



PILOT MOUNTAIN, NORTH CAROLINA

**STRUCTURAL DESIGN
ENCLOSED BUILDING**

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

2 July 2020

Revision 2

M&A Project No. 18315S/19179S/20176S

Prepared for:

NC Carports and Garages, LLC
309 S. Depot Street
Pilot Mountain, NC 27041

Prepared by:

Moore and Associates Engineering
and Consulting, Inc.

1009 East Avenue
North Augusta, SC 29841

401 S. Main St., Suite 200
Mt. Airy, NC 27030



MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING

			<p>Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 49744, Expiration Date <u>6/6/22</u></p>

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ENGINEERING AND CONSULTING, INC.

DRAWN BY: JG

CHECKED BY: PH

PROJECT MGR: WSM

CLIENT: NC CARPORTS

NC CARPORTS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 1

SCALE: NTS

DVG. NO: SK-3

183155/19179S/
JOB NO: 20176S

REV: 2

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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 2018 NORTH CAROLINA BUILDING CODE, 2009 INTERNATIONAL BUILDING CODE (IBC), 2012 IBC, 2015 IBC AND 2018 IBC.
3. DESIGN LOADS ARE AS FOLLOWS:
 - A) DEAD LOAD = 1.5 PSF
 - B) LIVE LOAD = 12 PSF
 - C) GROUND SNOW LOAD = 35 PSF
 - = 30 PSF ($W \leq 24'-0"$ WITH U-CHANNEL COLLAR TIE)
 NOTE: UNBALANCED SNOW LOADS DUE TO DRIFTING HAVE NOT BEEN EVALUATED.
4. 3-SECOND GUST ULTIMATE WIND SPEED (V_{ULT}) 105 TO 145 MPH (NOMINAL WIND SPEED 82 TO 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) = 9 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 16 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 ANCHORS (SOIL NAILS) CONSIST OF #4 REBAR W/WELDED NUT 30" LONG. SOIL NAILS MAY BE USED FOR WIND SPEEDS ≤ 145 MPH AND IN SUITABLE SOIL CONDITIONS. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED FOR WIND SPEEDS > 145 MPH AND/OR IN SUITABLE SOILS AS NOTED.
14. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:
 - SOIL SITE CLASS = D
 - RISK CATEGORY I
 - R = 3.25 $I_E = 1.0$
 - $S_{DS} = 2.039$ $V = C_S W$
 - $S_{D1} = 1.258$

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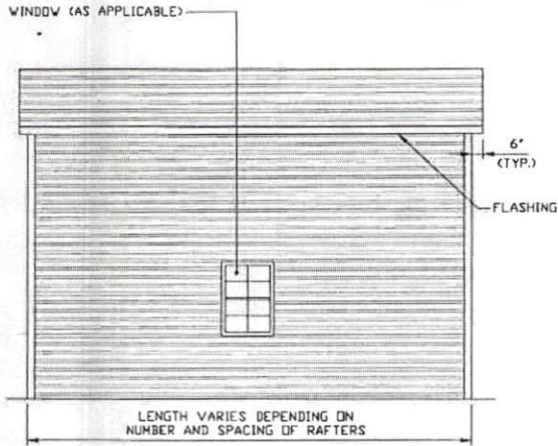
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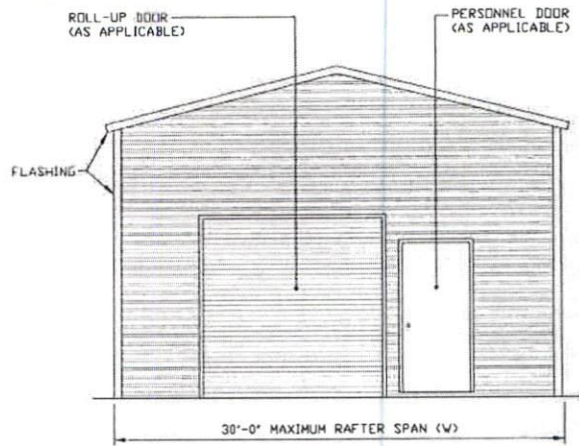
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BOX EAVE FRAME RAFTER STRUCTURE



TYPICAL SIDE ELEVATION
SCALE: NTS



TYPICAL END ELEVATION
SCALE: NTS

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SCALE: NTS

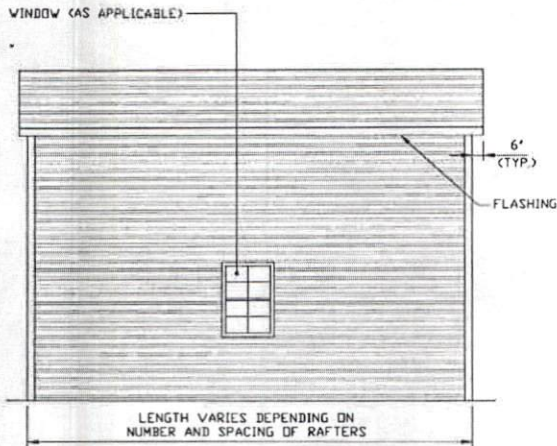
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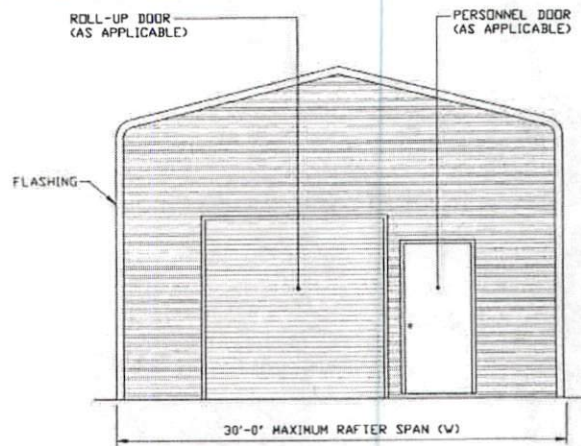
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BOW EAVE FRAME RAFTER STRUCTURE



TYPICAL SIDE ELEVATION
SCALE: NTS



TYPICAL END ELEVATION
SCALE: NTS

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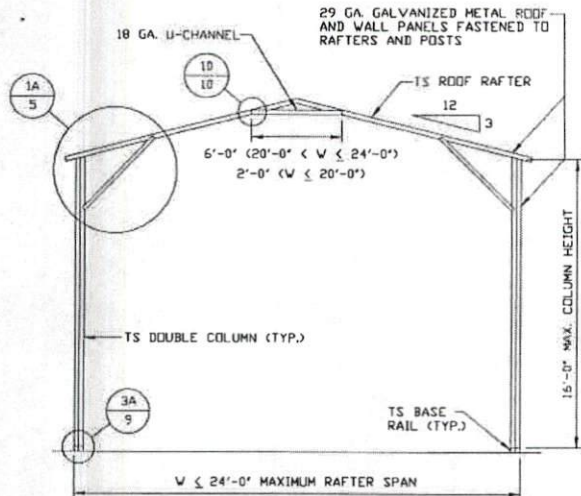
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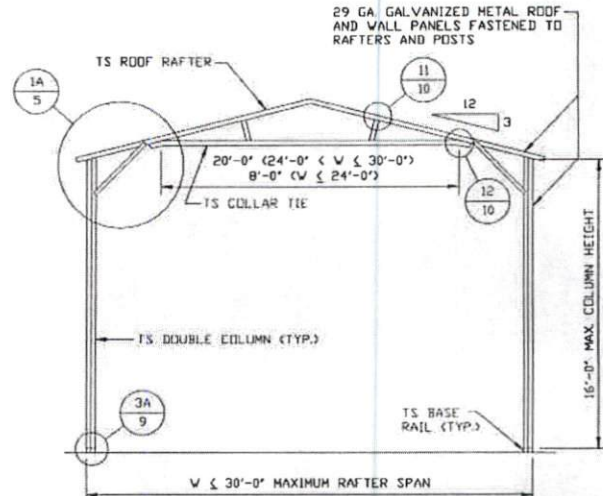
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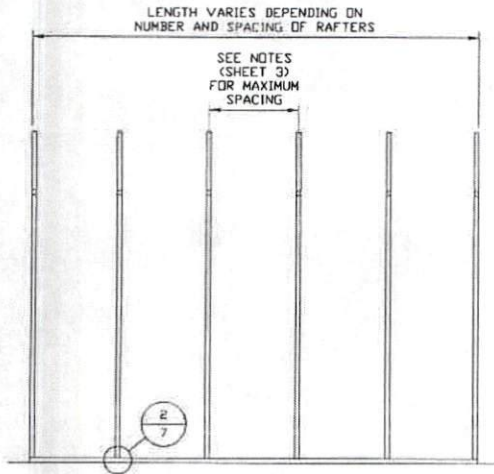
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TYPICAL RAFTER/COLUMN FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

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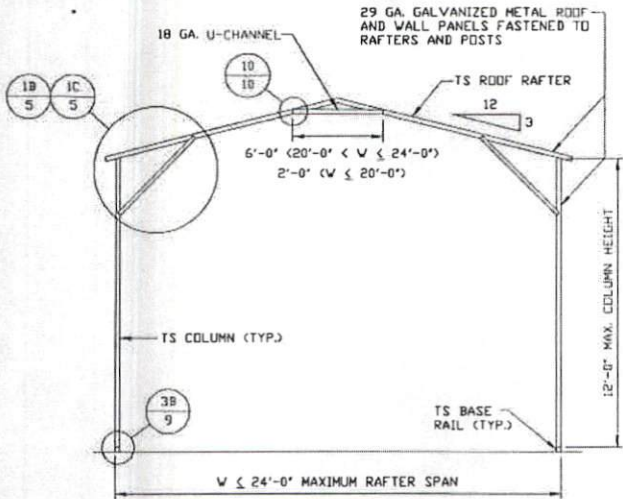
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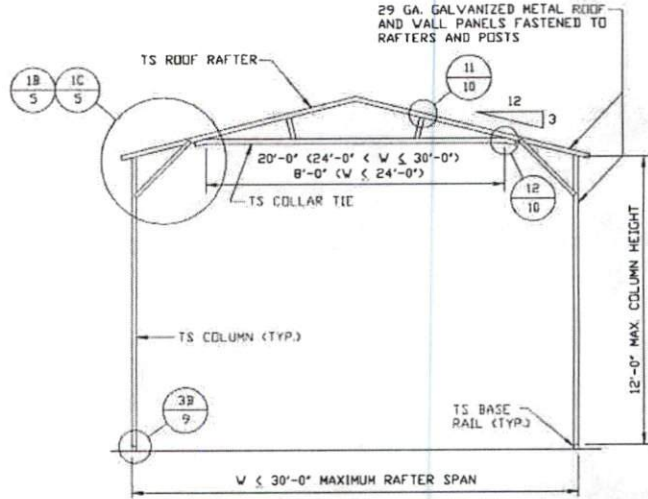
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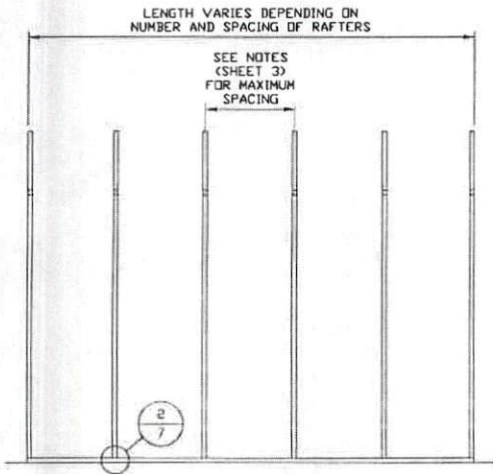
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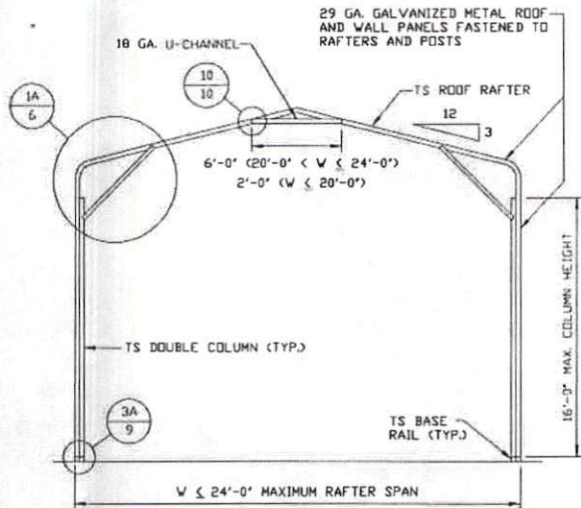
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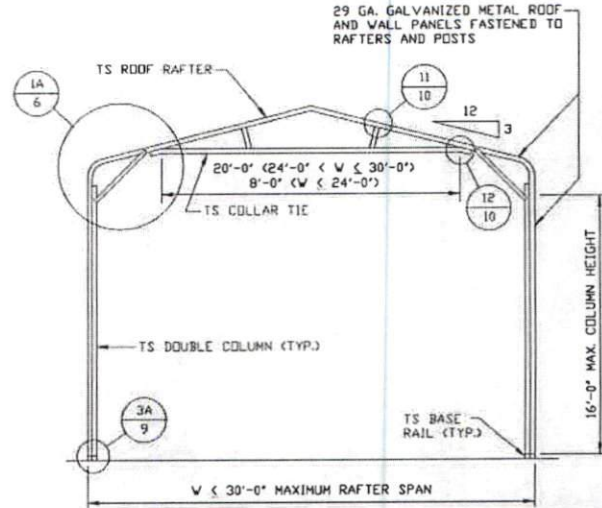
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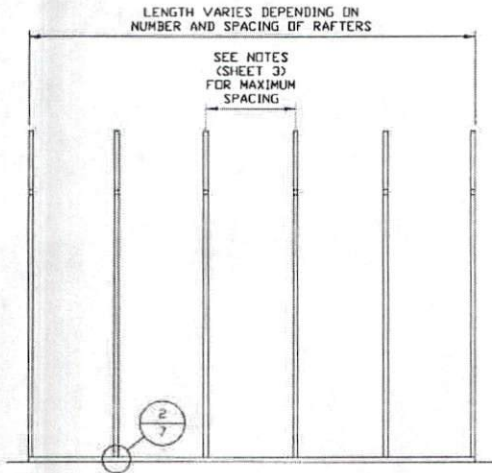
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TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
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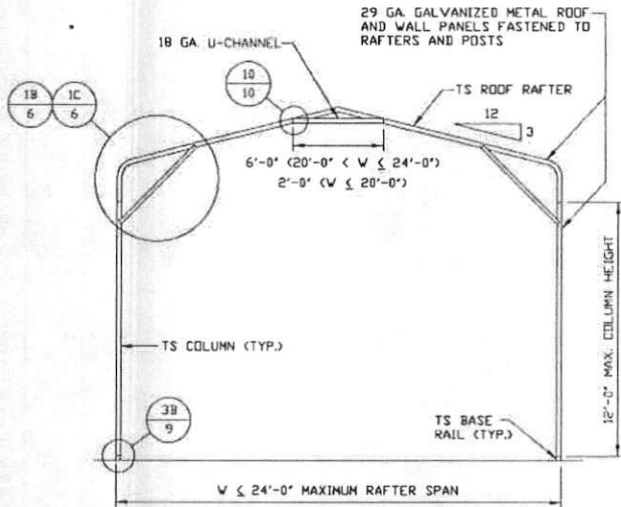
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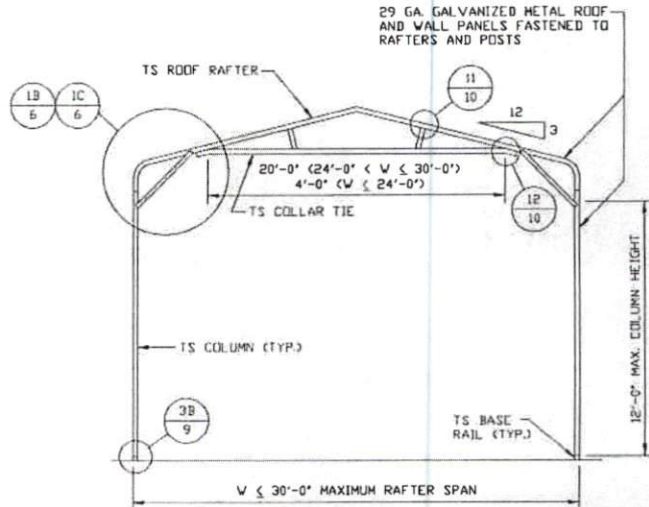
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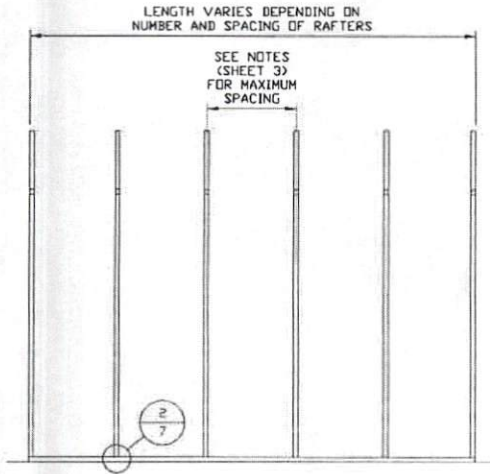
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TYPICAL RAFTER/COLUMN FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

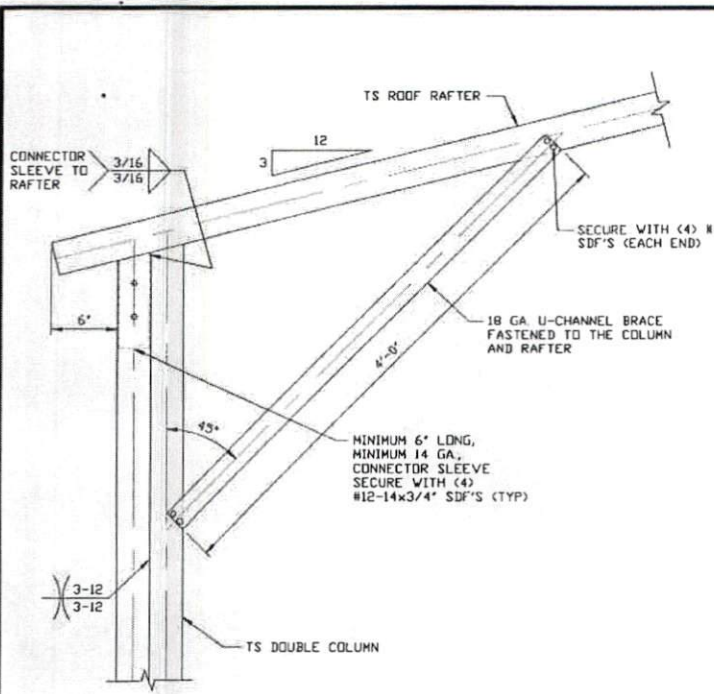
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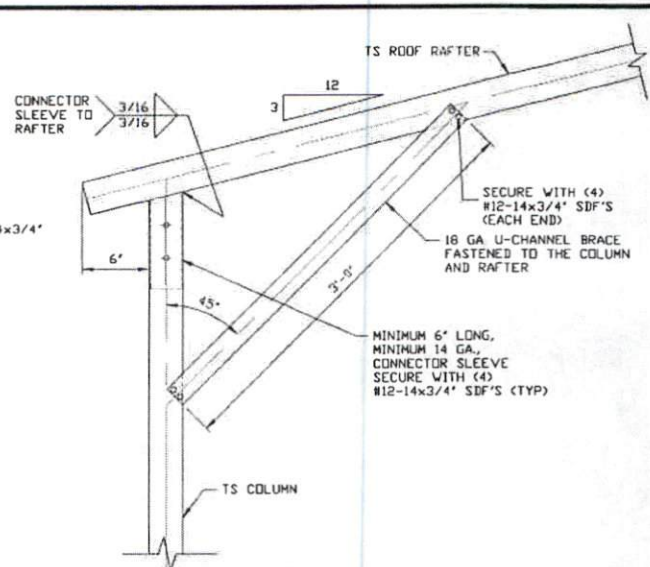
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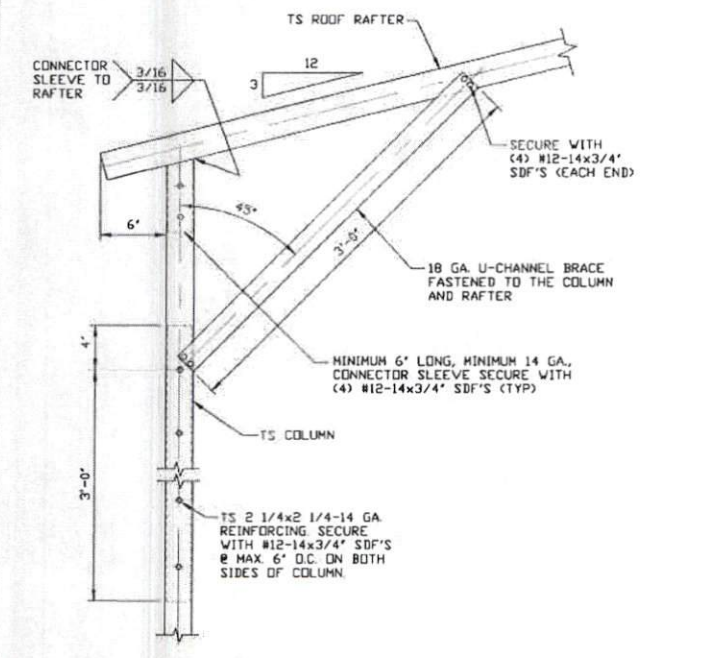
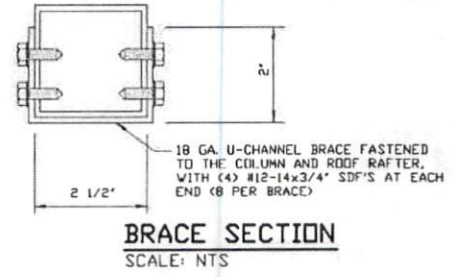
PROJECT MGR: WSM	DATE: 7-2-20	SCALE: NTS	JOB NO: 18315S/19179S/20176S
CLIENT: NC CARPORTS	SHT. 4C	DWG. NO: SK-3	REV: 2



1A
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
 FOR HEIGHTS 12'-0" < TO <= 16'-0"
 SCALE: NTS



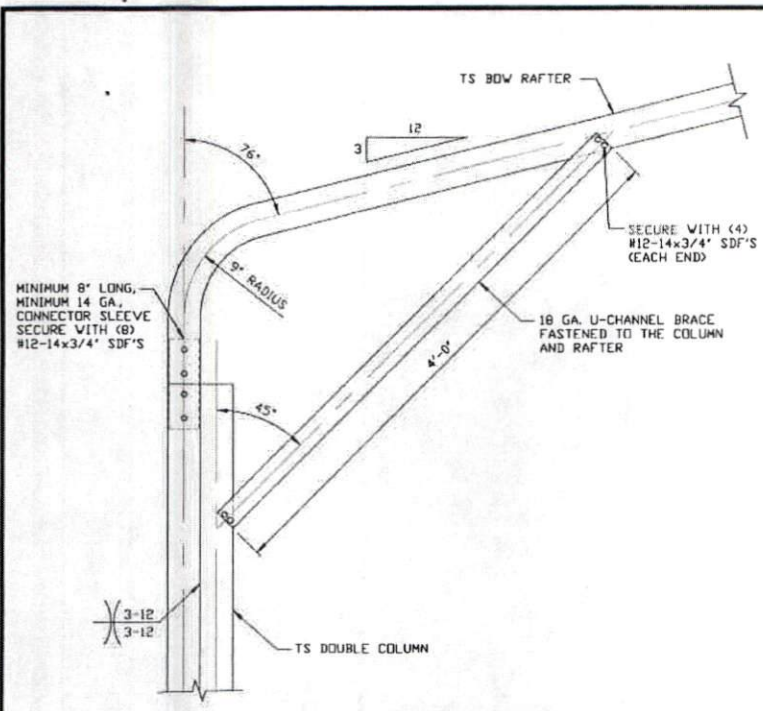
1C
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
 FOR HEIGHTS <= 10'-0"
 SCALE: NTS



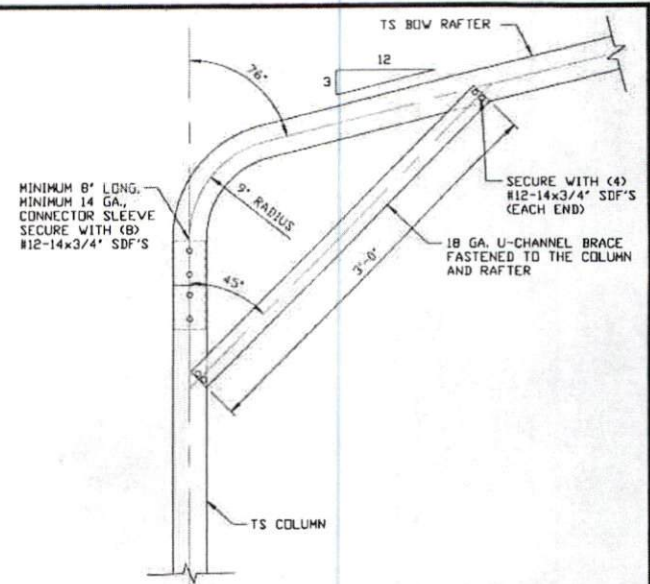
1B
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
 FOR HEIGHTS 10'-0" < TO <= 12'-0"
 SCALE: NTS

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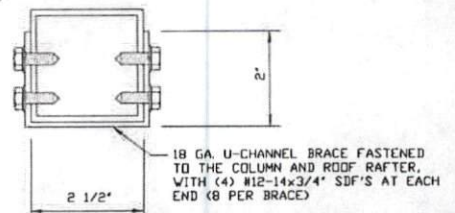
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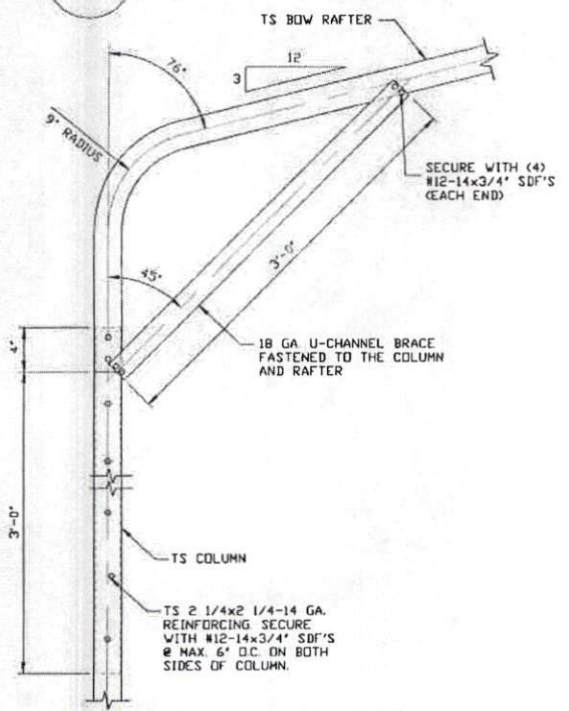
1A
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
FOR HEIGHTS 12'-0" < TO <= 16'-0"
 SCALE: NTS



1C
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL
FOR HEIGHTS <= 10'-0"
 SCALE: NTS



BRACE SECTION
 SCALE: NTS

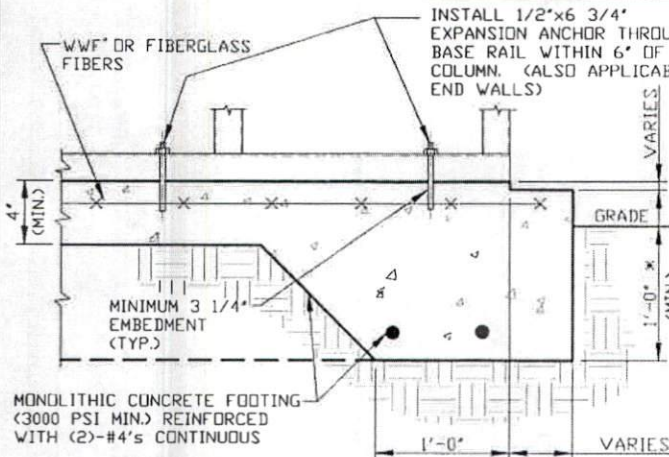


1B
BOW RAFTER/CORNER POST CONNECTION DETAIL
FOR HEIGHTS 10'-0" < TO <= 12'-0"
 SCALE: NTS

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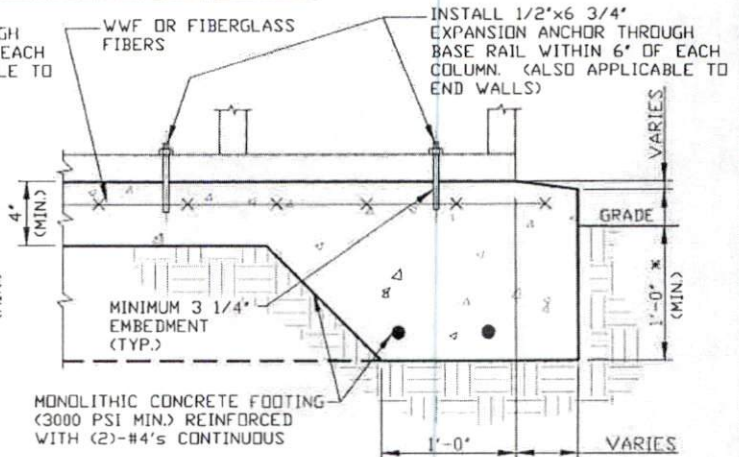
BASE RAIL ANCHORAGE OPTIONS



2A

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
MINIMUM ANCHOR EDGE DISTANCE IS 4".
* COORDINATE WITH LOCAL BUILDING CODE
AND/OR D REGARDING MINIMUM FROST DEPTH
(LENGTH).



2B

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
MINIMUM ANCHOR EDGE DISTANCE IS 4".
* COORDINATE WITH LOCAL BUILDING CODE
AND/OR D REGARDING MINIMUM FROST DEPTH
(LENGTH).

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 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

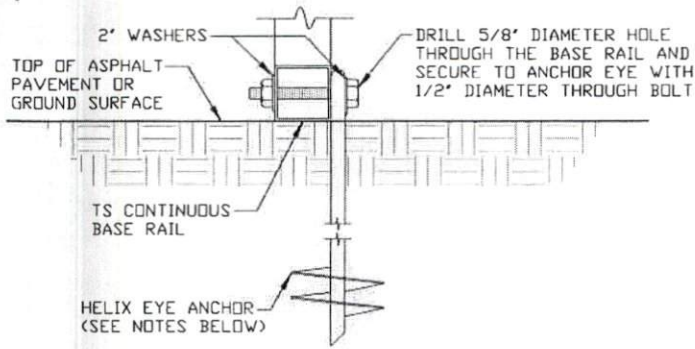
DWG. NO: SK-3

18315S/19179S/
JOB NO: 20176S

REV: 2

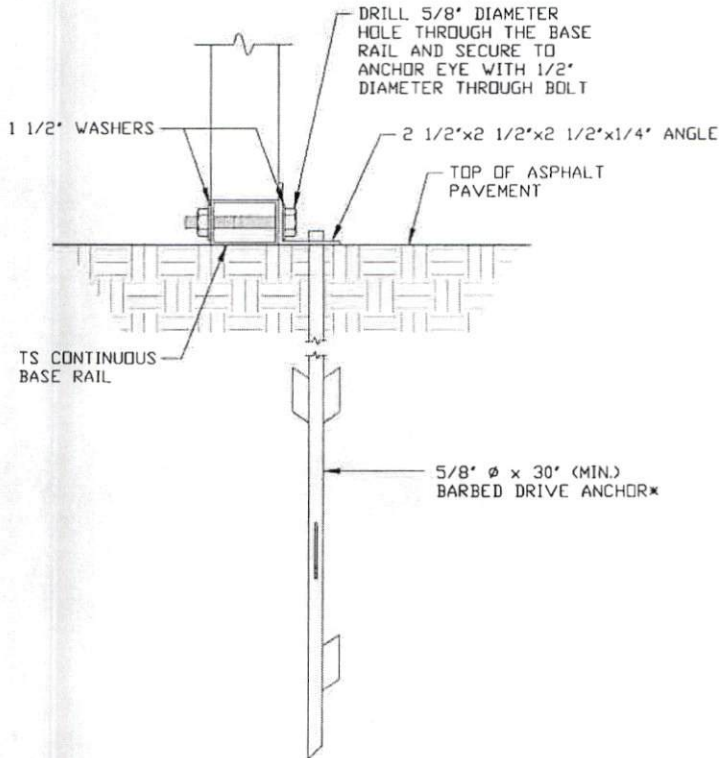
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BASE RAIL ANCHORAGE OPTIONS



2C GROUND BASE
HELIX ANCHORAGE

SCALE: NTS
(CAN BE USED FOR ASPHALT)
* COORDINATE WITH LOCAL BUILDING CODE
AND/OR D REGARDING MINIMUM FROST DEPTH
(LENGTH).



2D ASPHALT BASE ANCHORAGE

SCALE: NTS
* COORDINATE WITH LOCAL BUILDING CODE
AND/OR D REGARDING MINIMUM FROST DEPTH
(LENGTH).

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DRAWN BY: JG

CHECKED BY: PH

PROJECT MGR: VSM

CLIENT: NC CARPORTS

NC CARPORTS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 7A

SCALE: NTS

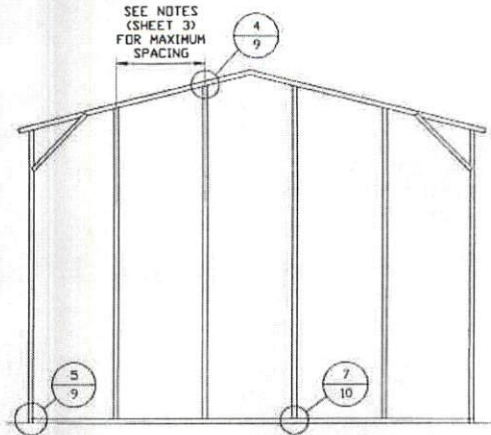
DWG. NO: SK-3

**18315S/19179S/
JOB NO:** 20176S

REV.: 2

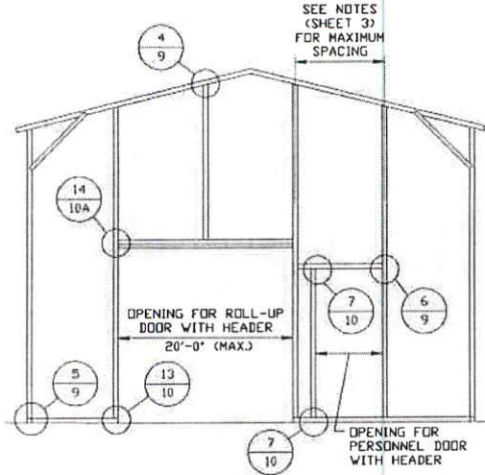
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



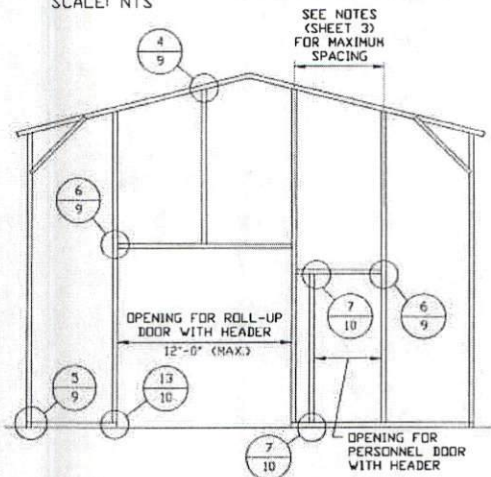
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

SCALE: NTS



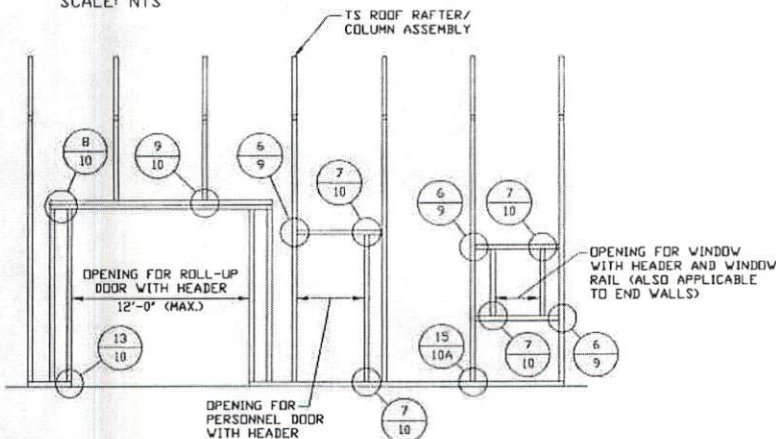
**TYPICAL BOX EAVE RAFTER END
WALL OPENINGS FRAMING SECTION**

SCALE: NTS



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

SCALE: NTS



**TYPICAL BOX EAVE RAFTER
SIDE WALL OPENINGS FRAMING SECTION**

SCALE: NTS

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ENGINEERING AND CONSULTING, INC.**

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CHECKED BY: PH

NC CARPORTS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

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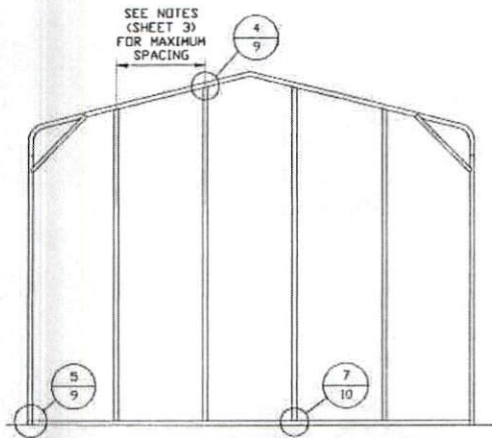
PROJECT MGR: WSM
CLIENT: NC CARPORTS

DATE: 7-2-20
SHT.: 8

SCALE: NTS
DWG. NO: SK-3

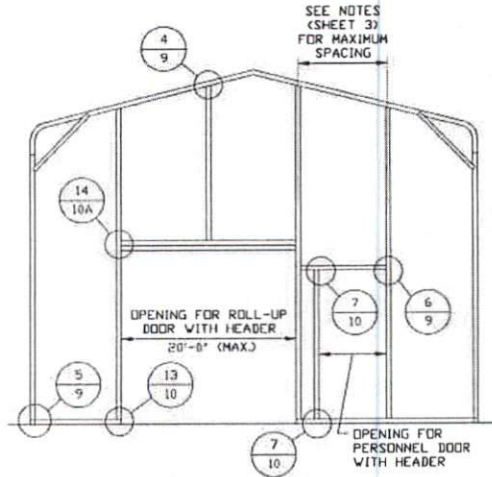
18315S/19179S/
JOB NO: 20176S
REV: 2

BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



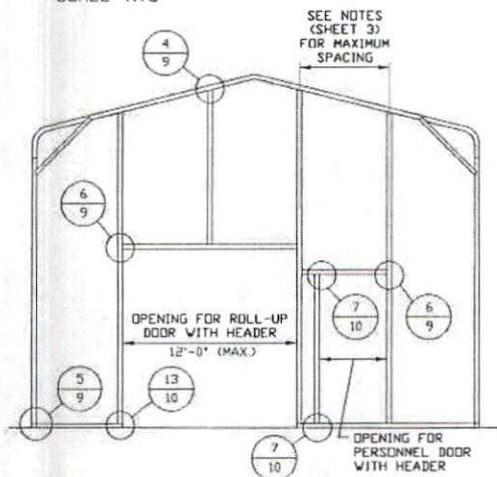
TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: NTS



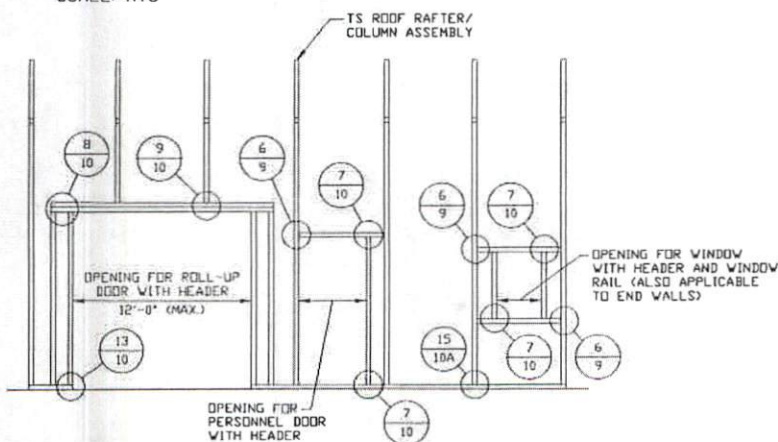
TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: NTS

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CLIENT: NC CARPORTS

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309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 8A

SCALE: NTS

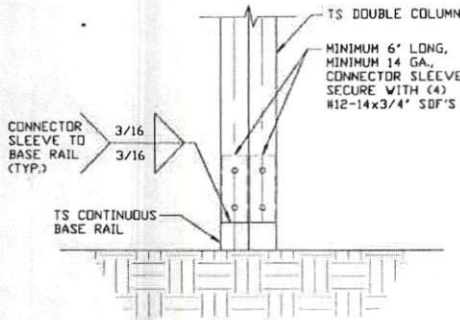
DWG. NO: SK-3

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JOB NO: 20176S

REV: 2

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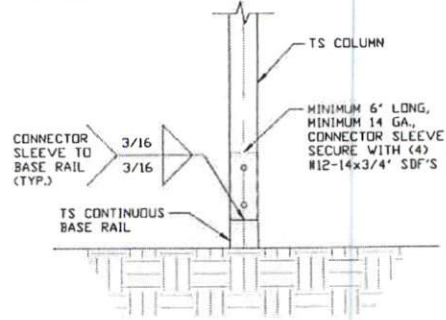
CONNECTION DETAILS



3A

POST/BASE RAIL CONNECTION DETAIL

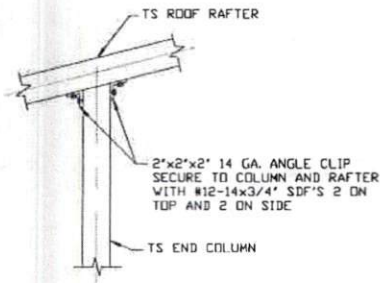
SCALE: NTS



3B

POST/BASE RAIL CONNECTION DETAIL

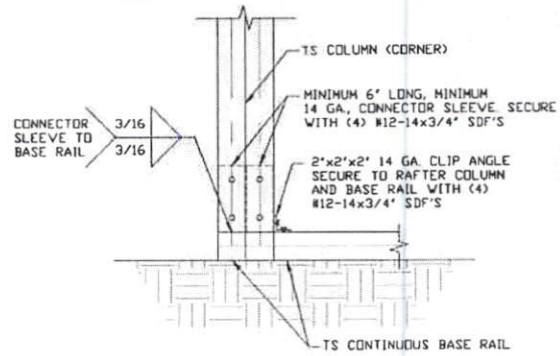
SCALE: NTS



4

END COLUMN/RAFTER CONNECTION DETAIL

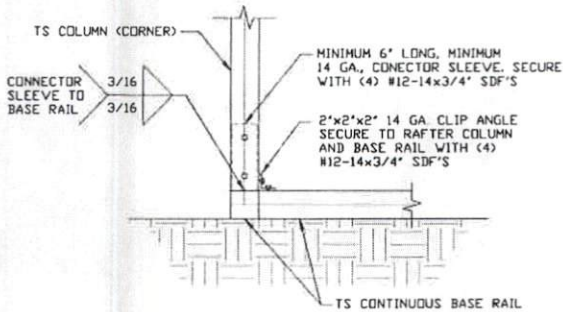
SCALE: NTS



5A

END COLUMN/BASE RAIL CONNECTION DETAIL

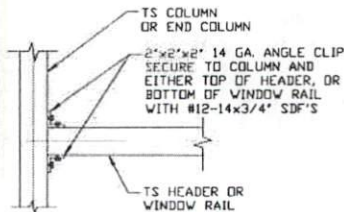
SCALE: NTS



5B

END COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



6

COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL

SCALE: NTS

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309 S. DEPOT STREET
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SHT. 9

SCALE: NTS

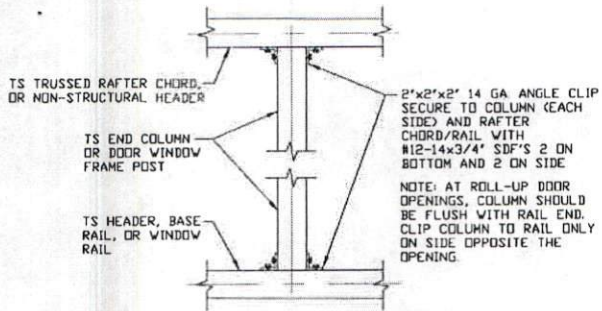
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JOB NO: 20176S

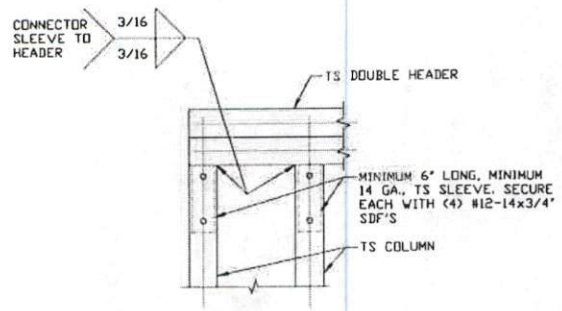
REV: 2

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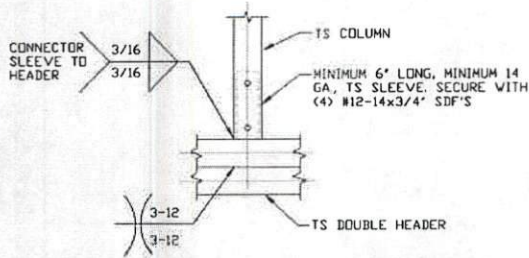
CONNECTION DETAILS



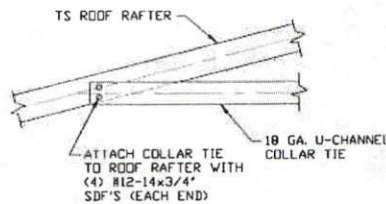
7 COLUMN TO HEADER, BASE RAIL, OR WINDOW RAIL CONNECTION DETAIL
SCALE: NTS



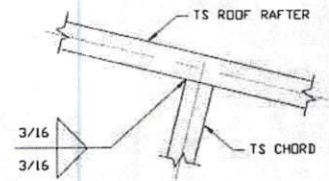
8 DOUBLE HEADER/COLUMN CONNECTION DETAIL
SCALE: NTS



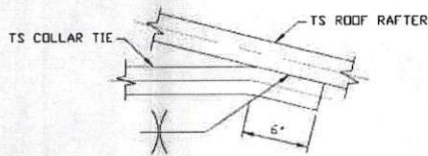
9 COLUMN/DOUBLE HEADER CONNECTION DETAIL
SCALE: NTS



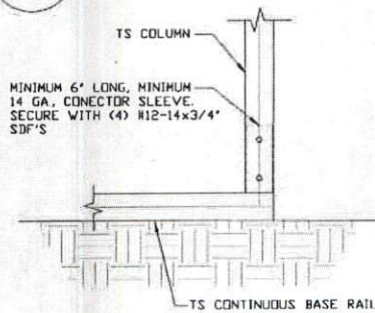
10 COLLAR TIE CONNECTION DETAIL
SCALE: NTS



11 RAFTER TO CHORD CONNECTION DETAIL
SCALE: NTS



12 COLLAR TIE CONNECTION DETAIL
SCALE: NTS



13 COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS

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CHECKED BY: PH

PROJECT MGR: WSM

CLIENT: NC CARPORTS

NC CARPORTS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0"X16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 10

SCALE: NTS

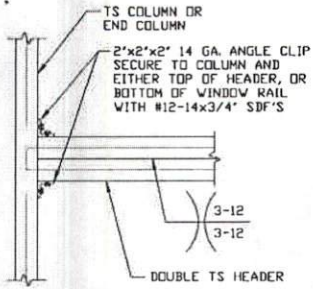
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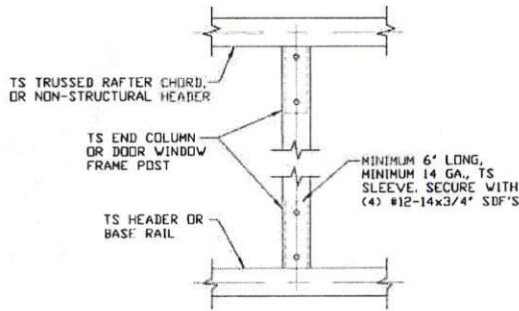
CONNECTION DETAILS



**DOUBLE HEADER
TO COLUMN
CONNECTION DETAIL**

14

SCALE: NTS



**COLUMN TO HEADER
OR BASE RAIL
CONNECTION DETAIL**

15

SCALE: NTS

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PILOT MOUNTAIN, NC 27041
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DATE: 7-2-20

SHT. 10A

SCALE: NTS

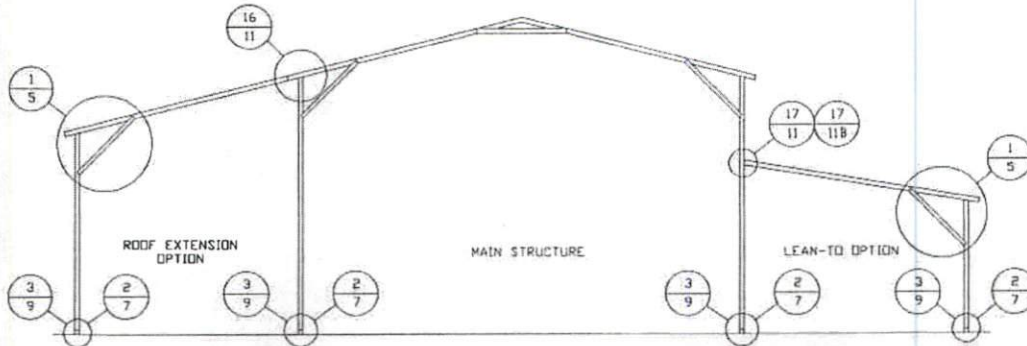
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18315S/19179S/
JOB NO: 20176S

REV: 2

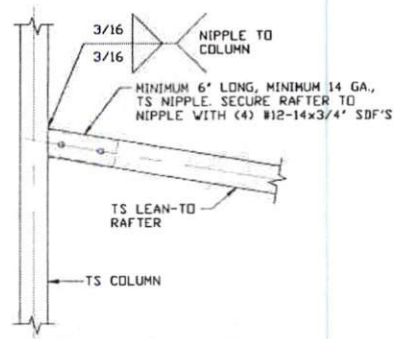
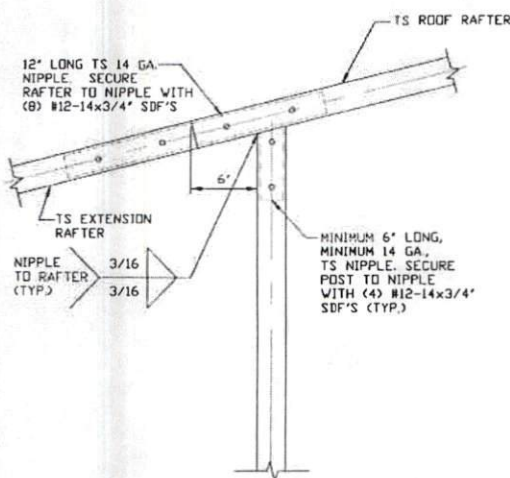
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BOX EAVE RAFTER LEAN-TO OPTIONS



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".
 MAXIMUM WIDTH OF DOUBLE MEMBER ROOF EXTENSION AND LEAN-TO OPTION IS 16'-0".



LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $\leq 12'-0"$

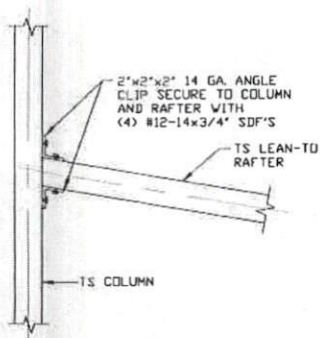
17A

SCALE: NTS

ROOF EXTENSION RAFTER/CORNER POST DETAIL FOR WIDTHS $\leq 12'-0"$

16

SCALE: NTS



LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $\leq 12'-0"$

17B

SCALE: NTS

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309 S. DEPOT STREET
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30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 11

SCALE: NTS

DWG. NO: SK-3

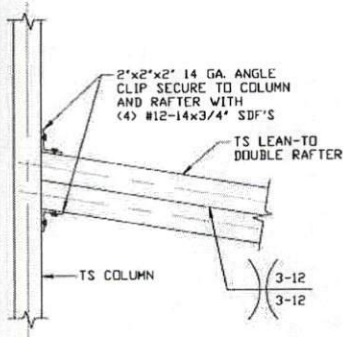
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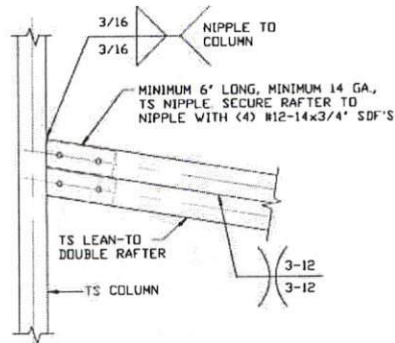
BOX EAVE RAFTER LEAN-TO OPTIONS



LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS 12'-0" < TO ≤ 16'-0"

17C

SCALE: NTS



LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS 12'-0" < TO ≤ 16'-0"

17D

SCALE: NTS

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30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 11A

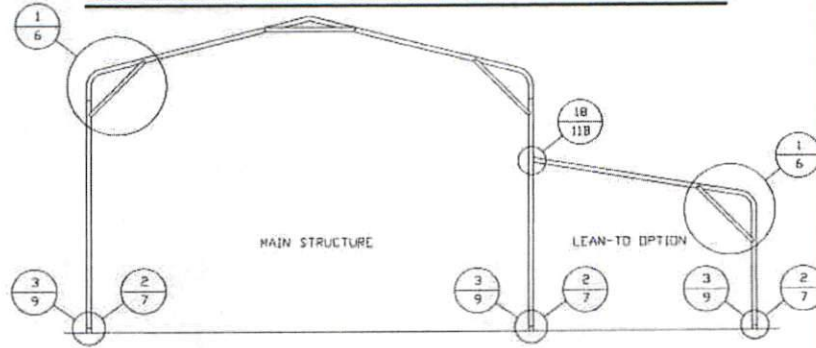
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DWG. NO: SK-3

18315S/19179S/
JOB NO: 20176S

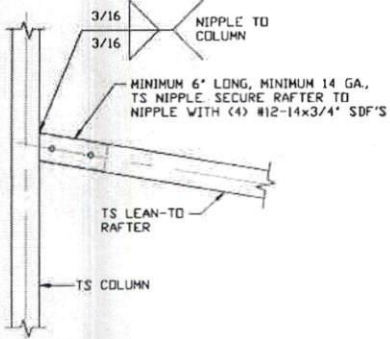
REV: 2

BOW EAVE RAFTER LEAN-TO OPTIONS

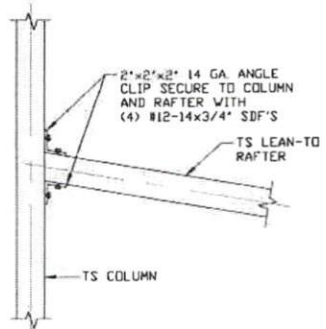


TYPICAL BOW EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION

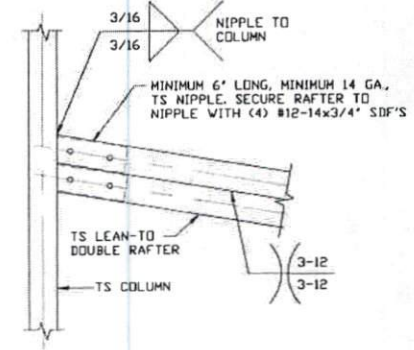
SCALE: NTS
 MAXIMUM WIDTH OF SINGLE MEMBER LEAN-TO OPTION IS 12'-0".
 MAXIMUM WIDTH OF DOUBLE MEMBER LEAN-TO OPTION IS 16'-0".



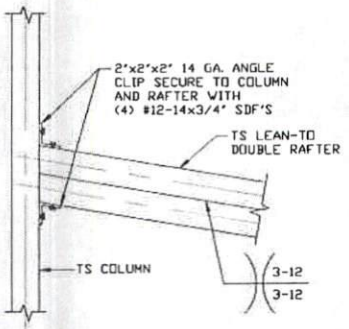
18A
 LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $\le 12'-0''$
 SCALE: NTS



18B
 LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $\le 12'-0''$
 SCALE: NTS



18C
 LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $12'-0'' < TO \le 16'-0''$
 SCALE: NTS



18D
 LEAN-TO RAFTER TO RAFTER POST CONNECTION DETAIL FOR WIDTHS $12'-0'' < TO \le 16'-0''$
 SCALE: NTS

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PROJECT MGR: WSM

CLIENT: NC CARPORTS

NC CARPORTS AND GARAGES, LLC
 309 S. DEPOT STREET
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 30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 11B

SCALE: NTS

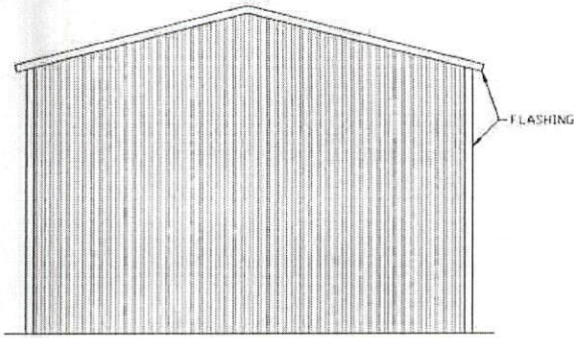
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18315S/19179S/
 JOB NO: 20176S

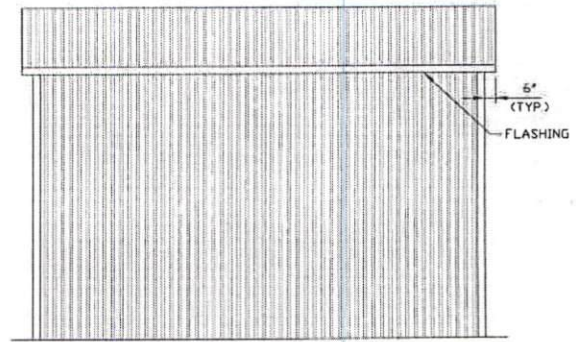
REV: 2

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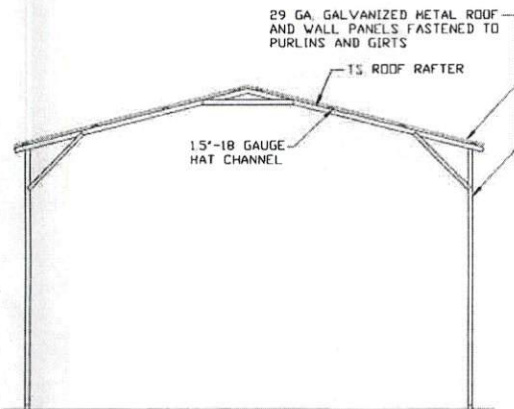
BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



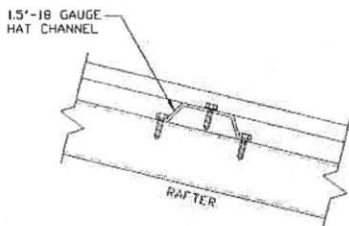
**TYPICAL END ELEVATION
VERTICAL ROOF/SIDING**
SCALE: NTS



**TYPICAL SIDE ELEVATION
VERTICAL ROOF/SIDING**
SCALE: NTS



**TYPICAL SECTION
VERTICAL ROOF/SIDING OPTION**
SCALE: NTS



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

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ENGINEERING AND CONSULTING, INC.**

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CHECKED BY: PH

PROJECT MGR: WSM

CLIENT: NC CARPDRS

NC CARPDRS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 12

SCALE: NTS

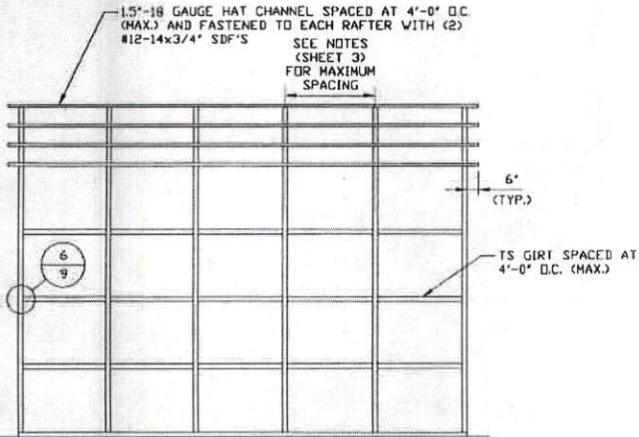
DWG. NO: SK-3

JOB NO: 18315S/19179S/
20176S

REV: 2

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BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



**TYPICAL FRAMING SECTION
VERTICAL ROOF/SIDING OPTION
WITH TS GIRTS**

SCALE: NTS

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

DRAWN BY: JG

CHECKED BY: PH

PROJECT MGR: WSM

CLIENT: NC CARPORTS

NC CARPORTS AND GARAGES, LLC
309 S. DEPOT STREET
PILOT MOUNTAIN, NC 27041
30'-0" x 16'-0" ENCLOSED STRUCTURE

DATE: 7-2-20

SHT. 12A

SCALE: NTS

DWG. NO: SK-3

18315S/19179S/
JOB NO: 20176S

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