

GENERAL

The contractor shall arrange a pre-construction meeting to discuss various construction requirements and expectations. The owner, superintendent, relevant trades and other design consultants will be required to attend.

Contractors are to ensure they are working from current "issued for Construction" plans.

The contractor shall check and verify all dimensions and details on the structural drawings for compatibility with architectural and other consultants' drawings and existing conditions before commencing with the work. The contractor shall inform the engineer in writing during the bidding period of any discrepancies or omissions noted on the drawings or in the specifications. Upon receipt of such information the engineer will provide additional instructions. Any such discrepancy, omission, or variation not reported by the responsibility of the contractor, and corrective work shall be performed as directed by the contractor.

After the contract has been awarded, provide to the engineer a complete breakdown of costs for the structural portion of the work.

During construction, the general contractor shall set-up a record copy of the structural drawings, detailing all changes to the contract documents, and shall be responsible for the construction as a result of field conditions and construction procedures not anticipated at the time of design.

The contractor is responsible for all costs associated with the correction of deficiencies, as determined by the engineer.

All dimensions to take precedence over scale shown on plans, sections, and details.

Engineering services presented on these drawings are for permanent structure only. The contractor shall be responsible for any temporary bracing required for structure stability and for construction loading until the project is completed.

Architectural Design, Electrical, Mechanical, Civil, and Geotechnical Engineering are the responsibility of others.

Unless otherwise noted, structural members have been designed for dry service conditions. Building envelope specifications for adequate protection of structural members is the responsibility of others.

All formwork, shoring for the excavation and underpinning of adjacent structures, if required, is the responsibility of the contractor and shall be designed and inspected by others to current Worker's Compensation and OSHA regulations.

Provision shall be made for safety on the job site during construction and shall ensure compliance to current W.C.B. regulations.

See mechanical, electrical and/or manufacturer's drawings for size, location, and anchor bolt requirements of all machine bases and openings in walls, floors, and roofs. All design of machine and equipment bases is the responsibility of others, unless specifically detailed on drawings. Subcontractors are to provide templates to general contractor showing anchor bolt location for equipment furnished by them, and provide electrical, mechanical, and electrical drawings for openings, slopes, drains, drainage, and waterproofing, etc.

Locations of permanent anchorages to the building structure for seismic restraint of mechanical and electrical equipment and for WCB full restraint must be reviewed with the Structural Engineer.

In cases of discrepancies on structural drawings, the more stringent requirements shall govern.

Governing codes: B.C. Building Code, 2006 including all amendments and Municipal Bylaws.

DESIGN LOADS

This structure has been designed for the following superimposed, service loads:

Roof Live Loads (psf) Dead Loads (psf)

Shed Ss = 50.1 15

Floors/Sheds 100 20

Wind (psf) 14.0

Seismic: Sa(0.2)=0.83, Sa(0.5)=0.62, Sa(1.0)=0.31, Sa(2.0)=0.17

Site Classification = D

Ia = 1.0

Ib = 1.0

Ic = 1.0

Id = 1.0

Allowable soil bearing 2,000psf.

Lateral earth pressure against foundation walls:

Static = 35H

Dynamic = 58H

Prepare site for foundations in accordance with geotechnical report recommendations.

Soil conditions, backfill material, methods of placement and slope stability to be inspected by the geotechnical engineer to verify the conditions and confirm the allowable bearing pressure after excavation and prior to construction of formwork for foundations.

Approval to pour concrete during the inspection design of temporary shoring and foundations for this project. Adequate concrete cover in the foundation design of temporary shoring and foundations for this project.

Bottom of exterior footings to be minimum 16" below final finished grade for frost cover.

Protect footings from frost damage, where necessary, until permanent construction provides such protection.

Footing elevations and sizes are subject to revision where site conditions differ from anticipated soil conditions.

Do not undermine footings by excavations for pits, trenches, etc. Footings may need to be lowered to accommodate mechanical/electrical services.

All footings to bear on firm, undisturbed material. Grassy, roots, top soil, etc., are to be removed from foundation area. Bearing surfaces must be protected from freezing before and after concrete placement.

Footings or slab-on-grade bearing on compacted, granular structural fill shall be compacted to a standard proctor as defined in the geotechnical engineer's report. Standard proctor value to be verified by compaction testing and results to be submitted to the engineer.

All footings shall be centered below walls and columns unless detailed otherwise. Dowels to match vertical bars.

Backfill walls only after a minimum of 7 days following the completion of interior floor system and exterior wall construction. Backfill shall be compacted in 6" lifts and drain away from building.

Coordinate with architectural and other consultants' drawings for ground elevations, openings, drainage slopes, waterproofing, etc.

Inspection of foundation drainage, waterproofing, excavation and shoring is the responsibility of others.

CONCRETE

Provide concrete and perform work to CAN/CSA A23.1-04/A23.2-04. Provide copy of standard at site for reference.

Use clean non-reinforced reinforcing bars conforming to CAN/CSA G30.13-09/2(R2002), grade 400 unless noted. Reinforcing bars shall be lap welded in accordance with CAN/CSA G30.13-09/2(R2002), grade 400, (green/walls, headers, and zones). Epoxy coating to ASTM G3963-G01, Dwyding thread bar Grade 400, welded wire fabrics to CSA G30.15-M1993. At the engineer's discretion, rebar mill certificates shall be provided. The contractor shall be responsible for the cost of testing and certification of the rebar at the expense of the contractor. Fabricate and place reinforcing steel to CAN/CSA A23.1-04/A23.2-04.

The contractor shall arrange for the taking and testing of concrete cylinders by an independent testing agency in accordance with CAN/CSA A23.10-04/A23.2-04 at the expense of the contractor. Test 2 cylinders at 7 days and 2 cylinders at 28 days. One of the cylinders tested at 7 days shall be field cured. Copies of all concrete test results to be sent to the structural engineer.

CONCRETE MIX REQUIREMENTS

LOCATION	COMPRESSIVE STRENGTH	SUMP	MAXIMUM AGG. SIZE	AIR	EXP CLASS
Below grade foundation & footings	3625 PSI (25 MPa)	3" ± 3/4"	3/4"	4-7%	F2
Walls	3625 PSI (25 MPa)	3" ± 3/4"	3/4"	4-7%	F2
Slab-on-Grade (Interior No Forming)	3625 PSI (25 MPa)	2.5" ± 3/4"	3/4"	4-7%	F2
Slab-on-Grade (Exterior)	4640 PSI (32 MPa)	2.5" ± 3/4"	3/4"	5-8%	C2

Submit proposed mix designs to materials consultant for review and provide written confirmation to engineer that the proposed mix designs meet project specifications.

In areas where rebar is congested or ducts create placing difficulties, provide smaller maximum aggregate size, add plasticizer, and adjust air and cement content as required.

All concrete nominal weight 2400 kg/m³, type GU cement, type F flyash, unless otherwise noted. Slumps noted are before the addition of superplasticizer.

No more than 120 minutes shall elapse between concrete batching and concrete placement unless approved by the testing agency and the structural engineer. Contractor's superintendent to monitor specifications.

Do not use admixtures other than air entrainment and standard water reducers or superplasticizers.

Maximum chloride as to CAN/CSA A23.1-04/A23.2-04.

Concrete temperatures as delivered shall comply with Table 14 of CAN/CSA A23.1-04

For concrete in contact with sulphate type soils, include requirements of Table 3 and Section 4.1.1.6 of CAN/CSA A23.1-04.

All reinforcing steel to be secured in final position before concrete is placed. Support reinforcing steel on approved supports, spacers, or hangers provided.

Forms and reinforcing steel must be inspected by the engineer before concrete is placed.

Compact concrete throughout with mechanical vibrators. Work concrete around all embedded material and into corners of forms. Embedded material shall be free from grease, scale and other coatings.

All hot and cold weather concrete work to be carried out in accordance with ACI 805 and ACI 306. When temperature is expected to fall below 0 degrees Celsius within 3 days of pouring concrete, the Contractor shall notify the engineer of the following:

- Provisions for heating form concrete
- Alterations to mix design
- Provisions for heating concrete in forms
- Provisions for curing

Concrete shall be protected from all harmful effects during construction. Concrete shall be cured by approved means for at least 5 days subsequent to pour.

Cold Weather Requirements

- Place and protect concrete in accordance with CAN/CSA A23.1-04/A23.2-04.
- a. Air Temperature not below 5 degrees C
i. Concrete temperature drops below 10 degrees C at point of pouring, the mixing water shall be heated to maintain concrete temperature above 10 degrees C.
b. Concrete shall not be placed on or against any surface which is at a temperature less than 5 degrees C.
c. Contractor shall be prepared to cover slab if air temperature falls below 5 degrees C.
d. Air Temperature below 5 degrees C but not below 0 degrees C
i. Mixing water shall be heated to give a minimum concrete temperature of 10 degrees C at point of pour.
ii. Concrete shall not be placed on or against any surface which is at a temperature less than 5 degrees C.
iii. Slabs shall be covered with canvas or similar, kept a few inches clear of surface.
e. Storey below slab shall be enclosed.
f. Protection shall be maintained for at least 5 days.
g. Enclosure to be constructed so that air can circulate around all structural members.
- Temperatures below 0 degrees C
i. Storey below slab shall be enclosed and supplementary heat provided.
ii. Heating to be started at least one hour ahead of pouring and maintained for a minimum of 3 days after placement.
- Enclosure of the concrete at all points shall be kept at 10 degrees C for 7 days.
- Enclosure to be constructed so that air can circulate around all structural members.

Hot Weather Requirements

- Place and protect concrete in accordance with CAN/CSA A23.1-04/A23.2-04. When air temperature is above 25 degrees C, protect concrete so that its temperature does not exceed 30 degrees C.
- Protect from drying, which causes shrinkage cracking, by effective means as required by conditions. Effective measures include windshield, dampen cover, place and finish at night, do not remove forms for footings and walls until a minimum of 48 hours after placing concrete and after the concrete has attained a strength of at least 10 MPa. Forms for suspended slabs may be removed after the concrete has attained a strength of at least 10 MPa. The design of formwork and reshoring is the responsibility of the contractor.

Clear concrete cover for reinforcing (unless otherwise noted):

Footings: Top & Sides 2"

Walls inside form 1"

Walls outside face and exposed surfaces 2"

Splice Reinforcement as follows (unless otherwise noted on drawings):

Bar Size	Tension Splices	Compression Splice
	Concrete strength 20MPa	25MPa & above
10M	20"	18"
15M	26"	24"
20M	34"	30"

– Where splices are dimensioned on the drawings, such dimensions shall apply.

– On drawings, splices shall be tension splices unless specifically noted as compression splices

All slabs to have temperature steel perpendicular to and immediately above slab bottom reinforcing as follows:

6" slab 15M @ 20" o.c.

Temperature reinforcement shall have a lap of 18" and splices in adjacent bars shall be staggered to be no less than 4' apart.

All concrete to be reinforced. Reinforce unspecified slab areas with 15M @ 18" o.c. each way bottom. Minimum wall reinforcing (including planters, sumps, pits, trenches, architectural walls, etc.) unless noted otherwise:

6" wall 10M @ 18" E.W.
15M @ 20" E.W.
15M @ 18" E.W.
15M @ 20" E.W./E.F.

Cross-lap strip footing steel 12" minimum at corners or provide corner bars.

All walls and columns shall be detailed into footings, walls, beams, or slabs with bars of the same size and spacing as the bars above.

Unless noted, provide:

Concrete to match horizontal wall reinforcement at all wall intersections.

Two 15M bars at ends of walls.

Two 15M bars around all wall openings extending 2'-0" past corners, plus 2-15M by bottom reinforcement at all wall intersections.

Hooks shown are to be CSA standard hooks, unless otherwise noted.

PLYWOOD

Wood Sheathing (Roof, Floor, Walls)

All plywood is to conform to CSA 0121-M1978(R2003) "Douglas Fir Plywood" (DFP) or CSA 0151-04 "Canadian Softwood Plywood" (CSP).

All water board or strand board (OSB) is to be Type 1, or 2 Design Rated OSB in accordance with CAN/CSA 0186-03 (OSB) or CAN/CSA 0186-03 (OSB) and 0253.0-92.

The following minimum panel marks must be displayed on Construction Sheathing OSB:

Minimum nominal thickness	OSB used for sheathings and walls	OSB used for diaphragms and floors/roofs
3/8"	2R24	2R24
1/2"	2R32/2F16 or 1F16	2R32/2F16
5/8"	2R40/2F20	2R40/2F20 or 1F20

Where plywood is specifically indicated, substitution with OSB is not permitted. In addition to indicated structural requirements, sheathing material and thickness must also conform to Architectural Specifications and the more stringent requirement shall govern.

Install sheathing with face grain perpendicular to supporting framing members and stagger end joints in adjacent sheets by 4'-0"

	Material	Dimensions (Min.)
Sloped roof/Ceiling	OSB/Plywood	1/2" + H clips
Floor	Plywood	3/4" T&G
Exterior walls	OSB/Plywood	1/2"

Sawn Timber	Grade	Size	Manufacture
Beams	SF No.2 u.n.o.		Dressed
Wall Plates	DF No.2 u.n.o.	See plan	Dressed
Interior Wall Studs	SF No.2 u.n.o.	See plan	Dressed
Exterior Wall Studs	SF No.2 u.n.o.	See plan	Dressed
Pests	DF No.1 u.n.o.	See plan	Dressed

• The use of finger-joined studs is not permitted.

Contractor is to submit list of proposed lumber species and grade to the engineer prior to start of construction.

All sawn timber exposed to the exterior or in contact with concrete to be pressure treated to CSA 089 Series-97(R2002). Material to bear Canadian Wood Preservers Bureau stamps. Treat cut ends of all timber with preservative. All bolts in contact with pressure treated lumber to be galvanized or stainless steel.

All nails into pressure treated lumber are to be galvanized to ASTM A153. All hangers in contact with pressure treated lumber to have ZMAX/HDC galvanized coating. All anchor bolts in contact with pressure treated lumber to be stainless steel or galvanized.

Any lumber not grade marked will be rejected.

Structural Composite Lumber (SCL)

To be manufactured to CSA Standards in CSA approved shops

Manufacturer to supply layout drawings showing location and specifications for their product.

Manufacturer to provide upon request appropriate documentation endorsed by a registered professional engineer to support the strength values set out in the manufacturer's technical literature.

SCL products shall bear an identification stamp with the grade and name of manufacturer.

Specified structural composite lumber for this project has been specified from products manufactured by Trus Joist MacMillan with design and specifications based on published values for Limit States factored resistances as indicated below:

	2.0E Parallel FSL	1.9E Microlam LVL	1.7E Timberstrand LSL
E (ksi)	2,0x10 ⁶	1,9x10 ⁶	1,7x10 ⁶
Fb (psi)	5360	4805	4805
Ft (psi)	1365	1365	1600
Fc (psi)	350	350	350
Fv (psi)	540	430	740

Specified Parallel FSL, Microlam LVL and Timberstrand LSL members may be replaced with other manufacturer's products with the following provisions:

- engineering properties of proposed substitute SCL to be within 5% of above noted values
- submit list of proposed substitute SCL for engineer's approval prior to ordering material
- upon request provide appropriate documentation of engineering properties for proposed SCL

Delivery, Storage and Handling:

All materials shall be delivered to the site in consultation with the supplier and contractor to ensure the construction sequence. Materials shall be stored away from site and not be piled off the construction site. Separating and wrapping shall be used on the underside to prevent the use of wrapped members, the wrapping shall be split on the underside to prevent the accumulation of condensation. Members that will be exposed to view in the finished building shall be handled using nylon or fabric slings to prevent surface damage.

Connectors :

Specified wood framing connectors for this project have been selected from catalogues published by Simpson Strong-Tie Company. All fasteners shall be installed in accordance with the manufacturer's instructions. Connectors shall be installed in accordance with the instructions in the manufacturer's catalogues and with fasteners supplied/specified by hanger manufacturer (do not use "P" nails). For proposed alternate connectors, submit literature indicating connector capacity and installation procedures to engineer for review and approval prior to installation. All nails into pressure treated lumber (ply) to be galvanized to ASTM A153. All hangers in contact with pressure treated lumber to be stainless steel or galvanized.

FRAMING

Any changes to the framing shown on the drawings shall have the prior written approval of the engineer. Framing changes that have not been approved will be rejected.

All framing details shall conform to B.C.B.C. sections 9.23 and 9.24.

Nails to be common wire nails, galvanized for exterior and visually exposed locations.

All bolts in contact with pressure treated lumber to be galvanized or stainless steel.

Finishes shall be detailed to accommodate shrinkage of the timber over time.

Minimum nailing of plywood sheathing on walls, roofs and floors (unless noted otherwise on plans):

- 2 1/2" nails @ 6" o.c. at sheet edges.
- 2 1/2" nails @ 6" o.c. at all other intermediate support members (Staples are not permitted.)

Do not use staples for plywood nailing. Nails which are recessed more than 10% of the sheathing thickness will be rejected.

Floor sheathing shall be nailed with spiral nails and shall be glued to the joists in addition to nailing. Nailing called up on these drawings is based on common nails. If smaller diameter nails ("P" nails) are used, increase the number of nails by 33%.

Provide double joists (or solid cross blocking @ 24" o.c.) under all partition walls parallel to wall span. Provide solid blocking between joists at all loadbearing walls, top of beams or headers, and at all supports for cantilevered joists.

1.5"x1.5" cross-bridging to be placed not more than 7'-0" from each support, typ. u.n.o.

Use approved joist hangers at all flush beams.

Align joists with studs.

All beam splices are to occur at supports, unless noted otherwise.

All built-up beams to have full bearing at top plate. All posts and built-up studs shown on any level shall be supported by a minimum of 2' of full bearing below. Provide solid blocking to full width of post in floor space under posts and blocking to built-up studs.

Built-up lumber beams to be nailed with 3 rows of 3 1/4" nails @ 12" o/c each ply.

Cantilevered beams greater than 1'-ply to be nailed with 3 rows of 3 1/4" nails @ 6" o/c each ply.

Laminated studs solid under all beams to full beam width.

All built-up posts (including within wall framing) to have the following nailing per lamination:

- 2 x 4 – 3" nails @ 8" o/c staggered
- 2 x 6 – 3" row 3" nails @ 8" o.c.

All loadbearing stud walls to be anchored to concrete at the base with 5/8" bolts @ 4' –0" o/c. u.n.o.

Fasten non-loadbearing partition walls with power-activated fasteners @ 24" o/c maximum.

Provide additional full height stud at end of beam in addition to indicated no. of cripples.

Provide horizontal mid-height blocking for all stud walls 9'-0" or higher.

All drop beams, lintels and flush beams to be 2-2x10 SPF#2 unless noted otherwise.

PREFABRICATED TRUSSES/JOISTS

Prefabricated wood trusses and built-up areas on wood trusses not detailed on structural drawings, shall be designed and fabricated in accordance with Part 4 of the B.C.B.C. and TPC procedures. Truss designer to prepare shop drawings as three dimensional system of trusses, and not a series of two dimensional structural components. Details for lateral restraint of longitudinal compression bracing to be provided by truss designer.

Truss manufacturer to design trusses for:

- Balanced top chord snow load = 46.4psf
- C_s = 0.8, C_e = 1.0, C_g = 1.0, C_q = 1.0

- Top chord dead load = 8.0psf
- Bottom chord dead load = 7.0psf
- Net wind uplift = 30.0psf

Shed loading for valley areas of roofs shall conform to Figure G-4 of N.B.C. 2005 structural commentaries.

Mechanical unit weights as specified by the mechanical subcontractor/mechanical engineer.

Live load deflections shall not exceed span/360 for roof trusses and span/500 for floor trusses. Trusses to be cambered for 1/2 live load and full dead load. Trusses with more than two bearing points to be fabricated with no camber for level bearing.

For trusses in a corrosive environment all plating to be galvanized and touched up if galvanizing coat is broken.

Refer to Timber section in general notes for truss top chord/bottom chord grade.

Manufacturer is responsible for design and supply of all bridging, blocking accessories, and metal required truss bearing lengths exceed those given on structural drawings.

Truss tie-down clips to be provided at ends of all roof trusses by manufacturer.

Manufacturer to provide cross-bracing at all bearing walls of bottom chord bearing trusses, unless plywood panels or blocking are shown on structural drawings. (Bracing to be designed for min. 200 PLF, or as noted otherwise.)

Where bottom chord bracing is required at spacing other than 10'-0" o/c, such as cantilevers, interior bearings, wind uplift conditions, bottom chord bracing to be graphically shown on truss drawings.

All overframing to be done with valley sets @ 24" o/c, unless noted otherwise. Valley set to be supported by continuous 2x4 blocking. Valley set connection details to be provided by fabricator.

Changes to the roof truss layout shown on the structural drawings are not permitted without prior written approval by the engineer. The engineer shall be responsible for the cost of restructuring the supporting structure to suit truss layout revisions will be charged to the contractor.

Submit 4 sets of shop drawings to Engineering for review minimum 10 working days prior to construction and start of any framing. Truss fabricator to receive approved shop drawings from Engineer before commencing construction. The contractor shall be responsible for the cost of testing and certification of the shop drawings. Submitting the shop drawings shall not constitute an acceptance of the structural drawings and that the truss designs are in general conformance with the requirements of the structural drawings.

Shop drawings to include:

- Project name, location, and shop drawing revision dates.
- Truss designs, indicating all trusses, and a clear reference between the layout and the individual truss designs.
- All loads used in the design. Snow build-up and mechanical loads are to be clearly shown on truss layout drawing and truss designs. All non-uniform loads to be graphically shown on individual truss drawings.
- Material size, grade, and species. Connector plate size, gauge, and location.
- Laminating instructions for multiple ply trusses.

Live load and total load deflection limits.

All lateral bracing requirements, including details to provide lateral restraint of longitudinal wall bracing at intervals along the length of building.

Hanger schedule showing all hardware for truss to truss connections (including girders).

- Certification for hangers and hardware to be supplied upon request

Instructions for temporary bracing of trusses in accordance with WCB regulations.

Shop drawings (including truss layout drawing) to be sealed with an original seal by a Professional Engineer registered in B.C.

All work numbers to be clearly displayed on the underside of the truss bottom chord, and roof top unit locations with the truss fabricator and mechanical contractor.

Field drilling, cutting, matching, or other modification to the trusses is not permitted without the approval of the engineer. All mechanical loads, duct openings, curb sizes, and roof top unit locations with the truss fabricator and mechanical contractor.

Truss fabricator must have an ongoing quality control program in place. The truss plant must be inspected by an independent engineering agency a minimum of 4 times per year. Plant inspection reports are to be made available to the Project Engineer upon request.

The truss manufacturer shall inspect the truss installation prior to the installation of the roof membrane, and after the mechanical system has been installed and provide sealed engineer's certificate, certifying that the trusses have been manufactured in accordance with the truss design and CSA standards and that all bracing, hangers, loads and applicable details have been correctly installed as per approved shop drawings.

SHOP DRAWINGS

Shop drawings for the following items shall be submitted for the engineer's review prior to any fabrication:

Prefabricated timber trusses/joists

The engineer's review will be for the sole purpose of ascertaining conformance with the general design concept only and such review does not relieve the contractor of responsibility for errors and omissions in the shop drawings or of his responsibility for meeting all requirements of the contract documents.

The contractor is responsible for verifying and correlating site dimensions, fabrication processes, methods of