

ROUGH CARPENTRY / WOOD continued (06100)

- All stud partitions or walls over 10 feet high shall have 2X bridging, some width as the stud, preferably placed at mid-height, but not to exceed intervals of 8 feet O.C.
- Do not bore or notch joists, rafters, or beams except where shown in details. Obtain structural engineer's approval for any holes or notches not detailed. Holes through sills, plates, studs, and double plates in interior bearing and shear walls shall not exceed 1/4 of the plate width. Use only bored holes located in the center of the stud or plate. All notching, cutting, etc. shall conform to CBC Section 2320.8 & 2320.11.9 of the CBC.
- Approved cross-bridging or solid blocking for rafters or joists shall be spaced at 8 feet O.C. maximum.
- Toe nails or slant nails shall be driven at an angle of approximately thirty degrees with the piece and started approximately one-third the length of the nail from the end of the piece.
- The use of pneumatic nailers (machine applied nailing) is subject to approval of the structural engineer subject to a satisfactory job site demonstration, and continued satisfactory performance. If nail heads penetrate outer plies more than would be normal for a hand nailing, or if minimum allowable edge distance is not maintained, the performance will be deemed unsatisfactory.
- Pressure treated Douglas fir shall be No. 2 minimum and bear the treating inspection agency quality mark. Cuts and holes shall be treated per AWPA M-84 (Statements such as "for refusal" are not permitted).
- Nailed connections shall conform to the minimum nailing schedule per CBC table 23-B-1, except as noted otherwise. All nails shall be common wire nails. Box or sinker nails are not permitted and shall not be used. Where driving of nails causes splitting, holes for the nails shall be sub-drilled. Pre-drill to a diameter not more than 3/4 of the nail diameter for all nails 20d or larger. Ring shank (string hold) nails shall be used where nail is subject to withdrawal.

CONNECTION	NAILING (1)
1. Joist to sill or girder, toenail	3-8d
2. Bridging to joist, toenail each end	2-8d
3. 1" x 6" (25mm x 152mm) subfloor or less to each joist, face nail	2-8d
4. Wider than 1" x 6" (25mm x 152mm) subfloor to each joist, face nail	3-8d
5. 2" (51mm) subfloor to joist or girder, blind and face nail	2-16d
6. Sole plate to joist or blocking, typical face nail 16d at 16" (406mm) o.c. Sole plate to joist or blocking, at braced wall panels	3-16d PER 16" (406mm)
7. Top plate to stud, end nail	2-16d
8. Stud to sole plate	4-8d toenail or (12) 2-16d, end nail
9. Double studs, face nail	16d @ 24" (610mm) O.C.
10. Doubled to plates, typical face nail Double top plates, lap splice	16d @ 16" (406mm) O.C. 8-16d
11. Blocking between joists or rafters to top plate, toenail	3-8d
12. Rim joist to top plate, toenail	8d @ 6" (152mm) O.C.
13. Top plates, laps and intersections, face nail	2-16d
14. Continuous header, two pieces	16d @ 16" (406mm) O.C. along each edge
15. Ceiling joists to plate, toenail	3-8d
16. Continuous header to stud, toenail	4-8d
17. Ceiling joists, laps over partitions, face nail	3-16d
18. Ceiling joists to parallel rafters, face nail	3-16d
19. Rafter to plate, toenail	3-8d
20. 1" (25mm) brace to each stud and plate, face nail	2-8d
21. 1" x 8" (25mm x 203mm) sheathing or less to each bearing, face nail	2-8d
22. Wider than 1" x 8" (25mm x 203mm) sheathing to each bearing, face nail	3-8d
23. Built-up corner studs	16d @ 24" (610mm) O.C.
24. Built-up girder and beams	20d @ 32" (813MM) O.C. at top and bottom and staggered 2-20d at ends and at each splice
25. 2" (51mm) planks	2-16d at each bearing
26. Wood structural panels: (2) Subfloor, roof and wall sheathing (to framing): (1 inch = 25.4mm) 1/2" and less 19/32" - 3/4" 7/8" - 1" 1-1/8" - 1-1/4"	8d (3) (4) or 6d (5) 8d (3) 8d (3) 10d (4) or 8d (5)
27. Panel siding (to framing): 1/2" (12mm) or less 5/8" (16mm)	6d (6) 6d (6)
28. Fiberboard sheathing: (7) 1/2" (13mm) 25/32" (20mm)	No. 11 ga. (8) 6d (4) No. 16 ga. (9) No. 11 ga. (8) 6d (4) No. 16 ga. (9)
29. Interior paneling 1/4" 3/8"	4d (10) 6d (11)
30. Truss joist to top plate	2-10d nails ea. side at bott. flange

- Nailing Notes**
- Common nails shall be used. Box nail are not permitted.
 - Nails spaced at 6 inches (152mm) on center at edges, 12 inches (305mm) at intermediate supports except 6 inches (152mm) at all supports where spans are 48 inches (1219mm) or more. For nailing of wood structural panel shear walls, refer to CBC Section 2314.3. Nails for wall sheathing shall be common nails.
 - Common or deformed shank.
 - Common.
 - Deformed shank.
 - Corrosion-resistant siding or casing nails conforming to the requirements of CBC Section 2325.1.
 - Fasteners spaced 3 inches (76mm) on center at exterior edges and 6 inches (152mm) on center at intermediate supports.
 - Corrosion-resistant roofing nails with 7/16" diameter (11mm) head and 1-1/2" (38mm) length for 1/2" (13mm) sheathing and 1-3/4" (44mm) length for 25/32" (20mm) sheathing conforming to the requirements of CBC Section 2325.1.
 - Corrosion-resistant staples with nominal 7/16" (11mm) crown and 1-1/8" (29mm) length for 1/2" (13mm) sheathing and 1-1/2" (38mm) length for 25/32" (20mm) sheathing conforming to the requirements of CBC Section 2325.1.
 - Panel supports at 16" (406mm) [20" (508mm) if strength axis in the long direction of the panel, unless otherwise marked]. Casing or finish nails spaced 6" (152mm) on panel edges, 12" (305mm) at intermediate supports.
 - Panel supports at 24 inches (610 mm). Casing or finish nails spaced 6 inches (152 mm) on panel edges, 12 inches (305 mm) at intermediate supports.
 - Add simpson H-1 anchors @ exterior walls and at perimeter walls at mech. well at each stud, top.

EPOXY OF REINFORCEMENT DOWELS (03505)

- Adhesive anchor system shall be the Hilti HIT C-100 adhesive for the structural observation, the Contractor, and an appropriate Subcontractor shall be held to review the details of the structural system to be structurally observed.
- Drill hole for proper diameter and depth using a carbide tipped drill or coring bit. Avoid any existing reinforcing steel by relocating hole slightly.
- Clean hole thoroughly by vacuum or air pressure.
- Make sure hole is dry and clean prior to grouting.
- Place epoxy grout in hole with caulking gun or similar equipment. Starting at bottom, fill hole approximately 1/2 to 2/3 full.
- Insert rebar into hole while twisting to force material around bar & completely fill all voids.
- Provide support for rebar by tying to rebar or other element until grout has cured.
- "Sikadur 31 HI/MOD GEL" may be used for setting vertical dowels.
- Continuous inspection by registered deputy inspector is required during epoxy grouting.

NON-SHRINK GROUT (03510)

- Non-shrink grout shall be Master Builders Embeco 636 or equal.
- Surface preparation shall follow manufacturer's printed instructions. Proper surface cleaning and moist curing is essential.
- Allow non-shrink grout to cure a minimum of 7 days prior to any epoxy injection work.

ROUGH CARPENTRY / WOOD (06100)

- All wood members shall be Douglas Fir (DF) or Larch grade marked by a recognized grading agency (WCLUB & WWPA).
- Wood grades (unless otherwise noted):

	Grade
A) For horizontal members: Joists & rafters	#1
Purlins & subpurlins	#1
Beams & Stringers	Dense #1
B) For vertical members: 2 X 4 studs	#2
2 X 6 & larger studs	#1
Post & Timbers	#1

- Plywood sheathing shall be A.P.A. rated Douglas Fir structural J conforming to Commercial Products Standard PS-1, latest edition (exterior glue). Wood structural panel diaphragm other than structural I plywood are not permitted and shall not be used.

Use plywood nails with same gauge as common wire nails, and with lengths at least equal to plywood thickness plus required penetration per CBC Table 23-11-1.

- All sills or plates resting on concrete or masonry, which are in contact with earth or resting on foundations, shall be pressure-treated Douglas Fir. Bolts shall be placed 8" from the end of a board or from a notch, and spaced at intervals noted (minimum 5/8" diameter @ 48" O.C.).
- Connector references, unless noted otherwise, are from "Simpson Strong-Tie" Catalog (latest edition). Approved equivalents shall have matching ICBO ratings and shall only be used with prior approval of the architect or structural engineer. Where more than one type of fastener, in the reference series, is scheduled for a joist or rafter, the contractor shall supply the fastener with the greatest capacity. All nail holes in the connector shall be filled with proper nails unless noted otherwise elsewhere.

- Provide double joists under all parallel partitions.
- Provide blocking or bridging per CBC Section 2320.8.6 & 2320.11.8

- Unless otherwise noted, top plates of all wood stud walls shall be 2-X (same width as studs), lap 48" (minimum), with not less than 8-16d nails at each lap, and not more than 12" between nails.

- Moisture content of wood at time of placing shall not exceed 19 percent.
- Bolt Holes for A 307 bolts shall be a minimum of 1/32" to a maximum of 1/16" larger diameter than nominal size of bolt used. Retighten all nuts prior to closing in.

- Holes for lag bolts and lag screws shall be pre-drilled to a diameter not more than 3/4 of the lag diameter. Retighten all lag bolts and lag screws prior to closing in.

- Standard cut steel plate washers shall be used under bolt heads and nuts bearing against wood. Use heavy plate of malleable iron washers for all bolts designed to act in tension (see drawings for location). No indentations on surface bearing against wood. Washer sizes shall be as indicated on detail 6/S1.2.

- All walls not solidly sheathed shall have a 1 X 6 diagonal let-in brace at each end and at 25 feet O.C. maximum. Let-in braces shall extend diagonally from bottom of lowest plate to top of upper plate at an angle sufficient to include at least four stud spaces.

STRUCTURAL OBSERVATION (20005)

Comply with the following procedures:

- A pre-construction meeting including the engineer responsible for the structural observation, the Contractor, and an appropriate Subcontractor shall be held to review the details of the structural system to be structurally observed.
- During the course of construction, the Engineer shall visually review the structural system for GENERAL CONFORMANCE with the approved plans. Any observed deficiencies shall be reported in writing to the owner's representative, to the contractor and to the building department.
- Upon completion of the work, the engineer performing the structural observation shall submit a letter to the building department with his/her wet stamp and signature attesting to (1) the date on which the pre-construction meeting was held and (2) the dates on which visual observations were conducted. The letter shall also identify any reported deficiencies which, to the best of the observer's knowledge, have not been resolved.

TESTS AND REPORTS (20010)

- Mill reports and laboratory tests are required to be submitted to the structural engineer for his record. Mill reports and laboratory test shall include, but not be limited to, the following:
 - Concrete cylinders
 - Reinforcing steel
 - Structural steel
 - Concrete mixes
 - Concrete anchors

SHOP DRAWINGS (20020)

- Shop drawings shall be submitted to the structural engineer for his review and authorization to proceed. Shop drawings shall include, but not be limited to, the following:
 - Reinforcing steel including location of construction joists.
 - Structural steel
 - Prefabricated wood truss joist
 - Other prefabricated item

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO) EVALUATION REPORTS

ITEM	ICBO REPORT NUMBER
Simpson Strong Tie Metal Bridging, SA Strap Anchors	NER-413
TJI Joists and Open Web Trusses	EPFC-4354
Residential TJI Joists	NER-119
MICRO-LAM Laminated Veneer Lumber	NER-126
TJI, TJI, TJI, 13/50 and 13/60 Open Web Truss Series	NER-148
TJI Joists	NER-200
Drilico Maxi-Bolt Bearing Type, Undercut Anchors	4133
Hilti HSE Heavy Duty Concrete Anchors	3897
Nelson Shear Connector Studs	2614
Simpson Strong Tie Framing Connectors & Hold-Down Anchors	1211
Simpson Strong Tie Joist Hangers	1296
Simpson Strong Tie HD2, HD5, HD7, HD10, HD12 & HD15	NER-393
Simpson Strong Tie Framing Connectors & Joist Hangers	NER-209
Eastell Cellular Concrete	1381
3M Scotch Grip Wood Adhesive 5230	2964
Willamette Industries Inc. WSI 423	PFC-4544
Standard Structures Inc. SSI 423	PFC-4325
TW Rammed/Red Head Trubolt Wedge Anchor	1372
Hilti Kwik Bolt II anchors	ER-4627

INSPECTIONS (20000)

Notify the structural engineer 24 hours prior to:

- Placing concrete
 - Covering wood framing
 - Covering plywood shear walls
 - Covering plywood with a floor sheathing
- Special inspection per CBC Section 1701.

Special inspection by a certified deputy building inspector, approved by the architect, structural engineer and the checking agency, shall be required for the types of work listed below. See Project Specifications for specific requirements.

Special inspections shall not be required when the work is done on the premises of a fabricator required and approved by the building official to perform such work without special inspection.

The special inspector shall be under the supervision of a registered professional engineer.

The special inspector shall furnish inspection reports to the building official, the architect, and the structural engineer. All discrepancies shall be brought to the immediate attention of the contractor for correction; then if uncorrected, to the proper design authority and the building official. The special inspector shall submit a final report, signed by both he and his supervisor, stating whether the work requiring special inspection was in conformance with the approved plans and specifications and the applicable workmanship provisions of the CBC.

- Concrete
f'c - Design strength greater than 2000 psi.
Placing of reinforcing steel.
- Welding
Structural steel,
Reinforcing steel,
Shear connectors,
Anchor studs.
- High-Strength Bolting
- Fabricated Steel or Timber Joists
- Glued-Laminated Timber
- Structural Masonry
f'm - Design stresses greater than 50% of allowable.
- Expansion Type Anchor Bolts (See Below)
- Compacted Fill
- Bolts Installed in Concrete
- Hilti HIT HY-150 Adhesive Anchor System (Installation in CMU and CONC).

Epoxy-Type Anchors

- Hilti HIT HY-150 and Simpson Set Adhesive
 - Anchor diameter refers to the thread size.
 - Apply proof test loads to anchors without removing the nut if possible. If nut removal is required, remove nut and install a threaded coupler to the same tightness as the original nut using a torque wrench and apply the load.
 - Reaction loads from test fixtures may be applied in close proximity to the anchor being tested provided the anchor is not restrained from withdrawing by the fixture (s).
 - Test equipment is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
 - The following criteria apply for the acceptance of installed anchors:
 - Hydraulic Ram Method:
The anchor should have no observable movement at the applicable test load. A practical way to determine observable movement is that the washer under the nut becomes loose.
 - Testing should occur a minimum of 24 hours after installation of the subject anchors.
 - Testing shall be performed in the presence of the Inspector of Record.
 - Test 50% of the installed anchors per Section 1923.A.3.5. If any anchor fails testing, test all anchors of the same type, installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.
 - Where epoxy-type anchors are used as shear dowels across cold joints in slabs on grade and the slab is not part of the structural system, testing of these dowels is not required.

DIRECT-PULL TENSION TEST LOADS:
Rebar Anchored in 4,000 Normal Weight Concrete

Rebar Size	Embedment Depth (inches)	Hilti HY-150	Simpson Set
No. 4	4 1/4	7,900	9,160
	8	9,408	9,408
No. 5	5	10,420	13,020
	10	14,736	14,736
No. 6	7	18,240	20,250
	14	21,216	21,216
No. 7	7 1/2	17,140	23,880
	13 1/4	28,848	28,848
No. 8	9	22,660	30,300
	16	37,680	37,680
No. 9	10	22,660	NA
	18	44,000	NA
No. 10	12	22,660	NA
	20	44,000	NA
No. 11	14	22,660	NA
	20	44,000	NA

DIRECT-PULL TENSION TEST LOADS:
Threaded Rods Anchored in 4,000 psi Normal Weight Concrete

Rod Diameter (inches)	Embedment Depth (inches)	Simpson Set Proof Loads (lbs)		Hilti HIT HY-150 Proof Loads (lbs)	
		A36 Rod	A449 Rod	A36 Rod	A449 Rod
3/8"	3 1/2"	3,168	5,140	3,168	5,080
	5 1/4"	3,168	5,250	3,168	5,250
1/2"	4 1/4"	5,645	9,200	5,645	7,380
	6 3/8"	5,645	9,930	5,645	9,930
5/8"	5"	8,842	16,100	8,842	9,840
	7 1/2"	8,842	16,100	8,842	15,430
3/4"	6 3/4"	12,730	21,240	12,730	16,660
	10"	12,730	22,760	12,730	22,760
7/8"	7 3/4"	17,309	27,440	17,309	20,500
	11 1/4"	17,309	31,210	17,309	31,210
1"	9"	22,608	32,510	21,820	21,820
	12 3/8"	22,608	36,610	22,608	36,610

(1) For deeper embedments, the proof load shall be the larger of the tabulated loads for the respective rod diameter.

PLAN CHECK SUBMITAL 9-28-98
PLAN CHECK COMMENTS 1-15-99
2001 CBC UPDATE 11-18-03

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GENERAL NOTES

DRAWN BY	
CHECKED BY	
DATE	
SCALE	
JOB NO.	2983401
SHEET	

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