Preventative Maintenance Thin Lift Surface

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Thin Lift HMA Overlays

- Thin Overlay definition:
  - HMA overlay consisting of one lift of surface course approximately ¾" thick to preserve pavement structure
- Expected life span:
  - 6 to 8 years

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Preventative Maintenance
Thin Lift Surface
SCDOT Selection Matrix

Treatment	Distresses											Parameters						
				Rutting		Cracking						Roughness		Traffic Vol.				
						Fatigue*			Long./Trans.									
	Raveling	Oxidation	Bleeding	< 1/2 "	> 1/2" but < 3/4"	0 to 2% Low	2 to 10% Medium	4 to 25% High	0 to 2% Low	> 2% Medium	> 4% High	IRI < 170	IRI > 170	Low	Medium	High	Urban	Rural
Ultra Thin Lift Overlay	G	G	G	G	F	F	F	F	F	F	F	G	NR	G	G	G	G	G

Good Performance	G
Fair Performance	F
Poor Performance	P
Not Recommended	NR
Not Used	NU

The quantity and severity that are listed for each distress indicate the degree that is considered significant. See Appendix A for a description of these distresses and severity levels.

* Does not include isolated areas that can be repaired with a full depth patch.

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Benefits of Thin Lift HMA

- At least marginally effective for all types of pavement distresses
  - Improve smoothness
  - Improve skid resistance and drainage issues
  - Correct surface defects
  - Enhance appearance
- Reduce Tire Noise
- May provide minor amount of structural enhancement
- Works well in all climates

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Disadvantages of Thin Lift HMA

- Subject to delamination and reflective cracking
- Grade issues may be a problem without milling
- Higher initial cost than other Pavement Preservation applications

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SCDOT Mix Design Criteria

Nov. 2013 Supplemental Spec Section 412.3.1

Sieve Designation		% By Weight Passing
⅜"	(9.5 mm)	100
No. 4	(4.75 mm)	90-100
No. 8	(2.36 mm)	70-100
No. 30	(0.60 mm)	36-70
No. 100	(0.150 mm)	4-28
No. 200	(0.075 mm)	2-10
Binder Content (%)		5.5-7.0
Gyratory Stability (95 $\pm$ 5 mm)		2,500 lbs. min. (50 gyrations)

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Pavement Preparation

- Should seal all cracks > ¼" at least 6 months prior
- If lots of smaller cracks, should consider an asphalt surface treatment
- May not be best option if rutting > ½" is present

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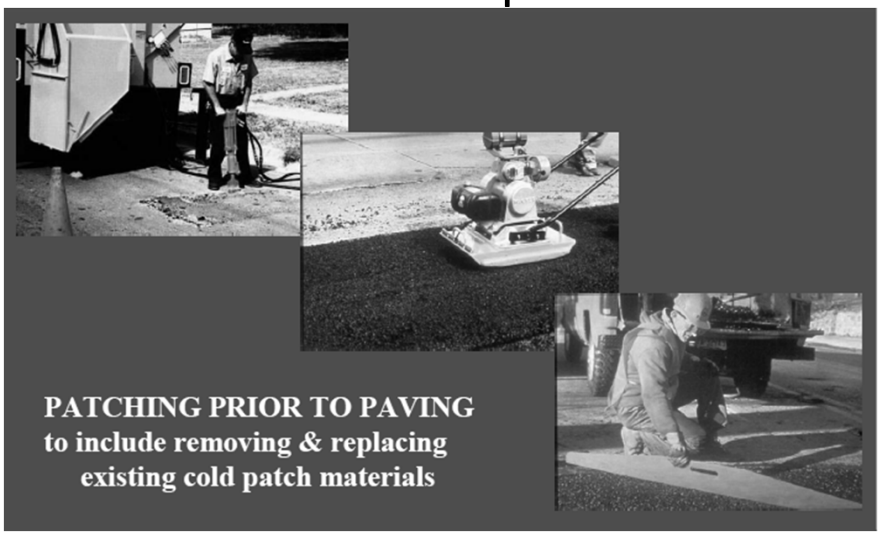
Pavement Preparation



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Pavement Preparation

- Performance greatly affected by how well the overlay bonds to the existing pavement
- Need pavement surface as clean as possible prior to placement
- Need a uniform tack coat applied prior to placement
  - Proper tack coat vital to avoid delamination

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Tack Coat

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Lift Thickness vs. Max. Agg. Size

- Lift thickness should be 3 to 4 times the largest aggregate size.

Mixture Designation	Minimum Lift Thickness
1½“ (37.5 mm)	4½“ (112.5 mm)
1” (25.0 mm)	3” (75.0 mm)
¾“ (19.0 mm)	2¼“ (57.0 mm)
½“ (12.5 mm)	1½“ (37.5 mm)
⅜” (9.5 mm)	1⅛” (28.5 mm)

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Smooth Pavements

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Mix Temperature

- Mix temperature is extremely important for achieving proper compaction
- SCDOT HMA Delivery Temperature Requirements (July 2010 Supplemental Specification):
  - PG 64-22 mixtures: 265°F – 325°F
  - PG 76-22 mixtures: 300°F – 350°F
  - These temperature ranges do not apply to WMA mixtures (refer to SC-M-408)

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Compaction

- Supplemental Specification: November 2013 (Section 412.5.3)
  - 8 – 12 ton tandem steel wheel roller
  - Minimum of 2 passes
  - Cease rolling once mixture is properly seated to underlying surface

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Thin Lift HMA Overlay Concerns

- Require less HMA per square ft. of roadway than thick HMA lifts:
  - Can result in increased paver speeds (in excess of 70ft/min), making it difficult for rollers to keep up.
- Will cool quickly:
  - This can result in smaller compaction temperature windows (sometimes as little as 3 to 5 min.)
- Increases screed wear:
  - If lift thickness is less than double the max. agg. size, the mat can tear under the screed

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Thin Lift HMA Overlay Concerns

- Sensitive to vibratory compaction:
  - Incorrectly chosen amplitude, frequency, or roller speed can result in:
    - Aggregate breakage
    - Damaging bond between overlay and existing pavement
- Density is difficult to control:
  - Thin lifts provide fewer options for aggregate to rearrange under compaction.
    - Densities less uniform than with a thicker lift
  - Should be recognized if pay is tied to mat density

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Thin Lift HMA Overlay Concerns

- Proper application of tack coat

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Thin Lift HMA Overlay Concerns

- Mixture temperature
  - Asphalt cement binder acts as lubricant
    - Allows movement of aggregate particles
  - If mix is too hot:
    - Poor internal strength
    - Compaction equipment “pushes” mix
    - Burns off liquid asphalt cement binder
  - If mix is too cold:
    - Asphalt acts like stiff glue
    - Aggregate particles cannot move

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Thin Lift HMA Overlay Concerns

- Having adequate number of rollers

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Thin Lift HMA Overlay Concerns

- Rolling pattern
  - Speed and lap pattern for each roller
  - # of passes for each roller
  - Minimum temperature by which each roller must complete pattern
  - Paver speed must not exceed that of the compaction operation

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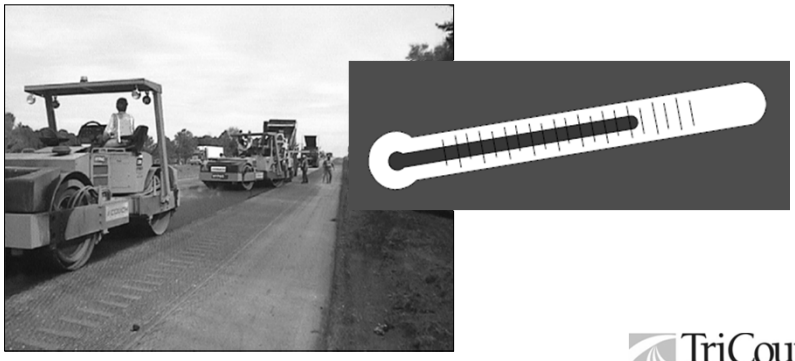
Thin Lift HMA Overlay Concerns

- Compaction temperature range:
  - Generally 185 – 300 °F (85 – 150 °C)



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Thin Lift HMA Overlay Summary

- Input:
  - Successful completion of:
    - Mix design
    - Production
    - Placement
    - Compaction
- Output:
  - Proper in-place volumetric properties
  - Smooth pavement
  - Long service life

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