

TABLE R602.3(1) FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a,b,c}	SPACING OF FASTENERS
ROOF			
1	BLOCKING BETWEEN JOISTS OR RAFTERS TO TOP PLATE, TOE NAIL	4-8D BOX (2 1/2" X 0.113") 3-8D (2 1/2" X 0.113") 3-10D (3" X 0.128") 3-3" X 0.131" NAILS	TOE NAIL
2	CEILING JOISTS TO PLATE, TOE NAIL	4-10D BOX (3" X 0.128") 3-16D COMMON (3 1/2" X 0.162") 4-3" X 0.131" NAILS	PER JOIST, TOE NAIL
3	CEILING JOISTS NOT ATTACHED TO PARALLEL RAFTER, LAPS OVER PARTITIONS (SEE SECTION R802.5.2 AND TABLE R802.52)	4-10D BOX (3" X 0.128") 3-16D COMMON (3 1/2" X 0.162") 4-3" X 0.131" NAILS	FACE NAIL
4	CEILING JOIST ATTACHED TO PARALLEL RAFTER (HEEL JOINT) SEE SECTION R802.5.2 AND TABLE R802.5.2)	TABLE R802.5.2	FACE NAIL
5	COLLAR TIE TO RAFTER, FACE NAIL OR 1 1/4" X 20GA. RIDGE STRAP TO RAFTER	4-10D BOX (3" X 0.128") 3-10D COMMON (3" X 0.148") 4-3" X 0.131" NAILS	FACE NAILS EACH RAFTER
6	RAFTER OR ROOF TRUSS TO PLATE	3-16D BOX NAILS (3 1/2" X 0.162") 3-10D COMMON NAILS (3" X 0.148") 4-10D BOX (3" X 0.128") 4-3" X 0.131" NAILS	2 TOE NAILS ON ONE SIDE AND 1 TOE NAIL ON OPPOSITE SIDE OF EACH RAFTER OR TRUSS ¹
7	ROOF RAFTERS TO RIDGE, VALLEY OR HIP RAFTERS OR ROOF RAFTER TO MINIMUM 2" RIDGE BEAM	4-16D (3 1/2" X 0.135"); OR 3-10D COMMON (3" X 0.148") 4-10D BOX (3" X 0.128"); OR 4-3" X 0.131" NAILS	TOE NAIL
		3-16D (3 1/2" X 0.135"); OR 2-16D COMMON (3 1/2" X 0.162") 3-10D BOX (3" X 0.128"); OR 3-3" X 0.131" NAILS	
WALL			
8	STUD TO STUD (NOT BRACED WALL PANELS)	16D (3 1/2" X 0.162") 10D BOX (3" X 0.128"); OR 3" X 0.131" NAILS	24" OC FACE NAIL 16" OC FACE NAIL
9	STUD TO STUD AND ABUTTING STUDS AT INTERSECTING WALL CORNERS (AT BRACED WALL PANELS)	16D BOX (3 1/2" X 0.135"); OR 3" X 0.131" NAILS	12" OC FACE NAIL
10	BUILT-UP HEADER (2" TO 2" HEADER WITH 1/2" SPACER)	16D COMMON (3 1/2" X 0.162") 16D BOX (3 1/2" X 0.135")	16" OC EACH EDGE FACE NAIL 12" OC EACH EDGE FACE NAIL
11	CONTINUOUS HEADER TO STUD	5-8D BOX (2 1/2" X 0.113") or 4-8D COMMON (2 1/2" X 0.131") 4-10D BOX (3" X 0.128")	TOE NAIL
12	TOP PLATE TO TOP PLATE	16D COMMON (3 1/2" X 0.162") 10D BOX (3" X 0.128") OR 3" X 0.131" NAILS	16" OC FACE NAIL 12" OC FACE NAIL
13	DOUBLE TOP PLATE SPLICE	8-16D COMMON (3 1/2" X 0.162"); or 12-16D BOX (3 1/2" X 0.135"); or 12-10D BOX (3" X 0.128"); or 12-3" X 0.131" NAILS	FACE NAIL ON EACH SIDE OF END JOINT (MINIMUM 24" LAP SPLICE LENGTH EACH SIDE OF END JOINT)
14	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING (NOT AT BRACED WALL PANELS)	16D COMMON (3 1/2" X 0.162") 16D BOX (3 1/2" X 0.135"); OR 3" X 0.131" NAILS	16" OC FACE NAIL 12" OC FACE NAIL
15	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING (NOT AT BRACED WALL PANELS)	3-16D BOX (3 1/2" X 0.135"); or 2-16D COMMON (3 1/2" X 0.162"); or 3-3" X 0.131" NAILS	3, 2, OR 4 EACH 16" OC FACE NAIL
16	TOP OR BOTTOM PLATE TO STUD	4-8D BOX (2 1/2" X 0.113"); or 3-16D BOX (3 1/2" X 0.135"); or 4-8D COMMON (2 1/2" X 0.131"); or 4-10D BOX (3" X 0.128"); or 3-3" X 0.131" NAILS	TOE NAIL
17	TOP PLATES, LAPS AT CORNERS AND INTERSECTIONS	3-16D BOX (3 1/2" X 0.135"); or 2-16D COMMON (3 1/2" X 0.162"); or 3-10D BOX (3" X 0.128"); or 3-3" X 0.131" NAILS	END NAIL
18	1" BRAVE TO EACH STUD AND PLATE	3-10D BOX (3" X 0.128"); or 2-16D COMMON (3 1/2" X 0.162"); or 3-3" X 0.131" NAILS	FACE NAIL
19	1" X 6" SHEATHING TO EACH BEARING	3-8D BOX (2 1/2" X 0.113"); or 2-8D COMMON (2 1/2" X 0.131"); or 2-10D BOX (3" X 0.128"); or 2 STAPLES 1" CROWN, 16GA., 1 3/4" LONG	FACE NAIL
20	1" X 6" AND WIDER SHEATHING TO EACH BEARING	3-8D BOX (2 1/2" X 0.113"); or 3-8D COMMON (2 1/2" X 0.131"); or 3-10D BOX (3" X 0.128"); or 3 STAPLES, 1" CROWN, 16GA., 1 3/4" LONG	FACE NAIL
		WIDER THAN 1" X 8" 4-8D BOX (2 1/2" X 0.113"); or 3-8D COMMON (2 1/2" X 0.131"); or 3-10D BOX (3" X 0.128"); or 4 STAPLES, 1" CROWN, 16GA., 1 3/4" LONG	
FLOOR			
21	JOIST TO SILL, TOP PLATE OR GIRDER	4-8D BOX (2 1/2" X 0.113"); or 3-8D COMMON (2 1/2" X 0.131"); or 3-10D BOX (3" X 0.128"); or 3-3" X 0.131" NAILS	TOE NAIL
22	RIM JOIST, BAND JOIST OR BLOCKING TO SILL OR TOP PLATE (ROOF APPLICATIONS ALSO)	8D BOX (2 1/2" X 0.113") 8D COMMON (2 1/2" X 0.131"); or 10D BOX (3" X 0.128") or 3-3" X 0.131" NAILS	4" OC TOE NAIL 6" OC TOE NAIL
23	1" X 6" SUBFLOOR OR LESS TO EACH JOIST	3-8D BOX (2 1/2" X 0.113"); or 2-8D COMMON (2 1/2" X 0.131"); or 2-10D BOX (3" X 0.128"); or 2 STAPLES, 1" CROWN, 16GA., 1 3/4" LONG	FACE NAIL
24	2" SUBFLOOR TO JOIST OR GIRDER	3-16D BOX (3 1/2" X 0.135"); or 2-16D COMMON (3 1/2" X 0.162")	BLIND AND FACE NAIL
25	2" PLANKS (PLANK & BEAM-FLOOR AND ROOF)	3-16D BOX (3 1/2" X 0.135"); or 2-16D COMMON (3 1/2" X 0.162")	AT EACH BEARING, FACE NAIL
26	BAND OR RIM JOIST TO JOIST	3-16D COMMON (3 1/2" X 0.162"); or 4-10D BOX (3" X 0.128"); or 4-3" X 0.131" NAILS; or 4-3" X 14GA. STAPLES, 7/16" CROWN	END NAIL
27	BUILT-UP GIRDERS AND BEAMS, 2-INCH LUMBER LAYERS	20D COMMON (4" X 0.192"); or 10D BOX (3" X 0.128"); or 3" X 0.131" NAILS	NAIL EACH LAYER AS FOLLOWS: 32" OC AT TIP AND BOTTOM AND STAGGERED 24" OC FACE NAIL AT TOP AND BOTTOM STAGGERED ON OPPOSITE SIDES
		AND: 2-20D COMMON (4" X 0.192"); or 3-10D BOX (3" X 0.128); or 3-3" X 0.131" NAILS	FACE NAIL AT END AND AT EACH SPLICE
28	LEDGER STRIP SUPPORTING JOISTS OR RAFTERS	4-16D BOX (3 1/2" X 0.135"); or 3-26D COMMON (3 1/2" X 0.162"); or 4-10D BOX (3" X 0.128"); or 4-3" X 0.131" NAILS	AT EACH JOIST OR RAFTER, FACE NAIL
29	BRIDGING OR BLOCKING TO JOIST	2-10D BOX (3" X 0.128"); or 2-8D COMMON (2 1/2" X 0.131"); or 2-3" X 0.131" NAILS	EACH END, TOE NAIL

a. ALL NAILS ARE SMOOTH-COMMON, BOX OR DEFORMED SHANKS EXCEPT WHERE OTHERWISE STATED. NAILS USED FOR FRAMING AND SHEATHING CONNECTIONS SHALL HAVE MINIMUM AVERAGE BENDING YIELD STRENGTHS AS SHOWN: 80 KSI FOR SHANK DIAMETER OF 0.192 INCH (200 COMMON), 100 KSI FOR SHANK DIAMETERS LARGER THAN 0.192 INCH BUT NOT LARGER THAN 0.171 INCH, AND 100 KSI FOR SHANK DIAMETER OF 0.142 INCH OR LESS.
b. STAPLES ARE 16 GAGE WIRE AND HAVE A MINIMUM 7/16" INCH ON DIAMETER CROWN WIDTH.
c. NAILS SHALL BE SPACED AT NOT MORE THAN 6 INCHES ON CENTER AT ALL SUPPORTS WHERE SPANS ARE 48 INCHES OR GREATER.
d. FOURFOOT BY SIXFOOT OR FOURFOOT BY EIGHTFOOT PANELS SHALL BE APPLIED VERTICALLY.
e. SPACING OF FASTENERS NOT INCLUDED IN THIS TABLE SHALL BE BASED ON TABLE R602.3(2).
f. FOR REGIONS HAVING BASIC WIND SPEED OF 110 MPH OR GREATER, 40 REFORMED (2 1/2" X 0.120) NAILS SHALL BE USED FOR ATTACHING PLYWOOD AND WOOD STRUCTURAL PANEL ROOF SHEATHING TO FRAMING WITHIN MINIMUM 48-INCHES DISTANCE FROM GABLE END WALLS, IF MEAN ROOF HEIGHT IS MORE THAN 25 FEET. UP TO 35 FEET MAXIMUM.
g. FOR REGIONS HAVING BASIC WIND SPEED OF 100 MPH OR LESS, NAILS FOR ATTACHING WOOD STRUCTURAL PANEL ROOF SHEATHING TO GABLE END WALL FRAMING SHALL BE SPACED 8 INCHES ON CENTER, WHEN BASIC WIND SPEED IS GREATER THAN 100 MPH, NAILS FOR ATTACHING PANEL ROOF SHEATHING TO INTERMEDIATE SUPPORTS SHALL BE SPACED 8 INCHES ON CENTER FOR MINIMUM 48-INCH DISTANCE FROM RIDGES, EAVES AND GABLE END WALLS, AND 4 INCHES ON CENTER TO GABLE END WALL FRAMING.
h. GYPSUM SHEATHING SHALL CONFORM TO ASTM C 1396 AND SHALL BE INSTALLED IN ACCORDANCE WITH GA 283. FIBERGLASS SHEATHING SHALL CONFORM TO ASTM C 208.
i. SPACING OF FASTENERS ON FLOOR SHEATHING PANEL EDGES SUPPORTED BY FRAMING MEMBERS AND REQUIRE BLOCKING AND AT ALL FLOOR PERIMETERS ONLY. SPACING OF FASTENERS ON ROOF SHEATHING PANEL EDGES APPLIES TO PANEL EDGES SUPPORTED BY FRAMING MEMBERS AND REQUIRE BLOCKING, BLOCKING OF ROOF OR FLOOR SHEATHING PANEL EDGES PERPENDICULAR TO THE FRAMING MEMBERS NEED NOT BE PROVIDED EXCEPT AS REQUIRED BY OTHER PROVISIONS OF THIS CODE. FLOOR PERIMETER SHALL BE SUPPORTED BY FRAMING MEMBERS OR SOLID BLOCKING.
j. WHERE A RAFTER IS FASTENED TO AN ADJACENT PARALLEL CEILING JOIST IN ACCORDANCE WITH THIS SCHEDULE, PROVIDE TWO TOE NAILS ON ONE SIDE OF THE RAFTER AND TWO NAILS FROM CEILING JOIST TO TOP PLATE IN ACCORDANCE WITH THIS SCHEDULE. THE TOE NAIL ON THE OPPOSITE SIDE OF THE RAFTER SHALL NOT BE REQUIRED.

CONTINUED TABLE R602.3(1) FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a,b,c}	SPACING OF FASTENERS	
			EDGES (INCHES) ^d	INTERMEDIATE ^{e,f} SUPPORTS (INCHES)
WOOD STRUCTURAL PANELS, SUBFLOOR, ROOF AND INTERIOR WALL SHEATHING TO FRAMING AND PARTICLEBOARD WALL SHEATHING TO WALL FRAMING (SEE TABLE R602.3(3) FOR WOOD STRUCTURAL PANEL EXTERIOR WALL SHEATHING TO WALL FRAMING)				
30	3/8" - 1/2"	6D COMMON (2" X 0.113" NAIL (SUBFLOOR, WALL) ; 8D COMMON (2 1/2" X 0.131 NAIL (ROOF); or RRSR-01 (2 3/8" X 0.113" NAIL (ROOF))	6	12'
31	19/32" - 1"	8D COMMON NAIL (2 1/2" X 0.131; or RRSR-01; 2 3/8" X 0.113) NAIL ROOF)	6	12'
32	1 1/8" - 1 1/4"	10D COMMON NAIL (3" X 0.148) NAIL; or 8D (2 1/2" X 0.131") DEFORMED NAIL	6	12'
OTHER WALL SHEATHING^g				
33	1/2" STRUCTURAL CELLULOSE FIBERBOARD SHEATHING	1 1/2" GALVANIZED ROOF NAIL, 7/16" HEAD DIAMETER, OR 1 1/4" LONG 16GA. STAPLE WITH 7/16" OR 1" CROWN	3	6
34	25/32" STRUCTURAL CELLULOSE FIBERBOARD SHEATHING	1 3/4" GALVANIZED ROOF NAIL, 7/16" HEAD DIAMETER, OR 1 1/2" LONG 16GA. STAPLE WITH 7/16" OR 1" CROWN	3	6
35	1/2" GYPSUM SHEATHING ^h	1 1/2" GALVANIZED ROOF NAIL, STAPLE GALVANIZED, 1 1/2" LONG, 1 1/4" SCREWS, TYPE W or S	7	7
36	5/8" GYPSUM SHEATHING ^h	1 3/4" GALVANIZED ROOF NAIL, STAPLE GALVANIZED, 1 5/8" LONG, 1 5/8" SCREWS, TYPE W or S	7	7
WOOD STRUCTURAL PANELS, COMBINATION SUBFLOOR UNDERLAYMENT TO FRAMING				
37	3/4" AND LESS	6D DEFORMED (2" X 0.120") NAIL OR 8D COMMON (2 1/2" X 0.131") NAIL	6	12'
38	7/8" - 1"	8D COMMON (2 1/2" X 0.131") NAIL OR 8D DEFORMED (2 1/2" X 0.120") NAIL	6	12'
39	1 1/8" - 1 1/4"	10D COMMON (3" X 0.148") NAIL OR 8D DEFORMED (2 1/2" X 0.120") NAIL	6	12'

For Sl: 1 inch = 25.4mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

TABLE R 602.3(5) SIZE, HEIGHT, AND SPACING OF WOOD STUDS

STUD SIZE (IN)	BEARING WALLS					NON-BEARING WALLS	
	LATERALLY UNSUPPORTED STUD HEIGHT ^a (feet)	MAXIMUM SPACING WHERE SUPPORTING A ROOF-CEILING ASSEMBLY OR A HABITABLE ATTIC ASSEMBLY, ONLY (inches)	MAXIMUM SPACING WHERE SUPPORTING ONE FLOOR, PLUS A ROOF-CEILING ASSEMBLY OR A HABITABLE ATTIC ASSEMBLY (inches)	MAXIMUM SPACING WHERE SUPPORTING TWO FLOORS, PLUS A ROOF-CEILING ASSEMBLY OR A HABITABLE ATTIC ASSEMBLY (inches)	MAXIMUM SPACING WHERE SUPPORTING ONE FLOOR HEIGHT ^b (inches)	LATERALLY UNSUPPORTED STUD HEIGHT ^a (feet)	LATERALLY UNSUPPORTED STUD HEIGHT (feet)
2x3 ^b	---	---	---	---	---	10	16
2x4	10	24 _c	16 _c	---	24	14	24
3x4	10	24	24	16	24	14	24
2x5	10	24	24	---	24	16	24
2x6	10	24	24	16	24	20	24

FOR SL: 1 INCH = 25.4mm, 1 FOOT = 304.8mm
a. LISTED HEIGHTS ARE DISTANCES BETWEEN POINTS OF LATERAL SUPPORT PLACED PERPENDICULAR TO THE PLANE OF THE WALL. BEARING WALL SHALL BE SHEATHED ON NOT LESS THAN ONE SIDE OR BRIDGING SHALL BE INSTALLED NOT GREATER THAN 2 FEET APART MEASURED VERTICALLY FROM EITHER END OF THE STUD. INCREASES IN UNSUPPORTED HEIGHT ARE PERMITTED WHERE IN COMPLIANCE WITH EXCEPTION 2 OF SECTION R602.3.1 OR DESIGNED IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICES.
b. SHALL NOT BE USED IN EXTERIOR WALLS.
c. A HABITABLE ATTIC ASSEMBLY SUPPORTED BY 2X4 STUDS IS LIMITED TO A ROOF SPAN OF 32 FEET. WHERE THE ROOF SPAN EXCEEDS 32 FEET, THE WALL STUDS SHALL BE INCREASED TO 2X6 OR THE STUDS SHALL BE DESIGNED IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICE.

MINIMUM MECHANICAL EQUIPMENT EFFICIENCY VALUES BY COMPONENT, PER IRC2018 N1103.6.1

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY CFM/WATT	AIR FLOW RATE MAXIMUM (CFM)
HRV OR ERV	ANY	1.2 CFM/WATT	ANY
RANGE HOOD	ANY	2.8 CFM/WATT	ANY
IN-LINE FAN	ANY	2.8 CFM/WATT	ANY
BATHROOM UTILITY FAN	10	1.4 CFM/WATT	<90
BATHROOM UTILITY FAN	90	2.8 CFM/WATT	ANY

MINIMUM INSULATION & FENSTRATION VALUES BY COMPONENT, PER IRC2018 N1102.1.2

VALUES BELOW ARE PER 2018 IECC. ACTUAL VALUES MAY VARY BASED ON ALTERNATE ENERGY COMPLIANCE PATH CHOSEN (IN JURISDICTIONS WHERE ALTERNATIVE PATHS ARE AVAILABLE)

CLIMATE ZONE	FENSTRATION U-FACTOR	SKYLIGHT U-FACTOR	GLAZED SHGC FENSTRATION	INSULATED METAL DOOR U-VALUE	INSULATED WOOD DOOR U-VALUE	CEILING R-VALUE	WOOD FRAMED WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE	DUCTWORK OVER OUTSIDE R-VALUE	DUCTWORK (ALL OTHER) R-VALUE
4 EXCEPT MARINE	0.32	0.55	0.40	0.60	0.50	49	20 OR 13 CAV. +5	19	10 CONTINUOUS OR 13 CAVITY	R-10, 2 FT.	10 CONTINUOUS OR 13 CAVITY	8	6

NOTES: 1) BUILDING THERMAL ENVELOPE IS REQUIRED TO BE SEALED WITH AN AIR BARRIER AS PER N1102.4.1 OF THE 2018 IRC
2) RECESSED LIGHTING SHALL BE SEALED TO PREVENT LEAKAGE BETWEEN THE CONDITIONED SPACE AND UNCONDITIONED SPACE
3) ALL DUCTS, AIR HANDLERS, FILTER BOXES, AND BUILDING CAVITIES USED AS DUCTS SHALL BE SEALED AS PER N1103.2 OF THE 2018 IRC

BUILDER'S PLANS: THE TERM "BUILDER'S PLANS" REFERS TO A CERTAIN LEVEL OF DEVELOPMENT OF THE DRAWINGS. AS THE NAME IMPLIES, THESE PLANS REQUIRE THAT THE CONTRACTOR POSSESSES COMPETENCE IN RESIDENTIAL CONSTRUCTION AND A THOROUGH UNDERSTANDING OF THE INTERNATIONAL RESIDENTIAL CODE (IRC). THE CONTRACTOR WARRANTS TO HD ENGINEERING & DESIGN THAT HE POSSESSES THE PARTICULAR COMPETENCE AND SKILL IN CONSTRUCTION NECESSARY TO BUILD THIS PROJECT WITHOUT FULL ENGINEERING AND DESIGN SERVICES, AND FOR THAT REASON THE CONTRACTOR OR HOME OWNER HAS RESTRICTED THE SCOPE OF PROFESSIONAL SERVICES. THE CONSTRUCTION DOCUMENTS PROVIDED BY THE LIMITED SERVICES SHALL BE TERMED "BUILDER'S PLANS" IN RECOGNITION OF THE CONTRACTOR'S SOPHISTICATION. ALTHOUGH HD ENGINEERING & DESIGN HAVE PERFORMED THEIR SERVICES WITH DUE CARE AND DILIGENCE, WE CANNOT GUARANTEE PERFECTION. ANY AMBIGUITY OR DISCREPANCY DISCOVERED BY THE USE OF THESE PLANS SHALL BE REPORTED IMMEDIATELY TO HD ENGINEERING. CONSTRUCTION MAY REQUIRE THAT THE CONTRACTOR ADAPT THE "BUILDER'S PLANS" TO THE FIELD CONDITIONS ENCOUNTERED AND MAKE LOGICAL ADJUSTMENTS IN FIT, FORM, DIMENSION AND QUANTITY. CHANGES MADE FROM THE PLANS WITHOUT THE CONSENT OF HD ENGINEERING & DESIGN ARE UNAUTHORIZED. IT IS ALSO UNDERSTOOD THAT THE CONTRACTOR WILL BE RESPONSIBLE FOR MEETING ALL APPLICABLE BUILDING CODES INCLUDING BUT NOT LIMITED TO MECHANICAL, ELECTRICAL AND PLUMBING CODE REQUIREMENTS (WHICH IS EXCLUDED FROM THESE PLANS). IN THE EVENT ADDITIONAL DETAIL OR GUIDANCE IS NEEDED BY THE CONTRACTOR OR HOMEOWNER FOR CONSTRUCTION OF ANY ASPECT OF THE PROJECT, HD ENGINEERING & DESIGN OR A QUALIFIED ENGINEER SHALL IMMEDIATELY BE RETAINED. FAILURE TO NOTIFY US OF THESE NEEDS OR OF CHANGES TO THE PLANS SHALL RELIEVE HD ENGINEERING & DESIGN OF ALL RESPONSIBILITIES OF THE CONSEQUENCES.

DESIGN LOADS (PSF)

THE DWELLING SHALL COMPLY WITH THE FOLLOWING LOAD CONDITIONS

AREA	MIN DEAD LOAD	MIN LIVE LOAD
EXTERIOR BALCONIES	10	60
DECKS, STAIRS	10	40
CEILING JOISTS / ATTICS NO STORAGE - SCUTTLE ACCESS ONLY ROOF SLOPE 3:12 OR LESS	10	10
CEILING JOISTS / ATTICS NO STORAGE - SCUTTLE ACCESS ONLY ROOF SLOPE OVER 3:12	10	10
CEILING JOISTS / ATTICS WITH STORAGE - DOOR PULL DOWN LADDER ACCESS	10	20
ROOMS: NON-SLEEPING	10	40
ROOMS: SLEEPING	10	30
ROOF: LIGHT ROOF COVERING	10	20
ROOF: HEAVY ROOF COVERING / CONCRETE / TILE / SLATE	20	20
GUARDRAILS, HANDRAILS	20# LL NORMAL	

HEAVY ROOF COVERING MATERIAL (TILE, CONCRETE, SLATE, ETC.) SHALL NOT BE USED UNLESS 20 PSF DEAD LOAD AND HEAVY ROOF IS NOTED ON THE ROOF PLAN. IF HEAVY ROOFING IS TO BE USED AND NOT NOTED ON THE ROOF PLAN NOTIFY ENGINEER PRIOR TO ANY CONSTRUCTION, INCLUDING FOUNDATION AND SITE WORK. IF THE PLAN HAS BEEN DESIGNED FOR HEAVY ROOF LOADS IT WILL BE NOTED IN THE ROOF NOTES ON THE ROOF PLAN.

COLUMN SCHEDULE

BASED ON FOOTING SIZE (ASSUME 1500 PSF SOIL)

PAD SIZE	REINFORCEMENT	COL. MIN.	COL. TYPE	MAX. LOAD
24x24x12	(4) #4 BARS E/W	3"	SCH40	6K
30x30x12	(5) #4 BARS E/W	3"	SCH40	9.4K
36x36x12	(6) #4 BARS E/W	3"	SCH40	13.5K
42x42x14	(7) #4 BARS E/W	3 1/2"	SCH40	18.4K
48x48x16	(8) #4 BARS E/W	3 1/2"	SCH40	24.0K
54x54x16	(9) #4 BARS E/W	3 1/2"	SCH40	30.4K
60x60x18	(10) #4 BARS E/W	3 1/2"	SCH40	37.5K

COLUMN CONNECTION TO STEEL BEAMS SHALL BE WITH A CLIP POST CAP WITH ALL FOUR TAB EARS BENT AROUND THE BOTTOM FLANGE OF THE BEAM. FOR A BEARING PLATE, FOUR HOLES SHALL BE DRILLED IN THE BOTTOM FLANGE OF THE STEEL BEAM TO MATCH THE HOLE PATTERN OF THE PLATE. 1/2" X 2" BOLTS SHOULD THEN BE INSTALLED WITH A FLAT WASHER, LOCK WASHER, AND A NUT IN EACH OF THE HOLES. THE POST CAP MAY BE WELDED TO THE STEEL BEAM IN ACCORDANCE WITH AWS D1.1-92 AS AN ALTERNATIVE, AND WOULD NEED TO BE INSPECTED BY AN AWS-CERTIFIED INSPECTOR.

ENGINEERED LUMBER

MIN. DESIGN REQUIREMENTS

	F _x (psi)	E (psi)	F _v (psi)
LVL	2600	1.8x10	285
GLULAM	2400	1.8x10	190
PARALAM	2600	2.0x10	290

CARDINAL CREST HOMES
 WHITE RESIDENCE
 3213 SW MARY ST. LEE'S SUMMIT, MO
 STRUCTURAL DETAILS & NOTES

HD#: 41463

DATE: 04/09/2021

CHECKED BY: CLS

NO.	ISSUE/REVISION	Revision Date

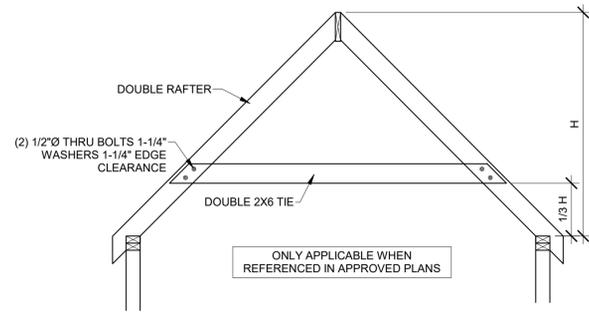
GENERAL NOTES

S-1.1

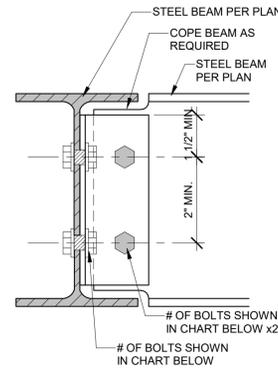
RELEASE FOR
 CONSTRUCTION
 AS NOTED ON PLANS REVIEW
 DEVELOPMENT SERVICES
 LEE'S SUMMIT, MISSOURI
 04/30/2021

HD ENGINEERING & DESIGN, INC
 11666 W. 75TH STREET
 SHAWNEE, KS 66214
 WWW.HDENGINEERS.COM
 913.631.2222
 SERVICE@HDENGINEERS.COM





11 HIP SUPPORT FRAME
3/8" = 1'-0"

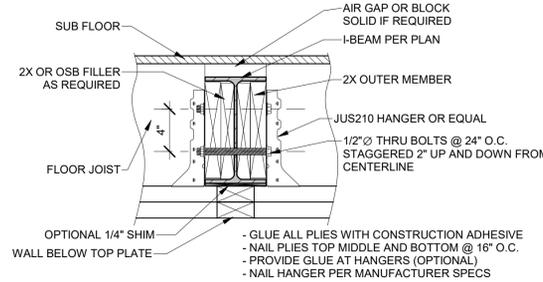


BEAM CONNECTION SCHEDULE

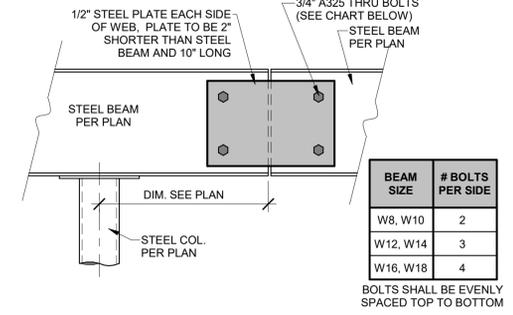
BEAM SIZE	# OF BOLT IN CONNECTION
W8, W10	2
W12, W14	3
W16, W18	4

NOTES:
1. NUMBER OF BOLTS DETERMINED BY SMALLER OF TWO BEAMS BEING CONNECTED
2. ALL BOLTS, 3/4" DIAMETER A325-N, UNO
3. FULL PERIMETER 1/4" FILLET WELD MAY BE SUBSTITUTED FOR EITHER OR BOTH BOLTED CONNECTIONS

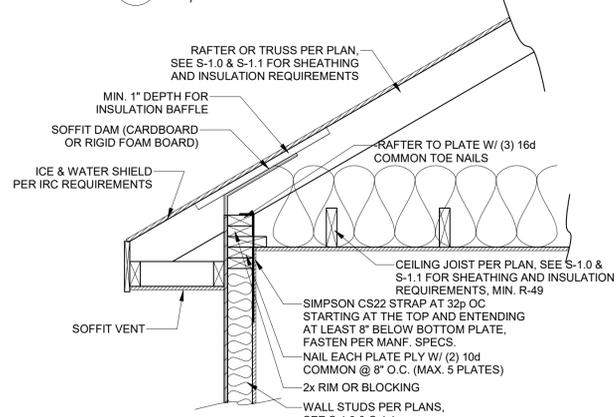
10 BEAM TO GIRDER CONNECTION
3" = 1'-0"



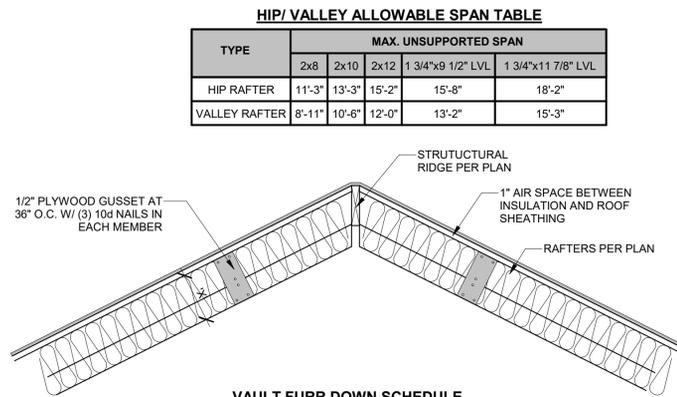
8 UPSET STEEL BEAM DETAIL
1 1/2" = 1'-0"



9 STEEL BEAM SPLICE DETAIL
1 1/2" = 1'-0"



7 OPTION 4 RAFTER BEARING
1" = 1'-0"



HIP/VALLEY ALLOWABLE SPAN TABLE

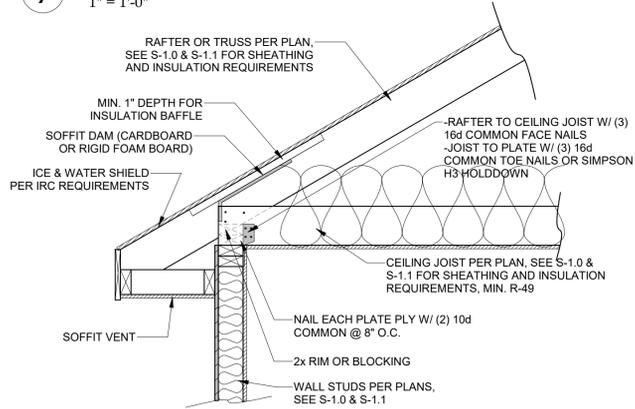
TYPE	MAX. UNSUPPORTED SPAN				
	2x8	2x10	2x12	1 3/4"x9 1/2" LVL	1 3/4"x11 7/8" LVL
HIP RAFTER	11'-3"	13'-3"	15'-2"	15'-8"	18'-2"
VALLEY RAFTER	8'-11"	10'-6"	12'-0"	13'-2"	15'-3"

VAULT FURR DOWN SCHEDULE

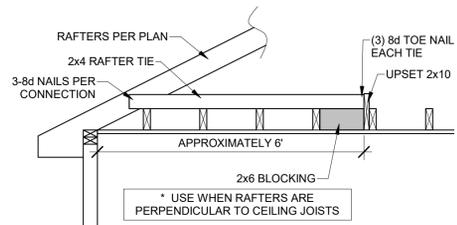
RAFTER SIZE	R-30C INSULATION (X = 9 1/4")	R-38C INSULATION (X = 11 1/4")
2x6	2x6	2x8
2x8	2x4	2x6
2x10	NOT REQUIRED	2x4
2x12	NOT REQUIRED	2x2

NOTES:
1. ALL VAULTS SHALL BE FURRED DOWN WITH 2X FRAMING TO THE REQUIRED DEPTH OF INSULATION, PLUS 1" AIR SPACE.
2. R-38C REQUIRED = 11" WITH AIR SPACE.
3. ALL VAULTED RAFTERS SHALL BE MIN. #2 2x6 DFL @ 16" O.C. OR PER ROOF PLAN.

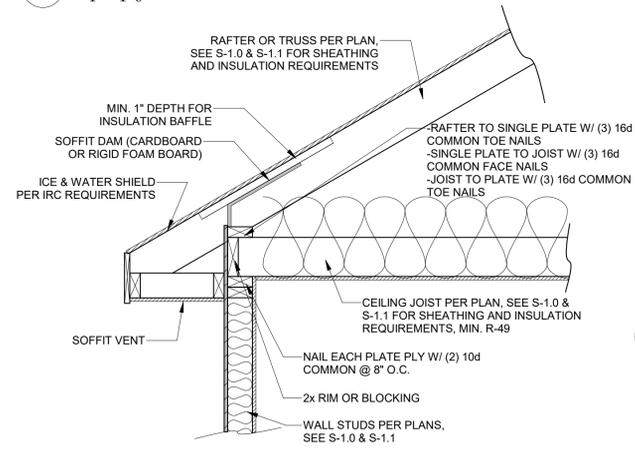
14 VAULTED RAFTER INSULATION
3/4" = 1'-0"



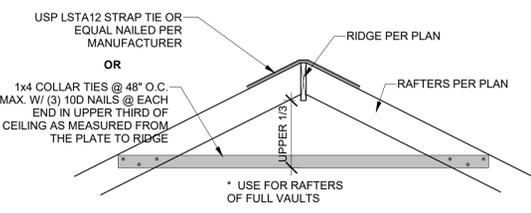
6 OPTION 3 RAFTER BEARING
1" = 1'-0"



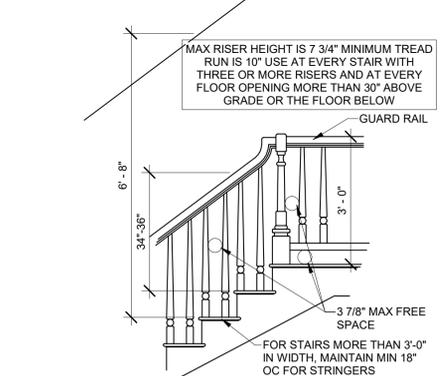
12 RAFTER TIE CONNECTION
1/2" = 1'-0"



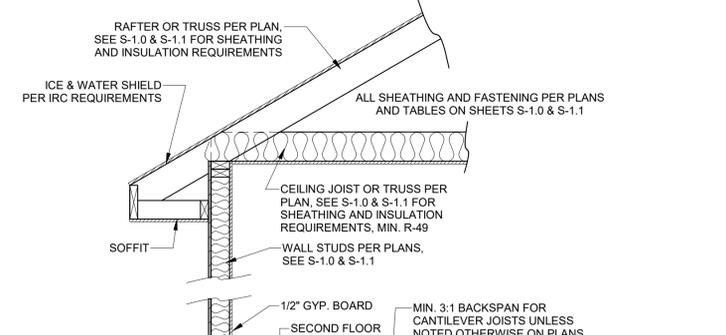
5 OPTION 2 RAFTER BEARING
1" = 1'-0"
THIS OPTION NOT AVAILABLE IN KC, MO



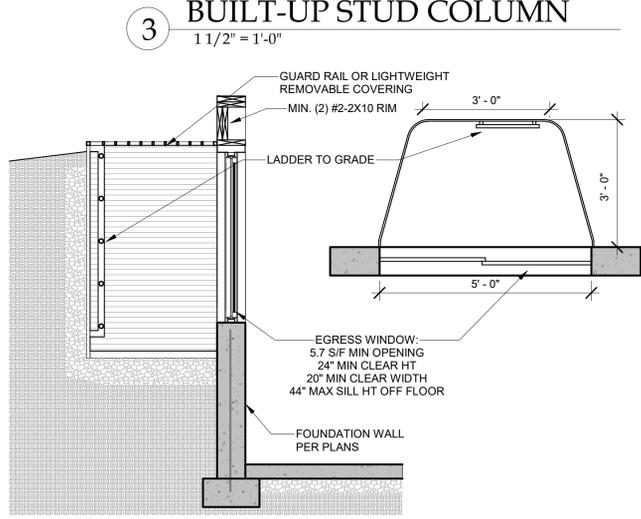
13 RIDGE SUPPORT
1/2" = 1'-0"



4 STAIR/RAIL DETAIL
1/2" = 1'-0"



1 TYPICAL WALL SECTION
3/4" = 1'-0"



2 EGRESS WINDOW SECTION
1/2" = 1'-0"

THIS DOCUMENT CONTAINS COPYRIGHTED MATERIAL AND CONFIDENTIAL INFORMATION BELONGING TO HD ENGINEERING, UNAUTHORIZED USE, DISCLOSURE, REPRODUCTION OR DUPLICATION OF ANY OF THE INFORMATION CONTAINED HEREIN MAY RESULT IN LIABILITY UNDER APPLICABLE LAW.

HD ENGINEERING & DESIGN, INC
11656 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.2222
SERVICE@HDENGINEERS.COM



CARDINAL CREST HOMES
WHITE RESIDENCE
3213 SW MARY ST. LEE'S SUMMIT, MO

STRUCTURAL DETAILS & NOTES

HD#: 41463

DATE: 04/09/2021
CHECKED BY: CLS

NO.	ISSUE/REVISION	Revision Date

FRAMING SECTIONS

S-1.2

RELEASE FOR PERMITS AND RECORD DRAWING AS NOTED ON PLANS REVIEW DEVELOPMENT SERVICES LEE'S SUMMIT, MISSOURI
04/30/2021

DUE TO THE WIDE VARIETY OF SOIL CONDITIONS IN OUR AREA AND THE WIDE VARIETY OF PLASTICITY INDEX AND SOIL BEARING CAPACITIES OUR FIRM RECOMMENDS ALL SITES BE EVALUATED BY HD ENGINEERING OR AN HD ENGINEERING REFERRED GEOTECHNICAL FIRM PRIOR TO PLACEMENT OF ANY "STANDARD" FOUNDATIONS.



CARDINAL CREST HOMES
 WHITE RESIDENCE
 3213 SW MARY ST. LEE'S SUMMIT, MO

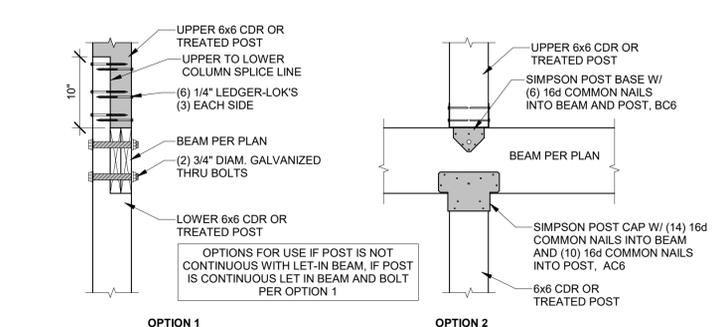
STRUCTURAL DETAILS & NOTES

HD#: 41463
 DATE: 04/09/2021
 CHECKED BY: CLS

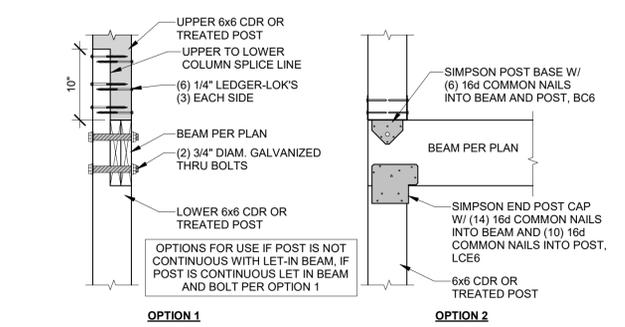
NO.	ISSUE/REVISION	Revision Date

DECK DETAILS

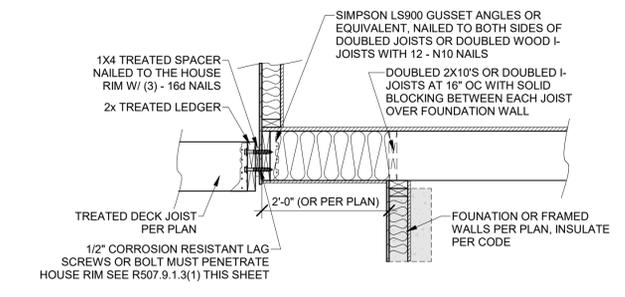
S-1.3



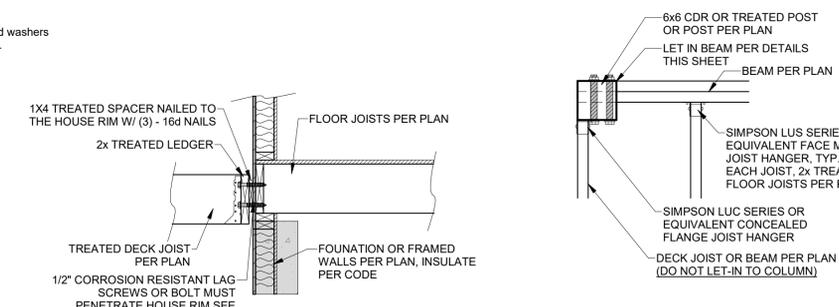
6 DECK LEVEL INTERIOR BEAM TO COLUMN
 1" = 1'-0"



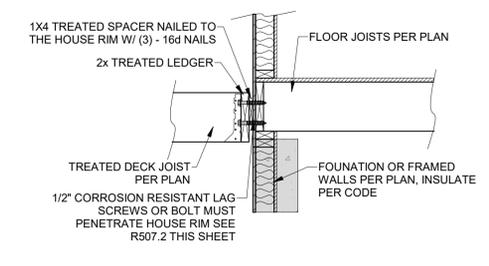
5 DECK LEVEL EXTERIOR BEAM TO COLUMN
 1" = 1'-0"



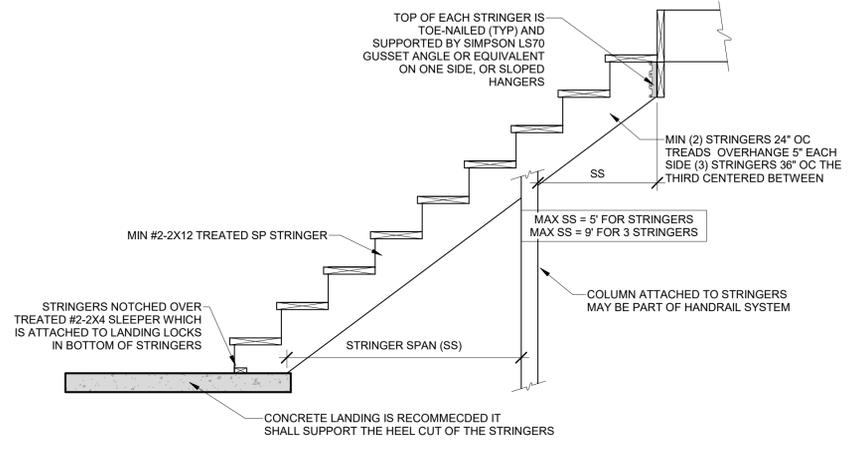
4 DECK LEDGER TO CANTILEVER
 3/4" = 1'-0"



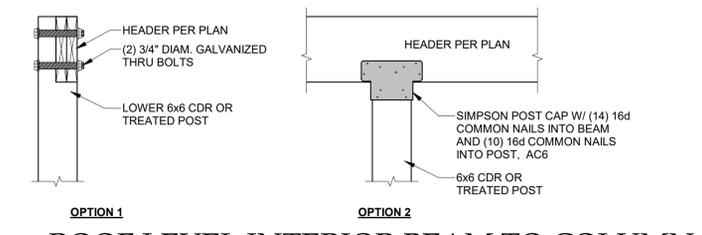
1 DECK CORNER COLUMN
 1" = 1'-0"



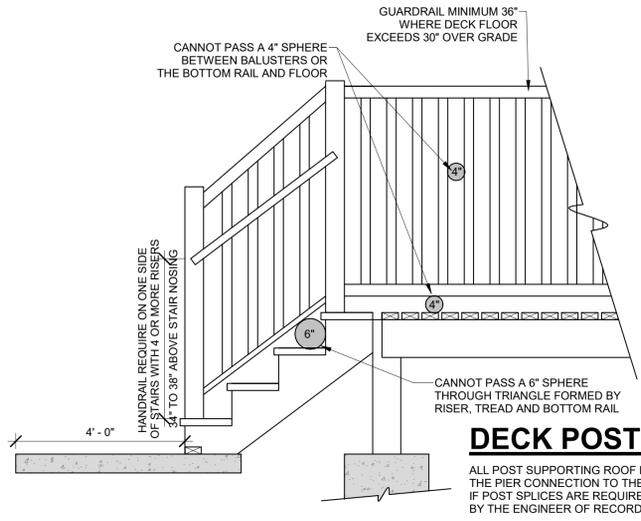
2 DECK LEDGER ATTACHMENT
 3/4" = 1'-0"



9 STAIR STRINGER DETAIL
 1/2" = 1'-0"



7 ROOF LEVEL INTERIOR BEAM TO COLUMN
 1" = 1'-0"



8 GUARD RAIL
 1/2" = 1'-0"

DECK POST NOTE

ALL POST SUPPORTING ROOF LOADS SHALL BE CONTINUOUS FROM THE PIER CONNECTION TO THE ROOF SUPPORTING STRUCTURE. IF POST SPLICES ARE REQUIRED THE SPLICE SHALL BE ENGINEERED BY THE ENGINEER OF RECORD FOR THE PROJECT.

TABLE IRC2018 R507.9.1.3(1) DECK LEDGER CONNECTION TO BAND JOIST
 (DECK LIVE LOAD = 40 PSF, DECK HEAD LOAD = 10 PSF, SNOW LOAD ≤ 40 PSF)

JOIST SPAN	ON-CENTER SPACING OF FASTENERS ^{a, b}						
	6' AND LESS	6'-1" TO 8'	8'-1" TO 10'	10'-1" TO 12'	12'-1" TO 14'	14'-1" TO 16'	16'-1" TO 18'
1/2" LAG SCREW WITH 15/32" MAX. SHEATHING ^{c, d}	30	23	18	15	13	11	10
1/2" DIAM. BOLT WITH 15/32" MAX. SHEATHING ^d	36	36	34	29	24	21	19
1/2" DIAM. BOLT WITH 15/32" MAX. SHEATHING & 1/2" STACKED WASHERS ^e	36	36	29	24	21	18	16

For SI: 1 inch = 25.4mm, 1 foot = 304.8mm, 1 pound per square foot = 0.0479 kPa
 a. Ledges shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
 b. Snow load shall not be assumed to act concurrently with live load.
 c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
 d. Sheathing shall be wood structural panel or solid sawn lumber.
 e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard lumber or foam sheathing. Up to 1/2" thickness of stacked washers shall be permitted to substitute for you to 1/2" of allowable sheathing thickness where combined with wood structural panel or lumbers sheathing.

TABLE IRC2018 R507.9.1.3(2) PLACEMENT OF LAG SCREWS AND BOLT IN DECK LEDGERS AND BAND JOISTS

	MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS			
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
LEDGER ^a	2 inches ^d	3/4 inches	2 inches ^b	1 5/8 inches ^b
BAND JOIST ^c	3/4 inches	2 inches	2 inches	1 5/8 inches ^b

For SI: 1 inch = 25.4mm.
 a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.9.1.3(1)
 b. Maximum: 5 inches
 c. For engineered rim joists, the manufacturer's recommendations shall govern.
 d. The minimum distances from bottom row of lag screws or bolts to the top of the ledger shall be in accordance with Figure R507.9.1.3(1)

RESIDENTIAL SEISMIC & WIND ANALYSIS				INPUT		CALCULATED VALUE	
DETERMINE WEIGHT OF HOUSE:							
LOCATION	DEAD LOAD (psf)	AREA (ft ²)	WEIGHT (lbs.)				
ROOF	10	2650	26500				
FLOOR	10	2540	25400				
SECOND FLOOR	10	262	2620				
FIRST FLOOR	10	1707	17070				
SECOND FLOOR EXT. WALL DL	WALL LENGTH (ft)	WALL HEIGHT (ft)	WALL UNIT WT. (psf)	WEIGHT (lbs.)			
FIRST FLOOR EXT. WALL DL	231.66	8	8	5696			
SECOND FLOOR INT. PARTITION WALL DL	0	0	0	0			
FIRST FLOOR INT. PARTITION WALL DL	6	1707	10242				

PROJECTED AREAS (WIND DESIGN PER 115 MPH 3-SECOND GUST EXPOSURE C AND MEAN ROOF HEIGHT <= 30 FT ASSUMED)					
FRONT-TO-BACK			SIDE-TO-SIDE		
AREA	LOAD	CUMULATIVE	AREA	LOAD	CUMULATIVE
SLOPED ROOF	412	6519	408	3471	6971
VERT. ROOF	489	5843	179	2225	921
2ND	129	1519	243	3024	2924
1ST	927.63	24972	131	346.5	4308
BSMT	0	0	100	1416	14945

SEISMIC SHEAR					
LOCATION	SEISMIC SHEAR	From ASCE7 (Eq. 12.8-1)	V (e 1.2 * S _{vs} * W / R) (lbs.)		
2ND FLOOR			1596		
1ST FLOOR			1736		
BASEMENT			1736		

Sheathing Location	Min. Sheathing Schedule	Fastening Schedule	Allowable Shear (k/ft)	Code Reference
Exterior (Option #1)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing	113 Shank Diameter Nails w/ 1-3/8" penetration @ 6" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 4" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing	220	AFAPA SDPWS Table 4.3A
Exterior (Option #2)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing	113 Shank Diameter Nails w/ 1-3/8" penetration @ 4" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 3" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing	320	AFAPA SDPWS Table 4.3A
Exterior (Option #3)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing and double studs at each panel edge	113 Shank Diameter Nails w/ 1-3/8" penetration @ 3" O.C. Edges, 12" O.C. Field	410	AFAPA SDPWS Table 4.3A
Interior	1/2" Gypsum Board	No. 6 - 1 1/4", Type W or S Screws @ 8" O.C. Edges, 12" O.C. Field	60	per IRC Table 2306.4.4
Interior	16 Ga. Simpson/USP Type WB Steel X-Brace (or equal)	(3) 16d @ end studs & (1) 8d @ intermediate studs (per manufacturer specifications - see detail on sheet S3)	325	

EXTERIOR SHEATHING OPTION FOR SECOND FLOOR	4	WIDTH OF 1ST STORY (FT.)	84.33	WIDTH OF 2ND STORY (FT.)	14
EXTERIOR SHEATHING OPTION FOR FIRST FLOOR	4	DEPTH OF 1ST STORY (FT.)	31.5	DEPTH OF 2ND STORY (FT.)	31.5
EXTERIOR SHEATHING OPTION FOR BASEMENT WALLS	6	BACK WALL OF GARAGE (FT.)	22.5		
		GAR. WALL 1-1/2" B. 2-3-5	2		

EXTERIOR STRUCTURAL WALL LENGTHS (ft) & RESISTANCES						
LOCATION	SEISMIC			WIND		
	FRONT-TO-BACK	RESISTANCE (lbs.)	SIDE-TO-SIDE	FRONT-TO-BACK	RESISTANCE (lbs.)	SIDE-TO-SIDE
2ND FLOOR	23	6460	52.2	23	1816	52.2
1ST FLOOR	153.66	43025	48	153.66	60235	48
BASEMENT	0	0	25	0	25	16490

ADDITIONAL RESISTANCE REQUIRED			Anchor Bolt Spacing (in.)			16d Nail Spacing req'd at bottom plate (in.)		
SEISMIC	WIND	OK?	2nd Floor F-B	2nd Floor S-S	1st Floor F-B	1st Floor S-S	BSMT F-B	BSMT S-S
2ND FLOOR FRONT-TO-BACK	0	5093	0	844	0	844	0	844
2ND FLOOR SIDE-TO-SIDE	0	0	0	0	0	0	0	0
1ST FLOOR FRONT-TO-BACK	0	0	0	46.7	0	46.7	0	46.7
1ST FLOOR SIDE-TO-SIDE	0	0	0	22.3	0	22.3	0	22.3
BASEMENT FRONT-TO-BACK	0	0	0	0	0	0	0	0
BASEMENT SIDE-TO-SIDE	0	0	0	0	0	0	0	0

RESISTANCE REQUIRED IN ADDITION TO RESISTANCE PROVIDED BY EXTERIOR WALLS**							
LOCATION	ADDITIONAL RESISTANCE REQUIRED (POUNDS)	PORTAL FRAMES OR PERF. SHEAR WALL RESISTANCE	INTERIOR X-BRACES (325# BRACE)	INTERIOR WALL LENGTH W/ 12" GYPSUM BOARD PER TABLE (FT.)	INT. WALL LENGTH SHEATHED W/ OSB (TOTAL LENGTH, ONE SIDE, FT.)	RESISTANCE PROVIDED BY ADDITIONAL METHODS (POUNDS)	OK?
2ND FLOOR FRONT-TO-BACK	5093	0	0	0	0	0	NO
2ND FLOOR SIDE-TO-SIDE	0	0	0	0	0	0	YES
1ST FLOOR FRONT-TO-BACK	0	0	0	0	0	0	YES
1ST FLOOR SIDE-TO-SIDE	0	0	0	0	0	0	YES
BASEMENT FRONT-TO-BACK	0	0	0	0	0	0	YES
BASEMENT SIDE-TO-SIDE	0	0	0	0	0	0	YES

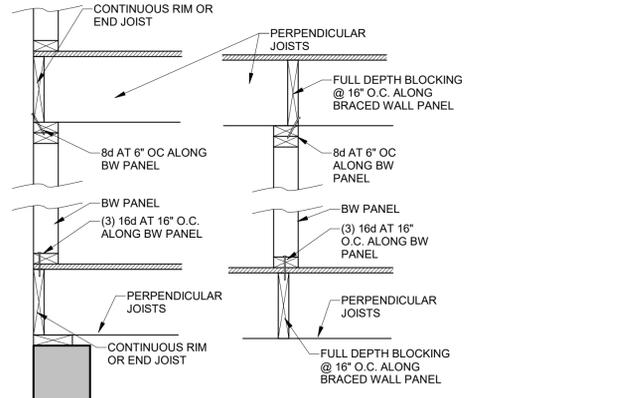
**NOTES: 1) SEE ATTACHED CALCULATIONS FOR PORTAL FRAME OR PERFORATED SHEAR WALL RESISTANCE CAPACITIES (IF APPLICABLE). 2) SEE SHEET S1 FOR INTERIOR STEEL X-BRACE INSTALLATION. 3) INTERIOR WALLS SHEATHED WITH OSB SHALL BE ATTACHED WITH SAME STAPLE/NAILING PATTERN AS EXTERIOR OSB ON SAME FLOOR (SEE TABLE ABOVE) AND ARE ONLY APPLICABLE FOR FULL-HEIGHT SECTIONS OF 2'-6" OR LONGER

WIND UPLIFT ANALYSIS					
ROOF PITCH (MAX)	X/12	DEGREES	PITCH OF 8:OR LESS, EOH-13.3, E-F-2, G-S-2	ASCE 7	ASCE 7
	0	33			
OVERHANG	LENGTH (FT.)	PRESSURE (PSF)	LINEAL FT. OF CH	UPLIFT PER FT. (LBS)	
	1.08	-1.08	233.66	-1.08	
MIN. ROOF**	TOTAL AREA (FT ²)	ZONE E AREA (FT ²)	ZONE G AREA (FT ²)	PRESSURE ZN. E (PSF)	TOTAL FORCE (LBS)
	2656.95	414.04	2241.95	-1.08	-1255
ALONG PERIMETER	TOTAL UPLIFT PER LINEAL FOOT ALONG EXTERIOR FOUNDATION				4.5
"INSIDE" EXTERIOR WALLS	RESISTANCE DUE TO DEAD WEIGHT (G) 1/4" TOPNAILS				251.6

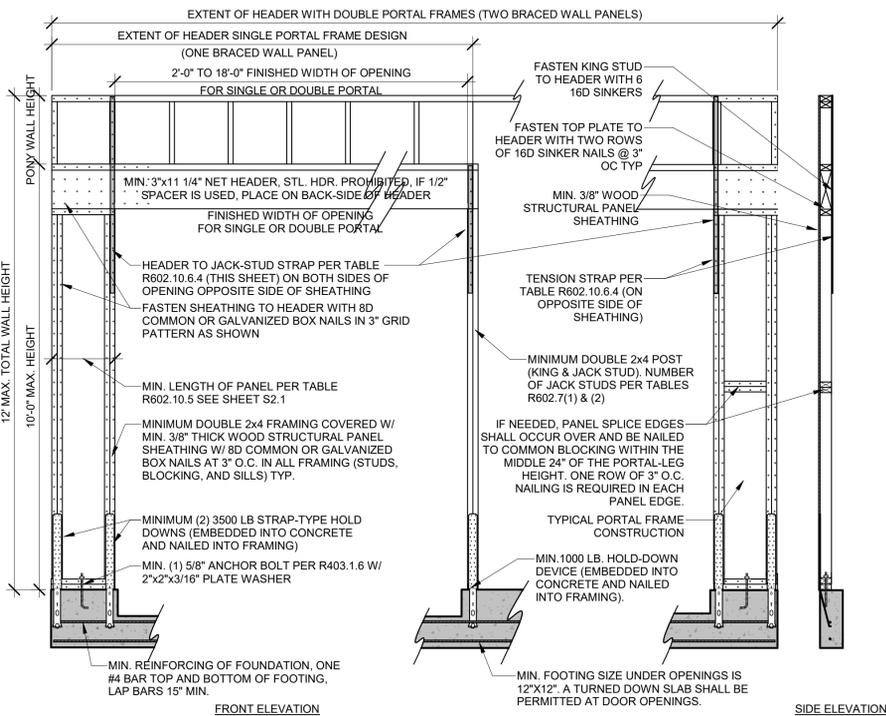
NOTE FOR CONSTRUCTION: THE CONTINUOUS STRUCTURAL PANEL SHEATHING BRACING METHOD REQUIRES USE OF THE ABOVE TABLE FOR SHEATHING OF THE ENTIRE STRUCTURE. IN ADDITION, FRAMING MEMBERS SHALL BE @ 16" O.C. MAX. UNBLOCKED, AND W/ SHEATHING APPLIED DIRECTLY TO FRAMING MEMBERS

NOTE FOR DESIGN: ALL WALLS USED IN THE CALCULATION OF THE RESISTANCE FOR THIS STRUCTURE SHALL HAVE A MINIMUM UNINTERRUPTED HEIGHT OF 8'-0" AND LENGTH OF 2'-6". ALLOWABLE RESISTANCES HAVE BEEN #FT AND INCREASED BY 40% FOR WIND LOADS, PER VALUES IN 2012 IRC SECTION 2309 AND AFAPA SDPWS TABLE 4.3A. FOR EXAMPLE, 7/16" APA-RATED SHEATHING WITH 8d @ 6" & 12" HAS A SEISMIC SHEAR VALUE OF 222 A WIND SHEAR VALUE OF 3584 FT. 40% GREATER THAN THAT OF SEISMIC

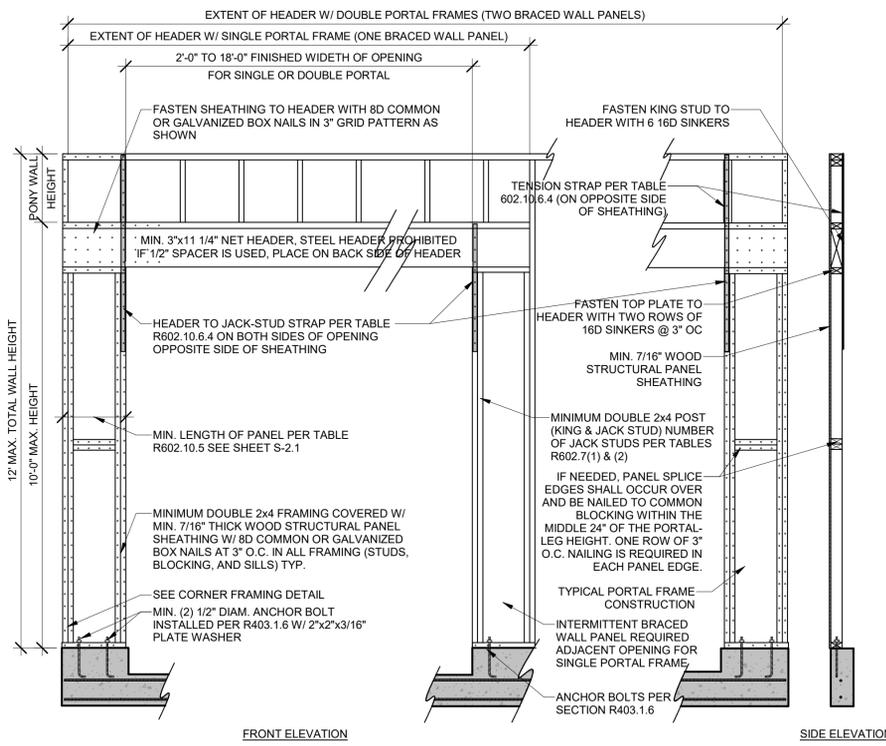
NOTE: SOIL SITE CLASS ASSUMED TO BE CLASS E OR F. IF SITE CONDITIONS ARE DETERMINED TO BE CLASS E OR F, CONSULT ENGINEER BEFORE PROCEEDING WITH CONSTRUCTION



3 BRACED WALL PANEL CONNECTIONS
1" = 1'-0"



1 PFG PORTAL FRAME W/ HOLD DOWNS (R602.10.6.2)
1/2" = 1'-0"



2 PFG PORTAL FRAME W/OUT HOLD DOWNS (R602.10.6.3)
1/2" = 1'-0"

HD ENGINEERING & DESIGN, INC
11656 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.2222
SERVICE@HDENGINEERS.COM



CARDINAL CREST HOMES
WHITE RESIDENCE
3213 SW MARY ST. LEE'S SUMMIT, MO
STRUCTURAL DETAILS & NOTES

HD#: 41463
DATE: 04/09/2021
CHECKED BY: CLS

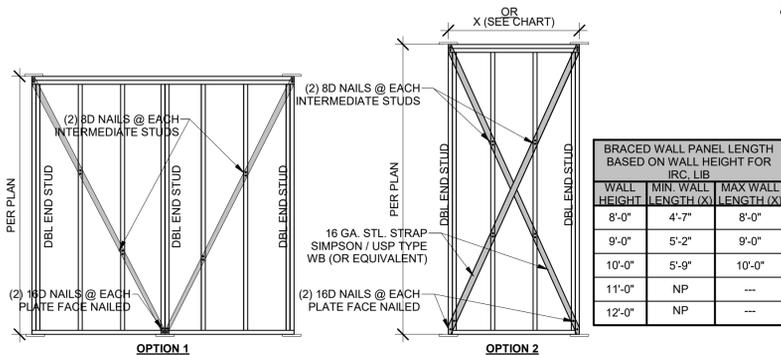
NO.	ISSUE/REVISION	Revision Date

BRACED WALL NOTES & DETAILS

S-2.0

RELEASE FOR CONSTRUCTION AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
04/30/2021

TENSION STRAP CAPACITY REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO METHOD PFH, PFG AND CS-PF BRACED WALL PANELS IRC2018 TABLE R602.10.6.4



6 LIB BRACING
3/8" = 1'-0"

FOR IRC CODE PRESCRIPTIVE METHOD
TABLE R602.10.5 MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (SEE TABLE R602.10.4)	MINIMUM LENGTH (INCHES) ^a					CONTRIBUTING LENGTH (INCHES)	
	WALL HEIGHT						
	8 FEET	9 FEET	10 FEET	11 FEET	12 FEET		
DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP	48	48	48	53	58	ACTUAL ^b	
GB	48	48	48	53	58	DOUBLE SIDED = ACTUAL SINGLE SIDED = .5x ACTUAL	
LIB	55	62	69	NP	NP	ACTUAL ^b	
ABW	SDC A, B, AND C ULTIMATE DESIGN WIND SPEED < 140	28	32	34	38	42	48
	SDC D, D ₁ , D ₂ ULTIMATE DESIGN WIND SPEED < 140	32	32	34	NP	NP	
PFH	SUPPORTING ROOF ONLY	16	16	16	NOTE C	NOTE C	48
	SPTNG. ONE STORY & ROOF	24	24	24	NOTE C	NOTE C	
PFG		24	27	30	NOTE D	NOTE D	1.5 x ACTUAL ^b
CS-G		24	27	30	33	36	ACTUAL ^b
CS-PF		16	18	20	NOTE E	NOTE E	ACTUAL ^b
CS-WSP, CS-SFB	ADJACENT CLEAR OPENING HEIGHT (INCHES)						ACTUAL ^b
	≤ 64	24	27	30	33	36	
	68	26	27	30	33	36	
	72	27	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	-	-	55	48	45	
	120	-	-	60	52	48	
	124	-	-	-	56	51	
128	-	-	-	61	54		
132	-	-	-	66	58		
136	-	-	-	-	62		
140	-	-	-	-	66		
144	-	-	-	-	72		

^a LINEAR INTERPOLATION SHALL BE PERMITTED
^b USE THE ACTUAL LENGTH WHEN IT IS GREATER THAN OR EQUAL TO THE MINIMUM LENGTH
^c MAX. HEADER HEIGHT FOR PFH IS 10' IN ACCORDANCE WITH R602.10.6.2. WALL HEIGHT MAY BE INCREASED TO 12' WITH PONY WALL
^d MAX. OPENING HEIGHT FOR PFG IS 10' IN ACCORDANCE WITH R602.10.6.3. WALL HEIGHT MAY BE INCREASED TO 12' WITH PONY WALL
^e MAX. OPENING HEIGHT FOR CS-PF IS 10' IN ACCORDANCE WITH R602.10.6.4. WALL HEIGHT MAY BE INCREASED TO 12' WITH PONY WALL

BRACED WALL PRESCRIPTIVE METHOD:
CONTINUOUS EXTERIOR SHEATHING (CS-WSP) PER WSP METHOD (BELOW) UNLESS OTHERWISE NOTED ON THE PLAN

EXTERIOR BRACED WALL METHOD: (SEE ON THIS SHEET)

WOOD STRUCTURAL PANEL SHEATHING WITH A THICKNESS NOT LESS THAN 3/8" WITH MINIMUM SPAN RATING OF 24/0 FOR 16" O.C. STUD SPACING WITH 8d COMMON NAILS @ 6" O.C. EDGES AND 12" O.C. FIELD OR SHEATHING THICKNESS NOT LESS THAN 7/16" WITH MINIMUM SPAN RATING OF 24/16 FOR 24" O.C. SPACING WITH 8d COMMON NAILS @ 6" O.C. EDGES AND 12" O.C. IN FIELD
 (NOTE: FRAMING MEMBERS 16" O.C. MAX. UNBLOCKED, AND W/ SHEATHING APPLIED DIRECTLY TO FRAMING MEMBERS).

INTERIOR BRACED WALLS (SEE ON THIS SHEET)

GB METHOD:
1/2" MINIMUM GYPSUM BOARD OVER STUDS SPACED @ 24" MAXIMUM FASTENED W/ #6- 1 1/4" TYPE "W" OR "S" DRYWALL SCREWS @ 7" O.C. EDGES AND FIELD (MIN. 4'-0" SECTION FOR BOTH SIDES)
OR

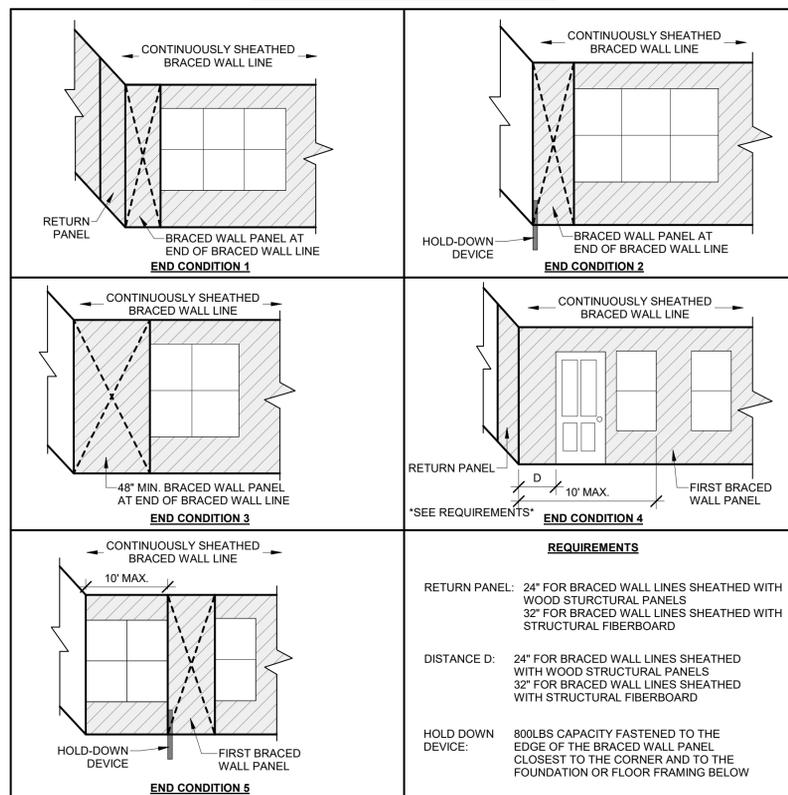
LIB METHOD:
1x4 WOOD FASTENED W/ (3) 8d COMMON NAILS OR SIMPSON / USP 16 GA. TYPE WB (OR EQUIVALENT) STL. X-BRACE(S) @ 45° TO 60° ANGLES, MAXIMUM 16" O.C. STUDS FASTENED PER MANUF. SPECS.

MINIMUM WALL STUD FRAMING NOMINAL SIZE & GRADE	MAX. PONY WALL HEIGHT (FEET)	MAX. TOTAL WALL HEIGHT (FEET)	MAX. OPENING WIDTH (FEET)	TENSION STRAP CAPACITY REQUIRED (POUNDS) ^a	
				ULTIMATE DESIGN WIND SPEED V (MPH)	
				115	115
				EXPOSURE B	EXPOSURE C
2x4 NO. 2 GRADE	0	10	18	1,000	1,000
			9	1,000	1,000
			16	1,025	2,500
			18	1,275	2,850
			9	1,000	1,875
			16	2,175	4,125
	2	10	18	2,500	DR
			9	1,500	3,175
			16	3,375	DR
			18	3,975	DR
			9	2,750	DR
			12	3,775	DR
2x6 STUD GRADE	2	12	9	1,000	2,025
			16	2,150	3,675
			18	2,550	DR
			9	1,750	3,125
			16	2,400	DR
			18	3,800	DR
	4	12	9	1,500	3,175
			16	3,375	DR
			18	3,975	DR
			9	2,750	DR
			12	3,775	DR
			18	3,800	DR

^a DR = DESIGN REQUIRED
^b STRAP SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

END WALL CONDITIONS

FOR CONTINUOUSLY SHEATHED BRACED WALL LINES

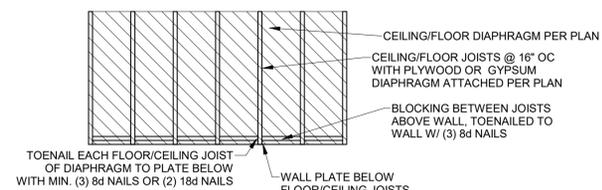


REQUIREMENTS

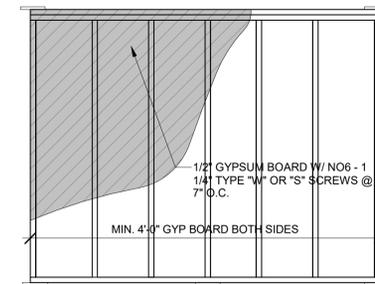
RETURN PANEL: 24" FOR BRACED WALL LINES SHEATHED WITH WOOD STRUCTURAL PANELS
32" FOR BRACED WALL LINES SHEATHED WITH STRUCTURAL FIBERBOARD

DISTANCE D: 24" FOR BRACED WALL LINES SHEATHED WITH WOOD STRUCTURAL PANELS
32" FOR BRACED WALL LINES SHEATHED WITH STRUCTURAL FIBERBOARD

HOLD DOWN DEVICE: 800LBS CAPACITY FASTENED TO THE EDGE OF THE BRACED WALL PANEL CLOSEST TO THE CORNER AND TO THE FOUNDATION OR FLOOR FRAMING BELOW



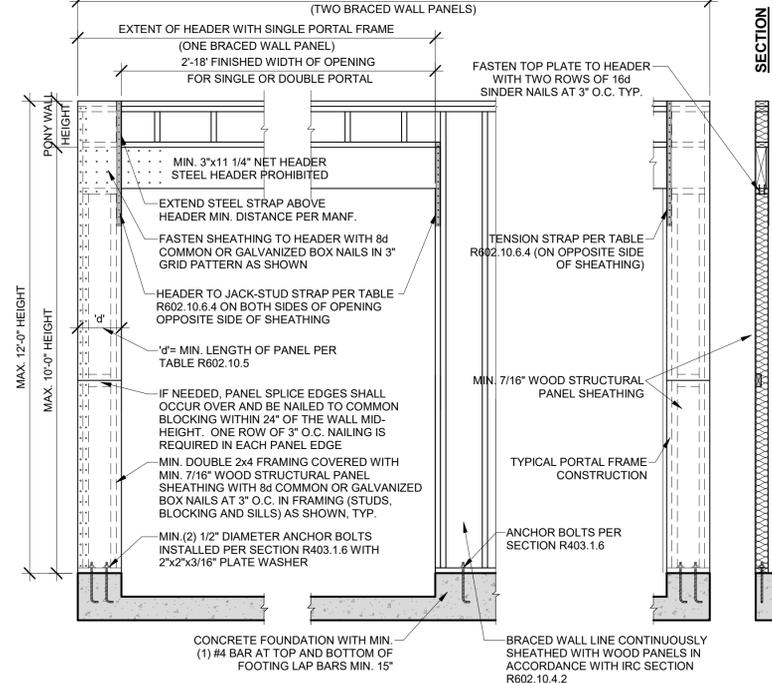
1 DIAPHRAGM CONNECTION TO INTERIOR WALL
3/8" = 1'-0"



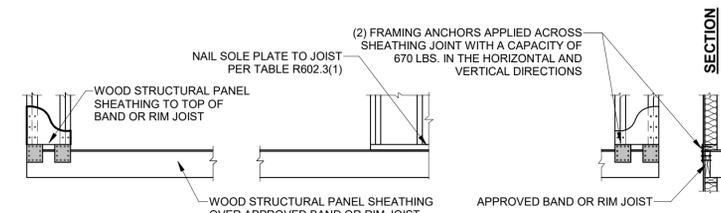
5 GB BRACING
1/2" = 1'-0"

FRONT ELEVATION

EXTENT OF HEADER WITH DOUBLE PORTAL FRAMES
(TWO BRACED WALL PANELS)

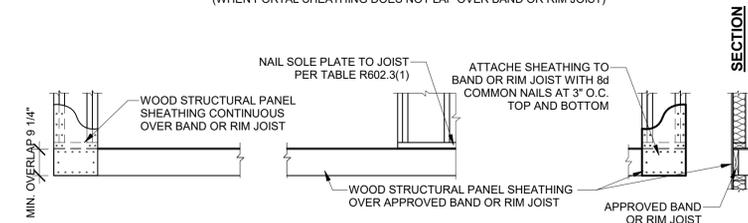


OVER CONCRETE OR MASONRY BLOCK FOUNDATION



OVER RAISED WOOD FLOOR - FRAMING ANCHOR OPTION

(WHEN PORTAL SHEATHING DOES NOT LAP OVER BAND OR RIM JOIST)

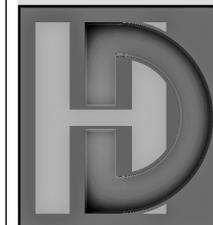


OVER RAISED WOOD FLOOR - OVERLAP OPTION

(WHEN PORTAL SHEATHING LAPS OVER BAND OR RIM JOIST)

4 CS-PF
1/2" = 1'-0"

HD ENGINEERING & DESIGN, INC
 11656 W. 75TH STREET
 SHAWNEE, KS 66214
 WWW.HDENGINEERS.COM
 913.631.2222
 SERVICE@HDENGINEERS.COM



CARDINAL CREST HOMES
 WHITE RESIDENCE
 3213 SW MARY ST. LEE'S SUMMIT, MO
 STRUCTURAL DETAILS & NOTES

HD#: 41463

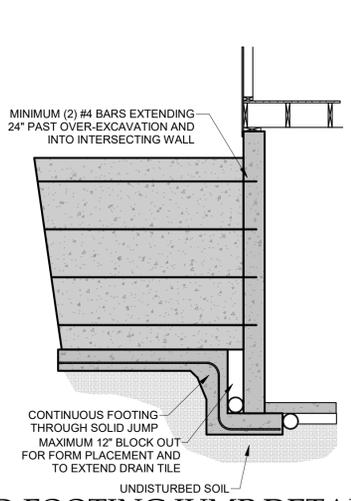
DATE: 04/09/2021
 CHECKED BY: CLS

NO.	ISSUE/REVISION	Revision Date

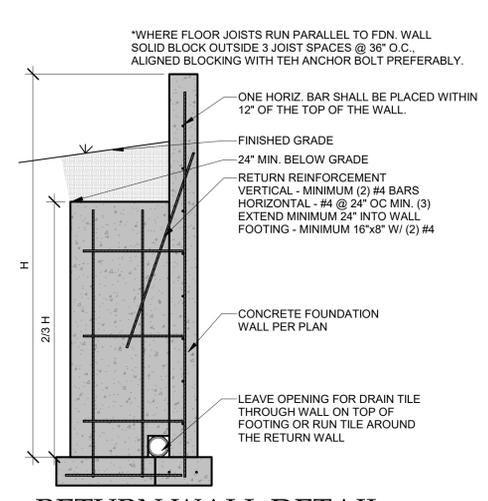
BRACED WALLS NOTES & DETAILS

S-2.1

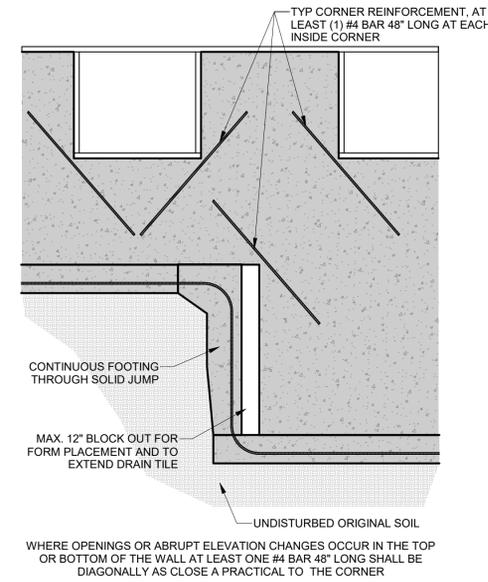
RELEASE FOR
 DEVELOPMENT SERVICES
 LEE'S SUMMIT, MISSOURI
 04/30/2021



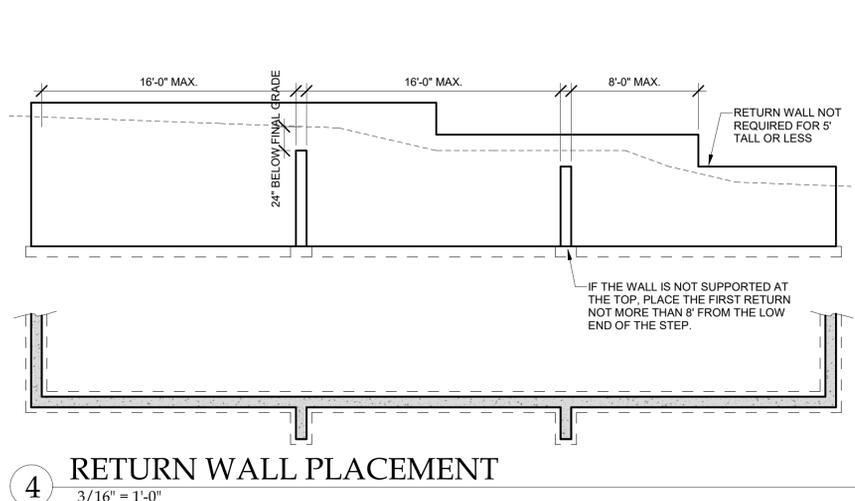
1 SOLID FOOTING JUMP DETAIL
3/8" = 1'-0"



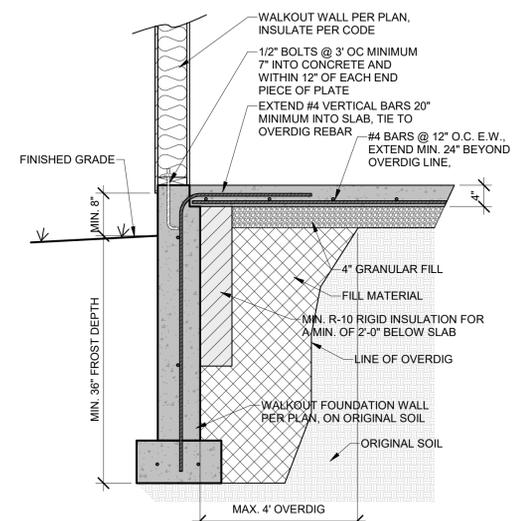
2 RETURN WALL DETAIL
1/2" = 1'-0"



3 REINFORCEMENT AT CORNERS AND STEPS
1/2" = 1'-0"

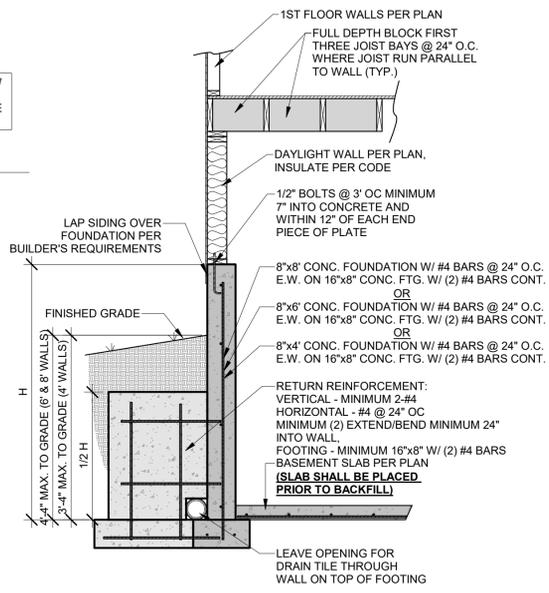


4 RETURN WALL PLACEMENT
3/16" = 1'-0"



IMPORTANT NOTE:
ANY SLAB WITH GREATER THAN 2' OF GRADED ROCK OR 8' OF FILL SOIL BELOW SHALL BE DESIGNED AS STRUCTURAL PER PLAN. OUR FIRM SHOULD BE CONTACTED IMMEDIATELY FOR DESIGN RECOMMENDATIONS. DESIGN MUST BE COMPLETED PRIOR TO PLACEMENT OF PIERS OR FOOTINGS.

6 WALKOUT DETAIL
3/4" = 1'-0"

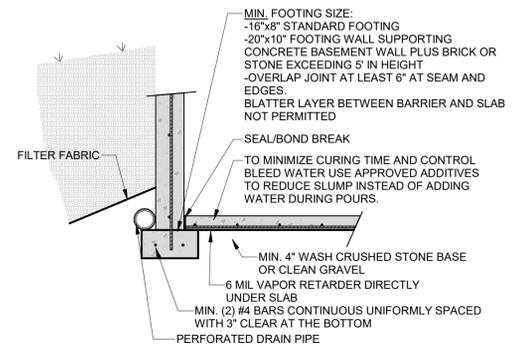


5 UNRESTRAINED FOUNDATION WALL
1/2" = 1'-0"

CONCRETE STRENGTH	8" THICK WALL		10" THICK WALL		
	8'	9'	8'	9'	10'
3000 PSI/ 40 KSI	16	12	24	16	12
3500 PSI/ 40 KSI	16	12	24	24	12
3000 PSI/ 60 KSI	24	16	24	20	16
3500 PSI/ 60 KSI	24	16	24	24	16

HORIZONTAL REINFORCEMENT**	8" x 4'		8" x 6'		8" x 8'	
	4-#4	5-#4	4-#4	5-#4	6-#4	6-#4
ONE BAR 12" FROM TOP OF WALL; MAX. SPACING 24" O.C.	4-#4	5-#4	4-#4	5-#4	6-#4	6-#4

* CONCRETE SHALL HAVE AIR ENTRAINMENT OF 5-7%.
 * MINIMUM REQUIREMENT FOR VERTICAL REBAR IN PLAIN CONCRETE WALLS IS #4 @ 36" ON CENTER (ACI 332).
 * VERTICAL BARS SHALL BE CONTINUED UP TO WITHIN 8" OF THE TOP OF THE WALL.
 * REBAR SHALL BE POSITIONED AT THE TENSION FACE OF THE WALL (2" FROM THE INSIDE FACE).
 * REINFORCEMENT SHALL LAP A MINIMUM OF 24 INCHES AT ENDS, SPLICES, AND AROUND CORNERS.
 ** #4 BARS @ 24" ON CENTER.
 ** #4 BAR WITHIN 12 OF TOP AND BOTTOM OF WALL.
 ** MINIMUM GRADE 40 (40ksi) STEEL (PER ACI 332).
 ** HORIZONTAL REINFORCEMENT SHALL BE INSTALLED ON THE COMPRESSION SIDE (SOIL SIDE) OF THE VERTICAL REINFORCEMENT



7 FOUNDATION FOOTINGS
1/2" = 1'-0"

THIS DOCUMENT CONTAINS COPYRIGHTED MATERIAL AND CONFIDENTIAL INFORMATION BELONGING TO HD ENGINEERING UNAUTHORIZED USE, DISCLOSURE, REPRODUCTION, OR DUPLICATION OF ANY OF THE INFORMATION CONTAINED HEREIN MAY RESULT IN LIABILITY UNDER APPLICABLE LAW.

HD ENGINEERING & DESIGN, INC
 11666 W. 75TH STREET
 SHAWNEE, KS 66214
 WWW.HDENGINEERS.COM
 913.631.2222
 SERVICE@HDENGINEERS.COM



CARDINAL CREST HOMES
 WHITE RESIDENCE
 3213 SW MARY ST. LEE'S SUMMIT, MO

STRUCTURAL DETAILS & NOTES

HD#: 41463
 DATE: 04/09/2021
 CHECKED BY: CLS

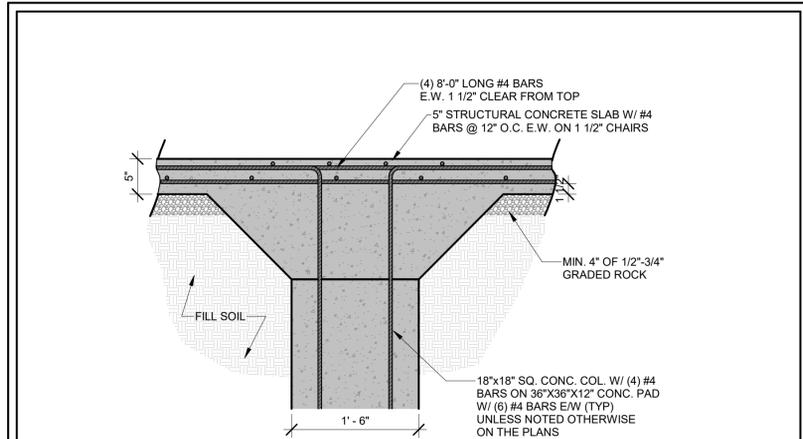
NO.	ISSUE/REVISION	Revision Date

CONCRETE DETAILS

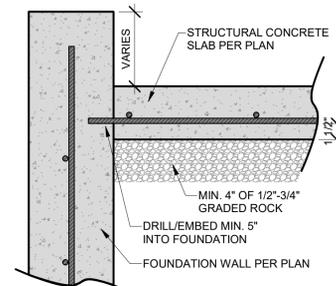
S-3.0

RELEASE FOR CONSTRUCTION AS NOTED ON PLANS REVIEW DEVELOPMENT SERVICES LEE'S SUMMIT, MISSOURI
 04/30/2021

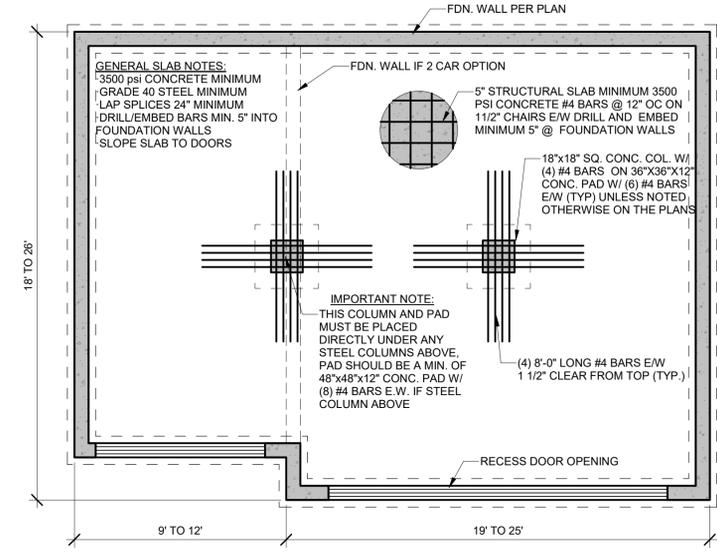
DETAILS PROVIDED ARE DERIVED FROM JOHNSON COUNTY RESIDENTIAL FOUNDATION GUIDELINE



7 GARAGE SLAB COLUMN DETAIL
1" = 1'-0"

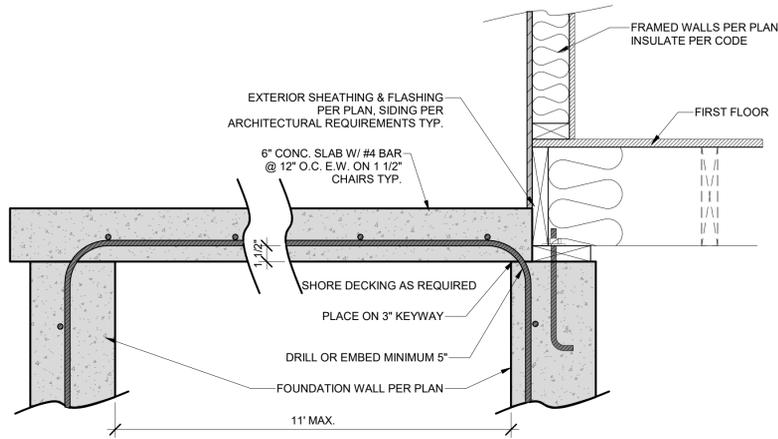


8 STRUCTURAL SLAB/ WALL
1 1/2" = 1'-0"



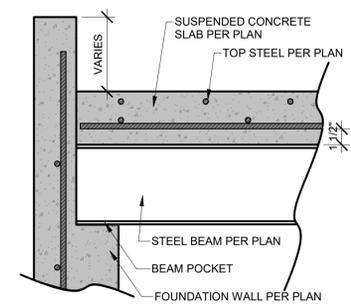
9 TYPICAL GARAGE SLAB
1/4" = 1'-0"

HD ENGINEERING STRUCTURAL GARAGE SLAB DETAILS

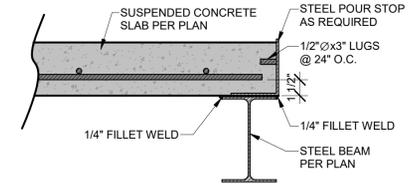


6 SUSPENDED PORCH STOOP SLAB
1 1/2" = 1'-0"

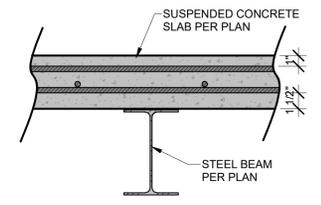
FOR SUSPENDED SLABS A MAXIMUM OF 10' ABOVE FLOOR BELOW: TEMPORARY SHORING WALLS SHALL BE PLACED AT A MAXIMUM OF 4' O.C./#2-2X4 STUDS AT 16" O.C. W/ TOP AND BOTTOM PLATE. WALL TO HAVE CONTINUOUS DIAGONAL BRACING. LATERAL BRACING TO BE RUN FROM WALL TO WALL AT MID HEIGHT 4' ON CENTER. SHORING TO REMAIN IN PLACE FOR AT LEAST 21 DAYS.



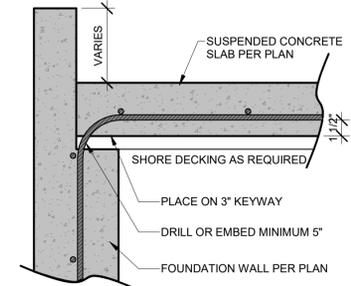
1 SUSPENDED SLAB BEAM/WALL CONNECTION
1 1/2" = 1'-0"



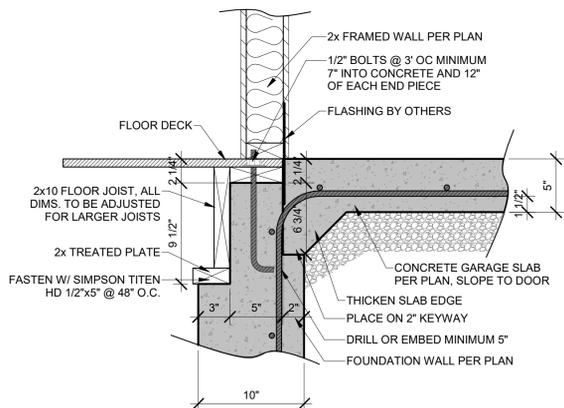
2 SUSPENDED SLAB POUR STOP
1 1/2" = 1'-0"



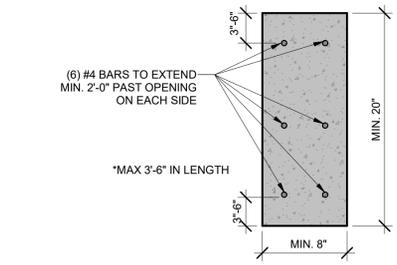
3 SUSPENDED SLAB/STEEL BEAM CROSS SECTION
1 1/2" = 1'-0"



4 SUSPENDED SLAB/WALL CONNECTION
1 1/2" = 1'-0"

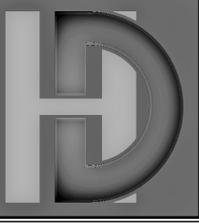


10 ZERO ENTRY GARAGE DETAIL
1 1/2" = 1'-0"



5 CONCRETE HEADER DETAIL
1 1/2" = 1'-0"

IMPORTANT NOTE:
FOR SUSPENDED SLABS A MAXIMUM OF 10' ABOVE FLOOR BELOW: TEMPORARY SHORING WALLS SHALL BE PLACED AT A MAXIMUM OF 4' O.C./#2-2X4 STUDS AT 16" O.C. W/ TOP AND BOTTOM PLATE. WALL TO HAVE CONTINUOUS DIAGONAL BRACING. LATERAL BRACING TO BE RUN FROM WALL TO WALL AT MID HEIGHT 4' ON CENTER. SHORING TO REMAIN IN PLACE FOR AT LEAST 21 DAYS.
ANY CAST IN PLACE SLABS FORMED MORE THAN 10' ABOVE THE FLOOR BELOW SHALL HAVE A SITE SPECIFIC SHORING DESIGN DONE. OUR FIRM SHOULD BE CONSULTED FOR THIS DESIGN ONCE FOUNDATION WALLS ARE IN PLACE TO EVALUATE ALL FIELD CONDITIONS. IT SHOULD BE NOTED THAT FAILURE TO HAVE AN ADEQUATE SHORING DESIGN CAN RESULT IN FORM COLAPSE AND/OR CATASTROPHIC FAILURE.



CARDINAL CREST HOMES
WHITE RESIDENCE
3213 SW MARY ST. LEE'S SUMMIT, MO

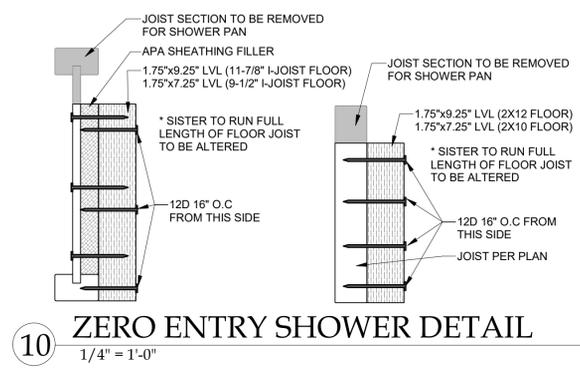
STRUCTURAL DETAILS & NOTES

HD#: 41463
DATE: 04/09/2021
CHECKED BY: CLS

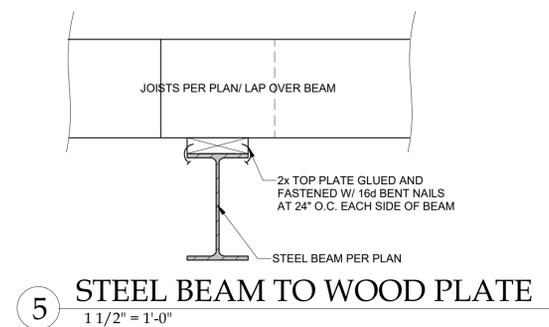
NO.	ISSUE/REVISION	Revision Date

SUSPENDED SLAB DETAILS

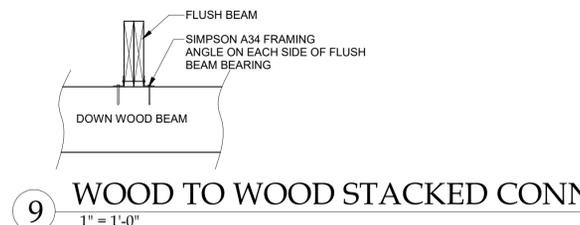
S-3.1



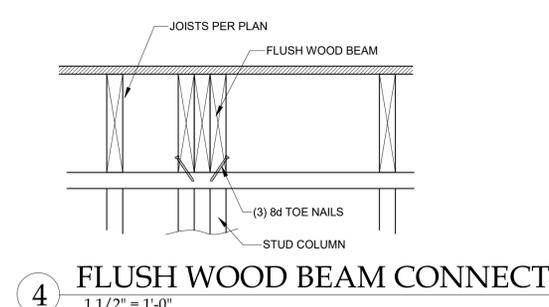
10 ZERO ENTRY SHOWER DETAIL
1/4" = 1'-0"



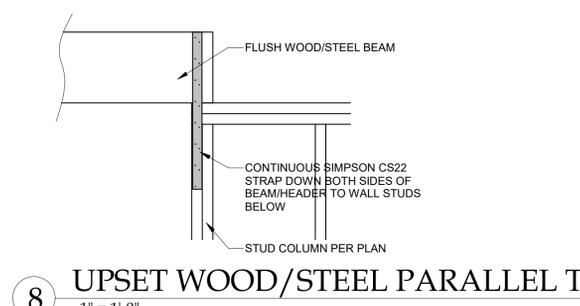
5 STEEL BEAM TO WOOD PLATE
1 1/2" = 1'-0"



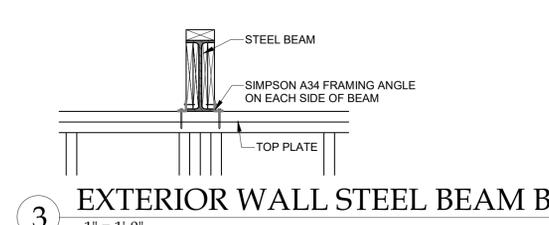
9 WOOD TO WOOD STACKED CONNECTION
1" = 1'-0"



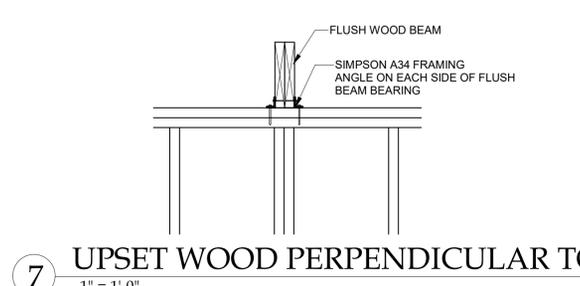
4 FLUSH WOOD BEAM CONNECTION
1 1/2" = 1'-0"



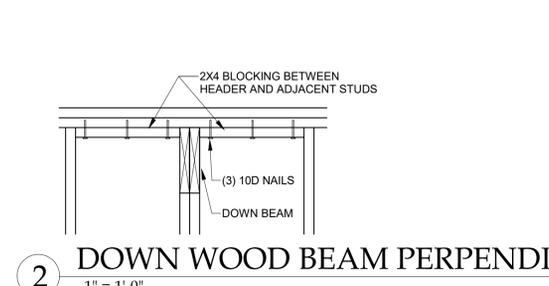
8 UPSET WOOD/STEEL PARALLEL TO WALL
1" = 1'-0"



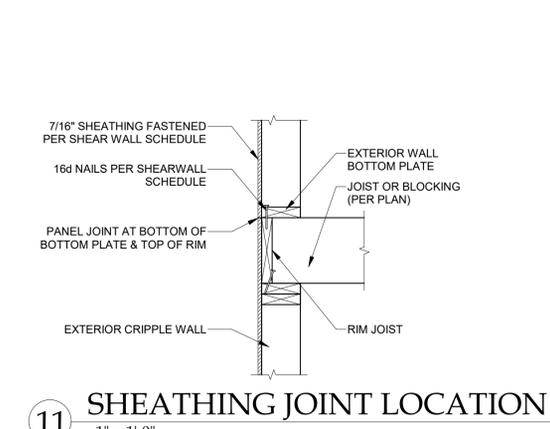
3 EXTERIOR WALL STEEL BEAM BEARING
1" = 1'-0"



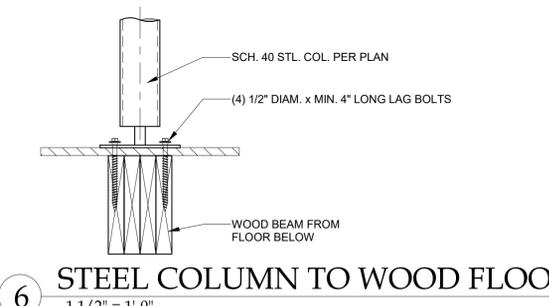
7 UPSET WOOD PERPENDICULAR TO WALL
1" = 1'-0"



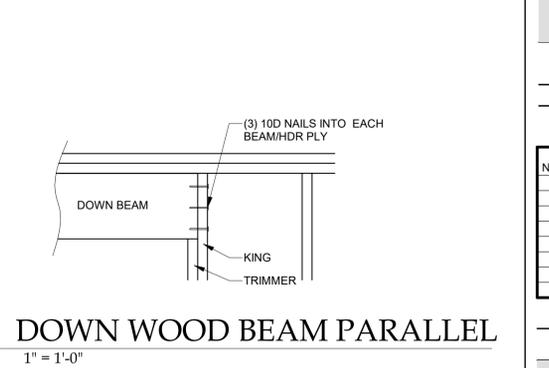
2 DOWN WOOD BEAM PERPENDICULAR
1" = 1'-0"



11 SHEATHING JOINT LOCATION
1" = 1'-0"



6 STEEL COLUMN TO WOOD FLOOR
1 1/2" = 1'-0"



1 DOWN WOOD BEAM PARALLEL
1" = 1'-0"

THIS DOCUMENT CONTAINS COPYRIGHTED MATERIAL AND CONFIDENTIAL INFORMATION BELONGING TO HD ENGINEERING. UNAUTHORIZED USE, DISCLOSURE, REPRODUCTION, OR DUPLICATION OF ANY OF THE INFORMATION CONTAINED HEREIN MAY RESULT IN LIABILITY UNDER APPLICABLE LAW.

HD ENGINEERING & DESIGN, INC.
11656 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.2222
SERVICE@HDENGINEERS.COM



CARDINAL CREST HOMES
WHITE RESIDENCE
3213 SW MARY ST. LEE'S SUMMIT, MO
STRUCTURAL DETAILS & NOTES

HD#: 41463
DATE: 04/09/2021
CHECKED BY: CLS

NO.	ISSUE/REVISION	Revision Date

GENERAL DETAILS

S-4.0

RELEASE FOR REVIEW
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
04/30/2021