GENERAL NOTES:

1. DRAWING IS TYPICAL FOR 200 MW RATED RENEWABLE COLLECTION SUBSTATION.

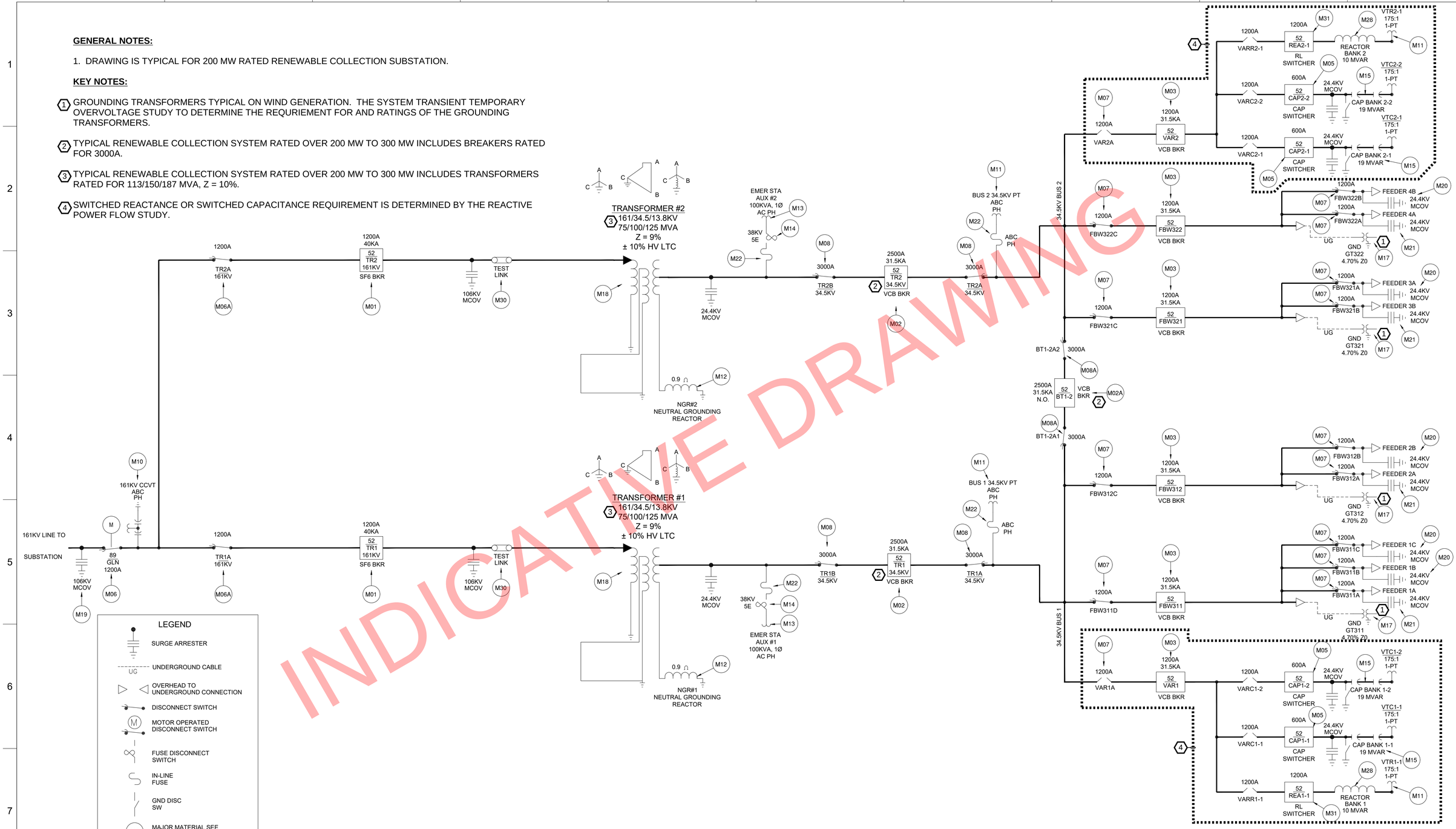
KEY NOTES:

(1) GROUNDING TRANSFORMERS TYPICAL ON WIND GENERATION. THE SYSTEM TRANSIENT TEMPORARY OVERVOLTAGE STUDY TO DETERMINE THE REQURIEMENT FOR AND RATINGS OF THE GROUNDING TRANSFORMERS.

(2) TYPICAL RENEWABLE COLLECTION SYSTEM RATED OVER 200 MW TO 300 MW INCLUDES BREAKERS RATED FOR 3000A.

(3) TYPICAL RENEWABLE COLLECTION SYSTEM RATED OVER 200 MW TO 300 MW INCLUDES TRANSFORMERS RATED FOR 113/150/187 MVA, Z = 10%.

(4) SWITCHED REACTANCE OR SWITCHED CAPACITANCE REQUIREMENT IS DETERMINED BY THE REACTIVE POWER FLOW STUDY.



NO	REVISION	ZONE	DATE	BY	CHK	ENG
	REV. A - ISSUED FOR REVIEW: 8-9-21					

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

Xcel Energy®
NORTHERN STATES POWER COMPANY
XXXXXXX WIND FARM
XXXXXXX COUNTY, MINNESOTA

DWN:	DATE:	CHK:	DATE:
ENG:	DATE:	CHK:	DATE:
PM:	DATE:	PROJ. NO:	
APVD:	DATE:	SCALE: NONE	

THIS MAP/DOCUMENT IS A TOOL TO ASSIST EMPLOYEES IN THE PERFORMANCE OF THEIR JOBS. YOUR PERSONAL SAFETY IS PROVIDED FOR BY USING SAFETY PRACTICES, PROCEDURES, AND EQUIPMENT AS DESCRIBED IN THE SAFETY TRAINING PROGRAMS AND MANUALS.

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

UNIT 0
COLLECTOR SUBSTATION PHYSICAL 161KV-34.5KV CIRCUIT DIAGRAM

NH-XXXXX-X

REV

MINOR MATERIAL

BUS, END CAPS & COUPLERS

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E01	1560'	5" SPS ALUMINUM TUBULAR BUS, SCH. 40, 6063-T6 ALLOY (DESIGN ASSUMES 40' STICKS)	ALCOA	5" SPS ALUM.	CONTRACTOR
E02	9	5" SPS ALUM., END CAP	SEFCOR	ABIR-67	CONTRACTOR
E03	6	5" SPS ALUM. TO 5" SPS ALUM. COUPLER, WELDED	SEFCOR	WSC-6767	CONTRACTOR
E04	240'	2 1/2" SPS ALUMINUM TUBULAR BUS, SCH. 40, 6063-T6 ALLOY (DESIGN ASSUMES 40' STICKS)	ALCOA	2 1/2" SPS ALUM.	CONTRACTOR

A-FRAME

Item#	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E10	6	CONNECTOR, ALUMINUM, ANGLE TEE, 5" SPS ALUM. TO (2) 2-1/2" SPS ALUM, 15 DEG. (HEAD)	SEFCOR	WFVT15-6760	CONTRACTOR
E10A	12	CONNECTOR, ALUMINUM, ANGLE TEE, 5" SPS ALUM. TO 2-1/2" SPS ALUM, 15 DEG. (LEG)	SEFCOR	WFTT15-6760	CONTRACTOR
E10B	12	CONNECTOR, ALUMINUM, ANGLE TEE, 2-1/2" SPS ALUM. TO 2-1/2" SPS ALUM, 15 DEG. (CROSS)	SEFCOR	WFTT15-6060	CONTRACTOR
E11	4	SPHERICAL COUPLER, WELDED, 2 1/2" ALUM. BUS	SEFCOR	WLBUA-5	CONTRACTOR

CABLE (SOUTHWIRE)

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E15	75'	#2, AWG, AAC 7 STRAND, CODE NAME "IRIS"	SOUTHWIRE	2 AAC	CONTRACTOR
E16	75'	795 MCM AAC 37 STRAND, CODE NAME "ARBUTUS"	SOUTHWIRE	795 AAC	CONTRACTOR
E17	1550'	1272 MCM AAC 61 STRAND, CODE NAME "NARCISSUS"	SOUTHWIRE	1272 AAC	CONTRACTOR
E18	950'	3/8" 7 STRAND, EXTRA HIGH STRENGTH (EHS) OVERHEAD STATIC SHIELD WIRE		3/8" EHS GUY	CONTRACTOR
E19	750'	750 MCM ALUM., 34.5KV SHIELDED CONDUCTOR (GND XFMR)		750 MCM AL.	CONTRACTOR
E20	1250'	954 MCM AAC 37 STRAND, CODE NAME "MAGNOLIA"	SOUTHWIRE	954 AAC	CONTRACTOR
E21	30'	556.5 MCM 37 STRAND, CODE NAME "MISTLETOE"	SOUTHWIRE	556.5 AAC	CONTRACTOR

TERMINAL PADS, TEES, CONNECTORS, BUS SUPPORTS, CABLE SPACERS & DEADEND MATERIAL

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E22	2	FLEX BOLTED FLAT TO 90 DEG, FLAT, 4"	SEFCOR	AFX90-4B	CONTRACTOR
E23	108	TERMINAL PAD, WELDED, (2) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC2-39-4B	CONTRACTOR
E25	54	GROUND STIRRUP, 900-1300 MCM AAC, BOLTED	SEFCOR	AHLSC-39	CONTRACTOR
E26	4	TERMINAL PAD, WELDED 2 1/2" SPS ALUM. BUS TO 4-HOLE PAD, CENTER FORMED	SEFCOR	WFXTC-60-4B	CONTRACTOR
E27	61	TEE CONNECTOR FOR 5" SPS ALUM. BUS TO 4-HOLE PAD, PERPENDICULAR	SEFCOR	WTFR-6269-B	CONTRACTOR
E28	39	TERMINAL PAD, WELDED 5" SPS ALUM. BUS TO NEMA 4-HOLE PAD, CENTER FORMED	SEFCOR	WFTC-67-4B	CONTRACTOR
E29	2	TEE CONNECTOR, WELDED, 5" SPS ALUM. TO 5" SPS ALUM.	SEFCOR	WFTT-6767	CONTRACTOR
E30	33	BOLTED TEE, (1) 874-1300 MCM AAC TO 4-HOLE PAD	SEFCOR	ACF-39-4B	CONTRACTOR
E31	22	TERMINAL PAD, COMPRESSION, (1) #2 AWG AAC CABLE TO NEMA 2-HOLE PAD	SEFCOR	AL-292-2A	CONTRACTOR
E32	190	TERMINAL PAD, WELDED, (1) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC-39-4B	CONTRACTOR
E32A	27	TERMINAL PAD, WELDED, (1) 1272 MCM AAC CABLE TO NEMA 2-HOLE PAD	SEFCOR	WFC-39-2B	CONTRACTOR
E33	10	TEE CONNECTOR FOR 3"-6" SPS ALUM. BUS TO 2-HOLE PAD, PARALLEL	SEFCOR	WTF-6269-2B	CONTRACTOR
E34	24	TEE CONNECTOR FOR 3"-6" SPS ALUM. BUS TO 4-HOLE PAD, PARALLEL	SEFCOR	WTF-6269-4B	CONTRACTOR
E35	39	SINGLE PHASE CABLE POSITIONER	HUBBELL	CCS820CE	CONTRACTOR
E36	18	TERMINAL PAD, WELDED 5" SPS ALUM. BUS TO NEMA 4-HOLE PAD, 90 DEG.	SEFCOR	WFT90-67-4B	CONTRACTOR
E37	54	TERMINAL PAD, WELDED, 954 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC-34-4B	CONTRACTOR
E37A	12	TERMINAL PAD, WELDED, 954 MCM AAC CABLE TO NEMA 4-HOLE PAD, 90 DEG	SEFCOR	WFC90-34-4B	CONTRACTOR
E38	14	BUS SUPPORT, CABLE TO INSULATOR, 1272 MCM AAC, 3" B.C.	SEFCOR	AVCA-43-3	CONTRACTOR
E39	36	CABLE SPACER, (2) 1272 MCM AAC, 8" SPACING	SEFCOR	ASPC-39-8	CONTRACTOR
E41	18	BUS SUPPORT, 5" SPS ALUM. BUS TO 3" B.C. INSULATOR	SEFCOR	WVTI-67-3	CONTRACTOR
E42	96	TERMINAL PAD, WELDED, (1) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD, 45 DEG.	SEFCOR	WFC45-39-4A	CONTRACTOR
E43	22	BUS SUPPORT, 5" SPS ALUM. BUS, SLIP OR RIGID, 5" B.C.	SEFCOR	ASWH-67-5-SE	CONTRACTOR
E44	24	TERMINAL PAD, EXPANSION, 5" SPS ALUM. BUS TO 4-HOLE PAD	SEFCOR	WFXTC-67-4B	CONTRACTOR
E45	6	TERMINAL PAD, WELDED, (2) 1272 MCM AAC CABLE TO NEMA 4-HOLE PAD, 90 DEG.	SEFCOR	WFC2-90-39-4B	CONTRACTOR
E46	12	TERMINAL PAD, WELDED, (1) 556 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC-21-4A	CONTRACTOR
E49	2	COUPLER 5" SPS SCH. 40 TO 5" SPS SCH. 40 @ 90°, WELDED, ALUMINUM	SEFCOR	WLBI90-6767	CONTRACTOR
E51	3	TERMINATION KIT, #3/0 - 600 MCM AL	3M	7665-S-8	CONTRACTOR
E52	36	TERMINATION KIT, 700-1500 MCM AL.	3M	7666-S-8	CONTRACTOR
E55	90	BUS SUPPORT, WELDED, 5" SPS ALUM. BUS, SLIP OR RIGID, 3" B.C.	SEFCOR	ASWH-67-3-SE	CONTRACTOR
E57	12	GROUNDING STUD TO ALUM. BUS, WELDED	SEFCOR	WTS-6064	CONTRACTOR
E61	18	TERMINAL PAD, SHEARBOLT, 2-HOLE PAD, MECHANICAL, 35KV, 500-1000 MCM	3M	QL2-A-500-1000	CONTRACTOR
E62	21	TERMINAL PAD, SHEARBOLT, 2-HOLE PAD, MECHANICAL, 35KV, 1000-1250 MCM	3M	QL2-A-1000-1250	CONTRACTOR
E63	8	TERMINAL PAD, COMPRESSION, (1) 300 MCM AAC CABLE TO NEMA 4-HOLE PAD (SST SECONDARY TERMINALS)	SEFCOR	AL-814-4A	CONTRACTOR
E64	3	COMPRESSION TEE, (1) 1272 MCM ACSR TO 4-HOLE PAD	SEFCOR	ATCF-140-4B	CONTRACTOR
E65	30	TERMINAL PAD, WELDED, (1) 795 MCM AAC CABLE TO NEMA 4-HOLE PAD	SEFCOR	WFC-29-4A	CONTRACTOR
E72	2	TERMINAL, BOLTED TO 2 1/2" SPS AL., 4-HOLE PAD, 90 DEGREE	SEFCOR	WTFR-3960-4B	CONTRACTOR
E73	4	EXPANSION TERMINAL, BOLTED TO 2 1/2" SPS AL., 4-HOLE PAD	SEFCOR	WFXT90-60-4A	CONTRACTOR

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E75	1	OPGW SPLICE BOX	AFL	SB01-72	CONTRACTOR
E76	1	OPGW EXTERNAL COIL BRACKET	AFL	CB-44-3AL	CONTRACTOR
E77	1	FIBER CONNECTION KIT (OPGW)	AFL	APCKE631/646	CONTRACTOR
E78	1	FIBER CONNECTION KIT (LOOSE TUBE UNDERGROUND)	AFL	BCK428/443	CONTRACTOR
E79	1	FIBER FURICATION KIT	AFL	SB01FK	CONTRACTOR

CABLE TRENCH

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E68A	AS REQ'D	CABLE TRENCH PEDESTRIAN, 10' LONG, 24" WIDE, 24" DEEP	TRENWA	BP2424-120	CONTRACTOR
E68B	AS REQ'D	CABLE TRENCH PEDESTRIAN, LID, CONCRETE, 24" WIDE	TRENWA	LP24-30	CONTRACTOR
E68C	AS REQ'D	CABLE TRENCH PEDSTRIAN, 10' T-SECTION	TRENWA	BM2424T30-120	CONTRACTOR
E68D	AS REQ'D	CABLE TRENCH ROAD CROSSING, 10' LONG 24" WIDE, 24" DEEP	TRENWA	BHC2424-120	CONTRACTOR
E68E	AS REQ'D	CABLE TRENCH ROAD CROSSING, LID CONCRETE, 30" LONG, 24" WIDE	TRENWA	VHC24-30	CONTRACTOR
E68F	AS REQ'D	CABLE TRENCH PEDESTRIAN, 5' LONG, 48" WIDE, 24" DEEP	TRENWA	BPS4824T24-60	CONTRACTOR
E69	34	GUARD POST BOLLARD	TRENWA	GPE-78	CONTRACTOR

LIGHTING

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E80	7	LIGHTING, 400W SECURITY LIGHT WITH VISOR, LAMPHOLDER AND MOUNTINGS, MULTIVOLT, GRAY	HOLOPHANE	PF400HPMTKW1GA	CONTRACTOR
E81	7	LIGHT MOUNTING BRACKET (USED WITH ITEM E80)	HOLOPHANE	BKT-1-HG	CONTRACTOR

MISCELLANEOUS

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
E83	3	1/4" X 5" X 30", RECTANGULAR AL. BAR 1.484 LB/FT (ONLY USED FOR DOUBLE FEEDER CIRCUITS)	JMT	1/4"X5"	CONTRACTOR
E85	9	JUNCTION BOX	HOFFMAN	A16R166HCR	CONTRACTOR
E86	2	TRANSITION PLATE, 2-HOLE PAD, ALUM. TO COPPER	SEFCOR	ATP-B	CONTRACTOR
E89	12	GROUND STUD, BOLTED TO 4-HOLE PAD	SEFCOR	WTS-4B	CONTRACTOR
E90	10	30K ANCHOR SHACKLE	-	-	CONTRACTOR
E91	10	QUADRANT STRAIN CLAMP, BOLTED, GALVANIZED DUCTILE IRON, 3/8" SHIELD WIRE	HUBBELL	SWDE46C	CONTRACTOR
E92	AS REQ'D	SEE WILDLIFE MITGATION ITEMS W1-W10 AND DRAWING FOR FURTHER INFORMATION	-	-	CONTRACTOR
E96	6	3/4" x 4" x 24", RECTANGULAR AL. BAR (ONLY USED FOR REACTOR NEUTRAL TO VT CONNECTION)	JMT	3/4" X 4"	CONTRACTOR
E97A	1	FIBER HAND HOLE, BOX, OPEN BOTTOM, 30" X 48" X 36"	QUAZITE	PG3048BA36	CONTRACTOR
E97B	1	FIBER HAND HOLE, BOX LID, 30" X 48"	QUAZITE	PG3048HA0009	CONTRACTOR
E70	100'	NON-METALLIC CHAIN LINK FENCE	-	-	CONTRACTOR

MAJOR MATERIAL

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
M01	2	CIRCUIT BREAKER, 170KV, 750KV, 1200A, 40KA, SF6	GE	CCDT1-170-FK-F1-017	CONTRACTOR
M02	2	38 KV CIRCUIT BREAKER, 2500 A, 31.5 KA, 200 KV BIL, VACUUM, WILDLIFE MITIGATION (MAIN)	SIEMENS	SDV7-SE	CONTRACTOR
M02A	1	38 KV CIRCUIT BREAKER, 2500 A, 31.5 KA, 200 KV BIL, VACUUM, WILDLIFE MITIGATION (BUSTIE)	SIEMENS	SDV7-SE	CONTRACTOR
M03	6	38 KV CIRCUIT BREAKER, 1200 A, 31.5 KA, 200 KV BIL, VACUUM, WILDLIFE MITIGATION (FEEDER/VAR)	SIEMENS	SDV7-SE	CONTRACTOR
M05	4	38 KV CAPACITOR SWITCHER, 600 A, 40 KA WITHSTAND, 200 KV BIL	SOUTHERN STATES	CAP-38M	CONTRACTOR
M06	1	DISCONNECT SWITCH 177KV, 750KV BIL, VERTICAL BREAK, MOTOR OPERATED, VERTICAL MOUNTING, 1200 A	USCO	-	CONTRACTOR
M06A	2	DISCONNECT SWITCH 177KV, 750KV BIL, VERTICAL BREAK, GROUP OPERATED, HORIZONTAL MOUNTING, 1200 A	USCO	-	CONTRACTOR
M07	39	34.5KV DISCONNECT SWITCH, 1200 A, 200 KV BIL, HOOKSTICK OPERATED, VERTICAL BREAK, VERTICALLY MOUNTED	USCO	-	CONTRACTOR
M08	4	38 KV DISCONNECT SWITCH, 3000 A, 200 KV BIL, GROUP OPERATED, VERTICAL BREAK, WORM GEAR OPERATOR, HORIZONTALLY MOUNTED (MAIN)	USCO	-	CONTRACTOR
M08A	2	38 KV DISCONNECT SWITCH, 3000 A, 200 KV BIL, GROUP OPERATED, VERTICAL BREAK, WORM GEAR OPERATOR, HORIZONTALLY MOUNTED (BUSTIE)	USCO	-	CONTRACTOR
M10	3	COUPLED CAPACITOR VOLTAGE TRANSFORMER, 177KV, 750KV BIL, 67KV: 115/69V, 800/1400:1:1, 1000VA, 0.15% WXYZ	GE	OTCF 170.IM	CONTRACTOR
M11	8	38 KV VT, 200 KV BIL, 20125/34500Y, 175/300:1, 0.3%WXYZ ACCURACY, TWO SECONDARY WINDINGS, WILDLIFE MITIGATION (BUS)	ARTECHE	URU-36	CONTRACTOR
M12	2	34.5 KV NEUTRAL GROUNDING REACTOR, 200KV BIL, 31.5 KA/3 SEC. WITHSTAND, 0.9 OHM IMPEDANCE, SUPPORT STANDS, INSULATORS, WILDLIFE MITIGATION	GE	XSNR	CONTRACTOR
M13	2	34.5 KV SST, 100 KVA, 200 KV BIL, 120/240 SECONDARY, (2) PRIMARY BUSHINGS, (3) SECONDARY BUSHINGS, WILDLIFE MITIGATION	POWER PARTNERS	AEJ12S99ZZZ05P1	CONTRACTOR
M14	4	38 KV FUSED DISCONNECT AND FUSE, 300A MOUNTING AND HOLDER W/ 5E AMP FUSE ELEMENT (STANDARD FUSE RATING), WILDLIFE MITIGATION	S&C	192504-EL	CONTRACTOR
M15	4	CAPACITOR BANK, THREE PHASE, 34.5KV/19.9KV, 200KV BIL, 19MVAR, WILDLIFE MITIGATION	EATON	CEB20016E0130F1	CONTRACTOR
M17	4	GROUNDING TRANSFORMER, 2500KVA, Z0 = 1.85%	ABB	F92HZY94BZ	CONTRACTOR
M17A	12	GROUNDING TRANSFORMER 35KV, 600A DEADBREAK ELBOW TERMINATION KIT	EATON	BT644RS4A1T	CONTRACTOR
M17B	12	GROUNDING TRANSFORMER 35KV, 600A DEADBREAK ELBOW SURGE ARRESTOR 24.4KV MCOV	EATON	DCEA635M30	CONTRACTOR
M18	2	MAIN POWER TRANSFORMER 161/34.5 KV , 75/100/125 MVA, ONAN/ONAF/ONAF, WLTC +/- 10%	HYUNDAI	-	XEL
M19	3	161KV, SURGE ARRESTER, 133KV, 106KV MCOV, STATION CLASS NEMA 4-HOLE CONNECTION, UPRIGHT MOUNTING	HUBBELL	EVP0106003001	CONTRACTOR
M20	15	34.5KV SURGE ARRESTERS, 30 KV DUTY CYCLE, 24.4 KV MCOV RATING, POLYMER, STATION CLASS, 4 HOLE PAD TERMINAL, UPRIGHT	HUBBELL	EVP0024003001	CONTRACTOR
M21	12	34.5KV SURGE ARRESTERS, 30 KV DUTY CYCLE, 24.4 KV MCOV RATING, POLYMER, STATION CLASS, 4 HOLE PAD TERMINAL, UNDERHUNG	HUBBELL	EVP202400-3001	CONTRACTOR
M22	12	CURRENT LIMITING FUSE 12K (USED WITH STATION SERVICE XFMR & 34.5KV PT'S, INCLUDES (2) SPARES	S&C	614005	CONTRACTOR
M23	22	161KV INSULATOR - 750 KV BIL, STANDARD STRENGTH, 5" BOLT CIRCLE TOP, 5" BOLT CIRCLE BOTTOM TR291	HUBBELL	PSP2913001	CONTRACTOR
M24	87	34.5 KV INSULATOR, 200 KV BIL, STANDARD STRENGTH, TR210	TE	SP-TR210PG	CONTRACTOR
M25	2	TERMINAL BOX, OUTDOOR, WEATHERPROOF, 400 AMP, 240 VOLT, SINGLE PHASE, 120/240V (WITH 3 TERMINAL BARS), MIDWEST CO. (TO BE USED FOR AC SOURCE ON SSVT AUX PANEL BOARDS)	MIDWEST ELECTRIC	-	CONTRACTOR
M26	2	QMB FUSIBLE PANELBOARD, SQUARE D CO., NEMA 3R ENCLOSURE, 400 AMP, 120/240VAC, SINGLE PHASE, SQUARE D CO. 3-WIRE, WITH FUSED SWITCHES AND FUSES: 300 AMP/2P, 1-200A/2P, 3-100A/2P, INCOMING CONDUCTORS ARE: 4-300 KCMIL CU. & 1-4/0 KCMIL CU. (NEUT)	SQUARE D	-	CONTRACTOR
M27	2	CONCRETE T-WALL BARRIERS, 8'-6" HEIGHT, 8' WIDTH (GROUNDING TRANSFORMER PROTECTION)	CREST PRECAST	21811980-10QD	CONTRACTOR
M28	2-3 PHASE	SHUNT REACTOR, 34.5KV, 10MVAR, 200KV BIL, 40KA WITHSTAND	GE	XSSR	CONTRACTOR
M29A	2	DISCONNECT SWITCH 34.5KV, 1200A, 200KV BIL, CENTER BREAK, "V": TYPE, VERTICAL MOUNTED, MANUAL OPERATED	USCO	-	CONTRACTOR
M29B	6	DISCONNECT SWITCH 34.5KV, 1200A, 200KV BIL, CENTER BREAK, "V": TYPE, HORIZONTAL MOUNTED, MANUAL OPERATED	USCO	-	CONTRACTOR
M30	6	TEST LINK, 1.5" = 12, NEMA 4HP, MPT HIGH SIDE (H1, H2, H3)	PCORE	B-63056-AF	MPT
M31	2-3 PHASE	REACTOR SWITCHER, 34.5KV, 1200A, 200KV BIL, 40KA WITHSTAND	SOUTHERN STATES	RLS	CONTRACTOR

WILDLIFE MITIGATION

Item #	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG #	SUPPLIER
W1	NOT REQ'D	BUSHING WILDLIFE COVER, MESH TYPE, 4.8" DIA X 9" HIGH, SMALL	THERM-A-GUARD*	TGB-50007	CONTRACTOR
W2	NOT REQ'D	BUSHING WILDLIFE COVER, MESH TYPE, 6.7" DIA X 10.6" HIGH, MEDIUM	THERM-A-GUARD*	TGB-65010	CONTRACTOR
W3	100	BUSHING WILDLIFE COVER, MESH TYPE, 6.8"-8.4" DIA X 14" HIGH, LARGE (4 SPARES)	THERM-A-GUARD*	TGB-82512	CONTRACTOR
W4	8	BUSHING WILDLIFE COVER, MESH TYPE, 8.9"-10.5" DIA X 19" HIGH, EXTRA LARGE	THERM-A-GUARD*	TGB-10517	CONTRACTOR
W5	100'	CONDUCTOR WILDLIFE COVER, SPLIT SILICONE RUBBER TUBING FOR 35KV CONDUCTORS 0.8063" - 1.00" DIA, GREY	MIDSUN GROUP*	E/INS-100-G	CONTRACTOR
W6	100'	CONDUCTOR WILDLIFE COVER, SPLIT SILICONE RUBBER TUBING FOR 35KV CONDUCTORS 0.25"-0.447" DIA, GREY	MIDSUN GROUP*	E/INS-50-G	CONTRACTOR
W7	NOT REQ'D	CONDUCTOR WILDLIFE COVER, SPLIT SILICONE RUBBER TUBING FOR 35KV CONDUCTORS 1.00"-1.196" DIA, GREY	MIDSUN GROUP*	E/INS-125-G	CONTRACTOR
W8	450'	CONDUCTOR WILDLIFE COVER, SPLIT SILICONE RUBBER TUBING FOR 35KV CONDUCTORS 1.25"-1.427" DIA, GREY	MIDSUN GROUP*	E/INS-150-G	CONTRACTOR
W9	NOT REQ'D	CONDUCTOR WILDLIFE COVER, SPLIT SILICONE RUBBER TUBING FOR 35KV CONDUCTORS 1.504"-1.735" DIA, GREY	MIDSUN GROUP*	E/INS-175-G	CONTRACTOR
W10	NOT REQ'D	FUSING TAPE, 2.5" x 36" 30 MIL - GRAY	MIDSUN GROUP*	E/FTP-250G	CONTRACTOR

*(OR EQUIVALENT MANUFACTURER)

GENERAL NOTES:

1. DRAWING IS FROM A FOR 200 MW RATED RENEWABLE COLLECTION SUBSTATION.
2. DRAWING IS INTENDED TO SUPPLEMENT THE SPECIFICATION.

KEY NOTES:

1. GROUNDING TRANSFORMERS TYPICAL ON WIND GENERATION. THE SYSTEM TRANSIENT TEMPORARY OVERVOLTAGE STUDY TO DETERMINE THE REQUIREMENT FOR AND RATINGS OF THE GROUNDING TRANSFORMERS.
2. TYPICAL RENEWABLE COLLECTION SYSTEM RATED OVER 200 MW TO 300 MW INCLUDES BREAKERS RATED FOR 3000A.
3. TYPICAL RENEWABLE COLLECTION SYSTEM RATED OVER 200 MW TO 300 MW INCLUDES TRANSFORMERS RATED FOR 113/150/187 MVA, Z = 10%.
4. SWITCHED REACTANCE OR SWITCHED CAPACITANCE REQUIREMENT IS DETERMINED BY THE REACTIVE POWER FLOW STUDY.

NO	REVISION	ZONE	DATE	BY	CHK	ENG
	REV. A - ISSUED FOR REVIEW: 8-9-21					

NO	REVISION	ZONE	DATE	BY	CHK	ENG

REFERENCE DRAWINGS

DWG NO.	MANUFACTURER	DESCRIPTION

Xcel Energy®
NORTHERN STATES POWER COMPANY
XXXXXXX WIND FARM
XXXXXXX COUNTY, MINNESOTA

DWN:	DATE:	CHK:	DATE:
ENG:	DATE:	CHK:	DATE:
PM:	DATE:	PROJ. NO:	
APVD:	DATE:	SCALE: NONE	

THIS MAP/DOCUMENT IS A TOOL TO ASSIST EMPLOYEES IN THE PERFORMANCE OF THEIR JOBS. YOUR PERSONAL SAFETY IS PROVIDED FOR BY USING SAFETY PRACTICES, PROCEDURES, AND EQUIPMENT AS DESCRIBED IN THE SAFETY TRAINING PROGRAMS AND MANUALS.

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

UNIT 0
COLLECTOR SUBSTATION PHYSICAL
161KV-34.5KV
BILL OF MATERIALS

NH-XXXXX-X

REV