Full Depth Reclamation of Aviation Pavement

Michael Buening, P.E.
Chief Airport Engineer
INDOT Multimodal Planning & Programs
Full Depth Reclamation (FDR)

- FDR consists of in-situ pulverization with added stabilizers of a typically failed asphalt layer with a portion of the underlying base to create a new pavement base layer.
- FDR is most commonly used to rebuild structurally failed asphalt pavements generally exhibiting fatigue cracking and/or rutting.
- FDR is both economically and environmentally friendly.
Advantages of the FDR Process

- Uses in-place materials
- Requires little or no material to be hauled off
- Maintains or improves existing grade
- Conserves virgin material
- Saves cost by using in-place “investment”
- Saves energy by reducing mining and hauls
- Is a very sustainable process
FDR Process Schematic

Schematic courtesy MN DOT
FDR Construction Process

- **Bituminous Surfacing**
  - Granular Base
  - Subgrade
  - Existing road
  - Pulverization to desired depth

- **Pulverized**
  - Pulverized
  - Subgrade

- **Subgrade**
  - Stabilized
  - Addition of asphalt emulsion or cement, mixing, reshaping, and compacting
  - Application of final surface course

- **New Surfacing**
  - Stabilized
  - Subgrade
Pulverization
Reshaping
Spreading Cement Slurry
Spreading Cement Slurry
Spreading Cement Powder
Spreading Cement Powder
Material Blending (Cement)
Material Blending (Cement)
Material Blending (Asphalt)
Grading
Final Rolling
Profile Milling
Existing Pavement Information

- Existing pavement section cores with subgrade material down to 16” - 18” depth must be provided to allow proper FDR design mix.
- Any variations in the existing section need documented to avoid errors in the mix design.
- Existing pavement can not be too deep. FDR process must go deeper than the existing pavement.
FDR Specifications

- FAA P-301 Spec. does not provide an adequate Spec for FDR.
- A Modification to Standards approved by FAA is needed. FAA Pavement Engineers are in favor of FDR and have approved FDR at various locations.
- INDOT has recent RSP 413-R-634 that has good guidance for a FDR Spec. Mix Designs 300-500 psi min 7 day unconfined strength for cement stabilized and 30 psi wet / 45 psi dry min indirect tensile strength for asphalt stabilized.
- High soluble sulfate content of soils can lead to heaving. A maximum 3000 ppm is required at some locations. INDOT has a stricter 1000 ppm maximum
Calcium induced heave, Sulfates
Construction Items

- A detailed Quality Control Plan with min. testing frequency should be included with any FDR.
- Control test strip should be required the 1st day of production to guarantee FDR will meet spec.
- Keeping moisture content at optimum and keeping stabilizing material at a consistent application rate are key to the FDR process.
- Adequate compaction effort with sufficient rollers required prior to substantial hydration. Pneumatic tire and vibratory pad-foot rollers are highly recommended.
- Curing required to allow strength gain and achieve adequate moisture content loss prior to paving.
Airports that have used FDR

- CEV Connersville, IN
- VPZ Valparaiso, IN (Spring, 2016 - 7” overlay)
- ONA Winona, MN (5” overlay)
- HCD Hutchinson, MN (4” overlay)
- BJI Bemidji, MN
- PDK Dekalb Co Peachtree, GA
- PIE St Petersburg-Clearwater FL
- X35 Marion Co Dunnello, FL (2” overlay)
- VNC Venice, FL (4” overlay)
- LKV Lake Co Lakeview, OR
FDR is a viable, cost effective pavement rehabilitation option that should be included for consideration when evaluating and determining method of repair for airfield pavement projects.
Questions or Comments?
Thank You!!

Michael W. Buening, P.E.
INDOT Multimodal P&P
Office of Aviation
317-232-1492
mbuening@indot.in.gov