Prepared by: SXZO

INSTALLING OH DISTRIBUTION LINE RECLOSERS 094669

Asset Type:	Electric Distribution	**Function:**	Construction, Engineering, and Estimating
Issued by:	Ibrahim Ihab (III1)	**Date:**	11/15/21

Rev. #01: For a description of the changes, see Page 34.

Purpose and Scope

This document specifies the construction, engineering, and estimating requirements for the OH Distribution Line Reclosers (LR) with a universal recloser controls on 4 kV to 21 kV distribution systems.

Level of Use: Informational Use

Target Audience

Electric Restoration Employees, Electric Engineering, Electric Operations, Electric Construction, Electric Distribution Employees.

General Information

1. Adherence to the requirements in this Standard **MUST** be followed at all times. This standard meets or exceeds G.O. 95 rules. Not all construction configurations are depicted. Any deviation from this Standard is in violation of company and regulatory requirements. If non–standard construction is needed use TD–2951P–01 Request for Variance from Electric Distribution Standards. To initiate a review from Electric Distribution Standards before starting the design process.
2. All electrical connections **MUST** be cleaned with a wire brush and a liberal amount of inhibitor must be applied.
   A. See Document
      (1) 015251, Page 24 Note 4 for corrosion details
      (2) TD–2907P–01, Section #2 “Preparing Aluminum and Copper Conductors for Splicing”
3. Line Reclosers must be installed only in locations that are bucket truck accessible. If proposed locations are not bucket truck accessible, the installation location must be moved to meet this requirement and circuit protection must adjust accordingly.
4. The reclosers and controllers shown in this document must be designed, manufactured, and tested to meet all the requirements of this document and to meet all applicable American National Standards Institute (ANSI) and Institute of Electrical and Electronic Engineers (IEEE) standards including, but not limited to, IEEE/ANSI Standard C37.60 and the Enclosure Integrity Standard C57.12.31. In addition, meet PG&E Engineering and Material Specification EMS 31.
5. The basic principles governing the coordination of reclosers with other source and load side protective devices are outlined in detail in the Electric Planning Manual.
6. PG&E will only purchase the 27 KV rated LR’s on all distribution service voltages. Manufacturer(s) will supply PG&E with site ready LR packages. Each package includes all the required installation materials such as recloser mounting frame, arrester brackets, controller cables, and other miscellaneous hardware. The LR package will be delivered pre–mounted in its frame and ready to be installed on the pole. All the site ready LR package codes are shown in Table 3 on Page 9.
7. The LR requires a 42–pin universal controller. It will not function with the Cooper/Eaton controllers such as Form 6, 4C or 3A. The deployment of recloser jobs must follow – “Attachment 1 – LR Application Criteria Flow Chart” below.
8. Regardless of Cal–Fire exemption status, all locations require firebreak maintenance.

9. The 42−pin universal controller codes are for SCADA equipped controllers, which support DNP 3.0 communication protocol, include a universal radio mounting plate, 24 Vdc power supply, radio antenna coax bulkhead connector mounted on the bottom of the enclosure, and a multiport communication input for digital radios. Refer to Table 7 for digital radio options.
10. All new recloser orders must be supplied with a set of specifically designed recloser fire retardant bushing animal guards which must be installed with the recloser, please see the material code parts list on Table 6 on Page 22. Use covered lead wires for the installation.
11. Use insulated lead wire from Document 059626 on Table 16 titled “Jumper and Lead Wires for Raptor Protection.” Size lead wires according to the required normal and emergency loading.
12. Arresters and potential transformers (PT’s) must also have animal guarding along with covered lead wires.
13. When a setting file is downloaded to the controller, the controller maintains the existing settings until the new settings are completely loaded. Therefore, it is not necessary to bypass the recloser for a setting/scheme download or upload.

    A. If a firmware update is needed, the LR will need to be bypassed.

Mounting Frame

1. The mounting frame approved for purchase is already included in the LR assembly material code package kit and available as a separate spare material code, if needed. Refer to Table 3 on Page 9.
2. Three−phase LR frame will consist of a 10−ft. arm with a pole mounting bracket that extends the arm 12” from the pole and provisions for 2 P.T.’s and arresters for both source and load side connections.
   See Figure 4 on Page 12 and Figure 9 on Page 17.

Bypassing and Disconnecting

1. The physical bypass must be done at the gang−operated underarm side−break (US) switch. The US switch is a class 1 rated switching device.
2. The bypass switch is designed as an operational device to restore service and completely clear the Line Recloser if the line recloser needs to be serviced.

   NOTE: In−line disconnects are **not** approved for use as a bypass switch.
3. To enhance operations, the LR can be placed into “Switch Mode” at the controller locally or remotely. This mode disables all protection elements and the recloser will function as a switch.

Ground Tripping

1. Ground Tripping is standard on the recloser controller.
2. A “Ground Relay Cut−Out” function is included in the recloser controller and can be operated locally or remotely.

Non−Reclosing

1. The recloser controller includes a “Reclose Relay Cut−out” function to allow for a “Non−Test” operation locally or remotely.

Installing OH Distribution Line Reclosers

Grounding

1. G.O. 95 Rule 33.3–B, Grounding Document 021904, Page 2, Note 15 and 16:
   A. Lightning arrester grounds can be interconnected in common neutral systems
   B. Lightning arrester grounds can be interconnected with the neutral conductor of a dedicated transformer and associated equipment cases solely for the purpose of providing power to operate electric utility supply equipment in non–common neutral system. Do not interconnect lightning arrester grounds to a neutral serving a third–party customer.
2. The following must be grounded:
   A. Mounting Frame
   B. Ground lug on the P.T.
   C. Secondary neutral of the P.T.
   D. Control Cabinet
   E. Surge Arresters
   F. Communication equipment ground (when applicable)
   G. Common Neutral, (When present)

Maintenance

1. Follow the Electric Distribution Preventive Maintenance Manual. Use the monitor or the vacuum interrupter life feature of the recloser to determine the operational requirements for maintenance/replacement.

Device Numbering

1. The installation locations must be phase identified. This is to ensure proper programming of the controller as well as provide required information to build the SCADA screen correctly.
   A. Individual phase ID lettering (A, B, and C) must be placed on either the pole, on cross-arm, and/or controller cabinet door.
      (1) Please see 057352 for alphabetical and numerical pole and sticker decals.
2. The Line Recloser operating number labeling will be installed on the controller cabinet door or side (whatever is roadside), as well as on the pole.
3. The Line Recloser, source side disconnects, and bypass switch must have separate numbers.

Miscellaneous

1. For all areas, the G&W Viper ST will come with 38 KV rated bushings. See material codes on Table 3 on Page 9.
2. The G&W Viper has both Current and Voltage sensing. Voltage on both the Source and load side bushings and Current sensing on the load side bushings.
3. Place the recloser number on the climbing space on the pole, as well as on the front of the controller.
   A. Each site must be phase identified and an A, B, C sticker must be placed on the appropriate phase recloser or on the pole.

Miscellaneous (continue)

4. For locations that require lightning arresters, use the mounting provisions on the recloser that are included.
   A. Do not connect the ground leads of the arresters to the equipment case on the back of the recloser (reclosers only have one frame ground connection). Create a ground bus underneath the recloser with #4 covered copper lead wire (M290288) and connect all grounds to the bus.
   B. Ensure the ground lead from the arrester SPU has enough slack (i.e.: not pulled too tight) per arrester manufacturer recommendation (add standard arrester doc).
   C. It is acceptable to connect the ground bus to the bottom of the LR frame using ground lugs (M301546) for support as shown in the example below. Strip the covered Cu to connect to the ground lug. Ensure the connection is tight.

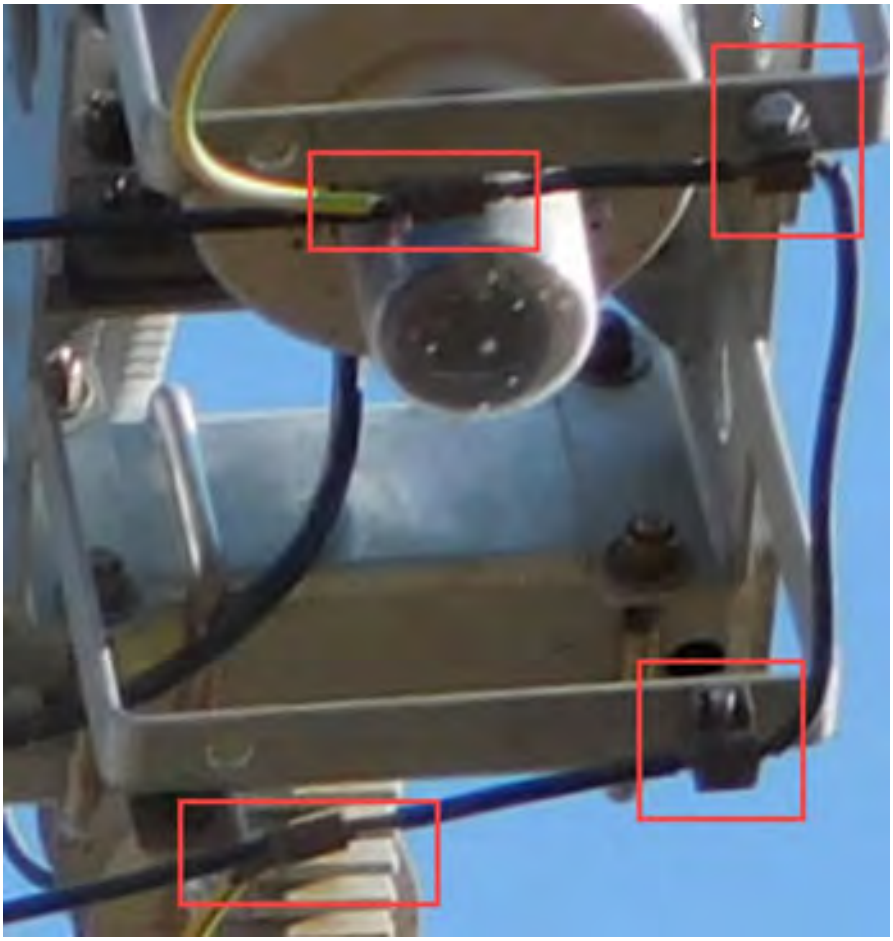

Figure 2
Ground Bus Connection

5. The “Switch Mode” function is standard on all M−7679 controllers. This accessory allows the recloser to function either as a normal recloser or as a SCADA switch. “Switch Mode” can be activated locally at the control or remotely via SCADA.
6. The “Trip on Slow Curves” function is standard on all M−7679 controllers. With the “Trip on Slow Curves” cut in, all trip operations will occur on the slow timing curve. “Trip on Slow Curves” can be activated by SCADA.
7. PT Installation
   A. For Mainline recloser installations, 2 dedicated 1KVA internally fused oil P.T.’s must be installed on the source and load sides of the LR for control power. See Table 6 on Page 22.
   B. For Tap line installations, only one dedicated 1KVA P.T. is required and connected on the source side.
   C. When installing the 3 pin AC power cables to the P.T.

(1) See Figure 10 for pigtail details

(2) There must be 1” of separation between protected 3 pin AC power cable and the PT can.

(a) See Doc 056425. Page 29, Note 2

(3) The 3 Pin AC cable lead wire must be installed as to prevent moisture from entering the cable

(a) See Doc 056425. Page 29, Note 1

8. Due to construction and operational safety considerations, all recloser installations on riser−poles are prohibited. This applies ONLY to primary risers that are fed source or load side of the recloser.

A. Reclosers CAN BE installed where there is a secondary riser.

(1) The Recloser Controller must not be fed from the secondary riser, the Recloser must be built with a dedicated PT source, see Notes 7 and 8 above.

9. All new reclosers must have all their mechanisms be pre−commission tested with the following tests per TD−2916S and TD−2916P−01 at the local PG&E yard closest to the area of installation before being installed.

A. Line Recloser (LR) Apparatus:

(1) Contact Resistance (CR) – Micro−Ohm (μΩ) test

(2) Insulation Resistance (IR) – Mega−Ohm Test – (MΩ)

(3) High Potential (HiPot) Withstand – Vacuum Bottle Integrity (VBI) Test

B. LR Controller (or relay):

(1) Secondary Current Injection (SCI) – Relay Function Test

C. LR and Controller together

(1) Mechanical and relay function test

10. The Following must be completed before job construction, See Engineering Section below.

A. Submit a SCADA Site Survey

B. Schedule a Crew or Distribution Line Technician (DLT) to have the location phase identified for true A, B, C phasing.

C. Schedule the “SCADA Controller Build” through the Centralized SCADA Shops via the online intake form.

(1) http://wwwt2/MyITServices/forms/intake/188

(2) Results from SCADA Site Survey needed

(3) Settings from Planning Engineer needed

(4) Schedule local DLT to Pre−Commission Line Recloser

(5) Minimum 15 days from request and receipt of equipment per TD−2916S Sect 3.4

(a) Schedule local SCADA Specialist to:

(6) Build SCADA Screen

(a) Use TD−2916P−02−F01 Attachment 1 − SCADA Screen Request Form (SSRF)

D. SCADA Commissioning of Device see Note 9.

E. DLT will need to be coordinated with the SCADA Specialist to perform testing

11. The Beckwith M−7679 42 pin controller is a universal control that will work with the G&W Viper ST and any future LR manufacturer.

A. The Settings template will have an option to select which Line Recloser will be used with the Beckwith M−7679 Controller.

B. The Form 6 controller can be updated with the Beckwith M−7679 relay with the Form 6 Beckwith retrofit kit, see table 5. This kit removes the Form 6 relay cube and the retro fit kit fits in its place inside the Form 6 Controller, keeping the 19−pin connection from the Nova to the Form 6.

C. Different settings templates must be appropriately selected for the Line Recloser that will be used with the Beckwith M−7679 Controller.

References	Location	Document
Corrosion Resistant Ground Rods and Ground Rod Clamps	UG:Connectors/Greenbook	013109
Brackets and Metal Crossarms for Overhead Line Construction	OH:Framing	015190
Cutouts, Fuses, and Disconnects for Overhead Distribution Lines	OH:Cutouts and Fuses	015225
Connectors for Insulated Cables Underground Distribution Systems	UG1:Connectors/Greenbook	015251
Installation of Grounds on Wood Pole Transmission and Distribution Lines	OH:Transformers	021904
Forged Steel Insulator Pins and Studs for Distribution Lines	OH:Framing	022473
Application of Surge Arresters on Overhead Distribution Lines	OH: General	031822
Cables for Underground Distribution	UG:Cable	039955
Miscellaneous Hardware for Overhead Line Construction	OH:Framing	058778
Conductors for Overhead Lines	OH:Conductors	059626
Raptor−Safe Construction and Wildlife Protection	OH:Framing	061149
Fired Wedge Connectors for Primary and Secondary Distribution Lines	OH:Conductors	066194
25 kV Underarm Side−Break Switch, Manual and Automated	OH:Switches	066195
Composite Dead−End Crossarms for Distribution Lines	OH:Framing	068180
Equipment Potential Transformers	OH/UG-1:Transformers	076250
PG&E Overhead SCADA Installation	OH: Switches	076253

Utility Procedures

Energize Normal Closed Recloser	TD−2908P−01−JA162
De−Energize Normal Closed Recloser	TD−2908P−01−JA163
Set Up Clearance Limit	TD−2908P−01−JA560
Remove Clearance Limit	TD−2908P−01−JA561
Set Up Non−Test in Field	TD−2908P−01−JA562
Remove Non−Test in Field	TD−2908P−01−JA563
Bypass Recloser	TD−2908P−01−JA564
Un−Bypass Recloser	TD−2908P−01−JA565
Test Battery	TD−2908P−01−JA566
Replace Battery	TD−2908P−01−JA567
Power Up – Battery Alone	TD−2908P−01−JA568
Power Down	TD−2908P−01−JA569
Cut−In/Out Relays	TD−2908P−01−JA572
Front Panel Operation	TD−2908P−01−JA573
Elevate Status LEDs	TD−2908P−01−JA574
Placing Tags on Control	TD−2908P−01−JA575
Changing Protection Modes	TD−2908P−01−JA576

DLT

Line Control Device Procedure	TD−2916S	TD−2916P−01
Contact Resistance − Megger	TD−2916P−01	TD−2916P−01−JA101
Insulation Resistance	TD−2916P−01	TD−2916P−01−JA201
Hi−Pot – PFT−503CM	TD−2916P−01	TD−2916P−01−JA301

Hi–Pot – Vidar	TD–2916P–01	TD–2916P–01–JA303
Secondary Current Injection	TD–2916P–01	TD–2916P–01–JA503
SCADA Commissioning	TD–2916P–02	TD–2916P–02–JA101
Connecting, Uploading, Downloading	TD–2916P–03	TD–2916P–03–JA121
Form 6 Retro Fit Upgrade Instructions	TD–2916P–03	TD–2916P–03–JA122
Updating the Firmware	TD–2916P–03	TD–2916P–03–JA123

Engineering

Programing Slow Curves using the Quick Editor	TD–094669–JA01
Programing Fast Curves using the Quick Editor	TD–094669–JA02
Programing Slow Curves using Setpoints	TD–094669–JA03
Programing Fast Curves using Setpoints	TD–094669–JA04
Programing Sectionalizer Mode using Setpoints	TD–094669–JA05
Loading and Reviewing Sequence of Events (SOE)	TD–094669–JA06
Loading and Reviewing Fault Records	TD–094669–JA07
Loading and Reviewing Trip Sequence Events	TD–094669–JA08
Loading and Reviewing Oscillography Wave Forms	TD–094669–JA09
Programming Switch Mode using the Quick Editor	TD–094669–JA10
Programming 3E0	TD–094669–JA11
Programming Close Block	TD–094669–JA12

Videos and Web Based Training

KnowldgeKeeper
PG&E Microsoft Stream page

Electrical and Mechanical Ratings

1. G&W Viper ST

Table 1 Switch Ratings

Description	Rating
Maximum Voltage	27 KV
Impulse Level (B.I.L)	125 KV
Continuous Current Rating, RMS Sym	800 Amps
Current Interrupting, RMS Sym	12.5 KA
24–Hour Emergency	1,233 Amps
AC 1 minute withstand (Dry)	60 KV
10 Second AC withstand (Wet)	50 KV
Momentary Current, RMS Asym.	20 KA – 10 Cycles
Making Current, RMS Asym.	20 KA
Short Time withstand, RMS Sym.	12.5 KA – 3 sec

Table 2 Approximate Component Weights

Description	Lifting Weight
G&W Viper 3 Phase	620 LBs
G&W Viper 3 Phase w/2 PT’s	780 LBs

Table 3 Bill of Materials for G&W Recloser

Description	PG&E Material Code	Manufacture code
Non–AA District – G&W Electric Viper–ST Solid Dielectric Reclosers – 3 single pole LR – 27KV Kit	DNP	G&W Item #2 – 3 Phase Complete LR Kit, Catalog No. VIP388ER–12–1–ST, Part # D8706PT2ZS00
AA District G&W Viper ST Package w/ 38KV insulators (use for all areas) Includes: • Aerial lugs included: 4–hole NEMA pad for 250–750 MCM conductor • "Z" style vacuum interrupter modules • Six (6) 800 Amp interfaces with screw–on silicone insulators • Encapsulated Six (6) capacitively coupled voltage sensors within the solid dielectric insulation. • 40–foot control cable, with 42 pin connectors on both ends • 2 – 40–foot power cables, with 3 pin connectors on one end, Pigtail at the other end. • 10–foot pole mount custom cross arm frame, with provisions for surge arrester mounting • Provisions for mounting two fused oil PTs • Additional 52B auxiliary contact	M343981	3 Phase Complete LR Kit, Catalog No. VIP388ER–12–1–ST, Part # D8706PT2ZAD0
Optional Spare Parts for the G&W Viper ST		
42–pin Control Cable 40ft	M343949	G&W – B13415282D00
3–pin AC Power Cable 40ft – individual (need 2 for each location)	M343950	G&W – B13413135E00
10ft Cross–arm 12" from Pole (LR's not included)	M343951	G&W – PLS188870022
27kV Insulator Kit	M343952	G&W – PLS108870012
27kV Insulator Only	M343953	G&W – B30460008G00
1 Single pole LR – VIP188ER–12–1–ST–SPR	M343954	G&W – D94988821DG0
38kV Insulator Kit	M343955	G&W – PLS188870008
4–Hole NEMA Pads for 12 and 21KV Insulators (Qt. 6)	M343967	G&W – PLS128230014
Connectorized Junction Box	M343975	G&W – PLS208230M00
8' Connectorized module cable from LR to J–Box (1 per single pole LR needed – full set order 3)	M343974	G&W – B13413301G00

2. Future LR – TBD (Placeholder for New LR)

Recloser Controllers

1. Beckwith M-7679 R-PAC Universal Controller

Table 4 Bill of Material for Beckwith Recloser Controller

Description	PG&E Material Code	Manufacture code
Complete 42−Pin Beckwith LR (Relay & 42−Pin Cabinet) Includes one B−1794 Rectangular Connector Lock for 42−Pin Connector and two B−1816 Security Sleeves for 3−Pin Connector, w/pole standoff bracket	M343747	Beckwith A−7679−PGE−LR1
Optional Spare Parts for Beckwith Controller		
(Relay Only) M−7679 R−PAC Protection, Automation and Control System for Recloser, Switch, Sectionalizer and Advanced Distribution Automation Applications. Customized for PG&E LR1 Application	M343751	Beckwith M−7679−V6L1LL6ELV2C C26X CSR−7679−PGELR1
(Cabinet Only) 42−Pin Cabinet with driving electronics for multi−recloser (G&W Viper ST and ABB Elastimold MVR) applications	M343752	Beckwith M−2979−A42B0133Q20S UTY0 ACC Code: 001
(Qty 1) Rectangular Connector Lock for 42−Pin Connector	M343754	Beckwith B−1794
(Qty 1) Security Sleeve for 3−Pin Connector (need 1 per AC source)	M343755	Beckwith B−1816
24V Battery Kit − Includes 2 Batteries 12V, 20AHr Power Sonic	M343759	Beckwith Battery Kit B−1746
(Qty 1) Battery 12V, 20AHr Power Sonic	M343760	Beckwith Battery 430−00645
(Qty 1) Fuse Ceramic, 3A, 250Vac	M343765	Beckwith 420−00944
(Qty 1) Fuse Ceramic, 5A, 250Vac	M343766	Beckwith 420−00945
(Qty 1) Fuse Ceramic, 15A, 250Vac	M343781	Beckwith 420−00946
(Qty 1) Fuse, 6.3A, 250V Slow blow	M343782	Beckwith 420−00933
AC Transfer Switch	M343783	Beckwith B−1848−120
(Qty 1) Power Capacitor, 22,000uF, 200V (need 2 per each PG&E LR1 Cabinet)	M343947	Beckwith 010−00645
Pole Stand−off Bracket	M343957	Beckwith B−1904
AC to 24VDC Power Supply	M343966	Beckwith B−1689

Table 5 Bill of Material for the Form 6 Retrofit with the Beckwith M−7679

Description	PG&E Material Code	Manufacture code
M−7679 Form 6 Retro Fit Kit Retrofit for Eaton Cooper Form 6 LR Control (Relay Only) for 19−Pin Cooper Nova VTC Reclosers Retrofit kit includes a Relay with mounting adaptor chassis to be installed in an existing Eaton Cooper Cabinet with 19−Pin interface to be used with NOVA VTC Ready Reclosers.	M343748	A−7679−PGE−EC F6R
A/D Interface Module (board only) for Beckwith M−2406	M343805	B−1866
Main cable harness for Beckwith M−2406	M343817	B−1852
Battery Charger Cable for Beckwith M−2406	M343825	B−1853
Battery wake cable for Beckwith M−2406	M343826	B−1870
SATA Cable 3ft with locking for Beckwith M−2406	M343854	430−00631

2. Future Recloser Controller – TBD (Placeholder for New Controller)

General Construction Requirements

1. Construction – G&W Viper ST

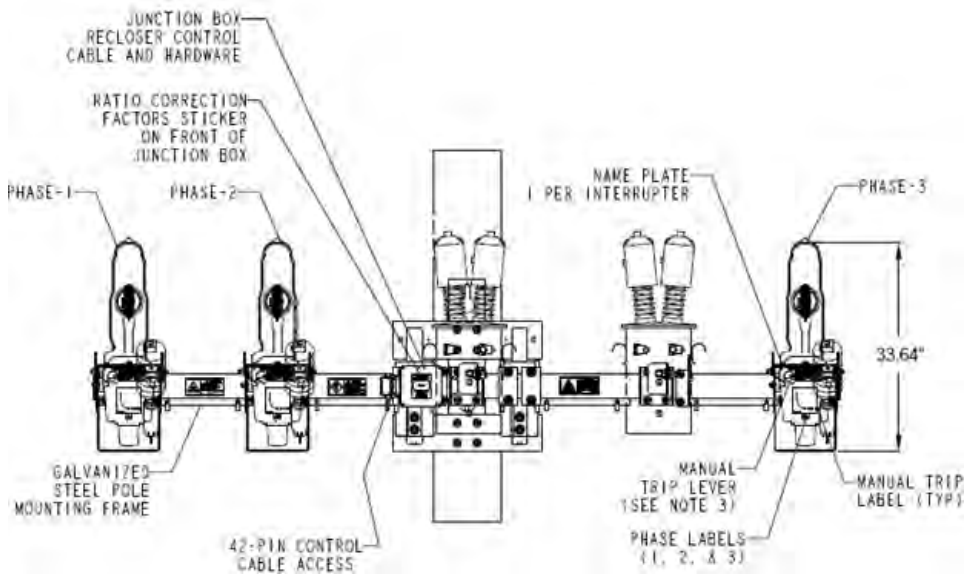

Figure 3
Front View

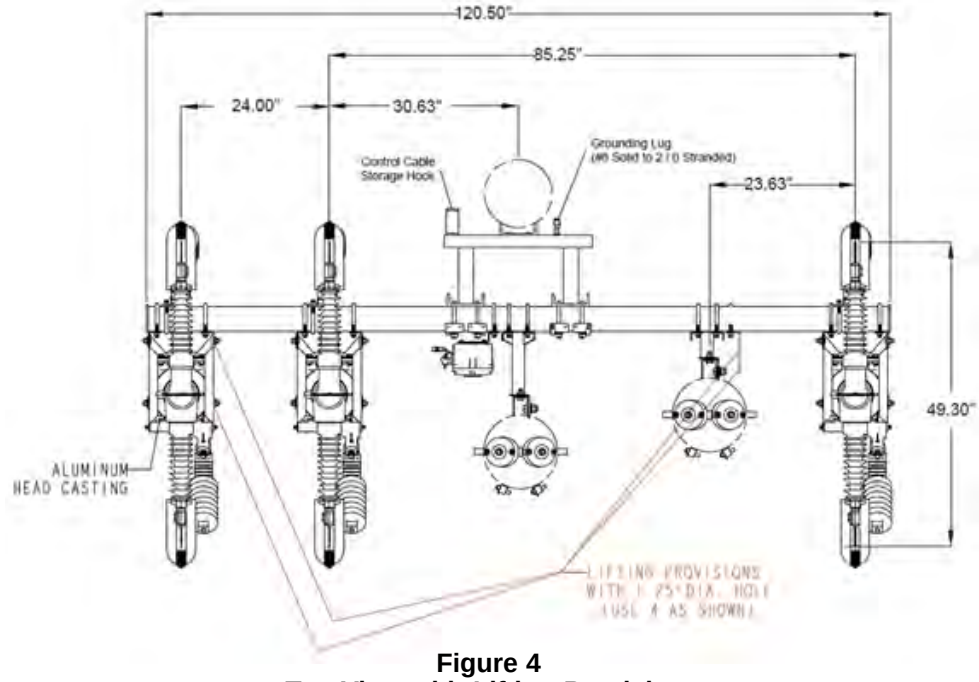

Figure 4
Top View with Lifting Provisions

- To Lift Recloser Evenly, make two straps on the heavier side of the recloser shorter than on the opposite side.
- The middle phase recloser may be positioned on the other side of the arm, PTs and lifting brackets must be moved to the other side as well. Contact Distribution Standards Engineering for more details and drawings.

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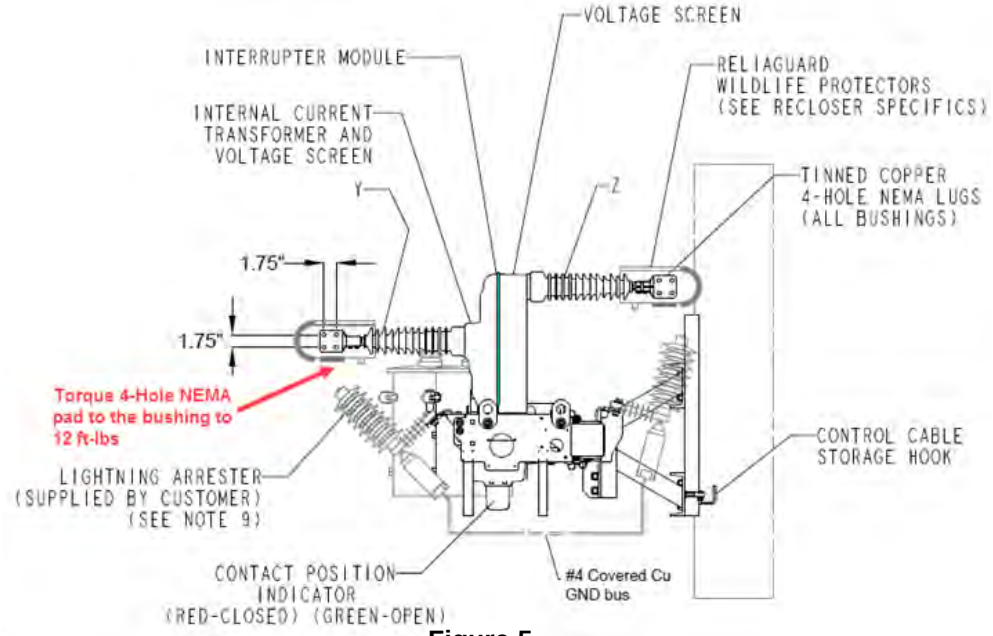


Figure 5
Right View

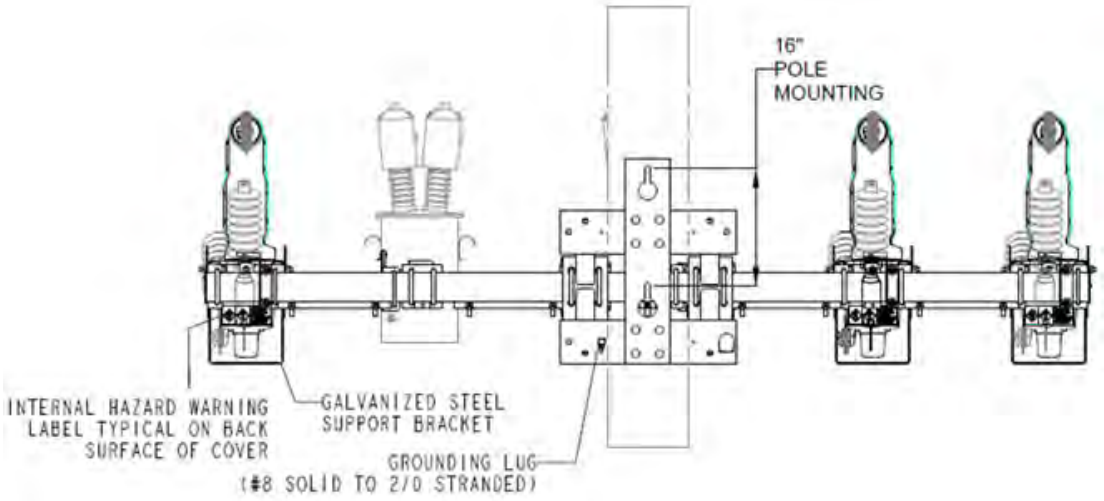
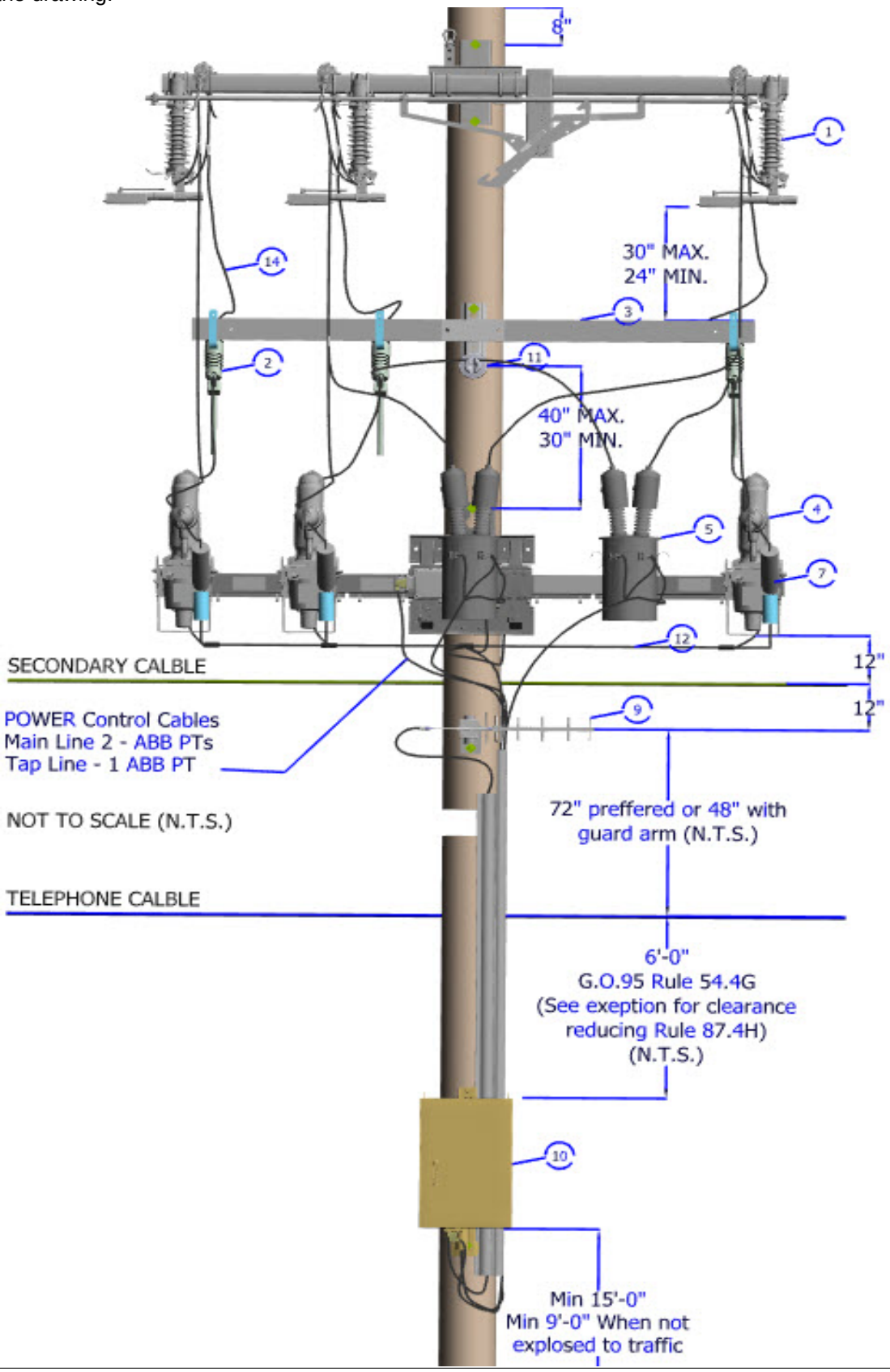


Figure 6
Back View

Installing OH Distribution Line Reclosers

Note: To open the 3D drawing, click on the picture below, allow to use one time, and re- click on the drawing.



Installing OH Distribution Line Reclosers

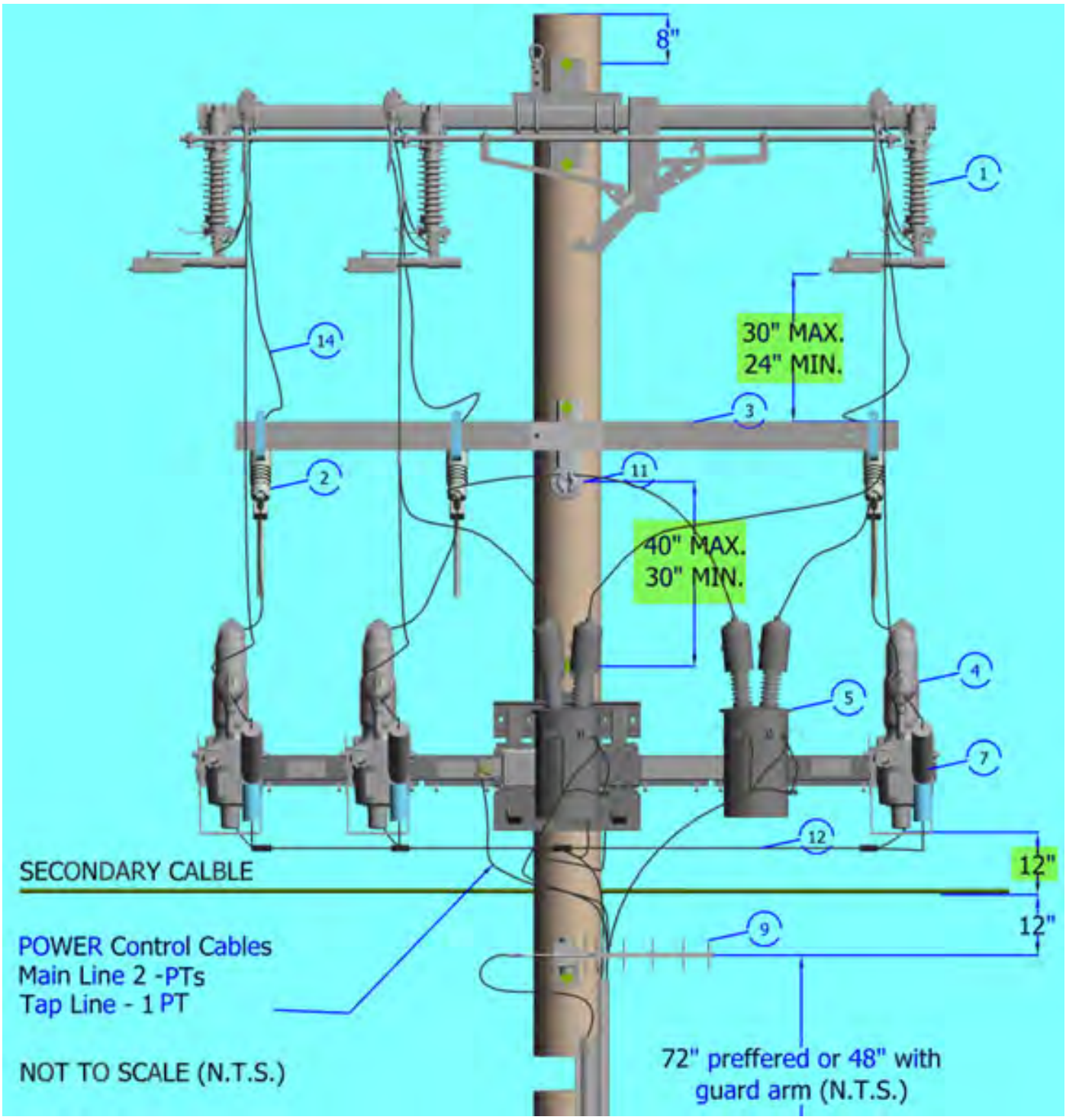


Figure 7
G&W Front Views

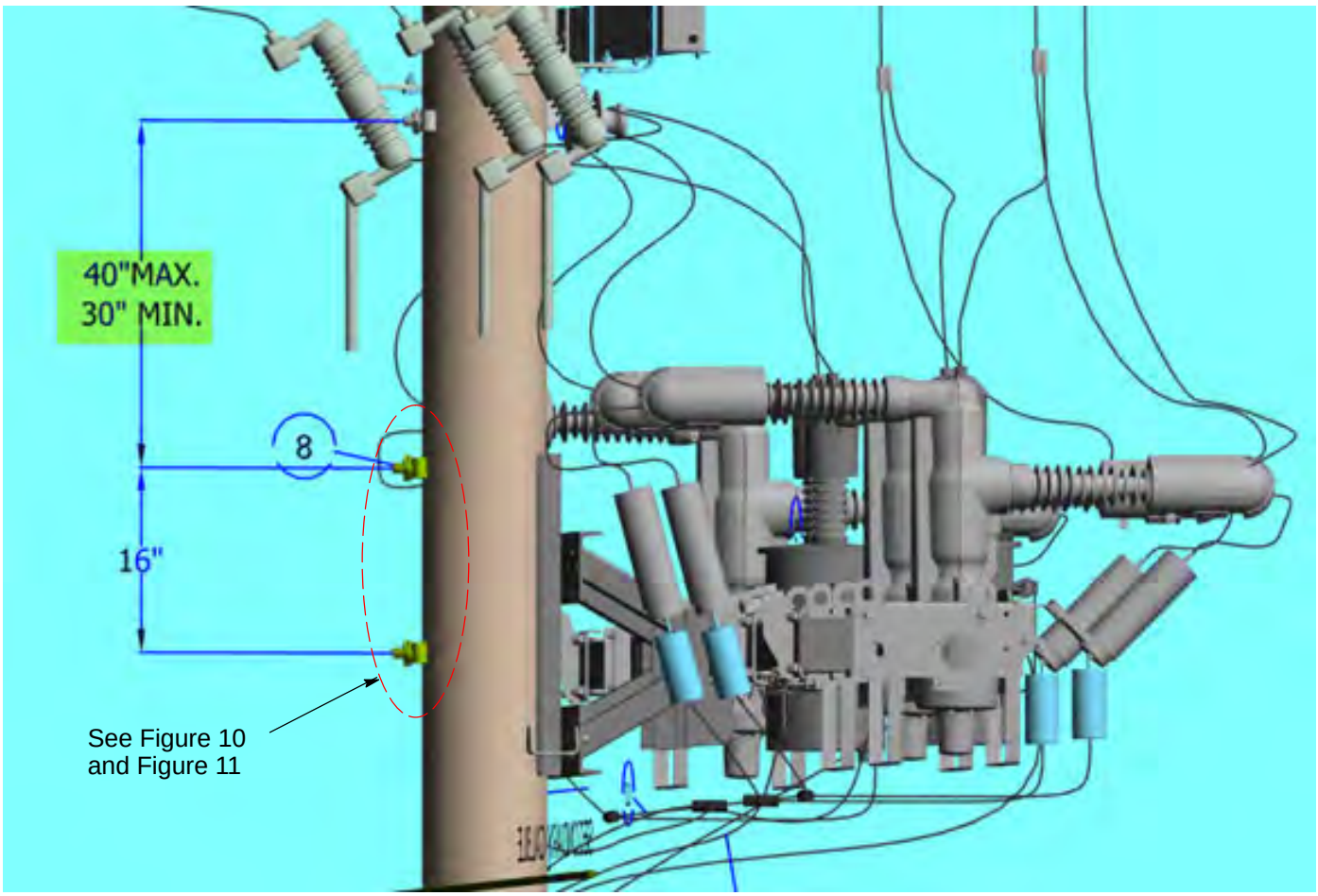


Figure 8
G&W Side Views

Construction Notes:

1. Based on feedback from the Grass Roots Safety Team, a min-max range was added. Whenever possible, build to the maximum as it helps with fitting a bucket in-between device levels to build and work on as well as helps train the jumpers for larger conductors without putting tension on the LR bushings.
2. Pole loading calculations still need to be done if using an existing pole. When replacing a pole or installing a new pole location, maximum measurements shall be used.
3. The change from 10” to 12” from the bottom of the LR to secondary voltage conductors is to ensure that there is adequate space when the PT used is larger than what is shown in the drawings. In those cases, the PT will extend up to 2” below the bottom of the LR.
4. The Stick Pin to route the PT jumper across the pole now has no measurement. It can be installed on the bottom hole of the disconnect arm.

Clarification on Controller Height:

The controller height is based off the location of the pole. If the pole location is near traffic (i.e.: sidewalk next to a road), then the controller must be placed at minimum of 15’. If the pole location is away from traffic, then the controller can be built to 9’.
See the Marking Document 022168 (Page 31 item #2) for a general rule to install controllers at 9’ should be the same as when Visibility Strips are not needed on the pole:
“Visibility strips should not be installed where there is no reasonable expectation of traffic. For example: Cross country poles, poles through waterways level of the or wetlands, rear easement poles, poles behind guardrails, or poles on embankments that are well above or below the road.”
DO NOT rotate controller to the back side of the pole as a way to move it out of traffic and install at 9. Doing this it makes it extremely difficult for field personnel to access the controller.

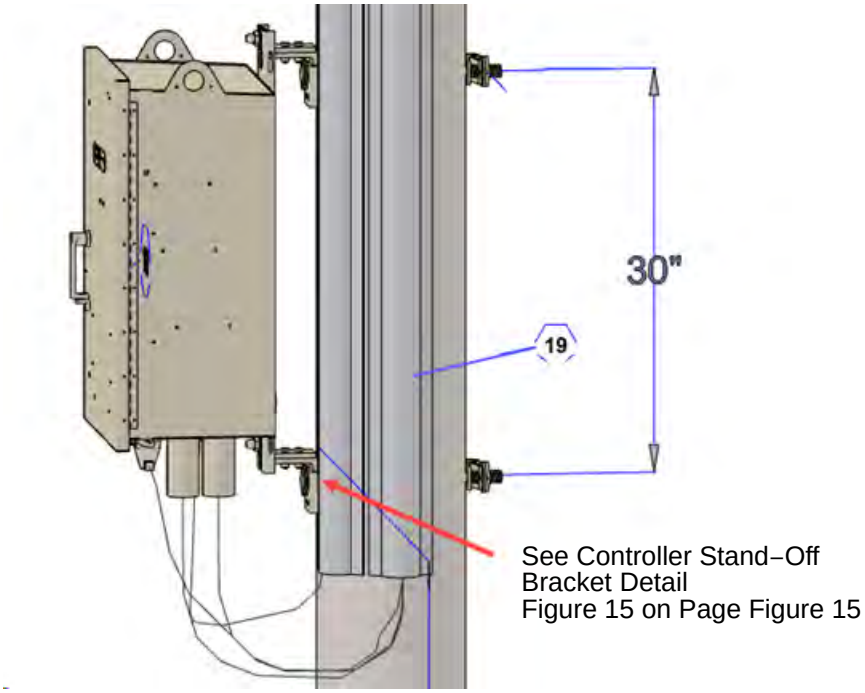


Figure 9
Controller

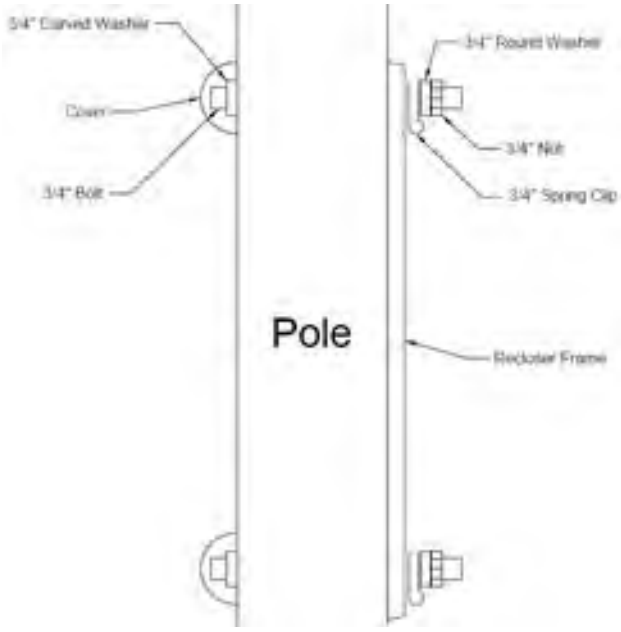


Figure 10
LR Bolt Detail

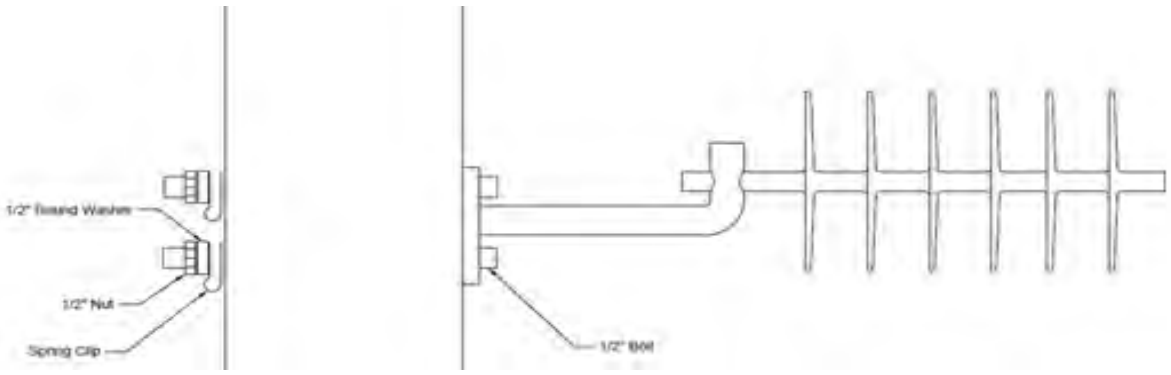


Figure 11
Antenna Bolt Detail

Antenna Installation Notes:

1. For Fiberglas poles, only 1 bolt is needed.
2. For poles Class H1/H2 it is acceptable to install 1/2” lags, (on poles thicker than 15”).

Controller Power Cable connections to PT

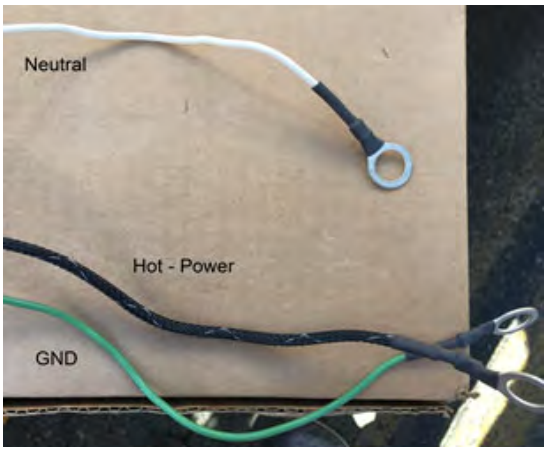


Figure 12
PT Cable Pigtails

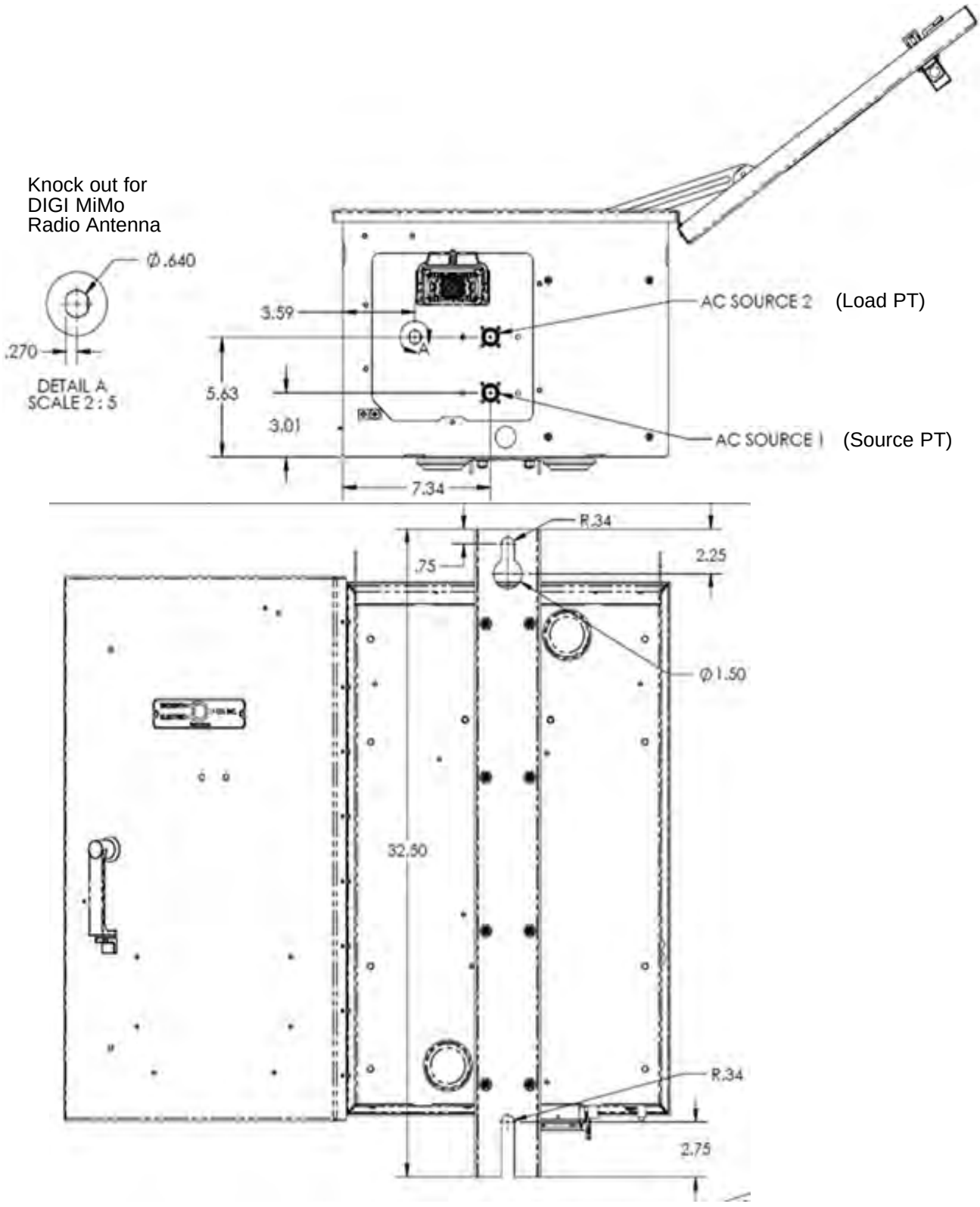


Figure 13
Beckwith Cabinet – Back and Bottom Views

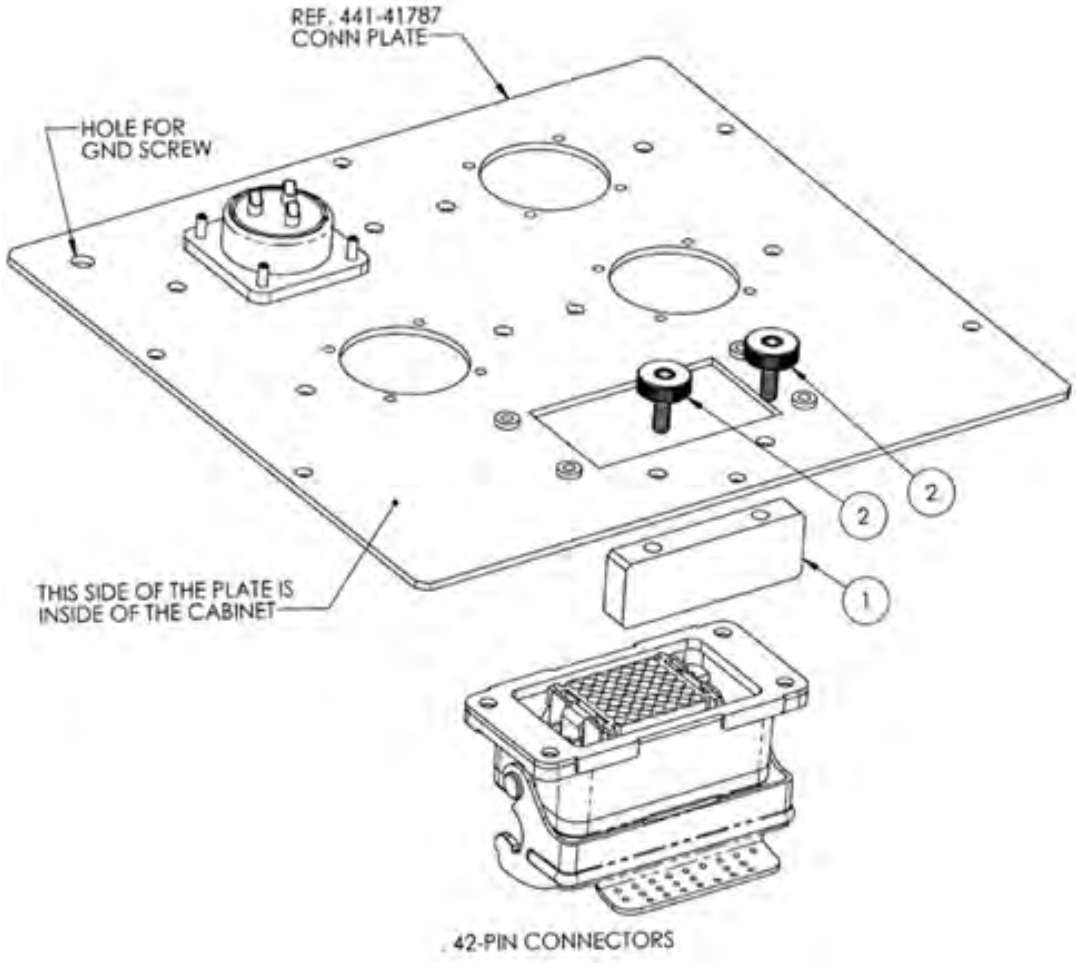


Figure 14
42 Pin Lock Installation

Installing OH Distribution Line Reclosers

Note: All line recloser controllers must use the stand−off brackets below.
Dimensions shown in inches.

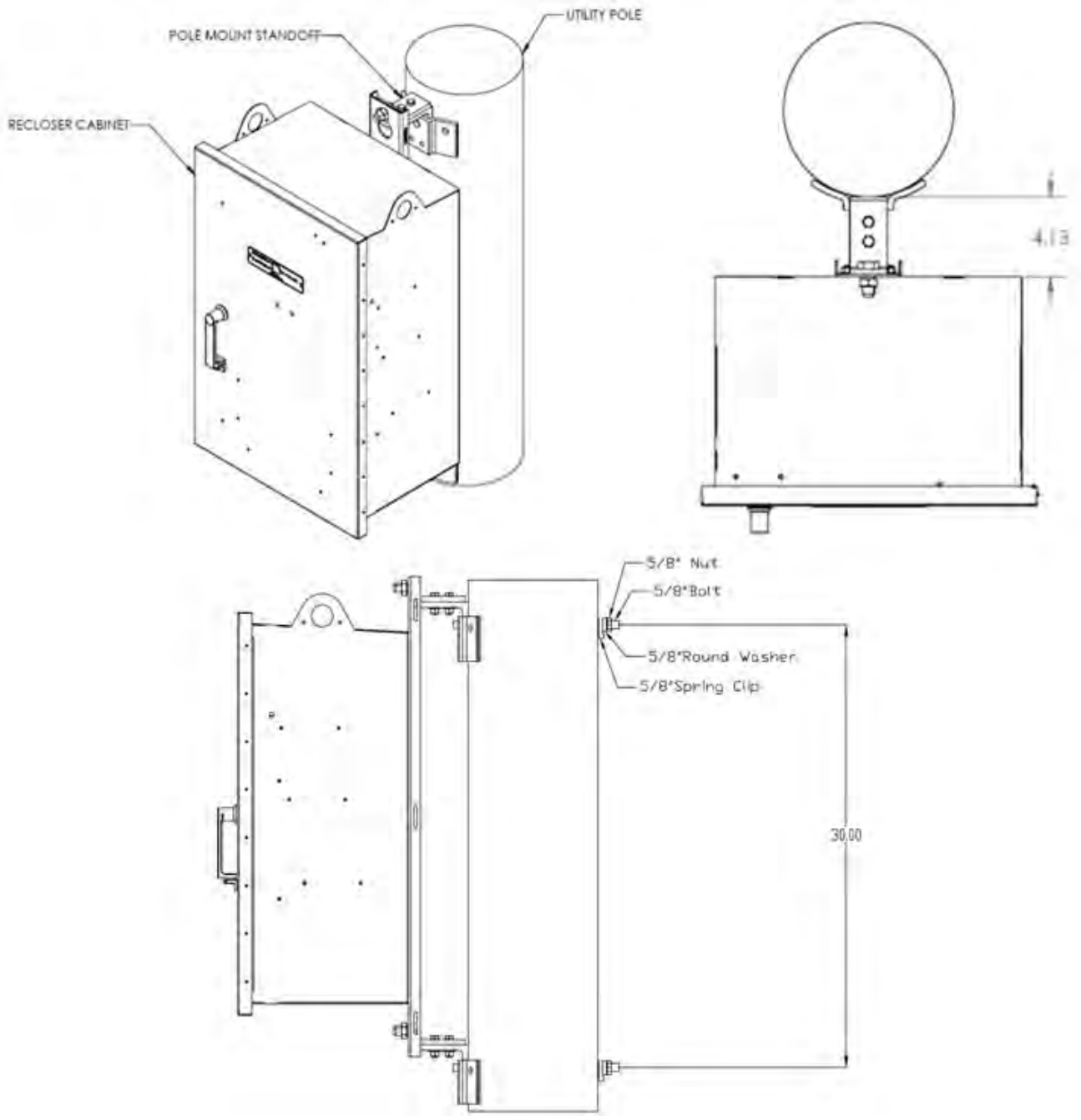


Figure 15
Stand−off Bracket and Dimensions

Table 6 Bill of Material for the Complete Location Construction of the G&W Line Recloser with the Beckwith Controller

Item	Description	Quantity	M–Code	Document
1	Manual US Bypass–Switch for AA Insulation Districts at 21 kV	1	M343958	066195
2	600 Amp Part 57HSB	3	M341276	015225
	300 Amp Part 44HSB		M330307	
3	9’ Tangent Composite Cross Arm	1	M150592	068180
4	G&W Electric Viper–ST Solid Dielectric Reclosers – 3 single pole LR – 38KV Kit – All Districts	1	M343981	–
5	Potential Transformer (P.T) – 1 KVA oil filled – Fused	Mainline – 2 Tap Line – 1	Table 2 by voltage	076250
	PT FR Bushing Covers	4	M560622	061149
6	LR FR Bushing Covers	6	M320302	061149
7	Arresters – w/ Straight Bracket – Source Side	3	M330316 – 15 KV	031822
	Arresters – w/ Angled Brackets – Load Side	3	M330315 – 24 KV	
	Arrester FR Bushing Covers	6	M330313	061149
8	Bolt Covers	As needed	–	058778
	3/4” Bolt	As needed	–	
	3/4” Spring Clips	As needed	M033501	
	3/4” Curved Washers	2 per bolt	M195293	
	Round Washers	As needed	M195275	
9	SCADA Equipment, See –Table 7[1]			
	If Yagi antenna is needed use below hardware			
	1/2” Bolt	Length as needed	–	058778
	1/2” Round Washers	As needed	–	
	5/8” Spring Clip	As needed	–	
10	Complete Kit – 42–Pin LR Beckwith Recloser Control for G&W Viper ST and for the ABB Elastimold MVR Re-closers. (Relay & 42–Pin Cabinet) Including Pole Standoff Bracket	1	M343747	–
11	Insulator Clearance Bracket	1	As needed	015190
	Insulator	1	As needed	022088
12	Protected GND Wire	As needed	M290406	021904
13	Wedge Connectors	As needed	Per jumper size	066194
	Wedge FR Covers	As needed	Per jumper size	061149
14	Jumper – Raptor Lead Wire	As needed	Table 14	059626
15	GNR Rod	2	M187013	013109
	Ground Rod Clamps	2	M187012	
16	5/8” Spring Clip	As needed	M033320	058778
	5/8” Bolt	As needed	–	
	Bolt Cover	As needed	–	
	5/8” Round Washers	2 per bolt	M195274	

Table 6 Bill of Material for the Complete Location Construction of the G&W Line Recloser with the Beckwith Controller

Item	Description	Quantity	M–Code	Document
17	2 Hole Cable to Flat Bar NEMA Spade Connector	As needed	Per Jumper Size	015251
	Everdur Bolt 2” and nut	As needed	M193025 M195013	
	Washers	As needed	M195252	
	Lock Washers	As needed	M195193	
18	Post Type Insulators, LP14	2	M310069	022088
	Stud or Pin	2	M182144	022473
19	Molding, U–Shaped PVC	As needed	–	021924
20	Extension Link, 14”	3	M340356, M343451 [2]	066195

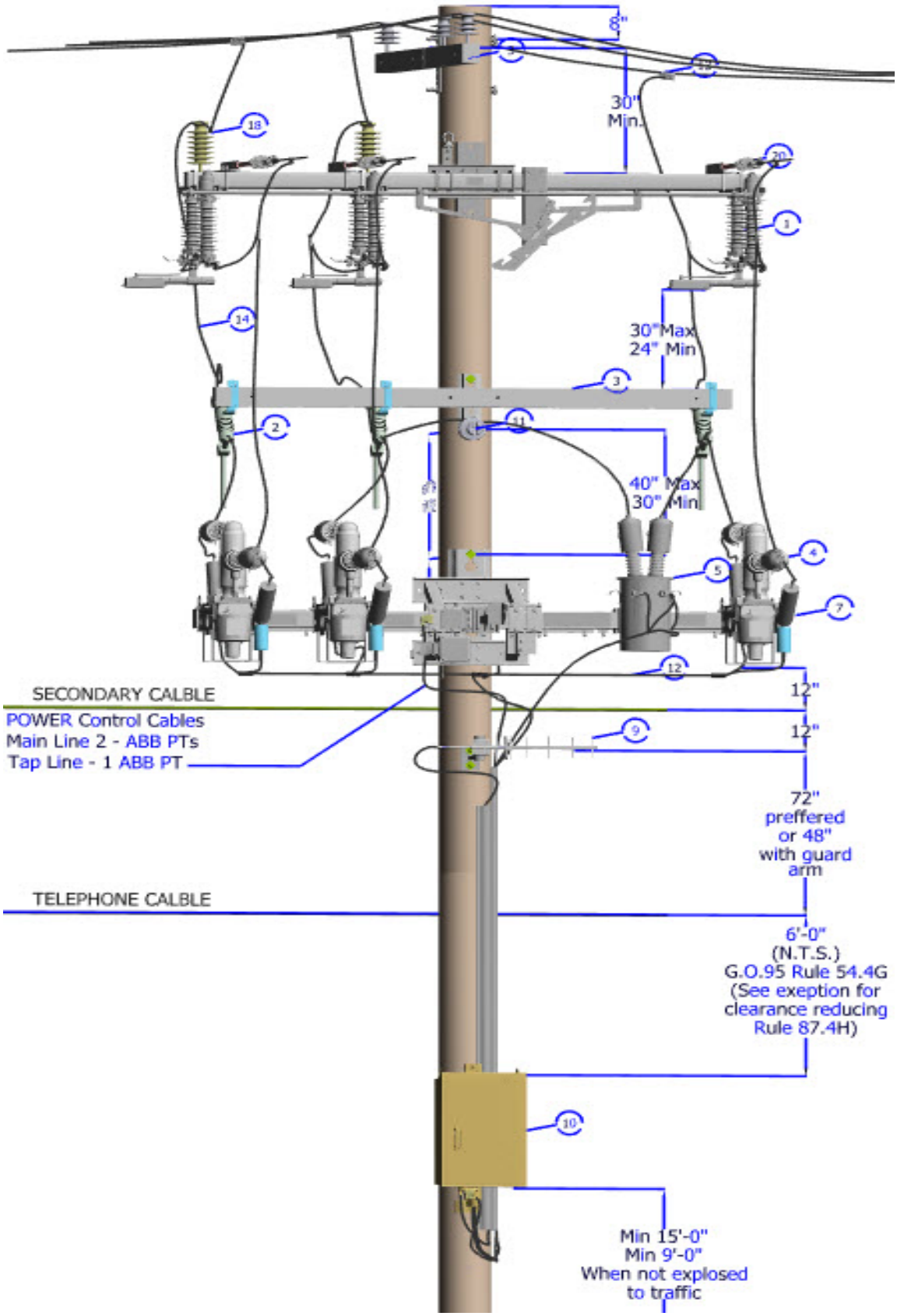
[1] SCADA Site Survey must be completed to determine the Radio Type to order.
[2] Use M343451 for BAS (Buy America Compliant).

Table 7 Communication Equipment for SCADA Installation

Material Code	Description	Watts
IP Option – Preferred		
DIGI Option		
DIGI WAN 4G Cellular Router Kit	1	M370166
DIGI Radio Antenna MiMo (Multi Inputs–Multi Outputs)	1	M370170
Orbit Option		
Orbit ECR Cell Verizon	1	M370226
or		
Orbit ECR Cell AT&T		M370227
Flat Bracket Mount	1	M370228
DIN Rail Mount	1	M370229
Serial Connected Option		
MAS Option		
SD9 Radio – SD9–C–ES	1	M378923
Yagi Antenna TY–900	1	M372816
Antenna Bracket A2436–A	1	M376632
Coaxial Cable to Radio – CXTA42G–24IN	1	M378909
RF Cable, N–male to TNC –male	1	
Coaxial Cable to Antenna – F1–PNMNM–15	1	M375048
Lightning Arrester	1	Tally purchase LABH2400NN
Covered GND Wire for Arrester	Length as needed	–
Cold Shrink Weatherproof Kit 1/4” to 1/2”	1	M378908
SD9 Radio – SD9–C–ES	1	M378923
LES Option		
Transnet Radio 900–EL805	1	M376847
Yagi Antenna TY–900	1	M372816
Antenna Bracket A2436–A	1	M376632
Coaxial Cable to Radio – CXTA42G–24IN	1	M378909
RF Cable, N–male to TNC–male	1	
Coaxial Cable to Antenna – F1–PNMNM–15	1	M375048
Lightning Arrester	1	Tally purchase LABH2400NN
GND Wire for Arrester	Length as needed	–
Cold Shrink Weatherproof Kit 1/4” to 1/2”	1	M378908

2. G&W Viper- ST Line and Buck - Slack Span Construction

Note: To open the 3D drawing, click on the picture below, allow to use one time, and re- click on the drawing



Pole Top Circuit Must Be Flat Framed

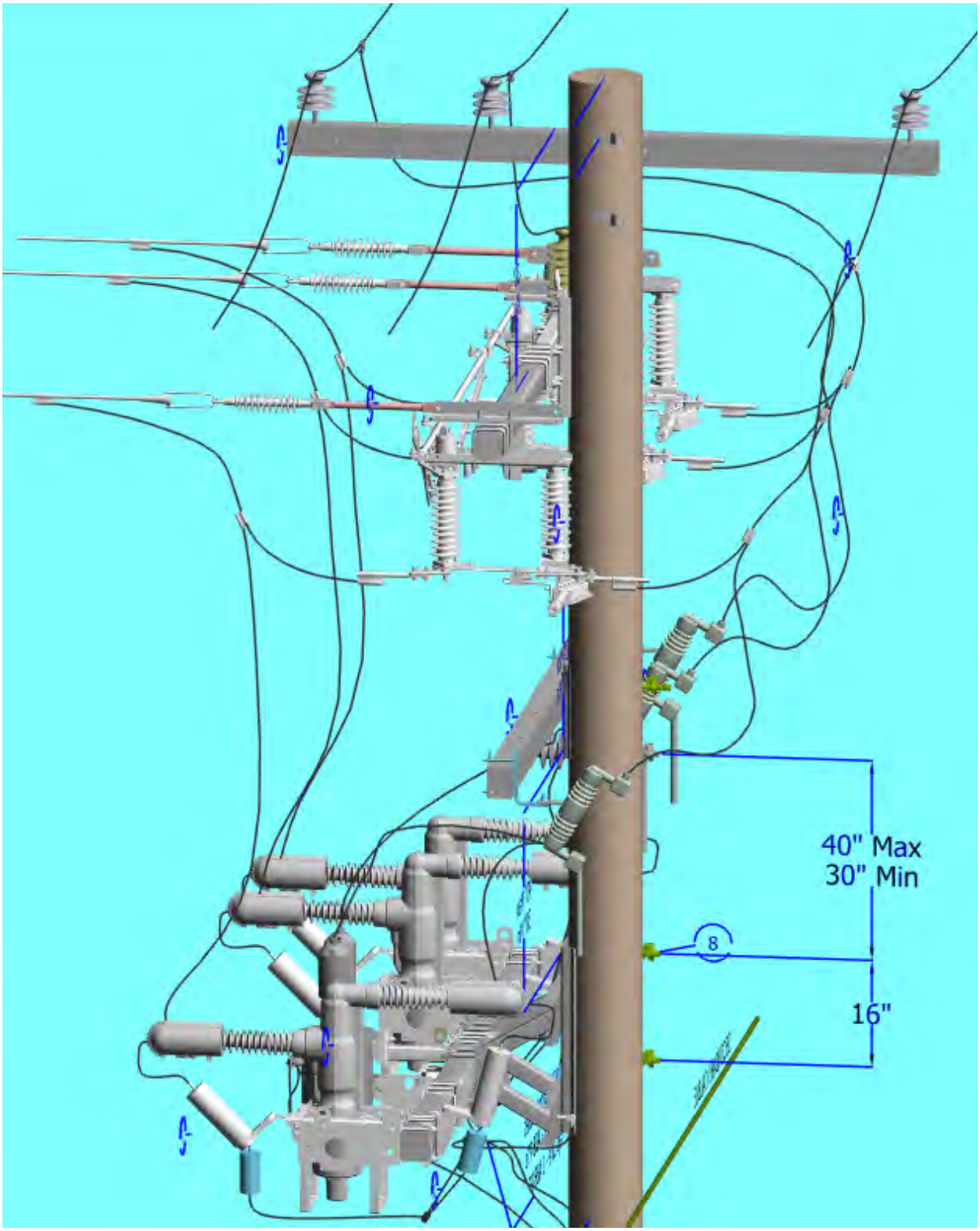


Figure 16
Line and Buck Side View

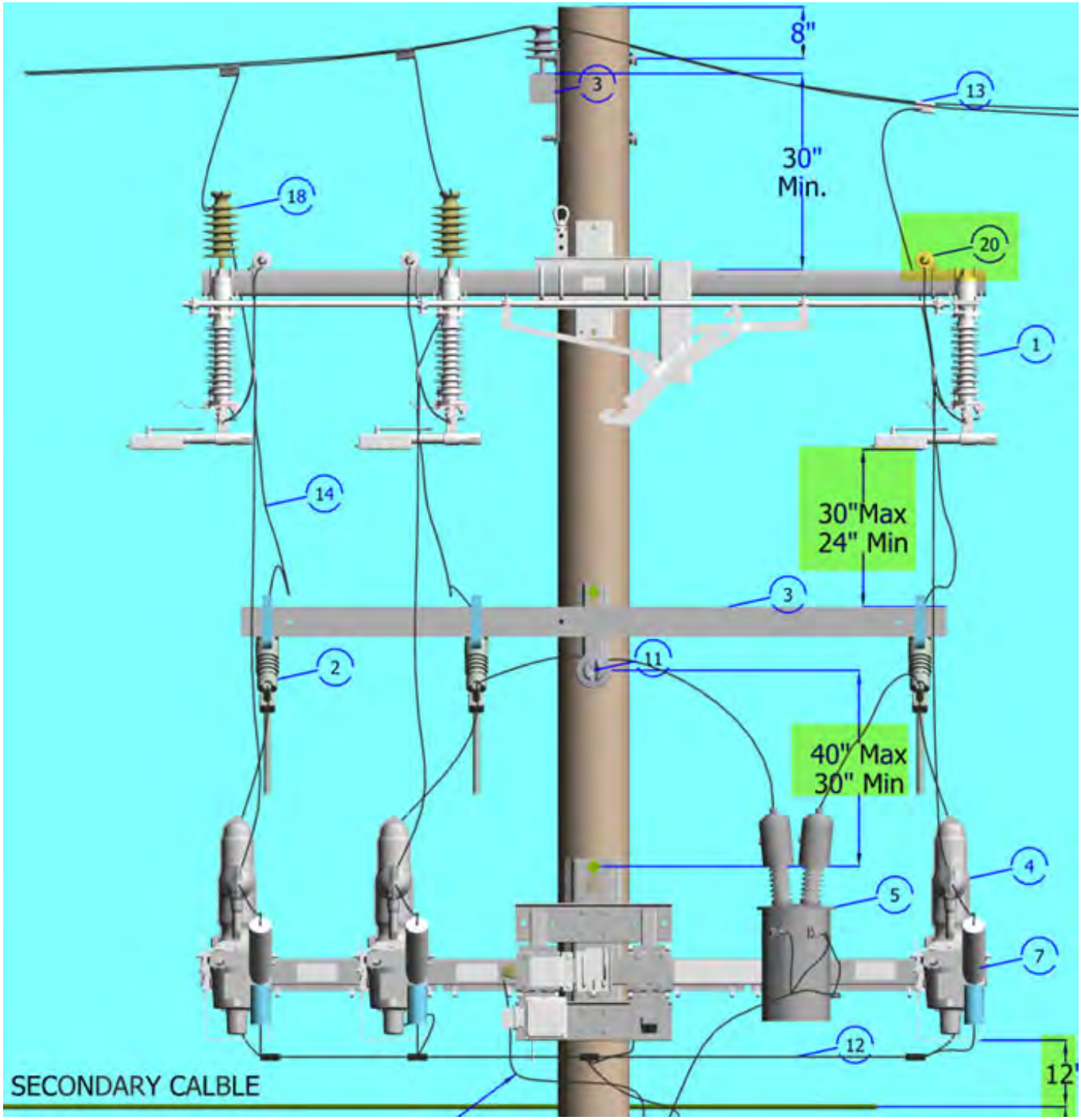


Figure 17
Line and Buck Front View

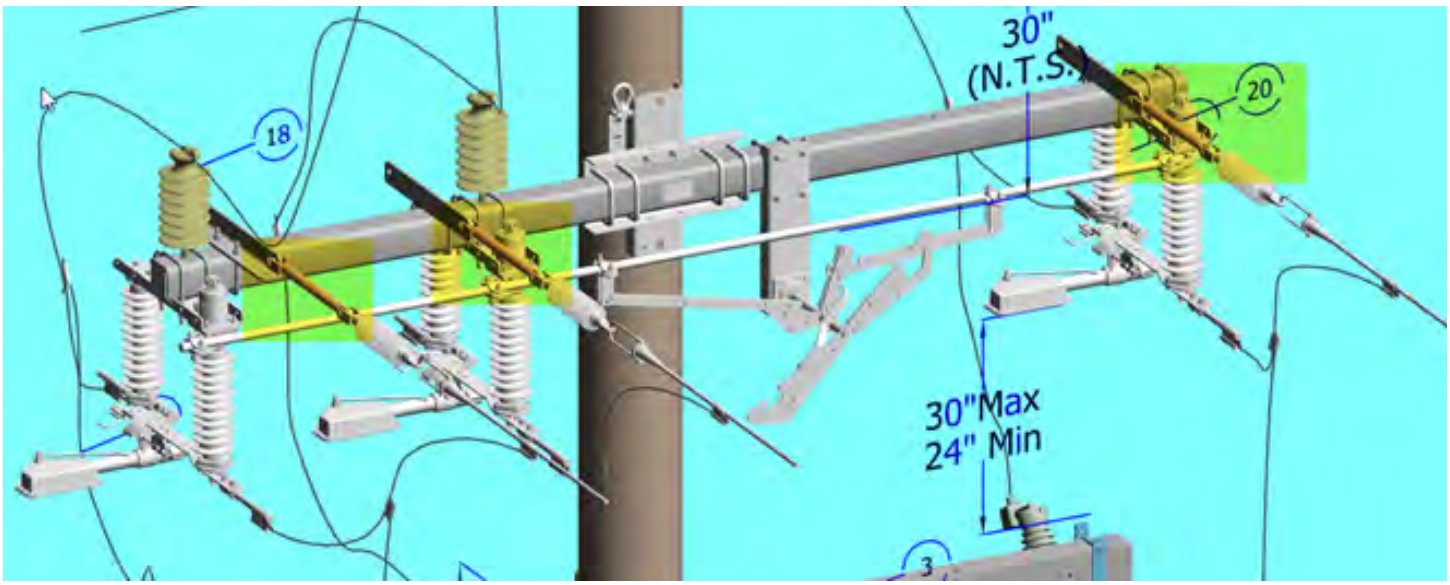


Figure 18
Switch Detail

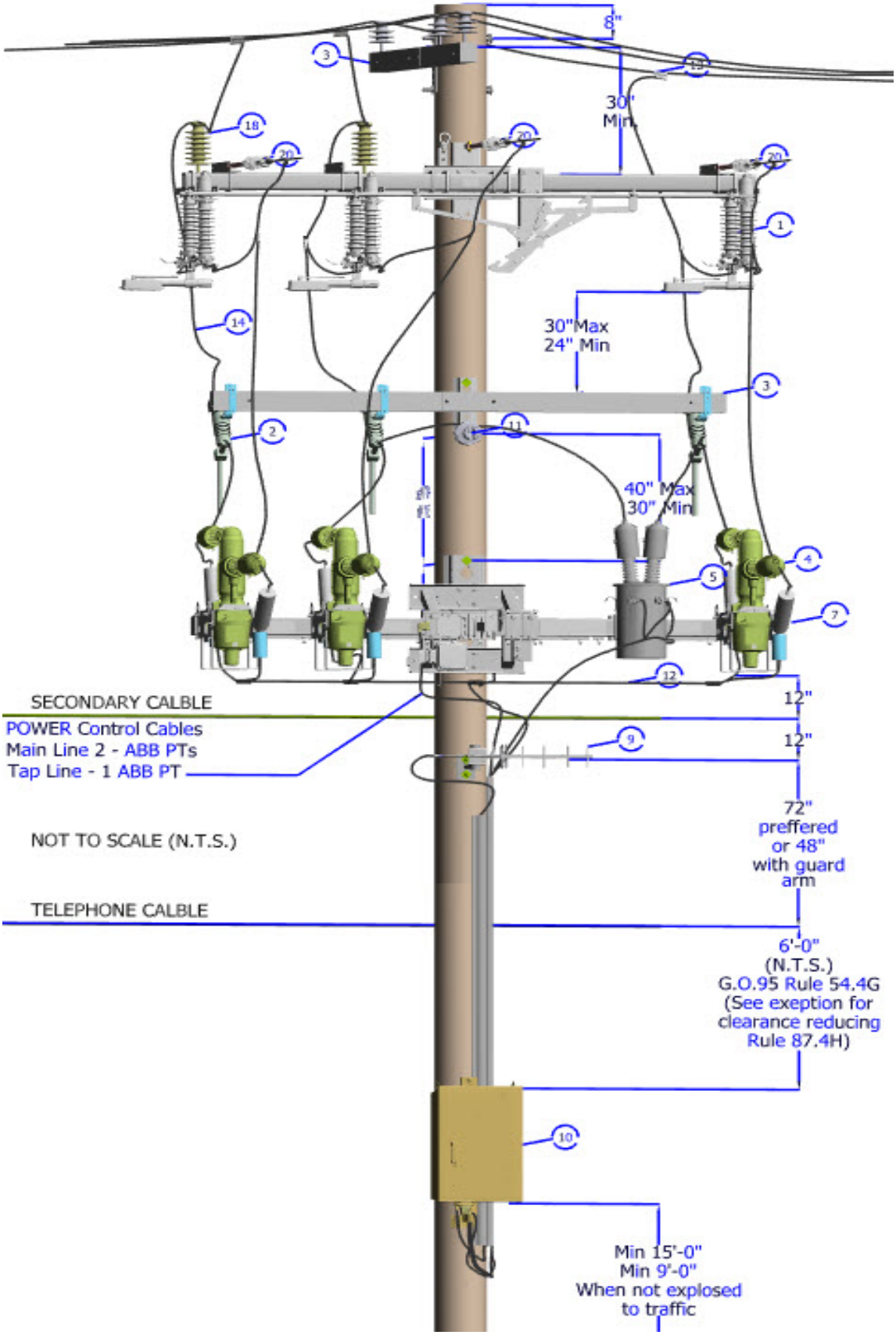
Slack Span Construction Notes:

1. On all line and buck installations, the line arm must be flat framed at pole top to accommodate the 36”x36” tangent climbing space needed for the bypass switch.
2. This construction cannot be used on Transmission underbuilt poles as the climbing space will end at the distribution line arm. Document 015201, Page. 4.
3. The use of bolted side opening type strain clamps (Document 028851) attached to strain insulators (Document 015543) is permitted with aluminum conductors for a slack span buck application. The use of RIV clips per Document 048470 is required on these installations.
4. Slack Span Line and Buck must use the 14” extension brackets and can be attached to the switch frame itself. See bill of material #20 for extension bracket m–code.

Installing OH Distribution Line Reclosers

3. G&W Viper-ST Line and Buck - Full tension Construction

Note: To open the 3D drawing, click on the picture below, allow to use one time, and re-click on the drawing



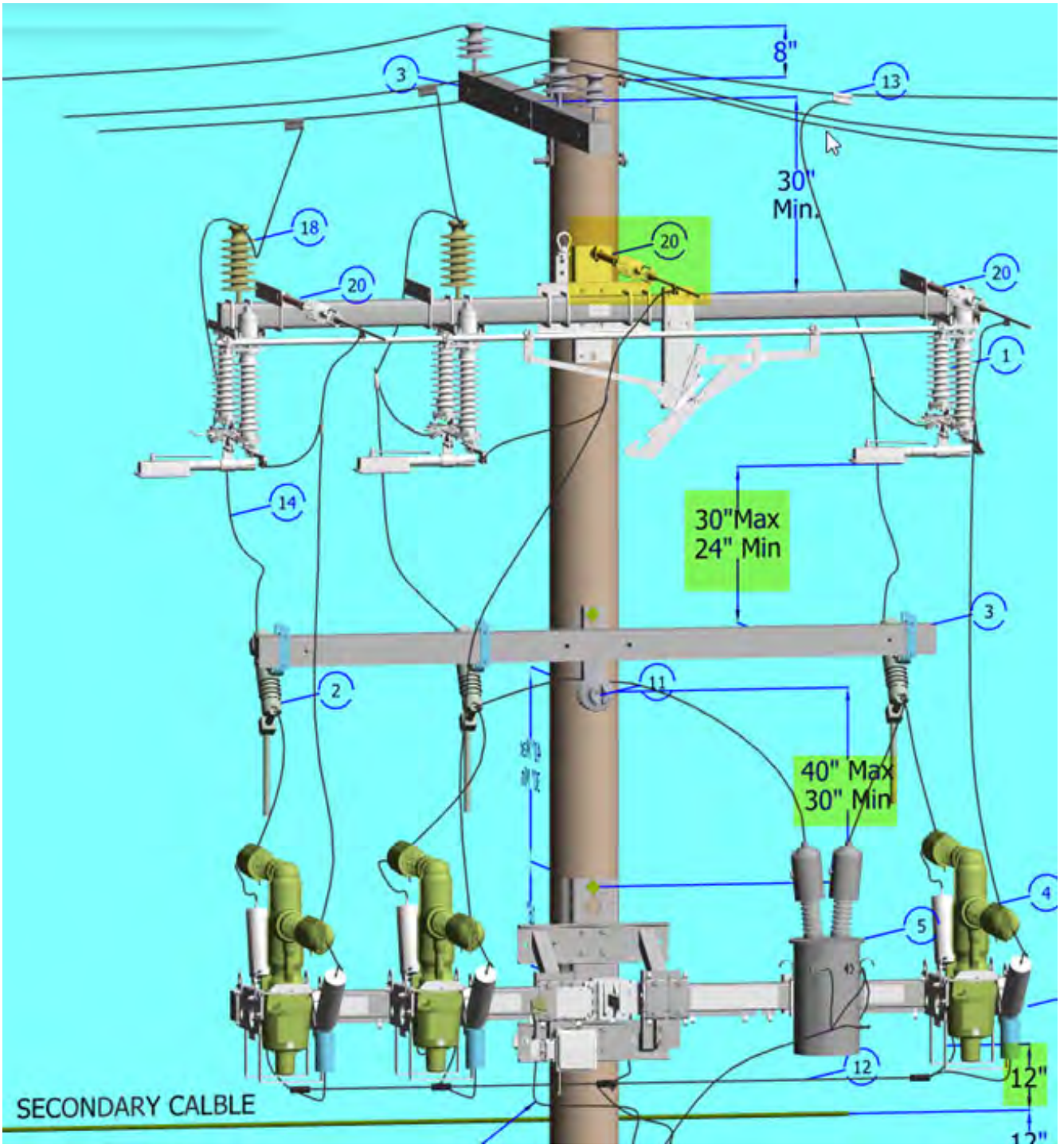


Figure 19
Full tension Front View

Installing OH Distribution Line Reclosers

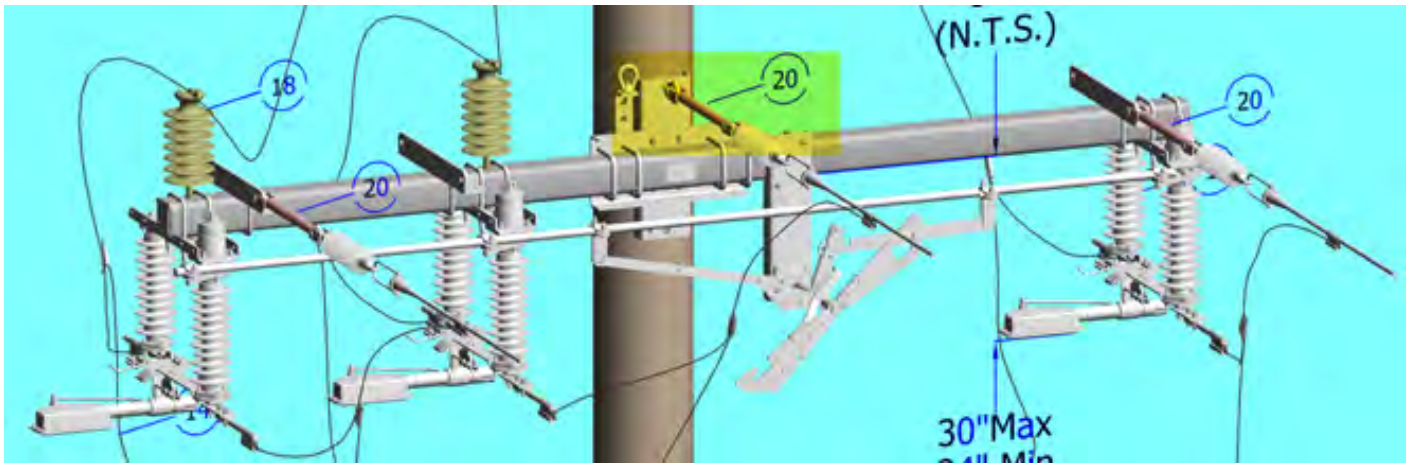


Figure 20
Switch Detail

Full tension Construction Notes:

1. On all line and buck installations, the line arm must be flat framed at pole top to accommodate the 36”x36” tangent climbing space needed for the bypass switch.
2. For a Line and Buck LR installation that has full tension the middle phase must attached to the top hole of the switch bracket and must use the 14” extension brackets. See bill of material #20 for extension bracket m–code.

3. Future LR Manufacturer Installation – TBD

Installation Instructions

1. Distribution Line Technicians (DLTs)
   A. DLTs must follow these procedures to safely test and release LRs into service
      (1) Pre–Commissioning the LR and controller (relay)
         (a) TD–2916P–01 Electric Distribution Line Control Device Pre–Commissioning Tests
      (2) Assist with phase identification for True Phasing during the build process
      (3) Submit a SCADA Screen Request Form (SSRF) as needed
         (a) TD–2916P–02–F01 Attachment 1 – SCADA Screen Request Form (SSRF)
      (4) Perform SCADA Acceptance test and energize the equipment into service
         (a) TD–2916P–02 Electric Distribution Line Control Device SCADA Commissioning
      (5) Line Control Device Data Management is available for programming and maintaining the LR
         (a) TD–2916P–03 Electric Distribution Line Control Device Data Management

2. **Planning Engineers**
   A. Shall submit a SCADA Site Survey
   B. Shall submit work order to have the controller built with radio from site survey and programmed.
      (1) http://wwwt2/MyITServices/forms/intake/188
   C. Settings Templates can be found in the Manuals and Template Sharepoint.
3. Visual Job Aid: Installing and Operating Line Reclosers (Engineers, DLT's, and field personnel)
   A. Knowledge Keeper Video Job Aids are available.
      (1) For Web or Android access, go to knowledgekeeper.com. For iPhone or iPads, download the Knowledge Keeper App in the iOS App Store.
      (2) Create a free account using your LAN ID email, password and company name (PG&E).
      (3) Wait for an email notification from Knowledge Keeper that your account has been linked to PG&E's private Knowledge Keeper subscription.

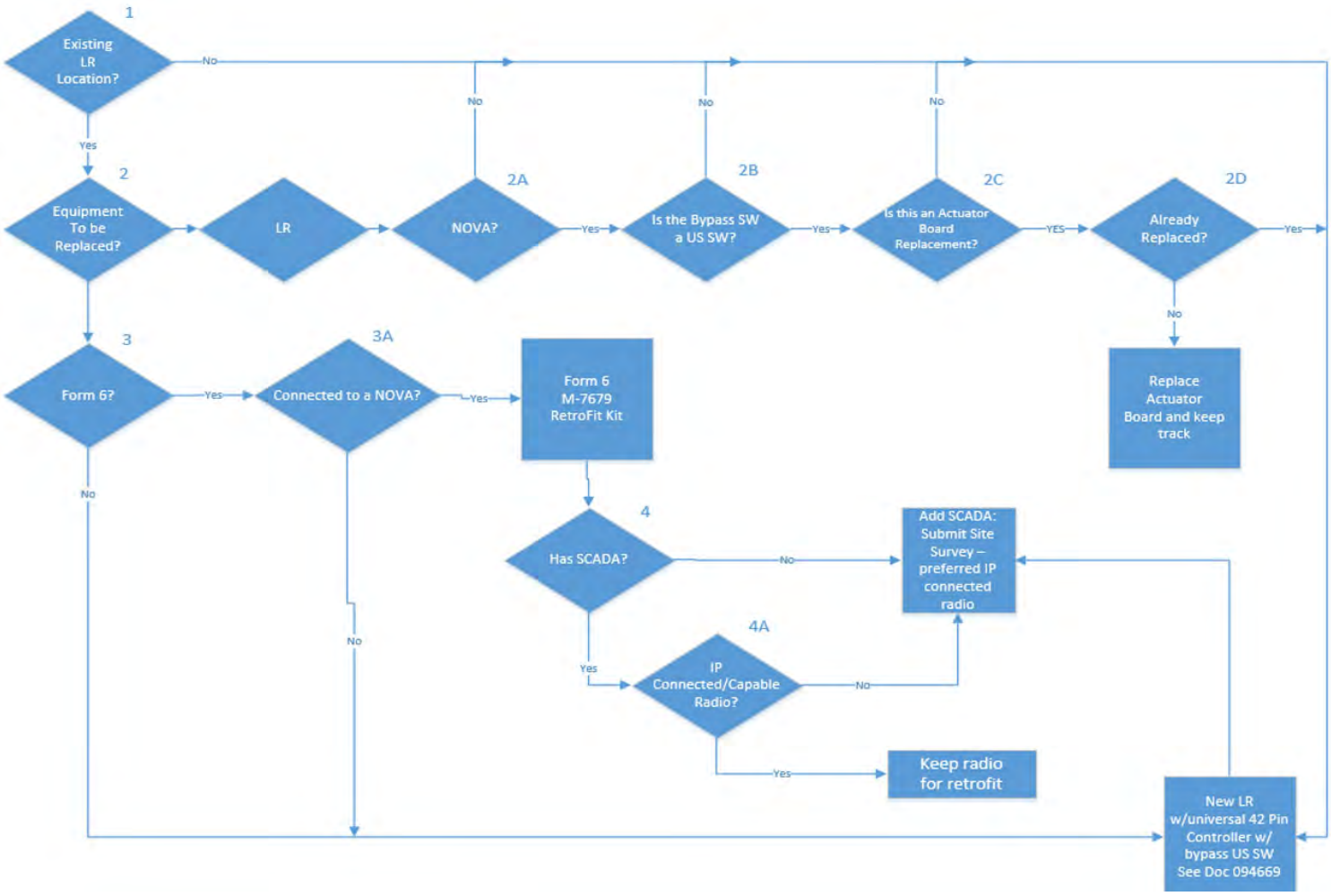
      Once you are logged:
      (4) Select "Find a Video"
      (5) Type "FuseSaver" into the search menu and all videos regarding the FuseSaver will appear
   B. PG&E Microsoft Stream Video Job Aids are available
      (1) Accessing Stream and Preparing Your Browser – PG&E Microsoft Stream page
      (2) Stream can be viewed from Internet Explorer and Chrome at https://portal.office.com/. If you are asked to login, do so with LANID@pge.com and your password.
      (3) If you do not see Stream in the initial "Apps" screen, click on "Explore all your apps –>", scroll down to Stream and click on the Stream icon.
      (4) You can also access Stream at https://web.microsoftstream.com/
      (5) If you are running Internet Explorer on Windows 10, please add Stream to the Trusted Sites by doing the following (this is not necessary for IE on Win7 or on Chrome on any version of Windows):
      (6) Open Internet Explorer and go to Stream https://web.microsoftstream.com
      (7) Press the ALT key and select Tools | Internet Options from the menu
      (8) Select the Security Tab and click on Trusted Sites
      (9) Press the Sites button and add https://web.microsoftstream.com/
      (10) Select Close and OK

Revision Notes

Revision 01 has the following changes:

1. Updated Note 4. Page 4.
2. Added Figure 2 on Page 4.
3. Updated Table 3 on Page 9.
4. Updated Table 5 on Page 11.
5. Updated Figure 7 on Page 15.
6. Created new Figure 8 on Page 16 and Construction Notes.
7. Updated Table 6 on Page 22 and Page 23.
8. Updated Figure 16 on Page 26.
9. Updated Figure 17 on Page 27.

Attachment 1 – LR Application Criteria Fl



Attachment 1 – LR Application Criteria Fl

1. Does the location already have a recloser?
   A. If No and the location does not have an existing recloser, use Doc 094669 to install a new recloser.
   B. If Yes, the location already has an existing recloser, see question 2.
2. What piece of the recloser is being upgraded, fixed, or replaced?
   A. Is the equipment a Cooper/Eaton NOVA?
      (1) If is anything else other than a NOVA (i.e. Oil filled), replace the entire location with a new LR following document 094669.
      (2) If Yes and is a Cooper/Eaton NOVA, move on to 2B.
   B. Does the location have a US Switch as the bypass?
      (1) If No and is anything other than a gang operated US Switch, replace the entire location with a new LR following document 094669.
      (2) If Yes and is a gang operated US Switch is already installed, move to 2C.
   C. Is the job replacing the Cooper/Eaton Actuator board?
      (1) If No, replace the entire location with a new LR following document 094669.
      (2) If Yes, move to 2D.
   D. Has this location already had its actuator board replaced?
      (1) If No, replace the actuator board and keep track of all locations that have had the actuator boards replaced.
      (2) If yes, replace the entire location with a new LR following document 094669.
3. Is the Controller being upgraded, fixed, or replaced and a Form 6?
   A. If Yes, is the Form 6 connected to a Cooper/Eaton NOVA?
      (1) If No, anything other than a Cooper/Eaton Form 6 controller (i.e. 3A or 4C) replace the entire location with a new LR following document 094669.
      (2) If Yes and controller is a Cooper/Eaton NOVA, replace the Cooper/Eaton Relay cube with the Beckwith M−7679 Retrofit replacement.
4. Does the Retrofit location already have SCADA?
   A. If Yes, Does the existing location have an IP connected radio (DIGI, FAN, Orbit, or L−Band)?
      (1) If Yes, keep existing radio for the retrofit.
      (2) If No or if the existing location has a serial connected radio (MAS, LES, or SD9), submit a SCADA site survey and see if location has a signal capable for an IP connected radio.

DOCUMENT APPROVER

Jim Gill, Director, Standards and Work Methods

Marlon Viduya, Supvr, Engg Standards Distrib Automation, EAM Distrib. Standards 03

DOCUMENT CONTACT

Ihab Ibrahim, Sr. Standards and Strategy Engineer

INCLUSION PLAN

094669 – Installing OH Distribution Line Reclosers