



**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

*30' x 30'
Metal Building
With 12' lean to
and 10' Front over Hang
over to Roll up Door*



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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CHECKED BY: PH	30'-0" x 16'-0" ENCLOSED STRUCTURE		
PROJECT MGR: WSM	DATE: 7-2-20	SCALE: NTS	183155/19179S/ JOB NO: 20176S
CLIENT: NC CARPORTS	SHT. 1	DWG. NO: SK-3	REV. 2

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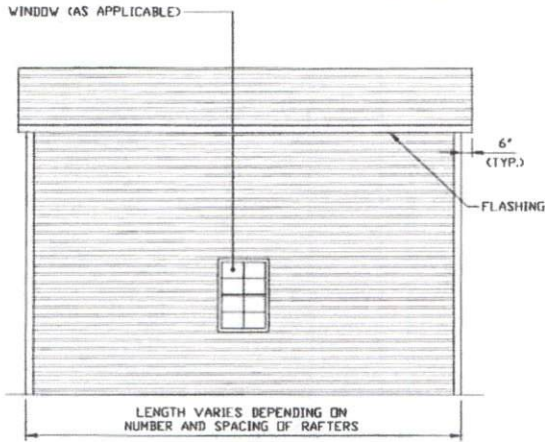
INSTALLATION NOTES AND SPECIFICATIONS

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 ≤ 24'-0" WITH U-CHANNEL COLLAR TIE)

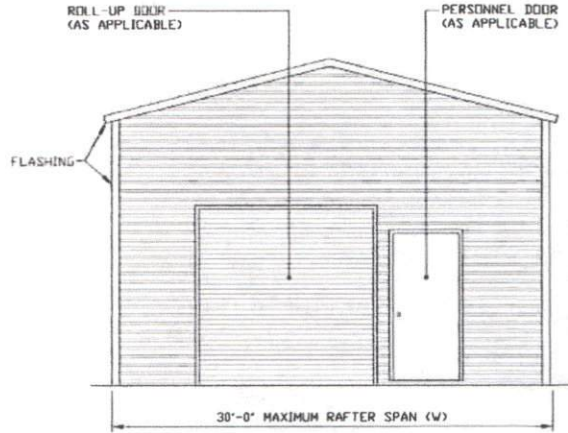
NOTE: UNBALANCED SNOW LOADS DUE TO DRIFTING HAVE NOT BEEN EVALUATED.
4. 3-SECOND GUST ULTIMATE WIND SPEED (V_{ULT}) 105 TO 145 MPH (NOMINAL WIND SPEED 82 TO 112 MPH).
5. MAXIMUM RAFTER/COLUMN AND END COLUMN SPACING = 5.0 FEET (UNLESS NOTED OTHERWISE).
6. SIDEWALL COLUMNS AND ENDWALL COLUMNS ARE SIMILAR 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
 - $S_{DS} = 2.039$
 - $S_{D1} = 1.258$
 - $I_E = 1.0$
 - $V = C_s W$

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BOX EAVE FRAME RAFTER STRUCTURE



TYPICAL SIDE ELEVATION
SCALE: NTS



TYPICAL END ELEVATION
SCALE: NTS

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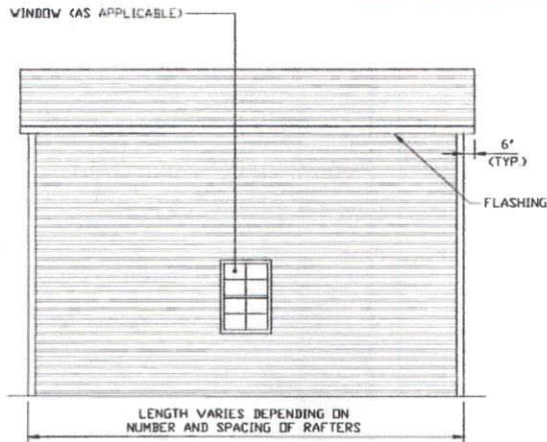
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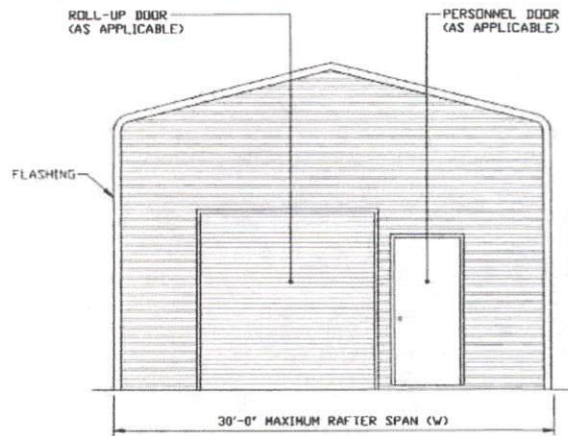
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BOW EAVE FRAME RAFTER STRUCTURE



TYPICAL SIDE ELEVATION
SCALE: NTS



TYPICAL END ELEVATION
SCALE: NTS

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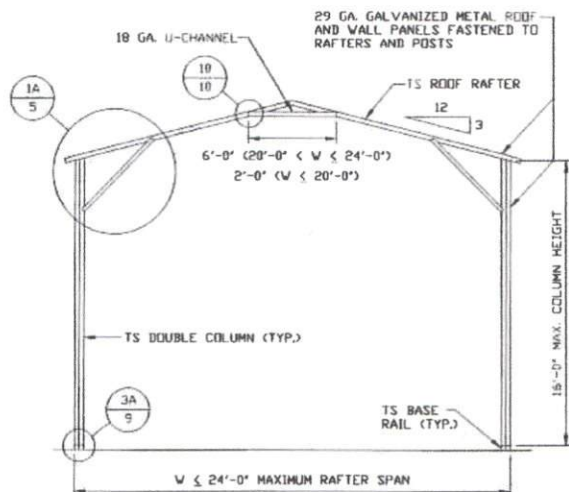
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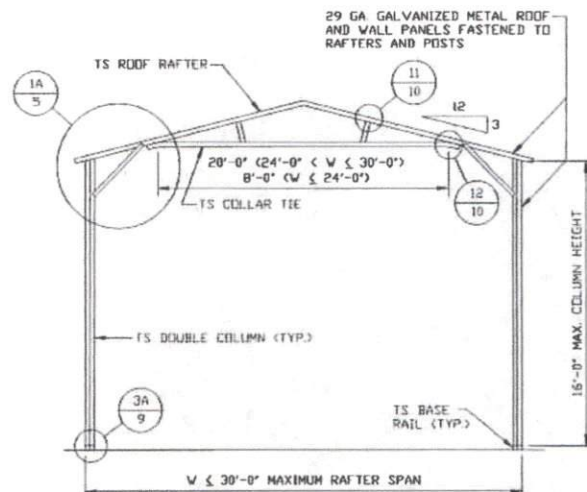
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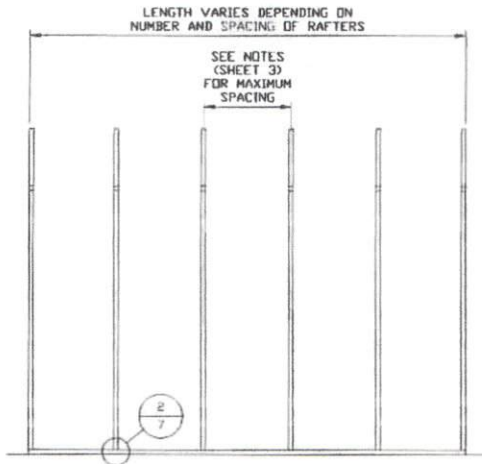
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TYPICAL RAFTER/COLUMN FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS

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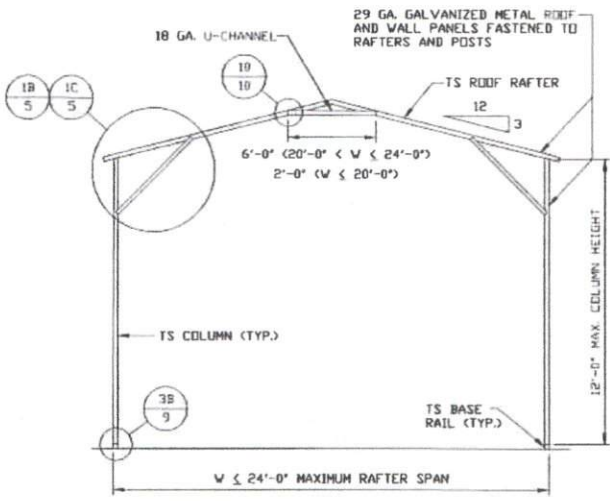
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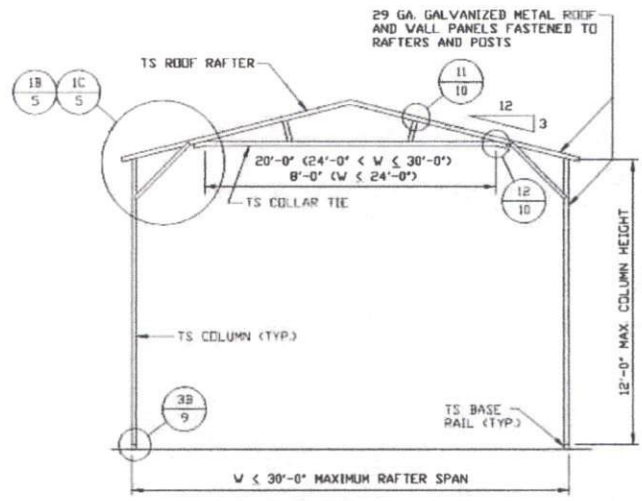
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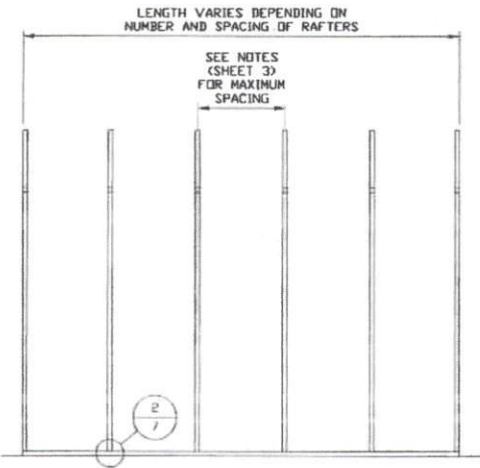
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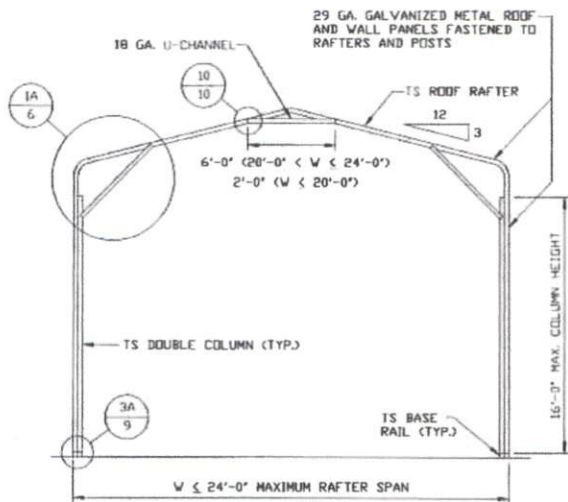
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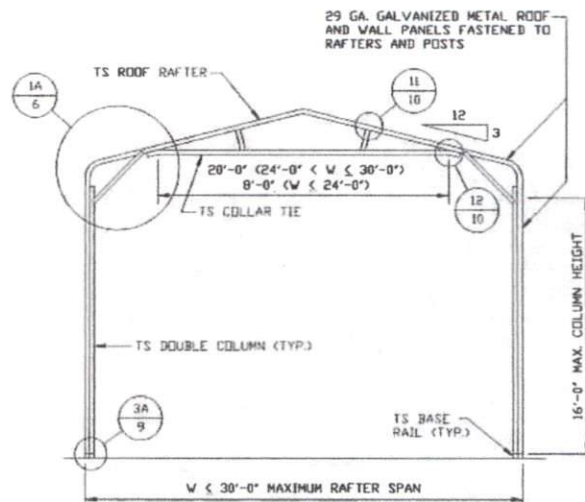
TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
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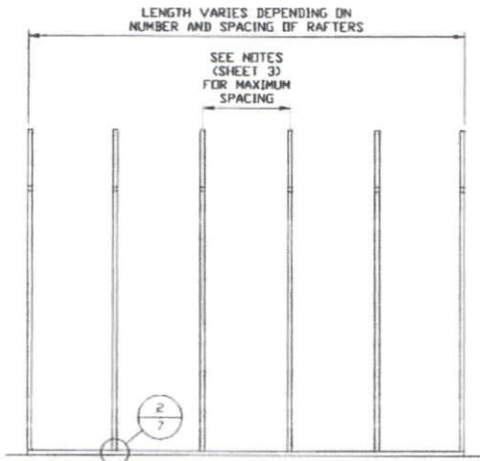
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TYPICAL RAFTER/COLUMN FRAME SECTION
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TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
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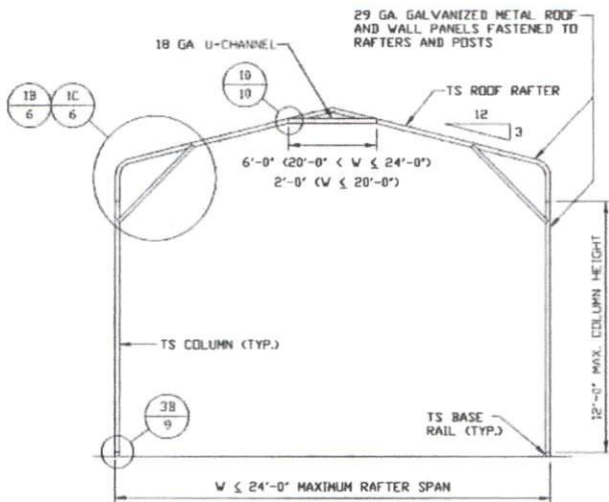
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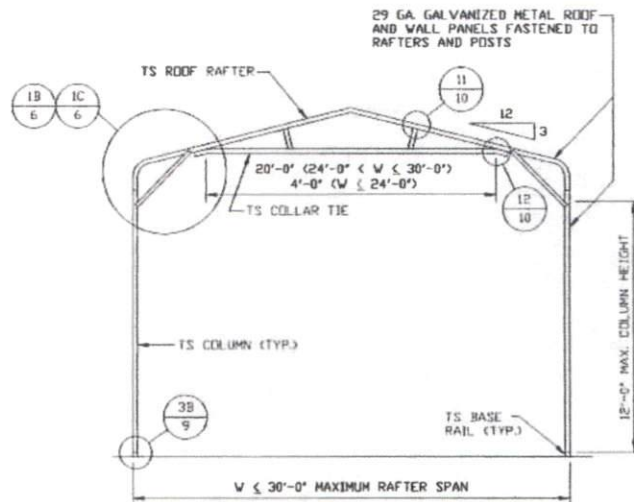
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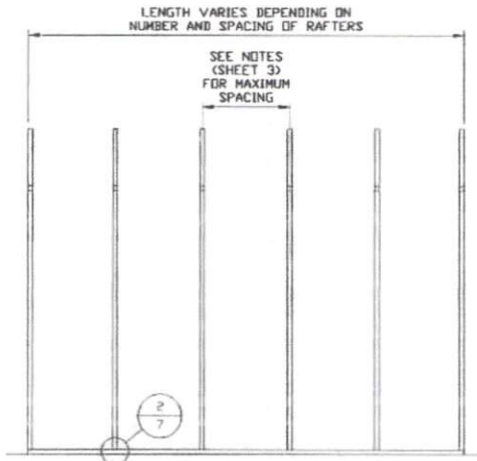
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TYPICAL RAFTER/COLUMN FRAME SECTION
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TYPICAL RAFTER/COLUMN FRAME SECTION
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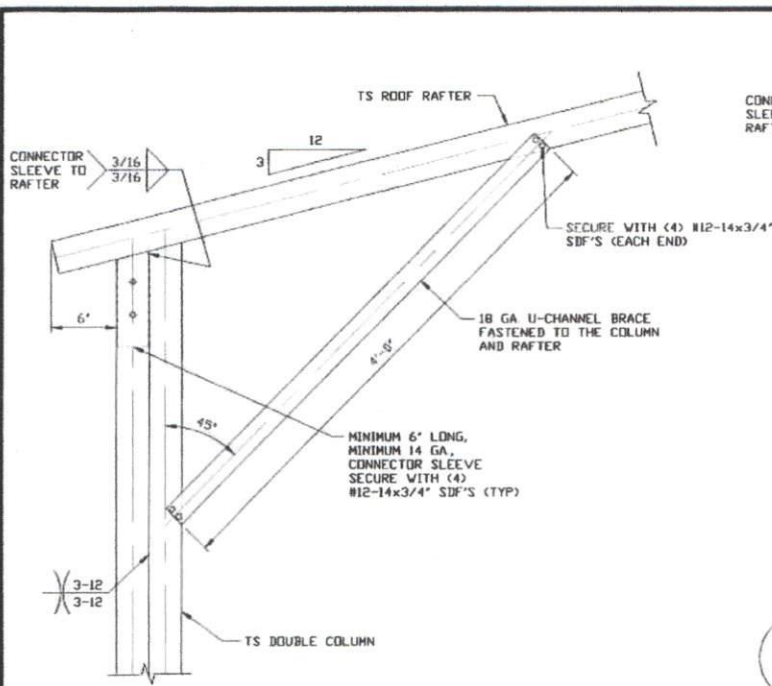
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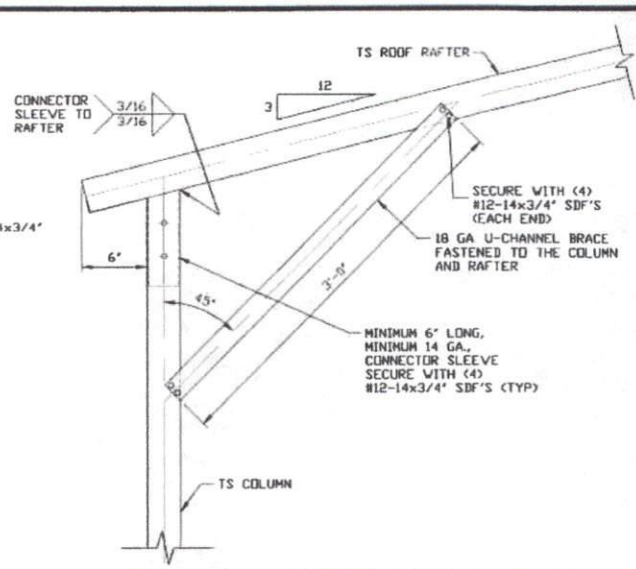
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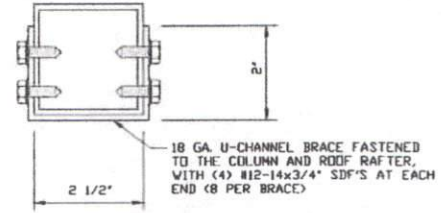
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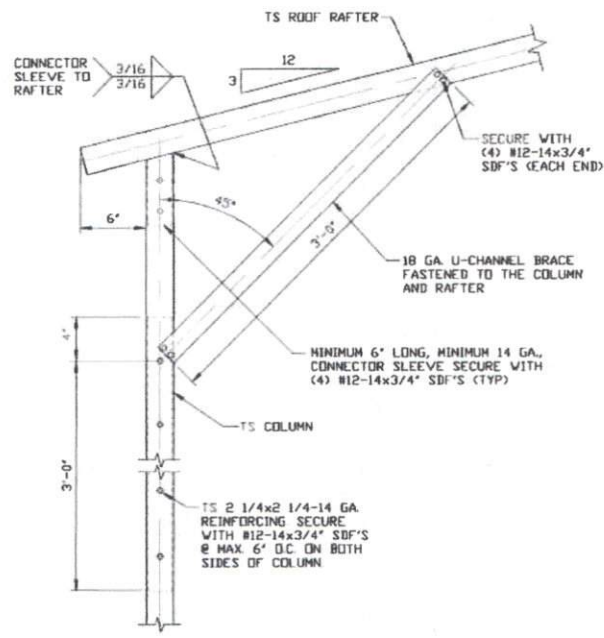
1A
BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS 12'-0" < TO <= 16'-0"
 SCALE: NTS



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

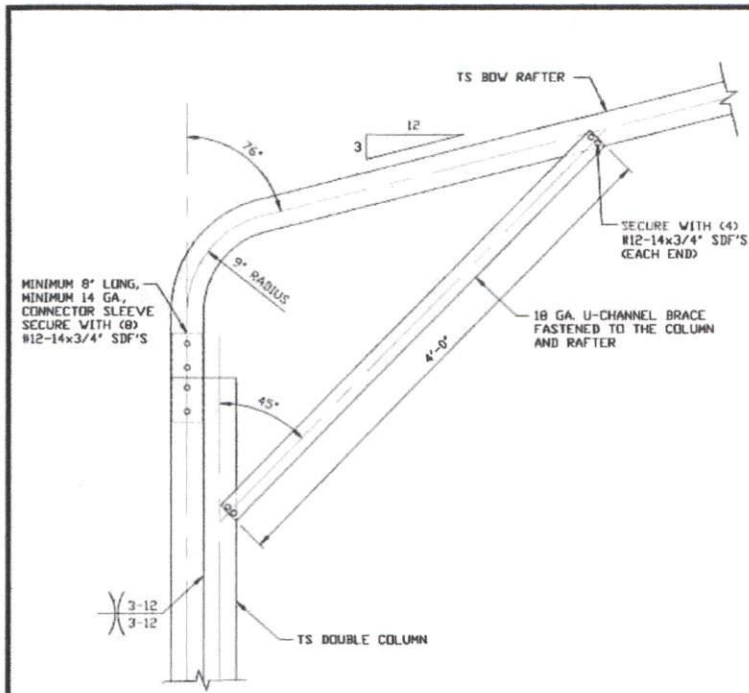


BRACE SECTION
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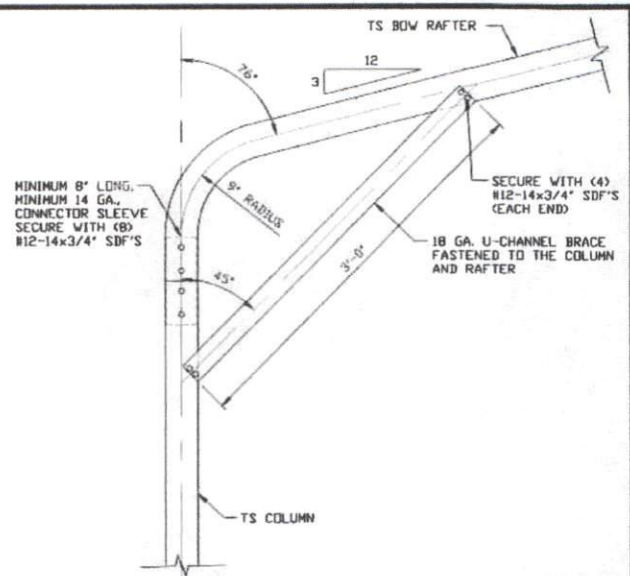
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BOX EAVE RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO <= 12'-0"
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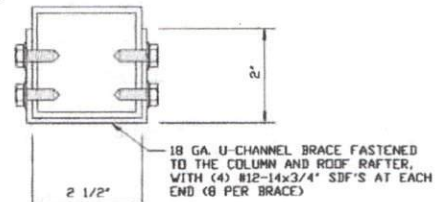
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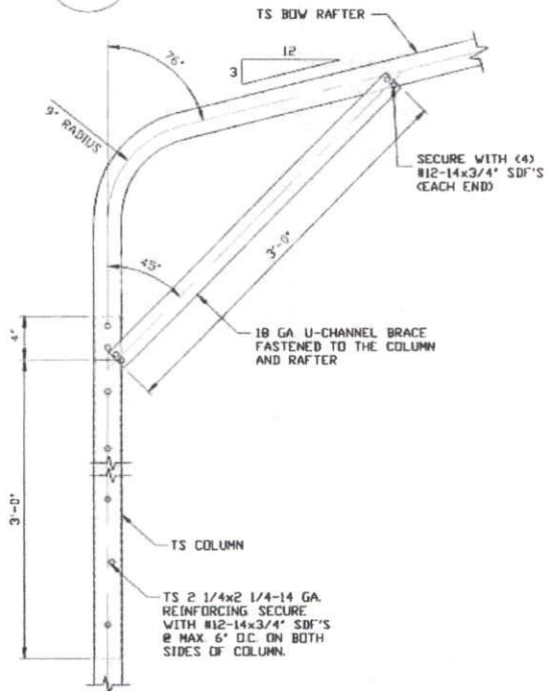


1C

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



BRACE SECTION
SCALE: NTS



1B

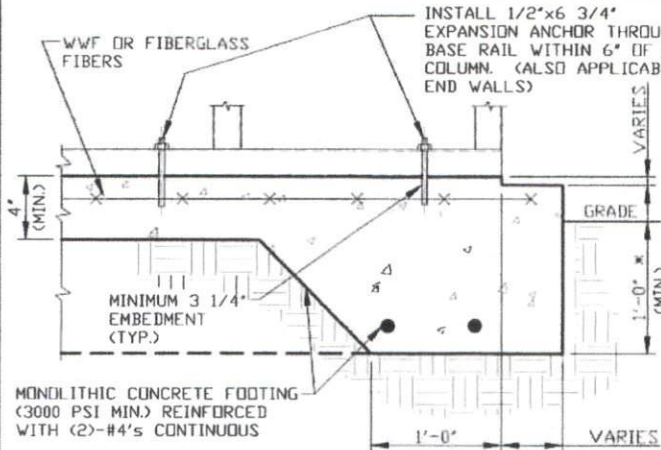
BOW RAFTER/CORNER POST CONNECTION DETAIL FOR HEIGHTS 10'-0" < TO <= 12'-0"
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BASE RAIL ANCHORAGE OPTIONS



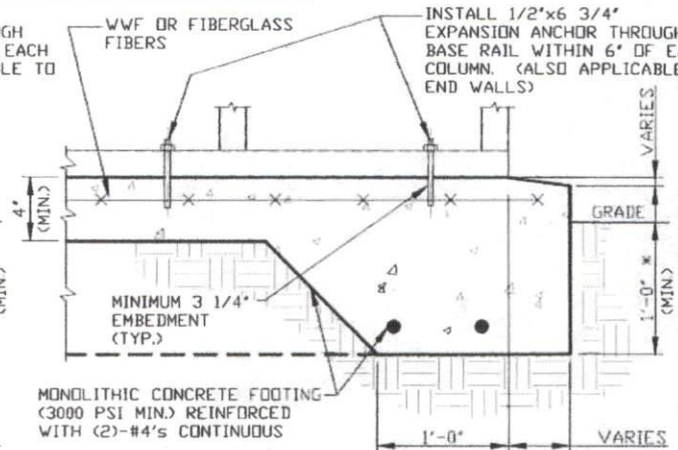
2A

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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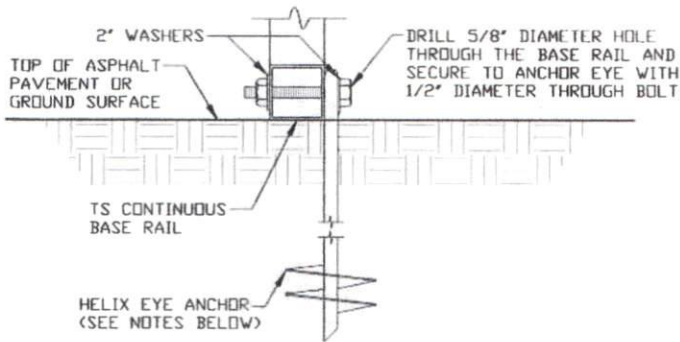
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BASE RAIL ANCHORAGE OPTIONS

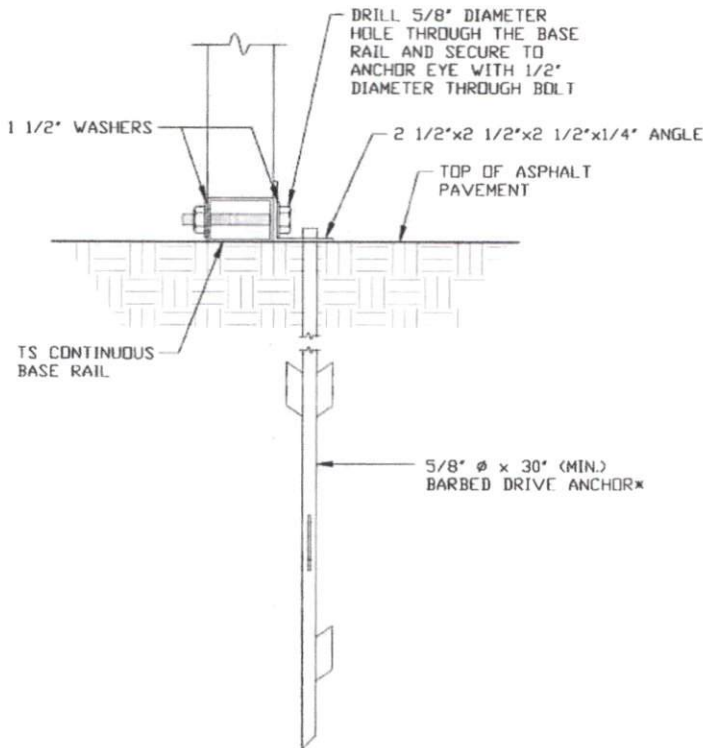


2C

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: 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. 7A

SCALE: NTS

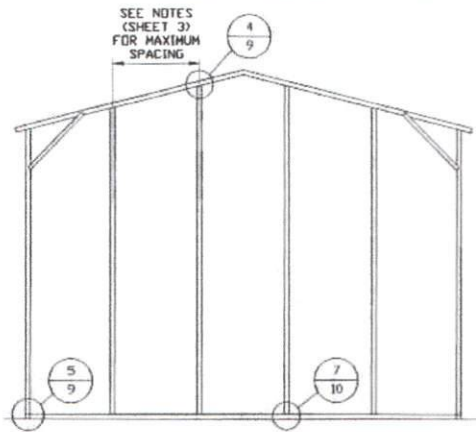
DWG. NO: SK-3

18315S/19179S/
JOB NO: 20176S

REV: 2

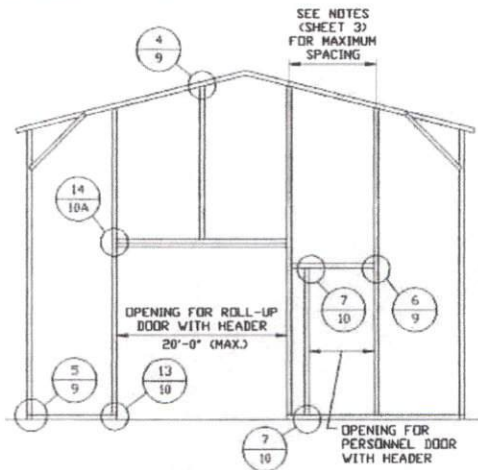
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



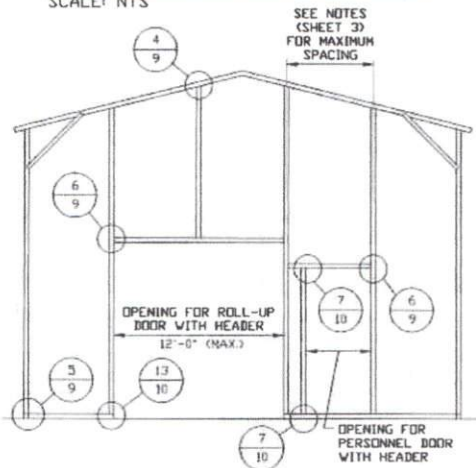
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

SCALE: NTS



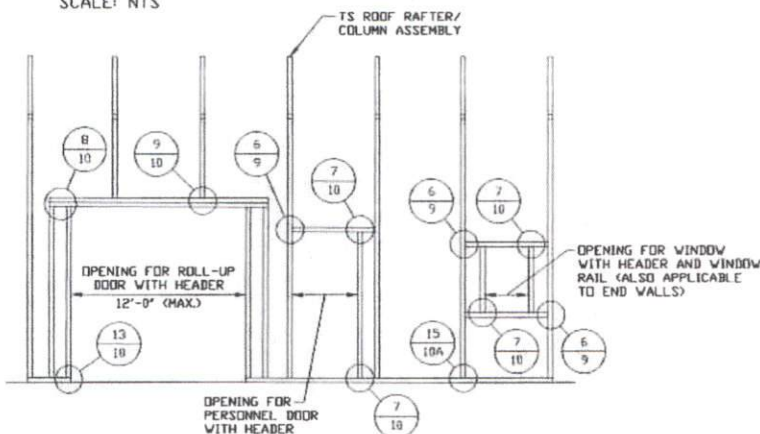
**TYPICAL BOX EAVE RAFTER END
WALL OPENINGS FRAMING SECTION**

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

DATE: 7-2-20

SHT. 8

SCALE: NTS

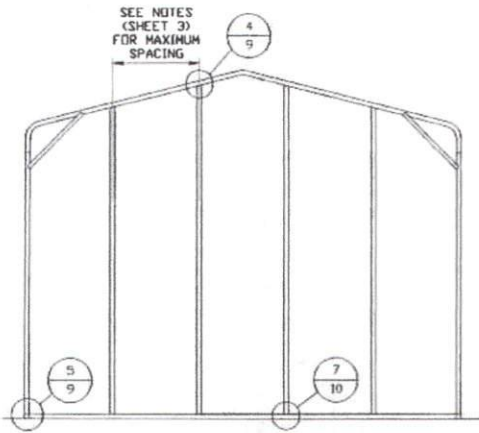
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**183155/19179S/
JOB NO: 20176S**

REV: 2

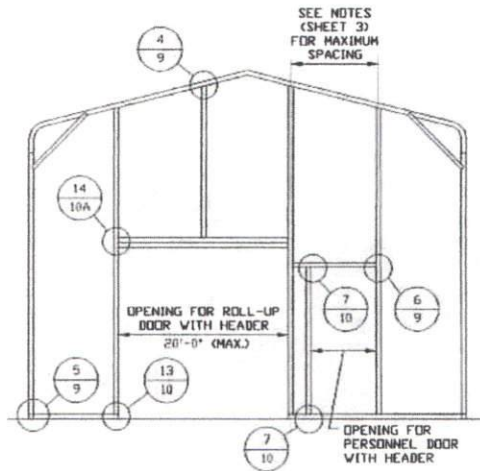
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BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



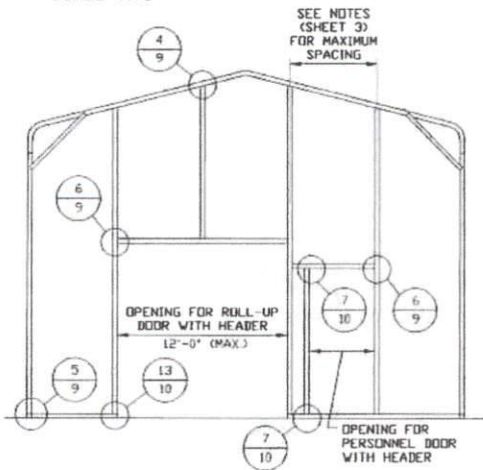
**TYPICAL BOX EAVE RAFTER
END WALL FRAMING SECTION**

SCALE: NTS



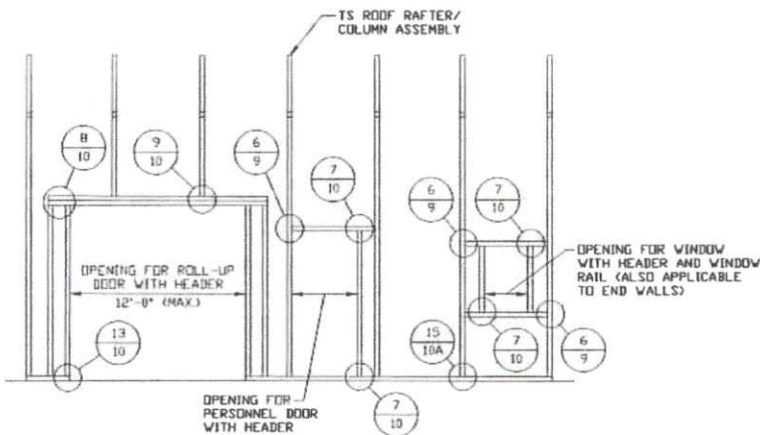
**TYPICAL BOX EAVE RAFTER END
WALL OPENINGS FRAMING SECTION**

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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309 S. DEPOT STREET
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DATE: 7-2-20

SHT. 8A

SCALE: NTS

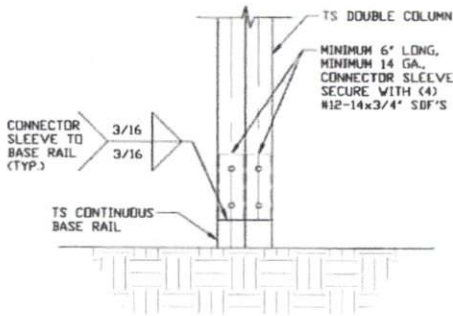
DWG. NO: SK-3

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

REV: 2

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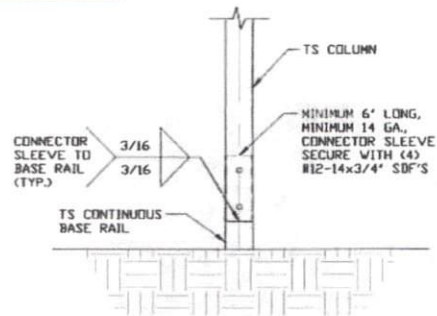
CONNECTION DETAILS



3A

POST/BASE RAIL CONNECTION DETAIL

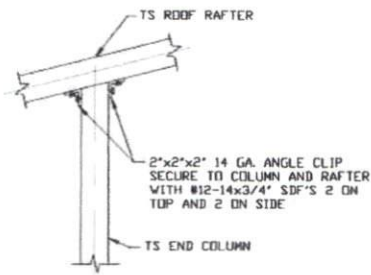
SCALE: NTS



3B

POST/BASE RAIL CONNECTION DETAIL

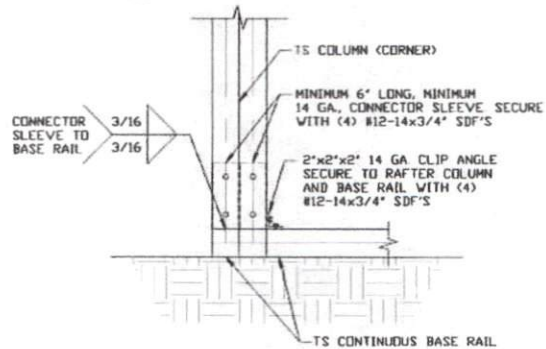
SCALE: NTS



4

END COLUMN/RAFTER CONNECTION DETAIL

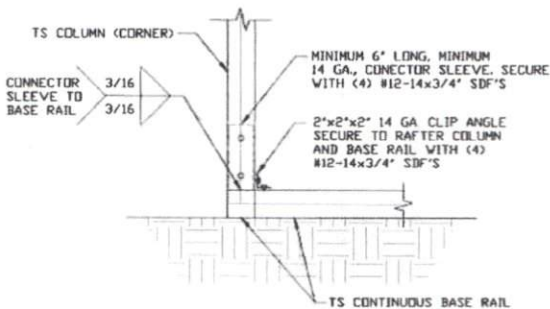
SCALE: NTS



5A

END COLUMN/BASE RAIL CONNECTION DETAIL

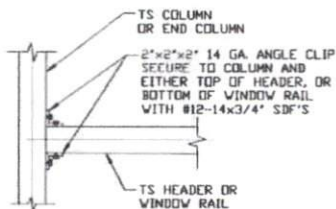
SCALE: NTS



5B

END COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS



6

COLUMN OR WINDOW RAIL TO POST CONNECTION DETAIL

SCALE: NTS

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

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SCALE: NTS

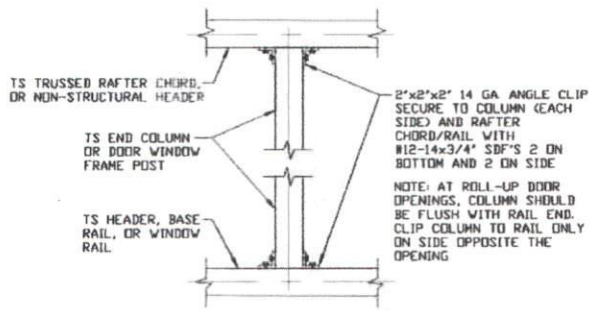
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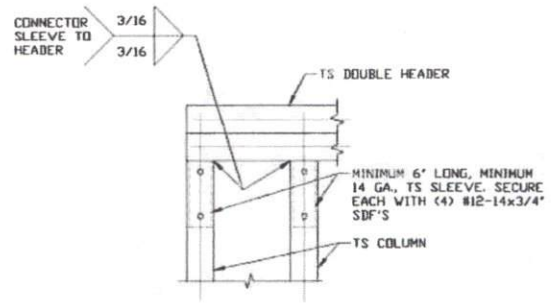
CONNECTION DETAILS



7

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

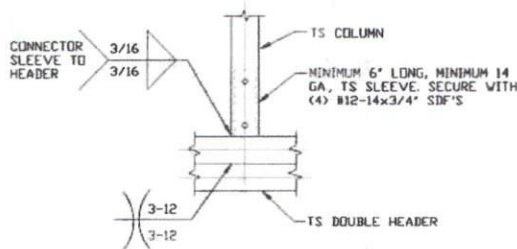
SCALE: NTS



8

DOUBLE HEADER/COLUMN CONNECTION DETAIL

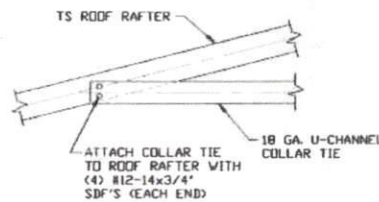
SCALE: NTS



9

COLUMN/DOUBLE HEADER CONNECTION DETAIL

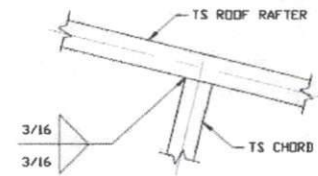
SCALE: NTS



10

COLLAR TIE CONNECTION DETAIL

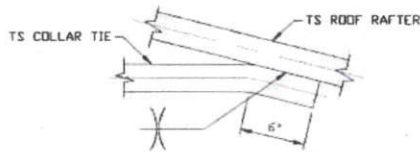
SCALE: NTS



11

RAFTER TO CHORD CONNECTION DETAIL

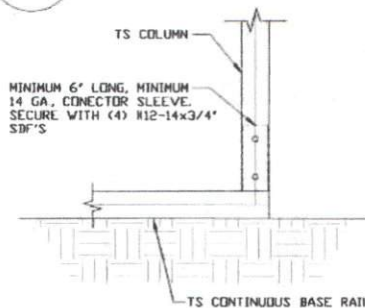
SCALE: NTS



12

COLLAR TIE CONNECTION DETAIL

SCALE: NTS



13

COLUMN/BASE RAIL CONNECTION DETAIL

SCALE: NTS

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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

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SCALE: NTS

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IN THE CASE OF THE ... THE ... THE
MOORE AND ASSOCIATES

13 CONNECTION DETAIL
 CONNECTION DETAIL

15 CONNECTION DETAIL
 CONNECTION DETAIL

9 CONNECTION DETAIL
 CONNECTION DETAIL

10 CONNECTION DETAIL
 CONNECTION DETAIL

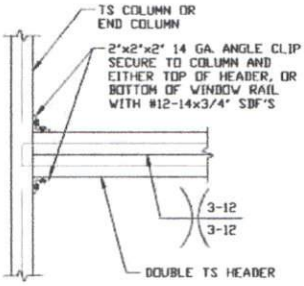
11 CONNECTION DETAIL
 CONNECTION DETAIL

7 CONNECTION DETAIL
 CONNECTION DETAIL

8 CONNECTION DETAIL
 CONNECTION DETAIL

CONNECTION DETAIL

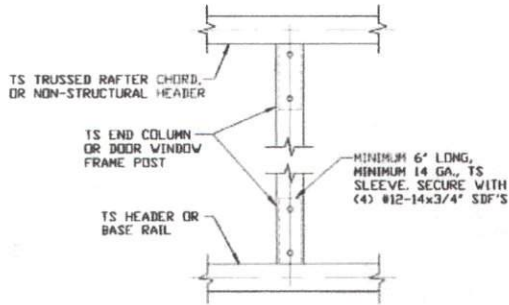
CONNECTION DETAILS



**DOUBLE HEADER
TO COLUMN
CONNECTION DETAIL**

14

SCALE: NTS



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

15

SCALE: NTS

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

DATE: 7-2-20

SHT. 10A

SCALE: NTS

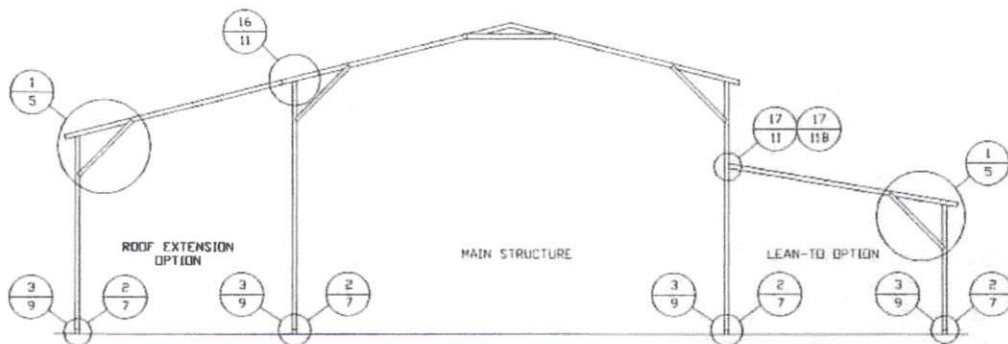
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BOX EAVE RAFTER LEAN-TO OPTIONS

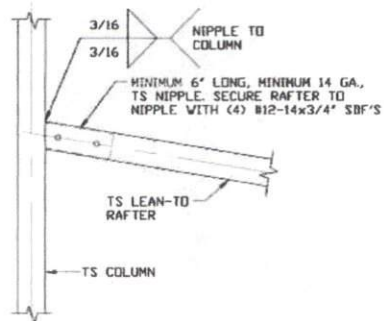
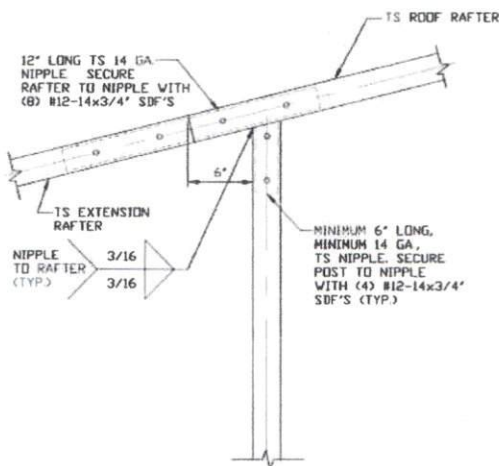


TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

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"

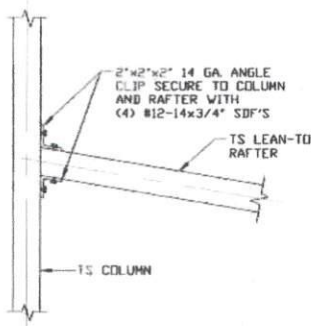
SCALE: NTS

17A

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

SCALE: NTS

16



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

SCALE: NTS

17B

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

DATE: 7-2-20

SCALE: NTS

JOB NO: 20176S

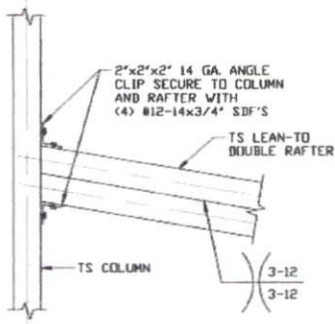
SHT. 11

DWG. NO: SK-3

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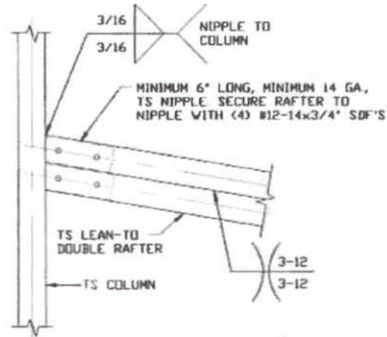
BOX EAVE RAFTER LEAN-TO OPTIONS



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

DATE: 7-2-20

SHT. 11A

SCALE: NTS

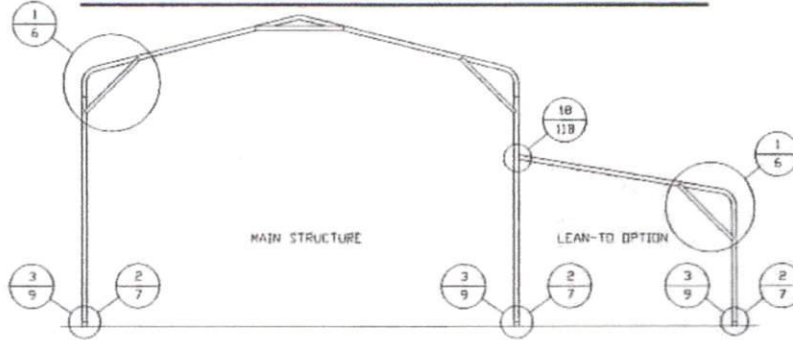
DWG. NO: SK-3

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JOB NO: 20176S

REV: 2

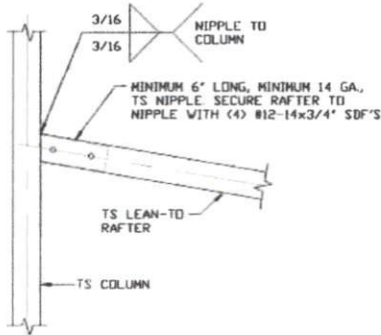
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BOW EAVE RAFTER LEAN-TO OPTIONS



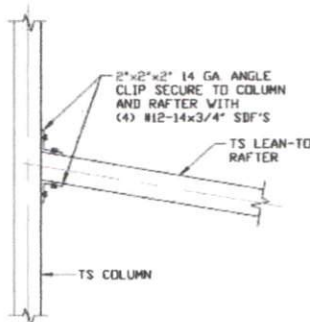
TYPICAL BOW EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION

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



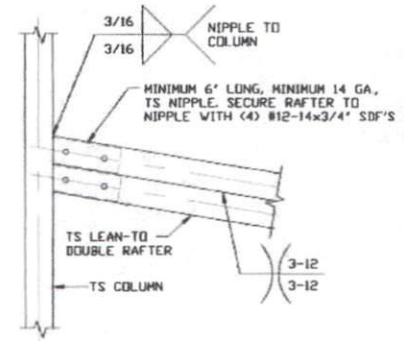
18A

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



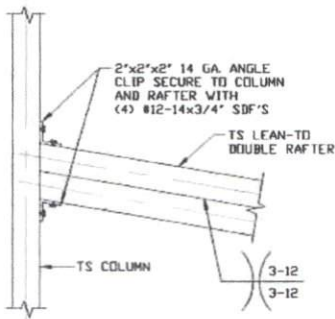
18B

**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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CHECKED BY: PH

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

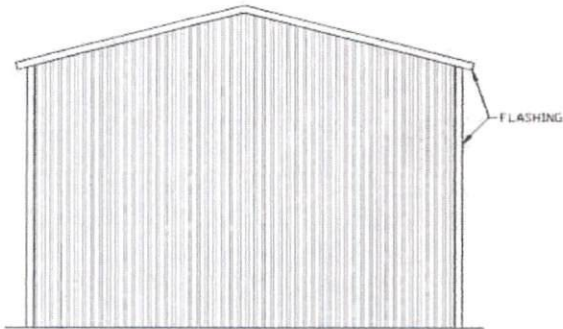
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REV: 2

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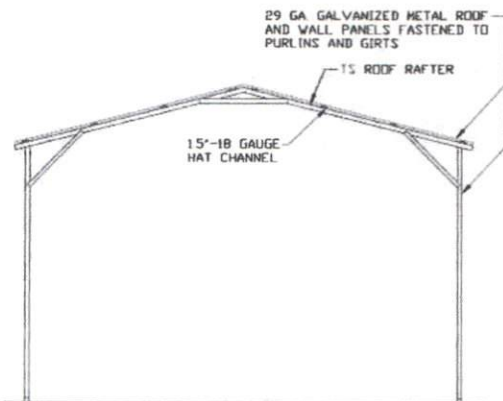
BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



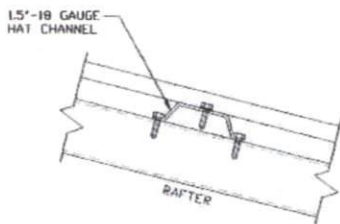
**TYPICAL END ELEVATION
VERTICAL ROOF/SIDING**
SCALE: NTS



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

DATE: 7-2-20

SCALE: NTS

JOB NO: 20176S

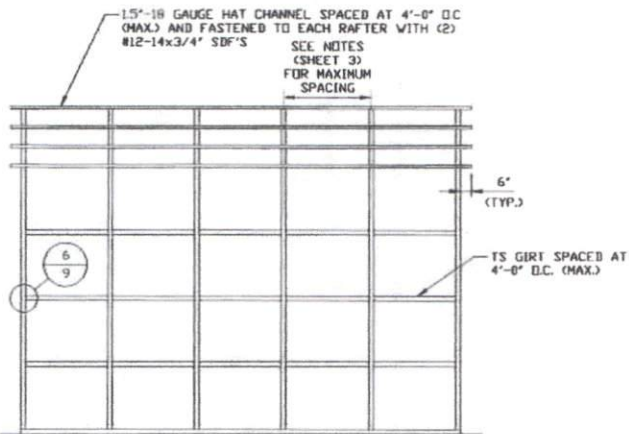
SHT. 12

DWG. NO: SK-3

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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	NC CARPORTS AND GARAGES, LLC 309 S. DEPOT STREET PILOT MOUNTAIN, NC 27041 30'-0" x 16'-0" ENCLOSED STRUCTURE		
	CHECKED BY: PH	18315S/19179S/ JOB NO: 20176S		
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	CLIENT: NC CARPORTS	SHT. 12A	DWG. NO: SK-3	REV: 2