

# A PLUS CARPORTS

## STRUCTURAL DESIGN

## ENCLOSED BUILDING

**MAXIMUM 30'-0" WIDE X 20'- 0" EAVE HEIGHT-  
BOX EAVE FRAME AND BOW FRAME**

**11 November 2020  
Revision 0  
M&A Project No. 20209S**

**Prepared for:**

**A Plus Carports, LLC  
4297 Hwy 268 East  
Pilot Mountain, NC 27041**

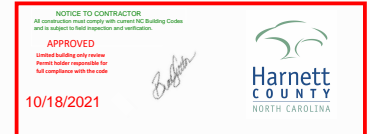
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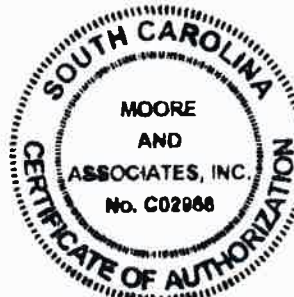
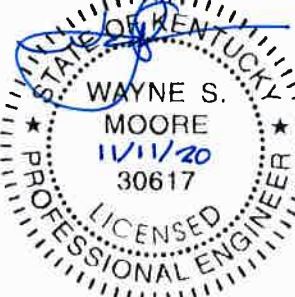

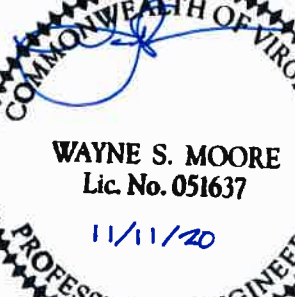




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**PROJECT MGR:** WSM  
**CLIENT:** A PLUS

**A PLUS CARPORTS, LLC**  
4297 HWY 268 EAST  
PILOT MOUNTAIN, NC 27041  
30'-0" x 20'-0" ENCLOSED STRUCTURE

**DATE:** 11-11-20  
**SCALE:** NTS  
**JOB NO:** 20209S  
**SHT.** 1  
**DWG. NO:** SK-3  
**REV:** 0

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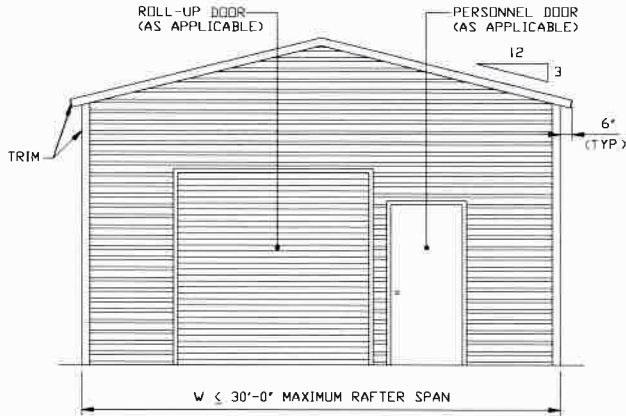
## INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR MAXIMUM 30'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2018 NORTH CAROLINA BUILDING CODE (NCBC), 2018 INTERNATIONAL BUILDING CODE (IBC), 2015 IBC AND 2012 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
  - A) DEAD LOAD = 115 PSF
  - B) LIVE LOAD = 20 PSF
  - C) GROUND SNOW LOAD = 25 PSF

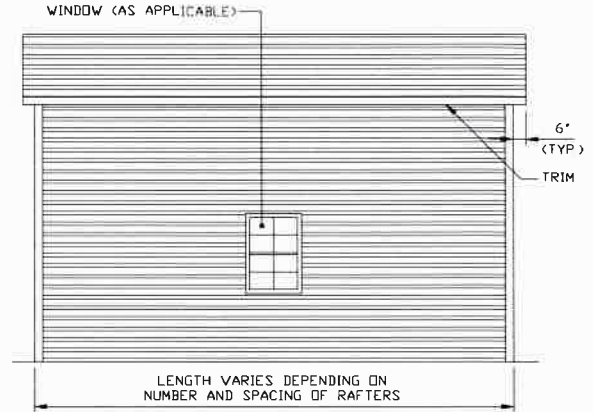
NOTE: UNBALANCED SNOW LOAD DUE TO DRIFTING HAS NOT BEEN EVALUATED.
4. 3-SECOND GUST ULTIMATE WIND SPEED ( $V_{ULT}$ ) =  $\leq$  155 MPH (NOMINAL WIND SPEED =  $\leq$  120 MPH).
5. MAXIMUM RAFTER/POST AND END POST SPACING = 4.0 FEET (UNLESS NOTED OTHERWISE).
6. END WALL COLUMNS (POSTS) ARE EQUIVALENT TO SIDE WALL POSTS IN SIZE AND SPACING (UNLESS NOTED OTHERWISE).
7. RISK CATEGORY I/II.
8. WIND EXPOSURE CATEGORY B/C.
9. SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2 1/2" x 2 1/2" - 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS (UNLESS NOTED OTHERWISE), TS 2 1/4" x 2 1/4" - 12 GAUGE MAY BE USED AS OPTIONAL FRAMING MEMBERS.
10. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 10" O.C. (MAX.) FOR RC I AND 8" O.C. (MAX.) FOR RC II.
11. FASTENERS CONSIST OF #12-14x3/4" SELF-DRILLING FASTENER (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MEAN ROOF HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14° (3:12 PITCH) OR LESS SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR SLOPES MAY VARY. ROOF SLOPES LESS THAN 3:12 REQUIRE USE OF LAP JOINT SEALANT.
12. ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6" OF EACH COLUMN.
13. STANDARD GROUND ANCHORS (SOIL NAILS) CONSIST OF #4 REBAR W/ WELDED NUT x 36" LONG AND MAY BE USED IN SUITABLE SOILS. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED. SOIL NAILS MAY ONLY BE USED FOR WIND SPEEDS  $\leq$  145 MPH. COORDINATE WITH LOCAL CODES/ORDINANCES REGARDING MINIMUM LENGTH FOR FROST DEPTH PROTECTION.
14. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:  
 SOIL SITE CLASS = D  
 RISK CATEGORY I/II  
 $R = 3.25$                        $I_E = 10$   
 $S_{DS} = 2.039 g$                $V = C_S W$   
 $S_{DI} = 1.258 g$
15. MAXIMUM THRESHOLD HEIGHT FOR PERSONNEL DOORS USED FOR MEANS OF EGRESS IN RC II STRUCTURES IS 1/2".

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**BOX EAVE FRAME RAFTER STRUCTURE**

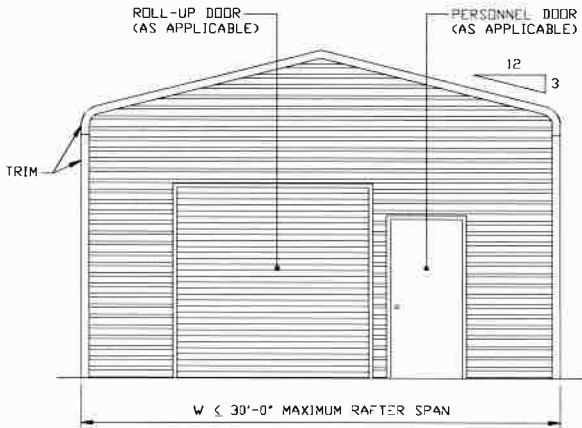


**TYPICAL END ELEVATION**  
SCALE: NTS

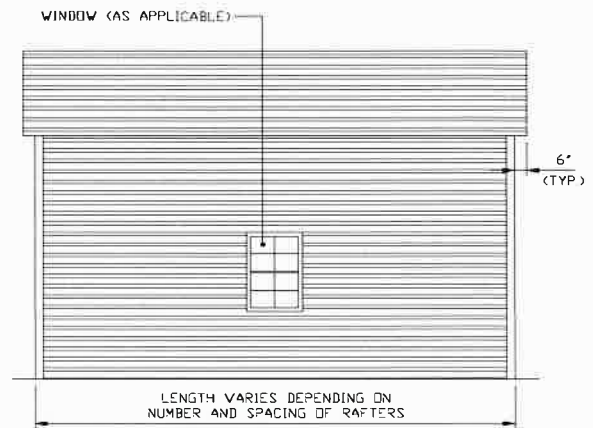


**TYPICAL SIDE ELEVATION**  
SCALE: NTS

**BOW EAVE FRAME RAFTER STRUCTURE**



**TYPICAL END ELEVATION**  
SCALE: NTS



**TYPICAL SIDE ELEVATION**  
SCALE: NTS

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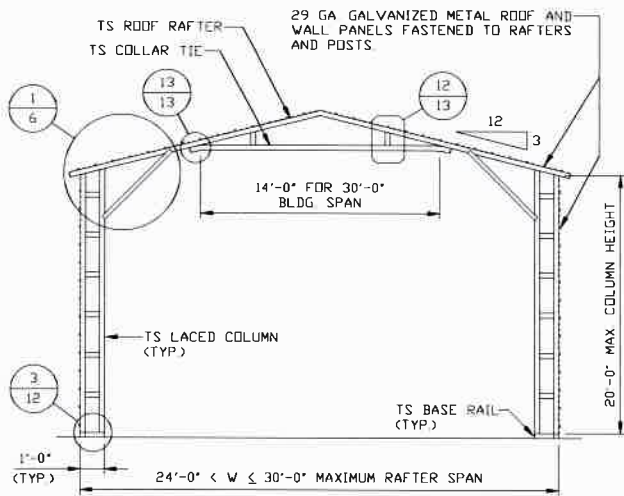
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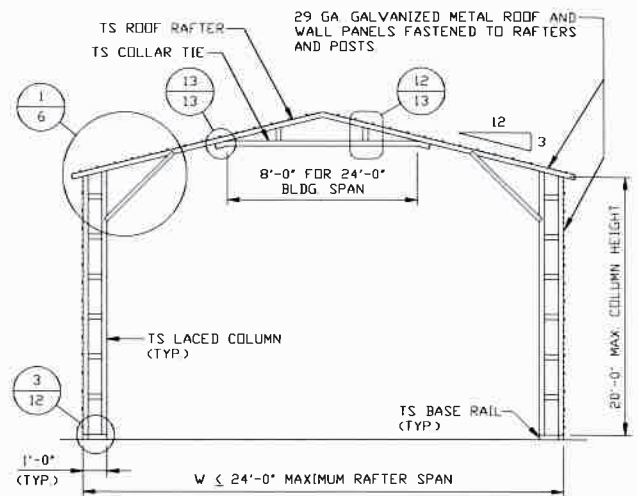
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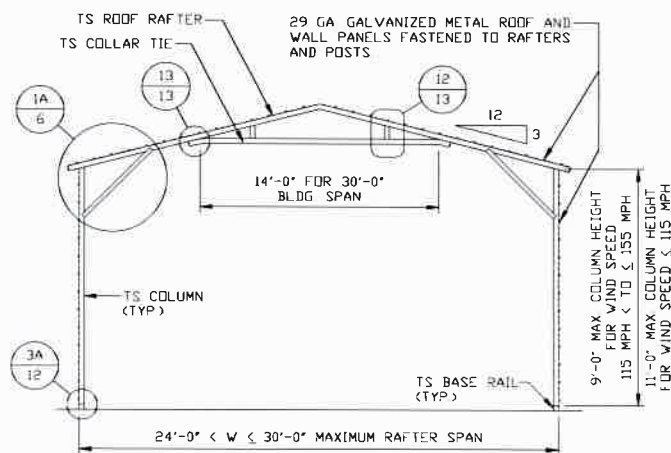
**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



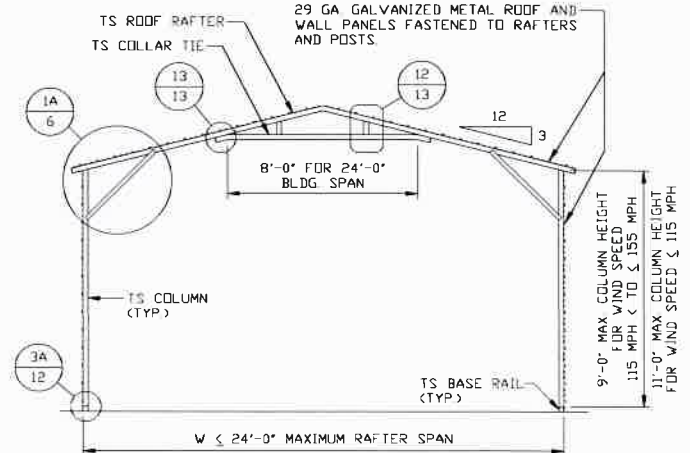
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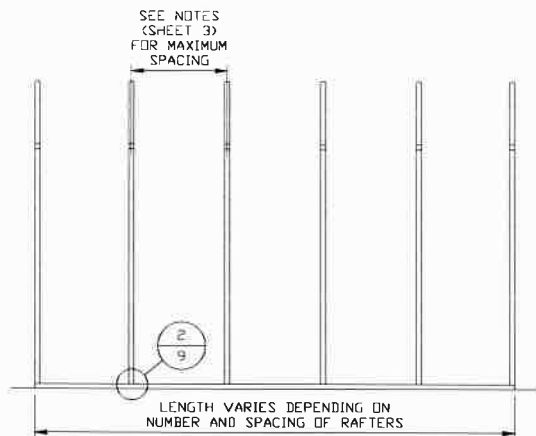
**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION**

SCALE: NTS

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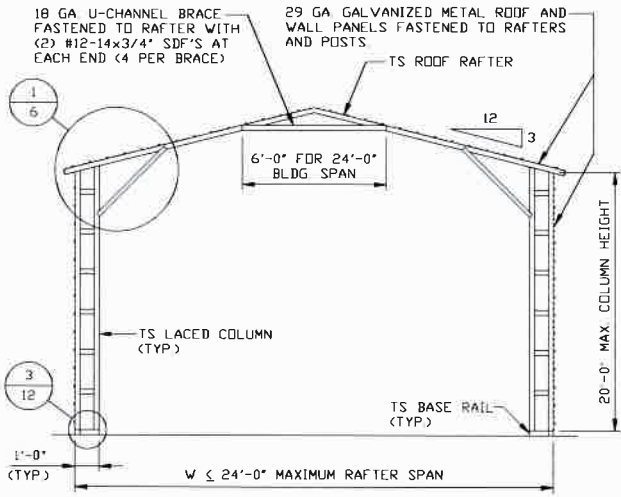
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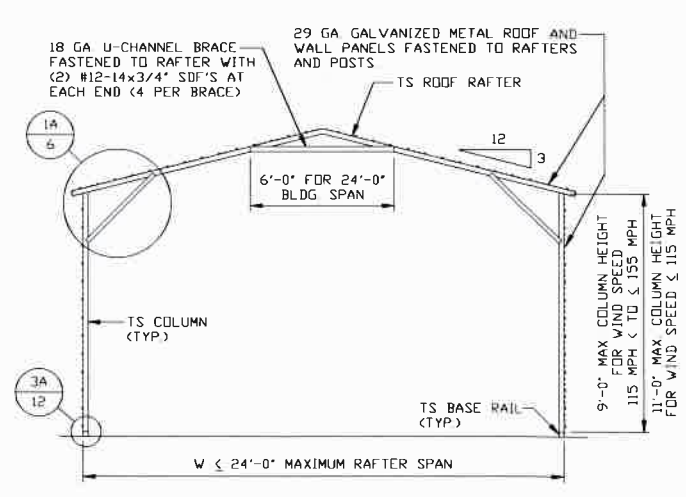
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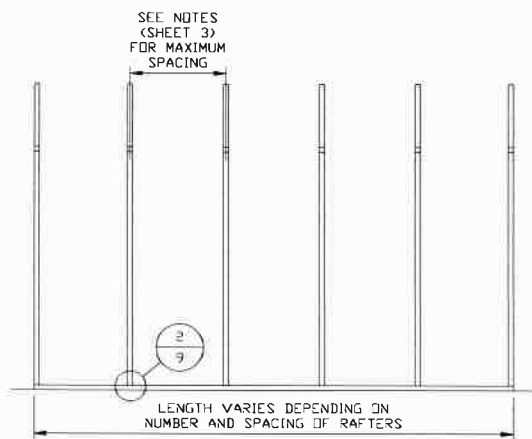
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS

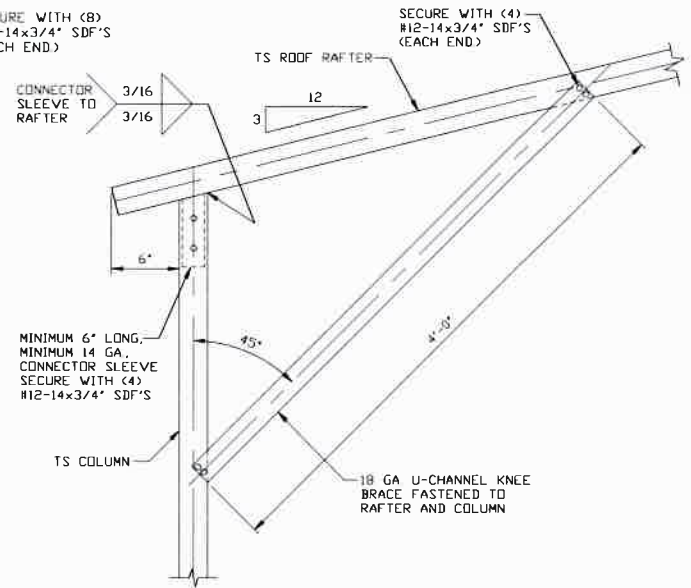
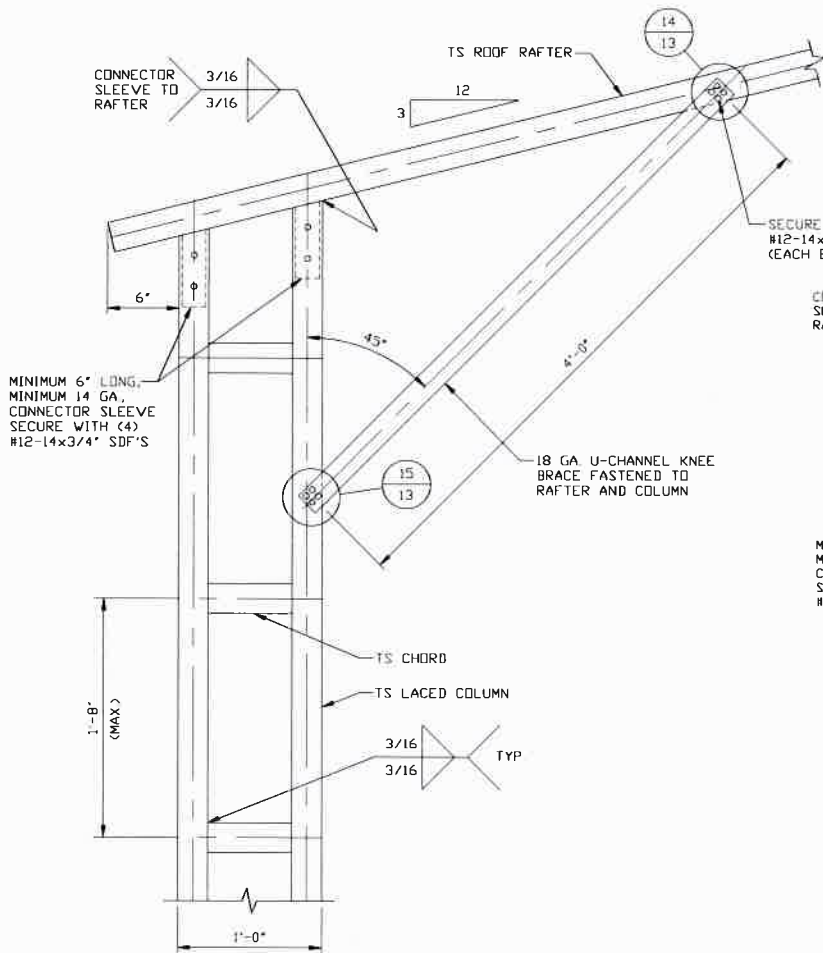


**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION**  
SCALE: NTS

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	<b>CLIENT:</b> A PLUS	<b>SHT.</b> 5A	<b>DWG. NO:</b> SK-3	<b>REV.:</b> 0

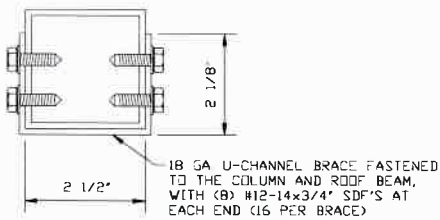


**BOX EAVE RAFTER COLUMN CONNECTION DETAIL**  
 HEIGHTS  $\leq 9'-0"$  FOR WIND SPEED  $115 \text{ MPH} < \text{TO} \leq 155 \text{ MPH}$   
 HEIGHTS  $\leq 11'-0"$  FOR WIND SPEED  $\leq 115 \text{ MPH}$

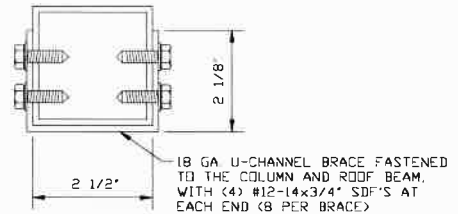
1A

SCALE: NTS  
 NOTE: 3'-0" KNEE BRACE MAY BE USED FOR BUILDING WIDTH  $\leq 24'-0"$

**1 BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS  $9'-0" < \text{TO} \leq 20'-0"$**   
 SCALE: NTS



**BRACE SECTION**  
 SCALE: NTS



**BRACE SECTION**  
 SCALE: NTS

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SCALE: NTS

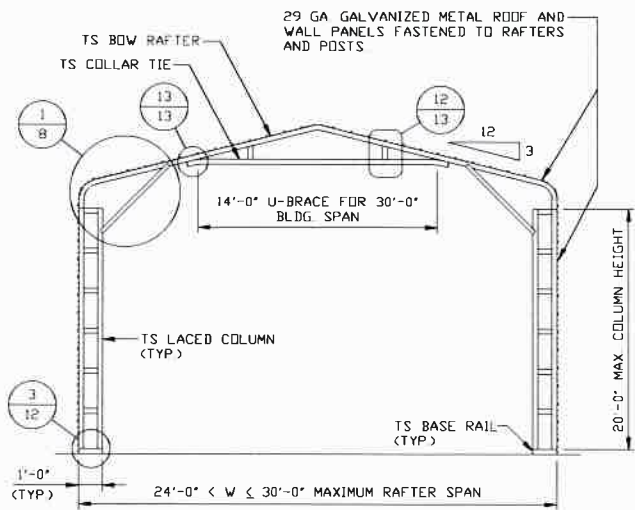
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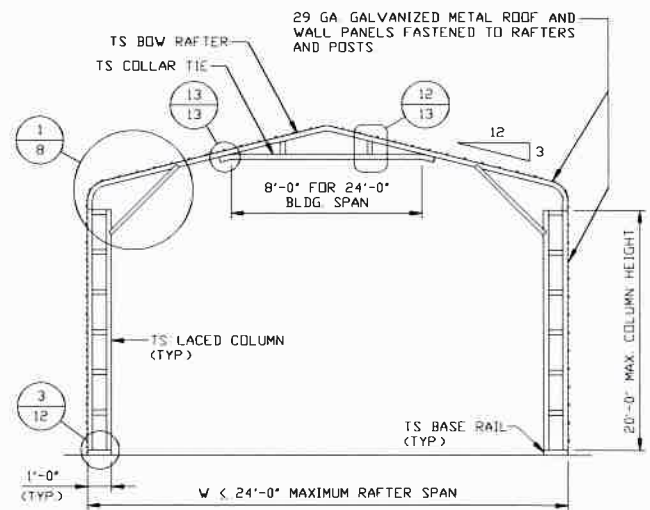
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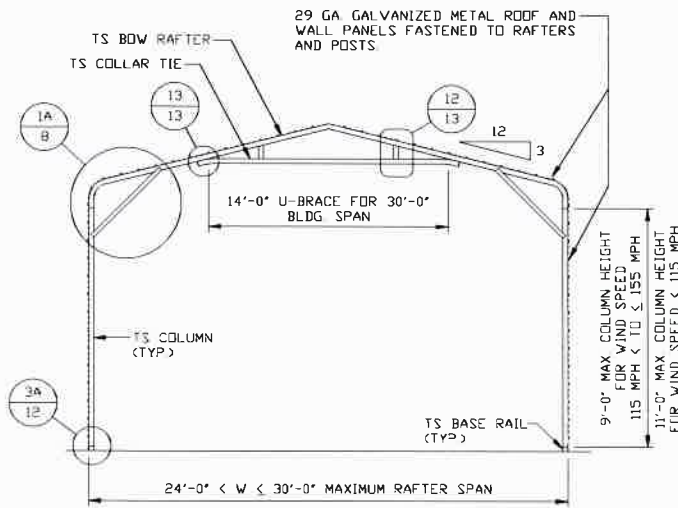




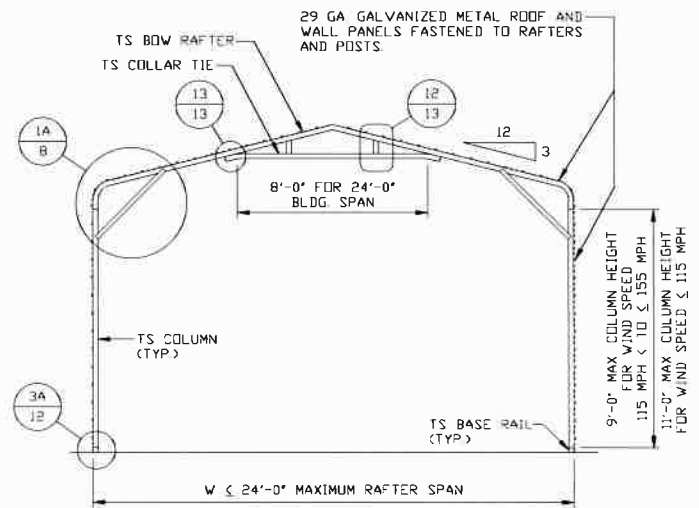
**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



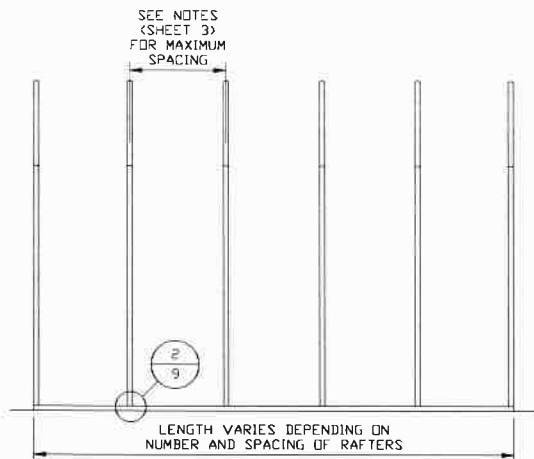
**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION**  
SCALE: NTS

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**SHT. 7**

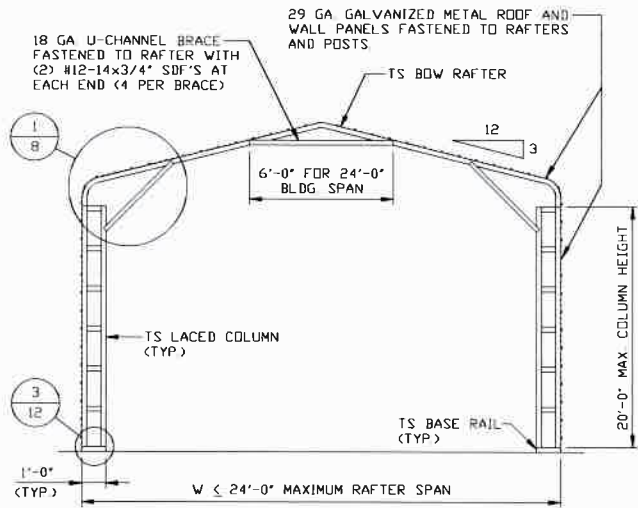
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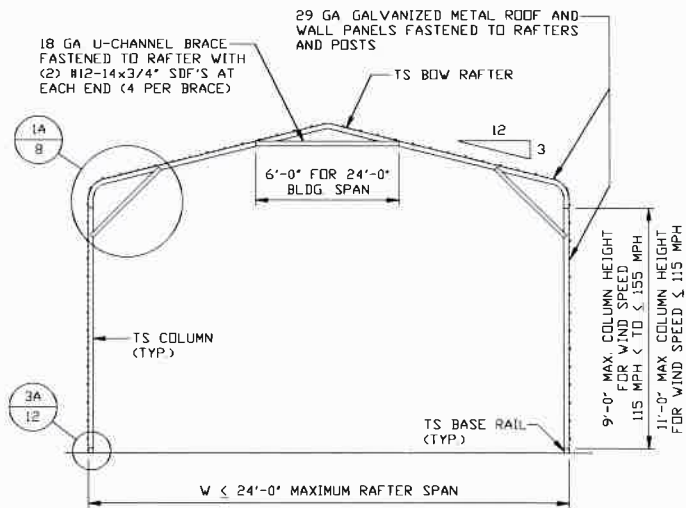
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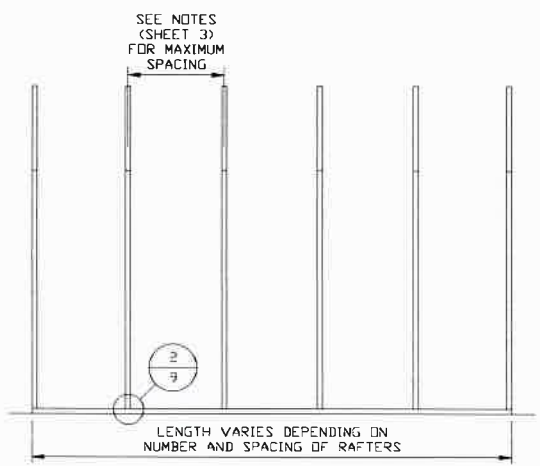
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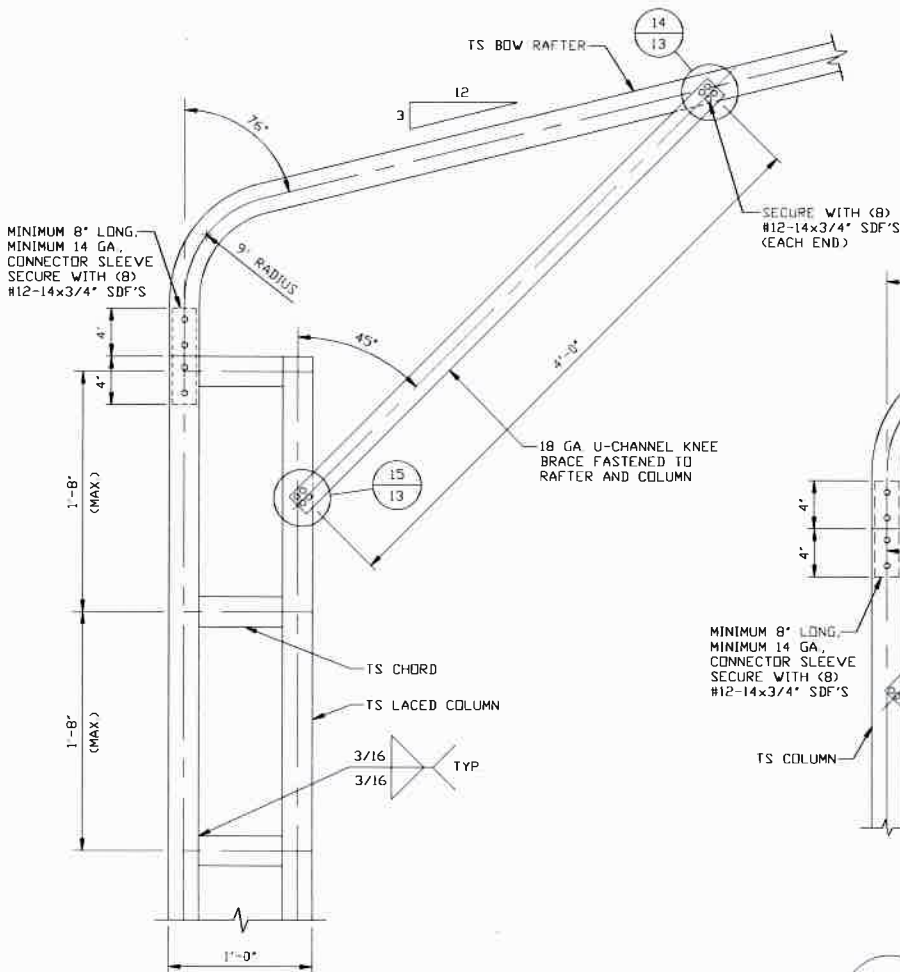


**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



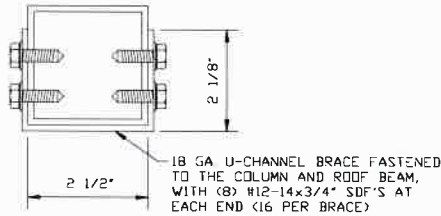
**TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION**  
SCALE: NTS

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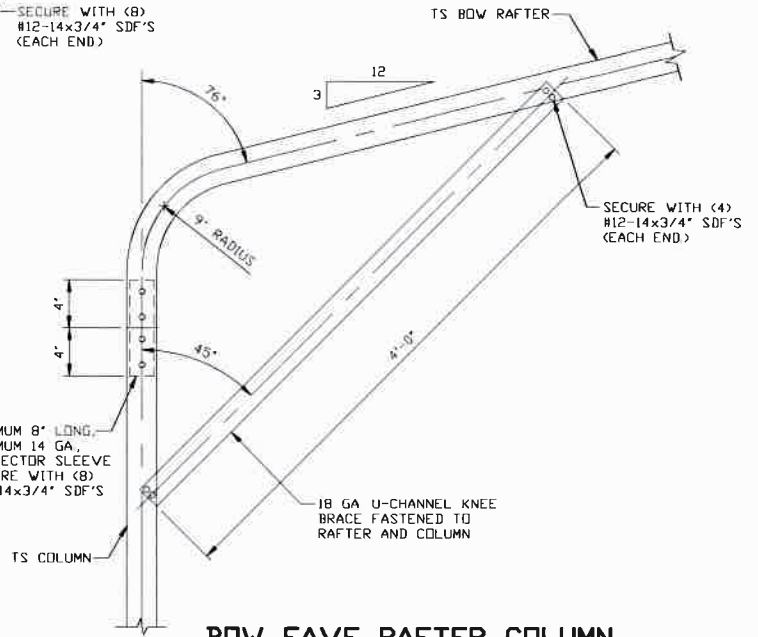
**1** BOW EAVE RAFTER COLUMN CONNECTION  
DETAIL FOR HEIGHTS 9'-0" < TO <= 20'-0"

SCALE: NTS



**BRACE SECTION**

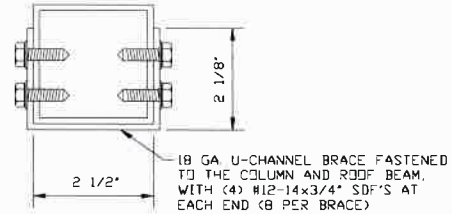
SCALE: NTS



**1A** BOW EAVE RAFTER COLUMN  
CONNECTION DETAIL  
HEIGHTS <= 9'-0" FOR WIND SPEED  
115 MPH < TO <= 155 MPH  
HEIGHTS <= 11'-0" FOR  
WIND SPEED <= 115 MPH

SCALE: NTS

NOTE: 3'-0" KNEE BRACE MAY BE USED  
FOR BUILDING WIDTH <= 24'-0"



**BRACE SECTION**

SCALE: NTS

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SCALE: NTS

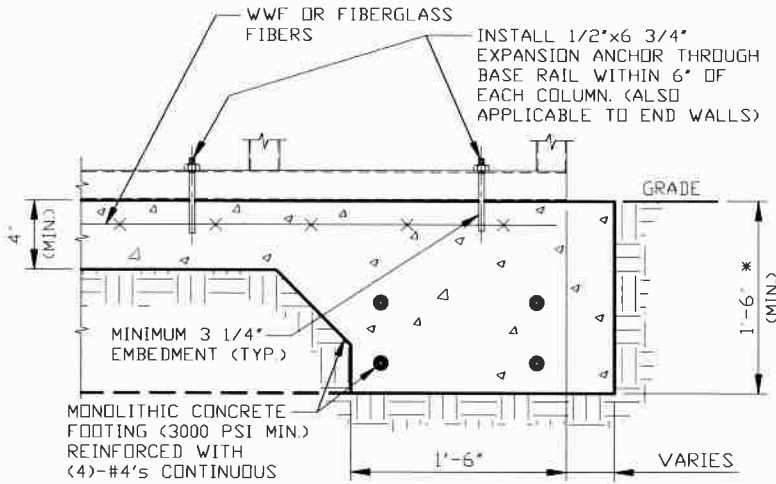
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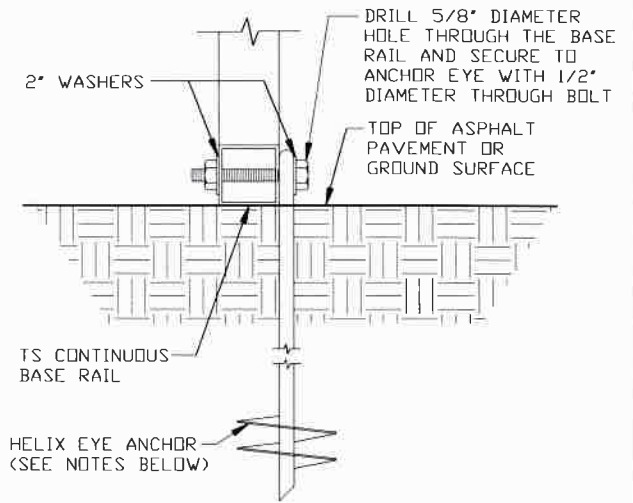
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# BASE RAIL ANCHORAGE OPTIONS



**2 CONCRETE MONOLITHIC SLAB  
BASE RAIL ANCHORAGE**  
SCALE: NTS  
MINIMUM ANCHOR EDGE DISTANCE IS 4"  
\* COORDINATE WITH LOCAL BUILDING CODE  
AND/OR BUILDING OFFICIAL REGARDING  
REQUIRED FOOTING DEPTH.



**2A GROUND BASE HELIX ANCHORAGE**  
SCALE: NTS (CAN BE USED FOR ASPHALT)  
\* COORDINATE WITH LOCAL CODES/ORD.  
REGARDING MIN. FROST DEPTH (LENGTH).

## GENERAL NOTES

NOTE: CONCRETE MONOLITHIC SLAB DESIGN BASED ON MINIMUM SOIL BEARING CAPACITY OF 1,500 PSF.

### CONCRETE:

CONCRETE SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.

### COVER OVER REINFORCING STEEL:

FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318:  
3" IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2" ELSEWHERE.

### REINFORCING STEEL:

THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

### REINFORCEMENT MAY BE BENT IN THE SHOP OR THE FIELD PROVIDED:

- 1 REINFORCEMENT IS BENT COLD.
- 2 THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS.
- 3 REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.

### HELIX ANCHOR NOTES:

1. FOR VERY DENSE AND/OR CEMENTED SANDS, COARSE GRAVEL AND COBBLES, CALICHE, PRELOADED SILTS AND CLAYS, USE MINIMUM (2) 4" HELICES WITH MINIMUM 30" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
2. FOR CORAL USE MINIMUM (2) 4" HELICES WITH MINIMUM 30" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
3. FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY STIFF SILTS, AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 30 INCH EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
4. FOR LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL, USE MINIMUM (2) 6" HELICES WITH MINIMUM 50" EMBEDMENT.
5. FOR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL, USE MINIMUM (2) 8" HELICES WITH MINIMUM 60" EMBEDMENT.

**MOORE AND ASSOCIATES  
ENGINEERING AND CONSULTING, INC.**

**DRAWN BY: LT**

**CHECKED BY: PIDH**

**PROJECT MGR: VSM**

**CLIENT: A PLUS**

A PLUS CARPORTS, LLC  
4297 HWY 268 EAST  
PILOT MOUNTAIN, NC 27041  
30'-0"x20'-0" ENCLOSED STRUCTURE

**DATE: 11-11-20**

**SHT. 9**

**SCALE: NTS**

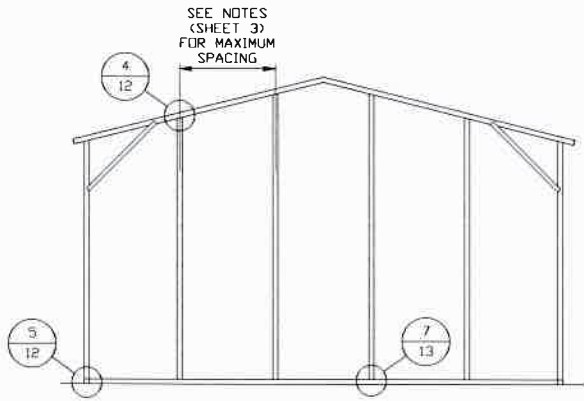
**DWG. NO: SK-3**

**JOB NO: 20209S**

**REV: 0**

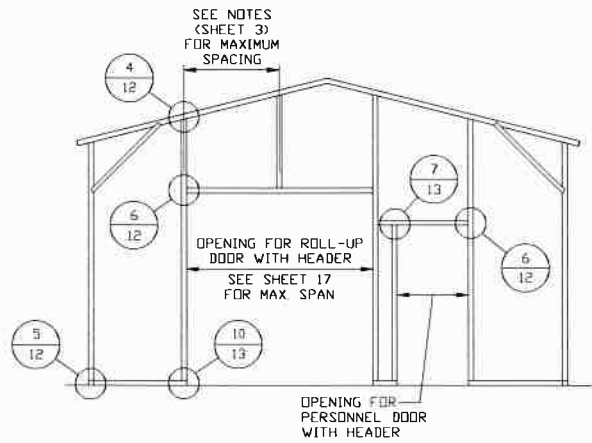
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# BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



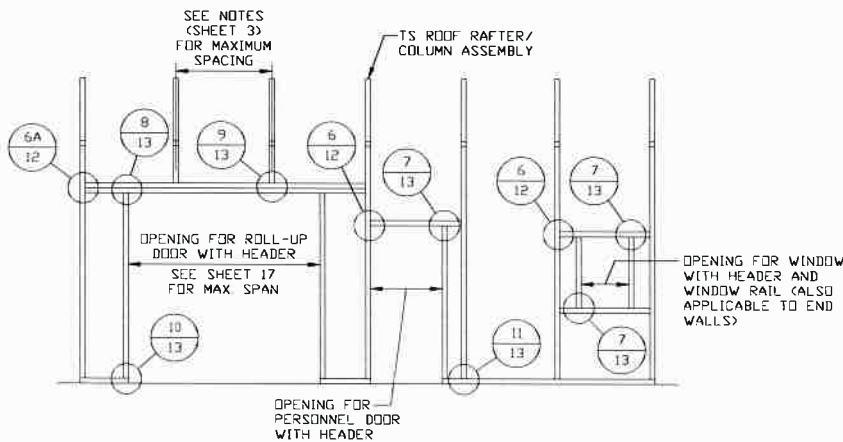
**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

SCALE: NTS



**TYPICAL BOX EAVE RAFTER END WALL  
OPENINGS FRAMING SECTION**

SCALE: NTS



**TYPICAL BOX EAVE RAFTER SIDE  
WALL OPENINGS FRAMING SECTION**

SCALE: NTS

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**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: A PLUS**

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4297 HWY 268 EAST  
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30'-0" x 20'-0" ENCLOSED STRUCTURE

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**SHT. 10**

**SCALE: NTS**

**DWG. NO: SK-3**

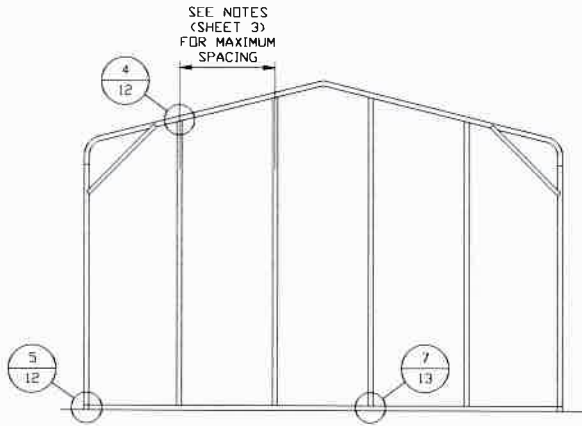
**JOB NO: 20209S**

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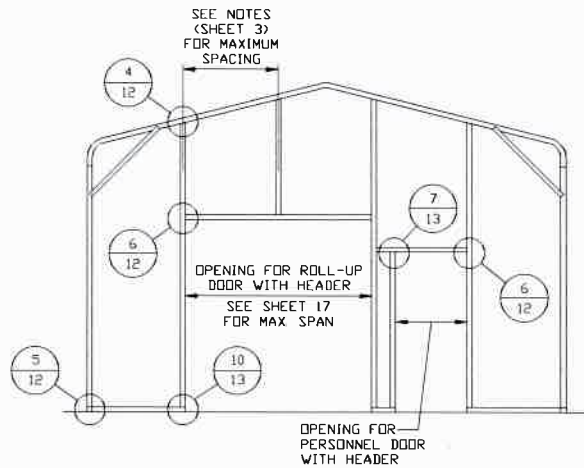


# BOW EAVE RAFTER END WALL AND SIDE WALL OPENINGS



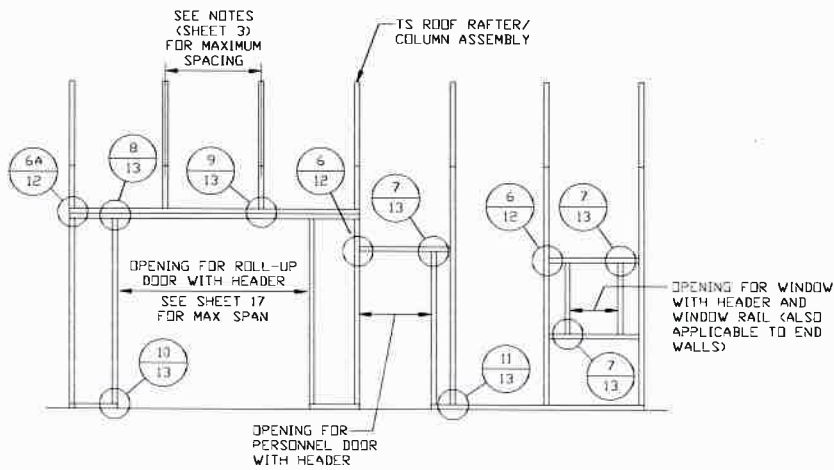
**TYPICAL BOW RAFTER  
END WALL FRAMING SECTION**

SCALE: NTS



**TYPICAL BOW RAFTER END WALL  
OPENINGS FRAMING SECTION**

SCALE: NTS



**TYPICAL BOW RAFTER SIDE  
WALL OPENINGS FRAMING SECTION**

SCALE: NTS

**MOORE AND ASSOCIATES  
ENGINEERING AND CONSULTING, INC.**

**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: A PLUS**

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PILOT MOUNTAIN, NC 27041  
30'-0" X 20'-0" ENCLOSED STRUCTURE

**DATE: 11-11-20**

**SHT. 11**

**SCALE: NTS**

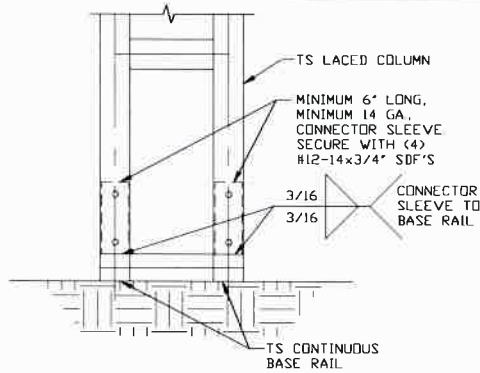
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**JOB NO: 20209S**

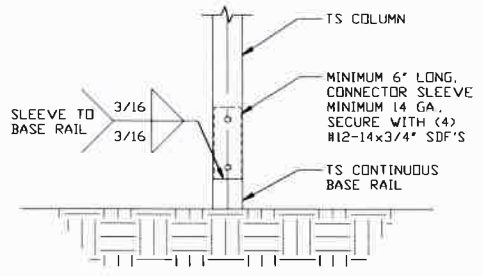
**REV: 0**

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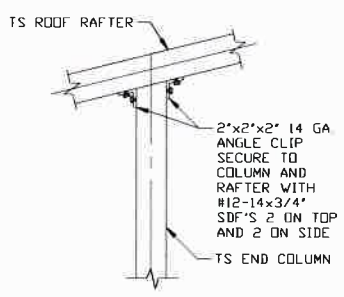
# CONNECTION DETAILS



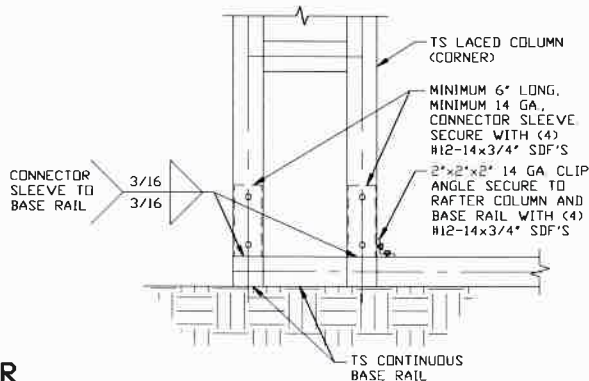
**3** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
 SCALE: NTS



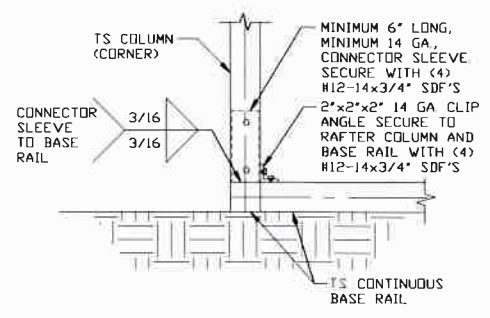
**3A** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
 SCALE: NTS



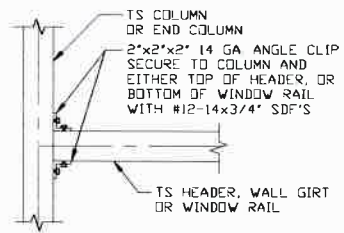
**4** END COLUMN/RAFTER CONNECTION DETAIL  
 SCALE: NTS



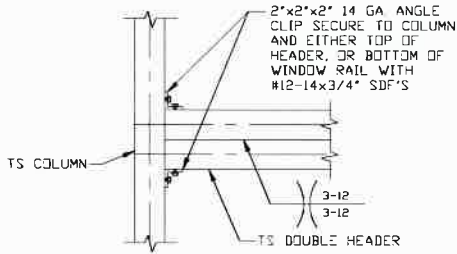
**5** END COLUMN/BASE RAIL CONNECTION DETAIL  
 SCALE: NTS



**5A** END COLUMN/BASE RAIL CONNECTION DETAIL  
 SCALE: NTS



**6** COLUMN OR WINDOW RAIL/WALL GIRT TO POST CONNECTION DETAIL  
 SCALE: NTS



**6A** COLUMN OR DOUBLE HEADER TO POST CONNECTION DETAIL  
 SCALE: NTS

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**DRAWN BY: LT**  
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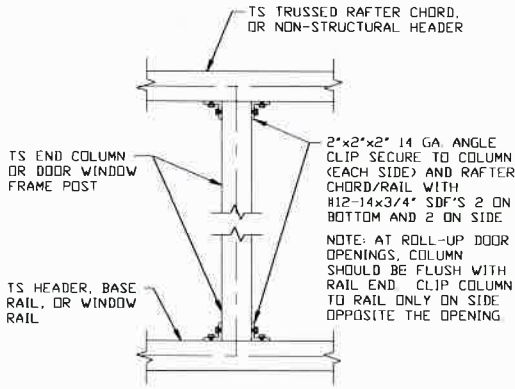
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**SHT. 12**  
**SCALE: NTS**  
**DWG. NO: SK-3**  
**JOB NO: 20209S**  
**REV: 0**

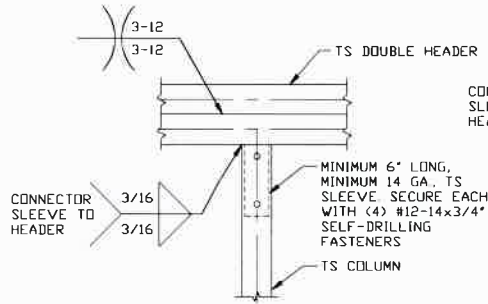
# CONNECTION DETAILS



7

**COLUMN TO WINDOW RAIL CONNECTION DETAIL**

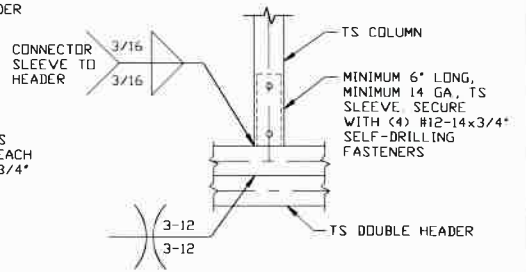
SCALE: NTS



8

**DOUBLE HEADER/COLUMN CONNECTION DETAIL**

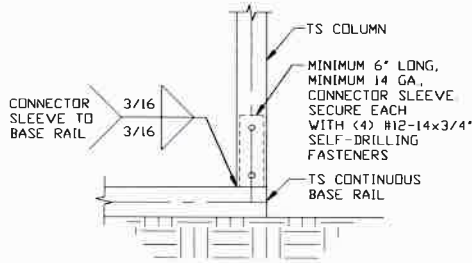
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9

**COLUMN/DOUBLE HEADER CONNECTION DETAIL**

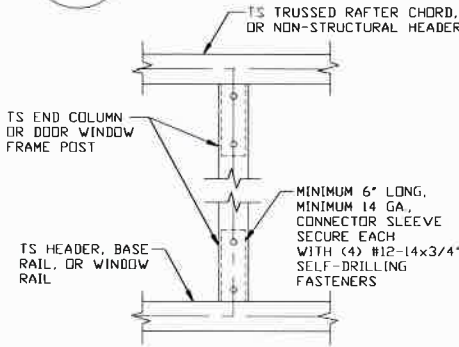
SCALE: NTS



10

**COLUMN/BASE RAIL CONNECTION DETAIL**

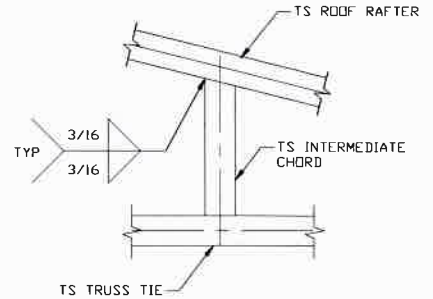
SCALE: NTS



11

**COLUMN TO HEADER OR BASE RAIL CONNECTION DETAIL**

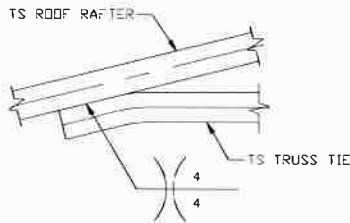
SCALE: NTS



12

**RAFTER TO CHORD CONNECTION DETAIL**

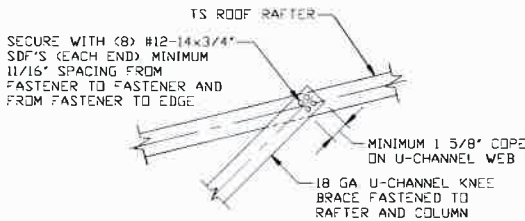
SCALE: NTS



13

**COLLAR TIE CONNECTION DETAIL**

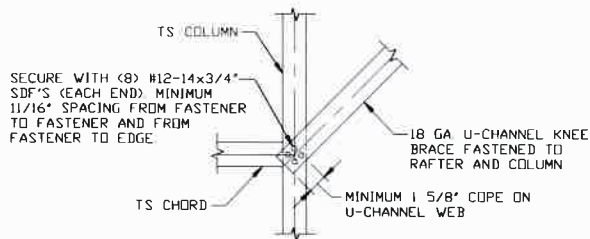
SCALE: NTS



14

**U-CHANNEL TO RAFTER CONNECTION DETAIL**

SCALE: NTS



15

**U-CHANNEL TO COLUMN CONNECTION DETAIL**

SCALE: NTS

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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: A PLUS

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SHT. 13

SCALE: NTS

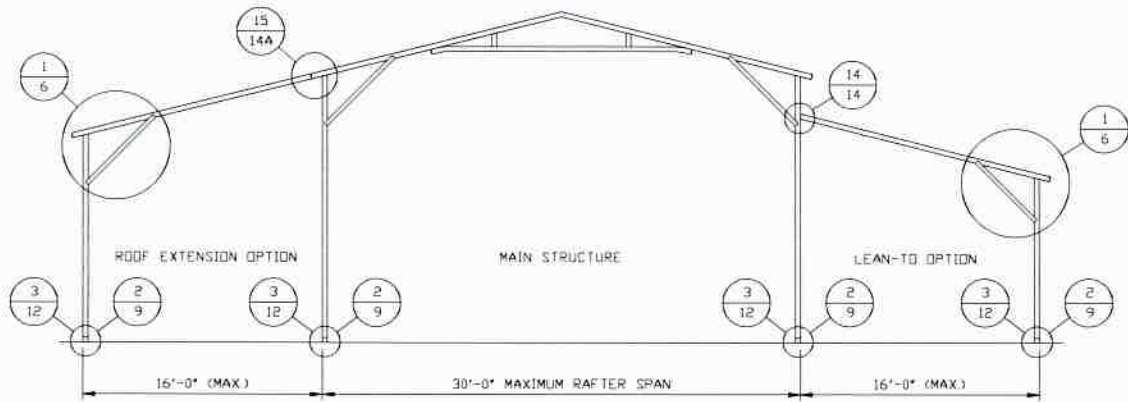
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JOB NO: 20209S

REV: 0

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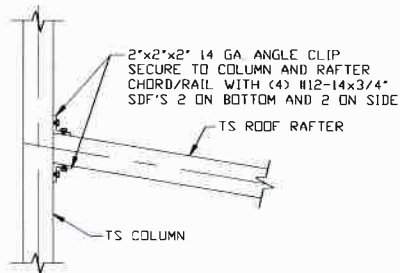
# BOX EAVE RAFTER LEAN-TO OPTIONS



**TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)**

SCALE: NTS

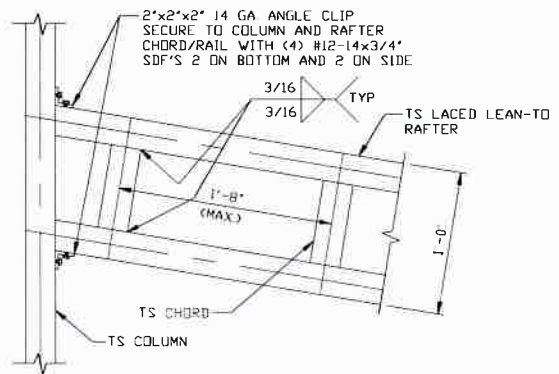
MAXIMUM WIDTH OF LACED TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 16'-0".  
 MAXIMUM WIDTH OF SINGLE TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 11'-0".  
 REFERENCE RAFTER COLUMN CONNECTION DETAILS FOR APPROPRIATE COLUMN HEIGHT AND TUBING SPECIFICATION.



**LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS  $\leq 11'-0''$**

14

SCALE: NTS



**LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS  $11'-0'' < \text{TO } \leq 16'-0''$**

14A

SCALE: NTS

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**PROJECT MGR: WSM**

**CLIENT: A PLUS**

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30-0"x20'-0" ENCLOSED STRUCTURE**

**DATE: 11-11-20**

**SHT. 14**

**SCALE: NTS**

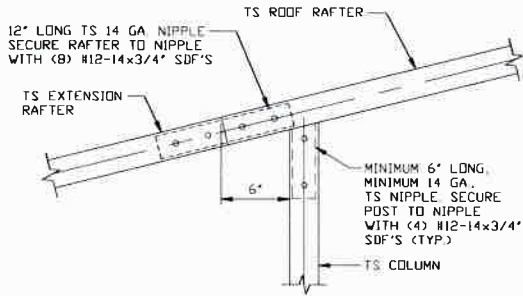
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**JOB NO: 20209S**

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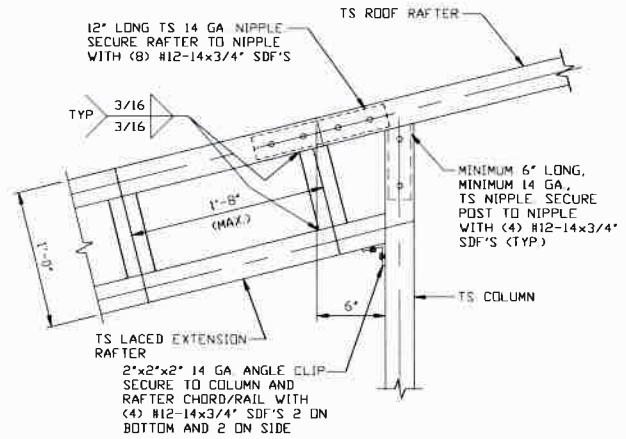
# BOX EAVE RAFTER LEAN-TO OPTIONS



**SIDE EXTENSION RAFTER  
COLUMN DETAIL FOR  
RAFTER SPANS  $\leq 11'-0''$**

SCALE: NTS

15



**SIDE EXTENSION RAFTER  
COLUMN DETAIL FOR RAFTER  
SPANS  $11'-0'' < \text{TO} \leq 16'-0''$**

SCALE: NTS

15A

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**PROJECT MGR: WSM**

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30'-0" x 20'-0" ENCLOSED STRUCTURE**

**DATE: 11-11-20**

**SHT. 14A**

**SCALE: NTS**

**DWG. NO: SK-3**

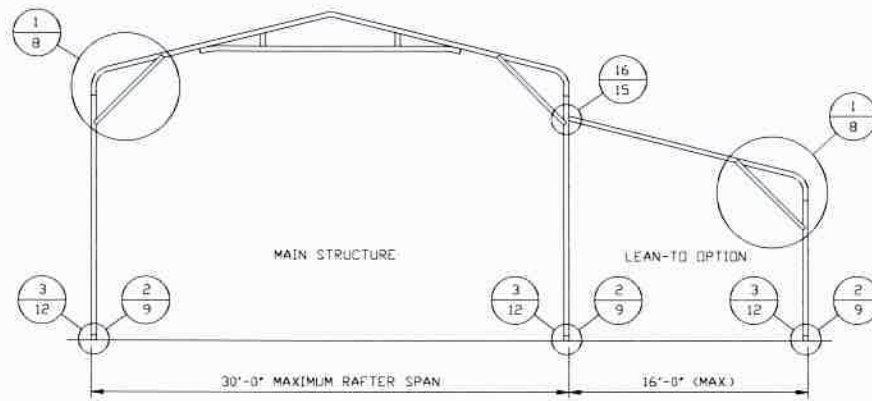
**JOB NO: 20209S**

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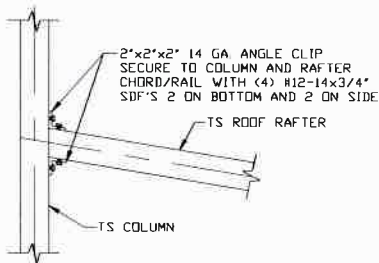
# BOW EAVE RAFTER LEAN-TO OPTION



## TYPICAL BOW EAVE RAFTER LEAN-TO OPTION FRAMING SECTION

SCALE: NTS

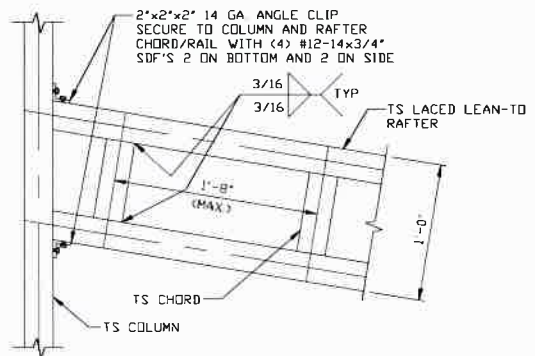
MAXIMUM WIDTH OF LACED TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 16'-0".  
 MAXIMUM WIDTH OF SINGLE TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 11'-0".  
 REFERENCE RAFTER COLUMN CONNECTION DETAILS FOR APPROPRIATE COLUMN HEIGHT AND TUBING SPECIFICATION.



### LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS $\leq$ 11'-0"

SCALE: NTS

16



### LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS 11'-0" < TO $\leq$ 16'-0"

SCALE: NTS

16A

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**PROJECT MGR: WSM**

**CLIENT: A PLUS**

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30-0"x20'-0" ENCLOSED STRUCTURE**

**DATE: 11-11-20**

**SHT. 15**

**SCALE: NTS**

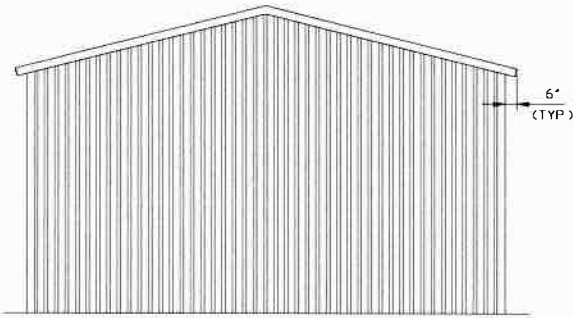
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**JOB NO: 20209S**

**REV: 0**

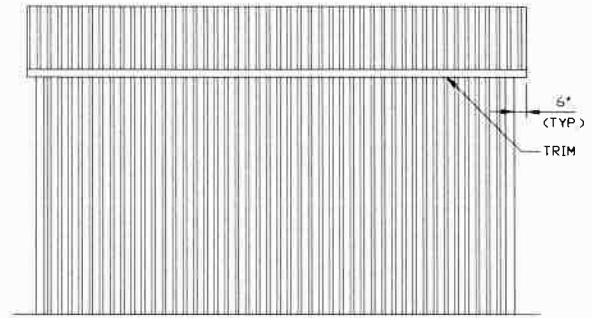
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# BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



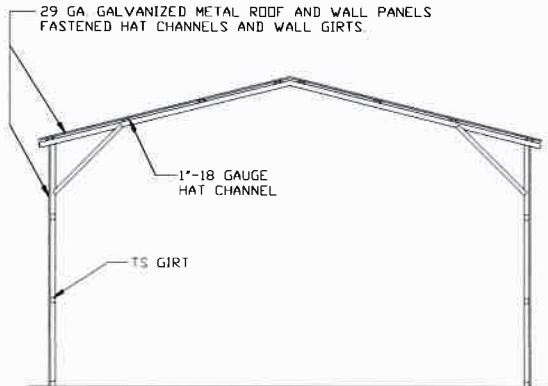
**TYPICAL END ELEVATION  
VERTICAL ROOF/SIDING**

SCALE: NTS



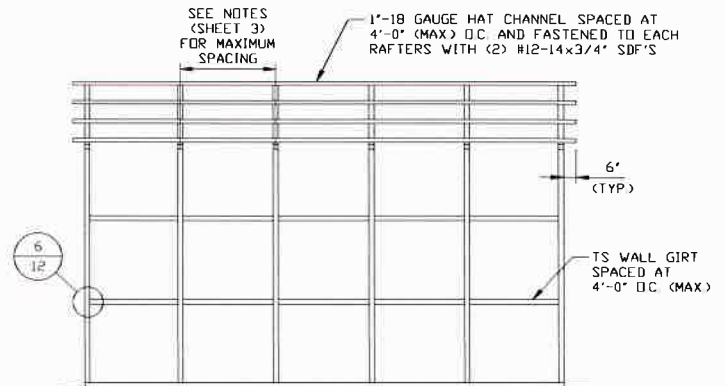
**TYPICAL SIDE ELEVATION  
VERTICAL ROOF/SIDING**

SCALE: NTS



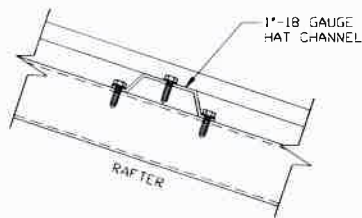
**TYPICAL SECTION VERTICAL  
ROOF/SIDING OPTION**

SCALE: NTS



**TYPICAL FRAMING SECTION  
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



**PANEL ATTACHMENT**

(ALTERNATE FOR VERTICAL ROOF PANELS)

SCALE: NTS

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**CHECKED BY:** PDH

**PROJECT MGR:** WSM

**CLIENT:** A PLUS

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30-0"x20'-0" ENCLOSED STRUCTURE

**DATE:** 11-11-20

**SHT.** 16

**SCALE:** NTS

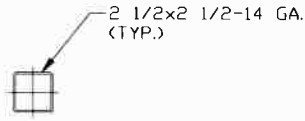
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**JOB NO:** 20209S

**REV.:** 0

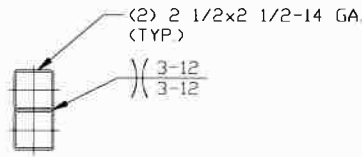
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## SIDE WALL HEADER OPTIONS



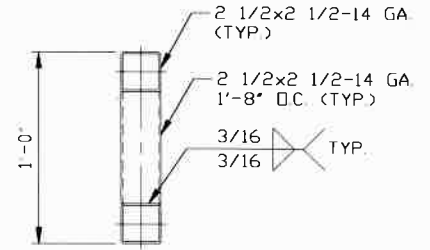
**HEADER DETAIL FOR DOOR OPENINGS LENGTHS  $\leq 6'-0"$**

SCALE: NTS



**HEADER DETAIL FOR DOOR OPENINGS  $6'-0" < \text{LENGTHS} \leq 10'-0"$**

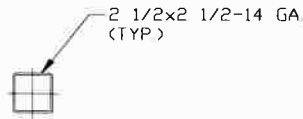
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**HEADER DETAIL FOR DOOR OPENINGS  $10'-0" < \text{LENGTHS} \leq 20'-0"$**

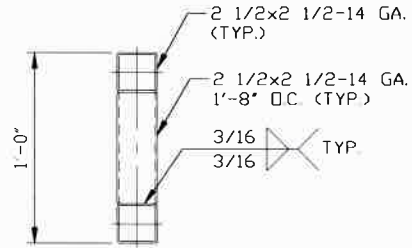
SCALE: NTS

## END WALL HEADER OPTIONS



**HEADER DETAIL FOR DOOR OPENINGS LENGTHS  $\leq 7'-0"$**

SCALE: NTS



**HEADER DETAIL FOR DOOR OPENINGS  $7'-0" < \text{LENGTHS} \leq 20'-0"$**

SCALE: NTS

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ENGINEERING AND CONSULTING, INC.**

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**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: A PLUS**

**A PLUS CARPORTS, LLC  
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**SHT. 17**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO: 20209S**

**REV: 0**

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