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WILLIAM V. VORYS
WVorys@dickinsonwright.com
(614) 744-2936

November 17, 2017

Ms. Barcy F. McNeal, Secretary
Ohio Power Siting Board
Docketing Division
180 East Broad Street, 11th Floor
Columbus, OH 43215

**Re: Case No. 13-197-EL-BGN, 16-1687-EL-BGA, and 17-1099-EL-BGA
Trishe Wind Ohio, LLC
Update to September 1, 2017 Filing Regarding Compliance with
Condition 6 – Drawings for Final Design Plan**

Dear Ms. McNeal:

Trishe Wind Ohio, LLC (“Applicant”) is certified to construct a wind-powered electric generation facility in Paulding County, Ohio (“Project”), in accordance with the December 16, 2013 Opinion, Order, and Certificate (“Certificate”) issued by the Ohio Power Siting Board.

Condition 6 of the Certificate requires the Applicant, at least 30 days prior to the preconstruction conference, to submit to staff for review and acceptance, one set of detailed engineering drawings of the final project design, including the facility, temporary and permanent access roads, and any crane routes, construction staging areas, and any other associated facilities and access points.

On September 1, 2017, Applicant filed a Notification of Compliance with Condition 6 of the Certificate. This filing included 60% of the civil construction plans for wind turbine generators, access roads, drainage, and erosion control for the Project. At this time, we are updating the September 1, 2017 filing to include the 60% substation construction drawings, which are attached hereto.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ William V. Vorys

William V. Vorys (0093479)
Christine M.T. Pirik (0029759)
Terrence O'Donnell (0074213)
Dickinson Wright PLLC
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Enclosure

Attorneys for Trishe Wind Ohio, LLC

**NORTHWEST OHIO
WIND PROJECT**
PAULDING COUNTY, OHIO

Rev.	Date	Description	By
0A	10/19/17	PRELIMINARY	UJE



- NOTES**
1. 1/0 B90 NMN CU (PER LINE AND NEUTRAL) 1-40 AWG CU (GROUND).
 2. BREAKERS TO BE HYDROCARBON.
 3. BOND NEUTRAL TO GROUND IN AC PANEL.
 4. BUILDING VENDOR TO UPDATE BREAKER AND CABLE SIZE AS NEEDED.
 5. BLACK TO HOT
WHITE TO NEUTRAL
GREEN TO GROUND
RED IS THIRD PHASE
 6. ENCLOSURE VENDOR TO UPDATE BREAKER/CABLE SIZE AS NECESSARY.
 7. WINDOW TO UPDATE CHARGER SIZE AS NECESSARY PER AVAILABILITY.

PRELIMINARY

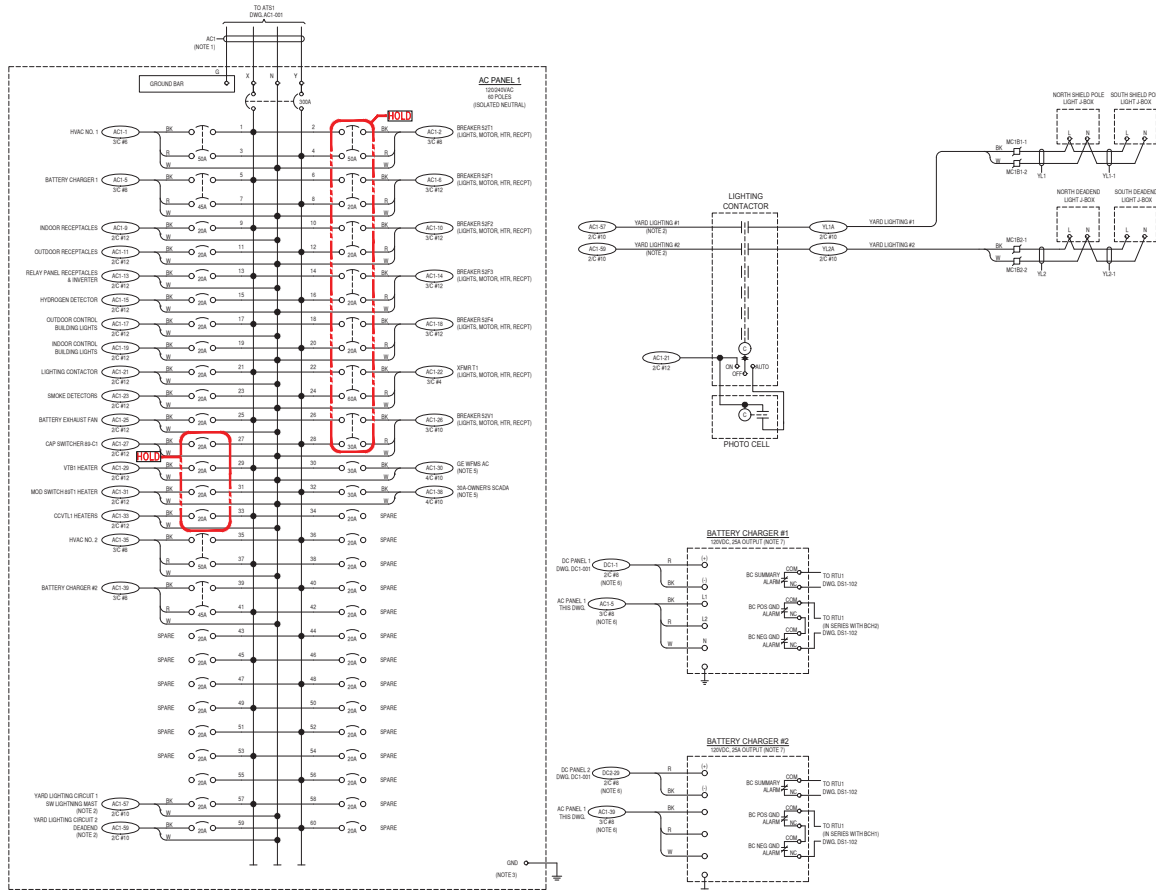
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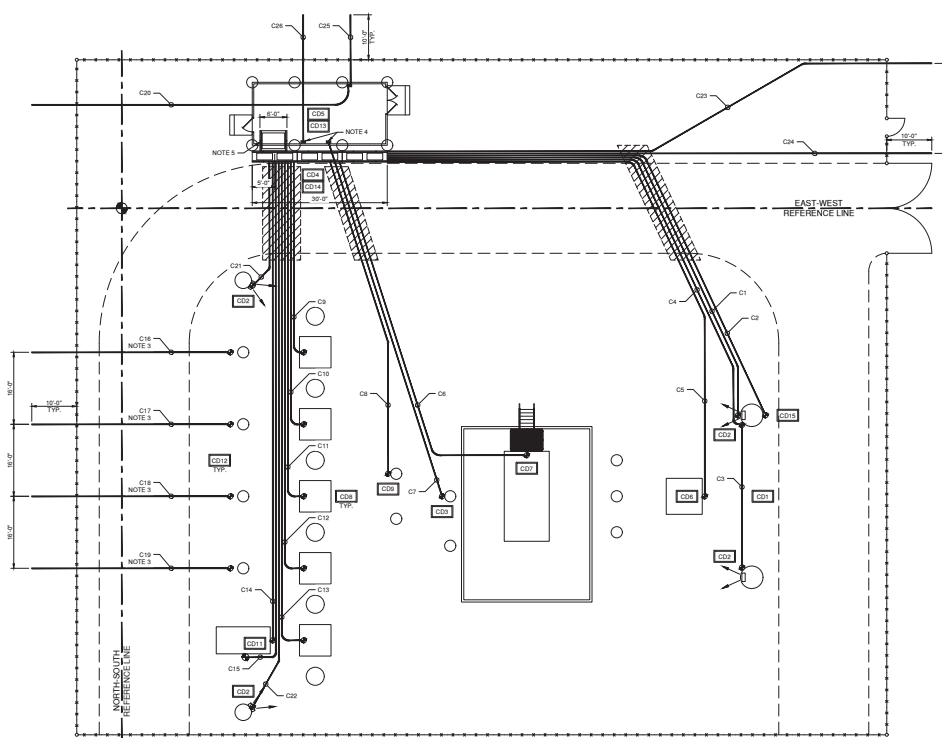
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Reviewed: Daniel L. Liles - Fargo - State Field - St. Paul
Design By: E. NEUMHART
Drawn By: E. NEUMHART
Approved By: J. CLISON
Project Number: 17-01246

AC PANEL 1

DWG #: **NWO-AC1-002** REVISION: **0A**





LEGEND:			
	-	DETAIL, SEE CONDUIT DETAIL, DWG.	
	-	CONDUIT	
	-	(1) 240 WATT AREA LIGHT	
	-	CONDUIT RUN ID (SEE CONDUIT SCHEDULE)	
	-	TRENCH DRAIN TILE	
	-	CONDUIT TERMINATION	
	-	CONDUIT ENCASED IN 4" CONCRETE SLURRY	

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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- NOTES:
1. ALL CONDUITS CARRYING FIBER CABLES ARE REQUIRED TO USE SWEETSPONIP TRANSITIONS TO PREVENT DAMAGE TO FIBERS.
 2. FEEDER POWER CONDUITS SHALL TERMINATE 1' OUTSIDE OF THE SUBSTATION FENCE.
 3. ALL FEEDER CONDUITS SHALL BE BURIED 48" BELOW SUBGRADE.
 4. STATION SERVICE CABLES SHALL BE ROUTED DIRECTLY TO FUSED DISCONNECT SWITCH.
 5. PROVIDE A SECTION OF CABLE TRENCH BELOW ENCLOSURE WITH DIMENSIONS AS SHOWN TO ROUTE CABLES UP INTO TERMINATION CABINET.
 6. SEE CABLE MANUFACTURERS RECOMMENDATIONS FOR CABLE BENDING RADIUS WHEN SELECTING THE RADIUS FOR ANY ELBOW SWEETSPONIP ALONG A CONDUIT RUN FOR WHICH THE CABLE IS INSTALLED.
 7. SEE GRADING PLAN FOR INDICATION OF TRUE NORTH.

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Approved By: J. OLSON
Project Number: 17-01246

138/34.5KV SUBSTATION CONDUIT PLAN



DWG # NWO-CC1-001 REVISION: 0A

**NORTHWEST OHIO
WIND PROJECT**
PAULDING COUNTY, OHIO

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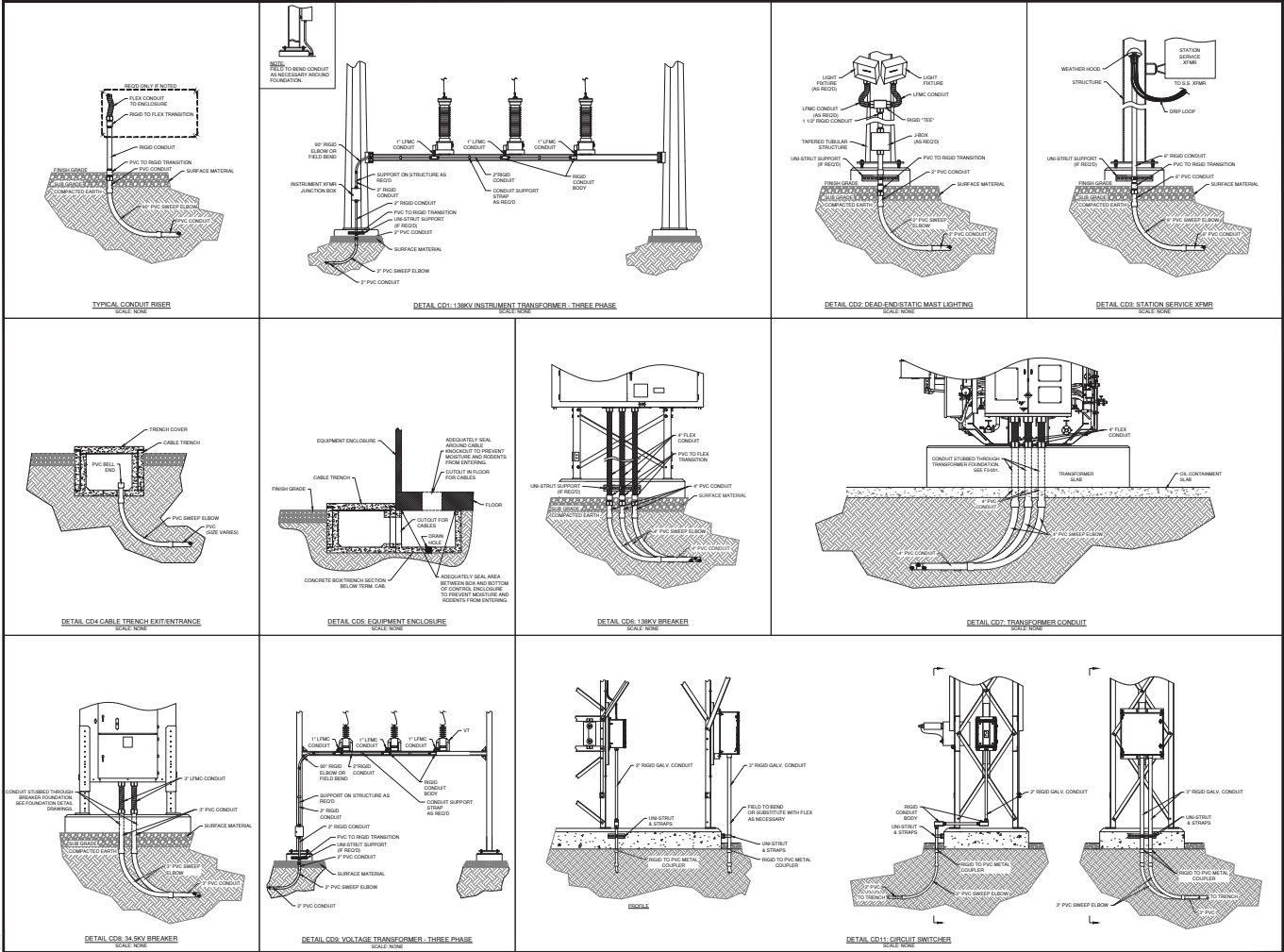
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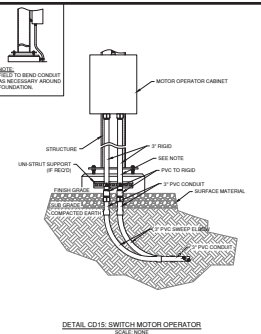
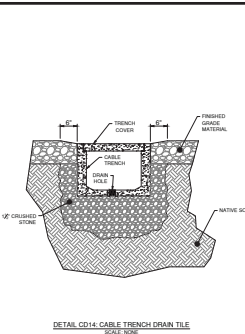
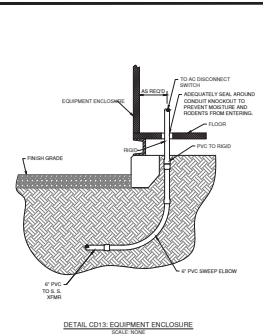
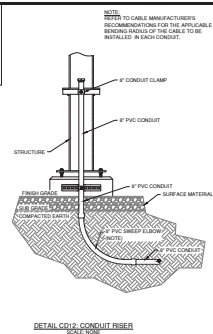
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Contract: Central - Detail Lines - Fargo - Snow Falls - St. Paul
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Drawn By: P. WISCHAKOWSKI
Approved By: J. OLSON
Project Number: 17-01246

**138/34.5KV SUBSTATION
CONDUIT DETAILS**

DWG #: **NWO-CC2-001** REVISION: **0A**






NORTHWEST OHIO WIND PROJECT

PAULDING COUNTY, OHIO

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138/34.5KV SUBSTATION CONDUIT DETAILS

DWG #: **NWO-CC2-002** REVISION: **0A**

NORTHWEST OHIO
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PAULDING COUNTY, OHIO

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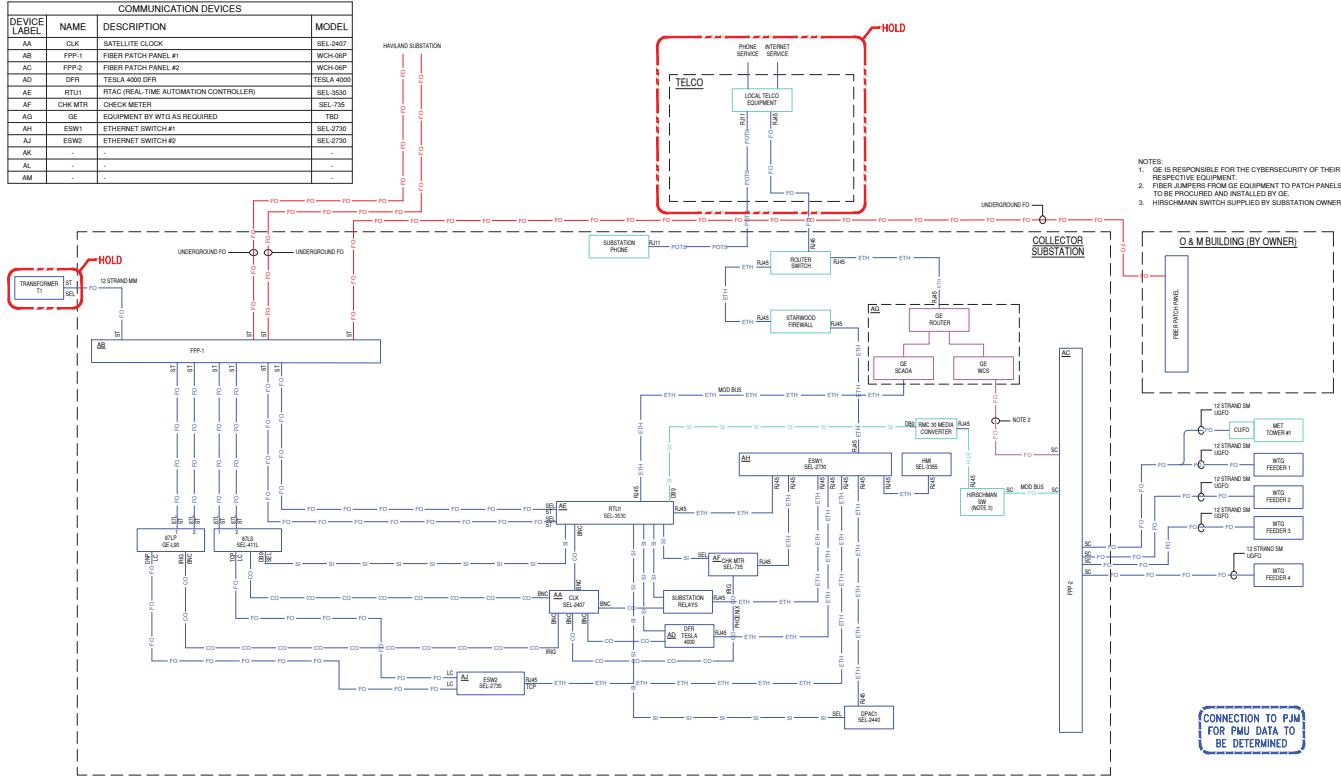
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Approved By: J. OLSON
Project Number: 17-01246

138/34.5KV SUBSTATION
CONDUIT SCHEDULE

DWG. NO. NWO-CC3-001 REVISION: 0A

CONDUIT SCHEDULE			
RUN NO.	CONDUIT SIZE	FROM	TO
C1	- 2"	138KV CCVTCL J-BOX	CABLE TRENCH
C2	1 3"	138KV MOD RST1	CABLE TRENCH
	2 3"		
C3	- 2"	SOUTH DEADEND LIGHT J-BOX	NORTH DEADEND LIGHT J-BOX
C4	- 2"	NORTH DEADEND LIGHT J-BOX	CABLE TRENCH
C5	1 4"	138KV BREAKER S2T1	CABLE TRENCH
	2 4"		
	3 4"		
C6	1 4"	138KV/34.5KV XFMR T1	CABLE TRENCH
	2 4"		
	3 4"		
C7	- 6"	PRIMARY STATION SERVICE	PRIMARY AC FUSED DISCONNECT
C8	- 2"	34.5KV VTBL	CABLE TRENCH
C9	1 3"	34.5KV FEEDER BREAKER 4	CABLE TRENCH
	2 3"		
C10	1 3"	34.5KV FEEDER BREAKER 3	CABLE TRENCH
	2 3"		
C11	1 3"	34.5KV FEEDER BREAKER 2	CABLE TRENCH
	2 3"		
C12	1 3"	34.5KV FEEDER BREAKER 1	CABLE TRENCH
	2 3"		
C13	1 3"	34.5KV VAR BREAKER	CABLE TRENCH
	2 3"		
C14	1 3"	34.5KV CAP SWITCHER B0C1	CABLE TRENCH
	2 3"		
C15	- 2"	34.5KV CAPACITOR VTC1	CABLE TRENCH
C16	- 8"	34.5KV COLLECTOR FEEDER 4	10' OUTSIDE FENCE
C17	- 8"	34.5KV COLLECTOR FEEDER 3	10' OUTSIDE FENCE
C18	- 8"	34.5KV COLLECTOR FEEDER 2	10' OUTSIDE FENCE
C19	- 8"	34.5KV COLLECTOR FEEDER 1	10' OUTSIDE FENCE
C20	1 6"	FIBER PATCH PANEL	10' OUTSIDE FENCE (FEEDER FIBER)
	2 6"		
C21	- 2"	NORTH-WEST SHIELD POLE LIGHT	CABLE TRENCH
C22	- 2"	SOUTH-WEST SHIELD POLE LIGHT	CABLE TRENCH
C23	- 2"	CABLE TRENCH	10' OUTSIDE FENCE (FIBER)
C24	- 2"	CABLE TRENCH	10' OUTSIDE FENCE (FIBER)
C25	- 2"	FIBER PATCH PANEL	10' OUTSIDE FENCE (OMR BUILDING)
C26	- 6"	SECONDARY AC FUSED DISCONNECT	10' OUTSIDE FENCE

DEVICE LABEL	NAME	DESCRIPTION	MODEL
AA	CLK	SATELLITE CLOCK	SEL-2407
AB	PPP-1	FIBER PATCH PANEL #1	WCH-60P
AC	PPP-2	FIBER PATCH PANEL #2	WCH-60P
AD	OPN	TESLA-400 DFR	TESLA-400D
AE	RTU1	RTAG (REAL-TIME AUTOMATION CONTROLLER)	SEL-3530
AF	CHK MTR	CHECK METER	SEL-735
AG	GE	EQUIPMENT BY WITO AS REQUIRED	TBD
AH	ESW1	ETHERNET SWITCH #1	SEL-2736
AI	ESW2	ETHERNET SWITCH #2	SEL-2730
AK	-	-	-
AL	-	-	-
AM	-	-	-



LEGEND:
 WHITE
 AEP
 GE
 UNDERGROUND CONTRACTOR
 STARWOOD

ACRONYMS USED:
 SI = SERIAL INTERFACE
 FO = FIBER OPTIC
 ETH = ETHERNET
 WIS = WIRE RANGE INSTRUMENT GROUP
 UGFO = UNDERGROUND FIBER OPTIC
 CUFO = COPPER TO FIBER OPTIC TRANSCEIVER
 CO = COAXIAL

- NOTES:
 1. GE IS RESPONSIBLE FOR THE CYBERSECURITY OF THEIR RESPECTIVE EQUIPMENT.
 2. FIBER JUMPS FROM GE EQUIPMENT TO PATCH PANELS TO BE PROVIDED AND INSTALLED BY GE.
 3. WIRECOMM SWITCH SUPPLIED BY SUBSTATION OWNER.

CONNECTION TO PJM
 FOR PMU DATA TO
 BE DETERMINED

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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 Drawn By: N. KUCIERT
 Approved By: J. LIEN
 Project Number: 17-01346

SUBSTATION ONE LINE DIAGRAM

DWG. # NWO-COM-001 REVISION: 0A

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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NOTES:

- VENDOR TO UPDATE BREAKER & CABLE SIZES AS NECESSARY.

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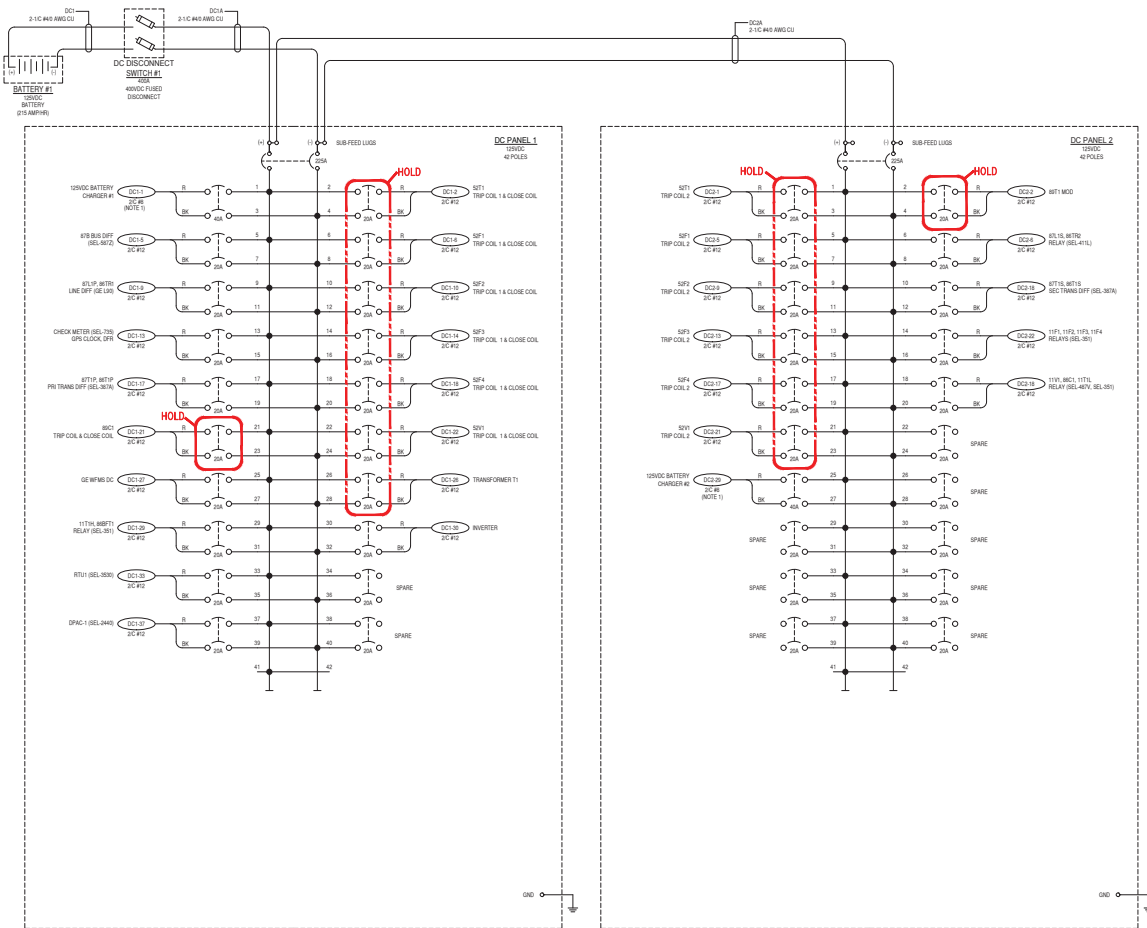
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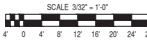
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Drawn By: E. NEUHARDT
Approved By: J. CLISON
Project Number: 17-01296

DC PANELS 1 & 2

DWG #: NWO-DC1-001 REVISION: 0A





Rev.	Date	Description	By
0A	07/20/17	PRELIMINARY	UEI
0B	09/06/17	PRELIMINARY	UEI
0C	10/19/17	PRELIMINARY	UEI



1. SEE GRADING PLAN FOR INDICATION OF TRUE NORTH.

F	FIXED FITTING
S	SLOP FITTING
E	EXPANSION FITTING
N.S.	NEAR SIDE
F.S.	FAIR SIDE
	MAJOR MATERIAL
	MINOR MATERIAL
	DETAIL, SEE DWG.
	OPERATOR PLATFORM
	INDICATES SECTION VIEW
	DRAWING ON WHICH SECTION APPEARS
	CABLE TRENCH
	AREA LIGHT
	BASE LINE INTERSECTION
	CONES AND BARRELS

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omark - Denver - Detroit Lakes - Fargo - Sioux Falls - St. Paul
Design By: T. SEVERANCE
Drawn By: P. IWACHUKWU
Approved By: J. OLSON
Project Number: 17.01246

DWG #: **NWO-EQ1-001** REVISION: **00**

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

Rev.	Date	Description	By
0A	10/19/17	PRELIMINARY	UEI



NOTES:

1. REFERENCE COLLECTION ONE LINE FOR CABLE SIZES.

LEGEND:

F	FIXED FITTING
S	SLIP FITTING
E	EXPANSION FITTING
N.S.	NEAR SIDE
F.S.	FAIR SIDE
(M)	MAJOR MATERIAL SEE DWG. EQ4-001
(M)	MINOR MATERIAL SEE DWG. EQ4-001
(D)	DETAIL SEE DWG. EQ3-001

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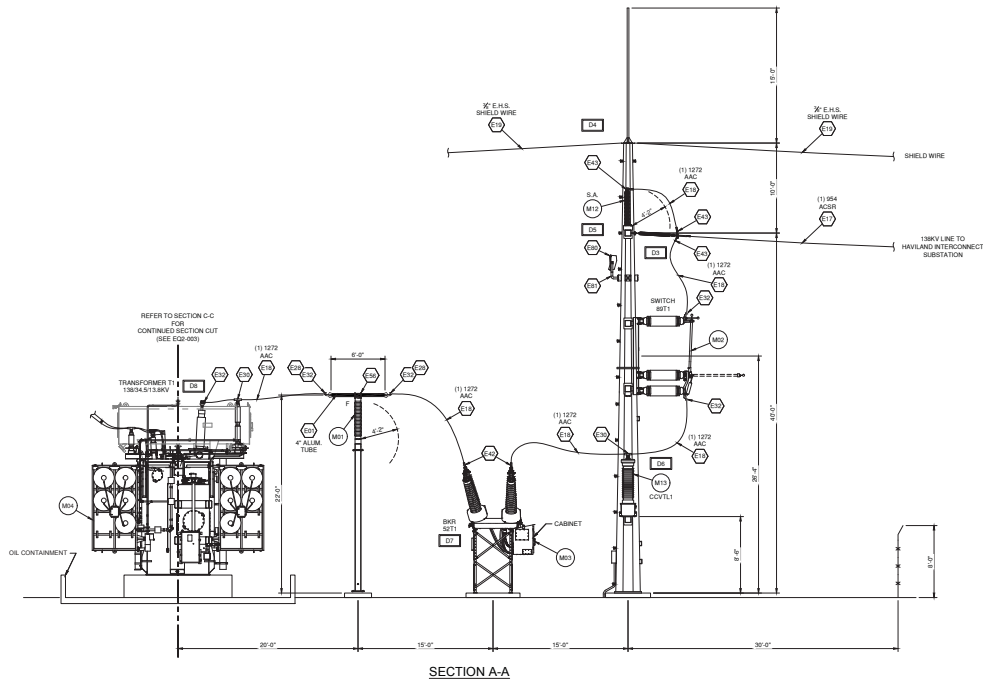
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Project Number: 17-01296

138KV
ELECTRICAL LAYOUT
SECTIONS

DWG # NWO-EQ2-001 REVISION 0A



NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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NOTES:

1. REFERENCE COLLECTION ONE LINE FOR CABLE SIZES.

LEGEND:

F	FIXED FITTING
S	SLIP FITTING
E	EXPANSION FITTING
N.S.	NEAR SIDE
F.S.	FAIR SIDE
MA	MAJOR MATERIAL SEE DWG. EQ4-001
MA	MINOR MATERIAL SEE DWG. EQ4-001
DA	DETAIL SEE DWG. EQ3-001

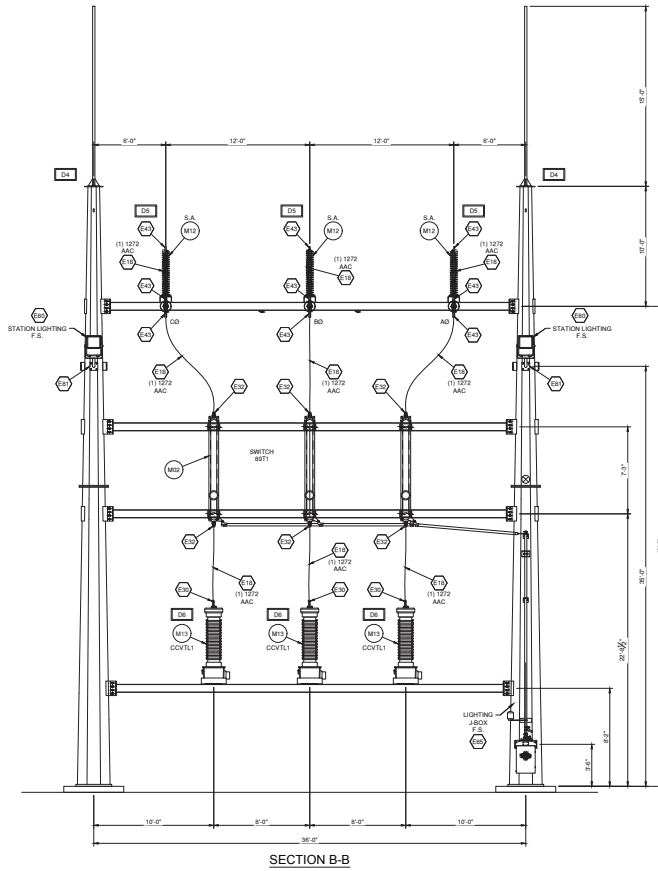
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Approved By: J. CLASON
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138KV
ELECTRICAL LAYOUT
SECTIONS

DWG. # NWO-EQ2-002 REVISION 0A



NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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NOTES:

1. REFERENCE COLLECTION ONE LINE FOR CABLE SIZES.

LEGEND:

- F FIXED FITTING
S SLP FITTING
E EXPANSION FITTING
N.S. NOISE SIDE
F.S. FAN SIDE
MA MAJOR MATERIAL
MI MINOR MATERIAL
D1 DETAIL SEE DWG.

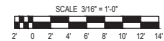
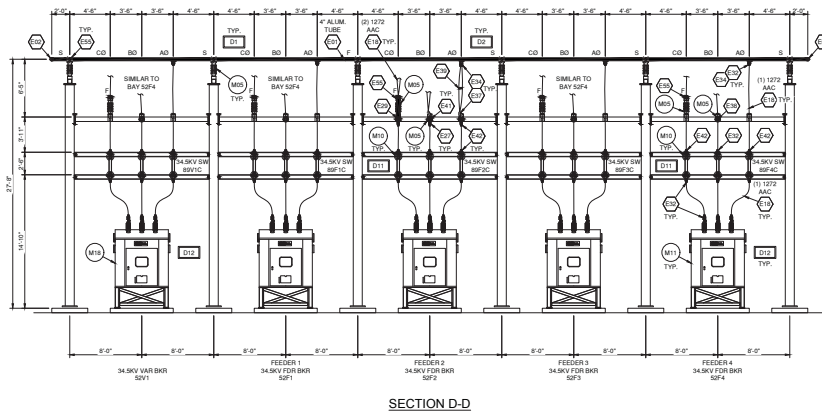
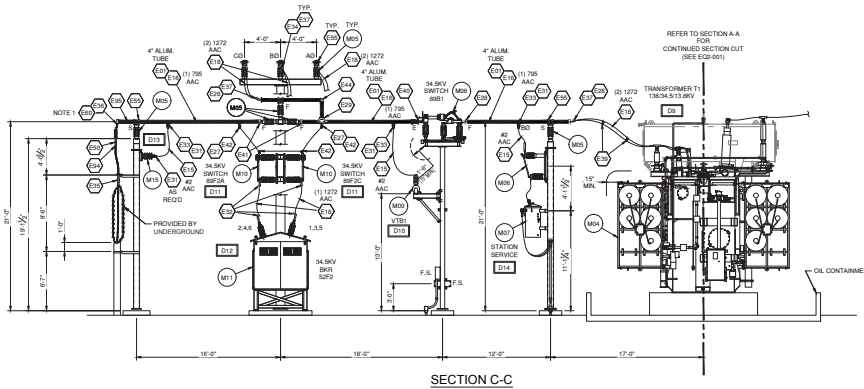
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Project Number: 17.01246

34.5KV
ELECTRICAL LAYOUT
SECTIONS

DWG # NWO-EQ2-003 REVISION 0A



NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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NOTES:

1. REFERENCE COLLECTION ONE LINE FOR CABLE SIZES.

LEGEND:

- F FIXED FITTING
S SLIP FITTING
E EXPANSION FITTING
N.S. NEAR SIDE
F.S. FAR SIDE
MA MAJOR MATERIAL
MI MINOR MATERIAL
D1A DETAIL SEE DWG.

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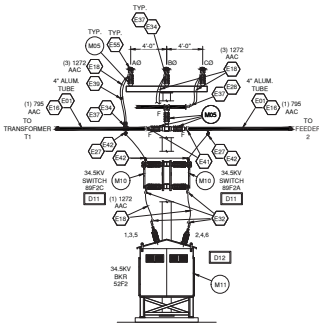
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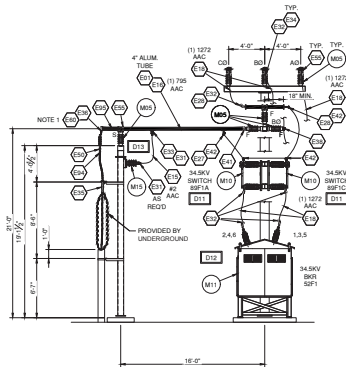
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Drawn By: P. WACHOWSKI
Approved By: J. CLISON
Project Number: 17-01246

34.5KV
ELECTRICAL LAYOUT
SECTIONS

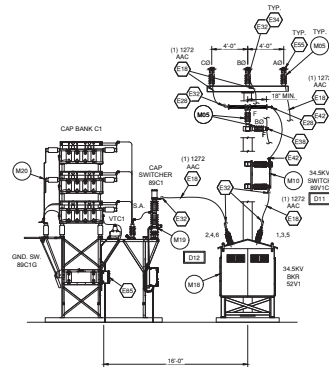
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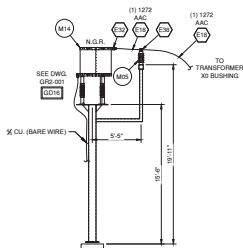
SECTION E-E



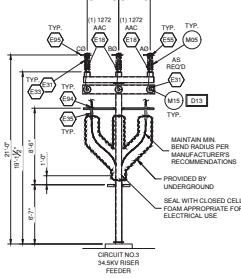
SECTION F-F



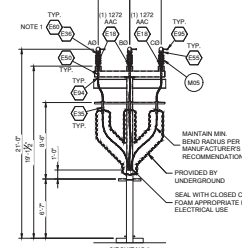
SECTION G-G



SECTION H-H

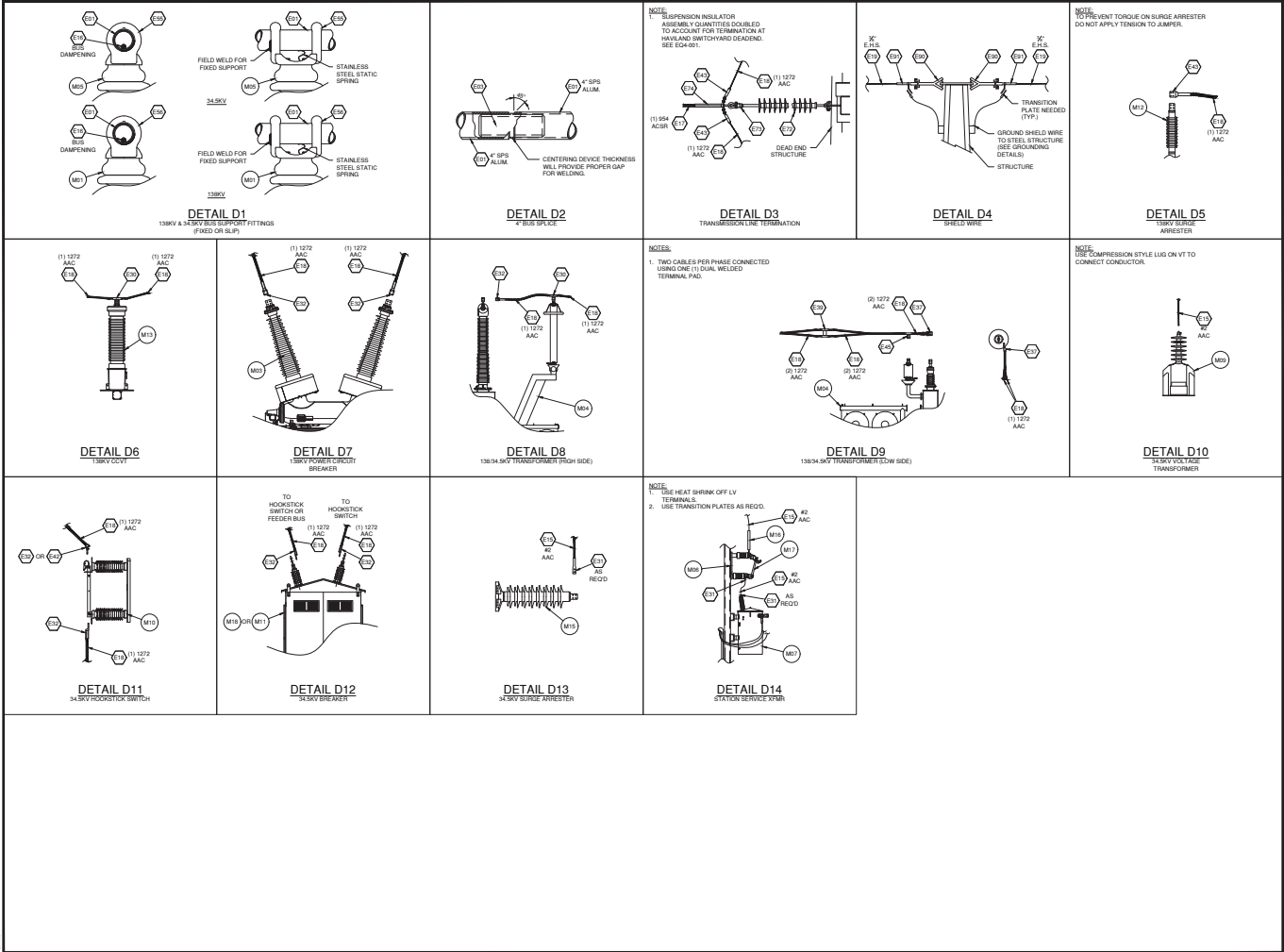


SECTION I-I



SECTION J-J





NORTHWEST OHIO WIND PROJECT
PAULDING COUNTY, OHIO

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WHITE
an iGREA company

NOTES:

- REFERENCE COLLECTION ONE LINE FOR CABLE SIZES.

LEGEND:

- F FIXED FITTING
- S SLIP FITTING
- E EXPANSION FITTING
- N.S. NEAR SIDE
- F.S. FAR SIDE
- MA MAJOR MATERIAL SEE DWG. EQ4-001
- MI MINOR MATERIAL SEE DWG. EQ4-001
- DET DETAIL SEE DWG. EQ3-001

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Design By: T. SEVERANCE
Drawn By: P. WISCHAGROW
Approved By: J. CLISON
Project Number: 17-01246

138/34.5KV ELECTRICAL DETAILS

DWG # **NWO-EQ3-001** REVISION **0A**

MINOR MATERIAL				
BUS, CONNECTORS, END CAPS & COUPLERS				
Item #	Quantity	Description	Manufacturer	Supplier
E01	-	4" SPS ALUMINUM TUBULAR BUS, SCH. 40, 6063-T6 ALLOY	ALCOA	4" SPS ALUM. Contractor
E02	-	4" SPS ALUM., END CAP	SEFCOR	ABIR-64 Contractor
E03	AS REQ'D	4" SPS ALUM. TO 4" SPS ALUM. COUPLER-STANDARD	SEFCOR	WSC-6464 Contractor
CONDUCTORS				
Item #	Quantity	Description	Manufacturer	Supplier
E15	-	#2, AWG, AAC 7 STRAND, CODE NAME "RIB"	SOUTHWIRE	2 AAC Contractor
E16	-	795 MCM AAC 61 STRAND, CODE NAME "LILAC" (BUS DAMPENING)	SOUTHWIRE	795 AAC Contractor
E17	-	954 MCM ACSR 45/7 STRAND, CODE NAME "RAIL"	SOUTHWIRE	954 ACSR Contractor
E18	-	1272 MCM AAC 61 STRAND, CODE NAME "NARCISUS"	SOUTHWIRE	1272 AAC Contractor
E19	-	3/8" 7 STRAND, EXTRA HIGH STRENGTH (EHS) OVERHEAD STATIC SHIELD WIRE	SOUTHWIRE	3/8" EHS GUY Contractor
TERMINAL PADS, TEES, BUS SUPPORTS, CABLE SPACERS & DEADEND MATERIAL				
Item #	Quantity	Description	Manufacturer	Supplier
E27	-	TEE CONNECTOR FOR 4" SPS ALUM. BUS TO 4-HOLE PAD, PERPENDICULAR	SEFCOR	WTR-64-4B Contractor
E28	-	TERMINAL PAD, WELDED 4" SPS ALUM. BUS TO NEMA 4-HOLE PAD, CENTER FORMED	SEFCOR	WTCF-64-4B Contractor
E29	-	TEE CONNECTOR, WELDED, 4" SPS ALUM. TO 4" SPS ALUM.	SEFCOR	WTF-64-4 Contractor
E30	-	TEE CONNECTOR, BOLTED, 1272 MCM AAC TO 4-HOLE PAD	SEFCOR	ACF-43-4B Contractor
E31	-	TERMINAL PAD, COMPRESSION, (1) #2 AWG AAC CABLE TO NEMA 2-HOLE PAD	SEFCOR	AL-292-2A Contractor
E32	-	TERMINAL PAD, WELDED, (1) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC-39-4B Contractor
E33	-	TEE CONNECTOR FOR 4" SPS ALUM. BUS TO 2-HOLE PAD	SEFCOR	WTF-6269-2B Contractor
E34	-	TEE CONNECTOR FOR 4" SPS ALUM. BUS TO 4-HOLE PAD, PARALLEL	SEFCOR	WTF-6269-4B Contractor
E35	-	SINGLE PHASE CABLE POSITIONER	ALUMA	S3939 Contractor
E36	-	TERMINAL PAD, WELDED 4" SPS ALUM. BUS TO NEMA 4-HOLE PAD, 90 DEG.	SEFCOR	WTR90-64-4B Contractor
E37	-	TERMINAL PAD, WELDED, (2) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC2-39-4B Contractor
E38	-	BUS SUPPORT, CABLE TO INSULATOR, 1272 MCM AAC, 3" B.C.	SEFCOR	AVCA-43-3 Contractor
E39	-	CABLE SPACER, (2) 1272 MCM AAC, 4" SPACING	SEFCOR	ASPC-43-4 Contractor
E40	-	TERMINAL PAD, EXPANSION, 4" SPS ALUM. BUS TO 4-HOLE PAD, CENTER FORMED	SEFCOR	WTRFC-64-4B Contractor
E41	-	BUS SUPPORT, 4" SPS ALUM. BUS TO 3" B.C. INSULATOR	SEFCOR	WVT1-64-3 Contractor
E42	-	TERMINAL PAD, WELDED, (1) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD, 45 DEG.	SEFCOR	WFC45-39-4A Contractor
E43	-	TERMINAL PAD, COMPRESSION, (1) 1272 MCM AAC CABLE TO 4-HOLE PAD	SEFCOR	AL-1302-4B Contractor
E44	-	COUPLER 4" SPS SCH. 40 TO 4" SPS SCH. 40 @ 90°, WELDED, ALUMINUM	SEFCOR	WLBH90-6464 Contractor
E45	-	CABLE SPACER, (3) 1272 MCM AAC, 4-HOLE PAD	SEFCOR	ASPC-43-4-4B Contractor
E50	-	TERMINATION KIT, 700-1500 MCM AL	3M	7666-S-8 Contractor
E55	-	BUS SUPPORT, WELDED, 4" SPS ALUM. BUS, SUP OR RIGID, 3" B.C.	SEFCOR	ASWH-64-3-SE Contractor
E56	-	BUS SUPPORT, WELDED, 4" SPS ALUM. BUS, SUP OR RIGID, 5" B.C.	SEFCOR	WCT1-64-5 Contractor
E60	-	TERMINAL PAD, COMPRESSION, (1) 1250 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	AL-1246-4B Contractor
CABLE TRENCH				
Item #	Quantity	Description	Manufacturer	Supplier
E65	AS REQ'D	CABLE TRENCH PEDESTRIAN, 30" LONG, 24" WIDE, 24" DEEP	TRENWA	BP2424-120 Contractor
E66	AS REQ'D	CABLE TRENCH PEDESTRIAN, LID, CONCRETE, 24" WIDE	TRENWA	LP24-30 Contractor
E67	AS REQ'D	CABLE TRENCH VAULT, 4' 6" LONG, 72" WIDE, 24" DEEP	TRENWA	- Contractor
E68	AS REQ'D	CABLE TRENCH VAULT, LID CONCRETE, 72" WIDE	TRENWA	- Contractor
SUSPENSION INSULATOR ASSEMBLY				
Item #	Quantity	Description	Manufacturer	Supplier
E72	-	INSULATOR, STRAIN, 49.1" LENGTH, 122" LEAKAGE, Y-CLEVIS BALL INSULATORS, 30K	OHIO BRASS	S150081201 Contractor
E73	-	SOCKET CLEVIS, 30K ULT, FOR ANSI S2-3 AND S2-5 BALL, 1-1/8" THROAT WIDTH	HUBBELL	SC-301 Contractor
E74	-	COMPRESSION DEAD END ASSEMBLY, 954 ACSR RAIL, 15 DEG. TERMINAL PADS, DOUBLE TONGUE, VERTICAL CLEVIS	HUBBELL	A101350 Contractor

MINOR MATERIAL				
LIGHTING				
Item #	Quantity	Description	Manufacturer	Supplier
E80	4	LIGHTING, 250W SECURITY LIGHT, LRD, LAMPHOLDER AND MOUNTINGS, MULTIVOLT, GRAY	ALL	ACP11ED610AMVOLT5KTMGY Contractor
E81	4	LIGHT MOUNTING BRACKET	HOLOPHANE	BKT-1-PP Contractor
MISCELLANEOUS				
Item #	Quantity	Description	Manufacturer	Supplier
E85	AS REQ'D	JUNCTION BOX, OUTDOOR RATED	HOPKINS	AS REQ'D Contractor
E86	AS REQ'D	TRANSITION PLATE, 2-HOLE PAD, ALUM. TO COPPER	SEFCOR	ATP-S Contractor
E87	AS REQ'D	TRANSITION PLATE, 4-HOLE PAD, ALUM. TO COPPER	SEFCOR	ATP-D Contractor
E90	6	SHIELD WIRE Y-CLEVIS	SEFCOR	AH-1231 Contractor
E91	6	COMP. DEADEND, HORIZONTAL, 3/8" SHIELD WIRE DEADEND	ANDERSON	86-1225-S Contractor
E94	12	CABLE FAULT INDICATOR	SEL	SCB-96-DF-L Contractor
E95	12	WELDED, GROUNDING STUD	SEFCOR	WTS-6064 Contractor
MAJOR MATERIAL				
Item #	Quantity	Description	Manufacturer	Supplier
M01	12	138KV INSULATOR - 650 KV BIL, STANDARD STRENGTH, 5" BOLT CIRCLE TOP 5" BOLT CIRCLE BOTTOM TR208	-	- Contractor
M02	1	DISCONNECT SWITCH 138KV, 1200A, 600KV BIL, VERTICAL BREAK, VERTICAL MOUNTED, MOTOR OPERATED	-	- Contractor
M03	1	CIRCUIT BREAKER, 138KV, 600KV BIL, 1200A, 40KA, SF6	-	- Contractor
M04	1	MAIN POWER TRANSFORMER 138/34.5/13.8 KV, 70.2/93.6/117 MVA, ONAN/ONAF/ONAF	-	- Owner
M05	59	34.5 KV INSULATOR, 200 KV BIL, STANDARD STRENGTH, 3" BOLT CIRCLE TR210	-	- Contractor
M06	1	FUSE HOLDER, 3MD-20 VERTICAL-OFFSET STYLE	S&C	192504-E Contractor
M07	1	STATION SERVICE, 75 KVA, 19.820V - 120/240V	-	- Contractor
M08	1	DISCONNECT SWITCH 34.5KV, 3000A, 200KV BIL, VERTICAL BREAK, WORM-GEAR OPERATED	-	- Contractor
M09	3	VOLTAGE TRANSFORMER, 34.5KV, 200KV BIL, SINGLE BUSHING, RATIO: 175/300-1, ACC 0.3 WXY	-	- Contractor
M10	30	DISCONNECT SWITCH 34.5KV, 1200A, 200KV BIL, VERTICAL MOUNTED, HOOKSTICK OPERATED	-	- Contractor
M11	4	GROUNDING CIRCUIT BREAKER, 34.5KV, 200KV BIL, 1200A, 25KA, VACUUM	-	- Contractor
M12	3	SURGE ARRESTER, 138KV, 88KV MCOV, STATION CLASS NEMA 4-HOLE CONNECTION, UPRIGHT MOUNTING	-	- Contractor
M13	3	CAPACITOR COUPLED VOLTAGE TRANSFORMER, 138KV 80,500:115V/67.08V, 700/1200:1:1, ACC 0.15 WXYZ	-	- Contractor
M14	1	NEUTRAL GROUNDING REACTOR, 34.5KV, 0.6 OHM, 600A MIN.	-	- Contractor
M15	12	SURGE ARRESTER, 30KV, 24.4KV MCOV, STATION CLASS, POLYMER TYPE NEMA 4-HOLE CONNECTION, CANTILEVER MOUNTING	-	- Contractor
M16	2	CURRENT LIMITING FUSE (1 SPARE)	MERSEN	9F59UBEZ71 Contractor
M17	2	FUSE, 34.5KV, 38KV MAX, SE (1 SPARE)	S&C	614005 Contractor
M18	1	CIRCUIT BREAKER, 38KV, 200KV BIL, 1200A, 25KA, VACUUM	-	- Contractor
M19	1	SWITCHER, CAP, 38KV, 600A, 200KV BIL, 25 KA WITHSTAND	-	- Contractor
M20	1	CAPACITOR BANK, 4 MVAR, 34.5KV	-	- Contractor

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

Rev.	Date	Description	By
0A	10/19/17	PRELIMINARY	UEI



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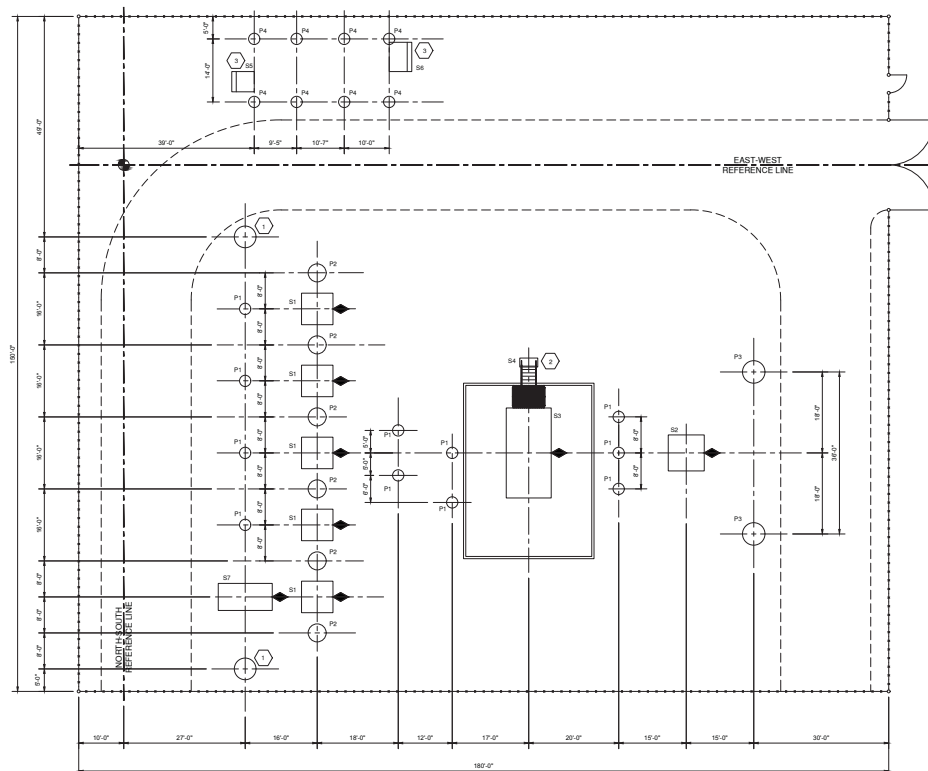
3350 18th Avenue South
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Fax: 701.207.3191
www.jbl.com



Design By: T. SEVERANCE
Drawn By: P. WISCHAKOWSKI
Approved By: J. CLISON
Project Number: 17-01246

138/34.5KV SUBSTATION
MATERIAL LIST

DWG #: NWO-EQ4-001 REVISION: 0A



FOUNDATION SCHEDULE				
MARK	QTY	DESCRIPTION	UNITS	TOTAL
P1	11	34.5W 30" SWITCH STAND 34.5W 30" BUS STAND 34.5W 30" BUS STAND 34.5W CABLE TERMINATION STRUCTURE 1300V 12 LOW VOLT BUS STAND	NW0-F-201	TBD
P2	6	34.5W CLOSURE STRUCTURE	NW0-F-201	TBD
P3	2	1380V DEAD END	NW0-F-201	TBD
S1	8	EQUIPMENT ENCLOSURE	NW0-F-202	TBD
S2	5	34.5W FERRULE MOUNTED SLAB	NW0-F-201	TBD
S3	1	1200V BREAKER SLAB	NW0-F-201	TBD
S3	1	OLT CONTAINER/ TRANSFORMER SLAB	NW0-F-201	TBD
S4	1	START/ STOP SLAB	NW0-F-201	TBD
S5	1	EQUIPMENT ENCLOSURE STOP	NW0-F-201	SEE DATA
S6	1	EQUIPMENT ENCLOSURE STOP	NW0-F-201	SEE DATA
S7	1	34.5W CABLE RACK SLAB	NW0-F-201	ABOUT 1

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO







Rev.	Date	Description	By
0A	06/30/17	PRELIMINARY	UE
0B	10/19/17	PRELIMINARY	UE



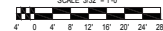
NOTES:

1. SEE GRADING PLAN FOR INDICATION OF TRUE NORTH.

LEGEND:

- | | |
|---|---|
|  | DIRECT EMBED SHIELD POLE, SEE S2-001 |
|  | FIELD LOCATE S4 IN COORDINATION WITH
OIL CONTAINMENT STAIRS NWO-S11-001
AND STEEL PLAN NWO-S0-001 |
|  | STOOPS TO BE CENTERED ON DOORS.
FORM AROUND AND PROVIDE BOND
BREAK AT BUILDING PIERS. |
|  | SUBSTATION FENCE |
|  | ALIGNMENT MARK |
|  | BASE LINE INTERSECTION |

SCALE 3/32" = 1'-0"



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Design By: D. WEBER
 Drawn By: V. LEE
 Approved By: M. PADULA
 Project Number: 17.01246

SUBSTATION
FOUNDATION PLAN

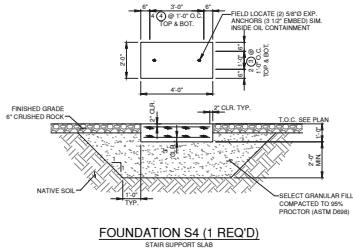
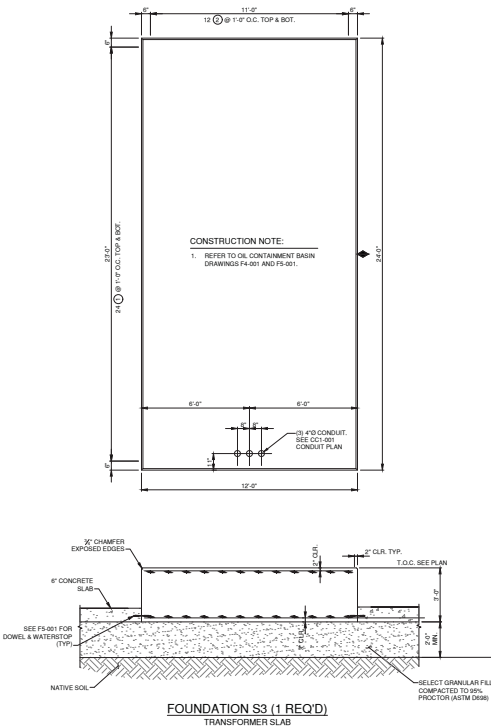
DWG #:
NWO-F1-001

REVISION:
0B

- | TO BE COMPLETED | |
|-----------------|--|
| 1. | FOUNDATION DESIGN ON HOLD
PENDING GEOTECHNICAL REPORT
AND VENDOR DRAWINGS. |
| 2. | T.O.C. ELEVATIONS |
| 3. | VERIFY CONDUIT LOCATIONS FOR
BREAKER SLABS WITH CONDUIT
PLAN. |
| 4. | XFM/OIL CONTAINMENT SIZE AND
LOCATION WHEN ACTUAL VENDOR
DRAWINGS ARE AVAILABLE. |

TO BE COMPLETED

1. FOUNDATION DESIGN ON HOLD
PENDING GEOTECHNICAL
REPORT AND VENDOR
DRAWINGS.



TO BE COMPLETED
1. FOUNDATION DESIGN ON HOLD PENDING GEOTECHNICAL REPORT AND VENDOR DRAWINGS.
2. VERIFY CONDUIT LOCATIONS FOR BREAKER SLABS WITH CONDUIT PLAN.

BAR BENDING DATA														
NO.	RECD.	CONC. CL. YD.	FND MARK	BAR SIZE	QTY	NOM. LENGTH	TYPE	1ST FLOOR						
								A	B	C	D	E	F	G
1	30.0	S3	48	#6	11'-0"	STR								
2	24	#6	22'-0"	STR										
3	4	#4	3'-0"	STR										
4	5	#4	1'-0"	STR										
WT. REBAR PER CON. =								3.014.4						
TOTAL WT. REBAR =								30.9						
TOTAL CON. YD. CONG. =								3.024.0						

NORTHWEST OHIO WIND PROJECT
PAULING COUNTY, OHIO

Rev.	Date	Description	By
0A	10/19/17	PRELIMINARY	UE



- NOTES:**
- CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,500 P.S.I. AT THE END OF 28 DAYS.
 - SOIL BEARING CAPACITY BENEATH FOOTING OR FOUNDATIONS SHALL BE NOT LESS THAN 3,000 PSI.
 - CONCRETE PLACEMENT: NO CONSTRUCTION JOINTS PERMITTED UNLESS NOTED.
 - EDGES OF CONCRETE: ALL EXPOSED EDGES ABOVE GROUND: FINISHED OR CHAMFERED 3/4 INCH.
 - REINFORCING STEEL: ASTM A-615 GRADE 60.
 - COVER: TWO INCHES MINIMUM PROTECTIVE CONCRETE COVER OVER REINFORCING STEEL UNLESS NOTED.
 - REFER TO DETAILED SPECIFICATION ON CONCRETE.
 - FINISH: TOP SURFACE OF OUTDOOR EQUIPMENT SLAB: WOOD FLOATED, LIGHTLY TROWELED AND THEN BROOMED.

LEGEND:
ALIGNMENT MARK

PRELIMINARY

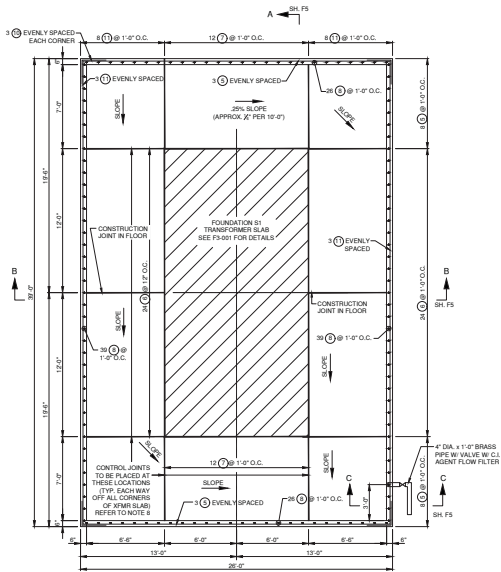
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WHITE
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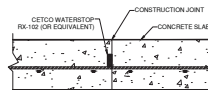
White Group
Concrete - Cement - Detail Lines - Formwork - Steel Fabric - St. Paul
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17.01296

138/34.5KV SUBSTATION FOUNDATION DETAILS
SLABS S3 AND S4

DWG # **NWO-F3-001** REVISION: **0A**



FOUNDATION S3 (1 REQ'D)
OIL CONTAINMENT



CONSTRUCTION JOINT DETAIL
SCALE: NONE

REINFORCING DATA											
NO.	CONC.	COL. YD.	FOU. MARK	BAR MARK	QTY	SIZE	NOM. LENGTH	TYPE	A	B	C
1	18.4	S3			5	25	#4	25'-0"	STR.		
					6	48	#4	6'-0"	STR.		
					7	24	#4	7'-0"	STR.		
					8	180	#4	4'-0"	STR.		
					9	75	#4	2'-0"	STR.		
					10	12	#4	4'-0"	STR.		
					11	22	#4	36'-0"	STR.		
TOTAL CUL. YDS. CONC. = 18.4 CUL. YDS.											
TOTAL WT. REBAR = 1,813.2 #											

TOTAL CUL. YDS. CONC. = 18.4 CUL. YDS.
TOTAL WT. REBAR = 1,813.2 #

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

Rev.	Date	Description	By
0A	10/19/17	PRELIMINARY	UEI



NOTES:

- CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,500 P.S.I. AT THE END OF 28 DAYS.
- CONCRETE PLACEMENT: NO CONSTRUCTION JOINT PERMITTED UNLESS NOTED.
- EDGES OF CONCRETE: ALL EXPOSED EDGES ABOVE GROUND: ROUNDED OR CHAMFERED 3/4" RADIUS.
- REINFORCING STEEL: ASTM A-615 GRADE 60.
- COVER: TWO INCHES MINIMUM PROTECTIVE CONCRETE COVER OVER REINFORCING STEEL UNLESS NOTED.
- REFER TO DETAILED SPECIFICATION ON CONCRETE.
- FINISH: TOP SURFACE OF OUTDOOR EQUIPMENT SLABS: WOOD FLOATED, LIGHTLY TROWELED AND THEN BROOMED.
- CONSTRUCTION JOINTS AND CONTROL JOINTS ARE TWO SEPARATE SPECIFICATIONS. SEE DETAIL FOR TYPICAL CONSTRUCTION JOINT. SAWCUT CONTROL JOINTS 1/2" DEEP AND FILL WITH CETO AKWASWELL.
- OIL CONTAINMENT CAPACITY: 12,360 GALLONS
XFORM OIL VOLUME: 4,120 GALLONS MAX
25 YR. 24 HR. RAINFALL (0.5") - 3,790 GALLONS

LEGEND:

ALIGNED MARK

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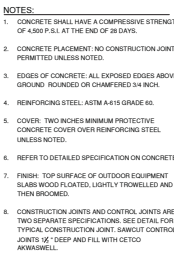
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www.jfrsg.com
JFRSG
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01246

138/34.5KV SUBSTATION
FOUNDATION DETAILS
SLAB S3 OIL
CONTAINMENT

TO BE COMPLETED
1. FOUNDATION DESIGN ON HOLD
PENDING GEOTECHNICAL REPORT
AND VENDOR DRAWINGS.

DWG # NWO-F4-001 REVISION: 0A

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0A	10/19/17	PRELIMINARY	UEI

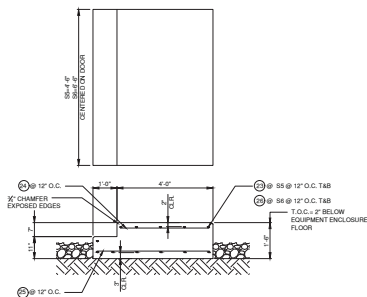


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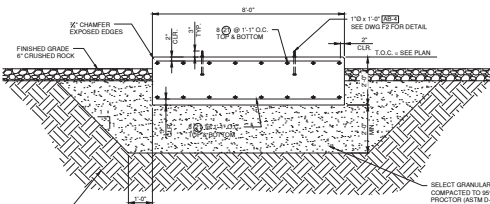
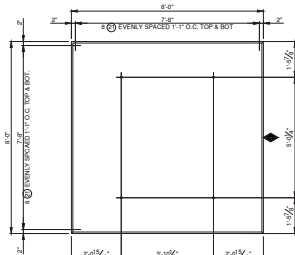
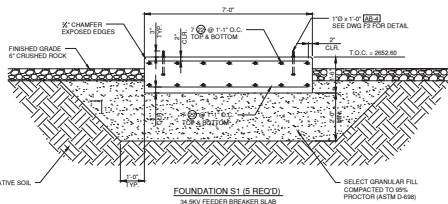
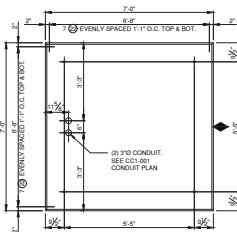
138/34.5KV SUBSTATION
FOUNDATION DETAILS
SLAB S3 OIL
CONTAINMENT

DWG #: **NWO-F5-001** REVISION: **0A**





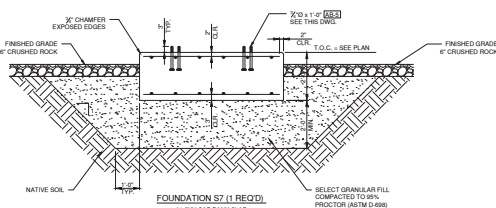
- NOTES:**
1. ADJUST DIMENSIONS AS NECESSARY TO MATCH FIELD CONDITIONS.
 2. STOOP TO BE CENTERED ON DOOR FIELD LOCATE.
 3. PROVIDE #4 REINFORCING BARS AS SHOWN, 12" O.C. EACH WAY.
 4. POUR STOOP SLAB OVER REBAR AS REQUIRED. CUT LOWER REBAR AS REQUIRED.














- TO BE COMPLETED**
1. FOUNDATION DESIGN ON HOLD PENDING GEOTECHNICAL REPORT AND VENDOR DRAWINGS.
 2. VERIFY CONDUIT LOCATIONS FOR BREAKER SLABS WITH CONDUIT PLAN.

BAR BENDING DATA														
NO.	CONC.	QTY.	BAR	SIZE	END HOOKS		STIRRUP & TIE HOOKS		A	B	C	D	E	G
					180° HOOKS	90° HOOKS	STIRRUP	TIE						
1	2.7	51	22	#5	6'-0"	STR								
2	1	4.7	52	21	#5	7'-0"	STR							
3	1	1.3	53	23	#4	4'-0"	STR							
4	1	1.7	54	24	#4	3'-0"	STR							
5	1	1.7	55	25	#4	4'-0"	STR							
6	1	1.7	56	26	#4	4'-0"	STR							
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11	1	1.7	61	25	#4	4'-0"	STR							
12	1	1.7	62	25	#4	4'-0"	STR							
13	1	1.7	63	25	#4	4'-0"	STR							
14	1	1.7	64	25	#4	4'-0"	STR							
15	1	1.7	65	25	#4	4'-0"	STR							
16	1	1.7	66	25	#4	4'-0"	STR							
17	1	1.7	67	25	#4	4'-0"	STR							
18	1	1.7	68	25	#4	4'-0"	STR							
19	1	1.7	69	25	#4	4'-0"	STR							
20	1	1.7	70	25	#4	4'-0"	STR							
21	1	1.7	71	25	#4	4'-0"	STR							
22	1	1.7	72	25	#4	4'-0"	STR							
23	1	1.7	73	25	#4	4'-0"	STR							
24	1	1.7	74	25	#4	4'-0"	STR							
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26	1	1.7	76	25	#4	4'-0"	STR							
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28	1	1.7	78	25	#4	4'-0"	STR							
29	1	1.7	79	25	#4	4'-0"	STR							
30	1	1.7	80	25	#4	4'-0"	STR							
31	1	1.7	81	25	#4	4'-0"	STR							
32	1	1.7	82	25	#4	4'-0"	STR							
33	1	1.7	83	25	#4	4'-0"	STR							
34	1	1.7	84	25	#4	4'-0"	STR							
35	1	1.7	85	25	#4	4'-0"	STR							
36	1	1.7	86	25	#4	4'-0"	STR							
37	1	1.7	87	25	#4	4'-0"	STR							
38	1	1.7	88	25	#4	4'-0"	STR							
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40	1	1.7	90	25	#4	4'-0"	STR							
41	1	1.7	91	25	#4	4'-0"	STR							
42	1	1.7	92	25	#4	4'-0"	STR							
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44	1	1.7	94	25	#4	4'-0"	STR							
45	1	1.7	95	25	#4	4'-0"	STR							
46	1	1.7	96	25	#4	4'-0"	STR							
47	1	1.7	97	25	#4	4'-0"	STR							
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49	1	1.7	99	25	#4	4'-0"	STR							
50	1	1.7	100	25	#4	4'-0"	STR							
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74	1	1.7	124	25	#4	4'-0"	STR							
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77	1	1.7	127	25	#4	4'-0"	STR							
78	1	1.7	128	25	#4	4'-0"	STR							
79	1	1.7	129	25	#4	4'-0"	STR							
80	1	1.7	130	25	#4	4'-0"	STR							
81	1	1.7	131	25	#4	4'-0"	STR							
82	1	1.7	132	25	#4	4'-0"	STR							
83	1	1.7	133	25	#4	4'-0"	STR							
84	1	1.7	134	25	#4	4'-0"	STR							
85	1	1.7	135	25	#4	4'-0"	STR							
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87	1	1.7	137	25	#4	4'-0"	STR							
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96	1	1.7	146	25	#4	4'-0"	STR							
97	1	1.7	147	25	#4	4'-0"	STR							
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99	1	1.7	149	25	#4	4'-0"	STR							
100	1	1.7	150	25	#4	4'-0"	STR							

NOTES:
 1. DIMENSIONS OMITTED ARE ZERO
 2. DIMENSIONS ARE OUT TO OUT OF BAR
 3. DIMENSIONS INCLUDING REINFORCING BAR TO



BENT REINFORCING BARS												
		BARS		END HOOKS		BENT END HOOKS						
		BAR NO.	BAR SIZE	BAR NO.	BAR SIZE	BAR NO.	BAR SIZE					
		1	5/8"	1	5/8"	1	5/8"	1	5/8"	1	5/8"	
		2	5/8"	2	5/8"	2	5/8"	2	5/8"			
		3	5/8"	3	5/8"	3	5/8"	3	5/8"			
		4	5/8"	4	5/8"	4	5/8"	4	5/8"			
		5	5/8"	5	5/8"	5	5/8"	5	5/8"			
		6	5/8"	6	5/8"	6	5/8"	6	5/8"	6	5/8"	
		7	5/8"	7	5/8"	7	5/8"	7	5/8"			
		8	5/8"	8	5/8"	8	5/8"	8	5/8"			
		9	5/8"	9	5/8"	9	5/8"	9	5/8"			
		10	5/8"	10	5/8"	10	5/8"	10	5/8"			
		11	5/8"	11	5/8"	11	5/8"	11	5/8"	11	5/8"	
		12	5/8"	12	5/8"	12	5/8"	12	5/8"			
		13	5/8"	13	5/8"	13	5/8"	13	5/8"			
		14	5/8"	14	5/8"	14	5/8"	14	5/8"			
		15	5/8"	15	5/8"	15	5/8"	15	5/8"			
		16	5/8"	16	5/8"	16	5/8"	16	5/8"	16	5/8"	
		17	5/8"	17	5/8"	17	5/8"	17	5/8"			
		18	5/8"	18	5/8"	18	5/8"	18	5/8"			
		19	5/8"	19	5/8"	19	5/8"	19	5/8"			
		20	5/8"	20	5/8"	20	5/8"	20	5/8"			
		21	5/8"	21	5/8"	21	5/8"	21	5/8"	21	5/8"	
		22	5/8"	22	5/8"	22	5/8"	22	5/8"			
		23	5/8"	23	5/8"	23	5/8"	23	5/8"			
		24	5/8"	24	5/8"	24	5/8"	24	5/8"			
		25	5/8"	25	5/8"	25	5/8"	25	5/8"			
		26	5/8"	26	5/8"	26	5/8"	26	5/8"	26	5/8"	
		27	5/8"	27	5/8"	27	5/8"	27	5/8"			
		28	5/8"	28	5/8"	28	5/8"	28	5/8"			
		29	5/8"	29	5/8"	29	5/8"	29	5/8"			
		30	5/8"	30	5/8"	30	5/8"	30	5/8"			
		31	5/8"	31	5/8"	31	5/8"	31	5/8"	31	5/8"	
		32	5/8"	32	5/8"	32	5/8"	32	5/8"			
		33	5/8"	33	5/8"	33	5/8"	33	5/8"			
		34	5/8"	34	5/8"	34	5/8"	34	5/8"			
		35	5/8"	35	5/8"	35	5/8"	35	5/8"			
		36	5/8"	36	5/8"	36	5/8"	36	5/8"	36	5/8"	
		37	5/8"	37	5/8"	37	5/8"	37	5/8"			
		38	5/8"	38	5/8"	38	5/8"	38	5/8"			
		39	5/8"	39	5/8"	39	5/8"	39	5/8"			
		40	5/8"	40	5/8"	40	5/8"	40	5/8"			
		41	5/8"	41	5/8"	41	5/8"	41	5/8"	41	5/8"	
		42	5/8"	42	5/8"	42	5/8"	42	5/8"			
		43	5/8"	43	5/8"	43	5/8"	43	5/8"			
		44	5/8"	44	5/8"	44	5/8"	44	5/8"			
		45	5/8"	45	5/8"	45	5/8"	45	5/8"			

NOTES:

1. DIMENSIONS OMITTED ARE ZERO

2. DIMENSIONS NOT OUT OF TOLERANCE

3. DEFORMED REINFORCING BARS ARE TO BE CIRCLED IN THE NOTE

NO	CONC	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR	FORM	BAR
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Rev.	Date	Description	By
0A	10/9/17	PRELIMINARY	UEI



1. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,500 P.S.I. AT THE END OF 28 DAYS.
2. SOIL BEARING CAPACITY BENEATH FOOTING OR FOUNDATIONS SHALL BE NOT LESS THAN 3,000/50.0 FT.
3. CONCRETE PLACEMENT: NO CONSTRUCTION JOINTS PERMITTED UNLESS SPECIFIED.
4. EDGES OF CONCRETE: ALL EXPOSED EDGES AND FINISH GROUND: ROUNDED OR CHAMFERED 3/4 INCH.
5. REINFORCING STEEL: ASTM A-615 GRADE 60.
6. COVER: TWO INCHES MINIMUM PROTECTIVE CONCRETE COVER ABOVE REINFORCING STEEL UNLESS NOTED.
7. REFER TO DETAILED SPECIFICATION ON CONCRETE.
8. FINISH TOP SURFACE OF OUTDOOR EQUIPMENT SALLS TO BE FLATTED, LIGHTLY TROWELED AND THEN BROOMED.
9. ANCHOR BOLTS SHALL BE PLAIN BARS FABRICATED FROM OPEN HEARTH STEEL CONFORMING TO ASTM SPEC. F-1554 GRADE 36 WITH HEAVY HEX NUTS CONFORMING TO ASTM A308.
10. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED CONFORMING TO ASTM-153.

 ALIGNMENT MARK

PRELIMINARY

THIS DOCUMENT IS
RELEASED FOR THE
PURPOSE OF REVIEW
UNDER THE AUTHORITY
OF (MARTIN F. PADULA),
(P.E. 80306) ON 10/19/17. IT
IS NOT TO BE USED FOR
CONSTRUCTION
PURPOSES.



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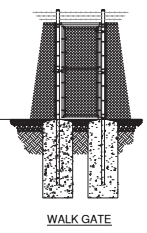
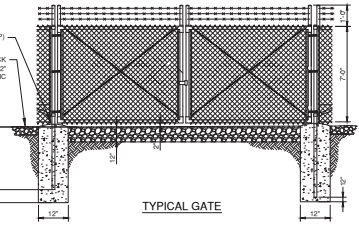
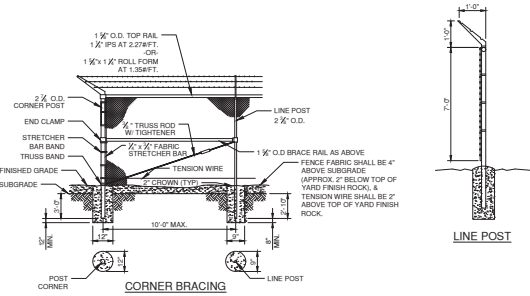
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17.01246

138/34.5KV SUBSTATION
FOUNDATION DETAILS
SLAB S7

DWG #: **NWO-F7-001** REVISION: **0A**

TO BE COMPLETED

1. FOUNDATION DESIGN ON HOLD
PENDING GEOTECHNICAL REPORT
AND VENDOR DRAWINGS.



ROADWAY AND PERSONNEL GATES

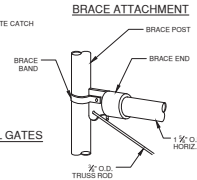
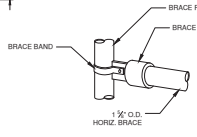


TABLE A FENCE POSTS FOR 9ft FENCE		
USE	TYPE	MINIMUM SIZE
LINE POSTS	ROUND	2 1/2" OD; t = .154in.
END, CORNER, PULL POSTS	ROUND	2 1/2" OD; t = .203in.
GATE POSTS	ROUND	4" OD; t = .226 in.

FENCE MATERIALS AND ERECTION MATERIAL

1. **FABRIC**
THE FENCE SHALL BE A MINIMUM OF 7 FT. HIGH. IT SHALL CONSIST OF A MINIMUM NO. 3 USWG STEEL WIRE, WOVEN INTO A 2 IN. DIAMOND MESH. THE MINIMUM BREAKING STRENGTH OF WIRE SHALL BE 1200 LBS. THE SIZE OF THE MESH PATTERN SHALL BE APPROXIMATELY 48" TO A VERTICAL LINE.

THE FABRIC SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A302, CLASS B.

2. **LINE, END, CORNER, PULL AND GATE POSTS**
ALL POST SHALL BE STEEL AND CONFORM TO THE SIZES AS LISTED IN TABLE A. (BELOW). FOR THE SPECIFIC TYPE OF APPLICATION, STRENGTH AND PROTECTIVE COATINGS OF ALL FENCE FRAMEWORK SHALL CONFORM TO ASTM F1043.

TUBULAR MATERIAL SHOULD CONFORM TO ASTM A53 GRADE B, FOR ROUND SHAPES AND ASTM A500 GRADE B OR ASTM A501 FOR SQUARE SHAPES. ROLL-FORMED SECTIONS SHALL MEET THE YIELD STRESS REQUIREMENTS OF ASTM A56 AS A MINIMUM.

LINE POSTS SHALL BE OF SUFFICIENT HEIGHT TO: (A) ACCOMMODATE A 7 FT FABRIC; (B) ACCOMMODATE EXTENSION ARMS; AND (C) BE EMBEDDED 34 IN INTO THE CONCRETE FOOTING.

END, CORNER AND PULL POST SHALL BE OF SUFFICIENT HEIGHT TO (A) ACCOMMODATE A 7 FT FABRIC; (B) ACCOMMODATE EXTENSION ARMS OR EXTEND 1 FT EXTRA; AND (C) BE EMBEDDED 38 IN INTO THE CONCRETE FOOTING.

GATE POSTS SHALL BE OF SUFFICIENT HEIGHT TO: (A) ACCOMMODATE A 7 FT FABRIC; (B) ACCOMMODATE EXTENSION ARMS; AND (C) BE EMBEDDED 48 IN INTO THE CONCRETE FOOTING.

ALL TUBULAR POSTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A53. ROLL FORMED SECTIONS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

3. **TOP RAIL**
TOP RAILS SHALL BE ROUND STEEL PIPE OR TUBING. THE MINIMUM SIZE SHALL NOT BE LESS THAN 1 1/2" OD NOR HAVE A MINIMUM WALL THICKNESS LESS THAN .138 IN. COUPLINGS SHALL BE THE OUTSIDE SLEEVE TYPE, SPACED ABOUT 20 FT APART AND AT LEAST 6 IN LONG, WITH PROVISIONS FOR EXPANSION AND CONTRACTION. THE TOP RAIL SHALL PASS THROUGH THE BASE OF THE EXTENSION ARM AND BE SECURELY FASTENED TO THE END, GATE AND PULL POSTS.

TOP RAILS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A53.

4. **BARBED WIRE**
BARBED WIRE SHALL CONSIST OF TWO STRANDS OF 12 GA. USWG STEEL WIRE WITH 4 POINT BARBS AT A MAXIMUM SPACING OF 5 IN. APART. THE WIRE SHALL BE GALVANIZED AFTER WEAVING IN ACCORDANCE WITH ASTM A121, CLASS 3, OR ALUMINUM COATED PER ASTM A56, CLASS 2.

THREE LINES OF BARRED WIRE SHALL BE PROVIDED.

5. **EXTENSION ARMS**
THE EXTENSION ARMS SHALL EXTEND UPWARD AND OUTWARD FROM THE FENCE AT AN ANGLE OF 45°. THERE SHALL BE PROVISIONS FOR THREE EQUALLY SPACED LINES OF BARBED WIRE ON THE EXTENDED ARMS. THE UPPERMOST WIRE SHALL BE APPROXIMATELY 1 FT VERTICALLY ABOVE THE FABRIC AND 1 FT HORIZONTALLY OUTSIDE THE FENCE LINE.

THE EXTENSION ARM SHALL BE MADE OF PRESTRESSED STEEL OR MALLEABLE IRON AND SHOULD BE DESIGNED FOR A 300 LBS MINIMUM PULL DOWN LOAD BEING APPLIED AT ARMS TIP.

THE EXTENSION ARM SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A103, CLASS B1.

6. **STRETCHER BAR**
STRETCHER BARS SHALL BE GALVANIZED STEEL BARS NOT LESS THAN 2 X 1/4". THEY SHALL BE APPROXIMATELY 1 IN. LESS THAN THE FABRIC HEIGHT.

THE STRETCHER BAR SHALL BE USED FOR SECURING THE FABRIC TO ALL TERMINAL POSTS. ONE BAR IS REQUIRED FOR EACH GATE AND END POST. TWO ARE REQUIRED FOR EACH CORNER AND PULL POST.

7. **POST BRACES**
POST BRACES ARE REQUIRED AT EACH GATE, CORNER, PULL AND END POST. IT SHALL CONSIST OF A STRUT, WHICH SHALL NOT BE LESS IN SIZE THAN THE TOP RAIL, AND A TRUSS ROD WITH TURNBUCKLE. THE ROD SHALL BE STEEL AND HAVE A MINIMUM DIAMETER OF 1/2".

THE TRUSS SHALL BE SECURED NEAR THE BASE OF THE CORNER GATE, PULL OR END POST. THE SECOND END SHALL BE SECURED AT APPROXIMATELY MID-HEIGHT ON THE ADJACENT LINE POST.

BRACING MEMBERS SHALL ALL BE HOT-DIP GALVANIZED PER ASTM 153.

8. **TENSION WIRE**

TENSION WIRE SHALL BE NO. 6 GAUGE COIL SPRING STEEL WIRE. ONE TENSION WIRE SHALL BE LOCATED AT THE BOTTOM OF THE FABRIC AND ATTACHED WITH HOG RINGS TO THE FABRIC ON 24" CENTERS.

9. **GATE FRAMES**

GATE FRAMES SHALL BE CONSTRUCTED OF TUBULAR STEEL MEMBERS WHICH SHALL BE WELDED AT THE JOINTS. ADDITIONAL HORIZONTAL AND VERTICAL STRUTS MAY BE REQUIRED TO PROVIDE FOR A RIGID GATE PANEL ALLOWING FOR NO VISIBLE SAG OR TWIST. GATE FRAMES SHALL BE MADE TO HAVE APPROXIMATELY 7" CLEARANCE ABOVE THE ROAD.

FABRIC FOR THE GATE PANELS SHALL BE THE SAME AS THE FENCE.

GATE FRAME AND BRACING MEMBERS SHALL NOT BE LESS THAN THE STRUCTURAL EQUIVALENT OF 2 1/2" OD STANDARD PIPE. STEEL TENSION RODS AND TURNBUCKLES MAY ALSO BE UTILIZED. GATE FRAME SHALL HAVE PROVISIONS FOR THREE LINES OF BARBED WIRE ABOVE FABRIC. ALL GATE FRAME MATERIAL SHALL BE HOT-DIP GALVANIZED PER ASTM A120.

10. **HARDWARE**

HINGES SHALL BE HEAVY DUTY AND ALLOW 180° SWING OF ALL GATE LEAVES. THE HINGES SHALL NOT TWIST OR TURN UNDER THE ACTION OF THE GATE AND SHALL PROVIDE EASE OF OPERATION.

LATCHES, STOPS AND KEEPERS SHALL ALL BE HEAVY DUTY. CONSTRUCTION OF GALVANIZED STEEL OR MALLEABLE IRON AND SHALL CONFORM TO ASTM A48 SPECS FOR GRAY IRON CASTING, ASTM 1-47 SPECS FOR MALLEABLE IRON CASTING AND ASTM 1028 SPECS FOR ROLLED PRESSURE AND FOR STEEL. FOR LATCHES SHALL HAVE A HEAVY DUTY DROP BAR. THE CENTER STOP SHALL BE A SPRING OPERATED LATCHING TYPE MADE TO BE CAST IN CONCRETE AND ENGAGE THE DROP BAR. A KEEPER SHALL BE PROVIDED WHICH WILL SECURE THE FREE END OF THE GATE IN THE OPEN POSITION.

HARDWARE SHALL ALLOW FOR GATE OPERATION FROM EITHER SIDE WITH PROVISIONS FOR SECURING WITH PADLOCK.

ALUMINUM TIES AND BANDS SHALL BE OF ALUMINUM WIRE PER ASTM B-211, OR ALUMINUM STRIP PER ASTM B-209. STEEL TIES AND BANDS SHALL BE OF STEEL WIRE WITH 0.8 OZ. OF ZINC COATING PER SQUARE FT OF SURFACE. NO. 6 GAUGE WIRE FOR FASTENING FABRIC TO LINE POST. NO. 9 GAUGE WIRE FOR FASTENING TO TOP RAIL, 2" x 1" FOR BANDS, AND 2" x 2" STEEL FOR STRETCHER BARS. THE SPACING SHALL BE EVERY 24" ON THE TOP RAIL FOR THE TIES AND EVERY 14" ON THE POSTS FOR THE BAND.

ERECTION

THE FABRIC SHALL BE PLACED ON THE OUTSIDE OF THE POSTS, STRETCHED TAUT AND SECURED TO THE POSTS, TOP RAIL AND TENSION WIRE. THE FABRIC SHALL BE SECURED TO THE LINE POSTS WITH WIRE TIES OR METAL BANDS AT MAXIMUM INTERVALS OF 14". THE TOP AND BOTTOM EDGES SHALL BE SECURED, RESPECTIVELY, TO THE TOP RAIL AND TENSION WIRE WITH THE WIRES NOT EXCEEDING INTERVALS OF 24". THE FABRIC SHALL BE SECURED TO TERMINAL POSTS BY MEANS OF THE STRETCHER BAR WHICH IS PASSED THROUGH THE END LOOPS OF FABRIC AND IS SECURED TO THE TERMINAL POSTS BY METAL BANDS SPACED AT A MAXIMUM INTERVAL OF 14".

FABRIC FOR FENCING SHALL ALL BE EITHER A LEFT HAND OR RIGHT HAND WEAVE. ROLLS OF FABRIC SHALL BE JOINED TOGETHER BY WEAVING A SINGLE STRAND INTO THE END OF THE ROLL TO FORM A CONTINUOUS PIECE.

THE SPACING OF LINE POSTS (10' MAX) SHALL IN GENERAL BE MEASURED PARALLEL TO THE GROUND. ALL POSTS SHALL BE PLACED IN A VERTICAL POSITION EXCEPT AS MAY BE SPECIFICALLY DESIGNATED OTHERWISE, WITH THE STRONG AXIS PARALLEL TO THE FABRIC. ALL POSTS SHALL BE SET IN HOLES AND BACKFILLED WITH CONCRETE. CONCRETE SHALL HAVE A MAXIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS WITH A MAXIMUM SIZE OF AGGREGATE OF 3/4". THE CONCRETE SHALL BE WELL WORKED (POCDED) IN THE HOLE. THE TOP OF THE FOOTING SHALL BE CROWNED TO SHED WATER.

THE MINIMUM DIAMETER OF HOLES FOR LINE POSTS SHALL BE 9" AND 12" FOR TERMINAL POSTS.

THE MINIMUM DEPTH OF THE FOOTING HOLES SHALL BE 42".

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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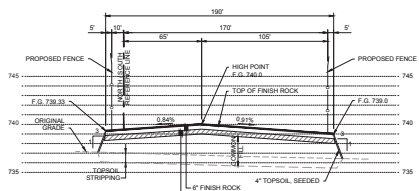
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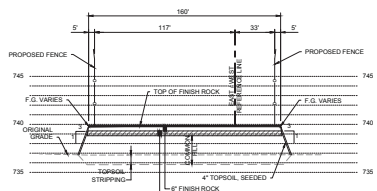
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Drawn By: P. WICKHAM
Approved By: J. CLISON
Project Number: 17-01-046

FENCE PLAN AND
DETAILS

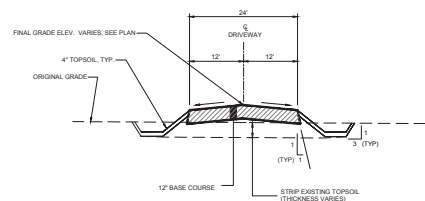
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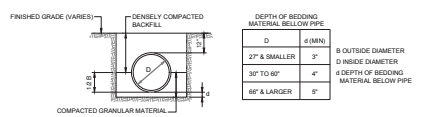
SECTION A-A
SCALE:
HORIZONTAL: 1" = 40'
VERTICAL: 1" = 5'



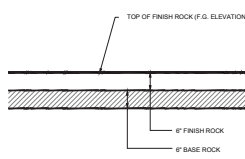
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VERTICAL: 1" = 5'



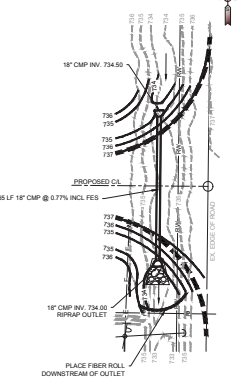
DRIVEWAY SECTION
TYPICAL THRU DRIVEWAY
SCALE: NONE



TYPICAL PIPE BEDDING SECTION
SCALE: NONE



SUBSTATION SECTION
TYPICAL THRU SUBSTATION PAD
SCALE: NONE



CULVERT DETAIL PLAN
SCALE: 1\"/>

CONSTRUCTION NOTES

1. THE SITE TOPSOIL SHALL BE STRIPPED OF VEGETATION TO SUCH DEPTH AS MAY BE NECESSARY TO REMOVE ROOTS AND OTHER ORGANIC MATTER.
2. THE GRADING CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL DEBRIS, INCLUDING TREES, BRUSH, ROOTS, AND SOIL STRIPPING RESULTING FROM SITE PREPARATION OPERATIONS.
3. PRIOR TO PLACEMENT OF FILL, THE SUBGRADE SHALL BE PROOF-ROLLED WITH A FULLY LOADED TANDEN-AXLE DUMP TRUCK WITH A MINIMUM GROSS WEIGHT OF 25 TONS. UNSUITABLE AREAS OBSERVED SHALL BE IMPROVED BY COMPACTION OR BY REPLACEMENT WITH SUITABLE COMPACTED FILL.
4. AFTER COMPLETION OF STRIPPING, EXCAVATING, AND ALL SUBGRADE SURFACES IN THE AREA, THE CONTRACTOR SHALL OBTAIN APPROVAL OF THE SUBGRADE BY THE OWNER. PRIOR TO FURTHER CONSTRUCTION, ANY UNKNOWN WATER CONDITIONS OR SOIL CONSIDERED TO BE WEAK AND SUBJECT TO SIGNIFICANT DISPLACEMENT UNDER NORMAL EQUIPMENT WHEEL APPLICATION SHALL REQUIRE THE OWNER'S ENGINEERS TO BE CONTACTED. UPON DISCOVERY OF ANY UNKNOWN WATER CONDITIONS OR WEAK SUBGRADE MATERIALS, THE ENGINEER MAY ORDER ADDITIONAL SUBCUTS OR BEST PRACTICE TREATMENT. THE CONTRACTOR SHALL PERFORM AND INSTALL THESE CHANGES AS DIRECTED BY THE OWNER. ALL OTHER DEBRIS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF BY THE CONTRACTOR WITHOUT LIABILITY ON THE PART OF THE OWNER.
5. FILLS AND EMBANKMENTS SHALL BE CONSTRUCTED IN UNIFORM LIFTS OR LAYERS NOT EXCEEDING 9 INCHES OF LOOSE FILL AND LAID PARALLEL TO THE FINISHED SURFACE.
6. COMPACT FILL MATERIAL IN LIFTS NOT EXCEEDING 4 INCHES UNCOMPACTED THICKNESS TO 90% OF STANDARD PROCTOR DENSITY (ASTM D698). MAINTAIN MOISTURE CONTENT WITHIN PLUS OR MINUS 2% OF THE OPTIMUM DETERMINED FOR MAXIMUM DENSITY OR AS RECOMMENDED BY GEOTECHNICAL ENGINEERING REPORT. DO NOT PLACE, SPREAD, OR COMPACT FILL MATERIAL DURING WET OR UNFAVORABLE WEATHER CONDITIONS. WET GRANULAR MATERIALS THOROUGHLY DURING OR IMMEDIATELY PRIOR TO COMPACTION.
7. FINISH FILL, EXCAVATED, AND OTHER DISTURBED AREAS TO UNIFORM GRADE AND SECTION NORMALLY OBTAINABLE WITH A BLADE GRADER/FINISH GRADE TO A NEAT APPEARANCE AND PROVIDE POSITIVE DRAINAGE. ALLOWABLE TOLERANCE: ± 0.10 FT.
8. SEE SPECIFICATION FOR FILL MATERIAL DESCRIPTION.
9. SEE GEOTECHNICAL ENGINEERING REPORT STARWOOD ENERGY GROUP GLOBAL, NORTHWEST OHIO WIND PROJECT, PAULDING COUNTY, OHIO, DATED DECEMBER 2014 BY BARR ENGINEERING FOR SITE PREPARATION RECOMMENDATIONS.

GENERAL NOTES

1. STRIPPING MATERIAL TO BE USED FOR DRESSING OF SIDE SLOPES.
2. LOCATION AND STAKING OF THE SITE WITHIN THE PROPERTY LINES WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. ALL SLOPES ≥ 1 MAXIMUM UNLESS NOTED.
4. BASE ROCK AREA TO HAVE SOIL STERILANT APPLIED PRIOR TO PLACEMENT OF FINISH ROCK.
5. EXCESS MATERIAL SHALL BE HAULED OFF AND DISPOSED OF OFF SITE OR SPREAD EVENLY IN AREAS AS DIRECTED BY OWNER.
6. ELEVATIONS INDICATED IN SUBSTATION GRADED AREA ARE FINISHED GRADE.
7. CONTOURS OUTSIDE OF THE SUBSTATION GRADED AREA INDICATE THE TOP OF FINISHED TOPSOIL.
8. NO EQUIPMENT WILL BE ALLOWED TO CROSS RIVERS OR STREAM BEDS.

BASE ROCK (ROUGH GRADE)

SEE ODOT SPECIFICATION 304 FOR GRADATION AND DESCRIPTION.

FINISH ROCK (FINISHED GRADE)

1. SEE ODOT SPECIFICATION 304 FOR GRADATION AND DESCRIPTION.
2. SUBSTATION FINISH ROCK SHALL BE INSTALLED BY THE SUBSTATION CONSTRUCTION CREW AFTER INSTALLATION OF FOUNDATIONS, GROUNDING, CONDUIT AND FENCE IS COMPLETE.

STONE RIPRAP (COMMON, DRY)

1. SEE ODOT, ITEM 601.04 FOR GRADATION AND DESCRIPTION.
2. FILTER FABRIC SHALL MEET THE REQUIREMENTS OF DEPARTMENTAL MATERIAL ODOT SPECIFICATION 712.08, TYPE A.

CONSTRUCTION SEQUENCE

1. INSTALL ROCK CONSTRUCTION ENTRANCE.
2. INSTALL SILT FENCE (AS NECESSARY).
3. COMPLETE GRADING.
4. APPLY SEED, MULCH AND EROSION CONTROL BLANKET.
5. INSTALL FIBER ROLLS (AS NECESSARY).
6. AFTER VEGETATION IS ESTABLISHED, REMOVE SILT FENCE.

DETAIL REFERENCES

REFER TO STORM WATER POLLUTION PREVENTION PLAN (SWPP) NARRATIVE FOR NORTHWEST OHIO, PREPARED BY WESTWOOD PROFESSIONAL SERVICES, DATED SEPTEMBER 8, 2017.

SEE ATTACHMENT 6: SITE PLANS, EROSION AND SEDIMENT CONTROL PLANS, DETAILS FOR THESE DETAILS:

- RIPRAP OUTLETS
- ROCK CONSTRUCTION ENTRANCE
- SILT FENCE
- SURFACE ROUGHENING FOR ALL SLOPES GREATER THAN 4:1
- TYPICAL FIBER ROLLS FOR PERIMETER CONTROL OF CONSTRUCTION AREA LIMIT
- TYPICAL SLOPE STABILIZATION TEMPORARY EROSION BLANKETS TURF REINFORCEMENT MATS FOR SLOPES

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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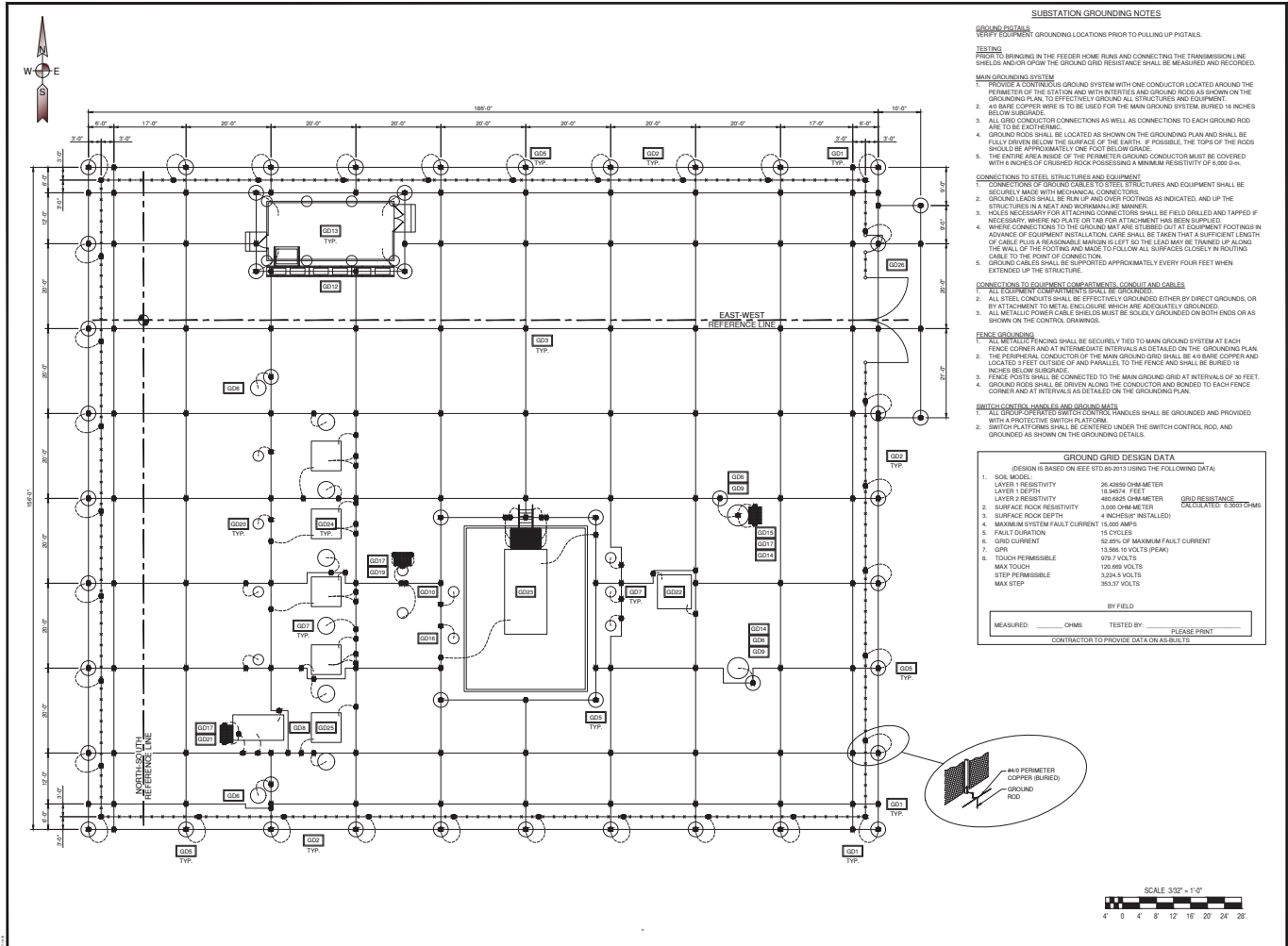
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Starwood Energy
Starwood Energy - Detroit-Lakes-Fargo-St. Paul

Design By: M. VELILLA
Drawn By: A. GARDNER-HELM
Approved By: M. PADULA
Project Number: 17-01296

SUBSTATION GRADING DETAILS

DWG # NWO-GD1-002 REVISION: A



GROUNDING PLAN
PLOT TO INDICATE GROUNDING LOCATIONS PRIOR TO PULLING UP PISTALS.

TESTING
PRIOR TO TIEING IN THE FEEDER HOME RUNS AND CONNECTING THE TRANSMISSION LINE SHIELDS AND/OR OPEN THE GROUND GRID RESISTANCE SHALL BE MEASURED AND RECORDED.

MAIN GROUNDING SYSTEM

1. PROVIDE A CONTINUOUS GROUND SYSTEM WITH ONE CONDUCTOR LOCATED AROUND THE PERIMETER OF THE STATION AND WITH INTERTIES AND GROUND RODS AS SHOWN ON THE GROUNDING PLAN, TO EFFECTIVELY GROUND ALL STRUCTURES AND EQUIPMENT.
2. AS BARE COPPER WIRE IS TO BE USED FOR THE MAIN GROUND SYSTEM, BURNED 18 INCHES BELOW SURFACE.
3. ALL GRID CONDUCTOR CONNECTIONS AS WELL AS CONNECTIONS TO EACH GROUND ROD ARE TO BE EXOTHERMIC.
4. GROUND RODS SHALL BE LOCATED AS SHOWN ON THE GROUNDING PLAN AND SHALL BE FULLY DRIVEN BELOW THE SURFACE OF THE EARTH. IF POSSIBLE, THE TOP OF THE RODS SHOULD BE APPROXIMATELY ONE FOOT BELOW GRADE.
5. THE ENTIRE AREA INSIDE OF THE PERIMETER GROUND CONDUCTOR MUST BE COVERED WITH 4 INCHES OF CRUSHED ROCK POSSESSING A MINIMUM RESISTIVITY OF 8,000 Ω-IN.

CONNECTIONS TO UTILITY STRUCTURES AND EQUIPMENT

1. CONNECTIONS OF GROUND CABLES TO STEEL STRUCTURES AND EQUIPMENT SHALL BE SECURELY MADE WITH MECHANICAL CONNECTIONS.
2. GROUND LEADS SHALL BE RUN UP AND OVER FOOTINGS AS INDICATED, AND UP THE STRUCTURES IN A NEAT AND WORKMANLIKE MANNER.
3. HOLES NECESSARY FOR ATTACHING CONNECTORS SHALL BE FIELD DRILLED AND TAPPED IF NECESSARY. WHERE NO PLATE OR TAIL FOR ATTACHMENT HAS BEEN SUPPLIED.
4. WHERE CONNECTIONS TO THE GROUND MAT ARE STUBBED OUT AT EQUIPMENT FOOTINGS IN ADVANCE OF EQUIPMENT INSTALLATION, CABLE SHALL BE TACKED TWICE A SUFFICIENT LENGTH OF CABLE PLUS A REASONABLE MARGIN IS LEFT SO THE LEAD MAY BE TRAINED UP ALONG THE WALL OF THE FOOTING AND MADE TO FOLLOW ALL SURFACES CLOSELY IN ROUTING CABLE TO THE POINT OF CONNECTION.
5. GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.

CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT AND CABLES

1. ALL EQUIPMENT COMPARTMENTS SHALL BE GROUNDING EITHER BY DIRECT GROUNDING, OR BY ATTACHMENT TO METAL ENCLOSURE WHICH ARE ADEQUATELY GROUNDING.
2. ALL STEEL CONDUITS SHALL BE EFFECTIVELY GROUNDING EITHER BY DIRECT GROUNDING, OR BY ATTACHMENT TO METAL ENCLOSURE WHICH ARE ADEQUATELY GROUNDING.
3. ALL METALLIC POWER CABLE SHIELDS MUST BE SOLIDLY GROUNDING ON BOTH ENDS OR AS SHOWN ON THE CONTROL DRAWINGS.

FENCE GROUNDING

1. ALL FENCE FINISHING SHALL BE SECURELY TIED TO MAIN GROUND SYSTEM AT EACH FENCE CORNER AND AT INTERMEDIATE INTERVALS AS DETAILED ON THE GROUNDING PLAN.
2. THE PERIPHERAL CONDUCTOR OF THE MAIN GROUND GRID SHALL BE 4/0 BARE COPPER AND LOCATED 3 FEET OUTSIDE OF AND PARALLEL TO THE FENCE AND SHALL BE BURNED 18 INCHES BELOW SURFACE.
3. FENCE POSTS SHALL BE CONNECTED TO THE MAIN GROUND GRID AT INTERVALS OF 30 FEET.
4. GROUND RODS SHALL BE DRIVEN ALONG THE CONDUCTOR AND BONDED TO EACH FENCE CORNER AND AT INTERVALS AS DETAILED ON THE GROUNDING PLAN.

SWITCH CONTROL, HANDLES AND GROUNDING MATS

1. ALL GROUP OPERATED SWITCH CONTROL HANDLES SHALL BE GROUNDING AND PROVIDED WITH A PROTECTIVE SWITCH PLATFORM.
2. SWITCH PLATFORMS SHALL BE CENTERED UNDER THE SWITCH CONTROL ROD, AND GROUNDING AS SHOWN ON THE GROUNDING DETAILS.

GROUND GRID DESIGN DATA
(DESIGN IS BASED ON IEEE STD 80-2013 USING THE FOLLOWING DATA)

		GRID RESISTANCE
1. SOIL MODEL	26,4859 OHM-METER	
LAYER 1 RESISTIVITY	18,4624 FEET	
LAYER 2 RESISTIVITY	400,8025 OHM-METER	
2. SURFACE ROCK RESISTIVITY	3,000 OHM-METER	
3. SURFACE ROCK DEPTH	4 INCHES (IF INSTALLED)	
4. MINIMUM SYSTEM FAULT CURRENT	5,000 AMPS	
5. FAULT DURATION	18 CYCLES	
6. GRID CURRENT	32.88% OF MAXIMUM FAULT CURRENT	
7. GPR	13,566 IN VOLTS (PEAK)	
8. TOUCH PERMISSIBLE	679.7 VOLTS	
9. MAX TOUCH	10,000 VOLTS	
10. STEP PERMISSIBLE	3,294.8 VOLTS	
11. MAX STEP	353.37 VOLTS	

MEASURED: _____ OHMS TESTED BY: _____ PLEASE PRINT
CONTRACTOR TO PROVIDE DATA ON AS-BUILT

LEGEND:

- 1. FINISH GRAVEL TO EXTEND 5' PAST EDGE OF FENCE.

NOTES:

1. FINISH GRAVEL TO EXTEND 5' PAST EDGE OF FENCE.

LEGEND:

- 1. DETAIL, SEE GROUNDING DETAIL, DWG.
- 2. SUBSTATION FENCE w/ BARBS
- 3. GROUND ROD (5/8" X 36")
- 4. 4/0 BARE COPPER (SOFT DRAWN) 1/2" BELOW GRADE
- 5. EXOTHERMIC TYPE CONNECTION
- 6. PISTAL TO EQUIPMENT/STRUCTURE
- 7. SWITCH OPERATOR PLATFORM

SCALE 3/32" = 1'-0"

NORTHWEST OHIO WIND PROJECT
PAULING COUNTY, OHIO

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Project Number: 17-01246

138/34.5KV SUBSTATION GROUNDING PLAN

DWG # NWO-GR1-001 REVISION: 0A

NORTHWEST OHIO
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PAULDING COUNTY, OHIO

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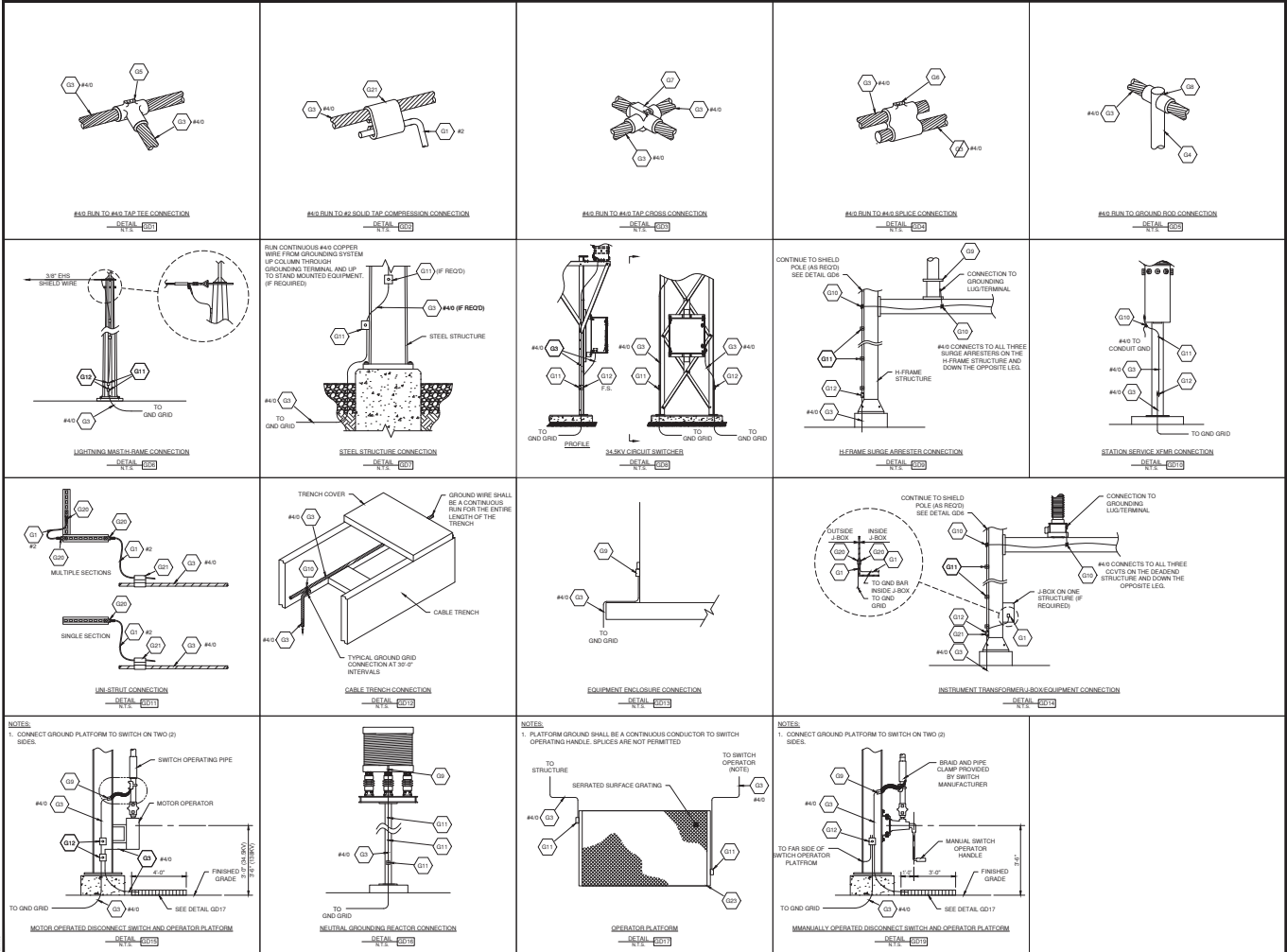
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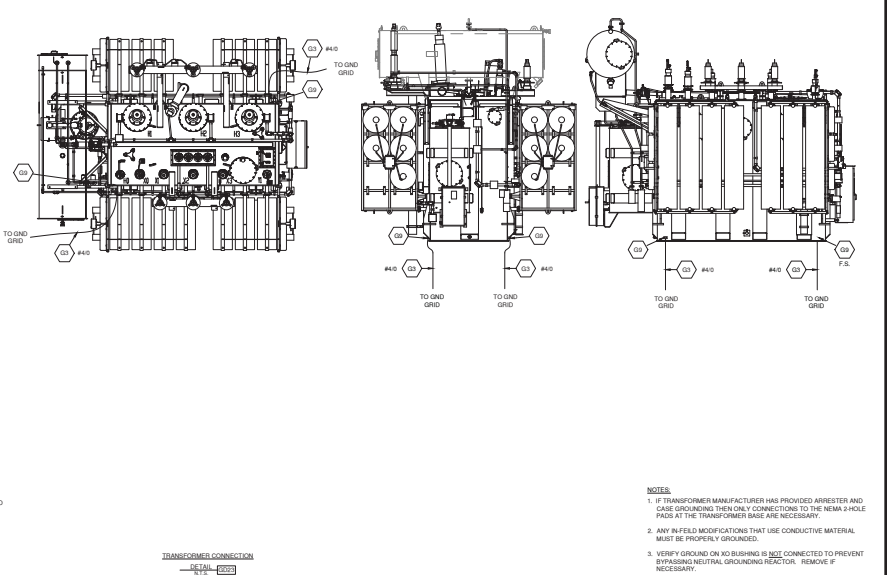
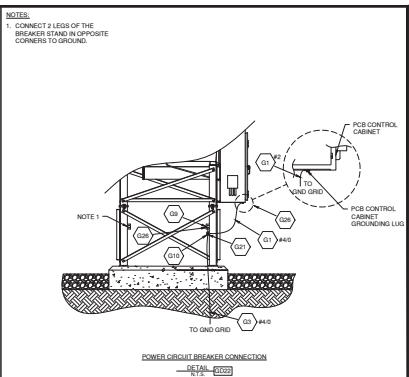
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138/34.5KV SUBSTATION
GROUNDING DETAILS

DWG # NWO-GR2-001 REVISION: 0A





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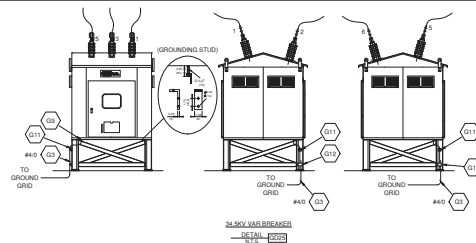
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138/34.5KV SUBSTATION
GROUNDING DETAILS

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Project Number: 17.01246

138/34.5KV SUBSTATION GROUNDING DETAILS

DWG #: **NWO-GR2-003** REVISION: **0A**

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Approved By: J. OLSON
Project Number: 17-01296

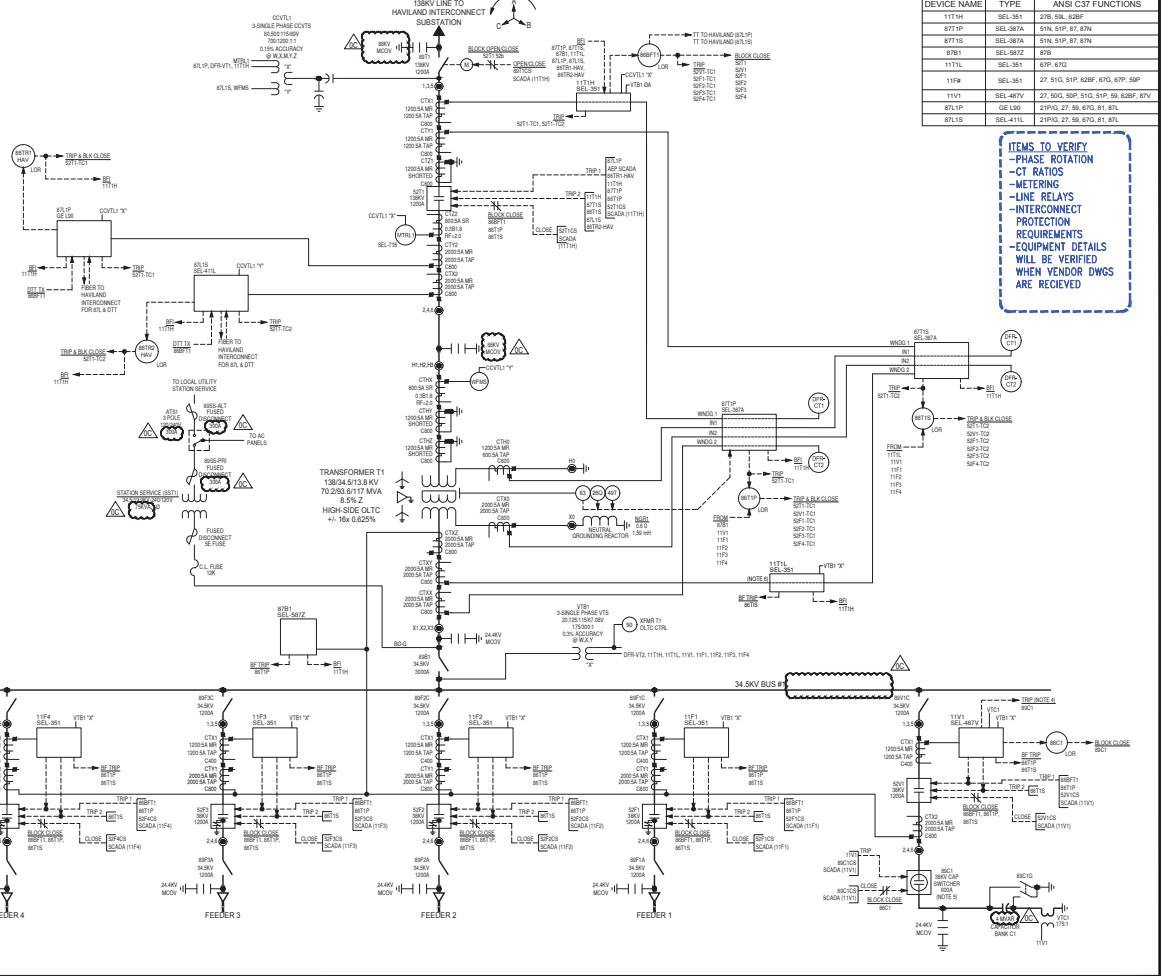
138/34.5KV SUBSTATION
GROUNDING
MATERIAL LIST

DWG # NWO-GR3-001 REVISION: 0A

GROUNDING MATERIAL				
Item #	Quantity	Description	Vendor	Catalog #
G1	AS REQ'D	WIRE, TIN PLATED SOLID COPPER, SOFT DRAWN, #2 BARE		
G2		UNUSED		
G3	AS REQ'D	WIRE, COPPER #4/0 BARE		
G4	AS REQ'D	GROUND ROD, COPPER WELD, 3/4"x10'-0"	ERICO	E33400
G5	AS REQ'D	ULTRAWELD MOLD, 4/0 AWG CU TO 4/0 AWG CU TAP TEE CONNECTION	HARGER	HT-4/0A/0B
G5A	AS REQ'D	SHOT, FOR ITEM G5	HARGER	US150
G6	AS REQ'D	ULTRAWELD MOLD, 4/0 AWG CU TO 4/0 TAP TEE CONNECTION	HARGER	PT-4/0A/0B
G6A	AS REQ'D	SHOT, FOR ITEM G6	HARGER	US200
G7	AS REQ'D	ULTRAWELD MOLD, 4/0 AWG CU TO 4/0 AWG CROSS SECTION WITH FRAME	HARGER	XO-4/0A/0Q
G7A	AS REQ'D	SHOT, FOR ITEM G7	HARGER	US250
G8	AS REQ'D	ULTRAWELD MOLD, 4/0 TO 4/0 THROUGH TO 3/4" ROD WITH FRAME	HARGER	GS-3/4A/0P
G8A	AS REQ'D	SHOT, FOR ITEM G8	HARGER	US150
G9	AS REQ'D	COMPRESSION GROUND TERMINAL #4/0 CU TO 2-HOLE NEMA PAD	BURNDY HYULS	15A28-2N
G10	AS REQ'D	GROUND CONNECTOR #2 AWG CU TO 250 KCMIL	BURNDY	YCHC250C20
G11	AS REQ'D	BOLTED GROUND CONNECTOR #2/0 - 250 TO FLAT	BURNDY	G820
G12	AS REQ'D	BOLTED GROUND CONNECTOR (2) #4/0 TO FLAT SURFACE	BURNDY	GC2909
G13	AS REQ'D	U-BOLT CLAMP FOR 2.375" O.D. LINE FENCE POST TO #2 CU	BURNDY	GS1826
G14	AS REQ'D	U-BOLT CLAMP FOR 2.375" O.D. CORNER FENCE POST TO #2 CU	BURNDY	GS1826
G15	AS REQ'D	U-BOLT CLAMP FOR 4" O.D. GATE FRAME TO #2 CU	BURNDY	GS2126
G16	AS REQ'D	U-BOLT CLAMP FOR 1.5/8" O.D. GATE FRAME TO #2 CU	BURNDY	GA81726
G17	AS REQ'D	BRONZE BOLTED CONNECTOR	FRAGO	GC-1000
G18	AS REQ'D	FLEXIBLE TINNED COPPER GROUND BRAID 24"	BURNDY	B024
G19	AS REQ'D	U-BOLT CLAMP FOR 4" O.D. GATE FRAME TO BRAID	BURNDY	GS22-2
G20	AS REQ'D	COMPRESSION GROUND TERMINAL, #2 TO FLAT	BURNDY HYFLUG	15A2C-2TC8
G21	AS REQ'D	BRONZE PARALLEL CONNECTOR #4/0 TO #2 MAIN AND TAP	BLACKBURN	CC402
G22	AS REQ'D	U-BOLT CLAMP FOR 1.5/8" O.D. TO BRAID	BURNDY	GS17-35
G23	AS REQ'D	GROUNDING PLATFORM	GRATING PACIFIC OIL (EQUIVALENT)	19-W-4
G24	AS REQ'D	PIPE GROUND CLAMP	HARGER	CPCL-1/2
G25	AS REQ'D	GROUND ROD COUPLER, BRONZE	ERICO	C804
G26	AS REQ'D		BURNDY	PGU-15-218/70-800



- NOTES:
- 138KV SW, 100MW WIND FARM
 - OLTC WILL REGULATE 34.5KV BUS VOLTAGE
 - WFMS + GE WIND FARM MANAGEMENT SYSTEM
 - 11KV RELAY WILL TRIP 80C1 ONE SECOND AFTER BREAKER 52V1 IS OPENED
 - CAP SWITCHER IS NOT RATED TO INTERRUPT FAULTS. NEUTRAL VOLTAGE UNBALANCE (BV) TRIPS WILL TRIP THE SWITCHER ONLY IF A FAULT IS DETECTED. IS NOT PICKED UP IF A FAULT IS DETECTED THE 5KV BREAKER WILL BE TRIPPED. ALL OTHER PROTECTIVE TRIPS WILL TRIP BREAKER 52V1
 - 11TTL IS WIRED IN REVERSE POLARITY



PROTECTIVE RELAY TABLE			
(REFER TO SW1.001 FOR DEVICE LEGEND AND ANSI FUNCTION LIST)			
DEVICE NAME	TYPE	ANSI C37 FUNCTIONS	
11T1H	SEL-351	276, 58, 62B	
87T1P	SEL-387A	51N, 51P, 87, 87N	
87T1B	SEL-387A	51N, 51P, 87, 87N	
87B1	SEL-5872	87B	
11T1L	SEL-351	69P, 69G	
11F1W	SEL-351	27, 51G, 51P, 62B, 67G, 67P, 58P	
11V1	SEL-487V	27, 51G, 51P, 51G, 51P, 58, 62B, 87V	
87L1P	GE L80	27P, 27, 58, 67G, 81, 87L	
87L1S	SEL-417L	27P, 27, 58, 67G, 81, 87L	

ITEMS TO VERIFY
-PHASE ROTATION
-CT RATIOS
-METERING
-LINE RELAYS
-INTERCONNECT
PROTECTION
REQUIREMENTS
EQUIPMENT DETAILS
WILL BE VERIFIED
WHEN VENDOR DWGS
ARE RECEIVED

NORTHWEST OHIO WIND PROJECT PAULING COUNTY, OHIO

Rev	Date	Description	By
0A	07/01/17	PRELIMINARY	UE
0B	08/08/17	PRELIMINARY	UE
0C	10/19/17	PRELIMINARY	UE



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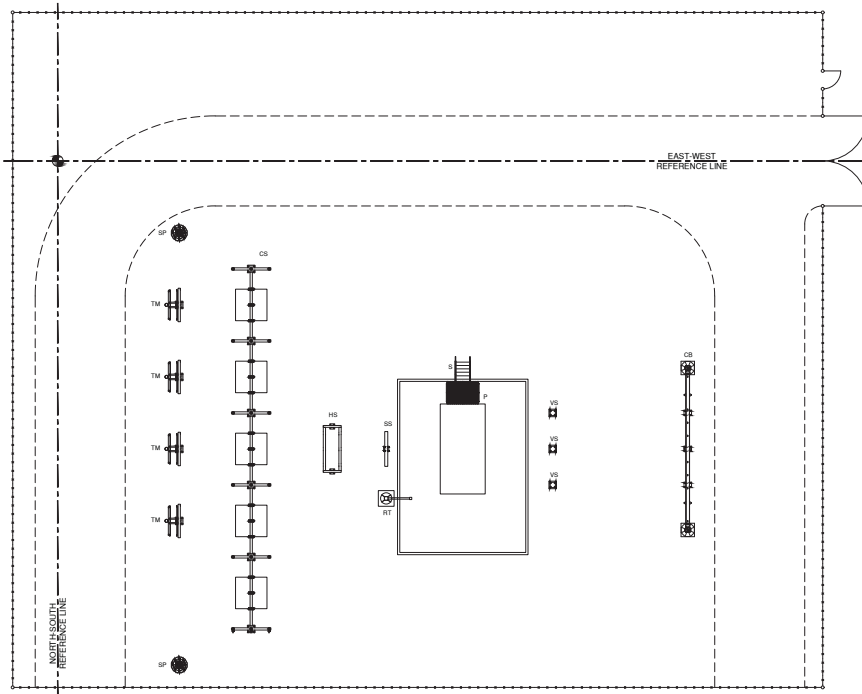
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Design By: E. NEUMHARDT
Drawn By: E. NEUMHARDT
Approved By: J. CLONON
Project Number: 17-01296

SUBSTATION ONE LINE DIAGRAM

DWG # NWO-OL1-001 REVISION: 0C



STRUCTURE SCHEDULE			
MARK	QTY	DESCRIPTION	DWG #
CB	1	138KV DEADEND STEEL STRUCTURE "CB"	S1
SP	2	8" SHIELD POLE "SP"	S2
VS	3	138KV 1-9 BUS SUPPORT STRUCTURE "VS"	S3
HS	1	34.5KV SWITCH STAND STRUCTURE "HS"	S4
RT	1	34.5KV RER SUPPORT STRUCTURE "RT"	S5
TM	4	34.5KV CABLE TERMINATION STRUCTURE "TM"	S6
CS	1	34.5KV COLLECTION STRUCTURE "CS"	S7
BS	1	34.5KV 38 BUS & SS SUPPORT STRUCTURE "BS"	S8
P	1	OIL CONTAINMENT PLATFORM "P"	S9
S	1	OIL CONTAINMENT STAIRS "S"	S10

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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- NOTES:**
- SEE GRADING PLAN FOR INDICATION OF TRUE NORTH.

- LEGEND:**
- BASE LINE INTERSECTION
 - FENCE



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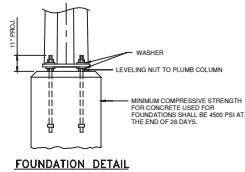
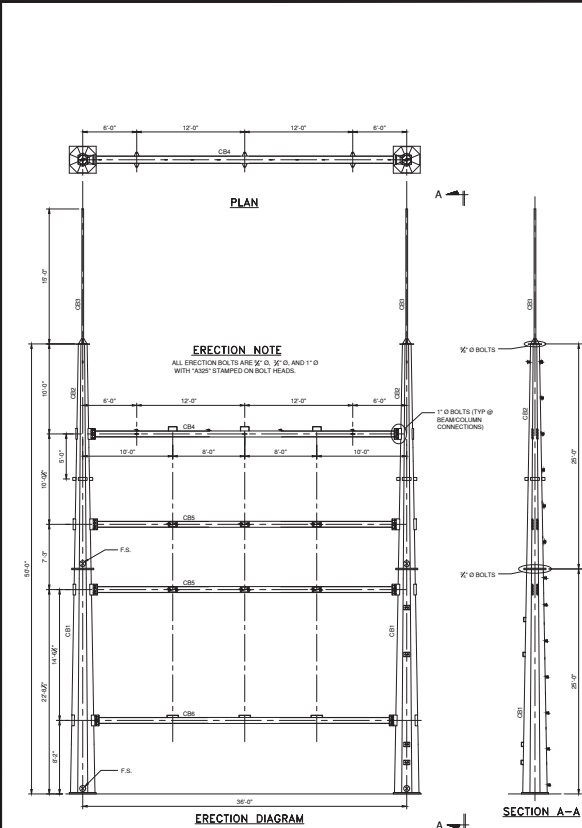
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Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV SUBSTATION
GENERAL ARRANGEMENT
STEEL LOCATION PLAN

DWG # **NWO-S0-001** REVISION: **0A**



- NOTES:**
1. MATERIAL:
 - W-SHAPES ASTM A-992
 - HSS-SHAPES ASTM A-500 Gr. B
 - C/L-SHAPES ASTM A-36
 - CONNECTION PLATES ASTM A-36
 - BASE PLATES ASTM A-572 Gr. 50
 - GALVANIZING: ASTM A-123 & A-588
 - FABRICATION & INSPECTION: AISC
 - ERECTOR BOLTS: ASTM A-308
 2. ALL HOLES 1/2" DIA. UNLESS OTHERWISE NOTED.
 3. ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERS CORRESPONDING TO THE DRAWING. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING. USE 1/2" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.
 4. ALL LONGITUDINAL WELDS TO HAVE 80% MIN. PENETRATION WITH FULL PENETRATION FOR LAST 1/2" INCHES ON EACH END.
 5. EXTERNAL FACTORED LOADS ON STRUCTURE NOT TO EXCEED 3000 LBS. PER PHASE AND 1500 LBS. PER WELD WIRE @ 90° MAX. ANGLE AND SHALL MEET NEISC MEDIUM LOADING CONDITIONS.

LIST OF MATERIAL									
STRUCTURES	ONE STRUCTURE		DESCRIPTION	MARK	SHEET	WEIGHT (LBS)	SHEET	WEIGHT (LBS)	SHEET
	NUMBER REQUIRED	NUMBER REQUIRED							
NUMBER REQUIRED	NUMBER REQUIRED	NUMBER REQUIRED							
LIGHT MTG.	2	2	WELDED ASSEMBLY	CB1	002				
	4	4	1/2" x 50 1/2" x 24'-9" (BENT)	CB1	002	1108			
	2	2	1/2" x 38" x 3'-0" (AST2)	CB1	002	736			
	2	2	1/2" x 28" x 2'-4"	CB1	002	222			
	8	8	MC8 x 15.1 x 0'-8"	CB1	002	10			
	14	14	1/2" x 28" x 3'-0" (BENT)	CB1	002	94			
	4	4	1/2" x 140" x 2'-0"	CB1	002	94			
	2	2	WELDED ASSEMBLY	CB1	003				
	4	4	1/2" x 38" x 24'-10 1/2" (BENT)	CB1	003	762			
	2	2	1/2" x 28" x 2'-4"	CB1	003	222			
	4	4	1/2" x 15" x 1'-0"	CB1	003	30			
	4	4	1/2" x 140" x 2'-0"	CB1	003	94			
	14	14	1/2" x 28" x 3'-0"	CB1	003	1			
	8	8	1/2" x 3" x 1'-0" (BENT)	CB1	003	3			
	SA. MTG.	2	2	WELDED ASSEMBLY	CB1	004			
2		2	3/4" STD. PIPE x 14'-11 1/2"	CB1	004	136			
2		2	1/2" x 15" x 1'-1"	CB1	004	24			
4		4	1/2" x 40" x 0'-7" (1 MAKES 2)	CB1	004	2			
2		2	1/2" x 4" x 1'-0"	CB1	004	15			
1		1	WELDED ASSEMBLY	CB1	004				
1		1	HSS 8 x 8 x 1/2" x 32'-4 1/2"	CB1	004	1061			
2		2	1/2" x 11" x 1'-3/2"	CB1	004	34			
4		4	1/2" x 5" x 1'-0"	CB1	004	15			
3		3	1/2" x 8" x 1'-7"	CB1	004	24			
2		2	4" x 8" STEEL SCREEN	CB1	004	1			
3		3	1/2" x 12" x 1'-10" (BENT)	CB1	004	38			
4		4	1/2" x 28" x 3'-0"	CB1	004	1			
2		2	WELDED ASSEMBLY	CB1	004				
2		2	HSS 8 x 8 x 1/2" x 32'-4 1/2"	CB1	004	844			
4	4	1/2" x 11" x 1'-3/2"	CB1	004	34				
8	8	1/2" x 5" x 1'-0"	CB1	004	15				
4	4	4" x 8" STEEL SCREEN	CB1	004	1				
6	6	C 12 x 30.7 x 0"	CB1	004	10				
SW. MTG.	1	1	WELDED ASSEMBLY	CB1	004				
	1	1	HSS 8 x 8 x 1/2" x 32'-1 1/2"	CB1	004	1023			
	2	2	1/2" x 11" x 1'-3/2"	CB1	004	34			
	4	4	1/2" x 5" x 1'-0"	CB1	004	15			
	2	2	4" x 8" STEEL SCREEN	CB1	004	1			
	3	3	1/2" x 12" x 1'-0"	CB1	004	45			
	GALV. BOLTS & WASHERS						WEIGHT (LBS)		
	10	10	1/2" D x 2" HEX HD. W/ HEX NUT (A307)			37.4			
	40	40	1/2" D x 3" HEX HD. W/ HEX NUT (A307)			70.0			
	75	75	1" D x 3" HEX HD. W/ HEX NUT (A307)			141.0			
	5	5	1/2" D x 1 1/2" HEX HD. W/ HEX NUT (A307)			43.2			
	10	10	1/2" D x 1 1/2" HEX HD. W/ HEX NUT (A307)			7.1			
	12	12	1/2" D x 2 1/2" HEX HD. W/ HEX NUT (A307)			15.6			
	15	15	1/2" D x 2 1/2" HEX HD. W/ HEX NUT (A307)			32.0			
	15	15	SQUARE BEVELED WASHER W/ 1/2" D HOLES			12.0			
15	15	1 1/2" x 2 1/2" HEX HD. W/ HEX NUT (A307)			111.1				
COVT. MTG.							STEEL BOLTS	16.003	
						TOTAL	1454		
						TOTAL	16,003		

NORTHWEST OHIO WIND PROJECT PAULING COUNTY, OHIO

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White & Padula
Structural - General - Detail - Steel - Fabric - S. Paul
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV
PROJECT SUBSTATION
138KV DEADEND "CB"
STEEL LAYOUT

DWG # NWO-S1-001 REVISION: 0A

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

Rev.	Date	Description	By
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NOTES:
1. ALL HOLES 1/2" DIA. UNLESS OTHERWISE NOTED.

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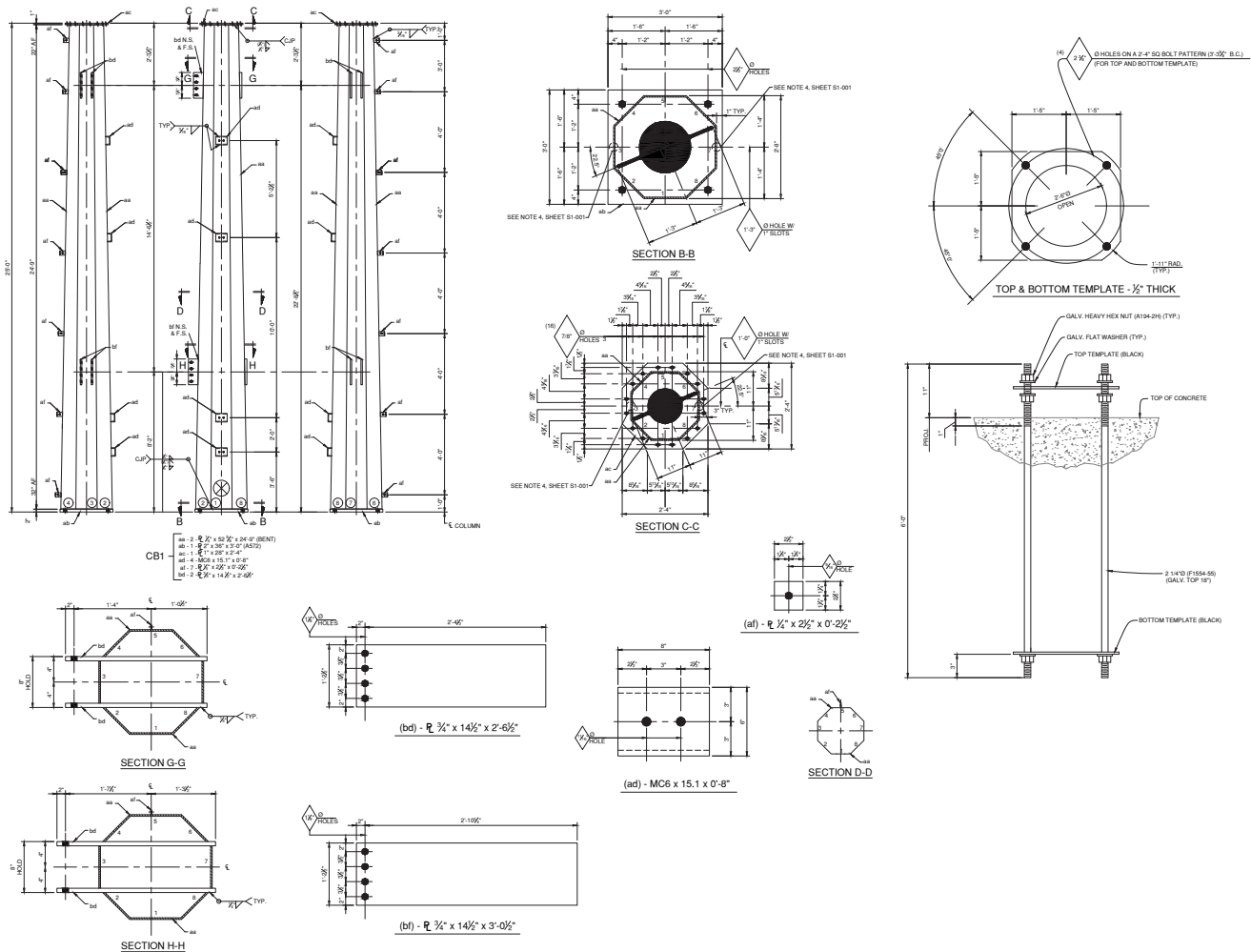
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Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV
PROJECT SUBSTATION
138KV DEADEND "CB"
STEEL DETAILS

DWG # NWO-S1-002 REVISION: 0A



NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO

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NOTES:
1. ALL HOLES 3/8" DIA. UNLESS OTHERWISE NOTED.

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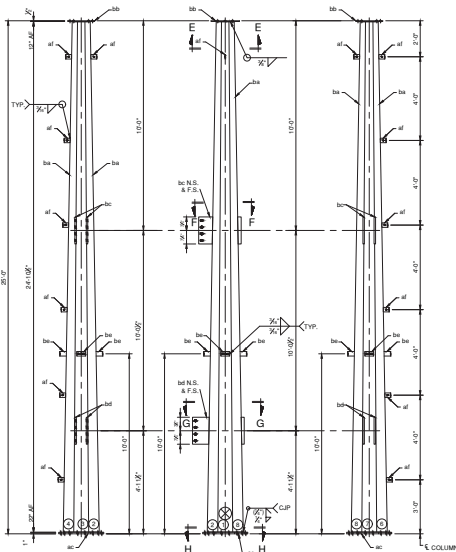
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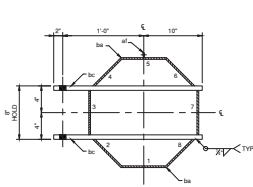
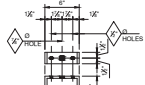
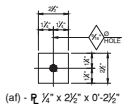
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Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV
PROJECT SUBSTATION
138KV DEADEND "CB"
STEEL DETAILS

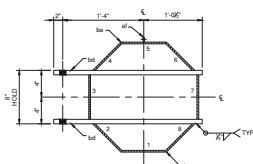
DWG # NWO-S1-003 REVISION 0A



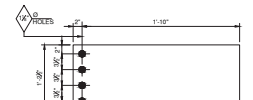
CB2
a. 2" x 10" x 3/8" x 24'-10" (BENT)
b. 2" x 10" x 3/8" x 2'-0"
c. 2" x 10" x 3/8" x 1'-0"
d. 2" x 10" x 3/8" x 2'-0"
e. 2" x 10" x 3/8" x 2'-0"
f. 2" x 10" x 3/8" x 2'-0"
g. 2" x 10" x 3/8" x 2'-0"
h. 2" x 10" x 3/8" x 2'-0" (BENT)



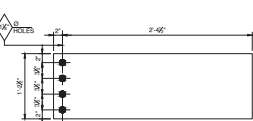
SECTION F-F



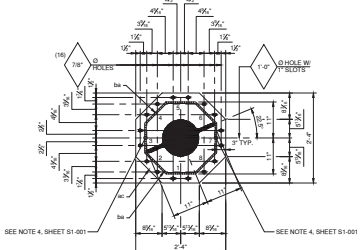
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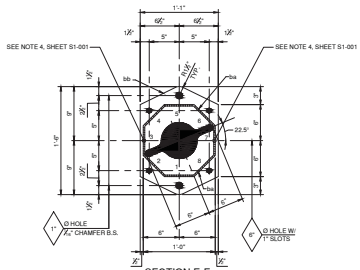
(bc) - R 3/4" x 14 1/2" x 2'-0"



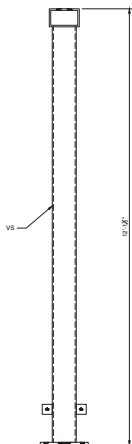
(bd) - R 3/4" x 14 1/2" x 2'-6 1/2"



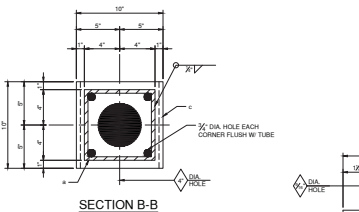
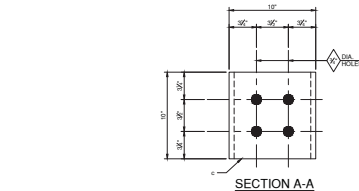
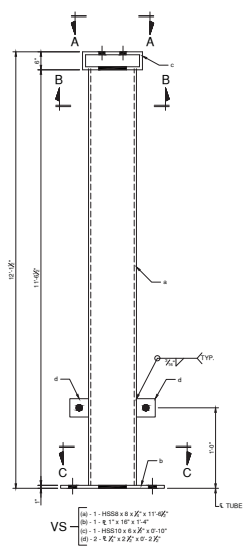
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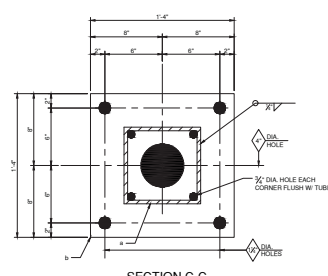
SECTION E-E



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



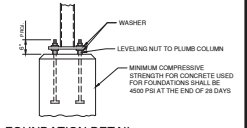
(d) - 2 x 1/2" x 2 1/2" x 0' - 2 1/2"



THREE STRUCTURES		ONE STRUCTURE		MATERIAL LIST			
NUMBER REQUIRED	DESCRIPTION	NUMBER REQUIRED	DESCRIPTION	MARK	SHEET	WEIGHT PER HUNDRED	PRICE
3	1	1	1	VS	THSS		
3	1	1	1	a		298	
3	1	1	1	b		72	
3	1	1	1	c		41	
6	2	2	2	d		1	

NUMBER REQUIRED	DESCRIPTION	MARK	SHEET	WEIGHT PER HUNDRED	PRICE
10	5	VS	THSS	18.9	
10	5	VS	THSS	2.4	

STEEL BOLTS	1.24M
TOTAL	1.24M



FOUNDATION DETAIL

- NOTES:
1. MATERIAL
W-SHAPES: ASTM A-992
HSS SHAPES: ASTM A-500 Gr. B
C-CHANNELS: ASTM A-36
PLATES: ASTM A-36
GALVANIZING: ASTM A-123 & A-155
FABRICATION & INSPECTION: ASQC
ERECTION BOLTS: ASTM A-305
 2. ALL HOLES 3/4" DIA. UNLESS OTHERWISE NOTED.
 3. ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERING CORRESPONDING TO THE DRAWINGS. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING DIES 3/16" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.

NORTHWEST OHIO
WIND PROJECT
PAULDING COUNTY, OHIO



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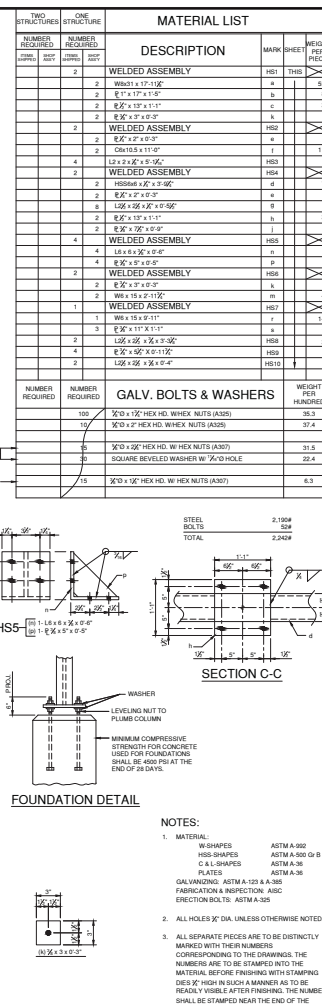
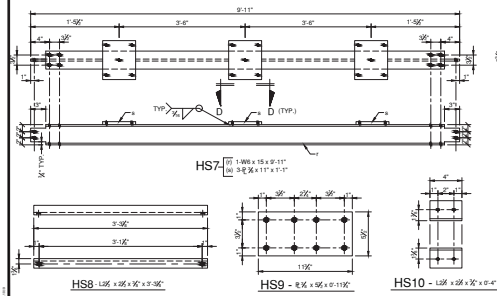
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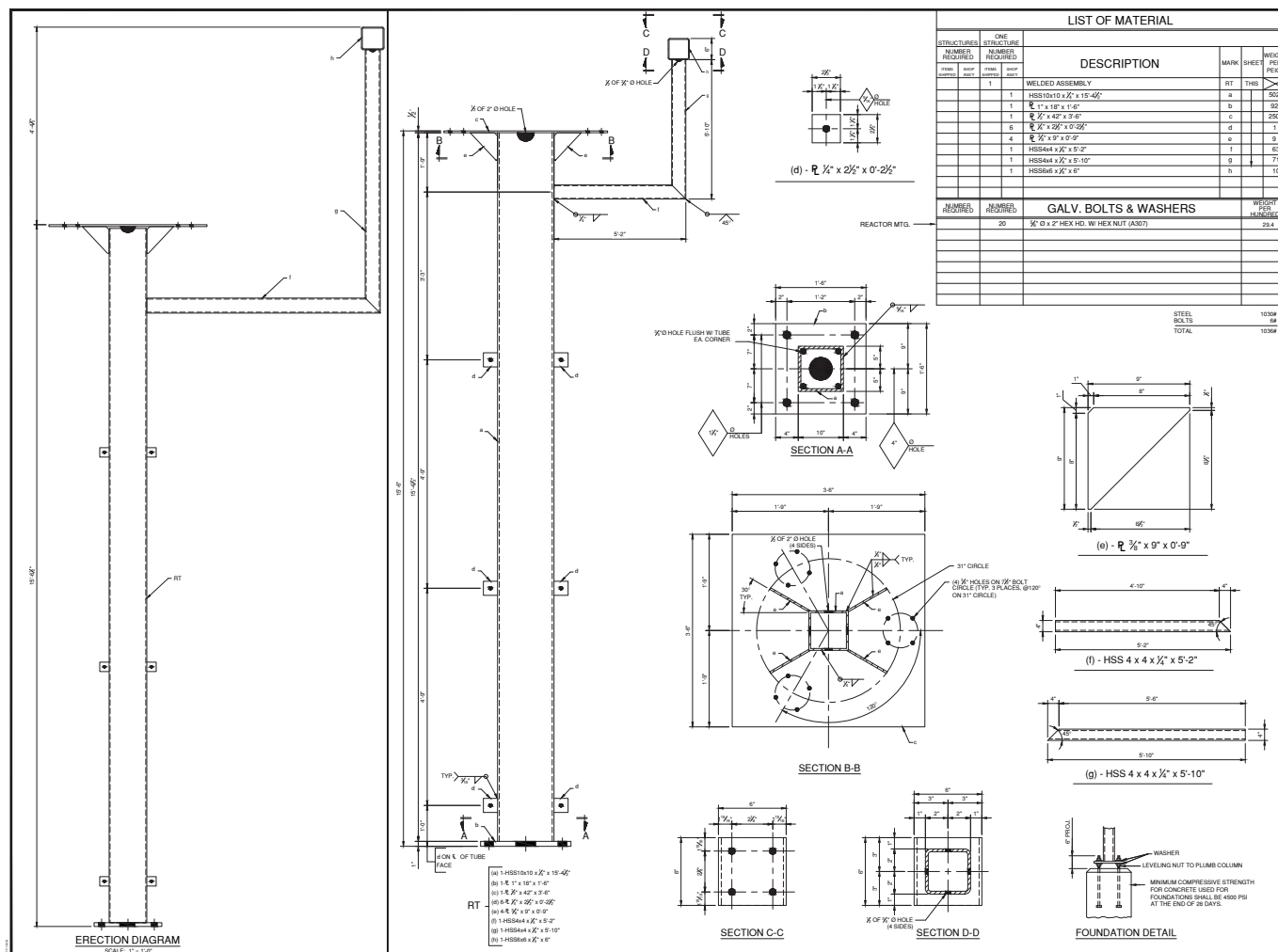
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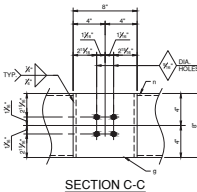
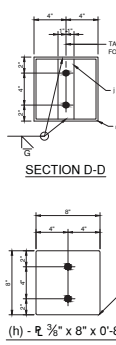
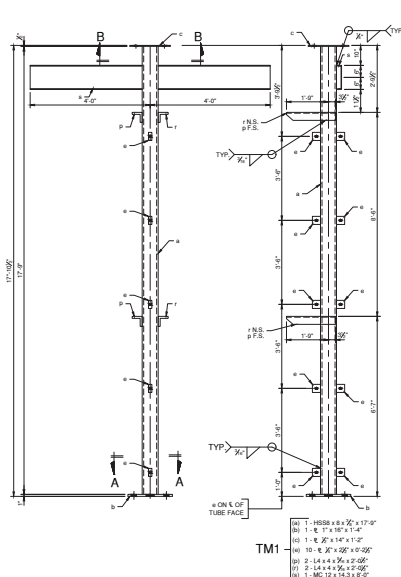
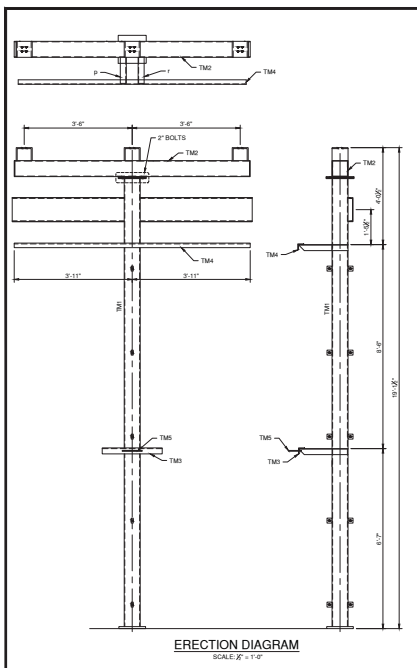
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Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV SUBSTATION
138KV 1Ø BUS SUPPORT
"VS"

DWG # NWO-S3-001 REVISION 0A

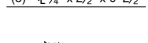
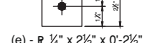
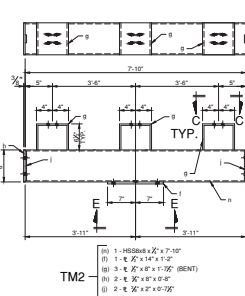
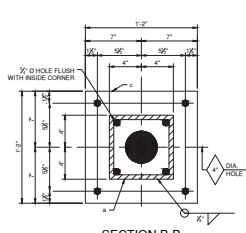
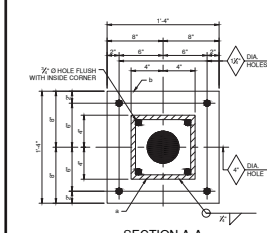
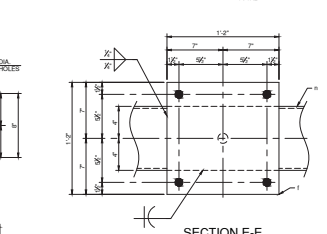
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FOUR STRUCTURES		ONE STRUCTURE		MATERIAL LIST			
NUMBER REQUIRED	ITEM	NUMBER REQUIRED	ITEM	DESCRIPTION	MARK	SHEET	WEIGHT PER HUNDRED
4	1	1	1	WELDED ASSEMBLY	TM1	THIS	666
4	1	1	1	HSSB x 8 x 3/4" x 17'-0"	a		73
4	1	1	1	4" x 14" x 1/4"	b		28
4	1	1	1	4" x 14" x 1/4"	c		1
40	10	10	10	4" x 14" x 1/4"	d		17
8	1	1	1	4" x 14" x 1/4"	e		114
4	1	1	1	WELDED ASSEMBLY	TM2	THIS	220
4	1	1	1	HSSB x 8 x 3/4" x 7'-10"	f		28
4	1	1	1	4" x 14" x 1/4"	g		22
12	1	1	1	4" x 14" x 1/4"	h		7
8	1	1	1	4" x 14" x 1/4"	i		2
16	4	4	4	4" x 14" x 1/4"	j		15
4	1	1	1	4" x 14" x 1/4"	k		38
4	1	1	1	4" x 14" x 1/4"	l		2

NUMBER REQUIRED	NUMBER REQUIRED	GALV. BOLTS & WASHERS		WEIGHT PER HUNDRED
20	5	3/8" x 1/2" HEX HD. W. HEX NUT (ASST)		33.1
20	5	3/8" x 1/2" HEX HD. W. HEX NUT (ASST)		37.4
32	8	3/8" x 1/2" HEX HD. W. HEX NUT (ASST)		15.1
48	12	3/8" x 1/2" HEX HD. W. HEX NUT (ASST)		19.1
60	15	3/8" x 1/2" CAPSCREW (ASST)		10.4
60	15	3/8" LOCK WASHER		1.3
STEEL TOTALS				5.320W
BOLTS TOTALS				85W
TOTAL				5.320W



NOTES:

- MATERIAL:
 - W-SHAPES: ASTM A-992
 - HSS SHAPES: ASTM A-500 Gr B
 - C-CHANNELS: ASTM A-36
 - PLATES: ASTM A-36
 - GALVANIZING: ASTM A-123 & A-305
 - FABRICATION & INSPECTION: ASIC
 - ERECTOR BOLTS: ASTM A-325
- ALL HOLES 3/4" DIA. UNLESS OTHERWISE NOTED.
- ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERS. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING. DIEB 3/4" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.

NORTHWEST OHIO WIND PROJECT
PAULING COUNTY, OHIO

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an AREA company

PRELIMINARY

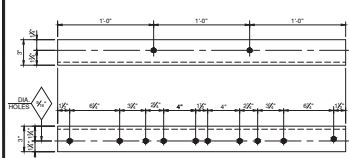
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Fargo, North Dakota 58104
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Fax: 701.237.2191
www.whitegroup.com

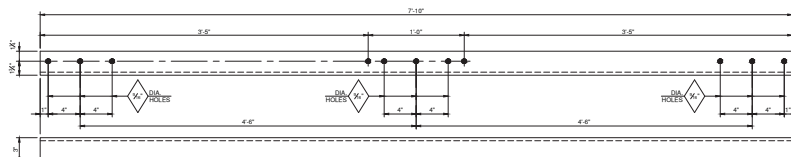
White Group
Structural - General - Detail - Steel - Fabric - St. Paul
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01246

138/34.5KV SUBSTATION
34.5KV CABLE TERMINAL STAND "TM"

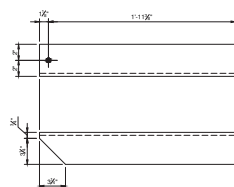
DWG #: **NWO-S6-001** REVISION: **0A**



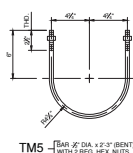
TM3 - L3 x 3 x 1/4" x 3'-0"



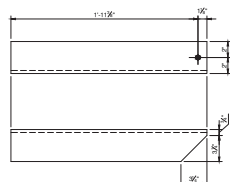
TM4 - L3 x 3 x 1/4" x 7'-10"



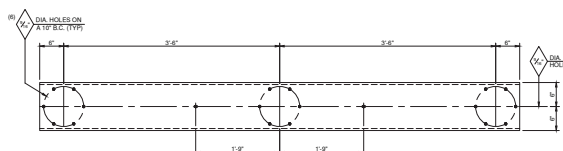
(p) - L4 x 4 x 5/8" x 2'-0 1/2"



TM5 [BAR 1/2" DIA. x 2'-0" (BENT) WITH 2 REG. HEX NUTS]



(r) - L4 x 4 x 5/8" x 2'-0 1/2"



(s) - MC 12 x 14.3 x 8'-0"

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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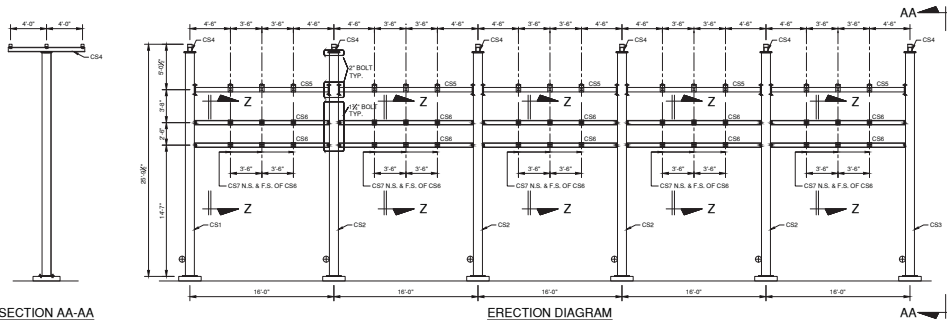
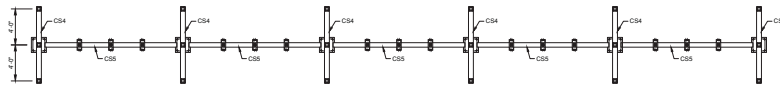
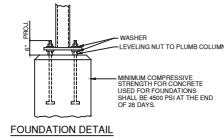
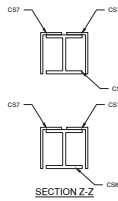
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White Engineering	3350 38th Avenue South Fargo, North Dakota 58104 Phone: 701.280.8500 Fax: 701.237.3191 www.whiteeng.com
Design By:	D. WEBER
Drawn By:	V. LEE
Approved By:	M. PADULA
Project Number:	17-01246

138/34.5KV
SUBSTATION
34.5KV CABLE TERMINAL
STAND "TM"

DWG # NWO-S6-002 REVISION 0A



SECTION AA-AA

ERECTION DIAGRAM

STRUCTURE		ONE STRUCTURE		MATERIAL LIST		MAINT	SHEET	WEIGHT PER PIECE
NUMBER REQUIRED	DESCRIPTION	NUMBER REQUIRED	DESCRIPTION	MAINT	SHEET			
ITEMS SHIPPED	SHOP ASSEMBLY	ITEMS SHIPPED	SHOP ASSEMBLY					
1	WELDED ASSEMBLY	CS1	CS2					
1	HSS10 x 10 x 1/4							147
1	1/2" x 10" x 1/4"							142
1	1/2" x 10" x 1/4"							46
2	1/2" x 10" x 1/4"							1
2	1/2" x 10" x 1/4"							1
1	1/2" x 10" x 1/4"							31
4	WELDED ASSEMBLY	CS3	CS4					147
4	HSS10 x 10 x 1/4							142
4	1/2" x 10" x 1/4"							46
4	1/2" x 10" x 1/4"							1
16	1/2" x 10" x 1/4"							1
8	1/2" x 10" x 1/4"							31
1	WELDED ASSEMBLY	CS5	CS6					147
1	HSS10 x 10 x 1/4							142
1	1/2" x 10" x 1/4"							46
2	1/2" x 10" x 1/4"							1
2	1/2" x 10" x 1/4"							1
1	1/2" x 10" x 1/4"							31
6	WELDED ASSEMBLY	CS7	CS8					147
6	HSS10 x 10 x 1/4							142
6	1/2" x 10" x 1/4"							46
18	1/2" x 10" x 1/4"							11
12	1/2" x 10" x 1/4"							4
12	1/2" x 10" x 1/4"							1
24	1/2" x 10" x 1/4"							1
5	WELDED ASSEMBLY	CS9	CS10					147
5	HSS10 x 10 x 1/4							142
10	1/2" x 10" x 1/4"							31
48	1/2" x 10" x 1/4"							11
18	1/2" x 10" x 1/4"							4
34	1/2" x 10" x 1/4"							7
NUMBER REQUIRED		GALV. BOLTS & WASHERS		WEIGHT PER HUNDRED				
66		1/2" x 10" HEX HD. W. HEX NUT (A307)		31.4				
100		1/2" x 10" HEX HD. W. HEX NUT (A307)		35.3				
130		1/2" x 1" CAPSCREW (A307)		6.2				
100		1/2" x 3" HEX HD. W. HEX NUT (A307)		23.5				
		STEEL		16.494				
		BOLTS		1074				
		TOTAL		13.6764				

NOTES:

- MATERIAL:
 - W-SHAPES: ASTM A-992
 - HSS SHAPES: ASTM A-500 Gr. B
 - C & L SHAPES: ASTM A-36
 - PLATES: ASTM A-36
 - GALVANIZING: ASTM A-123 A-36
 - FABRICATION & INSPECTION: ASCE
 - ERECTION BOLTS: ASTM A-307
- ALL HOLES 1/8" DIA. UNLESS OTHERWISE NOTED.
- ALL SEPARATE PARTS ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERING CORRESPONDING TO THE DRAWINGS. THE NUMBERING ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING DIE 3/8" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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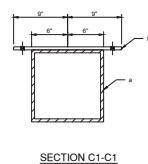
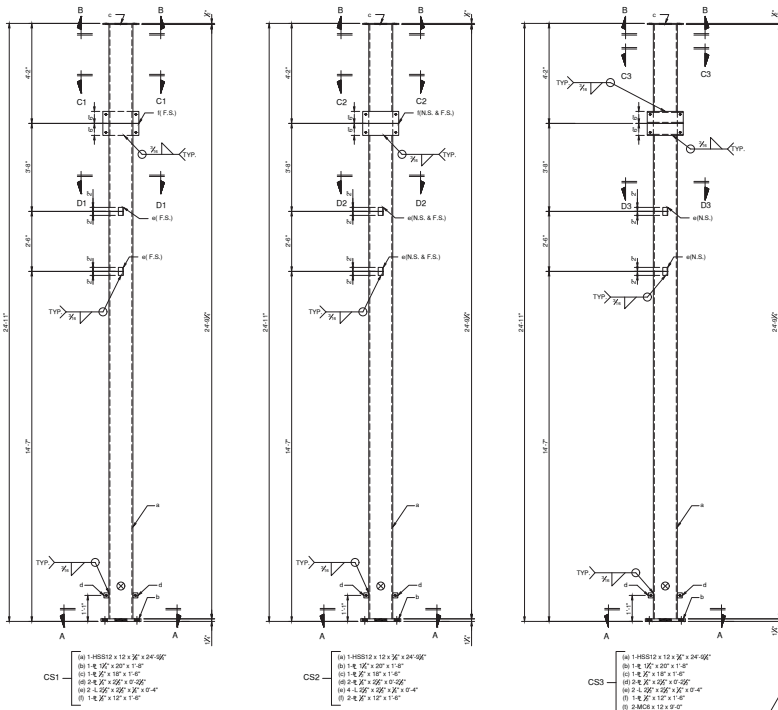
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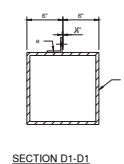
White House
Structural - General - Detail - Steel - Fabric - St. Paul
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17.01246

138/34.5KV
SUBSTATION
34.5KV COLLECTION
STRUCTURE "CS"

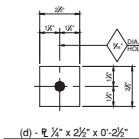
DWG # NWO-S7-001 REVISION: 0A



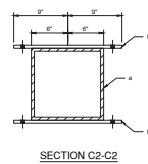
SECTION C1-C1



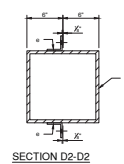
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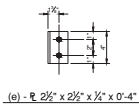
(d) - 2 1/2' x 2 1/2' x 0'-2 1/2'



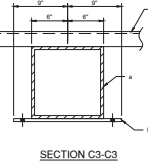
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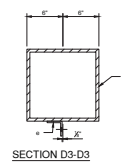
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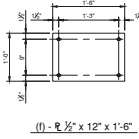
(e) - 2 1/2' x 2 1/2' x 0'-4"



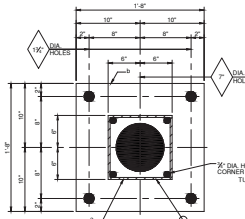
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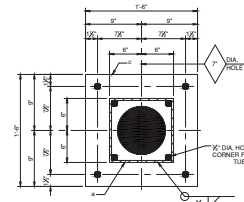
SECTION D3-D3



(f) - 2 1/2' x 12' x 1'-6"



SECTION A-A



SECTION B-B

NORTHWEST OHIO WIND PROJECT PAULDING COUNTY, OHIO

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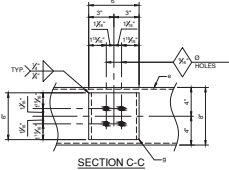
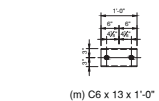
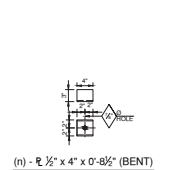
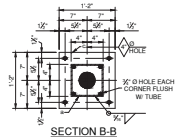
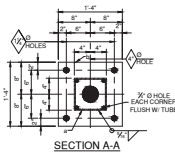
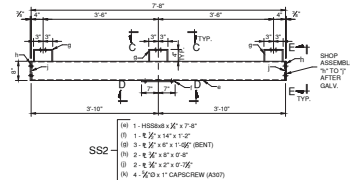
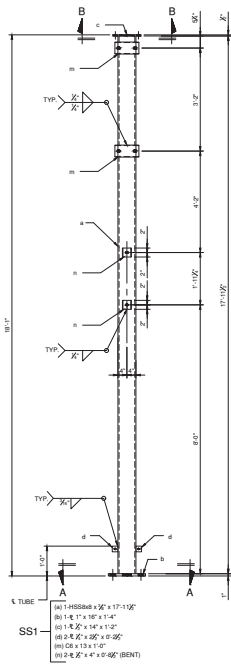
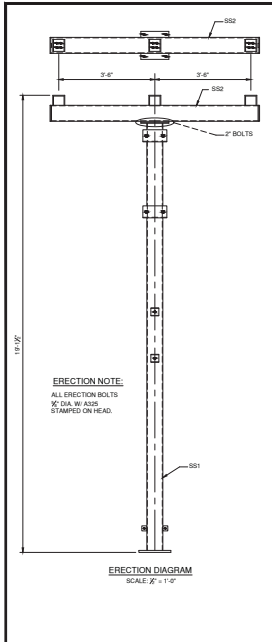
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White House
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.280.8500
Fax: 701.237.2191
www.whitehouse.com

Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV
SUBSTATION
34.5KV COLLECTION
STRUCTURE "CS"

DWG # NWO-S7-002 REVISION 0A



LIST OF MATERIAL									
STRUCTURES		ONE STRUCTURE							
NUMBER REQUIRED	DESCRIPTION	NUMBER REQUIRED	DESCRIPTION	MARK	SHEET	WEIGHT PER			
PIECES	UNIT	PIECES	UNIT			PIECE			
1		1							
WELDED ASSEMBLY				SS1	THIS				
1	1 HSSB8 x 3/8" x 17'-1 1/2"	a	875						
1	1 1" x 18" x 1/4"	b	73						
1	1 1" x 14" x 1/4"	c	28						
2	2 1" x 28" x 1/4"	d	1						
2	2 1/4 x 13" x 1/4"	e	15						
2	2 1/4 x 4" x 1/4" (BENT)	f	5						
WELDED ASSEMBLY				SS2					
1	1 HSSB8 x 3/8" x 7'-8"	g	158						
1	1 1" x 18" x 1/4"	h	26						
3	3 1/2" x 1" x 1/4" (BENT)	i	11						
2	2 1/2" x 8" x 1/4"	j	7						
2	2 1/2" x 8" x 1/4"	k	2						
4	4 3/8" x 1" CAPSCREW (A307)	l							
NUMBER REQUIRED	DESCRIPTION	NUMBER REQUIRED	DESCRIPTION	MARK	SHEET	WEIGHT PER			
PIECES	UNIT	PIECES	UNIT			PIECE			
5	5 3/4" x 2" HEX HD. W/ HEX NUT (A305)					37.4			
15	15 3/4" x 1/2" CAPSCREW (A307)					10.4			
15	15 3/4" x 1/2" LOCK WASHER					1.3			
10	10 3/4" x 1/2" HEX HD. (A307)					27.1			

- NOTES:
- MATERIAL:
 - W-SHAPES: ASTM A 992
 - H-SHAPES: ASTM A 500 Gr B
 - C & L-SHAPES: ASTM A-36
 - PLATES: ASTM A-36
 - GALVANIZING: ASTM A-123 & A-365
 - FABRICATION & INSPECTION: ASQC
 - ERECTION BOLTS: ASTM A-305
 - ALL HOLES 3/4\" DIA. UNLESS OTHERWISE NOTED.
 - ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERS CORRESPONDING TO THE DRAWINGS. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING. USES 3/4\" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.

NORTHWEST OHIO WIND PROJECT			
PAULDING COUNTY, OHIO			
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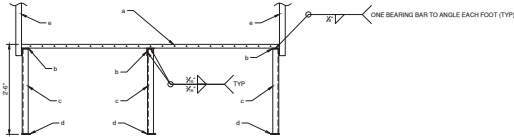
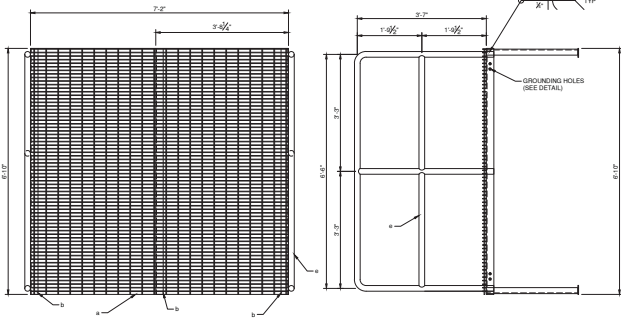
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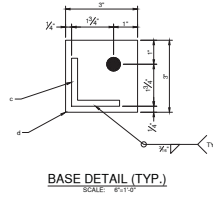
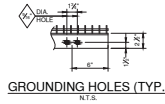
Design By: D. WEBER
Drawn By: V. LEE
Approved By: M. PADULA
Project Number: 17-01296

138/34.5KV
SUBSTATION
34.5KV 3Ø BUS & SS
SUPPORT "SS"

DWG #: NWO-S8-001 REVISION: 0A



- (a) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (b) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (c) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (d) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (e) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (f) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (g) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (h) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (i) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (j) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (k) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (l) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (m) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (n) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (o) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (p) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (q) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (r) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (s) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (t) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (u) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (v) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (w) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (x) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (y) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE
 (z) - 1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE



TWO STRUCTURES		ONE STRUCTURE		MATERIAL LIST		MARK	WEIGHT PER SHEET
NUMBER REQUIRED	NUMBER REQUIRED	NUMBER REQUIRED	NUMBER REQUIRED	DESCRIPTION	UNIT		
1	1	1	1	WELDED ASSEMBLY	P	THIS	445
3	3	3	3	1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE 1" x 1/2" BAR SPACING SPACING (1" x 1/2" x 1/2")	b		28
6	6	6	6	1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE 1" x 1/2" BAR SPACING SPACING (1" x 1/2" x 1/2")	c		7
6	6	6	6	1" x 1/2" x 1/2" BAR GRATE W/ SEPARATED SURFACE 1" x 1/2" BAR SPACING SPACING (1" x 1/2" x 1/2")	d		1
1	1	1	1	1/2" x 24" SCH40 PIPE (CUT)	e		68
NUMBER REQUIRED	NUMBER REQUIRED	NUMBER REQUIRED	NUMBER REQUIRED	GALV. BOLTS & WASHERS	WEIGHT PER HUNDRED		
				STEEL BOLTS	64#		
				TOTAL	64#		

- NOTES:
 1. MATERIAL:
 W-SHAPES ASTM A-992
 H-SHAPES ASTM A-992 Gr B
 C & L-SHAPES ASTM A-36
 PLATES ASTM A-36
 GALVANIZING: ASTM A-123 & A-155
 FABRICATION & INSPECTION: ASISC
 ERECTION BOLTS: ASTM A-305
 2. ALL HOLES 3/4" DIA. UNLESS OTHERWISE NOTED.
 3. ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERS CORRESPONDING TO THE DRAWINGS. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING DIES 3/4" HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.
 4. EACH GRATE SECTION IS TO BE ATTACHED TO CONCRETE W/ MINIMUM OF 4# 12" DIA. H&T IN W/ BOLT T2 ANCHORS (OR EQUIVALENT) INSTALLED PER MANUFACTURERS INSTRUCTIONS.

NORTHWEST OHIO
 WIND PROJECT
 PAULDING COUNTY, OHIO

Rev. Date Description By
 0A 10/19/17 PRELIMINARY UEL

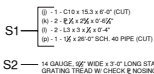
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 Design By: D. WEBER
 Drawn By: V. LEE
 Approved By: M. PADULA
 Project Number: 17-01296

138/34.5KV
 SUBSTATION
 OIL CONTAINMENT
 PLATFORM "P"

DWS # NWO-S9-001 REVISION 0A



STEEL	3884
BOLTS	24
TOTAL	3884

NOTES:

1. MATERIAL:

W-SHAPES	ASTM A 992
HSS-SHAPES	ASTM A-500 Gr B
C-I-SHAPES	ASTM A-36
PLATES	ASTM A-36

GALVANIZING: ASTM A-123 & 155
 FABRICATION & INSPECTION: AISC
 ERECTION BOLTS: ASTM A-325
2. ALL HOLES $\frac{1}{8}$ " DIA. UNLESS OTHERWISE NOTED.
3. ALL SEPARATE PIECES ARE TO BE DISTINCTLY MARKED WITH THEIR NUMBERS CORRESPONDING TO THE DRAWINGS. THE NUMBERS ARE TO BE STAMPED INTO THE MATERIAL BEFORE FINISHING WITH STAMPING DIES $\frac{1}{8}$ " HIGH IN SUCH A MANNER AS TO BE READILY VISIBLE AFTER FINISHING. THE NUMBER SHALL BE STAMPED NEAR THE END OF THE PIECE.
4. EACH GRAFT SECTION IS TO BE ATTACHED TO CONCRETE WITH MINIMUM OF (4) 1/2" DIA. HELIX BRK T T ANCHORS (OR EQUIVALENT) INSTALLED PER MANUFACTURER'S INSTRUCTIONS.

Rev.	Date	Description	By
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 Design By: D. WEBER
 Drawn By: V. LEE
 Approved By: M. PADULA
 Project Number: 17.01246

138/34.5KV
SUBSTATION
OIL CONTAINMENT
PLATFORM "S"

DWG #: **NWO-S10-001** REVISION: **0A**

Rev.	Date	Description	By
A	07/21/17	PRELIMINARY	UEI
0B	10/12/17	PRELIMINARY	UEI

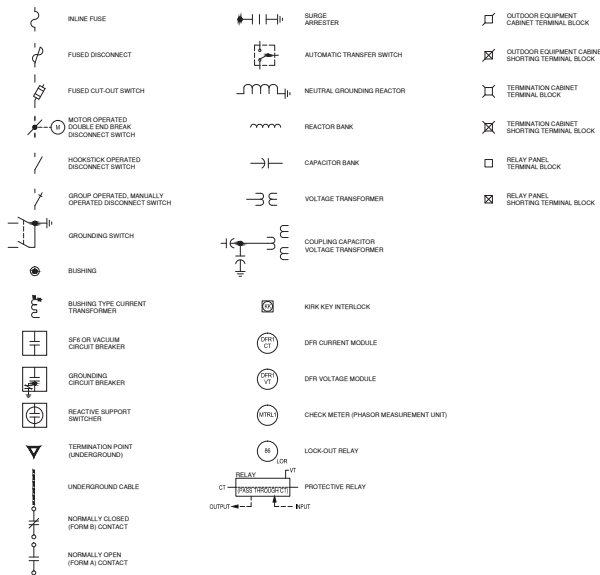
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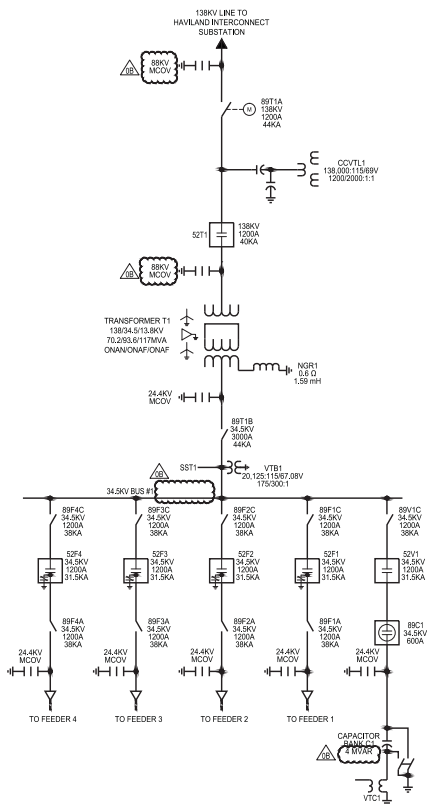
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DWG #: **NWO-SW1-001** REVISION: **0E**



DEVICE FUNCTION NUMBER LIST (ANSI C37.2)			
NO.	FUNCTION AND DEFINITION	NO.	FUNCTION AND DEFINITION
11	MULTIPLICATION	59L	HOT LINE (SYNCH CHECK)
21	DISTANCE	59H	HOT BUS (SYNCH CHECK)
21G	GROUND DISTANCE	2	TIMING RELAY
24	VOLTS PER HERTZ	3	TRANSFORMER PRESSURE RELAY
25	SYNCH CHECK (HOT LINE-DEAD BUS)	4	GROUND FAULT 4
25L	OIL TEMPERATURE THERMOMETER	4C	ARCTICIONAL OVERCURRENT
27	UNDERVOLTAGE	70	GROUND DIRECTIONAL OVERCURRENT
27B	DEAD BUS (SYNCH CHECK)	71	OL LEVEL INDICATOR
4	REVERSE PHASE LOCK-OUT RELAY	71B	FEED BACK
4F	TRANSFORMER THERMAL RELAY	8	LINE LOCK-OUT RELAY
50	INSTANTANEOUS OVERCURRENT	8 BF	BRAKER FAILURE LOCK-OUT RELAY
50G	GROUND INSTANTANEOUS OVERCURRENT	8 F	TRANSFORMER LOCK-OUT RELAY
50BF	BRAKER FAILURE	8F	DIFFERENTIAL
51	AC TIME OVERCURRENT	8FD	LINE DIFFERENTIAL
51F	PHASE AC TIME OVERCURRENT	8FB	BUS DIFFERENTIAL
51G	GROUND AC TIME OVERCURRENT	87	TRANSFORMER DIFFERENTIAL
51N	NEUTRAL TIME OVERCURRENT	87N	RESTRICTED EARTH FAULT
52	AC CIRCUIT BREAKER	87V	NO SE - VOLTAGE DIFFERENTIAL
59	OVERVOLTAGE	87V	LINE DISCONNECT SWITCH
59N	NEUTRAL VOLTAGE DISPLACEMENT	90	REGULATING DEVICE



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Case No(s). 13-0197-EL-BGN, 16-1687-EL-BGA, 17-1099-EL-BGA

Summary: Notice of Update to September 1, 2017 Filing Regarding Compliance with
Condition 6 – Drawings for Final Design Plan electronically filed by Mr. William V Vorys on
behalf of Trishe Wind Ohio, LLC