



**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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| <b>MOORE AND ASSOCIATES<br/>ENGINEERING AND CONSULTING, INC.</b>                                                                                                                                                                                                 | <b>DRAWN BY: LT</b>     |                       | <b>TUBULAR BUILDING SYSTEMS<br/>30'-0"x20'-0" ENCLOSED BUILDING EXP. B<br/>PE SEAL COVER SHEET</b> |                                  |
|                                                                                                                                                                                                                                                                  | <b>CHECKED BY: PDH</b>  |                       |                                                                                                    |                                  |
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|                                                                                                                                                                                                                                                                  | <b>CLIENT: TBS</b>      | <b>SHT. 1</b>         | <b>DWG. NO: SK-3</b>                                                                               | <b>REV: 4</b>                    |

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**CLIENT: TBS**

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

**DATE: 12-18-17**

**SHT. 2**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO:  
160225/173005**

**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 ULTIMATE WIND SPEED 105 TO 140 MPH (NOMINAL WIND SPEED 100 MPH) MAXIMUM RAFTER/POST AND END POST SPACING = 50 FT.
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 PICK CATEGORY I (WIND)
7. WIND EXPOSURE CATEGORY B
8. SPECIFICATIONS APPLICABLE: 16 GAUGE METAL PANELS FASTENED DIRECTLY TO 2x12x2x12 16 GAUGE TUBE STEEL (C) FRAMING MEMBERS FOR VERTICAL PANELS. 16 GAUGE METAL PANELS SHALL BE FASTENED TO 2x12x2x12 16 GAUGE TUBE STEEL (C) FRAMING MEMBERS FOR VERTICAL PANELS. 16 GAUGE METAL PANELS SHALL BE FASTENED TO 2x12x2x12 16 GAUGE TUBE STEEL (C) FRAMING MEMBERS FOR VERTICAL PANELS.
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS: EXTERIOR = 5" (P) END = 6" (MAX)
10. FASTENERS CONSIST OF #12-14x3/4" DEEP END LINE FASTENERS (DOFS), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR ROOF PITCHES OF 12:12 OR LESS, AND ROOF SLOPES OF 14:12 (3:12 PITCH) OR LESS. SPACING REQUIREMENTS FOR OTHER ROOF PITCHES AND/or CLIMATES MAY VARY.
11. GROUND ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITH MINIMUM 1" GUTTER RAIL COLUMN ALONG SIDES.
12. GROUND ANCHORS SHALL CONSIST OF #4 REBAR WELDED NOT 2" BUT LUMP IS SUITABLE. SEE FUNDING MAY BE USED FOR LOW WIND SPEEDS (105 MPH NOMINAL WIND SPEED) OR. OPTIONAL ANCHORAGE MAY BE USED IN LOW WIND SPEEDS AND MUST BE USED IN UNDER 105 MPH WINDS AS NOTED.
13. MINIMUM BASE RAIL ANCHORAGE MAY BE USED FOR LOW WIND AND MUST BE USED FOR HIGH WIND SPEEDS.
14. WIND SPEEDS GOVERN OVER DESIGN WINDS. CLIMATIC PARAMETERS ANALYZED ARE:  
 SFC SITE CLASS = II  
 RISK CATEGORY I/II/III  
 R = 10.25  
 C<sub>dir</sub> = 1.522  
 C<sub>ex</sub> = 0.839



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**CLIENT: TBS**

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

**DATE: 12-18-17**

**SCALE: NTS**

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

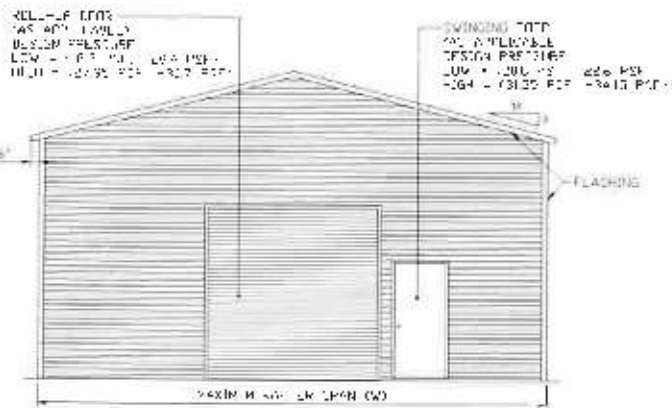
**SHT. 3**

**DWG. NO: SK-2**

**REV.: 4**

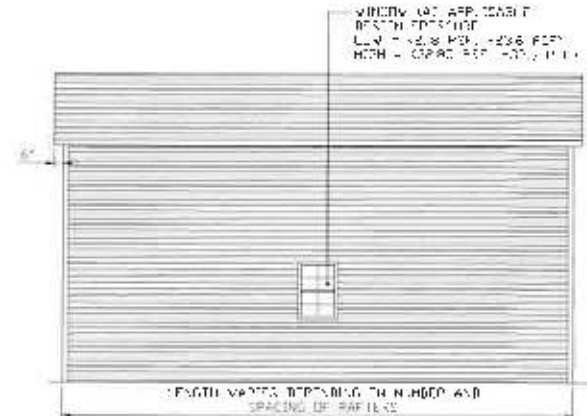
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## BOX EAVE FRAME RAFTER ENCLOSED BUILDING



**TYPICAL END ELEVATION-HORIZONTAL ROOF**

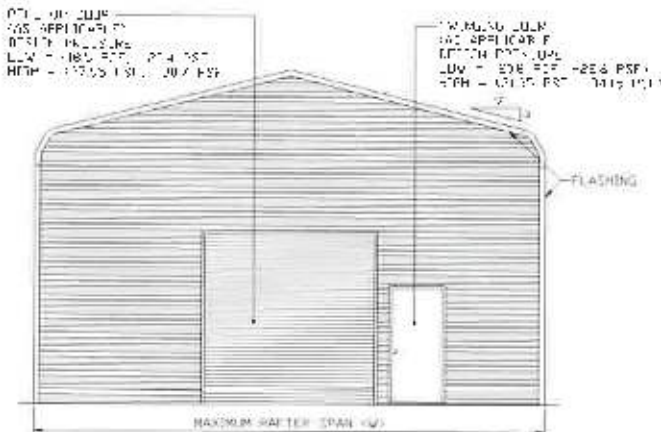
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**TYPICAL SIDE ELEVATION-HORIZONTAL ROOF**

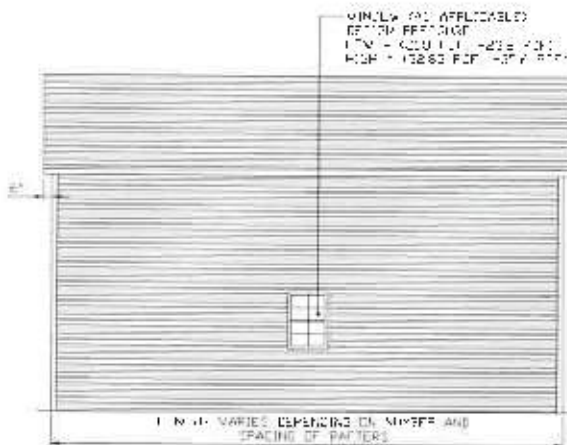
SCALE: NTS

## BOW FRAME RAFTER ENCLOSED BUILDING



**TYPICAL END ELEVATION**

SCALE: NTS



**TYPICAL SIDE ELEVATION**

SCALE: NTS



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

DATE: 12-18-17

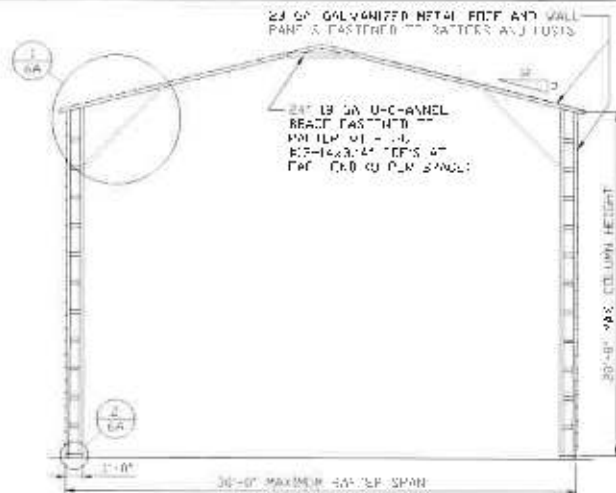
SHT. 4

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DWG. NO: SK-3

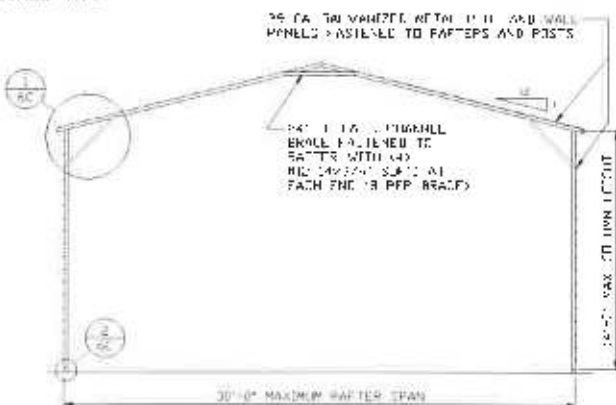
JOB NO:  
160225/173005

REV: 4



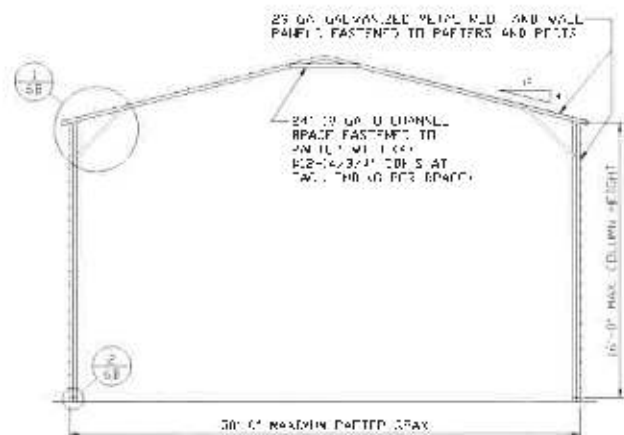
**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



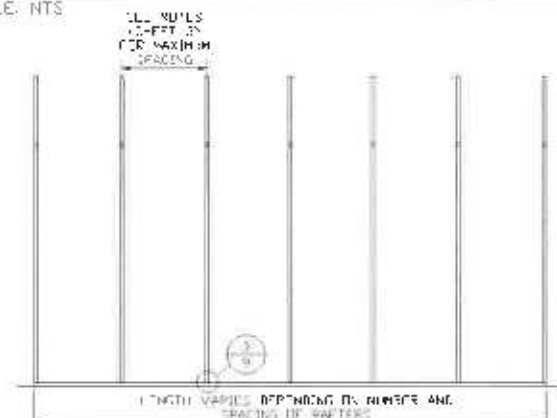
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SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION**

SCALE: NTS



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

DATE: 12-18-17

SHT. 5

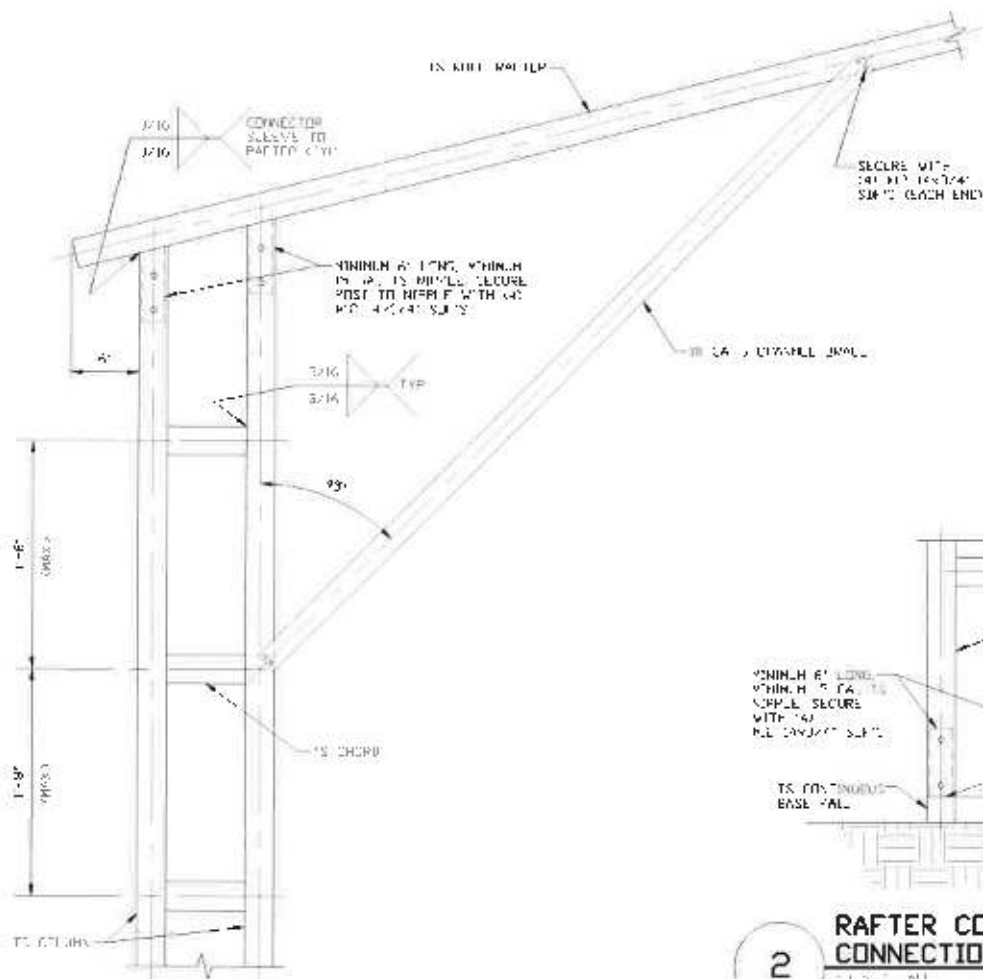
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JOB NO:  
160225/17300S

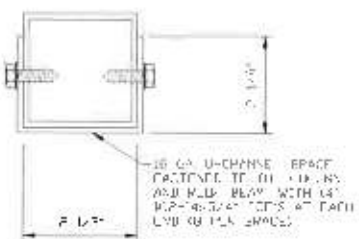
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 16'-0" < TO ≤ 20'-0"**

SCALE: NTS



**BRACE SECTION**

SCALE: 1/2" = 1'-0"

2

**RAFTER COLUMN/BASE RAIL  
CONNECTION DETAIL**

SCALE: NTS



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

DATE: 12-18-17

SCALE: NTS

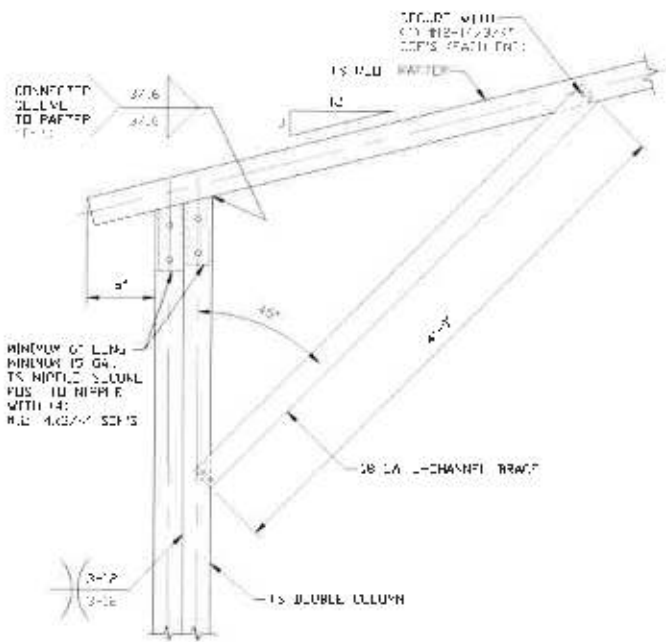
JOB NO:  
160223/173003

SHT. 6A

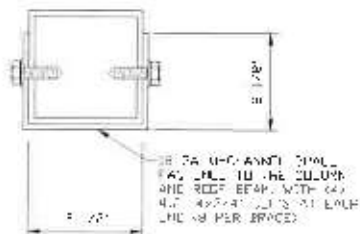
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REV: 4

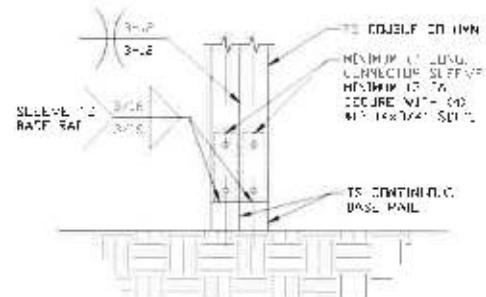
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 14'-0" < TO ≤ 16'-0"**  
SCALE: NTS



**BRACE SECTION**  
SCALE: NTS



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



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

DATE: 12-18-17

SHT. 6B

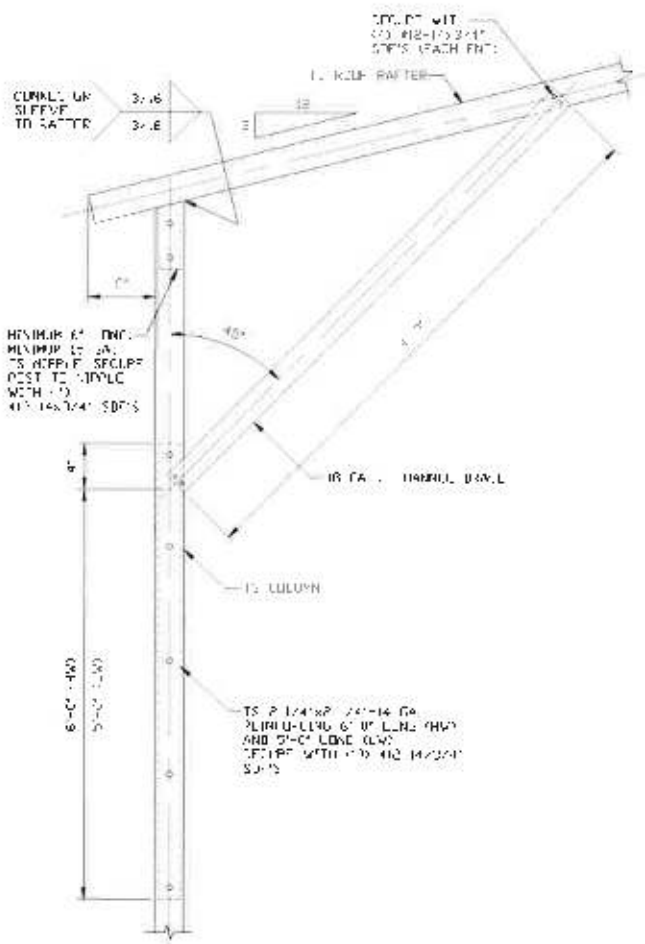
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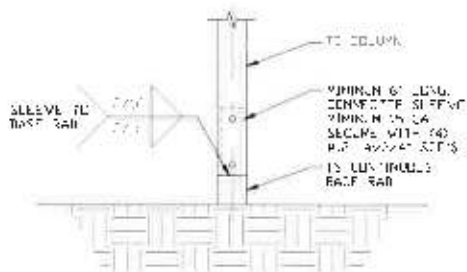
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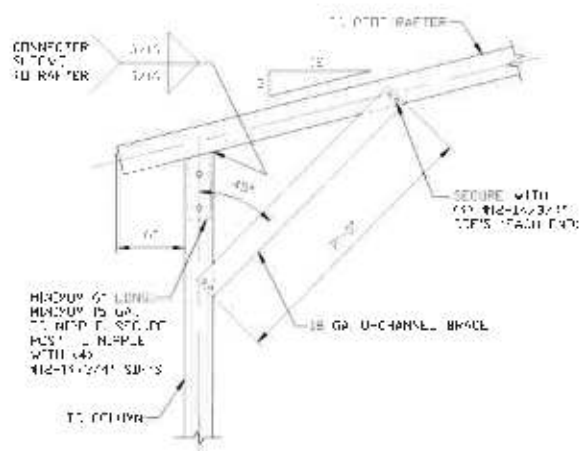
1A

**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 10'-0" < TD ≤ 14'-0"**  
SCALE: NTS



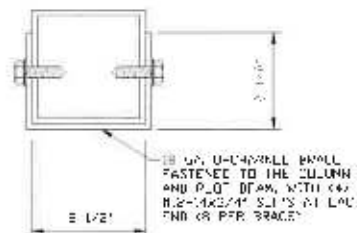
2

**RAFTER COLUMN/BASE RAIL  
CONNECTION DETAIL**  
SCALE: 1/4" = 1'-0"



1B

**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS ≤ 10'-0"**  
SCALE: NTS



**BRACE SECTION**  
SCALE: 1/4" = 1'-0"



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

**DATE: 12-19-17**

**SCALE: NTS**

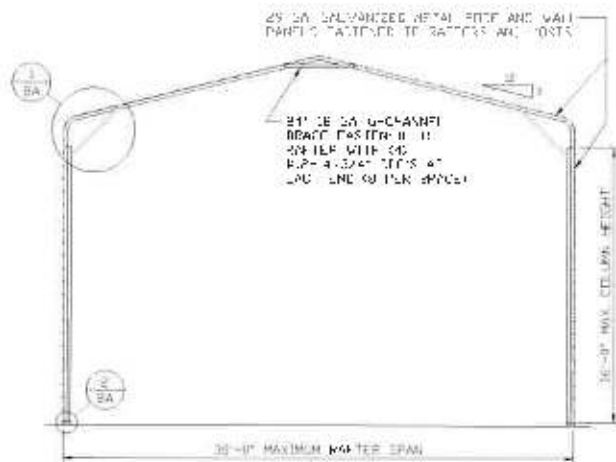
**JOB NO:  
160225/173085**

**SHT. 6C**

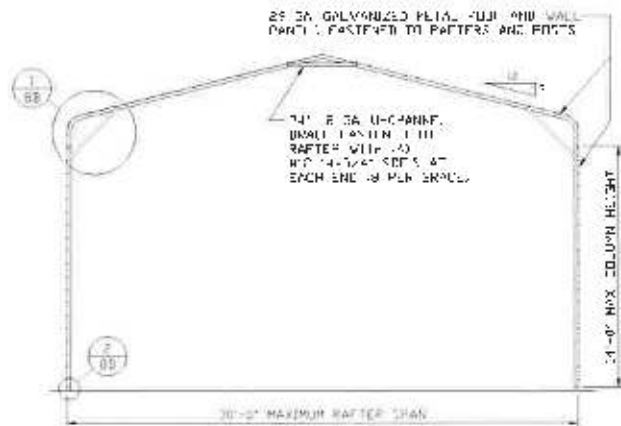
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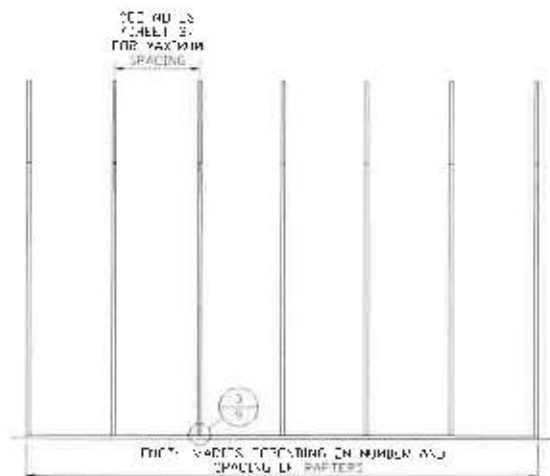
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



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



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



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

**DATE: 12-18-17**

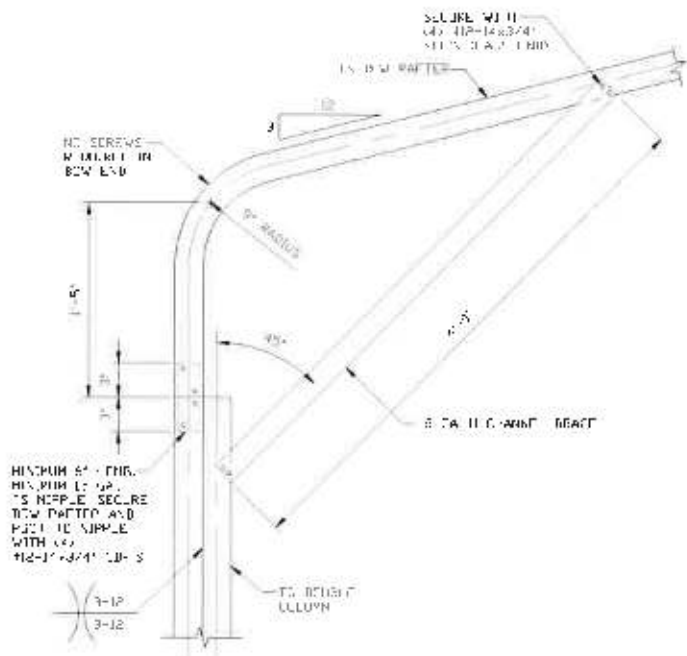
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160225/173005**

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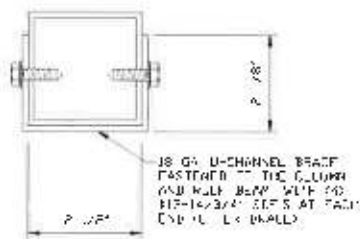
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1

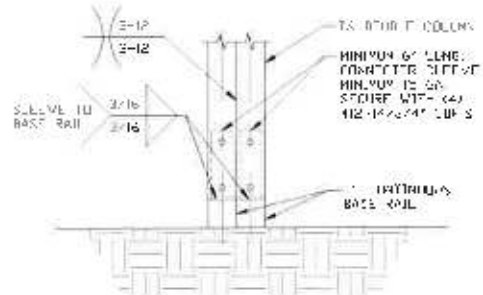
# BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 14'-0" < TO ≤ 16'-0"

SCALE: NTS



## BRACE SECTION

SCALE: NTS



2

## RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



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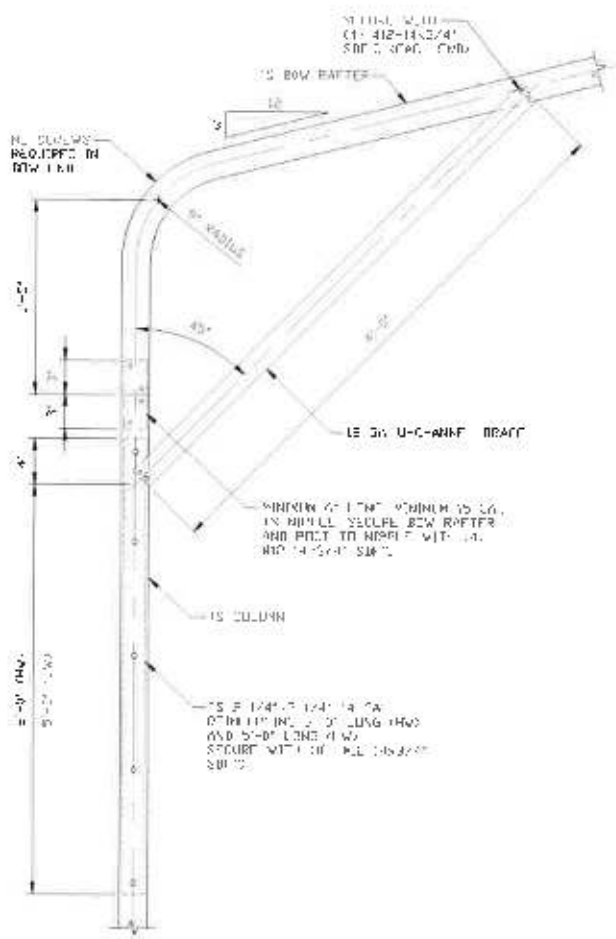
JOB NO:  
160225/173005

SHT. 8A

DWG. NO: SK-3

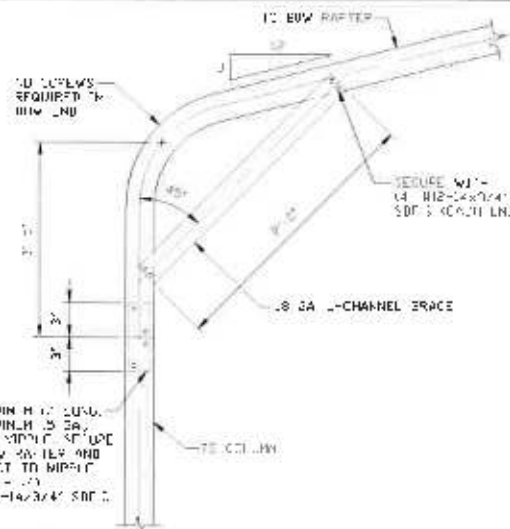
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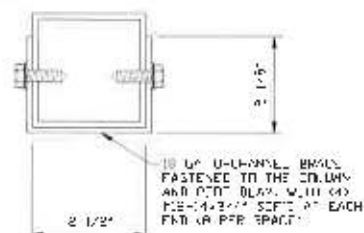
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS 10'-0" < TO ≤ 14'-0"**  
SCALE: NTS

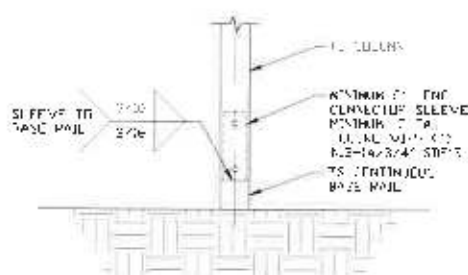


1B

**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL  
FOR HEIGHTS ≤ 10'-0"**  
SCALE: NTS



**BRACE SECTION**  
SCALE: NTS



2

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



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

DATE: 12-19-17

SHT. 6B

SCALE: NTS

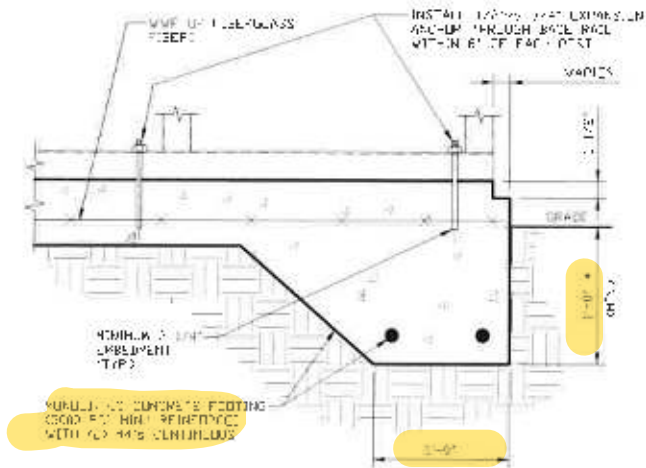
DWG. NO: SK-3

JOB NO:  
16022S/17300S

REV: 4

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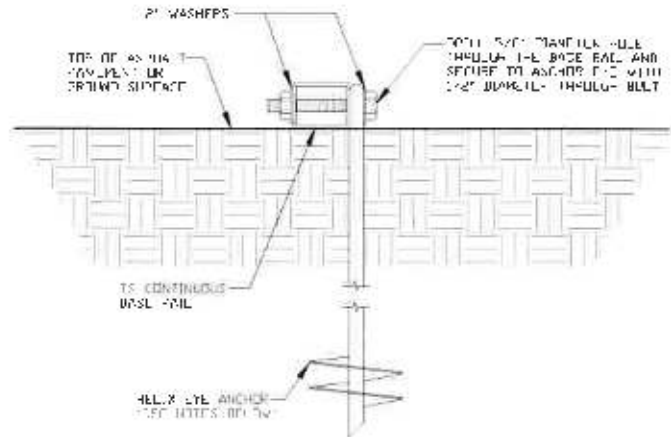
## BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED



3A

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS  
MINIMUM ANCHOR LENGTH DISTANCE TO 4\"/>



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, 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 EARTH OR EXPOSED TO THE EFFECTS OF WEATHER AND 1 1/2 INCHES ELSEWHERE.

### REINFORCING STEEL:

THE TOPDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCING SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR TUBULARS WITH 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 FIELD IN THE BAR IS NOT LESS THAN SIX-BAR DIAMETERS.
3. REINFORCEMENT, ESPECIALLY EXPOSED IN CONCRETE SHALL NOT BE FIELD BENT.

### HELIX ANCHOR NOTES:

1. FOR VERY BEND ANCHOR ORIENTED SANDS, COARSE GRAVEL, AND COE'S SAND, USE MINIMUM 24\"/>
2. FOR DURAL USE MINIMUM 24\"/>
3. FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVEL, VERY SAND, SILT, AND CLAYS USE MINIMUM 24\"/>
4. FOR LOOSE TO MEDIUM DENSE SANDS, FINE TO MEDIUM SILT, AND SILT, ALLUVIAL FILL USE MINIMUM 24\"/>
5. FOR VERY LOOSE TO MEDIUM DENSE SANDS, FINE TO MEDIUM SILT, AND SILT, ALLUVIAL FILL USE MINIMUM 24\"/>



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**DRAWN BY: LT**

**CHECKED BY: PJM**

**PROJECT MGR: VSH**

**CLIENT: TBS**

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

**DATE: 12-18-17**

**SHT. 9A**

**SCALE: NTS**

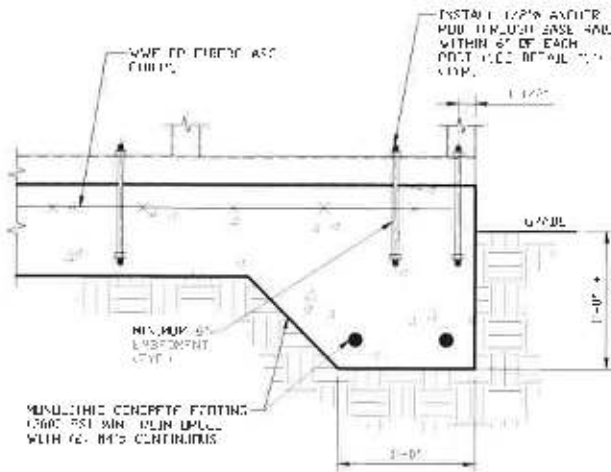
**DWG. NO: SK-3**

**JOB NO:  
1602RS/173005**

**REV: 4**

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## OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED

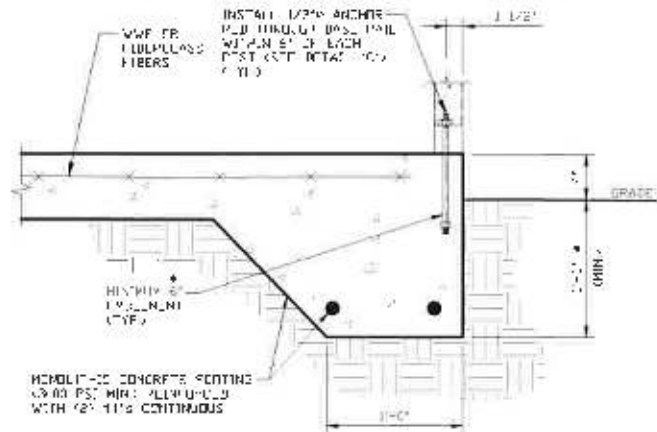


1A

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MINIMUM ANCHOR LODGE DISTANCE IS 1 1/2"  
\* COORDINATE WITH LOCAL CODES/CFI



1B

### CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MINIMUM ANCHOR LODGE 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.

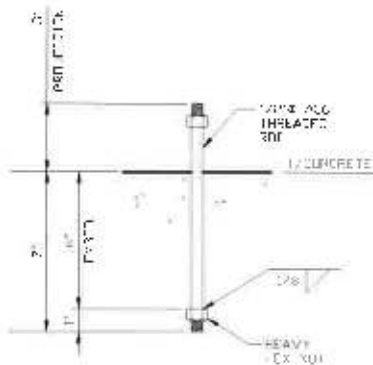
3 INCHES IN THICKNESS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

### REINFORCING STEEL

THE MINIMUM 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 90°.
2. THE DIAMETER OF THE BEND, MEASURED ON 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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DRAWN BY: LT

CHECKED BY: PDI

PROJECT MGR: WSM

CLIENT: TBS

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

DATE: 12-18-17

SHT. 9B

SCALE: NTS

DWG. NO: SK-3

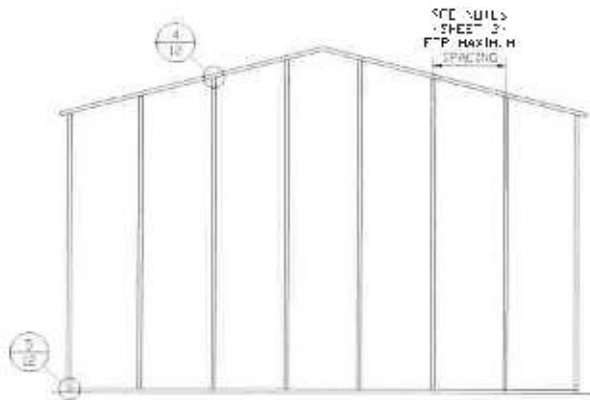
JOB NO:

16022S/17300S

REV: 4

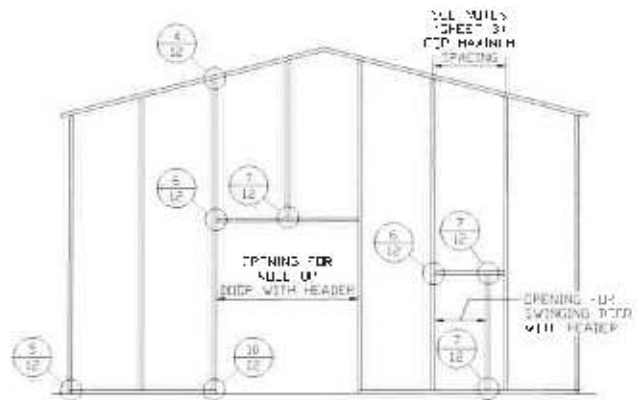
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## BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



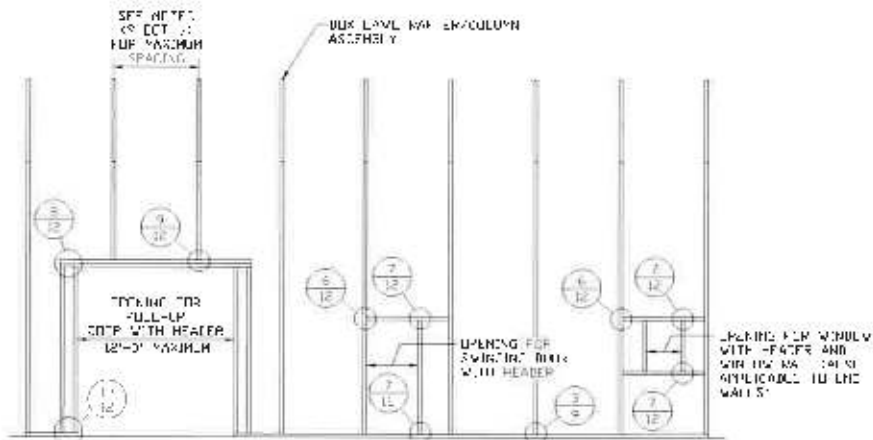
**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

SCALE: 1/2" = 1'-0"



**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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**CHECKED BY: PDH**

**PROJECT MGR: VSM**

**CLIENT: TBS**

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

**DATE: 12-18-17**

**SHT. 10**

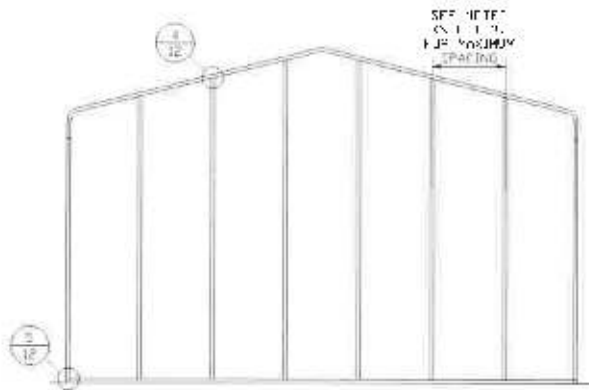
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**DWG. NO: SK-3**

**JOB NO:  
160223/173005**

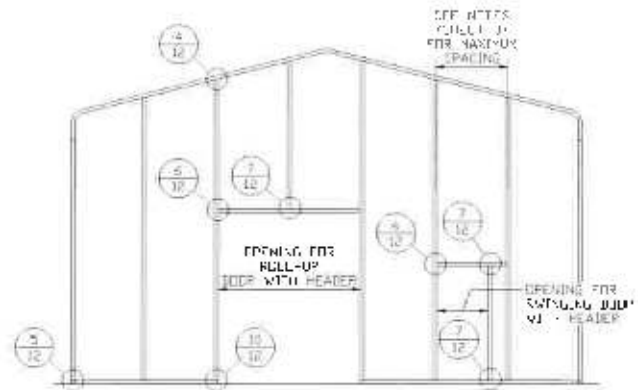
**REV: 4**

## BOW RAFTER END WALL AND SIDE WALL OPENINGS



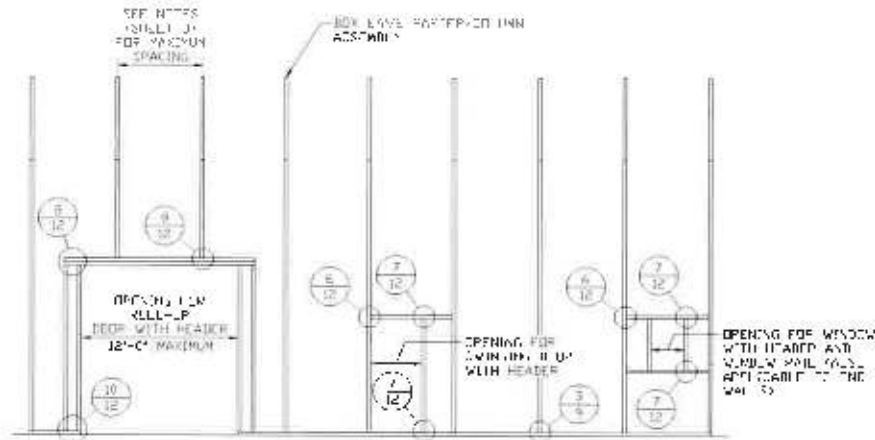
**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

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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**CHECKED BY: PDH**

**PROJECT MGR: WSM**

**CLIENT: TBS**

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

**DATE: 12-18-17**

**SHT. 11**

**SCALE: N.T.S.**

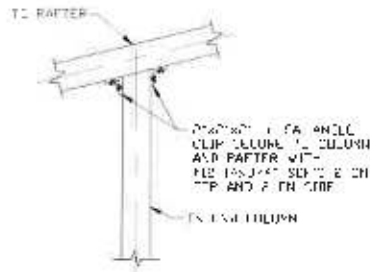
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**JOB NO.  
160825/173005**

**REV: 4**

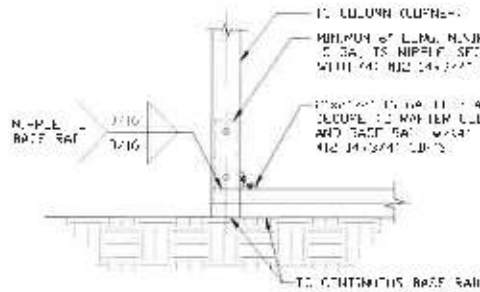
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## BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



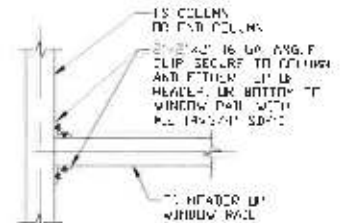
**4** **END COLUMN/RAFTER CONNECTION DETAIL**

SCALE: NTS



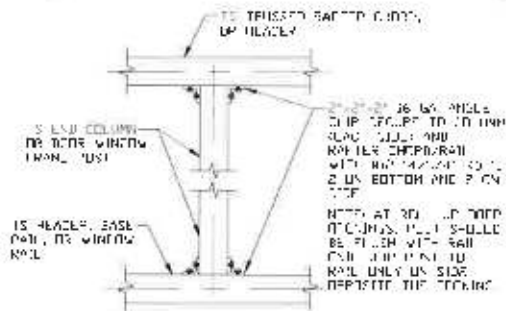
**5** **END COLUMN/BASE RAIL CONNECTION DETAIL**

SCALE: NTS



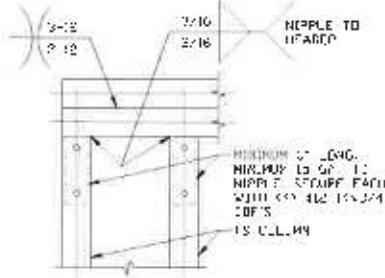
**6** **HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL**

SCALE: NTS



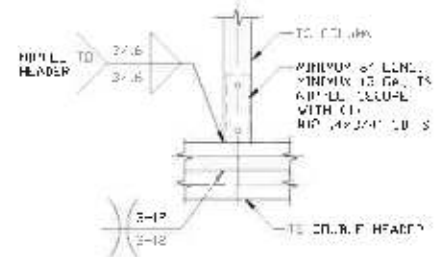
**7** **COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL**

SCALE: NTS



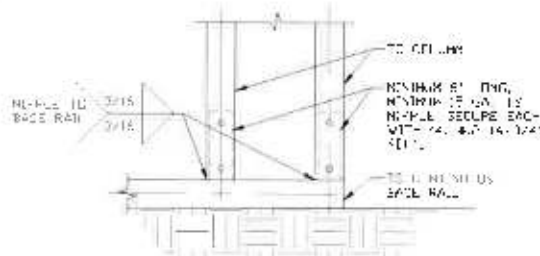
**8** **DOUBLE HEADER/COLUMN CONNECTION DETAIL**

SCALE: NTS



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

SCALE: NTS



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

SCALE: NTS



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**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**

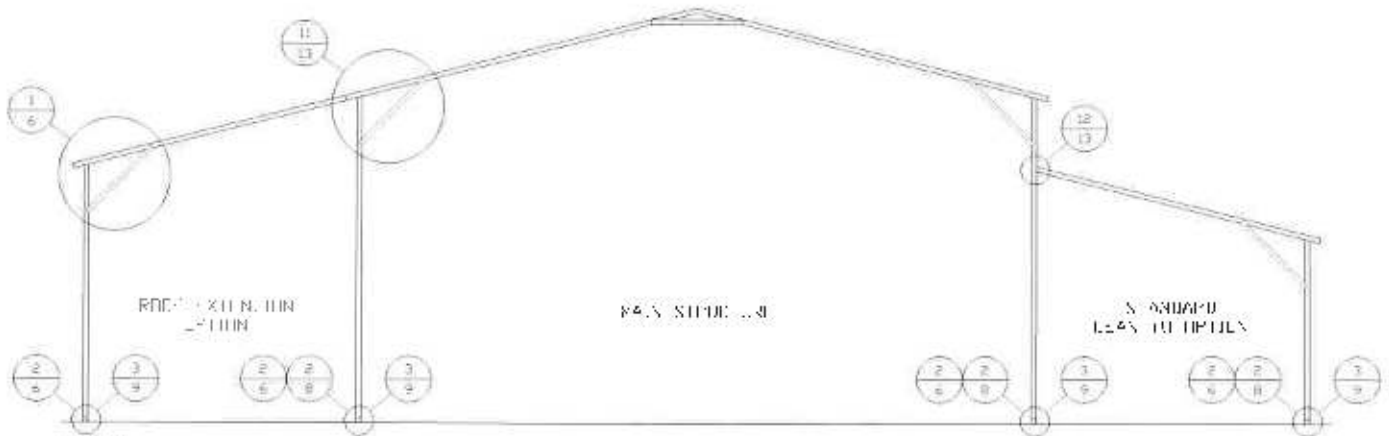
**JOB NO:**

**160225/173005**

**REV: 4**

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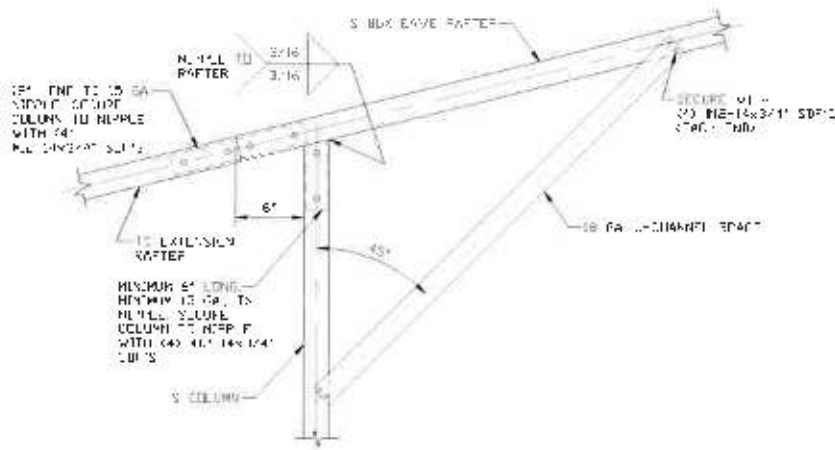
## BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

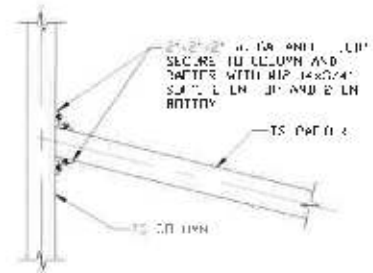
MAXIMUM WIDTH OF SINGLE MEMBER RAFTER (AN ALL IS 16'-0")



**11A**

**SIDE EXTENSION RAFTER/COLUMN DETAIL**

SCALE: NTS



**12**

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

SCALE: NTS



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CLIENT: TBS

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

DATE: 12-18-17

SHT. 13

SCALE: NTS

DWG. NO: SK-3

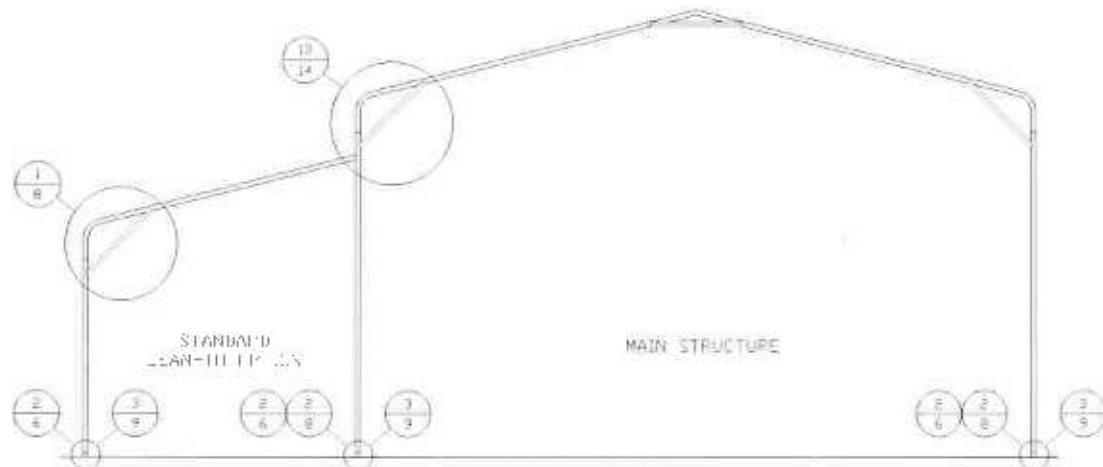
JOB NO:

160225/173005

REV. 4

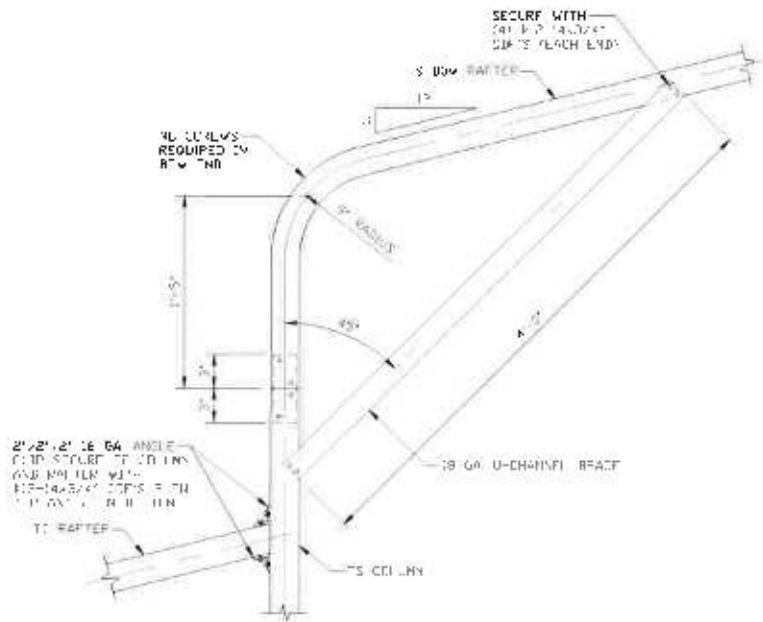
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## BOW RAFTER LEAN-TO OPTIONS



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

SCALE: NTC  
MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 10' 0"



**13 SIDE EXTENSION RAFTER/COLUMN DETAIL**

SCALE: NTC



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**PROJECT MGR: WSM**

**CLIENT: TBS**

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

**DATE: 12-18-17**

**SHT. 14**

**SCALE: NTS**

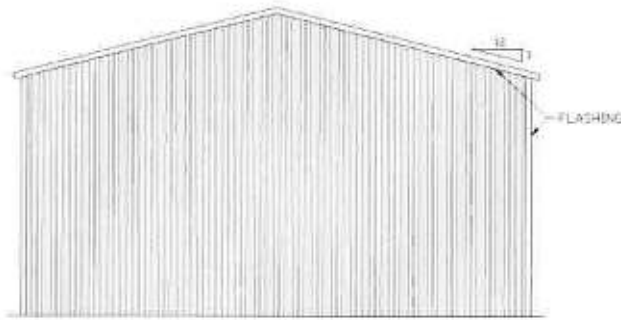
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**JOB NO:  
160225/173005**

**REV. 4**

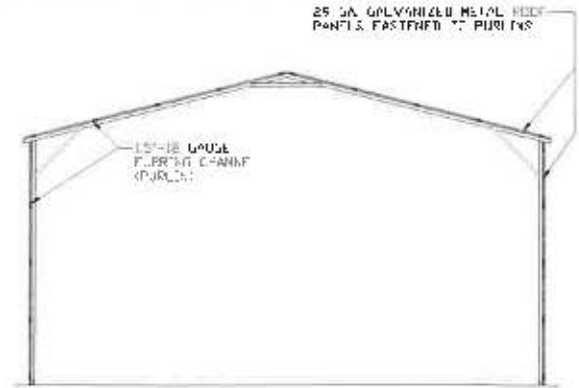
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## BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



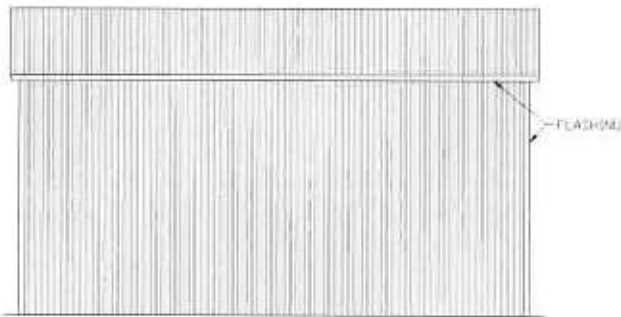
**TYPICAL END ELEVATION  
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



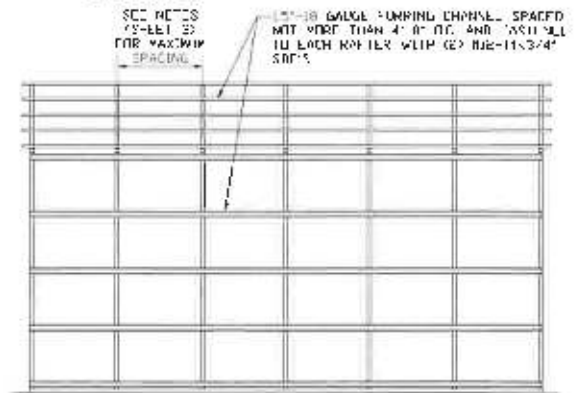
**TYPICAL SECTION VERTICAL  
ROOF/SIDING OPTION**

SCALE: NTS



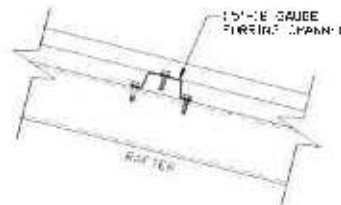
**TYPICAL SIDE ELEVATION  
VERTICAL ROOF/SIDING OPTION**

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**

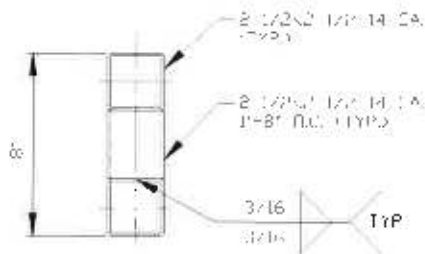
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**JOB NO:  
166223/173005**

**REV: 4**

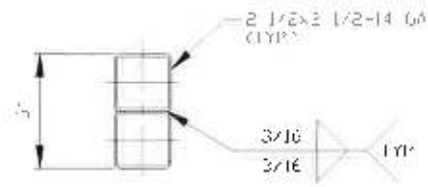
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## OPTIONAL DOOR HEADER



**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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**PROJECT MGR: WSM**

**CLIENT: TBS**

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

**DATE: 12-19-17**

**SHT. 16**

**SCALE: NTS**

**DWG. NO: SK-3**

**JOB NO:  
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