Sustainable Airport Pavement Construction
Garver
A full service, multi-disciplined consulting firm with 400 professional engineers, architects, planners, technicians and support staff.
Founded in 1919 and still growing...

Now with 16 offices in eight states in the southern U.S. with headquarters in North Little Rock, Arkansas.
Ever-Growing Acceptance of Pavement Recycling Methods
Our familiarity with Concrete Recycling

- Nashville International Airport
- Runway 2L-20R Reconstruction in 2010
- A Recycled Concrete Aggregate (RCA) process was employed for the 7,700’ by 150’ concrete runway
The RCA Process

- The existing 18” slabs were broken with guillotine breakers followed by pneumatic hoe-rams for the hard to reach areas.
- Mobile crushing and screening equipment was erected to handle the vast amount of material at the rate needed by the Contractor.
Meeting Sustainability Goals

• As a result of the RCA process, over 90,000 tons of material was recycled into the project as a base course in lieu of hauling it off-site.
Runway 2L-20R - Completed

RCA Process saved over $2M on a $24M project
Shelbyville Municipal Airport
Shelbyville, Tennessee, USA

- Project consists of removal and reconstruction of the terminal apron and parallel taxiway, also included installation of new drainage systems and taxiway edge lighting
- Nearly 50,330 SY of pavement
- Federal, state and local funding
- Budget of $3.5 million
- Construction time: 120 days
New Challenge = New Opportunity

• Vast amounts of bituminous asphalt pavements requiring reconstruction

• Budget and Construction Time Concerns

• Solution = Full Depth Reclamation
FDR has been used at commercial airports

- Friedman Memorial Airport – Hailey, Idaho
- 6,900’ of the 7,500’ runway was reconstructed
- 30 day construction time period
- Completed in 2007 with FAA funding
Traditional Full Depth Replacement

1. Most common method of reconstruction
2. Greatest amount of waste and use of new materials
3. Most Costly
4. Longest Duration
Full Depth Reclamation (FDR)

1. Newer method of reconstruction
2. Reuses the majority of existing materials
3. Lower construction costs
4. Short construction duration
How does FDR work?

• First pass of equipment pulverizes and mixes the materials

• Varying percentages of pavement material combinations (millings, aggregate and soil) are acceptable
How does FDR work?

- Cement addition typically ranges from 4% to 6%
- Last pass shapes and prepares the final surface
FDR at Shelbyville Municipal (SYI)

1. Common technique is to complete this process in place, however change in grades and configuration prevented this method

2. At SYI, the material had to be milled, stockpiled and returned to the site
Unique Project Challenges

- Parallel Taxiway: At-Grade Construction
- Terminal Apron: Gradient and Layout Changes
Shaping Process
Curing Process
Stress Absorbing Interlayer

1. Reflective Cracking:
   Bottom up reflection of cracks that translate to the surface layer

2. Interlayer can consist of geotextile fabrics or DBST (double bituminous surface treatments)
Specifying FDR

1. The FAA P-301 Soil Cement Base Course specification was utilized.
2. Target values of 300 to 400 psi compressive strength were established.
3. Cement addition was 6%.
FDR Results on the Project Budget:

For a 9” Thick Base Course Layer:

Removal of Asphalt Layer (milling) = $2.00/SY
Excavation of Aggregate Base = $1.15/SY
Placement of new Aggregate Base = $17.75/SY
Reclaimed Cement Treated Base = $10.25/SY
DBST Interlayer = $3.80/SY

Cost Savings over 50,330 SY = $345,000

…12% of the total construction budget
Lessons Learned…

• Grade control – Establishing tolerances that are achievable and consistent (electronic control is a must)

• Defining QA and QC roles and testing requirements
  1. What tests are being performed
  2. What rate of testing is required (lot definition)
  3. How testing affects payment

• FDR is not a replacement for any needed subgrade stabilization
Terminal Apron
Concrete Pavement Design
Design Considerations

1. Taxi pattern through the apron
2. Aircraft tie-down locations
3. Longitudinal and transverse gradients should not exceed 1.5%
4. Surface drainage patterns
5. FAA P-501 Portland Cement Concrete specification
   • 650 psi flexural design
   • Alkali-Silica Reactivity Testing
Terminal Apron Drainage Design
Terminal Apron Joint Layout Design

NOTES

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE SHOWN TO THE CENTERLINE OF THE JOINT.
3. ALL JOINTS ARE PREFERRED TO BE 12" SPACED THROUGHOUT THE AREA.
4. DETAILS FOR JOINTS IN THE TYPES OF JOINTS SHOWN MAY BE FOUND ON THE DRAWING.
5. ALL JOINTS ARE PREFERRED TO HAVE A MINIMUM DISTANCE BETWEEN JOINTS.
6. ALL JOINTS ARE PREFERRED TO HAVE A MINIMUM DISTANCE BETWEEN JOINTS.
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LEGEND

- Proposed Concrete Apron
- Proposed Asphalt Pavement

CATCH BASIN SLAB DETAILS

GRAPHIC SCALE

0 10 20 30 40 50
(IN FEET)
Construction and Completion Photos
Partners for Success

• Tennessee Aeronautics Division
  Jim Currey, PE - Project Manager
• Shelbyville Municipal Airport
  Jay Johnson, City Manager
• Mountain States Contractors (Prime)
  Daniel Daugherty – Project Manager
• Pozzalonic Contracting & Supply Co. (Sub)
  Barry Wilder – Project Manager
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