

GENERAL NOTES

A. PURPOSE

The intent of this standard plan is to promote public safety and welfare by reducing the risk of earthquake induced damage in existing wood frame residential buildings. The requirements represented here are minimum prescriptive standards which do not meet the requirements of the International Building Code. These standards are intended to improve the seismic performance of these existing buildings but will not necessarily prevent their damage on an earthquake. Their primary purpose is to reduce the likelihood that these buildings will fall off their foundations.

B. SCOPE

These standards apply to one, two and three story residential buildings with raised wood floors if they meet the following criteria: 1) cripple wall heights do not exceed 48 inches in one or two story buildings and do not exceed 14 inch stud height in three story buildings 2) the building is supported at its perimeter by a continuous concrete footing and stem wall 3) all of the floors in each story are at the same elevation 4) the maximum number of dwelling units and/or guest room is four 5) the cripple walls are sheathed with materials other than wood structural panels or diagonal sheathing 6) no portion of the building is constructed over a slope steeper than 3 horizontal to 1 vertical.

C. GENERAL REQUIREMENTS

PERMIT REQUIREMENTS: All work shown on these plans requires a permit.
PRE-INSPECTION REQUIREMENTS: None
INSPECTION REQUIREMENTS: All footing excavations and placement of reinforcing steel and anchor bolts in formwork shall be inspected prior to pouring of concrete for replacement footings and stem walls. All cripple wall bracing, blocking, connectors and anchors in existing concrete shall be inspected after the work is completed but before the concrete for the ventilation holes at all plate anchors are completely fastened.

D. DEFINITIONS

ADHESIVE ANCHOR: is a fastener placed in hardened concrete that derives its holding strength from a self-cured or pre-cured bond between the wall of the hole and the embedded portion of the anchor. Chemical adhesives are organic compounds comprised of resin and hardener, that form adhesives when mixed together. Examples of chemical adhesive compounds can include epoxies, polyurethanes, polyesters, methyl methacrylates and vinylesters.

ANCHOR SIDE PLATE: is a metal plate or plates used to connect the all plate or floor framing to the side of a concrete stem wall when conditions prevent anchor or ball installation vertically through the all plate.

APPROVAL: is current product acceptance under a City of Los Angeles Research Report for all of the conditions of the intended use except continuous inspection of anchors.

BOLTING: is a metal or plastic piece of place around a bolt in a wood sill plate to fit in the annular space created by an oversized drilled hole.

EMBEDMENT DEPTH: is the depth of the anchor into the concrete prior to setting of the anchor

EXPANSION ANCHOR: is a mechanical fastener placed in hardened concrete designed to expand in a self-drilled or pre-drilled hole of a specified size and engage the sides of the hole in one or more locations to develop shear and/or tension resistance to applied loads without grout, adhesive or drypack.

INSTALLATION TORQUE: is the minimum moment applied to a torque-set anchor that creates the degree of anchorage required for full load values.

MINIMUM CONCRETE EDGE DISTANCE: is the measure between the free edge of the concrete and the centerline of the bolt at which the concrete will not break away when the anchor is installed in service. Minimum edge distances for anchors are given in the product approvals.

SNUG TIGHT: is the condition when the full surface of the plate anchor is in contact with the wood member and begins to slightly indent the wood surface.

TORQUE-SET ANCHOR: is an expansion anchor whose wedge or sleeve engages the concrete base material in the drilled hole by the application of torque and where the amount of torque applied controls the degree of anchorage.

E. MATERIALS

ADHESIVE ANCHOR ROD MATERIALS: All adhesive anchors shall use all-thread rod manufactured from A307 or SAE 1018 material to meet the mechanical requirements of ASTM A307. All threaded rods shall be free of oil, scale and rust. The use of smooth or partially threaded rods or bolts is prohibited.

ADHESIVE PACKAGING: The packaging for each adhesive shall be marked with the manufacturer's name and address, lot number or date of packaging, shelf life or expiration date, name of the quality control agency, and instructions for installation. No adhesive shall be used after its expiration date.

ANCHORS: All adhesive or expansion anchors shall have a minimum normal load capacity of 635 lbs for 1/2 inch bolts and 850 lbs for 5/8 inch bolts in 2000 psi concrete at the installed edge distance and depth of embedment. Proprietary anchors shall have current City of Los Angeles Research Report approval.

ANCHOR SIDE PLATE: All anchor side plates shall be of minimum 7 gauge steel (3/16 inch) unless otherwise approved (i.e. 12 gauge steel in a Research Report for steel frame construction). The minimum seismic adjusted load capacity shall be 2200 lbs in shear. The number of expansion or adhesive anchors used must have a total shear capacity in concrete equal or greater to the value for the foundation anchor requirement above.

BOLT RINGS: Bolt rings shall be of schedule 40 galvanized iron or PVC pipe.

CONCRETE: All new concrete for replacement footings shall be of 2500 psi minimum compressive strength. No special inspection is required.

FRAMING ANCHORS: All framing anchors shall be of minimum 18 gauge galvanized steel, of 4 1/2 inch length and approved under a City of Los Angeles Research Report for steel frame construction. The seismic load capacity in the long direction must meet or exceed 450 lbs in dry lumber. The fasteners must be 12-8 common or 1 1/2 inch nails unless otherwise approved. #6 x 1 1/2 inch flat head wood screws may be used at existing rim joist, blocking or top plate connections.

LUMBER: All new lumber installed for blocking shall be a minimum of nominal two inch Douglas Fir-Larch #2 or better or graded under Western Wood Products Grading Rules. All lumber in contact with concrete shall be pressure treated Douglas Fir-Larch for new stem walls and for all plate replacements over 100% of the existing lumber. Replacement of all plate shall be done in place using the same lumber species as the existing material. All existing lumber shall be free of defects including decay, mildew, excessive warping and insect infestation or damage. Damaged lumber must be replaced and the source of water or insect intrusion removed.

PLATE WASHERS: Square plate washers are required. Use 3/16 x 2 x 2 for 1/2 inch anchors and 1/4 x 2 1/2 x 2 1/2 for 5/8 inch anchors. Standard circular cut washers shall not be used to connect plates to concrete stem walls. Washers furnished with the anchors shall not be used. Beveled washers shall be used on anchors drilled at an angle exceeding 6 degrees from vertical and shall be placed on the plate washers.

REINFORCING BAR: ASTM A615 Grade 60 or 60.

SHEATHING: All plywood shall be graded under PS 1-83. All structural wood panel sheathing used for wall blocking shall be 1/2 inch APA Rated Sheathing oriented strand board (OSB-C-3) Exposure 1 or plywood of minimum 5 ply and construction with a span rating of 32/16.

All sheathing used for blocking and shear transfer shall be 1 1/2 inch APA Rated Sheathing Exposure 1.

SHEATHING FASTENERS: Nails shall be 8d common (131 inch x 2 1/2 inch) with Fastenings (1 inch) on interior or corner sides and 6d x 1 1/2 inch wood screws may be substituted on interior sheathing when plaster exists on the exterior side of the cripple wall.

STEEL WALLS: 1. Deteriorated, cracked or unreinforced masonry footings may be replaced as shown on this plan provided proper shoring is provided. The method of shoring and sequence of its construction shall be the responsibility of the person performing the work. The shoring shall not be used as a tie to the structure or the safety of its occupants or passers nearby.

2. When existing footings and stem walls are replaced in place, the person performing the work shall take care to insure that all reinforcing steel shall be lapped a minimum of 24 inches and shall be dowelled into the existing concrete with adhesive or drypack a minimum of 8 inches.

3. The repair of damaged footings or stem walls or the continued use of archaic building materials such as unreinforced masonry, requires that plans and calculations be prepared by a licensed architect or engineer.

G. ANCHOR BOLT INSTALLATION

1. GENERAL REQUIREMENTS

A) CONDITION OF EXISTING CONCRETE: All concrete shall be fully cured and hardened, uncracked and in sound condition. Concrete with excessive cracking, deterioration or damage shall be replaced.

B) DRILLING OF THE HOLE IN CONCRETE: The drilled hole diameter and minimum spacing, depth of hole and edge distance must comply with the Research Report approval and manufacturer's recommendations. All holes shall be drilled with carbide-tipped drill bits conforming to ANSI Specification B94-12-7 tolerances. (1/2" = 0.520-0.530, 3/8" = 0.550-0.560 inch) Worn drill bits with reduced diameter below the above tolerance limits shall not be used. All holes shall be driven as perpendicular as possible to the concrete surface. Right angle drill motors shall be used or needed to provide the proper hole orientation.

C) DRILLING OF THE HOLE IN WOOD: Drilled holes through existing sill plates shall normally be located in the middle third of the plate width. The minimum edge distance for the bolt from the wood edge shall be 1 1/2 inch diameters. Anchors or bolts shall be placed within 12 inches but not less than 9 inches from both ends of all plate members.

D) CHOICE OF USE OF ADHESIVE OR EXPANSION ANCHORS: Only products approved by the Department (refer to the attachment for the list of approved products and materials of construction) may be used for the retrofit of cripplewall walls. Both types of anchors may be used interchangeably in concrete of average or better quality. Concrete of average quality may be indicated by spalling during drilling or setting of expansion anchors or failure of anchors to reach the maximum torque required. Concrete of weaker quality may use adhesive anchors. This requirement does not mean the need to replace existing concrete foundations when damaged, deteriorated, or of unsuitable quality.

2. REQUIREMENTS FOR ADHESIVE ANCHORS

A) CLEANING OF THE HOLE: The hole must be cleaned with a jet of compressed air or a brush. Wire brushes shall not be used to clean the hole. No debris or dust shall remain in the hole.

B) PLACEMENT OF THE ADHESIVE: The resin, filler and hardener shall be thoroughly mixed before placement in the holes unless approved by the manufacturer. The adhesive shall be applied through a static mixing nozzle must be of uniform color. Ensure uniform mixing by rotating the nozzle. Concrete of average quality may be indicated by spalling during drilling or setting of expansion anchors or failure of anchors to reach the maximum torque required. Concrete of weaker quality may use adhesive anchors. This requirement does not mean the need to replace existing concrete foundations when damaged, deteriorated, or of unsuitable quality.

C) PLACEMENT OF THE THREADED ROD: The all thread rod, completely free of rust, scale or oil, shall be installed to the full depth of the hole. The rod shall be turned counter-clockwise sufficiently during installation for the adhesive to engage the threads. The length of the rod shall extend a minimum of one rod diameter above the nut after tightening.

D) ADHESIVE SETTING TIME: No tightening of the anchors shall occur until the adhesive has cured for the recommended time based on the temperature as shown in the manufacturer's instructions. Care must be used to ensure that the anchor bond is not disturbed until the adhesive has sufficiently cured.

E) TORQUE REQUIREMENTS: A minimum torque setting of 30 ft. lbs. for 1/2 inch anchors and 40 ft. lbs. for 5/8 inch anchors is required for all adhesive anchors for the snug tight condition unless this value exceeds the maximum torque allowed by the approval. In those cases, the torque shall be set to its maximum allowable value.

3. REQUIREMENTS FOR EXPANSION ANCHORS

A) DRILLING OF THE HOLE: Care must be used to insure that the drilled hole accurately matches the depth and diameter requirements for the expansion anchor type. The depth of the hole cannot exceed 2/3 of the concrete thickness in the direction of the drilled hole. The depth required for embedment must be free of debris. This rule does not apply to drop-in anchors that rely on the bottom of a clean drilled hole to set the expansion anchors.

B) CLEANING OF THE HOLE: Unless otherwise required by the manufacturer's recommendations, the drilled hole must be deepened to allow the concrete debris to remain in the hole. The hole does not exceed 2/3 of the concrete thickness in the direction of the drilled hole. The depth required for embedment must be free of debris. This rule does not apply to drop-in anchors that rely on the bottom of a clean drilled hole to set the expansion anchors.

C) USE OF THE BOLLING RING: Bolt rings shall be required to be installed when the drilled hole in the wood member exceeds the bolt diameter by more than 1/8 inch. The retained edge of the ring shall be approximately equal to the thickness of the sill plate. Chemical compounds used in adhesive anchors may be substituted for bolt rings.

D) TORQUE REQUIREMENTS: A minimum torque setting equal to the installation torque or 30 ft. lbs. for 1/2 inch anchors and 40 ft. lbs. for 5/8 inch anchors, whichever is greater, is required for all expansion anchors unless this value exceeds the maximum torque allowed by the approval. In those cases, the torque shall be set to its maximum allowable value.

H. ANCHOR SIDE PLATE INSTALLATION

1. Anchor side plates may be substituted for vertically placed anchors or bolts only when conditions prevent anchor or ball installation vertically through the all plate even with a right angle drill motor. This condition only occurs when there is no cripple wall or one of greatly reduced height.

2. A minimum of two anchor side plates must be installed on each block of all plate 32 inches or longer. The retained edge of the plate shall be installed a minimum of 8 inches but not more than 22 inches from the all plate.

3. Installation of the anchor bolts in the existing concrete shall follow the information in Section F except as noted herein. Care shall be used to insure the drilled hole depth does not exceed 2/3 of the concrete thickness in the direction of the drilled hole. The depth required for embedment must be free of debris. This rule does not apply to drop-in anchors that rely on the bottom of a clean drilled hole to set the expansion anchors.

4. Lag screws used to attach anchor side plates shall be installed as follows:

a) The lag screw shall be located at the center of the plate thickness and shall penetrate the all plate a minimum of 2 1/2 inches.

b) Lead holes shall be pre-drilled for the threaded portion of the screw. The pre-drill diameter for the lead hole shall not exceed 70% of the shank diameter and shall be drilled to the full depth of penetration of the lag screw. Use a 1/4 inch diameter drill bit for 3/8 inch lag screws and 1/8 inch drill bit for 1/4 inch lag screws.

c) Clearance holes shall also be drilled for the solid portion of the shank. The clearance hole shall be equal in depth and diameter to the solid portion of the shank.

d) The threaded portion of the lag screw shall be inserted in its lead hole by turning with a wrench and not by driving with a hammer or other blunt object.

e) soap or other lubricant shall be used on the lag screws or in the lead holes for ease of installation and to prevent damage to the wood screw.

5. Wood screws used to attach anchor side plates shall be installed as follows:

a) wood screws shall be located at the center of the plate thickness and shall penetrate the sill plate a minimum of 2 1/2 inches.

b) lead holes shall be pre-drilled for the threaded portion of the screw. The pre-drill diameter for the lead hole shall be about 7/8th of the diameter of the screw at the root of the thread (minimum solid diameter). Use 1/8 inch for #4 screws.

c) clearance holes shall also be drilled for solid portion of the shank. The clearance hole shall be about 7/8ths of the diameter of the solid portion of the shank. Use a 3/16 inch drill bit for #4 screws.

d) The threaded portion of the wood screw shall be inserted in its lead hole by turning with a wrench and not by driving with a hammer or other blunt object.

e) soap or other lubricant shall be used on the wood screws or in the lead holes for ease of installation and to prevent damage to the wood screw.

6. Shims may be used on all plates for single plate anchors when the space exceeds 3/16" and is less than 3/4".

7. Framing members or blocking shall be provided at the edge of all wood structural sheathing.

8. Nails or screws shall be centered in the framing member or blocking except in the panel edges where a minimum 3/8 inch edge distance shall be maintained.

9. Panel joints shall normally occur on the centerline of studs but may occur on the 1/4th of double studs when these studs are nailed with 16d common or sinker nails at 4 inches on center.

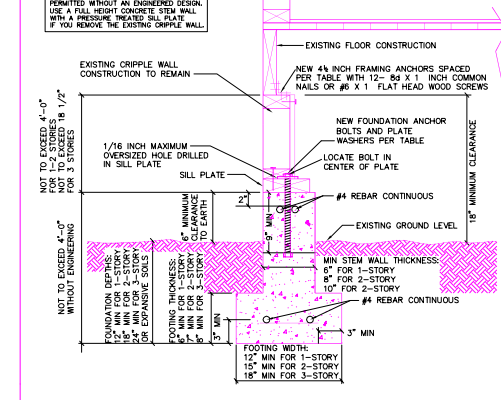
10. Panel joints shall maintain a 1/8 inch separation between panels for expansion.

11. Panels may be oriented horizontally or vertically.

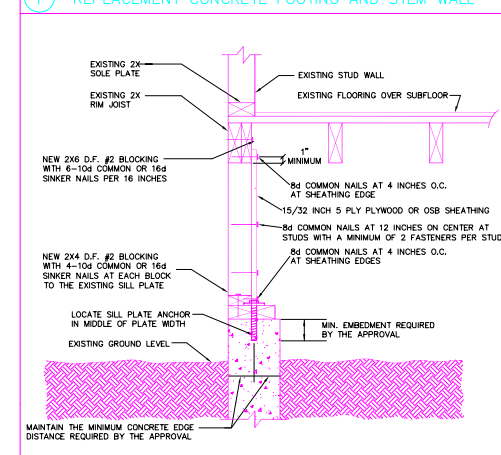
12. Nails shall be driven flush but shall not fracture the surface of the sheathing. When a nail fractures the sheathing it shall be left in place and not counted as part of the required nailing. A new nail shall be driven flush to the surface within 2 inches of the fractured nail.

13. Framing anchors shall be installed with their long dimension horizontal and with all of the nail holes filled with nails or approved wood screws. Drywall screws shall not be used.

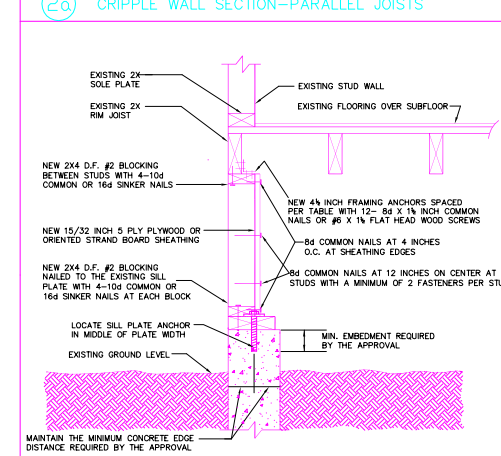
14. Existing ventilation must be maintained and not covered by the wall bracing. Where obstructions such as vent holes or mechanical utilities cannot be avoided in the panel width, the required panel width shall be increased by the length of the obstruction or a minimum of 1/8 inch. The panel width shall be greater up to, but not exceeding the full length of the cripple wall.



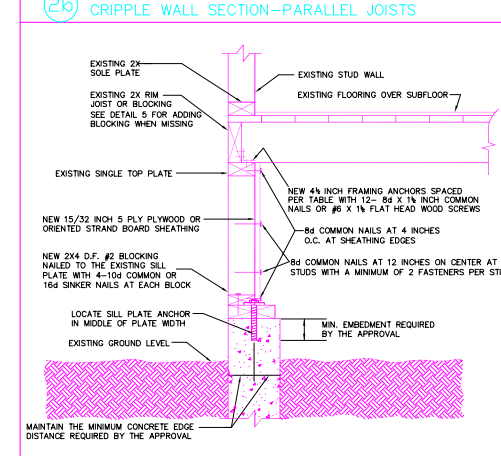
1 REPLACEMENT CONCRETE FOOTING AND STEM WALL



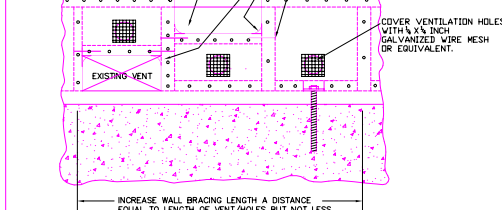
2a CRIPPLE WALL SECTION-PARALLEL JOISTS



2b CRIPPLE WALL SECTION-PARALLEL JOISTS



3 CRIPPLE WALL SECTION-PERPENDICULAR JOISTS



4 CRIPPLE WALL BRACING- OPENING REINFORCEMENT

