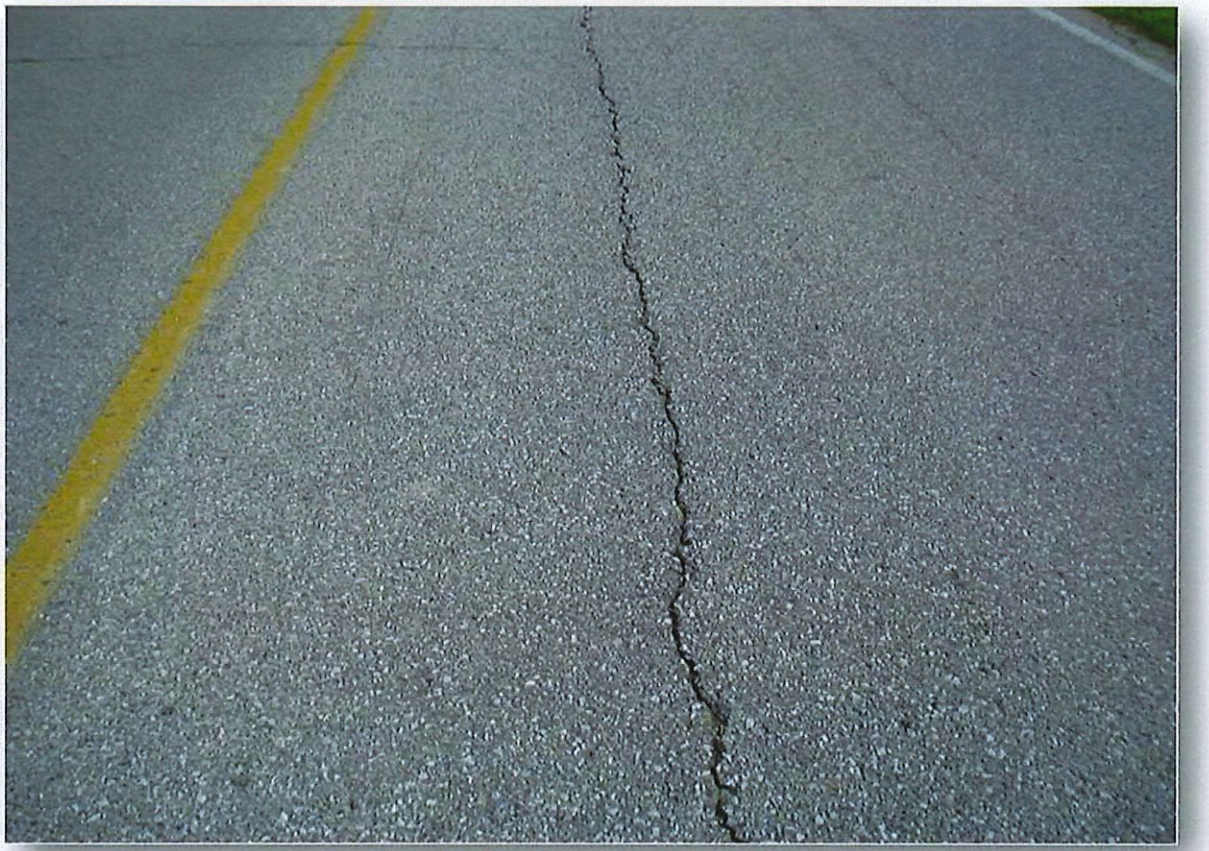
Treatable Distresses HMA

- Longitudinal Cracking



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Treatable Distresses HMA

- Surface Friction
- Edge Cracking
- Potholes

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Treatable Distresses PCC

- Joints, Spalling

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Treatable Distresses PCC

- Scaling

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Treatable Distresses PCC

- Corner Breaks

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Treatable Distresses PCC

- **Faulting**

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Treatable Distresses PCC

- Cracking & Crack Deterioration

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Treatable Distresses PCC

- Pumping, Loss of Fines

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Treatable Distresses PCC

- Surface Friction Loss
- Small Blow-ups

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Non-Treatable Distresses, HMA

- Severe Potholes
- Extensive Fatigue Cracking
- Delamination / Stripping
- Unstable Rutting, Shoving

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Non-Treatable Distresses, PCC

- Severe Cracking, Shattered Panels
- Larger Blow-ups
- Extensive Corner Breaks
- Extensive Faulting

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Maintenance Treatments, HMA

- Crack Filling, Crack Sealing
- Patching
- Seal Coats
- Fog Seals
- Chip Seals
- Thin Overlays
- Fine Milling

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Maintenance Treatments, PCC

- Joint Sealing & Crack Sealing
- Diamond Grinding & Grooving
- Partial Depth Repairs
- Full Depth Repairs
- Load Transfer Restoration
- Undersealing
- Slab Jacking

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Maintenance Treatments, Other

- Underdrain Installation
- Storm & Underdrain Repair
- Grading

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FAA Airport PMP

- **Grant Assurance #11 requirement**
- **AC 150/5380-7B details PMP**
- **PMP Components**
  - Pavement inventory
  - Pavement Structure
  - Maint & Rehab history w/ costs
  - Pavement Condition Information
  - Traffic Data

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FAA Airport PMP

- PMP update every year or third years with detailed PCI Study
- ASTM D5340-12 Standard PCI Surveys
- Paver Distress Manuals in AC Appendix
- Record of all inspection and maintenance kept until pavement replaced.
- Less comprehensive routine inspections to be documented and kept (daily, weekly, monthly)

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FAA Specs AC 150/5370 – 10G

- **P101 Surface Preparation**
- **P605 joint seals for concrete**
  - ASTM D5893 Silicone sealant
  - ASTM D6690 Hot Applied joint & Crack Sealant
  - Backer Rod 25% ± 5% larger than crack width
  - Joints must be clean & dry (sand or water blast)
  - Silicone 2:1 width to depth ratio

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FAA Specs AC 150/5370 – 10G

- **P603 Tack Coat**
  - Cleaning and full coverage is key
- **P608 Emulsified Asphalt Seal Coats**
  - Chip seals required for RW or TW
  - Aggregate can be left out on Secondary or tertiary pavements
  - Low to moderate weathering can be "Fog Sealed"
  - Polymer Modified increases durability

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FAA Specs AC 150/5380 – 6C

Table 6-1. Quick guide for maintenance and repair of common flexible pavement surface problems

Problem	Repair	Probable Cause
Weathering/ Oxidation	- Apply surface treatment - Overlay	- Environment - Lack of timely surface treatments
Cracks	- Remove old sealer material if present - Clean and prepare cracks - Seal/reseal cracks - Joint heating may be an option for longitudinal cracks when under the direction of an engineer. (Operate heaters to avoid excessive heat on the pavement.)	- Age - Environmental conditions - Bitumen too hard or overheated in mix - Sealant defects (e.g., incorrect application temperature, improper sealant selection, improper crack preparation)
Alligator or fatigue cracking	- Remove and replace damaged pavement, including the base and/or subbase course if required.	- Base and/or Subgrade failure - Overload - Under-designed surface course (too thin)
Patches	- Remove/replace. - Repair and Resurface	- Inadequate/Improper repair detail/material - Age
Surface irregularities (e.g., rutting, wash-boarding, birdbaths)	- Remove and replace damaged areas - Surface grinding/milling	- Traffic - Age
Loss of Skid Resistance	- Remove rubber/surface contamination - Apply surface treatment	- Rubber deposits/surface contamination - Polished aggregate - Improper surface treatment
Bleeding	- Blot with sand and remove sand prior to resuming aircraft operations. Excessive bleeding may require removal and replacement of pavement.	- Overly rich mix/low air void content. Bleeding may be a precursor to other surface deformities forming, e.g., rutting, wash-boarding, etc.
Drainage	- Grade pavement shoulders, clear drainage path - Clean out drainage structures, e.g., edge drains, outfalls, etc.	- Poor maintenance of drainage facilities - Poor maintenance of grade

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FAA Specs AC 150/5380 – 6C

Table 6-2. Quick guide for maintenance and repair of common rigid pavement surface problems

Problem	Repair	Probable Cause
Joint sealant damage	- Remove old sealant, clean joints, reseal	- Age - Environmental conditions - Sealant defects (e.g., incorrect application temperature, improper sealant selection, improper joint preparation)
Cracks	- Clean and seal cracks - Repair/replace slab - Evaluate adequacy of pavement structure; may require strengthening	- Loss of slab support - Load repetition; curling stresses; and shrinkage stresses
Corner Breaks	- Seal and maintain until full depth patch	- Loss of slab support - Load repetition and curling stresses
Joint spalling	- Remove lose material; refill with approved product; reseal - Partial depth repair	- Latent defects, i.e., excessive finishing - Incompressible matter in joint spaces - Snow plow damage
Slab blowup	- Replace slab in blowup area; clean and reseal joints.	- Incompressible material in joints preventing slab from expanding
Loss of Skid Resistance	- Remove rubber/surface contamination. - Grinding.	- Rubber deposits/surface contamination - Age, i.e., surface wear
Drainage	- Grade pavement shoulders, clear drainage path - Clean out drainage structures, e.g., edge drains, outfalls, etc.	- Poor maintenance of drainage facilities - Poor maintenance of grade
Popouts	- Remove FOD	- Material
Patches	- Remove/replace	- Inadequate/Improper repair detail/material - Age

Joint & Crack Filling or Sealing

- Top pavement maintenance treatment
- Joint & Crack Filling - less preparation, lower cost, lower life, asphalt emulsions, PG binders
- Joint & Crack Sealing – working cracks or joints, routing if needed, fiber reinforced, polymer modified, crumb rubber modified

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Joint & Crack Filling

- Since non-working cracks do not change in width significantly with temperature, applications of crack filling treatments can proceed at any time of the year

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Joint & Crack Sealing

- Spring and fall have the best weather for asphalt pavement crack sealing.
- Temperature between 45 and 65 degrees
- Cracks are normally at the middle of their working ranges.

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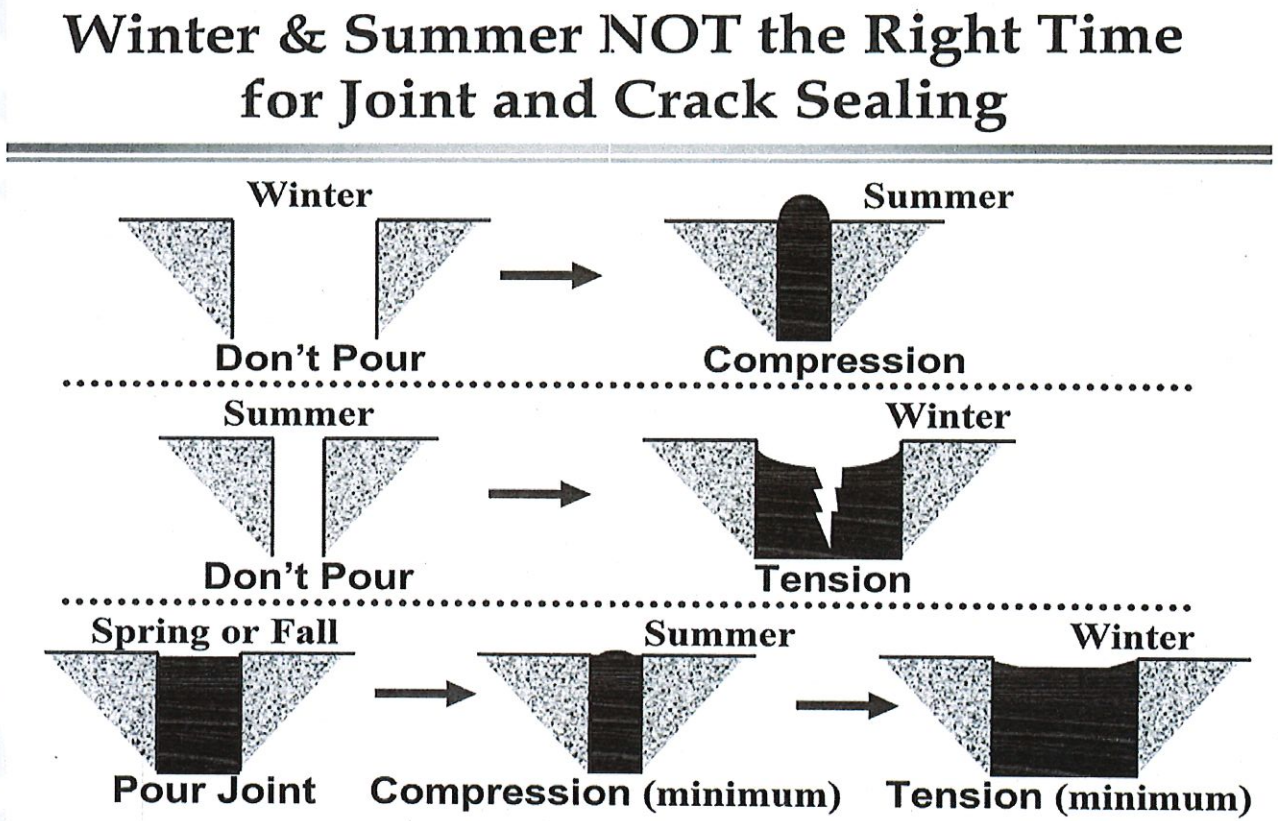
Joint & Crack Sealing



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Joint & Crack Sealing

- Good example of a crack seal job. The seal material is not painted on the roadway and is contained to the crack area.

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Trouble Shooting

Table 4: Trouble Shooting Crack Sealing and Filling Projects

CAUSE	PROBLEM						
	ALL SEALS			EMULSION SEALS ONLY			
	Tacky Picks Up	Re-Cracks Quickly	Bumpy Surface	Separation From Crack Sides	Emulsion Sealer Not Breaking	Emulsion Sealer Breaks Too Fast	Emulsion Sealer Washes Off
Crack Wet					●		●
Sealant Not Cured	●			●		●	
Crack Dirty	●	●		●		●	
Insufficient Sanding	●			●		●	
Poor Finish, Wrong Tools	●	●	●	●		●	
Sealant Too Cold		●	●				
Sealant Too Hot	●			●			
Application Too High	●		●	●			
Application Too Low		●	●				
Sealant Degraded Due to Overheating	●	●	●	●	●	●	●
Rain During Application					●		●
Cold Weather		●			●		
Hot Weather	●		●	●		●	

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Common Problems & Solutions

Table 5: Common Problems and Related Solutions

Problem	Solution
TRACKING	▪ Reduce the amount of sealant or filler being applied. ▪ For hot applied materials, allow to cool or use sand or other blotter. ▪ Allow sufficient time for emulsions to cure or use a sufficient amount of sand for a blotter coat. ▪ Ensure the sealer/filler is appropriate for the climate in which it is being placed.
PICK OUT OF SEALER	▪ Ensure cracks are clean and dry. ▪ Increase temperature of application. ▪ Use the correct sealant for the climate. ▪ Allow longer cure time before trafficking.
BUMPS	▪ Check squeegee and ensure it is leaving the correct flush finish. ▪ Have squeegee follow more closely to the application. ▪ Decrease the viscosity of the sealer. ▪ Change the rubber on the squeegee.

Questions or Comments?

Michael Buening mbuening@indot.in.gov

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