

Paul Wilson  
ORDERING Thursday  
910-514-2146



## STRUCTURAL DESIGN

### ENCLOSED BUILDING

**MAXIMUM 30'-0" WIDE X 16'-0" HEIGHT-  
BOX EAVE FRAME AND BOW FRAME**

24 January 2018  
Revision 0  
M&A Project No. 17275S

Prepared for:

Quality Commercial Structures  
P.O. Box 1448  
Pilot Mountain, NC 27041

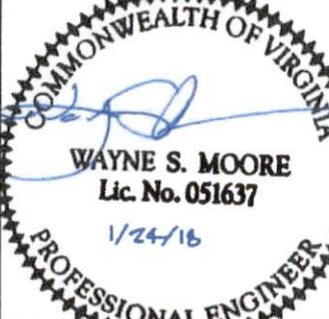
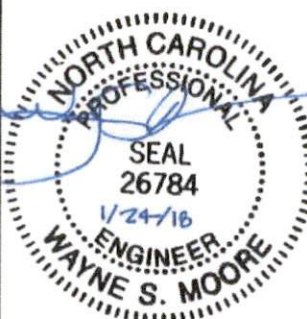
Prepared by:

Moore and Associates Engineering and Consulting, Inc.

1009 East Avenue  
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401 S. Main Street  
Mount Airy, NC 27030





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PILOT MOUNTAIN, NC 27041  
30'x16' ENCLOSED BUILDING

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PROJECT MGR: WSM  
CLIENT: QUALITY/A PLUS

DATE: 1-24-18  
SCALE: NTS  
JOB NO: 17275S  
SHT. 1  
DWG. NO: SK-3  
REV: 0


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**DATE: 1-24-18**  
**SHT. 1A**

**SCALE: NTS**  
**DWG. NO: SK-3**  
**JOB NO: 1727SS**  
**REV: 0**

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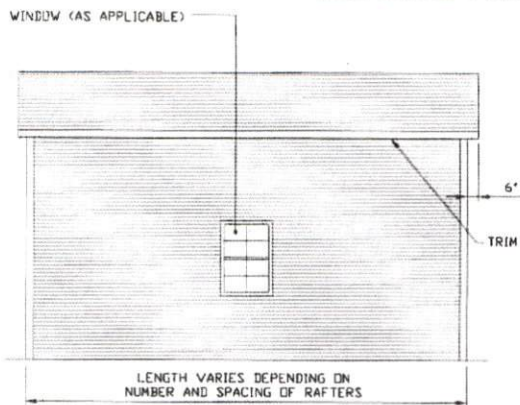
## INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR MAXIMUM 30'-0" WIDE x 16'-0" EAVE HEIGHT ENCLOSED STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2012 NORTH CAROLINA BUILDING CODE, 2009 INTERNATIONAL BUILDING CODE (IBC), 2012 IBC, AND THE 2015 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
  - A) DEAD LOAD = 1.5 PSF
  - B) LIVE LOAD = 12 PSF
  - C) GROUND SNOW LOAD = 35 PSF (GROUND SNOW LOAD = 45 PSF FOR RAFTER/POST SPACING = 4.0 FEET.)  
= 30 PSF WITH U-CHANNEL PEAK BRACE (W < 24'-0")
4. 3-SECOND GUST ULTIMATE WIND SPEED ( $V_{ULT}$ ) 105 TO 145 MPH (NOMINAL WIND SPEED 81 TO 112 MPH).
5. MAXIMUM RAFTER/POST AND END POST SPACING = 50 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 (UNLESS NOTED OTHERWISE.)
9. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 10" O.C. (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 SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6' OF EACH RAFTER COLUMN ALONG SIDES.
12. GROUND ANCHORS CONSIST OF #4 REBAR W/ WELDED NUT x 36" LONG IN SUITABLE SOIL CONDITIONS OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED.
13. WIND FORCES GOVERN OVER SEISMIC FORCES SEISMIC PARAMETERS ANALYZED ARE:  
SOIL SITE CLASS = D  
RISK CATEGORY I/II/III  

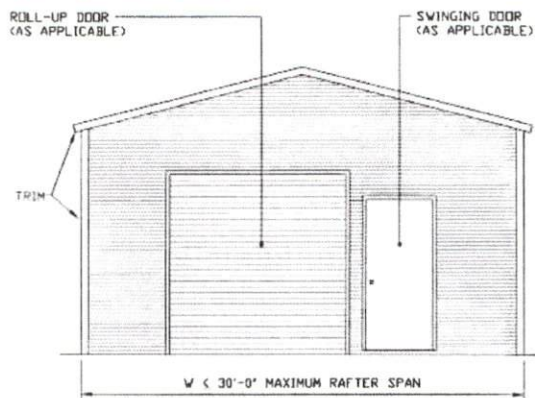
R= 3.25	I <sub>E</sub> = 1.0
S <sub>DS</sub> = 1.522	V= C <sub>S</sub> W
S <sub>DI</sub> = 0.839	

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### BOX EAVE FRAME RAFTER STRUCTURE

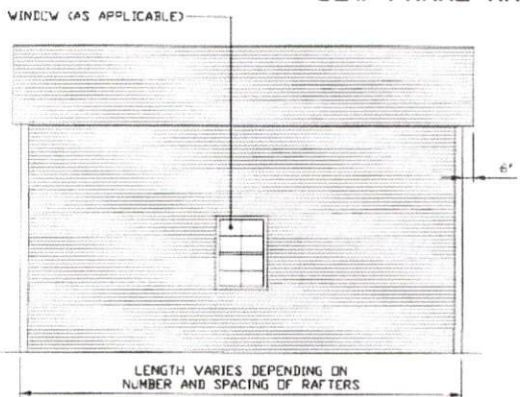


**TYPICAL SIDE ELEVATION**  
SCALE: NTS

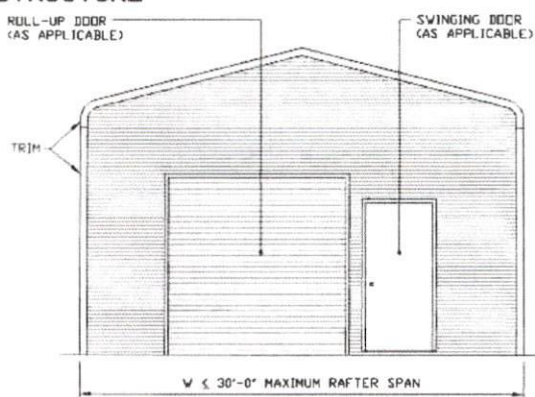


**TYPICAL END ELEVATION**  
SCALE: NTS

### BOX FRAME RAFTER STRUCTURE



**TYPICAL SIDE ELEVATION**  
SCALE: NTS



**TYPICAL END ELEVATION**  
SCALE: NTS

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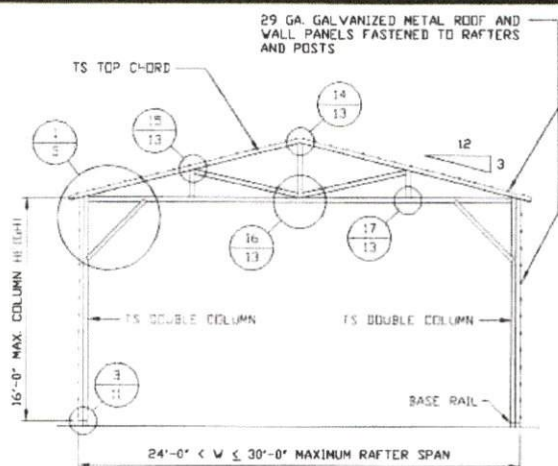
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**SHT. 3A**

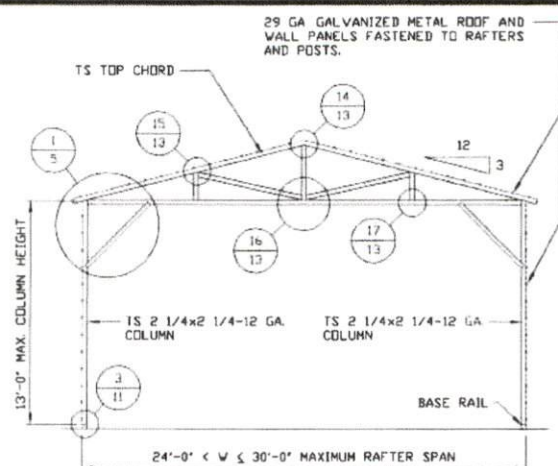
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**REV: 0**

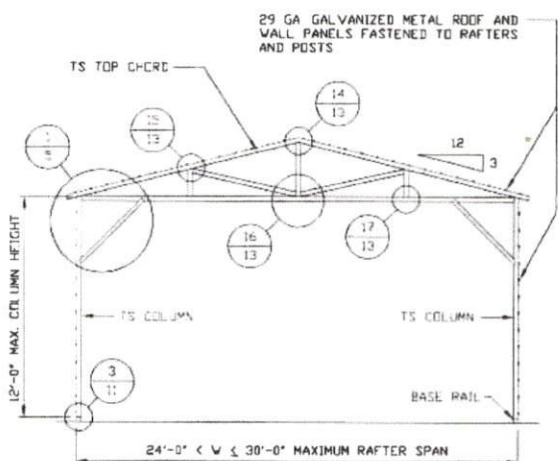
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS

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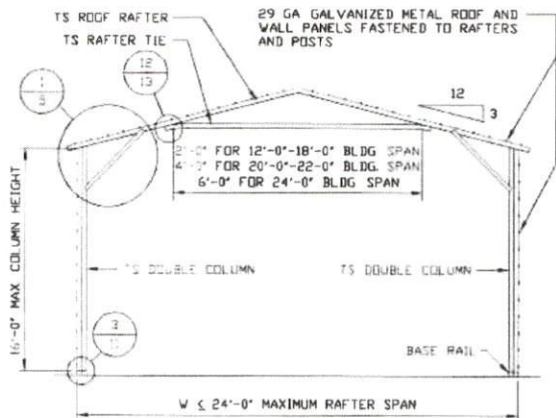
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SHT. 4

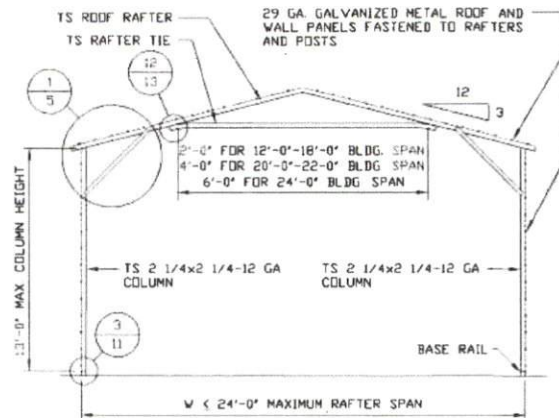
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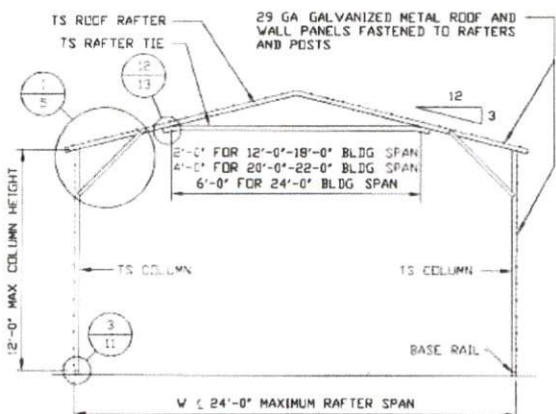
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
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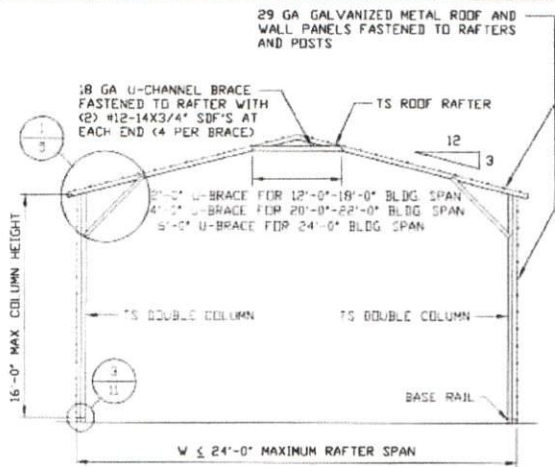
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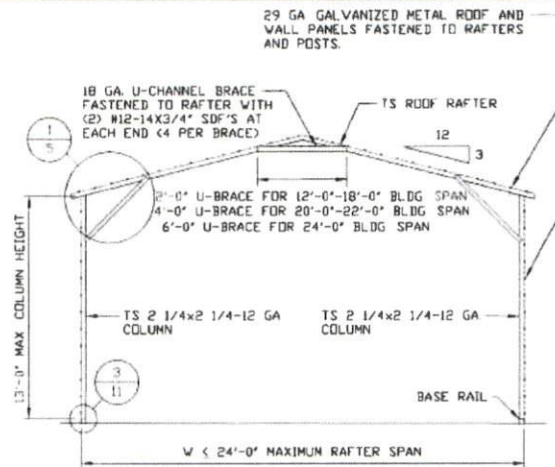
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<b>CLIENT: QUALITY/A PLUS</b>	<b>SHT. 4A</b>	<b>DWG. NO: SK-3</b>	<b>REV: 0</b>

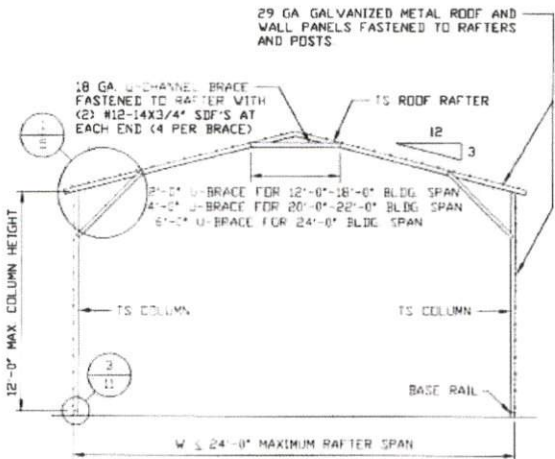




**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
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**TYPICAL RAFTER/COLUMN END FRAME SECTION**  
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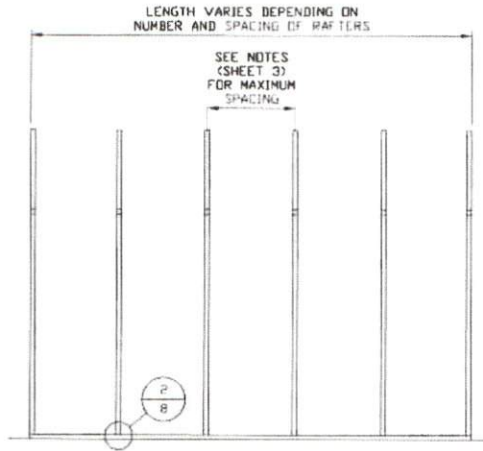
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SHT. 4B

DWG. NO: SK-3

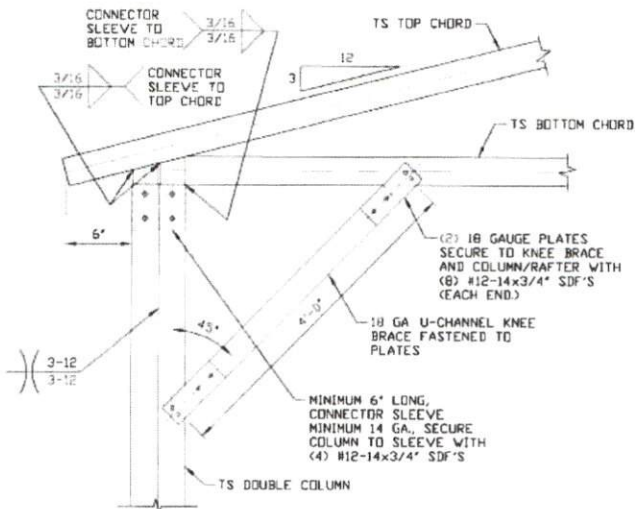
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**TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION**  
SCALE: NTS

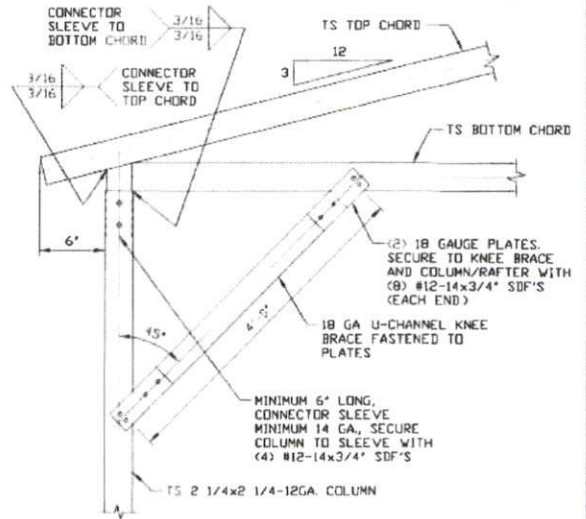
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	<b>CLIENT:</b> QUALITY/A PLUS	<b>SHT.</b> 4C	<b>DWG. NO:</b> SK-3	<b>REV:</b> 0



**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 13'-0" < TO ≤ 16'-0"**

1A

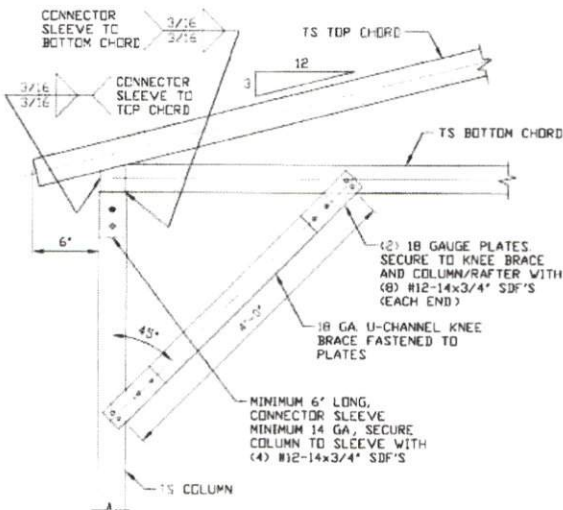
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**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 12'-0" < TO ≤ 13'-0"**

1B

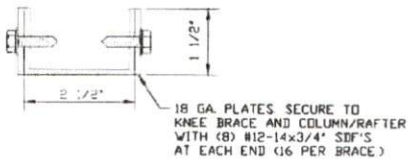
SCALE: NTS



**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO ≤ 12'-0"**

1C

SCALE: NTS



**BRACE SECTION**

SCALE: NTS

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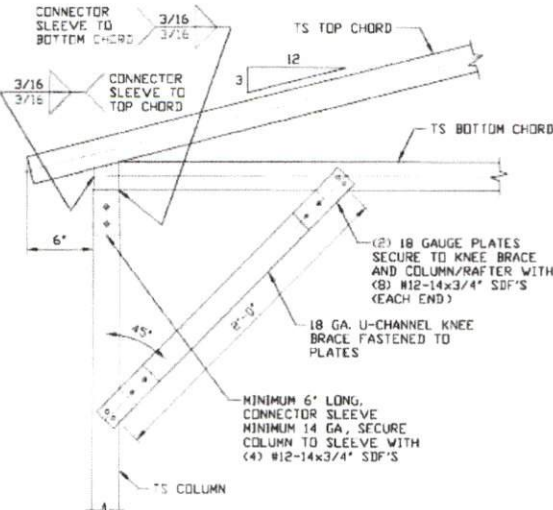
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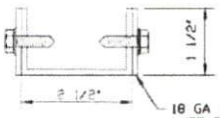
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**BOX EAVE RAFTER COLUMN  
CONNECTION DETAIL FOR  
HEIGHTS ≤ 10'-0"**

1D

SCALE: NTS



18 GA PLATES SECURE TO  
KNEE BRACE AND COLUMN/RAFTER  
WITH (8) #12-14x3/4" SDF'S  
AT EACH END (16 PER BRACE)

**BRACE SECTION**

SCALE: NTS

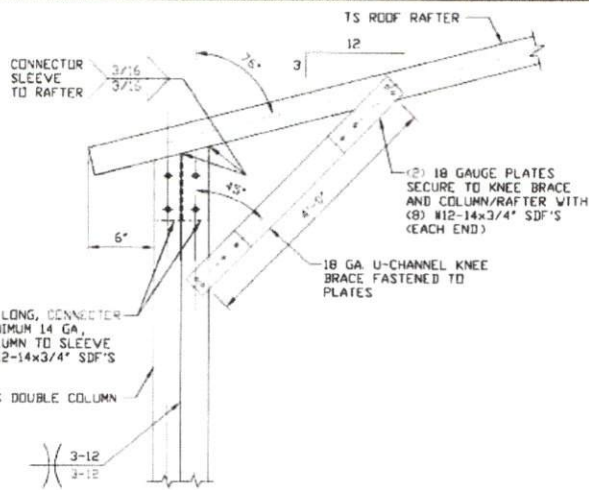
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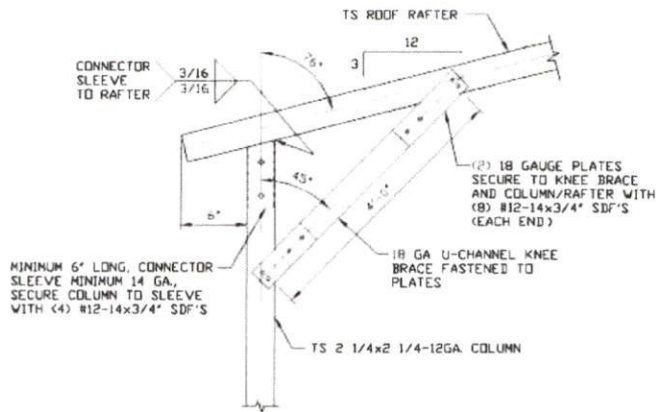
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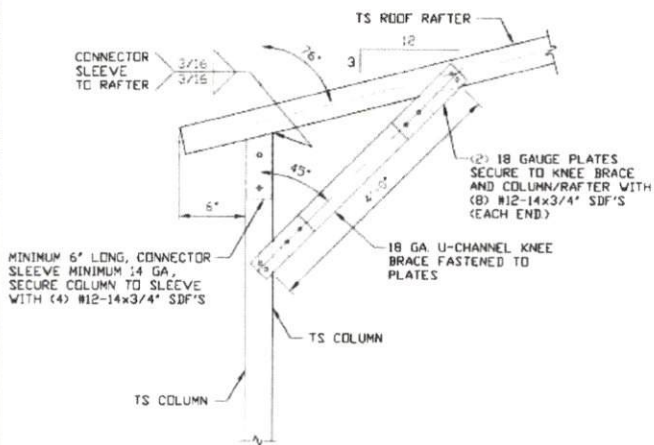
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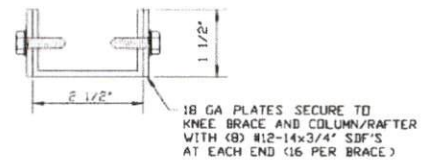
**1E** BOX EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 13'-0" < TO ≤ 16'-0"  
 SCALE: NTS



**1F** BOX EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 12'-0" < TO ≤ 13'-0"  
 SCALE: NTS



**1G** BOX EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 10'-0" < TO ≤ 12'-0"  
 SCALE: NTS



**BRACE SECTION**  
 SCALE: NTS

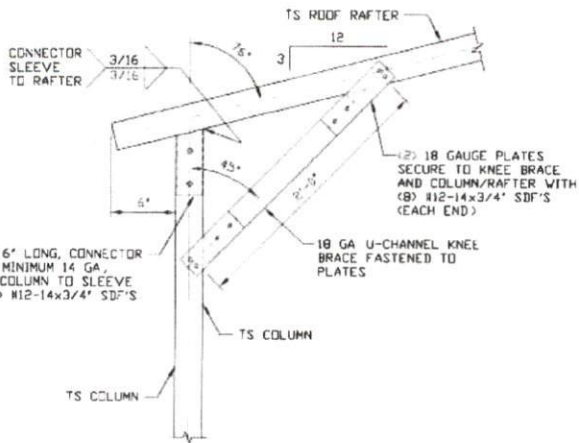
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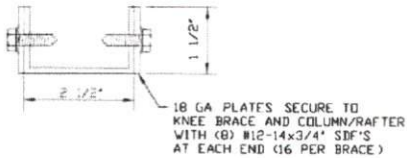
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**BOX EAVE RAFTER COLUMN CONNECTION  
DETAIL FOR HEIGHTS ≤ 10'-0"**

1H

SCALE: NTS



**BRACE SECTION**

SCALE: NTS

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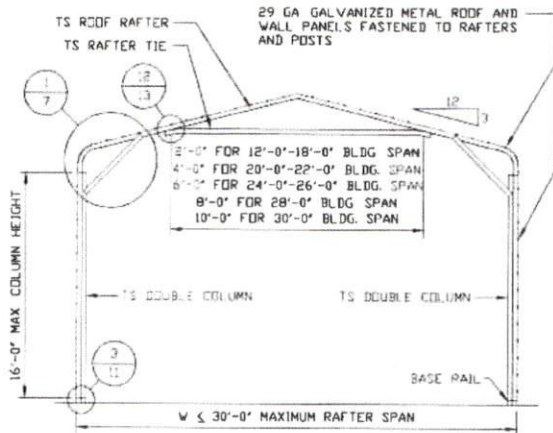
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SHT. 5C

DWG. NO: SK-3

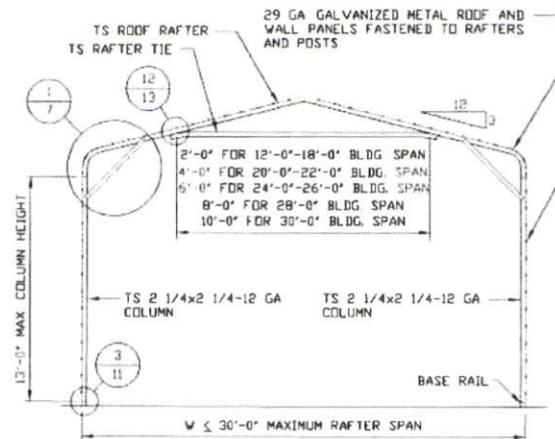
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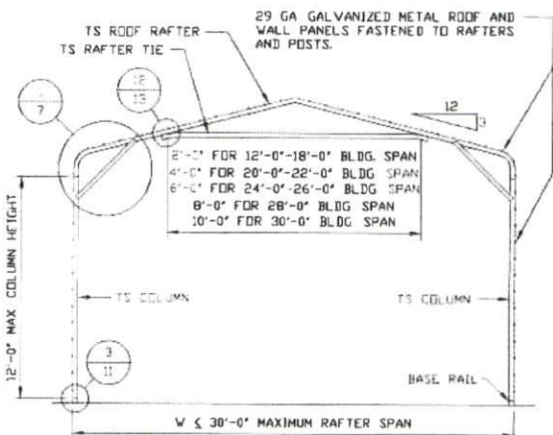
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SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS

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PILOT MOUNTAIN, NC 27041  
30'x16' ENCLOSED BUILDING

DATE: 1-24-18

SCALE: NTS

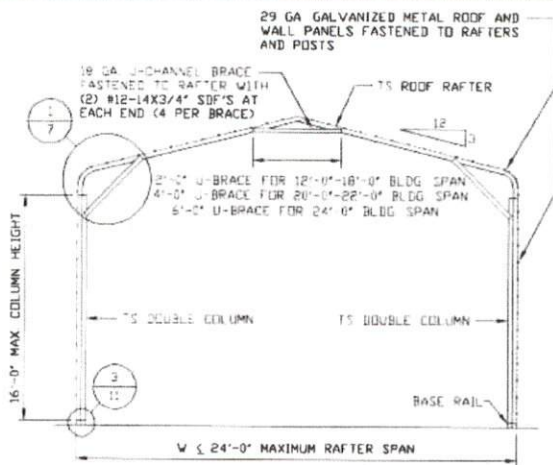
JOB NO: 1727SS

SHT. 6

DWG. NO: SK-3

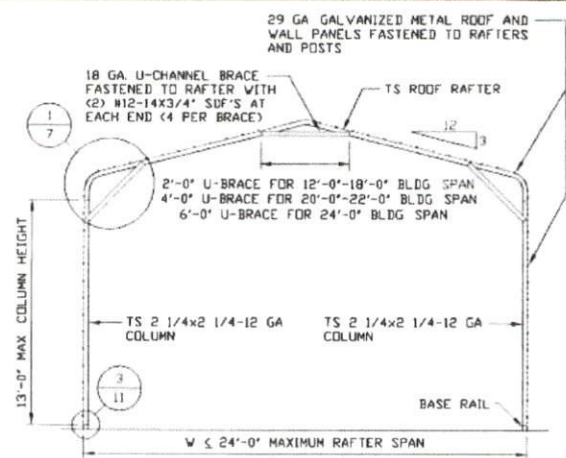
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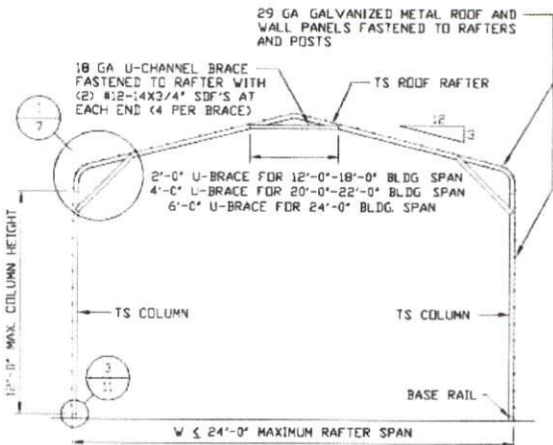
**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS



**TYPICAL RAFTER/COLUMN END FRAME SECTION**

SCALE: NTS

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JOB NO: 17273S

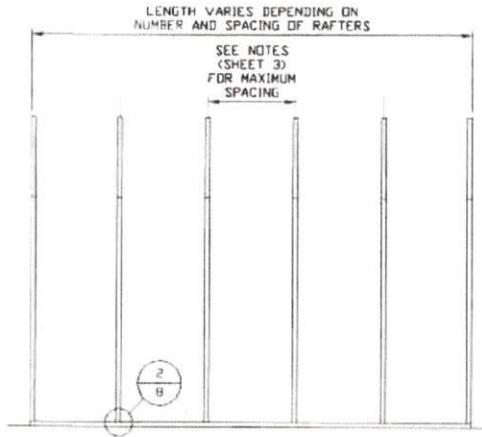
SHT. 6A

DWG. NO: SK-3

REV: 0

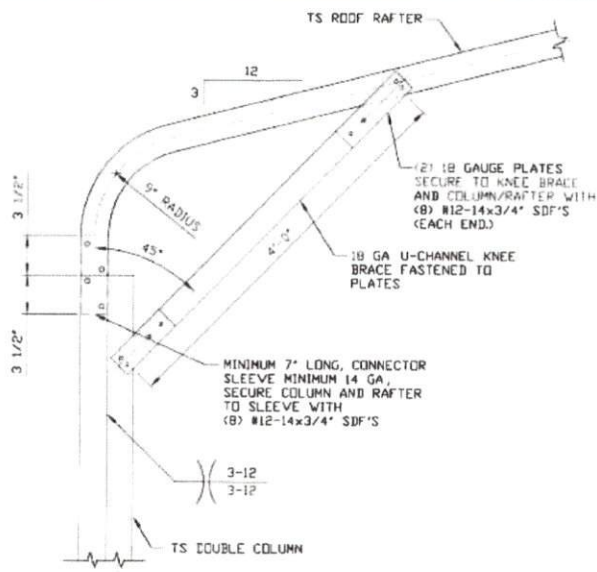
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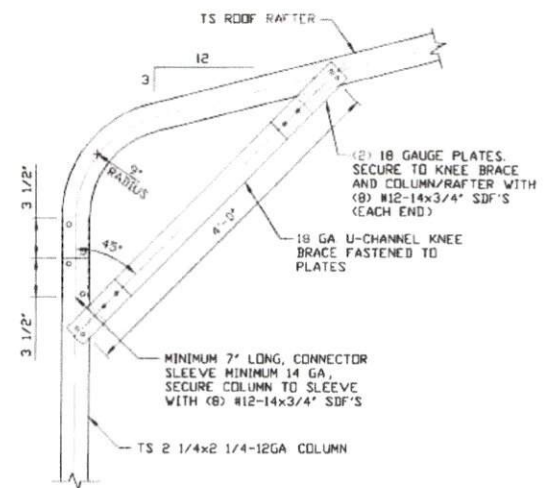


**TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION**  
SCALE: NTS

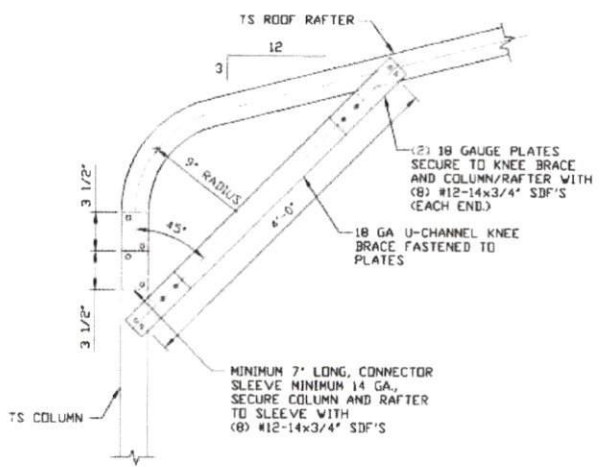
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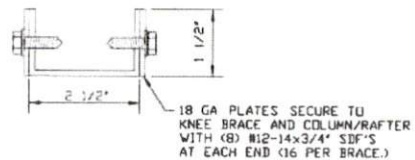
**1A** BOW EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 13'-0" < TO ≤ 16'-0"  
 SCALE: NTS



**1B** BOW EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 12'-0" < TO ≤ 13'-0"  
 SCALE: NTS



**1C** BOW EAVE RAFTER COLUMN CONNECTION  
 DETAIL FOR HEIGHTS 10'-0" < TO ≤ 12'-0"  
 SCALE: NTS



**BRACE SECTION**  
 SCALE: NTS

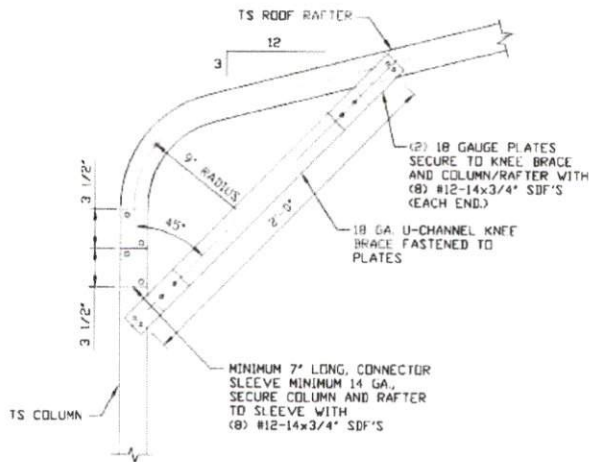
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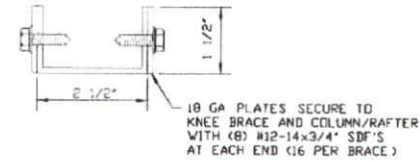
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**CLIENT: QUALITY/A PLUS**    **SHT. 7**    **DWG. NO: SK-3**    **REV: 0**



**BOW EAVE RAFTER COLUMN CONNECTION  
DETAIL FOR HEIGHTS  $\leq 10'-0"$**

1D

SCALE: NTS



**BRACE SECTION**

SCALE: NTS

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JOB NO: 1727SS

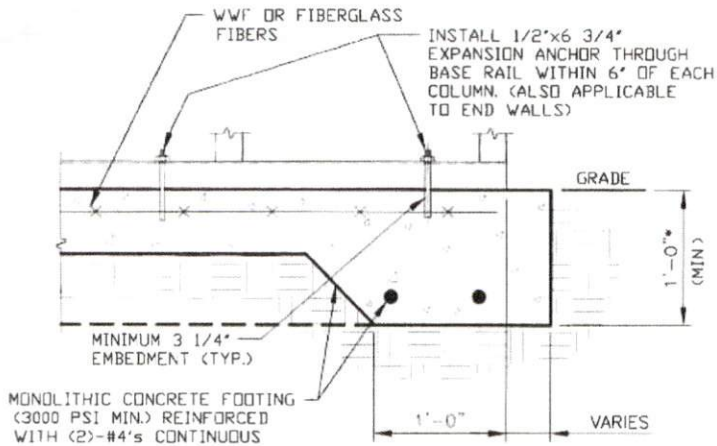
SHT. 7A

DWG. NO: SK-3

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## BASE RAIL ANCHORAGE OPTIONS

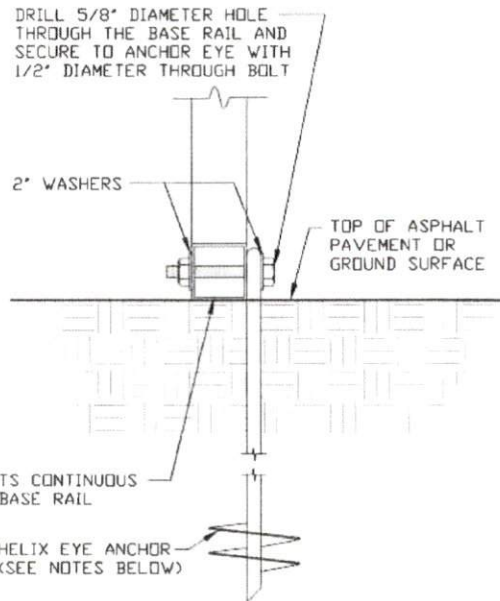


2A

### 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 FOOTING DEPTH.



2B

### 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" 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 LOSE 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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SCALE: NTS

JOB NO: 17279S

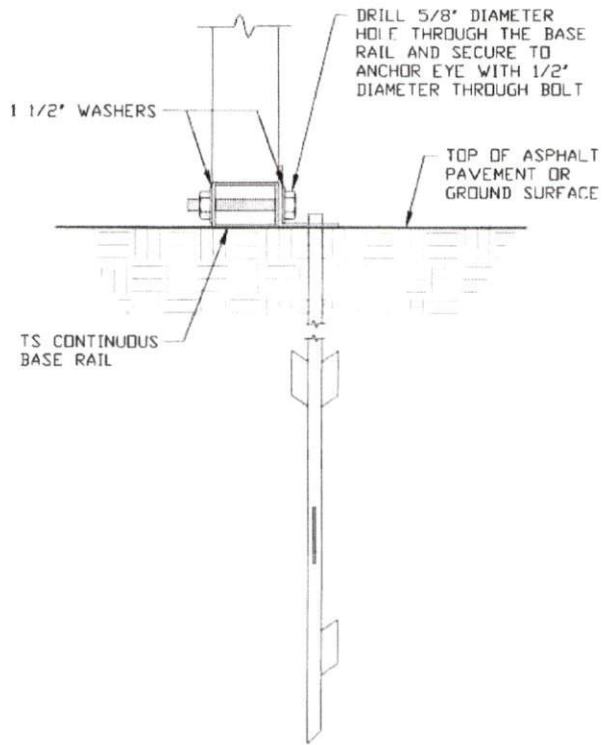
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DWG. NO: SK-3

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## BASE RAIL ANCHORAGE OPTIONS



2C

**ASPHALT BASE ANCHORAGE**  
 SCALE: NTS

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**SCALE: NTS**

**JOB NO: 17279S**

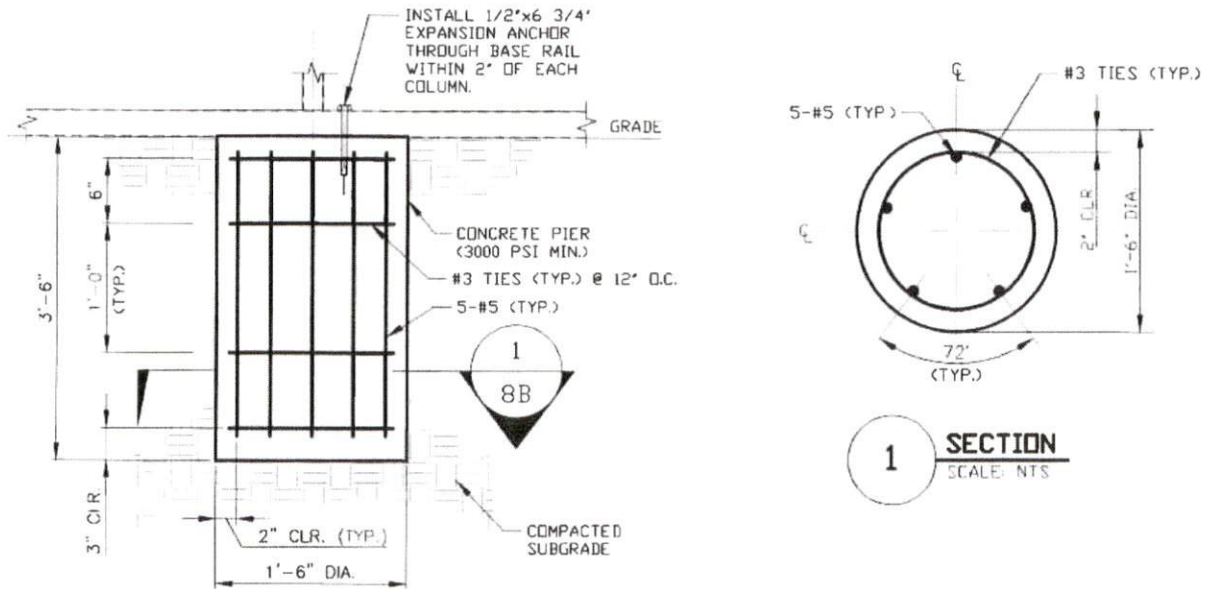
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**DWG. NO: SK-3**

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## BASE RAIL ANCHORAGE OPTIONS



2D

### DRILLED CONCRETE PIER BASE RAIL ANCHORAGE

SCALE: NTS

(NOTE: MIN. ANCHOR EDGE DISTANCE IS 4")

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JOB NO: 17279S

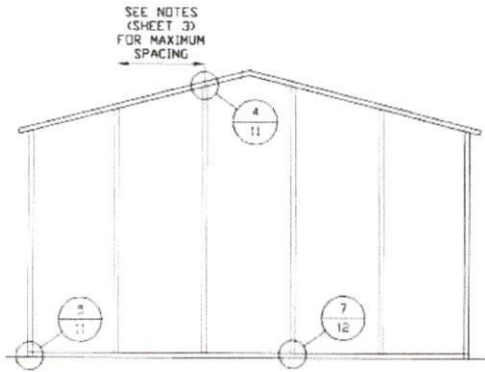
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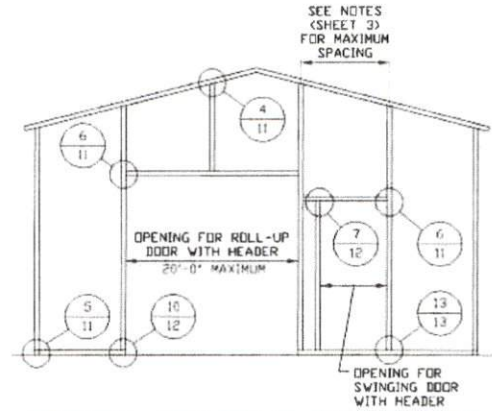
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## BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



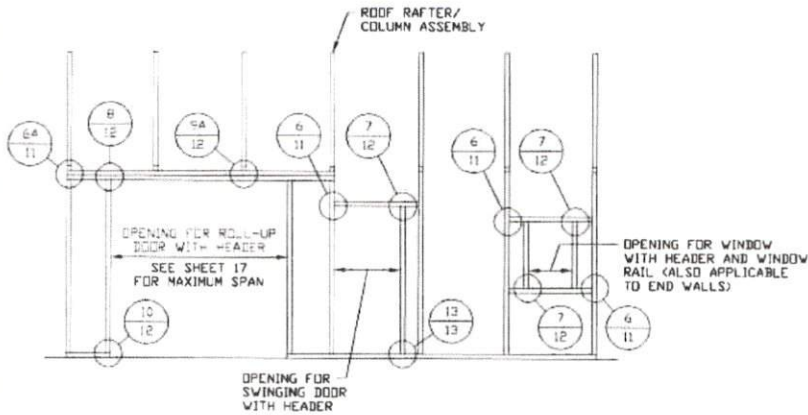
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END WALL FRAMING SECTION**

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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**SCALE: NTS**

**JOB NO. 17279S**

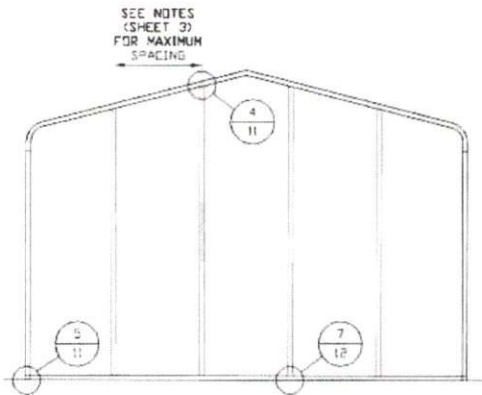
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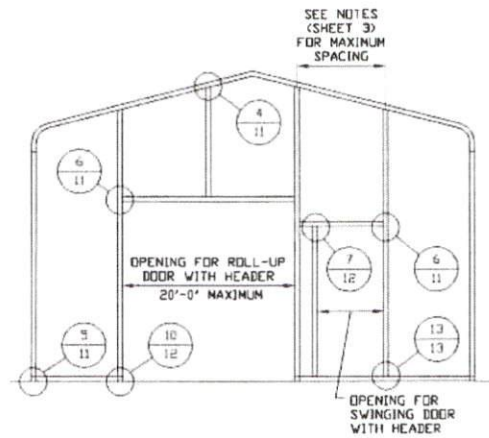
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## BOW RAFTER END WALL AND SIDE WALL OPENINGS



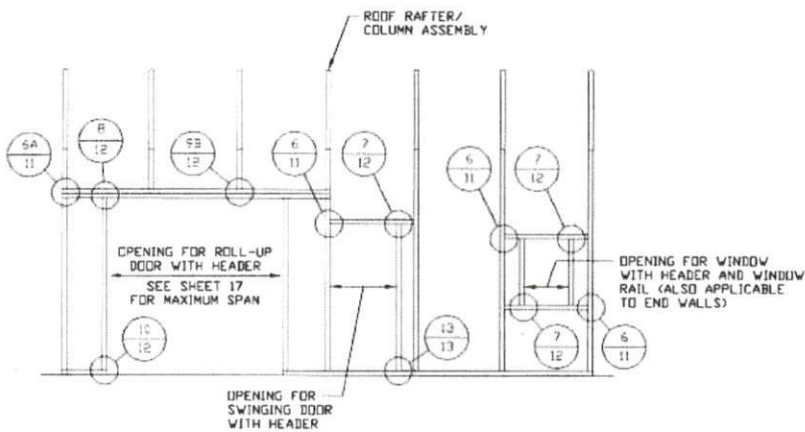
**TYPICAL BOW RAFTER  
END WALL FRAMING SECTION**

SCALE: NTS



**TYPICAL BOW RAFTER END  
WALL OPENINGS FRAMING SECTION**

SCALE: NTS



**TYPICAL BOW RAFTER SIDE  
WALL OPENINGS FRAMING SECTION**

SCALE: NTS

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**SCALE: NTS**

**JOB NO: 172755**

**SHT. 10**

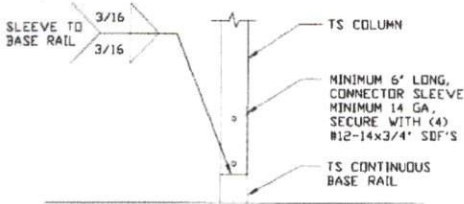
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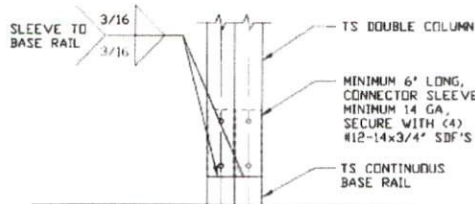
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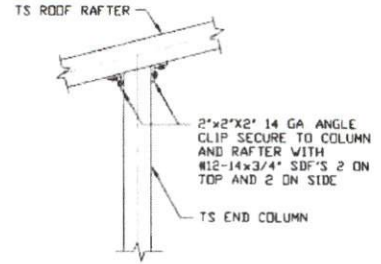
## CONNECTION DETAILS



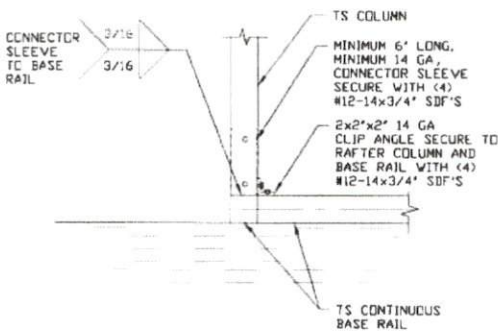
**3** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



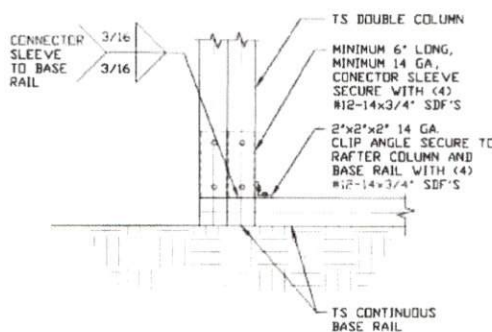
**3A** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



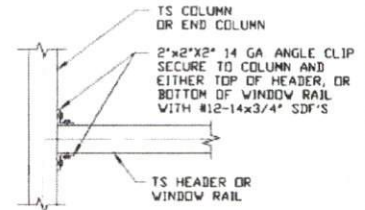
**4** END COLUMN/RAFTER CONNECTION DETAIL  
SCALE: NTS



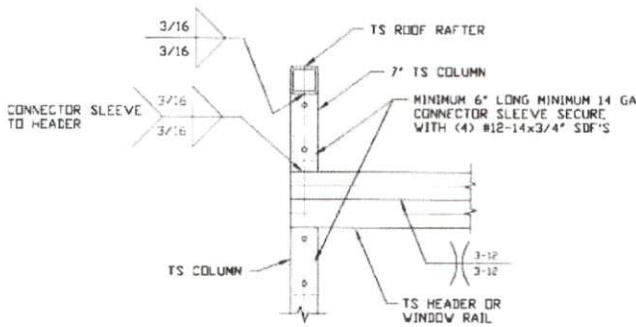
**5** END COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



**5A** END COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



**6** COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL  
SCALE: NTS



**6A** COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL  
SCALE: NTS

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SCALE: NTS

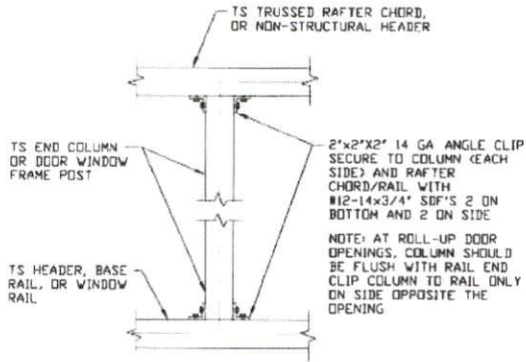
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JOB NO: 17279S

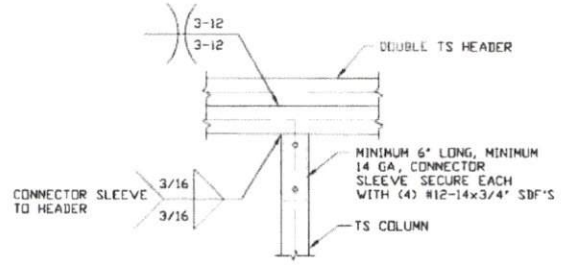
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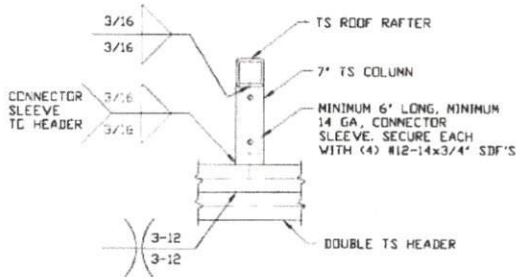
## CONNECTION DETAILS



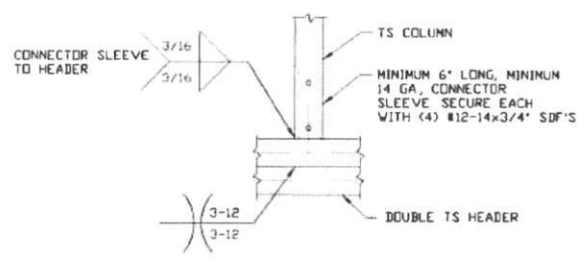
**7** COLUMN TO WINDOW RAIL CONNECTION DETAIL  
SCALE: NTS



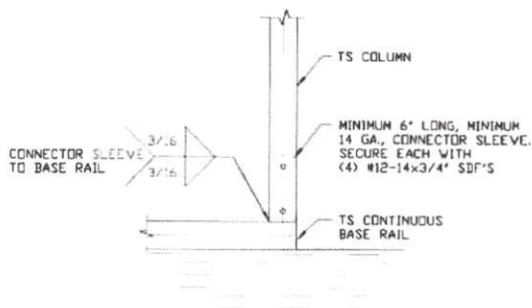
**8** DOUBLE HEADER/COLUMN CONNECTION DETAIL  
SCALE: NTS



**9A** COLUMN/DOUBLE HEADER CONNECTION DETAIL  
SCALE: NTS



**9B** COLUMN/DOUBLE HEADER CONNECTION DETAIL  
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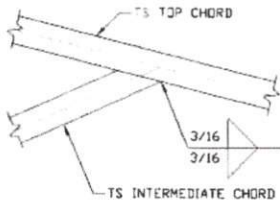


**10** COLUMN/BASE RAIL CONNECTION DETAIL  
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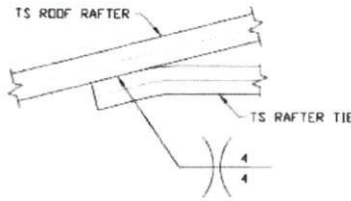
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	CHECKED BY: PDH			
PROJECT MGR: WSM	DATE: 1-24-18	SCALE: NTS	JOB NO: 1727SS	
CLIENT: QUALITY/A PLUS	SHT. 12	DWG. NO: SK-3	REV. 0	

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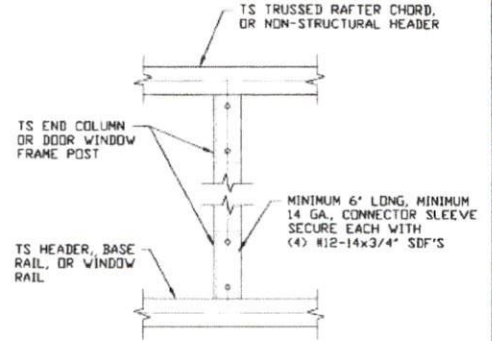
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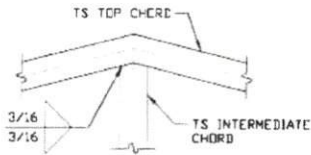
**11** TOP CHORD TO INTERMEDIATE CHORD CONNECTION DETAIL  
SCALE: NTS



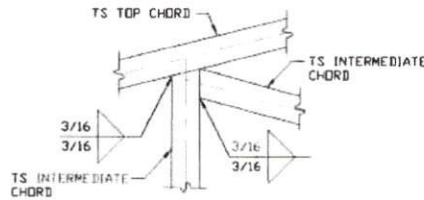
**12** RAFTER TIE CONNECTION DETAIL  
SCALE: NTS



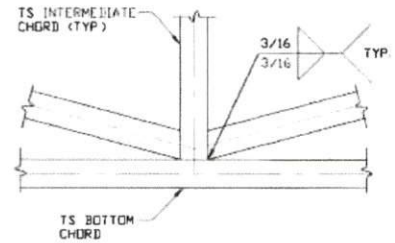
**13** COLUMN TO HEADER OR BASE RAIL CONNECTION DETAIL  
SCALE: NTS



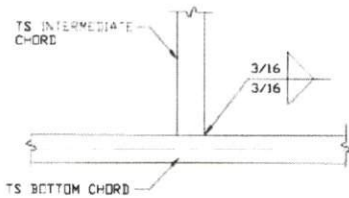
**14** TOP CHORD TO INTERMEDIATE CHORD CONNECTION DETAIL  
SCALE: NTS



**15** TOP CHORD TO INTERMEDIATE CHORD CONNECTION DETAIL  
SCALE: NTS



**16** BOTTOM CHORD TO INTERMEDIATE CHORD CONNECTION DETAIL  
SCALE: NTS



**17** BOTTOM CHORD TO CHORD CONNECTION DETAIL  
SCALE: NTS

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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: QUALITY/A PLUS

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30'x16' ENCLOSED BUILDING

DATE: 1-24-19

SCALE: NTS

JOB NO: 17275S

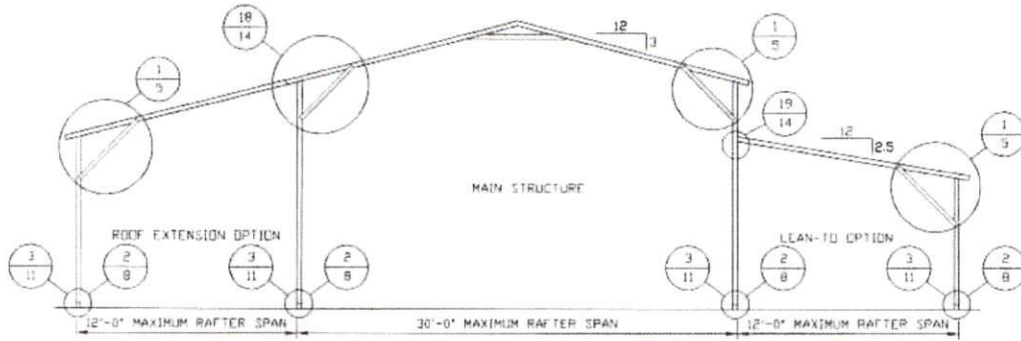
SHT. 13

DWG. NO: SK-3

REV: 0

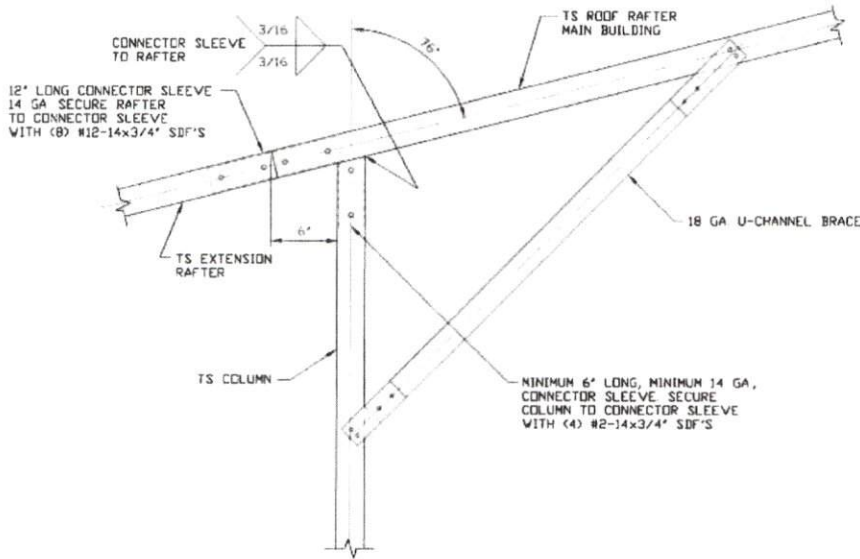
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## BOX EAVE RAFTER LEAN-TO OPTION



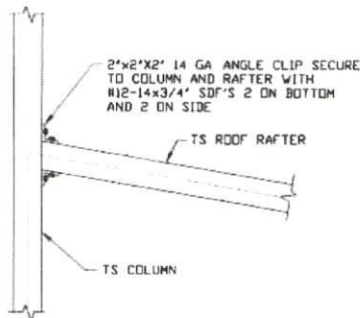
**TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)**

SCALE: NTS



**18 SIDE EXTENSION RAFTER/COLUMN DETAIL**

SCALE: NTS



**19 LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL**

SCALE: NTS

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DATE: 1-24-18

SCALE: NTS

JOB NO: 17279S

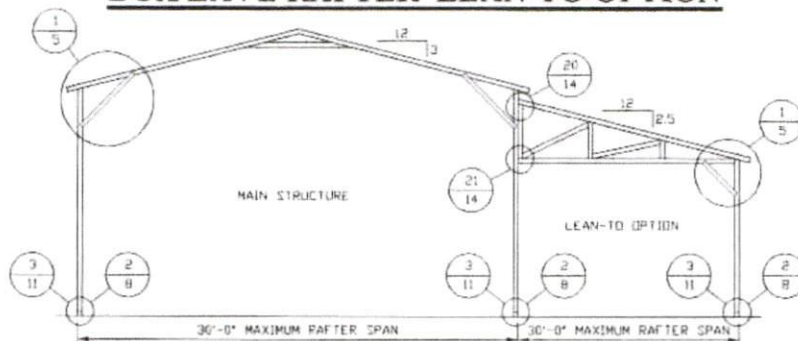
SHT. 14

DWG. NO: SK-3

REV: 0

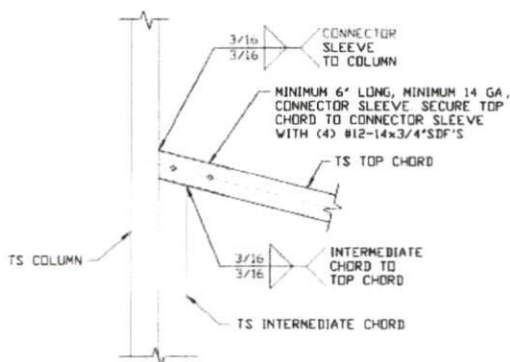
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## BOX EAVE RAFTER LEAN-TO OPTION



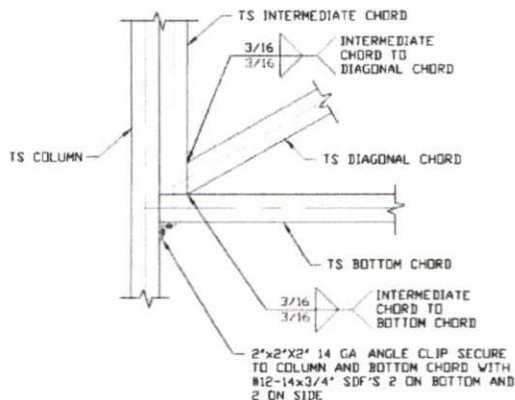
### TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION

SCALE: NTS



#### 20 LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS



#### 21 LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS

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SCALE: NTS

JOB NO: 172755

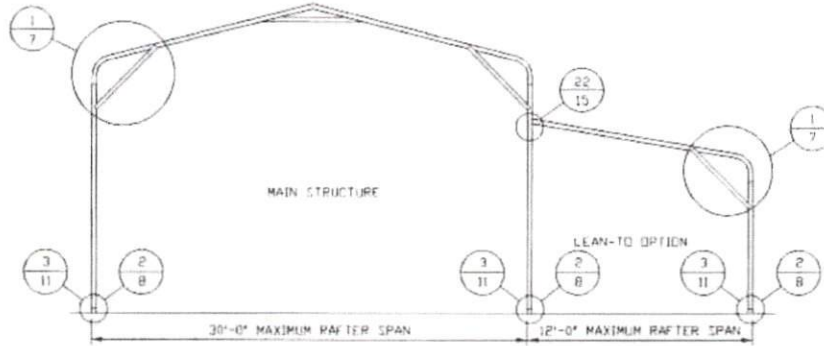
SHT. 14A

DWG. NO: SK-3

REV: 0

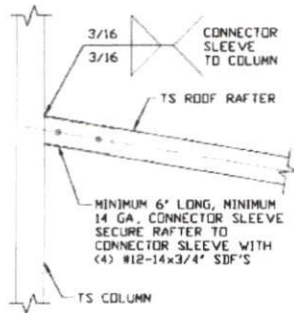
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## BOW EAVE RAFTER LEAN-TO OPTION



**TYPICAL BOW RAFTER LEAN-TO OPTION FRAMING SECTION**

SCALE: NTS



**LEAN-TO RAFTER TO RAFTER  
COLUMN CONNECTION DETAIL**

22

SCALE: NTS

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**DATE: 1-24-18**

**SCALE: NTS**

**JOB NO: 17275S**

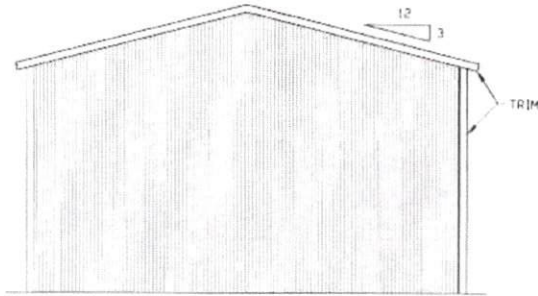
**SHT. 15**

**DWG. NO: SK-3**

**REV: 0**

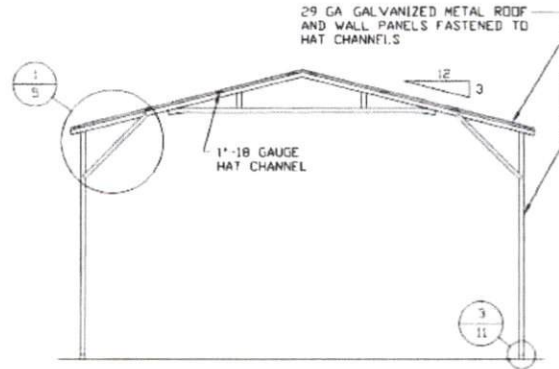
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## BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



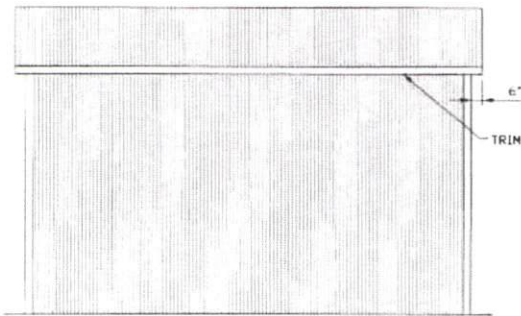
**TYPICAL END ELEVATION  
VERTICAL ROOF/SIDING**

SCALE: NTS



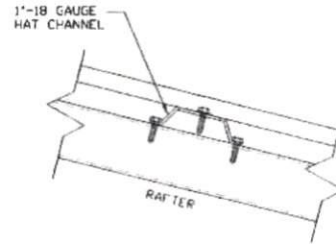
**TYPICAL SECTION VERTICAL  
ROOF/SIDING OPTION**

SCALE: NTS



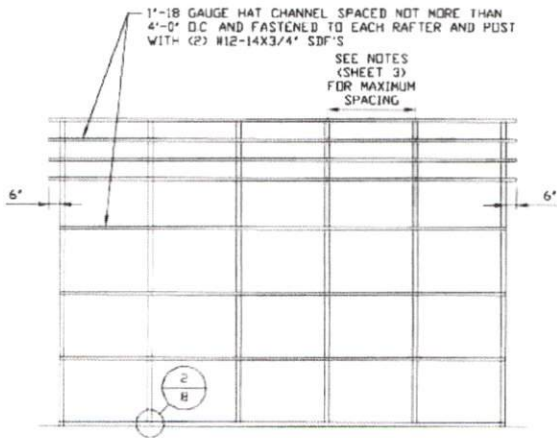
**TYPICAL SIDE ELEVATION  
VERTICAL ROOF/SIDING**

SCALE: NTS



**PANEL ATTACHMENT**

(ALTERNATE FOR VERTICAL ROOF PANELS)  
SCALE: NTS



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

SCALE: NTS

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**DATE: 1-24-18**

**SHT. 16**

**SCALE: NTS**

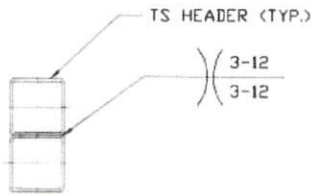
**DWG. NO: SK-3**

**JOB NO: 172735**

**REV: 0**

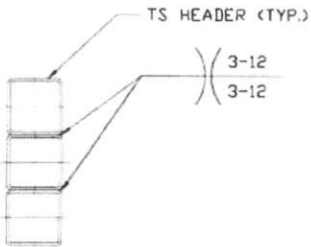
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## HEADER OPTION



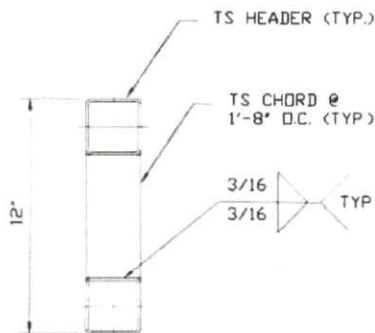
**HEADER DETAIL FOR SPANS:**  
 $\leq 12'-0''$  (FOR GROUND SNOW LOAD  $\leq 35$  PSF)  
 $\leq 10'-0''$  (FOR GROUND SNOW LOAD  $35$  PSF  $< TO \leq 45$  PSF)

SCALE: NTS



**HEADER DETAIL FOR SPANS:**  
 $12'-0'' < TO \leq 16'-0''$  (FOR GROUND SNOW LOAD  $\leq 35$  PSF)  
 $10'-0'' < TO \leq 14'-0''$  (FOR GROUND SNOW LOAD  
 $35$  PSF  $< TO \leq 45$  PSF)

SCALE: NTS



**HEADER DETAIL FOR SPANS:**  
 $16'-0'' < TO \leq 20'-0''$  (FOR GROUND SNOW LOAD  $\leq 35$  PSF)  
 $14'-0'' < TO \leq 20'-0''$  (FOR GROUND SNOW LOAD  
 $35$  PSF  $< TO \leq 45$  PSF)

SCALE: NTS

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JOB NO: 1727SS

SHT. 17

DWG. NO: SK-3

REV: 0

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