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PART 1 - GENERAL

- 1.1 Scope of Work .1 This section outlines the requirements for placement of the formwork for the Generator Upgrade and all other appurtenances requiring concrete forms and accessories.
- 1.2 Related Sections .1 Section 03200 – Concrete Reinforcement.  
.2 Section 03300 – Cast-in-Place Concrete.
- 1.3 Reference Standards Unless noted otherwise, the following documents and standards, and documents referenced therein, shall be the edition in effect at the time of the Agreement.
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| ACI 347        | Formwork for Concrete                          |
| CAN/CSA A23.1  | Concrete Materials and Methods of Construction |
| CAN/CSA G40.21 | Structural Quality Steels                      |
| CSA 0121       | Douglas Fir Plywood                            |
| CSA 0151       | Canadian Softwood Plywood                      |
| CSA S269.1     | Falsework for Construction Purposes            |
| CSA O86        | Engineered Design in Wood                      |
- 1.4 Quality Assurance .1 Qualifications
- .1 Employ personnel skilled and experienced in the construction of formwork in relation to the surface finish requirements and the safety aspects.
- .2 Design
- .1 Design the formwork to support loads and maintain the required shape and dimensions of the concrete within specified tolerances.
  - .2 Have the design prepared, sealed and signed by a professional Engineer registered in the Province where the Work is installed.
  - .3 Design in accordance with CSA S269.1, CAN/CSA A23.1 and ACI 347.
- .3 Allowable Tolerances
- .1 As shown on the Drawings, and where not shown on the Drawings, as in CAN/CSA A23.1, Clause 6.4.
  - .2 The tolerances apply to the completed concrete.
- 1.5 Product Delivery, Storage and Handling .1 Store forming materials in neat piles supported and protected to prevent warping, twisting and other damage.

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PART 2 - PRODUCTS

2.1 Materials

- .1 Plywood
  - .1 Exterior grade fir plywood made with waterproof adhesive and having smooth finish on face for contact with concrete.
- .2 Lumber
  - .1 Grade marked spruce, pine or fir in accordance with CSA 086 and NLGA grading rules.
  - .2 Grades suitable for the superimposed loads and size of members and in accordance with approved design and shop drawings.
- .3 Form Screws
  - .1 Sizes to suit formwork design and shop drawings.
    - .1 Tyscrus
    - .2 Waterseal Tyscrus
    - .3 Cone-Tight Tycones and Plastic Set-Back Plugs
    - .4 All as manufactured by Richmond Screw Anchor Co.
- .4 Void Forms
  - .1 Waxmat by Shearmat Structures Ltd.
- .5 Fibre Forms
  - .1 Water resistant tubes of wall thickness and construction to contain the plastic concrete without buckling or breaking :
    - .1 Sonotube by Sonoco Ltd.
    - .2 Preform Tube by Richmond Screw Anchor Co.
- .6 Structural Steel Shapes, Plate and Bar
  - .1 In accordance with CAN/CSA G40.21 300W min.
- .7 Form Releasing Agent
  - .1 Non-staining compound, not injurious to the concrete, effective in preventing adhesion of concrete to forms and providing clean, oil and grease free concrete surfaces suitable for proper bonding of coatings to concrete:
  - .2 Sealtight-Duogard by W.R. Meadows.
  - .3 Rich-Cote by Richmond Screw Anchor Co.

- .4 Sternson C.R.A. by Sternson Ltd.
- .8 If concrete is to remain exposed, use the same form releasing agent for all applications.

### PART 3 - EXECUTION

#### 3.1 Examination

- .1 Prior to commencing installation, thoroughly examine other work upon which this Work is dependent. Report deficiencies discovered and propose adjustments to the Contract Administrator and obtain written authorization before proceeding.

#### 3.2 Installation

- .1 Construct formwork and falsework in accordance with CAN/CSA A23.1 and CSA S269.1 and the following :
  - .1 Use plywood or steel formwork in contact with concrete, unless the Drawings require board forms.
  - .2 In areas where coating of concrete is shown on Drawings, use clean, oil and grease-free forms and forming accessories to provide concrete surfaces suitable for proper bonding of coatings to concrete.
  - .3 Construct connections to permit easy removal of the formwork. Nail, screw, bolt, clamp or otherwise secure to retain the correct shape until the concrete sets.
  - .4 Ensure deflection and deformation under load are minimal but allowed for so that the completed concrete is within the specified tolerances.
- .2 Make formwork for beams and slabs so that the forms for the sides of the beams and for the soffits of slabs can be removed without disturbing the forms for the beam bottoms or the props under the beam bottoms. Either support vertical props on wedges, or employ other measures whereby the props can be gently lowered vertically when commencing to remove the formwork.
- .3 Apply form releasing agent to faces of formwork in contact with concrete.
- .4 Form openings as necessary for cleaning and for inspection within the formwork. Close the openings before concrete placing.
- .5 Tighten forms to close all joints. Align and secure joints to avoid offsets.
- .6 Form 25 mm by 25 mm chamfers on the external corners of all concrete except where the Drawings require otherwise.

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- .7 Wood Formwork
- .1 Use plywood or other approved panel for formwork throughout except where "boardmarked concrete" as required on the Drawings.
  - .2 In general, make plywood forms from full sheets, cut sheets being used only where specifically indicated or necessary due to configuration of the structure.
  - .3 Use plywood backing for all boards for formwork for "boardmarked concrete" to prevent seepage of fines.
  - .4 Carefully arrange panels and form screws so that joints are in continuous straight lines as far as possible and are as inconspicuous as possible, and so that form screws are uniformly spaced along straight lines horizontally and vertically.
  - .5 Butt and cover panel joints on the outside by walers or wood strips to prevent leakage of fines.
  - .6 Ensure faces of formwork for contact with concrete are clean and free from splits, projecting nails and other defects.
- .8 Steel Formwork
- .1 Use steel walers and steel forms of sufficient steel plate thickness to allow full head of freshly placed concrete without any trace of pillowing.
  - .2 Use steel form panels constructed in largest practical size to reduce panel joints to a minimum.
    - .1 Locate vertical panel joints at construction joints and other vertical joints, if required, uniformly distributed.
    - .2 Install panels with all joints between panels smooth.
    - .3 Use only form panels that extend the full height of walls. Horizontal panel joints are not permitted.
  - .3 Keep use of form screws to the fewest necessary to meet formwork design requirements. Locate the form screws uniformly spaced along straight lines vertically and horizontally.
    - .1 Use waterseal type Tycrus and Cone-tight Tycones for tunnel and water retaining structures such as tanks, thickeners and pumpbox formwork provided that wall thickness is less than 600 mm.

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- .2 Use Tycrus and Cone-tight Tycones for all other formwork.
  - .2 Install void forms where shown on Drawings. Follow manufacturer's instruction in installing void forms and keep dry until concrete on top can support its own weight.
  - .3 Install all fibre forms with spiral joints in same direction throughout the building. Horizontal form joints are not permitted.
  - .4 Formwork for Architectural Concrete
    - .1 Architectural concrete means concrete where surface is exposed to view.
    - .2 Ensure forms used on each individual wall face are of the same material. Do not mix formwork materials.
- 3.3 Removal of Formwork
- .1 Remove formwork, not structurally supporting concrete such as sides of beams, walls and columns, only after a period of not less than 24 hrs and at a concrete surface temperature of 10 degree C or such longer period as necessary to ensure that the concrete is sufficiently hard, cured and protected.
  - .2 Remove formwork, supporting weight of concrete such as beam soffits, joists and slabs only after a period of not less than 14 days and not until the concrete has attained the designed minimum 28 day compressive strength.
  - .3 Remove forms and form screws with care to prevent marring of the concrete surface and to leave neat holes. Plug holes using grey plastic buttons or grout and filling to 12 mm from the surface.
- 3.4 Cleaning
- .1 Thoroughly clean concrete surfaces and remove fins and laitance.
  - .2 Clean up all debris to the satisfaction of the Contract Administrator.

END OF SECTION 03100

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PART 1 - GENERAL

- 1.1 Scope of Work. .1 Supply, fabrication, and placement of reinforcing steel for the Generator Upgrade, and all other appurtenances requiring concrete reinforcing.
- 1.2 Related Sections .1 Section 03100 – Concrete Formwork.  
.2 Section 03300 – Cast-in-Place Concrete.
- 1.3 Reference Standards Unless noted otherwise, the following documents and standards, and documents referenced therein, shall be the edition in effect at the time of the Agreement.
- CAN/CSA A23.1 Concrete Materials and Methods of Construction  
CSA A23.3 Design of Concrete Structures  
CSA G30.3 Cold-drawn Steel Wire for Concrete Reinforcement  
CSA G30.5 Welded Steel Wire Fabric for Concrete Reinforcement (Withdrawn)  
CAN/CSA G30.18 Billet Steel Bars for Concrete Reinforcement  
RSIC RSIC Manual of Standard Practice
- 1.4 Quality Assurance .1 Personnel Qualifications  
.1 Employ personnel skilled and experienced in the fabrication and installation of concrete reinforcement.  
.2 Tolerances  
.1 Fabricate and install concrete reinforcement in accordance with CAN/CSA A23.1, Clause 12.8 except as required otherwise by the Drawings.
- 1.5 Submittals .1 Submit to the Contract Administrator:  
.1 Shop Drawings  
.1 Detail reinforcement in accordance with CSA A23.3.  
.2 Provide complete bar lists together with location and setting drawings with sufficient plans, elevations, sections and details to clearly show the positioning and number of bars. Identify bar list with drawings.  
.3 Identify each bar by mark number. Show relationship of reinforcement with construction joints, control joints, expansion joints and embedded parts.

- .4 Ensure that embedded parts shown on the Drawings are shown on the reinforcing setting drawings when submitted to the Contract Administrative for review.

1.6 Product Delivery, Storage and Handling

- .1 In accordance with CAN/CSA A23.1, Clause 9.
- .2 Store and handle reinforcing steel so as not to alter the shape and dimensions.
- .3 Prevent oil and dirt contamination of the reinforcing steel.
- .4 Do not dump materials when unloading or handling.

PART 2 - PRODUCTS

2.1 Materials

- .1 Reinforcing Steel
  - .1 Deformed Bars:
    - .1 In accordance with CAN/CSA G30.18 Grade 400.
  - .2 Cold-drawn steel wire:
    - .1 In accordance with CSA G30.3.
  - .3 Welded steel wire fabric:
    - .1 In accordance with CSA G30.5.
- .2 Support of Reinforcement
  - .1 Supports, spacers and chairs:
    - .1 Precast concrete blocks for bottom bars only.
    - .2 Plastic of acceptable type and manufacture.
    - .3 Steel of acceptable type and manufacture with rustproof finish where any part extends to the surface of the concrete.

2.2 Fabrication

- .1 Reinforcing Steel
  - .1 Fabricate reinforcing steel in accordance with CAN/CSA A23.1 and the RSIC, Manual of Standard Practice to the dimensions shown on the bar lists and shop drawings.
  - .2 Do not bend or straighten reinforcing bars in a manner which might damage the bars or reduce the cross-section. Do not use bars with kinks or sharp bends.
  - .3 Identify each bar with the same code used for it in the bar lists and setting drawings.

PART 3 - EXECUTION

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- 3.1 Examination
- .1 Prior to commencing installation, thoroughly examine other work upon which this Work is dependent. Report deficiencies discovered and propose adjustments to the Contract Administrative and obtain written authorization before proceeding.
  - .2 Check that forms are in satisfactory condition for the Work to proceed.
- 3.2 Installation
- .1 Install reinforcement in accordance with CAN/CSA A23.1 and the following requirements :
    - .1 Secure crossing bars at intersections by using tie-wire of not less than 1.6 mm thick.
    - .2 Ensure concrete cover, placing and maintaining position of reinforcement is in accordance with CAN/CSA A23.1.
    - .3 Install tension and compression splices for reinforcing steel in accordance with CSA A23.3 and as shown on Drawings.
    - .4 At running joints place starter bars or dowels equivalent in size and spacing to the continuing reinforcing of the member.
    - .5 At wall corners provide embedment and splice all horizontal bars according to code requirements.
- 3.3 Openings in Concrete
- .1 Provide two additional 15M reinforcing bars at each face of opening extending 600 mm minimum past each side of opening unless shown otherwise.
  - .2 Unless shown otherwise where an opening interrupts more than two reinforcing bars, add reinforcing bars equivalent to half the interrupted reinforcing bars at each side of the opening.

END OF SECTION 03200



PART 1 - GENERAL

1.1 Scope of Work

- .1 This section specifies the materials, mixes preparation, and construction of Cast-in-Place concrete for the Generator Upgrade, and all other appurtenances requiring cast-in-place concrete. The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified. The Work shall consist of:
- .1 Supplying of materials and the mixing and placing of reinforced cast-in-place concrete as shown and described on the Drawings and in this Specification, including vibrating, finishing concrete surfaces and curing;
  - .2 Supplying, fabricating, constructing and removing temporary works, including falsework and formwork;
  - .3 Cooling and Heating concrete, if required;
  - .4 Taking all the necessary requirements to protect the concrete from cold and hot weather as specified in the subsequent sections of this Specification;
  - .5 The quality control (QC) testing of all materials;
  - .6 Supplying and installing water seals and joint fillers (when applicable);
  - .7 Grouting works: under bearings, base plates, etc.

1.2 Related Sections

- .1 Section 03100 – Concrete Formwork.
- .2 Section 03200 – Concrete Reinforcement.

1.3 Reference Standards

Unless noted otherwise, the following documents and standards, and documents referenced therein, shall be the edition in effect at the time of the Agreement.

ACI 207.1	Guide to Mass Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A563	Standard Specification for Carbons and Alloy Steel Nuts
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

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ASTM C494	Specifications for Chemical Admixtures for Concrete
CISC	Code of Standard Practice for Structural Steel
CAN/CSA A23.1	Concrete Materials and Methods of Construction
CAN/CSA A23.2	Methods of Test and Standard Practices for Concrete
CSA A23.3	Design of Concrete Structures
CSA A266.1	Air Entraining Admixtures for Concrete
CSA A266.2	Chemical Admixtures for Concrete
CSA A3000	Cementitious Materials Compendium, consists of: A3001 to A3005, inclusive
CAN/CSA G30.18	Billet Steel Bars for Concrete Reinforcement
CAN/CSA G40.21	Structural Quality Steels
CAN/CSA S16	Limit States Design of Steel Structures

1.4 Quality Assurance

- .1 Placing of Concrete
  - .1 Employ persons skilled in the use of concrete vibrators and experienced with concrete pumping equipment.
- .2 Floor Finishing
  - .1 Employ persons skilled in floor finishing.
- .3 Tolerances
  - .1 Construct all concrete Work in accordance with CAN/CSA A23.1 Clause 6.4 except as required otherwise on the Drawings.
  - .2 Tolerances for anchor bolt location in accordance with CAN/CSA S16 Clause 13 and the CISC Code of Standard Practice for Structural Steel.

1.5 Submittals

- .1 Submit to the Contract Administrator:
  - .1 Samples
    - .1 A 250 mm x 250 mm size "non-slip" light hair broom floor finish sample for review.
  - .2 Shop Drawings
    - .1 Show details, locations and dimensions of construction joints, control joints, expansion joints and embedded parts and relationship of all such Work with reinforcing steel.
  - .3 Mix Design
    - .1 Ensure concrete mix designs are prepared by an approved concrete mix design specialist.

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- .2 Data on the aggregate, cement and admixtures.
  - .4 Test Reports and Certificates
    - .1 Test reports and certificates showing results and records of tests conducted.
    - .2 On test reports for concrete used in the Work, show the exact location where the tested concrete was placed.
  - .5 Concrete Delivery Tickets
    - .1 One copy of concrete delivery ticket to the Contract Administrator on Site at the time the concrete is delivered.
- 1.6 Product Delivery, Storage and Handling
- .1 In accordance with CAN/CSA A23.1, Clause 7.2.
  - .2 Keep materials protected from damage, weather and deterioration.
  - .3 Keep materials dry until mixing to produce concrete.
- 1.7 Job Conditions
- .1 Protection
    - .1 During curing of concrete, protect the concrete against premature drying and extremes of temperature. Maintain relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements of CAN/CSA A23.1.
    - .2 Prevent water penetration and freezing damage in recesses, shear pockets, grooves, bolt sleeves and other openings susceptible to such damages.
    - .3 Provide protection at all times when freezing temperatures are likely to occur until the above recesses, etc., are grouted or the building is enclosed and heated.

## PART 2 - PRODUCTS

- 2.1 Materials
- .1 Ensure that materials used in production, placing, patching, curing and finishing of concrete are compatible with each other and with protective coating and paint materials for concrete.
  - .2 Portland Cement
    - .1 In accordance with CSA A3000.
    - .2 Type HSb unless shown otherwise on the Drawings.

- .3 Aggregate
  - .1 Normal density, clean, hard uncoated inert particles from naturally formed sand and gravel formations or from crushed quarried rock, boulders or cobbles. Fine and coarse aggregates to conform to the requirements of CAN/CSA A23.1. Maintain uniformity of quality and colour throughout the work. Unless authorized in writing by the Contract Administrator, do not use aggregates deemed reactive when tested for Alkali-Aggregate Reactivity in accordance with CAN/CSA A23.1 Annex B.
- .4 Water
  - .1 In accordance with CAN/CSA A23.1.
- .5 Admixtures
  - .1 Air entraining agent :
    - .1 Vinsol resin or equal to produce a uniform dispersion of very fine bubbles, in accordance with CSA A266.1.
    - .2 Chemical admixtures in accordance with CSA A266.2.
    - .3 High range water reducing agents in accordance with ASTM C494
- .6 Joint Filler
  - .1 Isolation and expansion joint filler:
    - .1 Close Cell PVC Foam
    - .2 Unifoam 1002 (firm grade) by Goodco Ltd.
    - .3 CPD Closed Cell Foam Rigid Joint Filler by Construction Product Distribution Services
- .7 Paper Joints :
  - .1 Asphalt impregnated building paper of approved quality
- .8 Joint filler for paving:
  - .1 Asphalt impregnated fibreboard
  - .2 Sternboard by Sternson Limited
- .9 Polyethylene Sheet (under slabs on grade)
  - .1 6 mil, thick polyethylene sheet of approved quality
- .10 Waterstop
  - .1 Continuous polyvinyl chloride:
    - .1 Width and thickness not less than 150 mm x 10 mm except as shown otherwise on Drawings
    - .2 Durajoint by Sternson Limited

2.2 Concrete Mixes

- .3 Sealtight PVC Waterstop by W.R. Meadows
- .11 Joint Sealing Strip
  - .1 Evazote 50 non-extending water proof strip by E-Poxy Industries, Concord, Ontario
- .12 Concrete Bonding Adhesive
  - .1 Two component 100% solids epoxy for bonding new concrete to existing concrete
    - .1 Sealtight Interlok by W.R. Meadows
    - .2 Sikadur 32 High-Mod by Sika
- .13 Curing Compound/Sealer
  - .1 Permanent type to cure / seal the concrete in accordance with ASTM C309:
    - .1 Acrylic type:
      - .1 Sealtight CS-309 by W.R. Meadows
      - .2 CPD Acrylic Cure and Seal by Construction Product Distribution Services
- .14 Non-Metallic Mineral Hardener
  - .1 Type and coverage as shown on the Drawings
- .1 Mix proportions in accordance with CAN/CSA A23.1 and the following:
  - .1 All new concrete shall have a minimum compressive strength equal to 70% of its specified 28 day strength prior to any loading of the concrete slabs.
  - .2 Concrete Specification:
    - .1 Cement – Type HSb-S1 Classification
    - .2 28 day strength – 35 MPa
    - .3 Slump – 90mm MAX.
    - .4 Maximum Agregate – 20mm
    - .5 Entrained Air – 5%-7%
    - .6 Water/Cement Ratio – 0.40 Max.
  - .3 Fully vibrate all concrete during placement.
- .2 The Contractor shall be responsible for the concrete mix design.

- .3 Any approval of submitted mixes by the Contract Administrator is restricted to confirming that the proposed materials and proportions comply with the Specification requirements. The field performance remains the responsibility of the Contractor

### 2.3 Fabrication

- .1 Anchor Bolts
  - .1 Normal Steel Bolts:
    - .1 Plain bars in accordance with CAN/CSA G40.21, Grade 300W as shown on the Drawings, or as supplies by the equipment manufacture.
  - .2 Special Steel Bolts:
    - .1 As shown and specified on the Drawings.
  - .3 Nuts:
    - .1 Heavy hexagonal nuts in accordance with ASTM A563.
  - .4 Anchor Plates:
    - .1 In accordance with CAN/CSA G40.21, Grade 300W.
- .2 Fabricate anchor bolts, nuts and anchor plates for installation of City-supplied equipment in class and sizes as shown in equipment catalogues, product specifications and on equipment drawings.
- .3 Anchor Bolt Sleeves
  - .1 Wilson anchor bolts sleeves or as shown on the Drawings.
- .4 Pipe Sleeves
  - .1 In accordance with ASTM A53, Black, Schedule 40.
  - .2 Sizes as shown on Drawings.
- .5 Embedded Metals
  - .1 Door sills, corner guards, frames and other metal fabrications as required and in accordance with CAN/CSA G40.21 Grade 300W.

## PART 3 - EXECUTION

### 3.1 Examination

- .1 Prior to placing concrete, advise the Contract Administrator that the excavation is ready for inspection.
- .2 Agree with the Contract Administrator on the scheduling of all such inspections.

### 3.2 Mixing, Delivery and

Placing of Concrete

- .1 Ensure source, methods of mixing and delivery of concrete are in accordance with CAN/CSA A23.1.
- .2 Maintain close control on concrete mixed for all concrete work.
- .3 Ensure placing of concrete is in accordance with CAN/CSA A23.1.
- .4 Unless shown otherwise on Drawings, provide concrete cover to reinforcement in accordance with CAN/CSA A23.1:
  - .1 In non-corrosive environment in accordance with Clause 12.12.
  - .2 In corrosive environment in accordance with Clause 4.1.1.1 to 4.1.1.9 and tables 7.4 and 2.0.
- .5 Do not disturb reinforcement, embedded parts and formwork. Use the proper type of concrete vibrators designed for use on each particular application.
- .6 Prior to placing slabs on grade, on granular base or against absorptive materials, place one layer of dampproofing membrane.
- .7 Pumped Concrete
  - .1 Provide a concrete pumping system using proven methods and equipment. Submit to the Contract Administrator for review the following information:
    - .1 Type, model and effective capacity of the pump.
    - .2 Type and size of the pipelines.
    - .3 Description of operating procedures.
    - .4 Schedule of concrete placement.
- .8 Field Practices
  - .1 Locate pumps as near the concrete placing area as practicable and with due consideration for maintaining a continuous supply of concrete to the pumps.
  - .2 Provide readily available standby power and standby pumping equipment for important concrete placement and large pours.
  - .3 Lay out lines from the pump to the concrete placing area with a minimum of bends. For large placing areas install alternate lines. Build pipelines firmly supported.
  - .4 Maintain direct communication between the pump operator and the concrete placing crew.
  - .5 Test concrete mix for pumpability under actual field conditions. Do not place any concrete until field tests are completed.
  - .6 Before placing concrete, pump concrete through the system to lubricate the system. Dispose of the

concrete used to lubricate the system in area approved by the Contract Administrator.

- .9 Steel Deck Protection
  - .1 Place planking over steel deck to prevent damage to deck when buggies, wheelbarrows or the like are used for concreting operation.
- .10 Stepped Foundation
  - .1 Where underside of foundation is stepped, ensure that the slope between elevations does not exceed one vertical to two horizontal; and step between elevations does not exceed 600 mm.

### 3.3 Joints

- .1 Provide construction, control, isolation and expansion joints where shown on the Drawings including final shop drawings and in accordance with CAN/CSA A23.1 but in any case provide adequate number, spacing and distribution of joints to prevent cracks due to expansion or contraction.
- .2 Where additional joints are required, submit recommendations to the Contract Administrator for review.
- .3 Sawcut control joints as early as possible after concrete has set sufficiently to sawcut without damaging the concrete.
- .4 If control joints can not be sawcut where shown on the Drawings, form joint using pre-molded strip while placing concrete.
- .5 Dimensions shown on the Drawings for keys and recesses are nominal and intended to suit standard lumber sizes. If dimensions are otherwise shown they may be subject to adjustment to suit standard lumber sizes when proposed adjustments are submitted to the Contract Administrator for review.
- .6 Install continuous waterstop at construction and expansion joints where shown on the Drawings and at additional construction and expansion joints as directed by the Contract Administrator.
- .7 Install and splice the waterstop in accordance with manufacturer's instructions, ensuring that the waterstop is continuous, particularly at intersecting joints. Make joints and splices by heat fusion. At tee intersections, cut the branch and splice in a wedge joint with the through section of waterstop, such that the centre ribs are joined. Protect waterstop from damage, particularly the exposed half of installed waterstop.



- .8 Install expansion and isolation joint filler, in accordance with manufacturer's instructions and ensure complete contact between concrete surfaces and filler material. Install temporary wood strip to form recess for sealant and back-up, as required. Prevent concrete and mortar seepage from bridging the joint. Do not damage the filler material.
- .9 Install expansion joint covers as shown on Drawings.

### 3.4 Embedded Parts

- .1 Set embedded parts accurately in place in accordance with CAN/CSA A23.1 and CAN/CSA S16 and as shown on the Drawings and as required for anchorage attachments and supports for the Work of other trades and contractors.
- .2 Obtain all templates required for setting embedded parts.
- .3 Ensure embedded parts that are required for the Work are shown on the reinforcing setting Drawing when submitted to the Contract Administrator
- .4 Maintain concrete cover when moving reinforcing steel to clear openings and embedded parts.
- .5 Do not displace or distort embedded parts in placing concrete.
- .6 Ensure exposed portions, such as threads of anchor bolts, of embedded parts are protected from concrete and damage.

### 3.5 Curing and Protection

- .1 Maintain moist curing by approved means in accordance with CAN/CSA 23.1, Clause 21 and the following:
  - .1 Hot weather:
    - .1 Accomplish curing and protection in accordance with ACI 305.
  - .2 Cold Weather:
    - .1 Accomplish curing and protection in accordance with ACI 306.
- .2 Use of Curing Compounds
  - .1 Do not use curing compounds over concrete surfaces designated to have a protective coating.
  - .2 Request for the use of curing compounds will only be considered if the products meet the requirements of ASTM C309.

### 3.6 Finishes

- .1 Ensure that concrete work is sound, watertight, repaired, made good where necessary, and finished in accordance with CAN/CSA A23.1 and the following and acceptable to the Contract Administrator.
- .2 General:
  - .1 Construct finished surfaces as shown on the Drawings.

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- .2 Remove fins and unsightly ridges from all concrete surfaces and make the surfaces flush with the general surface except where covered by backfill after completion of the Work.
  - .3 Trowel finish the floors with an approved disc type power trowelling machine. Compact and finish to a smooth, dense surface, free from defects and blemishes. Test the surface with a straight edge and eliminate all high and low spots to meet the required tolerances. Proceed with trowelling only after the concrete has set up sufficiently to prevent excess fines from working to the surface.
  - .4 Provide a "non-slip" light hair broom finish in all areas unless noted otherwise on Drawings, and to the satisfaction of the Contract Administrator.
  - .5 Horizontal Surfaces - General:
  - .6 Steel trowel finish tops of formed concrete such as walls, parapets, curbs, piers where these appear as showing faces and also as shown on the Drawings. Produce a smooth, neat, uniform appearance.
  - .7 Provide a neat dense uniform wood float finish to tops of footings, pilecaps and other buried surfaces and surfaces where grout is to be placed.
- .3 Floors:
    - .1 Construct and finish floors as monolithic slabs. Carefully screed and finish the floor surfaces to the elevations and slopes shown on the Drawings. Ensure that the flatness tolerance is within 5mm in 3 metres.
  - .4 Foundations and Bases:
    - .1 Screed and wood float to required elevations and level the tops of foundations and bases for equipment and for other items requiring grouting after installation.
    - .2 Scrub the surfaces with a stiff brush or broom to remove all laitance and provide a suitable bonding surface for the grout.
    - .3 Ensure the finished surfaces are uniform and free from irregularities exceeding 5 mm in 3 metres.
  - .5 Concrete bases for tanks:
    - .1 Ensure that concrete bases for tanks are level to a flatness of 5mm in 3 metres along the perimeter of the tank and provide hard, smooth, dense trowelled finish free from blemishes.

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- .6 Floors with floor drains:
- .1 Regardless of the specified tolerances, ensure all parts of the floor drain to the appropriate floor drain.
  - .2 After the floor has cured, test floor drainage with water, in the presence of the Contract Administrator. If all the water does not flow to the floor drains correct the work by the Contract Administrator's choice of installing additional floor drains and associated additional piping at each location where water is retained or by grinding the floors and installing additional floor drains and associated piping as necessary to prevent ponding on the floor. The Contract Administrator's choice may vary from one ponding location to another.
  - .3 Carry out all remedial work to the satisfaction of the Contract Administrator without additional payment.
- 3.7 Openings in Concrete .1 Accurately form openings, to required locations, in concrete using embedded pipes, sleeves and box-outs as shown on the Drawings.
- 3.8 Concrete Closures .1 Complete closures in concrete foundations and other locations as shown on the Drawings.
- 3.9 Concrete Lintels and Caps .1 Construct reinforced concrete lintels and caps other than those which are part of masonry construction. Lintels and wall caps and their reinforcing details are shown on the Drawings. Take measurements on the Site to confirm actual dimensions required. Set anchor bolts and inserts in place as shown on the Drawings and as required for fastening to Work of others.
- 3.10 Dovetail Anchor Slots .1 Install dovetail anchor slots in concrete where concrete block abut concrete surface.
- 3.11 Inspection and Testing .1 Control and monitor concrete to meet the requirements of CAN/CSA A23.1 in particular:
- .1 Control water content, air content and slump.
  - .2 Control measuring and mixing of all materials.
  - .3 Control and monitor elapsed time from batching to the time of placing.
  - .4 Keep on-going records of concrete deliveries.
  - .5 Sample and test in accordance with CAN/CSA A23.1, Clause 17 and with CAN/CSA A23.2.
- .2 Perform additional sampling and testing if, in the opinion of the Contract Administrator, test results, appearance or other field observations indicate changes in the quality of the concrete being supplied.

- .3 Sample pumped concrete both at the truck discharge and point of final placement to determine if any changes in the slump, air content and other significant mix characteristics occur. Ensure placed concrete meets all the requirements of this Specification.

3.12 Coatings

- .1 Apply coatings over concrete surfaces as required and as shown on the Drawings.

END OF SECTION 03300