



STRUCTURAL DESIGN

STANDARD PACKAGE ENCLOSED BUILDING

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

24 September 2020

Revision 0

M&A Project No. 20195S

Prepared for:

Universal Metal Buildings

9283 US 601

Dobson, NC 27017

Prepared by:

Moore and Associates Engineering and Consulting, Inc.

1009 East Avenue

North Augusta, SC 29841

401 South Main Street

Mount Airy, NC 27030



**MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING**

**MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING, INC.**

DRAWN BY: JG

CHECKED BY: PDH

PROJECT MGR: VSM

CLIENT: UNIVERSAL

UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 1

SCALE: NTS

DWG. NO: SK-3

JOB NO: 201955

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DRAWING INDEX

SHEET 1	PE SEAL COVER SHEET
SHEET 2	DRAWING INDEX
SHEET 3	INSTALLATION NOTES AND SPECIFICATIONS
SHEET 4	TYPICAL SIDE AND END ELEVATIONS
SHEET 5	TYPICAL RAFTER/COLUMN FRAME SECTIONS
SHEET 5A	TYPICAL RAFTER/COLUMN FRAME AND SIDE FRAMING SECTION
SHEET 6	COLUMN CONNECTION DETAILS (LACED COLUMN)
SHEET 6A	COLUMN CONNECTION DETAILS (DOUBLE AND SINGLE COLUMN)
SHEET 7	BASE RAIL ANCHORAGE OPTIONS
SHEET 7A	BASE RAIL ANCHORAGE OPTIONS
SHEET 8	TYPICAL END WALL OPENINGS FRAMING SECTIONS
SHEET 8A	TYPICAL SIDE WALL OPENINGS FRAMING SECTIONS
SHEET 9	CONNECTION DETAILS
SHEET 10	CONNECTION DETAILS
SHEET 11	LEAN-TO OPTIONS
SHEET 11A	LEAN-TO OPTIONS
SHEET 11B	LEAN-TO OPTIONS
SHEET 11C	LEAN-TO OPTIONS
SHEET 12	VERTICAL ROOF/SIDING OPTION END AND SIDE ELEVATION
SHEET 13	VERTICAL ROOF/SIDING OPTION END AND SIDE SECTION
SHEET 14	END WALL AND SIDE WALL HEADER OPTIONS

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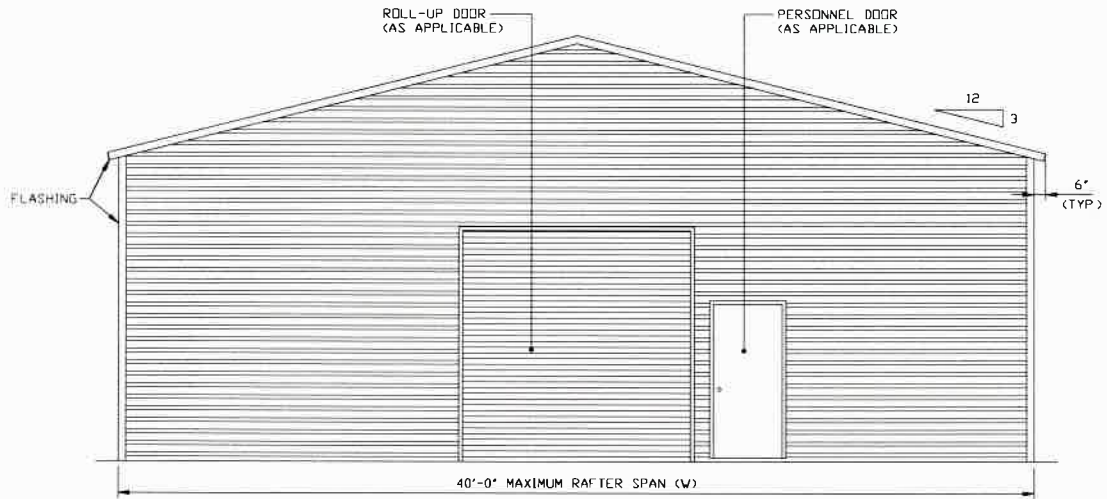
INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR MAXIMUM 40'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2018 NORTH CAROLINA BUILDING CODE, 2018 INTERNATIONAL BUILDING CODE (IBC), 2015 IBC, 2012 IBC AND 2009 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
 - A) DEAD LOAD = 15 PSF
 - B) LIVE LOAD = 12 PSF
 - C) GROUND SNOW LOAD = 35 PSF

NOTE: UNBALANCED SNOW LOADS DUE TO DRIFTING HAVE NOT BEEN EVALUATED.
4. 3-SECOND GUST ULTIMATE WIND SPEED (V_{ULT}) = \leq 145 MPH (NOMINAL WIND SPEED = \leq 112 MPH)
5. MAXIMUM RAFTER/COLUMN AND END COLUMN SPACING = 5.0 FEET (UNLESS NOTED OTHERWISE)
6. SIDEWALL COLUMNS AND ENDWALL COLUMNS ARE SIMILAR IN SIZE, UNLESS NOTED OTHERWISE.
7. RISK CATEGORY I.
8. WIND EXPOSURE CATEGORY B.
9. SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2 1/2" x 2 1/2" - 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS (UNLESS NOTED OTHERWISE).
10. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 10 INCHES.
11. 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.
12. ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6' OF EACH COLUMN.
13. STANDARD GROUND FOUNDATION SYSTEM CONSISTS OF #4 REBAR W/ WELDED NUT x 36" LONG SOILS NAILS AND ARE APPLICABLE ONLY IN MEDIUM TO STIFF SOILS (SUITABLE SOIL). OPTIONAL FOUNDATION SYSTEMS MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS. COORDINATE WITH LOCAL CODES/ORDINANCES FOR FOUNDATION SYSTEM TO BE COMPLIANT WITH FROST DEPTH PROTECTION.
14. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:
 - SOIL SITE CLASS = D
 - RISK CATEGORY I
 - R = 3.25 $I_e = 10$
 - $S_{Ds} = 2.039 g$ $V = C_s W$
 - $S_{D1} = 1.258 g$

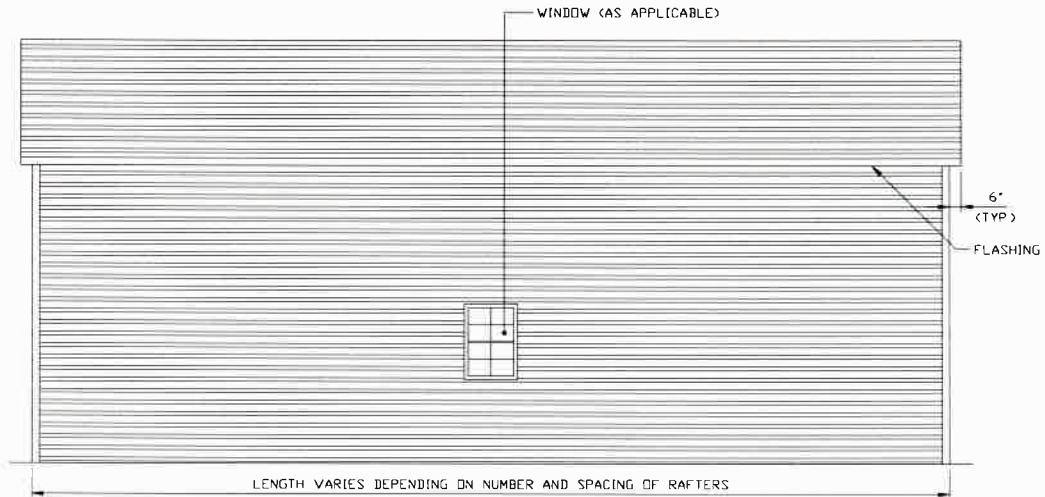
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BOX EAVE FRAME RAFTER STRUCTURE



TYPICAL END ELEVATION

SCALE: NTS



TYPICAL SIDE ELEVATION

SCALE: NTS

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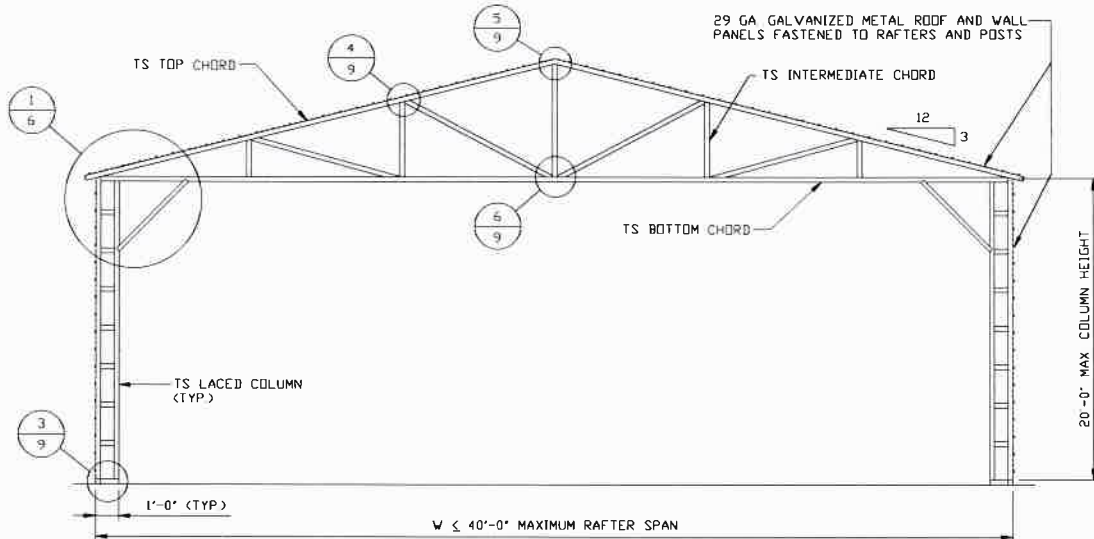
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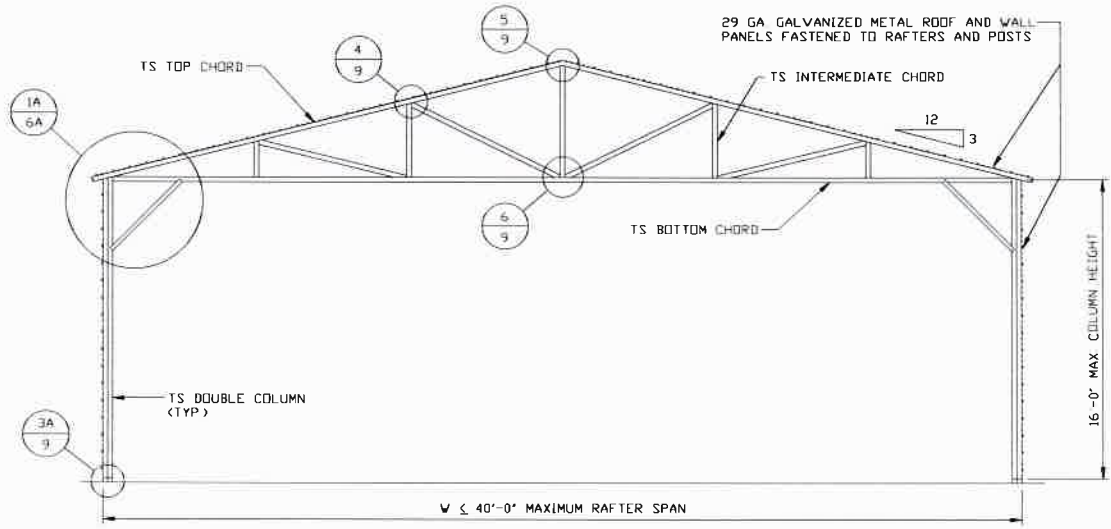
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TYPICAL RAFTER/COLUMN FRAME SECTION

SCALE: NTS

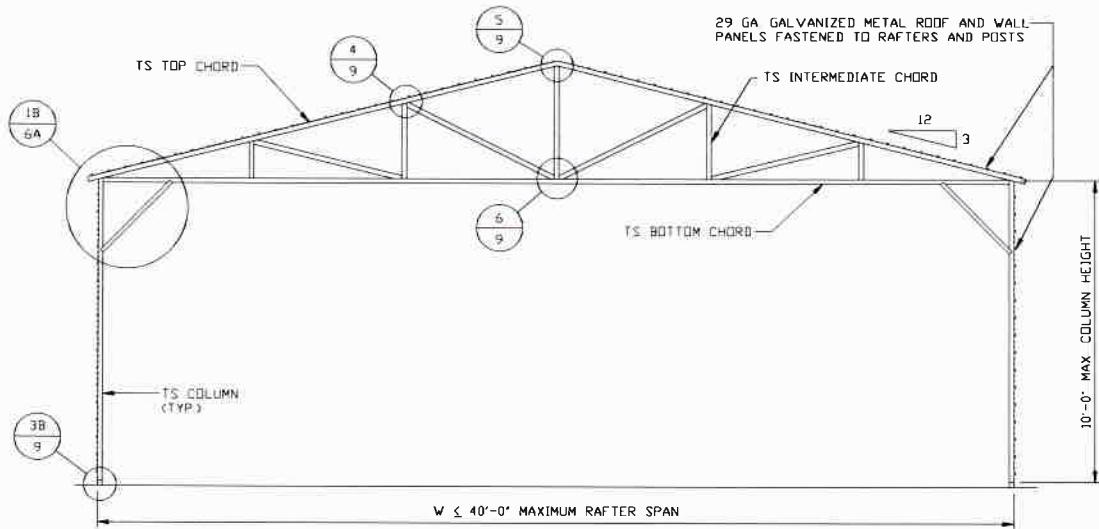


TYPICAL RAFTER/COLUMN FRAME SECTION

SCALE: NTS

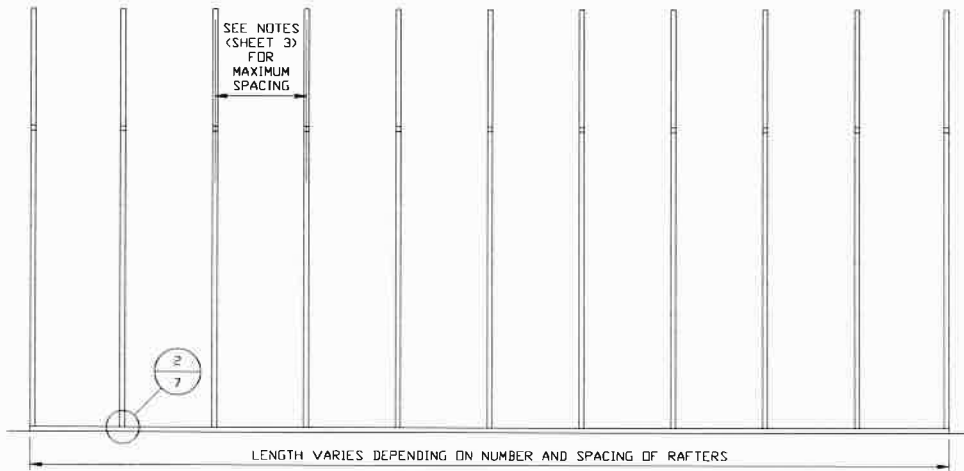
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TYPICAL RAFTER/COLUMN FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS

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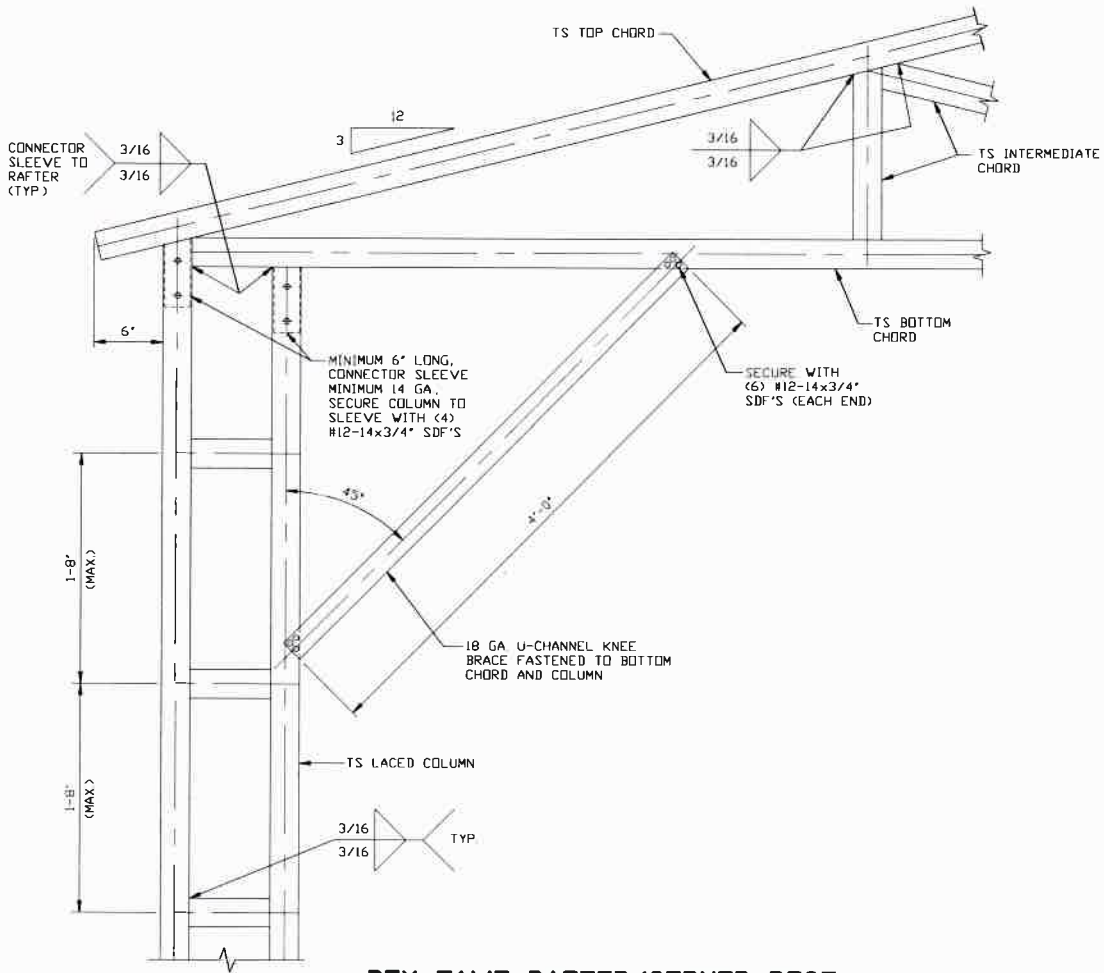
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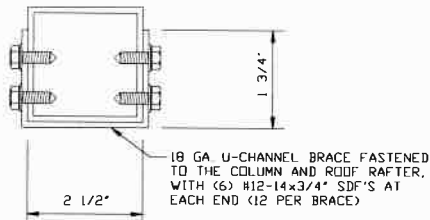
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BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
FOR HEIGHTS 16'-0" < TO ≤ 20'-0"
 SCALE: NTS

1



BRACE SECTION
 SCALE: NTS

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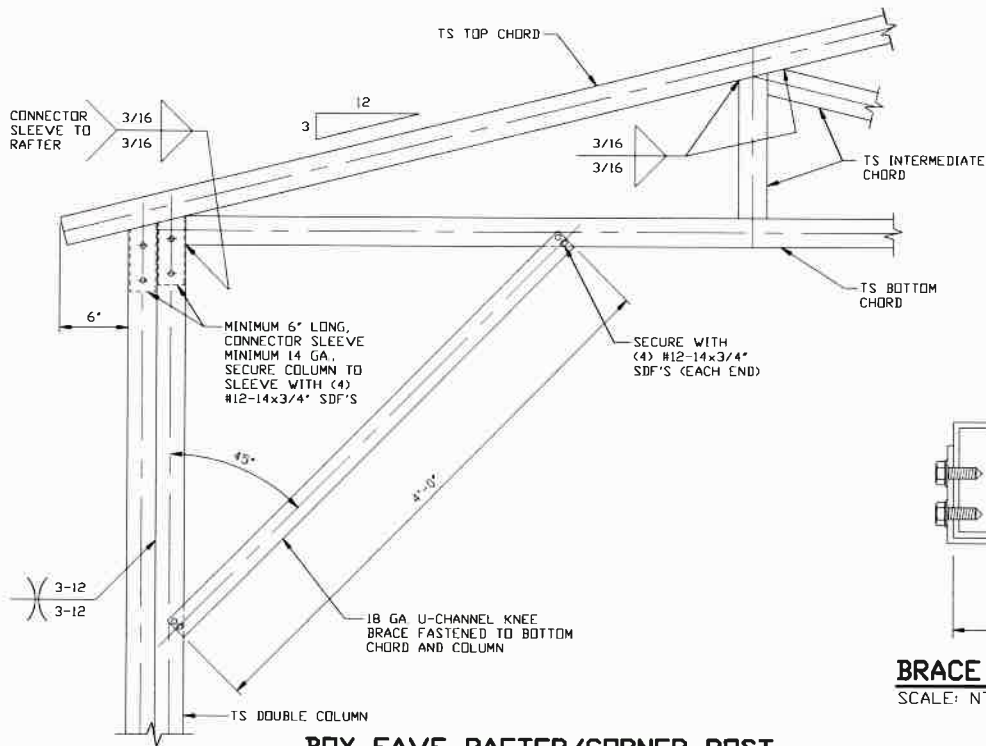
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DATE: 9-24-20
SHT. 6

SCALE: NTS
DWG. NO: SK-3

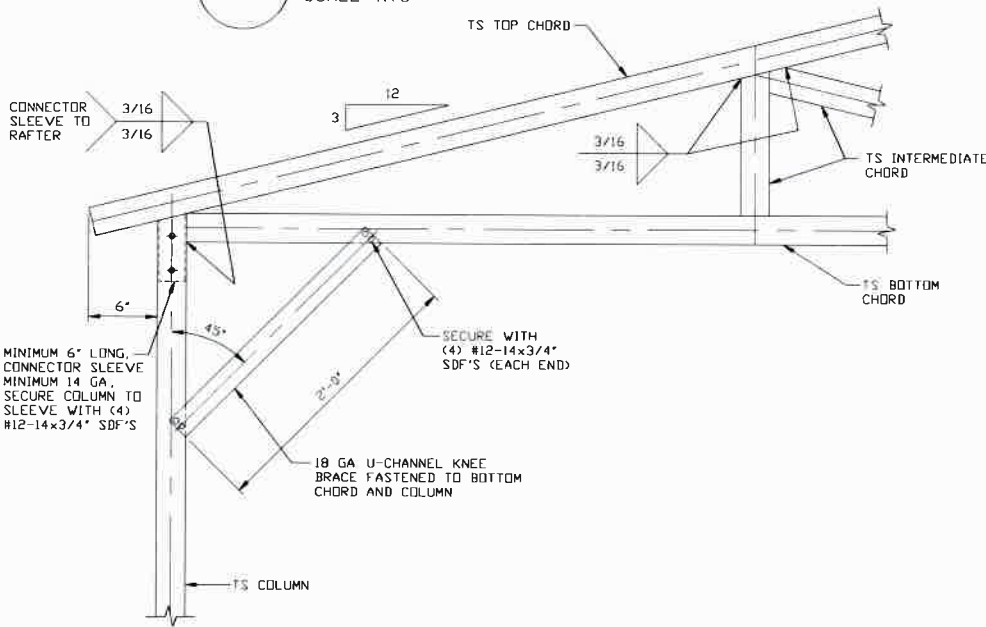
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BRACE SECTION
SCALE: NTS

1A

BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO <= 16'-0"
SCALE: NTS



1B

BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS <= 10'-0"
SCALE: NTS

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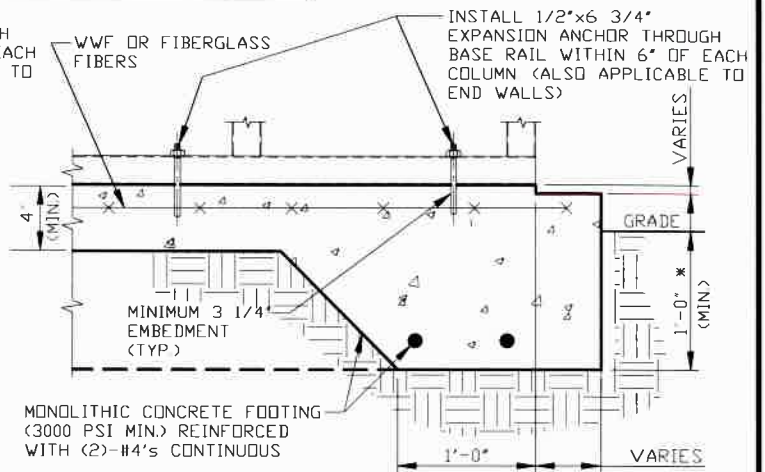
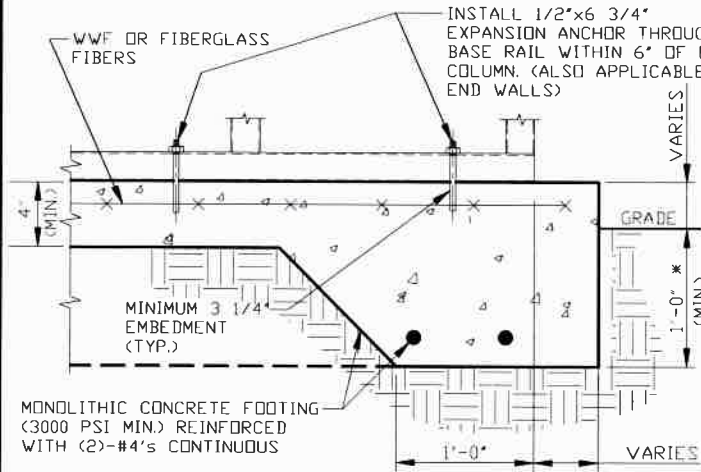
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BASE RAIL ANCHORAGE OPTIONS



2A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
 MINIMUM ANCHOR EDGE DISTANCE IS 4"
 * COORDINATE WITH LOCAL BUILDING CODE
 AND/OR BUILDING OFFICIAL REGARDING
 REQUIRED MINIMUM FOOTING DEPTH.

2B

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
 MINIMUM ANCHOR EDGE DISTANCE IS 4"
 * COORDINATE WITH LOCAL BUILDING CODE
 AND/OR BUILDING OFFICIAL REGARDING
 REQUIRED MINIMUM FOOTING DEPTH.

GENERAL NOTES

NOTE: CONCRETE MONOLITHIC SLAB DESIGN BASED ON MINIMUM SOIL BEARING CAPACITY OF 1,500 PSF.

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" 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" 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" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
2. FOR CORAL USE MINIMUM (2) 4" HELICES WITH MINIMUM 30" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
3. FOR MEDIUM DENSE COARSE SANDS, SANDY GRAVELS, VERY STIFF SILTS, AND CLAYS USE MINIMUM (2) 4" HELICES WITH MINIMUM 30 INCH EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
4. FOR LOOSE TO MEDIUM DENSE SANDS, FIRM TO STIFF CLAYS AND SILTS ALLUVIAL FILL, USE MINIMUM (2) 6" HELICES WITH MINIMUM 50" 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" EMBEDMENT.

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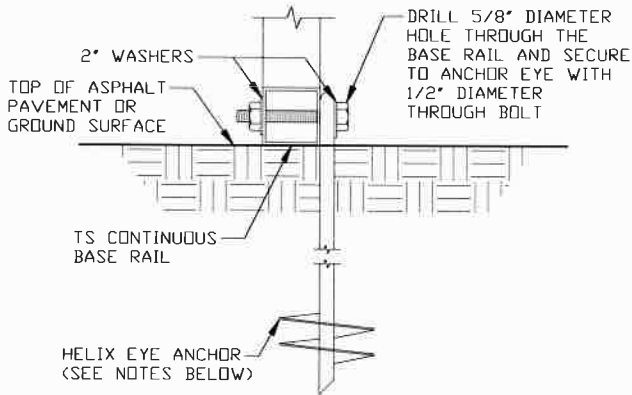
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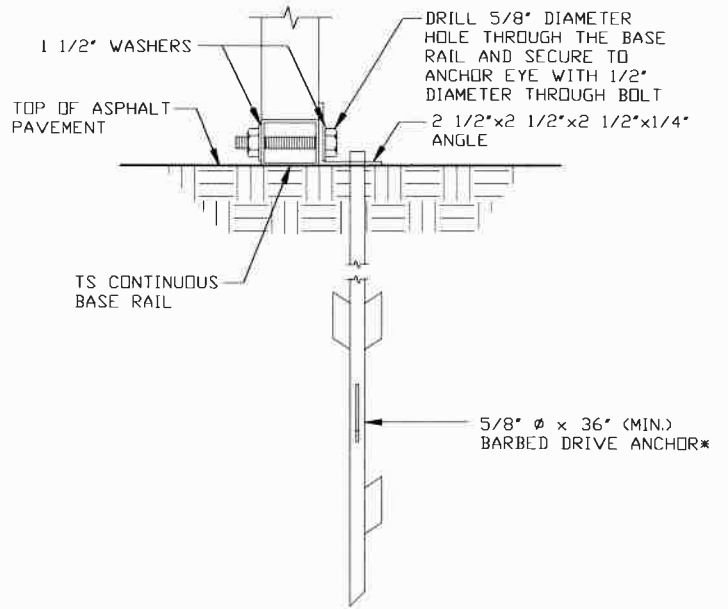
BASE RAIL ANCHORAGE OPTIONS



2C

GROUND BASE HELIX ANCHORAGE

SCALE: NTS
 (CAN BE USED FOR ASPHALT)
 * COORDINATE WITH LOCAL BUILDING CODE
 AND/OR BUILDING OFFICIAL REGARDING
 REQUIRED FOOTING DEPTH.



2D

ASPHALT BASE ANCHORAGE

SCALE: NTS
 * COORDINATE WITH LOCAL BUILDING CODE
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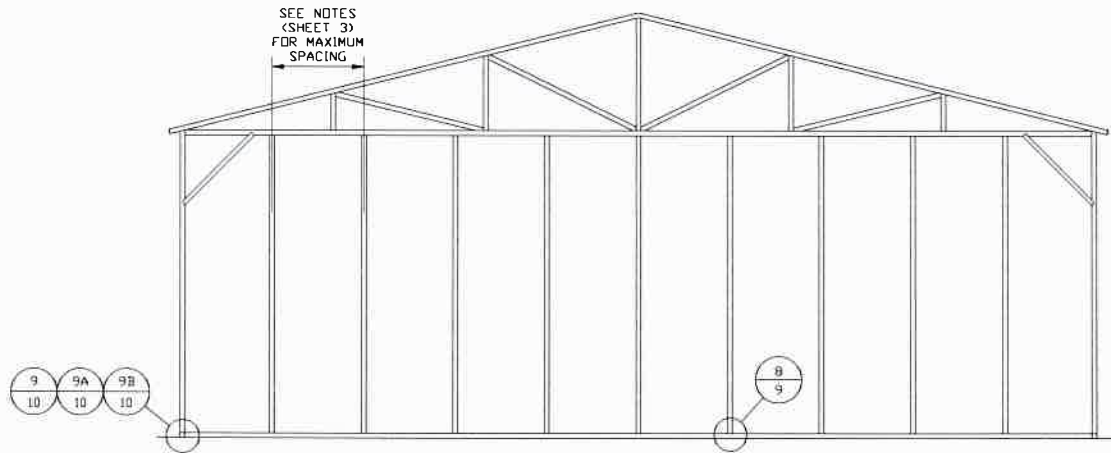
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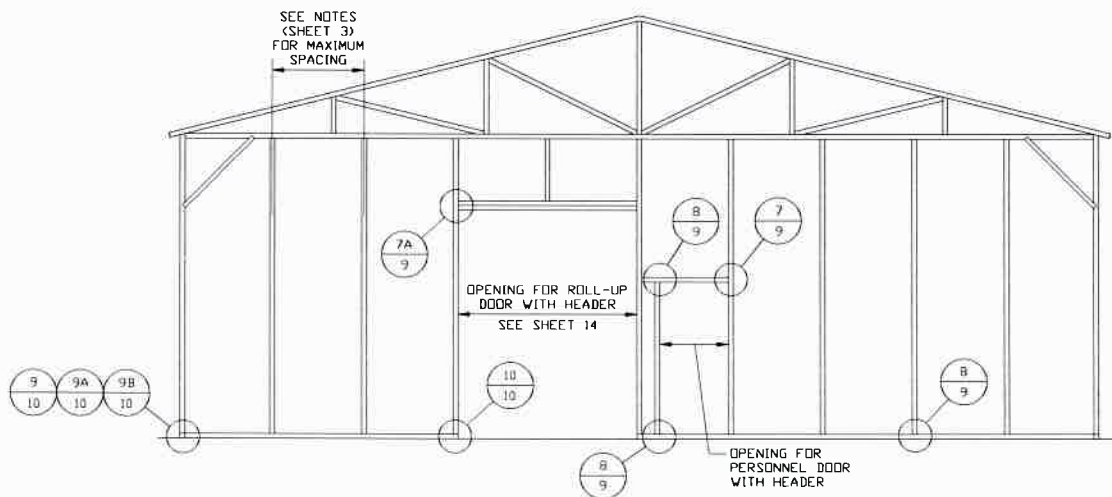
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BOX EAVE RAFTER END WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS

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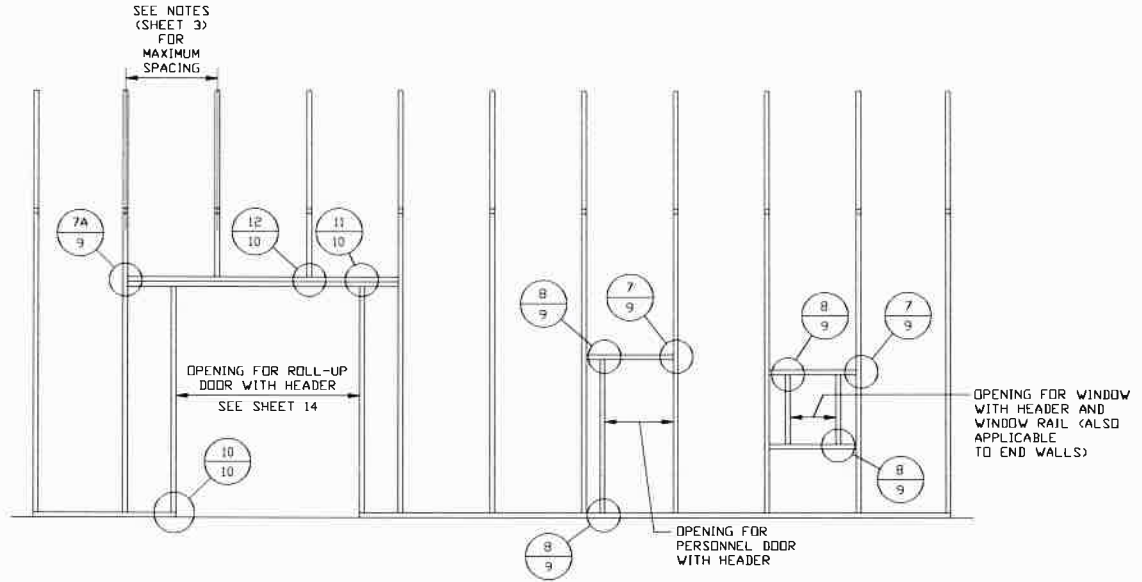
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS

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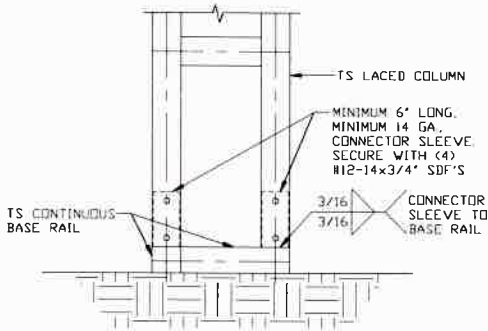
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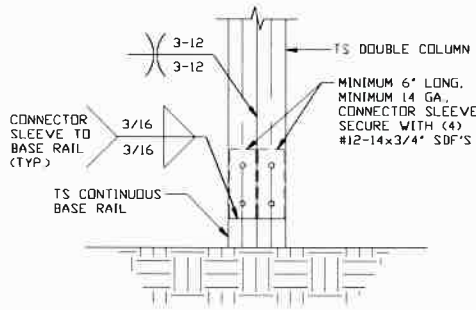
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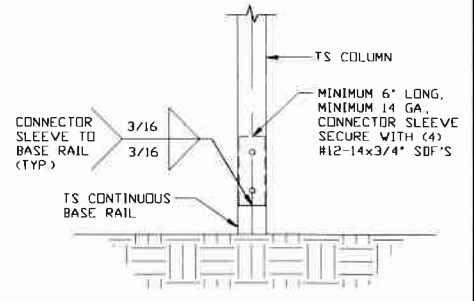
CONNECTION DETAILS



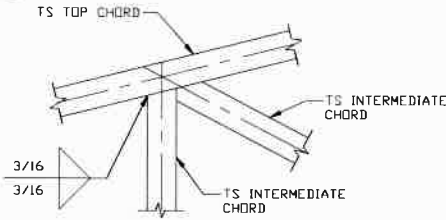
3 POST/BASE RAIL CONNECTION DETAIL
SCALE: NTS



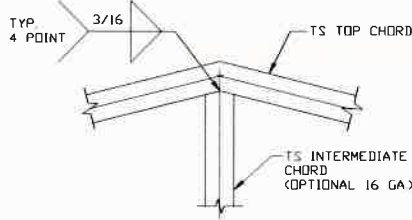
3A POST/BASE RAIL CONNECTION DETAIL
SCALE: NTS



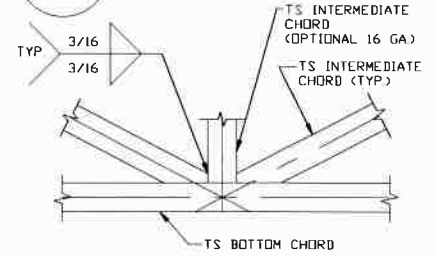
3B POST/BASE RAIL CONNECTION DETAIL
SCALE: NTS



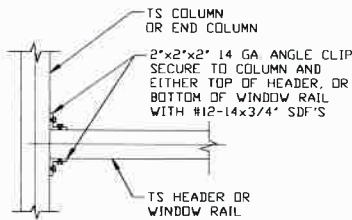
4 INTERMEDIATE CHORD TO TOP CHORD CONNECTION DETAIL
SCALE: NTS



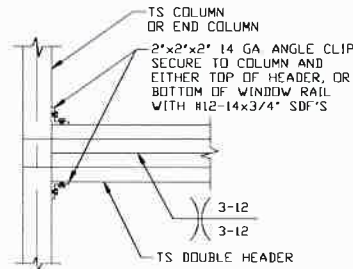
5 CENTER POST TO RAFTER CONNECTION DETAIL
SCALE: NTS



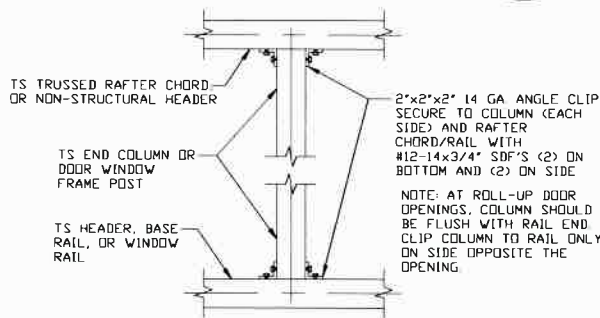
6 CENTER POST TO BOTTOM CHORD CONNECTION DETAIL
SCALE: NTS



7 COLUMN OR WINDOW RAIL/WALL GIRT TO POST CONNECTION DETAIL
SCALE: NTS



7A COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL
SCALE: NTS



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

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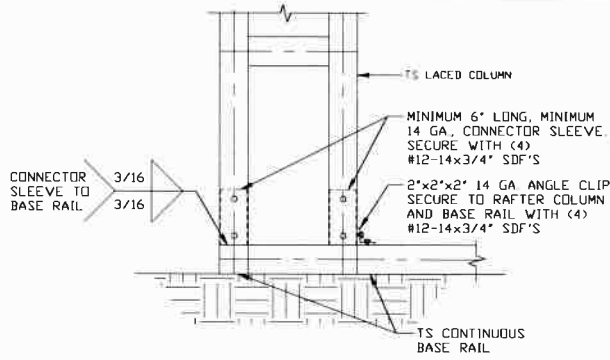
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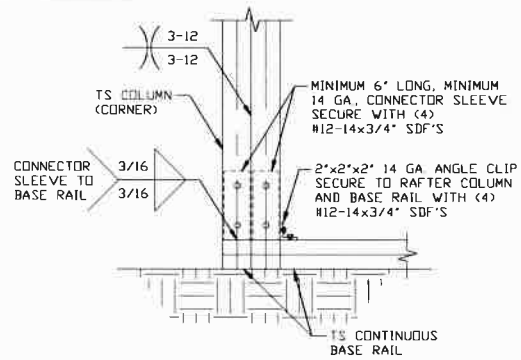
CONNECTION DETAILS



9

END COLUMN/BASE RAIL CONNECTION DETAIL

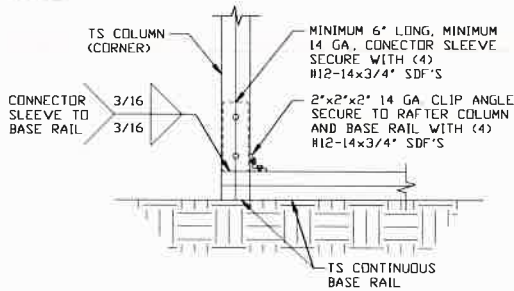
SCALE: NTS



9A

END COLUMN/BASE RAIL CONNECTION DETAIL

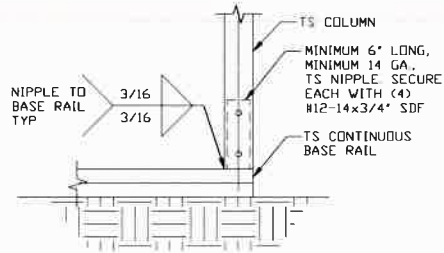
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9B

END COLUMN/BASE RAIL CONNECTION DETAIL

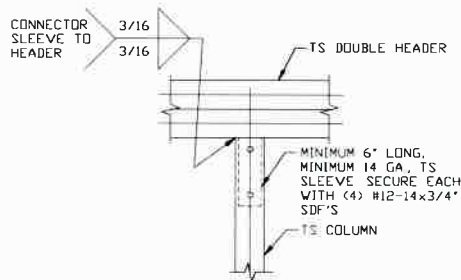
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10

COLUMN/BASE RAIL CONNECTION DETAIL

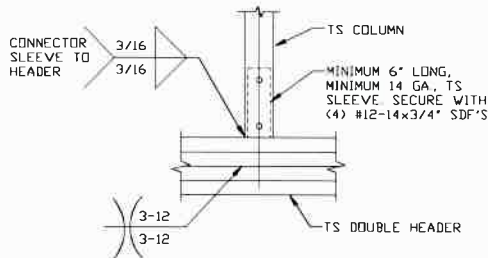
SCALE: NTS



11

DOUBLE HEADER/COLUMN CONNECTION DETAIL

SCALE: NTS



12

COLUMN/DOUBLE HEADER CONNECTION DETAIL

SCALE: NTS

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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: UNIVERSAL

UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 10

SCALE: NTS

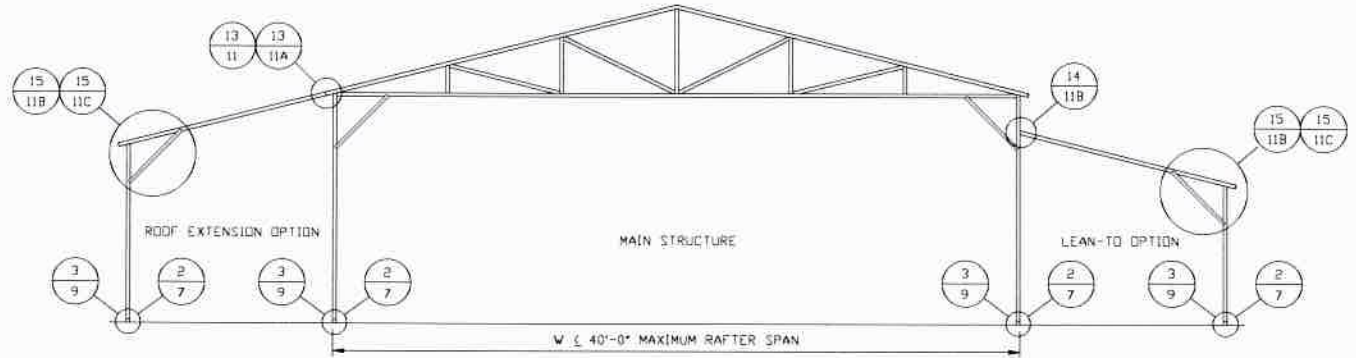
DWG. NO: SK-3

JOB NO: 201955

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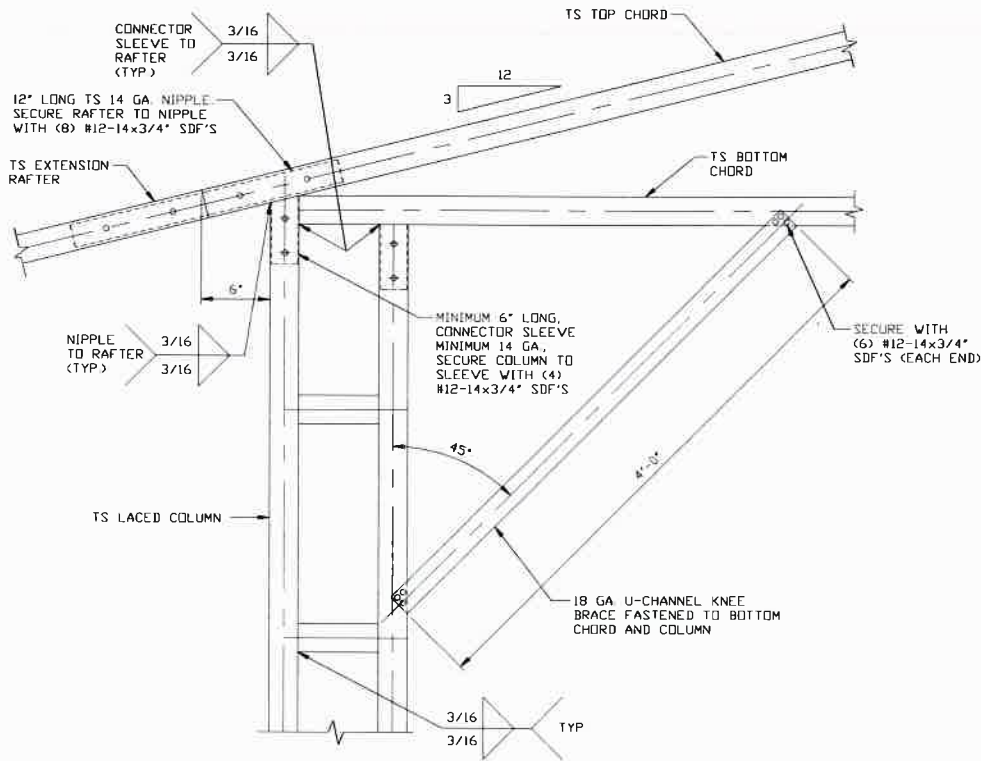
BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

MAXIMUM WIDTH OF SINGLE MEMBER ROOF EXTENSION AND LEAN-TO OPTION IS 12'-0".



SIDE EXTENSION RAFTER/ COLUMN DETAIL FOR HEIGHTS 16'-0" < TO <= 20'-0"

13

SCALE: NTS

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CLIENT: UNIVERSAL

UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 11

SCALE: NTS

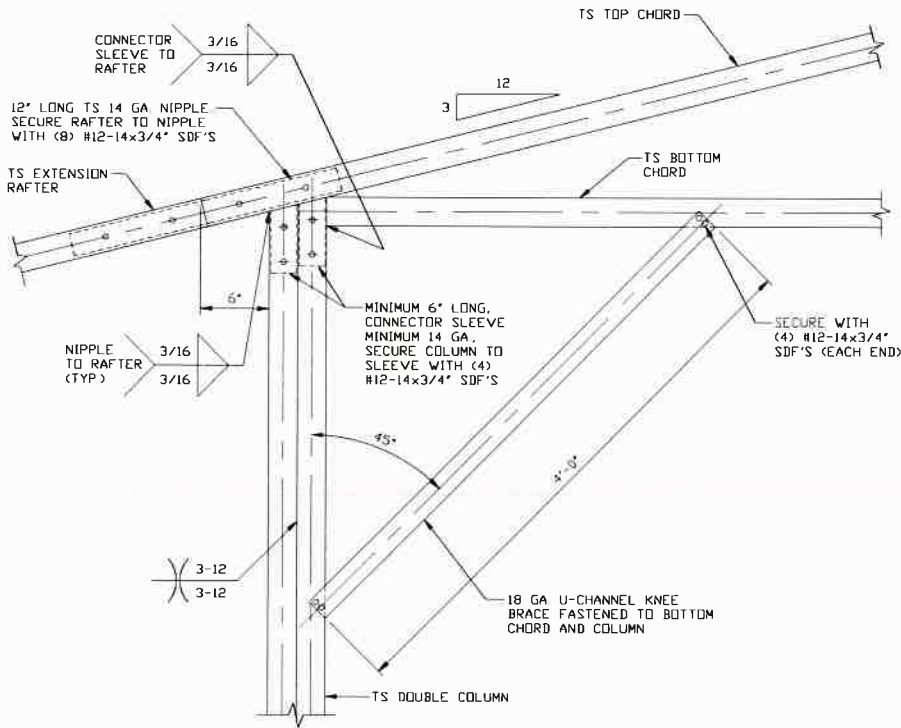
DWG. NO: SK-3

JOB NO: 20195S

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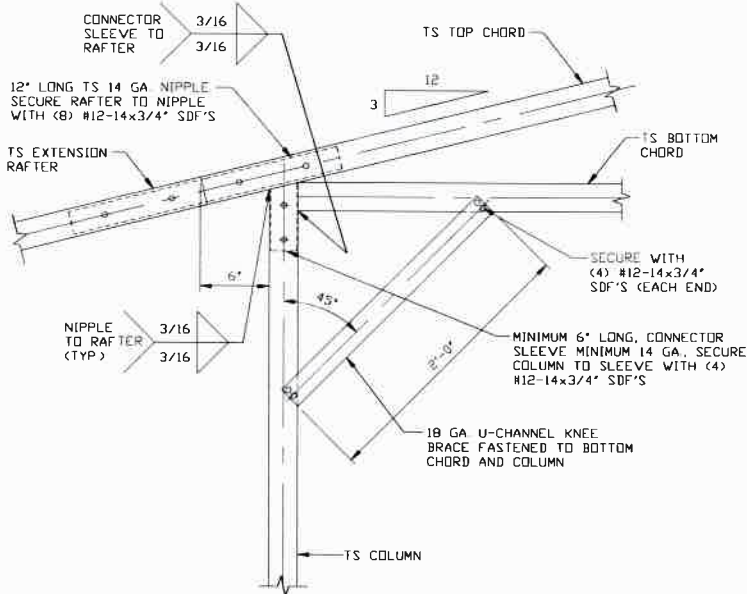
BOX EAVE RAFTER LEAN-TO OPTIONS



13A

**SIDE EXTENSION RAFTER/
COLUMN DETAIL FOR
HEIGHTS 10'-0" < TO <= 16'-0"**

SCALE: NTS



13B

**SIDE EXTENSION RAFTER/
COLUMN DETAIL FOR
HEIGHTS <= 10'-0"**

SCALE: NTS

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UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 11A

SCALE: NTS

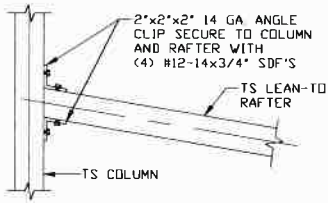
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JOB NO: 201955

REV: 0

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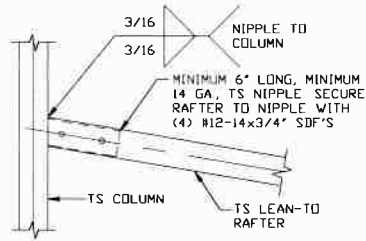
BOX EAVE RAFTER LEAN-TO OPTIONS



**LEAN-TO RAFTER TO
RAFTER POST
CONNECTION DETAIL
FOR WIDTHS $\le 12'-0''$**

14

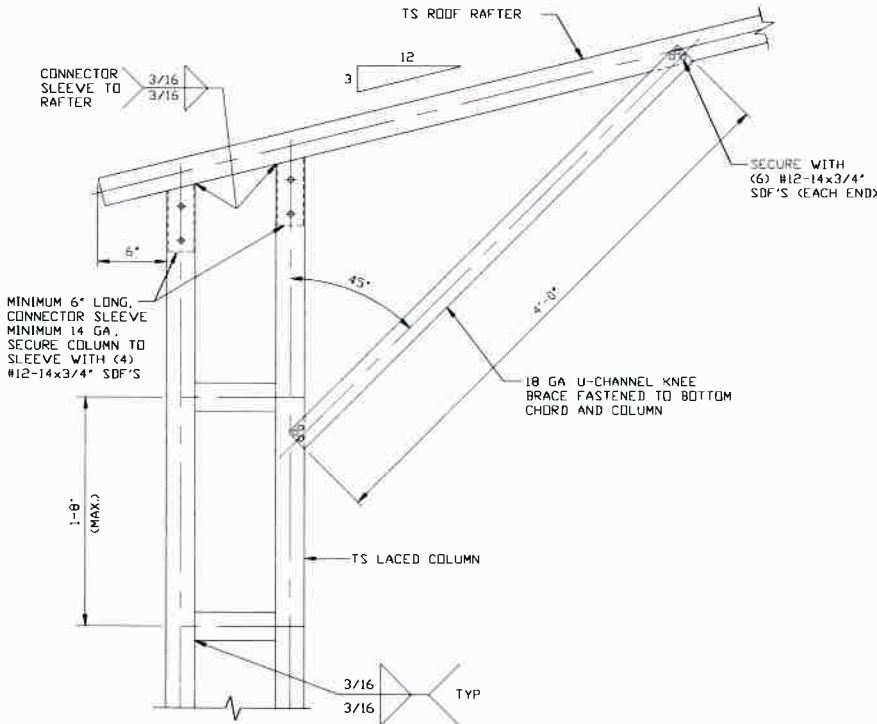
SCALE: NTS



**LEAN-TO RAFTER
TO RAFTER POST
CONNECTION DETAIL
FOR WIDTHS $\le 12'-0''$**

14A

SCALE: NTS



**ROOF EXTENSION RAFTER/
CORNER POST DETAIL FOR
HEIGHTS 16'-0 $< TO \le 17'-0''$**

15

SCALE: NTS

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PROJECT MGR: VSM

CLIENT: UNIVERSAL

UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 11B

SCALE: NTS

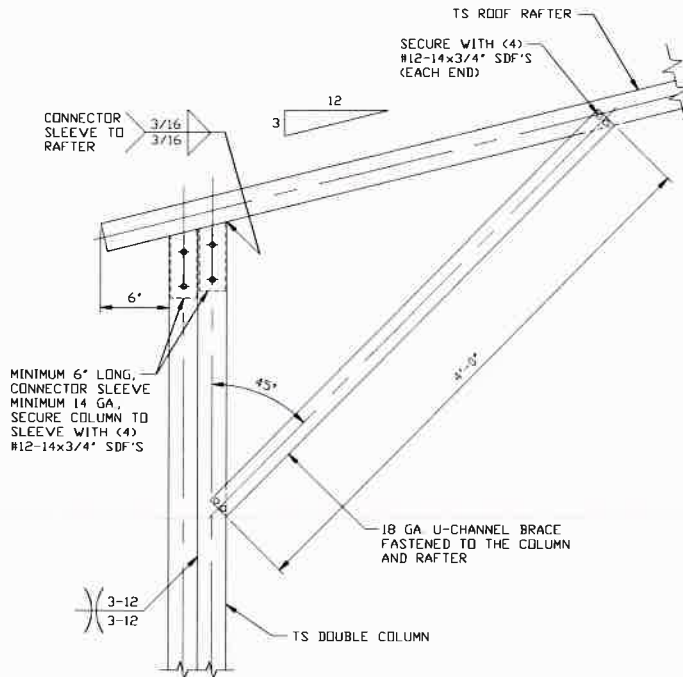
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JOB NO: 20195S

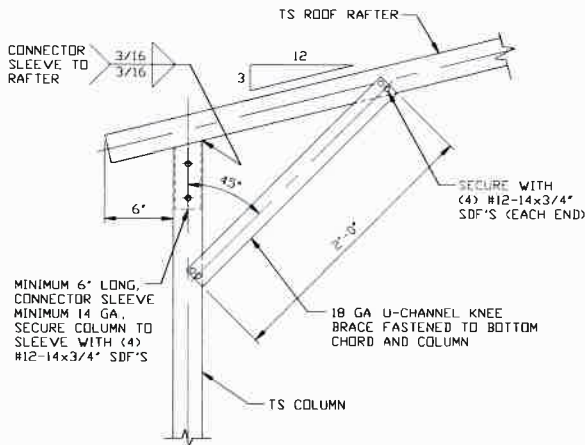
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BOX EAVE RAFTER LEAN-TO OPTIONS



15A
**ROOF EXTENSION RAFTER/
 CORNER POST DETAIL FOR
 HEIGHTS 10'-0" < TO ≤ 16'-0"**
 SCALE: NTS



15B
**ROOF EXTENSION RAFTER/
 CORNER POST DETAIL FOR
 HEIGHTS ≤ 10'-0"**
 SCALE: NTS

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**UNIVERSAL METAL BUILDINGS
 9283 US 601
 DOBSON, NC 27017
 40'-0"x20'-0" ENCLOSED STRUCTURE**

DATE: 9-24-20

SCALE: NTS

JOB NO: 20195S

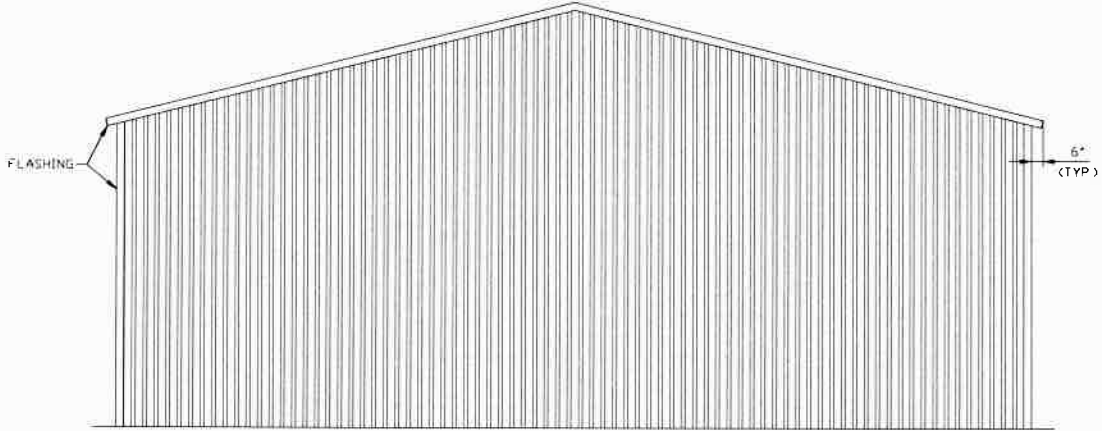
SHT. 11C

DWG. NO: SK-3

REV: 0

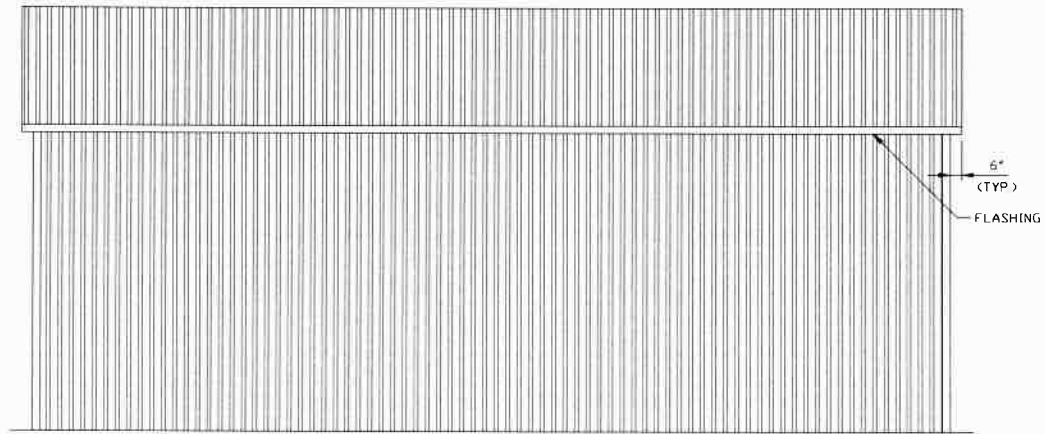
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BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL END ELEVATION VERTICAL ROOF/SIDING

SCALE: NTS



TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING

SCALE: NTS

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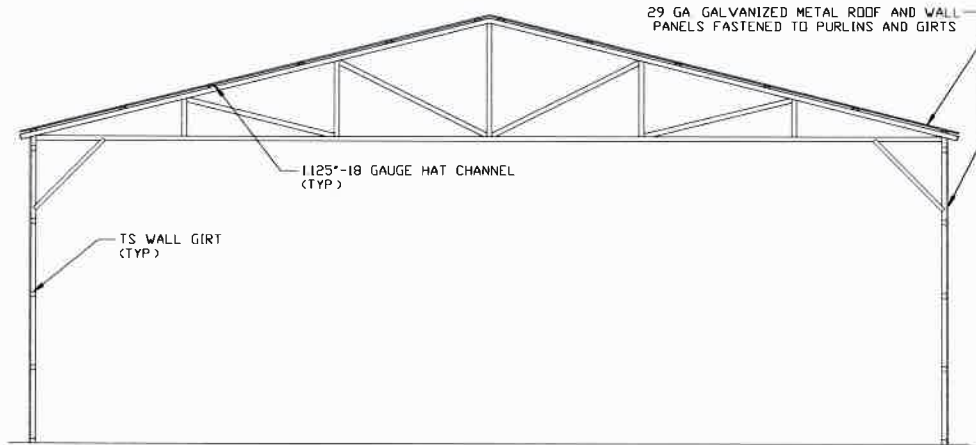
DRAWN BY: JG
CHECKED BY: PDH
PROJECT MGR: WSM
CLIENT: UNIVERSAL

UNIVERSAL METAL BUILDINGS
9283 US 601
DOBSON, NC 27017
40'-0"X20'-0" ENCLOSED STRUCTURE

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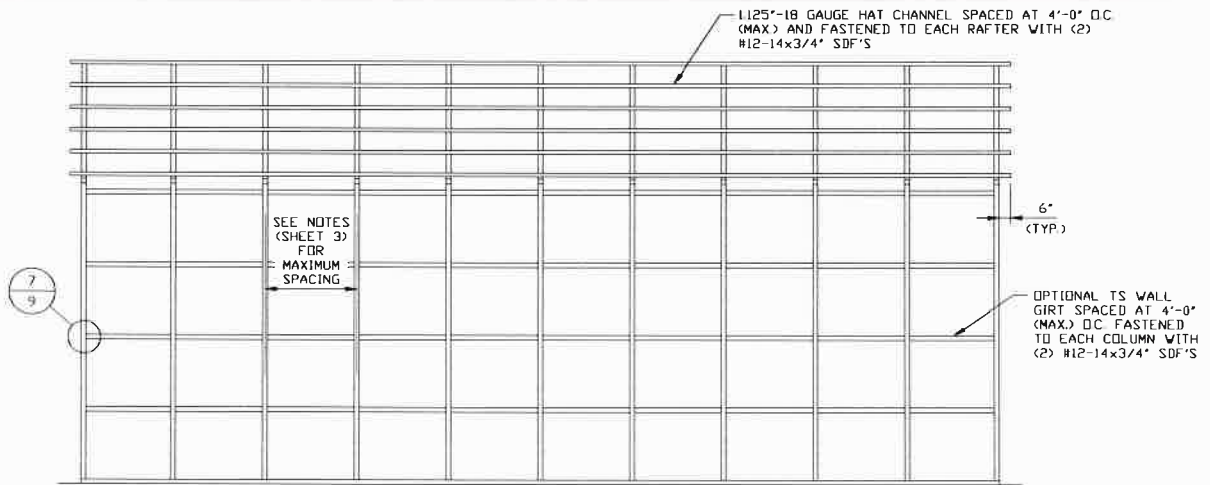
DATE: 9-24-20	SCALE: NTS	JOB NO: 20195S
SHT. 12	DWG. NO SK-3	REV: 0

BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



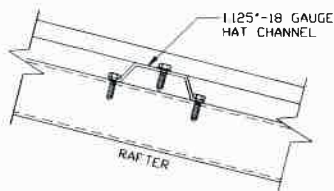
TYPICAL SECTION VERTICAL ROOF/SIDING OPTION

SCALE: NTS



TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION WITH TS GIRTS

SCALE: NTS



PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS)
SCALE: NTS

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UNIVERSAL METAL BUILDINGS
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40'-0"x20'-0" ENCLOSED STRUCTURE

DATE: 9-24-20

SHT. 13

SCALE: NTS

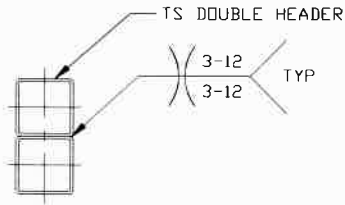
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JOB NO: 2019SS

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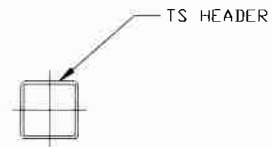
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END WALL HEADER OPTIONS



**HEADER DETAIL FOR
SPANS 12'-0" < TO ≤ 16'-0"**

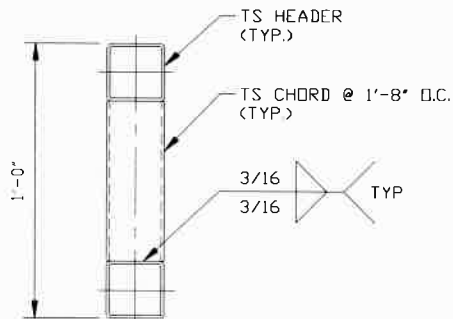
SCALE: NTS



**HEADER DETAIL FOR
SPANS ≤ 12'-0"**

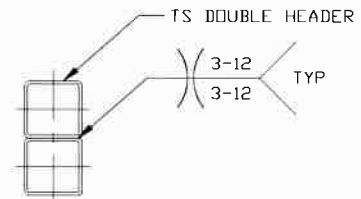
SCALE: NTS

SIDE WALL HEADER OPTIONS



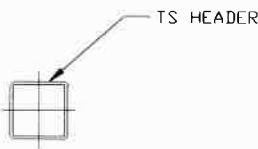
**HEADER DETAIL FOR
SPANS 10'-0" < TO ≤ 12'-0"**

SCALE: NTS



**HEADER DETAIL FOR
SPANS 6'-0" < TO ≤ 10'-0"**

SCALE: NTS



**HEADER DETAIL FOR
SPANS ≤ 6'-0"**

SCALE: NTS

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SHT. 14

SCALE: NTS

DWG. NO SK-3

JOB NO: 20195S

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