

# 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:

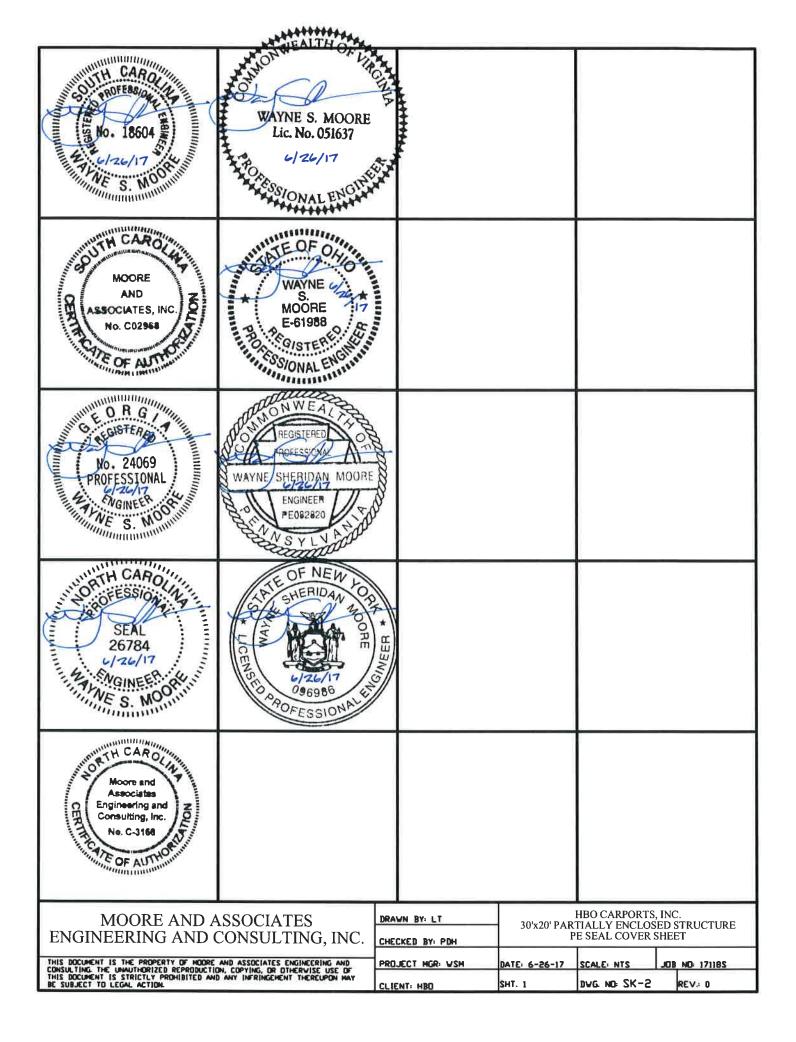
HBO Carports, Inc. 998 W Pine St. Mount Airy, North Carolina 27030

### Prepared by:

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

> 401 S. Main Street, Suite 200 Mt. Airy, NC 27030



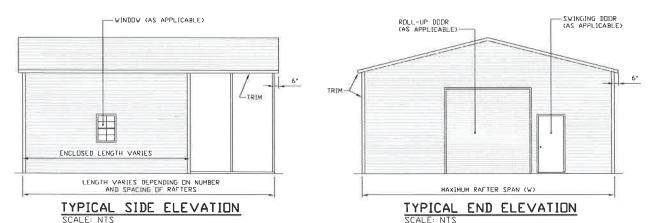


# DRAWING INDEX

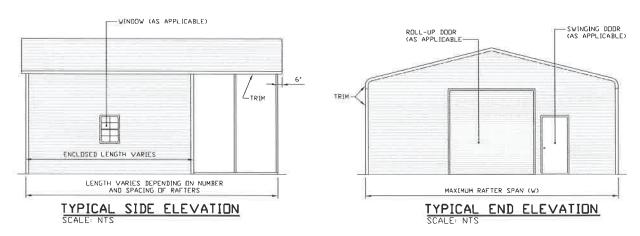
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# BOX EAVE FRAME RAFTER STRUCTURE (Sheets 4, 4A, 4B, 4C, 5, 5A, 5B, 5C, 8, 9, 11, 12, 13 AND 15)



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



#### 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 CARDLINA 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 CATHIL)
  - C> GROUND SNOW LOAD = 30 PSF ( $\leq$  24'), 70 PSF (24' < W  $\leq$  30')
- 4. LOW 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 1 ONLY))
- 5 LOW HAZARD RISK CATEGORY I AND II (WIND)
- 6: WIND EXPOSURE CATEGORY B OR C.
- 7. SPECIFICATIONS APPLICABLE TO 29 GAUGE (FOR SL & GO PSF) AND 26 GAUGE (FOR SL ) GO PSF) METAL PANELS FASTENED DIRECTLY TO 2 1/2' × 2 1/2' 14 GAUGE TUBE STEEL (TS) FOR RISK CAT, I AND 2 1/4' × 2 1/4' 12 GAUGE (TS) FOR RISK CAT, II FRAMING MEMBERS (UNLESS NOTED DTHERWISE).
- 8 AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 8' D.C. (MAX.)
- 9 FASTENERS CONSIST OF #12-14×3/4\* 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 (SDIL NAILS) CONSIST OF #4 REBAR W/ WELDED NUT x 30' LONG IN SUITABLE SDIL CONDITIONS OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SDILS AND MUST BE USED IN UNSUITABLE SDILS 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

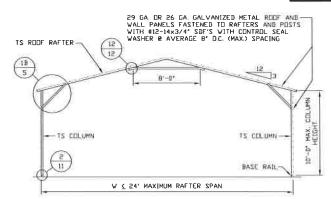
I<sub>E</sub>= 1.0

 $S_{00} = 1.522$ 

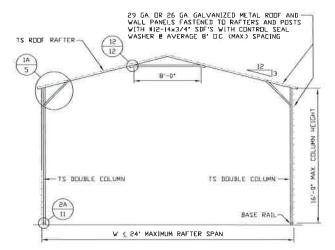
v= csw

SDI= 0.839

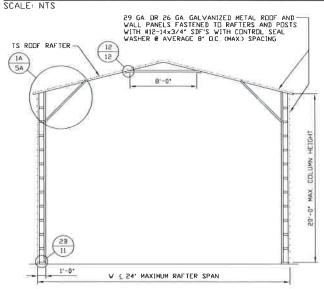
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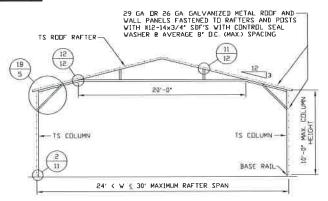
# TYPICAL RAFTER/COLUMN END FRAME SECTION



# TYPICAL RAFTER/COLUMN END FRAME SECTION

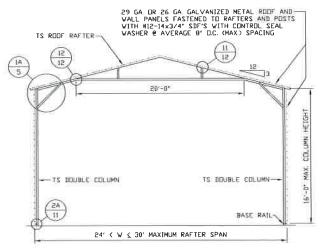


# TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS



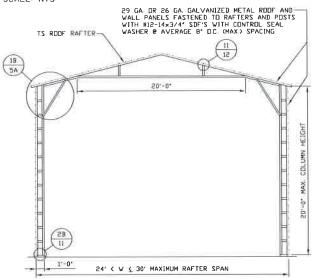
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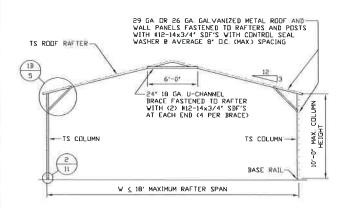


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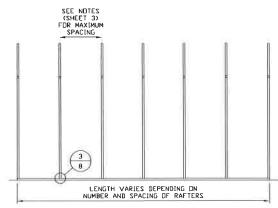
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TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS



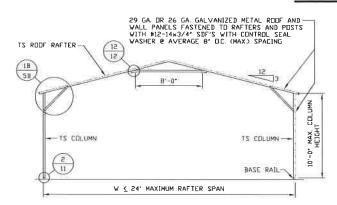
TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION SCALE: NTS

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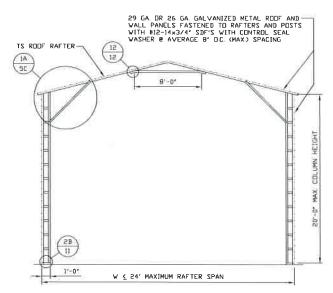
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### **EXPOSURE C**

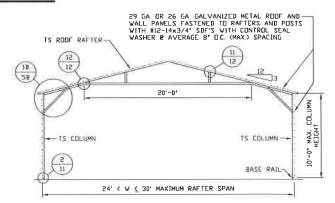


### TYPICAL RAFTER/COLUMN END FRAME SECTION

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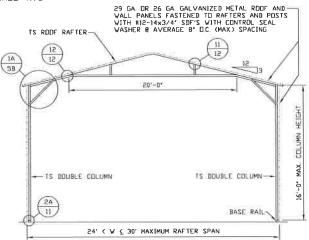


# TYPICAL RAFTER/COLUMN END FRAME SECTION



## TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



# TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS

29 GA DR 26 GA GALVANIZED METAL RODF AND
VALL PANELS FASTENED TO RAFTERS AND POSTS
VITH BI2-14×3/4" S DF 2 WITH CONTROL SEAL
VASHER @ AVERAGE B' D.C. (MAX.) SPACING

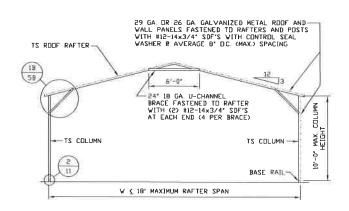
11
12
13
14
15
16
17
18
20'-D'
2

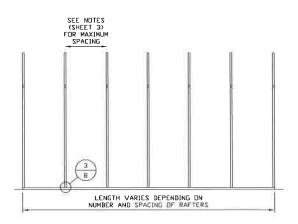
# TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS

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# **EXPOSURE C**





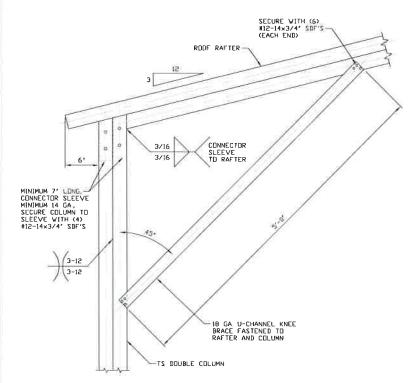
TYPICAL RAFTER/COLUMN END FRAME SECTION

TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION SCALE: NTS

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

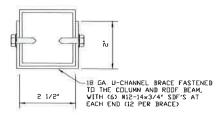
SECURE WITH (6)

NIZ-14x3/4' SDF'S
(EACH END)

MINIMUM 7' LCING
CONNECTOR SLEEVE
MINIMUM 14 GA,
SECURE CDLUMN TO
SLEEVE WITH (4)
#12-14x3/4' SDF'S

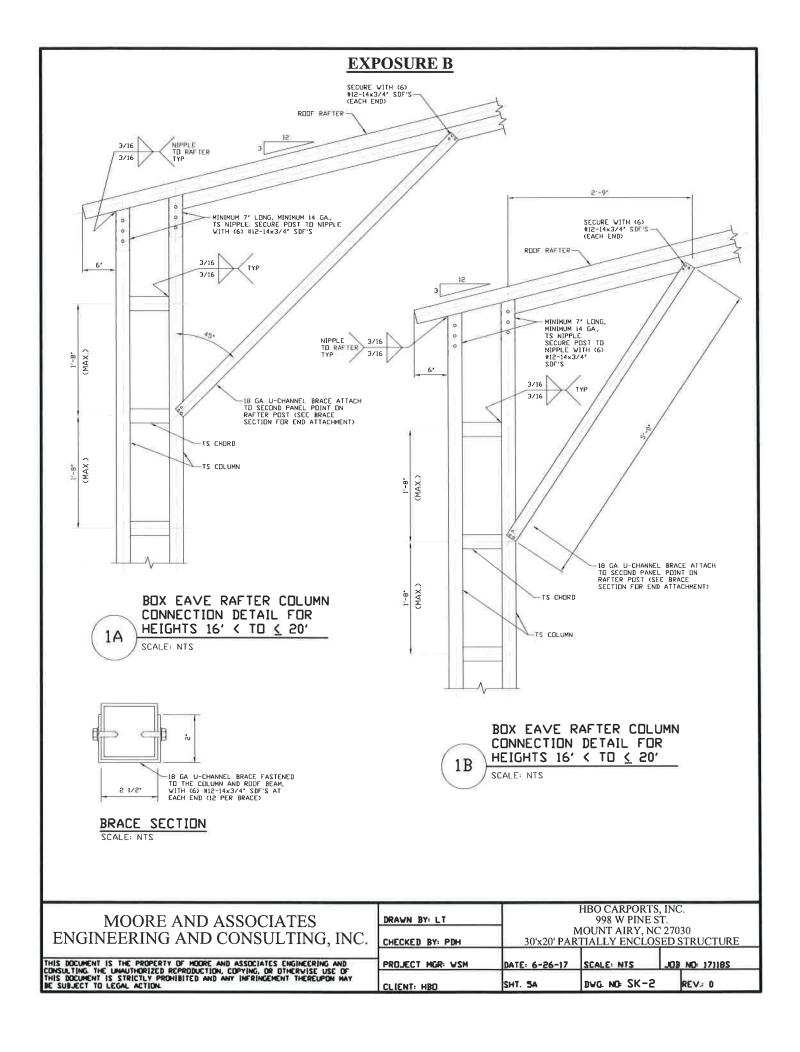
18 GA U-CHANNEL KNEE
BRACE FASTENED TO
RAFTER AND COLUMN
TS CDLUMN

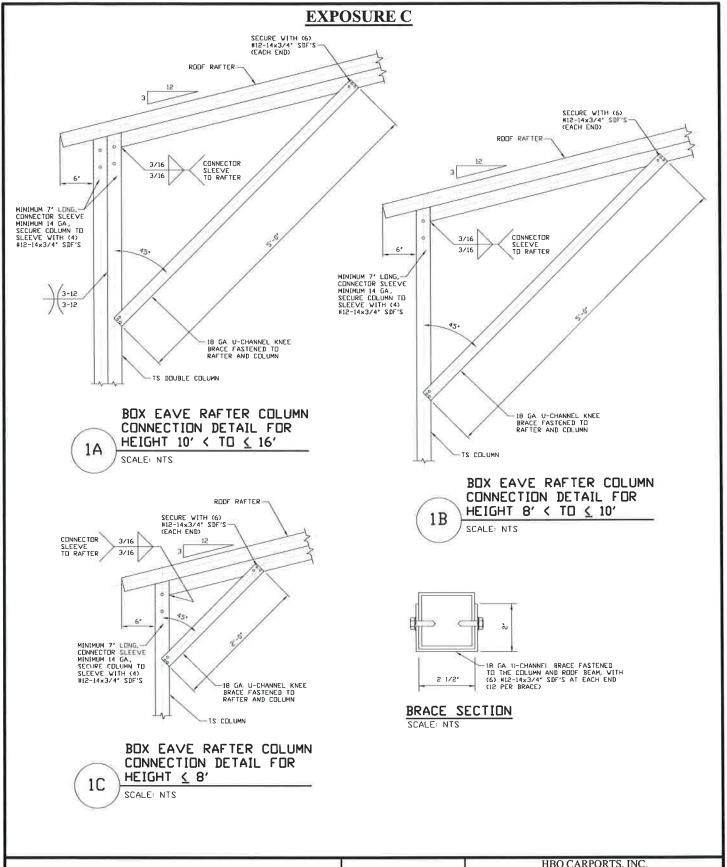
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS & 10'



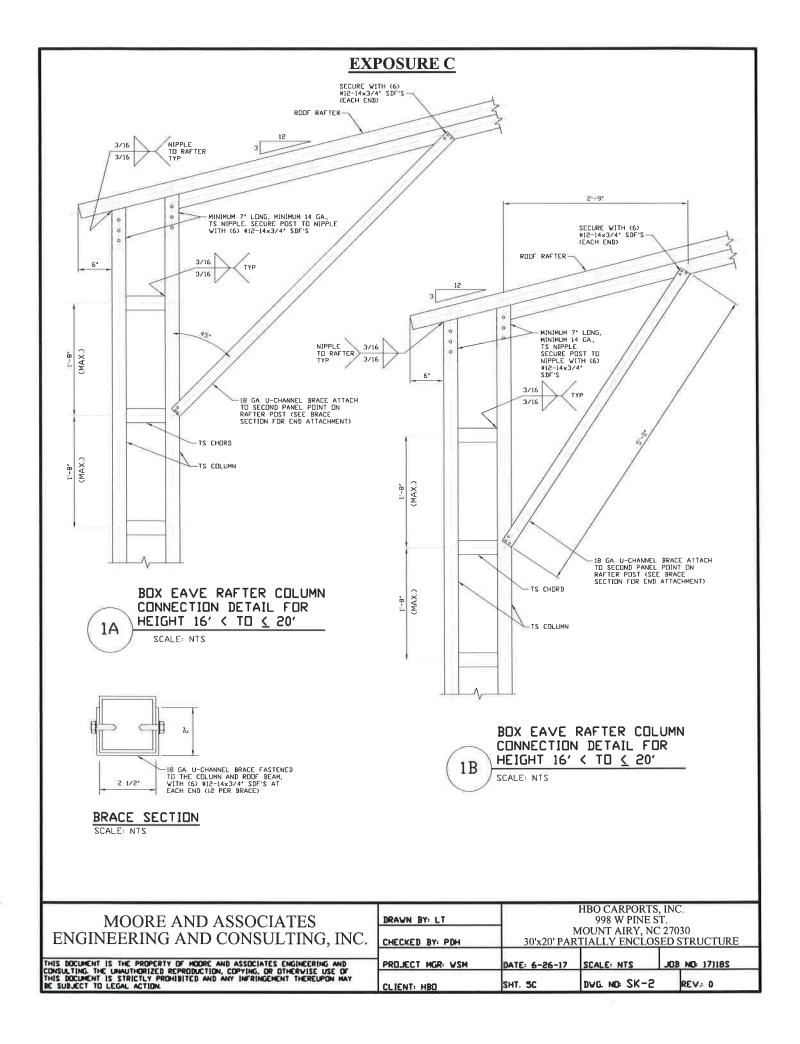
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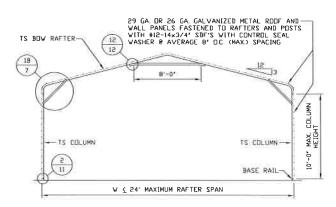
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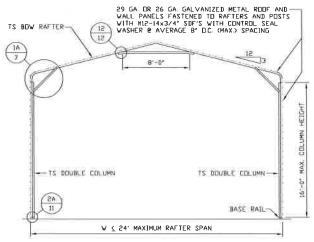
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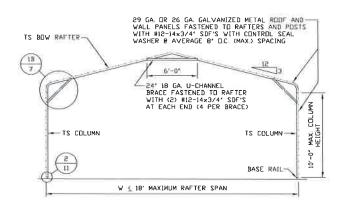
#### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



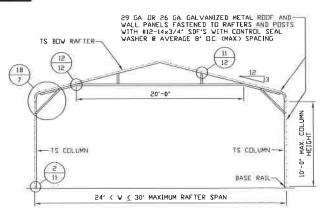
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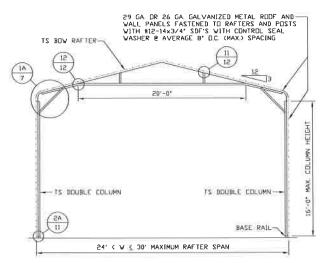
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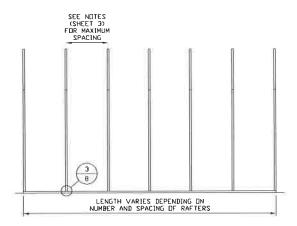
#### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



#### TYPICAL RAFTER/COLUMN END FRAME SECTION

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#### TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

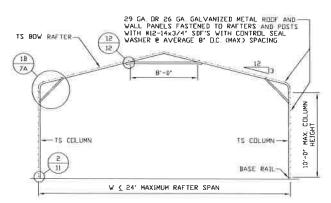
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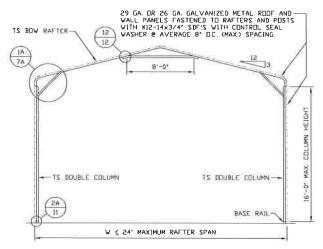
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CHECKED BI. PUH	30 A20 I AIC	30 X20 PARTIALLY ENCLOSED STRUCTURE				
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## **EXPOSURE C**



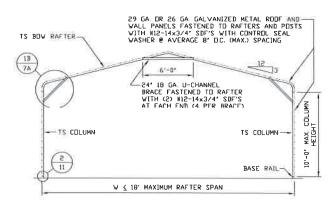
### TYPICAL RAFTER/COLUMN END FRAME SECTION

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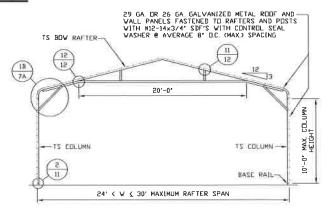
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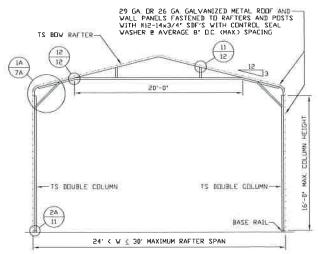
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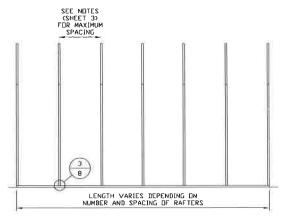
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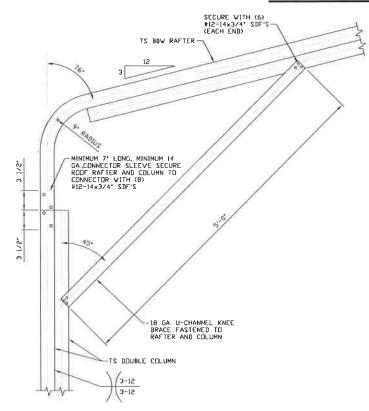
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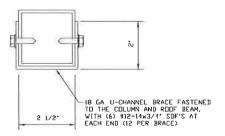
#### TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

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# BRACE SECTION SCALE: NTS

TS BOW RAFTER SECURE VITH (6) HI2-14x3/4' SDF'S (EACH END)  3. Rabus	
72/1 E	
18 GA U-CHANNEL KNEE BRACE FASTENED TO RAFTER AND COLUMN MINIMUM 7' LONG, CONNECTOR	
SLEEVE MINIMUM 14 GA., SECURE COLUMN TO SLEEVE VITH (4) 812-14x3/4' SDF'S TS COLUMN	

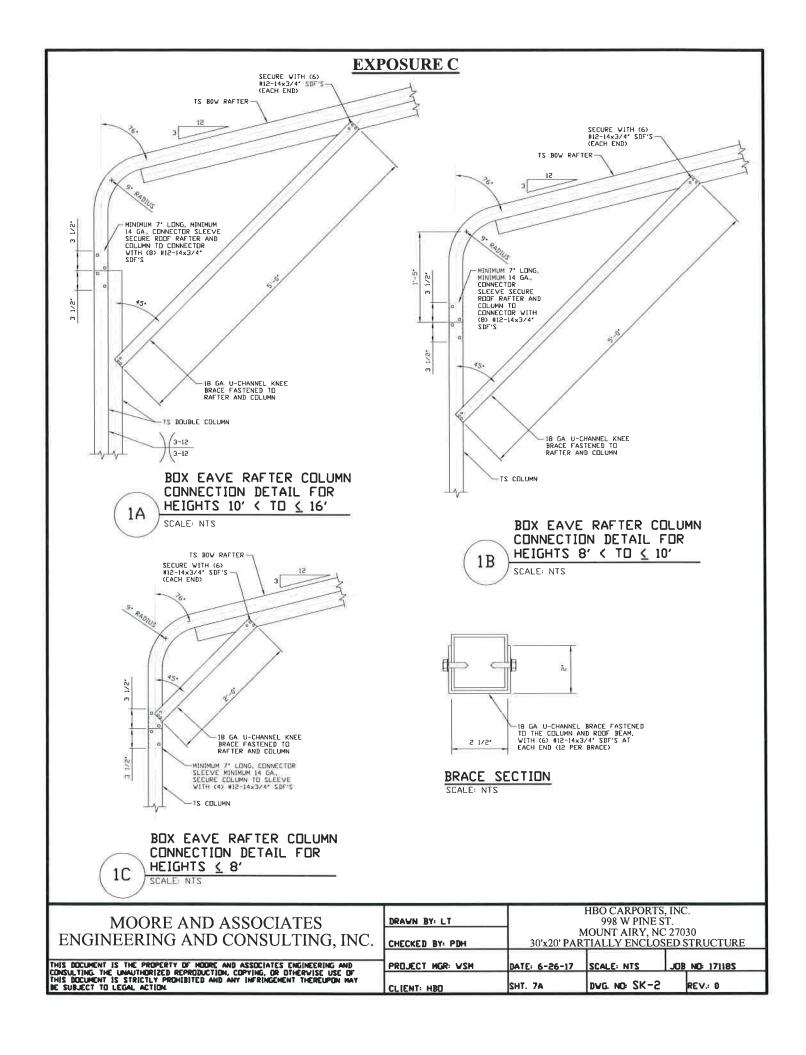
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS & 10'

1B SCALE: NTS

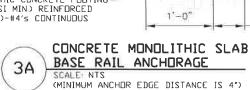
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### **BASE RAIL ANCHORAGE OPTIONS** INSTALL 1/2'x6 3/4" EXPANSION ANCHOR THROUGH BASE RAIL WITHIN 6' DF EACH COLUMN (ALSO APPLICABLE TO WWF DR FIBERGLASS FIBER REINF END WALLS> VARIES GRADE 9 (MIM) MINIMUM 3 1/4" EMBEDMENT (TYP.) MONDLITHIC CONCRETE FOOTING (3000 PSI MIN) REINFORCED WITH (2)-#4's CONTINUOUS 1'-0" **VARIES**



## GENERAL NOTES

#### CONCRETE:

CONCRETE SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH DF 3,000 PSI AT 28 DAY

#### COVER OVER REINFORCING STEEL:

FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING

PARS SHALL BE PER ACI-318:

3' IN FDUNDATIONS 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:

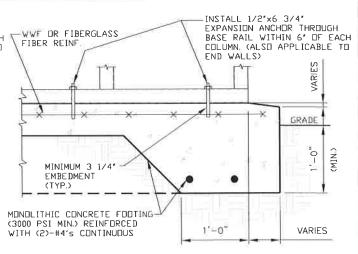
THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

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

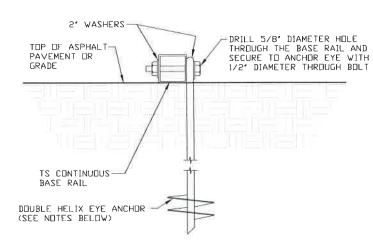
- 1. REINFORCEMENT IS BENT COLD.
- THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS.
  REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT
- BE FIELD BENT.

#### 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 LODSE TO MEDIUM DENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL, USE MINIMUM (2) 6' HELICES WITH MINIMUM
- 5; FDR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL, USE MINIMUM (2) 8' HELICES WITH MINIMUM 60' EMBEDMENT,



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



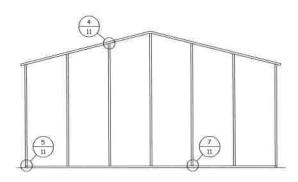
GROUND BASE HELIX ANCHORAGE SCALE: NTS (CAN BE USED FUR ASPHALT)

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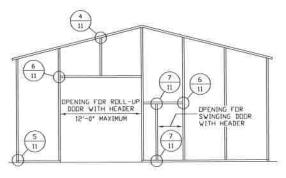
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PROJECT MGR: VSM	DATE: 6-26-17	SCALE: NTS	JOE	NO: 17118S	
CLIENT: HBO	SHT. 8	DVG. NO: SK-2	2	REV. 0	

# BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



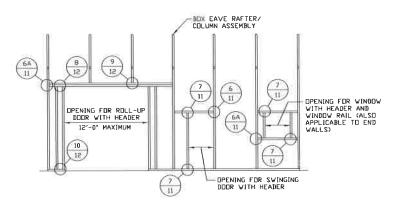
TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

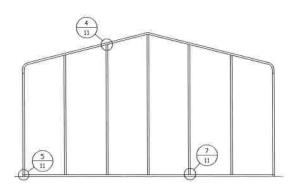
SCALE: NTS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION SCALE: NTS

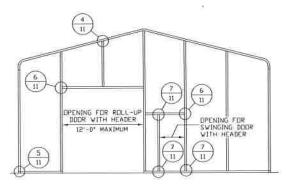
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# **BOW RAFTER END WALL AND SIDE WALL OPENINGS**



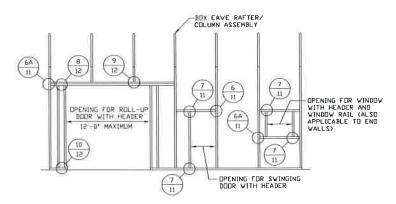
TYPICAL BOW RAFTER END WALL FRAMING SECTION

SCALE: NTS



TYPICAL BOW RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



TYPICAL BOW RAFTER SIDE WALL OPENINGS FRAMING SECTION

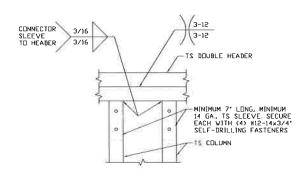
SCALE: NTS

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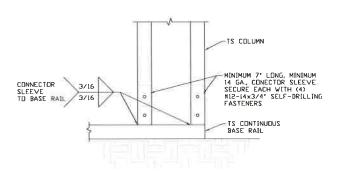
#### **BOW AND BOX EAVE RAFTER WALL OPENING DETAILS** TS COLUMN TS COLUMN TS COLUMN MINIMUM 7' LONG, CONNECTOR SLEEVE MINIMUM 14 GA., SECURE WITH (4) #12-14x3/4' SDF'S MINIMUM 7' LDNG, MINIMUM 14 GA, TS NIPPLE SECURE WITH (6) #12-14x3/4' SDF'S MINIMUM 7' LUNG, CUNNECTUR SLEEVE MINIMUM 14 GA., SECURE WITH (4) #12-14×3/4' SDF'S SLEEVE TO 3/16 BASE RAIL 3/16 SLEEVE TO BASE RAIL 3/16 3/16 o NIPPLE TO BASE RAIL TYP 3/16 TS CONTINUOUS BASE RAIL TS CONTINUOUS BASE RAIL 3/16 TS CONTINOUS BASE RAIL COLUMN/BASE RAIL COLUMN/BASE RAIL CONNECTION DETAIL COLUMN/BASE RAIL CONNECTION DETAIL 2A SCALE: NTS CONNECTION DETAIL SCALE: NTS 2B TS COLUMN (CORNER) TS COLUMN (CORNER) 3-12 CONNECTOR SLEEVE TO BASE RAIL MINIMUM 7" LDNG, MINIMUM 14 GA, CDNECTOR SLEEVE SECURE WITH (4) #12-14×3/4" SDF'S 3/16 TS RAFTER MINIMUM 7' LDNG, MINIMUM 14 GA, CDNECTOR SLEEVE SECURE WITH (4) #12-14x3/4' SDF'S 3-12 CONNECTOR SLEEVE TO BASE RAIL 3/16 2'x2'x2' 14 GA ANGLE CLIP SECURE TO RAFTER COLUMN AND BASE RAIL WITH (4) #12-14x3/4' SDF'S -2'x2'x2' 14 GA ANGLE CLIP SECURE TO RAFTER COLUMN AND BASE RAIL WITH (4) #12-14x3/4' SDF'S 2'x2'x2' 14 GA ANGLE CLIP SECURE TD COLUMN AND RAFTER WITH H12-14x3/4' SDF'S 2 DN TOP AND 2 DN SIDE TS END COLUMN TS CONTINUOUS BASE RAIL TS CONTINUOUS BASE RAIL END COLUMN/RAFTER END COLUMN/BASE RAIL END COLUMN/BASE RAIL CONNECTION DETAIL CONNECTION DETAIL 4 CONNECTION DETAIL 5 SCALE: NTS 5A SCALE: NTS TS TRUSSED RAFTER CHDRD, DR NON-STRUCTURAL HEADER TS COLUMN OR END COLUMN TS COLUMN OR END COLUMN 2'x2'x2' 14 GA ANGLE CLIP SECURE TD CDLUMN AND EITHER TDP OF HEADER, DR BOTTOM OF WINDOW RAIL WITH #12-14x3/4' SDF'S 2'x2'x2' 14 GA ANGLE CLIP SECURE TO COLUMN AND EITHER TOP OF HEADER, DR BOTTOM OF WINDOW RAIL WITH #12-14x3/4' SDF'S -2'x2'x2' 14 GA ANGLE CLIP SECURE TO COLUMN (EACH SIDE) AND RAFTER CHORD/RAIL WITH #12-14x3/4' SDF'S 2 ON BOTTOM AND 2 ON SIDE TS END COLUMN — OR DOOR WINDOW FRAME POST NOTE: AT ROLL-UP DOOR DPENINGS, COLUMN SHOULD BE FLUSH WITH RAIL END CLIP COLUMN TO RAIL ONLY ON SIDE OPPOSITE THE OPENING. IS HEADER DR WINDOW RAIL TS HEADER OR WINDOW RAIL TS HEADER, BASE RAIL, OR WINDOW RAIL 3-12 COLUMN OR WINDOW RAIL TO POST COLUMN OR WINDOW CONNECTION DETAIL 6 RAIL TO POST COLUMN TO HEADER, BASE SCALE: NTS CONNECTION DETAIL RAIL OR WINDOW RAIL 6A CONNECTION DETAIL SCALE: NTS 7 SCALE: NTS

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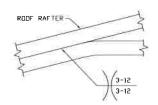
# **BOW AND BOX EAVE RAFTER WALL OPENING DETAILS**



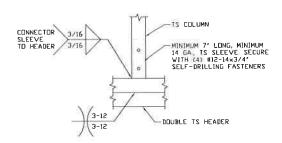
# 8 DOUBLE HEADER/COLUMN CONNECTION DETAIL SCALE: NTS



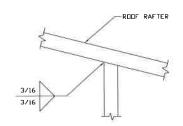
10 COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS



COLLAR TIE CONNECTION DETAIL
SCALE NTS



9 COLUMN/DOUBLE HEADER
CONNECTION DETAIL
SCALE NTS



RAFTER TO CHORD CONNECTION DETAIL

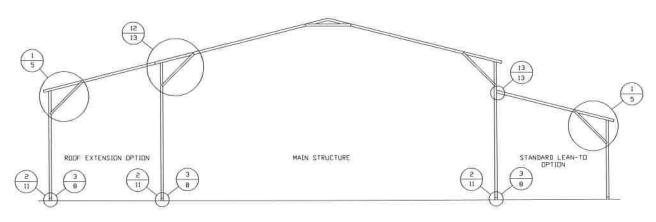
SCALE: NTS

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# **BOX EAVE RAFTER LEAN-TO OPTIONS**

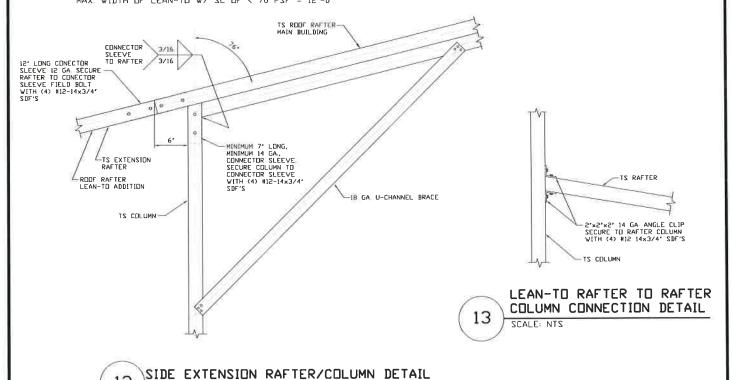


### TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

SCALE: NTS NDTE: MAX. WIDTH OF LEAN-TO W/ SL OF 70 PSF = 11'-0' MAX. WIDTH OF LEAN-TO W/ SL OF < 70 PSF = 12'-0"

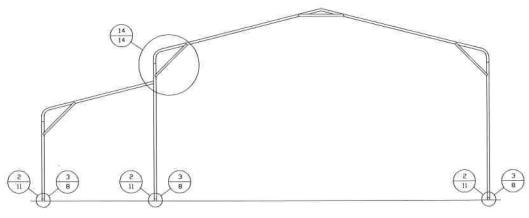
12

SCALE: NTS



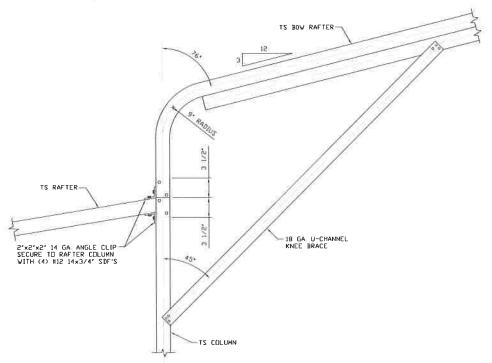
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# **BOW RAFTER LEAN-TO OPTION**



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

SCALE: NTS NDTE: MAX. WIDTH DF LEAN-TD W/ SL DF 70 PSF = 11'-0' MAX. WIDTH DF LEAN-TD W/ SL DF < 70 PSF = 12'-0"

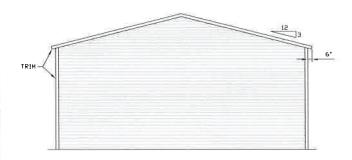


LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS

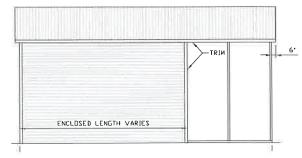
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# **BOX EAVE RAFTER VERTICAL ROOF OPTION**



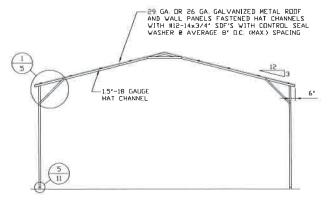
TYPICAL END ELEVATION-VERTICAL ROOF

SCALE: NTS



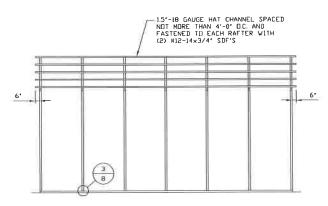
TYPICAL SIDE ELEVATION-VERTICAL ROOF OPTION

SCALE: NTS



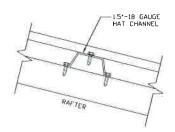
TYPICAL SECTION-VERTICAL ROOF

SCALE: NTS



TYPICAL FRAMING SECTION-VERTICAL ROOF OPTION

SCALE: NTS



ROOF PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS) SCALE: NTS

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