Update:
Nebraska’s Asphalt Mixes and Applications

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Nebraska Department of Roads

December 2011
Topics of Discussion

- Updated Superpave Mixes
- Leveling Courses
- Superpave Updates and Urban Superpave
Update of Superpave Mixes

SP1
SP2
SP3
SP4
SP4 Special
SP5
SPR
SPS

SPR
SPH
SPS
Spr

- Replaces SP4 Special and most SP4 designs
- High Recycle Mix (Up to 50% RAP)
- Been in use for 12 years (SPL)
- High strength modulus for increased structural value and rut resistance
- Allows for improved in-place density, especially at joints
SPR: Keys to the Mix

• 64-34 Grade Binders

64+34 = 98 = Polymer Modified!

**PG 64-34**

7- day Max Air Temperature (°C) 1-day Avg. Min. Temperature (°C)
SPR: Keys to the Mix

- 64-34 Grade Binders
- Tighter Gradation Band
SPR: Keys to the Mix

- 64-34 Grade Binders
- Tighter Gradation Band
- Lower Gyrations (Ndes=65)
- 3.0% Target Air Void Content
SPR: Keys to the Mix

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- Tighter Gradation Band
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- 83% CAA, 43% FAA
SPR: Keys to the Mix

- 64-34 Grade Binders
- Tighter Gradation Band
- Lower Gyrations (Ndes=65)
- 3.0% Target Air Void Content
- 83% CAA, 43% FAA
- Minimum AC of 5.0%
- VMA dropped to 12 (soon to be eliminated)
- Higher Dust Content (Around 6%)
• **SPR with PG 64-34 is 20 to 25% lower material cost**
• SPR with PG 64-34 is 20 to 25% lower material cost
SPH

• Heavy truck applications – Interstate, Expressways, and large volume urban corridors

• Same as SP-5 mix design except lower gyrations
  – Ndes now 95, was 109
  – Will allow improved binder and dust contents, should correct main drawbacks we have seen.

• Utilizing 70-34 and 64-34 binder
• Shoulder Mix
• Very Economical
• Designed to allow high RAP (50% max)
• Wider gradation band
• 52-34 Grade Binder
Topics of Discussion

- Updated Superpave Mixes
- Leveling Courses
- Superpave Updates and Urban Superpave
LC and RLC

Used on:

- Concrete
- Heavily Patched Asphalt or Composite Pavements

- 1 3/8” – 3”
- 5/8” – 1”
Overlay of Bare Concrete Pavement without LC (Bottom lift)
Overlay of Heavily Patched Pavement with LC (Bottom Lift)
LC and RLC

- Keys to the mix:
  - 64-34 & 70-34 Grade Binders
  - High Binder Content (6-7%)
  - Lower Gyrations (Ndes=50)
  - 2.5% Target Air Void Content
  - Fine Gradation Band
    - 70% Crushed Aggregate
    - 30% Natural Sand
  - 45% FAA on Crushed Aggregate
Topics of Discussion

- Updated Superpave Mixes
- Leveling Courses
- Superpave Updates and Urban Superpave
Superpave Updates:

- Removal of VMA as a pay factor.
  - Bulk Specific Gravity will be 2.585 (Information only)
- Removal of option to exceed maximum RAP percentages by lowering bottom end of PG Binder temperature grade.
- Allowance of 80% limestone aggregate on surface lift
- No coal sand or chat aggregate allowed in any mix
- Removed CAA requirement for SPS
- SPR CAA only tested on verification test
Superpave Updates:

- Addition of SPR (fine) mix gradation:

<table>
<thead>
<tr>
<th>English Sieve (Metric)</th>
<th>0.375 Inch (9.5 mm) Control Points (percent passing)</th>
<th>SPR Control Points (percent passing)</th>
<th>SPR (Fine) Control Points (percent passing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 inch (19 mm)</td>
<td>98.0 100.0</td>
<td>81.0 89.0</td>
<td>81.0 96.0</td>
</tr>
<tr>
<td>1/2 inch (12.5 mm)</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8 inch (9.5 mm)</td>
<td>90.0 100.0</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>32.0 67.0</td>
<td>46.0 56.0</td>
<td>46.0 56.0</td>
</tr>
<tr>
<td>No. 8 (2.36 mm)</td>
<td>12.0 21.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
<td>2.0 10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 30 (600 μm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 50 (300 μm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*No. 200 (75 μm)</td>
<td>4.0 9.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Narrowed mixes down to SPS, SPR, SPH

- Required compaction temperatures:

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>% RAP</th>
<th>Compaction Temp °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPS</td>
<td>0-25</td>
<td>270 ± 5</td>
</tr>
<tr>
<td></td>
<td>26-50</td>
<td>280 ± 5</td>
</tr>
<tr>
<td>SPR</td>
<td>0-35</td>
<td>280 ± 5</td>
</tr>
<tr>
<td></td>
<td>36-50</td>
<td>290 ± 5</td>
</tr>
<tr>
<td>SPH</td>
<td>0-25</td>
<td>300 ± 5</td>
</tr>
</tbody>
</table>
Superpave Updates:

- Updated Minimum Binder Contents:

  **Table 1028.12**
  Minimum Binder Content

<table>
<thead>
<tr>
<th>Mix Type (Metric)</th>
<th>Minimum Binder Content, Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPS</td>
<td>4.8</td>
</tr>
<tr>
<td>SPR</td>
<td>5.0</td>
</tr>
<tr>
<td>3/8 inch (9.5 mm)</td>
<td>5.5</td>
</tr>
<tr>
<td>1/2 inch (12.5 mm)</td>
<td>5.1</td>
</tr>
<tr>
<td>3/4 inch (19 mm)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

- Update to aggregate adjustment table:

  **Table 1028.15**
  Aggregate Adjustments

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch (25 mm), 3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm), No. 4 (4.75 mm)</td>
<td>± 6%</td>
</tr>
<tr>
<td>No. 8 (2.36 mm), No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)</td>
<td>± 5%</td>
</tr>
<tr>
<td>No. 200 (75 µm)</td>
<td>± 2%</td>
</tr>
</tbody>
</table>
Superpave Updates:

- Pour time for FAA AASHTO T304 Method A decreased from max. 6 seconds to 5±1 seconds.
- Recommended sample size for FAA cold feeds is now 6000 grams instead of 4000 grams if referee testing may be desired.
- Updated Gradation Testing Tolerance table to specify tolerance for specific sieve sizes:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm), No. 4 (12.5 mm), No. 8 (2.36 mm)</td>
<td>5%</td>
</tr>
<tr>
<td>No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)</td>
<td>4%</td>
</tr>
<tr>
<td>No. 200 (75 µm)</td>
<td>2%</td>
</tr>
</tbody>
</table>
Superpave Updates:

- Removed wording on sampling after 100 tons produced.
- Stair Stepped FAA Penalty for SPH:

<table>
<thead>
<tr>
<th>Percentage outside of allowable deviation given in Table 1028.19</th>
<th>Penalty for SPR</th>
<th>Penalty for SPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1%</td>
<td>20% or reject</td>
<td>5% or reject</td>
</tr>
<tr>
<td>0.2%</td>
<td>20% or reject</td>
<td>10% or reject</td>
</tr>
<tr>
<td>0.3%</td>
<td>20% or reject</td>
<td>15% or reject</td>
</tr>
<tr>
<td>0.4% or greater</td>
<td>20% or reject</td>
<td>20% or reject</td>
</tr>
</tbody>
</table>

- The Air Void Table now states “50% or Reject” for pay factors that were previously “Reject” only.
Other updates include minor changes to specification language, significant digits, and movement of items within the specification to improve flow and arrangement of the specification.
“Urban” Superpave Spec.

• Additional Updates
  – Includes latest Superpave updates
  – Smaller Sublot/Lot Sizes
  – Pay cannot exceed 100% at end of project, but still incentive before final 100% pay is reached.

<table>
<thead>
<tr>
<th>Air voids test results for Asphaltic Concrete Type SPR</th>
<th>Air voids test results for SPH Asphaltic Concrete</th>
<th>Pay Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.5%</td>
<td>Less than 1.5%</td>
<td>50% or Reject 50% or Reject</td>
</tr>
<tr>
<td>0.5% to 0.9%</td>
<td>1.5% to 1.9%</td>
<td>50% or Reject 50%</td>
</tr>
<tr>
<td>1.0% to 1.4%</td>
<td>2.0% to 2.4%</td>
<td>50% or Reject 95%</td>
</tr>
<tr>
<td>1.5% to 1.9%</td>
<td>2.5% to 2.9%</td>
<td>90% 95%</td>
</tr>
<tr>
<td>2.0% to 2.4%</td>
<td>3.0% to 3.4%</td>
<td>100% 100%</td>
</tr>
<tr>
<td>2.5% to 3.5%</td>
<td>3.5% to 4.5%</td>
<td>102% 104%</td>
</tr>
<tr>
<td>3.6% to 4.0%</td>
<td>4.6% to 5.0%</td>
<td>100% 100%</td>
</tr>
<tr>
<td>4.1% to 4.5%</td>
<td>5.1% to 5.5%</td>
<td>95% 95%</td>
</tr>
<tr>
<td>4.6% to 5.0%</td>
<td>5.6% to 6.0%</td>
<td>90% 95%</td>
</tr>
<tr>
<td>5.1% to 5.5%</td>
<td>6.1% to 6.5%</td>
<td>50% or Reject 90%</td>
</tr>
<tr>
<td>5.6% to 6.0%</td>
<td>6.6% to 7.0%</td>
<td>50% or Reject 50%</td>
</tr>
<tr>
<td>6.1% and over</td>
<td>7.1% and over</td>
<td>50% or Reject 50% or Reject</td>
</tr>
</tbody>
</table>
“Urban” Superpave Spec.

- “Upon completion of all of the sublots and pay factors for the entire project, the final pay factor calculated for quality incentive/disincentive shall not exceed 100%.” (1028.03.7.c.)
Discussion....