Airport Pavement Rehabilitation

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Pavement Life Cycle

- Routine Maintenance
- Pavement Preservation
- Defer Action
- Rehabilitation
- Reconstruction
Airport Pavement Rehabilitation

- The minimum acceptable level of serviceability has been reached and/or it is no longer cost-effective to perform maintenance activities on the pavement.

Available options are rehabilitation OR wait until the pavement deteriorates to the point it needs reconstruction.
Pavement Assessment

• Pavement assessment is the first step in making good decisions.
• The condition of the existing pavement is assessed through:
  – Pavement History
  – Pavement Condition/Distress Survey
  – Pavement Strength Evaluation
  – Surface, Base and Subgrade Analysis
  – Surface and Subsurface Drainage Review
  – Others?
Pavement Rehabilitation Techniques

• Recycling Options
  – Cold In-place Recycling
  – Full-Depth Reclamation
    • Pulverization
    • Stabilization

• Overlays
  – Bituminous
  – Concrete
  – Pre-overlay Treatments
  – Mill and Overlay
  – Mill and Inlay

• Pavement Reconstruction
Recycling Options - Bituminous

• Cold In-place Recycle (CIR)
  – Conventional
  – Engineered

• Full Depth Reclamation (FDR)
  – Pulverization
  – Stabilization
Cold In-place Recycling (CIR)

What is Cold In-place Recycling?

- CIR is the on-site rehabilitation of asphalt pavements without the application of heat during recycling.

- CIR interrupts the existing crack pattern and produces a crack-free layer for the new wearing course.
CIR Crack Elimination
Cold In-place Recycling (CIR)  
The Train Machine Concept

Used when the Engineer’s design requires milled material needs to be screened, be of a uniform size and fully mixed in a pugmill.
Cold In-place Recycling (CIR)  
Environmental Benefits of CIR  

• No heat is used during the process thereby reducing the use of fossil fuels and also reducing air pollution.  
• Since the existing aggregate and asphalt cement is reused, the need for virgin aggregate and asphalt cement are reduced or eliminated.  
• 40% to 50% energy savings can be achieved using this process versus conventional approaches.
Cold In-place Recycling (CIR)

Applications for CIR

• Good candidates include pavement with:
  – At least 4” of hot mix
  – Adequate base and subgrade
  – Severe pavement distresses

• Poor candidates include pavements with:
  – Inadequate base or subgrade support
  – Inadequate drainage
  – Paving fabrics or inter-layers
Full Depth Reclamation (FDR)
Full Depth Reclamation (FDR)  
What is FDR?

• The full thickness of the asphalt pavement and a predetermined potion of the base, subbase and/or subgrade is uniformly pulverized and blended to provide a homogeneous material.

• If new material is not a sufficient base for a new surface course, the reclaimed materials are stabilized by mechanical, chemical or bituminous means.
Full Depth Reclamation (FDR)
What is FDR?

Bituminous pavement needing repair

FDR Example
- Overlay
- 6-10 inches stabilized material
- Granular base
- Soil
Full Depth Reclamation (FDR)
Types of FDR

- **Mechanical stabilization** - FDR without addition of binder (Pulverization)
- **Chemical stabilization** - FDR with chemical additive (Calcium or Magnesium Chloride, Lime, Fly Ash, Kiln Dust, Portland Cement, etc.)
- **Bituminous stabilization** - FDR with asphalt emulsion, emulsified recycling agent, or foamed/expanded asphalt additive
Full Depth Reclamation (FDR) Applications for FDR

- Good Candidates (Continued):
  - High severity distresses
    - Ruts
    - Base problems
    - Cracks
    - Edge failures
    - Potholes
  - Good drainage or drainage that can be corrected
Full Depth Reclamation (FDR)
Applications for FDR

• Poor Candidates include pavements with:
  – Clay-like native soils
    • Exception- can be stabilized with cement or Class C fly ash
  – Doesn’t meet P200 criteria & can’t or won’t accept added rock
  – Drainage problems that can’t be corrected
Concrete Overlays

• A new concrete surface is paved over an existing bituminous or concrete pavement

• Typically used as an unbonded overlay (≥6”)

• For unbonded overlays, degree of bond is not considered in design – normally dowelled

• For bonded overlays the condition of the asphalt pavement is critical
Concrete Overlays

- Site assessment is key to determining the appropriate approach
Pavement Reconstruction

- Reconstruction may be necessary in certain situations when there is/are:
  - No redeemable pavement life – rehabilitation is not a viable option
  - Major subgrade corrections
  - Changes to geometrics
  - Major increase in traffic volume
Questions?