ARCHITECTURAL PRECAST CONCRETE

PART 1 GENERAL

1.1 Related Work

.1	All Division 1	Specification Sections
.2	Section 02233	Granular Base
.3	Section 02311	Site Grading
.4	Section 03100	Concrete Formwork
.5	Section 03200	Concrete Reinforcement
.6	Section 07900	Joint Sealant

1.2 References

.1 American Society for Testing and Materials (ASTM):

.1 ASTM-C494/C494M, Structural Specification for Chemical Admixtures for Concrete.

.2 ASTM C494, Guidelines for the Use of Super plasticizing Admixtures.

.2 Canadian Standards Association (CSA):

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Methods of Test and Standard Practices for Concrete.

.2 CSA 23.4, Precast Concrete – Materials and Construction.

.3 CSA A251-M1982, Qualification Code for Manufacturers of Architectural and Structural Precast Concrete.

.4 CSA A283-1980, Qualification Code for Concrete Testing Laboratories.

.5 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregular Shaped Articles.

.6 CSA W186-M1997, Welding or Reinforcing Bars in Reinforced Concrete Construction

1.3 Description

.1 Provide all architectural precast concrete caps for architectural piers for pergola, trellis, columns, and others as specified.

1.4 Warranty

.1 Warranty: The warranty period stipulated for architectural precast concrete shall be extended to five (5) years in writing. The warranty shall state that the architectural precast concrete work will be as specified and structurally sound in all respects and will not change colour, craze, spall, crack or pit, for a period of not less than three (3) years from the date of Substantial Performance of the Work.

1.5 Shop Drawings

.1 Prepare and submit shop drawings in accordance with Section **01330 Submittals** and as specified below:

.1 Submit fully detailed and dimensioned drawings showing method of fastening and sealing and provisions made to receive work of other Sections. Indicate type of finish and other pertinent information on each shop drawing.

.2 Consult reviewed shop drawings relating to interface elements and show exact location of inserts and anchors required to be cast in precast units for interface elements.

.3 Show system of identifying units for erection purposes on shop drawings and apply similar mark on units at time of manufacture.

.4 Each drawing submitted shall bear stamp and signature of qualified Professional Engineer registered in Canada, province of Ontario.

1.6 Performance Requirements

.1 Tolerance of precast elements to CAN3-A23.4, Section 10.

.2 Length of precast elements not to vary from design length by more than plus or minus 5mm.

.3 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 5 mm.

.4 Deviations from straight lines not to exceed 5mm in 0.5m.

.5 Precast elements not to vary by more than plus or minus 5mm from true overall cross sectional shape as measured by difference in diagonal dimensions.

1.7 Samples

.1 Provide one (1) sample of precast concrete option for approval. Unless otherwise noted, minimum size 300 x 300 x 25mm. Or if accepted as a sample alternative, high resolution photos may be approved. Finish exposed face as described under “finishes” elsewhere in this Section. Make samples until final approval is made by the Consultant.

.2 All work shall match approved production run samples.

.3 Identify all samples with project name and number, date, description and all other pertinent information.

1.8 Delivery, Storage and Protection

.1 The Contractor is to accept full responsibility for delivery, handling and storage of units;

.2 Deliver, handle and store precast units in a near vertical plane at all times, and by methods approved by the manufacturer. Units are not permitted to contact earth or staining influences or to rest on corners. Do not stockpile defective units, remove them from the site;

.3 Construct easels for stacking units and place non-staining spacers between each unit. If wood is used it shall be wrapped with polyethylene;

.4 Protect holes and reglets from water and ice during freezing weather.

1.9 Qualifications

.1 Precast concrete elements to be fabricated and erected by manufacturing plant certified by Canadian Standards Association in appropriate category applies according to CSA A251. Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting tender and to specifically verify as part of tender that plant is currently certified in appropriate categories. Only precast elements fabricated in such certified plants to be acceptable to owner, and plant certification to be maintained for duration of fabrication, erection until warranty expires.

1.10 Waste Management and Disposal

.1 Separate and recycle waste materials.

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

.3 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

PART 2 PRODUCTS

2.1 Materials

.1 Precast:

.1 Concrete – 35 MPa compressive cylinder strength at twenty-eight (28) days with maximum water and cement ratio by mass of 0.45 and 6 to 8% entrained air. (CSA A23.4.). Use white or grey cement in facing matrix. Air Entrainment of Concrete Mix: refer to CSA-A23.1. Use of calcium chloride is not permitted.

.2 Steel Reinforcement: Galvanized – CSA-A23.1

.3 Aggregates: Conforming to CSA-A23.1/A23.2, 4mm to 18mm.

.4 Air entraining agent: MBVR by Master Builders Co. Ltd., Darex AEA by W.R. Grace: N.V.R. by Sternson Ltd., or other approved alternative conforming to ASTM C260.

.5 Waterproofing and curing sealing to manufacturer's standard as per approved sample.

.6 Bearing pads: smooth

.7 Zinc-rich primer: to CGSB 1 GP-181M.

.8 Forms: to CSA3-A23.4. Manufacture forms to dimensions as indicated on the approval architectural shop drawings.

.9 Hardware and miscellaneous materials: to CSA-A23.1.

.10 Anchors and supports: to CSA-G40.21

.11 Welding materials: to CSA W47.1-97 and CSA W186-M1997.

.12 Steel primer: to CGSB 1-GP-40M.

.13 Surface retardant: To ASTM C494.

.14 Colour of concrete to be approved by the Consultant.

2.2 Colours

.1 Concrete Colour: To be confirmed by Consultant unless otherwise specified.

.2 Aggregate Type: To be confirmed by Consultant unless otherwise

specified.

.3 Special Projects: to be selected by the Consultant.

2.3 Alternate Colours

.1 Any alternatives must be approved by the Consultant prior to use.

PART 3 EXECUTION

3.1 Examination

.1 Design: Design precast concrete units to withstand handling stresses, anticipated temperature changes and load requirements in accordance with the Ontario Building Code (OBC). Climactic design criteria, based on a 30 year return. Absorption – not to exceed 3% measured after a 48 hour soaking. Porosity – air entraining agent to produce “in place” 6% nominal (5%-7%). Waterproofing – additive – to be added in ratio as specified by manufacturer and mixed in strict accordance with their recommendations.

.2 Fabrication:

.1 Fabricate precast units to CSA-A2.4., profiles and sizes as detailed on the drawings.

.2 Set reinforcing as required including reinforcement or anchors necessary for fixing precast unit to footings. All reinforcing and anchors to be galvanized.

.3 Shop apply sealer to all surfaces.

.4 The Contractor shall inform the Consultant of fabrication schedule so that a visit to the Fabricator’s shop is possible during fabrication.

.5 Chases, Grooves and Boxes:

1. Determine the location and size of openings to be left in for electrical ducts, boxes or other items, if applicable. Provide clean neat edges to openings in the exposed work.

2. Leave reglets where required for the installation of flashings and sheet metal or brackets work as required.

.3 Installation:

.1 Set precast concrete units plumb, true, square and level with all joints parallel and uniform.

.2 Non-cumulative Erection Tolerances:

1. Joint dimension – Nominal 15 mm – to vary not more than +/- 6mm

.2 Joint taper – unit edges at joint not out of parallel over 0.6mm in 300 mm (1/40" per 1 ft.) but not more than 2.9 mm total.

.3 Provide mortar levelling base.

.4 Edge alignment – alignment of panel edges not to exceed 6 mm.

.5 Offset in faces of adjacent panels to be not more than 3 mm.

.6 Bowed panels, within allowable bowing tolerances, arranged so offset between adjacent panels does not exceed 6 mm.

.7 Fasten units in place by welding wherever possible. Protect work from damage by weld splatter.

.8 Provide temporary erection anchorage for welded anchorage system.

.9 Where bolts are used for installation, tighten with equal torque. Secure bolts with lock washers or tack-weld nut to bolt.

.10 Clean field welds with wire brush and touch up with galvafroid paint or zinc rich primer.

.11 Remove shims and spacers from joints between non-load bearing panels after fastening but before sealant is applied.

.12 Seal all joints between precast units and adjacent materials with approved sealant. All exterior joints are to be vented.

.13 Co-ordinate this work to ensure protection of adjacent finishes by means of scheduling or installation of temporary protection.

.4 Footings 32 MPa to size as detailed complete with reinforcement and anchors.

2.4 Finishes

.1 Finish and colour of precast units to match approved sample.

.2 Fluted finish achieves finish using trapezoidal form liners.

.3 Smooth finish: as cast smooth from plastic or steel form liners.

.4 Exposed aggregate finish:

.1 Apply even coat of retardant to inside face of forms.

.2 Remove panels from forms after concrete hardens.

.3 Expose coarse aggregate by washing and brushing away surface mortar.

.4 Expose aggregate to depth required.

.5 Sandblast finish: in order to expose aggregate face, sandblast surface to depth of (1.5 to 6mm).

2.5 Cleaning

.1 Obtain approval of cleaning methods from Consultant before cleaning soiled precast concrete surfaces.

.2 Clean exposed face Work by washing and brushing only, as precast is erected, if required. Use approved masonry cleaner if washing and brushing fails to achieve required finish. Remove immediately materials that set up or harden.

END OF SECTION - 03450