SUBSTATION DESIGN CRITERIA DOCUMENT

East Point Collector Station
Schoharie Co, NY

Prepared for

NextEra Energy

Prepared by

TRC
10 Maxwell Drive
Clifton Park NY 12065
Project # 327851

June 2019

REVISION INDEX

Written by:	Andrew Dion, PE - TRC	**Date:**	April 1, 2019
Revised by:		**Date:**	
Reviewed by:	D. R. Gilman	**Date:**	April 17, 2019
Approved by:		**Date:**	

Revision	Description	Date
0	Issued for Project Record	June 20, 2019

Design Criteria Document
Substation Systems

Project: East Point Collector Substation
Client: NextEra Energy
Project Location: Schoharie Co, NY
Date: June 2019
Revision: 0

General Description

Summary

East Point Collector Substation will be designed and built to collect roughly 50MW of PV solar power located in upstate New York and transmit to a nearby 69kV interconnection point. The 110’ x 144’ substation yard will consist of two (2) incoming 34.5kV collector line feeders, each with circuit breaker protection feeding onto the substation bus and through a 69-34.5kV Power Transformer with associated 69kV high voltage circuit breaker, disconnect switches, instrument transformers and revenue metering.

Standards and Reference Documents

Applicable federal, state, and local codes and standards shall also be observed. A summary of the industry codes and standards to be used are as follows:

Industry References

ANSI	American National Standards Institute
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NEC	National Electrical Code
RUS 1724E-300	U.S. Dept. of Agriculture Design Guide for Rural Substations
AISC	American Institute of Steel Construction
ASTM	American Society for Testing and Materials
ACI	American Concrete Institute
AWS	American Welding Society
IEEE	Institute of Electrical and Electronics Engineers
CSI	Construction Specifications Institute
NFPA	National Fire Protection Association
IES	Illuminating Engineering Society
ASCE	American Society of Civil Engineers
NPCC	Northeast Power Coordinating Council

Design Criteria & System Parameters

System Parameters – 69kV System	
Nominal Voltage	69kV Line to Line
Maximum Design Level Voltage	72kV
Basic Impulse Level	350kV
Design Continuous Amperage	1200 Amps
Fault Current Level (Equipment)	40kAIC (RMS Symmetrical)
Grounding	Grounded Wye
Post Project 3 Phase-Fault Current	20kA (3L-Gnd)
3 Phase Fault Current for Bus Design	30kA
Post Project 1 Line to Gnd. Fault Current	17.5kA
L-Gnd. Fault Current for Ground Grid Design	20kA
Min. Withstand Fault Capability:	
• Short Time	38kA
• RMS Asymmetrical (Momentary)	61kA
• Peak Asymmetrical	99kA
Post Project Line-Line Fault Current	30kA

System Parameters – 34.5kV System	
Nominal Voltage	34.5kV Line to Line
Maximum Design Level Voltage	35kV
Basic Impulse Level	200kV
Design Continuous Amperage	1200 Amps
Fault Current Level (Equipment)	40kAIC (RMS Sym)
Grounding	Effectively Grounded
Post Project 3 Phase-Fault Current	20kA (3L-Gnd)
3 Phase Fault Current for Bus Design	25kA
Post Project 1 Line to Gnd. Fault Current	17.5kA
L-Gnd. Fault Current for Ground Grid Design	20kA
Min. Withstand Fault Capability:	
• Short Time	38kA
• RMS Asymmetrical (Momentary)	61kA
• Peak Asymmetrical	99kA
Post Project Line-Line Fault Current	30kA

Listed design values to be validated and updated during detail engineering based on System Impact Study (SIS) and corresponding Aspen fault model for the collector substation.

Electrical Clearances

Yard Clearances

The substation shall be designed to provide at a minimum, the yard clearances and spacing in **Table 1-1.** Equipment spacing shall be in accordance with the applicable codes.

Table 1-1
Yard Minimum Clearances

Nominal Operating Voltage (Ph-Ph)[1,2], kV Nom	Basic Impulse Level (BIL)[1,2], kV Peak	Minimum Phase-to-Phase, Metal-to-Metal, Inches[1]	Phase-to-Ground, Metal-to-Metal,[1] Inches
69	350	31	25
34.5	200	18	15

[1] ANSI C37.32
[2] NESC, Section 12

Outdoor Bus Clearances & Spacings

Standard Phase Spacings	69kV	8' – 0"
	34.5kV	3' – 0"

The substation bus shall be designed to maintain the clearances and spacing in **Table 1-2**. The values given below shall be treated as the minimum allowed.

Table 1-2
Minimum Bus Clearances (Outdoor)

Nominal Operating Voltage (Ph-Ph), kV Nom	Basic Impulse Level (BIL), kV Peak	Vertical Clearance of Unguarded Parts,[2] Inches	Horizontal Clearance of Unguarded Parts,[2] Inches	Vertical Break Disconnecting Switches, [1] Inches	Side Break Disconnecting Switches,[1] Inches	All Horn Gap Switches (Vertical and Side Break),[1] Inches
72.5	350	125	59	60	72	84
34.5	200	114	48	36	48	60

[1] ANSI C37.32
[2] NESC, Section 12

High & Medium Voltage Bus System & Hardware

Bus

Tubular bus fittings shall be 360 degree circumferential swage 2 piece compression type with NEMA configured equipment terminal pad configurations as manufactured by DMC or approved equal. All tubular bus spans exceeding 20' shall include 795KCM AAC dampening cable for Aeolian vibration control. Bus supports shall be bolted aluminum two piece ring type - capable of either slip of fixed

support with anti-chatter springs. The 34.5kV tubular aluminum bus will be 2 or 4 inch I.P.S., and will transition to 1272KCM or 795KCM AAC to 69kV and 34.5kV yard equipment.

Conductors

69kV conductor leads for the yard equipment will be (1) 1272KCM AAC. Transformer conductor leads will be (1) 1272KCM AAC.

34.5kV conductor leads for the cable terminators and surge arresters will be (1) 1272KCM AAC. Transformer conductor leads will be (1) 1272KCM AAC.

Insulators

The load on the insulator (cantilever, tension, compression, torsion) shall not exceed the respective insulator strength published in ANSI C29.9, Tables 1 or 2. All insulators for the rigid bus system and disconnect switches shall be porcelain station post, standard creep, and shall be ANSI 70 gray in color. Standard strength, High strength or Extra-high strength insulators will be specified according to project criteria resulting from three phase symmetrical bus design fault current.

Apparatus Insulators (69kV):

- Nominal Voltage 69kV
- Type Station Post
- BIL 350kV
- Color ANSI-70
- Cantilever Strength 1500/3000 lbs standard/high strength
- NEMA TR No. 216/278

Apparatus Insulators (34.5kV):

- Nominal Voltage 34.5kV
- Type Station Post
- BIL 200kV
- Color ANSI-70
- Cantilever Strength 2000 lbs minimum (standard strength)
- NEMA TR No. TR-210

Major Equipment

(1) - 69/34.5/13.8kV Power Transformer

- Vendor TBD
- High Voltage 69kV Grounded-Wye
- Low Voltage 34.5kV Grounded-Wye
- Ter. Voltage 13.8kV Delta (Buried)
- MVA 36/48/60

34.5kV Switch

- Vendor TBD
- Type Vertical Break
- Voltage 38kV
- BIL 200kV
- Cont. Current 1200A
- kA Mom. 61kA

69kV Operated Line Switch

- Vendor TBD
- Type Vertical Break
- Voltage 69kV
- BIL 350kV
- Cont. Current 1200A
- kA Mom. 61kA
- Control Volt. 125VDC

69kV Transformer Switch

- Vendor TBD
- Type Center Break
- Voltage 69kV
- BIL 350kV
- Cont. Current 1200A
- kA Mom. 61kA

69kV Ground Switch

- Vendor TBD
- Type Vertical Break
- Voltage 69kV
- BIL 350kV
- kA Mom. 61kA

AC Station Service

Design Criteria

The AC station service system shall be sized to accommodate all new and known future substation AC power requirements. AC Station service will be established from two independent sources.

The Primary station service will originate from the 34.5kV bus and feed a single phase 25kVA transformer. A 240/120V grounded-wye, 1 phase, 3 wire secondary will be derived and used as the Primary station service.

The Alternate station service will originate from a nearby distribution line or emergency generator and will be selected during the detailed design process.

An automatic transfer switch (ATS) will be installed and fed from the two independent station service sources.

Substation Lighting

Design Criteria

All interior building and exterior yard lighting will be designed per NextEra Energy or applicable industry standard. Outdoor Yard lighting designed to a 2.4 foot-candle average, and will be building wall, and pole structure mounted. Light fixture maintenance can be accomplished with equipment / bus in service by qualified personnel.

Materials

- Building Entry Light, Wallpack, 70W, HPS, with Full Visor
    - Lithonia TWA-70S
- Floodlight, 250W, HPS
    - Lithonia TFLU-250S

Direct Stroke Protection

Design Criteria

A three (3) 60ft. lightning mast will be utilized for the direct stroke protection. The analysis of then lightning protection for the substation yard will employ IEEE-998 “Rolling Sphere method” for the 69kV voltage level and “Fixed Angle method” for the voltages below 69kV.

Grounding

Design Criteria

The fault current that will be used for grounding system design will be based on 20 kA. IEEE-80 Standard current split factor will be used to determine the return ground current.

Subgrade Grounding

A 4/0 (19 strand) copperweld conductor will be installed 18" below finish yard grade. The 4/0 conductor will be arranged throughout the yard in an overlapping rectangular grid pattern, extending 3 feet beyond the fenceline (including gate swing radius), with 20 foot by 20 foot spacing as determined by design software. The grid spacing will be closer in the proximity of electrical equipment, and will be connected at all conductor intersections. Two (2) steel copper clad ground rods ¾" x 10', with threaded couplings will be installed as dictated by design software and client standards throughout the yard area connected to the 4/0 grid, to enhance the grid system's effectiveness, by penetrating into stable & lower resistivity unfrozen soil layers. The sub-grade ground grid connectors will be the "Hyground irreversible compression system" type - as manufactured by Burndy. All group operated airswitch mechanisms will have personnel protection mats below grade (installed with 4" of crushed stone cover) at each operating mechanism location. This protection mat will be connected to the operating handle, and to the ground grid to maximize personnel protection from touch potentials. Connected pigtails (4/0) extending from the subgrade grid to the base of equipment structures, and stands will bond all above grade facilities. The below grade grounding conductor will loop around yard structures. The substation yard finish grade will consist of a 4 inch layer of coarse crushed rock (3,000 OHM-meter), which is considered for safe yard step and touch potentials.

Structure & Equipment Grounding

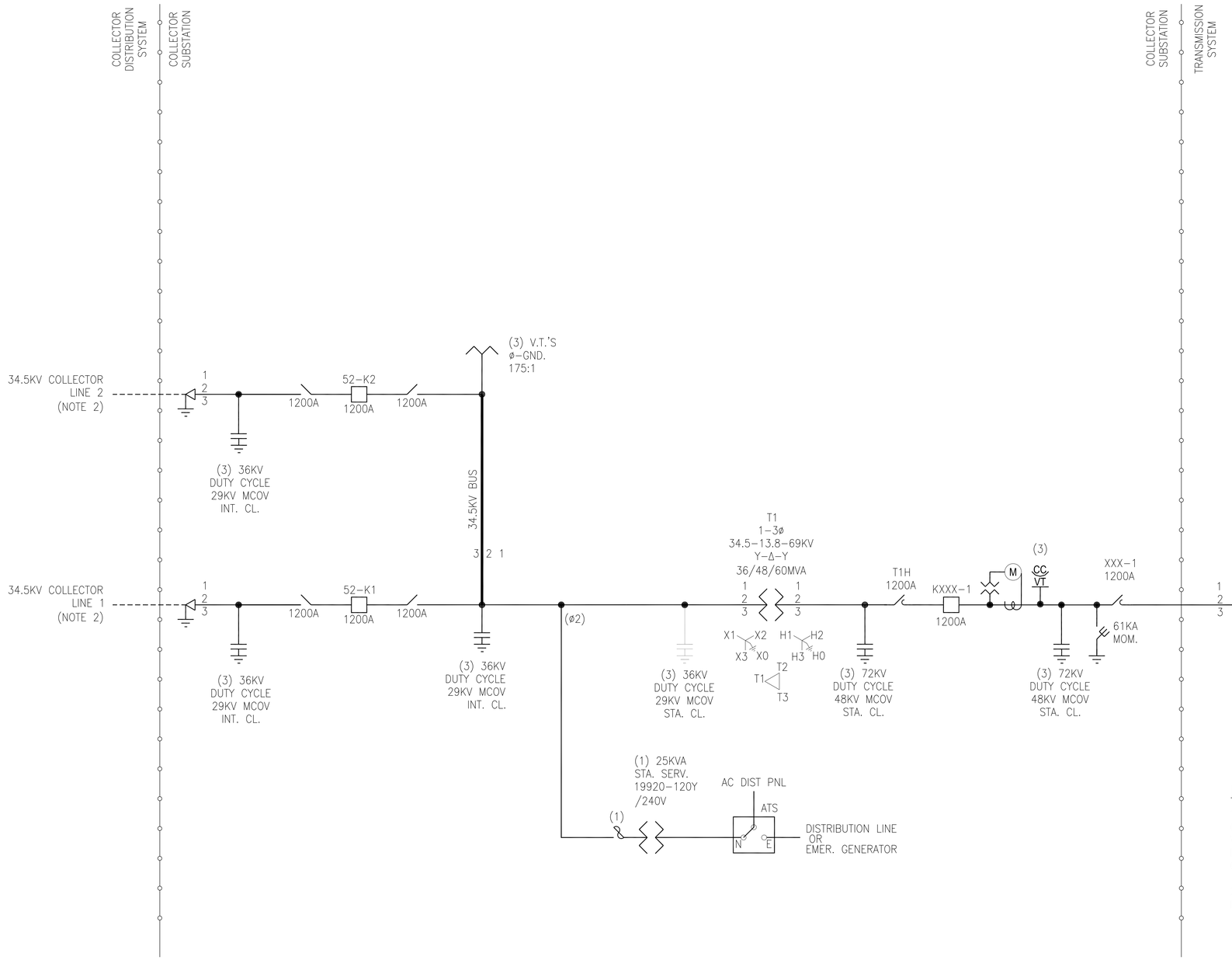
Ground grid pigtails will connect to the base of structure legs using bronze bolted or copper compression clamps as required at each leg for single and double leg structures, or at diagonally opposite legs for four leg structures and stands. Bronze mechanical connectors will also support jacketed 4/0 copper conductor to be run along structures and stands for grounding of equipment casings, surge arresters, ground switches, and overhead shield wires.

Where aluminum structures are used, bolted connections will be used and connections will be plated to accept copper conductors. Copper conductors shall be covered in solid dielectric insulation to avoid dissimilar metal corrosion from the contact of aluminum and copper.

All above grade equipment will be properly bonded to the station ground grid using a continuous conductor path.

Fence Grounding

The substation perimeter fence posts will be bonded using 4/0 copperweld pigtails from the station ground grid at regular intervals, and where each overhead transmission phase conductor (if applicable) crosses the fenceline with bolted bronze pipe-type mechanical connectors. Fence corner and gate posts shall be bonded directly to a ground rod. Gate frames and top rails will be bonded with 1/0 stranded copper, with the gate frame using a high strand 600V welding cable for maximum flexibility. Grounding of the chain-link fence, barbs, and bottom tension wire will be completed with a #2 stranded bare copper conductor and tinned bronze split bolt mechanical connectors.



LEGEND OF SYMBOLS:	
POWER TRANSFORMER (3Ø)	STATION SERVICE TRANSFORMER
SURGE ARRESTER	FUSED DISCONNECT (HOOKSTICK)
3Ø GROUND SWITCH	VOLTAGE TRANSFORMER (WOUND)
FAULT INT. DEVICE (CKT. BKR.)	SUBSTATION FENCE LINE DEMARCATION
3Ø GROUP OPER. AIRBREAK W/ ARCING HORNS	DISCONNECT SWITCH, GROUP OPERERATED
H.V. TERM. TO SOLID DI-ELECTRIC U.G. CABLE	
CC VT COUPLING CAPACITOR VOLTAGE TRANSFORMER	
REVENUE METERING	

REFERENCE DRAWINGS:

327851-101 – EAST POINT GENERAL ARRANGEMENT PLAN
327851-102 – EAST POINT ELEVATIONS & SECTIONS A-A, B-B
327851-103 – EAST POINT SECTIONS C-C, D-D
327851-104 – EAST POINT YARD LIGHTING PLAN
327851-105 – EAST POINT FENCE & GROUNDING PLAN
327851-106 – EAST POINT FENCE & GROUNDING DETAILS
327851-107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

NOTES:

1. THIS DESIGN ASSUMES EACH WIND-TURBINE GENERATOR STEP-UP OPERATES WYE-WYE WITH FOUR WIRE COLLECTOR LINES TO COLLECTOR SUBSTATION FOR A SOLIDLY GROUNDED FACILITY AT 34.5KV. NO GROUND BANK IS SHOWN UNDER THIS ASSUMPTION.

2. VOLTAGE WILL BE REGULATED AT EACH COLLECTOR LINE BY FEEDER NETWORK INVERTERS.

PRELIMINARY

TRC
249 Western Avenue
Augusta, ME 04330

PROJECT NO: 327851

REV	DESCRIPTION	DATE	DES	CHK	APP
A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

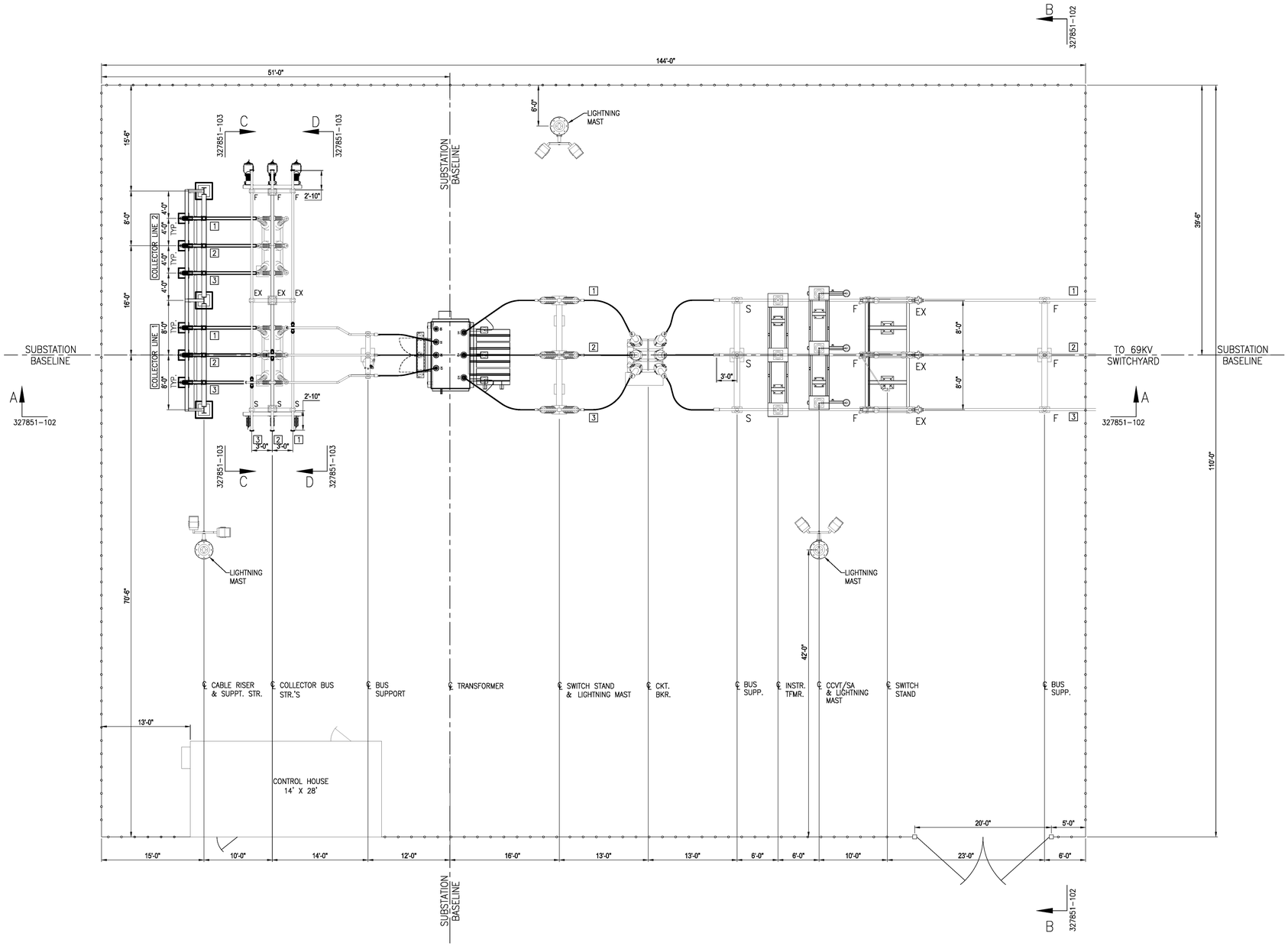
AAD/TRC DESIGNED	
AAD/TRC DRAWN	
DG/TRC CHECKED	
AKD/TRC APPROVED	
REVIEW 1	06/20/19 DATE
REVIEW 2	NONE SCALE

EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
POWER ONE-LINE DIAGRAM

SCHOHARIE COUNTY NEW YORK

TRC 327851-100 REV. A

ADJUST DIRECTION
OF NORTH ARROW
AS NEEDED



PLAN VIEW

NOTES:

1. BUS SUPPORTS PROVIDED AND INSTALLED AS SHOWN FOR THE FOLLOWING TYPES:
   F–FIXED BUS SUPPORT
   S–SLIP BUS SUPPORT
   EX–EXPANSION BUS SUPPORT
2. CLEARANCES FOR ALL BUS & CONDUCTOR TO BE PER VALUES PUBLISHED IN ANSI C37.32 TABLE 5:
   69KV–PHASE TO PHASE 7'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 2'–1" (METAL TO METAL)
   34.5KV–PHASE TO PHASE 3'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 1'–3" (METAL TO METAL)
3. WIRE CONDUCTOR MINIMUM BEND RADIUS TO BE INSTALLED NO LESS THAN:
   1272KCM–20 INCHES
   336KCM–10 INCHES
   4/0 COPPER–8 INCHES
   2/0 COPPER–6 INCHES
   1/0 AAAC–5.5 INCHES
   #2 COPPER–4 INCHES

REFERENCE DRAWINGS:

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327851–106 – EAST POINT FENCE & GROUNDING DETAILS
327851–107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

0 5 10 15 20 30
SCALE (FEET)
⅛" = 1'–0"

PRELIMINARY

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249 Western Avenue
Augusta, ME 04330

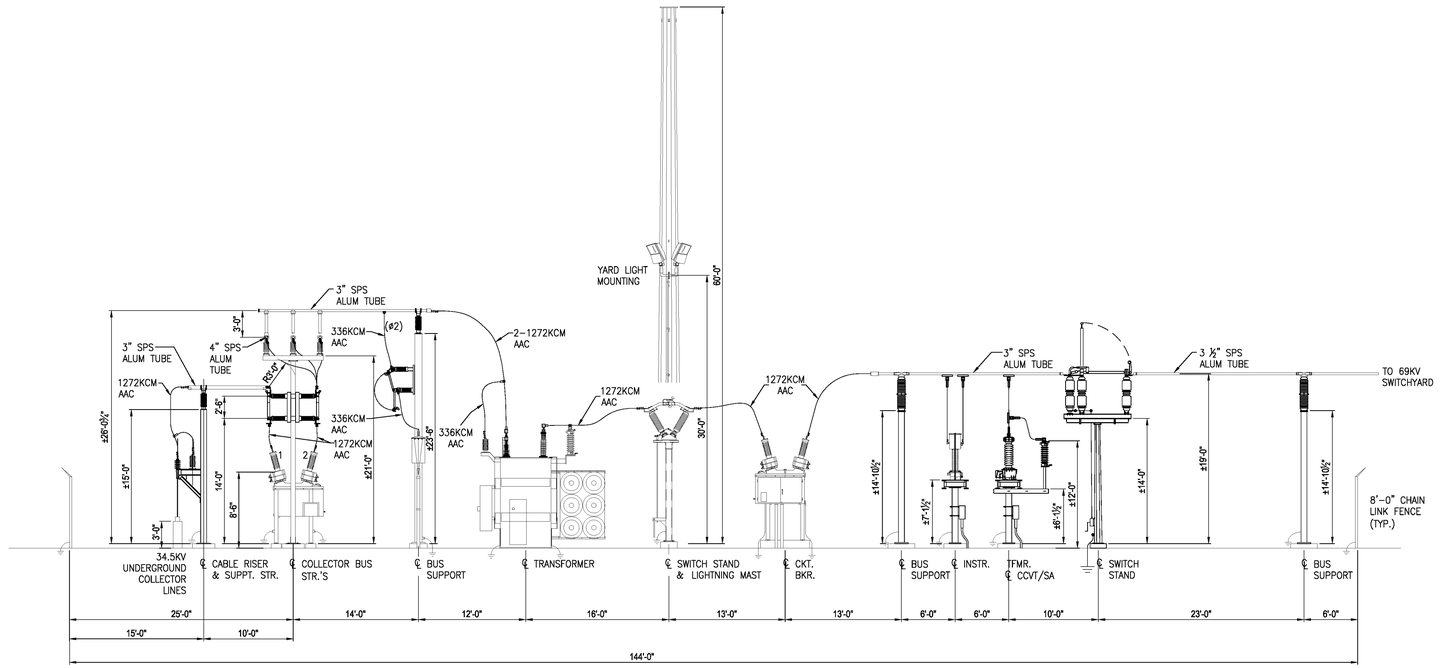
PROJECT NO: 327851

REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
	A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

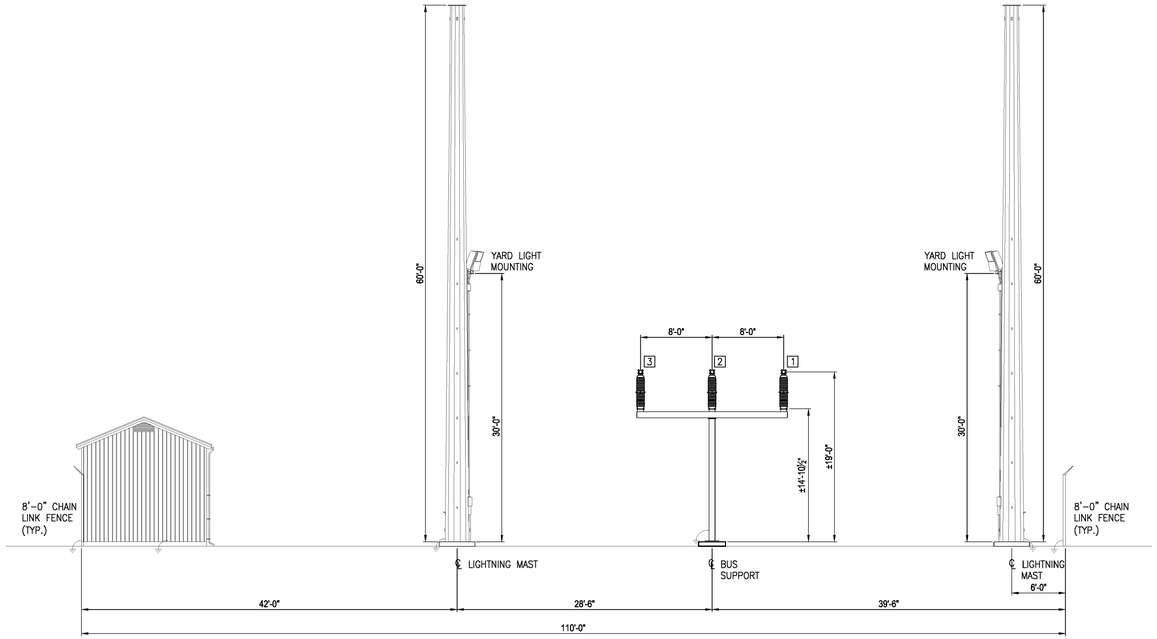
AAD/TRC DESIGNED
AAD/TRC DRAWN
DG/TRC CHECKED
AKD/TRC APPROVED
REVIEW 1
REVIEW 2
06/20/19 DATE
1/8"=1'-0" SCALE

EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
GENERAL ARRANGEMENT PLAN
1 TRANSFORMER DESIGN
SCHOHARIE COUNTY NEW YORK

TRC 327851-101 REV. A



ELEVATION A–A



SECTION B–B

NOTES:

1. BUS SUPPORTS PROVIDED AND INSTALLED AS SHOWN FOR THE FOLLOWING TYPES:
   F–FIXED BUS SUPPORT
   S–SLIP BUS SUPPORT
   EX–EXPANSION BUS SUPPORT
2. CLEARANCES FOR ALL BUS & CONDUCTOR TO BE PER VALUES PUBLISHED IN ANSI C37.32 TABLE 5:
   69KV–PHASE TO PHASE 7'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 2'–1" (METAL TO METAL)
   34.5KV–PHASE TO PHASE 3'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 1'–3" (METAL TO METAL)
3. WIRE CONDUCTOR MINIMUM BEND RADIUS TO BE INSTALLED NO LESS THAN:
   1272KCM–20 INCHES
   336KCM–10 INCHES
   4/0 COPPER–8 INCHES
   2/0 COPPER–6 INCHES
   1/0 AAAC–5.5 INCHES
   #2 COPPER–4 INCHES

REFERENCE DRAWINGS:

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327851–105 – EAST POINT FENCE & GROUNDING PLAN
327851–106 – EAST POINT FENCE & GROUNDING DETAILS
327851–107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

0 5 10 15 20 30
SCALE (FEET)
⅛" = 1'–0"

PRELIMINARY

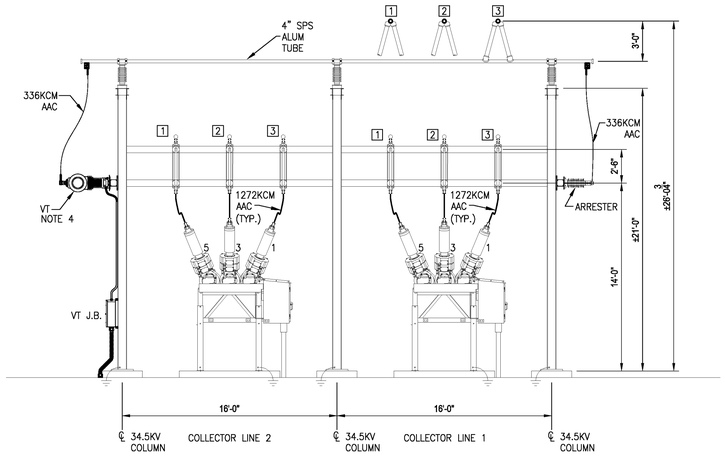
TRC
249 Western Avenue
Augusta, ME 04330

PROJECT NO: 327851

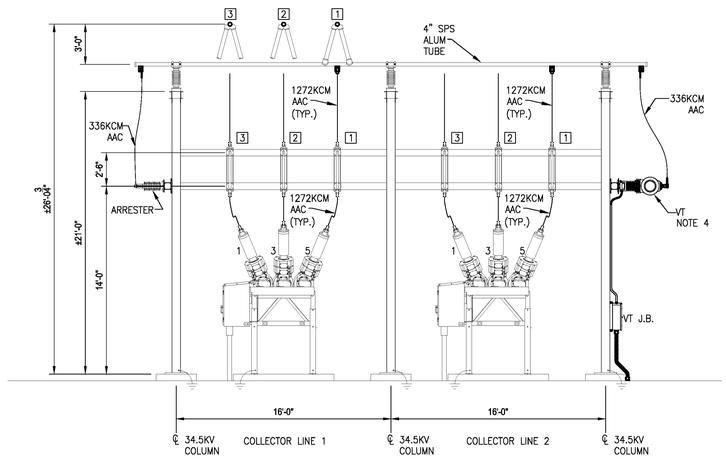
REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
	A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

AAD/TRC DESIGNED	EAST POINT
AAD/TRC DRAWN	34.5KV/69KV COLLECTOR SUBSTATION
DG/TRC CHECKED	ELEVATIONS & SECTIONS A-A, B-B
AKD/TRC APPROVED	1 TRANSFORMER DESIGN
	SCHOHARIE COUNTY NEW YORK
REVIEW 1	06/20/19 DATE
REVIEW 2	1/8"=1'-0" SCALE

TRC 327851-102 REV. A



SECTION C–C
LINE–SIDE



SECTION D–D
BUS–SIDE

NOTES:

1. BUS SUPPORTS PROVIDED AND INSTALLED AS SHOWN FOR THE FOLLOWING TYPES:
   F–FIXED BUS SUPPORT
   S–SLIP BUS SUPPORT
   EX–EXPANSION BUS SUPPORT
2. CLEARANCES FOR ALL BUS & CONDUCTOR TO BE PER VALUES PUBLISHED IN ANSI C37.32 TABLE 5:
   115KV–PHASE TO PHASE 7'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 2'–1" (METAL TO METAL)
   34.5KV–PHASE TO PHASE 3'–0" (CENTERLINE–CENTERLINE)
   –PHASE TO GROUND 1'–3" (METAL TO METAL)
3. WIRE CONDUCTOR MINIMUM BEND RADIUS TO BE INSTALLED NO LESS THAN:
   1272KCM–20 INCHES
   336KCM–10 INCHES
   4/0 COPPER–8 INCHES
   2/0 COPPER–6 INCHES
   1/0 AAAC–5.5 INCHES
   #2 COPPER–4 INCHES
4. BUS TIE VOLTAGE TFMRS. TO BE INSTALLED H1–PHASE H2–GROUND.

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327851–106 – EAST POINT FENCE & GROUNDING DETAILS
327851–107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

0 5 10 15 20
SCALE (FEET)
3/16" = 1'–0"

PRELIMINARY

TRC
249 Western Avenue
Augusta, ME 04330

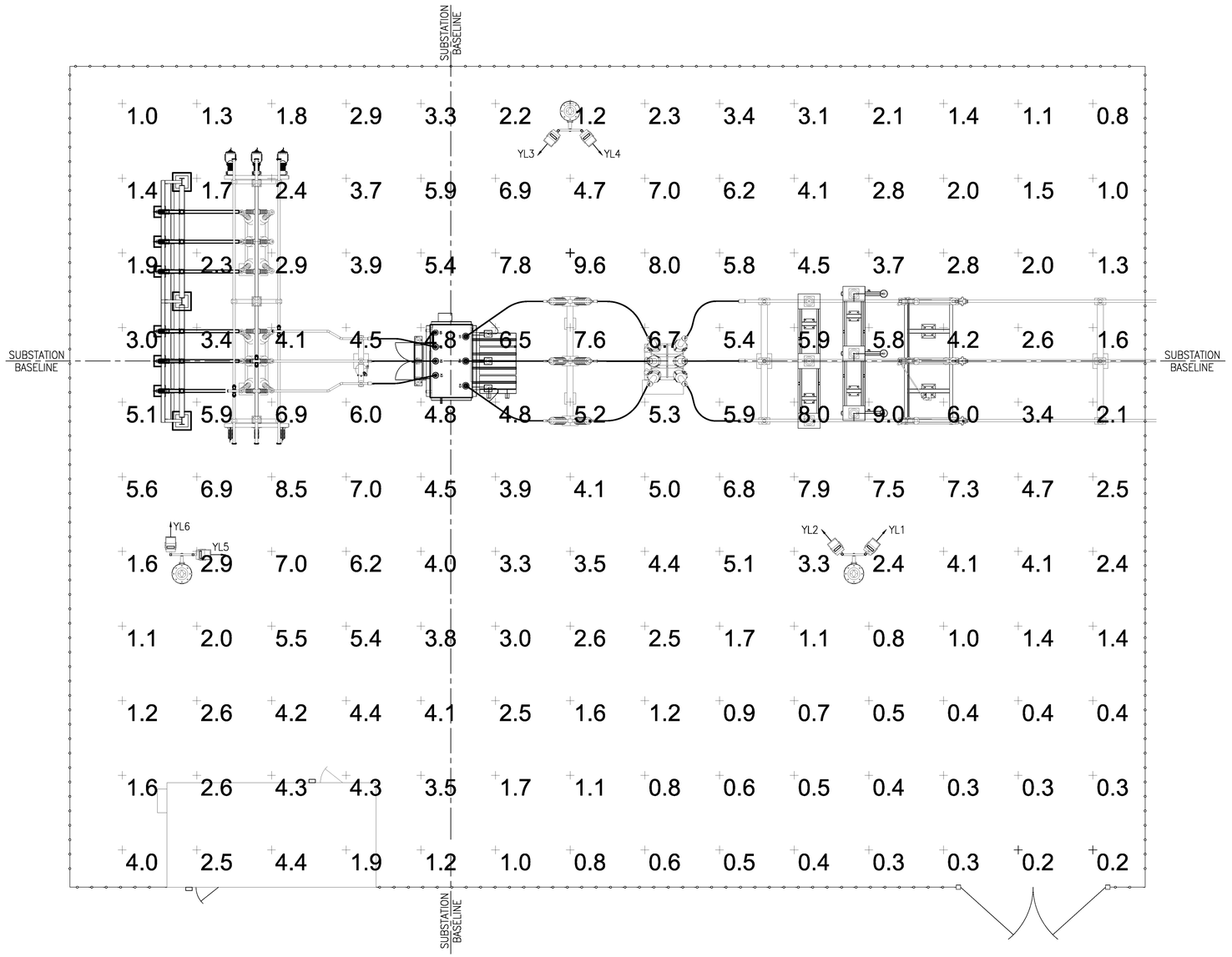
PROJECT NO: 327851

REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
	A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

AAD/TRC DESIGNED	EAST POINT
AAD/TRC DRAWN	34.5KV/69KV COLLECTOR SUBSTATION
DG/TRC CHECKED	SECTIONS C-C, D-D
AKD/TRC APPROVED	1 TRANSFORMER DESIGN
	SCHOHARIE COUNTY NEW YORK
REVIEW 1	06/20/19 DATE
REVIEW 2	3/16"=1'-0" SCALE

TRC 327851-103 REV. A

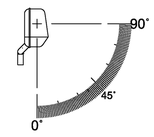
ADJUST DIRECTION OF NORTH ARROW AS NEEDED



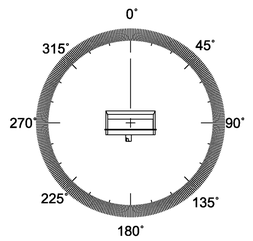
PLAN VIEW

YARD LIGHTING SCHEDULE						
LIGHT NO.	TYPE	WATTAGE	MOUNTING HEIGHT	ORIENTATION	TILT (DEGREES)	PANEL/ CCT. #
YL1	TFLU 250S	250W	30FT	40	60	---
YL2	TFLU 250S	250W	30FT	320	60	---
YL3	TFLU 250S	250W	30FT	220	60	---
YL4	TFLU 250S	250W	30FT	140	60	---
YL5	TFLU 250S	250W	30FT	90	60	---
YL6	TFLU 250S	250W	30FT	0	60	---
CHL1	TWA 70S	70W	10FT	---	---	---
CHL2	TWA 70S	70W	10FT	---	---	---

STATISTICS – OVERALL SITE						
DESCRIPTION	SYMBOL	AVERAGE	MAXIMUM	MINIMUM	MAX/MIN	AVERAGE/MIN
SITE	+	3.4 fc	9.6 fc	0.2 fc	48.0:1	17.0:1



YARD LIGHT TILT



YARD LIGHT ORIENTATION ANGLE

LEGEND

(XXX) — "A" LIGHT FIXTURE, LITHONIA CONTOUR TFLU-250S (WOOD POLE MOUNTED)

(XXX) — "C" LIGHT FIXTURE, LITHONIA CONTOUR TWA-70S (BUILDING MOUNTED)

NOTES:

1. YARD FLOOD FIXTURES YL-1, YL-2, YL-3, YL-4, YL-5 & YL-6 ARE MOUNTED 30'-0" ABOVE FINISHED GRADE.
2. EXTERIOR CONTROL HOUSE FIXTURES ARE MOUNTED 10'-0" ABOVE FINISHED GRADE.
3. INCIDENT LIGHT LEVEL POINTS ARE SPACED AT 10' X 10'.
4. THE AVERAGE ILLUMINATION IN THE SUBSTATION YARD IS 3.4 FOOTCANDLES.
5. YARD LIGHTING CONTROL EQUIPMENT IS DEFINED ON DWG. 327851-XX.
6. LIGHTING CALCULATIONS WERE PERFORMED USING VISUAL 2016, VERSION 2.08.
7. OVERALL SITE LAYOUT INCLUDES PROPOSED PERIMETER AND PROPOSED WORK LIGHTING.
8. PERIMETER LIGHTING CONTROL OPTIONS ARE ON/OFF/AUTO.
9. WORK LIGHTING CONTROL OPTIONS ARE ON/OFF.

REFERENCE DRAWINGS:

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327851-103 – EAST POINT SECTIONS C-C, D-D
327851-105 – EAST POINT FENCE & GROUNDING PLAN
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327851-107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

0 5 10 15 20 30

SCALE (FEET)
⅛" = 1'-0"

PRELIMINARY

TRC
249 Western Avenue
Augusta, ME 04330

PROJECT NO: 327851

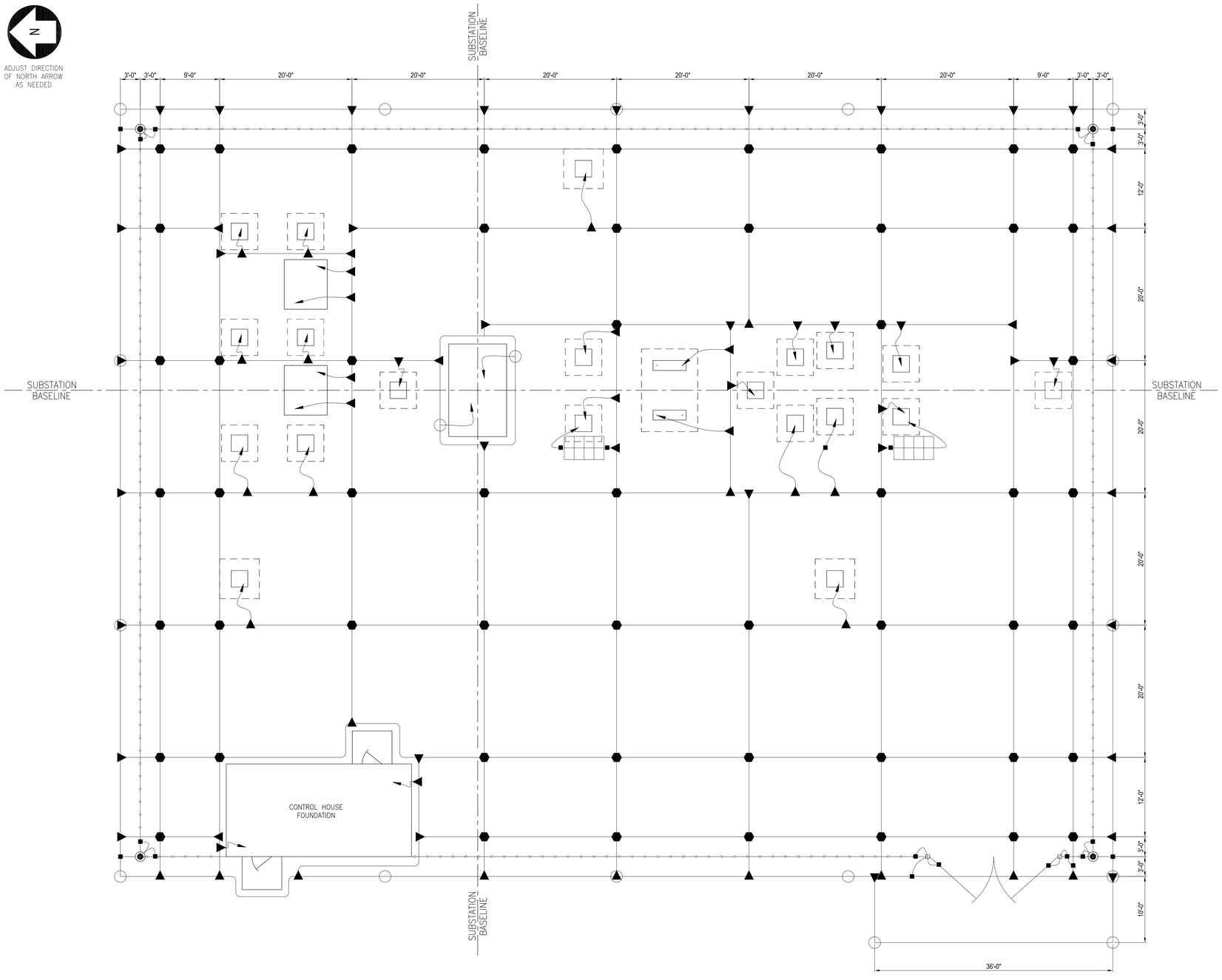
REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
	A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

AAD/TRC DESIGNED
AAD/TRC DRAWN
DG/TRC CHECKED
AKD/TRC APPROVED
REVIEW 1
REVIEW 2
06/20/19 DATE
1/8"=1'-0" SCALE

EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
YARD LIGHTING PLAN
1 TRANSFORMER DESIGN
SCHOHARIE COUNTY NEW YORK

TRC
327851-104
REV. A

ADJUST DIRECTION OF NORTH ARROW AS NEEDED



PLAN VIEW

LEGEND OF SYMBOLS:		
SYMBOL	DESCRIPTION	MATERIAL MARK
	8' PERIMETER FENCE	G01
	GROUND CLAMP, GALV. PIPE TO CABLE (FOR LINE POST)	G04
	GROUND CLAMP, GALV. PIPE TO CABLE (FOR GATE POST)	G05
	GROUND CLAMP, GALV. PIPE TO CABLE (FOR INTERMEDIATE POST)	G06
	SPLIT BOLT CONNECTOR	G07
	2/0 COPPER GROUND STRAND SOFT DRAWN	G08
	4/0 COPPER GROUND WIRE 19 STRAND SOFT DRAWN	G09
	4/0 COPPER WIRE PIGTAIL	G09
	GROUND CLAMP, GALV. PIPE TO CABLE	G10
	GROUND CLAMP, GALV. PIPE TO CABLE (FOR GATE FRAME)	G11
	CONNECTOR, GROUND, #2/0 TO GALV. PIPE	G12
	4/0 TO 4/0 COPPER WIRE CROSS CONNECTION	G13
	4/0 TO 4/0 COPPER WIRE TEE CONNECTION	G13
	4/0 TO 1/0 COPPER WIRE TEE CONNECTION	G15
	BRAID,1⅝" X 18", TINNED COPPER, FERRULE ENDS,	G16
	4' X 6' COPPER WIRE SWITCH MAT	G17
	GROUND ROD LOCATION	G20
	FENCE POST	TBD

NOTES:

1. PERIMITER GROUND CONDUCTOR TO BE A CONTINUOUS LOOP.
2. THE GROUND GRID SHALL BE 4/0 COPPERWELD AND BURIED AT A MINIMUM DEPTH OF 2'-0" BELOW GRADE.
3. TAPS FROM MAIN GRID SHALL BE AT LOCATIONS INDICATED TO GROUND STRUCTURE COLUMNS, EQUIPMENT, ETC.
4. PROVIDE TAPS FOR FENCE GROUND AT EACH GATE POST, CORNER POST AND FOR EVERY THIRD OR FOURTH LINE POST.
5. ALL TAPS SHALL EXTEND AT LEAST 6'-0" ABOVE FINISHED GRADE (AFG), UNLESS OTHERWISE NOTED.

REFERENCE DRAWINGS:

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327851-103 – EAST POINT SECTIONS C-C, D-D
327851-104 – EAST POINT YARD LIGHTING PLAN
327851-106 – EAST POINT FENCE & GROUNDING DETAILS
327851-107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

0 5 10 15 20 30
SCALE (FEET)
⅛" = 1'-0"

PRELIMINARY

TRC
249 Western Avenue
Augusta, ME 04330

PROJECT NO: 327851

REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
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AAD/TRC DRAWN
DG/TRC CHECKED
AKD/TRC APPROVED
REVIEW 1
REVIEW 2

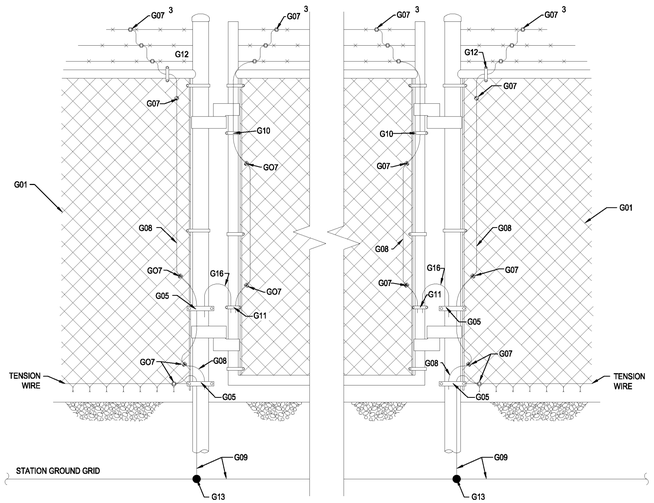
EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
FENCE & GROUNDING PLAN
1 TRANSFORMER DESIGN
SCHOHARIE COUNTY NEW YORK

06/20/19 DATE
1/8"=1'-0" SCALE

TRC

327851-105

REV. A

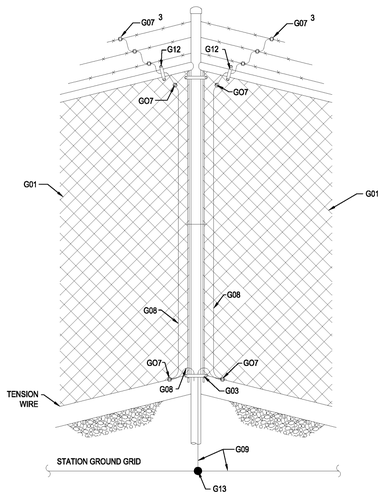


PER GATE QUANTITIES

G05 Qty 4	G10 Qty 2
G07 Qty 24	G11 Qty 2
G08 Qty 32'	G12 Qty 2
G09 Qty 20'	G13 Qty 2
	G16 Qty 4'

DETAIL "A"

24'-0" MAIN GATE GROUNDING

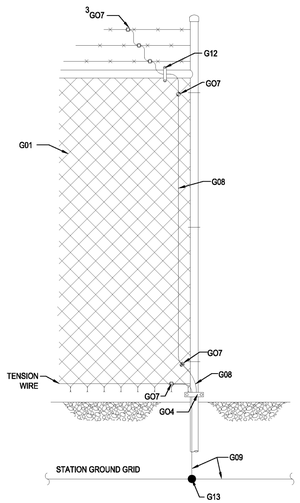


PER CORNER POST QUANTITIES

G03 Qty 1	G09 Qty 10'
G07 Qty 10	G12 Qty 2
G08 Qty 20'	G13 Qty 1

DETAIL "B"

CORNER POST GROUNDING

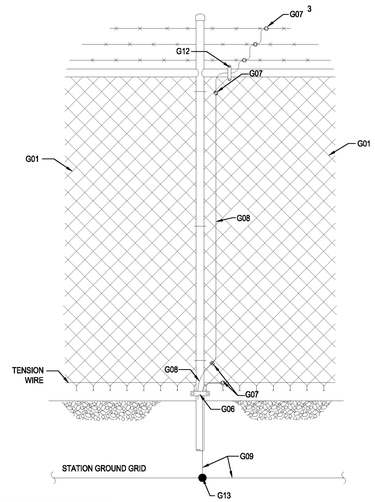


PER END POST QUANTITIES

G04 Qty 1	G09 Qty 10'
G07 Qty 6	G12 Qty 1
G08 Qty 8'	G13 Qty 1

DETAIL "C"

END POST GROUNDING

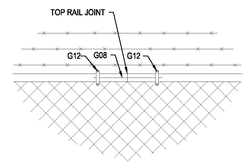


PER INTERMEDIATE POST QUANTITIES

G06 Qty 1	G12 Qty 1
G07 Qty 6	G13 Qty 1
	G08 Qty 8'
	G09 Qty 10'

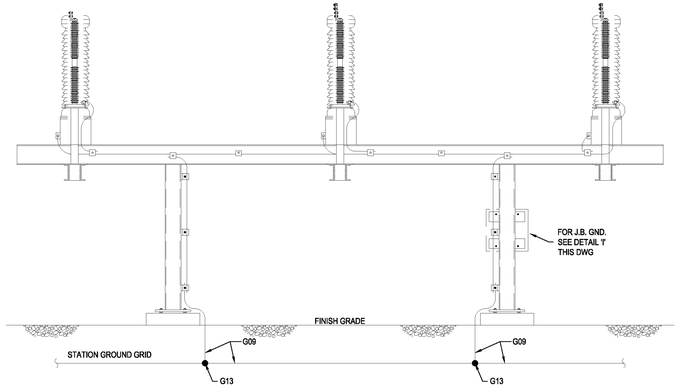
DETAIL "D"

INTERMEDIATE POST GROUNDING



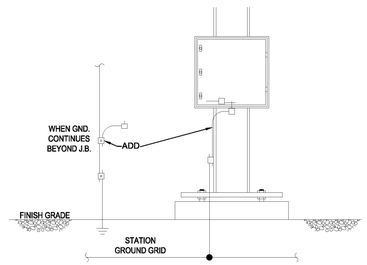
DETAIL "E"

TOP RAIL JOINT GROUNDING



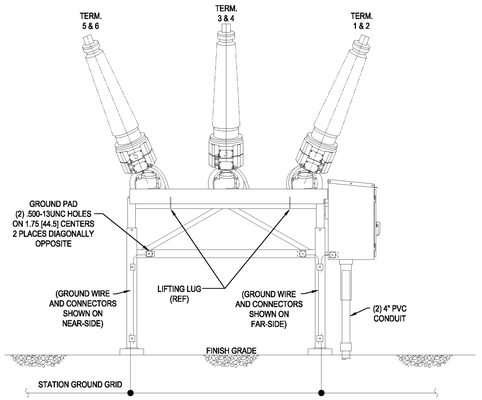
DETAIL "H"

TYPICAL 115KV CCVT/LA GROUNDING



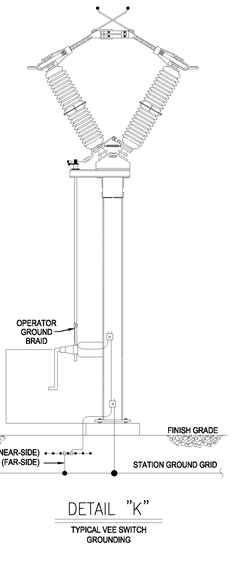
DETAIL "I"

TYPICAL JUNCTION BOX GROUNDING



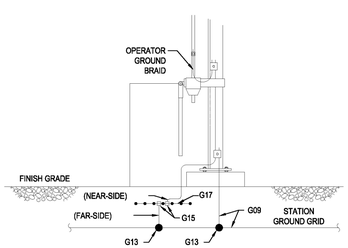
DETAIL "J"

TYPICAL BREAKER & MECH. HOUSING GROUNDING



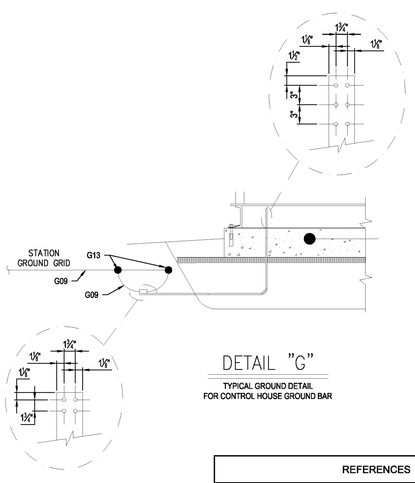
DETAIL "K"

TYPICAL VEE SWITCH GROUNDING



DETAIL "F"

TYPICAL GROUND DETAIL AT WORM GEAR SW. OPER. MECH.

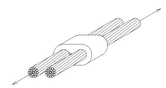


DETAIL "G"

TYPICAL GROUND DETAIL FOR CONTROL HOUSE GROUND BAR

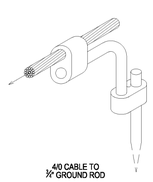
4/0 CABLE TO 4/0 CABLE CROSS OR TEE

BURNDY CAT.#YGL29C29 MARK"G13"
CONDUCTOR RANGE:
COND. "A" - #2 SOL.-250KCM
COND. "B" - #2 STR.-250KCM
COMPRESSION TOOLS:
Y750/Y35/Y39 HYPRESS
Y45 HYPRESS W/ PT6515 ADAPTER
Y46 HYPRESS W/ P-UADP ADAPTER
DIE SET CAT.# U997
ONE (1) CRIMP REQUIRED



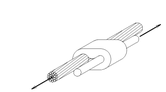
4/0 CABLE TO 1/0 CENTER WIRE GROUND MAT

BURNDY CAT.#YGHC29C29 MARK"G23"
CONDUCTOR RANGE:
RUN - #3/0 STR.-250KCM
TAP - #3/0 STR.-250KCM
COMPRESSION TOOLS:
Y750/Y35/Y39 HYPRESS
DIE SET CAT.# U997
ONE (1) CRIMP REQUIRED



4/0 CABLE TO ½" GROUND ROD

BURNDY CAT.#YGL34C29 MARK"G14"
CONDUCTOR RANGE:
ROD -⅝" -½"
CABLE - #2 STR.-250KCM
COMPRESSION TOOLS:
Y750/Y45/Y46 HYPRESS
Y750 COND."A" DIE SET CAT.# PU998
Y750 COND."B" DIE SET CAT.# U997
Y45 COND. "A" DIE SET CAT.# S998 OR PU998
Y45 COND. "B" DIE SET CAT.# U997
Y46 COND. "A" DIE SET CAT.# P998 OR PU998
Y46 COND. "B" DIE SET CAT.# U997
ONE (1) CRIMP REQUIRED
TWO (2) CRIMP ON GND ROD
PRECRIMP GND ROD USE CAT.#U2CABT



4/0 CABLE TO 1/0 CENTER WIRE GROUND MAT

BURNDY CAT.#YGHC29C26 MARK"G15"
CONDUCTOR RANGE:
RUN - #3/0 STR.-250KCM
TAP - #6 SOL.-2/0 STR.
COMPRESSION TOOLS:
Y750/Y35/Y39 HYPRESS
DIE SET CAT.# U997
ONE (1) CRIMP REQUIRED

REFERENCE DRAWINGS:

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327851-105 – EAST POINT FENCE & GROUNDING PLAN
327851-107 – EAST POINT CONTROL HOUSE ELECTRICAL LAYOUT PLAN

PRELIMINARY

TRC
249 Western Avenue
Augusta, ME 04330

PROJECT NO: 327851

REFERENCES	REV	DESCRIPTION	DATE	DES	CHK	APP
	A	ISSUED FOR REVIEW	06/20/19	AAD	DG	AKD

AAD/TRC	DESIGNED
AAD/TRC	DRAWN
DG/TRC	CHECKED
AKD/TRC	APPROVED
	REVIEW 1
	REVIEW 2

EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
FENCE & GROUNDING DETAILS
1 TRANSFORMER DESIGN
SCHOHARIE COUNTY NEW YORK

06/20/19 DATE
NONE SCALE

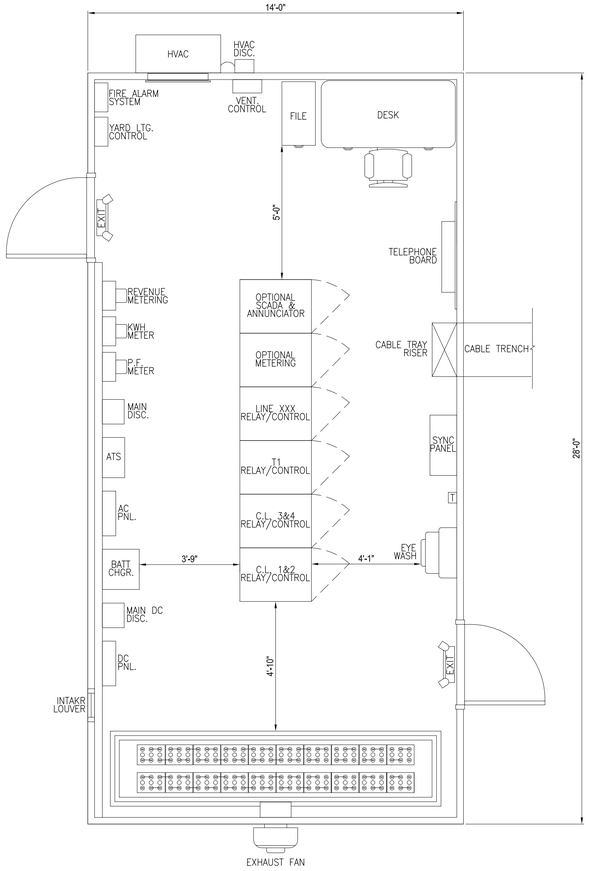
TRC

327851-106

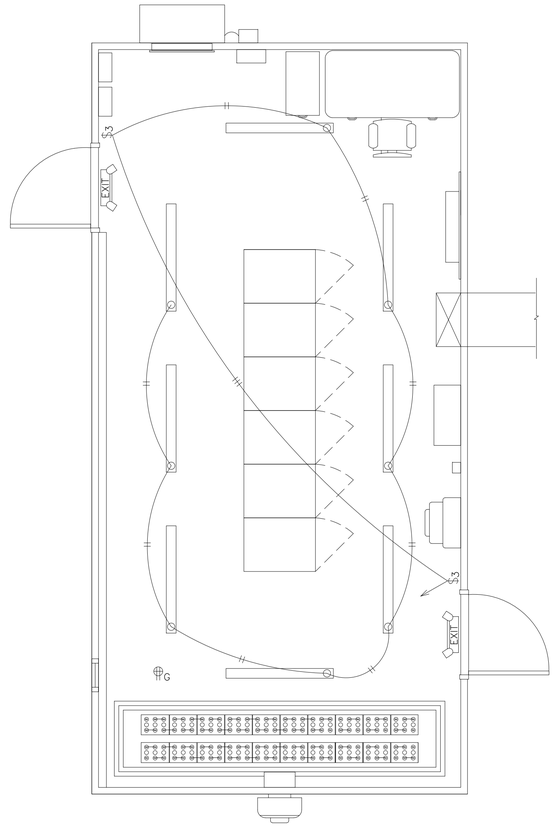
REV. A

N

ADJUST DIRECTION
OF NORTH ARROW
AS NEEDED



CONTROL ROOM FLOOR PLAN



CONTROL ROOM LIGHTING PLAN

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327851-105 – EAST POINT FENCE & GROUNDING PLAN
327851-106 – EAST POINT FENCE & GROUNDING DETAILS

LEGEND:

(XX) $ –SINGLE TOGGLE SWITCH
(XX) $3 –3 WAY TOGGLE SWITCH
(XX) T –HVAC THERMOSTAT
–WIRING HOME RUN, SINGLE POLE
–WIRING HOME RUN, DOUBLE POLE
(XX) G –DOUBLE DUPLEX OUTLET, 20A

LIGHTING SCHEDULE:

(XX) –FLOURESCENT LIGHT FIXTURE, 2 LAMP 4', 32 WATT, 120V
(XX) –OUTDOOR LIGHT FIXTURE, HIGH PRESSURE SODIUM, 70 WATT, 120V
(XX) EXIT –EMERGENCY BATTERY LIGHT/EXIT SIGN, 120V

PRELIMINARY

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EAST POINT
34.5KV/69KV COLLECTOR SUBSTATION
CONTROL HOUSE ELECTRICAL LAYOUT PLAN
1 TRANSFORMER DESIGN
SCHOHARIE COUNTY NEW YORK

06/20/19 DATE
3/8"=1'-0" SCALE

TRC

327851-107

REV. A