



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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Digitally signed
by Wayne S
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MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT		TUBULAR BUILDING SYSTEMS	
	CHECKED BY: PDH		30'-0"x20'-0" ENCLOSED BUILDING EXP. B	
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	CLIENT: TBS		SHT. 1	JOB NO: 160223/173005
			DWG. NO: SK-3	REV: 4

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

DATE: 12-18-17

SCALE: NTS

**JOB NO:
160225/173005**

SHT. 2

DWG. NO: SK-3

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: 16 GAUGE METAL PANELS FASTENED DIRECTLY TO 2x12x12x2x12x14 GAUGE TUBULAR STEEL (TSS) FRAMING MEMBERS. FOR VERTICAL PANELS, 16 GAUGE METAL PANELS SHALL BE FASTENED TO TUBULAR STEEL FRAMING MEMBERS. OTHERWISE NOTED.
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS: INTERIOR = 5' ON CENTER, END = 6' (MAX).
10. FASTENERS CONSIST OF #10-14x3/4" DEEP DRILLING FASTENERS (DOFS), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MAXIMUM HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPED OF 14° (3:12 PITCH) OR LESS. SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR PITCHES 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 WELDED NOT LESS THAN 18" IN SUITABLE SOIL. FINDER AS MAY BE USED FOR LOW WIND SPEEDS (105 MPH NOMINAL WIND SPEED OR LESS). OPTIONAL ANCHORAGE MAY BE USED IN LOOSE SOILS AND MUST BE USED IN UNDESIRABLE SOILS AS NOTED.
13. MINIMUM RAFTER RAIL ANCHORAGE MAY BE USED FOR LOW 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 = 10.25 S_s = 1.0
 - S_{MS} = 0.522 S_{MS} = 0.522
 - S_{MS} = 0.339



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

DATE: 12-18-17

SCALE: NTS

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

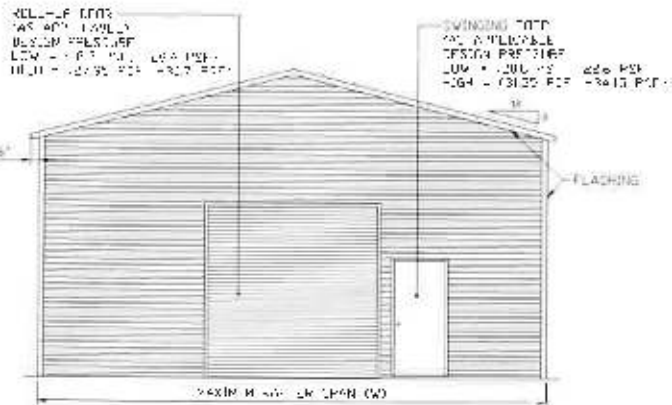
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DWG. NO: SK-2

REV.: 4

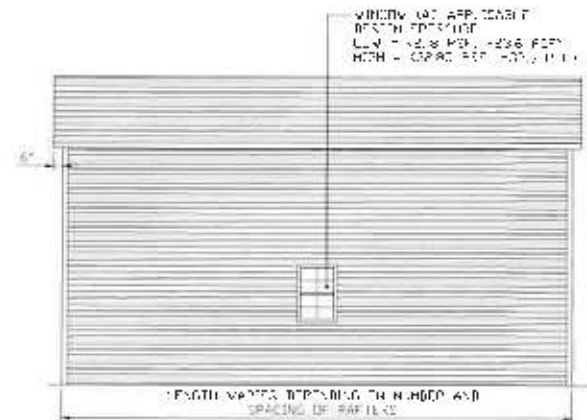
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BOX EAVE FRAME RAFTER ENCLOSED BUILDING



TYPICAL END ELEVATION-HORIZONTAL ROOF

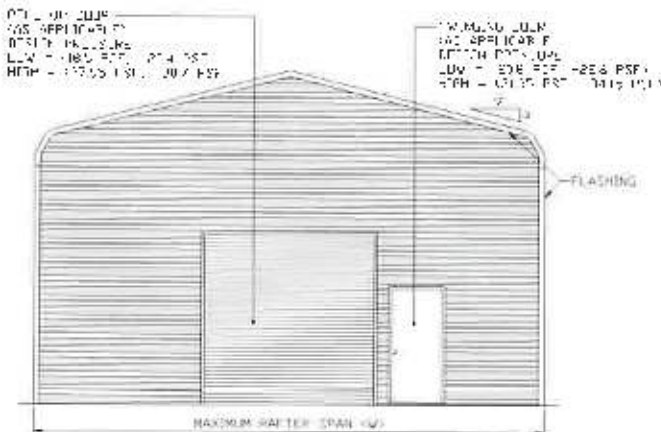
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TYPICAL SIDE ELEVATION-HORIZONTAL ROOF

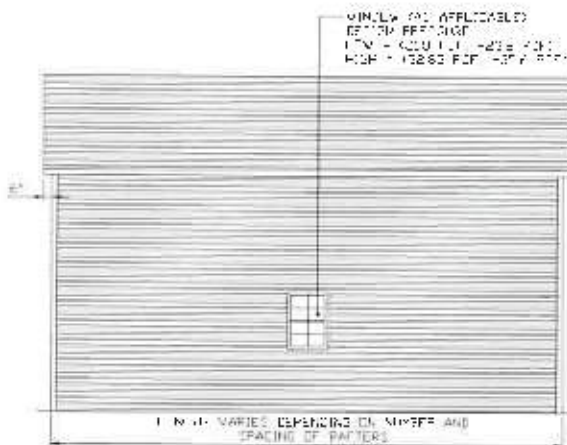
SCALE: NTS

BOW FRAME RAFTER ENCLOSED BUILDING



TYPICAL END ELEVATION

SCALE: NTS



TYPICAL SIDE ELEVATION

SCALE: NTS



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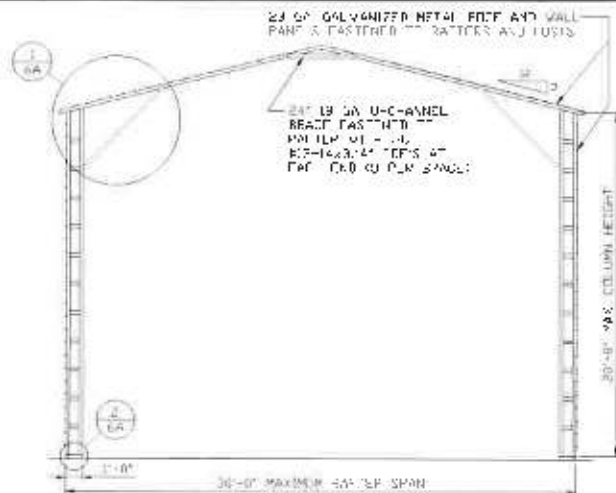
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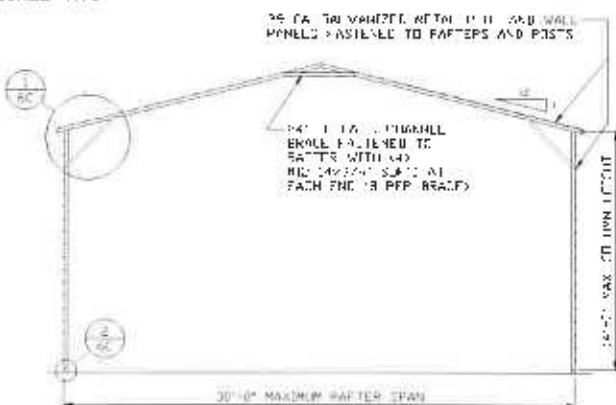
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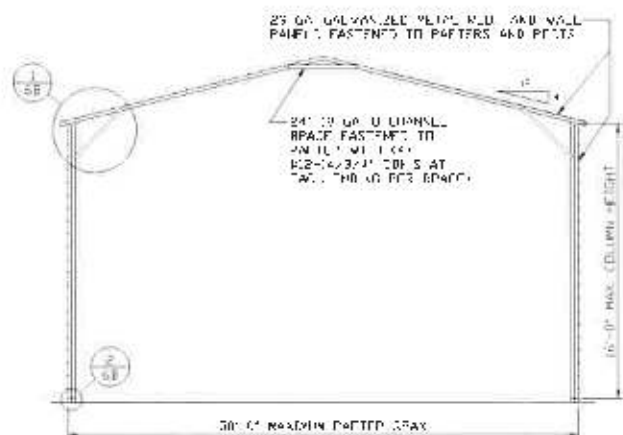
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



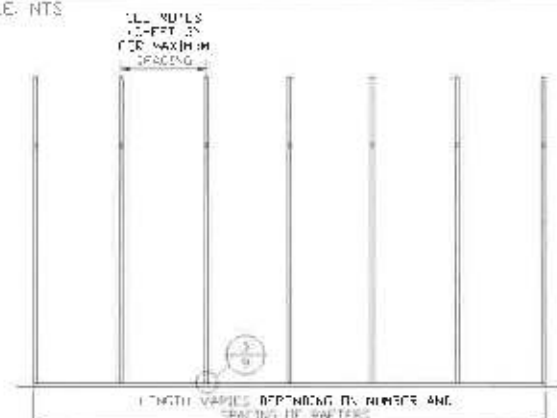
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SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS



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SHT. 5

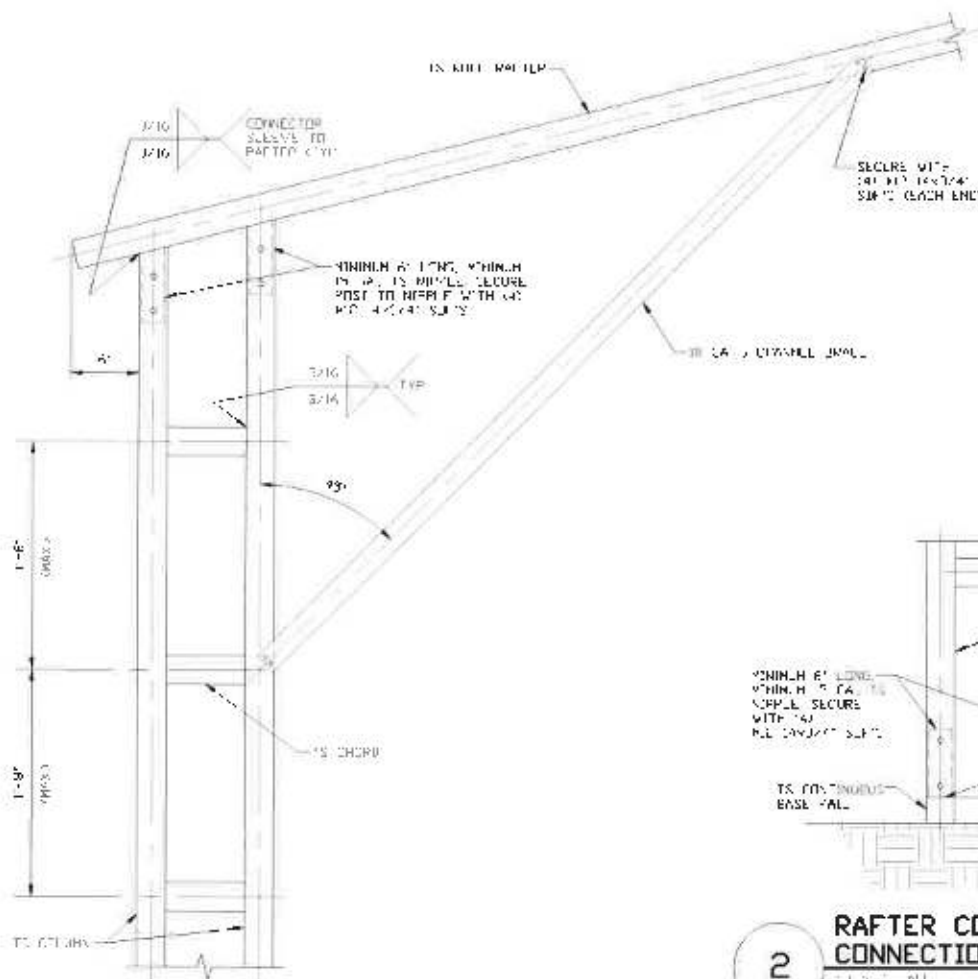
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JOB NO:
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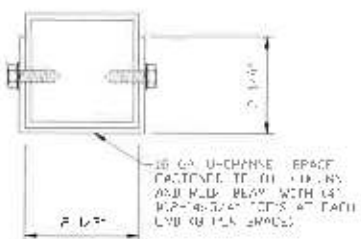
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**BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 16'-0" < TO ≤ 20'-0"**

SCALE: NTS



BRACE SECTION

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

**RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL**

SCALE: NTS



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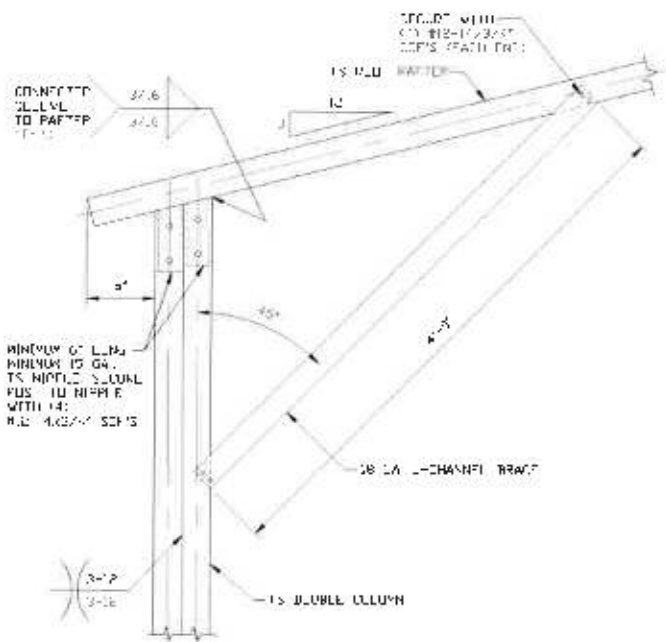
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160223/173003

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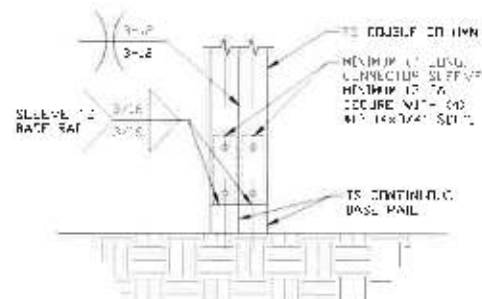
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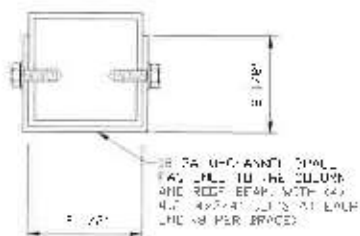
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1
**BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 14'-0" < TO ≤ 16'-0"**
SCALE: NTS



2
**RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL**
SCALE: NTS



BRACE SECTION
SCALE: NTS



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SHT. 6B

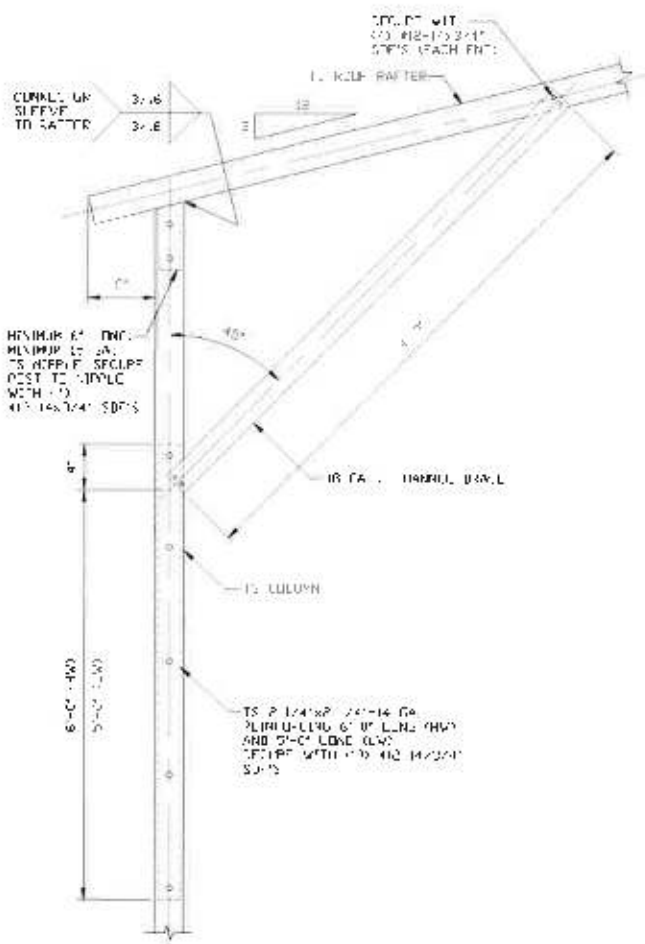
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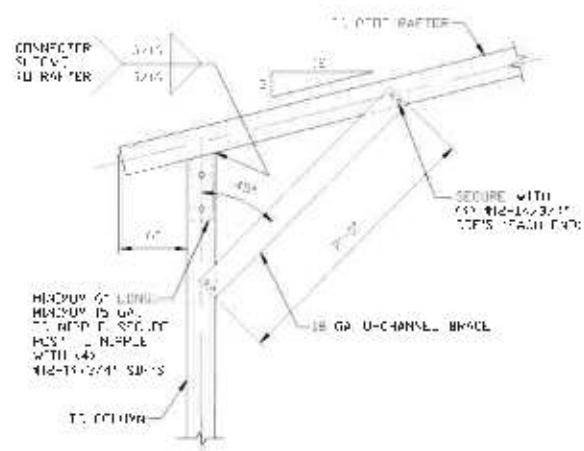
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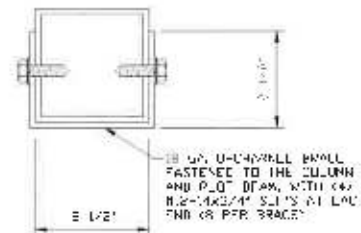
1A

**BOX EAVE RAFTER COLUMN
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FOR HEIGHTS 10'-0" < TD ≤ 14'-0"**
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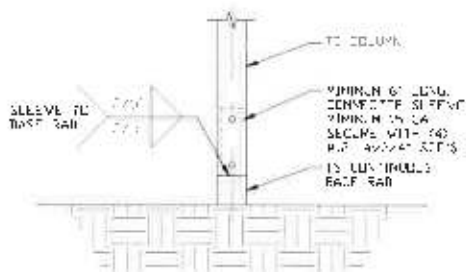


1B

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



BRACE SECTION
SCALE: NTS



2

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



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SHT. 6C

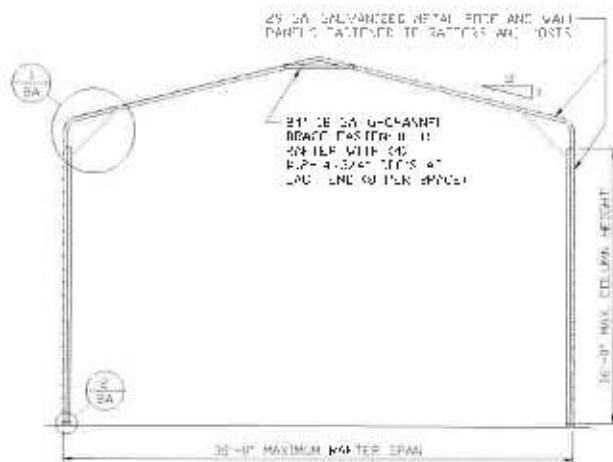
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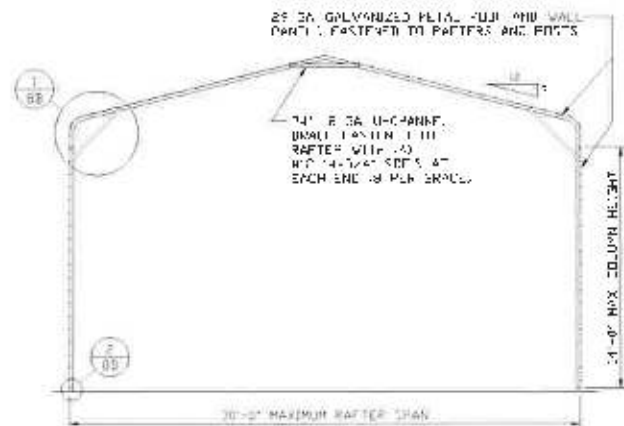
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160225/173085**

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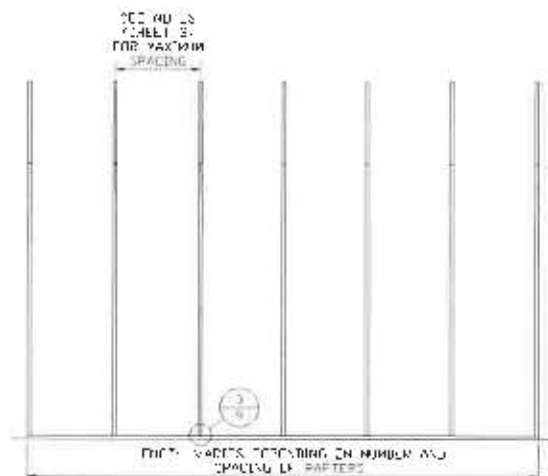
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TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS



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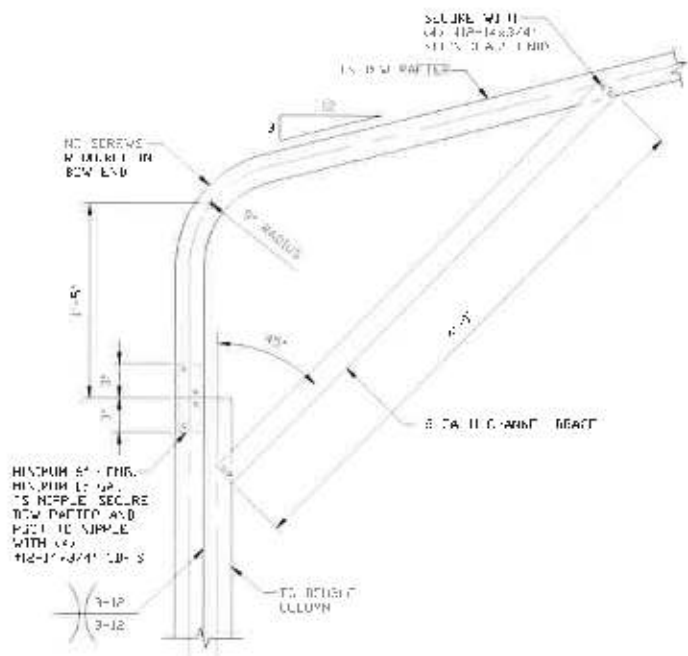
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SHT. 7

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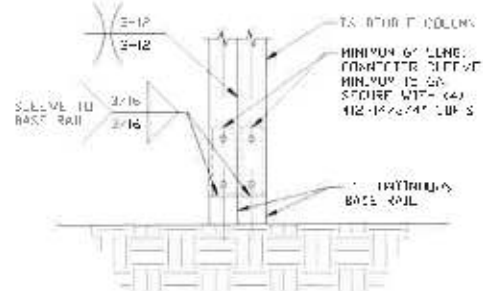
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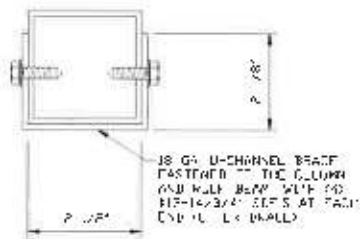
**BOX EAVE RAFTER COLUMN
CONNECTION DETAIL**
FOR HEIGHTS 14'-0" < TO ≤ 16'-0"

SCALE: NTS



**RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL**

SCALE: NTS



BRACE SECTION

SCALE: NTS



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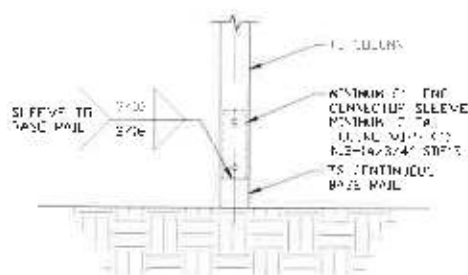
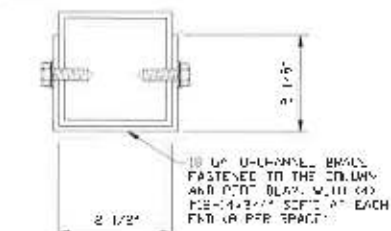
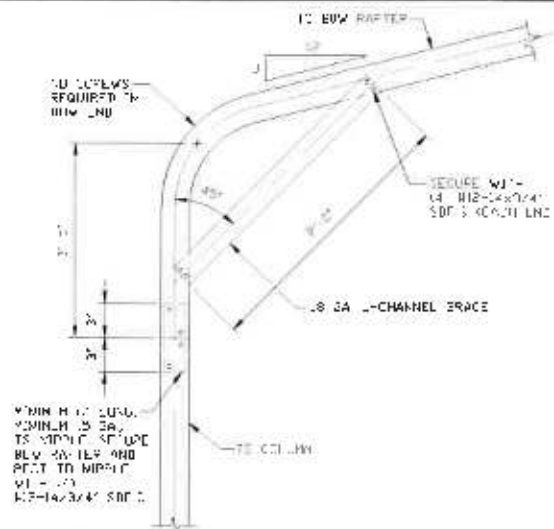
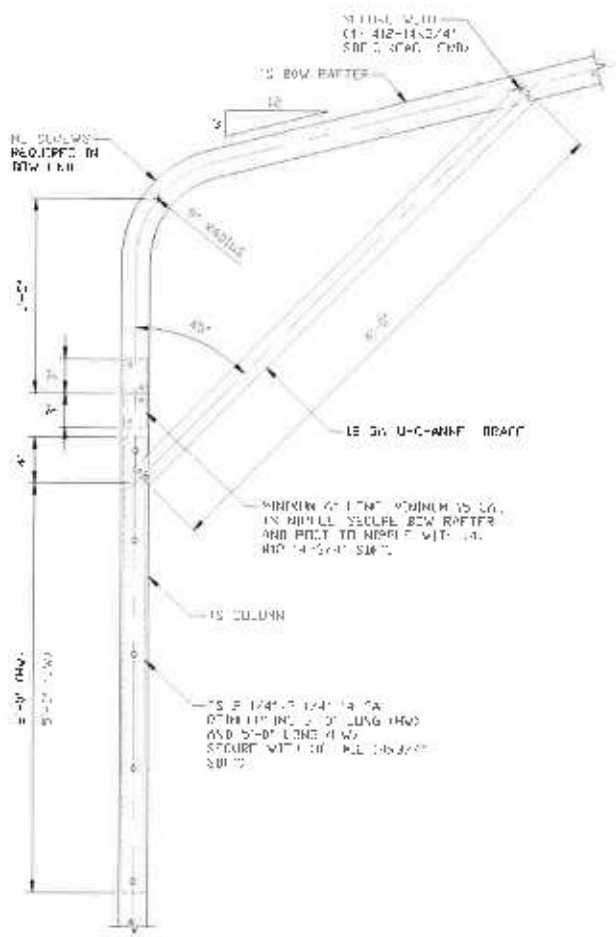
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TUBULAR BUILDING SYSTEMS
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SHT. 6B

SCALE NTS

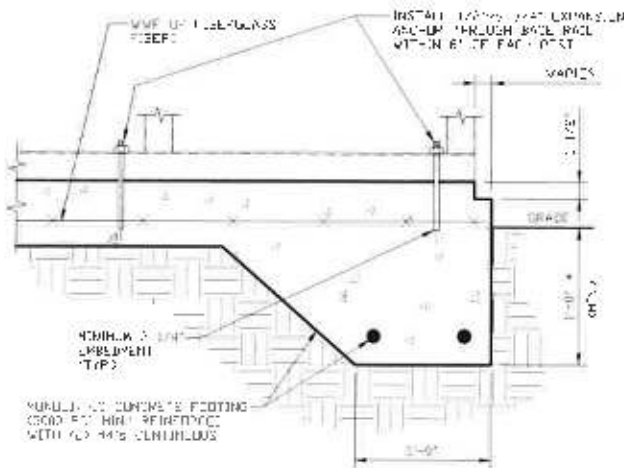
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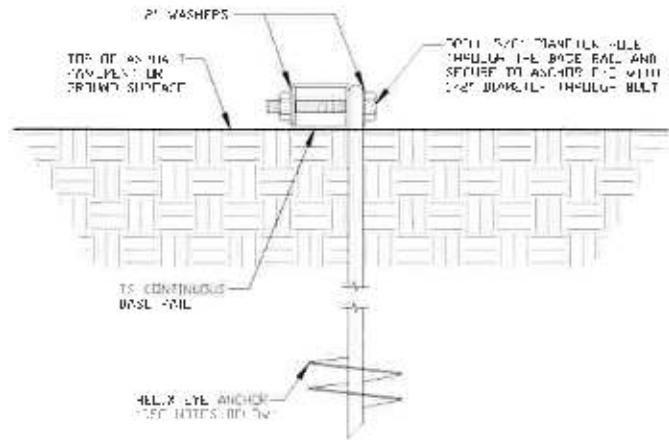
BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED



3A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
MINIMUM ANCHOR EMBEDMENT IS 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 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 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 MIDDLE OF THE BEND IS NOT LESS THAN SIX-BAR DIAMETERS.
3. REINFORCEMENT FULLY 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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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

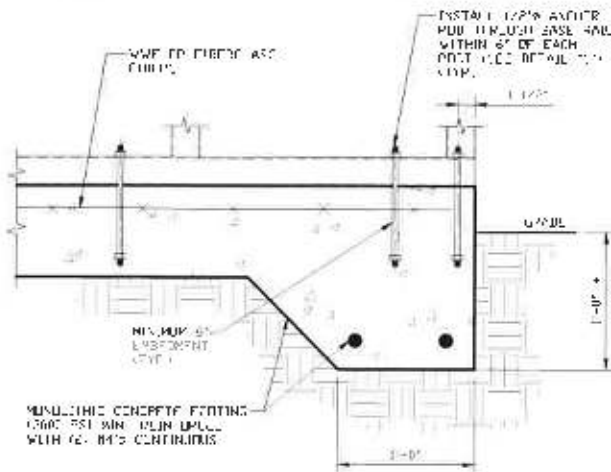
DWG. NO: SK-3

**JOB NO:
160225/173005**

REV: 4

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OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED

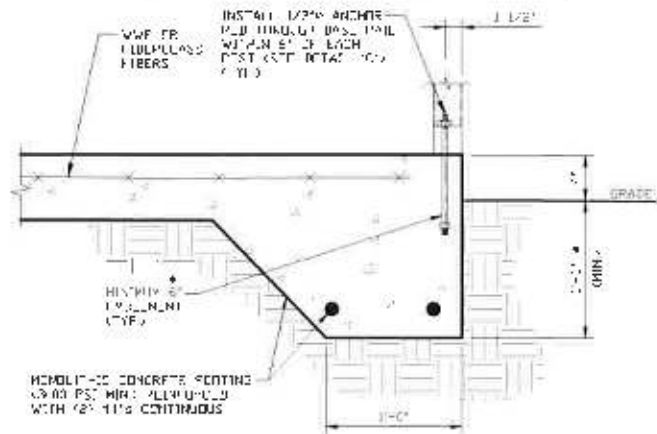


1A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MIN. 1/2" ANCHOR ROD DISTANCE IS 1 1/2"
* COORDINATE WITH LOCAL CODES/CFI



1B

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

MINIMUM ANCHOR-OR 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.

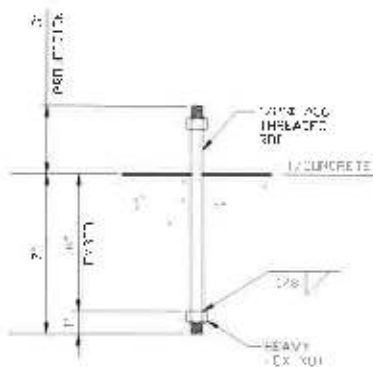
3 INCHES MINIMUM WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL

THE FOUNDATION REINFORCING STEEL SHALL BE AS Y AND FRAM. CO. 11. 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 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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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

SCALE: NTS

JOB NO:
16022S/17300S

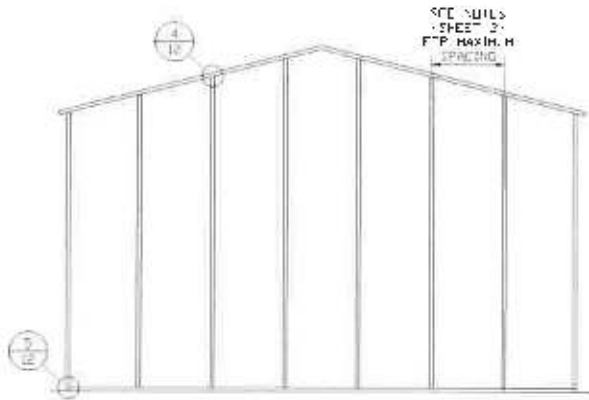
SHT. 9B

DWG. NO: SK-3

REV: 4

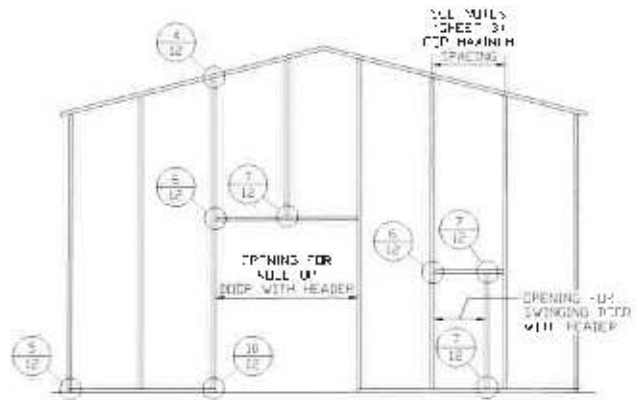
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



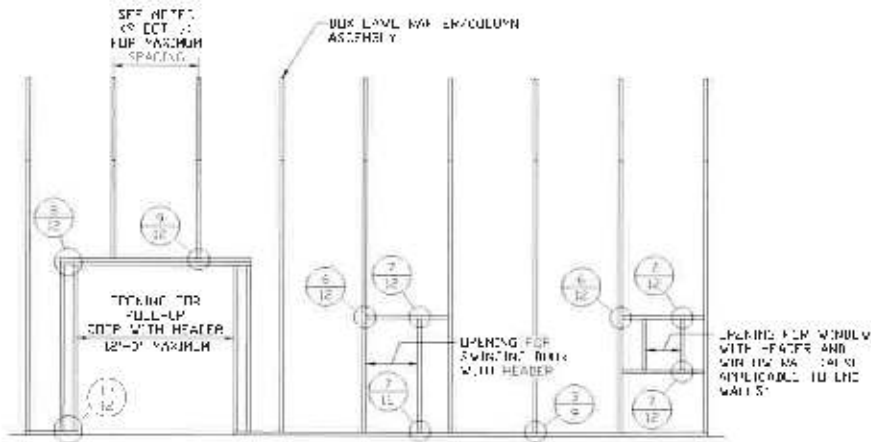
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

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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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

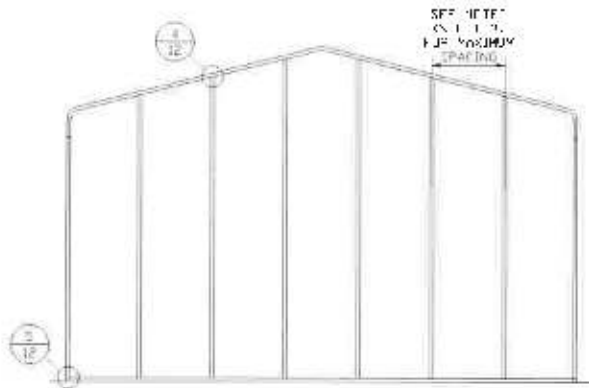
SCALE: NTS

DWG. NO: SK-3

**JOB NO:
160223/173005**

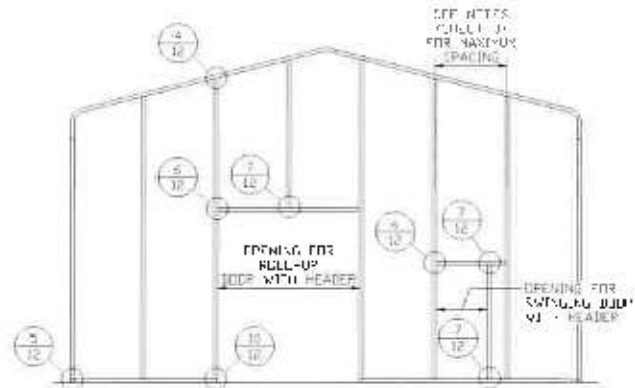
REV: 4

BOW RAFTER END WALL AND SIDE WALL OPENINGS



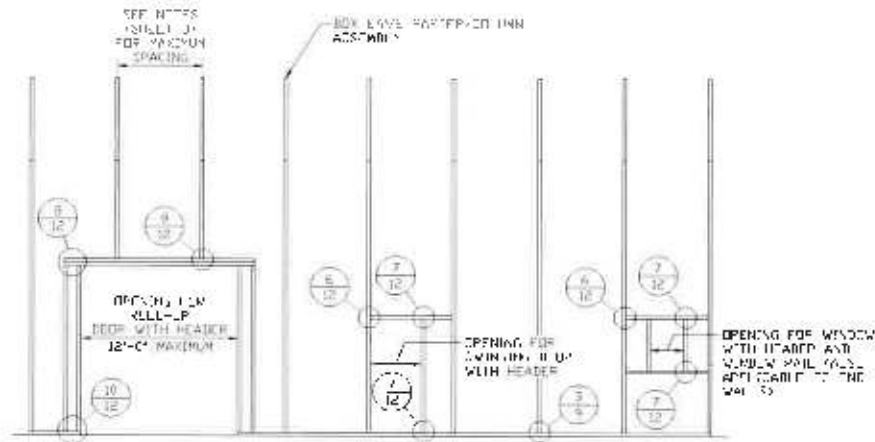
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

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. H**

DATE: 12-18-17

SHT. 11

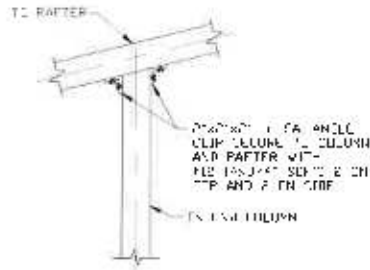
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DWG. NO: SK-3

**JTB NO
160825/173005**

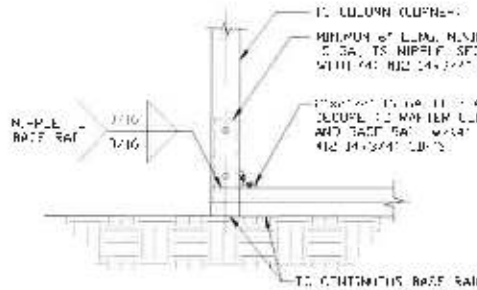
REV: 4

BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



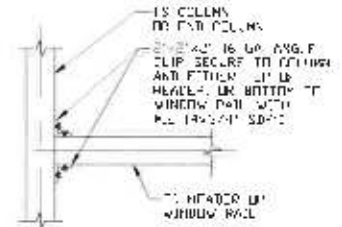
4 **END COLUMN/RAFTER CONNECTION DETAIL**

SCALE: NTS



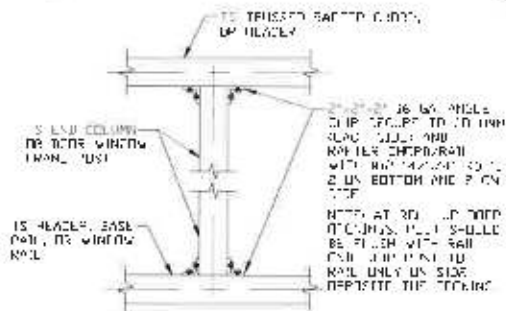
5 **END COLUMN/BASE RAIL CONNECTION DETAIL**

SCALE: NTS



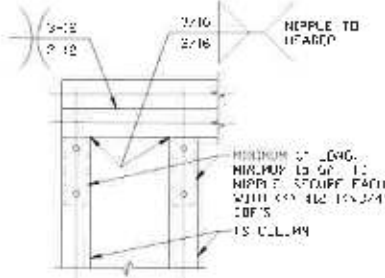
6 **HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL**

SCALE: NTS



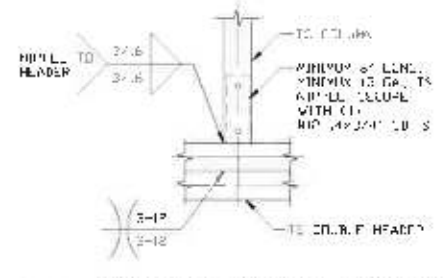
7 **COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL**

SCALE: NTS



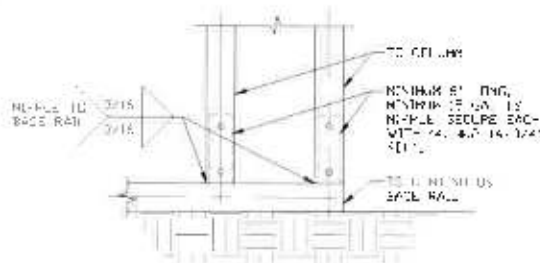
8 **DOUBLE HEADER/COLUMN CONNECTION DETAIL**

SCALE: NTS



9 **COLUMN/DOUBLE HEADER CONNECTION DETAIL**

SCALE: NTS



10 **COLUMN/BASE RAIL CONNECTION DETAIL**

SCALE: NTS



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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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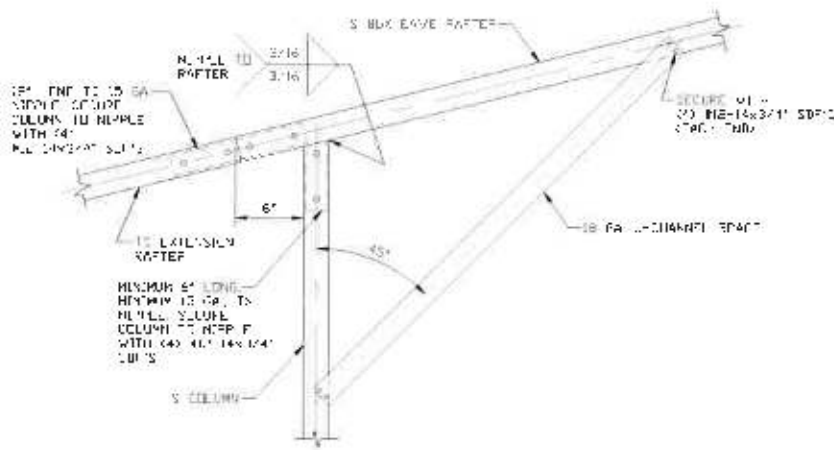
BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

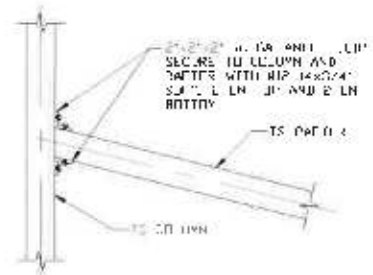
MAXIMUM WIDTH OF SINGLE MEMBER RAFTER: 16" (16" MAX)



11A

SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS



12

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS



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CLIENT: TBS

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

DATE: 12-10-17

SCALE: NTS

JOB NO:
160225/173005

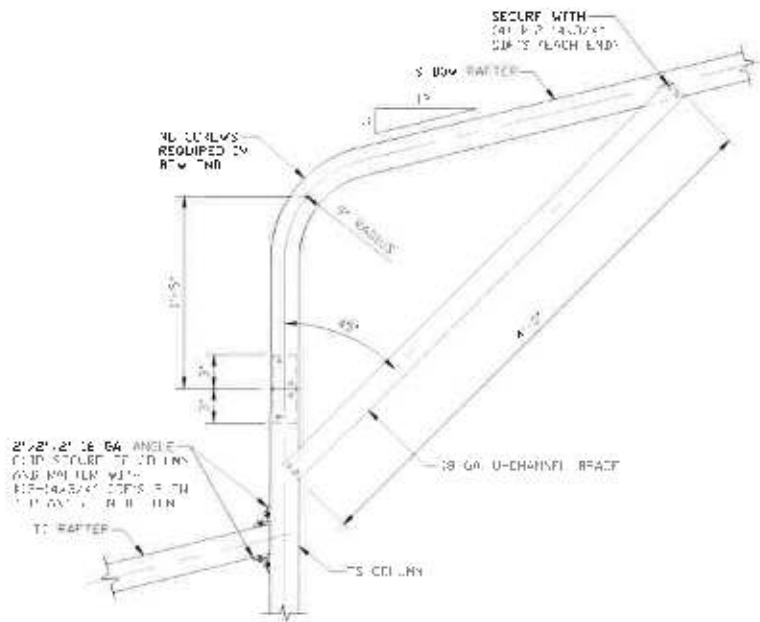
SHT. 13

DWG. NO: SK-3

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MAXIMUM WIDTH OF SINGLE MEMBER= RAFTER L446 TO L510 IS 10' 2"



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

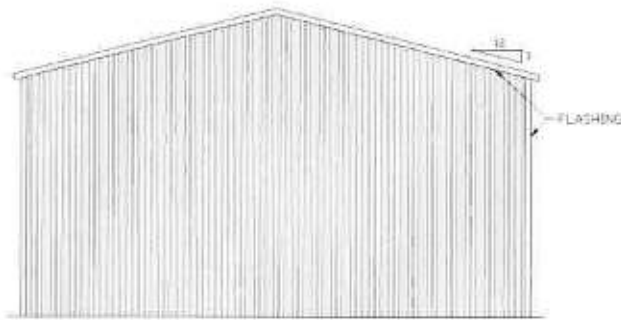


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REV. 4

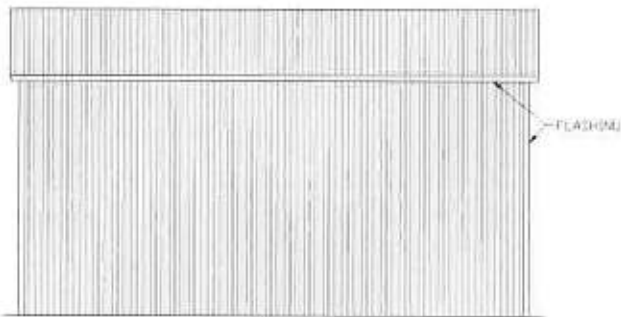
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BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



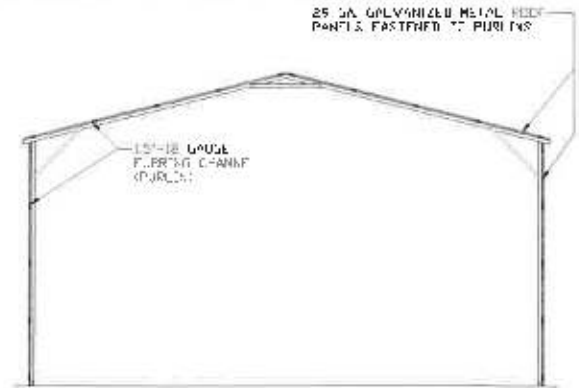
**TYPICAL END ELEVATION
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



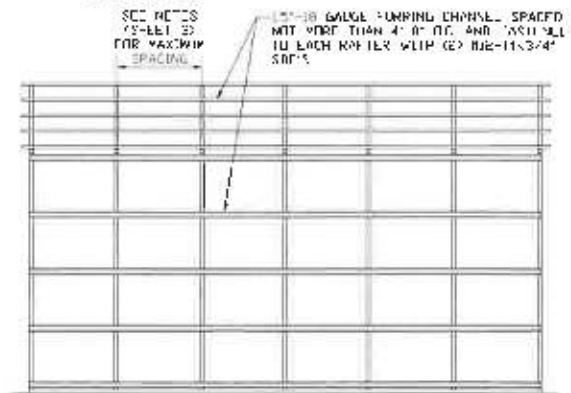
**TYPICAL SIDE ELEVATION
VERTICAL ROOF/SIDING OPTION**

SCALE: NTS



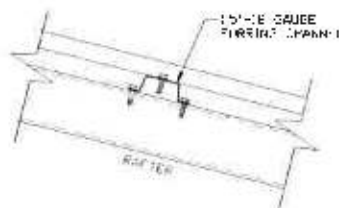
**TYPICAL SECTION VERTICAL
ROOF/SIDING OPTION**

SCALE: NTS



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

SCALE: NTS



ROOF PANEL ATTACHMENT

(6.1) TYPICAL FOR VERTICAL ROOF PANELS
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. 15

SCALE: NTS

DWG. NO: SK-3

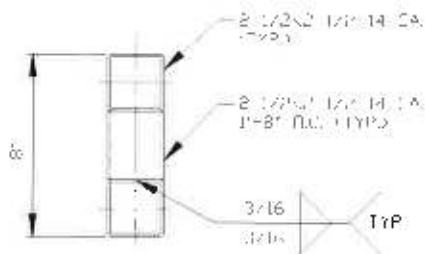
JOB NO:

168223/173005

REV: 4

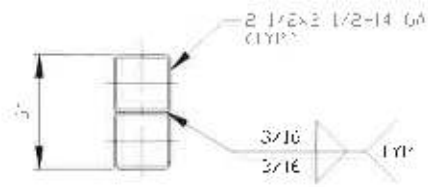
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OPTIONAL DOOR HEADER



**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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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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