

05/15/2020 1:34:01 PM ChrisSaathoff
RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
04/13/2022 4:03:03

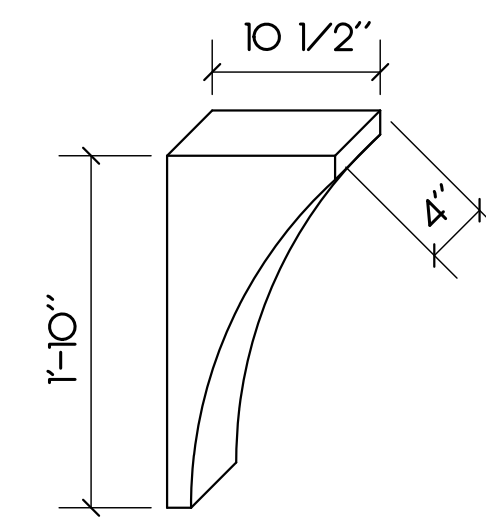
Digitally signed by
Andrea Sessler
DN: CN=Andrea
Sessler,
OU=Development,
O=Lee's Summit,
DC=COLS,
Date: 2022.04.13
16:03:48-05'00'

ROOF AND SOFFIT VENTS PER CODE
VERIFY WALL BEARING HEIGHTS AND WINDOW HEADERS IN BOTH PLAN AND ELEVATION !

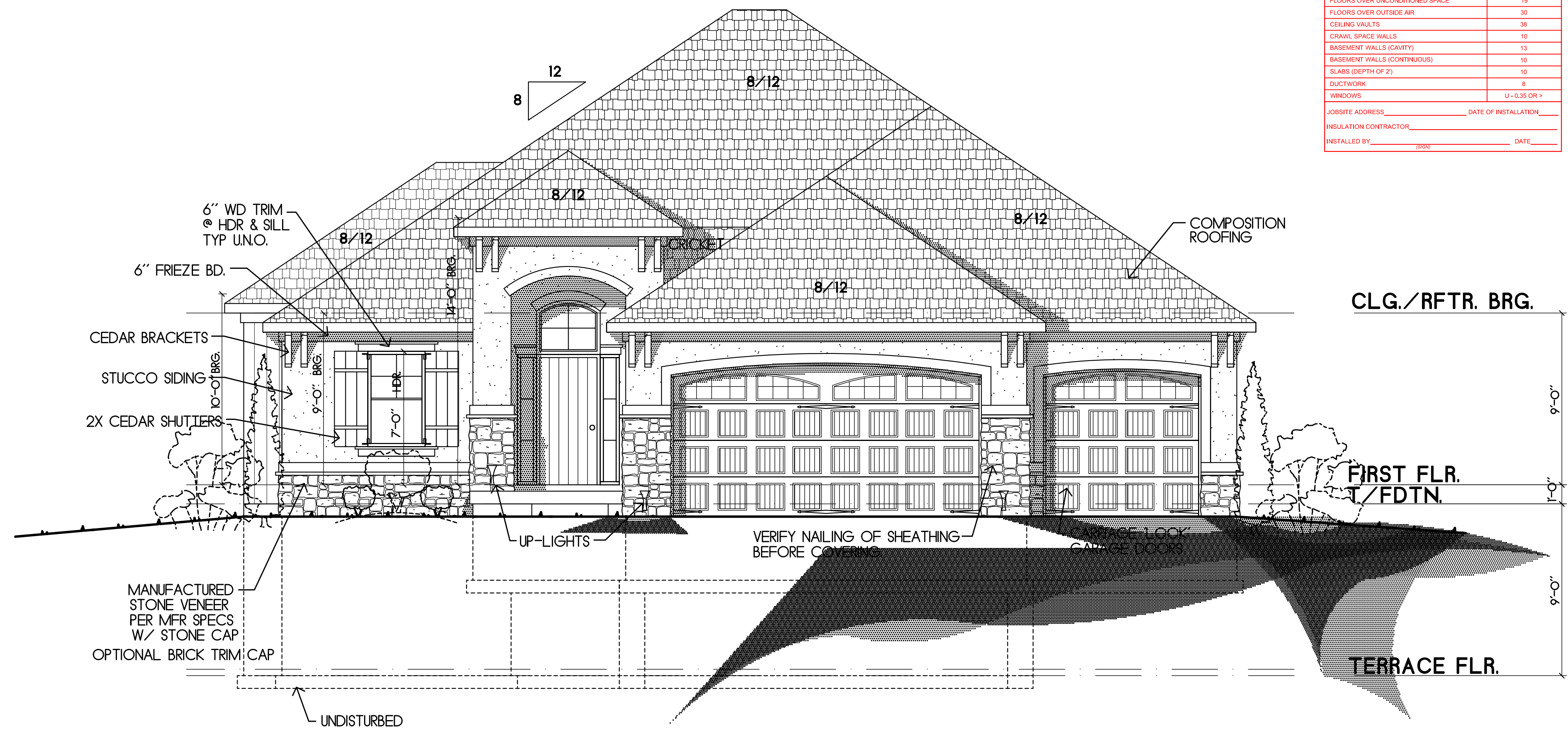
HOME WILL MEET COMPLIANCE WITH THE PHYSICAL
SECURITY ORDINANCE OF THE KANSAS CITY BUILDING
AND REHABILITATION CODE SECTION 329 (B 161)

MINIMUM INSULATION VALUES & CONTRACTOR CERTIFICATION	
BUILDING COMPONENT	R-VALUE
WALLS	13
ATTICS	49
FLOORS OVER UNCONDITIONED SPACE	19
FLOORS OVER OUTSIDE AIR	30
CEILING VAULTS	38
CRAWL SPACE WALLS	10
BASEMENT WALLS (CAVITY)	13
BASEMENT WALLS (CONTINUOUS)	10
SLABS (DEPTH OF 2')	10
DUCTWORK	8
WINDOWS	U-0.35 OR >
JOBSITE ADDRESS: _____ DATE OF INSTALLATION: _____	
INSULATION CONTRACTOR: _____	
INSTALLED BY: _____ DATE: _____	

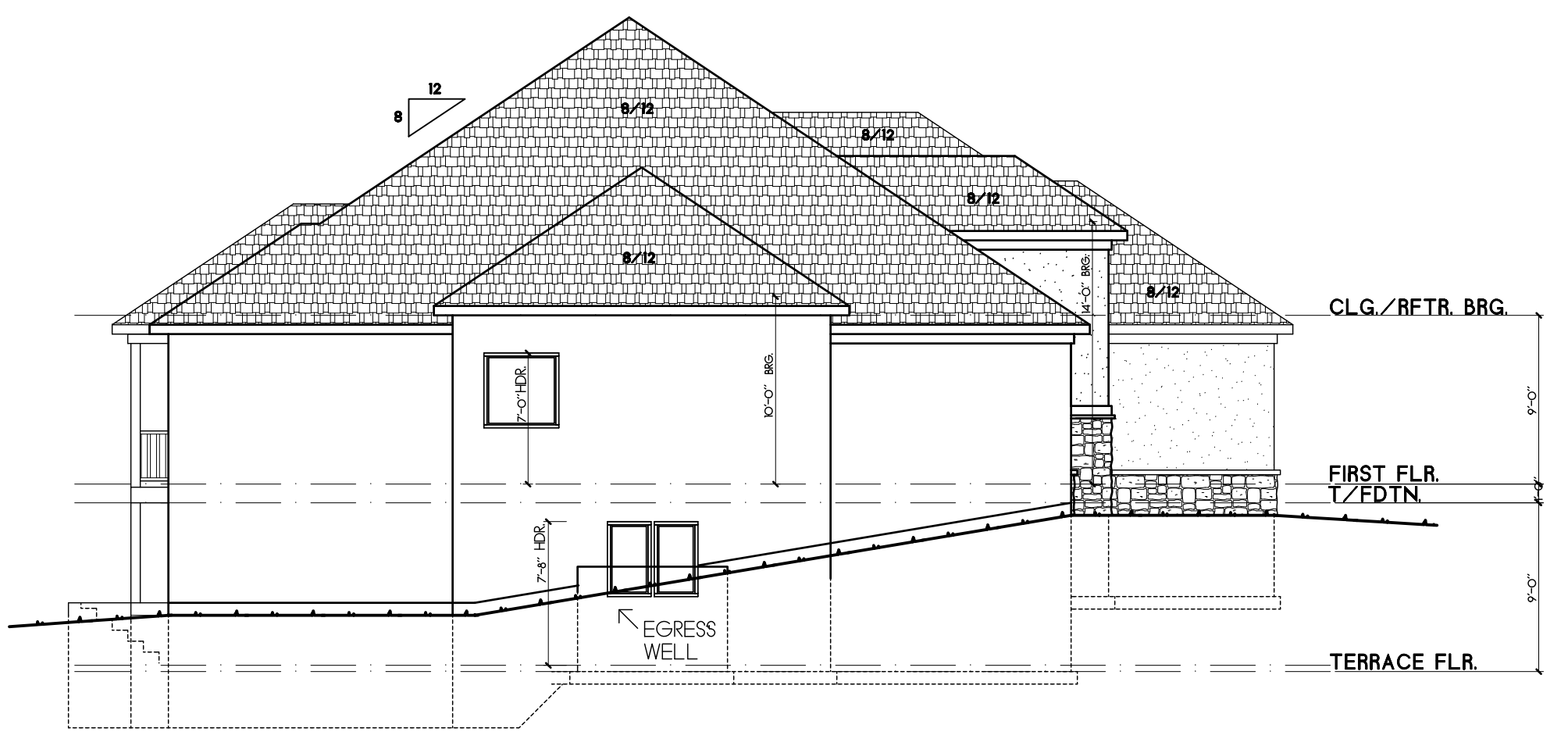
SQUARE FOOTAGE SUMMARY:	
MAIN FLOOR FINISH	1800 SF
LOWER FINISH AREA	1100 SF
LOWER FLOOR SLAB	1760 SF
GARAGE AREA	706 SF
GARAGE SLAB	642 SF
FRONT PORCH	28 SF
REAR DECK	172 SF



BRACKET DETAIL
SCALE: 1"=1'-0"



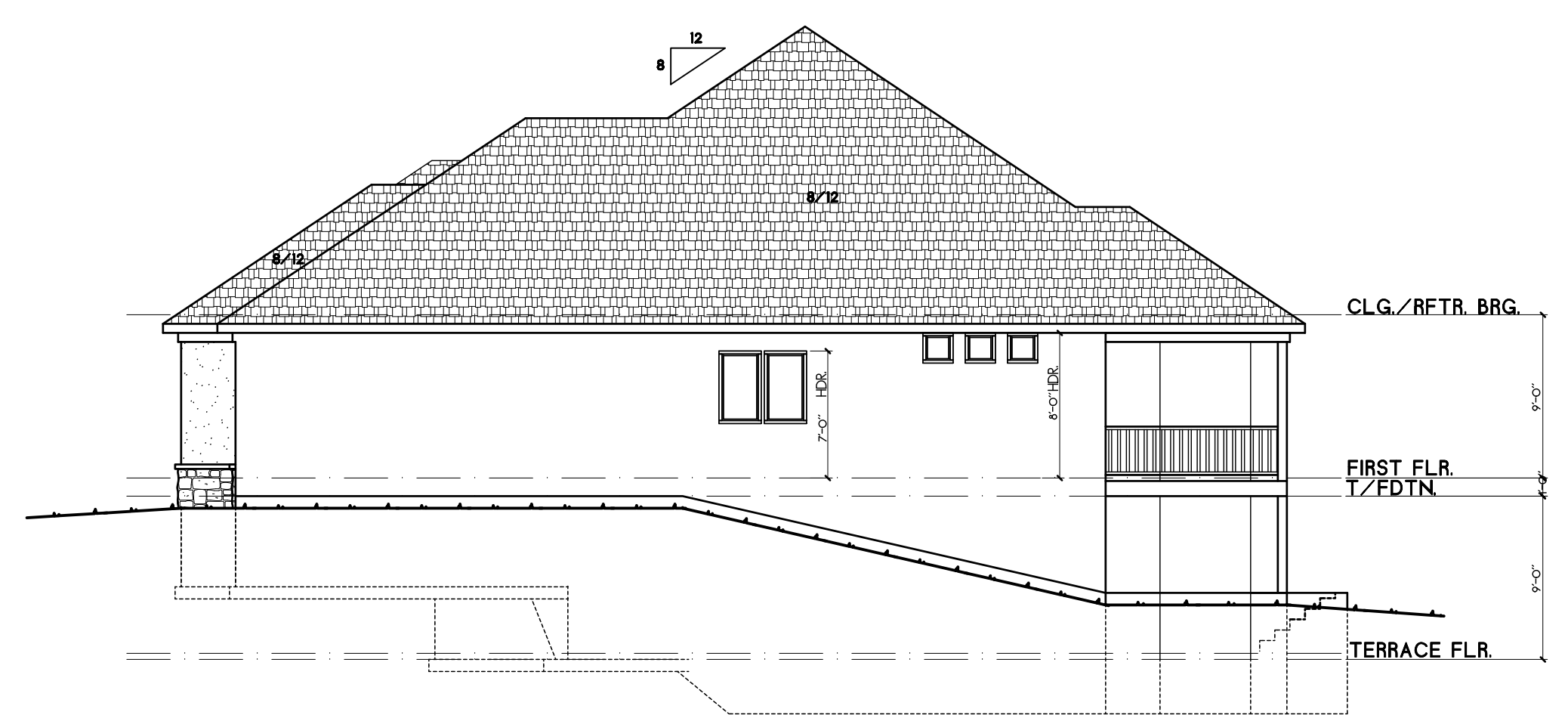
FRONT ELEVATION
SCALE: 1/4"=1'-0"



LEFT ELEVATION
SCALE: 1/8"=1'-0"

ELEVATION SET

ROOF AND SOFFIT VENTS PER CODE



RIGHT ELEVATION
SCALE: 1/8"=1'-0"



REAR ELEVATION
SCALE: 1/8"=1'-0"

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HD ENGINEERING & DESIGN, INC
11655 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.2222
SERVICE@HDENGINEERS.COM



SAB CONSTRUCTION, LLC.
ELLENBROOK II WOMU - HFR089
2030 SW HARVEST MOON LN., KANSAS CITY, MO

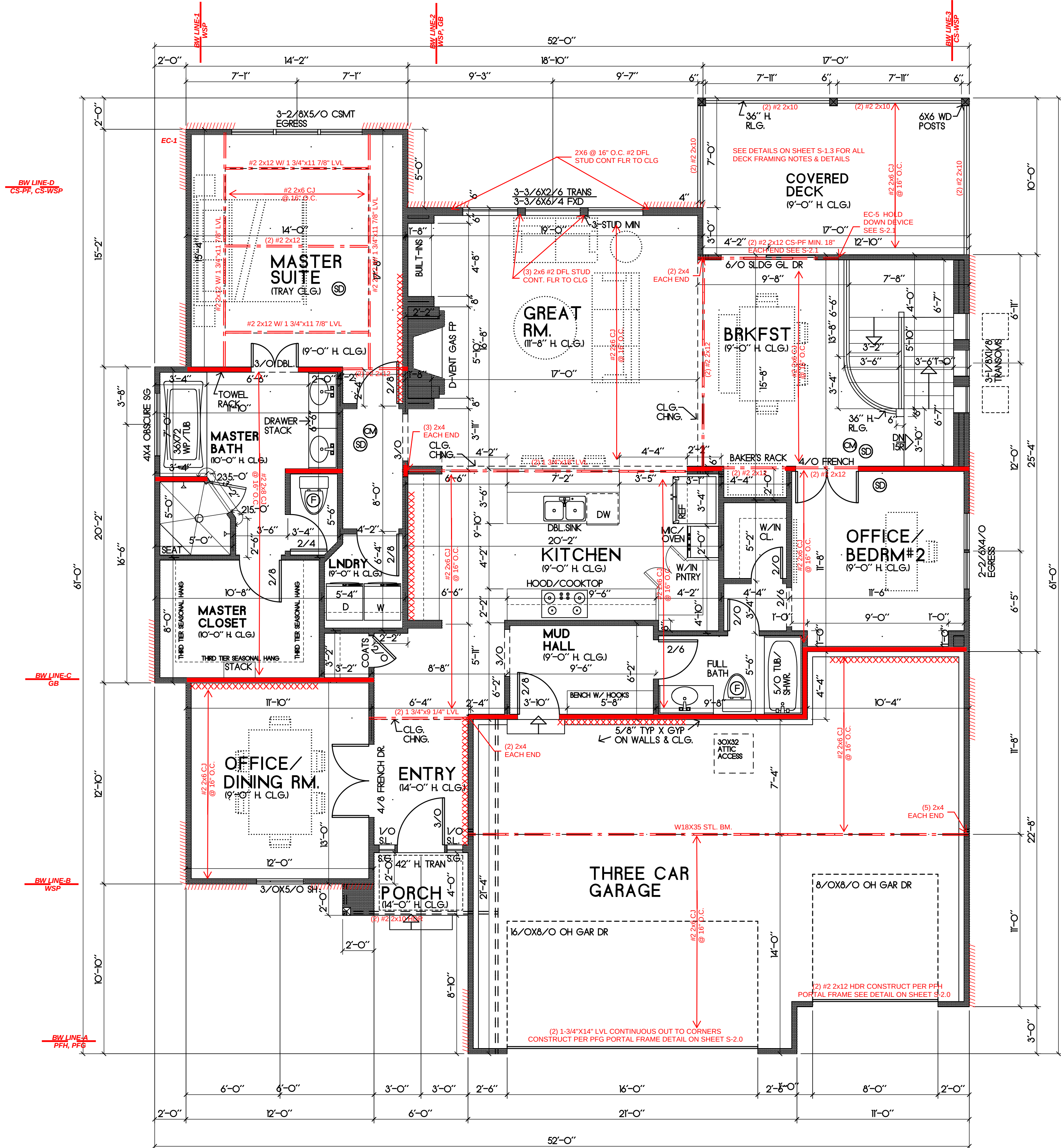
STRUCTURAL DETAILS & NOTES

HD#:	43679	
DATE:	03/28/2022	
CHECKED BY:	CLS	
NO.	ISSUE/REVISION	Revision Date

PLANS DRAWN BY OTHERS

S-0.1

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MAIN FLOOR PLAN

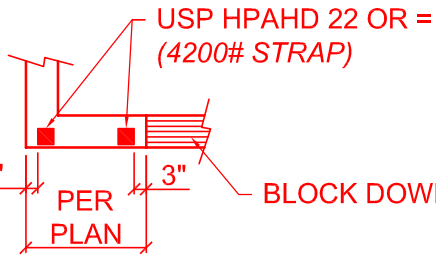
SCALE 1/4"=1'-0" AREA= 1,800 SF

NOTE: 2X6 STUDS AT ANY WALL TALLER THAN 12' TALL

- LOAD BEARING WALL
- - - - - LOAD BEARING BEAM
- SD - SMOKE DETECTOR
- CS - CARBON MONOXIDE SENSOR

GENERAL NOTES:
- WINDOW SHALL HAVE FALL PROTECTION PER IRC 312.2.4
- HOUSE WILL BE PROVIDED WITH A "UFER" GROUND PER IRC SECTION 3608.1.5
- OVERHEAD GARAGE DOORS MUST MEET DASMA REQUIREMENTS SEE DETAIL SHEET S-1.0
- ALL HEADERS NOT LABELED SHALL BE MIN (2) #2-2X10 DFL
- DBL ALL JST UNDER ISLAND
- SOILS IN THIS AREA COMMONLY HAVE A VERY HIGH SHRINK SWELL CAPACITY. OUR FIRM RECOMMENDS ALL SITES BE EVALUATED BY A GEOTECHNICAL FIRM PRIOR TO PLACEMENT OF FOUNDATIONS
- PROVIDE CARBON MONOXIDE AND SMOKE DETECTORS PER IRC REQUIREMENTS
- ANY PORTION OF THESE PRINTS ISSUED WITHOUT A MIN. OF S-1.0 - S-4.0 SHALL NOT BE CONSIDERED A COMPLETE SET OF CONSTRUCTION DOCUMENTS
- ICE AND WATER SHIELD AS REQUIRED PER IRC

TYPICAL TIE DOWN AT NARROW WALL



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

EXTERIOR BRACED WALL METHOD:
• WSP METHOD:
WOOD STRUCTURAL PANEL SHEATHING WITH A THICKNESS NOT LESS THAN 3/4" WITH MINIMUM SPAN RATING OF 3/8" FOR 16" O.C. STUD SPACING WITH 6d NAILS COMMON NAILS @ 6" O.C. EDGES AND 12" O.C. FIELD OR SHEATHING THICKNESS NOT LESS THAN 3/4" WITH MINIMUM SPAN RATING OF 3/8" 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).

XXXXXXXXXXXXXXXXXXXX **INTERIOR BRACED WALLS (SEE ON SHEET S-2.1)**
• GB METHOD:
1/2" MINIMUM GYPSUM BOARD OVER STUDS SPACED @ 24" MAXIMUM FASTENED W/ #6-1 1/2" 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.



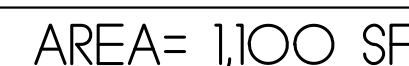
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STRUCTURAL DETAILS & NOTES

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PLANS DRAWN BY OTHERS

S-0.2



ADAPT FDTN WALL HTS FOR SITE TOPO

• **1/2" MINIMUM GYPSUM BOARD OVER STUDS SPACED @ 24" MAXIMUM FASTENED W/ #6-1 1/2" 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.

SAB CONSTRUCTION, LLC.
ELLENBROOK II WO/WU - HFR089
2030 SW HARVEST MOON LN., KANSAS CITY, MO 64111

STRUCTURAL DETAILS & NOTES

PLANS DRAWN BY OTHERS

S-0.3



ALL HIPS, RIDGE, AND VALLEYS SHALL BE SUPPORTED BY A MIN. (2) 2x4 STUD COL. AT ALL ENDS AND STRUT LOCATIONS SHOWN ON THIS SHEET UNLESS NOTED OTHERWISE.

ALLOWABLE LOADS FOR PNEUMATIC OR MECHANICALLY DRIVEN NAILS AND STAPLES

FASTENER DESCRIPTION	NAIL GUN NAILS/ WIRE DIA.	WIRE GA.	PENETRATION REQUIRED INTO MAIN MEMBER FOR LATERAL STRENGTH (IN.)	ALLOWABLE LOADS (IN POUNDS)			
				LATERAL STRENGTH		WITHDRAWAL STRENGTH	
				SP	DF/L	SP	DF/L
16 GA. STAPLE	.063	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	.099	12-1/2	1-1/8	61	55	31	24
6d CASING NAIL							
7d COOLER NAIL							
6d COMMON NAIL	.113	11-1/2	1-1/4	79	72	35	28
8d COOLER NAIL							
8d SINKER NAIL							
8d BOX NAIL							
8d CASING NAIL	.120	11	1-3/8	89	81	41	32
6d RING SHANK NAIL							
6d SCREW SHANK NAIL							
8d RING SHANK NAIL							
8d SCREW SHANK NAIL	.128	10-1/2	1-1/2	89	81	36	31
10d Cooler Nail							
10d Sinker Nail							
12d Short							
10d Box Nails	.128	10-1/2	1-1/2	101	93	40	31
12d Box Nails							
10d Casing Nails	.131	10-1/4	1-1/2	106	97	41	32
8d Common Nails							
16d Short							
12d Sinkers							
16d Box Nails	.135	10	1-1/2	113	103	42	33
10d Ring Shank Nails	.135	10	1-5/8	113	103	46	36
10d Screw Shank Nails							
12d Ring Shank Nails							
12d Screw Shank Nails	.148	9	1-5/8	128	118	46	36
10d Common Nails							
12d Common Nails							
16d Sinker Nails							
20d Box Nails	.148	9	1-3/4	128	118	50	40
30d Box Nails							
16d Ring Shank Nails							
16d Screw Shank Nails							
16d Common Nails	.162	8	1-3/4	154	141	50	40
40d Box Nails	.177	7	2-1/8	178	163	59	47
20d Ring Shank Nails							
20d Screw Shank Nails							
20d Sinker Nails	.177	7	2-1/8	178	163	54	43
20d Common Nails							
30d Sinker Nails	.148	9	2-1/8	170	166	59	47

SHEATHING SCHEDULE

ALL SHEATHING MATERIALS TO BE APPLIED PERPENDICULAR TO JOISTS AND ENDS STAGGERED

BUILDING COMPONENT	MATERIAL	FASTENING
ROOF SHEATHING	7/16" PLYWOOD	16 GA X 1 3/4" STAPLES @ 6" OC EDGES & 12" OC IN FIELD
	1x 4 #3 FURRING	1/2" CROWN STAPLES
FLOOR SHEATHING	3/4" T&G YELLOW PINE PLYWOOD	14 GA X 1 3/4" STAPLES @ 6" OC EDGES & 12" OC IN FIELD
		12.5 GA X 1 1/2" RING OR SCREW SHANK NAILS @ 6" OC EDGES & 12" OC IN FIELD
WALL COVERING	1/2" GYPSUM SHEATHING	6D COMMON NAILS - 1 5/8" GALVANIZED STAPLES; 1 1/4" SCREWS, TYPE W OR S @ 4" OC EDGES & 8" OC IN FIELD
CEILING COVERING	1/2" GYPSUM SHEATHING	7" OC NAILED / 12" OC SCREWED W/ 13GA, 1 3/8" LONG, 19/64" HEAD; 0.098 Ø, 1 1/4" LONG, ANG-RINGED; 5D COOLER NAIL, 0.086 Ø, 1 5/8" LONG, 15/64" HEAD; OR GYP BD NAIL, 0.086 Ø, 1 5/8" LONG, 19/64" HEAD
EXTERIOR WALL SHEATHING	7/16" APA RATED SHEATHING	8D COMMON NAILS @ 6" OC EDGES & 12" OC IN THE FIELD
	RATED PANEL SIDING, RATED 16" O.C. 7/16" THICK	8D BOX OR SINKER NAILS @ 6" OC EDGES & 12" OC IN THE FIELD

FRAME FASTENING SCHEDULE

BUILDING COMPONENT	FASTEN TO	FASTEN WITH
RAFTERS	RIDGE / VALLEY / HIP	TOENAIL W/ (4) 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 JST RUN PARALLEL TO RAFTERS	FACENAIL TO RAFTERS W/ (3) 10D MINIMUM
	LAPS OVER PARTITIONS	FACENAIL W/ (3) 10D
BEAMS	BLOCKING BETWEEN JOISTS OR RAFTERS TO TOP PLATE	TOENAIL W/ (3) 8D
	BUILT-UP BEAMS, 2" LUMBER LAYERS, FACENAIL OPPOSITE SIDES, (2) @ EACH END PLUS	10D @ 32" OC STAGGERED, TOP & BOTTOM, OPPOSITE SIDES
	BUILT-UP BEAMS OF ENGINEERED LUMBER, FACE NAIL OPPOSITE SIDES	(2) ROWS @ 12" OC
	BUILT-UP HEADER, TWO PIECES W/ 1/2" SPACER	16D @16" OC ALONG EDGES
	BUILT-UP HEADER, TWO PIECES, NO 1/2" SPACER	3" x 0.131" NAILS @ 12" OC ALONG EDGES
FLOOR JOISTS	BEARING	TOENAIL W/ (2) 18D @ EACH END
	RIM JOIST TO SILL OR TOP PLATE	TOENAIL W/ 8D COMMON OR 10D BOX NAILS @ 6" OC
	JOIST TO SILL OR GIRDER	TOENAIL W/ (3) 8D
	JOIST TO RIM 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
	RIM JOIST TO I-JOIST	FACENAIL W/ (2) 10D BOX NAILS - ONE INTO EACH FLANGE
	SOLE PLATE TO LSL RIM BOARD	16D BOX NAILS @ 12" OC
	SINGLE JOIST HANGERS *	10D FACENAILS AND TOENAILS
	DOUBLE JOIST HANGERS *	16D FACENAILS AND TOENAILS
	TOP & SOLE PLATE TO STUD	END NAIL W/ (2) 16D
	STUD TO SOLE AND TOP PLATE	TOENAIL W/ (4) 8D
	DOUBLE TOP PLATES	FACENAIL W/ 16D @ 16" OC
	DOUBLE TOP PLATE LAP SPLICE	FACENAIL W/ (8) 16D
	TOP PLATE LAPS & INTERSECTIONS	FACENAIL W/ (2) 16D
WALLS	DOUBLE STUDS	FACENAIL W/ 16D @ 24" OC
	BUILT-UP CORNER STUDS	FACENAIL W/ 16D - 2 ROWS @ 24" OC
	STEEL "X" BRACING	FACENAIL W/ (2) 16D IN EACH TOP & BOTTOM PLATE & (1) 8D PER STUD
	SOLE PLATE TO JOIST OR BLOCKING	FACENAIL W/ 16D @ 16" OC
	SOLE PLATES TO JOIST OR BLOCKING AT BRACED WALL LINES, PERPENDICULAR TO FRAMING	FACENAIL W/ (3) 16D @ 16" OC ALONG BRACED WALL PANEL
	TOP PLATE TO JOIST OR BLOCKING AT BW LINES, PERPENDICULAR TO FRAMING	TOENAIL W/ 8D @ 6" OC ALONG BRACED WALL PANEL
	SOLE PLATES TO JOIST OR BLOCKING AT BW LINES PARALLEL TO FRAMING, BLOCKING @ 16" OC	FACENAIL W/ (3) 16D @ 16" OC ALONG BW PANEL & AT EACH BLOCK
	TOP PLATE TO JOIST OR BLOCKING AT BW LINES, PARALLEL TO FRAMING, BLOCKING @ 16" OC	TOENAIL W/ 8D @ 6" OC ALONG BW PANEL & AT EACH BLOCK
	NON-STRUCT. SIDING OVER STRUCT. SHEATHING	(1) 6D BOX NAIL IN EACH STUD
	FIBER CEMENT PLANK SIDING	(1) 6D GALVANIZED NAIL IN EACH STUD
WALLS	WINDOW INSTALLATION ALLOWING	1 3/4" - 2" ROOFING NAILS @ 12" OC MAX.

* JOIST HANGER NOTES: 1) NO JOIST HANGER NAILS ALLOWED FOR TOENAILS, 2) NO GUN NAILS OR SCREWS ALLOWED IN CONNECTORS, 3) TOENAILS SHALL ALWAYS BE A FULL 3" OR 3.5" NAIL

COLUMN CONNECTION TO STEEL BEAMS SHALL BE WITH A CLIP POST CAP WITH ALL FOUR TAB ENDS 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"x2" 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.

DUCT SEALING METHOD, PER IRC2018 W1103.3.2

N1103.2.2 (R403.2.2) SEALING (MANDATORY) DUCTS, AIR HANDLERS, AND FILTER BOXES SHALL BE SEALED. JOINTS AND SEAMS SHALL COMPLY WITH SECTION M1601.4.1 OF THIS CODE.

EXCEPTIONS:

1. AIR-IMPERMEABLE SPRAY FOAM 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. CONTINUOUSLY WELDED 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.

DUCT TIGHTNESS SHALL BE VERIFIED BY EITHER OF THE FOLLOWING:

1. POST CONSTRUCTION TEST: TOTAL LEAKAGE SHALL NOT BE LESS THAN OR EQUAL TO 4 CFM (113.3 L/MIN) PER 100FT² (9.29m²) OF CONDITIONED FLOOR AREA WHEN TESTED AT A PRESSURE DIFFERENTIAL OF 0.1 INCHES W.G. (25 Pa) ACROSS THE ENTIRE SYSTEM, INCLUDING THE MANUFACTURER'S AIR HANDLER ENCLOSURE. ALL REGISTER BOOTS SHALL BE TAPED OR OTHERWISE SEALED DURING THE TEST.

2. ROUGH-IN TEST: TOTAL AIR LEAKAGE SHALL NOT BE LESS THAN OR EQUAL TO 4 CFM (113.3 L/MIN) PER 100FT² (9.29m²) OF CONDITIONED FLOOR AREA WHEN TESTED AT A PRESSURE DIFFERENTIAL OF 0.1 INCHES W.G. (25 Pa) ACROSS THE ENTIRE SYSTEM, INCLUDING THE MANUFACTURER'S AIR HANDLER ENCLOSURE. ALL REGISTERS SHALL BE TAPED OR OTHERWISE SEALED DURING THE TEST. IF THE AIR HANDLER IS NOT INSTALLED AT THE TIME OF THE TEST, TOTAL AIR LEAKAGE SHALL BE LESS THAN OR EQUAL TO 3 CFM (85 L/MIN) PER 100FT² (9.29m²) 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:

- PLANS SHALL COMPLY WITH THE 2018 INTERNATIONAL RESIDENTIAL CODE, IECC AS ADOPTED BY AHJ, AND ALL AMENDMENTS AS ADOPTED BY THE AHJ. IF ANY CHANGES OR DEVIATIONS ARE MADE FROM THESE PLANS THE CONTRACTOR SHALL NOTIFY THE APPROPRIATE AUTHORITY AND THE ENGINEER TO EVALUATE THE CHANGES AND MAKE ANY APPROPRIATE MODIFICATIONS TO THE PLANS.
- WHERE DISCREPANCIES EXIST BETWEEN THE STANDARD COMMENTS, NOTES FOR THE DESIGN PROFESSIONAL OR THE CODE, THE MOST RESTRICTIVE SHALL APPLY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE OWNER/ARCHITECT 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/AHJ MINIMUM DESIGNS 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 HD ENGINEERING OR A PROFESSIONAL REFERRED BY HD ENGINEERING SHALL RELEASE HD ENGINEERING FROM ALL LIABILITY ASSOCIATED WITH THIS DESIGN.
- 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 POTENTIAL FILL MATERIAL OR A POTENTIAL SOIL BEARING CAPACITY BELOW 1500 PSF SHOULD BE EVALUATED BY OUR FIRM OR AN HD ENGINEERING REFERRED 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 CONSENT/REQUEST OF THE OWNER/BUILDER. 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.
- 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.

FOUNDATION NOTES:

- THE FOUNDATION DESIGN SHALL COMPLY WITH THE ENFORCING JURISDICTION RESIDENTIAL FOUNDATION STANDARD IN LIEU OF ENGINEERING REPORT REQUIREMENTS BASED ON ACTUAL SITE CONDITIONS.
- FOUNDATION WALLS SHALL BE DAMP-PROOFED PER IRC SECTION R406.
- 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 6" 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.
- FOUNDATION DESIGN SHALL BE BASED ON A MINIMUM SOIL BEARING CAPACITY OF 1500 PSF.
- FOOTINGS SHALL BE A MIN. OF 16" WIDE AND 8" DEEP W/ (2) #4 BARS CONTINUOUS, LOCATED A MIN. OF 3" CLEAR FROM BOTTOM. FOOTINGS SHALL BE A MINIMUM OF 36" BELOW GRADE FOR FROST PROTECTION.
- COLUMN PADS SHALL BE A MINIMUM OF 24"x24"x8" WITH (3) #4 BARS EACH WAY.
- FOUNDATION WALLS SHALL BE A MINIMUM 8" THICK W/ MINIMUM #4 BARS @ 24" O.C. HORIZONTAL AND VERTICAL W/ THE TOP BAR WITHIN 8" OF THE TOP OF THE WALL UNLESS NOTED OTHERWISE ON PLAN.
- REINFORCEMENT SHALL LAP A MINIMUM OF 24"
- INTERIOR BEARING WALLS AND COLUMNS SHALL BE ISOLATED FROM THE BASEMENT FLOOR SLAB.
- 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".
- CONCRETE FLOOR SLABS ON GRADE, SHALL BE A MINIMUM 4" THICK OVER A MINIMUM 4" BASE OF SAND, GRAVEL, OR CRUSHED STONE. BASEMENT SLABS SHALL HAVE A MIN. 6 MIL POLYETHYLENE OR APPROVED VAPOR RETARDER WITH JOINTS LAPPED NOT LESS THAN 6" SHALL BE PLACED BETWEEN THE FLOOR SLAB AND THE BASE COURSE.
- FLOOR SLABS SUPPORTED BY FILL CONSISTING OF MORE THAN 24" OF GRANULAR FILL OR 8" OF EARTH SHALL BE REINFORCED PER A SEPARATE ENGINEERING DESIGN.
- BASEMENT FOUNDATION SILL PLATES SHALL BE BOLTED TO THE FOUNDATION W/ A MINIMUM OF 1/2" ANCHOR BOLTS EMBEDDED AT LEAST 7" INTO THE CONCRETE AND SPACED NOT MORE THAN 3' ON CENTER AND WITHIN 12" OF EACH END PIECE PER IRC SECTION R403.1.6.
- FOUNDATION WINDOW WELLS FOR SECONDARY MEANS OF EGRESS SHALL PROVIDE A MINIMUM 3'X3' HORIZONTAL AREA.
- 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 BEARING LEVEL BECOME EXCESSIVELY DRY OR SALT-CONTAMINATED, WE RECOMMEND THAT THE AFFECTED MATERIAL BE REMOVED 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. UNSUITABLE AREAS IDENTIFIED AT THIS TIME SHOULD BE CORRECTED. CORRECTIVE PROCEDURES WOULD BE DEPENDENT UPON CONDITIONS ENCOUNTERED AND MAY INCLUDE DEEPENING OF FOUNDATION ELEMENTS, OR UNDERCUTTING OF UNSUITABLE MATERIALS AND REPLACEMENT WITH ENGINEERED FILL.

STAIRWAY NOTES:

- STAIRWAYS SHALL PROVIDE A MAXIMUM 7 3/4" RISE AND MIN. 10" RUN.
- PROVIDE MINIMUM 36" GUARDRAILS ON THE OPEN SIDES OF RAISED FLOORS, PORCHES AND BALCONIES. MINIMUM 34" GUARDRAILS ON THE OPEN SIDES OF STAIRWAYS LOCATED MORE THAN 30" ABOVE THE FLOOR OR GRADE BELOW. GUARDRAIL ENCLOSURES SHALL HAVE INTERMEDIATE RAILS OR ORNAMENTAL PATTERNS THAT DO NOT ALLOW PASSAGE OF A SPHERE 4" IN DIAMETER.
- EACH STAIRWAY OF 3 OR MORE RISERS SHALL PROVIDE A CONTINUOUS HANDRAIL ON AT LEAST ONE SIDE BETWEEN 34" AND 38" ABOVE THE NOSING OF THE TREADS. HANDRAILS SHALL HAVE A CIRCULAR CROSS-SECTION OF 1 1/4" MINIMUM TO 2" MAXIMUM OR OTHER APPROVED GRASPABLE SHAPE PER IRC SECTION R311.7.8.5
- PROVIDE A MINIMUM 6'-8" OF HEADROOM CLEARANCE IN STAIRWAYS.
- ENCLOSED ACCESSIBLE SPACE UNDER STAIRWAYS SHALL HAVE WALLS AND THE UNDERSIDE OF THE STAIR AND LANDING PROTECTED WITH 1/2" GYPSUM BOARD ON ENCLOSURE SIDE.
- WINDERS SHALL PROVIDE A MINIMUM TREAD OF AT LEAST 6" AT ANY POINT WITHIN CLEAR WIDTH OF STAIRS. WINDER TREAD PROPORTION TO COMPLY WITH IRCR311.7.5.2.1.

GLAZING NOTES:

- 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 WHOSE BOTTOM EDGE IS WITHIN 60" OF THE FLOOR, WALLS ENCLOSEING STAIRWAYS AND LANDINGS WHERE THE GLAZING IS WITHIN 60" OF THE TOP OR BOTTOM OF THE STAIR, ENCLOSURES FOR SPAS, TUBS, SHOWERS AND WHIRLPOOLS, GLAZING IN FIXED OR OPERABLE PANELS EXCEEDING 9 S.F. AND WHOSE BOTTOM EDGE IS LESS THAN 18" ABOVE THE FLOOR OR WALKING SURFACE WITHIN 36"
- IN DWELLING UNITS, WHERE THE OPENING OF AN OPERABLE WINDOW IS LOCATED MORE THAN 72 INCHES ABOVE THE FINISHED GRADE OR SURFACE BELOW, THE LOWEST PART OF THE CLEAR OPENING OF THE WINDOW SHALL BE A MINIMUM OF 24 INCHES ABOVE THE FINISHED FLOOR OF THE ROOM IN WHICH THE WINDOW IS LOCATED. OPERABLE SECTIONS OF WINDOWS SHALL NOT PERMIT OPENINGS THAT ALLOW PASSAGE OF A 4 INCH DIAMETER SPHERE WHERE SUCH OPENINGS ARE LOCATED WITHIN 24 INCHES OF THE FINISHED FLOOR.

FRAMING NOTES:

- ALL LUMBER SIZES ARE FOR DOUGLAS FIR-LARCH UNLESS OTHERWISE NOTED.
- ALL HEADERS TO BE A MINIMUM OF (2) #2-2X10'S UNLESS OTHERWISE NOTED.
- BLOCK CANTILEVERS, DOOR JAMBS, AND OVER BEAMS.
- ALL HEADERS/BEAMS TO BEAR ON A MINIMUM OF (2) 2X4 POSTS UNLESS NOTED OTHERWISE.
- INTERIOR NON-BEARING WALLS, OTHER THAN THOSE RESTING DIRECTLY ON THE FOOTING SHALL BE ISOLATED FROM THE FLOOR FRAMING ABOVE.
- WHERE JOISTS RUN PARALLEL TO FOUNDATION WALLS, SOLID BLOCKING FOR A MINIMUM OF (2) JOIST SPACES SHALL BE PROVIDED AT A MAXIMUM OF 4' CENTERS TO TRANSFER LATERAL LOADS ON THE WALL TO THE FLOOR DIAPHRAGM. THE BLOCKING SHALL BE SECURELY NAILED TO THE JOISTS AND FLOORING. NAIL JOISTS AND BLOCKING TO SILL PLATE WITH (4) 10D NAILS.
- IF DUCTS ARE INSTALLED IN THE FIRST JOIST SPACE(S), NAIL 2X4'S FLAT AT 4' CENTERS WITHIN THE JOIST SPACE(S) AND THEN PROVIDE SOLID BLOCKING, INSTALLED UPRIGHT, IN THE NEXT TWO JOIST SPACES. SECURE THE 2X4'S TO THE SILL PLATE WITH (4) 10D NAILS.
- ALL SILLS AND SLEEPERS SUPPORTED ON CONCRETE OR MASONRY AND FURRING ATTACHED TO CONCRETE OR MASONRY SHALL BE OF DECAY RESISTANT MATERIALS.
- JOISTS UNDER BEARING PARTITIONS SHALL BE SIZED TO CARRY THE DESIGN LOAD IN ACCORDANCE WITH IRC SECTION R502.4.
- JOISTS FRAMING FROM OPPOSITE SIDES OVER BEARING SUPPORTS SHALL LAP A MINIMUM OF 3" AND SHALL BE NAILED TOGETHER WITH A MINIMUM 10D FACE NAILS.
- JOISTS FRAMING INTO A WOOD GIRDER OR BEAM SHALL BE SUPPORTED BY APPROVED FRAMING ANCHORS OR ON MINIMUM 2"x2" LEDGER STRIPS.
- 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 3' FROM THE TRIMMER JOIST BEARING. WHEN THE HEADER SPAN EXCEEDS 4', THE HEADER AND TRIMMER SHALL BE DOUBLED.
- JOISTS AT SUPPORTS SHALL BE SUPPORTED Laterally AT THE ENDS BY FULL-DEPTH SOLID 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.
- ALL WALL COVERINGS TO COMPLY WITH IRC SECTION 702 AND 703
- ALL RAFTER / COLLAR TIES TO COMPLY WITH IRC SECTIONS 804
- ALL RAFTERS TO HAVE 2x4 COLLAR TIES @ 48" OC IN UPPER 1/3 OF DISTANCE BETWEEN CEILING AND ROOF
- BLOCKING BETWEEN JOISTS UNDER A PERPENDICULAR LOAD-BEARING WALL IS NOT REQUIRED.
- BOTTOM OF ALL FLOOR ASSEMBLIES SHALL BE PROVIDED WITH A 1/2" GYPSUM WALLBOARD MEMBRANE (IF REQUIRED BY LOCAL CODE)
- I-JOIST AND FLOOR TRUSS SYSTEMS SHALL BE FIRE PROTECTED PER IRC AS ADOPTED BY AHJ
- STUDS SHALL BE CONTINUOUS FROM THE FLOOR TO THE ROOF/ CEILING DIAPHRAGM PER IRC 602.3

CONCRETE NOTES:

- 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:

- PROVIDE ONE WINDOW FOR EACH BEDROOM THAT HAS A

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")	TOE NAIL
2	CEILING JOISTS TO PLATE, TOE NAIL	3-10D (3"X0.128") 3-3"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" X0.135") 3-10D COMMON NAILS (3" X 0.148") 4-10D BOX (3" X 0.128") 4-3" X0.131" NAILS	2 TOE NAILS ON ONE SIDE AND 1 TOE NAIL ON OPPOSITE SIDE OF EACH RAFTER OR TRUSS ¹
7	ROOF FASTENERS 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 3-16D(3 1/2" X0.135"); OR 2-16D COMMON (3 1/2" X0.162") 3-10D BOX (3" X 0.128"); OR 3-3" X 0.131" NAILS	TOE NAIL
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 16D COMMON (3 1/2" X 0.162")	12" OC FACE NAIL 16" 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" X0.162"); or 4-3" 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" X0.135"); or 4-8D COMMON (2 1/2" X0.131");or 4-10D BOX (3" X0.128"); or 3-3" X 0.131" NAILS 3-16D BOX (3 1/2" X 0.135"); or 2-16D COMMON (3 1/2" X0.162"); or 3-10D BOX (3" X0.128");or 3-3" X 0.131" NAILS	TOE NAIL END NAIL
17	TOP PLATES, LAPS AT CORNERS AND INTERSECTIONS	3-10D BOX (3" X 0.128"); or 2-16D COMMON (3 1/2" X0.162"); or 3-3" X 0.131" NAILS	FACE NAIL
18	1" BRAVE TO EACH STUD AND PLATE	3-8D BOX (2 1/2" X 0.113"); or 2-8D COMMON (2 1/2" X0.131") or 2-10D BOX (3" X 0.128"); or 2 STAPLES 1 3/4"	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" X0.131") or 2-10D BOX (3" X 0.128"); or 2 STAPLES 1" CROWN, 16GA., 1 3/4" LONG	FACE NAIL
20	1" X 8" AND WIDER SHEATHING TO EACH BEARING	3-8D BOX (2 1/2" X 0.113"); or 3-8D COMMON (2 1/2" X0.131") or 3-10D BOX (3" X 0.128"); or 3 STAPLES, 1" CROWN, 16GA., 1 3/4" LONG WIDER THAN 1" X 8" 4-8D BOX (2 1/2" X 0.113"); or 3-8D COMMON (2 1/2" X0.131") or 3-10D BOX (3" X 0.128"); or 4 STAPLES, 1" CROWN, 16GA., 1 3/4" LONG	FACE NAIL
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" X0.131") 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" X0.128") 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" X0.131") or 3-10D 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" X0.162")	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" X0.162")	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" X0.128") 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 AND: 2-20D COMMON (4" X 0.192"); or 3-10D BOX (3" X 0.128; or 3-3" 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 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 (20D COMMON), NAILS FOR SHANK DIAMETERS LARGER THAN 0.42 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. FOUR FOOT BY 6 FOOT OR 4 FOOT BY 6 FOOT PANELS SHALL BE NIPLED 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, 8D DEFORMED (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 110 MPH OR LESS, NAILS FOR ATTACHING WOOD STRUCTURAL PANEL ROOF SHEATHING TO GABLE END WALL FRAMING SHALL BE SPACED 6 INCHES ON CENTER, WHEN BASIC WIND SPEED IS GREATER THAN 100 MPH, NAILS FOR ATTACHING PANEL ROOF SHEATHING TO INTERMEDIATE SUPPORTS SHALL BE SPACED 6 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 FIBERBOARD 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 REQUIRED 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 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 ^f
31	19/32" - 1"	8D COMMON NAIL (2 1/2" X 0.131; or RSR5-01; 2 3/8" X 0.113) NAIL ROOF)	6	12 ^f
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 ^d	1 1/2" GALVANIZED ROOF NAIL, STAPLE GALVANIZED, 11/2" LONG; 1 1/4" SCREWS, TYPE W or S	7	7
36	5/8" GYPSUM SHEATHING ^d	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 St: 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 ^a (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 ST: 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 4 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

CATHEDRAL / VAULTED CEILING
FRAMING AND INSULATION

MINIMUM R-38 INSULATION REQUIRED, SEE DETAIL 14/S-1.2

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"

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

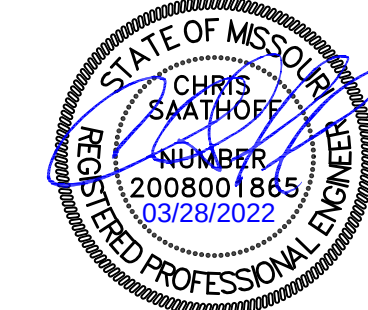
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11655 W. 75TH STREET
SHAWNEE, KS 66214

WWW.HDENGINEERS.COM

913.631.2222
SERVICE@HDENGINEERS.COM



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ELLENBROOK II WOMU - HFR089
2030 SW HARVEST MOON LN., KANSAS CITY, MO

STRUCTURAL DETAILS & NOTES

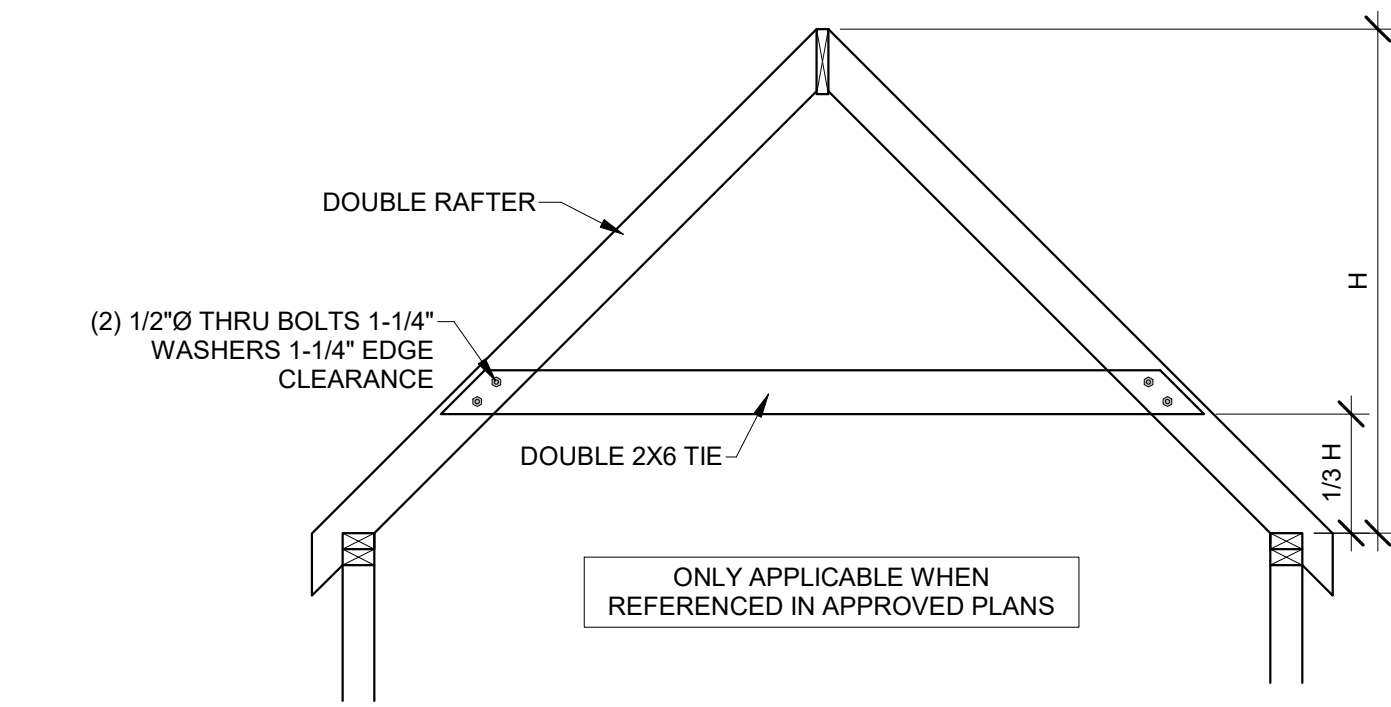
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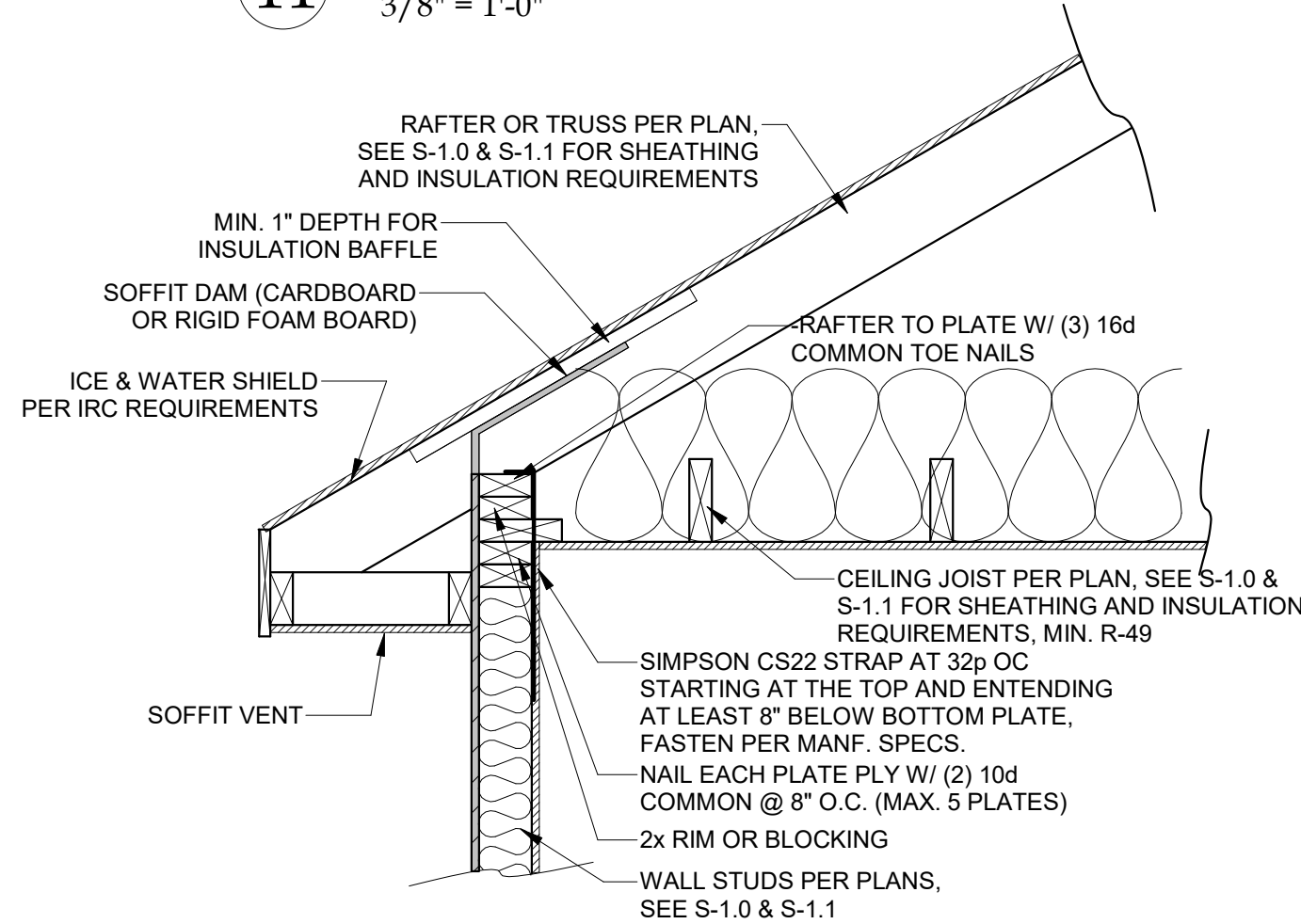
NO.	ISSUE/REVISION	Revision Date

GENERAL NOTES

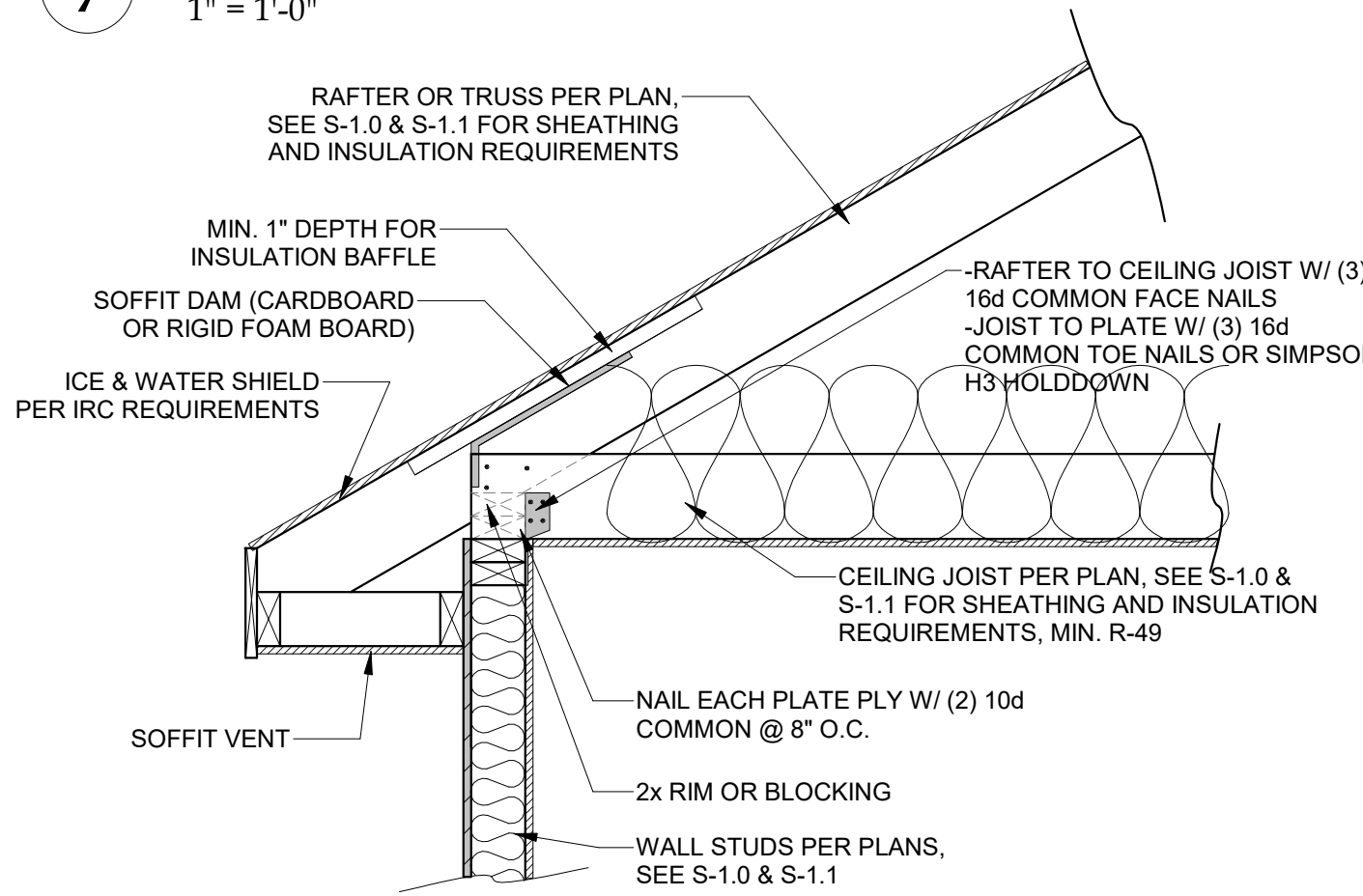
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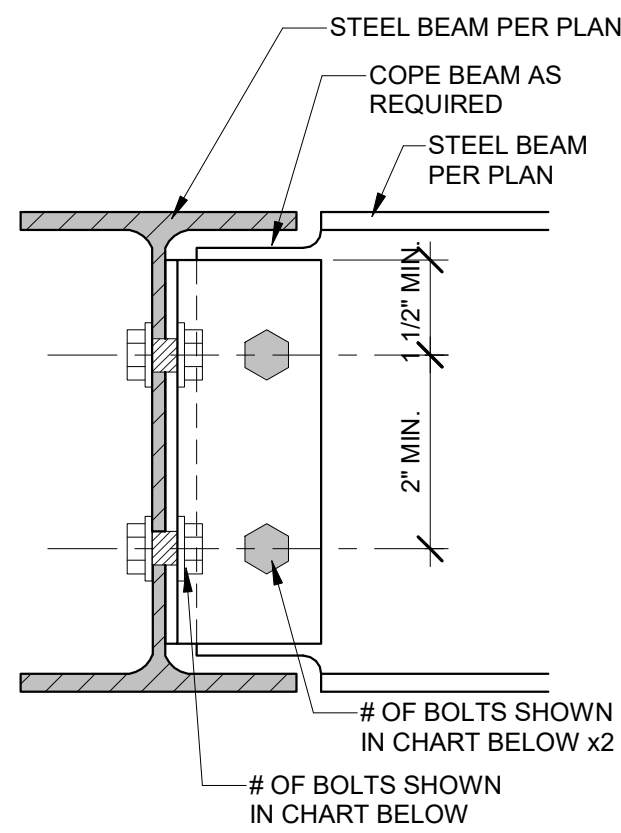
11 HIP SUPPORT FRAME
3/8" = 1'-0"



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

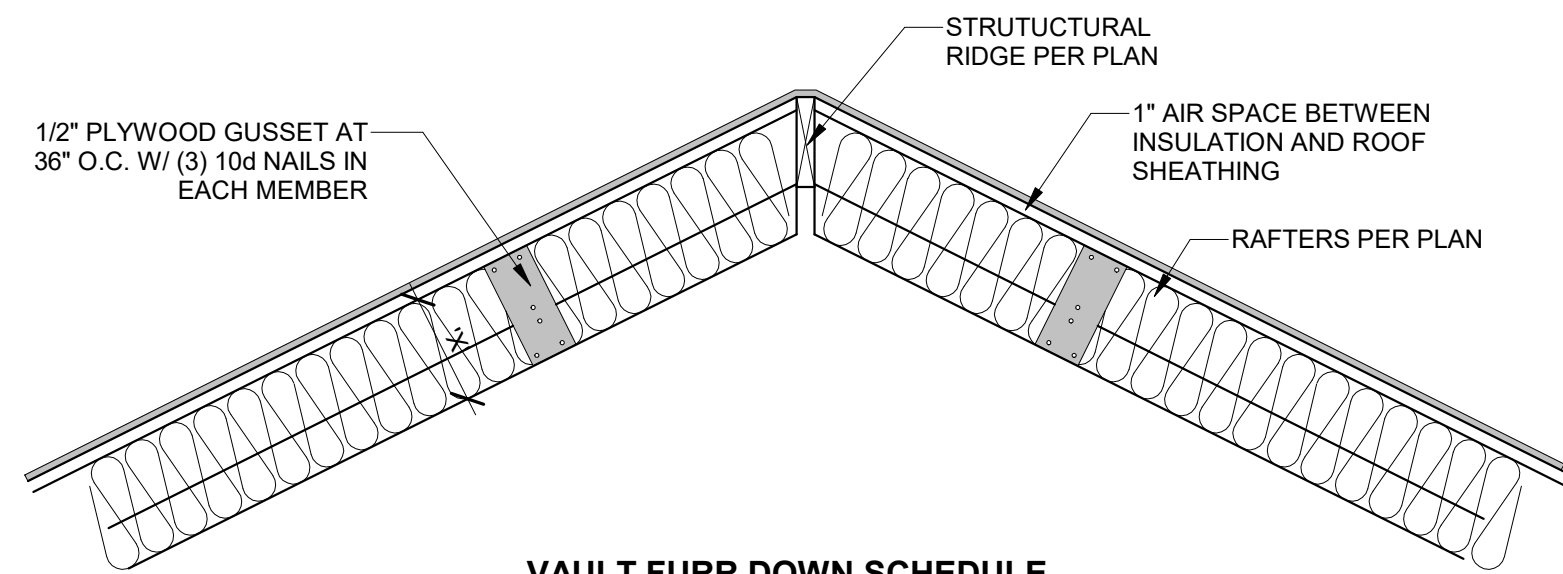


6 OPTION 3 RAFTER BEARING
1" = 1'-0"



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

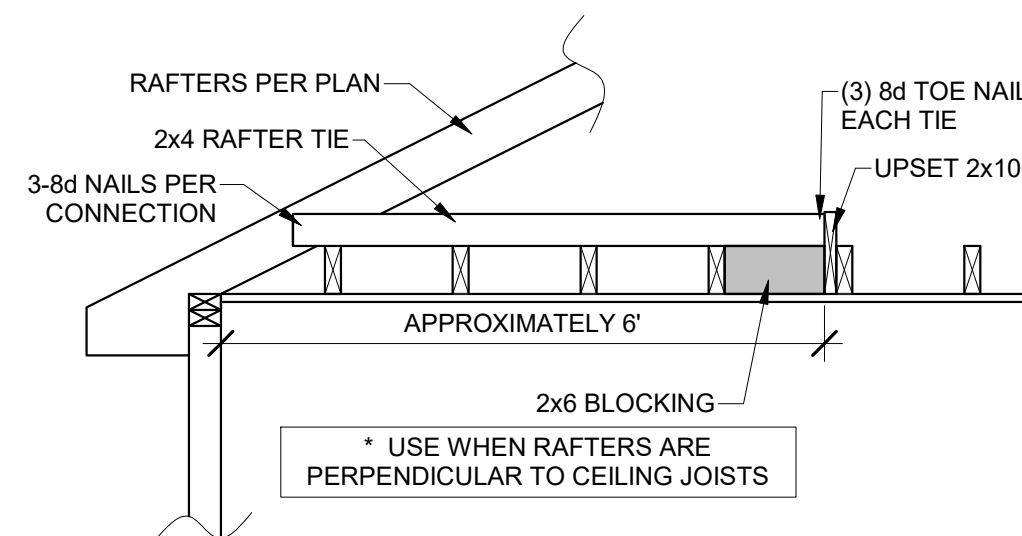
HIP/ VALLEY ALLOWABLE SPAN TABLE						
TYPE	MAX. UNSUPPORTED SPAN					
	2x8	2x10	2x12	1 3/4"x9 1/2" LVL	1 3/4"x11 7/8" LVL	
HIP RAFTER	11'-3"	13'-3"	15'-2"	15'-8"	18'-2"	
VALLEY RAFTER	8'-11"	10'-6"	12'-0"	13'-2"	15'-3"	



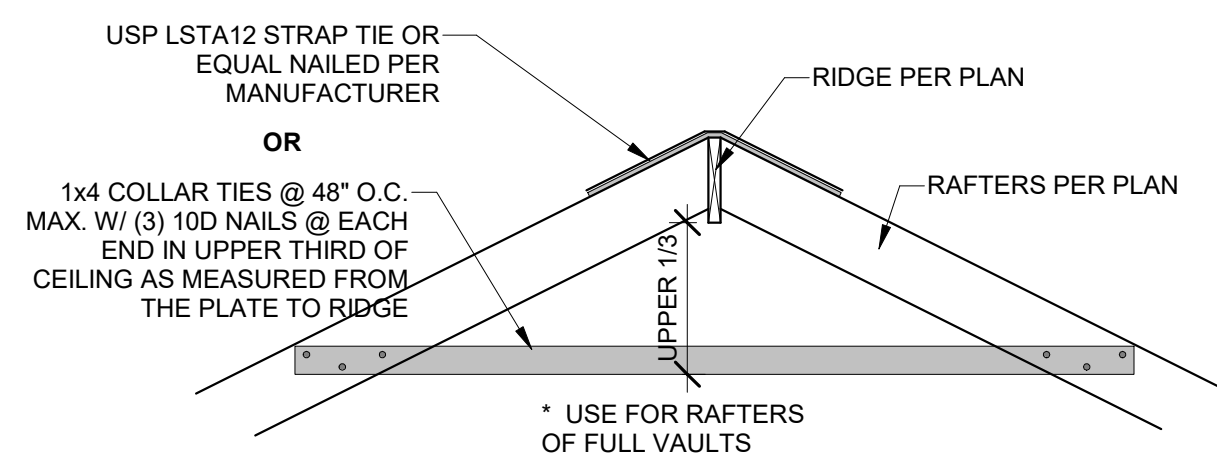
VAULT FURR DOWN SCHEDULE			
RAFTER SIZE	R-30C INSULATION (X = 9 1/4")	R-38C INSULATION (X = 11 1/4")	
2x6	2x6	2x8	
2x8	2x4	2x6	
2x10	NOT REQUIRED	2x4	
2x12	NOT REQUIRED	2x2	

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"



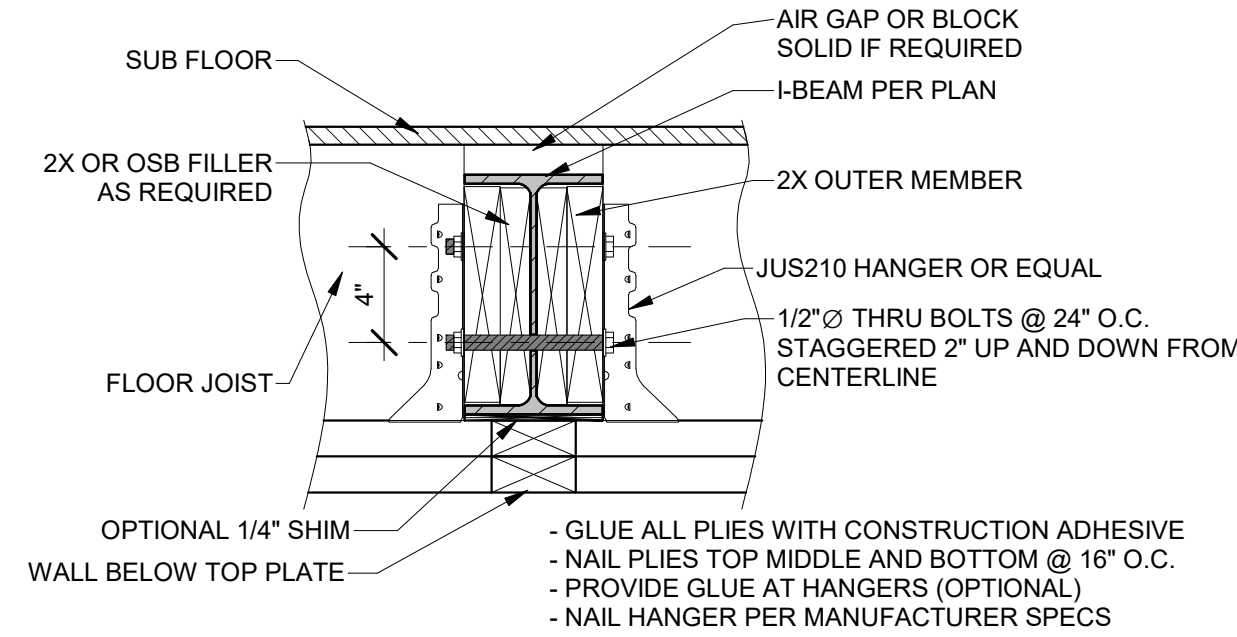
12 RAFTER TIE CONNECTION
1/2" = 1'-0"



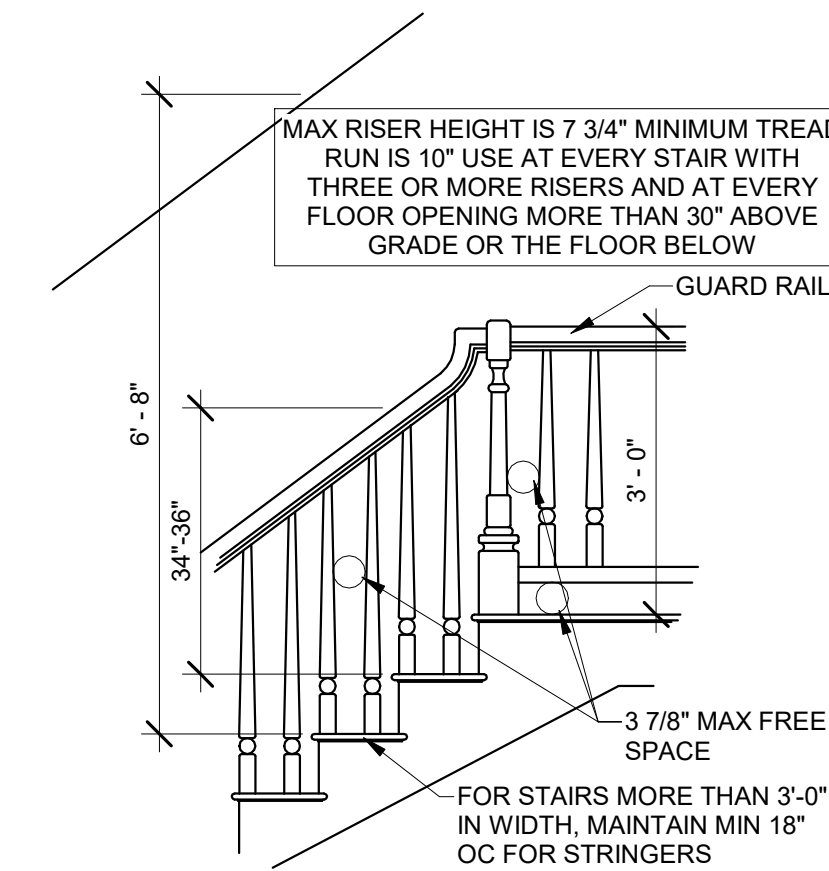
13 RIDGE SUPPORT
1/2" = 1'-0"

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

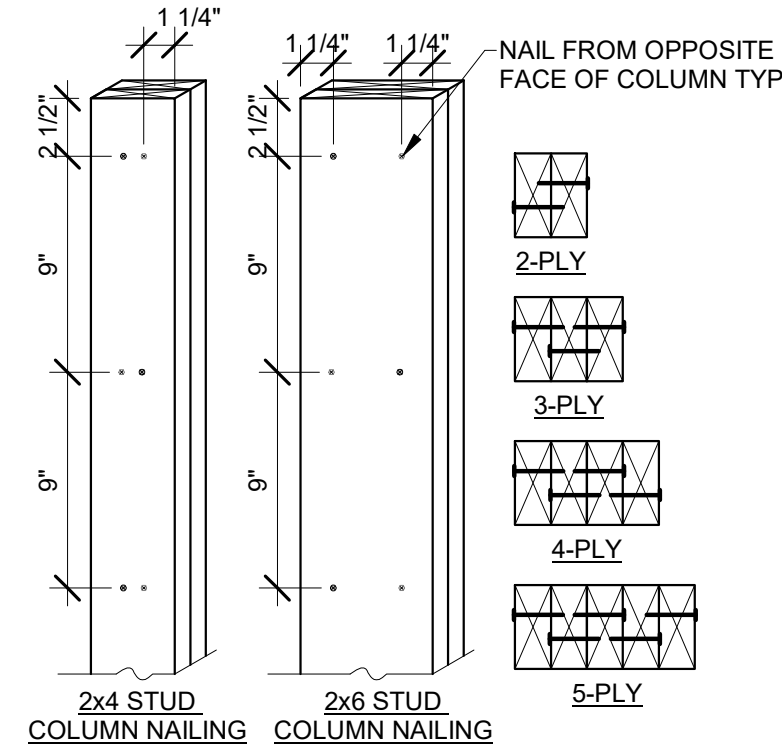
NOTES:
1. NUMBER OF BOLTS DETERMINED BY SMALLER OF TWO BEAMS BEING CONNECTED
2. ALL BOLTS, 3/4" DIAMETER A325-N, UNO
3. FULL PERIMETER 1/4" FILLET WELD MAY BE SUBSTITUTED FOR EITHER OR BOTH BOLTED CONNECTIONS



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

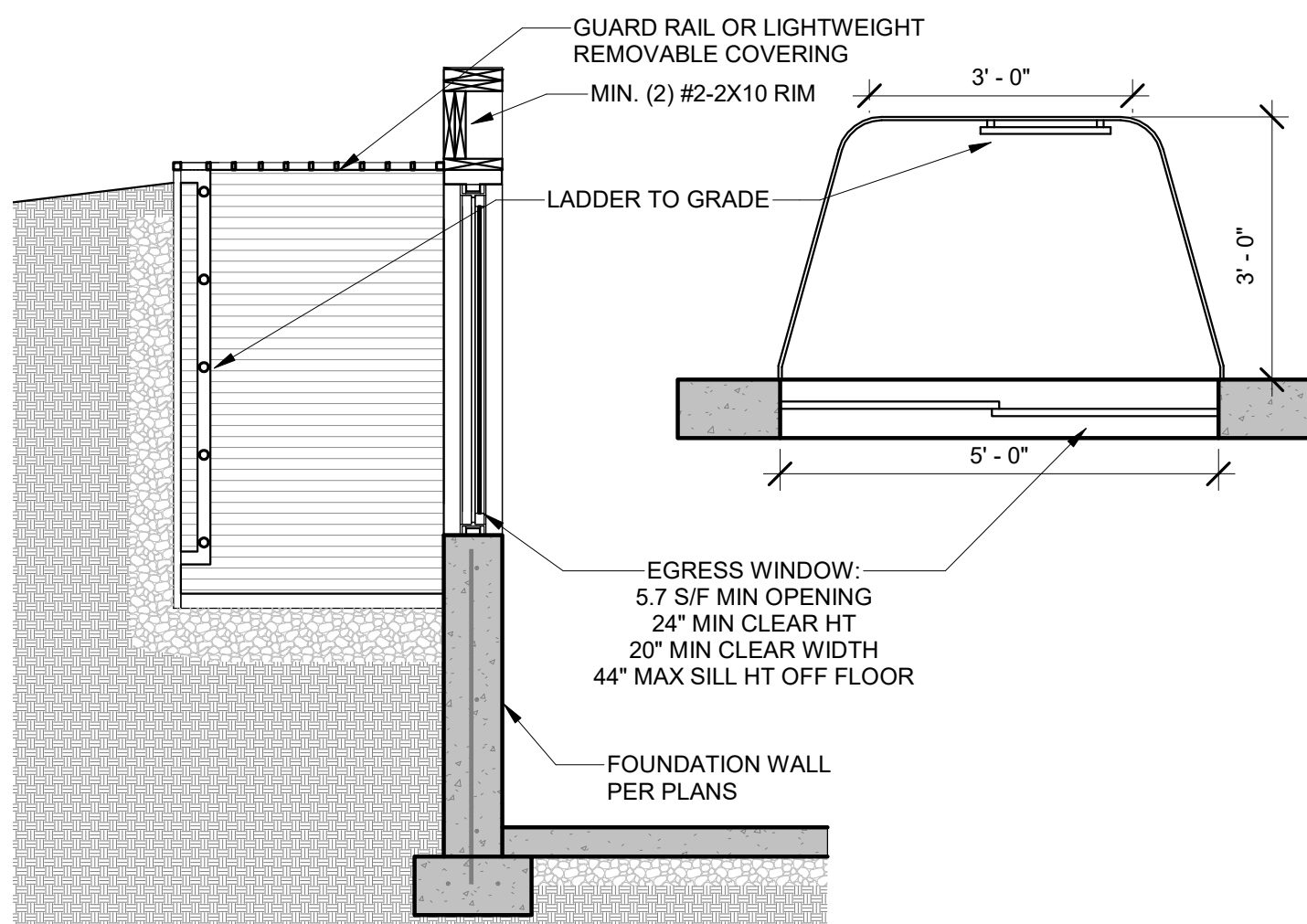


4 STAIR/ RAIL DETAIL
1/2" = 1'-0"

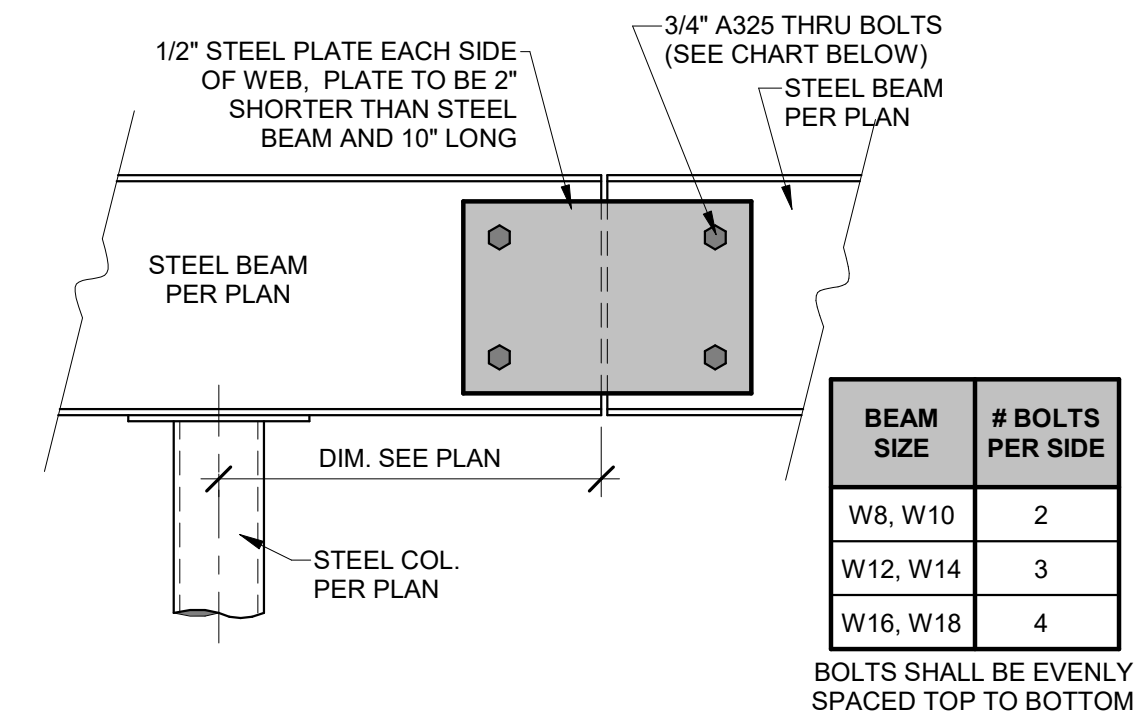


NOTES:
1. EACH 2x PLY SHALL BE FASTENED WITH (1) ROW OF 10d NAILS AT 9" O.C. ALTERNATING SIDE TO SIDE
2. 1 1/4" MIN. EDGE DISTANCE, AND STARTING 2 1/2" FROM EACH END.
3. EXTEND FULL AREA OF COLUMN AS SOLID BLOCKING THROUGH JOIST BAYS AND WALLS TO LOAD-BEARING BEAM/WALL BELOW.

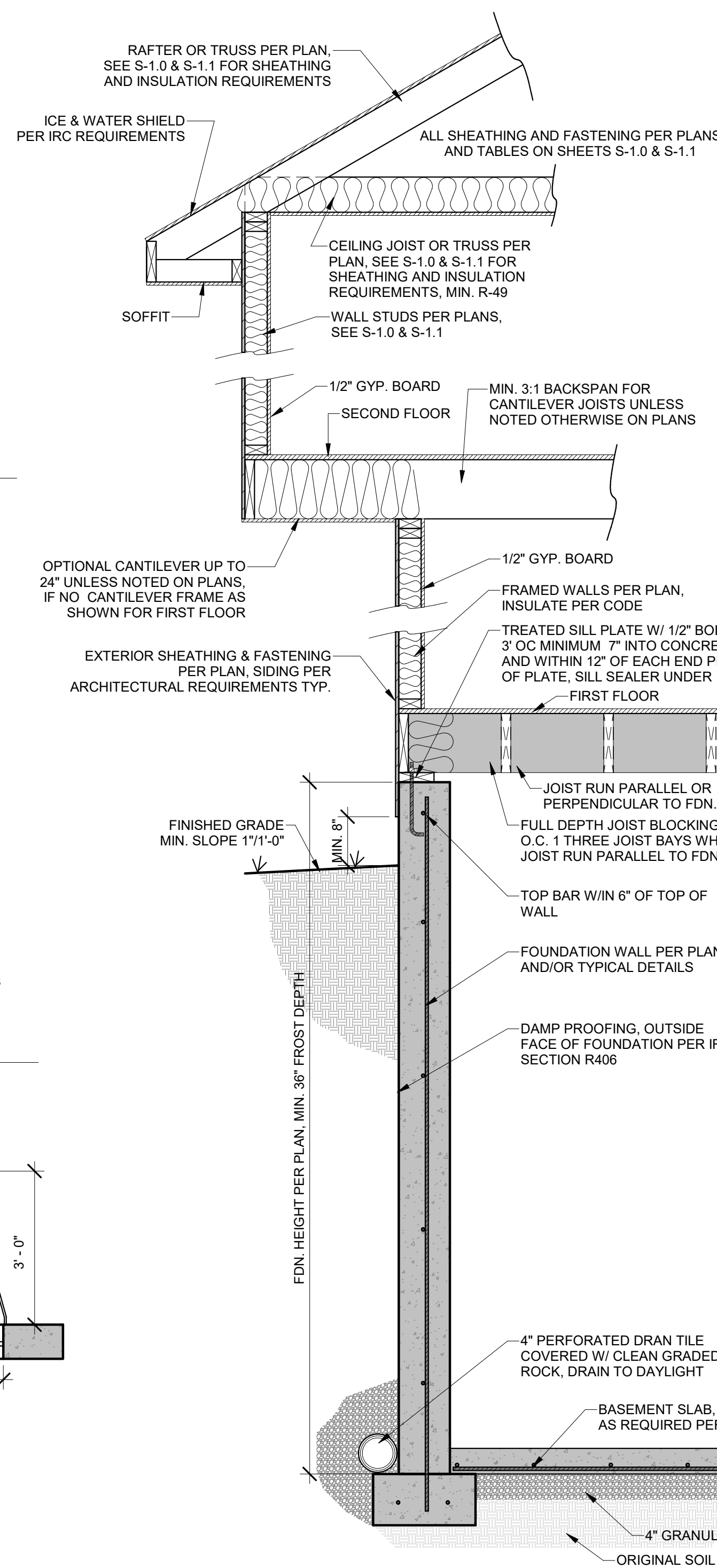
3 BUILT-UP STUD COLUMN
1 1/2" = 1'-0"



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



9 STEEL BEAM SPLICE DETAIL
1 1/2" = 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 .

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

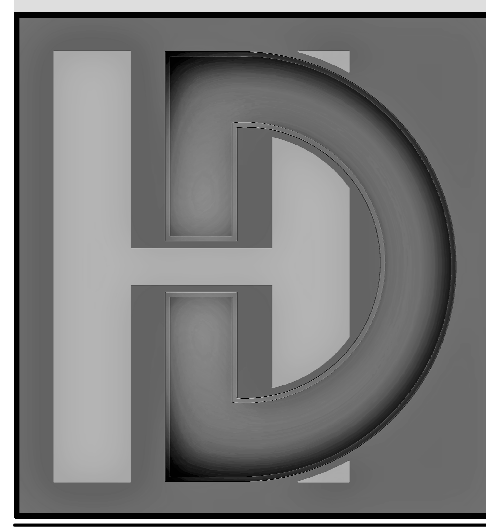
HD ENGINEERING & DESIGN, INC

11656 W. 75TH STREET
SHAWNEE, KS 66214

WWW.HDENGINEERS.COM

913.631.2222

SERVICE@HDENGINEERS.COM



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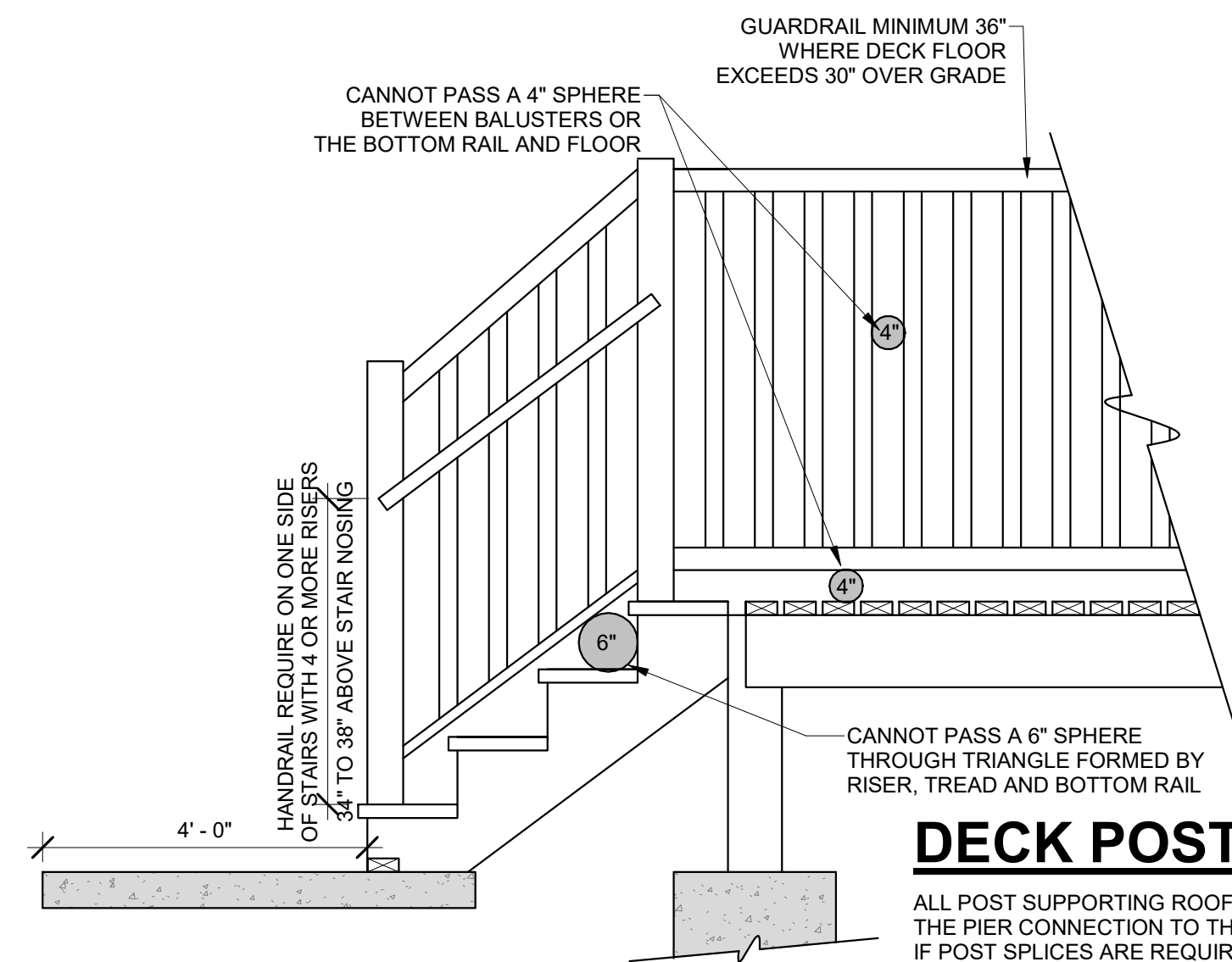
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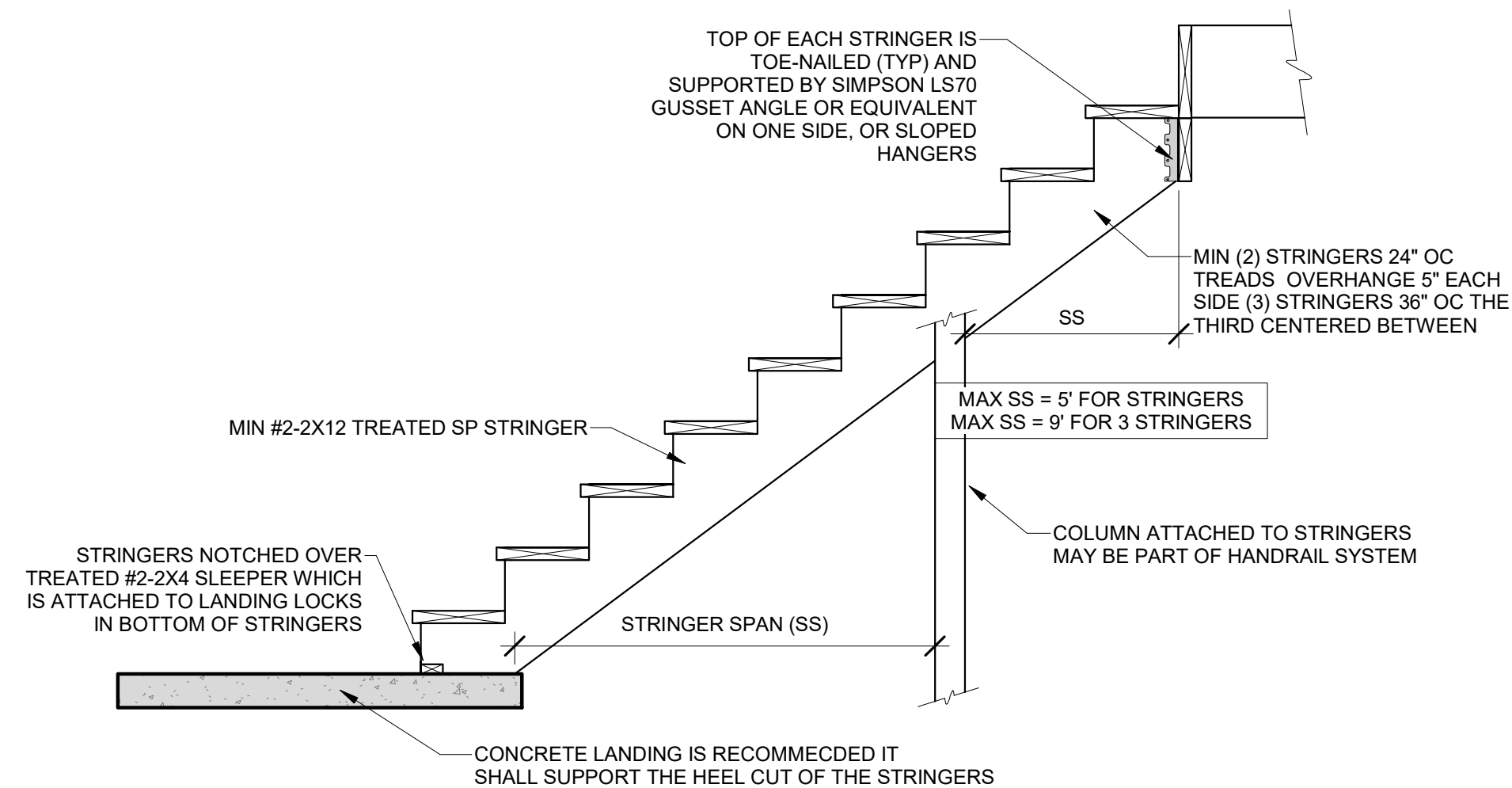
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FRAMING SECTIONS

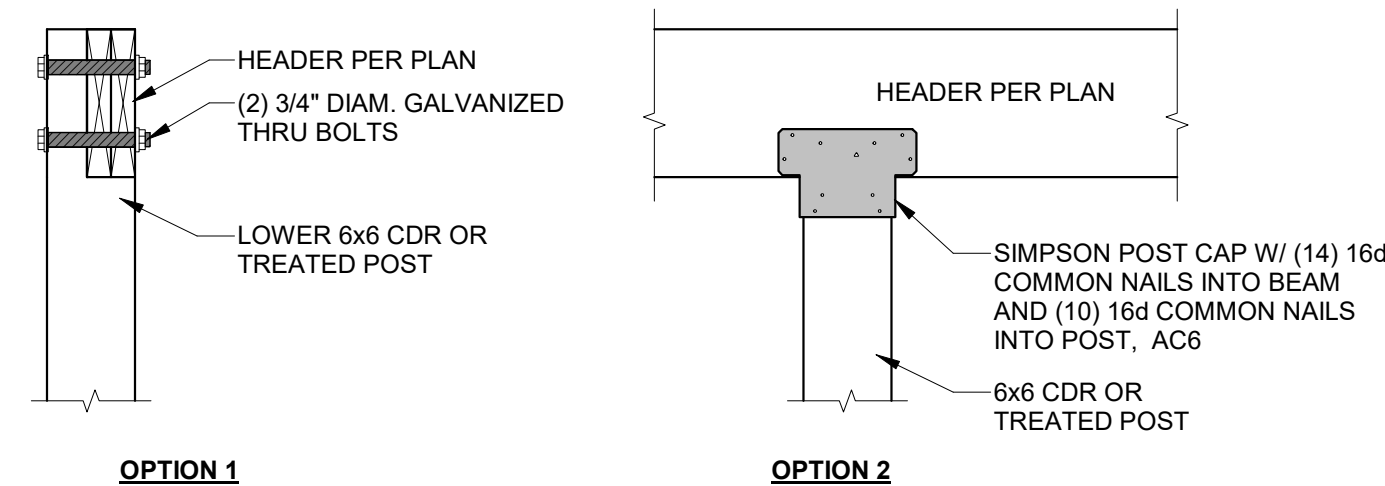
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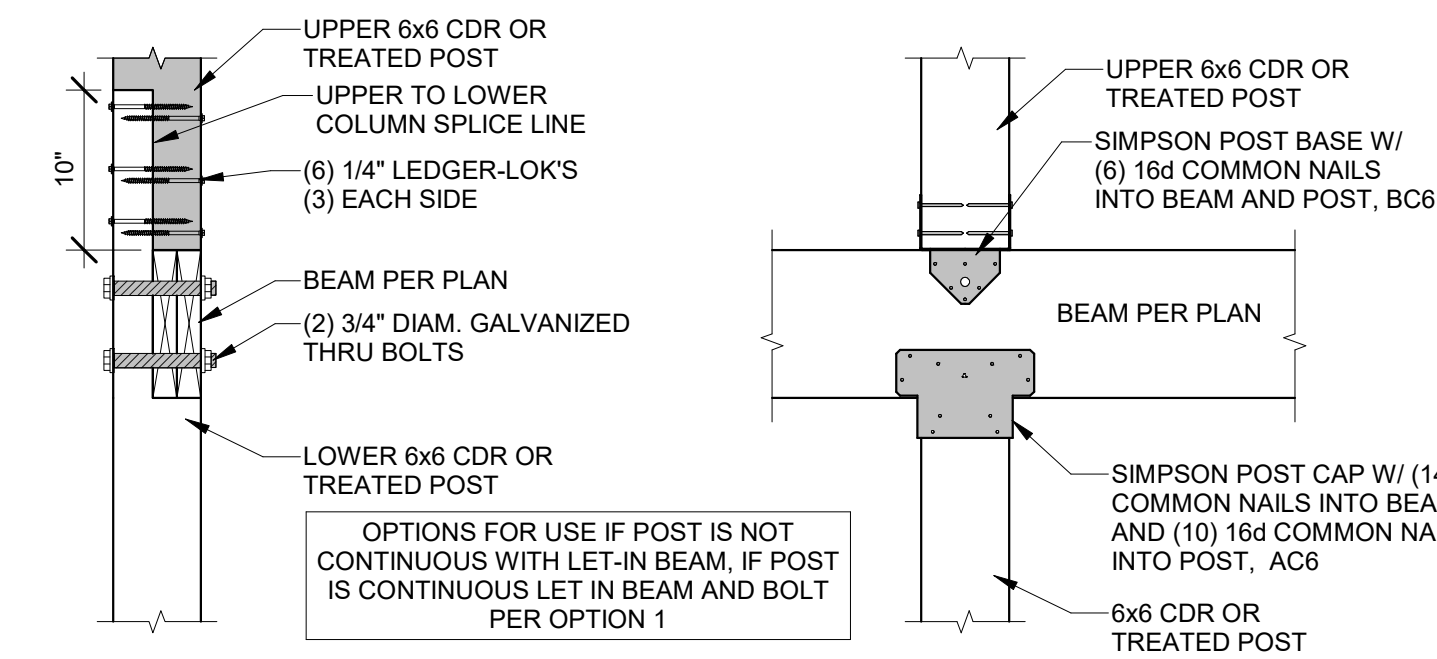
8 GUARD RAIL
1/2" = 1'-0"



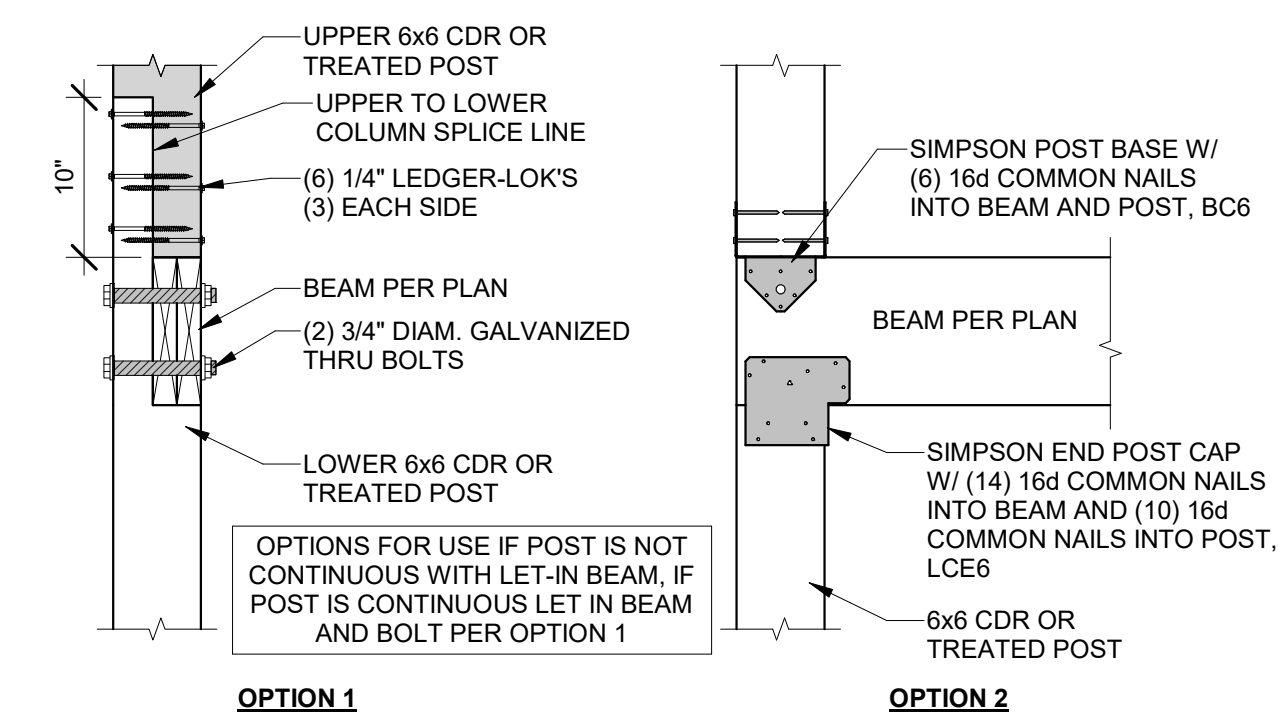
9 STAIR STRINGER DETAIL
1/2" = 1'-0"



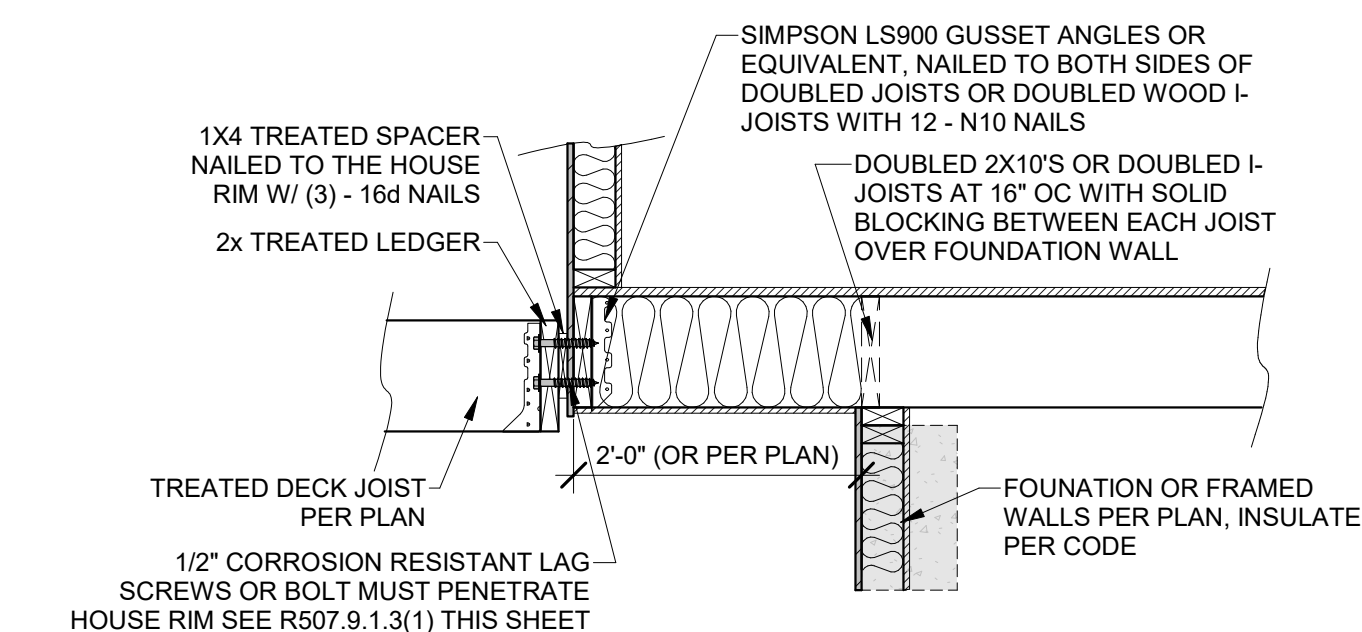
7 ROOF LEVEL INTERIOR BEAM TO COLUMN
1" = 1'-0"



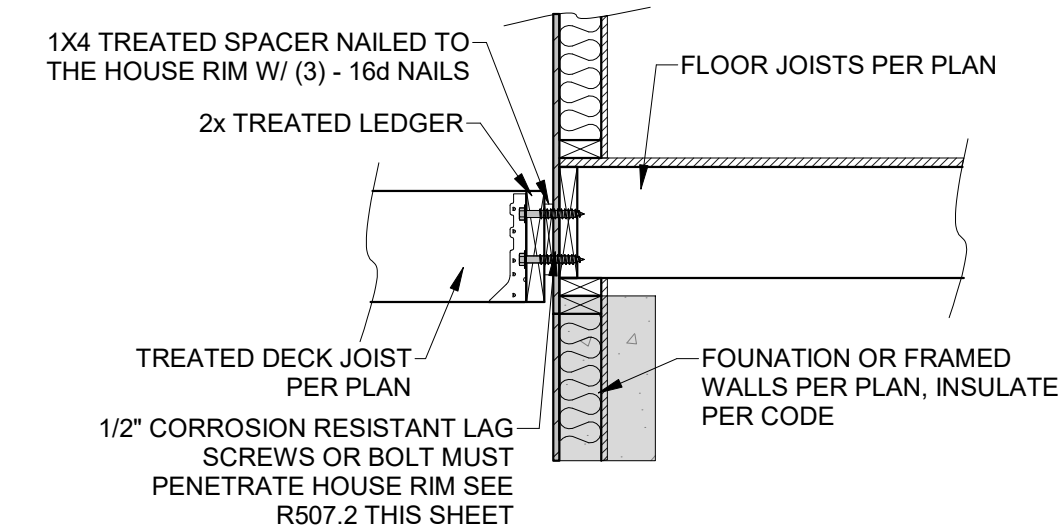
6 DECK LEVEL INTERIOR BEAM TO COLUMN
1" = 1'-0"



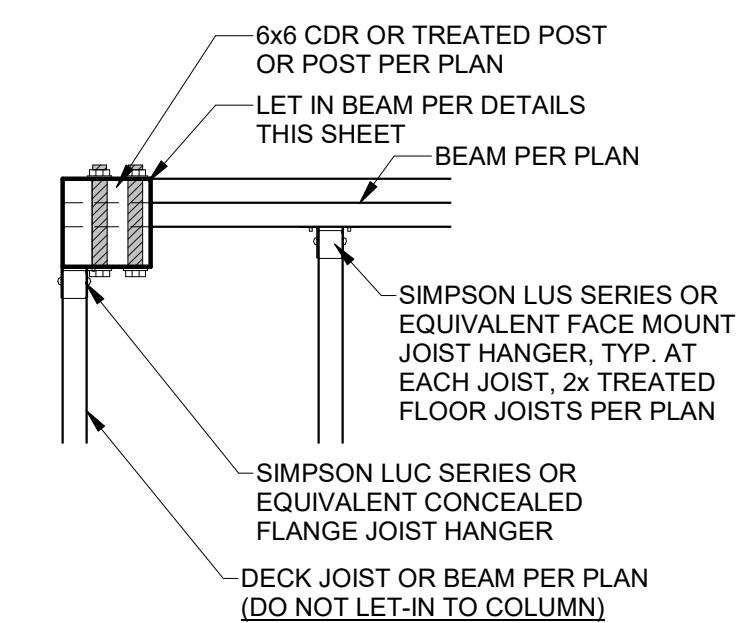
5 DECK LEVEL EXTERIOR BEAM TO COLUMN
1" = 1'-0"



4 DECK LEDGER TO CANTILEVER



2 DECK LEDGER ATTACHMENT



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

SAB CONSTRUCTION, LLC.
ELLENBROOK II WO/WU - HFR089
2030 SW HARVEST MOON LN., KANSAS CITY, MO

INSTRUCTION

BROOK II WO/WU - H

EAST MOON LN., KAN

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HD ENGINEERING & DESIGN, INC
11658 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.1222
SERVICE@HDENGINEERS.COM

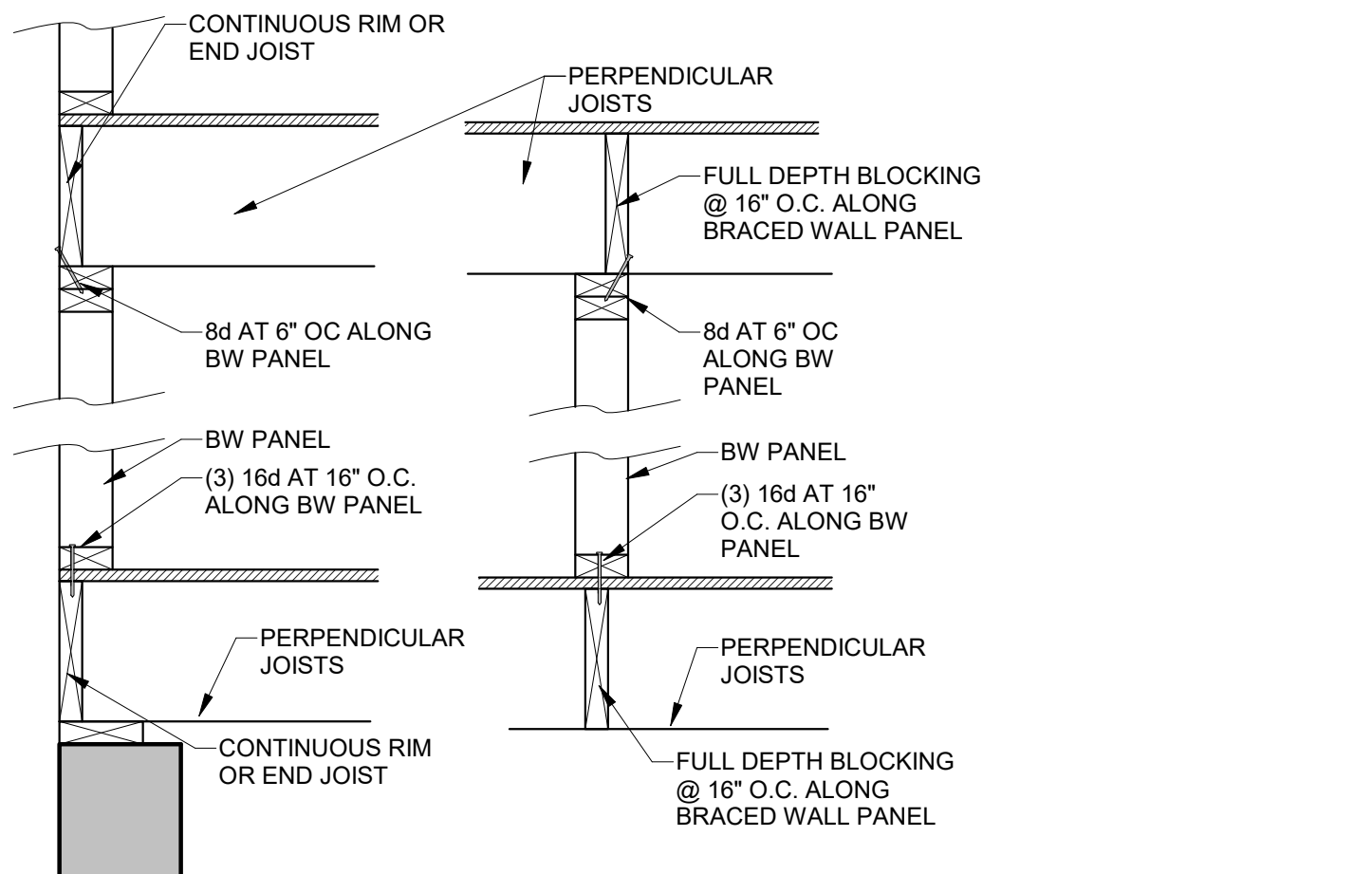
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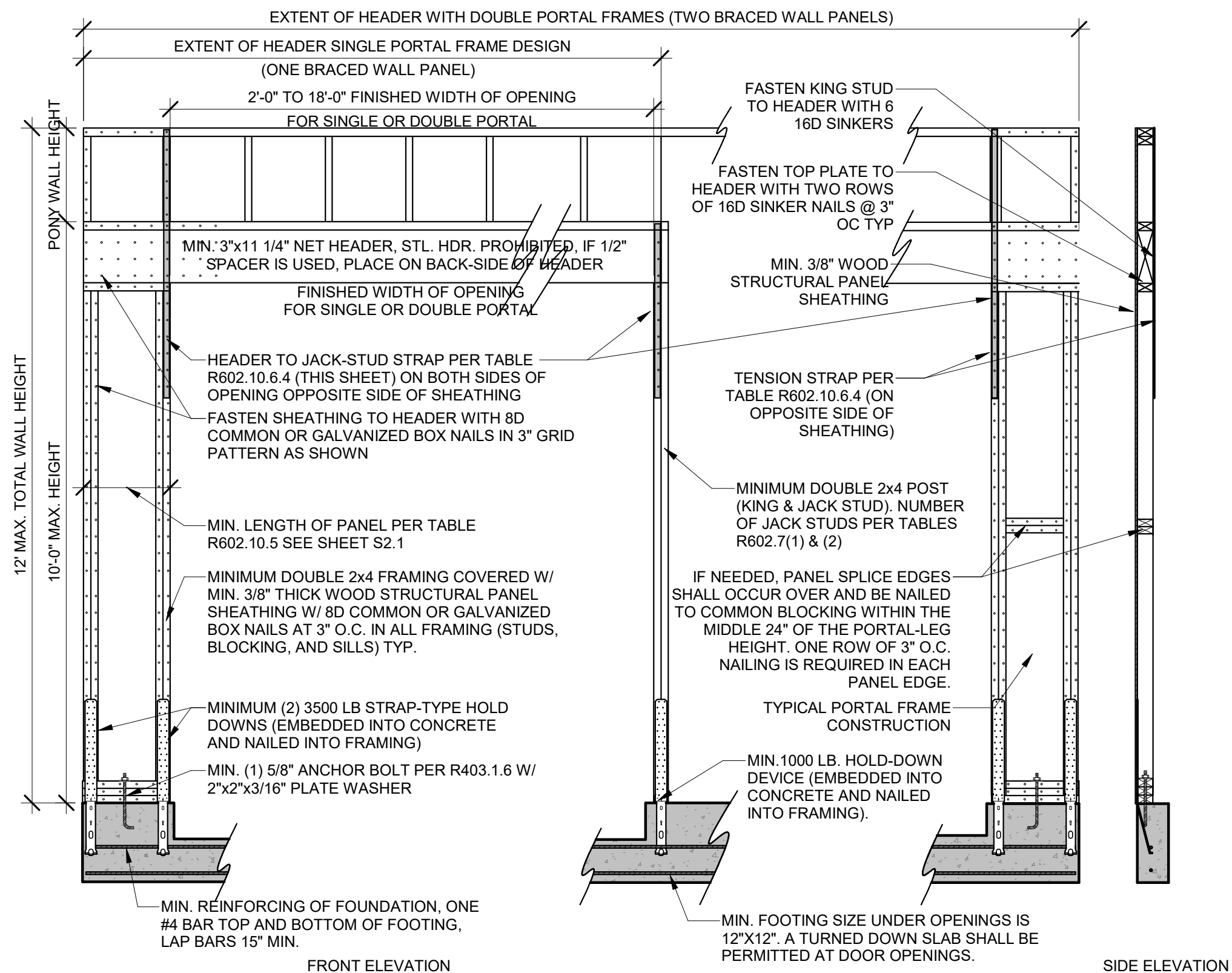
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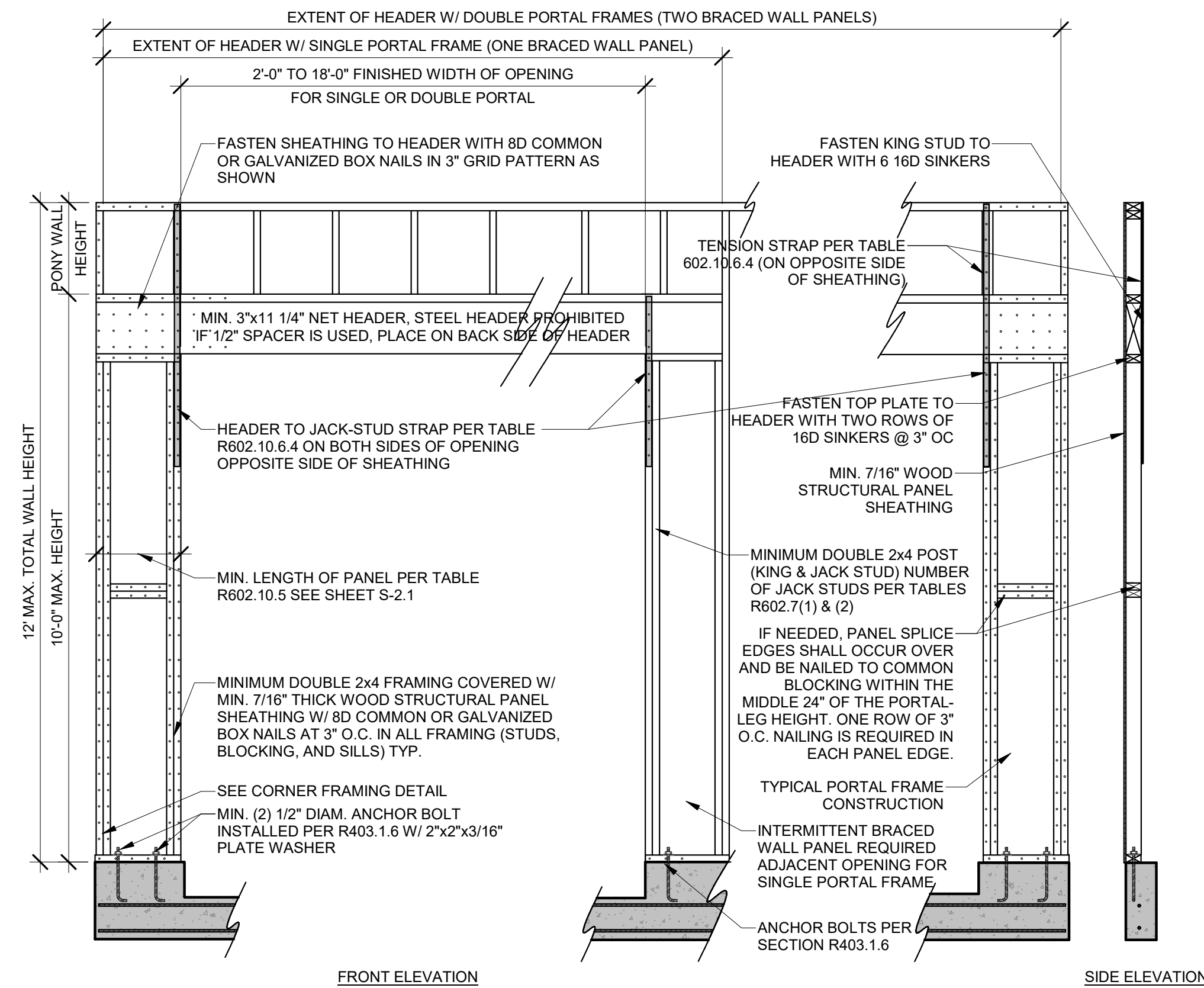
S-1.3



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



1 PFH 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"

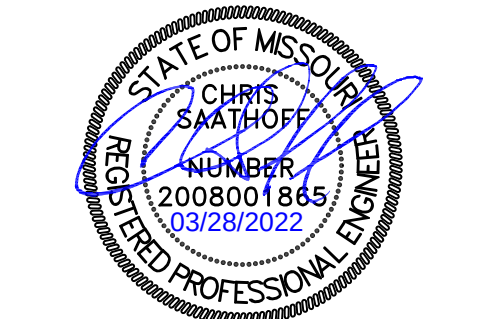
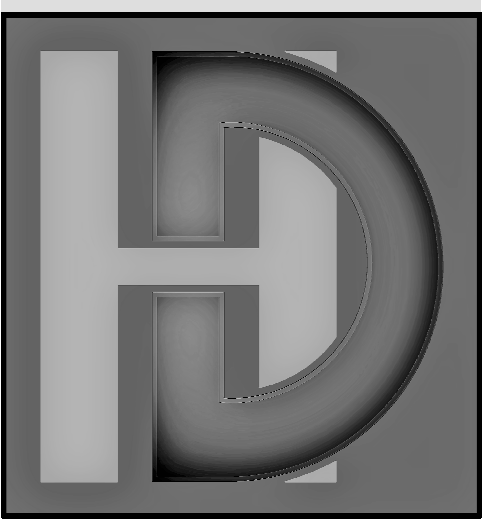
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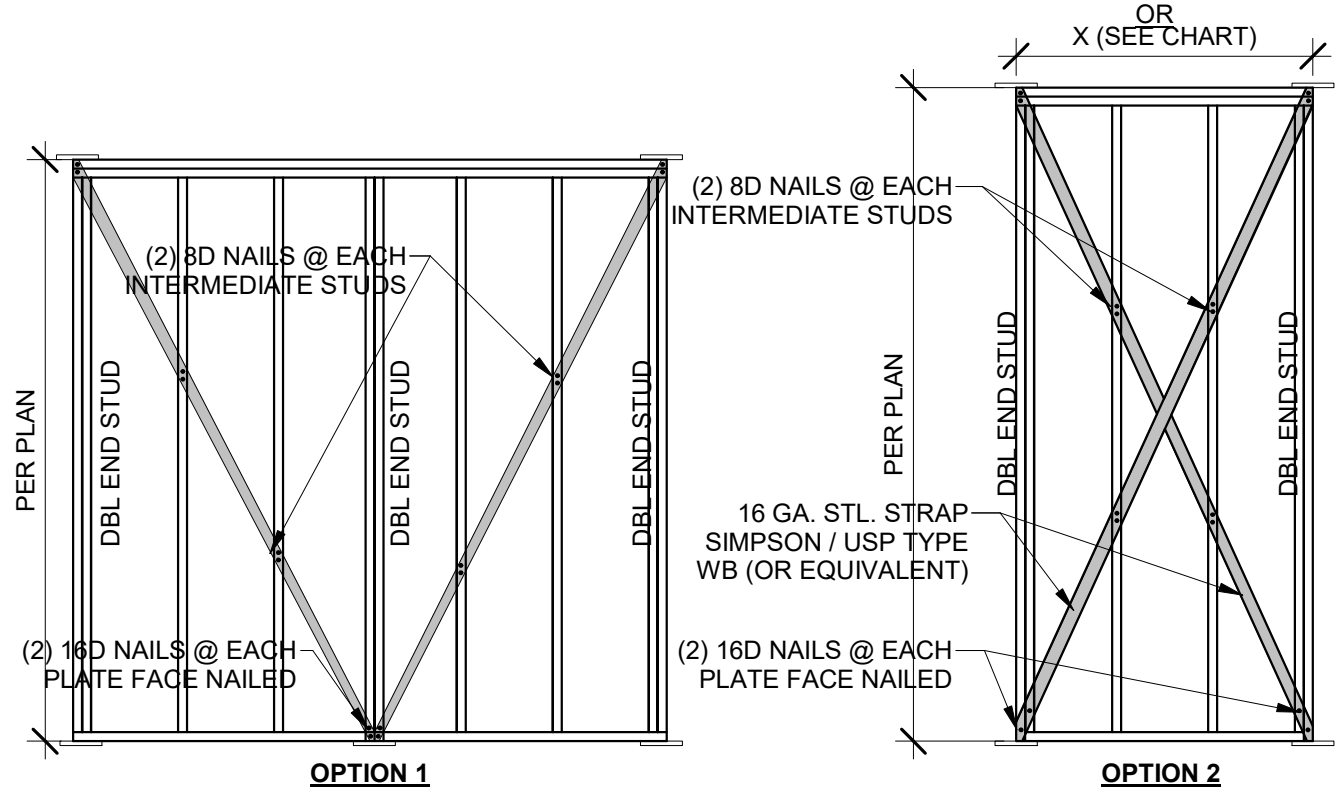
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BRACED WALL NOTES & DETAILS

S-2.0



STRUCTURAL DETAILS & NOTES



BRACED WALL PANEL LENGTH BASED ON WALL HEIGHT FOR IRC LIB		
WALL HEIGHT	MIN. WALL LENGTH (X)	MAX WALL LENGTH (X)
8'-0"	4'-7"	8'-0"
9'-0"	5'-2"	9'-0"
10'-0"	5'-9"	10'-0"
11'-0"	NP	---
12'-0"	NP	---

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=.5xACTUAL
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, D 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	48
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 NAILS 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.

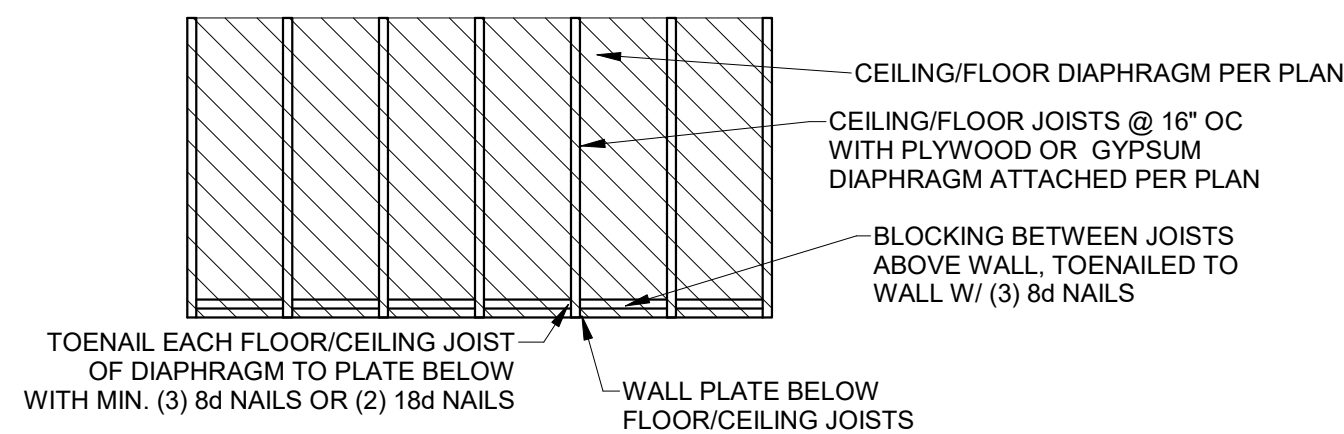
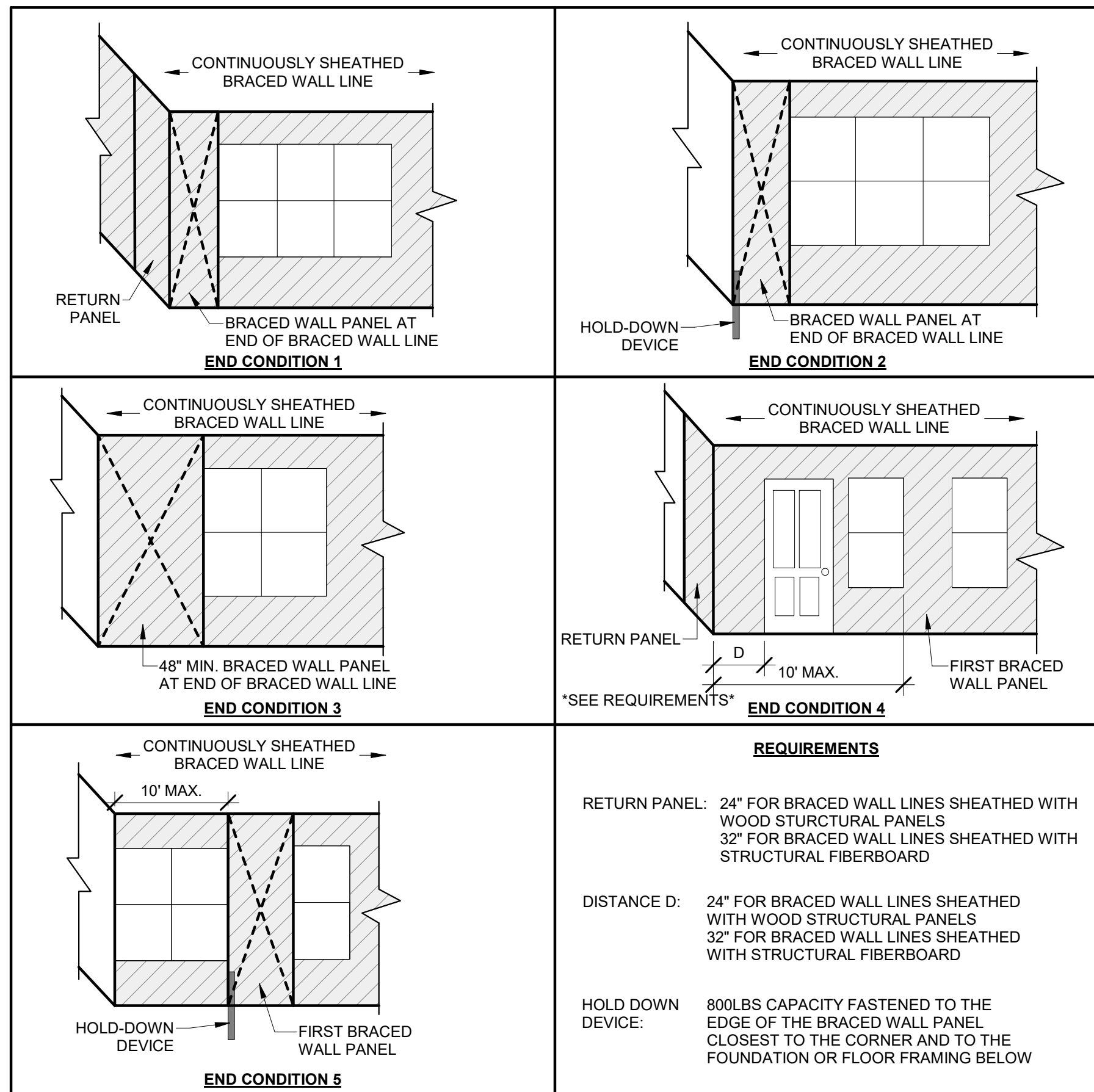
TENSION STRAP CAPACITY REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO METHOD PFH, PFG AND CS-PF BRACED WALL PANELS IRC2018 TABLE R602.10.6.4

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
2X4 NO. 2 GRADE	0	10	18	1,000	1,000
			9	1,000	1,000
			16	1,025	2,500
	1	10	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
	2	12	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
	4	12	9	1,750	3,125
			16	2,400	DR
			18	3,800	DR

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

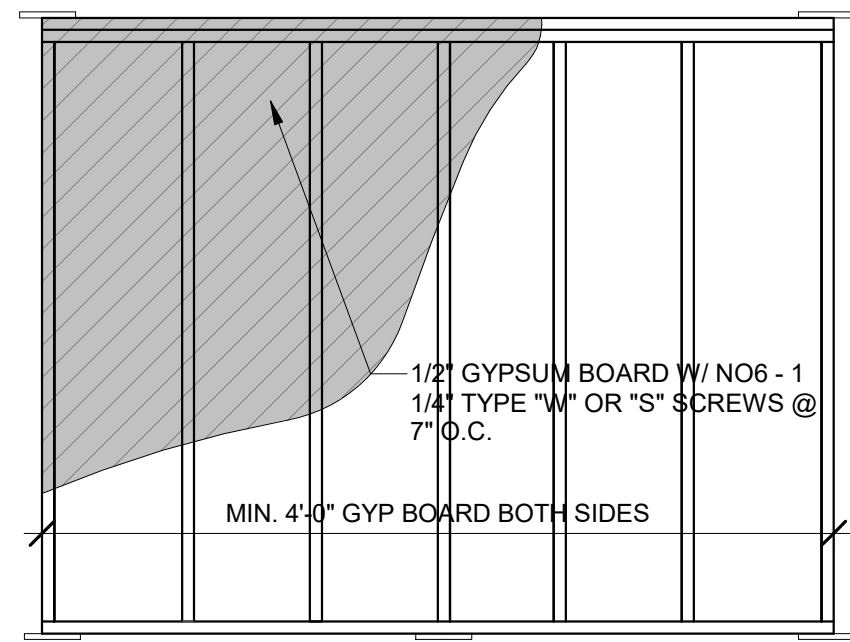
END WALL CONDITIONS

FOR CONTINUOUSLY SHEATHED BRACED WALL LINES



DIAPHRAGM CONNECTION TO INTERIOR WALL

3/8" = 1'-0"

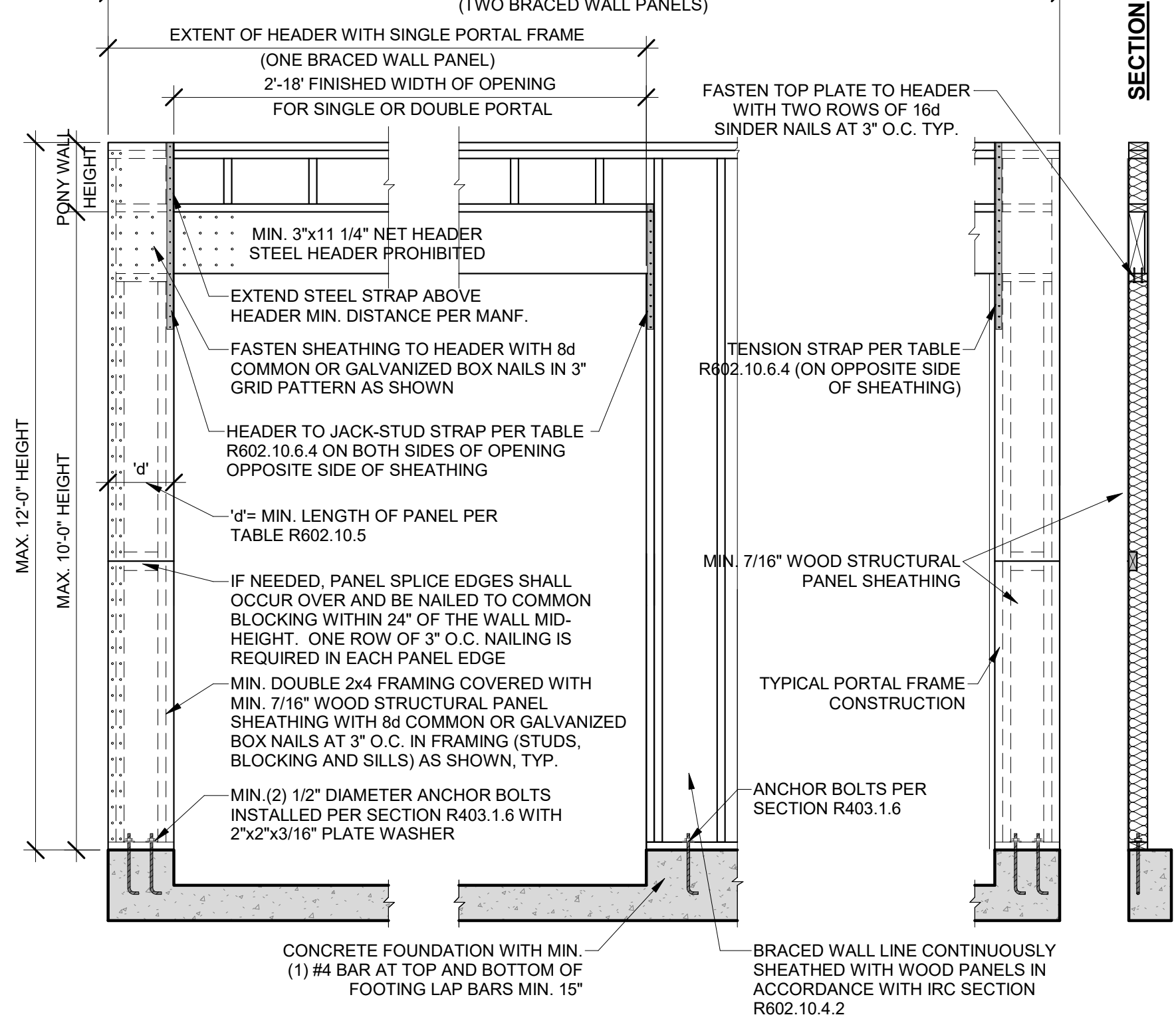


GB BRACING

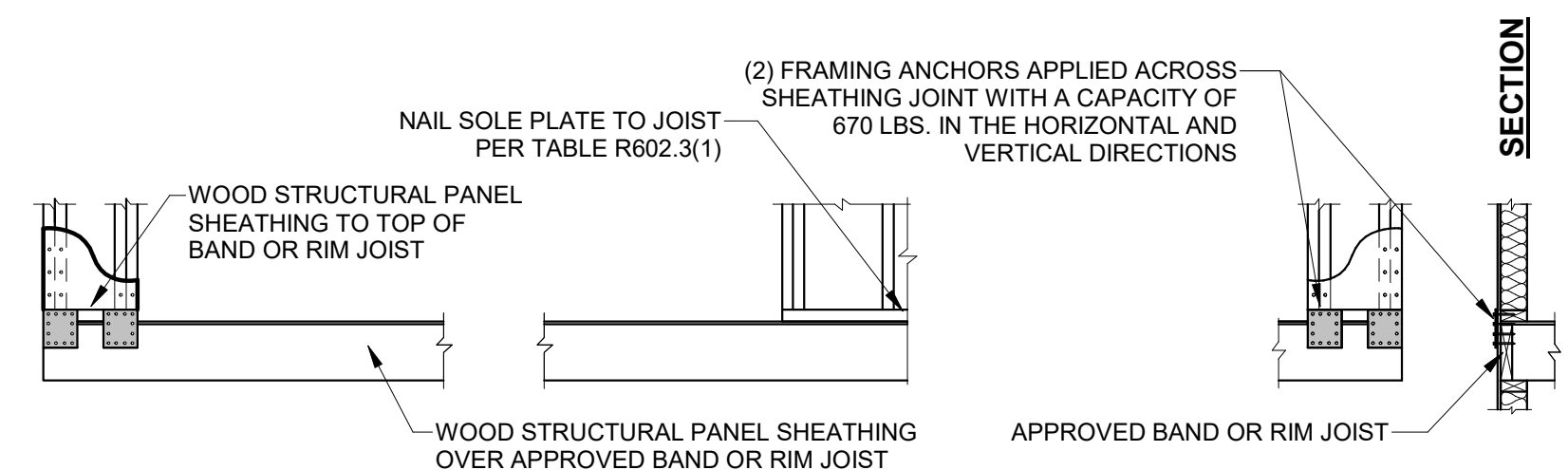
1/2" = 1'-0"

FRONT ELEVATION

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

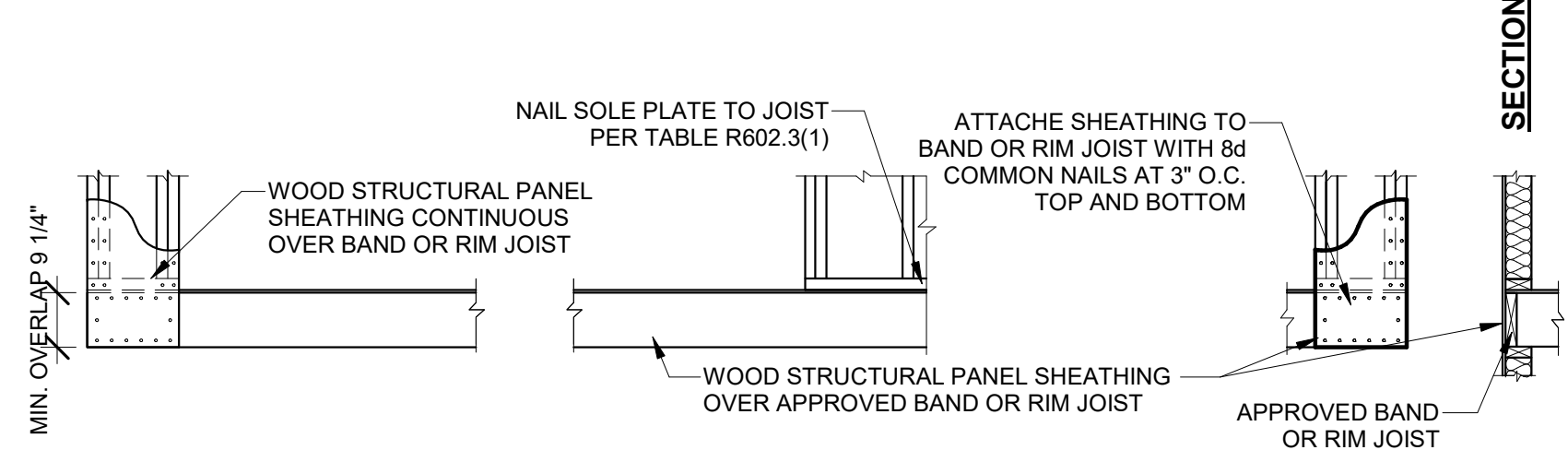


OVER CONCRETE OR MASONRY BLOCK FOUNDATION



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)

CS-PF

1/2" = 1'-0"



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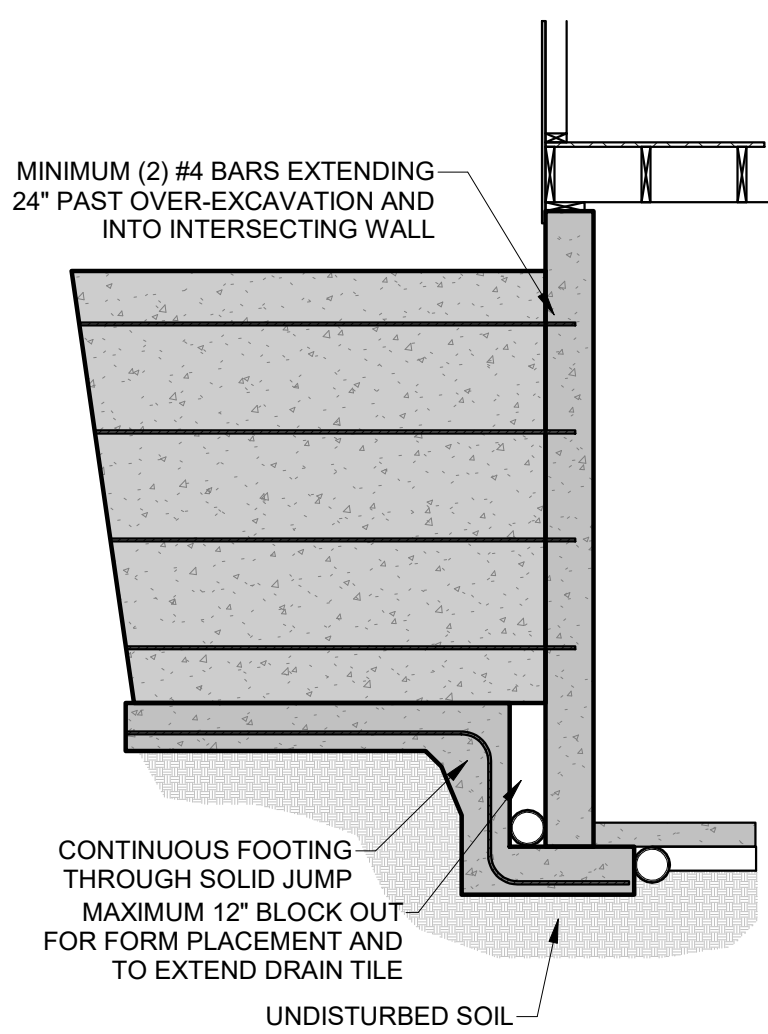
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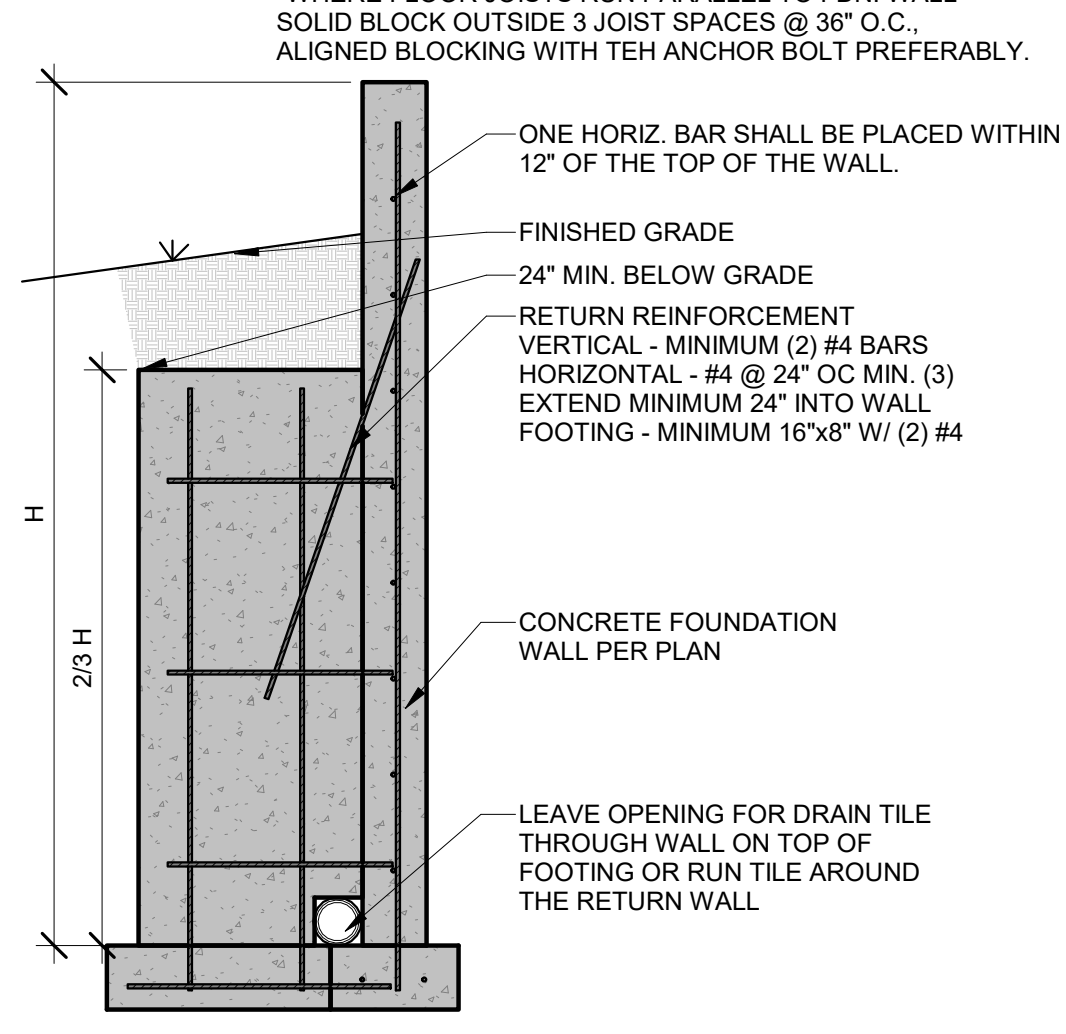
NO.	ISSUE/REVISION	Revision Date

BRACED WALLS NOTES & DETAILS

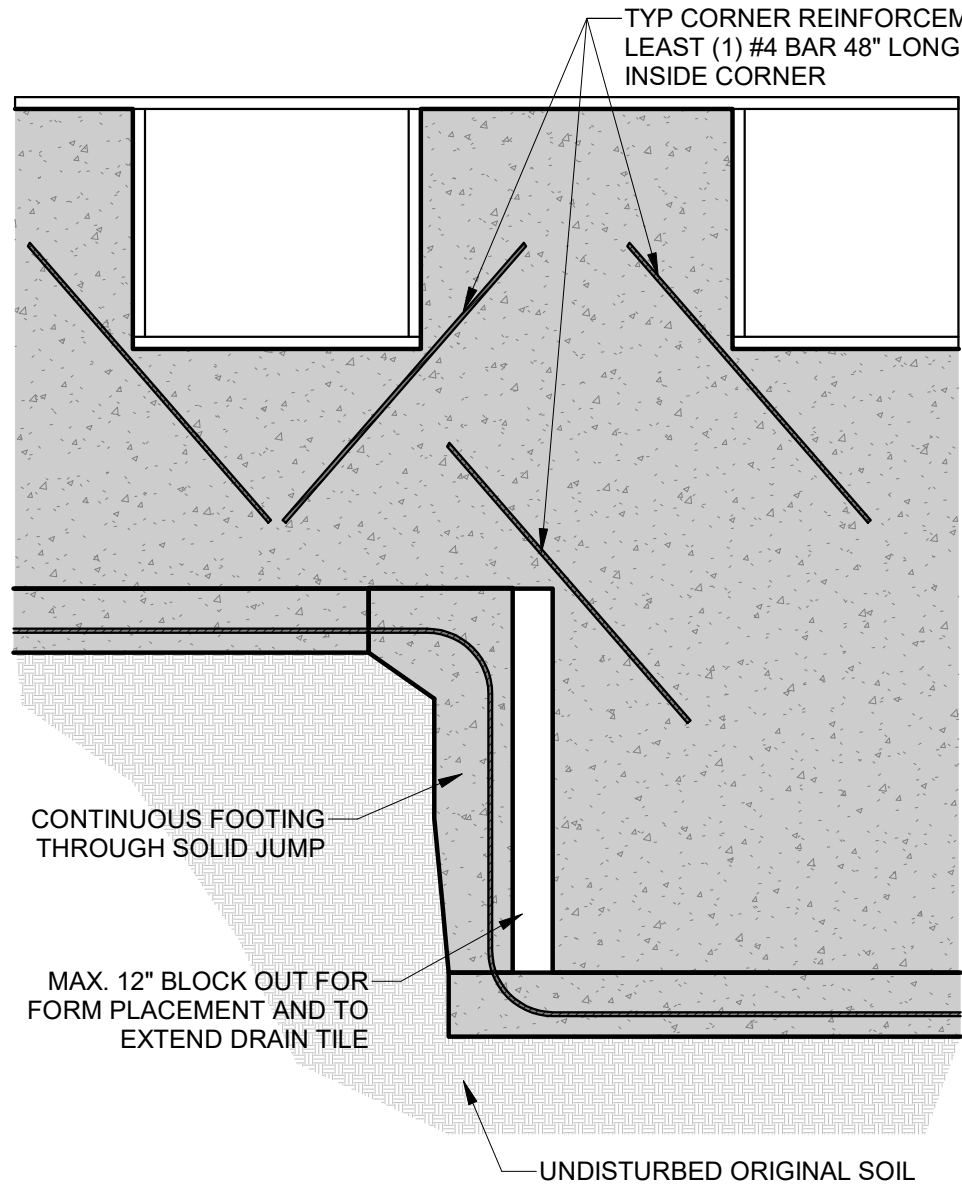
S-2.1



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

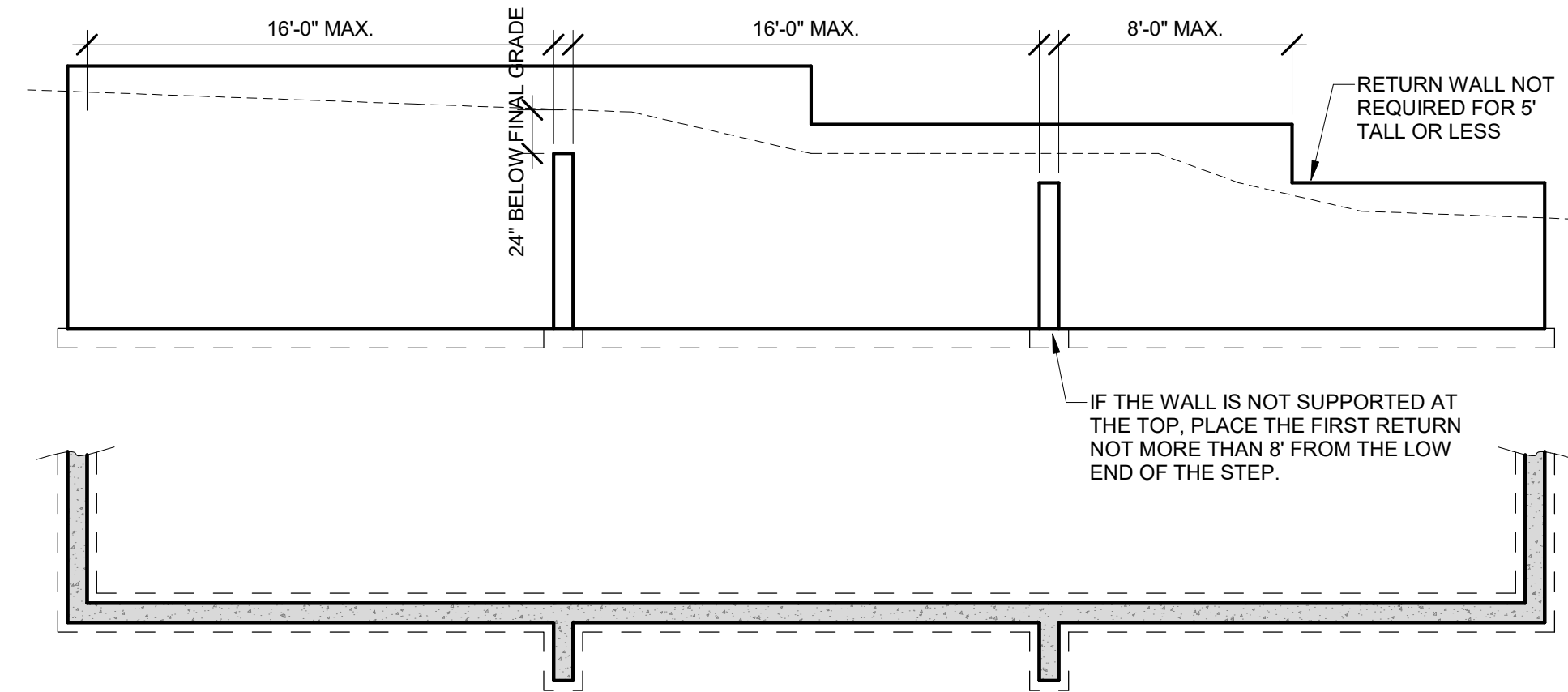


2 RETURN WALL DETAIL
1/2" = 1'-0"

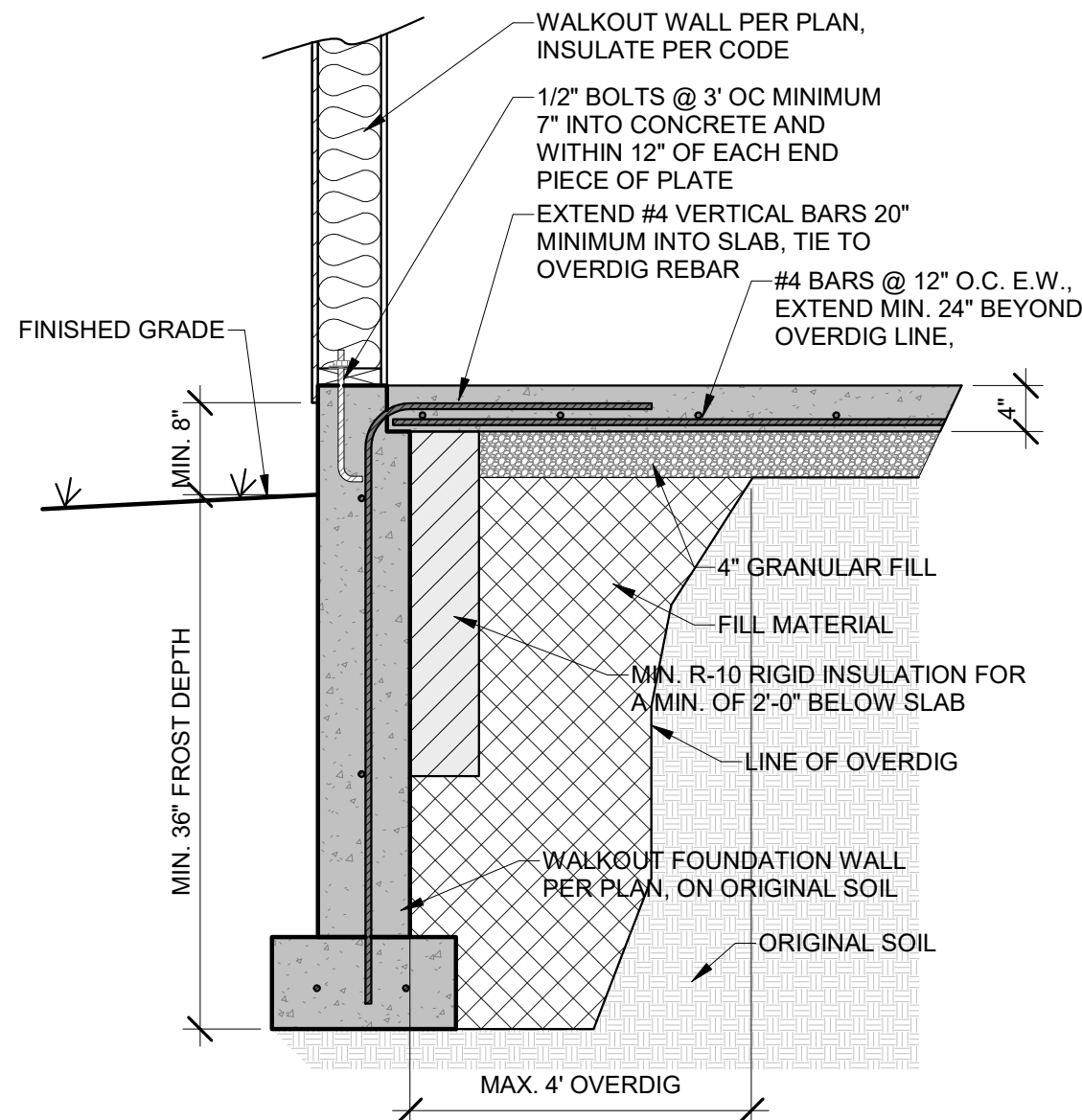


WHERE OPENINGS OR ABRUPT ELEVATION CHANGES OCCUR IN THE TOP OR BOTTOM OF THE WALL AT LEAST ONE #4 BAR 48" LONG SHALL BE DIAGONALLY AS CLOSE A PRACTICAL TO THE CORNER

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



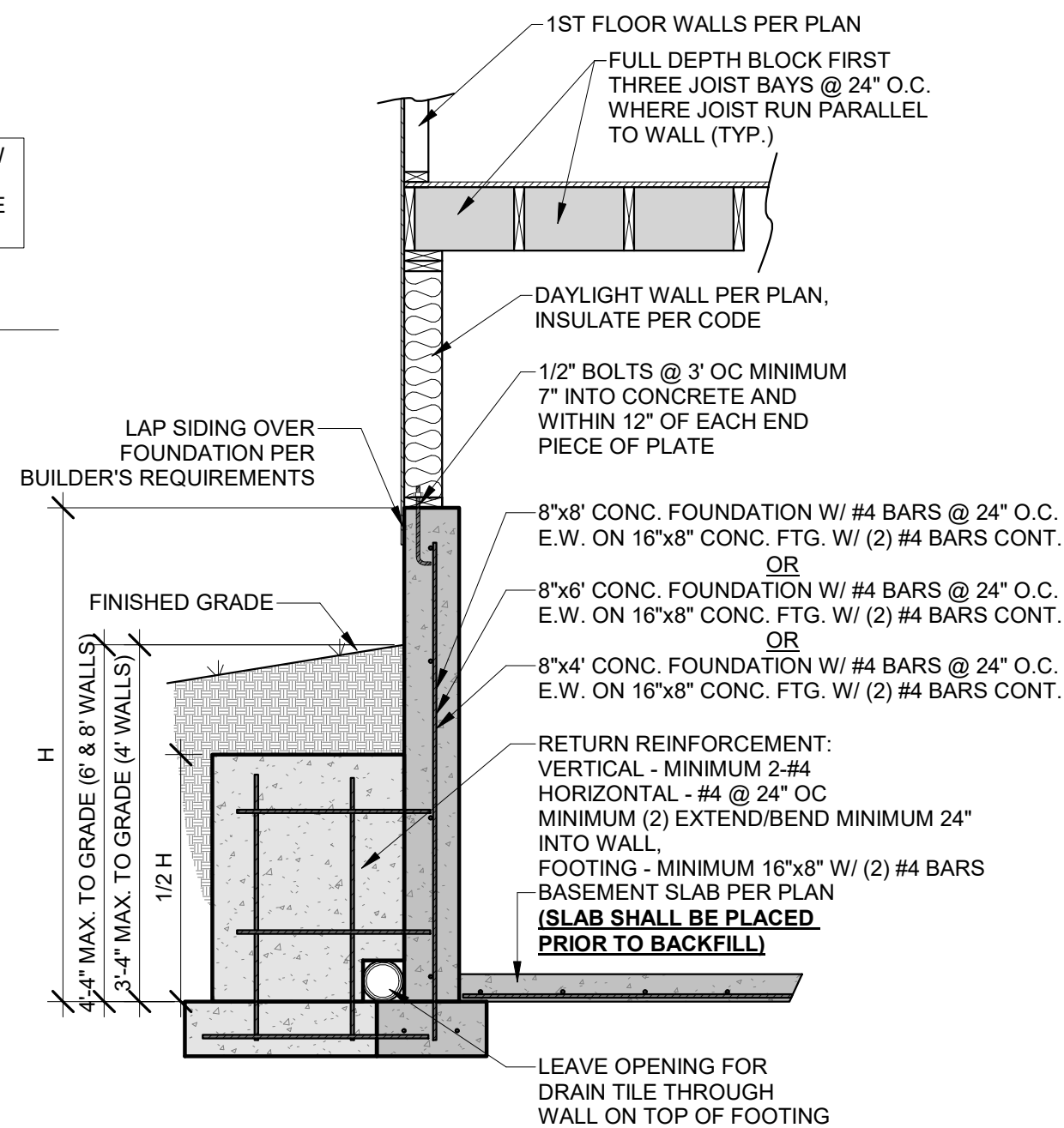
4 RETURN WALL PLACEMENT
3/16" = 1'-0"



IF OVER 4' OVERDIG SEE HD ENGINEERING FOR STRUCTURAL BASEMENT SLAB DESIGN

IMPORTANT NOTE:
ANY SLAB WITH GREATER THAT 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"

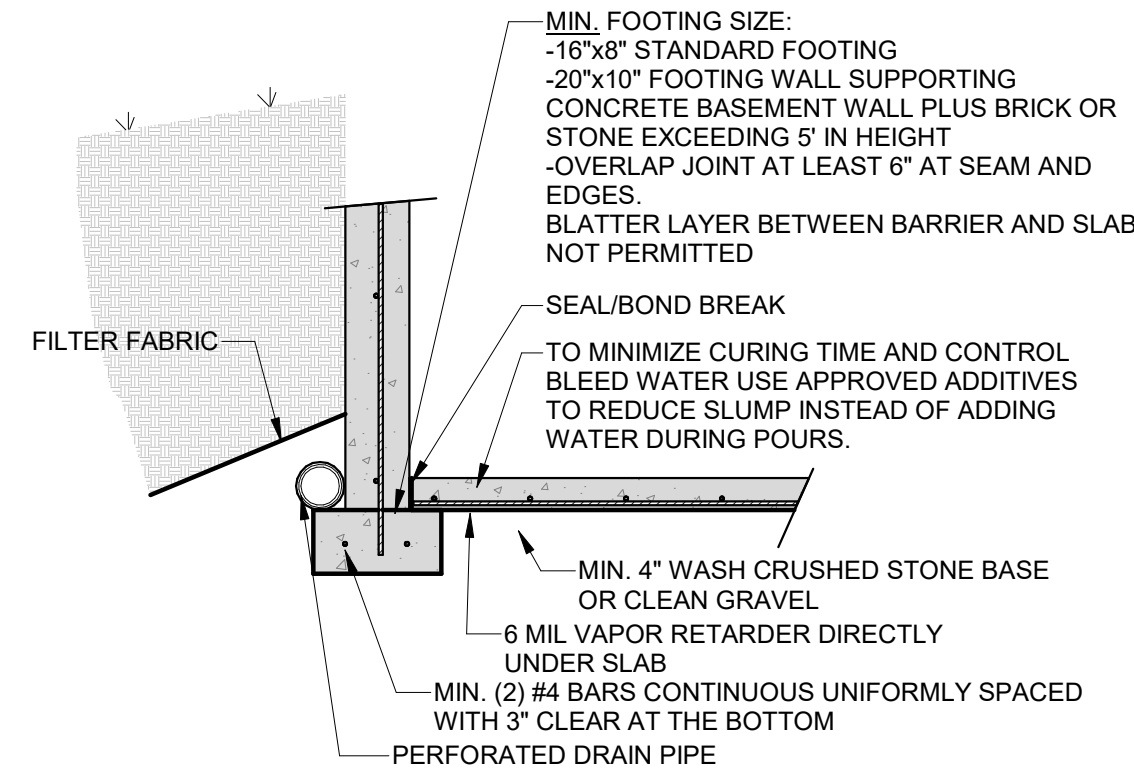


5 UNRESTRAINED FOUNDATION WALL
1/2" = 1'-0"

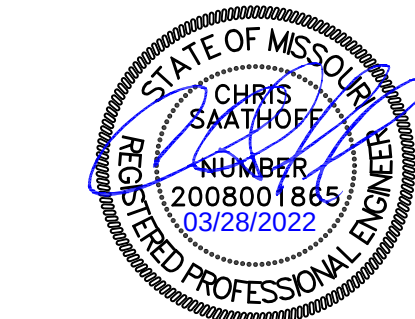
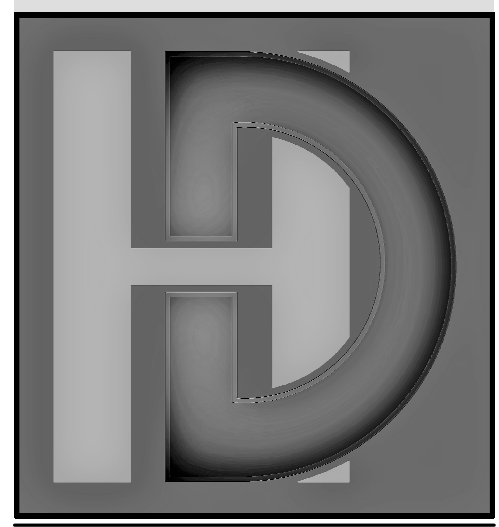
VERTICAL REINFORCEMENT SPACING* 60 PSF SOIL; 40 & 60 KSI STEEL					
CONCRETE STRENGTH	8" THICK WALL		10" THICK WALL		
	8'	9'	8'	9'	10'
3000 PSI/ 40 KSI	16	12	24	16	12
3500 PSI/ 40 KSI	16	12	24	24	12
3000 PSI/ 60 KSI	24	16	24	20	16
3500 PSI/ 60 KSI	24	16	24	24	16
HORIZONTAL REINFORCEMENT**					
ONE BAR 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 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.

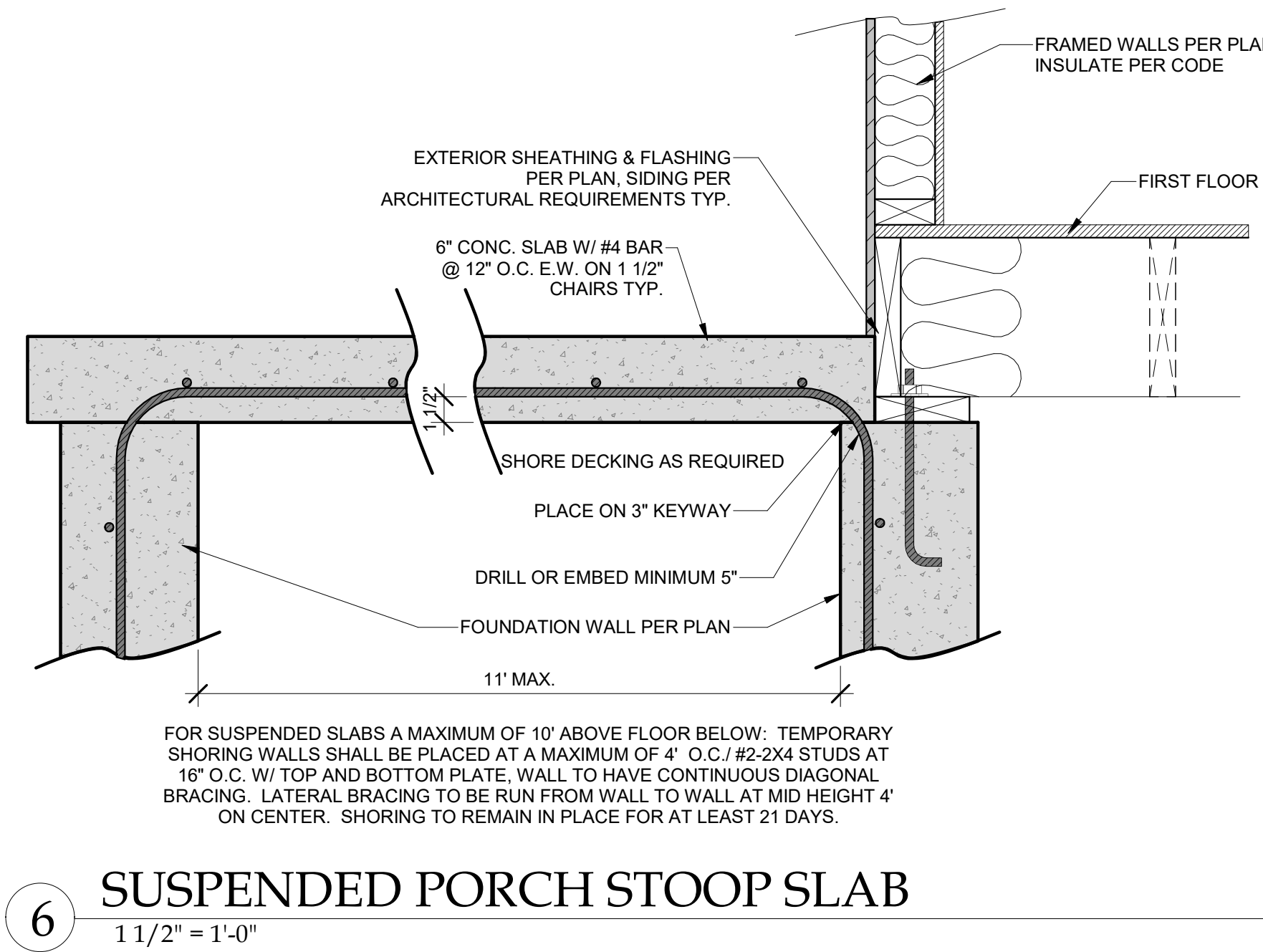
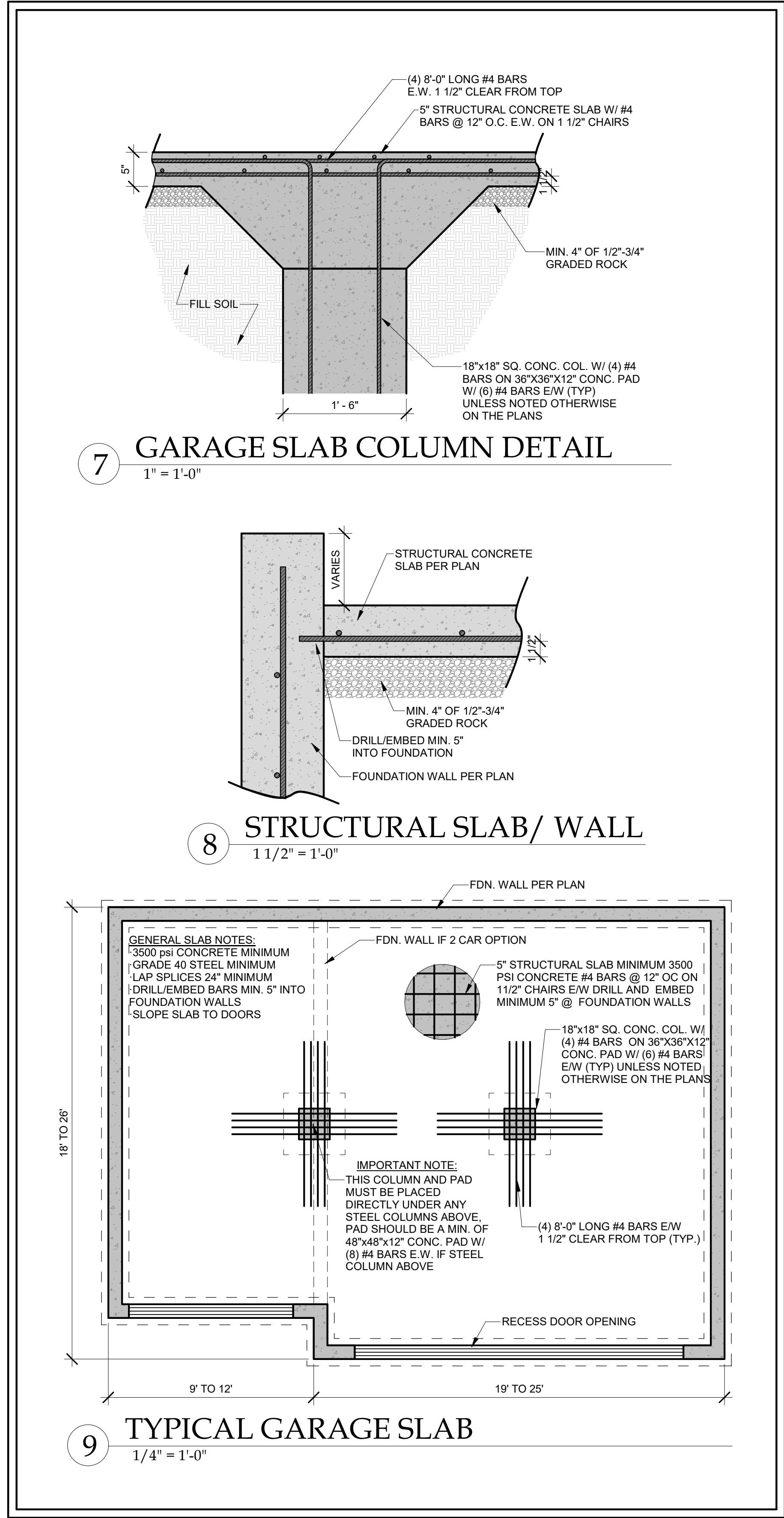
** #4 BARS @ 24" ON CENTER.
** #4 BAR WITHIN 12 OF TOP AND BOTTOM OF WALL.
** MINIMUM GRADE 40 (40ksi) STEEL (PER ACI 332).
** HORIZONTAL REINFORCEMENT SHALL BE INSTALLED ON THE COMPRESSION SIDE (SOIL SIDE) OF THE VERTICAL REINFORCEMENT



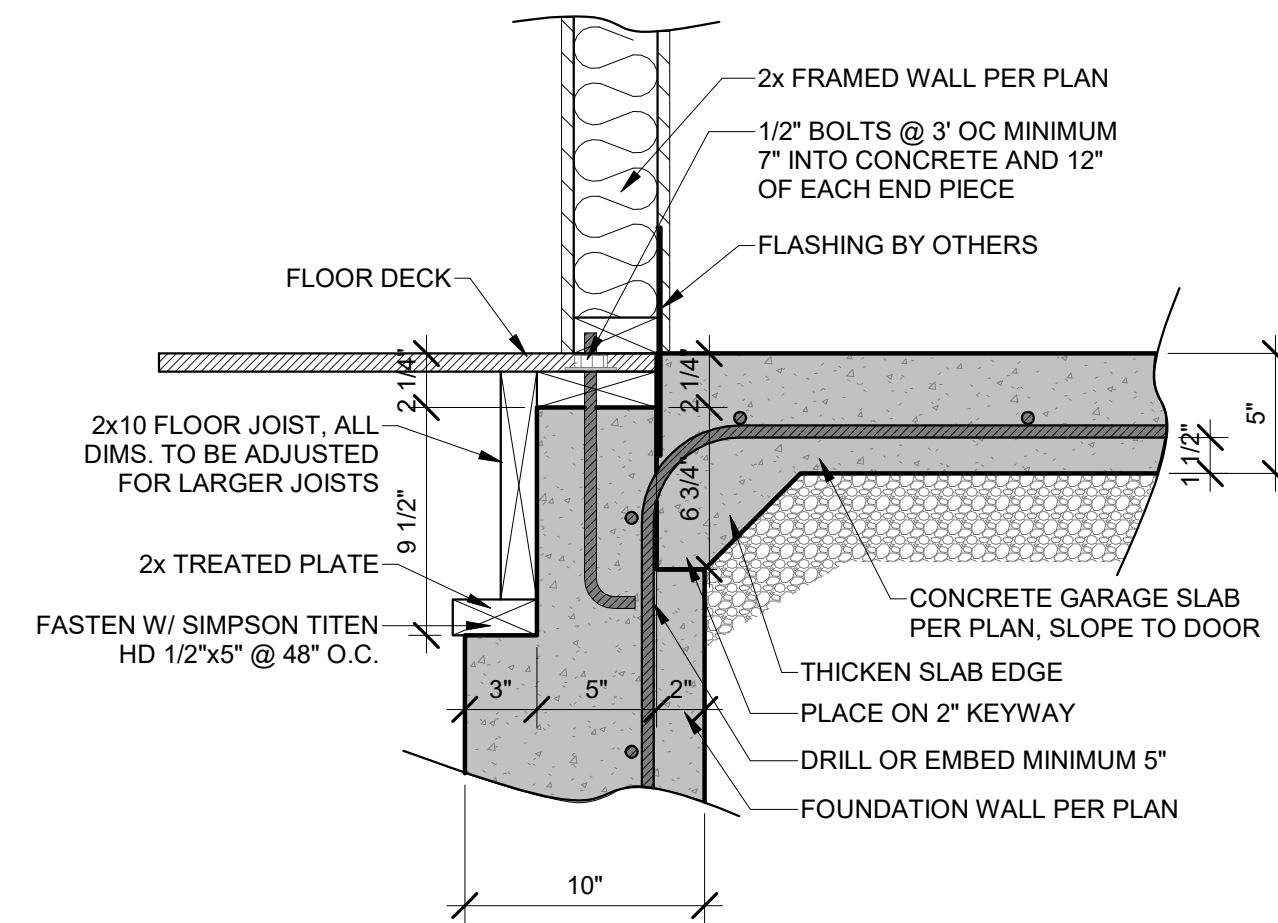
7 FOUNDATION FOOTINGS
1/2" = 1'-0"



NO.	ISSUE/REVISION	Revision Date



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



SAB CONSTRUCTION, LLC.
ELLENBROOK II WOMU - HFR089
2030 SW HARVEST MOON LN., KANSAS CITY, MO

STRUCTURAL DETAILS & NOTES

HD#:	43679
DATE:	03/28/2022
CHECKED BY:	CLS

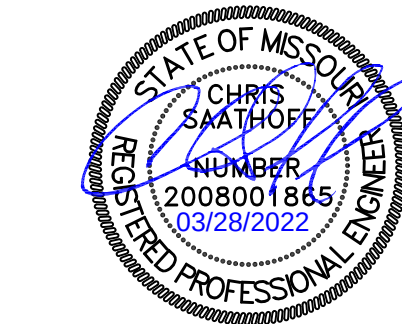
NO.	ISSUE/REVISION	Revision Date

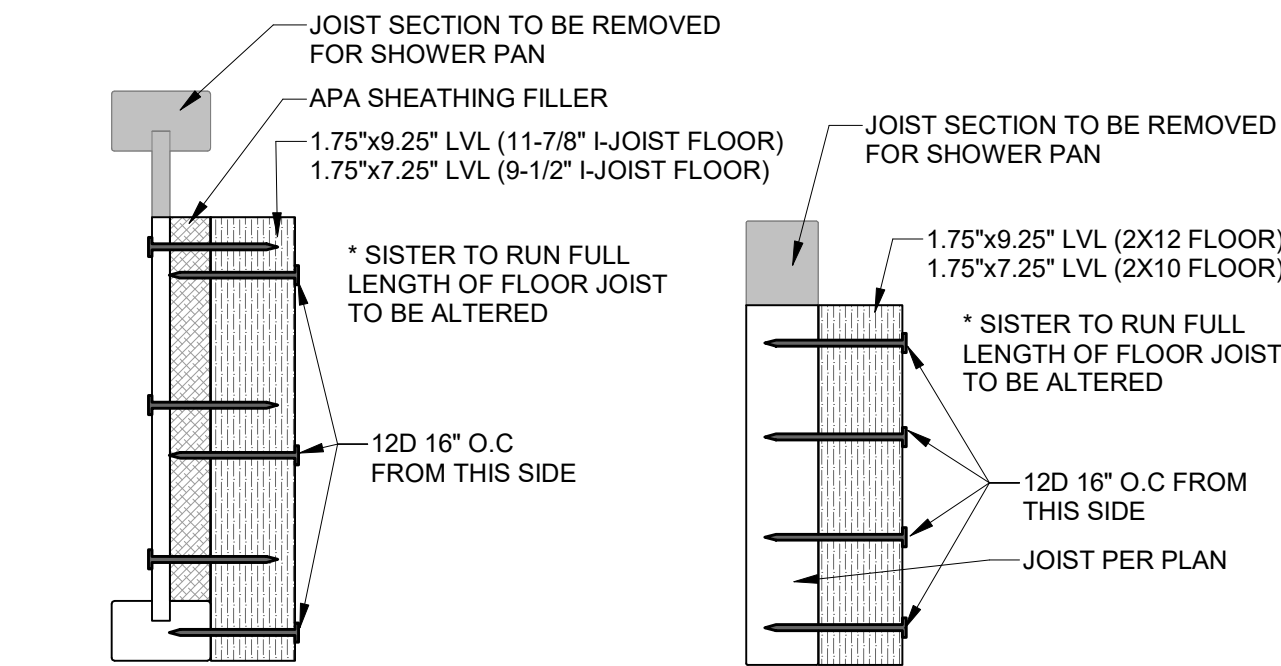
HD ENGINEERING SLAB DETAILS

S-3.1

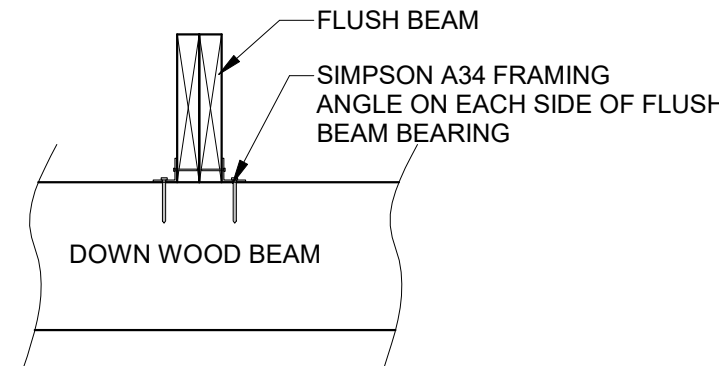
HD ENGINEERING & DESIGN, INC
11656 W. 75TH STREET
SHAWNEE, KS 66214
WWW.HDENGINEERS.COM
913.631.2222
SERVICE@HDENGINEERS.COM

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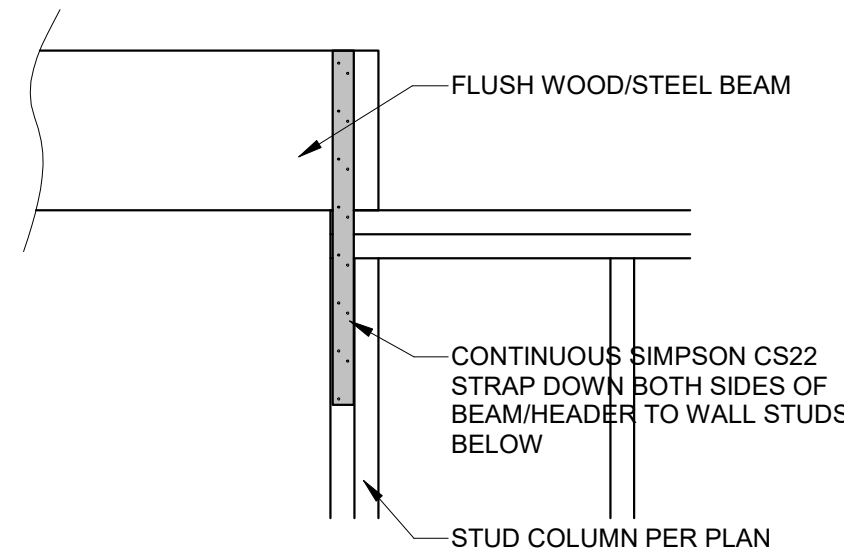




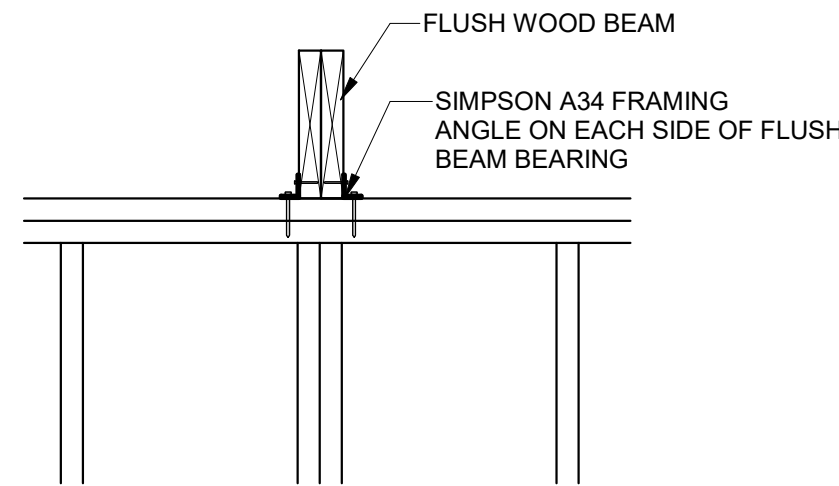
10 ZERO ENTRY SHOWER DETAIL
1/4" = 1'-0"



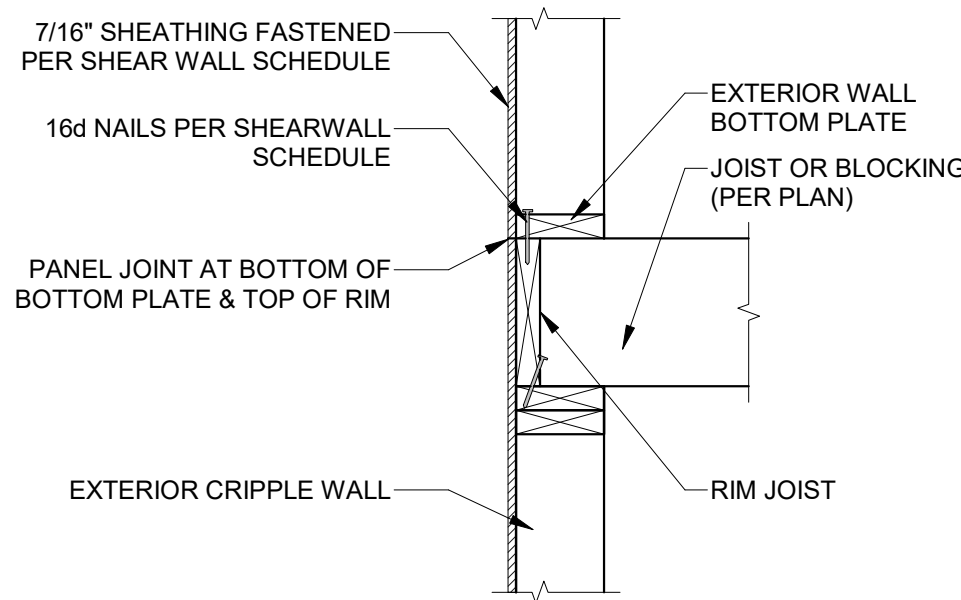
9 WOOD TO WOOD STACKED CONNECTION
1" = 1'-0"



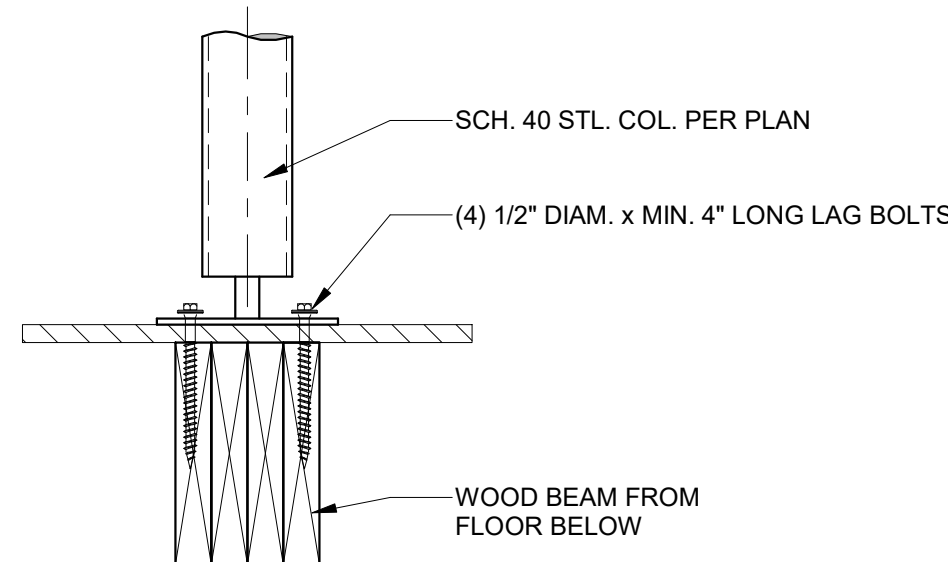
8 UPSET WOOD/STEEL PARALLEL TO WALL
1" = 1'-0"



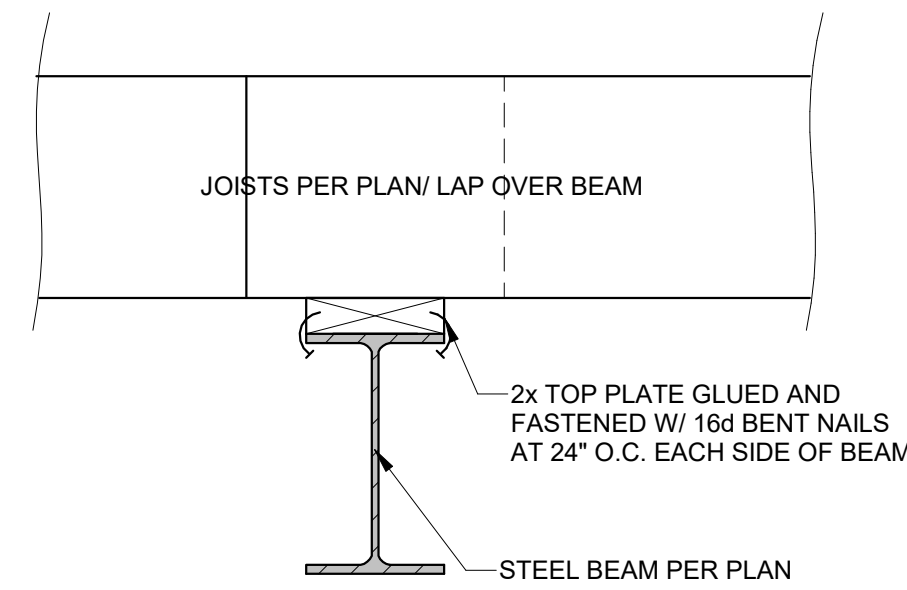
7 UPSET WOOD PERPENDICULAR TO WALL
1" = 1'-0"



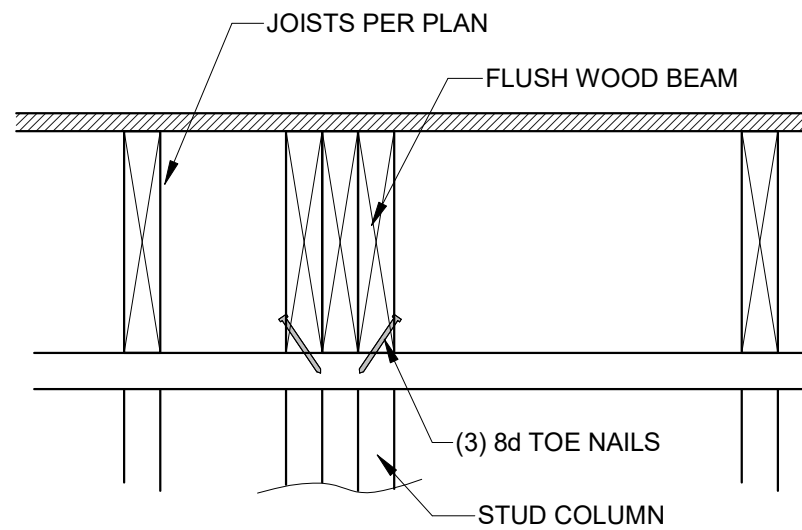
11 SHEATHING JOINT LOCATION
1" = 1'-0"



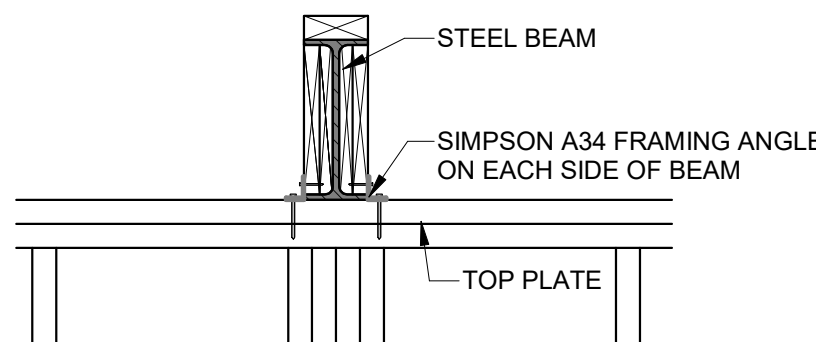
6 STEEL COLUMN TO WOOD FLOOR
1 1/2" = 1'-0"



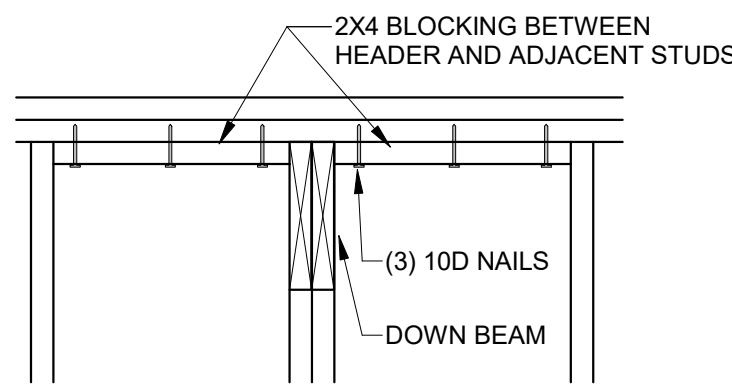
5 STEEL BEAM TO WOOD PLATE
1 1/2" = 1'-0"



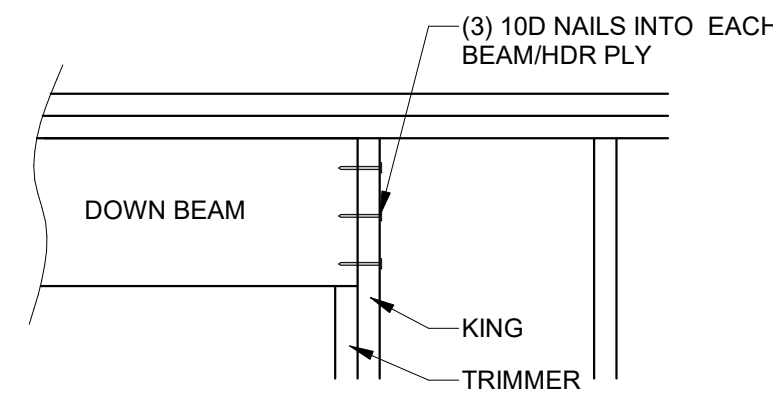
4 FLUSH WOOD BEAM CONNECTION
1 1/2" = 1'-0"



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



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



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

NO.	ISSUE/REVISION	Revision Date



HD Engineering & Design

Solutions for all your engineering and design needs



TWO-WAY SLAB DESIGN METHOD

(HD ENGINEERING MASTER SLAB CALCULATION)

Case type (1-9) :

2

Location of Slab Panel :

$f'c$ = 3500 psi
weight of concrete = 150 pcf
 f_y = 40000 psi
live load = 50 psf
 $l_{a, (short)}$ = 12.00 ft
 $l_{b, (long)}$ = 12.00 ft
 $m = l_a / l_b$ = 1.00

min. thickness = 3.20 in
design thickness = 5 in
dead load = 62.5 psf
factored live load = 85 psf (LLx1.7)
factored dead load = 87.5 psf (DLx1.4)
total design load = 172.5 psf

$M_u / (\phi * b * d^2)$:

ϕ = 0.9
cover = 1 in

Short Direction

bar no. (midspan) = 4
bar dia. = 0.5 in
bar no. (continuous) = 4
bar dia. = 0.5 in
bar# (discontinuous) = 4
bar dia. = 0.5 in

Long Direction

bar no. (midspan) = 4
bar dia. = 0.5 in
bar no. (continuous) = 4
bar dia. = 0.5 in
bar# (discontinuous) = 4
bar dia. = 0.5 in

Shear Check

max. allow. V_u = 4828 lbs
long beam (V_u) = 466 lbs OK
short beam (V_u) = 466 lbs OK

coefficient if case 1 - 7 coefficient if case 8 or 9
 $C_{a, neg}$ = 0.04500 please enter 8 or 9
 $C_{b, neg}$ = 0.04500 please enter 8 or 9
 $C_{a, pos, dl}$ = 0.01800 please enter 8 or 9
 $C_{a, pos, ll}$ = 0.02700 please enter 8 or 9
 $C_{b, pos, dl}$ = 0.01800 please enter 8 or 9
 $C_{b, pos, ll}$ = 0.02700 please enter 8 or 9

$C_{a, neg}$ = 0.33
 $C_{b, neg}$ = 0.33

Short Direction

R (look @ chart if above 150 roe (from Graph A.1)
midspan 39 psi 0.0042
continuous edge 78 psi 0.0042
discontinuous edge 13 psi

Long Direction

midspan 51 psi 0.0042
continuous edge 78 psi 0.0042
discontinuous edge 13 psi

Beam Width

12 in.

2000-lb Concentrated Load

$\pi * r^2$ = 20 in²
 r = 2.52 in
 C = $2 * \pi * r$
 C = 15.85 in
Area = 79.27 in²
 V_p = 9379 lb
 V_a = 2000 ok

Negative Moments at Continuous Edges (Table 12.3)

$M_{a, neg}$ = 13414 in-lbs
 $M_{b, neg}$ = 13414 in-lbs

Positive Moments (Table 12.4 and 12.5)

$M_{a, pos, dl}$ = 2722 in-lbs
 $M_{a, pos, ll}$ = 3966 in-lbs
 $M_{a, pos, tot}$ = 6687 in-lbs
 $M_{b, pos, dl}$ = 2722 in-lbs
 $M_{b, pos, ll}$ = 3966 in-lbs
 $M_{b, pos, tot}$ = 6687 in-lbs

Negative Moments at Discontinuous Edges (1/3 X Positive Moments)

$M_{a, neg}$ = 2229 in-lbs
 $M_{b, neg}$ = 2229 in-lbs

formula info
 A_s = 0.20 in² 0.20
 A_s = 0.20 in² 0.20
 A_s = 0.07 in² 0.07

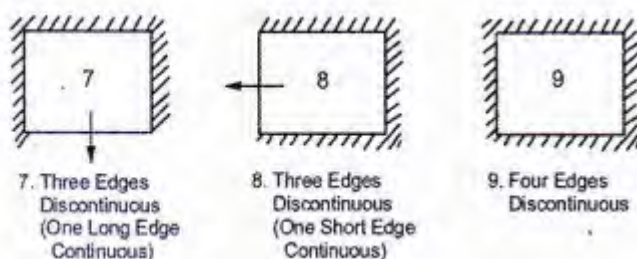
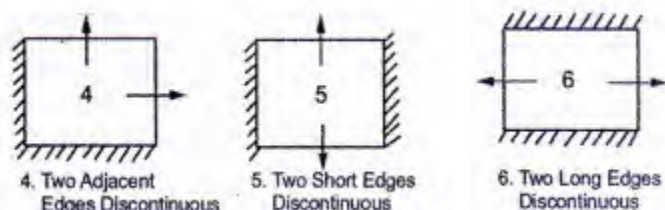
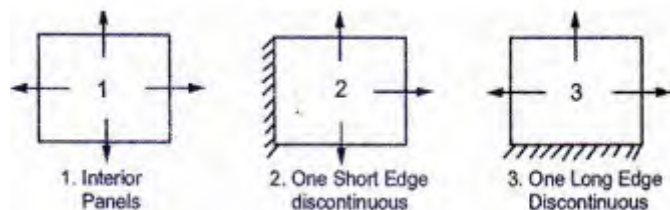
A_s = 0.18 in² 0.18
 A_s = 0.20 in² 0.20
 A_s = 0.06 in² 0.06

bar size	spacing (from Table A.4)
# 4 bar @	12 in. o.c.
# 4 bar @	12 in. o.c.
# 4 bar @	12 in. o.c.
# 4 bar @	12 in. o.c.
# 4 bar @	12 in. o.c.
# 4 bar @	12 in. o.c.

Reinforcing steel spacing table

Bar no.	Spacing (in.)	Bar no.	Spacing (in.)	Bar no.	Spacing (in.)
3	0.00	4	0.00	5	0.00
0.00	12.0	0.00	12.0	0.00	12.0
0.11	12.0	0.20	12.0	0.31	12.0
0.13	10.0	0.24	10.0	0.37	10.0
0.15	9.0	0.26	9.0	0.41	9.0
0.17	8.0	0.29	8.0	0.46	8.0
0.18	7.5	0.31	7.5	0.49	7.5
0.19	7.0	0.34	7.0	0.53	7.0
0.20	6.5	0.36	6.5	0.57	6.5
0.22	6.0	0.39	6.0	0.61	6.0
0.24	5.5	0.43	5.5	0.67	5.5
0.26	5.0	0.47	5.0	0.74	5.0
0.29	4.5	0.52	4.5	0.82	4.5
0.33	4.0	0.59	4.0	0.92	4.0
0.38	3.5	0.67	3.5	1.05	3.5
0.44	3.0	0.78	3.0	1.23	3.0

CASE TYPE FOR 2-WAY SLAB SUPPORT CONDITIONS





INTERPOLATION TABLES

Coefficients for negative moments in slabs

l_a / l_b	Case 1		Case 2		Case 3		Case 4		Case 5		Case 6		Case 7		Case 8		Case 9	
	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long
0.50			0.086	0.006		0.022	0.094	0.006	0.090		0.097			0.014	0.089	0.010	0.088	0.003
0.55			0.084	0.007		0.028	0.092	0.008	0.089		0.096			0.019	0.085	0.014	0.086	0.005
0.60			0.081	0.010		0.035	0.089	0.011	0.088		0.095			0.024	0.080	0.018	0.085	0.006
0.65			0.077	0.014		0.043	0.085	0.015	0.087		0.093			0.031	0.074	0.024	0.083	0.008
0.70			0.074	0.017		0.050	0.081	0.019	0.086		0.091			0.038	0.068	0.029	0.081	0.011
0.75			0.069	0.022		0.056	0.076	0.024	0.085		0.088			0.044	0.061	0.036	0.078	0.014
0.80			0.065	0.027		0.061	0.071	0.029	0.083		0.086			0.051	0.055	0.041	0.075	0.017
0.85			0.060	0.031		0.065	0.066	0.034	0.082		0.083			0.057	0.049	0.046	0.072	0.021
0.90			0.055	0.037		0.070	0.060	0.040	0.080		0.079			0.062	0.043	0.052	0.068	0.025
0.95			0.050	0.041		0.072	0.055	0.045	0.079		0.075			0.067	0.038	0.056	0.065	0.029
1.00			0.045	0.045		0.076	0.050	0.050	0.075		0.071			0.071	0.033	0.061	0.061	0.033

0.018

please enter 8 or 9

Coefficients for dead load positive moments in slabs

l_a / l_b	Case 1		Case 2		Case 3		Case 4		Case 5		Case 6		Case 7		Case 8		Case 9	
	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long
0.50	0.095	0.006	0.037	0.002	0.080	0.007	0.059	0.004	0.039	0.001	0.061	0.003	0.089	0.007	0.056	0.004	0.038	0.002
0.55	0.088	0.008	0.035	0.003	0.071	0.009	0.056	0.005	0.038	0.002	0.058	0.004	0.081	0.009	0.052	0.005	0.037	0.003
0.60	0.081	0.010	0.034	0.004	0.062	0.011	0.053	0.007	0.037	0.003	0.056	0.006	0.073	0.012	0.048	0.007	0.036	0.004
0.65	0.074	0.013	0.032	0.006	0.054	0.014	0.050	0.009	0.036	0.004	0.054	0.007	0.065	0.014	0.044	0.009	0.034	0.005
0.70	0.068	0.016	0.030	0.007	0.046	0.016	0.046	0.011	0.035	0.005	0.051	0.009	0.058	0.017	0.040	0.011	0.033	0.006
0.75	0.061	0.019	0.028	0.009	0.040	0.018	0.043	0.013	0.033	0.007	0.048	0.012	0.051	0.020	0.036	0.013	0.031	0.007
0.80	0.056	0.023	0.026	0.011	0.034	0.020	0.039	0.016	0.032	0.009	0.045	0.015	0.045	0.022	0.032	0.015	0.029	0.010
0.85	0.050	0.026	0.024	0.012	0.029	0.022	0.036	0.019	0.031	0.011	0.042	0.017	0.040	0.025	0.029	0.017	0.028	0.013
0.90	0.045	0.029	0.022	0.014	0.025	0.024	0.033	0.022	0.029	0.013	0.039	0.021	0.035	0.028	0.025	0.019	0.026	0.015
0.95	0.040	0.033	0.020	0.016	0.021	0.025	0.030	0.024	0.028	0.015	0.036	0.024	0.031	0.031	0.022	0.021	0.024	0.017
1.00	0.036	0.036	0.018	0.018	0.018	0.027	0.027	0.027	0.027	0.018	0.033	0.027	0.027	0.033	0.020	0.023	0.023	0.020

Coefficients for live load positive moments in slabs

l_a / l_b	Case 1		Case 2		Case 3		Case 4		Case 5		Case 6		Case 7		Case 8		Case 9	
	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long
0.50	0.095	0.006	0.066	0.004	0.088	0.007	0.077	0.005	0.067	0.004	0.035	0.005	0.092	0.007	0.076	0.005	0.067	0.004
0.55	0.088	0.008	0.062	0.006	0.080	0.009	0.072	0.007	0.063	0.005	0.078	0.006	0.085	0.009	0.070	0.007	0.063	0.006
0.60	0.081	0.010	0.058	0.007	0.071	0.011	0.067	0.009	0.059	0.007	0.073	0.008	0.077	0.011	0.065	0.009	0.059	0.007
0.65	0.074	0.013	0.053	0.010	0.064	0.014	0.062	0.011	0.055	0.009	0.068	0.010	0.070	0.014	0.059	0.011	0.054	0.009
0.70	0.068	0.016	0.049	0.012	0.057	0.016	0.057	0.014	0.051	0.011	0.064	0.013	0.063	0.017	0.054	0.014	0.050	0.011
0.75	0.061	0.019	0.045	0.014	0.051	0.019	0.052	0.016	0.047	0.013	0.060	0.016	0.056	0.020	0.049	0.016	0.046	0.013
0.80	0.056	0.023	0.041	0.017	0.045	0.022	0.048	0.020	0.044	0.016	0.055	0.019	0.051	0.023	0.044	0.019	0.042	0.017
0.85	0.050	0.026	0.037	0.019	0.040	0.024	0.043	0.023	0.041	0.019	0.051	0.022	0.045	0.026	0.040	0.022	0.039	0.020
0.90	0.045	0.029	0.034	0.022	0.035	0.027	0.039	0.026	0.037	0.021	0.046	0.025	0.040	0.029	0.035	0.024	0.036	0.022
0.95	0.040	0.033	0.030	0.025	0.031	0.029	0.035	0.029	0.034	0.024	0.042	0.029	0.036	0.032	0.031	0.027	0.032	0.025
1.00	0.036	0.036	0.027	0.027	0.027	0.032	0.032	0.032	0.032	0.027	0.038	0.032	0.032	0.035	0.028	0.030	0.030	0.028

Ratio of load W in l_a and l_b directions for shear in slab and load on supports

l_a / l_b	Case 1		Case 2		Case 3		Case 4		Case 5		Case 6		Case 7		Case 8		Case 9	
	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long	short	long
0.50	0.94	0.06	0.94	0.06	0.76	0.24	0.94	0.06	0.99	0.01	0.97	0.03	0.86	0.14	0.89	0.11	0.97	0.03
0.55	0.92	0.08	0.92	0.08	0.69	0.31	0.92	0.08	0.98	0.02	0.96	0.04	0.81	0.19	0.85	0.15	0.95	0.05
0.60	0.89	0.11	0.89	0.11	0.61	0.39	0.89	0.11	0.97	0.03	0.95	0.05	0.76	0.24	0.80	0.20	0.94	0.06
0.65	0.85	0.15	0.85	0.15	0.53	0.47	0.85	0.15	0.96	0.04	0.93	0.07	0.69	0.31	0.74	0.26	0.92	0.08
0.70	0.81	0.19	0.81	0.19	0.45	0.55	0.81	0.19	0.95	0.05	0.91	0.09	0.62	0.38	0.68	0.32	0.89	0.11
0.75	0.76	0.24	0.76	0.24	0.39	0.61	0.76	0.24	0.94	0.06	0.88	0.12	0.56	0.44	0.61	0.39	0.86	0.14
0.80	0.71	0.29	0.71	0.29	0.33	0.67	0.71	0.29	0.92	0.08	0.86	0.14	0.49	0.51	0.55	0.45	0.83	0.17
0.85	0.66	0.34	0.66	0.34	0.28	0.72	0.66	0.34	0.90	0.10	0.83	0.17	0.43	0.57	0.49	0.51	0.79	0.21
0.90	0.60	0.40	0.60	0.40	0.23	0.77	0.60	0.40	0.88	0.12	0.79	0.21	0.38	0.62	0.43	0.57	0.75	0.25
0.95	0.55	0.45	0.55	0.45	0.20	0.80	0.55	0.45	0.86	0.14	0.75	0.25	0.33	0.67	0.38	0.62	0.71	0.29
1.00	0.50	0.50	0.50	0.50	0.17	0.83	0.50	0.50	0.83	0.17	0.71	0.29	0.29	0.71	0.33	0.67	0.67	0.33



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18" REINFORCED CONCRETE COLUMN SUPPORT

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

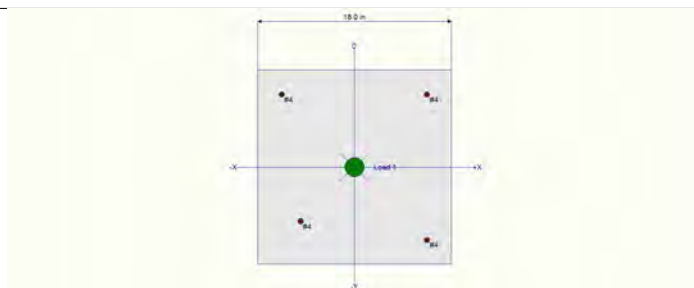
f'_c : Concrete 28 day strength = 3.50 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 40.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 1.0 %
Max. Reinf. = 8.0 %

Overall Column Height = 8.0 ft
End Fixity **Top Fixed, Bottom Fixed**
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT X-X Axis

Column Cross Section

Column Dimensions : 18.0in Square Column, Column Edge to Rebar Edge Cover = 4.0in

Column Reinforcing : general



Rebar Sizes & Locations

Total bars = 4

X & Y distances measured from lower-left corner.

Bar Size #	X in	Y in	Bar Size #	X in	Y in	Bar Size #	X in	Y in	Bar Size #	X in	Y in
# 4	4.000	4.000	# 4	2.250	15.750	# 4	15.750	15.750	# 4	15.750	2.250

Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 2,700.0 lbs * Dead Load Factor

AXIAL LOADS . . .

SLAB LOAD: Axial Load at 8.0 ft above base, D = 7.660, L = 6.128 k

DESIGN SUMMARY

Load Combination **+1.20D+1.60L**
Location of max. above base **7.946 ft**
Maximum Stress Ratio **0.043 : 1**
Ratio = $(P_u^2 + M_u^2)^{.5} / (\phi P_n^2 + \phi M_n^2)^{.5}$
 $P_u = 22.237$ k $\phi * P_n = 516.63$ k
 $M_u - x = 0.0$ k-ft $\phi * M_n - x = 0.0$ k-ft
 $M_u - y = 0.0$ k-ft $\phi * M_n - y = 0.0$ k-ft
 M_u Angle = 0.0 deg
 M_u at Angle = 0.0 k-ft ϕM_n at Angle = 0.0 k-ft
P_n & M_n values located at P_u-M_u vector intersection with capacity curve
Column Capacities . . .
 P_{nmax} : Nominal Max. Compressive Axial Capacity **993.52** k
 P_{nmin} : Nominal Min. Tension Axial Capacity k
 ϕP_n , max : Usable Compressive Axial Capacity **516.63** k
 ϕP_n , min : Usable Tension Axial Capacity k

Maximum SERVICE Load Reactions . .

Top along Y-Y **0.0** k Bottom along Y-Y **0.0** k
Top along X-X **0.0** k Bottom along X-X **0.0** k

Maximum SERVICE Load Deflections . .

Along Y-Y **0.0** in at **0.0** ft above base
for load combination :
Along X-X **0.0** in at **0.0** ft above base
for load combination :

General Section Information . $\phi = 0.650$ $\beta = 0.850$ $\theta = 0.80$

ρ : % Reinforcing **0.2469** % Rebar < Min of 1.0 %
Reinforcing Area **0.80** in²
Concrete Area **324.0** in²



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Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from		Axial Load		Bending Analysis						Utilization	
	X-X	Y-Y	base	ft	Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D			7.95		14.50	516.63					0.000			0.028
+1.20D+1.60L			7.95		22.24	516.63					0.000			0.043
+1.20D+0.50L			7.95		15.50	516.63					0.000			0.030
+1.20D			7.95		12.43	516.63					0.000			0.024
+0.90D			7.95		9.32	516.63					0.000			0.018

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						10.360					
+D+L						16.488					
+D+0.750L						14.956					
+0.60D						6.216					
L Only						6.128					

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only			k-ft			k-ft
+D+L			k-ft			k-ft
+D+0.750L			k-ft			k-ft
+0.60D			k-ft			k-ft
L Only			k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft



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36"x36"x12" REINFORCED CONCRETE COLUMN PAD

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Load Combinations Used : IBC 2018

General Information

Material Properties

f'_c : Concrete 28 day strength	=	3.50	ksi
f_y : Rebar Yield	=	40.0	ksi
E_c : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	150.0	pcf
ϕ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=		
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.0	: 1

Add Ftg Wt for Soil Pressure	:	Yes	
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	
Use Pedestal wt for stability, mom & shear	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=		ft
Allow press. increase per foot of depth when footing base is below	=		ksf

Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=		ksf
	=		ft

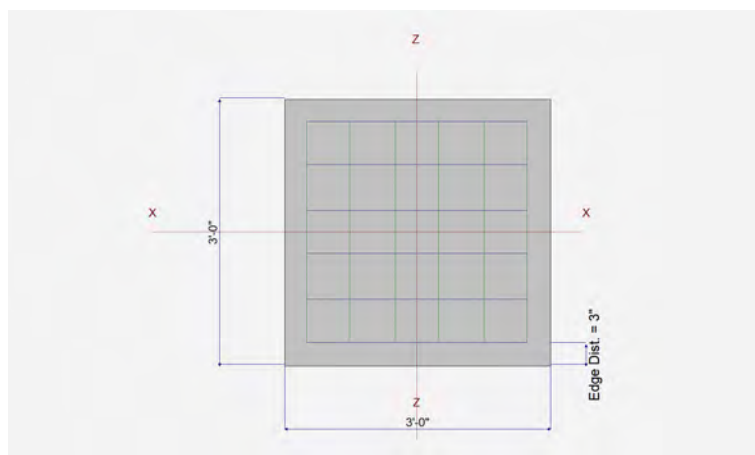
Dimensions

Width parallel to X-X Axis	=	3.0	ft
Length parallel to Z-Z Axis	=	3.0	ft
Footing Thickness	=	12.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in

Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0	in
--	---	-----	----



Reinforcing

Bars parallel to X-X Axis	=		
Number of Bars	=	6	
Reinforcing Bar Size	=	# 4	

Bars parallel to Z-Z Axis	=		
Number of Bars	=	6	
Reinforcing Bar Size	=	# 4	

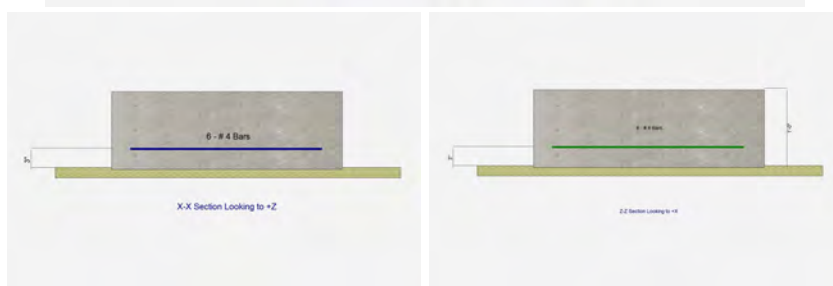
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars required within zone n/a

Bars required on each side of zone n/a

Bars required on each side of zone n/a



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	6.50		5.0			k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



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DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9520	Soil Bearing	1.428 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1875	Z Flexure (+X)	1.975 k-ft/ft	10.531 k-ft/ft	+1.20D+1.60L
PASS	0.1875	Z Flexure (-X)	1.975 k-ft/ft	10.531 k-ft/ft	+1.20D+1.60L
PASS	0.1875	X Flexure (+Z)	1.975 k-ft/ft	10.531 k-ft/ft	+1.20D+1.60L
PASS	0.1875	X Flexure (-Z)	1.975 k-ft/ft	10.531 k-ft/ft	+1.20D+1.60L
PASS	0.1374	1-way Shear (+X)	12.191 psi	88.741 psi	+1.20D+1.60L
PASS	0.1374	1-way Shear (-X)	12.191 psi	88.741 psi	+1.20D+1.60L
PASS	0.1374	1-way Shear (+Z)	12.191 psi	88.741 psi	+1.20D+1.60L
PASS	0.1374	1-way Shear (-Z)	12.191 psi	88.741 psi	+1.20D+1.60L
PASS	0.2576	2-way Punching	45.718 psi	177.482 psi	+1.20D+1.60L

Detailed Results

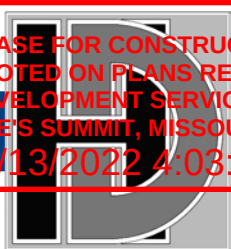
Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.8722	0.8722	n/a	n/a	0.582
X-X, +D+L	1.50	n/a	0.0	1.428	1.428	n/a	n/a	0.952
X-X, +D+0.750L	1.50	n/a	0.0	1.289	1.289	n/a	n/a	0.859
X-X, +0.60D	1.50	n/a	0.0	0.5233	0.5233	n/a	n/a	0.349
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.8722	0.8722	0.582
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.428	1.428	0.952
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.289	1.289	0.859
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.5233	0.5233	0.349

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				
Footing Flexure				

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.138	+Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.40D	1.138	-Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D+1.60L	1.975	+Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D+1.60L	1.975	-Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D+0.50L	1.288	+Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D+0.50L	1.288	-Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D	0.9750	+Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +1.20D	0.9750	-Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +0.90D	0.7313	+Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
X-X, +0.90D	0.7313	-Z	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.40D	1.138	-X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.40D	1.138	+X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D+1.60L	1.975	-X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D+1.60L	1.975	+X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D+0.50L	1.288	-X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D+0.50L	1.288	+X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D	0.9750	-X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +1.20D	0.9750	+X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +0.90D	0.7313	-X	Bottom	0.2592	Min Temp %	0.40	10.531	OK
Z-Z, +0.90D	0.7313	+X	Bottom	0.2592	Min Temp %	0.40	10.531	OK



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One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	7.02 psi	7.02 psi	7.02 psi	7.02 psi	7.02 psi	88.74 psi	0.08	OK
+1.20D+1.60L	12.19 psi	12.19 psi	12.19 psi	12.19 psi	12.19 psi	88.74 psi	0.14	OK
+1.20D+0.50L	7.95 psi	7.95 psi	7.95 psi	7.95 psi	7.95 psi	88.74 psi	0.09	OK
+1.20D	6.02 psi	6.02 psi	6.02 psi	6.02 psi	6.02 psi	88.74 psi	0.07	OK
+0.90D	4.51 psi	4.51 psi	4.51 psi	4.51 psi	4.51 psi	88.74 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	26.33 psi	177.48psi	0.1484	OK
+1.20D+1.60L	45.72 psi	177.48psi	0.2576	OK
+1.20D+0.50L	29.80 psi	177.48psi	0.1679	OK
+1.20D	22.57 psi	177.48psi	0.1272	OK
+0.90D	16.93 psi	177.48psi	0.09537	OK

Title Block Line 1
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Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x8 HIP

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

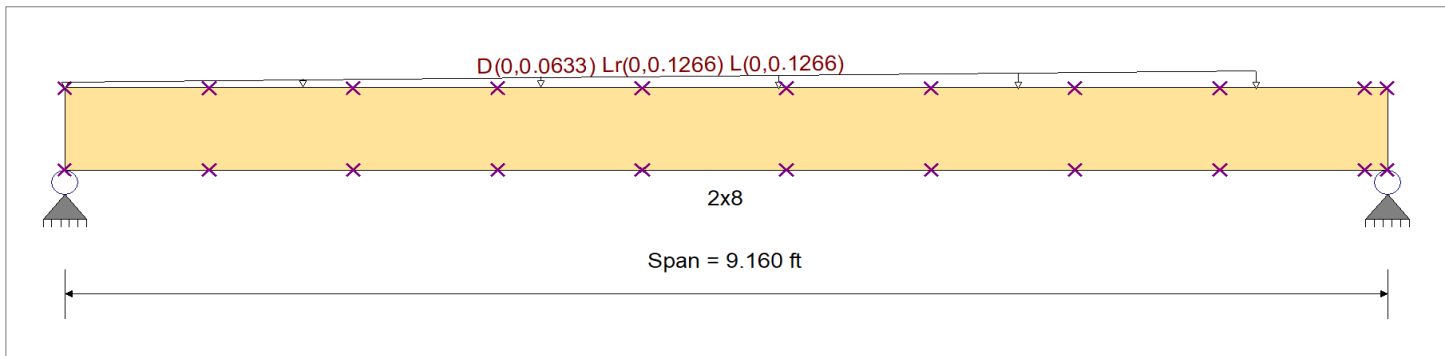
E : Modulus of Elasticity
Ebend- xx 1,600.0 ksi
Eminbend - xx 580.0 ksi
Density 31.210pcf

Unbraced Lengths

Note : User has selected to consider

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020 ksf, Extent = 0.0 -->> 8.250 ft, Trib Width = 0.0->6.330 ft, (RAFTERS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.990	1	Maximum Shear Stress Ratio	=	0.384	1
Section used for this span		2x8		Section used for this span		2x8	
fb: Actual	=	1,324.93	psi	fv: Actual	=	86.50	psi
Fb: Allowable	=	1,337.86	psi	Fv: Allowable	=	225.00	psi
Load Combination		+D+0.750Lr+0.750L		Load Combination		+D+0.750Lr+0.750L	
Location of maximum on span	=	5.215	ft	Location of maximum on span	=	8.257	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.141	in	Ratio =		781	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		0.281	in	Ratio =		390	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only														0.00			
Length = 0.9695 ft	1		0.094	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.10	91.30	966.20	0.10	14.20	162.00
Length = 1.003 ft	1		0.185	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.20	178.96	965.98	0.10	14.20	162.00
Length = 1.003 ft	1		0.262	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.28	252.72	965.98	0.09	14.20	162.00
Length = 1.003 ft	1		0.316	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.33	305.50	965.98	0.07	14.20	162.00
Length = 1.003 ft	1		0.342	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.36	330.25	965.98	0.04	14.20	162.00
Length = 1.003 ft	1		0.343	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.36	331.23	965.98	0.03	14.20	162.00
Length = 1.003 ft	1		0.331	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.35	319.89	965.98	0.08	14.20	162.00
Length = 1.003 ft	1		0.277	0.120	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.29	267.36	965.98	0.14	19.39	162.00

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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Wood Beam

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DESCRIPTION: 2x8 HIP

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+L	Length = 1.003 ft	1	0.171	0.133	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.18	165.59	965.98	0.16	21.63	162.00
	Length = 0.1672 ft	1	0.025	0.133	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.03	23.93	971.08	0.16	21.63	162.00
						1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9695 ft	1	0.255	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.30	273.91	1072.75	0.31	42.60	180.00
	Length = 1.003 ft	1	0.501	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.59	536.88	1072.47	0.30	42.60	180.00
	Length = 1.003 ft	1	0.707	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.83	758.15	1072.47	0.27	42.60	180.00
	Length = 1.003 ft	1	0.855	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	1.00	916.50	1072.47	0.21	42.60	180.00
	Length = 1.003 ft	1	0.924	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	1.08	990.75	1072.47	0.13	42.60	180.00
	Length = 1.003 ft	1	0.927	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	1.09	993.70	1072.47	0.10	42.60	180.00
	Length = 1.003 ft	1	0.895	0.237	1.00	1.200	1.00	1.00	1.00	1.00	0.99	1.05	959.68	1072.47	0.25	42.60	180.00
+D+Lr	Length = 1.003 ft	1	0.748	0.323	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.88	802.08	1072.47	0.42	58.17	180.00
	Length = 1.003 ft	1	0.463	0.360	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.54	496.76	1072.47	0.47	64.88	180.00
	Length = 0.1672 ft	1	0.067	0.360	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.08	71.80	1078.86	0.47	64.88	180.00
						1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9695 ft	1	0.205	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.30	273.91	1338.33	0.31	42.60	225.00
	Length = 1.003 ft	1	0.401	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.59	536.88	1337.86	0.30	42.60	225.00
	Length = 1.003 ft	1	0.567	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.83	758.15	1337.86	0.27	42.60	225.00
	Length = 1.003 ft	1	0.685	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.00	916.50	1337.86	0.21	42.60	225.00
	Length = 1.003 ft	1	0.741	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.08	990.75	1337.86	0.13	42.60	225.00
	Length = 1.003 ft	1	0.743	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.09	993.70	1337.86	0.10	42.60	225.00
+D+0.750Lr+0.750L	Length = 1.003 ft	1	0.717	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.05	959.68	1337.86	0.25	42.60	225.00
	Length = 1.003 ft	1	0.600	0.259	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.88	802.08	1337.86	0.42	58.17	225.00
	Length = 1.003 ft	1	0.371	0.288	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.54	496.76	1337.86	0.47	64.88	225.00
	Length = 0.1672 ft	1	0.053	0.288	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.08	71.80	1348.22	0.47	64.88	225.00
						1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9695 ft	1	0.273	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.40	365.22	1338.33	0.41	56.80	225.00
	Length = 1.003 ft	1	0.535	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.78	715.84	1337.86	0.40	56.80	225.00
	Length = 1.003 ft	1	0.756	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.11	1,010.86	1337.86	0.36	56.80	225.00
	Length = 1.003 ft	1	0.913	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.34	1,222.01	1337.86	0.28	56.80	225.00
	Length = 1.003 ft	1	0.987	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.45	1,321.00	1337.86	0.17	56.80	225.00
+D+0.750L	Length = 1.003 ft	1	0.990	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.45	1,324.93	1337.86	0.13	56.80	225.00
	Length = 1.003 ft	1	0.956	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.40	1,279.57	1337.86	0.33	56.80	225.00
	Length = 1.003 ft	1	0.799	0.345	1.25	1.200	1.00	1.00	1.00	1.00	0.99	1.17	1,069.45	1337.86	0.56	77.56	225.00
	Length = 1.003 ft	1	0.495	0.384	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.73	662.35	1337.86	0.63	86.50	225.00
	Length = 0.1672 ft	1	0.071	0.384	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.10	95.73	1348.22	0.63	86.50	225.00
						1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9695 ft	1	0.185	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.25	228.26	1232.24	0.26	35.50	207.00
	Length = 1.003 ft	1	0.363	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.49	447.40	1231.86	0.25	35.50	207.00
	Length = 1.003 ft	1	0.513	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.69	631.79	1231.86	0.22	35.50	207.00
	Length = 1.003 ft	1	0.620	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.84	763.75	1231.86	0.18	35.50	207.00
+0.60D	Length = 1.003 ft	1	0.670	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.90	825.63	1231.86	0.11	35.50	207.00
	Length = 1.003 ft	1	0.672	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.91	828.08	1231.86	0.08	35.50	207.00
	Length = 1.003 ft	1	0.649	0.171	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.88	799.73	1231.86	0.21	35.50	207.00
	Length = 1.003 ft	1	0.543	0.234	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.73	668.40	1231.86	0.35	48.48	207.00
	Length = 1.003 ft	1	0.336	0.261	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.45	413.97	1231.86	0.39	54.06	207.00
	Length = 0.1672 ft	1	0.048	0.261	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.07	59.83	1240.49	0.39	54.06	207.00
						1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9695 ft	1	0.032	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.06	54.78	1708.03	0.06	8.52	288.00
	Length = 1.003 ft	1	0.063	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.12	107.38	1707.20	0.06	8.52	288.00
	Length = 1.003 ft	1	0.089	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.17	151.63	1707.20	0.05	8.52	288.00
	Length = 1.003 ft	1	0.107	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.20	183.30	1707.20	0.04	8.52	288.00
	Length = 1.003 ft	1	0.116	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.22	198.15	1707.20	0.03	8.52	288.00
	Length = 1.003 ft	1	0.116	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.22	198.74	1707.20	0.02	8.52	288.00
	Length = 1.003 ft	1	0.112	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.21	191.94	1707.20	0.05	8.52	288.00
	Length = 1.003 ft	1	0.094	0.040	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.18	160.42	1707.20	0.08	11.63	288.00
	Length = 1.003 ft	1	0.058	0.045	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.11	99.35	1707.20	0.09	12.98	288.00
	Length = 0.1672 ft	1	0.008	0.045	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.02	14.36	1725.06	0.09	12.98	288.00

Title Block Line 1
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Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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Wood Beam

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HD ENGINEERING & DESIGN INC

Lic. # : KW-06001844

DESCRIPTION: 2x8 HIP

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.2812	4.747		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.417	0.627
Overall MINimum	0.209	0.314
D Only	0.104	0.157
+D+L	0.313	0.470
+D+Lr	0.313	0.470
+D+0.750Lr+0.750L	0.417	0.627
+D+0.750L	0.261	0.392
+0.60D	0.063	0.094
Lr Only	0.209	0.314
L Only	0.209	0.314

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x10 HIP

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

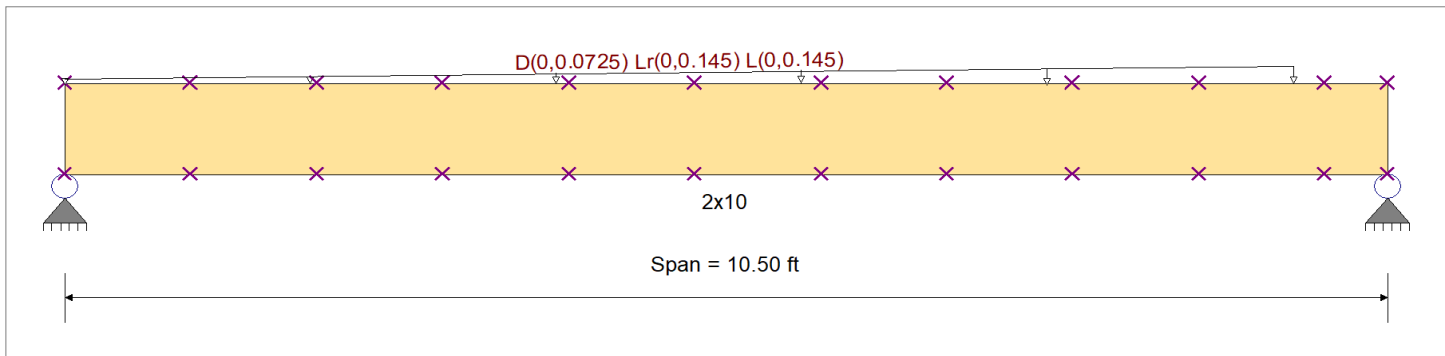
Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

E : Modulus of Elasticity
Ebend- xx 1,600.0 ksi
Eminbend - xx 580.0 ksi
Density 31.210pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020 ksf, Extent = 0.0 -->> 9.750 ft, Trib Width = 0.0->7.250 ft, (RAFTERS)

DESIGN SUMMARY

						Design OK					
Maximum Bending Stress Ratio	=	0.990	1	Maximum Shear Stress Ratio	=	0.418	1				
Section used for this span		2x10		Section used for this span		2x10					
fb: Actual	=	1,212.13	psi	fv: Actual	=	94.10	psi				
Fb: Allowable	=	1,224.24	psi	Fv: Allowable	=	225.00	psi				
Load Combination		+D+0.750Lr+0.750L		Load Combination		+D+0.750Lr+0.750L					
Location of maximum on span	=	6.016	ft	Location of maximum on span	=	9.734	ft				
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1					
Maximum Deflection											
Max Downward Transient Deflection		0.133	in	Ratio =		949	>=180				
Max Upward Transient Deflection		0.000	in	Ratio =		0	<180				
Max Downward Total Deflection		0.265	in	Ratio =		474	>=180				
Max Upward Total Deflection		0.000	in	Ratio =		0	<180				

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 0.9964 ft	1	0.084	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.13	74.57	884.47	0.13	14.32	162.00
Length = 0.9964 ft	1	0.164	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.26	145.01	884.47	0.13	14.32	162.00
Length = 0.9964 ft	1	0.234	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.37	207.21	884.47	0.12	14.32	162.00
Length = 0.9964 ft	1	0.291	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.46	257.02	884.47	0.10	14.32	162.00
Length = 0.9964 ft	1	0.328	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.52	290.33	884.47	0.08	14.32	162.00
Length = 0.9964 ft	1	0.343	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.54	303.01	884.47	0.04	14.32	162.00
Length = 0.9964 ft	1	0.343	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.54	303.03	884.47	0.05	14.32	162.00
Length = 0.9964 ft	1	0.329	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.52	290.94	884.47	0.10	14.32	162.00

Title Block Line 1
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Title Block" selection

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Engineer:
Project ID:
Project Descr:

Title Block Line 6

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Wood Beam

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HD ENGINEERING & DESIGN INC

Lic. #: KW-06001844

DESCRIPTION: 2x10 HIP

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+L	Length = 0.9964 ft	1	0.283	0.110	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.45	249.98	884.47	0.16	17.76	162.00
	Length = 0.9964 ft	1	0.199	0.145	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.31	176.02	884.47	0.22	23.52	162.00
	Length = 0.5365 ft	1	0.074	0.145	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.12	65.85	887.68	0.22	23.52	162.00
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9964 ft	1	0.228	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.40	223.71	981.82	0.40	42.96	180.00
	Length = 0.9964 ft	1	0.443	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.78	435.04	981.82	0.39	42.96	180.00
	Length = 0.9964 ft	1	0.633	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.11	621.62	981.82	0.36	42.96	180.00
	Length = 0.9964 ft	1	0.785	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.37	771.07	981.82	0.30	42.96	180.00
	Length = 0.9964 ft	1	0.887	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.55	871.00	981.82	0.23	42.96	180.00
	Length = 0.9964 ft	1	0.926	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.62	909.04	981.82	0.13	42.96	180.00
	Length = 0.9964 ft	1	0.926	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.62	909.10	981.82	0.14	42.96	180.00
	Length = 0.9964 ft	1	0.889	0.239	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.56	872.81	981.82	0.30	42.96	180.00
	Length = 0.9964 ft	1	0.764	0.296	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.34	749.94	981.82	0.49	53.29	180.00
	Length = 0.9964 ft	1	0.538	0.392	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.94	528.05	981.82	0.65	70.57	180.00
	Length = 0.5365 ft	1	0.200	0.392	1.00	1.100	1.00	1.00	1.00	1.00	1.00	0.35	197.55	985.87	0.65	70.57	180.00
+D+Lr						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9964 ft	1	0.183	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.40	223.71	1224.24	0.40	42.96	225.00
	Length = 0.9964 ft	1	0.355	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.78	435.04	1224.24	0.39	42.96	225.00
	Length = 0.9964 ft	1	0.508	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.11	621.62	1224.24	0.36	42.96	225.00
	Length = 0.9964 ft	1	0.630	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.37	771.07	1224.24	0.30	42.96	225.00
	Length = 0.9964 ft	1	0.711	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.55	871.00	1224.24	0.23	42.96	225.00
	Length = 0.9964 ft	1	0.743	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.62	909.04	1224.24	0.13	42.96	225.00
	Length = 0.9964 ft	1	0.743	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.62	909.10	1224.24	0.14	42.96	225.00
	Length = 0.9964 ft	1	0.713	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.56	872.81	1224.24	0.30	42.96	225.00
	Length = 0.9964 ft	1	0.613	0.237	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.34	749.94	1224.24	0.49	53.29	225.00
	Length = 0.9964 ft	1	0.431	0.314	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.94	528.05	1224.24	0.65	70.57	225.00
	Length = 0.5365 ft	1	0.160	0.314	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.35	197.55	1230.93	0.65	70.57	225.00
						1.100	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9964 ft	1	0.244	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.53	298.28	1224.24	0.53	57.28	225.00
	Length = 0.9964 ft	1	0.474	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.03	580.06	1224.24	0.52	57.28	225.00
+D+0.750Lr+0.750L	Length = 0.9964 ft	1	0.677	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.48	828.83	1224.24	0.48	57.28	225.00
	Length = 0.9964 ft	1	0.840	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.83	1,028.09	1224.24	0.41	57.28	225.00
	Length = 0.9964 ft	1	0.949	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	2.07	1,161.33	1224.24	0.30	57.28	225.00
	Length = 0.9964 ft	1	0.990	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	2.16	1,212.05	1224.24	0.17	57.28	225.00
	Length = 0.9964 ft	1	0.990	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	2.16	1,212.13	1224.24	0.18	57.28	225.00
	Length = 0.9964 ft	1	0.951	0.255	1.25	1.100	1.00	1.00	1.00	1.00	0.99	2.07	1,163.75	1224.24	0.41	57.28	225.00
	Length = 0.9964 ft	1	0.817	0.316	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.78	999.92	1224.24	0.66	71.06	225.00
	Length = 0.9964 ft	1	0.575	0.418	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.26	704.06	1224.24	0.87	94.10	225.00
	Length = 0.5365 ft	1	0.214	0.418	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.47	263.40	1230.93	0.87	94.10	225.00
						1.100	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9964 ft	1	0.165	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.33	186.43	1127.44	0.33	35.80	207.00
	Length = 0.9964 ft	1	0.322	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.65	362.54	1127.44	0.33	35.80	207.00
	Length = 0.9964 ft	1	0.459	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.92	518.02	1127.44	0.30	35.80	207.00
	Length = 0.9964 ft	1	0.570	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.15	642.55	1127.44	0.25	35.80	207.00
	Length = 0.9964 ft	1	0.644	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.29	725.83	1127.44	0.19	35.80	207.00
+D+0.60D	Length = 0.9964 ft	1	0.672	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.35	757.53	1127.44	0.11	35.80	207.00
	Length = 0.9964 ft	1	0.672	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.35	757.58	1127.44	0.12	35.80	207.00
	Length = 0.9964 ft	1	0.645	0.173	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.30	727.34	1127.44	0.25	35.80	207.00
	Length = 0.9964 ft	1	0.554	0.215	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.11	624.95	1127.44	0.41	44.41	207.00
	Length = 0.9964 ft	1	0.390	0.284	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.78	440.04	1127.44	0.54	58.81	207.00
	Length = 0.5365 ft	1	0.145	0.284	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.29	164.63	1132.98	0.54	58.81	207.00
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9964 ft	1	0.029	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.08	44.74	1561.06	0.08	8.59	288.00
	Length = 0.9964 ft	1	0.056	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.16	87.01	1561.06	0.08	8.59	288.00
	Length = 0.9964 ft	1	0.080	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.22	124.32	1561.06	0.07	8.59	288.00
	Length = 0.9964 ft	1	0.099	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.27	154.21	1561.06	0.06	8.59	288.00
	Length = 0.9964 ft	1	0.112	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.31	174.20	1561.06	0.05	8.59	288.00
	Length = 0.9964 ft	1	0.116	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.32	181.81	1561.06	0.03	8.59	288.00
	Length = 0.9964 ft	1	0.116	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.32	181.82	1561.06	0.03	8.59	288.00
	Length = 0.9964 ft	1	0.112	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.31	174.56	1561.06	0.06	8.59	288.00

Title Block Line 1
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Project Title: HD STANDARD CALC
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Title Block Line 6

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Wood Beam

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Lic. # : KW-06001844

DESCRIPTION: 2x10 HIP

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 0.9964 ft		1	0.096	0.037	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.27	149.99	1561.06	0.10	10.66	288.00
Length = 0.9964 ft		1	0.068	0.049	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.19	105.61	1561.06	0.13	14.11	288.00
Length = 0.5365 ft		1	0.025	0.049	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.07	39.51	1572.95	0.13	14.11	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.2654	5.442		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.539	0.875
Overall MINimum	0.269	0.438
D Only	0.135	0.219
+D+L	0.404	0.656
+D+Lr	0.404	0.656
+D+0.750Lr+0.750L	0.539	0.875
+D+0.750L	0.337	0.547
+0.60D	0.081	0.131
Lr Only	0.269	0.438
L Only	0.269	0.438

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x12 HIP

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

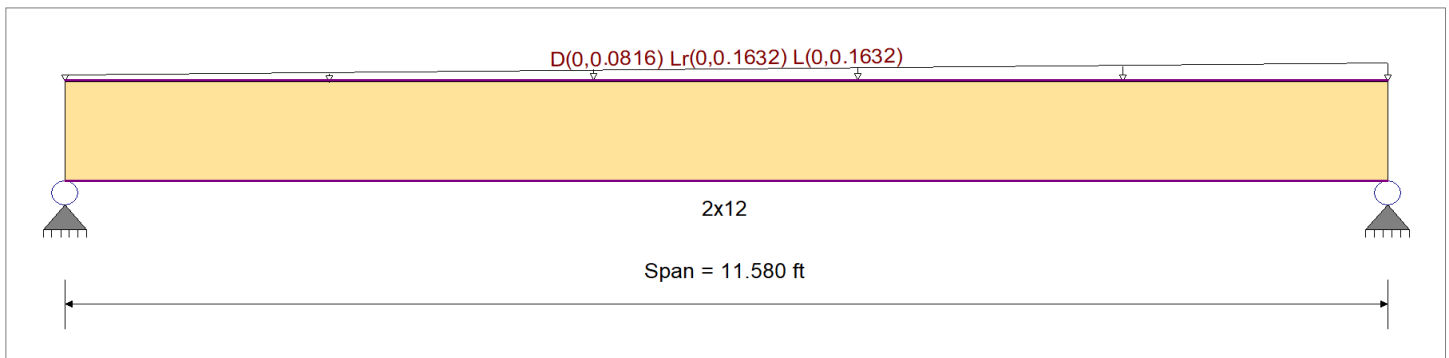
Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900 psi E : Modulus of Elasticity
Fb - 900 psi Ebend- xx 1600 ksi
Fc - Prll 1350 psi Eminbend - xx 580 ksi
Fc - Perp 625 psi
Fv 180 psi
Ft 575 psi Density 31.21pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020 ksf, Extent = 0.0 --> 11.580 ft, Trib Width = 0.0->8.160 ft, (RAFTERS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.947 : 1	Maximum Shear Stress Ratio	=	0.383 : 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	1,064.88psi	fv: Actual	=	86.10 psi
Fb: Allowable	=	1,125.00psi	Fv: Allowable	=	225.00 psi
Load Combination	=	+D+0.750Lr+0.750L	Load Combination	=	+D+0.750Lr+0.750L
Location of maximum on span	=	6.678ft	Location of maximum on span	=	10.650ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.117 in	Ratio =	1189	>=180
Max Upward Transient Deflection		0.000 in	Ratio =	0	<180
Max Downward Total Deflection		0.234 in	Ratio =	594	>=180
Max Upward Total Deflection		0.000 in	Ratio =	0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only													0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.329	0.133	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.70	266.22	810.00	0.24	21.52	162.00	
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.887	0.359	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.11	798.66	900.00	0.73	64.57	180.00	
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.710	0.287	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.11	798.66	1125.00	0.73	64.57	225.00	
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.947	0.383	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.81	1,064.88	1125.00	0.97	86.10	225.00	
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.643	0.260	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.75	665.55	1035.00	0.61	53.81	207.00	
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 11.580 ft	1	0.111	0.045	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.42	159.73	1440.00	0.15	12.91	288.00	

Title Block Line 1
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Title Block Line 6

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Lic. # : KW-06001844

DESCRIPTION: 2x12 HIP

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.2336	6.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.630	1.260
Overall MINimum	0.315	0.630
D Only	0.157	0.315
+D+L	0.472	0.945
+D+Lr	0.472	0.945
+D+0.750Lr+0.750L	0.630	1.260
+D+0.750L	0.394	0.787
+0.60D	0.094	0.189
Lr Only	0.315	0.630
L Only	0.315	0.630

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 1 3/4"x9 1/2" LVL HIP

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

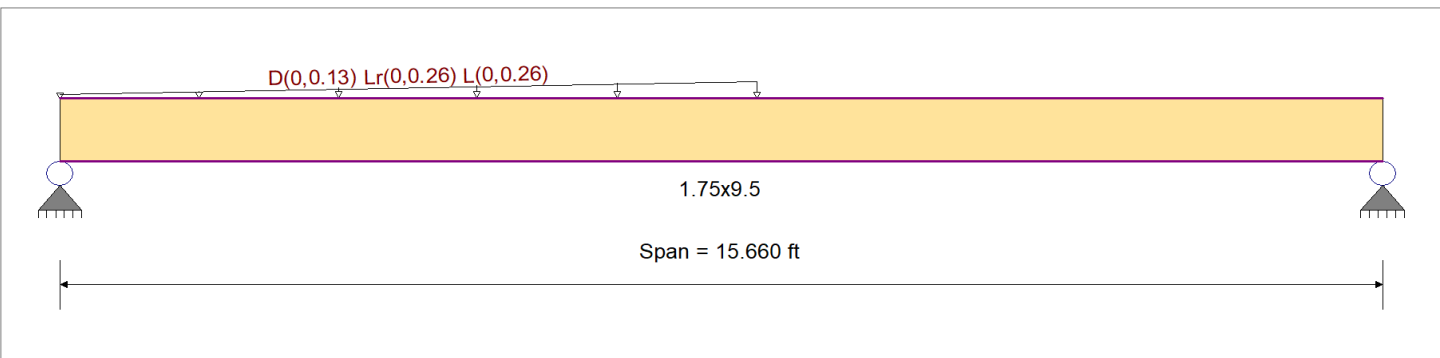
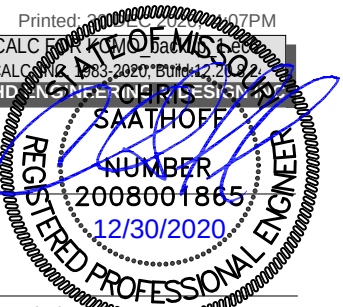
Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 2,600.0 psi
Fb - 2,600.0 psi
Fc - Prll 2,510.0 psi
Fc - Perp 750.0 psi
Fv 285.0 psi
Ft 1,555.0 psi
E : Modulus of Elasticity 1,900.0 ksi
Ebend- xx 965.71 ksi
Eminbend - xx 965.71 ksi
Density 42.010pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020 ksf, Extent = 0.0 --> 8.250 ft, Trib Width = 0.0->13.0 ft, (RAFTERS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.865	1	Maximum Shear Stress Ratio	=	0.348	1
Section used for this span		1.75x9.5		Section used for this span		1.75x9.5	
fb: Actual	=	2,810.52	psi	fv: Actual	=	123.99	psi
Fb: Allowable	=	3,250.00	psi	Fv: Allowable	=	356.25	psi
Load Combination	=	+D+0.750Lr+0.750L		Load Combination	=	+D+0.750Lr+0.750L	
Location of maximum on span	=	6.630	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.517	in	Ratio =		363	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		1.034	in	Ratio =		181	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment	Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only															0.00	0.00	0.00
	Length = 15.660 ft	1	0.300	0.121	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.54	702.63	2340.00	0.34	31.00	256.50
+D+L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 15.660 ft	1	0.811	0.326	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.62	2,107.89	2600.00	1.03	92.99	285.00
+D+Lr						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 15.660 ft	1	0.649	0.261	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.62	2,107.89	3250.00	1.03	92.99	356.25
+D+0.750Lr+0.750L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 15.660 ft	1	0.865	0.348	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.17	2,810.52	3250.00	1.37	123.99	356.25
+D+0.750L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 15.660 ft	1	0.587	0.236	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.85	1,756.57	2990.00	0.86	77.50	327.75
+0.60D						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 15.660 ft	1	0.101	0.041	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.92	421.58	4160.00	0.21	18.60	456.00

Title Block Line 1
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Title Block Line 6

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DESCRIPTION: 1 3/4"x9 1/2" LVL HIP

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	1.0336	7.430		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.392	0.753
Overall MINimum	0.696	0.377
D Only	0.348	0.188
+D+L	1.044	0.565
+D+Lr	1.044	0.565
+D+0.750Lr+0.750L	1.392	0.753
+D+0.750L	0.870	0.471
+0.60D	0.209	0.113
Lr Only	0.696	0.377
L Only	0.696	0.377

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 1 3/4"x11 7/8" LVL HIP

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

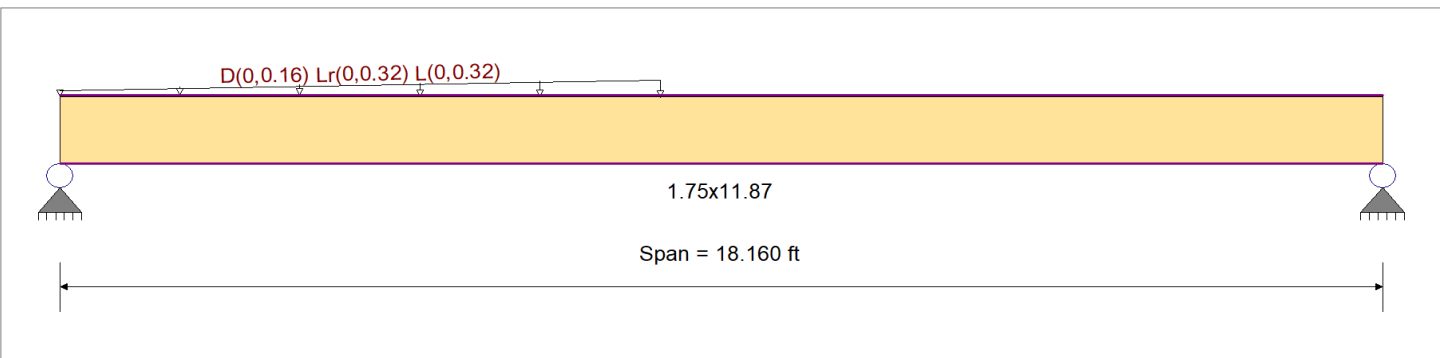
Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 2,600.0 psi
Fb - 2,600.0 psi
Fc - Prll 2,510.0 psi
Fc - Perp 750.0 psi
Fv 285.0 psi
Ft 1,555.0 psi
E : Modulus of Elasticity
Ebend- xx 1,900.0 ksi
Eminbend - xx 965.71 ksi
Density 42.010 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020 ksf, Extent = 0.0 --> 8.250 ft, Trib Width = 0.0->16.0 ft, (RAFTERS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.759	1	Maximum Shear Stress Ratio	=	0.366	1
Section used for this span		1.75x11.87		Section used for this span		1.75x11.87	
fb: Actual	=	2,465.87	psi	fv: Actual	=	130.43	psi
Fb: Allowable	=	3,250.00	psi	Fv: Allowable	=	356.25	psi
Load Combination		+D+0.750Lr+0.750L		Load Combination		+D+0.750Lr+0.750L	
Location of maximum on span	=	6.893	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.472	in	Ratio =		461	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		0.944	in	Ratio =		230	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment	Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only														0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.263	0.127	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.11	616.47	2340.00	0.45	32.61	256.50
+D+L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.711	0.343	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.34	1,849.40	2600.00	1.36	97.83	285.00
+D+Lr						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.569	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.34	1,849.40	3250.00	1.36	97.83	356.25
+D+0.750Lr+0.750L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.759	0.366	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.45	2,465.87	3250.00	1.81	130.43	356.25
+D+0.750L						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.515	0.249	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.28	1,541.17	2990.00	1.13	81.52	327.75
+0.60D						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 18.160 ft	1	0.089	0.043	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.27	369.88	4160.00	0.27	19.57	456.00

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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HD ENGINEERING & DESIGN INC

Lic. # : KW-06001844

DESCRIPTION: 1 3/4"x11 7/8" LVL HIP

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.9442	8.351		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.840	0.800
Overall MINimum	0.920	0.400
D Only	0.460	0.200
+D+L	1.380	0.600
+D+Lr	1.380	0.600
+D+0.750Lr+0.750L	1.840	0.800
+D+0.750L	1.150	0.500
+0.60D	0.276	0.120
Lr Only	0.920	0.400
L Only	0.920	0.400

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x8 VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

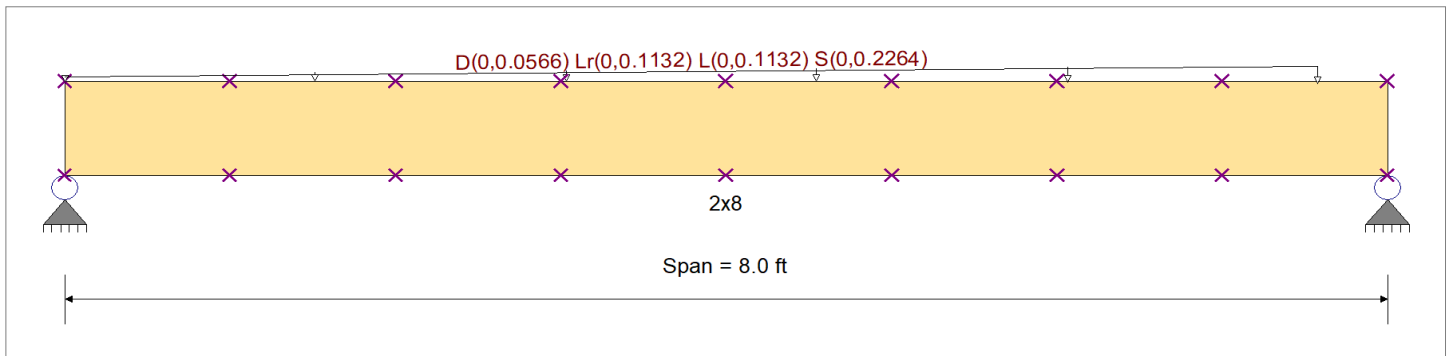
Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

E : Modulus of Elasticity
Ebend- xx 1,600.0 ksi
Eminbend - xx 580.0 ksi
Density 31.210pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.040->0.040 ksf, Extent = 0.0 --> 7.580 ft, Trib Width = 0.0->5.660 ft,

DESIGN SUMMARY

						Design OK					
Maximum Bending Stress Ratio	=	0.988	1	Maximum Shear Stress Ratio	=	0.463	1				
Section used for this span		2x8		Section used for this span		2x8					
fb: Actual	=	1,217.08	psi	fv: Actual	=	95.83	psi				
Fb: Allowable	=	1,231.98	psi	Fv: Allowable	=	207.00	psi				
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S					
Location of maximum on span	=	4.613	ft	Location of maximum on span	=	7.416	ft				
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1					
Maximum Deflection											
Max Downward Transient Deflection		0.144	in	Ratio =		668	>=360				
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360				
Max Downward Total Deflection		0.198	in	Ratio =		486	>=180				
Max Upward Total Deflection		0.000	in	Ratio =		0	<180				

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 0.9927 ft	1	0.073	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.08	70.52	966.05	0.08	10.72	162.00
Length = 0.9927 ft	1	0.139	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.15	134.36	966.05	0.08	10.72	162.00
Length = 0.9927 ft	1	0.191	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.20	184.86	966.05	0.06	10.72	162.00
Length = 1.022 ft	1	0.224	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.24	215.88	965.85	0.05	10.72	162.00
Length = 0.9927 ft	1	0.229	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.24	221.29	966.05	0.02	10.72	162.00
Length = 0.9927 ft	1	0.226	0.066	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.24	218.81	966.05	0.05	10.72	162.00
Length = 0.9927 ft	1	0.195	0.088	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.21	188.18	966.05	0.10	14.18	162.00
Length = 1.022 ft	1	0.121	0.108	0.90	1.200	1.00	1.00	1.00	1.00	0.99	0.13	117.33	965.85	0.13	17.42	162.00

Title Block Line 1
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Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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DESCRIPTION: 2x8 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F _b	V	fv	F _v
+D+L					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.197	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.23	211.55	1072.56	0.23	32.17	180.00
Length = 0.9927 ft	1		0.376	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.44	403.08	1072.56	0.23	32.17	180.00
Length = 0.9927 ft	1		0.517	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.61	554.59	1072.56	0.19	32.17	180.00
Length = 1.022 ft	1		0.604	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.71	647.65	1072.31	0.14	32.17	180.00
Length = 0.9927 ft	1		0.619	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.73	663.86	1072.56	0.06	32.17	180.00
Length = 0.9927 ft	1		0.612	0.179	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.72	656.42	1072.56	0.16	32.17	180.00
Length = 0.9927 ft	1		0.526	0.236	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.62	564.54	1072.56	0.31	42.53	180.00
Length = 1.022 ft	1		0.328	0.290	1.00	1.200	1.00	1.00	1.00	1.00	0.99	0.39	352.00	1072.31	0.38	52.27	180.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.158	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.23	211.55	1338.01	0.23	32.17	225.00
Length = 0.9927 ft	1		0.301	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.44	403.08	1338.01	0.23	32.17	225.00
Length = 0.9927 ft	1		0.414	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.61	554.59	1338.01	0.19	32.17	225.00
Length = 1.022 ft	1		0.484	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.71	647.65	1337.60	0.14	32.17	225.00
Length = 0.9927 ft	1		0.496	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.73	663.86	1338.01	0.06	32.17	225.00
Length = 0.9927 ft	1		0.491	0.143	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.72	656.42	1338.01	0.16	32.17	225.00
Length = 0.9927 ft	1		0.422	0.189	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.62	564.54	1338.01	0.31	42.53	225.00
Length = 1.022 ft	1		0.263	0.232	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.39	352.00	1337.60	0.38	52.27	225.00
+D+S					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.286	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.39	352.58	1231.98	0.39	53.61	207.00
Length = 0.9927 ft	1		0.545	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.74	671.80	1231.98	0.38	53.61	207.00
Length = 0.9927 ft	1		0.750	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.01	924.32	1231.98	0.32	53.61	207.00
Length = 1.022 ft	1		0.876	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.18	1,079.41	1231.64	0.23	53.61	207.00
Length = 0.9927 ft	1		0.898	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.21	1,106.43	1231.98	0.10	53.61	207.00
Length = 0.9927 ft	1		0.888	0.259	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.20	1,094.03	1231.98	0.27	53.61	207.00
Length = 0.9927 ft	1		0.764	0.342	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.03	940.90	1231.98	0.51	70.89	207.00
Length = 1.022 ft	1		0.476	0.421	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.64	586.67	1231.64	0.63	87.12	207.00
+D+0.750Lr+0.750L					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.211	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.31	282.06	1338.01	0.31	42.89	225.00
Length = 0.9927 ft	1		0.402	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.59	537.44	1338.01	0.30	42.89	225.00
Length = 0.9927 ft	1		0.553	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.81	739.46	1338.01	0.26	42.89	225.00
Length = 1.022 ft	1		0.646	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.95	863.53	1337.60	0.18	42.89	225.00
Length = 0.9927 ft	1		0.662	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.97	885.15	1338.01	0.08	42.89	225.00
Length = 0.9927 ft	1		0.654	0.191	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.96	875.22	1338.01	0.22	42.89	225.00
Length = 0.9927 ft	1		0.563	0.252	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.82	752.72	1338.01	0.41	56.71	225.00
Length = 1.022 ft	1		0.351	0.310	1.25	1.200	1.00	1.00	1.00	1.00	0.99	0.51	469.34	1337.60	0.51	69.70	225.00
+D+0.750L+0.750S					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.315	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.42	387.84	1231.98	0.43	58.97	207.00
Length = 0.9927 ft	1		0.600	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.81	738.99	1231.98	0.41	58.97	207.00
Length = 0.9927 ft	1		0.825	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.11	1,016.76	1231.98	0.35	58.97	207.00
Length = 1.022 ft	1		0.964	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.30	1,187.35	1231.64	0.25	58.97	207.00
Length = 0.9927 ft	1		0.988	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.33	1,217.08	1231.98	0.11	58.97	207.00
Length = 0.9927 ft	1		0.977	0.285	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.32	1,203.43	1231.98	0.30	58.97	207.00
Length = 0.9927 ft	1		0.840	0.377	1.15	1.200	1.00	1.00	1.00	1.00	0.99	1.13	1,034.99	1231.98	0.57	77.98	207.00
Length = 1.022 ft	1		0.524	0.463	1.15	1.200	1.00	1.00	1.00	1.00	0.99	0.71	645.34	1231.64	0.69	95.83	207.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9927 ft	1		0.025	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.05	42.31	1707.45	0.05	6.43	288.00
Length = 0.9927 ft	1		0.047	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.09	80.62	1707.45	0.05	6.43	288.00
Length = 0.9927 ft	1		0.065	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.12	110.92	1707.45	0.04	6.43	288.00
Length = 1.022 ft	1		0.076	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.14	129.53	1706.72	0.03	6.43	288.00
Length = 0.9927 ft	1		0.078	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.15	132.77	1707.45	0.01	6.43	288.00
Length = 0.9927 ft	1		0.077	0.022	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.14	131.28	1707.45	0.03	6.43	288.00
Length = 0.9927 ft	1		0.066	0.030	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.12	112.91	1707.45	0.06	8.51	288.00
Length = 1.022 ft	1		0.041	0.036	1.60	1.200	1.00	1.00	1.00	1.00	0.99	0.08	70.40	1706.72	0.08	10.45	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1975	4.175		0.0000	0.000

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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DESCRIPTION: 2x8 VALLEY

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.435	0.745
Overall MINimum	0.316	0.542
D Only	0.079	0.136
+D+L	0.237	0.407
+D+Lr	0.237	0.407
+D+S	0.395	0.678
+D+0.750Lr+0.750L	0.316	0.542
+D+0.750L+0.750S	0.435	0.745
+0.60D	0.047	0.081
Lr Only	0.158	0.271
L Only	0.158	0.271
S Only	0.316	0.542

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x10 VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

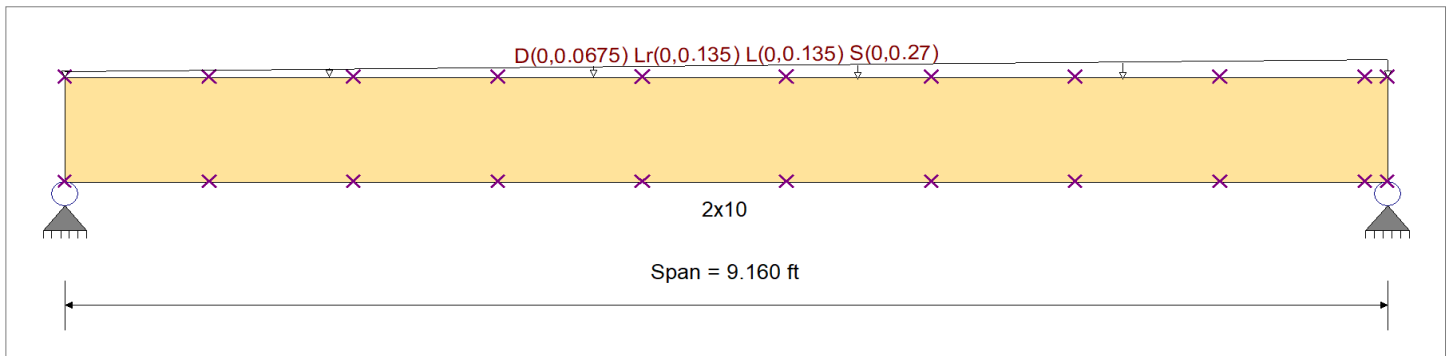
Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

E : Modulus of Elasticity 1,600.0 ksi
Ebenbend - xx 1,600.0 ksi
Eminbend - yy 580.0 ksi
Density 31.210pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.040->0.040 ksf, Extent = 0.0 --> 9.160 ft, Trib Width = 0.0->6.750 ft,

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.994	1	Maximum Shear Stress Ratio	=	0.449	1
Section used for this span		2x10		Section used for this span		2x10	
fb: Actual	=	1,121.01	psi	fv: Actual	=	92.98	psi
Fb: Allowable	=	1,127.35	psi	Fv: Allowable	=	207.00	psi
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	5.282	ft	Location of maximum on span	=	8.391	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.136	in	Ratio =		807	>=180
Max Upward Transient Deflection		0.000	in	Ratio =		0	<180
Max Downward Total Deflection		0.187	in	Ratio =		587	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 0.9695 ft	1	0.063	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.10	55.42	884.67	0.10	10.91	162.00
Length = 1.003 ft	1	0.123	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.19	108.74	884.42	0.10	10.91	162.00
Length = 1.003 ft	1	0.174	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.27	153.86	884.42	0.09	10.91	162.00
Length = 1.003 ft	1	0.211	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.33	186.60	884.42	0.07	10.91	162.00
Length = 1.003 ft	1	0.229	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.36	202.81	884.42	0.04	10.91	162.00
Length = 1.003 ft	1	0.230	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.36	203.82	884.42	0.03	10.91	162.00
Length = 1.003 ft	1	0.224	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.35	198.30	884.42	0.08	10.91	162.00
Length = 1.003 ft	1	0.191	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.30	168.91	884.42	0.13	14.29	162.00

Title Block Line 1
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Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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HD ENGINEERING & DESIGN INC

DESCRIPTION: 2x10 VALLEY

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 1.003 ft	1	0.125	0.104	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.20	110.47	884.42	0.16	16.91	162.00
Length = 0.1672 ft	1	0.021	0.104	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.03	18.80	890.01	0.16	16.91	162.00
+D+L					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.169	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.30	166.26	982.07	0.30	32.72	180.00
Length = 1.003 ft	1	0.332	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.58	326.22	981.76	0.30	32.72	180.00
Length = 1.003 ft	1	0.470	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.82	461.57	981.76	0.27	32.72	180.00
Length = 1.003 ft	1	0.570	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.00	559.81	981.76	0.21	32.72	180.00
Length = 1.003 ft	1	0.620	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.08	608.43	981.76	0.13	32.72	180.00
Length = 1.003 ft	1	0.623	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.09	611.46	981.76	0.09	32.72	180.00
Length = 1.003 ft	1	0.606	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.06	594.90	981.76	0.23	32.72	180.00
Length = 1.003 ft	1	0.516	0.238	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.90	506.73	981.76	0.40	42.86	180.00
Length = 1.003 ft	1	0.338	0.282	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.59	331.40	981.76	0.47	50.72	180.00
Length = 0.1672 ft	1	0.057	0.282	1.00	1.100	1.00	1.00	1.00	1.00	1.00	0.10	56.40	988.78	0.47	50.72	180.00
+D+Lr					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.136	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.30	166.26	1224.66	0.30	32.72	225.00
Length = 1.003 ft	1	0.266	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.58	326.22	1224.13	0.30	32.72	225.00
Length = 1.003 ft	1	0.377	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.82	461.57	1224.13	0.27	32.72	225.00
Length = 1.003 ft	1	0.457	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.00	559.81	1224.13	0.21	32.72	225.00
Length = 1.003 ft	1	0.497	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.08	608.43	1224.13	0.13	32.72	225.00
Length = 1.003 ft	1	0.500	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.09	611.46	1224.13	0.09	32.72	225.00
Length = 1.003 ft	1	0.486	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.06	594.90	1224.13	0.23	32.72	225.00
Length = 1.003 ft	1	0.414	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.90	506.73	1224.13	0.40	42.86	225.00
Length = 1.003 ft	1	0.271	0.225	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.59	331.40	1224.13	0.47	50.72	225.00
Length = 0.1672 ft	1	0.046	0.225	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.10	56.40	1235.58	0.47	50.72	225.00
+D+S					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.246	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.49	277.09	1127.79	0.50	54.53	207.00
Length = 1.003 ft	1	0.482	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.97	543.69	1127.35	0.50	54.53	207.00
Length = 1.003 ft	1	0.682	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.37	769.29	1127.35	0.44	54.53	207.00
Length = 1.003 ft	1	0.828	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.66	933.02	1127.35	0.35	54.53	207.00
Length = 1.003 ft	1	0.899	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.81	1,014.04	1127.35	0.22	54.53	207.00
Length = 1.003 ft	1	0.904	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.82	1,019.10	1127.35	0.14	54.53	207.00
Length = 1.003 ft	1	0.879	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.77	991.50	1127.35	0.38	54.53	207.00
Length = 1.003 ft	1	0.749	0.345	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.51	844.55	1127.35	0.66	71.44	207.00
Length = 1.003 ft	1	0.490	0.408	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.98	552.34	1127.35	0.78	84.53	207.00
Length = 0.1672 ft	1	0.083	0.408	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.17	94.00	1136.88	0.78	84.53	207.00
+D+0.750Lr+0.750L					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.181	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.40	221.67	1224.66	0.40	43.62	225.00
Length = 1.003 ft	1	0.355	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.78	434.95	1224.13	0.40	43.62	225.00
Length = 1.003 ft	1	0.503	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.10	615.43	1224.13	0.35	43.62	225.00
Length = 1.003 ft	1	0.610	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.33	746.42	1224.13	0.28	43.62	225.00
Length = 1.003 ft	1	0.663	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.45	811.23	1224.13	0.18	43.62	225.00
Length = 1.003 ft	1	0.666	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.45	815.28	1224.13	0.12	43.62	225.00
Length = 1.003 ft	1	0.648	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.41	793.20	1224.13	0.31	43.62	225.00
Length = 1.003 ft	1	0.552	0.254	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.20	675.64	1224.13	0.53	57.15	225.00
Length = 1.003 ft	1	0.361	0.301	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.79	441.87	1224.13	0.63	67.62	225.00
Length = 0.1672 ft	1	0.061	0.301	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.13	75.20	1235.58	0.63	67.62	225.00
+D+0.750L+0.750S					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.270	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.54	304.80	1127.79	0.55	59.98	207.00
Length = 1.003 ft	1	0.531	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.07	598.06	1127.35	0.55	59.98	207.00
Length = 1.003 ft	1	0.751	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.51	846.21	1127.35	0.49	59.98	207.00
Length = 1.003 ft	1	0.910	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.83	1,026.32	1127.35	0.39	59.98	207.00
Length = 1.003 ft	1	0.989	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.99	1,115.45	1127.35	0.25	59.98	207.00
Length = 1.003 ft	1	0.994	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	2.00	1,121.01	1127.35	0.16	59.98	207.00
Length = 1.003 ft	1	0.967	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.94	1,090.65	1127.35	0.42	59.98	207.00
Length = 1.003 ft	1	0.824	0.380	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.66	929.01	1127.35	0.73	78.58	207.00
Length = 1.003 ft	1	0.539	0.449	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.08	607.57	1127.35	0.86	92.98	207.00
Length = 0.1672 ft	1	0.091	0.449	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.18	103.40	1136.88	0.86	92.98	207.00
+0.60D					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9695 ft	1	0.021	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.06	33.25	1561.83	0.06	6.54	288.00
Length = 1.003 ft	1	0.042	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.12	65.24	1560.88	0.06	6.54	288.00

Title Block Line 1
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Title Block Line 6

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DESCRIPTION: 2x10 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 1.003 ft	1	1	0.059	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.16	92.31	1560.88	0.05	6.54	288.00
Length = 1.003 ft	1	1	0.072	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.20	111.96	1560.88	0.04	6.54	288.00
Length = 1.003 ft	1	1	0.078	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.22	121.69	1560.88	0.03	6.54	288.00
Length = 1.003 ft	1	1	0.078	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.22	122.29	1560.88	0.02	6.54	288.00
Length = 1.003 ft	1	1	0.076	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.21	118.98	1560.88	0.05	6.54	288.00
Length = 1.003 ft	1	1	0.065	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.18	101.35	1560.88	0.08	8.57	288.00
Length = 1.003 ft	1	1	0.042	0.035	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.12	66.28	1560.88	0.09	10.14	288.00
Length = 0.1672 ft	1	1	0.007	0.035	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.02	11.28	1580.83	0.09	10.14	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1871	4.781		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.567	1.134
Overall MINimum	0.412	0.824
D Only	0.103	0.206
+D+L	0.309	0.618
+D+Lr	0.309	0.618
+D+S	0.515	1.031
+D+0.750Lr+0.750L	0.412	0.824
+D+0.750L+0.750S	0.567	1.134
+0.60D	0.062	0.124
Lr Only	0.206	0.412
L Only	0.206	0.412
S Only	0.412	0.824

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x12 VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

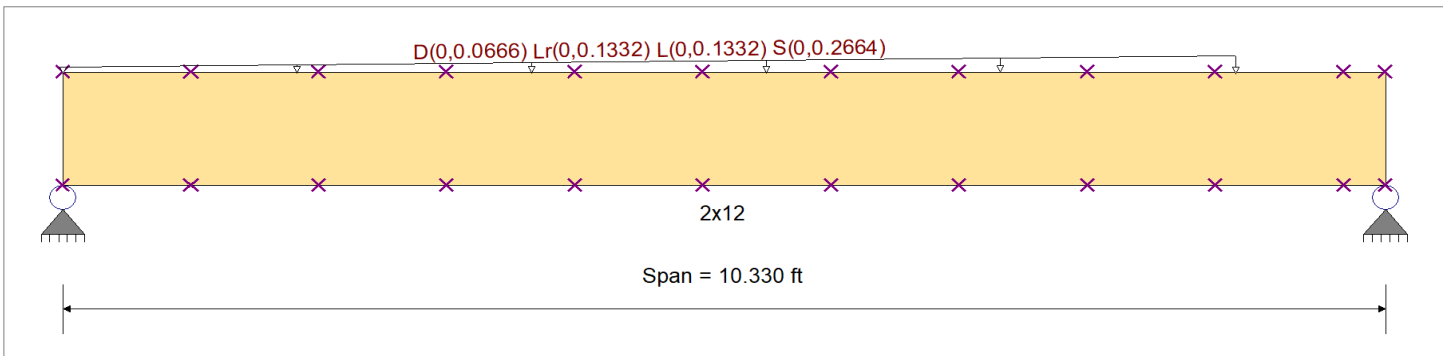
Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

E : Modulus of Elasticity
Ebend- xx 1,600.0 ksi
Eminbend - xx 580.0 ksi
Density 31.210pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.040->0.040 ksf, Extent = 0.0 --> 9.160 ft, Trib Width = 0.0->6.660 ft,

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.993	1	Maximum Shear Stress Ratio	=	0.426	1
Section used for this span		2x12		Section used for this span		2x12	
fb: Actual	=	1,015.72	psi	fv: Actual	=	88.16	psi
Fb: Allowable	=	1,023.39	psi	Fv: Allowable	=	207.00	psi
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	5.844	ft	Location of maximum on span	=	9.161	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.128	in	Ratio =		965	>=180
Max Upward Transient Deflection		0.000	in	Ratio =		0	<180
Max Downward Total Deflection		0.177	in	Ratio =		702	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00			
Length = 0.9802 ft	1	0.057	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.12	45.93	803.47	0.12	10.82	162.00
Length = 1.018 ft	1	0.113	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.24	90.84	803.18	0.12	10.82	162.00
Length = 0.9802 ft	1	0.160	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.34	128.72	803.47	0.11	10.82	162.00
Length = 1.018 ft	1	0.199	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.42	159.68	803.18	0.09	10.82	162.00
Length = 0.9802 ft	1	0.222	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.47	178.73	803.47	0.07	10.82	162.00
Length = 1.018 ft	1	0.230	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.49	184.68	803.18	0.03	10.82	162.00
Length = 0.9802 ft	1	0.230	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.49	184.52	803.47	0.05	10.82	162.00
Length = 1.018 ft	1	0.217	0.067	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.46	173.95	803.18	0.11	10.82	162.00

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Title Block Line 6

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HD ENGINEERING & DESIGN INC

DESCRIPTION: 2x12 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+L	Length = 0.9802 ft	1	0.178	0.092	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.38	143.37	803.47	0.17	14.93	162.00
	Length = 1.018 ft	1	0.115	0.099	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.24	92.38	803.18	0.18	16.03	162.00
	Length = 0.3393 ft	1	0.029	0.099	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.06	23.20	807.93	0.18	16.03	162.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9802 ft	1	0.155	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.36	137.78	891.81	0.37	32.46	180.00
	Length = 1.018 ft	1	0.306	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.72	272.52	891.44	0.36	32.46	180.00
	Length = 0.9802 ft	1	0.433	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.02	386.17	891.81	0.33	32.46	180.00
	Length = 1.018 ft	1	0.537	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.26	479.04	891.44	0.28	32.46	180.00
	Length = 0.9802 ft	1	0.601	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.41	536.19	891.81	0.20	32.46	180.00
	Length = 1.018 ft	1	0.621	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.46	554.03	891.44	0.10	32.46	180.00
	Length = 0.9802 ft	1	0.621	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.46	553.57	891.81	0.16	32.46	180.00
	Length = 1.018 ft	1	0.585	0.180	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.38	521.84	891.44	0.32	32.46	180.00
+D+Lr	Length = 0.9802 ft	1	0.482	0.249	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.13	430.11	891.81	0.50	44.79	180.00
	Length = 1.018 ft	1	0.311	0.267	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.73	277.13	891.44	0.54	48.09	180.00
	Length = 0.3393 ft	1	0.078	0.267	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.18	69.61	897.43	0.54	48.09	180.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9802 ft	1	0.124	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.36	137.78	1111.66	0.37	32.46	225.00
	Length = 1.018 ft	1	0.245	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.72	272.52	1111.04	0.36	32.46	225.00
	Length = 0.9802 ft	1	0.347	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.02	386.17	1111.66	0.33	32.46	225.00
	Length = 1.018 ft	1	0.431	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.26	479.04	1111.04	0.28	32.46	225.00
	Length = 0.9802 ft	1	0.482	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.41	536.19	1111.66	0.20	32.46	225.00
	Length = 1.018 ft	1	0.499	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.46	554.03	1111.04	0.10	32.46	225.00
	Length = 0.9802 ft	1	0.498	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.46	553.57	1111.66	0.16	32.46	225.00
	Length = 1.018 ft	1	0.470	0.144	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.38	521.84	1111.04	0.32	32.46	225.00
+D+S	Length = 0.9802 ft	1	0.387	0.199	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.13	430.11	1111.66	0.50	44.79	225.00
	Length = 1.018 ft	1	0.249	0.214	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.73	277.13	1111.04	0.54	48.09	225.00
	Length = 0.3393 ft	1	0.062	0.214	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.18	69.61	1120.94	0.54	48.09	225.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9802 ft	1	0.224	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	0.61	229.64	1023.90	0.61	54.10	207.00
	Length = 1.018 ft	1	0.444	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.20	454.19	1023.39	0.61	54.10	207.00
	Length = 0.9802 ft	1	0.629	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.70	643.62	1023.90	0.55	54.10	207.00
	Length = 1.018 ft	1	0.780	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.11	798.40	1023.39	0.46	54.10	207.00
	Length = 0.9802 ft	1	0.873	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.36	893.65	1023.90	0.33	54.10	207.00
	Length = 1.018 ft	1	0.902	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.43	923.38	1023.39	0.17	54.10	207.00
	Length = 0.9802 ft	1	0.901	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.43	922.62	1023.90	0.26	54.10	207.00
	Length = 1.018 ft	1	0.850	0.261	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.29	869.74	1023.39	0.54	54.10	207.00
+D+0.750Lr+0.750L	Length = 0.9802 ft	1	0.700	0.361	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.89	716.86	1023.90	0.84	74.66	207.00
	Length = 1.018 ft	1	0.451	0.387	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.22	461.89	1023.39	0.90	80.14	207.00
	Length = 0.3393 ft	1	0.112	0.387	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.31	116.02	1031.58	0.90	80.14	207.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9802 ft	1	0.165	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.48	183.71	1111.66	0.49	43.28	225.00
	Length = 1.018 ft	1	0.327	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.96	363.36	1111.04	0.48	43.28	225.00
	Length = 0.9802 ft	1	0.463	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.36	514.90	1111.66	0.44	43.28	225.00
	Length = 1.018 ft	1	0.575	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.68	638.72	1111.04	0.37	43.28	225.00
	Length = 0.9802 ft	1	0.643	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.89	714.92	1111.66	0.27	43.28	225.00
	Length = 1.018 ft	1	0.665	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.95	738.70	1111.04	0.14	43.28	225.00
	Length = 0.9802 ft	1	0.664	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.95	738.09	1111.66	0.21	43.28	225.00
	Length = 1.018 ft	1	0.626	0.192	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.83	695.79	1111.04	0.43	43.28	225.00
+D+0.750L+0.750S	Length = 0.9802 ft	1	0.516	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.51	573.49	1111.66	0.67	59.73	225.00
	Length = 1.018 ft	1	0.333	0.285	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.97	369.51	1111.04	0.72	64.11	225.00
	Length = 0.3393 ft	1	0.083	0.285	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.24	92.82	1120.94	0.72	64.11	225.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9802 ft	1	0.247	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	0.67	252.61	1023.90	0.67	59.51	207.00
	Length = 1.018 ft	1	0.488	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.32	499.61	1023.39	0.67	59.51	207.00
	Length = 0.9802 ft	1	0.691	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.87	707.98	1023.90	0.61	59.51	207.00
	Length = 1.018 ft	1	0.858	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.32	878.24	1023.39	0.51	59.51	207.00
	Length = 0.9802 ft	1	0.960	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.59	983.02	1023.90	0.37	59.51	207.00
	Length = 1.018 ft	1	0.993	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.68	1,015.72	1023.39	0.19	59.51	207.00
	Length = 0.9802 ft	1	0.991	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.68	1,014.88	1023.90	0.29	59.51	207.00
	Length = 1.018 ft	1	0.935	0.288	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.52	956.71	1023.39	0.59	59.51	207.00

Title Block Line 1
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Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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HD ENGINEERING & DESIGN INC

Lic. #: KW-06001844

DESCRIPTION: 2x12 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 0.9802 ft	1	1	0.770	0.397	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.08	788.54	1023.90	0.92	82.12	207.00
Length = 1.018 ft	1	1	0.496	0.426	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.34	508.08	1023.39	0.99	88.16	207.00
Length = 0.3393 ft	1	1	0.124	0.426	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.34	127.62	1031.58	0.99	88.16	207.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 0.9802 ft	1	1	0.019	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.07	27.56	1416.81	0.07	6.49	288.00
Length = 1.018 ft	1	1	0.039	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.14	54.50	1415.66	0.07	6.49	288.00
Length = 0.9802 ft	1	1	0.055	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.20	77.23	1416.81	0.07	6.49	288.00
Length = 1.018 ft	1	1	0.068	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.25	95.81	1415.66	0.06	6.49	288.00
Length = 0.9802 ft	1	1	0.076	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.28	107.24	1416.81	0.04	6.49	288.00
Length = 1.018 ft	1	1	0.078	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.29	110.81	1415.66	0.02	6.49	288.00
Length = 0.9802 ft	1	1	0.078	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.29	110.71	1416.81	0.03	6.49	288.00
Length = 1.018 ft	1	1	0.074	0.023	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.28	104.37	1415.66	0.06	6.49	288.00
Length = 0.9802 ft	1	1	0.061	0.031	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.23	86.02	1416.81	0.10	8.96	288.00
Length = 1.018 ft	1	1	0.039	0.033	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.15	55.43	1415.66	0.11	9.62	288.00
Length = 0.3393 ft	1	1	0.010	0.033	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.04	13.92	1433.23	0.11	9.62	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1765	5.354		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.686	0.992
Overall MINimum	0.499	0.721
D Only	0.125	0.180
+D+L	0.374	0.541
+D+Lr	0.374	0.541
+D+S	0.624	0.902
+D+0.750Lr+0.750L	0.499	0.721
+D+0.750L+0.750S	0.686	0.992
+0.60D	0.075	0.108
Lr Only	0.249	0.361
L Only	0.249	0.361
S Only	0.499	0.721

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 1 3/4"x9 1/2" LVL VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

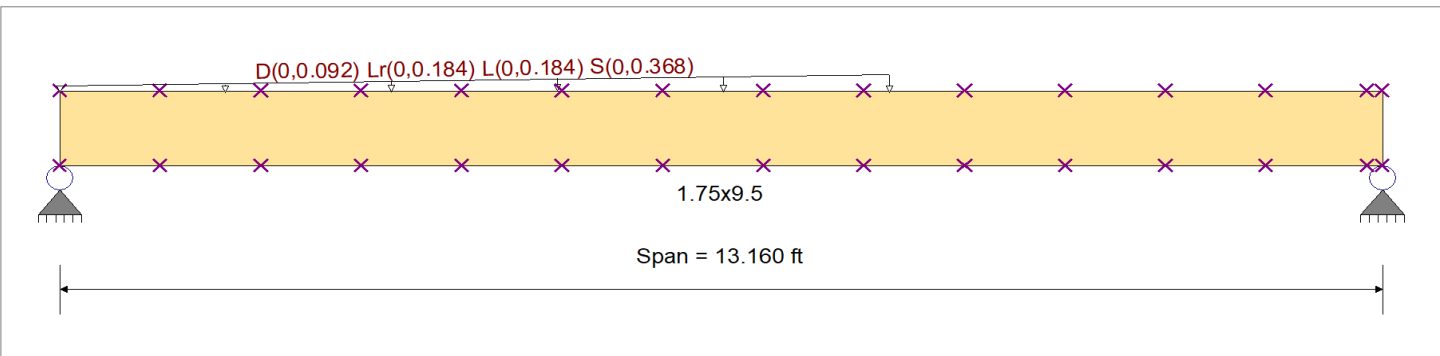
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb + 2,600.0 psi
Fb - 2,600.0 psi
Fc - Prll 2,510.0 psi
Fc - Perp 750.0 psi
Fv 285.0 psi
Ft 1,555.0 psi
E : Modulus of Elasticity
Ebend- xx 1,900.0 ksi
Eminbend - xx 965.71 ksi
Density 42.010 pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.040->0.040 ksf, Extent = 0.0 -->> 8.250 ft, Trib Width = 0.0->9.20 ft,

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.787	1	Maximum Shear Stress Ratio	=	0.329	1
Section used for this span		1.75x9.5		Section used for this span		1.75x9.5	
fb: Actual	=	2,324.04 psi		fv: Actual	=	107.98 psi	
Fb: Allowable	=	2,953.74 psi		Fv: Allowable	=	327.75 psi	
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	6.292ft		Location of maximum on span	=	0.000ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.454 in	Ratio = 347	>=180			
Max Upward Transient Deflection		0.000 in	Ratio = 0	<180			
Max Downward Total Deflection		0.625 in	Ratio = 252	>=180			
Max Upward Total Deflection		0.000 in	Ratio = 0	<180			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	Fb	V	fv	Fv
D Only													0.00			
Length = 0.9606 ft	1	0.041	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.21	95.98	2319.94	0.22	19.63	256.50
Length = 1.009 ft	1	0.083	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.42	191.83	2318.77	0.22	19.63	256.50
Length = 1.009 ft	1	0.120	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.61	277.49	2318.77	0.20	19.63	256.50
Length = 1.009 ft	1	0.150	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.76	347.76	2318.77	0.17	19.63	256.50
Length = 1.009 ft	1	0.171	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.87	397.41	2318.77	0.13	19.63	256.50
Length = 0.9606 ft	1	0.181	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.92	420.75	2319.94	0.08	19.63	256.50
Length = 1.009 ft	1	0.182	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.93	422.55	2318.77	0.05	19.63	256.50
Length = 1.009 ft	1	0.179	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.91	415.12	2318.77	0.13	19.63	256.50

Title Block Line 1
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Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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HD ENGINEERING & DESIGN INC

DESCRIPTION: 1 3/4"x9 1/2" LVL VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+L	Length = 1.009 ft	1	0.161	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.82	373.46	2318.77	0.16	19.63	256.50
	Length = 1.009 ft	1	0.130	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.66	302.13	2318.77	0.16	19.63	256.50
	Length = 1.009 ft	1	0.099	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.50	229.20	2318.77	0.16	19.63	256.50
	Length = 0.9606 ft	1	0.067	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.34	156.27	2319.94	0.16	19.63	256.50
	Length = 1.009 ft	1	0.037	0.077	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.19	86.82	2318.77	0.16	19.63	256.50
	Length = 0.1921 ft	1	0.006	0.077	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.03	13.89	2336.42	0.16	19.63	256.50
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.112	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.63	287.94	2574.81	0.65	58.90	285.00
	Length = 1.009 ft	1	0.224	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.26	575.49	2573.32	0.65	58.90	285.00
	Length = 1.009 ft	1	0.324	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.83	832.48	2573.32	0.60	58.90	285.00
	Length = 1.009 ft	1	0.405	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.29	1,043.28	2573.32	0.51	58.90	285.00
	Length = 1.009 ft	1	0.463	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.62	1,192.22	2573.32	0.40	58.90	285.00
	Length = 0.9606 ft	1	0.490	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.77	1,262.26	2574.81	0.25	58.90	285.00
	Length = 1.009 ft	1	0.493	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.78	1,267.66	2573.32	0.15	58.90	285.00
	Length = 1.009 ft	1	0.484	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.73	1,245.35	2573.32	0.40	58.90	285.00
+D+Lr	Length = 1.009 ft	1	0.435	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.46	1,120.39	2573.32	0.48	58.90	285.00
	Length = 1.009 ft	1	0.352	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.99	906.38	2573.32	0.48	58.90	285.00
	Length = 1.009 ft	1	0.267	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.51	687.60	2573.32	0.48	58.90	285.00
	Length = 0.9606 ft	1	0.182	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.03	468.82	2574.81	0.48	58.90	285.00
	Length = 1.009 ft	1	0.101	0.207	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.57	260.45	2573.32	0.48	58.90	285.00
	Length = 0.1921 ft	1	0.016	0.207	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.09	41.67	2595.57	0.48	58.90	285.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.090	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.63	287.94	3208.89	0.65	58.90	356.25
	Length = 1.009 ft	1	0.179	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.26	575.49	3206.35	0.65	58.90	356.25
	Length = 1.009 ft	1	0.260	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.83	832.48	3206.35	0.60	58.90	356.25
	Length = 1.009 ft	1	0.325	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.29	1,043.28	3206.35	0.51	58.90	356.25
	Length = 1.009 ft	1	0.372	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.62	1,192.22	3206.35	0.40	58.90	356.25
	Length = 0.9606 ft	1	0.393	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.77	1,262.26	3208.89	0.25	58.90	356.25
	Length = 1.009 ft	1	0.395	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.78	1,267.66	3206.35	0.15	58.90	356.25
	Length = 1.009 ft	1	0.388	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.73	1,245.35	3206.35	0.40	58.90	356.25
+D+S	Length = 1.009 ft	1	0.349	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.46	1,120.39	3206.35	0.48	58.90	356.25
	Length = 1.009 ft	1	0.283	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.99	906.38	3206.35	0.48	58.90	356.25
	Length = 1.009 ft	1	0.214	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.51	687.60	3206.35	0.48	58.90	356.25
	Length = 0.9606 ft	1	0.146	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.03	468.82	3208.89	0.48	58.90	356.25
	Length = 1.009 ft	1	0.081	0.165	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.57	260.45	3206.35	0.48	58.90	356.25
	Length = 0.1921 ft	1	0.013	0.165	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.09	41.67	3243.03	0.48	58.90	356.25
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.162	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.05	479.90	2955.81	1.09	98.17	327.75
	Length = 1.009 ft	1	0.325	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.10	959.15	2953.74	1.08	98.17	327.75
	Length = 1.009 ft	1	0.470	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.04	1,387.47	2953.74	1.00	98.17	327.75
	Length = 1.009 ft	1	0.589	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.81	1,738.80	2953.74	0.86	98.17	327.75
	Length = 1.009 ft	1	0.673	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.36	1,987.04	2953.74	0.66	98.17	327.75
	Length = 0.9606 ft	1	0.712	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.61	2,103.76	2955.81	0.41	98.17	327.75
	Length = 1.009 ft	1	0.715	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.63	2,112.76	2953.74	0.25	98.17	327.75
	Length = 1.009 ft	1	0.703	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.55	2,075.58	2953.74	0.67	98.17	327.75
+D+0.750Lr+0.750L	Length = 1.009 ft	1	0.632	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.10	1,867.31	2953.74	0.79	98.17	327.75
	Length = 1.009 ft	1	0.511	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.31	1,510.64	2953.74	0.79	98.17	327.75
	Length = 1.009 ft	1	0.388	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.51	1,146.00	2953.74	0.79	98.17	327.75
	Length = 0.9606 ft	1	0.264	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.71	781.36	2955.81	0.79	98.17	327.75
	Length = 1.009 ft	1	0.147	0.300	1.15	1.000	1.00	1.00	1.00	1.00	0.99	0.95	434.09	2953.74	0.79	98.17	327.75
	Length = 0.1921 ft	1	0.023	0.300	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.15	69.45	2984.12	0.79	98.17	327.75
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.120	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.84	383.92	3208.89	0.87	78.53	356.25
	Length = 1.009 ft	1	0.239	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.68	767.32	3206.35	0.86	78.53	356.25
	Length = 1.009 ft	1	0.346	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.43	1,109.98	3206.35	0.80	78.53	356.25
	Length = 1.009 ft	1	0.434	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.05	1,391.04	3206.35	0.69	78.53	356.25
	Length = 1.009 ft	1	0.496	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.49	1,589.63	3206.35	0.53	78.53	356.25
	Length = 0.9606 ft	1	0.524	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.69	1,683.01	3208.89	0.33	78.53	356.25
	Length = 1.009 ft	1	0.527	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.71	1,690.21	3206.35	0.20	78.53	356.25
	Length = 1.009 ft	1	0.518	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.64	1,660.46	3206.35	0.53	78.53	356.25

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Printed: 30 DEC 2020, 3:58PM

Wood Beam

File: ENERCALC FOR KCMO_backup_1.ec6

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HD ENGINEERING & DESIGN INC

DESCRIPTION: 1 3/4"x9 1/2" LVL VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
	Length = 1.009 ft	1	0.466	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.28	1,493.85	3206.35	0.63	78.53	356.25
	Length = 1.009 ft	1	0.377	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.65	1,208.51	3206.35	0.63	78.53	356.25
	Length = 1.009 ft	1	0.286	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	2.01	916.80	3206.35	0.63	78.53	356.25
	Length = 0.9606 ft	1	0.195	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	1.37	625.09	3208.89	0.63	78.53	356.25
	Length = 1.009 ft	1	0.108	0.220	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.76	347.27	3206.35	0.63	78.53	356.25
	Length = 0.1921 ft	1	0.017	0.220	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.12	55.56	3243.03	0.63	78.53	356.25
+D+0.750L+0.750S						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.179	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.16	527.89	2955.81	1.20	107.98	327.75
	Length = 1.009 ft	1	0.357	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.31	1,055.06	2953.74	1.19	107.98	327.75
	Length = 1.009 ft	1	0.517	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.35	1,526.22	2953.74	1.10	107.98	327.75
	Length = 1.009 ft	1	0.648	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.20	1,912.67	2953.74	0.94	107.98	327.75
	Length = 1.009 ft	1	0.740	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.79	2,185.74	2953.74	0.73	107.98	327.75
	Length = 0.9606 ft	1	0.783	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	5.08	2,314.13	2955.81	0.45	107.98	327.75
	Length = 1.009 ft	1	0.787	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	5.10	2,324.04	2953.74	0.27	107.98	327.75
	Length = 1.009 ft	1	0.773	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	5.01	2,283.13	2953.74	0.73	107.98	327.75
	Length = 1.009 ft	1	0.695	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	4.51	2,054.04	2953.74	0.87	107.98	327.75
	Length = 1.009 ft	1	0.563	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	3.65	1,661.70	2953.74	0.87	107.98	327.75
	Length = 1.009 ft	1	0.427	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	2.77	1,260.60	2953.74	0.87	107.98	327.75
	Length = 0.9606 ft	1	0.291	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.89	859.50	2955.81	0.87	107.98	327.75
	Length = 1.009 ft	1	0.162	0.329	1.15	1.000	1.00	1.00	1.00	1.00	0.99	1.05	477.50	2953.74	0.87	107.98	327.75
	Length = 0.1921 ft	1	0.026	0.329	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.17	76.40	2984.12	0.87	107.98	327.75
+0.60D						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 0.9606 ft	1	0.014	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.13	57.59	4088.23	0.13	11.78	456.00
	Length = 1.009 ft	1	0.028	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.25	115.10	4083.51	0.13	11.78	456.00
	Length = 1.009 ft	1	0.041	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.37	166.50	4083.51	0.12	11.78	456.00
	Length = 1.009 ft	1	0.051	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.46	208.66	4083.51	0.10	11.78	456.00
	Length = 1.009 ft	1	0.058	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.52	238.44	4083.51	0.08	11.78	456.00
	Length = 0.9606 ft	1	0.062	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.55	252.45	4088.23	0.05	11.78	456.00
	Length = 1.009 ft	1	0.062	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.56	253.53	4083.51	0.03	11.78	456.00
	Length = 1.009 ft	1	0.061	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.55	249.07	4083.51	0.08	11.78	456.00
	Length = 1.009 ft	1	0.055	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.49	224.08	4083.51	0.10	11.78	456.00
	Length = 1.009 ft	1	0.044	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.40	181.28	4083.51	0.10	11.78	456.00
	Length = 1.009 ft	1	0.034	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.30	137.52	4083.51	0.10	11.78	456.00
	Length = 0.9606 ft	1	0.023	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.21	93.76	4088.23	0.10	11.78	456.00
	Length = 1.009 ft	1	0.013	0.026	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.11	52.09	4083.51	0.10	11.78	456.00
	Length = 0.1921 ft	1	0.002	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.02	8.33	4148.45	0.10	11.78	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6248	6.484		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.215	0.872
Overall MINimum	0.884	0.634
D Only	0.221	0.159
+D+L	0.663	0.476
+D+Lr	0.663	0.476
+D+S	1.104	0.793
+D+0.750Lr+0.750L	0.884	0.634
+D+0.750L+0.750S	1.215	0.872
+0.60D	0.133	0.095
Lr Only	0.442	0.317
L Only	0.442	0.317
S Only	0.884	0.634

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 1 3/4"x11 7/8" LVL VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

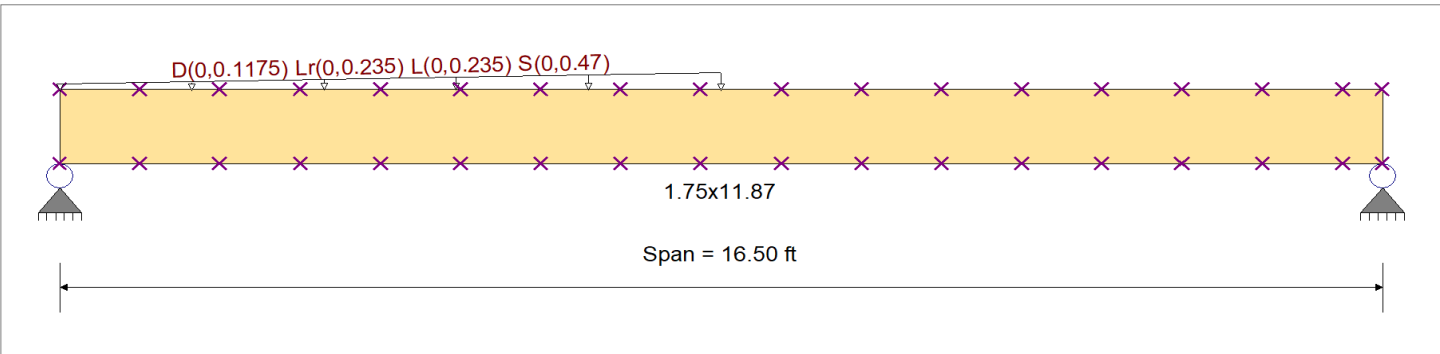
Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb + 2,600.0 psi
Fb - 2,600.0 psi
Fc - Prll 2,510.0 psi
Fc - Perp 750.0 psi
Fv 285.0 psi
Ft 1,555.0 psi
E : Modulus of Elasticity
Ebend- xx 1,900.0 ksi
Eminbend - xx 965.71 ksi
Density 42.010 pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.020->0.040 ksf, Extent = 0.0 --> 8.250 ft, Trib Width = 0.0->11.750 ft,

DESIGN SUMMARY

Maximum Bending Stress Ratio			=	0.811: 1			Maximum Shear Stress Ratio			=	0.393 : 1		
Section used for this span			=	1.75x11.87			Section used for this span			=	1.75x11.87		
fb: Actual			=	2,386.69psi			fv: Actual			=	128.84 psi		
Fb: Allowable			=	2,941.23psi			Fv: Allowable			=	327.75 psi		
Load Combination			=	+D+0.750L+0.750S			Load Combination			=	+D+0.750L+0.750S		
Location of maximum on span			=	6.745ft			Location of maximum on span			=	0.000ft		
Span # where maximum occurs			=	Span # 1			Span # where maximum occurs			=	Span # 1		
Maximum Deflection													
Max Downward Transient Deflection				0.547 in			Ratio =				362 >=360		
Max Upward Transient Deflection				0.000 in			Ratio =				0 <360		
Max Downward Total Deflection				0.774 in			Ratio =				255 >=180		
Max Upward Total Deflection				0.000 in			Ratio =				0 <180		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only														0.00	0.00	0.00
Length = 0.9635 ft	1	0.045	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.35	103.45	2313.84	0.36	26.03	256.50
Length = 1.024 ft	1	0.090	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.71	207.42	2311.86	0.36	26.03	256.50
Length = 0.9635 ft	1	0.128	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.01	295.75	2313.84	0.33	26.03	256.50
Length = 1.024 ft	1	0.162	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.29	375.24	2311.86	0.29	26.03	256.50
Length = 1.024 ft	1	0.188	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.49	435.57	2311.86	0.24	26.03	256.50
Length = 0.9635 ft	1	0.203	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.61	470.86	2313.84	0.16	26.03	256.50
Length = 1.024 ft	1	0.208	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.65	481.65	2311.86	0.08	26.03	256.50

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Printed: 30 DEC 2020, 3:50PM

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HD ENGINEERING & DESIGN INC

DESCRIPTION: 1 3/4"x11 7/8" LVL VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
	Length = 0.9635 ft	1	0.208	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.65	481.27	2313.84	0.13	26.03	256.50
	Length = 1.024 ft	1	0.200	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.58	461.66	2311.86	0.17	26.03	256.50
	Length = 1.024 ft	1	0.179	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.42	414.56	2311.86	0.17	26.03	256.50
	Length = 0.9635 ft	1	0.157	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.25	364.07	2313.84	0.18	26.03	256.50
	Length = 1.024 ft	1	0.136	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.08	314.85	2311.86	0.18	26.03	256.50
	Length = 0.9635 ft	1	0.113	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.89	260.76	2313.84	0.19	26.03	256.50
	Length = 1.024 ft	1	0.090	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.71	208.16	2311.86	0.20	26.03	256.50
	Length = 1.024 ft	1	0.065	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.52	150.47	2311.86	0.20	26.03	256.50
	Length = 0.9635 ft	1	0.039	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.31	90.93	2313.84	0.21	26.03	256.50
	Length = 0.5420 ft	1	0.014	0.101	0.90	1.000	1.00	1.00	1.00	1.00	0.99	0.11	33.20	2326.46	0.21	26.03	256.50
+D+L						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9635 ft	1	0.111	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.97	283.88	2566.99	0.99	71.73	285.00
	Length = 1.024 ft	1	0.223	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.96	571.24	2564.43	0.99	71.73	285.00
	Length = 0.9635 ft	1	0.318	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.80	816.52	2566.99	0.92	71.73	285.00
	Length = 1.024 ft	1	0.405	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	3.56	1,037.67	2564.43	0.82	71.73	285.00
	Length = 1.024 ft	1	0.470	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.13	1,205.03	2564.43	0.66	71.73	285.00
	Length = 0.9635 ft	1	0.507	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.46	1,301.44	2566.99	0.46	71.73	285.00
	Length = 1.024 ft	1	0.518	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.55	1,328.28	2564.43	0.22	71.73	285.00
	Length = 0.9635 ft	1	0.517	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.55	1,326.23	2566.99	0.38	71.73	285.00
	Length = 1.024 ft	1	0.493	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.33	1,264.75	2564.43	0.49	71.73	285.00
	Length = 1.024 ft	1	0.438	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	3.85	1,124.20	2564.43	0.50	71.73	285.00
	Length = 0.9635 ft	1	0.381	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	3.35	977.20	2566.99	0.50	71.73	285.00
	Length = 1.024 ft	1	0.326	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.87	837.15	2564.43	0.51	71.73	285.00
	Length = 0.9635 ft	1	0.267	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	2.35	686.55	2566.99	0.51	71.73	285.00
	Length = 1.024 ft	1	0.212	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.86	543.11	2564.43	0.52	71.73	285.00
	Length = 1.024 ft	1	0.152	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	1.33	388.91	2564.43	0.53	71.73	285.00
	Length = 0.9635 ft	1	0.091	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.80	232.86	2566.99	0.53	71.73	285.00
	Length = 0.5420 ft	1	0.033	0.252	1.00	1.000	1.00	1.00	1.00	1.00	0.99	0.29	84.29	2583.09	0.53	71.73	285.00
+D+Lr						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9635 ft	1	0.089	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	0.97	283.88	3195.41	0.99	71.73	356.25
	Length = 1.024 ft	1	0.179	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.96	571.24	3190.93	0.99	71.73	356.25
	Length = 0.9635 ft	1	0.256	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	2.80	816.52	3195.41	0.92	71.73	356.25
	Length = 1.024 ft	1	0.325	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.56	1,037.67	3190.93	0.82	71.73	356.25
	Length = 1.024 ft	1	0.378	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.13	1,205.03	3190.93	0.66	71.73	356.25
	Length = 0.9635 ft	1	0.407	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.46	1,301.44	3195.41	0.46	71.73	356.25
	Length = 1.024 ft	1	0.416	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.55	1,328.28	3190.93	0.22	71.73	356.25
	Length = 0.9635 ft	1	0.415	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.55	1,326.23	3195.41	0.38	71.73	356.25
	Length = 1.024 ft	1	0.396	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.33	1,264.75	3190.93	0.49	71.73	356.25
	Length = 1.024 ft	1	0.352	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.85	1,124.20	3190.93	0.50	71.73	356.25
	Length = 0.9635 ft	1	0.306	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.35	977.20	3195.41	0.50	71.73	356.25
	Length = 1.024 ft	1	0.262	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	2.87	837.15	3190.93	0.51	71.73	356.25
	Length = 0.9635 ft	1	0.215	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	2.35	686.55	3195.41	0.51	71.73	356.25
	Length = 1.024 ft	1	0.170	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.86	543.11	3190.93	0.52	71.73	356.25
	Length = 1.024 ft	1	0.122	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.33	388.91	3190.93	0.53	71.73	356.25
	Length = 0.9635 ft	1	0.073	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.98	0.80	232.86	3195.41	0.53	71.73	356.25
	Length = 0.5420 ft	1	0.026	0.201	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.29	84.29	3222.79	0.53	71.73	356.25
+D+S						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9635 ft	1	0.158	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	1.59	464.31	2944.85	1.63	117.42	327.75
	Length = 1.024 ft	1	0.318	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	3.20	935.06	2941.23	1.63	117.42	327.75
	Length = 0.9635 ft	1	0.454	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	4.58	1,337.30	2944.85	1.51	117.42	327.75
	Length = 1.024 ft	1	0.578	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	5.83	1,700.09	2941.23	1.34	117.42	327.75
	Length = 1.024 ft	1	0.671	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	6.77	1,974.49	2941.23	1.08	117.42	327.75
	Length = 0.9635 ft	1	0.724	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.31	2,132.03	2944.85	0.75	117.42	327.75
	Length = 1.024 ft	1	0.739	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.45	2,175.01	2941.23	0.36	117.42	327.75
	Length = 0.9635 ft	1	0.737	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.44	2,171.20	2944.85	0.63	117.42	327.75
	Length = 1.024 ft	1	0.703	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.09	2,067.83	2941.23	0.81	117.42	327.75
	Length = 1.024 ft	1	0.623	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	6.29	1,833.85	2941.23	0.82	117.42	327.75
	Length = 0.9635 ft	1	0.540	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	5.45	1,590.33	2944.85	0.82	117.42	327.75
	Length = 1.024 ft	1	0.462	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	4.66	1,359.45	2941.23	0.83	117.42	327.75
	Length = 0.9635 ft	1	0.378	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	3.81	1,112.33	2944.85	0.84	117.42	327.75

Title Block Line 1
You can change this area
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Title Block" selection

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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HD ENGINEERING & DESIGN INC

Lic. # : KW-06001844

DESCRIPTION: 1 3/4"x11 7/8" LVL VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+0.750Lr+0.750L	Length = 1.024 ft	1	0.299	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	3.01	878.06	2941.23	0.84	117.42	327.75
	Length = 1.024 ft	1	0.213	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	2.15	627.35	2941.23	0.85	117.42	327.75
	Length = 0.9635 ft	1	0.127	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.98	1.28	374.79	2944.85	0.85	117.42	327.75
	Length = 0.5420 ft	1	0.046	0.358	1.15	1.000	1.00	1.00	1.00	1.00	0.99	0.46	135.39	2967.24	0.85	117.42	327.75
						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9635 ft	1	0.117	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.28	374.10	3195.41	1.31	94.57	356.25
	Length = 1.024 ft	1	0.236	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	2.58	753.15	3190.93	1.31	94.57	356.25
	Length = 0.9635 ft	1	0.337	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.69	1,076.91	3195.41	1.22	94.57	356.25
	Length = 1.024 ft	1	0.429	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.69	1,368.88	3190.93	1.08	94.57	356.25
	Length = 1.024 ft	1	0.498	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	5.45	1,589.76	3190.93	0.87	94.57	356.25
	Length = 0.9635 ft	1	0.537	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	5.88	1,716.74	3195.41	0.60	94.57	356.25
	Length = 1.024 ft	1	0.549	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	6.00	1,751.65	3190.93	0.29	94.57	356.25
	Length = 0.9635 ft	1	0.547	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	5.99	1,748.72	3195.41	0.51	94.57	356.25
	Length = 1.024 ft	1	0.522	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	5.71	1,666.29	3190.93	0.65	94.57	356.25
	Length = 1.024 ft	1	0.464	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	5.07	1,479.02	3190.93	0.66	94.57	356.25
	Length = 0.9635 ft	1	0.402	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	4.40	1,283.77	3195.41	0.66	94.57	356.25
	Length = 1.024 ft	1	0.344	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.76	1,098.30	3190.93	0.67	94.57	356.25
	Length = 0.9635 ft	1	0.281	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	3.08	899.44	3195.41	0.67	94.57	356.25
	+D+0.750L+0.750S	Length = 1.024 ft	1	0.223	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	2.44	710.59	3190.93	0.68	94.57
Length = 1.024 ft		1	0.159	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.74	508.13	3190.93	0.69	94.57	356.25
Length = 0.9635 ft		1	0.095	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.98	1.04	303.82	3195.41	0.69	94.57	356.25
Length = 0.5420 ft		1	0.034	0.265	1.25	1.000	1.00	1.00	1.00	1.00	0.99	0.38	109.84	3222.79	0.69	94.57	356.25
						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 0.9635 ft		1	0.173	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	1.75	509.42	2944.85	1.79	128.84	327.75
Length = 1.024 ft		1	0.349	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	3.52	1,026.02	2941.23	1.79	128.84	327.75
Length = 0.9635 ft		1	0.498	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	5.03	1,467.49	2944.85	1.66	128.84	327.75
Length = 1.024 ft		1	0.634	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	6.39	1,865.70	2941.23	1.47	128.84	327.75
Length = 1.024 ft		1	0.737	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.43	2,166.85	2941.23	1.18	128.84	327.75
Length = 0.9635 ft		1	0.794	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	8.02	2,339.68	2944.85	0.82	128.84	327.75
Length = 1.024 ft		1	0.811	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	8.18	2,386.69	2941.23	0.40	128.84	327.75
Length = 0.9635 ft		1	0.809	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	8.17	2,382.45	2944.85	0.70	128.84	327.75
Length = 1.024 ft		1	0.771	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	7.78	2,268.60	2941.23	0.89	128.84	327.75
Length = 1.024 ft		1	0.684	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	6.89	2,011.26	2941.23	0.90	128.84	327.75
Length = 0.9635 ft		1	0.592	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	5.98	1,743.62	2944.85	0.91	128.84	327.75
Length = 1.024 ft		1	0.507	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	5.11	1,490.02	2941.23	0.91	128.84	327.75
Length = 0.9635 ft		1	0.414	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	4.18	1,218.78	2944.85	0.92	128.84	327.75
+0.60D		Length = 1.024 ft	1	0.327	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	3.30	961.80	2941.23	0.92	128.84
	Length = 1.024 ft	1	0.234	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	2.35	686.96	2941.23	0.93	128.84	327.75
	Length = 0.9635 ft	1	0.139	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.98	1.41	410.27	2944.85	0.93	128.84	327.75
	Length = 0.5420 ft	1	0.050	0.393	1.15	1.000	1.00	1.00	1.00	1.00	0.99	0.51	148.16	2967.24	0.93	128.84	327.75
						1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
	Length = 0.9635 ft	1	0.015	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.21	62.07	4062.74	0.22	15.62	456.00
	Length = 1.024 ft	1	0.031	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.43	124.45	4054.04	0.22	15.62	456.00
	Length = 0.9635 ft	1	0.044	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.61	177.45	4062.74	0.20	15.62	456.00
	Length = 1.024 ft	1	0.056	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.77	225.14	4054.04	0.18	15.62	456.00
	Length = 1.024 ft	1	0.064	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.90	261.34	4054.04	0.14	15.62	456.00
	Length = 0.9635 ft	1	0.070	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.97	282.51	4062.74	0.10	15.62	456.00
	Length = 1.024 ft	1	0.071	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.99	288.99	4054.04	0.05	15.62	456.00
	Length = 0.9635 ft	1	0.071	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.99	288.76	4062.74	0.08	15.62	456.00
	Length = 1.024 ft	1	0.068	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.95	277.00	4054.04	0.10	15.62	456.00
	Length = 1.024 ft	1	0.061	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.85	248.73	4054.04	0.10	15.62	456.00
	Length = 0.9635 ft	1	0.054	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.75	218.44	4062.74	0.11	15.62	456.00
	Length = 1.024 ft	1	0.047	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.65	188.91	4054.04	0.11	15.62	456.00
	Length = 0.9635 ft	1	0.039	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.54	156.46	4062.74	0.11	15.62	456.00
	Length = 1.024 ft	1	0.031	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.43	124.90	4054.04	0.12	15.62	456.00
Length = 1.024 ft	1	0.022	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.97	0.31	90.28	4054.04	0.12	15.62	456.00	
Length = 0.9635 ft	1	0.013	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.98	0.19	54.56	4062.74	0.12	15.62	456.00	
Length = 0.5420 ft	1	0.005	0.034	1.60	1.000	1.00	1.00	1.00	1.00	0.99	0.07	19.92	4113.50	0.12	15.62	456.00	

Title Block Line 1
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HD ENGINEERING & DESIGN INC

Lic. # : KW-06001844

DESCRIPTION: 1 3/4"x11 7/8" LVL VALLEY

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.7738	7.768		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.827	0.939
Overall MINimum	1.293	0.646
D Only	0.373	0.212
+D+L	1.019	0.535
+D+Lr	1.019	0.535
+D+S	1.666	0.858
+D+0.750Lr+0.750L	1.343	0.696
+D+0.750L+0.750S	1.827	0.939
+0.60D	0.224	0.127
Lr Only	0.646	0.323
L Only	0.646	0.323
S Only	1.293	0.646

Project Title: HD STANDARD CALC
Engineer:
Project ID:
Project Descr:

Title Block Line 6

Wood Beam

Lic. #: KW-06001844

DESCRIPTION: 2x10 VALLEY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

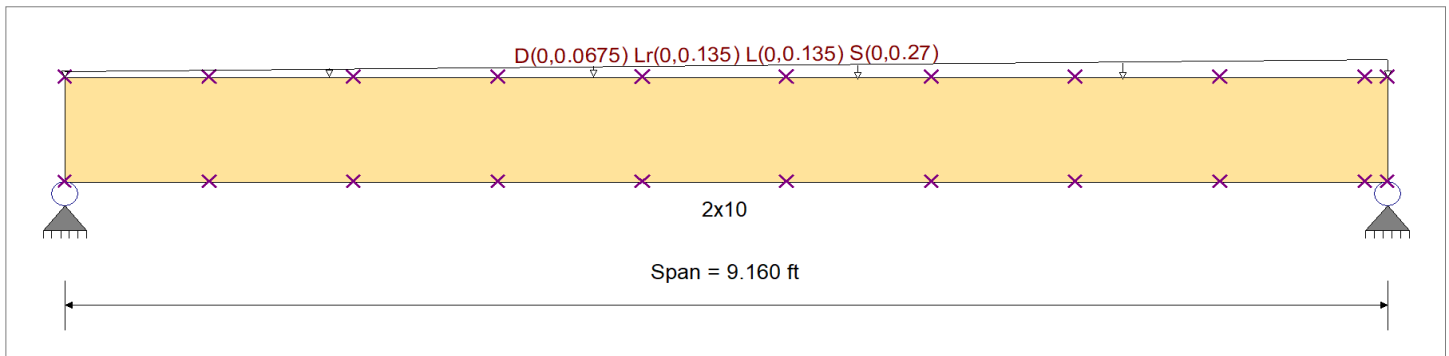
Fb + 900.0 psi
Fb - 900.0 psi
Fc - Prll 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Ft 575.0 psi

E : Modulus of Elasticity
Ebend- xx 1,600.0 ksi
Eminbend - xx 580.0 ksi
Density 31.210pcf

Unbraced Lengths

First Brace starts at ft from Left-Most support

Regular spacing of lateral supports on length of beam = 1.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Varying Uniform Load : D= 0.010->0.010, Lr= 0.020->0.020, L= 0.020->0.020, S= 0.040->0.040 ksf, Extent = 0.0 --> 9.160 ft, Trib Width = 0.0->6.750 ft,

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.994	1	Maximum Shear Stress Ratio	=	0.449	1
Section used for this span		2x10		Section used for this span		2x10	
fb: Actual	=	1,121.01	psi	fv: Actual	=	92.98	psi
Fb: Allowable	=	1,127.35	psi	Fv: Allowable	=	207.00	psi
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	5.282	ft	Location of maximum on span	=	8.391	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.136	in	Ratio =		807	>=180
Max Upward Transient Deflection		0.000	in	Ratio =		0	<180
Max Downward Total Deflection		0.187	in	Ratio =		587	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only													0.00		0.00	0.00
Length = 0.9695 ft	1	0.063	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.10	55.42	884.67	0.10	10.91	162.00
Length = 1.003 ft	1	0.123	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.19	108.74	884.42	0.10	10.91	162.00
Length = 1.003 ft	1	0.174	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.27	153.86	884.42	0.09	10.91	162.00
Length = 1.003 ft	1	0.211	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.33	186.60	884.42	0.07	10.91	162.00
Length = 1.003 ft	1	0.229	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.36	202.81	884.42	0.04	10.91	162.00
Length = 1.003 ft	1	0.230	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.36	203.82	884.42	0.03	10.91	162.00
Length = 1.003 ft	1	0.224	0.067	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.35	198.30	884.42	0.08	10.91	162.00
Length = 1.003 ft	1	0.191	0.088	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.30	168.91	884.42	0.13	14.29	162.00

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Lic. #: KW-06001844

HD ENGINEERING & DESIGN INC

DESCRIPTION: 2x10 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v	
+D+L	Length = 1.003 ft	1	0.125	0.104	0.90	1.100	1.00	1.00	1.00	1.00	0.99	0.20	110.47	884.42	0.16	16.91	162.00	
	Length = 0.1672 ft	1	0.021	0.104	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.03	18.80	890.01	0.16	16.91	162.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
	Length = 0.9695 ft	1	0.169	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.30	166.26	982.07	0.30	32.72	180.00	
	Length = 1.003 ft	1	0.332	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.58	326.22	981.76	0.30	32.72	180.00	
	Length = 1.003 ft	1	0.470	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.82	461.57	981.76	0.27	32.72	180.00	
	Length = 1.003 ft	1	0.570	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.00	559.81	981.76	0.21	32.72	180.00	
	Length = 1.003 ft	1	0.620	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.08	608.43	981.76	0.13	32.72	180.00	
	Length = 1.003 ft	1	0.623	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.09	611.46	981.76	0.09	32.72	180.00	
	Length = 1.003 ft	1	0.606	0.182	1.00	1.100	1.00	1.00	1.00	1.00	0.99	1.06	594.90	981.76	0.23	32.72	180.00	
	Length = 1.003 ft	1	0.516	0.238	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.90	506.73	981.76	0.40	42.86	180.00	
	Length = 1.003 ft	1	0.338	0.282	1.00	1.100	1.00	1.00	1.00	1.00	0.99	0.59	331.40	981.76	0.47	50.72	180.00	
	Length = 0.1672 ft	1	0.057	0.282	1.00	1.100	1.00	1.00	1.00	1.00	1.00	0.10	56.40	988.78	0.47	50.72	180.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
		Length = 0.9695 ft	1	0.136	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.30	166.26	1224.66	0.30	32.72	225.00
+D+Lr	Length = 1.003 ft	1	0.266	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.58	326.22	1224.13	0.30	32.72	225.00	
	Length = 1.003 ft	1	0.377	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.82	461.57	1224.13	0.27	32.72	225.00	
	Length = 1.003 ft	1	0.457	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.00	559.81	1224.13	0.21	32.72	225.00	
	Length = 1.003 ft	1	0.497	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.08	608.43	1224.13	0.13	32.72	225.00	
	Length = 1.003 ft	1	0.500	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.09	611.46	1224.13	0.09	32.72	225.00	
	Length = 1.003 ft	1	0.486	0.145	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.06	594.90	1224.13	0.23	32.72	225.00	
	Length = 1.003 ft	1	0.414	0.191	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.90	506.73	1224.13	0.40	42.86	225.00	
	Length = 1.003 ft	1	0.271	0.225	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.59	331.40	1224.13	0.47	50.72	225.00	
	Length = 0.1672 ft	1	0.046	0.225	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.10	56.40	1235.58	0.47	50.72	225.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
		Length = 0.9695 ft	1	0.246	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.49	277.09	1127.79	0.50	54.53	207.00
	Length = 1.003 ft	1	0.482	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.97	543.69	1127.35	0.50	54.53	207.00	
	Length = 1.003 ft	1	0.682	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.37	769.29	1127.35	0.44	54.53	207.00	
	Length = 1.003 ft	1	0.828	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.66	933.02	1127.35	0.35	54.53	207.00	
	Length = 1.003 ft	1	0.899	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.81	1,014.04	1127.35	0.22	54.53	207.00	
+D+S	Length = 1.003 ft	1	0.904	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.82	1,019.10	1127.35	0.14	54.53	207.00	
	Length = 1.003 ft	1	0.879	0.263	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.77	991.50	1127.35	0.38	54.53	207.00	
	Length = 1.003 ft	1	0.749	0.345	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.51	844.55	1127.35	0.66	71.44	207.00	
	Length = 1.003 ft	1	0.490	0.408	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.98	552.34	1127.35	0.78	84.53	207.00	
	Length = 0.1672 ft	1	0.083	0.408	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.17	94.00	1136.88	0.78	84.53	207.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
		Length = 0.9695 ft	1	0.181	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.40	221.67	1224.66	0.40	43.62	225.00
	Length = 1.003 ft	1	0.355	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.78	434.95	1224.13	0.40	43.62	225.00	
	Length = 1.003 ft	1	0.503	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.10	615.43	1224.13	0.35	43.62	225.00	
	Length = 1.003 ft	1	0.610	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.33	746.42	1224.13	0.28	43.62	225.00	
	Length = 1.003 ft	1	0.663	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.45	811.23	1224.13	0.18	43.62	225.00	
	Length = 1.003 ft	1	0.666	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.45	815.28	1224.13	0.12	43.62	225.00	
	Length = 1.003 ft	1	0.648	0.194	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.41	793.20	1224.13	0.31	43.62	225.00	
	Length = 1.003 ft	1	0.552	0.254	1.25	1.100	1.00	1.00	1.00	1.00	0.99	1.20	675.64	1224.13	0.53	57.15	225.00	
	Length = 1.003 ft	1	0.361	0.301	1.25	1.100	1.00	1.00	1.00	1.00	0.99	0.79	441.87	1224.13	0.63	67.62	225.00	
+D+0.750Lr+0.750S	Length = 0.1672 ft	1	0.061	0.301	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.13	75.20	1235.58	0.63	67.62	225.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
		Length = 0.9695 ft	1	0.270	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	0.54	304.80	1127.79	0.55	59.98	207.00
	Length = 1.003 ft	1	0.531	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.07	598.06	1127.35	0.55	59.98	207.00	
	Length = 1.003 ft	1	0.751	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.51	846.21	1127.35	0.49	59.98	207.00	
	Length = 1.003 ft	1	0.910	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.83	1,026.32	1127.35	0.39	59.98	207.00	
	Length = 1.003 ft	1	0.989	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.99	1,115.45	1127.35	0.25	59.98	207.00	
	Length = 1.003 ft	1	0.994	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	2.00	1,121.01	1127.35	0.16	59.98	207.00	
	Length = 1.003 ft	1	0.967	0.290	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.94	1,090.65	1127.35	0.42	59.98	207.00	
	Length = 1.003 ft	1	0.824	0.380	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.66	929.01	1127.35	0.73	78.58	207.00	
	Length = 1.003 ft	1	0.539	0.449	1.15	1.100	1.00	1.00	1.00	1.00	0.99	1.08	607.57	1127.35	0.86	92.98	207.00	
	Length = 0.1672 ft	1	0.091	0.449	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.18	103.40	1136.88	0.86	92.98	207.00	
						1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
		Length = 0.9695 ft	1	0.021	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.06	33.25	1561.83	0.06	6.54	288.00
	Length = 1.003 ft	1	0.042	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.12	65.24	1560.88	0.06	6.54	288.00	

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DESCRIPTION: 2x10 VALLEY

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 1.003 ft	1	1	0.059	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.16	92.31	1560.88	0.05	6.54	288.00
Length = 1.003 ft	1	1	0.072	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.20	111.96	1560.88	0.04	6.54	288.00
Length = 1.003 ft	1	1	0.078	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.22	121.69	1560.88	0.03	6.54	288.00
Length = 1.003 ft	1	1	0.078	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.22	122.29	1560.88	0.02	6.54	288.00
Length = 1.003 ft	1	1	0.076	0.023	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.21	118.98	1560.88	0.05	6.54	288.00
Length = 1.003 ft	1	1	0.065	0.030	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.18	101.35	1560.88	0.08	8.57	288.00
Length = 1.003 ft	1	1	0.042	0.035	1.60	1.100	1.00	1.00	1.00	1.00	0.99	0.12	66.28	1560.88	0.09	10.14	288.00
Length = 0.1672 ft	1	1	0.007	0.035	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.02	11.28	1580.83	0.09	10.14	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1871	4.781		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.567	1.134
Overall MINimum	0.412	0.824
D Only	0.103	0.206
+D+L	0.309	0.618
+D+Lr	0.309	0.618
+D+S	0.515	1.031
+D+0.750Lr+0.750L	0.412	0.824
+D+0.750L+0.750S	0.567	1.134
+0.60D	0.062	0.124
Lr Only	0.206	0.412
L Only	0.206	0.412
S Only	0.412	0.824

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Title Block Line 6

Concrete Beam

Lic. # : KW-06001844

DESCRIPTION: GARAGE GRADE BEAM

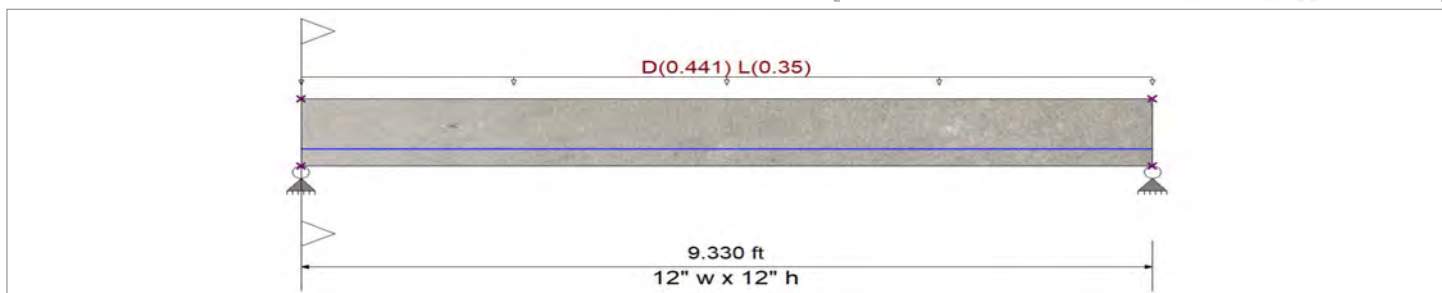
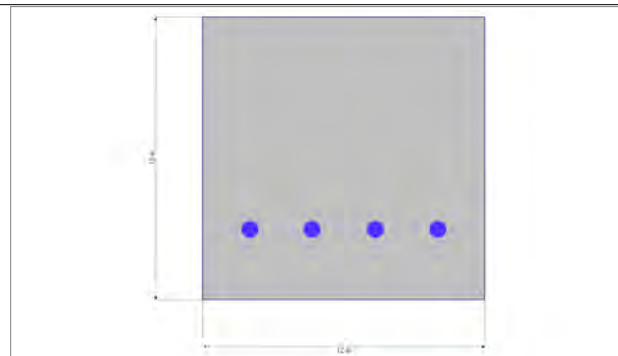
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

f _c	=	3.0 ksi	Φ Phi Values	Flexure :	0.90
f _r = f _c ^{1/2} * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β ₁	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
f _y - Main Rebar	=	40.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
		Number of Resisting Legs Per Stirrup	=		2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 12.0 in

Span #1 Reinforcing....

4-#6 at 3.0 in from Bottom, from 0.0 to 9.330 ft in this span

Load for Span Number 1

Uniform Load : D = 0.0630, L = 0.050 ksf, Tributary Width = 7.0 ft, (FLOOR SLAB)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.286	: 1	Maximum Deflection			
Section used for this span		Typical Section		Max Upward Transient Deflection	0.011 in	Ratio =	10125 >=360.
Mu : Applied		11.852	k-ft	Max Downward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		41.446	k-ft	Max Downward Total Deflection	0.025 in	Ratio =	4480 >=180.
Location of maximum on span		4.673	ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1					

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.690	3.690
Overall MINimum	1.234	1.234
+D+H	2.057	2.057
+D+L+H	3.690	3.690
+D+Lr+H	2.057	2.057
+D+S+H	2.057	2.057
+D+0.750Lr+0.750L+H	3.282	3.282
+D+0.750L+0.750S+H	3.282	3.282
+D+0.60W+H	2.057	2.057
+D+0.70E+H	2.057	2.057
+D+0.750Lr+0.750L+0.450W+H	3.282	3.282
+D+0.750L+0.750S+0.450W+H	3.282	3.282
+D+0.750L+0.750S+0.5250E+H	3.282	3.282
+0.60D+0.60W+0.60H	1.234	1.234

Project Title:
Engineer:
Project ID:
Project Descr:

Ellenbrook II 3 Car



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Title Block Line 1
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Project Title: 43284 - Ellenbrook II 3 Car 7701 NE 102nd Ter FSI
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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Concrete Beam

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HD ENGINEERING & DESIGN INC

DESCRIPTION: GARAGE GRADE BEAM

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D+0.70E+0.60H	1.234	1.234
D Only	2.057	2.057
L Only	1.633	1.633
H Only		

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd Suggest	
+1.20D+1.60L+0.50S+1.60H	1	0.00	9.00	5.08	5.08	0.00	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.10	9.00	4.97	4.97	0.51	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.20	9.00	4.86	4.86	1.01	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.31	9.00	4.75	4.75	1.50	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.41	9.00	4.64	4.64	1.98	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.51	9.00	4.53	4.53	2.45	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.61	9.00	4.41	4.41	2.90	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.71	9.00	4.30	4.30	3.35	0.96	11.61	Vu < PhiVc/2	lot Reqd 9.6.	11.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.82	9.00	4.19	4.19	3.78	0.83	11.17	Vu < PhiVc/2	lot Reqd 9.6.	11.2	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	0.92	9.00	4.08	4.08	4.20	0.73	10.83	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.02	9.00	3.97	3.97	4.61	0.65	10.56	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.12	9.00	3.86	3.86	5.01	0.58	10.33	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.22	9.00	3.75	3.75	5.40	0.52	10.15	Vu < PhiVc/2	lot Reqd 9.6.	10.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.33	9.00	3.64	3.64	5.78	0.47	9.99	Vu < PhiVc/2	lot Reqd 9.6.	10.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.43	9.00	3.53	3.53	6.14	0.43	9.85	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.53	9.00	3.42	3.42	6.50	0.39	9.73	Vu < PhiVc/2	lot Reqd 9.6.	9.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.63	9.00	3.30	3.30	6.84	0.36	9.62	Vu < PhiVc/2	lot Reqd 9.6.	9.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.73	9.00	3.19	3.19	7.17	0.33	9.53	Vu < PhiVc/2	lot Reqd 9.6.	9.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.84	9.00	3.08	3.08	7.49	0.31	9.45	Vu < PhiVc/2	lot Reqd 9.6.	9.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	1.94	9.00	2.97	2.97	7.80	0.29	9.37	Vu < PhiVc/2	lot Reqd 9.6.	9.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.04	9.00	2.86	2.86	8.10	0.26	9.30	Vu < PhiVc/2	lot Reqd 9.6.	9.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.14	9.00	2.75	2.75	8.38	0.25	9.24	Vu < PhiVc/2	lot Reqd 9.6.	9.2	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.24	9.00	2.64	2.64	8.66	0.23	9.18	Vu < PhiVc/2	lot Reqd 9.6.	9.2	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.35	9.00	2.53	2.53	8.92	0.21	9.13	Vu < PhiVc/2	lot Reqd 9.6.	9.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.45	9.00	2.42	2.42	9.17	0.20	9.08	Vu < PhiVc/2	lot Reqd 9.6.	9.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.55	9.00	2.30	2.30	9.41	0.18	9.04	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.65	9.00	2.19	2.19	9.64	0.17	8.99	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.75	9.00	2.08	2.08	9.86	0.16	8.95	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.86	9.00	1.97	1.97	10.07	0.15	8.91	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	2.96	9.00	1.86	1.86	10.26	0.14	8.88	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.06	9.00	1.75	1.75	10.45	0.13	8.84	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.16	9.00	1.64	1.64	10.62	0.12	8.81	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.26	9.00	1.53	1.53	10.78	0.11	8.78	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.36	9.00	1.42	1.42	10.93	0.10	8.75	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.47	9.00	1.30	1.30	11.07	0.09	8.72	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.57	9.00	1.19	1.19	11.20	0.08	8.69	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.67	9.00	1.08	1.08	11.31	0.07	8.67	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.77	9.00	0.97	0.97	11.42	0.06	8.64	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.87	9.00	0.86	0.86	11.51	0.06	8.61	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	3.98	9.00	0.75	0.75	11.59	0.05	8.59	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.08	9.00	0.64	0.64	11.66	0.04	8.56	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.18	9.00	0.53	0.53	11.72	0.03	8.54	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.28	9.00	0.42	0.42	11.77	0.03	8.52	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.38	9.00	0.31	0.31	11.81	0.02	8.49	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.49	9.00	0.19	0.19	11.83	0.01	8.47	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.59	9.00	0.08	0.08	11.85	0.01	8.45	Vu < PhiVc/2	lot Reqd 9.6.	8.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.69	9.00	-0.03	0.03	11.85	0.00	8.44	Vu < PhiVc/2	lot Reqd 9.6.	8.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H	1	4.79	9.00	-0.14	0.14	11.84	0.01	8.46	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0

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Engineer:
Project ID:
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HD ENGINEERING & DESIGN INC

DESCRIPTION: GARAGE GRADE BEAM

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd Suggest
+1.20D+1.60L+0.50S+1.60H	1	4.89	9.00	-0.25	0.25	11.82	0.02	8.48	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.00	9.00	-0.36	0.36	11.79	0.02	8.51	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.10	9.00	-0.47	0.47	11.75	0.03	8.53	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.20	9.00	-0.58	0.58	11.70	0.04	8.55	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.30	9.00	-0.69	0.69	11.63	0.04	8.58	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.40	9.00	-0.81	0.81	11.55	0.05	8.60	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.51	9.00	-0.92	0.92	11.47	0.06	8.63	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.61	9.00	-1.03	1.03	11.37	0.07	8.65	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.71	9.00	-1.14	1.14	11.26	0.08	8.68	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.81	9.00	-1.25	1.25	11.14	0.08	8.71	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	5.91	9.00	-1.36	1.36	11.00	0.09	8.74	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.02	9.00	-1.47	1.47	10.86	0.10	8.76	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.12	9.00	-1.58	1.58	10.70	0.11	8.80	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.22	9.00	-1.69	1.69	10.53	0.12	8.83	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.32	9.00	-1.80	1.80	10.36	0.13	8.86	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.42	9.00	-1.92	1.92	10.17	0.14	8.90	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.53	9.00	-2.03	2.03	9.97	0.15	8.93	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.63	9.00	-2.14	2.14	9.75	0.16	8.97	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.73	9.00	-2.25	2.25	9.53	0.18	9.01	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.83	9.00	-2.36	2.36	9.29	0.19	9.06	Vu < PhiVc/2	lot Reqd 9.6.	9.1	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	6.93	9.00	-2.47	2.47	9.05	0.20	9.11	Vu < PhiVc/2	lot Reqd 9.6.	9.1	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.04	9.00	-2.58	2.58	8.79	0.22	9.16	Vu < PhiVc/2	lot Reqd 9.6.	9.2	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.14	9.00	-2.69	2.69	8.52	0.24	9.21	Vu < PhiVc/2	lot Reqd 9.6.	9.2	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.24	9.00	-2.80	2.80	8.24	0.26	9.27	Vu < PhiVc/2	lot Reqd 9.6.	9.3	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.34	9.00	-2.92	2.92	7.95	0.28	9.34	Vu < PhiVc/2	lot Reqd 9.6.	9.3	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.44	9.00	-3.03	3.03	7.65	0.30	9.41	Vu < PhiVc/2	lot Reqd 9.6.	9.4	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.55	9.00	-3.14	3.14	7.33	0.32	9.49	Vu < PhiVc/2	lot Reqd 9.6.	9.5	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.65	9.00	-3.25	3.25	7.01	0.35	9.58	Vu < PhiVc/2	lot Reqd 9.6.	9.6	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.75	9.00	-3.36	3.36	6.67	0.38	9.68	Vu < PhiVc/2	lot Reqd 9.6.	9.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.85	9.00	-3.47	3.47	6.32	0.41	9.79	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	7.95	9.00	-3.58	3.58	5.96	0.45	9.92	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.06	9.00	-3.69	3.69	5.59	0.50	10.06	Vu < PhiVc/2	lot Reqd 9.6.	10.1	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.16	9.00	-3.80	3.80	5.21	0.55	10.24	Vu < PhiVc/2	lot Reqd 9.6.	10.2	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.26	9.00	-3.91	3.91	4.82	0.61	10.44	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.36	9.00	-4.03	4.03	4.41	0.68	10.69	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.46	9.00	-4.14	4.14	3.99	0.78	10.99	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.57	9.00	-4.25	4.25	3.57	0.89	11.38	Vu < PhiVc/2	lot Reqd 9.6.	11.4	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.67	9.00	-4.36	4.36	3.13	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.77	9.00	-4.47	4.47	2.68	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.87	9.00	-4.58	4.58	2.22	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	8.97	9.00	-4.69	4.69	1.74	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	9.08	9.00	-4.80	4.80	1.26	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	9.18	9.00	-4.91	4.91	0.76	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0
+1.20D+1.60L+0.50S+1.60H	1	9.28	9.00	-5.03	5.03	0.26	1.00	11.73	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0 0.0

Maximum Forces & Stresses for Load Combinations

Load Combination	Location (ft)		Bending Stress Results (k-ft)		
Segment	Span #	along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.330	11.85	41.45	0.29
+1.40D+1.60H					
Span # 1	1	9.330	6.72	41.45	0.16
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	9.330	11.85	41.45	0.29
+1.20D+1.60L+0.50S+1.60H					
Span # 1	1	9.330	11.85	41.45	0.29

Title Block Line 1
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Title Block" selection.

Project Title: 43284 - Ellenbrook II 3 Car 7701 NE 102nd Ter FSI
Engineer:
Project ID:
Project Descr:

Title Block Line 6

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Concrete Beam

File: 43284.ec6

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HD ENGINEERING & DESIGN INC

DESCRIPTION: GARAGE GRADE BEAM

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+1.60Lr+0.50L+1.60H Span # 1	1	9.330	7.66	41.45	0.18
+1.20D+1.60Lr+0.50W+1.60H Span # 1	1	9.330	5.76	41.45	0.14
+1.20D+0.50L+1.60S+1.60H Span # 1	1	9.330	7.66	41.45	0.18
+1.20D+1.60S+0.50W+1.60H Span # 1	1	9.330	5.76	41.45	0.14
+1.20D+0.50Lr+0.50L+W+1.60H Span # 1	1	9.330	7.66	41.45	0.18
+1.20D+0.50L+0.50S+W+1.60H Span # 1	1	9.330	7.66	41.45	0.18
+1.20D+0.50L+0.70S+E+1.60H Span # 1	1	9.330	7.66	41.45	0.18
+0.90D+W+0.90H Span # 1	1	9.330	4.32	41.45	0.10
+0.90D+E+0.90H Span # 1	1	9.330	4.32	41.45	0.10

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.0250	4.665		0.0000	0.000