

### 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



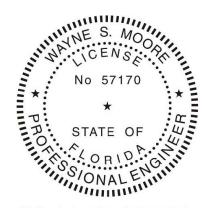


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CLIENT: TBS	SHT. 2	DWG. NO SK-3		REV. 4	_	

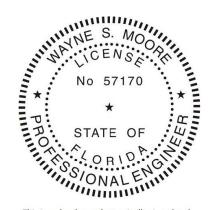
#### INSTALLATION NOTES AND SPECIFICATIONS

- 1 DESIGN IS FOR A MAXIMUM 30'-0" WIDE  $\times$  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
  B) LIVE LOAD = 12 PSF
  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 FFFT.
- 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' × 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 OTHERWISE NOTED).
- 9 AVERAGE FASTENER SPACING DN-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 DNLY 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 (SOIL NAILS) CONSIST OF #4 REBAR W/WELDED NUT x 30" LONG IN SUITABLE SOIL CONDITIONS MAY BE USED FOR LOW ( \$108 MPH NOMINAL) WIND SPEEDS ONLY. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS 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  $I_E$ = 1.0  $S_{DS}$ = 1.522 V=  $C_S W$ 

 $2^{DI} = 0.839$ 



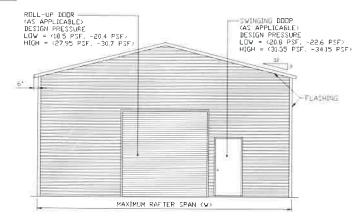
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PREJECT MGR: VSM	DATE: 12-18-17	JOB NO: 16022S/17300S				
CLIENT: TBS	знт. з	DVG. NO: SK-3	REV. 4			

#### BOX EAVE FRAME RAFTER ENCLOSED BUILDING



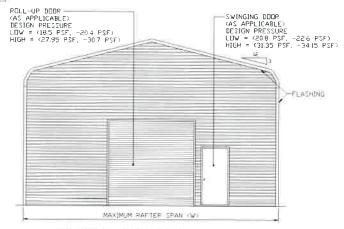
#### TYPICAL END ELEVATION-HORIZONTAL ROOF

SCALE: NTS

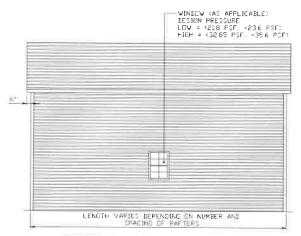
# TYPICAL SIDE ELEVATION—HORIZONTAL ROOF

-WINDOW (AS APPLICABLE) DESIGN PRESSURE LOW = (218 PSF, -236 PCF) HIGH = (2285 PSF, -356 PSF)

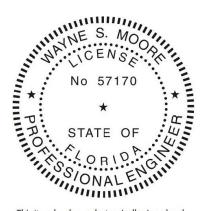
#### BOW FRAME RAFTER ENCLOSED BUILDING



### TYPICAL END ELEVATION



TYPICAL SIDE ELEVATION
SCALE: NTS



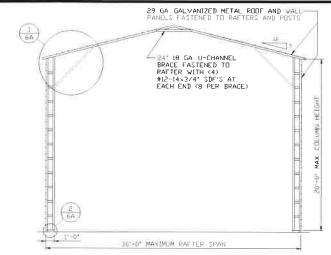
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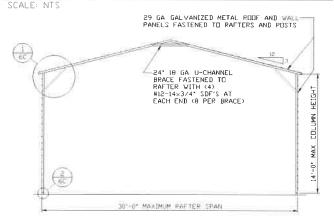
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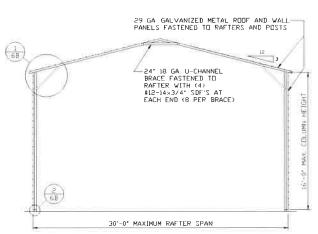
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	PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005	
	CLIENT: TBS	SHT. 4	DWG. NO: SK-3	REV.i 4	



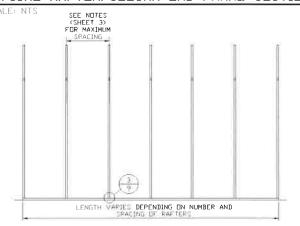
#### TYPICAL RAFTER/COLUMN END FRAME SECTION



### TYPICAL RAFTER/COLUMN END FRAME SECTION



#### TYPICAL RAFTER/COLUMN END FRAME SECTION



#### TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS



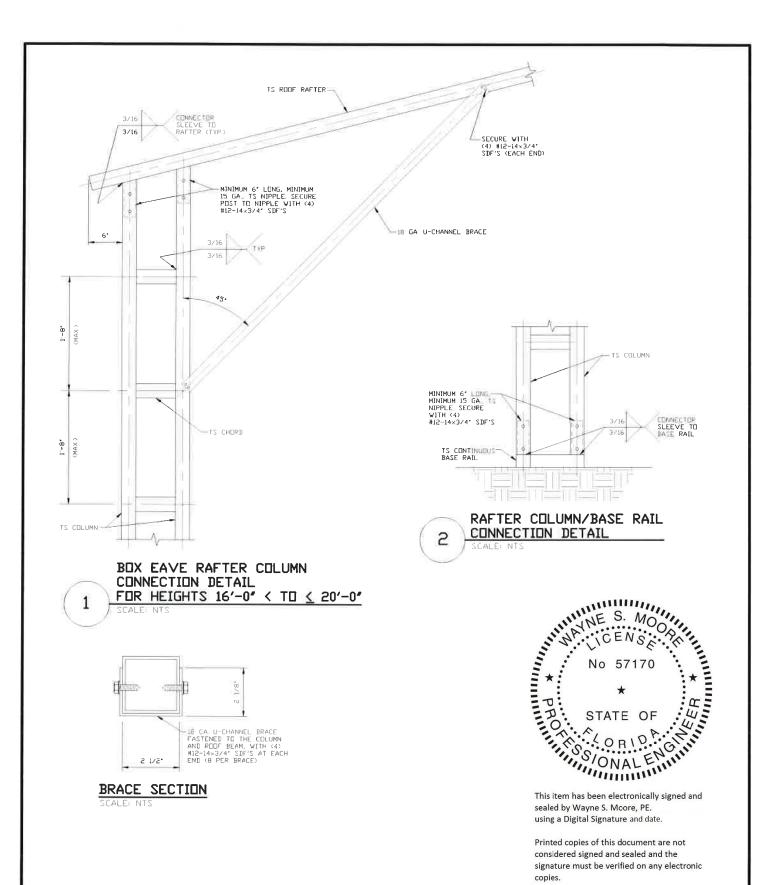
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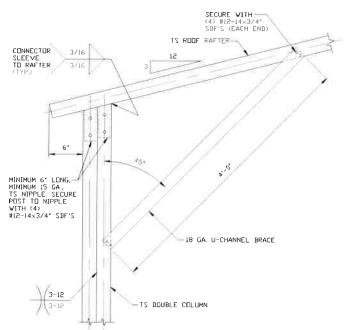
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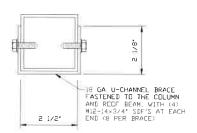
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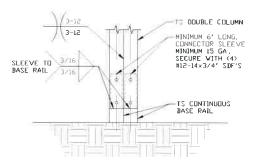


BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 14'-0" < TO < 16'-0"

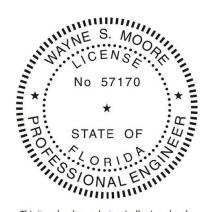


#### BRACE SECTION

SCALE: NTS



RAFTER COLUMN/BASE RAIL CONNECTION DETAIL



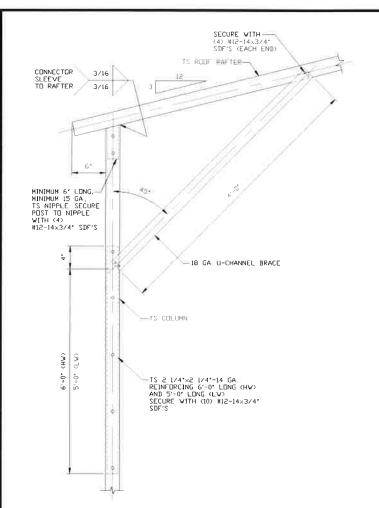
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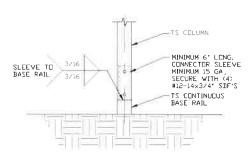
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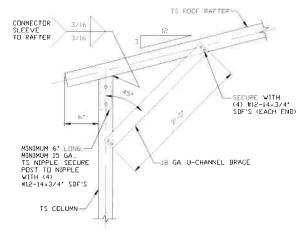


BOX EAVE RAFTER COLUMN CONNECTION DETAIL

FOR HEIGHTS 10'-0' < TO \( \) 14'-0'

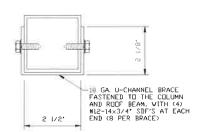


2 RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL
SCALE: NTS



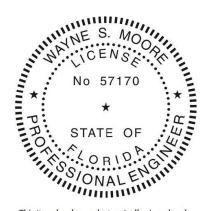
BOX EAVE RAFTER COLUMN CONNECTION DETAIL

FOR HEIGHTS \( \) 10'-0"



### BRACE SECTION

SCALE: NTS



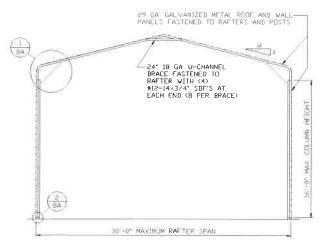
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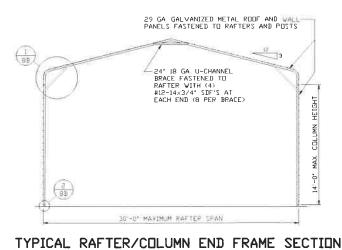
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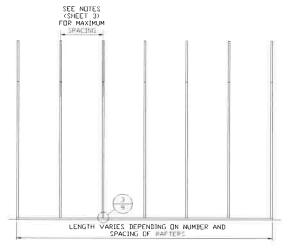




#### TYPICAL RAFTER/COLUMN END FRAME SECTION

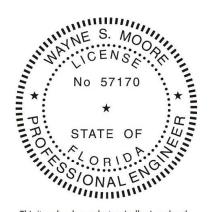
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SCALE: NTS



#### TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS



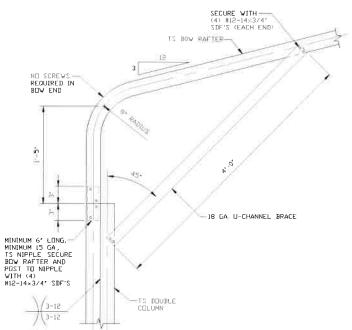
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CLIENT: TRS	SHT. 7	DWG. ND: SK-3		REV. 4	

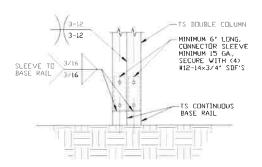


BOX EAVE RAFTER COLUMN FOR HEIGHTS 14'-0" < TO ≤ 16'-0"

<u>,</u> 'n -18 GA U-CHANNEL BRACE FASTENED TO THE COLUMN AND REOF BEAM, WITH (4) #12-14/3/4' SDF'S AT EACH END (8 PER BRACE)

CONNECTION DETAIL

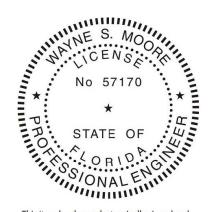
BRACE SECTION



RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS

2



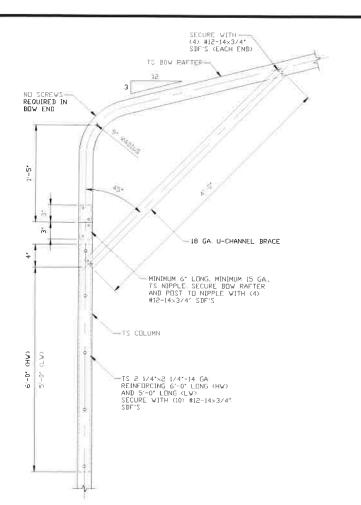
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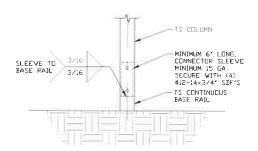
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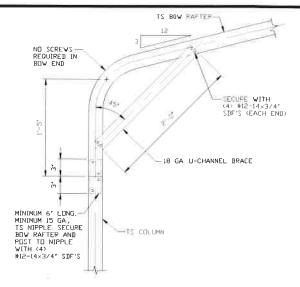


BOX EAVE RAFTER COLUMN CONNECTION DETAIL

FOR HEIGHTS 10'-0' < TO \( \) 14'-0'

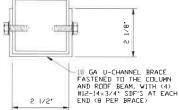


2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS



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

1B



BRACE SECTION

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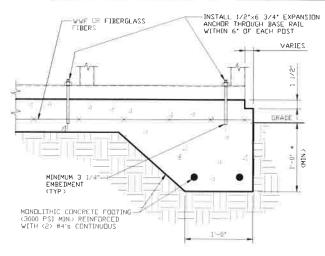
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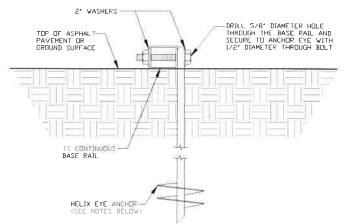
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#### BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED





3A

#### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

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

3B

#### GROUND BASE HELIX ANCHORAGE SCALE: NTS (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 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.

#### HELIX ANCHOR NOTES:

- 1 FOR VERY DENSE AND/OR CEMENTED SANDS, CDARSE GRAVEL AND COBBLES, CALICHE, PRELOADED 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 EMBEDMENT.
- 3 FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY STIFF SILTS, AND CLAYS USE MINIMUM (2) 4° HELICES WITH MINIMUM 30 INCH EMBEDMENT.
- 4 FOR LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL USE MINIMUM (2) 6' HELICES WITH MINIMUM 50 INCH EMBEDMENT
- 5. FOR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL USE MINIMUM (2)  $8^{\circ}$  HELICES WITH MINIMUM 6C INCH EMBEDMENT.



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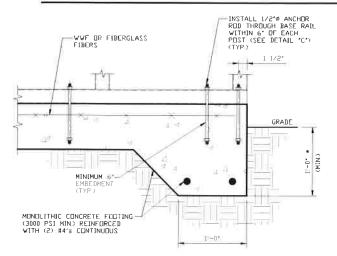
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PROJECT MGR: VSH	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005		
CLIENT: TBS	SHT. 9A	DWG. NO: SK-3	REV,i 4		

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





#### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHURAGE

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

#### **GENERAL NOTES**

#### CONCRETE

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

#### COVER OVER REINFORCING STEEL!

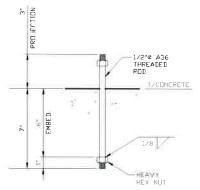
FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING FUR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318:

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

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.

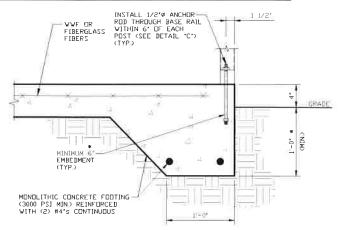
#### REINFORCEMENT MAY BE BENT IN THE SHOP OR THE FIELD PROVIDED:

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



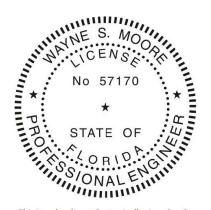


#### ANCHOR ROD THROUGH BASE RAIL DETAIL



CONCRETE MONOLITHIC SLAB BASE RAIL ANCHURAGE 1B

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



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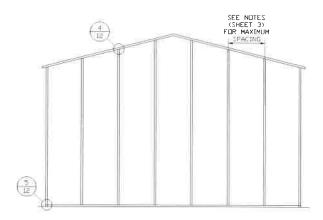
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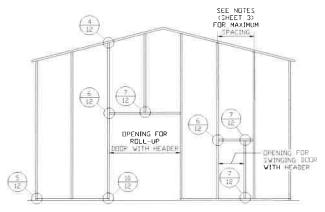
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PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 16022S/17300S
CLIENT: TBS	SHT. 9B	DVG. NO: SK-3	REV.1 4

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



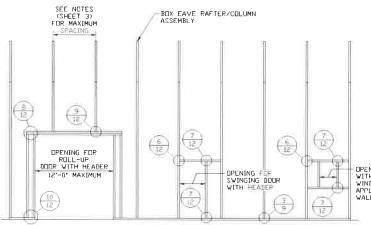
### TYPICAL BOX EAVE RAFTER

END WALL FRAMING SECTION



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

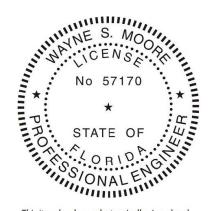
SCALE: NTS



DPENING FOR WINDOW WITH HEADER AND WINDOW RAIL (ALSO APPLICABLE TO END WALLS)

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

SCALE: NTS



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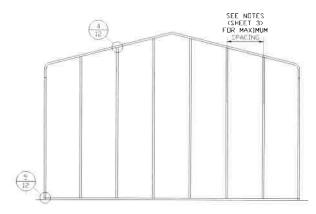
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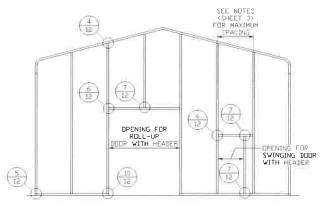
	DRAVN BY: LT CHECKED BY: PDH	TUBULAR BUILDING SYSTEMS 30'-0"x20'-0" ENCLOSED BUILDING EXP. B						
_	PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JDB ND: 16022S/17300S				
	CLIENT, TRS	SHT. 10	DWG. ND: SK-3	REV. 4				

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



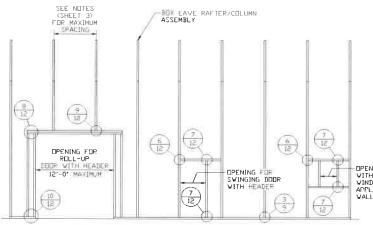
## TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: NTS



## TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



-OPENING FOR WINDOW WITH HEADER AND WINDOW RAIL (ALSO APPLICABLE TO END WALLS)

# TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS



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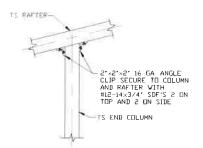
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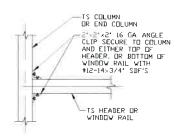
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 PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JUB ND 160225/173005	
CLIENT: TBS	SHT. 11	DAC ND 2K-3	REV. 4	

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



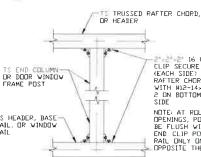
TS COLUMN (CORNER) MINIMUM 6' LONG, MINIMUM 15 GA, TS NIPPLE SECURE WITH (4) #12-14×3/4' SDF'S 2'x2'x2' 16 GA CLIP ANGLE SECURE TO RAFTER COLUMN AND BASE RAIL W/(4) #12-14x3/4" SDF'S NIPPLE TO 3/16 BASE RAIL 3/16 TS CONTINUOUS BASE RAIL



#### END COLUMN/RAFTER CONNECTION DETAIL 4

END COLUMN/BASE RAIL CONNECTION DETAIL 5

HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL



IS GA ANGLE
CLIP SECURE TO COLUMN
(EACH SIDE) AND
RAFTER CHORD/RAIL
WITH #12-14×3/4' SDF'S
2 ON BOTTOM AND 2 ON
SIDE

NOTE: AT ROLL-UP DOOR OPENINGS, POST SHOULD BE FLUSH WITH RAIL END CLIP POST TO RAIL ONLY ON SIDE OPPOSITE THE OPENING.

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

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

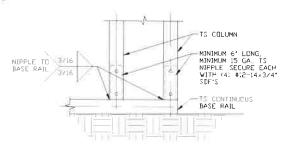
6

#### COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL

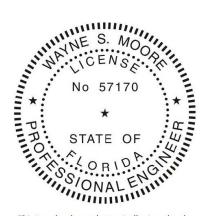
DOUBLE HEADER/COLUMN CONNECTION DETAIL 8

COLUMN/DOUBLE HEADER CONNECTION DETAIL 9

CONNECTION DETAIL



COLUMN/BASE RAIL CONNECTION DETAIL 10



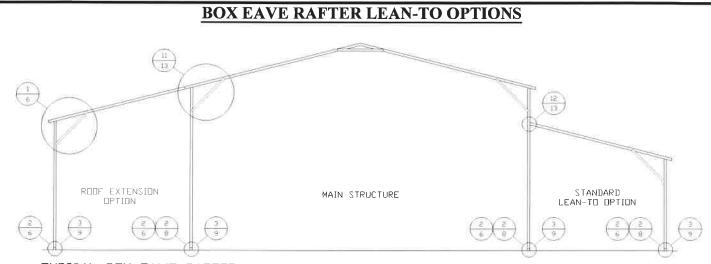
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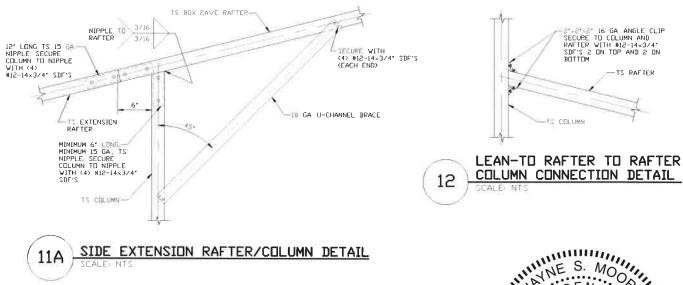
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PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005		
CLIENT: TBS	SHT. 12	DAC NO 2K-3		REV. 4	



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

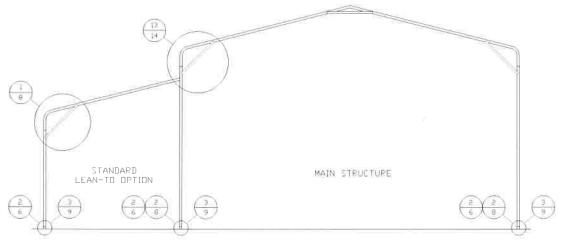
SCALE: NTS
MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 16'-0'.



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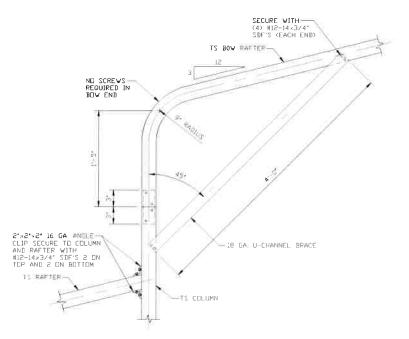
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### **BOW RAFTER LEAN-TO OPTIONS**



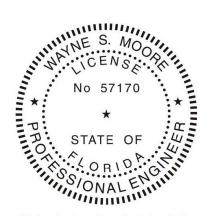
#### TYPICAL BOW RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

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



SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS



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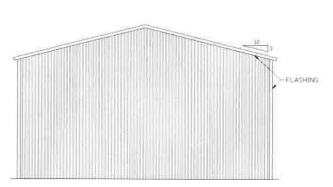
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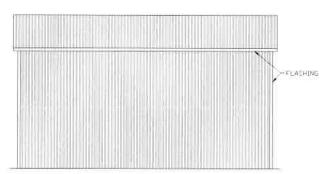
DRAWN BY: LT CHECKED BY: PDH	TUBULAR BUILDING SYSTEMS 30'-0"x20'-0" ENCLOSED BUILDING EXP. B				
PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005		
CLIENT: TBS	SHT. 14	DWG. ND: SK-3	REV,1 4		

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



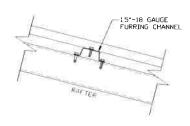
TYPICAL END ELEVATION VERTICAL ROOF/SIDING OPTION

SCALE: NTS



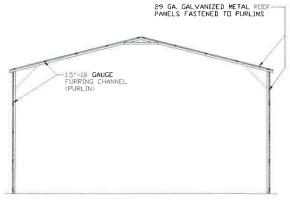
TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING OPTION

SCALE: NTS



ROOF PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS)
SCALE: NTS



## TYPICAL SECTION VERTICAL ROOF/SIDING OPTION

SCALE: NTS

SEE NOTES
(SHEET 3)
FOR MAXIMUM
SPACING

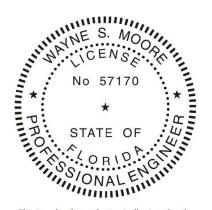
SDF'S

SCALE: NTS

ADT MORE THAN 4'-0' DC AND FASTENED
TO EACH RAFTER WITH (2) Hi2-14×3/4'
SDF'S

TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION

SCALE: NTS



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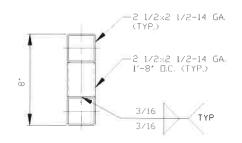
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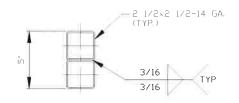
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PROJECT MGR: VSM	DATE: 12-18-17	SCALE: NTS		ND: 225/17300S		
CLIENT: TBS	SHT. 15	DVG. NO SK-3		REV.i 4		

#### **OPTIONAL DOOR HEADER**



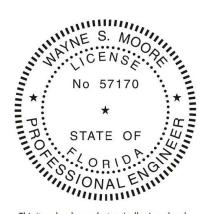
HEADER DETAIL FOR DOOR OPENINGS 12'-0" < LENGTH ≤ 15'-0"

SCALE: NTS



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

SCALE: NTS



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_	PROJECT MGR: VSM	DATE: 12-18-17		JDB ND: 16022S/17300S	
	CLIENT: TBS	SHT. 16	DWG. ND: SK-3	REV. 4	