



STRUCTURAL DESIGN

FULLY OPEN (CARPORT) BUILDING

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

5 November 2018

Revision 6

M&A Project No. 17062S/17174S/17254S/18033S/18113S/18246S

Prepared for:

**Newmart Builders
1000 Cycle Lane
South Hill, VA 23970**

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**



**MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING**

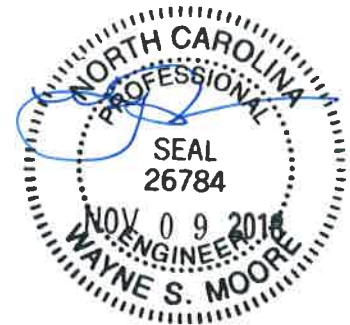




MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	NEWMART BUILDERS 30'-0"x14'-0" FULLY OPEN STRUCTURE PE SEAL COVER SHEET		
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	CLIENT: NEWMART BUILDERS	SHT. 1	DWG. NO: SK-1	REV: 6

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MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.	DRAWN BY: LT	NEWMART BUILDERS 1000 CYCLE LANE SOUTH HILL, VA 23970 30'-0"x14'-0" FULLY OPEN STRUCTURE		
	CHECKED BY: PDH	DATE: 11-5-18	SCALE: NTS	JOB NO: 18033S/18113S/18246S
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INSTALLATION NOTES AND SPECIFICATIONS

- 1 DESIGN IS FOR MAXIMUM 30'-0" WIDE x 14'-0" EAVE HEIGHT OPEN CARPORT STRUCTURES.
- 2 DESIGN WAS DONE IN ACCORDANCE WITH THE 2018 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 = 15 PSF
 - B) LIVE LOAD = 12 PSF
 - C) GROUND SNOW LOAD = 30 PSF ($W \leq 24'-0"$)
 = 35 PSF ($18'-0" < W \leq 30'-0"$)
 = 45 PSF @ 4'-0" O.C. MAX. RAFTER/COLUMN AND END COLUMN SPACING ($24'-0" < W \leq 30'-0"$)
 @ 5'-0" O.C. MAX. RAFTER/COLUMN AND END COLUMN SPACING ($W \leq 24'-0"$)
- 4 LOW ULTIMATE WIND SPEED (LW) 105 TO 140 MPH (NOMINAL WIND SPEED 81 TO 108 MPH); MAXIMUM RAFTER/POST AND END POST SPACING = 50 FEET (UNLESS NOTED OTHERWISE).
- 5 END WALL COLUMNS (POST) ARE SIMILAR TO SIDE WALL POSTS UNLESS NOTED OTHERWISE.
- 6 LOW HAZARD RISK CATEGORY I (WIND)
- 7 WIND EXPOSURE CATEGORY B
- 8 SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2"x3"-14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS FOR ($24'-0" < W \leq 30'-0"$) AND 2 1/4"x2 1/4"-14 GAUGE TUBE STEEL (TS) FOR ($W \leq 24'-0"$) (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 1/4"x3/4" SELF-DRILLING FASTENER (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MEAN ROOF HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14' (3:12 PITCH) OR LESS. SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR SLOPES MAY VARY.
- 11 GROUND ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6" OF EACH RAFTER COLUMN ALONG SIDES
- 12 GROUND ANCHORS CONSIST OF #4 REBAR W/ WELDED NUT/FORMED HEAD x 30" 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
 $R = 3.25$ $I_E = 1.0$
 $S_{DS} = 2.039 g$ $V = C_S W$
 $S_{DI} = 1.258 g$



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NEWMART BUILDERS

1000 CYCLE LANE

SOUTH HILL, VA 23970

30'-0"x14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 3A

SCALE: NTS

DWG. NO: SK-1

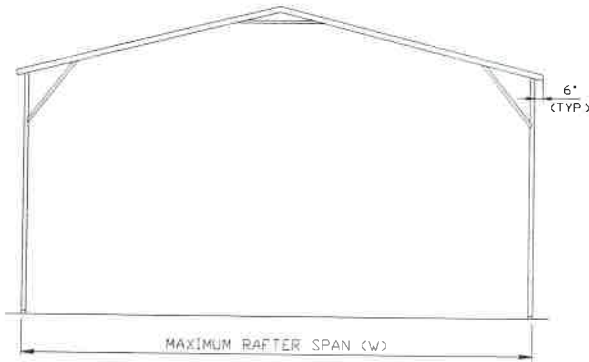
JOB NO:

180333/181135/182465

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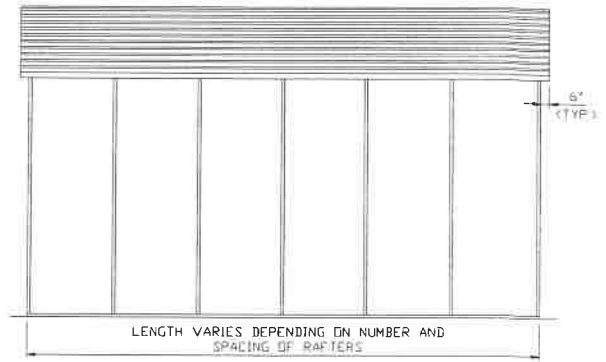
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BOX EAVE FRAME RAFTER STRUCTURE (Sheets 4, 5, 8, 9, 10, 12, 14, 16 AND 17)



TYPICAL END ELEVATION

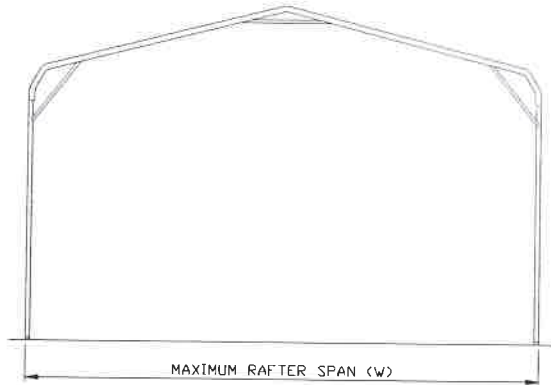
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TYPICAL SIDE ELEVATION

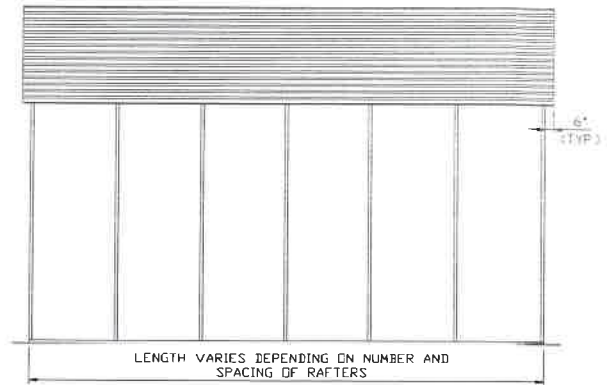
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BOW FRAME RAFTER STRUCTURE (Sheets 6, 7, 8, 9, 11, 13, 15 AND 17)



TYPICAL END ELEVATION

SCALE: NTS



TYPICAL SIDE ELEVATION

SCALE: NTS



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1000 CYCLE LANE

SOUTH HILL, VA 23970

30'-0" x 14'-0" FULLY OPEN STRUCTURE

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SHT. 3B

SCALE: NTS

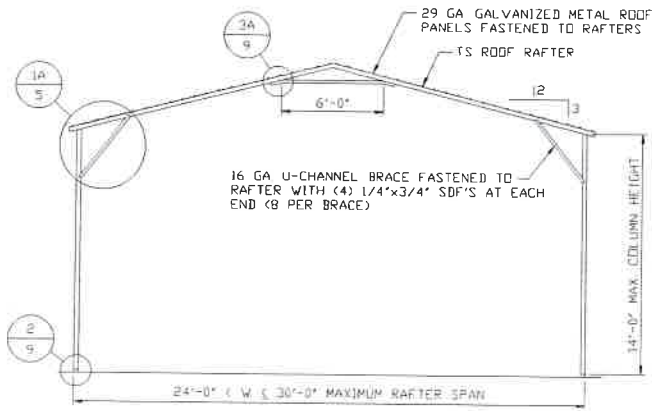
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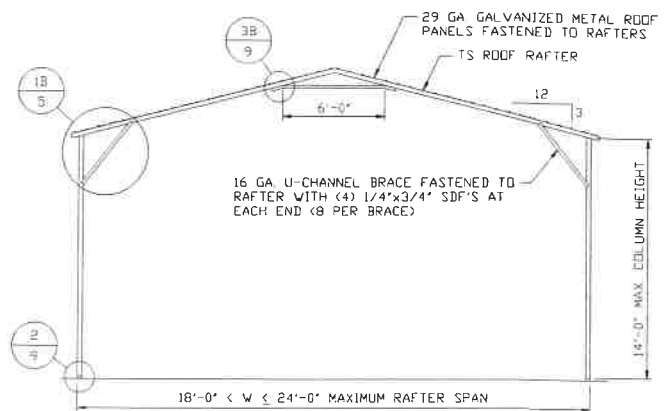
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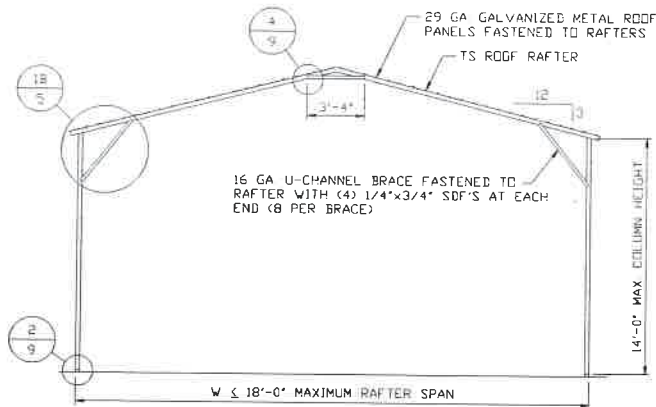
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



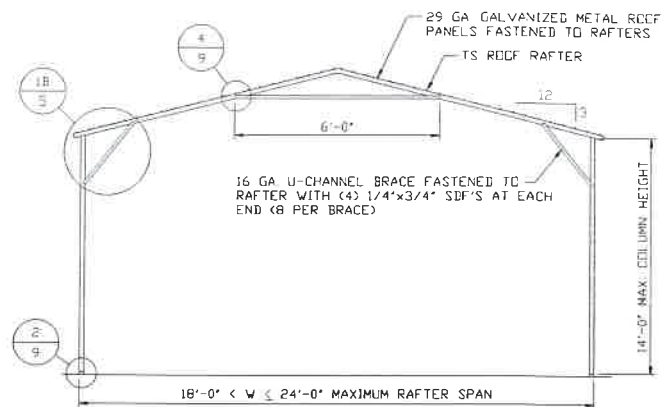
TYPICAL RAFTER/COLUMN END FRAME SECTION

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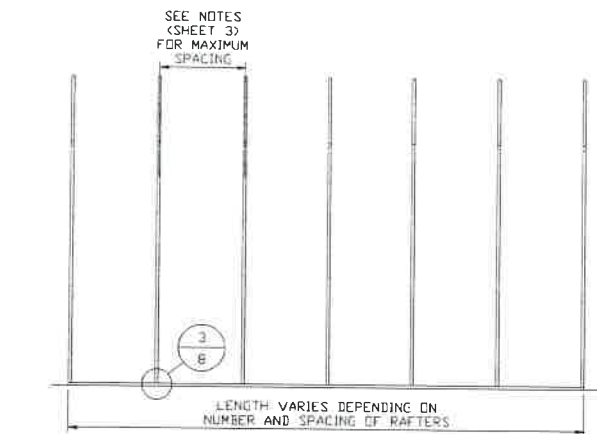
TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION

SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION

SCALE: NTS



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NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 4

SCALE: NTS

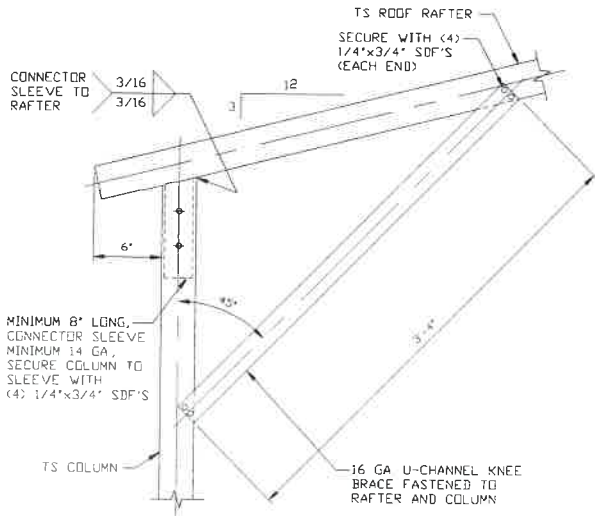
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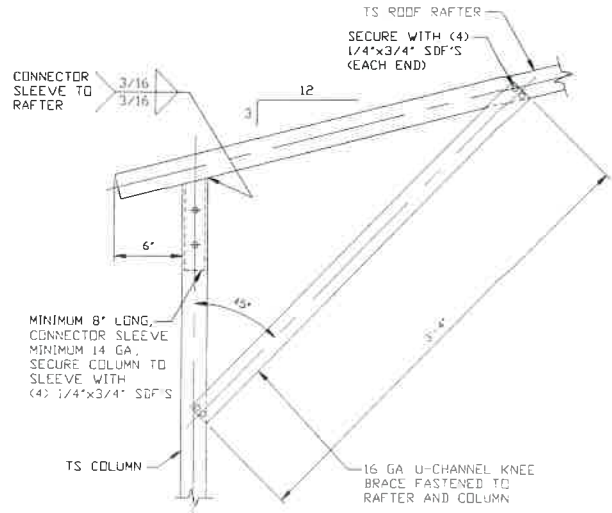
CONNECTION DETAILS



BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR $24'-0'' < W \leq 30'-0''$ AND HEIGHTS $< 14'-0''$

1A

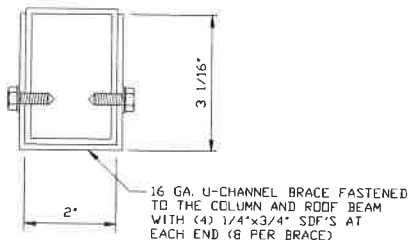
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BOX EAVE RAFTER COLUMN CONNECTION DETAIL FOR $W \leq 24'-0''$ AND HEIGHTS $\leq 14'-0''$

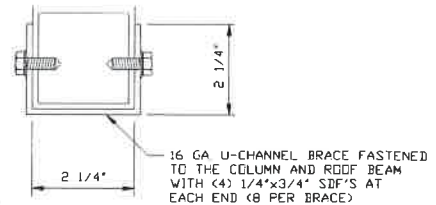
1B

SCALE: NTS



BRACE SECTION

SCALE: NTS



BRACE SECTION

SCALE: NTS



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1000 CYCLE LANE

SOUTH HILL, VA 23970

30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 5

SCALE: NTS

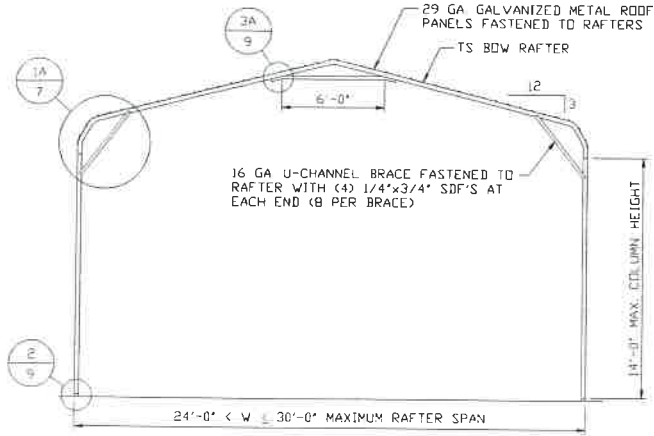
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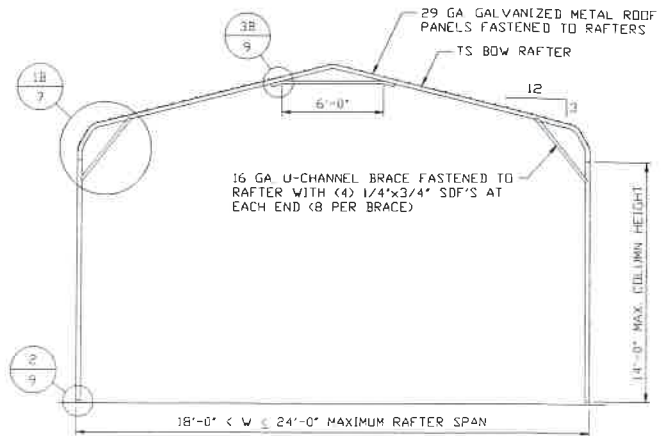
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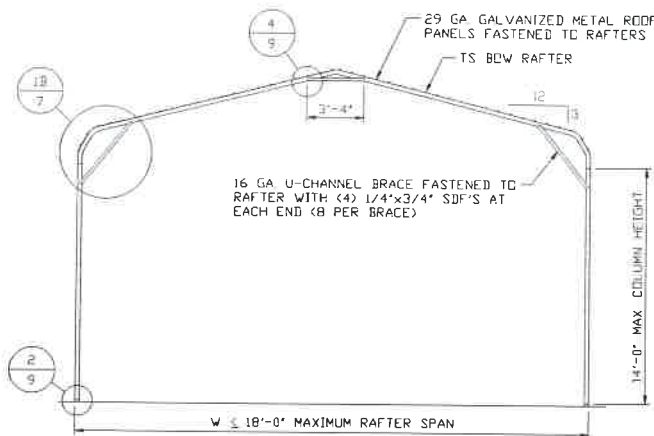
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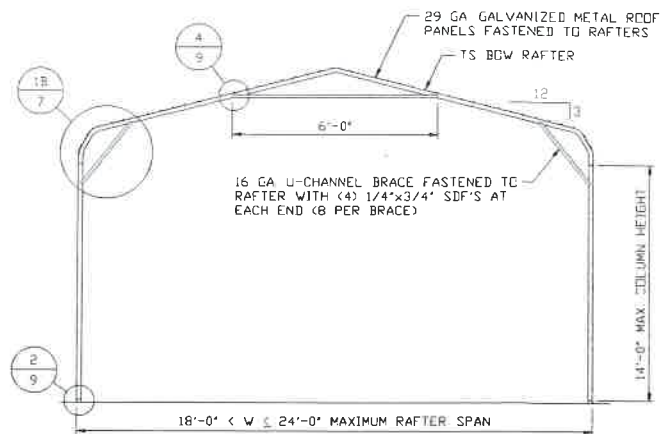
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



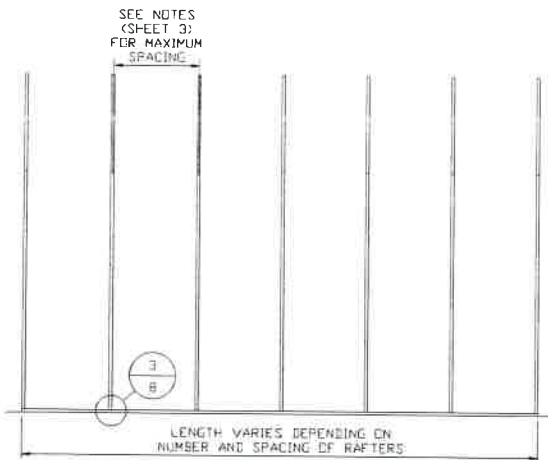
TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN SIDE FRAMING SECTION
SCALE: NTS



TYPICAL RAFTER/COLUMN END FRAME SECTION
SCALE: NTS



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30'-0" x 14'-0" FULLY OPEN STRUCTURE

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SHT. 6

SCALE: NTS

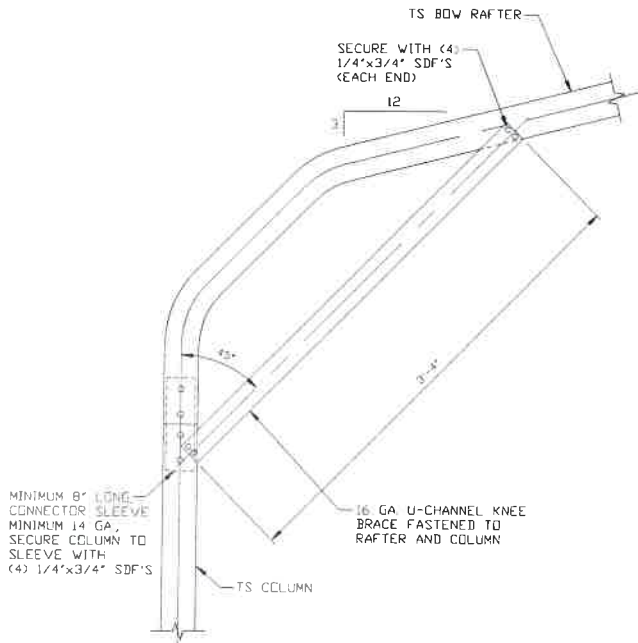
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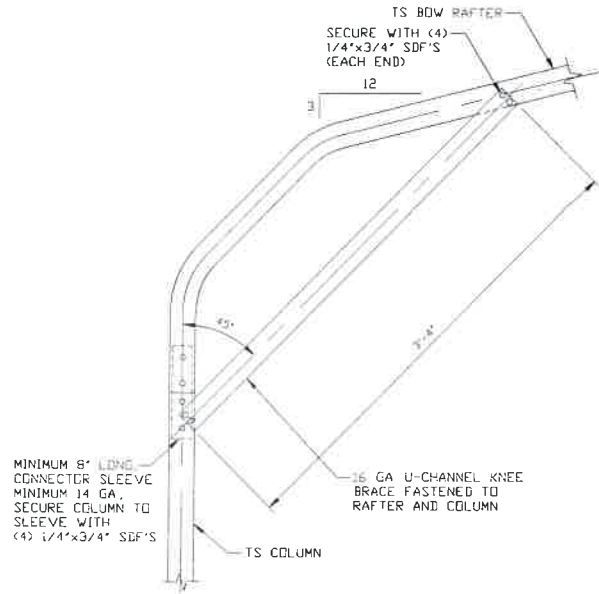
CONNECTION DETAILS



BOW RAFTER COLUMN CONNECTION DETAIL FOR $24'-0'' < W \leq 30'-0''$ AND HEIGHTS $\leq 14'-0''$

1A

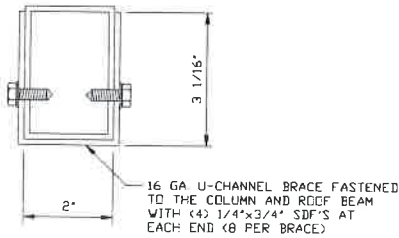
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BOW EAVE RAFTER COLUMN CONNECTION DETAIL FOR $W \leq 24'-0''$ AND HEIGHTS $\leq 14'-0''$

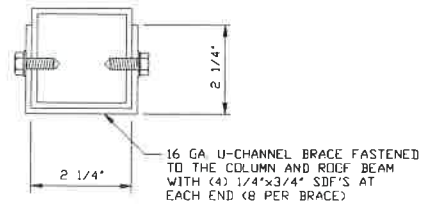
1B

SCALE: NTS



BRACE SECTION

SCALE: NTS



BRACE SECTION

SCALE: NTS



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NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970

30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 7

SCALE: NTS

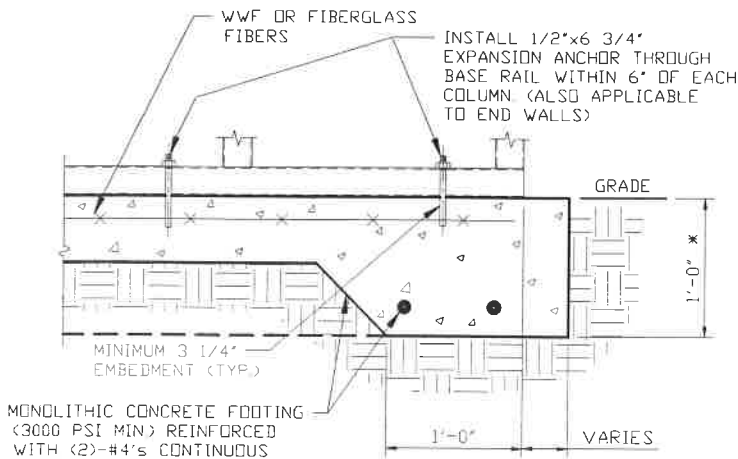
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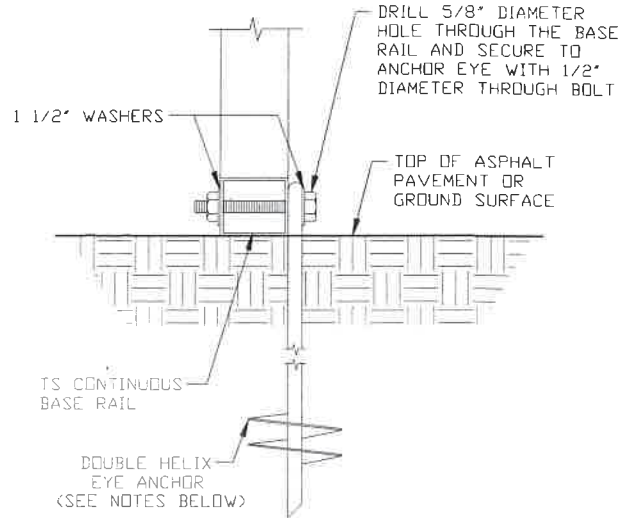
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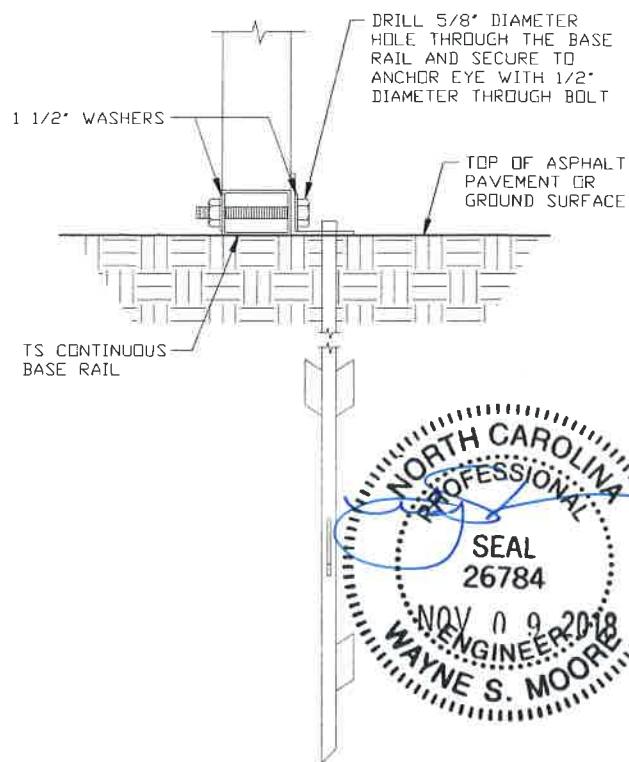
BASE RAIL ANCHORAGE OPTIONS FOR LOW WIND SPEEDS



3A CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE
 SCALE: NTS
 NOTE: MIN. ANCHOR EDGE DISTANCE IS 4"
 * COORDINATE WITH LOCAL CODES/ORD.



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



3C ASPHALT BASE ANCHORAGE
 SCALE: NTS



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:

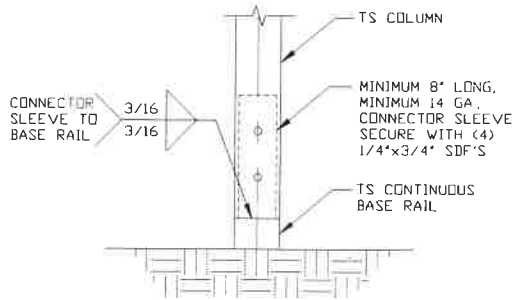
1. REINFORCEMENT IS BENT COLD.
2. THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS.
3. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.

HELIX ANCHOR NOTES:

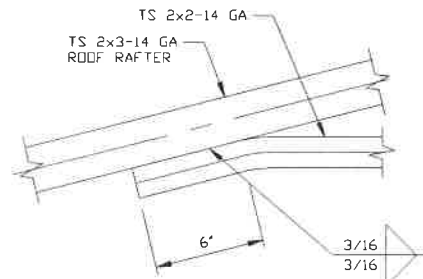
1. FOR VERY DENSE AND/OR CEMENTED SANDS, COARSE GRAVEL AND COBBLES, CALICHE, PRELOADED SILTS AND CLAYS, USE MINIMUM (2) 4" HELICES WITH MINIMUM 30" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 50" EMBEDMENT.
2. FOR CORAL USE MINIMUM (2) 4" HELICES WITH MINIMUM 30" EMBEDMENT OR SINGLE 6" HELIX WITH MINIMUM 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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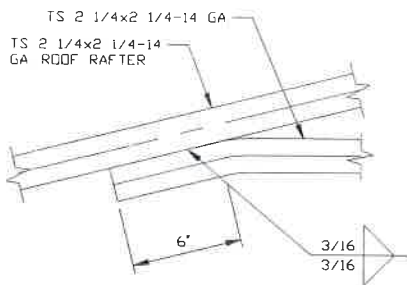
CONNECTION DETAILS



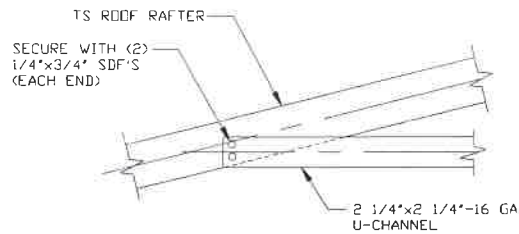
2 RAFTER COLUMN/BASE RAIL CONNECTION DETAIL
SCALE: NTS



3A 6'-0" ROOF RAFTER TIE CONNECTION DETAIL
SCALE: NTS



3B 6'-0" ROOF RAFTER TIE CONNECTION DETAIL
SCALE: NTS



4 3'-4" ROOF RAFTER TIE CONNECTION DETAIL
SCALE: NTS



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NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0"x14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 9

SCALE: NTS

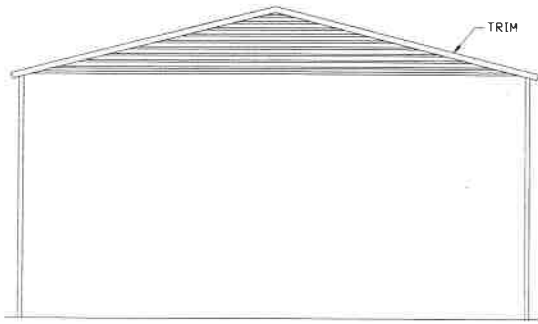
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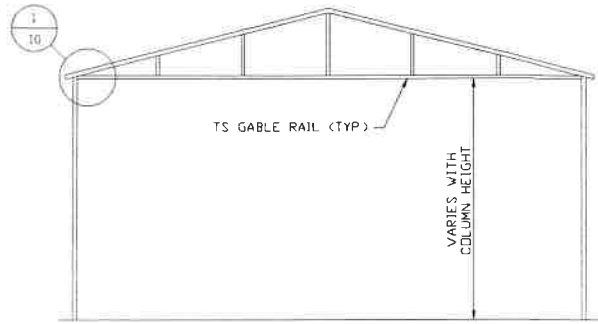
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BOX EAVE RAFTER GABLE END OPTION



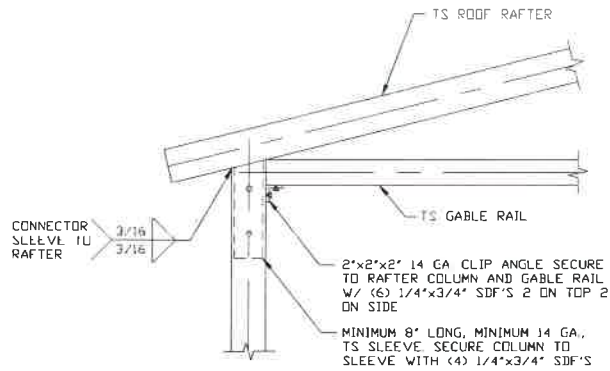
**TYPICAL BOX EAVE RAFTER
GABLE END ELEVATION**

SCALE: NTS



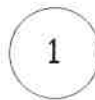
**TYPICAL BOX EAVE RAFTER
GABLE END FRAMING SECTION**

SCALE: NTS



**BOX EAVE RAFTER GABLE RAIL TO
RAFTER COLUMN CONNECTION DETAIL**

SCALE: NTS



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

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

**CLIENT: NEWMART
BUILDERS**

**NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0" x 14'-0" FULLY OPEN STRUCTURE**

DATE: 11-5-18

SHT. 10

SCALE: NTS

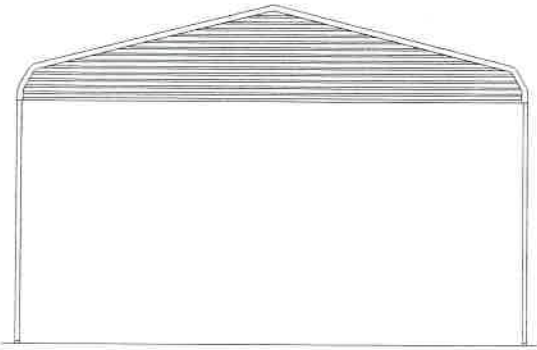
DWG. NO: SK-1

**JOB NO:
18033S/18113S/18246S**

REV: 6

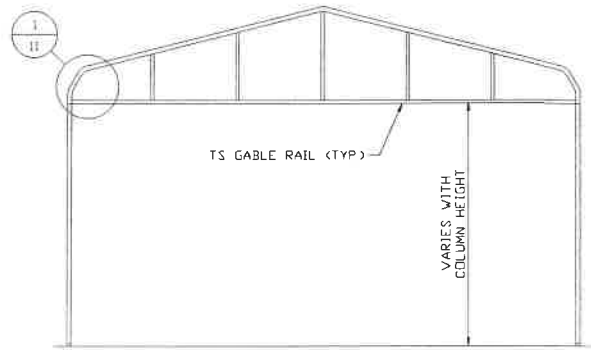
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BOW RAFTER GABLE END OPTION



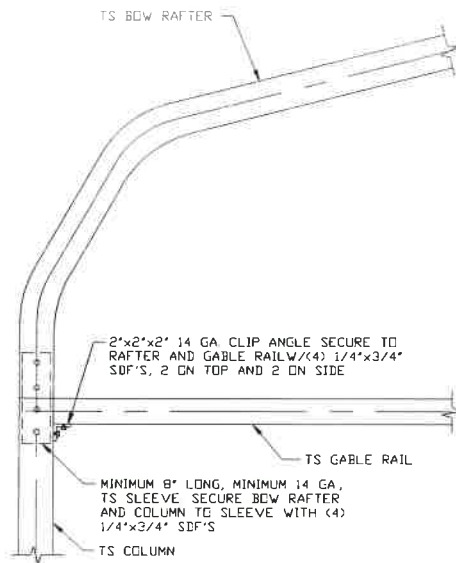
**TYPICAL BOW RAFTER
GABLE END ELEVATION**

SCALE: NTS



**TYPICAL BOW RAFTER GABLE
END FRAMING SECTION**

SCALE: NTS



**1 BOW RAFTER GABLE RAIL TO
RAFTER/COLUMN CONNECTION DETAIL**

SCALE: NTS



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

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

**CLIENT: NEWMART
BUILDERS**

**NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0"x14'-0" FULLY OPEN STRUCTURE**

DATE: 11-5-18

SHT. 11

SCALE: NTS

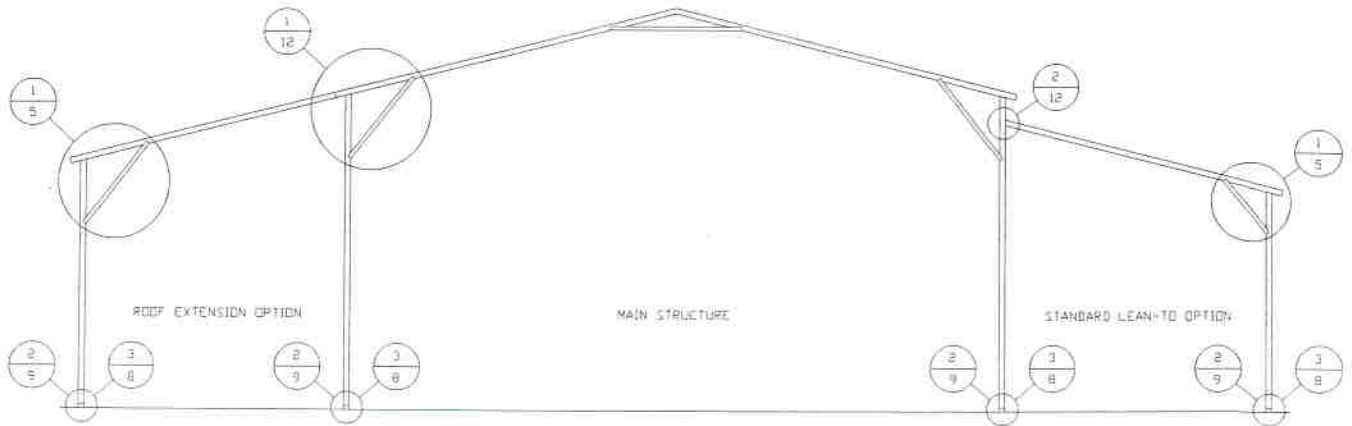
DWG. NO: SK-1

**JOB NO:
18033S/18113S/18246S**

REV: 6

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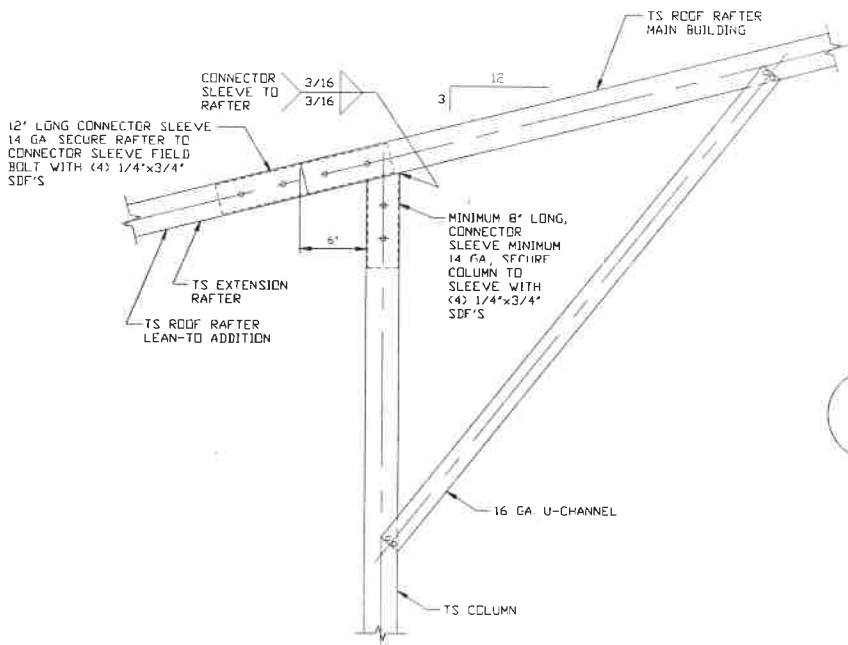
BOX EAVE RAFTER LEAN-TO OPTIONS



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

SCALE: NTS

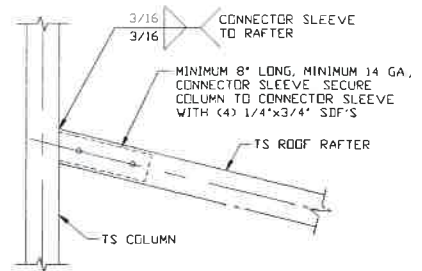
MAXIMUM WIDTH OF STANDARD LEAN-TO IS 12'-0"



1

SIDE EXTENSION RAFTER/COLUMN DETAIL

SCALE: NTS



2

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL

SCALE: NTS



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PROJECT MGR: WSM

CLIENT: NEWMART BUILDERS

NEWMART BUILDERS

1000 CYCLE LANE

SOUTH HILL, VA 23970

30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 12

SCALE: NTS

DWG. NO: SK-1

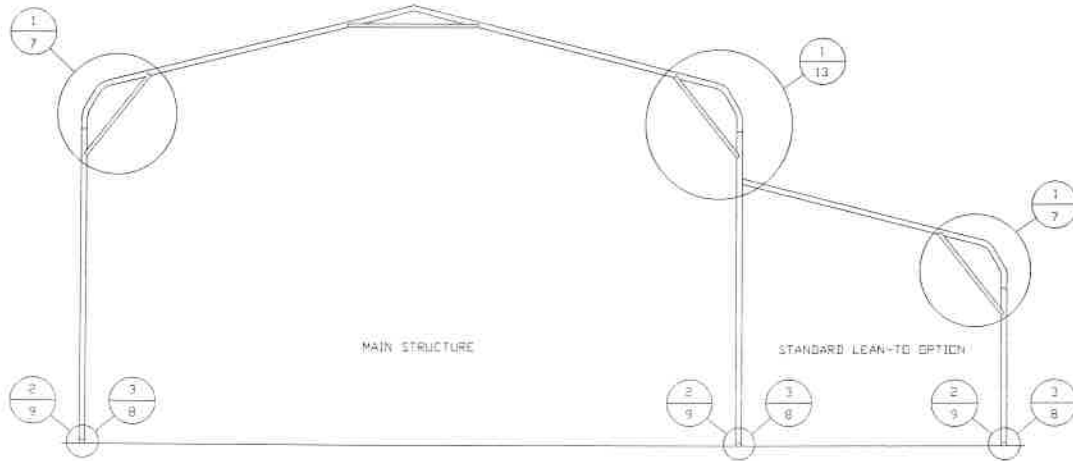
JOB NO:

18033S/18113S/18246S

REV: 6

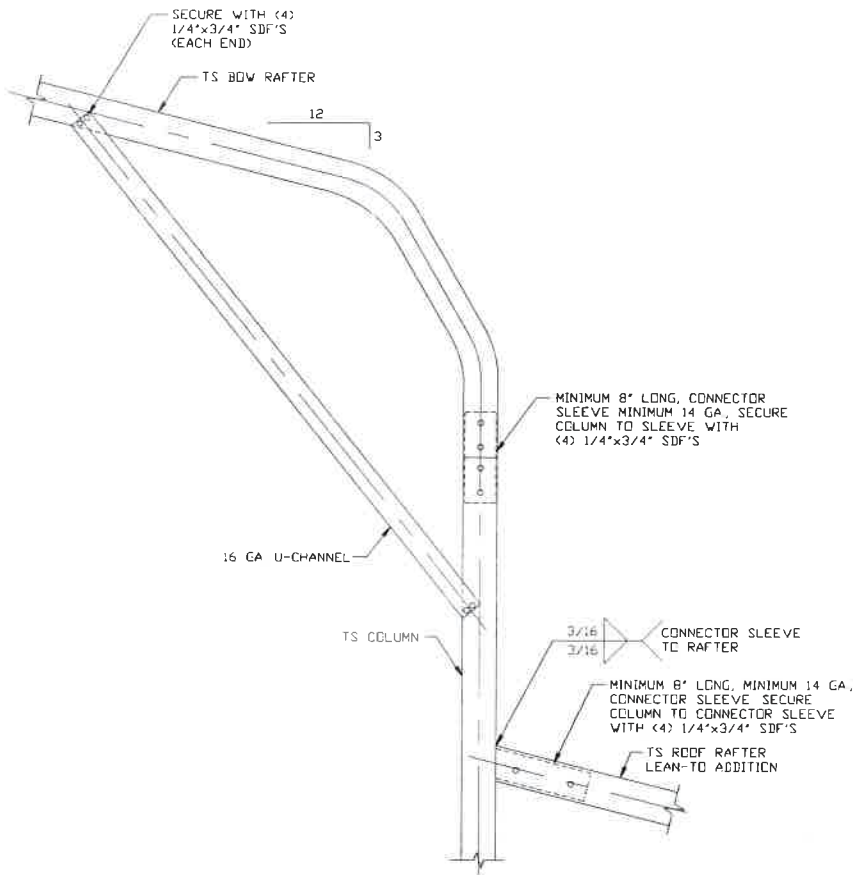
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BOW RAFTER LEAN-TO OPTIONS



TYPICAL BOW RAFTER LEAN-TO OPTION FRAMING SECTION

SCALE: NTS
 MAXIMUM WIDTH OF STANDARD LEAN-TO IS 12'-0"



1 LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL
 SCALE: NTS



**MOORE AND ASSOCIATES
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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: NEWMART BUILDERS

**NEWMART BUILDERS
 1000 CYCLE LANE
 SOUTH HILL, VA 23970
 30'-0"x14'-0" FULLY OPEN STRUCTURE**

DATE: 11-5-18

SHT. 13

SCALE: NTS

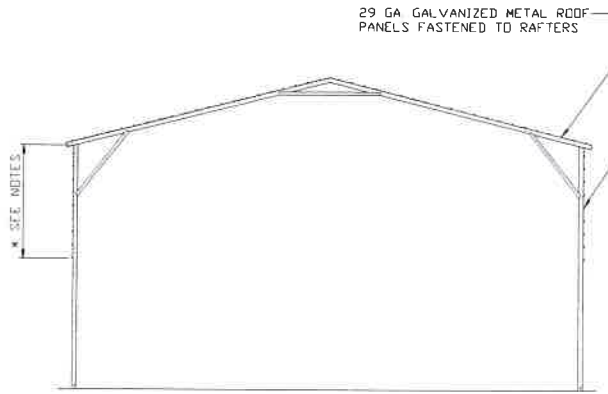
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**JOB NO:
 18033S/18113S/18246S**

REV: 6

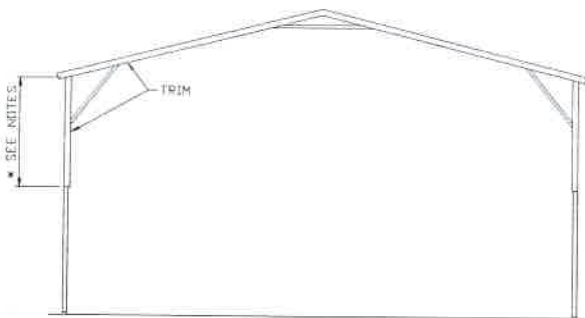
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BOX EAVE RAFTER EXTRA SIDE PANEL OPTION



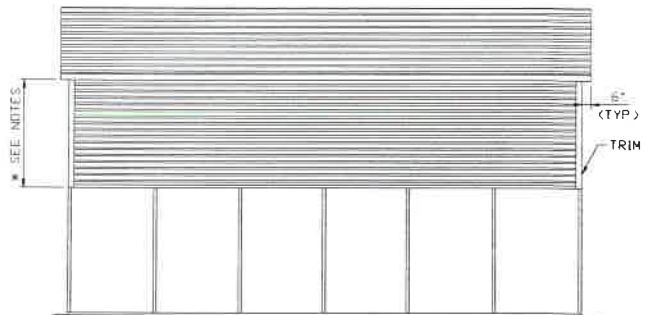
TYPICAL RAFTER/COLUMN FRAME SECTION - EXTRA SIDE PANELS

SCALE: NTS



TYPICAL END ELEVATION
EXTRA SIDE PANELS

SCALE: NTS



TYPICAL SIDE ELEVATION
EXTRA SIDE PANELS

SCALE: NTS

NOTES:

- * 6'-0" MAX (FOR EAVE HEIGHT \leq 10'-0")
- * 3'-0" MAX. (FOR EAVE HEIGHT 10'-0" $<$ TO \leq 14'-0")



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

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

**CLIENT: NEWMART
BUILDERS**

NEWMART BUILDERS

1000 CYCLE LANE

SOUTH HILL, VA 23970

30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 14

SCALE: NTS

DWG. NO: SK-1

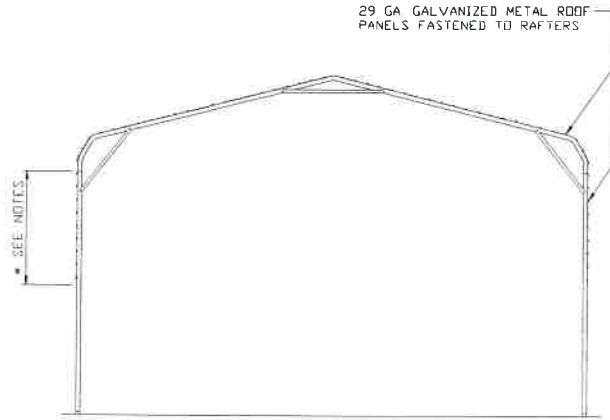
JOB NO:

18033S/18113S/18246S

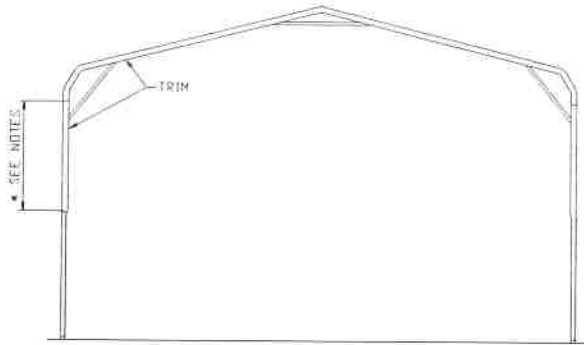
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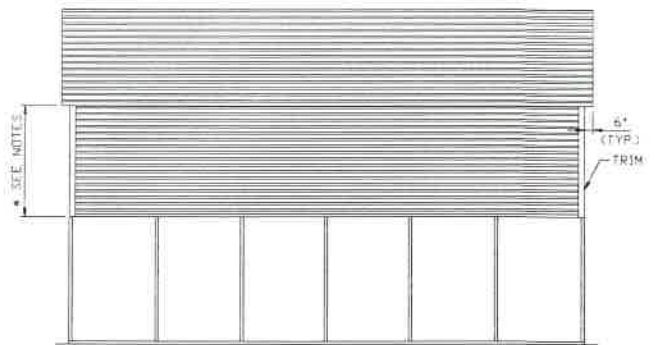
BOW RAFTER EXTRA SIDE PANEL OPTION



TYPICAL RAFTER/COLUMN FRAME SECTION - EXTRA SIDE PANELS
SCALE: NTS



**TYPICAL END ELEVATION
EXTRA SIDE PANELS**
SCALE: NTS



**TYPICAL SIDE ELEVATION
EXTRA SIDE PANELS**
SCALE: NTS

NOTES

- * 6'-0" MAX. (FOR EAVE HEIGHT < 10'-0")
- * 3'-0" MAX. (FOR EAVE HEIGHT 10'-0" < TO < 14'-0")



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PROJECT MGR: WSM

CLIENT: NEWMART BUILDERS

NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 15

SCALE: NTS

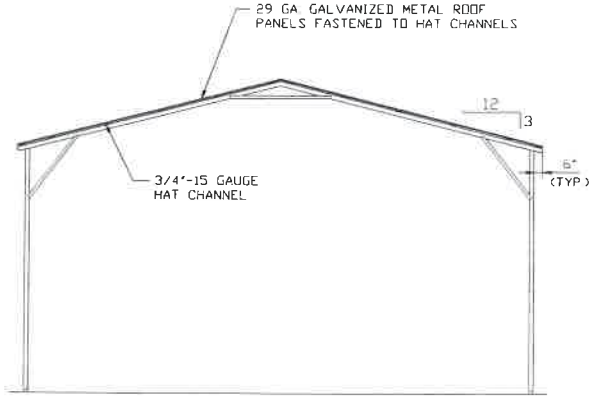
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JOB NO: 18033S/18113S/18246S

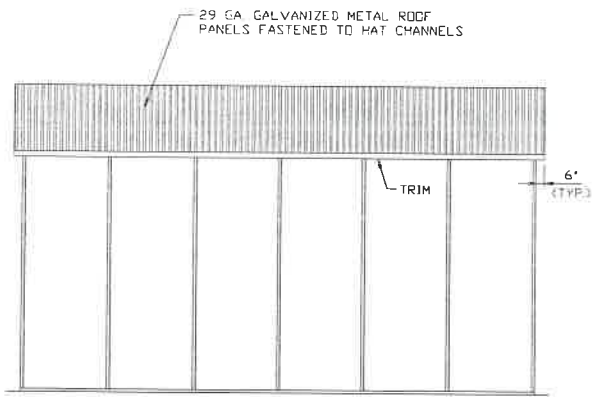
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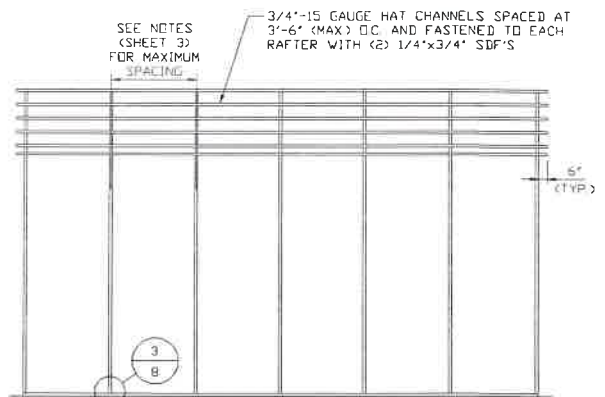
BOX EAVE RAFTER VERTICAL ROOF OPTION



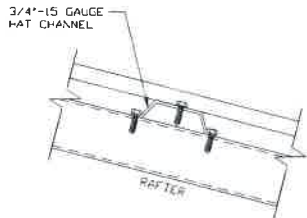
TYPICAL SECTION VERTICAL ROOF OPTION
SCALE: NTS



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.**

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CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: NEWMART BUILDERS

NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0" x 14'-0" FULLY OPEN STRUCTURE

DATE: 11-5-18

SHT. 16

SCALE: NTS

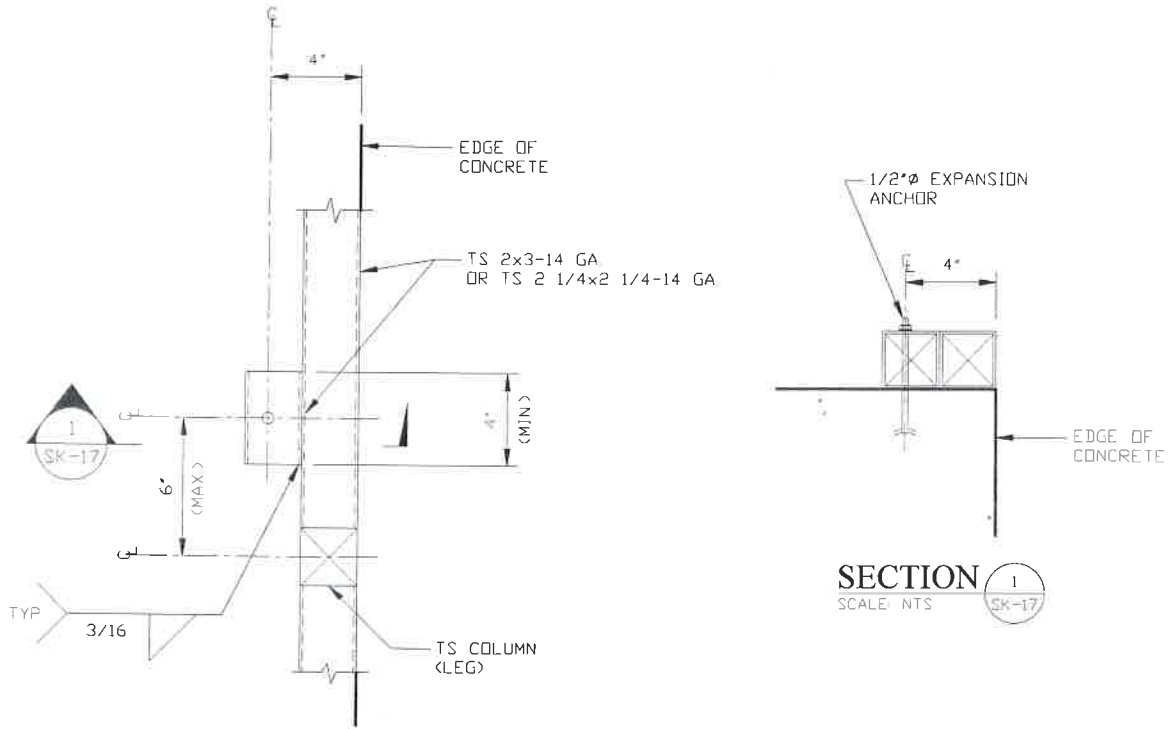
DWG. NO: SK-1

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ADDITIONAL BASE RAIL ANCHORAGE OPTION



TYPICAL ANCHOR DETAIL WHEN BASE RAIL IS NEAR EDGE OF CONCRETE

SCALE: NTS



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**NEWMART BUILDERS
1000 CYCLE LANE
SOUTH HILL, VA 23970
30'-0" x 14'-0" FULLY OPEN STRUCTURE**

DATE: 11-5-18

SHT. 17

SCALE: NTS

DWG. NO: SK-1

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