CHAPTER 607

Pavement Pay Items

Design Memorandum	Revision Date	Sections Affected
20-01	Jan. 2020	Previously 304-15.0 and 16.0
21-20	Sep. 2021	607-1.04 & 607-1.05(new)
23-06	Jun. 2023	607-1.0
23-21	Dec. 2023	607-1.0, 607-1.01

The design memorandum applicable revision date is noted in brackets next to each section heading below.

TABLE OF CONTENTS

CHAPTER 607

PAVEMENT PAY ITEMS

607-1.0 HMA PAVEMENT PAY ITEMS [Rev. Jun. 2023, Dec. 2023]

The INDOT *Standard Specifications* section 401 QC/QA-HMA pay item should use the format as follows:

QC/QA-HMA, _____,	_____,	_____,	_____ mm
	(ESAL Category)	(PG Binder Traffic Designation)	(Course)	(Mixture Designation)

The ESAL categories can be found in Section 601-4.0, INDOT Pavement Philosophy.

EXAMPLE: The pay item QC/QA-HMA, 4, 58E, Surface, 9.5 mm represents a QC/QA-HMA-mixture with between 10,000,000 and 30,000,000 ESALs, a PG 58E high-temperature binder, a Surface course, and a mixture designation size of 9.5 mm.

The project designer should use the pay-item descriptions shown in the INDOT *Standard Specifications* for QC/QA-HMA mixtures.

When Section 401 HMA is specified on mainline or shoulders and the original contract pay item quantities are less than 300 tons, acceptance will be based upon Type D certification.

For Section 402 miscellaneous mixtures such as HMA Rumble Strips, HMA for Approaches, HMA for Temporary Pavement, HMA Wedge and Level, Widening with HMA, and HMA for Sidewalks, the project designer should specify the applicable pay item and mixtures as listed in the INDOT *Standard Specifications.*

607-1.01 Performance Grade (PG) Binder [Rev. Dec. 2023]

Performance Graded (PG) Binders for QC/QA mixtures are designed based on their performance-related properties determined for the project's climate (temperature) and location within the pavement structure.

PG binder is designated in a number-letter-number format. The first number reflects the high pavement temperature in degrees Celsius at which the binder is expected to perform. The letter grade designation based on traffic levels. The second number is the low temperature grade in degrees Celsius. The designation PG 58S-28 identifies 58°C as the high-temperature value and -28°C as the low-temperature value with a traffic designation of "S" or Standard. The high-temperature value is the average seven-day maximum pavement temperature. The low-temperature value is the lowest air temperature recorded at the weather station(s) nearest the project site.

With the old Superpave PG asphalt binder specification Indiana used PG 64-22 as its base unmodified binder. At the same time the switch to MSCR PG grading occurred, Indiana changed to PG 58-28 as its base binder which is more appropriate for Indiana's climate.

The pavement designer will select a MSCR PG binder for QC/QA HMA surface and intermediate mixes using design ESALs and the table below. Figure 601-4E, ESAL CATEGORY FOR QC/QA-HMA MIXTURES, should be used to determine design ESALs for a project. The top two lifts of HMA should be the same PG grade. HMA base mixes will always specify PG 58S-28 regardless of the design ESALs. The table also shows the comparable Superpave PG binder grade to the MSCR PG grade for use with the MEPDG software when using Level 3 HMA inputs. The number of PG grades on any one project should be minimized.

Stone Matrix Asphalt (SMA) and Open-Graded (OG) asphalt are specialty mixes and will always use PG 58E-28 regardless of the design ESALs.

Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR)			
MSCR PG Binder	Similar Superpave PG Binder for MEPDG	MSCR Traffic Designation	Design ESALs, millions
PG 58S-28	PG 58-28	Standard S grade	< 3 million ESAL's
PG 58H-28	PG 64-28	Heavy H grade	3 ≤ ESAL's < 10 million
PG 58E-28	PG 70-28	Extreme E grade	> 10 million ESAL's

The PG binder for a QC/QA project will be identified in the pay item designation in accordance with INDOT *Standard Specifications*.

607-1.02 HMA Shoulders

For an HMA paved shoulder of 4 ft. or narrower, the project designer should specify the same HMA pay item designations and thicknesses as those used for the adjacent travel lane. For an HMA paved shoulder wider than 4 ft., the project designer should specify the thicknesses and HMA pay item designations for the appropriate pavement section.

Shoulder corrugations should be in accordance with INDOT *Standard Specifications* Section 302.

607-1.03 HMA for Approaches

HMA for Approaches is a mixture designated for a drive, public-road approach, crossover, turn lane, acceleration or deceleration lane, mailbox approach on a non-paved shoulder, etc. It should be used where the paving involves a large amount of handwork or non-paving movement of the paver and rollers. The limits and the pavement section for HMA for Approaches are shown in the INDOT *Standard Drawings* for drives, public-road approaches, and crossovers. Where the AADT exceeds the amount shown on the *Standard Drawings*, the HMA pavement section must be determined in accordance with Section 604-2.0. See INDOT *Standard Specifications* Sections 610 and 611.

For a public-road approach, the limits for HMA mixtures for approaches may be extended to include up to an additional 100 ft of pavement to satisfy project requirements. If the project

requires more than 100 ft of additional pavement, the entire public approach section will be designed based on MEPDG.

For a mailbox approach on a non-stabilized shoulder, HMA for Approaches of the type required, should be used as specified on the INDOT *Standard Drawings*.

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).

607-2.0 PCC PAVEMENT PAY ITEMS

607-2.01 Portland Cement Concrete Pavement (PCCP)

The requirements for Portland Cement Concrete Pavement (PCCP) are given in the INDOT *Standard Specifications* Division 500. The latest pay items listed should be used. PCCP is constructed on Subbase for PCCP (drainable aggregate layer and aggregate separation layer), or Dense Graded Subbase on a prepared subgrade.

The subgrade should be designed in accordance with the Geotechnical Report. The geotechnical recommendations may include a soil modification or stabilization process, subgrade-treatment type, or a compacted-aggregate stabilization layer.

Subbase for PCCP is placed on the prepared subgrade and is composed of 3 in. of a drainable aggregate layer on 6 in. of a compacted aggregate separation layer. The drainable aggregate is a permeable layer that collects and removes water entering the pavement system. The compacted aggregate separation layer is a dense layer that separates the subgrade from water entering the pavement subbase system. Underdrains must be included where Subbase for PCCP is specified. Dense Graded Subbase may be used where underdrains are not warranted, although in the case where Dense Graded Subbase is used the design life may be reduced to 20 years. Dense Graded Subbase is composed of 6 in. of a compacted aggregate.

The designed thickness of PCCP, determined by the AASHTOWare Pavement ME Design software. The transverse joint spacing and dowel bar diameter in the concrete pavement joints are designed in accordance with MEPDG and are constructed as contraction joints type D-1. The

minimum concrete cover over the dowel should be at least 3 in. The joint spacing should be shortened where necessary to meet a drive, inlet, adjacent lane, etc., so that all joints are continuous across the entire width of pavement, including shoulders. The additional D-1 joints should be included in the contract quantities. "Hot Pour" material used for the sealant material for D-1 joints is preferred.

Non-standard joints are not to be used in a pavement without approval from Central Office Pavement Design. If a project designer desires to utilize non-standard pavement joints in an individual contract, a submittal should be made to Central Office Pavement Design.

Quality Control/Quality Assurance (QC/QA) PCCP pay items and PCCP pay items, as described in the INDOT *Standard Specifications* Division 500 are used for a project specifying PCCP. The criteria for using QC/QA-PCCP or PCCP are based on the area of PCC pavement specified. For a project requiring a PCCP quantity of 7200 yd^2 (one lot) or greater, the pay item should be "QC/QA-PCCP, ___ in." For a project requiring a PCCP quantity of less than 7200 yd^2, the pay item should be "PCCP, ___ in."

607-2.02 Continuously Reinforced Concrete Pavement (CRCP)

The pavement designer is to reference FHWA-HIF-16-026 *Continuously Reinforced Concrete Pavement Manual* for designing CRCP. INDOT adopts the latest version of this manual for designing CRCP. CRCP has the potential to provide a long-term, zero-maintenance, service life under heavy traffic loadings and challenging environmental conditions, provided proper design and quality construction practices are utilized. AASHTOWare Pavement ME Design software should be utilized to design a CRCP.

CRCP design focuses on managing the cracking that develops so as to reduce the structural distress that may develop as a result of traffic and environmental loadings. These distresses include punchouts, steel rupture, and crack spalling.

CRCP design involves determining the proper combination of the following:

1. slab thickness;
2. concrete mixture constituents and properties;
3. steel reinforcement content and location (critical element); and
4. expansion system type or end restraint lug.

Other important features that a designer must require for a good CRCP design are as follows:

1. provide for sufficient slab edge support (critical element);

2. strengthen or treat the subgrade; and
3. provide a dense graded HMA base that also minimizes friction.

Most transverse cracks form at very early ages before a pavement is open to traffic, and cracking may continue for several years after concrete placement. Transverse cracks occur when and where the tensile stress, due to the restrained volume changes in the concrete, exceeds the concrete's developing tensile strength. New transverse cracks occur roughly at the midpoint between two previously formed cracks, where the maximum concrete stress occurs. Crack formation continues until concrete strength exceeds the stresses due to the restrained volume change. Recognizing that the tensile strength of the concrete and the tensile stresses vary along the length of the slab, the transverse crack spacing pattern is never uniform, but the majority of cracks should be spaced within the desired range of 2 to 4 ft, as designed.