Texas Thin Overlay Mixes (TOM's)

Texas A&M Transportation Institute

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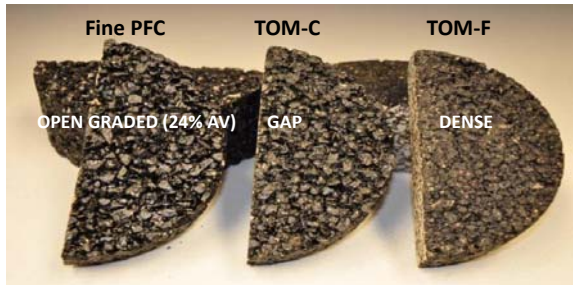**Tom Scullion, TTI**

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

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What are TOM's

↕ 1-inch or less

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

	Percent Passing	
Sieve Size	Thin Overlay Mix TOM –C	Thin Overlay Mix TOM-F
1/2"	100.0	100.0
3/8"	95.0 – 100.0	98.0 – 100.0
#4	40.0 – 60.0	70.0 – 95.0
#8	17.0 – 27.0	40.0 – 65.0
#16	5.0 – 27.0	20.0 – 45.0
#30	5.0 – 27.0	10.0 – 35.0
#50	5.0 – 27.0	10.0 – 20.0
#200	5.0 – 9.0	2.0 – 12.0
	Gap-Graded	*Dense-Graded*

Surface Texture of Thin Mixes

TOM-C	TOM-F

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Why Thin Overlays?   Cost Savings

3 year Cost Savings with Austin District Thin Overlay Program (Material Cost Only)				
HWY	Traditional Option	CSJ	Traditional	Thin Overlay Mix (TOM)	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%)

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Why Thin Overlays ?   Good Performance

Rut/Crack resistance

Skid resistance
- SAC B – High 30's to Mid 40's
- SAC A – High 40's to Low 50's

Smoothness (IRI improvement)
- Typically 25-35% improvement – depends on pre-existing conditions

Sound Abatement
- Substantial reduction in tire/pavt noise
- 96.5-98dB = PFC

IH-35 (ADT >100k): Before/After

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Why Thin Overlays ?
Disappointing Performance of some dense graded mixes

Conventional overlay 2 years old

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Conventional vs. TOM Mixes
Item 341   vs.   Item 347

Properties	Conventional HMA	TOM-C	TOM-F
Gradation	Dense	GAP	Dense
Polymer Modified AC	Maybe	Yes	Yes
High Quality Aggr.	Maybe	Yes	Yes
AC Content	~ 4.8 – 5.2%	6.0% min	6.5% min
RAP	Yes	No	No
RAS	Yes	No	No
Rutting Requirement	Yes	Yes	Yes
Cracking Requirement	No	Yes	Yes

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Tools needed for Balanced Mix Design

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

Hamburg Wheel Tracking Device   Overlay Tester

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TOM Usage 2014-2016

# Projects	Mix Type	SAC	Tons	Lane Miles
54	TOM-C	A	548,800	1,414
24	TOM-C	B	143,000	369
9	TOM-F	A	39,500	102
8	TOM-F	B	54,000	139

Total Lane miles   2024

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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/sy

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

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First TOM C Application IH 35

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

3.8mm   2.7mm   2.8mm   2.6mm
Rut depths after 20,000 wheel passes

**FM 1960 Houston
Summer 2016
12 mile project**

Micro-mill section
Trackless + 1 inch

Trackless + 1 inch

Micro-mill + Trackless + 1" TOM C

First TOM-F Application

- Ultra-Thin Overlays (Item 347 TOM-F)
- ¾" to ½" 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

Hamilton Pool Road
Austin District
July 22nd 2013

Thickness ½ inch to 5/8 inch

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

WORSHOP NOTES
Guidelines on the Use and Inspection of Thin Surface Mixes in TxDOT's Maintenance and Pavement Preservation Programs

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Thank you!
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