ITEM 502.0101 10 – PERVIOUS PORTLAND CEMENT CONCRETE

DESCRIPTION:

Furnish and place non-reinforced pervious Portland cement concrete in accordance with the plans and specifications. Common applications include, but not limited to, parking lots, shoulders, bicycle paths, sidewalks and driveways.

MATERIALS:

Pervious Portland cement concrete shall be manufactured in accordance with the requirements of §501-2, with the following modifications:

Design a pervious Portland cement concrete mixture as specified in this document. Produce a homogeneous mixture of cement, pozzolan (fly ash or GGBFS), coarse aggregate, set retarding water reducing admixture, water reducing admixture, viscosity modifying admixture (VMA) and water.

Coarse aggregate gradation shall meet the requirements of size 1 or 1A in table 703-4 of the Department's Standard Specifications, Section 703-AGGREGATES. Aggregate/cement ratio shall be in the range of 4:1 to 4.5:1.

Use Type I, II or I/II cement. Cementitous content shall be a minimum of 308 Kilogram (Kg)/Cubic Meter (CM) for size 1 aggregate, and a minimum of 344 Kg/CM for size 1A aggregate. Water/cementitious ratio shall be in the range of 0.27 – 0.34.

At least one (1) week prior to placement of the test panel, provide the Regional Materials Engineer with the following:

1. List of all materials and source numbers.
2. Proposed mix design batch weights, including design unit weight.
3. Proposed production facility and location.

CONSTUCTION DETAILS:

All the provisions of §501-3 shall apply with the following modifications:

The Contractor shall provide a minimum of one National Ready Mix Concrete Association (NRMCA) Certified Pervious Concrete Technician at the placement site.

Mix the concrete in approved transit mix trucks. Load trucks to a maximum of 80% of the rated mixer capacity.

Thoroughly wet the entire subbase surface for a minimum of 2 hours immediately prior to placement. Remove all standing water prior to placement.

The NRMCA Certified Technician shall check each truck for uniformity during discharge. Mix water shall be such that the cement paste displays a "wet metallic sheen" without causing the

paste to flow from the aggregate. Additions of water to the mix, as directed by the Certified Technician, shall be followed by 20 mixing revolutions.

The concrete shall be deposited as close to its final position as practicable and such that fresh concrete enters the mass of previously placed concrete. The practice of discharging onto subbase and pulling or shoveling to final placement is not allowed.

Unless otherwise approved by the Engineer in writing, the Contractor shall provide mechanical equipment of either slipform or form riding with a following compactive unit that will provide a minimum of 69 kPa vertical force. The pervious concrete pavement will be placed to the required cross section and shall not deviate more than +/- 6 millimeter (mm) in 3.0 meter (M) from profile grade.

Preferred method of strike off and compaction is the use of a form riding roller screed (i.e. NRMCA "One step method"). If allowed by the Engineer, the NRMCA "two step method" may be employed. If the two step method is used, strike off the concrete to approximately 10 mm to 19 mm above the forms to allow for compaction. After strike off, compact the concrete to the height of the forms. Compaction shall be accomplished by rolling over the concrete with a steel roller, compacting the concrete to the height of the forms. Concrete shall be covered with minimum 6 mil plastic prior to rolling to prevent aggregate pull outs. Compaction shall be completed within 15 minutes of placement. Edges near forms shall be compacted using a 300 mm by 300 mm steel tamp, a float, or other similar device to prevent raveling of the edges. If vibration, internal or surface applied, is used, it shall be shut immediately when forward progress is halted for any reason.

After mechanical or other approved strike-off and compaction operation, no other finishing operation will be allowed.

The Contractor will be restricted to pavement placement widths of a maximum of 4.50 M unless the Contractor can demonstrate competence to provide pavement placement widths greater than the maximum specified, to the satisfaction of the Engineer.

Curing procedures shall begin within 15 minutes after placement. The pavement surface shall be covered with polyethylene curing covers meeting §711-04, or other pre-approved covering material. Overlap curing covers a minimum of 0.5 M. Prior to covering, a fog or light mist shall be sprayed above the surface. The cover shall overlap all exposed edges and shall be fully secured throughout the curing period (without using dirt) to prevent dislocation due to winds or adjacent traffic conditions. The polyethylene covering shall remain on the surface for the full duration of the cure time. Supply form insulating materials when the air temperature is expected to fall below 5°C at any time during the curing period.

Cure Time:

a. Minimum of 7 days.

b. No truck traffic shall be allowed for 10 days (no passenger car/light trucks for 7 days).

Jointing: Control (contraction) joints shall be installed at maximum 6.0 M intervals. They shall be installed at a depth of least 1/4 the thickness of the pavement. It is recommended that these joints be installed in the plastic concrete with a rolling joint tool. Saw cut joints, if used, should be installed as soon as the pavement has hardened sufficiently to prevent raveling and uncontrolled cracking (normally immediately after curing). Transverse construction joints shall be installed whenever placing is suspended a sufficient length of time that concrete may begin to harden. In order to assure aggregate bond at construction joints, a bonding agent suitable for bonding fresh concrete shall be brushed, rolled, or sprayed on the existing pavement surface edge. Isolation (expansion) joints will not be used except when pavement is abutting slabs or other adjoining structures.

Testing, Inspection, and Acceptance

A. Test panel(s): At least one week prior to use, the Contractor shall place, joint, and cure a test panel, a minimum of 9.0 square meter at the required project thickness, designed in-place unit weight, and finish. The test panel will be constructed at a location designated by the Engineer and will remain in place for the duration of the project to be used as a reference for acceptance of the pavement surface.

1. Satisfactory performance of the test panels will be determined by:

    a) Void Structure: 15% minimum; 25% maximum as per ASTM C1688.
    b) Unit weight (Density): Unit weight shall be within 80 Kg/CM of the design unit weight as per ASTM C1688.
    c) Infiltration Rate: Infiltration rate shall be a minimum of 2540 mm/hr as per ASTM C1701. Perform this test after 7 day cure.
    d) Compacted Thickness: Core the test panel at a minimum of 7 days and determine the compacted thickness as per ASTM C42. Compacted thickness shall be within 6 mm of the specified thickness.

2. If the test panel does not meet performance criteria, it shall be removed and redone at the Contractor's expense, and the failed test panel disposed of in an appropriate manner.

3. The test panel will not be incorporated into the work, and will be removed when ordered by the Engineer.

ITEM 502.0101 10 – PERVIOUS PORTLAND CEMENT CONCRETE

B. Testing:

During production, the following shall be conducted at the Contractor's expense:

1. A minimum of one test for each day's placement of pervious concrete in accordance with ASTM C 1688 to verify unit weight and percent void content. Unit weight shall be within 80 Kg/CM of the design unit weight.

2. In a slipform paving operation, determine plastic thickness according to §502-3.08. Perform this test at the frequency indicated in the §502-3.08, but at a minimum of twice per day. Fixed form thickness shall be determined by measuring from grade to top of forms prior to paving. Thickness shall be within 6 mm of the specified thickness.

3. Infiltration Rate: Test as per ASTM C1701 after 7 day cure at a minimum of three locations chosen by the Engineer. Infiltration rate shall be a minimum of 2540 mm/hr.

Should any of these test results fall outside of the specified limits, the concrete shall be removed, replaced, and retested at no additional cost.

METHOD OF MEASUREMENT:

This work will be measured as the number of cubic meter of pervious Portland cement concrete satisfactorily furnished and installed in accordance with the plans, specifications, and orders of the Engineer.

BASIS OF PAYMENT:

The unit price bid per cubic meter shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work, including saw cutting, and providing the test panel(s).

The cost of excavation and subbase course will be paid for under their appropriate items.