Concrete Overlays for SC Airports
Lessons Learned

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Carolinas Concrete Paving Association

Local Voice of the Concrete Pavement Industry

Who are we?

- Member-Driven Organization
  - Contractors
    - Highway, Airports, S&LR, Preservation, RCC
  - Material Suppliers (i.e. Cement, Admixtures, etc.)
- Work closely with our partners (CRMCA, SCPA)
- Agency Responsive
## South Carolina Aviation Metrics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong># Commercial Airports</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong># General Aviation</strong></td>
<td>51</td>
</tr>
<tr>
<td><strong># of Counties</strong></td>
<td>46</td>
</tr>
<tr>
<td><strong>AIP Grant History</strong></td>
<td></td>
</tr>
<tr>
<td>Average (4-yr)</td>
<td>$65M</td>
</tr>
<tr>
<td>(range $58M - $76.5M)</td>
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<tr>
<td><strong>Needs vs. Revenue</strong></td>
<td>Big Gap $M</td>
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</table>

- CAE RW 5-23
- Keel Section
- GSP, 15 acre, New Cargo Apron (2019)
Airfield Concrete Overlays

Questions?

• Can concrete overlays be a cost-competitive alternative to asphalt resurfacings?
  ▫ Will the cracks in the existing pavement reflect into the concrete overlays?
  ▫ Can they enhance competition in a local market?
  ▫ Can concrete overlays be constructed fast?
TYPES OF CONCRETE OVERLAYS

**Bonded**

- Bonded Concrete Overlays of Concrete Pavements
  - previously called bonded overlays

- Bonded Concrete Overlays of Asphalt Pavements
  - previously called ultra-thin whitetopping

- Bonded Concrete Overlays of Composite Pavements

**Unbonded**

- Unbonded Concrete Overlays of Concrete Pavements
  - previously called unbonded overlays

- Unbonded Concrete Overlays of Asphalt Pavements
  - previously called conventional whitetopping

- Unbonded Concrete Overlays of Composite Pavements
Timing is Important...

Restoration

Resurfacing

Reconstruction

Existing pavement condition before treatment

Excellent

Good

Fair

Poor

Deteriorated

Failed

Preventive maintenance

Minor rehabilitation

Major rehabilitation

Bonded on Concrete

Unbonded on Concrete

Bonded on Asphalt or Composite

Unbonded on Asphalt or Composite

Time
Unbonded Over Asphalt or Composite
Keys to Success

- Milling to eliminate surface distortions of 2 in. or more
- Complete repairs at isolated spots where structural integrity needs restoring
- Concrete patches in the existing pavement should be separated from the overlay
- Surface temperature of existing asphalt pavement should be maintained below 120°F (48.9°C) when placing overlay
- Partial bonding between the overlay and the existing asphalt pavement is acceptable and may even improve load-carrying capacity
Unbonded Overlay of Concrete Pavements: Keys to Success

- Full-depth repairs - only where structural integrity is lost at isolated spots.
- Separator layer (normally 1” asphalt or non-woven geotextile fabric)
- Use to restore structural capacity of the existing pavement and increase pavement life equivalent to full-depth pavement.
- Faulting of 3/8 in. or less in the existing concrete pavement
- Shorter joint spacing helps minimize curling and warping stresses.
- Best not to match joints with those of the underlying concrete pavement.
# SC General Aviation Airports

## Concrete Overlays

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>Engineering Consultant</th>
<th>PCCP Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berkeley Co RW</td>
<td>WK Dickson Inc</td>
<td>Ballenger Paving (McI)</td>
</tr>
<tr>
<td>Charleston Exec (UBO)</td>
<td>ADC Engineers</td>
<td>Ballenger Paving (McI)</td>
</tr>
<tr>
<td>Darlington Co RW</td>
<td>Michael Baker Inc</td>
<td>Hi-Way Paving</td>
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<tr>
<td>Grand Strand RW</td>
<td>Holt Inc</td>
<td>HI-Way Paving</td>
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<tr>
<td>Greenwood Co RW &amp; TW</td>
<td>Michael Baker Inc</td>
<td>McCarthy Improvement</td>
</tr>
<tr>
<td>Lancaster Co RW</td>
<td>Michael Baker Inc (LPA)</td>
<td>Hinkle Contracting</td>
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<tr>
<td>Laurens Co RW &amp; TW</td>
<td>Michael Baker Inc (LPA)</td>
<td>Ballenger Paving (McI)</td>
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<tr>
<td>Williamsburg Co Ramp</td>
<td>Wilbur Smith Assoc</td>
<td>?</td>
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**BLUE** = Active or Upcoming, **RED** = Unbonded of Concrete
### Lancaster County (SC) Airport

**April 2009 Bid**

<table>
<thead>
<tr>
<th>TEN Contractors</th>
<th>2 PCCP &amp; Asph</th>
<th>2 Asph only</th>
<th>6 PCCP only</th>
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</table>

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Alternative Bid Amount ($)</th>
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<tbody>
<tr>
<td></td>
<td>Asphalt / FDR</td>
</tr>
<tr>
<td>A</td>
<td>$2,326,545</td>
</tr>
<tr>
<td>B</td>
<td>$2,453,970</td>
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<tr>
<td>C</td>
<td>-</td>
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<tr>
<td>D</td>
<td>-</td>
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</table>
Lancaster County Completed - 7.5” WT
350’ Extension

Batch Plant On-Site

Crushing Operation – Base Material
RW Width reduced to 100’

WW II Era PCCP

Asphalt Sep Layer
CONCRETE OVERLAY COMPLETED

59,700 SY of 11-inch P-501
Quotes from (JZI) Open House

• A Concrete Overlay kept us “out of the subgrade” vs. reconstruction option.
• A Concrete Overlay raised our pavement elevation out of the high water table
• Inch per Inch concrete was less expensive than the asphalt leveling (sep) layer
• Our original concrete surface lasted 60+ years, no reason why this (new concrete) surface cannot last another 60 years!
Open Houses
Opportunities to see up close

Lancaster County Airport
Concrete Overlay of Asphalt

Charleston Exec Airport
Concrete Overlay of Concrete
Laurens County (SC) Airport
½ Width Paving - 37.5’

5-Inch, SCDOT 501 Spec (substituted for P-501), Min of 4400 psi
Pavement Sections - Laurens Co Runway
Cost Breakdown per layer

**Asphalt Section**
- 4” P-401 Surface: $27.87/ SY
- Dbl Surface Treatment: $4.75/ SY
- 8” P-301 FDR: $7.40/ SY
- Subgrade: $12.12/ SY

Subgrade Costs reflect all “other” project related costs

**Concrete Section**
- 5” SC-501A: $29.00/ SY
- 3-4” Aged Asphalt: $9.04/ SY
- Subgrade: $7.93/ SY

Aged Asphalt Costs include Transition and grade correction costs
Two Years following RW Project

Successful projects breed additional projects!
Greenwood County RW 9-27

- Asphalt was nearly one foot thick!
- PCCP Paving completed in 10 days!
Greenwood County RW 9-27
55,500 SY of 5-inch PCCP
4 Contractors
- 2 Base Bid (PCCP)
  - Connectors
- 2 Additive Bids
  - Parallel TW

May 2018 Bid

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Project Bids</th>
<th>Concrete</th>
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<tbody>
<tr>
<td>A</td>
<td>$6,859,463</td>
<td>$46.50/SY</td>
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<tr>
<td>B</td>
<td>$7,001,427</td>
<td>$40.40/SY</td>
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<tr>
<td>C</td>
<td>$7,261,864</td>
<td>$47.71/SY</td>
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<tr>
<td>D</td>
<td>$8,174,051</td>
<td>$47.29/SY</td>
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Grand Strand Airport

7.5-inch Runway Overlay
Grand Strand Airport

7.5-inch Runway Overlay
About 25% of 51 General Aviation Airports now have concrete
Construction Lessons Learned

- Paving directly over the asphalt cracks is OK
- Curing is extremely important with thinner overlays (pavement edges too)
- Remember to “block out” working joints that have opened wide (pilot lanes)
- There are more joints on thinner overlays…saw timing is critical
Concrete Overlays
Airports and Highways
The Opportunities... How can they help?

- Mix of Fixes, Asset management, Avoid Market saturation
- Smooth out the use of concrete pavement
- ACPA Explorer Database
  - Where have concrete overlays been completed?
  - All market segments – Airports, Highways, Streets & Local Roads
  - http://overlays.acpa.org

Concrete Overlays - Highway Applications
The Opportunities...
Where are the Best Places to start?

▫ Existing Asphalt (or Concrete) in FAIR / POOR Condition
▫ Looking to improve pavement resiliency (e.g. raise the grade)
▫ Rutting / Cracks in the pavement are normal – can be addressed
▫ Areas where competition has been lacking, high Asphalt prices
▫ Enough pavement structure where milling (profiling) can be accomplished that helps with project economics
▫ Short temporary shut-downs are ideal versus complex phasing

Highway Applications
Finding a good overlay candidate…
Airfield Concrete Overlays
Lessons Learned

Summary

✓ They can be a cost-competitive alternative to asphalt resurfacings.
✓ Unlike asphalt overlays, pavement cracks do not reflect into concrete overlays
✓ In particular markets, they can enhance competition
✓ Concrete overlays can be constructed fast!
THANK YOU

Questions?

GDean@pavementse.com