

STRUCTURAL GENERAL NOTES

DESIGN LOADS: International Building Code: IBC 2009 Edition, except as noted

Occupancy Category, Table 1604.5	II	Standard
Roofs		
Ground Snow, Pg		60 psf (used for drifting calculations)
Flat Roof Snow, Pf		42 psf
Snow Exposure Factor, Ce	Table 1608.3.1	1.0
Snow importance Factor, Is	Table 1604.5	1.0
Snow Thermal Factor, Ct	Table 1608.3.2	1.0

Residential		40 psf
Corridors & Public Spaces		100 psf
Corridors above first floor		40 psf
Storage Areas		125 psf
Commercial 1 st floor		100 psf
Balconies		60 psf
Stairs		100 psf

Wind	IBC 1603.1.4, ASCE 7-05	Analytic Method
3 Second Gust Velocity		100 mph
Importance Factor		1.0
Building Category and Internal Pressure Coefficient		
IBC 1609.2, ASCE Figure 6-5	Partially Enclosed	GCp1-0.55
Exposure		B
Components and Cladding Pressures	DP 50 uno	Also see specs
Seismic		
Use Group		1
Importance Factor		1.0
Spectral Response	Acceleration	Coefficient
Short Period	S _s 0.314 g	S _{vs} 0.324 g
One Second	S ₁ 0.077 g	S _{vs1} 0.123 g
Soils Site Class	Table 1615.1.1	D
Design Category	Table 1616.3	B
Basic Force Resisting System, Table 1617.6.2		
Design Base Shear		148 kips
Seismic Response Coefficient	C _s	0.051
Response Modification Coefficient	R	5
Analysis Procedure		Equivalent Lateral Force

FOUNDATION DESIGN:

Refer to soils report no. 14221 by Summit Geoenvironmental Services, dated February 2015. Soils engineer shall verify soil conditions and types during excavation and prior to concrete placement.

-Piles--

Steel piling shall be 8" dia. concrete-filled steel pipe unless noted otherwise. Piling shall be driven in accordance with the requirements outlined in the soils report and the Architect's specification. Minimum capacity per pile shall be as noted on the drawings.

-Retaining Structures--

Earth Equivalent Fluid Lateral Pressure:

Restrained Walls (at rest)	64 pcF
Cantilevered Walls (active)	42 pcF
Passive Resisting	375 pcF
Coefficient of Friction	0.45

REINFORCED CONCRETE:

We encourage the use of blast furnace slag. Design is based on "Building Code Requirements for Reinforced Concrete" (ACI 318). Concrete work shall conform to "Standard Specifications for Structural Concrete" (ACI 301R).

Structural concrete shall have the following properties:

Intended Use	f _c , psi 28day	Max W/C Ratio	Maximum Aggregate	Slump inches	Entrained Air Percent ±1.5%	Cement Type	Admixtures, Comments
footings	3,500	6	3/4" Stone	4	---	I/II	
walls	4,000	.45	3/4" Stone	4	6%	I/II	
grade beams, pile caps	4,000	.5	3/4" Stone	4	3%	I/II	
struct slab on deck	4,000	.5	3/4" Stone	4	---	I/II	6x6 - W2.1xW2.1 W.F.F.
formed struct slab	4,000	.45	3/4" Stone	4	3%	I/II	
exterior slab on grade	4,500	.45	3/4" Stone	4	6%	I/II	
interior slabs on grade	3,500	.5	3/4" Stone	4	---	I/II	Fibermesh
beams, columns	4,000	.45	3/4" Stone	4	6%	I/II	

Detailing, fabrication, and placement of reinforcing steel shall be in accordance with the Manual of Standard Practice for Detailing Reinforced Concrete Structures (ACI 315).

Welded wire fabric shall conform to ASTM A185.

Reinforcing bars shall conform to ASTM A615, Grade 60.

Exposed ties or bars shown to be field-bent, which shall be Grade 40.

Epoxy coated reinforcing bars shall conform to ASTM 775.

Zinc coated (galvanized) reinforcing bars shall conform to ASTM 767.

Bars to be welded shall conform to ASTM 706.

At splices, lap bars 50 diameters unless noted otherwise.

At corners and intersections, make horizontal bars continuous or provide matching corner bars.

Around openings in walls and slabs, provide 2-#5, extending 2'-0" beyond edge of opening.

In continuous members, splice top bars at mid-span and splice bottom bars over supports.

Provide intermittent shear keys at all construction joints and elsewhere as shown on the drawings.

Except as noted on the drawings, concrete protection for reinforcement in cast-in-place concrete shall be as follows:

- Cast against and permanently exposed to earth: 3"
- Exposed to earth or weather:
 - #6 through #18 bars: 2"
 - #5 bar, W31 or D31 wire, and smaller: 1-1/2"
- Not exposed to weather or in contact with ground:
 - Slabs, walls, joists: #11 bar and smaller: 3/4"
 - Beams, columns:
 - Primary reinforcement: 1-1/2"
 - Stirrups, ties, spirals: 1-1/2"

Fibermesh admixture shall be 100% virgin polypropylene, fibrillated fibers as manufactured by Fibermesh Co. per ASTM C-1116 type 111 4.1.3 and ASTM C-1116 performance level one, 1.5 lbs per cubic yard of concrete.

Anchor bolts and rods for beam and column-bearing plates shall be placed with setting templates.

Permanent corrugated steel forms for concrete floor slabs shall be manufactured and erected according to the "Specifications and Code of Standard Practice" of the Steel Deck Institute.

All concrete work is subject to inspection by a qualified special inspector employed by the owner in accordance with IBC Section 1704.4.

STRUCTURAL STEEL:

Structural steel shall be detailed, fabricated, and erected in accordance with latest AISC Specifications, and Code of Standard Practice. Structural steel wide flange beams shall conform to ASTM A992.

Except as noted, framed beam connections shall be bearing-type with 3/4" diameter, snug tight, A325-X bolts, detailed in conformance with Part 4, Tables II and III, for 0.6 times the allowable uniform loads tabulated in Part 2 of the AISC Manual, 9th Edition. Install bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

All beams shall have full depth web stiffeners each side of webs above and below columns.

Anchor rods shall conform to ASTM F1554, Grade 55, with weldability supplement S1.

Headed anchor studs (HAS) shall be attached to structural steel with equipment approved by the stud manufacturer according to the stud manufacturer's recommendations.

Welding shall be done by a certified welder in accordance with AISC and AWS specifications and recommendations using E70 electrodes. Where not specifically noted, minimum weld shall be 3/16" fillet by length of contact edge.

All post-installed anchors shall have current National Evaluation Report, and shall be installed in accordance with the manufacturer's requirements.

Expansion anchors shall be approved "wedge" type unless specifically noted to be "sleeve" type.

Chemical anchors shall be approved epoxy or similar adhesive type and shall have current National Evaluation Report. Where base material is not solid, approved screen tubes shall be used.

Grout beneath column base and beam-bearing plates shall be

minimum 28-day compressive strength of 7,500 psi,

approved pre-bagged, non-metallic, non-gaseous, bleed free, non-shrink, when tested in accordance with ASTM C1107

Grade B or C at a flow cone fluid consistency of 20 to 30 seconds

LIGHT GAUGE STRUCTURAL STEEL FRAMING:

Member forming shall conform to AISI Cold-Formed Steel Specifications.

All structural framing (studs, joists, track, runners, bracing, and bridging) shall be galvanized sheet steel conforming to ASTM A525, G-60.

Studs and joists 54 mils (16 gauge) and heavier shall be 50 ksi yield.

43 mils (18 gauge) and lighter shall be 33 ksi yield.

Subcontractor shall provide bridging and blocking at a maximum of 6 foot spacing or as required for stability and stiffness of the final assembly wherever sheathing does not provide adequate bracing.

Supplier shall design required lintels and headers at openings where not specifically detailed.

Member sizes noted on drawings are in the new SSMA standard nomenclature:

(#d) x (s) x (#w) - (#t)	(#d) Member Depth (inches hundredths)	(s) Style Designation (see Style Designation in table below)	(#w) Flange Width (inches hundredths)	(#t) Material Thickness (mils) (see Mils vs equivalent Gauge in table below)
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(sd) Style Designation	Member Type	(#t) Mils Thickness	Equivalent Gauge
S	Punched C-Section	18	25
J	Unpunched C-Section	27	22
T	Track	30	20 - Drywall
U	Channel	33	20 - Structural
F	Furring Channel	43	18
		54	16
		68	14
		97	12

STRUCTURAL MASONRY:

Design is based on Unit Strength Method

MSJC, Section SC-1.4 B.2

Compressive strength of masonry assembly used for design is 1500 psi, based on net-bedded area.

Ilfollow load-bearing concrete masonry (CMU) shall be medium-weight units conforming to ASTM C90,

Grade N1, minimum compressive strength 1,900 psi based on average net area.

Mortar shall be Type S conforming to ASTM C270.

Masonry cement shall not be used.

Provide full shovled mortar in all head and bed joints.

Admixtures shall not be added for any reason unless approved by the Architect.

Except for lintels, bond beam units shall be produced from standard vertically voided units with pre-cut knockout cross walls.

Grout used in masonry walls and block cells shall be:

course grout, as defined by ASTM C476, with a minimum cube strength = 2,000 psi.

3000 psi concrete using 3/8" diameter aggregate, placed by vibrating unless an approved self-consolidating mix is used

Lifts shall not exceed five feet in height

If grout pour height exceeds 5 feet, clean-out holes shall be provided.

Space continuous horizontal joint reinforcing at 16" maximum in all CMU walls.

Joint reinforcing shall be welded type with 9 gage side-wires and 9 gage trussed or ladder cross wires.

Reinforcing bars shall be as for reinforced concrete except as noted.

At splices, lap bars 48 diameters.

Provide reinforced grouted vertical cells

at corners, ends of walls, jambs of openings, each side of vertical control joints, and at spacing shown on drawings.

Reinforcement shall be secured against displacement prior to grouting

by wire bar locators or other suitable devices at intervals not exceeding 200 bar diameters or 10 feet.

When noted on the drawings,

provide clearance between masonry and structural elements, or

wrap steel with polyethylene film.

Provide vertical control joints in all masonry walls

as located on architectural drawings or

at 25'-0" maximum spacing

at both jambs of openings wider than six feet.

Submit for review

Certificates for materials used in masonry construction indicating compliance with the contract documents

Special Inspection is required by design. See Special Inspection Notes.

MSJC Level 2 Quality Assurance, MSJC Table 1.14.2

Prism and grout tests will be required prior to the start of masonry work shall consist of five (5) masonry prisms.

Test specimens shall be made by the masons, at the direction of the owner's representative,

with materials and techniques currently being used in the wall.

Specimens shall be protected and field cured for 48 hours before being transported to a testing agency.

The testing agent will be hired by the owner and shall be responsible for laboratory care and curing of specimens, testing, and reporting results to the owner, contractor, architect, and engineer in accordance with ASTM E447-92

LOOSE LINTELS:

Unless noted otherwise, provide loose lintels as follows: (One angle for each 4" of wall thickness to bear 6" minimum each end).

Openings 4'-0": Angle 3-1/2" x 3-1/2" x 1/4"

Openings 4'-1 to 5'-4": Angle 5" x 3-1/2" x 1/4"

Openings 5'-5 to 6'-6": Angle 6" x 3-1/2" x 5/16"

STRUCTURAL WOOD FRAMING:

In-Grade Base Values have been used for design

2x framing shall be Spruce-Pine-Fir S4S No. 2 and better unless noted.

All lumber shall be 19% maximum moisture content, unless noted.

Solid timber beams and posts shall be Douglas Fir-Larch No. 1.

Studs shall be Spruce-Pine-Fir S4S No. 2 and better.

Top and bottom plates shall be Spruce-Pine-Fir S4S No. 2 and better.

Wood in contact with concrete shall be pressure-treated Spruce-Pine-Fir S4S No. 2 or Southern Yellow Pine.

Conventional light framing shall comply with IBC Section 2308.

Except as noted otherwise, minimum nailing shall be provided as specified in IBC Table 2304.9.1 "Fastening Schedule."

Flywood and oriented strand board (OSB) floor and roof sheathing shall be APA graded with panel identification index, thickness, and nailing as noted on the drawings.

Nail wall sheathing with 8d commons at 4" o.c. at panel edges, and 12" o.c. at intermediate framing except as noted.

SHEATH ALL EXTERIOR WALLS. SHEATH INTERIOR WALLS AS SHOWN ON THE DRAWINGS. BLOCK AND NAIL ALL EDGES BETWEEN STUDS.

Sheathing shall be continuous from bottom plate to top plate. Cut in "L" and "T" shapes around openings. Lap sheathing over rim joists min 4" at all floors to tie upper and lower stud walls together.

Minimum height of sheathing panels shall be 16" to assure that plates are tied to studs.

Minimum 3-8d per stud and nail plates with "edge nail" spacing.

Sole plate at all perimeter walls and at designated shear walls shall be nailed as for braced panels with 3-16d x 3 1/2" long box nails (coated or deformed shank) per 16". 12d nails are not acceptable.

Provide solid blocking between joists under jamb studs of openings.

Pre-engineered, prefabricated trusses shall be designed for the fabricator by a Professional Engineer Registered in the State of construction, and shall comply with Code Requirements.

Truss to truss connections specified shall be by truss supplier, unless specifically noted on the drawings.

Lower chord of gable end trusses shall be anchored to wall plate with framing anchors at 4'-0" spacing and laterally braced to roof framing at 8'-0" spacing.

Truss supplier shall specify all floor and roof truss bracing and bridging.

All roof rafters, joists, trusses, and beams shall be anchored to supports with metal framing anchors.

Light gage framing anchors shown or required, shall be Simpson "Strong Tie" and installed with the number and type of nails recommended by the manufacturer to develop the rated capacity.

Note that heavy-duty hangers and skewed hangers may not be stocked locally and require special order from the factory.

All beams and trusses shall be braced against rotation at points of bearing.

Unless otherwise indicated, install two lengths of solid blocking x joist depth x 12 inches long in floor framing under column loads. Columns must have a continuous load path to foundation.

Lead holes for lag screws shall be drilled in accordance with Table 6.23 of the AITC Timber Construction Manual, 3rd edition.

PLANT FABRICATED / PRE-ENGINEERED WOOD FRAMING:

Trussed floor joists and roof joists shall be designed and stamped by a registered engineer to support the full dead loads and the superimposed design loads noted on the drawings.

Stresses shall not exceed those listed in the NDS. 15% stress increase may not be used.

Web arrangement and member forces shall be determined by the fabricator.

Manufacture and installation of trusses shall comply with

ANSI/TPI 1 "National Design Standard for Metal-Plate-Connected Wood Truss Construction",

TPI H1B "Commentary and Recommendations for Handling Installing and Bracing Metal Plate Connected Wood Trusses",

TPI DSB "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses".

Calculations and shop drawings, including member sizes, lumber species and grades, and substantiating data for connector capacities, shall be submitted to the Architect and Engineer for review prior to fabrication.

Manufactured "I"-series roof and floor joists shall be by TJI/L-Level, LPL, BCI, NJI, OJ with structural wood flanges and webs, and carry Code approval for the composite section.

Bridging and blocking shall be installed according to the fabricator's requirements.

Shop drawings shall be submitted to the Architect for review prior to fabrication.

Beams noted as LVL on plan shall be 1-3/4" wide Laminated Veneer Lumber beams of the depth noted on plan

Shall be plant-fabricated and manufactured by I Level.

Shall have the following minimum allowable design stresses:

F_b = 2600 psi F_v = 285 psi F_c (||) = 2460 psi F_c(L) = 750 psi E = 1900 ksi

Beams noted as PSL on plan shall be plant-fabricated

Manufactured by I Level, and have the following minimum allowable design stresses:

F_b = 2900 psi F_v = 290 psi F_c (||) = 2900 psi F_c(L) = 750 psi E = 2000 ksi

SHOP DRAWINGS:

Construction Documents are copyrighted and shall not be copied for use as erection plans or shop details.

Use of SI Inc.'s electronic files as base for shop drawings requires prior approval by SI Inc,

signed release of liability by subcontractor,

payment of an administration fee of \$100 per drawing sheet to SI Inc, and

deletion of SI Inc.'s name and Logo from all sheets so used.

The General Contractor and his subcontractors shall submit in writing any requests to modify the plans or specifications.

All shop and erection drawings shall be checked and stamped by the General Contractor prior to submission for Engineer's review.

Unchecked submittals will be returned without review.

Furnish one (1) reproducible and two (2) prints of shop and erection drawings to the Structural Engineer for review prior to fabrication for reinforcing steel, structural steel, wood trusses

Submit in a timely manner to permit ten (10) working days for review.

Shop drawings submitted for review do not constitute "in writing" unless specific suggested changes are clearly marked.

In any event, such changes by means of the shop drawing submittal process become the responsibility of the one initiating such change.

FIELD VERIFICATION OF EXISTING CONDITIONS:

Contractor shall thoroughly inspect and survey existing structure to verify conditions that affect the work shown on the drawings.

Contractor shall report any variations or discrepancies to the Architect before proceeding.

STRUCTURAL ERECTION AND BRACING REQUIREMENTS:

The structural drawings illustrate the completed structure with elements in their final positions, properly supported and braced.

These construction documents contain typical and representative details to assist the contractor.