



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

## Design Memorandum No. 21-20

September 9, 2021

**TO:** All Design, Operations, and District Personnel, and Consultants

**FROM:** /s/Matthew Beeson  
Matthew Beeson  
Director  
Division of Materials and Tests

**SUBJECT:** Spray Paver Use with HMA/SMA

**REVISES:** Indiana Design Manual (IDM) Chapter 17, 17-4.01(01) &  
Figure 17-4A  
Indiana Design Manual (IDM) Chapter 607, 607-1.04 & 607-1.05

**EFFECTIVE:** Lettings on or after 9/1/2022

Spray Pavers are a technology that allows the asphalt emulsion used for tack coats to be sprayed directly in front of the HMA or SMA material without the use of a separate distributor truck, which eliminates tracking. Because it eliminates tracking issues, it is possible to use a polymer modified emulsion and a higher application rate. The enhanced tack coat greatly improves layer bonding and leads to significantly less/delayed cracking and longer pavement life.

This technology is intended for use in roadways with higher ESAL category roads.

- Spray pavers should be specified on any interstate HMA project with more than 3,000 tons of surface material and/or more than 5,000 tons of intermediate/base material used on the mainline pavement.
- Spray pavers should be specified on limited access freeways and 4 lane divided highways with more than 3,000 tons of ESAL category 4 HMA surface material and/or more than 5,000 tons of ESAL category 4 HMA intermediate/base material used on the mainline pavement.
  - For example: QC/QA-HMA, 4, 76, SURFACE, 9.5 mm
- Spray pavers should be specified on a project that calls for SMA mixture with over 2,400 tons of surface and/or 4,000 tons of intermediate material used as mainline pavement.

Spray pavers also provide a unique advantage for at least two other scenarios:

- Spray pavers should be considered when performing composite pavement rehabilitation, specifically when HMA is placed directly on top of PCC. The increased application rate and polymer modified emulsion can increase the bond between the materials and retard reflective cracking.
- Spray pavers should also be considered if a project is known to be specified as nightwork only. Spray pavers eliminate the need to wait for the emulsion to break and set, which can often be troublesome during night paving.

A spray paver project will incorporate RSP 401-R-417 “HMA Spray Paver and Emulsion” or 410-R-418 “SMA Spray Paver and Emulsion” as appropriate. The new pay items 401-12664 “HMA Spray Paver Emulsion” or 410-12665 “SMA Spray Paver Emulsion” should be used for HMA and SMA mixtures, respectively. Emulsion quantity can be estimated using the application rates as described in the RSPs and Figure 17-4A of the IDM. The RSPs direct the spray paver to be used on mainline pavement such as travel lanes, turn lanes, auxiliary lanes, and ramps. This includes any mixture placed simultaneously with a travel lane, turn lane, auxiliary lane, or ramp. A conventional paver and distributor truck with tack coat in accordance with 406 will still be used on areas such as shoulders, approaches, tapers, or gore areas.

Consideration should be taken regarding potential bundled contracts as spray pavers may not be appropriate on some roadways. This memo does not necessarily exclude other roadway types from using a spray paver if deemed appropriate by the District Pavement Asset Engineer or Asphalt Engineer, Division of Materials and Tests.

For questions related to this design memo, please contact the Division of Materials and Tests at 317-522-9661 or [nawwad@indot.in.gov](mailto:nawwad@indot.in.gov).

## IDM Revisions

### Chapter 17

#### **17-4.01(01) Spray Paver Emulsion [New Sep. 2021]**

A spray paver project should incorporate RSP 401-R-417 “HMA Spray Paver Emulsion” or 410-R-418 “SMA Spray Paver and Emulsion” as appropriate. The pay items 401-12664 “HMA Spray Pave Emulsion” or 410-12665 “SMA Spray Paver Emulsion” should be used for HMA and SMA mixtures, respectively. Emulsion quantity should be estimated using the application rate in Figure 17-4A. Spray pavers should be used on mainline pavement such as travel lanes, turn lanes, auxiliary lane, or ramp. A conventional paver and distributor truck with tack coat in accordance with INDOT *Standard Specifications* Section 406 should be used on areas such as shoulders, approaches, tapers, or gore areas.

### Chapter 607

#### **607-1.04 Composite Pavement Rehabilitation [Rev. Sep. 2021]**

HMA over existing asphalt and PCC composite pavement will be designed to match the existing pavement. If there is existing excessive reflective cracking, the designer needs to obtain enough information to determine where partial depth patching and full depth patching is required. FWD is recommended on composite pavements to determine the structural integrity and the need for undersealing. The longitudinal joint of the widened composite pavement should not be placed in a wheel path of a travel lane.

Spray pavers in accordance with [Section 607-1.05](#) should be considered when performing composite pavement rehabilitation, specifically when HMA is placed directly on top of PCCP. The increased application rate and polymer modified emulsion decreases the potential for reflective cracking.

If the existing pavement has an open-graded subbase with underdrains, the existing longitudinal underdrain system will be perpetuated with additional outlets added in accordance with Section 605-2.0. If the existing pavement has a dense-graded subbase, underdrains are typically not added. The existing asphalt over PCC composite pavement should be milled in accordance with Section 603-2.0 and prepared in accordance with the INDOT *Standard Specifications* Section 306.

### **607-1.05 Spray Paver Use with HMA or SMA [New Sep. 2021]**

Spray Pavers are a technology that allows the asphalt emulsion used for tack coats to be sprayed directly in front of the HMA or SMA material without the use of a separate distributor truck, which eliminates tracking. It is possible to use a polymer modified emulsion and a higher application rate because it eliminates tracking issues. The enhanced tack coat greatly improves layer bonding and can lead to significantly delayed cracking and longer pavement life.

Spray pavers can also be advantageous during nightwork. Spray pavers eliminate the need to wait for the emulsion to break and set, which can often be even more problematic during night time operations.

Spray pavers should be used on roadways in a manner that optimizes the benefit from added pavement life against the cost associated with emulsion and spray pavers:

1. Spray pavers should be specified on any interstate HMA project with more than 3,000 tons of surface material and/or more than 5,000 tons of intermediate/base material used on the mainline pavement.
2. Spray pavers should be specified on limited access freeways and 4 lane divided highways with more than 3,000 tons of ESAL category 4 HMA surface material and/or more than 5,000 tons of ESAL category 4 HMA intermediate/base material used on the mainline pavement. See Section 601-4.0 for examples of roadway categories.
3. Spray pavers should also be specified on a project that call for SMA mixture with over 2,400 tons of surface and/or 4,000 tons of intermediate material used as mainline pavement.

Quantities should be determined in accordance with Section 17-4.01(01).

**Figure**

Asphalt Mixtures		Compacted Aggregate	
Pavement Thickness	Factor	Aggregate Thickness	Factor
1 in.	110 lb/yd <sup>2</sup> = 0.055 T/yd <sup>2</sup>	3 in.	0.167 T/yd <sup>2</sup>
1.25 in.	140 lb/yd <sup>2</sup> = 0.070 T/yd <sup>2</sup>	4 in.	0.222 T/yd <sup>2</sup>
1.5 in.	165 lb/yd <sup>2</sup> = 0.083 T/yd <sup>2</sup>	5 in.	0.278 T/yd <sup>2</sup>
1.65 in.	180 lb/yd <sup>2</sup> = 0.090 T/yd <sup>2</sup>	6 in.	0.333 T/yd <sup>2</sup>
2 in.	220 lb/yd <sup>2</sup> = 0.110 T/yd <sup>2</sup>	7 in.	0.389 T/yd <sup>2</sup>
2.25 in.	250 lb/yd <sup>2</sup> = 0.125 T/yd <sup>2</sup>	8 in.	0.444 T/yd <sup>2</sup>
2.5 in.	275 lb/yd <sup>2</sup> = 0.138 T/yd <sup>2</sup>	9 in.	0.500 T/yd <sup>2</sup>
2.75 in.	300 lb/yd <sup>2</sup> = 0.150 T/yd <sup>2</sup>	12 in.	0.667 T/yd <sup>2</sup>
3 in.	330 lb/yd <sup>2</sup> = 0.165 T/yd <sup>2</sup>	<b>B Borrow for Drain tile</b>	
3.25 in.	360 lb/yd <sup>2</sup> = 0.180 T/yd <sup>2</sup>	Pipe Dia.	Factor
3.5 in.	385 lb/yd <sup>2</sup> = 0.193 T/yd <sup>2</sup>	6 in.	0.257 yd <sup>3</sup> /lft
4.5 in.	495 lb/yd <sup>2</sup> = 0.248 T/yd <sup>2</sup>	8 in.	0.269 yd <sup>3</sup> /lft
8 in.	880 lb/yd <sup>2</sup> = 0.440 T/yd <sup>2</sup>	10 in.	0.278 yd <sup>3</sup> /lft
Asphalt for Prime Coat	0.63 gal./yd <sup>2</sup> = 0.0028 T/yd <sup>2</sup>	12 in.	0.304 yd <sup>3</sup> /lft
Asphalt for Tack Coat	0.08 gal./yd <sup>2</sup> = 0.00034 T/yd <sup>2</sup>	18 in.	0.502 yd <sup>3</sup> /lft
Spray Paver Emulsion	0.20 gal./yd <sup>2</sup> = 0.00084 T/yd <sup>2</sup>	<b>Aggregate for Underdrains</b>	
<b>Riprap</b>		Pipe Dia.	Factor
Riprap	1.5 T/yd <sup>3</sup>	6 in.	0.090 yd <sup>3</sup> /lft
<b>Water for Sodding</b>		8 in.	0.110 yd <sup>3</sup> /lft
Water	4 gal./yd <sup>2</sup> = 0.004 kgal/yd <sup>2</sup>	10 in.	0.136 yd <sup>3</sup> /lft
<b>Pavement Markings</b>		<b>Shoulder Drains</b>	
Permanent Broken Centerline	0.25 lft/ft	Flat Terrain	24.8 T/mi
		Rolling Terrain	30.2 T/mi
		Hilly Terrain	35.5 T/mi

**ROADWAY QUANTITIES FACTORS**

**Figure 17-4A**  
**[Rev. Sep. 2021]**