



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:

Moore and Associates Engineering and Consulting, Inc. 1009 East Avenue North Augusta, SC 29841

> 401 S. Main Street, Suite 200 Mount Airy, NC 27030



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DRAWING INDEX

SHEET	1	PE SEAL COVER SHEET
SHEET	5	DRAWING INDEX
SHEET	3	INSTALLATION NOTES AND SPECIFICATIONS
SHEET	4	TYPICAL SIDE AND END ELEVATIONS
SHEET	5	TYPICAL RAFTER COLUMN END AND SIDE FRAMING SECTIONS (BOX EAVE RAFTER)
SHEET	6A	TYPICAL RAFTER COLUMN CONNECTION DETAILS (LACED COLUMN)
SHEET	6B	TYPICAL RAFTER COLUMN CONNECTION DETAILS (DOUBLE COLUMN)
SHEET	6C	TYPICAL RAFTER COLUMN CONNECTION DETAILS (SINGLE COLUMN)
SHEET	7	TYPICAL RAFTER COLUMN END AND SIDE FRAMING SECTIONS (BOW RAFTER)
SHEET	8A	TYPICAL RAFTER COLUMN CONNECTION DETAILS (DOUBLE COLUMN)
SHEET	8B	TYPICAL RAFTER COLUMN CONNECTION DETAILS (SINGLE COLUMN)
SHEET	9A	BASE RAIL ANCHORAGE OPTIONS
SHEET	9B	OPTIONAL FOUNDATION ANCHORAGE
SHEET	10	TYPICAL END WALL AND SIDE WALL OPENING FRAMING SECTIONS (BOX EAVE RAFTER)
SHEET	11	TYPICAL END WALL AND SIDE WALL OPENING FRAMING SECTIONS (BOW RAFTER)
SHEET	12	WALL DPENING DETAILS
SHEET	13	LEAN-TO OPTIONS (BOX EAVE RAFTER)
SHEET	14	LEAN-TO OPTIONS (BOW RAFTER)
SHEET	15	VERTICAL ROOF/SIDING OPTION END AND SIDE ELEVATION AND SECTION
SHEET	16	OPTIONAL DOOR HEADER

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INSTALLATION NOTES AND SPECIFICATIONS

- 1. DESIGN IS FOR A MAXIMUM 30'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURES
- 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 = 15 PSF B) LIVE LOAD = 12 PSF C) GROUND SNOV 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 TD 170 MPH (NDMINAL WIND SPEED 109 TD 132 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 4.0 FEET
- 6. LOW HAZARD RISK CATEGORY I (WIND).
- 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 (UNLESS OTHERWISE NOTED).
- 9. AVERAGE FASTENER SPACING DN-CENTERS ALONG RAFTERS OR PURLINS, AND POSTS, INTERIOR = 9° OR END = 6°, (MAX.)
- 10. FASTENERS CONSIST OF #12-14x3/4' SELF-DRILLING FASTENER (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS SPECIFICATIONS APPLICABLE DNLY FOR MEAN ROOF HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14' (312 PITCH) OR LESS SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR SLOPES MAY WARY.
- 11. GROUND ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6' OF EACH RAFTER COLUMN ALONG SIDES
- 12. GROUND ANCHORS (SOIL NAILS) CONSIST OF 84 REBAR W/WELDED NUT × 30' LONG IN SUITABLE SOIL CONDITIONS MAY BE USED FOR LOW (& 108 MPH NOMINAL) WIND SPEEDS ONLY. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USE IN UNSUITABLE SDILS AS NOTED
- 13. OPTIONAL BASE RAIL ANCHORAGE MAY BE USED FOR LOW AND MUST BE USED FOR HIGH WIND SPEEDS.
- 14. VIND FORCES GOVERN OVER SEISMIC FORCES, SEISMIC PARAMETERS ANALYZED ARE:

SDIL SITE CLASS = D RISK CATEGORY I/II/III

V= C2M R= 3.25 Sps= 1522 Sps= 1522

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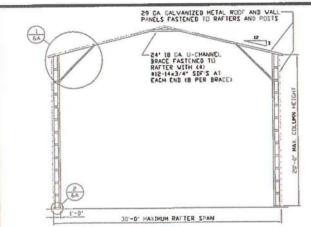
BOX EAVE FRAME RAFTER ENCLOSED BUILDING -VINDOV (AZ APPLICABLE) DESIGN PRESSURE LOV = (218 PSF, -236 PSF) HIGH * (3285 FSF, -356 PSF) ROLL-UP DOOR— (AS APPLICABLE) DESIGN PRESSURE LOV = (185 PSF, -204 PSF) H(GH = (27.95 PSF, -30.7 PSF SVINGING DODR (AS APPLICABLE) DES(GN PRESSURE LDV = (208 PSF, -22.6 PSF) HIGH * (3135 PSF, -3415 PSF) 12 6. FLASHING LENGTH VARIES DEPENDING ON NUMBER AND SPACING OF RAFTERS HAXIMUH RAFTER SPAN (V) TYPICAL END ELEVATION-HORIZONTAL ROOF TYPICAL SIDE ELEVATION-HORIZONTAL ROOF SCALE NTS SCALE: NTS BOW FRAME RAFTER ENCLOSED BUILDING RDLL-UP DDDR CAS APPLICABLED DESIGN PRESSURE LDV = (185 PSF, -20.4 PSF) HIGH = (27.95 PSF, -30.7 PSF) RODO DRIDRIVE (318A311946 AD (31836 AD (324 655 ,724 805) V VOI (324 6155 ,724 605) HOIH 12 -FLASHING MAXIMUM RAFTER SPAN (V) TYPICAL END ELEVATION VINDOV (AS APPLICABLE) DESIGN PRESSURE LOV = (218 PSF. -236 PSF) HIGH = (32.85 PSF. -356 PSF) LENGTH VARIES DEPENDING ON NUMBER AND SPACING OF RAFTERS TYPICAL SIDE ELEVATION MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC. TUBULAR BUILDING SYSTEMS DRAWN BY: LT 30'-0"x20'-0" ENCLOSED BUILDING EXP. B CHECKED BY PDH JOB NO: 160225/173005 THIS BOCUMENT IS THE PROPERTY OF MODRE AND ASSOCIATES ENGINEERING AND CONSULTING. THE UNMUTHORIZED REPRODUCTION, COPYING, OR OTHERWISE USE OF THIS BOCUMENT IS STRICTLY PROHIBITED AND ANY INFRINGEMENT THEREUPON MAY BE SUBJECT TO LEGAL ACTION. PROJECT HGR: WSH DATE: 12-18-17 SCALE: NTS

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TYPICAL RAFTER/COLUMN END FRAME SECTION

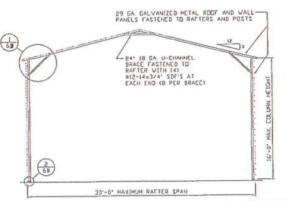
SCALEI NTS

29 GA CALVANIZED METAL RDDF AND VALL
PANELS FASTENED 1D RAFTERS AND PUSTS

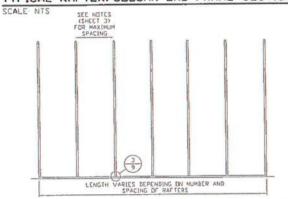
24' 18 CA U-CHANNEL
BRACE FASTENED 1D
RAFTER VIII (4)
812-1443/4' 550'S AT
EACH END (8 PER BRACE)

20'-0' MAXIMUM RAFTER SPAN

TYPICAL RAFTER/COLUMN END FRAME SECTION



TYPICAL RAFTER/COLUMN END FRAME SECTION

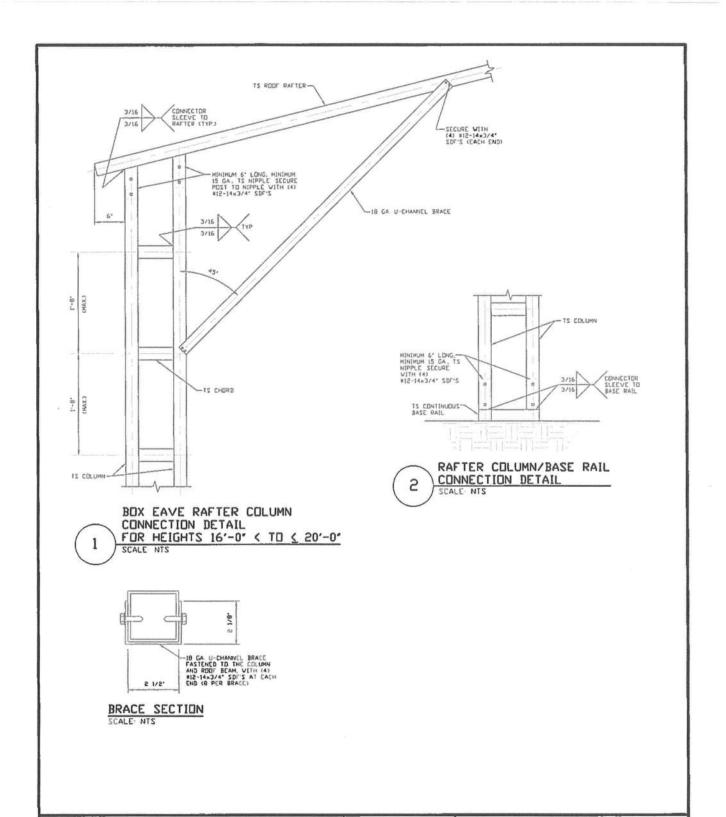


TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION SCALE NTS

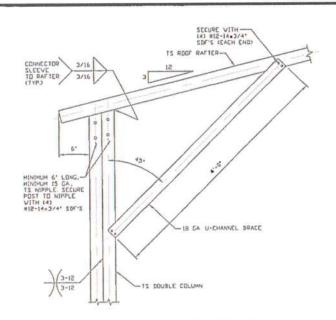
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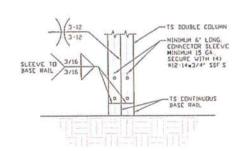
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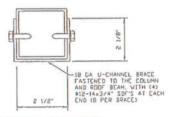
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BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 14'-0' < TO < 16'-0'
SCALE: NTS



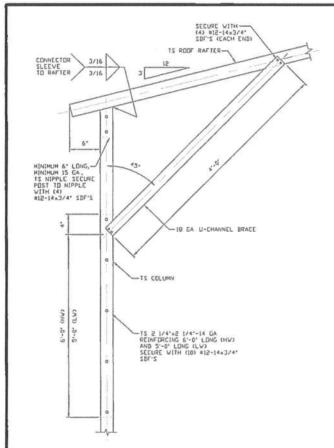
2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL



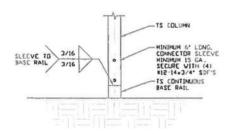
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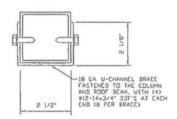
BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 10'-0' < TO < 14'-0"



2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL

CDIANECTOR SLEEVE TO RAFTER 3/16 3/16	12 RDDF RAFTER
6, 43.	25 SDF,2 (EVEN HWD) 25COME A1H (4) #15-14*3/4, 20L,2 (EVEN HWD)
HINIMUM 6' LONG,— HINIMUM 15 GA. TS NIPPLE SECURE POST TO NIPPLE VITH (45 V	18 GA U-CHANGEL BRACE
12-14×3/4' SDF'S	

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

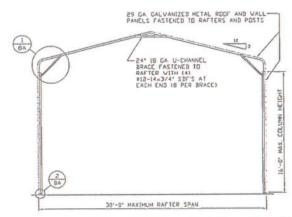


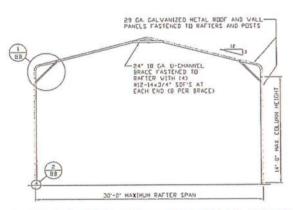
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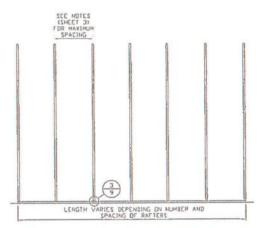
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TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS

TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS

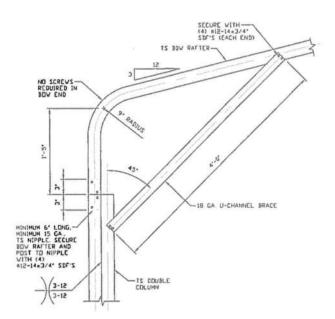


TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

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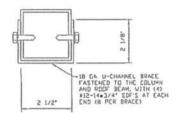
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BOX EAVE RAFTER COLUMN
CONNECTION DETAIL
FOR HEIGHTS 14'-0" < TO < 16'-0"



BRACE SECTION

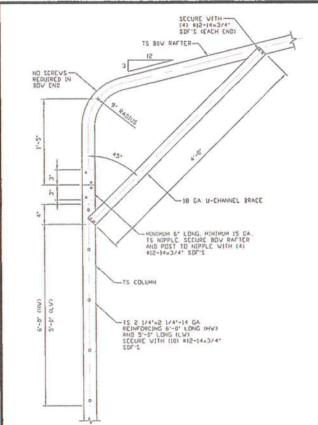
SLEEVE TO 3/16	-TS DOUBLE COLUMN -MINIMUM 6" LONG, COMMECTOR SLEEVE MINIMUM 15 GA, SECURE VITH (4) #12-14=3/4" SDF'S
100	TS CONTINUOUS BASE RAIL

2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL SCALE: NTS

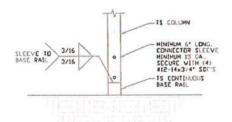
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BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO < 14'-0"



14

RAFTER COLUMN/BASE RAIL CONNECTION DETAIL SCALE NTS 2

75 B	DV RAFTER -
12	
ND SCREVS	1
REQUIRED IN	
	X
1-1-3-	(4) #15-14#3/4"
in / 25	SDF S (EACH END)
is // /	
I Y	
18	GA. U-CHANNEL BRACE
÷1 -/	
HINIHUM 5" LDNG.	
HINIMUM 15 GA.	
BOU RAFTER AND TS COLUNN POST TO NIPPLE	
VITH (4)	
1	
,	
BOX EAVE	RAFTER COLUMN
CONNECTION	DETAIL
1B FOR HEIGHT	\$ ≤ 10'-0"
SCALE NTS	
	. 1
	.8/
	N
	L
18 GA	U-CHANNEL BRACE HED TO THE COLUMN DOF BEAM, VITH (4)
AND R #12-14	OF BEAM, VITH (4) #3/4" SDE'S AT EACH I PER BRACE)
5 1/5. END (PER BRACE)

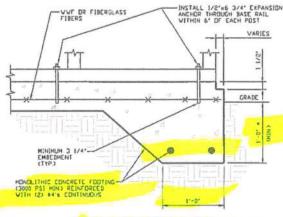
BRACE SECTION

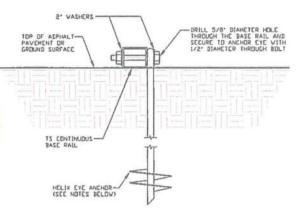
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BASE RAIL ANCHORAGE OPTIONS FOR LOW AND HIGH WIND SPEED





3A

CONCRETE MONDLITHIC SLAB BASE RAIL ANCHORAGE

(MINIMUM ANCHOR EDGE DISTANCE IS 4')

* COORDINATE WITH LOCAL CODES/ORD

GROUND BASE HELIX ANCHORAGE 3B (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 DVER 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 I 1/2 INCHES ELSEWHERE

REINFORCING STEEL:

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

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

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

HELIX ANCHOR NOTES:

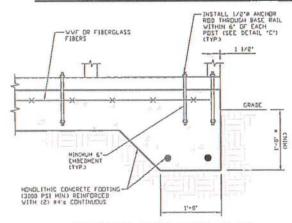
- 1 FOR VERY DENSE AND/OR CEMENTED SANDS, CDARSE GRAVEL AND COBBLES, CALICHE, PRELOADED SILTS AND CLAYS USE MINIMUM (2) 4° HELICES WITH MINIMUM 30 INCH EMBEDMENT.
- 2 FOR CORAL USE MINIMUM (2) 4' HELICES WITH MINIMUM 30 INCH EMBEDMENT
- 3 FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY STIFF SILTS, AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 30 INCH EMBEDMENT.
- 4 FOR LODSE TO MEDIUM DENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL USE MINIMUM (2) 6" HELICES WITH MINIMUM SO INCH EMBEDMENT.
- 5 FOR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL USE MINIMUM (2) 8' HELICES WITH MINIMUM 6D INCH EMBEDMENT.

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OPTIONAL FOUNDATION ANCHORAGE FOR LOW & HIGH WIND SPEED





CONCRETE MONDLITHIC 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:

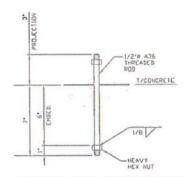
FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318
3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL:

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.





ANCHOR ROD THROUGH BASE RAIL DETAIL

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DRAWN BY: LT		TUBULAR BUILDING SYSTEMS 30'-0"x20'-0" ENCLOSED BUILDING EXP. B					
CHECKED BY: PDH	00 0 1120						
PROJECT HGR: WSH	DATE: 12-18-17	SCALE: NTS		ND: 225/17300S			
CLIENT: TBS	SHT. 98	DVG. NO: SX-3		REV. 4			

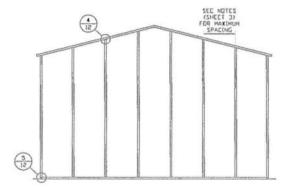
FIBERS (CTYP.) INSTALL I/2'S ANCHOR ROD THROUGH BASE RAIL FIBERS (CTYP.) FIBERS (CTYP.)	1 1/2"
× × × × ×	GRADE
MINIMIM 6. EMBEDMENT (TYP.)	E .F
RDNOLITHIC CONCRETE FOOTING C3000 PSI MH3 REINFORCED VITH (2) 84°s CONTINUOUS 1'-0'	

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE 1B

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

** COORDINATE WITH LOCAL CODES/ORD

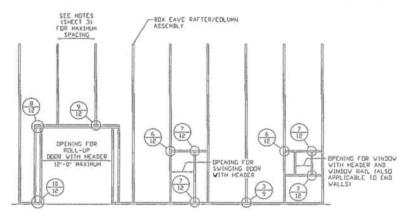
BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



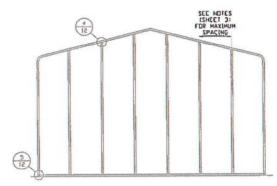
TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS

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-	PROJECT HGR: WSH	DATE: 12-18-17	SCALE: NTS		3 NO: 225/17300S				
	CHECKED BY: PDH	30'-0"x20'-	0" ENCLOSED I	BUILD	DING EXP. B				
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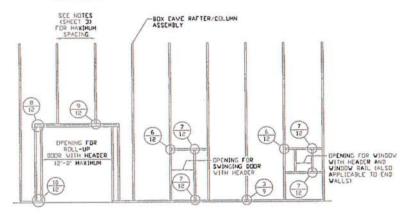
BOW RAFTER END WALL AND SIDE WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION SCALE NTS

TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS

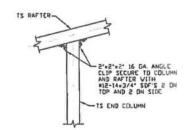


TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE NTS

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BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



TS CDLUNN (CDRNER)

MINIMUM 6' LDNG, MINIMUM

IS GA. TS NIPPLE SECURE

VITH (4) BIZ-14-3/4' SDF'S

2'*2'*2' 16 GA CLIP ANGLE

SECURE TO RAFTER COLUMN

AND BASE RAIL

3/16

TS CONTINUOUS BASE RAIL

TS CONTINUOUS BASE RAIL

TS COLUMN

DR CND COLUMN

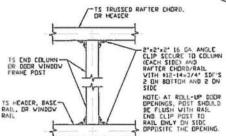
2**2**2* 16 GA. ANGLE
CLIP SECURE TO COLUMN
AND CITHER TOP
HEADER, DR BOTTOM OF
VINDOU WAIL VITH
812-14*3/4* SDF'S

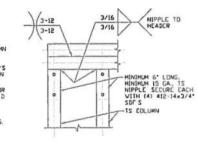
TS HEADER DR
VINDOU RAIL

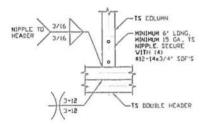
END COLUMN/RAFTER
CONNECTION DETAIL
SCALE: NTS

5 CONNECTION DETAIL
SCALE NTS

HEADER OR WINDOW
RAIL TO COLUMN
CONNECTION DETAIL
SCALE: NTS



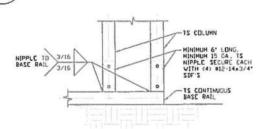




COLUMN TO HEADER,
BASE RAIL, OR
WINDOW RAIL
CONNECTION DETAIL
SCALE: NTS

8 DOUBLE HEADER/COLUMN
CONNECTION DETAIL

9 COLUMN/DOUBLE HEADER
CONNECTION DETAIL
SCALE: NTS

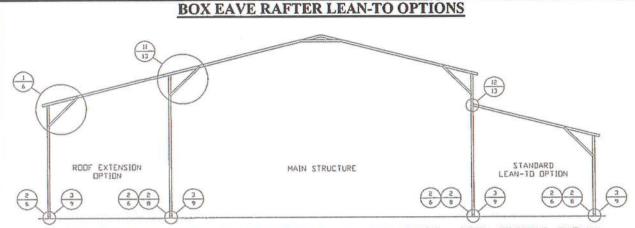


COLUMN/BASE RAIL
CONNECTION DETAIL
SCALE NTS

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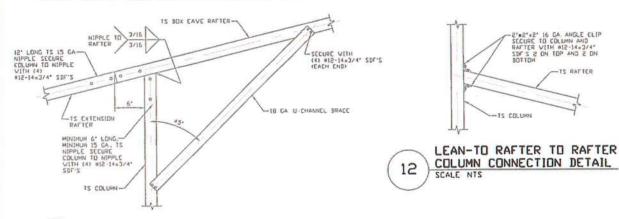
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PROJECT HGR: VSH	DATE: 12-18-17			JOB NO: 160225/173005				
CLIENT: TBS	SHT. 12	DVG. NO: SK-3		REV. 4				



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

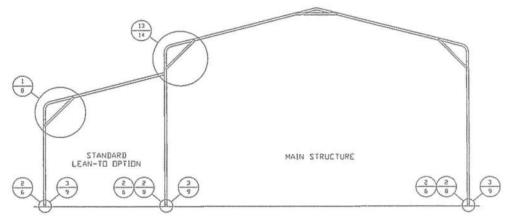
SCALE: NTS MAXIMUM WIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 16'-0'.



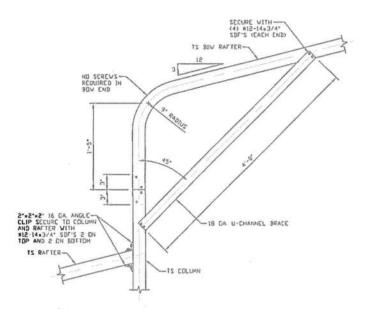
11A SIDE EXTENSION RAFTER/COLUMN DETAIL

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BOW RAFTER LEAN-TO OPTIONS



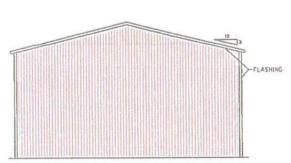
TYPICAL BOW RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN) SCALE: NTS MAXIMUM VIDTH OF SINGLE MEMBER RAFTER LEAN-TO IS 16'-0'



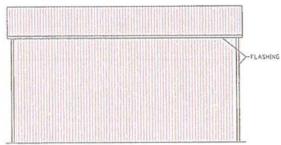
SIDE EXTENSION RAFTER/COLUMN DETAIL
SCALE NTS

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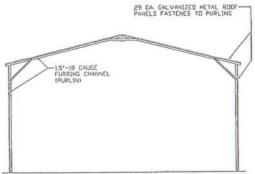
BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL END ELEVATION VERTICAL ROOF/SIDING OPTION



TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING OPTION



TYPICAL SECTION VERTICAL ROOF/SIDING OPTION

SCALE: NTS

SEE NOTES (SHEET 3) FOR HANHUH NOT MORE THAN 4'-0' DC. AND FASTENED TO EACH RAFTER WITH (2) 812-14#3/4'

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TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION

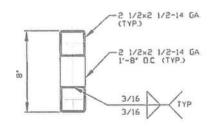
-15'-18 GAUGE FURRING CHANNEL

ROOF PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS) SCALE NTS

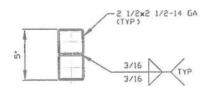
		7		
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OPTIONAL DOOR HEADER



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 HGR: VSH	DATE: 12-18-17	SCALE: NTS	JOB NO: 160225/173005		
	CLIENT: TBS	SHT. 16	DVG. NO: SK-3	REV. 4		

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