1.0 GENERAL

1.1 RELATED SECTIONS

.1 Concrete Reinforcing Section 03 2100
.2 Cast-in-Place Concrete Section 03 3000

1.2 REFERENCES

.1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
.2 CSA – A3000, Cementitious Material Compendium.
.3 CAN/CSA-O86, Engineering Design in Wood (Limit States Design).
.4 CSA O121, Douglas Fir Plywood.
.5 CSA O151, Canadian Softwood Plywood.
.6 CSA S269.1, Falsework for Construction Purposes.
.7 CAN/CSA-S269.3, Concrete Formwork.

1.3 SHOP DRAWINGS

.1 Prepare shop drawings for formwork and falsework in accordance with Section 01 3300 – Submittal Procedures.
.2 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 CSA S269.1, for falsework drawings and comply with CAN/CSA-S269.3 for formwork drawings.
.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
.4 Indicate sequence of erection and removal of formwork/falsework as directed by Engineer.
.5 Each shop drawing submission shall bear stamp and signature of a qualified professional engineer registered or licensed in the Province of British Columbia.

1.4 MEASUREMENT FOR PAYMENT

.1 No measurement will be made under this Section. Include costs in items of work for which concrete formwork and falsework is required.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 7420 -Waste Management and Disposal.
2.0 PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
.1 For concrete without special architectural features, use plywood and wood formwork materials to CSA-O121 and CAN/CSA-O86.
.2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1.

.2 Pan forms: permanent steel 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 dia. in concrete surface.

.2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:
.1 Plywood: high density overlay Douglas Fir to CSA O121 or Canadian Softwood Plywood to CSA O151, square edge

.5 Form release agent: chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps.

.6 Form stripping agent: colourless mineral oil, free of kerosene, with viscosity between [70 and 110 s Saybolt Universal] [15 to 24 mm²/s] at 40°C, flashpoint minimum 150°C, open cup.

.7 Falsework materials: to CSA S269.1.

.8 Sealant: to Section 07 92 00 - Joint Sealants.

3.0 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 Engineer'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 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 of concrete members, joints, unless specified otherwise.
.12 Form chases, slots, openings, recesses, expansion/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 specific 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.
.16 If slip forming and flying forms are used, submit details of equipment and procedures for Engineer approval.

3.2 REMOVAL AND RESHORING
.1 For removal and reshoring see General Notes.
.2 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.
.3 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1

END OF SECTION
1.0 GENERAL

1.1 RELATED WORK

.1 Concrete Form and Accessories Section 03 1000
.2 Cast-in-Place Concrete Section 03 3000
.3 Concrete Finishes and Accessories Section 03 3500

1.2 REFERENCES

.2 ASTM A775/A775M, Specification for Epoxy-Coated Reinforcing Steel Bars.
.3 ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
.4 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
.5 ASTM D3963 / D3963M, Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars
.6 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
.7 CAN3-A23.3, Design of Concrete Structures for Buildings.
.8 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
.9 CAN/CSA-G40.21, Structural Quality Steels.
.10 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SOURCE QUALITY CONTROL

.1 Provide Engineer with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 1 week prior to commencing reinforcing work.
.2 Inform Engineer of proposed source of material to be supplied.

1.4 SHOP DRAWINGS

.1 Produce shop drawings including placing of reinforcement.

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.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement and mechanical splices if approved by Engineer, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide Class [A] [B] tension lap splices where indicated.

1.5 SUBSTITUTES

.1 Substitute different size bars only if permitted in writing by Engineer.

2.0 PRODUCTS

2.1 MATERIALS

.1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.2 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA G30.18.

.3 Cold-drawn annealed steel wire ties: to CSA G30.3.

.4 Welded steel wire fabric: to ASTM A185/A185M. Provide in flat sheets only.

.5 Epoxy coating of non-prestressed reinforcement: to ASTM A775/A775M.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.7 Mechanical splices: subject to approval of Engineer.

.8 Plain round bars: to CAN/CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada unless indicated otherwise. For epoxy coated bars, fabricate in accordance with ASTM D3963.

.2 Obtain Engineer's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Engineer, weld reinforcement in accordance with CSA W186.
.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists. For epoxy coated bars, method of bundling and transportation should be in accordance with ASTM A775/A775M and ASTM D3963.

3.0 EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Engineer.

.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 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 Engineer'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 reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

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1.0 GENERAL

1.1 RELATED SECTIONS

.1 Concrete Forms and Accessories  
Section 03 1000

.2 Concrete Reinforcing  
Section 03 2100

.3 Concrete Finishing and Accessories  
Section 03 3500

.4 Anchors and Inserts  
Section 03 1511

.5 Waterstops  
Section 03 1513

.6 Metal Fabrications  
Section 05 5000

1.2 REFERENCES


.2 ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C332, Specification for Lightweight Aggregates for Insulating Concrete.

.4 ASTM C827, Test Method for Early Volume Change of Cementitious Mixtures.

.5 ASTM C939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

.6 ASTM D412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.7 ASTM D624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.8 ASTM D1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.9 ASTM D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.10 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.11 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.12 CGSB 81-GP-1M, Flooring, Conductive and Spark Resistant.


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

.15 CAN/CSA-A23.2, Methods of Test for Concrete.

16 CSA A283, Qualification Code for Concrete Testing Laboratories.

17 CSA S269.1, Falsework for Construction Purposes

.18 CAN/CSA-S269.3, Concrete Formwork

1.3 CERTIFICATES

.1 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

.2 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.4 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for Engineer’s approval for following items:

.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal.
.7 Joints.

.2 Minimum 1 week prior to starting concrete work, submit satisfactory test results on the permeability index of concrete tested in accordance with ASTM C1202 from prequalification tests. The samples, minimum three specimens, in the prequalification tests shall be taken from cylinders cast from concrete with the same mix proportions and mixing procedures as intended for the project. The maximum permeability index based on the charge passed is 1500 coulombs. Owner will pay for costs of tests as specified in Section 01 1000 Summary of Work and 01 4000 – Quality Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 7420 - Waste Management and Disposal.

.2 Ensure emptied containers are sealed and stored safely.
.3 Use excess concrete for: additional paving, post footing anchorage, swale rip-rap reinforcing, mud slab, flowable fill, footing bottom, retaining wall footing ballast, storm structure covers, underground utility pipe kickers, storm pipe flared end section, toe wash protection, shoulder and toe outfall restraints for temporary erosion pipes.

.4 Divert unused concrete materials from landfill to local facility as reviewed by Consultant.

.5 Provide appropriate area on job site where concrete trucks can be safely washed.

.6 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Consultant.

.7 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

2.0 PRODUCTS

2.1 MATERIALS


.2 Supplementary cementing materials: to CAN/CSA- A3000.

.3 Water: to CAN/CSA-A23.1.

.4 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.5 Low density aggregate for insulating concrete: to CAN/CSA-A23.1 and ASTM C332 group I.

.6 Air entraining admixture: to CAN3-A266.1.

.7 Chemical admixtures: to CAN/CSA A3000. Engineer 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.

.9 Compressive strength: 50 MPa at 28 days.

.2 Consistency:

.1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.

.2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.

.3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.

.4 Dry pack to manufacturer’s requirements.

.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 50 MPa at 28 days.

.10 Curing compound: to CAN/CSA-A23.1 white and to ASTM C309, Type 1-chlorinated rubber.

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.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 Ribbed waterstops: extruded PVC Arctic Grade of sizes indicated with welded corner and intersecting pieces:

- Elongation: to ASTM D412, method A, Die "C", minimum 275%.
- Tear resistance: to ASTM D624, method A, Die "B", minimum 48 kN/m.

.13 Premoulded joint fillers:

- Bituminous impregnated fibre board: to ASTM D1751.
- Sponge rubber: to ASTM D1752, Type I, [flexible] [firm] grade.
- Self-expanding standard cork: to ASTM D1752, Type [II] [III].

.14 Weep hole tubes: plastic.

.15 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

.16 Dampproofing: Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2, and to Section 07 1300 - Modified Bituminous Sheet Waterproofing.

2.2 MIXES

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give the following properties:

- Cement: Type GU or GUb – General use cement.
- Minimum compressive strength at 28 days: See General Notes
- Class of exposure: See General Notes
- Nominal size of coarse aggregate: See General Notes
- Slump at time and point of discharge: See General Notes
- Air content: See General Notes
- Chemical admixtures: following admixtures in accordance with CAN/CSA 3000. Admixtures shall contain no salts or acids.

3.0 EXECUTION

3.1 PREPARATION

.1 Obtain Engineer’s approval before placing concrete. Provide 24 h 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 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 Engineer.

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 Engineer.

.2 Where approved by Engineer, 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 Engineer.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.

.4 Check locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts.

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.2 With approval of Engineer, grout anchor bolts in holes drilled after concrete has set. 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 1000 - Concrete Forms and Accessories. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.
.5 Dovetail anchor slots:
  .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
  .2 Install continuous vertical anchor slots at 800 mm o/c where concrete walls are masonry faced.

.6 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.7 Finishing:
  .1 Finish concrete in accordance with CAN/CSA-A23.1.
  .2 Use procedures acceptable to Engineer or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.
  .3 Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete: Provide written declaration that compounds used are compatible.

.8 Waterstops:
  .1 Install waterstops to provide continuous water seal. Do not distort or pierce waterstop in such a way as to hamper performance. Do not displace reinforcement when installing waterstops. Use equipment to manufacturer's requirements to field splice waterstops. Tie waterstops rigidly in place.
  .2 Use only straight, heat sealed butt joints in field. Use factory welded corners and intersections unless otherwise approved by Engineer.

.9 Joint fillers:
  .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Engineer. 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 isolation, construction and expansion 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.

.10 Dampproof membrane:
  .1 Install dampproof membrane under concrete slabs-on-grade inside building.
  .2 Lap dampproof membrane minimum 150 mm at joints and seal.
  .3 Seal punctures in dampproof membrane before placing concrete. Use patching material at least 150 mm larger than puncture and seal.

3.3 SITE TOLERANCE

.1 All horizontal surfaces shall meet the Class A Slab and Floor Finish classification (+/- 8mm) in accordance with Table 22 of CAN/CSA-A23.1 straight edge method.
3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Owner in accordance with CAN/CSA-A23.1.

.2 Owner will pay for costs of tests as specified in Section 01 4000 – Quality Requirements

.3 Additional test cylinders shall be taken during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.

.5 Inspections or testing by Owner will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

END OF SECTION
1.0 **GENERAL**

1.1 **RELATED SECTIONS**

.1 Cast in Place Concrete  
.2 Masonry Mortar and Grout  
.3 Masonry Accessories  
.4 Masonry Anchorage and Reinforcement  
.5 Brick Masonry  
.6 Concrete Unit Masonry  
.7 Metal Fabrications  
.8 Joint Sealers

1.2 **REFERENCES**

.1 CSA A179-04 (R2009), Mortar and Grout for Unit Masonry.
.2 CAN3-A371-04 (R2009), Masonry Construction for Buildings.
.3 CSA G30.18-09, Billet Steel Bars for Concrete Reinforcement

1.3 **SAMPLES**

.1 Submit samples in accordance with Section 01 33 00 - Submittals.
.2 Submit samples:

.1 Two of each type of masonry unit specified
.2 One of each type of masonry accessory specified.
.3 One of each type of masonry reinforcement, tie and connector proposed for use.
.4 As required for testing purposes.

1.4 **TEST REPORTS**

.1 Submit laboratory test reports in accordance with Section 01 33 00 - Submittals.
.2 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
.3 For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating rate of absorption.

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1.5 **JOB MOCK-UP**

.1 Construct mock-ups in accordance with Sections 01 33 00 - Submittals.

.2 Construct mock-up panel of exterior masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.

.3 Construct mock-up where directed.

.4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may not remain as part of the finished work.

1.6 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver materials to job site in dry condition.

.2 Keep materials dry until use except where wetting of bricks is specified.

.3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.7 **ENVIRONMENTAL REQUIREMENTS**

.1 Cold weather requirements

.1.1 Supplement Clause 5.16.2 of CAN3-A371 with following requirements:

.1.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used.

.2 Hot weather requirements

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.2 Keep masonry dry using waterproof, non-staining covering that extends over walls and down sides, sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashing or other permanent construction.

.3 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.4 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place. Bracing to be in accordance with Clause 6.1.1 of CSA – A371.
1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section [01 74 19 - Construction/Demolition Waste Management and Disposal] [ ].
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] packaging material [in appropriate on-site] [ ] for recycling in accordance with Waste Management Plan.
.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

2.0 PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified in related Sections indicated in 1.1.

3.0 EXECUTION

3.1 INSTALLATION

.1 Do masonry work in accordance with CAN3-A371 except where specified otherwise.
.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.2 CONSTRUCTION

.1 Exposed Masonry

.1 Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.

.2 Jointing

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
.2 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thing finish coating.
.3 Cutting

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-in

.1 Build in items required to be built into masonry.
.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks

.1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute1000 mm²: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.6 Support of loads

.1 Use 25Mpa concrete to Section [03 30 00] [03 30 05] - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
.2 Use grout to CSA A179 where grout is used in lieu of solid units.
.3 Install building paper below voids to be filled with grout; keep paper 25mm back from faces of units.

.7 Provision for movement

.1 Leave 6 mm space below shelf angles.
.2 Leave 12 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
.3 Built masonry to tie in with stabilizers, with provision for vertical movement.

.8 Loose steel lintels

.1 Install loose steel lintels. Centre over opening width.

.9 Control joints

.1 Construct continuous control joints as indicated

.10 Expansion joints

.1 Build-in continuous expansion joints as indicated.
3.3 SITE TOLERANCES

.1 Tolerances in notes to Clause 6.2 of CSA - A371 apply.

3.4 RE-INSTALLATION

.1 Cut openings in existing work as indicated.

.2 Openings in walls to be approved by Engineer.

.3 Make good existing work. Use materials to match existing.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing will be carried out by Testing Laboratory designated by Consultant.

.2 Owner will pay costs for testing, as specified in Section [01 29 83 – Payment Procedures for Testing of Laboratory Services] [01 29 00 – Payment Procedures] [01 45 00 - Quality Control].
GENERAL

1.0 RELATED SECTIONS

.1 Masonry Procedures Section 04 05 00

1.1 REFERENCES

.1 CSA A179-04 (R2009), Mortar and Grout for Unit Masonry.

1.2 SAMPLES

.1 Submit samples in accordance with Section [01 33 00] – [Submittals]
.2 Submit two samples of mortar.

2.0 PRODUCTS

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.
.2 Mortar and grout: CSA A179.
.3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
.4 Colour: ground coloured natural aggregates or metallic oxide pigments.
.5 Mortar for exterior masonry above grade:

.1 Loadbearing: Type S based on Property specifications.
.2 Non-loadbearing: Type S based on Property specifications.
.3 Parapet walls, chimneys, unprotected walls: Type S based on Property specifications.

.6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: Type S based on Property specifications.

.7 Mortar for interior masonry:

.1 Loadbearing: Type N based on Property specifications.
.2 Non-loadbearing: Type N based on Property specifications.

.8 Following applies regardless of mortar types and uses specified above:

.1 Mortar for calcium silicate brick and concrete brick: Type N based on Proportion specifications.
.2 Mortar for stonework: Type N based on Property specifications.

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.3 Mortar for grouted reinforced masonry: Type S based on Property specifications.

.4 Mortar for pointing: Type S based on Proportion specifications.

.5 Mortar for glass block: 1 part Portland cement, 1 part hydrated lime, 4 parts aggregate by volume.

.9 White mortar: use white Portland cement, and lime to produce mortar type specified.

.10 Coloured mortar: use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.

.11 Non-staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

.12 Grout: to CSA A179, Table 5 and Table 7.

.13 Parging mortar: Type S to CSA A179.

2.2 MIXES

.1 Colour and admixtures: Mix grout to semi-fluid consistency.

.2 Coloured mortars: Incorporate colour and admixtures into mixes in accordance with manufacturer's instructions.

   .1 Use clean mixer for coloured mortar.

   .3 Pointing mortar: Prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour nor more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

3.0 EXECUTION

3.1 CONSTRUCTION

   .1 Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.

   .2 Apply parging in uniform coating not less than total 10 mm thick, where indicated.

3.2 SCHEDULE

   .1 Grout masonry components as indicated on drawings.

END OF SECTION
1.0 GENERAL

1.1 RELATED SECTIONS

.1 Masonry Procedures Section 04 05 00
.2 Mortar and Masonry Grout Section 04 06 00

1.2 REFERENCES

.1 ASTM D2240-03, Test Method for Rubber Property - Durometer Hardness.
.2 CSA-A371-04, Masonry Construction for Buildings.

2.0 PRODUCTS

2.1 MATERIALS

.1 Control joint filler: purpose-made to ASTM D2240 of size and shape indicated.
.2 Lap adhesive: recommended by masonry flashing manufacturer.
.3 Weep hole vents: purpose-made screened PVC to drain cavity to exterior.
.4 Mechanical fasteners:
   .1 Brick Veneer Ties:
      .1 Masonry contractor is responsible for engineering and installing face brick veneer to meet Code requirements.
      .2 L-plate with vertical slot and wire V-ties are to be hot dipped galvanized. Use corrosion resistant screws.
   .5 Through Wall Flashing: Minimum 60 mil self-adhering sheet membrane flashing, Grace Perm-A-Barrier Wall Flashing, Monsey Bakor Blueskin S.A. Sheet Membrane Flashing, Soprema Colphene 1000 GSA or acceptable substitution. Primers to be supplied by flashing manufacturer.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install continuous control joint fillers in control joints at locations indicated.
.2 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm oc.

3.2 CONSTRUCTION

.1 Build in flashings in masonry in accordance with CSA - A371 as follows:
.1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. Install flashings under weep hole courses and as indicated.

.2 In cavity walls and veneered walls, carry flashings from front edge of masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
   .1 For masonry backing embed flashing 25 mm in joint.
   .2 For concrete backing, insert flashing into reglets.
   .3 For wood frame backing, staple flashing to walls behind sheathing paper.
   .4 For gypsum board backing, bond to wall using manufacturer’s recommended adhesive.

.3 Lap joints 150 mm and seal with adhesive.

END OF SECTION
PART 1  GENERAL

1.1 RELATED SECTIONS

.1  Cast-in-Place Concrete  Section 03 3000
.2  Metal Fabrications  Section 05 5000

1.2 REFERENCES

.1  Canadian Standards Association (CSA).
   .1  CAN/CSA-G40.20, General Requirements for Rolled or Welded Structural Quality Steel.
   .2  CAN/CSA-G40.21, Structural Quality Steels.
   .3  CAN/CSA-S16.1, Design of Steel Structures.
   .4  CAN/CSA-S136, Cold Formed Steel Structural Members.
   .5  CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
   .6  CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.
   .7  CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
   .8  CSA W59, Welded Steel Construction (Metal Arc Welding)

.2  Canadian General Standards Board
   .1  CAN/CGSB-1.40 Anticorrosive Structural Steel Alkyd Primer
   .2  CAN/CGSB 85.10 Protective Coatings for Metals

.3  American Society for Testing and Materials (ASTM).
   .1  ASTM A A27/A 27M, Specification for Structural Steel.
   .2  ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60 ksi Tensile Strength.
   .3  ASTM A 325, Specification for Structural Bolts, Steel, Heat Treated,120/105 ksi Minimum Tensile Strength.
   .4  ASTM A 325M, Specification for High-Strength Bolts for Structural Steel Joints.
   .5  ASTM A 490, Specification for Heat Treated, Steel Structural Bolts, 150 ksi (1035 MPa) Tensile Strength.
   .6  ASTM A 490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints
   .7  ASTM F1554, Standard Specifications for Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength

.4  Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
   .1  CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel
   .2  CISC/CPMA 2 -75, Quick-Drying, Primer for use on Structural Steel.

1.3 SHOP DRAWINGS

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.1 Submit shop drawings including fabrication and erection documents, and materials list in accordance with Section 01300 - Submittals.

.2 On erection drawings, indicate all details and information necessary for assembly and erection purposes such as, description of methods, sequence of erection, type of equipment used in erection and temporary bracings. Show detail of all non-standard connections such as bracing connections, truss connections, moment connections and hanger assemblies and other non-standard connections as requested by the Engineer.

.3 All fabricator designed assemblies, components and connections, and drawings to be stamped and signed by qualified professional engineer licensed in the province of British Columbia, Canada.

.4 The Professional Engineer responsible for the shop drawings shall inspect the installation of the work for conformance with the design and the shop drawings, and shall upon completion of the work, provide to the Consultant a completed Schedule S-B: Assurance of Professional Design and Commitment for Field Review by Supporting Registered Professional, and Schedule S-C: Assurance of Professional Field Review and Compliance by Supporting Registered Professional.

1.4 DESIGN OF DETAILS AND CONNECTIONS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16.1 and CAN/CSA-S136 with CSA S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 If connection for shear only (standard connection) is required:
   .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction".

.3 If shears are not indicated, select or design connections to support reaction from 120% maximum uniformly distributed load that can be safely supported by beam in bending (60% each end), provided no point loads act on beam.

.4 At the Engineer’s request, submit sketches and design calculations for non standard connections, stamped and signed by qualified professional engineer licensed in Province of British Columbia, Canada.

1.5 QUALITY ASSURANCE

.1 Submit 2 copies of mill test reports showing chemical and physical properties and other details of steel to be incorporated into work at least 4 weeks prior to fabrication of structural steel. Mill test reports shall be certified by metallurgists qualified to practice in province of British Columbia.
.2 Fabricator of structural steel shall, in addition, provide an affidavit stating that materials and products used in fabrication conform to applicable material and products standards called for by design drawings and specifications.

PART 2  PRODUCTS

2.1 MATERIALS

.1 Structural steel: to CAN/CSA-G40.21 Grade as indicated on drawings.

.2 Anchor bolts: ASTM A307 unless noted otherwise on drawings.

.3 Bolts, nuts and washers: to ASTM A325/ASTM A325M unless noted otherwise on drawings.

.4 High Strength anchor bolts to ASTM F3125/3125M.

.5 Welding materials: to CSA W48 Series and CSA W59 and certified by Canadian Welding Bureau.

.6 Shop paint primer: to CAN/CGSB-1.40.

.7 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m2.

.8 Steel supplied should contain the following minimum percentages of recycled materials
   - Rolled steel shapes 80% or greater
   - All other steel minimum 25%

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16.1 and/or CAN/CSA-S136 and in accordance with reviewed shop drawings.

.2 Continuously seal members by continuous welds. Grind smooth.

2.3 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16.1 except where members to be encased in concrete.

.2 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC SP1 “Solvent Cleaning” for paint and SP7 Brush Off Blast Cleaning for primer.

.3 Apply one coat of CISC/CMPD2-75 primer in shop to all steel surfaces to achieve minimum dry film thickness of 3 to 4 mils, except:
   .1 Surfaces to be encased in concrete.
   .2 Surfaces to receive field installed stud shear connections.
.3 Surfaces and edges to be field welded.
.4 Faying surfaces of friction-type connections.
.5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5°C.
.5 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.
.6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

PART 3 EXECUTION

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16, CAN/CSA-S136.
.2 Welding: in accordance with CSA W59.
.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report any discrepancy and potential problem areas to Engineer for direction before commencing fabrication.

3.3 MARKING

.1 Mark materials in accordance with CAN/CSA-G40.20. Do not use die stamping. If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.
.2 Match marking: shop mark for fit and match.

3.4 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16.1, CAN/CSA-S136 and in accordance with reviewed erection drawings.
.2 Field cutting or altering structural members: to approval of Engineer.
.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
.4 Continuously seal members by continuous welds where indicated. Grind smooth.
3.5 FIELD QUALITY CONTROL

.1 The Owner and his Consultants will not be responsible for inspection of the Contractor’s work as described in Clause 7.12 of the CISC Code of Standard Practice for Structural Steel. The Contractor is responsible for the accuracy and completeness of his own work and shall verify that the structural steel has been fabricated, erected and finished in accordance with the contract specifications, and that all connections designed by the fabricator have been inspected in the field by the Professional Engineer responsible for the design of those connections (or his representative).

.2 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Engineer.

.3 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Engineer.

.4 Submit test reports to Engineer within 1 week of completion of inspection.

.5 Owner will pay costs of tests as specified in Section 01 45 00 - Testing Laboratory Services.

.6 Test shear studs in accordance with CSA W59.

3.6 FIELD PAINTING

.1 Paint in accordance with Section – 09 91 10 - Interior Painting.

.2 Touch up all damaged surfaces and surfaces without shop coat with primer to CAN/CGSB-1.40 except as specified otherwise. Apply in accordance with CGSB 85.10-99.

END OF SECTION
1.0 GENERAL

1.1 RELATED SECTIONS

.1 Payment Procedures: Quality Requirements Section 01 4000
.2 Submittal Procedures Section 01 3300
.3 Cleaning and Waste Management Section 01 7400

1.2 REFERENCES

.1 American Wood-Preservers’ Association (AWPA)
  .1 AWPA M2, Standard Inspection of Treated Wood Products.
  .2 AWPA M3, Standard Quality Control Procedures for Wood Preserving Plants.

.2 Canadian Standards Association (CSA)
  .1 CSA O80, Wood Preservation.
  .2 CSA O80.20, Fire-Retardant Treatment of Lumbering Pressure Processes. This Standard applies to the Fire-Retardant Treatment of Lumber by Pressure Processes. This is not a stand alone specification.
  .3 CSA O80.27, Fire-Retardant Treatment of Plywood by Pressure Processes. This Standard covers the fire-retardant treatment of Douglas Fir, hardwood, softwood, and Poplar plywood by pressure processes. This not a stand alone specification.
  .4 CSA O80.201, Standard for Hydrocarbon Solvents for Preservatives. This Standard covers hydrocarbon solvents for preparing solutions of preservatives. This is not stand alone specification.
  .5 CSA O322, Procedure for Certification of Pressure-Treated Wood Materials for Use in Preserved Wood Foundations.

1.3 QUALITY ASSURANCE

.1 Plant inspection of products treated with preservative and fire-retardant by pressure impregnation will be carried out by a designated testing laboratory to AWPA M2, and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.

.2 Each piece of lumber and plywood for preserved wood foundations to be identified by CSA O322 certified stamp.

.3 Inspection and testing of insert materials will be carried out by a Testing Laboratory designated by Owner.

.4 Owner will pay for costs of tests as specified in Section 01 4000 – Quality Requirements.

1.4 REGULATORY REQUIREMENTS

.1 Each board or bundle of fire-retardant treated material, panel to bear ULC label indicating Flame Spread Classification (FSC), and smoke developed.
1.5 CERTIFICATES

.1 Submit certificates in accordance with Section 01 3300 - Submittal Procedures.

.2 For products treated with preservative, fire-retardant by pressure impregnation submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water-borne preservative, fire-retardant.

.3 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 7400 - Cleaning and Waste Management.

.2 Do not dispose of preservative treated wood through incineration.

.3 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.

.4 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.

.5 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

.6 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

2.0 PRODUCTS

.1 Preservative: to CSA-O80 Series, odourless, salt, chemical, oil-borne, for clear finish.

.2 Fire-Retardant: to CSA O80.20, CSA O80.27, to provide:

.1 Flame Spread Classification: FSC [___].

.2 Smoke developed of not more than: [____].

.3 Solvent: to CSA-O80.201, Type [____].

3.0 EXECUTION

3.1 APPLICATION: PRESERVATIVE

.1 Treat indicate material to CSA O80 Series [indicate commodity standard number] using [____] preservative to obtain minimum net retention of [____] kg/m³ of wood.

SPEC NOTE: Use the following paragraph for treatment with water-borne preservatives.
.2 Following water-borne preservative treatment, dry material to maximum moisture content of [___]%.

3.2 APPLICATION: FIRE-RETARDANT

SPEC NOTE: Use CSA O80.20 for lumber; CSA O80.27 for plywood.

.1 Treat indicate material by pressure impregnation with fire-retardant chemicals in accordance with CSA O80.20, CSA O80.27.

.2 Following treatment, kiln-dry material to maximum moisture content of 12%.

SPEC NOTE: For field treatment of end cuts, see applicable section where preservative treatment is specified.

3.3 APPLICATION: FIELD TREATMENT

SPEC NOTE: Supplement requirements of AWPA M4 as required.

.1 Comply with AWPA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.

.2 Remove chemical deposits on treated wood to receive applied finish.

END OF SECTION
1.0 GENERAL

1.1 RELATED SECTIONS

.1 Shop Fabricated Wood Trusses  Section 06 1753
.2 Glued-Laminated Construction  Section 06 1819
.3 Wood Treatment  Section 06 0573

1.2 REFERENCES

.1 C 1396 / C 1396M, Standard Specification for Gypsum Board.
.2 CSA A123.2, Asphalt Coated Roofing Sheets.
.3 CAN/CSA-A247, Insulating Fiberboard.
.4 CSA B111, Wire Nails, spikes and Staples.
.5 CAN/CSA-G164, Hot Galvanizing of Irregularly Shaped Articles.
.6 CAN/CSA-086, Engineering design in wood.
.7 CAN/CSA-080, Wood Preservation
.8 CSA O112 , CSA Standards for Wood Adhesives.
.9 CSA O121, Douglas Fir Plywood.
.10 CAN/CSA- O122, Structural glued-laminated lumber.
.11 CAN/CSA-O141, Softwood Lumber.
.12 CSA O151, Canadian Softwood Plywood.
.13 CAN/CSA-O325.0, Construction Sheathing.
.14 CAN3-O437.0, OSB and waferboard
.15 CAN/CGSB-11.3, Hardboard.
.16 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
.17 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.18 CAN/CGSB-71.26, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.
.19 National Lumber Grades Authority (NLGA) Special Products Standard for Finger joined Structural Lumber SPS 1.


1.3 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

2.0 PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 12% or less in accordance with following standards:

.1 CAN/CSA-O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber is not acceptable

.3 Framing and board lumber: in accordance with NBC.

.4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 S2S is acceptable.
.2 Board sizes: "Standard" or better grade.
.3 Dimension sizes: "Standard" light framing or better grade.
.4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Construction sheathing: to CAN/CSA-O325.0.

.2 Douglas fir plywood (DFP): to CSA O121, standard construction.

.3 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.4 Waferboard: to CAN 3-O437.0.

.5 Mat-formed structural panelboards strandboard: to CAN3-O437.0.

.6 Hardboard: to CAN/CGSB-11.3.

.7 Insulating fiberboard sheathing: to CAN/CSA-A247.

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.8 Glass fibre board sheathing: non-structural, rigid, faced, fibreglass, insulating exterior sheathing board.

.9 [Isocyanurate] [Urethane] sheathing: to CAN/ULC –S704 [unfaced] [faced].

.10 Gypsum sheathing: to C 1396/C 1396M.

2.3 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 as indicated.

.2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.

.3 Air seal: closed cell polyurethane or polyethylene.

.4 Sealants: Section 07900 - Joint Sealers.

.5 Subflooring adhesive: to CGSB 71-26, cartridge loaded.

.6 General purpose adhesive: to CSA O112 Series.

.7 Nails, spikes and staples: to CSA B111.

.8 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.9 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.10 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.11 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.12 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Engineer.

2.4 FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work or interior highly humid areas and pressure-preservative or fire-retardant treated lumber.

2.5 WOOD PRESERVATIVE

.1 Surface-applied wood preservative: coloured, copper napthenate or 5% pentachlorophenol solution, water repellent preservative.
3.0 EXECUTION

3.1 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces of pressure treated lumber or plywood exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat all material as indicated and follows:

.1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.
.2 Wood furring on outside surface of exterior masonry concrete walls.
.3 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.
.4 Plywood wall sheathing under waterproofing membrane.

3.2 INSTALLATION

.1 Comply with requirements of BCBC 2018 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install subflooring and combined subfloor and underlay with panel end-joints located on solid bearing, staggered at least 800 mm.

.1 In addition to mechanical fasteners, apply subflooring adhesive under panels installed on wood joists. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt. When weather conditions are unsuitable for adhesive, use drywall screws for mechanical fasteners.

.2 Use wood for mechanical fasteners when weather conditions are unsuitable for subflooring adhesive.

.7 Install roof sheathing in accordance with requirements of BCBC.
.8 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, pipe chases, access hatches, fascia, soffit, siding, electrical and mechanical equipment mounting boards, and other work as required.

.9 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

.1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.10 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.11 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.

.12 Install sleepers as indicated.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

.3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.4 SCHEDULES

.1 Roof sheathing:

.1 Plywood, DFP or CSP sheathing grade, T&G.

.2 Exterior wall sheathing:

.1 Plywood, DFP or CSP sheathing grade square edge.

.3 Subflooring:

.1 Plywood, DFP or CSP sheathing grade, T&G edge.

.4 Electrical equipment mounting boards:

.1 19mm thick Plywood, DFP or CSP sheathing grade, square edge.

END OF SECTION
1.0 GENERAL

1.1 RELATED WORK

.1 Rough Carpentry  
Section 06 1000

.2 Glued-Laminated Construction  
Section 06 1819

1.2 REFERENCES

.1 CAN/CSA-O80, Wood Preservation.

.2 CSA-O86, Engineering Design in Wood.

.3 CAN/CSA-O141, Softwood Lumber.

.4 CSA S307, Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.

.5 CSA S347, Method of Test for Evaluation of Truss Plates Used in Lumber Joints.

.6 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.7 NLGA, Standard Grading Rules for Canadian Lumber.

1.3 DESIGN REQUIREMENTS

.1 Design trusses, bracing and bridging in accordance with CAN/CSA-O86 for building locality as ascertained by BCBC Climatic Information for Building Design.

.2 Limit live load deflection to 1/360th of span where plaster and/or gypsum board ceilings are hung directly from trusses.

.3 Limit live load deflections to 1/240th of span unless otherwise specified or indicated.

.4 Provide camber for trusses as indicated.

1.4 SOURCE QUALITY CONTROL

.1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

1.5 QUALIFICATION OF MANUFACTURERS

.1 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.
1.6 **SHOP DRAWINGS**

.1 Submit shop drawings in accordance with Section 01 3300 – Submittal Procedures.

.2 Each shop drawing submission shall bear the signature and seal of the Professional Engineer registered or licensed in the Province of British Columbia.

.3 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration, connections and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details and connections to structural support elements. Indicate design load for each member.

.4 Submit printout of computer design indicating design loads and resistances for truss members.

.5 Do load testing on representative trusses selected by Engineer or provide certification that trusses meet requirements of CSA S307 and CSA S347.

.6 Indicate arrangement of webs or other members to accommodate ducts and other specialties.

.7 Show lifting points for storage, handling and erection.

.8 Show location of lateral bracing for compression members.

.8 The Professional Engineer responsible for the shop drawings shall inspect the installation of the work for conformance with the design and the shop drawings, and shall upon completion of the work, provide to the Engineer a completed Schedule S-B: Assurance of Professional Design and Commitment for Field Review by Supporting Registered Professional, and Schedule S-C: Assurance of Professional Field Review and Compliance by Supporting Registered Professional.

1.7 **DELIVERY AND STORAGE**

.1 Store trusses on job site in accordance with manufacturer’s instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling.
.3 Separate for reuse and/or recycling and place in designated containers for steel, metal, plastic, wood, cardboard as applicable.

.4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

2.0 PRODUCTS

2.1 MATERIALS

.1 Lumber: softwood, S4S, with maximum moisture content of 12% at time of fabrication and to following standards:

.1 CAN/CSA-O141.
.2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.

.2 Fastenings: to CAN/CSA-O86.

.3 Preservative: per Section 06 0573 – Wood Treatment.

.4 Fire retardant: per Section 06 0573 – Wood Treatment.

2.2 FABRICATION

.1 Fabricate wood trusses in accordance with reviewed shop drawings.

.2 Provide for design camber and roof slopes when positioning truss members.

.3 Connect members using bolts and nuts, metal or plywood gussets, metal connector plates, split rings or shear plates as indicated on the reviewed shop drawings.

.4 Apply preservative and fire retardant in accordance with CAN/CSA-O80 Series 97.

3.0 EXECUTION

3.1 ERECTION

.1 Erect wood trusses in accordance with reviewed erection drawings.

.2 Handling, installation, erection, bracing and lifting in accordance with manufacturer’s instructions.

.3 Make adequate provisions for handling and erection stresses.

.4 Exercise care to prevent out-of-plane bending of trusses.

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.5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.

.6 Install permanent bracing in accordance with reviewed shop drawings, prior to application of loads to trusses.

.7 Do not cut or remove any truss material without approval of Engineer.

.8 Remove chemical and other surface deposits on treated wood, in preparation for applied finishes.

END OF SECTION
1.0 GENERAL

1.1 RELATED SECTIONS

.1 Wood Treatment Section 06 0573
.2 Rough Carpentry Section 06 1000
.3 Shop Fabricated Wood Trusses Section 06 1753

1.2 REFERENCES

.1 Canadian Standards Association

.1 CAN/CSA-G40.21, Structural Quality Steels.
.3 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
.4 CAN/CSA-O80, Wood Preservation.
.5 CAN/CSA-O86, Engineering Design in Wood.
.6 CSA O112.9, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
.7 CSA O112.10, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
.8 CAN/CSA-O122, Structural Glued-Laminated Timber.
.9 CAN/CSA-O177, Qualification Code for Manufacturers of Structural Glued-Laminated Timber.
.10 CAN/CSA-S16, Design of Steel Structures.
.11 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGBS-1.40, Primer, Structural Steel, Oil Alkyd Type.

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 36/A36M, Specification for Carbon Structural Steel.
.3 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile Strength.
.4 ASTM A 653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SHOP DRAWINGS

.1 Submit shop and erection drawings in accordance with Section 01 3300 – Submittal Procedures.
.2 Submit erection drawings in accordance with CAN/CSA-S16.
.3 Shop drawings for members to indicate stress grade, service grade and appearance grades, shop applied finishes, camber, cuts, ledgers, holes and connection details.

.4 Each erection and shop drawing submission shall bear signature and stamp of qualified professional engineer registered or licensed in province of British Columbia, for items designed by fabricator or manufacturer. The Professional Engineer shall, upon completion of the work, submit to the Consultant a completed Schedule S-B: Assurance of Professional Design and Commitment for Field Review by Supporting Registered Professional, and Schedule S-C: Assurance of Professional Field Review and Compliance by Supporting Registered Professional.

1.4 QUALIFICATIONS

.1 Manufacture structural glued-laminated members in plant certified by CSA as meeting requirements of CAN/CSA-O177, Class 1 (interior) and Class X (exterior) members.

.2 Submit certificate in accordance with CAN/CSA-O177, Appendix B at completion of fabrication.

.3 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.

.4 Place authorization labels on glued-laminated members indicating manufactured in CSA certified plant.

.5 Certification of material protective sealer.

1.5 DELIVERY AND HANDLING

.1 Apply protective sealer to glued-laminated units before shipping unless specified otherwise.

.2 Wrap quality grade members prior to leaving plant with a moisture resistant wrapping.

.3 Use padded, non-marring slings for handling glued-laminated members.

.4 Protect corners with wood blocking.

.5 Slit underside of membrane covering during storage at site. Do not deface member.

.6 Store glued-laminated units and protect from weather, block off ground and separate with stripping, so air may circulate around all faces of members.

.7 Cover glued-laminated units with opaque moisture resistant membrane if stored outside.

.8 Make adequate provision for delivery and handling stresses.
1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 7400 – Cleaning and Waste Management.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.5 Divert unused paint material from landfill to official hazardous material collections site approved by Consultant.

.6 Do not dispose of unused paint materials or preservative material into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.7 Do not dispose of preservative treated wood through incineration.

.8 Do not dispose of preservative treated wood with materials destined for recycling or reuse.

.1 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.

.9 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

.10 Divert unused wood materials from landfill to recycling, reuse, composting facility approved by Consultant.

2.0 PRODUCTS

2.1 MATERIALS


.2 Adhesive: to CSA O112 Series, to grade of service required in accordance with CAN/CSA-O122.

.3 Sealer for glued-laminated members: penetrating type, clear, non-yellowing liquid.

.4 Fastenings:

.1 Split ring connections: hot rolled carbon steel, SAE 1010, meeting requirements of SAE handbook.

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2.2 FABRICATION

.1 Fabricate members to following classifications:

.1 Stress grade: to 24f-E bending grade, 24f-Ex bending grade, 16c-E compression grade as specified on drawings.
.2 Service grade: “Exterior”
.3 Appearance grade: “Quality” where exposed to view, “Industrial” where concealed.

.2 Mark laminated members for identification during erection. Marks not to be visible in final assembly.

.3 Do not apply sealer to areas which are to receive stained finish or preservative treatment.

.4 Unless specifically detailed, design connections to CAN/CSA-O86.1, and CAN/CSA-S16, to resist shears, moments and forces indicated. Fabricate in accordance with CAN/CSA-S16.

.5 Galvanize connections after fabrication.

3.0 EXECUTION

3.1 PRESERVATIVE TREATMENT

.1 After fabrication, pressure treat indicated members with preservative and fire-retardant in accordance with CAN/CSA-O80 Series.
3.2 ERECTION

.1 Ensure protective sealer is not damaged before erection. If damaged, touch up on site before erection.

.2 Erect glued-laminated members in accordance with reviewed erection drawings.

.3 Brace and anchor members until permanently secured by structure.

.4 Make adequate provisions for erection stresses.

.5 Splice and join only at locations as indicated on reviewed erection drawings.

.6 Do not field cut or alter members without Engineer's approval. If approved, preservative treat all cut ends.

.7 Collect waste wood pieces from cutting for reuse where appropriate.

END OF SECTION