Byproduct Services
Renewable Construction Materials from Electric Generation

Blended CFB Ash and Limestone Base Course

by
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Lexington, Kentucky
May 4-7, 2009

PRESENTATION AGENDA

• Overview of JEA (formerly Jacksonville Electric Authority)
• Circulating Fluidized Bed (CFB) Process
• Byproduct Utilization Environmental Approval Process
• EZBase Production
• EZBase Applications
• EZBase “Plus” Production
• EZBase “Plus” Applications
• Questions?
General Information

• Largest Municipally Owned Utility in FL, 8th Largest in US
  – Service in Four Counties (Duval, Clay, Nassau, St. Johns)
• 450,000 Electric Customers
  – 2360 Megawatts Generation Capacity
  – 1160 Megawatts Solid Fuel
• Treat/Produce 110 MGD Water
• Treat 85 MGD Wastewater

Northside Generating Station

– Units 1 & 2, 640 megawatts
– 1.4 million tons pet coke/year
– 200,000 tons coal/year
– 600,000 tons limestone/year
– 600,000 tons byproduct (ash)/year

Petroleum coke, coal and limestone are brought in by ship/barge
Fuel transferred to storage domes

Limestone handling

CFB Process Description

JEA Large-Scale CFB Combustion Demonstration Project
CFB Combustion Byproducts

Bed Ash
375,000 tons/year

Fly Ash
125,000 tons/year

EZBase Processing

Material milled to <3.5 inches

Material placed in wind row for drying

Material placed in slurry pit for calcium hydroxide placement

Material stacked for transport to customers
Environmental Approvals

FDEP Beneficial Use Approval

- Surface Water Impact
- Ground Water Impact
- Particulate Impact (dust)
- Human Health Impact

Material Properties

<table>
<thead>
<tr>
<th>Material Property</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Dry Density (pcf)</td>
<td>85-95</td>
</tr>
<tr>
<td>Optimum Moisture (%)</td>
<td>20-25</td>
</tr>
<tr>
<td>LBR</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Swell (in)</td>
<td>&lt;0.005</td>
</tr>
</tbody>
</table>

Applications

- Road Construction
- Cross Section Improvement
- Parking Lot/Lay Down Yard Golf Cart Path Rail Sub-base
The Future...

- EZBase Plus
- Improved Constructability
- Reduced Moisture Sensitivity
- Improved In-Place Density
- Proven Performance

- JaxPort
- 160 Acres
- 300,000 Tons

EZBase Plus Processing

EZBase PLUS Processing
**EZBase PLUS**

**Material Properties**

<table>
<thead>
<tr>
<th>MECHANICAL PROPERTY</th>
<th>RANGE</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Driveway pressures (psf)</td>
<td>9570-11200</td>
<td></td>
</tr>
<tr>
<td>Plastic Modulus (psi)</td>
<td>235-335</td>
<td></td>
</tr>
<tr>
<td>Softening Point (°F)</td>
<td>2109</td>
<td></td>
</tr>
<tr>
<td>LBR</td>
<td>127-141</td>
<td>136</td>
</tr>
<tr>
<td>Swell (in)</td>
<td>0.001-0.006</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**JaxPort Pavement Design Data**

**Table 1.1 – RTG Pavement Loading Data**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Imperial</th>
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<tbody>
<tr>
<td>Wheel Load</td>
<td>15 metric ton</td>
</tr>
<tr>
<td>Tire Pressure</td>
<td>9 lb/ in²</td>
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</tbody>
</table>

**Table 1.2 – RTG Runway RCC Pavement Design**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Thickness (inches)</th>
<th>Material Specification</th>
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<tbody>
<tr>
<td>Concrete Wearing Surface</td>
<td>15</td>
<td>Roller Compacted Concrete</td>
</tr>
<tr>
<td>Base</td>
<td>12</td>
<td>Stabilized Sub-Grd LPE = 40</td>
</tr>
<tr>
<td>Sub-Grd       (ft)</td>
<td>—</td>
<td>Sand Fill CBM = 15</td>
</tr>
</tbody>
</table>

**JaxPort Alternate Design**

**Table 2.1 – Alternate WCDA Flexible Pavement Section**

<table>
<thead>
<tr>
<th>Compressed Thickness Design</th>
<th>Pavement Criteria</th>
<th>Layer</th>
<th>Drainage Coefficient</th>
<th>Compressed Number</th>
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</thead>
<tbody>
<tr>
<td>3.5</td>
<td>HMA FDOT 2.1 with</td>
<td>0.44</td>
<td>1.04</td>
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<tr>
<td></td>
<td>Mastic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>HMA FDOT 2.1 with</td>
<td>0.31</td>
<td>1.06</td>
<td></td>
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<td></td>
<td>Mastic</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>HMA FDOT 2.1 with</td>
<td>0.15</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mastic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>AC-20G</td>
<td></td>
<td>0.06</td>
<td>3.89</td>
</tr>
</tbody>
</table>

Total Structural Number = 3.89
JaxPort Base Material Design

EZBase Plus:
50% EZBase/
50% #67 Limestone
Max. Dry Density: 108.2 pcf
Opt. Moisture: 17.4 %
Maximum LBR: 140

JaxPort EZBase Plus Placement

JaxPort
January, 2008

JaxPort
February 8, 2008
Completed Project

JaxPort Mitsui Terminal

Subgrade Stabilization, 90,000 EZBase Base Course

Parking Lot/Lay-Down Yards, 70,000 EZSorb, 60,000

Secondary Roads, 136,000 Yards, 70,000

Questions/Comments
EZBase.org