



**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:**

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by Wayne S  
Moore  
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2020.03.18  
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| <b>MOORE AND ASSOCIATES<br/>ENGINEERING AND CONSULTING, INC.</b>                                                                                                                                                                                                 | <b>DRAWN BY: LT</b>     |  | <b>TUBULAR BUILDING SYSTEMS</b>               |                      |
|                                                                                                                                                                                                                                                                  | <b>CHECKED BY: PDH</b>  |  | <b>30'-0"x20'-0" ENCLOSED BUILDING EXP. B</b> |                      |
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|                                                                                                                                                                                                                                                                  | <b>CLIENT: T&amp;S</b>  |  | <b>SHT. 1</b>                                 | <b>DWG. NO: SK-3</b> |
|                                                                                                                                                                                                                                                                  |                         |  | <b>JOB NO: 160223/173005</b>                  | <b>REV: 4</b>        |

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**PROJECT MGR: WSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXPH**

**DATE: 12-18-17**

**SHT. 2**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO:  
160223/173005**

**REV: 4**

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## INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR A MAXIMUM 30'-0" WIDE X 20'-0" ENCLOSED BUILDING STRUCTURE.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2007 ASCE BUILDING CODE (FBC) 6TH EDITION, 2012 INTERNATIONAL BUILDING CODE (IBC) AND 2015 IRC.
3. DESIGN LOADS ARE AS FOLLOWS:
  - A) DEAD LOAD = 10 PSF
  - B) LIVE LOAD = 20 PSF
  - C) GROUND SNOW LOAD = 10 PSF
4. LOW VELOCITY WIND SPEED 105 TO 140 MPH (MINIMAL WIND SPEED 105 MPH) MAXIMUM RAFTER/POST AND END POST SPACING = 50 FT.
5. HIGH VELOCITY WIND SPEED 141 TO 170 MPH (MINIMAL WIND SPEED 109 TO 135 MPH) MAXIMUM RAFTER/POST AND END POST SPACING = 40 FEET.
6. LOW HAZARD PICK CATEGORY I (WIND)
7. WIND EXPOSURE CATEGORY B
8. SPECIFICATIONS APPLICABLE TO 20 GAUGE METAL PANELS FASTENED DIRECTLY TO 2" X 12" X 2" X 2" 14 GAUGE TUBE STEEL (TSS) FRAMING MEMBERS. FOR VERTICAL PANELS, 20 GAUGE METAL PANELS SHALL BE FASTENED TO 2" X 12" X 2" X 2" 14 GAUGE TUBE STEEL (TSS) FRAMING MEMBERS. FOR HORIZONTAL PANELS, 20 GAUGE METAL PANELS SHALL BE FASTENED TO 2" X 12" X 2" X 2" 14 GAUGE TUBE STEEL (TSS) FRAMING MEMBERS.
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR GUNNIES AND GUNNIES INTERIOR = 5' ON CENTER END = 6' (MAX)
10. FASTENERS CONSIST OF #10-14 X 3/4" DEEP. FOR INTERIOR FASTENERS (ROOF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MAXIMUM HILL UP TO 20 FEET OR LESS, AND ROOF SLOPED 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 12" OF EACH RAFTER COLUMN ALONG SIDES.
12. GROUND ANCHORS SHALL CONSIST OF #4 REBAR W/ WELDED NUTS. 2" DEEP LUMP IS SUFFICIENT. FOR FUTURE USE MAY BE USED FOR LOW TO 108 MPH NOMINAL WIND SPEED OR MAY BE USED IN OTHER APPLICATIONS. ANCHORAGE MAY BE USED IN OTHER APPLICATIONS AS NOTED.
13. MINIMUM RAFTER RAIL ANCHORAGE MAY BE USED FOR FUTURE USE AND MUST BE USED FOR HIGH WIND SPEEDS.
14. WIND SPEEDS GOVERN OVER DESIGN LOADS. CLIMATIC PARAMETERS ANALYZED ARE:
  - SOIL SITE CLASS = D
  - RISK CATEGORY I/II/III
  - R = 0.25      S<sub>s</sub> = 1.0
  - S<sub>MS</sub> = 0.522      S<sub>MS</sub> = 0.522
  - S<sub>MS</sub> = 0.339      S<sub>MS</sub> = 0.339



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**CLIENT: TBS**

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30'-0" X 20'-0" ENCLOSED BUILDING EXP. B**

**DATE: 12-18-17**

**SCALE: NTS**

**JOB NO:  
16022S/17300S**

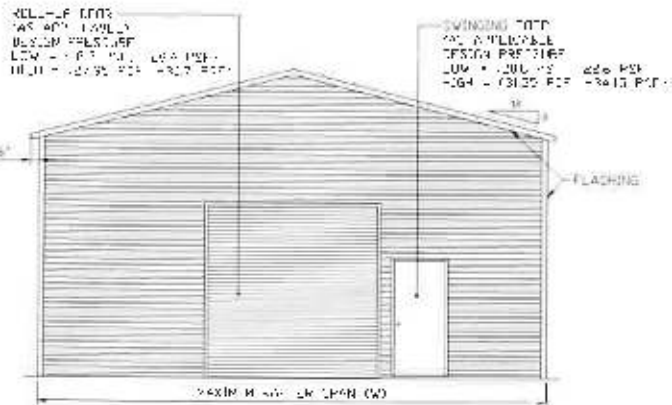
**SHT. 3**

**DWG. NO: SK-2**

**REV.: 4**

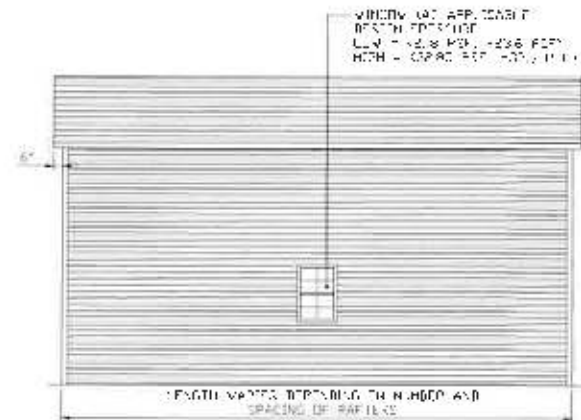
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## BOX EAVE FRAME RAFTER ENCLOSED BUILDING



**TYPICAL END ELEVATION-HORIZONTAL ROOF**

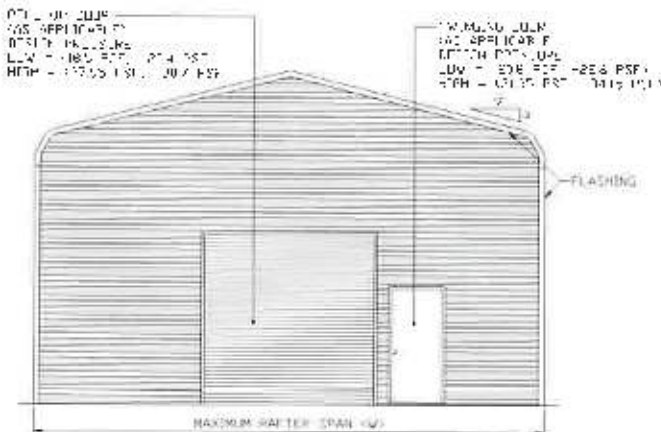
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**TYPICAL SIDE ELEVATION-HORIZONTAL ROOF**

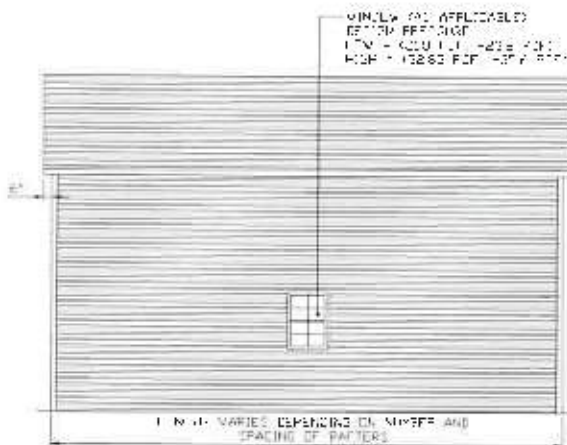
SCALE: NTS

## BOW FRAME RAFTER ENCLOSED BUILDING



**TYPICAL END ELEVATION**

SCALE: NTS



**TYPICAL SIDE ELEVATION**

SCALE: NTS



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**TUBULAR BUILDING SYSTEMS  
30'-0" x 20'-0" ENCLOSED BUILDING EXP. B**

DATE: 12-18-17

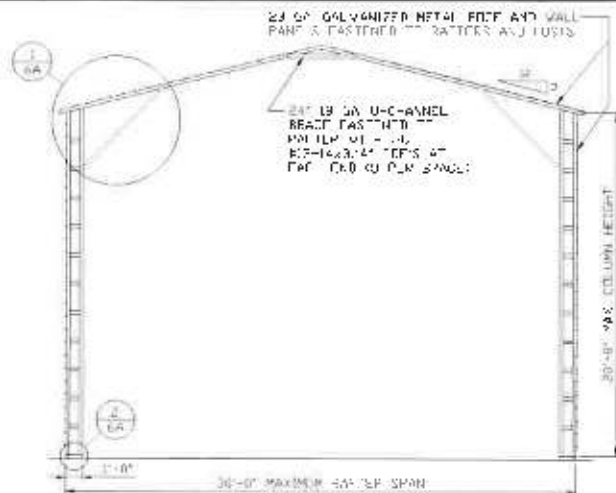
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DWG. NO: SK-3

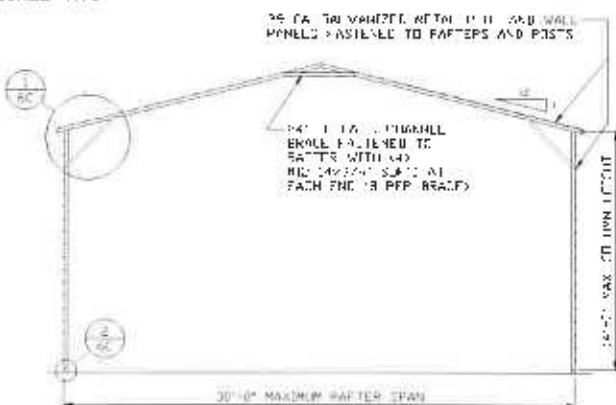
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160225/173005

REV: 4



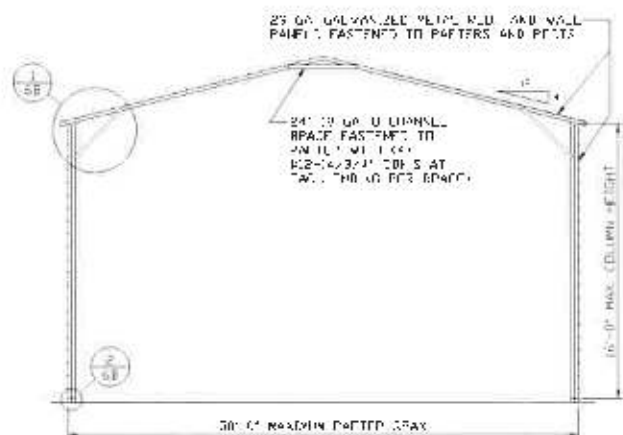
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SCALE: NTS



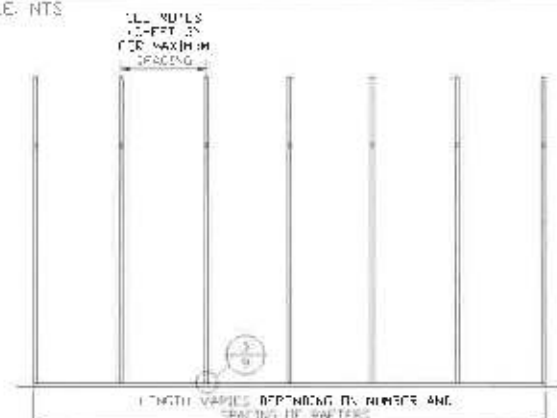
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SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION**

SCALE: NTS



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DATE: 12-18-17

SHT. 5

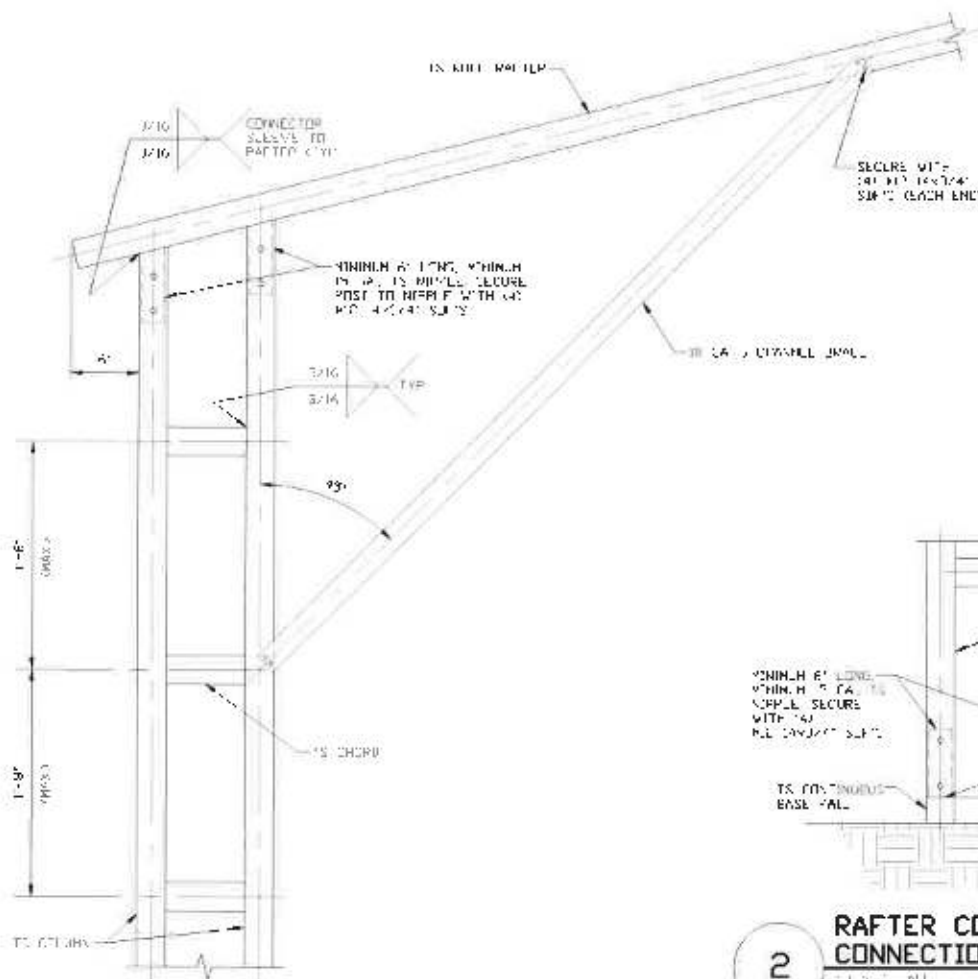
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JOB NO:  
160825/17300S

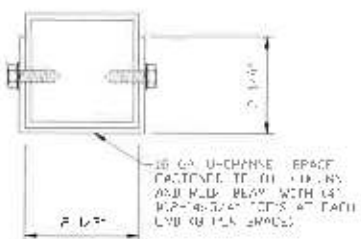
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 16'-0" < TO ≤ 20'-0"**

SCALE: NTS



**BRACE SECTION**

SCALE: 1/4" = 1'-0"

2

**RAFTER COLUMN/BASE RAIL  
CONNECTION DETAIL**

SCALE: NTS



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30'-0"X20'-0" ENCLOSED BUILDING EXP. B**

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SCALE: NTS

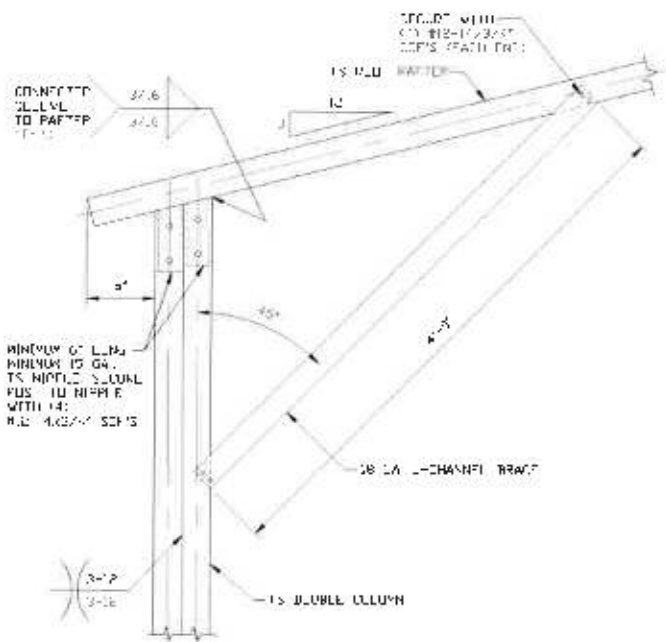
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160223/173003

SHT. 6A

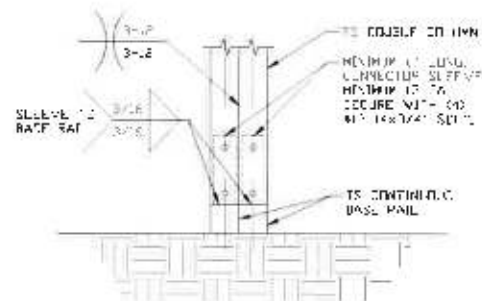
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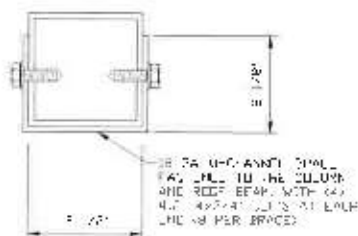
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 14'-0" < TO ≤ 16'-0"**  
SCALE: NTS



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



**BRACE SECTION**  
SCALE: NTS



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SHT. 6B

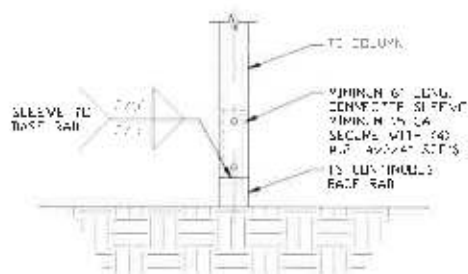
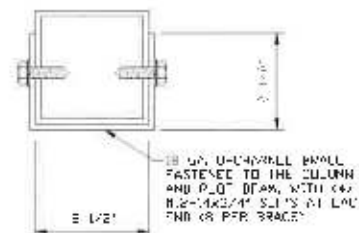
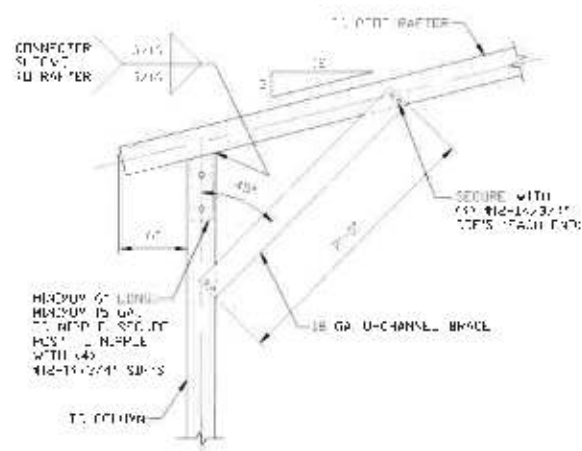
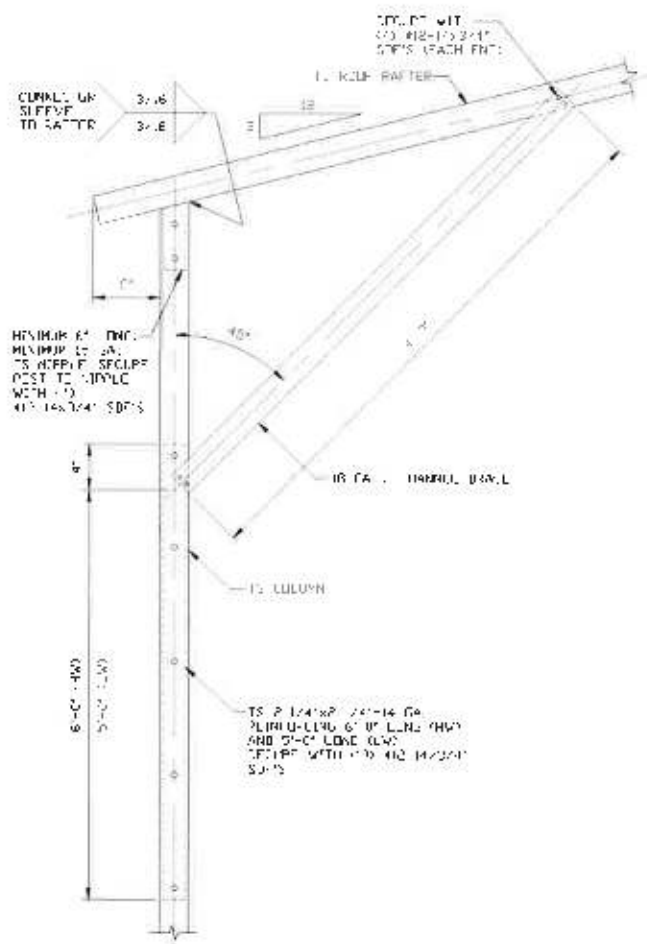
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TUBULAR BUILDING SYSTEMS  
30'-0" x 20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. &amp;C

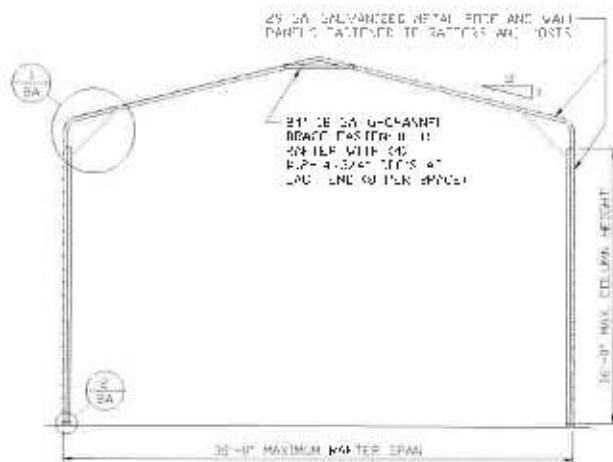
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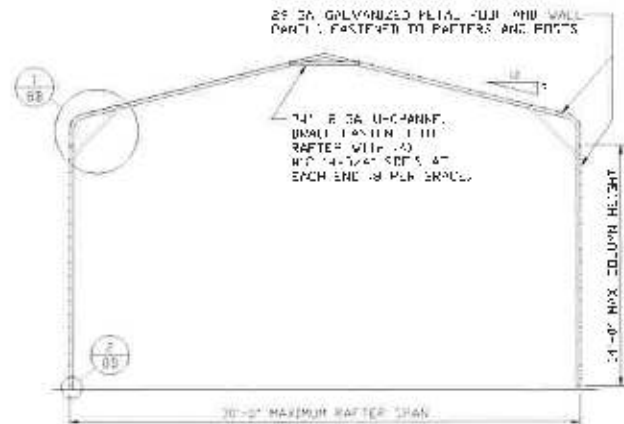
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160225/173005

REV. 4

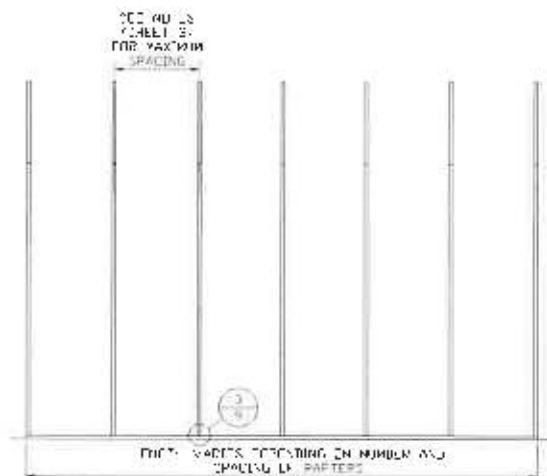
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



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



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



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**TUBULAR BUILDING SYSTEMS  
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**SHT. 7**

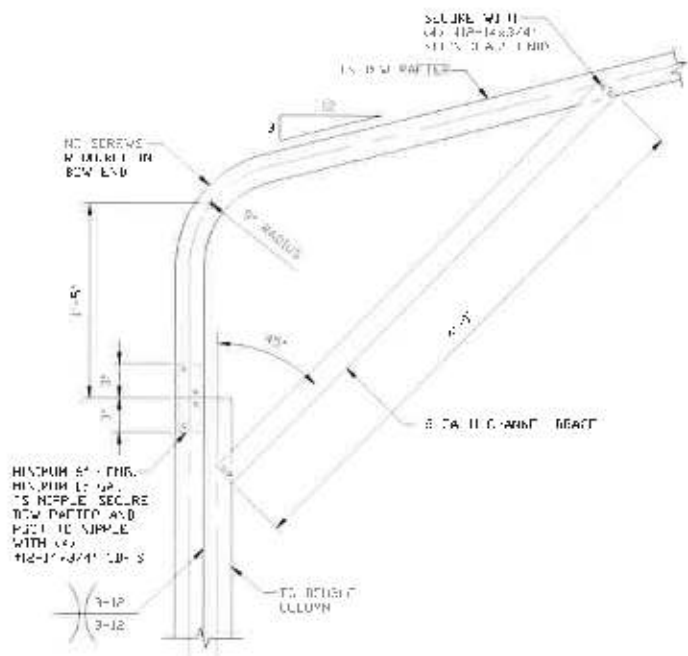
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**JOB NO:  
160225/173003**

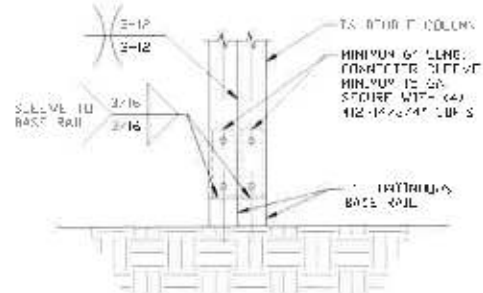
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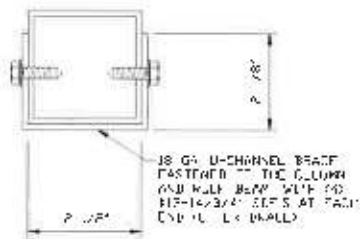
**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL**  
FOR HEIGHTS 14'-0" < TO ≤ 16'-0"

SCALE: NTS



**RAFTER COLUMN/BASE RAIL  
CONNECTION DETAIL**

SCALE: NTS



**BRACE SECTION**

SCALE: NTS



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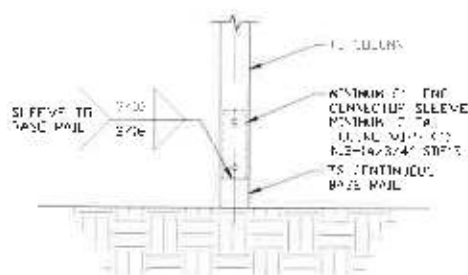
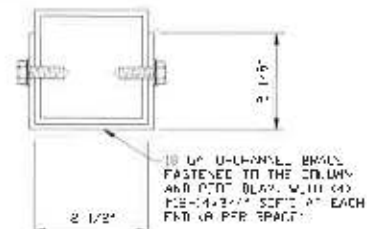
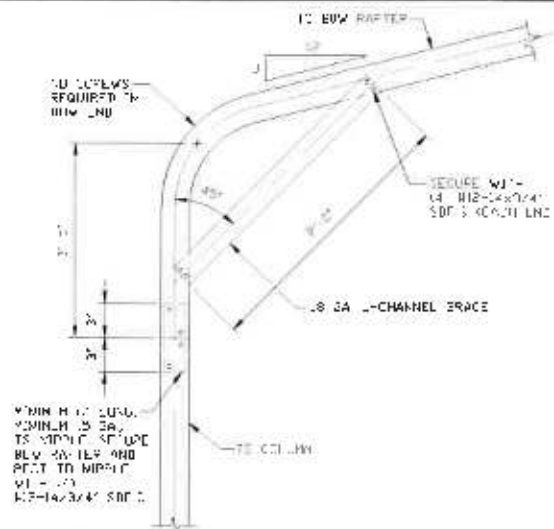
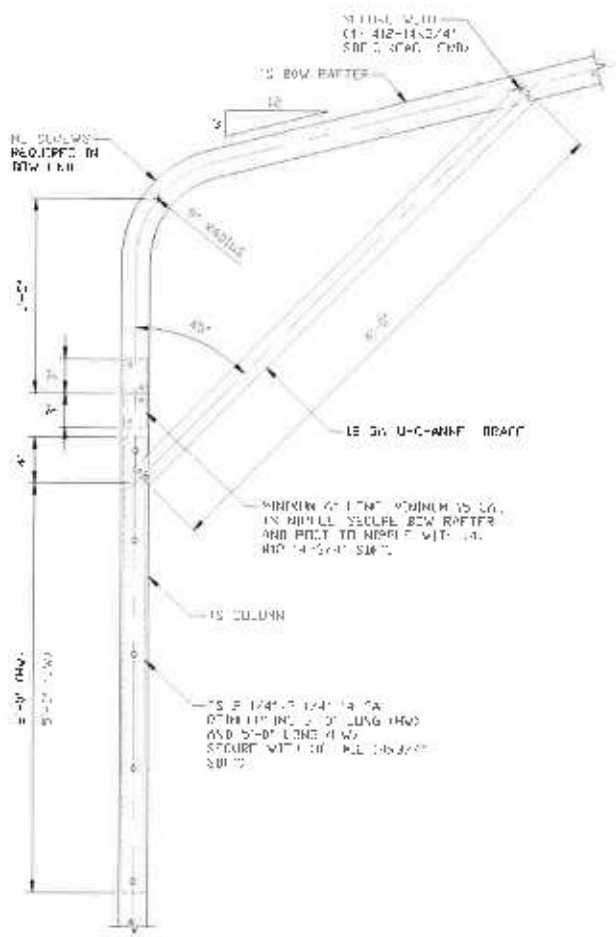
SCALE: NTS

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PROJECT NGR VSM

CLIENT: TBS

TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE 12-18-17

SMT. 6B

SCALE NTS

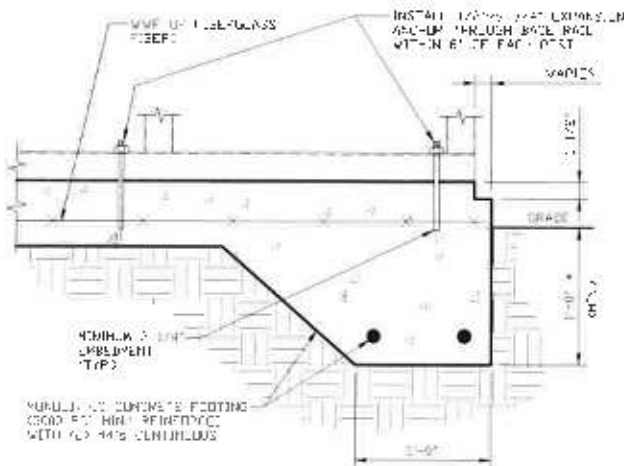
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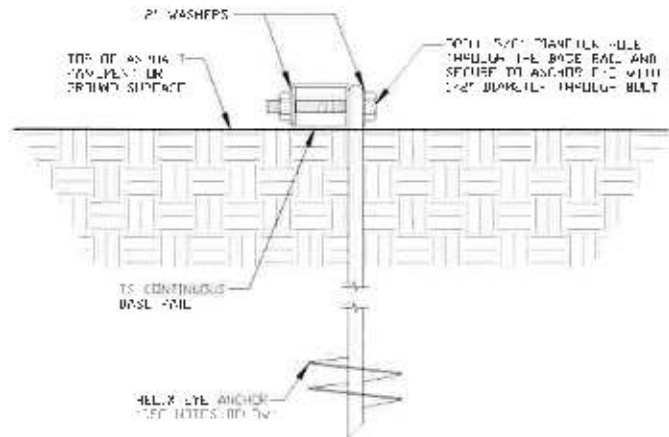
## BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED



3A

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS  
MINIMUM ANCHOR EMBEDMENT: 12\"/>



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:

THE THICKNESS OF MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE 1 1/2\"/>

3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE PARTIAL EXPOSED TO THE EFFECT OF WEATHER AND 1 1/2\"/>

### REINFORCING STEEL:

THE TOPDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCING SHALL BE WELDED WIRE FABRIC MEETING ASTM A182 OR EQUIVALENT. THE REINFORCEMENT

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

1. REINFORCEMENT IS BENT CORRECTLY.
2. DIAMETER OF THE BEND MEASURED IN THE INTERIOR OF THE BEND IS NOT LESS THAN SIX-BAR DIAMETERS.
3. REINFORCEMENT PERMANENTLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.

### HELIX ANCHOR NOTES:

1. FOR VERY DENSE AND/OR CEMENTED SANDS, COARSE GRAVEL, AND COE'S SAND, OR OTHER FILL, USE MINIMUM (2) 4\"/>
2. FOR DURAL USE MINIMUM (2) 4\"/>
3. FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVEL, VERY SILTY SAND, AND CLAYS USE MINIMUM (2) 4\"/>
4. FOR LOOSE TO MEDIUM DENSE SANDS, FIRM TO FIRM CLAYS, AND SILTY ALLUVIAL FILL USE MINIMUM (2) 4\"/>
5. FOR VERY LOOSE TO MEDIUM DENSE SANDS, FIRM TO FIRM CLAYS, AND SILTY ALLUVIAL FILL USE MINIMUM (2) 4\"/>



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

**DRAWN BY: LT**

**CHECKED BY: PDM**

**PROJECT MGR: VSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXP. B**

**DATE: 12-18-17**

**SHT. 9A**

**SCALE: NTS**

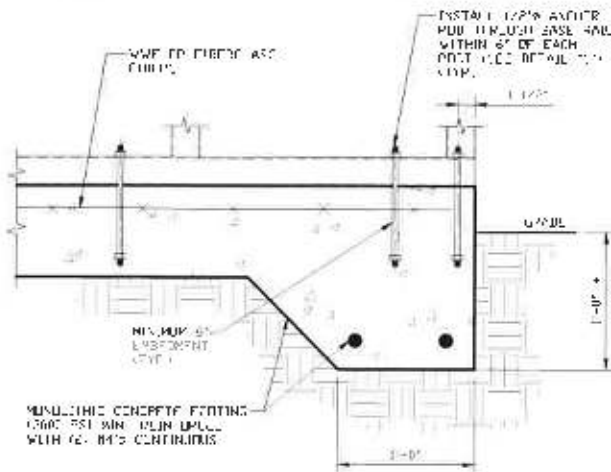
**DWG. NO: SK-3**

**JOB NO:  
160225/173005**

**REV: 4**

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## OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED



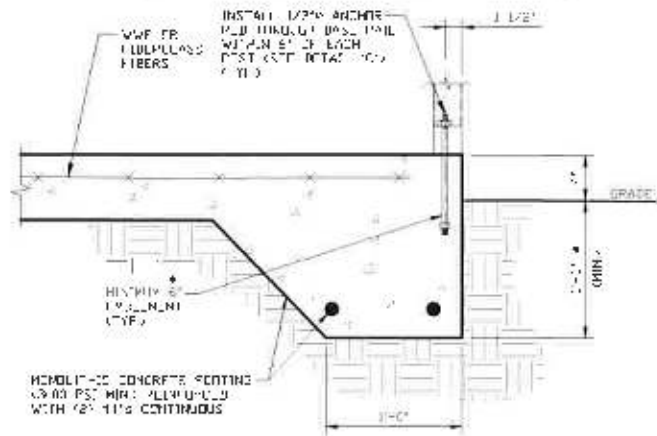
1A

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MIN. 1/2\"/>

COORDINATE WITH LOCAL CODES/CFI



1B

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2\"/>

COORDINATE WITH LOCAL CODES/CFI

## 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 STEEL SHALL BE PER ACI-308.

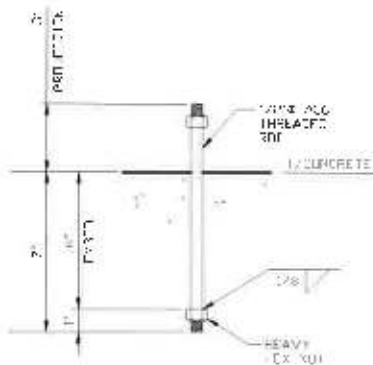
3 INCHES MINIMUM WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

### REINFORCING STEEL

THE FOUNDATION REINFORCING STEEL SHALL BE AS Y AND FR 60. ALL SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM AND FR FIBERGLASS FIBER REINFORCEMENT.

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

1. REINFORCEMENT IS BENT CORRECTLY.
2. THE DIAMETER OF THE BEND, MEASURED IN THE INSIDE OF THE BEND, IS NOT LESS THAN SIX-BAR DIAMETER.
3. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE CUT OFF.



1C

### ANCHOR ROD THROUGH BASE RAIL DETAIL

SCALE: NTS



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ENGINEERING AND CONSULTING, INC.

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: TBS

TUBULAR BUILDING SYSTEMS  
30'-0" X 20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SCALE: NTS

JOB NO:  
16022S/17300S

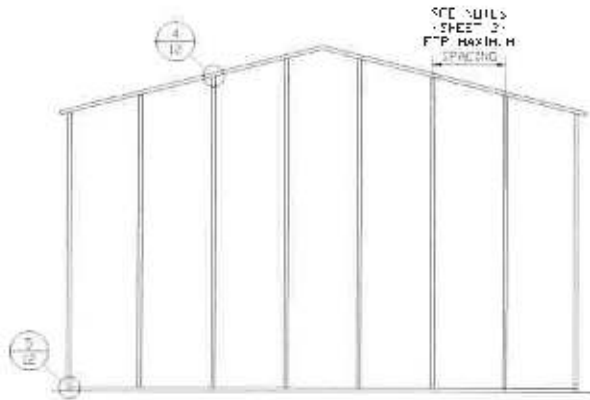
SHT. 9B

DWG. NO: SK-3

REV: 4

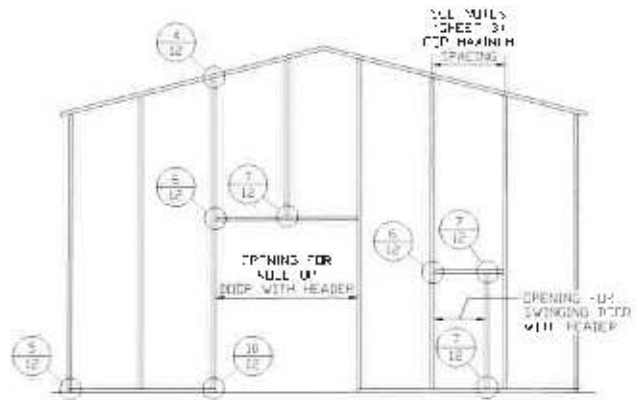
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## BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



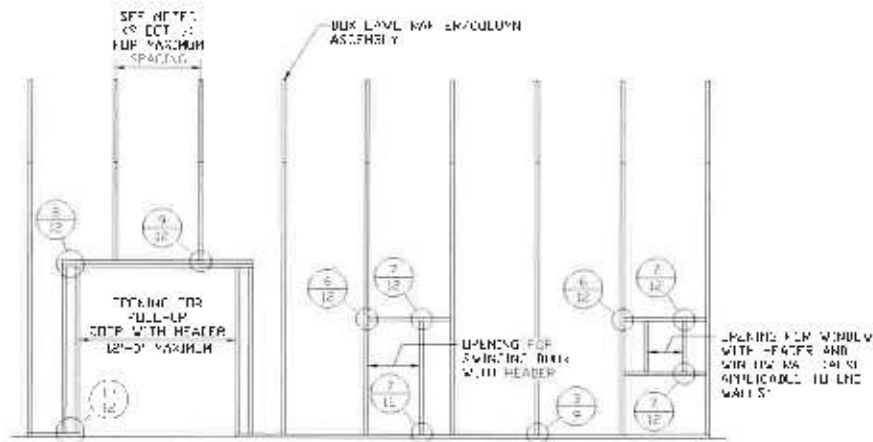
**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

SCALE: 1/2"



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

SCALE: NTC



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

SCALE: NTC



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**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: VSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXP. B**

**DATE: 12-18-17**

**SHT. 10**

**SCALE: NTS**

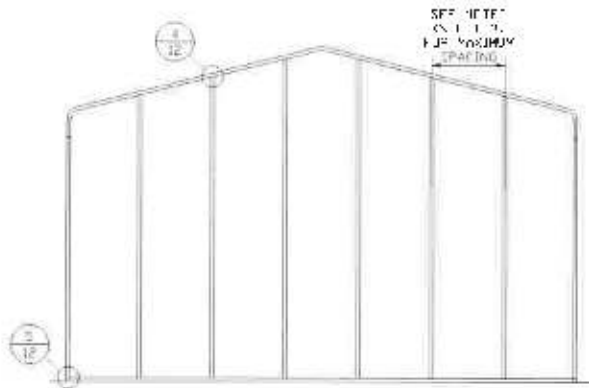
**DWG. NO: SK-3**

**JOB NO:  
160223/173005**

**REV: 4**

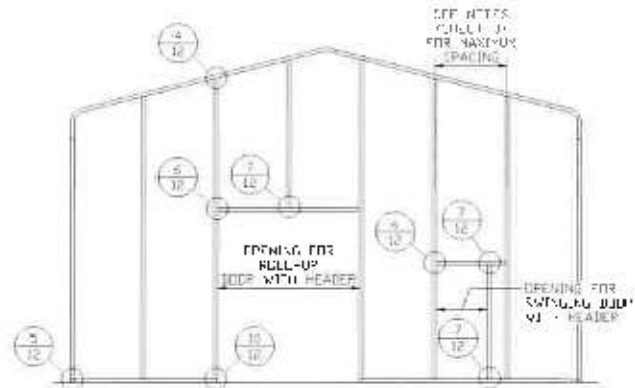
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## BOW RAFTER END WALL AND SIDE WALL OPENINGS



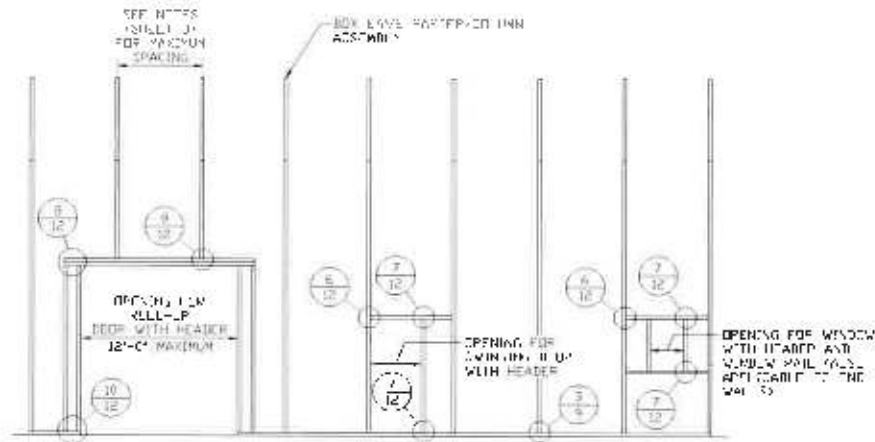
**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

SCALE: N.T.S.



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

SCALE: N.T.S.



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

SCALE: N.T.S.



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**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0" x 20'-0" ENCLOSED BUILDING EXPI. H**

**DATE: 12-18-17**

**SHT. 11**

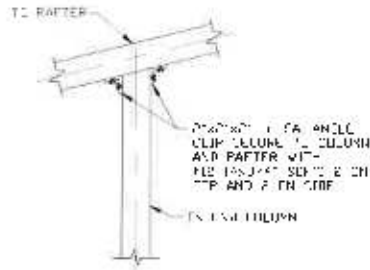
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**DWG. NO: SK-3**

**JTB NO  
160825/173005**

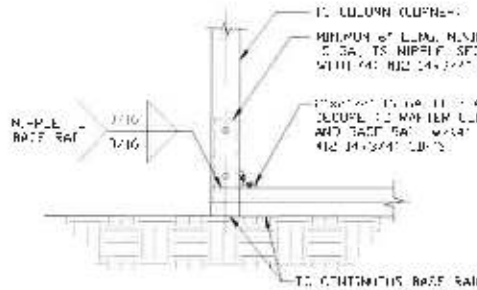
**REV: 4**

## BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



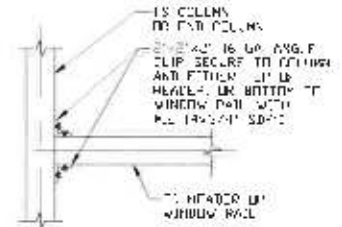
**4** **END COLUMN/RAFTER CONNECTION DETAIL**

SCALE: NTS



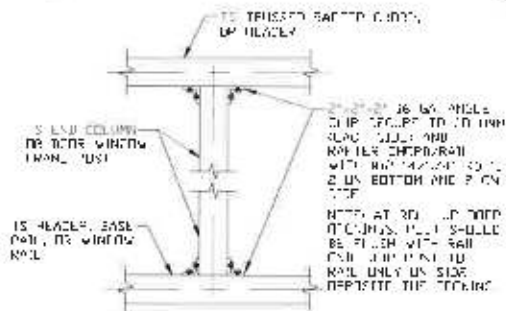
**5** **END COLUMN/BASE RAIL CONNECTION DETAIL**

SCALE: NTS



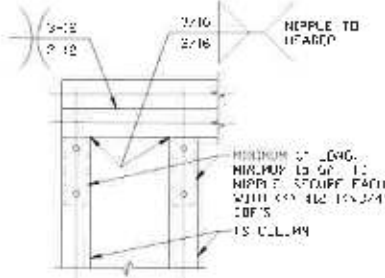
**6** **HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL**

SCALE: NTS



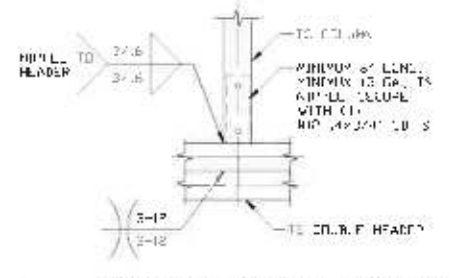
**7** **COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL**

SCALE: NTS



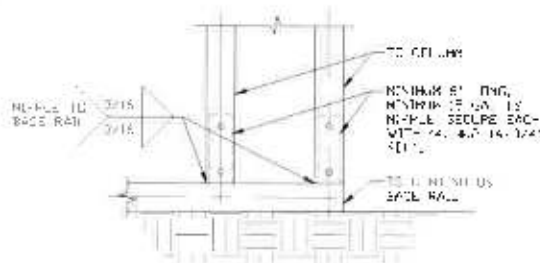
**8** **DOUBLE HEADER/COLUMN CONNECTION DETAIL**

SCALE: NTS



**9** **COLUMN/DOUBLE HEADER CONNECTION DETAIL**

SCALE: NTS



**10** **COLUMN/BASE RAIL CONNECTION DETAIL**

SCALE: NTS



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**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXP. B**

**DATE: 12-18-17**

**SHT. 12**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO:**

**160225/173005**

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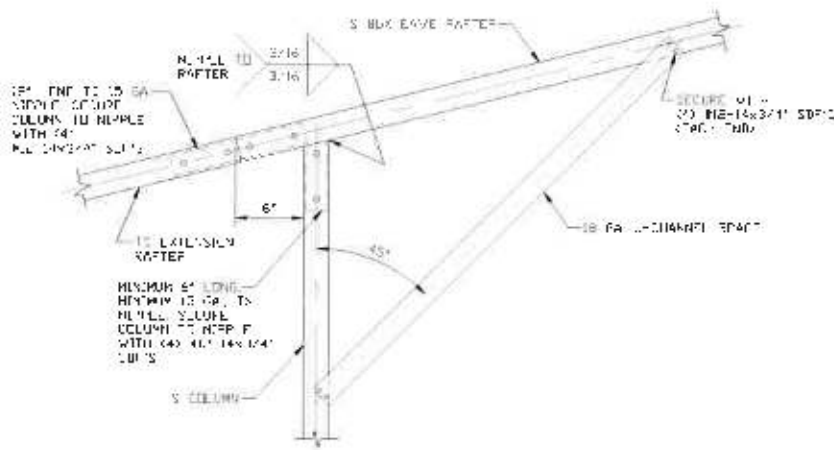
## BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

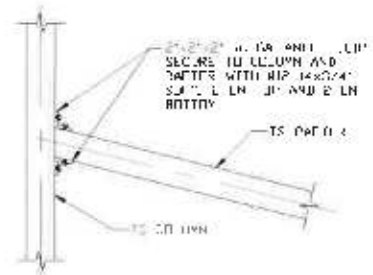
MAXIMUM WIDTH OF SINGLE MEMBER RAFTER: 16" (16" MAX)



11A

**SIDE EXTENSION RAFTER/COLUMN DETAIL**

SCALE: NTS



12

**LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL**

SCALE: NTS



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CHECKED BY: PDH

PROJECT MGR: WSH

CLIENT: TBS

**TUBULAR BUILDING SYSTEMS**  
30'-0" x 20'-0" ENCLOSED BUILDING EXPI. B

DATE: 12-10-17

SHT. 13

SCALE: NTS

DWG. NO: SK-3

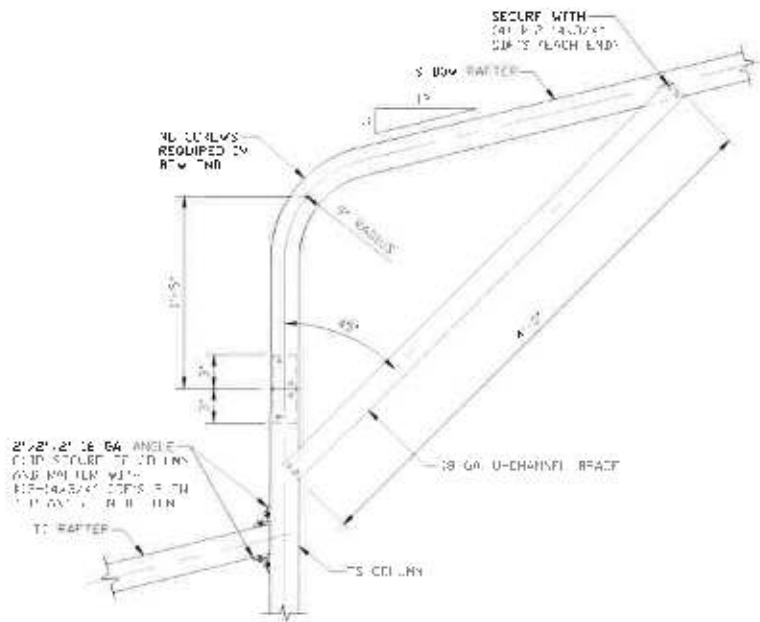
JOB NO:

160225/173005

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MAXIMUM WIDTH OF SINGLE MEMBER= RAFTER L46 TO IS 10' 0"



**SIDE EXTENSION RAFTER/COLUMN DETAIL**  
SCALE: 1/4" = 1'-0"

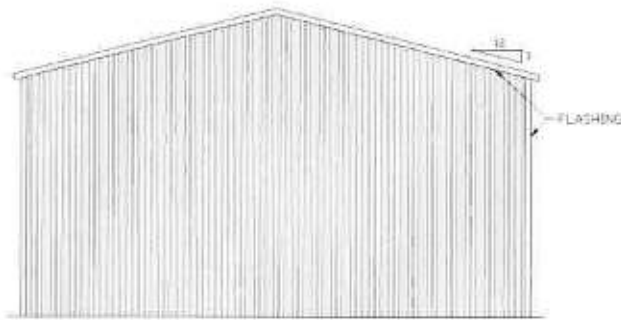


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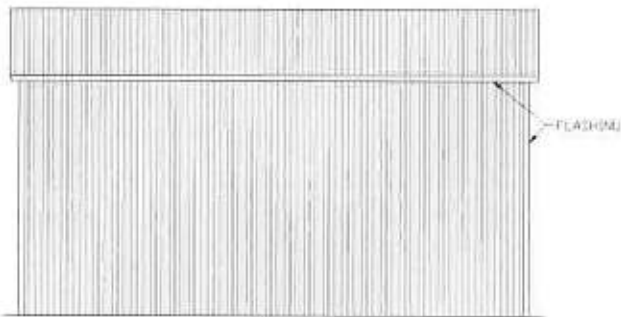
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## BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



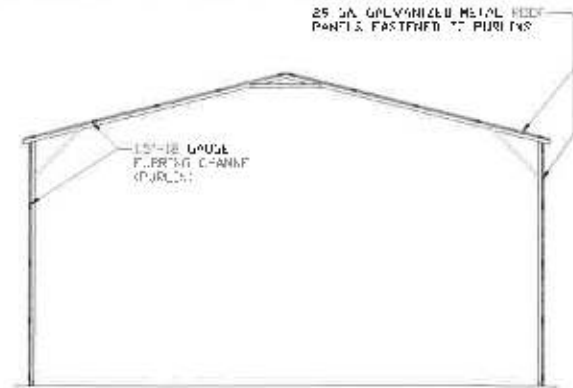
**TYPICAL END ELEVATION  
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



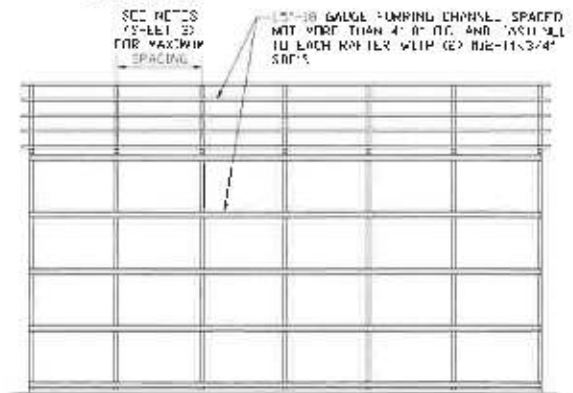
**TYPICAL SIDE ELEVATION  
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



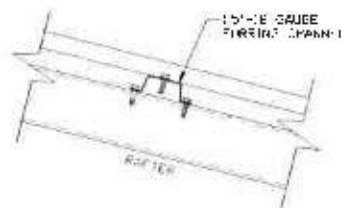
**TYPICAL SECTION VERTICAL  
ROOF/SIDING OPTION**

SCALE: NTS



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

SCALE: NTS



**ROOF PANEL ATTACHMENT**

(6.11) RATT FOR VERTICAL ROOF PANELS  
SCALE: NTS



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**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"X20'-0" ENCLOSED BUILDING EXP. B**

**DATE: 12-18-17**

**SHT. 15**

**SCALE: NTS**

**DWG. NO: SK-3**

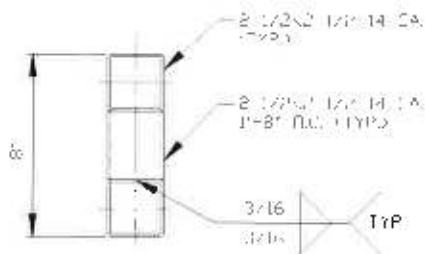
**JOB NO:**

**168223/173005**

**REV: 4**

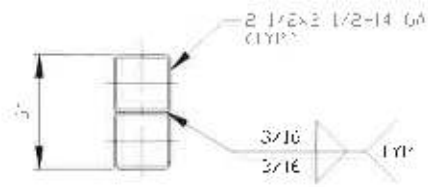
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## OPTIONAL DOOR HEADER



**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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**DRAWN BY: LT**

**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: TBS**

**TUBULAR BUILDING SYSTEMS  
30'-0"x20'-0" ENCLOSED BUILDING EXP. H**

**DATE: 12-18-17**

**SHT. 16**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO:  
16022S/17300S**

**REV: 4**

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