COLES COUNTY MEMORIAL AIRPORT
MATTOON, ILLINOIS

RUBBLIZATION OF RUNWAY 11-29
Airport Background

- Located on IL Route 16 between Mattoon and Charleston
- Owned and operated by Coles County Airport Authority
- Inaugural construction in 1949
- Two paved runways - 11-29 & 6-24, sod strip 18-36
- 82 based aircraft, including several corporate aircraft and a large crop dusting service
- 33,000 annual operations
- Aircraft weights up to 190k lbs
- Takeoff speeds up to 180 mph
Airport Background
Coles County Memorial Airport

Runway 11-29
6,500’ x 150’

Runway 6-24
5,800’ x 100’

Former Runway (pre 1974)

Turf Runway 18-36

1974 Construction (yellow)

2015 Rubblization
Pavement History

- Runway 11-29, full parallel taxiway, and apron constructed in 1974
- 14” concrete over 7” asphalt base on subgrade
- 200,000 SY of pavement
- 80k CY concrete, 90k tons asphalt
- Project cost ~$25,000,000 in today’s dollars
Pavement History

- Began showing signs of distress in mid-90’s
- 4 light rehab and patching projects over next 15 years - $1.8 million total
- Concerned with not only smoothness, but FOD (foreign object debris)
Pavement History

Pavement Condition Index (PCI) Survey
Pavement History

- 5th project programmed in 2013 - $1.1 million
- Full pavement survey revealed much more extensive amounts repair areas, especially full-depth joint failure, than anticipated – 1300 areas of 1-80 square feet

Sample sheet from pavement survey showing repair areas
Pavement History

- Pavement had finally become too costly to maintain – a permanent solution was now needed.
- IDA directed Hanson to perform Alternatives Analysis of reconstruction options.
Alternatives Analysis

Pavement Cores & Geotechnical Investigation
Alternatives Analysis

- **Overlay Existing Runway**
  - Extensive amounts of full-depth failure, or “D” Cracking, and likelihood of more in the future, made for prohibitive use as base

- **Remove and Replace**
  - Most expensive, major operational impact

- **Rubblize and Overlay**
  - Mitigates existing concrete pavement failures
  - Save time, material, and cost by repurposing onsite material
Pavement Structure

- Pavement design using FAA guidance materials and FAARFIELD software
- Projected fleet mix
- Rubblize with 4” min. asphalt overlay - $4.9 million projected cost
Pavement Structure
Design Considerations

- **Profile Geometry, Tie-ins**
  - Variable depth base course (2-6”) to make minor profile and cross-slope corrections, account for unevenness after rubblizing
  - Shoulder adjustments greater than 4” affect runway lighting
  - Runway intersection area is critical
Design Considerations
Design Considerations
Design Considerations

- **Underdrains**
  - Needed to keep subgrade dry during rubblization
  - Old, but functional underdrain present on Runway 11 side – replaced afterwards.
  - New underdrain to be installed on Runway 29 side prior to rubblizing
Design Considerations

Multi-Head Drop-Hammer Breaker

Resonate Breaker
Design Considerations

- Rubblization Performance Specification
  - 75% of top half material under 3” size
  - 75% of bottom half material under 12” size
Design Considerations

**Staging**
- 11-29 closed for project duration ➔ Critical to minimize 6-24 closures and overall project time
- Work on both sides concurrently, rubblize and place base course on 11 End, install underdrain on 29 End
- Switch sides
- Intersection work
- Surface course last
- Groove and final mark after 30 days curing
Construction Contract

Plan Quantities
- 112,500 SY Concrete Pavement Rubblization
- 18,600 tons HMA Base Course
- 14,200 tons HMA Surface Course
- 11,300 LF of Underdrain
- 110,000 SF of Waterborne Pavement Marking

6,500’ x 150’ runway ➔ ~15 lane miles

113 Calendar Days Allotted

Awarded to Howell Paving, Inc.

Bid of $4.71 million

N.T.P. issued July 6, 2015
Post Construction Testing

University of Illinois
Department of Civil and Environmental Engineering
TYPICAL HMA OVERLAY (OL) MILL & HMA INLAY (IL) RUBBLIZATION & HMA INLAY

Dr. Marshall Thompson
Post Construction Testing

HWD – DATA ANALYSIS

IMPULSE STIFFNESS MODULUS (ISM)

ISM = HWD LOAD (KIPS) / MAX Δ (ins)

ISM: KIPS/IN

CURRENT SECTION

5.8 HMA SURFACE
12.8-INCH RUBBLIZED PCCP
7-IN HMA SUBBASE
SUBGRADE CBR ~ 10
FWD DATA (35 KIP LOAD) ARE SUMMARIZED FOR CENTERLINE IN THE PREVIOUS SLIDE

LEFT C/L – AVERAGE ISM = 2084
RIGHT C/L – AVERAGE ISM = 2164

SECTION A

5.8 HMA SURFACE
12.8-INCH CRUSHED STONE BASE
7-IN HMA SUBBASE
SUBGRADE CBR ~ 10
SURFACE DEFLECTION (35 KIP LOAD) = 37 MILS
ISM = 945 KIPS/INCH

SECTION B

5.8 HMA SURFACE
19.8-INCH CRUSHED STONE BASE
SUBGRADE CBR ~ 10
SURFACE DEFLECTION (35 KIP LOAD) = 46 MILS
ISM = 760 KIPS/INCH
Thank You!
Illinois Asphalt Pavement Association
March 14-15, 2016
Rubilization of Coles County Memorial Airport Runway 11-29
Located between Mattoon & Charleston
Built in 1951-52, Dedicated in 1953
Runway 11-29 built in 1973
Surface Cracking, Spaulding, & excessive Joint Repair led to Rubilization
Implemented Staging Area in Three parts to allow Airport to remain open as long as possible
Closing of Runways
Thickness required use of Guillotine Breakers first
Followed by Piano Breakers
Test Hole to ensure Complete Rubilization
“Z” Rollers after Rubilization
Multiple Breakers to Expedite Project
- 3D file of plans created
- Reshot Runway after Rubilization & Created File
- Sitech created a Paving File
  - Grade Control
  - Takes into account Roll Down
- Utilized a Robotic Total Station
  - For Grade Control instead of Stringline
  - Three Setups for Entire Length of Runway

Coles County Memorial Airport Runway 11-29
Milled Rubilized to Correct for Cross Runways
Allowed us to Maintain Thickness & Profile
Coles County Memorial Airport
Mix Came from our Coles County Plant
Hand Held “Pole” to Check Grade
First Lift Bit. Base Ty B AERO N40 (2 – 6 inches)
No String For Grade Control
Paving Program adjusted for Roll Down
Except for First Pass 2-60’ Skii’s were used on Surface Mix (2” Lift Thickness)
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Questions