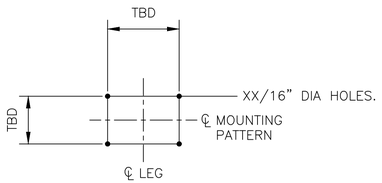
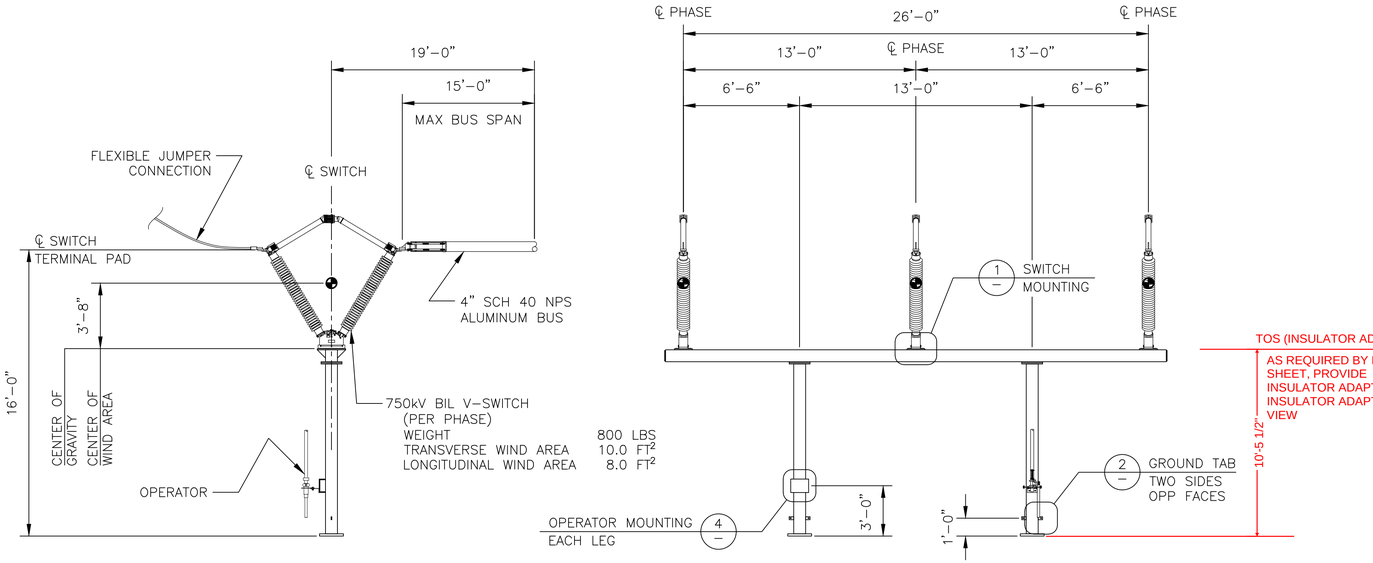
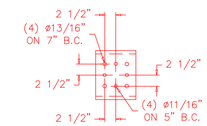


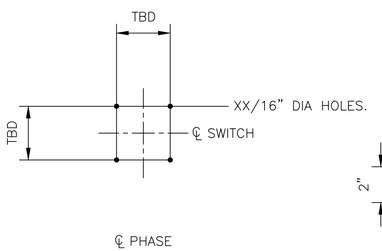
DETAIL 4
OPERATOR MOUNTING PATTERN



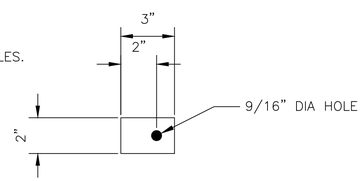
161kV THREE PHASE V–SWITCH SUPPORT
MAKE (4) TIMES



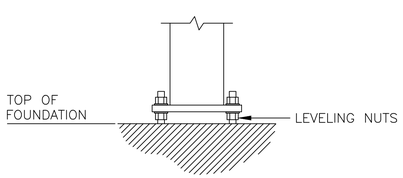
INSULATOR ADAPTER PLAN VIEW



DETAIL 1
SWITCH MOUNTING PATTERN



DETAIL 2
GROUNDING TAB



DETAIL 3
BASE PLATE & ANCHOR BOLTS

DESIGN NOTES:

1. ALL LOAD CASES (EXCLUDING NESC HEAVY) SHALL USE THE FOLLOWING WIND DESIGN PARAMETERS:

EXPOSURE HEIGHT	17 FT
EXPOSURE FACTOR	0.872

2. ALL WIND LOADS SHALL BE MULTIPLIED BY THE FOLLOWING SHAPE FACTORS:

RIGID BUS/POST INSULATORS	1.0
ROUND SECTIONS	0.9
12 OR 16 SIDED SECTIONS	1.0
8 SIDED SECTIONS	1.4
SQUARE/RECTANGULAR SECTIONS	2.0

3. ALL LOAD CASES (EXCLUDING NESC HEAVY) SHALL USE THE FOLLOWING ICE DESIGN PARAMETERS:

EXPOSURE FACTOR	0.936

4. EQUIPMENT/INSULATOR WIND AREAS SHOWN INCLUDE SHAPE FACTORS AND SHOULD NOT BE MODIFIED.

5. DEFLECTIONS SHALL BE CALCULATED FOR ALL POINTS OF INTEREST, INCLUDING SWITCH TERMINAL PADS, HIGH POINTS OF RIGID BUS, CONDUCTOR ATTACHMENTS, AND WHERE OTHERWISE NOTED. DEFLECTION LIMITS FOR DEFLECTION LOAD CASES SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
   i. HORIZONTAL DEFLECTION OF VERTICAL MEMBERS: 1/100 OF THE HEIGHT AT THE POINT OF INTEREST
   ii. VERTICAL DEFLECTION OF HORIZONTAL MEMBERS: 1/200 OF THE HORIZONTAL SPAN
   iii. HORIZONTAL DEFLECTION OF HORIZONTAL MEMBERS:
      a. CLASS 'A' SWITCH SUPPORT MEMBERS: 1/200 OF THE HORIZONTAL SPAN
      b. CLASS 'B' ALL OTHER SUPPORT MEMBERS: 1/100 OF THE HORIZONTAL SPAN

6. DEAD WEIGHT OF ALL HORIZONTAL RIGID BUS SHALL BE INCREASED BY 25% AS AN ALLOWANCE FOR CONTINUOUS LOOSE CABLE DAMPER.

7. ALL STRUCTURAL STEEL SHALL BE HOT–DIPPED GALVANIZED. ALL STRUCTURAL STEEL SHALL BE SUPPORTED ON LEVELING NUTS WITHOUT GROUT (DETAIL 3) AND ALL BASE PLATES AND ANCHOR BOLTS SHALL BE DESIGNED AND DETAILED ACCORDINGLY.

8. STRUCTURE DESIGN AND DETAILING SHALL INCLUDE SUPPORT PROVISIONS FOR SWITCH OPERATOR MECHANISMS AND PIPE.

9. SEE DRAWING S907PS10 FOR ADDITIONAL LOADING INFORMATION.

BURNS McDONNELL
Engineering License # CA-421

PRELIMINARY ONLY NOT FOR CONSTRUCTION

REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPRVD

GRAND RIVER DAM AUTHORITY
HERRON SUBSTATION S907
PRYOR, OKLAHOMA
161kV

161kV SUBSTATION 3–PH V–SWITCH SUPPORT STRUCTURE

SCALE: NTS	DRAWN BY: GM	ENGR: GM	APPD: –
		CH: JAM	DATE: 12/05/2024

GRDA
GRAND RIVER DAM AUTHORITY
P.O. BOX 409
VINITA, OK 74301

DRAWING No. S907PS04 REV. A

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Last plotted by: Martinez, Genaro (HOU) Plot Style: Monochrome.ctb Plot Scale: 1:1 Plot Date: 12/3/2024 1:17 PM Plotter_Used: DWG To PDF.pc3

File: \\bmcd.burnsmcd.com\dfs\Clients\TND\GRDA\176404_Herron-Sub-Exp\Design\Substation\Struc\Structures\IFB Steel Spec\Structures\S907PS08.dwg Last Saved: 12/3/2024 1:20 PM Last saved by: Gmartinez3
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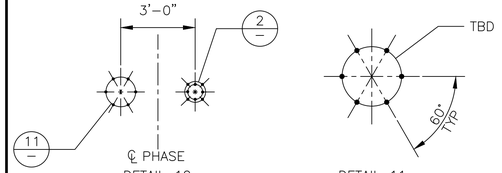
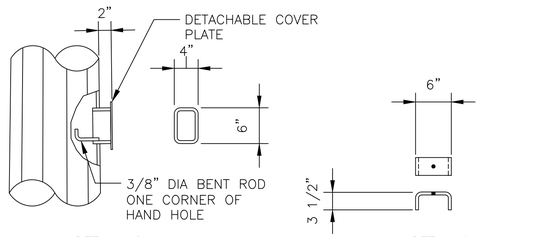


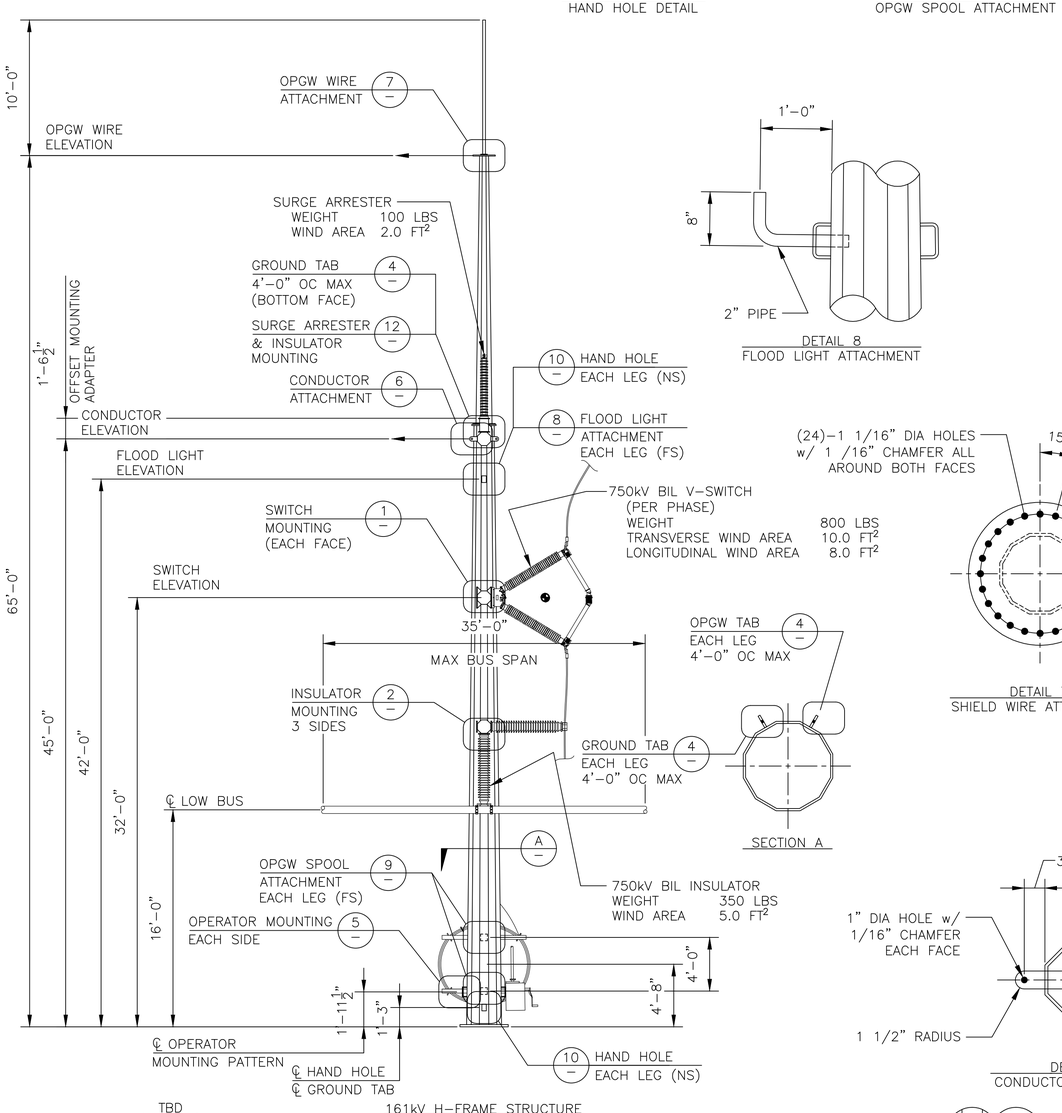
DETAIL 12
SURGE ARRESTER & INSULATOR MOUNTING

DETAIL 11
SURGE ARRESTER MOUNTING



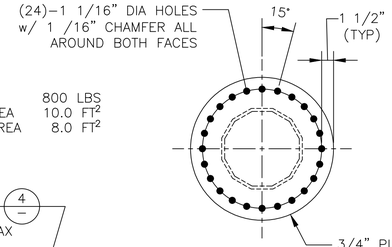
DETAIL 10
HAND HOLE DETAIL

DETAIL 9
OPGW SPOOL ATTACHMENT



161kV H-FRAME STRUCTURE

DETAIL 8
FLOOD LIGHT ATTACHMENT



DETAIL 7
SHIELD WIRE ATTACHMENT

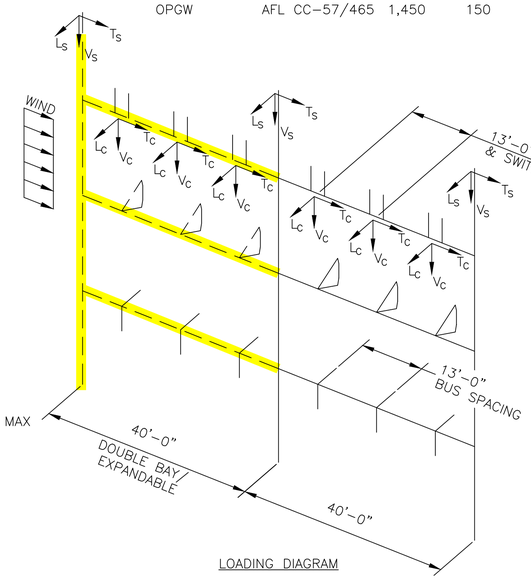
WIRE LOADS (0-15° LINE ANGLE):

H-FRAME STRUCTURES SHALL BE ANALYZED AND DESIGNED USING ULTIMATE STRENGTH DESIGN (USD) FOR THE FOLLOWING WIRE LOADS IN CONJUNCTION WITH THE STRUCTURE LOADS SHOWN ON DRAWING S907PS10.

	LOAD CASE	CONDUCTOR (KIPS)			OPGW (KIPS)			OVERLOAD FACTORS		
								WIND	VERTICAL	WIRE TENSIONS
		V_C	T_C	L_C	V_S	T_S	L_S			
CONDITION 1	NESC HEAVY	5.0	2.4	13.6	1.2	0.7	2.6	2.5	1.5	1.65
	EXTREME WIND	3.0	2.2	8.4	0.7	0.5	1.4	1.1	1.1	1.1
	EXTREME ICE	4.9	1.6	11.6	1.5	0.4	2.3	1.1	1.1	1.1
	ICE & WIND	4.9	2.0	11.8	1.5	0.7	2.5	1.0	1.0	1.0
	DEFLECTION	2.6	0.5	3.8	0.5	0.1	0.4	1.0	1.0	1.0
	CONSTRUCTION	5.7	1.7	0.5	1.6	0.7	0.2	1.0	1.0	1.0
CONDITION 2	NESC HEAVY	-1.1	1.7	6.6	0.3	0.7	2.4	2.5	1.5	1.65
	EXTREME WIND	-1.0	1.1	3.9	0.2	0.4	1.1	1.1	1.1	1.1
	EXTREME ICE	-1.2	1.2	5.9	0.4	0.6	2.3	1.1	1.1	1.1
	ICE & WIND	-1.3	1.4	6.1	0.4	0.7	2.4	1.0	1.0	1.0
	DEFLECTION	-0.3	0.4	1.9	0.1	0.1	0.3	1.0	1.0	1.0
	CONSTRUCTION	-0.6	0.7	3.0	0.1	0.2	0.6	1.0	1.0	1.0

1. FOR WIRE LOAD LOCATIONS, SEE LOADING DIAGRAM BELOW.
2. WIRE LOADS INCLUDE OVERLOAD FACTORS.

DESCRIPTION	TYPE	MAX INITIAL TENSION (LBS)	WIND SPAN (FT)	WEIGHT SPAN (FT)
CONDUCTOR	ACSR LAPWING	4,100	150	300
OPGW	AFL CC-57/465	1,450	150	300



LOADING DIAGRAM

DESIGN NOTES:

1. ALL LOAD CASES (EXCLUDING NESC HEAVY) SHALL USE THE FOLLOWING WIND DESIGN PARAMETERS:

   EXPOSURE HEIGHT 44 FT (2/3 x h)
   EXPOSURE FACTOR 1.065

2. ALL WIND LOADS SHALL BE MULTIPLIED BY THE FOLLOWING SHAPE FACTORS:

   RIGID BUS/POST INSULATORS 1.0
   ROUND SECTIONS 0.9
   12 OR 16 SIDED SECTIONS 1.0
   8 SIDED SECTIONS 1.4
   SQUARE/RECTANGULAR SECTIONS 2.0

3. ALL LOAD CASES (EXCLUDING NESC HEAVY) SHALL USE THE FOLLOWING ICE DESIGN PARAMETERS:

   EXPOSURE FACTOR 1.029

4. EQUIPMENT/INSULATOR WIND AREAS SHOWN INCLUDE SHAPE FACTORS AND SHOULD NOT BE MODIFIED.

5. DEFLECTIONS SHALL BE CALCULATED FOR ALL POINTS OF INTEREST, INCLUDING SWITCH TERMINAL PADS, HIGH POINTS OF RIGID BUS, CONDUCTOR ATTACHMENTS, AND WHERE OTHERWISE NOTED. DEFLECTION LIMITS FOR DEFLECTION LOAD CASES SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

   i. HORIZONTAL DEFLECTION OF VERTICAL MEMBERS: 1/100 OF THE HEIGHT AT THE POINT OF INTEREST
   ii. VERTICAL DEFLECTION OF HORIZONTAL MEMBERS: 1/200 OF THE HORIZONTAL SPAN
   iii. HORIZONTAL DEFLECTION OF HORIZONTAL MEMBERS:
      a. CLASS 'A' SWITCH SUPPORT MEMBERS: 1/200 OF THE HORIZONTAL SPAN
      b. CLASS 'B' ALL OTHER SUPPORT MEMBERS: 1/100 OF THE HORIZONTAL SPAN

6. DEAD WEIGHT OF ALL HORIZONTAL RIGID BUS SHALL BE INCREASED BY 25% AS AN ALLOWANCE FOR CONTINUOUS LOOSE CABLE DAMPER.

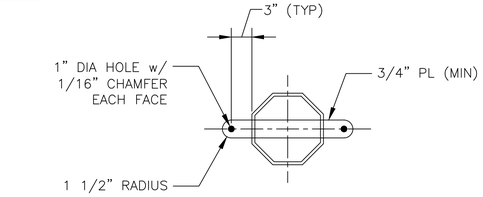
7. ALL STRUCTURAL STEEL SHALL BE HOT-DIPPED GALVANIZED. ALL STRUCTURAL STEEL SHALL BE SUPPORTED ON LEVELING NUTS WITHOUT GROUT (DETAIL 3) AND ALL BASE PLATES AND ANCHOR BOLTS SHALL BE DESIGNED AND DETAILED ACCORDINGLY.

8. STRUCTURE DESIGN AND DETAILING SHALL INCLUDE SUPPORT PROVISIONS FOR SWITCH OPERATOR MECHANISMS AND PIPE.

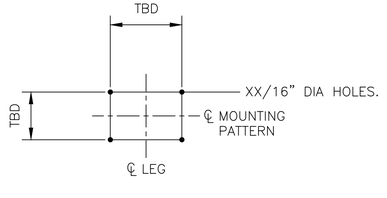
9. SEE DRAWING S907PS10 FOR ADDITIONAL LOADING INFORMATION.

QTY 2
REQUIRED

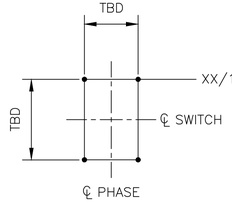
*ONLY HIGHLIGHTED PIECE MARKS, ANNOTATED IN RED, WITH REQUIRED ASSEMBLY HARDWARE ARE REQUIRED



DETAIL 6
CONDUCTOR ATTACHMENT

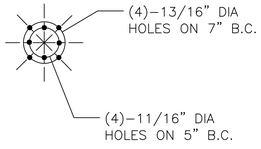


DETAIL 5
OPERATOR MOUNTING PATTERN

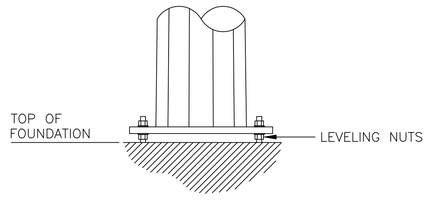


DETAIL 1
SWITCH MOUNTING PATTERN

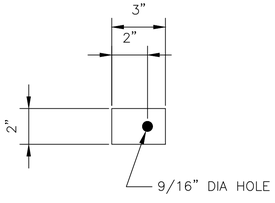
MAKE (2) TIMES - EXPANDABLE BAY



DETAIL 2
INSULATOR MOUNTING PATTERN



DETAIL 3
BASE PLATE & ANCHOR BOLTS



DETAIL 4
GROUNDING/OPGW TAB

BURNS McDONNELL
Engineering License # CA-421

PRELIMINARY ONLY NOT FOR CONSTRUCTION

REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPRVD

GRAND RIVER DAM AUTHORITY
HERRON SUBSTATION S907
PRYOR, OKLAHOMA
161kV
161kV SUBSTATION
DBLE BAY/EXPANDABLE 65' H-FRAME STR

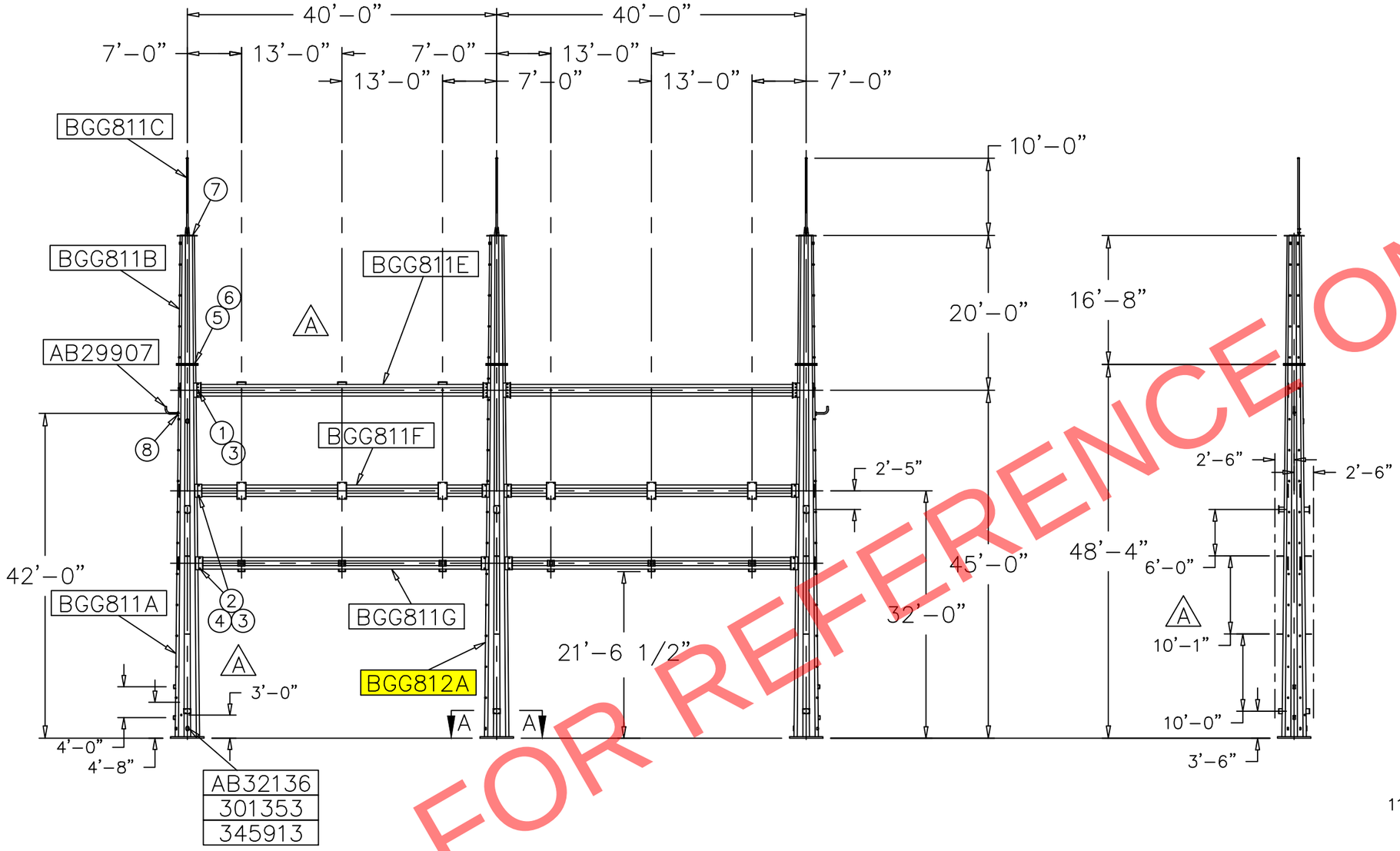
SCALE: NTS	DRAWN BY: GM	ENGR: GM	APPD:
		CH: JAM	DATE: 12/05/2024

GRDA
GRAND RIVER DAM AUTHORITY
P.O. BOX 409
VINITA, OK 74301

DRAWING No. S907PS08 REV. A

BGG812Z

THIS DRAWING IS FOR REFERENCE ONLY FOR CONNECTING TO THE EXISTING MIDDLE COLUMN (BGG812A). NEW ADDITIONAL BAY TO BE DESIGNED AND DETAILED BY VENDOR.



TOTAL HARDWARE QUANTITIES TO INCLUDE AN EXTRA 5 PERCENT OVERAGE

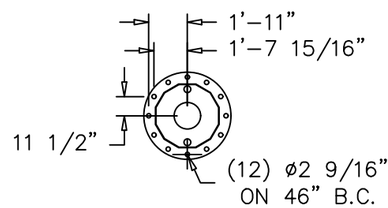
BILL OF MATERIAL

(SHIPPING SEQ. = 1 FOR ALL)

PART NUMBER	DESCRIPTION	UNIT WEIGHT	QTY PER STR.
BGG811A	END COLUMN BASE SECTION	10088	2
BGG812A	MIDDLE COLUMN BASE SECTION	10262	1
BGG811B	UPPER COLUMN SECTION	1823	3
BGG811C	SPIKE ASSEMBLY	104	3
BGG811E	CONDUCTOR BEAM	2583	2
BGG811F	SWITCH BEAM	3058	2
BGG811G	INSULATOR BEAM	2406	2
AB29907	LIGHT MOUNTING ARM	10	2
AB32136	HAND HOLE COVER	1	4
301353	COVER MOUNTING BAR		4
345913	COVER MOUNTING SCREW		4
AS54630	HARDWARE KIT		1

DESCRIPTION

LINE	PART NUMBER	HARDWARE SIZE TYPE	DIA.	LENGTH	THREAD LENGTH	GENERAL	FINISH	ASTM SPEC	QTY
1	169198	BOLT	1.25	4.00	2.00		HDGV	A325	42
2	169199	BOLT	1.25	3.75	2.00		HDGV	A325	34
3	133024	NUT	1.25			DH,LOCK	HDGV	A563	76
4	142086	WSHR	1.25			CS,FLAT	HDGV	F436	34
5	1004421	BOLT	1.00	4.50	1.75		HDGV	A325	38
6	131188	NUT	1.00			DH,LOCK	HDGV	A563	38
7	161147	BOLT	0.63	1.50	1.25		HDGV	A325	13
8	161820	BOLT	0.50	1.50	1.50		HDGV	A307	3



SECTION A–A

THESE DRAWINGS ARE THE EXCLUSIVE PROPERTY INFORMATION OF VALMONT INDUSTRIES, INC. AND ARE FURNISHED SOLELY UPON THE CONDITIONS THAT THEY WILL BE RETAINED IN STRICTEST CONFIDENCE AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE, IN ANY WAY, WITHOUT THE PRIOR WRITTEN PERMISSION OF VALMONT INDUSTRIES, INC.

FOR REFERENCE ONLY

Customer: GRDA
Substation: IGLOO VALLEY INTERCONNECT S121
P.O.#: 42541
Item #: 907SPS08
Description: 161KV 2–BAY H–FRAME DEADEND
Valmont #: 433459

REV	DATE	DESCRIPTION
A	02/07/19	Approval Change KLK2/KLK2

HFA1614500200000000400002

WELD: AWS D1.1

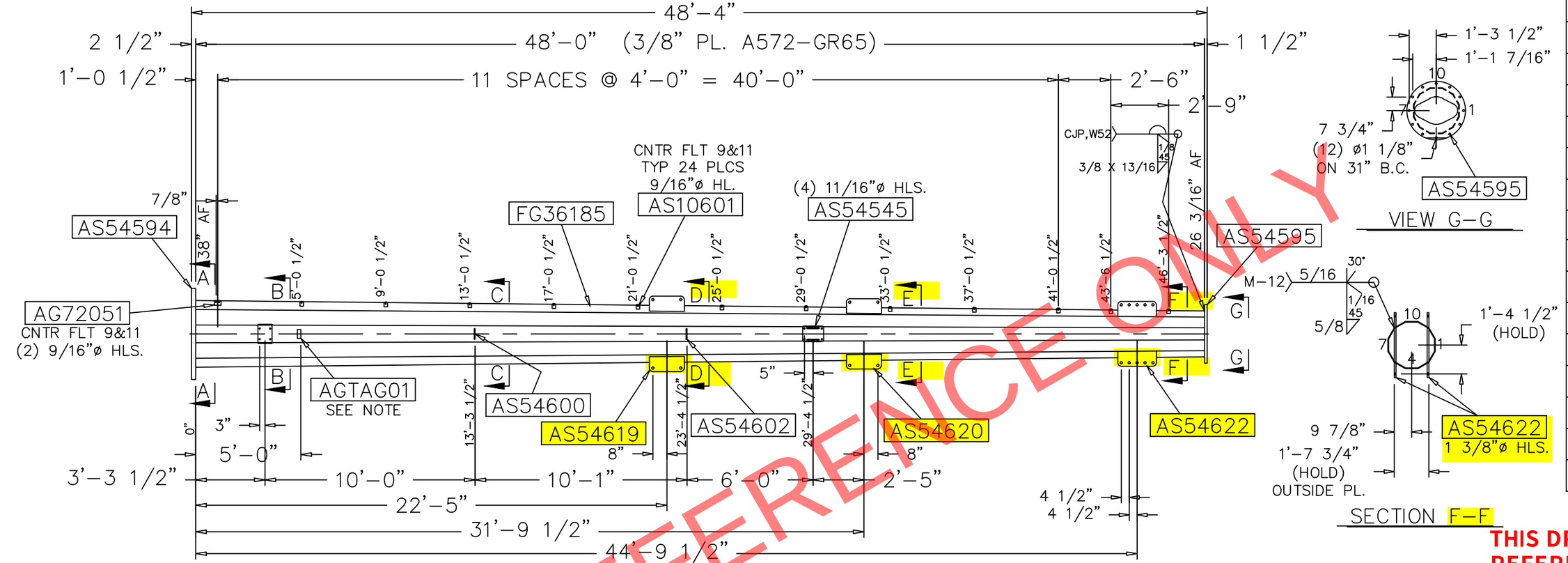
DRAWN	CHECKED	DATE	SCALE
KLK2	KLK2	01–29–19	NONE

TOLERANCE 5001 THICK N/A MATERIAL N/A FINISH F1 WEIGHT 52339

valmont UTILITY

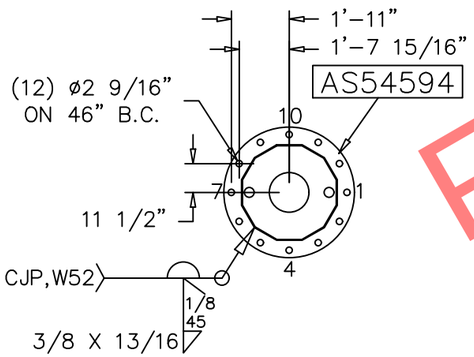
BGG812Z

BGG812A

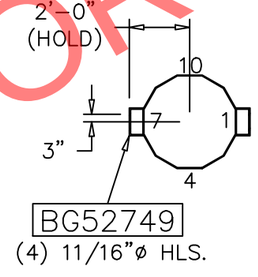


BILL OF MATERIAL	
PART NUMBER	QTY.
FG36185	1
AS54594	1
AS54595	1
AS54619	2
AS54620	2
AS54622	2
BG52749	2
AS54600	2
AS54602	2
AS54545	2
AS54606	4
AG72051	2
AS10601	24
AGTAG01	1

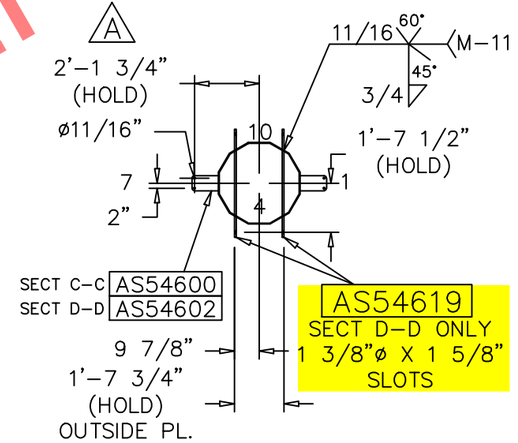
NOTE: STENCIL "BGG812A" ON TAG
AGTAG01 IN 1/2" HIGH LETTERS



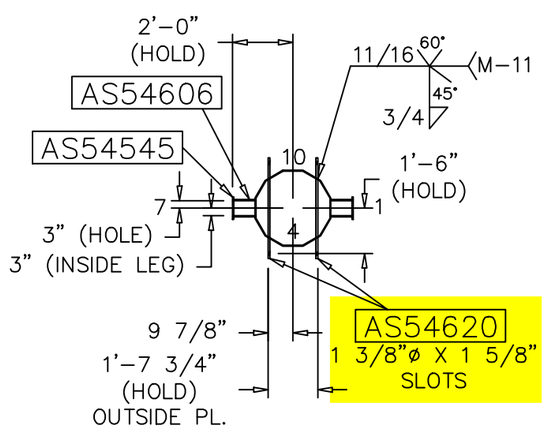
SECTION A-A



SECTION B-B



SECT C-C & D-D



SECTION E-E

FOR REFERENCE ONLY

THIS DRAWING IS FOR REFERENCE ONLY FOR CONNECTING TO THE EXISTING MIDDLE COLUMN (BGG812A). NEW ADDITIONAL BAY TO BE DESIGNED AND DETAILED BY VENDOR.

ALL WELDS UNLESS NOTED 3/16

THESE DRAWINGS ARE THE EXCLUSIVE PROPERTY INFORMATION OF VALMONT INDUSTRIES, INC. AND ARE FURNISHED SOLELY UPON THE CONDITIONS THAT THEY WILL BE RETAINED IN STRICTEST CONFIDENCE AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE, IN ANY WAY, WITHOUT THE PRIOR WRITTEN PERMISSION OF VALMONT INDUSTRIES, INC.

Customer: GRDA
Substation: IGLOO VALLEY INTERCONNECT S121
P.O.#: 42541
Item #: 907SPS08 & 09
Description: MIDDLE COLUMN BASE SECTION
Valmont #: 433459

REV	DATE	DESCRIPTION
A	02/07/19	Approval Change KLK2/KLK2

CBSB4833380026190381200OG

WELD: AWS D1.1

DRAWN	CHECKED	DATE	SCALE
KLK2	KLK2	01-29-19	NONE

TOLERANCE 5001 THICK N/A MATERIAL N/A FINISH F1 WEIGHT 10262

valmont UTILITY

BGG812A