PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 No measurement will be made for Cast-in-Place Concrete. Include cost in items which require this work.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 260-01, Standard Specification for Air-Entraining Admixtures for Concrete.
.2 ASTM C 309-03, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
.3 ASTM C 494/C 494M-05, Standard Specification for Chemical Admixtures for Concrete.
.4 ASTM C 1017/C 1017M-03, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.2 Canadian Standards Association (CSA International)
.1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA A283-00(R2003), Qualification Code for Concrete Testing Laboratories.
.3 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

1.3 ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
.1 Type GU or GUb - General use cement.
.2 Type MS or MSb - Moderate sulphate-resistant cement.
.3 Type MH or MHb - Moderate heat of hydration cement.
.4 Type HE or Heb - High early-strength cement.
.5 Type LH or LHb - Low heat of hydration cement.
.6 Type HS or HSb - High sulphate-resistant cement.

1.3 ACRONYMS AND TYPES (Cont'd)

.2 Fly ash:
.1 Type F - with CaO content less than 8%.
.2 Type CI - with CaO content ranging from 8 to 20%.
.3 Type CH - with CaO greater than 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

1.4 DESIGN REQUIREMENTS

.1 Alternative 1 - Performance: in accordance with CSA-A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit testing inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.4 Concrete hauling time: submit for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
.1 Modifications to maximum time limit must be agreed to by Departmental Representative laboratory representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Departmental Representative.

1.7 DELIVERY, STORAGE AND HANDLING (Cont'd)

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling.
.2 Divert unused concrete materials to local quarry or facility approved by Departmental Representative.
.3 Divert unused admixtures and additive materials (pigments, fibres) to official hazardous material collections site as approved by the Departmental Representative.
.4 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
.5 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CSA-A23.1.

.3 Aggregates: to CAN/CSA-A23.1/A23.2 ASTM C 330.

.4 Admixtures:
.1 Air entraining admixture: to ASTM C 260.
.2 Chemical admixture: to ASTM C494 ASTM C 1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.5 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

2.2 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet performance criteria in accordance with CAN/CSA-A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.

.2 Provide concrete mix to meet following plastic state requirements:

.1 Workability: free of surface blemishes loss of mortar colour variations segregation.

.3 Provide concrete mix to meet following requirements:

.1 Durability and class of exposure: C-XL .

.2 Minimum compressive strength at 28 days: 50 MPa.

.4 Minimum cement content: 340 kg/m^3 of concrete.

.5 Nominal size of coarse aggregate: 20-5 mm.

.6 Slump at time and point of discharge:60 to 80 mm.

.7 Air content:5 to 7 %.

.8 Admixtures: to Clause 6 of CSA A23.1-00/A23.2-00.

2.3 Unshrinkable Fill

.1 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated. proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum Portland cement content of 25 kg/m^3 .

.3 Minimum strength of 0.07 MPa at 24 h.

.4 Concrete aggregates: to CSA A23.1-00/A23.2-00.

.5 Portland cement: Type GU.

.6 Slump: 160 to 200 mm.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative's approval before placing concrete.
.1 Provide 24 hours notice prior to placing of concrete.

.2 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather

.3 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

.2 Grout under base plates resulting in 100 % contact over grouted area.

.3 Finishing and curing:
.1 Finish concrete in accordance with CSA-A23.1/A23.2.
.2 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
.3 Cure and protect concrete in accordance with CSA A23.1-00/A23.2-00, except that curing compounds shall not be used where bond is required by subsequent topping or coating.

3.3 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by contractor in approved testing laboratory in accordance with CSA-A23.1/A23.2
.1 Ensure testing laboratory is certified in accordance with CSA A283.
.2 The testing laboratory shall be designated and paid for by Contractor.

.2 Take minimum 3 cylinder for each day; cylinder shall be taken at point of deposit.

.3 One cylinder for each day sample will be tested at 7 days and remaining two at 28 days.

3.3 FIELD QUALITY CONTROL (Cont'd)

.4 When temperature are below 5 Degree C , additional field cured sample will be prepared to verify the actual field condition strength.

.5 Departmental Representative will request additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.6 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.4 VERIFICATION

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products, by Departmental Representative and provide verification of compliance.

END