# **A PLUS CARPORTS**

# STRUCTURAL DESIGN

# **ENCLOSED BUILDING**

# MAXIMUM 30'-0" WIDE X 20'- 0" EAVE HEIGHT-BOX EAVE FRAME AND BOW FRAME

11 November 2020 Revision 0 M&A Project No. 20209S

Prepared for:

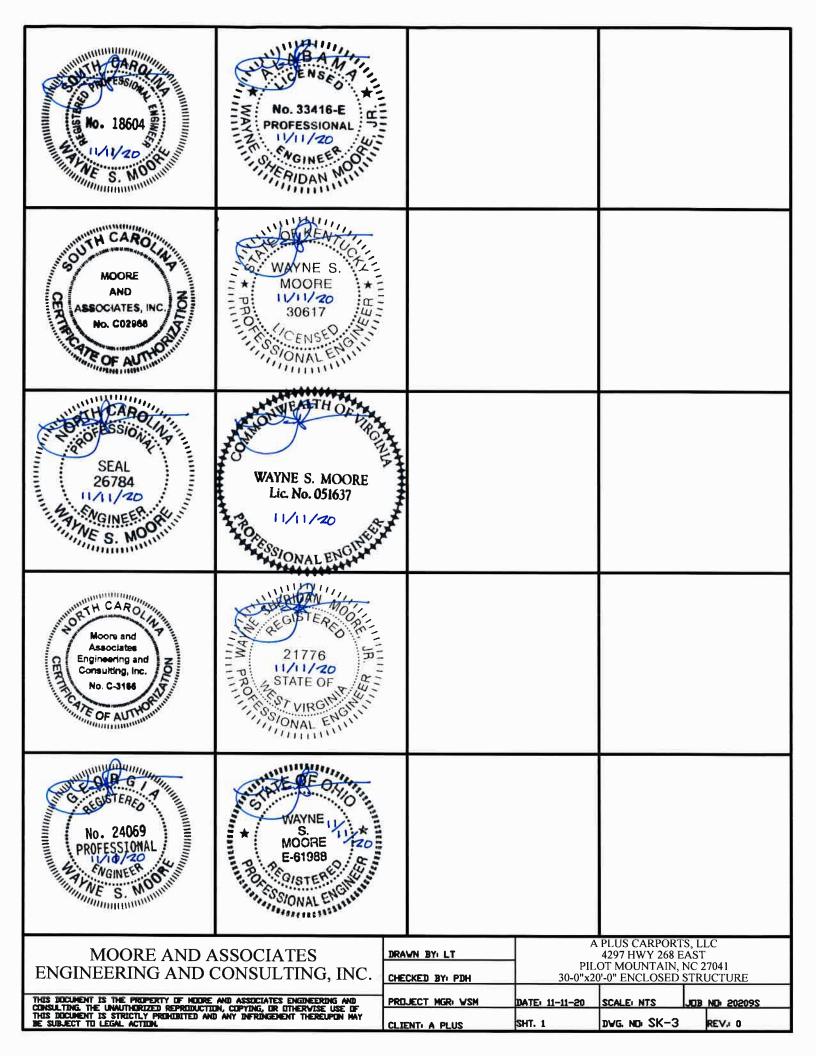
A Plus Carports, LLC 4297 Hwy 268 East Pilot Mountain, NC 27041

# Prepared by:

Moore and Associates Engineering and Consulting, Inc. 1009 East Avenue North Augusta, SC 29841

> 401 S. Main Street, Suite 200 Mount Airy, NC 27030





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#### INSTALLATION NOTES AND SPECIFICATIONS

- 1. DESIGN IS FOR MAXIMUM 30'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURES.
- 2 DESIGN WAS DONE IN ACCORDANCE WITH THE 2018 NORTH CAROLINA BUILDING CODE (NCBC), 2018 INTERNATIONAL BUILDING CODE (IBC), 2015 IBC AND 2012 IBC:
- 3. DESIGN LOADS ARE AS FOLLOWS:

A) DEAD LOAD = 115 PSF
B) LIVE LOAD = 20 PSF
C) GROUND SNOW LOAD = 25 PSF

NOTE: UNBALANCED SNOW LOAD DUE TO DRIFTING HAS NOT BEEN EVALUATED.

- 4. 3-SECOND GUST ULTIMATE WIND SPEED < VULT> = ≤ 155 MPH (NOMINAL WIND SPEED = ≤ 120 MPH).
- 5, MAXIMUM RAFTER/POST AND END POST SPACING = 40 FEET (UNLESS NOTED OTHERWISE).
- 6, END WALL COLUMNS (POSTS) ARE EQUIVALENT TO SIDE WALL POSTS IN SIZE AND SPACING (UNLESS NOTED OTHERWISE).
- 7 RISK CATEGORY I/II
- 8 WIND EXPOSURE CATEGORY B/C
- 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), TS 2 1/4" x 2 1/4" x 1/4" 12 GAUGE MAY BE USED AS OPTIONAL FRAMING MEMBERS.
- 10, AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR HAT CHANNELS, AND COLUMNS (INTERIOR OR END) = 10° D.C. (MAX.) FOR RC I AND 8° D.C. (MAX.) FOR RC II.
- 11. FASTENERS CONSIST OF #12-14×3/4° 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, ROOF SLOPES LESS THAN 3:12 REQUIRE USE OF LAP JOINT SEALANT.
- 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 x 36' LONG AND MAY BE USED IN SUITABLE SOILS

  □PTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED. SOIL NAILS MAY DNLY BE

  USED FOR WIND SPEEDS ≤ 145 MPH. COORDINATE WITH LOCAL CODES/ORDINANCES REGARDING MINIMUM LENGTH FOR FROST DEPTH PROTECTION.
- 14. WIND FORCES GOVERN OVER SEISMIC FORCES, SEISMIC PARAMETERS ANALYZED ARE:

SDIL SITE CLASS = D RISK CATEGORY [/II

R= 3.25  $I_E= 1.0$   $S_{DS}= 2.039 g$   $V= C_SW$ 

S<sub>D1</sub>= 1.258 g

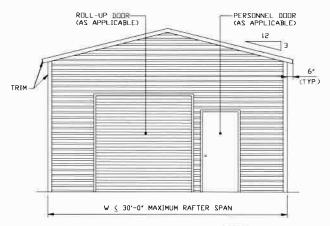
15. MAXIMUM THRESHOLD HEIGHT FOR PERSONNEL DOORS USED FOR MEANS OF EGRESS IN RC II STRUCTURES IS 1/2.

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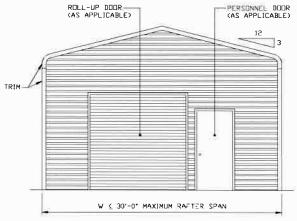
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### BOX EAVE FRAME RAFTER STRUCTURE

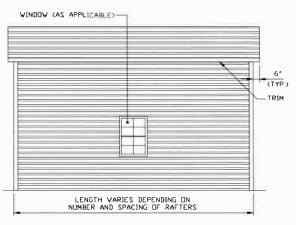


TYPICAL END ELEVATION

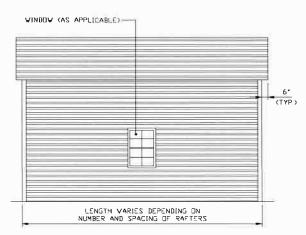
# BOW EAVE FRAME RAFTER STRUCTURE



TYPICAL END ELEVATION
SCALE: NTS



TYPICAL SIDE ELEVATION
SCALE: NTS

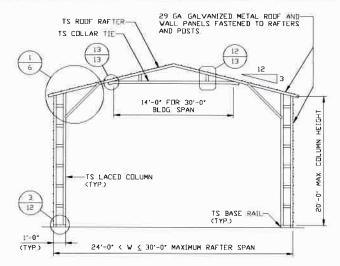


TYPICAL SIDE ELEVATION SCALE: NTS

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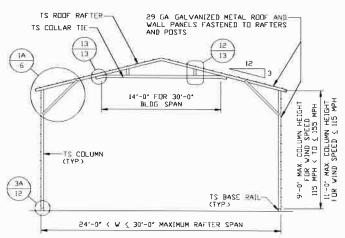
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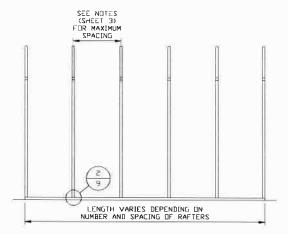
### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



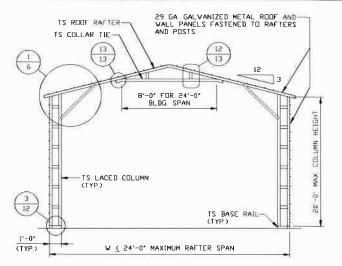
# TYPICAL RAFTER/COLUMN END FRAME SECTION

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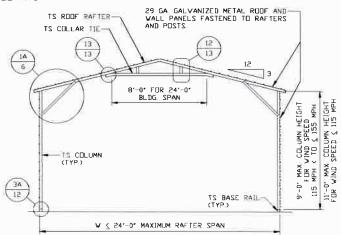
# TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS



### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS

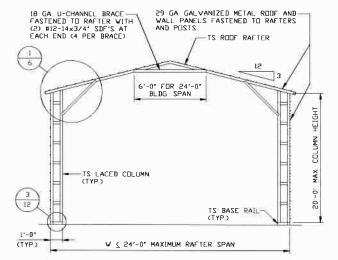


# TYPICAL RAFTER/COLUMN END FRAME SECTION

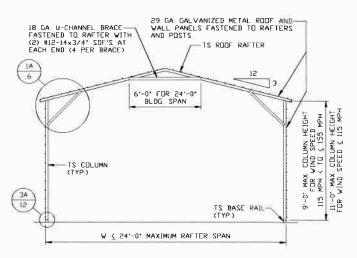
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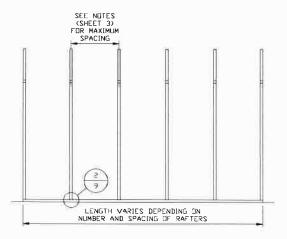
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# TYPICAL RAFTER/COLUMN END FRAME SECTION



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS

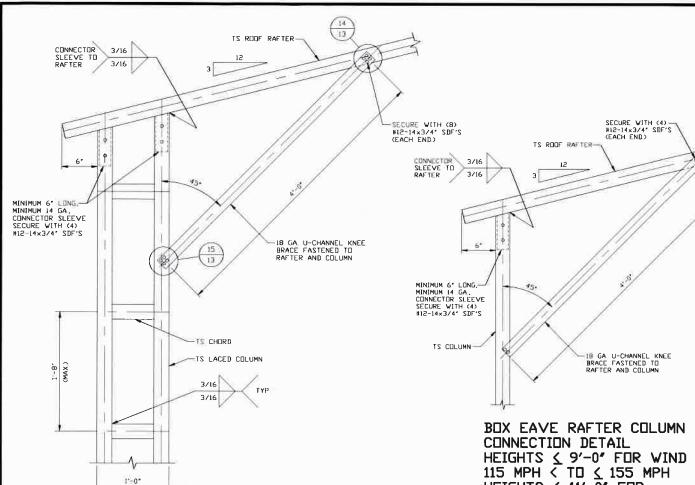


# TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION SCALE: NTS

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BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR HEIGHTS 9'-0' < TO < 20'-0" SCALE: NTS

18 GA U-CHANNEL BRACE FASTENED TO THE COLUMN AND ROOF BEAM, WITH (8) #12-14×3/4' SDF'S AT EACH END (16 PER BRACE) 2 1/2"

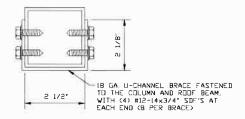
# BRACE SECTION

SCALE: NTS

1

HEIGHTS ≤ 9'-0" FOR WIND SPEED 115 MPH < TO ≤ 155 MPH HEIGHTS < 11'-0' FOR WIND SPEED & 115 MPH

SCALE: NTS NBTE: 3'-0" KNEE BRACE MAY BE USED FOR BUILDING WIDTH \( 24'-0"

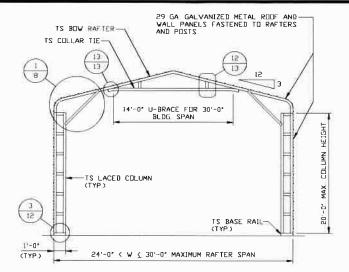


### BRACE SECTION

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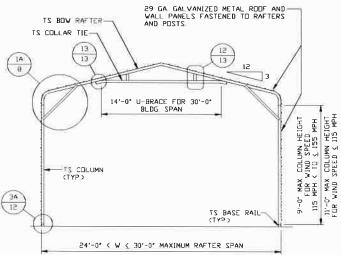
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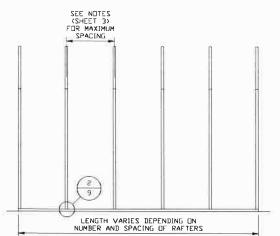
#### **TYPICAL** RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



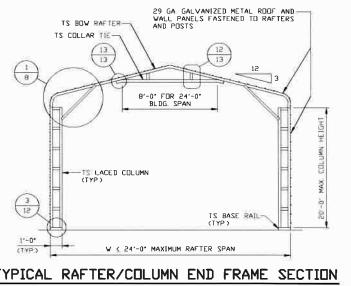
### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



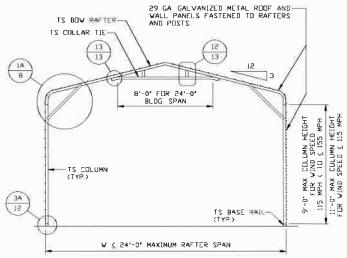
### TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION

SCALE: NTS



### **TYPICAL**

SCALE: NTS



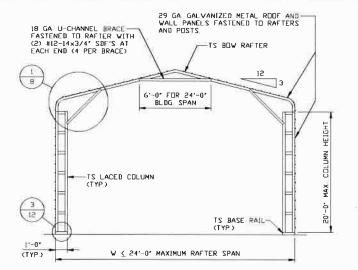
### TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS

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	DRAWN BY: LT		4297 HWY 268 E	AST				
		A PLUS CARPORTS, LLC						



# TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS

29 GA GALVANIZED METAL ROOF AND WALL PANELS FASTENED TO RAFTERS AND POSTS

18 GA U-CHANNEL BRACE FASTENED TO RAFTERS AND POSTS

18 GA U-CHANNEL BRACE WITH A LIBRARY SPE'S AT EACH END (4 PER BRACE)

19 G'-0' FOR 24'-0' BLDG SPAN

11 STAND SPEED TO RAFTER

12 BOV RAFTER

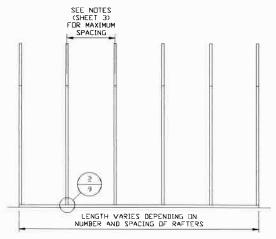
13 TS BASE RAIL (TYP)

14 TS BASE RAIL (TYP)

15 BASE RAIL (TYP)

16 G'-0' MAXIMUM RAFTER SPAN

# TYPICAL RAFTER/COLUMN END FRAME SECTION SCALE: NTS

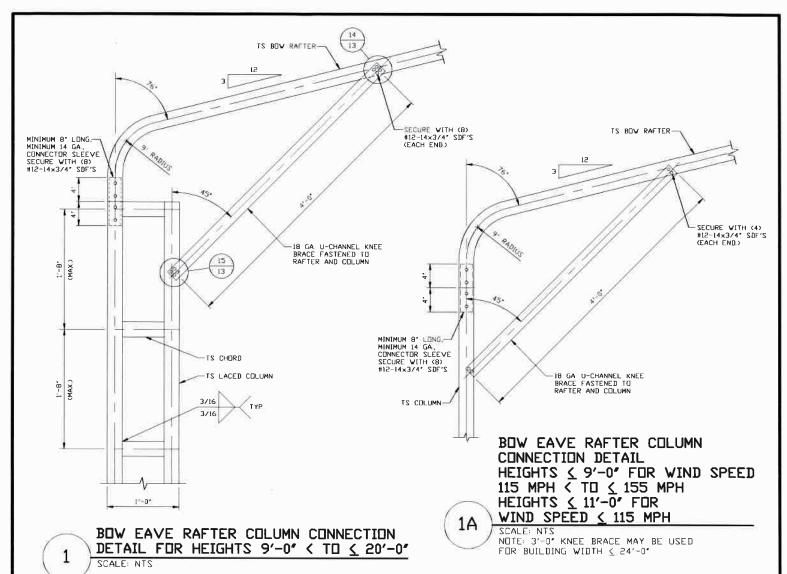


# TYPICAL RAFTER/COLUMN FRAMING SIDE SECTION

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DRAWN BY: LT	A	PLUS CARPORTS 4297 HWY 268 EA				



-18 GA U-CHANNEL BRACE FASTENED TO THE COLUMN AND ROOF BEAM, WITH (8) #12-14×3/4" SDF'S AT EACH END (16 PER BRACE) 2 1/2\*

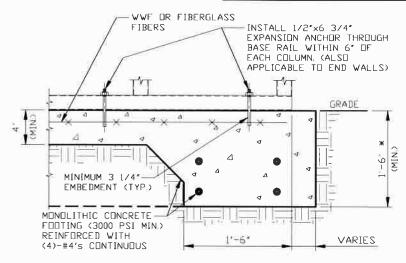
BRACE SECTION SCALE: NTS

# -18 GA. U-CHANNEL BRACE FASTENED TO THE COLUMN AND RODE BEAM, WITH (4) #12-14×3/4" SDF'S AT EACH END (8 PER BRACE) 2 1/2\*

BRACE SECTION SCALE: NTS

MOORE AND ASSOCIATES	DRAWN BY: LT	A	A PLUS CARPORTS, LLC 4297 HWY 268 EAST			
ENCINEEDING AND CONCULTING INC	CHECKED BY: PDH		OT MOUNTAIN, N )'-0" ENCLOSED S			
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### **BASE RAIL ANCHORAGE OPTIONS**





### 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.

# **GENERAL NOTES**

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

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

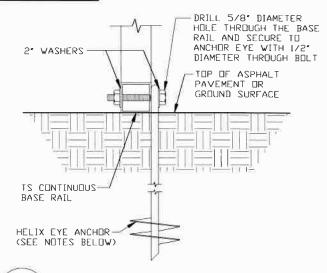
THE TURNDOWN REINFORCING STEEL SHALL BE ASTM AGI5 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT

### 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

#### 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
- 50 FOR VERY LOSE TO MEDIUM DENSE SANDS, FIRM TO STIFFER CLAYS AND SILTS, ALLUVIAL FILL, USE MINIMUM (2) 8° HELICES WITH MINIMUM 60° EMBEDMENT.



2A

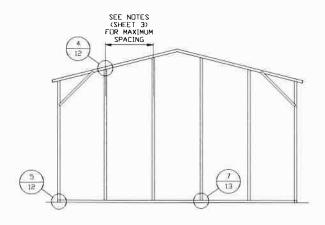
#### GROUND BASE HELIX ANCHORAGE

(CAN BE USED FOR ASPHALT)

COORDINATE WITH LOCAL CODES/ORD. REGARDING MIN. FROST DEPTH (LENGTH).

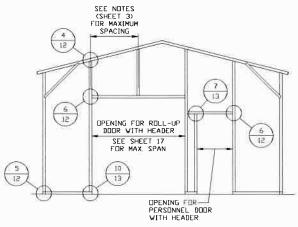
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# BOX EAVE RAFTER END WALL AND SIDE WALL OPENINGS



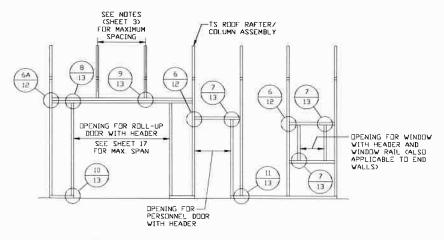
# TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: NTS



# TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION

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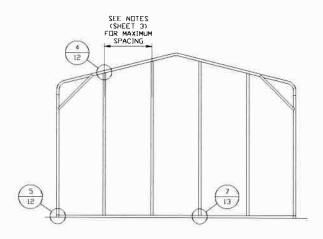


# TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

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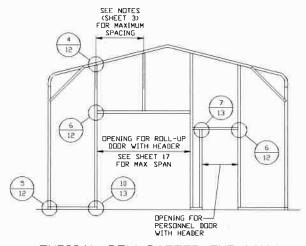
CHECKED BY: PDH	30-0"x20	4297 HWY 268 EAST PILOT MOUNTAIN, NC 27041 30-0"x20'-0" ENCLOSED STRUCTURE					
	Į	SCALE: NTS JUD DWG. ND: SK-3	B ND: 20209S REV.: 0				

# **BOW EAVE RAFTER END WALL AND SIDE WALL OPENINGS**



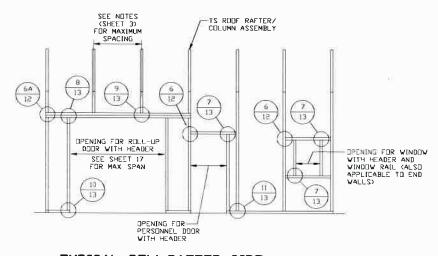
# TYPICAL BOW RAFTER END WALL FRAMING SECTION

SCALE: NTS



# TYPICAL BOW RAFTER END WALL OPENINGS FRAMING SECTION

SCALE: NTS

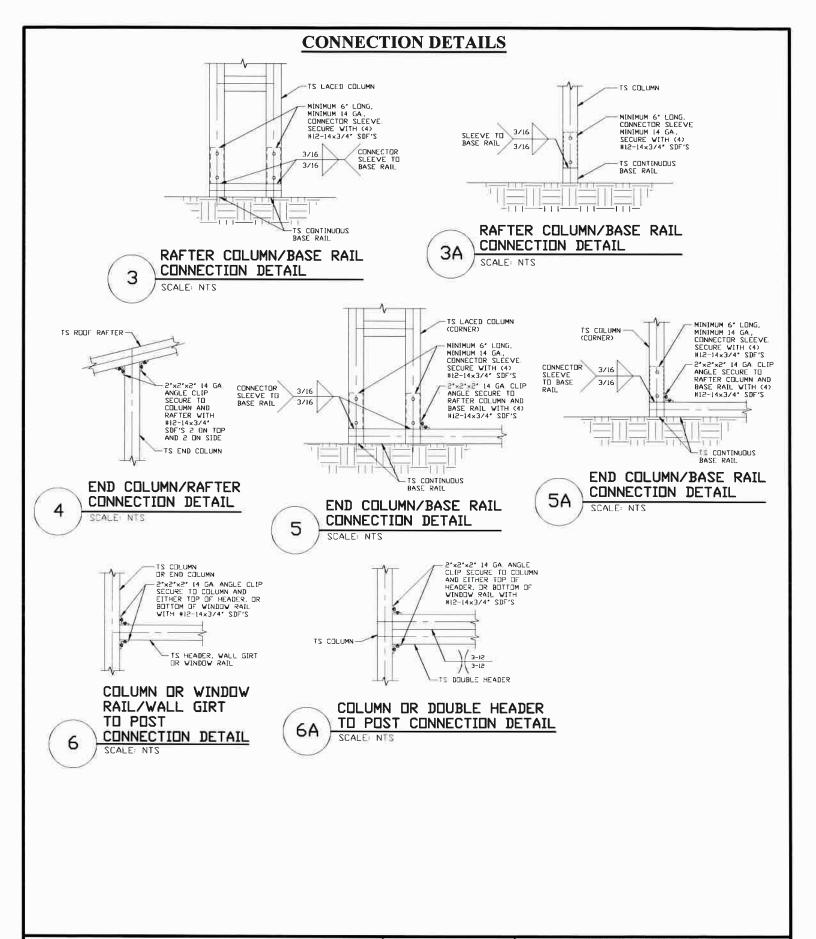


# TYPICAL BOW RAFTER SIDE WALL OPENINGS FRAMING SECTION

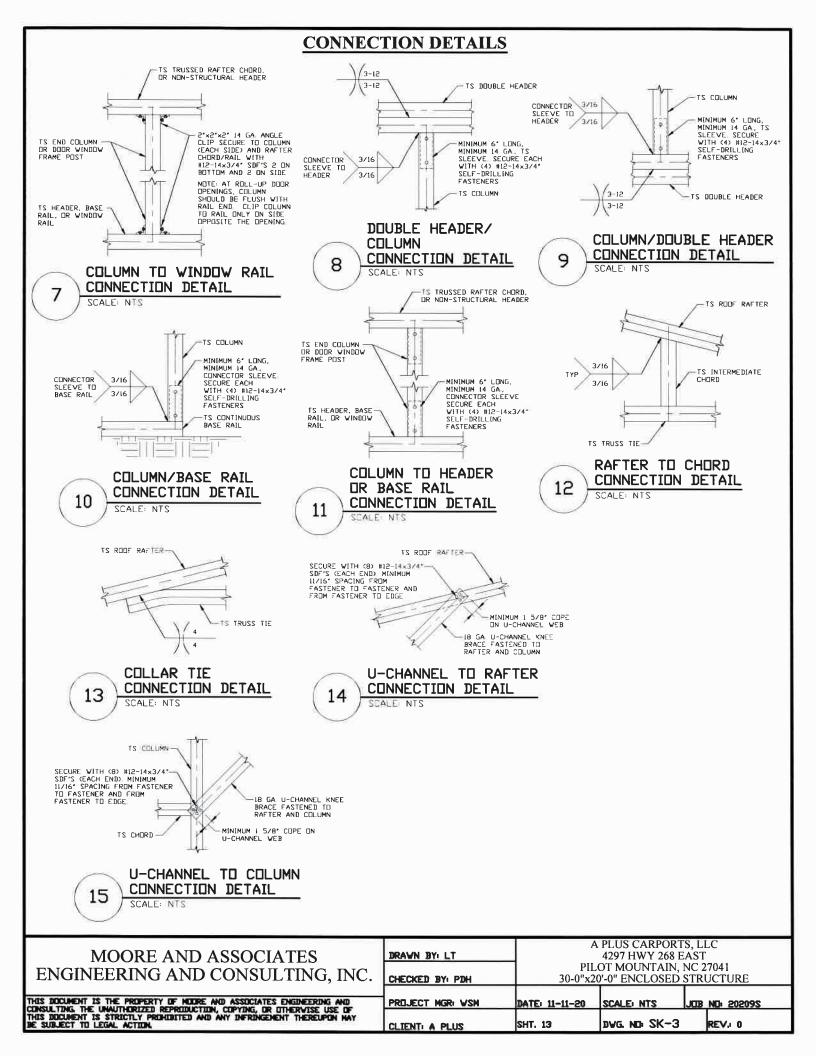
MOORE AND ASSOCIATES	
ENGINEERING AND CONSULTING, INC.	

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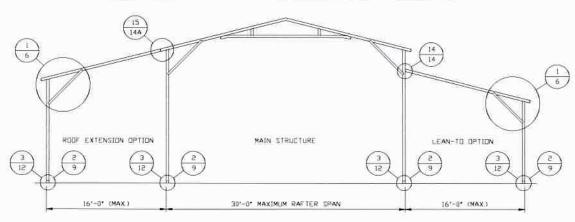
		P A	A PLUS CARPORTS, LLC						
J	DRAWN BY: LT	_	4297 HWY 268 EAST						
ì	_	PILOT MOUNTAIN, NC 27041							
J	CHECKED BY: PDH	30-0"x20'-0" ENCLOSED STRUCTURE							
J	PROJECT MGR: VSM	DATE: 11-11-20	SCALE: NTS	JOB	ND 20209S				
ĺ	CLIENT: A PLUS	SHT, 11	DVG. NO: SK-3		REV. 0				



MOORE AND ASSOCIATES	DRAWN BY: LT		PLUS CARPORT 4297 HWY 268 E OT MOUNTAIN. 1	ÁST
ENGINEERING AND CONSULTING, INC.	CHECKED BY: PDH	30-0"x20'-0" ENCLOSED STRUCTURE		
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# **BOX EAVE RAFTER LEAN-TO OPTIONS**



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

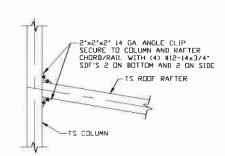
14A

SCALE: NTS

MAXIMUM WIDTH OF LACED TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 16'-0'.

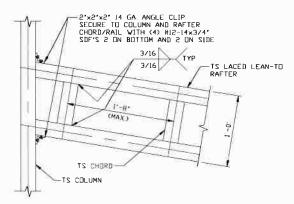
MAXIMUM WIDTH OF SINGLE TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 11'-0'.

REFERENCE RAFTER COLUMN CONNECTION DETAILS FOR APPROPRIATE COLUMN HEIGHT AND TUBING SPECIFICATION.



LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS & 11'-0'

14



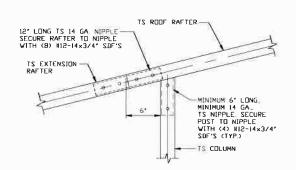
LEAN-TO RAFTER TO RAFTER
COLUMN CONNECTION DETAIL
FOR RAFTER SPANS 11'-0' < TO < 16'-0'
SCALE: NTS

MOORE AND ASSOCIATES
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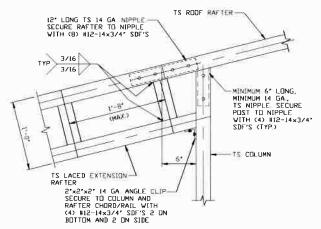
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DRAVN BY: LT CHECKED BY: PDH	A PLUS CARPORTS, LLC 4297 HWY 268 EAST PILOT MOUNTAIN, NC 27041 30-0"x20'-0" ENCLOSED STRUCTURE					
PROJECT NGRI VSM	DATE: 11-11-20	SCALE: NTS	J03	ND 20209S		
CLIENT: A PLUS	SHT. 14	DVG. ND: SK-3		REV. 0		

### **BOX EAVE RAFTER LEAN-TO OPTIONS**



SIDE EXTENSION RAFTER COLUMN DETAIL FOR RAFTER SPANS & 11'-0'



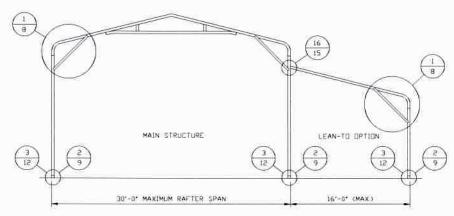
SIDE EXTENSION RAFTER COLUMN DETAIL FOR RAFTER SPANS 11'-0' < TO \( \lefta \) 16'-0'

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HECKED BY: PDH 30-0"x20'-	30-0"x20'-0" ENCLOSED STRUCTURE  DATE: 11-11-20					
#ECKED BY: PDH 30-0"x20"-	30-0"x20'-0" ENCLOSED STRUCTURE					
PILO	A PLUS CARPORTS, LLC 4297 HWY 268 EAST PILOT MOUNTAIN, NC 27041 30-0"x20'-0" ENCLOSED STRUCTURE					

### **BOW EAVE RAFTER LEAN-TO OPTION**



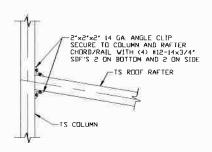
### TYPICAL BOW EAVE RAFTER LEAN-TO OPTION FRAMING SECTION

SCALE: NTS

MAXIMUM WIDTH OF LACED TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 16'-0".

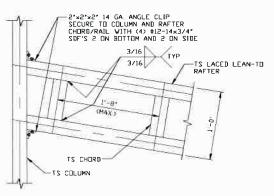
MAXIMUM WIDTH OF SINGLE TUBE MEMBER (RAFTER AND COLUMN) ROOF EXTENSION AND LEAN-TO IS 11'-0".

REFERENCE RAFTER COLUMN CONNECTION DETAILS FOR APPROPRIATE COLUMN HEIGHT AND TUBING SPECIFICATION.



LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS & 11'-0" 16

SCALE: NTS



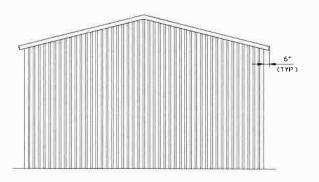
LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS 11'-0" < TO ≤ 16'-0" 16A

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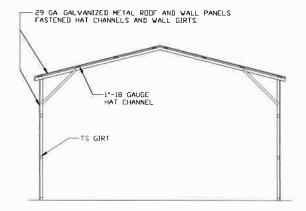
ı		A	A PLUS CARPORTS, LLC					
ı	DRAWN BY: LT	4297 HWY 268 EAST						
I		PILOT MOUNTAIN, NC 27041						
١	CHECKED BY: PDH	30-0"x20'-0" ENCLOSED STRUCTURE						
	PROJECT MGR: VSM	DATE: 11-11-20 SCALE: NTS JUB NO: 20209S						
	CLIENT: A PLUS	SHT. 15	DWG. NO SK-3		REV. 0			

# **BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION**



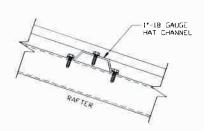
# TYPICAL END ELEVATION VERTICAL ROOF/SIDING

SCALE: NTS



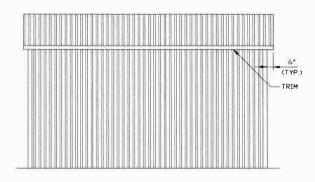
# TYPICAL SECTION VERTICAL ROOF/SIDING OPTION

SCALE: NTS



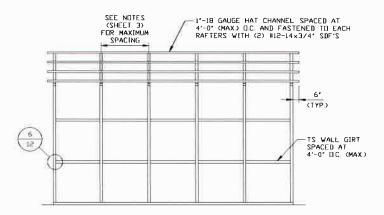
### PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS) SCALE: NTS



# TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING

SCALE: NTS



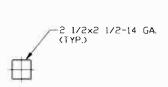
# TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION

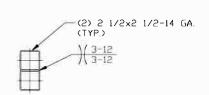
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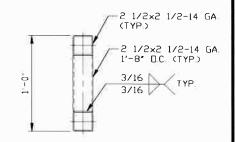
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	PILOT MOUNTAIN, NC 27041				
CHECKED BY: PDH	30-0"x20'-0" ENCLOSED STRUCTURE				
PROJECT MGR: VSM	DATE: 11-11-20	SCALE: NTS	JOB	ND 505032	
CLIENT: A PLUS	SHT. 16	DWG. NO: SK-3		REV.: 0	

# SIDE WALL HEADER OPTIONS





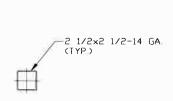


HEADER DETAIL FOR DOOR □PENINGS LENGTHS < 6'-0'</pre>

HEADER DETAIL FOR DOOR OPENINGS 6'-0' < LENGTHS < 10'-0' SCALE: NTS

HEADER DETAIL FOR DOOR OPENINGS 10'-0" < LENGTHS < 20'-0" SCALE: NTS

# **END WALL HEADER OPTIONS**



-2 1/2×2 1/2-14 GA. (TYP.) 2 1/2×2 1/2-14 GA. 1'-8' OC (TYP) 3/16 TYP 1'-0"

HEADER DETAIL FOR DOOR □PENINGS LENGTHS < 7'-0'</pre>

SCALE: NTS

HEADER DETAIL FOR DOOR OPENINGS 7'-0" < LENGTHS < 20'-0"

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CHECKED BY DIVI	PILOT MOUNTAIN, NC 27041					
DRAWN BY: LT	A PLUS CARPORTS, LLC 4297 HWY 268 EAST					