

### STRUCTURAL DESIGN

# ENCLOSED BUILDING EXPOSURE B

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



18 December 2017 Revision 4 M&A Project No. 16022S/17300S

Prepared for:

Tubular Building Systems, LLC 631 SE Industrial Circle Lake City, Florida 32025

Prepared by:

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

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





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MOORE AND A ENGINEERING AND	CONSULTING, INC.	CHECK	N BY: LT	30'-0"x20'-0 P.	JLAR BUILDING D' ENCLOSED BU E SEAL COVER S	JILDING EXP. B SHEET
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#### INSTALLATION NOTES AND SPECIFICATIONS

- 1. DESIGN IS FOR A MAXIMUM 30'-0' WIDE x 20'-0' EAVE HEIGHT ENCLOSED STRUCTURES.
- 2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2017 FLORIDA BUILDING CODE (FBC) 6TH EDITION, 2012 INTERNATIONAL BUILDING CODE (IBC), AND 2015 IBC
- 3 DESIGN LOADS ARE AS FOLLOWS: A) DEAD LOAD = 1.5 PSF

= 12 PSF

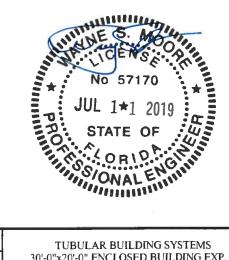
- B) LIVE LOAD
- C) GROUND SNOW LOAD = 10 PSF
- 4. LOW ULTIMATE WIND SPEED 105 TO 140 MPH (NOMINAL WIND SPEED 81 TO 108 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 50 FEET
- 5. HIGH ULTIMATE WIND SPEED 141 TO 170 MPH (NOMINAL WIND SPEED 109 TO 132 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 40 FEET
- 6 LOW HAZARD RISK CATEGORY I (WIND)
- 7. WIND EXPOSURE CATEGORY B.
- 8 SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2 1/2' x 2 1/2' 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS FOR VERTICAL PANELS, 29 GAUGE METAL PANELS SHALL BE FASTENED TO 18 GAUGE HAT CHANNELS (UNLESS DTHERWISE NOTED)
- 9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR PURLINS, AND POSTS, INTERIOR = 9" OR END = 6", (MAX)
- 10 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.
- 11 GROUND ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6" OF EACH RAFTER COLUMN ALONG SIDES.
- 12 GROUND ANCHORS (SDIL NAILS) CONSIST OF #4 REBAR W/WELDED NUT x 30' LONG IN SUITABLE SDIL CONDITIONS MAY BE USED FOR LOW ( 108 MPH NOMINAL) WIND SPEEDS ONLY OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SDILS AND MUST BE USE IN UNSUITABLE SOILS AS NOTED
- 13 OPTIONAL BASE RAIL ANCHORAGE MAY BE USED FOR LOW AND MUST BE USED FOR HIGH WIND SPEEDS
- 14 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

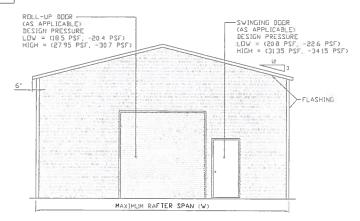
S<sub>DS</sub>= 1522 V= CsM

Spi= 0839



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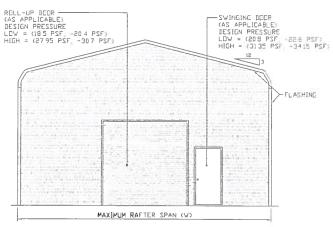
#### BOX EAVE FRAME RAFTER ENCLOSED BUILDING



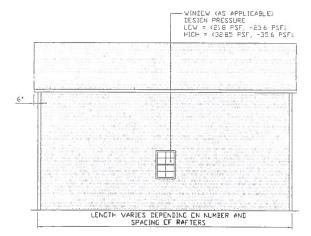
#### TYPICAL END ELEVATION-HORIZONTAL ROOF

SCALE: NTS

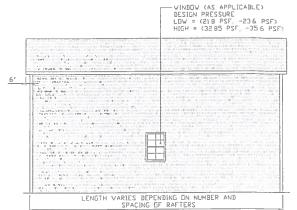
#### BOW FRAME RAFTER ENCLOSED BUILDING



#### TYPICAL END ELEVATION



### TYPICAL SIDE ELEVATION



#### TYPICAL SIDE ELEVATION-HORIZONTAL ROOF

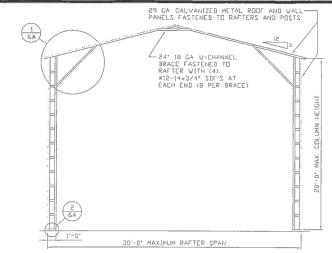
SCALE NTS



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#### TYPICAL RAFTER/COLUMN END FRAME SECTION

29 GA GALVANIZED METAL ROOF AND VALL
PANELS FASTENED TO RAFTERS AND PESTS

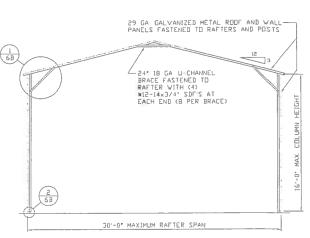
18
24' IB GA U-CHANNEL
BRACE FASTENED TO
RAFTER WITH (4)
W12-14x3/4' SDF'S AT
EACH END (8 PER BRACE)

19
26C

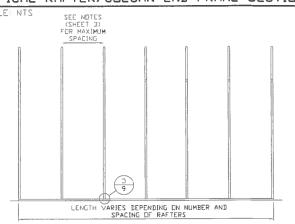
30'-0' MAXIMUM RAFTER SPAN

#### TYPICAL RAFTER/COLUMN END FRAME SECTION

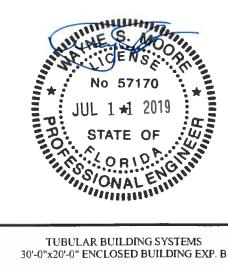
SCALE NTS



#### TYPICAL RAFTER/COLUMN END FRAME SECTION



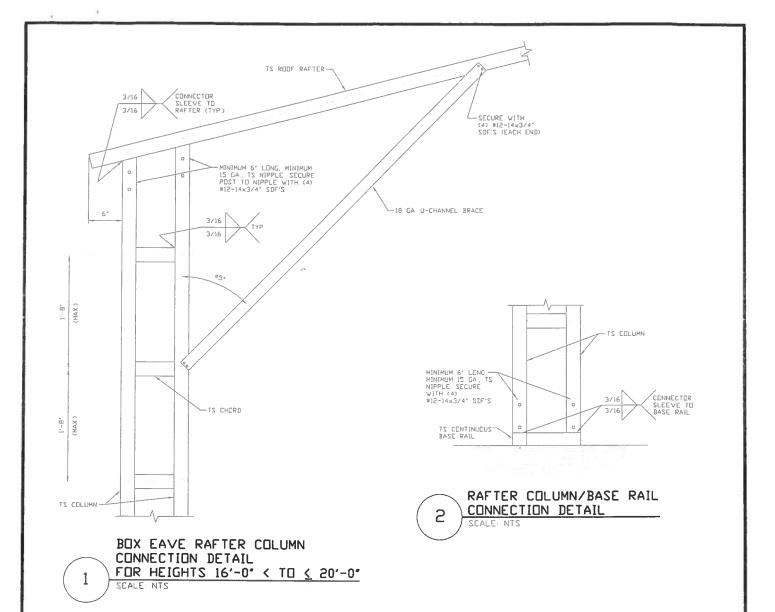
## TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION SCALE NTS

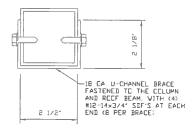


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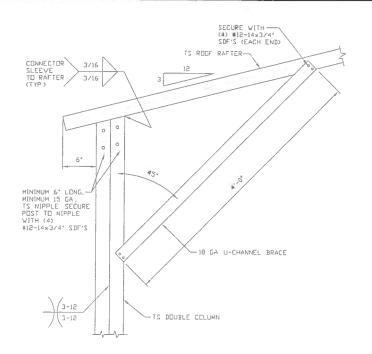




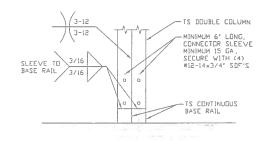
BRACE SECTION
SCALE: NTS



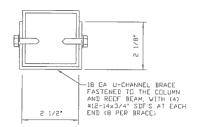
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BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 14'-0" < TO < 16'-0"
SCALE: NTS



2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS



BRACE SECTION

No 57170

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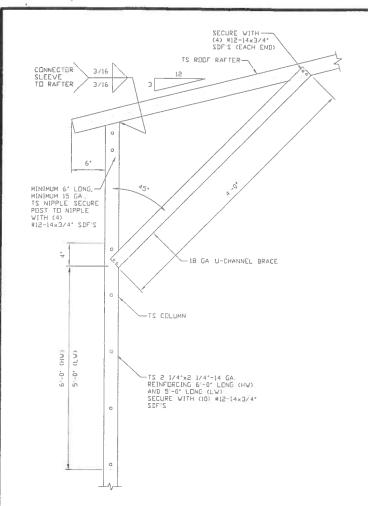
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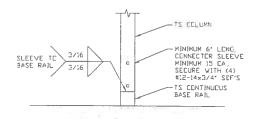
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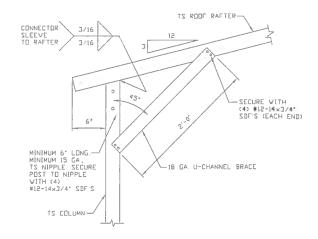
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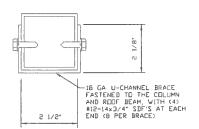
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10'-0" < T□ < 14'-0" 1A



RAFTER COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS



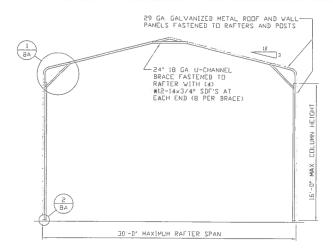
BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS < 10'-0" 1B SCALE: NTS



BRACE SECTION SCALE NTS

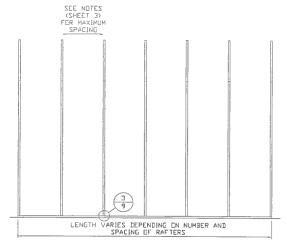


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TYPICAL RAFTER/COLUMN END FRAME SECTION

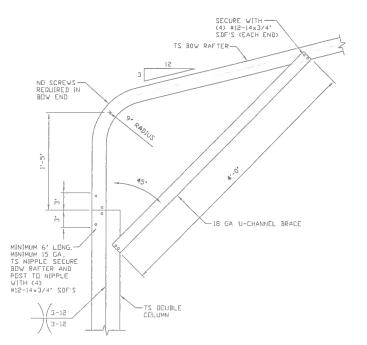
TYPICAL RAFTER/COLUMN END FRAME SECTION



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION



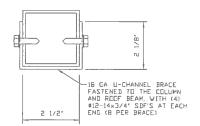
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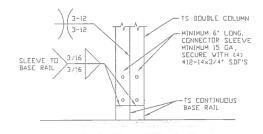
BOX EAVE RAFTER COLUMN
CONNECTION DETAIL

FOR HEIGHTS 14'-0" < TO < 16'-0"

SCALE NTS



BRACE SECTION
SCALE NTS



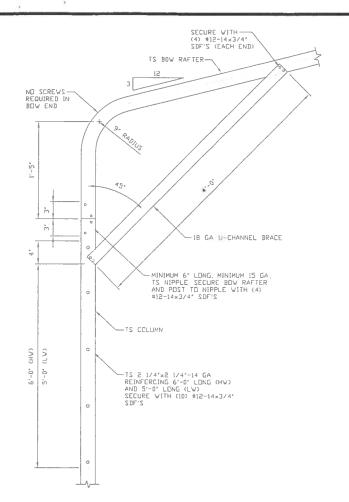
RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL
SCALE NTS



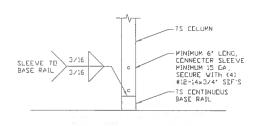
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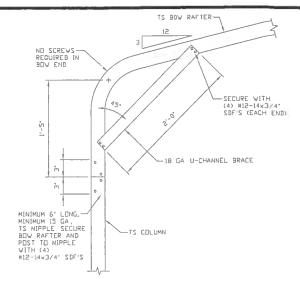
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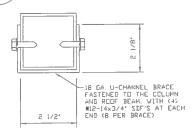
BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 10'-0" < TO < 14'-0"



2 RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL
SCALE NTS



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS < 10'-0"



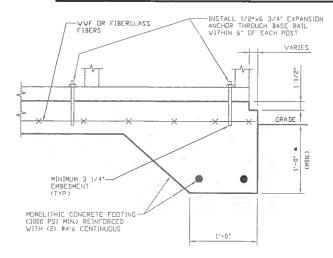
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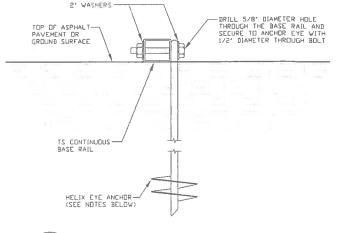
1B



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#### BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED





**3A** 

#### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS (MINIMUM ANCHOR EDGE DISTANCE IS 4") \* COORDINATE WITH LOCAL CODES/ORD

#### GROUND BASE HELIX ANCHORAGE (CAN BE USED FOR ASPHALT)

#### **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 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND I 1/2 INCHES 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 CEBBLES, CALICHE, PRELEADED SILTS AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 30 INCH EMBEDMENT.
- 2 FOR CORAL USE MINIMUM (2) 4" HELICES WITH MINIMUM 30 INCH
- 3 FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY AND CLAYS USE MINIMUM (2) 4' HELICES WITH MINIMUM 3C INCH EMBEDMENT
- 4. FOR LODSE TO MEDIUM CENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL USE MINIMUM (2) 6' HELICES WITH MINIMUM 50 INCH EMBERMENT
- 5 FOR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL USE MINIMUM (2) 8° HELICES WITH MINIMUM 60 INCH EMBEDMENT.

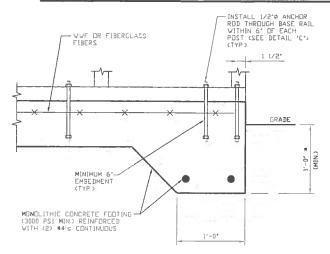


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#### OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED



1A

#### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

(MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2") ★ COORDINATE WITH LOCAL CODES/ORD

#### **GENERAL NOTES**

#### CONCRETE:

CONCRETE SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH DF 3,000 PS1 AT 28 DAYS

#### COVER OVER REINFORCING STEEL:

FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318:

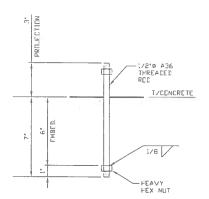
3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

#### 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:

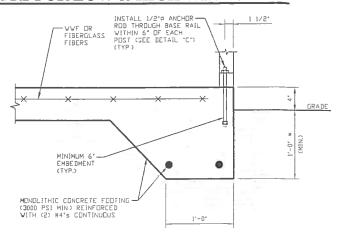
- 1 REINFORCEMENT IS BENT COLD.
  2 THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS.
  3 REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT
- BE FIELD BENT



1C

ANCHOR ROD THROUGH BASE RAIL DETAIL

SCALE: NTS



1B

#### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

(MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2")
\* COORDINATE WITH LOCAL CODES/ORD

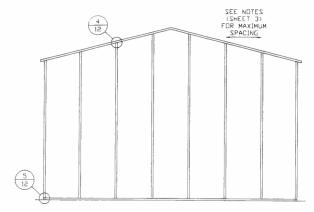


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-	PROJECT MGR: VSM	DATE: 12-18-17		JOB NO: 160225/173005		
	CLIENT: TBS	SHT. 9B	DWG. NO: SK-3	REVa 4		

#### **BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS**



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION SCALE NTS

SEE NDTES
(SHEET 3)
FOR MAXIMUM
SPACING

DPENING FOR
ROLL-UP
DCOR WITH HEADER

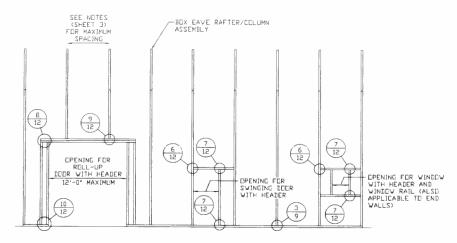
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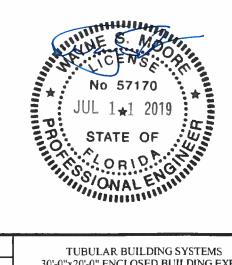
TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



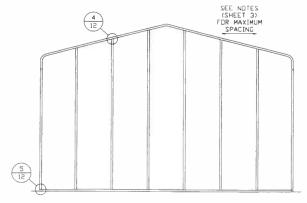
TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS



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



## TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SEE NOTES
(SHEET 3)
FOR MAXIMUM
SPACING

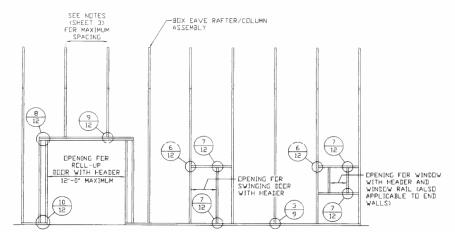
DPENING FOR
RCLL-UP
DEER VITH HEADER

TO THE SVINGING FOR SVINGING DOOR
VITH HEADER

TO THE SVINGING DOOR
VITH HEADER

TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

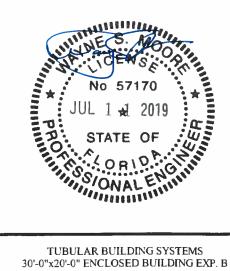
SCALE: NTS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS

SCALE: NTS

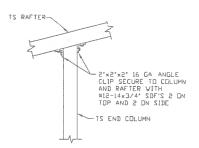


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PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005			
CLIENT: TRS	SHT. 11	DVG. ND: SK-3	REV.: 4			

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



TS COLUMN (CORNER) MINIMUM 6° LDNG, MINIMUM 15 GA., TS NIPPLE SECURE WITH (4) #12-14x3/4° SDF'S 2'x2'x2' 16 GA CLIP ANGLE SECURE TD RAFTER COLUMN AND BASE RAIL W/(4) #12-14x3/4' SDF'S NIPPLE TO BASE RAIL 3/16 TS CONTINUOUS BASE RAIL

2"x2"x2" 16 GA ANGLE
CLIP SECURE TO COLUMN
AND EITHER TOP OF
HEADER, OR BOTTOM OF
VINDOW RAIL WITH
#12-14x3/4" SDF'S TS HEADER OR WINDOW RAIL

END COLUMN/RAFTER CONNECTION DETAIL 4

END COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS

HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL 6 SCALE NTS

SCALE NTS

TS TRUSSED RAFTER CHORD.
OR HEADER TS END CELUMN-OR DEOR WINCOW FRAME POST TS HEADER, BASE-RAIL, GR WINDOW RAIL

SCALE: NTS

-2'x2'x2' 16 GA ANGLE CLIP SECURE TO COLUMN (EACH SIDE) AND RAFTER CHORD/RAIL WITH #12-14x3/4' SDF'S 2 EN BOTTOM AND 2 ON SIDE

NDTE AT RELL-UP DEGR PPENINGS, POST SHEULD BE FLUSH WITH RAIL END CLIP POST TO RAIL ONLY ON SIDE CPPOSITE THE OPENING.

3/16 NIPPLE TO 3-12 3/16 // 3-12 -MINIMUM 6' LENG MINIMUM 15 GA TS NIPPLE SECURE EACH WITH (4) #12-14x3/4' SDF'S TS CELUMN

TS COLUMN NIPPLE TO HEADER 3/16 MINIMUM 6' LENG MINIMUM 15 GA, TS NIPPLE SECURE WITH (4) #12-14x3/4' SDF'S TS DOUBLE HEADER

COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL

DOUBLE HEADER/COLUMN CONNECTION DETAIL 8

COLUMN/DOUBLE HEADER CONNECTION DETAIL 9

TS COLUMN MINIMUM 6' LENG, MINIMUM 15 GA, TS NIPPLE. SECURE EACH WITH (4) #12-14x3/4' SDF'S NIPPLE TO BASE RAIL TS CENTINUEUS BASE RAIL

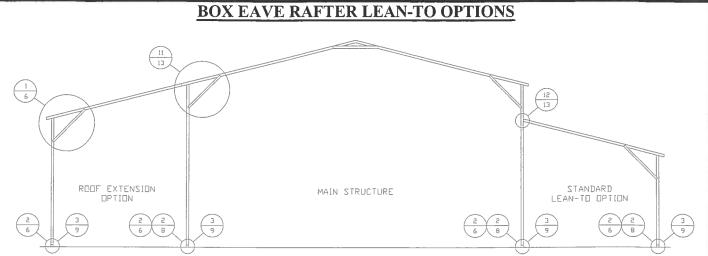
COLUMN/BASE RAIL CONNECTION DETAIL 10 SCALE NTS



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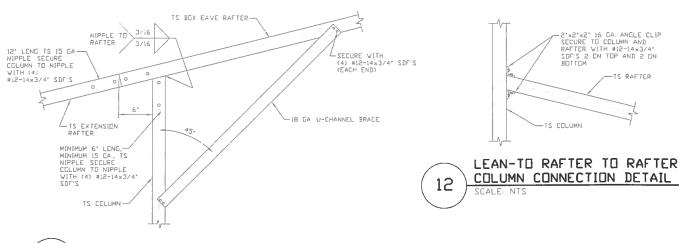
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 PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005		
CLIENT: TBS	SHT. 12	DVG. NO: SK-3	REV.: 4		



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

SCALE NTS MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 16'-0'

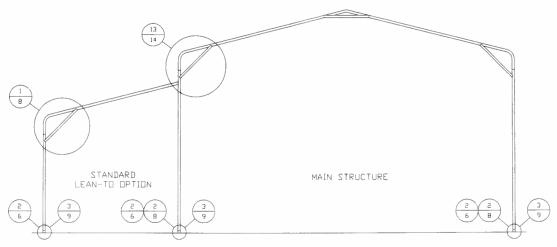


11A) SIDE EXTENSION RAFTER/COLUMN DETAIL



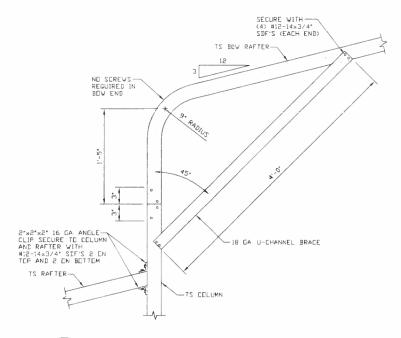
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#### **BOW RAFTER LEAN-TO OPTIONS**



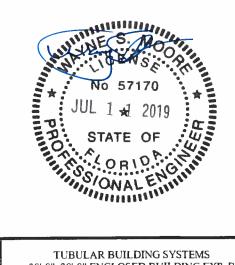
TYPICAL BOW RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

SCALE: NTS MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 16'-0".



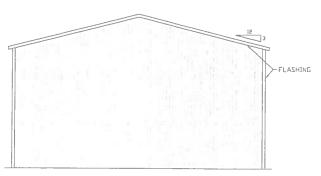
SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS

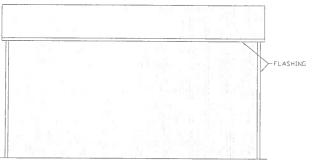


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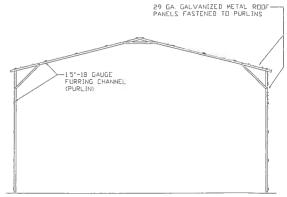
#### BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



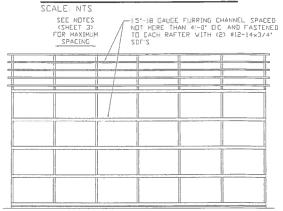
TYPICAL END ELEVATION
VERTICAL ROOF/SIDING OPTION
SCALE NTS



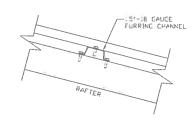
TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING OPTION



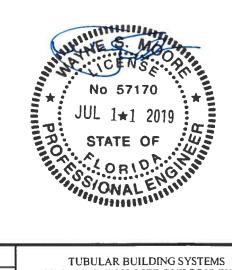
TYPICAL SECTION VERTICAL ROOF/SIDING OPTION



TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION SCALE NTS

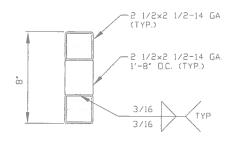


ROOF PANEL ATTACHMENT
(ALTERNATE FOR VERTICAL ROOF PANELS)
SCALE: NTS



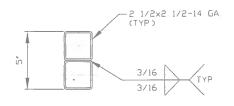
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#### **OPTIONAL DOOR HEADER**



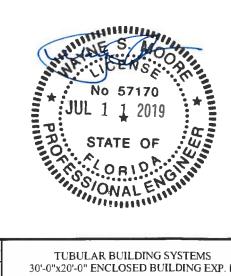
HEADER DETAIL FOR DOOR
OPENINGS 12'-0" < LENGTH < 15'-0"

SCALE: NTS



HEADER DETAIL FOR DOOR OPENINGS LENGTH < 12'-0"

SCALE NTS



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## **Florida Product Approval Codes**

Walk-In Door:

Elixir Door & Metal Company blank (no window): 17996.5

EXP 9/14/2020

Window:

Kinro 993.7

EXP 10/19/21

**Roof Deck:** 

Capital Metal Supply Inc. Ag Panel: 20147.1

EXP 07/20/2020

Wall Panel:

Capital Metal Supply Inc. Ag Panel: 20148.1

EXP 07/20/2020

If you have any questions on concern, please contact Donald Little at 386-961-0006 or at tubularbuildingsystems@gmail.com.