|  |  |  |
| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 5, 2007 | Minor revisions by Legal Services. |
| 3 | November 13, 2009 | Modified ‘Related Section’ |
| 4 | June 5, 2012 | Added References and Replacement Parts Sections |
| 5 | June 29, 2012 | Reformatted to Remove White Space |
| 6 | April 24, 2015 | General Formatting |
| 7 | August 17, 2015 | First draft review of updated spec. (AV) |
| **8** | **September 16, 2015** | **Updated, Finalized Specification – Reference eDOCS #5823151-v3 (AV)** |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GEneral

## Related Sections

### *[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

### *Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

### *Contractor is responsible for coordination of the Work.*

### *This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

### *[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### *[List Sections specifying related requirements.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

## Measurement Procedures

### Measure precast elements in units supplied, delivered, stored and erected.

### Precast elements measured as individual units will include cost, supply, delivery, storage and erection of bearing assemblies, anchor bolts, removal and patching of erection devices, transverse connections and field grouting of grout keys between precast members.

## References

### *[Edit the following paragraph to suit standards specified in project specifications.]*

### American Society for Testing and Materials (ASTM)

#### ASTM A775/A775M-07b(2014), Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

#### ASTM D412-06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

#### ASTM D2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

#### ASTM A1064/A1064M-15, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

### Canadian General Standards Board (CGSB)

#### CAN/CGSB 1.181 92, Ready Mixed Organic Zinc Rich Coating.

#### CAN/CGSB 51.20 M87, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

### Canadian Standards Association (CSA)

#### CAN/CSA A23.1 14, Concrete Materials and Methods of Concrete Construction.

#### CAN/CSA A23.3 14, Design of Concrete Structures for Buildings.

#### CSA A23.4 09 (R2014), Precast Concrete - Materials and Construction.

#### CAN/CSA G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.

#### CAN/CSA G40.21-13, Structural Quality Steels.

#### CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding for Steel Structures.

#### CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.

#### CSA W59-13, Welded Steel Construction (Metal Arc Welding).

#### CSA W186 M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

#### CSA S6-14 Package, Canadian Highway Bridge Design Code and S6.1-14 – Commentary on S6-14, Canadian Highway Design Code.

## Design Requirements

### Design precast elements in accordance with CAN3 A23.3-14 and CSA A23.4-09 (R2014) to carry handling stresses.

### Design precast elements to carry the loads specified by the Consultant or as indicated in the Contract Documents, in accordance with the Ontario Building Code.

### Design connections/attachments of precast elements to the load/forces specified by the Consultant.

### Where precast units are designed to provide diaphragm action, design connections between the units and supporting members to effectively fulfil the load transfer requirements as indicated in the Contract Documents.

### Provide a unit to meet the fire rating requirement of the facility.

### Submit 6 copies of detailed calculations and design drawings for typical precast elements and connections to the Consultant for review a minimum of 28 Days prior to manufacture.

## Performance Requirements

### Tolerance of precast elements in accordance with CSA A23.4-09 (R2014), Section 10 *[Consultant to verify reference and amend as required]*.

## Shop Drawings

### Submit shop drawings in accordance with Section 01300 - Submittals.

### Include the following items:

#### Design calculations for items designed by the manufacturer.

#### Details of pre-stressed and non-pre-stressed members, reinforcement and their connections.

#### Camber.

#### Finishing schedules.

#### Methods of handling and erection.

#### Openings, sleeves, inserts and related reinforcement.

### Each drawing submitted shall bear the stamp and signature of a qualified professional engineer registered or licensed in the Province of Ontario.

## Qualifications

### Precast concrete elements are to be fabricated and erected by a manufacturing plant certified by the Canadian Standards Association in the appropriate categories as required by CSA A251. *[Consultant to amend given CSA A251 has been withdrawn]*

### The precast concrete manufacturer is to be certified in accordance with the CSA's certification procedures for precast concrete plants. The Contractor is to verify the current certification of the plant.

### Only precast elements fabricated in such certified plants will be acceptable to the Region, and plant certification is to be maintained for the duration of the Contract and until the warranty expires.

### Welding companies are to certified in accordance with CSA W47.1-09 (R2014).

# PRODUCTS

## Materials

### Cement, aggregates, water, admixtures: in accordance with CAN/CSA A23.1-14 and CSA A23.4-09 (R2014).

### Reinforcing steel: in accordance with CAN/CSA G30.18-09 (R2014).

### Prestressing steel tendons and bars: in accordance with CAN/CSA S6-14 *[Consultant to update with applicable standards]*.

### Welded wire fabric: in accordance with ASTM A1064/A1064M-15.

### Hardware and miscellaneous materials: in accordance with CAN/CSA A23.1-14.

### Forms: in accordance with CSA A23.4-09 (R2014).

### Anchors and supports: in accordance with CAN/CSA G40.21-13 Type 300W advanced after fabrication.

### Welding materials: in accordance with CSA W48.1-09 (R2014).

### Welding electrodes: in accordance with CSA W48.1-09 (R2014) and certified by the Canadian Welding Bureau.

### Galvanizing: hot dipped galvanizing with a minimum zinc coating of 610 g/m2 in accordance with *[CAN/CSA G164 - Consultant to update with applicable standard]*.

### Epoxy coating: in accordance with ASTM A775/A775M-07b(2014).

### Steel primer: in accordance with *[CAN/CGSB 1.40 Consultant to amend with replacement given standard has been withdrawn]*.

### Zinc rich primer: in accordance with *[CAN/CGSB 1.181 Consultant to amend with replacement given standard has been withdrawn]*.

### Post tensioning ducts: in accordance with CAN/CSA A23.1-14.

### Air entrainment admixtures: in accordance with *[CSA/CAN3-A266.1 M78 Consultant to amend with replacement given standard has been withdrawn]*.

### Chemical admixtures: in accordance with *[CSA/CAN3-A266.2 M78 Consultant to amend with replacement given standard has been withdrawn]*.

### Insulation: expanded polystyrene in accordance with *[CAN/CGSB 51.20, Type \_\_\_\_\_Consultant to amend with replacement standard given this standard has been withdrawn].*

## Mixes

### Concrete.

#### Proportion normal density concrete in accordance with CAN/CSA A23.1-14.

#### Minimum compressive strength at 28 Days: 35 MPa.

#### Class of exposure: C1.

#### Nominal size of coarse aggregate: 20 mm.

### Grout.

#### Minimum compressive strength: 40 MPa.

#### Shrinkage compensating grout: in accordance with Section 03300 - Cast in Place Concrete.

## Manufactured Units

### Manufacture units in accordance with CSA A23.4-09 (R2014), and [ ] *[Consultant to update with applicable standard]*.

### Mark each precast unit to correspond to an identification mark on the shop drawings for the location with the date cast on a part of the unit which will not be exposed.

### Provide hardware suitable for handling elements.

### Shop prime anchors after fabrication and touch up primer on anchors after welding. Do not apply primer to the embedded portion of anchor or inserts.

## Finishes

### Finish units to standard grade in accordance with CSA-A23.4-09 (R2014), Section 24 *[Consultant to verify section reference and amend as required]*.

### Where bonded concrete topping is added on the precast units provide a scratch surface to enhance the bond between the unit and topping.

## Source Quality Control

### Provide the Consultant with certified copies of quality control tests related to this Contract as specified in CSA A23.4-09 (R2014) and [ ] *[Consultant to update with applicable standard*].

### Provide records from the Contractor’s in house quality control program based upon plant certification requirements to the Consultant for inspection and review.

### Upon request, provide the Consultant with a certified copy of the mill test report of the reinforcing steel supplied, showing the physical and chemical analysis.

### Precast plants should keep complete records of the supply source of concrete material, steel reinforcement, pre-stressing steel and provide them to the Consultant for review upon request.

# EXECUTION

## Erection

### Perform precast concrete Work in accordance with CSA A23.4-09 (R2014) and CAN3 A23.3-14 and CSA S6-14 Package.

### Perform welding in accordance with CSA W59-13 for welding to steel structures and CSA W186-M1990 (R2012) for welding of reinforcement.

### Erect precast elements within the allowable tolerances specified in the Contract Documents.

### Set elevations and alignment between units to within the allowable tolerances before connecting units.

### Fasten precast units in place as indicated on the reviewed shop drawings.

### Secure with bolts using lock washers or tack weld the nut to the bolt.

### Uniformly tighten bolted connections with the torque indicated in the Contract Documents.

### Do not weld or secure bearing plates at sliding joints.

### Install precast concrete closures between the stems of flanged units where indicated in the Contract Documents.

### Clean field welds with a wire brush and touch up shop primer with a primer galvanized finish with zinc rich primer.

## Cleaning

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

**END OF SECTION**