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**PART 1 - GENERAL**

1.1 Scope of work:

- .1 Architectural (non-structural) precast concrete units to locations as shown on the drawings. Specifically pre-cast skate park features; coping, ledges, walls and transitions.

1.2 Related Work:

- .1 Concrete Formwork Section 03100
- .2 Concrete Reinforcement Section 03200
- .3 Cast-In-Place Concrete Section 03300
- .4 Miscellaneous Metal Work Section 05500

1.3 References:

- .1 CSA A23.1-M94, "Concrete Materials and Methods of Construction". See specifically mix designs given in Section 03300 'Cast-in-place-Concrete.'
- .2 CSA A23.4-M94, "Precast Concrete - Materials and Construction".
- .3 CSA Standard A179-[M1976] - Mortar and Grout for Unit Masonry.
- .4 CSA A251-M1982, "Qualification Code for Manufacturers of Architectural and Structural Precast Concrete".
- .5 CSA W59-M1989, "Welded Steel Construction".
- .6 CSA W186-M1990, "Welding of Reinforcing Bars in Reinforced Concrete Construction".
- .7 ACI 303R-74 (revised 1982), "Guide to Cast-In-Place Architectural Concrete Practice".

1.4 Design Requirements:

- .1 All design work shall be under the direct supervision of, and be prepared by, a Structural Engineer registered in the Province of Manitoba.
- .2 Be responsible for complete design of pre-cast concrete units specified in this section including structural adequacy of units used individually, in combination with other elements, structural handling and connection/support design, formwork design and all other design related to the structural performance of the precast work in accordance with design criteria established by the Consultant and Engineering Consultant for the building structure to ensure that the pre-cast concrete units shall:
  - .1 withstand wind, snow and seismic loads;

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**PART 1 – GENERAL (Cont.)**

- .2 withstand all loads incurred by handling, storage, transportation and erection, without forming tension cracks; and
  - .3 satisfy all applicable requirements of the Manitoba Building Code, local building codes and bylaws and authorities having jurisdiction.
  - .3 Lifting devices shall have an ultimate lifting capacity of a minimum of four (4) times the dead weight of the appropriate portion of the pre-cast element. Inclination of the lifting forces shall be considered.
- 1.5 Qualifications:
- .1 Pre-cast concrete units shall be fabricated by a manufacturer certified by CSA to meet requirements of CSA A251 for Class AC products.
  - .2 Produce, deliver and erect where directed by the Consultant on project site, full size pre-cast unit incorporating required details and showing specified colour, finish and quality.
- 1.6 Submittals:
- .1 Submit samples and shop drawings in accordance with Section CW1110-R1 / NMS 01300 – Submittals, see Division 1 – General Requirements – not included in Technical Specifications – refer to Bid Package.
  - .2 Submit duplicate 150mm x 150mm x 1050mm samples of pre-cast concrete finish and end detailing for approval by the *Contract Administrator* prior to fabrication of pieces. Show maximum colour variation expected. Approved samples will become standards of finish against which installed work will be checked on the project.
  - .3 Submit shop drawings for approval prior to fabrication.
  - .4 Submit additional copies of shop drawings to other trades, as required, for indicating inserts, fasteners, etc., which are required to be built into the work of this section.
  - .5 Supply seating plans to other trades for placement of all anchoring and securing devices for connection of the work of this section to the structure.
  - .6 Each shop drawing submitted by the manufacturer shall be prepared, signed and sealed by a professional structural engineer registered in the Province of Manitoba certifying adequacy that each pre-cast concrete units, lifting devices and connections to the building structure are designed to carry the loads indicated.

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**PART 1 – GENERAL (Cont.)**

- .7 Show clearly the support and connection details and all connection components.
- .8 Identify methods of handling and erection including storage on site.
- .9 Upon request, provide the *Contract Administrator* with certified copies of quality control tests related to this project as specified in CSA A251.

**PART 2 - MATERIALS**

2.1 Materials:

- .1 Cement: Type 10 conforming to CSA A5-M93.
- .2 Aggregates: To CSA-A23.1
- .3 Air Entraining Agent: Conform to CSA A266.1-M78.
- .4 Water: Potable.
- .5 Mortar and Grout: To CSA A179.
- .6 Reinforcing Bars and Stirrups: Grade 400W conforming to CSA G30, 18-M92
- .7 Welded Wire Fabric: Conforming to CSA G30.5-M1983.
- .8 Anchors and Supports: Type 300W conforming to CAN/CSA G40.21-M92, hot dipped galvanized after fabrication.
- .9 Welding Materials: Conforming to CSA W48.1-M1991.
- .10 Galvanizing: Hot-dipped galvanizing with a minimum coating of 600 g/m<sup>2</sup>, TO CSA G164-M92.
- .11 Zinc-rich Primer: conforming to CGSB 1-GP-181a.
- .12 Shims: Lead or plastic.

2.2 Concrete Mixes:

- .1 For pre-cast coping sections refer to Section 03300, Para. 2.1.11, Mix 3 Warm Weather.
- .2 Air entrainment in accordance with CSA A265.4-M78 and the manufacturer's directions.
- .3 Use of calcium chloride not permitted.

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**PART 2 – MATERIALS (Cont.)**

2.3 Manufacture:

- .1 Manufacture units to CSA A251 in accordance with reviewed shop drawings.
- .2 Mark each pre-cast unit to correspond to identification mark on shop drawings for location.
- .3 Mark each pre-cast unit with date cast on part of unit which will not be exposed.
- .4 The manufacturer shall keep a record of each day's work showing:
  - .1 Members cast that day.
  - .2 Concrete Information: Mix proportions and additives, slump, air content, compressive strength, curing cycle.
  - .3 Any unusual problems.
  - .4 One (1) copy of these records shall be forwarded to the *Contract Administrator*.
- .5 Design and attach anchors and inserts to pre-cast elements to carry design loads.
- .6 Galvanize anchors after fabrication and touch up with zinc rich primer after welding.

2.4 Finishes:

- .1 Glassy smooth form finish. Pieces will not be sandblasted.

2.5 Openings and Inserts:

- .1 Grouting of anchors in exposed finished surfaces after casting will not be accepted.
- .2 Should the requirements of a trade interfere with the structural adequacy of the pre-cast concrete units, or be impractical for the production of the units, alternate arrangements shall be made with this section and accepted by the *Contract Administrator and the Contractor*.

2.6 Connections:

- .1 Design and supply of connection hardware or embeds by pre-caster.

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**PART 2 – MATERIALS (Cont.)**

2.7 Allowable Tolerances:

- .1 Length of pre-cast elements not to vary from design length more than plus or minus 3mm.
- .2 Cross sectional dimensions of pre-cast elements not to vary from design dimensions by more than plus or minus 3mm.
- .3 Deviations from straight lines not to exceed 3mm in 3m.
- .4 Pre-cast elements not to vary by more than plus or minus 3mm from true overall cross sectional shape as measured by differences in diagonal dimensions.

2.8 Quality Control:

- .1 In-plant quality control shall comply with CSA A251.

2.9 Mortar Mixes:

- .1 Semi-rigid Epoxy joint filler, Master Fill 3001 with Cabosil filler and polyester fibres.
- .2 Mortar Colour: To match pre-cast concrete.

**PART 3 - EXECUTION**

3.1 Inspection:

- .1 Before installing pre-cast concrete units, verify that structures and anchorage inserts are within tolerances required to erect unit.
- .2 Determine field conditions by actual measurements.

3.2 Erection:

- .1 Set pre-cast concrete units straight, level and square in accordance with engineered shop drawings.
- .2 Connect pre-cast units to supports in accordance with engineered shop drawings and set in full mortar bed. Grout joints between units.
- .3 Tool exposed mortar joints concave, strike concealed joints flush. After mortar has initially set up, tool all joints where required, wipe wall surface with suitable brush or burlap to remove mortar protrusions and re-tool the joints.

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**PART 3 – EXECUTION (Cont.)**

- .4 Non-cumulative Erection Tolerances:
  - .1 Joint Dimension: Nominal 3.0mm; to vary not more than +/-1.5mm.
  - .2 Edge Alignment: Alignment of unit edges not exceeding 3.0mm.
  - .3 Faces of adjacent units offset not over +/-1.5mm.
- 3.3 Cleaning:
  - .1 After installation, clean soiled pre-cast concrete areas to match adjacent surfaces to the satisfaction of the *Contract Administrator*.
- 3.4 Protection:
  - .1 Protect finished pre-cast concrete work and all other adjacent and surrounding work and materials from damage during the work of this section. Protect exposed corners with boards.
  - .2 Make good all areas damaged by the operations in connection with this section regardless of the limits of the Contract as shown on the drawings, as directed by the *Contract Administrator*.