ITEM 18403.1760 M - ICE RETARDANT ASPHALT CONCRETE - TYPE 6F RA

.The requirements of Section 403 - Hot Mix Asphalt Concrete Pavement shall apply except for the modifications described below:

DESCRIPTION

This work shall consist of construction of one course of rut avoidance 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 and pavement coring as required by the specification.

MATERIALS

The materials and composition of this course shall meet the following requirements of Subsection 401-2.01 through 401-2.05, with the following exceptions:

The Contractor shall formulate and submit to the Regional Director, a job mix formula that satisfies the design general limits listed in the table below:

A. Table 401-1, Composition of Bituminous Plant Mixtures, shall be modified as follows:

Mixture Requirements (note 1)

	Type 6F RA Top Course General Limits	
Screen Sizes	**Passing**	**% Tolerance**
19.0 mm	100	-
12.5 mm	95-100	-
6.3 mm	58-72	±5
3.2 mm	36-54	±4
850 µm	15-32	±4
425 µm	8-25	±4
180 µm	4-16	±3
75 µm	2-6	±2
Asphalt Content	5.5% - 6.5%	-
Additive Content	**(note 2)**	±0.1
Asphalt Cement	AC-20 **(note 3)**	

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Grade & No. 702-0500 **(note 4)**

Mixing and Placing Temperature Range 135° C - 163° C.

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

NOTE 2: The percentage of Verglimit 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.

NOTE 3: The percentage of asphalt cement is based on the total weight of the mixture.

NOTE 4: Refer to Notes 5 and 6 of Table 401-1, Composition of Bituminous Plant Mixtures in the Standard Specification Section 401 - Plant Mix Pavements - General.

B. The additive shall be Verglimit, an encapsulated calcium chloride product manufactured by Infrastructure Limited, P.O. Box 508, LCD-1, Hamilton, Ontario, Canada L8L7W9.

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

COARSE AGGREGATES. Top Course Type 6F RA asphalt concrete mixture shall meet one of the following high friction 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), or crushed dolomite (excluding Wappinger Dolomite as defined by the Department).

2. Coarse aggregates shall be crushed sandstone, granite, chert, traprock, ore tailings, slag or other similar materials.

3. 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 shall meet the following requirements:

   Type 6FRA Mixes - Not less than 20% (by weight with adjustments to equivalent volumes for materials of different specific gravities) of 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 content not less than 80%.

BLENDING. Where coarse aggregates for these 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.

MIX PROPERTIES. The mixtures shall meet the Marshall property criteria appearing in the table

below:

MIX CRITERIA	
MIX PROPERTY	**TYPE 6FRA**
Stability, N., min.	6700
Flow, 0.25 mm, min.	8
Marshall Quotient, N/.25 mm, min.	670
Air Voids, percent	3.0 - 5.0
Voids in Mineral Aggregate (VMA), percent min.	14.0
Voids Filled with Asphalt (VFA), percent	65 - 75

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 be met at each of the five mix design asphalt cement contents.

4. The Marshall quotient is calculated as the ratio of corrected stability to flow.

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, and air voids. The mid-point of the common overlap is the optimum asphalt cement content provided it does not fall on the positive slope of the VMA curve. When this occurs the low point of the VMA curve shall be the optimum asphalt cement content provided it falls within the common overlap of the specified stability, Marshall quotient, air void, and VFA ranges.

CONSTRUCTION DETAILS

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

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The Verglimit may be batched and recorded manually. Batching of the Verglimit shall be accurate to ±0.1% of the total batch weight of the mixture. The Verglimit 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 Verglimit additive shall then be added to the mixture and mixed for an additional 15 seconds or until all the Verglimit particles are thoroughly coated.

Project Target Density (PTD) Determination:

The Contractor shall establish a Project Target Density (PTD), at the start of paving, in the following manner:

1) Density testing should be accomplished 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.

2) Once an appropriate amount of material has been placed, compact the pavement with 2 passes of the roller. Perform density tests at three (3) randomly selected sites, at least 0.7 meters from the edge of the pavement. Mark the sites so that subsequent tests can be performed at the same locations. After every two subsequent passes of the roller, density measurements shall be performed at the three selected sites. The Engineer will visually inspect the course being compacted for obvious signs of distress. If distress occurs, different compaction methods must be used until satisfactory results are achieved. Rolling and testing shall continue until no further average increase (less than 16 kilograms per cubic meter) in density is obtained, or until the Engineer directs compaction efforts to stop because the pavement shows signs of distress.

3) If the average density measurements of the three sites shows a significant loss of density, greater than 16 kilograms per cubic meter, the Contractor shall consider these test sites invalid and shall select 3 new test sites to be used for density readings. The distressed pavement will be permitted to remain in place unless significant damage is visually apparent.

4) Determine the average of the final density measurements at the three test locations. This average density will be established as the PROJECT TARGET DENSITY (PTD). Once a PTD has been established full scale paving operations may begin.

The Contractor shall be responsible for continuous monitoring of the pavement density using a nuclear density gauge. 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 Contractor shall monitor and record the pavement density in accordance with this section and the "Method for In-Place Density Monitoring of Verglimit Contracts". A copy of this document may be obtained from the Director, Materials Bureau. Compact the pavement sufficiently to achieve a minimum of 96% of the PROJECT TARGET DENSITY (PTD) in a single test location and 98% of the PTD calculated as a

moving average of the last 10 test locations as determined by a nuclear density gauge. Take and record a gauge reading at each randomly selected site along the length of the pavement selected according to the following:

Initially take readings at 15 meters and 30 meters from the start of paving, then continue according to the following table for the remainder of the project:

GUIDELINES FOR DETERMINING FREQUENCY OF NUCLEAR DENSITY GAUGE TESTING	
Lane Meters	Frequency of Readings
30 m to 450 m	every 30 meters
451 m to 900 m	every 60 meters
901 m to 1500 m	every 90 meters
over 1500 meters	every 150 meters

If the average of 4 nuclear gauge readings taken at 90° angles over a single location falls below 96% of the PTD or the moving average of the last 10 nuclear gauge test sites falls below 98% of the PTD, the Contractor shall establish a new PTD in accordance with this specification, step numbers 2, 3, and 4 listed above.

Density readings shall be recorded on a BR340 (temp.). At the end of each production day provide the Engineer with copies of all BR340 (temp.) forms relating to that day's 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. On depressed areas, a trench roller or small vibratory roller approved by the Engineer may be used. Cleated compression strips also may be used under the roller to transmit compression to the depressed area.

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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 and cannot be corrected, then the imperfected pavement section(s) shall be removed and replaced 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 1 to 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 degrees 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 nine liters per square meter 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 nine liters per square meter. The pavement shall be flushed as many times as necessary each day, as directed by the Engineer, to remove the sheen from the pavement, 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 shall be applied when and as required by the specifications. Preformed marking materials used for short term pavement markings shall be mechanically fastened to the pavement surface if the normal adhesives fail to hold.

METHOD OF MEASUREMENT

The pavement course shall be measured by the number of metric tons of compacted material in place.

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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, the Verglimit, 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.

Pavement will be made under:

ITEM NO.	ITEM	PAY UNIT
18403.1760 M	Ice-Retardant Asphalt Concrete, Type 6FRA	Metric Ton