Illinois Department of Transportation
Division of Highways / Bureau of Construction
2300 South Dirksen Parkway, Springfield, Illinois 62764

Subject:
Procedures for Calculating Payment for Prime Coat

CONSTRUCTION MEMORANDUM 14-82

Effective: March 12, 2014
Expires: Indefinite

PURPOSE

This memorandum prescribes procedures for calculating prime coat for payment.

APPLICABILITY

Procedures herein apply to all contracts awarded by the Department of Transportation under Bureau of Construction supervision, which have included the "Hot Mix Asphalt - Prime Coat" special provision as part of the contract.

SUMMARY

Articles 406.02, 406.05, 406.14, and 1032.02 have been revised to update construction procedures, method of measurement and basis of payment relating to the preparation of existing pavement surfaces for resurfacing with HMA.

Bituminous materials used for prime coat can be an emulsion or a cutback. Emulsions are asphalts that have been mixed with an emulsifier and water to create a liquid asphalt that is easy to apply to the pavement surface from a pressure distributor. Cutbacks are asphalts that have been mixed with kerosene or some other lighter petroleum product to cut the asphalt's viscosity so that it is easy to apply to a pavement surface from a pressure distributor. Emulsions will be the most common type of prime coat that is used but when the ambient temperature falls below 60 °F the emulsions may take longer to break. For this reason cutbacks will be allowed when the ambient temperature is lower than 60 °F, but that will be the only condition in which cutbacks will be allowed for use.

Prime may be supplied to the project from a tanker, either hauled to the project site or a fixed tank at the contractor's yard or producer's facility. The material is applied to the pavement surface with the use of a pressure distributor specified in Article 1102.05.

The contractor may want to have additional water mixed with the emulsion as they feel necessary to work with their pressure distributor. However, the water must be added by the emulsion producer. The benefit of adding water is to lower the viscosity of the emulsion. The diluted emulsions will easily flow through the pressure distributor and provide a consistent cover on the pavement surface. The downside to adding water is it increases the "break time" needed for all water to evaporate out of the emulsion before traffic, including construction traffic, is allowed on the primed surface. The contractor will take these into consideration and determine how much water, if any, will be mixed with the emulsion.

In order to accurately pay for material placed on the pavement surface, the quantity measured for payment will be the actual residual amount of asphalt applied. In other words, the volume of the cutback or emulsion used and any water added will not be the amount that is measured for payment. The residual amount of asphalt in the emulsion or cutback will be used for payment.

A test procedure has been developed to physically check the residual amount of asphalt applied to the pavement surface. For projects that contain at least 2,000 tons of HMA, the inspector shall determine the residual amount of asphalt placed using the test procedure titled, "Determination of Residual Asphalt in Prime and Tack Coat Materials" which is Appendix B24 located in the Manual of Test Procedures for Materials. If a copy of the Manual is not available in the Engineer's field office, a copy of the test procedure can be obtained from the district Bureau of Materials or IDOT's website. The test shall be performed at least once per project for each type of surface being primed for which at least 2,000 tons of HMA will be placed, preferably on the first day prime coat is placed on a given surface. But more tests may be performed at the Engineer's discretion. The contractor may proceed with paving as soon as the prime fully breaks and before the test results are provided. However, test results should be obtained as quickly as possible and at least before the next day of paving.

This test is not intended to be the sole criteria used for acceptance of the work, but it is a tool for the Engineer to evaluate the contractor's performance. The residual rate of material placed will be calculated as described below based on truck weights.

If the test results and/or quantity calculations indicate that the residual amount of prime on the surface to be paved does not meet the specified amount, the prime may be considered unacceptable. However, research has shown that prime coat applied with a tolerance of plus or minus 0.01 lbs/sq. ft. is adequate. Recognizing that precisely meeting the specified rate can be difficult, engineering judgment should be used to consider if unacceptable work performed is adequate to leave in place. In accordance with Article 105.03, the Department reserves the right to accept work that is in close conformity with the contract by a contract modification. The construction supervisor and district materials office should be consulted on how to handle the situation. The contractor shall make appropriate adjustments for further applications so the correct amount of material is placed.

Payment will be made by weight as follows.

PAYMENT PROCEDURES

The inspector will need to know three things to properly calculate the amount of material for payment.

1. The total weight of the material applied. This weight includes any additional water added to the emulsion
2. The actual percentage of residual asphalt in the emulsion or cutback as produced
3. The amount of water added to the emulsion

The pressure distributor shall be weighed before and after placement of the prime coat to determine the net amount of material placed. Any scale of adequate size and displaying a current Department of Agriculture sticker will be sufficient to perform the weighing.

The actual percentage of residual asphalt in the emulsion or cutback, as produced, will be indicated on the producer's Bill of Lading or attached Certificate of Analysis from the Bureau of Materials and Physical Research. The amount of additional water (if any) added to an emulsion will also be indicated on the Bill of Lading.

The amount of water added is necessary to calculate the percent of emulsion in the diluted emulsion mix. The Bill of Lading will show the amount of water that was added to a tanker of the emulsion from which the pressure distributor is loading out of. For example, a pressure distributor may only have 2 tons of a diluted emulsion mix in its tank, but the tanker it loads out from will have much more. The amounts of emulsion and water on the Bill of Lading may far exceed the quantity delivered in a pressure distributor. Information provided in this fashion is appropriate because only the percentages of water and emulsion are necessary to calculate quantities for payment. Payment is based on weighing the amount of diluted emulsion placed from the pressure distributor.

Using the percentage of residual asphalt for the material used, the quantity of residual asphalt placed can then be calculated.

EXAMPLE TO CALCULATE RESIDUAL AMOUNT OF ASPHALT FROM AN EMULSION

Known: Material used is an emulsion.
Percent of residual asphalt in the emulsion = 57% (from the producer's Bill of Lading or attached Certificate of Analysis)
Weight of pressure distributor before application of material = 35,000 lbs.
Weight of pressure distributor after application of material = 28,000 lbs.
Amount of water added (from Bill of Lading) = 2,208 lbs. added to a tanker containing 8,300 lbs. of the emulsion.

Calculate the amount of residual asphalt for payment.

Net weight of material:
35,000 – 28,000 = 7,000 lbs.

Percentage of emulsion in the pressure distributor:
8,300 lbs. + 2,208 lbs. = 10,508 lbs. (total weight of diluted emulsion mix)
8,300 lbs./10,508 lbs. = 79% (amount of emulsion in the pressure distributor)

Percent residual asphalt for payment
7,000 lbs. x 0.79 = 5,530 lbs. of emulsion
5,530 lbs. x 0.57 = 3,152 lbs. of residual asphalt

3,152 lbs. represents the weight of actual residual asphalt that can be paid as PRIME COAT.

The provisions for maximum payment will apply to this quantity.

For example, assume the quantity ordered by the Engineer for prime coat is 3,100 lbs. (based on the area to be primed and the appropriate residual rate).

Maximum payment = 3,100 lbs x 1.05 = 3,255 lbs.

All 3,152 lbs. of residual asphalt placed can be paid for.

EXAMPLE TO CALCULATE RESIDUAL AMOUNT OF ASPHALT FROM A CUT BACK

Known: Material used is a cutback.
Percent of residual asphalt in the cutback = 60% (from the Bill of Lading or attached Certificate of Analysis)
Weight of pressure distributor before application of material = 35,000 lbs.
Weight of pressure distributor after application of material = 29,750 lbs.

Calculate the amount of residual asphalt for payment.

Net weight of material:
35,000 – 29,750 = 5,250 lbs.

Percent residual asphalt for payment
5,250 lbs. x 0.60 = 3,150 lbs.

3,150 lbs. represents the weight of actual residual asphalt that can be paid as PRIME COAT.

The provisions for maximum payment will apply to this quantity.

For example, assume the quantity ordered by the Engineer for prime coat is 3,100 lbs. (based on the area to be primed and the appropriate residual rate)

Maximum payment = 3,100 x 1.05 = 3,255 lbs.

Please note that the Method of Measurement for Bituminous Materials (Prime Coat) is located in Article 1032.02. The article states that a weight ticket for each truck load shall be furnished to the inspector. The truck referred to in this article is the pressure distrubutor that is required to place the material. Prime may be supplied to the project in a large semi tanker, a tank at the contractor's yard or may be supplied from a tank at the producer's facility. Weight tickets are not needed for materials contained in these tanks. Only material that is delivered to the project in a pressure distributor require weight tickets.

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