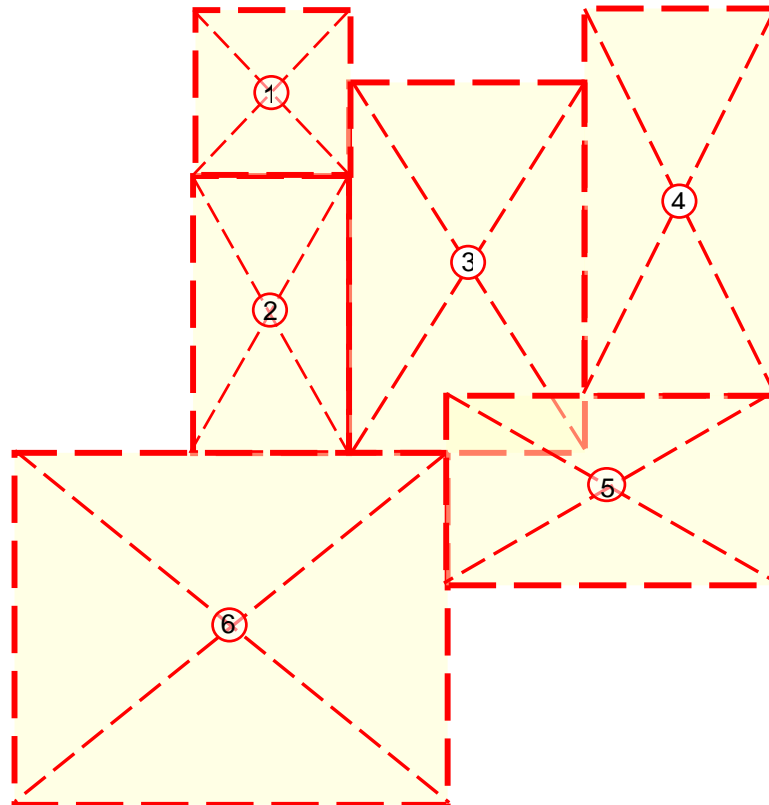


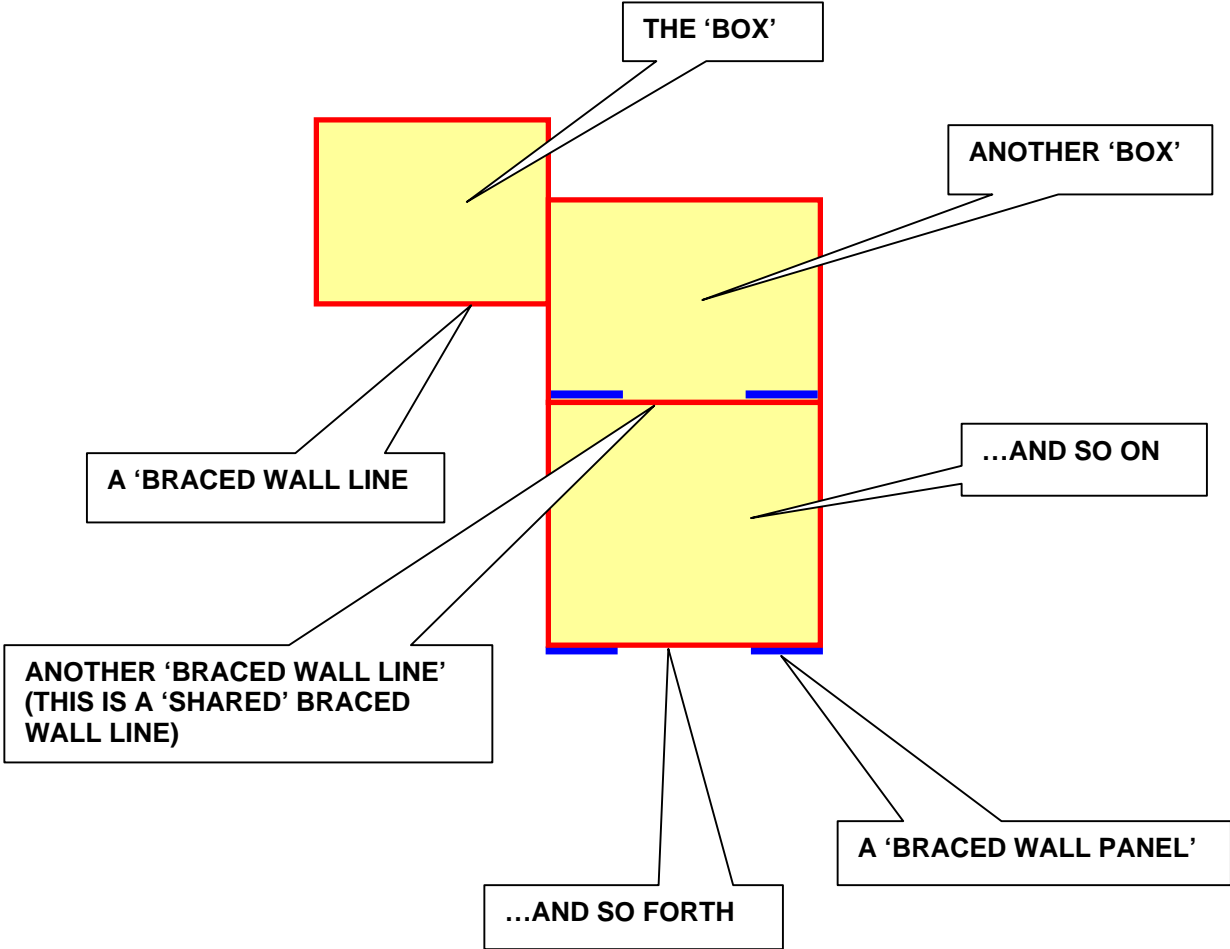
A RESIDENTIAL 'BOX' SOLUTION



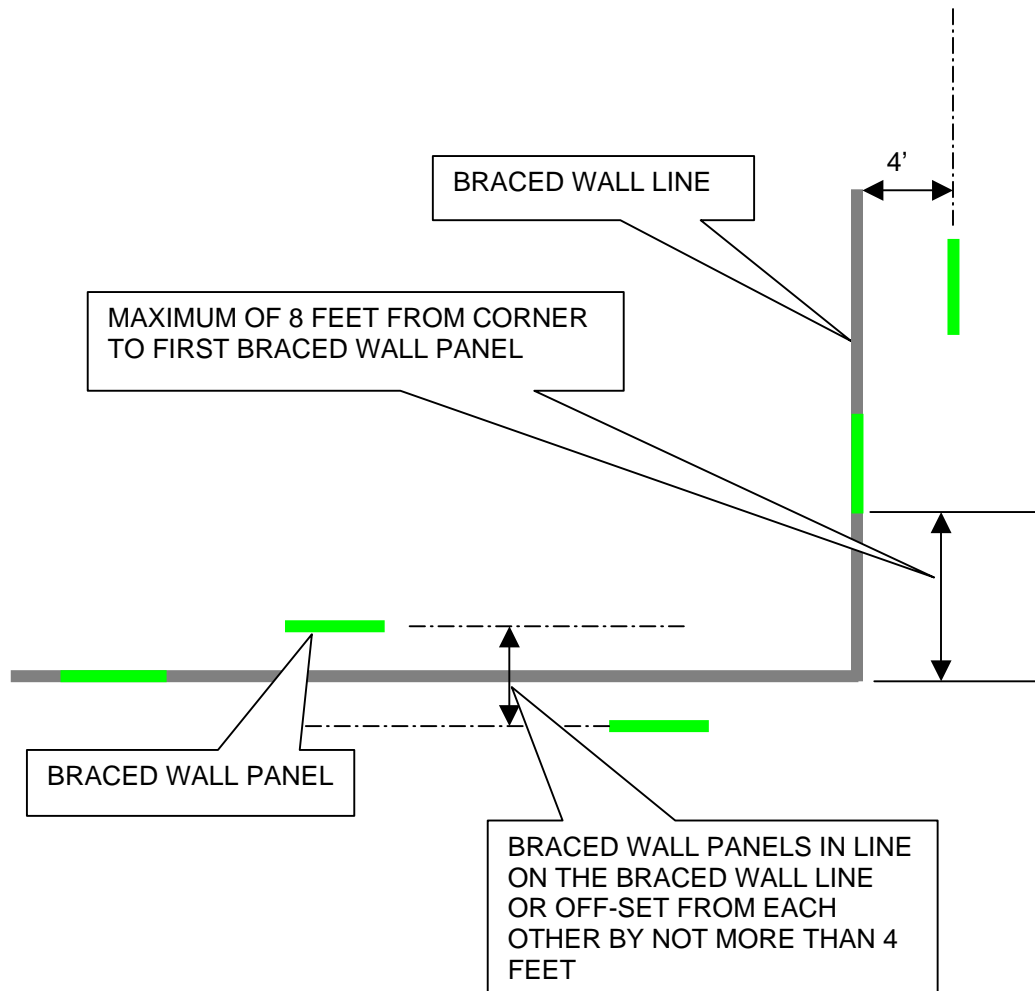
The 'BOX' solution is a non-engineered approach to providing structural bracing for certain types of structures. Braced walls, braced wall panels, and braced wall lines refer to this type of solution. Shear walls, shear wall panels, and shear wall lines refer to the engineered approach. The next few pages will illustrate the method of analyzing the bracing for a residence.

CONVENTIONAL BRACING

- A conventionally braced building is a 'box' or several 'boxes' joined together.
- The maximum size of the 'box' is 34 feet in Tehama County. This maximum size is based on the wind load and the seismic zone for our area.
- Each side of the 'box' is a 'braced wall line'.
- Each 'braced wall line' is made up of a number of 'braced wall panels'.
- Adjacent 'boxes' may share the same 'braced wall line'.

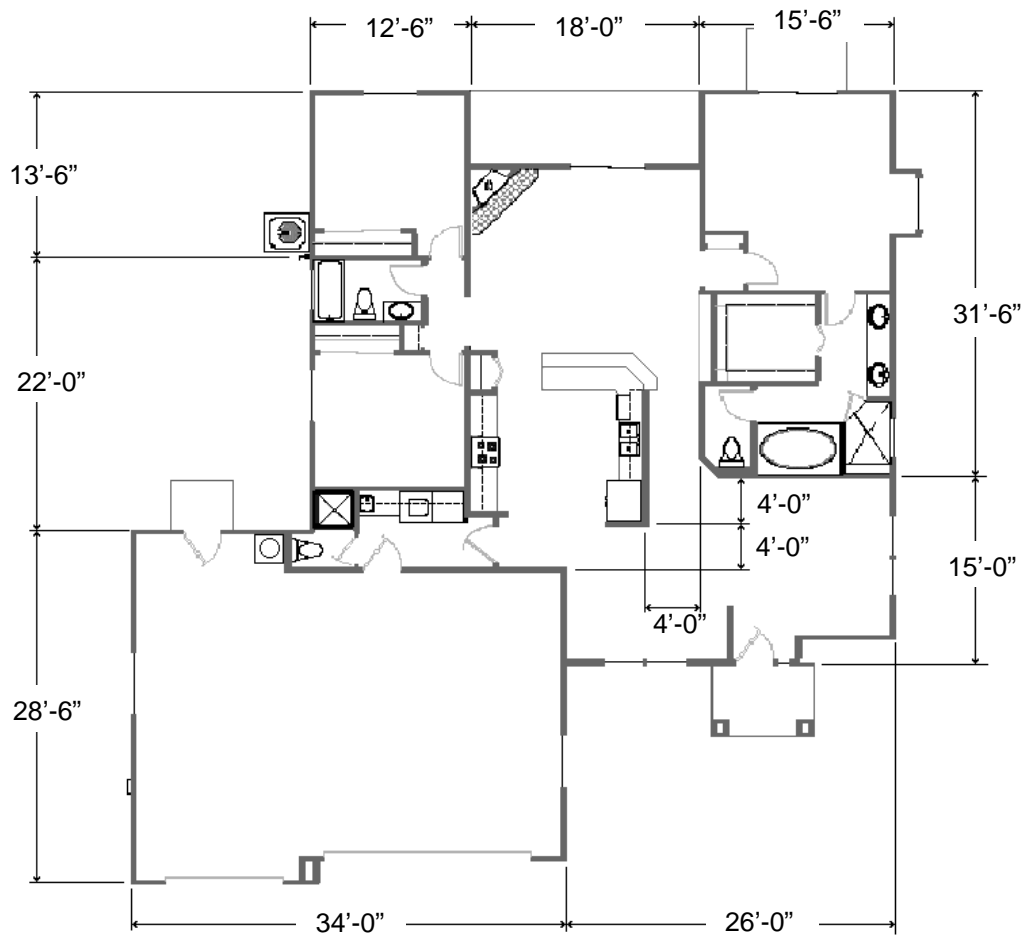


BRACED WALL PANELS



- Braced wall panels may be offset within a braced wall line a maximum of 4 feet.
- The beginning of a braced wall panel may begin a maximum of 8 feet from the end of a braced wall line.
- Braced wall panels must occur directly over floor joists, over blocking between floor joists, or over foundations.

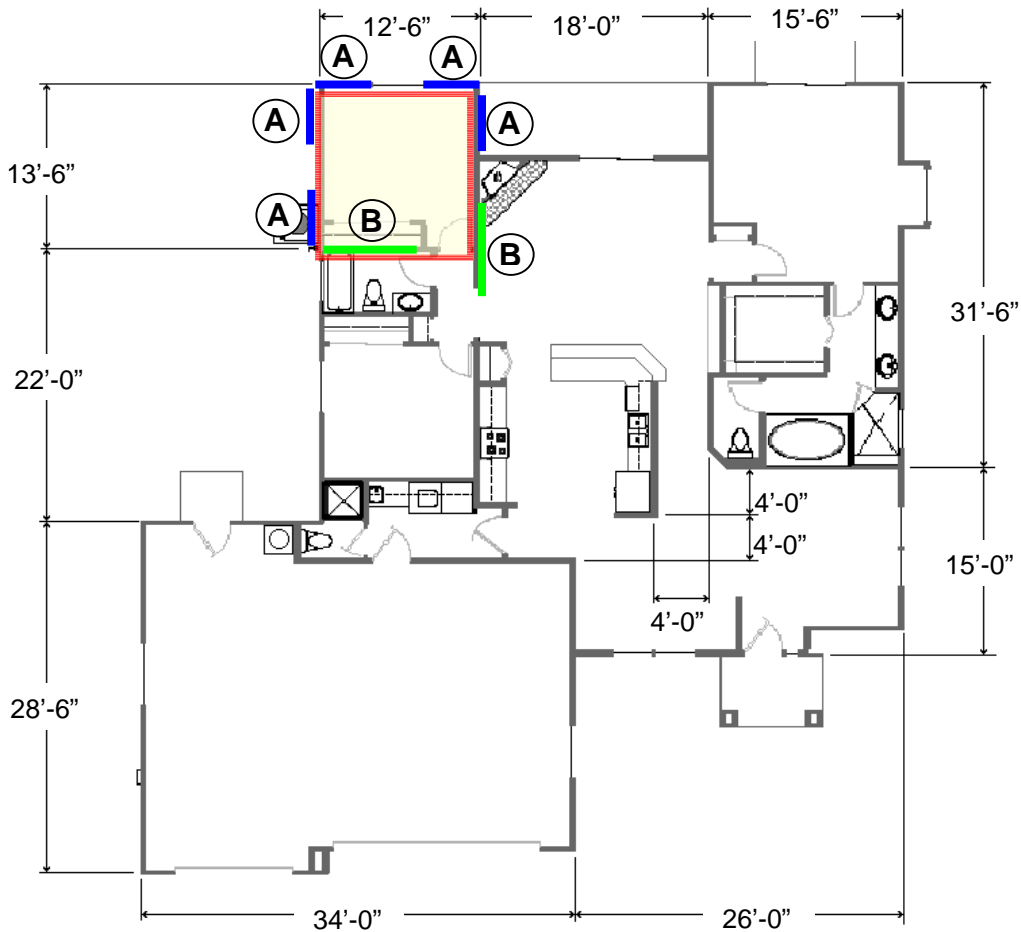
DIMENSIONED FLOOR PLAN



The plan is a single-family residence...a simple design without odd angles or large open spaces. This type of design serves well to explain the code requirements for 'Braced wall design' and conventional construction.

The dimensions shown on this plan are within the criteria for "boxing" as required for Tehama County.

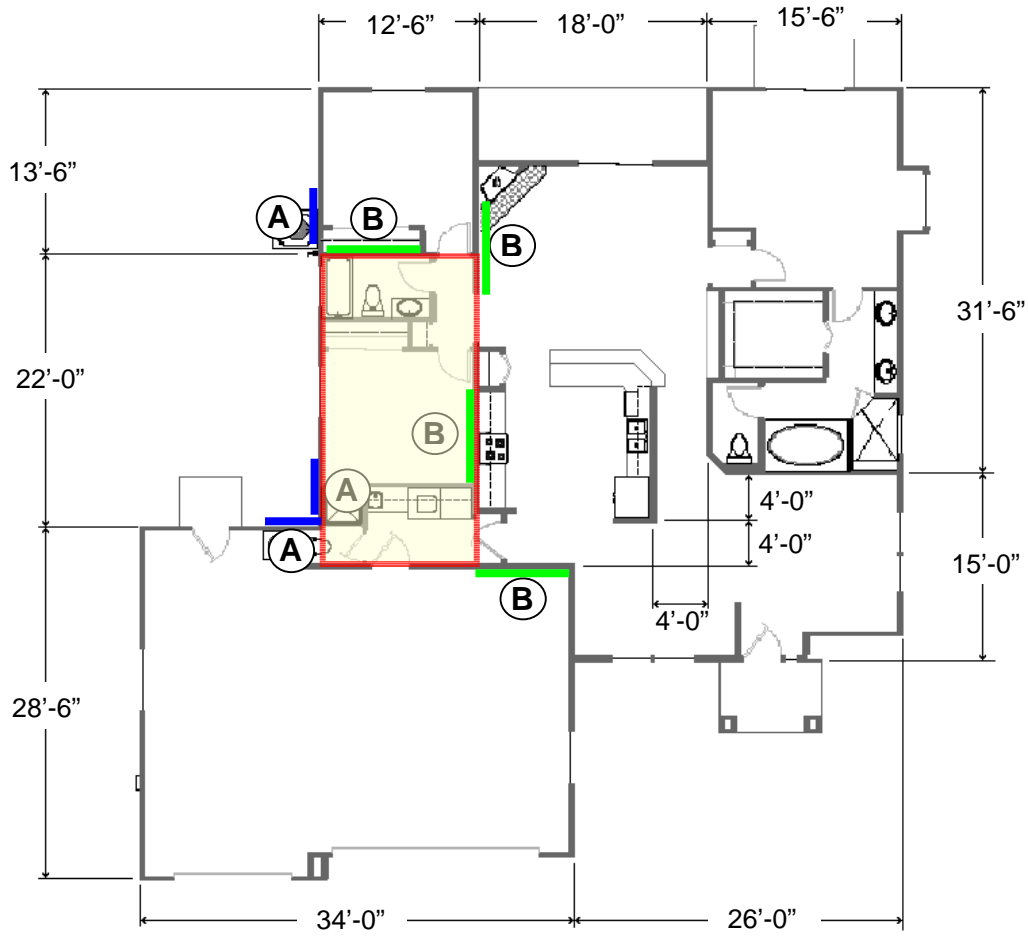
Box #1



Ⓐ Wood structural panel sheathing with a thickness of not less than 5/16 inch for 16-inch stud spacing and not less than 3/8 inch for 24-inch stud spacing.

Ⓑ Gypsum board sheathing 1/2 inch thick applied vertically on studs spaced no more than 24 inches on center and nailed at 7 inches on center with 6d cooler or wallboard nails. Minimum length shall be 8' on one side of a wall or 4' on opposite sides of a wall. Unblocked gypsum board applied horizontally shall be nailed @ 4" o.c. Screws of proper size may also be used.

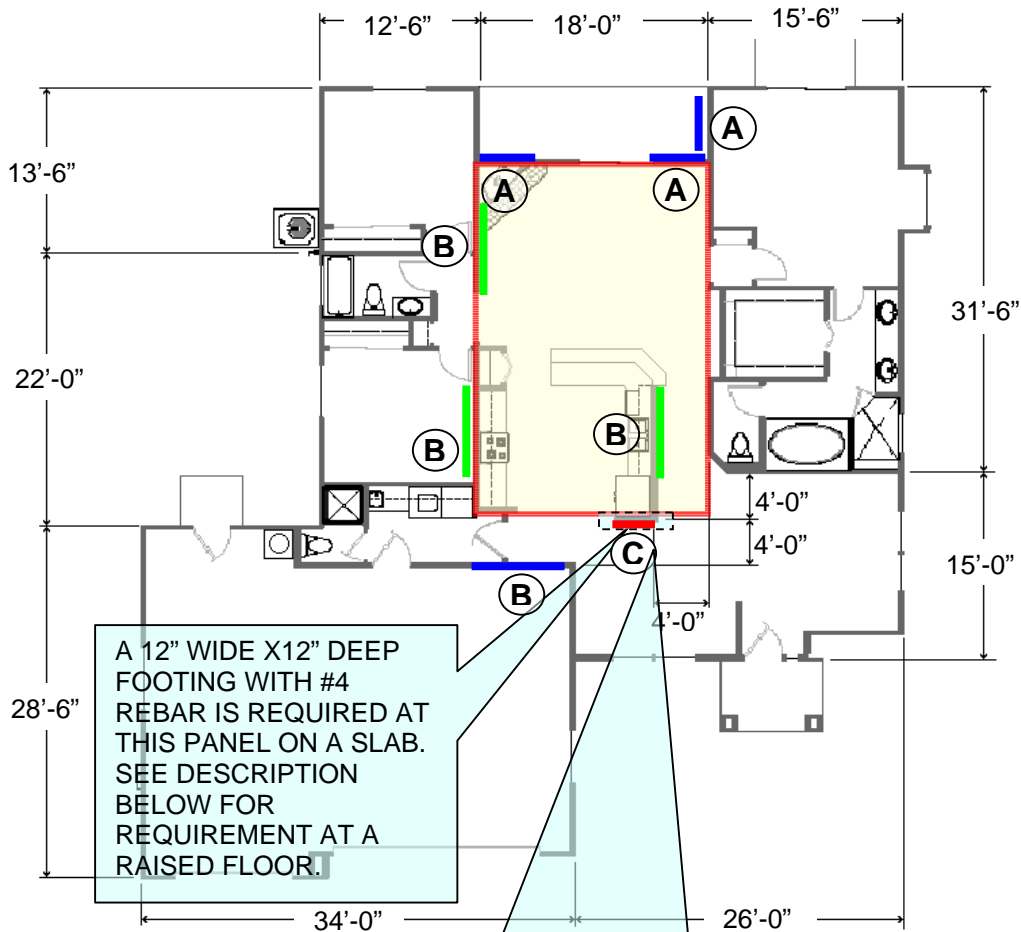
BOX #2



(A) Wood structural panel sheathing with a thickness of not less than 5/16 inch for 16-inch stud spacing and not less than 3/8 inch for 24-inch stud spacing.

(B) Gypsum board sheathing 1/2 inch thick applied vertically on studs spaced no more than 24 inches on center and nailed at 7 inches on center with 6d cooler or wallboard nails. Minimum length shall be 8' on one side of a wall or 4' on opposite sides of a wall.

BOX #3

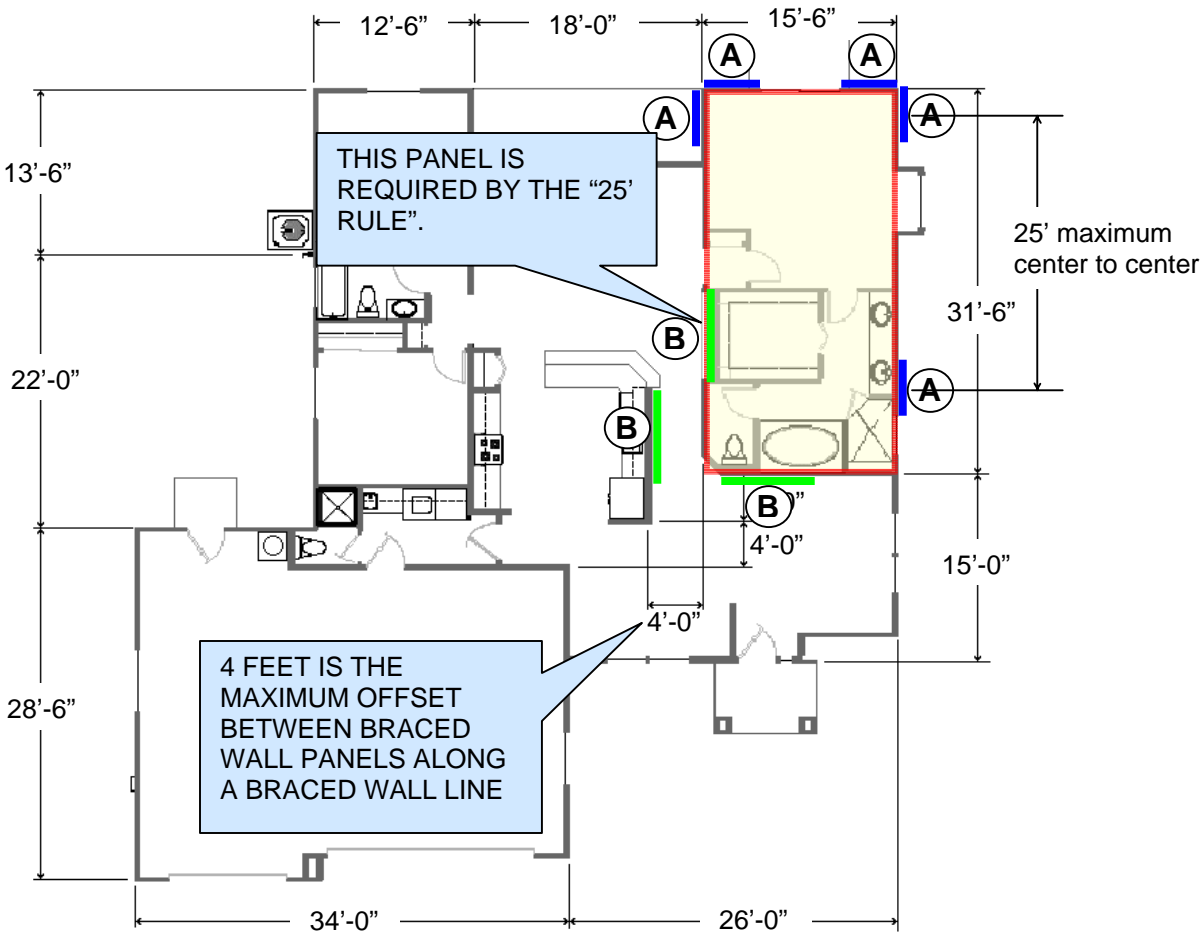


BOX 3

THIS BOX USES AN 'ALTERNATE BRACED WALL PANEL' (RED). WHEN THE DESIGN DOES NOT ALLOW THE USE OF A 4-FOOT PANEL, THIS PANEL MAY BE USED FOR LENGTHS FROM 2'-8" TO 4'-0". THE MAJOR DIFFERENCE IS THE USE OF HOLDDOWNS AND FOOTINGS.

- (C)** Alternate braced wall panels. Any braced wall panel may be replaced by an alternate braced wall panel constructed in accordance with the following:
1. In one-story buildings, each panel shall have a length of not less than 2 feet 8 inches and a height of not more than 10 feet. Each panel shall be sheathed on one face with 3/8-inch-minimum-thickness plywood sheathing nailed with 8d common or galvanized box nails and blocked at all plywood edges. Two anchor bolts shall be provided in each panel. Anchor bolts shall be placed at panel quarter points. Each panel end stud shall have a tie-down device fastened to the foundation, capable of providing an approved uplift capacity of not less than 1,800 pounds. The tie-down shall be installed in accordance with the manufacturer's recommendations. The panels shall be supported directly on a foundation or on floor framing supported directly on a foundation that is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom.
 2. In the first story of two-story buildings, a braced wall panel shall be provided on both faces, three anchor bolts shall be placed at one-fifth points, and tie-down uplift capacity shall not be less than 3,000 pounds.

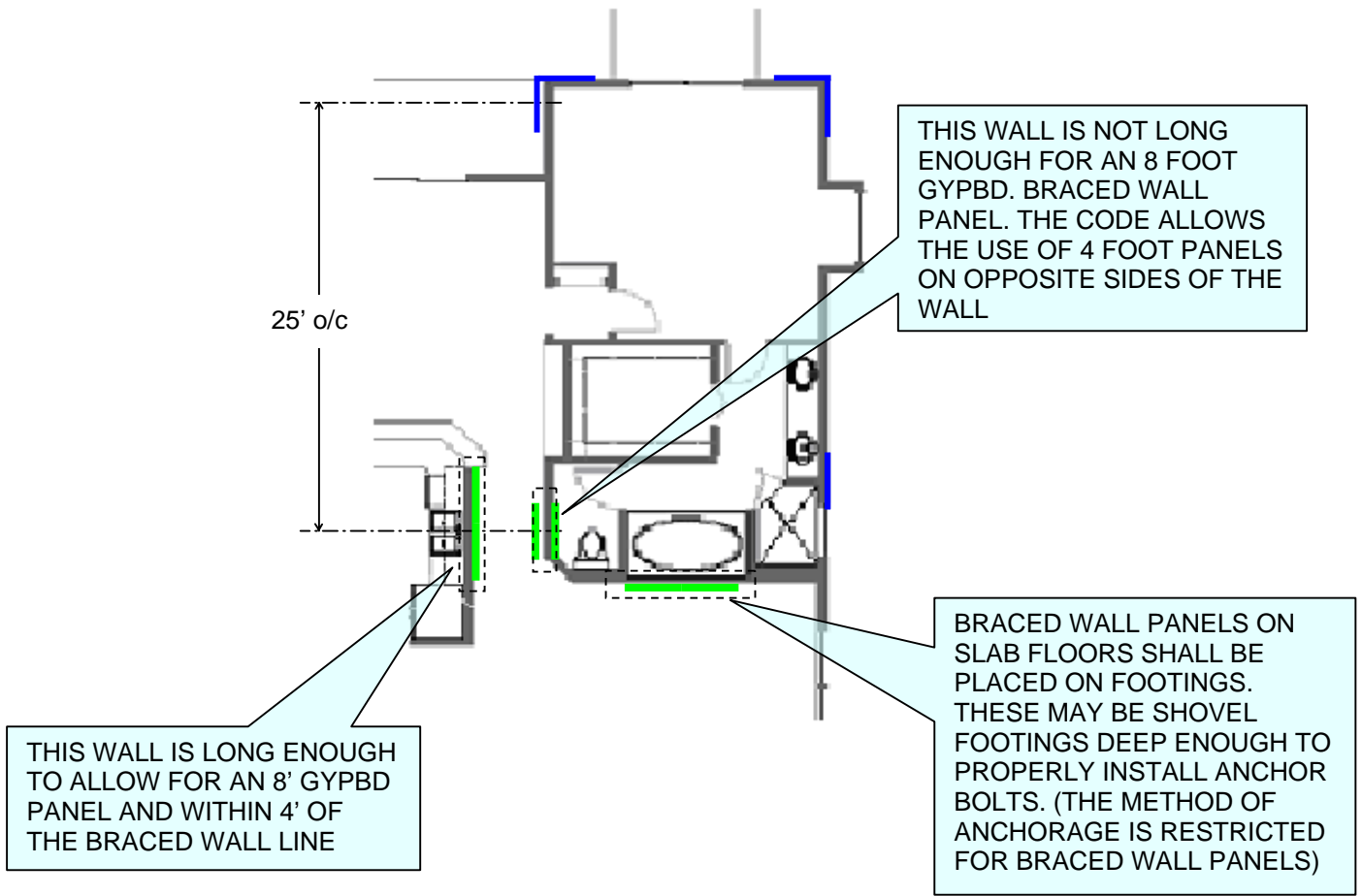
BOX #4



Each Braced wall line requires braced wall panels no more than 25' apart center to center

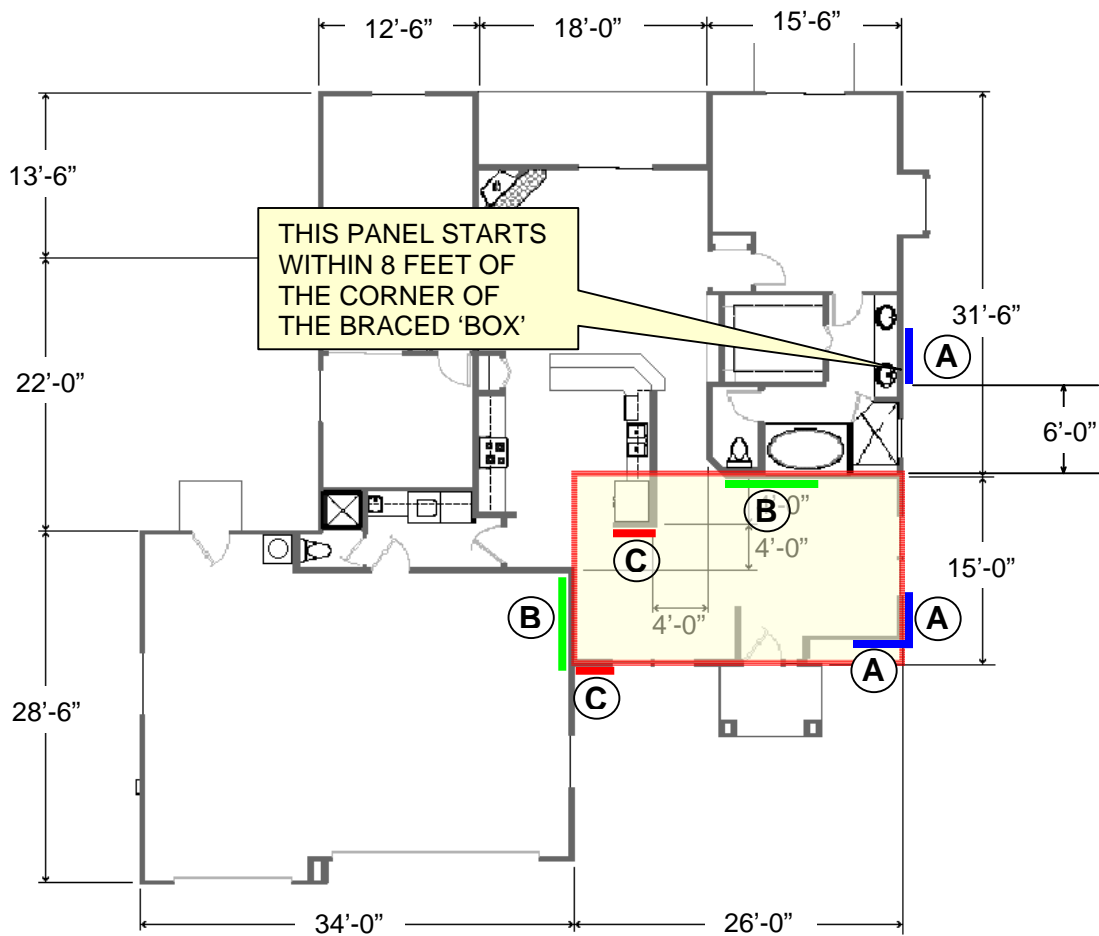
BOX #4

BRACE WALL ALTERNATE



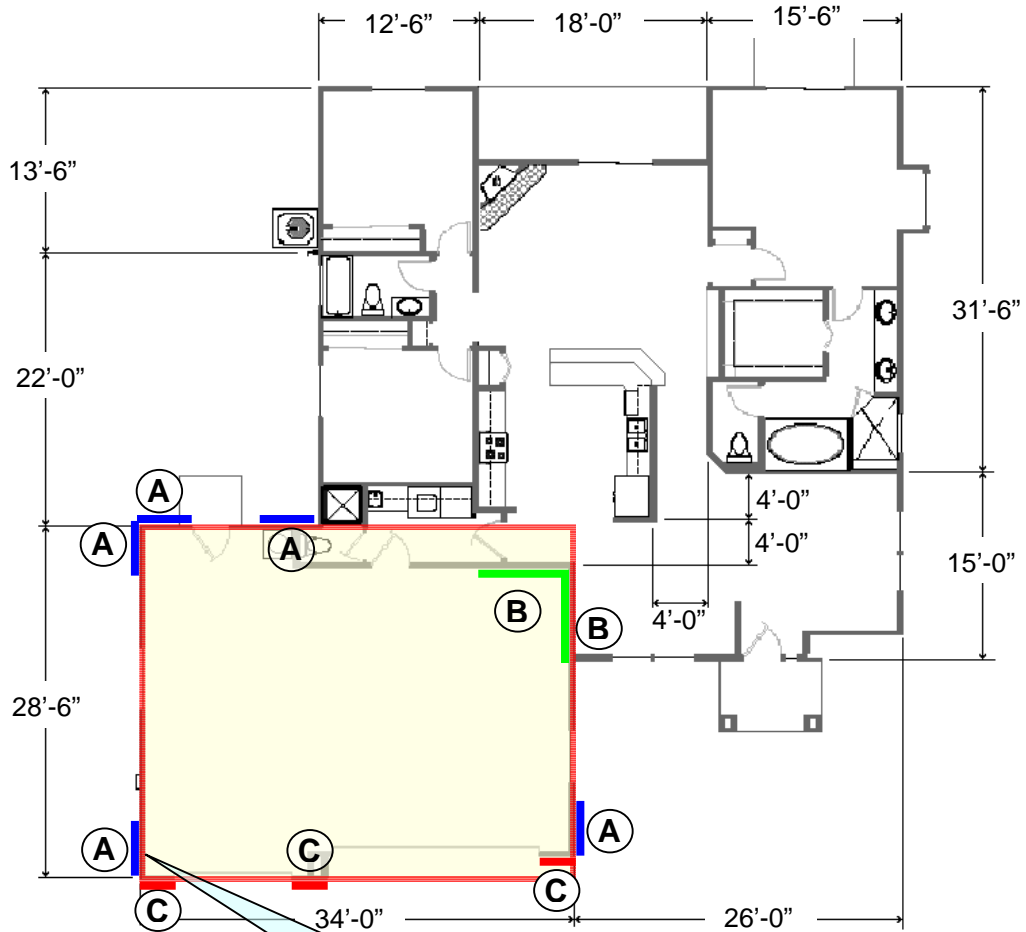
This diagram illustrates an alternate location for one of the braced wall panels required for 'Box 4'. The 8 foot panel is within 4 feet of the braced wall line.

BOX 5



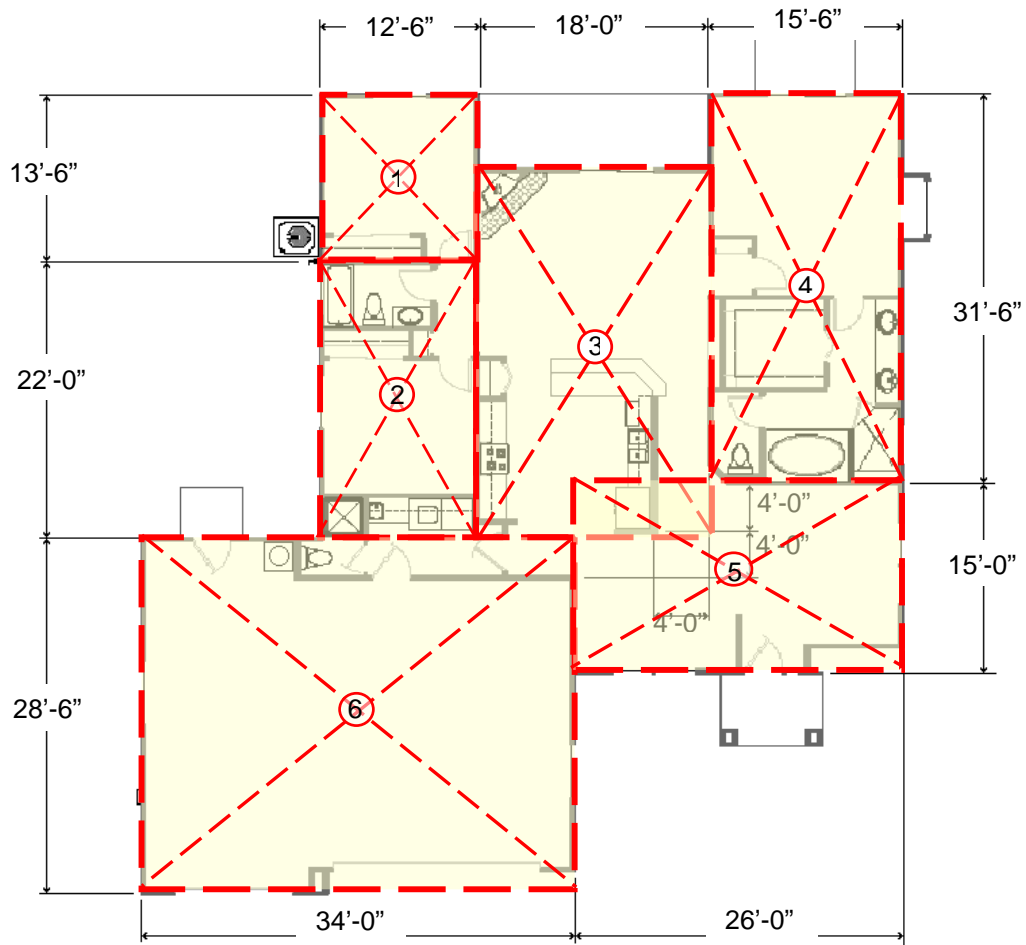
This diagram illustrates a braced wall panel beyond the perimeter of the 'box' being considered. You will also notice one exterior and one interior braced wall panel are not located on the braced wall line but both are located no more than 4 feet from the braced wall line. The interior 'C' panel is not a gypbd. panel. As an alternate braced wall panel, the bracing material is plywood, which is then covered with the finish material, usually gypbd.

BOX #6

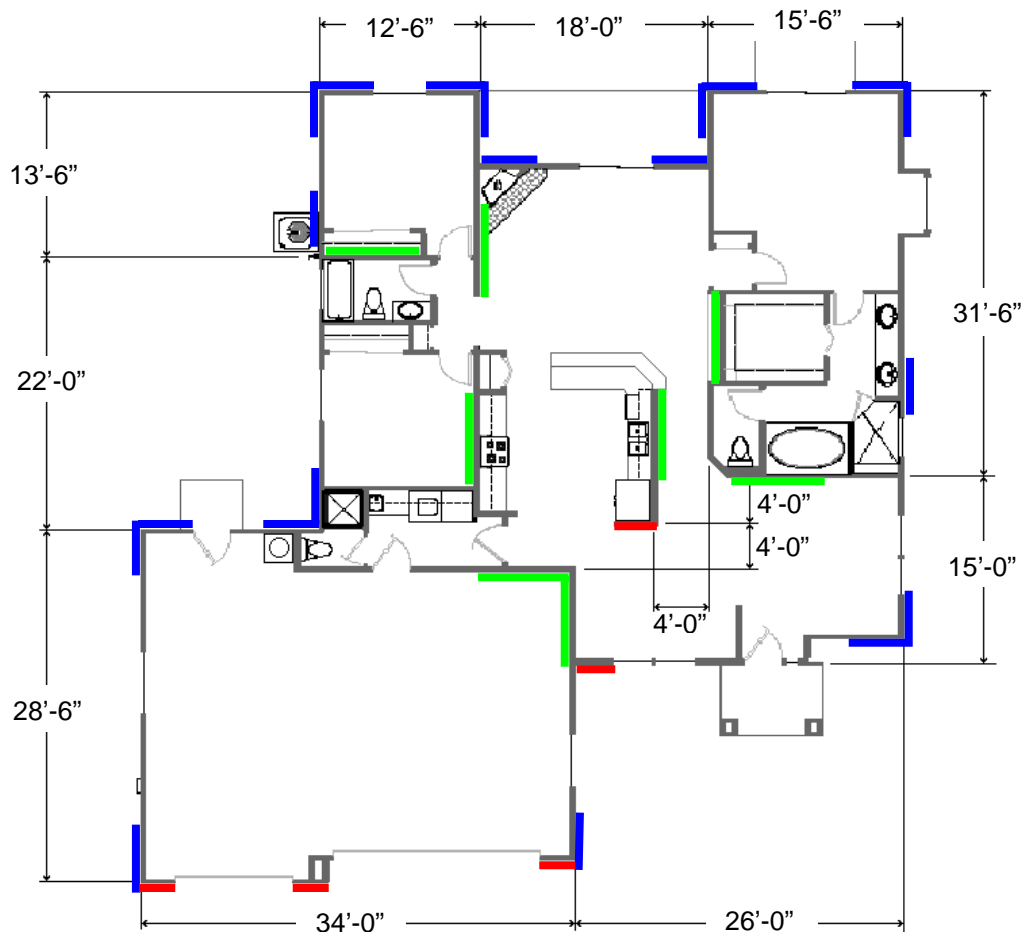


DO NOT INSTALL A FLUSH-MOUNTED ELECTRICAL PANEL IN A BRACED WALL PANEL. HOLES IN PANELS ARE NOT ACCEPTABLE

THE 'BOXED' PLAN

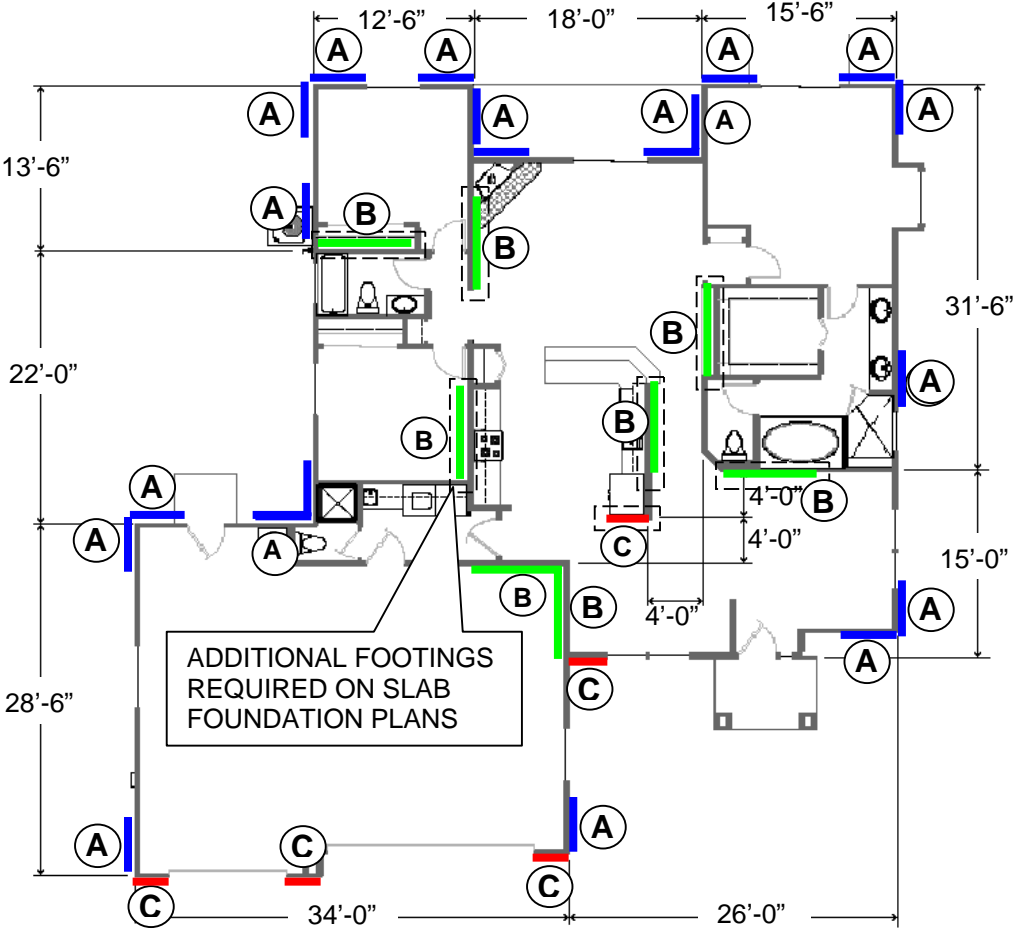


CONVENTIONAL FRAMED STRUCTURE



The final result combines all six boxes. If you compare the design of each individual box, you will find that several of the braced wall lines are shared with different boxes. A basic difference between the braced wall process and the engineered process is the distance between braced wall lines and shear lines. Engineers will calculate the loads affecting individual wall lines and design shear panels of materials, nailing patterns and holdown devices such that the location of the wall is less critical and not limited to 34' maximum distance. Using the knowledge of bracing the 'Box ' during the design process can save money for the owner

Braced wall panel layout



SAMPLE BRACED WALL SCHEDULE

BRACED WALL SCHEDULE



3/8" CDX OR OSB NAILED WITH 8d @ 6" O.C. EDGES, 12" O.C. IN FIELD.
1/2" ANCHOR BOLTS @ 48" O.C., TWO PER PANEL. A-35 CLIPS @ BLOCK/JOIST
TO TOP PLATE @ 48" O.C.



1/2" GYPSUM BOARD, INTERIOR, NAILED WITH 5d @ 7" O.C., EDGE
AND FIELD. BOTTOM SILL ATTACHED TO CONCRETE FLOORS
WITH A MINIMUM OF 2 - 1/2" DIAMETER ANCHOR BOLTS EMBEDDED
AT LEAST 7" INTO CONCRETE NOT MORE THAN 12" OR
LESS THAN 7 BOLT DIAMETERS FROM THE END.



1/2" GYPSUM BOARD, INTERIOR, NAILED W/5d @ 7" O.C. EDGE AND FIELD.
BOTTOM SILL ATTACHED W/16d @ 8" O.C.; GIRDER OR DOUBLE FLOOR JOIST
UNDER WALL. MINIMUM 8' ON ONE SIDE, 4' ON BOTH SIDES (RAISED FLOOR
SYSTEM)



THREE COAT STUCCO, METAL LATH ATTACHED W/No. 11 GAGE,
1 1/2" LONG X 7/16" HEAD NAILS OR No. 16 GAGE STAPLES W/7/8" LEGS @ 6" O.C.



3/8" CDX OR OSB NAILED W/8d @ 6" O.C. EDGES, 12" FIELD W/PHD2A @ EACH
END W/SSTB16 ANCHOR BOLTS, PLUS 2 ANCHOR BOLTS INSTALLED @ 1/4
PANEL POINTS. ALL EDGES BLOCKED.

NOTE:

**USE OF POWDER-ACTUATED FASTENERS OR
ANY ANCHORS OTHER THAN ANCHOR BOLTS
MUST BE ACCOMPANIED BY AN ICBO/ICC
EVALUATION REPORT ALLOWING THE USE OF
ANCHORS FOR RESISTING WIND AND SEISMIC
LOADING**