Texas Thin Overlay Mixes (TOM's)

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Overview
- Types of Thin Overlay Mixes in Texas
- Where/Why to use Thin Surface Mixes
- Keys to Successful Construction
- Case Studies

Three Mixture Types

Fine PFC  TOM-C  TOM-F
OPEN GRADED (24% AV)  GAP  DENSE

Recommend PG 76-22  SAC A  Grade 5 Rock + Limestone Screenings

What are TOM’s

High Performance Surface Mixes designed using the balanced mix design approach and placed with conventional equipment at thicknesses from 0.5 to 1 inch
(TxDOT Spec Item 347)

Gradation of Thin Surface Mixes

<table>
<thead>
<tr>
<th>Percent Passing</th>
<th>TOM-C</th>
<th>TOM-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size</td>
<td>Thin Overlay Mix</td>
<td>Thin Overlay Mix</td>
</tr>
<tr>
<td>1/2”</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>3/8”</td>
<td>95.0 – 100.0</td>
<td>98.0 – 100.0</td>
</tr>
<tr>
<td>#4</td>
<td>40.0 – 60.0</td>
<td>70.0 – 95.0</td>
</tr>
<tr>
<td>#8</td>
<td>17.0 – 27.0</td>
<td>40.0 – 65.0</td>
</tr>
<tr>
<td>#16</td>
<td>5.0 – 27.0</td>
<td>20.0 – 45.0</td>
</tr>
<tr>
<td>#30</td>
<td>5.0 – 27.0</td>
<td>10.0 – 35.0</td>
</tr>
<tr>
<td>#50</td>
<td>5.0 – 27.0</td>
<td>10.0 – 20.0</td>
</tr>
<tr>
<td>#200</td>
<td>5.0 – 9.0</td>
<td>2.0 – 12.0</td>
</tr>
</tbody>
</table>

Gap-Graded  Dense-Graded

Surface Texture of Thin Mixes

TOM-C  TOM-F
### Why Thin Overlays?

**Cost Savings**

- **3 Year Analysis**
- **Total Cost Traditional Overlays** $36.8 m
- **Total Cost Thin Overlays** $24.0 m
- **Total Saving** $11.8 m (33%)

*Mike Arellano and Tommy Blackmore*

### Why Thin Overlays?

**Disappointing Performance of some dense graded mixes**

*Conventional overlay 2 years old*

*Mike Arellano; Austin District*

### Tools needed for Balanced Mix Design

- **HWTT<12.5 mm@20k(PG76-22)**
- **OT > 300 Cycles**

*Hamburg Wheel Tracking Device*  
*Overlay Tester*

### Conventional vs. TOM Mixes

**Item 341 vs. Item 347**

<table>
<thead>
<tr>
<th>Properties</th>
<th>Conventional HMA</th>
<th>TOM-C</th>
<th>TOM-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>Dense</td>
<td>GAP</td>
<td>Dense</td>
</tr>
<tr>
<td>Polymer Modified AC</td>
<td>Maybe</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>High Quality Aggr.</td>
<td>Maybe</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AC Content</td>
<td>~ 4.8 – 5.2%</td>
<td>6.0% min</td>
<td>6.5% min</td>
</tr>
<tr>
<td>RAP</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>RAS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Rutting Requirement</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cracking Requirement</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### TOM Usage 2014-2016

<table>
<thead>
<tr>
<th># Projects</th>
<th>Mix Type</th>
<th>SAC</th>
<th>Tons</th>
<th>Lane Miles</th>
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</thead>
<tbody>
<tr>
<td>54</td>
<td>TOM-C</td>
<td>A</td>
<td>548,800</td>
<td>1,414</td>
</tr>
<tr>
<td>24</td>
<td>TOM-C</td>
<td>B</td>
<td>143,000</td>
<td>369</td>
</tr>
<tr>
<td>9</td>
<td>TOM-F</td>
<td>A</td>
<td>39,500</td>
<td>102</td>
</tr>
<tr>
<td>8</td>
<td>TOM-F</td>
<td>B</td>
<td>54,000</td>
<td>139</td>
</tr>
</tbody>
</table>

**Total Lane miles 2024**
Good Candidates
- Shallow rutting < ½ in
- Top down cracking
- Longitudinal cracking
- Transverse cracking (with underseal)
- Raveling
- Highly oxidized surface
- Polished surface
- Acceptable ride quality
- Where cross slope correction not required
- Texas CRCP Concrete pavements
- Where low noise surface is desired
- Both low and high volume traffic roadways

Keys to Successful Construction
- Preparing and Repairing
  - Spot repair
  - Mill and fill areas with fatigue cracking, failures or shallow rutted areas
- Level-up
  - Should get a 25 to 35% improvement in IRI
  - If roughness > 120 in/mile, place level-up
- Milling recommended if
  - Pavement highly oxidized/stiff
  - Cross-slope corrections needed
  - Minor to moderate ride issues
  - Extensive thermal or top-down cracking (>40 percent by area)
  - Extensive recent crack seal or Multiple unstable seals
  - Extensive Thermal Segregation/Raveling
  - Micro-milling recommended if milling required

Keys to Successful Construction (cont)
- Bonding
  - On existing HMA, apply non-tracking tack, chip seal, or use spray paver.
  - Apply non-tracking tacks at 0.03 to 0.06 gal/sq

Keys to Successful Construction (cont)
- Underseals (chip seals/interlayers)
  - Only if significant unsealed cracks
  - If used on top of CRCP
  - If milling will expose underlying cracking
  - If overlaying newly widened sections
  - Use polymer modified binder in chip seal
  - Design chip seal with smaller aggregate
  - Use proper chip seal construction practices

Keys to Successful Construction (cont)
- Mixture Placement
  - Warm mix additives
    - if haul distance greater than 40 miles
    - As compaction aid
    - if ambient air temp less than 70°F
  - Pave-IR and MTV's
- Compaction
  - No pneumatics
  - Recommend dual rollers in tandem
  - TOM-C (3 passes – each pass is one vibratory/one static)
  - TOM-F 4-5 static passes
  - Need adequate release agents (mix very sticky)

Keys to Successful Construction (cont)
- Acceptance in the Field
  - Water Flow Test (Flow rate > 2 minutes)
- Management of Wind rows
  - Remove Chunks – they do not remix
Selected Case Studies

Houston’s Award Winning Thin Overlay project on US 59 AADT 250,000 + (Hot Rubber Seal + 1" TOM-F + 1" TOM-C)

First TOM C Application IH 35

FM 1960 Houston Summer 2016 12 mile project

First TOM-F Application

- Ultra-Thin Overlays (item 347 TOM-F)
- 3/4” to 1/2” thickness
- When road is not a good candidate for seal coat
  - Good pavement condition
  - Lowest cost application
  - Turning movements
  - Improve skid resistance
  - Crack-resistant level up layer

TOM-F Applications in Atlanta District.

- Urban Location in Jefferson benefits in curb and gutter situations
- Inside Lane only on IH 30 in Bowie County
Paris Districts first use of TOM-F Mix SH 11 Spring 2015

- Tough Section: Badly cracked from cement treated base
- Walmart Super store on route
- District is monitoring - very good after 1 year
- Level up course + 1" TOM F

Thank you!
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