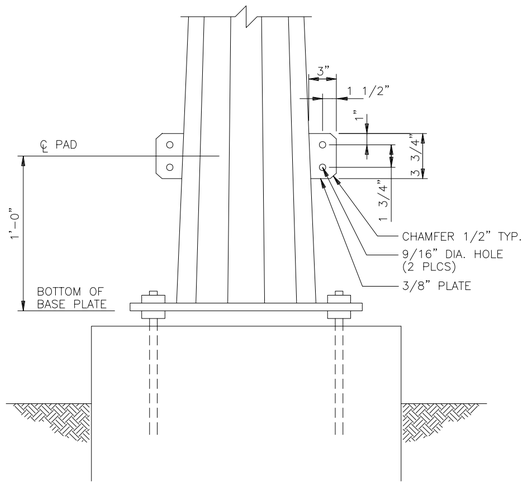
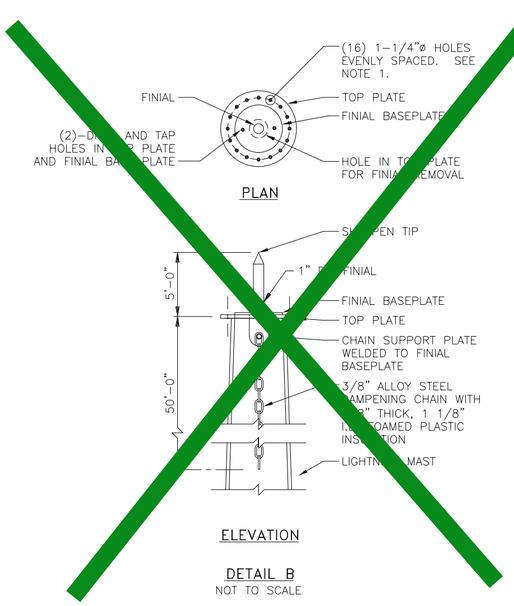


ELEVATION

DETAIL A
NOT TO SCALE



ELEVATION

DETAIL B
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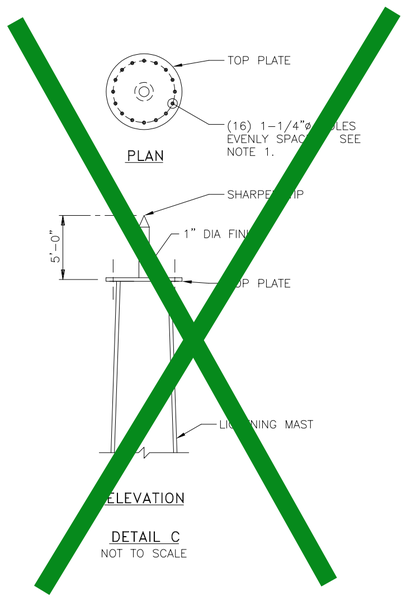
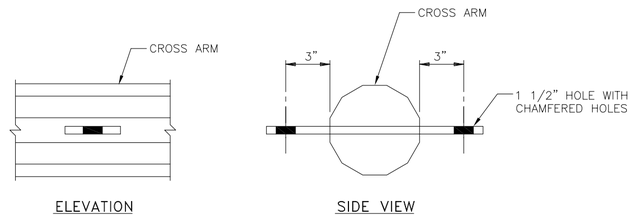


ELEVATION

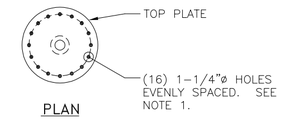
DETAIL C
NOT TO SCALE



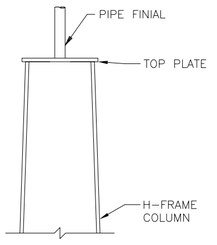
ELEVATION

SIDE VIEW

DETAIL D
NOT TO SCALE

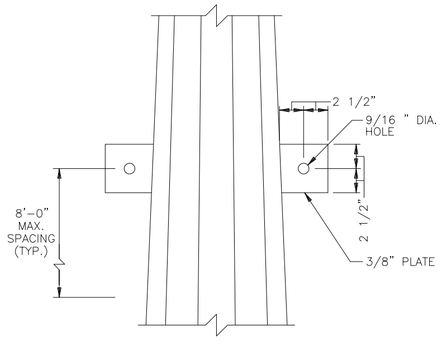


PLAN



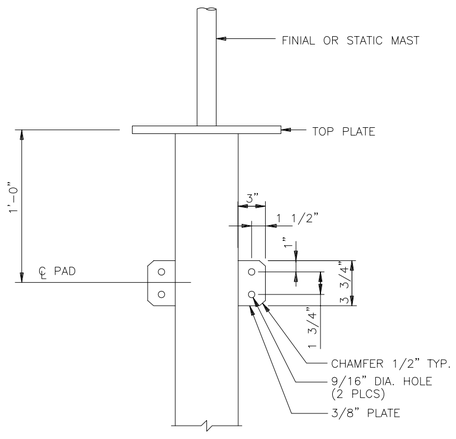
ELEVATION

DETAIL E
NOT TO SCALE



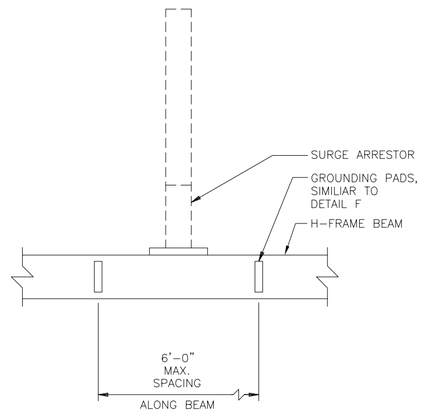
ELEVATION

DETAIL F
NOT TO SCALE



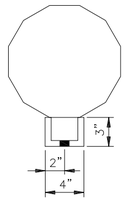
ELEVATION

DETAIL G
NOT TO SCALE

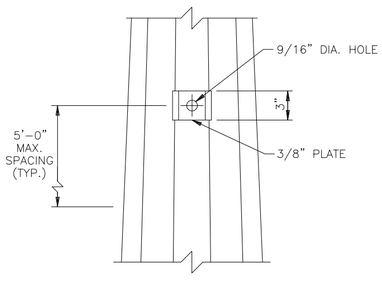


ELEVATION

DETAIL H
NOT TO SCALE



PLAN



ELEVATION

DETAIL J
NOT TO SCALE

NOTES

1. THE BOLT CIRCLE DIAMETER FOR THE 16 HOLES IN THE LIGHTNING MAST AND SHIELD WIRE TOP PLATE SHALL BE AT LEAST 1'-7". THE DIMENSION FROM THE CENTER OF THE BOLT CIRCLE TO THE EDGE OF THE PLATE SHALL BE 1.50"

NOT TO BE USED FOR CONSTRUCTION

REV. NO.	BY	CHK	DATE	DESCRIPTION
1	JJB	SLG	OPEN	GENERAL REVISIONS
0	AMH	JAH	12/17/09	ISSUED FOR BID

REVISIONS

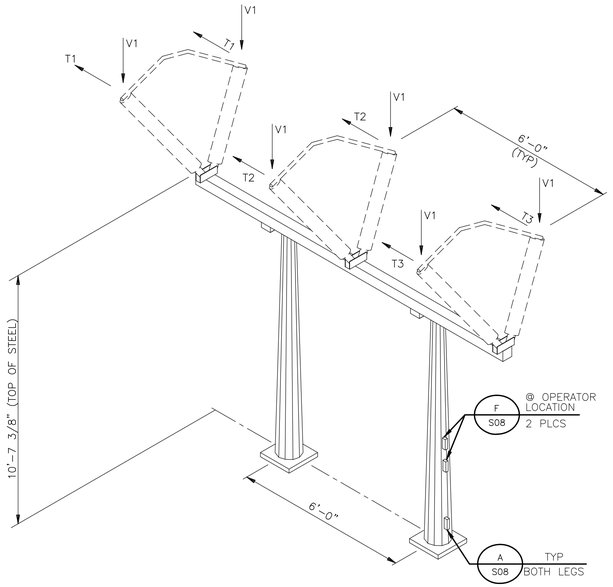
GRAND RIVER DAM AUTHORITY
TONNECE SUBSTATION S877
DELAWARE COUNTY, OKLAHOMA
345/161/69KV

345/161/69KV SUBSTATION STEEL STRUCTURE DETAILS

SCALE: NONE	DRAWN BY: NWH	ENGR: AMH	APPD: LAL
		CH: JAH	DATE: 09/23/09

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

DRAWING No. **S877PS08** REV. **1**



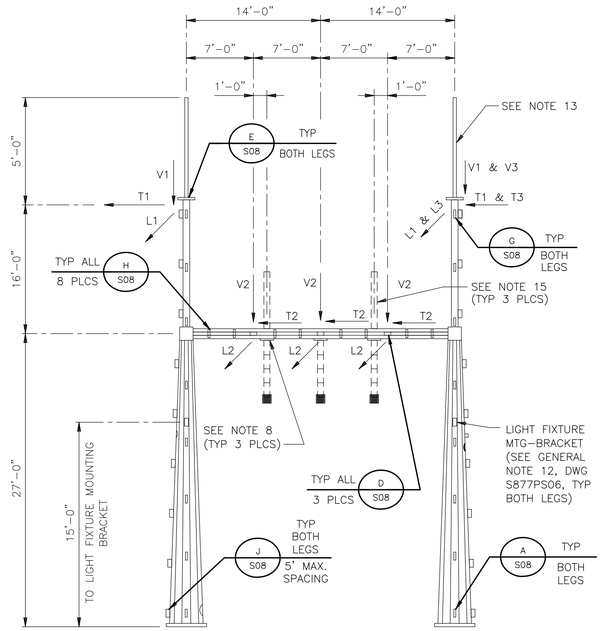
69KV THREE PHASE LOW DISCONNECT SWITCH STAND (507)

NOT TO SCALE

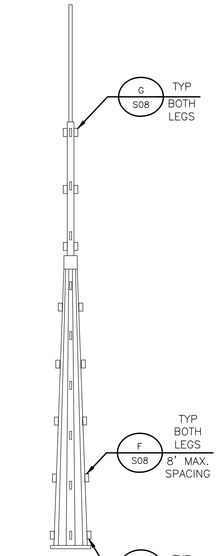
LOADING TABLE–ITEM (507)							
LOAD	NESC HVY	EW TRAN	EW LONG	EI	EW+ SC	TRAN DEFL	LONG DEFL
T1	0.14	0.27	0.00	0.00	0.25	0.25	0.00
T2	0.14	0.27	0.00	0.00	1.86	0.25	0.00
T3	0.14	0.27	0.00	0.00	−1.38	0.25	0.00
V1	0.31	0.13	0.13	0.35	0.12	0.12	0.12
WT	0.010	0.024	0.000	0.000	0.021	0.021	0.000
WL	0.000	0.000	0.024	0.000	0.000	0.000	0.021

PLAN @ SHEILD WIRES

NOT TO SCALE



ELEVATION

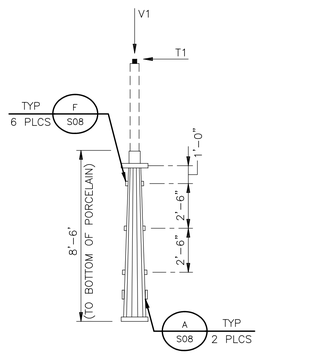


SIDE VIEW

69KV H–FRAME LINE TERMINATION STRUCTURE (513)

NOT TO SCALE

LOADING TABLE–ITEM (513) (SEE NOTE 14 DWG S877PS06)								
LOAD	NESC HVY CASE 1	NESC HVY CASE 2	EW CASE 1	EW CASE 2	EI CASE 1	EI CASE 2	TRAN DEFL	LONG DEFL
T1	0.12	0.12	0.09	0.09	0.00	0.00	0.06	0.00
T2	0.18	0.18	0.27	0.27	0.00	0.00	0.18	0.00
T3	0.10	0.00	0.09	0.00	0.00	0.00	0.06	0.00
L1	1.65	1.65	0.81	0.81	1.67	1.67	0.56	0.23
L2	1.65	1.65	1.28	1.28	1.63	1.63	0.87	0.43
L3	−2.48	0.00	−1.15	0.00	−2.27	0.00	−1.71	0.00
V1	0.90	0.90	0.59	0.59	0.81	0.81	0.54	0.54
V2	1.13	1.13	0.70	0.70	1.05	1.05	0.64	0.64
V3	0.36	0.00	0.40	0.00	0.40	0.00	0.21	0.00
W	0.010	0.010	0.029	0.029	0.000	0.000	0.019	0.019



69KV SINGLE PHASE STAND (525)

NOT TO SCALE

LOADING TABLE–ITEM (525)				
LOAD	NESC HVY	EW	EI	DEFL
T1	0.04	0.05	0.00	0.04
V1	0.07	0.03	0.08	0.03
W	0.010	0.024	0.000	0.021

LOAD ORIENTATION

BILL OF MATERIALS		
ITEM	QUANTITY	NAME
507	1	69KV THREE PHASE LOW DISCONNECT SWITCH STAND
513	1	69KV H–FRAME LINE TERMINATION STRUCTURE
525	6	69KV SINGLE PHASE STAND

GENERAL DESIGN NOTES:

1. LOAD ABBREVIATIONS AND UNIT ENTRIES IN THE LOADING TABLES ARE AS FOLLOWS: TRANSVERSE LOADS (T), VERTICAL LOADS (V), AND LONGITUDINAL LOADS (L) ARE IN KIPS. WIND PRESSURE LOADS (W) ARE IN KIPS PER SQUARE FOOT.
2. LOADS IN LOADING TABLES INCLUDE OVERLOAD FACTORS (OLF).
3. WIND PRESSURE LOADS (W) DO NOT INCLUDE SHAPE FACTORS (S.F.). WIND PRESSURES SHALL BE MULTIPLIED BY THE APPROPRIATE SHAPE FACTOR BELOW AND THEN APPLIED TO THE EQUIPMENT AND STRUCTURE IN THE CONTROLLING DIRECTION. MINIMUM SHAPE FACTORS SHALL BE AS FOLLOWS:
   WIRES AND CYLINDRICAL SURFACES = 1.0
   OCTAGONAL SHAPES = 1.4
   FLAT SURFACE = 1.6
4. THE VERTICAL LOADS (V) IN THE LOADING TABLES INCLUDE ONLY THE WEIGHT OF CONDUCTORS, BUS AND FITTINGS. THESE LOADS DO NOT INCLUDE THE DEAD WEIGHT OF THE EQUIPMENT OR STRUCTURE. THE EQUIPMENT AND STRUCTURE DEAD WEIGHT SHALL BE SUPPLIED BY THE SELLER AND INCLUDED IN THE DESIGN CALCULATIONS.
5. THE TRANSVERSE LOADS (T) IN THE LOADING DIAGRAMS INCLUDE ONLY THE WIND PRESSURE ON THE CONDUCTOR AND BUS. THE SELLER SHALL APPLY THE APPOPRIATE WIND PRESSURE WITH SHAPE FACTOR TO THE EQUIPMENT AND STRUCTURE.
6. LOAD CASE ABBREVIATIONS AND DESCRIPTIONS ARE AS FOLLOWS:
   NESC HVY: NESC HEAVY (1/2" RADIAL ICE, 4psf WIND), OLF: T(WIND)=2.50, T(WIRE TENSION)=1.65, L=1.65, V=1.50
   EW EXTREME WIND (100MPH) OLF: T,L,V=1.10
   EI EXTREME ICE (1" RADIAL ICE,NO WIND), OLF: T,L,V=1.10
   EW+SC EXTREME WIND(100MPH)+SHORT CIRCUIT FORCES. OLF: T,L,V=1.00
   DEFL DEFLECTION LIMIT CASE (SEE NOTE 7). OLF: T,L,V=1.00
7. STRUCTURE DEFLECTIONS FOR THE STRUCTURE DEFLECTION LOAD CASE (DEFL) SHALL NOT EXCEED THE FOLLOWING LIMITS:
   SWITCH STANDS (STRUCTURE 507) SHALL MEET THE REQUIREMENTS OF NEMA SG6 FOR CLASS "A" STRUCTURES
   SINGLE PHASE SUPPORTS (STRUCTURES 508, 509, 510, 511, 518 & 523) SHALL MEET THE REQUIREMENTS OF NEMA SG6 FOR CLASS "B" STRUCTURES
   H–FRAME TERMINATION STRUCTURE (STRUCTURE 513) SHALL MEET THE FOLLOWING REQUIREMENTS:
   - VERTICAL DEFLECTION OF HORIZONTAL BEAMS = L/200
   - HORIZONTAL DEFLECTION OF HORIZONTAL BEAMS = L/100
   - HORIZONTAL DEFLECTION OF COLUMNS = L/50
8. H–FRAME LINE TERMINATION STRUCTURE (STRUCTURE 513) SHALL INCLUDE PROVISIONS TO MOUNT ITEM 412, INSULATOR POSTS, AT LOCATIONS INDICATED.
9. FOR SWITCH STRUCTURES (STRUCTURES 501 AND 509) SELLER SHALL PROVIDE SWITCH OPERATOR MOUNTING BRACKETS AND GROUND PADS FOR SWITCH OPERATOR MECHANISM AND GROUND SWITCH CONNECTION AS REQUIRED. SEE DRAWING E8202–SH1 FOR OPERATOR LOCATION.
10. ALL ANCHOR BOLT DIAMETERS, SPACING AND CONFIGURATIONS FOR STRUCTURES 507, 508, 509, 510, 511, 518, 523 & 525 SHALL BE IDENTICAL AND NOT EXCEED A BOLT CIRCLE DIAMETER OF 18.5 INCHES.
11. ANCHOR BOLT CIRCLE DIAMETER FOR H–FRAME LINE TERMINATION STRUCTURES (STRUCTURES 513) SHALL NOT EXCEED 48 INCHES.
12. THE FABRICATOR SHALL PROVIDE LIGHT FIXTURE MOUNTING BRACKETS FOR THE H–FRAME STRUCTURE (STRUCTURE 513). TWO BRACKETS SHALL BE PROVIDED AT 180° APART ON EACH LEG OF THE STRUCTURE (4 BRACKETS TOTAL PER STRUCTURE). SEE DETAIL "I" ON DWG S877PG53.
13. THE STATIC MAST ON TOP OF THE H–FRAME LINE TERMINATION STRUCTURE (STRUCTURE 513) SHALL BE DESIGNED AND DETAILED BY THE FABRICATOR.
14. THE FABRICATOR SHALL DESIGN THE SHIELD WIRE AND CONDUCTOR LOADS (L1 AND L2) FOR A LINE ANGLE FROM 0° TO ± 20°.
15. H–FRAME LINE TERMINATION STRUCTURE (STRUCTURE 513) SHALL INCLUDE PROVISIONS TO MOUNT ITEM 410, SURGE ARRESTERS, AT LOCATIONS INDICATED.

ISSUED FOR BID

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

GRAND RIVER DAM AUTHORITY
TONNECE SUBSTATION S877
DELAWARE, COUNTY 345/161/69kV

69kV SUBSTATION STRUCTURES

GRDA
P.O. BOX 669
CHOUTEAU, OK 74337

ENGINEER: PJ	SCALE: NONE	DATE: 19MAR26	REV.
DRAWN BY: DK	DRAWING NO.		
CHECKED BY: PJ	S877PS09		
APPROVED BY: DP			