

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
**HOT MIX ASPHALT SHOULDER DENSITY IN CONJUNCTION WITH SUPERPAVE
HOT MIX ASPHALT PERCENT WITHIN LIMITS**

CFS:KPK

1 of 4

APPR:CJB:DBP:02-26-20

FHWA:APPR:03-03-20

a. Description. This special provision sets forth the quality assurance procedures that will be followed for acceptance of hot mix asphalt (HMA) shoulder density. Except as explicitly modified by this special provision, all materials and HMA mixture requirements of the standard specifications, the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits, and the contract apply.

1. Terminology:

Base Price. Price established by the Department to be used in calculating incentives or adjustments to pay items and shown in the contract.

Shoulder Paving. The placement of all HMA in areas designated as shoulder on the typical cross sections for the roadway being paved. Shoulder paving may occur in conjunction with mainline paving or independent of mainline paving. Shoulders paved in echelon with mainline are considered to be independent of mainline paving. In those instances when a widened lane is being paved full depth into the shoulder, the shoulder paving will be considered from where the full depth stops, where mainline mix type stops and the thinner shoulder begins, or where the mix type changes. In those instances where the mainline paving is at the same total thickness and mix type as the shoulder, the shoulder paving will be the same width as the shoulder as shown in the typical cross sections on the plans.

Tier 1 Shoulder. A shoulder being constructed over a new base and sub-base. The shoulder may be paved integrally (paved in one pass with one paver) with the mainline operation or independently. Follow current version of percent within limits (PWL) for acceptance.

Tier 2 Shoulder. A shoulder being constructed over existing base and sub-base with minor or no improvements to the base. The shoulder is paved independently from the mainline operation. Follow current version of PWL for acceptance with the exception that the lower specification limit for Mat Density, %Gmm, is 92.0 percent.

Tier 3 Shoulder. A shoulder being constructed over existing base and sub-base with minor or no improvements to the base. The shoulder is paved integrally (paved in one pass with one paver) with the mainline operation. Follow current version of PWL for acceptance as modified herein.

Shoulder Density Lot. The shoulder density lot is a discrete tonnage of one mixture used for shoulder paving and applicable for a Tier 3 Shoulder only. Each lot is typically made up of five sublots.

Shoulder Density Sublot. The portion of a shoulder density lot represented by a complete set of in-place density cores and applicable for a Tier 3 Shoulder only. Shoulder density sublots will be approximately equal size. The tonnage will be calculated using the length of the mainline sublot and the plan width of the shoulder at the plan application rate. The 1000 ton sublot requirement for the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits will include the tonnage placed within the mainline and shoulder. Shoulder density sublots will be a subset of the 1000 tons.

b. Quality Control Sampling and Testing During Production (Tier 3 Shoulders). In addition to the 15 cores allowed in the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits an additional 5 cores will be allowed per shoulder density lot of material for quality control of in-place density.

c. Quality Assurance Sampling and Testing (Tier 3 Shoulders). Acceptance of HMA for shoulder paving will be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits with the exception that the lower specification limit for Mat Density, %Gmm, is 90.0 percent.

1. Plant Produced Material (Mixture) Quality Assurance (QA) Sampling and Testing. There will be no separate sampling and testing of HMA used for shoulder paving.

2. In-Place Density Quality Assurance Sampling. In-place density QA sampling must be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits except as modified herein.

Core sample locations will be marked for the shoulder after final rolling. Core sample locations will be marked at the completion of a shoulder density sublot, prior to traffic staging changes, or at another time that is independent of paving operations. The Engineer will identify two core sample locations for each shoulder density sublot based on random longitudinal and transverse measurements taken from the edge of the mainline. These random core locations are separate from the mainline cores and will be evaluated independently for pay.

d. Dispute Resolution Process for Shoulder Density (Tier 3 Shoulders).

1. Shoulder Density Lot Dispute Resolution Criteria. The QA in-place density results for a shoulder density lot, including an initial production lot, may be eligible for Dispute Resolution if the lot pay factor (PF) for in-place shoulder density based on the Quality Control (QC) test results is larger than the corresponding PF based on the QA test results. Only independent random QC test results (minimum of 1 random shoulder density sublot cores from each shoulder density sublot) from the corresponding shoulder density lot under Dispute Resolution will be used by the Engineer when processing the Dispute Resolution request. The lot PF for in-place shoulder density will be recomputed based on the Dispute Resolution sample test results.

2. Dispute Resolution Schedule will be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits.

3. Dispute Resolution Testing Process will be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits.

e. PWL Quality Index Analysis (Tier 3 Shoulders). Quality index analysis will be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits except as modified herein.

1. Pay Factor for In-Place Shoulder Density (PF_{SD}).

A. If PWL for in-place shoulder density (PWL_{SD}) is between 100 and 70, use the following formula to determine PF_{SD} . Round the value of PF_{SD} two decimal places.

$$PF_{SD} = 55 + (0.5 \times PWL_{SD})$$

B. If PWL for in-place shoulder density is between 70 and 50 inclusive, use the following equation to determine PF_{SD} . Round the value of PF_{SD} two decimal places.

$$PF_{SD} = 37.5 + (0.75 \times PWL_{SD})$$

C. If PWL_{SD} is less than 50; the Engineer may elect to take one of the actions specified in subsection j.1.C of the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits.

2. Overall Lot Pay Factor Shoulder (OLPFS).

$$OLPFS = (0.40 \times PF_{SD}) + (0.30 \times PF_{AV}) + (0.15 \times PF_{BINDER}) + (0.15 \times PF_{VMA})$$

3. Minimum Average In-Place Shoulder Density. If the average lot in-place shoulder density for a Tier 3 Shoulder is less than 90.00 percent then the shoulder must be removed. The replacement shoulder will be evaluated as a Tier 3 Shoulder; alternate acceptance will not be allowed.

f. Single Test Acceptance (STA) Criteria (Tier 3 Shoulders). For density use the average of two cores. All values of PF in these formulae are percent, not decimals. All values of PF are rounded to two decimal places.

1. Pay Factor for In-Place Density (PF_d).

A. If the test result for In-Place Density is greater than 92.00 the In-Place Density (PF_d) = 105.

B. If the test result for In-Place Density is between 90.00 and 92.00 inclusive, use the following formula to determine In-Place Density (PF_d).

$$PF_d = (2.5 \times \text{Density}) - 125$$

C. If the test result for In-Place Density is less than 90.00 but greater than or equal to 88.00 use the following formula to determine PF_d .

$$PF_d = (10 \times \text{Density}) - 800$$

D. If the single test result for In-Place Density is less than 88.00 the Engineer may elect to take one of the actions specified in subsection k.1.C of the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits.

2. Overall Sublot Pay Factor Shoulder (OSPFS). Round the value of the OSPF to the whole number.

$$\text{OSPFS} = (0.40 \times \text{PF}_d) + (0.30 \times \text{PF}_{AV}) + (0.15 \times \text{PF}_{\text{BINDER}}) + (0.15 \times \text{PF}_{\text{VMA}})$$

g. Measurement and Payment. Measurement and payment will be in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits except as modified herein.

The Overall Lot Pay Factor, for a project with Tier 3 Shoulders, for a lot that includes the Shoulder Density Lot will be determined in two separate calculations. The mainline quantity will be determined and Overall Lot Pay Factor calculated in accordance with the Special Provision for Superpave Hot Mix Asphalt Percent Within Limits and the Lot Payment Adjustment made accordingly. The Shoulder Density Lot will be determined and the Overall Lot Pay Factor Shoulder will be calculated in accordance with section e of this special provision and the Lot Payment Adjustment made as shown below.

The Overall Lot Pay Factor Shoulder (OLPFS) will be used to determine the lot pay adjustment as follows:

Lot Payment Adjustment = $(\text{OLPFS} - 100) / 100 \times (\text{Contract Base Price}) \times (\text{Shoulder Density Lot Quantity})$.

Any positive adjustment earned will be paid for using the following pay item:

Pay Item	Pay Unit
HMA Quality Initiative	Dollar