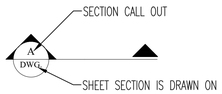
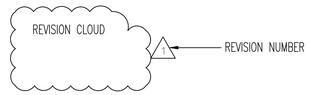
STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS
(HEAVY DUTY RESIDENTIAL & AGRICULTURAL)

STRUCTURAL GRAPHICS SYMBOLS

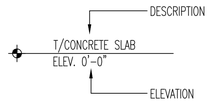


SECTION CROSS-REFERENCES SYMBOL

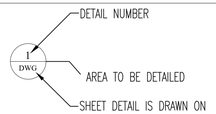


REVISION INDICATOR SYMBOL

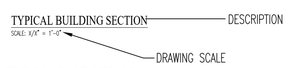
EXTERIOR ELEVATION CROSS-REFERENCE SYMBOL



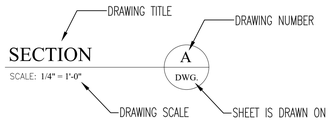
ELEVATION TARGET SYMBOL



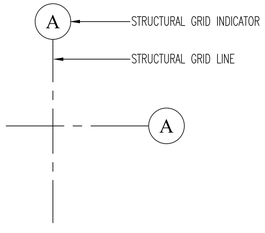
DETAIL CROSS-REFERENCE SYMBOL



TYPICAL SECTION SYMBOL



DRAWINGS TITLE SYMBOL



STRUCTURAL GRID REFERENCE SYMBOL

ABBREVIATIONS

TYPE	DESCRIPTION	TYPE	DESCRIPTION
A.B.	ANCHOR BOLT	L	LENGTH
ALT.	ALTERNATE	L.L.H.	LONG LEG HORIZONTAL
ARCH.	ARCHITECTURAL	L.L.V.	LONG LEG VERTICAL
AVG.	AVERAGE	L.P.	LOW POINT
BCDL	BOTTOM CHORD DEAD LOAD	MAX.	MAXIMUM
BCLL	BOTTOM CHORD LIVE LOAD	MECH.	MECHANICAL
BFF.	BELOW FINISH FLOOR	MEZZ.	MEZZANINE
BLDG.	BUILDING	MFR.	MANUFACTURER
BM.	BEAM	MIN.	MINIMUM
B.O.	BOTTOM OF	MISC.	MISCELLANEOUS
BOT.	BOTTOM	MWFRS	MAIN WIND FORCE RESISTING SYSTEM
BRG.	BEARING	M.O.	MASONRY OPENING
C.J.	CONTROL JOINT	N.S.	NEAR SIDE
CLR.	CLEAR	O.C.	ON CENTER
C.M.U.	CONCRETE MASONRY UNIT	O.D.	OUTSIDE DIAMETER
CONC.	CONCRETE	O.H.	OVER HEAD
CONST. JT.	CONSTRUCTION JOINT	O/O	OUT TO OUT
CONT.	CONTINUOUS	P.S.F.	POUNDS PER SQUARE FOOT
D	DEPTH	P.S.I.	POUNDS PER SQUARE INCH
DET.	DETAIL	R.	RADIUS
DIA.	DIAMETER	REINF.	REINFORCEMENT
ELEV.	ELEVATION	SIM.	SIMILAR
EQ.	EQUAL	T&B	TOP AND BOTTOM
E.W.	EACH WAY	TCDL	TOP CHORD DEAD LOAD
EXIST.	EXISTING	TCLL	TOP CHORD LIVE LOAD
FIN.	FINISH	T.O.	TOP OF
FLR.	FLOOR	T.O.S.	TOP OF STEEL
FND.	FOUNDATION	TYP.	TYPICAL
F.S.	FAR SIDE	U.N.O.	UNLESS NOTED OTHERWISE
FTG.	FOOTING	VERT.	VERTICAL
GA.	GAUGE	V.I.F.	VERIFY IN FIELD
HORIZ.	HORIZONTAL	W.W.F.	WELDED WIRE FABRIC
H.P.	HIGH POINT	W	WIDTH
INSUL.	INSULATION	W/	WITH
I.L.O.	IN LIEU OF		

BUILDING CODES & ZONING ORDINANCES

1. EXECUTE ALL WORK IN ACCORDANCE WITH LOCAL AND FEDERAL CODES, MANUFACTURERS' RECOMMENDATIONS, TRADE AND REFERENCE STANDARDS.

2. THIS PLAN IS TO COMPLY WITH THE FOLLOWING GOVERNING AUTHORITIES:
   A. INTERNATIONAL BUILDING CODE IBC 2021
   B. NORTH CAROLINA RESIDENTIAL CODE 2015 (NCRC 2015)

STRUCTURAL DRAWING LIST:

CRAMER ENGINEERING, LLC
STRUCTURAL ENGINEERING
1640 AKRON-PENINSULA ROAD
BUILDING #1-SUITE 202-203
AKRON, OH 44313
Phone (440) 655-1348
email: james@cramerengineering.com
www.cramerengineering.com

NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

No. 23-230-NC

REVISION

REVISIONS:	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023	DRAWN BY: W. HEADY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

COVER SHEET

C1.0

GENERAL NOTES:

GENERAL THESE PLANS ARE ISSUED FOR A SINGLE PROJECT UTILIZING TRUSSES MANUFACTURED BY BLACKWATER TRUSS SYSTEMS, LLC.

1. DESIGN CODE DATA:
   2021 INTERNATIONAL BUILDING CODE
   ASCE 7-10: MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
   AISC 360-05: SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

2. DESIGN LOADS:
   TRUSS SPACING: 12'-0"
   DEAD LOADS: 5 PSF (WIND) 10 PSF TOTAL
   LIVE LOADS: 20 PSF

3. WIND DESIGN CRITERIA:
   WIND LOAD: 150 MPH 3 SECOND GUST
   NOMINAL DESIGN WIND SPEED: 116 MPH
   INTERNAL PRESSURE COEFFICIENT: 0 (OPEN)
   RISK CATEGORY 2 BUILDING
   EXPOSURE CATEGORY C
   BASE VELOCITY PRESSURE: 34.3 PSF

4. SNOW LOAD(S)

ROOF SNOW LOAD:	19PSF
GROUND SNOW LOAD:	25PSF
THERMAL FACTOR:	1.00
SNOW EXPOSURE FACTOR:	1.00
SNOW IMPORTANCE FACTOR:	1.00

5. THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED UPON OR EXISTING STRUCTURAL FRAMING. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN CAPACITY OF THE FRAMING AT THE TIME THE LOADS ARE IMPOSED.

6. THE STRUCTURE IS DESIGNED TO FUNCTION AS A UNIT UPON COMPLETION.

7. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING AND FURNISHING ALL TEMPORARY BRACING AND/OR SUPPORT THAT MAY BE REQUIRED AS THE RESULT OF THE CONTRACTOR'S CONSTRUCTION METHODS AND/OR SEQUENCES.

8. THE STRUCTURAL ENGINEER ASSUMES NO LIABILITY FOR THE STRUCTURE DURING CONSTRUCTION.

9. THE CONTRACTOR IS RESPONSIBLE FOR ALL MEANS AND METHODS OF CONSTRUCTION AND ALL JOB SITE SAFETY.

10. VERIFY ALL DIMENSIONS PRIOR TO THE START OF CONSTRUCTION – DO NOT SCALE DRAWINGS.

WOOD:

1. ALL WOOD CONSTRUCTION SHALL BE DESIGNED, FURNISHED, AND ERECTED IN ACCORDANCE WITH N.D.S. AND THE LATEST EDITION OF THE AITC TIMBER CONSTRUCTION MANUAL.

2. ALL LUMBER SHALL BE MINIMUM NO. 1/ NO.2 SPF UNLESS INDICATED OTHERWISE.

3. ALL WOOD IN CONTACT WITH CONCRETE, MASONRY OR GROUND SHALL BE SOUTHERN PINE, PRESSURE TREATED FOR DECAY AS FOLLOWS:

   0.60 FOR IN-GROUND USE
   0.40 FOR ABOVE GROUND AND IN CONTACT W/GROUND
   0.40 FOR WOOD IN CONTACT WITH CONCRETE
   RETENTION SHALL BE PER MANUFACTURER'S SPECIFICATIONS FOR THE PARTICULAR USE.

4. ALL FASTENERS IN CONTACT WITH PRESSURE TREATED LUMBER SHALL BE GALVANIZED WITH A MINIMUM G185 COATING.

5. ALL PLYWOOD DESIGNATED ON THE STRUCTURAL DRAWINGS SHALL BE DOUGLAS FIR, CONFORMING TO THE LATEST NATIONAL BUREAU OF STANDARDS "U.S. PRODUCT STANDARDS PS 1". PLYWOOD SHALL BE GRADE STAMPED CDX WITH EXTERIOR GLUE AND PANEL INDEX 24/16, UNLESS NOTED OTHERWISE.

6. STRUCTURAL PLYWOOD SHALL CONFORM TO U.S. PRODUCT STANDARD PS 1-83. STRUCTURAL USE PANELS SHALL CONFORM TO NER-108 (APA PRP-108). A.P.A. GRADE STAMP SHALL BE PROVIDED ON ALL SHEATHING. ROOF AND FLOOR SHEATHING AND SHEAR WALL PANELS SHALL BE IN PLACE AND INSPECTED BY THE BUILDING OFFICIAL PRIOR TO COVERING. INSTALL WITH FACE GRAIN ACROSS SUPPORTS EXCEPT WHERE NOTED ON PLANS OR DETAILS. PROVIDE GAPS AT ALL EDGES AS SPECIFIED BY A.P.A.

7. PLYWOOD SHALL BE A.P.A. PERFORMANCE STAMPED, AS SPECIFIED ABOVE, GRADE STAMPED C-D, EXPOSURE.

8. ALL GLUE LAMINATED MEMBERS AS SHOWN ON PLANS SHALL BE IN ACCORDANCE WITH A.N.S.I. A190.1, A.I.T.C. OR A.P.A. INSPECTION CERTIFICATES SHALL BE FURNISHED WITH EACH BEAM. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW. GLUE LAMINATED MEMBERS SHALL BE OF INDUSTRIAL APPEARANCE WITH EXTERIOR GLUE.

9. NO WOOD MEMBER SHALL BE CUT, NOTCHED OR BORED, EXCEPT AS DETAILED OR PERMITTED BY THIS CODE.

10. ALL TOPS OF COLUMNS AND WALLS SHALL BE ADEQUATELY BRACED UNTIL THE ROOF SHEATHING IS COMPLETELY NAILED IN PLACE.

11. MAXIMUM STUD HEIGHT AND SPACING PER TABLE 2308.9.1 OF THE CODE. MAXIMUM CEILING JOIST SPANS SHALL BE PER OBC SPAN TABLES. PROVIDE BLOCKING AT 8'-0" O.C.

12. BUILDING DEPARTMENT INSPECTION OF THE ROOF AND FLOOR SYSTEMS IS REQUIRED PRIOR TO PLACING ANY MATERIAL ON OR SUSPENDING ANY LOADS FROM THE ROOF OR FLOOR SYSTEMS.

13. FRAMING HARDWARE SHALL BE SIMPSON "STRONG TIE" OR EQUAL. SUBSTITUTIONS SHALL BEAR I.C.B.O. APPROVAL. ALL FLUSH WOOD TO WOOD CONNECTORS SHALL BE MADE WITH "SIMPSON" METAL HANGERS AS FOLLOWS, UNLESS NOTED OTHERWISE:

2x4, 6 AND 8 MEMBERS:	"U" SERIES
2x10, 12, 14, AND 16 MEMBERS:	"HU" SERIES
4x4 AND LARGER:	"HUTF" SERIES
POST TO BEAM MEMBERS:	"PC" SERIES

14. FASTENING – UNLESS NOTED OTHERWISE ON THE DRAWINGS, THE QUANTITY AND SIZE OF FASTENERS CONNECTING WOOD FRAME MEMBERS TOGETHER AND SHEATHING MATERIALS TO WOOD FRAME MEMBERS SHALL NOT BE LESS THAN THAT SPECIFIED IN TABLE 2304.9.1 OF THE CODE AND PER MANUFACTURERS SPECIFICATIONS.

   A. ALL NAILS EXPOSED TO THE WEATHER SHALL BE GALVANIZED.

   B. TOE NAILS SHALL BE DRIVEN AT AN ANGLE OF 30 DEGREES TO THE PIECE SURFACE AND BE STARTED AT 1/3 THE LENGTH OF THE NAIL FROM THE EDGE OF THE PIECE.

15. WOOD SCREWS SHALL BE IN CONFORMANCE WITH A.N.S.I. B18.6.1.

16. BOLTS AND LAG SCREWS SHALL CONFORM TO A.N.S.I. B18.2.1. ALL BOLTS THROUGH WOOD SHALL HAVE STANDARD CUT WASHERS EXCEPT WHERE METAL SIDE PLATES ARE SPECIFIED. BOLT HOLES SHALL BE BORED 1/32" TO 1/16" LARGER THAN THE BOLT DIAMETER, UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE RETIGHTENED PRIOR TO APPLICATION OF PLASTER, PLYWOOD, ETC

STRUCTURAL STEEL NOTES:

1. ALL STRUCTURAL STEEL SHALL BE CONFORM TO THE LATEST EDITION "STEEL CONSTRUCTION MANUAL" OF THE AISC.

2. UNLESS OTHERWISE NOTED (UNO), ALL MATERIAL SHALL BE IN ACCORDANCE WITH THE FOLLOWING ASTM SPECIFICATIONS:
   ASTM A 992, WIDE FLANGE
   ASTM A 1085, GRADE B, HSS HOLLOW STRUCTURAL SHAPE
   ASTM A 36, PLATES, BARS, RODS, AND ANGLES
   ASTM A 1085, PIPE
   ASTM A 3125, GR A325 OR A409 FOR HIGH STRENGTH BOLTS.
   ASTM F 1554 GRADE ANCHOR BOLTS.
   ASTM A 307, GRADE A, ANCHOR BOLTS.
   ASTM A 563, HEAVY HEX NUTS.
   ASTM A 436, HARDENED STEEL WASHERS.
   ASTM B193 B7, THREADED ROD.

3. ALL CONNECTIONS SHALL BE SHEAR TYPE CONNECTIONS AND DESIGNED BE THE FABRICATOR FOR THE FACTORED SHEAR FORCES INDICATED ON PLAN IN ACCORDANCE FACTOR DESIGN. MINIMUM BOLT DIAMETER SHALL BE ½" UNO. ALL BOLTS SHALL BE SHEAR/BEARING TYPE BOLTS AND "SNUG TIGHT".

4. ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 USING E70XX ELECTRODES UNO. PROVIDE CONTINUOUS MINIMUM SIZED FILLET WELD PER AISC REQUIREMENTS. ALL FILLER MATERIAL SHALL HAVE MINIMUM YIELD STRENGTH OF 58KSI.

5. WHERE "CONTINUOUS CHORD" ANGLES ARE INDICATED, PROVIDE A CONTINUOUS BUTT WELD OR FULL PENETRATION WELD AT THE SPLICE POINTS. THE STEEL FABRICATOR MAY SUBMIT AN ALTERNATE BOLTS CONNECTION DETAILS FOR APPROVAL.

6. ALL MOMENT CONNECTIONS ARE NOTED THUS ( ) ON PLAN. SEE TYPICAL DETAILS.

7. WHERE STEEL BEAMS BEAR ACROSS BUILDING EXPANSION JOINTS OR AT WALL CONTROL JOINTS, PROVIDE A "SLIP" CONNECTION PER TYPICAL DETAIL.

8. HOLES IN STEEL SHALL BE DRILLED OR PUNCHED. ALL SLOTTED HOLES SHALL BE PROVIDED WITH SMOOTH EDGES. BURNING OF HOLES AND TORCH CUTTING AT THE SITE IS NOT PERMITTED.

9. UNLESS OTHERWISE NOTED, ALL STRUCTURAL STEEL PERMANENTLY EXPOSED TO VIEW SHALL BE SHOP PRIMED WITH ONE COAT OF BLACK ENAMEL W/HARDNER.

10. THE STRUCTURAL STEEL ERECTOR SHALL PROVIDE ALL TEMPORARY GUYING AND BRACING.

STRUCTURAL STEEL FABRICATION NOTES:

SHOP FABRICATION DETAILS ARE TO BE MADE FROM "ISSUED FOR CONSTRUCTION" DESIGN DRAWINGS ONLY.

1. FABRICATOR IS RESPONSIBLE FOR:
   a. CHECKED SHOP DETAILS.
   b. CONNECTIONS NOT SHOWN ON THE DESIGN DRAWINGS.
   c. PROVIDING FINISHED SHIPPING WEIGHTS (EITHER UNDER THE PIECE OR IN THE BILL OF MATERIAL).
   d. FIELD BOLT LIST FOR STRUCTURAL STEEL TO STRUCTURAL STEEL FIELD CONNECTIONS, INCLUDING BOLT SUMMARY.
   e. CHECKING BEAM WEBS WITH DEEP COPE CUTS FOR WEB SHEAR, AND PROVIDING NECESSARY REINFORCEMENT, IF REQUIRED.
   f. PAINTING CONSISTENT WITH FABRICATION SPECIFICATION. FIELD PAINTING TO BE MINIMIZED WHILE NOT AFFECTING DESIGN OF BOLTED CONNECTIONS.
   g. COORDINATING OF DETAILING WITH SUBCONTRACTOR'S APPROVAL PACKAGE SUBMITTALS

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NORTH CAROLINA PROFESSIONAL SEAL 049286 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

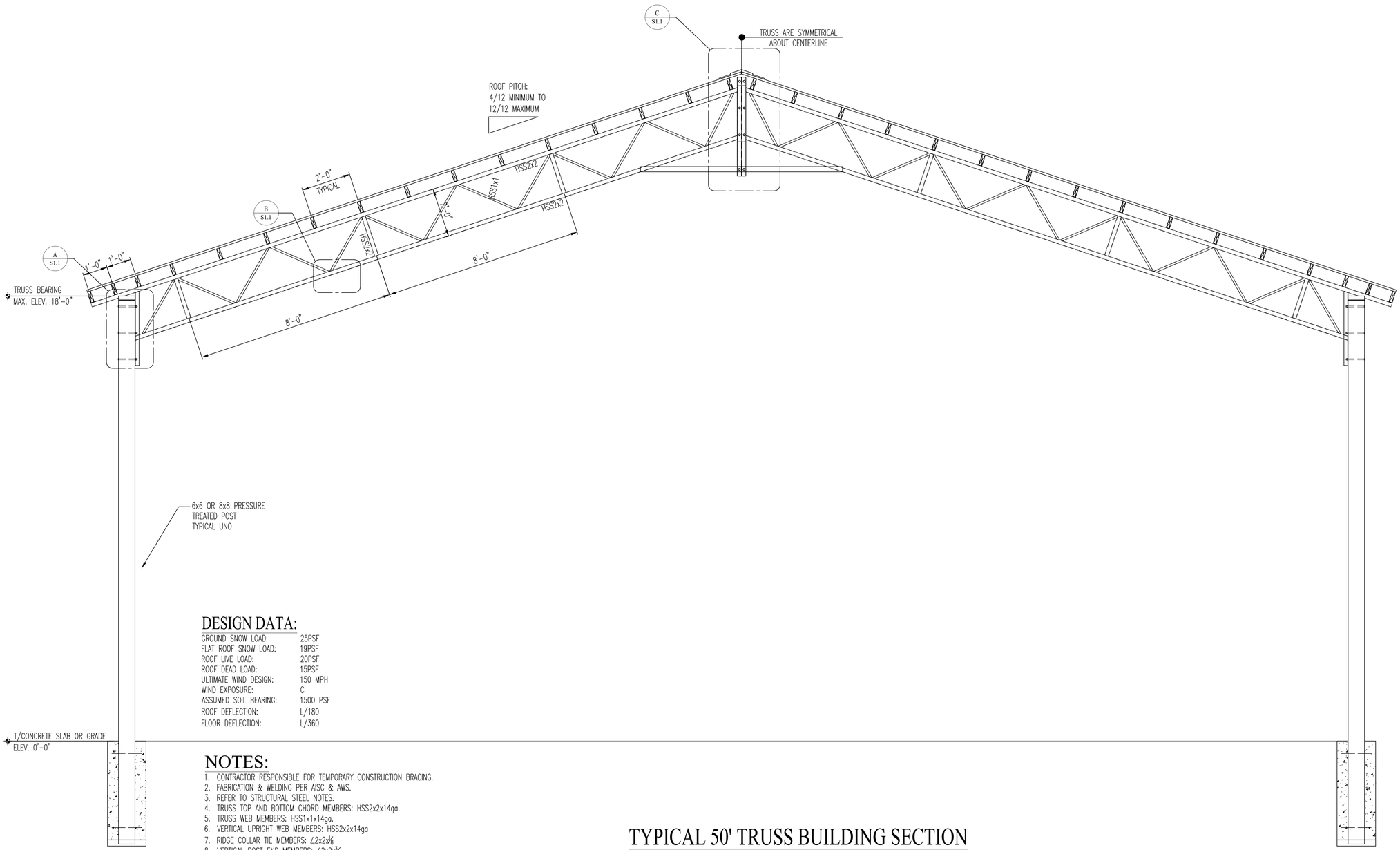
REVISION		
REVISIONS:	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023	DRAWN BY: M. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

GENERAL NOTES & SPECIFICATIONS

S0.1



DESIGN DATA:

GROUND SNOW LOAD:	25PSF
FLAT ROOF SNOW LOAD:	19PSF
ROOF LIVE LOAD:	20PSF
ROOF DEAD LOAD:	15PSF
ULTIMATE WIND DESIGN:	150 MPH
WIND EXPOSURE:	C
ASSUMED SOIL BEARING:	1500 PSF
ROOF DEFLECTION:	L/180
FLOOR DEFLECTION:	L/360

NOTES:

1. CONTRACTOR RESPONSIBLE FOR TEMPORARY CONSTRUCTION BRACING.
2. FABRICATION & WELDING PER AISC & AWS.
3. REFER TO STRUCTURAL STEEL NOTES.
4. TRUSS TOP AND BOTTOM CHORD MEMBERS: HSS2x2x14ga.
5. TRUSS WEB MEMBERS: HSS1x1x14ga.
6. VERTICAL UPRIGHT WEB MEMBERS: HSS2x2x14ga
7. RIDGE COLLAR TIE MEMBERS: ∠2x2x⅛
8. VERTICAL POST END MEMBERS: ∠2x2x3/16
9. POST TO BIRD NEST: ∠2x2x⅛
10. Z BRACKET CONNECTION 48" LONG, 10ga.
11. CONCRETE SHALL BE 3,000PSI (MIN.), COMPRESSIVE STRENGTH.
12. ASSUMED ALLOWABLE SOIL BEARING = 2,000 PSF (MIN).
13. SIDING SHALL BE 29GA OR 26GA MASTERIB METAL MOUNTED TO
    - 13.1. 2x4 GIRTS: 24" O.C.
    - 13.2. 2x6 OR 2x8 GIRTS: 36" O.C.

TYPICAL 50' TRUSS BUILDING SECTION

SCALE: 1/2" = 1'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
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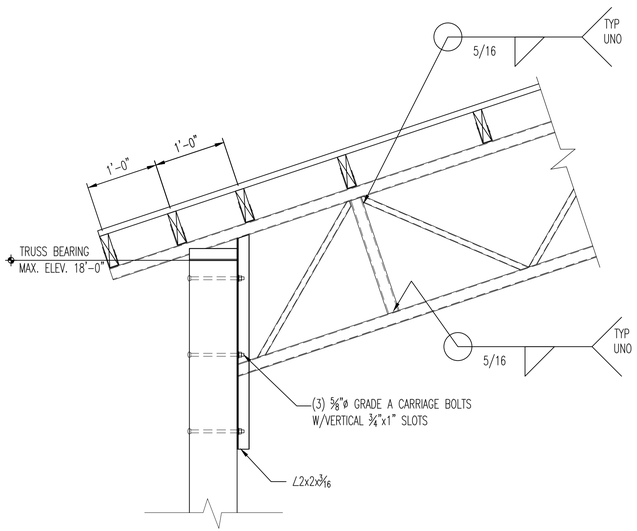
START DATE: 10-12-2023	DRAWN BY: M. HENLEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

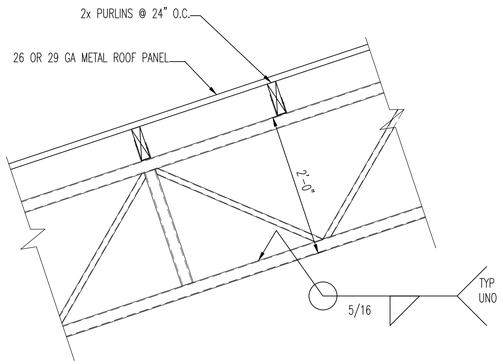
VERIFY ALL DIMENSIONS IN FIELD

TYPICAL 50' TRUSS BUILDING SECTION

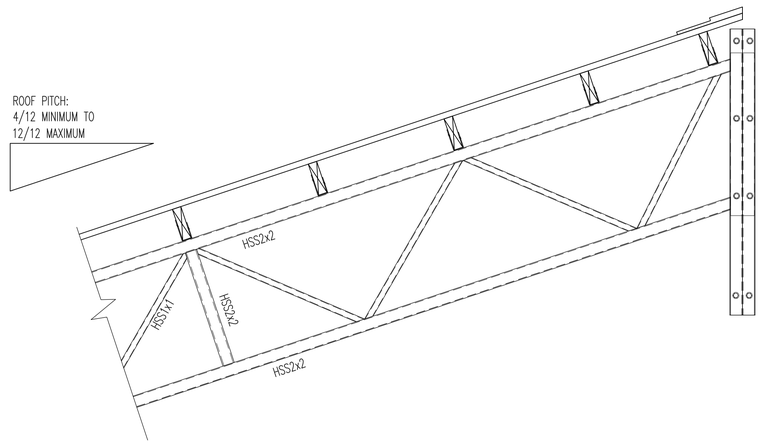
S1.0



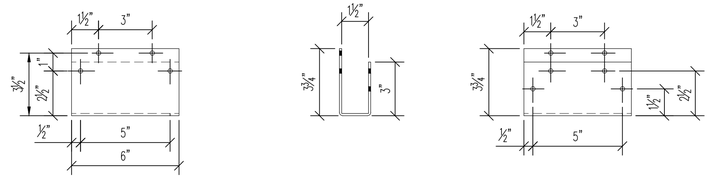
TYPICAL END
FRAME DETAIL
SCALE: 1" = 1'-0"
A
S1.0



TYPICAL PURLIN
FRAME DETAIL
SCALE: 1" = 1'-0"
B
S1.0



TYPICAL RIDGE
FRAME DETAIL
SCALE: 1" = 1'-0"
C
S1.0



PURLIN BUCKET DETAIL
SCALE: 3" = 1'-0"

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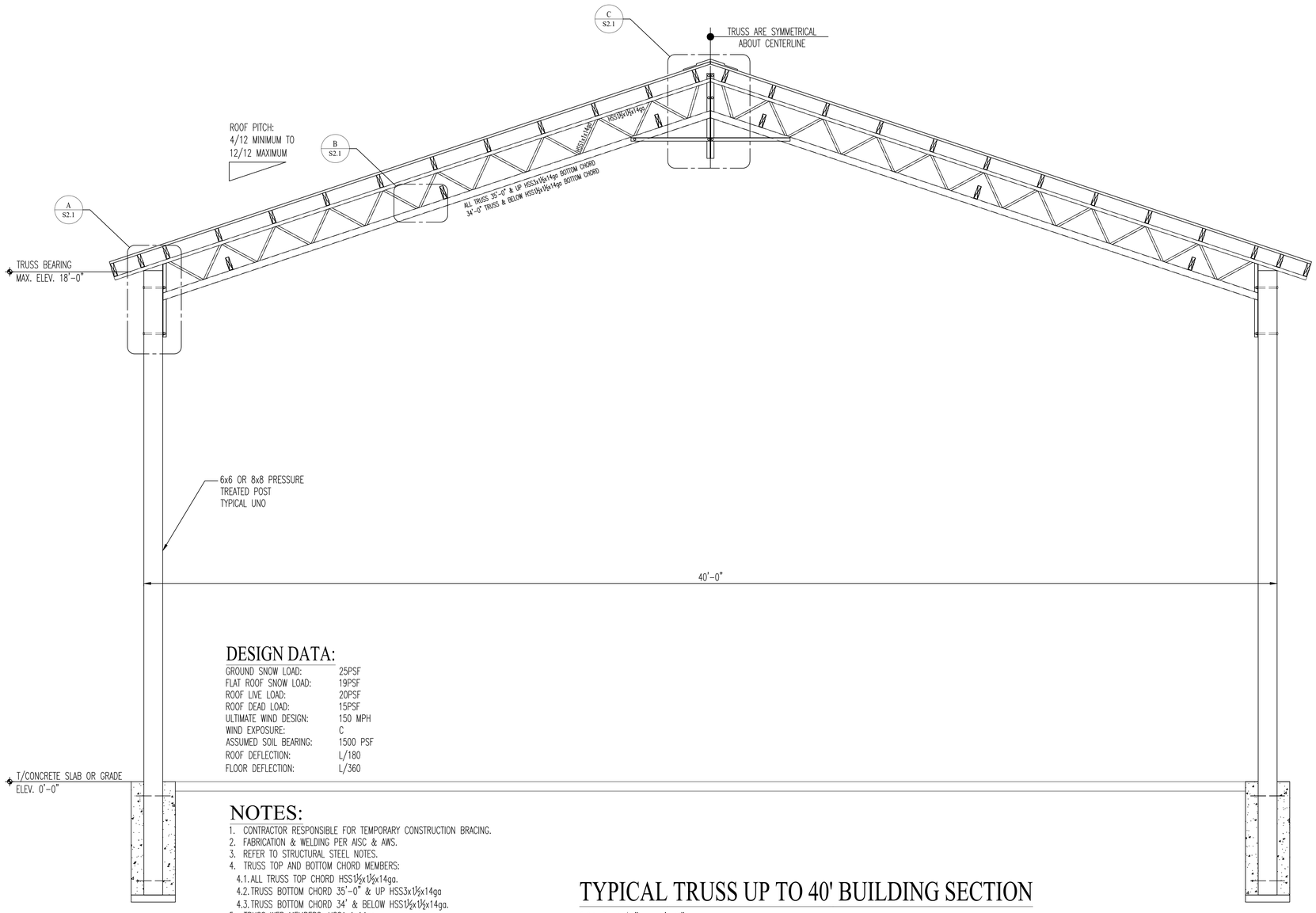
START DATE: 10-12-2023	DRAWN BY: W. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL SECTIONS & DETAILS FOR 50' TRUSS

S1.1



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ROOF LIVE LOAD:	20PSF
ROOF DEAD LOAD:	15PSF
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WIND EXPOSURE:	C
ASSUMED SOIL BEARING:	1500 PSF
ROOF DEFLECTION:	L/180
FLOOR DEFLECTION:	L/360

NOTES:

1. CONTRACTOR RESPONSIBLE FOR TEMPORARY CONSTRUCTION BRACING.
2. FABRICATION & WELDING PER AISC & AWS.
3. REFER TO STRUCTURAL STEEL NOTES.
4. TRUSS TOP AND BOTTOM CHORD MEMBERS:
   - 4.1. ALL TRUSS TOP CHORD HSS1½x1½x14ga.
   - 4.2. TRUSS BOTTOM CHORD 35'-0" & UP HSS3x1½x14ga
   - 4.3. TRUSS BOTTOM CHORD 34' & BELOW HSS1½x1½x14ga.
5. TRUSS WEB MEMBERS: HSS1x1x14ga
6. COLLAR TIE MEMBERS: ∠1½x1½x⅛
7. TRUSS END MEMBER: ∠1½x1½x⅛
8. CONCRETE SHALL BE 3,000PSI (MIN.), COMPRESSIVE STRENGTH.
9. ASSUMED ALLOWABLE SOIL BEARING = 2,000 PSF (MIN).
10. SIDING SHALL BE 29GA OR 26GA MASTERIB METAL MOUNTED TO SIDING SHALL BE 29GA OR 26GA MASTERIB METAL MOUNTED TO
    - 10.1. 2x4 GIRTS: 24" O.C.
    - 10.2. 2x6 OR 2x8 GIRTS: 36" O.C.

TYPICAL TRUSS UP TO 40' BUILDING SECTION

SCALE: 1/2" = 1'-0"

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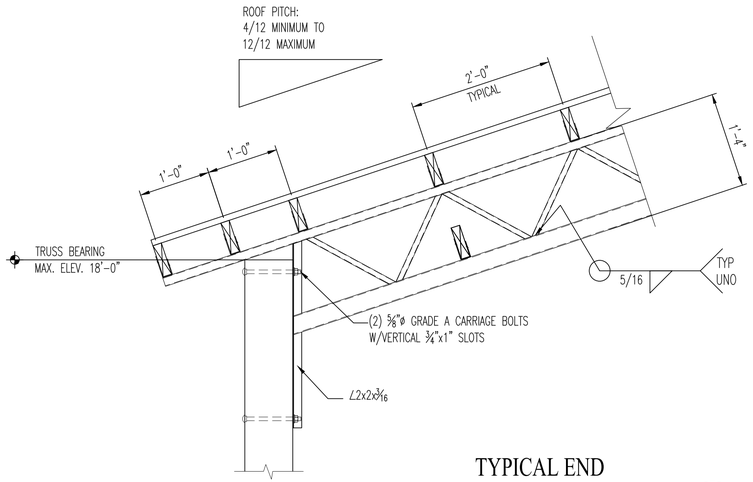
REVISION		
DESIGNER	DATE:	DESCRIPTION

START DATE: 10-12-2023	DRAWN BY: M. HEANEY
REVIEW DATE:	REVIEW BY: K. RICHARDSON
APPROVAL DATE:	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL TRUSS UP TO 40' SECTION BUILDING SECTION

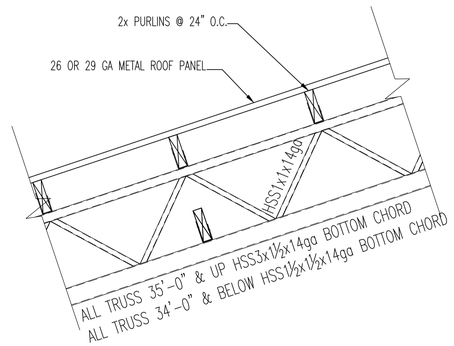
S2.0



TYPICAL END
FRAME DETAIL

SCALE: 1" = 1'-0"

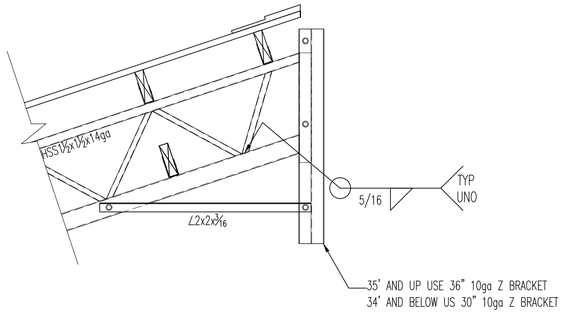
A
S2.0



TYPICAL PURLIN
FRAME DETAIL

SCALE: 1" = 1'-0"

B
S2.0



TYPICAL RIDGE
FRAME DETAIL

SCALE: 1" = 1'-0"

C
S2.0

CRAMER ENGINEERING, LLC
STRUCTURAL ENGINEERING
1640 AKRON-PENINSULA ROAD
BUILDING #1-SUITE 202-203
AKRON, OH 44313
Phone (440) 655-1348
email: james@cramerengineering.com
www.cramerengineering.com

NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA TRUSSES BY BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

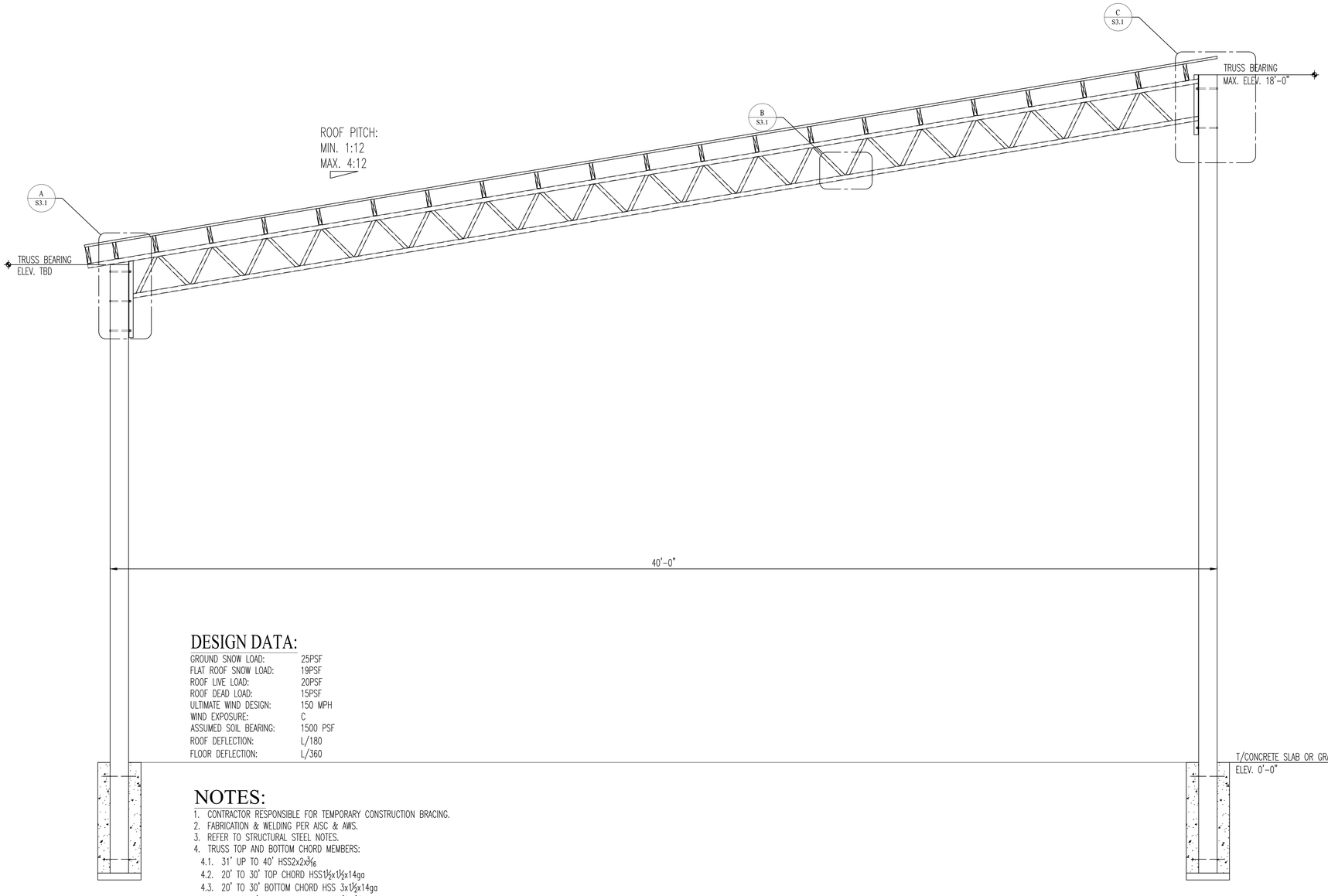
REVISION		
REVISIONS:	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023 — DRAWN BY: M. HERNEY
REVIEW DATE: 02-09-2024 — REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024 — APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL TRUSS SECTIONS & DETAILS FOR TRUSS UP TO 40'

S2.1



DESIGN DATA:

GROUND SNOW LOAD:	25PSF
FLAT ROOF SNOW LOAD:	19PSF
ROOF LIVE LOAD:	20PSF
ROOF DEAD LOAD:	15PSF
ULTIMATE WIND DESIGN:	150 MPH
WIND EXPOSURE:	C
ASSUMED SOIL BEARING:	1500 PSF
ROOF DEFLECTION:	L/180
FLOOR DEFLECTION:	L/360

NOTES:

1. CONTRACTOR RESPONSIBLE FOR TEMPORARY CONSTRUCTION BRACING.
2. FABRICATION & WELDING PER AISC & AWS.
3. REFER TO STRUCTURAL STEEL NOTES.
4. TRUSS TOP AND BOTTOM CHORD MEMBERS:
   - 4.1. 31" UP TO 40' HSS2x2x3/16
   - 4.2. 20' TO 30' TOP CHORD HSS1½x1½x14ga
   - 4.3. 20' TO 30' BOTTOM CHORD HSS 3x1½x14ga
   - 4.4. UP TO 19' BOTTOM CHORD HSS 1½x1½x14ga
5. TRUSS WEB MEMBERS = HSS1x1, TYP.
6. END ATTACHMENTS:
   - 6.1. UP TO 30' HSS 1½x1½x14ga
   - 6.2. 31" AND UP ∠2x2x3/16
7. CONCRETE SHALL BE 3,000PSI (MIN.), COMPRESSIVE STRENGTH.
8. ASSUMED ALLOWABLE SOIL BEARING = 2,000 PSF (MIN).
9. SIDING SHALL BE 29GA OR 26GA MASTERIB METAL MOUNTED TO
   - 9.1. 2x4 GIRTS: 24" O.C.
   - 9.1. 2x6 OR 2x8 GIRTS: 36" O.C

TYPICAL MONOSLOPE TRUSS UP TO 40' BUILDING SECTION

SCALE: 1/2" = 1'-0"

CRAMER ENGINEERING, LLC
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NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

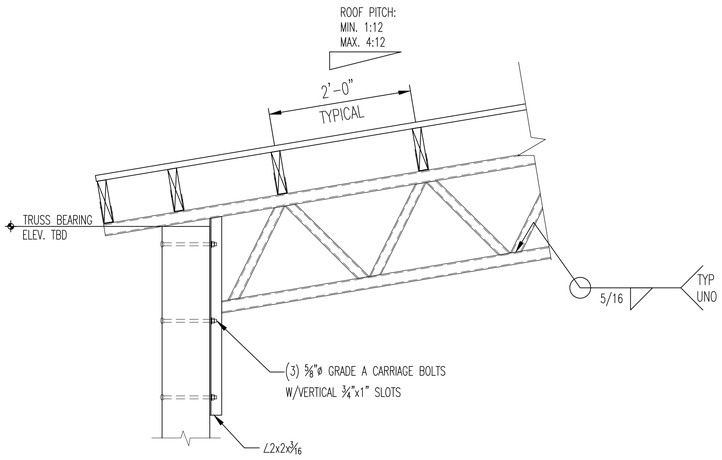
REVISION		
REVISIONS	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023	DRAWN BY: M. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

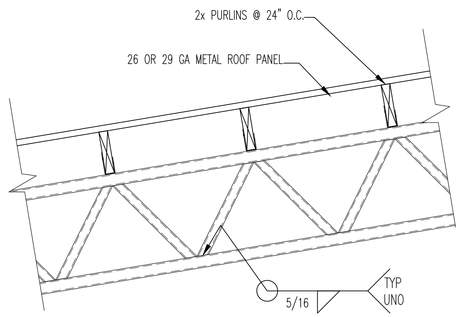
VERIFY ALL DIMENSIONS IN FIELD

TYPICAL MONOSLOPE
TRUSS UP TO 40' SECTION
BUILDING SECTION

S3.0

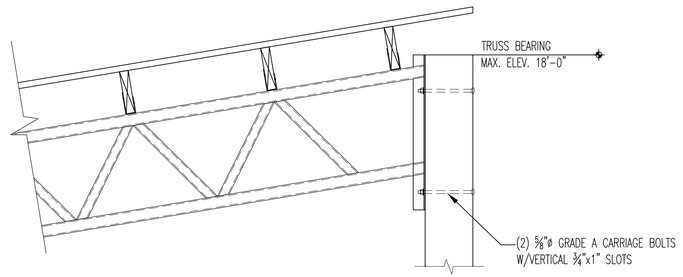


TYPICAL END
FRAME DETAIL
SCALE: 1" = 1'-0"
A
S3.0



REFER TO NOTES FOR
MEMBER SIZES

TYPICAL PURLIN
FRAME DETAIL
SCALE: 1" = 1'-0"
B
S3.0



TYPICAL RIDGE
FRAME DETAIL
SCALE: 1" = 1'-0"
C
S3.0

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NORTH CAROLINA PROFESSIONAL SEAL 049288 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE
OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

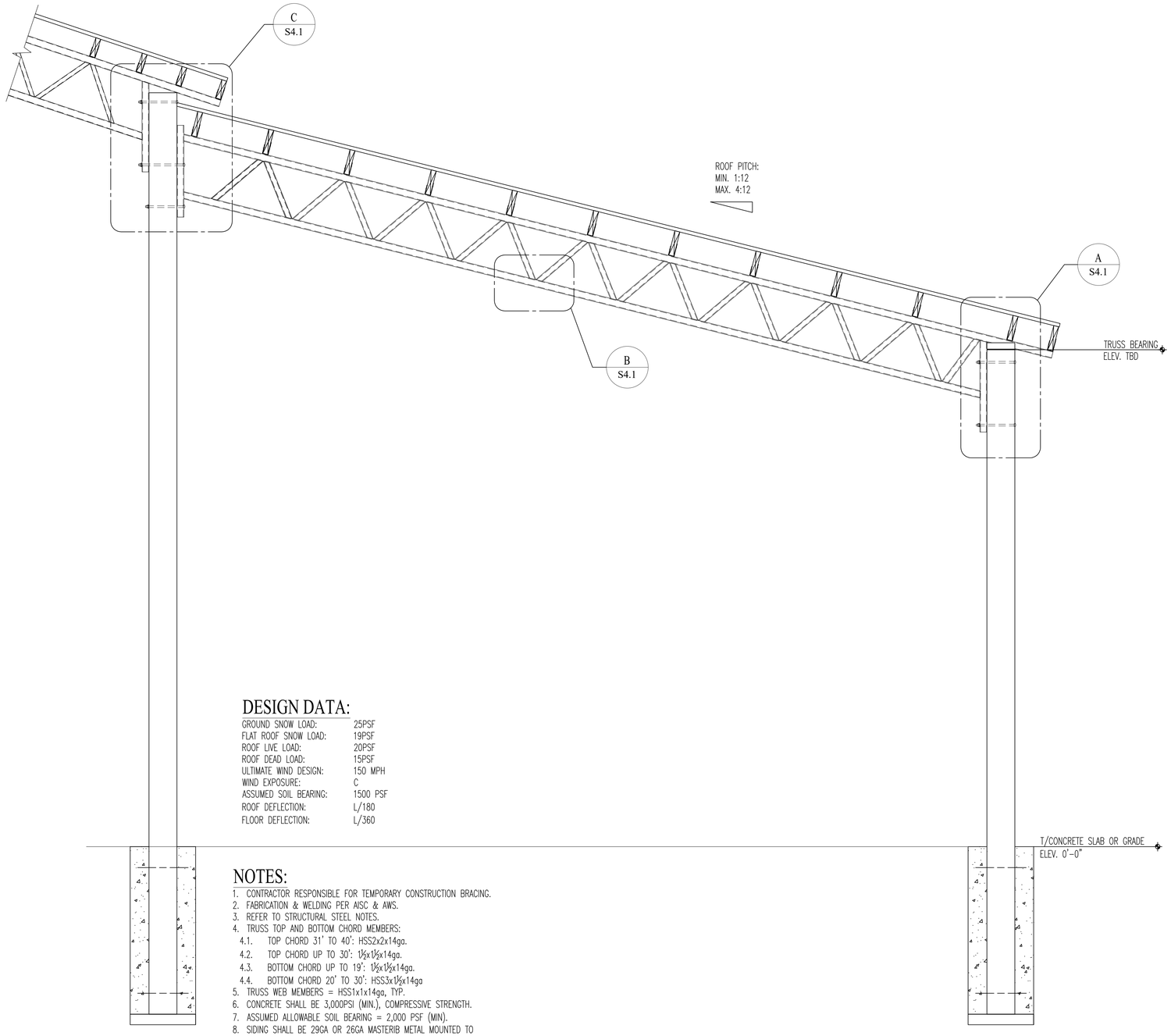
REVISION:		
DESIGNS:	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023	DRAWN BY: M. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL SECTIONS & DETAILS
FOR 40' MONOSLOPE TRUSS

S3.1



DESIGN DATA:

GROUND SNOW LOAD:	25PSF
FLAT ROOF SNOW LOAD:	19PSF
ROOF LIVE LOAD:	20PSF
ROOF DEAD LOAD:	15PSF
ULTIMATE WIND DESIGN:	150 MPH
WIND EXPOSURE:	C
ASSUMED SOIL BEARING:	1500 PSF
ROOF DEFLECTION:	L/180
FLOOR DEFLECTION:	L/360

NOTES:

1. CONTRACTOR RESPONSIBLE FOR TEMPORARY CONSTRUCTION BRACING.
2. FABRICATION & WELDING PER AISC & AWS.
3. REFER TO STRUCTURAL STEEL NOTES.
4. TRUSS TOP AND BOTTOM CHORD MEMBERS:
   - 4.1. TOP CHORD 31' TO 40': HSS2x2x14ga.
   - 4.2. TOP CHORD UP TO 30': 1½x1½x14ga.
   - 4.3. BOTTOM CHORD UP TO 19': 1½x1½x14ga.
   - 4.4. BOTTOM CHORD 20' TO 30': HSS3x1½x14ga
5. TRUSS WEB MEMBERS = HSS1x1x14ga, TYP.
6. CONCRETE SHALL BE 3,000PSI (MIN.), COMPRESSIVE STRENGTH.
7. ASSUMED ALLOWABLE SOIL BEARING = 2,000 PSF (MIN).
8. SIDING SHALL BE 29GA OR 26GA MASTERIB METAL MOUNTED TO
   - 8.1. 2x4 GIRTS: 24" O.C.
   - 8.2. 2x6 OR 2x8 GIRTS: 36" O.C

TYPICAL LEAN-TO TRUSS UP TO 40' BUILDING SECTION

SCALE: ¾" = 1'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

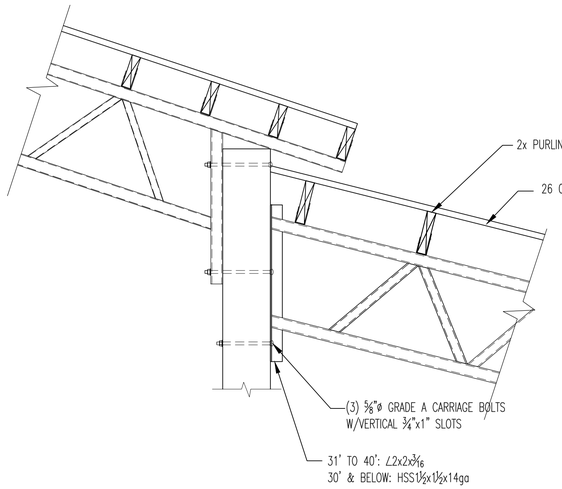
REVISION		
REVISIONS	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023	DRAWN BY: M. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

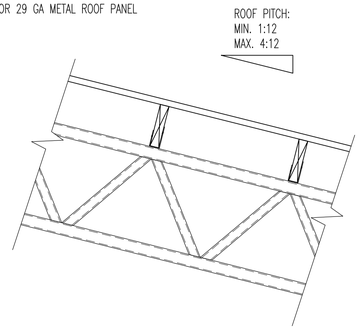
TYPICAL LEAN-TO TRUSS
UP TO 40' BUILDING
SECTION

S4.0



TYPICAL RIDGE
FRAME DETAIL — C / S4.0

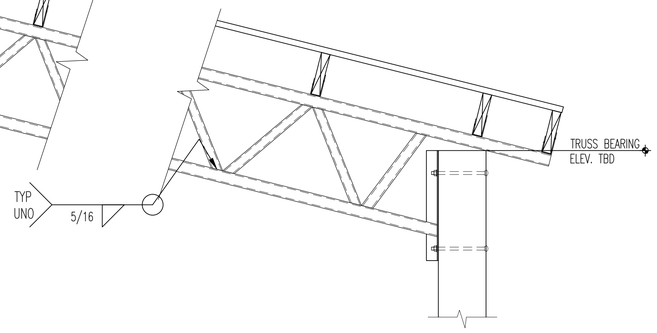
SCALE: 1" = 1'-0"



REFER TO NOTES
FOR MEMBER SIZES

TYPICAL PURLIN
FRAME DETAIL — B / S4.0

SCALE: 1" = 1'-0"



TYPICAL END
FRAME DETAIL — A / S4.0

SCALE: 1" = 1'-0"

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email: james@cramerengineering.com
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NORTH CAROLINA PROFESSIONAL SEAL 045286 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE
OF NORTH CAROLINA
TRUSSES BY
BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

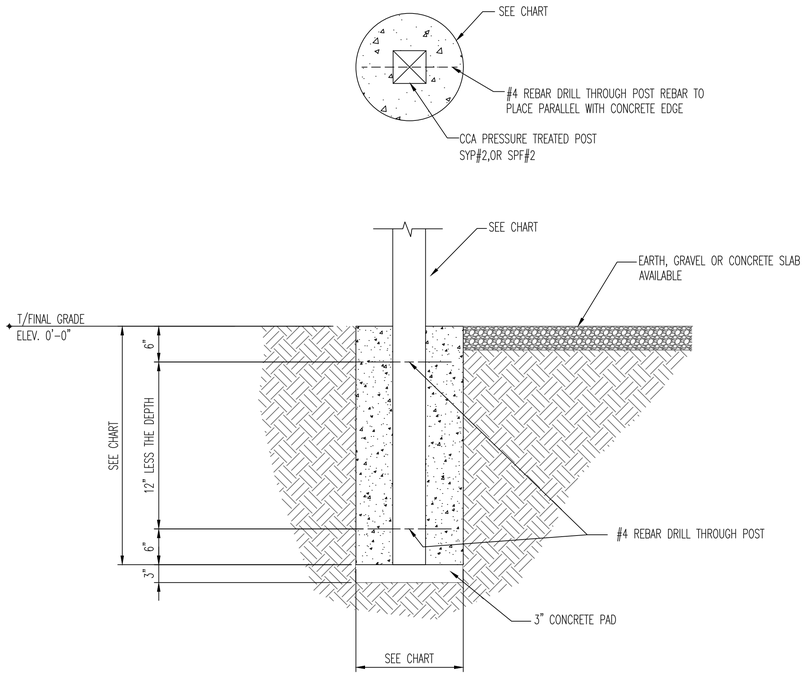
REVISION		
REVISIONS:	DATE:	DESCRIPTION:
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023 — DRAWN BY: M. HEANEY
REVIEW DATE: 02-09-2024 — REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024 — APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL SECTIONS &
DETAILS FOR LEAN-TO
TRUSS UP TO 40' SECTION

S4.1



TYPICAL FOUNDATION SECTION

SCALE: 1" = 1'-0"

FOOTING GUIDELINES FOR OPEN OR ENCLOSED GABLES/LEAN-TO POLE BARN		
BUILDING WIDTH (SPAN)	POST HOLE DIAMETER	
20'-0"	16"ø	
30'-0"	16"ø	
40'-0"	16"ø	
50'-0"	18"ø	
60'-0"	18"ø	

NOTE:
MAXIMUM SPACING OF POST IS 8'-0" O.C.,
DESIGN DATA:
ALLOWABLE SOIL BEARING: 2,500 PSF
SNOW LOAD: 25 PSF
DEAD LOAD: 10 PSF

FOOTING GUIDELINES FOR OPEN OR ENCLOSED GABLES/LEAN-TO POLE BARN		
BUILDING WIDTH (SPAN)	POST HOLE DIAMETER	
20'-0"	16"ø	
30'-0"	16"ø	
40'-0"	16"ø	
50'-0"	18"ø	
60'-0"	20"ø	

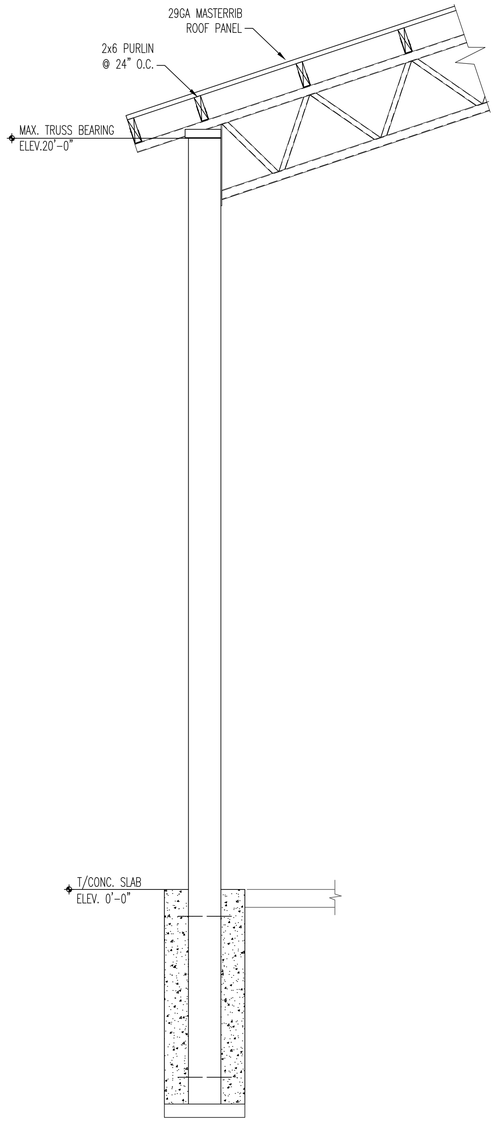
NOTE:
MAXIMUM SPACING OF POST IS 10'-0" O.C.,
DESIGN DATA:
ALLOWABLE SOIL BEARING: 2,500 PSF
SNOW LOAD: 25 PSF
DEAD LOAD: 10 PSF

FOOTING GUIDELINES FOR OPEN OR ENCLOSED GABLES/LEAN-TO POLE BARN		
BUILDING WIDTH (SPAN)	POST HOLE DIAMETER	
20'-0"	16"ø	
30'-0"	16"ø	
40'-0"	16"ø	
50'-0"	20"ø	
60'-0"	20"ø	

NOTE:
MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.
DESIGN DATA:
ALLOWABLE SOIL BEARING: 2,500 PSF
SNOW LOAD: 25 PSF
DEAD LOAD: 10 PSF

POST GUIDELINES FOR OPEN OR ENCLOSED GABLES/LEAN-TO POLE BARN			
EAVE HEIGHT	POST SIZE (MIN)	POST DEPTH (MIN)*	
10'-0"	6x6	3'-2"	
12'-0"	6x6	3'-6"	
14'-0"	8x8	4'-0"	
16'-0"	8x8	4'-8"	
18'-0"	8x8	5'-5"	
20'-0"	10x10	6'-0"	

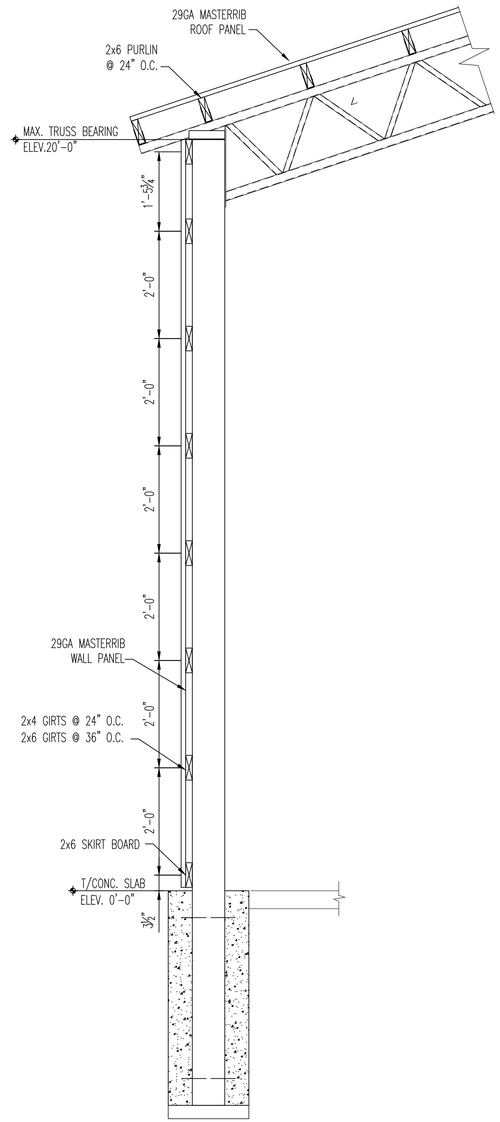
NOTE:
MAXIMUM SPACING OF POST SEE CHARTS BELOW
DESIGN DATA:
ALLOWABLE SOIL BEARING: 2,500 PSF
SNOW LOAD: 25 PSF
DEAD LOAD: 10 PSF



TYPICAL WALL SECTION

A S5.0

SCALE: 3/4" = 1'-0"



TYPICAL WALL SECTION

B S5.0

SCALE: 3/4" = 1'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 040266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA TRUSSES BY BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

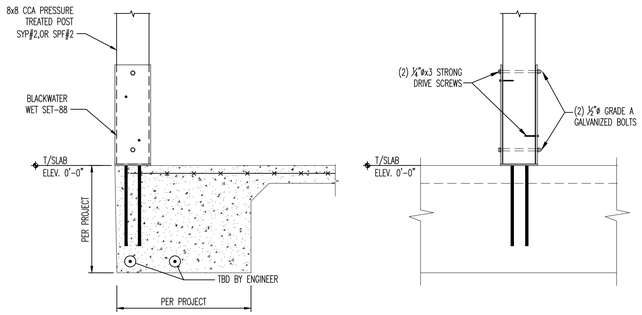
REVISION			
REVISIONS:	DATE:	DESCRIPTION:	
1	02-09-2024	ISSUED FOR CONSTRUCTION	

START DATE: 10-12-2023	DRAWN BY: W. HEANEY
REVIEW DATE: 02-09-2024	REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024	APPROVED BY: J. CRAMER

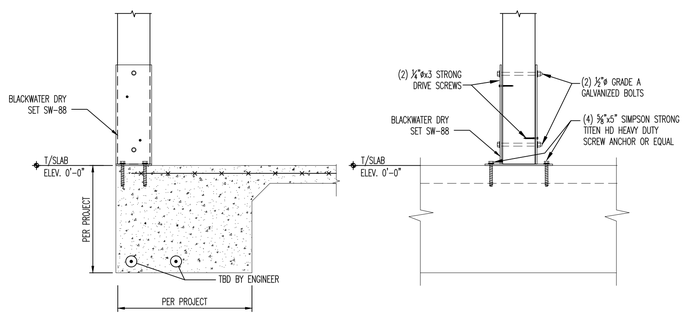
VERIFY ALL DIMENSIONS IN FIELD

TYPICAL FOUNDATION SECTIONS & CHARTS

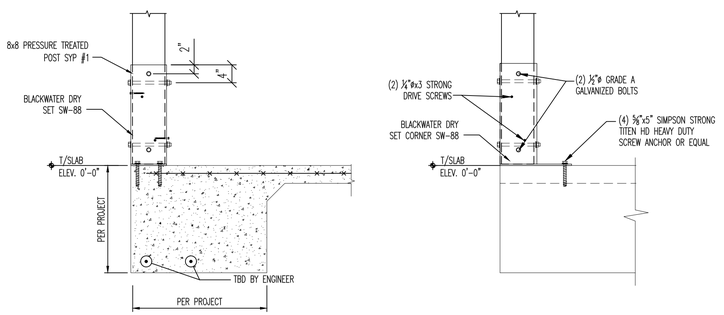
S5.0



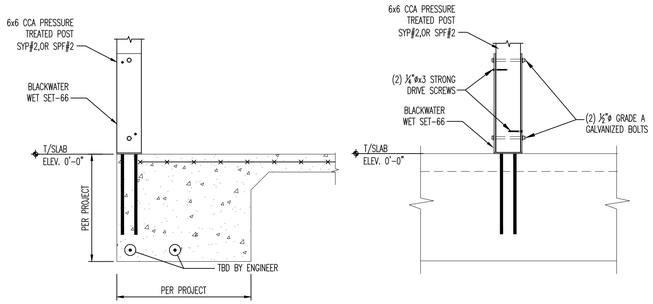
BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET C
SCALE: 1" = 1'-0" S5.1



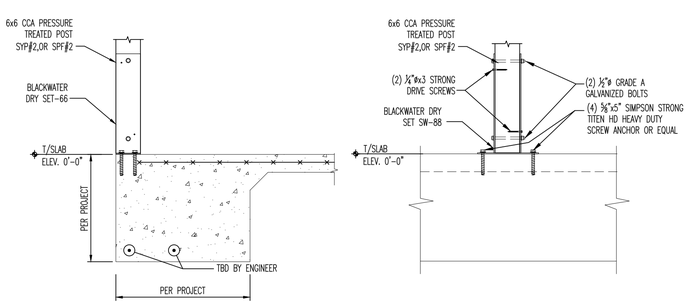
BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET D
SCALE: 1" = 1'-0" S5.1



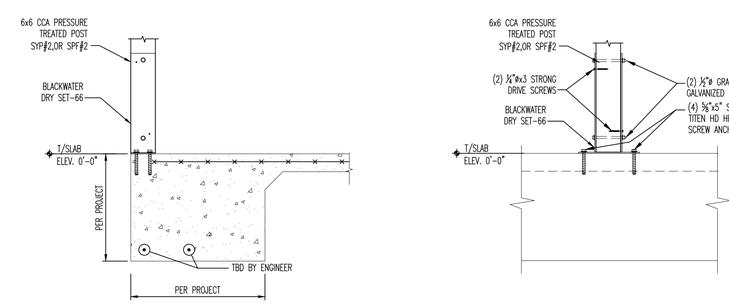
BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET E
SCALE: 1" = 1'-0" S5.1



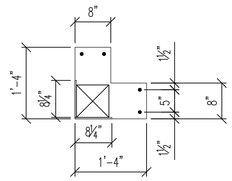
BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET E
SCALE: 1" = 1'-0" S5.1



BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET F
SCALE: 3/4" = 1'-0" S5.1



BLACKWATER TRUSS SYSTEMS
ANCHOR BRACKET G
SCALE: 3/4" = 1'-0" S5.1



FOOTING GUIDELINES FOR ENCLOSED WET SET POST ANCHORS

EAVE HEIGHT	POST SIZE (MIN)	TYPE	INSIDE DIMENSION STD.
10'-0"	6x6	BWP66	3⅝"
12'-0"	6x6	BWP66	3⅝"
14'-0"	8x8	BWP88	7⅝"
16'-0"	8x8	BWP88	7⅝"
18'-0"	8x8	BWP88	7⅝"

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

MAXIMUM GUIDELINES FOR ENCLOSED WET SET POST ANCHORS

EAVE HEIGHT	MAXIMUM SPAN	TYPE	POST SIZE (MIN)
10'-0"	40'	BWP66	6x6
12'-0"	40'	BWP66	6x6
14'-0"	40'	BWP88	8x8
16'-0"	30'	BWP88	8x8
18'-0"	25'	BWP88	8x8

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

FOOTING GUIDELINES FOR ENCLOSED DRY SET POST ANCHORS

EAVE HEIGHT	POST SIZE (MIN)	TYPE	INSIDE DIMENSION STD.
10'-0"	6x6	BW66	3⅝"
12'-0"	6x6	BW66	3⅝"
14'-0"	8x8	BW88	7⅝"
16'-0"	8x8	BW88	7⅝"
18'-0"	8x8	BW88	7⅝"

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

MAXIMUM GUIDELINES FOR ENCLOSED DRY SET POST ANCHORS

EAVE HEIGHT	MAXIMUM SPAN	TYPE	POST SIZE (MIN)
10'-0"	40'	BW66	6x6
12'-0"	40'	BW66	6x6
14'-0"	40'	BW88	8x8
16'-0"	30'	BW88	8x8
18'-0"	25'	BW88	8x8

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

FOOTING GUIDELINES FOR ENCLOSED DRY SET POST ANCHORS

EAVE HEIGHT	POST SIZE (MIN)	TYPE	INSIDE DIMENSION STD.
10'-0"	6x6	BW66	3⅝"
12'-0"	6x6	BW66	3⅝"
14'-0"	8x8	BW88	7⅝"
16'-0"	8x8	BW88	7⅝"
18'-0"	8x8	BW88	7⅝"

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

MAXIMUM GUIDELINES FOR ENCLOSED DRY SET POST ANCHORS

EAVE HEIGHT	MAXIMUM SPAN	TYPE	POST SIZE (MIN)
10'-0"	40'	BW66	6x6
12'-0"	40'	BW66	6x6
14'-0"	40'	BW88	8x8
16'-0"	30'	BW88	8x8
18'-0"	25'	BW88	8x8

ENGINEER NOTES:
1. MAXIMUM SPACING OF POST IS 12'-0" O.C., ALL SPACING OVER 12'-0" MAX. REQUIRES ADDITIONAL ENGINEERING BY LICENSED ENGINEER.

CRAMER ENGINEERING, LLC
STRUCTURAL ENGINEERING
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BUILDING #1-SUITE 202-203
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NORTH CAROLINA PROFESSIONAL SEAL 049266 ENGINEER JAMES J CRAMER

DATE: 02-09-2024

STEEL TRUSSES FOR THE STATE OF NORTH CAROLINA
TRUSSES BY BLACKWATER TRUSS SYSTEMS

No. 23-230-NC

REVISION

REVISIONS	DATE	DESCRIPTION
1	02-09-2024	ISSUED FOR CONSTRUCTION

START DATE: 10-12-2023 DRAWN BY: W. HEINEY
REVIEW DATE: 02-09-2024 REVIEW BY: J. CRAMER
APPROVAL DATE: 02-09-2024 APPROVED BY: J. CRAMER

VERIFY ALL DIMENSIONS IN FIELD

TYPICAL FOUNDATION SECTIONS, DETAILS & CHARTS

S5.1