

16th Road Pavement Forum
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CONCRETE PAVEMENT REHABILITATION

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Presentation Overview

Look at:

Restoration of pavement life
in

existing rigid pavement
using techniques

of

Cracking & Seating

or

Rubblizing

Rehab. of Concrete Pavement



Typical Failed Pavements



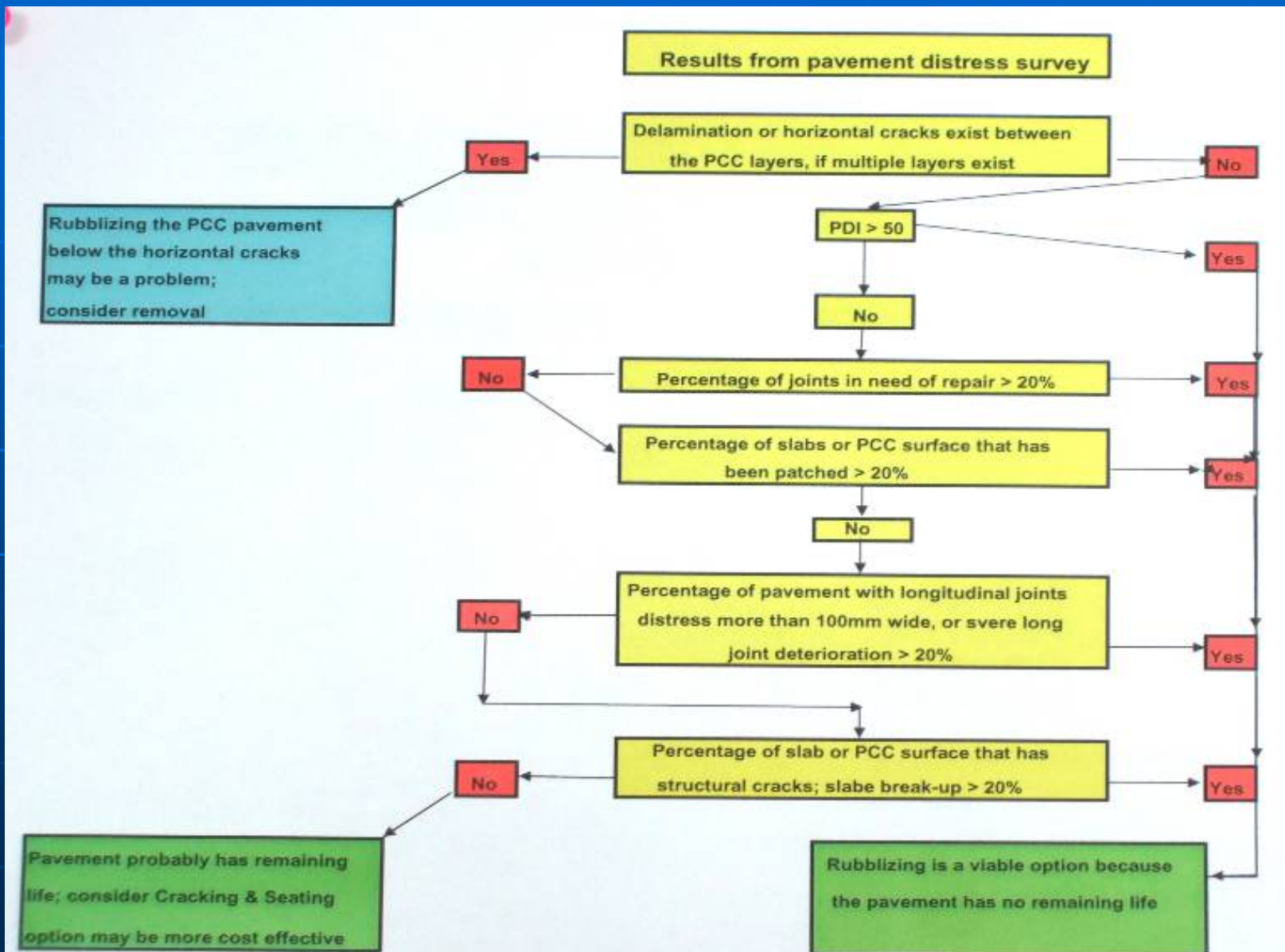
Typical Failed Pavements



Typical Failed Pavements



Typical Decision Flow Diagram

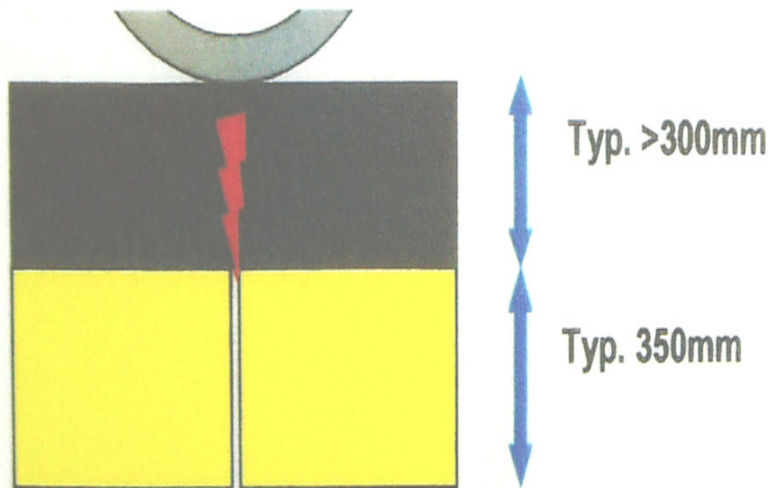


1. CRACK AND SEAT (C&S)

Principles and Method
of
Crack and Seat
Operations

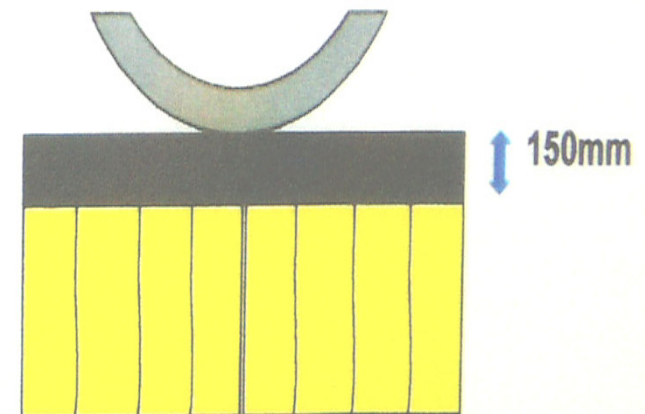
Principle of Cracking & Seating

Traditional Asphalt Overlay



Cracks are induced in the Asphalt layer due to large movements at the existing bay joints in concrete.

"Crack & Seat" Pavement



Existing concrete cracked into small platelets, reducing movement thus allowing less asphalt to be used.

Objective of C & S

TO:

modify characteristics of rigid pavement:

- into a more flexible structure,

BUT ALSO TO:

minimise asphalt overlay thickness :

- by retaining max pavement stiffness / strength

C & S Technique - 1

- Produces shorter slabs
 - 0.6 – 2m in length
- Retains structural integrity
- Induces fine, vertical, transverse cracks in JCP
- Reduces effective length of slab between joints.

C & S Technique - 2

- Size of slabs is effectively reduced

Therefore:

- Horizontal strains - from thermal movements:
 - distributed more evenly over pavement,
 - less likely to cause reflective cracks in HMA overlay
- Cracks induced in PCC slab so fine that:
 - load transfer between newly formed slabs = good
 - because of aggregate interlock.
- After cracking:
 - PCC segments firmly seated by heavy pneumatic tire roller
 - ensure - no voids beneath PCC segments prior to overlay

Typical Equipment



8600 Badger Guillotine Breaker



20 ton Pneumatic Tyre Roller

Cracking & Seating Operation



Typical Induced Crack



**Core taken from a
450mm thick
pavement**



**Broken core showing good
aggregate interlocking
Crack should be vertical
throughout depth of core**

C & S @ Heathrow Airport



C & S @ Heathrow Airport



C & S Issues affecting performance

- Foundation = firm with good seating
- Too small slab size: accelerate cracking
- Better in un-reinforced JCP
- Method preferred for cracked/faulted

2. Rubblization (Asphalt Institute)

- Process of:
 - breaking / pulverising PCC pavement in-place
 - into small, interconnected pieces (75 - 200mm)
- Serve as base course for HMA overlay.
- Deflections / weak spots:
 - filled with coarse aggregate
- Rubblized - compact with steel roller
- The rubblizing process:
 - reduces slab to an granular base for overlay
 - eliminates all reflective cracking concerns

Distressed Concrete Mid-panel cracking



Water trapped below concrete



Before rubblization



After rubblization



Rubblization Method

To meet specifications for concrete pavements:

1. Firstly - break using guillotine

2. Then - 16hammer Breaker

3. Then - grid roller:

- to further pulverize
- to shape concrete particles at surface
- to begin compaction process.

4. Final - seating typically accomplished with:

- 20-ton pneumatic-rubber tyre roller [PTR]











Layer Stiffness

The rubberized layer stiffness:

- 700 - 3000MPa

Compared a typical high quality crushed aggregate base

- 500 MPa

Pre-cracking 500mm concrete



Pre-cracking pattern



Pre-cracking concrete



Rubblization



Completing the rubblization



Completing the rubblization



Surface after grid rolling



Surface after grid rolling



Test hole



Test hole



Test hole



Paving with M/T Vehicle



Placing aggregate base layer



Concrete overlay in process



Sustainability

- No hauling or disposal costs
- Existing pavement retained - saves natural resources
- Saves landfill space
- Expedites construction
- Environmentally friendly
- Cost-effective as rehabilitation technique.
- Existing concrete pavement stays in place
- Becomes base for new HMA pavement
- Reduce or eliminate need for new virgin aggregates.
- Weather delays minimised - sub grade never opened

Göing Klörme?



Project size

- Minimum: 25 000m²
- R30/m²
- 2 weeks on site