SCDOT Pavements Seminar

Columbia, SC
Project Spotlight:
Georgetown Intersection

Owner: SCDOT
Contractor: Greenwall Construction Service, Inc
Concrete Pavement Subcontractor: J.A. Long
Before the project:

- HMA pavement throughout project limits
- Severe rutting and fatigue cracking
- HMA was being replaced every 7-10 years
- THEREFORE, we knew the subgrade was failing
Intersection US 17, US 701, and US 521 - Georgetown

- ADT: 23,000
- Phased construction to reduce impacts to motorist
- 2 alternatives were given in the plans to replace unsuitable subgrade
  - Aggregate CR-14 (Stone Crusher Run)
    - Up to 12 inches would be used under 12 inches Class 4000 PCCP
  - Portland Cement Concrete (Special Use) and Nonwoven Geotextile Interlayer Fabric
    - Class 2500 “Econocrete”
      - Would be the “base” slab.
      - 12 inches of “econcrete” mix, then later topped with another 12 inches of Class 4000 concrete
What is “Econocrete”?  

- Lower strength, less expensive concrete mixture  
- Sometimes referred to as lean concrete  
- Standard fly ash mix  
- 0.42 water to cement ratio  
- Air content would be kept on lower end of acceptance due to the fact this concrete would never be exposed to the elements
Stage 1 Phase 1

- Critical phase because alternative must be determined once 12 in of existing pavement and subgrade were removed.
- Subgrade was not structurally sound - a large pocket of sawdust, pieces of metal, and logs were found.
- Decision was made to excavate an additional 12 in and replace with “econocrete”
Stage 2 – Phase 3

Stage 2 – Phase 4
Georgetown Intersection

▪ What was the determining factor(s) for concrete being selected for this job?
  ▪ Due to poor subgrade that was encountered the decision was made to excavate 24” down and replace with 12” “Econocrete” and 12” of Class 4000 Portland Cement Concrete Pavement
  ▪ A nonwoven geotextile interlayer was placed between the two slabs
  ▪ Alternatives could not be mixed due to the potential of differential settlement throughout the project (which would have caused issues with the PCCP; cracking at joints between two alternatives)
Factors for Success

▪ Joint Plan
▪ Logistics and Communication
▪ Service from the concrete supplier
STAGE 1 PHASE 1
STAGE 2 PHASE 2

DOWELED TRANSVERSE JOINTS
TIED LONGITUDINAL JOINT
ISOLATION JOINT
Stage 1
PCCP Placement
- 5,500 square yards
- 1,850 cubic yards
- 2 mobilizations
Stage 2 Phase 1
PCCP Placement
- 7,460 square yards
- 2,500 cubic yards
- 4 mobilizations
Logistics and Communication

- Communication with the Prime Contractor
  - Working closely with the Prime Contractor on a weekly basis to go over any schedule changes. Staying up to date on the schedule was important because we had 6 mobilizations in a short period of time. Many times we would mobilize from other jobs up to seven hours away.

- Communication with the DOT
  - Communicating with the DOT about any potential problems and resolving them before they occurred. Joint Plan revisions, issues with existing curb and gutter, etc.

- Logistics and Communication with the concrete supplier Argos
  - Making sure Argos knew our pour schedule and production needs. The schedule was constantly changing due to weather and other issues. Keeping in contact with them on a daily basis allowed them to service the production needs on the job.
Materials and Mix Designs

- 3 primary mix designs were used for this project:
  - **Class 2500 “Econocrete”**
    - Econocrete was placed 12 inches thick and served as the base slab for the concrete pavement. Fabric was placed on top of this to serve as a bond breaker for the concrete pavement.
  - **Class 4000**
    - Standard DOT mix with Ash .40 water to cement ratio
  - **Class 5000 High Early**
    - 800# straight cement .37 water to cement ratio
    - Used in areas where local businesses needed access.
    - Same raw materials used throughout the duration of the project. There was a fly ash shortage halfway through the project but we were able to switch to straight cement without delay because the mix had already been submitted to the DOT and approved.
<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Trade Name</th>
<th>Sp. Grav</th>
<th>Amt./Cu. Yd.</th>
<th>Location or SSD Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>Argos Cement USA</td>
<td>Newberry, Florida</td>
<td>3.15</td>
<td>5.745 Bag/540.0 lb</td>
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<tr>
<td>Fly Ash</td>
<td>Southeastern Fly Ash</td>
<td>Wayah/Cross</td>
<td>2.26</td>
<td>1.489 Bag/140.0 lb</td>
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<tr>
<td>Slag</td>
<td></td>
<td></td>
<td>2.91</td>
<td>5.062 Bag/20.0 lb</td>
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<tr>
<td>Fine Agg</td>
<td>Carolina Sand</td>
<td>Johnson NV</td>
<td>2.65</td>
<td>1065 lb</td>
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<tr>
<td>Coarse Agg</td>
<td>Volcanic Materials</td>
<td>Rockingham 57 Granite</td>
<td>2.70</td>
<td>1875 lb</td>
<td></td>
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<tr>
<td>Interm. Agg</td>
<td></td>
<td></td>
<td>2.70</td>
<td>5 lb</td>
<td></td>
</tr>
<tr>
<td>Admix 1</td>
<td>BASF</td>
<td>Pozzolith 80 Water Reducer</td>
<td>NR</td>
<td>As Needed cz</td>
<td></td>
</tr>
<tr>
<td>Admix 2</td>
<td>BASF</td>
<td>Air 90 Air Entrainer</td>
<td>NR</td>
<td>As Needed cz</td>
<td></td>
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<tr>
<td>Admix 3</td>
<td>BASF</td>
<td>Master Set 30HR retarder</td>
<td>NR</td>
<td>As Required cz</td>
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<tr>
<td>Water</td>
<td>City Water</td>
<td>GT City Water</td>
<td>1.00</td>
<td>32.50 gal/271 lb</td>
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</tr>
</tbody>
</table>

Date(s) of Mix: Performed By: Stump

Air Content: % By Weight of Mix
Pressure Meter: 27.09 psi
Rollometer: 144.7 psi
Unit Weight: 96.7 psi/Cu Ft
Average Compressive Strength: PSI @ 3 Days
PSI @ 7 Days

Percent of Fine Aggregate to total Aggregate by Volume: 37%
Percent of Int. Aggregate to total Aggregate by Volume: 6%
Percent of Coarse Aggregate to total Aggregate by Volume: 53%
Total Cementitious Material: 690 lb divided by 94 = 7.234 bags
Total gallons of water: 32.50 gal divided by 4.49 gal/bag = 7.234 bags
Total ft of water: 271 ft divided by total cementitious material 690 = 0.40 W/C Ratio

Designed % Air: 4.50 %
Range 3% to 6%

Comments: BASF Polyblend 697 Mid Range may be added to this mix on request to increase slump to 5" +/- 1" Mix Code 490DAF414

Signed By: DA Jackson
Date: 7/8/2016

Return To: South Carolina Department of Transportation
Research and Materials Laboratory
Attn: Concrete Section
P. O. Box 191
Columbia, South Carolina 29222
Fax (803) 737-8649

Lab Form 271 (R-02)
### HES MIX DESIGN

**SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
Concrete Mix Proposal/Fly Ash-Slag (Other)

**Company:** Ready Mixed Concrete Company  
**Address:** 210 Ridge Street, Georgetown, SC 29440  
**Individual to Contact:** DA Jackson  
**Phone No.:** 843-560-2000

**Testing Agency**  
**Address:**  
**Individual to Contact:**  
**Phone No.:**

**Class of Concrete:** 5000  
**Special Mix:** High Early Mix

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</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>Argos Cement USA</td>
<td>Newberry, Florida</td>
<td>3.15</td>
<td>8.511 Bag/100 lb</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>Southeastern Fly Ash</td>
<td>Wayah/Cross</td>
<td>2.26</td>
<td>5.000 Bag/100 lb</td>
</tr>
<tr>
<td>Slag</td>
<td></td>
<td></td>
<td>2.91</td>
<td>0.000 Bag/100 lb</td>
</tr>
<tr>
<td>Fine Agg</td>
<td>Carolina Sand</td>
<td>Johnsonville Pit</td>
<td>2.65</td>
<td>100 lb</td>
</tr>
<tr>
<td>Coarse Agg</td>
<td>Vulcan Materials</td>
<td>Rockingham 67 granite</td>
<td>2.70</td>
<td>1810 lb</td>
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<tr>
<td>Interim Agg</td>
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<td></td>
<td>2.70</td>
<td>0 lb</td>
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<tr>
<td>Admix 1</td>
<td>BASF</td>
<td>Prozeal 80 Water Reducer</td>
<td>NR</td>
<td>As Needed oz</td>
</tr>
<tr>
<td>Admix 2</td>
<td>BASF</td>
<td>Air 80 Air Entrainer</td>
<td>NR</td>
<td>As Needed oz</td>
</tr>
<tr>
<td>Admix 3</td>
<td>BASF</td>
<td>Master Set 300 Retarder</td>
<td>NR</td>
<td>As Requested oz</td>
</tr>
<tr>
<td>Water</td>
<td>City Water</td>
<td></td>
<td>1.00 gal</td>
<td>36.00 oz</td>
</tr>
</tbody>
</table>

**Date(s) of Mix:**  
**Performed By:**  
**Air Content % By Volume:**  
**Unit Weight:** 145.35 lbs/Cu Ft  
**The yield:** 27.00 Cu Ft

**Average Compressive Strength:**  
**PSI @ 3 Days:**  
**PSI @ 7 Days:**  
**PSI @ 28 Days:**

| Percent of Fine Aggregate to total Aggregate by Volume | 35% |
| Percent of Int. Aggregate to total Aggregate by Volume | 0% |
| Percent of Coarse Aggregate to total Aggregate by Volume | 64% |

**Total Cementious Material:** 800 (lbs) divided by 94 = 8.511 bags

**Total gallons of water:** 36.00 divided by 8.511 bags = 4.23 gallons/bag

**Total lbs of water:** 300 divided by total cementious 800 = 0.37 W/C Ratio

**Designed % Air:** 4.50 %  
**Range 3% to 8%**

**Comments:**

**Lab Form 271 (R-02)**

**Signed By:** DA Jackson  
**Date:** 7/8/2016

**Return To:** South Carolina Department of Transportation  
Research and Materials Laboratory  
Attn: Concrete Section  
P. O. Box 161  
Columbia, South Carolina 29222  
Fax (803) 737-6549
Questions??
Road Construction Engineer: Kit Scott
Concrete Contractor: Bobby Tillery, J.A. Long, Inc