



## **STRUCTURAL DESIGN**

## **ENCLOSED BUILDING**

**MAXIMUM 30'- 0" WIDE X 14'- 0" EAVE HEIGHT  
BOX EAVE FRAME AND BOW FRAME**

**17 July 2017  
Revision 0  
M&A Project No. 17168S**

**Prepared for:**

**Lear Metal Carports, LLC  
253 Bowtie Lane  
Low Gap, NC 27024**

**Prepared by:**

**Moore and Associates Engineering and Consulting, Inc.**

**1009 East Avenue  
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**401 S. Main Street  
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**MOORE AND ASSOCIATES  
ENGINEERING AND CONSULTING**


<b>MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.</b>		DRAWN BY: JRS		LEAR METAL CARPORTS, LLC 30'x14' ENCLOSED STRUCTURE PE SEAL COVER SHEET				
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		CLIENT: LMC		SHT. 1		DWG. NO: SK-3		REV: 0

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253 BOWTIE LANE  
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30'x14' ENCLOSED STRUCTURE

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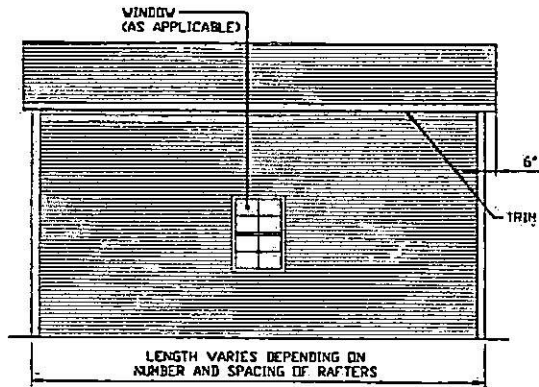
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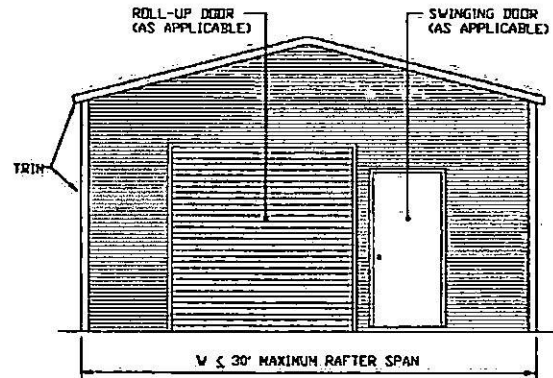
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**BOX EAVE FRAME RAFTER STRUCTURE (Sheets 3, 4, 5, 6, 11, AND 17)**

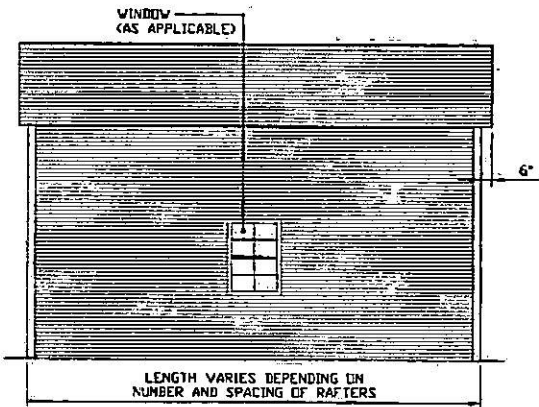


**TYPICAL SIDE ELEVATION-HORIZONTAL ROOF**  
SCALE: NTS

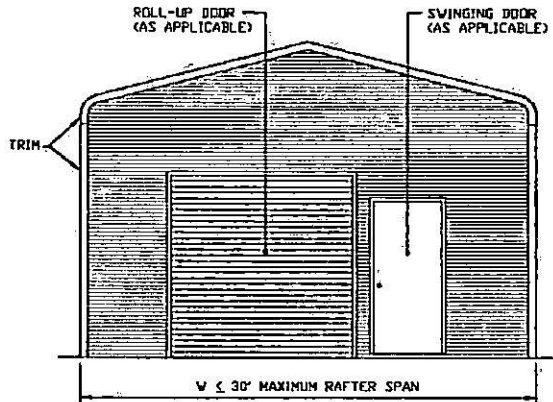


**TYPICAL END ELEVATION-HORIZONTAL ROOF**  
SCALE: NTS

**BOX FRAME RAFTER STRUCTURE (Sheets 7, 8, 9, 12, AND 16)**



**TYPICAL SIDE ELEVATION**  
SCALE: NTS



**TYPICAL END ELEVATION**  
SCALE: NTS

**INSTALLATION NOTES AND SPECIFICATIONS**

1. DESIGN IS FOR MAXIMUM 30' WIDE x 14' EAVE HEIGHT ENCLOSED STRUCTURES.
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2012 NORTH CAROLINA BUILDING CODE, 2006 INTERNATIONAL BUILDING CODE (IBC), 2009 IBC, 2012 IBC AND 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 (SPACING = 5.0 FEET)
  - = 60 PSF (SPACING = 4.0 FEET)
4. ULTIMATE LOW WIND SPEED (LW) 105 TO 140 MPH (NOMINAL WIND SPEED 81 TO 109 MPH); MAXIMUM RAFTER/POST AND END POST SPACING = 50 FEET.
5. ULTIMATE HIGH WIND SPEED (HW) 141 TO 145 MPH (NOMINAL WIND SPEED 110 TO 112 MPH); MAXIMUM RAFTER/POST AND END POST SPACING = 40 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 AND ENDS.
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>ES</sub> = 1522                      V = C<sub>s</sub>W
  - S<sub>DI</sub> = C839

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253 BOWTIE LANE  
LOWGAP, NC 27024  
30'x14' ENCLOSED STRUCTURE

DATE: 7-17-17

SHT. 3

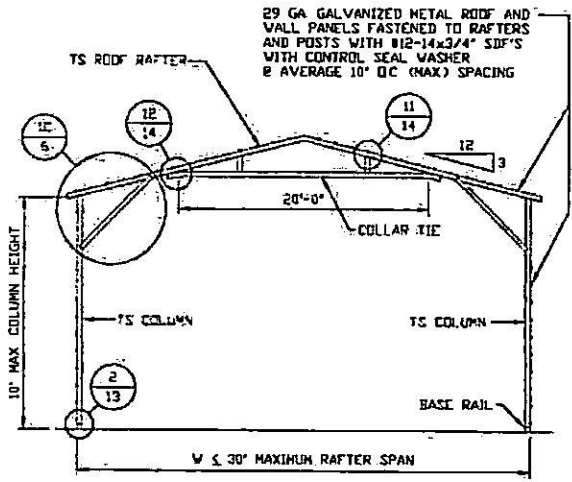
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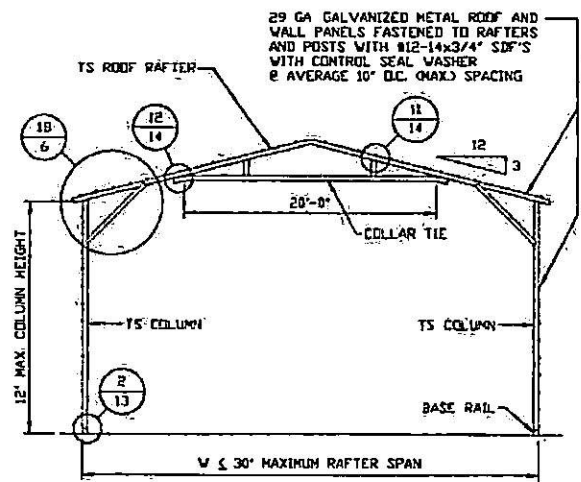
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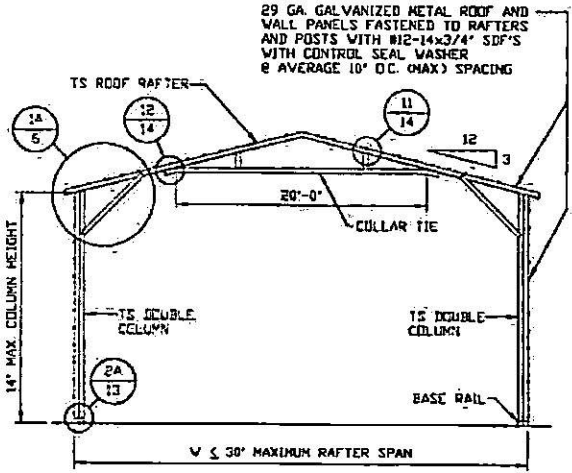
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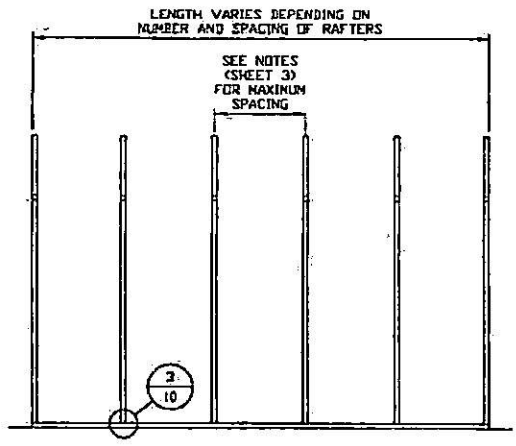
**TYPICAL RAFTER/COLUMN FRAME SECTION**  
SCALE: NTS



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



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



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

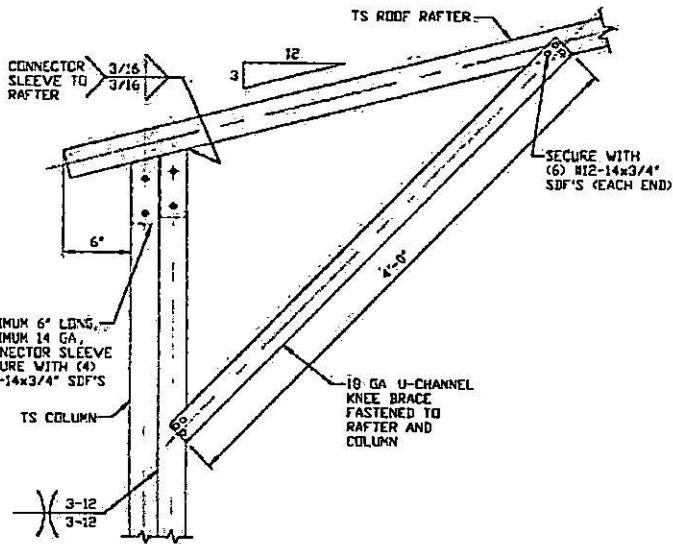
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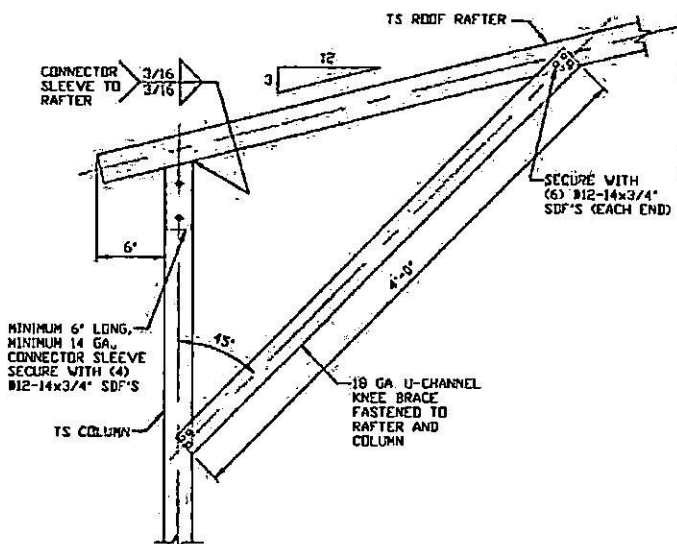
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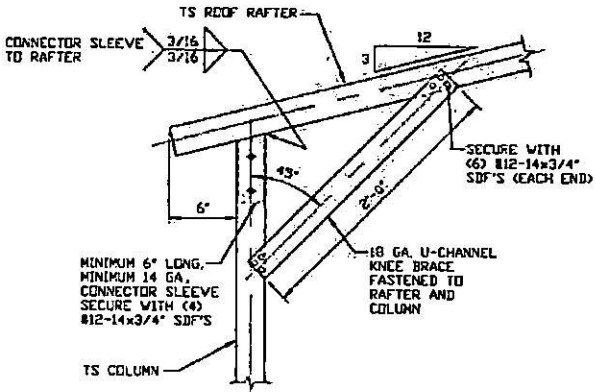
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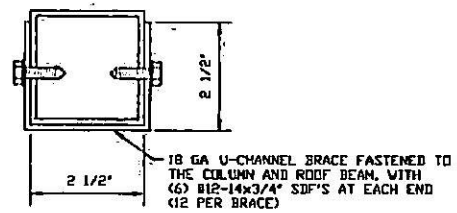
**1A**  
**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 14' > TO > 12'**  
 SCALE: NTS



**1B**  
**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 12' > TO > 10'**  
 SCALE: NTS



**1C**  
**BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS ≤ 10'**  
 SCALE: NTS



**BRACE SECTION**  
 SCALE: NTS

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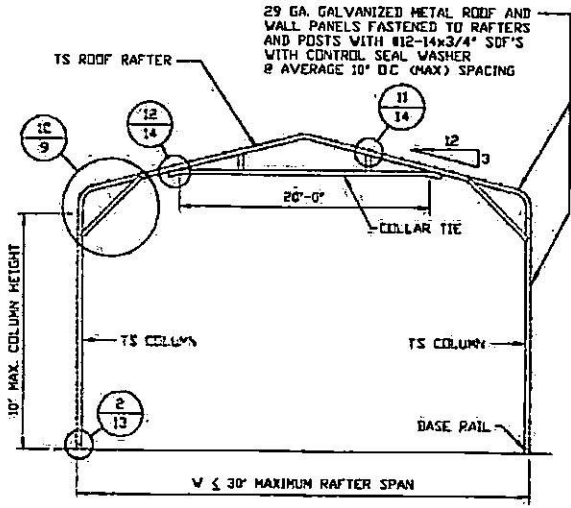
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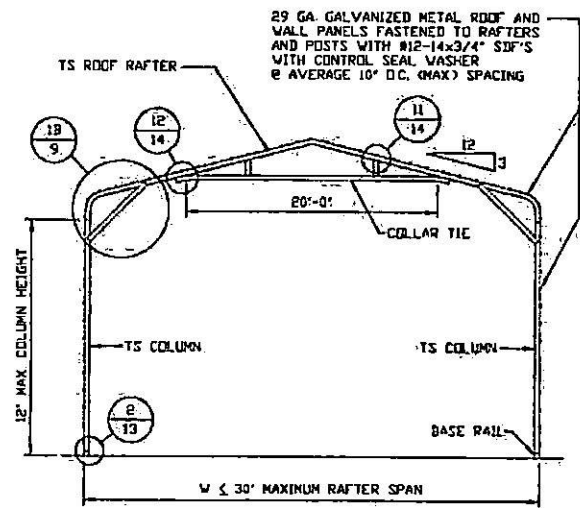
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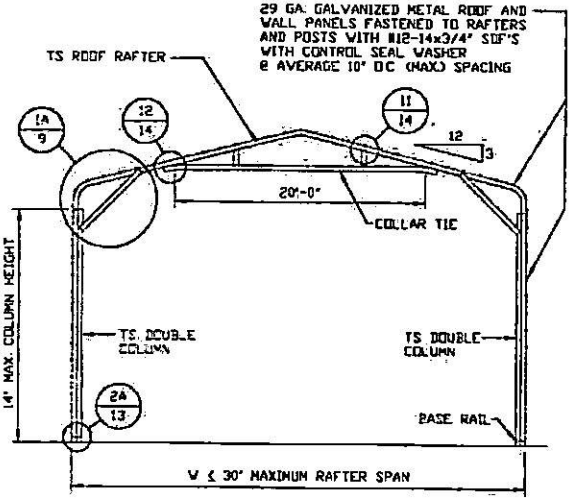
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**REV: 0**



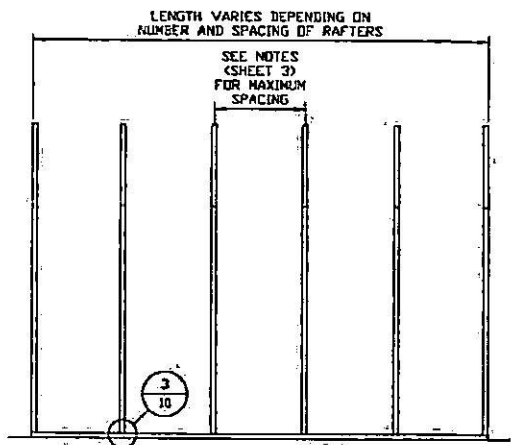
**TYPICAL RAFTER/COLUMN FRAME SECTION**  
SCALE: NTS



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

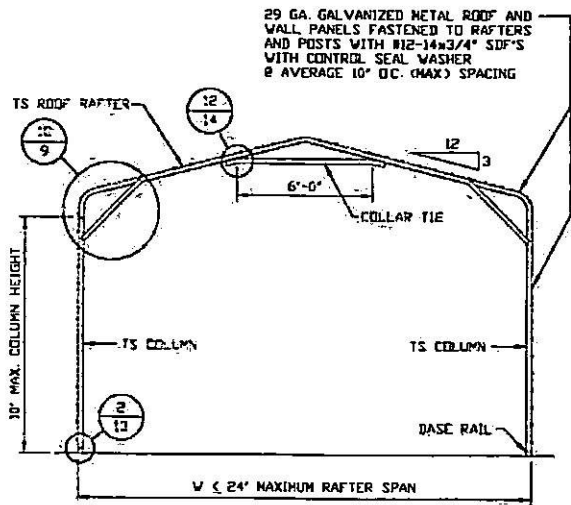


**TYPICAL RAFTER/COLUMN FRAME SECTION**  
SCALE: NTS

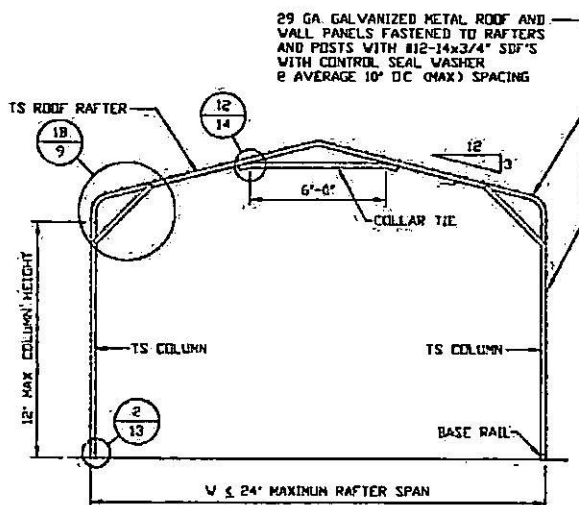


**TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION**  
SCALE: NTS

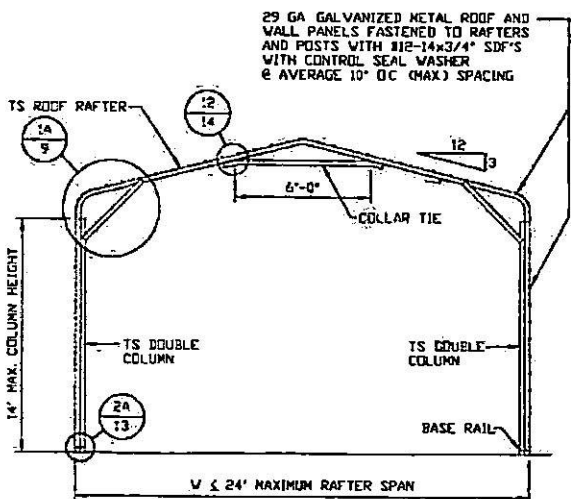
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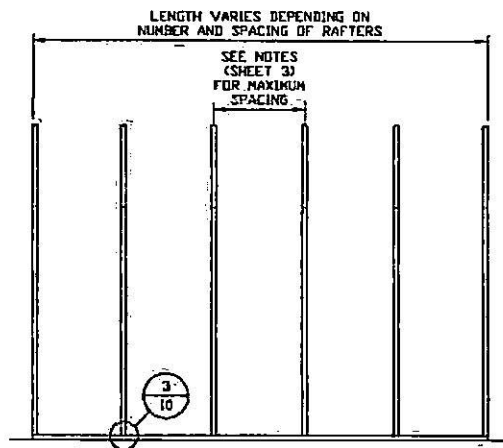
**TYPICAL RAFTER/COLUMN FRAME SECTION**  
SCALE: NTS



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



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



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

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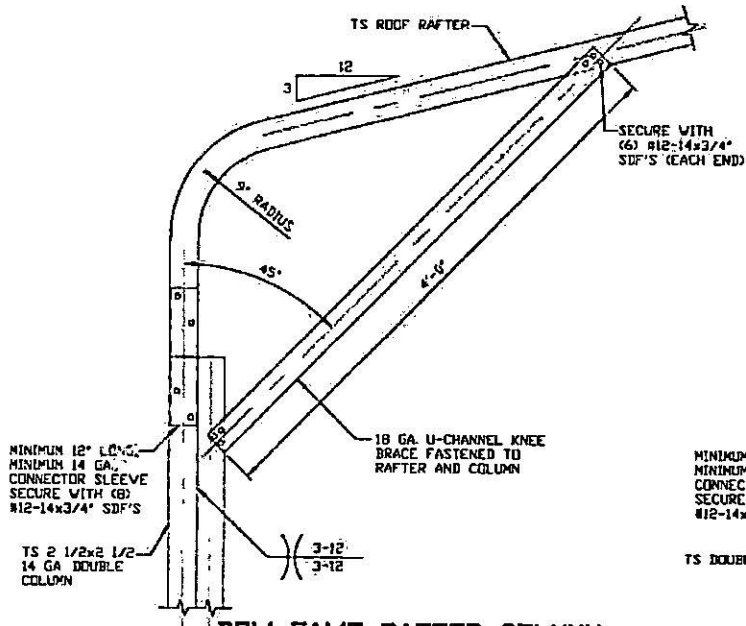
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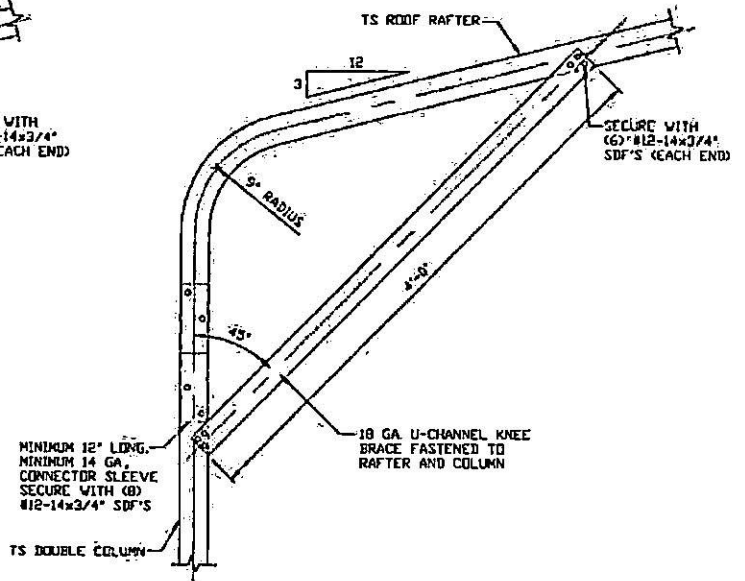




1A

**BOW EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 14' > TO > 12'**

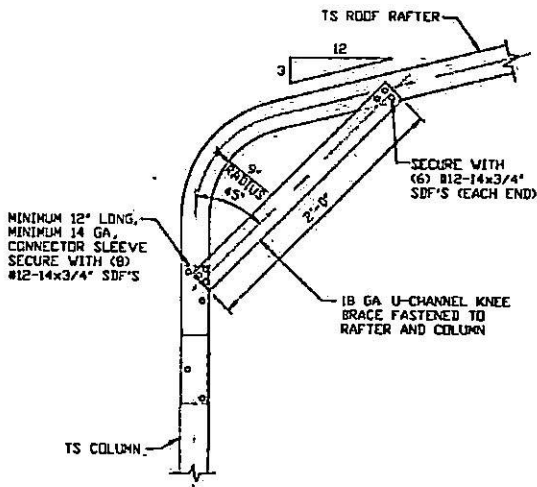
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1B

**BOW EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 12' > TO > 10'**

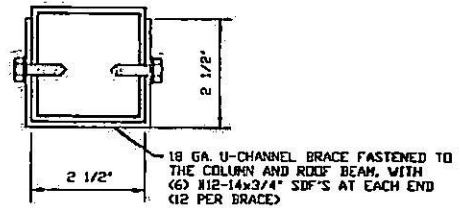
SCALE: NTS



1C

**BOW EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS ≤ 10'**

SCALE: NTS



**BRACE SECTION**

SCALE: NTS

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SCALE: NTS

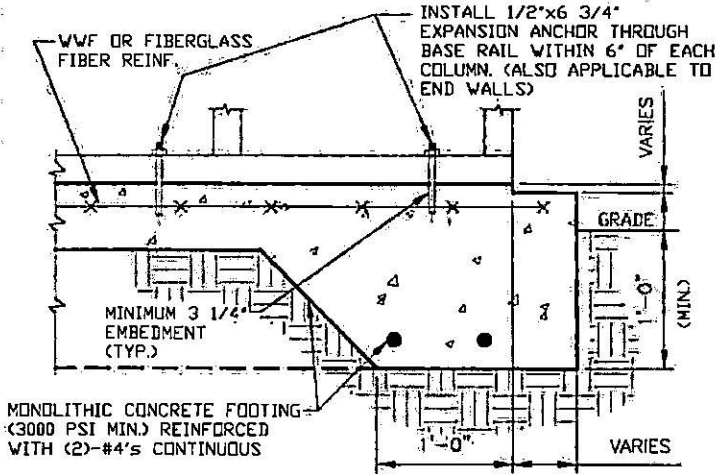
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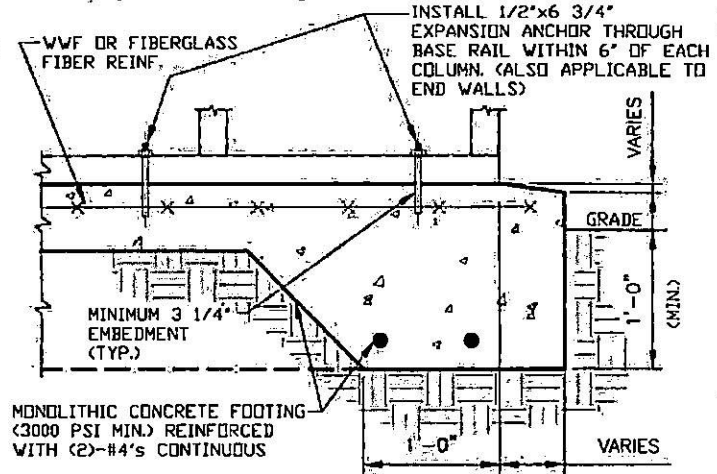
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## OPTIONAL BASE RAIL ANCHORAGE



**3A** CONCRETE MONOLITHIC SLAB  
BASE RAIL ANCHORAGE  
SCALE: NTS  
(MINIMUM ANCHOR EDGE DISTANCE IS 4")



**3B** CONCRETE SLAB BASE  
RAIL ANCHORAGE  
SCALE: NTS  
(MINIMUM ANCHOR EDGE DISTANCE IS 4")

### 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:

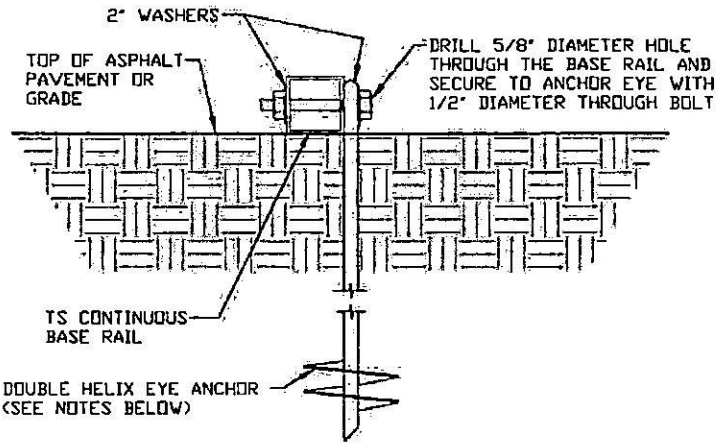
THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

#### 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.



**3C** GROUND BASE HELIX ANCHORAGE  
SCALE: NTS  
(CAN BE USED FOR ASPHALT)

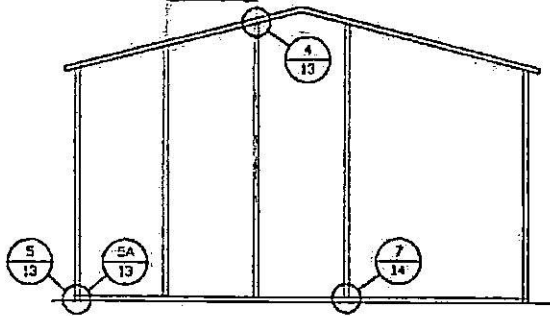
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# BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS

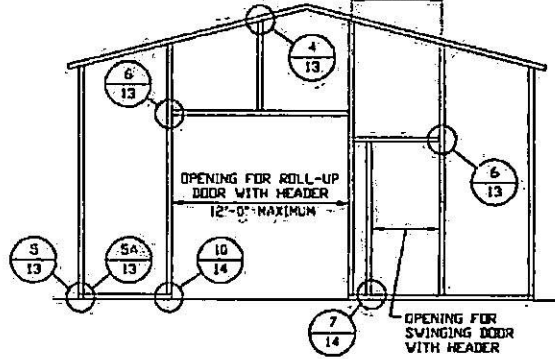
SEE NOTES  
(SHEET 3)  
FOR MAXIMUM  
SPACING



**TYPICAL BOX EAVE RAFTER  
END WALL FRAMING SECTION**

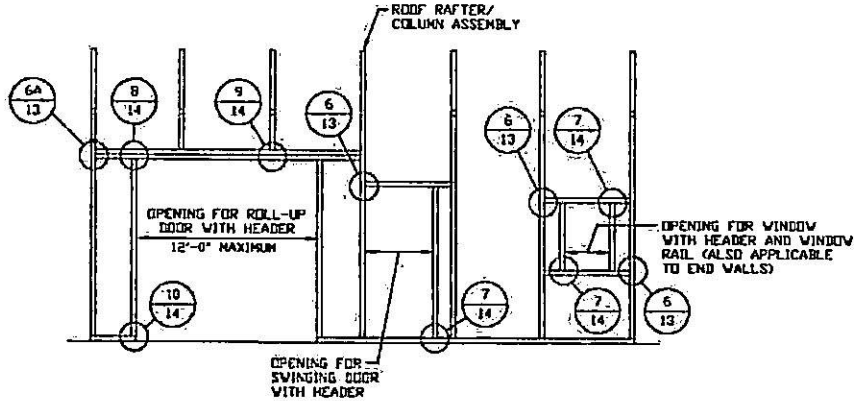
SCALE: NTS

SEE NOTES  
(SHEET 3)  
FOR MAXIMUM  
SPACING



**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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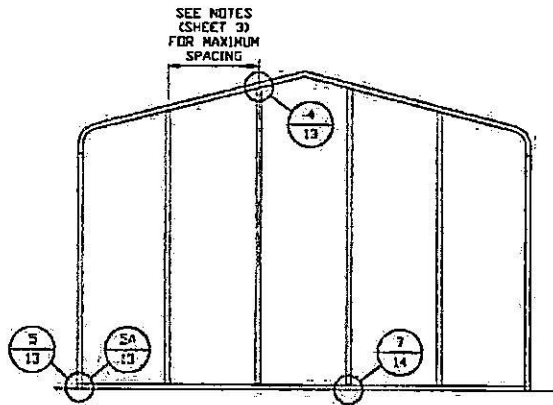
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DWG. NO SK-3

REV: 0

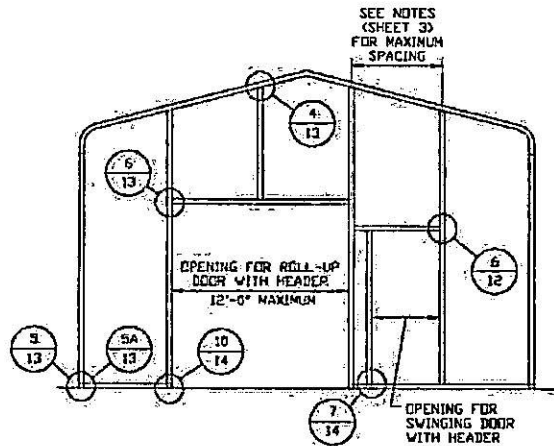
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# BOW RAFTER END WALL AND SIDE WALL OPENINGS



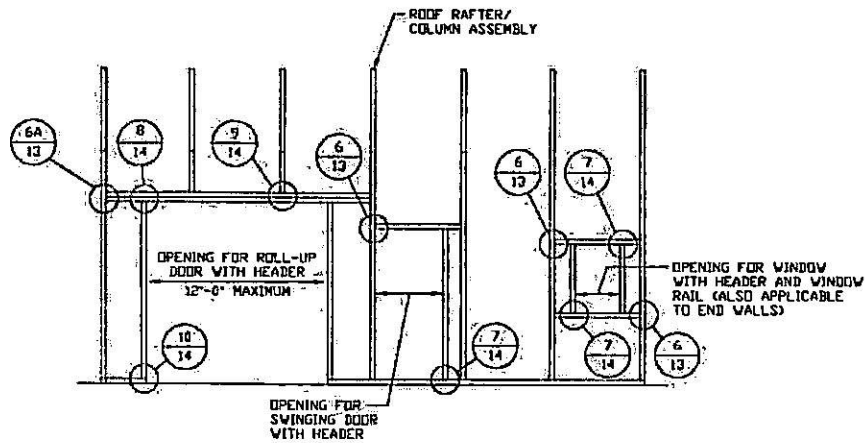
**TYPICAL BOW RAFTER  
END WALL FRAMING SECTION**

SCALE: NTS



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

SCALE: NTS



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

SCALE: NTS

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

DRAWN BY: JRS

CHECKED BY: JM

PROJECT MGR: WSN

CLIENT: LMC

LEAR METAL CARPORTS, LLC  
253 BOWTIE LANE  
LOWGAP, NC 27024  
30'x14' ENCLOSED STRUCTURE

DATE: 7-17-17

SCALE: NTS

JOB NO: 17168S

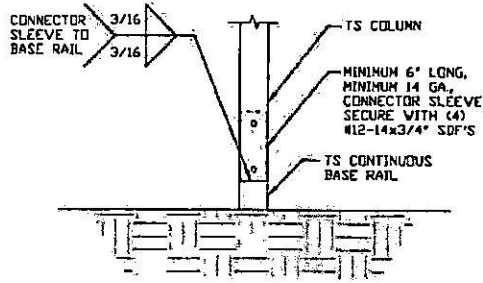
SHT. 12

DWG. NO: SK-3

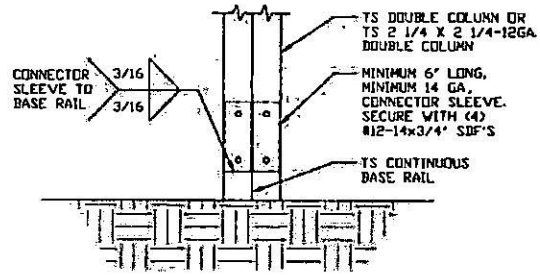
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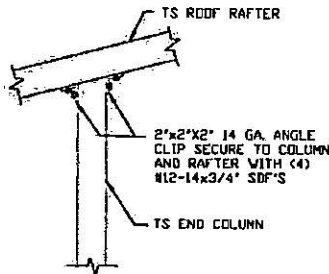
# BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



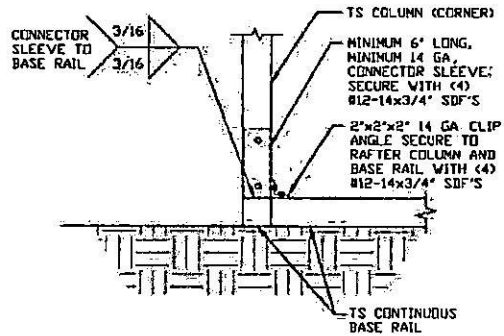
**2** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



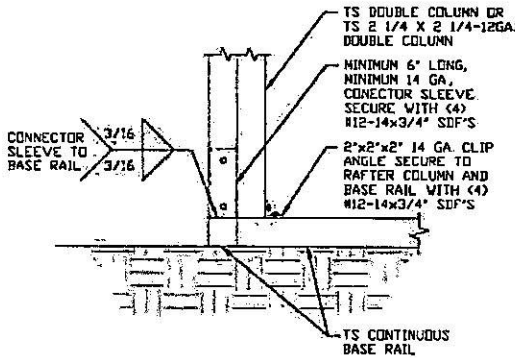
**2A** RAFTER COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



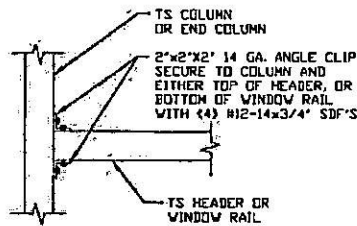
**4** END COLUMN/RAFTER CONNECTION DETAIL  
SCALE: NTS



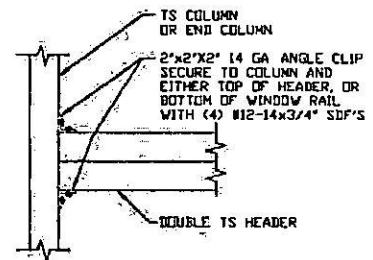
**5** END COLUMN/BASE RAIL CONNECTION DETAIL  
SCALE: NTS



**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

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

DRAWN BY: JRS

CHECKED BY: JM

PROJECT MGR: WSM

CLIENT: LMC

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DATE: 7-17-17

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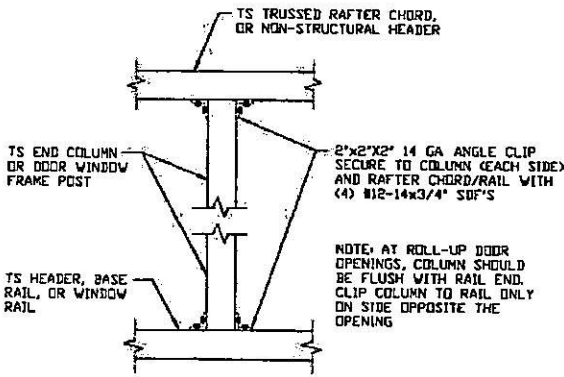
SHT. 13

DWG. NO: SK-3

REV: 0

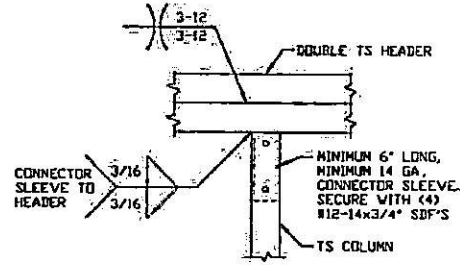
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# BOW AND BOX EAVE RAFTER WALL OPENING DETAILS



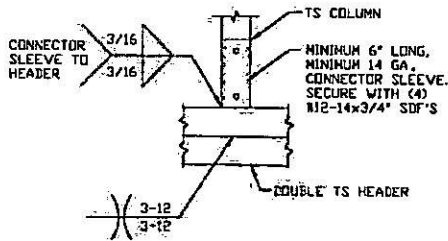
**7** COLUMN TO HEADER, BASE RAIL OR WINDOW RAIL CONNECTION DETAIL

SCALE: NTS



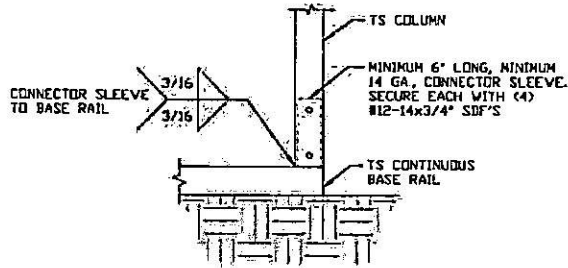
**8** HEADER/COLUMN CONNECTION DETAIL

SCALE: NTS



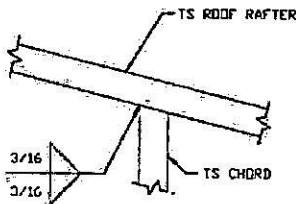
**9** HEADER/COLUMN CONNECTION DETAIL

SCALE: NTS



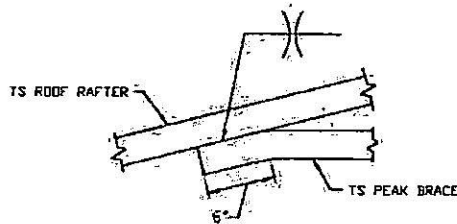
**10** COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



**11** RAFTER TO CHORD CONNECTION DETAIL

SCALE: NTS



**12** PEAK BRACE CONNECTION DETAIL

SCALE: NTS

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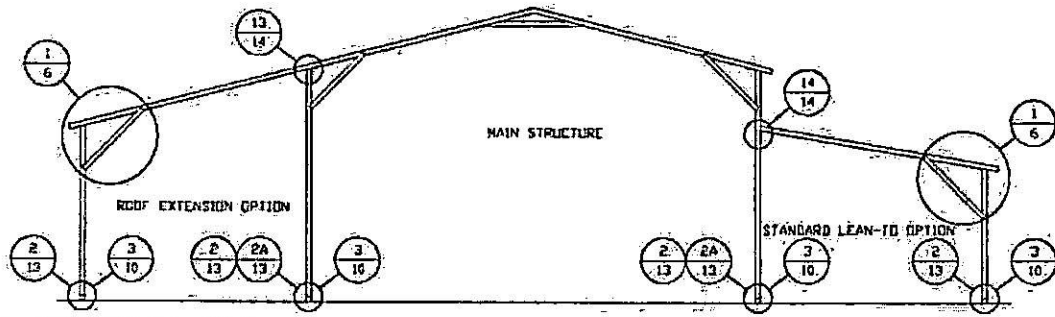
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DWG NO: SK-3

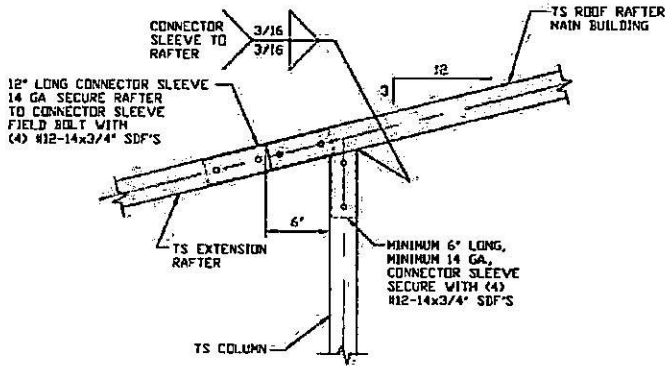
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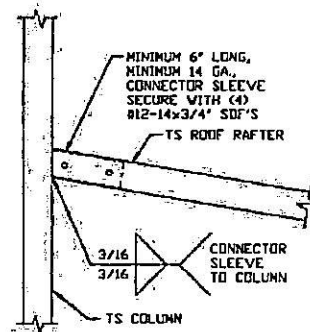
# BOX EAVE RAFTER LEAN-TO OPTIONS



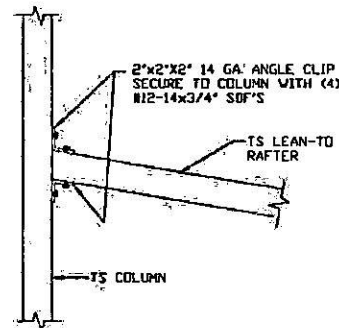
**TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)**



**13** SIDE EXTENSION RAFTER/  
COLUMN DETAIL FOR  
RAFTER SPANS < 12'  
SCALE: NTS



**14A** LEAN-TO RAFTER TO RAFTER  
COLUMN CONNECTION DETAIL  
FOR RAFTER SPANS < 12'  
SCALE: NTS



**14B** OPTIONAL LEAN-TO RAFTER TO  
RAFTER COLUMN CONNECTION  
DETAIL FOR RAFTER SPANS < 12'  
SCALE: NTS

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

DRAWN BY: JRS

CHECKED BY: JM

LEAR METAL CARPORTS, LLC  
253 BOWTIE LANE  
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PROJECT MGR: VSM

CLIENT: LMC

DATE: 7-17-17

SHT. 15

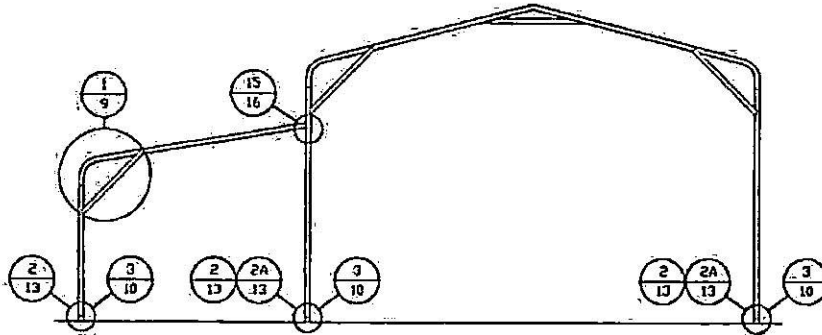
SCALE: NTS

DWG. NO: SK-3

JOB NO: 17168S

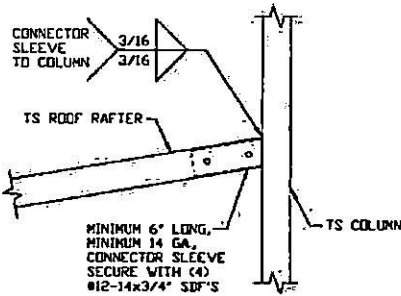
REV: 0

# BOW RAFTER LEAN-TO OPTION



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

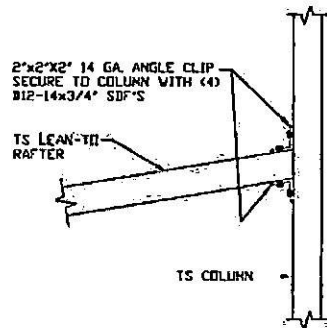
SCALE: NTS



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

15A

SCALE: NTS



**OPTIONAL LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS < 12'**

15B

SCALE: NTS

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

**DRAWN BY: JRS**

**CHECKED BY: JM**

**PROJECT MGR: VSM**

**CLIENT: LMC**

**LEAR METAL CARPORTS, LLC  
253 BOWTIE LANE  
LOWGAP, NC 27024  
30'x14' ENCLOSED STRUCTURE**

**DATE: 7-17-17**

**SCALE: NTS**

**JOB NO: 17168S**

**SHT. 16**

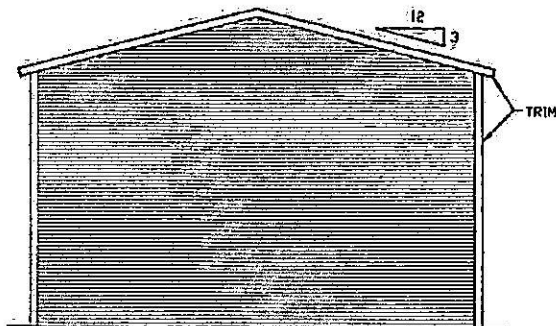
**DWG. NO SK-3**

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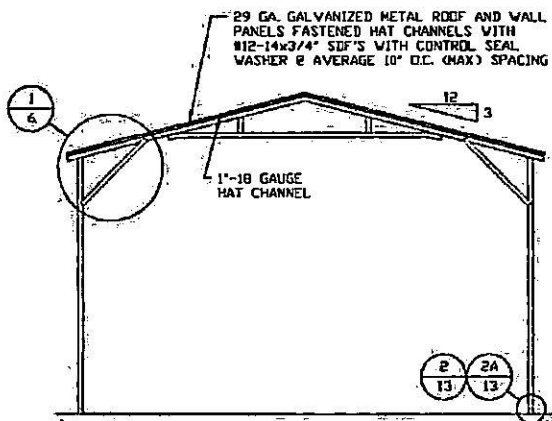


# BOX EAVE RAFTER VERTICAL ROOF OPTION



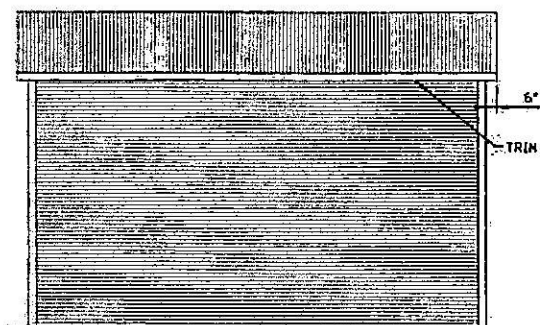
**TYPICAL END ELEVATION  
VERTICAL ROOF**

SCALE: NTS



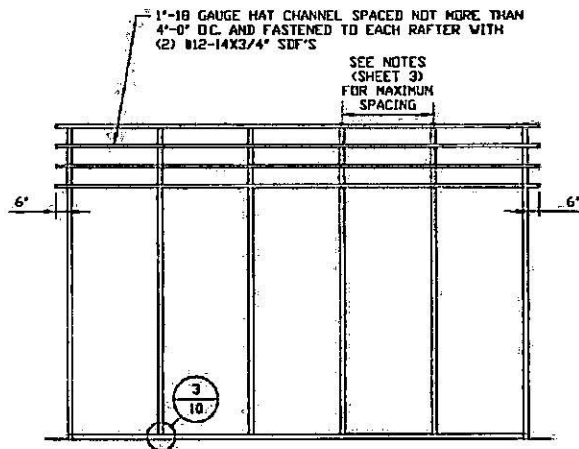
**TYPICAL SECTION  
VERTICAL ROOF OPTION**

SCALE: NTS



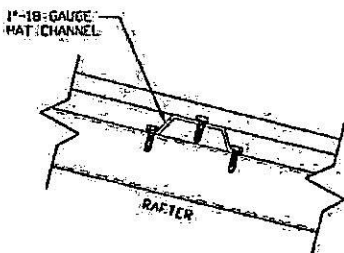
**TYPICAL SIDE ELEVATION  
VERTICAL ROOF**

SCALE: NTS



**TYPICAL FRAMING SECTION  
VERTICAL ROOF OPTION**

SCALE: NTS



**ROOF PANEL ATTACHMENT**

(ALTERNATE FOR VERTICAL ROOF PANELS)  
SCALE: NTS

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

DRAWN BY: JRS

CHECKED BY: JM

PROJECT NGR VSM

CLIENT: LMC

LEAR METAL CARPORTS, LLC  
253 BOWTIE LANE  
LOWGAP, NC 27024  
30'x14' ENCLOSED STRUCTURE

DATE: 7-17-17

SHT. 17

SCALE: NTS

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