2014 ASPHALT PAVEMENT
RECOMMENED SPECIFICATIONS FOR
LOCAL GOVERNMENTS AND NON-GOVERNMENTAL APPLICATIONS

THINLAY™ ASPHALT SURFACE

This recommended specification incorporates the latest asphalt pavement technologies. It attempts to present current best practices and processes, but it is not intended to replace sound engineering knowledge, judgment and experience

All numbered specification references (for example: INDOT SEC. 400.xx) in this document refer to the most recent version of the Indiana Department of Transportation (INDOT) Standard Specifications, dated 2014, applicable Recurring Special Provisions and current Indiana Test Methods (ITM).

TAS.01 Description

This work shall consist of construction of a wearing course of 4.75mm Thinlay Asphalt Surface (TAS) mixture placed at a nominal thickness of ¾ inches or greater on existing pavement surfaces prepared in accordance with INDOT Sec. 402.11.

TAS.02 Quality Control

Thinlay Asphalt Surface shall be supplied from a Certified HMA Plant in accordance with Indiana Test Method (ITM) 583 – Certified Volumetric Hot Mix Asphalt Producer Program. TAS shall be transported and placed according to a Quality Control Plan (QCP) prepared by the Contractor in accordance with ITM 803 – Contractor Quality Control Plan for HMA Pavement, and submitted to the Architect/Engineer/Agency prior to commencing paving operations.

TAS.03 Materials

Asphalt Binder Materials shall be Performance Graded Binder, PG 58-28*, PG 64-22, PG 64-28*, PG 70-22, PG 70-28* or PG 76-22 in accordance with INDOT Sec. 902.01(a).

*Only for use in mixtures containing greater than 25% Binder Replacement from RAP and/or RAS.

Fine Aggregates shall be in accordance with INDOT Sec. 904.02.

Coarse Aggregates shall be Class B or higher in accordance with INDOT Sec. 904.03

TAS.04 Mix Design Formula

A Design Mix Formula/Job Mix Formula (DMF/JMF) shall be developed by an INDOT Certified HMA Producer.. The JMF shall be submitted in the current INDOT format at least one week prior to use. The mixture may be produced by using a water injection foaming device per INDOT Sec. 401.04 or other Warm Mix Asphalt (WMA) additives, as specified herein, and in accordance with the manufacturer's recommendations. A JMF used in the current or previous calendar year that was developed to N_{des} or higher ESAL Type will be allowed as long as it meets the requirements

of current mix design procedures and mix design guides for G_{sb} effective October, 2013. The JMF shall list the minimum and maximum plant discharge temperature for HMA and WMA as applicable to the mixture.

TAS.05 Volumetric Mix Design

The DMF/JMF shall be determined for the TAS mixture from a volumetric mix design for 4.75 mm dense graded mixture in accordance with 401.05. The mix desin shall be developed by an INDOT approved mix design laboratory. The single percentage of aggregate passing each required sieve shall be within the following limits:

Sieve Size	Percent Passing
12.5 mm (1/2 inch)	100.00
9.5 mm (3/8 inch)	95.0 – 100.0
4.75 mm (No. 4)	90.0 – 100.0
1.18 mm (No. 16)	30.0 - 55.0
75 µm (No. 200)	3.0 - 8.0

The total blended aggregate gradation for the TAS mixture shall have a Fineness Modulus greater than or equal to 3.30 as determined in accordance with ASSHTO T 27.
The mix design criteria shall be based on the Mixture Type in the table below and the following at N_{des}.

Air Voids (AV) %	5.0
Voids in the Mineral Aggregate (VMA) %	16.0 minimum
Voids Filled with Asphalt (VFA) %	66-79
Fine Aggregate Angularity	
Types A & B	40 minimum
Types C	45 minimum

The Dust/Calculated Effective Binder Ratio shall be 0.8 to 2.0. The Material Adjustment Factor (MAF) shall not apply.

MIX TYPE APPLICATION TABLE

Mixture Type	***Type A ****	***Type B****	***Type C****
Design ESAL	*<300,000*	*300,000 to <3,000,000*	*3,000,000 to <10,000,000*
AADT (Average Annual Daily Traffic)	*<4000*	*4000- 15,000*	*15,000-30,000*
AADTT (Average Annual Daily Truck Traffic)	*< 50*	*50-1700*	*>1700*
Commercial & Residential Application	*Residential Driveways, passenger car parking ,<500 stalls, < 20 **heavy trucks per day, service stations*	*Parking Lots with 20-300 **heavy trucks per day, Truck Stops*	*Heavy Commercial parking with 150-300 **heavy trucks per day*

PG Binder	*64-22*	*64-22*	*70-22*

TAS.06 Recycled Materials

Recycled materials may consist of reclaimed asphalt pavement (RAP) or recycled asphalt roofing shingles (RAS) or a blend of both. RAP shall be the product of cold milling or crushing of an existing pavement. The RAP shall be processed so that 100% will pass the 2 in. (50mm) sieve when entering the plant. The aggregate in the recycled materials shall be 100% passing the 3/8 in. (9.5mm) sieve and 90% to 100% passing the No. 4 (4.75mm) sieve.

Recycled materials may be used as a substitute for a portion of the new materials required to produce the TAS mixture. The amount of total binder replaced by binder in the recycled material shall be computed as follows:

$$\text{Binder Replacement, \%} = \frac{(A \times B) + (C \times D)}{E} \times 100$$

Where:

A = RAP, % Binder Content
B = RAP, % in Mixture
C = RAS, % Binder Content
D = RAS, % in Mixture
E = Total, % Binder Content in Mixture

The maximum binder replacement (%) shall not exceed 40 % for Type A and B (or equivalent traffic volumes) and 25% for Types C and D. Total RAS binder replacement shall not exceed 25% by weight (mass) of the total binder of the mixture.

The combined aggregate properties of a mixture with recycled materials shall be determined in accordance with ITM 584 and shall be in accordance with INDOT Sec. 904. Gradation of the combined aggregates shall be in accordance with TAS.05.

When recycled materials are incorporated into the mixture the bulk specific gravity (G_{sb}) of the recycled aggregates used in the calculations shall be determine according to Indiana Test Method (ITM) 584. Specifically, it shall be as follows:

$$(Gsb)RA = [0.9397 \times (Gse)RA] + 0.0795$$

where:

(Gsb)RA = bulk specific gravity of the recycled aggregates
(Gse)RA = effective specific gravity of the recycled aggregates

The low temperature classification of the PG binder for mixtures containing greater than 25% and up to 40% RAP (or equivalent blend of RAP and RAS) shall be -28C, and the high temperature classification may be reduced by 6°C.

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TAS.08 Job Mix Formula

A job mix formula (JMF) shall be developed by a Certified HMA Producer. A JMF used in current or previous calendar year that was developed per N_{des} will be allowed, as long as it meets the requirements of the current mix design procedures and mix design guide for aggregate Bulk Specific Gravity (G_{sb}) implemented in October, 2013. The DMF for each mixture shall be submitted as per TAS.04. MAF shall not apply.

TAS.09 Acceptance of Mixtures

Acceptance of TAS mixtures for binder content and air voids at N_{des} will be based on test results from a minimum of one truck sample per day for up to 600 tons. A Type D certification in accordance with INDOT Sec. 916 shall be furnished by the Certified HMA Supplier. The test results shown on the Type D certification shall be the quality control tests representing the material supplied. Type D certification shall be submitted to the Contracting Agency's representative each day in which material is received

TAS.10 GENERAL CONSTRUCTION REQUIREMENTS

Equipment for TAS operations shall be in accordance with INDOT Sec. 409. Fuel oil, kerosene, or other solvents shall not be transported in open containers on any equipment at any time. Cleaning of equipment and tools shall not be accomplished on the pavement or paved shoulder areas.

Segregation, flushing or bleeding of TAS mixtures will not be permitted. Corrective action shall be taken to prevent the continuation of these conditions. All areas showing an obvious excess or deficiency of asphalt materials shall be removed and replaced. All mixture that becomes loose and broken, mixed with dirt, or is in any way obviously defective shall be removed and replaced.

TAS.11 PREPARATION OF SURFACES

Surfaces on which a TAS mixture is to be placed shall be free from objectionable or foreign materials at the time of placement. Milling of an existing surface shall be in accordance with 306. PCCP, milled asphalt surfaces and asphalt surfaces shall be tack coated in accordance with 406.

TAS.12 WEATHER LIMITATIONS

TAS shall be placed when the ambient and surface temperatures are 60F or above. TAS surface courses may be placed at lower temperatures with written approval of the accepting agency.

TAS.13 SPREADING AND FINISHING

TAS mixture shall be placed on a prepared surface by means of laydown equipment in accordance with 409.03(c). Mixtures in areas inaccessible to laydown equipment or mechanical devices may be placed by other methods.

The finished thickness of a TAS course shall be at least one and one-half times but not more than four times the maximum aggregate particle size as shown on the JMF. Feathering may be less than the minimum thickness requirements.

TAS.14 JOINTS

Longitudinal joints on roads and streets shall be located at the lane lines whenever possible. Transverse joints shall be constructed by exposing a near vertical full depth face of the previous course.

TAS.15 Compaction

The TAS mixture shall be compacted with equipment in accordance with 409.03(d) immediately after the mixture has been spread and finished. Rollers shall not cause undue displacement, cracking, or shoving.

A roller application is defined as one pass of the roller over the entire mat. Compaction operations shall be completed in accordance with one of the following options.

	Number of Roller Applications				
Rollers	Option 1	Option 2	Option 3	Option 4	Option 5
Three Wheel	2		4		
Pneumatic Tire	2	4			
Tandem (static)	2	2	2		
Vibratory Roller				6*	
Oscillatory					6*

*V*ibratory rollers shall be operated in the static mode and the vertical impact force capability of the oscillatory roller shall not be used. only.*
The number of passes may be reduced if detrimental results are being observed.

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TAS.17 Intentionally Left Blank

TAS.18 Intentionally Left Blank

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TAS.19 Method of Measurement

The Architect/Engineer will verify quantities of TAS placed and accepted.

TAS.20 Basis of Payment

The accepted quantities of TAS will be paid for at the unit price specified in the contract.

Pay Item	**Pay Unit**
Thinlay Asphalt Surface, Type __*__	Ton

*Mixture Type