

## **Oregon Interpretive Ruling No. 01 - 03**

### **CLARIFICATIONS OF THE PRESCRIPTIVE BRACING REQUIREMENTS FOR DETACHED ONE-& TWO-FAMILY DWELLINGS**

**REQUESTED BY:** Structural Engineering Committee.

**REQUEST FOR RULING:** Structural Engineering Committee (SEC) requests approval of the clarifications of the prescriptive bracing requirements for detached one-& two-family dwellings, as provided in this ruling.

#### **APPLICABLE CODE SECTIONS AND DEFINITIONS:**

**Oregon One-& Two-Family Dwelling Code (OTFDC), 2000 edition:** Sections 602.9 & 602.10, Tables 602.10 & 602.3 (1)

**Oregon Structural Specialty Code (OSSC), 1998 edition:** Chapter 23, Section 2320.5.4... .

**International Building Code (IBC), 2000 edition:** Section 2308.12.6(6).

**Oregon Interpretive Rulings:** IR 97-1 Wall Bracing (Residential Prescriptive Portal Frame).

**BACKGROUND & ANALYSIS:** The 2000 OTFDC contains several revisions in the wall bracing section, most of which are a result of clarifying the use of Alternate Braced Panel's (ABP) on second and third stories. It also brings forward and incorporates model code language from the 1998 OSSC, which helps to clarify and unify the prescriptive requirements.

Knowing that there has been confusion in the past about the 1996 OTFDC prescriptive wall bracing requirements, and how they relate to Interpretive Ruling 97-1 and the rescinded IR 93-7, the State of Oregon Structural Engineering Committee decided to form a sub-committee to review the published form of the 2000 OTFDC and identify needed clarifications by ruling to be valid until effective date of the new code.

As part of this ruling development, members of the structural engineering committee held numerous stakeholder classes across the state in cooperation with Oregon Building Officials Association (OBOA) and the regional chapters of International Conference of Building Officials (ICBO). Attendance at these classes was strong and usually comprised of plans examiners, building inspectors, architects, building designers, contractors and structural engineers. Each class brought forth questions, concerns and needed clarifications, which were addressed by the committee and incorporated as needed into this ruling.

The goal was to develop a statewide ruling that encompassed all prescriptive bracing requirements outside of IR 97-1, into one document. The numbering system adopted in this ruling is done keeping that goal in mind and the existing code section numbers are provided in parenthesis for easy reference and clarity purposes. This ruling does not intend to create any additional code requirement other than the existing code language and the language recommended by SEC for inclusion in the code text in the year 2002. For clarity, this ruling differentiates proposed OTFDC language (that may

become effective April 1, 2002) from existing OTFDC code language with “*italicized*” text. Additional language within this ruling needed to clarify existing code language is shown with a “**different font**”, which is provided only to aid in understanding the bracing requirements of the code.

**FINDINGS:**

The 2000 One and Two Family Dwelling Specialty Code (OTFDC), Section 108, Alternate Materials, allows acceptance of an alternate which achieves the intent of the code and provides equivalent suitability, strength, effectiveness, fire resistance, durability, safety and sanitation for occupants and property.

This interpretation is authorized by ORS 455.060, Rulings on Acceptability of Materials, Designs or Methods of Construction, and Attorney General’s Opinion OP-5208, issued October 1, 1981, which advised the statute permits authoritative interpretations of code requirements.

This interpretive ruling provides clarifications to the prescriptive bracing requirements of the 2000 edition of the OTFDC with state amendments effective April 1, 2001.

- Current Oregon dwelling building code do not adequately address the issues surrounding prescriptive wall bracing for wood frame residential construction. Using this language in this ruling provides needed clarification to existing code.

Previous Interpretive Ruling 97-1 related to prescriptive residential portal frames shall remain effective and serve as a complimentary document to this ruling.

This ruling contains duplicate language to that contained within the 2000 OTFDC with

state amendments effective April 1, 2001. It also contains language (*italicized*) that has been submitted as code changes, which may become effective April 1, 2002. These proposed code changes have been reviewed and recommended for approval by the State of Oregon Structural Engineering Committee and are awaiting final approval from the Building Codes Structures Board.

**RULING:** The Building Codes Structures Board accepts the recommendation of the Structural Engineering Committee for the approval of the following clarifications of the prescriptive bracing requirements for detached one and two family dwellings. This ruling may need to be revised if any of the proposed code changes to the OTFDC code sections referenced here are amended, changed or replaced.

Signed:

John A. Talbot, P.E. Chairman  
Building Codes Structures Board

Date

The recommendation and findings of the Building Codes Structures Board are accepted and Interpretive Ruling 01- 3 is adopted.

Joseph A. Brewer III, Administrator Date Building Codes Division

## BEGINNING OF THE INTERPRETIVE RULING 01-3

### LEGEND:

Normal text = Language from the existing OTFDC. *Italicized text* = Language recommended to become code text effective April 1, 2002  
**Different font text** = Language used in this ruling to provide clarifications to the wall bracing code provisions.

### Section 1. Definitions (Section 202, OTFDC)

**Basement** (*New definition to replace the existing language*) – *Is any floor level below the first story in a building, except that a floor level in a building having only one floor level shall be classified as a basement unless such floor level qualifies as a first story as defined herein.*

**Cripple Wall** (*New language*) – *A framed stud wall less than 96 inches in height extending from the top of a concrete or masonry foundation to the underside of the floor framing for the lowest occupied floor level or from the top of daylight basement concrete or masonry foundation walls to the underside of the floor framing above.*

**Fasteners** – Unless noted otherwise within this ruling or referenced tables, fasteners shall be defined as common or galvanized box nails. Equivalent fasteners shall be allowed when proper documentation is submitted and approved by the local building official.

**Story** – That portion of a building included between the upper surface of any floor and the upper surface of the floor next above, except that the topmost story shall be that ~~habitable~~ portion of a building included between the upper surface of the topmost floor and ceiling or roof above. *If the finished floor level directly above a usable or unused under-floor space is more than 6 feet above grade, as defined herein, for more than 50 percent of the perimeter or is more than 12 feet above grade, as defined herein, at any point, such usable or unused under-floor space shall be considered a story.*

**Story, First** (*New language*) – *The lowest story in a building that qualifies as a story, as defined herein, except that a floor level in a building having only one floor level shall be classified as the first story, provided such floor level is not more than 4 feet below grade, as defined herein, for more than 50 percent of the total perimeter, or not more than 8 feet below grade, as defined herein, at any point.*

### Section 2. Cripple Walls

**2.1. Cripple Walls (Section 602.9, OTFDC).** Foundation cripple walls shall be framed of studs not less in size than the studding above. Where exceeding 4 feet (1219 mm) in height, such walls shall be framed of studs having the size required for an additional story. *Cripple walls supporting three stories shall be framed with 2x6 studs spaced not more than 16 inches on center.*

**2.2. Cripple walls less than 14 inches (Section 602.9.1, OTFDC).** Cripple walls with a stud height less than 14 inches (**supporting exterior walls or an interior braced wall line which is supported by a continuous foundation as required by Section 5 {Section 602.10.2.1, OTFDC} of this ruling**), shall be sheathed on at least one side with a wood structural panel that is fastened to

both the top and bottom plates in accordance with OTFDC Table 602.3(1), or the cripple walls shall be constructed of solid blocking.

~~*Exception: Cripple walls with a stud height of 18 inches or less when the wall is enclosed by foundation walls.*~~

**2.3. Cripple walls exceeding 14 inches (Section 602.9.1, OTFDC).** Cripple walls with a stud height exceeding 14 inches *supporting exterior walls or (an) interior braced wall lines (supported by a continuous foundation) as required by Section 5 of this ruling (OTFDC Section 602.10.2.1)* shall be considered as first-story walls for the purpose of determining the amount of bracing required by OTFDC Table 602.10. (See sketch 1).

**2.4. Cripple walls supporting 3 stories (Section 602.9.1, OTFDC).** *Cripple walls supporting three stories shall comply with the following conditions: (See sketch 2).*

1 *The top of the cripple wall shall be not more than 6 feet above the finished ground level for more than 50 percent of the total building perimeter nor more than 12 feet above the finished ground level at any point.*

2 *The floor framing system of the lowest story shall be supported directly on a foundation sill on at least one side.*

3 *65 percent of the cripple wall length shall be sheathed with wood structural panels.*

4 *When the bottom plate of the wall immediately above the cripple wall is interrupted by openings in the walls (i.e. doors), a corrosion-resistant steel tie strap or holdown device capable of providing an uplift capacity of not less than 1,800 pounds shall be installed on both sides of the opening and connected to the cripple wall below.*

### **Section 3. Exterior Wall Bracing Requirements**

**3.1. General (Section 602.10, OTFDC).** Exterior and foundation wall panels of frame construction shall be braced in accordance with Section 3.2 (Section 602.10.1, OTFDC). Structure located in Seismic Zones 3 & 4 shall be braced in accordance with Sections 3.2 (Section 602.10.1, OTFDC) and 5.0 (Section 602.10.2, OTFDC). The braced wall lines in each story of the building shall be constructed with a series of one or more braced wall panels complying with Sections 3.2 (Section 602.10.1, OTFDC) or 4.0 (Section 602.10.1.4, OTFDC).

**3.2. Exterior braced wall panel requirements (Section 602.10.1, OTFDC).** Braced wall lines shall consist of braced wall panels which meet the requirements for location, type and amount of bracing specified in OTFDC Table 602.10 and are in line or offset **horizontally** from each other by not more than 4 feet. Braced wall panels shall begin within 8 feet from each end of an exterior braced wall line. Braced wall lines 12 feet in length or less shall have not less than one braced wall panel.

**3.3. Vertical alignment of exterior braced wall lines.** Braced wall panels are required to be in one plane vertically from the foundation to the uppermost story for which they are required.

**Exception:** Structures complying with the exception outlined in Section 6.1.1 (unusually shaped building provisions) of this ruling.

**3.4. Construction of braced panels (Section 602.10.1, OTFDC).** The construction of braced wall

panels shall be in accordance with one of the following methods:

- 1 Nominal 1-inch by 4-inch continuous diagonal braces let in to the top and bottom plates and the intervening studs or approved metal strap devices installed in accordance with the manufacturer's specifications. The let-in bracing shall be placed at an angle not more than 60 degrees or less than 45 degrees from the horizontal.
- 2 Wood boards of 5/8-inch net minimum thickness applied diagonally (approximately 45 degrees) on studs spaced a maximum of 24 inches on center attached according to OTFDC Table 602.3(1). End joints in adjacent boards shall be separated by at least one framing member and there shall be at least two boards between joints on the same support.
- 3 Wood structural panel sheathing with a thickness not less than 5/16-inch for 16inch stud spacing and not less than 3/8-inch for 24-inch stud spacing. Wood structural panels shall be installed in accordance with OTFDC Table 602.3(2).
- 4 4-foot by 8-foot panels of at least 1/2-inch thick fiberboard sheathing applied vertically on studs spaced a maximum of 16-inches on center. Fiberboard sheathing shall be installed in accordance with OTFDC Table 602.3(1).
- 5 Gypsum board with minimum 1/2-inch thickness placed on studs spaced a maximum of 24-inches on center and fastened at 7-inches on center with nails in accordance with OTFDC Table 702.3.4.
- 6 Particleboard wall sheathing panels installed in accordance with OTFDC Table 602.3(3).
- 7 Portland cement plaster on studs spaced a maximum of 16-inches on center and installed in accordance with OTFDC Section 703.6.

**Exception:** Alternate braced wall panels constructed in accordance with Section 4.0 (OTFDC Section 602.10.1.4) shall be permitted to replace any of the above methods of braced wall panels.

**3.5. Minimum braced panel length (Section 602.10.1.1, OTFDC).** For methods 2, 3, 4, 6 and 7 as described in Section 3.4 above, each braced wall panel shall be at least 48 inches in length, covering a minimum of three stud spaces where studs are spaced 16 inches on center and covering a minimum of two stud spaces where studs are spaced 24 inches on center. For method 5 above, each braced wall panel shall be at least 96 inches in length where applied to one face of a braced wall panel and at least 48 inches where applied to both faces.

**3.6. Exterior wall bracing requirements. OTFDC TABLE**

**602.10**

*c,d*

**EXTERIOR WALL BRACING**

<b>SEISMIC ZONE</b>	<b>CONDITION<sup>a</sup></b>	<b>TYPE OF BRACE</b>	<b>AMOUNT OF BRACING<sup>b, e</sup></b>
<b>0, 1 and 2</b>	One Story. Top of two or three story. First story of two story. Second story of three story.	Methods 1, 2, 3, 4, 5, 6 or 7	Located at each end and at least every 25 feet <i>on center but not less than 16 percent</i> of wall length.
	First story of three story.	Methods 2, 3, 4, 5, 6 or 7	Located <i>at each end and at least every 25 feet on center but not less than 16 percent of wall length.</i>

<b>3 and 4</b>	One story. Top of two or three story.	Methods 2, 3, 4, 5, 6 or 7	Located at each end and at least every 25 feet <i>on center but not less than 16 percent of wall length</i>
	First story of two story. Second story of three story.	Methods 2, 3, 4, 5, 6 or 7	<i>Located at each end and at least every 25 feet on center but not less than 25 percent of wall length.</i>
	First story of three story.	Methods 2, 3, 4, 5, 6 or 7	<i>Located at each end and at least every 25 feet on center but not less than 40 percent of wall length.</i>

Footnotes:

- a. Braced wall panels between the lowest framed floor of the structure and top of the foundation wall shall be braced as required *by Section 602.9.1* (Sections 2.2 and 2.3 of this ruling).
- b. Methods of bracing shall be as described in Section 602.10.1 (Section 3.4 of this ruling). Where methods 2,3,4,5,6, & 7 are used, each braced wall panel shall be at least 48 inches in width. Alternate braced panels, as outlined in Section 602.10.1.4 (Section 4.0 of this ruling), shall also be permitted, *where applicable*.
- c. *An alternate braced panel shall be considered to have an effective length of 4 feet for the purpose of satisfying the percentage of wall length required to be braced.*
- d. *When a braced panel is constructed using method 5 (gypsum board) and applied one face for a length of 96 inches, it shall be considered to have an effective length of 4 feet for the purpose of satisfying the percentage of wall length required to be braced.*
- e. *The center-to-center spacing of 25 feet in one and two story dwellings may be exceeded up to a maximum of 30 feet on center, provided the percentage of bracing for that braced wall line meets the requirement for the next highest level (i.e. 16% to 25% or 25% to 40%).*

**3.7 Maximum height of braced panels (Section 602.10.1, OTFDC).** *Braced wall panels shall not be more than 12 feet in height and constructed to a maximum height to width ratio of 2 1/2:1. The minimum width of a braced panel shall be 4'-0" except as permitted for Alternate braced panels and portal frames. No increase in height shall be allowed for braced wall panels sheathed on both faces of the wall.*

**3.8. Braced wall panel joints (Section 602.10.1.2, OTFDC).** All vertical joints of panel sheathing shall occur over studs. Horizontal joints shall occur over blocking of sufficient thickness to accommodate the required nailing. **Flat blocking, with a nominal 2" thickness, may be used in lieu of nominal 2" edge blocking.**

**Exception:** Blocking is not required behind horizontal joints where permitted by the manufacturer's installation requirements for the specific sheathing material.

**3.9. Braced wall panel connections (Section 602.10.1.3, OTFDC).** Exterior braced wall panel sole plates shall be fastened to the floor framing **joists, solid decking or blocking between joists using (3) 16d nails per 16" length** and top plates shall be connected to the framing above in accordance with OTFDC Table 602.3(1). Where joists are perpendicular to the braced wall lines above **or below**, blocking shall be provided **over**, under and in line with the braced wall panels. **Blocking need only be installed in bays affected by the location of the brace wall panels.**

**Exception:** The sole plate nailing requirement above may be decreased to (1) 16d nail at 16"o.c. provided the sheathing is lapped a minimum of 1½" over the rim joist and braced panel edge nailing is provided from the braced panel to the rim joist (See sketch 3).

**3.10. Connection of roof to exterior walls.** The roof diaphragm shall be continuously attached to the exterior walls in accordance with OTFDC Table 602.3 (1) and sketch 4.

#### **Section 4. Alternate Braced Wall Panels**

**Note:** The required uplift capacities for tie-down devices, as described within this section of the ruling, may be reduced by 25% for alternate braced panels installed within Seismic Zones 0, 1 & 2 except for areas exposed to Columbia River Gorge [refer to figure 301.2(4), OTFDC]. All other requirements remain as noted.

**4.1. Alternate braced wall panels (Section 602.10.1.4, OTFDC).** Any braced wall panel required by Section 3.2 (OTFDC Section 602.10.1) shall be permitted to be replaced by an alternate braced wall panel constructed in accordance with the following provisions:

1. **In one-story buildings**, each panel shall have a minimum width of 32 inches and a maximum height of 10 feet. Each panel shall be sheathed on one face with 3/8-inch minimum thickness wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with OTFDC Table 602.3(1) and blocked at all edges. Two anchor bolts installed in accordance with OTFDC Section 403.1.4 or approved equivalent shear connectors shall be provided in each panel. Where each

panel is supported directly on a foundation or on floor framing supported directly on a foundation, 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 device shall be installed in accordance with the manufacturer's recommendations. The foundation wall and footing shall be reinforced with a minimum of two No. 4 horizontal bars, one located at the top of the wall and one located a minimum of 3-inches from the bottom of the footing or two No. 4 horizontal bars located a minimum of 3 inches from the bottom of the footing, extending not less than 5 feet each way from the center of the panel with No. 4 vertical bars spaced not more than 24 inches on center (See sketch 5).

2 **In the first story of two-story buildings**, each braced wall panel shall be in accordance with Item 1, except that the wood structural panel sheathing shall be applied to both faces, three anchor bolts or approved equivalent shear connectors shall be provided, and tie-down device uplift capacity shall not be less than 3,000 pounds.

3 **In the second story of a three-story building**, each panel shall have a minimum width of 32 inches and a maximum height of 10 feet. Each panel shall be sheathed on both faces with 3/8-inch minimum thickness wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with OTFDC Table 602.3(1) and blocked at all edges. Each panel end stud shall be connected to an equivalent cross section of stud in the wall below with a corrosion resistant steel tie

strap or hold-down capable of providing an approved uplift capacity of not less than 3,000 pounds. The alternate braced panel shall not extend more than 12 inches over an opening in the wall below and the opening has a minimum 4-inch by 12-inch header. Reinforcement of the foundation is not required when alternate braced panels are supported by a braced panel.

4 **In the top story of a two-story building or the top story of a three-story building**, each panel shall have a minimum width of 32-inches and a maximum of 10-feet in height. Each panel shall be sheathed on one face with 3/8-inch minimum thickness wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with OTFDC Table 602.3(1) and blocked at all edges. Each panel end stud shall be connected to an equivalent cross section of stud in the wall below with a corrosion-resistant steel tie strap or hold-down capable of providing an approved uplift capacity of not less than 1,800 pounds. The alternate braced panel shall not extend more than 12-inches over an opening in the wall below and the opening has a minimum 4-inch by 12-inch header. Reinforcement of the foundation is not required when alternate braced panels are supported by a braced panel.

**Exception:** When alternate braced panels are required to be sheathed on both faces, panels may be sheathed on one side of the wall only when the panel thickness is increased to a nominal 1/2 inch structural sheathing thickness and the nail spacing at the edge of panel is reduced to 3-inches on center. (Note: Exception applies to entire code section [4.1 of this ruling], not just to item no.4).

#### 4.2. Tie down requirements for alternate braced panels.

4.2.1. Alternate braced panels at first story. When alternate braced panels are installed at the first story of a structure and supported directly on a foundation or on floor framing supported directly on a foundation, each panel end stud shall have a tie-down device fastened to the foundation, capable of providing an approved uplift capacity as specified in Section 4.1 of this ruling. The tie-down device shall be installed in accordance with the manufacturer's recommendations. (See sketches 6 & 8).

**Exception:** Alternate braced panels installed over a cripplewall greater than 4 feet but less than 8 feet in height may utilize the provisions of Section 4.2.2 of this ruling in lieu of direct fastening to the foundation.

4.2.2. Alternate braced panels at second or third stories. Alternate braced panels installed at second or third stories of a structure shall be located directly above a braced panel (or alternate braced panel, if allowed) in the story below. Each panel end stud shall be connected to an equivalent cross section of stud in the wall below with a corrosion-resistant steel tie strap or hold-down capable of providing an approved uplift capacity as specified in Section 4.1 of this ruling. The tie-down device shall be installed in accordance with the manufacturer's recommendations. (See sketches 6, 7 & 8).

4.3. Alternate braced panels located at garage fronts. When alternate braced panels are proposed at garage fronts, the footing and

reinforcement shall run continuous across the garage door opening from pier to pier.

Exception: The wall footing may be discontinuous at the garage opening provided a continuous garage slab turndown with a minimum size of 12 inches deep (verify frost depth requirements with the local jurisdiction) by 6 inches wide, reinforced with a minimum of 2 - #4 continuous horizontal bars, is provided between and attached to the two garage piers by one of the following two provisions: (See sketch 9).

1. Dowel out (2) - #4 bars from pier footing a minimum of 24 inches and lap with turndown reinforcement.
2. Drill and epoxy (2) - #4 bars into the stemwall or footing with a minimum lap length of 24 inches. Installation, embedment depth and special inspection requirements shall be as per manufacturer's installation guidelines and associated ICBO evaluation reports. The depth of embedment shall develop the full strength of the bar.

## Section 5. Interior Wall Bracing Requirements

**5.1. Interior braced wall support (Section 602.10.2, OTFDC).** Buildings located in Seismic Zones 3 and 4 shall be provided with exterior and interior braced wall lines. The spacing between braced wall lines shall not exceed 35 feet on center in both the longitudinal and transverse directions in each story. Interior braced wall lines *are required* to extend to perpendicular exterior braced wall lines.

**5.2. Interior braced wall panel requirements (Section 602.10.2, OTFDC).** *Interior braced wall lines shall consist of braced wall panels which meet the percentage requirements as set forth in OTFDC Table 602.10 but are not subject to the spacing requirements set forth within OTFDC Table 602.10.* Interior braced wall lines shall consist of braced wall panels, which are in line or offset horizontally from each other by not more than 4 feet.

**5.3. Vertical alignment of interior braced wall lines (Section 602.10.2, OTFDC).** With the exception of interior braced wall lines satisfying Section 5.6 (OTFDC Section 602.10.2.1), *Interior braced wall lines are not required to align vertically with interior braced wall lines on adjacent stories.*

**5.4. Location of interior braced wall panels (Section 602.10.2, OTFDC).** *Interior braced wall panels shall begin within 8 feet from each end of an interior braced wall line.*

*Exception: Interior braced wall panels at one end of the interior braced wall line may exceed the 8 foot distance, provided the interior braced panel at the opposite end of the interior braced wall line extends fully to the perpendicular exterior braced wall line.*

**5.5. Interior braced wall support (Section 602.10.2.1, OTFDC).** Interior braced wall lines shall be supported on continuous foundations at intervals not exceeding 70-feet. *Braced wall panels in*

(located on) interior braced wall lines located less than 70-foot intervals shall be supported by doubled floor joists or blocking *between floor joists*. *Where floor joists are perpendicular to the braced wall line, blocking shall be provided for the length of the braced panel and shall extend to the next available joist below for braced panels whose ends are not aligned with the joists below*. The length to width ratio of the horizontal diaphragm supporting interior braced wall lines shall not exceed 4 to 1. *For alternate braced panels, provide double joists or double blocking at the ends of panels*. (See sketches 10 & 11).

**5.6. Connection of interior braced panel to roof/ceiling assembly (Section 602.10.2.2, OTFDC).** *Interior braced wall panels shall be extended to the roof/ceiling assembly (ceiling joists for site built roofs or the bottom chords of trusses for pre-manufactured trussed roofs) and attached per prescriptive requirements, unless otherwise specified by manufacturer instructions.* (See sketches 12 & 13).

**5.7. Interior braced panels at vaulted ceilings.** Interior braced panels or alternate braced panels located in areas with a vaulted or elevated ceiling shall satisfy the height restrictions set forth within this ruling.

## Section 6. Unusually Shaped Building Provisions

**6.1 (Section 2320.5.4, OSSC).** When of unusual shape, buildings of light-frame construction shall have a lateral-force-resisting system designed to resist the forces specified in OSSC Chapter

16. Buildings shall be considered to be of unusual shape when the building official determines that the structure has framing irregularities, offsets, split levels or any configuration that creates discontinuities in the seismic load path and may include one or more of the following.

**6.1.1 (Section 2320.5.4.1, OSSC).** When exterior braced wall panels, as required by Section 3.2 of this ruling, are not in one plane vertically from the foundation to the uppermost story in which they are required.

**EXCEPTION:** Floors with cantilevers or setbacks not exceeding four times the nominal depth of the floor joists may support braced wall panels provided (See sketch 14: ABP at cantilevered floor framing):

1 Floor joists are 2 inches by 10 inches or larger and spaced at not more than 16 inches on center.

2 The ratio of the back span to the cantilever is at least 2 to 1.

3 Floor joists at ends of braced wall panels are

doubled.

4 A continuous rim joist is connected to ends of all cantilevered joists. The rim joist may be spliced using a metal tie not less than 0.058 inch (16 galvanized gage) and 1 ½ inches wide fastened with six 16d nails.

5 Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof load and the reactions from headers having a span of 8 feet or less.

6.1.2 (Section 2320.5.4.2, OSSC). When a section of floor or roof is not laterally supported by braced wall lines on all edges.

EXCEPTION: Portions of roofs or floor which do not support braced wall panels above may extend up to 6 feet beyond a braced wall line.

6.1.3 (Section 2320.5.4.3, OSSC). When the end of a required braced wall panel extends more than 1 foot over an opening in the wall below. This provision is applicable to braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by Section 6.1.1, exception.

EXCEPTION: Braced wall panels may extend over an opening not more than 8 feet in width when the header is a 4-inch by 12-inch or larger member.

6.1.4 (Section 2308.12.6{6}, IBC). Where openings in the floor or roof diaphragms having a maximum dimension of greater than 50% of the distance between lines of bracing or an area greater than 25% of the area between orthogonal pairs of braced wall lines are present, the structure shall be considered to be irregular.

6.1.5 (Section 2320.5.4.5, OSSC). Construction where portions of a floor level are vertically offset such that the framing members on either side of the offset cannot be lapped or tied together in an approved manner as required by Section 2320.8.3, OSSC (... Joist framing from opposite sides of a beam, girder or partition shall be lapped at least 3 inches or the opposing joists shall be tied together in an approved manner ... ).

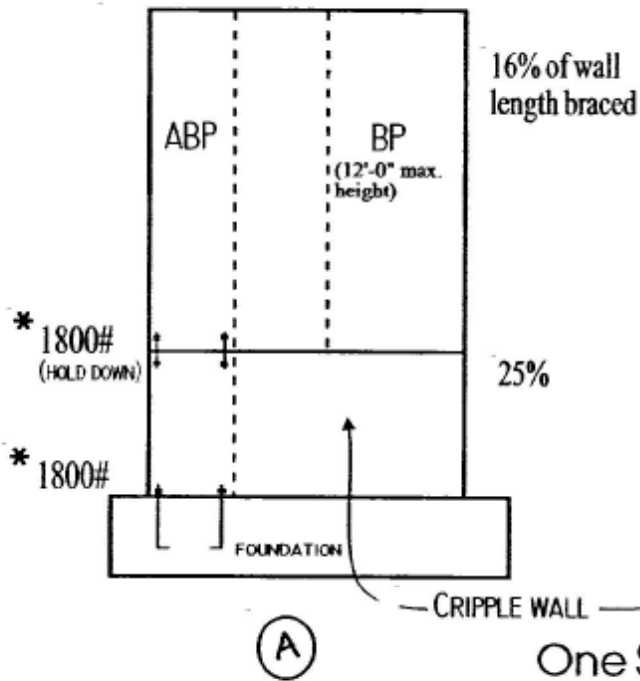
EXCEPTION: Framing supported directly by foundations.

6.1.6(Section 2320.5.4.6, OSSC). When braced wall lines do not occur in two perpendicular directions.

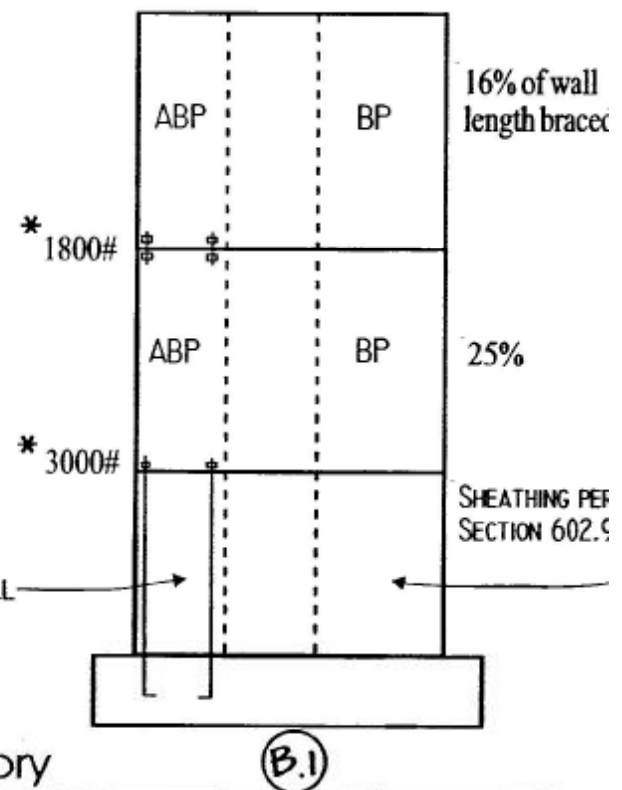
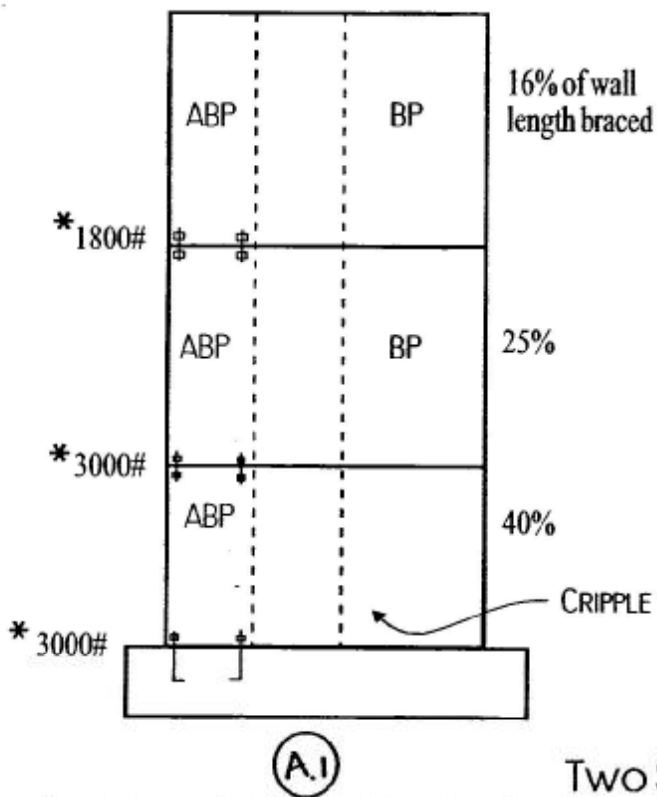
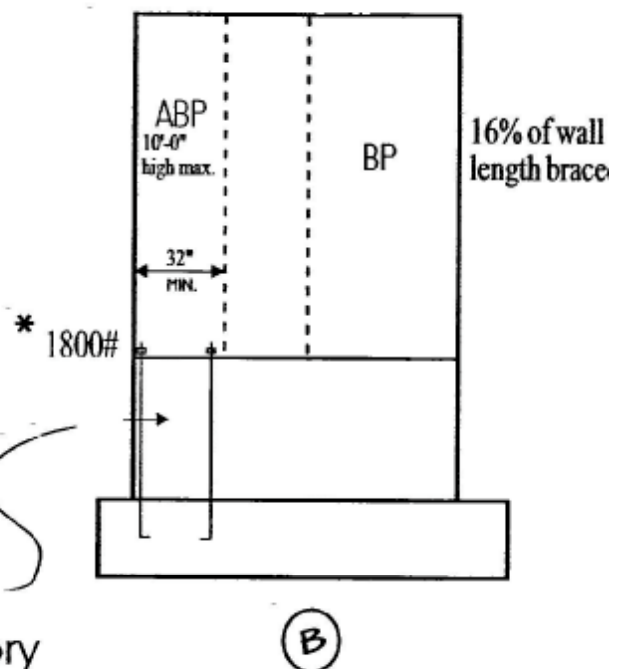
**END OF THE INTERPRETIVE RULING 01-3**

RESCINDED

EXTERIOR CRIPPLE WALL  
WITH A STUD HEIGHT > 14" BUT ≤ 8'-0"



EXTERIOR CRIPPLE WALL WITH  
A STUD HEIGHT ≤ 14"

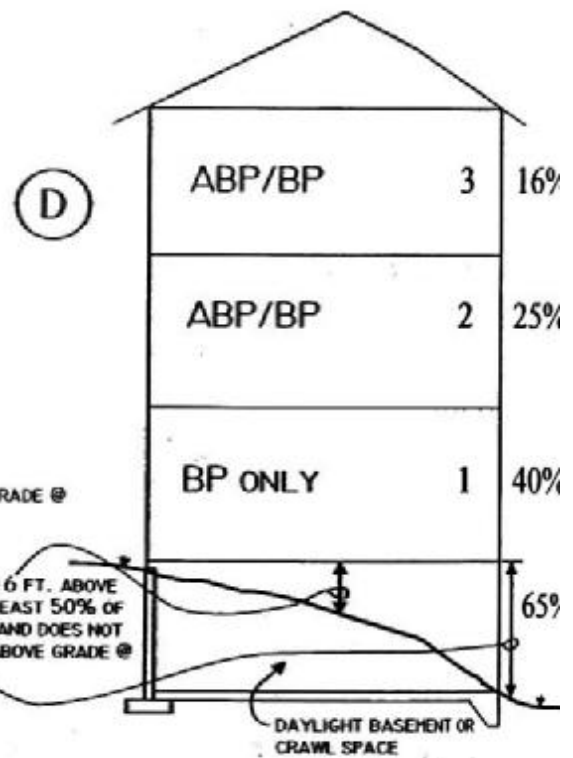
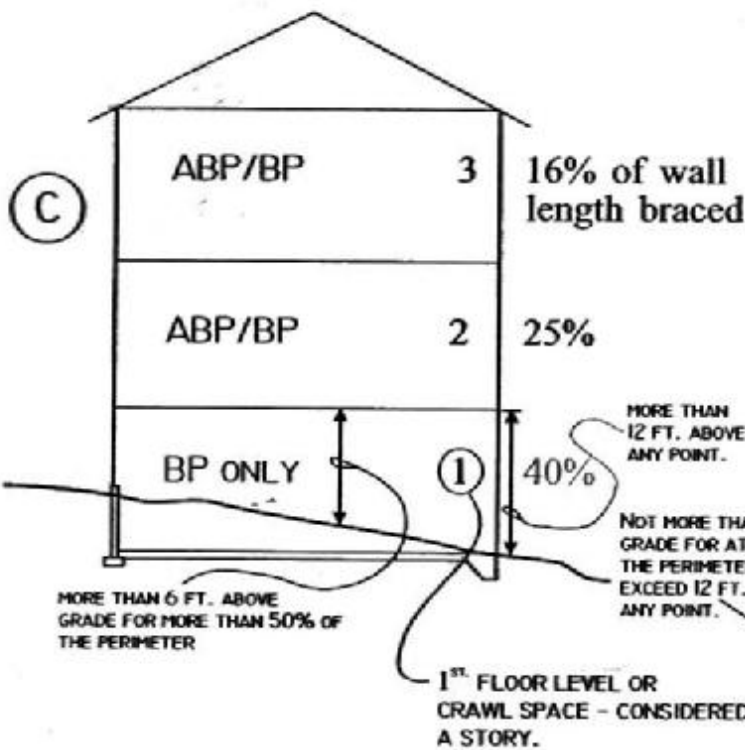
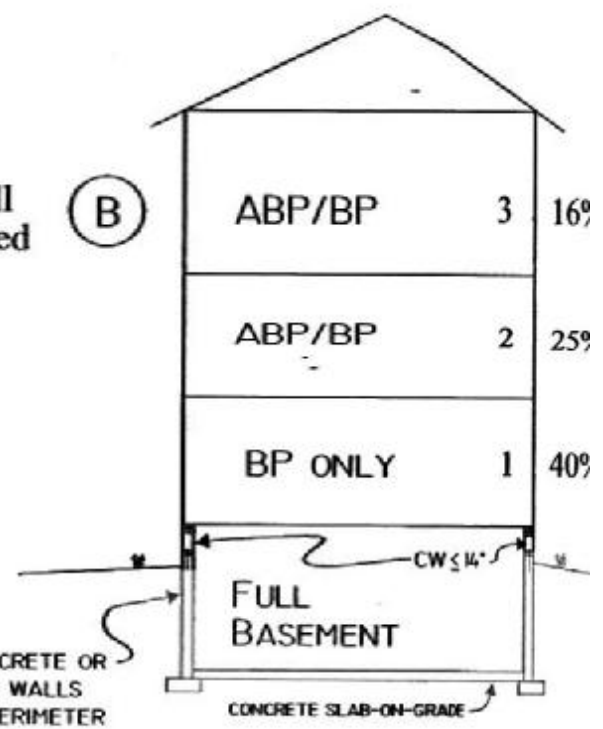
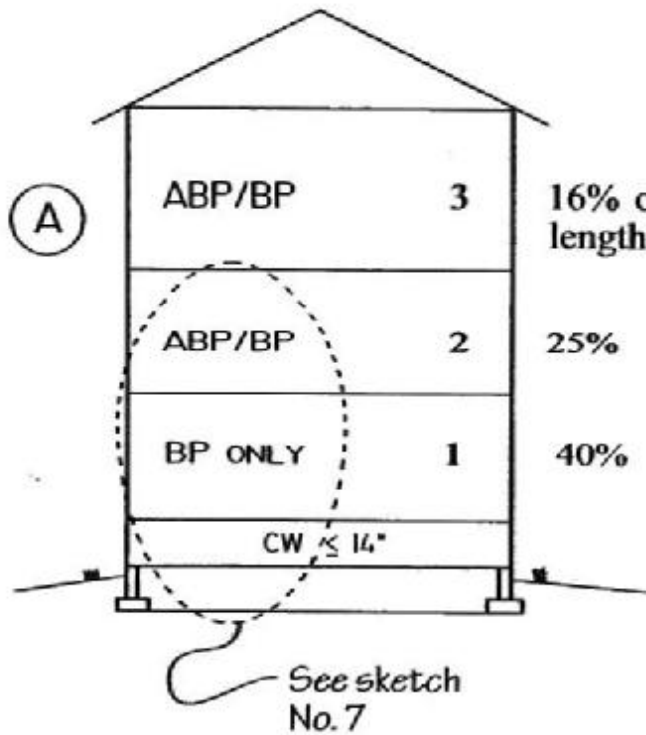


1

REQUIREMENTS FOR 1&2 STORY STRUCTURES WITH CRIPPLE WALLS

\* Acceptable to use straps with equivalent capacities, in lieu of hold-downs.

NTS

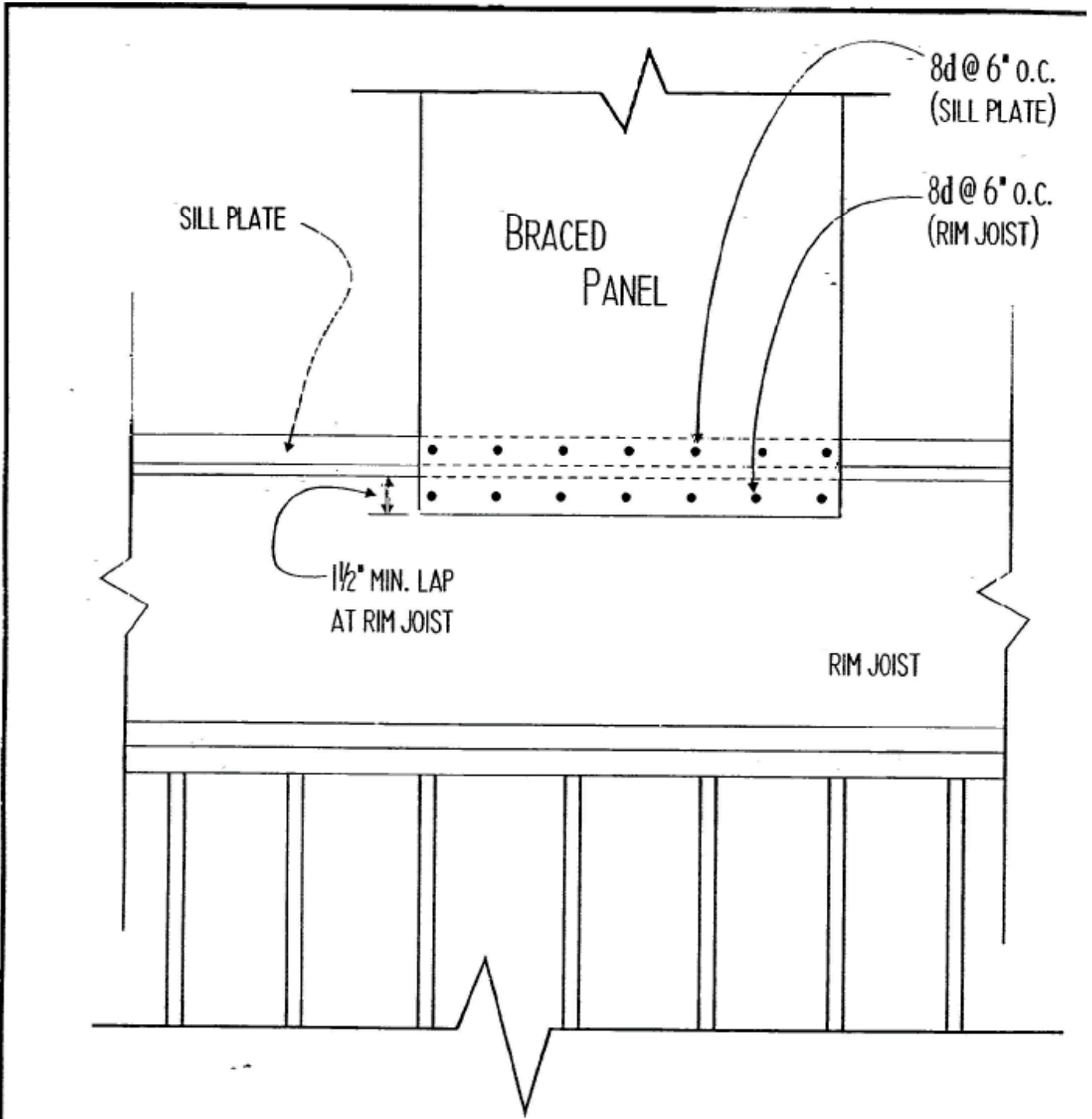


2

REQUIREMENTS FOR 3-STORY STRUCTURES

NTS

\*\* CRIPPLE WALLS WITH LESS THAN 65% BRACING SHOULD BE DESIGNED TO ENSURE LATERAL LOAD CAN BE SAFELY TRANSFERRED TO THE FOUNDATION

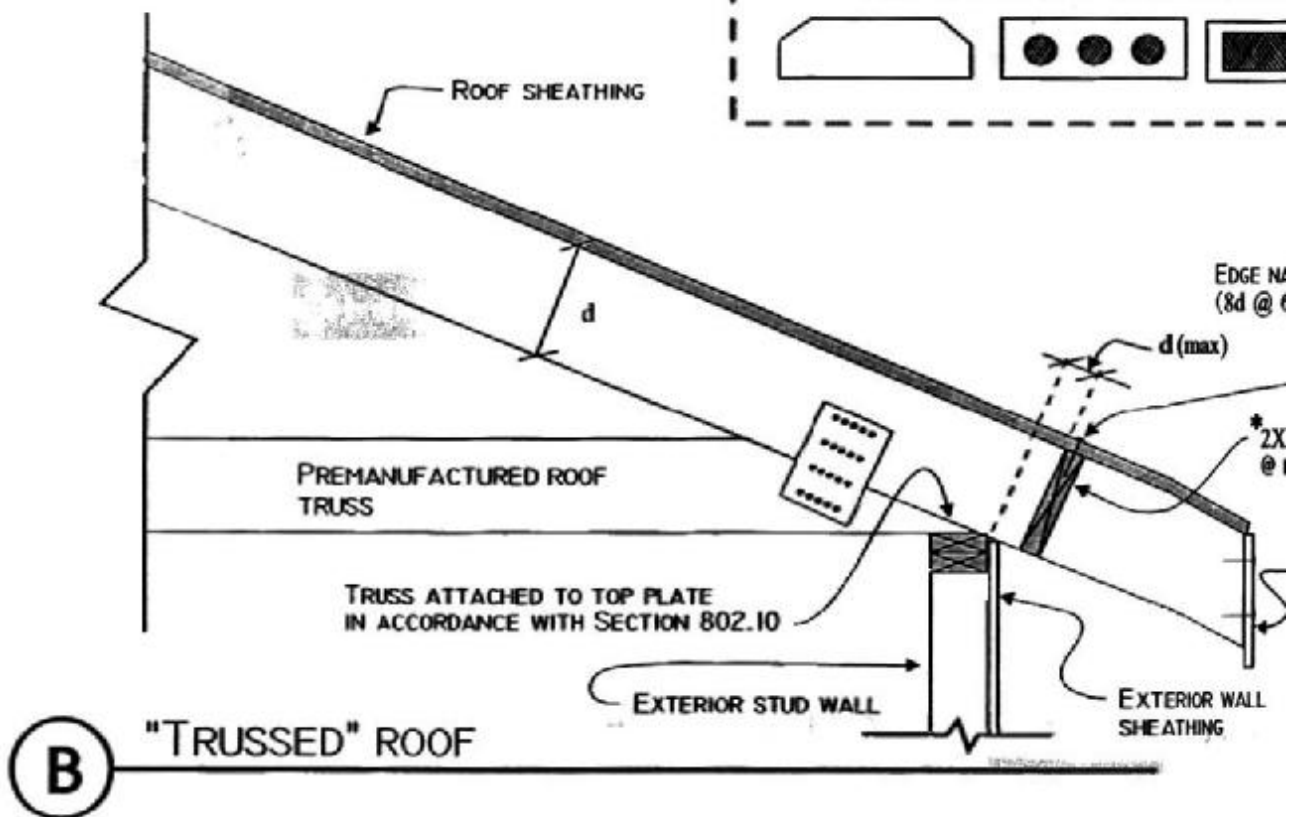
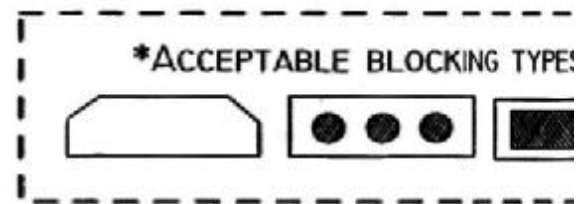
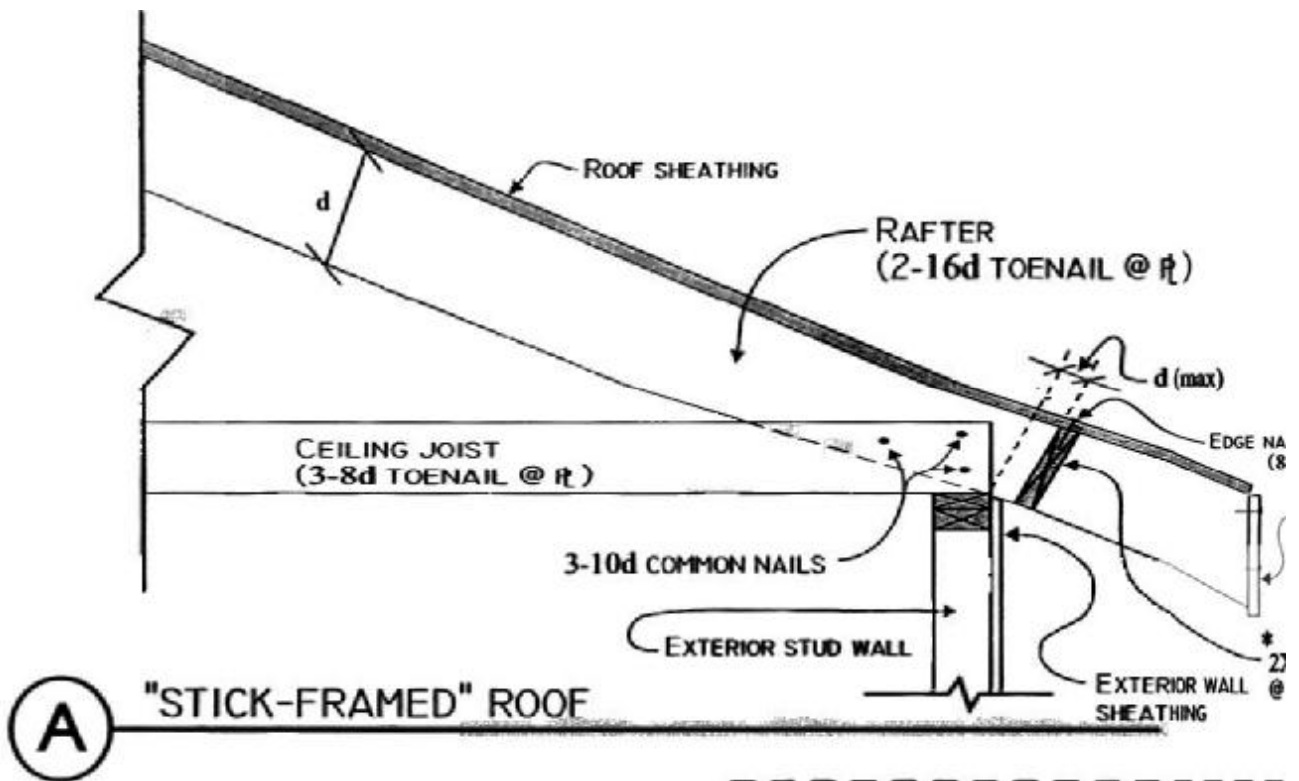


3

ALTERNATE CONNECTION - BRACE PANEL TO FLOOR

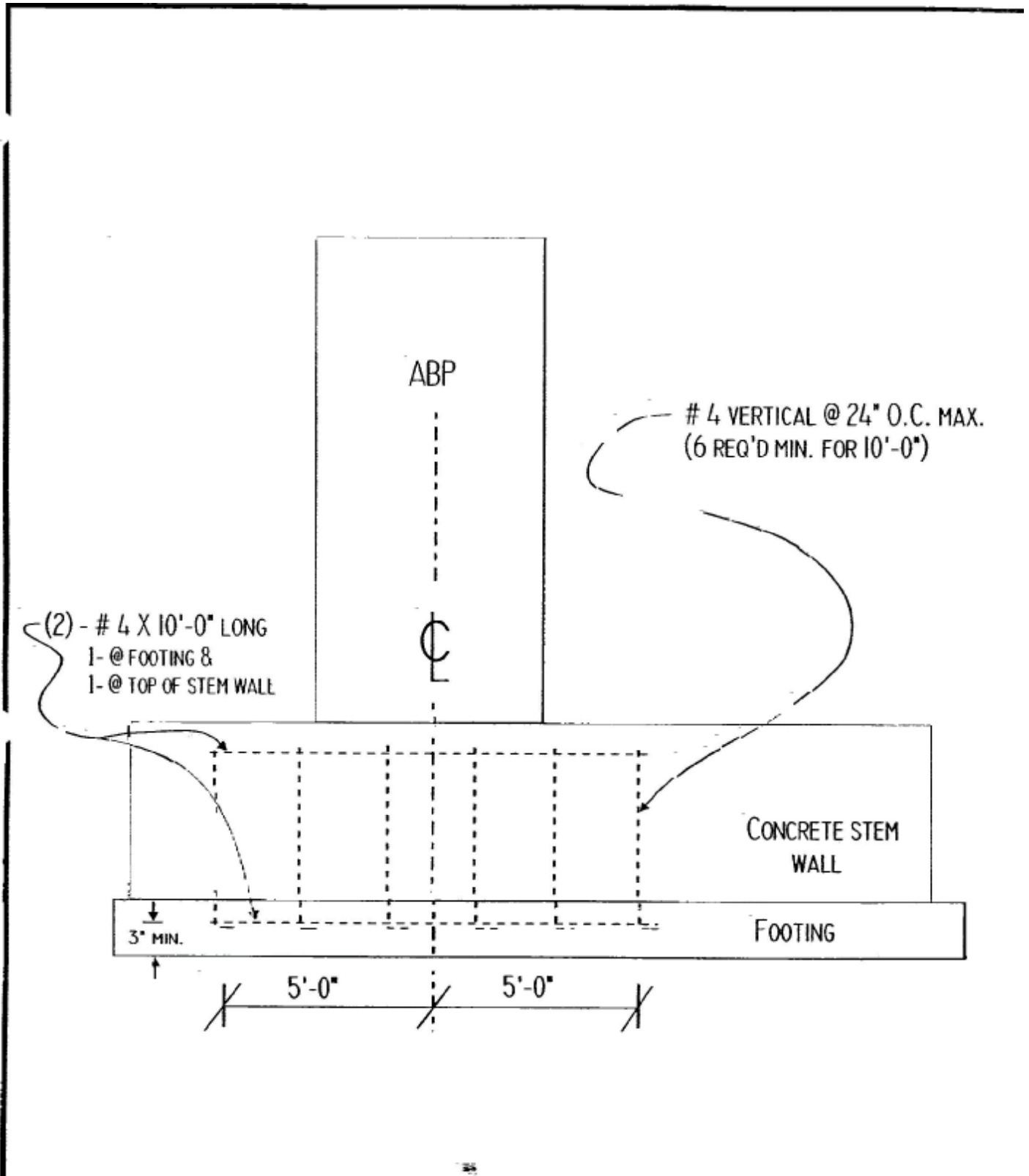
NTS

STATE OF OREGON --- BUILDING CODES DIVISION		DATE: July 10, 2001	
INTERPRETIVE RULING 01-3		DRN: ME	CHK: RM



**4** PRESCRIPTIVE EAVE DETAIL

NTS



5

CONNECTION OF ABP TO FOUNDATION

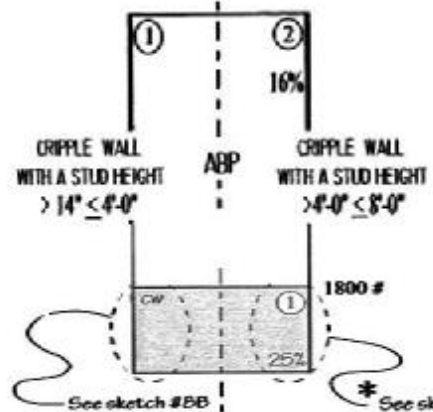
NTS

STATE OF OREGON --- BUILDING CODES DIVISION		DATE: July 10, 2001
INTERPRETIVE RULING 01-3		DRN: ME    CHK: RM

CRIPPLE WALL HEIGHT  $\leq 14"$



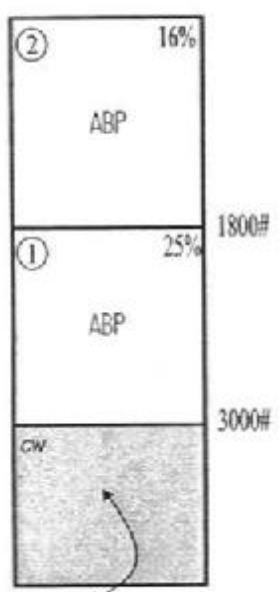
See sketch #8A



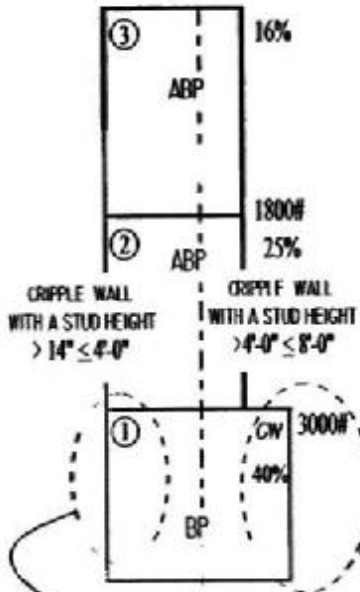
See sketch #8B

\* See sketch #7

1 Story over cripple wall



See sketch #8A

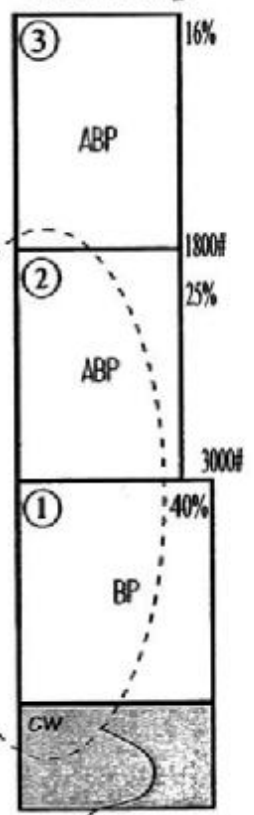


See sketch #8B

\* See sketch #7

2 Story

CRIPPLE WALL HEIGHT  $\leq 14"$



3 story

See sketch #7

Legend:

cs = crawl space

cw = cripple wall

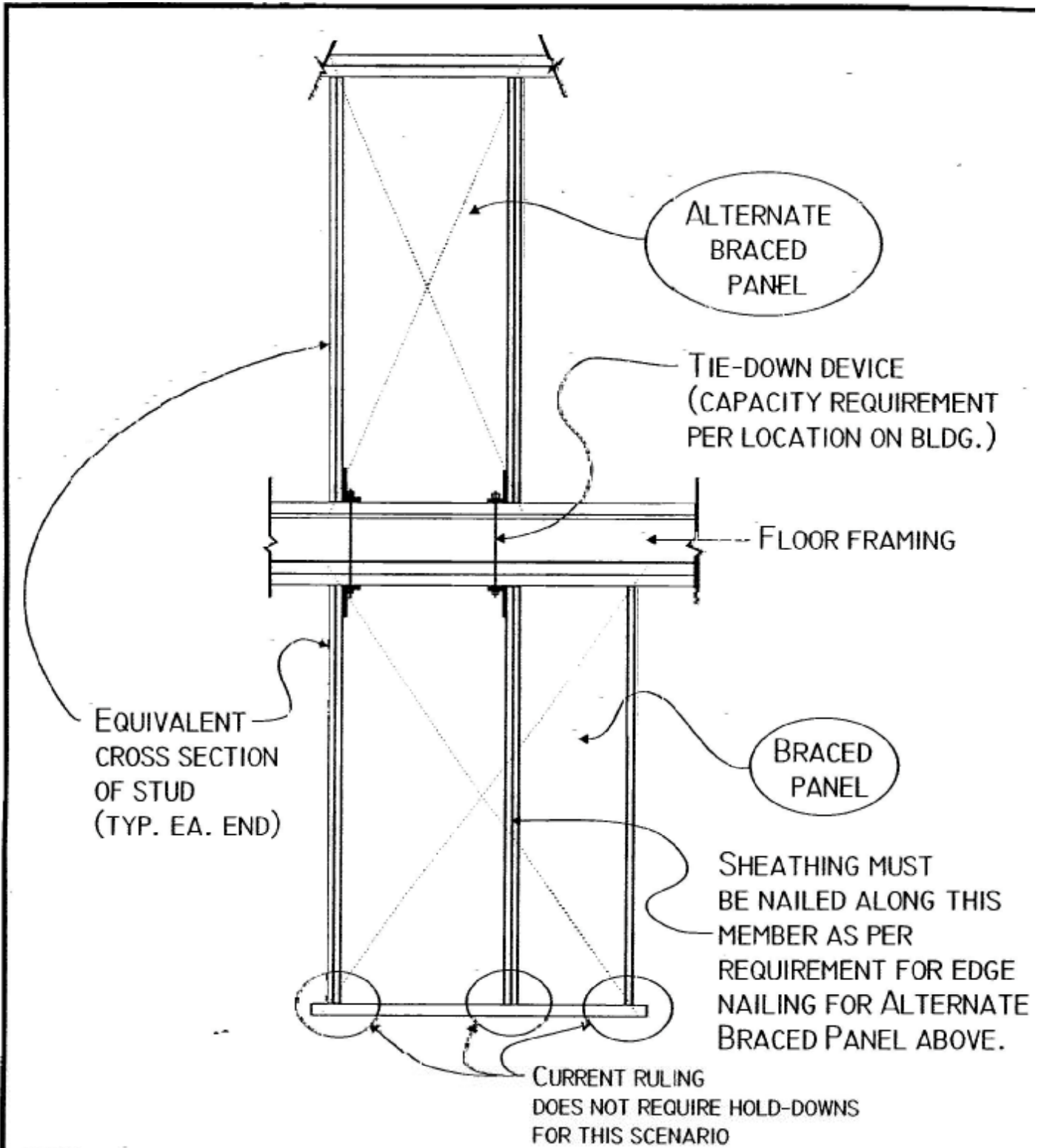
# = number of story

\* = equivalent cross section of stud and edge nailing same as above

6

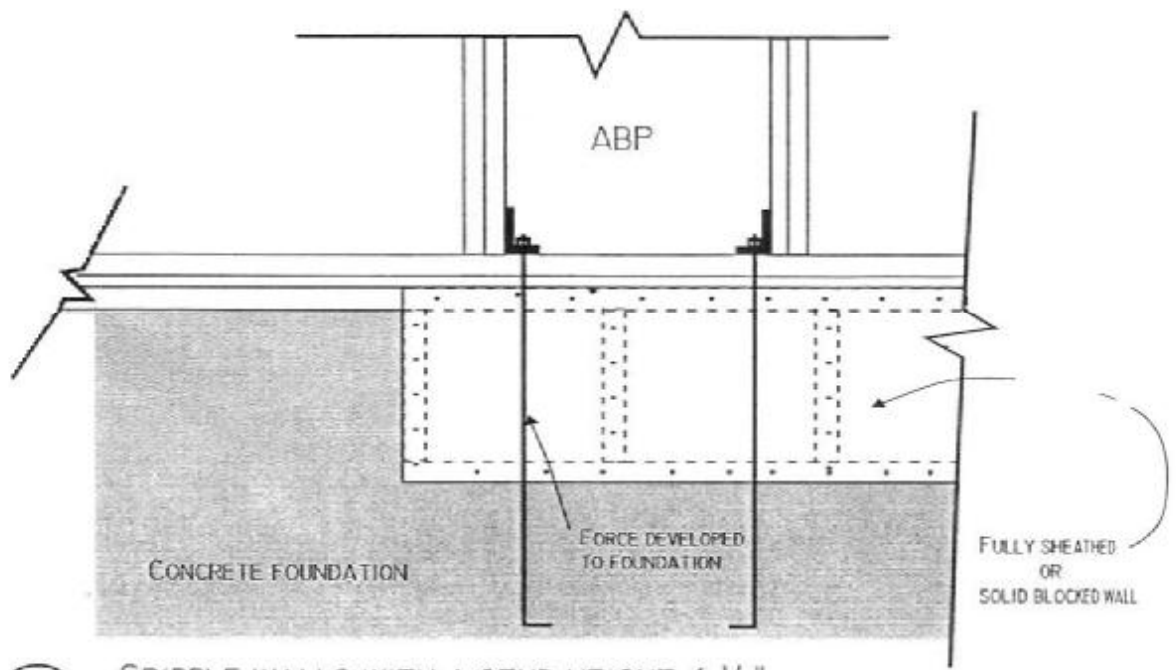
TIE DOWNS AT ALTERNATE BRACED PANELS

NTS

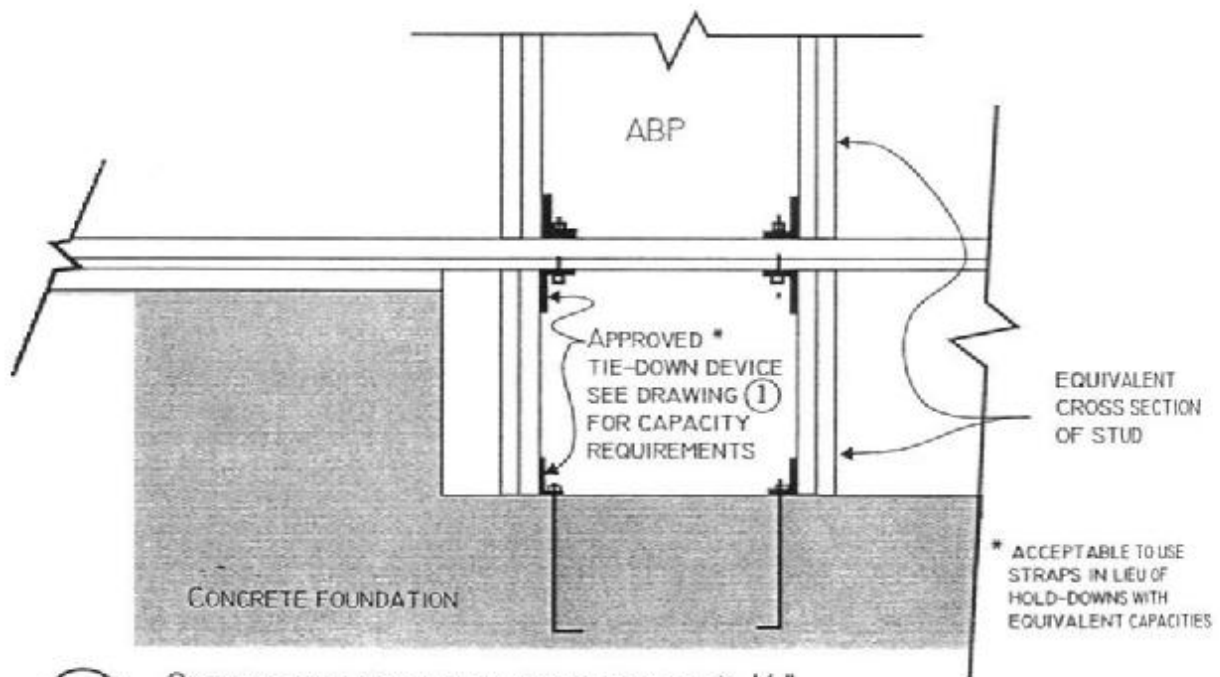


**7** DETAIL OF ALTERNATE BRACED PANEL OVER BRACED PANEL NTS

STATE OF OREGON --- BUILDING CODES DIVISION		DATE: July 10, 2001	
INTERPRETIVE RULING 01-3		DRN: ME	CHK: RM



**A** CRIPPLE WALLS WITH A STUD HEIGHT  $\leq 14"$



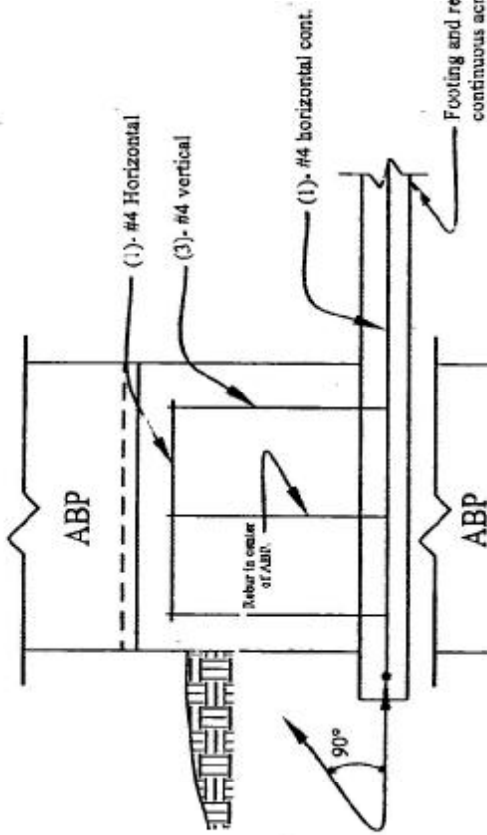
**B** CRIPPLE WALLS WITH A STUD HEIGHT  $> 14"$

**8** CONNECTION OF CRIPPLE WALL & OTHER WALLS TO FOUNDATION NTS

STATE OF OREGON --- BUILDING CODES DIVISION		DATE: July 10, 2001
INTERPRETIVE RULING 01-3		DRN: ME      CHK: RM

## Elevation

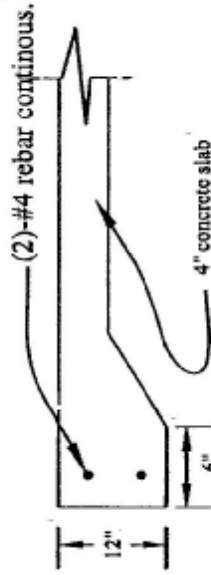
Horizontal and vertical rebar shall extend 5'-0" from center of ABP around corner, same for "Exceptions" 1 & 2.



Verify stem wall thickness w/ite-down and/or anchor bolt manufacturer's requirements (min. 6" width)

## Exception 1

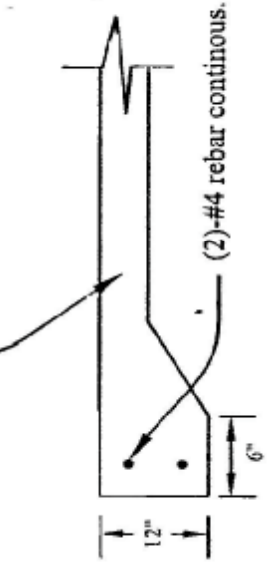
Rebar configuration same as "Elevation" view above



## Exception 2

Dowel depth per manufacturer of epoxy specification

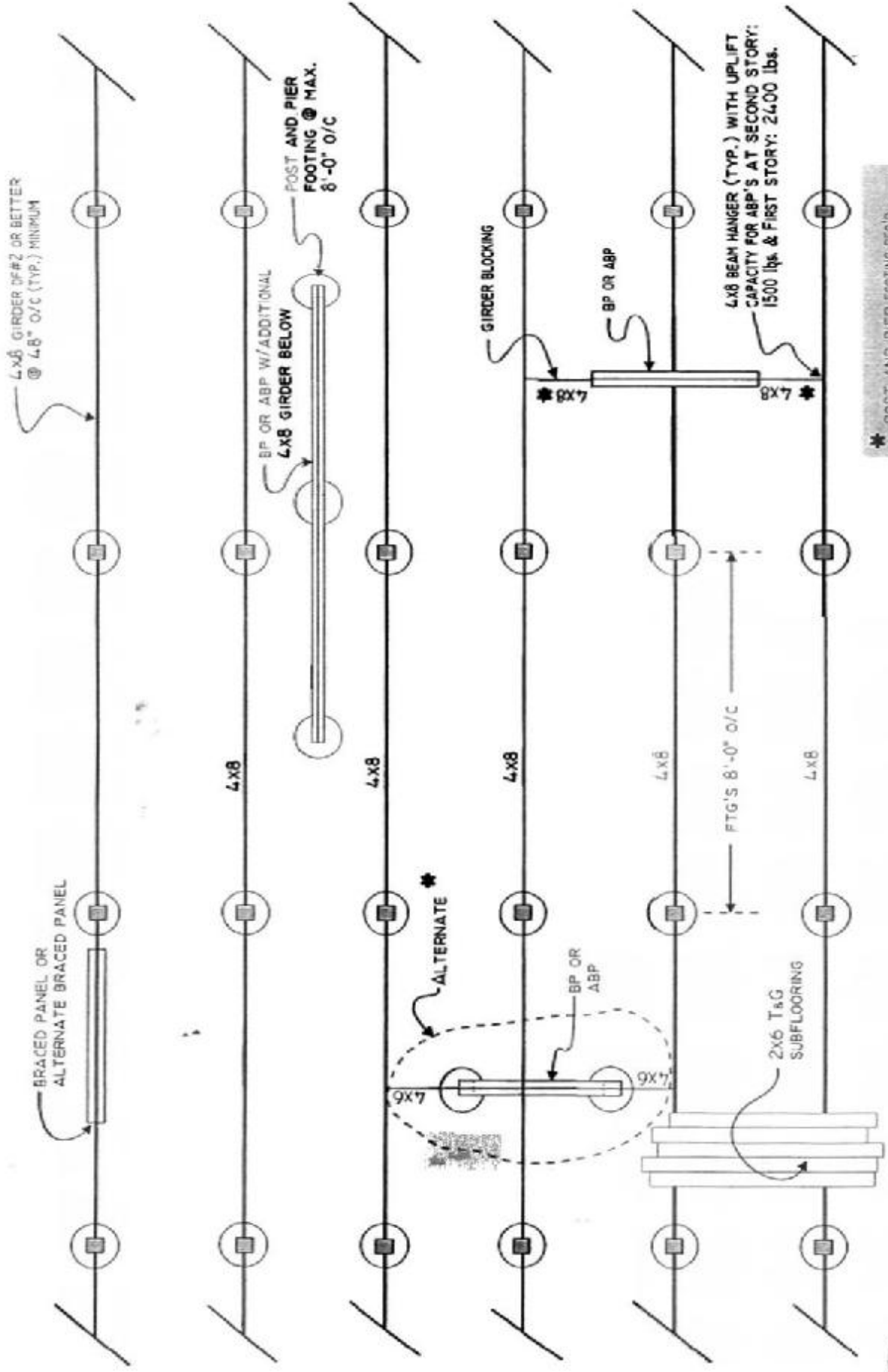
Rebar configuration same as "Elevation" view above



Drill & epoxy into concrete stem wall. (Special inspection required)

## 9 Alternate Braced Panel at Garage Front

NTS

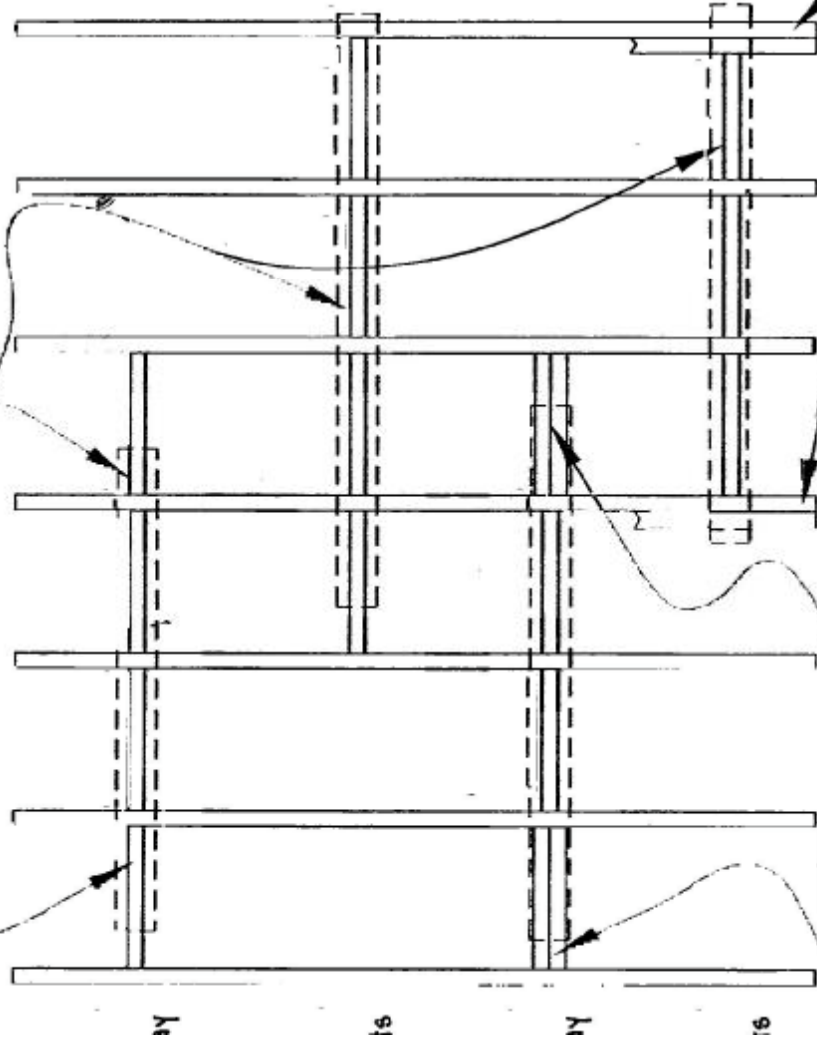


**10** FLOOR FRAMING OPTIONS AT INTERIOR BRACED PANELS

NTS

\* All blocking shall be full-depth, on edge.

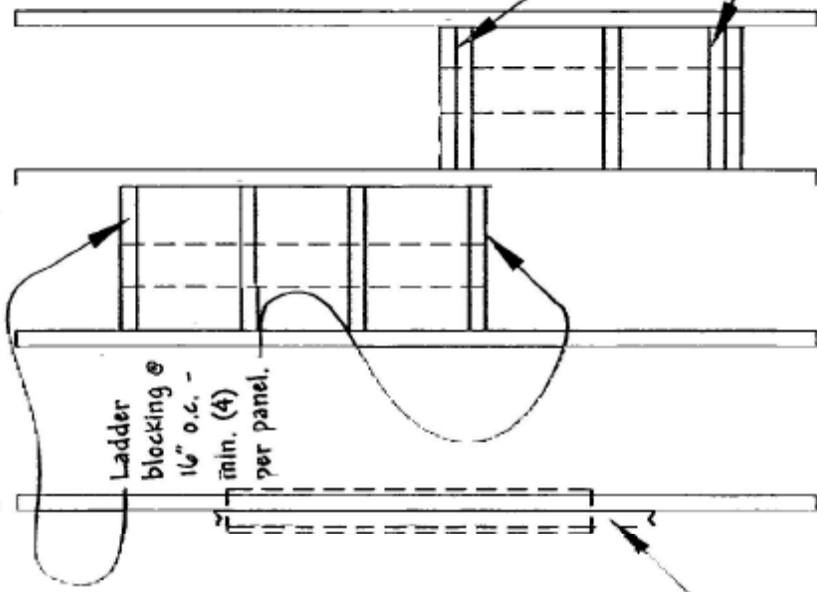
Single blocking \*



Floor Framing PERPENDICULAR to panels

\* Double blocking @ end bays - otherwise single blocking.

BP/ABP On joist      BP Mid-bay      ABP Mid-bay

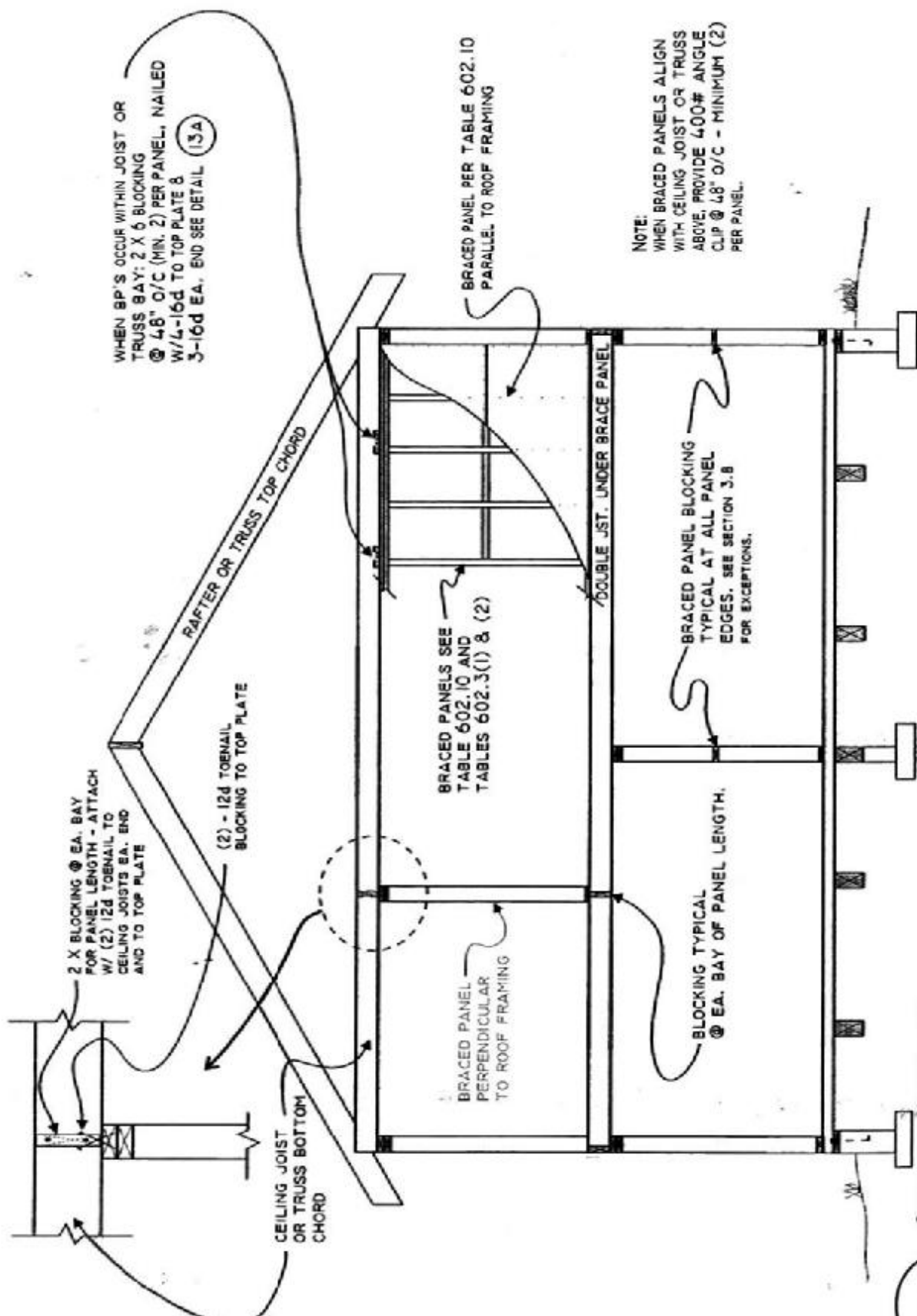


Ladder blocking @ 16" o.c. - min. (4) per panel.

Floor Framing PARALLEL to panels

\* Double ladder blocking @ ends - otherwise single ladder blocking @ 16" o.c.

Floor Framing Supports Under Braced Panels (Plan View)



WHEN SP'S OCCUR WITHIN JOIST OR TRUSS BAY: 2 X 6 BLOCKING @ 48" O/C (MIN. 2) PER PANEL, NAILED W/L-16d TO TOP PLATE & 3-16d EA. END SEE DETAIL 13A

2 X BLOCKING @ EA. BAY FOR PANEL LENGTH - ATTACH W/ (2) 12d TOENAIL TO CEILING JOISTS EA. END AND TO TOP PLATE

(2) - 12d TOENAIL BLOCKING TO TOP PLATE

CEILING JOIST OR TRUSS BOTTOM CHORD

RAFTER OR TRUSS TOP CHORD

BRACED PANELS SEE TABLE 602.10 AND TABLES 602.3(1) & (2)

BRACED PANEL PERPENDICULAR TO ROOF FRAMING

BRACED PANEL PER TABLE 602.10 PARALLEL TO ROOF FRAMING

DOUBLE JST. UNDER BRACE PANEL

BLOCKING TYPICAL @ EA. BAY OF PANEL LENGTH.

BRACED PANEL BLOCKING TYPICAL AT ALL PANEL EDGES. SEE SECTION 3.8 FOR EXCEPTIONS.

NOTE: WHEN BRACED PANELS ALIGN WITH CEILING JOIST OR TRUSS ABOVE, PROVIDE 400# ANGLE CLIP @ 48" O/C - MINIMUM (2) PER PANEL.

12 CROSS SECTION AT ROOF FRAMING PARALLEL TO BRACED PANELS NTS



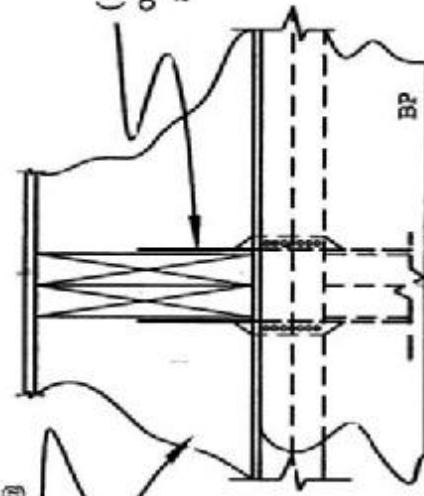
Corrosion resistant steel strap  
with approved uplift capacity.

Mid-point location  
of strap

(1) strap each side capable  
of developing 1/2 required  
approved uplift capacity.

Limited to 4X nominal  
depth of floor joists.

blocking @  
h bay



Section A-A

## Alternate Braced Panel

Continuous rim joist

Floor sheathing

2X blocking @  
each bay (shown dashed  
for clarity)

Doubled floor joist  
at ABP

Braced Panel below

Minimum backspan  
to be 2:1

## Alternate Braced Panel at Cantilever

NTS