



STRUCTURAL DESIGN

PARTIALLY ENCLOSED (UTILITY) BUILDING

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

**26 June 2017
Revision 0
M&A Project No. 17118S**

Prepared for:

**HBO Carports, Inc.
998 W Pine St.
Mount Airy, North Carolina 27030**

Prepared by:

**Moore and Associates Engineering and Consulting, Inc.
1009 East Avenue
North Augusta, SC 29841**

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**MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING**

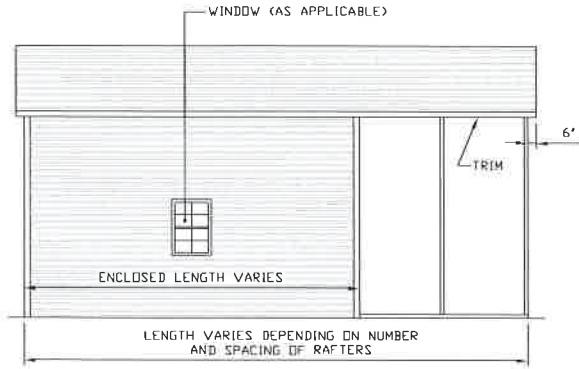
MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	HBO CARPORTS, INC. 30'x20' PARTIALLY ENCLOSED STRUCTURE PE SEAL COVER SHEET		
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	CLIENT: HBO	SHT. 1	DWG. NO: SK-2	REV: 0

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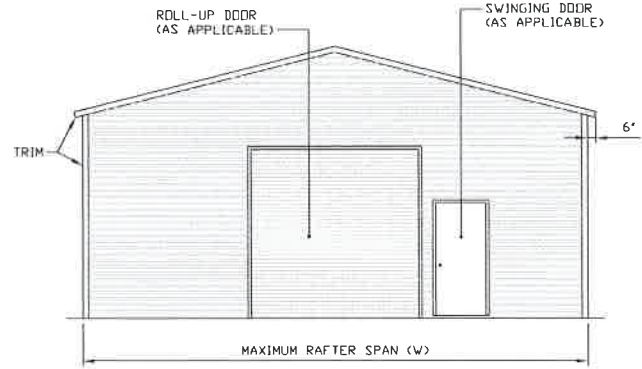
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MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	HBO CARPORTS, INC. 998 W PINE ST. MOUNT AIRY, NC 27030 30'x20' PARTIALLY ENCLOSED STRUCTURE		
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BOX EAVE FRAME RAFTER STRUCTURE (Sheets 4, 4A, 4B, 4C, 5, 5A, 5B, 5C, 8, 9, 11, 12, 13 AND 15)

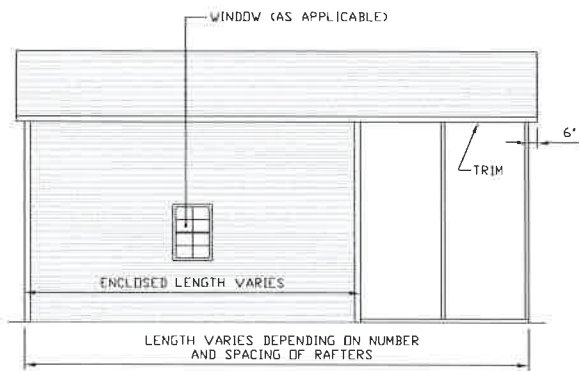


TYPICAL SIDE ELEVATION
SCALE: NTS

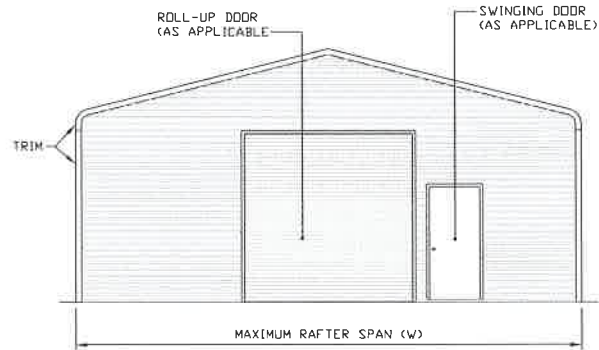


TYPICAL END ELEVATION
SCALE: NTS

BOW FRAME RAFTER STRUCTURE (Sheets 6, 6A, 7, 7A, 8, 10, 11, 12, AND 14)



TYPICAL SIDE ELEVATION
SCALE: NTS



TYPICAL END ELEVATION
SCALE: NTS

INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR MAXIMUM 30' WIDE x 20' EAVE HEIGHT PARTIALLY ENCLOSED STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE 2012 NORTH CAROLINA BUILDING CODE, 2006 INTERNATIONAL BUILDING CODE, 2009 IBC 2012 IBC AND 2015 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
 - A) DEAD LOAD = 15 PSF
 - B) LIVE LOAD = 12 PSF (20 PSF FOR RISK CAT. II)
 - C) GROUND SNOW LOAD = 30 PSF ($\leq 24'$), 70 PSF ($24' < W \leq 30'$)
4. LDW ULTIMATE WIND SPEED (LW) 115 (155 MPH (RC II)) TO 145 (155 MPH (RC II)) (NOMINAL WIND SPEED 81 (89) TO 108 (120) MPH); MAXIMUM RAFTER/POST AND END POST SPACING = 4.0 FEET (5.0 FEET FOR WIND SPEED 105 MPH < TO ≤ 145 MPH RC I ONLY).
5. LDW HAZARD RISK CATEGORY I AND II (WIND).
6. WIND EXPOSURE CATEGORY B OR C.
7. SPECIFICATIONS APPLICABLE TO 29 GAUGE (FOR SL < 60 PSF) AND 26 GAUGE (FOR SL > 60 PSF) METAL PANELS FASTENED DIRECTLY TO 2 1/2" x 2 1/2" - 14 GAUGE TUBE STEEL (TS) FOR RISK CAT. I AND 2 1/4" x 2 1/4" - 12 GAUGE (TS) FOR RISK CAT. II FRAMING MEMBERS (UNLESS NOTED OTHERWISE).
8. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 8' O.C. (MAX).
9. 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.
10. ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6' OF EACH RAFTER COLUMN ALONG SIDES.
11. GROUND ANCHORS (SOIL NAILS) CONSIST OF #4 REBAR W/ WELDED NUT x 30" LONG IN SUITABLE SOIL CONDITIONS. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED. NOT ALLOWED FOR HIGH WIND APPLICATION.
12. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:
 - SDIL SITE CLASS = D
 - RISK CATEGORY I/II/III
 - R = 3.25 I_e = 1.0
 - S_{DS} = 1.522 V = C_sW
 - S₀₁ = 0.839

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SHT. 3

SCALE: NTS

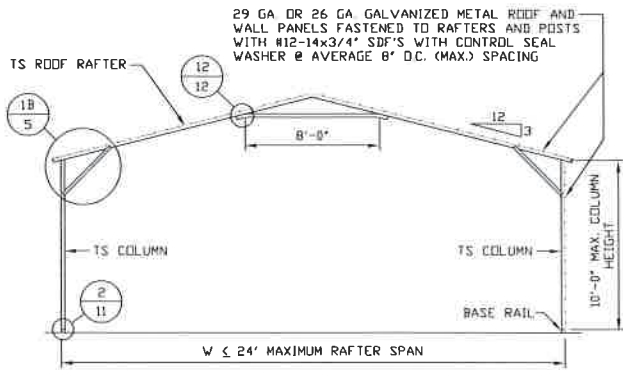
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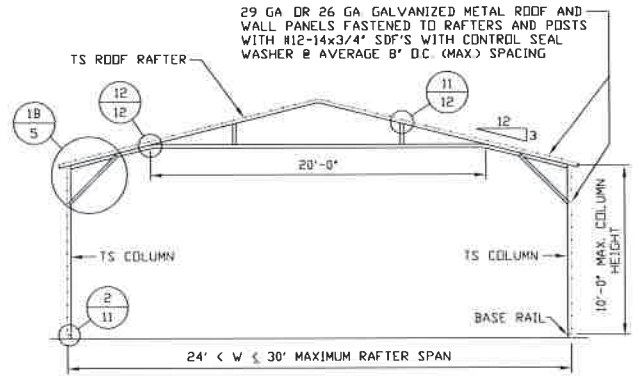
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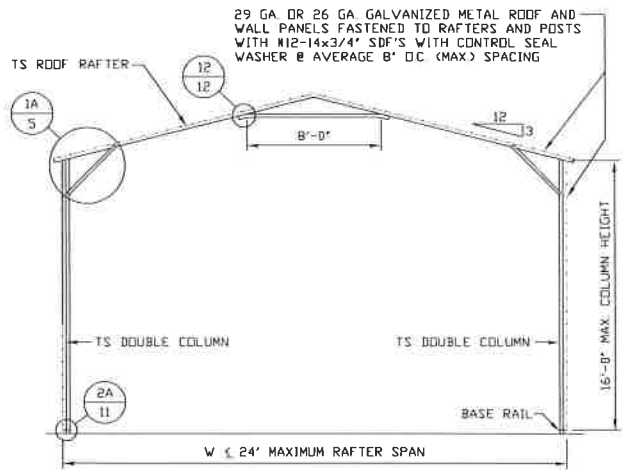
EXPOSURE B



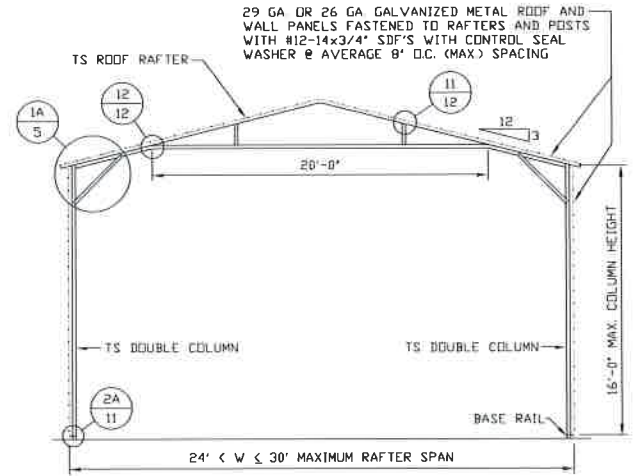
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



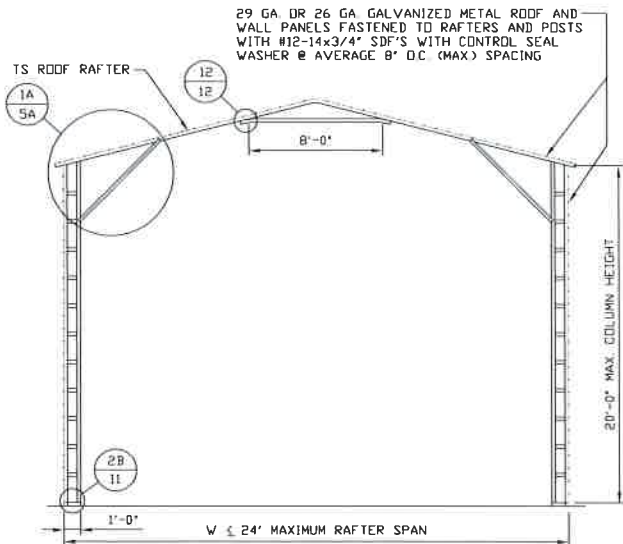
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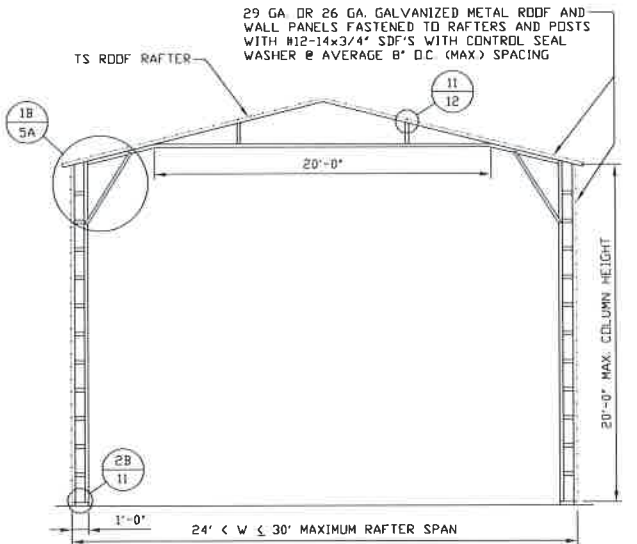
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SHT. 4

SCALE: NTS

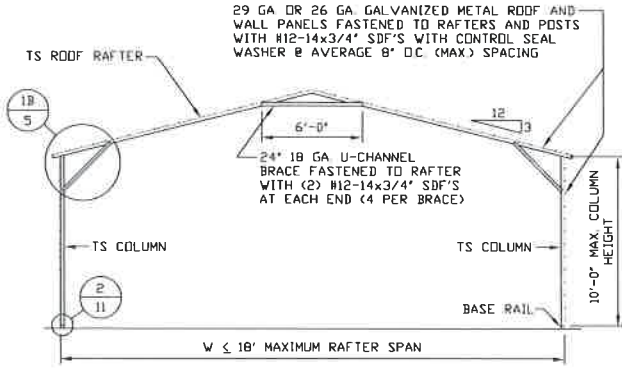
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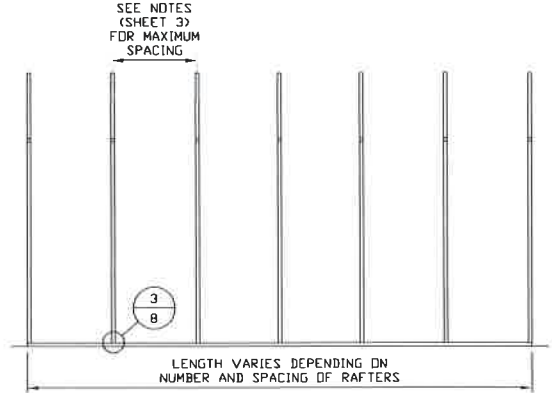
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EXPOSURE B



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

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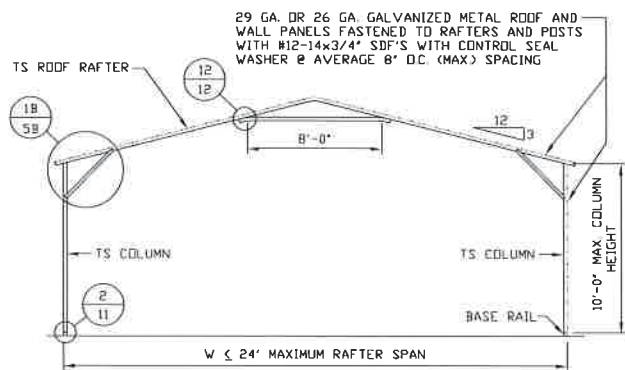
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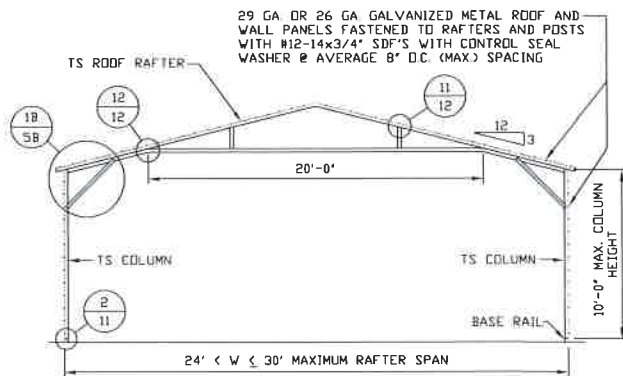
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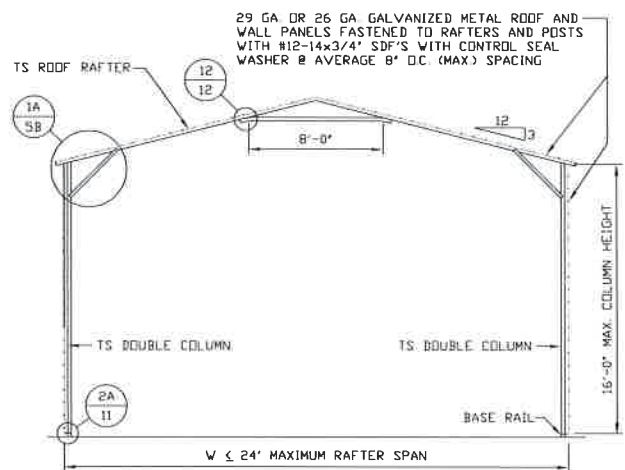
EXPOSURE C



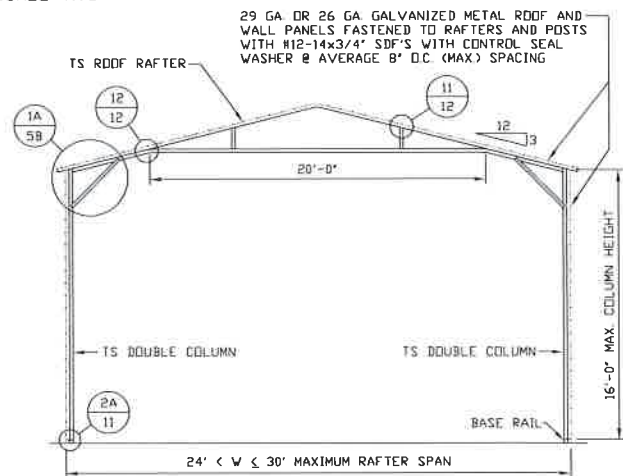
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



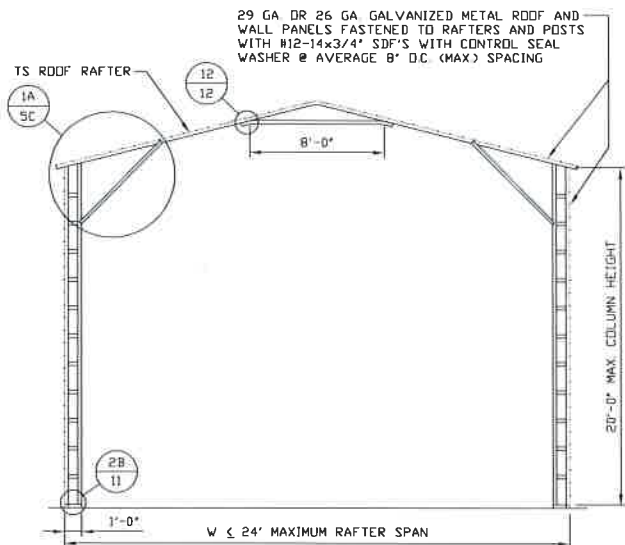
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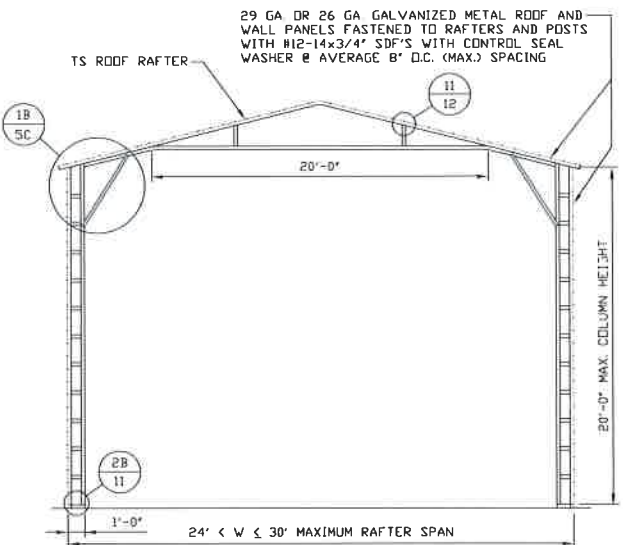
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SHT. 4B

SCALE: NTS

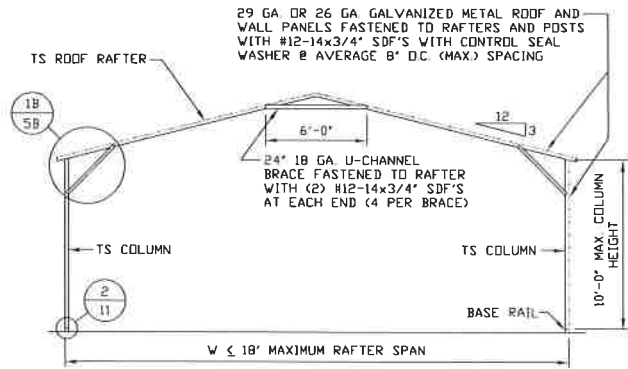
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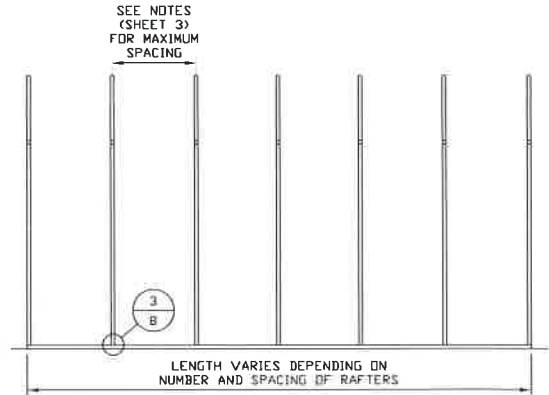
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EXPOSURE C



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

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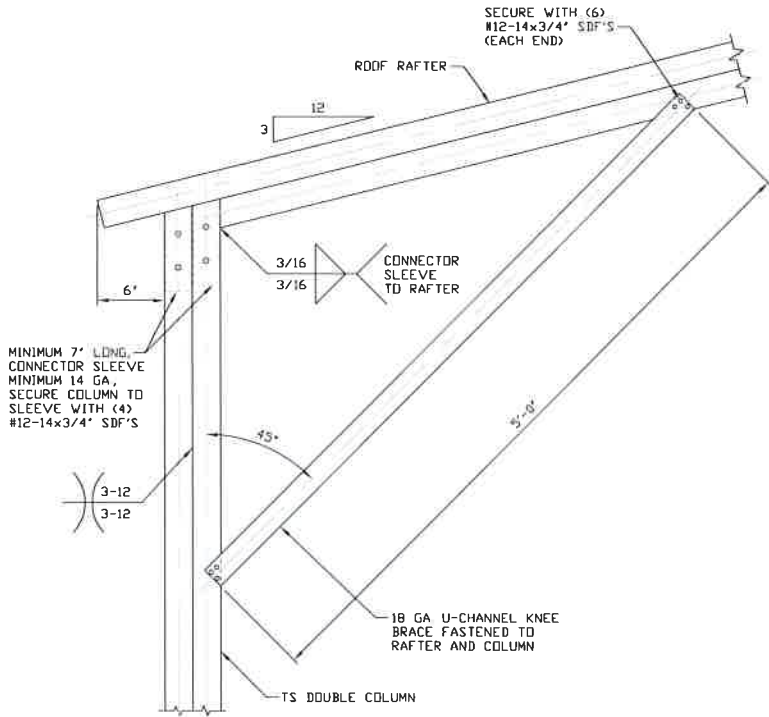
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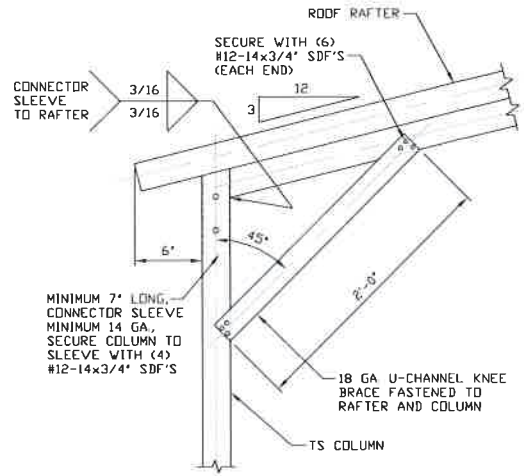
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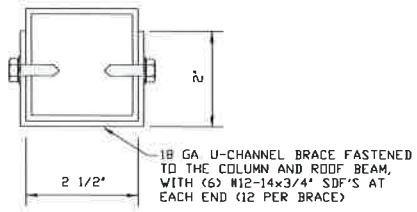
EXPOSURE B



1A
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10' < TO <= 16'
 SCALE: NTS



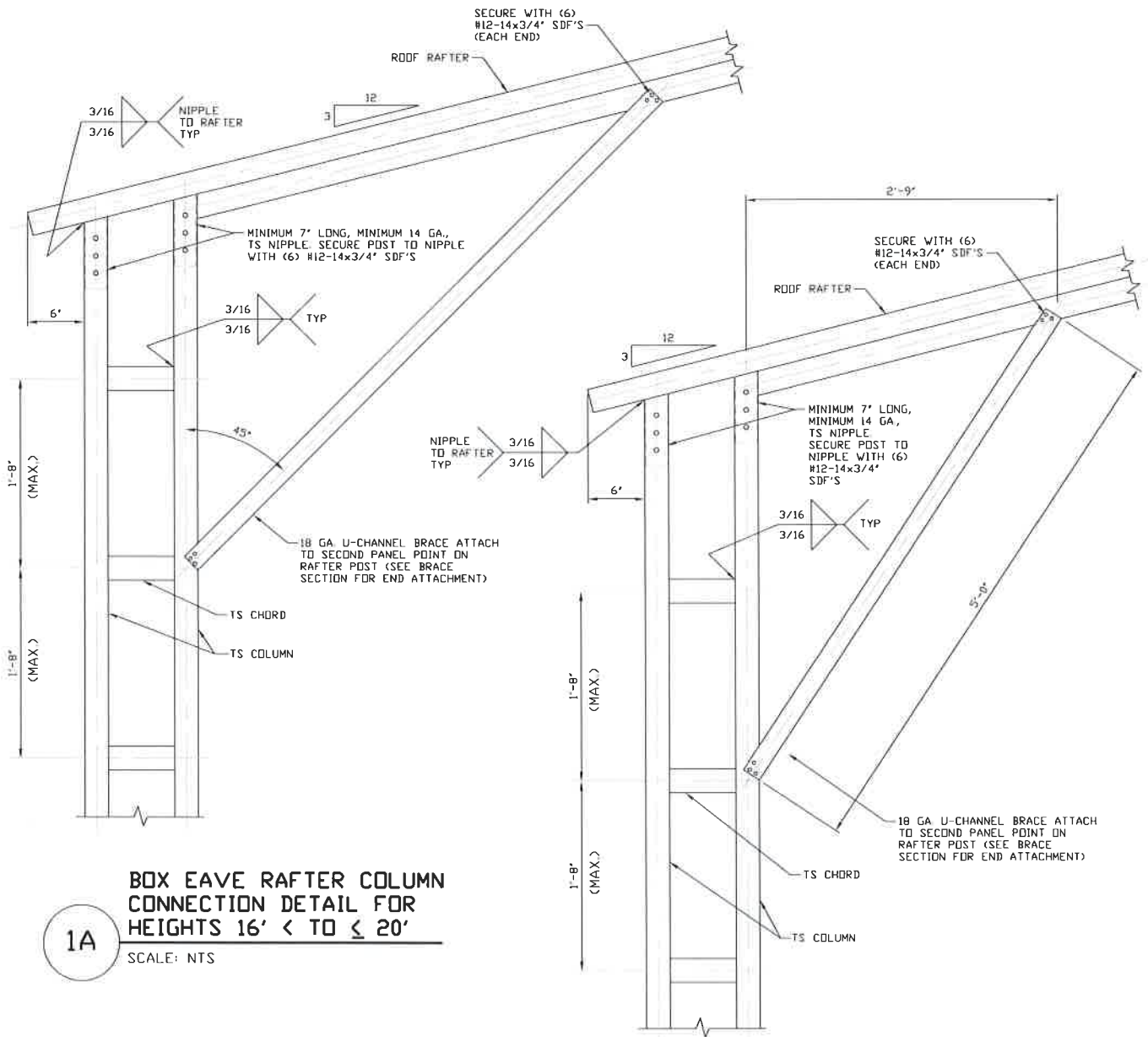
1B
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS <= 10'
 SCALE: NTS



BRACE SECTION
 SCALE: NTS

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EXPOSURE B



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 16' < TO ≤ 20'

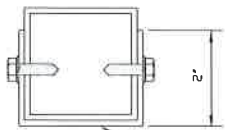
1A

SCALE: NTS

BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 16' < TO ≤ 20'

1B

SCALE: NTS



18 GA U-CHANNEL BRACE FASTENED TO THE COLUMN AND ROOF BEAM, WITH (6) #12-14x3/4" SDF'S AT EACH END (12 PER BRACE)

BRACE SECTION

SCALE: NTS

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SHT. 5A

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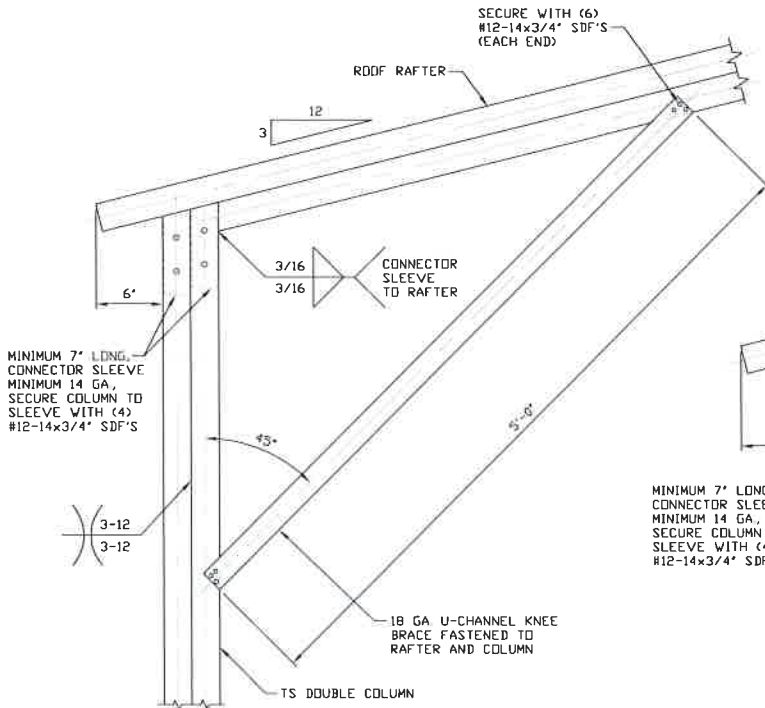
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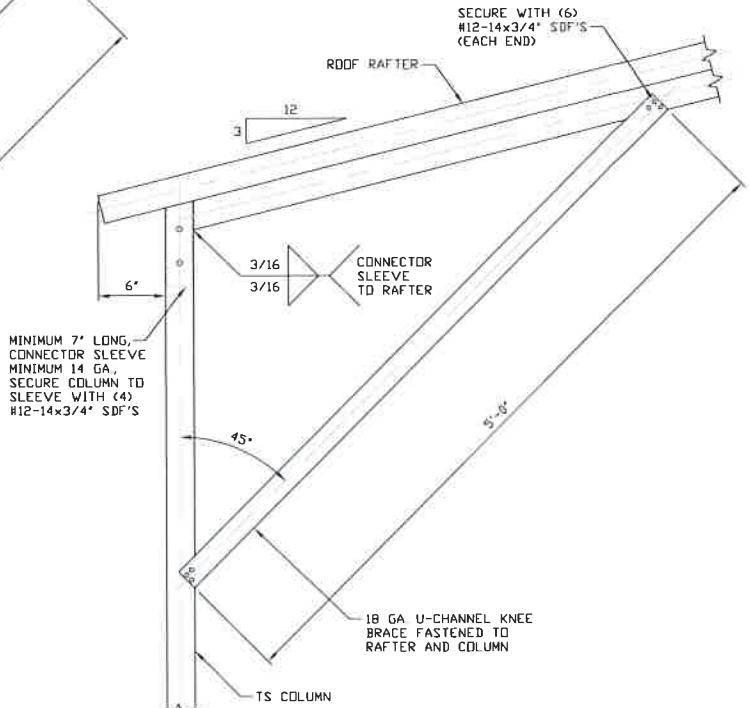
EXPOSURE C



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHT 10' < TO ≤ 16'

1A

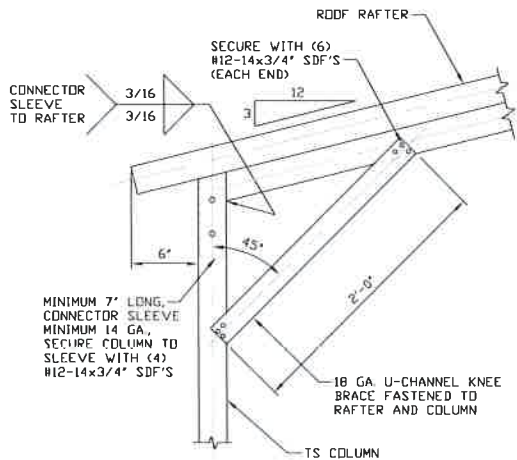
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BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHT 8' < TO ≤ 10'

1B

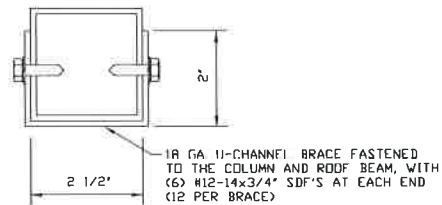
SCALE: NTS



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHT ≤ 8'

1C

SCALE: NTS



BRACE SECTION

SCALE: NTS

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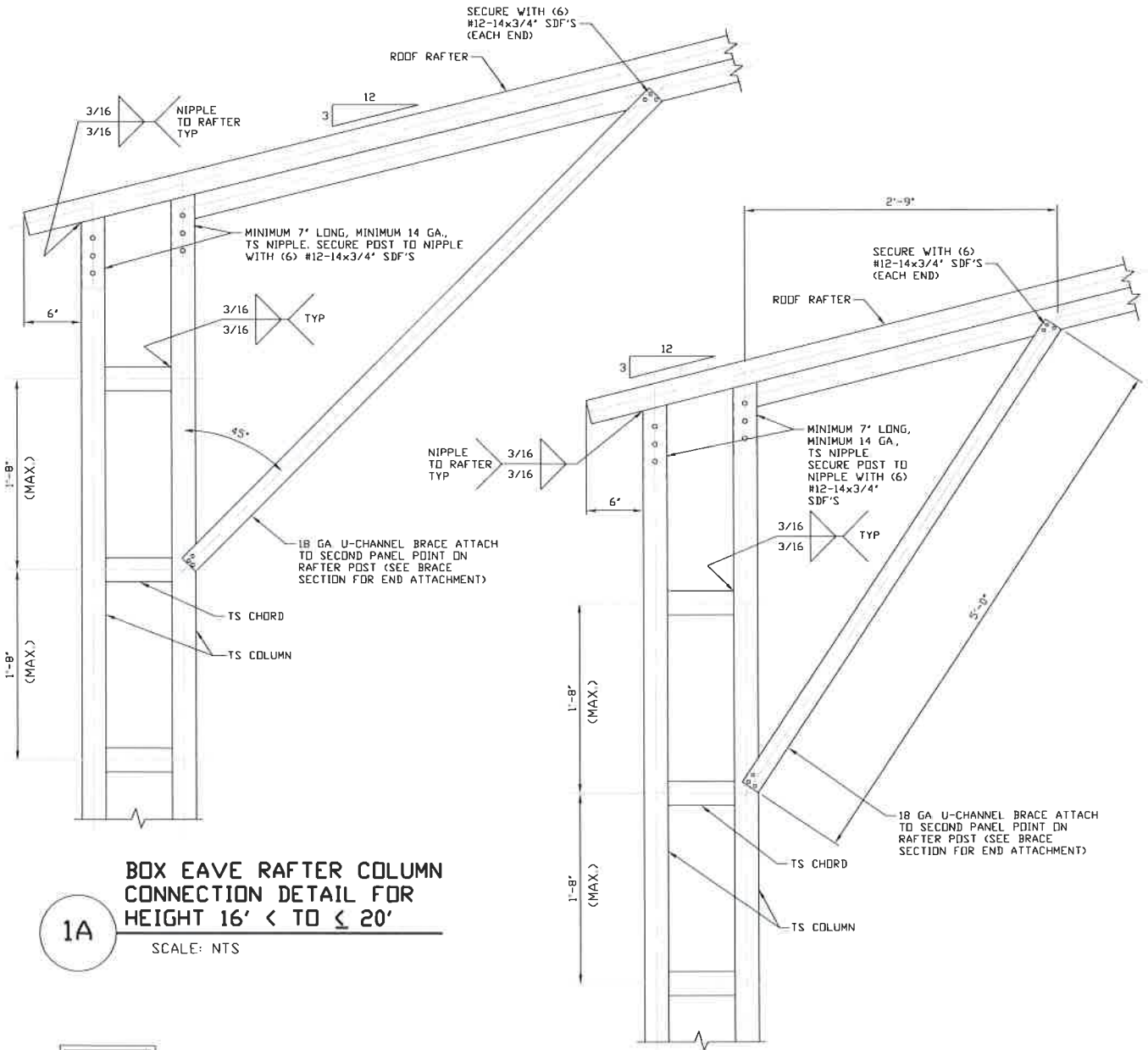
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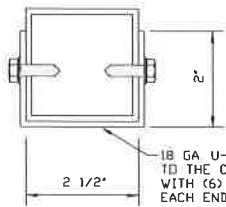
EXPOSURE C



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHT 16' < TO ≤ 20'

1A

SCALE: NTS



18 GA U-CHANNEL BRACE FASTENED TO THE COLUMN AND ROOF BEAM, WITH (6) #12-14x3/4" SDF'S AT EACH END (12 PER BRACE)

BRACE SECTION

SCALE: NTS

BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHT 16' < TO ≤ 20'

1B

SCALE: NTS

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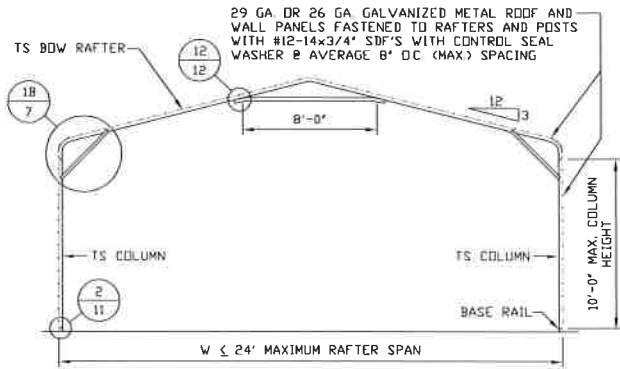
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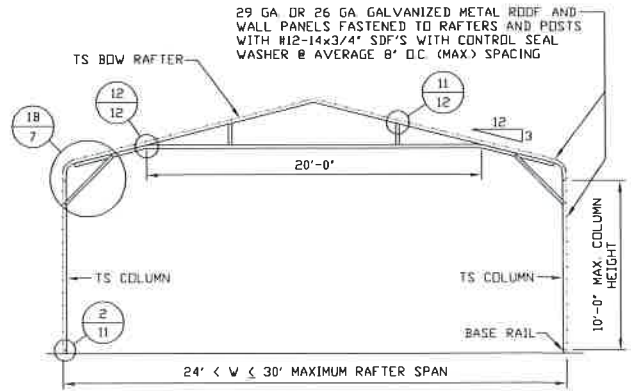
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EXPOSURE B



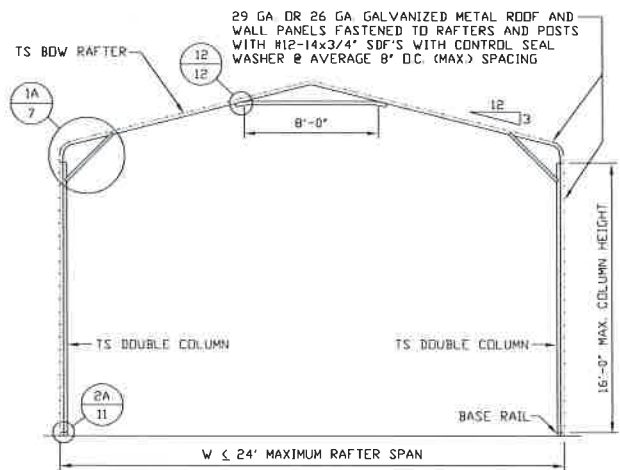
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



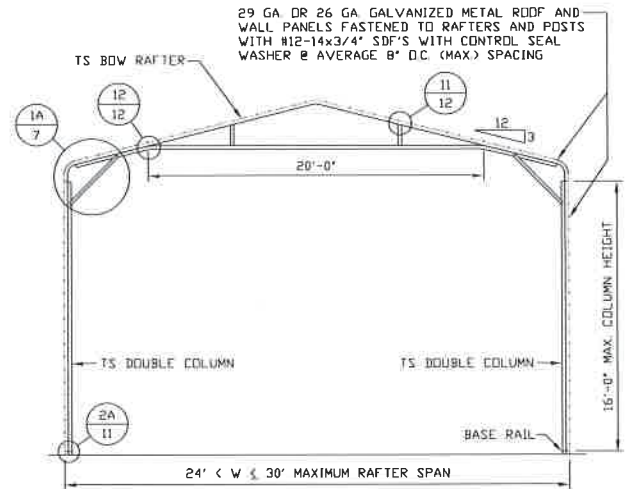
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



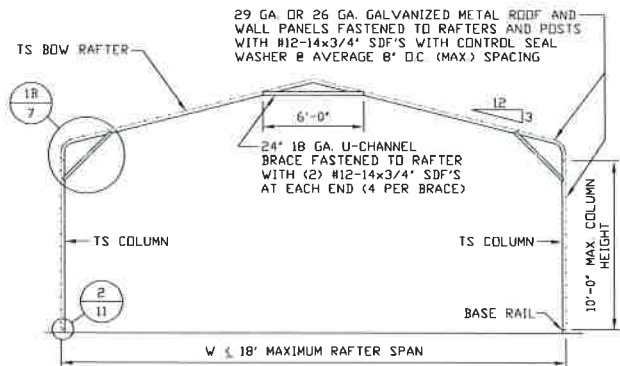
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SCALE: NTS



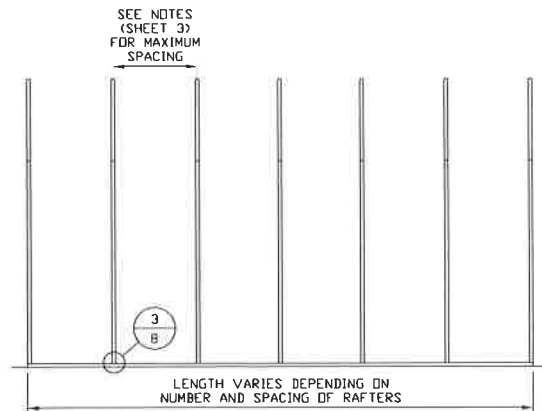
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS

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ENGINEERING AND CONSULTING, INC.**

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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: HBO

HBO CARPORTS, INC.
998 W PINE ST.
MOUNT AIRY, NC 27030
30'x20' PARTIALLY ENCLOSED STRUCTURE

DATE: 6-26-17

SHT. 6

SCALE: NTS

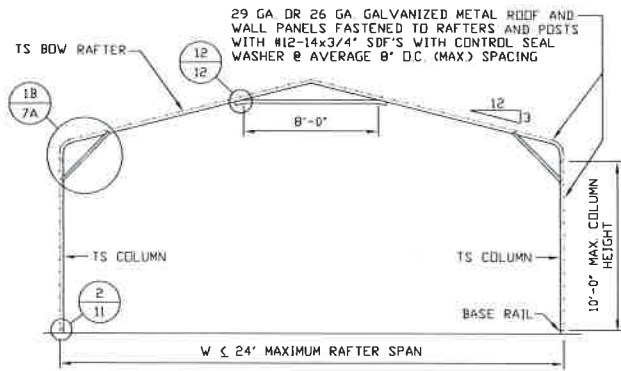
DWG. NO: SK-2

JOB NO: 1711BS

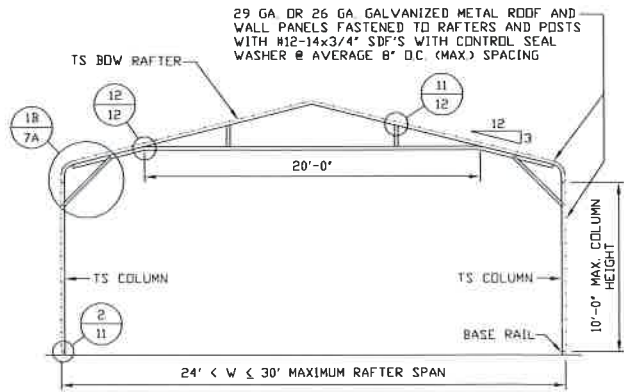
REV: 0

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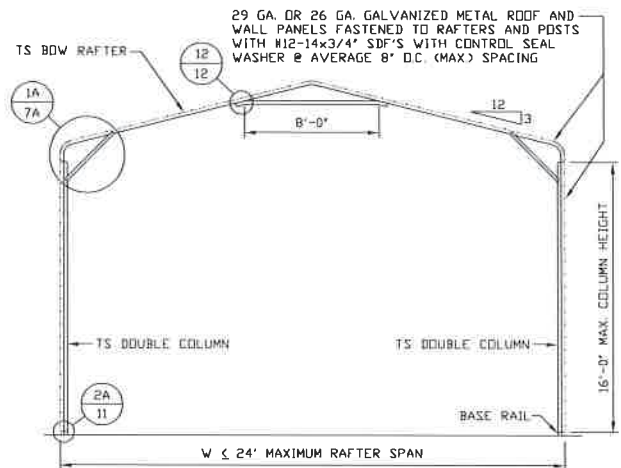
EXPOSURE C



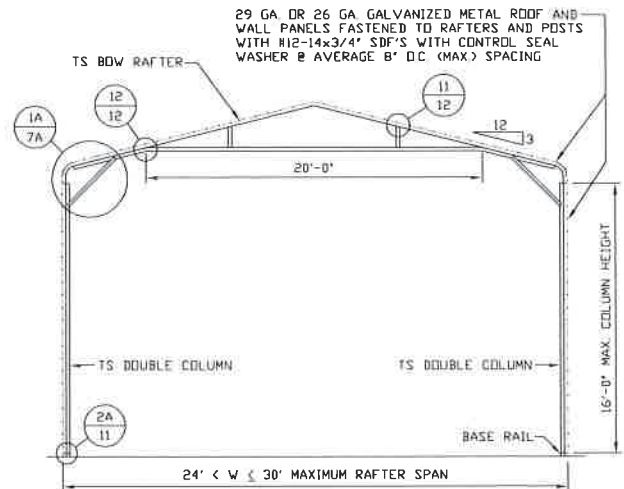
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



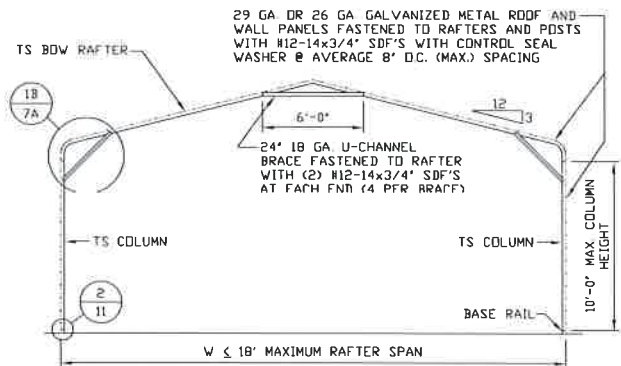
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



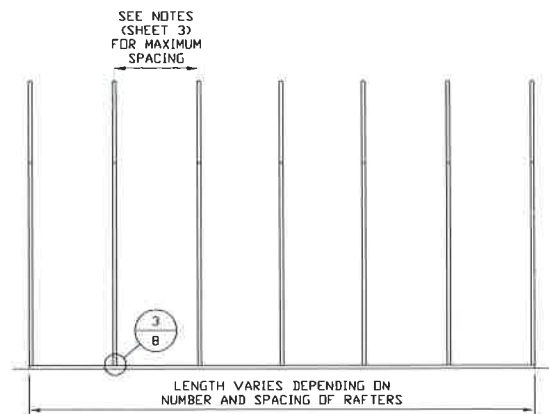
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

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CLIENT: HBO

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MOUNT AIRY, NC 27030
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SHT. 6A

SCALE: NTS

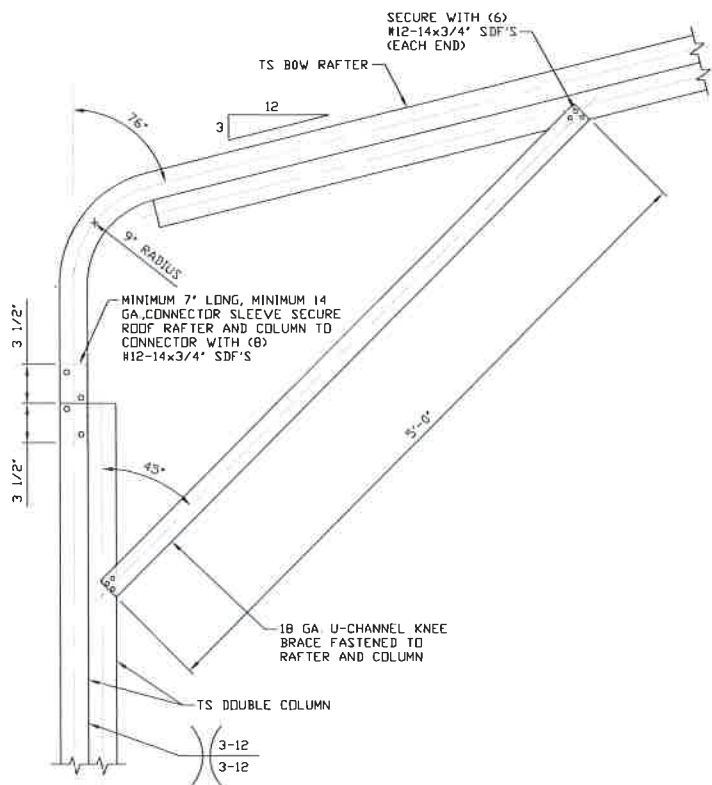
DWG. NO: SK-2

JOB NO: 17118S

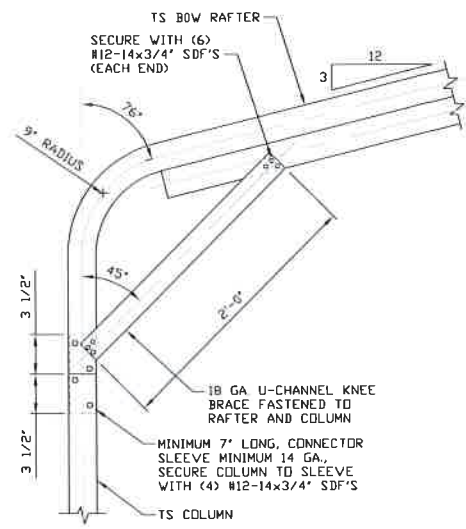
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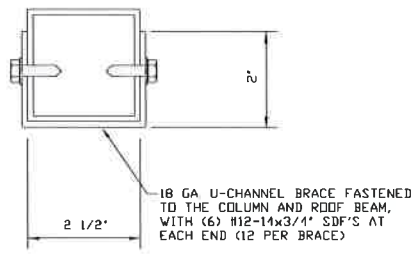
EXPOSURE B



1A
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10' < TO <= 16'
 SCALE: NTS



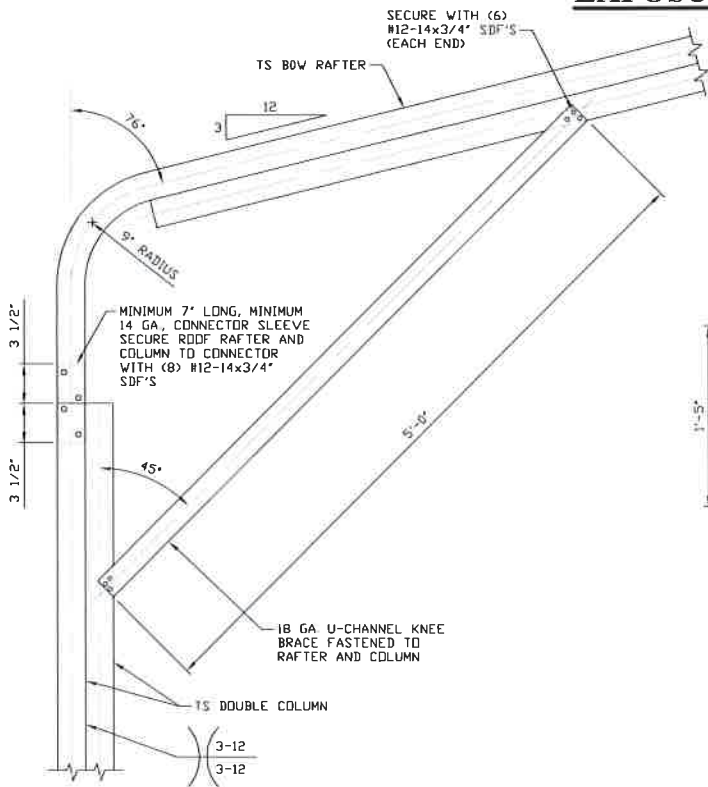
1B
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS <= 10'
 SCALE: NTS



BRACE SECTION
 SCALE: NTS

MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	HBO CARPORTS, INC. 998 W PINE ST. MOUNT AIRY, NC 27030 30'x20' PARTIALLY ENCLOSED STRUCTURE			
	CHECKED BY: PDH	PROJECT MGR: WSM	DATE: 6-26-17	SCALE: NTS	JOB NO: 17118S
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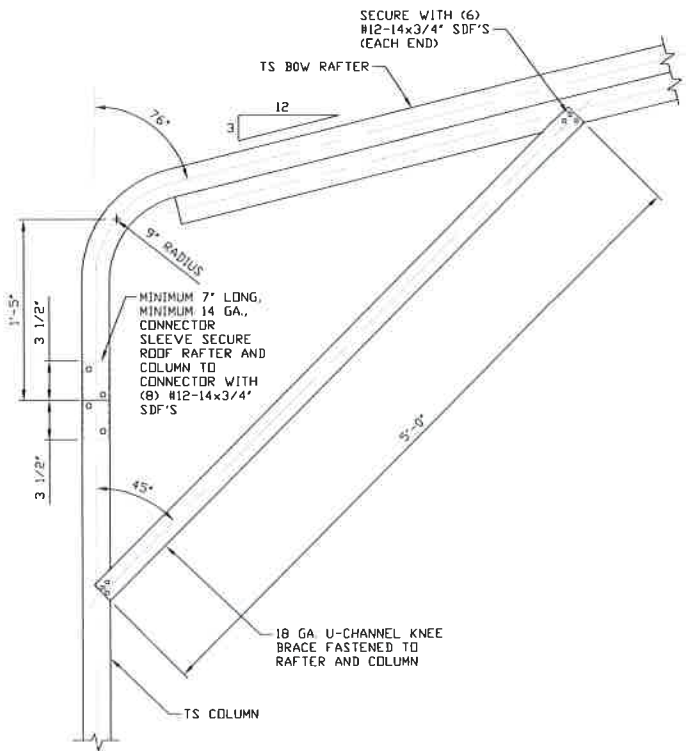
EXPOSURE C



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10' < TO ≤ 16'

1A

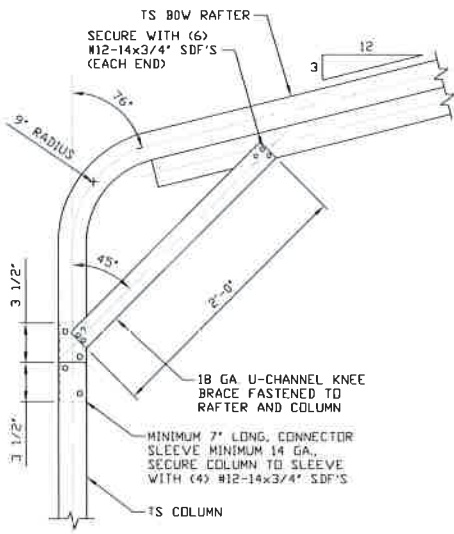
SCALE: NTS



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 8' < TO ≤ 10'

1B

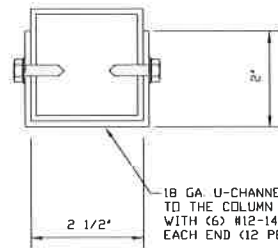
SCALE: NTS



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS ≤ 8'

1C

SCALE: NTS



BRACE SECTION

SCALE: NTS

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CLIENT: HBO

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DATE: 6-26-17

SHT. 7A

SCALE: NTS

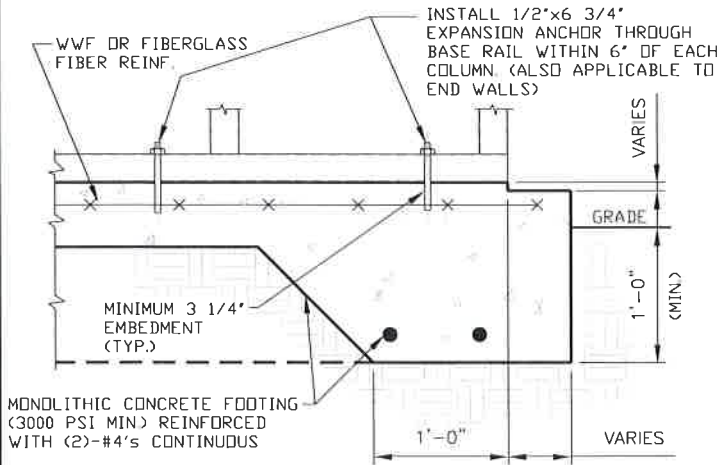
DWG. NO: SK-2

JOB NO: 17118S

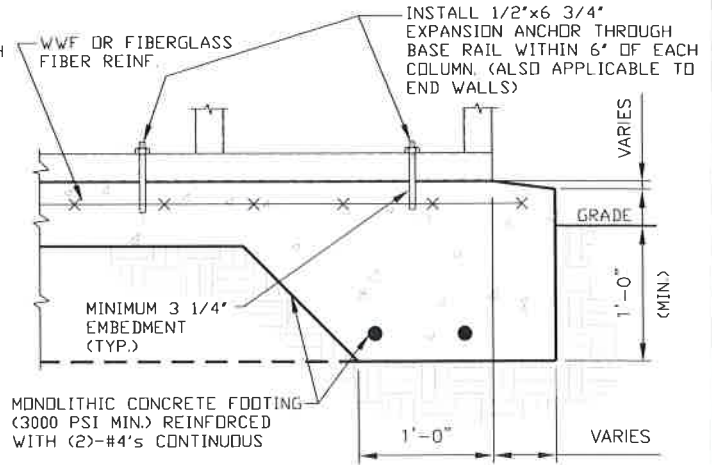
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BASE RAIL ANCHORAGE OPTIONS



**3A CONCRETE MONOLITHIC SLAB
BASE RAIL ANCHORAGE**
SCALE: NTS
(MINIMUM ANCHOR EDGE DISTANCE IS 4')



**3B CONCRETE SLAB BASE
RAIL ANCHORAGE**
SCALE: NTS
(MINIMUM ANCHOR EDGE DISTANCE IS 4')

GENERAL NOTES

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:

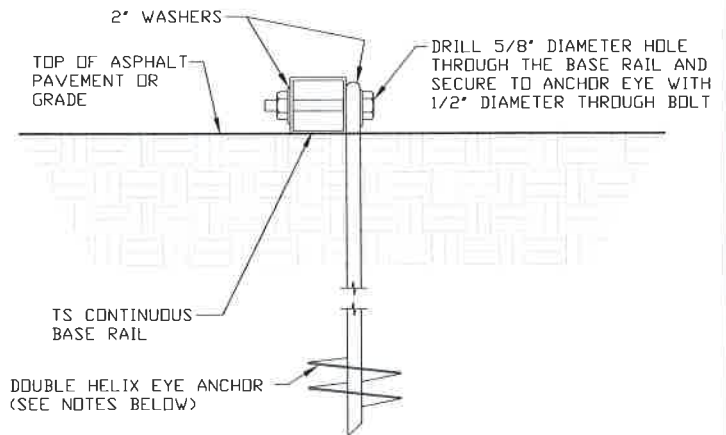
THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

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 LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL, USE MINIMUM (2) 8" HELICES WITH MINIMUM 60" EMBEDMENT.



3C GROUND BASE HELIX ANCHORAGE
SCALE: NTS (CAN BE USED FOR ASPHALT)

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SHT. 8

SCALE: NTS

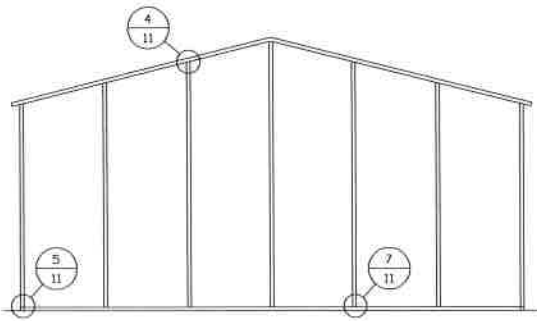
DWG. NO: SK-2

JOB NO: 17118S

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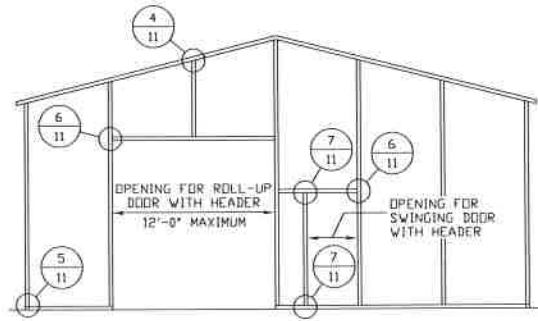
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



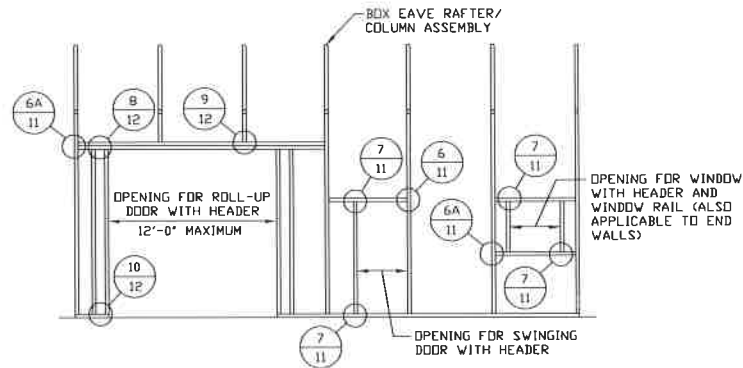
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

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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DATE: 6-26-17

SHT. 9

SCALE: NTS

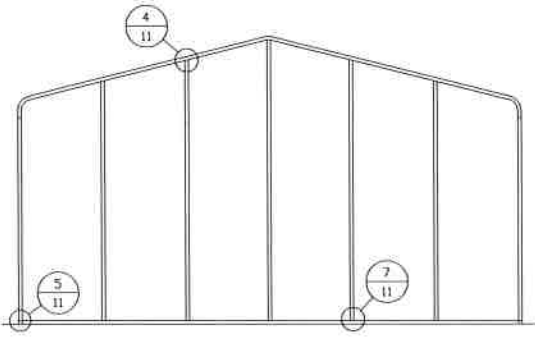
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JOB NO: 17118S

REV.: 0

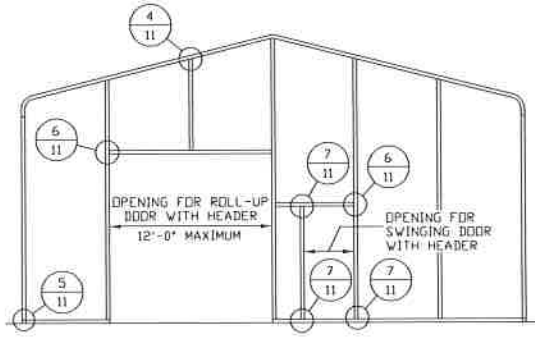
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BOW RAFTER END WALL AND SIDE WALL OPENINGS



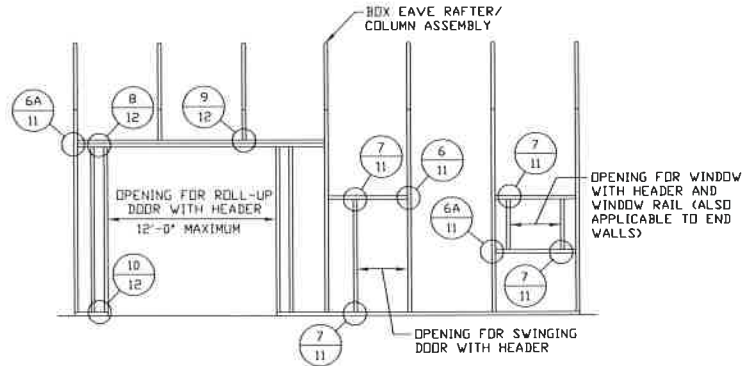
**TYPICAL BOW RAFTER END
WALL FRAMING SECTION**

SCALE: NTS



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

SCALE: NTS



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

SCALE: NTS

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DATE: 6-26-17

SHT. 10

SCALE: NTS

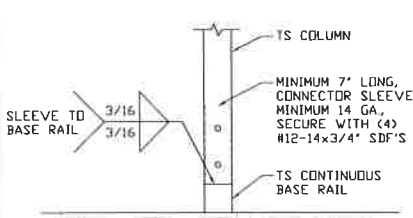
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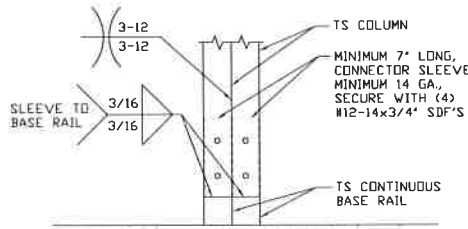
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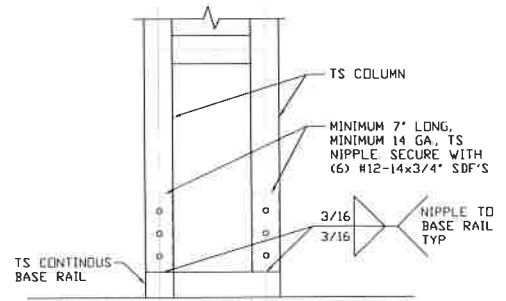
BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



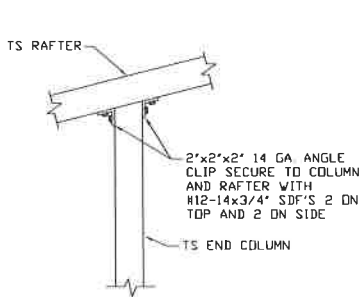
2 COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS



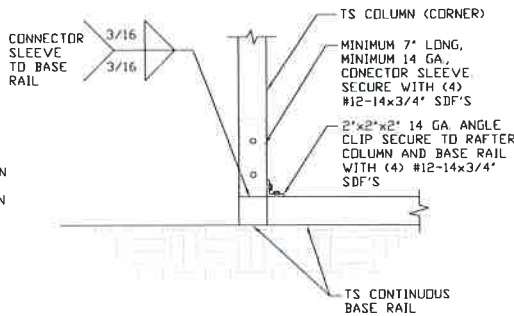
2A COLUMN/BASE RAIL CONNECTION DETAIL
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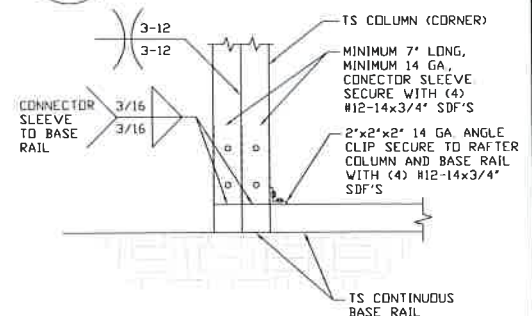
2B COLUMN/BASE RAIL CONNECTION DETAIL
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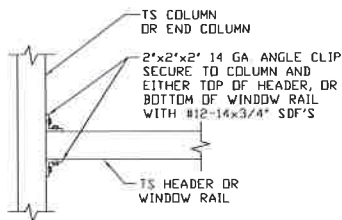
4 END COLUMN/RAFTER CONNECTION DETAIL
SCALE: NTS



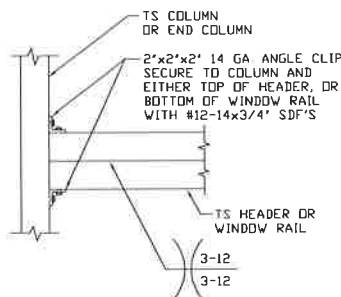
5 END COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS



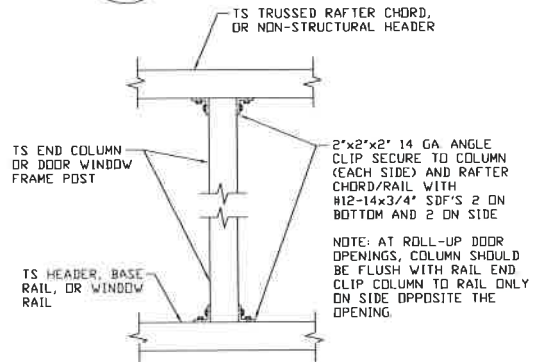
5A END COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS



6 COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL
SCALE: NTS



6A COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL
SCALE: NTS



7 COLUMN TO HEADER, BASE RAIL OR WINDOW RAIL CONNECTION DETAIL
SCALE: NTS

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DATE: 6-26-17

SHT. 11

SCALE: NTS

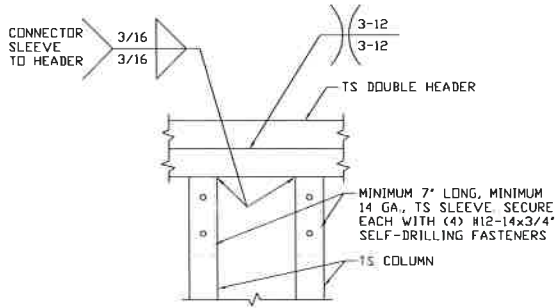
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JOB NO: 17118S

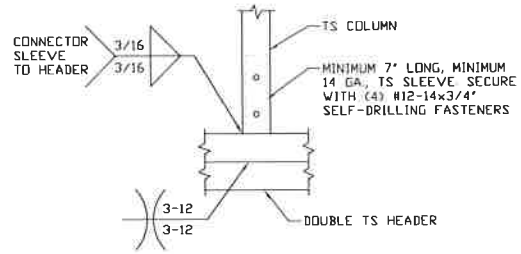
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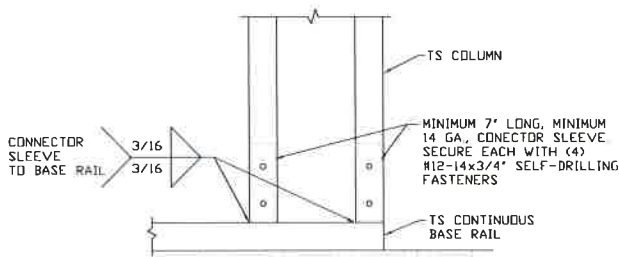
BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



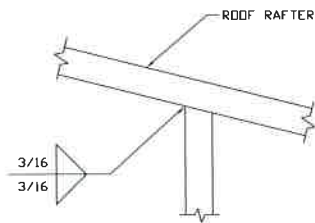
8 **DOUBLE HEADER/COLUMN CONNECTION DETAIL**
SCALE: NTS



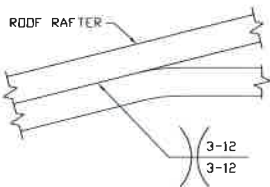
9 **COLUMN/DOUBLE HEADER CONNECTION DETAIL**
SCALE: NTS



10 **COLUMN/BASE RAIL CONNECTION DETAIL**
SCALE: NTS



11 **RAFTER TO CHORD CONNECTION DETAIL**
SCALE: NTS



12 **COLLAR TIE CONNECTION DETAIL**
SCALE: NTS

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DATE: 6-26-17

SHT. 12

SCALE: NTS

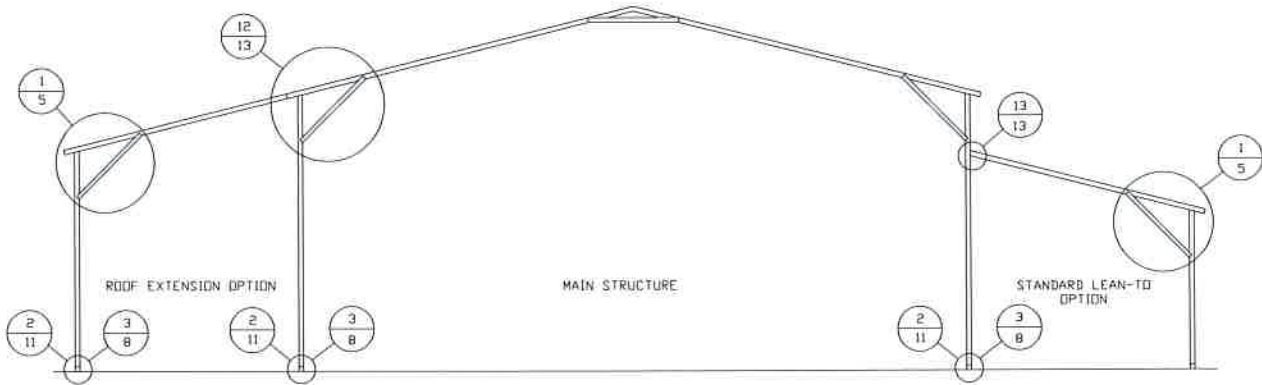
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JOB NO: 17118S

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BOX EAVE RAFTER LEAN-TO OPTIONS

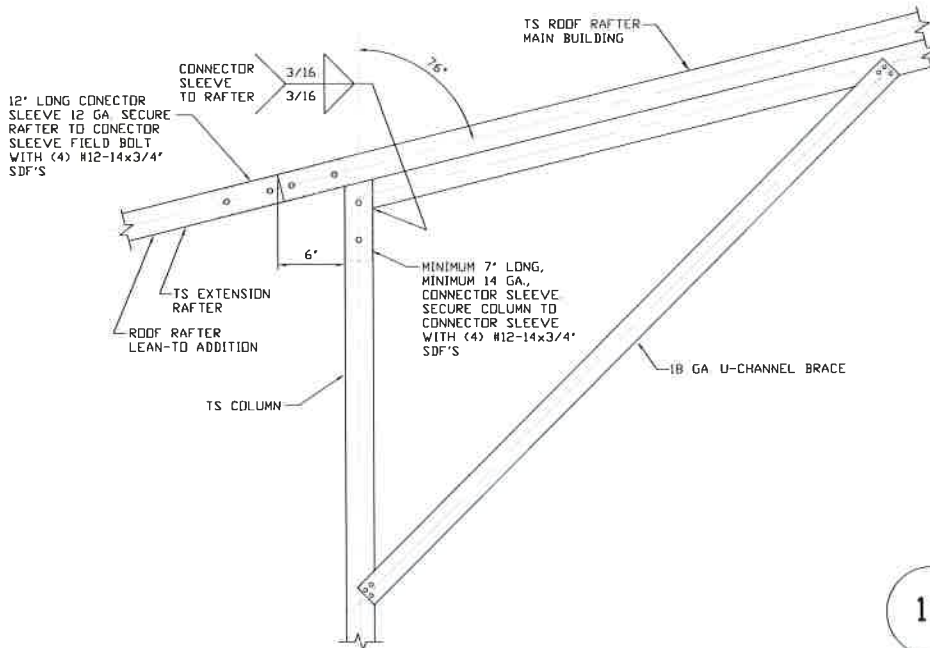


TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

SCALE: NTS

NOTE: MAX. WIDTH OF LEAN-TO W/ SL OF 70 PSF = 11'-0"

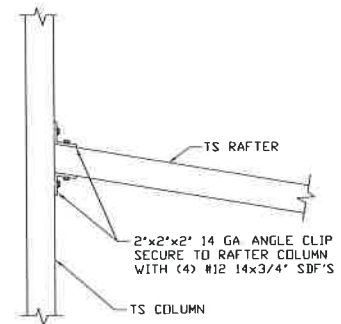
MAX. WIDTH OF LEAN-TO W/ SL OF < 70 PSF = 12'-0"



12

SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS



13

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS

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**HBO CARPORTS, INC.
998 W PINE ST.**

**MOUNT AIRY, NC 27030
30'x20' PARTIALLY ENCLOSED STRUCTURE**

DATE: 6-26-17

SHT. 13

SCALE: NTS

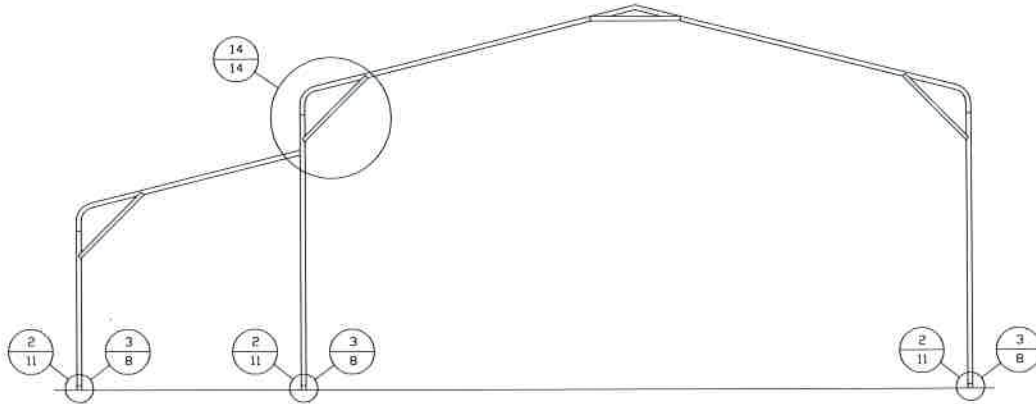
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BOW RAFTER LEAN-TO OPTION

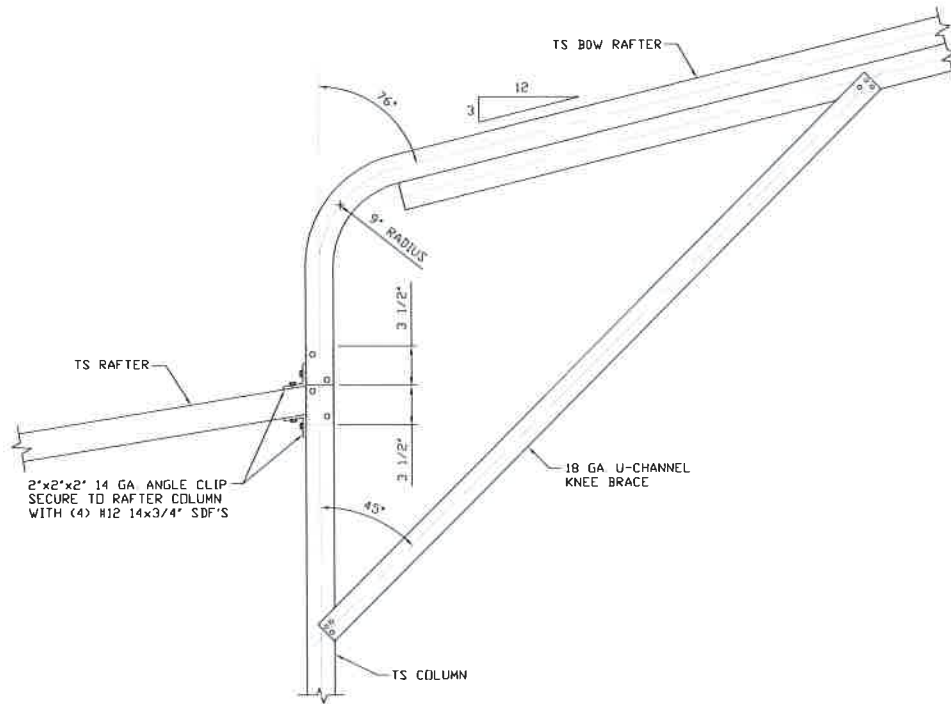


TYPICAL BOW RAFTER LEAN-TO OPTION FRAMING SECTION

SCALE: NTS

NOTE: MAX. WIDTH OF LEAN-TO W/ SL OF 70 PSF = 11'-0"

MAX. WIDTH OF LEAN-TO W/ SL OF < 70 PSF = 12'-0"



LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

14

SCALE: NTS

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DATE: 6-26-17

SHT. 14

SCALE: NTS

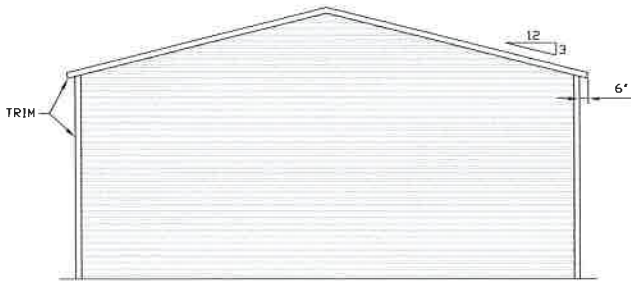
DWG. NO: SK-2

JOB NO: 17118S

REV: 0

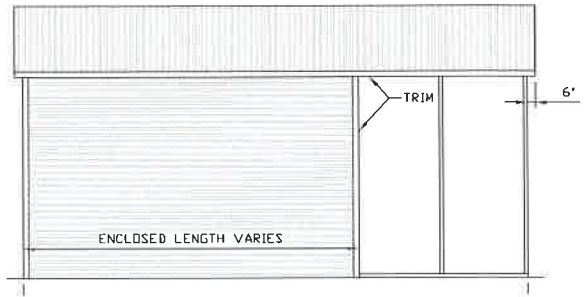
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BOX EAVE RAFTER VERTICAL ROOF OPTION



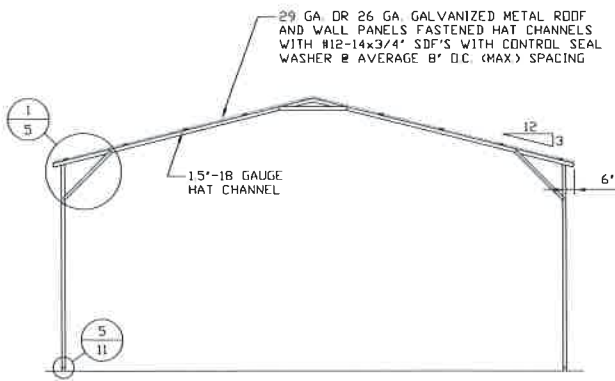
TYPICAL END ELEVATION-VERTICAL ROOF

SCALE: NTS



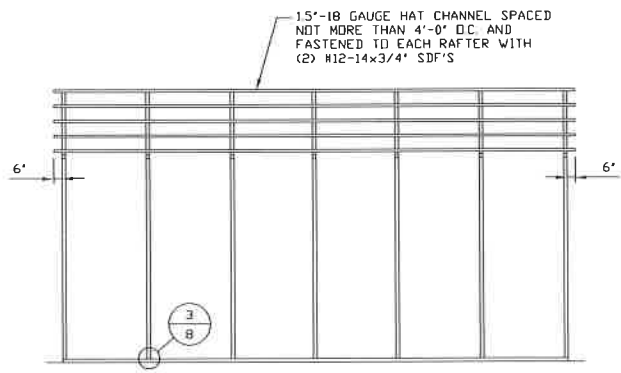
TYPICAL SIDE ELEVATION-VERTICAL ROOF OPTION

SCALE: NTS



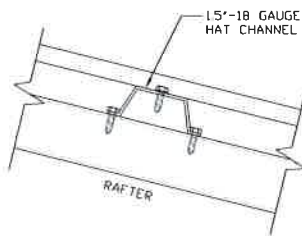
TYPICAL SECTION-VERTICAL ROOF

SCALE: NTS



TYPICAL FRAMING SECTION-VERTICAL ROOF OPTION

SCALE: NTS



ROOF PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS)

SCALE: NTS

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

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: HBO

HBO CARPORTS, INC.
998 W PINE ST.
MOUNT AIRY, NC 27030
30'x20' PARTIALLY ENCLOSED STRUCTURE

DATE: 6-26-17

SHT. 15

SCALE: NTS

DWG. NO: SK-2

JOB NO: 1711BS

REV: 0

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