NEAUP

Superpave for Local Government and Commercial Applications

10-26-00
Local Roads
Local Roads
Cul-de-sac
Truck Parking
For each there is a Superpave Mix
You need to know:

- Compaction Level
- Mix Size
- Binder Grade
Compaction level is a function of traffic and depth of layer.
Mix size is determined by thickness of layer.
Binder Grade is a function of environment and traffic level.
Why does Superpave make a difference?
There are...

More Options...
How Superpave is Different...

Traditional Maryland Method
- SC, SF, BC, BF, Gap Graded
- 3 surface options, 2 base options

Superpave Method - 71 options
- 4.75, 9.5, 12.5, 19.0, 25.0, 37.5
- PG 64-22, PG 70-22, PG 76-22, PG 70-22 P
- ESAL Category 1, 2, 3, 4 or 5
- 47 surface options, 24 base options
Selection Process

1 - Select Compaction Level
2 - Determine Pavement Thickness
3 - Select Mix
4 - Select Appropriate Binder
5 - Prepare Specifications
Select Compaction Level

Option 1
Select Category Based on Visual Observation

<table>
<thead>
<tr>
<th>Compaction Level</th>
<th>Local Roads</th>
<th>Collector Roads</th>
<th>Arterial Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3 to &lt; 3.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0 to &lt; 10.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Select Compaction Level

Option 2

Calculate 20 year Cumulative ESALs

Input:
- AADT - AADT
- % Trucks - PT
- Truck Factor - TF
- Lane Factor - LF
- Dir Distribution - DD
- Growth Rate - GR

20 year Cumulative ESALs

\[ \text{AADT(PT)(TF)(LF)(365)(DD)(GF)} \]

where:

\[ GF = \frac{((1+GR)^{20}-1)}{GR} \]
## Mix Selection

<table>
<thead>
<tr>
<th>Mix</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.75</td>
<td>Surface Treatment, Rut Fill</td>
</tr>
<tr>
<td>9.5</td>
<td>Surface Course, Leveling</td>
</tr>
<tr>
<td>12.5</td>
<td>Surface Course, Thin Patch</td>
</tr>
<tr>
<td>19.0</td>
<td>Surface Course, Base Course, Patching</td>
</tr>
<tr>
<td>25.0</td>
<td>Base Course, Deep Patching</td>
</tr>
<tr>
<td>37.5</td>
<td>Base Course</td>
</tr>
</tbody>
</table>
Superpave Mix Selection

4.75

9.5

12.5

19.0

25.0

37.5
Surface Course Selection

Mixes - 4.75, 9.5, 12.5 and 19.0 mm

<table>
<thead>
<tr>
<th>Mix</th>
<th>Min</th>
<th>Pref</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.75</td>
<td>0.5</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>9.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>12.5</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>19.0</td>
<td>2.0</td>
<td>2.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>
Wearing (Top) Course Selection

**High Polish Stone**
- AADT > 15,000
- Speed > 55 mph

**Dense-Graded Mix**
- AADT < 15,000 or
- Speed < 55 mph

**Gap-Graded Mix**
- AADT > 20,000
- Speed > 55 mph
Base Course Selection

Mixes - 19.0, 25.0 or 37.5 mm

<table>
<thead>
<tr>
<th>Lift Thickness (inches)</th>
<th>Mix</th>
<th>Min</th>
<th>Pref</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19.0</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>25.0</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>37.5</td>
<td>4.0</td>
<td>4.5</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Knock down 1 ESAL level for depths < 100 mm
Select Binder

1) Identify if Rutting Exists

2) Identify Traffic Loading Rate
   - Standing  - avg. < 12 mph
   - Slow      - avg. 12 to 43 mph
   - Standard  - avg. > 43 mph

3) Define Quantity of HMA
   - < 1,000 tons
   - > 1,000 tons
Superpave Binder Selection

- 58-28
- 70-28
- 64-22
- 70-22
- 76-22
Remember!

Aggregate quality effects
PERFORMANCE and PRICE
!!
<table>
<thead>
<tr>
<th>Estimated Design Traffic Level (Million ESALs)$^2$</th>
<th>Coarse Aggregate Angularity</th>
<th>Fine Aggregate Angularity</th>
<th>Sand Equivalent Value</th>
<th>Flat and Elongated</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.3</td>
<td>$\leq 100$ mm</td>
<td>$&gt;100$ mm</td>
<td>$\leq 100$ mm</td>
<td>$&gt;100$ mm</td>
</tr>
<tr>
<td></td>
<td>$55/-$</td>
<td>-/-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
## Aggregate Consensus Properties

<table>
<thead>
<tr>
<th>Estimated Design Traffic Level (Million ESALs)$^2$</th>
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<th>Sand Equivalent Value</th>
<th>Flat and Elongated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 - 3</td>
<td>≤100 mm 75/-</td>
<td>≤100 mm 40</td>
<td>All Mixtures 40</td>
<td>All Mixtures &lt;10%</td>
</tr>
<tr>
<td></td>
<td>&gt;100 mm 50/-</td>
<td>&gt;100 mm 40</td>
<td></td>
<td></td>
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</tr>
</thead>
<tbody>
<tr>
<td>3 - 10</td>
<td>85/80</td>
<td>60/-</td>
<td>45</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>10 - 30</td>
<td>95/90</td>
<td>80/75</td>
<td>45</td>
<td>&lt;10%</td>
</tr>
</tbody>
</table>
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</thead>
<tbody>
<tr>
<td>&gt;30.0</td>
<td>≤100 mm 100/100</td>
<td>≤100 mm 45</td>
<td>50</td>
<td>&lt;10%</td>
</tr>
<tr>
<td></td>
<td>&gt;100 mm 100/100</td>
<td>&gt;100 mm 45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Design Constraints/Guidelines

- Limit to 3 mixes per contract
- Limit to two binders per contract
- Limit 1 ESAL category per mix for quantities < 1,000 tons
- Limit drop off to 2 inches maximum
- Recommend binders requiring polymer to > 1,000 tons of mix
- Potential need for MTD for coarse mixes
- Place surface on 19 mm or less
Choices

4.75 mm  PG 64-22
9.5 mm    PG 70-22
12.5 mm
Choices

9.5 mm
12.5 mm
19.0 mm

PG 64-22
PG 70-22
Superpave Toolbox

- Environment
- ESALs
- N_{design}
- Crushed Faces
- Performance Grades
- Nominal Sizes
The key to success is knowing how to use the tools...
Questions...