CITY OF CORONADO

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HANDOUT 304 AUG 2012

MINIMUM CONSTRUCTION SPECS

PURPOSE: Provide minimum construction specifications for residential construction

AUTHORITY: 2010 California Building Code / 2010 California Residential Code / 2010 California Electrical Code
2010 California Mechanical Code / 2010 California Plumbing Code / 2010 California Fire Code
2010 California Energy Code / City of Coronado amendments thereto

NOTES: 1. These are minimum specification requirements and shall not supersede more restrictive specifications on the plans or as required by applicable code.

SPECIFICATIONS:

A. Electrical, Plumbing, and Mechanical

1. Exterior lighting. All projects shall comply with the City of Coronado lighting ordinance.

2. GFCI outlets. Ground Fault Circuit Interrupter (GFCI) outlets are required in bathrooms, at kitchen countertops, at laundry and wet bar sinks,in garages, in crawlspaces, in unfinished basements, and outdoors. (CEC 210.8)

3. AFCI outlets. Electrical circuits in all interior areas, except as noted in item #2 above, must be protected by Arc Fault Circuit Interrupters (AFCI). (CEC210.12)

4. Tamper resistant outlets. All 125 volt, 15 and 20 amp residential outlets shall be listed as tamper resistant. (CEC 406.11)

5. Fluorescent lighting. Fluorescent fixtures must be of the ballasted type that only accepts fluorescent bulbs with a minimum efficacy of 40 lumens per watt.

6. Smoke detectors in building remodels. Smoke detectors are required in each existing sleeping room, outside each separate sleeping area in the immediate vicinity of sleeping rooms, and on each story of a dwelling including basements. Battery-operated detectors are acceptable in existing areas with no construction taking place and in alterations not resulting in removal of interior wall or ceiling finishes and without access via an attic, crawl space, or basement. (CRC R314.3.1)

7. Carbon monoxide detectors in building remodels. Carbon monoxide detectors are required outside each separate sleeping area in the immediate vicinity of sleeping rooms and on each story of a dwelling including basements. Battery-operated detectors are acceptable in existing areas with no construction taking place and in alterations not resulting in removal of interior wall or ceiling finishes and without access via an attic, crawl space, or basement. (CRC R315.2)

8. Water heater seismic strapping. A minimum of two ¾" x 24 gauge straps are required around water heaters with ¼" x 3" lag bolts attached directly to the framing. The straps shall be at points within the upper third and lower third of the water heater's vertical dimension. (CPC508.2)

9. Gas appliances in garages. Water heaters and heating/cooling equipment capable of igniting flammable vapors shall be placed on a minimum 18" high platform unless a listing report number is provided indicating an ignition-resistant appliance. (CPC 508.14(1) and CMC 307.1)

10. Impact protection of appliances. Water heaters and heating/cooling equipment subject to vehicular impact shall be protected by bollards or an equivalent measure. (CPC 508.14(2) and CMC 307.1)

11. Water closet (toilet) clearance. A minimum 30" wide x 24" deep clearance is required at the front of water closets (toilets). (CPC 407.5)

12. Water closet (toilet) efficiency. All water closets (toilets) shall use a maximum of 1.6 gallons average per flush. (CPC 402.2)

13. Shower size. Shower compartments shall have a minimum area of 1024 square inches and be able to encompass a 30" diameter circle. Shower doors shall have a minimum 22" unobstructed width. (CPC 411.6 and CPC 411.7)

14. Fireplace appliances. Fireplaces with gas appliances are required to have the flue damper permanently fixed in the open position and fireplaces with LPG appliances are to have no "pit" or "sump" configurations. (CMC303.7.1)

15. Chimney clearance. A minimum 2' chimney clearance is required above the building within 10' horizontally of the chimney. The chimney shall extend a minimum 3' above the highest point where the chimney passes through the roof. (CRC R1003.9)

B. Mechanical Ventilation / Indoor Air Quality

1. Transfer air. Ventilation air shall be provided directly from the outdoors and not as transfer air from adjacent dwelling units or other spaces, such as garages, unconditioned crawlspaces, or unconditioned attics.

2. Instructions and labeling. Ventilation system controls shall be labeled and the home owner shall be provided with instructions on how to operate the system.

3. Combustion and solid fuel burning appliances. Combustion appliances shall be properly vented and air systems shall be designed to prevent back drafting.

4. Garages. The wall and openings between occupiable spaces and the garage shall be sealed. HVAC systems that include air handlers or return ducts located in garages shall have total air leakage of no more than 6% of total fan flow when measured at 0.1" w.c. using California Title 24 or equivalents.

5. Minimum filtration. Mechanical systems supplying air to occupiable space through ductwork shall be provided with a filter having a minimum efficiency of MERV 6 or better.

6. Air Inlets. Air inlets (not exhaust) shall be located away from known contaminants.

7. Air moving equipment. Air moving equipment used to meet either the whole-building ventilation requirement or the local ventilation exhaust requirement shall be rated in terms of airflow and sound.

- **a.** All continuously operating fans shall be rated at a maximum of 1.0 sone.
- **b.** Intermittently operated whole-building ventilation fans shall be rated at a maximum of 1.0 sone.
- **c.** Intermittently operated local exhaust fans shall be rated at a maximum of 3.0 sone.
- **d.** Remotely located air-moving equipment (mounted outside of habitable spaces) need not meet sound requirements if there is at least 4' of ductwork between the fan and intake grill.

C. Foundation and Underfloor

1. Foundation reinforcement. Continuous footings and stem walls shall be provided with a minimum of two longitudinal #4 bars, one at the top and one at the bottom of the footing.

2. Shear wall foundation support. Shear walls shall be supported by continuous foundations. (CRC R602.10.7.1)

3. Concrete slabs-on-grade. Slabs-on-grade shall be a minimum 3-1/2" thick. (CRC R506.1)

4. Vapor retarder. A 6-mil polyethylene or approved vapor retarder with joints lapped a minimum of 6" shall be placed between a concrete slab-on-grade and the base course or subgrade. (CRC 506.2.3)

5. Anchor bolts and sills. Foundation plates or sills shall be bolted or anchored to the foundation or foundation wall per the following: (CRC R403.1.6 and CRC R602.11)

- **a.** Minimum 1/2" diameter steel bolts
- **b.** Bolts embedded at least 7" into concrete or masonry
- **c.** Bolts spaced at a maximum of 6' o.c.
- **d.** Minimum two bolts per plate/sill piece with one bolt located a maximum of 12" and minimum of 7 bolt diameters from the end of each sill plate/piece.
- **e.** Minimum 3" x 3" x 0.299" steel plate washer between the sill and the nut on each bolt.

6. Hold-downs. All hold-downs must be tied in place prior to foundation inspection.

7. Protection of wood against decay. Naturally durable or preservative-treated wood shall be provided in the following locations: (CRC R317.1 and CRC R317.2)

- **a.** Wood in contact with the ground, embedded in concrete in direct contact with the ground, or embedded in concrete exposed to the weather
- **b.** Wood joists within 18" and wood girders within 12" of the exposed ground in crawl spaces
- **c.** Wood framing members that rest on concrete or masonry exterior foundation walls and are less than 8" from the exposed earth
- **d.** Wood framing, sheathing, and siding on the exterior of the building having a clearance of less than 6" from the exposed ground or less than 2" vertically from concrete steps, porch slabs, patio slabs, and similar horizontal surfaces exposed to weather
- **e.** Sills and sleepers on concrete or masonry slabs in direct contact with the ground unless separated from such slabs by an impervious moisture barrier
- **f.** Ends of wood girders entering masonry or concrete walls with a clearance of less than ½" on tops, sides, and ends
- **g.** Wood structural members supporting moisture-permeable floors or roofs exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier
- **h.** Wood furring strips or other wood framing members attached directly to the interior of exterior concrete or masonry walls below grade except where there is a vapor retarder applied between the wall and furring strips or framing members.

8. Underfloor ventilation. Underfloor areas shall have ventilation openings through the foundation walls or exterior walls, with a minimum net area of ventilation openings of 1 square foot for each 150 square feet of underfloor area. One such ventilating opening shall be within 3' of each corner of the building. (CRC R408.1)

9. Underfloor access. Underfloor areas shall be provided with a minimum 18" X 24" access opening. (CRC R408.4)

D. Wood Framing

1. Fastener requirements. The number, size, and spacing of fasteners connecting wood members/elements shall not be less than set forth in CRC Table R602.3(1). This Table is provided at the end of this handout. (CRC R502.9, CRC R602.3, and CRC R802.2)

2. Stud size, height, and spacing. The size, height, and spacing of studs shall be in accordance with CRC Table R602.3(5). (CRC R602.3.1)

3. Sill plates. Studs shall have full bearing on a nominal 2" thick or larger sill plate with a width at least equal to the stud width. (CRC R602.3.1)

4. Bearing studs. Where joists, trusses, or rafters are spaced more than 16" o.c. and the bearing studs below are spaced 24" o.c., such members shall bear within 5" of the studs beneath. (CRC R602.3.3)

5. Drilling and notching of studs. Any stud in an exterior wall or bearing partition may be cut or notched to a depth not exceeding 25% of its width. Studs in nonbearing partitions may be notched to a depth not to exceed 40% of a single stud width. Any stud may be bored or drilled, provided the diameter of the resulting hole is not more than 60% of the stud width, the edge of the hole is not more than 5/8" to the edge of the stud, and the hole is not located in the same section as a cut or notch. Studs located in exterior walls or bearing partitions drilled over 40% and up to 60% shall also be doubled with no more than two successive studs bored.

6. Top plates. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and at intersections with other partitions. End joints in double top plates shall be offset at least 24". Joints in plates need not occur over studs. Plates shall be a minimum nominal 2" thick and have a width at least equal to the width of the studs. (CRC R602.3.2)

7. Top plate splices. Top plate lap splices shall be face-nailed with a minimum of 8 16d nails on each side of the splice. (CRC R602.10.6.1)

8. Drilling and notching of top plates. When piping or ductwork is placed in or partly in an exterior wall or an interior load-bearing wall, necessitating cutting, drilling, or notching of the top plate by more than 50% of its width, a galvanized metal tie not less than 0.054" thick and 1-1/2" wide shall be fastened across and to the plate at each side of the opening with not less than 8 10d nails. The metal tie must extend a minimum 6" past the opening. (CRC R602.6.1)

9. Cripple walls. Foundation cripple walls shall be framed of studs not less in size than the studding above. Cripple walls more than 4' in height shall have studs sized as required for an additional story. Cripple walls with a stud height less than 14" shall be sheathed on at least one side with a wood structural panel fastened to both the top and bottom plates in accordance with Table R602.3(1), or the cripple walls shall be constructed of solid blocking. Cripple walls shall be supported on continuous foundations. (CRC R602.9)

10. Wall bracing. Buildings shall be braced in accordance with the methods allowed per CRC R602.10.2, R602.10.4, and/or R602.10.5.

11. Braced wall line spacing. Spacing between braced wall lines shall not exceed 25' or the alternate provisions of CRC R602.10.1.5.

12. Shear wall cumulative length. The cumulative length of shear walls within each braced wall line shall meet the provisions of CRC Table R602.10.1.2(1) for wind loads and CRC Table R602.10.1.2(2) for seismic loads. (CRC R602.10.1.2)

13. Shear wall spacing. Shear walls shall be located not more than 25' o.c. (CRC R602.10.1.4)

14. Shear wall offset. Shear walls may be offset out-of-plan not more than 4' from the designated braced wall line and not more than 8' from any other offset wall considered part of the same braced wall line. (CRC R602.10.1)

15. Shear wall location. Shear walls shall be located at the ends of each braced wall line or meet the alternate provisions of CRC R602.10.1.4.

16. Individual shear wall length. Shear walls shall meet the minimum length requirements of CRC R602.10.3.

17. Cripple wall bracing. Cripple walls shall be braced per CRC R602.10.9.

18. Shear wall and diaphragm nailing. All shear walls, roof diaphragms, and floor diaphragms shall be nailed to supporting construction per CRC Table R602.3(1). (CRC R604.3)

19. Shear wall joints. All vertical joints in shear wall sheathing shall occur over, and be fastened to, common studs. Horizontal joints in shear walls shall occur over, and be fastened to, minimum 1-1/2" thick blocking. (CRC R602.10.8)

20. Framing over openings. Headers, double joists, or trusses of adequate size to transfer loads to vertical members shall be provided over window and door openings in lead-bearing walls and partitions. (CBC 2304.3.2)

21. Joints under bearing partitions. Joists under parallel bearing partitions shall be of adequate size to support the load. Double joists, sized to adequately support the load, that are separated to permit the installation of piping or vents shall be full-depth solid-blocked with minimum 2" nominal lumber spaced at a maximum of 4" o.c. Bearing partitions perpendicular to joists shall not be offset from supporting girders, walls, or partitions more than the joist depth unless such joists are of sufficient size to carry the additional load. (CRC R502.4)

22. Joists above or below shear walls. Where joists are perpendicular to a shear wall above or below, a rim joist, band joist, or blocking shall be provided along the entire length of the shear wall. Where joists are parallel to a shear wall above or below, a rim joist, end joist, or other parallel framing shall be provided directly above and/or below the shear wall. Where a parallel framing member cannot be located directly above and/or below the shear wall, full-depth blocking at 16" spacing shall be provided between the parallel framing members to each side of the shear wall. (CRC R602.10.6)

23. Floor member bearing. The ends of each floor joist, beam, or girder shall have a minimum 1-1/2" of bearing on wood or metal and a minimum 3" of bearing on masonry or concrete except where supported on a 1" x 4" ribbon strip and nailed to the adjoining stud or by the use of approved joist hangers. (CRC R502.6)

24. Floor joist lap. Floor joists framing opposite sides over a bearing support shall lap a minimum of 3" and shall be nailed together with a minimum of 3 10d faced nails. A wood or metal splice with strength equal to or greater than that provided by the lap is permitted. (CRC R502.6.1)

25. Floor joist-to-girder support. Floor joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips a minimum nominal 2" x 2". (CRC R502.6.2)

26. Floor joist lateral restraint. Floor joists shall be supported laterally at ends and each intermediate support by a minimum 2" full-depth blocking, by attachment to full-depth header, band joist, or rim joist, to an adjoining stud, or shall be otherwise provided with lateral support to prevent rotation. (CRC R502.7)

27. Floor joist bridging. Floor joists exceeding a nominal 2" x 12" shall be supported laterally by solid blocking, diagonal bridging (wood to metal), or a continuous 1" x 3" strip nailed across the bottom of the joists perpendicular to the joists at maximum 8' intervals. (CRC R502.7.1)

28. Framing of floor openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4', the header joist may be a single member the same size of the floor joist. Single trimmer joists may be used to carry a single header joists located within 3' of the trimmer joist bearing. When the header joist span exceeds 4', the trimmer joist and header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. Approved hangers shall be used for the header-joist-to-trimmer-joist connections when the header joist span exceeds 6'. Tail joists over 12' long shall be supported at the header by framing anchors or on ledger strips a minimum of 2" x 2". (CRC R502.10)

29. Girders. Girders for single-story construction or girders supporting loads from a single floor shall not be less than 4" x 6" for spans 6' or less, provided that girders are spaced no more than 8' o.c. Other girders shall be designed to support the loads specified in the CBC. Girder end joints shall occur over supports. When a girder is spliced over a support, an adequate tie shall be provided. The ends of beams or girders supported on masonry or concrete shall not have less than 3" of bearing. (CBC 2308.7)

30. Ridges, hips, and valleys. Rafters shall be framed to a ridge board or to each other with a gusset plate as a tie. Ridge boards shall be minimum 1" nominal thickness and not less in depth than the cut end of the rafter. At all valleys and hips, there shall be a valley or hip rafter not less than 2" nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. Where the roof pitch is less than 3:12 slope (25% gradient), structural members that support rafters and ceiling joists, such as ridges, hips, and valleys, shall be designed as beams. (CRC R802.3)

31. Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other per CRC Table R802.5.1(9), and the rafter shall be nailed to the wall top plate per CRC Table R602.3(1). Ceiling joists shall be continuous or securely joined per CRC Table R802.5.1(9) where they meet over interior

partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to rafters. Where ceiling joists are not connected to the rafters at the wall top plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be minimum 2" x 4" nominal, installed per CRC Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or engineer-designed girder. (CRC R802.3.1)

32. Ceiling joists lapped. Ends of ceiling joists shall be lapped a minimum 3" or butted over bearing partitions or beams and toenailed to the bearing element. Where ceiling joists provide resistance to rafter thrust, lapped joists shall be nailed together per CRC Table R602.3(1) and butted joists shall be tied together in a manner to resist such thrust. (CRC R802.3.2)

33. Collar ties. Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space. Collar ties shall be a minimum 1" x 4" nominal and spaced at a maximum 4' o.c. (CRC R802.3.1)

34. Purlins. Purlins installed to reduce the span of rafters shall be sized not less than the required size of the rafters they support. Purlins shall be continuous and shall be supported by 2" x 4" nominal braces installed to bearing walls at a minimum 45-degreee slope from horizontal. The braces shall be spaced a maximum 4' o.c. with a maximum 8' unbraced length. (CRC R802.5.1)

35. Roof/ceiling member bearing. The ends of each rafter or ceiling joist shall have not less than 1-1/2" of bearing on wood or metal and not less than 3" of bearing on masonry or concrete. (CRC R802.6)

36. Roof/ceiling member lateral support. Roof framing members and ceiling joists with a nominal depth-to-thickness ratio exceeding 5:1 shall be provided with lateral support at points of bearing to prevent rotation. (CRC R802.8)

37. Roof/ceiling bridging. Rafters and ceiling joists with a nominal depth-to-thickness ratio exceeding 6:1 shall be supported laterally by solid blocking, diagonal bridging (wood or metal) , or a continuous 1" x 3" wood strip nailed across the rafters or ceiling joists at maximum 8' intervals. (CRC R802.8.1)

38. Framing of roof/ceiling openings. Openings in roof and ceiling framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4', the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist located within 3' of the trimmer joist bearing. When the header joist span exceeds 4', the trimmer joists and header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafters framing into the header. Approved hangers shall be used for the header-joist-to-trimmer-joist connections when the header joist span exceeds 6'. Tail joists over 12' long shall be supported at the header by framing anchors or on ledger strips a minimum of 2" x 2". (CRC R502.10)

39. Roof framing above shear walls. Rafters or roof trusses shall be connected to top plates of shear walls with blocking between the rafters or trusses. (CRC R602.10.6.2)

40. Roof diaphragm under fill framing. Roof plywood shall be continuous under California fill framing.

41. Roof diaphragm at ridges. Minimum 2" nominal blocking is required for roof diaphragm nailing at ridges.

42. Blocking of roof trusses. Minimum 2" nominal blocking is required between trusses at ridge lines and at points of bearing at exterior walls.

43. Truss clearance. Minimum 1/2" clearance is required between the top plates of interior non-bearing partitions and the bottom chords of trusses.

44. Drilling, cutting, and notching of roof/floor framing. Notches in solid lumber joists, rafters, blocking, and beams shall not exceed one-sixth of the member depth, shall be no longer than one-third the member depth, and shall not be located in the middle one-third of the span. Notches at member ends shall not exceed one-fourth the member depth. The tension side of members 4" or greater in nominal thickness shall not be notched except at member ends. The diameter of holes bored or cut into members shall not exceed one-third the member depth. Holes shall not be closer than 2" to the top or bottom of the member or to any other hole located in the member. Where the member is also notched, the hole shall not be closer than 2" to the notch. (CRC R502.8.1)

45. Exterior landings, decks, balconies, and stairs. Such elements shall be positively anchored to the primary structure to resist both vertical and lateral forces or shall be designed to be self-supporting. Attachment shall not be accomplished by use of toenails or nails subject to withdrawal. (CRC R311.5)

E. Fireblocking

1. Fireblocking. Fireblocking shall be provided in the following locations: (CRC R302.11 and CRC R1003.19)

- **a.** In concealed spaces of stud walls and partitions, including furred spaces, and parallel rows of studs or staggered studs, as follows:
  - **(1).** Vertically at the ceiling and floor levels
  - **(2).** Horizontally at intervals not exceeding 10'
- **b.** At all interconnections between concealed vertical and horizontal spaces which may occur at soffits, drop ceilings, and cove ceilings
- **c.** In concealed spaces between stair stringers at the top and bottom of the run
- **d.** At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion
- **e.** At chimneys and fireplaces per item E4.
- **f.** Comices of a two-family dwelling at the line of dwelling-unit separation.

2. Fireblocking materials. Except as otherwise specified in items E3 and E4, fireblocking shall consist of the following materials with the integrity maintained: (CRC R302.11.1)

- **a.** 2" nominal lumber
- **b.** Two thicknesses of 1" nominal lumber with broken lap joints
- **c.** One thickness of 23/32" wood structural panel with joints backed by 23/32" wood structural panel
- **d.** One thickness of ¾" particleboard with joints backed by ¾" particleboard
- **e.** ½" gypsum board
- **f.** ¼" cement-based millboard
- **g.** Batts or blankets of mineral or glass fiber of other approved materials installed in such a manner as to be securely retained in place. Batts or blankets of mineral or glass fiber or other approved non-rigid materials shall be permitted for compliance with the 10' horizontal fireblocking in walls constructed using parallel rows of studs or staggered studs. Unfaced fiberglass batt insulation used as fireblocking shall fill the entire cross-section of the wall cavity to a minimum height of 16" measured vertically. When piping, conduit, or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction. Loose-fill insulation material shall not be used as a fireblock unless specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gasses.

3. **Fireblocking at openings around vents, pipes, ducts, cables, and wires at ceiling and floor level.** Such openings shall be fireblocked with an approved material to resist the free passage of flame and products of combustion. (CRC R302.11)

4. **Fireblocking of chimneys and fireplaces.** All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams, or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney. (CRC R1003.19)

5. **Draftstopping.** In combustible construction where there is usable space both above and below the concealed space of the floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1000 square feet. Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances: (CRC R302.12)
   a. Ceiling is suspended under the floor framing
   b. Floor framing is constructed of truss-type open-web or perforated members.

6. **Draftstopping materials.** Draftstopping shall not be less than ½" gypsum board, 3/8" wood structural panels, or other approved materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise approve by the building official. The integrity of draftstops shall be maintained. (CRC R302.12.1)

7. **Combustible insulation clearance.** Combustible insulation shall be separated a minimum 3" from recessed luminaires, fan motors, and other heat-producing devices. (CRC R302.13)

F. General Material Specifications

1. **Lumber.** All joists, rafters, beams, and posts 2" to 4" thick shall be #2 grade Douglas Fir – Larch or better. All posts and beams 5" and thicker shall be #1 grade Douglas Fir – Larch or better. Studs not more than 8' long shall be stud-grade Douglas Fir – Larch or better when supporting not more than one floor, roof, or ceiling. Studs longer than 8' shall be #2 grade Douglas Fir – Larch or better.

2. **Concrete.** Concrete shall have a minimum compressive strength of 2,500 psi at 28 days and shall consist of 1 part cement, 3 parts sand, 4 parts 1" maximum size rock, and not more than 7-1/2 gallons of water per sack of cement. (CRC R402.2)

3. **Mortar.** Mortar used in construction of masonry walls, foundation walls, and retaining walls shall conform to ASTM C-270 and shall consist of 1 part Portland cement, 2-1/4 to 3 parts sand, and ¼ to ½ part hydrated lime. (CBC 2103.8)

4. **Grout.** Grout shall conform to ASTM C-476 and shall consist of 1 part Portland cement, 1/10 part hydrated lime, 2-1/4 to 3 parts sand, and 1 to 2 parts gravel. Grout shall attain a minimum compressive strength of 2,000 psi at 28 days. (CBC 2103.12)

5. **Masonry.** Masonry units shall comply with ASTM C-90 for load-bearing concrete masonry units. (CBC 2103.1)

6. **Reinforcing steel.** Reinforcing steel used in construction of reinforced masonry or concrete structures shall be deformed and comply with ASTM A-615. (CBC 2103.13)

7. **Structural steel.** Steel used as structural shapes such as wide-flange sections, channels, plates, and angles shall comply with ASTM A-36. Pipe columns shall comply with ASTM A-53. Structural tubes shall comply with ASTM A-500, Grade B.

8. **Fasteners for preservative-treated wood.** Fasteners for preservative-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze, or copper. (CRC R317.3.1)
   Exception: ½" diameter or greater steel bolts
   Exception: Fasteners other than nails and timber rivets may be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B-695, Class 55 minimum.

9. **Fasteners for fire-retardant-treated wood.** Fasteners for fire-retardant wood used in exterior applications or wet or damp locations shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze, or copper. (CRC R317.3.3)

G. Roofing and Weatherproofing

1. **Roof covering.** All roof covering shall be applied in accordance with the applicable requirements of CBC 1507 and the manufacturer's installation instructions.

2. **Roof flashing.** Flashing shall be installed at wall and roof intersections, at gutters, wherever there is a change in roof slope or direction, and around roof openings. Where flashing is of metal, the metal shall be corrosion-resistant with a thickness of not less than 0.019" (#26 galvanized sheet). (CRC R903.2.1)

3. **Crickets and saddles.** A cricket or saddle shall be installed on the ridge side on any chimney or penetration more than 30" wide as measured perpendicular to the slope. The cricket or saddle covering shall be sheet metal or the same material as the roof covering. (CRC R903.2.2)

4. **Water-resistive barrier.** A minimum of one layer of #15 asphalt felt shall be attached to studs or sheathing of all exterior walls. Such felt or materials shall be applied horizontally, with the upper layer lapped over the lower layer a minimum of 2". Where joints occur, felt shall be lapped a minimum of 6". The felt shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to maintain a weather-resistant exterior wall envelope. (CRC R703.2)

5. **Wall flashing.** Approved corrosion-resistant flashing shall be applied shingle fashion at the following locations to prevent entry of water into the wall cavity or penetration of water to the building structural framing components: (CRC R703.8)
   a. Exterior door and window openings, extending to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage
   b. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings
   c. Under and the ends of masonry, wood, or metal copings and sills
   d. Continuously above all projecting wood trim
   e. Where exterior porches, decks, or stairs attach to a wall or floor assembly of wood-frame construction
   f. At wall and roof intersections
   g. At built-in gutters.

6. **Damp-proofing.** Damp-proofing materials for foundation walls enclosing usable space below grade shall be installed on the exterior surface of the wall, and shall extend from the top of the footing to finished grade. (CRC R406.1)

7. **Weep screed.** A minimum 0.019" (#26 galvanized sheet gauge) , corrosion-resistant weep screed or plastic weep screed with a minimum vertical attachment flange of 3-1/2" shall be provided at or below the foundation plate line on exterior stud walls. The weep screed shall be placed a minimum 4" above the earth or 2" above paved areas and shall be of a type allowing trapped water to drain to the exterior of the building. (CRC R703.3.2.1)

H. Grading and soils

1. Grading permit. A grading permit is required if the volume of earth to be moved exceeds 200 cubic yards or if any cuts or fills exceed 8' in height/depth.

2. Compaction report. A compaction report is required for fill material 12" or more in depth. (CBC 1803.5.8)

Table R602.3(1) – Fastener Schedule for Structural Members

Description of Building Elements	No. & Type of Fastener Notes a, b, and c	Spacing of Fasteners
ROOF		
Blocking between joists or rafters to top plate – toe nail	3 – 8d (2-1/2" x 0.113")	-
Ceiling joists to plate – toe nail	3 – 8d	-
Ceiling joists not attached to parallel rafter, laps over partitions – face nail	3 – 10d (3" x 0.128")	-
Collar tie rafter – face nail or 1-1/4" x 20 gage ridge strap	3 – 10d	-
Rafter to plate – toe nail	2 – 16d (3-1/2" x 0.135")	-
Roof rafters to ridge, valley or hip rafters – toe nail / face nail	4 – 16d / 3 – 16d	-
WALL		
Built-up corner studs	10d	24" o.c.
Built-up header, two pieces with ½" spacer	16d	16" o.c. along each edge
Continued header, two pieces	16d	16" o.c. along each edge
Continuous header to stud – toe nail	4 – 8d	-
Double studs – face nail	10d	24" o.c.
Double top plates – face nail	10d	24" o.c.
Double top plates, min. 48" offset of end joints – face nail in lapped area	8 – 16d	-
Sole plate to joist or blocking – face nail	16d	16" o.c.
Sole plate to joist or blocking at braced wall panels	3 – 16d	16" o.c.
Stud to sole plate – toe nail	3 – 8d or 2 – 16d	-
Top or sole plate to stud – end nail	2 – 16d	-
Top plates, laps at corners and intersections – face nail	2 – 10d	-
1" brace to each stud and plate – face nail	2 – 8d / 2 – 1-3/4" staples	-
1" x 6" sheathing to each bearing – face nail	2 – 8d / 2 – 1-3/4" staples	-
1" x 8" sheathing to each bearing – face nail	2 – 8d / 3 – 1-3/4" staples	-
Wider than 1" x 8" sheathing to each bearing – face nail	3 – 8d / 4 – 1-3/4" staples	-
FLOOR		
Joist to sill or girder – toe nail	3 – 8d	-
1" x 6" subfloor or less to each joist – face nail	2 – 8d / 2 – 1-3/4" staples	-
2" subfloor to joist or girder – blind and face nail	2 – 16d	-
Rim joist to top plate – toe nail (roof applications also)	8d	6" o.c.
2" planks (plank & beam – floor & roof)	2 – 16d	at each bearing
Built-up girders and beams – 2" lumber layers	10d	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
Ledger strip support joists or rafters	3 – 16d	at each joist or rafter

Description of Building Materials	Description of fastener Notes b, c, and e	Spacing of Fasteners	
		Edges Note i	Intermediate supports Notes c, e
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing			
3/8" – 1/2"	6d common (2" x 0.113") (subfloor, wall) 8d common (roof	6"	12" Note g
5/16" – 1/2"	6d common (subfloor, wall) 8d common (roof) Note f	6"	12" Note g
19/32" – 1"	8d common	6"	12" Note g
1-1/8" – 1-1/4"	10d common or 8d deformed	6"	12"
Other wall sheathing - Note h			
1/2" structural cellulosic fiberboard sheathing	1/2" galvanized roofing nail, 7/16" crown **or** 1" crown staple, 16 gage, 1-1/4" long	3"	6"

25/32" structural cellulosic fiberboard sheathing	1-3/4" galvanized roofing nail, 7/16" crown **or** 1" crown staple, 16 gage, 1-1/2" long	3"	6"
1/2" gypsum sheathing Note d	1-1/2" galvanized roofing nail; staple galvanized, 1-1/2" long; 1-1/4" screws, Type W or S	7"	7"
5/8" gypsum sheathing Note d	1-3/4" galvanized roofing nail; staple galvanized, 1-5/8" long; 1-5/8" screws, Type W or S	7"	7"
Wood structural panels, combination subfloor underlayment to framing			
3/4" and less	6d deformed **or** 8d common	6"	12"
7/8" – 1"	8d deformed **or** 8d common	6"	12"
1-1/8" – 1-1/4"	8d deformed **or** 10d common	6"	12"

Notes:

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192" (20d), 90 ksi for shank diameters larger and 0.142" but not larger than 0.177", and 100 ksi for shank diameters of 0.142" or less.

b. Staples are 16 gauge wire and have a minimum 7/16" on diameter crown width.

c. Nails shall be spaced at not more than 6" o.c. at all supports where spans are 48" or greater.

d. 4' x 8' or 4' x 9' panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. For regions having basic wind speed of 110 mph or greater, 8d deformed nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48" distance from gable end walls, if mean roof height is more than 25 feet up to 35 feet maximum.

g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaces 6" o.c. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6" o.c. for a minimum of 48" distance from ridges, eaves and gable end walls; and 4" o.c. to gable end wall framing.

h. Gypsum sheathing shall conform to ASTM C-1396 and shall be installed in accordance with GA-253. Fiberboard sheathing shall conform to ASTM C-208.

i. Spacing for fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.