TUBULAR BUILDING SYSTEMS

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

Columbia County Building Department
Plans Reviewed for Code Compliance
State of Florida

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

Digitally signed by Wayne S Moore
Date: 2020.03.18 12:15:14 -04'00'

MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING

WAYNE S. MOORE
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No 57170
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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DRAWN BY: LT	TUBULAR BUILDING SYSTEMS 30'-0"x20'-0" ENCLOSED BUILDING EXP. B PE SEAL COVER SHEET			
CHECKED BY: PDH				
PROJECT MGR: WSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/17300S	
CLIENT: TBS	SHT. 1	DWG. NO: SK-3	REV.: 4	

DRAWING INDEX

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MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	TUBULAR BUILDING SYSTEMS 30'-0"x20'-0" ENCLOSED BUILDING EXP. B		
	CHECKED BY: PDH			
	PROJECT MGR: WSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/17300S
	CLIENT: TBS	SHT. 2	DWG. NO: SK-3	REV: 4

INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR A MAXIMUM 30'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURE.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2017 FLORIDA BUILDING CODE (FBC) 6TH EDITION, 2012 INTERNATIONAL BUILDING CODE (IBC) AND 2015 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
   A) DEAD LOAD = 2.5 PSF
   B) LIVE LOAD = 20 PSF
   C) GROUND SNOW LOAD = 0 PSF
4. LOW ULTIMATE WIND SPEED 105 TO 140 MPH (NOMINAL WIND SPEED 81 TO 108 MPH) MAXIMUM RAFTER/JOIST AND END POST SPACING = 10.0 FT.
5. HIGH ULTIMATE WIND SPEED 141 TO 170 MPH (NOMINAL WIND SPEED 109 TO 131 MPH) MAXIMUM RAFTER/POST AND END POST SPACING = 10 FEET.
6. LOW HAZARD RISK CATEGORY I (WIND)
7. WIND EXPOSURE CATEGORY B
8. SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 12" O.C. OR LESS 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS FOR WALL PANELS, 26 GAUGE METAL PANELS SHALL BE FASTENED TO 14 GAUGE FLAT GLAVANIZED UNLESS OTHERWISE NOTED.
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR PURLINS AT EAVES, INTERIOR = 24" OR END = 6" (MAX)
10. FASTENERS CONSIST OF #12-14x3/4" DR. DRILL IN FASTENERS (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR BUILDINGS WITH EAVE HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14° (3/12 PITCH) OR LESS. SPACING PER MOUNTS FOR OTHER ROOF PITCH AND/OR STEEPS MAY VARY.
11. GROUND ANCHORS (GA) TO BE INSTALLED THROUGH BASE RAIL W/ MIN 6" EMBEDMENT ALONG SIDES.
12. GROUND ANCHORS (SOIL VALUES) CONSIST OF #4 REBAR W/WELDED NUT x 30" LONG IN SUITABLE SOIL CONDITIONS AS MAY BE USED FOR LOW (105 MPH NOMINAL) WIND SPEED OR OPTIONAL ANCHORAGE MAY BE USED IN LIEU OF THIS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED.
13. OPTIONAL DUCK BILL ANCHORAGE MAY BE USED IN LIEU AND MUST BE USED FOR HIGH WIND SPEEDS.
14. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE
    SOIL SITE CLASS = D
    RISK CATEGORY I/II/III
    S_s = 0.07g I_e = 1.0
    S_{MS} = 0.122 V_s = $S_{DS}W$
    S_{D1} = 0.039

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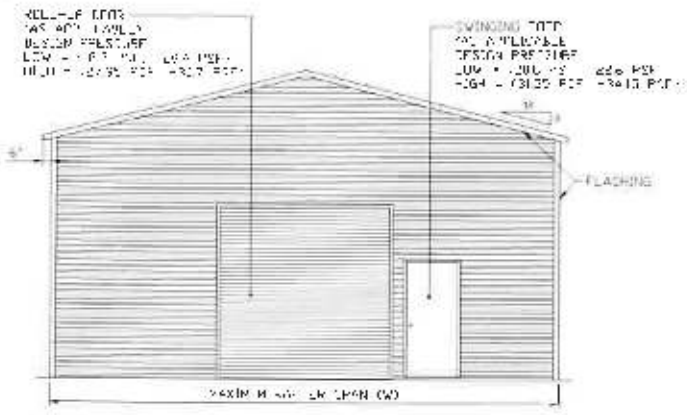
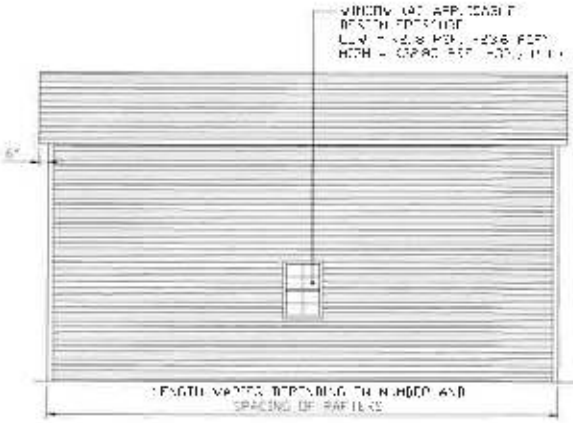
	CHECKED BY: PJH			
	PROJECT MGR: WSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 16022S/17300S
	CLIENT: TBS	SHT. 3	DWG. NO: SK-3	REV.: 4

BOX EAVE FRAME RAFTER ENCLOSED BUILDING



TYPICAL END ELEVATION-HORIZONTAL ROOF

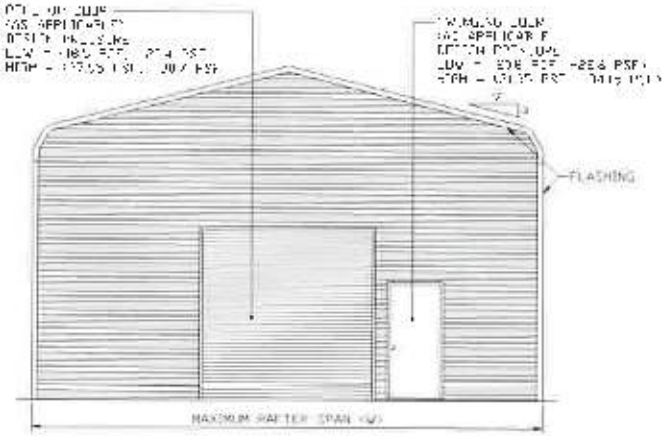
SCALE: NTS



TYPICAL SIDE ELEVATION-HORIZONTAL ROOF

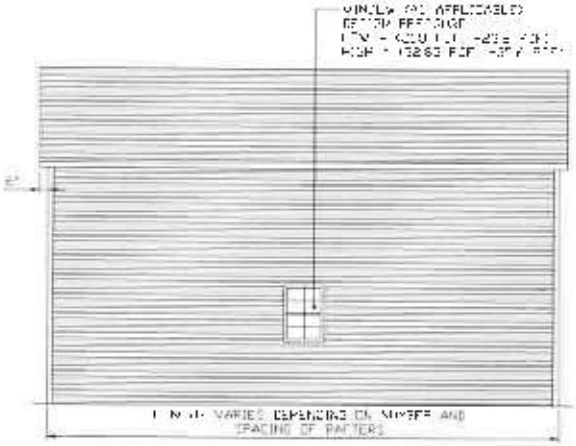
SCALE: NTS

BOW FRAME RAFTER ENCLOSED BUILDING



TYPICAL END ELEVATION

SCALE: NTS



TYPICAL SIDE ELEVATION

SCALE: NTS

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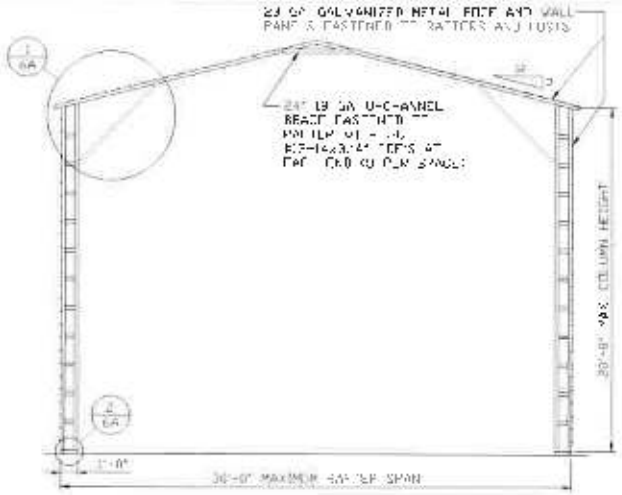
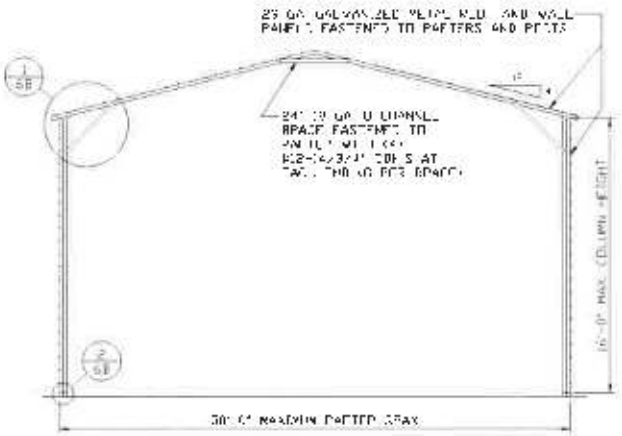
PROJECT MGR: WSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005
CLIENT: TBS	SHT. 4	DWG. NO: SK-3	REV.: 4



TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION

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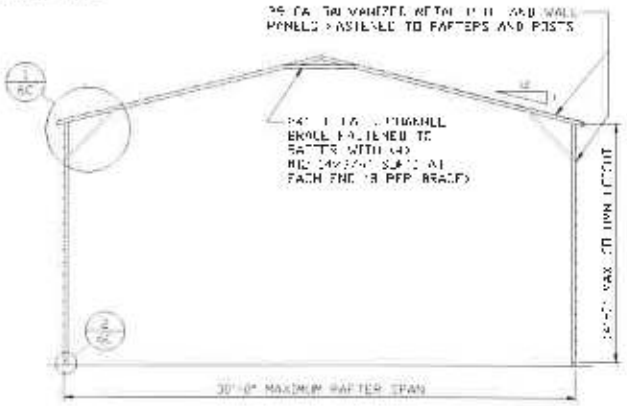

TYPICAL RAFTER/COLUMN END FRAME SECTION

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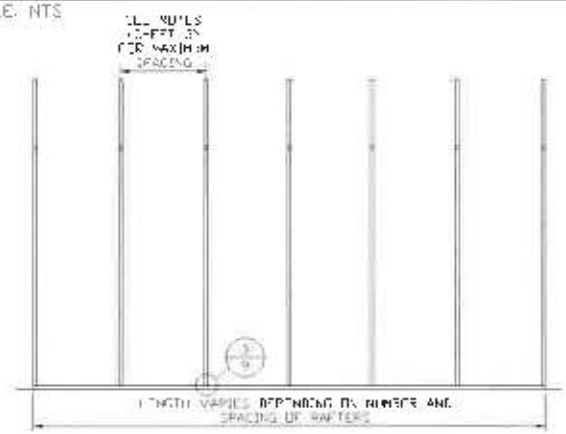

TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

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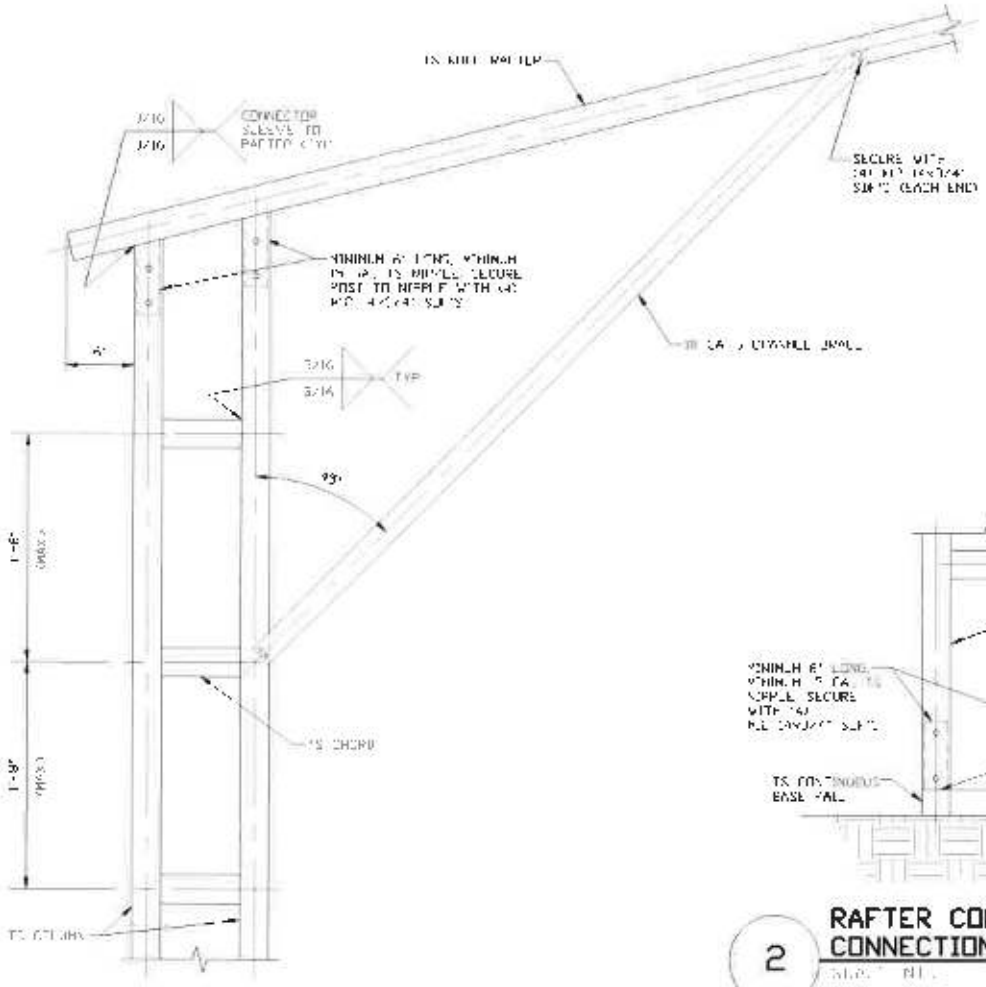
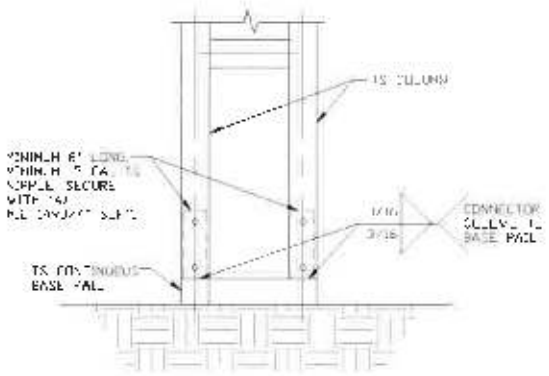
	CLIENT: TBS	SHT. 5	DWG. NO: SK-3	REV.: 4



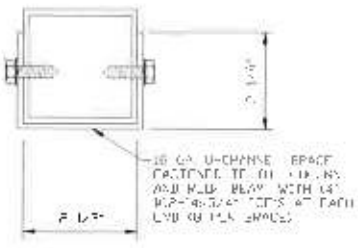
1 BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 16'-0" < TO ≤ 20'-0"

SCALE: NTS



2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



BRACE SECTION

SCALE: N.T.S

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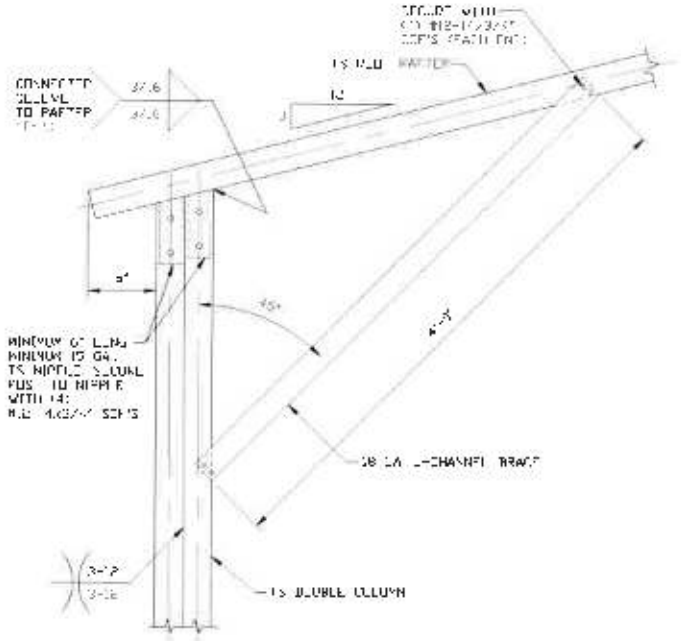
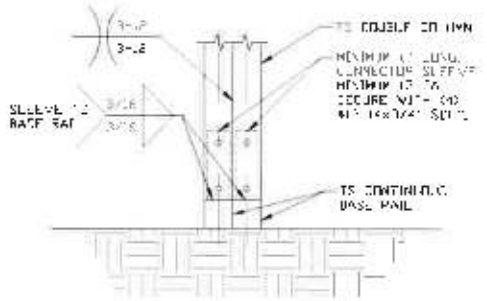
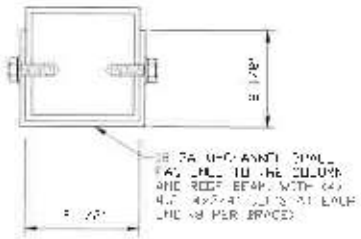
CLIENT: TBS	SHT. 6A	DWG. NO: SK-3	REV.: 4



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



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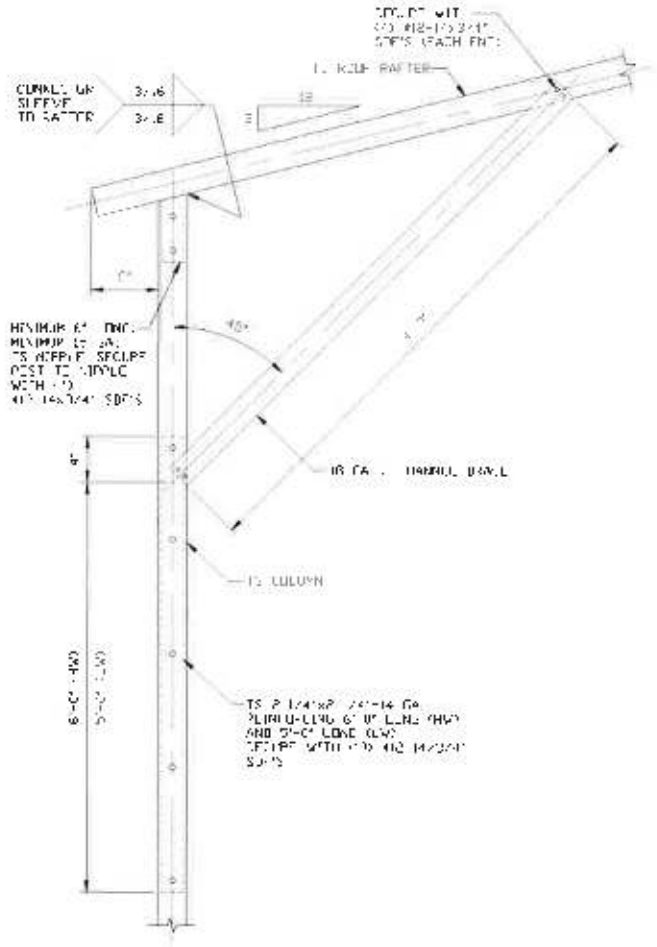
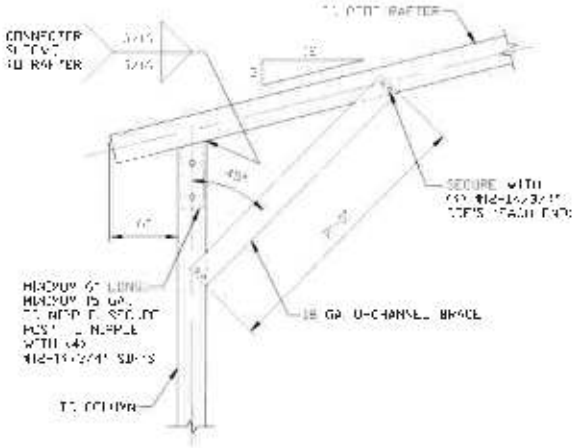


BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 10'-0" < TD ≤ 14'-0"

1A

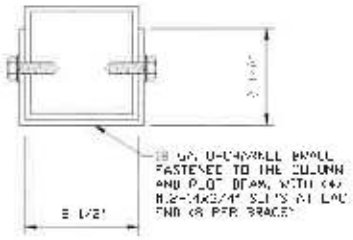
SCALE: NTS



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

1B

SCALE: NTS



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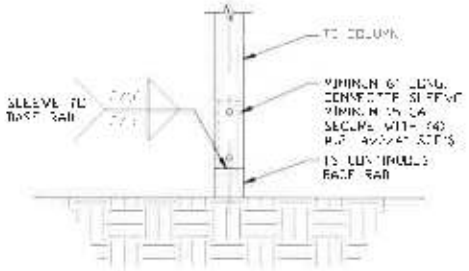

RAFTER COLUMN/BASE RAIL
CONNECTION DETAIL

2

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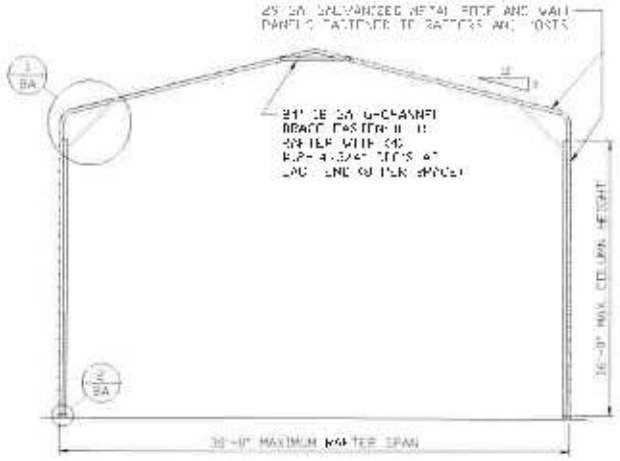

TYPICAL RAFTER/COLUMN END FRAME SECTION

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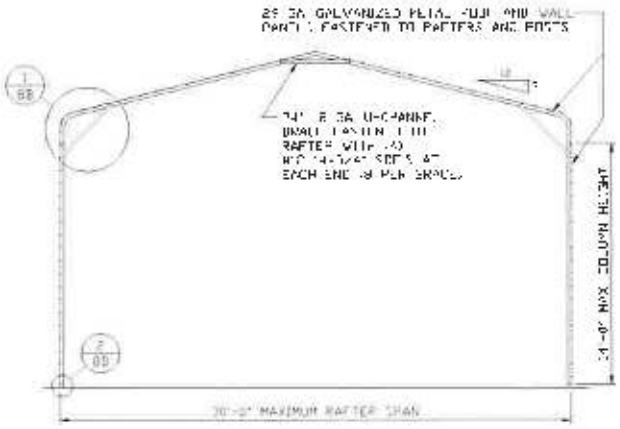

TYPICAL RAFTER/COLUMN END FRAME SECTION

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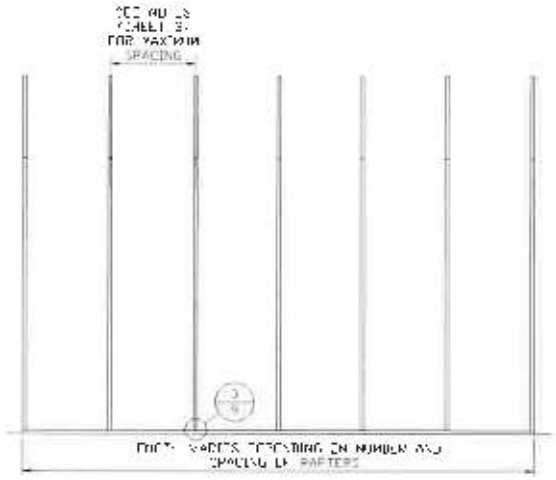

TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

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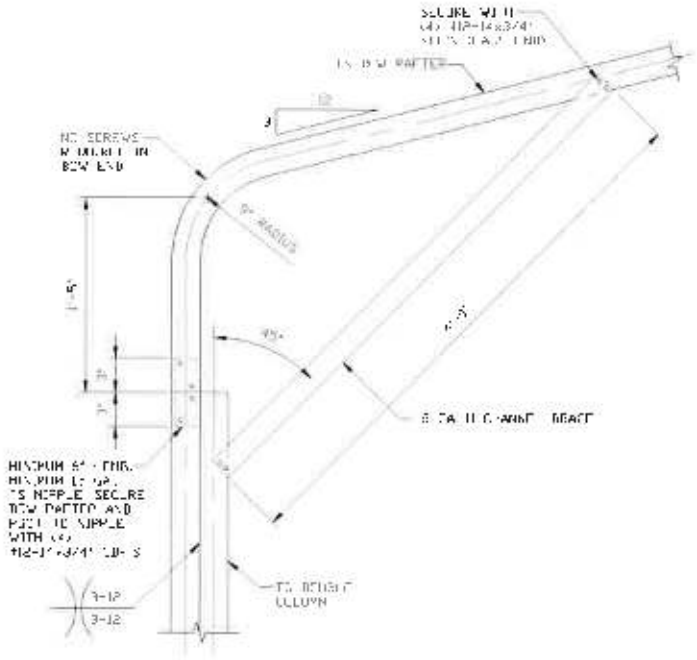
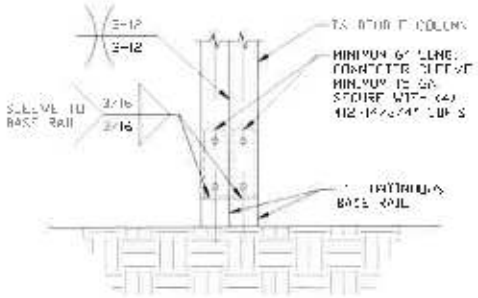


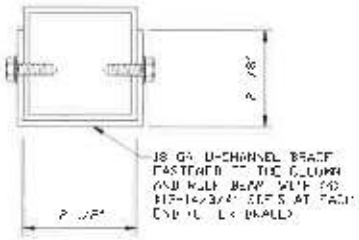
1 BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 14'-0" < TO ≤ 16'-0"

SCALE: NTS



2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



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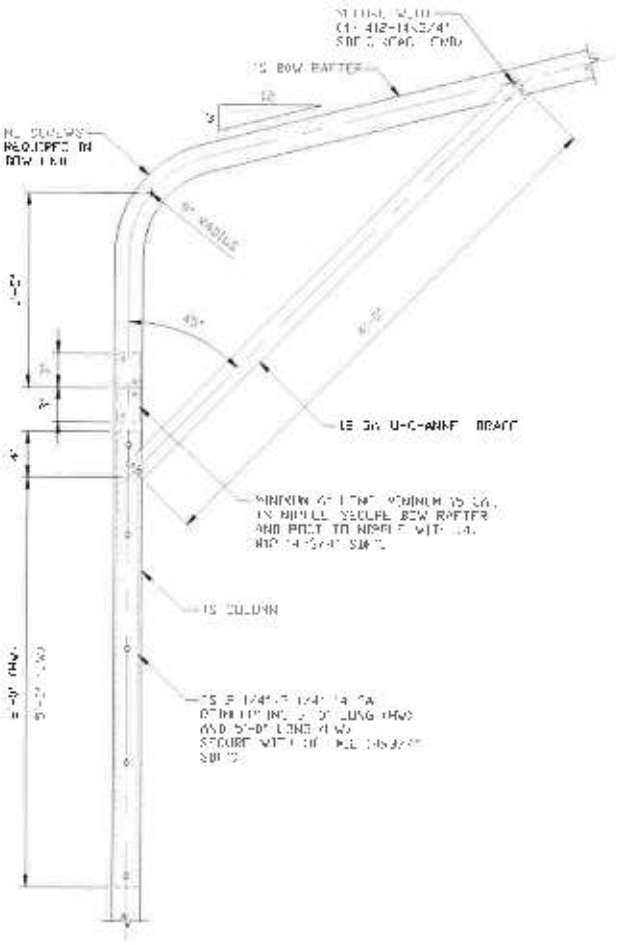

1A BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO ≤ 14'-0"

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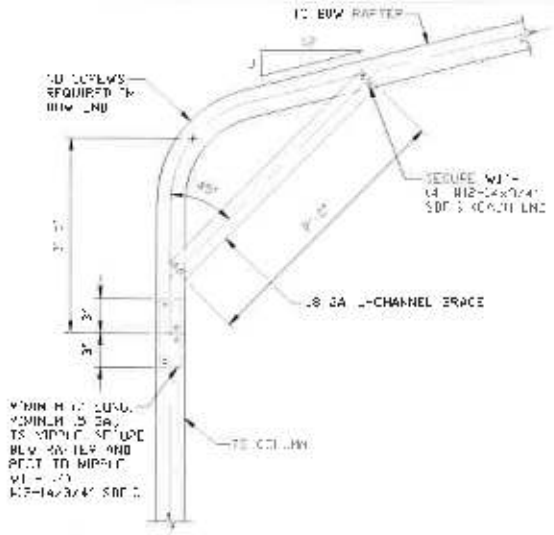

1B BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS ≤ 10'-0"

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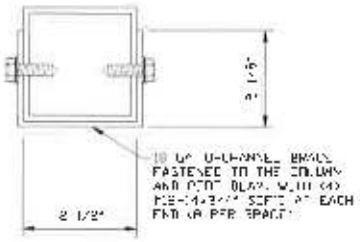

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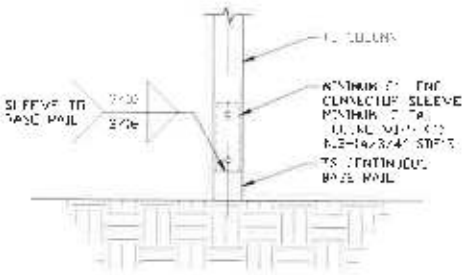

2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS

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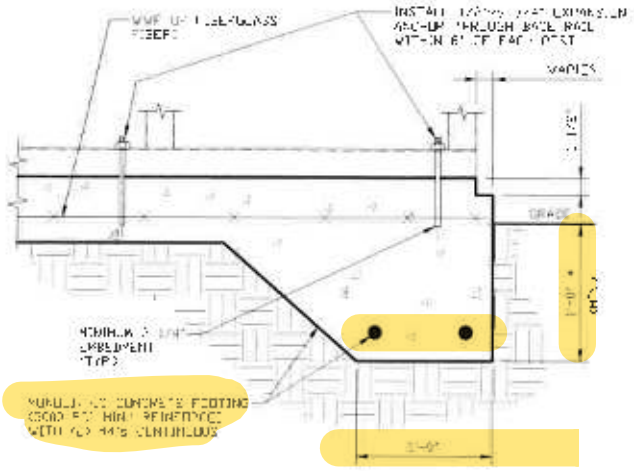
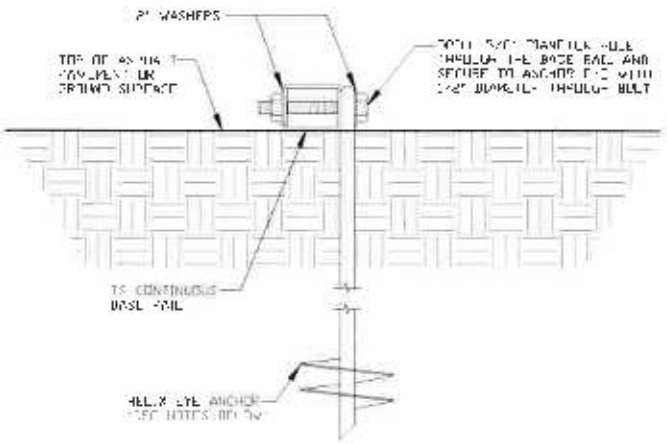
BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED



3A CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

(MINIMUM ANCHORAGE DISTANCE TO BE COORDINATE WITH LOCAL CODES/AHJ)



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 AS 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 FOR WALLS

REINFORCING STEEL:

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

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

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

HELIX ANCHOR NOTES:

1. FOR VERY LOOSE TO MEDIUM DENSE SANDS, COARSE GRAVEL AND COBBLES, NON-CALCAREOUS, NON-PLASTIC SILTS AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 72 INCH EMBEDMENT.
2. FOR ORGANIC SOILS, MINIMUM (2) 4" HELICES WITH MINIMUM 96 INCH EMBEDMENT.
3. FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY STIFF TO HARD, NON-CALCAREOUS, NON-PLASTIC SILTS AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 60 INCH EMBEDMENT.
4. FOR LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFF SILTS AND CLAYS, ALLUVIAL FILL USE MINIMUM (2) 4" HELICES WITH MINIMUM 84 INCH EMBEDMENT.
5. FOR VERY LOOSE TO MEDIUM DENSE SANDS, NON-ORGANIC SILTS AND CLAYS, ALLUVIAL FILL USE MINIMUM (2) 4" HELICES WITH MINIMUM 60 INCH EMBEDMENT.

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PROFESSIONAL ENGINEER

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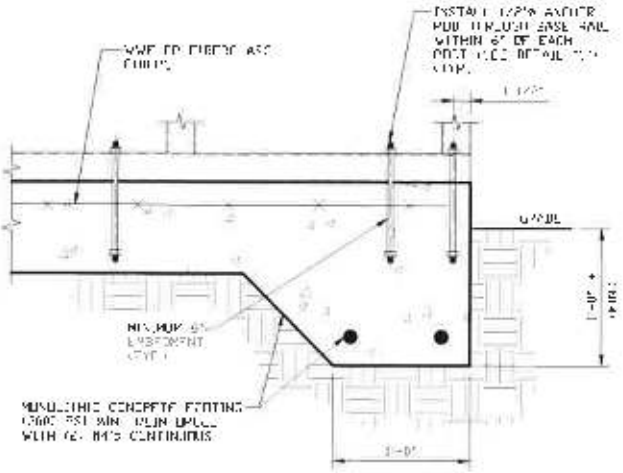
CHECKED BY: PDH			
PROJECT MGR: WSM	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005
CLIENT: TBS	SHT. 9A	DWG. NO: SK-3	REV.: 4

OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED

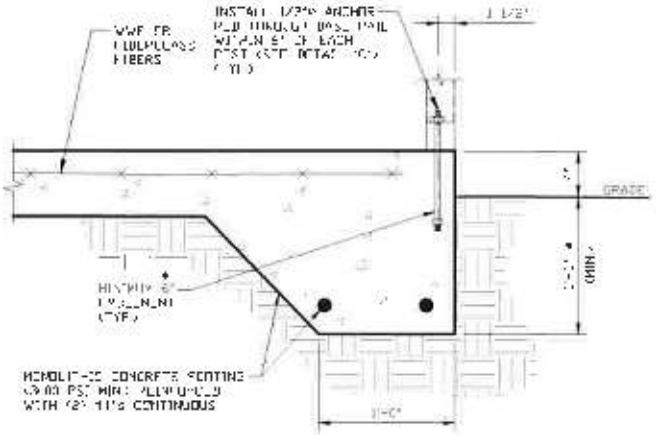


1A CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

(*) MIN. ANCHOR EDGE DISTANCE IS 1 1/2"

* COORDINATE WITH LOCAL CODES/EPI



1B CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS

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

* COORDINATE WITH LOCAL CODES/EPI

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

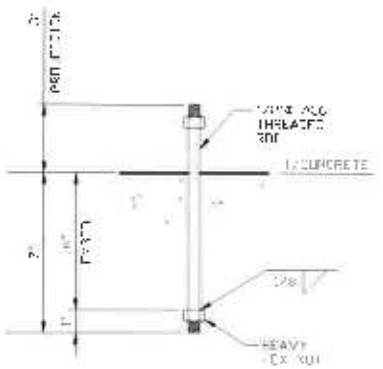
3 INCHES WHERE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL:

THE REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. 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. A BAR WITH ONE END PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.



1C ANCHOR ROD THROUGH BASE RAIL DETAIL

SCALE: NTS

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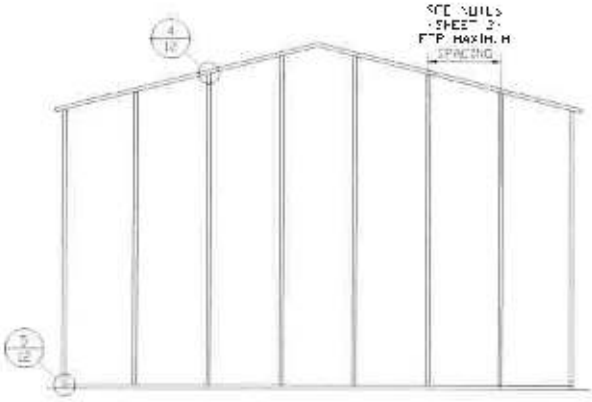
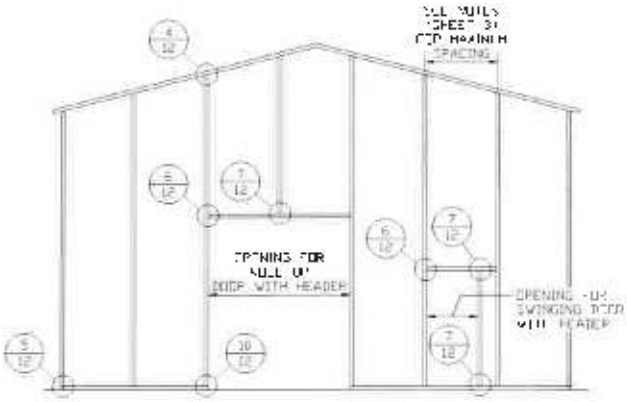
	CLIENT: TBS	SHT. 9B	DWG. NO: SK-3	REV.: 4

BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



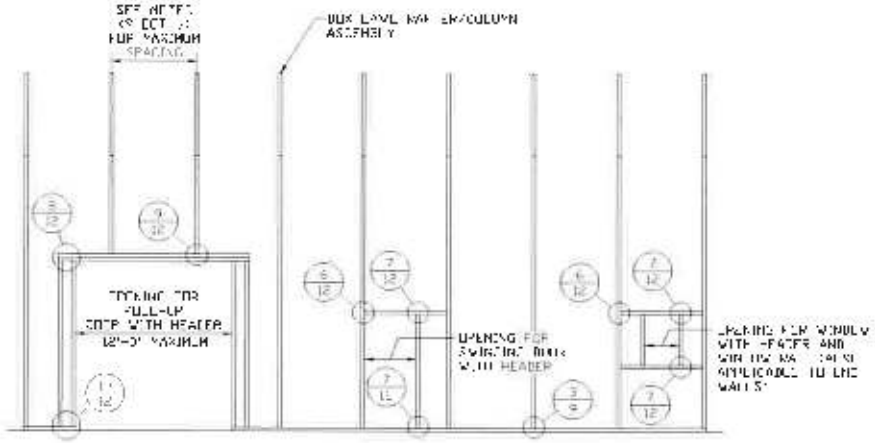
TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

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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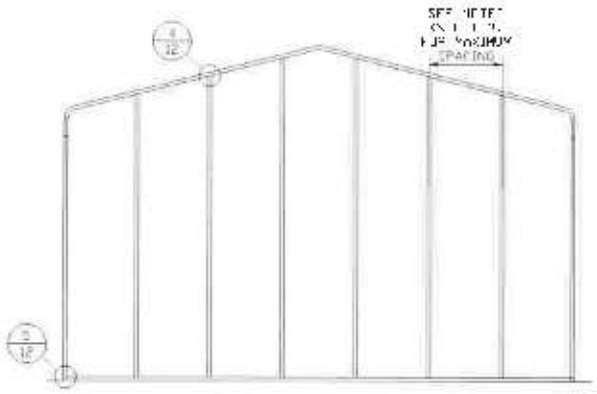
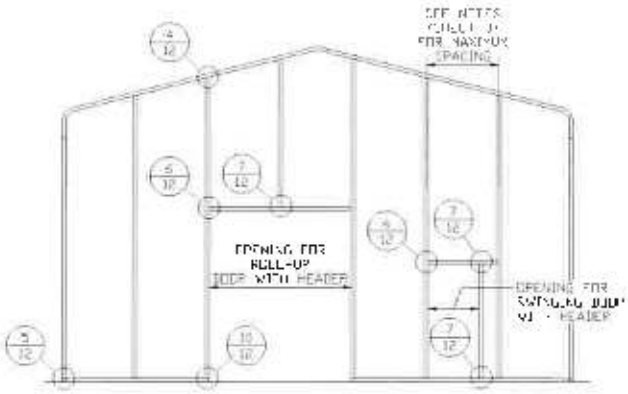
BOW RAFTER END WALL AND SIDE WALL OPENINGS



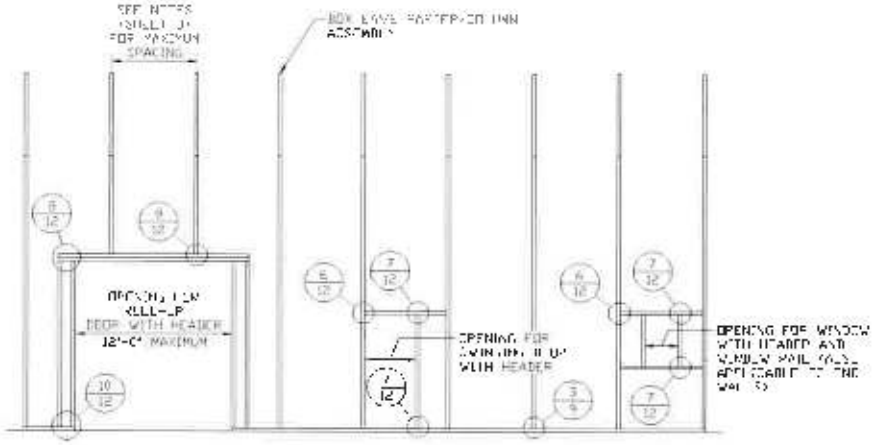
TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER END
WALL OPENINGS FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER SIDE
WALL OPENINGS FRAMING SECTION

SCALE: NTS

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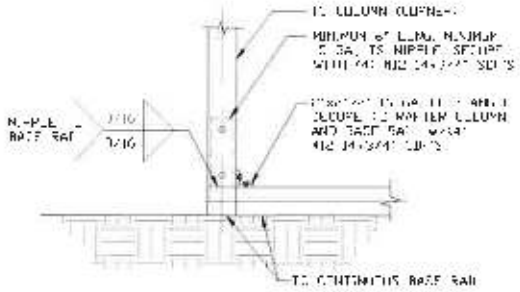
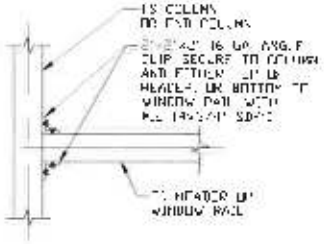
BOW AND BOX EAVE RAFTER WALL OPENING DETAILS

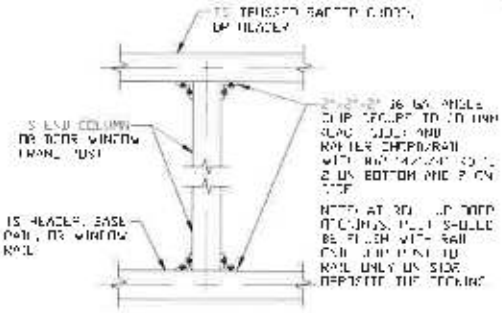
4 END COLUMN/RAFTER CONNECTION DETAIL
SCALE: NTS



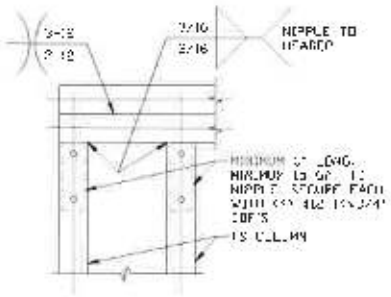
5 END COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS



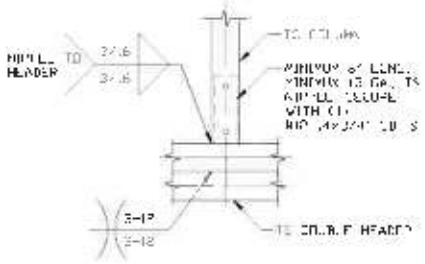
6 HEADER OR WINDOW RAIL TO COLUMN CONNECTION DETAIL
SCALE: NTS



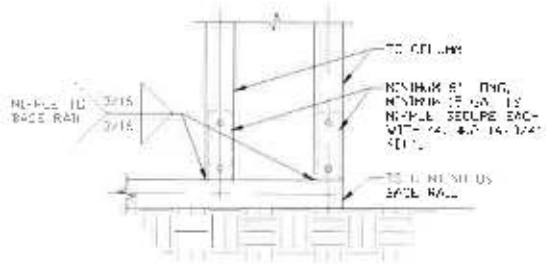
7 COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL
SCALE: NTS



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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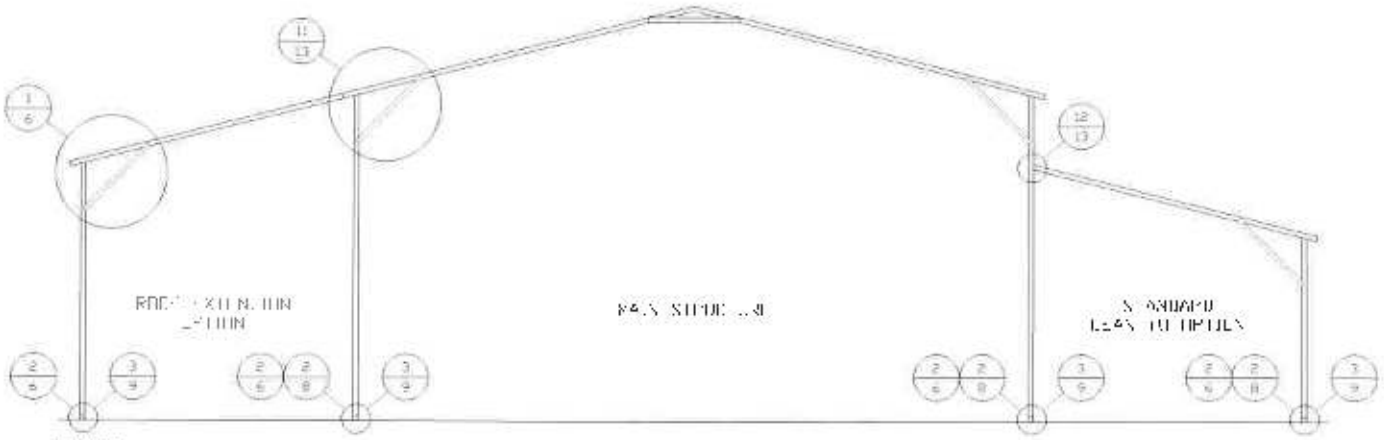
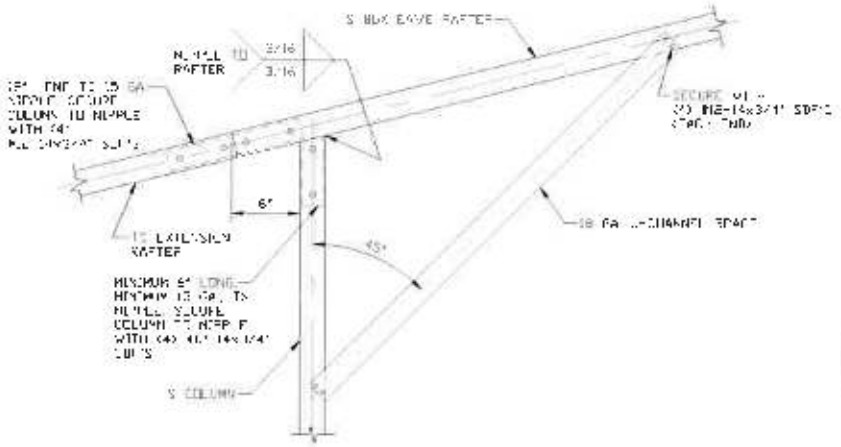
BOX EAVE RAFTER LEAN-TO OPTIONS



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

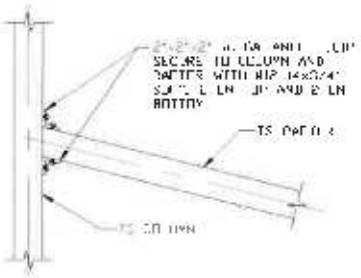
SCALE: NTS

MAXIMUM WIDTH OF SINGLE MEMBER RAFTER [illegible]



11A SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS



12 LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS

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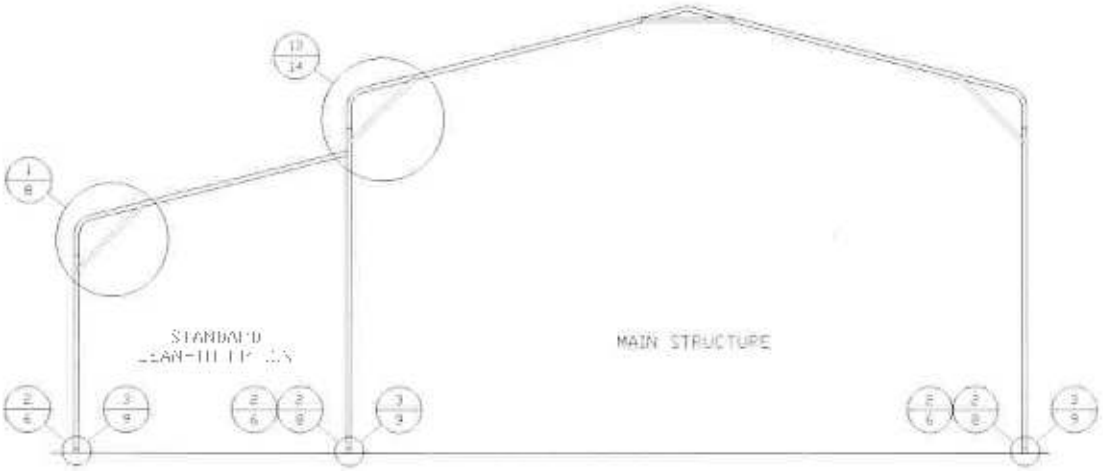
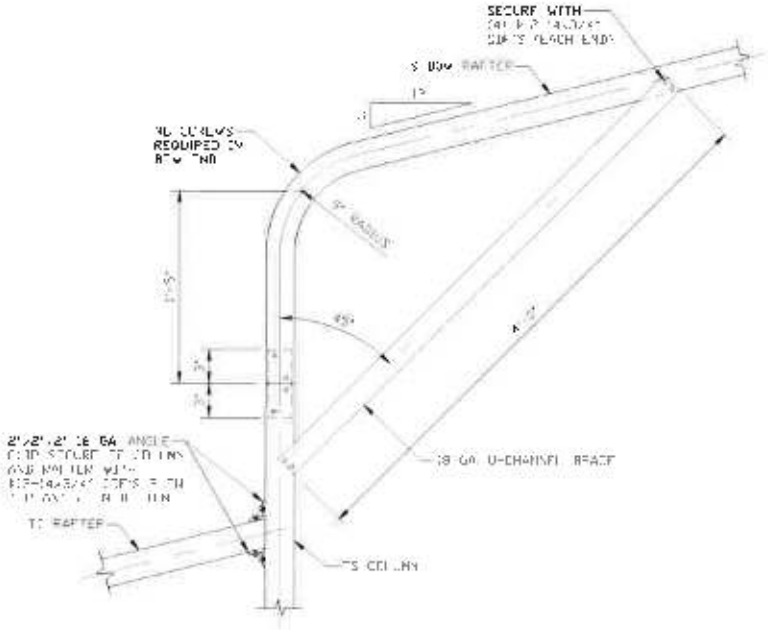
	PROJECT MGR: WSN	DATE: 12-18-17	SCALE: NTS	JOB NO: [illegible]	
	CLIENT: TBS	SHT. 13	DWG. NO: SK-3	REV.: 4	

BOW RAFTER LEAN-TO OPTIONS



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

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



13 SIDE EXTENSION RAFTER/COLUMN DETAIL
SCALE: NTS

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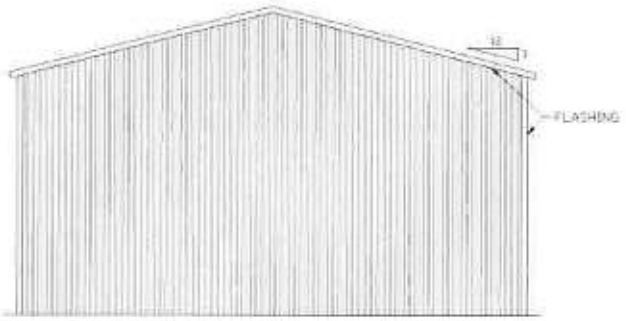
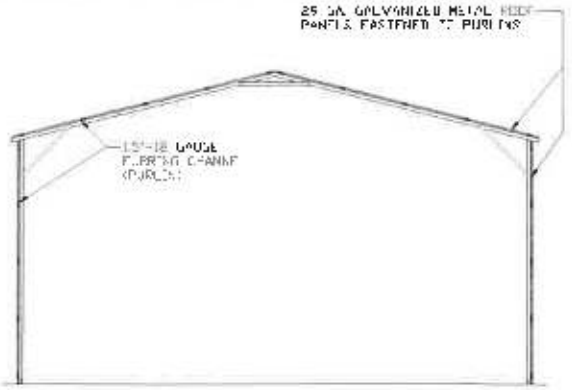
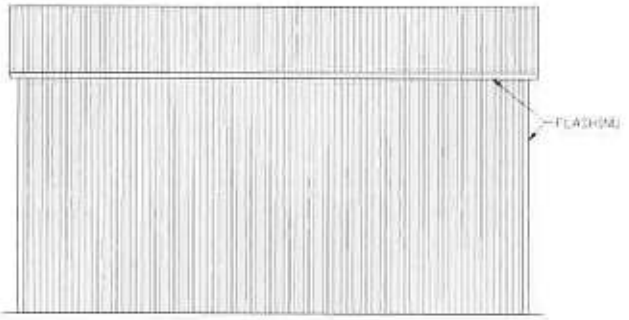
BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



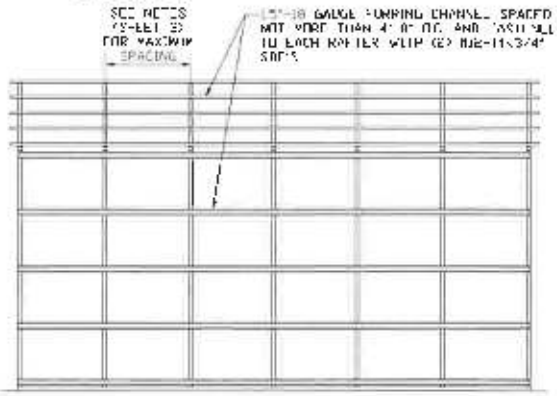
TYPICAL END ELEVATION
VERTICAL ROOF/SIDING OPTION
SCALE: NTS



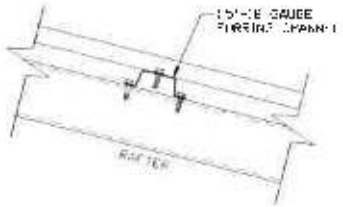
TYPICAL SECTION VERTICAL
ROOF/SIDING OPTION
SCALE: NTS



TYPICAL SIDE ELEVATION
VERTICAL ROOF/SIDING OPTION
SCALE: NTS



TYPICAL FRAMING SECTION
VERTICAL ROOF/SIDING OPTION
SCALE: NTS



ROOF PANEL ATTACHMENT
(ALTERNATE FOR VERTICAL ROOF PANELS)
SCALE: NTS

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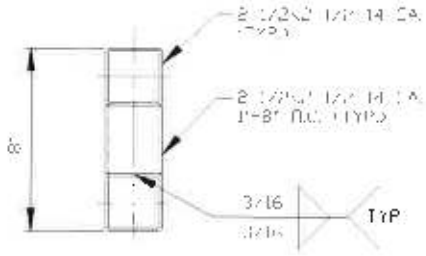
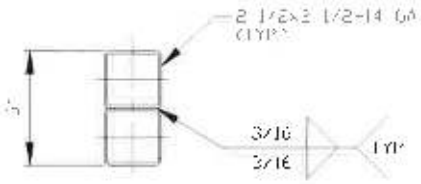
	CLIENT: TBS	SHT. 15	DWG. NO: SK-3	REV: 4

OPTIONAL DOOR HEADER



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

SCALE: NTS



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

SCALE: NTS

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	CLIENT: TBS	SHT. 16	DWG. NO: SK-3	REV.: 4