

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-14/A23.2-14c, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121-M1978(R2013), Douglas Fir Plywood.
  - .4 CSA O151-17, Canadian Softwood Plywood.
  - .5 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
  - .6 CAN/CSA-S269.3-M92(R2013), Concrete Formwork, National Standard of Canada
- .2 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork.
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Northwest Territories of Canada.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.
- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse/recycling.
  - .2 Place materials defined as hazardous or toxic in designated containers.
  - .3 Divert wood materials from landfill to a recycling/reuse/composting facility as approved by Departmental Representative.
  - .4 Divert plastic materials from landfill to a recycling/reuse/composting facility as approved by Departmental Representative.
  - .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

## **Part 2            Products**

### **2.1                MATERIALS**

- .1    Formwork materials:
  - .1        For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121 or CAN/CSA-O86 or CSA O437 Series or CSA-O153.
- .2    Pan forms: removable as indicated.
- .3    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 diameter in concrete surface.
- .4    Form release agent: non-toxic, or biodegradable.
- .5    Form stripping agent: colourless mineral oil, non-toxic, biodegradable, and low VOC.

## **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 Departmental Representative'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.
- .5    Do not place shores and mud sills on frozen ground.
- .6    Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7    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 CSA-A23.1/A23.2.
- .8    Align form joints and make watertight.
  - .1        Keep form joints to minimum.
- .9    Construct forms for architectural concrete, and place ties [as indicated] [as directed].
  - .1        Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .10   Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
  - .1        Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

- .11 Line forms for following surfaces:
  - .1 Secure lining taut to formwork to prevent folds.
  - .2 Pull down lining over edges of formwork panels.
  - .3 Ensure lining is new and not reused material.
  - .4 Ensure lining is dry and free of oil when concrete is poured.
  - .5 Application of form release agents on formwork surface is prohibited where drainage lining is used.
  - .6 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
- .12 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

### **3.2 REMOVAL AND RESHORING**

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
  - .1 2 days for walls and sides of beams.
  - .2 28 days for beam soffits, slabs, decks and other structural members, or 2 days when replaced immediately with adequate shoring to standard specified for falsework.
  - .3 2 days for footings and abutments.
- .2 Remove formwork when concrete has reached 80% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide 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 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

**END OF SECTION**