

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-O86.1, Engineering Design in Wood (Limit States Design).
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O437, Standards for OSB and Waferboard.
 - .6 CSA S269.1, Falsework for Construction Purposes.
 - .7 CAN/CSA-S269.3, Concrete Formwork.
- .2 Council of Forest Industries of British Columbia (COFI)
 - .1 COFI Exterior Plywood for Concrete Formwork.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.1.
 - .2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1.
- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .3 Form release agent: non-toxic, low VOC.
- .4 Falsework materials: to CSA-S269.1.
- .5 Sealant: to Section 07 92 10 - Joint Sealing.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Contract Administrator's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

- .8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .9 Align form joints and make watertight. Keep form joints to minimum.
- .10 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.
- .11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners , joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .15 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days for walls and sides of beams.
 - .2 3 days for footings and abutments.
- .2 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3000 mm apart.
- .5 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Concrete Institute (ACI)
 - .1 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
- .3 Canadian Standards Association (CSA)
 - .1 CAN3-A23.3, Design of Concrete Structures for Buildings.
 - .2 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
 - .3 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing's, locations of reinforcement and mechanical splices if approved by Contract Administrator, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing's and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.
- .3 Detail lap lengths and bar development lengths to CAN3-A23.3.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Engineer.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-30.18.
- .4 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
- .5 Mechanical splices: subject to approval of Contract Administrator.
- .6 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Contract Administrator 's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

PART 3 - EXECUTION

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Contract Administrator.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Contract Administrator 's approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

3.3 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 03 35 00 - Concrete Finishing.
- .4 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
 - .2 ASTM C 260, Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C 309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C 332, Specification for Lightweight Aggregates for Insulating Concrete.
 - .5 ASTM C 494, Specification for Chemical Admixtures for Concrete.
 - .6 ASTM C 827, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .7 ASTM C 939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
 - .8 ASTM D 412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - .9 ASTM D 624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .10 ASTM D 1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .11 ASTM D 1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A5, Portland Cement.
 - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2, Methods of Test for Concrete.
 - .4 CAN/CSA-A23.5, Supplementary Cementing Materials.
 - .5 CAN/CSA A363, Cementitious Hydraulic Slag.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate a cleaning area for tools to limit water use and runoff.
- .3 Carefully coordinate the specified concrete work with weather conditions.
- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 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.
- .6 Choose least harmful, appropriate cleaning method, which will perform adequately.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Portland cement: to CAN/CSA-A5.
- .2 Supplementary cementing materials: to CAN/CSA-A23.5.
- .3 Cementitious hydraulic slag: to CAN/CSA-A363.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1.
- .6 Air entraining admixture: to ASTM C 260.
- .7 Chemical admixtures: to ASTM C 494. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 35 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C 827. Time of efflux through flow cone (ASTM C 939), under 30s.
 - .2 Flowable: to ASTM C 827. Flow table, 5 drops in 3s, (ASTM C 109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C 827. Flow table, 5 drops in 3 s, (ASTM C 109, applicable portions) 100 to 125 %.
 - .4 Dry pack to manufacturer's requirements.
 - .3 Net shrinkage at 28 days: maximum 0 %.
- .9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .10 Curing compound: to CAN/CSA-A23.1 white and to ASTM C 309, Type 1-chlorinated rubber.
- .11 Cushion pads: tough, resilient, weather, moisture, and oil resistant material that will not corrode or cause corrosion, consisting of either layers of approved cotton duck saturated and bound together by approved rubber or synthetic compounds, or made from specially compounded synthetic materials.
- .12 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D 1751.
 - .2 Sponge rubber: to ASTM D 1752, Type I, flexible grade.
- .13 Polyethylene film: 0.254 mm thickness to CAN/CGSB-51.34.

2.2 MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, as indicated on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing.

- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .7 Do not place load upon new concrete until authorized by Contract Administrator.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts.
 - .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Contract Administrator.
 - .2 Where approved by Contract Administrator, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Contract Administrator.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
- .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of Contract Administrator, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be to manufacturer's recommendations.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with epoxy grout.
 - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .6 Finishing.
 - .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Use procedures acceptable to Contract Administrator to remove excess bleed water. Ensure surface is not damaged.
 - .3 Provide smooth trowel finish on interior slabs unless otherwise indicated.
 - .4 Provide broom finish on exterior slabs unless otherwise indicated.
 - .5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
- .7 Joint fillers.
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .2 Locate and form joints as indicated. Install joint filler.
 - .3 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3.3 SITE TOLERANCE

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CAN/CSA-A23.1 and Section 01 45 00 - Quality Control.
- .2 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

End of Section

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20, Surface Sealer for Floors.

1.3 PERFORMANCE REQUIREMENTS

- .1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.
- .3 Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.
- .2 Electrical power: Provide sufficient electrical power to operate equipment normally used during construction.
- .3 Work area: Make the work area water tight protected against rain and detrimental weather conditions.
- .4 Temperature: Maintain ambient temperature of not less than 10 °C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .5 Moisture: Ensure concrete substrate is within moisture limits prescribed by manufacturer.
- .6 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .7 Ventilation:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Provide continuous ventilation during and after coating application.

PART 2 - PRODUCTS

2.1 SEALING COMPOUNDS

- .1 Surface sealer: to CAN/CGSB-25.20, as recommended by stain manufacturer.

2.2 CURING COMPOUNDS

- .1 Select water-based curing compounds.

2.3 CONCRETE STAINS

- .1 Select solvent free concrete stains. Primers, thinners, fillers, cleaning agents and equipment as per Niagara Protective Coatings. Colour, concentration and finish to be selected by Contract Administrator.

Standard of Acceptance: Epoxal Stain - Series 4000 as manufactured by Niagara Protective Coatings. CS1=2k Acrylic Clear, CS2=2k Acrylic Clear.

2.4 MIXES

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that slab surfaces are ready to receive work and elevations are as instructed by manufacturer.

3.2 PREPARATION OF SLAB

- .1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated.
- .2 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete as indicated on drawings.
- .3 Remove chlorinated rubber or existing surface coatings.
- .4 Use protective clothing, eye protection and respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

- .1 Prepare and mix materials and apply each component of coating system in accordance with manufacturer's directions to produce a uniform monolithic surface. Minimum of 2 coats required. Total dry film thickness to be 32 mils.
 - .1 Prime Coat: Apply epoxy stain over prepared substrate at a spread rate of 6 mils. Allow coating to cure.
 - .2 Finish Coat: Apply epoxy finish coat over the primed substrate at a spread rate of 14 mils. Allow coating to cure.
 - .3 Anti Skid Top Coat: Apply epoxy topcoat over the entire floor at a spread rate of 6 mils. Broadcast #55 quartz aggregate into the wet coating and back roll. Allow coating to cure.
 - .4 Satin Finish Top Coat: Apply two coats of 2K Satin Urethane topcoat over entire floor at a spread rate of 6 mils. Allow coating to cure.
 - .5 Finished colour and texture to meet approval of Contract Administrator.

3.4 PROTECTION

- .1 Protect finished installation in accordance with manufacturer's instructions.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation non-load bearing, plant-precast architectural concrete.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 03 30 00 - Cast-in-Place Concrete.

1.3 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CAN/CSA-A23.4/A251.
- .2 Length of precast elements not to vary from design length by more than plus or minus 3 mm.
- .3 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 3 mm.
- .4 Deviations from straight lines not to exceed 3mm in 3m.
- .5 Precast elements not to vary by more than plus or minus 3mm from true overall cross sectional shape as measured by difference in diagonal dimensions.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings to CAN/CSA-A23.4/A251 and CSA-A23.3. Include the following items:
 - .1 Design calculations for items designated by manufacturer.
 - .2 Finishing schedules.
 - .3 Methods of handling and erection.
 - .4 Openings, sleeves, inserts and related reinforcement.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE SPLASH PADS

- 1 Precast Concrete Splashpad.
 - .1 36"x12"x2 1/2" for downspouts, Natural Pebblestone finish as manufactured by Barkman or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install splashpads as indicated on drawings.

End of Section