South Mountain Freeway

2018 Arizona Pavements/ Materials Conference

Pavement Design-Construction-Maintenance

November 16, 2018
Today’s Agenda

- Project Overview
- ADOT and Developer Teams
- Arizona Pavement History
- Subgrade
- Mix Designs
- Subbase and Binder Selection
- Pavement Maintenance
- Lessons Learned
- Q&A
Overview

- Largest Project in Arizona History
- $1.77 Billion Programmed
  - Publicly financed
  - 40% federal funding
  - 60% Proposition 400
- 4 Construction Segments
- 30 year Maintenance
Project Features

- **SOUTH MOUNTAIN FREEWAY**

- **I-10 Papago Segment**
  - Van Buren Street
  - Buckeye Road
  - Lower Buckeye Road
  - Broadway Road
  - Southern Avenue
  - Baseline Road
  - Dobbins Road
  - Elliot Road
  - Estrella Drive

- **Salt River Segment**

- **Center Segment**

- **Pecos Segment**
  - 17th Avenue
  - Desert Foothills Parkway
  - 24th Street
  - 40th Street
  - Ray Road
  - Chandler Boulevard

**Project Features**

- **22 miles of new freeway**
- **Savings over $100 million**
- **Double Roundabout Interchange**
- **4.5 miles of widening improvements between 75th & 43rd avenues**
- **3 general purpose lanes**
- **1 high occupancy vehicle lane**
- **40 bridges & 1 pedestrian bridge**
- **5 multi-use underpass crossings**
- **11 miles of sound walls**
- **2 half Diverging Diamond Interchanges (DDI)**
- **13 interchanges**
- **6-mile long shared use path**

2018 Arizona Pavements / Materials Conference

Steve Mishler (ADOT), Kevin Turner (KTCM) & Doug LaMont (WSP)
- GEC: HDR & Subconsultants
- Co-location with C202P
- Reviews Pavement Designs
- Verify Pavement Placements
- Test Pavement Samples
Connect 202 Partners

- Fluor-Granite-Ames Joint Venture
- Raba Kistner - Independent Quality Firm
- Granite - AC Pavement
- Coffman Specialties – PCCP
Design Team

- 30 Design Subconsultants
- Pavement Design by Transtec
- Geotech by WSP/AMEC/Ethos
- AC and PCCP Pavements
- Pavement Design Reports
ADOT Highway System Pavement History

- Asphalt Highways = 94%
- PCCP Highways = 6%
- Phoenix/Metro Area are PCCP
  - I-10, I-17, US60, SR51, SR101, SR202, SR303 and SR143
  - I-10 and I-19 Tucson and I-17 approaching Flagstaff
- Rural Highways are Asphalt
AC Pavement History

- 1970’s Stack Up Plants
- Boeing Construction/Shearer
  - Continuous Mix Plants
  - Asphalt Failures
- Oil Refineries
  - Oil Producers made other things
AC Pavement History (Cont.)

- Oil Refineries
  - Oil Producers made other things
- ISSUE: Resulted in lesser quality Asphalt pavement
- Early 1990’s – Oil Producers put plastics put back in
  - SHRP and TMR
  - Nationwide
Why AC Instead of PCCP?

- Durable and Adaptable
- Expedites Construction
- Extended Pavement Life with SBS Binder (PG 76-22)
- More Efficient to Replace AR-ACFC
Subgrade Soils

- 1.45 Million Tons of AB Required
- Develop based upon soil conditions
- Native vs. Borrow
- Farm Fields
- South Mountain Park area
Mainline

- **I-10 Mainline (Match Existing - Prescribed)**
  - 1” AR-ACFC
  - 15” PCCP

- **SR 202 Mainline AC**
  - AR-ACFC – ½” Depth
  - AC - Varies 8-9” Depth
  - AB – Varies 13 ½ – 14 ½”

New Approach 3” of SBS
Ramps

- **SR 202 Ramps AC**
  - AR-ACFC – ½” Depth
  - AC Varies 4-6” Depth
  - AB Varies 8-12” Depth
Cross Roads

- Cross Roads
  - PCCP 8-11 1/2 " Depth
  - AC 2 1/2 " Depth
- Acceleration/Deceleration
- Truck Traffic
Mix Designs

- 25 Mix Designs as of 9-10-18
- 5 - Vulcan Plants
Mix Designs

- AC Under PCCP – 416 Mix
- AC Widenings – 409 Misc.
- 416 Base for Mainline w/15% Recycle
- 416 (PG 76-22) SBS Surface Mix
Styrene–Butadiene–Styrene (SBS) Modified Binder

- **Polymers**
  - Elastomers (Rubber/Elastics)
  - Plastomers (Plastics)

- **SBS is an Elastomer**
  - Most commonly used

SBS Powder
Styrene-Butadiene-Styrene (SBS) Modified Binder (Cont.)

- **2005 Asphalt Institute Study**
  - Tested 84 sites across N. America
  - Reduced Rutting
  - Improved Fatigue
  - Thermal Cracking resistance
- **PG 76-22 (SBS Modified) in Upper Lift**
  - First time Used in Arizona
### 70-10 vs. 76-22 SBS Modified

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<thead>
<tr>
<th>70-10 SBS Modified</th>
<th>76-22 SBS Modified</th>
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<tbody>
<tr>
<td>Binder – Holly PG 70-10</td>
<td>Binder – Holly PG 76-22 SBS Mod.</td>
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<tr>
<td>Wash Sand 30%</td>
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<tr>
<td>Crusher Fines 37%</td>
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<tr>
<td>½” Rock 13%</td>
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<tr>
<td>¾” Rock 20%</td>
<td>¾” Rock 20%</td>
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<tr>
<td>MF (Lime) 1%</td>
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<tr>
<td>Oil Content 5.3%</td>
<td>Oil Content 5.4%</td>
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<td><strong>STABILITY 3,578 (@5.3%)</strong></td>
<td><strong>STABILITY 4,426 (@5.4%)</strong></td>
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Pavement Maintenance / Life Cycle

- Pavement Maintenance = 30 years
- AR-ACFC
  - Years 10 and 30
- 2.5” Mill and Replace + AR-ACFC
  - Year 20
- Year 30 Requires a 10 yr. Handback Life
Lessons Learned
Lessons Learned

- Know the AB material source
- Mix Design Tracking
- Field training on material acceptance
- SAF (Subgrade Acceptance Factors)
Q & A

INFORMATION

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