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STRUCTURAL REVIEW  
HD ENGINEERING & DESIGN  
HD: 39841 DATE: 8/25/2020

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SHAWNEE, KS 66214  
WWW.HDENGINEERS.COM

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1033 SW ARMIE ST., LEE'S SUMMIT, MO

## PATTON CUSTOM Cover Sheet

|                |                |
|----------------|----------------|
| Project number | Project Number |
| Date           | Issue Date     |
| Drawn by       | Author         |
| Checked by     | Checker        |

A-0

|       |              |
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| Scale | 3/8" = 1'-0" |
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LABOR SQFT

1ST FLOOR - 1647 SF  
2ND FLOOR - 256 SF  
BASEMENT - 950 SF  
**TOTAL - 2853 SF**

GARAGE - 502 SF  
UNFINISHED - 552 SF

**OTHER UPGRADES**  
BURRY (6) DOWNSPOUTS

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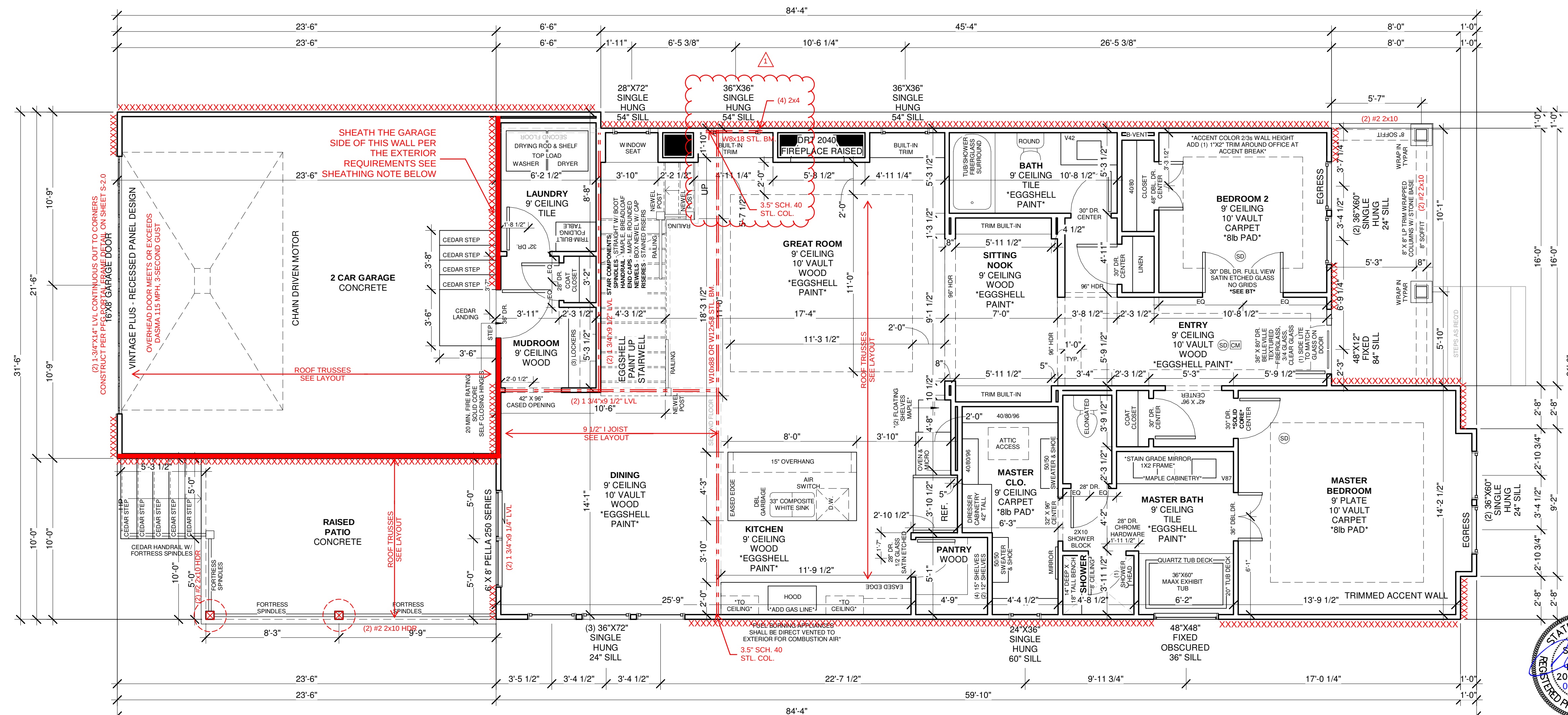
1033 SW ARMIE ST., LEE'S SUMMIT, MO

## PATTON CUSTOM First Floor Plan

|                |                |
|----------------|----------------|
| Project number | Project Number |
| Date           | Issue Date     |
| Drawn by       | Author         |
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A-1

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| Scale | 1/4" = 1'-0" |
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1 09/01/2020 CITY COMMENTS

STRUCTURAL REVIEW  
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XXXXXXXXXX **BRACED WALLS:**  
SEE CALCULATIONS ON SHEET S-2.0, PER ASCE7-10  
REQUIREMENTS AS ALLOWED BY IRC 2018 R301.2.1

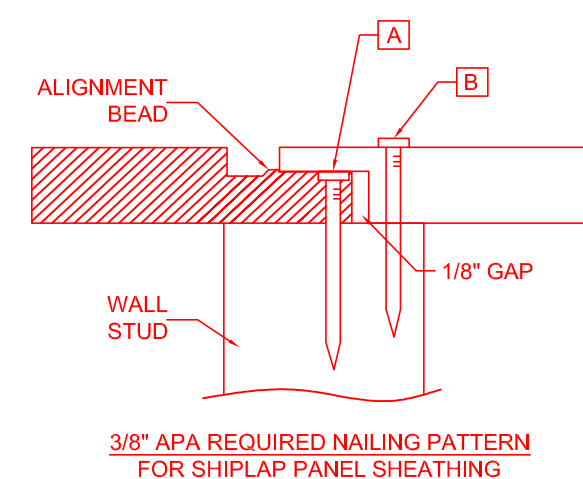
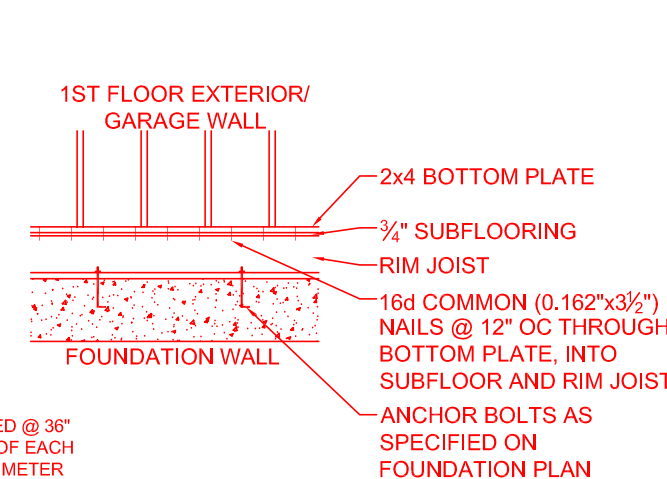
ALL EXTERIOR WALLS SHALL BE SHEATHED PER ANY ONE OF THE FOLLOWING OPTIONS:

- 7/16" APA-RATED PLYWOOD(OSB WITH 8d NAILS @ 6" O.C. AT EDGES AND @ 12" O.C. IN THE FIELD
- 7/16" SHIPLAP PANEL SHEATHING (I.E. LP SMARTSIDE OR EQUIVALENT) WITH 8d NAILS @ 6" O.C. AT EDGES AND @ 12" O.C. IN THE FIELD
- 3/8" SHIPLAP PANEL SHEATHING (I.E. LP SMARTSIDE OR EQUIVALENT) WITH 6d NAILS @ 4" O.C. AT EDGES AND @ 12" O.C. IN THE FIELD

INTERIOR BRACED WALL LOCATIONS ONLY SHOWN  
WHEN REQUIRED BY ADDITIONAL BRACING SECTION OF  
CALCULATIONS ON SHEET S-2.0

## FOUNDATION ANCHORING NOTES

- MIN. 1/2" ANCHOR BOLTS SHALL BE INSTALLED @ 36" O.C. MAX AND WITHIN 6"-12" FROM THE END OF EACH SECTION OF SILL PLATE ALONG ENTIRE PERIMETER OF FOUNDATION



NAILING WITH SPACING AS SPECIFIED PER PLAN. FOR EXAMPLE, IF REQUIRED SPACING IS 4" O.C., BOTTOM LAP SHALL FIRST BE NAILED AT 4" O.C. (NAIL "A"), THEN FULL DEPTH SECTION OF OVERLAP PANEL SHALL BE NAILED @ 4" O.C. (NAIL "B")

**DEFERRED JOIST SUBMITTAL:**

JOIST DESIGN SHALL BE SUBMITTED TO HD ENGINEERING AND DESIGN FOR REVIEW PRIOR TO CONSTRUCTION AND INSTALLATION OF JOISTS

JOIST DESIGNER / MANUFACTURER SHALL FOLLOW ASSUMED  
JOIST DIRECTION SA CLOSELY AS POSSIBLE TO CONFORM WITH  
HOUSE STRUCTURE AS A WHOLE

IF DEVIATIONS FROM ASSUMED JOIST DESIGN ARE REQUIRED,  
MANUFACTURER SHALL CONTACT HD ENGINEERING AND DESIGN

R-VAULE NOTES:

## INSULATION NOTES:

R-11 BATT  
INTERIOR SOUNDPROOFING AT BATHROOMS,  
LAUNDRY, AND MASTER BEDROOM

R-13 BATT  
2X4 EXTERIOR WALLS  
2X4 GARAGE WALLS

R-19 BATT  
2X6 EXTERIOR WALLS

R-30 BATT  
GARAGE CEILING (IF LIVABLE SPACE BUILT ABOVE)

R-49 BLOWN IN  
ALL ATTIC INSULATION

**GENERAL NOTES:**

- GENERAL NOTES:**
- 1. WINDOWS SHALL HAVE FULL PROTECTION PER IRC 312.2.4
  - 2. "HOUSE WIFE" BE PROVIDED WITH A "UFER" GROUND PER IRC SECTION 3608.1.5
  - 3. OVERHEAD GARAGE DOORS MUST MEET MASTA REQUIREMENTS SEE DETAIL SHEET S-10
  - 4. ALL HEADERS NOT LABELED SHALL BE MIN (2) 4X12X16F
  - 5. DBL. ALL 3RD JST UNDER ISLAND
  - 6. SOILS SHALL BE COMPACTED LOCALLY HAVE A VERY HIGH SHRINK SWELL CAPACITY. OUR FIRM RECOMMENDS ALL SITES BE EVALUATED BY A GEOTECHNICAL FIRM PRIOR TO PLACEMENT OF FOUNDATIONS
  - 7. PROVIDE CARBON MONOXIDE AND SMOKE DETECTORS PER IRC REQUIREMENTS
  - 8. "ANY PORTION OF THESE PRISMS ISSUED WITHOUT A MIN. OF S-I.O - S-I.O SHALL NOT BE CONSIDERED A COMPLETE SET OF CONSTRUCTION DOCUMENTS"
  - 9. ICE AND WATER SHIELD AS REQUIRED PER IRC







1ST FLOOR - 1647 SF  
2ND FLOOR - 256 SF  
BASEMENT - 950 SF  
TOTAL - 2853 SF

GARAGE - 502 SF  
UNFINISHED - 552 SF

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# PATTON CUSTOM

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## Basement Plan

A-2

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HD ENGINEERING & DESIGN  
HD: 39841 DATE: 8/25/2020

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R-11 BATT  
INTERIOR SOUNDPROOFING AT BATHROOMS,  
LAUNDRY, AND MASTER BEDROOM

R-13 BATT  
2X4 EXTERIOR WALLS  
2X4 GARAGE WALLS

R-19 BATT  
2X6 EXTERIOR WALLS

R-30 BATT  
GARAGE CEILING (IF LIVABLE SPACE BUILT ABOVE)

R-49 BLOWN IN  
ALL ATTIC INSULATION

**NOTES:**

- 1. COLUMN AND PIER PAD SIZES SHOWN ARE FOR MAX. COLUMN HEIGHT OF 10'-0" TALL.**
- 2. COLUMN AND PIER PAD SIZES SHOWN ARE BASED ON AN ASSUMED 1500 PSF. THIS IS THE CAPACITY REQUIRED BY AHJ, UNDERLINED GENERAL NOTES ON S-1.0 FOR MORE DETAILS.**
- 3. ALL STEEL COLUMN COLUMNS SHALL BE ISOLATED FROM SLABS WITH APPROVED ISOLATION DEVICE OR JOINT.**

OF 12 WITHOUT CONTACTING HD ENGINEERING  
FOR GUIDANCE.

**FOUNDATION ANCHORING NOTES**

- MIN. 1/2" ANCHOR BOLTS SHALL BE INSTALLED @ 36" O.C. MAX AND WITHIN 6"-12" FROM THE END OF EACH SECTION OF SILL PLATE ALONG ENTIRE PERIMETER OF FOUNDATION





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1033 SW ARMIE ST., LEE'S SUMMIT, MO

PATTON CUSTOM

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Front / Back  
Elevations

|                |                |
|----------------|----------------|
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A-3

|       |              |
|-------|--------------|
| Scale | 1/4" = 1'-0" |
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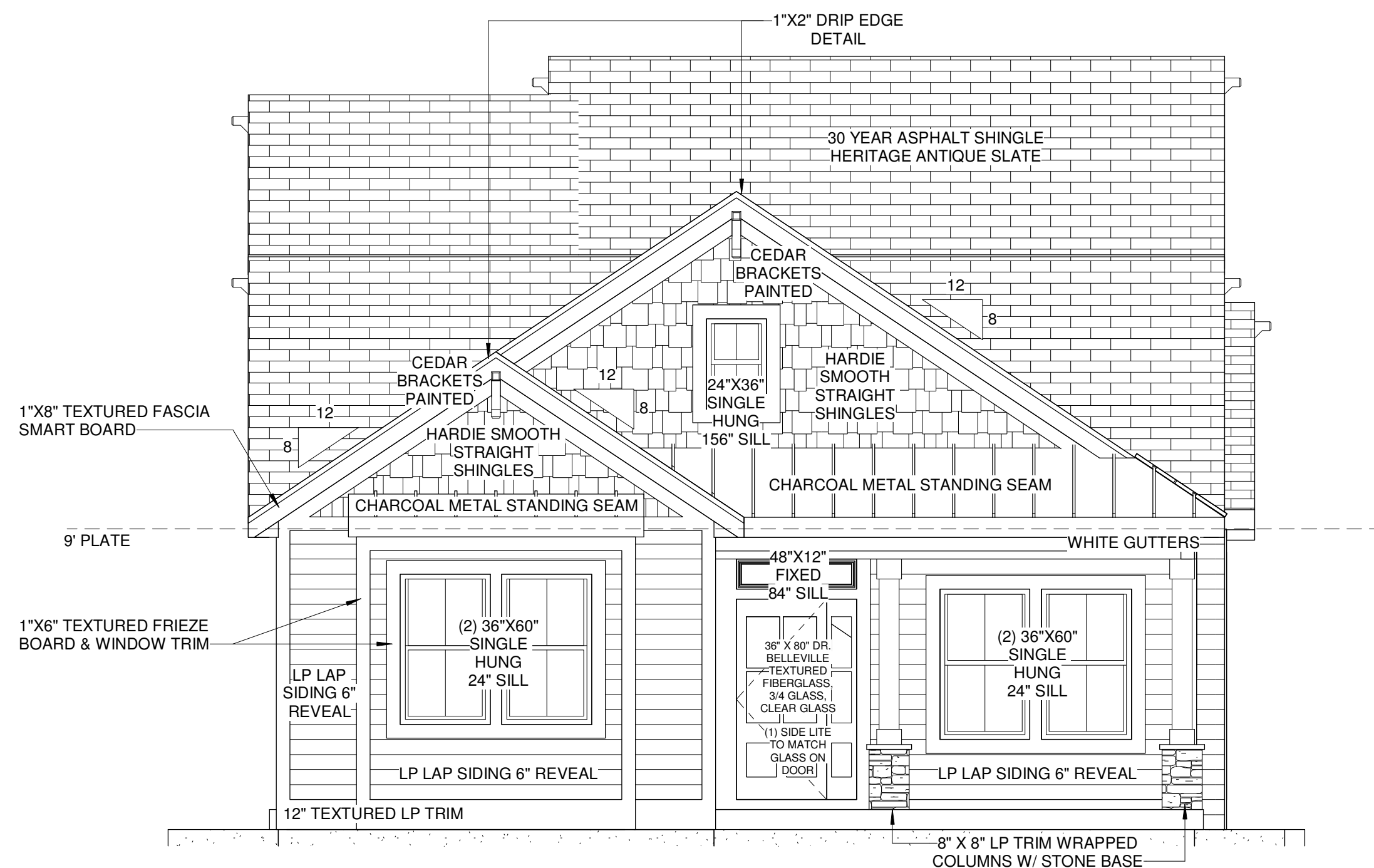
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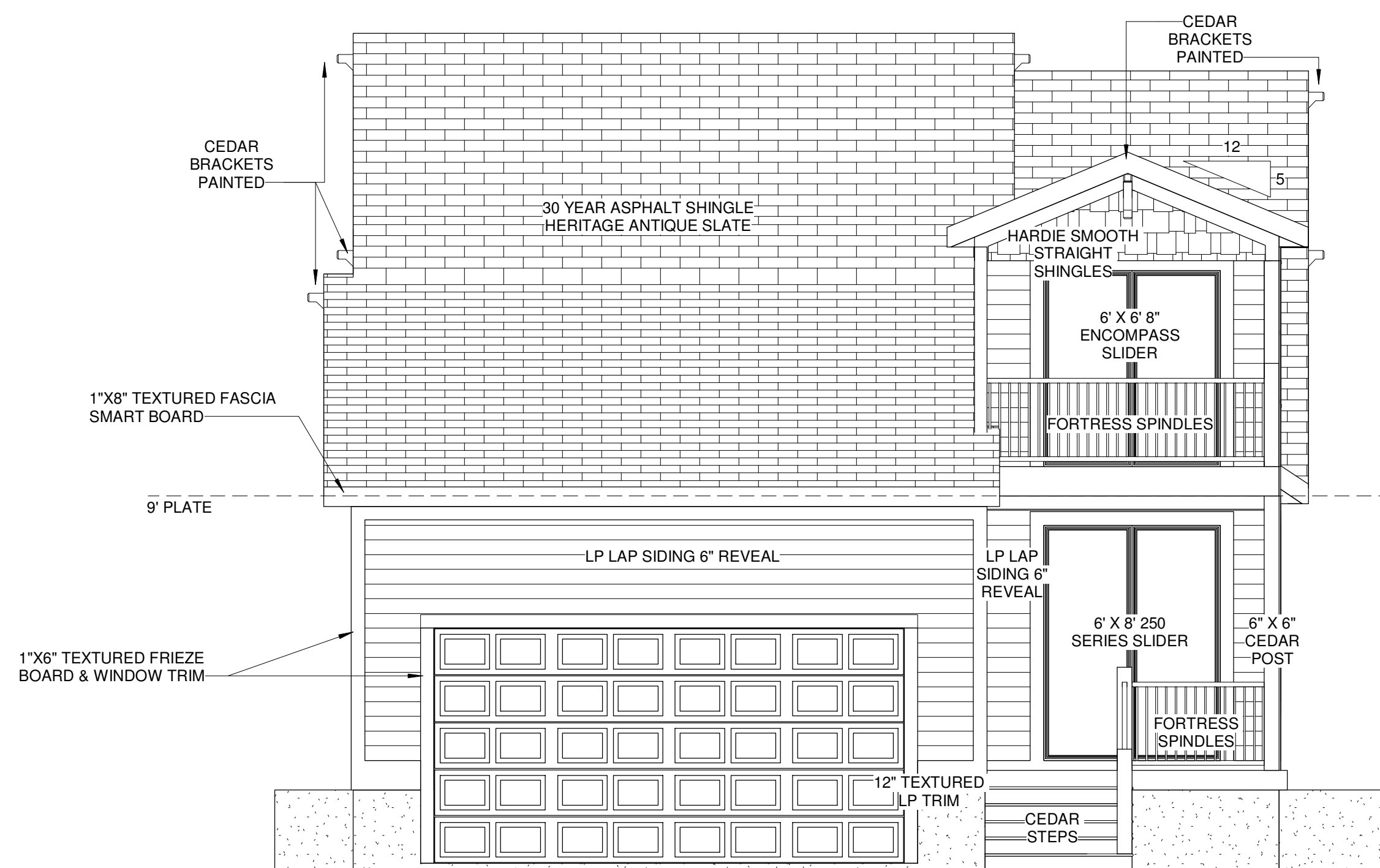
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MINNETONKA, MN 55345

913.631.2222



FRONT ELEVATION

$$\frac{3}{8}'' = 1'-0''$$


REAR ELEVATION

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1/4" = 1'-0"





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Scale  $1/4" = 1'-0"$

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$$1/4'' = 1' 0''$$
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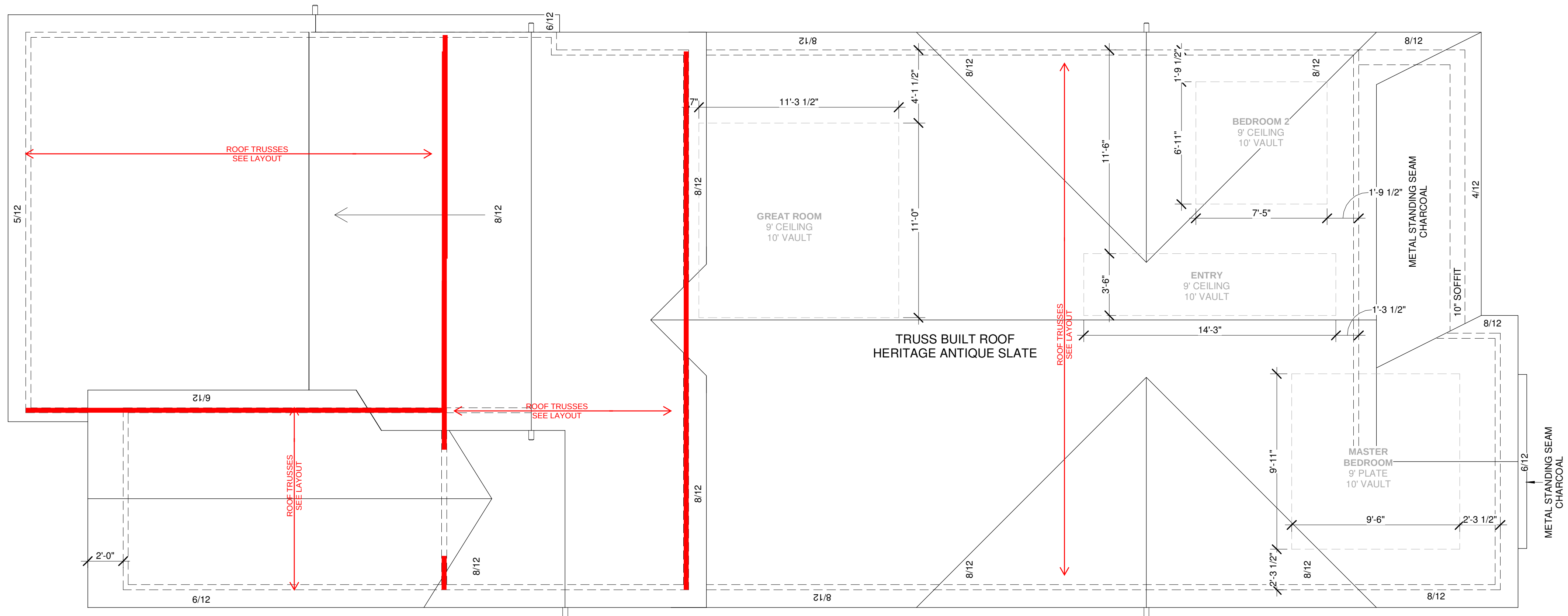
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# PATTON CUSTOM

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## Roof Framing

|                |                |
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| A-5            |                |
| Scale          | 1/4" = 1'-0"   |



ROOF PLAN  
1/4" = 1'-0"

**PROPOSED USE OF ROOF TRUSSES:**

- TRUSSES WILL BE DESIGNED FOR
- 20# SL / 10# DL FOR LIGHT ROOFING
- 20# SL / 20# DL FOR HEAVY ROOFING
- MIN. 10# DL ON BC FOR CEILING LOAD

GIRDER END BEARING WILL BE PROVIDED WITH TWICE THE STUDS AS PLIES OF THE GIRDER.

HD ENGINEERING WILL VERIFY GENERAL CONFORMANCE OF LAYOUT PRIOR TO

CONSTRUCTION. FAILURE TO SUBMIT FOR CONFORMANCE REVIEW BY HD ENGINEERING WILL

RELIEVE HD ENGINEERING OF LIABILITY FOR THE ENTIRE STRUCTURE.

-TRUSSES ARE TO BE SECURED TO TOP PLATE AT EACH END WITH MINIMUM SIMPSON H2.5

OR =,

-VERIFY GIRDER END FASTENING WITH MANUFACTURER REQUIREMENTS.

-TRUSS PLAN SHALL COMPLY WITH SECTION 802.11 IRC 2018



STRUCTURAL REVIEW  
HD ENGINEERING & DESIGN  
HD-20041 DATE: 01/25/2020

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## 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 |                           |          |                                                                  |                             |      |                     |      |
| 10d Common Nails      | .148                      | 9        | 1-5/8                                                            | 128                         | 118  | 46                  | 36   |
| 12d Common Nails      |                           |          |                                                                  |                             |      |                     |      |
| 16d Sinker Nails      |                           |          |                                                                  |                             |      |                     |      |
| 20d Box Nails         |                           |          |                                                                  |                             |      |                     |      |
| 30d Box Nails         | .148                      | 9        | 1-3/4                                                            | 128                         | 118  | 50                  | 40   |
| 16d Ring Shank Nails  |                           |          |                                                                  |                             |      |                     |      |
| 16d Screw Shank Nails |                           |          |                                                                  |                             |      |                     |      |
| 16d Common Nails      |                           |          |                                                                  |                             |      |                     |      |
| 40d Box Nails         | .162                      | 8        | 1-3/4                                                            | 154                         | 141  | 50                  | 40   |
| 20d Ring Shank Nails  | .177                      | 7        | 2-1/8                                                            | 178                         | 163  | 59                  | 47   |
| 20d Screw Shank Nails | .177                      | 7        | 2-1/8                                                            | 178                         | 163  | 54                  | 43   |
| 20d Sinker Nails      |                           |          |                                                                  |                             |      |                     |      |
| 20d Common Nails      | .148                      | 9        | 2-1/8                                                            | 170                         | 166  | 59                  | 47   |
| 30d Sinker Nails      |                           |          |                                                                  |                             |      |                     |      |

## 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                                                 |
|                    | BLOCKING BETWEEN JOISTS OR RAFTERS TO TOP PLATE                                     | TOENAIL W/ (3) 8D                                                   |
| BEAMS              | 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                                                   |
|                    | 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                                          |
| WALLS              | 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                                                 |
|                    | 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                                 |
|                    | WINDOW INSTALLATION NAILING                                                         | 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 HOLE 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 100FT<sup>2</sup> (9.29m<sup>2</sup>) 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 BE LESS THAN OR EQUAL TO 4 CFM (113.3 L/MIN) PER 100FT<sup>2</sup> (9.29m<sup>2</sup>) 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 100FT<sup>2</sup> (9.29m<sup>2</sup>) OF CONDITIONED FLOOR AREA.  
**EXCEPTION:** THE TOTAL LEAKAGE IS NOT REQUIRED FOR DUCTS AND AIR HANDLERS LOCATED ENTIRELY WITHIN THE BUILDING THERMAL ENVELOPE.

### GENERAL NOTES:

1. PLANS SHALL COMPLY WITH THE 2018 INTERNATIONAL RESIDENTIAL CODE, 2018 IECC, 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.  
2. WHERE DISCREPANCIES EXIST BETWEEN THE STANDARD COMMENTS, NOTES FOR THE DESIGN PROFESSIONAL OR THE CODE, THE MOST RESTRICTIVE SHALL APPLY.  
3. THE CONTRACTOR SHALL OBLIGATE HIMSELF TO PROVIDE THE OWNER/OWNER AND THE AHJ WITH A SET OF PLANS THAT MEET ALL 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.  
4. 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.  
5. 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:

1. THE FOUNDATION DESIGN SHALL COMPLY WITH THE ENFORCING JURISDICTION RESIDENTIAL FOUNDATION STANDARD IN LIEU OF ENGINEERING REPORT REQUIREMENTS BASED ON ACTUAL SITE CONDITIONS.  
2. FOUNDATION WALLS SHALL BE DAMP-PROOFED PER IRC SECTION R406.  
3. PROVIDE A MINIMUM 4" PERFORATED DRAIN AROUND USABLE SPACE BELOW GRADE OR OTHER EQUIVALENT MATERIALS PER IRC SECTION 405.1. THE PIPE SHALL BE COVERED WITH NOT LESS THAN 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.  
4. FOUNDATION DESIGN SHALL BE BASED ON A MINIMUM SOIL BEARING CAPACITY OF 1500 PSF.  
5. 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.  
6. COLUMN PADS SHALL BE A MINIMUM OF 24"x24"x8" WITH (3) #4 BARS EACH WAY.  
7. 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.  
8. REINFORCEMENT SHALL LAP A MINIMUM OF 24".  
9. INTERIOR BEARING WALLS AND COLUMNS SHALL BE ISOLATED FROM THE BASEMENT FLOOR SLAB.  
10. INTERIOR NON-BEARING WALLS, OTHER THAN THOSE RESTING DIRECTLY ON THE FOOTING, SHALL BE ISOLATED FROM THE FLOOR FRAMING ABOVE BY A SEPARATION OF 1/2".  
11. CONCRETE FLOOR SLABS ON GRADE SHALL BE A MINIMUM 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.  
12. 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.  
13. 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.  
14. FOUNDATION WINDOW WELLS FOR SECONDARY MEANS OF EGRESS SHALL PROVIDE A MINIMUM 3'X3' HORIZONTAL AREA.  
15. 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 CRUMBLY, WE RECOMMEND THAT THE AFFECTED MATERIAL BE REMOVED PRIOR TO PLACING CONCRETE.  
16. 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:

1. STAIRWAYS SHALL PROVIDE A MAXIMUM 7 3/4" RISE AND MIN. 10" RUN.  
2. 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.  
3. 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  
5. PROVIDE A MINIMUM 6'-8" OF HEADROOM CLEARANCE IN STAIRWAYS.  
6. 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.  
7. 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:

1. GLAZING IN HAZARDOUS LOCATIONS AS IDENTIFIED IN IRC SECTION R308.4 SHALL BE OF APPROVED SAFETY GLAZING MATERIALS. GLASS IN STORM DOORS, INDIVIDUAL FIXED OR OPERABLE PANELS ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE IS WITHIN A 24" ARCH OF THE DOOR IN A CLOSED POSITION AND WHOSE BOTTOM EDGE IS WITHIN 60" OF THE FLOOR, WALLS ENCLOSING 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"  
2. 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:

1. ALL LUMBER SIZES ARE FOR DOUGLAS FIR-LARCH UNLESS OTHERWISE NOTED.  
2. ALL HEADERS TO BE A MINIMUM OF (2) #2-2X10'S UNLESS OTHERWISE NOTED.  
3. BLOCK CANTILEVERS, DOOR JAMBS, AND OVER BEAMS.  
4. ALL HEADERS/BEAMS TO BEAR ON A MINIMUM OF (2) 2X4 POSTS UNLESS NOTED OTHERWISE.  
5. INTERIOR NON-BEARING WALLS, OTHER THAN THOSE RESTING DIRECTLY ON THE FOOTING SHALL BE ISOLATED FROM THE FLOOR FRAMING ABOVE.  
6. WHERE JOISTS RUN PARALLEL TO FOUNDATION WALLS, 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.  
7. 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.  
8. ALL SILLS AND SLEEPERS SUPPORTED ON CONCRETE OR MASONRY AND FURRING ATTACHED TO CONCRETE OR MASONRY SHALL BE OF DECAY RESISTANT MATERIALS.  
9. JOISTS UNDER BEARING PARTITIONS SHALL BE SIZED TO CARRY THE DESIGN LOAD IN ACCORDANCE WITH IRC SECTION R502.4.  
10. JOISTS FRAMING FROM OPPOSITE SIDES OVER BEARING SUPPORTS SHALL LAP A MINIMUM OF 3" AND SHALL BE NAILED TOGETHER WITH A MINIMUM 10D FACE NAILS.  
11. JOISTS FRAMING INTO A WOOD GIRDER OR BEAM SHALL BE SUPPORTED BY APPROVED FRAMING ANCHORS OR ON MINIMUM 2"x2" LEDGER STRIPS.  
12. HEADER AND TRIMMERS SHALL BE OF SUFFICIENT CROSS SECTION TO SUPPORT THE FLOOR FRAMING. TRIMMER JOISTS SHALL BE DOUBLED WHEN THE HEADER IS SUPPORTED MORE THAN 3' FROM THE TRIMMER JOIST BEARING. WHEN THE HEADER SPAN EXCEEDS 4', THE HEADER AND TRIMMER SHALL BE DOUBLED.  
13. JOISTS AT SUPPORTS SHALL BE SUPPORTED Laterally AT THE ENDS BY FULL-DEPTH 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.  
14. ALL WALL COVERINGS TO COMPLY WITH IRC SECTION 702 AND 703  
15. ALL RAFTER / COLLAR TIES TO COMPLY WITH IRC SECTIONS 804  
16. ALL RAFTERS TO HAVE 2x4 COLLAR TIES @ 48" OC IN UPPER 1/3 OF DISTANCE BETWEEN CEILING AND ROOF  
17. BLOCKING BETWEEN JOISTS UNDER A PERPENDICULAR LOAD-BEARING WALL IS NOT REQUIRED.  
18. BOTTOM OF ALL FLOOR ASSEMBLIES SHALL BE PROVIDED WITH A 1/2" GYPSUM WALLBOARD MEMBRANE (IF REQUIRED BY LOCAL CODE)  
19. I-JOIST AND FLOOR TRUSS SYSTEMS SHALL BE FIRE PROTECTED PER IRC AS ADOPTED BY AHJ  
20. STUDS SHALL BE CONTINUOUS FROM THE FLOOR TO THE ROOF/ CEILING DIAPHRAGM PER IRC 602.3

### CONCRETE NOTES:

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

### EMERGENCY EGRESS AND RESCUE NOTES:

1. PROVIDE ONE WINDOW FOR EACH BEDROOM THAT HAS A MINIMUM OPENABLE AREA OF 5.7 S.F. WITH A MINIMUM OPENABLE HEIGHT OF 24" AND WIDTH OF 21". IN ADDITION, THE OPENABLE PORTION OF EGRESS WINDOWS SHALL NOT EXCEED 44" ABOVE THE ADJOINING FLOOR OR PERMANENT STEP.  
2. PROVIDE SMOKE ALARMS IN EACH SLEEPING ROOM, OUTSIDE OF EACH SLEEPING AREA AND ON EACH FLOOR INCLUDING BASEMENTS. ALARMS SHALL BE INTERCONNECTED IN SUCH A MANNER THAT THE ACTIVATION OF ONE ALARM WILL ACTIVATE ALL OF THE ALARMS IN THE DWELLING.  
3. PROVIDE CARBON MONOXIDE ALARMS AS REQUIRED PER IRC. CARBON MONOXIDE ALARMS SHALL BE INSTALLED OUTSIDE OF EACH SEPARATE SLEEPING AREA, WHERE FIRE-BURNING APPLIANCES ARE LOCATED WITHIN A BEDROOM OR ITS ATTACHED BATHROOM, A CARBON MONOXIDE ALARM SHALL BE INST



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

| ITEM  | DESCRIPTION OF BUILDING ELEMENTS                                                                              | NUMBER AND TYPE OF FASTENER <sup>a,b,c</sup>                                                                                                                                                                                                                                                    | SPACING OF FASTENERS                                                                                                                                                     |
|-------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ROOF  |                                                                                                               |                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                          |
| 1     | BLOCKING BETWEEN JOISTS OR RAFTERS TO TOP PLATE, TOE NAIL                                                     | 4-8D BOX (2 1/2" X 0.113")<br>3-8D (2 1/2" X 0.113")<br>3-10D (3"X0.128")<br>3-3"X 0.131" NAILS                                                                                                                                                                                                 | TOE NAIL                                                                                                                                                                 |
| 2     | CEILING JOISTS TO PLATE, TOE NAIL                                                                             |                                                                                                                                                                                                                                                                                                 | 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")<br>3-16D COMMON (3 1/2"X 0.162")<br>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")<br>3-10D COMMON (3" X 0.148")<br>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")<br>3-10D COMMON NAILS (3" X 0.148")<br>4-10D BOX (3" X 0.128")<br>4-3" X0.131" NAILS                                                                                                                                                                           | 2 TOE NAILS ON ONE SIDE AND 1 TOE NAIL ON OPPOSITE SIDE OF EACH RAFTER OR TRUSS <sup>1</sup>                                                                             |
| 7     | ROOF RAFTERS TO RIDGE, VALLEY OR HIP RAFTERS OR ROOF RAFTER TO MINIMUM 2" RIDGE BEAM                          | 4-16D(3 1/2" X 0.135"); OR 3-10D COMMON (3" X 0.148")<br>4-10D BOX (3" X 0.128"); OR 4-3" X 0.131" NAILS<br><br>3-16D(3 1/2" X0.135"); OR 2-16D COMMON (3 1/2" X0.162")<br>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")<br><br>10D BOX (3" X 0.128"); OR 3" X 0.131" NAILS                                                                                                                                                                                                                        | 24" OC FACE NAIL<br><br>16" OC FACE NAIL                                                                                                                                 |
| 9     | STUD TO STUD AND ABUTTING STUDS AT INTERSECTING WALL CORNERS (AT BRACED WALL PANELS)                          | 16D BOX (3 1/2" X 0.135"); OR 3" X 0.131" NAILS                                                                                                                                                                                                                                                 | 12" OC FACE NAIL                                                                                                                                                         |
| 10    | BUILT-UP HEADER (2" TO 2" HEADER WITH 1/2" SPACER)                                                            | 16D COMMON (3 1/2" X 0.162")<br><br>16D BOX (3 1/2" X 0.135")                                                                                                                                                                                                                                   | 16" OC FACE NAIL<br><br>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")<br>4-10D BOX (3" X 0.128")                                                                                                                                                                                                          | TOE NAIL                                                                                                                                                                 |
| 12    | TOP PLATE TO TOP PLATE                                                                                        | 16D COMMON (3 1/2" X 0.162")<br><br>10D BOX (3" X 0.128") OR 3" X 0.131" NAILS                                                                                                                                                                                                                  | 16" OC FACE NAIL<br><br>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")<br><br>16D BOX (3 1/2" X 0.135"); OR 3" X 0.131" NAILS                                                                                                                                                                                                             | 16" OC FACE NAIL<br><br>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<br><br>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<br><br>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<br><br>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")<br>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<br>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<br>10D BOX (3" X 0.128"); or 3" X 0.131" NAILS<br><br>AND: 2-20D COMMON (4" X 0.192"); or<br>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<br>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. FOURFOOT BY 4FOOT OR 4FOOT BY 8FOOT PANELS SHALL BE APPLIED VERTICALLY.  
e. SPACING OF FASTENERS NOT INCLUDED IN THIS TABLE SHALL BE BASED ON TABLE R602.3(2).  
f. FOR REGIONS HAVING BASIC WIND SPEED OF 110 MPH OR GREATER, 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 9 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 REQUIRE BLOCKING. BLOCKING OF ROOF OR FLOOR SHEATHING PANEL EDGES PERPENDICULAR TO THE FRAMING MEMBERS NEED NOT BE PROVIDED EXCEPT AS REQUIRED BY OTHER PROVISIONS OF THIS CODE. FLOOR PERIMETER SHALL BE SUPPORTED BY FRAMING MEMBERS OR SOLID BLOCKING.  
j. WHERE A RAFTER IS FASTENED TO AN ADJACENT PARALLEL CEILING JOIST IN ACCORDANCE WITH THIS SCHEDULE, PROVIDE TWO TOE NAILS ON ONE SIDE OF THE RAFTER AND TWO NAILS FROM CEILING JOIST TO TOP PLATE IN ACCORDANCE WITH THIS SCHEDULE. THE TOE NAIL ON THE OPPOSITE SIDE OF THE RAFTER SHALL NOT BE REQUIRED.

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

| ITEM                                                                                                                                                                                                                 | DESCRIPTION OF BUILDING ELEMENTS                 | NUMBER AND TYPE OF FASTENER <sup>a,b,c</sup>                                                                                    | SPACING OF FASTENERS<br>EDGES (INCHES), <sup>d</sup> INTERMEDIATE <sup>e,f</sup> SUPPORTS (INCHES) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| WOOD STRUCTURAL PANELS, SUBFLOOR, ROOF AND INTERIOR WALL SHEATHING TO FRAMING AND PARTICLEBOARD WALL SHEATHING TO FRAMING<br>[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 RSR5-01 (2 3/8" X 0.113" NAIL (ROOF) ) | 6 12 1                                                                                             |
| 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 1                                                                                             |
| 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 <sup>g</sup>                                                                                                                                                                                    |                                                  |                                                                                                                                 |                                                                                                    |
| 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 <sup>h</sup>               | 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 <sup>h</sup>               | 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 <sup>a</sup> (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 <sup>a</sup> (inches) | LATERALLY UNSUPPORTED STUD HEIGHT <sup>a</sup> (feet) | LATERALLY UNSUPPORTED STUD HEIGHT (feet) |
|                  |                                                       |                                                                                                       |                                                                                                                 |                                                                                                                  |                                                                         |                                                       |                                          |
| 2x3 <sup>b</sup> | ---                                                   | ---                                                                                                   | ---                                                                                                             | ---                                                                                                              | ---                                                                     | 10                                                    | 16                                       |
| 2x4              | 10                                                    | 24 <sub>c</sub>                                                                                       | 16 <sub>c</sub>                                                                                                 | ---                                                                                                              | 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 = 25.4 mm, 1 FOOT = 304.8 mm  
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<br>MINIMUM (CFM) | MINIMUM EFFICACY<br>CFM/WATT | AIR FLOW RATE<br>MAXIMUM (CFM) |
|----------------------|--------------------------------|------------------------------|--------------------------------|
| HRV OR ERV           | ANY                            | 1.2 CFM/WATT                 | ANY                            |
| RANGE HOOD           | ANY                            | 2.8 CFM/WATT                 | ANY                            |
| IN-LINE FAN          | ANY                            | 2.8 CFM/WATT                 | ANY                            |
| BATHROOM UTILITY FAN | 10                             | 1.4 CFM/WATT                 | <90                            |
| BATHROOM UTILITY FAN | 90                             | 2.8 CFM/WATT                 | ANY                            |

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

| CLIMATE ZONE    | FENSTRATION U-FACTOR | SKYLIGHT U-FACTOR | GLAZED SHGC FENSTRATION | INSULATED METAL DOOR U-VALUE | INSULATED WOOD DOOR U-VALUE | CEILING R-VALUE | WOOD FRAMED WALL R-VALUE | FLOOR R-VALUE | BASEMENT WALL R-VALUE      | SLAB R-VALUE & DEPTH | CRAWL SPACE WALL R-VALUE   | DUCTWORK OVER OUTSIDE R-VALUE | DUCTWORK (ALL OTHER) R-VALUE |
|-----------------|----------------------|-------------------|-------------------------|------------------------------|-----------------------------|-----------------|--------------------------|---------------|----------------------------|----------------------|----------------------------|-------------------------------|------------------------------|
| 4 EXCEPT MARINE | 0.32                 | 0.55              | 0.40                    | 0.60                         | 0.50                        | 49              | 15                       | 19            | 10 CONTINUOUS OR 13 CAVITY | R-10, 2 FT.          | 10 CONTINUOUS OR 13 CAVITY | 8                             | 6                            |

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

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

DESIGN LOADS (PSF)

THE DWELLING SHALL COMPLY WITH THE FOLLOWING LOAD CONDITIONS

| AREA                                                                             | MIN DEAD LOAD  | MIN LIVE LOAD |
|----------------------------------------------------------------------------------|----------------|---------------|
| EXTERIOR BALCONIES                                                               | 10             | 60            |
| DECKS, STAIRS                                                                    | 10             | 40            |
| CEILING JOISTS / ATTICS NO STORAGE - SCUTTLE ACCESS ONLY ROOF SLOPE 3:12 OR LESS | 10             | 10            |
| CEILING JOISTS / ATTICS NO STORAGE - SCUTTLE ACCESS ONLY ROOF SLOPE OVER 3:12    | 10             | 10            |
| CEILING JOISTS / ATTICS WITH STORAGE - DOOR PULL DOWN LADDER ACCESS              | 10             | 20            |
| ROOMS: NON-SLEEPING                                                              | 10             | 40            |
| ROOMS: SLEEPING                                                                  | 10             | 30            |
| ROOF: LIGHT ROOF COVERING                                                        | 10             | 20            |
| ROOF: HEAVY ROOF COVERING / CONCRETE / TILE / SLATE                              | 20             | 20            |
| GUARDRAILS, HANDRAILS                                                            | 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 D1.9-92 AS AN ALTERNATIVE, AND WOULD NEED TO BE INSPECTED BY AN AWS-CERTIFIED INSPECTOR.

ENGINEERED LUMBER

MIN. DESIGN REQUIREMENTS

|         | F <sub>b</sub> (psi) | E (psi) | F <sub>v</sub> (psi) |
|---------|----------------------|---------|----------------------|
| LVL     | 2600                 | 1.8x10  | 285                  |
| GLULAM  | 2400                 | 1.8x10  | 190                  |
| PARALAM | 2600                 | 2.0x10  | 290                  |

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<br>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" |



CARDINAL CREST HOMES  
AVERY REV. CUSTOM W/BONUS RM PATTON RESID.  
3209 SW MARY ST. LEE'S SUMMIT, MO

STRUCTURAL DETAILS & NOTES

HD#: 39841

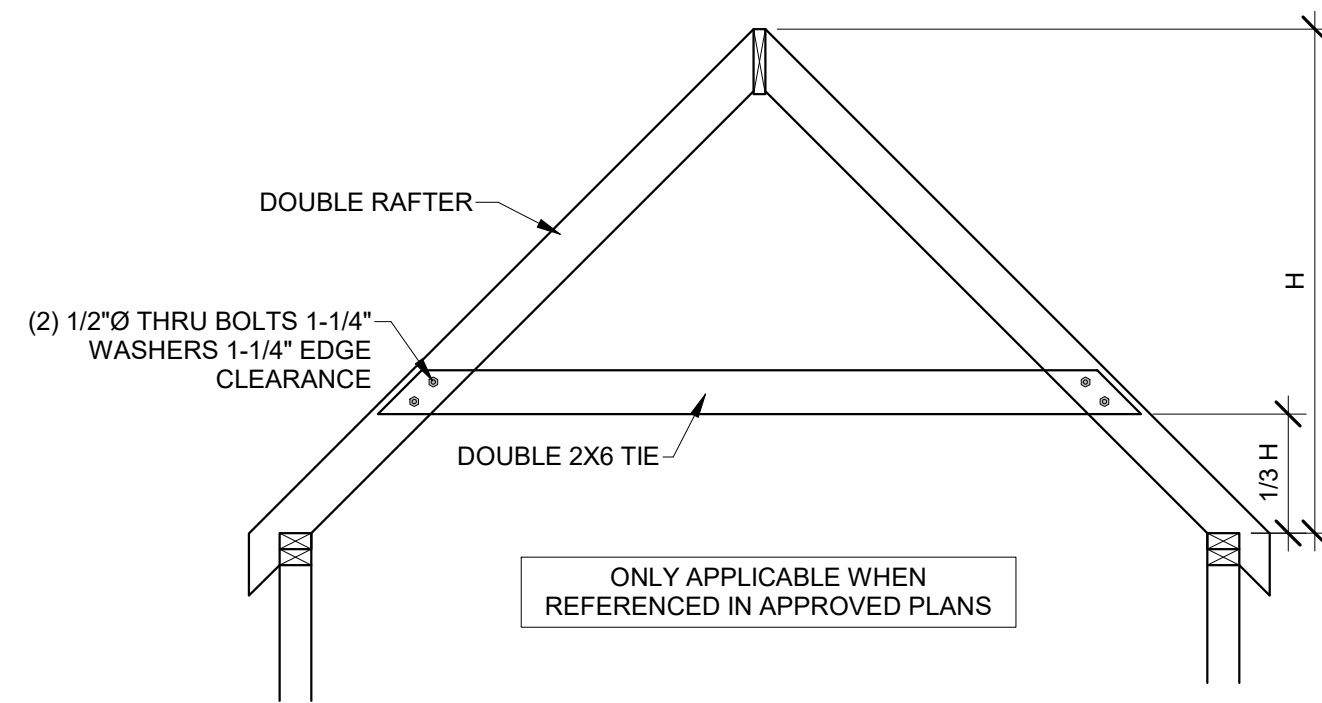
DATE: 08/25/2020  
CHECKED BY: CLS

| NO. | ISSUE/REVISION | Revision Date |
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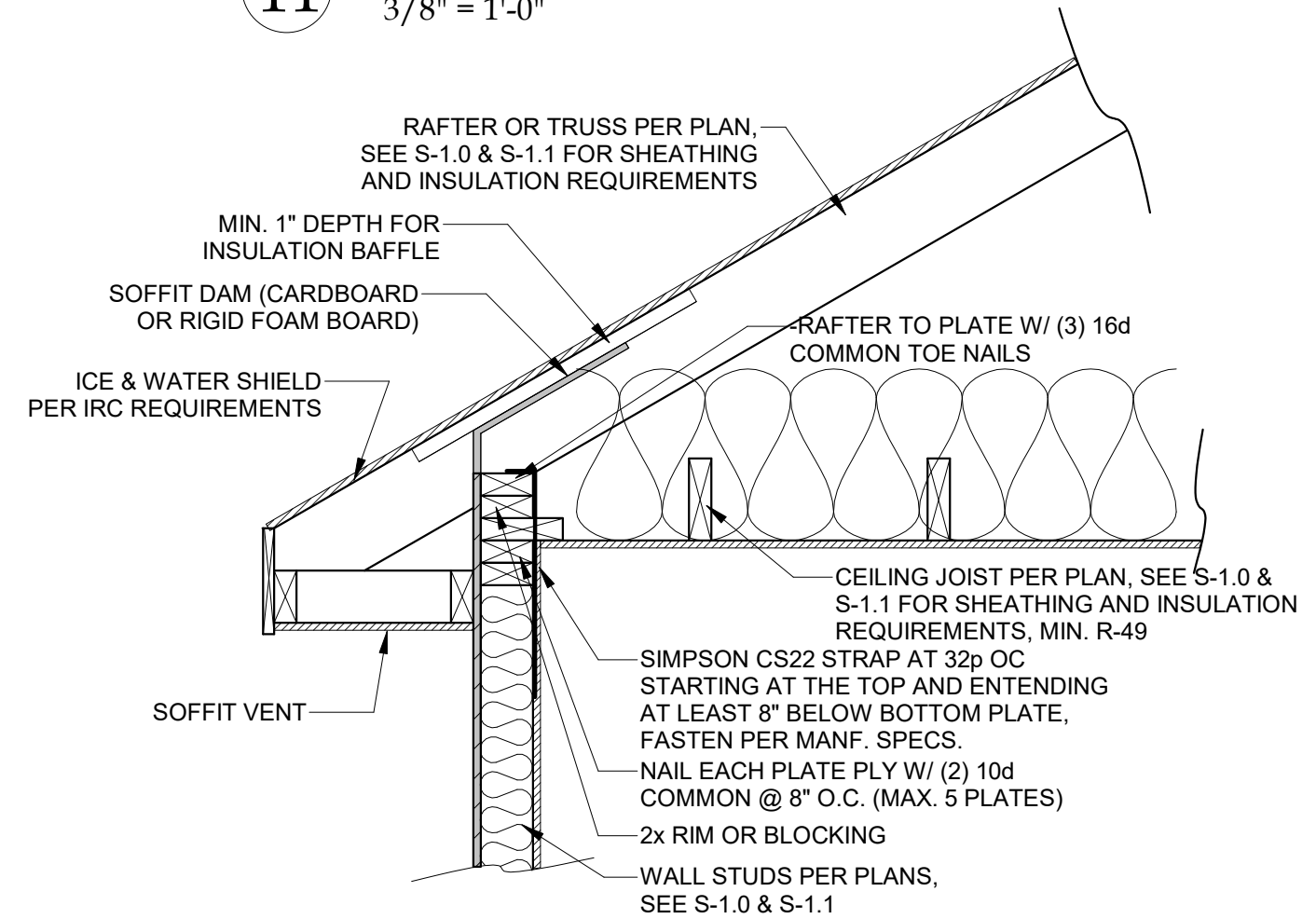
GENERAL NOTES

S-1.1

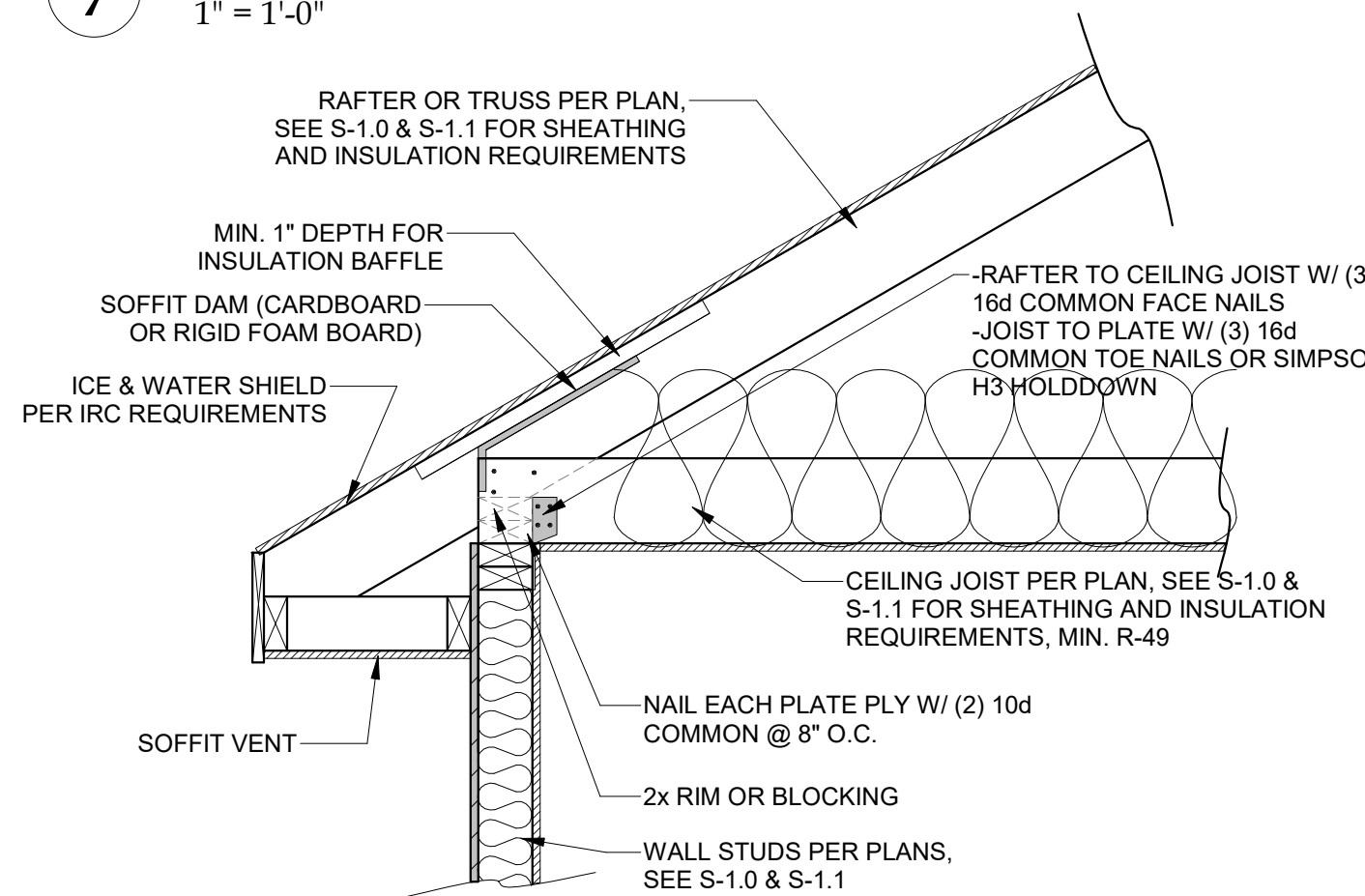




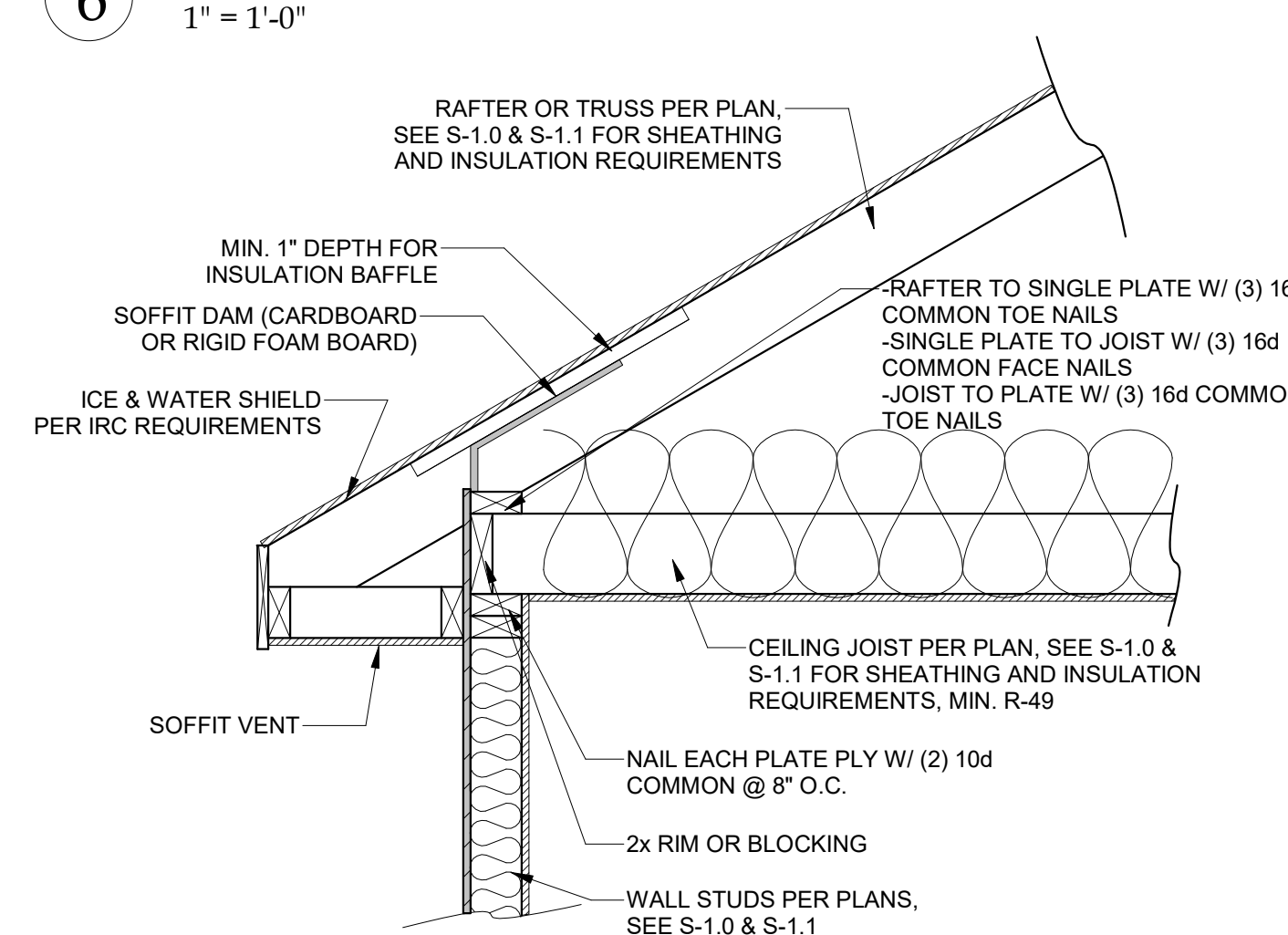
**11 HIP SUPPORT FRAME**  
3/8" = 1'-0"



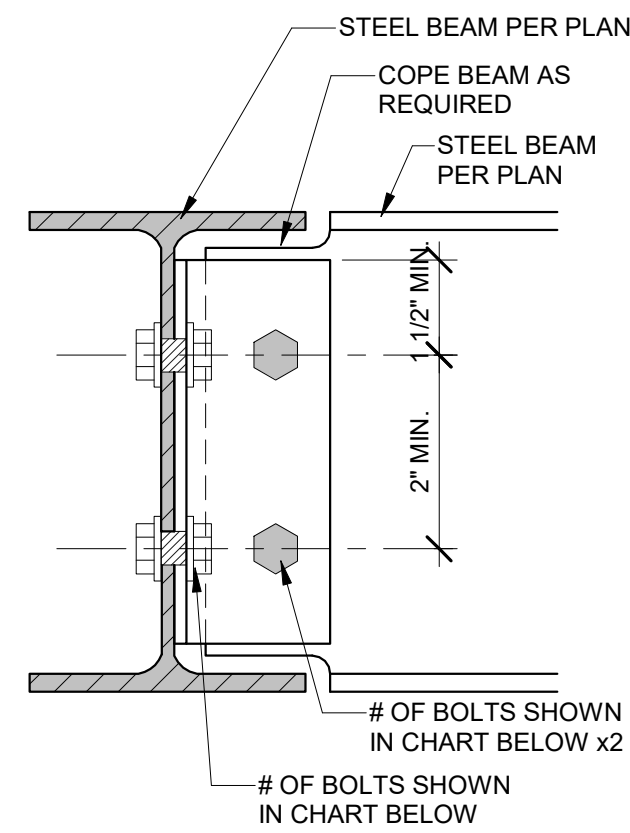
**7 OPTION 4 RAFTER BEARING**  
1" = 1'-0"



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



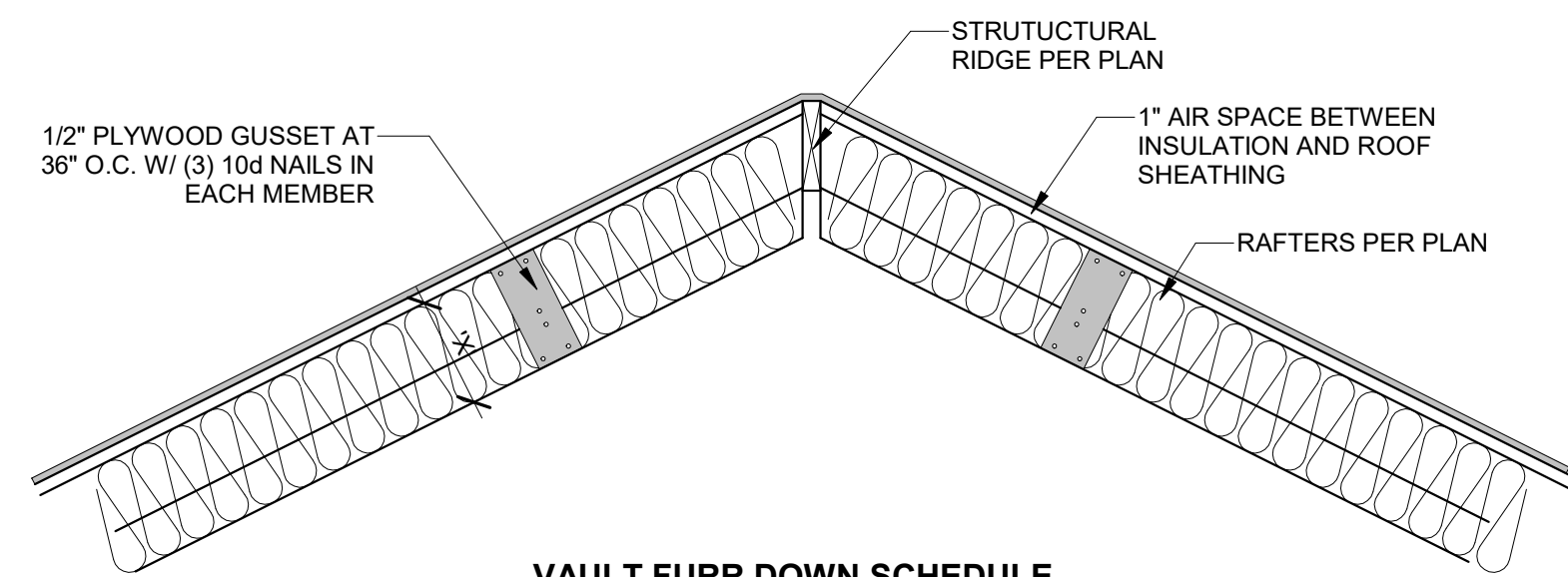
**5 OPTION 2 RAFTER BEARING**  
1" = 1'-0"



**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"             |

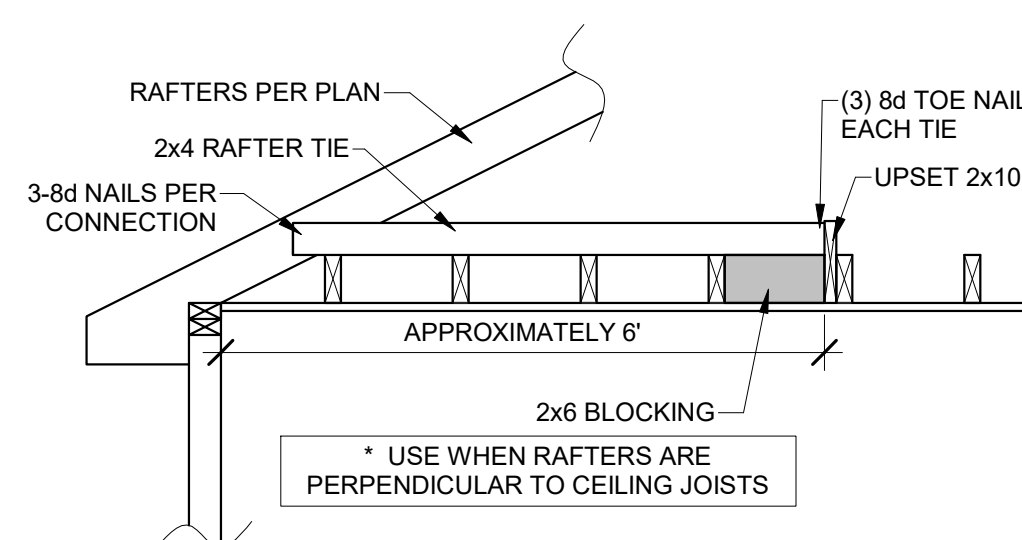


**VAULT FURR DOWN SCHEDULE**

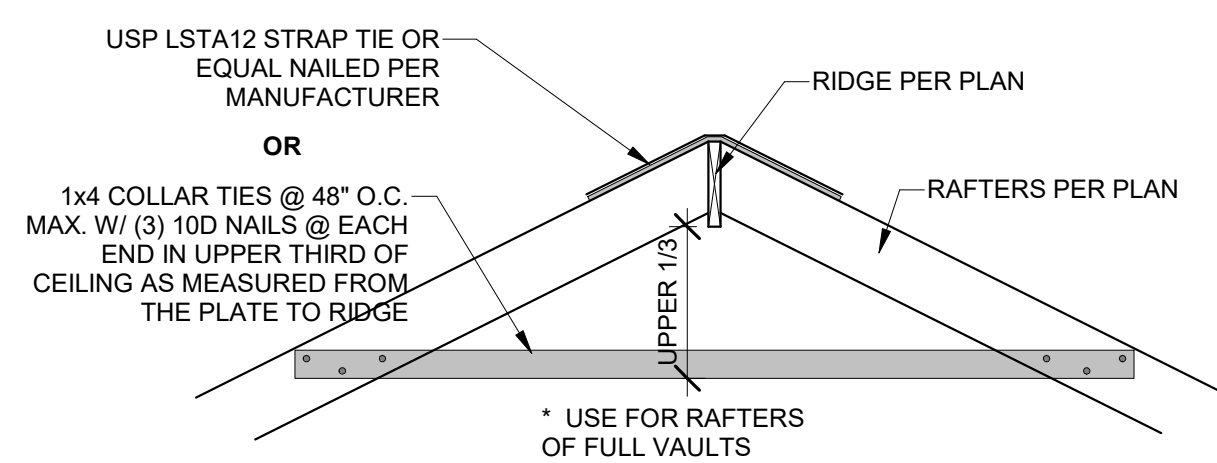
| RAFTER SIZE | R-30C INSULATION (X = 9 1/4") | R-38C INSULATION (X = 11 1/4") |
|-------------|-------------------------------|--------------------------------|
| 2x6         | 2x6                           | 2x8                            |
| 2x8         | 2x4                           | 2x6                            |
| 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"



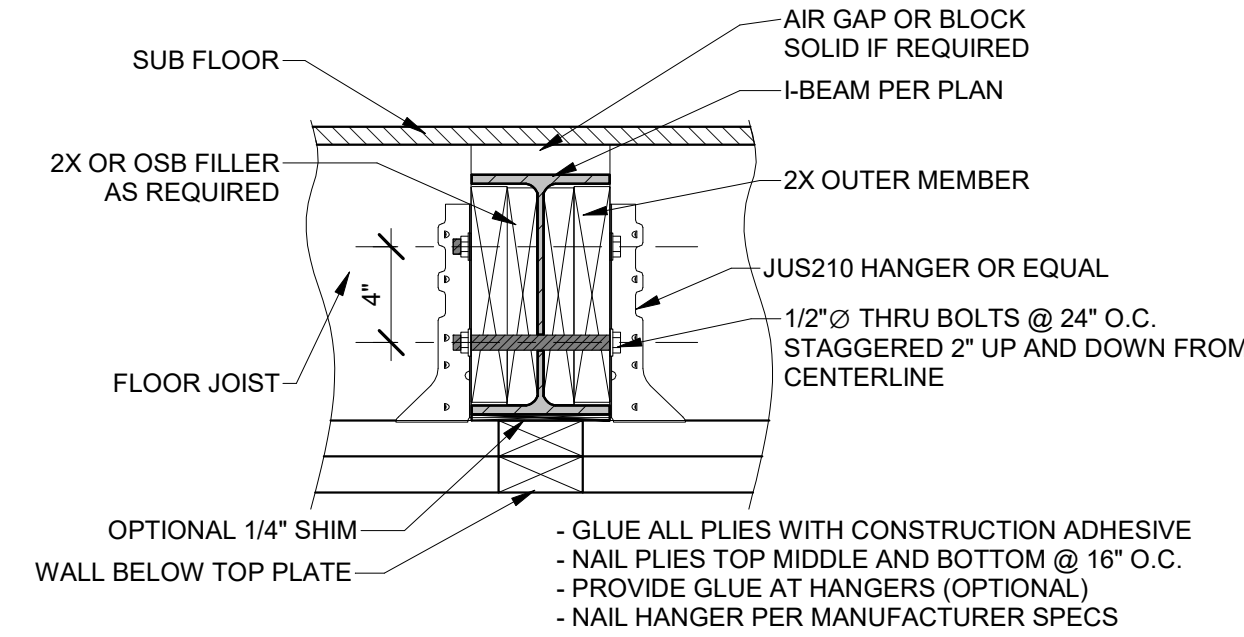
**12 RAFTER TIE CONNECTION**  
1/2" = 1'-0"



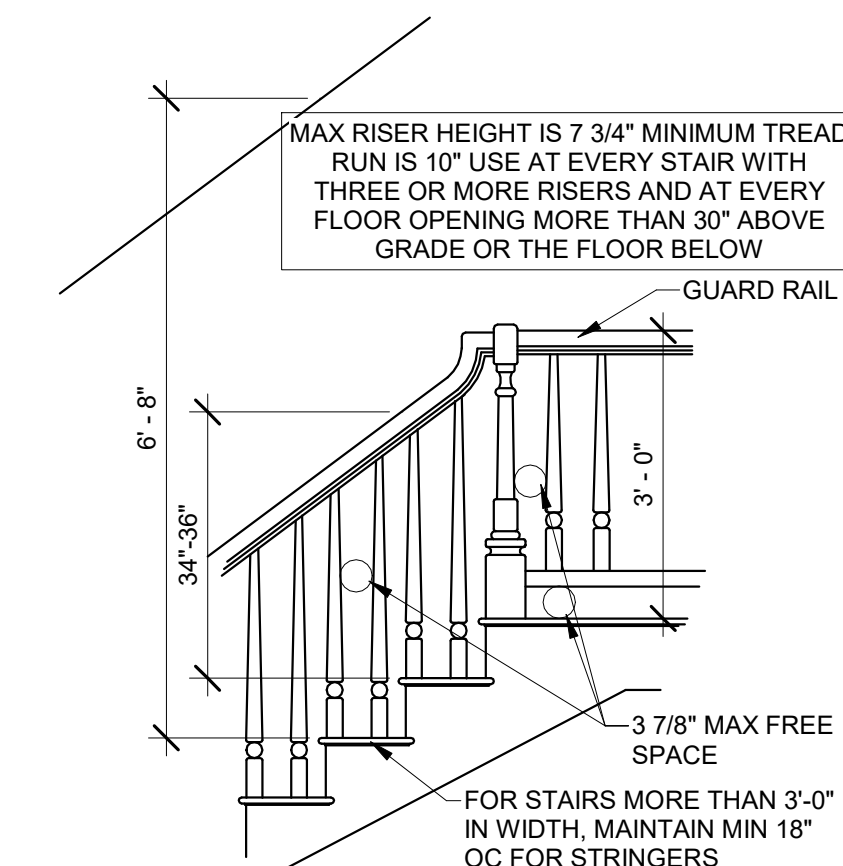
**13 RIDGE SUPPORT**  
1/2" = 1'-0"

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

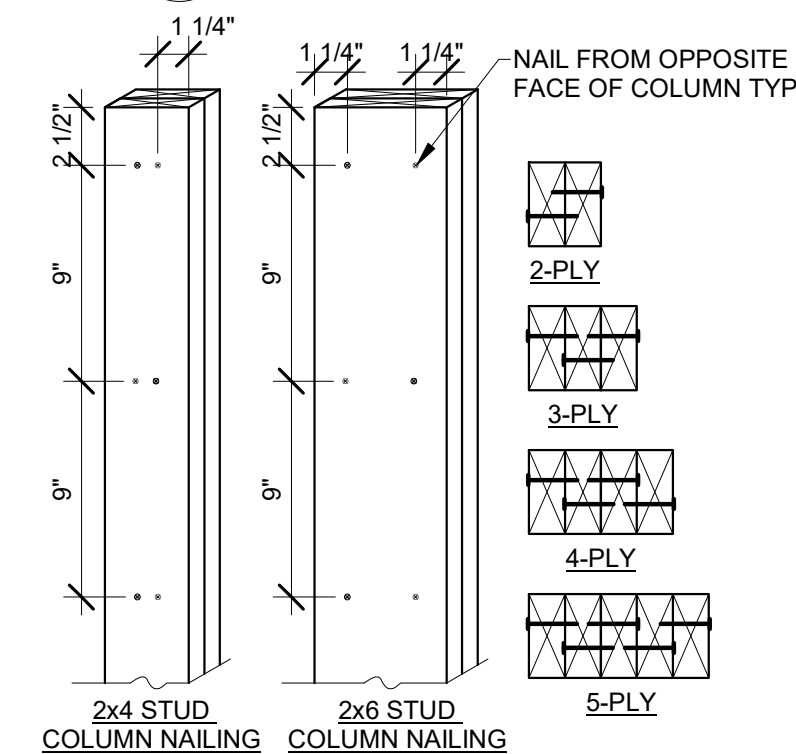
NOTES:  
1. NUMBER OF BOLTS DETERMINED BY SMALLER OF TWO BEAMS BEING CONNECTED  
2. ALL BOLTS, 3/4" DIAMETER A325-N, UNO  
3. FULL PERIMETER 1/4" FILLET WELD MAY BE SUBSTITUTED FOR EITHER OR BOTH BOLTED CONNECTIONS



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

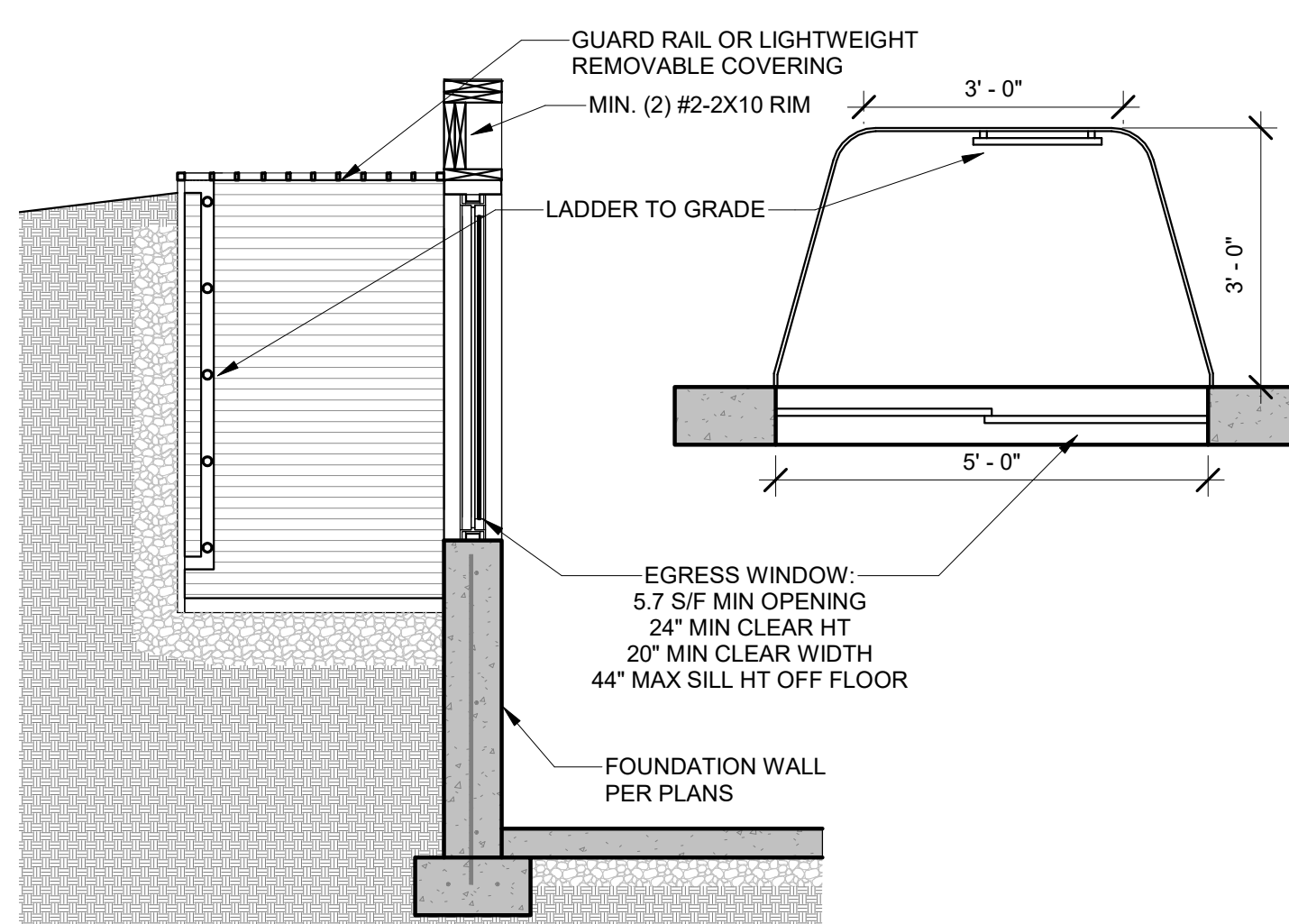


**4 STAIR/ RAIL DETAIL**  
1/2" = 1'-0"

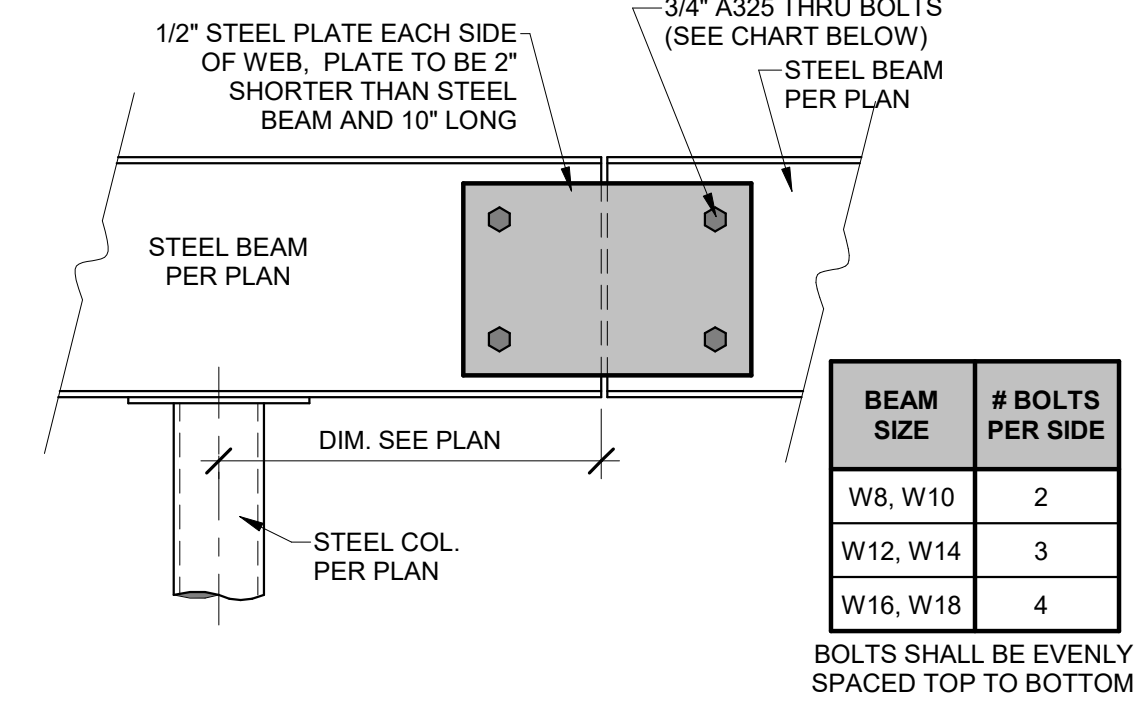


NOTES:  
1. EACH 2x PLY SHALL BE FASTENED WITH (1) ROW OF 10d NAILS AT 9" O.C. ALTERNATING SIDE TO SIDE  
2. 1 1/4" MIN. EDGE DISTANCE, AND STARTING 2 1/2" FROM EACH END.  
3. EXTEND FULL AREA OF COLUMN AS SOLID BLOCKING THROUGH JOIST BAYS AND WALLS TO LOAD-BEARING BEAM/WALL BELOW.

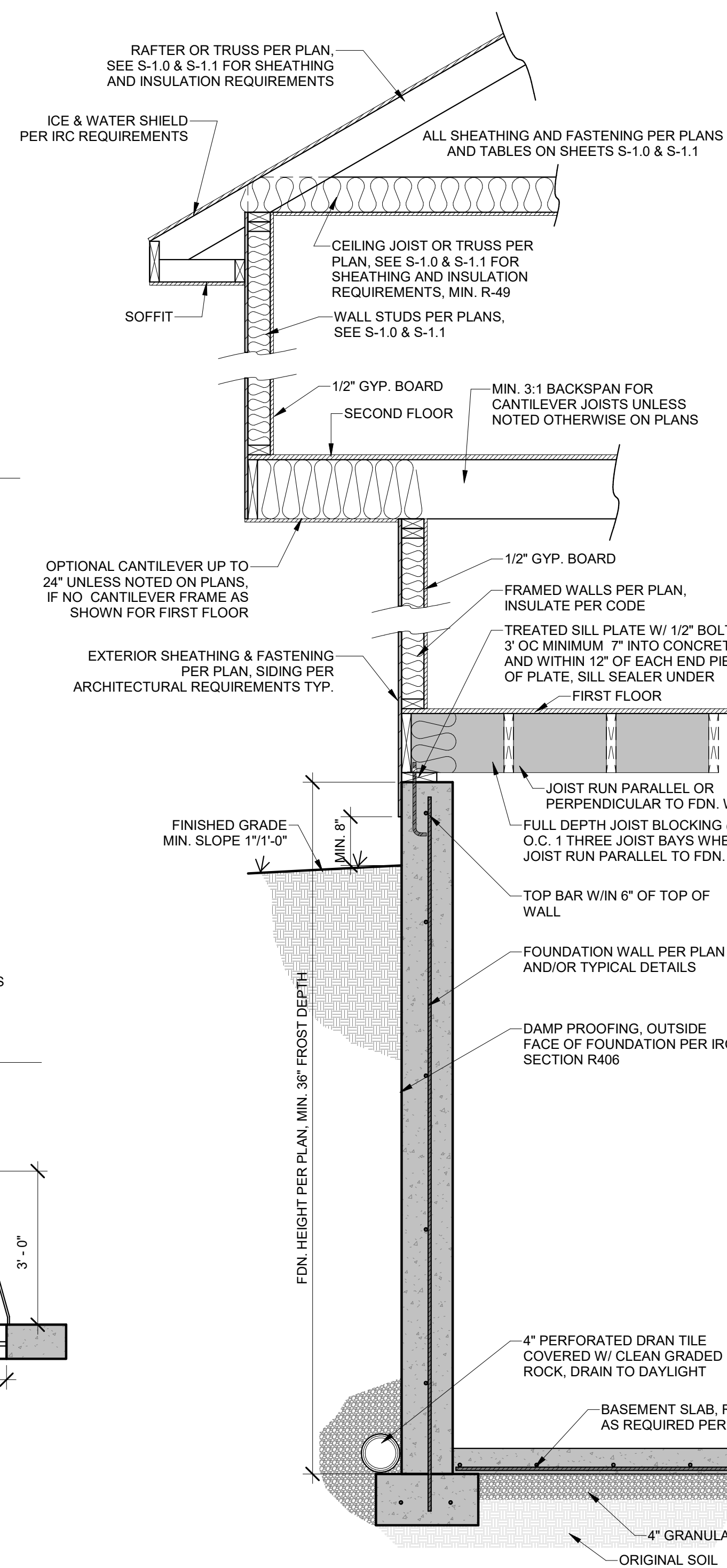
**3 BUILT-UP STUD COLUMN**  
1 1/2" = 1'-0"



**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#: 39841

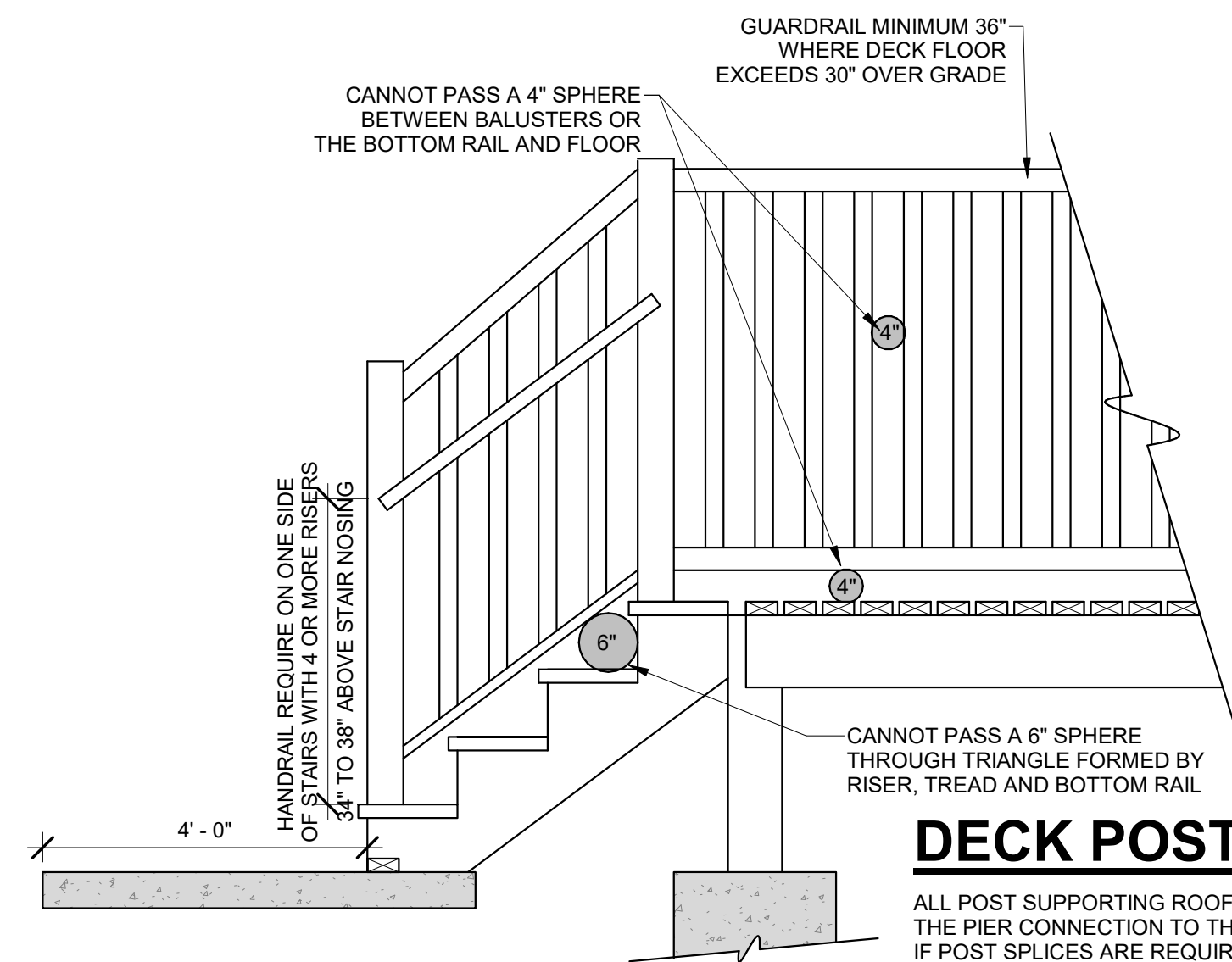
DATE: 08/25/2020  
CHECKED BY: CLS

| NO. | ISSUE/REVISION | Revision Date |
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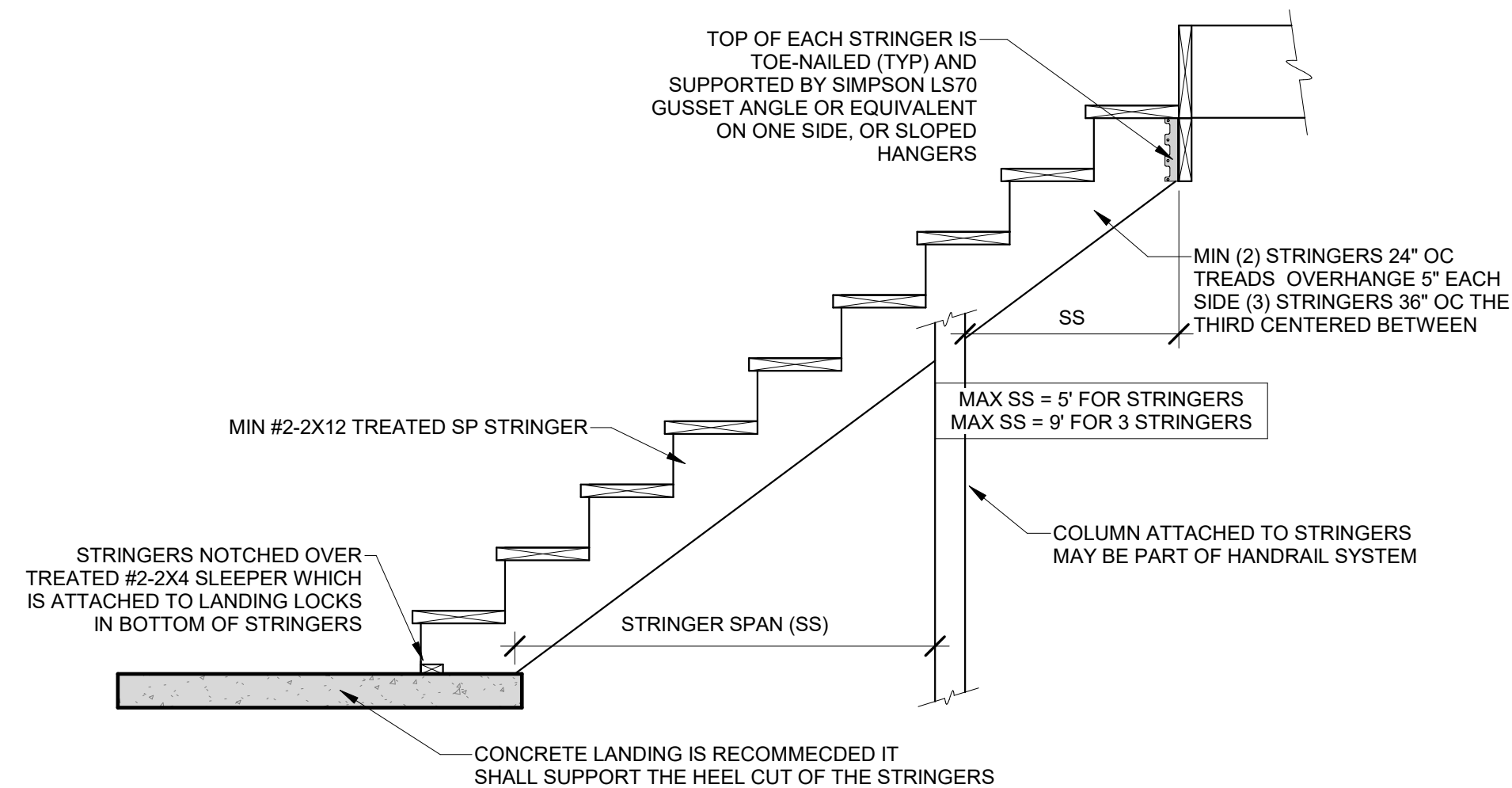
FRAMING SECTIONS

**S-1.2**

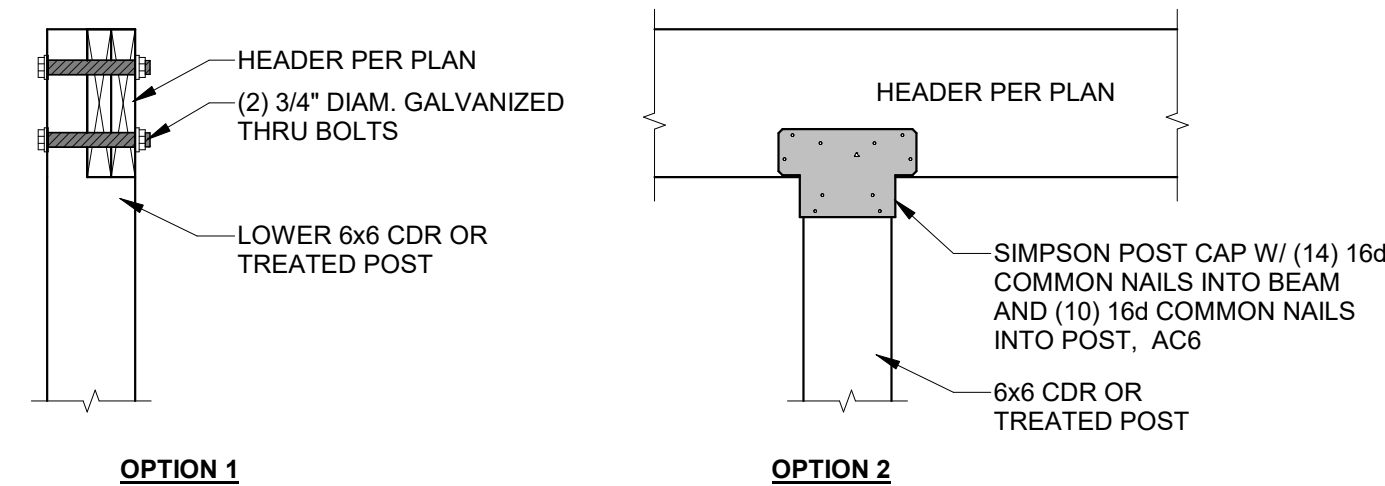




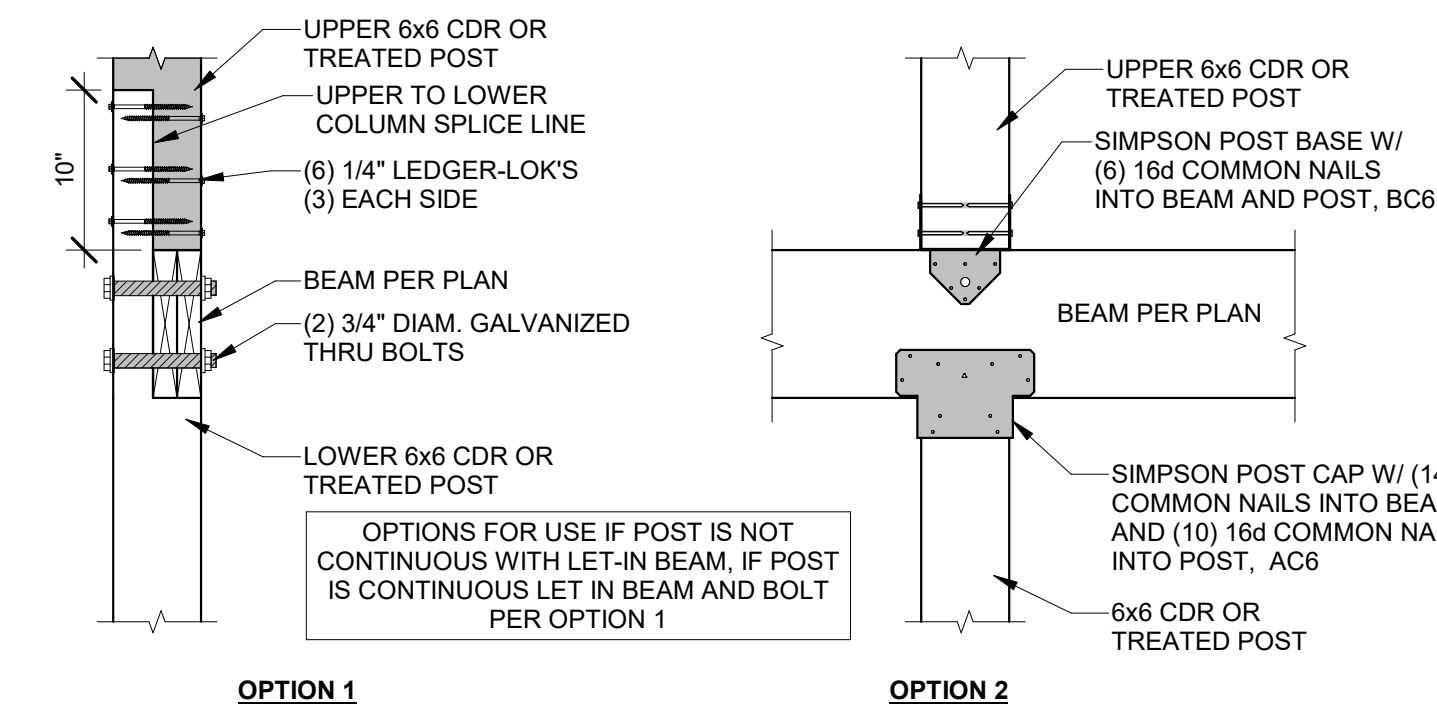
8 GUARD RAIL  
1/2" = 1'-0"



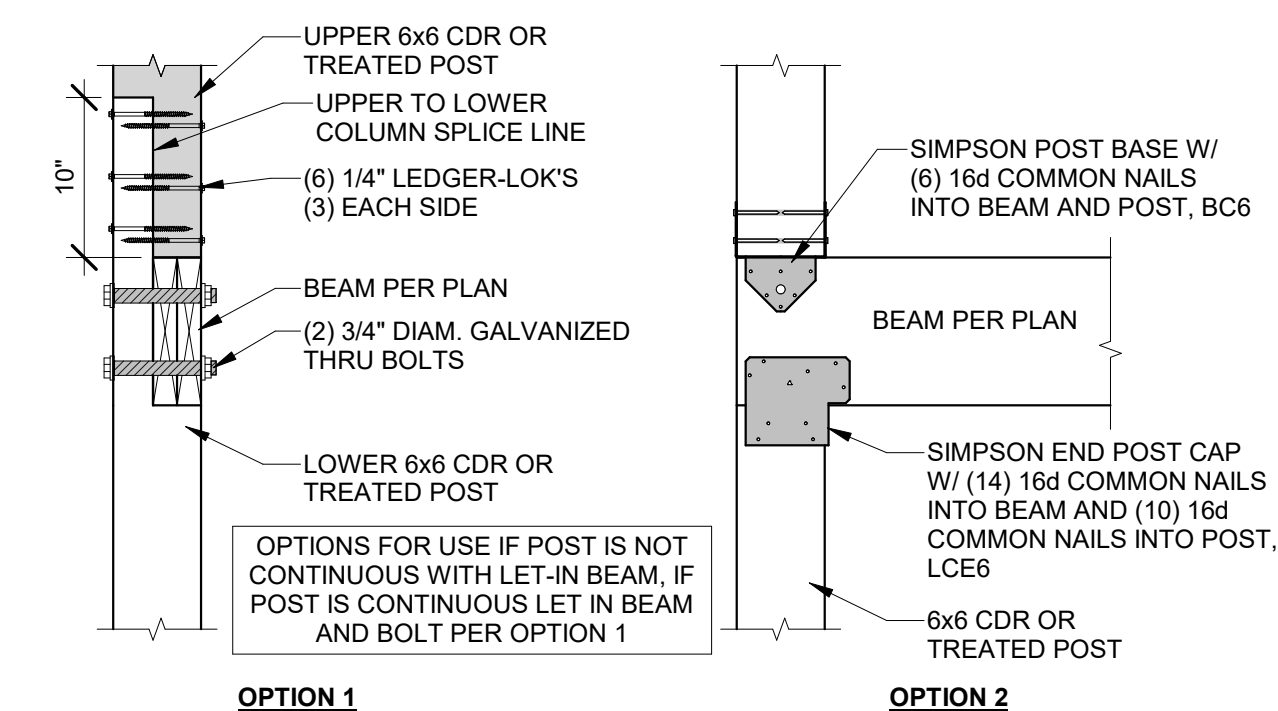
9 STAIR STRINGER DETAIL  
1/2" = 1'-0"



## 7 ROOF LEVEL INTERIOR BEAM TO COLUMN



## 6 DECK LEVEL INTERIOR BEAM TO COLUMN



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

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

For S1: 1 inch = 25.4mm, 1 foot = 304.8mm, 1 pound per square foot = 0.0479 kPa

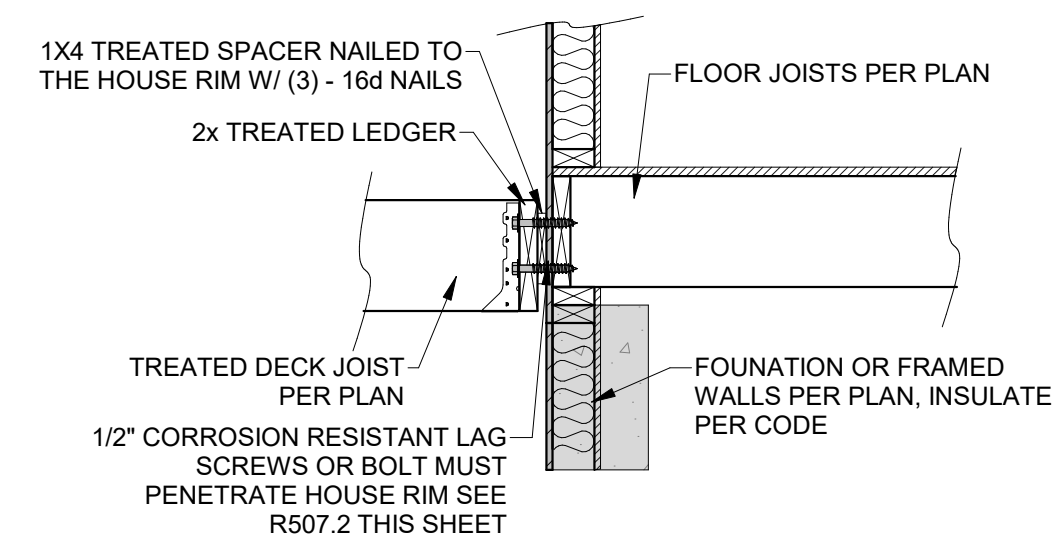
- a. Ledges shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joint.
- b. Snow load shall not be assumed to act concurrently with live load.
- c. The tip of the lag screw shall fully extend beyond the inside face of the band joint.
- d. Sheathing shall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

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

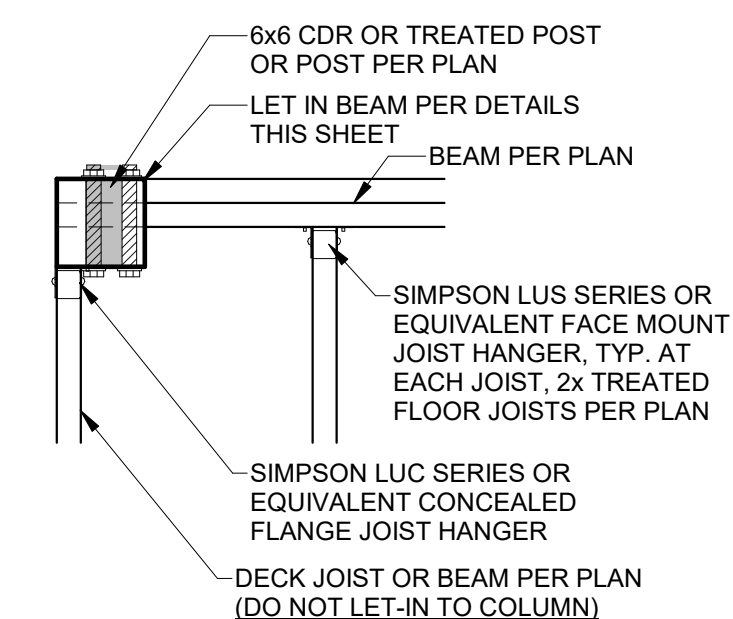
| MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS |                       |             |                       |                           |
|---------------------------------------------------------|-----------------------|-------------|-----------------------|---------------------------|
|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

For SI: 1 inch = 25.4mm.

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



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



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



| RESIDENTIAL SEISMIC & WIND ANALYSIS                                                                      |  |                  |  |                  |  | INPUT                 |  |
|----------------------------------------------------------------------------------------------------------|--|------------------|--|------------------|--|-----------------------|--|
| DETERMINE WEIGHT OF HOUSE:                                                                               |  |                  |  |                  |  | CALCULATED VALUE      |  |
| LOCATION                                                                                                 |  | DEAD LOAD (psf)  |  | AREA (ft²)       |  | WEIGHT (lbs.)         |  |
| ROOF                                                                                                     |  | 10               |  | 2650             |  |                       |  |
| CEILING                                                                                                  |  | 10               |  | 2500             |  |                       |  |
| SECOND FLOOR                                                                                             |  | 10               |  | 262              |  | 2620                  |  |
| FIRST FLOOR                                                                                              |  | 10               |  | 1707             |  | 17070                 |  |
| SECOND FLOOR EXT. WALL DL                                                                                |  | WALL LENGTH (ft) |  | WALL HEIGHT (ft) |  | WEIGHT (lbs.)         |  |
| FIRST FLOOR EXT. WALL DL                                                                                 |  | 231.66           |  | 8                |  | 5666                  |  |
| SECOND FLOOR INT. PARTITION WALL DL                                                                      |  |                  |  |                  |  |                       |  |
| FIRST FLOOR INT. PARTITION WALL DL                                                                       |  |                  |  |                  |  |                       |  |
|                                                                                                          |  | DEAD LOAD (psf)  |  | AREA (ft²)       |  | WEIGHT (lbs.)         |  |
|                                                                                                          |  | 6                |  | 262              |  | 1572                  |  |
|                                                                                                          |  | 6                |  | 1707             |  | 10242                 |  |
| PROJECTED AREAS (WIND DESIGN PER 115 MPH 3 SECOND GUST EXPOSURE C AND MEAN ROOF HEIGHT <= 30 FT ASSUMED) |  |                  |  |                  |  |                       |  |
| FRONT-TO-BACK                                                                                            |  |                  |  | SIDE-TO-SIDE     |  |                       |  |
|                                                                                                          |  | AREA             |  | LOAD             |  | LOAD                  |  |
| SLOPED ROOF                                                                                              |  | 811              |  | 65.31            |  | 526                   |  |
| VERT. ROOF                                                                                               |  | 499              |  | 5843             |  | 179                   |  |
| 2ND                                                                                                      |  | 126              |  | 1748             |  | 292                   |  |
| 1ST                                                                                                      |  | 927.63           |  | 10863            |  | 346.5                 |  |
| BSMT                                                                                                     |  | 0                |  | 0                |  | 0                     |  |
| PRESSURE (PSF) - PER ASCE CH. 6                                                                          |  |                  |  | WIND             |  |                       |  |
| SLOPED ROOF                                                                                              |  | ZONE B           |  | 9.7              |  | ZONE C                |  |
| WALL/VERT. ROOF                                                                                          |  | ZONE A           |  | 18.2             |  | ZONE D                |  |
| MEAN ROOF HT. (ft)                                                                                       |  | 32               |  |                  |  | 28 (PER 68.63, ASCE7) |  |

If there is a vertical wall to be sheathed, determine tributary wind area and enter here. If no wall, enter 0 for area.  
 $q_{w1} = 0.00256 K_d K_{e1} V^2$  (ASCE7-10 Velocity Pressure)  $q_{w2} = 0.00256 K_d V^2$  (Design Velocity Pressure for ASD analysis under ASCE7-10 and IRC/IBC 2012)

|                                                                 |       |
|-----------------------------------------------------------------|-------|
| 2ND FLOOR TRIBUTARY WEIGHT                                      | 54838 |
| 1ST FLOOR TRIBUTARY WEIGHT                                      | 73461 |
| BASEMENT TRIBUTARY WEIGHT                                       | 73461 |
| S <sub>1</sub> (SITE GROUND MOTION - %g FROM ASCE7 SEISMIC MAP) | 12.0% |
| F <sub>s</sub> (from ASCE7 Table 11.4-1)                        | 1.6   |
| S <sub>0.1</sub> (0.25 S <sub>1</sub> F <sub>s</sub> )          | 0.128 |
| R (from ASCE7 Table 12.2-1)                                     | 6.5   |

| SEISMIC SHEAR |  | From ASCE7 (Eq. 12.8-1) | V (± 1.2 * S <sub>0.1</sub> * W / R) (lbs.) |
|---------------|--|-------------------------|---------------------------------------------|
| LOCATION      |  |                         |                                             |
| 2ND FLOOR     |  |                         | 1296                                        |
| 1ST FLOOR     |  |                         | 1736                                        |
| BASEMENT      |  |                         | 1736                                        |

| Sheathing Location   | Min. Sheathing Schedule                                                                                                                               | Fastening Schedule                                                                                                                                                                                            | Allowable Shear (PLF) | Code Reference          |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|
| Exterior (Option #1) | 7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing                                     | 113 Shark Diameter Nails w/ 1-3/8" penetration @ 6" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 4" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing | 220                   | AFAPA SDPWS Table 4.3A  |
| Exterior (Option #2) | 7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing                                     | 113 Shark Diameter Nails w/ 1-3/8" penetration @ 4" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 3" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing | 320                   | AFAPA SDPWS Table 4.3A  |
| Exterior (Option #3) | 7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing and double studs at each panel edge | 113 Shark Diameter Nails w/ 1-3/8" penetration @ 3" O.C. Edges, 12" O.C. Field                                                                                                                                | 410                   | AFAPA SDPWS Table 4.3A  |
| Interior             | 1/2" Gypsum Board                                                                                                                                     | No. 6-1/4" Type W or S Screws @ 8" O.C. Edges, 12" O.C. Field                                                                                                                                                 | 60                    | per IBC, Table 2006.4.4 |
| Interior             | 16 Ga. Simpson/USP Type WB Steel X-Brace (or equal)                                                                                                   | (3) 16d @ end studs & (1) 8d @ intermediate studs (per manufacturer specifications - see detail on sheet S3)                                                                                                  | 325                   |                         |

|                                              |   |                            |       |                          |      |
|----------------------------------------------|---|----------------------------|-------|--------------------------|------|
| EXTERIOR SHEATHING OPTION FOR SECOND FLOOR   | 4 | WIDTH OF 1ST STORY (FT.)   | 84.23 | WIDTH OF 2ND STORY (FT.) | 14   |
| EXTERIOR SHEATHING OPTION FOR FIRST FLOOR    | 4 | DEPTH OF 1ST STORY (FT.)   | 31.5  | DEPTH OF 2ND STORY (FT.) | 31.5 |
| EXTERIOR SHEATHING OPTION FOR BASEMENT WALLS | 6 | BACK WALL OF GARAGE (FT.)  | 22.5  |                          |      |
|                                              |   | GAR. WALL 14'-8", 2'-5"-5" | 2     |                          |      |

| EXTERIOR STRUCTURAL WALL LENGTHS (ft.) & RESISTANCES |  | SEISMIC       |                   | WIND          |                   |
|------------------------------------------------------|--|---------------|-------------------|---------------|-------------------|
|                                                      |  | FRONT-TO-BACK | RESISTANCE (lbs.) | FRONT-TO-BACK | RESISTANCE (lbs.) |
| 2ND FLOOR                                            |  | 23            | 646               | 23            | 646               |
| 1ST FLOOR                                            |  | 153.66        | 4305              | 153.66        | 6035              |
| BASEMENT                                             |  | 0             | 0                 | 0             | 0                 |

| ADDITIONAL RESISTANCE REQUIRED |      | Anchor Bolt Spacing (in.) |      | 16d Nail Spacing req'd at bottom plate (in.) |   |
|--------------------------------|------|---------------------------|------|----------------------------------------------|---|
| SEISMIC                        | WIND | diameter (in.)            | 2    | 2nd Floor F-B                                | 5 |
| 0                              | 5093 | Shear value (per NDS)     | 84   | 2nd Floor S-S                                | 5 |
| 0                              | 0    | Spacing F-B (inches)      | 48   | 1st Floor F-B                                | 7 |
| 0                              | 0    | Spacing S-S (inches)      | 22.5 | 1st Floor S-S                                | 5 |
| 0                              | 0    |                           |      |                                              |   |
| 0                              | 0    |                           |      |                                              |   |

| RESISTANCE REQUIRED IN ADDITION TO RESISTANCE PROVIDED BY EXTERIOR WALLS* |  | ADDITIONAL RESISTANCE REQUIRED (POUNDS) |  | PORTAL FRAMES OR PERFOR. SHEAR WALL RESISTANCE |  | INTERIOR X-BRACES (25#/BRACE) |  | INTERIOR WALL LENGTH W/ 1/2" GYPSUM BOARD PER TABLE (FT.) |  | INT. WALL LENGTH SHEATHED W/ OSB (TOTAL LENGTH, ONE SIDE, FT.) |  | RESISTANCE PROVIDED BY ADDITIONAL METHODS (POUNDS) |  | OK? |  |
|---------------------------------------------------------------------------|--|-----------------------------------------|--|------------------------------------------------|--|-------------------------------|--|-----------------------------------------------------------|--|----------------------------------------------------------------|--|----------------------------------------------------|--|-----|--|
| 2ND FLOOR FRONT-TO-BACK                                                   |  | 5093                                    |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | NO  |  |
| 2ND FLOOR SIDE-TO-SIDE                                                    |  | 0                                       |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | YES |  |
| 1ST FLOOR FRONT-TO-BACK                                                   |  | 0                                       |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | YES |  |
| 1ST FLOOR SIDE-TO-SIDE                                                    |  | 0                                       |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | YES |  |
| BASEMENT FRONT-TO-BACK                                                    |  | 0                                       |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | YES |  |
| BASEMENT SIDE-TO-SIDE                                                     |  | 0                                       |  |                                                |  |                               |  |                                                           |  |                                                                |  | 0                                                  |  | YES |  |

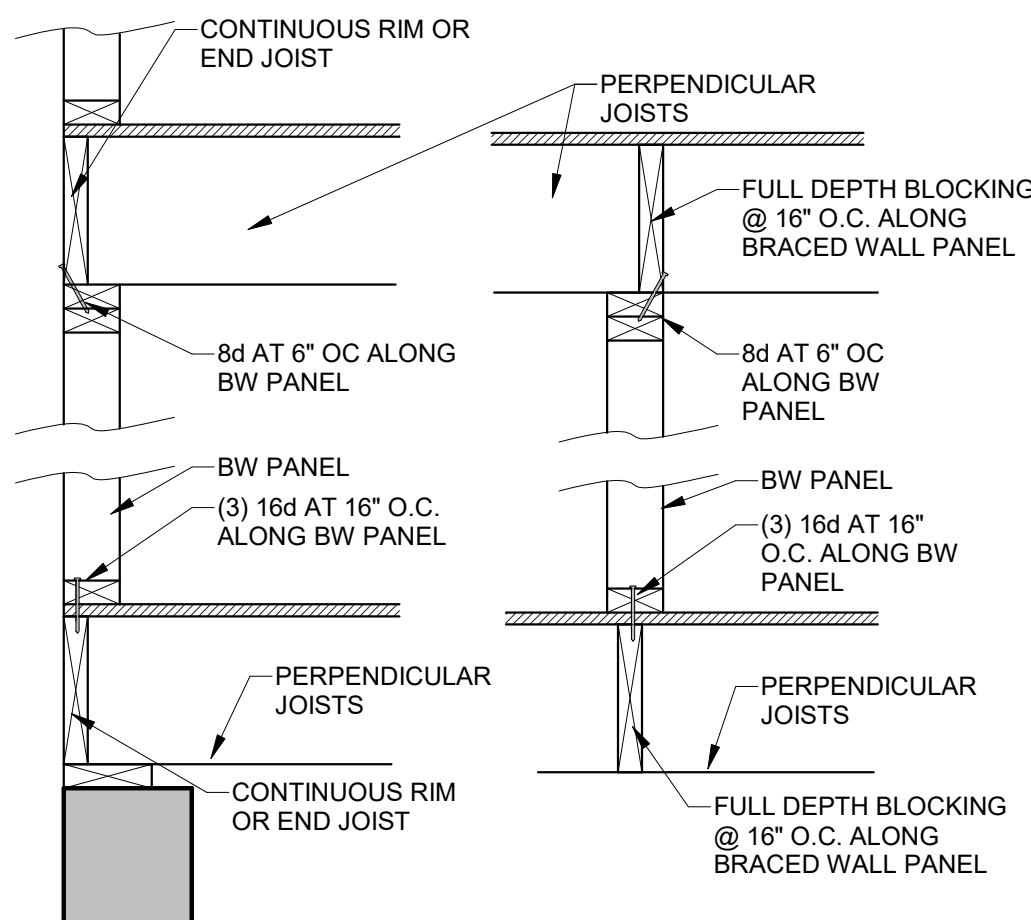
\*NOTES: 1) SEE ATTACHED CALCULATIONS FOR PORTAL FRAME OR PERFORATED SHEAR WALL RESISTANCE CAPACITIES (IF APPLICABLE).  
 2) SEE SHEET S3 FOR INTERIOR STEEL X-BRACE INSTALLATION. 3) INTERIOR WALLS SHEATHED WITH OSB SHALL BE ATTACHED WITH SAME STAPLE/NAILING PATTERN AS EXTERIOR OSB ON SAME FLOOR (SEE TABLE ABOVE) AND ARE ONLY APPLICABLE FOR FULL-HEIGHT SECTIONS OF 2'-0" OR LONGER

| WIND UPLIFT ANALYSIS    |        | WIND UPLIFT PER LINEAL FOOT ALONG EXTERIOR (POUNDS) |                | RESISTANCE DUE TO DEAD WEIGHT & (S) 16d TOP WALLS |                  | UPLIFT OK             |  |
|-------------------------|--------|-----------------------------------------------------|----------------|---------------------------------------------------|------------------|-----------------------|--|
| ROOF PITCH (MAX)        | X12    | DEGREES                                             | ASCE 7         | 33.7                                              |                  |                       |  |
| OVERHANG                | 1      | LENGTH (FT.)                                        | PRESSURE (PSF) | 1.98                                              | LINEAL FT. OF GH | UPLIFT PER FT. (LBS.) |  |
| MAIN ROOF**             | 266.86 | TOTAL AREA (FT <sup>2</sup> )                       | 233.66         | 1.98                                              | 233.66           | 467                   |  |
| ALONG PERIMETER         |        | 266.86                                              | 233.66         | 1.98                                              | 233.66           | 467                   |  |
| WINDSIDE EXTERIOR WALLS |        |                                                     |                |                                                   |                  |                       |  |

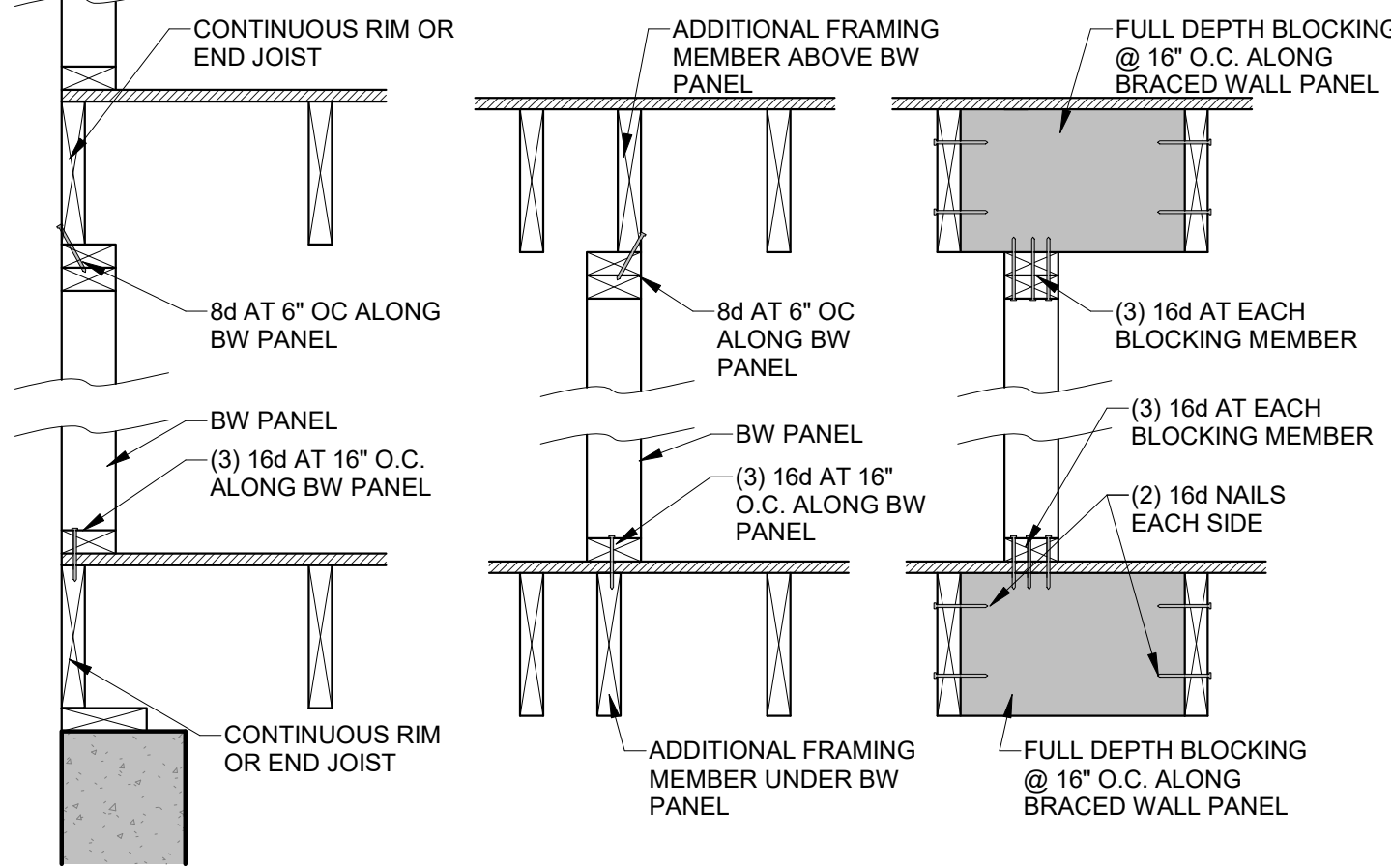
NOTE FOR CONSTRUCTION:  
 THE CONTINUOUS STRUCTURAL PANEL SHEATHING BRACING METHOD REQUIRES USE OF THE ABOVE TABLE FOR SHEATHING OF THE ENTIRE STRUCTURE. IN ADDITION, FRAMING MEMBERS SHALL BE @ 16" O.C. MAX. UNBLOCKED, AND W/ SHEATHING APPLIED DIRECTLY TO FRAMING MEMBERS

NOTE FOR DESIGN:  
 ALL WALLS USED IN THE CALCULATION OF THE RESISTANCE FOR THIS STRUCTURE SHALL HAVE A MINIMUM UNINTERRUPTED HEIGHT OF 8'-0" AND LENGTH OF 2'-0". ALLOWABLE RESISTANCES HAVE BEEN #/FT AND INCREASED BY 40% FOR WIND LOADS, PER VALUES IN 2012 IBC SECTION 2006 AND AFAPA SDPWS TABLE 4.3A. FOR EXAMPLE, 7/16" APA-RATED SHEATHING WITH 8d @ 6" & 12" HAS A SEISMIC SHEAR VALUE OF 221 A WIND SHEAR VALUE OF 350#/FT. 40% GREATER THAN THAT OF SEISMIC

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



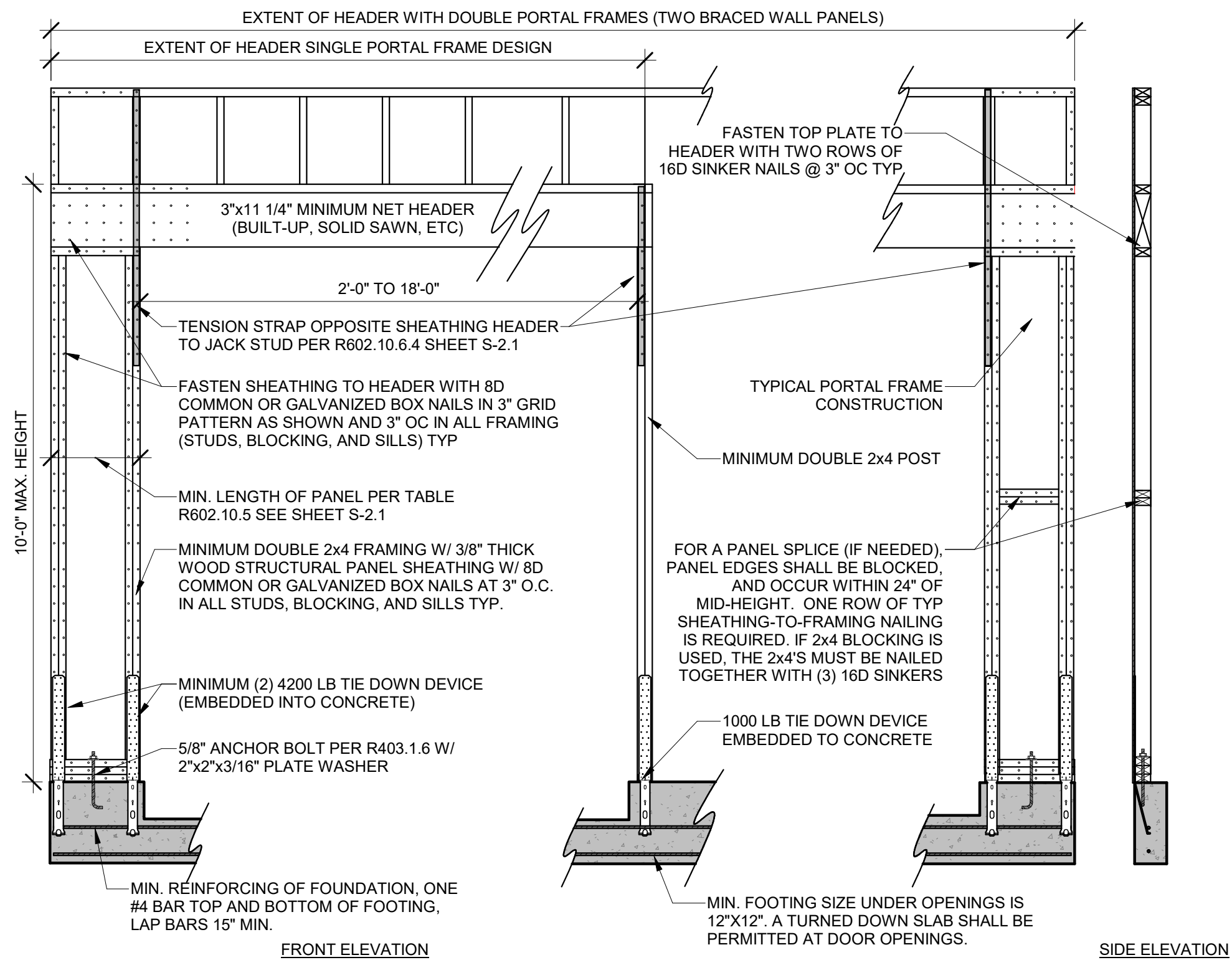
**BRACED WALL PANEL CONNECTION WHEN PERPENDICULAR TO FLOOR/CEILING JOISTS**



**BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING JOISTS**

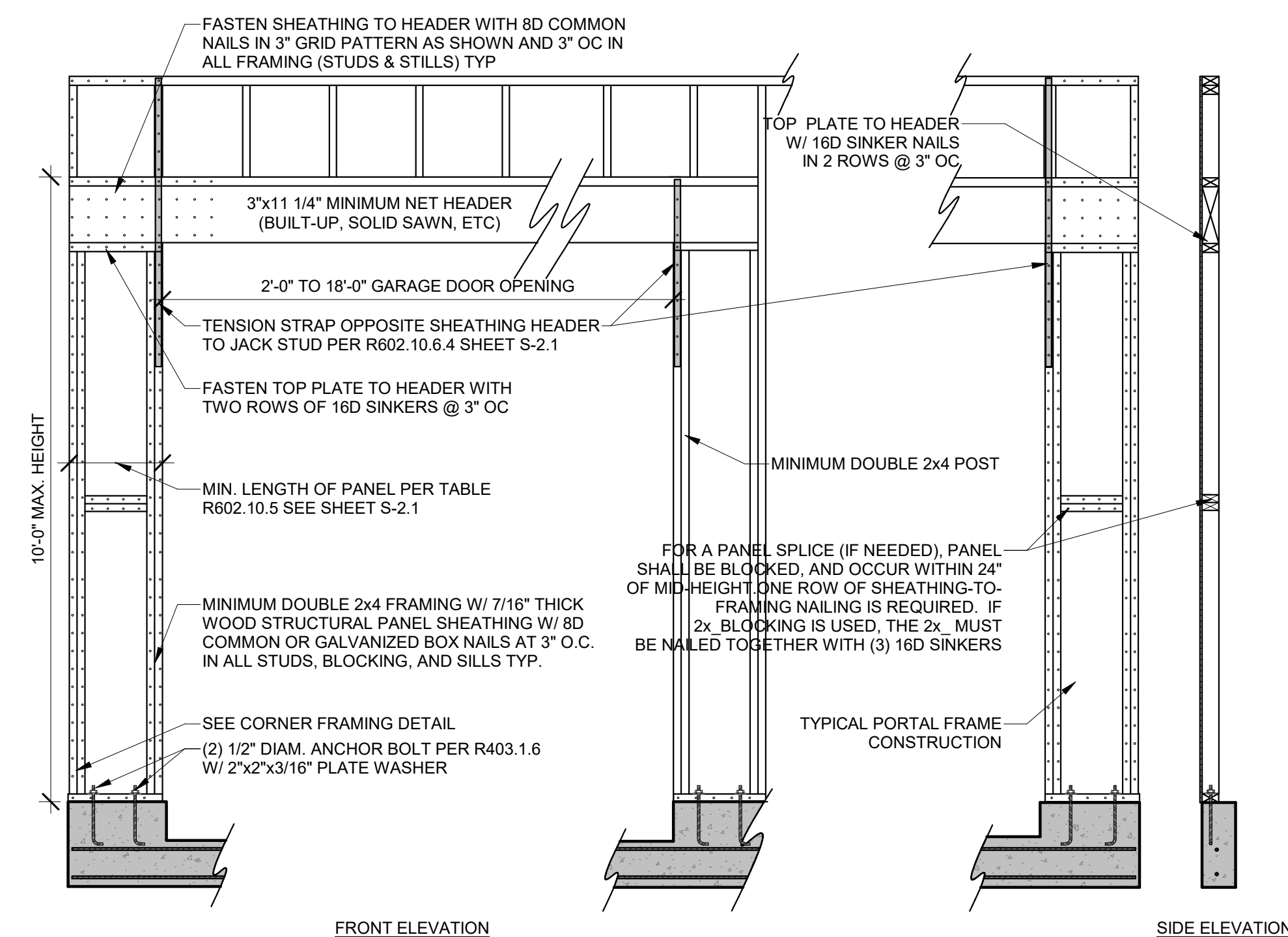
### 3 BRACED WALL PANEL CONNECTIONS

1" = 1'-0"



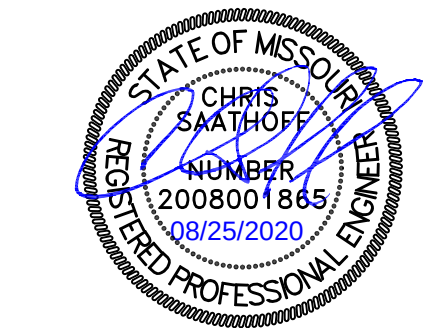
### 1 PFH PORTAL FRAME W/ HOLD DOWNS (R602.10.6.2)

1/2" = 1'-0"



### 2 PFG PORTAL FRAME W/OUT HOLD DOWNS (R602.10.6.3)

1/2" = 1'-0"



## CARDINAL CREST HOMES

AVERY REV. CUSTOM W/BONUS RM PATTON RESID.  
 3209 SW MARY ST. LEE'S SUMMIT, MO

STRUCTURAL DETAILS & NOTES

HD#: 39841

DATE: 08/25/2020

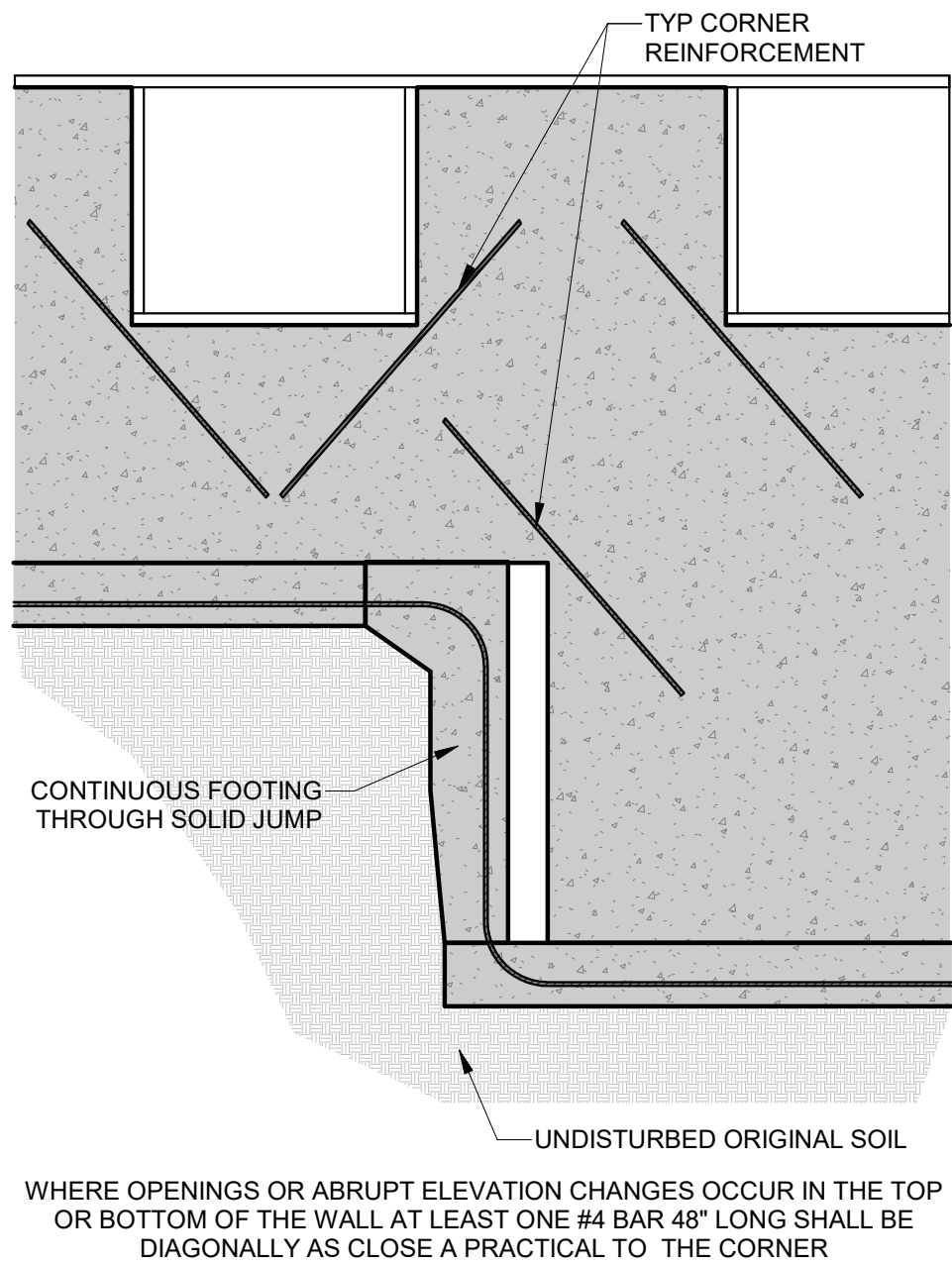
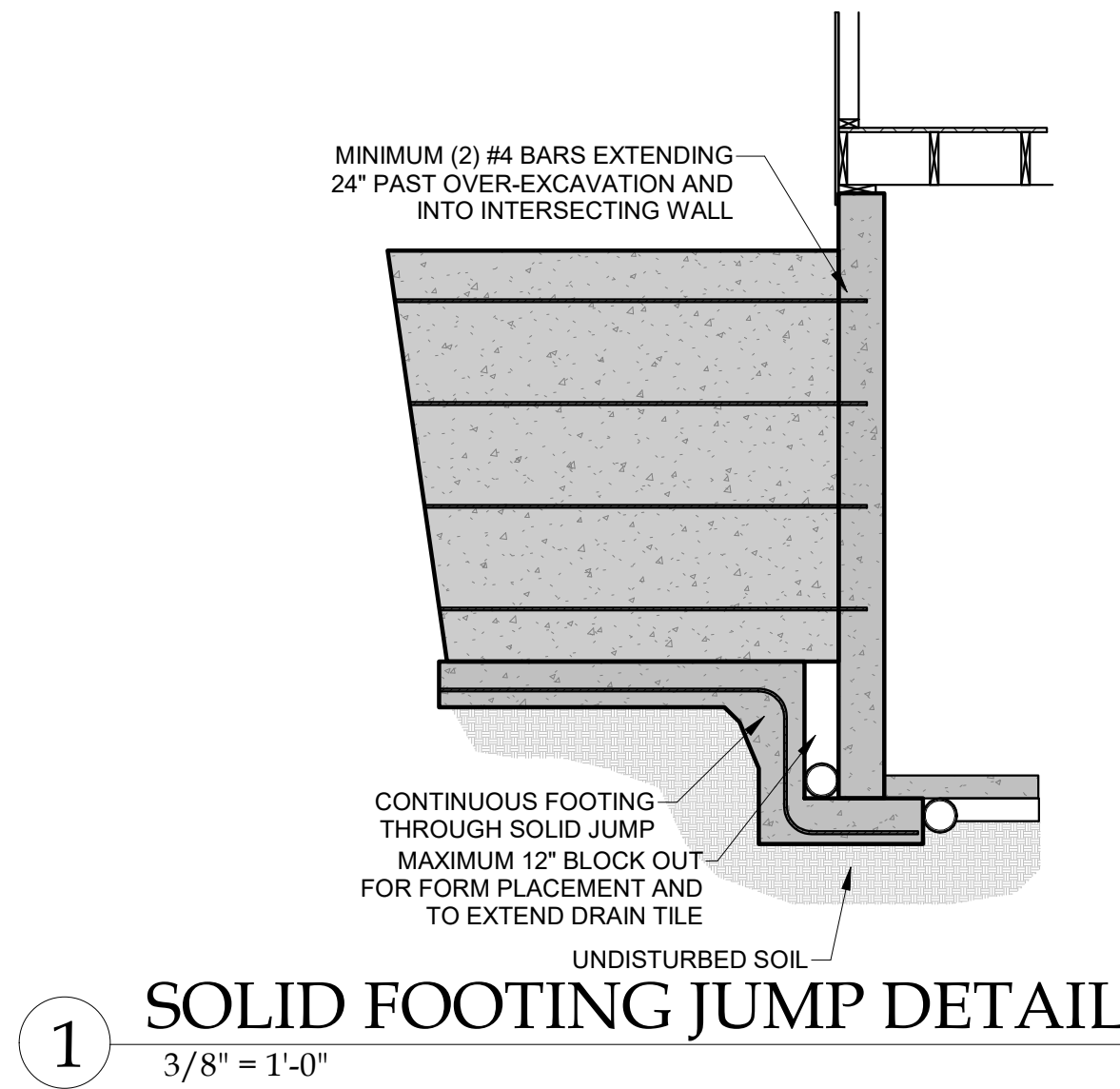
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| NO. | ISSUE/REVISION | Revision Date |
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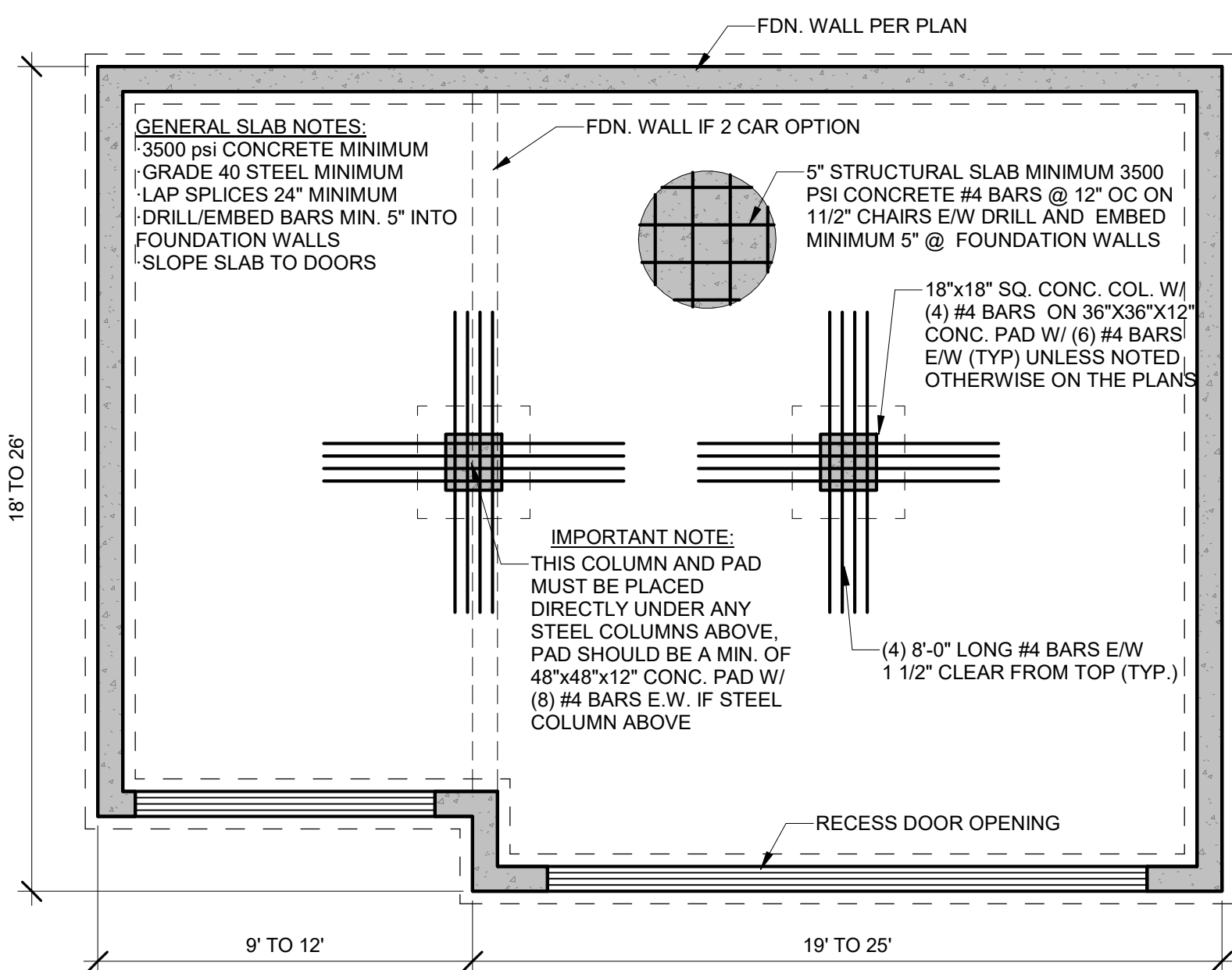
BRACED WALL NOTES & DETAILS

# S-2.0

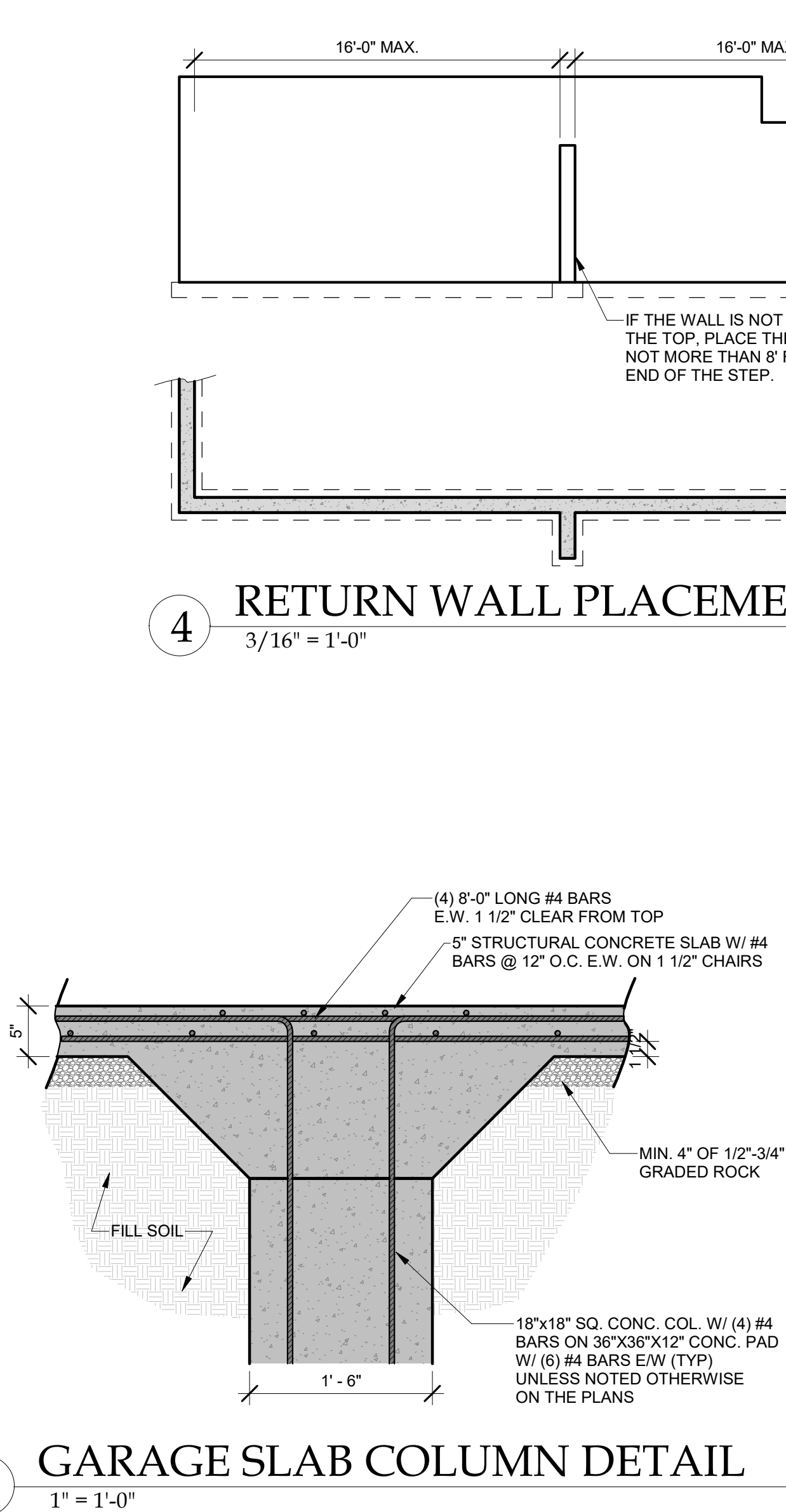




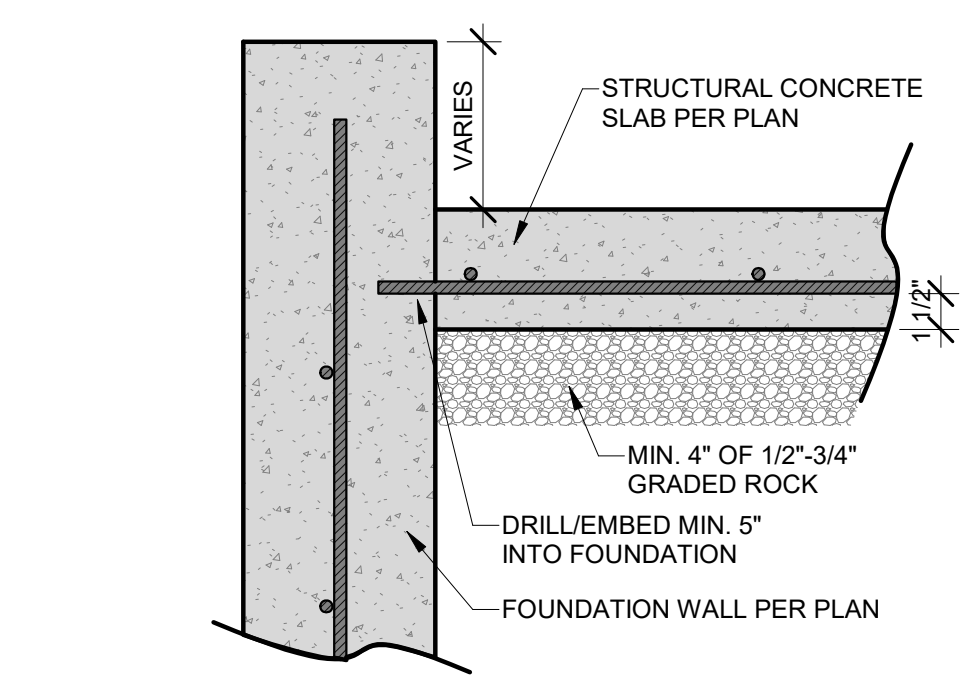
9 REINFORCEMENT AT CORNERS AND STEPS  
1/2" = 1'-0"



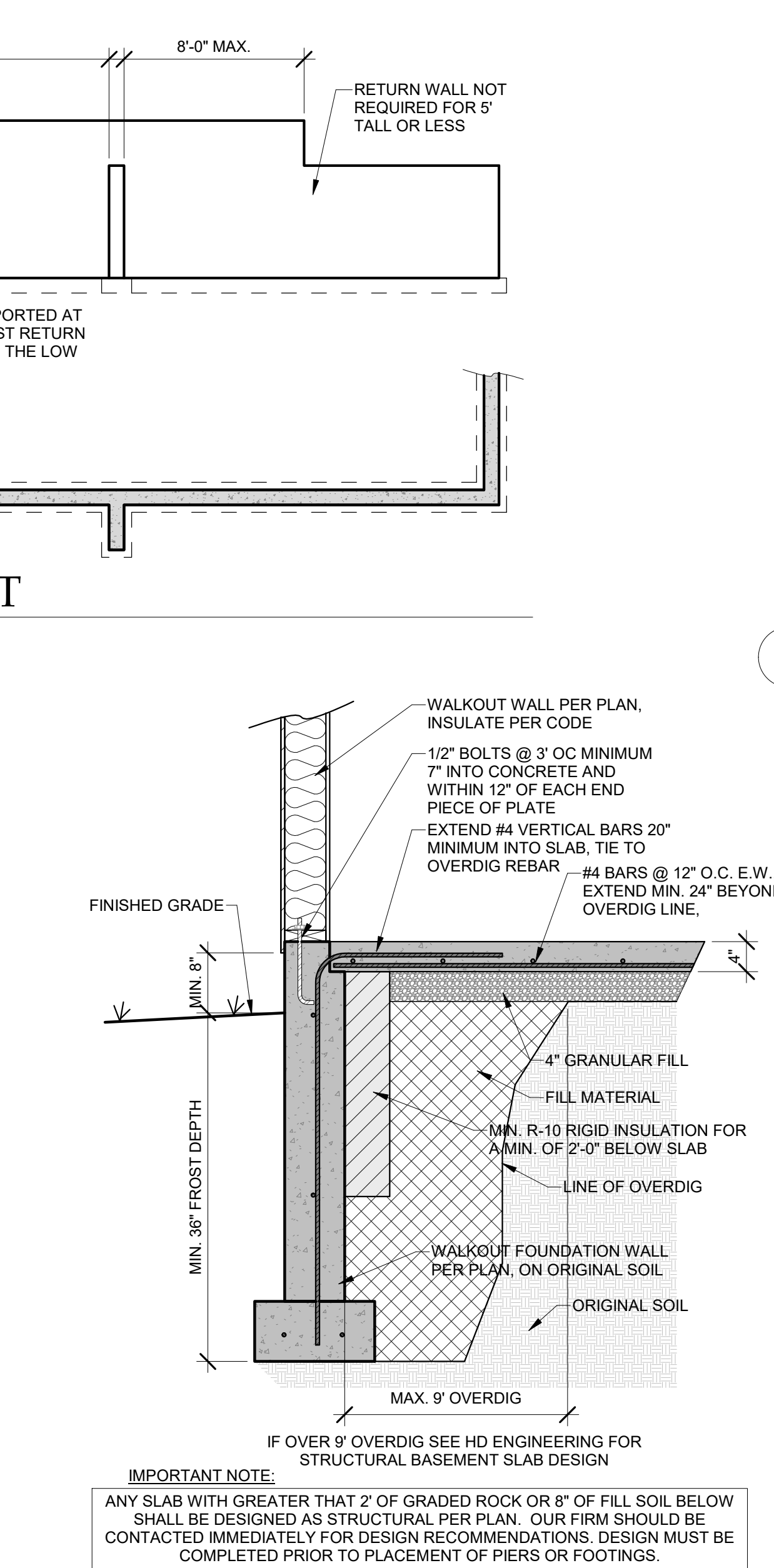
5 TYPICAL GARAGE SLAB  
1/4" = 1'-0"



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



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

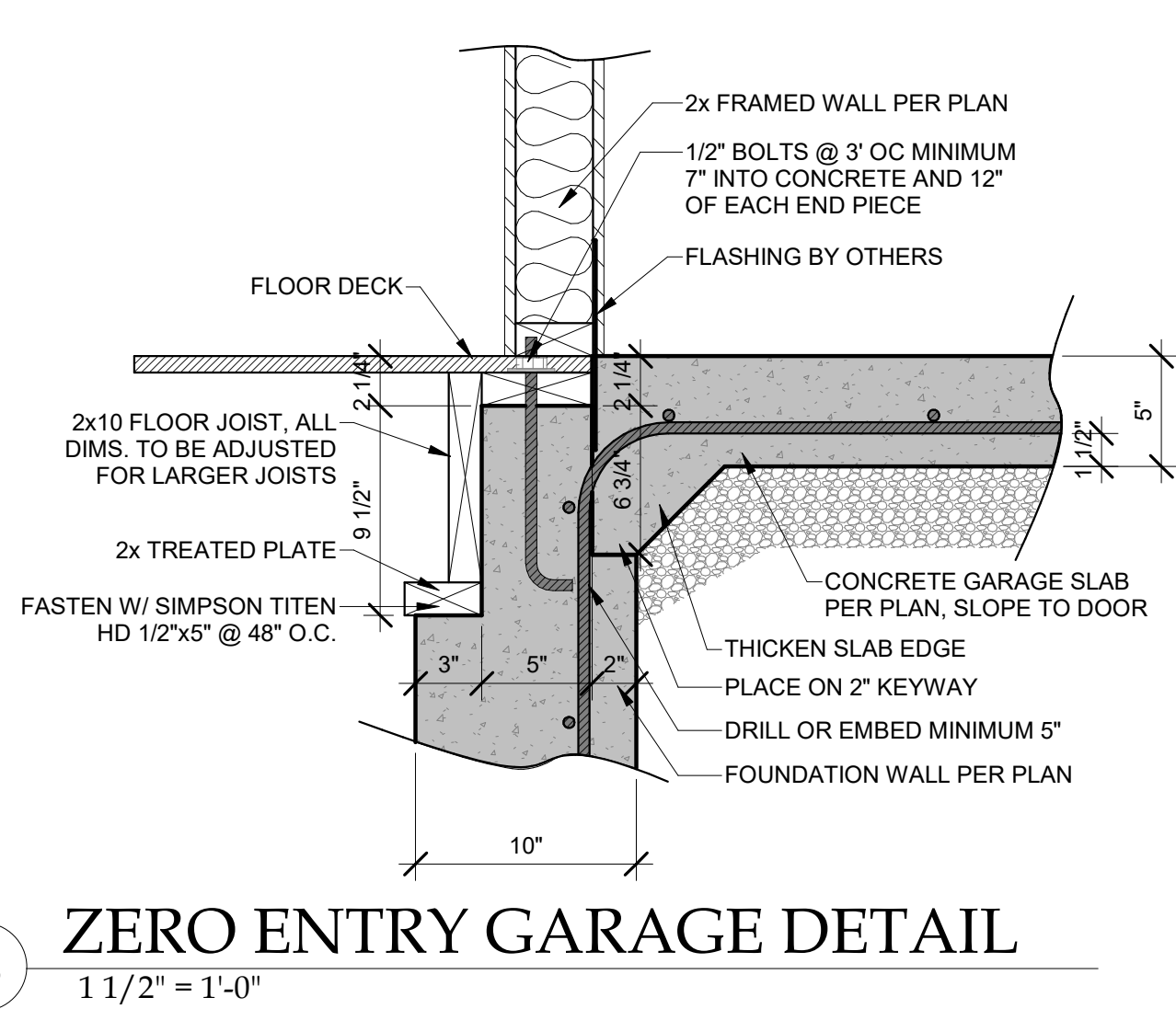


10 WALKOUT DETAIL  
3/4" = 1'-0"

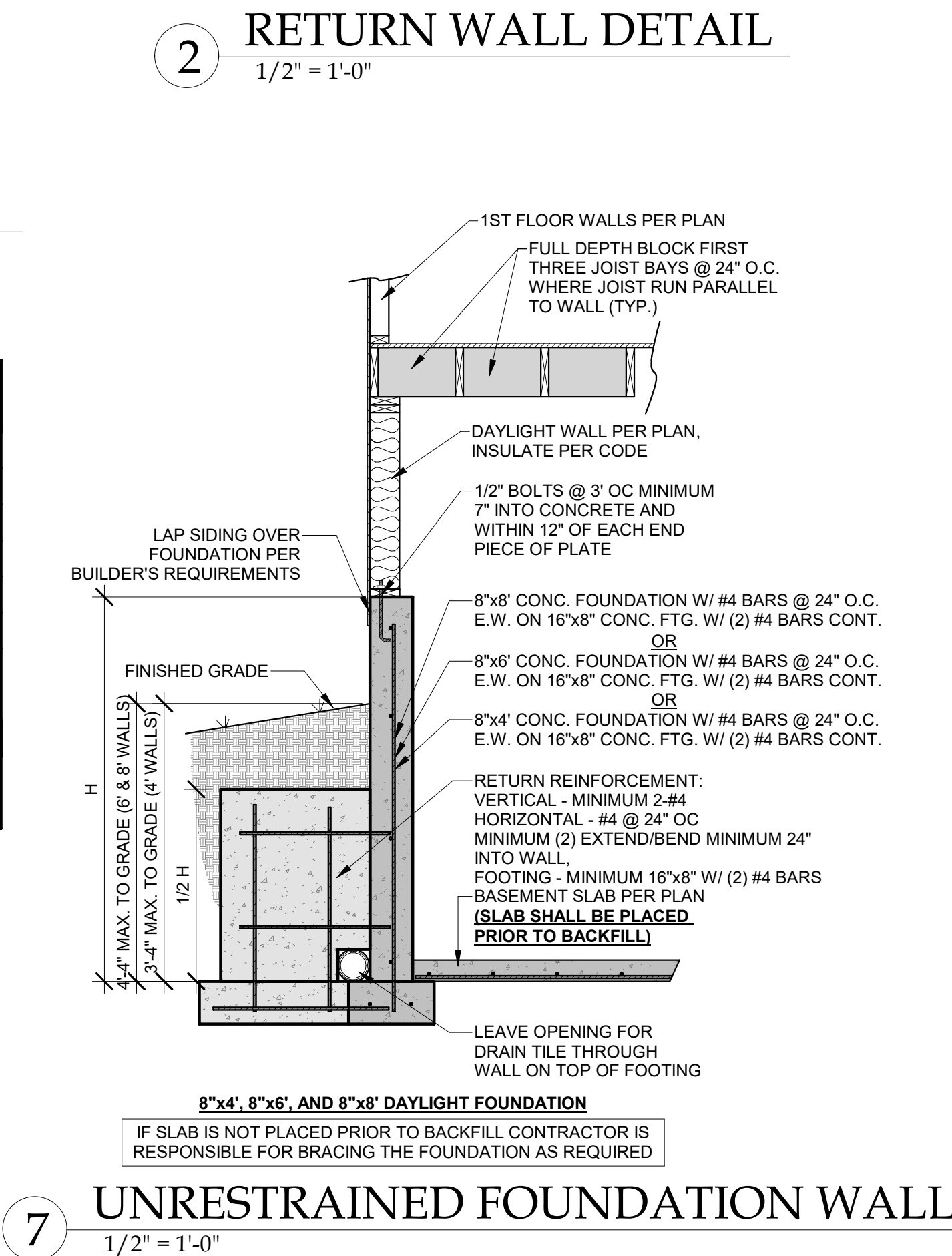
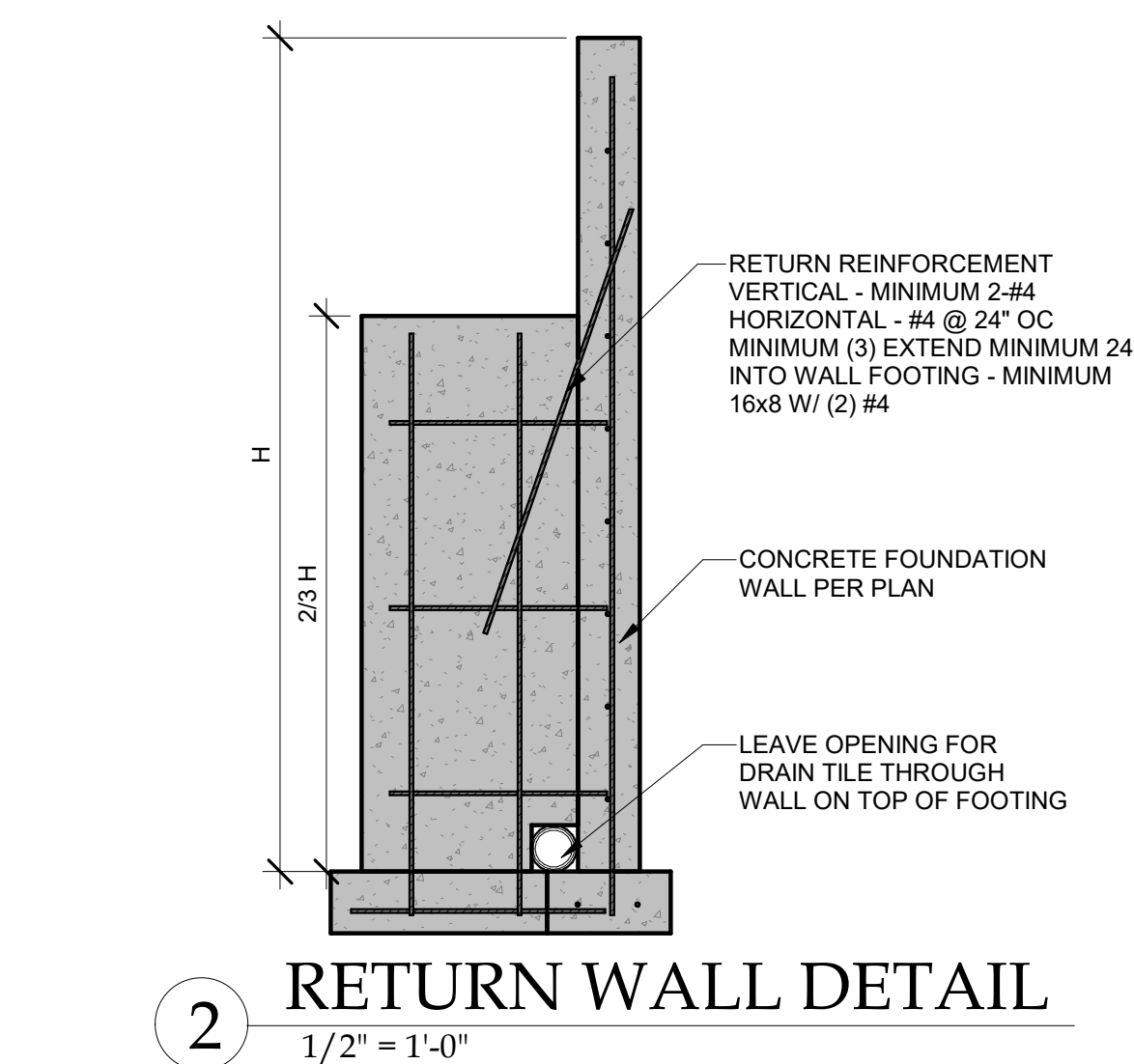
| VERTICAL REINFORCEMENT SPACING*<br>60 PSF SOIL; 40 & 60 KSI STEEL |               |       |                |       |       |
|-------------------------------------------------------------------|---------------|-------|----------------|-------|-------|
| CONCRETE STRENGTH                                                 | 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;<br>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



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



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

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CARDINAL CREST HOMES  
AVERY REV. CUSTOM W/BONUS RM PATTON RESID.  
3209 SW MARY ST. LEE'S SUMMIT, MO

STRUCTURAL DETAILS & NOTES

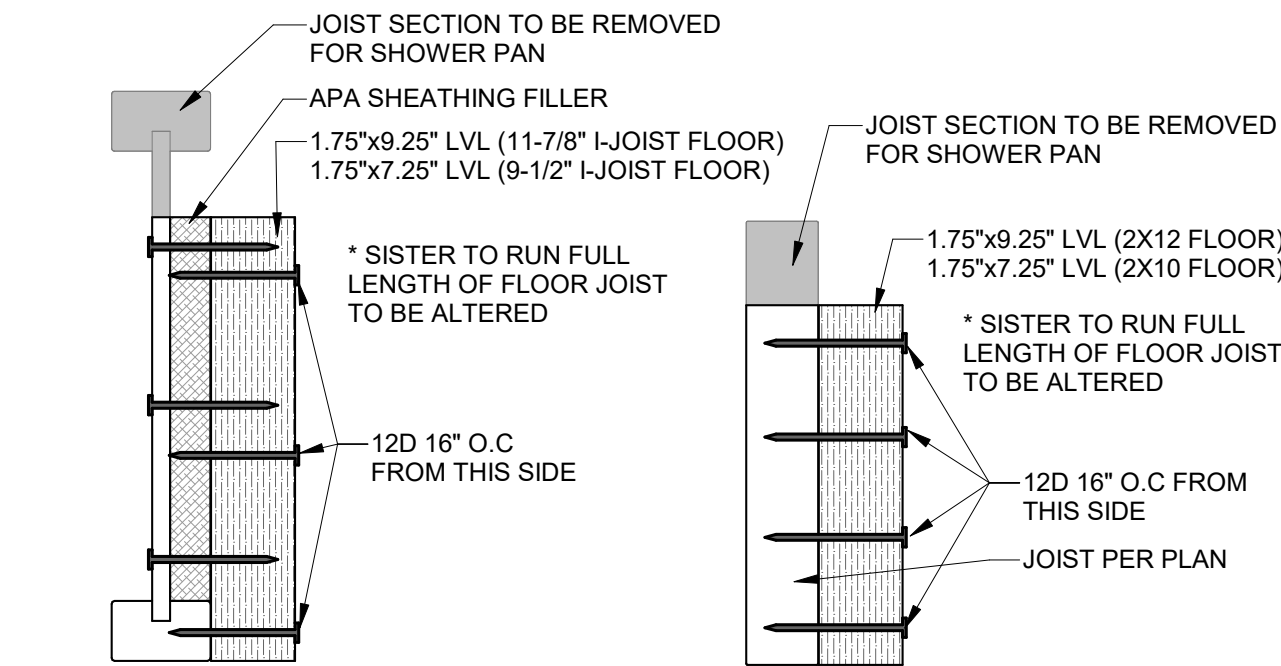
| HD#:        | 39841          |               |
|-------------|----------------|---------------|
| DATE:       | 08/25/2020     |               |
| CHECKED BY: | CLS            |               |
| NO.         | ISSUE/REVISION | Revision Date |
|             |                |               |
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|             |                |               |
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CONCRETE DETAILS

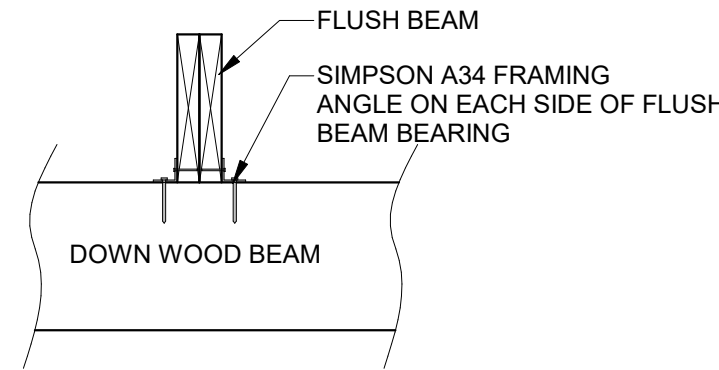
S-3.0

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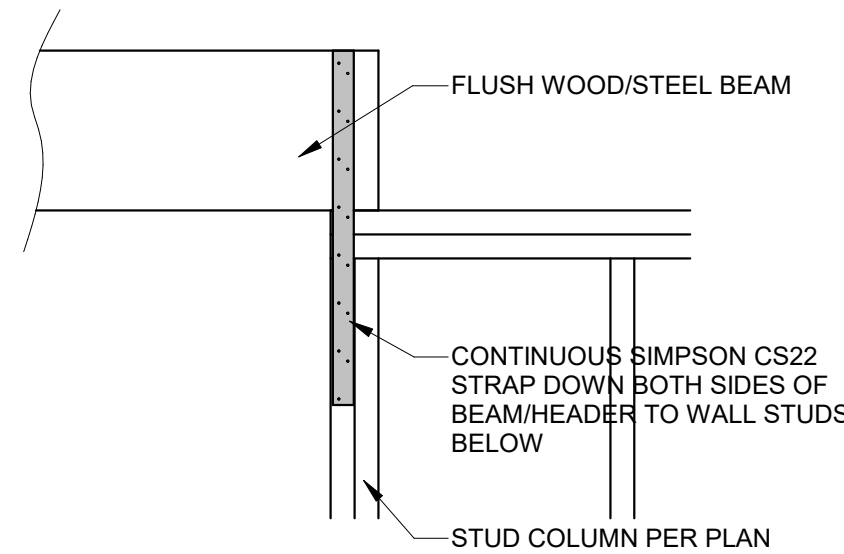




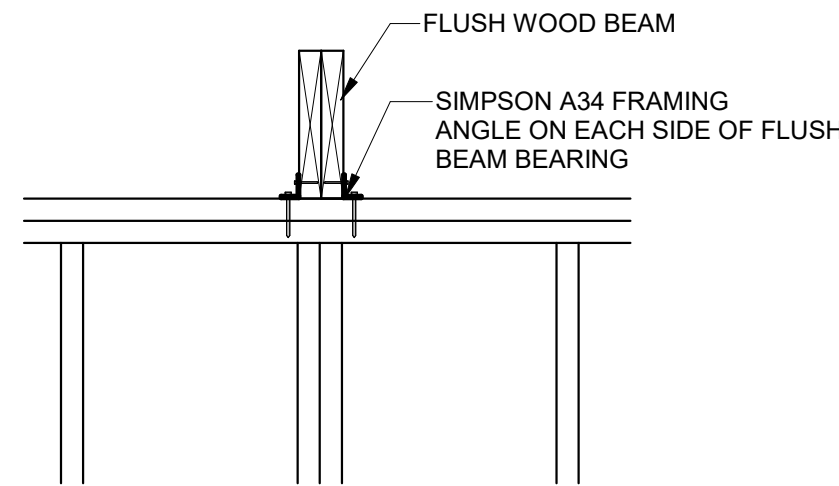
10 ZERO ENTRY SHOWER DETAIL  
1/4" = 1'-0"



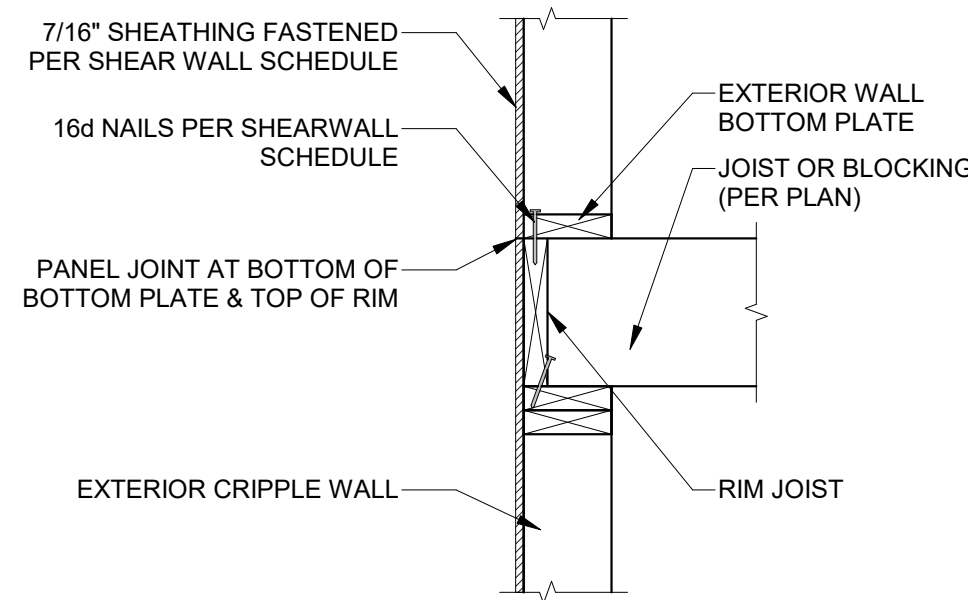
9 WOOD TO WOOD STACKED CONNECTION  
1" = 1'-0"



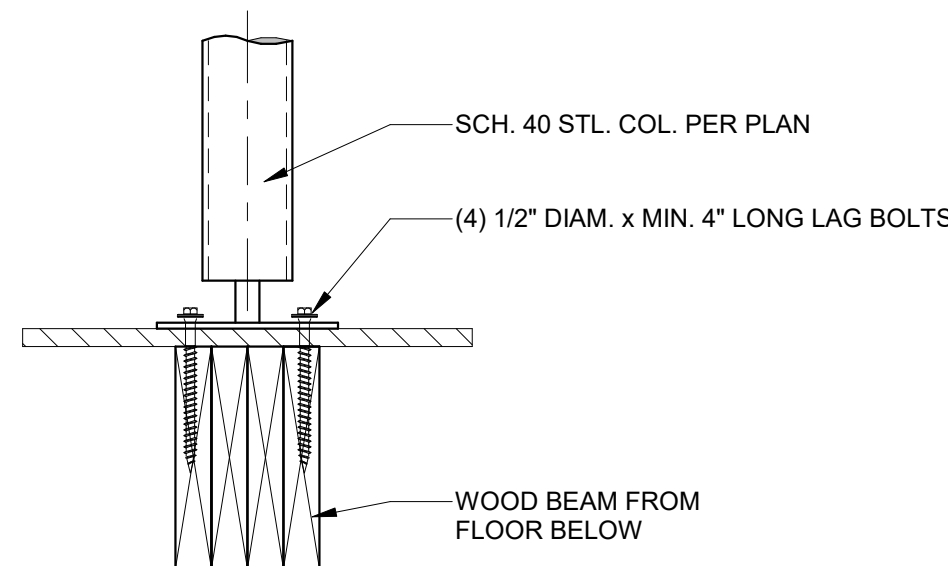
8 UPSET WOOD/STEEL PARALLEL TO WALL  
1" = 1'-0"



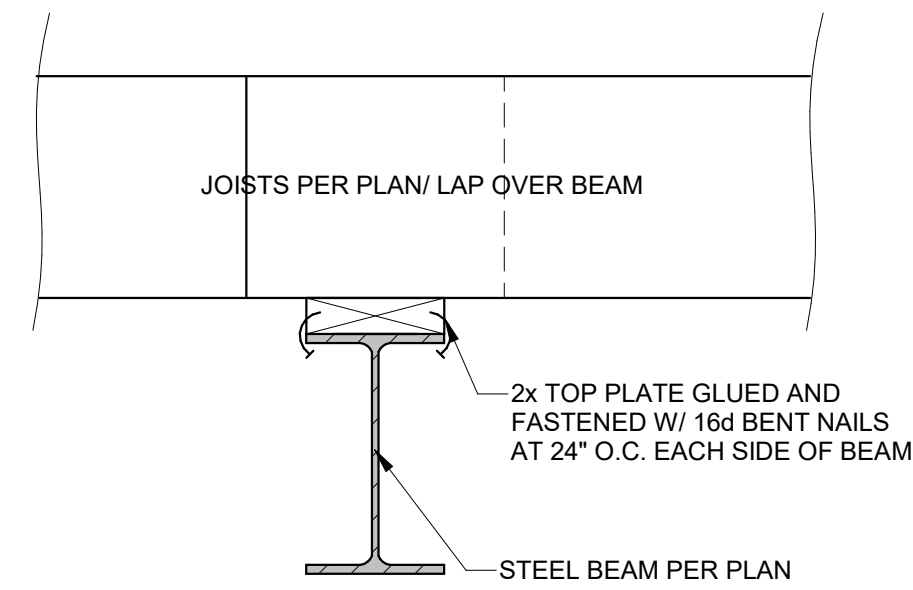
7 UPSET WOOD PERPENDICULAR TO WALL  
1" = 1'-0"



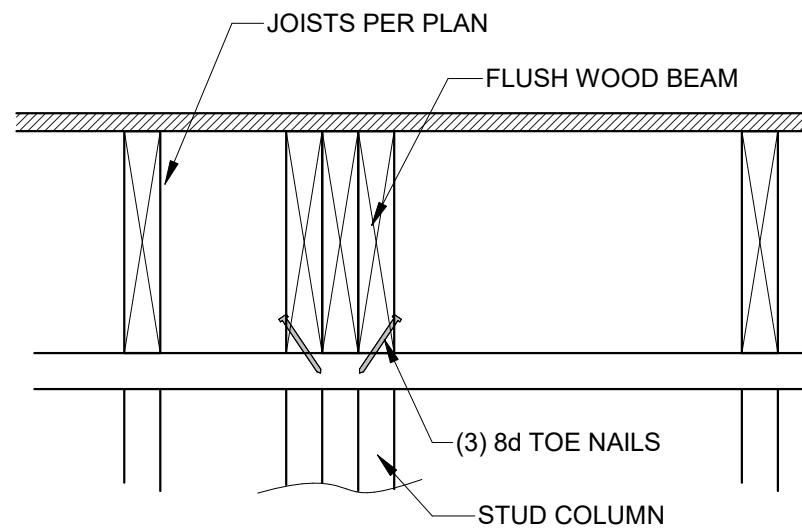
11 SHEATHING JOINT LOCATION  
1" = 1'-0"



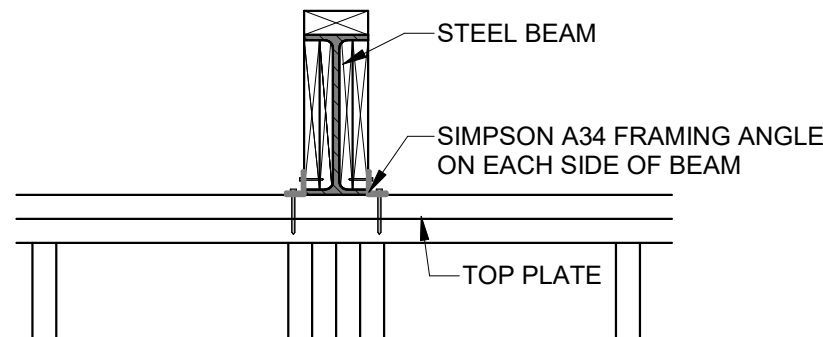
6 STEEL COLUMN TO WOOD FLOOR  
1 1/2" = 1'-0"



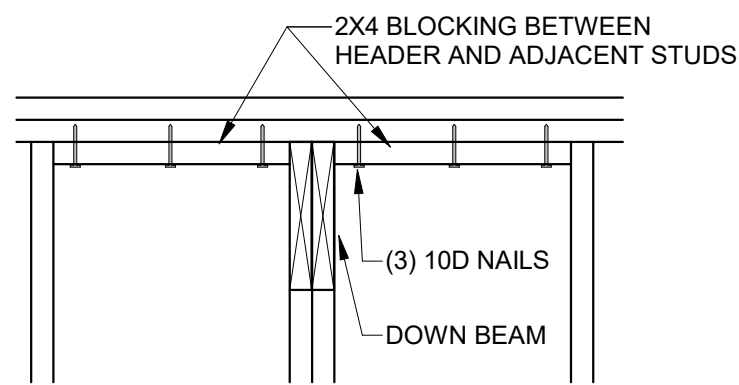
5 STEEL BEAM TO WOOD PLATE  
1 1/2" = 1'-0"



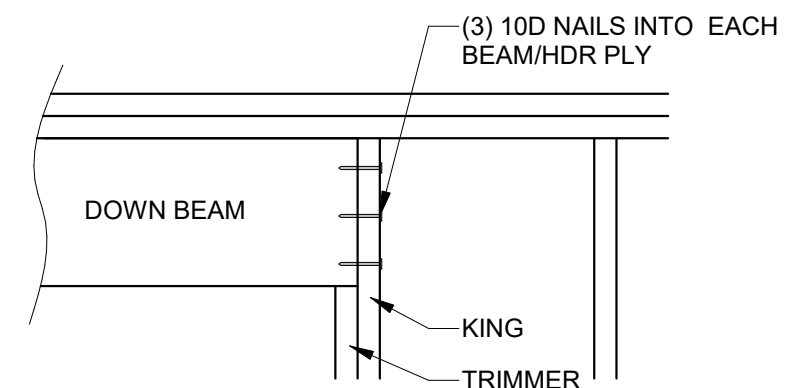
4 FLUSH WOOD BEAM CONNECTION  
1 1/2" = 1'-0"



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"

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|     |                |               |
|     |                |               |
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GENERAL DETAILS

S-4.0