

















**ALLOWABLE LOADS FOR PNEUMATIC OR MECHANICALLY DRIVEN NAILS AND STAPLES**

FASTENER DESCRIPTION	NAIL GUN NAILS/ WIRE DIAMETER	WIRE GAGE	PENETRATION REQUIRED INTO MAIN MEMBER FOR LATERAL STRENGTH (INCHES)	ALLOWABLE LOADS (POUNDS)			
				LATERAL STRENGTH		WITHDRAWAL STRENGTH	
				SP	DF/PL	SP	
16 GA. STAPLE	.053	16	1	51		36	32
15 GA. STAPLE	.072	15	1	64		42	37
14 GA. STAPLE	.080	14	1	75		46	41
6d COOLER NAIL	.092	13	1	46		27	23
6d SINKER NAIL							
6d BOX NAIL							
6d CASING NAIL	.099	12-12	1-1/8	61	55	31	24
7d COOLER NAIL							
6d COMMON NAIL							
8d COOLER NAIL							
8d SINKER NAIL	.113	11-12	1-1/4	79	72	35	28
8d BOX NAIL							
8d CASING NAIL							
6d RING SHANK NAIL							
6d SCREW SHANK NAIL							
8d RING SHANK NAIL							
8d SCREW SHANK NAIL							
10d COOLER NAIL							
10d SINKER NAIL	.128	10-1/2	1-1/2	89	81	38	31
12d SHORT							
10d BOX NAILS							
12d CASING NAILS							
8d COMMON NAILS	.131	10-14	1-1/2	106	97	41	32
16d SHORT							
16d BOX NAILS	.135	10	1-1/2	113	103	42	33
10d RING SHANK NAILS							
10d SCREW SHANK NAILS							
12d RING SHANK NAILS							
12d SCREW SHANK NAILS							
10d COMMON NAILS							
12d COMMON NAILS							
16d SINKER NAILS	.148	9	1-3/4	128	118	46	36
20d BOX NAILS							
30d BOX NAILS							
16d RING SHANK NAILS							
16d SCREW SHANK NAILS	.148	9	1-3/4	128	118	50	40
16d COMMON NAILS							
40d BOX NAILS	.162	8	1-3/4	154	141	50	40
20d RING SHANK NAILS							
20d SCREW SHANK NAILS	.177	7	2-1/8	178	163	59	47
20d SINKER NAILS	.177	7	2-1/8	178	163	54	43
20d COMMON NAILS	.148	9	2-1/8	170	166	59	47
30d SINKER NAILS							

**MINIMUM SHEATHING REQUIREMENTS**

BUILDING COMPONENT	MATERIAL
ROOF SHEATHING	7/16" PLYWOOD 1 x 4 @3 FURRING
FLOOR SHEATHING	3/4" TAG YELLOW PINE PLYWOOD
WALL SHEATHING	1/2" GYPSUM SHEATHING
CEILING COVERING	1/2" GYPSUM SHEATHING
EXTERIOR WALL SHEATHING	RATED PANEL SIDING, RATED 16" O.C. 7/16" THICK

ALL SHEATHING MATERIALS TO BE APPLIED PERPENDICULAR TO JOISTS AND ENDS STAGGERED REFER TO TABLE R802.3(1) ON S-1.1 FOR FASTENING SCHEDULE

**HIP/ VALLEY ALLOWABLE SPAN TABLE**

TYPE	MAX. UNSUPPORTED SPAN				
	2x6	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'-6"	18'-2"
VALLEY RAFTER	8'-11"	10'-6"	12'-0"	13'-2"	15'-3"

**FRAME FASTENING SCHEDULE**

BUILDING COMPONENT	FASTEN TO	FASTEN WITH	
		TOENAIL W/ (3) 16D, FACENAIL W/ (3) 16D	TOENAIL W/ (3) 10D
RAFTERS	ROGGE / VALLEY / HIP	TOENAIL W/ (3) 16D, FACENAIL W/ (3) 16D	
	PLATE	TOENAIL W/ (3) 10D	
	LEDGER STRIPS SUPPORTING JOISTS OR RAFTERS	FACENAIL W/ (3) 16D	
CEILING JOISTS	COLLAR TIE TO RAFTERS	FACENAIL W/ (3) 10D	
	TOP PLATE	TOENAIL W/ (3) 8D @ EACH END	
	WHERE CLG./ST. RUN PARALLEL TO RAFTERS FACENAIL TO RAFTERS W/ (3) 10D MINIMUM LAPS OVER PARTITIONS	FACENAIL W/ (3) 10D	
BEAMS	BUILT-UP BEAMS 2" LUMBER LAYERS, FACENAIL OPPOSITE SIDES, (2) @ EACH END	10D @ 32" O.C. STAGGERED, TOP & BOTTOM, OPPOSITE SIDES	
	BUILT-UP BEAMS OF ENGINEERED LUMBER, FACE NAIL OPPOSITE SIDES	(2) ROWS @ 12" O.C.	
	BUILT-UP HEADER, TWO PIECES W/ A 1/2" SPACER	16D @ 16" O.C. ALONG EDGES	
FLOOR JOISTS	BUILT-UP HEADER, TWO PIECES W/ NO 1/2" SPACER	7" x 0 131" NAILS @ 12" O.C. ALONG EDGES	
	BEARING	TOENAIL W/ (2) 18D @ EACH END	
	RM JOIST TO SILL OR TOP PLATE	TOENAIL W/ 8D COMMON OR 10D BOX @ 8" O.C.	
WALLS	JOIST TO SILL OR GIRDER	TOENAIL W/ (3) 8D	
	JOIST TO RM JOIST	FACENAIL W/ (3) 16D	
	BRIDGING TO JOIST	TOENAIL W/ (2) 8D	
WALLS	I-JOIST TO BEARING PLATE	TOENAIL W/ (2) 8D - ONE INTO EACH SIDE AT LEAST 1 1/2" FROM THE END	
	RM JOIST TO I-JOIST	FACENAIL W/ (2) 16D - ONE INTO EACH FLANGE	
	SOLE PLATE TO LSL, RM BOARD	16D BOX @ 12" O.C.	
WALLS	SINGLE JOIST HANGERS*	10D FACENAILS AND TOENAILS	
	DOUBLE JOIST HANGERS*	16D FACENAILS AND TOENAILS	
	TOP AND SOLE PLATE TO STUD	END NAIL W/ (2) 16D	
WALLS	STUD TO SOLE AND TOP PLATE	TOENAIL W/ (4) 8D	
	DOUBLE TOP PLATES	FACENAIL W/ 16D @ 18" O.C.	
	DOUBLE TOP PLATE LAP INTERSECTIONS	FACENAIL W/ (8) 16D	
WALLS	TOP PLATE LAPS AND SPICES	FACENAIL W/ (2) 16D	
	DOUBLE STUDS	FACENAIL W/ 16D @ 24" O.C.	
	BUILT-UP CORNER STUDS	FACENAIL W/ 16D - 2 ROWS @ 24" O.C.	
WALLS	STEEL "X" BRACING	FACENAIL W/ (2) 16D IN EACH TOP AND BOTTOM PLATE AND (1) 8D PER STUD	
	SOLE PLATE TO JOIST OR BLOCKING	FACENAIL W/ 16D @ 16" O.C.	
	SOLE PLATE TO JOIST OR BLOCKING AT BRACED WALL LINES, PERPENDICULAR TO FRAMING	FACENAIL W/ (3) 16D @ 16" O.C. ALONG BRACED WALL PANEL	
WALLS	TOP PLATE TO JOIST OR BLOCKING AT BRACED WALL LINES, PARALLEL TO FRAMING, BLOCKING @ 16" O.C.	TOENAIL W/ 8D @ 16" O.C. ALONG BRACED WALL PANEL	
	SOLE PLATE TO JOIST OR BLOCKING AT BRACED WALL LINES, PARALLEL TO FRAMING, BLOCKING @ 16" O.C.	FACENAIL W/ (3) 16D @ 16" O.C. ALONG BRACED WALL PANEL AND AT EACH BLOCK	
	TOP PLATE TO JOIST OR BLOCKING AT BRACED WALL LINES, PARALLEL TO FRAMING, BLOCKING @ 16" O.C.	TOENAIL W/ (3) @ 16" O.C. ALONG BRACED WALL PANEL AND AT EACH BLOCK	
WALLS	NON-STRUCT. SIDING OVER STRUCT. SHEATHING	(1) 8D BOX IN EACH STUD	
	FIBER-CEMENT PLANK SIDING	(1) 8D GALVANIZED IN EACH STUD	
	WINDOW INSTALLATION	1 1/4" x 2" ROOFING NAILS @ 12" O.C. MAX.	

\* JOIST HANGER NOTES:  
a. NO JOIST HANGER NAILS ALLOWED FOR TOENAILS.  
b. NO NAIL GUN NAILS OR SCREWS ALLOWED IN CONNECTORS.  
c. TOENAILS SHALL ALWAYS BE A FULL 3" OR 3.5" NAIL.

COLLUM 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 D1.1:12 AS AN ALTERNATIVE, AND WOULD NEED TO BE INSPECTED BY AN AWS CERTIFIED INSPECTOR.

**DUCT SEALING METHOD, PER 2018 IRC W1103.3.2**

**M1103.2.2 (R403.2) SEALING (MANDATORY DUCTS, AIR HANDLERS, AND FILTER BOXES SHALL BE SEALED, JOINTS AND SEAMS SHALL COMPLY WITH SECTION M1601.1(1) OF THIS CODE.**

- EXCEPTIONS:
1. AIR-IMPERMEABLE SPRAY FOM PRODUCTS SHALL BE PERMITTED TO BE APPLIED WITHOUT ADDITIONAL JOINT SEALS.
  2. WHERE A DUCT CONNECTION IS MADE THAT IS PARTIALLY INACCESSIBLE, THREE SCREWS OR RIVETS SHALL BE EQUALLY SPACED ON THE EXPOSED PORTION OF THE JOINT SO AS TO PREVENT A HINGE EFFECT.
  3. CONTINUOUS (W/ FURRED) AND LOCKING TYPE LONGITUDINAL JOINTS AND SEAMS IN DUCTS OPERATING AT STATIC PRESSURE, LESS THAN 2 INCHES OF WATER COLUMN (500 PA) PRESSURE CLASSIFICATION SHALL NOT REQUIRE ADDITIONAL CLOSURE SYSTEMS.
  4. DUCT TIGHTNESS SHALL BE VERIFIED BY EITHER OF THE FOLLOWING:
    - a. POST CONSTRUCTION TEST: TOTAL LEAKAGE SHALL NOT BE LESS THAN OR EQUAL TO 4 CFM (113 L/MIN) PER 100FT<sup>2</sup> (9.29m<sup>2</sup>) OF CONDITIONED FLOOR AREA WHEN TESTED AT A PRESSURE DIFFERENTIAL OF 1 INCHES W.C. (25 PA) ACROSS THE ENTIRE SYSTEM, INCLUDING THE MANUFACTURER'S AIR HANDLER ENCLOSURE, ALL REGISTER BOOTS SHALL BE TAPED.
    - b. LEAKAGE TEST: TOTAL AIR LEAKAGE SHALL BE LESS THAN OR EQUAL TO 4 CFM (113 L/MIN) PER 100FT<sup>2</sup> (9.29m<sup>2</sup>) OF CONDITIONED FLOOR AREA WHEN TESTED AT A PRESSURE DIFFERENTIAL OF 1 INCHES W.C. (25 PA) ACROSS THE ENTIRE SYSTEM, INCLUDING THE MANUFACTURER'S AIR HANDLER ENCLOSURE, ALL REGISTERS SHALL BE TAPED OR OTHERWISE SEALED PRIOR TO THE TEST.
  5. TOTAL AIR LEAKAGE SHALL BE LESS THAN OR EQUAL TO 1 CFM (85 L/MIN) PER 100FT<sup>2</sup> (9.29m<sup>2</sup>) OF CONDITIONED FLOOR AREA.
- EXCEPTION: THE TOTAL LEAKAGE IS NOT REQUIRED FOR DUCTS AND AIR HANDLERS LOCATED ENTIRELY WITHIN THE BUILDING THERMAL ENVELOPE.

- GENERAL NOTES:**
1. PLANS SHALL COMPLY WITH THE 2018 INTERNATIONAL RESIDENTIAL CODE, ICC AS ADOPTED BY AHJ, AND ALL AMENDMENTS AS ADOPTED BY THE AHJ. IF ANY CHANGES OR DISCREPANCIES ARE MADE BETWEEN THESE PLANS THE CONTRACTOR SHALL NOTIFY THE APPROPRIATE AUTHORITY AND THE ENGINEER TO EVALUATE THE CHANGES AND MAKE ANY APPROPRIATE MODIFICATIONS TO THE PLANS.
  2. WHERE DISCREPANCIES EXIST BETWEEN THE STANDARD COMMENTS, NOTES FOR THE DESIGN PROFESSIONAL OR THE CODE, THE MOST RESTRICTIVE SHALL APPLY.
  3. THE CONTRACTOR'S OBLIGATION FOR THESE PLANS IS TO PROVIDE THE OWNER/BUILDER AND THE AHJ WITH A SET OF PLANS THAT MEET AHJ AND CODE REQUIREMENTS FOR A SINGLE SITE CONSTRUCTION PROJECT. UNLESS REQUESTED BY OUR CLIENT, CODE/MINIMUM DESIGN WILL BE UTILIZED. ALSO, UNLESS REQUESTED BY THE OWNER, OUR FIRM CAN NOT AND WILL NOT BE AUTHORIZED TO VISIT THE SITE TO EVALUATE THE SITE OR ANY CONSTRUCTION FOR THIS PROJECT. IMPLEMENTATION OF ALTERNATES TO THE DESIGNS INCLUDING BUT NOT LIMITED TO PIER DESIGNS, FOUNDATION ALTERATIONS, OR ANY STRUCTURAL CHANGES NOT PROVIDED BY HO ENGINEERING OR A PROFESSIONAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE OWNER/BUILDER. HO ENGINEERING SHALL RELY ON THE INFORMATION PROVIDED BY THE OWNER/BUILDER. OUR FIRM HIGHLY RECOMMENDS THAT ANY SITE WITH GREATER THAN A 15% GRADE, ANY SITE WHERE A PREVIOUS STRUCTURE WAS LOCATED, OR ANY SITE WITH SLOTTED PILING OR A FOUNDATION WITH A BEARING CAPACITY BELOW 1500 PSF SHOULD BE EVALUATED BY OUR FIRM OR AN ENGINEER BEFORE ANY CONSTRUCTION. A GEOTECHNICAL FIRM PRIOR TO PLACING FOOTINGS. THE ATTACHED PLANS HAVE BEEN DESIGNED WITH THE UNDERSTANDING THAT OUR FIRM HAS NOT AND CAN NOT VISIT OR INSPECT THE SITE WITHOUT WRITTEN PROVISIONS, PLASTICITY MODELS, AND SOIL BEARING CAPACITIES. DUE TO THIS FACT, OUR FIRM CAN ONLY DESIGN THE ATTACHED PLANS TO CERTAIN CODE REQUIREMENTS WHICH ARE DETAILED THROUGHOUT THE PLAN AND ATTACHED DETAIL SHEETS. IF THE OWNER DESIRES GREATER THAN CODE DESIGNS THAT REQUEST MUST BE MADE CLEARLY AND IN WRITING PRIOR TO ENGINEERING OF THE PLAN.
  4. DUE TO THE WIDE VARIETY OF SOIL CONDITIONS, PLASTICITY MODELS, AND SOIL BEARING CAPACITIES, DUE TO THIS FACT, OUR FIRM CAN ONLY DESIGN THE ATTACHED PLANS TO CERTAIN CODE REQUIREMENTS WHICH ARE DETAILED THROUGHOUT THE PLAN AND ATTACHED DETAIL SHEETS. IF THE OWNER DESIRES GREATER THAN CODE DESIGNS THAT REQUEST MUST BE MADE CLEARLY AND IN WRITING PRIOR TO ENGINEERING OF THE PLAN.
  5. DUE TO THE WIDE VARIETY OF SOIL CONDITIONS, PLASTICITY MODELS, AND SOIL BEARING CAPACITIES, DUE TO THIS FACT, OUR FIRM CAN ONLY DESIGN THE ATTACHED PLANS TO CERTAIN CODE REQUIREMENTS WHICH ARE DETAILED THROUGHOUT THE PLAN AND ATTACHED DETAIL SHEETS. IF THE OWNER DESIRES GREATER THAN CODE DESIGNS THAT REQUEST MUST BE MADE CLEARLY AND IN WRITING PRIOR TO ENGINEERING OF THE PLAN.

- FOUNDATION NOTES:**
1. THE FOUNDATION DESIGN SHALL COMPLY WITH THE ENFORCING JURISDICTION RESIDENTIAL FOUNDATION STANDARD IN LIEU OF ENGINEERING REPORT REQUIREMENTS BASED ON ACTUAL SITE CONDITIONS.
  2. FOUNDATION WALLS SHALL BE DAMP PROOFED PER IRC SECTION R408.
  3. PROVIDE A MINIMUM 4" PERFORATED DRAIN AROUND USABLE SPACE BELOW GRADE OR OTHER EQUIVALENT MATERIALS PER IRC SECTION 405.1. THE PIPE SHALL BE COVERED WITH NOT LESS THAN 2" OF WASHED GRAVEL OR CRUSHED ROCK. THE DRAIN SHALL DAYLIGHT TO THE EXTERIOR BELOW THE FLOOR LEVEL OR TERMINATE IN A MINIMUM 20 GALLON SUMP PIT.
  4. FOUNDATION DESIGN SHALL BE BASED ON A MINIMUM SOIL BEARING CAPACITY OF 1500 PSF.
  5. FOOTINGS SHALL BE A MINIMUM OF 18" WIDE AND 8" DEEP WITH (2) #4 BARS CONTINUOUS. LOCATED A MINIMUM OF 3" CLEAR FROM THE BOTTOM. FOOTINGS SHALL BE A MINIMUM OF 36" BELOW GRADE FOR FROST PROTECTION.
  6. COLUMN PADS SHALL BE A MINIMUM OF 24" x 24" WITH (3) #4 BARS EACH WAY.
  7. FOUNDATION WALLS SHALL BE A MINIMUM OF 8" THICK WITH MINIMUM #4 BARS @ 24" O.C. HORIZONTAL AND VERTICAL WITH THE TOP BAR WITHIN 8" OF THE TOP OF THE WALL UNLESS NOTED OTHERWISE ON PLAN.
  8. REINFORCEMENT SHALL BE A MINIMUM OF 24".
  9. INTERIOR BEARING WALLS AND COLLARS SHALL BE ISOLATED FROM THE BASEMENT FLOOR SLAB.
  10. INTERIOR NON-BEARING WALLS, OTHER THAN THOSE RESTING DIRECTLY ON THE FOOTING, SHALL BE ISOLATED FROM THE FLOOR FRAMING ABOVE BY A SEPARATION OF 1/2".
  11. CONCRETE FLOOR SLABS ON GRADE SHALL BE A MINIMUM OF 4" THICK OVER A MINIMUM 4" BASE OF SAND, GRAVEL, OR CRUSHED STONE. BASEMENT SLABS SHALL HAVE A MINIMUM 8 MIL POLYETHYLENE OR APPROVED VAPOR RETARDER WITH JOINTS LAPPED NOT LESS THAN 6" AND SHALL BE PLACED BETWEEN THE FLOOR SLAB AND THE BASE COURSE.
  12. FLOOR SLABS SUPPORTED BY FULL CONCRETE OR MORE THAN 24" OF GRANULAR FILL OR 8" OF EARTH SHALL BE REINFORCED BY A SEPARATE ENGINEERING DESIGN. BASEMENT FOUNDATION WALLS SHALL BE REINFORCED TO THE FOUNDATION WITH MINIMUM 1/2" DIAMETER ANCHOR BOLTS EMBEDDED AT LEAST 7" INTO THE CONCRETE AND SPACED NOT MORE THAN 30" ON CENTER AND WITHIN 12" OF EACH END OF THE PLATE SECTION PER IRC SECTION R403.1.6.
  13. FOUNDATION WALLS SHALL BE REINFORCED WITH MINIMUM #4 BARS @ 24" HORIZONTAL AREA.
  14. THE BASE OF ALL FOOTING EXCAVATIONS SHOULD BE FREE OF ALL WATER AND LOOSE MATERIAL. PRIOR TO PLACING CONCRETE, CONCRETE SHOULD BE PLACED AS SOON AS POSSIBLE AFTER EXCAVATING SO THAT EXCESSIVE DRYING OR DISTURBANCE OF BEARING MATERIALS DOES NOT OCCUR. SHOULD THE MATERIALS AT FOUNDATION LEVEL BECOME WET OR SATURATED, WE RECOMMEND THAT THE AFFECTED MATERIALS BE REPLACED PRIOR TO PLACING CONCRETE. IT IS RECOMMENDED THAT ALL FOOTING EXCAVATIONS BE EVALUATED AND TESTED BY A GEOTECHNICAL ENGINEER IMMEDIATELY PRIOR TO PLACEMENT OF FOUNDATION CONCRETE. THESE AREAS IDENTIFIED AT THE SHOWING SHOULD BE CORRECTED. CORRECTIVE PROCEDURES WOULD BE DEPENDENT UPON CONDITIONS ENCOUNTERED AND MAY INCLUDE THE DEEPENING OF FOUNDATION ELEMENTS, OR THE UNDERCUTTING OF UNSUITABLE MATERIALS AND REPLACEMENT WITH ENGINEERED FILL.

- STAIRWAY NOTES:**
1. STAIRWAYS SHALL PROVIDE A MAXIMUM 7 1/2" RISE AND A MINIMUM 10" RUN.
  2. PROVIDE MINIMUM 36" GUARDRAILS ON THE OPEN SIDES OF RAISED FLOORS, PORCHES, AND BALCONIES. PROVIDE MINIMUM 34" GUARDRAILS ON THE OPEN SIDES OF STAIRWAYS LOCATED MORE THAN 30" ABOVE THE FLOOR OR GRADE BELOW. GUARDRAIL ENCLOSEMENTS SHALL HAVE INTERMEDIATE PATTERNS THAT DO NOT ALLOW PASSAGE OF A 4" DIAMETER SPHERE.
  3. EACH STAIRWAY SHALL PROVIDE A CONTINUOUS HANDRAIL ON AT LEAST ONE SIDE BETWEEN 34" AND 38" ABOVE THE NOSING OF THE TREADS.
  4. HANDRAILS SHALL HAVE A CIRCULAR CROSS-SECTION OF 1 1/2" MINIMUM TO 2" MAXIMUM OR ANOTHER APPROVED GRASPABLE SHAPE PER IRC SECTION R311.7.5.5.
  5. PROVIDE A MINIMUM 4" CLEARANCE FROM HANDRAILS TO THE WALLS.
  6. ENCLOSE ACCESSIBLE SPACE UNDER STAIRWAYS SHALL HAVE WALLS AND THE UNDERSIDE OF THE STAIR AND LANDING PROTECTED WITH 1/2" GYPSUM BOARD ON THE ENCLOSED SIDE.
  7. WINDERS SHALL PROVIDE A MINIMUM TREAD OF 6" AT ANY POINT WITH CLEAR WIDTH OF STAIRS. WINDER TREAD PROPORTION IS TO COMPLY WITH IRC SECTION R311.7.5.2.1.

- GLAZING NOTES:**
1. GLAZING IN HAZARDOUS LOCATIONS AS IDENTIFIED IN IRC SECTION R308.4 SHALL BE OF APPROVED SAFETY GLAZING MATERIALS. GLASS IN STORM DOORS, INDIVIDUAL FIXED OR OPERABLE PANELS ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE IS WITHIN A 24" ARCH OF THE DOOR IN A CLOSED POSITION AND WHERE BOTTOM EDGE IS WITHIN 60" OF THE FLOOR, WALLS ENCLOSED STAIRWAYS AND LANDINGS WHERE THE GLAZING IS WITHIN 60" OF THE TOP OR BOTTOM OF THE STAIR ENCLOSURES FOR SPAS, TUBS, SHOWER AND WHIRLPOOLS, GLAZING IN FIXED OR OPERABLE PANELS EXCEEDING 9 SF, AND A CLOSED BOTTOM EDGE IS LESS THAN 18" ABOVE THE FLOOR.
  2. IN DWELLING UNITS WHERE THE OPENING OF AN OPERABLE WINDOW IS LOCATED MORE THAN 72" ABOVE THE FINISHED GRADE OR SURFACE BELOW, THE LOWEST PART OF THE CLEAR OPENING OF THE WINDOW SHALL BE A MINIMUM OF 24" ABOVE THE FINISHED FLOOR OF THE ROOM IN WHICH THE WINDOW IS LOCATED. OPERABLE SECTIONS OF WINDOWS SHALL NOT PERMIT PASSAGES THAT ALLOW PASSENGERS, RA-4 CIRCUMFERENCES, OR 4" DIAMETER SPHERE, WHERE SUCH OPENINGS ARE LOCATED WITHIN 24" OF THE FINISHED FLOOR.

- FRAMING NOTES:**
1. ALL LUMBER SIZES ARE FOR DOUGLAS FIR-LARCH UNLESS NOTED OTHERWISE.
  2. ALL HEADERS ARE TO BE A MINIMUM OF (2) #2 X18S UNLESS NOTED OTHERWISE.
  3. LOCK CANTERS SHALL BE USED TO SUPPORT THE JOISTS.
  4. ALL HEADERS/BEAMS ARE TO BEAR ON A MINIMUM OF (2) 2x4 POSTS UNLESS NOTED OTHERWISE.
  5. INTERIOR NON-BEARING WALLS, OTHER THAN THOSE RESTING DIRECTLY ON THE FOOTING, SHALL BE ISOLATED FROM THE FLOOR FRAMING ABOVE.
  6. WHERE JOISTS RUN PARALLEL TO FOUNDATION WALLS, SOLE BLOCKING SHALL BE PROVIDED AT A MAXIMUM OF 4' ON CENTER TO TRANSFER LATERAL LOADS ON THE WALL TO THE FLOOR DIAPHRAGM. THE BLOCKING SHALL BE SECURELY NAIL TO THE JOISTS AND FLOORING. NAIL JOISTS AND BLOCKING TO SILL OR GIRDER WITH TOENAILS AT 16" ON CENTER.
  7. IF DUCTS ARE INSTALLED IN THE FIRST JOIST SPACE(S), NAIL 2x4S FLAT AT 4" ON CENTER WITHIN THE JOIST SPACE(S) AND THEN PROVIDE SOLE BLOCKING, INSTALLED UPRIGHT IN THE NEXT TWO JOIST SPACES. SECURE THE 2x4S TO THE SILL PLATE WITH (4) 16D NAILS.
  8. ALL SELLS AND SLEEPERS SUPPORTED ON CONCRETE OR MASONRY AND FIRING ATTACHED TO CONCRETE OR MASONRY SHALL BE OF DECAY RESISTANT MATERIALS.
  9. JOISTS UNDER BEARING PARTITIONS SHALL BE SIZED TO CARRY THE DESIGN LOAD IN ACCORDANCE WITH IRC SECTION R502.4.
  10. JOISTS FRAMING FROM OPPOSITE SIDES OVER BEARING SUPPORTS SHALL LAP A MINIMUM OF 3' AND SHALL BE NAIL TOGETHER WITH MINIMUM 100 FACE NAILS.
  11. JOISTS FRAMING INTO A WOOD GIRDER OR BEAM SHALL BE SUPPORTED BY APPROVED FRAMING ANCHORS OR ON NAILING 2x2 LEADER STRIPS.
  12. HEADER AND TRIMMERS SHALL BE OF SUFFICIENT CROSS SECTION TO SUPPORT THE FLOOR FRAMING. TRIMMER JOISTS SHALL BE DOUBLED WHEN THE HEADER IS SUPPORTED MORE THAN 7' FROM THE TRIMMER JOIST BEARING. WHEN THE HEADER SPAN EXCEEDS 4', THE HEADER AND TRIMMER SHALL BE DOUBLED.
  13. JOISTS AT SUPPORTS SHALL BE SUPPORTED LATERALLY AT THE ENDS BY FULL-DEPTH SOLE BLOCKING NOT LESS THAN 2" NOMINAL THICKNESS OR BY ATTACHMENT TO A HEADER, BAND, OR RIM JOIST OR TO AN ADJOINING STUD OR OTHERWISE PROVIDED WITH LATERAL SUPPORT TO PREVENT ROTATION.
  14. ALL WALL COVERINGS ARE TO COMPLY WITH IRC SECTIONS 702 AND 703.
  15. ALL RAFTER / COLLAR TIES ARE TO COMPLY WITH IRC SECTION 802.
  16. ALL RAFTERS ARE TO HAVE 2x4 COLLAR TIES @ 48" O.C. IN THE UPPER 1/3 OF DISTANCE BETWEEN THE CEILING AND ROOF.
  17. BLOCKING BETWEEN JOISTS UNDER A PERPENDICULAR LOAD-BEARING WALL IS NOT REQUIRED.
  18. THE BOTTOM OF ALL FLOOR ASSEMBLIES SHALL BE PROVIDED WITH A 1/2" GYPSUM WALLBOARD MEMBRANE (IF REQUIRED BY LOCAL CODE).
  19. JOIST AND FLOOR TRUSS SYSTEMS SHALL BE PROTECTED PER IRC AS ADOPTED BY AHJ.
  20. STUDS SHALL BE CONTINUOUS FROM THE FLOOR TO THE ROOF/ CEILING DIAPHRAGM PER IRC SECTION 602.3.

- CONCRETE NOTES:**
1. CONCRETE SHALL BE AIR-ENTRAINED (5%-7%) WITH A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 2500 PSI FOR BASEMENT AND INTERIOR FLOOR SLABS, 3000 PSI FOR BASEMENT AND FOUNDATION WALLS, AND 3500 PSI FOR PORCHES, CARPORTS AND GARAGE FLOOR SLABS.

- EMERGENCY EGRESS AND RESCUE NOTES:**
1. PROVIDE ONE WINDOW FOR EACH BEDROOM THAT HAS A MINIMUM OPENABLE AREA OF 5.7 SF WITH A MINIMUM OPENABLE HEIGHT OF 24" AND WIDTH OF 21". IN ADDITION, THE OPENABLE PORTION OF EACH WINDOW SHALL NOT EXCEED 48" ABOVE THE FINISHING FLOOR OR PERMANENT STEP.
  2. PROVIDE SMOKE ALARMS IN EACH SLEEPING ROOM, OUTSIDE OF EACH SLEEPING AREA, AND ON EACH FLOOR INCLUDING BASEMENTS. ALARMS SHALL BE INTERCONNECTED IN SUCH A MANNER THAT THE ACTIVATION OF ONE ALARM WILL ACTIVATE ALL OF THE ALARMS IN THE DWELLING.
  3. PROVIDE CARBON MONOXIDE ALARMS AS REQUIRED PER CODE. CARBON MONOXIDE ALARMS SHALL BE INSTALLED OUTSIDE OF EACH SEPARATE SLEEPING AREA, WHERE LUEL-BURNING APPLIANCES ARE LOCATED WITHIN A BEDROOM OR ITS ATTACHED BATHROOM, A CARBON MONOXIDE ALARM SHALL BE INSTALLED IN THE BEDROOM.

- GARAGE NOTES:**
1. THE GARAGE FLOOR SHALL SLOPE TOWARDS THE GARAGE DOORWAYS OR TOWARD A TRENCH OR UNTRAPPED DRAIN THAT DISCHARGES DIRECTLY TO THE EXTERIOR ABOVE GRADE.
  2. LOCATIONS BETWEEN THE GARAGE AND DWELLING - MINIMUM 1 1/4" THICK SOLID WOOD, MINIMUM 1 1/4" THICK SOLID OR HONEY-COMB-CORE STEEL DOOR, OR 20-MINUTE FIRE-RATED EQUIPPED WITH A SELF-CLOSING DEVICE PER IRC SECTION R302.5.
  3. GARAGE VEHICLES SHALL BE PROTECTED FROM COLLISION AND INSTALLED TO MEET THE 115 MPH 3-SECOND GUST LOADING PER DASHA 108 AND ASTM E 330-96 PER IRC SECTION R301.2.
  4. THE GARAGE SHALL BE SEPARATED FROM THE DWELLING AND ITS ATTIC AREAS BY MINIMUM 1/2" GYPSUM BOARD APPLIED TO THE GARAGE SIDE WHERE HABITABLE SPACE OCCURS ABOVE THE GARAGE. THE FLOORING ASSEMBLY SHALL BE PROTECTED WITH MINIMUM 1/2" TYPE X GYPSUM BOARD ON THE GARAGE CEILING. WHERE A FLOORING IS PROVIDED ABOVE THE GARAGE, COLLARS AND BEAMS SUPPORTING THE SEPARATION SHALL ALSO BE PROTECTED WITH GYPSUM BOARD OR EQUIVALENT.
  5. GARAGE DOOR H-RAME FOR THE ATTACHMENT OF THE TRACK AND COUNTER BALANCE SHALL BE THE FOLLOWING: 2x6 VERTICAL JAMBS RUNNING FROM FLOOR TO CEILING ATTACHED WITH 1 1/2" x 12" NAILS AT 7" ON CENTER STAGGERED WITH (7) 3/4" x 16" NAILS THROUGH THE JAMB INTO THE HEADER, MINIMUM 2x8 HEADER FOR ATTACHMENT OF THE COUNTER BALANCE SYSTEM.
  6. ANY ATTACHED GARAGE TO THE MAIN HOUSE SHALL BE PROVIDED WITH A SINGLE HEAT DETECTOR. THE HEAT DETECTOR SHALL BE HARDWIRED AND INTERCONNECTED WITH THE HOUSEHOLD SMOKE ALARM SYSTEM. THE HEAT DETECTOR SHALL BE LISTED FOR THE AMBIENT ENVIRONMENT AND INSTALLED PER MANUFACTURER'S INSTRUCTIONS.

- MECHANICAL INSULATION:**
1. BUILDING ENVELOPE INSULATION SHALL COMPLY WITH IRC TABLE N1102.1.2 OR THE 2018 IECC. (SEE S-60 FOR MORE DETAILS)

- VENTILATION:**
1. ENCLOSED ATTICS SHALL HAVE CROSS VENTILATION FOR EACH SEPARATE SPACE BY VENTILATING OPENINGS PROTECTED AGAINST THE ENTRANCE OF RAIN OR SNOW. EXHAUSTING SHALL BE PROVIDED WITH CORROSION-RESISTANT WIRE MESH WITH 1/4" TO 1/2" OPENINGS. THE TOTAL FREE VENTILATING AREA SHALL NOT BE LESS THAN 1/150<sup>th</sup> OF THE AREA OF SPACE VENTILATED. WHERE THE VENTILATORS ARE LOCATED IN THE UPPER PORTION OF THE SPACE TO BE VENTILATED, THE REQUIRED AREA MAY BE REDUCED TO 1/300<sup>th</sup>.

**HD ENGINEERING & DESIGN, INC.**  
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**CHAD A. HESTER**  
REGISTERED PROFESSIONAL ENGINEER  
STATE OF MISSOURI  
LICENSE NO. 000001865

**CARDINAL CREST HOMES**  
AVERY REVERSE - LOT 31 - PERGOLA PARK  
1509 SW CORINTHIAN PL., LEE'S SUMMIT, MO.  
STRUCTURAL DETAILS & NOTES

HD#: 46865

DATE: 11/02/2023

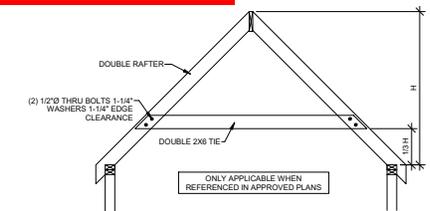
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NO.	ISSUE/REVISION	Revision Date

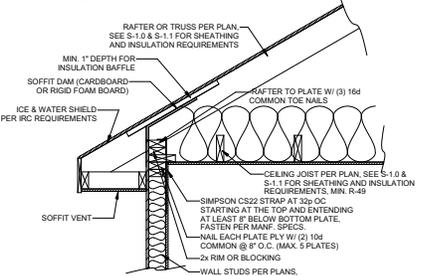
GENERAL NOTES

**S**

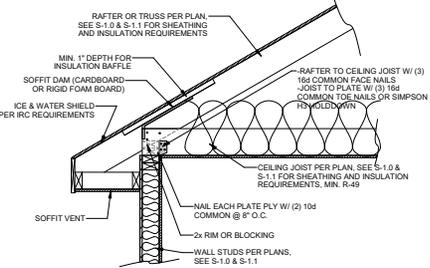




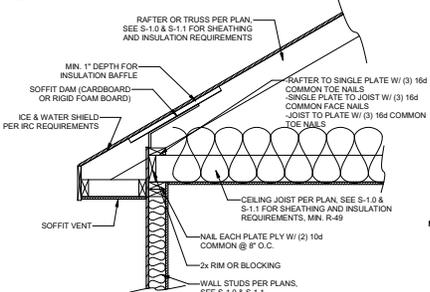
**11 HIP SUPPORT FRAME**  
3/8" = 1'-0"



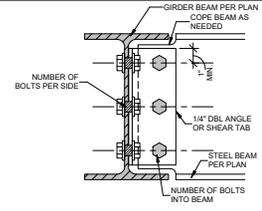
**7 OPTION 4 RAFTER BEARING**  
1" = 1'-0"



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

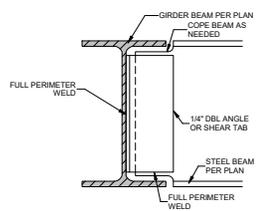


**5 OPTION 2 RAFTER BEARING**  
1" = 1'-0"  
THIS OPTION NOT AVAILABLE IN KC, MO



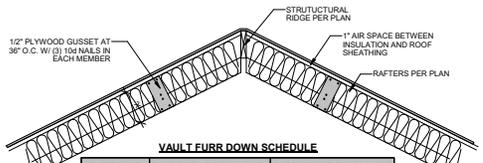
BEAM CONNECTION SCHEDULE		
BEAM SIZE	# OF BOLTS PER SIDE	ANGLE
W8, W10	2	(4" LONG)
W12, W14	3	(8" LONG)
W16, W18	4	(10" LONG)

NOTES:  
1. NUMBER OF BOLTS DETERMINED BY SMALLER OF TWO BEAMS BEING CONNECTED  
2. ALL BOLTS: 3/4" DIAMETER A508-A UNF  
3. BOLTS SHALL BE EVENLY SPACED TOP TO BOTTOM



BEAM CONNECTION SCHEDULE		
BEAM SIZE	ANGLE	
W8, W10	1.5x1.5x1/4 (4" LONG)	
W12, W14	3x3x3/8 (8" LONG)	
W16, W18	3.5x3.5x3/8 (10" LONG)	

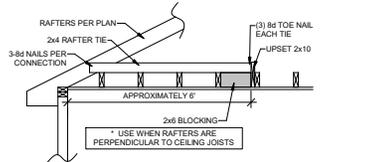
**10 BEAM TO GIRDER CONNECTION**  
3" = 1'-0"



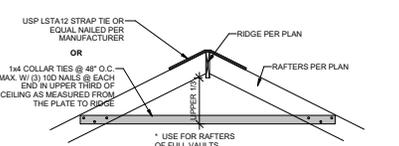
RAFTER SIZE	VAULT FURR DOWN SCHEDULE	
	R-38C INSULATION (X = 9 1/4")	R-38C INSULATION (X = 11 1/4")
2x6	2x6	2x6
2x8	2x4	2x6
2x10	NOT REQUIRED	2x4
2x12	NOT REQUIRED	2x2

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

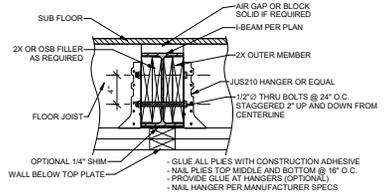
**14 VAULTED RAFTER INSULATION**  
3/4" = 1'-0"



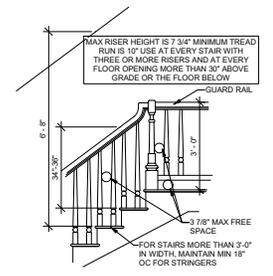
**12 RAFTER TIE CONNECTION**  
1/2" = 1'-0"



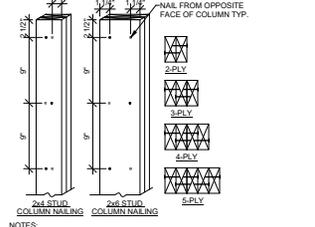
**13 RIDGE SUPPORT**  
1/2" = 1'-0"



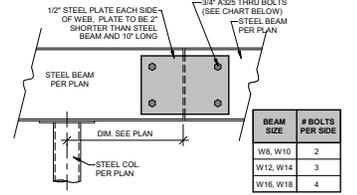
**8 UPSET STEEL BEAM DETAIL**  
1 1/2" = 1'-0"



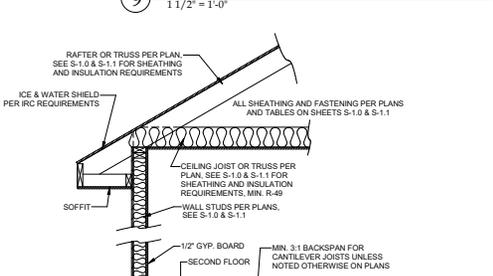
**4 STAIR/RAIL DETAIL**  
1/2" = 1'-0"



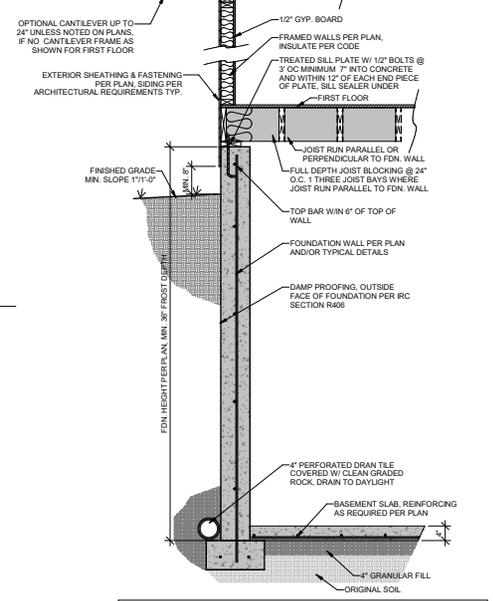
**3 BUILT-UP STUD COLUMN**  
1 1/2" = 1'-0"



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



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



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.

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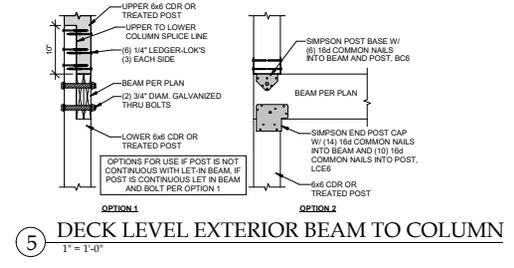
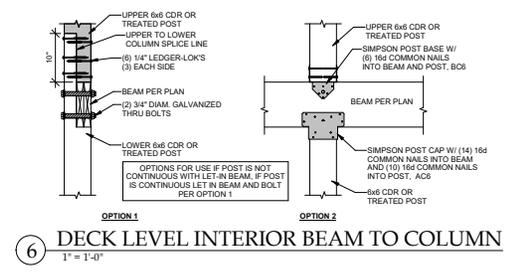
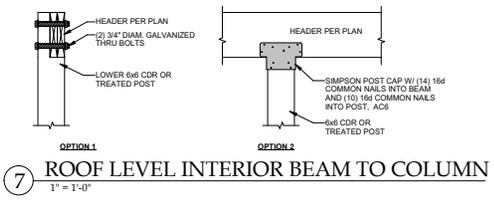
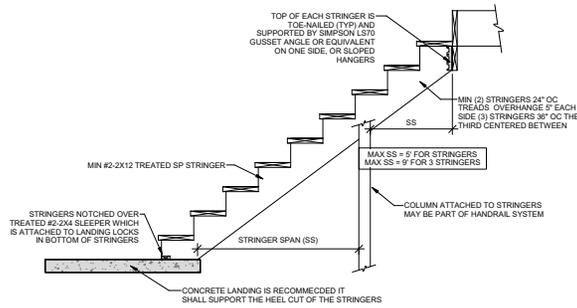
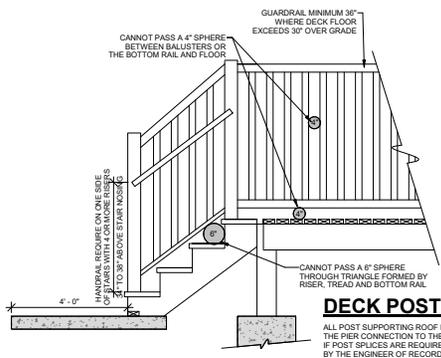
**CARDINAL CREST HOMES**  
AVERY REVERSE - LOT 31 - PERGOLA PARK  
1509 SW CORINTHIAN PL., LEE'S SUMMIT, MO.  
STRUCTURAL DETAILS & NOTES

HD#: 46865

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FRAMING SECTIONS  
**S-1.2**



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

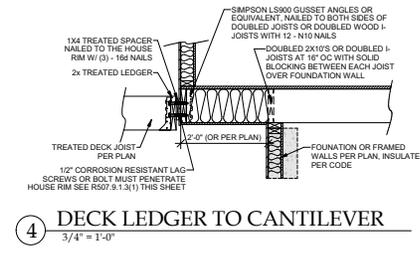
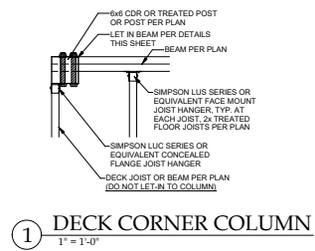
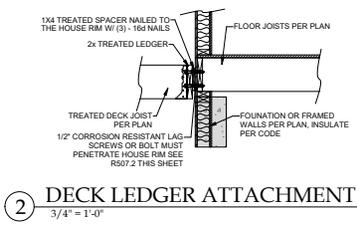
CONNECTION DETAILS	ON-CENTER SPACING OF FASTENERS <sup>a</sup>						
	6' AND LESS	6'-1" TO 8'	8'-1" TO 10'	10'-1" TO 12'	12'-1" TO 14'	14'-1" TO 16'	16'-1" TO 18'
1/2" LAG SCREW WITH 15/32" MAX. SHEATHING <sup>c,d</sup>	30	23	18	15	13	11	10
1/2" DIAM. BOLT WITH 15/32" MAX. SHEATHING <sup>d</sup>	36	36	34	29	24	21	19
1/2" DIAM. BOLT WITH 15/32" MAX. SHEATHING & 1/2" STACKED WASHERS <sup>a</sup>	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 lumbars 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 <sup>a</sup>	2 inches <sup>d</sup>	3/4 inches	2 inches <sup>a</sup>	1-5/8 inches <sup>b</sup>
BAND JOIST <sup>a</sup>	3/4 inches	2 inches	2 inches	1-5/8 inches <sup>b</sup>

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 distance 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)



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**TABLE R602.3(5) SIZE, HEIGHT AND SPACING OF WOOD STUDS<sup>a</sup>**

STUD SIZE (INCHES)	BEARING WALLS				NON-BEARING WALLS	
	LATERALLY UNSUPPORTED STUD HEIGHT (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)	LATERALLY UNSUPPORTED STUD HEIGHT (FEET)	MAXIMUM SPACING (INCHES)
2 x 3 <sup>b</sup>	---	---	---	---	10	16
2 x 4	10	24 <sup>c</sup>	16 <sup>d</sup>	---	14	24
3 x 4	10	24	24	16	24	24
2 x 5	10	24	24	---	16	24
2 x 6	10	24	24	16	24	24

<sup>a</sup> For 11/16" and 1/2" max. total wall height.  
<sup>b</sup> LIFTED HEIGHTS ARE DISTANCES BETWEEN POINTS OF LATERAL SUPPORT PLACES PERPENDICULAR TO THE PLANE OF THE WALL BEARING WALLS SHALL BE SHEATHED ON NOT LESS THAN ONE SIDE OR BRIDGING SHALL BE INSTALLED NOT GREATER THAN 16 FEET APART AND REQUIRED VERTICALLY FROM EITHER END OF THE STUD. INCREASE IN UNSUPPORTED HEIGHT IS PERMITTED WHERE IN ACCORDANCE WITH SECTION R602.3.1 OR DESIGNED IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICE.  
<sup>c</sup> SHALL NOT BE USED IN EXTERIOR WALLS.  
<sup>d</sup> A HABITABLE ATTIC ASSEMBLY IS SUPPORTED BY 2 x 4 STUDS IS LIMITED TO A ROOF SPAN EXCEEDS 35 FEET. THE WALL STUDS SHALL BE INCREASED TO 2 x 6 OR THE STUDS SHALL BE DESIGNED IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICE.

**RESIDENTIAL DESIGN & WOOD ANALYSIS**

SECTION	NO.	DESCRIPTION	ANALYSIS	STATUS
FOUNDATION	1	...	...	...
WALLS	2	...	...	...
FLOOR	3	...	...	...
ROOF	4	...	...	...

**WALL ANALYSIS**

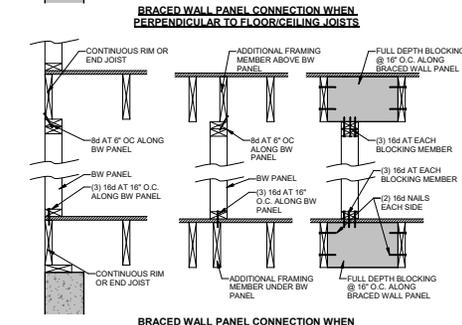
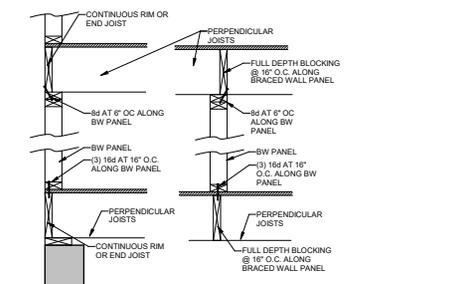
WALL TYPE	HEIGHT	LOADS	RESISTANCE	STATUS
...	...	...	...	...

**FLOOR ANALYSIS**

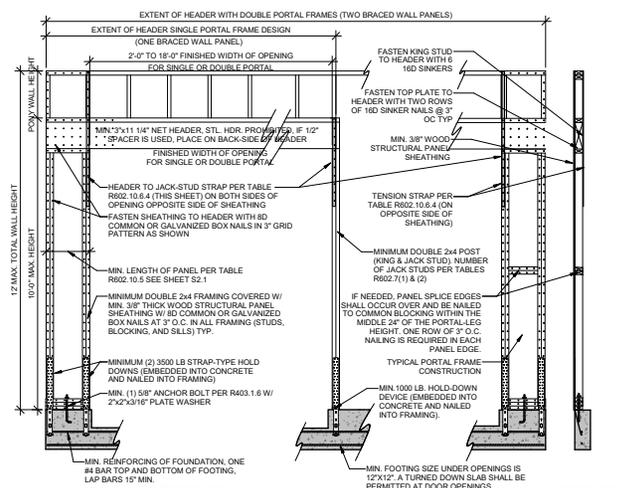
FLOOR TYPE	SPACING	LOADS	RESISTANCE	STATUS
...	...	...	...	...

**ROOF ANALYSIS**

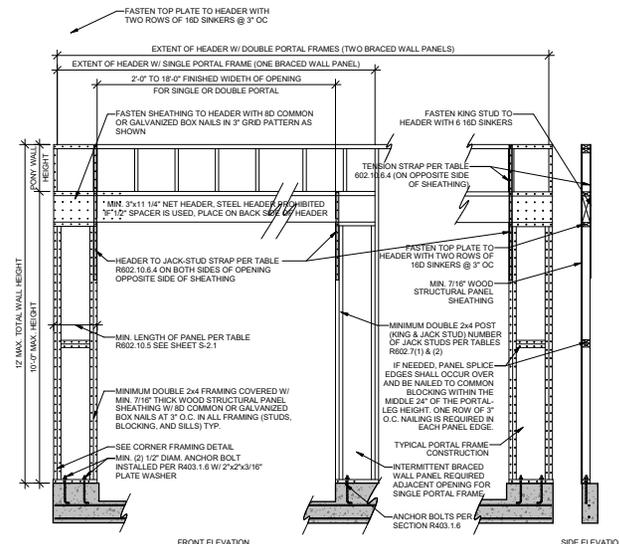
ROOF TYPE	SPACING	LOADS	RESISTANCE	STATUS
...	...	...	...	...



**3 BRACED WALL PANEL CONNECTIONS**  
1 1/2" = 1'-0"



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



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



**CARDINAL CREST HOMES**  
AVERY REVERSE - LOT 31 - PERGOLA PARK  
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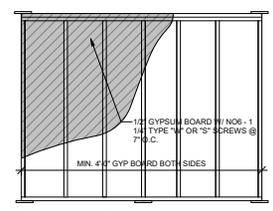
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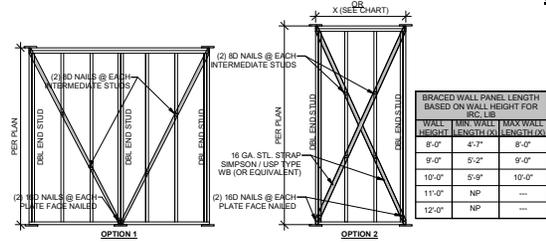
NO.	ISSUE/REVISION	Revision Date

BRACED WALL NOTES & DETAILS

**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**



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



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

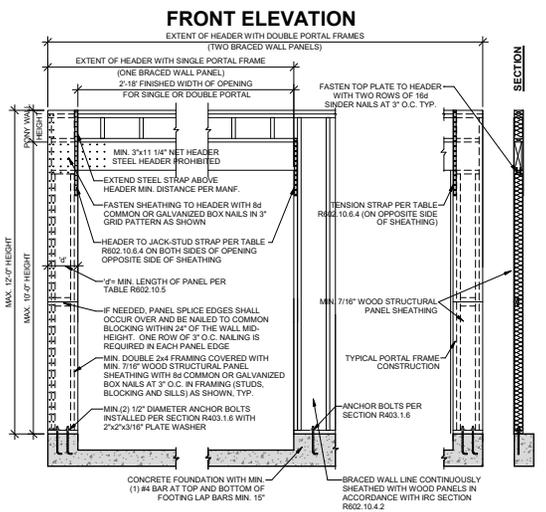
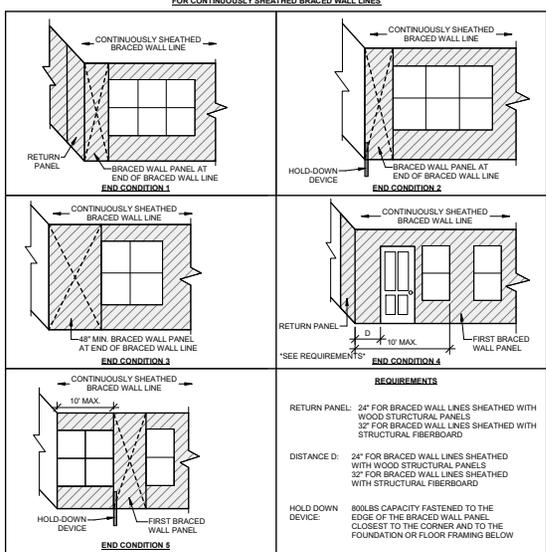
**FOR IRC CODE PRESCRIPTIVE METHOD  
TABLE R602.10.5 MINIMUM LENGTH OF BRACED  
WALL PANELS**

METHOD (SEE TABLE R602.10.4)	MINIMUM LENGTH (INCHES)*				CONTRIBUTING LENGTH (INCHES)
	8 FEET	9 FEET	10 FEET	11 FEET	
DWB,WSP,SFB,P6S,PCP,HPS,BV,WSP	48	48	48	53	58
GB	48	48	48	53	58
LIB	55	62	69	NP	NP
ABW	28	32	34	38	42
PFH	16	16	16	NOTE C	NOTE C
PFG	24	27	30	NOTE D	NOTE D
CS-G	24	27	30	33	36
CS-PF	16	18	20	NOTE E	NOTE E
CS-WSP CS-SFB	94	24	27	30	33
	68	26	27	30	33
	72	27	27	30	33
	76	30	29	30	33
	80	32	30	30	33
	84	35	32	32	33
	88	38	35	33	33
	92	43	37	35	35
	96	48	41	38	36
	100	-	44	40	38
	104	-	49	43	40
	108	-	54	46	43
	112	-	-	50	45
	116	-	-	55	48
120	-	-	60	52	
124	-	-	-	56	
128	-	-	-	61	
132	-	-	-	66	
136	-	-	-	62	
140	-	-	-	66	
144	-	-	-	72	

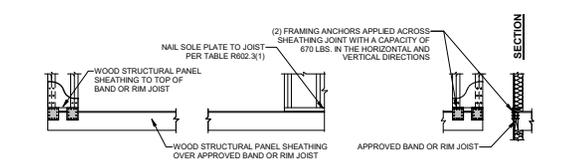
MINIMUM WALL STUD FRAMING NOMINAL SIZE & GRADE	MAX. PONY WALL HEIGHT (FEET)	MAX. TOTAL WALL HEIGHT (FEET)	MAX. OPENING WIDTH (FEET)	TENSION STRAP CAPACITY REQUIRED (POUNDS)†	
				EXPOSURE B	EXPOSURE C
2X4 NO. 2 GRADE	0	10	18	1,500	1,000
			16	1,025	2,500
			18	1,275	2,850
			9	1,000	1,875
			16	2,175	4,125
			18	2,500	DR
	2	12	9	1,500	3,175
			16	3,375	DR
			18	3,975	DR
			9	2,750	DR
			12	3,775	DR
			12	1,000	2,025
2X6 STUD GRADE	2	12	16	2,150	3,675
			18	2,550	DR
			9	1,750	3,125
			16	2,400	DR
			18	3,800	DR
			9	1,000	2,025

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

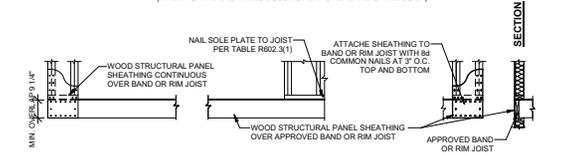
**END WALL CONDITIONS**  
FOR CONTINUOUSLY SHEATHED BRACED WALL LINES



**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)

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

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

**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) WSP METHOD:**  
WOOD STRUCTURAL PANEL SHEATHING WITH A THICKNESS NOT LESS THAN 3/8" WITH MINIMUM SPAN RATING OF 240 FOR 16" O.C. STUD SPACING WITH 8d NAILS COMMON NAILS @ 16" O.C. EDGES AND 12" O.C. FIELD OR SHEATHING THICKNESS NOT LESS THAN 7/16" WITH MINIMUM SPAN RATING OF 240 FOR 24" O.C. SPACING WITH 8d COMMON NAILS @ 16" 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 GYP/PLUM 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" SECTION FOR BOTH SIDES)

**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.

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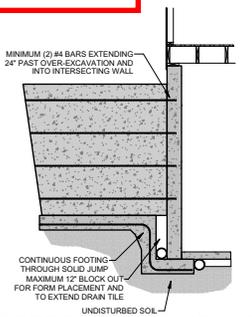


**CARDINAL CREST HOMES**  
AVERY REVERSE - LOT 31 - PERGOLA PARK  
1509 SW CORINTHIAN PL., LEE'S SUMMIT, MO.  
STRUCTURAL DETAILS & NOTES

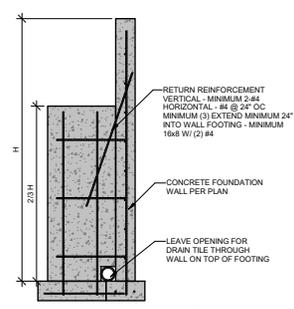
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BRACED WALLS NOTES & DETAILS

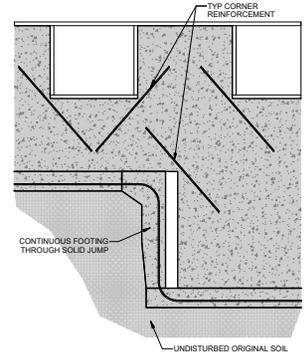
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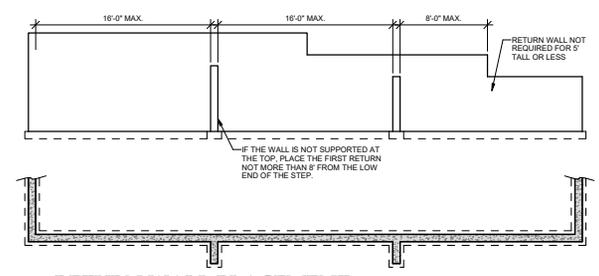
**1 SOLID FOOTING JUMP DETAIL**  
3/8" = 1'-0"



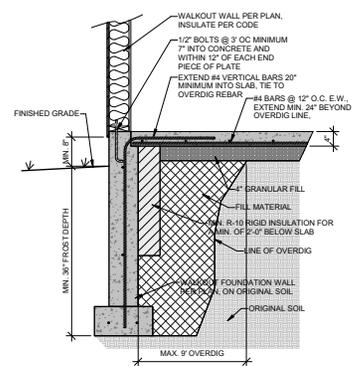
**2 RETURN WALL DETAIL**  
1/2" = 1'-0"



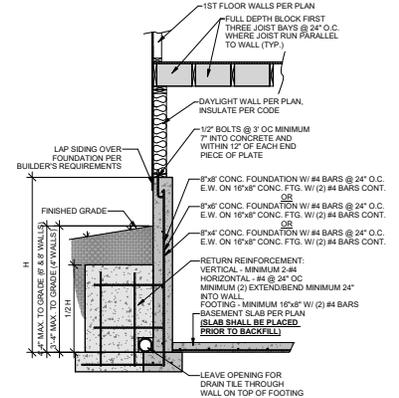
**3 REINFORCEMENT AT CORNERS AND STEPS**  
1/2" = 1'-0"



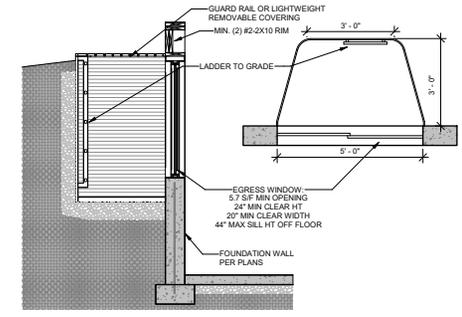
**4 RETURN WALL PLACEMENT**  
3/16" = 1'-0"



**5 WALKOUT DETAIL**  
3/4" = 1'-0"



**6 UNRESTRAINED FOUNDATION WALL**  
1/2" = 1'-0"



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

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

**HORIZONTAL REINFORCEMENT\*\***

ONE BAR 12" FROM TOP OF WALL: MAX. SPACING 24" O.C.	4-#4	5-#4	4-#4	5-#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 318).  
 \* 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 (P 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 60 (HRB) STEEL, PER ACI 318.  
 \* HORIZONTAL REINFORCEMENT SHALL BE INSTALLED ON THE COMPRESSION SIDE (SOIL SIDE) OF THE VERTICAL REINFORCEMENT.

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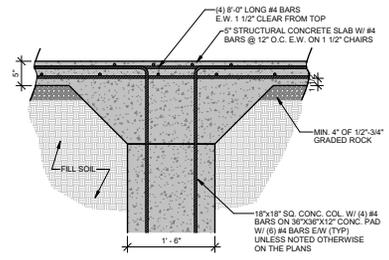


**CARDINAL CREST HOMES**  
 AVERY REVERSE - LOT 31 - PERGOLA PARK  
 1509 SW CORINTHIAN PL., LEE'S SUMMIT, MO.  
 STRUCTURAL DETAILS & NOTES

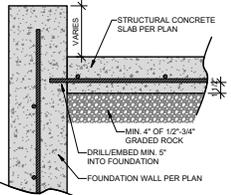
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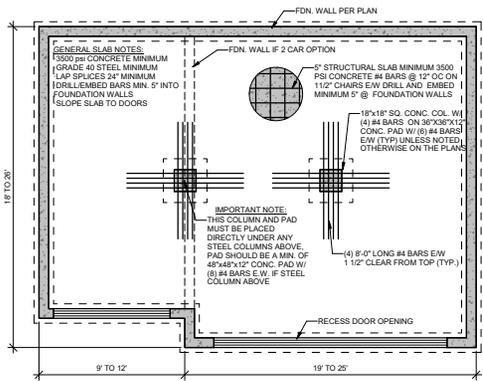
CONCRETE DETAILS  
**S-3.0**



**8 GARAGE SLAB COLUMN DETAIL**  
1" = 1'-0"

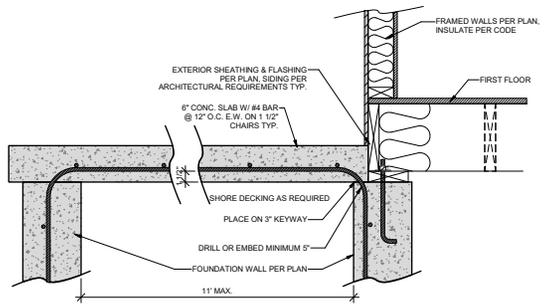


**9 STRUCTURAL SLAB/ WALL**  
1 1/2" = 1'-0"

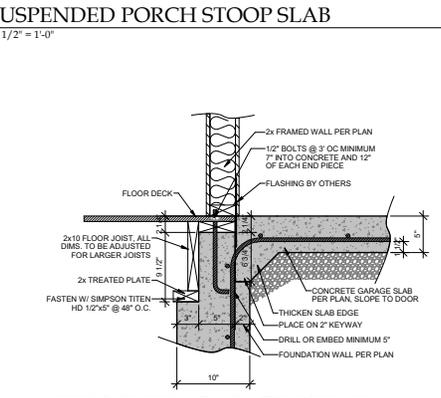


**10 TYPICAL GARAGE SLAB**  
1/4" = 1'-0"

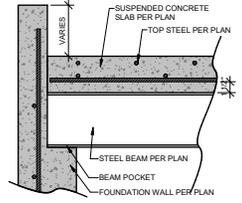
**HD ENGINEERING STRUCTURAL  
GARAGE SLAB DETAILS**



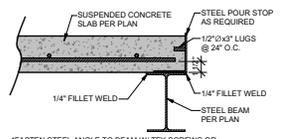
**6 SUSPENDED PORCH STOOP SLAB**  
1 1/2" = 1'-0"



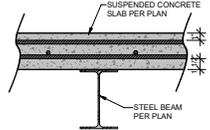
**7 ZERO ENTRY GARAGE DETAIL**  
1 1/2" = 1'-0"



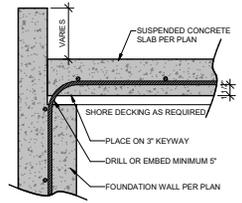
**1 SUSPENDED SLAB BEAM/WALL CONNECTION**  
1 1/2" = 1'-0"



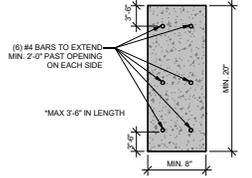
**2 SUSPENDED SLAB POUR STOP**  
1 1/2" = 1'-0"



**3 SUSPENDED SLAB/STEELBEAM CROSS SECTION**  
1 1/2" = 1'-0"



**4 SUSPENDED SLAB/WALL CONNECTION**  
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. #2x4 STUDS AT 18" 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 COLLAPSE AND/OR CATASTROPHIC FAILURE.

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**CARDINAL CREST HOMES**  
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SUSPENDED SLAB DETAILS

**S-3.1**

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

CLIMATE ZONE	FENSTRATION U-FACTOR	SKYLIGHT U-FACTOR	GLAZED SHOS-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	CRANL SPACE U-VALUE	DUCTWORK OVER OUTSIDE R-VALUE	DUCTWORK (ALL OTHER) R-VALUE
EXCEPT MARINE	0.32	0.55	0.40	0.90	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

**CATHEDRAL / VAULTED CEILING  
FRAMING AND INSULATION**

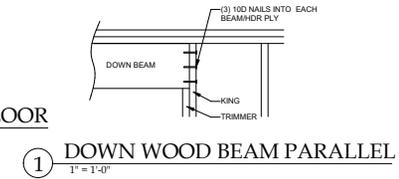
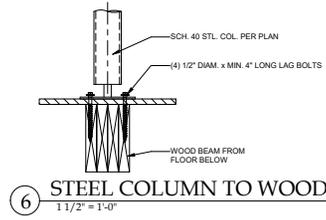
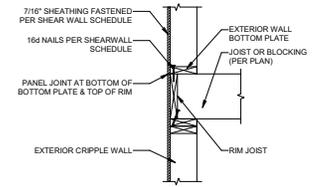
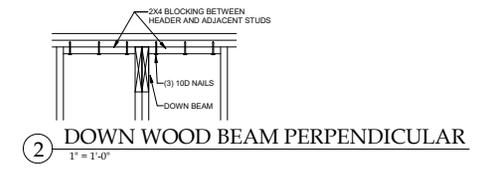
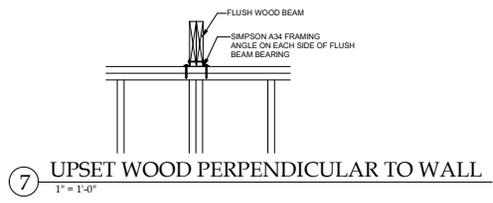
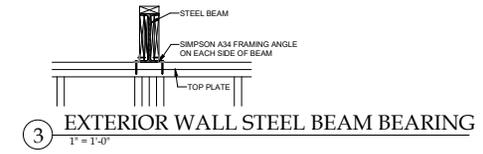
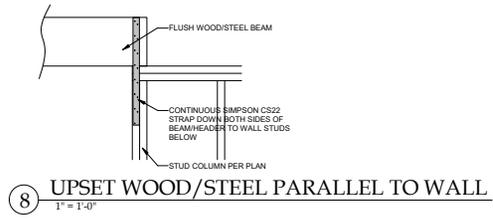
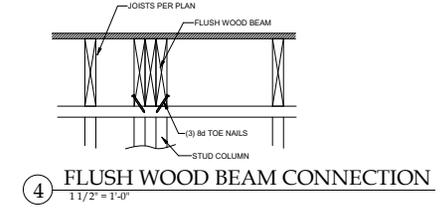
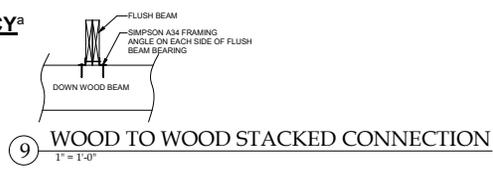
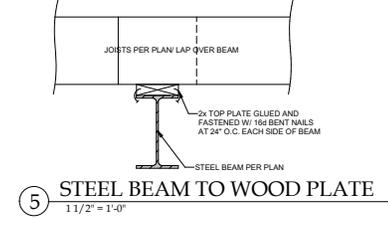
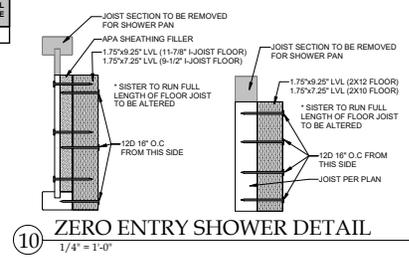
MINIMUM R-38 INSULATION REQUIRED. SEE DETAIL 14S-12  
WHERE THE CEILING IS APPLIED DIRECTLY TO THE BOTTOM OF THE RAFTERS, A MINIMUM 1" AIR SPACE SHALL BE PROVIDED BETWEEN THE TOP OF THE INSULATION AND THE SHEATHING FOR VENTILATION. (R806.3)  
NOTE: RAFTER SIZES SPECIFIED ON PLANS ARE THE MINIMUM REQUIRED FOR STRUCTURAL PURPOSES ONLY. BUILDER TO VERIFY.  
IF FULL RAFTER DEPTH IS NOT ADEQUATE FOR MINIMUM INSULATION VALUE, RAFTER SIZES WILL NEED TO BE INCREASED, OR ADEQUATE FURRING SHALL BE USED TO OBTAIN THE MINIMUM JOIST DEPTH FOR THE REQUIRED INSULATION. IN ADDITION, IF THE RAFTER SIZE IS INCREASED IT SHALL BE VERIFIED THAT THE RIDGE BE A MINIMUM OF ONE NOMINAL SIZE LARGER THAN THE RAFTERS BEING RECEIVED. (SEE CHART BELOW)

MAXIMUM INSULATION VALUE 1" AIR SPACE (FIBERGLASS)	2x6	2x8	2x10	2x12
R-13, 3 1/2"	R-19, 6 1/4"	CONDENSED R-38, 8 1/4"	R-38, 10 1/4"	

**TABLE N1103.6.1 (R403.6.1) WHOLE-HOUSE  
MECHANICAL VENTILATION SYSTEM FAN EFFICACY<sup>a</sup>**

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 HOODS	ANY	2.8 CFM/WATT	ANY
IN-LINE FAN	ANY	2.8 CFM/WATT	ANY
BATHROOM, UTILITY ROOM	10	1.4 CFM/WATT	< 90
BATHROOM, UTILITY ROOM	90	2.8 CFM/WATT	ANY

<sup>a</sup> For R-11 walls that are made of 2x12 studs.  
Source: ENERGY STAR 2.0 Performance metrics and requirements



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GENERAL DETAILS  
**S-4.0**