Part 1 General

1.1 SECTION INCLUDES

.1 Columns and walls, and other structural framing units

.2 Beams, spandrels, girders, purlins.

.3 Floor [[single] [double] [quad] tees.] [inverted tee beam.] [channel slabs.]

.4 Grout packing.

.5 Connection [and supporting] devices.

.6 Lintels [and bond beams].

.7 [Perimeter and] intermediate joint seals.

1.2 RELATED SECTIONS

.1 Section [_____-_____]: Foundation concrete work.

.2 Section 03 30 00 - Cast-in-Place Concrete: Building structural frame.

.3 Section 03 38 00 - Post Tensioned Concrete: Building structural frame.

.4 Section 03 41 13 - Precast Concrete Hollow Core Planks.

.5 Section 03 45 00 - Architectural Precast Concrete.

.6 Section 03 47 13 – Site Cast Tilt-up Concrete.

.7 Section 03 52 16 — Lightweight Insulating Concrete.

.8 Section 03 54 00 - Self-leveling Underlayment.

.9 Section 07 92 00 - Joint Sealants: Caulking of butt joints of precast units at [exposed underside of floor members.] [_____ .]

.10 Section [_____- _____]: Exterior applied finish.

.11 Section [_____- _____]: Placement of anchorage [and connection] devices.

.12 Section [_____- _____]: Placement of lintels [and bond beams].

1.3 REFERENCES

.1 ASTM A108-07 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

.2 ASTM A123/A123m-12 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.3 ASTM /A153M-09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.4 ASTM A185/A185M-07 - Steel Welded Wire Reinforcement, Plain, for Concrete.

.5 ASTM A307-12 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

.6 ASTM A416/A416M-12a - Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

.7 ASTM A555/A555M-05 (2009) - General Requirements for Stainless Steel and Wire Rods.

.8 ASTM A666-10 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.9 ASTM A775/A775M-07b - Epoxy-Coated Reinforcing Steel Bars.

.10 ASTM C494/C494M-12 - Chemical Admixtures for Concrete.

.11 ASTM C881/C881M-10 - Epoxy-Resin-Base Bonding Systems for Concrete.

.12 ASTM D2240 - 05 (2010) - Test Method for Rubber Property - Durometer Hardness.

.13 CAN/CGSB-1.40-97 - Anticorrosive Structural Steel Alkyd Primer.

.14 CAN/CGSB-1.181-99 - Ready-Mixed Organic Zinc-Rich Coating.

.15 CAN/CSA-A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete.

.16 CAN/CSA-A3000-08 - Cementitious Materials Compendium.

.17 CAN/CSA-G30.18-09 – Carbon steel bars for concrete reinforcement

.18 CAN/CSA-G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel /Structural Quality Steel.

.19 CSA-A23.3-04 (R 2010) - Design of Concrete Structures.

.20 CSA-A23.4-09 - Precast Concrete - Materials and Construction.

.21 CSA-W47.1-09 - Certification of Companies for Fusion Welding of Steel.

.22 CSA-W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.23 CSA-W186-M1990 (R2012) - Welding of Reinforcing Bars in Reinforced Concrete Construction.

.24 CPCI (Canadian Precast/Prestressed Concrete Institute) - Structural Precast / Prestressed Concrete Infrastructure Construction Technical Guide.

.25 CPCI (Canadian Precast/Prestressed Concrete Institute) Design Manual – 4th Edition.

.26 PCI (Precast Concrete Institute) MNL 116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

1.4 PERFORMANCE REQUIREMENTS

.1 Design framing components and connections to withstand design loads as calculated in accordance with applicable codes.

.2 Design units to withstand actual loads such as wind, suction, deflection, and thermal movement loads.

.3 Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with [_____] code.

.4 Size components to withstand design loads in a [restrained] [unrestrained] condition as follows:
- .1 Horizontal Assembly: <[____] kPa> <<[____] psf>> live [and dead] loads.
- .2 Vertical Assembly: <[____] kPa> <<[____] psf>>.

.5 Maximum Allowable Deflection: [1/180] [1/240] [1/360] [____] span.

.6 Design members exposed to the weather to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.

.7 Design system to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

.8 Design and size component joints to receive sealant and backer rod, dimensioned to permit dynamic movement of sealant with full recovery without damage.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 31 00: Project management and coordination procedures.

.2 Coordination:
- .1 Coordinate with other work having a direct bearing on work of this section.
- .2 Coordinate the work of framing components associated with the work of this section.

.3 Pre-installation Meetings:
.1 Convene [one (1)] [( )] week before starting work of this section.
.2 Instruct others when field cutting of required openings are <[250] [_____] mm><<[10] [_____] inches >> and smaller.
.3 Cast in openings larger than 250 mm [10 inches] in diameter or 250 mm [10 inches] square according to shop drawings. Smaller holes may be field cut by trades requiring them, as approved by Precast Engineer.

1.6 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Indicate standard component configurations, design loads, deflections, cambers and bearing requirements.

.3 Shop Drawings: Indicate layout, unit locations, fabrication details, [unit identification marks,] reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials [, and sealed by a Professional Structural Engineer]. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.

.4 Samples: Provide range of samples of precast finish illustrating surface finish, colour and texture for approval as requested. Unless otherwise noted, provide 2 samples, minimum size 300 x 300 x 25 mm. Make samples sets until final approval is obtained. All production run work shall match approved samples.

1.7 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Design Data: If requested, submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing.

.3 [OPTIONAL FOR LEED PROJECTS]
SUSTAINABLE DESIGN
.1 Section [01 35 18]: LEED documentation procedures.
.2 Provide required LEED documentation for Product [recycled content] [regional materials].

1.8 QUALITY ASSURANCE

.1 Perform work in accordance with:
.1 CAN/ CSA-A23.1/A23.2, CSA-A23.3, and CSA-A23.4
.2 CPCI Structural Precast/Prestressed Infrastructure Construction Technical Guide.
.3 CPCI (Canadian Precast/Prestressed Concrete Institute) Design Manual – 4th Edition.

.2 Welding: CSA-W59 and CSA-W186.

.3 Welders: Certified to CSA-W47.1. Submit certificates for each welder.

.4 Fabricator and Erector:
- .1 Manufacturer to meet requirements of CSA A23.4, including Appendices A and B, together with PCI MNL-116 and 117 and CPCI certification requirements.
- .2 Manufacturer: Certified to Canadian Precast/Prestressed Concrete Institute (CPCI) Certification Program for Structural, Architectural and Specialty Precast Concrete Products and Systems at time of bid.
- .3 Erector: Company specializing in performing the work of this section with minimum [five (5)] [_____ (__)] years [documented experience.]

.5 Design units under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

1.9 REGULATORY REQUIREMENTS

.1 Conform to applicable code for design load and and construction requirements applicable to work of this section.

.2 Conform to [NBC Appendix D] to achieve [____] hour fire rating for wall, roof and floor assembly.

1.10 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Handle structural precast members in position consistent with their shape and design. Lift and support only from support points.

.3 Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

.4 Protect members to prevent chipping or spalling of concrete. [If exposed to view, prevent staining.]

.5 Mark each member with date of production and final position in structure.

PART 2 Products

2.1 FABRICATORS

.1 [ ] [Product] [ ].

.2 [ ] [Product] [ ].

.3 [ ] [Product] [ ].

.4 Substitutions: [Refer to Section 01 61 00.] [Not permitted.]

2.2 MATERIALS

.1 Portland Cement: CSA-A3001, Type [GU] [____]; [White] [Grey] [Buff] [____] color for facing mix.

.2 Concrete Materials: [CSA-A23.4] [and] [CAN/CSA-A23.1/A23.2], water and sand.

.3 Concrete Admixtures: [CSA-A23.4.]

2.3 REINFORCEMENT

.1 Tensioning Steel Tendons: ASTM A416/A416M, Grade [<1860 MPa> <<270 ksi>>] pre-stressing, strand, unfinished, of sufficient strength commensurate with member design.

.2 Reinforcing Steel Bars: [CAN/CSA-G30.18, deformed steel, unfinished,] [ASTM A555/A555M, stainless steel,] [ASTM A775/A775M epoxy coated reinforcing] strength and size commensurate with precast unit design.

.3 Welded Steel Wire Fabric: ASTM A185/A185M, welded steel wire fabric, in [flat sheets] [coiled rolls], [unfinished.] [hot dip galvanized.]

2.4 ACCESSORIES

.1 Miscellaneous Plates, Channels, Angles, Studs and HSS: [CSA-G40.20/G40.21, carbon steel, Type [300 W] [350 W].] [ASTM A666 stainless steel, Type [304] [316].] [ASTM A108]

.2 Protective Finish: [Prime painted.] [Hot-dip galvanized [to ASTM A123/A123M].] [Electroplated.] [Unfinished.]

.3 Welding materials: CSA-W48.

.4 Grout:
- .1 [Non-shrink,] [Non-metallic,]]
- .2 [Ferrous,] [Non-ferrous,]
- .3 [Thermo-setting epoxy].
- .4 Minimum compressive strength of grout <[35 [__] MPa> <<[5000] [___] psi>> at 28 days.
- .5 Minimum compressive strength of grout used in shear keys of flat members (floor and roof slabs) to be 20 MPa [3000psi] at 28 days.

.5 Epoxy Anchor Hole Filler: ASTM C881/C881M, 100 percent solids, sand-filled non-shrinking, non-staining of type, class, and grade to suit application.

.6 Bearing Pads: [High density plastic,] [Steel,] [Vulcanized elastomeric compound molded to size,] [Neoprene (Chloroprene), to ASTM D2240, Shore A Durometer [_____],][Tetrafluoroethylene (TFE),] <[3] [_____] mm> <<[1/8] [_____] inch>> thick, smooth both sides.

.7 Shims: [Plastic.] [Steel.]

.8 Bolts, Nuts and Washers: [ASTM A307] [galvanized to A153/A153M.]

.9 Prime Paint: [CAN/CGSB-1.181, zinc rich.] [CAN/CGSB-1.40, alkyd primer.]

2.5 MIXES

.1 Concrete: Minimum <[____] MPa> <<[ ] psi>>, 28 day strength, air entrained to [5 to 7] [_____] percent.

.2 Grout: [CAN/CSA-A23.1/A23.2.] [_____.]

2.6 FABRICATION

.1 Fabricate to CSA-A23.4.

.2 Maintain plant records and quality control program during production of precast members. Make records available upon request.

.3 Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on [shop drawings] [Drawings].

.4 Tension reinforcement tendons as required to achieve design load criteria.

.5 Provide required openings with a dimension larger than <[250] [200] mm> <<[10] [8] inches>> and embed accessories provided by other sections, at indicated locations.

.6 Exposed Ends at Stressing Tendons: Fill recess with [non-shrink] [epoxy] [___] grout, trowel flush.

2.7 FINISHES

.1 Ensure exposed-to-view finish surfaces of precast concrete members are uniform in colour and appearance.

.2 Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as uniformity, staining, or surface cracking.

.3 Finish members to:

.1 A normal plant finish; surface may contain small surface holes caused by air bubbles, minor chips or spalling at edges or ends, without major discoloration.

[OR]

.2 Normal plant finish with fins and protrusions removed, ground edges and ends, flat face surfaces.

[OR]

.3 Precast Concrete Surface Finish: Conform to CPCI-Colour and Texture - Selection Guide.

.4 CPCI Plate Number [101.] [_____.]

.5 Ensure exposed-to-view finish surfaces are uniform in colour and appearance.

2.8 FINISH SUPPORT DEVICES

.1 Clean surfaces of rust, scale, grease, and foreign matter.

.2 Prime paint in [one (1) coat] [two (2) coats], except surfaces in direct contact with concrete or requiring field welding.

.3 Galvanize after fabrication to <[610] [____] g/sq m> <<[2.0] [____] oz/sq ft>> [to ASTM A123/A123M].

2.9 FINISHES

.1 Finish units to CSA-A23.4, [commercial grade] [standard grade] [finish grade A] [finish grade B].

2.10 FABRICATION TOLERANCES

.1 Conform to CSA A23.4.

2.11 SOURCE QUALITY CONTROL [AND TESTS]

.1 Section 01 45 00: Manufacturer quality control.

.2 Provide [testing] [and] [analysis] of concrete mix to CAN/CSA-A23.1/A23.2.

.3 Take [____] concrete test cylinders for every <[____] cu m> <<[____] cu yd>> of concrete placed.

.4 Take [____] slump tests for every [____] test cylinders.

.5 Take [one (1)] [ ] air entrainment test cylinders for each set of exterior concrete test cylinders taken.

PART 3 Execution

3.1 EXAMINATION

.1 Section 01 70 00: Verification of existing conditions prior to beginning work.

.2 Verify that site conditions are ready to receive work and field measurements are as shown on [shop drawings] [Drawings]] [instructed by the fabricator].

.3 Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.2 PREPARATION

.1 Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

.2 Maintain temporary bracing in place until final support is provided.

3.3 ERECTION

.1 Install bearing pads.

.2 Erect members without damage to structural capacity, shape, or finish. Repair damaged members.

.3 Align and maintain uniform horizontal and vertical joints, as erection progresses.

.4 Maintain temporary bracing in place until final support is provided.

.5 Prior to installing the precast structural concrete, the supporting structure shall be braced as required.

.6 Adjust differential camber between precast members to tolerance before final attachment.

.7 Grout as approved shop drawings.

.8 [Fasten] [and] [Weld] units in place. [Perform welding in accordance with CSA-W59 for welding to steel structures and CSA-W186, for welding of reinforcement.]

3.4 ERECTION TOLERANCES

.1 Section 01 73 00: Tolerances.

.2 Erect members level and plumb, within allowable tolerances.

.3 Erect to the tolerances as specified in CSA A23.4.

3.5 ADJUSTING

.1 Adjust units and secure components to achieve dimensions within tolerances.

3.6 PROTECTION OF FINISHED WORK

.1 Section 01 78 40: Protecting installed work.

.2 Protect exposed view to members from damage caused by field welding or erection operations.

END OF SECTION