

ITEM 18403.2301 M - ICE RETARDANT ASPHALT CONCRETE WITH IN-PLACE DENSITY MONITORING, TYPE I

ITEM 18403.2302 M - ICE RETARDANT ASPHALT CONCRETE WITH IN-PLACE DENSITY MONITORING, TYPE II

The requirements of Section 403 - Hot Mix Asphalt Concrete Pavement of the Standard Specifications of January 2, 1995 shall apply except as modified below:

DESCRIPTION

This work shall consist of constructing a single course of hot plant mixed ice retardant asphalt concrete on a prepared base and in close conformance with the required lines, grades, thicknesses, and typical sections shown on the plans or established by the Engineer. The Contractor shall be responsible for continuous monitoring of the pavement density using a nuclear density gauge as required by the specification.

MATERIALS

The Contractor shall formulate and submit to the Regional Director a job mix formula that satisfies the design general tolerances in Table 1 - Composition of Mixtures.

This Specification has been Disapproved as a result of the issuance of

**TABLE 1
COMPOSITION OF MIXTURES**

Screen Sizes	Type I		Type 2	
	Design ¹ General Limits % Passing	Production ² Tolerance %	Design ¹ General Limits % Passing	Production ² Tolerance %
19.0 mm	-	-	100	-
12.5 mm	100	-	95-100	-
6.3 mm	90-100	-	58-72	±5
3.2 mm	45-70	±4	36-54	±4
850 µm	15-40	±4	15-32	±4
425 µm	8-27	±4	8-25	±4
180 µm	4-16	±3	4-16	±3
75 µm	2-6	±2	2-6	±2
Asphalt Content	5.5% - 7.5%	-	5.2% - 6.5%	-
Additive Content	varies ³	±0.1	varies ³	±0.1
Asphalt Cement Grade & No.	AC-20 702-0500	- -	AC-20 702-0500	- -
Mixing and Placing Temperature Range 135°C - 163°C				

NOTE 1: All aggregate percentages are based on total weight of the aggregate.

NOTE 3: The production tolerances in Table 1 will be permitted to exceed the design general limits.

NOTE 2: The percentage of additive is based on the total weight of the mix and shall be 5.0%, 5.25%, or 5.5% as specified by Special Note in the project proposal.

A. Coarse Aggregates. Coarse aggregates used shall be from approved sources and shall meet one

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of the following requirements:

1. Coarse aggregates shall be crushed limestone having an acid insoluble residue content of not less than 20%, excluding particles of chert and similar siliceous rocks.
2. Coarse aggregates shall be crushed dolomite having an acid insoluble residue content of not less than 17%, excluding particles of chert and similar siliceous rocks.
3. Coarse aggregates shall be crushed sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials. Non-carbonate particles are defined as those having an acid insoluble residue content not less than 80%.
4. Coarse aggregates shall be crushed gravel or blends of two or more of the following types of materials: crushed gravel, limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials. These aggregates must meet the following requirements:

For Type I Ice Retardant Mixtures - not less than 20% (by weight with adjustments to equivalent volumes for materials of different specific gravities) of the total coarse aggregate particles (plus 3.2 mm material) shall be non-carbonate. Non-carbonate particles are defined as those having an acid insoluble residue content not less than 80%.

For Type II Ice Retardant Mixtures - not less than 20% (by weight with adjustments to equivalent volumes for materials of different specific gravities) of the total coarse aggregate particles (plus 3.2 mm material) shall be non-carbonate. In addition, not less than 20% of the plus 6.3 mm particles shall be non-carbonate. Non-carbonate particles are defined as those having an acid insoluble residue content not less than 80%.

- B. Blending.** Where coarse aggregate for the mixes are from more than one source or of more than one type of material, they shall be proportioned and blended to provide a uniform mixture.
- C. Additive.** The Ice Retardant additive shall appear on the Department's current Approved List.
- D. Mix Properties.** The mixtures shall meet the Marshall property criteria appearing in Table 2, Marshall Mix Property Criteria.

TABLE 2

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MARSHALL MIX PROPERTY CRITERIA

Mix Property	Mix Criteria	
	Type I	Type II
Stability, N., min.	6700	6700
Flow, 0.25 mm, min.	8	8
Marshall Quotient, N/.25 mm, min.	670	670
Air Voids, percent	3.0 - 5.0	3.0 - 5.0
Voids in Mineral Aggregate (VMA), percent min.	16.0	14.0
Voids Filled with Asphalt (VFA), percent	65 - 75	65 - 75

E. Mix Preparation. The Marshall specimens shall be prepared, mix properties determined, and completed mix design submitted in accordance with the procedures outlined by Department written instructions with the following modifications:

1. Compactive effort shall be 75 blows per side.
2. Only five point Marshall mix designs will be acceptable and must be approved prior to production.
3. The minimum specified VMA shall meet at each of the five mix design asphalt cement contents.
4. The Marshall quotient is calculated as the ratio of corrected stability (N.) to flow (.25 mm).
5. The optimum asphalt content shall be determined by the "Range" method. Graphs shall be constructed for each of the mix design properties (stability, Marshall quotient, air voids, VMA and VFA) using each property as the vertical axis and percent asphalt cement content as the horizontal axis. The plotted values in each graph shall be fitted with a smooth curve that obtains the "best fit" for all values. A vertical line is drawn at the point where the asphalt cement content provides the acceptable lower and upper limits for the properties of stability, flow, Marshall quotient, air voids, VMA and VFA. The mid-point of the common overlap is the optimum asphalt cement content.

F. Blotting Aggregate. Fine aggregates for blotting shall meet the requirements of §703-3 Mortar Sand.

CONSTRUCTION DETAILS

The construction details specified in Subsection 401-3.01 through 401-3.15, shall apply with the following modifications:

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The Ice Retardant additive may be batched and recorded manually. Proportioning of the additive shall be accurate to $\pm 0.1\%$ of the total batch weight of the mixture. The additive shall be sieved through a 19 mm sieve, to eliminate large lumps, prior to its addition to the mixer.

The aggregate dry mix time shall be at least 15 seconds. The aggregate and asphalt wet mix time shall be at least 30 seconds. The Ice Retardant additive shall then be added to the mixture and mixed for an additional 15 seconds or until all the additive particles are thoroughly coated.

Compaction The Contractor shall be responsible for continuous monitoring of the pavement density using a nuclear density gauge. This gauge should consist of a radioactive source, scaler and other basic components housed in a single backscatter unit. This gauge should be operated by personnel trained in the principles of nuclear testing and safety practices.

The operation of the rollers during compaction of the pavement including the speed, the amplitude settings, the vibration frequency, and the weight of the rollers will be controlled by the Contractor.

The rollers shall keep the use of water to a bare minimum. Only enough water to prevent pickup should be used.

The PROJECT TARGET DENSITY (PTD) shall be established at the start of paving will be determined initially using the average Maximum Theoretical Specific Gravity from the Marshall mix design. After production starts, the PTD will be determined from the average Maximum Theoretical Specific Gravity of plant mix specimens. The test for the Maximum Theoretical Specific Gravity of the plant mix specimens should be done on the first batch produced when production starts. Compaction will be 91% - 97% of the Maximum density as determined by a nuclear density gauge at all tested locations. Continue to monitor compaction with a density gauge for the duration of the paving operation. The frequency of testing shall be determined by the Engineer according to the following guidelines and Table 3.

Initially take readings at 15 meters and 30 meters from the start of paving, then continue according to Table 3.

**TABLE 3
GUIDELINES FOR DETERMINING FREQUENCY OF
NUCLEAR DENSITY GAUGE TESTING**

Lane Feet, L	Frequency of Readings	Number of Readings, X
$30 \text{ m} < L \leq 450 \text{ m}$	every 30 meters	$2 \leq X \leq 16$
$451 \text{ m} < L \leq 900 \text{ m}$	every 60 meters	$9 \leq X \leq 16$
$901 \text{ m} < L \leq 1500 \text{ m}$	every 90 meters	$11 \leq X \leq 18$
$L > 1500 \text{ m}$	every 150 meters	$X \geq 11$

Density readings shall be recorded on a BR 334 "Ice Retardant Asphalt Concrete Pavement Density Data" The procedure for collecting nuclear density gauge readings is described in the "Method for In - Place Density

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Monitoring of Ice Retardant Asphalt Concrete ". This document can be obtained from the Director, Materials Bureau. At the end of each production day provide the Engineer with copies of all BR 334 forms relating to that days work.

During the rolling operation, correct at once any displacement occurring as a result of reversing the direction of the roller, or from other causes, by the use of rakes and addition of fresh mixture as required. Exercise care in rolling not to displace the line and grade of the edges of the HMA mixture. To prevent adhesion of the mixture to the drum(s) of the roller, properly moisten the drums with water, or water mixed with small quantities of detergent or other Department approved materials. If a pneumatic tire roller is used, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar materials to prevent pneumatic tire pickup. However, in all instances, all materials used to prevent adhesion shall be kept to a minimum and the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in paving, compaction or cleaning operations.

If vibratory rollers with pneumatic drive wheels are used, compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two (2) passes with the drum operating static, unless otherwise directed by the Engineer. If dual drum vibratory rollers are used, compact the joint by overlapping the joints in two (2) passes with both drums operating static, unless otherwise directed by the Engineer. Along forms, curbs, headers, walls and other areas not accessible to the rollers, compact the mix thoroughly with mechanical tampers as directed by the Engineer.

Remove any mixture that becomes loose and broken, mixed with dirt, or is in any way defective. Replace with fresh HMA mixture and compact to conform with the surrounding area. Correct any area showing an excess or deficiency of bituminous materials to the satisfaction of the Engineer.

When the rolling operation is complete there should be no visible ruts, ridges, roller marks, or irregularities in the pavement. If these imperfections are present, correct the imperfections or remove and repave the section(s) to the satisfaction of the Engineer. Perform all corrective work at no additional cost to the Department.

The Contractor should note that if they elect to use vibratory compaction equipment, they assume full responsibility for the cost of repairing all damage which may occur to highway components and adjacent property. Vibratory compaction is not permitted on structural bridge decks.

Immediately after compaction, while the surface is still warm, the ice retardant overlay shall be covered with a layer of clean, dry, crushed screenings. Fine or natural sand must be avoided. The particle size should be between 1 mm and 3 mm. The fine aggregate shall be applied at approximately 1.1 kg per square meter. Spreading of the fine aggregate may be done by hand brooming or other methods approved by the Engineer. The fine aggregate shall be rolled with a self propelled steel wheel tandem roller weighing a minimum of 7 metric tons in a separate operation from the compaction train. The temperature of the surface shall not be lower than 88° C. Just prior to opening to traffic, the fine aggregate shall be swept from the pavement surface

by a method approved by the Engineer. The sweeping must remove all loose aggregate particles. Before opening the pavement to traffic, the Contractor shall erect warning signs W8-28 "Fresh Oil" as prescribed by the New York State Department of Transportation Manual of Uniform Traffic Control Devices and the pavement surface shall be flushed with water using a pressure distributor. The pressure distributor shall be equipped and operated so that the water can be applied, at a minimum width of 3.6 meters at a rate of 9 liters per square meter

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with uniform pressure. The flushing shall be done in two passes. The first pass shall be made using a minimum rate of 2.3 liters per square meter. Before the pavement dries, approximately 10 to 30 minutes, the second pass shall be made using a minimum rate of 9 liters per square meter. The pavement shall be flushed as many times as necessary each day, as directed by the Engineer, including all locations where traffic has tracked it. The Contractor shall remove the "Fresh Oil" warning signs when directed by the Engineer.

Permanent pavement marking shall be applied either before any sheen develops on the surface of the ice retardant asphalt concrete or after all evidence of it has vanished.

Short-term pavement markings such as preformed tape and raised pavement markers, that fail to adhere to the pavement, shall be mechanically fastened. Fastening materials (e.g. nails, etc.) and fastening methods shall be approved by the Engineer. After removal of the short-term pavement markings, damage to the new asphalt concrete pavement caused by mechanical fastening shall be repaired to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

The provisions of §402-4, Method of Measurement, shall apply except that the final Quantity Adjustment Factor shall be 1.00.

BASIS OF PAYMENT

The unit price bid per metric ton for the pavement courses shall include the cost of furnishing all materials, including asphalt cement, ice retardant additive, mortar sand, and all equipment and labor necessary to complete the work, except pavement delineation and the permanent pavement marking will be paid for under their respective items.

Payment will be made under:

<u>ITEM NO.</u>	<u>ITEM</u>	<u>PAY UNIT</u>
18403.2301M Metric Ton	Ice-Retardant Asphalt Concrete With In-Place Density Monitoring, Type I	
18403.2302M Metric Ton	Ice-Retardant Asphalt Concrete With In-Place Density Monitoring, Type II	