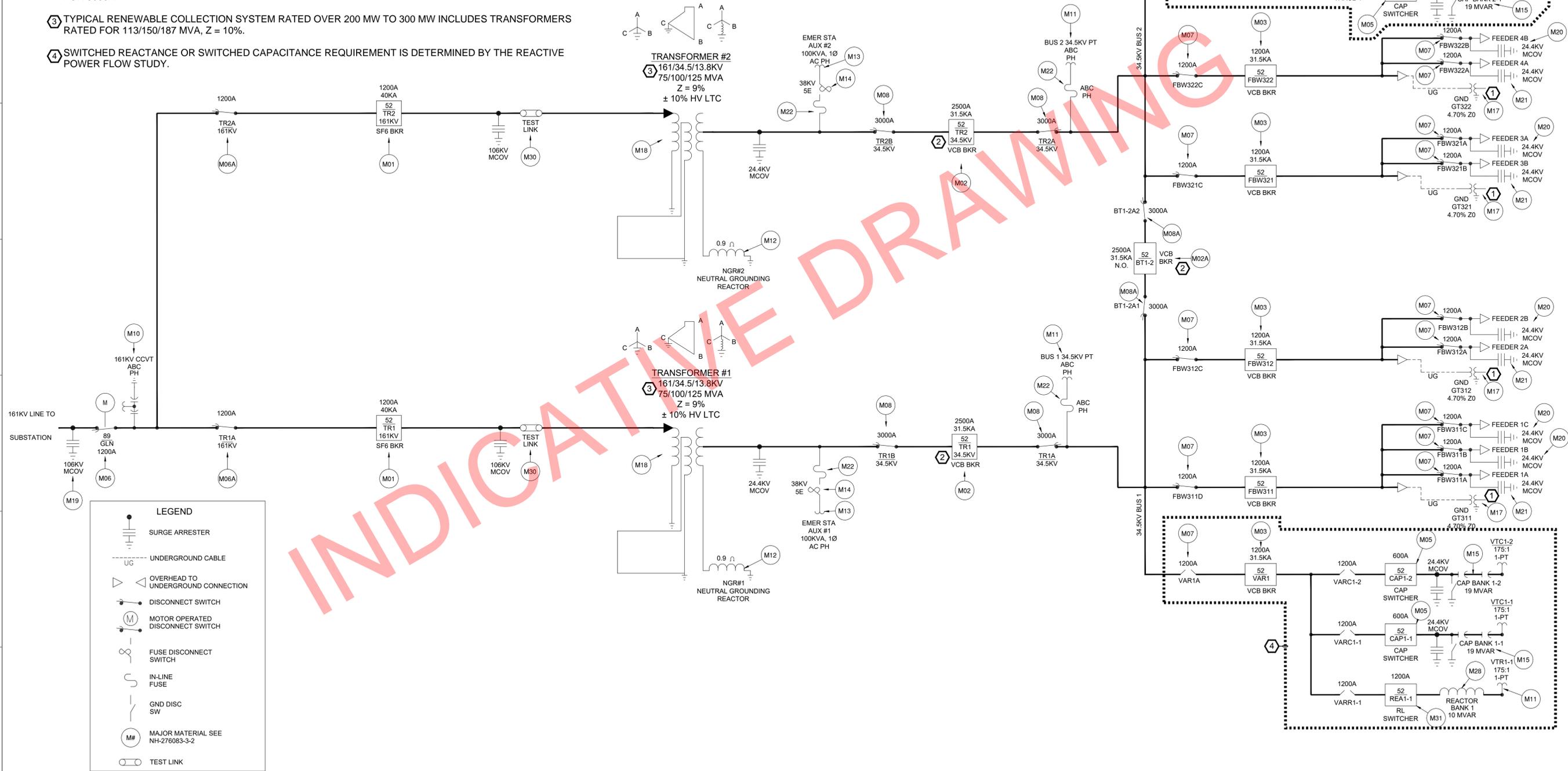


GENERAL NOTES:

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 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.



LEGEND

	SURGE ARRESTER
	UNDERGROUND CABLE
	OVERHEAD TO UNDERGROUND CONNECTION
	DISCONNECT SWITCH
	MOTOR OPERATED DISCONNECT SWITCH
	FUSE DISCONNECT SWITCH
	IN-LINE FUSE
	GND DISC SW
	MAJOR MATERIAL SEE NH-276083-3-2
	TEST LINK

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS		
														DWG NO.	MANUFACTURER	DESCRIPTION
	REV. A - ISSUED FOR REVIEW: 8-9-21															

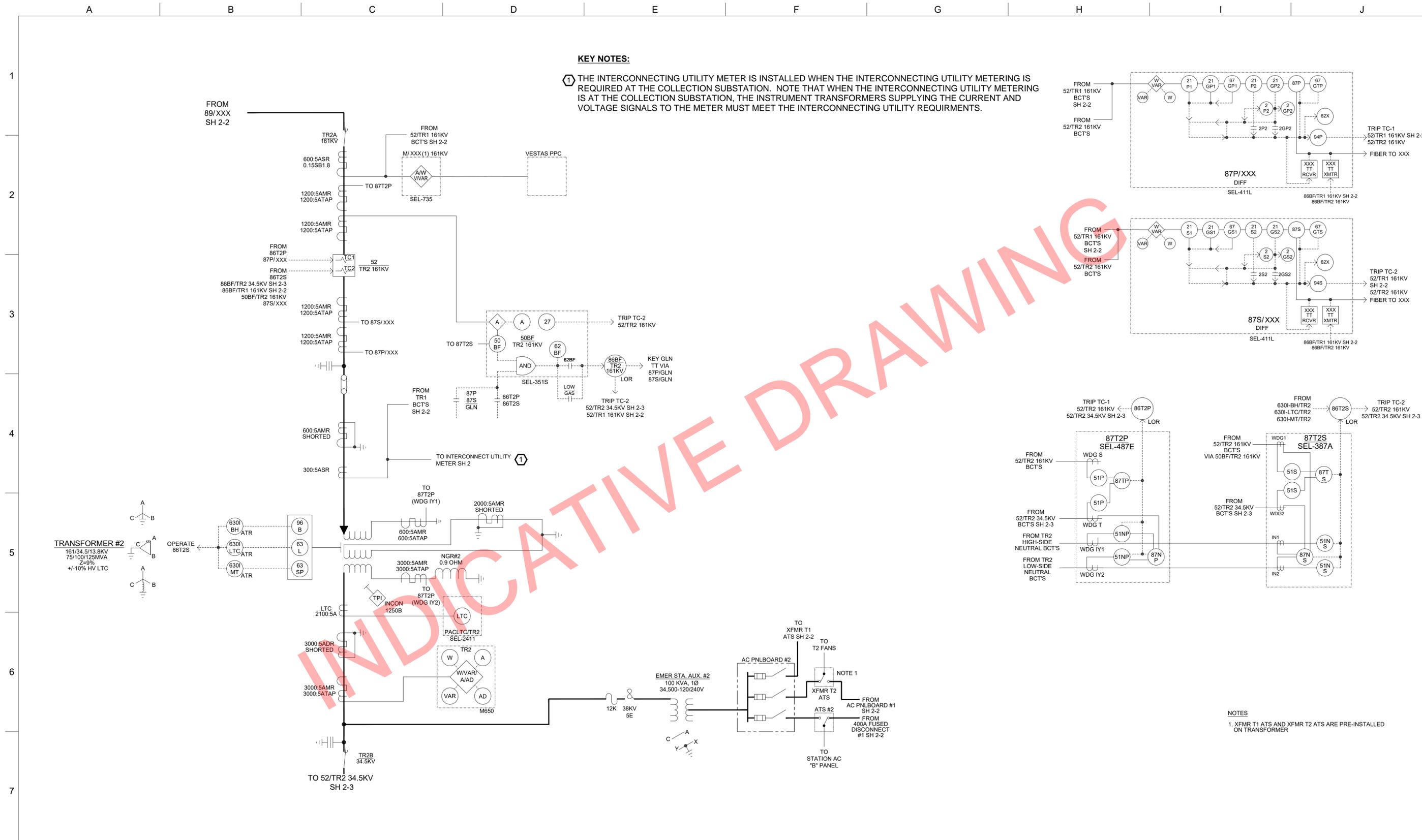
NORTHERN STATES POWER COMPANY
XXXXXXX WIND FARM
XXXXXXX COUNTY, MINNESOTA

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.

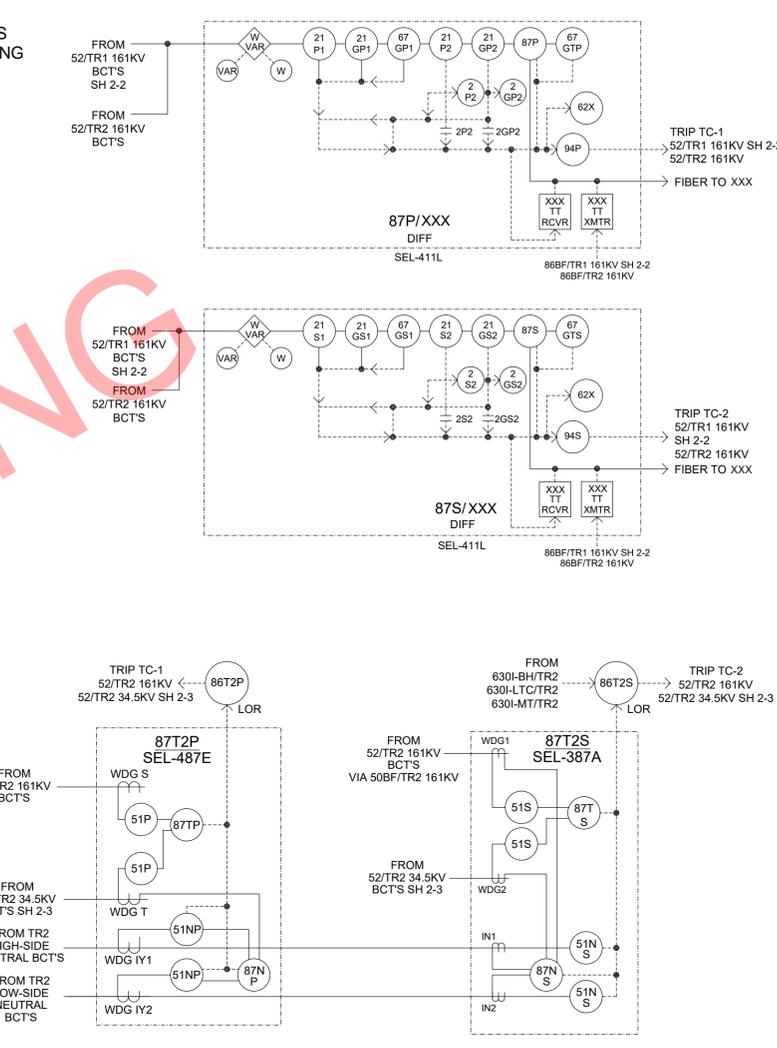
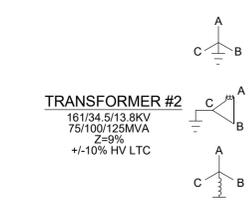
UNIT 0
COLLECTOR SUBSTATION PHYSICAL
161KV-34.5KV CIRCUIT DIAGRAM

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

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION
NH-XXXX-X
REV



1
2
3
4
5
6
7



NOTES
1. XFMR T1 ATS AND XFMR T2 ATS ARE PRE-INSTALLED ON TRANSFORMER

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS		
														DWG NO.	MANUFACTURER	DESCRIPTION
	REV. A - ISSUED FOR REVIEW: 8-9-21															
	REV. B - ADDED FAST BUS TRANSFER, 1-29-24															
	REV. C - LINE PROTECTION UPDATED (2) SEL-411L, 2-20-24															

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

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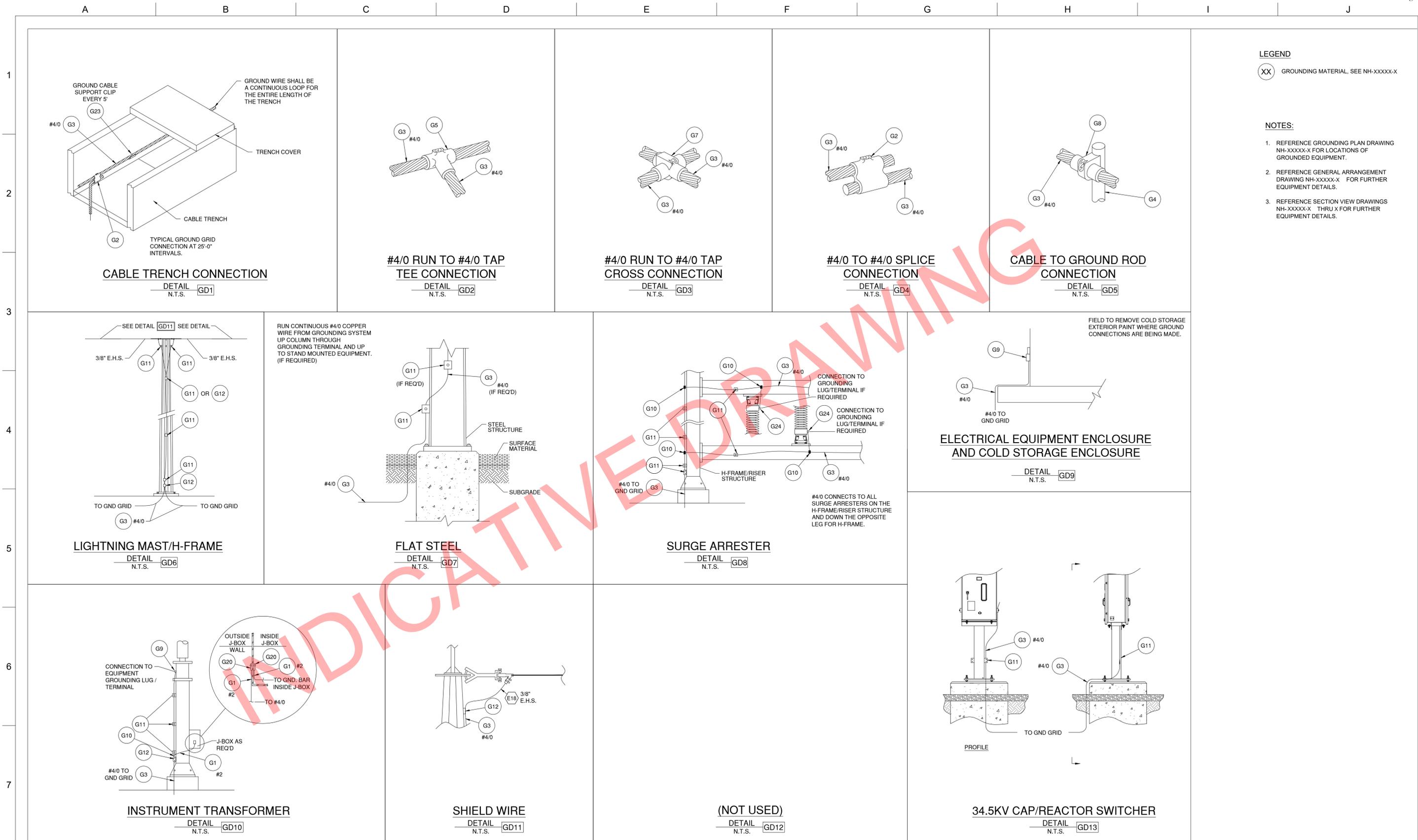
UNIT 0
COLLECTOR SUBSTATION CONTROL
161KV-34.5KV
TRANSFORMER #2
METERING AND RELAYING DIAGRAM

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

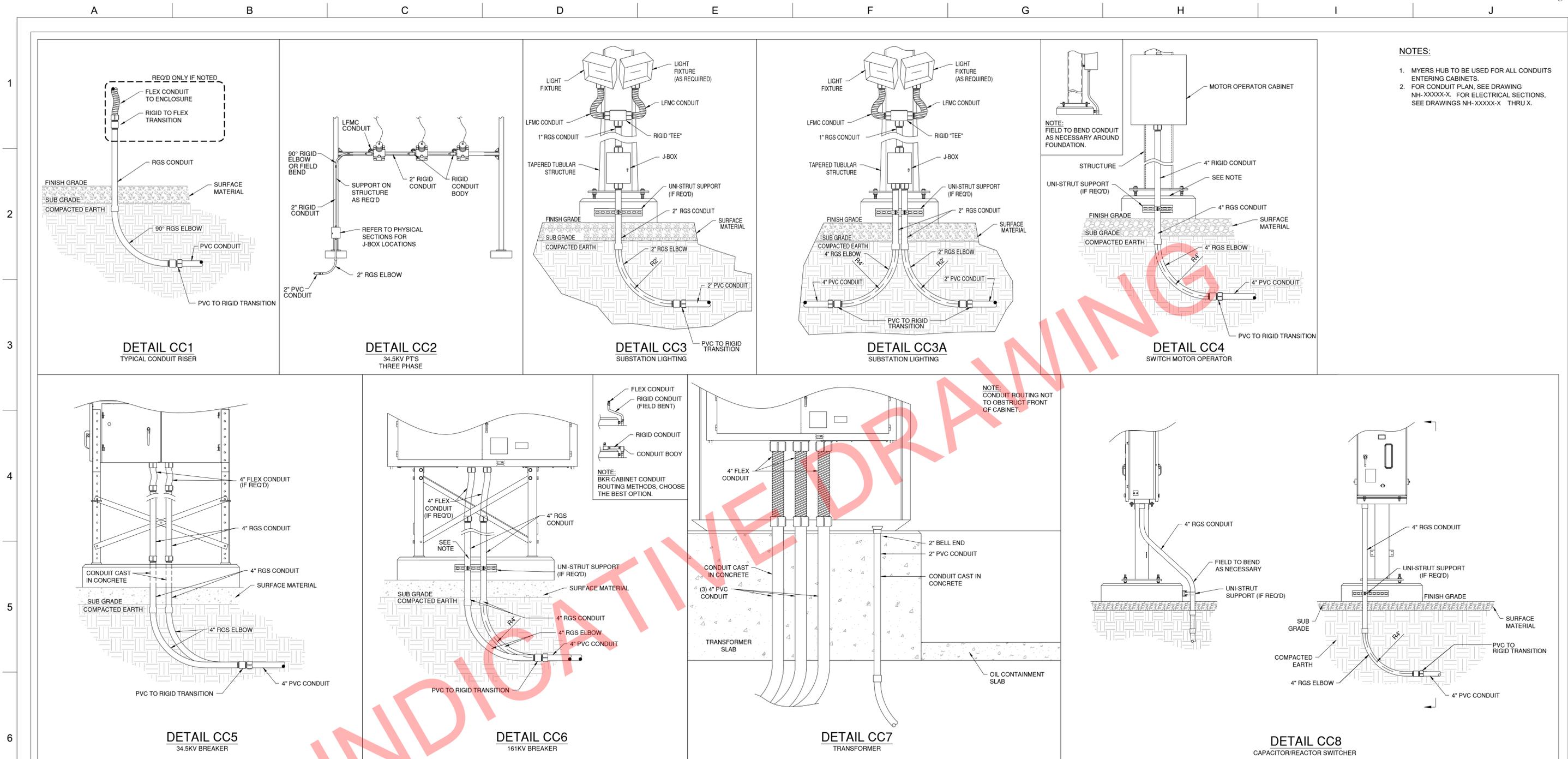
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

NH-XXXXX- 2-1

REV
C



NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	THIS MAP/DRAWING 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.	UNIT 0 COLLECTOR SUBSTATION PHYSICAL GROUNDING DETAILS	NH-XXXXX-X	REV									
DWG NO.			MANUFACTURER			DESCRIPTION																								
	REV. A - ISSUED FOR REVIEW: 8-9-21													DWN: BRR	DATE: 12-22-20	CHK:	DATE:	ENG: RCS	DATE: 12-22-20	CHK:	DATE:	PM: BMD	DATE: 12-22-20	PROJ. NO: 22586	APVD: BKC	DATE: 12-22-20	SCALE: NONE	ENERGY SUPPLY ENGINEERING & CONSTRUCTION		



NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			
														DWG NO.	MANUFACTURER	DESCRIPTION	
0	ISSUED FOR CONSTRUCTION		04-10-20	RCS	BKC	BKC											
1	REV. A - ISSUED FOR REVIEW: 8-9-21 ISSUED FOR RECORD		12-22-20	RCS	BKC	BKC											

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

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ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

UNIT 0
COLLECTOR SUBSTATION PHYSICAL CONDUIT DETAILS

NH-XXXXX-X

REV

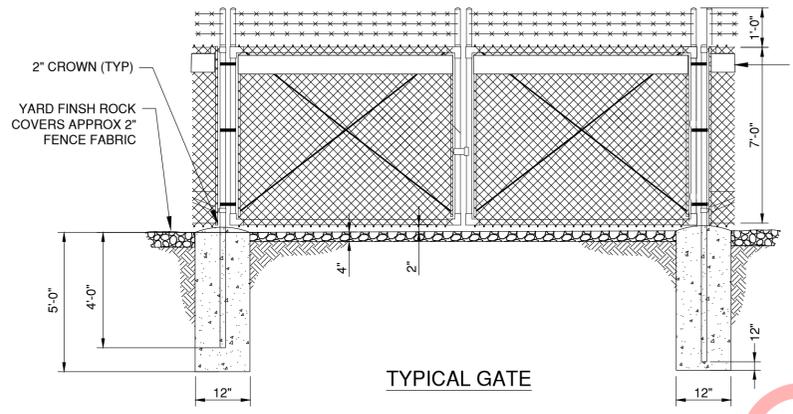
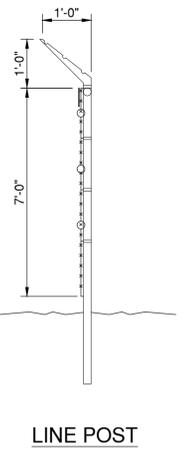
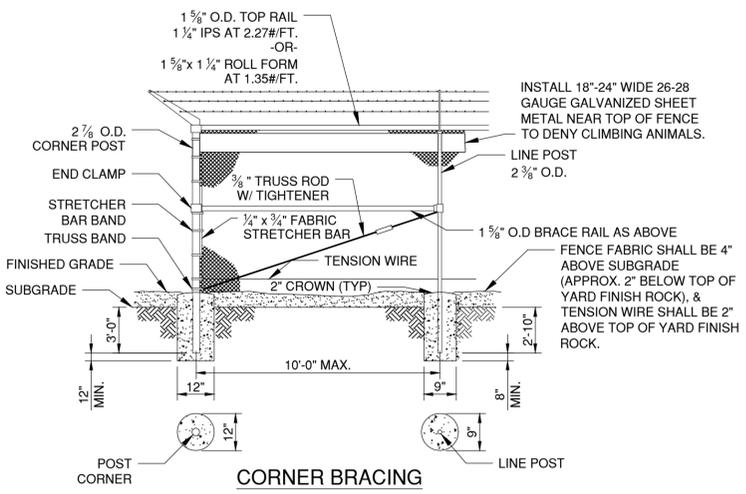
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ENG: DATE: CHK: DATE:
PM: DATE: PROJ. NO:
APVD: DATE: SCALE: NONE

USE	TYPE	MINIMUM SIZE
LINE POSTS	ROUND	2 3/8" OD; t = .154in.
END, CORNER, PULL POSTS	ROUND	2 7/8" OD; t = .203in.
GATE POSTS	ROUND	4" OD; t = .226 in.

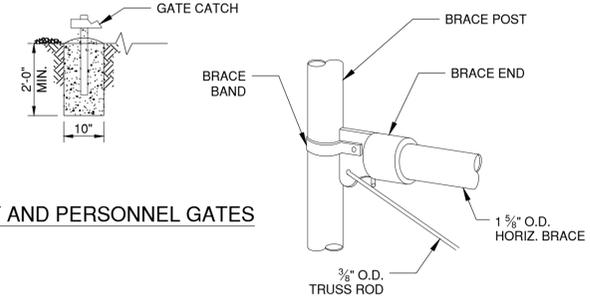
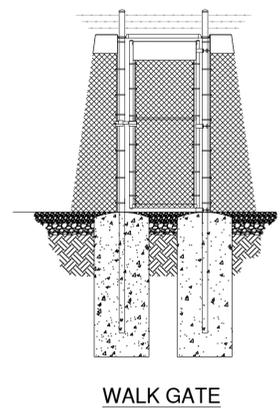
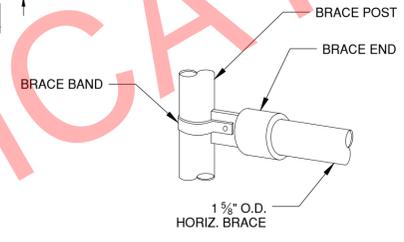
FENCE MATERIALS AND ERECTION MATERIAL

- FABRIC**
THE FENCE SHALL BE A MINIMUM OF 7 FT. HIGH. IT SHALL CONSIST OF A MINIMUM NO. 9 USWG STEEL WIRE, WOVEN INTO A 2 IN. DIAMOND MESH. THE MINIMUM BREAKING STRENGTH OF WIRE SHALL BE 1200 LBS. THE SIDES OF THE MESH PATTERN SHALL BE APPROXIMATELY 45° TO A VERTICAL LINE.
THE FABRIC SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A392, CLASS II.
- 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 A36 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 36 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.
- 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.
- BARBED WIRE**
BARBED WIRE SHALL CONSIST OF TWO STRANDS OF 12 1/2" 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 A-585, CLASS 2.
THREE LINES OF BARBED WIRE SHALL BE PROVIDED.
- 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 PRESSED 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 A153, CLASS B1.
- STRETCHER BAR**
STRETCHER BARS SHALL BE GALVANIZED STEEL BARS NOT LESS THAN 1/4" x 3/4". 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.
- 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 3/4".
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.

- 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.
- 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 3" 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 3/8" 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 A-120.
- 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 A-48 SPECS FOR GRAY IRON CASTING, ASTM 1-47 SPECS FOR MALLEABLE IRON CASTING AND 2SAE-1025 SPECS FOR ROLLED PRESSED AND FOR STEEL. FORK 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, 1/2" x 1" FOR BANDS, AND 1/4" x 3/4" 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 TIE 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 2500 PSI AT 28 DAYS WITH A MAXIMUM SIZE OF AGGREGATE OF 3/4". THE CONCRETE SHALL BE WELL WORKED (RODDED) 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".

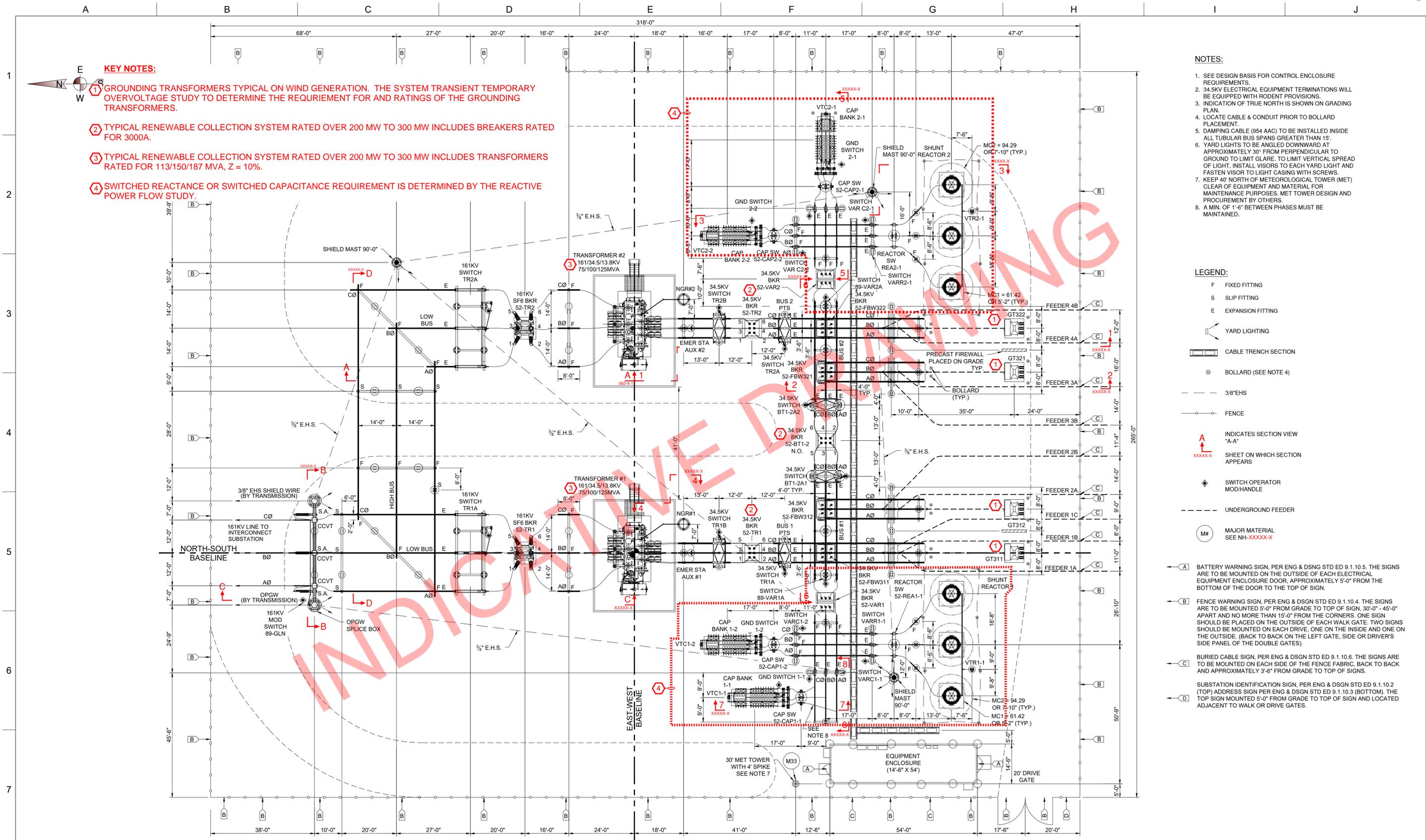


SECURITY SIGNS
SEE CONSTRUCTION SPECIFICATION FOR COMPLETE LIST OF SECURITY SIGNS.



ROADWAY AND PERSONNEL GATES

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	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.	UNIT 0 COLLECTOR SUBSTATION PHYSICAL 161KV-34.5KV FENCE DETAILS	REV
DWG NO.	MANUFACTURER	DESCRIPTION	ENERGY SUPPLY	NH-XXXXX-X																
	REV. A - ISSUED FOR REVIEW: 8-9-21													DWN:	DATE:	CHK:	DATE:	ENGINEERING & CONSTRUCTION		
														ENG:	DATE:	CHK:	DATE:			
														PM:	DATE:	PROJ. NO:				
														APVD:	DATE:	SCALE: NONE				



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

- NOTES:**
- SEE DESIGN BASIS FOR CONTROL ENCLOSURE REQUIREMENTS.
 - 34.5KV ELECTRICAL EQUIPMENT TERMINATIONS WILL BE EQUIPPED WITH RODENT PROVISIONS.
 - INDICATION OF TRUE NORTH IS SHOWN ON GRADING PLAN.
 - LOCATE CABLE & CONDUIT PRIOR TO BOLLARD PLACEMENT.
 - DAMPING CABLE (954 AAC) TO BE INSTALLED INSIDE ALL TUBULAR BUS SPANS GREATER THAN 15'.
 - YARD LIGHTS TO BE ANGLED DOWNWARD AT APPROXIMATELY 30° FROM PERPENDICULAR TO GROUND TO LIMIT GLARE. TO LIMIT VERTICAL SPREAD OF LIGHT, INSTALL VISORS TO EACH YARD LIGHT AND FASTEN VISOR TO LIGHT CASING WITH SCREWS.
 - KEEP 40' NORTH OF METEOROLOGICAL TOWER (MET) CLEAR OF EQUIPMENT AND MATERIAL FOR MAINTENANCE PURPOSES. MET TOWER DESIGN AND PROCUREMENT BY OTHERS.
 - A MIN. OF 1'-6" BETWEEN PHASES MUST BE MAINTAINED.

- LEGEND:**
- F FIXED FITTING
 - S SLIP FITTING
 - E EXPANSION FITTING
 - YARD LIGHTING
 - CABLE TRENCH SECTION
 - BOLLARD (SEE NOTE 4)
 - 3/8"EHS
 - FENCE
 - INDICATES SECTION VIEW "A-A"
 - SHEET ON WHICH SECTION APPEARS
 - SWITCH OPERATOR MOD/HANDLE
 - UNDERGROUND FEEDER
 - MAJOR MATERIAL SEE NH-XXXXX-X

- BATTERY WARNING SIGN, PER ENG & DSGN STD ED 9.1.10.5. THE SIGNS ARE TO BE MOUNTED ON THE OUTSIDE OF EACH ELECTRICAL EQUIPMENT ENCLOSURE DOOR, APPROXIMATELY 5'-0" FROM THE BOTTOM OF THE DOOR TO THE TOP OF SIGN.
- FENCE WARNING SIGN, PER ENG & DSGN STD ED 9.1.10.4. THE SIGNS ARE TO BE MOUNTED 5'-0" FROM GRADE TO TOP OF SIGN, 30'-0" - 45'-0" APART AND NO MORE THAN 15'-0" FROM THE CORNERS. ONE SIGN SHOULD BE PLACED ON THE OUTSIDE OF EACH WALK GATE. TWO SIGNS SHOULD BE MOUNTED ON EACH DRIVE, ONE ON THE INSIDE AND ONE ON THE OUTSIDE. (BACK TO BACK ON THE LEFT GATE, SIDE OR DRIVER'S SIDE PANEL OF THE DOUBLE GATES).
- BURIED CABLE SIGN, PER ENG & DSGN STD ED 9.1.10.6. THE SIGNS ARE TO BE MOUNTED ON EACH SIDE OF THE FENCE FABRIC, BACK TO BACK AND APPROXIMATELY 3'-6" FROM GRADE TO TOP OF SIGNS.
- SUBSTATION IDENTIFICATION SIGN, PER ENG & DSGN STD ED 9.1.10.2 (TOP) ADDRESS SIGN PER ENG & DSGN STD ED 9.1.10.3 (BOTTOM). THE TOP SIGN MOUNTED 5'-0" FROM GRADE TO TOP OF SIGN AND LOCATED ADJACENT TO WALK OR DRIVE GATES.

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

REFERENCE DRAWINGS		
DWG NO.	MANUFACTURER	DESCRIPTION

XcelEnergy
NORTHERN STATES POWER COMPANY
XXXXXXX WIND FARM
XXXXXXX COUNTY, MINNESOTA

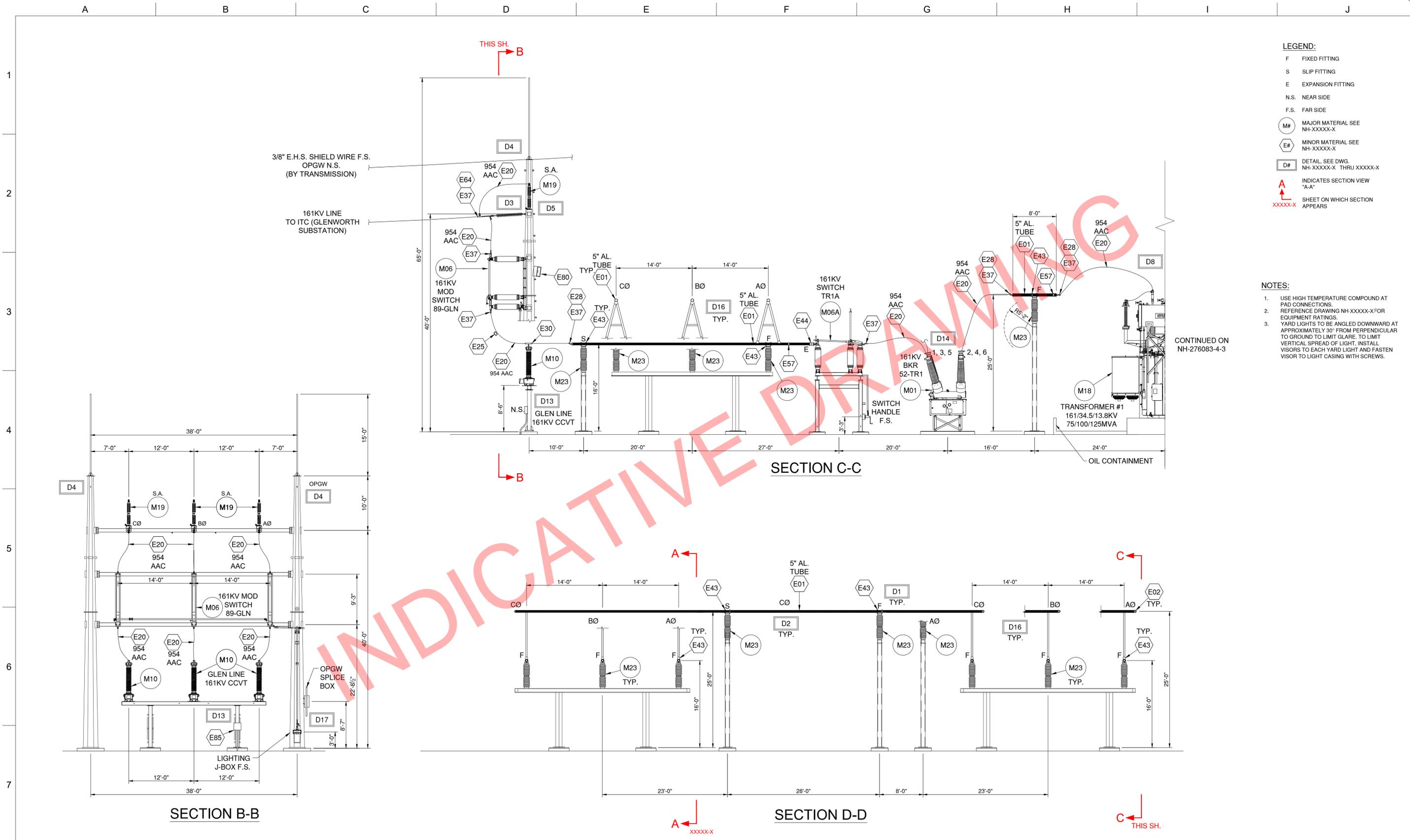
DWN: DATE: CHK: DATE:
ENG: DATE: CHK: DATE:
PM: DATE: PROJ. NO:
APVD: DATE: SCALE: 1/16" = 1'-0"

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
GENERAL ARRANGEMENT

NH-XXXXX-X

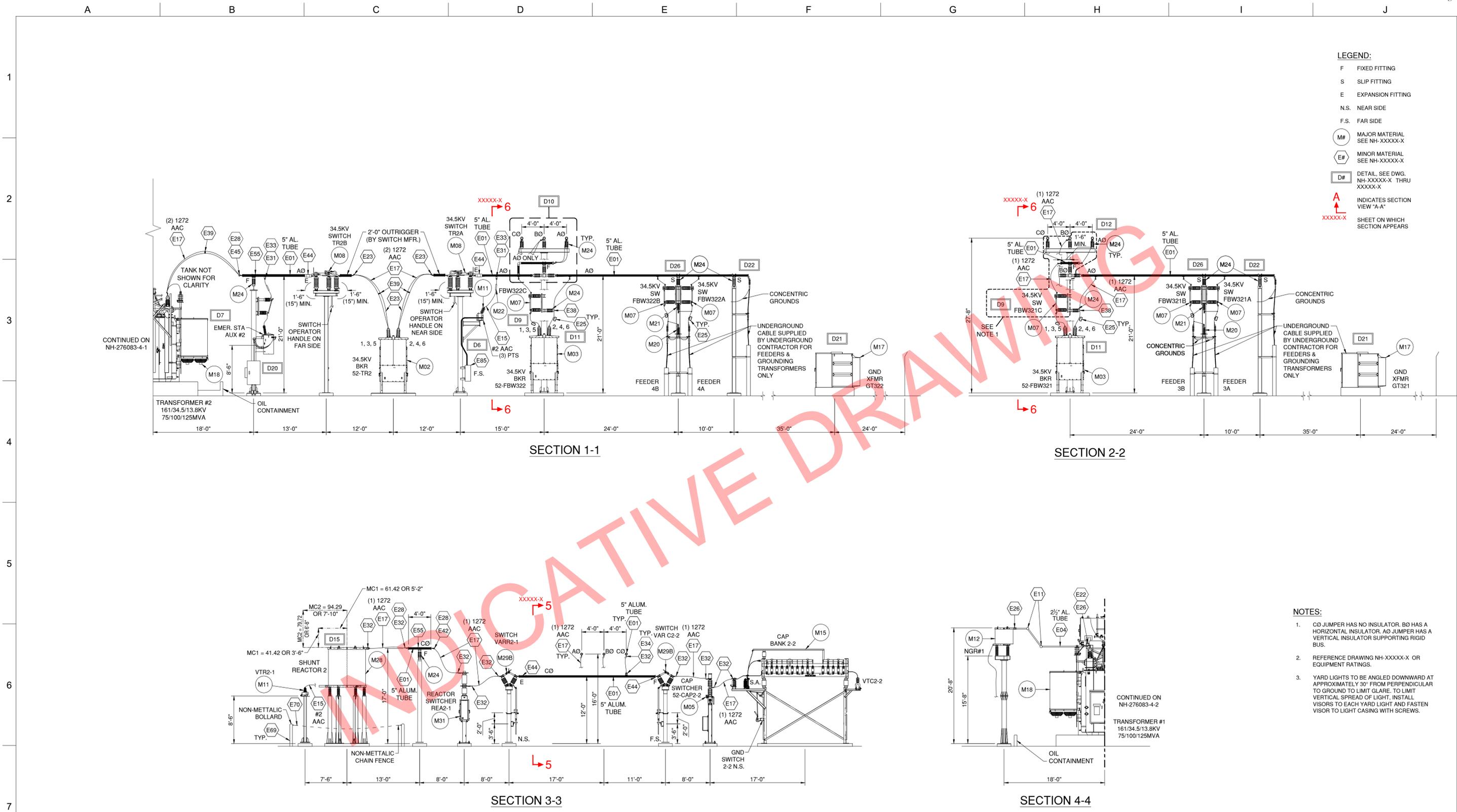


- LEGEND:**
- F FIXED FITTING
 - S SLIP FITTING
 - E EXPANSION FITTING
 - N.S. NEAR SIDE
 - F.S. FAR SIDE
 - M# MAJOR MATERIAL SEE NH-XXXXX-X
 - E# MINOR MATERIAL SEE NH-XXXXX-X
 - D# DETAIL, SEE DWG. NH-XXXXX-X THRU XXXXX-X
 - A INDICATES SECTION VIEW "A-A"
 - XXXXX-X SHEET ON WHICH SECTION APPEARS

- NOTES:**
1. USE HIGH TEMPERATURE COMPOUND AT PAD CONNECTIONS.
 2. REFERENCE DRAWING NH-XXXXX-X FOR EQUIPMENT RATINGS.
 3. YARD LIGHTS TO BE ANGLED DOWNWARD AT APPROXIMATELY 30° FROM PERPENDICULAR TO GROUND TO LIMIT GLARE. TO LIMIT VERTICAL SPREAD OF LIGHT, INSTALL VISORS TO EACH YARD LIGHT AND FASTEN VISOR TO LIGHT CASING WITH SCREWS.

CONTINUED ON NH-276083-4-3

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS		 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	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.	UNIT 0 COLLECTOR SUBSTATION PHYSICAL SECTIONS B-B, C-C & D-D	NH-XXXXX-X	REV
DWG NO.		MANUFACTURER		DESCRIPTION																
	REV. A - ISSUED FOR REVIEW: 8-9-21													DWN:	DATE:	CHK:	DATE:			
														ENG:	DATE:	CHK:	DATE:			
														PM:	DATE:	CHK:	DATE:			
														APVD:	DATE:	CHK:	DATE:			
																	SCALE: 1/8" = 1'-0"			



NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS		
														DWG NO.	MANUFACTURER	DESCRIPTION
	REV. A - ISSUED FOR REVIEW: 8-9-21															

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

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APVD: DATE: SCALE: 1/8" = 1'-0"

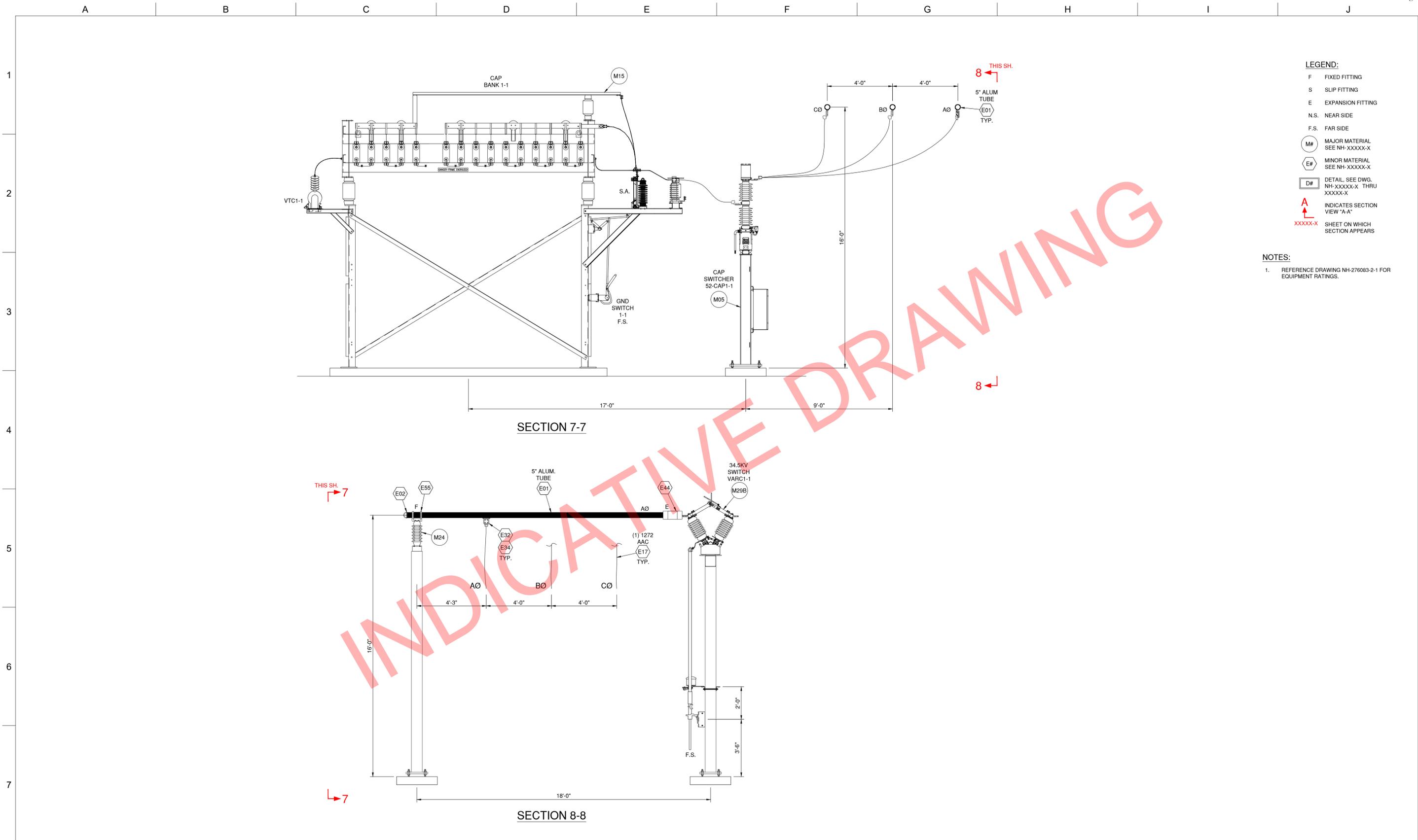
THIS MAP/DOCUMENT IS A TOOL TO ASSIST EMPLOYEES IN THE PERFORMANCE OF THEIR JOBS. YOUR PERSONAL SAFETY IS PROVIDED FOR BY USING SAFETY PRACTICES, PROCEDURES, AND EQUIPMENT AS DESCRIBED IN THE SAFETY TRAINING PROGRAMS AND MANUALS.

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

UNIT 0
COLLECTOR SUBSTATION PHYSICAL
SECTIONS 1-1, 2-2, 3-3 & 4-4

NH-XXXXX-X

REV

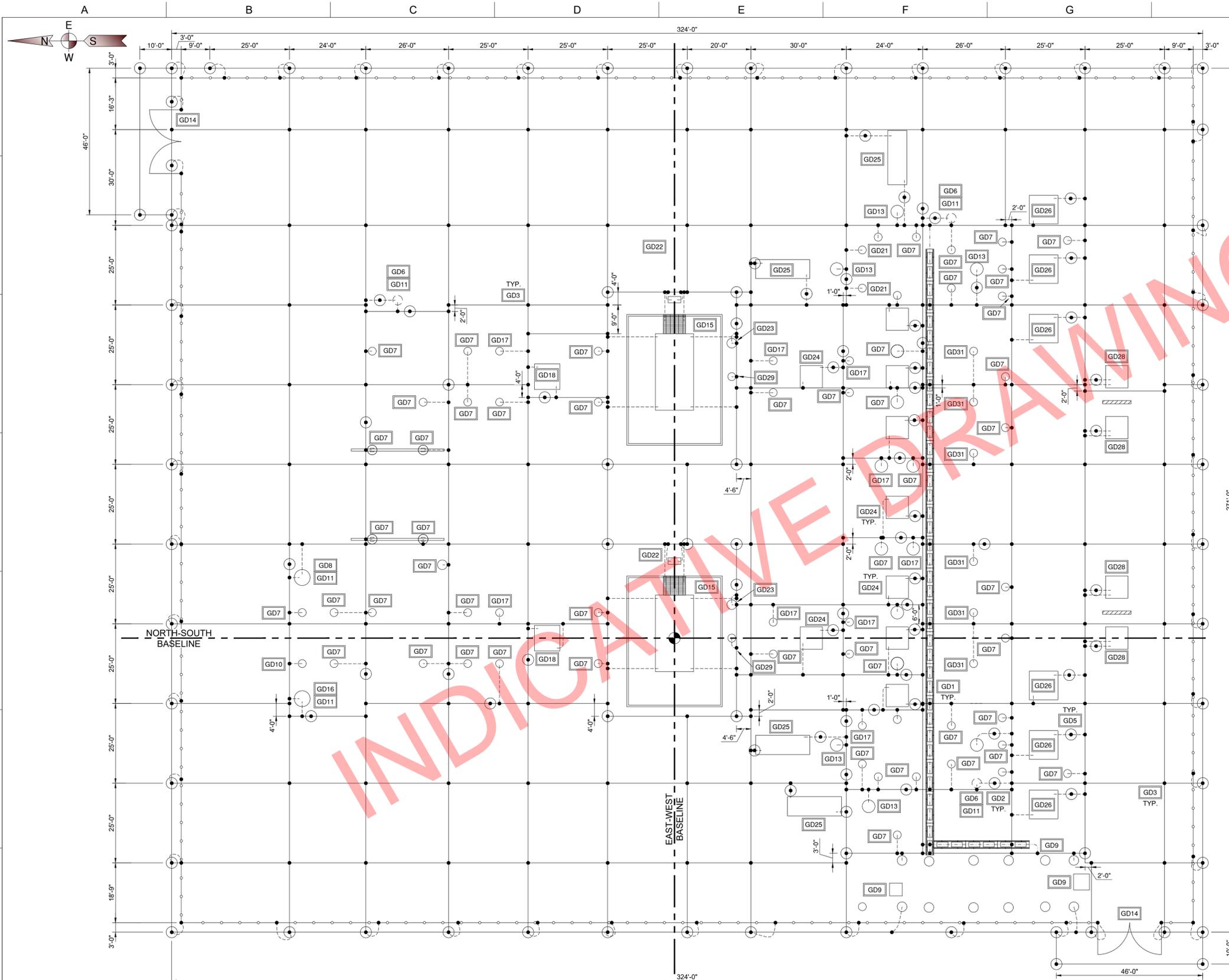


- LEGEND:**
- F FIXED FITTING
 - S SLIP FITTING
 - E EXPANSION FITTING
 - N.S. NEAR SIDE
 - F.S. FAR SIDE
 - M# MAJOR MATERIAL
SEE NH-XXXXX-X
 - E# MINOR MATERIAL
SEE NH-XXXXX-X
 - D# DETAIL, SEE DWG.
NH-XXXXX-X THRU
XXXXX-X
 - A INDICATES SECTION
VIEW "A-A"
 - XXXXX-X SHEET ON WHICH
SECTION APPEARS

- NOTES:**
- REFERENCE DRAWING NH-276083-2-1 FOR EQUIPMENT RATINGS.

INDICATIVE DRAWING

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	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.	UNIT 0	
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SUBSTATION GROUNDING NOTES

- GROUND PIGTAILS**
VERIFY EQUIPMENT GROUNDING LOCATIONS PRIOR TO PULLING UP PIGTAILS.
- TESTING**
PRIOR TO BRINGING IN THE FEEDER HOME RUNS AND CONNECTING THE TRANSMISSION LINE SHIELDS AND/OR OPGW THE GROUND GRID RESISTANCE SHALL BE MEASURED AND RECORDED.
- MAIN GROUNDING SYSTEM**
- 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.
 - 4/0 BARE COPPER WIRE IS TO BE USED FOR THE MAIN GROUND SYSTEM, BURIED A MINIMUM OF 18 INCHES AND A MAXIMUM OF 20 INCHES BELOW SUBGRADE.
 - ALL GRID CONDUCTOR CONNECTIONS AS WELL AS CONNECTIONS TO EACH GROUND ROD ARE TO BE EXOTHERMIC.
 - 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 TOPS OF THE RODS SHOULD BE APPROXIMATELY ONE FOOT BELOW GRADE.
 - THE ENTIRE AREA INSIDE OF THE PERIMETER GROUND CONDUCTOR MUST BE COVERED WITH CRUSHED ROCK WITH A DEPTH AND MINIMUM RESISTIVITY AS SPECIFIED BELOW IN THE DESIGN DATA TABLE.
 - THE OUTSIDE PERIMETER SHALL BE A MINIMUM OF 3 FEET OUTSIDE OF THE FENCE ALL OF THE OTHER GROUNDING WILL HAVE A MINIMUM OF ± 8 INCHES TOLERANCE.
- CONNECTIONS TO STEEL STRUCTURES AND EQUIPMENT**
- CONNECTIONS OF GROUND CABLES TO STEEL STRUCTURES AND EQUIPMENT SHALL BE SECURELY MADE WITH MECHANICAL CONNECTORS.
 - GROUND LEADS SHALL BE RUN UP AND OVER FOOTINGS AS INDICATED, AND UP THE STRUCTURES IN A NEAT AND WORKMAN-LIKE MANNER.
 - HOLES NECESSARY FOR ATTACHING CONNECTORS SHALL BE FIELD DRILLED AND TAPPED IF NECESSARY, WHERE NO PLATE OR TAB FOR ATTACHMENT HAS BEEN SUPPLIED.
 - WHERE CONNECTIONS TO THE GROUND MAT ARE STUBBED OUT AT EQUIPMENT FOOTINGS IN ADVANCE OF EQUIPMENT INSTALLATION, CARE SHALL BE TAKEN THAT 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.
 - GROUND CABLES SHALL BE SUPPORTED APPROXIMATELY EVERY FOUR FEET WHEN EXTENDED UP THE STRUCTURE.
- CONNECTIONS TO EQUIPMENT COMPARTMENTS, CONDUIT AND CABLES**
- ALL EQUIPMENT COMPARTMENTS SHALL BE GROUNDING.
 - ALL STEEL CONDUITS SHALL BE EFFECTIVELY GROUNDING EITHER BY DIRECT GROUNDING, OR BY ATTACHMENT TO METAL ENCLOSURE WHICH ARE ADEQUATELY GROUNDING.
 - ALL METALLIC POWER CABLE SHIELDS MUST BE SOLIDLY GROUNDING ON BOTH ENDS OR AS SHOWN ON THE CONTROL DRAWINGS.
- GROUNDING DETAIL REFERENCES**
- REFERENCE DRAWINGS NH-XXXXX-X THRU XX-X FOR GROUNDING DETAILS.
- FENCE GROUNDING**
- ALL METALLIC FENCING SHALL BE SECURELY TIED TO MAIN GROUND SYSTEM AT EACH FENCE CORNER AND AT INTERMEDIATE INTERVALS AS DETAILED ON THE GROUNDING PLAN.
 - 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 BURIED 18 INCHES BELOW SUBGRADE.
 - FENCE POSTS SHALL BE CONNECTED TO THE MAIN GROUND GRID AT INTERVALS AS SHOWN.
 - GROUND RODS SHALL BE DRIVEN ALONG THE CONDUCTOR AND BONDED TO EACH FENCE CORNER AND AT INTERVALS AS SHOWN ON THE DRAWING.

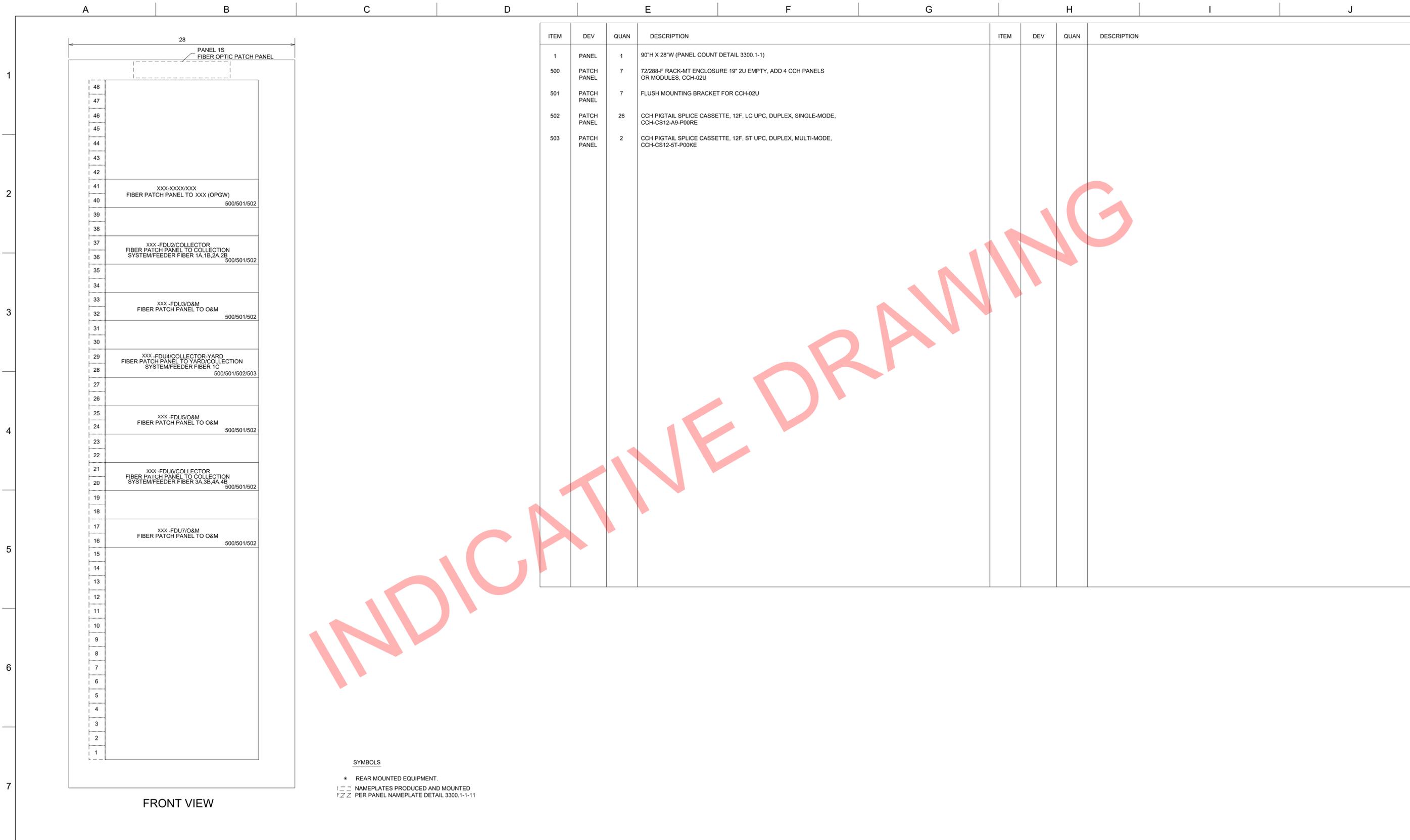
SUBSTATION GROUNDING DESIGN PARAMETERS

GROUND GRID DESIGN DATA	
(DESIGN IS BASED ON IEEE STD.80-2013 USING THE FOLLOWING DATA)	
1. SOIL MODEL:	
LAYER 1 RESISTIVITY	21.89 OHM-METER
LAYER 1 DEPTH	89.86 FEET
LAYER 2 RESISTIVITY	131.08 OHM-METER
LAYER 2 DEPTH	INFINITE FEET
LAYERS CREATED BASED ON SOIL RESISTIVITY DATA OBTAINED BY RRC INC. 08-04-2019	
2. SURFACE ROCK RESISTIVITY	3,000 OHM-METER
3. SURFACE ROCK DEPTH	6" INSTALLED, MODELED AT 4"
4. MAXIMUM SYSTEM FAULT CURRENT	20,000 AMPS (3IO)
5. FAULT DURATION	30 CYCLES
6. GRID CURRENT	100% OF MAX FAULT CURRENT
7. FAULT INJECTION POINT	LOW SIDE BUS BY TRANSFORMER #1
8. GPR	4,677 VOLTS (RMS)
9. TOUCH PERMISSIBLE	659.86 VOLTS
MAX TOUCH	588.64 VOLTS
STEP PERMISSIBLE	922.40 VOLTS
MAX STEP	230.68 VOLTS
10. BODY WEIGHT	50 KG
11. RESULTS PER CODEGS VERSION	15.4.9400

GRID RESISTANCE	
CALCULATED:	0.234 OHMS
BY FIELD	
MEASURED:	OHMS
TESTED BY:	PLEASE PRINT
CONTRACTOR TO PROVIDE DATA ON AS-BUILTS	

- LEGEND:**
- SUBSTATION FENCE
 - GROUND ROD (3/4" X 10'-0") UNLESS OTHERWISE NOTED.
 - FENCE CONNECTION WITH GROUND ROD
 - PIGTAIL TO EQUIPMENT / STRUCTURE
 - GDx DETAIL CALLOUT, SEE DWG. NH-276083-8-1 THRU 8-4
 - #4/0 BARE COPPER (SOFT DRAWN)
 - - - TRENCH GND CONNECTION
 - EXOTHERMIC TYPE CONNECTION

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			Xcel Energy NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	THIS MAP/DRAWING 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.	UNIT 0 COLLECTOR SUBSTATION PHYSICAL 161KV-34.5KV GROUNDING LAYOUT	NH-XXXXX-X	REV
														DWG NO.	MANUFACTURER	DESCRIPTION					
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INDICATIVE DRAWING

SYMBOLS
 * REAR MOUNTED EQUIPMENT.
 □ NAMEPLATES PRODUCED AND MOUNTED
 □ PER PANEL NAMEPLATE DETAIL 3300.1-1-11

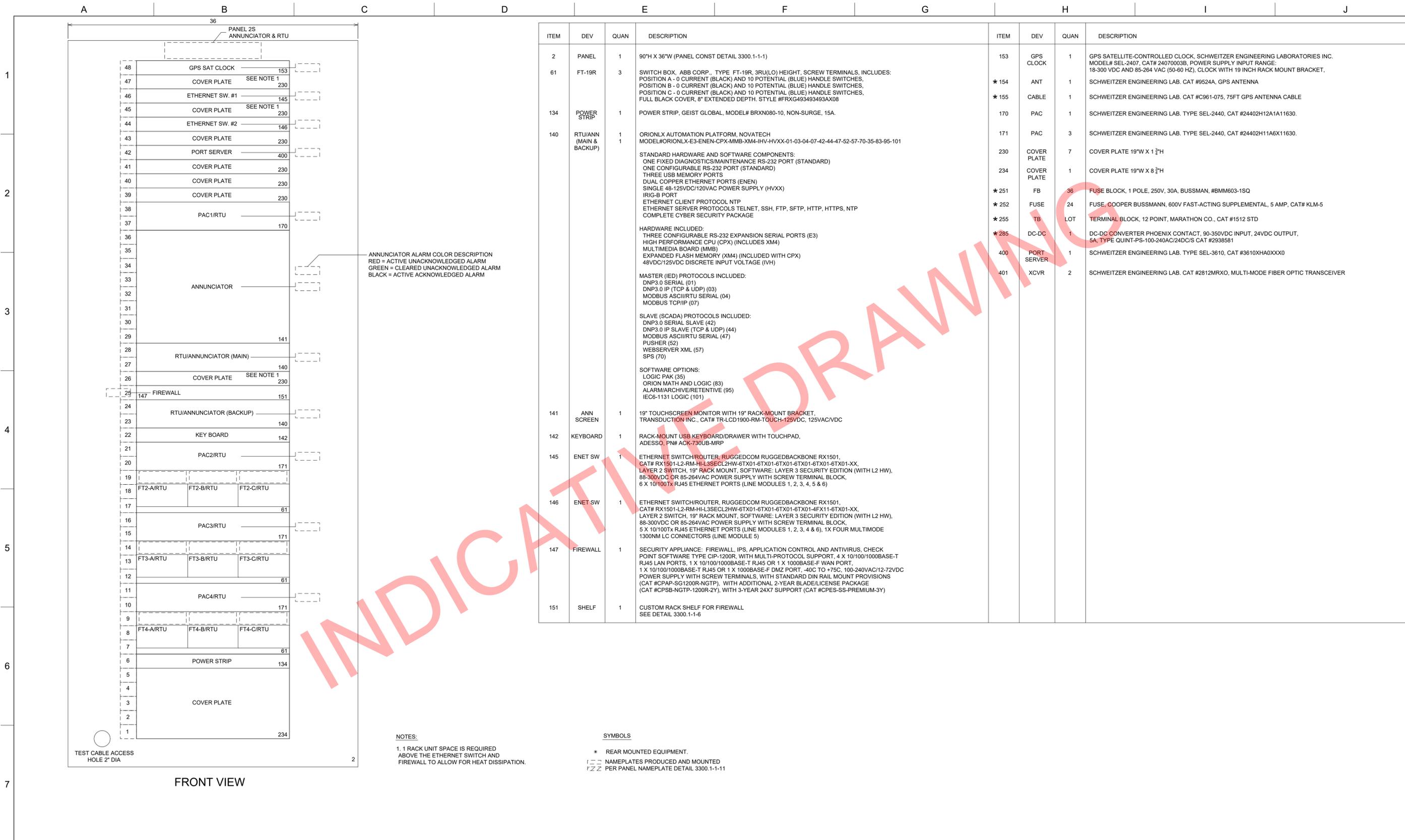
FRONT VIEW

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APVD:	DATE:	SCALE: NONE	

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

NH-XXXXX-X



ITEM	DEV	QUAN	DESCRIPTION
2	PANEL	1	90"H X 36"W (PANEL CONST DETAIL 3300.1-1-1)
61	FT-19R	3	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG493493493AX08
134	POWER STRIP	1	POWER STRIP, GEIST GLOBAL, MODEL# BRXN080-10, NON-SURGE, 15A.
140	RTU/ANN (MAIN & BACKUP)	1	ORIONLX AUTOMATION PLATFORM, NOVATECH MODEL#ORIONLX-E3-ENEN-CPX-MMB-XM4-IHV-HVXX-01-03-04-07-42-44-47-52-57-70-35-83-95-101 STANDARD HARDWARE AND SOFTWARE COMPONENTS: ONE FIXED DIAGNOSTICS/MAINTENANCE RS-232 PORT (STANDARD) ONE CONFIGURABLE RS-232 PORT (STANDARD) THREE USB MEMORY PORTS DUAL COPPER ETHERNET PORTS (ENEN) SINGLE 48-125VDC/120VAC POWER SUPPLY (HVXX) IRIG-B PORT ETHERNET CLIENT PROTOCOL NTP ETHERNET SERVER PROTOCOLS TELNET, SSH, FTP, SFTP, HTTP, HTTPS, NTP COMPLETE CYBER SECURITY PACKAGE HARDWARE INCLUDED: THREE CONFIGURABLE RS-232 EXPANSION SERIAL PORTS (E3) HIGH PERFORMANCE CPU (CPX) (INCLUDES XM4) MULTIMEDIA BOARD (MMB) EXPANDED FLASH MEMORY (XM4) (INCLUDED WITH CPX) 48VDC/125VDC DISCRETE INPUT VOLTAGE (IVH) MASTER (IED) PROTOCOLS INCLUDED: DNP3.0 SERIAL (01) DNP3.0 IP (TCP & UDP) (03) MODBUS ASCII/RTU SERIAL (04) MODBUS TCP/IP (07) SLAVE (SCADA) PROTOCOLS INCLUDED: DNP3.0 SERIAL SLAVE (42) DNP3.0 IP SLAVE (TCP & UDP) (44) MODBUS ASCII/RTU SERIAL (47) PUSHER (52) WEBSERVER XML (57) SPS (70) SOFTWARE OPTIONS: LOGIC PAK (35) ORION MATH AND LOGIC (83) ALARM/ARCHIVE/RETENTIVE (95) IEC6-1131 LOGIC (101)
141	ANN SCREEN	1	19" TOUCHSCREEN MONITOR WITH 19" RACK-MOUNT BRACKET, TRANSDUCTION INC., CAT# TR-LCD1900-RM-TOUCH-125VDC, 125VAC/VDC
142	KEYBOARD	1	RACK-MOUNT USB KEYBOARD/DRAWER WITH TOUCHPAD, ADESSO, PN# ACK-730UB-MRP
145	ENET SW	1	ETHERNET SWITCH/ROUTER, RUGGEDCOM RUGGEDBACKBONE RX1501, CAT# RX1501-L2-RM-HI-L3SECL2HW-6TX01-6TX01-6TX01-6TX01-6TX01-XX, LAYER 2 SWITCH, 19" RACK MOUNT, SOFTWARE: LAYER 3 SECURITY EDITION (WITH L2 HW), 88-300VDC OR 85-264VAC POWER SUPPLY WITH SCREW TERMINAL BLOCK, 6 X 10/100TX RJ45 ETHERNET PORTS (LINE MODULES 1, 2, 3, 4, 5 & 6)
146	ENET SW	1	ETHERNET SWITCH/ROUTER, RUGGEDCOM RUGGEDBACKBONE RX1501, CAT# RX1501-L2-RM-HI-L3SECL2HW-6TX01-6TX01-6TX01-4FX11-6TX01-XX, LAYER 2 SWITCH, 19" RACK MOUNT, SOFTWARE: LAYER 3 SECURITY EDITION (WITH L2 HW), 88-300VDC OR 85-264VAC POWER SUPPLY WITH SCREW TERMINAL BLOCK, 5 X 10/100TX RJ45 ETHERNET PORTS (LINE MODULES 1, 2, 3, 4 & 6), 1X FOUR MULTIMODE 1300NM LC CONNECTORS (LINE MODULE 5)
147	FIREWALL	1	SECURITY APPLIANCE: FIREWALL, IPS, APPLICATION CONTROL AND ANTIVIRUS, CHECK POINT SOFTWARE TYPE CIP-1200R, WITH MULTI-PROTOCOL SUPPORT, 4 X 10/100/1000BASE-T RJ45 LAN PORTS, 1 X 10/100/1000BASE-T RJ45 OR 1 X 1000BASE-F WAN PORT, 1 X 10/100/1000BASE-T RJ45 OR 1 X 1000BASE-F DMZ PORT, -40C TO +75C, 100-240VAC/12-72VDC POWER SUPPLY WITH SCREW TERMINALS, WITH STANDARD DIN RAIL MOUNT PROVISIONS (CAT #CPAP-SG1200R-NGTP), WITH ADDITIONAL 2-YEAR BLADE/LICENSE PACKAGE (CAT #CPSB-NGTP-1200R-2Y), WITH 3-YEAR 24X7 SUPPORT (CAT #CPES-SS-PREMIUM-3Y)
151	SHELF	1	CUSTOM RACK SHELF FOR FIREWALL SEE DETAIL 3300.1-1-6

ITEM	DEV	QUAN	DESCRIPTION
153	GPS CLOCK	1	GPS SATELLITE-CONTROLLED CLOCK, SCHWEITZER ENGINEERING LABORATORIES INC. MODEL# SEL-2407, CAT# 24070003B, POWER SUPPLY INPUT RANGE: 18-300 VDC AND 85-264 VAC (50-60 HZ), CLOCK WITH 19 INCH RACK MOUNT BRACKET.
* 154	ANT	1	SCHWEITZER ENGINEERING LAB. CAT #9524A, GPS ANTENNA
* 155	CABLE	1	SCHWEITZER ENGINEERING LAB. CAT #C961-075, 75FT GPS ANTENNA CABLE
170	PAC	1	SCHWEITZER ENGINEERING LAB. TYPE SEL-2440, CAT #24402H12A1A11630.
171	PAC	3	SCHWEITZER ENGINEERING LAB. TYPE SEL-2440, CAT #24402H11A6X11630.
230	COVER PLATE	7	COVER PLATE 19"W X 1 3/4"H
234	COVER PLATE	1	COVER PLATE 19"W X 8 3/4"H
* 251	FB	36	FUSE BLOCK, 1 POLE, 250V, 30A, BUSSMAN, #BMM603-1S0
* 252	FUSE	24	FUSE, COOPER BUSSMANN, 600V FAST-ACTING SUPPLEMENTAL, 5 AMP, CAT# KLM-5
* 255	TB	LOT	TERMINAL BLOCK, 12 POINT, MARATHON CO., CAT #1512 STD
* 285	DC-DC	1	DC-DC CONVERTER PHOENIX CONTACT, 90-350VDC INPUT, 24VDC OUTPUT, 5A, TYPE QUINT-PS-100-240AC/24DC/S CAT #2938581
400	PORT SERVER	1	SCHWEITZER ENGINEERING LAB. TYPE SEL-3610, CAT #3610XHA0000X
401	XCVR	2	SCHWEITZER ENGINEERING LAB. CAT #2812MRX0, MULTI-MODE FIBER OPTIC TRANSCEIVER

INDICATED DRAWING

NOTES:
1. 1 RACK UNIT SPACE IS REQUIRED ABOVE THE ETHERNET SWITCH AND FIREWALL TO ALLOW FOR HEAT DISSIPATION.

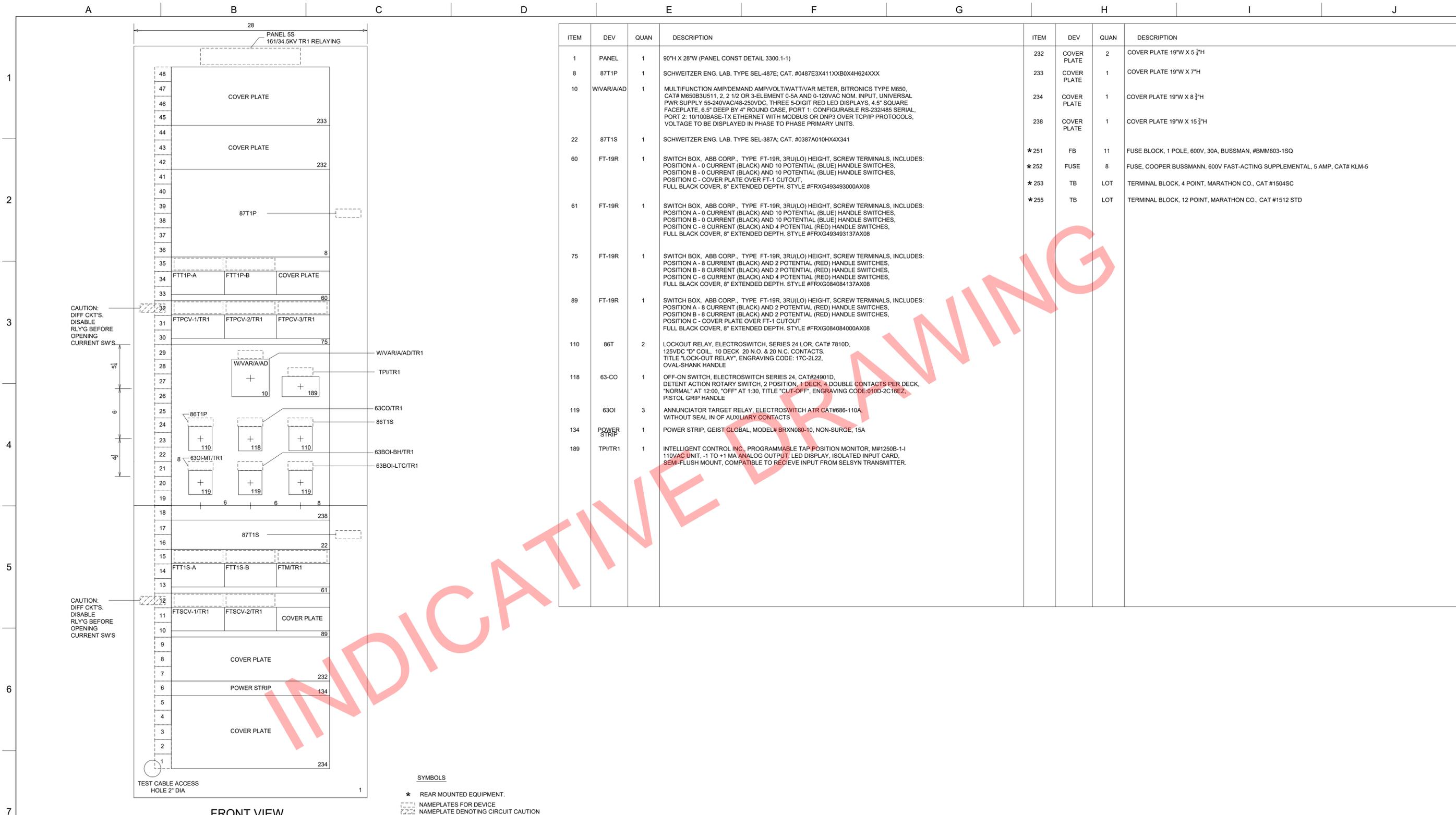
SYMBOLS
* REAR MOUNTED EQUIPMENT.
[] NAMEPLATES PRODUCED AND MOUNTED
[] PER PANEL NAMEPLATE DETAIL 3300.1-1-11

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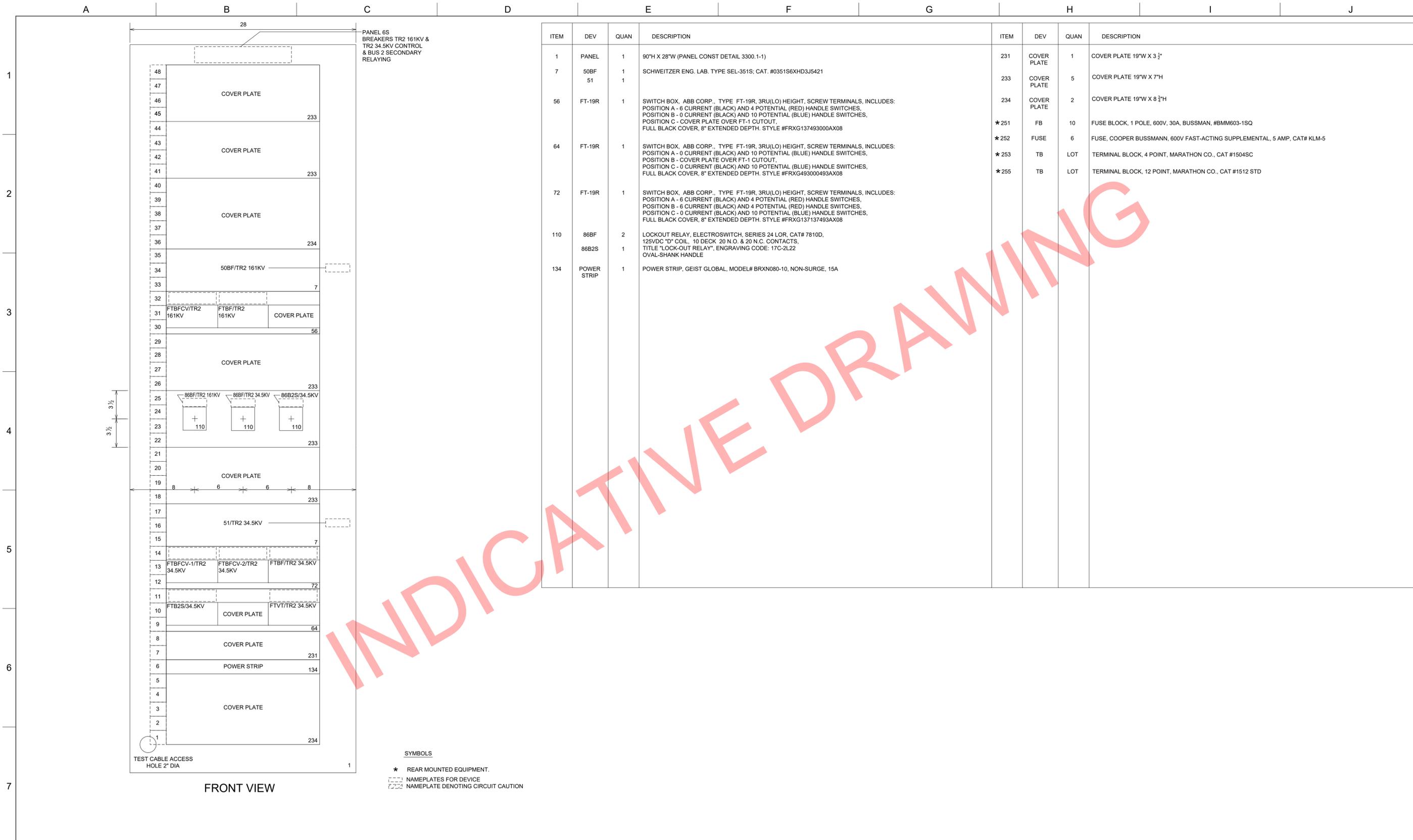
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

NH-XXXXX-X



ITEM	DEV	QUAN	DESCRIPTION	ITEM	DEV	QUAN	DESCRIPTION
1	PANEL	1	90"H X 28"W (PANEL CONST DETAIL 3300.1-1)	232	COVER PLATE	2	COVER PLATE 19"W X 5 1/4"H
8	87T1P	1	SCHWEITZER ENG. LAB. TYPE SEL-487E; CAT. #0487E3X411XXB0X4H624XXX	233	COVER PLATE	1	COVER PLATE 19"W X 7"H
10	WVAR/A/AD	1	MULTIFUNCTION AMP/DEMAND AMP/VOLT/WATT/VAR METER, BITRONICS TYPE M650, CAT# M850B3U511, 2, 2 1/2 OR 3-ELEMENT 0-5A AND 0-120VAC NOM. INPUT, UNIVERSAL PWR SUPPLY 55-240VAC/48-250VDC, THREE 5-DIGIT RED LED DISPLAYS, 4.5" SQUARE FACEPLATE, 6.5" DEEP BY 4" ROUND CASE, PORT 1: CONFIGURABLE RS-232/485 SERIAL, PORT 2: 10/100BASE-TX ETHERNET WITH MODBUS OR DNP3 OVER TCP/IP PROTOCOLS, VOLTAGE TO BE DISPLAYED IN PHASE TO PHASE PRIMARY UNITS.	234	COVER PLATE	1	COVER PLATE 19"W X 8 3/4"H
22	87T1S	1	SCHWEITZER ENG. LAB. TYPE SEL-387A; CAT. #0387A010HX4X341	238	COVER PLATE	1	COVER PLATE 19"W X 15 3/4"H
60	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - COVER PLATE OVER FT-1 CUTOUT, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG493493000AX08	*251	FB	11	FUSE BLOCK, 1 POLE, 600V, 30A, BUSSMAN, #BMM603-1SQ
61	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG084084137AX08	*252	FUSE	8	FUSE, COOPER BUSSMANN, 600V FAST-ACTING SUPPLEMENTAL, 5 AMP, CAT# KLM-5
75	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 8 CURRENT (BLACK) AND 2 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 8 CURRENT (BLACK) AND 2 POTENTIAL (RED) HANDLE SWITCHES, POSITION C - 8 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG084084137AX08	*253	TB	LOT	TERMINAL BLOCK, 4 POINT, MARATHON CO., CAT #1504SC
89	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 8 CURRENT (BLACK) AND 2 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 8 CURRENT (BLACK) AND 2 POTENTIAL (RED) HANDLE SWITCHES, POSITION C - COVER PLATE OVER FT-1 CUTOUT, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG084084000AX08	*255	TB	LOT	TERMINAL BLOCK, 12 POINT, MARATHON CO., CAT #1512 STD
110	86T	2	LOCKOUT RELAY, ELECTROSWITCH, SERIES 24 LOR, CAT# 7810D, 125VDC 1D COIL, 10 DECK 20 N.O. & 20 N.C. CONTACTS, TITLE "LOCK-OUT RELAY", ENGRAVING CODE: 17C-2L22, OVAL-SHANK HANDLE				
118	63-CO	1	OFF-ON SWITCH, ELECTROSWITCH SERIES 24, CAT#24801D, DETENT ACTION ROTARY SWITCH, 2 POSITION, 1 DECK, 4 DOUBLE CONTACTS PER DECK, "NORMAL" AT 12:00, "OFF" AT 1:30, TITLE "CUT-OFF", ENGRAVING CODE:010D-2C16EZ, PISTOL GRIP HANDLE				
119	63OI	3	ANNUNCIATOR TARGET RELAY, ELECTROSWITCH ATR CAT#686-110A, WITHOUT SEAL IN OF AUXILIARY CONTACTS				
134	POWER STRIP	1	POWER STRIP, GEIST GLOBAL, MODEL# BRXN080-10, NON-SURGE, 15A				
189	TPI/TR1	1	INTELLIGENT CONTROL INC., PROGRAMMABLE TAP POSITION MONITOR, M#1250B-1-1 110VAC UNIT, -1 TO +1 MA ANALOG OUTPUT, LED DISPLAY, ISOLATED INPUT CARD, SEMI-FLUSH MOUNT, COMPATIBLE TO RECIEVE INPUT FROM SELSYN TRANSMITTER.				

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														DWG NO.	MANUFACTURER	DESCRIPTION					
	REV. A - ISSUED FOR REVIEW: 8-9-21														DWN:	DATE:	CHK:	DATE:	ENERGY SUPPLY ENGINEERING & CONSTRUCTION	NH-XXXXX-X	
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														APVD:	DATE:	SCALE: NONE					



ITEM	DEV	QUAN	DESCRIPTION	ITEM	DEV	QUAN	DESCRIPTION
1	PANEL	1	90"H X 28"W (PANEL CONST DETAIL 3300.1-1)	231	COVER PLATE	1	COVER PLATE 19"W X 3 1/2"
7	50BF 51	1 1	SCHWEITZER ENG. LAB. TYPE SEL-351S; CAT. #0351S6XHD3J5421	233	COVER PLATE	5	COVER PLATE 19"W X 7"H
56	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - COVER PLATE OVER FT-1 CUTOUT, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG137493000AX08	234	COVER PLATE	2	COVER PLATE 19"W X 8 3/4"
64	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION B - COVER PLATE OVER FT-1 CUTOUT, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG493000493AX08	* 251	FB	10	FUSE BLOCK, 1 POLE, 600V, 30A, BUSSMAN, #BMM603-1SQ
72	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG137493AX08	* 252	FUSE	6	FUSE, COOPER BUSSMANN, 600V FAST-ACTING SUPPLEMENTAL, 5 AMP, CAT# KLM-5
110	86BF 86B2S	2 1	LOCKOUT RELAY, ELECTROSWITCH, SERIES 24 LOR, CAT# 7810D, 125VDC "D" COIL, 10 DECK 20 N.O. & 20 N.C. CONTACTS, TITLE "LOCK-OUT RELAY", ENGRAVING CODE: 17C-2L22 OVAL-SHANK HANDLE	* 253	TB	LOT	TERMINAL BLOCK, 4 POINT, MARATHON CO., CAT #1504SC
134	POWER STRIP	1	POWER STRIP, GEIST GLOBAL, MODEL# BRXN080-10, NON-SURGE, 15A	* 255	TB	LOT	TERMINAL BLOCK, 12 POINT, MARATHON CO., CAT #1512 STD

INDICATIVE DRAWING

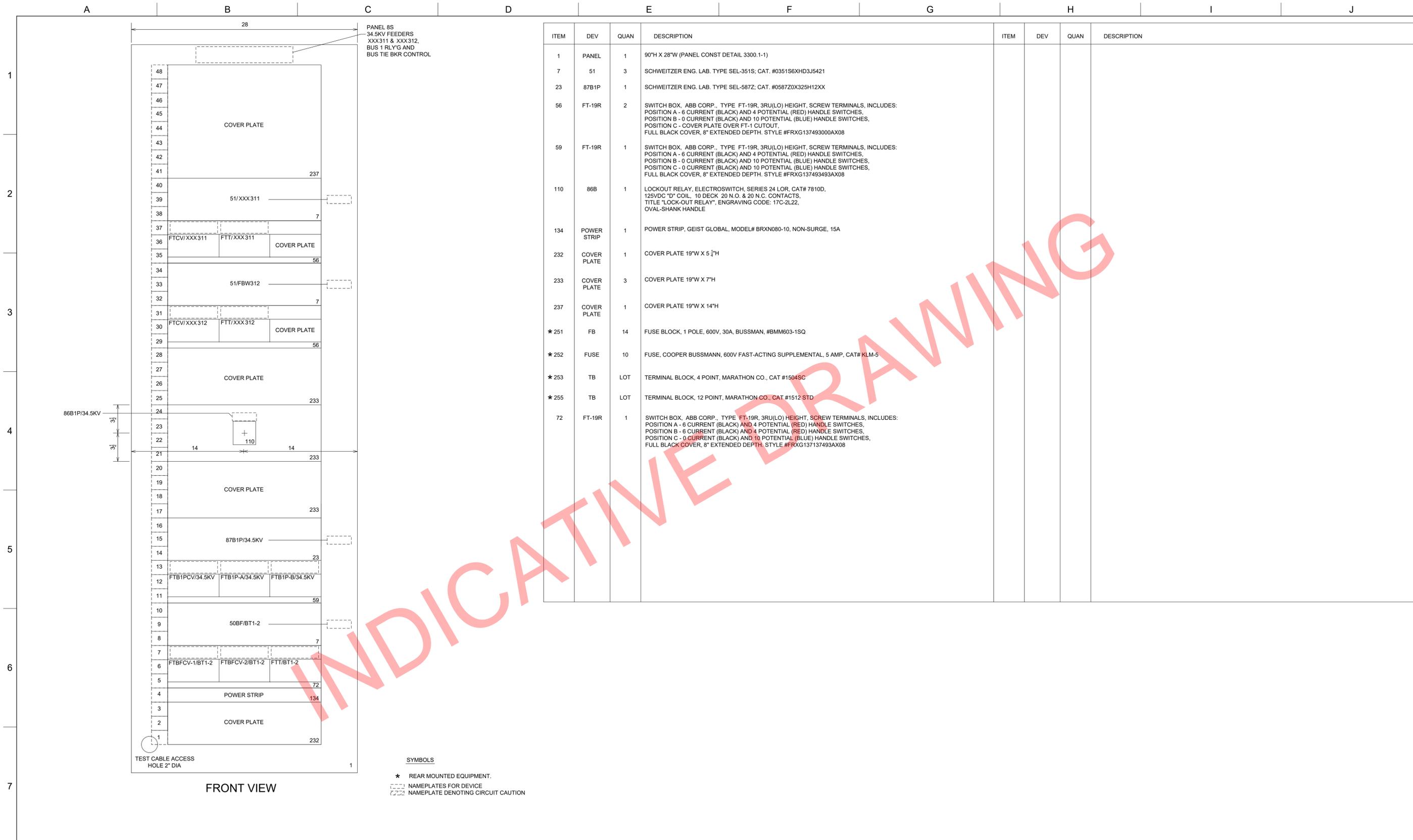
SYMBOLS
 * REAR MOUNTED EQUIPMENT.
 --- NAMEPLATES FOR DEVICE
 --- NAMEPLATE DENOTING CIRCUIT CAUTION

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	THIS MAP/DRAWING 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.	UNIT 0 COLLECTOR SUBSTATION CONTROL 161KV/34.5KV PANEL 6S BKR TR2 161KV & TR2 34.5KV CONTROL PANEL ELEVATION	REV	
														DWG NO.	MANUFACTURER	DESCRIPTION					
	REV. A - ISSUED FOR REVIEW: 8-9-21																				

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

ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

NH-XXXXX-X



ITEM	DEV	QUAN	DESCRIPTION	ITEM	DEV	QUAN	DESCRIPTION
1	PANEL	1	90"H X 28"W (PANEL CONST DETAIL 3300.1-1)				
7	51	3	SCHWEITZER ENG. LAB. TYPE SEL-351S; CAT. #0351S6XHD3J5421				
23	87B1P	1	SCHWEITZER ENG. LAB. TYPE SEL-587Z; CAT. #0587Z0X325H12XX				
56	FT-19R	2	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - COVER PLATE OVER FT-1 CUTOUT, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG137493000AX08				
59	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG137493493AX08				
110	86B	1	LOCKOUT RELAY, ELECTROSWITCH, SERIES 24 LOR, CAT# 7810D, 125VDC "D" COIL, 10 DECK 20 N.O. & 20 N.C. CONTACTS, TITLE "LOCK-OUT RELAY", ENGRAVING CODE: 17C-2L22, OVAL-SHANK HANDLE				
134	POWER STRIP	1	POWER STRIP, GEIST GLOBAL, MODEL# BRXN080-10, NON-SURGE, 15A				
232	COVER PLATE	1	COVER PLATE 19"W X 5 1/2"H				
233	COVER PLATE	3	COVER PLATE 19"W X 7"H				
237	COVER PLATE	1	COVER PLATE 19"W X 14"H				
*251	FB	14	FUSE BLOCK, 1 POLE, 600V, 30A, BUSSMAN, #BMM603-1SQ				
*252	FUSE	10	FUSE, COOPER BUSSMANN, 600V FAST-ACTING SUPPLEMENTAL, 5 AMP, CAT# KLM-5				
*253	TB	LOT	TERMINAL BLOCK, 4 POINT, MARATHON CO., CAT #1504SC				
*255	TB	LOT	TERMINAL BLOCK, 12 POINT, MARATHON CO., CAT #1512 STD				
72	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH. STYLE #FRXG137137493AX08				

SYMBOLS
 * REAR MOUNTED EQUIPMENT.
 [Symbol] NAMEPLATES FOR DEVICE
 [Symbol] NAMEPLATE DENOTING CIRCUIT CAUTION

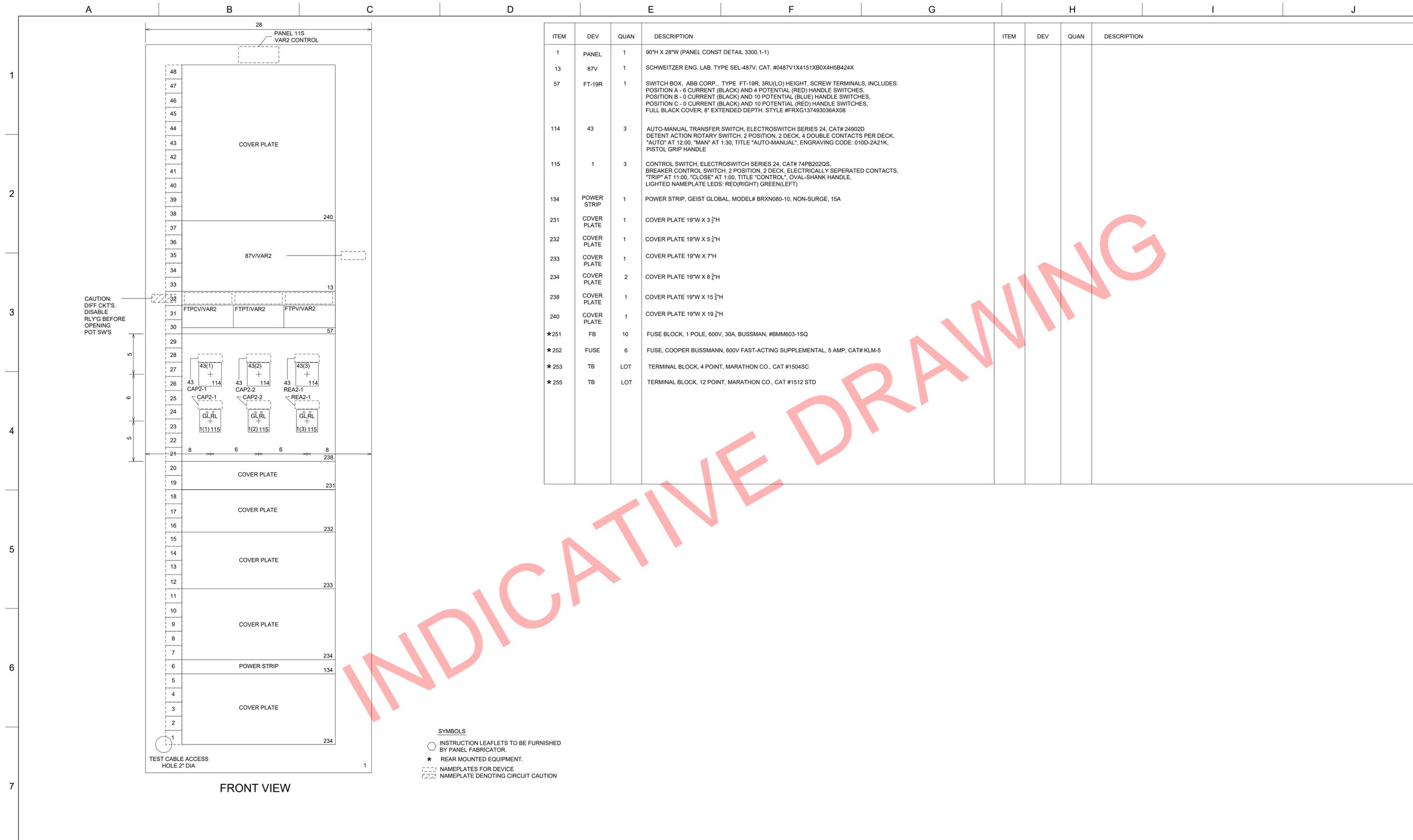
FRONT VIEW

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	THIS MAP/DRAWING 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.	UNIT 0 COLLECTOR SUBSTATION CONTROL 34.5KV PANEL 8S FEEDERS XXX311 & XXX312, BUS TIE CTRL AND RLYG PANEL ELEVATION	REV		
														DWNG NO.	MANUFACTURER	DESCRIPTION						
	REV. A - ISSUED FOR REVIEW: 8-9-21																					

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

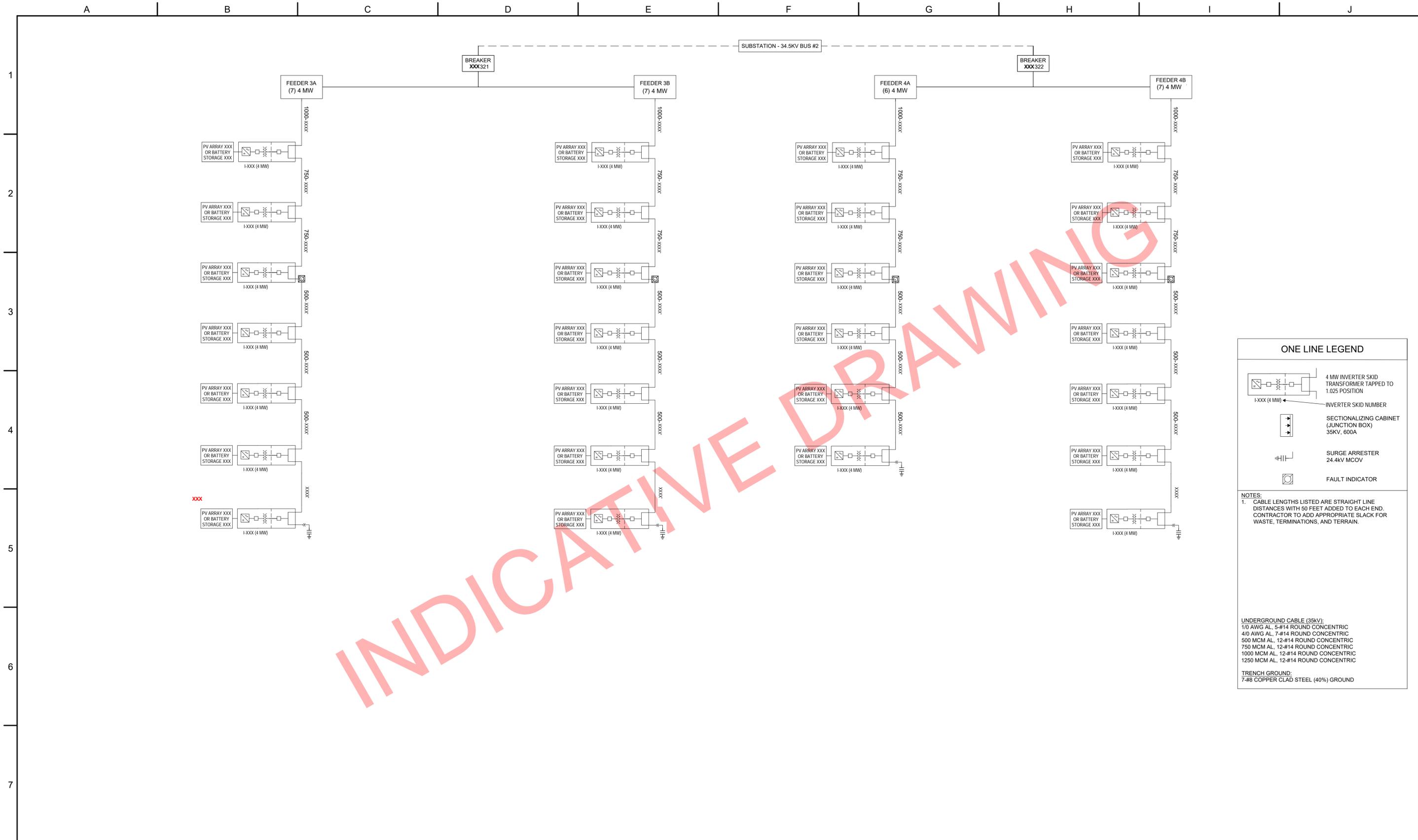
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

NH-XXXXX-X

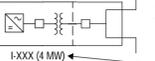


ITEM	DEV	QUAN	DESCRIPTION	ITEM	DEV	QUAN	DESCRIPTION
1	PANEL	1	90"H X 28"W (PANEL CONST DETAIL 3300.1-1)				
13	87V	1	SCHWEITZER ENG. LAB. TYPE SEL-487V; CAT. #0487V1X4151XB0X4H5B424X				
57	FT-19R	1	SWITCH BOX, ABB CORP., TYPE FT-19R, 3RU(LO) HEIGHT, SCREW TERMINALS, INCLUDES: POSITION A - 6 CURRENT (BLACK) AND 4 POTENTIAL (RED) HANDLE SWITCHES, POSITION B - 0 CURRENT (BLACK) AND 10 POTENTIAL (BLUE) HANDLE SWITCHES, POSITION C - 0 CURRENT (BLACK) AND 10 POTENTIAL (RED) HANDLE SWITCHES, FULL BLACK COVER, 8" EXTENDED DEPTH, STYLE #FRXG137493036AX08				
114	43	3	AUTO-MANUAL TRANSFER SWITCH, ELECTROSWITCH SERIES 24, CAT# 24902D, DETENT ACTION ROTARY SWITCH, 2 POSITION, 2 DECK, 4 DOUBLE CONTACTS PER DECK, "AUTO" AT 12:00, "MAN" AT 1:30, TITLE "AUTO-MANUAL", ENGRAVING CODE: 010D-2A21K, PISTOL GRIP HANDLE				
115		3	CONTROL SWITCH, ELECTROSWITCH SERIES 24, CAT# 74PB202QS, BREAKER CONTROL SWITCH, 2 POSITION, 2 DECK, ELECTRICALLY SEPERATED CONTACTS, "TRIP" AT 11:00, "CLOSE" AT 1:00, TITLE "CONTROL", OVAL-SHANK HANDLE, LIGHTED NAMEPLATE LEDS: RED(RIGHT) GREEN(LEFT)				
134	POWER STRIP	1	POWER STRIP, GEIST GLOBAL, MODEL# BRXN080-10, NON-SURGE, 15A				
231	COVER PLATE	1	COVER PLATE 19"W X 3 3/4"H				
232	COVER PLATE	1	COVER PLATE 19"W X 5 1/2"H				
233	COVER PLATE	1	COVER PLATE 19"W X 7"H				
234	COVER PLATE	2	COVER PLATE 19"W X 8 3/4"H				
238	COVER PLATE	1	COVER PLATE 19"W X 15 3/4"H				
240	COVER PLATE	1	COVER PLATE 19"W X 19 1/2"H				
*251	FB	10	FUSE BLOCK, 1 POLE, 600V, 30A, BUSSMAN, #BMM603-1SQ				
*252	FUSE	6	FUSE, COOPER BUSSMANN, 600V FAST-ACTING SUPPLEMENTAL, 5 AMP, CAT# KLM-5				
*253	TB	LOT	TERMINAL BLOCK, 4 POINT, MARATHON CO., CAT #1504SC				
*255	TB	LOT	TERMINAL BLOCK, 12 POINT, MARATHON CO., CAT #1512 STD				

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX WIND FARM XXXXXXX COUNTY, MINNESOTA	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.	UNIT 0 COLLECTOR SUBSTATION CONTROL 34.5KV PANEL 11S VAR2 CTRL & RLYG PANEL ELEVATION	REV			
														DWG NO.	MANUFACTURER	DESCRIPTION							
	REV. A - ISSUED FOR REVIEW: 8-9-21																						



ONE LINE LEGEND

 4 MW INVERTER SKID TRANSFORMER TAPPED TO 1.025 POSITION
 I-XXX (4 MW) ← INVERTER SKID NUMBER
 SECTIONALIZING CABINET (JUNCTION BOX) 35KV, 600A
 SURGE ARRESTER 24.4kV MCOV
 FAULT INDICATOR

NOTES:

1. CABLE LENGTHS LISTED ARE STRAIGHT LINE DISTANCES WITH 50 FEET ADDED TO EACH END. CONTRACTOR TO ADD APPROPRIATE SLACK FOR WASTE, TERMINATIONS, AND TERRAIN.

UNDERGROUND CABLE (35KV):
 1/0 AWG AL, 5-#14 ROUND CONCENTRIC
 4/0 AWG AL, 7-#14 ROUND CONCENTRIC
 500 MCM AL, 12-#14 ROUND CONCENTRIC
 750 MCM AL, 12-#14 ROUND CONCENTRIC
 1000 MCM AL, 12-#14 ROUND CONCENTRIC
 1250 MCM AL, 12-#14 ROUND CONCENTRIC

TRENCH GROUND:
 7-#6 COPPER CLAD STEEL (40%) GROUND

NO	REVISION	ZONE	DATE	BY	CHK	ENG	NO	REVISION	ZONE	DATE	BY	CHK	ENG	REFERENCE DRAWINGS			 NORTHERN STATES POWER COMPANY XXXXXXX SOLAR / ENERGY STORAGE XXXXXXX COUNTY, MINNESOTA	THIS MAP/DRAWING 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.	UNIT 0 COLLECTION SYSTEM ONE LINE DIAGRAM FEEDER 3 & FEEDER 4	REV
	REV. A - ISSUED FOR REVIEW: 8-9-21							DWG. NO.						MANUFACTURER	DESCRIPTION	DWN:				

