

GUIDELINES FOR QUALITY CONSTRUCTION

INTRODUCTION

Quality in Construction Manual

For the past few years, the East Bay Chapter of the International Code Council (ICC) has been discussing ways to improve the quality of construction in wood-frame single-family homes. Specifically, Chapter members believed that assisting contractors and trade personnel in better understanding code requirements would achieve dual goals:

The quality of construction would improve.

The number of corrections for noncompliance would be reduced, thus saving the builder time and money.

To lead this effort, the Chapter formed a committee consisting of engineers, designers, inspectors, and contractors. As a first step, the committee surveyed East Bay cities and counties to compile a list of the most commonly missed items found when inspecting wood-frame construction. The survey results included all aspects of building a house, from grading and drainage to the items checked on final inspection. Once the results were tabulated, the committee took the time to relate each survey item to the proper code section, and provided additional information to assist contractors, architects, and engineers in meeting code requirements and achieving compliance for their work.

Illustrations were added to supplement the information, detailing the proper installation of framing members, foundation hold-downs, shear panels and load path connections. Checklist were added to assist in the inspection of the plumbing, mechanical and electrical systems. Although these illustrations and checklist are based on commonly accepted practices, they have been added for educational purposes only. They are not intended to be used in lieu of details on approved drawings.

This manual is the East Bay Chapter's first step toward the goal of achieving a uniform understanding of code requirements for the construction industry. By reviewing the information in the manual, we believe builders and contractors will be able to understand the code requirements as well as the logic behind them. Having this knowledge they will be better prepared for their inspections, while at the same time will reduce their costs by achieving code compliance in a timely manner.

Clearly, the road to quality construction does not end with the publication of this manual. It will require the continuous commitment of the building industry and regulatory agencies, working together toward this common goal. Users of this manual are encouraged to become part of this journey toward quality construction of wood-frame houses. It is hoped users of this manual will share additional suggestions and ideas for improving the construction or inspection process with the East Bay Chapter for inclusion in future publications.

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ACKNOWLEDGMENTS

The East Bay Chapter would like to acknowledge the members of the Quality in Construction Committee for donating their time and for their commitment to this project. Without their input, this project would never have started, nor developed as well as it has.

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Gary Smith, retired Building Official, City of Pleasanton

John Ward, of M. J. Ward and Associates, a general contracting and consulting firm in Danville

Sharon Waterman, of Interactive Resources, an architectural and engineering firm in Richmond

CONTRIBUTING ORGANIZATIONS

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The Chapter would like to thank Ron Richards, for the creation of the illustrations, overall design and professional appearance of this manual.

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FRAMING

COMMON CONSTRUCTION ERRORS

DESCRIPTION / DISCUSSION

WALLS ARE NOT PLUMB, TRUE OR ADEQUATELY BRACED.

In addition to the aesthetics, load paths may be affected if walls are not plumb and straight.
Refer to UBC Section 1605.3

HOLD-DOWNS AND STRAPS NOT IN PLACE, PROPERLY NAILED OR TIGHTLY BOLTED.

Framing hardware shall be installed according to manufacturer's instructions to develop the strength values for which they are intended.
Refer to UBC Section 2304.4.1 & manufacturer's installation standards.

INADEQUATE VENTING AND/OR ACCESS TO ALL UNDER FLOOR AREAS.

Cross ventilation of, and access to, crawl space areas are often impeded by grade beams, heating ducts and sewer lines.
Refer to UBC Section 2306.7 & 2306.3

JOISTS NOT ADEQUATELY NAILED TO SILL PLATE OR TO TOP PLATE.

Refer to sketch on Fig.4A and Fig.4B, General Frame Nailing Requirements.

INCONSISTENT RISER HEIGHT OR TREAD WIDTH AT STAIRS.

The intent of the code is to provide uniformity in stair construction and prevent accidents. Maximum riser height for residential construction is 8" and minimum riser height is 4". Minimum tread dimension is 9", measured nosing to nosing. Variations in these dimensions are limited to 3/8" between highest and lowest risers and widest and narrowest treads. Often the contractor fails to take into account a change in material at landings such as hardwood flooring, marble and tile, which add to the riser height.
Refer to UBC Section 1003.3.3.3

BOTTOM PLATES NOT ADEQUATELY NAILED.

Bottom plate nailing often required for shear transfer.
Refer to Fig. 4A, General Frame Nailing Requirements.

3X STUDS AND PLATES NOT INSTALLED WHERE REQUIRED.

Note – UBC table 23-II-I-1 or Shear Schedule on Plan

MISSING LAYOUT CAUSING INADEQUATE BEARING.

Refer to UBC Sections 2320.8.2, 2320.8.4, 2320.11.6

PLYWOOD SHEETS SPANNING LESS THAN 2 BAYS OR RUN PARALLEL TO JOISTS.

Refer to UBC Sections 2312 and 2315.3.3, UBC tables 23-II-E-1, 23-II-E-2 and 23-II-H.

FIRE BLOCK MISSING ON WALLS OVER 10 FEET.

Refer to UBC Section 708.2.1

IMPROPER NOTCHING OF SILL PLATE

Please refer to Fig. 1

WOOD FRAMING CLEARANCES FROM EARTH WAS NOT MET

Please refer to Fig. 2

WEEP SCREED INSTALLED IMPROPERLY

Please refer to Fig. 3

OVER DRIVEN NAIL

Please refer to Fig. 5

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FRAMING

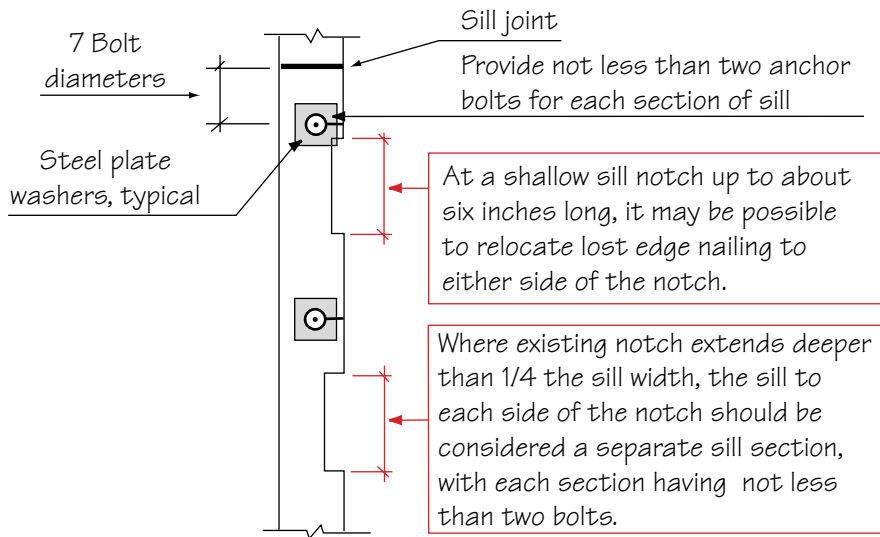


FIG. 1 ~ FOUNDATION SILL PENETRATIONS

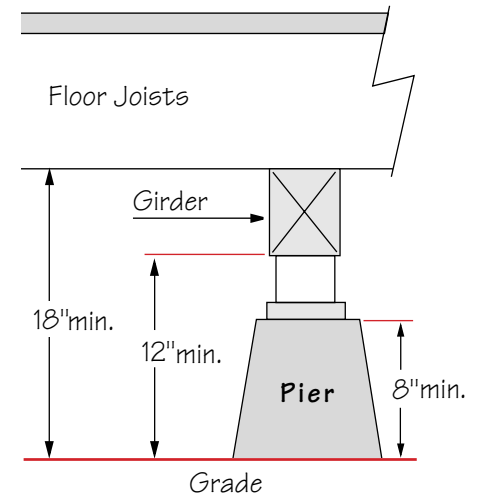


FIG. 2 ~ UNDER FLOOR CLEARANCES

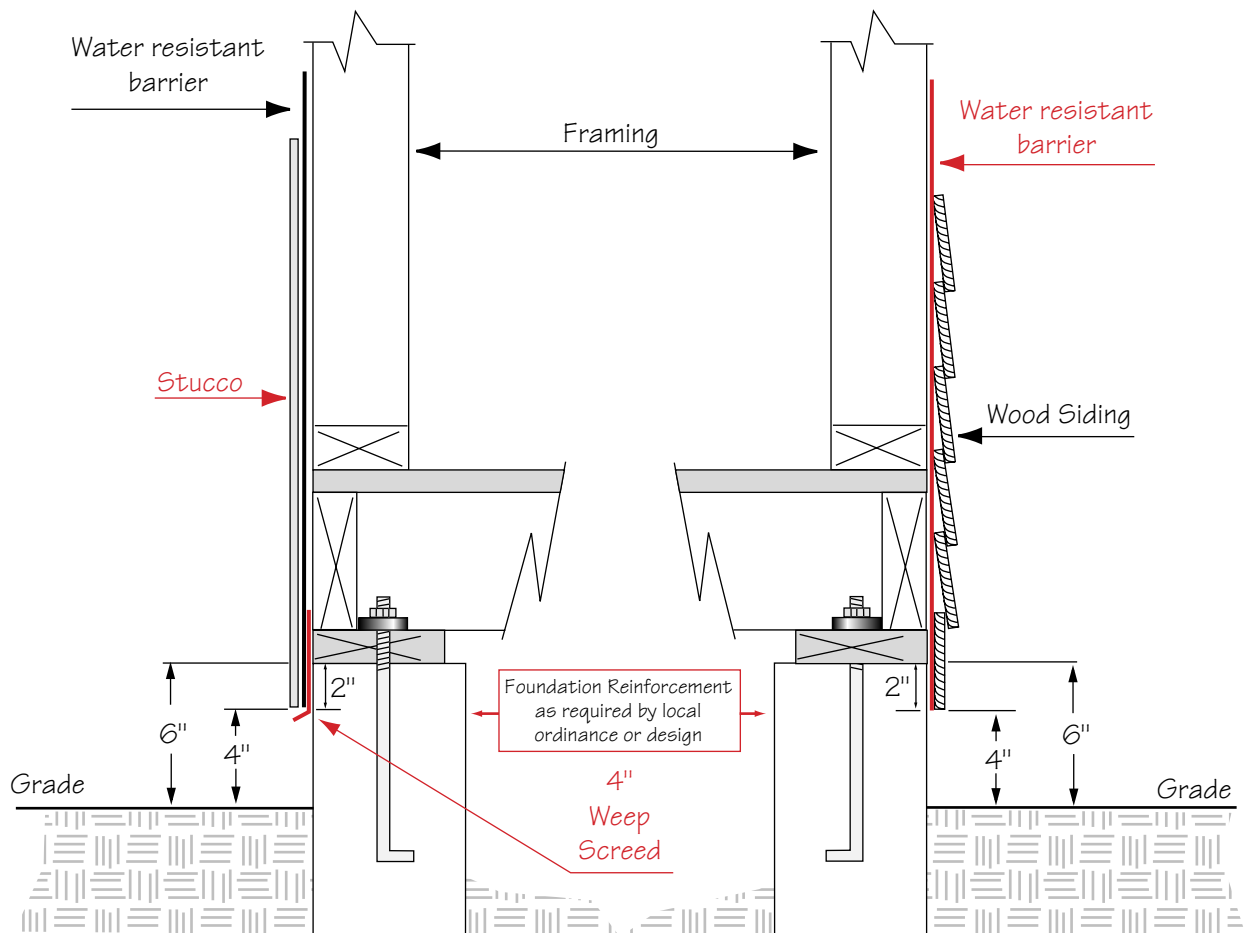


FIG. 3 ~ WEEP SCREED CLEARANCES

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CHECKLIST FOR RESIDENTIAL ELECTRICAL INSPECTION (BASED ON THE NEC 99)

ITEM

SOURCE

1. Check job address.
2. Check description of electrical work on electrical worksheet.
3. Look at city approved plans and check electrical permit for correct cost.

GENERAL REQUIREMENTS

A. RECEPTACLES (REQUIRED)

1. Receptacles are required to be located so that no point along the floor line of the room is more than 6' away from an outlet [210-52(a)]
2. Any wall over 2' wide requires a receptacle [210-52(a)]
3. GFI receptacle in Garage [210-52(g)]
4. GFI receptacle outside, 1 at rear and 1 at front. [210-52(e)]
5. Hallway over 10 ft long [210-52(h)]

B. NM CABLE (NON-METALLIC SHEATHED CABLE)

1. Staple wire within 12" of box and every 4'-6" (use clamp to attach wire to box) [336-18]
2. Staple wire within 8" of box for single gang plastic boxes (no clamp needed) [370-17(c) ex]
3. Nail plates required when NMC is less than $\frac{1}{4}$ " from face of stud [300-4(a) (1) (2)]
4. NMC sheathing to penetrate into box $\frac{1}{4}$ " min. [370-17(c)]
5. Bend of wire must be gradual (5 times diameter of wire) [336-16]
6. Protect NMC wire from physical damage; (Less than 8' above floor) [300-5(d)] - [336-6(b)]
7. Protect NMC within 6' of attic access [333-12(a)]

C. BOXES & SUB-PANELS (SEE 370-19)

1. Outlet boxes shall be flush with combustible surfaces [370-20]
2. Outlet boxes may set back into a noncombustible wall no more than $\frac{1}{4}$ " [370-20]
3. Provide min. 6" of free conductor in box [300-14]
4. Metal boxes must be grounded [250-148(a)] - [370-4]
5. All splicing must be done in boxes [300-15(a)]
6. Wire overfill in boxes [Table 370-16(b)]
7. Boxes must remain accessible [370-29] - [370-72]
8. Sub-panels must be secured with screws (manufacturer)
9. Sub-panel working clearance minimum 30" wide 36" deep above and below Table [110-26(a)]
10. Sub-panel grounding wires must be isolated from the neutral buss [384-20]
11. 1 hour walls; elec. boxes back to back must be offset min 24" or approved fire pad [UBC 1997]
12. No sub-panels (circuit breakers) in clothes closets or bathrooms [240-24 de]
13. Max. height of circuit breaker and disconnects is 6'7" [380-8(a)]