

# STAIR NOTES:

**R311.11 Width:** Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 32 inches (813 mm) where a handrail is installed on one side and 27 inches (688 mm) where handrails are provided on both sides. Exception: The width of spiral stairways shall be in accordance with Section R311.1.1.

**R311.12 Headroom:** The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2052 mm) measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.

**Exception:** Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom a maximum of 43/4 inches (121 mm).

**R311.13 Walking:** The walking surface across winder treads shall be concentric to the curved direction of travel through the turn and located 12 inches (305 mm) from the side where the winders are narrower. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder. If winders are adjacent within the flight, the point of the widest clear stair width of the adjacent winders shall be used.

**R311.14 Stair treads and risers:** Stair treads and risers shall meet the requirements of this section. For the purposes of this section all dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners.  
**R311.14.1 Riser height:** The maximum riser height shall be 73/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm).

**R311.14.1 Riser height:** The maximum riser height shall be 73/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm).

**R311.14.2 Tread depth:** The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm).

**R311.14.3 Profile:** The radius of curvature at the nosing shall be no greater than 9/16 inch (14 mm). A nosing not less than 3/4 inch (19 mm) but not more than 1 1/4 inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed 1/2 inch (12.7 mm). Risers shall be vertical or sloped under the tread above from the underside of the nosing above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

**Exceptions:**  
1. A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).  
2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

**R311.14.4 Exterior wood/plastic composite stair treads:** Wood/plastic composite stair treads shall comply with the provisions of Section R311.4.

**R311.15 Landings for stairways:** There shall be a floor or landing at the top and bottom of each stairway.

**Exception:** A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs. A flight of stairs shall not have a vertical rise larger than 12

feet (3658 mm) between floor levels or landings. The width of each landing shall not be less than the width of the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

**R311.16 Stairway walking surface:** The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope).

**R311.17 Handrails:** Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers.

**R311.17.1 Height:** Handrail height, measured vertically from the sloped plane adjoining the tread nosing or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

**Exceptions:**

- The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
- When handrail fittings or bandings are used to provide continuous transition between flights, the transition from handrail to guardrail, or used at the start of a flight, the handrail height at the fittings or bandings shall be permitted to exceed the maximum height.

**R311.17.2 Continuity:** Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to walls shall have a space of not less than 1 1/2 inch (38 mm) between the wall and the handrails.

**Exceptions:**

- Handrails shall be permitted to be interrupted by a newel post at the turn.
- The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

**R311.17.3 Grip-size:** All required handrails shall be of one of the following types or provide equivalent graspability.

**Type I:** Handrails with a circular cross section shall have an outside diameter of at least 1 1/4 inches (32 mm) and not greater than 2 inches (51 mm). If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches (102 mm) and not greater than 6 1/4 inches (160 mm) with a maximum cross section of dimension of 2 1/4 inches (57 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

**Type II:** Handrails with a perimeter greater than 6 1/4 inches (160 mm) shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of 3/4 inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch (8 mm) within 7/8 inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least 3/8 inch (10 mm) to a level that is not less than 13/4 inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1 1/4 inches (32 mm) to a maximum of 2 3/4 inches (70 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

**R311.17.4 Exterior wood/plastic composite handrails:** Wood/plastic composite handrails shall comply with the provisions of Section R311.4.

**R311.17.5 Illumination:** All stairs shall be provided with illumination in accordance with Section R309.6.

**R311.17.6 Special stairways:** Spiral stairways and bulkhead enclosure stairways shall comply with all requirements of Section R311.1 except as specified below.

**R311.17.1 Spiral stairways:** Spiral stairways are permitted, provided the minimum clear width at and below the handrail shall be 26 inches (660 mm) with each tread having a 7/12-inch (140 mm) minimum tread depth at 12 inches (914 mm) from the narrower edge. All treads shall be identical, and the rise shall be no more than 9 1/2 inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

**R311.17.2 Bulkhead enclosure stairways:** Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside grade level to the basement level shall be exempt from the requirements of Sections R311.3 and R311.7 where the maximum height from the basement finished floor level to grade adjacent to the stairway does not exceed 8 feet (2438 mm) and the grade level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other approved means.

# GUARD NOTES:

**R312.1 Where required:** Guards shall be located along open-sided walking surfaces, including stairs, ramps and landings, that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a guard.

**R312.2 Height:** Required guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches (914 mm) high measured vertically above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads.

**Exceptions:**

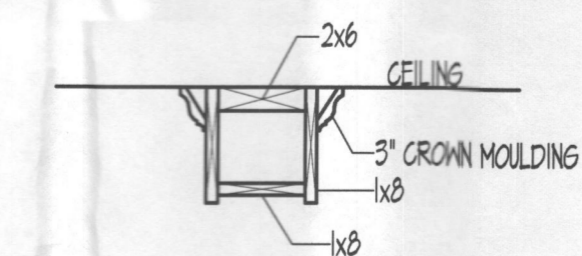
- Guards on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
- Where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

**R312.3 Opening limitations:** Required guards shall not have openings from the walking surface to the required guard height which allow passage of a sphere 4 inches (102 mm) in diameter.

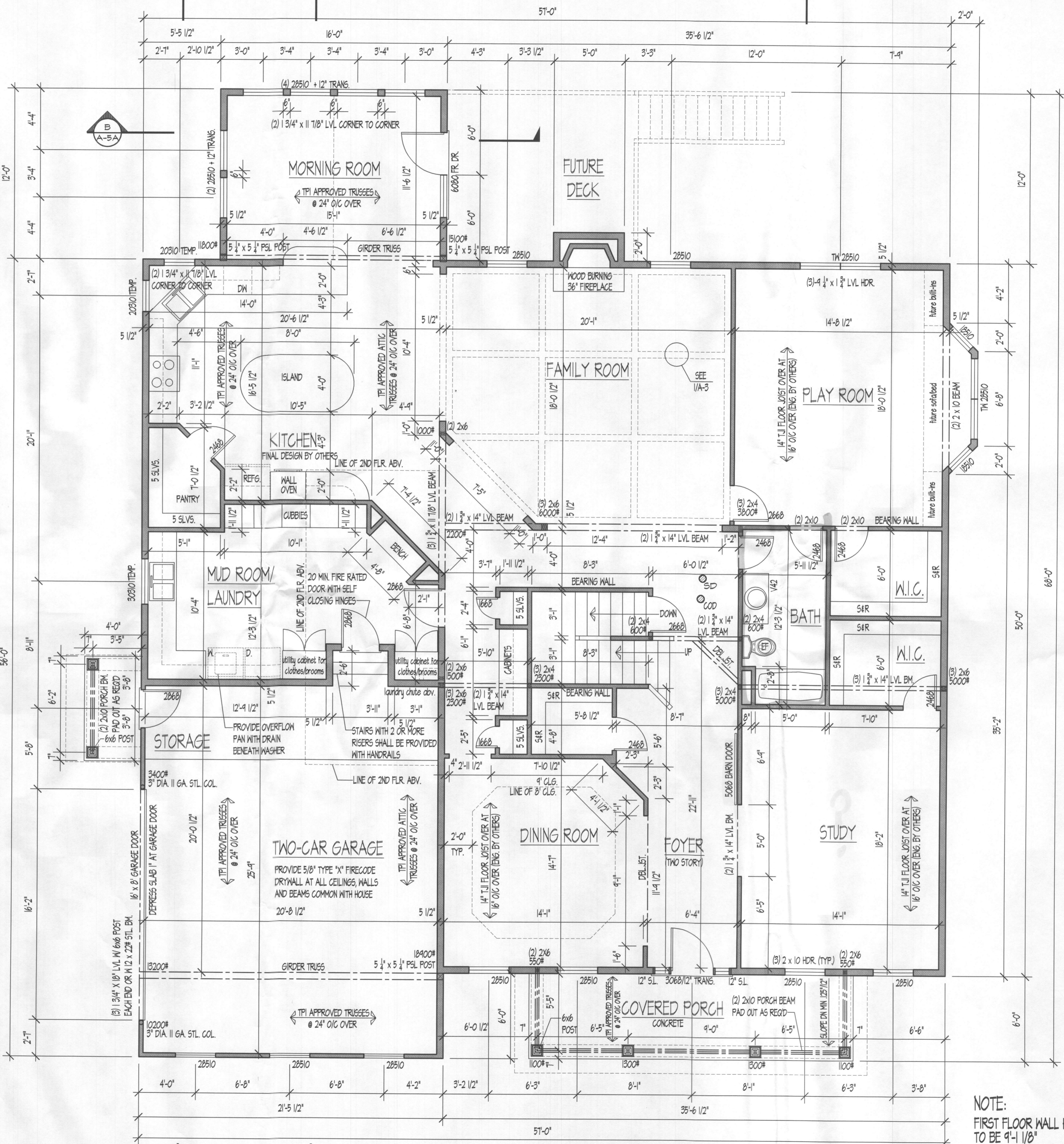
**Exceptions:**

- The triangular openings at the open side of a stair, formed by the riser, tread and bottom rail of a guard, shall not allow passage of a sphere 6 inches (153 mm) in diameter.
- Guards on the open sides of stairs shall not have openings which allow passage of a sphere 43/8 inches (111 mm) in diameter.

**R312.4 Exterior wood/plastic composite guards:** Wood/plastic composite guards shall comply with the provisions of Section R311.4.



I. COFFER DTL.  
SCALE: 1/4"=1'-0"



NOTE:  
FIRST FLOOR WALL HEIGHT  
TO BE 9'-1 1/8"

FIRST FLOOR PLAN  
SCALE: 1/4"=1'-0"

**JB HOME DESIGN, LLC**  
446 CONCORD COURT  
BALTIMORE, MARYLAND 21254  
OFFICE (410) 594-6501  
FAX (410) 662-4084  
EMAIL: JON@JBHOMEDSIGN.COM

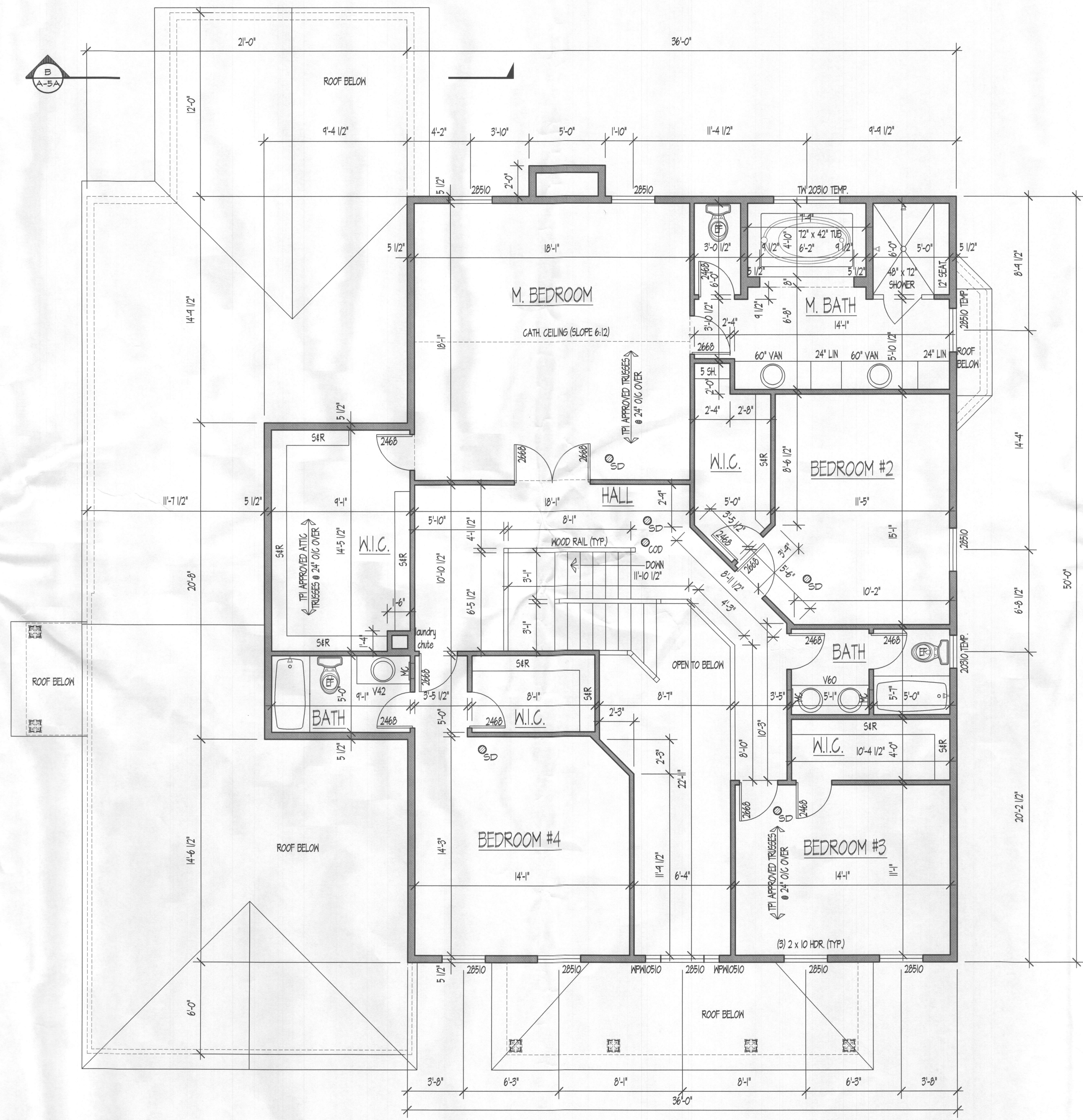


**FIRST FLOOR PLAN**  
PRJ. NO. \_\_\_\_\_  
DATE \_\_\_\_\_  
SCALE: 1/4" = 1'-0"

**BRENDEL RESIDENCE**  
PRJ. TITLE \_\_\_\_\_  
SHEET NO. \_\_\_\_\_

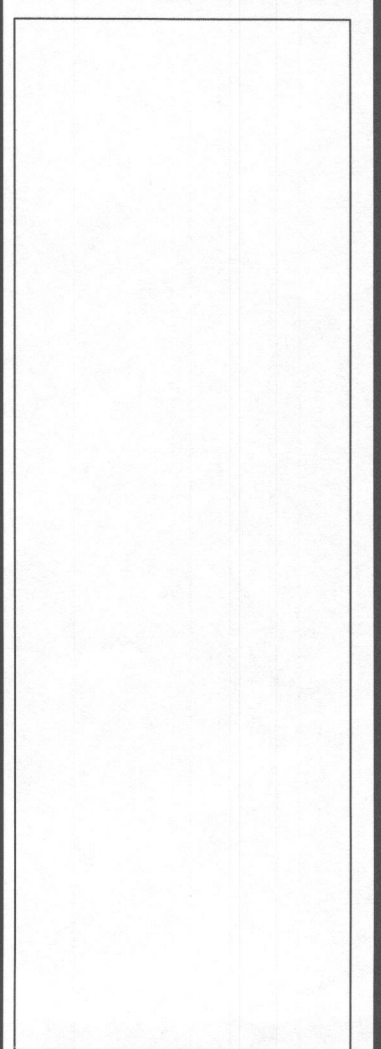
ISSUE \_\_\_\_\_  
DATE \_\_\_\_\_  
SCALE: 1/4" = 1'-0"

A=3



NOTE:  
SECOND FLOOR WALL HEIGHT  
TO BE 9'-1 1/8"

**SECOND FLOOR PLAN**  
SCALE: 1/4"=1'-0"

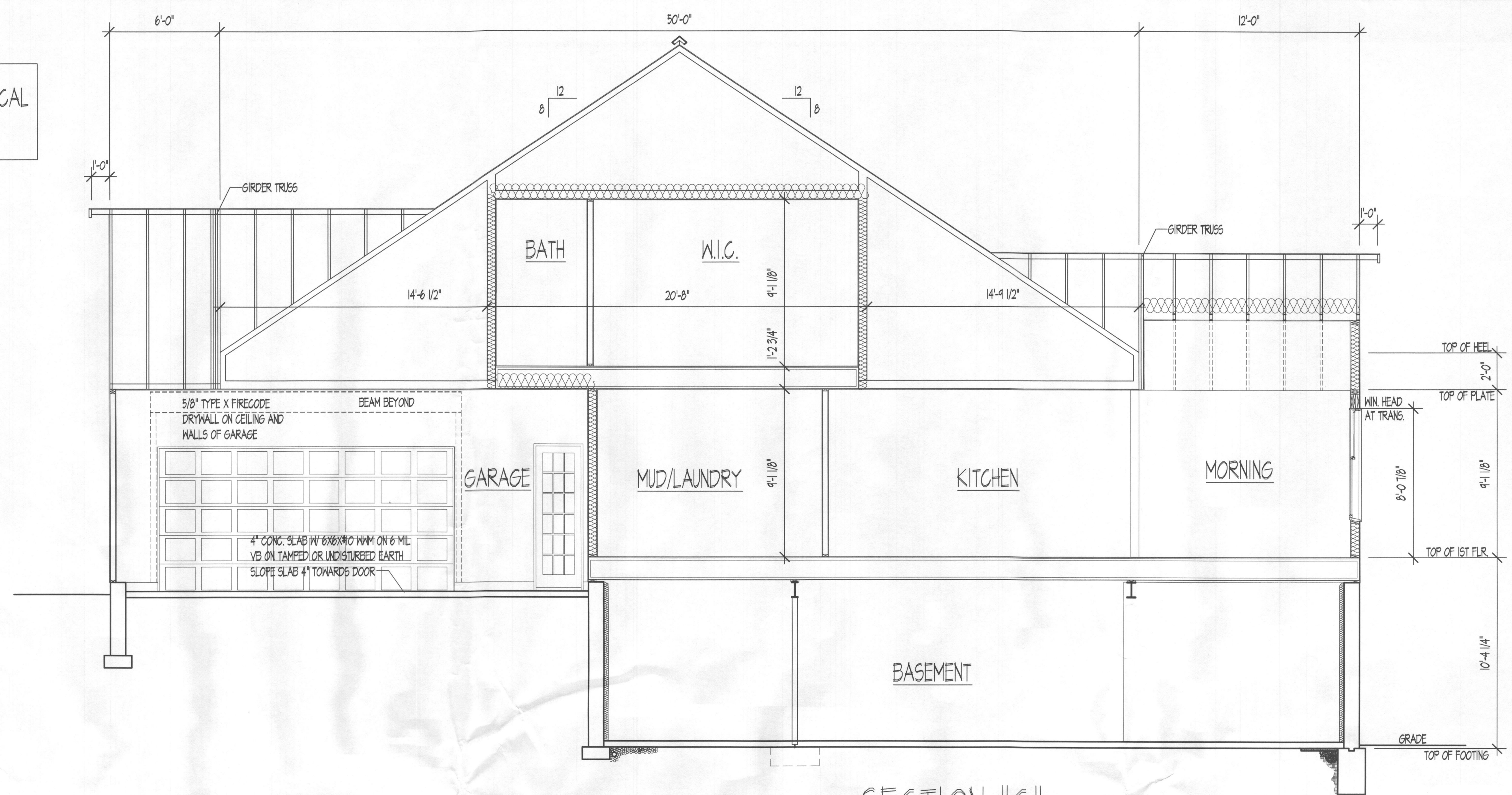


CONTENTS	DATE:	DRWN:	PRJ. NO.
SCALE: 1/4"=1'-0"			
<b>SECOND FLOOR PLAN</b>			
<b>BRENDEL RESIDENCE</b>			
PROJECT TITLE:			

ISSUE	DATE	DESCRIPTION
01/04/2014		PERMITTING SET
SHEET NO.	A=4	

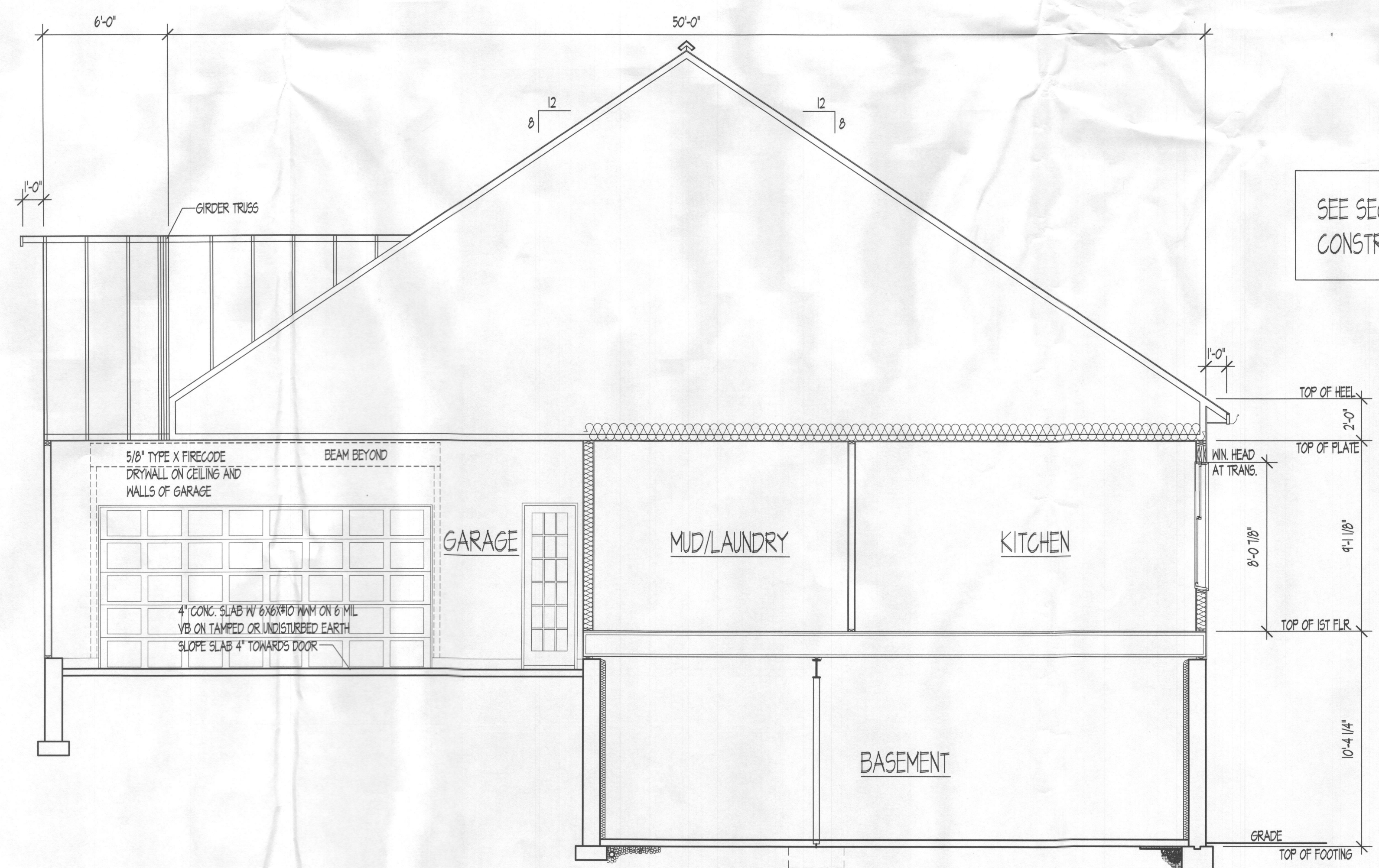


SEE SECTION A FOR TYPICAL CONSTRUCTION NOTES



SECTION "C"  
SCALE: 1/4"=1'-0"

SEE SECTION A FOR TYPICAL CONSTRUCTION NOTES



SECTION "D"  
SCALE: 1/4"=1'-0"

**JB HOME DESIGN, LLC**  
 446 CONCORD COURT  
 BALTIMORE, MARYLAND 2124  
 OFFICE (410) 882-4881  
 FAX (410) 882-4284  
 EMAIL: JON@JBHOMEDSIGN.COM

**JB**  
 home design

SECTIONS C-D		PRJ. NO.
BRENDLE RESIDENCE		DATE
CONTENTS	SCALE: 1/4" = 1'-0"	PROJECT TITLE

ISSUE	DATE	DESCRIPTION

SHEET NO.  
**A-5B**

TABLE R602.10.4  
INTERMITTENT BRACING METHODS

METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA	
				Fasteners	Spacing
LIB	Let-in bracing	1 x 4 wood or approved metal straps at 45° to 60° angles for maximum 16" stud spacing		Wood: 2-8d common nails or 3-8d (2 1/2" long x .131 dia.) nails Metal strap: per manufacturer	Wood: per stud and top and bottom plates Metal: per manufacturer
DWB	Diagonal wood boards	3/4" (1" nominal) for maximum 24" stud spacing		2-8d (2 1/2" long x .131 dia.) nails or 2-1 3/4" long staples	Per stud
HEP	Wood structural panel (See Section R604)	3/8"		Exterior sheathing per Table R602.3(3) Interior sheathing per Table R602.3(1) or R602.3(2)	6" edges 12" field Varies by fastener
BV-HEP (e)	Wood structural panels with stone or masonry veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d (2 1/2" long x .131 dia.) common nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
SFP	Structural Fiberboard sheathing	1/2" or 25/32" for maximum 16" stud spacing		1 1/2" long x 12" dia. (for 1/2" thick sheathing) 1 3/4" long x 12" dia. (for 25/32" sheathing) galvanized roofing nails or 8d common (2 1/2" long x .131 dia.) nails	3" edges 6" field
GB	Gypsum board	1/2"		Nails or screws per Table R602.3(1) for exterior locations Nails or screws per Table R702.5.5 for interior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
PBS	Particleboard sheathing (See Section R605)	3/8" or 1/2" for maximum 16" stud spacing		For 3/8" 6d common (2" long x .131 dia.) nails For 1/2" 8d common (2 1/2" long x .131 dia.) nails	3" edges 6" field
PCP	Portland cement plaster	See Section R703.6 For maximum 16" stud spacing		1 1/2" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members
HPS	Hardboard panel siding	7/16" For maximum 16" stud spacing		.042" dia., 225° dia. nails with length to accommodate 1/2" penetration into studs	4" edges 8" field
AMB	Alternate braced wall	See Section R602.10.3.2		See section R602.10.6.1	See section R602.10.6.1
FFH	Intermittent portal frame	See Section R602.10.3.3		See section R602.10.6.2	See section R602.10.6.2
FFG	Intermittent portal frame at garage	See Section R602.10.3.4		See section R602.10.6.3	See section R602.10.6.3

TABLE R602.10.4  
CONTINUOUS SHEATHING METHODS

METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA	
				Fasteners	Spacing
CS-HEP	Wood structural panel	3/8"		Exterior sheathing per Table R602.3(3) Interior sheathing per Table R602.3(1) or R602.3(2)	6" edges 12" field Varies by fastener
CS-G (bc)	Wood structural panel adjacent to garage openings and supporting roof load only	3/8"		See method CS-HEP	See method CS-HEP
CS-PF	portal frame	7/16"		See Section R602.10.6.4	See Section R602.10.6.4
CS-SFP (a)	Structural Fiberboard	1/2" or 25/32" for maximum 16" stud spacing		1 1/2" long x 12" dia. (for 1/2" thick sheathing) 1 3/4" long x 12" dia. (for 25/32" sheathing) galvanized roofing nails or 8d common (2 1/2" long x .131 dia.) nails	3" edges 6" field

- Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, DO, D1 and D2.
- Applies to panels next to garage door opening when supporting gable end wall and roof load only. May only be used on one wall of the garage. In Seismic Design Categories DO, D1 and D2, roof covering dead load may not exceed 3 psf.
- Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.3(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- Method CS-SFB does not apply in Seismic Design Categories DO, D1 and D2 and in areas where the wind speed exceeds 100 mph.
- Method applies to detached one- and two-family dwellings in Seismic Design Categories D0 through D2 only.

R602.10.1 Braced wall lines. For the purpose of determining the amount and location of bracing required in each story level of a building, braced wall lines shall be designated as straight lines in the building plan placed in accordance with this section.

R602.10.1.1 Length of a braced wall line. The length of a braced wall line shall be the distance between its ends. The end of a braced wall line shall be the intersection with a perpendicular braced wall line, an angled braced wall line as permitted in Section R602.10.1.4 or an exterior wall as shown in Figure R602.10.1.1.

R602.10.1.2 Offsets along a braced wall line. All exterior walls parallel to a braced wall line shall be offset not more than 4 feet (1219 mm) from the designated braced wall line location as shown in Figure R602.10.1.1. Interior walls used as bracing shall be offset not more than 4 feet (1219 mm) from a braced wall line through the interior of the building as shown in Figure R602.10.1.1.

R602.10.1.3 Spacing of braced wall lines. The spacing between parallel braced wall lines shall be in accordance with Table R602.10.1.3. Intermediate braced wall lines through the interior of the building shall be permitted.

R602.10.1.4 Angled walls. Any portion of a wall along a braced wall line shall be permitted to angle out of plane for a maximum diagonal length of 8 feet (2438 mm). Where the angled wall occurs at a corner, the length of the braced wall line shall be measured from the projected corner as shown in Figure R602.10.1.4. Where the diagonal length is greater than 8 feet (2438 mm), it shall be considered a separate braced wall line and shall be braced in accordance with Section R602.10.1.

R602.10.2 Braced wall panels. Braced wall panels shall be full-height sections of wall that shall have no vertical or horizontal offsets. Braced wall panels shall be constructed and placed along a braced wall line in accordance with this section and the bracing methods specified in Section R602.10.4.

R602.10.2.1 Braced wall panel uplift load path. The bracing lengths in Table R602.10.3(1) apply only when uplift loads are resisted in accordance with Section R602.3.5.

R602.10.2.2 Locations of braced wall panels. A braced wall panel shall begin within 10 feet (3010 mm) from each end of a braced wall line as determined in Section R602.10.1.1. The distance between adjacent edges of braced wall panels along a braced wall line shall be no greater than 20 feet (6096 mm) as shown in Figure R602.10.2.2.

R602.10.2.3 Minimum number of braced wall panels. Braced wall lines with a length of 16 feet (4877 mm) or less shall have a minimum of two braced wall panels of any length or one braced wall panel equal to 48 inches (1219 mm) or more. Braced wall lines greater than 16 feet (4877 mm) shall have a minimum of two braced wall panels.

R602.10.3 Required length of bracing. The required length of bracing along each braced wall line shall be determined as follows:

- All buildings in Seismic Design Categories A and B shall use Table R602.10.3(1) and the applicable adjustment factors in Table R602.10.3(2).
- Detached buildings in Seismic Design Category C shall use Table R602.10.3(1) and the applicable adjustment factors in Table R602.10.3(2).
- Townhouses in Seismic Design Category C shall use the greater value determined from Table R602.10.3(1) or R602.10.3(3) and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4) respectively.
- All buildings in Seismic Design Categories DO, D1 and D2 shall use the greater value determined from Table R602.10.3(1) or R602.10.3(3) and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4) respectively. Only braced wall panels parallel to the braced wall line shall contribute toward the required length of bracing of that braced wall line. Braced wall panels along an angled wall meeting the minimum length requirements of Tables R602.10.5 and R602.10.5.2 shall be permitted to contribute its projected length toward the minimum required length of bracing for the braced wall line as shown in Figure R602.10.1.4. Any braced wall panel on an angled wall at the end of a braced wall line shall contribute its projected length for only one of the braced wall lines at the projected corner. Exception: The length of wall bracing for dwellings in Seismic Design Categories DO, D1 and D2 with stone or masonry veneer installed per Section R703.1 and exceeding the first-story height shall be in accordance with Section R602.10.6.5.

R602.10.4 Construction methods for braced wall panels. Intermittent and continuously sheathed braced wall panels shall be constructed in accordance with this section and the methods listed in Table R602.10.4.

R602.10.4.1 Mixing methods. Mixing of bracing methods shall be permitted as follows:

- Mixing intermittent bracing and continuous sheathing methods from story to story shall be permitted.
- Mixing intermittent bracing methods from braced wall line to braced wall line within a story shall be permitted. Within Seismic Design Categories A, B and C or in regions where the basic wind speed is less than or equal to 100 mph (45 m/s), mixing of intermittent bracing and continuous sheathing methods from braced wall line to braced wall line within a story shall be permitted.
- Mixing intermittent bracing methods along a braced wall line shall be permitted in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C provided the length of required bracing in accordance with Table R602.10.3(1) or R602.10.3(3) is the highest value of all intermittent bracing methods used.
- Mixing of continuous sheathing methods CS-HEP, CS-G and CS-PF along a braced wall line shall be permitted.
- In Seismic Design Categories A and B, and for detached one- and two-family dwellings in Seismic Design Category C, mixing of intermittent bracing methods along the interior portion of a braced wall line with continuous sheathing methods CS-HEP, CS-G and CS-PF along the exterior portion of the same braced wall line shall be permitted. The length of required bracing shall be the highest value of all intermittent bracing methods used in accordance with Table R602.10.3(1) or R602.10.3(3) as adjusted by Tables R602.10.3(2) and R602.10.3(4), respectively. The requirements of Section R602.10.7 shall apply to each end of the continuously sheathed portion of the braced wall line.

R602.10.4.2 Continuous sheathing methods. Continuous sheathing methods require structural panel sheathing to be used on all sheathable surfaces on one side of a braced wall line including areas above and below openings and gable end walls and shall meet the requirements of Section R602.10.1.

R602.10.6.4 Method CS-PF: Continuously sheathed portal frame. Continuously sheathed portal frame braced wall panels shall be constructed in accordance with Figure R602.10.6.4 and Table R602.10.6.4. The number of continuously sheathed portal frame panels in a single braced wall line shall not exceed four.

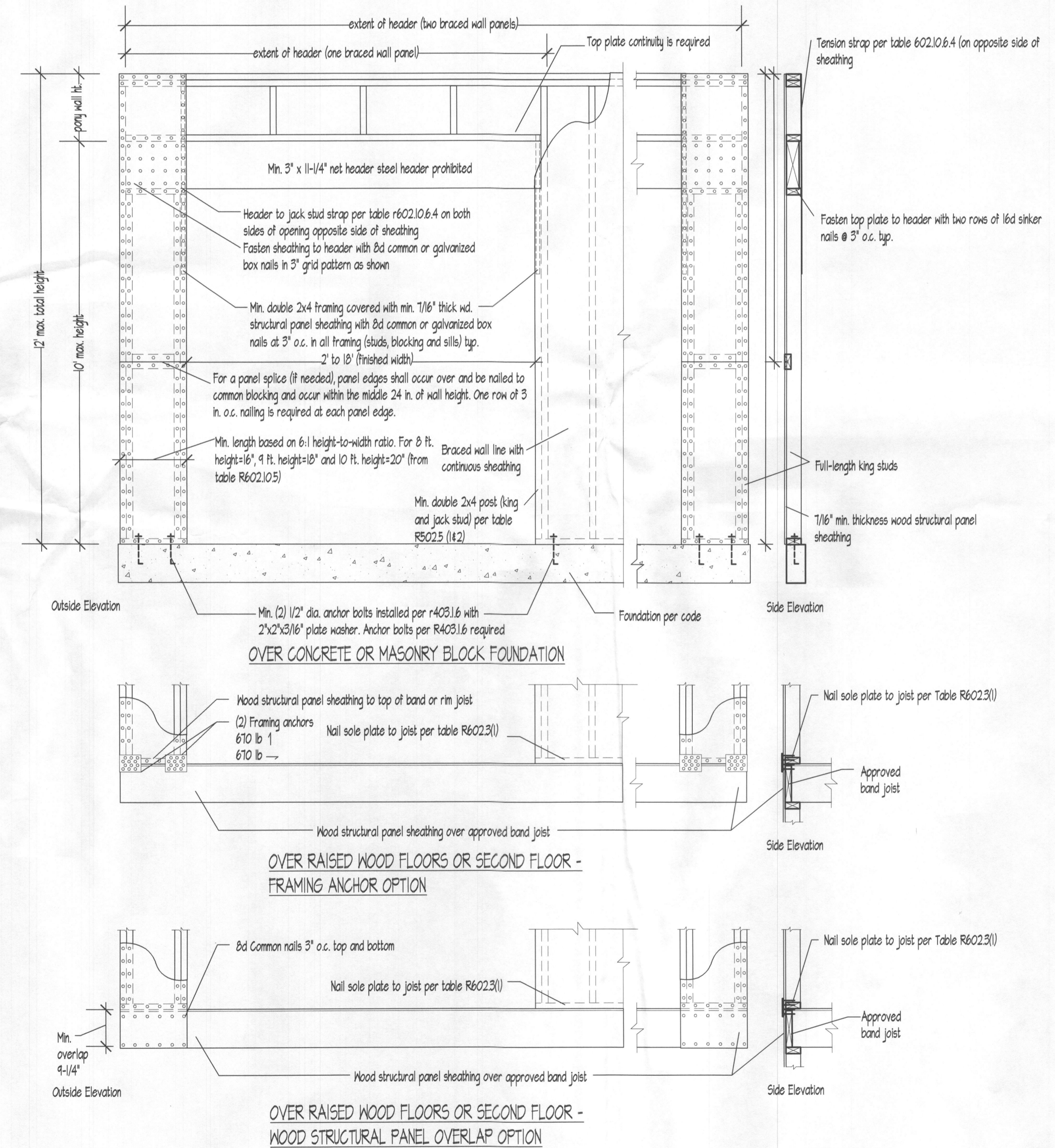
R602.10.7 Ends of braced wall lines with continuous sheathing. Each end of a braced wall line with continuous sheathing shall have one of the conditions shown in Figure R602.10.7.

R602.10.8 Braced wall panel connections. Braced wall panels shall be connected to floor framing or foundations as follows:

- Where joists are perpendicular to a braced wall panel above or below, a rim joist, band joist or blocking shall be provided along the entire length of the braced wall panel in accordance with Figure R602.10.8(1). Fastening of top and bottom wall plates to framing, rim joist, band joist and/or blocking shall be in accordance with Table R602.3(1).

- Where joists are parallel to a braced wall panel above or below, a rim joist, end joist or other parallel framing member shall be provided directly above and below the braced wall panel in accordance with Figure R602.10.8(2). Where a parallel framing member cannot be located directly above and below the panel, full-depth blocking at 16-inch (406 mm) spacing shall be provided between the parallel framing members to each side of the braced wall panel in accordance with Figure R602.10.8(2). Fastening of blocking and wall plates shall be in accordance with Table R602.3(1) and Figure R602.10.8(2).

- Connections of braced wall panels to concrete or masonry shall be in accordance with Section R403.1.6.



1 METHOD CS-PF: CONT. PORTAL FRAME PANEL CONSTRUCTION  
PER IRC 2015 figure R602.10.6.4.

**JB HOME DESIGN, LLC**  
446 CONCORD COURT  
BALTIMORE, MARYLAND 21284  
OFFICE (410) 594-9981  
FAX (410) 663-4094  
EMAIL: J@JBHOMEDSIGN.COM

**JB HOME DESIGN**

APA NARROW WALL DETAILS  
BRENDLE RESIDENCE  
DATE: \_\_\_\_\_  
DRAWN: \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
PROJECT TITLE: \_\_\_\_\_

ISSUE NO. \_\_\_\_\_  
DATE: \_\_\_\_\_  
SHEET NO. \_\_\_\_\_  
A=8A

TABLE R602.10.5  
LENGTH REQUIREMENTS FOR BRACED WALL PANELS WITH CONTINUOUS SHEATHING

METHOD	ADJACENT CLEAR OPENING HEIGHT	WALL HEIGHT				
		8'	9'	10'	11'	12'
CS-WSP CS-SFB	64"	24"	27"	30"	33"	36"
	68"	26"	27"	30"	33"	36"
	72"	28"	27"	30"	33"	36"
	76"	30"	29"	30"	33"	36"
	80"	32"	30"	30"	33"	36"
	84"	35"	32"	32"	33"	36"
	88"	38"	35"	33"	33"	36"
	92"	43"	37"	35"	35"	36"
	96"	48"	41"	38"	36"	36"
	100"		44"	40"	38"	38"
	104"		49"	43"	40"	39"
	108"		54"	46"	43"	41"
	112"			50"	45"	43"
	116"			54"	48"	45"
	120"			60"	52"	48"
	124"				56"	51"
	128"				61"	54"
132"				66"	58"	
136"					62"	
140"					66"	
144"					72"	
CS-G	<120"	24"	27"	30"	33"	36"
CS-PF	<120"	16"	18"	20"	22"	24"

TABLE R602.10.3 (1)  
BRACING REQUIREMENTS BASED ON WIND SPEED

EXPOSURE CATEGORY B, 30 FT MEAN ROOF HEIGHT, 10 FT EAVE TO RIDGE HEIGHT 10 FT WALL HEIGHT 2 BRACED WALL LINES			MINIMUM TOTAL LENGTH (feet) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINES			
BASIC WIND SPEED (mph)	STORY LOCATION	BRACED WALL LINE SPACING (feet)	METHOD LB	METHOD GB (double sided)	METHODS DWB, WSP, SFB, PCP, HFS, DWB, PBS, CS-SFB	CONTINUOUS SHEATHING
< 115 MPH		10	35	35	2.0	2.0
		20	7.0	7.0	4.0	3.5
		30	9.5	9.5	5.5	5.0
		40	12.5	12.5	7.5	6.0
		50	15.5	15.5	9.0	7.5
		60	18.5	18.5	10.5	9.0
		10	7.0	7.0	4.0	3.5
		20	13.0	13.0	7.5	6.5
		30	18.5	18.5	10.5	9.0
		40	24.0	24.0	14.0	12.0
		50	29.5	29.5	17.0	14.5
		60	35.0	35.0	20.0	17.0
		10	NP	10.5	6.0	5.0
		20	NP	19.0	11.0	9.5
		30	NP	27.5	15.5	13.5
		40	NP	35.5	20.5	17.5
		50	NP	44.0	25.0	21.5
		60	NP	52.0	30.0	25.5

**JB HOME DESIGN, LLC**  
446 CONCORD COURT  
BALTIMORE, MARYLAND 2124  
OFFICE (410) 594-6871  
FAX (410) 665-4044  
EMAIL: JON@JBHOMEDSIGN.COM

2015 IRC RESIDENTIAL ENERGY EFFICIENCY CEILING CONDITIONS

**NI0221 (R402.2.1) Ceilings with attic spaces.**  
Where Section NI0221.2 would require R-30 insulation in the ceiling, installing R-30 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R-30 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, where Section NI0221.2 would require R-44 insulation in the ceiling, installing R-30 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R-44 insulation wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section NI0221.4 and the total UA alternative in Section NI0221.5.

**NI0222 (R402.2.2) Ceilings without attic spaces.**  
Where Section NI0221.2 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section NI0221.2 shall be limited to 500 square feet (46 m<sup>2</sup>) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section NI0221.4 and the total UA alternative in Section NI0221.5.

**NI0223 (R402.2.3) Eave baffle.**  
For air-permeable insulations in vented attics, a baffle shall be installed adjacent to soffits and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

2015 IRC RESIDENTIAL ENERGY EFFICIENCY CHAPTER II SECTION 402

**R402.1 General (Prescriptive).** The building thermal envelope shall meet the requirements of Sections R402.1.1 through R402.1.4.

**R402.2 Specific insulation requirements (Prescriptive).** In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12.

**R402.3 Fenestration (Prescriptive).** In addition to the requirements of Section R402.1, fenestration shall comply with Sections R402.3.1 through R402.3.6.

**R402.4 Air leakage (Mandatory).** The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

**R402.4.1 Building thermal envelope.** The building thermal envelope shall comply with Sections R402.4.1.1 and R402.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

**R402.4.1.1 Installation.** The components of the building thermal envelope as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the code official, an approved third party shall inspect all components and verify compliance.

**R402.4.1.2 Testing.** The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

- During testing:**
1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
  2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
  3. Interior doors, if installed at the time of the test, shall be open;
  4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
  5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
  6. Supply and return registers, if installed at the time of the test, shall be fully open.

**R402.4.2 Fireplaces.** New wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air.

**R402.4.3 Fenestration air leakage.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cm per square foot (1.5 L/s/m<sup>2</sup>) and swinging doors no more than 0.5 cm per square foot (2.6 L/s/m<sup>2</sup>), when tested according to NFRC 400 or AIAA/W WDMA/CSA 10/15.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer. Exception: Site-built windows, skylights and doors.

**R402.4.4 Recessed lighting.** Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as having an air leakage rate not more than 2.0 cm (0.944 L/s) when tested in accordance with ASTM E 285 at a 151 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**R402.5 Maximum fenestration U-factor and SHGC (Mandatory).** The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.

2015 IRC RESIDENTIAL ENERGY EFFICIENCY CHAPTER II SECTION 403

SEE SECTION 403 FOR SYSTEM REQUIREMENTS INCLUDING:

1. Programmable thermostat.
2. Duct insulation and sealing.
3. Verification of duct tightness.
4. Air handler sealing.
5. Mechanical system piping insulation and protection.
6. Hot water systems
7. Hot water pipe insulation.
8. Mechanical ventilation.
9. Equipment sizing.
10. Snow melt system controls
11. In ground pools and spas.

2015 IRC RESIDENTIAL ENERGY EFFICIENCY CHAPTER II SECTION 404

SEE SECTION 404 FOR ELECTRICAL POWER AND LIGHTING REQUIREMENTS

2015 IRC RESIDENTIAL ENERGY EFFICIENCY CHAPTER II SECTION 405

SEE SECTION 405 FOR SIMULATED PERFORMANCE ALTERNATIVES (PERFORMANCE) INCLUDING:

1. Mandatory requirements.
2. Performance-based compliance.
3. Documentation.
4. Calculation procedure.
5. Calculation software, approved software and input values.

TABLE R402.1.2 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION U-FACTOR (b)	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC (b,c)	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE (f)	FLOOR R-VALUE	BASEMENT WALL R-VALUE (c)	SLAB R-VALUE & DEPTH (d)	CRAWL SPACE WALL R-VALUE (c)
1	NR	0.75	0.25	30	13	5/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 OR 13+5 (h)	8/13	19	5/13 (f)	0	5/13
4 EXCEPT MARINE	0.35	0.55	0.40	44	20 OR 13+5 (h)	8/13	19	10/13	10, 2FT.	10/13
5 AND MARINE 4	0.32	0.55	NR	44	20 OR 13+5 (h)	13/17	30 (g)	15/19	10, 2 FT.	15/19
6	0.32	0.55	NR	44	20+5 OR 13+10 (h)	15/20	30 (g)	15/19	10, 4 FT.	15/19
7 & 8	0.32	0.55	NR	44	20+5 OR 13+10 (h)	19/21	30 (g)	15/19	10, 4 FT.	15/19

For SI: 1 foot = 304.8 mm.  
a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.  
b. The Fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.  
c. 15/19 means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. 15/19 shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. 10/13 means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.  
d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.  
e. There are no SHGC requirements in the Marine Zone.  
f. Basement wall insulation is not required in warm-humid locations as defined by Figure NI01.0 and Table NI01.0.  
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.  
h. The first value is cavity insulation, the second value is continuous insulation, so 13+5 means R-13 cavity insulation plus R-5 continuous insulation.  
i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

TABLE R402.1.4 EQUIVALENT U-FACTORS

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR (b)	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL R-VALUE (c)
1	0.50	0.75	0.035	0.082	0.191	0.064	0.360	0.471
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.471
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 (c)	0.136
4 EXCEPT MARINE	0.35	0.55	0.026	0.057	0.098	0.047	0.054	0.065
5 AND MARINE 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 & 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

NOTES

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.  
b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.067 in Zone 4 except Marine, 0.065 in Zone 5 and Marine 4, and 0.051 in Zones 6 through 8.  
c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure NI01.0 (R30.1) and Table NI01.0 (R30.1).

2015 IRC RESIDENTIAL ENERGY EFFICIENCY BASEMENT/FOUNDATION CONDITIONS

**NI0224 (R402.2.4) Basement walls.**  
Walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections NI0221.2 and NI022.8.

**NI0221.0 (R402.2.1.0) Slab-on-grade floors.**  
Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table NI0221.2. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table NI0221.2 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by not less than 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the exterior wall. Slab-edge insulation is not required in jurisdictions designated by the building official as having a very heavy termite infestation.

**NI0221.1 (R402.2.1.1) Crawl space walls.**  
As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in inverted crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with this code. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder

**WALL BRACING/ECC NOTES AND CHARTS**  
DATE: \_\_\_\_\_  
SCALE: 1/4" = 1'-0"  
PROJECT TITLE: BRENDLE RESIDENCE

ISSUE: \_\_\_\_\_  
DATE: \_\_\_\_\_  
SHEET NO: A-8B

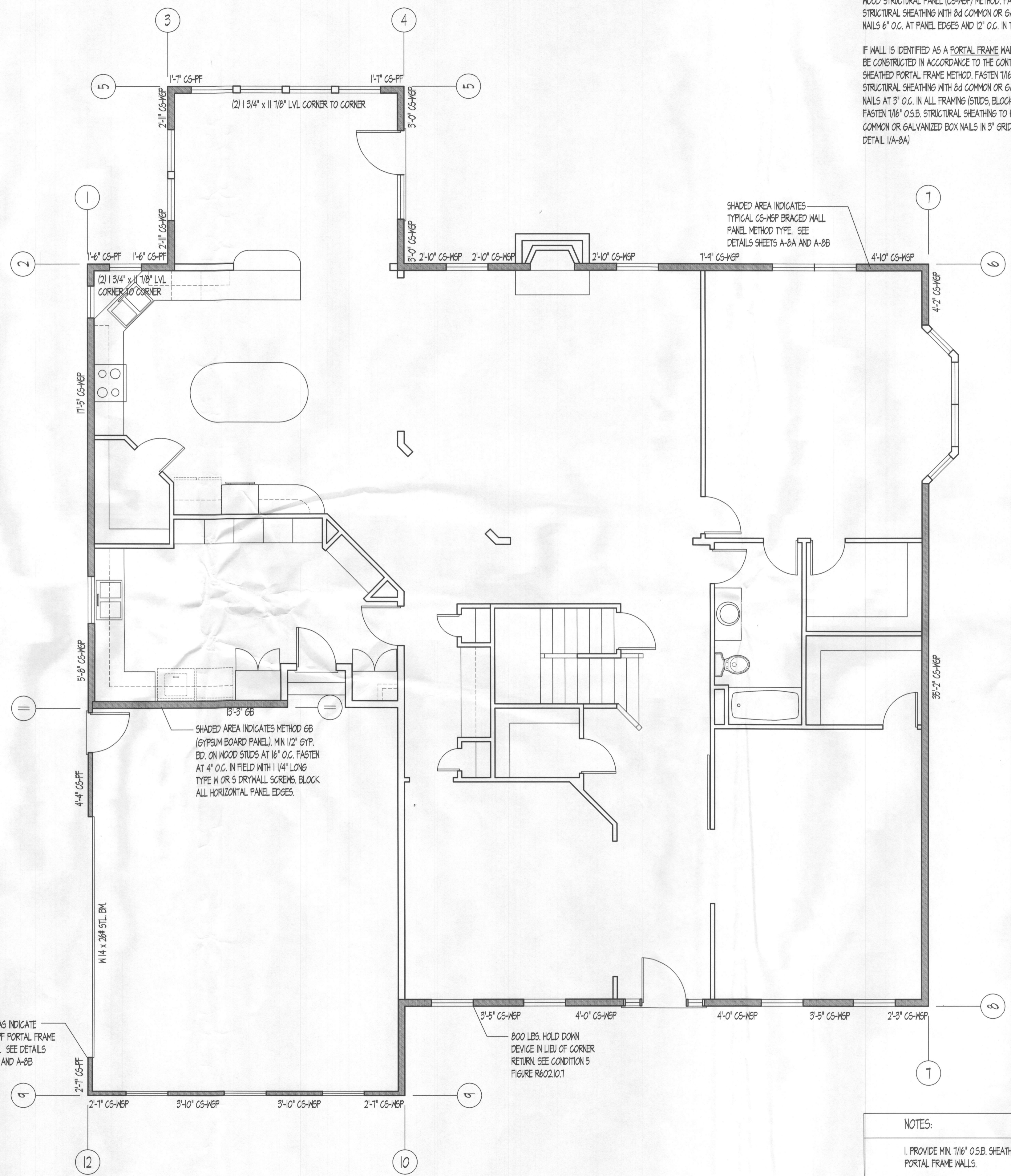
ALL NEW EXTERIOR WALLS (UNLESS NOTED OTHERWISE) SHALL BE CONSTRUCTED IN ACCORDANCE TO THE CONTINUOUSLY SHEATHED WOOD STRUCTURAL PANEL (CS-WSP) METHOD. FASTEN 7/16" O.S.B. STRUCTURAL SHEATHING WITH 8d COMMON OR GALVANIZED BOX NAILS 6" O.C. AT PANEL EDGES AND 12" O.C. IN THE FIELD.

IF WALL IS IDENTIFIED AS A PORTAL FRAME WALL THAN IT SHALL BE CONSTRUCTED IN ACCORDANCE TO THE CONTINUOUSLY SHEATHED PORTAL FRAME METHOD. FASTEN 7/16" O.S.B. STRUCTURAL SHEATHING WITH 8d COMMON OR GALVANIZED BOX NAILS AT 3" O.C. IN ALL FRAMING (STUDS, BLOCKING AND SILLS). FASTEN 7/16" O.S.B. STRUCTURAL SHEATHING TO HEADER WITH 8d COMMON OR GALVANIZED BOX NAILS IN 3" GRID PATTERN (SEE DETAIL 1/A-8A)

CS-WSP CONTINUOUS SHEATHING BRACED WALL PANELS  
 BRACED WALL LINE INFORMATION - 1ST FLOOR (ALL WALLS ARE 9 FEET TALL)

BRACED WALL LINE MARK AND LENGTH	WALL PANEL METHOD	LENGTH OF PANELS REQUIRED	LENGTH OF PANELS PROVIDED	
1	30'-0"	CS-WSP	5'-0"	23'-1"
2	5'-6"	CS-PF	1'-6"	1'-6"
3	12'-0"	CS-WSP	3'-0"	5'-10"
4	12'-0"	CS-WSP	3'-0"	6'-0"
5	16'-0"	CS-PF	1'-6"	1'-7"
6	35'-6 1/2"	CS-WSP	11'-0"	21'-1"
7	5'-0"	CS-WSP	14'-6"	39'-4"
8	35'-6 1/2"	CS-WSP	11'-0"	17'-1"
9	21'-5 1/2"	CS-WSP	4'-0"	12'-10"
10	6'-0"	CS-WSP	3'-6"	6'-0"
11	13'-3"	CS-GB	5'-0"	13'-3"
12	26'-0"	CS-PF	1'-6"	2'-7 1/4"

SHADED AREAS INDICATE TYPICAL CS-PF PORTAL FRAME METHOD TYPE. SEE DETAILS SHEETS A-8A AND A-8B



SHADED AREA INDICATES METHOD GB (GYPSUM BOARD PANEL). MIN 1/2" GYP. ED. ON WOOD STUDS AT 16" O.C. FASTEN AT 4" O.C. IN FIELD WITH 1 1/4" LONG TYPE M OR S DRYWALL SCREWS. BLOCK ALL HORIZONTAL PANEL EDGES.

SHADED AREA INDICATES TYPICAL CS-WSP BRACED WALL PANEL METHOD TYPE. SEE DETAILS SHEETS A-8A AND A-8B

800 LBS. HOLD DOWN DEVICE IN LIEU OF CORNER RETURN. SEE CONDITION 5 FIGURE R602.10.1

NOTES:

1. PROVIDE MIN. 7/16" O.S.B. SHEATHING AT ALL PORTAL FRAME WALLS.
2. 800# CAPACITY HOLD DOWN DEVICE TO BE SIMPSON HD12 OR DITZEL HOLDINGS. INSTALL TO MANUFACTURER'S SPECIFICATIONS USING ANCHOR BOLT CONNECTIONS AT CONCRETE AND ALL-THREAD ROD CONNECTIONS AT WOOD FLOORS.

FIRST FLOOR WALL BRACING PLANS

DATE: \_\_\_\_\_ DRAWN: \_\_\_\_\_ PROJECT NO: \_\_\_\_\_

BRENDEL RESIDENCE

ISSUE	DATE	DESCRIPTION

SHEET NO.

A-8C

ALL NEW EXTERIOR WALLS (UNLESS NOTED OTHERWISE) SHALL BE CONSTRUCTED IN ACCORDANCE TO THE CONTINUOUSLY SHEATHED WOOD STRUCTURAL PANEL (CS-WSP) METHOD. FASTEN 1/8" O.S.B. STRUCTURAL SHEATHING WITH 8d COMMON OR GALVANIZED BOX NAILS 6" O.C. AT PANEL EDGES AND 12" O.C. IN THE FIELD.

IF WALL IS IDENTIFIED AS A PORTAL FRAME WALL THEN IT SHALL BE CONSTRUCTED IN ACCORDANCE TO THE CONTINUOUSLY SHEATHED PORTAL FRAME METHOD. FASTEN 1/8" O.S.B. STRUCTURAL SHEATHING WITH 8d COMMON OR GALVANIZED BOX NAILS AT 3" O.C. IN ALL FRAMING (STUDS, BLOCKING AND SILLS). FASTEN 1/8" O.S.B. STRUCTURAL SHEATHING TO HEADER WITH 8d COMMON OR GALVANIZED BOX NAILS IN 3' GRID PATTERN (SEE DETAIL 1/A-8A)

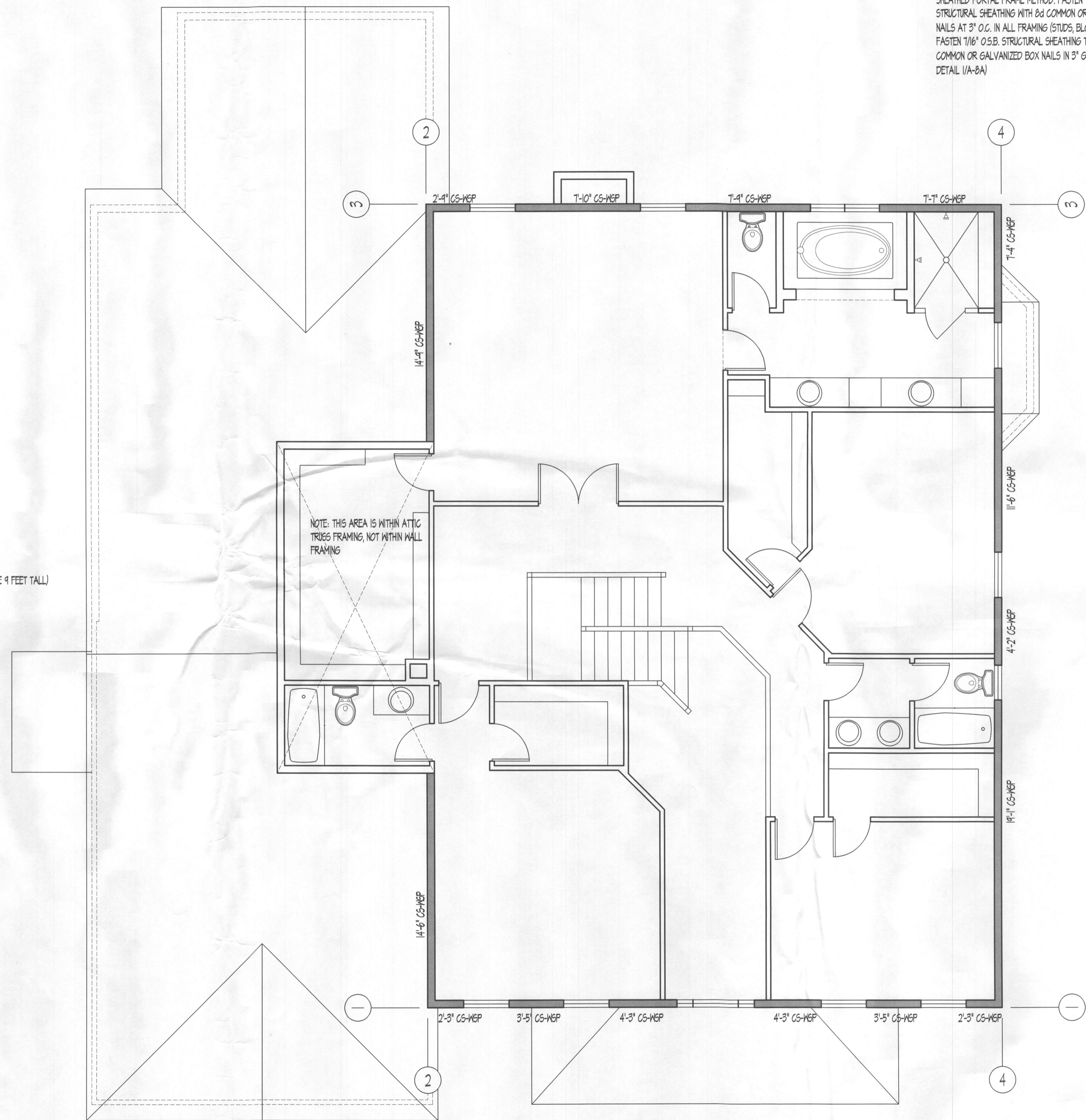
**JB HOME DESIGN, LLC**  
 9416 CONCORD COURT  
 BALTIMORE, MARYLAND 21284  
 OFFICE (410) 594-4871  
 FAX (410) 663-4064  
 EMAIL: JON@JBHOMEDSIGN.COM



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CS-WSP CONTINUOUS SHEATHING BRACED WALL PANELS  
 BRACED WALL LINE INFORMATION - 2ND FLOOR (ALL WALLS ARE 9 FEET TALL)

BRACED WALL LINE MARK AND LENGTH	WALL PANEL METHOD	LENGTH OF PANELS REQUIRED	LENGTH OF PANELS PROVIDED
1 36'-0"	CS-WSP	6'-0"	19'-10"
2 50'-0"	CS-WSP	7'-6"	29'-3"
3 36'-0"	CS-WSP	6'-0"	25'-11"
4 50'-0"	CS-WSP	7'-6"	42'-1"



NOTES:

- PROVIDE MIN. 1/8" O.S.B. SHEATHING AT ALL PORTAL FRAME WALLS.
- 800# CAPACITY HOLD DOWN DEVICE TO BE SIMPSON HDL2 OR DTT22 HOLDINGS. INSTALL TO MANUFACTURER'S SPECIFICATIONS USING ANCHOR BOLT CONNECTIONS AT CONCRETE AND ALL-THREAD ROD CONNECTIONS AT WOOD FLOORS.

SECOND FLOOR WALL BRACING PLANS

CONTENTS: SCALE: 1/4" = 1'-0" DATE: DRWN. PRJ. NO.

BRENDEL RESIDENCE

PROJECT TITLE

ISSUE	DATE	DESCRIPTION
01/18/18		PERMIT BRACING SET

SHEET NO.

A-8D