**COLD IN-PLACE RECYCLED EXPANDED ASPHALT MIX - Item No.**

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| Special Provision No. 335S04 November 2021 |

**Amendment to OPSS 335, November 2015**

**335.02 REFERENCES**

Section 335.02 of OPSS 335 is amended by the deletion of the following:

**Ministry of Transportation Publications**:

LS-200 Penetration of Bituminous Materials

**American Association of State Highway and Transportation Officials (AASHTO)**

T 40-02 Sampling Bituminous Materials

**Wirtgen GmbH Publication**

Wirtgen Cold Recycling Technology manual, 1st edition, 2012

Section 335.02 of OPSS 335 is amended with the addition of the following:

**Ministry of Transportation Publications**:

LS-805 Practice for Mix Design of Cold Recycled Mixtures with Expanded Asphalt

Compaction Measurement of Cold In-Place Recycled Pavements Using Nuclear Moisture and Density Gauges

**American Association of State Highway and Transportation Officials (AASHTO)**:

R 66-16 Sampling of Asphalt Materials

**ASTM Publications**

D5/D5M-20 Standard Test Method for Penetration of Bituminous Materials

D2041/D2041M-19 Standard Test Method for Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures

**335.04 DESIGN AND SUBMISSION REQUIREMENTS**

**335.04.01 Design Requirements**

The first paragraph of Subsection 335.04.01 of OPSS 335 is amended by deleting point b) in its entirety and replacing it with the following:

b) The dry tensile strength shall be a minimum of 225 kPa and the tensile strength ratio shall be a minimum of 50%.

The second paragraph of Subsection 335.04.01 of OPSS 335 is amended by deleting the first sentence in its entirety and replacing it with the following:

The mix design shall be carried out according to the LS-805.

The third paragraph of Subsection 335.04.01 of OPSS 335 is amended by deleting point d) and h) in its entirety and replacing it with the following:

d) The optimum moisture content, the mix design bulk relative density, and the air void for the CIREAM mix. Air void shall be according to ASTM D2041, Supplemental Procedure for Asphalt Mixtures Containing Porous Aggregate.

h) Recovered penetration for the binder of the existing pavement according to ASTM D5M.

**335.05 MATERIALS**

**335.05.02 Performance Graded Asphalt Cement**

The second sentence of Subsection 335.05.02 of OPSS 335 is deleted in its entirety and replaced with the following:

The additional testing requirements according OPSS 1101 Table 2 Additional Testing Requirements and Categories for PGAC shall not apply.

**335.05.01 Reclaimed Asphalt Pavement**

Subsection 335.05.01 of OPSS 335 is deleted in its entirety and replaced with the following:

The gradation requirement for RAP shall be 100% passing the 37.5 mm sieve, and 95% to 100% passing the 26.5 mm sieve. The gradation shall be measured based on unextracted washed gradation according to the procedures in LS-602, with full range of gradation sizes provided for information purposes only.

**335.05.04 Active Filler**

The second paragraph of Subsection 335.05.04 of OPSS 335 is deleted in its entirety and replaced with the following:

When any of the strength requirements as specified in Subsection 335.04.01 Design Requirements are not met, active filler such as Portland cement, hydrated lime, or quick lime may be considered to be added into the CIREAM. Portland cement shall be according to OPSS 1301. The maximum cement content to added asphalt content ratio shall be 1:2.5. The maximum quantity of hydrated lime is limited to 1.0% by dry mass of RAP.

**335.06 EQUIPMENT**

**335.06.03 Compaction Equipment**

Subsection 335.06.03 of OPSS 335 is amended by the addition of the following sentence:

Compaction equipment for control strips shall have a minimum static weight of 11,000 kg.

**335.06.05 Pilot Vehicle**

Subsection 335.06.05 of OPSS 335 is deleted in its entirety.

**335.07 CONSTRUCTION**

**335.07.06 Compaction**

Subsection 335.07.06 of OPSS 335 is deleted in its entirety and replaced by the following:

**335.07.06.01 Compaction Testing Target Density**

Compaction acceptance shall be according to the Acceptance Criteria for Compaction clause and shall be based on the target density. A control strip for the determination of the target density shall be constructed at the start of CIREAM production. The control strip shall be constructed according to Compaction Measurement of Cold In-Place Recycled Pavements Using Nuclear Moisture and Density Gauges. Levelling sand may be used to provide a flat surface for the nuclear moisture and density gauge when open coarse texture CIREAM mix is encountered. A minimum notice of two Business Days shall be given to the Contract Administrator prior to the construction of the control strip.

The Owner shall be provided access to complete the following tests according to the Compaction Testing clause:

a) Compaction testing of the control strip.

b) Establishment of the target density.

c) Compaction acceptance testing.

Compaction acceptance testing shall be performed once compaction has been completed on the CIREAM mat. Compaction acceptance shall be achieved prior to opening to traffic.

**335.07.06.02 Target Density**

A new control strip shall be constructed, and a new target density established for every 100,000 m² of CIREAM production and whenever any one of the following situations arises:

a) A different mix design is applied to the pavement section.

b) The existing pavement material significantly changes in surface roughness, gradation, composition, or layer thickness as determined by the Contract Administrator.

c) A different nuclear moisture and density gauge is to be used for the sublot testing.

The new target density shall apply to the calculations according to the Acceptance Criteria subsection for all sublots constructed after the establishment of a new target density.

**335.07.07 Surface Appearance**

Subsection 335.07.07 of OPSS 335 is deleted in its entirety and replaced by the following:

The compacted CIREAM mat shall be smooth and constructed to the crossfall and grade specified in the Contract Documents. The surface of the CIREAM mat shall be of uniform texture and free of severe segregation and longitudinal streaks, moderate to severe raveling, rutting and flushing, and free of fat spots, oil spills, roller marks, and other defects.

**335.07.05 Mixing**

Subsection 335.07.05 of OPSS 335 is deleted in its entirety and replaced with the following:

The expanded asphalt shall be added at the design rate. Expanded asphalt expansion ratio and half-life shall be checked using the test nozzle on the recycling unit or mixer for each load of asphalt delivered to the site, where appropriate. The rate of addition of expanded asphalt shall be field adjusted as required to within 0.20% of the design rate and mixed to produce a uniformly coated CIREAM that can be compacted to the specified density. The expanded asphalt added shall not be less than 1.0%.

**335.07.08 Traffic Control with Moving Vehicles**

Subsection 335.07.08 of OPSS 335 is deleted in its entirety and replaced by the following:

**335.07.08 Traffic Control with Pilot Vehicles**

Traffic shall be controlled with pilot vehicles according to OTM, Book 7.

The pilot vehicles shall guide one-way traffic through or around construction. The maximum speed of the moving vehicles shall be 30 km/h. Traffic control with moving vehicles shall be maintained until the CIREAM mat is able to carry traffic without damage.

Section 335.07 of OPSS 335 is amended by the addition of the following subsection:

**335.07.10 Longitudinal Joints**

For achieving continuity and integrity in the paved area, the minimum overlap between two successive lanes in longitudinal joints shall be 150 mm. In addition, the face of the joints shall be inspected between the milling unit and paving unit to make sure it is free of excessive loose material or any built-up dust generated by the milling machine.

**335.08 QUALITY ASSURANCE**

**335.08.02 Sampling**

**335.08.02.02 Cold In-Place Recycled Expanded Asphalt Mix Samples**

**335.08.02.02.01 Loose Samples**

The last paragraph of Clause 335.08.02.02.01 of OPSS 335 is deleted in its entirety.

**335.08.02.02.02 Slabs**

Clause 335.08.02.02.02 of OPSS 335 is deleted in its entirety.

Subsection 335.08.02 of OPSS 335 is amended by the addition of the following clause:

**335.08.02.02.03 RAP Gradation**

For the purpose of determining the RAP gradation, 30 kg of RAP samples shall be taken prior to the application of expanded asphalt from each of five randomly selected sublots for every lot.

**335.08.02.03 Performance Graded Asphalt Cement**

The first sentence of Clause 335.08.02.03 of OPSS 335 is deleted in its entirety and replaced by the following:

Samples of PGAC to be used in the mix shall be taken from the storage tank at the terminal according to the Tank Tap Method specified in AASHTO R66 and the terminal’s health and safety plan in the presence of the Contract Administration at a frequency of three sets of samples per Contract for PGAC providing to three different lots.

**335.08.03 Acceptance Criteria**

**335.08.03.03 Compaction**

Clause 335.08.03.03 of OPSS 335 is deleted in its entirety and replaced by the following:

**335.08.03.03.01 Compaction Testing**

Quality assurance for the compaction of CIREAM shall consist of taking five random field wet density and moisture content measurements from each sublot of compacted CIREAM and using them to calculate the Quality Index (*Qi*) according to Compaction Measurement of Cold In-Place Recycling Pavements Using Nuclear Moisture and Density Gauges.

**335.08.03.03.02 Acceptance Criteria for Compaction**

When *Qi* for a sublot is equal to or greater than 1.49, the sublot shall be accepted; otherwise, the sublot shall be rejected for compaction.

**335.08.03.03.03 Rejected Sublots**

If a sublot is rejected for compaction, the sublot shall be recompacted, with adjustment to the moisture content if required, until satisfactory compaction is achieved. The recompacted sublot shall be retested and the compaction re-evaluated according to the Acceptance Criteria subsection.

**335.08.03.04 Tensile Strength of Cold In-Place Recycled Expanded Asphalt Mix**

Clause 335.08.03.04 of OPSS 335 is amended by addition of the following clause:

**335.08.03.04.01 Referee Testing**

A written request may be made to the Contract Administrator for referee testing within 3 Business Days of receiving a rejectable tensile strength test result. Referee testing shall be carried out by a laboratory designated by the Owner from a roster maintained for this purpose.

The referee testing shall be conducted by taken slab samples at random locations within the sublot as directed by the Contract Administrator. The total of six slab sample shall be dry cut 150 mm × 150 mm and removed intact from the CIREAM mat. The tensile strength test shall follow either the Method A or Method B procedure, as per LS-297.

The results of the referee test shall be used for acceptance determination and shall be binding on both parties. If the referee testing results in rejection of the tensile strength, the referee testing shall be at no addition cost to the Owner. If the referee testing results in the material passing all test criteria, the referee testing charge shall be paid by the Owner.

**335.10 BASIS OF PAYMENT**

Section 335.10 of OPSS 335 is amended by the addition of the following subsection:

**335.10.02 Traffic Control with Pilot Vehicles**

Traffic control with pilot vehicles shall be included under the Temporary Traffic Control Signs item.

WARRANT: Always with this tender item.