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**READY MIXED CONCRETE**

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**PART 1 GENERAL**

- 1.01 OTHER CONTRACT DOCUMENTS      The General Conditions of the Contract, General Requirements, and Supplemental Conditions attached hereto shall apply to and be part of this Section.
- 1.02 DESCRIPTION OF WORK      The Work described herein shall be for the supply and delivery of Ready Mixed Concrete products in a plastic and unhardened state and does NOT cover the placement, consolidation or protection of concrete after delivery.
- 1.03 RELATED WORK      Section 02210 Excavation, Bedding & Backfill  
Section 02514 Concrete Construction  
Section 02660 Watermains  
Section 02665 Building Connections  
Section 02700 Sewers
- 1.04 CLASSIFICATION OF THE WORK      Ready Mixed Concrete shall be classified as either Class A, Class B, Class C or Unshrinkable Backfill.
- Class A – CSA Class C-2 exposure, 32 MPa minimum compressive strength at 28 days, 20 mm nominal size aggregate, 5-8% air content, Slump 80 millimetres  $\pm$  30 millimetres.
- Class B - CSA Class C-2 exposure, 32 MPa minimum compressive strength at 28 days, 20 mm nominal size aggregate, maximum 2.5% low density granular materials by mass in the coarse aggregate, 5-8% air content, Slump 80 millimetres  $\pm$  30 millimetres.
- Class C - CSA Class N exposure, 20 MPa minimum compressive strength at 28 days, 20 mm nominal size aggregate, maximum 2.5% low density granular materials by mass in the coarse aggregate, 5-8% air content, Slump 80 millimetres  $\pm$  30 millimetres.
- Unshrinkable Backfill – 1.0 MPa maximum compressive strength at 28 days, 10 mm nominal size aggregate, Slump 175 millimetres  $\pm$  25 millimetres. Unshrinkable Backfill shall gain sufficient strength within 24 hours of placement to support anticipated equipment and traffic loads.

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1.05 SUBMITTALS

The Contractor shall provide notice to the Engineer of the source or sources of supply of all Products and materials to be incorporated into the Work a minimum of fourteen (14) calendar days prior to commencing the Work or incorporating such Products and materials into the Work. The source of Product and material supply shall not be changed without the prior approval of the Engineer. Any material of a quality or nature not suitable for its intended use will be rejected. The Engineer reserves the right to prohibit the use of material from any source where, in his opinion, the character of the material or the method of manufacture is such as to make improbable the furnishing of material conforming to the requirements of this Section.

Changes in the source of aggregate supply or aggregate gradation during the Work will not be permitted without the approval of the Engineer. In the event that, by authorization of the Engineer, changes are made during the progress of the Work, each different kind of material shall be entirely used in the batching operations or otherwise disposed of before the use of another material from an alternative source is used. Aggregates may be blended to obtain a material meeting the requirements of this Section.

1.06 MIX DESIGN  
STATEMENT

Prior to the supply of any concrete, the Contractor shall submit, for review by the Engineer, a written Mix Design Statement which shall certify the concrete is proportioned and produced in accordance with the requirements of this Section and is suitable for incorporation into the Work.

The Contractor shall include with the Mix Design Statement, the names of suppliers and sources for aggregates, cement, fly ash (if used), water, the names of manufacturers and products for admixtures and a copy of the current MRMCA certificate for the concrete batch plant. If requested by the Engineer, the Mix Design Statement shall also include documentation from an approved quality control program confirming the concrete achieves the specified strength, durability and performance requirements stated in this Section.

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1.06 QUALITY  
ASSURANCE

The analysis and approval of materials by the City will not relieve the Contractor from his duty to produce an acceptable product as stated in this Section.

Quality assurance will be used to determine the acceptability of the concrete supplied. The frequency and number of concrete control assurance tests will be as determined by the Engineer. The sampling and testing of concrete for slump, air and strength will be done in accordance with CSA-A23.1 and CSA-A23.2.

**PART 2 PRODUCTS**

2.01 CEMENT

Cement shall be Type GU – General use hydraulic cement or Type HS – High Sulphate Resistant Hydraulic Cement manufactured in accordance with CSA A3001. Unless stated otherwise in Section 01001 Supplemental Conditions, shown on the Drawings, or requested by the Engineer, concrete shall be manufactured with Type GU – General Use Hydraulic Cement.

Supplementary Cementing Materials shall conform to the requirements of CSA-A23.1.

2.02 WATER

Water shall be potable and free from injurious amounts of oil, acid, alkali, soluble chlorides, organic matter, sediment, and other deleterious substances. If requested by the Engineer, the Contractor shall provide written verification from an approved testing laboratory confirming the water used in the manufacture of the concrete meets the requirements this Section.

2.03 FINE AGGREGATE

The Contractor shall handle and stockpile all aggregate materials as described in Part 3.01 of Section 02303 Granular Base Course.

The fine aggregate shall not have more than forty-five (45%) percent retained between any two consecutive sieves. The material shall be reasonably between limits and shall not be subject to extreme variation from maximum to minimum of the gradation specified.

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Fine Aggregate shall be clean, hard, durable, well graded, normal density, natural sand, manufactured sand or a combination thereof, free of thin or elongated particles, clay, sod, roots, organic material and other deleterious matter, all in accordance with the requirements of CSA-A23.1 and conforming to the following gradation:

<b>Type A, B and C Concrete Fine Aggregate</b>	
<b>Sieve Size</b>	<b>Percent Passing Sieve (by mass)</b>
10 mm	100%
5 mm	95 – 100%
2.5 mm	80 – 100%
1.25 mm	50 – 90%
600 um	25 – 65%
300 um	10 – 35%
150 um	2 – 10%
75um	0 – 3%

The maximum percentages of deleterious substances shall not exceed the following percentages by mass of total sample:

- clay lumps 1.0%
- low density granular material 0.5%  
(including shale and ironstone)
- MgSO<sub>4</sub> soundness loss 16%

**2.04 COARSE AGGREGATE**

Coarse Aggregate shall be clean, well graded, normal density, crushed stone or gravel consisting of hard, strong, durable pieces free of injurious amounts of organic materials all in accordance with the requirements of CSA-A23.1 and conforming to the following gradation:

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<b>Type A, B and C Concrete Coarse Aggregate</b>	
<b>Sieve Size</b>	<b>Percent Passing Sieve (by mass)</b>
28 mm	100%
20 mm	85 – 100%
13 mm	50 – 90%
10 mm	25 – 60%
5 mm	0 – 10%
2.5 mm	0 – 5%

The maximum percentage of deleterious substances shall not exceed the following percentages by mass of total sample:

Clay lumps	0.25%
Material finer than 74 um sieve	1.00%
Low density granular material	
Type A concrete	0.50%
Type B & Type C concrete	2.50%
Shale and ironstone shall be included with the other low density granular material	
MgSO <sub>4</sub> soundness loss	12%
Los Angeles abrasion loss	<35%

Chemical admixtures, other than an approved air-entraining admixture or a normal range water reducer, shall not be used in the concrete without the prior authorization of the Engineer. Powdered admixtures shall used in strict accordance with the manufacturer's written instructions.

**2.05 ADMIXTURES**

Air-entraining admixtures shall conform to the requirements of ASTM Standard C 260. Chemical and Superplasticizing admixtures, if specified, shall conform to the requirements of ASTM Standard C 494 or ASTM Standard C1017.

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**PART 3 EXECUTION**

**3.01 PRODUCTION AND  
DELIVERY**

In addition to the requirements of this Section, all concrete shall be manufactured, proportioned, mixed and delivered to the Site in accordance with the requirements stated in CSA-23.1.

The concrete shall be manufactured in a stationary ready mix plant which has a current 'Certificate of Conformance' as issued by the Manitoba Ready Mix Concrete Association (MRMCA). Concrete shall be delivered in a uniform agitated batch free of any segregation. The transporting of ready mixed concrete in non-agitating equipment will not be permitted. Each transit mixer load of ready mixed concrete shall be accompanied by a delivery ticket issued at the batch plant, clearly stating the time of the first mixing of the cement, aggregate and water. The discharge of concrete from the transit mixer shall be completed within 120 minutes after the introduction of the mixing water to the cement and aggregates, unless the Engineer authorizes an extension of time. Transit mixers supplying concrete under this specification shall have a MRMCA certification sticker affixed to the rear window of the driver's cab. The Engineer shall have the right to conduct uniformity tests to determine the suitability of a transit mixer to convey concrete.

The temperature of the concrete shall be kept as close as possible to the minimum temperature of 10°Celsius and shall not exceed 30°Celsius.

**3.02 TESTING AND  
ACCEPTANCE**

Concrete which fails to meet the requirement for slump as stated in Part 1.04 of this Section, following two successive tests, will not be accepted for delivery or incorporation into the Work and shall be promptly removed from the Site.

If additional testing indicate the concrete is not as stated herein, the Engineer will have the right to require the Contractor, at his sole expense, to undertake any additional remedial action as stated in CSA-A23.1 to correct any and all deficiencies, all the satisfaction of the Engineer.

END OF SECTION