



STRUCTURAL DESIGN

ENCLOSED BUILDING EXPOSURE B

MAXIMUM 40'-0" WIDE X 20'-0" EAVE HEIGHT- BOX EAVE
FRAME

18 December 2017

Revision 4

M&A Project No. 16022S/16072S/16073S/17301S

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





MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: JRS	TUBULAR BUILDING SYSTEMS PE COVER SHEET		
	CHECKED BY: PDH	40'-0"x20'-0" ENCLOSED BUILDING EXP. B		
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	CLIENT: TBS	SHT. 1	DWG. NO: SK-2	REV: 4

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**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 12-18-17

SCALE: NTS

DWG. NO: SK-2

**JOB NO: 16022S
17301S**

REV: 4

INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR A MAXIMUM 40'-0" WIDE x 20'-0" EAVE HEIGHT STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2014 FLORIDA BUILDING CODE (FBC) 5TH EDITION, 2017 FBC 6TH EDITION, 2012 INTERNATIONAL BUILDING CODE (IBC), AND 2015 IBC (U.N.D.).
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 = 5.0 FEET.
5. HIGH ULTIMATE WIND SPEED 141 TO 170 MPH (NOMINAL WIND SPEED 109 TO 132 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 4.0 FEET.
6. RISK CATEGORY I.
7. WIND EXPOSURE CATEGORY B.
8. SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2 1/2" x 2 1/2" - 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS. FOR VERTICAL PANELS, 29 GAUGE METAL PANELS SHALL BE FASTENED TO 18 GAUGE HAT CHANNELS (U.N.D.).
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR PURLINS, AND POSTS, INTERIOR = 9' AND END = 6', (MAX).
10. FASTENERS CONSIST OF #12-14x3/4" SELF-DRILLING FASTENER (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MEAN ROOF HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14" (3:12 PITCH) OR LESS SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR SLOPES MAY VARY.
11. GROUND ANCHORS CONSISTING OF #4 REBAR W/WELDED NUT x 30" LONG MAY BE USED FOR LOW WIND SPEEDS ONLY.
12. GROUND ANCHORS (SOIL NAILS) CONSIST OF #4 REBAR W/ WELDED NUT x 30" LONG IN SUITABLE SOIL CONDITIONS. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED. SOIL NAILS ARE NOT ALLOWED FOR HIGH WIND APPLICATION.
13. GROUND ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6' OF EACH RAFTER COLUMN ALONG SIDES AND ENDS.
14. OPTIONAL BASE RAIL ANCHORAGE MAY BE USED FOR LOW AND AND MUST BE USED FOR HIGH WIND SPEEDS.
15. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:
SOIL SITE CLASS = D
RISK CATEGORY I/II/III
 $R = 3.25$ $I_E = 1.0$
 $S_{DS} = 1.522$ $V = C_S W$
 $S_{DI} = 0.839$



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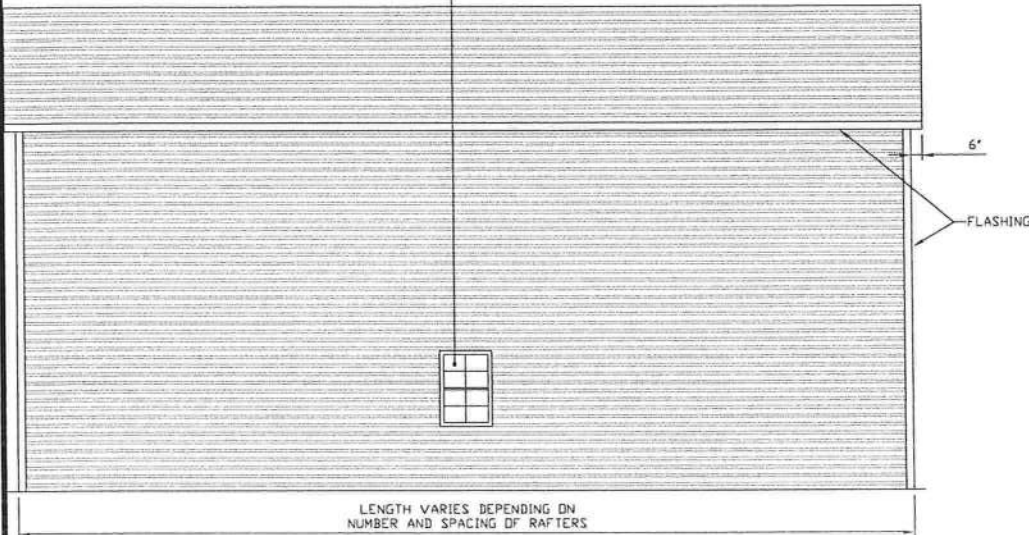
17301S
JOB NO: 16022S

SHT. 3

REV: 4

BOX EAVE FRAME RAFTER ENCLOSED BUILDING

WINDOW (AS APPLICABLE)
DESIGN PRESSURE
LOW = (21.8 PSF, -23.6 PSF)
HIGH = (32.85 PSF, -35.6 PSF)



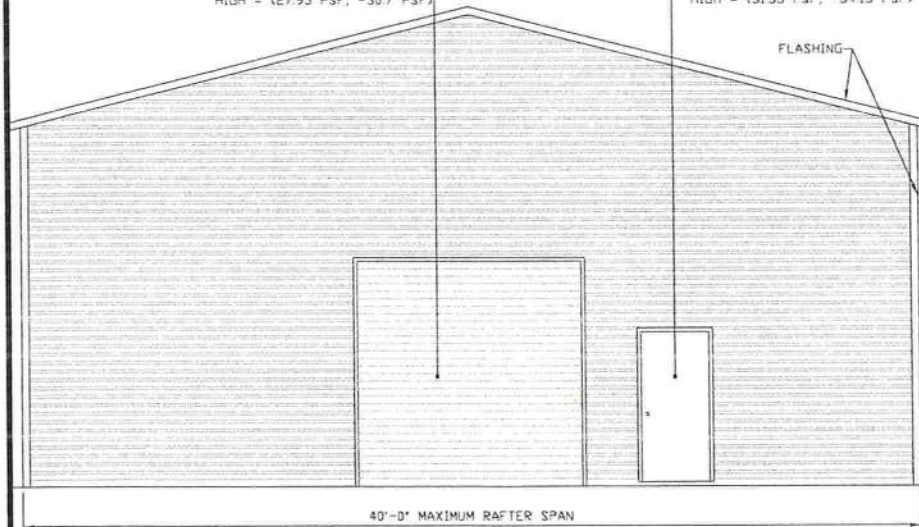
TYPICAL SIDE ELEVATION-HORIZONTAL ROOF

SCALE: 1/8" = 1'-0"

ROLL-UP DOOR
(AS APPLICABLE)
DESIGN PRESSURE
LOW = (18.5 PSF, -20.4 PSF)
HIGH = (27.95 PSF, -30.7 PSF)

SWINGING DOOR
(AS APPLICABLE)
DESIGN PRESSURE
LOW = (20.8 PSF, -22.6 PSF)
HIGH = (31.35 PSF, -34.15 PSF)

FLASHING



TYPICAL END ELEVATION-HORIZONTAL ROOF

SCALE: 1/8" = 1'-0"



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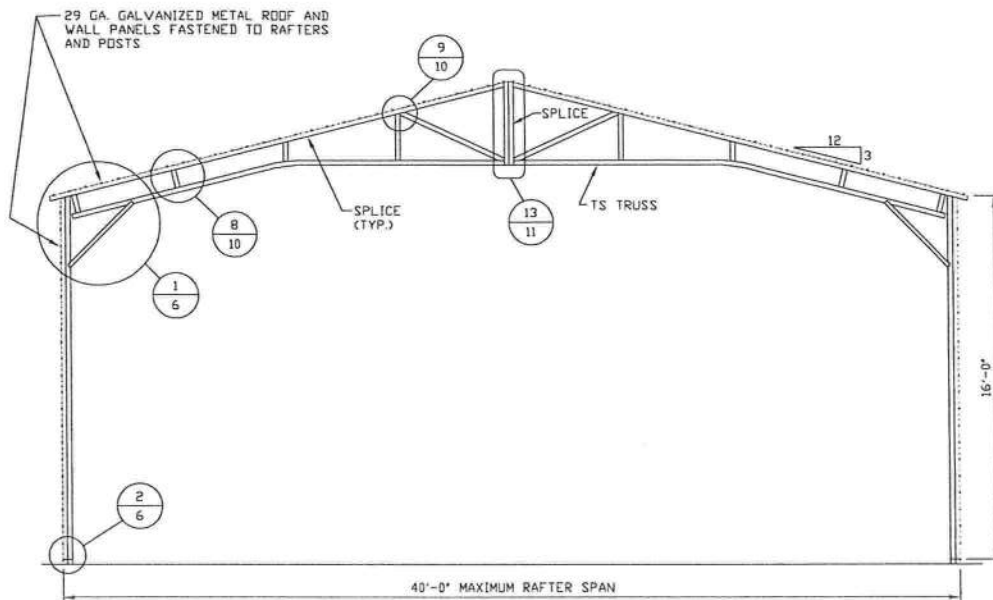
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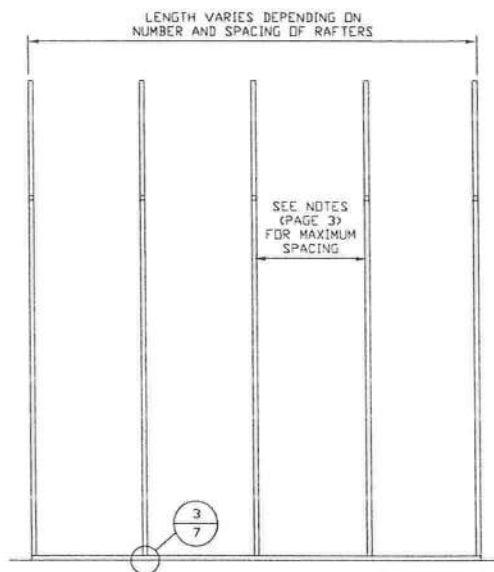
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TYPICAL RAFTER/POST FRAME SECTION

SCALE: 1/8" = 1'-0"



TYPICAL RAFTER/POST SIDE FRAMING SECTION

SCALE: 1/8" = 1'-0"



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SHT. 5

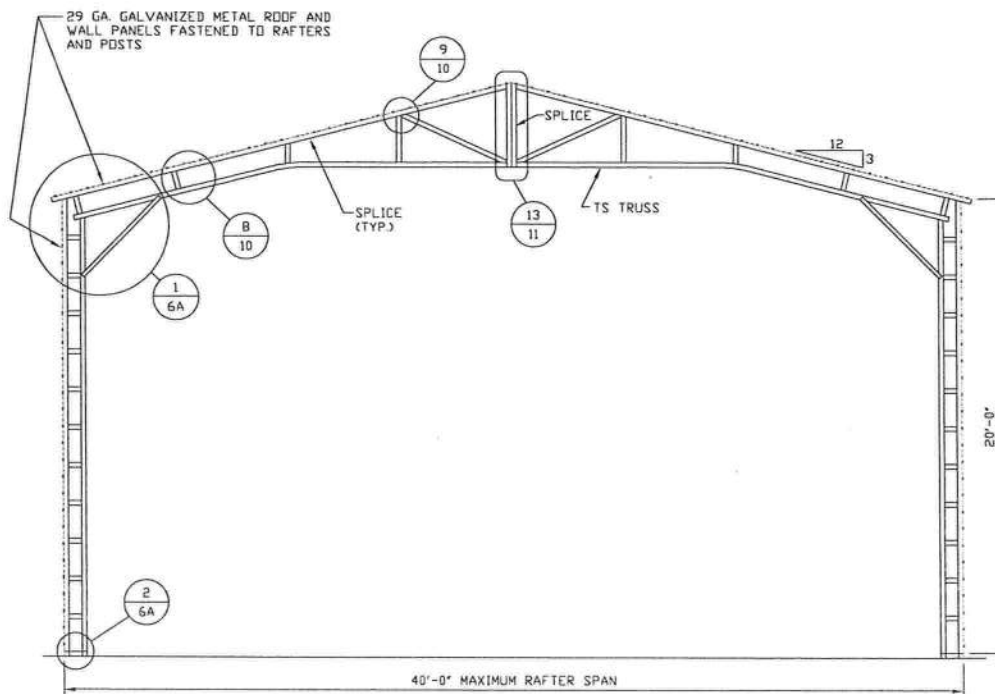
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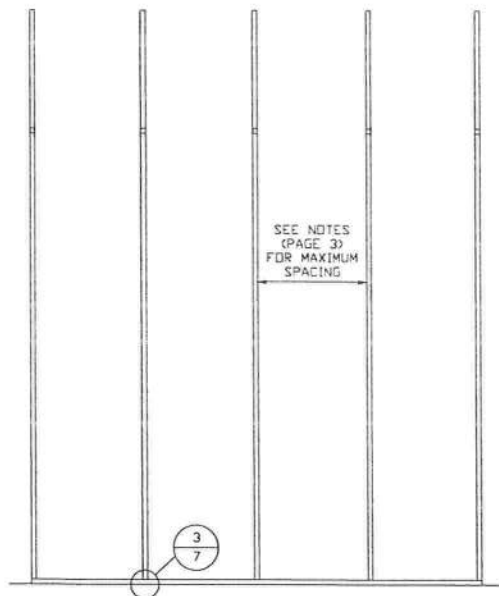
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TYPICAL RAFTER/POST FRAME SECTION

SCALE: 1/8" = 1'-0"



TYPICAL RAFTER/POST SIDE FRAMING SECTION

SCALE: 1/8" = 1'-0"



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SHT. 5A

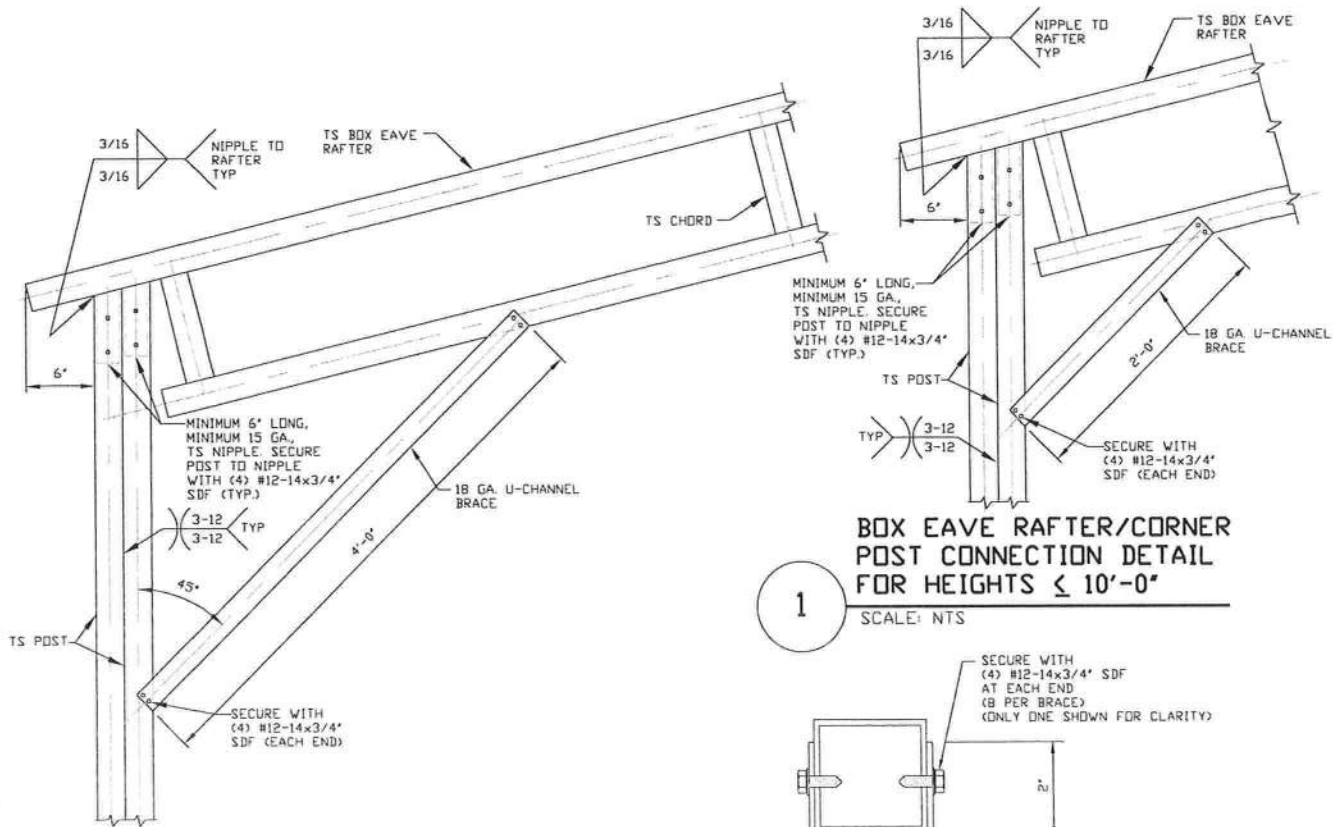
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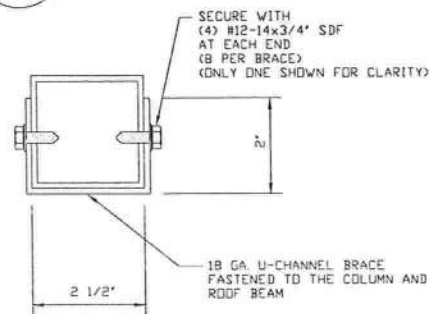
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BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS $\leq 10'-0"$

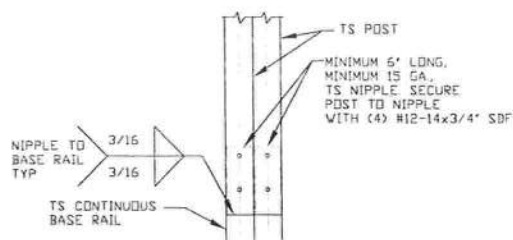
1

SCALE: NTS



BRACE SECTION

SCALE: NTS



2

POST/BASE RAIL CONNECTION DETAIL

SCALE: NTS



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TUBULAR BUILDING SYSTEMS
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SHT. 6

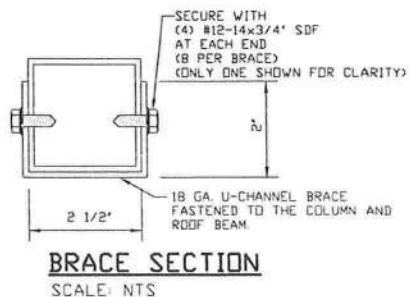
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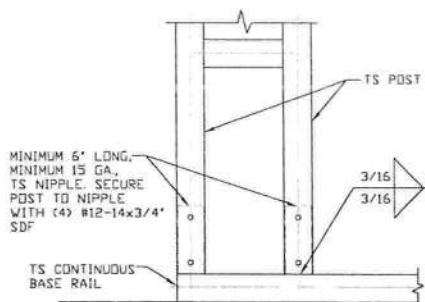
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BOX EAVE RAFTER/CORNER
POST CONNECTION DETAIL FOR
HEIGHTS 16'-0" < TO < 20'-0"



POST/BASE RAIL CONNECTION DETAIL



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SHT. 6A

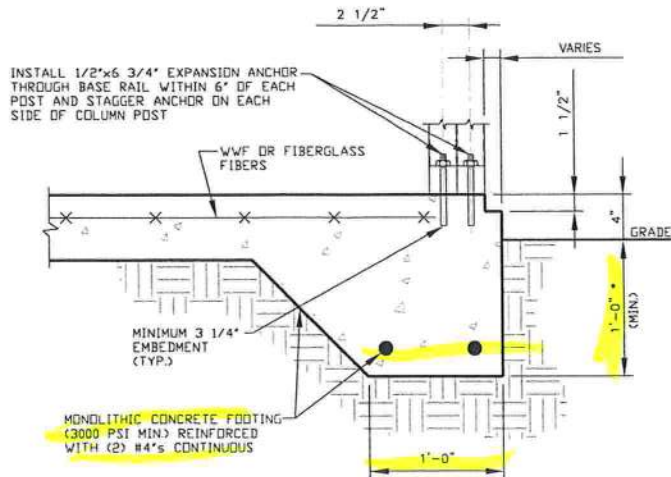
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BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED

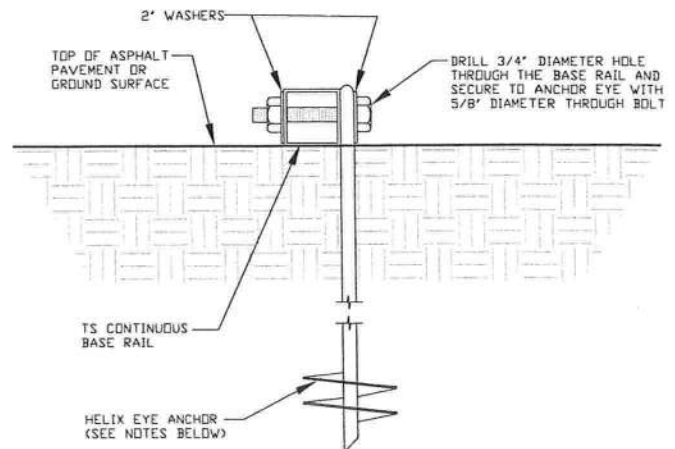


3A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

(MINIMUM ANCHOR EDGE DISTANCE IS 4")
* COORDINATE WITH LOCAL CODES/ORD.



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 BARS SHALL BE PER ACI-318:

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

REINFORCING STEEL:

THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

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

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

HELIX ANCHOR NOTES:

1. FOR VERY DENSE AND/OR CEMENTED SANDS, COARSE 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 LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL USE MINIMUM (2) 8' HELICES WITH MINIMUM 60 INCH EMBEDMENT.



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DATE: 12-18-17

SHT. 7A

SCALE: NTS

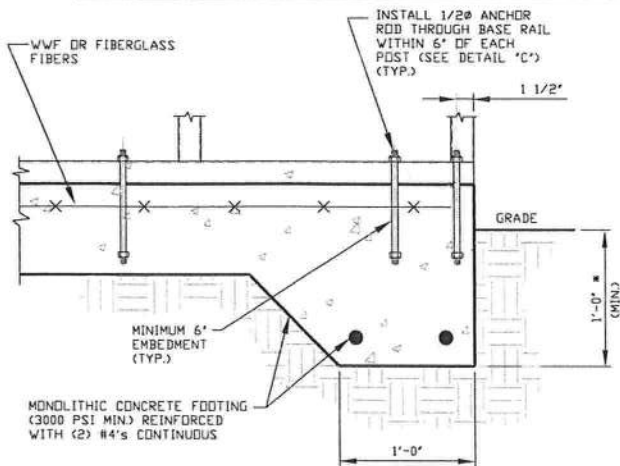
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OPTIONAL FOUNDATION ANCHORAGE FOR LOW AND HIGH WIND SPEED



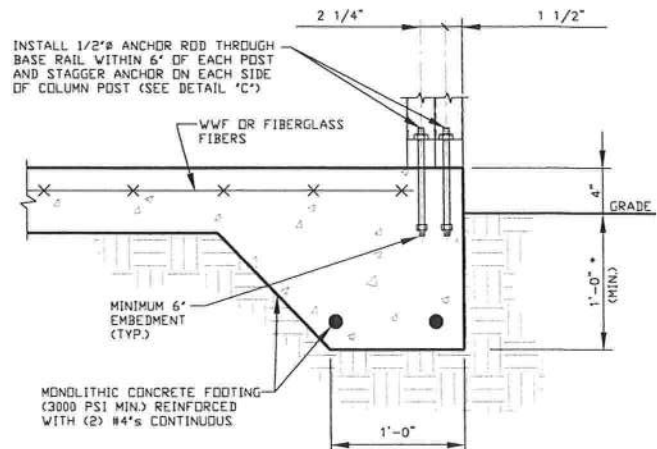
1A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

(MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2")

* COORDINATE WITH LOCAL CODES/ORD.



1B

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

(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 BARS SHALL BE PER ACI-318:

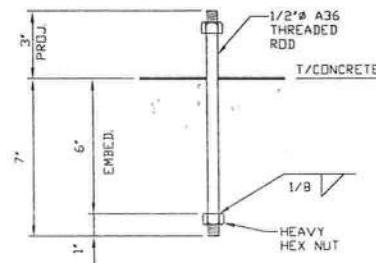
3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL:

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

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3. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.



1C

ANCHOR ROD THROUGH BASE RAIL DETAIL

SCALE: NTS



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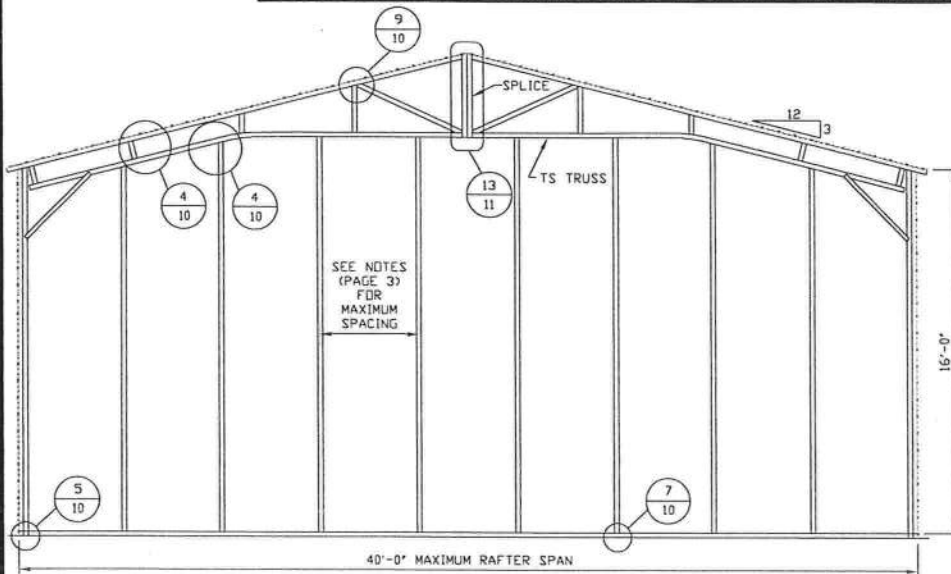
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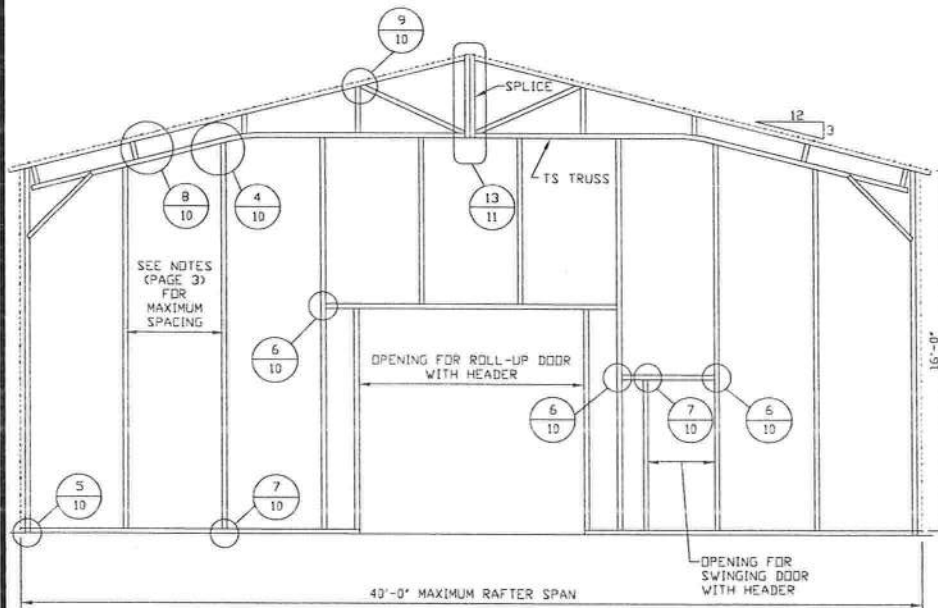
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BOX EAVE RAFTER END WALL AND WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: 1/8" = 1'-0"



TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: 1/8" = 1'-0"



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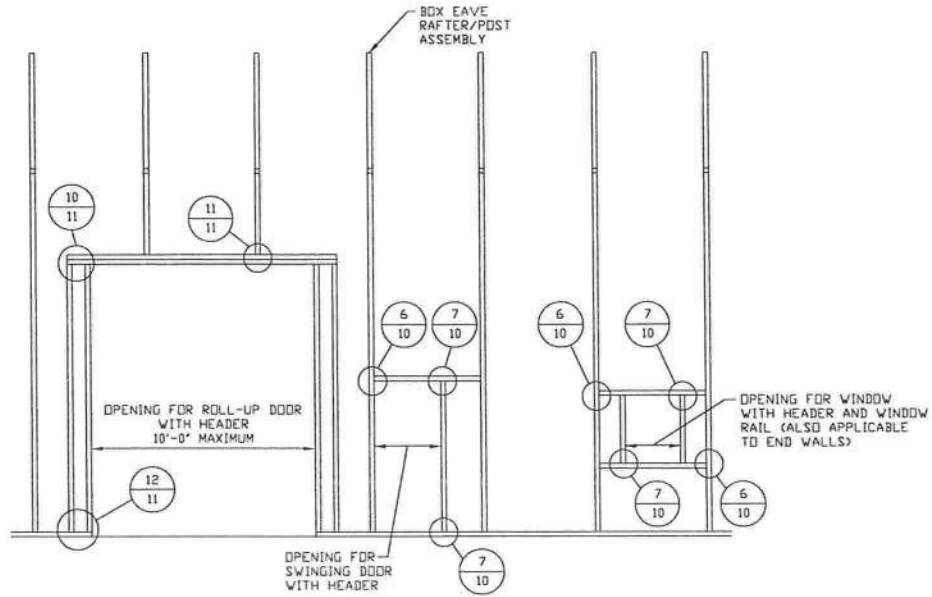
SCALE: NTS

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BOX EAVE RAFTER SIDE WALL AND WALL OPENINGS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: 1/8" = 1'-0"



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SHT. 9

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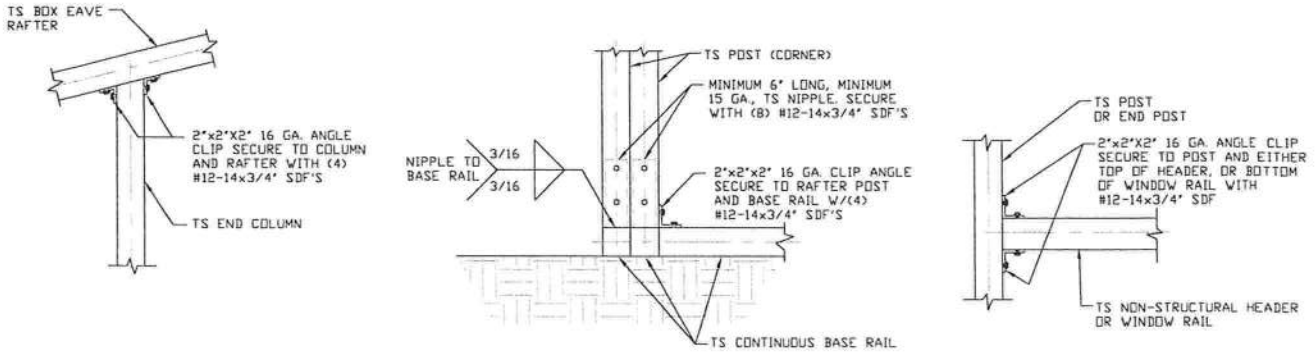
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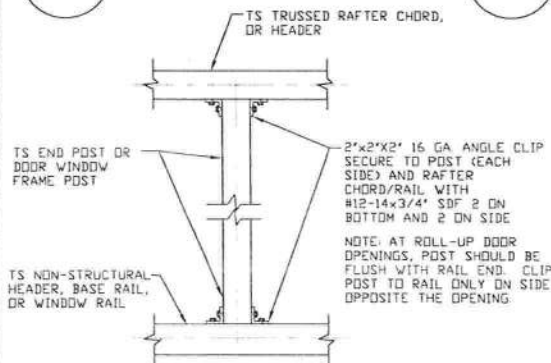
BOX EAVE RAFTER WALL OPENING DETAILS



4

END POST/RAFTER CONNECTION DETAIL

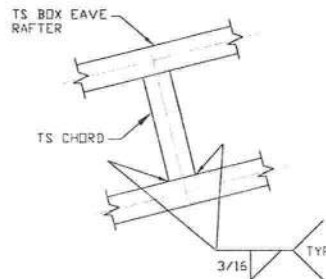
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5

END POST/BASE RAIL CONNECTION DETAIL

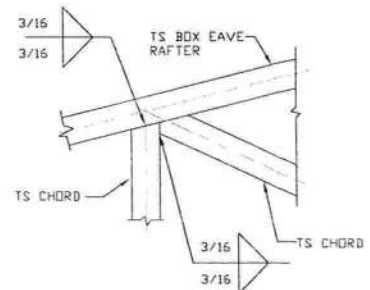
SCALE: NTS



6

HEADER OR WINDOW RAIL TO POST CONNECTION DETAIL

SCALE: NTS



7

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

SCALE: NTS

8

CHORD/RAFTER CONNECTION DETAIL

SCALE: NTS

9

TRUSS POST AND CORD TO RAFTER CONNECTION DETAIL

SCALE: NTS



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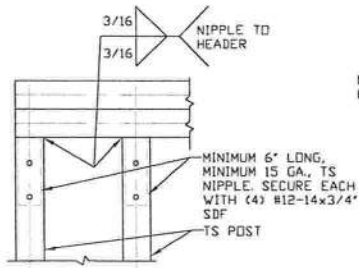
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JOB NO: 17301S

REV: 4

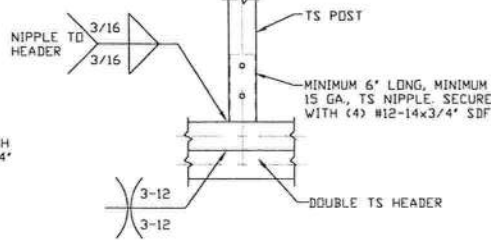
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BOX EAVE RAFTER WALL OPENING DETAILS



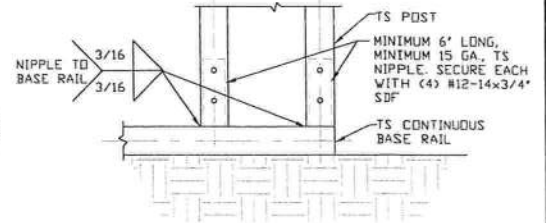
10 DOUBLE HEADER/POST CONNECTION DETAIL

SCALE: NTS



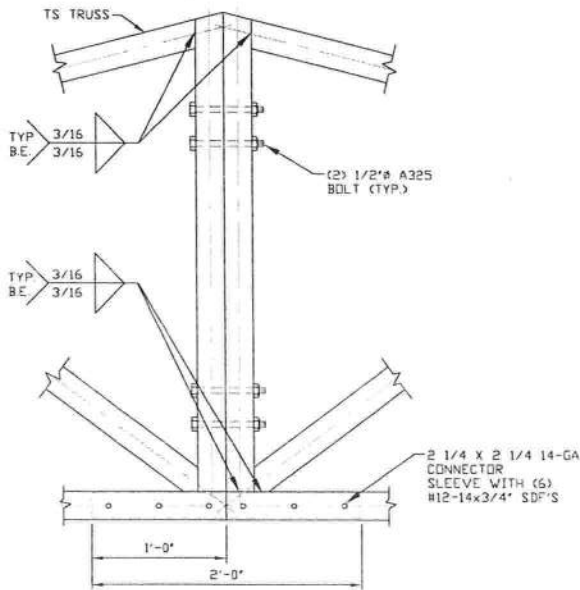
11 POST/DOUBLE HEADER CONNECTION DETAIL

SCALE: NTS



12 POST/BASE RAIL CONNECTION DETAIL

SCALE: NTS



13 SPLICE CONNECTION DETAIL

SCALE: NTS



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PROJECT MGR: WSM

CLIENT: TBS

TUBULAR BUILDING SYSTEMS
40'-0"X20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. 11

SCALE: NTS

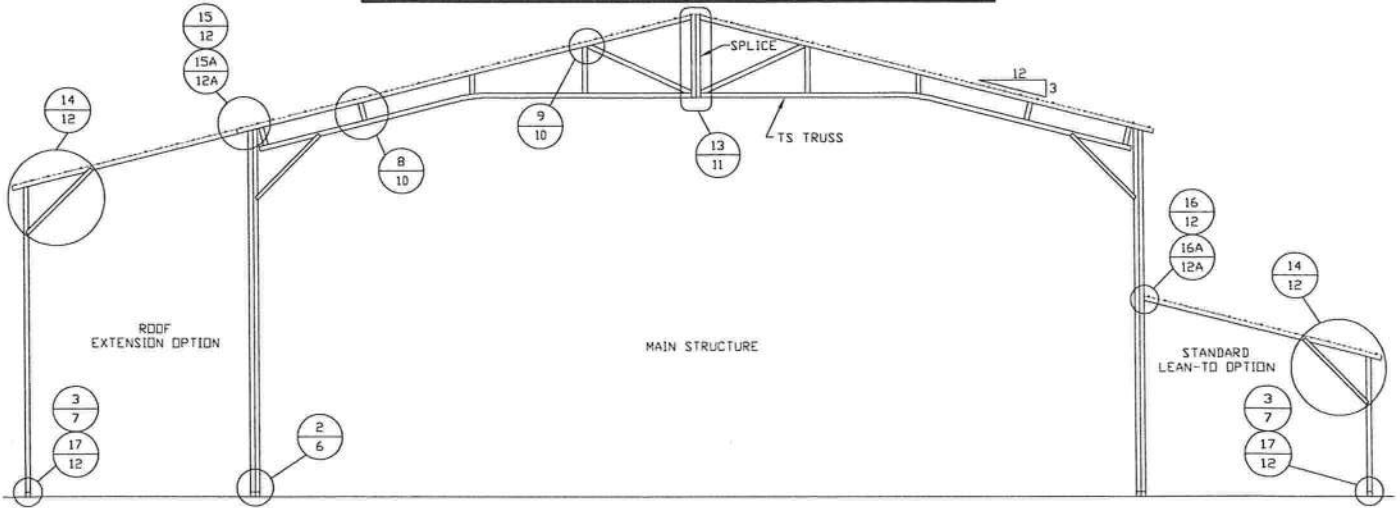
DWG. NO: SK-2

JOB NO: 17301S
16022S

REV: 4

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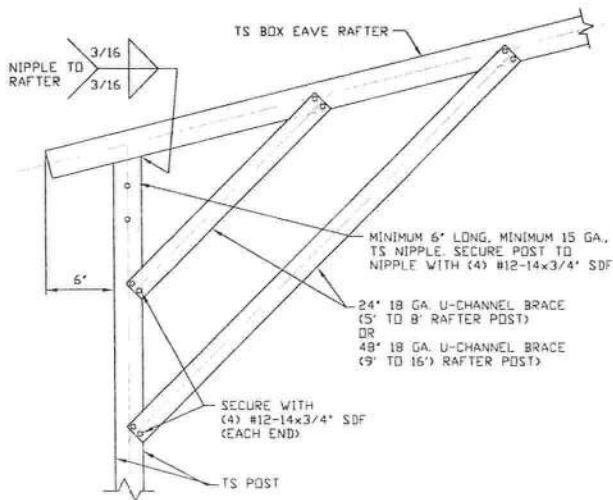
BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

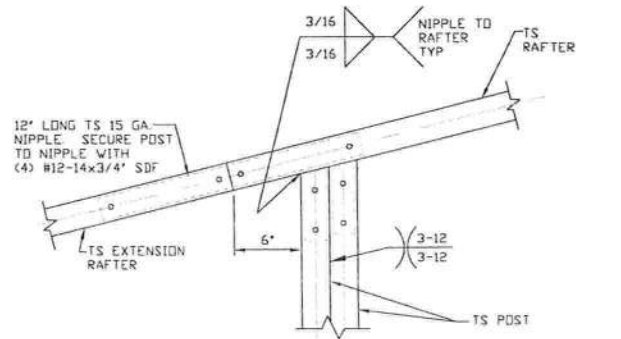
(MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 12'-0")
(MAXIMUM WIDTH OF DOUBLE MEMBER RAFTER LEAN-TO IS 16'-0")



14

**LEAN-TO RAFTER/
CORNER POST DETAIL**

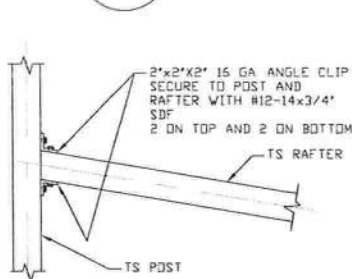
SCALE: NTS



15

**SIDE EXTENSION RAFTER/COLUMN
DETAIL FOR RAFTER SPANS < 12'-0"**

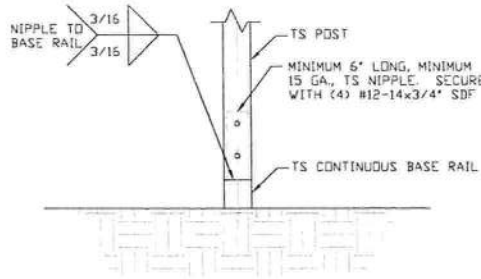
SCALE: NTS



16

**LEAN-TO RAFTER TO RAFTER
COLUMN CONNECTION DETAIL
FOR RAFTER SPANS 12'-0"**

SCALE: NTS



17

**LEAN-TO POST
CONNECTION DETAIL**

SCALE: NTS



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TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. 12

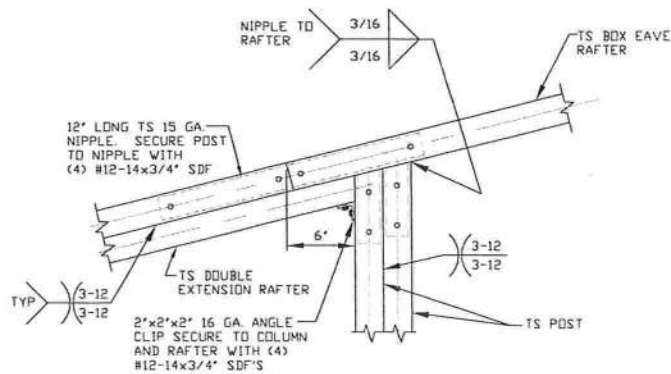
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DWG. NO: SK-2

JOB NO: 17301S
16022S

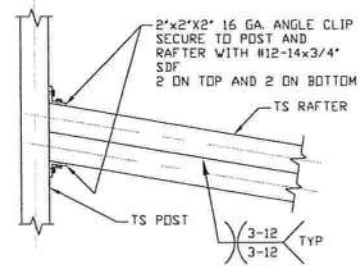
REV: 4

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15A

SIDE EXTENSION RAFTER/COLUMN DETAIL
FOR RAFTER SPANS 12'-0" < L ≤ 16'-0"
SCALE: NTS



16A

LEAN-TO RAFTER TO RAFTER
COLUMN CONNECTION DETAIL FOR
RAFTER SPANS 12'-0" < L ≤ 16'-0"
SCALE: NTS



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PROJECT MGR: WSH

CLIENT: TBS

TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. 12A

SCALE: NTS

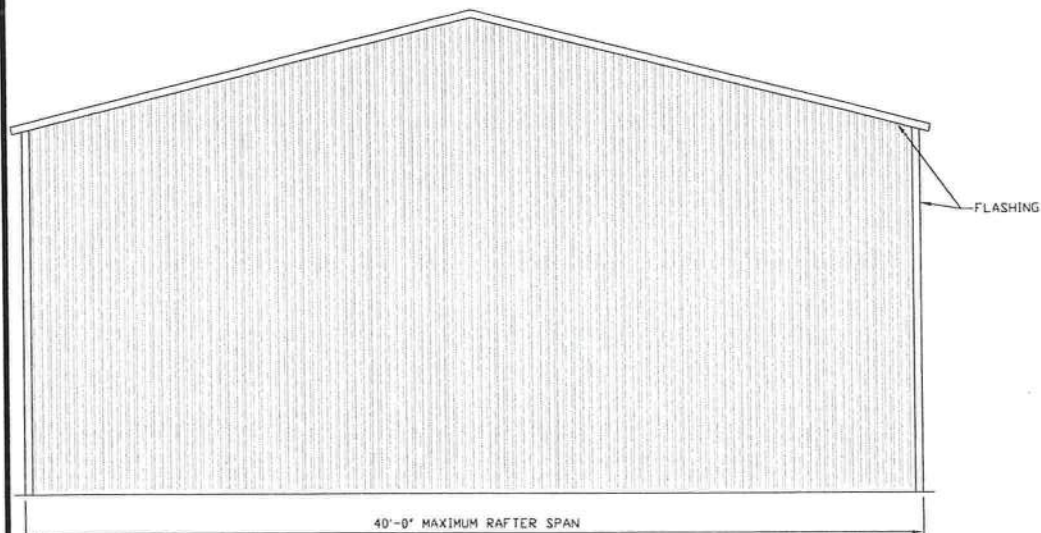
DWG. NO: SK-2

JOB NO: 16022S

REV: 4

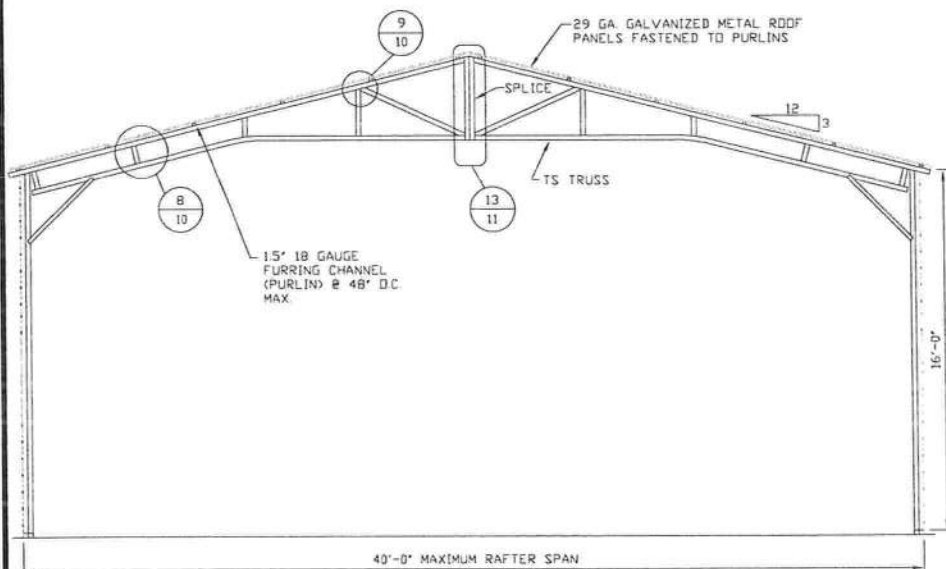
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BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL END ELEVATION VERTICAL ROOF

SCALE: 1/8" = 1'-0"



TYPICAL SECTION VERTICAL ROOF OPTION

SCALE: 1/8" = 1'-0"



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CLIENT: TBS

**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 12-18-17

SHT. 13

SCALE: NTS

DWG. NO: SK-2

**JOB NO: 17301S
16022S**

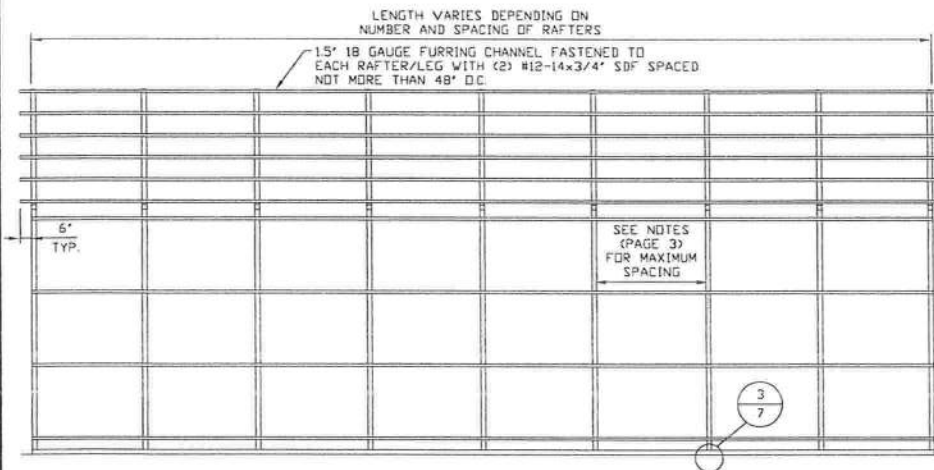
REV: 4

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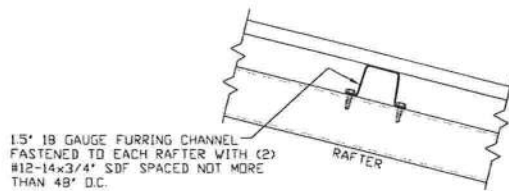
BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING
SCALE: 1/8" = 1'-0"



TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION
SCALE: 1/8" = 1'-0"



PANEL ATTACHMENT
(ALTERNATE FOR VERTICAL ROOF PANELS)



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TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. 14

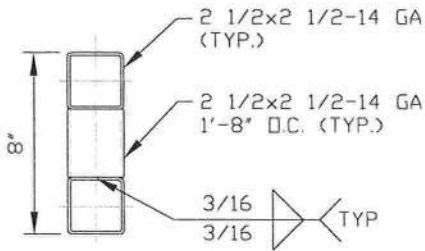
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DWG. NO: SK-2

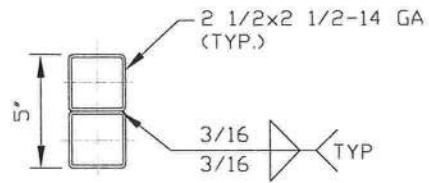
JOB NO: 17301S
16022S

REV: 4

OPTIONAL HEADER



**HEADER DETAIL FOR
OPENINGS 10'-0" < LENGTH ≤ 15'-0"**
SCALE: NTS



**HEADER DETAIL FOR
OPENINGS LENGTH ≤ 10'-0"**
SCALE: NTS



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TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 12-18-17

SHT. 15

SCALE: NTS

DWG. NO: SK-2

JOB NO: 16022S

REV: 4