



A Touchstone Energy® Cooperative 

GRAND VALLEY RURAL POWER LINES, INC.

GRAND JUNCTION, COLORADO

**SPECIFICATIONS AND DRAWINGS FOR 7.2/12.5 kV,
14.4/24.9 kV, AND UNDERGROUND CONSTRUCTION**

[Click HERE to search for a unit](#)

Revised: 7/20/2023
(Updated for Fiberglass Crossarm Framing)

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VOLUME I

INDEX OF CONSTRUCTION DRAWINGS
7.2/12.5kv LINE CONSTRUCTION

Single-Phase:

A1, A1A	Single Primary Support, 5° Angle Max, 500 lbs./conductor
A1-1, A1-1A	Double Primary Support, 5° Angle Max, 500 lbs./conductor
A1X	Single Primary Support, Double Deadend in conductor
A2	Double Primary Support, 20° Angle Max, 1,000 lbs./conductor
A3	Primary 1-Phase 20° to 60° Angle, 4,000 lbs./conductor
A3A	Primary 1-Phase 20° to 60° Angle
A4	Primary 1-Phase 60° to 90°
A5	Deadend (Single)
A5-1, A5-2, A5-2A	Primary, Single Phase Tap
A5-3, A5-4	Primary, Single Phase Tap
A6	Vertical Deadend (Double)
A7, A7-1	Crossarm Construction Deadend (Single)
A7A/8	Crossarm Construction Deadend (Single)
A8	Crossarm Construction Deadend (Double)
A8A/8	1-Phase Crossarm construction-Dead End (Double)
A9, A9W	1-Phase Crossarm Construction – Double Line Arm
A9-1, A9-1W	1-Phase Crossarm Construction – Single Line Arm

Two-Phase:

B1, B1-A	Crossarm Construction Single Primary Support, 5° Angle Max, 500 lbs./conductor
B1-1, B1-1A	Crossarm Construction Double Primary Support, 5° Angle Max, 1,000 lbs./conductor

B1-3	V-Phase, Crossarm Construction Double Primary Support
B2	Crossarm Construction Double Primary Support, 20° Angle Max, 1,000 lbs./conductor
B3, B3A	Vertical Construction, 20° to 60°
B4-1, B4-1A	Vertical Construction, 60° to 90°
B5-1, B5-1A	Vertical Construction Deadend (Single)
B7, B7-1	Crossarm Construction Deadend (Single)
B8	Crossarm Construction Deadend (Double)
B9, B9W	Two Phase, Crossarm Construction-Double Line Arm
B9-1, B9-1W	Two Phase, Crossarm Construction Single Line Arm
B9-2	Crossarm Construction Double Line Arm, 20° Angle Max, 1,000 lbs./conductor
B9-3	Crossarm Construction Single Line Arm, 5° Angle Max, 500 lbs./conductor
B22	Crossarm Construction Single Phase Junction, 5° Angle Max, 500 lbs./conductor

Three-Phase:

C1, C1A	Crossarm Construction Single Primary Support, 5° Angle Max, 500 lbs./conductor
C1-1, C1-1A	Crossarm Construction Double Primary Support, 2° Angle Max, 1,000 lbs./conductor
C1R, C1AR	3-Phase Crossarm Construction Single Primary Support, 0° to 5° Angle
C1-1R, C1-1AR	3-Phase Crossarm Construction Double Primary Support
C1-2, C1-2A	Crossarm Construction (Large Conductors), 2° Angle Max, 500 lbs./conductor
C1-2R, C1-2AR	Crossarm Construction (Large Conductors) 3-Phase
C1-3	Crossarm Construction Double (Large Conductors) 5° Angle Max, 1,000 lbs./conductor

C1-3R	3-Phase Crossarm Construction Double Primary Support (Large Conductor)
C1-4	Crossarm Construction (Large Conductor), 5° Angle Max, 1,000 lbs./conductor
C1-4R	3-Phase, Crossarm Construction (Large Conductor)
C1-5	Crossarm Construction (Large Conductor) 3-Phase
C2	Crossarm Construction Double Primary Support, 20° Angle Max, 1,000 lbs./conductor
C2-1	Crossarm Construction Double Primary Support 20° Angle Max, 1,500 lbs./conductor
C2-2	Crossarm Construction Double Primary Support (Large Conductor) 20° Angle Max, 2,000 lbs./conductor
C2-2PL	Crossarm Construction Double Primary Support (Large Conductor) 20° Angle Max, 2,000 lbs./conductor
C3	Vertical Construction 20° to 60°
C3L	Vertical Construction (Large Conductor) 20° to 60° Angle
C3-1	Vertical Construction (Large Conductor) 10° to 20° Angle
C3-1L	Vertical Construction (Large Conductor) Pole Band 10° to 20° Angle
C4-1	Vertical Construction, 60° to 90° Angle Max
C4-1L	Vertical Construction (Large Conductor) Pole Band
C5-1	Vertical Construction Deadend (Single)
C5-1L	Vertical Construction (Large Conductor) Pole Band
C7, C7-1	Crossarm Construction Deadend (Single)
C7-2	Crossarm Construction Deadend (Single)
C7A/8, C7A/10	Crossarm Construction Deadend (Single)
C7A/10F	Crossarm Construction Deadend (Flat)
C7-3P	3-Phase 3 Pole Deadend
C8, C8X	Crossarm Construction Deadend (Double)

C8-1	Crossarm Construction Deadend (Double)
C8-2, C8-2X	Crossarm Construction Deadend (Double) (Large Conductor)
C8-3	Crossarm Construction Deadend (Double) Large Conductor With Unbalanced Loads
C8A/8	3-Phase Crossarm Construction Dead End (Double)
C8-3P	3-Phase 3 Pole Deadend (Double)
C9, C9W	Crossarm Construction – Double Line Arm
C9-1, C9-1W	Crossarm Construction Single Line Arm
C9-2	Crossarm Construction Double Line Arm, 5° Angle Max, 2,000 lbs./conductor
C9-3	Crossarm Construction Single Line Arm, (Large Conductor) 5° Angle Max, 1,000 lbs./conductor
C22	Crossarm Construction Single Phase Junction, 5° Angle Max, 500 lbs./conductor
C24	Crossarm Construction Two Phase Junction, 5° Angle Max, 500 lbs./conductor

Three-Phase, Double Circuit:

DC-C1	Crossarm Construction Double Circuit Single Primary Support, 2 Crossarm Type, 5° Angle Max, 500 lbs./conductor
DC-C1A	Crossarm Construction Double Circuit Single Primary Support, 3 Crossarm Type, 5° Angle Max, 500 lbs./conductor
DC-C1-1A	Crossarm Construction Double Circuit Double Primary Support, 3 Crossarm Type, 5° Angle Max, 1,000 lbs./conductor
DC-C1BLH	Crossarm Construction Double Circuit Single Primary Support, 2 Crossarm Type
DC-C1BLH1	Crossarm Construction Single Line Arm (Large Conductor)
DC-C2	Crossarm Construction Double Circuit Double Primary Support, 2 Crossarm Type, 5° Angle Max, 1,000 lbs./conductor
DC-C2-1	Double Circuit Crossarm Construction 2 Crossarm Type, 20° Angle Max, 1,000 lbs./conductor
DC-C3	Double Circuit, Vertical Construction, 20° to 60° Angle Max,

	4,000 lbs./ conductor
DC-C4-1	Double Circuit, Vertical Construction, 60° to 90° Angle Max
DC-C8	Crossarm Construction Double Circuit Deadend (Double)
DC-C25	Crossarm Construction Double Circuit, 3-Phase Tap 5° Angle Max, 500 lbs./conductor

Single-Phase (Post Insulator)

A1P, A1AP	Single Primary Support, 5° Angle Max, 750 lbs./conductor
A1-1P, A1-1AP	0° to 5° Angle Max, Double Primary Support, 5° Angle Max, 750 lbs./conductor
A2P	Double Primary Support, 20° Angle Max, 1,500 lbs./conductor
A9P	Crossarm Construction Double Support, 20° Angle Max, 1,000 lbs./conductor
A9-1P	Crossarm Construction Single Line Arm, 5° Angle Max, 500 lbs./conductor
A22P	Crossarm Construction Single-Phase Junction 5° Angle Max, 500 lbs./conductor

Two-Phase (Post Insulator)

B1P, B1AP	Crossarm Construction Single Primary Support, 5° Angle Max, 750 lbs./conductor
B1-1P, B1-1AP	Crossarm Construction Double Primary Support, 5° Angle Max, 1,500 lbs./conductor
B2P	Crossarm Construction Double Primary Support, 20° Angle Max, 1,500 lbs./conductor
B9P	Crossarm Construction Double Line Arm, 20° Angle Max, 1,000 lbs./conductor
B9-1P	Crossarm Construction Single Line Arm, 5° Angle Max, 500 lbs./conductor
B9-2P	Crossarm Construction Double Line Arm, 20° Angle Max, 1,000 lbs./conductor
B9-3P	Crossarm Construction Single Line Arm, 5° Angle Max, 500 lbs./conductor

B22P Crossarm Construction Single-Phase Junction at 0° to 5° Angle Max, 500 lbs./conductor

Three-Phase (Post Insulator)

C1P, C1AP	Crossarm Construction Single Primary Support, 5° Angle Max, 750 lbs./conductor
C1PR, C1APR	Crossarm Construction Single Primary Support, 0° to 5° Angle. Raptor Protection Framing
C1PL, C1PLX	Crossarm Construction Single Primary Support (Large Conductor) 5° Angle Max, 750 lbs./conductor
C1-1P, C1-1AP	Crossarm Construction Double Primary Support, 5° Angle Max, 750 lbs./conductor
C1PLR, C1APLR	3-Phase Crossarm Construction Single Primary Support 750 lbs/ Conductor 5° Angle Max
C1-1PR, C1-1APR	Crossarm Construction Double Primary Support, 5° Angle Max, 750 lbs./conductor, Raptor Protection Framing
C1-3P, C1-3PX	Crossarm Construction Double Primary Support (Large Conductor) 5° Angle Max, 1,500 lbs./conductor
C1-4PL	Crossarm Construction Double Pole Top Support (Large Conductor) 5° Angle Max, 1,000 lbs./conductor
C2-2PL	Crossarm Construction Double Primary Support 20° Angle Max, 2,000 lbs./conductor
C9-1P	Crossarm Construction Single Line Arm, 5° Angle Max, 500 lbs./conductor
C9-2PL	Crossarm Construction – Double Line Arm (Large Conductor) 5° Angle Max, 1,000 lbs./conductor
C9-3PL	Crossarm Construction Single Line Arm (Large Conductor) 5° Angle Max, 500 lbs./conductor

Three-Phase, Double Circuit (Post Insulator)

DC-C1PL	Crossarm Construction Double Circuit Single Primary Support, 20° Angle Max, 1,000 lbs./conductor
DC-C1-3PL	Crossarm Construction Double Circuit Double Primary Support, 20° Angle Max, 2,000 lbs./conductor

Narrow Profile

() C1 ()	Three Phase 0° to 2° Angle (Narrow)
() C1-1 ()	Three Phase Small Angle
() C2 ()	Three Phase 5° to 15° Angle (Narrow)
() C1 ()	3-Phase, Vertical Construction Single Primary Support, at 0° to 2° Angle
() C2 ()	3-Phase, Vertical Construction Single Primary Supports, 2° to 15° Angle
() C1-1 ()	3-Phase, Vertical Construction Three-Phase Junction 0° to 2° Angle
() C5-1 ()	3-Phase Vertical Construction Tap (Small Conductors)
() C1 ()	Three Phase 0° to 2° Angle
() C2 ()	Three Phase Small Angle
() C7 ()	Three Phase Deadend (Single)

Guy Assemblies

E1-2, E1-3	Single Down Guy, Through Bolt Type
E1-2G, E1-3G	Single Down Guy, Existing Pole Band
E1-2L, E1-3L	Single Down Guy, Pole Band Type
E2-2G, E3-3G	Single Overhead Guy Pole Band Type
E2-1, E2-2, E2-3	Single Overhead Guy, Through Bolt Type
E2-1P, E2-2P, E2-3P	Single Overhead Guy, Through Bolt Type
E3-2, E3-3, E3-10	Single Down Guy, Wrapped Type
E3-11	Guy Protection – Rubbing Post
E4-2, E4-3	Single Overhead Guy, Wrapped Type
E5-1, E5-2	Deadend Guy Crossarm Construction
E6-2, E6-3	Double Down Guy

E7-2, E7-3	Three Down Guys (Large Conductors)
E8-2, E8-3	Four Down Guys (Large Conductors)
E11, E12	Single Loop Guy, Wrapped Type

Anchor Assemblies

F1-1 to F1-4	Line Anchor Assemblies
F1-4PS	Line Anchor Assemblies
F2-1 to F2-4	Log Anchor Assemblies
F4-1	Service Anchor Assembly
F5-1, F5-2, F5-3	Rock Anchor Assemblies
F6-1, F6-2, F6-3	Swamp Anchor Assembly

Transformer Assemblies:

G9-, G65-, G105-	Single Phase Transformer at 1-Phase Tangent
G10-, G66-, G106-	Single Phase Transformer at Deadend
G39-, G67-, G136-	Single Phase Transformer on 3-Phase Circuit
G210-	Two Transformers, Cluster Mounted Open Wye- Open Delta For 120/240 Volt Power Loads
G310-	Three Transformers, Cluster Mounted UG Wye-Center Tap Grounded Delta for 120/240 Volt Loads
G311-	Three Transformers, Cluster Mounted UG Wye-Corner Grounded Delta for 240 or 480 V Loads
G312-	Three Transformers, Cluster Mounted 4-Wire Grounded Wye- Grounded Wye for 208/120 V Loads

Secondary Assemblies:

J5 to J12	Secondary Assemblies
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Service Assemblies:

K10, K11, K14	Service Assemblies
K10C	Service Assemblies, Cable
K10L, K11L, K14L	Service Assemblies (Large Conductors)
K11C, K14C, K15C	Service Assemblies, Cable
K16C, K17L, K17	Service Assemblies (For Ranch Type Houses)

Miscellaneous Assemblies:

M2-1, M2-11	Grounding Assembly – Ground Rod Type
M26-250C 30-S BASE	Roadway Light Standard 12" Bolt Circle
M26-250CL 30-S BASE	Ornamental Street Lighting Standard 250W HPS 12" Bolt Circle
M26-400C 40-S BASE	Roadway Light Standard 15" Bolt Circle
M2-2, M2-12	Pole Protection Assembly-Plate Type
M2-2A2, M2-12A2	Pole Protection Assembly Plate Type
M2-2A, M2-12A	Pole Protection Assembly Wrap-Around Type
M2-3, M2-13	Grounding Assembly Trench Type
M2-7, M2-17	Galvanic Anode Assembly
M2-9	Pole Top Protection Assembly
M2-15	Grounding Assembly Ground Rod Type for Sectionalizing Air Break Switch
M2-15A	Ground Assembly – Platform Type for Sectionalizing Air Break Switch
M3-1A, M3-4	One Sectionalizing Fuse Cutout
M3-4S	Single Phase Electronic Sectionalizer
M3-2A, M3-3A	Two or Three Sectionalizing Disconnect Switches
M3-3B	Line Tension Switches
M3-10, M3-41	One Sectionalizer or Oil Circuit Recloser

M3-11, M3-12	2 or 3 Phase, Three Sectionalizing Oil Circuit Reclosers
M3-11A, M3-12A	2 or 3 Sectionalizing Oil Circuit Reclosers
M3-15A	Sectionalizing Airbreak Switch
M3-15X	Sectionalizing Load Break Switch
VM3-19, VM3-20	2 or 3 Sectionalizing Oil Circuit Reclosers
M3-23	One Sectionalizing Oil Circuit Recloser with By-Pass Switch
M3-23 A	Oil Circuit Recloser with By-Pass Cutout
M3-23B	Oil Circuit Recloser with By-Pass Cutout
M3-24, M3-25	2 or 3 Sectionalizing Oil Circuit Reclosers with By-Pass Switches
M3-24A, M3-25A	2 or 3 Sectionalizing Oil Circuit Reclosers with By-Pass Switches
M3-30	Three Phase Oil Circuit Recloser with By-Pass Switches
VM3-24, VM3-25	2 or 3 Sectionalizing Oil Circuit Reclosers with By-Pass Switches
M3-41S	Oil Sectionalizer with By-Pass Cutout
M4-A	Crossarm Construction – Single Deadend
M5-1 to 8	Miscellaneous Primary Assemblies
M5-9S	Type SID Disconnect Switch
M5-9 to 16	Miscellaneous Primary Assemblies
M5-17 to 23,32	Miscellaneous Primary Assemblies
M5-24 to M5-29	Miscellaneous Assemblies
M5-27A	Single Phase Standoff Bracket
M5-30	Raptor Protection Assembly
M5-31	Spiral Vibration Damper
M7-11	One Voltage Regulator Pole Mounted
M7-13	Three Voltage Regulators Platform Mounted

Metering Assembly Guide Drawings:

M8	Secondary Metering Guide Single Phase 120/240 Volts
M8-6	Secondary Metering Guide Three Phase 120/240 Volts 4 Wire Delta
M8-6R	Secondary Metering Guide Overhead
M8-9	Guide to Yard Pole Meter Installation
M8-10	Meter Pole Standards, Single Meter And Riser
M8-10A	Meter Pole Standards Dual Meters And Risers
M8-10B	Meter Pole Standards Multiple Meters And Gutters
M8-11	Secondary Metering Guide Three Phase, 120/208 Volts 4 Wire Grounded Wye
M8-12	Secondary Metering Guide Three Phase 240 Volts 3 Wire Corner Grounded Delta
M8-15	Primary Metering Guide Three Phase 4-Wire Wye
VM8-15A	Primary Metering Guide Three Phase 4-Wire Wye

Capacitor Assemblies:

M9-11	Single Phase Capacitor Assembly
M9-12, M9-13	Two or Three Phase Capacitor Assembly
M9-13CS	Three Phase Capacitor Assembly
M9-13TS	Three Phase Capacitor Assembly

Guide Drawings:

M19	Crossarm Drilling Guide
M20	Pole Framing Guide
W1.1G	Grand Valley Power Pole Framing Guide (GVP Current)
M21	Angle Construction Guide Crossarm to Vertical Construction 30° to 60° Angle
M22-1	Tree Trimming Guide

M22-2	Tree Trimming Guide
M24	Cable Service Assembly Guide
M24-1	Open Wire Secondary or Service Assembly Guide
M24-10	Assembly Guide of Service Mast for Ranch Type House
M26-5	Security Light Installation Guide (Unmetered)
M27	Transformer Connection Guide Open Wire Service
M27-1	Transformer Connection Guide Triplex Cable Services
M27-1A	Detail of Alternative Transformer Connection (Primary Tangent, Service Takeoff at Transformer)
M27-2	Transformer Connection Guide Secondary Underbuild
M28	Transformer Connection and Service Take-Off Guide From Secondary
M29-1	Tap Assembly Guide
M29-2	Tap Assembly Guide
M30-1	Guide for Installation of Ground Wire above Neutral on Guyed Poles
M30-2	Guide for Installation of Ground Wire above Neutral on Poles With Butt Wrapped or Driven Grounds
M32-2	Pole Key Assembly
VM33-1 to VM33-6	Two Side Arms (Double) for Primary
M40-11	Armor Rods A.C.S.R. Conductor
M41-1	Angle Assembly Guide, Vertical Construction 20° to 60° Angle, Copper Type Conductors with Formed Type Armor Rods
M41-10	Angle Assembly Guide, Vertical Construction 20° to 60° Angle A.C.S.R. Conductors with Straight or Formed Type Armor Rods
M42-3	Deadend Assembly Guide – Deadend Clamp Method Copperweld Copper & Copper Conductors
M42-11	Deadend Assembly Guide – Deadend Clamp Method A.C.S.R. Conductor

M42-13	Deadend Assembly Guide (Large Conductor)
M42-21	Deadend Assembly Guide – Compression Method Copper Type Conductors
M43-4	Tap Assembly Guide Copperweld-Copper and Copper Conductors
M43-10	Tap Assembly Guide A.C.S.R. Conductors
M52-3, M52-4, M52-5	Neutral Identification and Pole Numbering Guide
R1	Clearing Right-Of-Way Guide

G.V.P. Consumer Service Guide Specifications:

UM5/2.5I	Secondary Cable Terminal Pole (Consumer Trench & Wire)
UM5/3.5U	Secondary Cable Terminal Pole (Consumer Trench & Wire)
UK6-1,2,3	Junction Box Standard Underground Construction
UK6-G1, UK6-G2, UK6-G3	Transformer Service Termination 1 Position, 2 Position
M8-6R	Secondary Metering Guide Overhead
M8-10	Meter Pole Standards Single Meter and Riser
M8-10A	Meter Pole Standards Dual Meters & Risers
M8-10B	Meter Pole Standards Multiple Meters & Gutter
CONS-MP-1	Customer's Meter Pedestal Standards
CONS-MP-2	Customer's Meter Pedestal Multiple Meters & Gutter
UMP-1	Single Meter Pedestal Standards
UMP-2	Dual Meter Pedestal Standards
UMP-W	Typical Wiring Diagram Meter Pedestal

G.V.P. Metering Standards Summary

G.V.P. Consumer Trenching Specs.

G.V.P. Road Crossing Specs.

G.V.P. Standard Trench Configuration

G.V.P. Conduit Stub Up Guidelines

G.V.P. Miscellaneous Assemblies:

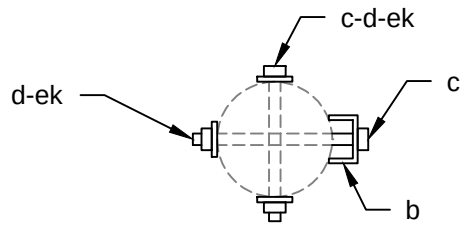
UA2U	Single Phase Cable Terminal Pole
UC2U	Three Phase Cable Terminal Pole
UK6-1	Secondary Assembly Junction Box (See details of conduit installation)
UK6-1	Secondary Assembly Junction Box (20" Replacement)
UK6-1A,2A3A,4A	Secondary Assembly Junction Box (30")
UK6-1AG	Secondary Assembly "Above Grade" Junction Box (New Standard)
UK7	Support for Secondary Spade Bus Bar Extensions
UM-4C,4V	Voltage & Current Fault Indicators
UM5/2I, UM5/2.5I	Secondary Cable Terminal Pole
UM5-3U, UM5-3UA	UG Guard Pole Riser System
UM5-4U, UM5-4UA	UG Guard Pole Riser System
UMP-1	Single Meter Pedestal Standards
UMP-2	Dual Meter Standards
30-S	Roadway Lighting, Steel Pole & Foundation
UX3	Single Phase Looping Pedestal
G106-	Single Phase Transformer at Deadend
GP	Temporary Guard Pole
TM-10	Stub Reinforcing of Transmission & Distribution Poles
TG-24	Guy Link
TA-2P	Steel Cross Plate Anchor
TM-9B	Pole Ground And Butt Wrap
M-9E	Multiple Pole And Anchor Grounding
TP-69G	Tangent Horizontal Line Post

TZ-1	Tangent Wishbone-Single Arm
TZ-2	Tangent Wishbone-Double Arm

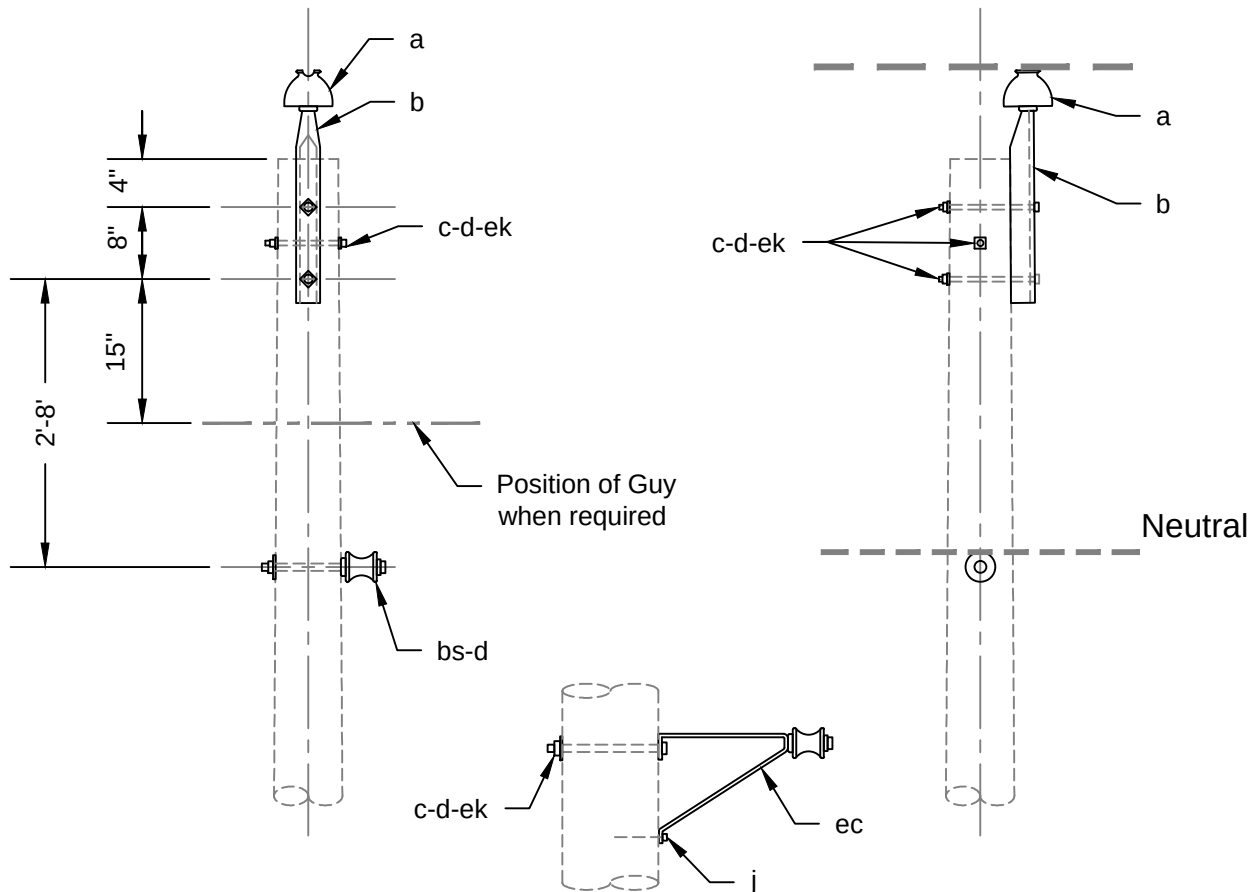
G.V.P. Special Drawing Index:

UM-30R	Splice Vault (40400,40150,40750)
UM1-7C, UM1-7NC	Ground Sleeve Assembly
UM1-11S	Three Phase Transformer (225 KVA & Larger) Pad, Base And Vault
UM1-13S	Three Phase Transformer (150 KVA & Smaller) Pad, Base And Vault
UM1-35L	Splice Vault (Feeder)
40200	Vault Specification Large Base
40420	Vault Specifications Large Manhole Pad
40500	Vault Specifications 3-Phase Transformer Pad
40800	Vault Specifications 6'x6'x2' Square Vault
40700	Vault Specifications 4'x4'x4' Square Vault
UM 3-14	Single Phase Sectionalizing Cabinet (Steel/Fiberglass Base)
UM3-14F	Single Phase Sectionalizing Cabinet (Fiberglass)
UM33,F	3-Phase Sectionalizing Cabinet (Steel/Fiberglass Base)
	3-Phase Sectionalizing Cabinet (Fiberglass)
PME-6	3-Phase Switchgear

Switch Cabinet and Padmount Transformer Labeling Guide Lines



Pole Top Pin Assembly



Specify A1A for
Offset Neutral Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	ek	-	Locknuts, as required
b	1	Pin, pole top, 20"			
c	3	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR A1A)
d	3	Washer, square, 2 1/4"	c	1	Bolt, machine 5/8" x required length
d	2	Washer, 3" square, curved	d	1	Washer, square, 2 1/4"
bs	1	Bolt, single upset, insulated, (A1 only)	j	1	Screw, lag, 1/2" x 4", (A1A only)
			ec	1	Bracket, offset, insulated, (A1A only)

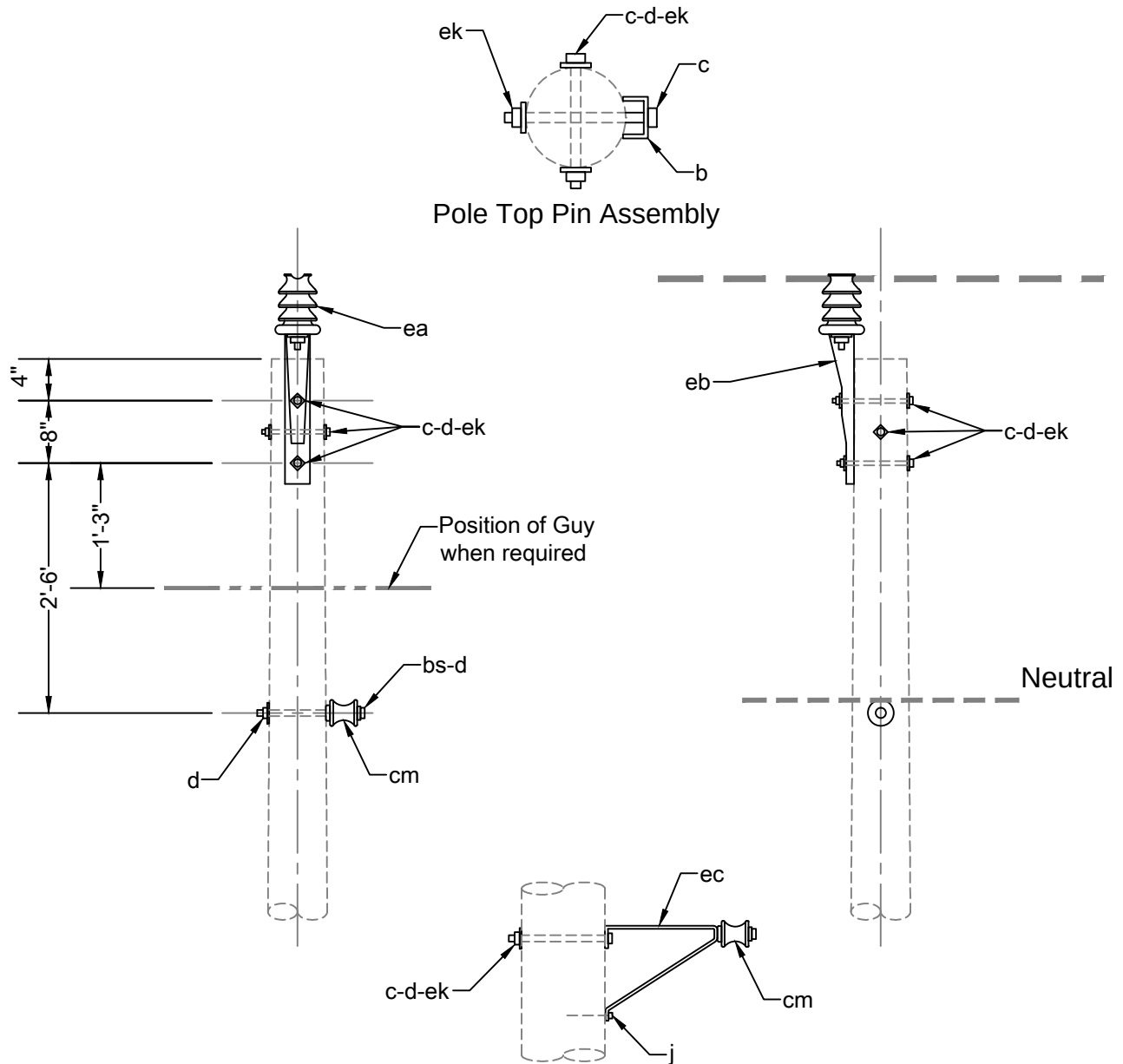
7.2 / 12.5KV PRIMARY, 1-PHASE
0° TO 5 ° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Dec 6 ,2019



A1, A1A



Specify A1AP for
Offset Neutral Assembly

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	3	Washer, square, 2 1/4"			
d	2	Washer, square, 3", curved			(ADDITIONAL MATERIALS FOR A1AP)
bs	1	Bolt, single upset, insulated. (A1P only)	c	1	Bolt, machine 5/8" x required length
cm	1	Spool insulator	d	1	Washer, square, 2 1/4"
ea	1	Insulator, post type	j	1	Screw, lag, 1/2" x 4", (A1AP only)
eb	1	Bracket, pole top	ec	1	Bracket, offset, insulated, (A1AP only)

DESIGN LIMITS

Maximum transverse load:
750 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

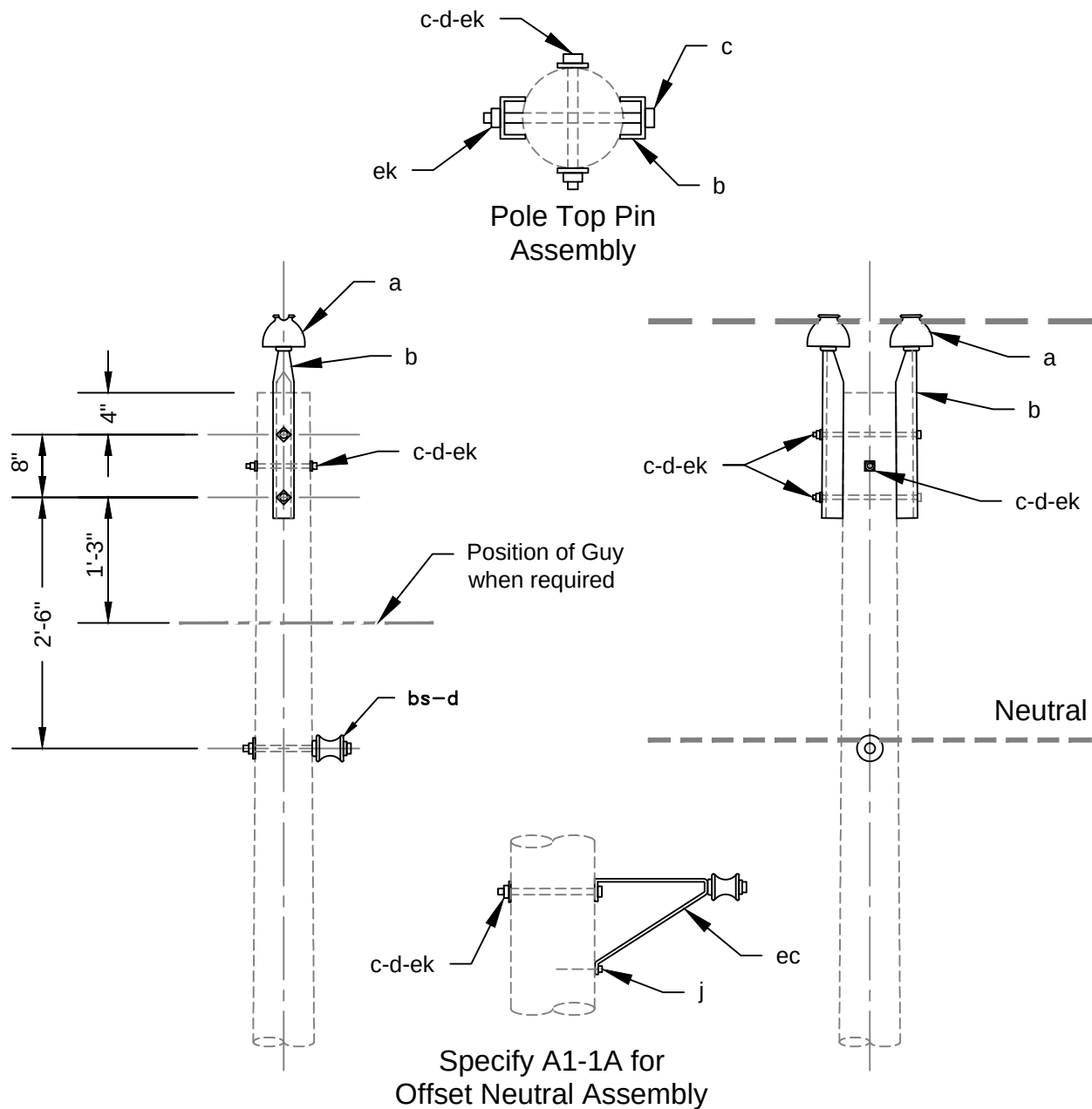
7.2 / 12.5KV PRIMARY, 1-PHASE
0° TO 5° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Dec 6, 2019



A1P, A1AP



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	bs	1	Bolt, single upset, insulated, (A1-1 only)
b	2	Pin, pole top, 20"	ek	-	Locknuts, as required
c	3	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR A1-1A)
d	1	Washer, square, 2 1/4"	c	1	Bolt, machine 5/8" x required length
d	2	Washer, 3" square, curved	d	1	Washer, square, 2 1/4"
			j	1	Screw, lag, 1/2" x 4", (A1-1A only)
			ec	1	Bracket, offset, insulated, (A1-1A only)

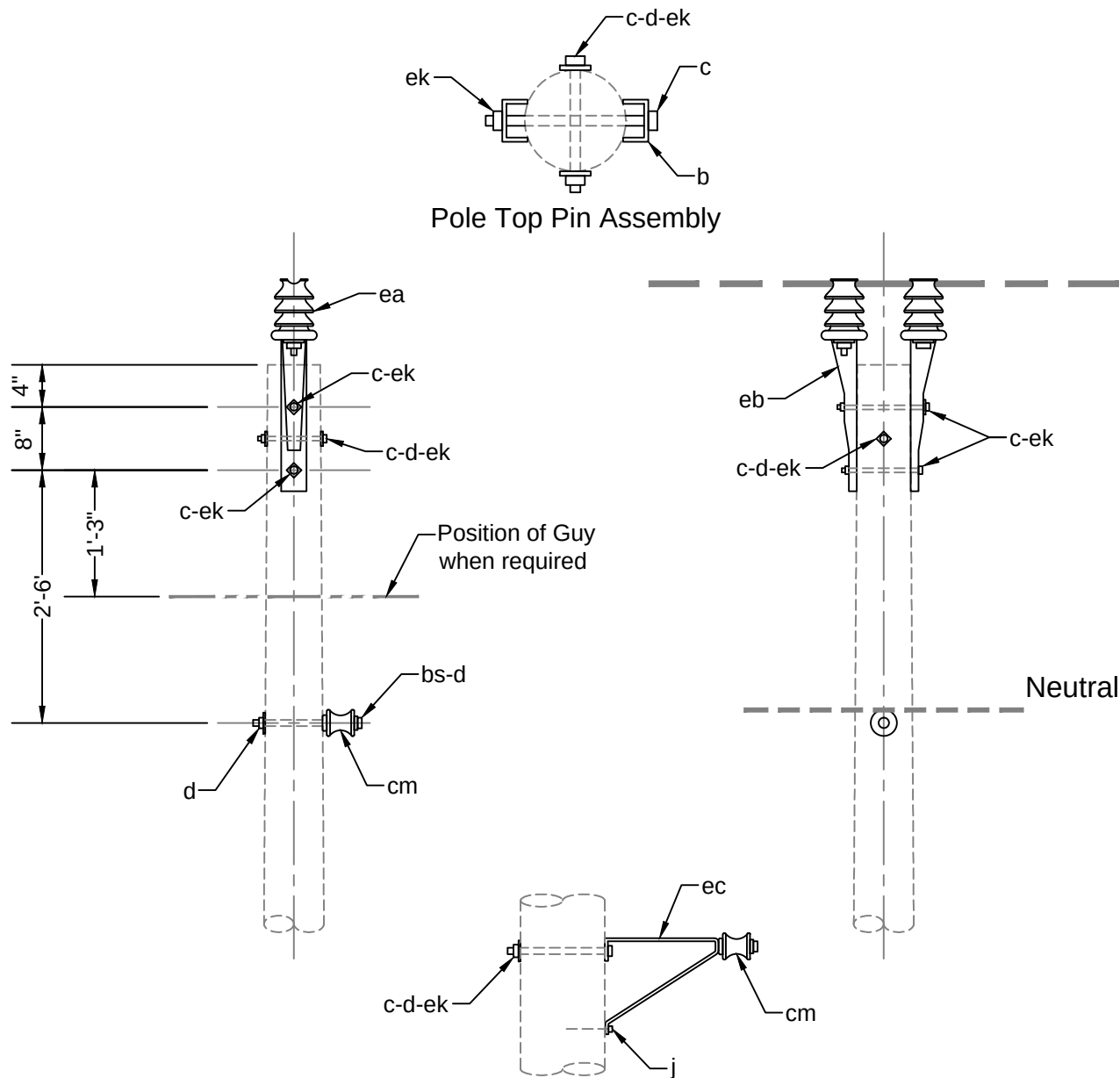
7.2 / 12.5 KV PRIMARY, 1-PHASE 0° TO 5° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Dec 6, 2019



**A1-1
A1-1A**



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	2	Washer, square, 3", curved	(ADDITIONAL MATERIAL FOR A1-1AP)		
bs	1	Bolt, single upset, insulated. (A1-1P only)	c	1	Bolt, machine 5/8" x required length
cm	1	Spool insulator	d	1	Washer, square, 2 1/4"
ea	2	Insulator, post type	j	1	Screw, lag, 1/2" x 4", (A1-1AP only)
eb	2	Bracket, pole top	ec	1	Bracket, offset, insulated, (A1-1AP only)

DESIGN LIMITS

Maximum transverse load:
750 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

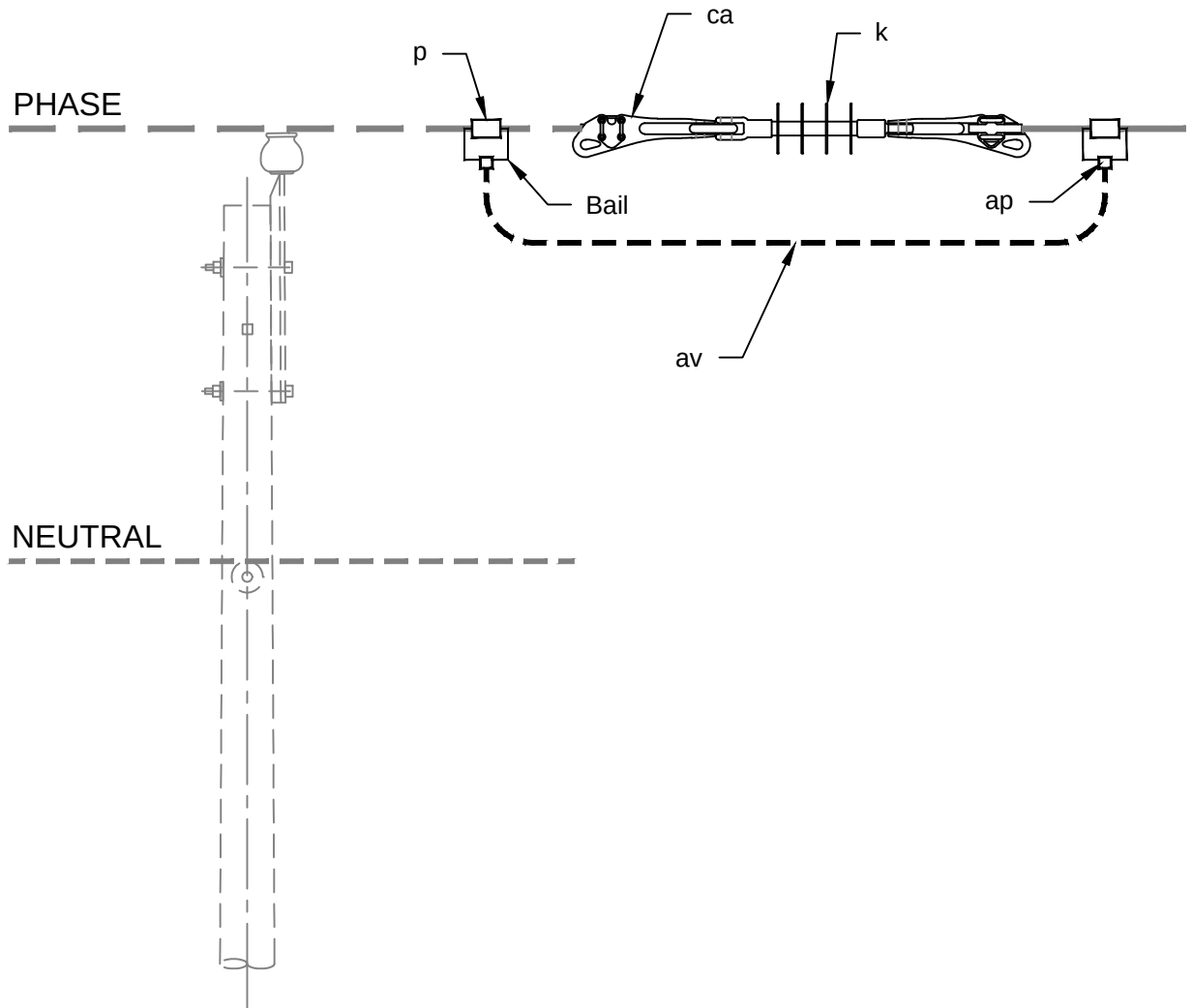
7.2 / 12.5KV PRIMARY, 1-PHASE
0° TO 5° ANGLE, DOUBLE PRIMARY SUPPORT

Revision Date

Dec 6, 2019



A1-1P
A1-1AP



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
k	1	Insulator, suspension epoxilator	ap	2	Clamp, hot line
p	2	Connectors, crimpit as required	av	-	Jumper, as required
-	2	Bail, hot line	ca	2	Deadend assembly, primary

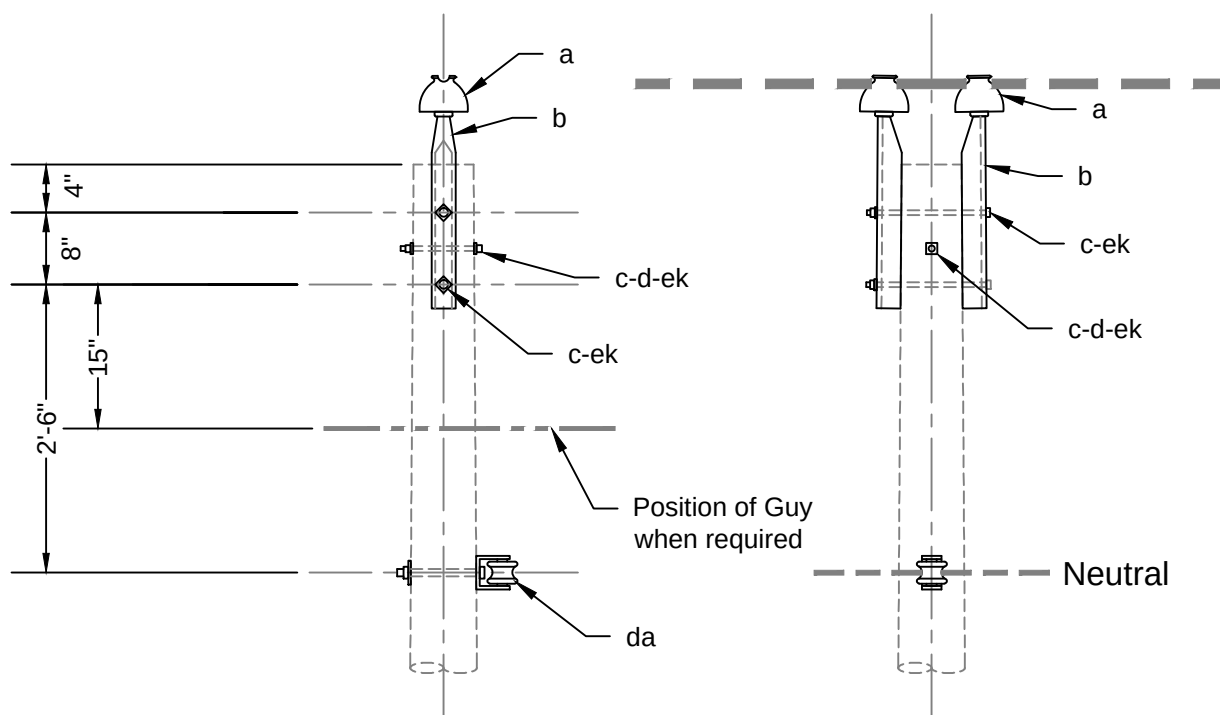
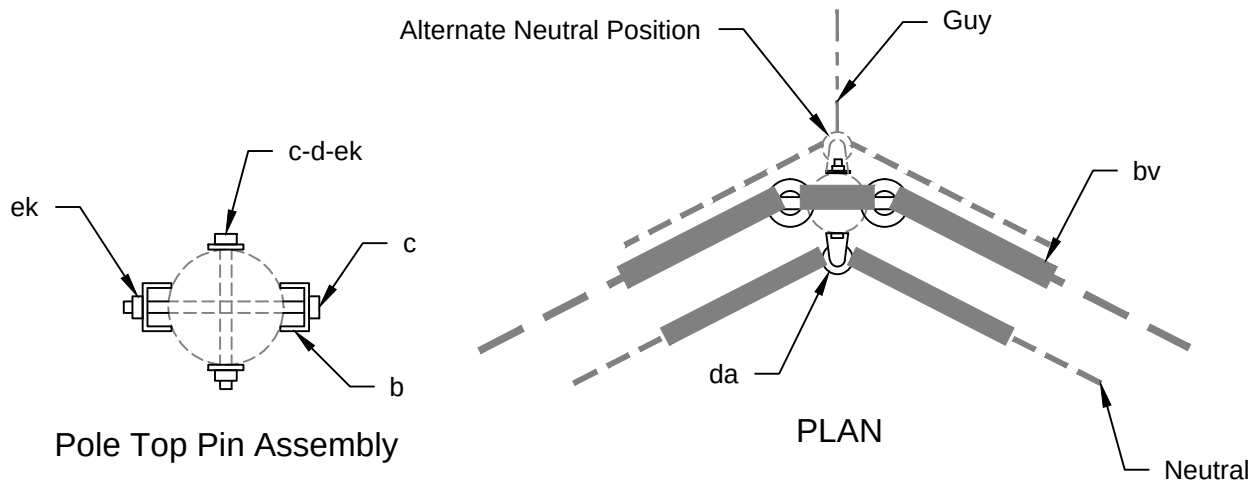
SECTIONALIZING IN CONDUCTOR DEADEND

Revision Date

Nov 2, 2015



A1X



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	bv	2	Rod, armor, selected size
b	2	Pin, pole top, 20"	da	1	Bracket, insulated
c	4	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	1	Washer, square, 2 1/4" x 13/16" hole			
d	2	Washer, 3" square, curved			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle

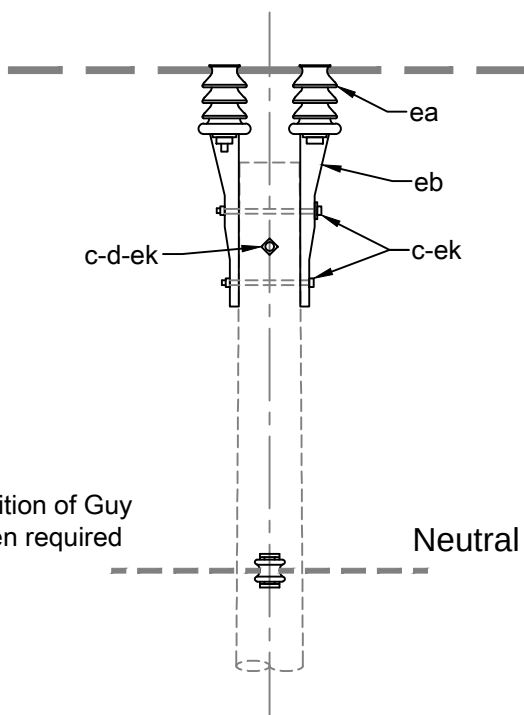
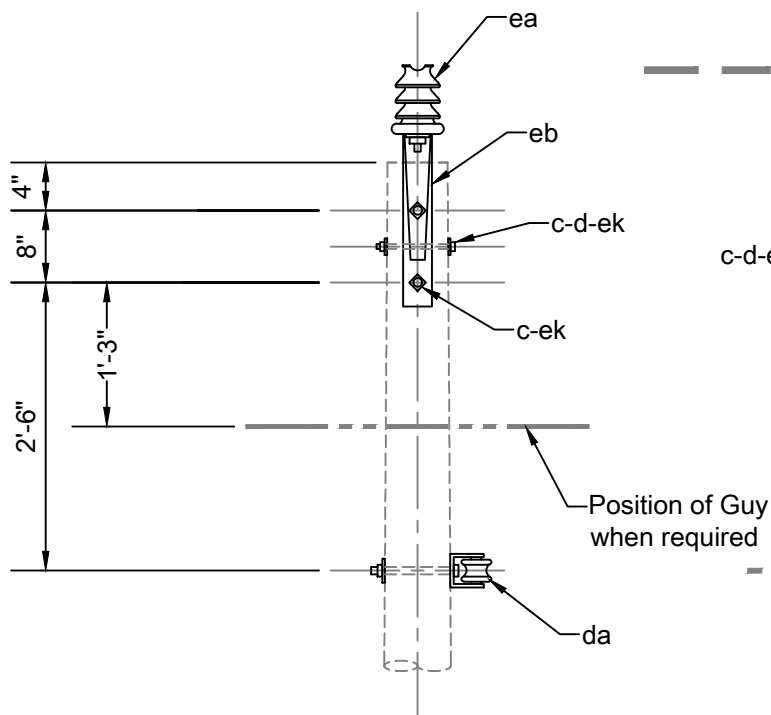
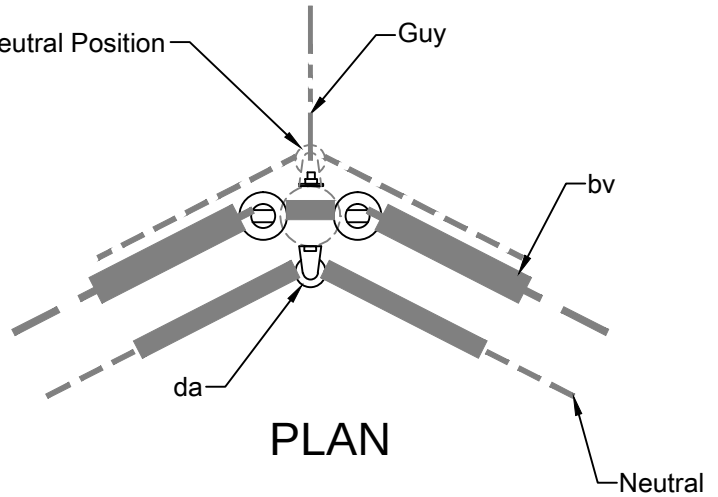
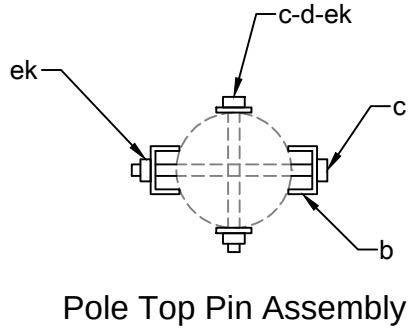
7.2 / 12.5KV PRIMARY, 1-PHASE DOUBLE PRIMARY SUPPORT

Revision date

Nov 2, 2015



A2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	bv	2	Rod, armor, selected size
d	3	Washer, square, 2 1/4" x 13/16" hole	da	1	Bracket, insulated
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
ea	2	Insulator, post type			
eb	2	Bracket, pole top			

DESIGN LIMITS

Maximum transverse load:
1500 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

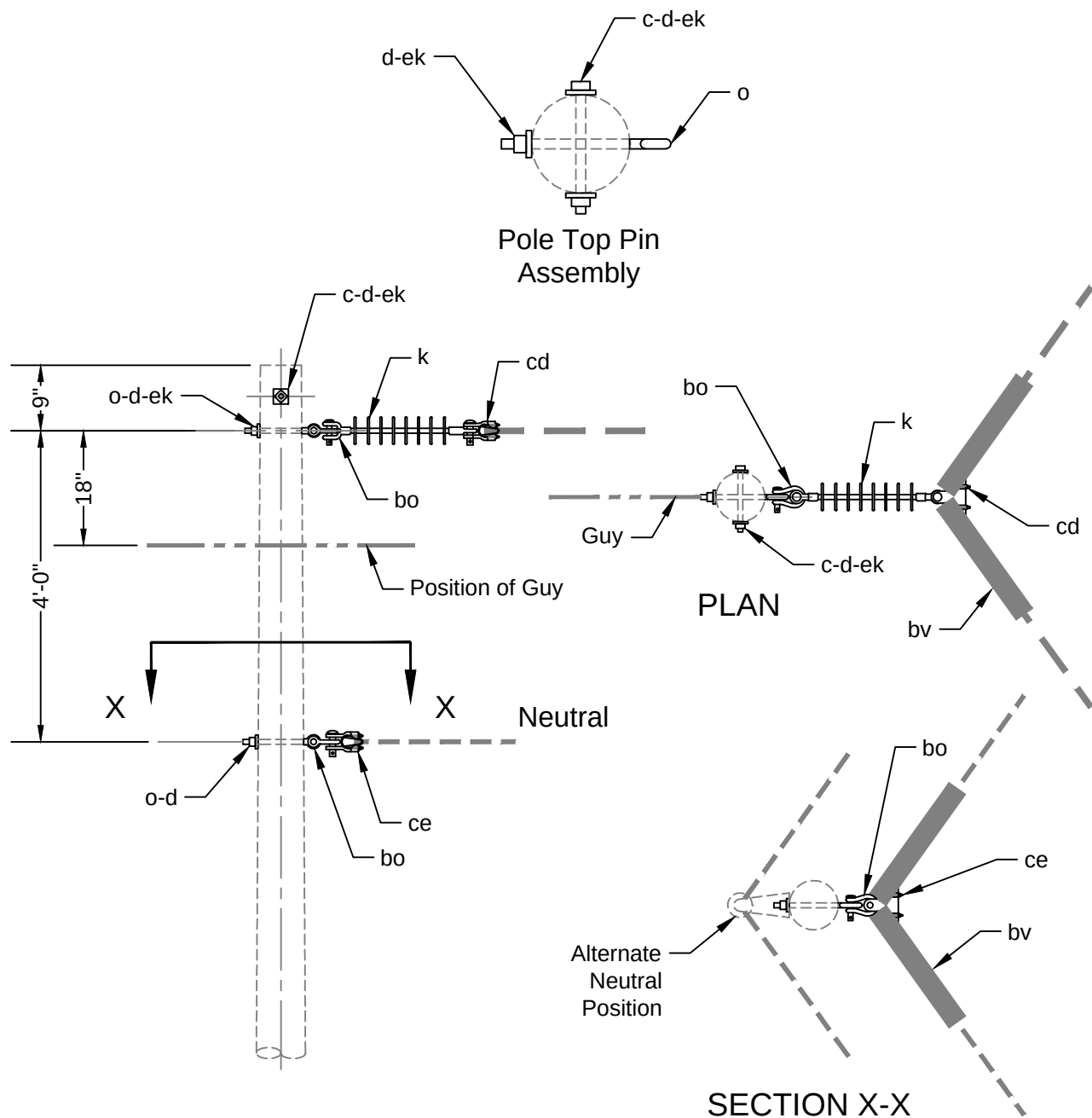
7.2 / 12.5KV PRIMARY, 1-PHASE DOUBLE PRIMARY SUPPORT

Revision Date:

FEB 2, 2016



A2P



Note: Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	bv	2	Rod, Armor, select size
d	4	Washer, square, 3" curved	cd	1	Angle assembly, primary
k	1	Insulator, suspension, epoxilator	ce	1	Angle assembly, neutral
o	2	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
bo	2	Shackle, anchor			

DESIGN LIMITS
Maximum transverse load:
4000 lbs. per conductor.

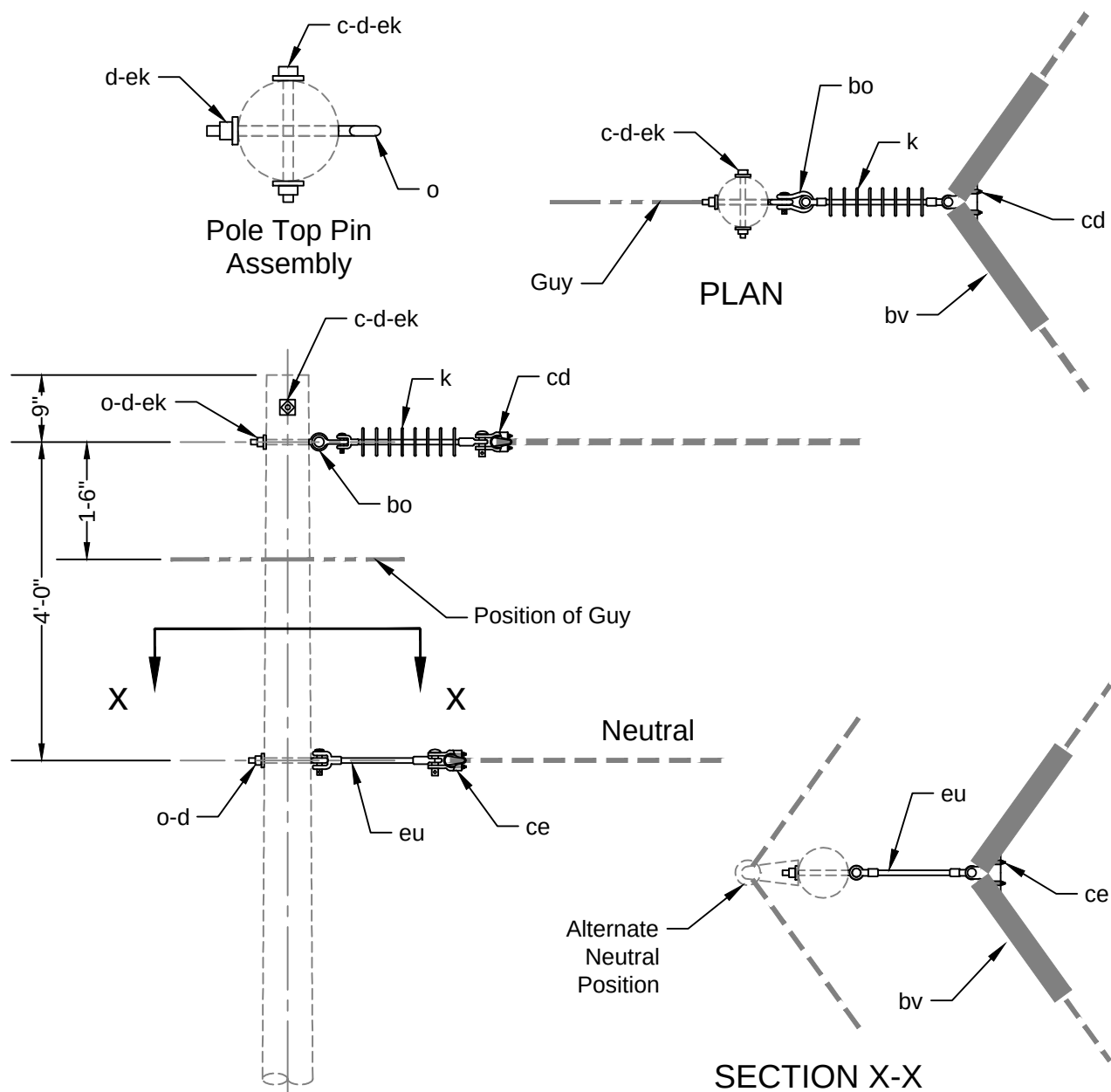
Maximum line angle within load limits:
20° to 60° Angle

12.5 / 7.2 KV PRIMARY, 1-PHASE
20° TO 60° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date
Jan 28, 2015



A3



Note: Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	bv	2	Rod, Armor, select size
d	4	Washer, square, 3" curved	eu	1	Insulator, fiberglass, strain 12"
k	1	Insulator, suspension, epoxilator	cd	1	Angle assembly, primary
o	2	Bolt, eye, 5/8" x required length	ce	1	Angle assembly, neutral
bo	1	Shackle, anchor	ek	-	Locknut, as required

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor.

Maximum line angle within load limits:
20° to 60° Angle

12.5 / 7.2 KV PRIMARY, 1-PHASE

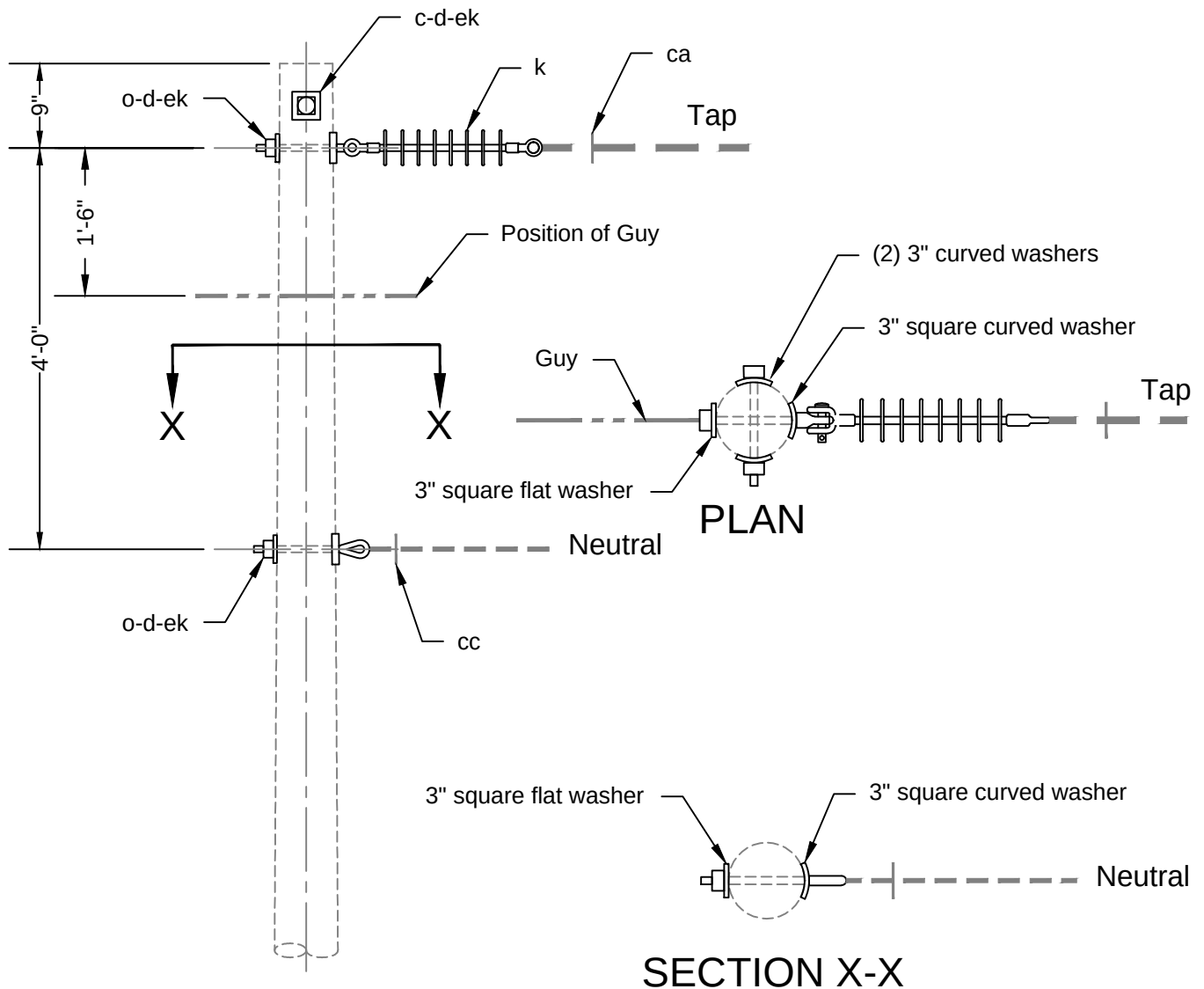
20° TO 60° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Jan 28, 2015



A3A



Note:

Item ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	o	2	Bolt, eye, 5/8" x required length
d	2	Washer, square, 3" flat	ca	1	Deadend assembly, primary
d	4	Washer, square, 3" curved	cc	1	Deadend assembly, neutral
k	1	Insulator, suspension, epoxilator	ek	-	Locknut, as required

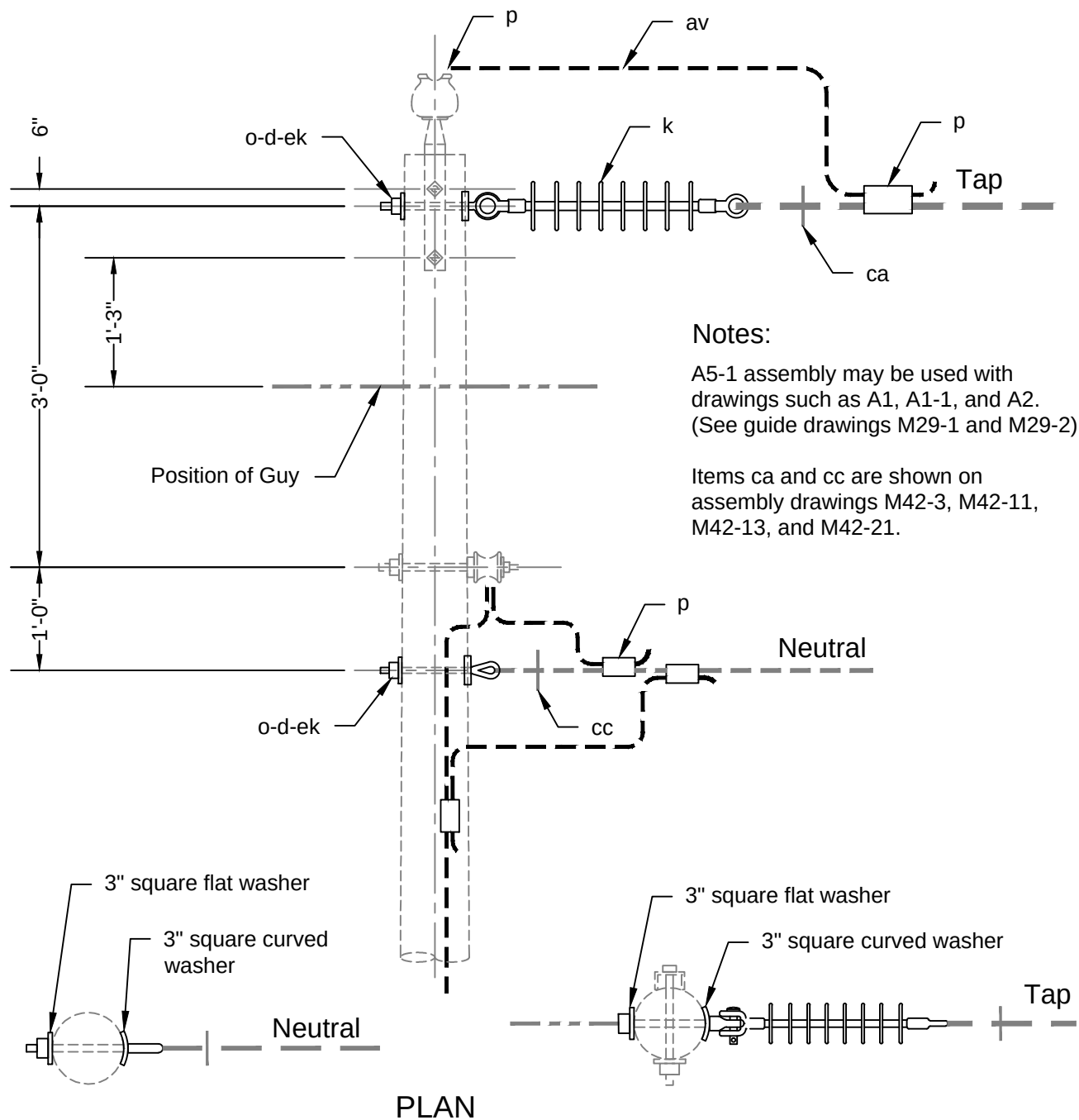
**12.5 / 7.2 KV PRIMARY, 1-PHASE
DEADEND (SINGLE) , SINGLE PRIMARY SUPPORT**

Revision Date

April 25, 2017



A5



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 3" curved	av	-	Jumpers and leads, as required
d	2	Washer, square, 3" flat	ca	1	Deadend assembly, primary
k	1	Insulator, suspension, epoxilator	cc	1	Deadend assembly, neutral
o	2	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
p	-	Connectors, as required			

Modified to meet
2005 RUS Standards.

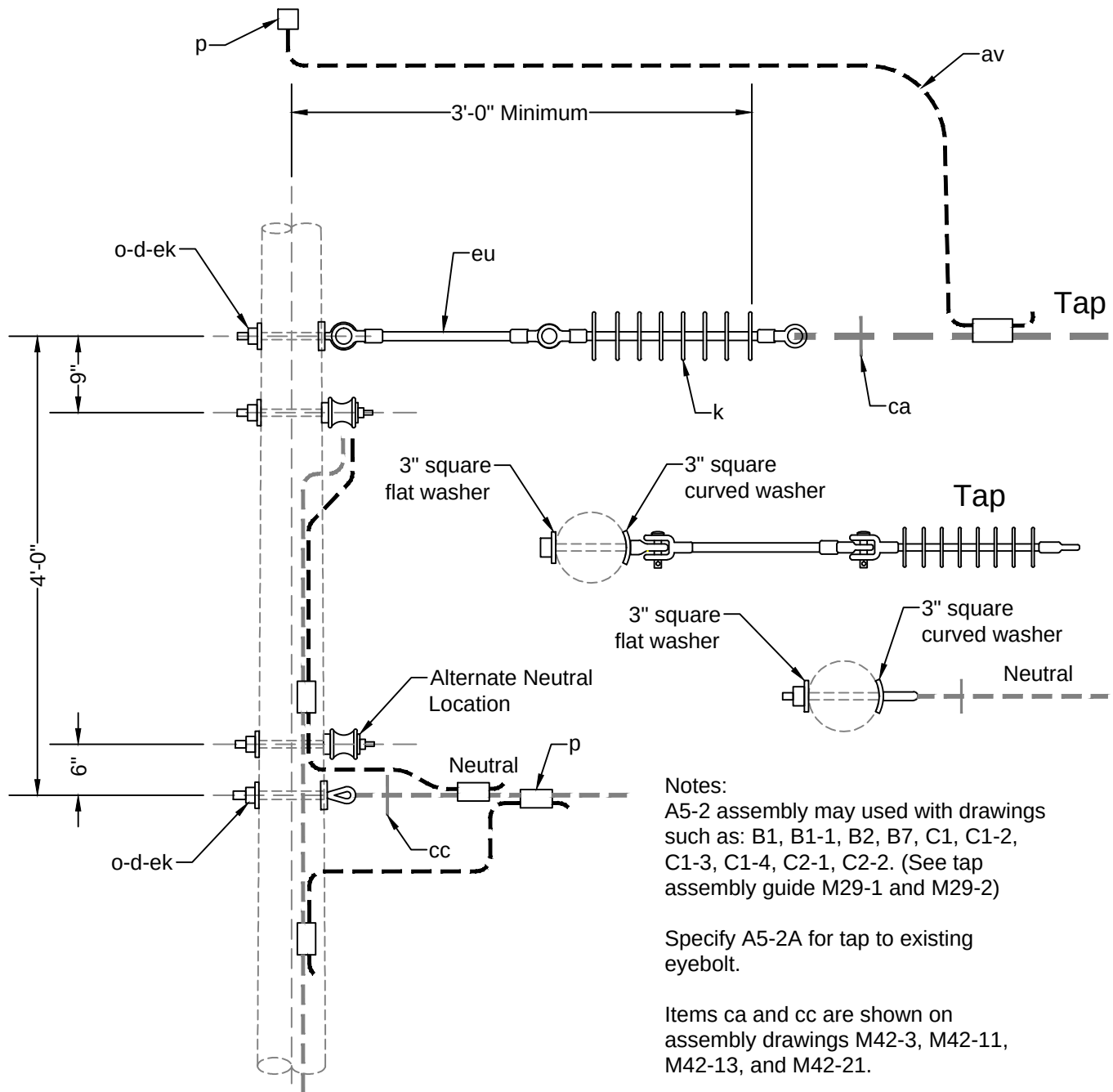
7.2 / 12.5 KV PRIMARY, 1-PHASE SINGLE PHASE TAP

Revision Date

October 13, 2015



A5-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 3" curved	aa	2	Nut, eye, 5/8 (A5-2A only)
d	2	Washer, square, 3" flat	av	-	Jumpers and leads, as required
k	1	Insulator, suspension, epoxilator	ca	1	Deadend assembly, primary
o	2	Bolt, eye, 5/8" x required length	cc	1	Deadend assembly, neutral
p	-	Connectors, as required	ek	-	Locknuts, as required
			eu	1	Link, extension, insulated

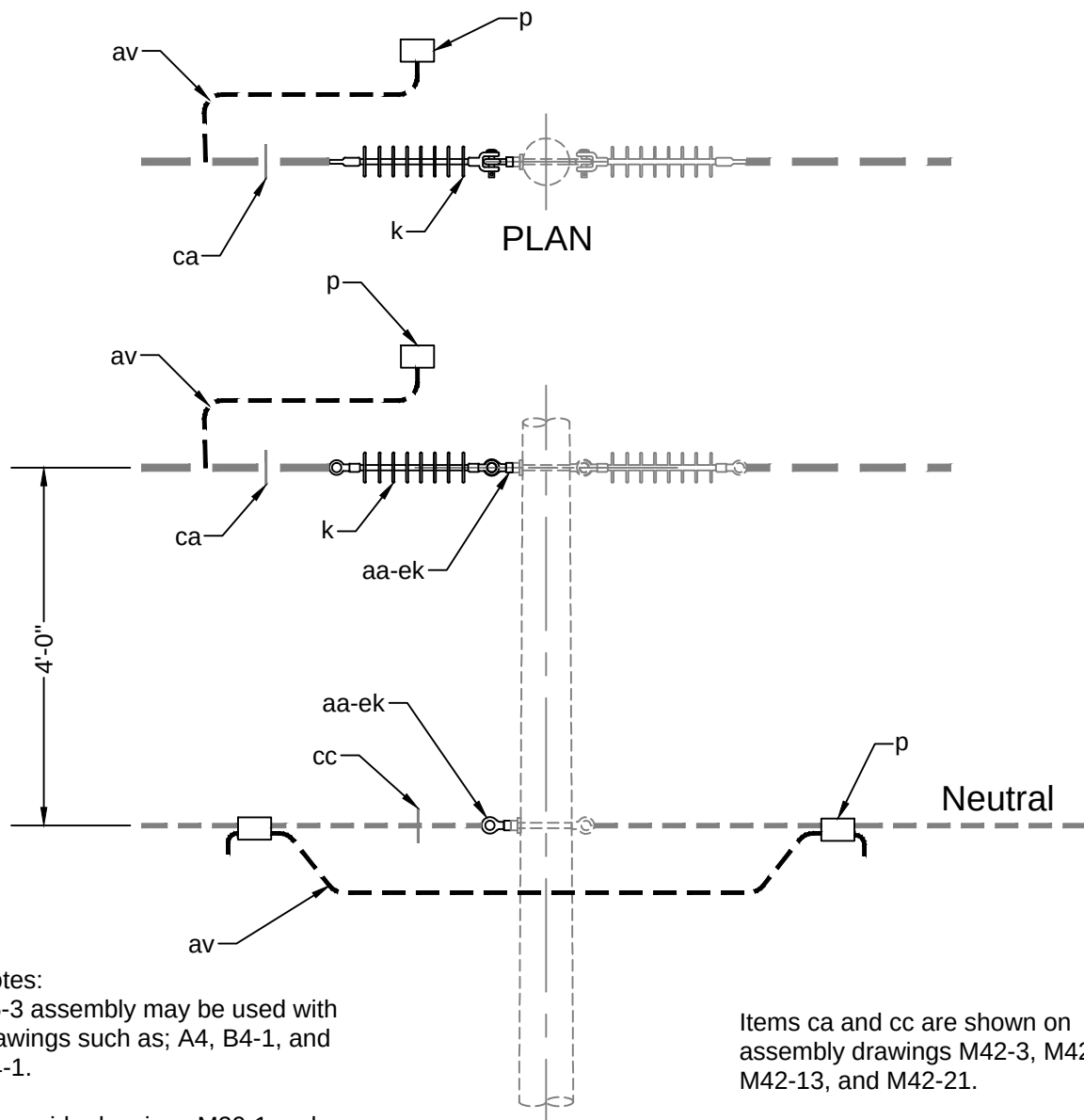
Modified to meet
2005 RUS Standards.

7.2 / 12.5 KV PRIMARY, 1-PHASE SINGLE PHASE TAP

Revision Date
October 13, 2015



A5-2
A5-2A



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
k	1	Insulator, suspension, epoxilator	av	-	Jumpers, as required
p	-	Connectors, as required			
aa	2	Nut, eye, 5/8"			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	-	Locknuts, as required			

Modified to meet
2005 RUS Standards.

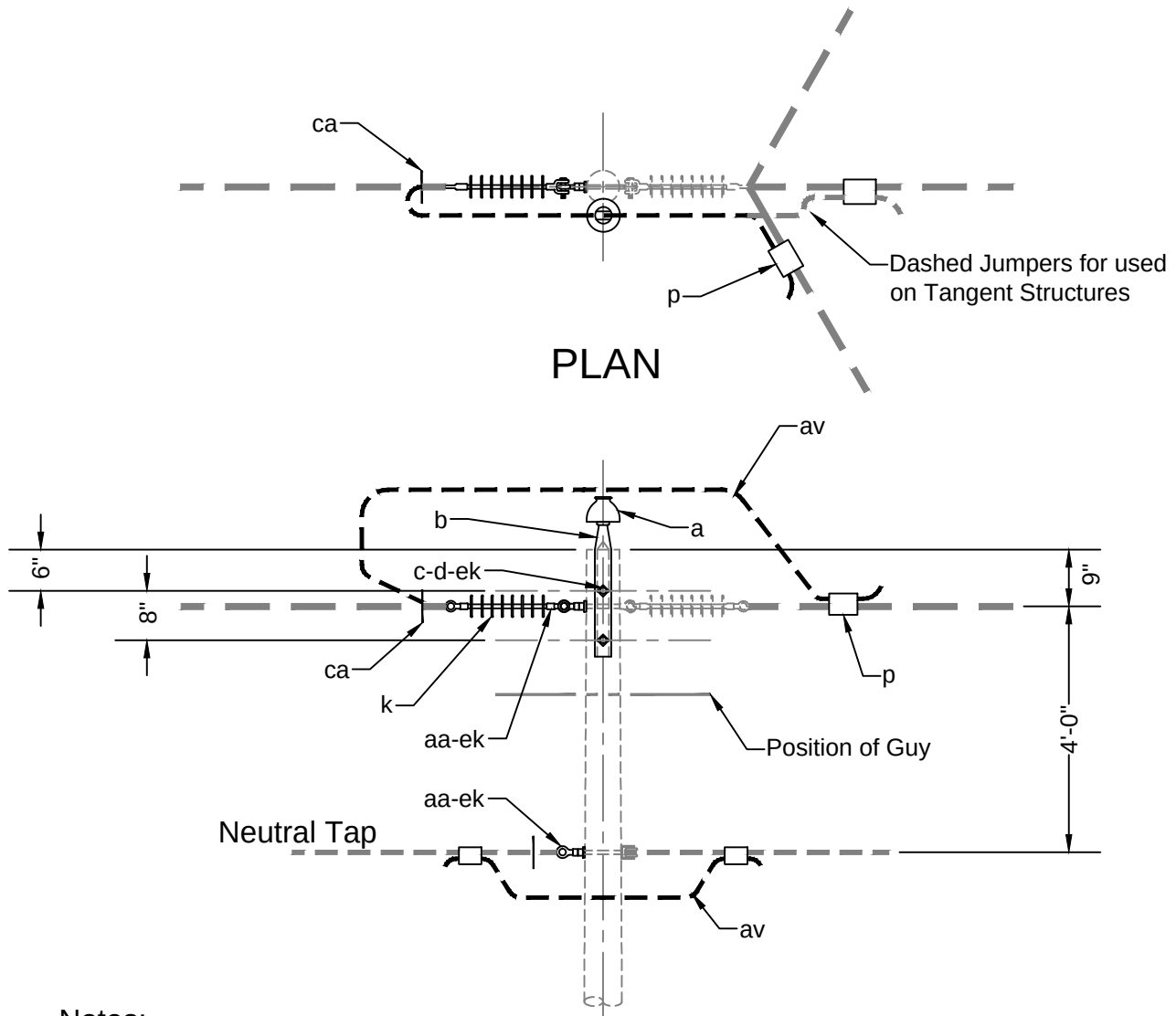
7.2 / 12.5 KV PRIMARY, 1-PHASE SINGLE PHASE TAP

Revision Date

Jan 29, 2015



A5-3



Notes:

A5-4 assembly may be used with A3, A5, B3, B5-1, C3, and C5-1 structures.

Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

See guide drawings M29-1 and M29-2.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	1	Insulator, pin type	av	-	Jumpers, as required
b	1	Pin, pole top, 20"	ca	1	Deadend assembly, primary
c	2	Bolt, machine, 5/8" x required length	cc	1	Deadend assembly, neutral
d	2	Washed, 2 1/4" square	ek	-	Locknuts, as required
k	1	Insulator, suspension, epoxilator			
p	-	Connectors, as required			
aa	2	Nut, eye, 5/8"			

Modified to meet
2005 RUS Standards

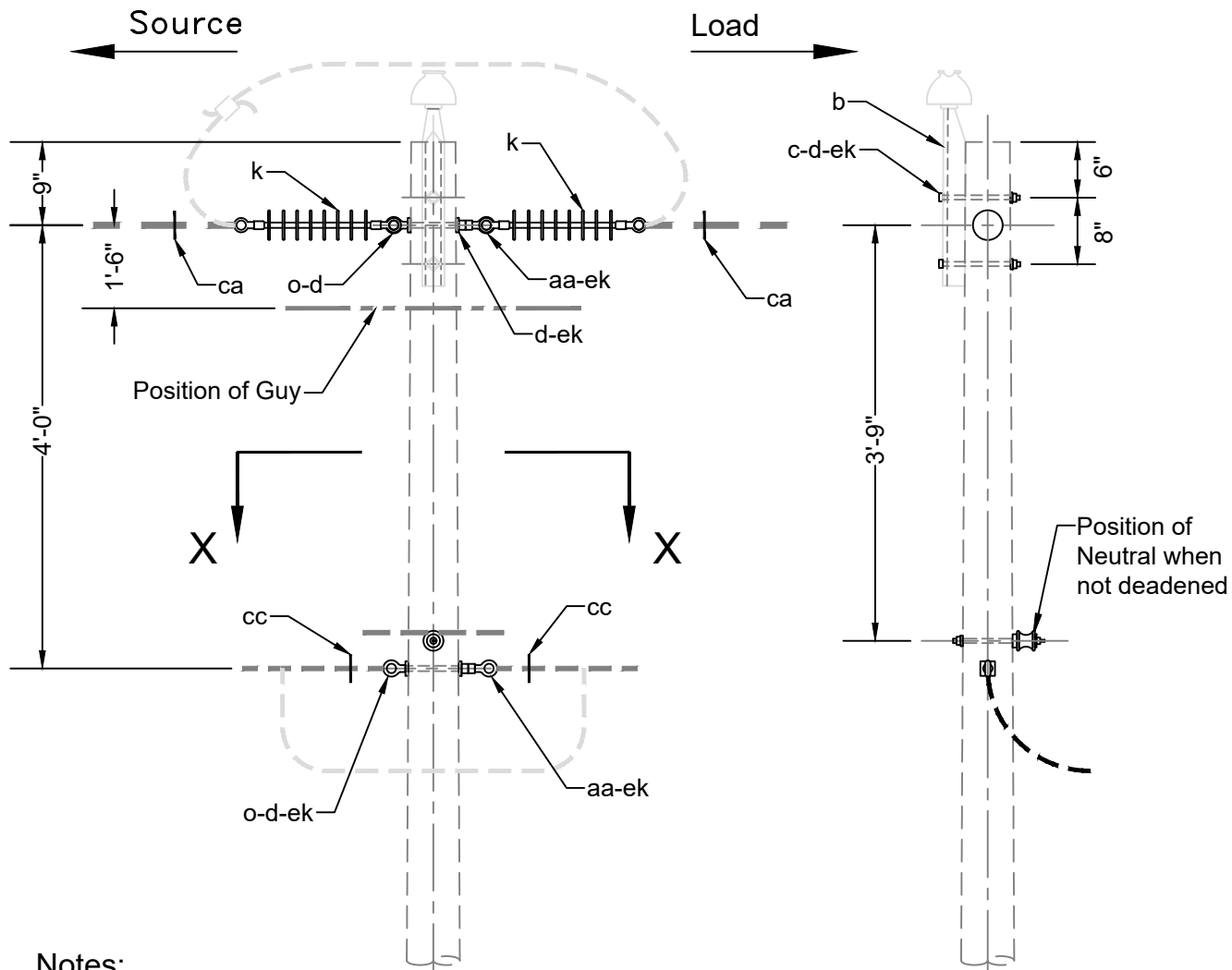
7.2 / 12.5 KV PRIMARY, 1-PHASE SINGLE PHASE TAP

Revision date

Feb. 2, 2015



A5-4



Notes:

A6 may be used with drawings such as M3-1A, M3-10, M3-41, M3-23, M5-1, M5-4, M5-2 (as shown). Items ac and aa are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.

For Feed Through use Unit A6-1

SECTION X-X

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
b	1	Pin, pole top, 20"	o	2	Bolt, eye, 5/8" x required length
c	2	Bolt, machine, 5/8" x required length	aa	2	Nut, eye, 5/8"
d	2	Washed, 2 1/4" Square,	ca	1	Deadend assembly, primary
d	4	Washed, square, 3" curved	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknuts, as required

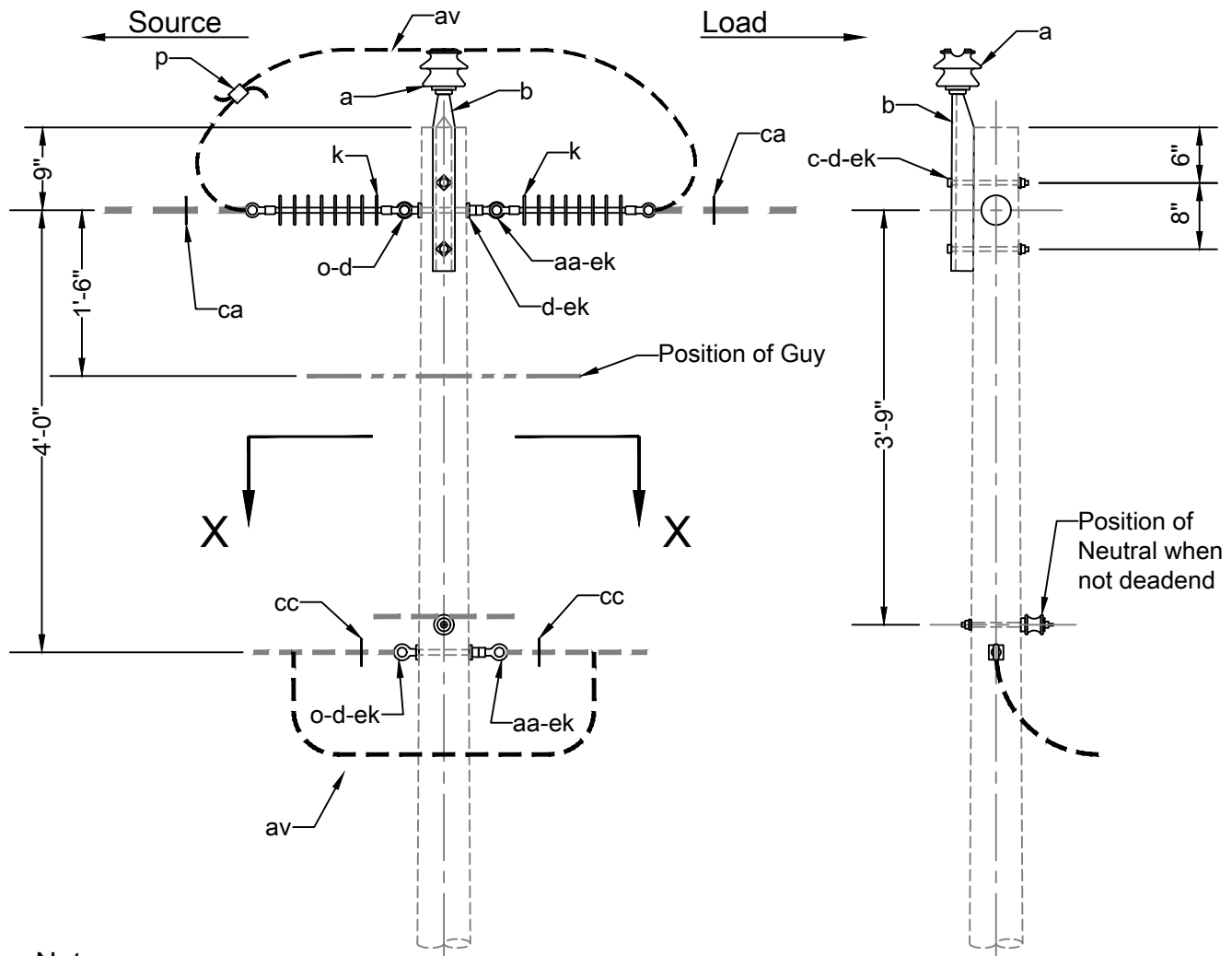
7.2 / 12.5 KV PRIMARY, 1 PHASE
VERTICAL DEADEND (DOUBLE)

Revision Date

April 30, 2020



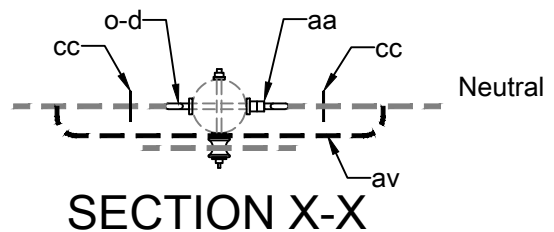
A6



Notes:

A6 may be used with drawings such as M3-1A, M3-10, M3-41, M3-23, M5-1, M5-4, M5-2 (as shown).

Items ac and aa are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	1	Insulator, pin type	p	-	Connectors, as required
b	1	Pin. pole top, 20"	aa	2	Nut, eye, 5/8"
c	2	Bolt, machine, 5/8" x required length	av	-	Jumpers, as required
d	2	Washed, 2 1/4" square	ca	1	Deadend assembly, primary
d	4	Washed, square, 3" curved	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
o	2	Bolt, eye, 5/8" x required length			

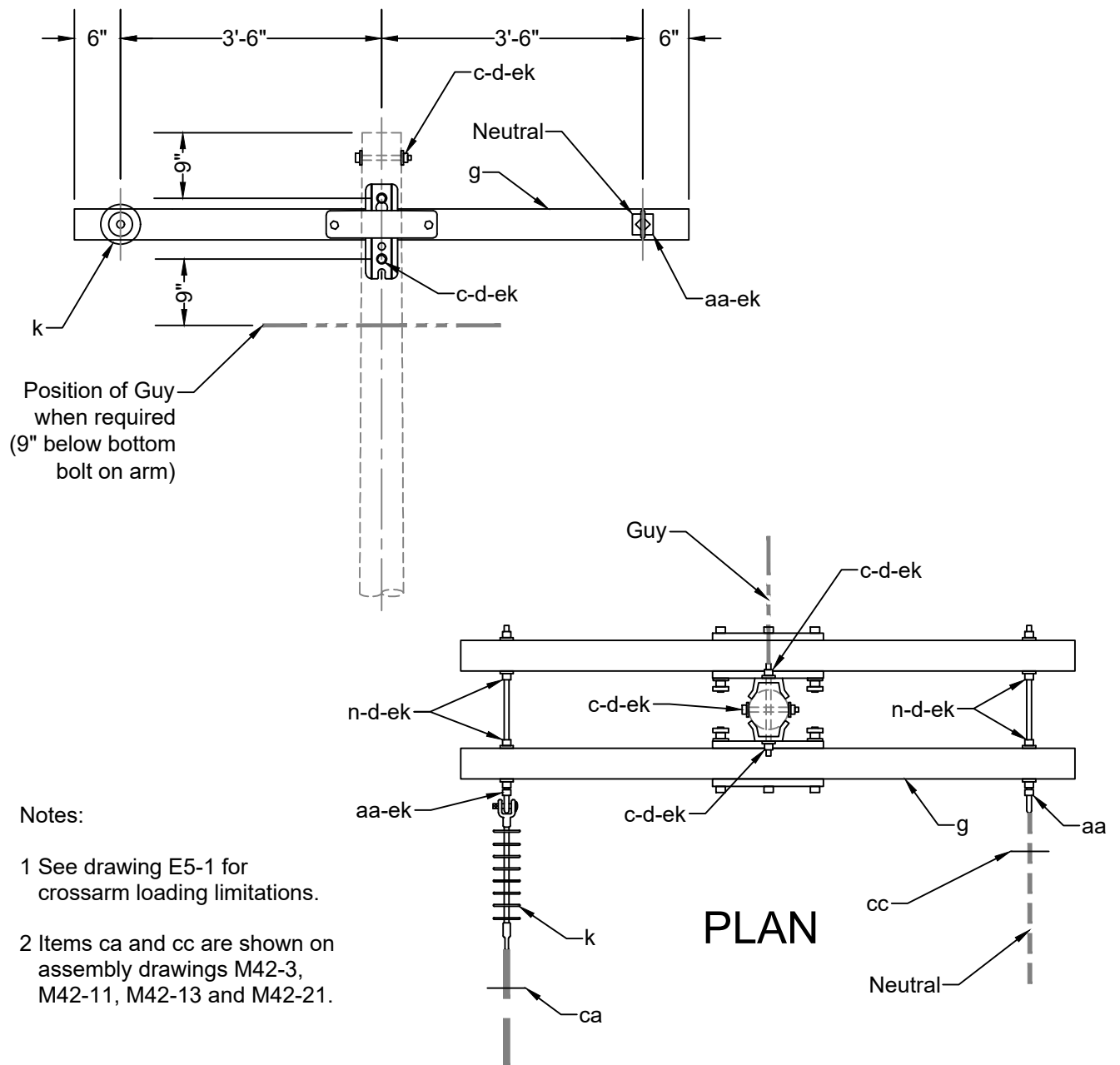
**7.2 / 12.5 KV PRIMARY, 1 PHASE
VERTICAL DEADEND (DOUBLE FEED THROUGH)**

Revision Date

April 30, 2020



A6-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	n	2	Bolt, double arming, 5/8" x required length
d	12	Washer, 2 1/4" square, 13/16" hole	aa	2	Nut, eye, 5/8"
d	2	Washer, 3" square, curved	ca	1	Deadend assembly, primary
g	2	Fiberglass Crossarm 3 3/4" x 4 3/4" x 8'-0"	cc	1	Deadend assembly, neutral
k	1	Insulator, suspension, expoxilator	ek	-	Locknuts, as required

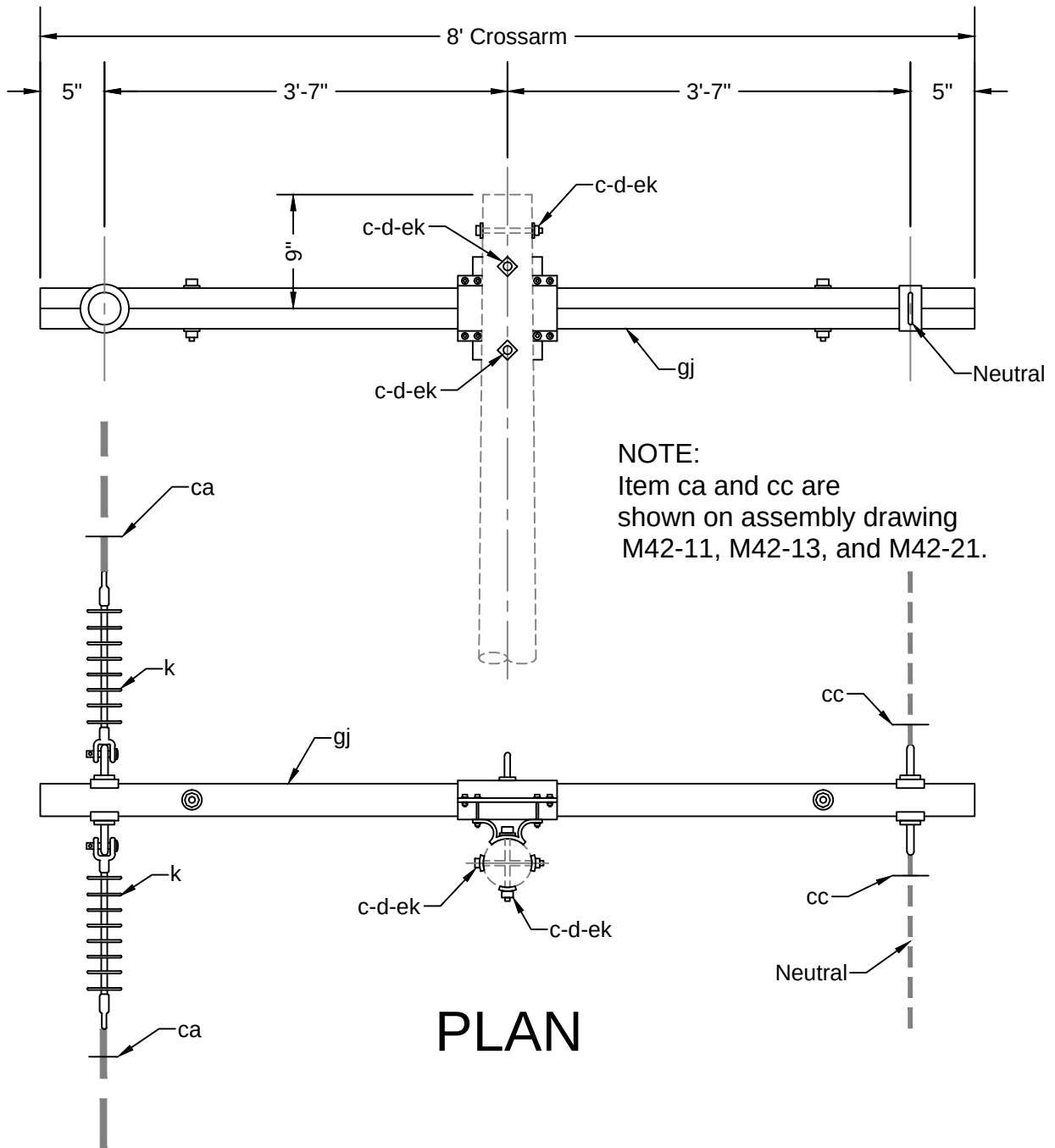
12.5 / 7.2 KV PRIMARY, 1-PHASE
CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Dec. 12, 2022



A7



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	2	Deadend Assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend Assembly, Neutral
k	2	Insulator, suspension, epoxilator	gj	1	8' Crossarm Assembly, DE
d	4	Washer, Square, curved 3"	ek	-	Locknuts, as required
av	-	Jumpers, as required			

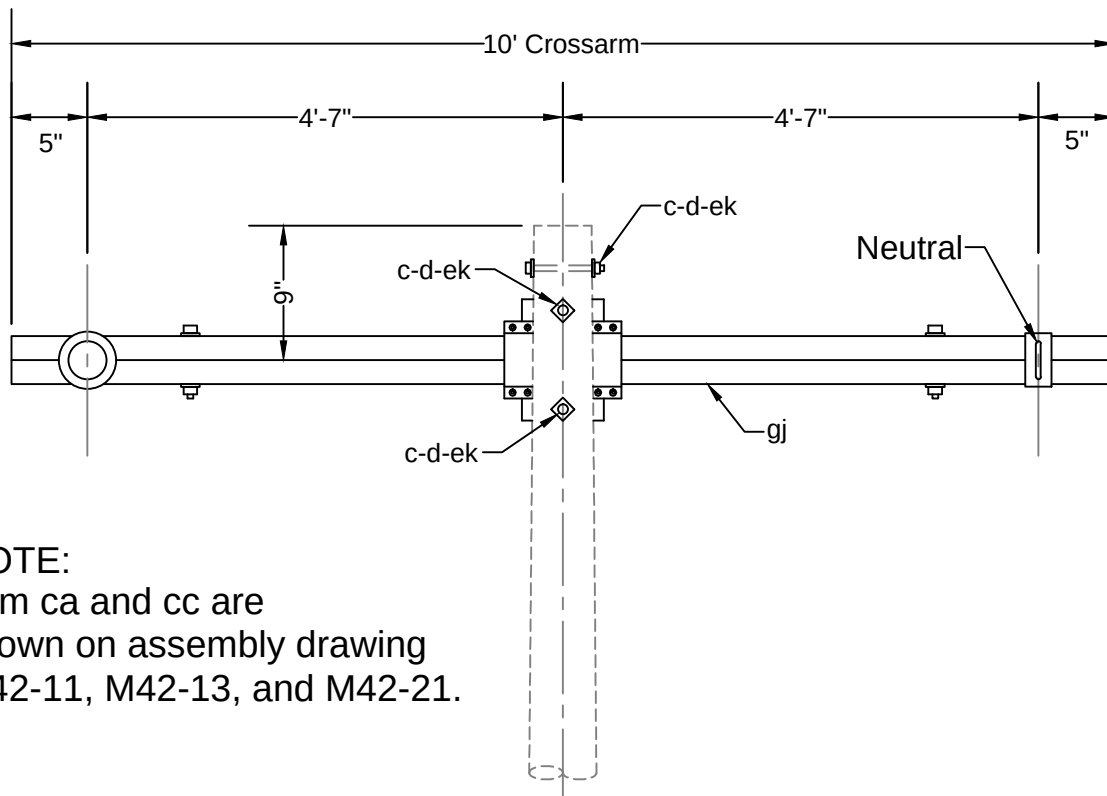
12.5 / 7.2 KV PRIMARY, 1-PHASE
8' CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

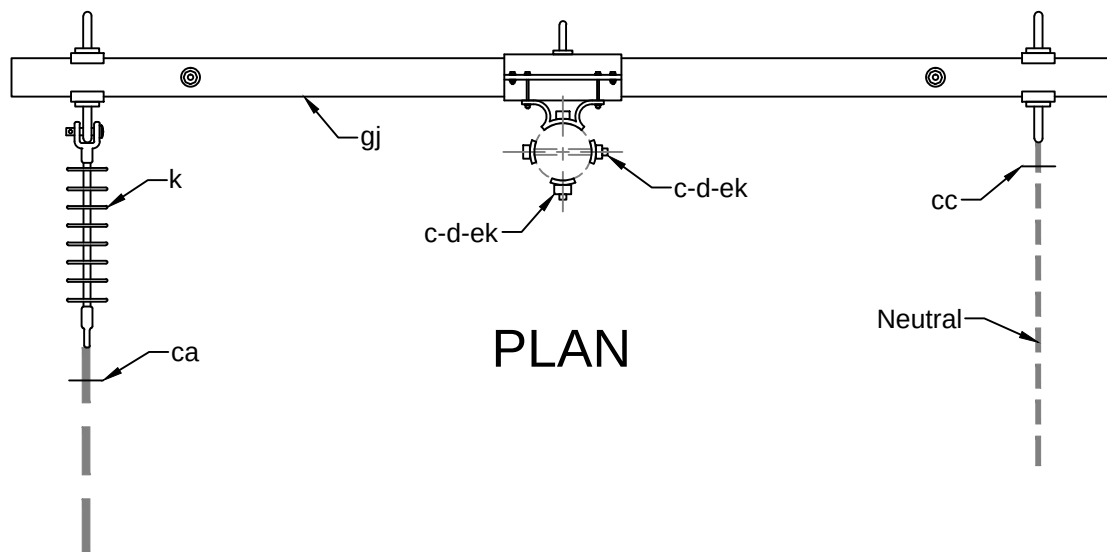
Feb 21, 2018



A8A/8



NOTE:
Item ca and cc are
shown on assembly drawing
M42-11, M42-13, and M42-21.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ek	-	Locknuts, as required
c	2	Bolt, machine 3/4" x required length	gj	1	Crossarm assembly, DE 10'
k	1	Insulator, suspension, epoxilator	ca	1	Deadend assembly, Primary
d	4	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral

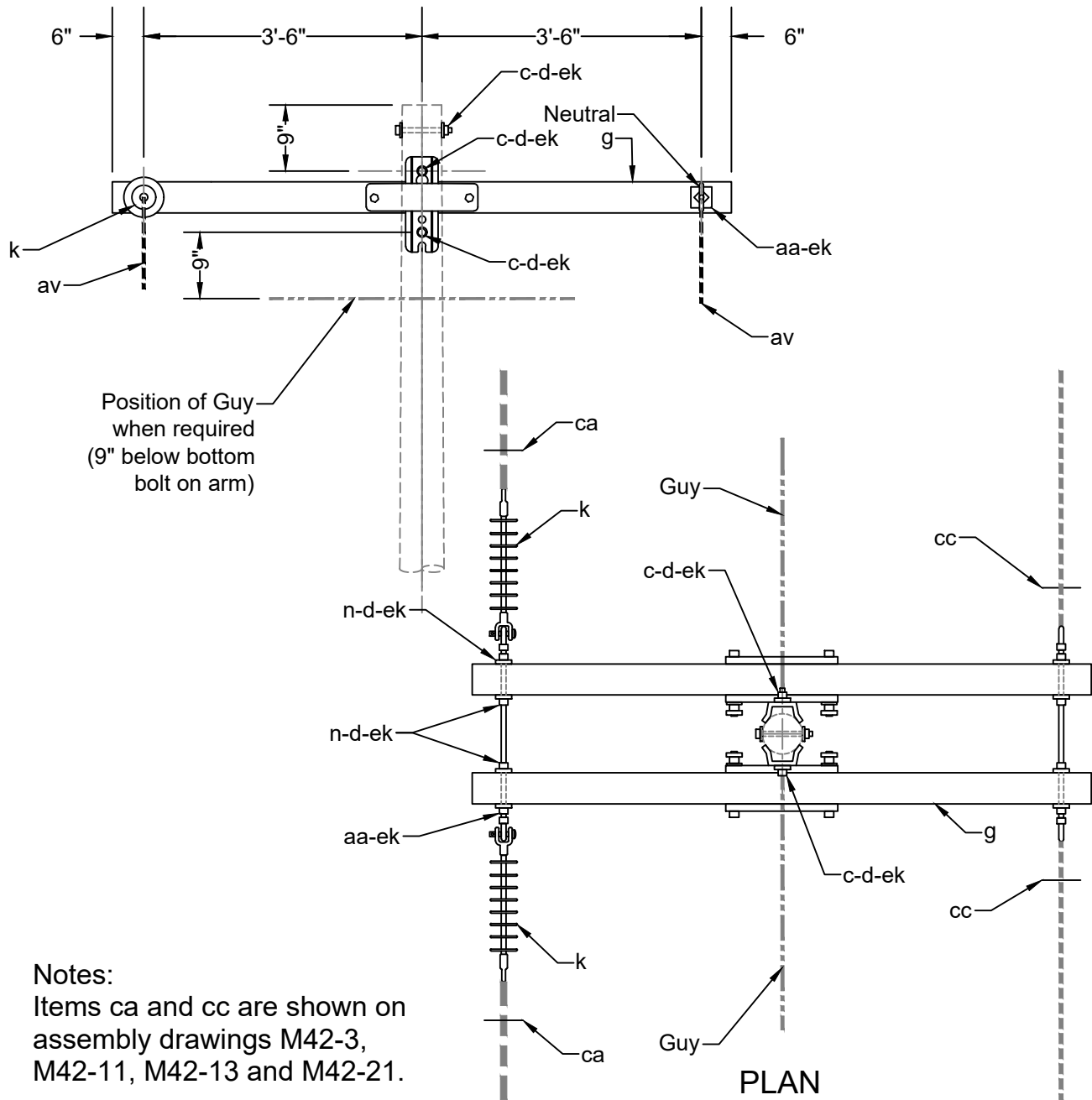
12.5 / 7.2 KV PRINARY , 1-PHASE
10' CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Feb 21, 2018



A7A/10



Notes:

Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	aa	4	Nut, eye, 5/8"
d	2	Washer, 3" square, curved	av	-	Jumpers
d	12	Washer, 2 1/4" square, 13/16" hole	ca	2	Deadend assembly, primary
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	cc	2	Deadend assembly, neutral
k	1	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	2	Bolt, double arming, 5/8" x required length			

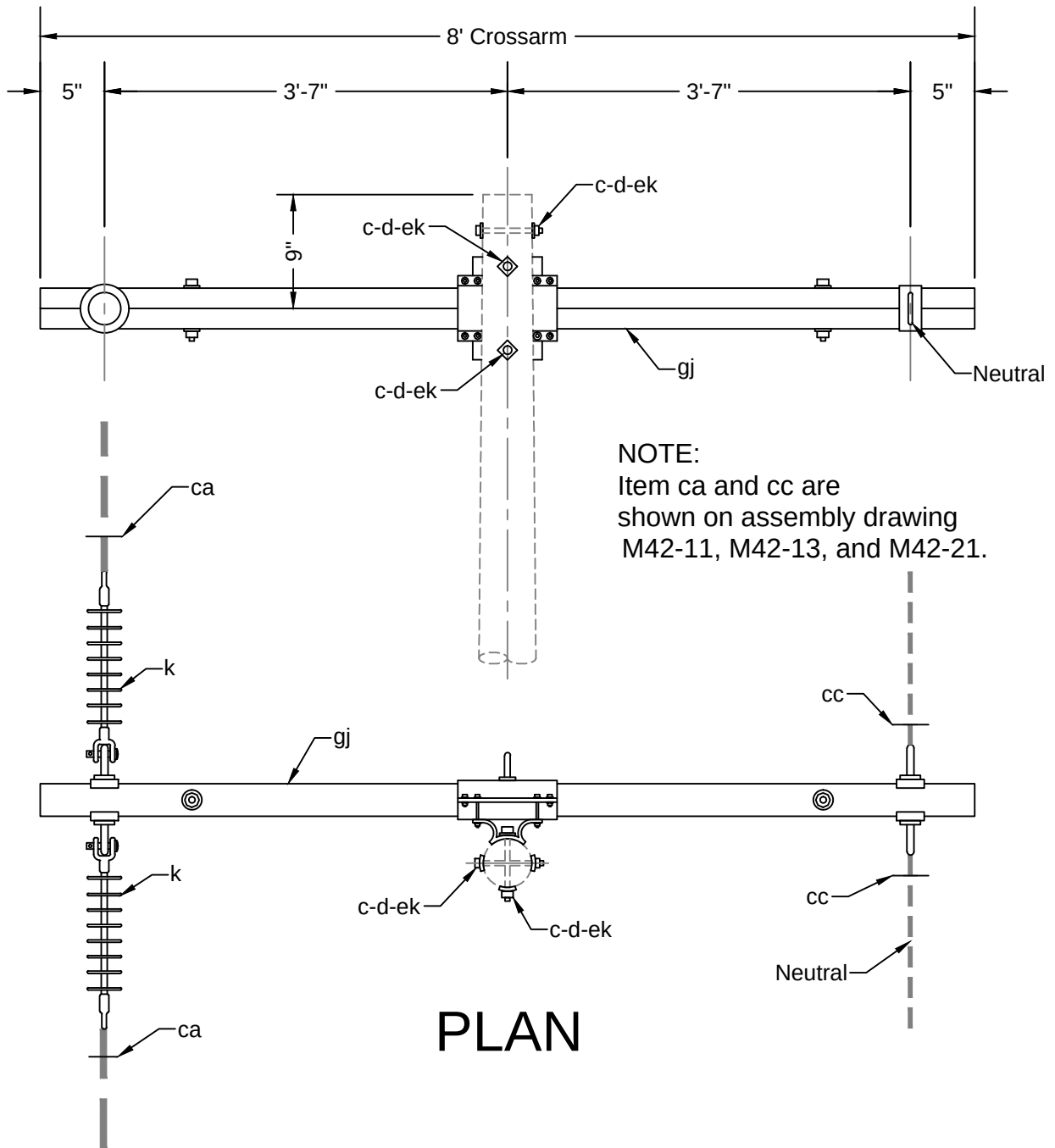
12.5 / 7.2 KV PRIMARY, 1-PHASE
CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Dec. 12, 2022



A8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	2	Deadend Assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend Assembly, Neutral
k	2	Insulator, suspension, epoxilator	gj	1	8' Crossarm Assembly, DE
d	4	Washer, Square, curved 3"	ek	-	Locknuts, as required
av	-	Jumpers, as required			

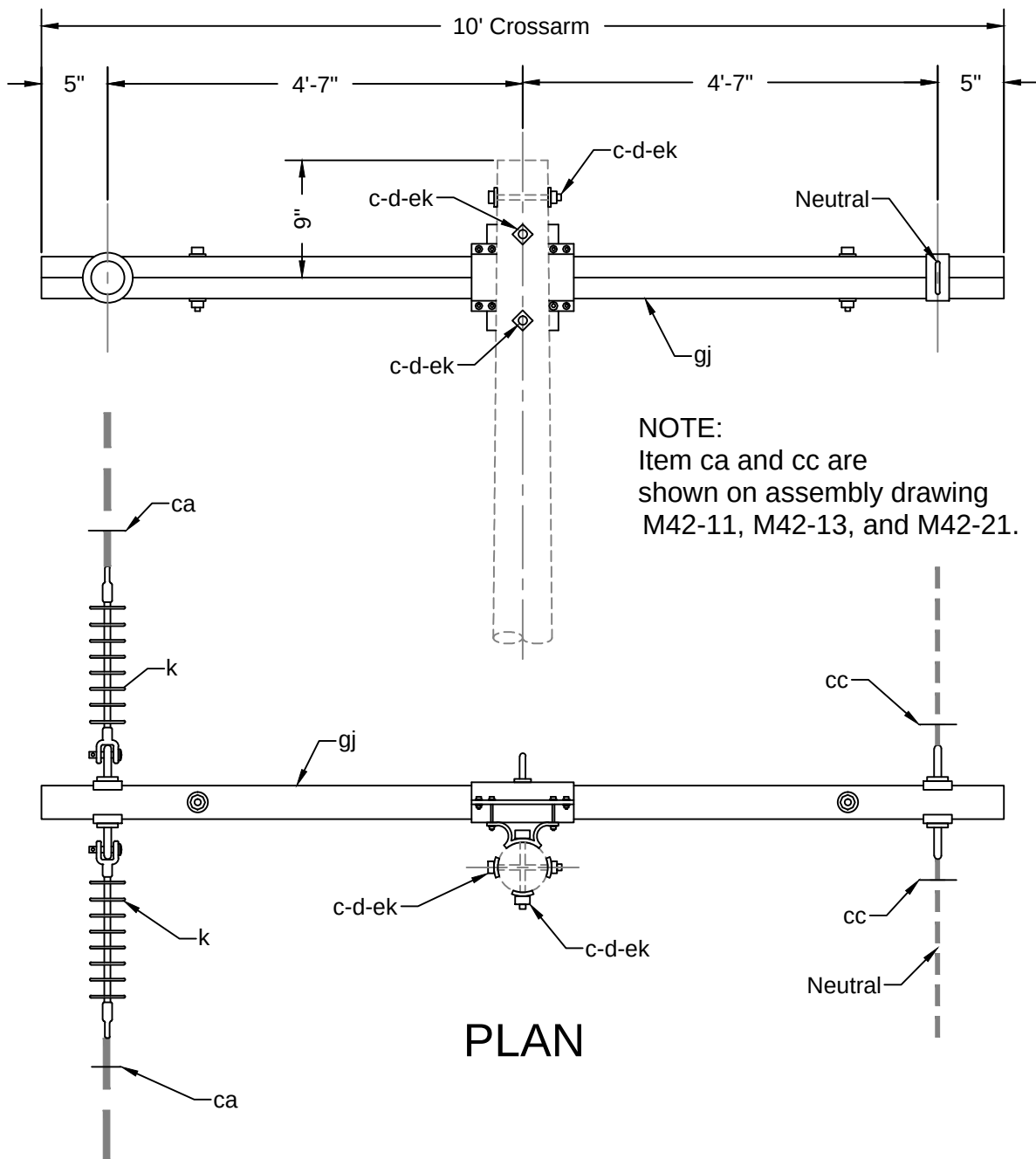
12.5 / 7.2 KV PRIMARY, 1-PHASE
8' CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Feb 21, 2018



A8A/8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	2	Deadend assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend assembly, Neutral
k	2	Insulator, suspension, epoxilator	gj	1	10' Crossarm assembly, DE
d	4	Washer, Square, curved 3"	ek	-	Locknuts, as required
av	-	Jumpers, as required			

12.5 / 7.2 KV PRIMARY, 1-PHASE

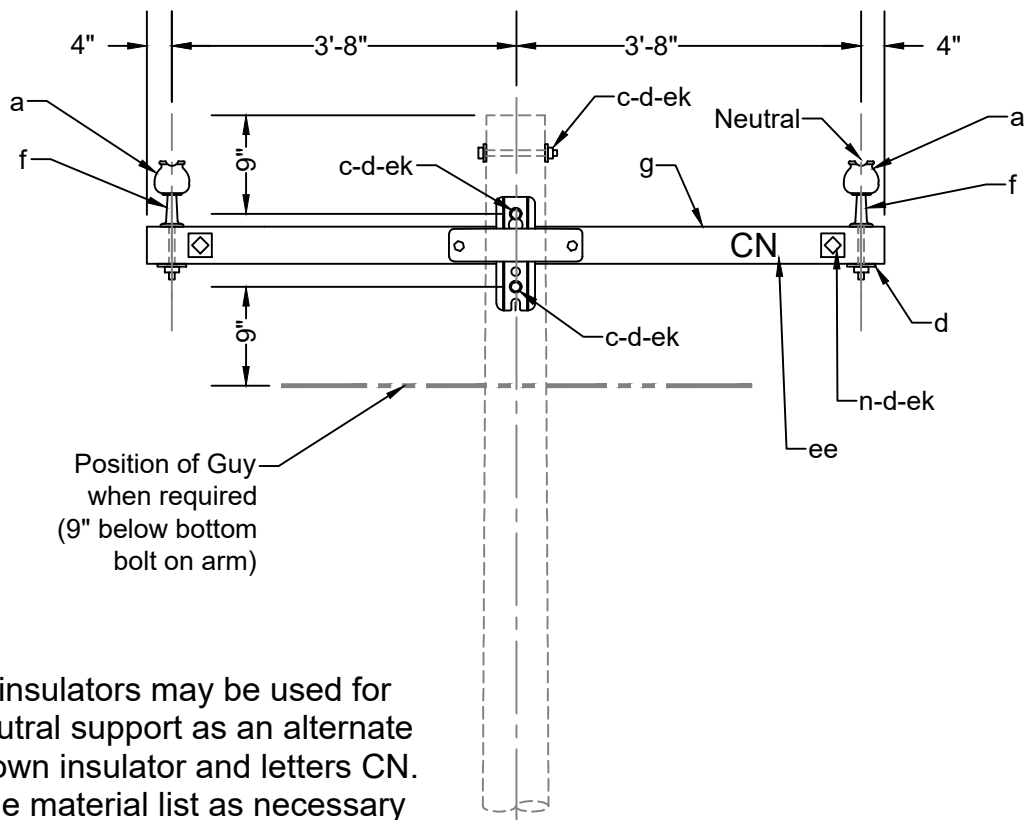
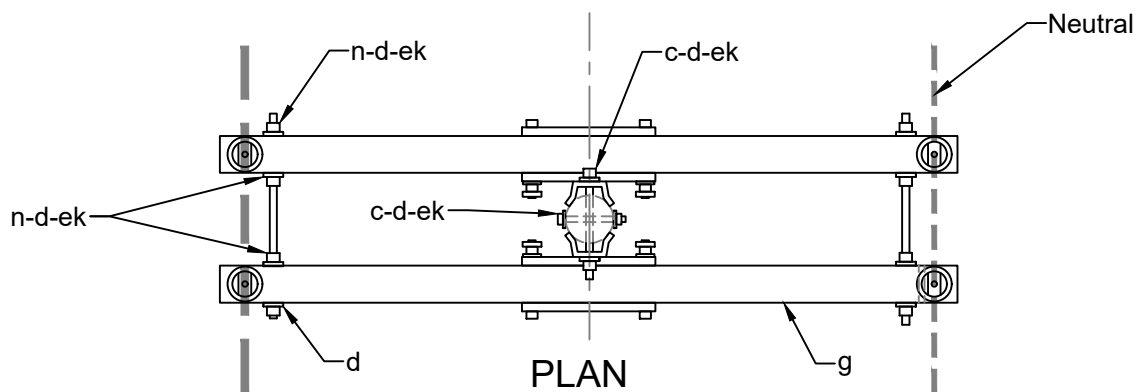
10' CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Feb 21, 2018



A8A/10



Notes:

White insulators may be used for the neutral support as an alternate the brown insulator and letters CN. Change material list as necessary and specify as A9W.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved	ee	4	Letters 2C, 2N with 1" nails
d	16	Washer, 2 1/4" square, 13/16" hole			
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			

7.2 / 12.5 KV PRIMARY, 1-PHASE

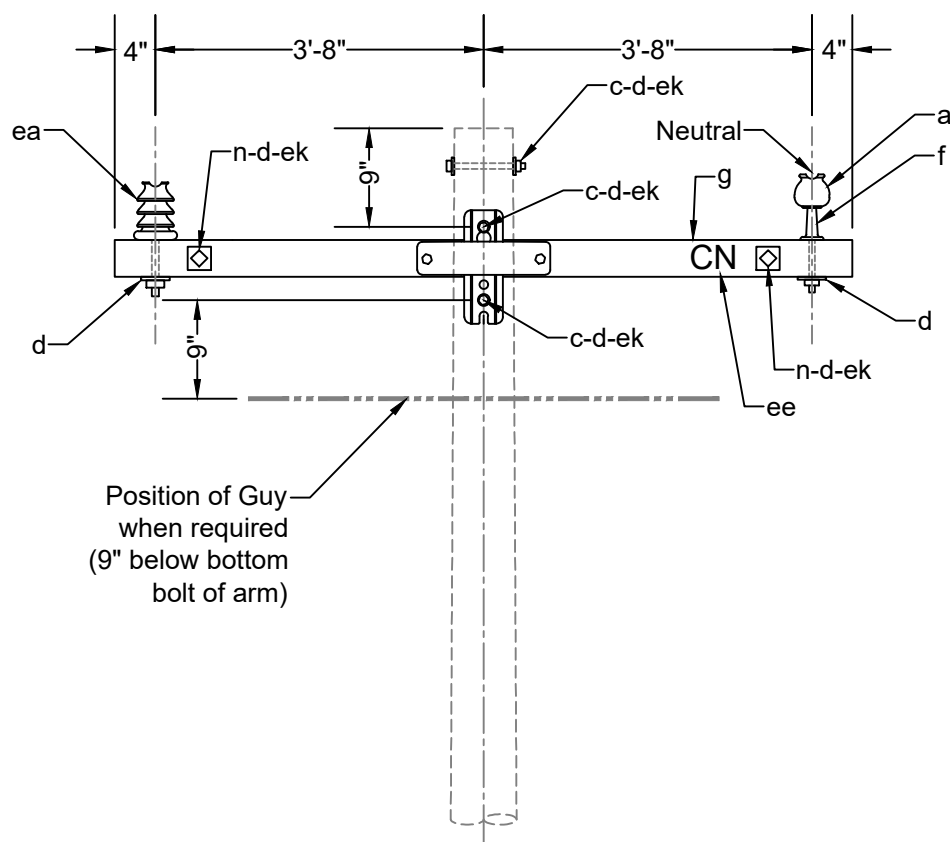
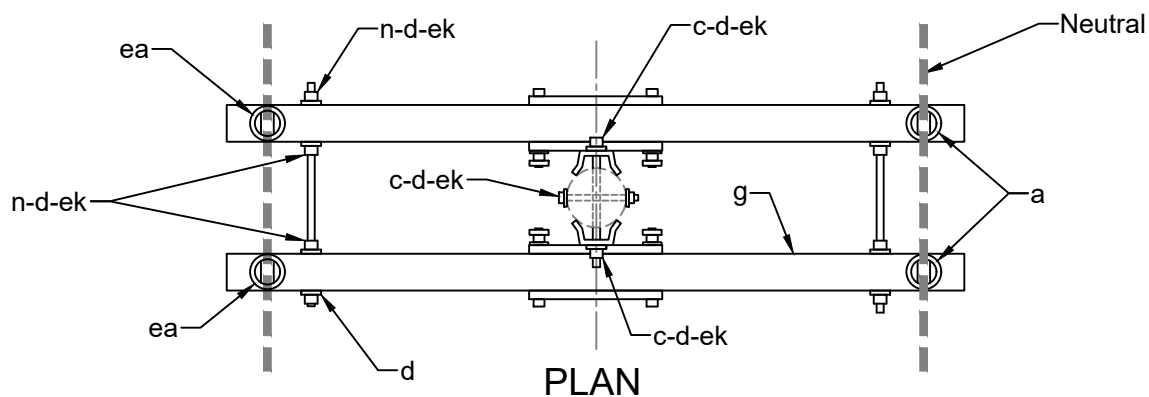
CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 12, 2022



A9, A9W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ea	2	Insulator, post type
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
d	16	Washer, 2 1/4" square, 13/16" hole	ee	4	Letters 2C, 2N with 1" nails
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			

DESIGN LIMITS
Maximum transverse load:
1000 lbs. per conductor
Maximum line angle within
load limits: 20°

7.2 / 12.5 KV PRIMARY, 1-PHASE

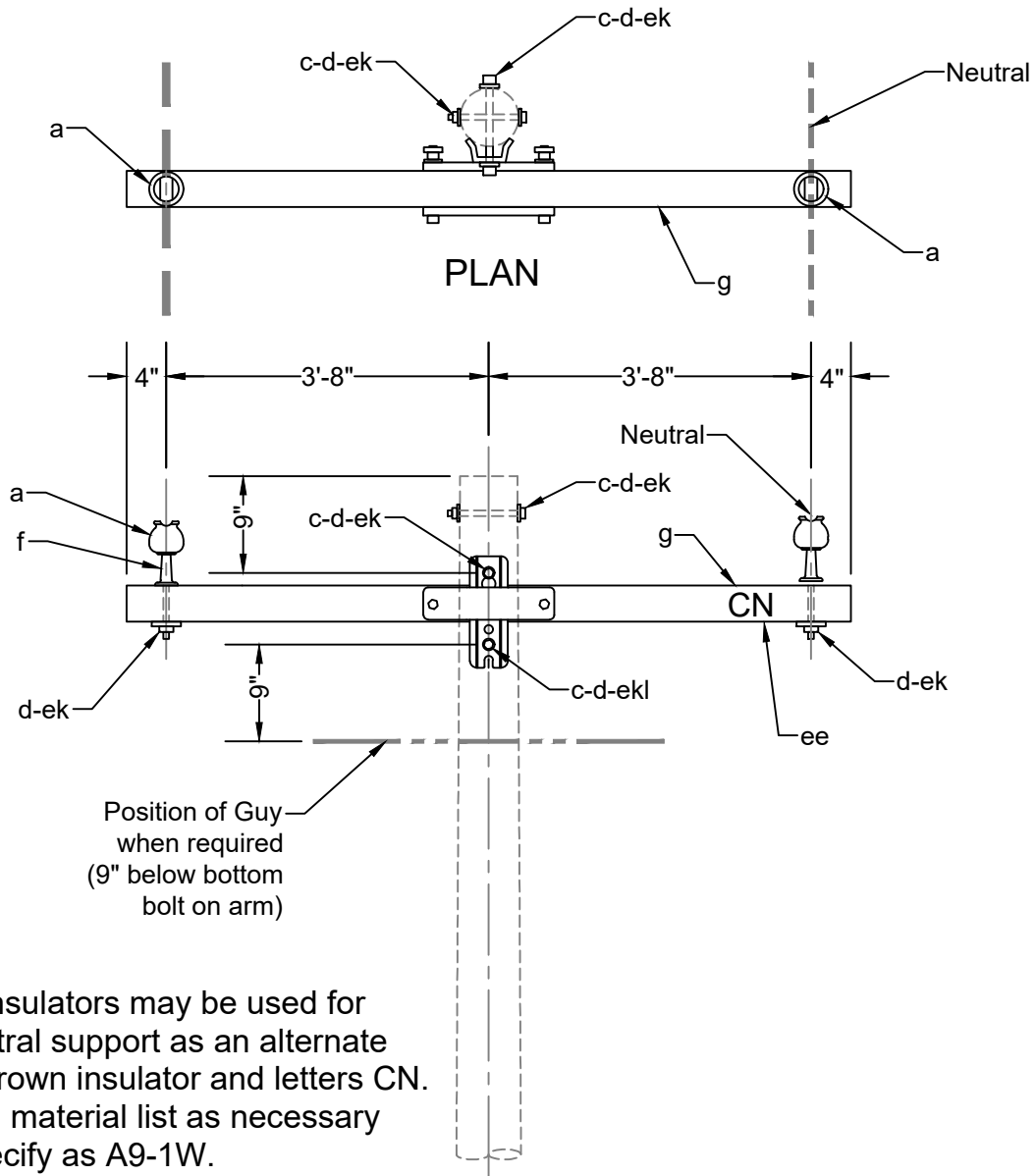
CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec 12, 2022



A9P



Notes:
 White insulators may be used for the neutral support as an alternate to the brown insulator and letters CN. Change material list as necessary and specify as A9-1W.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
c	3	Bolt, machine, 5/8" x required length	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"
d	4	Washer, 2 1/4" Square	ee	4	Letters 2C, 2N with 1" nails
d		Washer, 3" Square, curved	ek	-	Locknuts, as required

7.2 / 12.5 KV PRIMARY, 1-PHASE

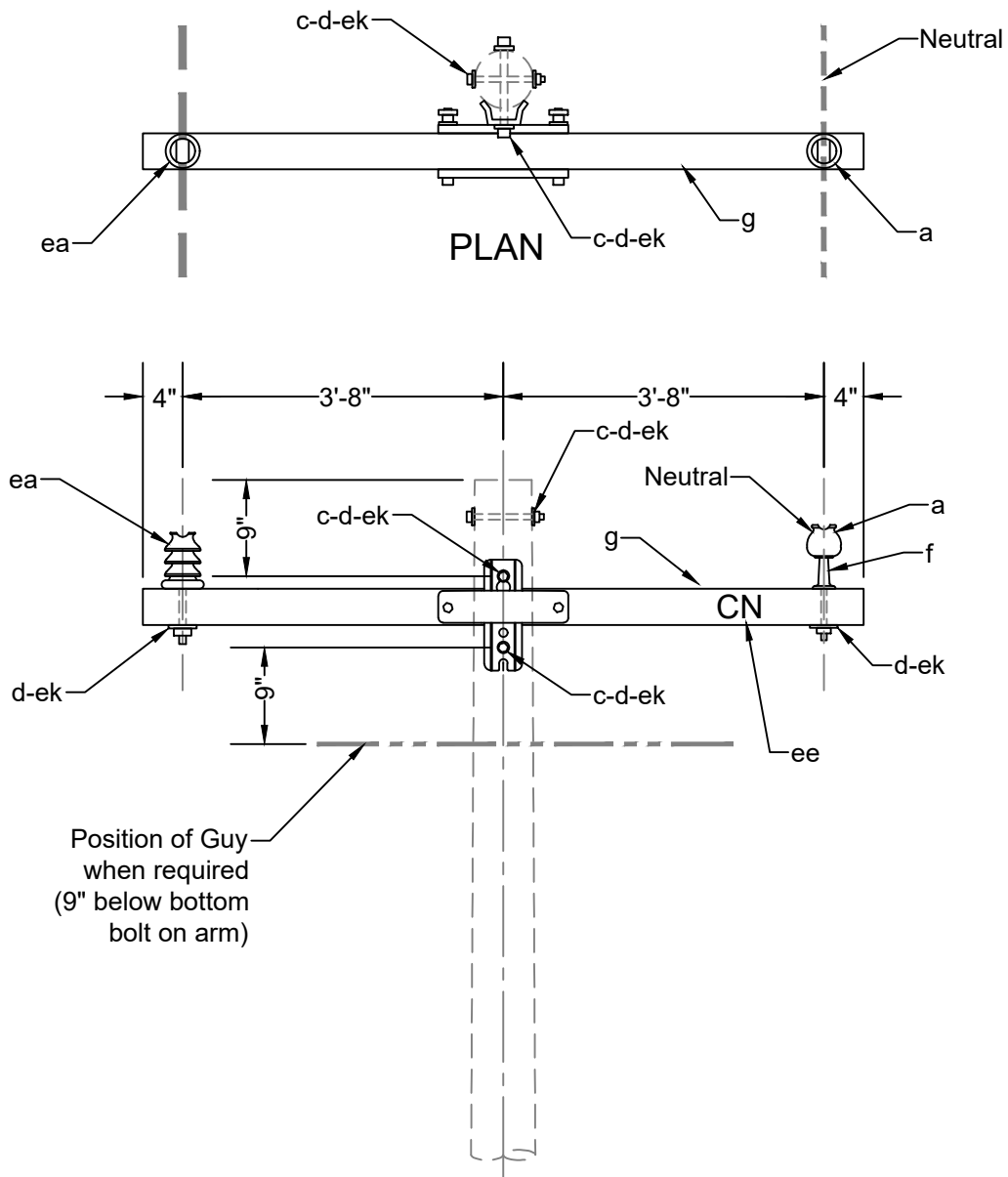
CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 6, 2022



A9-1
A9-1W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"
c	3	Bolt, machine, 5/8" x required length	ea	1	Insulator, post type
d	4	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	4	Washer, 3" square, curved	ee	2	Letters 2C, 2N with 1" nails
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"			

DESIGN LIMITS
 Maximum transverse load:
 500 lbs. per conductor
 Maximum line angle within
 load limits: 5°

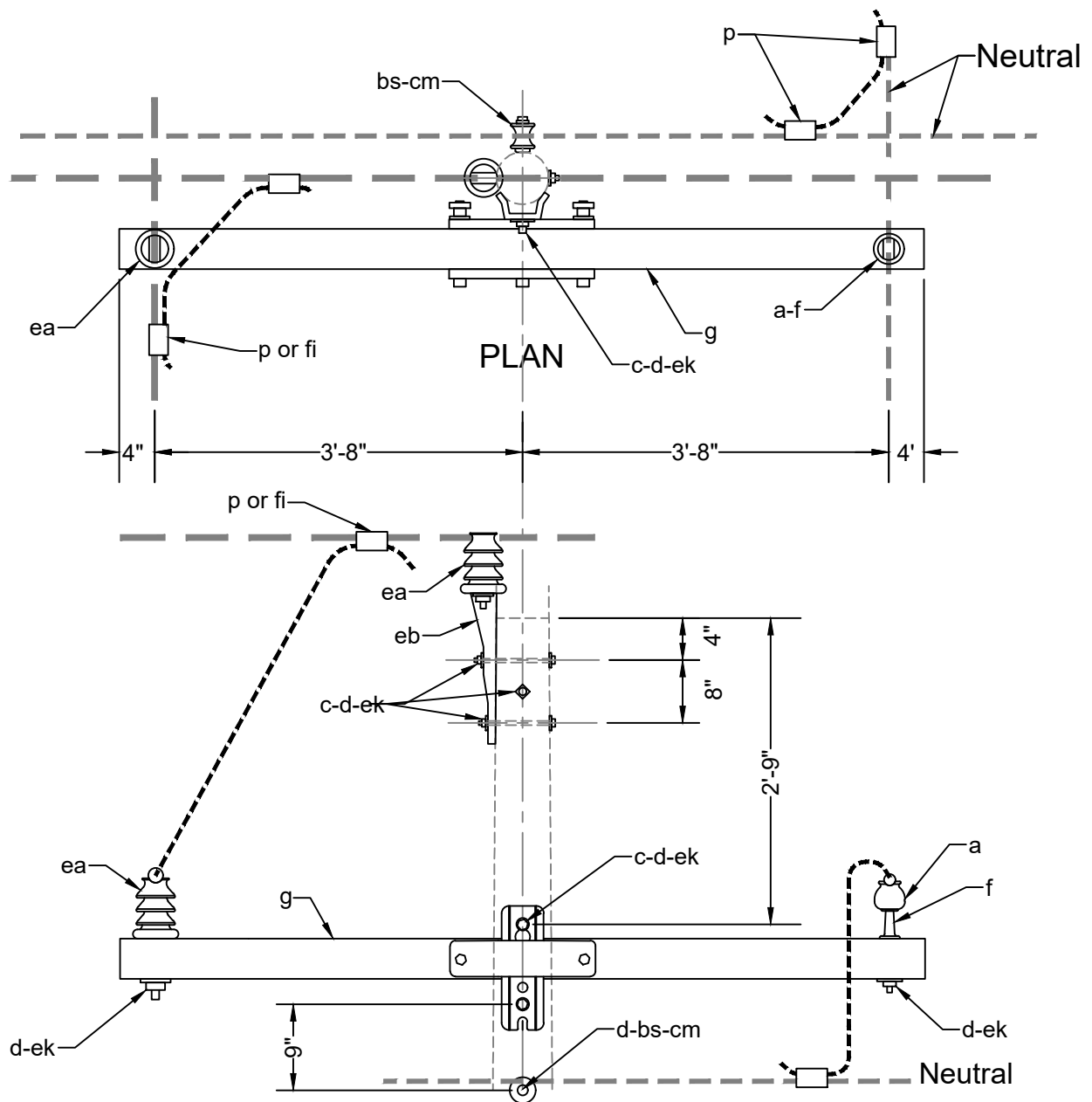
7.2 / 12.5 KV PRIMARY, 1-PHASE CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec 12, 2022



A9-1P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	p		Connectors, as required
c	4	Bolt, machine, 5/8" x required length	av		Jumpers, as required
d	5	Washer, 3" square, curved	bs	1	Bolt , single upset
d		Washer, 2 1/4" square, 13/16" hole	ea	2	Insulator, post type
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"	eb	1	Bracket, pole top
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ek	-	Locknuts, as required
			cm	1	Spool, insulator

DESIGN LIMITS

Maximum transverse loads:
500 lbs per conductor

Maximum line angle within load limits:
5° Angle.

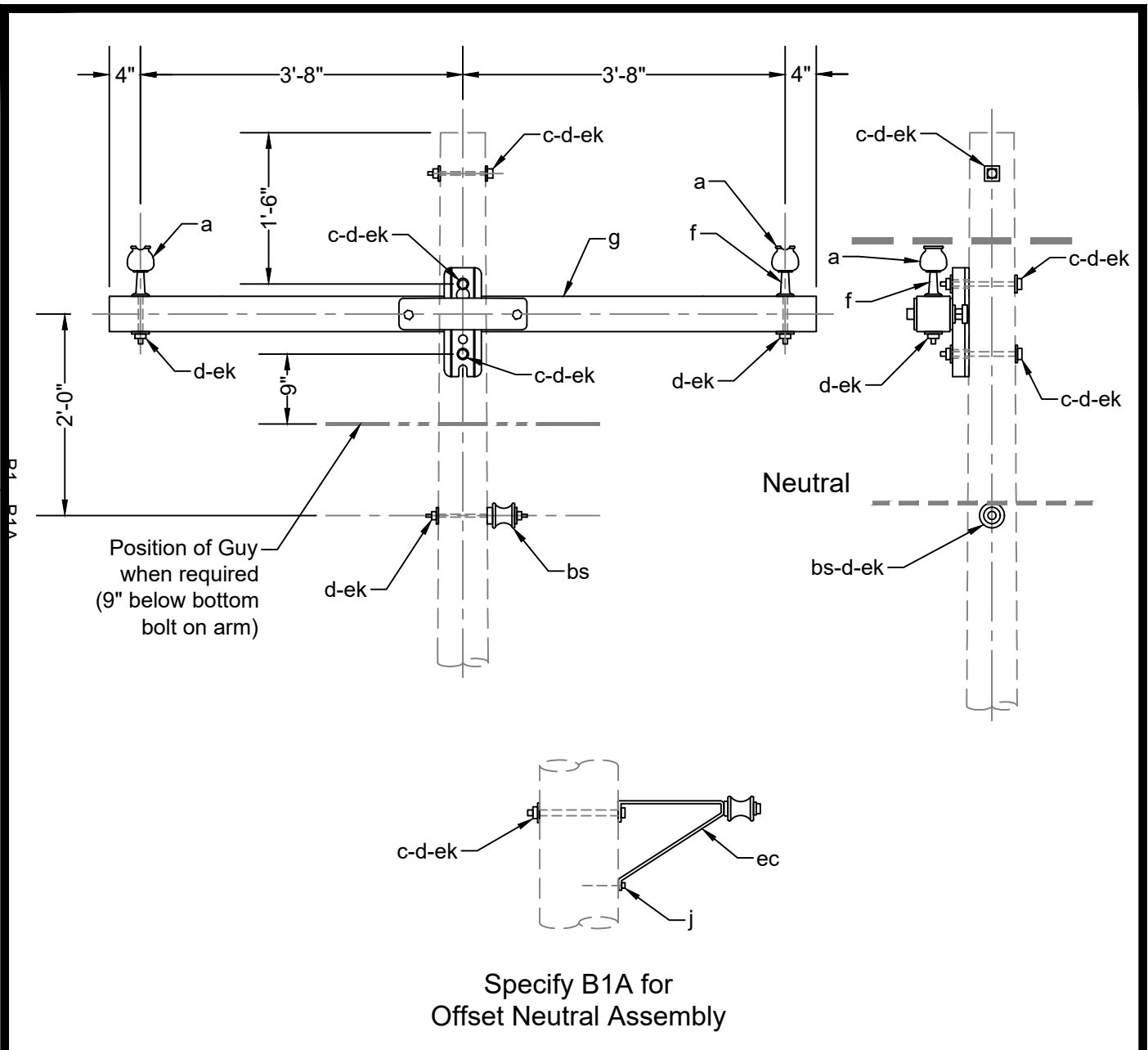
7.2 / 12.5 KV, 1- PHASE CROSSARM CONSTRUCTION - SINGLE PHASE JUNCTION

Revision Date

Dec. 12, 2022



A22P



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	2	Insulator, pin type			(ADDITIONAL MATERIAL FOR B1A)
c	3	Bolt, machine, 5/8" x required length	j	1	Screw, lag, 1/2" x 4" (B1A only)
d	5	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length (B1A)
d	4	Washer, 3" square curved	ec	1	Bracket, offset, insulated (B1A only)
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"	d	1	Washer, 2 1/4" square
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			
bs	1	Bolt, single upset, insulated (B1 only)			
ek	-	Locknuts, as required			

7.2 / 12.5 KV PRIMARY, 2-PHASE

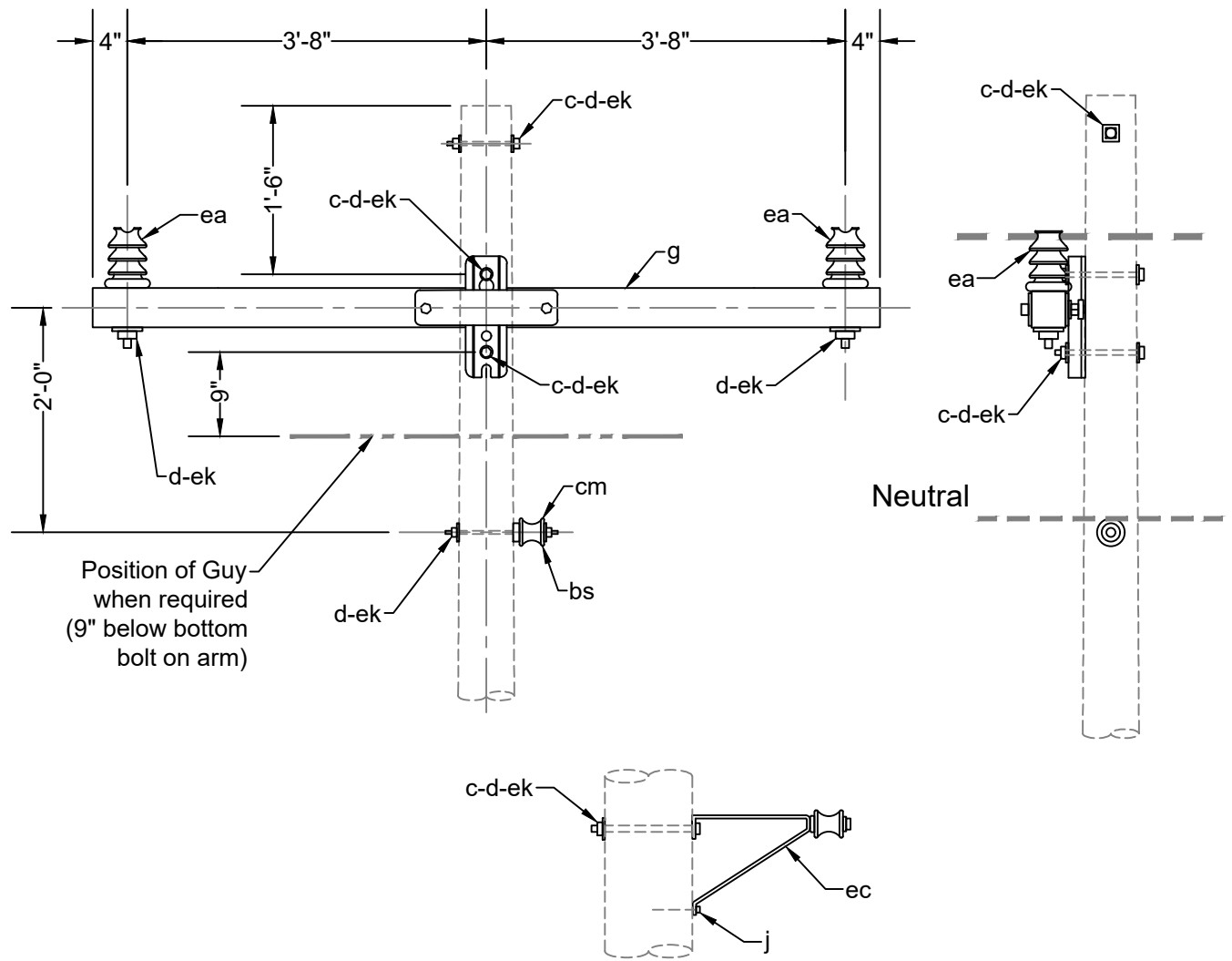
CROSSARM CONSTRUCTION - 0° TO 5° ANGLE
SINGLE PRIMARY SUPPORT

Revision Date

Dec. 12, 2022



B1
B1A



Specify B1AP for
Offset Neutral Assembly

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
c	3	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR B1AP)
d	5	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length
d	4	Washer, 3" square, curved	d	1	Washer, 2 1/4" square
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"	j	2	Screw, lag, 1/2" x 4" (B1AP only)
bs	1	Bolt, single upset, insulated (B1P only)	ec	1	Bracket, offset, insulated (B1AP only)
cm	1	Spool insulator			
ea	2	Insulator, post type			
ek	-	Locknuts, as required			

DESIGN LIMITS
Maximum transverse load:
750 lbs. per conductor

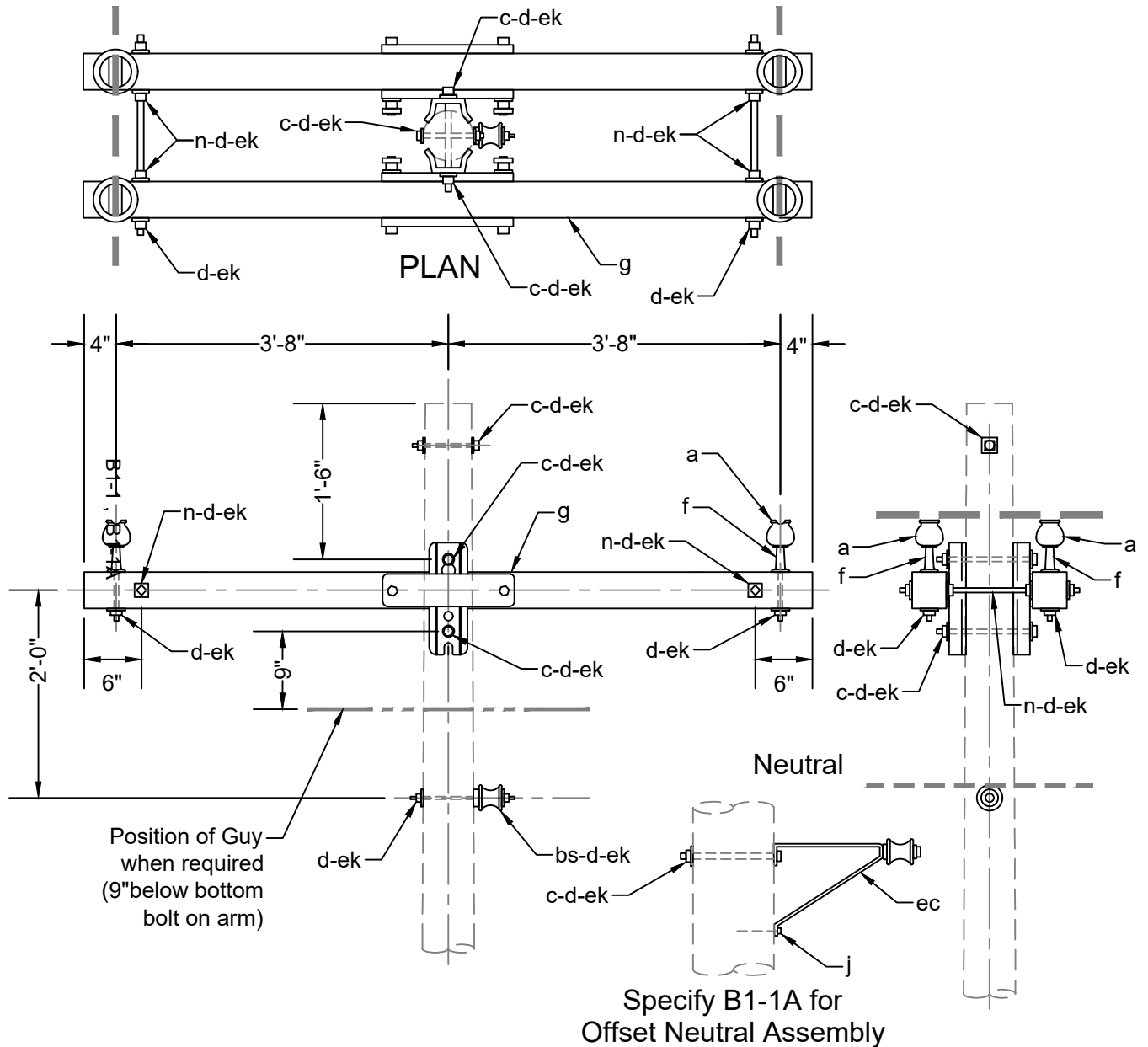
Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 2-PHASE
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT

Revision Date
Dec. 12, 2022



B1P, B1AP



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	4	Insulator, pin type			(ADDITIONAL MATERIAL FOR B1-1A)
c	3	Bolt, machine, 5/8" x required length	c	1	Bolt, machine, 5/8" x required length (B1-1A)
d	17	Washer, 2 1/4" square	d	1	Washer, 2 1/4" square
d	2	Washer, 3" square curved	j	1	Screw, lag, 1/2" x 4" (B1-1A only)
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	ec	1	Bracket, offset, insulated (B1-1A only)
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			
n	2	Bolt, double arming, 5/8" x required length			
bs	1	Bolt, single upset, insulated (B1-1 only)			
ek	-	Locknuts, as required			

7.2 / 12.5 KV PRIMARY, 2-PHASE

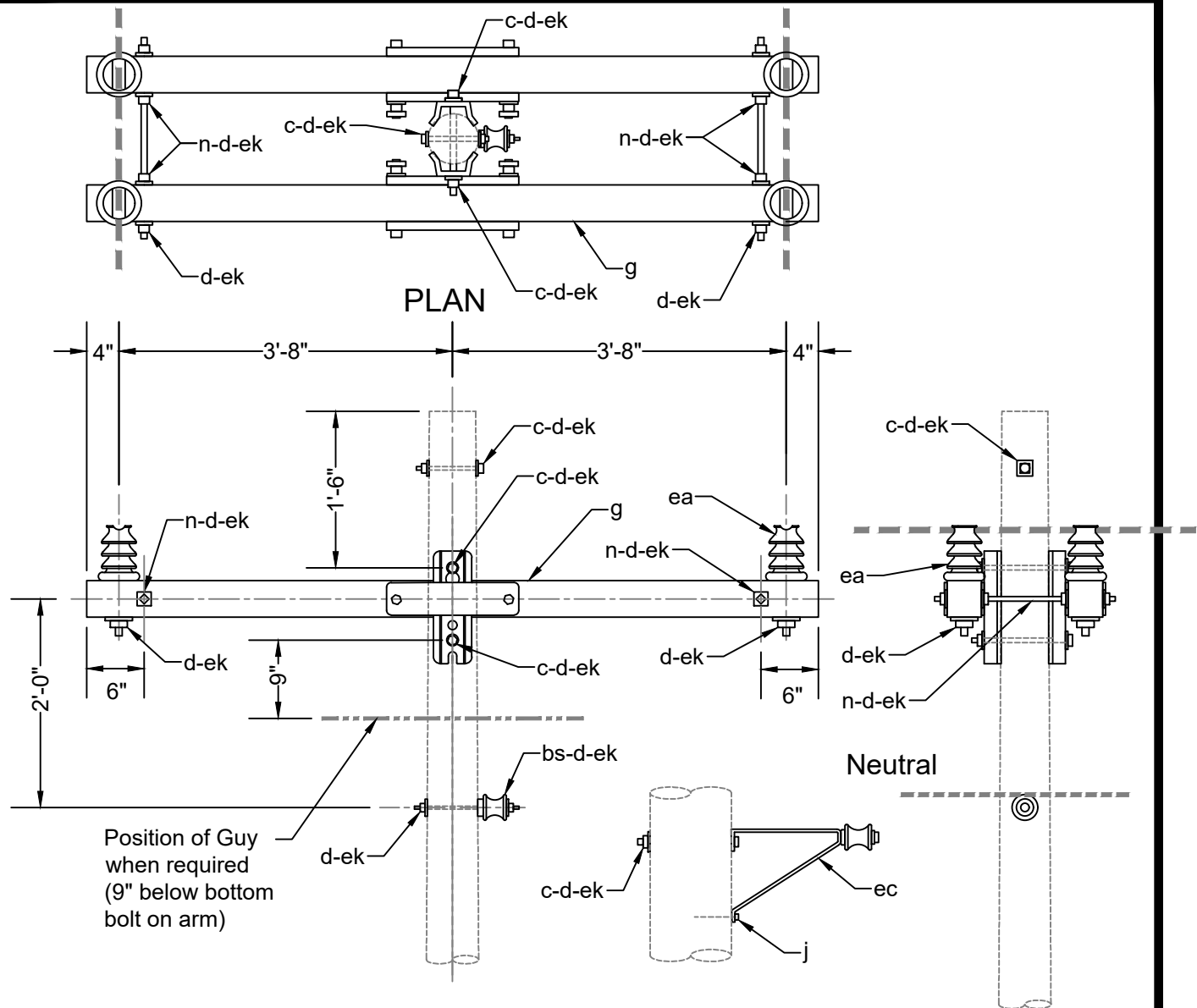
CROSSARM CONSTRUCTION - 0° TO 5° ANGLE
SINGLE PRIMARY SUPPORT

Revision Date

Dec. 7, 2022



B1-1
B1-1A



Specify B1-1AP for
Offset Neutral Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR B1-1AP)
d	17	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length
d	2	Washer, 3" Square, curved	d	1	Washer, 2 1/4" square
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"	ec	1	Bracket, offset, insulated (B1-1AP only)
n	2	Bolt, double arming, 5/8" x required length	j	3	Screw, lag, 1/2" x 4" (B1-1AP only)
bs	1	Bolt, single upset, insulated (B1-1P only)			
cu	2	Brace, wood, 28", pair			
ea	4	Insulator, post type			
ek	-	Locknuts, as required			

DESIGN LIMITS

Maximum transverse load:
1500 lbs per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 2-PHASE

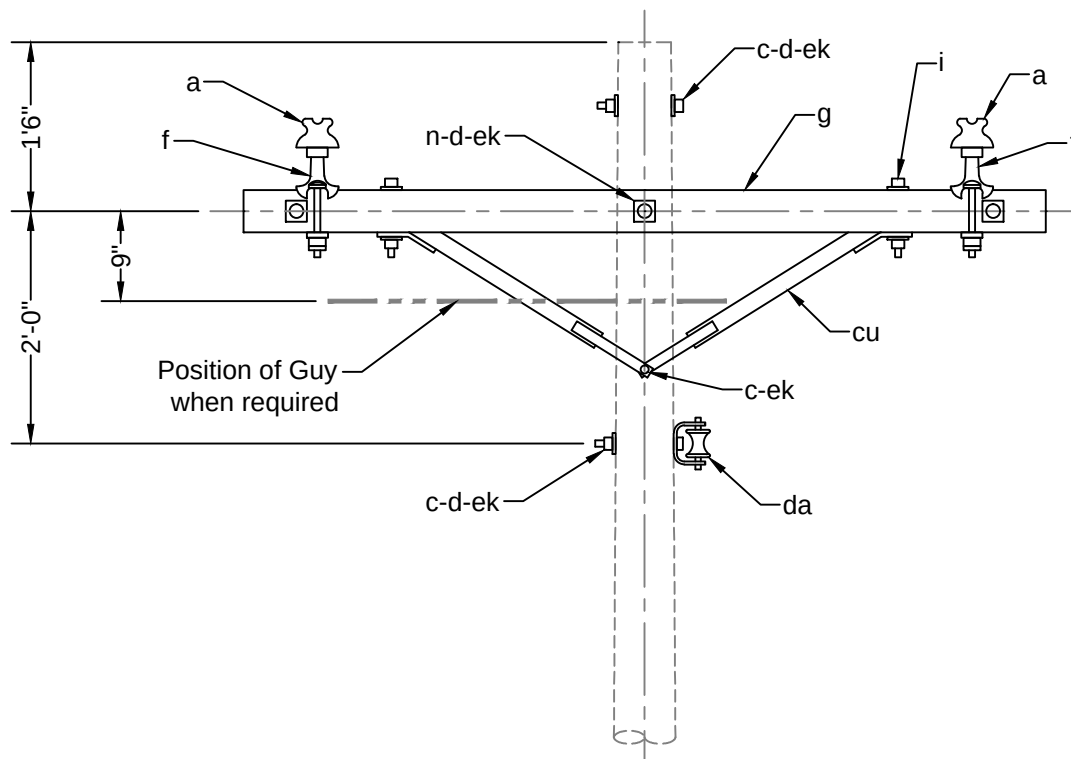
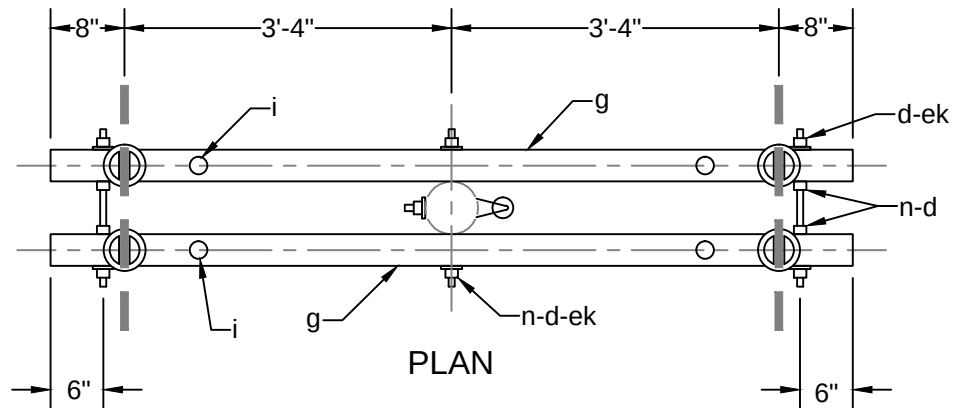
CROSSARM CONSTRUCTION
0° to 5°, DOUBLE PRIMARY SUPPORT

Revision Date

Dec 12, 2022



B1-1P
B1-1AP



Obsolete. For Retirement Only.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0"
c	2	Bolt, machine, 5/8" x required length	n	3	Bolt, double arming, 5/8" x required length
i	4	Bolt, carriage, 1/2" x required length	cu	2	Brace, wood, 60" span
d	13	Washer, 2 1/4" x 2 1/4" x 13/16 hole	da	1	Bracket, insulated
f	4	Pin, cross arm, steel, clamp type	ek		Locknuts, as required

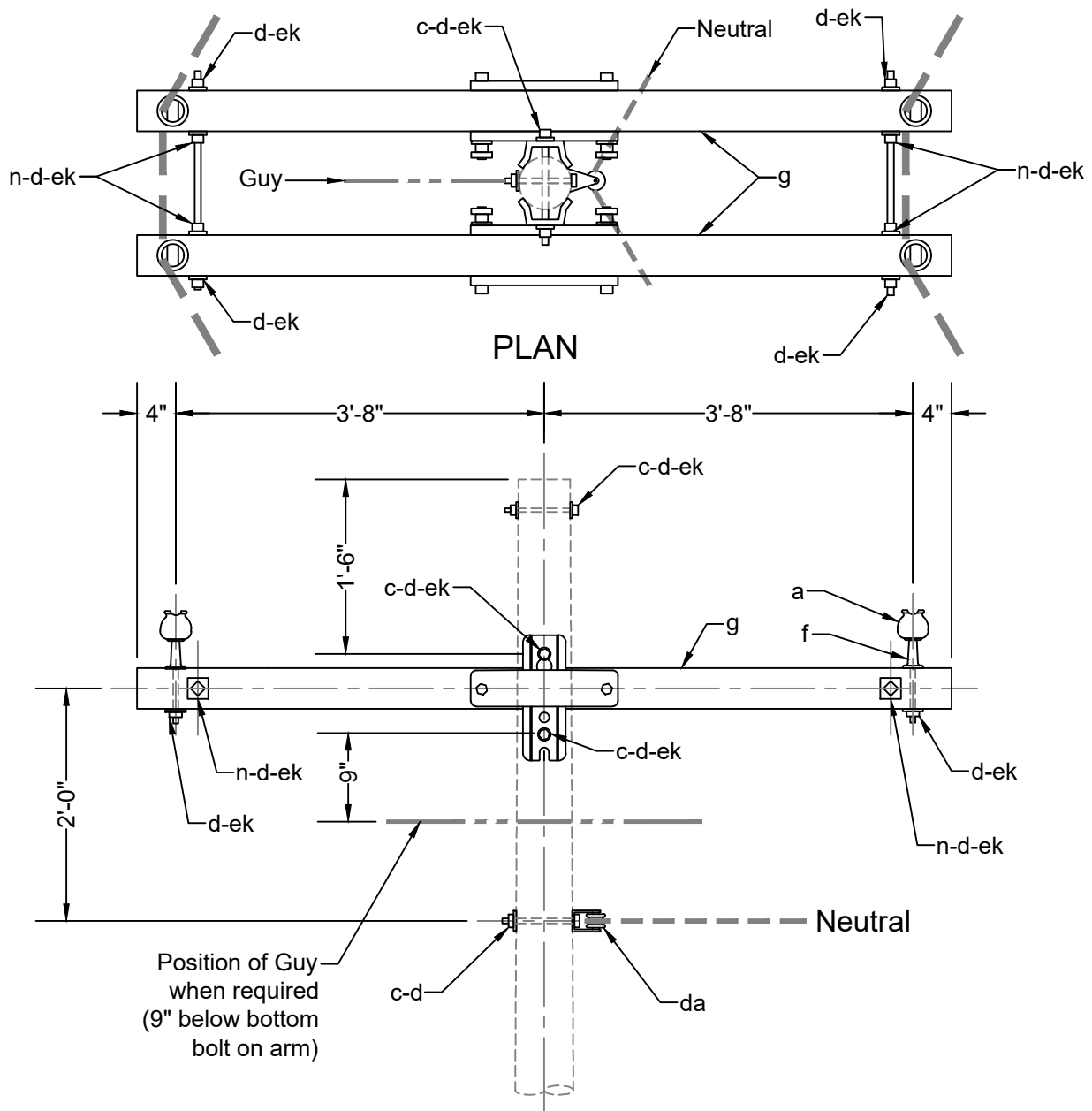
12.5 / 7.2 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Feb 4, 2015



B1-3



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	17	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			

DESIGN LIMITS:
Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° to 30° Angle

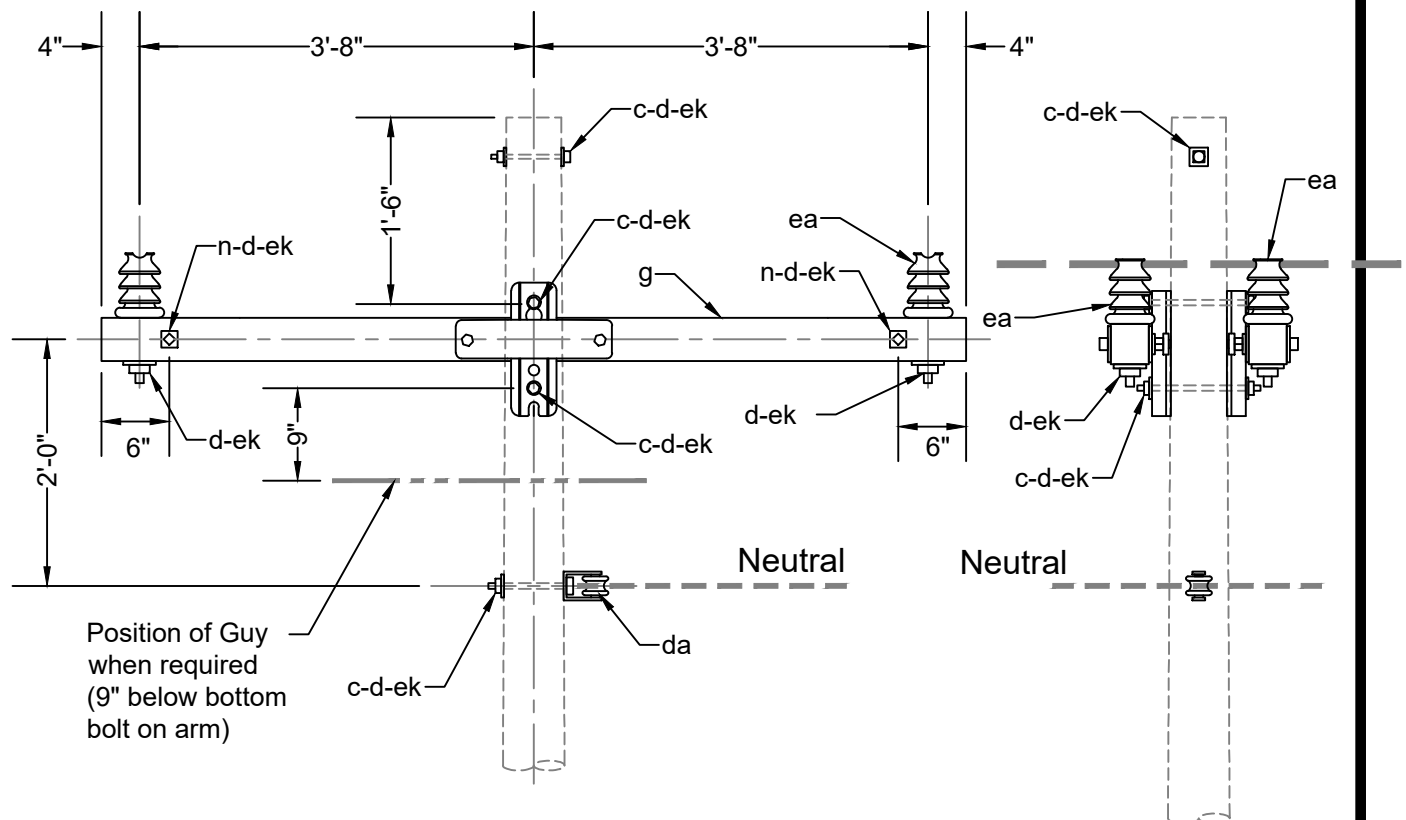
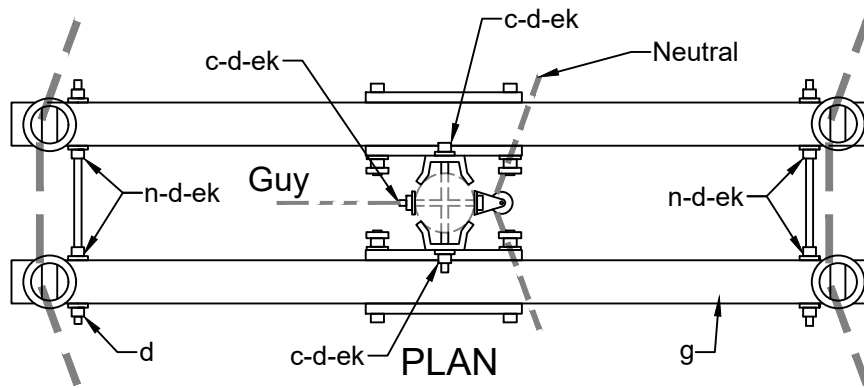
7.2 / 12.5 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORTS

Revision Date

Dec. 12, 2022



B2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	17	Washer, 2 1/4" square	ea	4	Insulator, post type
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			
n	2	Bolt, double arming, 5/8" x required length			

DESIGN LIMITS

Maximum transverse load:
1500 lbs per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 2-PHASE

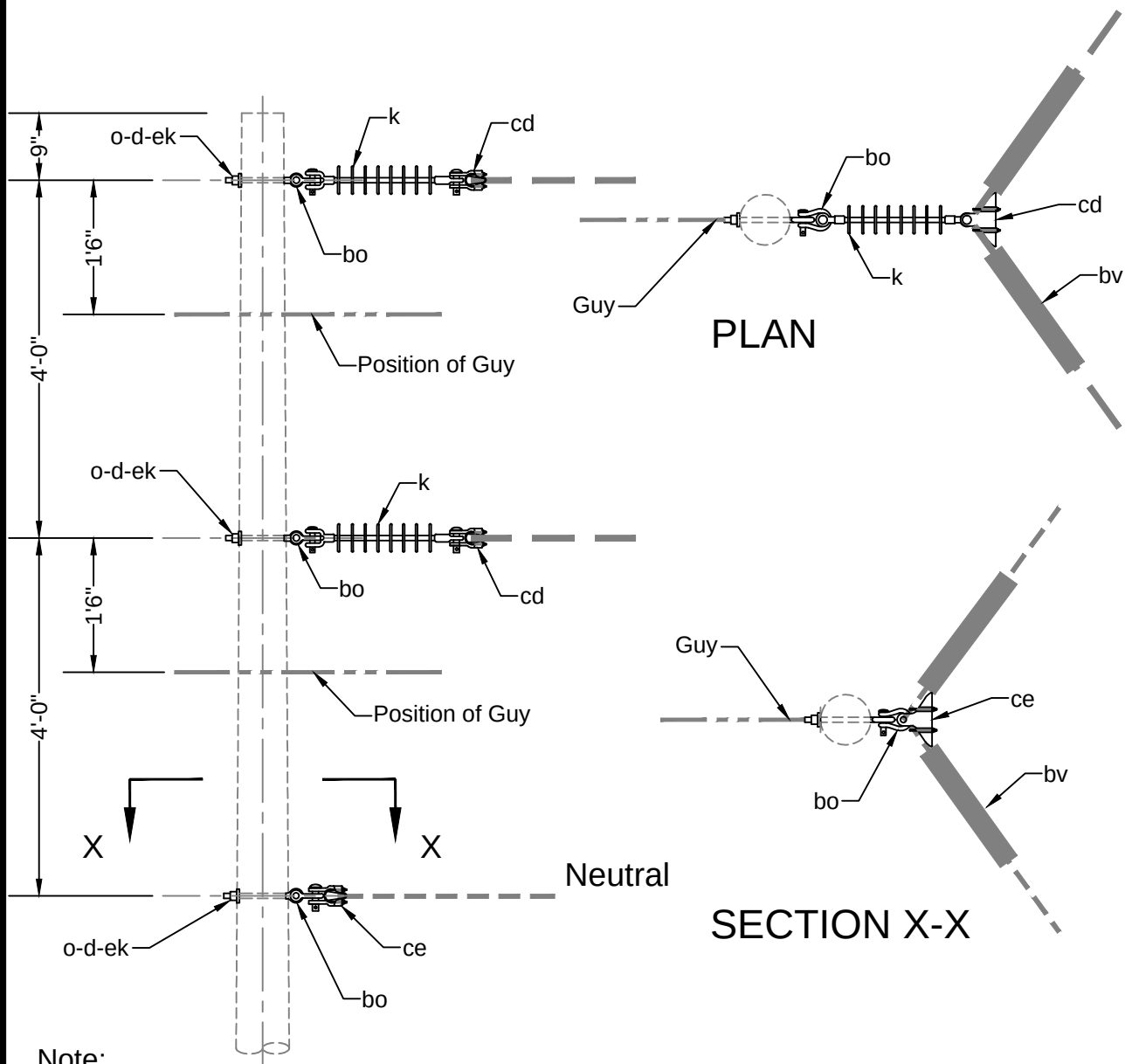
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 12, 2022



B2P



Note:

If future conversion is likely, allow space at top of pole for middle phase. Designate as B3A for this construction.

Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
d	3	Washer, 2/14" x 2 1/4" x 3/16" hole	cd	2	Angle assembly, primary
k	2	Insulator, suspension, epoxilator	ce	1	Angle assembly, neutral
o	3	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
bo	3	Shackle, anchor			
bv	3	Rod, Armor, select size			

12.5 / 7.2 KV PRIMARY, 2-PHASE

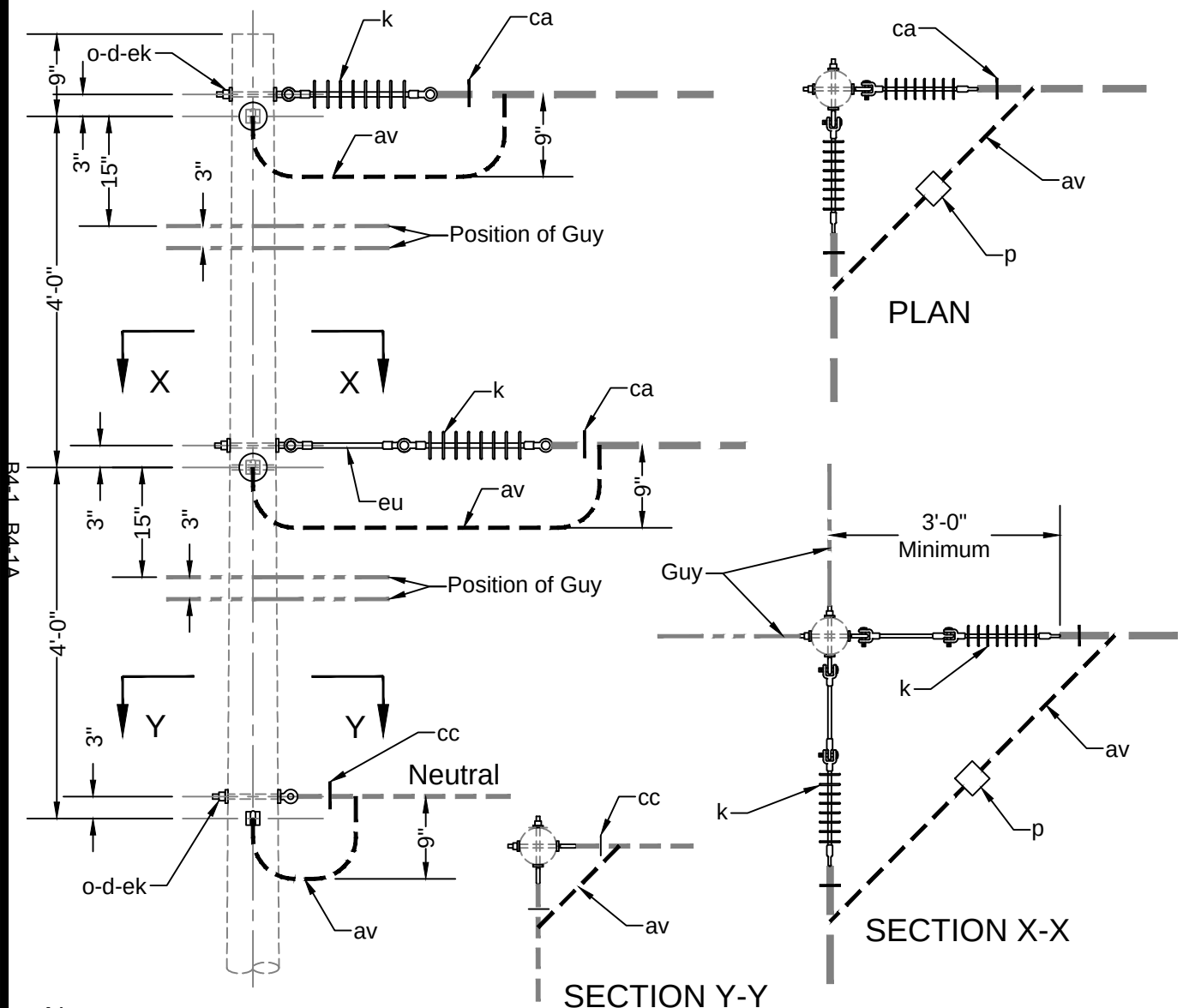
VERTICAL CONSTRUCTION - 30° TO 60° ANGLE

Revision Date

Feb 6, 2015



B3, B3A



Note:

If future conversion is likely, allow space at top of pole for middle phase. Designate as B4-1A for this construction.

Item ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
d	6	Washer, square, 2/14" x 3/16" hole	av	-	Jumpers, as required
k	4	Insulator, suspension, epoxilator	ca	4	Deadend assembly, primary
o	6	Bolt, eye, 5/8" x required length	cc	2	Deadend assembly, neutral
p	-	Connectors, as required	ek	-	Locknut, as required
eu	2	Insulator, fiberglass, strain			

12.5 / 7.2 KV PRIMARY, 2-PHASE

VERTICAL CONSTRUCTION - 60° TO 90° ANGLE

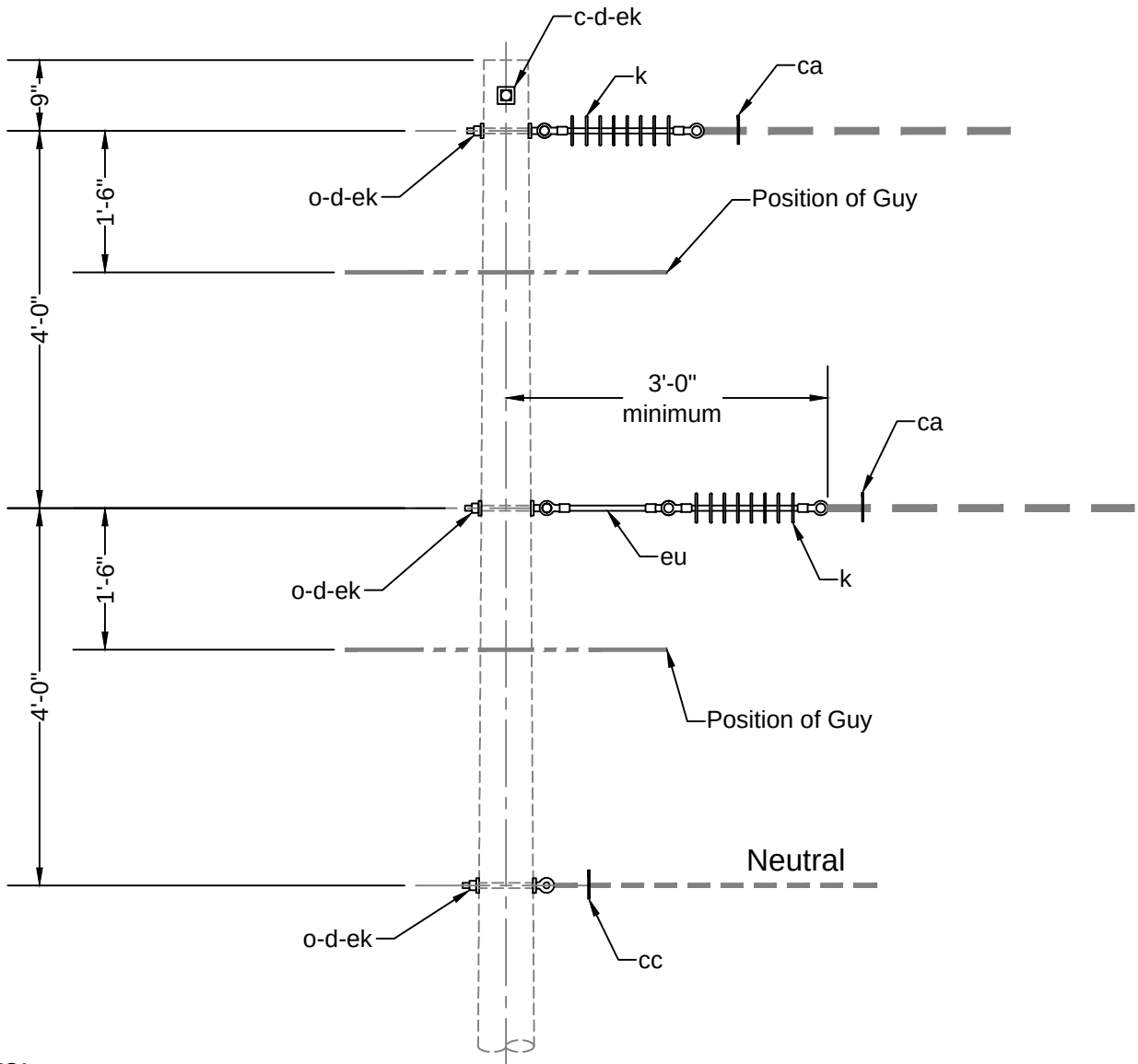
Revision Date

Feb 6, 2015



B4-1
B4-1A

B5-1, B5-1A



Note:

If future conversion is likely, allow space at top of pole for middle phase. Designate as B5-1A for this construction.

Item ca and cc are shown on assembly drawings M42-3, M42-3, M42-11, M42-13, and M42-21.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	eu	1	Insulator, fiberglass, strain
d	3	Washer, square, 2/14" x 3/16" hole	ca	4	Deadend assembly, primary
d	2	Washer, 3", square, curved	cc	2	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknut, as required
o	3	Bolt, eye, 5/8" x required length			

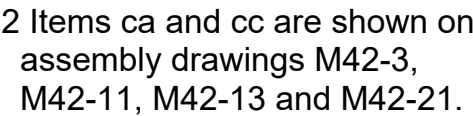
12.5 / 7.2 KV PRIMARY, 2-PHASE
VERTICAL CONSTRUCTION - DEADEND (SINGLE)

Revision Date

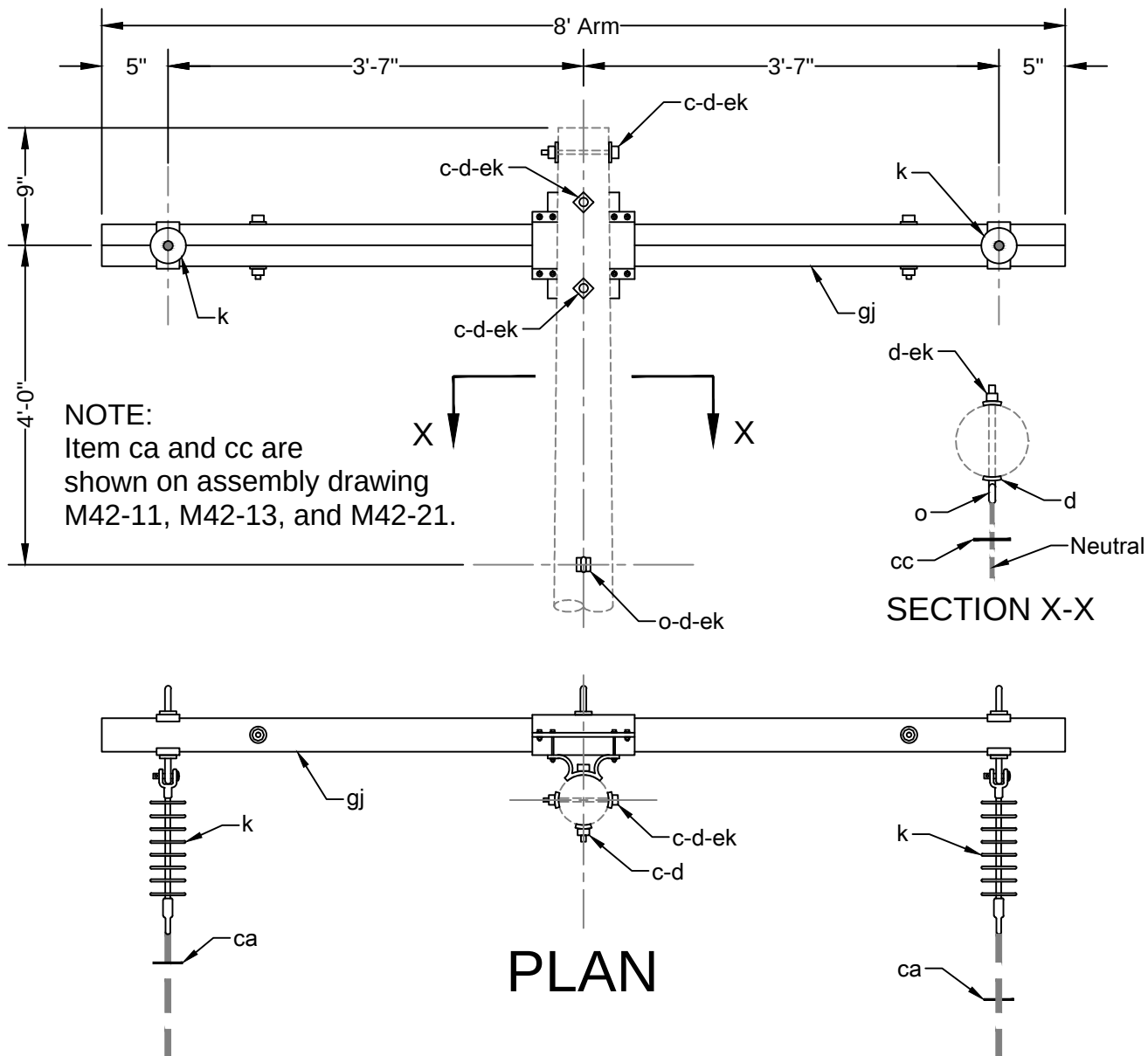
Feb 6, 2015



B5-1
B5-1A



B7



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length			
c	2	Bolt, machine 3/4" x required length	ca	2	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
k	2	Insulator, suspension, epoxilator 7.2 KV	gj	1	8' - Crossarm assembly, DE
o	1	Bolt eye, 5/8" x required length	ek	-	Locknuts, as required

7.2 / 12.5 KV, 3-PHASE

8' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

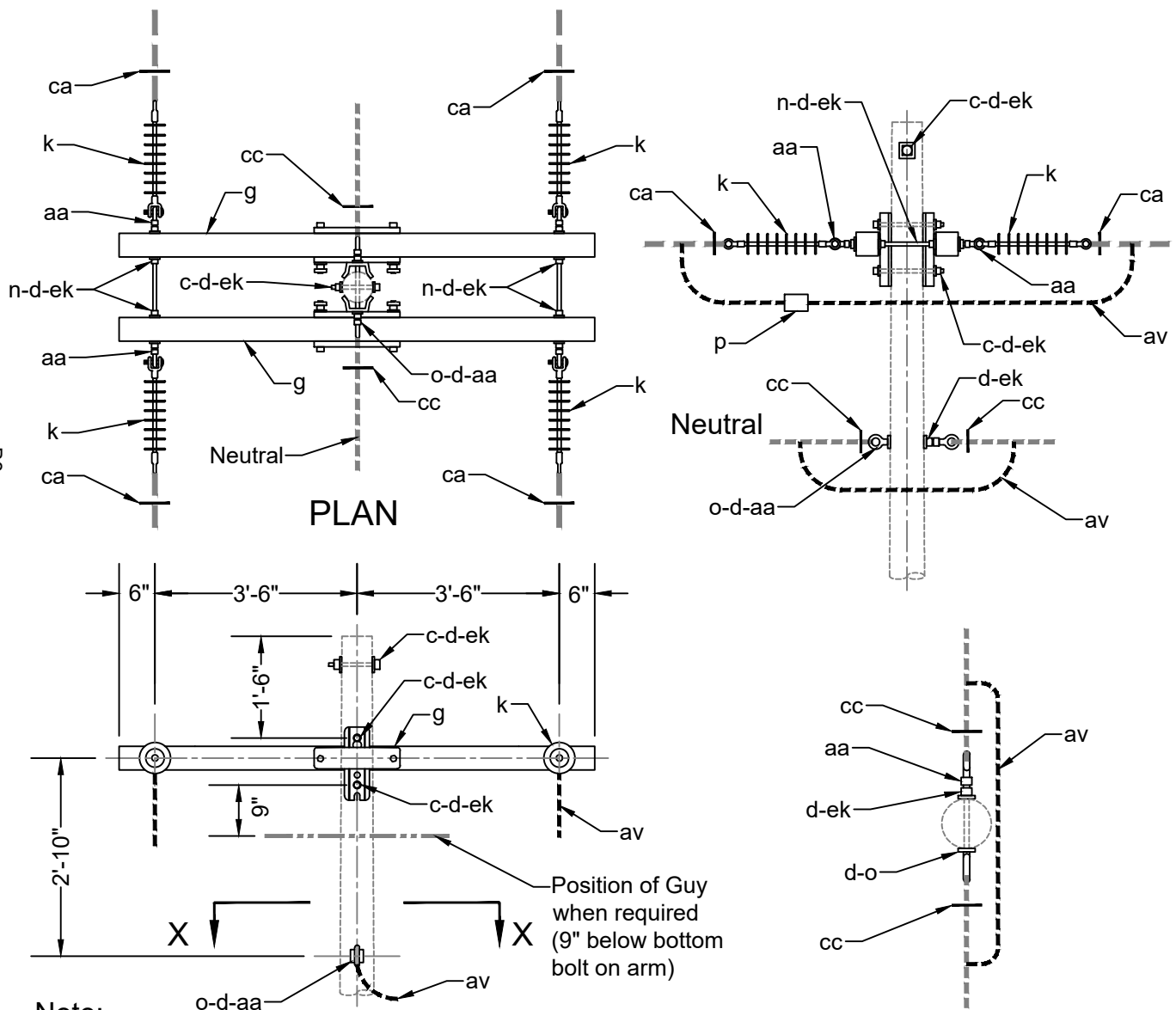
Revision Date

Feb 20, 2018



B7A/8

B8



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	14	Washer, 2 1/4" square, 13/16" hole	ca	4	Deadend assembly, primary
d	2	Washer, 3" square, curved	cc	2	Deadend assembly, neutral
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	av	-	Jumpers, as required
k	4	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	2	Bolt, double arming, 5/8" x required length			
o	1	Bolt, eye, 5/8" x required length			
aa	5	Nut, eye, 5/8"			

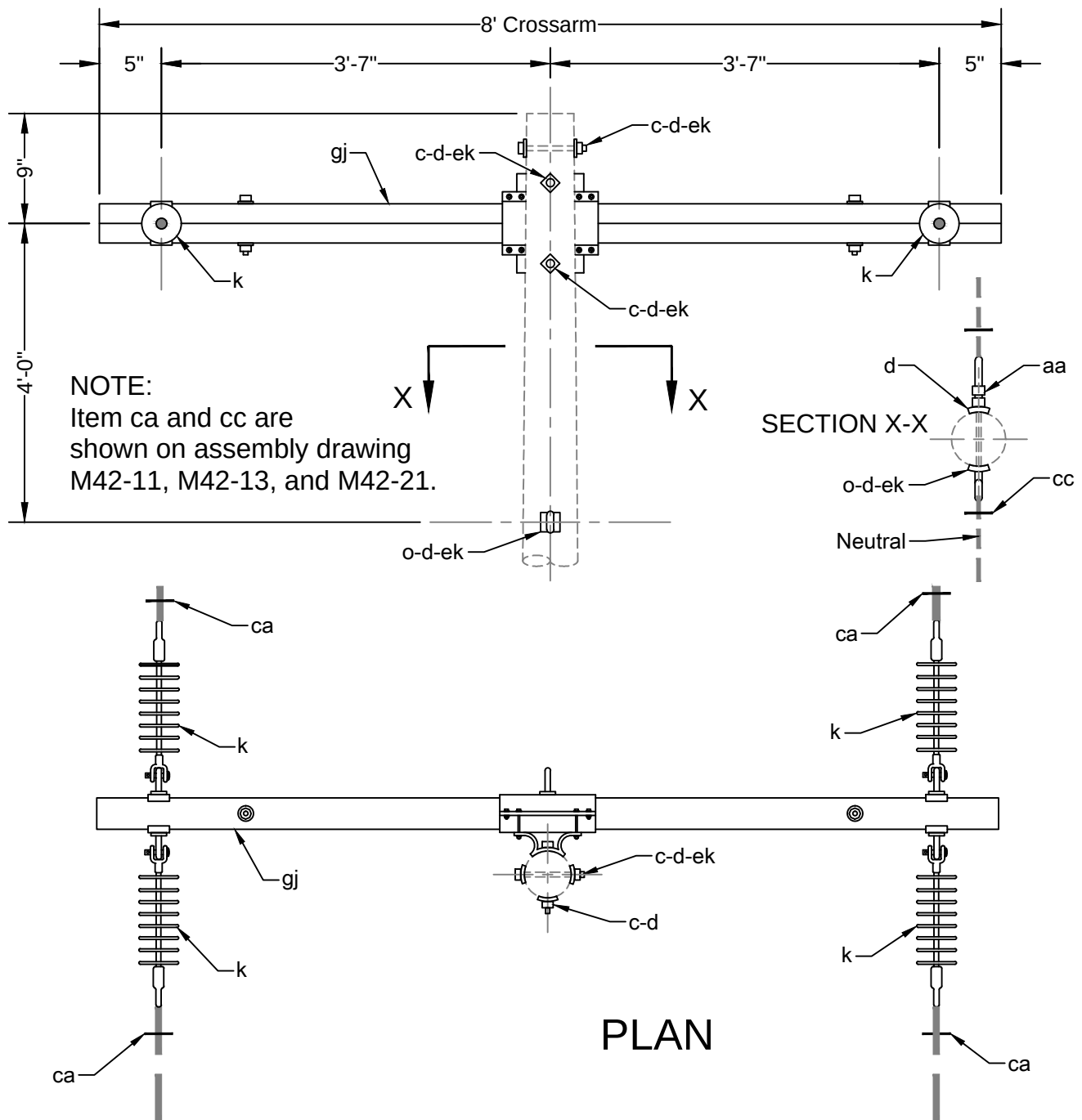
12.5 / 7.2 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Dec. 12, 2022



B8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 5/8"
c	2	Bolt, machine 3/4" x required length	ca	4	Deadend assembly, Primary
d	6	Washer, 3" Square, curved	cc	2	Deadend assembly, Neutral
k	4	Insulator, suspension, epoxilator	gj	1	8' Crossarm assembly, DE
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required

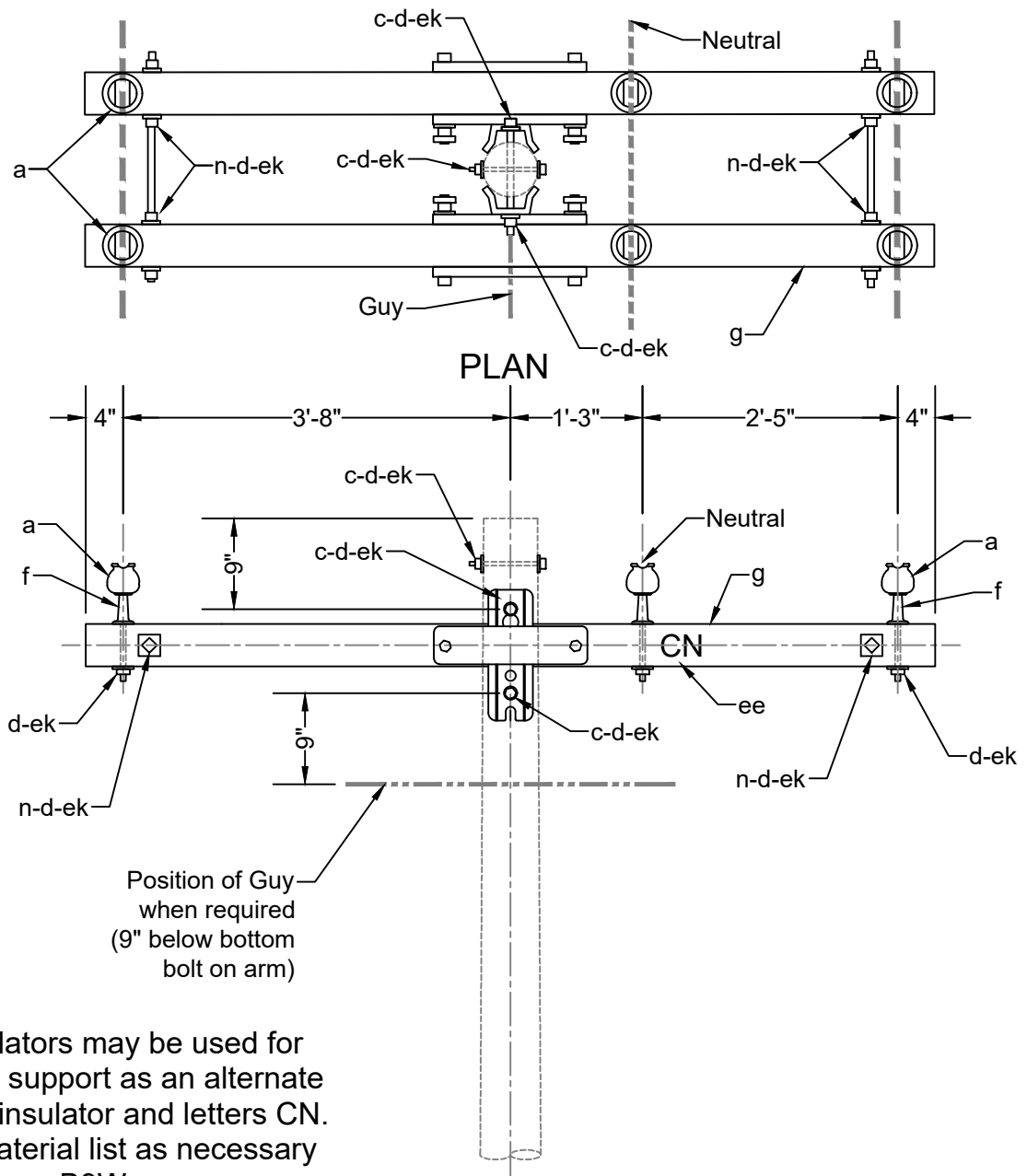
7.2 / 12.5 KV, 2-PHASE
8' - CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Feb 21, 2018



B8A/8



Notes:

White insulators may be used for the neutral support as an alternate the brown insulator and letters CN. Change material list as necessary and specify as B9W.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	18	Washer, 2 1/4" square, 13/16" hole	ee	4	Letters (2) C, (2) N with 1" nails
d	2	Washer, 3" square, curved			
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			

7.2 / 12.5 KV PRIMARY, 2-PHASE

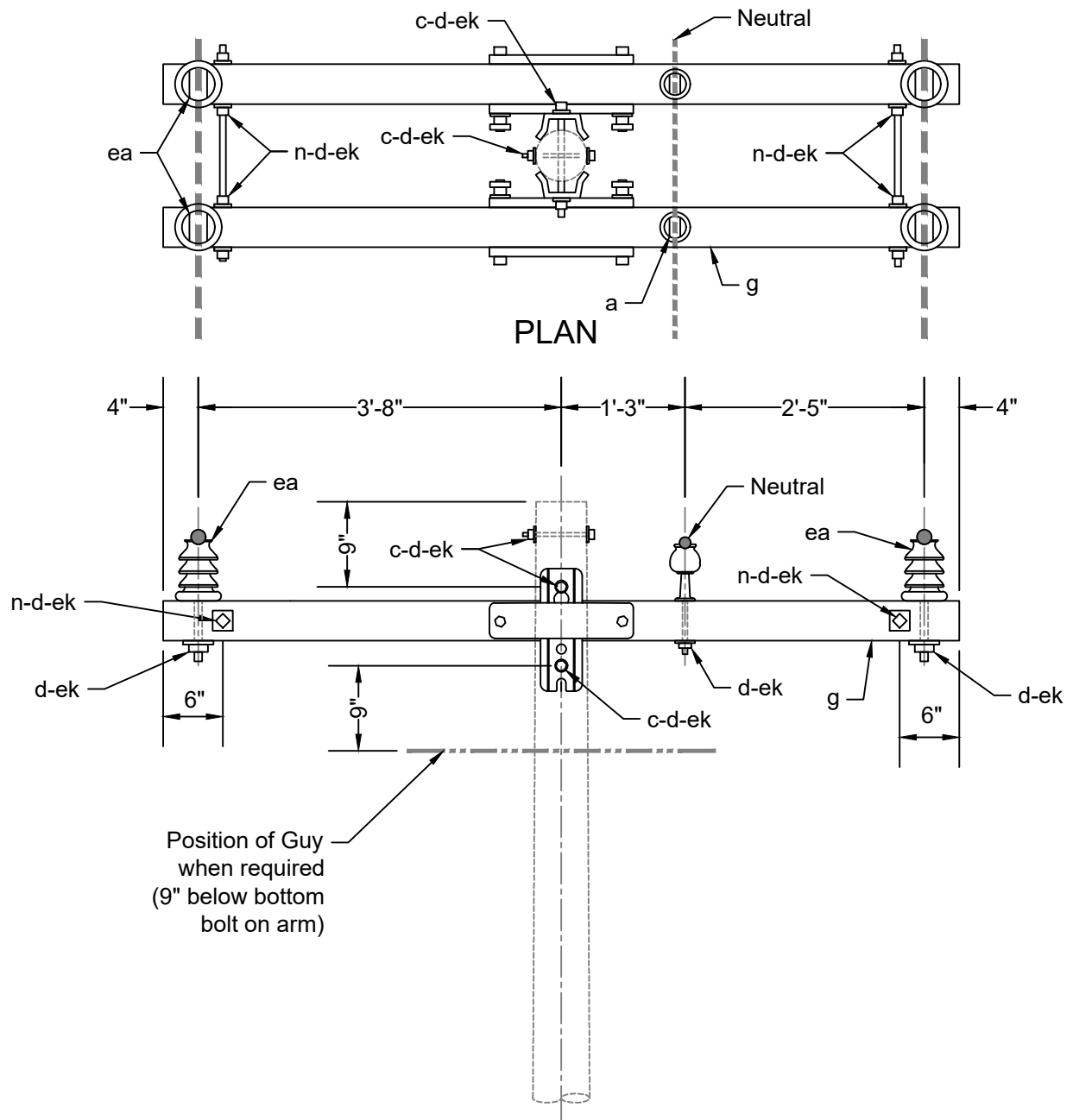
CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 13, 2022



B9, B9W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"
c	3	Bolt, machine, 5/8" x required length	n	2	Bolt, double armed, 5/8" x required length
d	18	Washer, 2 1/4" square, 13/16" hole	ea	4	Insulator, post type
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"			
i					

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

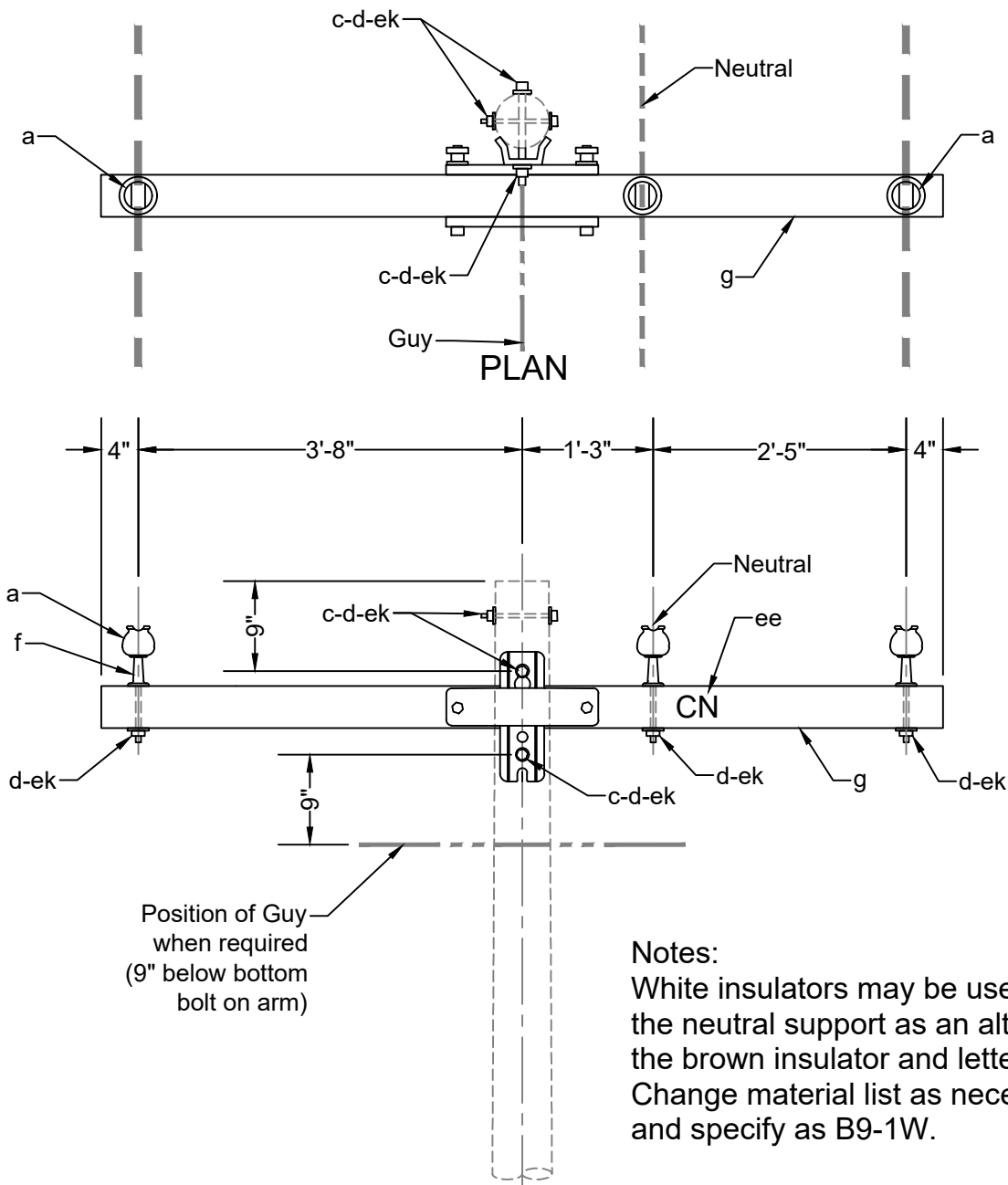
7.2 / 12.5 KV, 2-PHASE CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 13, 2022



B9P



Notes:
 White insulators may be used for the neutral support as an alternate the brown insulator and letters CN. Change material list as necessary and specify as B9-1W.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	5	Washer, 2 1/4" square, 13/16" hole	ee	4	Letters 2C, 2N with 1" nails
d	4	Washer, 3" square, curved			
f	3	Pin, crossarm, steel, 5/8" x 10 3/4"			

7.2 / 12.5 KV PRIMARY, 2-PHASE

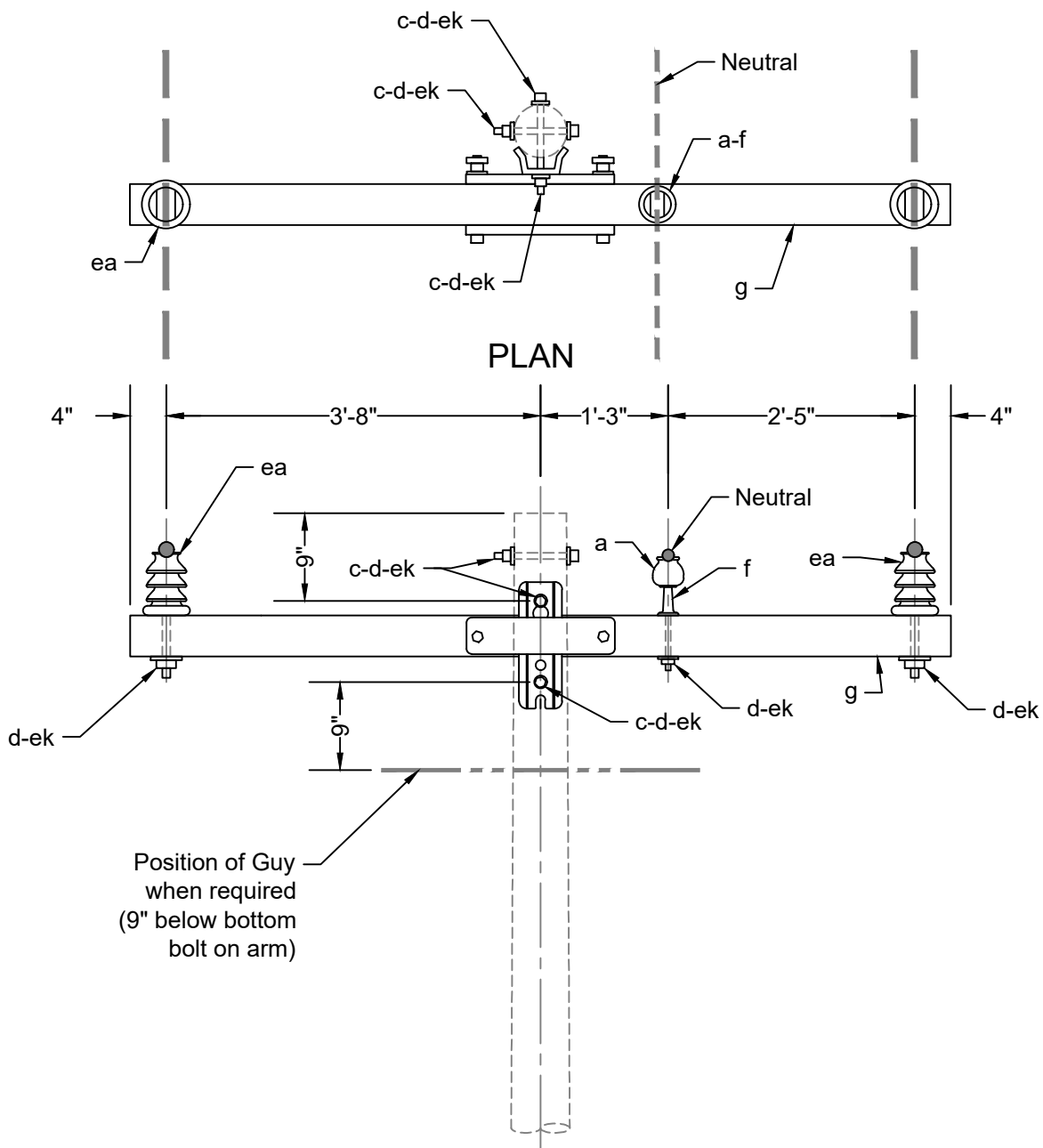
CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 13, 2022



B9-1
B9-1W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"
c	3	Bolt, machine, 5/8" x required length	ea	2	Insulator, post type
d	5	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	4	Washer, 3" square, curved			
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 2-PHASE

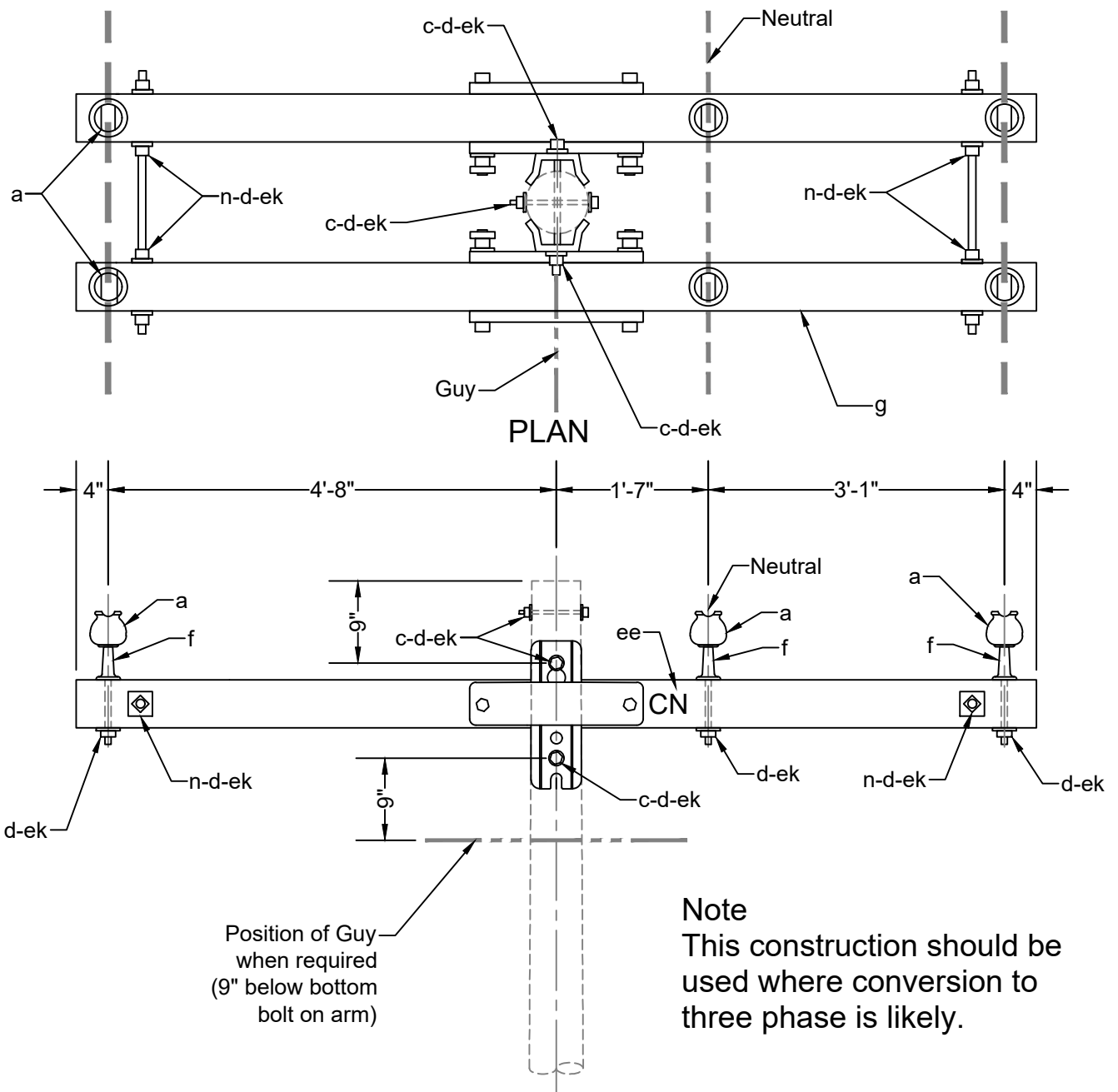
CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 13, 2022



B9-1P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	3	Bolt, machine, 1/2" x required length	n	2	Bolt, double armed, 5/8" x required length
d	18	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved	ee	4	Letters (2) C, (2) N with 1" nails
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			

DESIGN LIMITS:
Maximum transverse Load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle

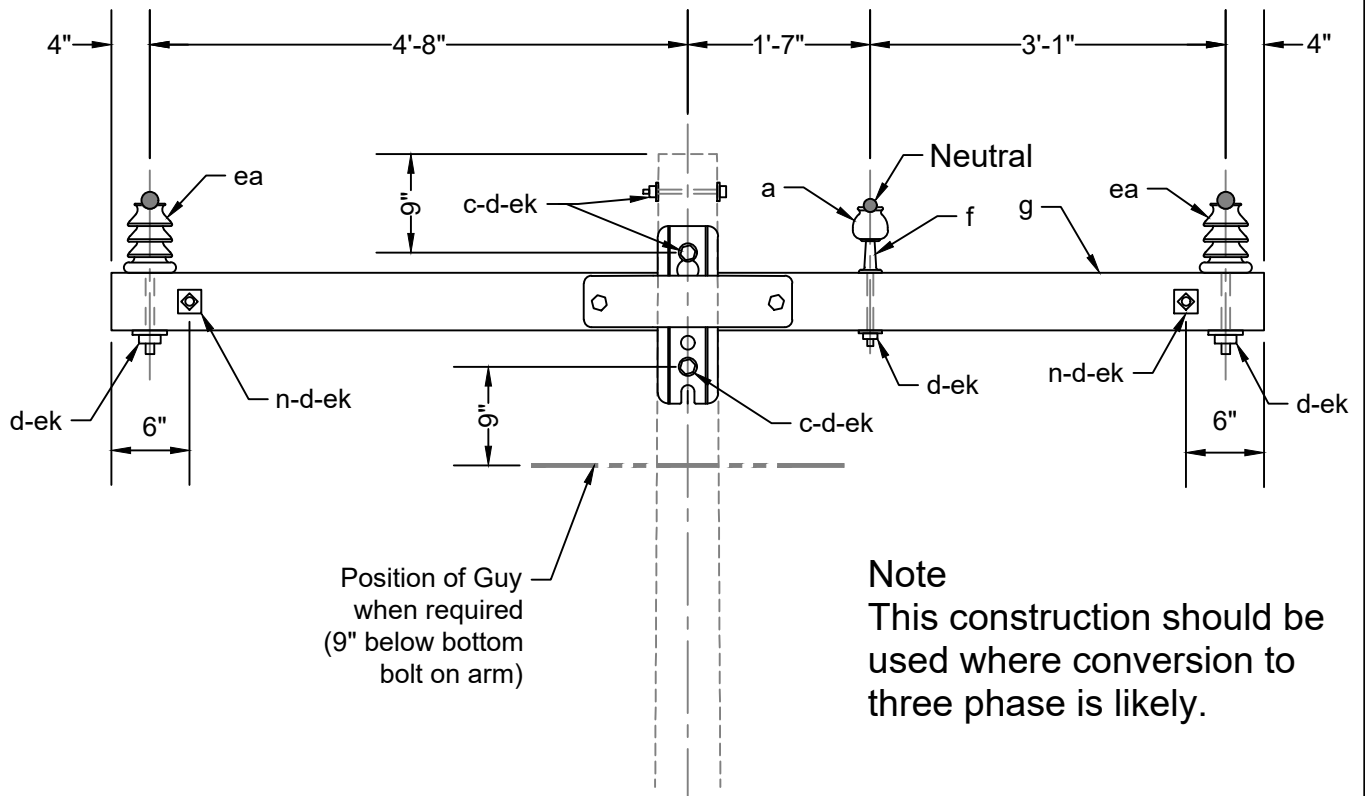
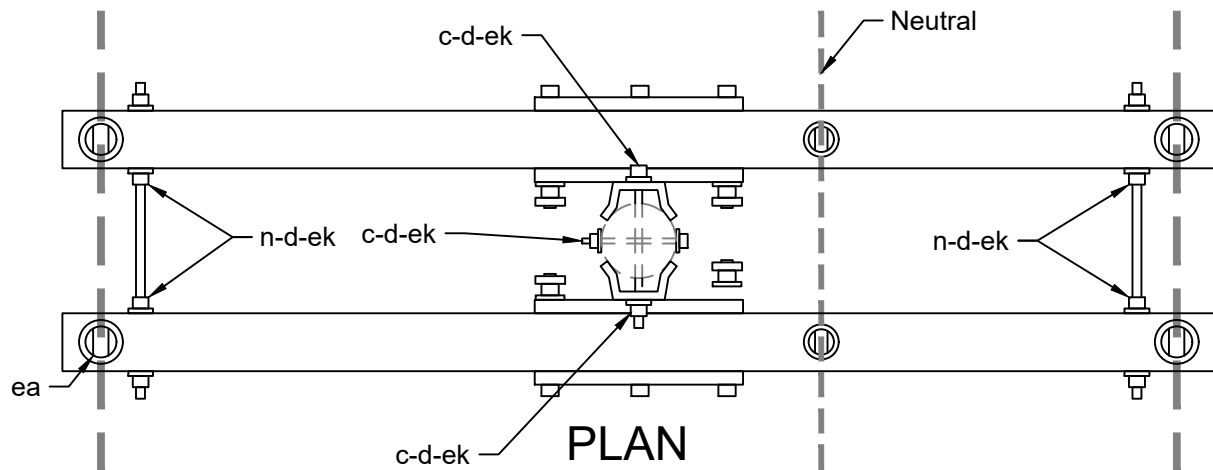
7.2 / 12.5 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 13, 2022



B9-2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	3	Bolt, machine, 1/2" x required length	n	2	Bolt, double armed, 5/8" x required length
d	18	Washer, 2 1/4" square, 13/16" hole	ea	4	Insulator, post type
d	2	Washer, 3" square, curved	ee	4	Letters 2C, 2N with 1" nails
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"	ek	-	Locknuts, as required

DESIGN LIMITS:

Maximum transverse Load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

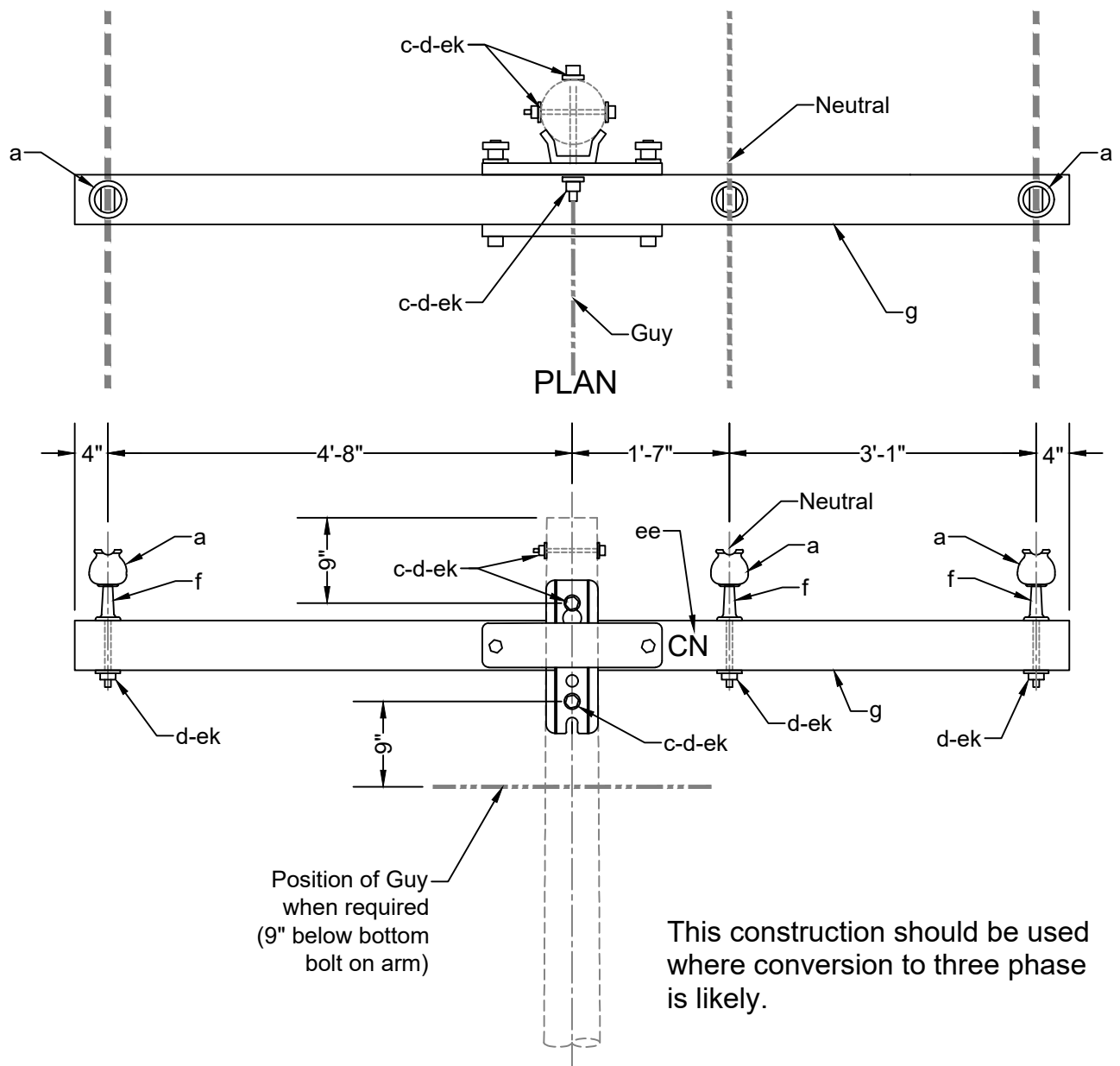
**7.2 / 12.5 KV, 2-PHASE
CROSSARM CONSTRUCTION - DOUBLE LINE ARM**

Revision Date

Dec. 13, 2022



B9-2P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	5	Washer, 2 1/4" square, 13/16" hole	ee	4	Letters (2) C, (2) N with 1" nails
d	4	Washer, 3" square, curved			
f	3	Pin, crossarm, steel, 5/8" x 10 3/4"			

DESIGN LIMITS:
Maximum transverse Load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle

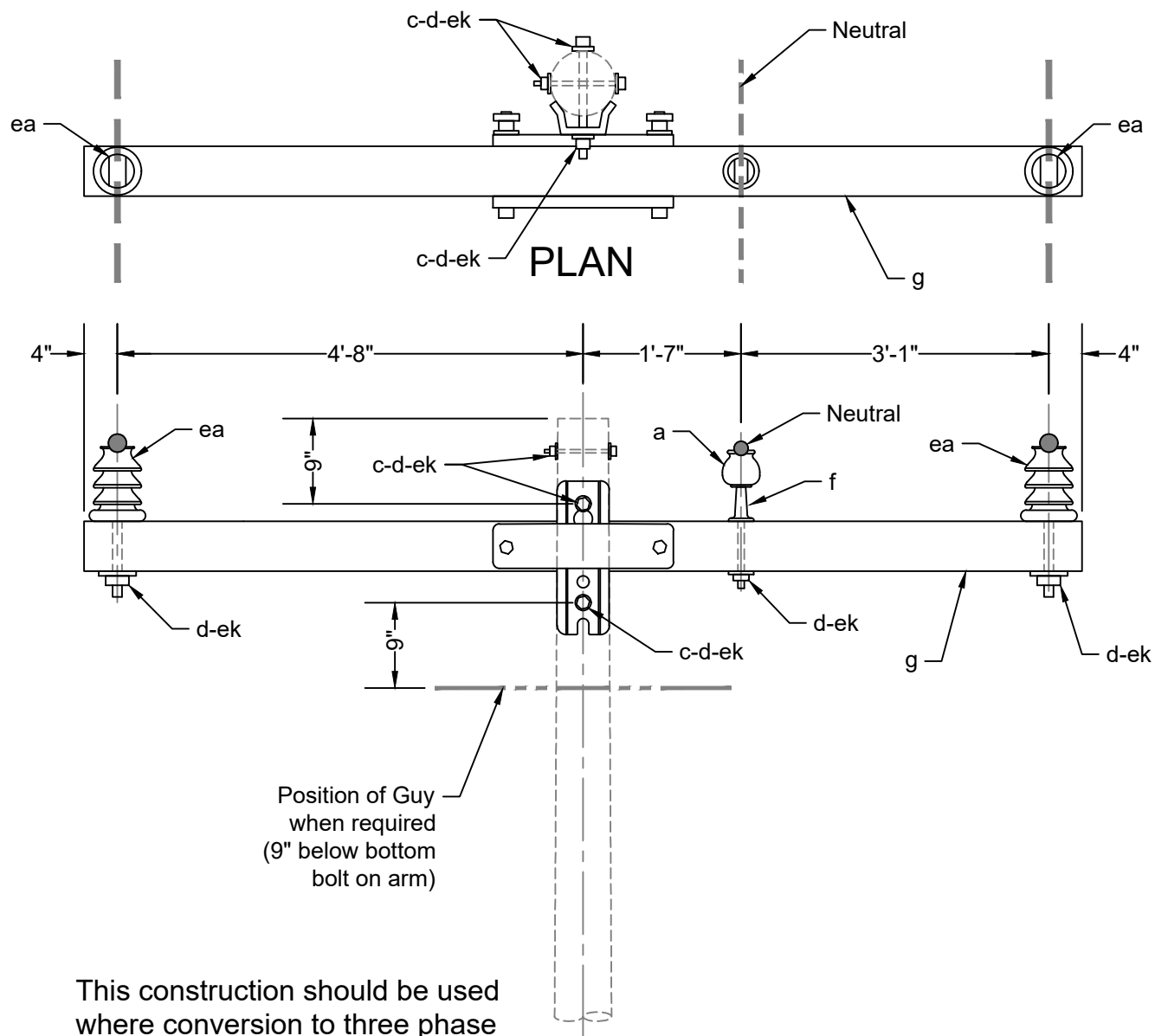
7.2 / 12.5 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 13, 2022



B9-3



This construction should be used where conversion to three phase is likely.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	3	Bolt, machine, 5/8" x required length	ea	2	Insulator, post type
d	5	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	4	Washer, 3" square, curved			
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"			

DESIGN LIMITS:

Maximum transverse Load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

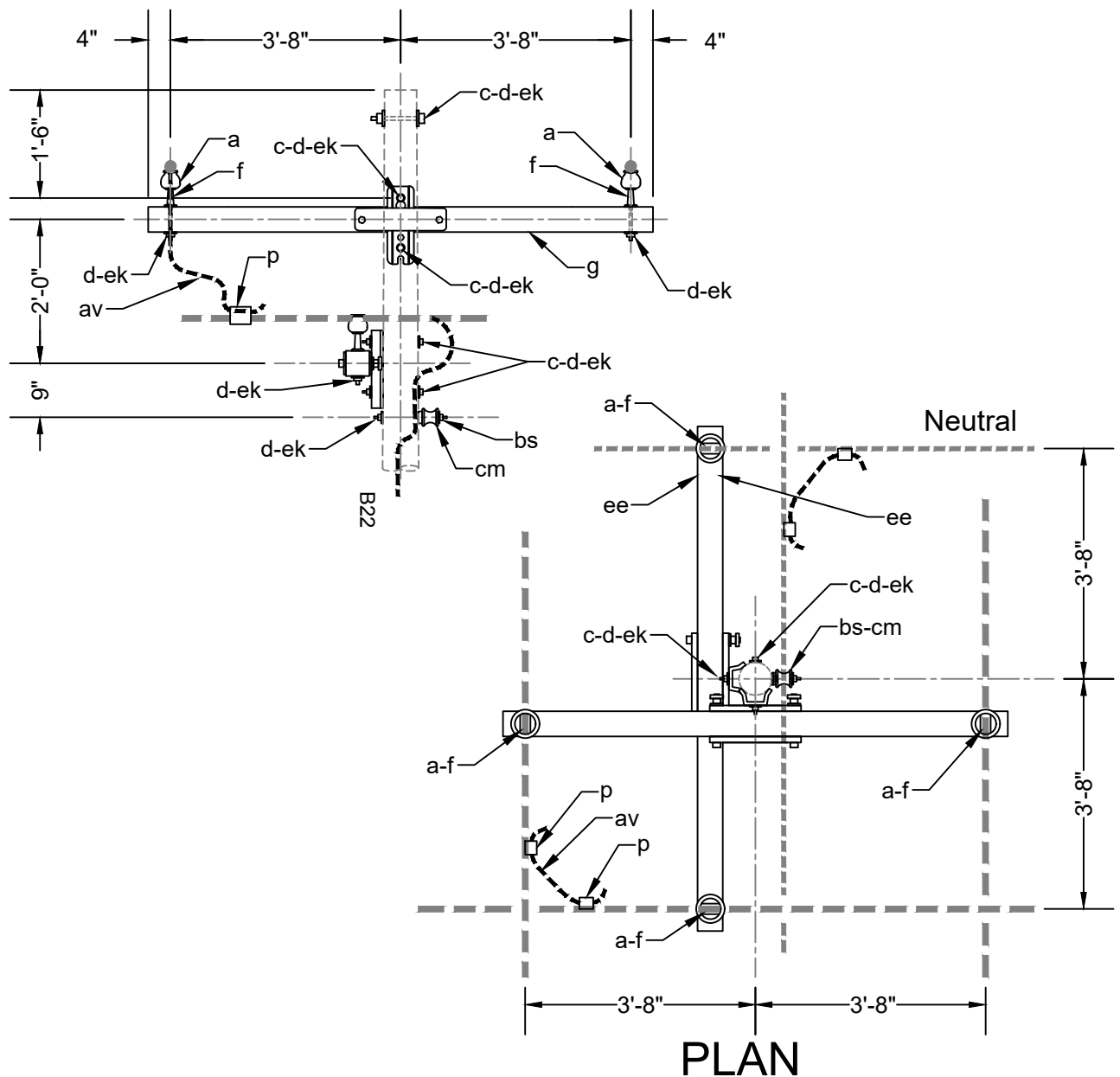
7.2 / 12.5 KV, 2-PHASE CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 13, 2022



B9-3P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	p	-	Connectors, as required
c	5	Bolt, machine, 5/8" x required length	av	-	Jumpers and leads as required
d	9	Washer, 2 1/4" square, 13/16" hole	bs	1	Bolt, single upset
d		Washer, 3" square, curved	cm	1	Spool Insulator
f	4	Pin, crossarm, steel, 5/8" x 10 1/4"	ee	4	Letters, 2" C, 2" N, with 1" nails
g	2	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle

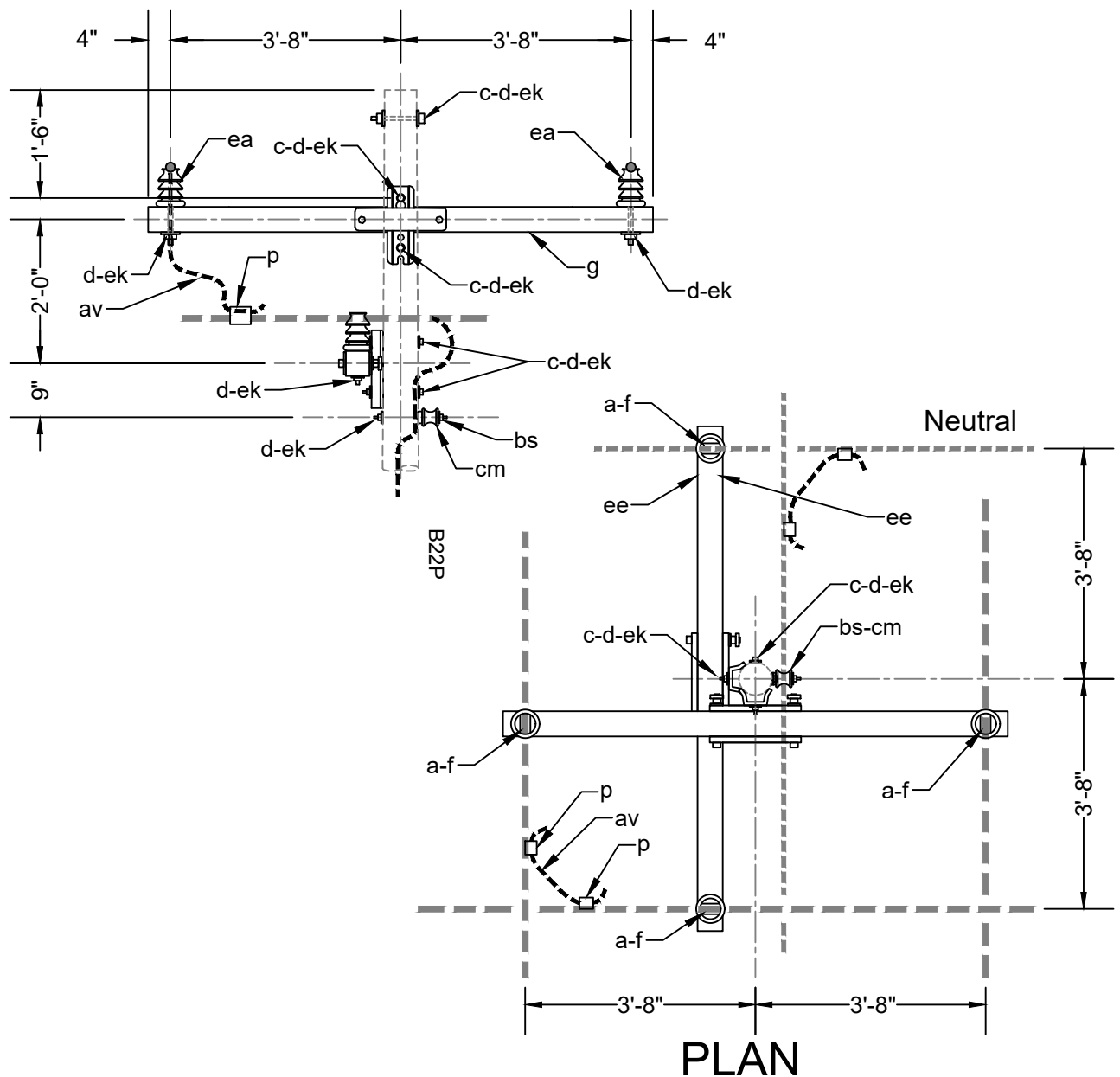
7.2 / 12.5 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - SINGLE PHASE JUNCTION

Revision Date

Dec. 27, 2022



B22



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	av	-	Jumpers and leads as required
c	5	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	9	Washer, 2 1/4" square, 13/16" hole	cm	1	Spool Insulator
d		Washer, 3" square, curved	ea	3	Insulator, post type
f	1	Pin, crossarm, steel, 5/8" x 10 1/4"	ee	4	Letters, 2" C, 2" N, with 1" nails
g	2	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek	-	Locknuts, as required
p	-	Connectors, as required			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle

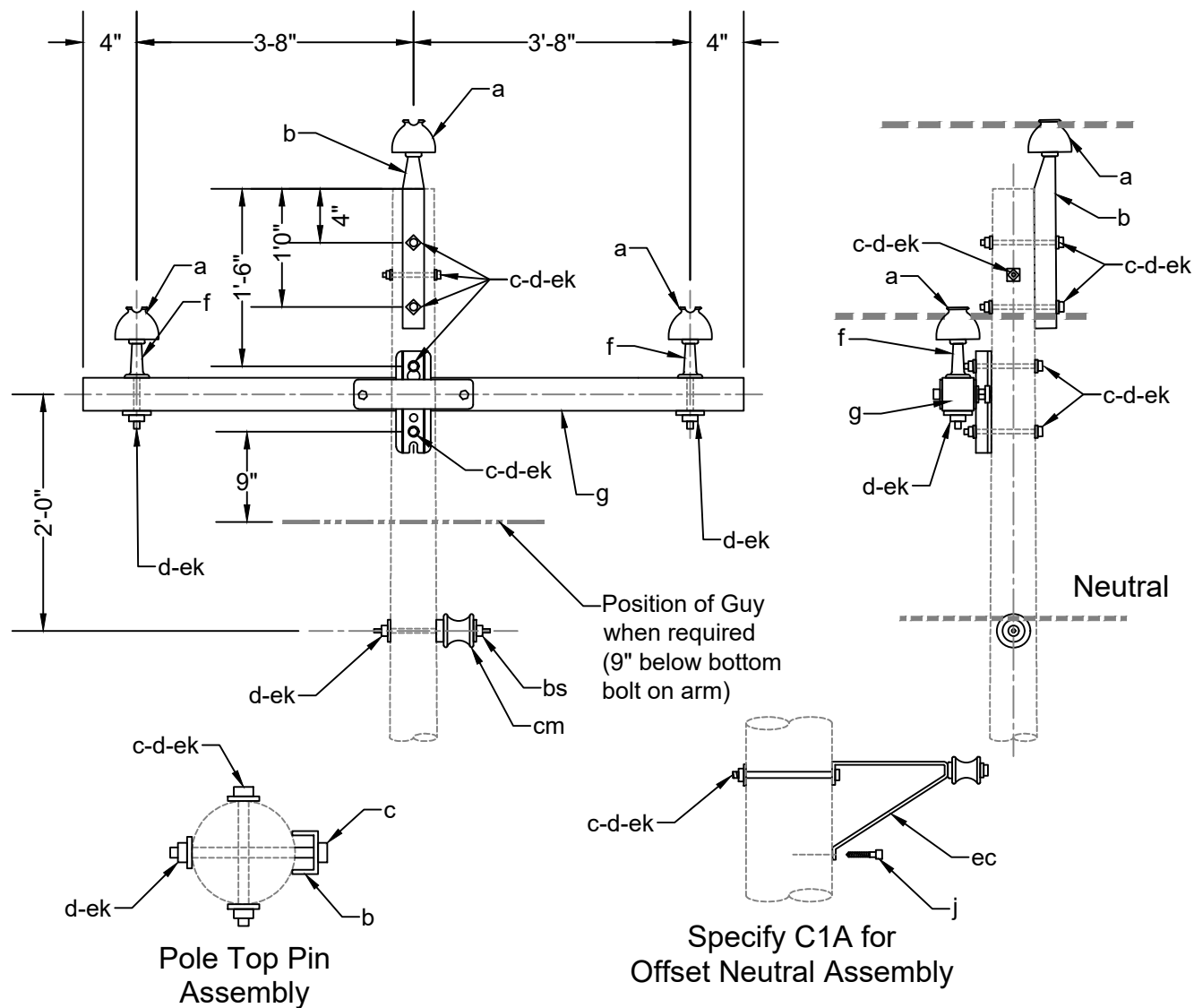
7.2 / 12.5 KV PRIMARY, 2-PHASE CROSSARM CONSTRUCTION - SINGLE PHASE JUNCTION

Revision Date

Dec. 14, 2022



B22P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type	cm	1	Spool insulator, (C1 only)
b	1	Pin, pole top, 20"	cm	1	Spool insulator, (C1 only)
c	5	Bolt, machine, 5/8" x required length			
d	5	Washer, 2 1/4" square, 13/16"hole			
d	6	Washer, 3" square, curved			(ADDITIONAL MATERIAL FOR C1A)
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"	c	1	Bolt, machine, 5/8" x required length
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	d	1	Washer, 2 1/4" square, 13/16"hole
ek	-	Locknuts , as required	ec	1	Bracket, offset, insulated (C1A only)
bs	1	Bolt, single upset, (C1 only)	j	1	Screw, lag, 1/2" x 4" (C1A only)
cm	1	Spool insulator, (C1 only)			

12.5 / 7.2 KV PRIMARY, 3-PHASE
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT

Revision Date

Dec. 14, 2022



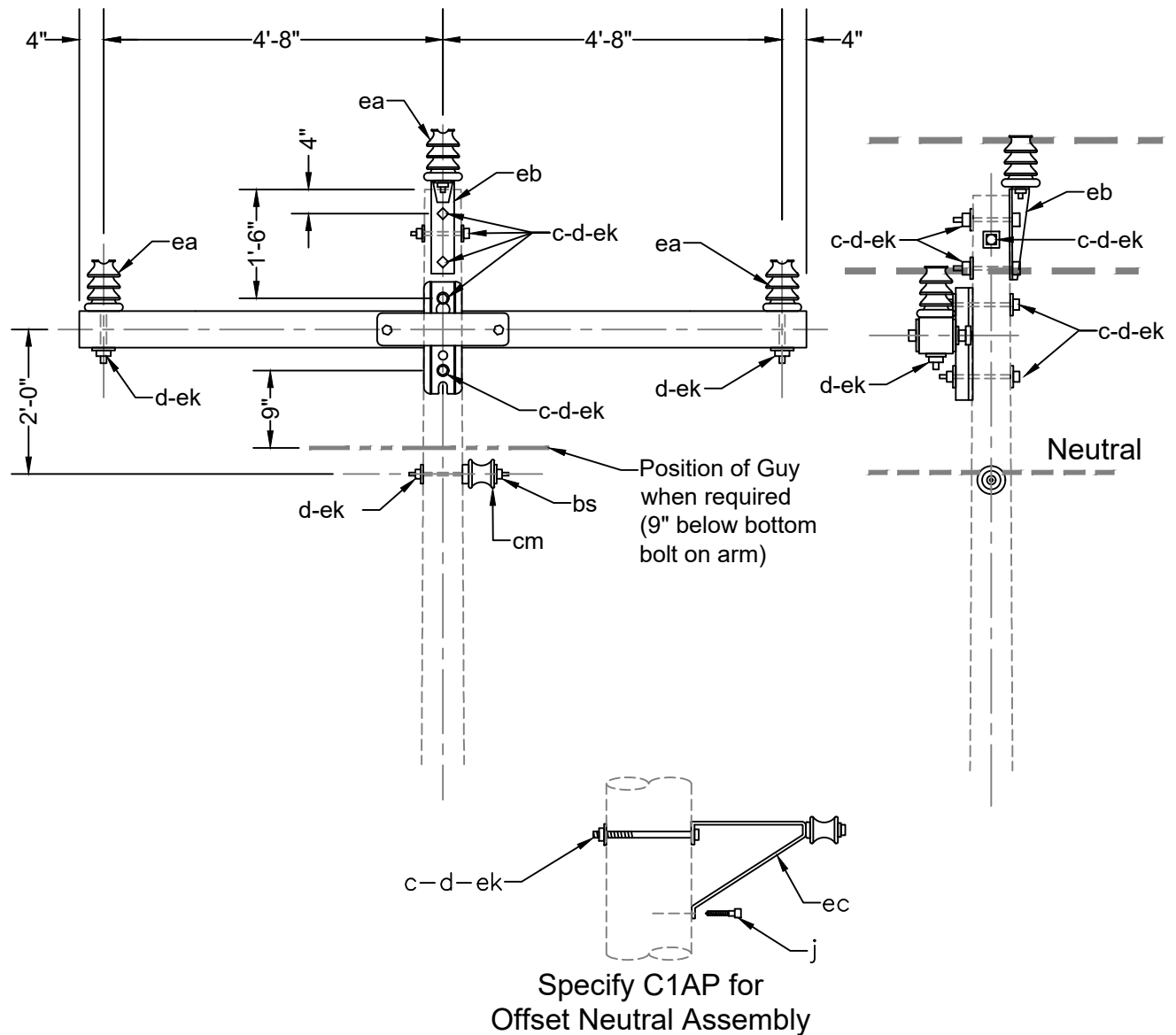
C1, C1A



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	3	Insulator, pin type	ek	-	Locknuts
b	1	Pin, pole top 20"	bs	1	Bolt, single upset
c	5	Bolt, machine, 5/8" x required length	cm	1	Spool insulator
d	5	Washer, 2 1/4" square, 13/16" hole			
d	6	Washer, 3" square, curved			(ADDITIONAL MATERIAL FOR C1AR)
f	2	Pin, Crossarm, steel, 5/8" x 10 3/4"	c	1	Bolt, machine, 5/8" x required length
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	d	1	Washer, 2 1/4" square, 13/16" hole
			j	1	Screw, lag, 1/2" x 4" (C1AR only)
			ec	1	Bracket, offset, insulated (C1AR only)

7.2/12.5 KV, 3-PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

C1R
C1AR



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR C1AP)
d	5	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length
d	6	Washer, 3" square, curved	d	1	Washer, 2 1/4" square
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	j	1	Screw, lag, 1/2" x 4" (C1AP only)
bs	1	Bolt, single upset (C1P only)	ec	1	Bracket, offset, insulated (C1AP only)
cm	1	Spool insulator			
ea	3	Insulator, post type			
eb	1	Bracket, pole top			
ek	-	Locknuts			

DESIGN LIMITS

Not to be used with large conductor

Maximum transverse load:
750 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 3-PHASE

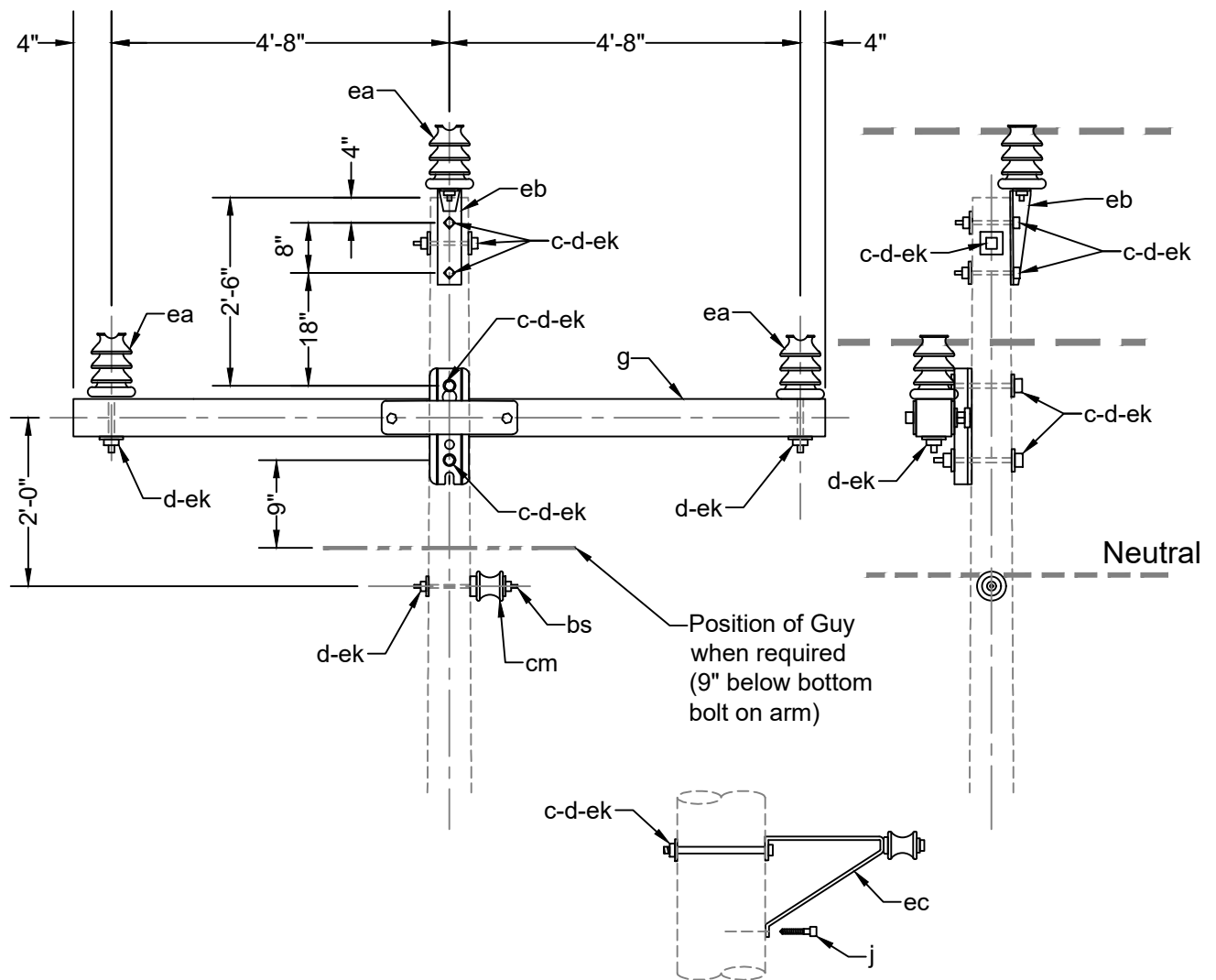
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT

Revision Date

Dec. 14, 2022



C1P
C1AP



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length			(ADDITION MATERIAL FOR C1APR)
d	5	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length
d	6	Washer, 3" square curved	d	1	Washer, 2 1/4" square
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	j	1	Screw, lag, 1/2" x 4" (C1APR only)
bs	1	Bolt, single upset	ec	1	Bracket, offset, insulated (C1APR only)
cm	1	Spool insulator			
ea	3	Insulator, post type			
eb	1	Bracket, pole top			
ek	-	Locknuts			

RAPTOR PROTECTION

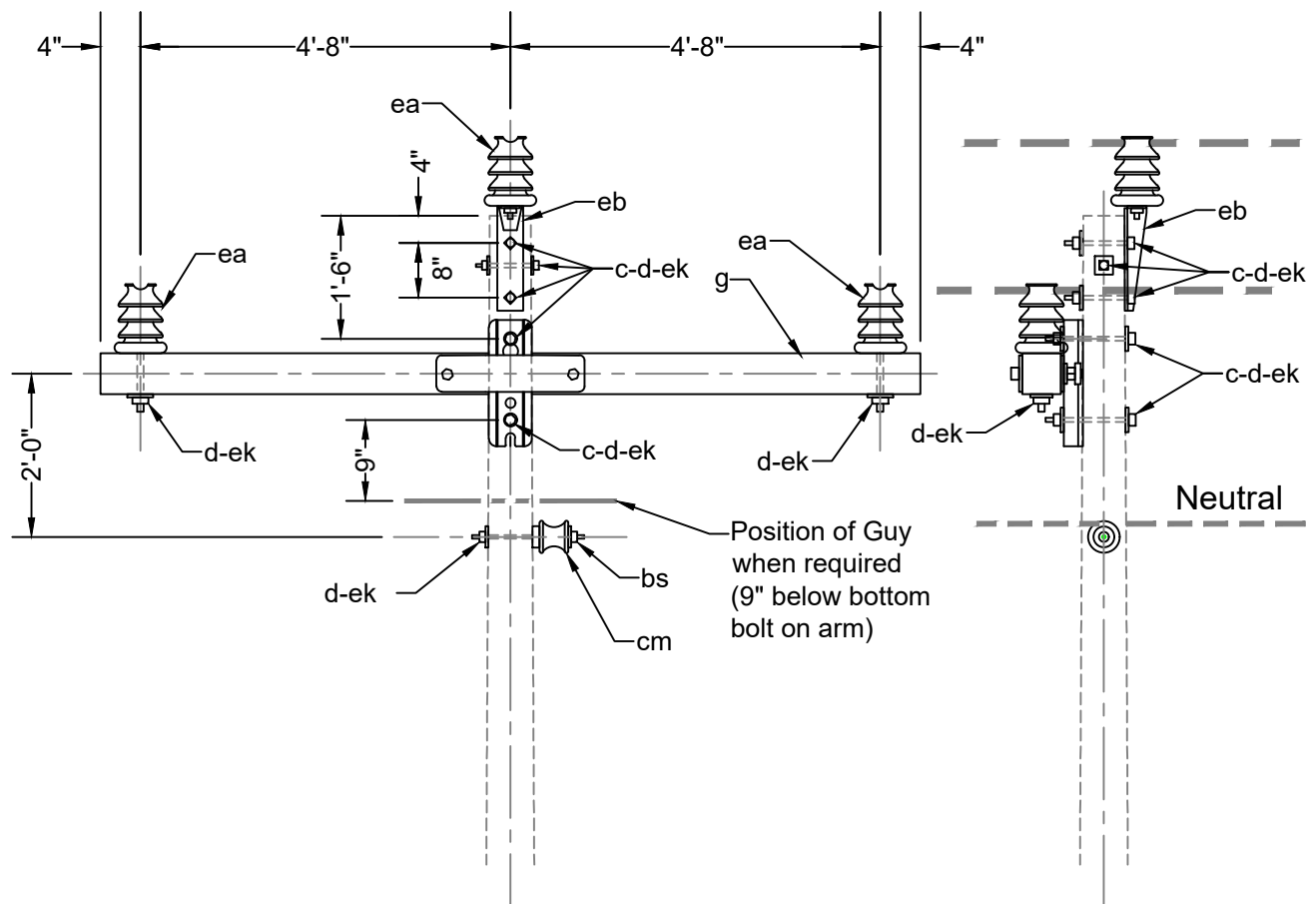
7.2 / 12.5 KV, 3-PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

Revision Date

Dec. 14, 2022



C1PR
C1APR



NOTE:
C1PL has a 8' Crossarm
C1PLX has a 10' Crossarm

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	ea	3	Insulator, post type
d	5	Washer, square , 2 1/4"	eb	1	Bracket, pole top
d	6	Washer, square curved, 3"	ek	-	Locknuts
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8' (C1PL)			
bs	1	Bolt, single upset			(C1APLX ONLY)
cm	1	Spool insulator	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10' (C1PLX)

DESIGN LIMITS
Maximum transverse load:
750 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

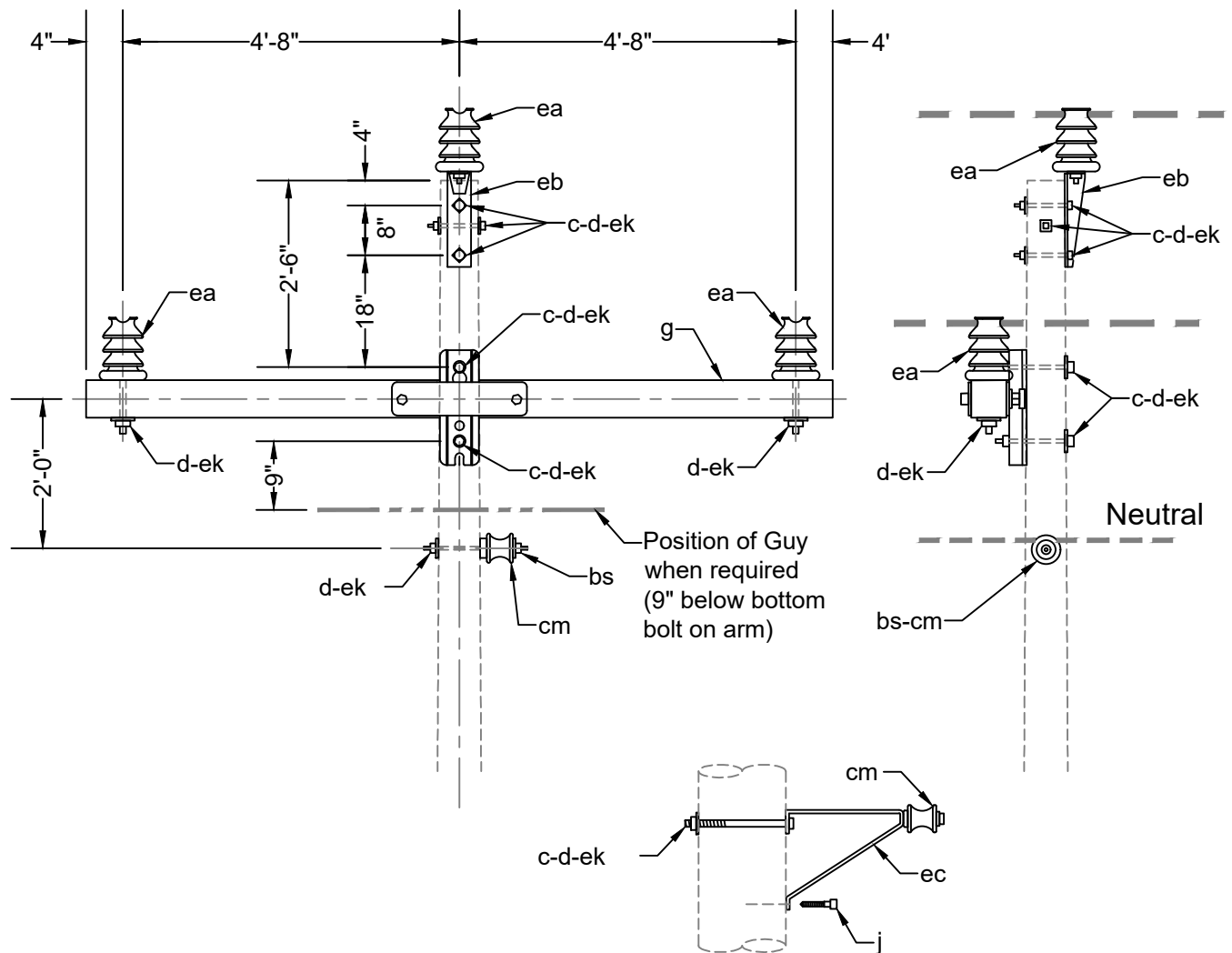
7.2 / 12.5 KV, 3-PHASE
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT
(LARGE CONDUCTORS)

Revision Date

De .



C1PL
C1PLX



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR C1APLR)
d	5	Washer, 2 1/4" square	c	1	Bolt, machine, 5/8" x required length
d	6	Washer, 3" square curved	d	1	Washer, 2 1/4" square
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	j	1	Screw, lag, 1/2" x 4" (C1APLR)
bs	1	Bolt, single upset	ec	1	Bracket, offset, insulated (C1APLR)
cm	1	Spool insulator			
ea	3	Insulator, post type			
eb	1	Bracket, pole top			
ek	-	Locknuts			

DESIGN LIMITS:

Maximum transverse load:
750 lbs per conductor

Maximum line angle within load limits:
5° Angle.

RAPTOR PROTECTION

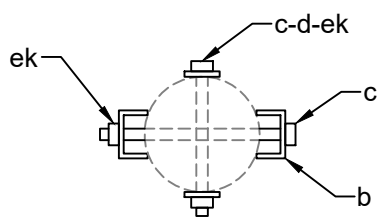
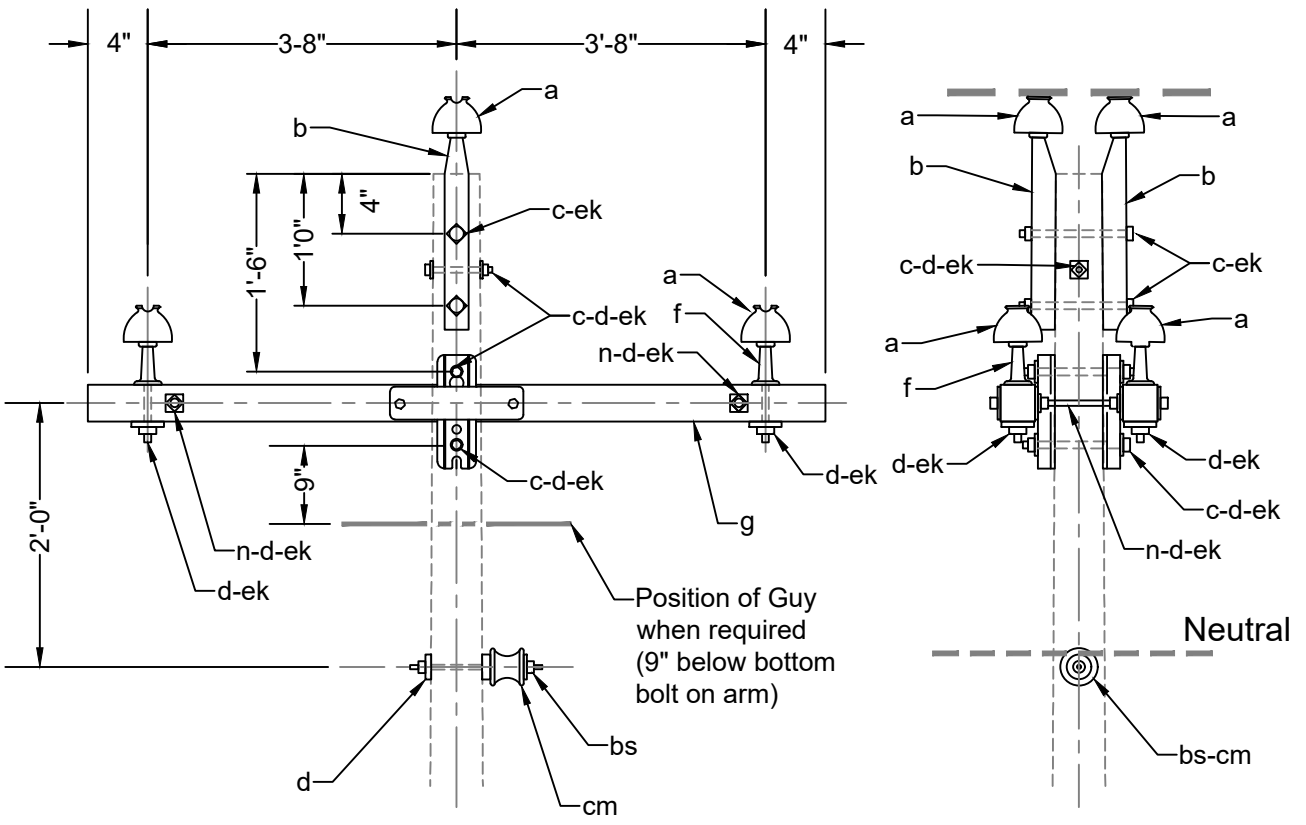
7.2/12.5 KV, 3-PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT, (LARGE CONDUCTORS)

Revision Date

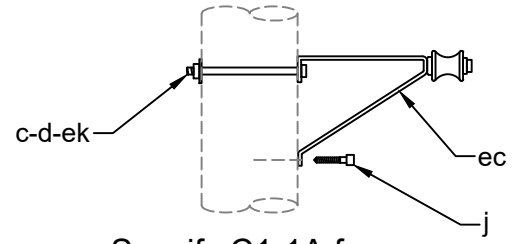
Dec. 15, 2022



C1PLR
C1APLR



Pole Top Pin Assembly



Specify C1-1A for Offset Neutral Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	bs	1	Bolt, single upset, (C1 only)
b	2	Pin, pole top, 20"	cm	1	Spool insulator, (C1 only)
c	5	Bolt, machine, 5/8" x required length	ek	-	Locknuts
d	17	Washer, 2 1/4" square, 13/16"hole			
d	2	Washer, 3" square, curved			(ADDITIONAL MATERIAL FOR C1-1A)
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	c	1	Bolt, machine, 5/8" x required length
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	d	1	Washer, 2 1/4" square, 13/16"hole
n	2	Bolt, double arming, 5/8 x required length	ec	1	Bracket, offset, insulated (C1-1A only)
			j	3	Screw, lag, 1/2" x 4" (C1-1A only)

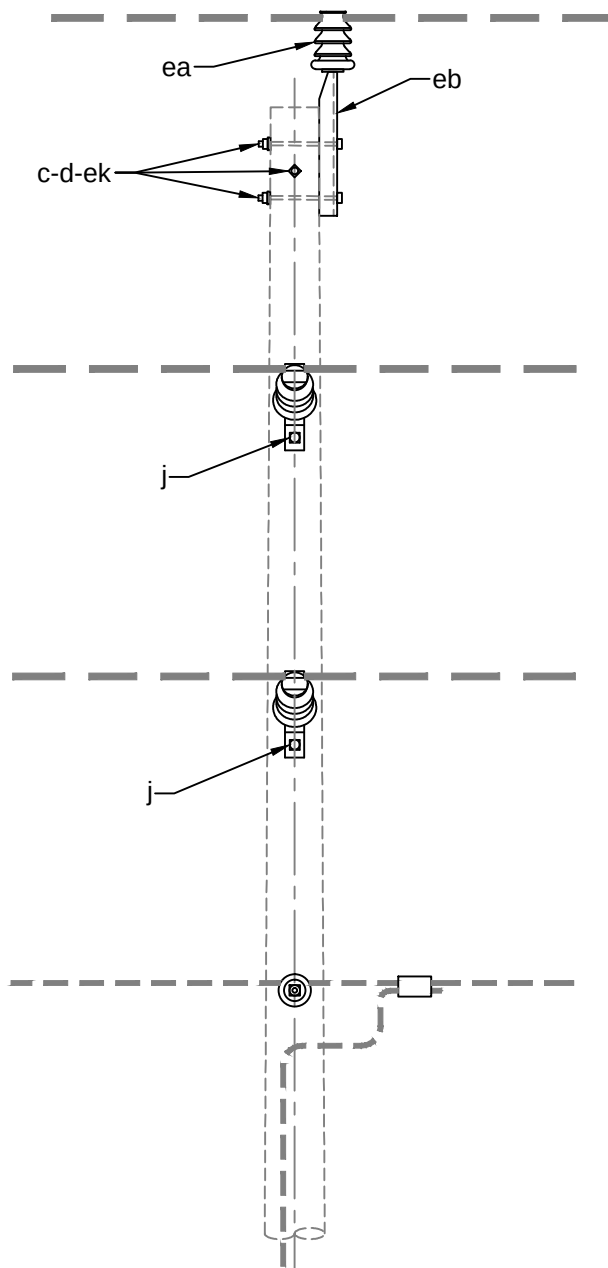
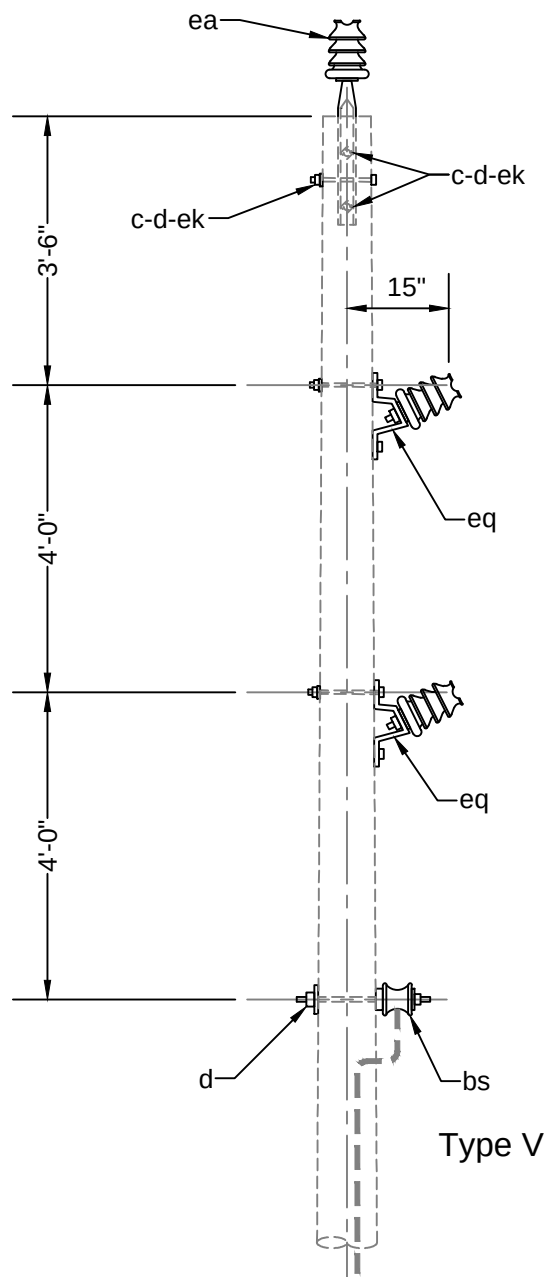
12.5 / 7.2 KV PRIMARY, 3-PHASE
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT
AT 0° TO 5° ANGLE

Revision Date:
Dec. 15, 2022



C1-1
C1-1A

C1S



Note: Lower phase may be mounted on other side of pole.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	ea	3	Insulator, post type 15 kv
d	7	Washer, square, 2 1/4"	eb	1	Bracket, pole top
j	2	Screw, lag, 1/2" x 4"	ek	-	Locknuts, as required
bs	1	Bolt, single upset, insulated	eq	2	Insulator bracket, single

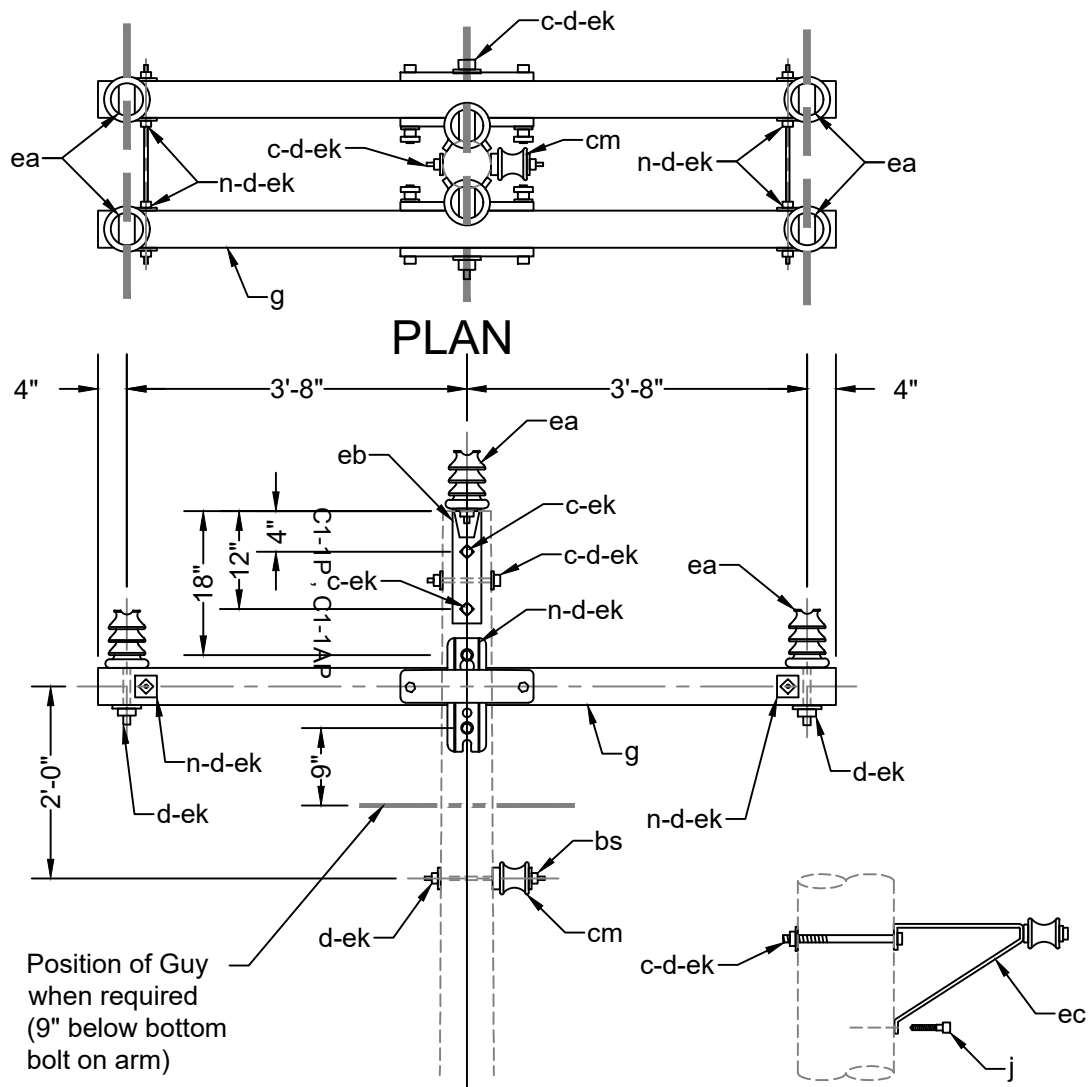
7.2 / 12.5 KV PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION - SINGLE PRIMARY SUPPORT
 at 0° to 2° Angle

Revision Date

Nov 24, 2015



C1S



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length			(ADDITIONAL MATERIAL FOR C1-1AP)
d	2	Washer, 3" square, curved	c	1	Bolt, machine, 5/8" x required length
d	17	Washer, 2 1/4" square, 13/16" hole	d	1	Washer, 2 1/4" square, 13/16" hole
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ec	1	Bracket, offset neutral, (C1-1AP only)
n	2	Bolt, double arming, 5/8" x required length	j	1	Screw, lag, 1/2" x 4" (C1-1AP only)
bs	1	Bolt, single upset			
cm	1	Spool insulator			
ea	6	Insulator, post type			
eb	2	Bracket, pole top			
ek	-	Locknuts, as required			

DESIGN LIMITS

Maximum transverse load:
750 lbs per conductor.

Maximum line angle within load limits:
5° Angle.

12.5 / 7.2, 3-PHASE

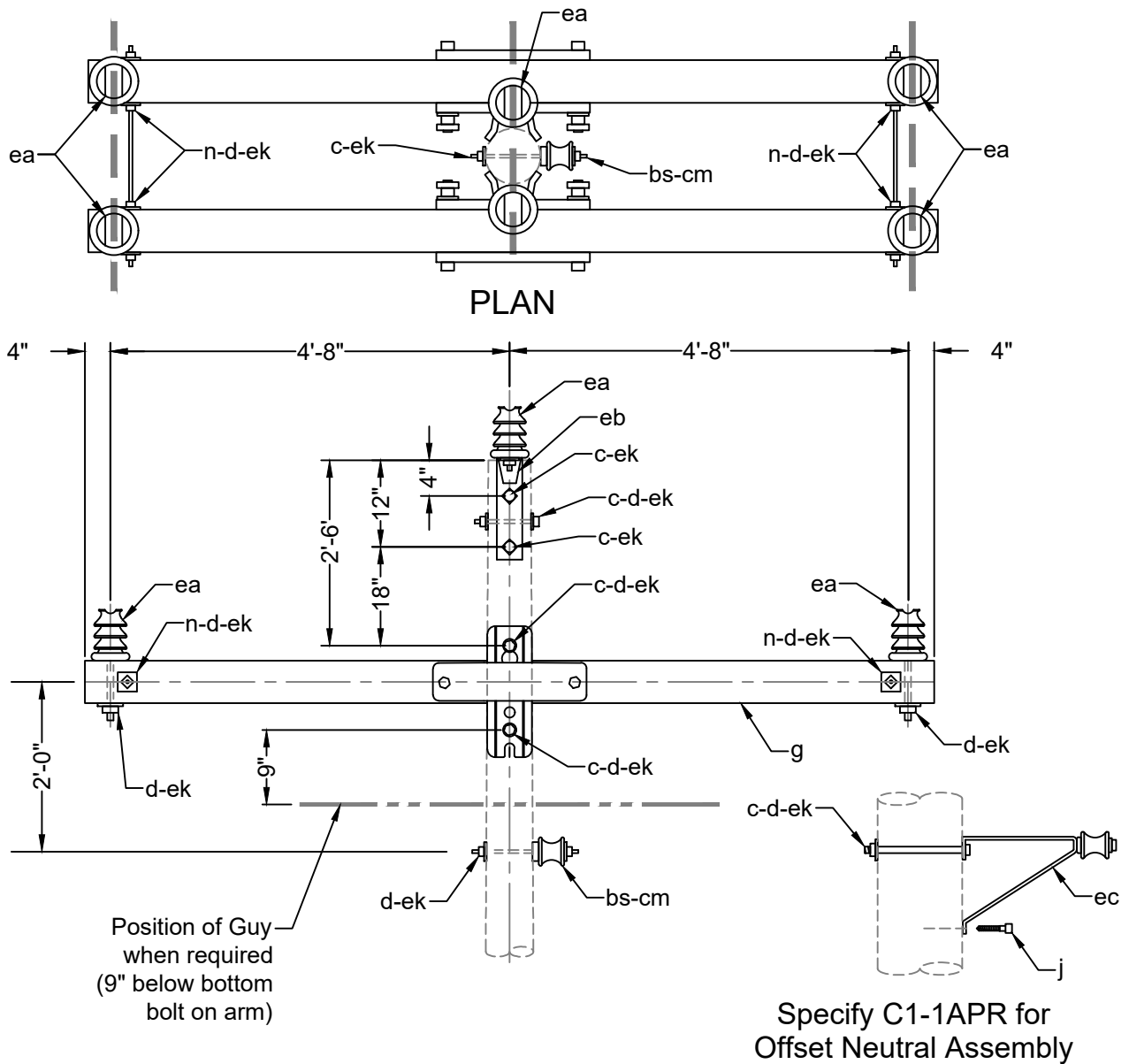
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 19, 2022



C1-1P
C1-1AP



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length			
d	2	Washer, 3" square, curved			(ADDITIONAL MATERIAL FOR C1-1APR)
d	17	Washer, 2 1/4" square, 13/16" hole	c	1	Bolt, machine, 5/8" x required length
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	d	1	Washer, 2 1/4" square, 13/16" hole
n	2	Bolt, double arming, 5/8" x required length	ec	1	Bracket offset neutral (C1-1APR only)
bs	1	Bolt, single upset	j	2	Screw, lag, 1/2" x 4" (C1-1APR only)
cm	1	Spool insulator			
ea	6	Insulator, post type			
eb	2	Bracket, pole top			
ek	-	Locknuts, as required			

DESIGN LIMITS
Maximum transverse load:
750 lbs per conductor.

Maximum line angle within load limits:
5° Angle.

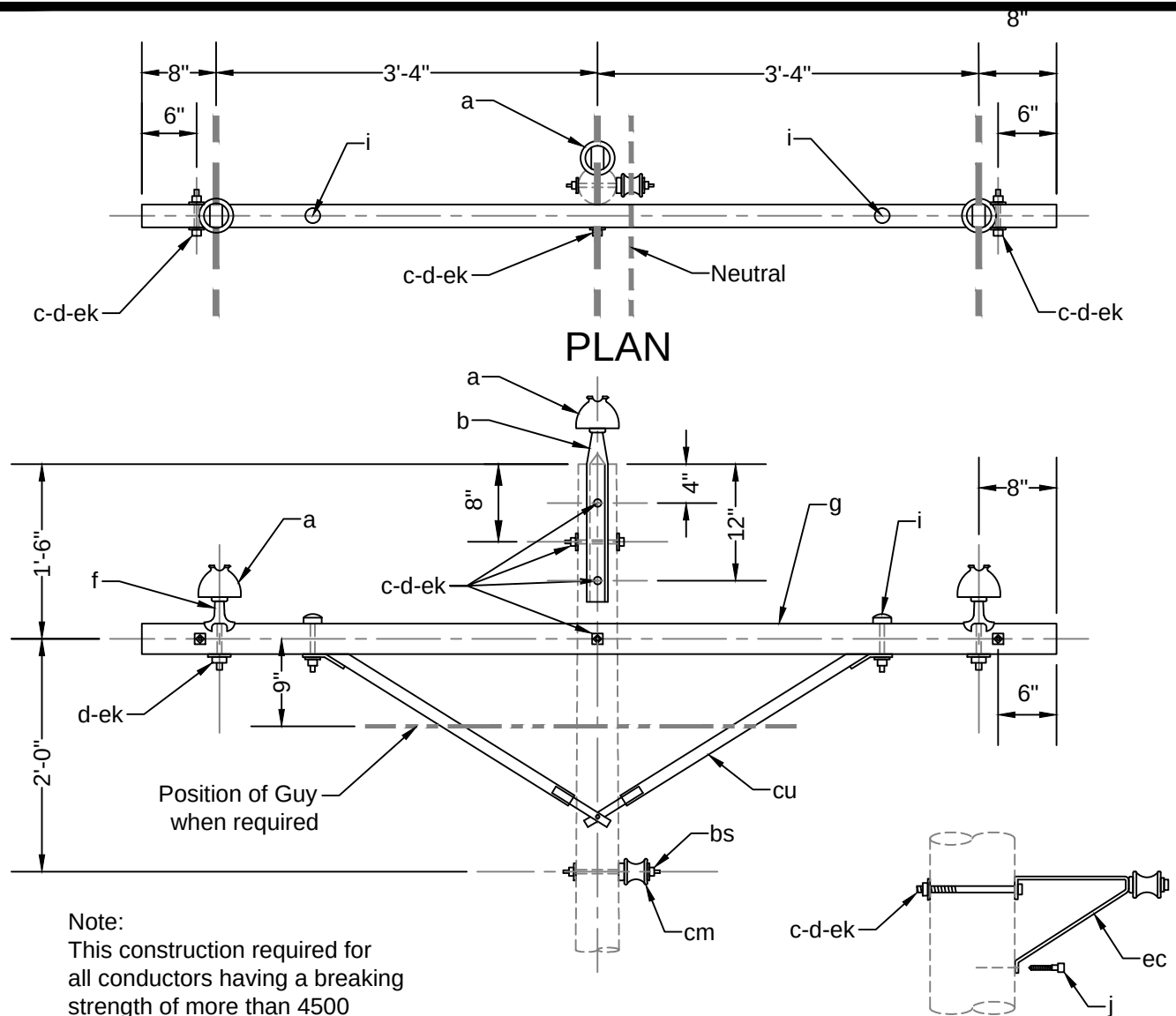
RAPTOR PROTECTION
12.5 / 7.2 KV, 3-PHASE
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 19, 2022



C1-1PR
C1-1APR



Obsolete. For Retirement Only.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	3	Insulator, pin type	cm	1	Spool insulator
b	1	Pin, pole top, 20"	cu	1	Brace, wood, 60" span
c	7	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	10	Washer, 2 1/4" square, 13/16" hole			
d	2	Washer, 3" Square curved, 13/16" hole			(ADDITIONAL MATERIAL FOR C1-2A)
f	2	Pin, crossarm, clamp type	c	1	Bolt, machine, 5/8" x required length
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'-0"	d	1	Washer, 2 1/4" square, 13/16" hole
i	2	Bolt, carriage, 1/2" x required length	j	1	Screw, lag, 1/2" x 4" (C1-2A only)
bs	1	Bolt, single upset	ec	1	Bracket, offset, insulated, (C1-2A only)

DESIGN LIMITS
Maximum transverse load :
500 lbs. per conductor.

Maximum line angle within load limits:
2° Angle.

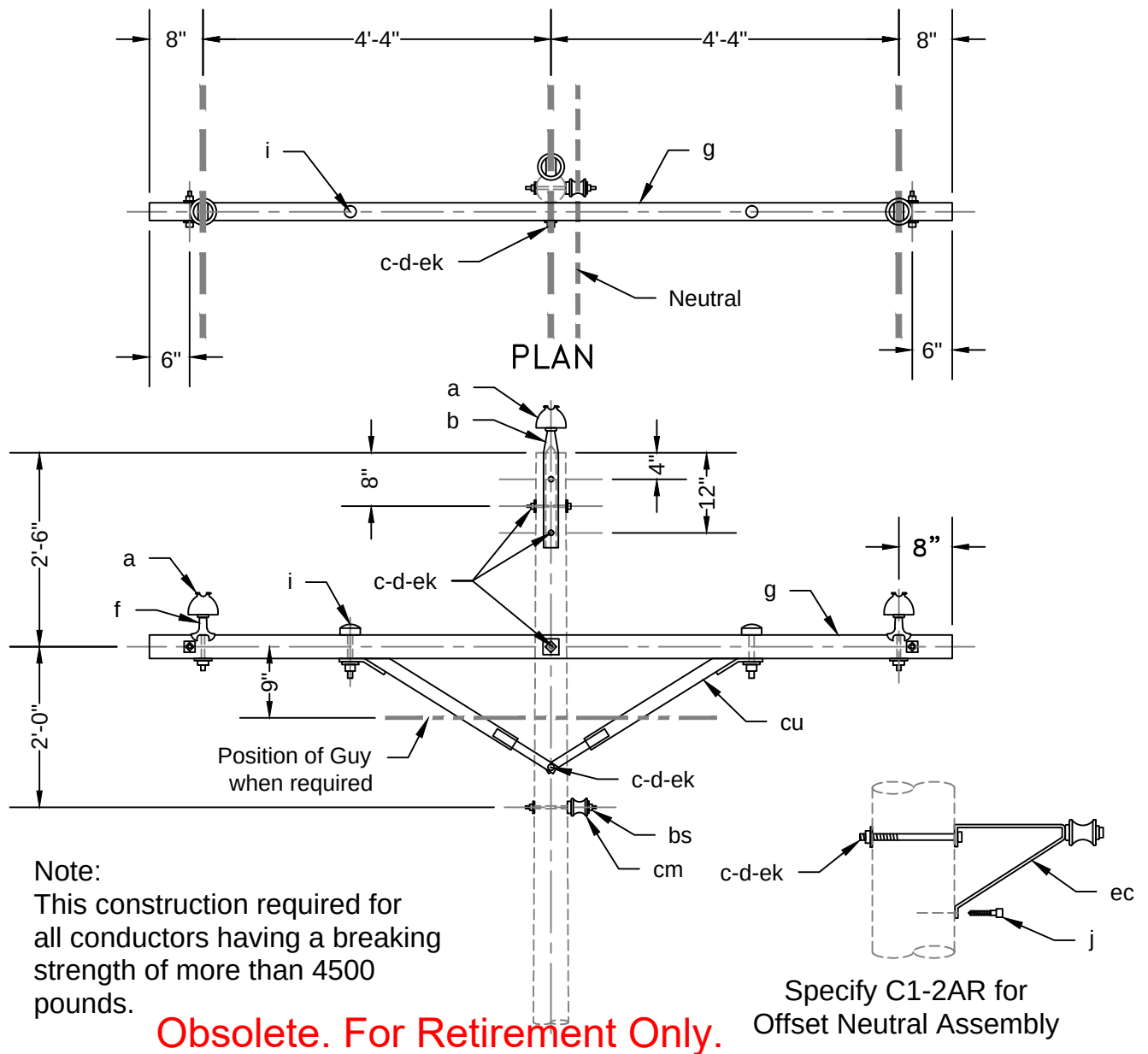
7.2 / 12.5 KV PRIMARY, 3-PHASE
CROSSARM CONSTRUCTION - (LARGE CONDUCTORS)

Revision Date:

Nov 25, 2015



C1-2
C1-2A



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	3	Insulator, pin type	cu	1	Brace, wood, 60" span
b	1	Pin, pole top, 20"	ek	-	Locknuts, as required
c	7	Bolt, machine, 5/8" x required length	cm	1	Spool insulator
d	10	Washer, 2 1/4" square, 13/16" hole			
d	2	Washer, 3" square curved, 13/16" hole			(ADDITIONAL MATERIAL FOR C1-2AR)
f	2	Pin, crossarm, clamp type	c	1	Bolt, machine, 5/8" x required length
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"	d	1	Washer, 2 1/4" square, 13/16" hole
i	2	Bolt, carriage, 1/2" x required length	j	1	Screw, lag, 1/2" x 4" (C1-2AR only)
bs	1	Bolt, single upset	ec	1	Bracket, offset, insulated (C1-2AR only)

DESIGN LIMITS

Maximum transverse load:

500 lbs. per conductor

Maximum line angle within load limits:

2° Angle.

RAPTOR PROTECTION

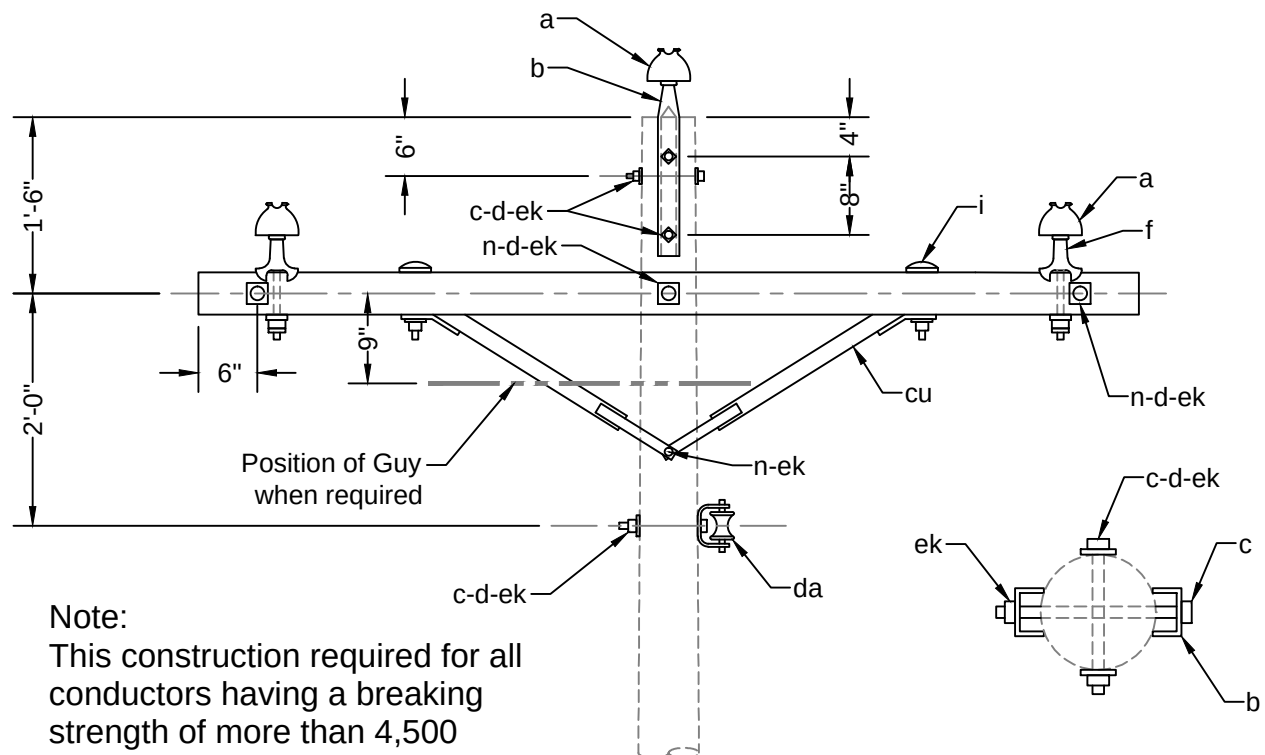
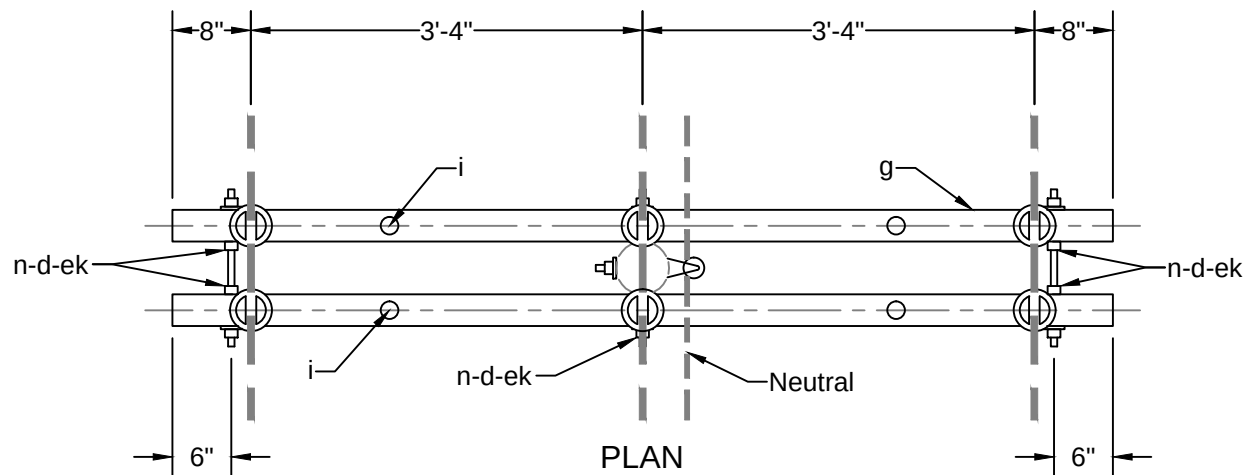
7.2/12.5 KV, 3-PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

Revision Date

Nov 25, 2015



C1-2R
C1-2AR



Note:

This construction required for all conductors having a breaking strength of more than 4,500 pounds.

Obsolete. For Retirement Only. Pole Top Pin Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0"
b	2	Pin, pole top, 20"	n	3	Bolt, double arming, 5/8" x required length
c	4	Bolt, machine, 5/8" x required length	cu	2	Brace, wood, 60" span
i	4	Bolt, carriage, 1/2" x required length	da	1	Bracket, insulated
d	13	Washer, 2 1/4" square x 13/16 hole	ek		Locknuts, as required
f	4	Pin, cross arm, steel, clamp type			

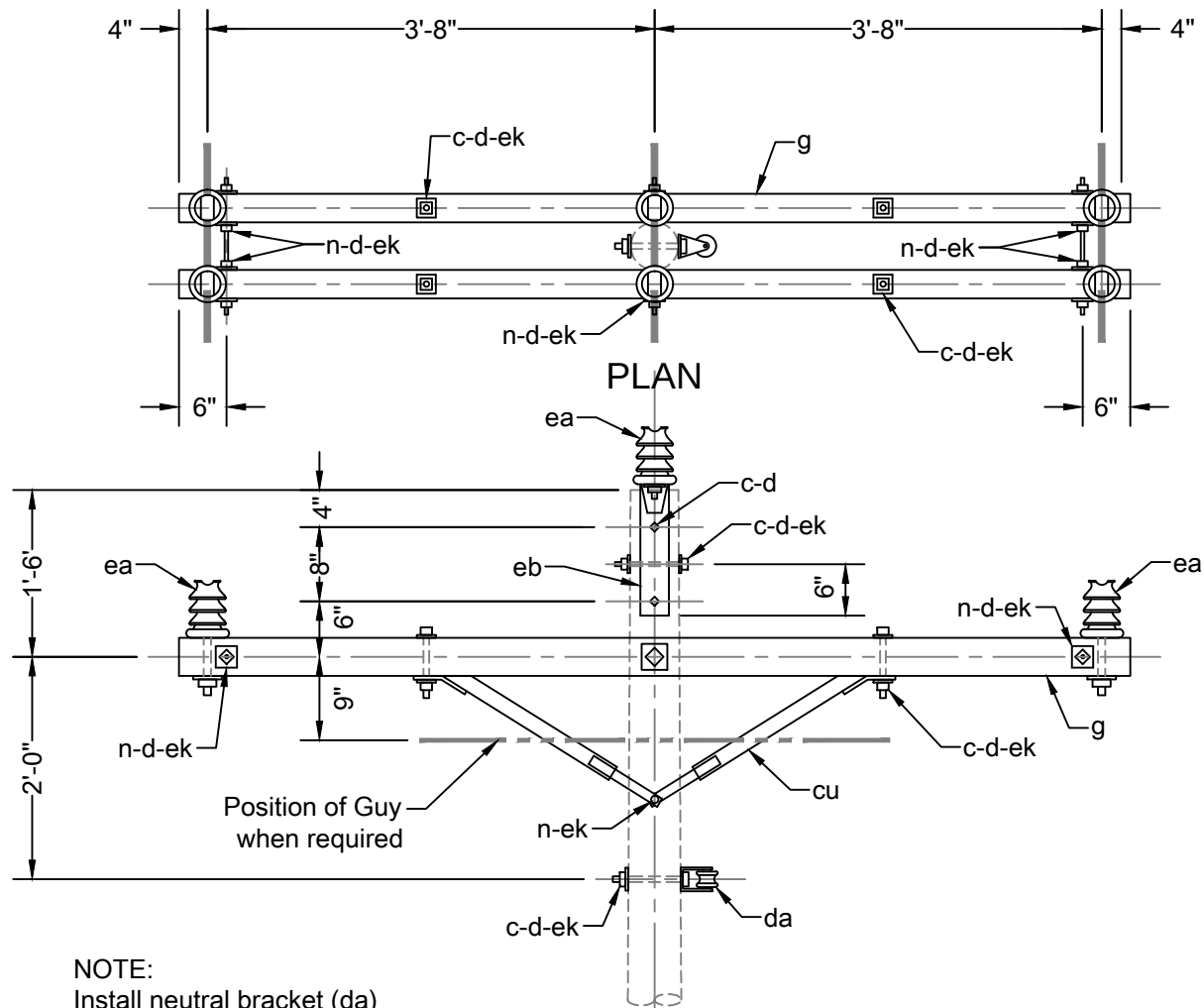
12.5 / 7.2 KV, 3-PHASE
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT
(LARGE CONDUCTORS)

Revision Date

Dec 28, 2015



C1-3



NOTE:
Install neutral bracket (da)
on angle poles,

Install neutral upset bolt (bs)
on tangent poles.

C1-3P = 8' Crossarm
C1-3PX = 10' Crossarm

NOTE:
This construction required for all
conductor having a breaking strength
of more than 4,500 pounds.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	n	4	Bolt, double arming, 5/8" x required length
c	4	Bolt, machine, 1/2" x required length	bs	1	Bolt, single upset
d	10	Washer, 3" square,	cu	2	Brace, wood, 60" span
d	3	Washer, 3" square, curved	da	1	Bracket, insulated
d	4	Washer, round, 1 3/8" diameter	ea	6	Insulator, post type
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0" (C1-2P)	eb	2	Bracket, pole top
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0" (C1-3PX)	ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
1500 lbs per conductor.

Maximum line angle within load limits:
5° Angle.

12.5 / 7.2 KV, 3 PHASE

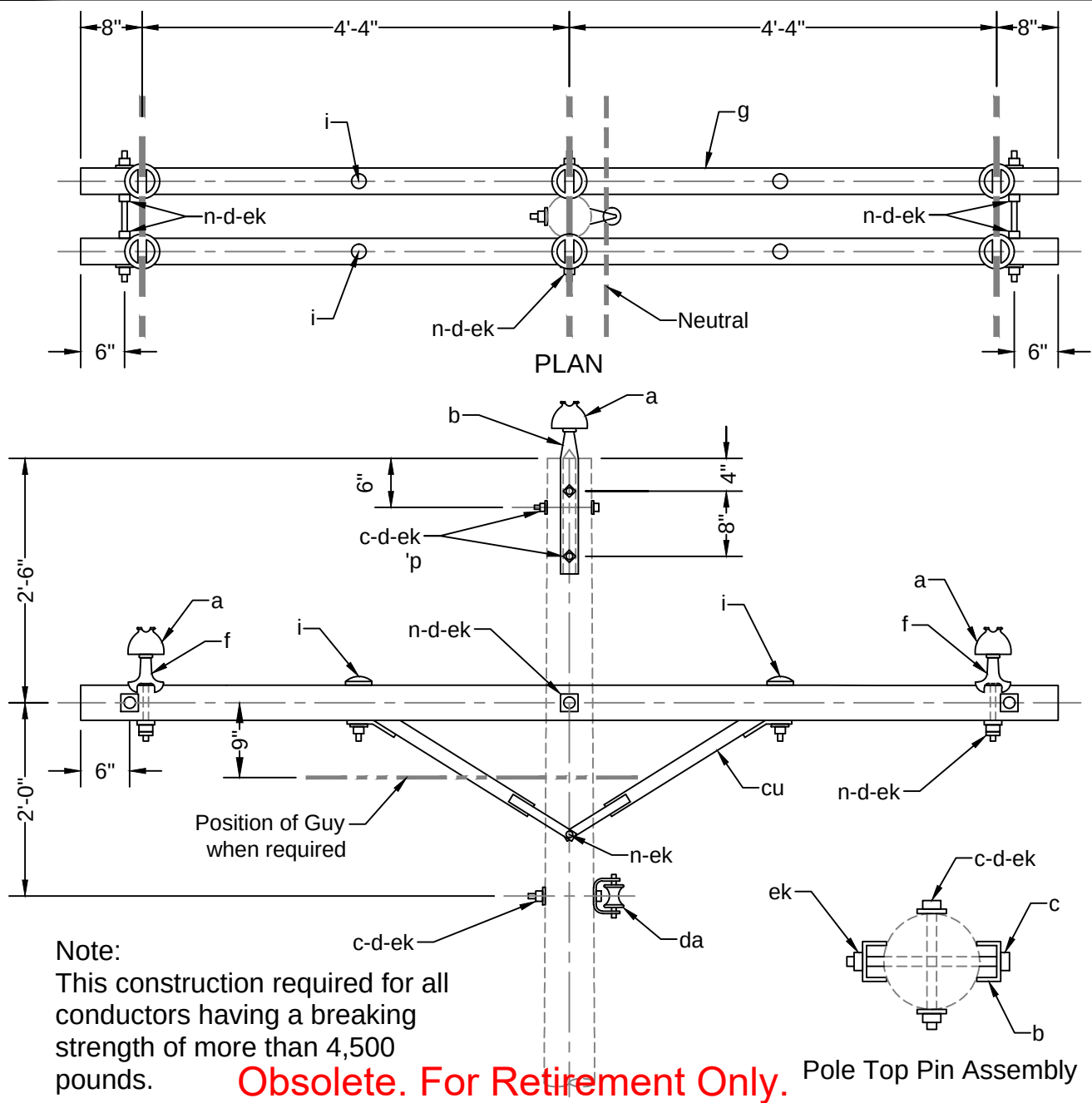
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT
(LARGE CONDUCTOR)

Revision Date

Feb. 10, 2016



C1-3P
C1-3PX



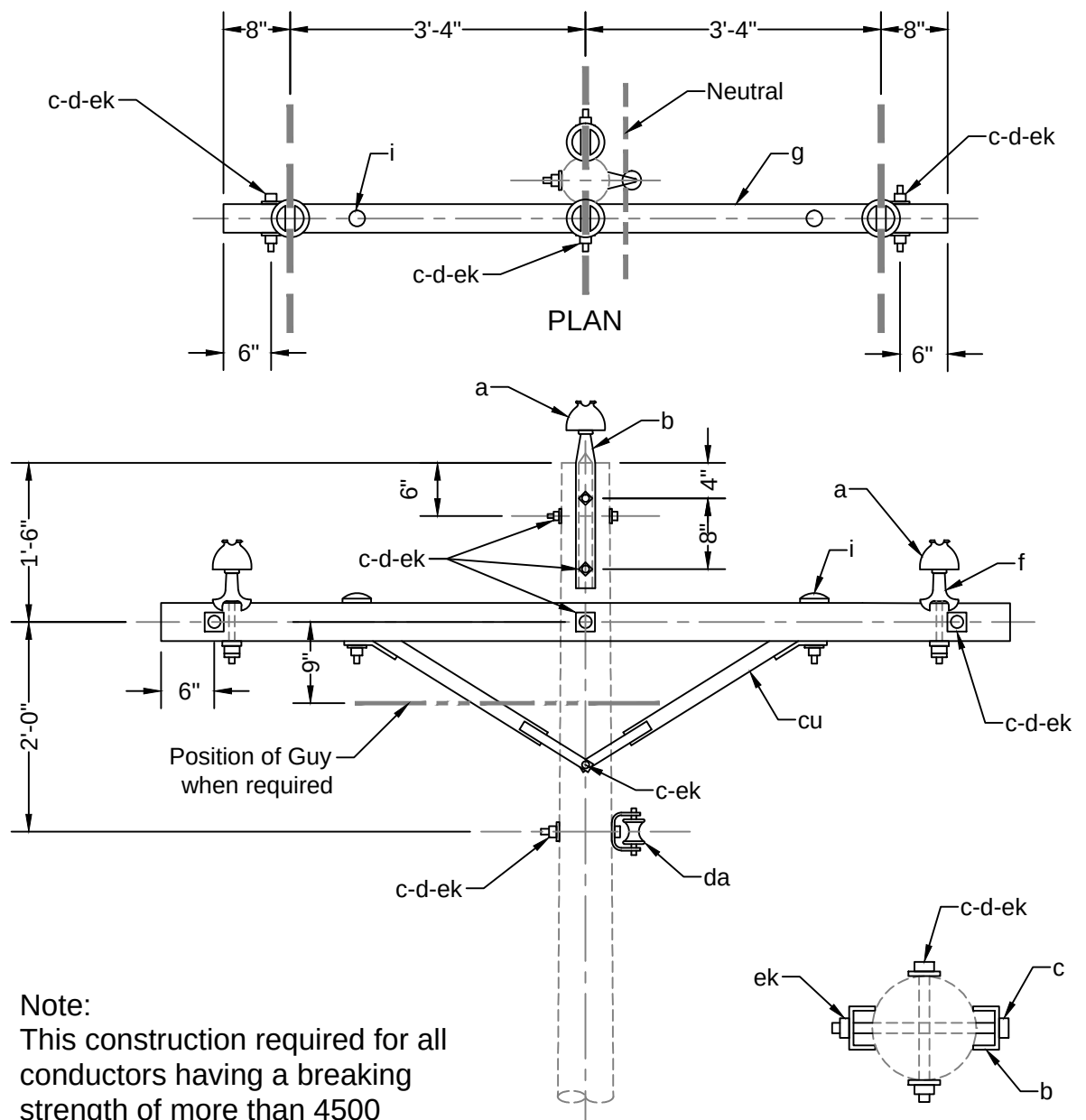
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
b	2	Pin, pole top, 20"	n	3	Bolt, double arming, 5/8" x required length
c	4	Bolt, machine, 5/8" x required length	cu	2	Brace, wood, 60" span
i	4	Bolt, carriage, 1/2" x required length	da	1	Bracket, insulated
d	13	Washer, 2 1/4" square x 13/16 hole	ek		Locknuts, as required
f	4	Pin, cross arm, steel, clamp type			

RAPTOR PROTECTION
7.2 / 12.5 KV, 3-PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT, (LARGE CONDUCTORS)

Revision Date

Dec 28, 2015

**C1-3R**



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	g	1	Crossarm, 3 3/4" x 4 3/4" x 8'-0"
b	2	Pin, pole top, 20"	cu	1	Brace, wood, 60" span
c	8	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
i	2	Bolt, carriage, 1/2" x required length	ek		Locknuts, as required
d	10	Washer, 2 1/4" square x 13/16 hole			
f	2	Pin, cross arm, steel, clamp type			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

12.5 / 7.2 KV, 3-PHASE

CROSSARM CONSTRUCTION - LARGE CONDUCTORS

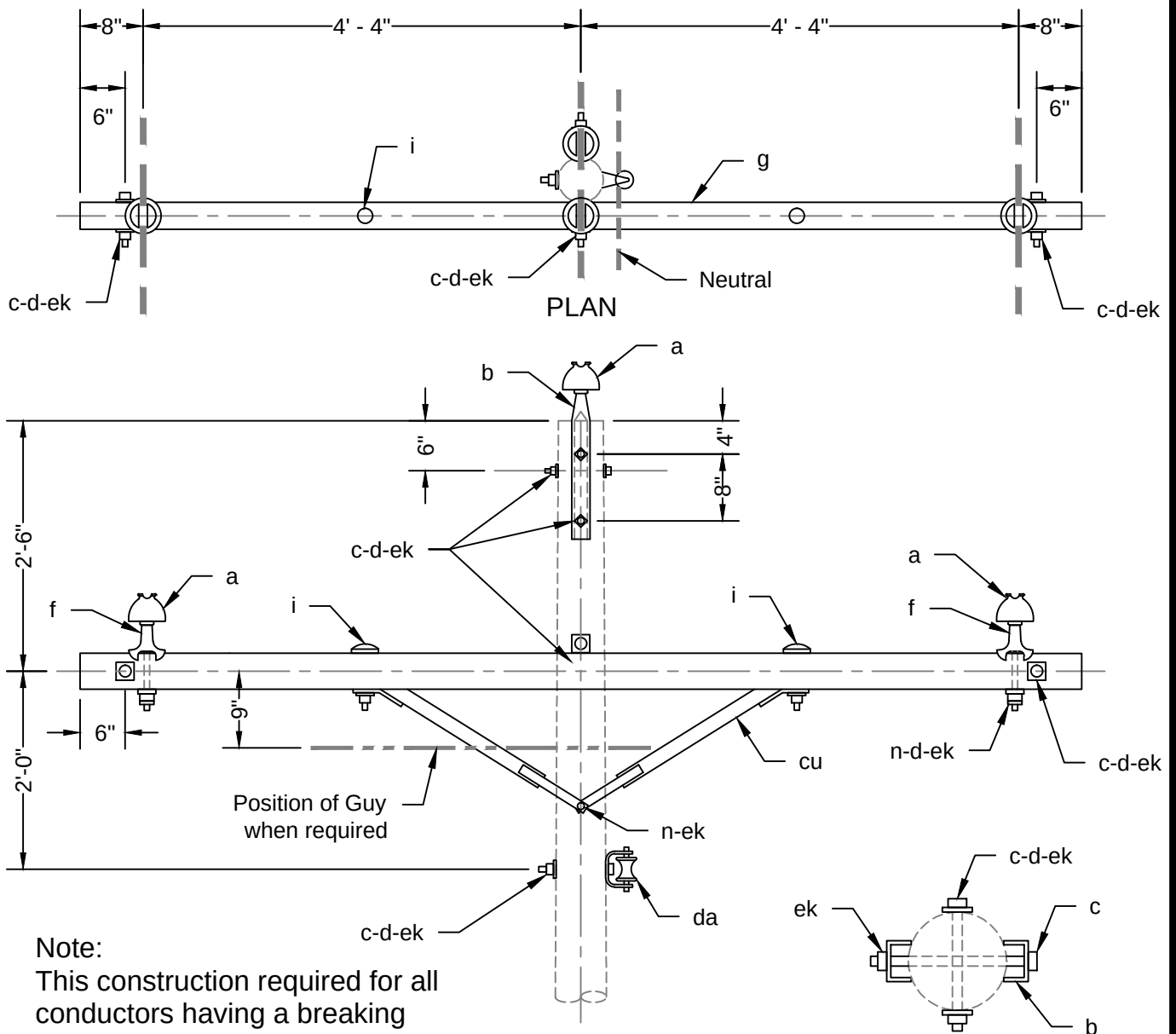
Revision Date

Dec 28, 2015



C1-4

C1-4R

**Note:**

This construction required for all conductors having a breaking strength of more than 4,500 pounds.

Obsolete. For Retirement Only.

Pole Top Pin Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
b	2	Pin, pole top, 20"	cu	2	Brace, wood, 60" span
c	8	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
i	2	Bolt, carriage, 1/2" x required length	ek		Locknuts, as required
d	10	Washer, 2 1/4" square x 13/16 hole			
f	2	Pin, cross arm, steel, clamp type			

RAPTOR PROTECTION

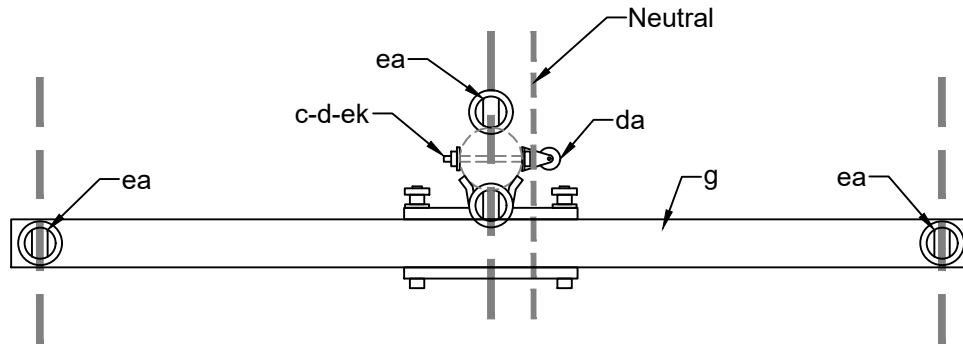
7.2 / 12.5 KV, 3-PHASE, CROSSARM CONSTRUCTION
LARGE CONDUCTORS

Revision Date

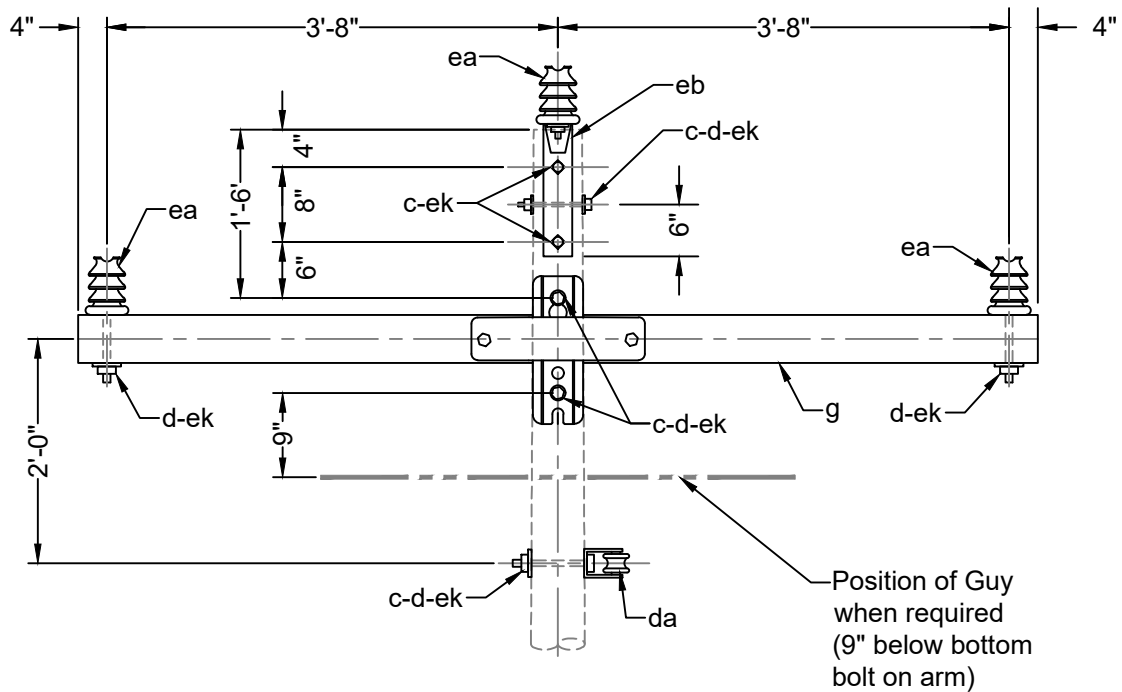
Dec 28, 2015



C1-4R



PLAN



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	6	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	5	Washer, 2 1/4" square,	ea	4	Insulator, post type
d	2	Washer, 3" square, curved	eb	2	Bracket, pole top
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
1000 lbs per conductor.

Maximum line angle within load limits:
5° Angle.

12.5 / 7.2 KV, 3 PHASE

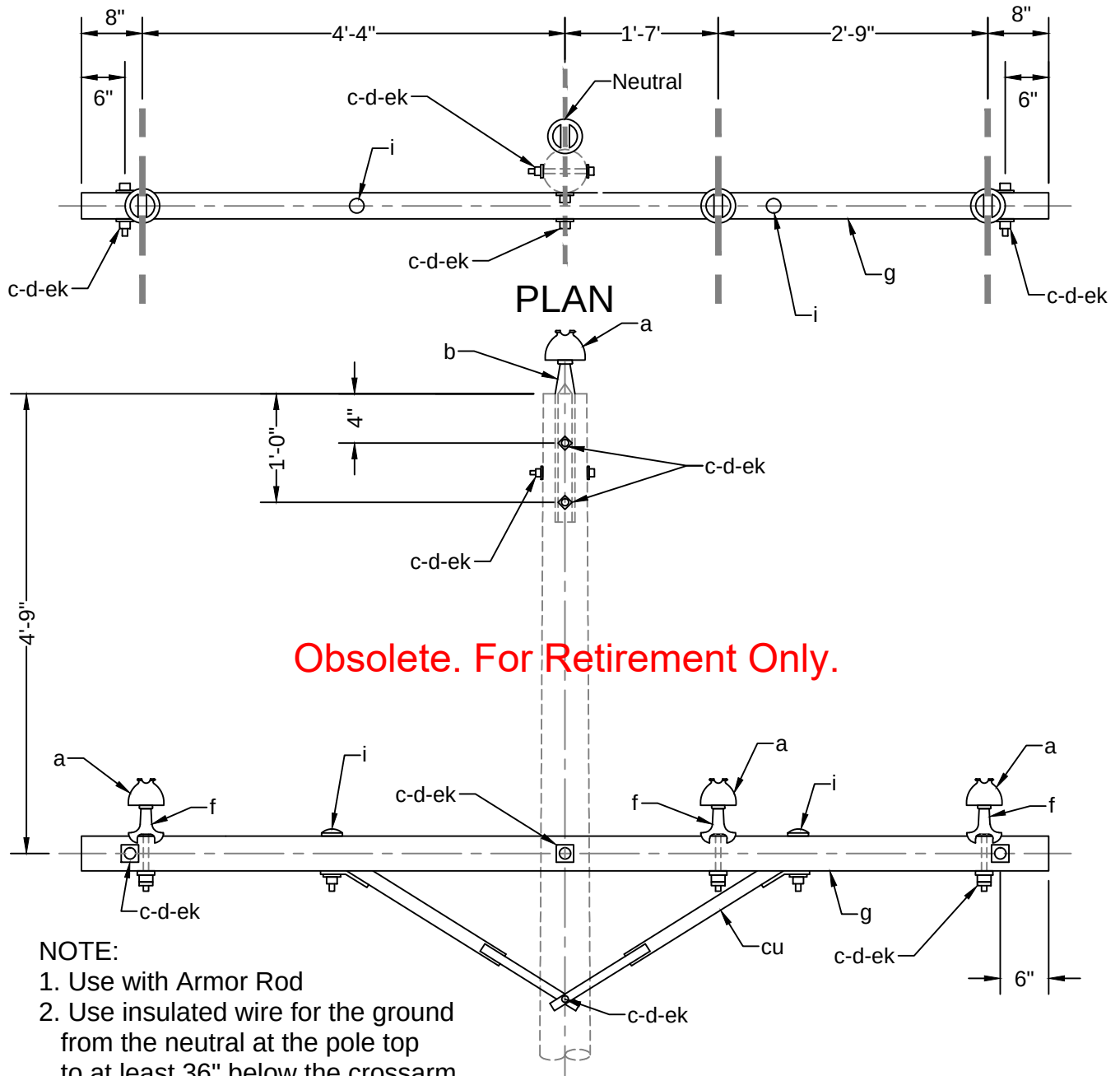
CROSSARM CONSTRUCTION - DOUBLE POLE-TOP SUPPORT
(LARGE CONDUCTOR)

Revision Date

Dec 19, 2022



C1-4PL



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	i	2	Bolt, carriage, 1/2" x required length
b	1	Pin, pole top, 20"	cu	2	Brace, wood, 60" span
c	7	Bolt, machine, 5/8" x required length	ek		Locknuts, as required
d	9	Washer, 2 1/4" square x 13/16 hole			
d	2	Washer, 3" square, curved			
f	3	Pin, cross arm, steel, clamp type			
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 3-PHASE

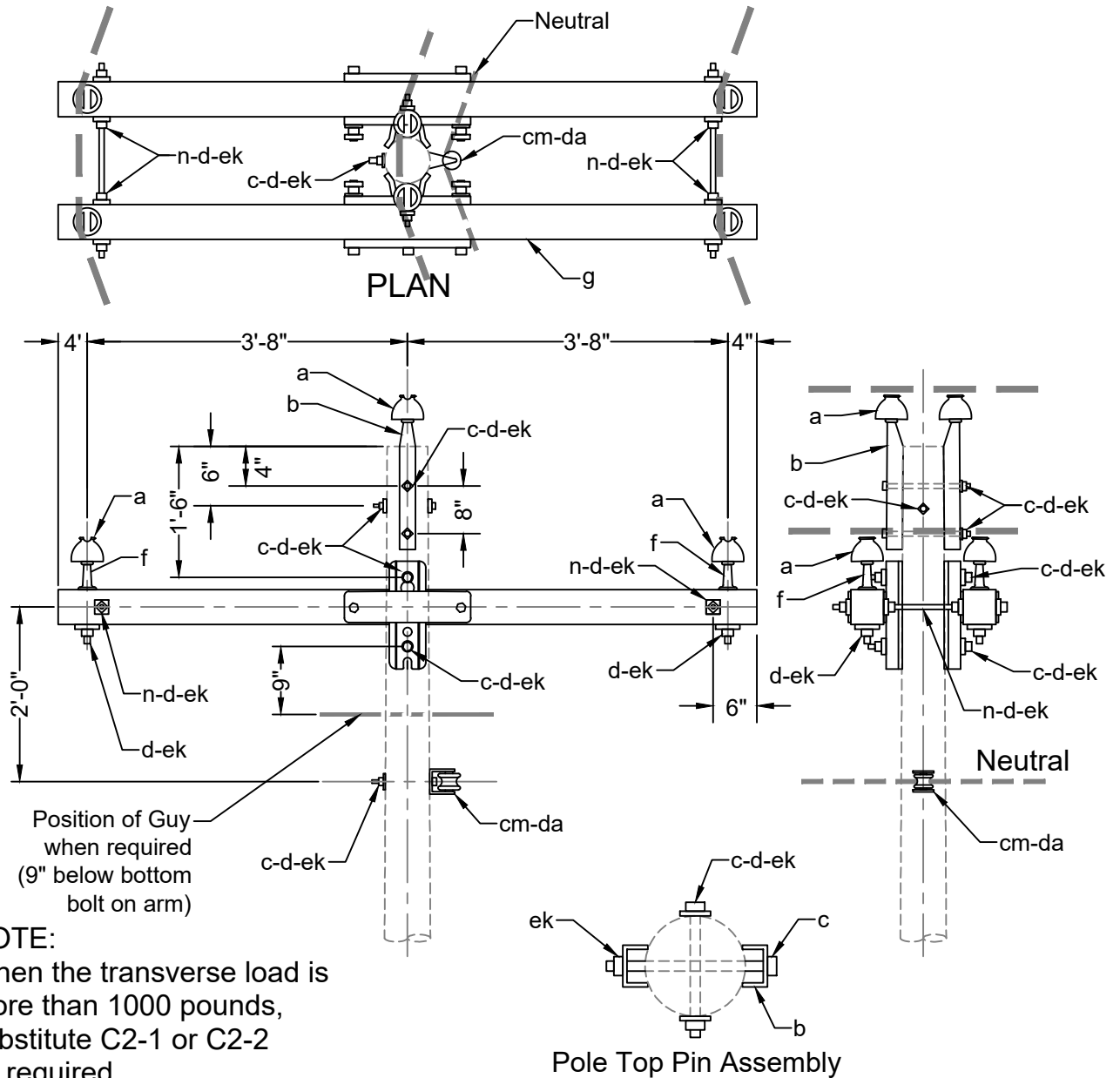
CROSSARM CONSTRUCTION - LARGE CONDUCTORS

Revision Date

Nov 30, 2015



C1-5



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	6	Insulator, pin type	n	3	Bolt, double arming, 5/8 x required length
b	2	Pin, pole top, 20"	bv	4	Rod, armor, selected size
c	6	Bolt, machine, 5/8" x required length	cm	1	Spool insulator
d	17	Washer, 2 1/4" square, 13/16" hole	da	1	Bracket, insulated (Neutral)
d	2	Washer, 3" square, curved	ek	-	Locknuts
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

12.5 / 7.2 KV, 3-PHASE

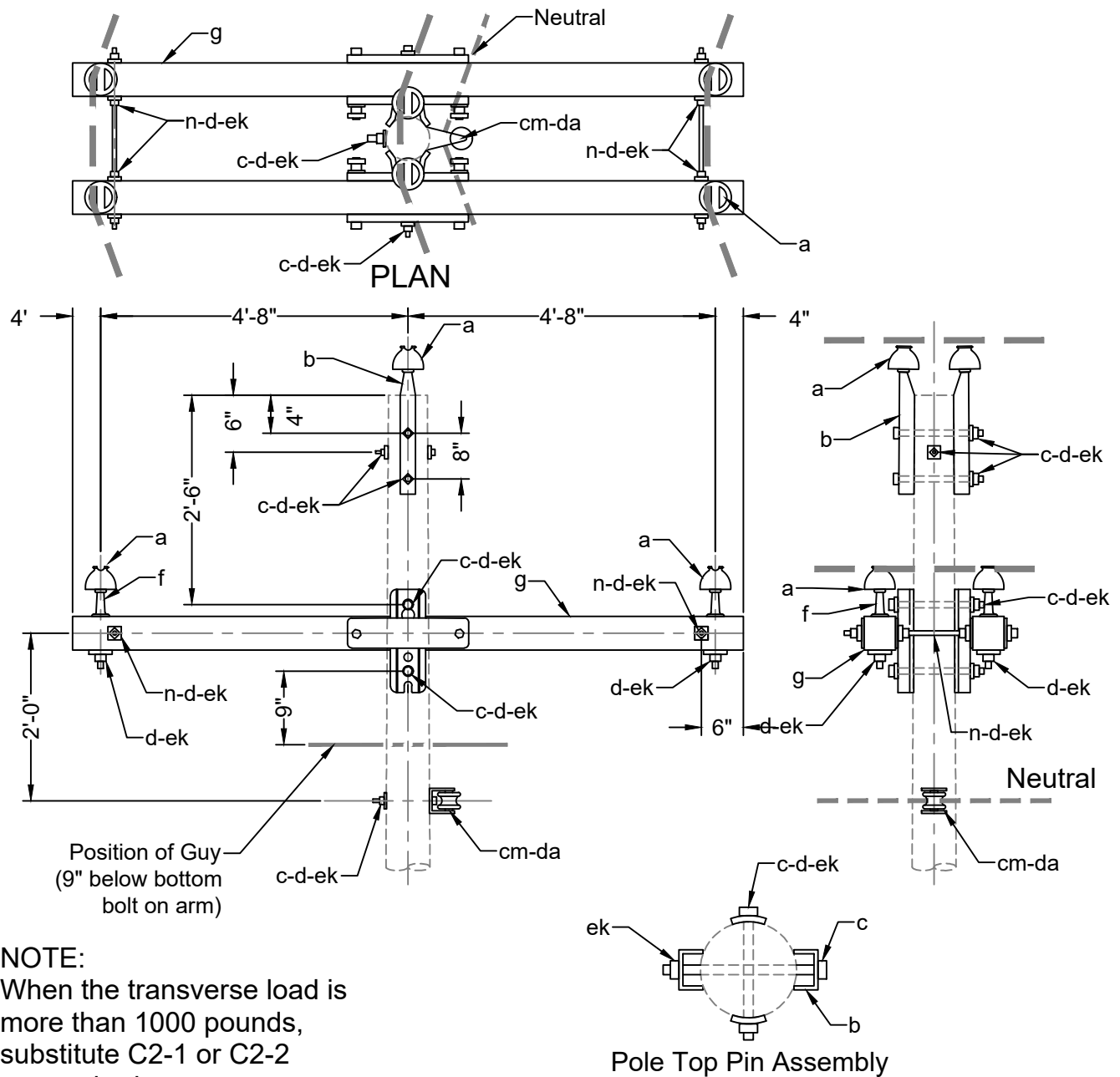
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 20, 2022



C2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	n	3	Bolt, double arming, 5/8 x required length
b	2	Pin, pole top, 20"	bv	4	Rod, armor, selected size
c	6	Bolt, machine, 5/8" x required length	cm	1	Spool Insulator
d	17	Washer, 2 1/4" square, 13/16" hole	da	1	Bracket, insulated (Neutral)
d	2	Washer, 3" square, curved	ek	-	Locknuts
f	4	Pin, Crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum Transverse Load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

RAPTOR PROTECTION

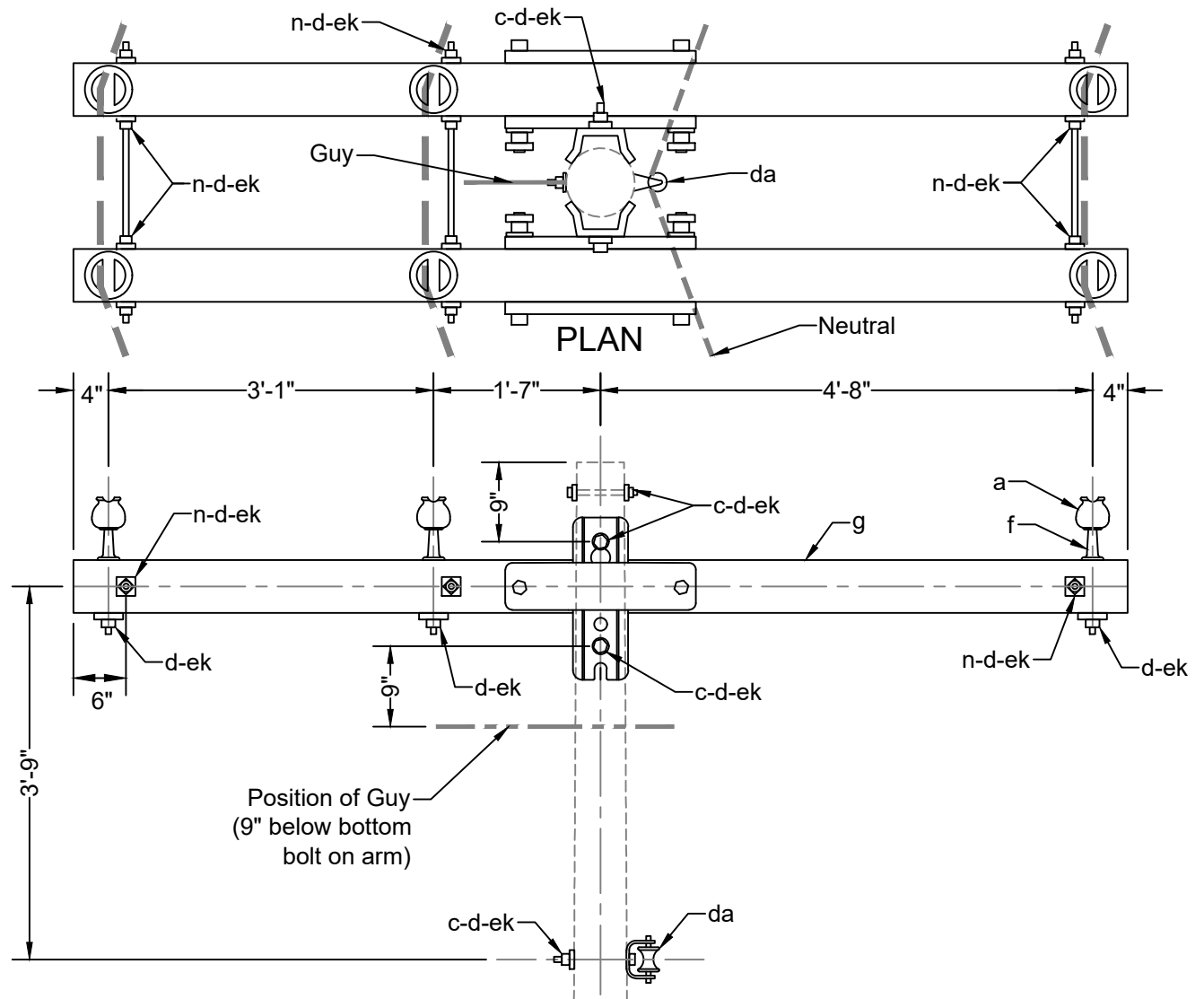
7.2 / 1.5 KV, 3-PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 20, 2022



C2R



NOTES:

Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.

When the transverse load is more than 1000 pounds per conductor install a 2 1/4" x 2 1/4" x 3/16" washer on the top of the crossarm for each pin.

If the load is more than 1500 pounds, use the construction shown on C2-2.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	bv	4	Rod, armor, selected size
c	4	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	23	Washer, 2 1/4" square x 13/16 hole	ek		Locknuts, as required
d	2	Washer, 3" square, curved			
f	6	Pin, cross arm, steel, clamp type			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
n	3	Bolt, double arming, 5/8" x required length			

DESIGN LIMITS

Maximum transverse load:
1500 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 3- PHASE

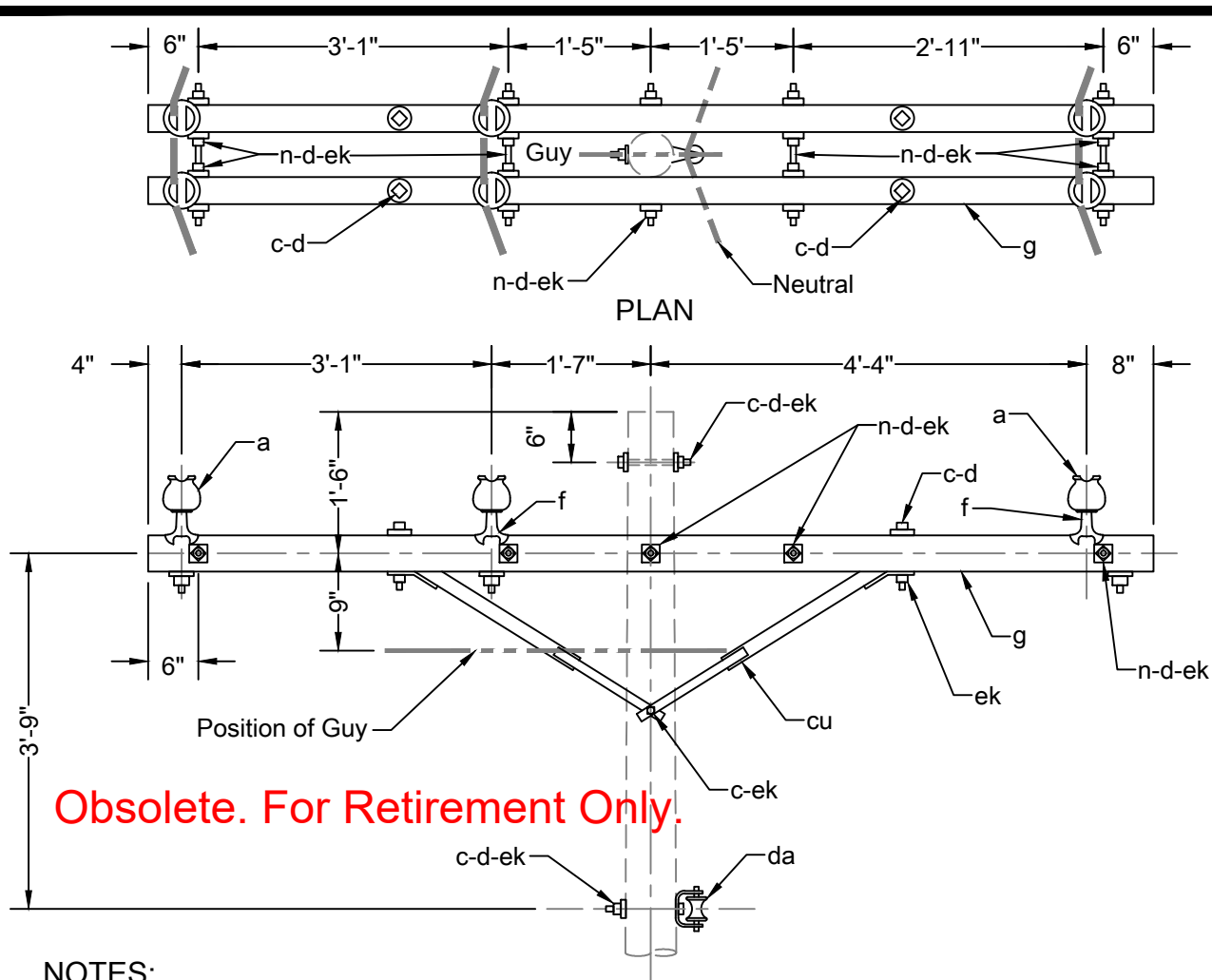
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 20, 2022



C2-1



NOTES:

Side grooves of the insulator always to be larger than the overall diameter of the conductor including the armor rods when required.

Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.

This construction required for all conductors to have a breaking strength of more than 4500 pounds.

If transverse load exceeds 2000 pounds per conductor, use vertical construction.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	3	Bolt, machine, 5/8" x required length	n	5	Bolt, double arming, 5/8" x required length
i	4	Bolt, carriage, 1/2" x required length	bv	4	Rod, armor, select size
d	21	Washer, 2 1/4" square x 13/16 hole	cu	2	Brace, wood, 60" span
d	2	Washer, 3" square, curved	da	1	Bracket, insulated
f	6	Pin, cross arm, steel, clamp type	ek		Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
2000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 3-PHASE

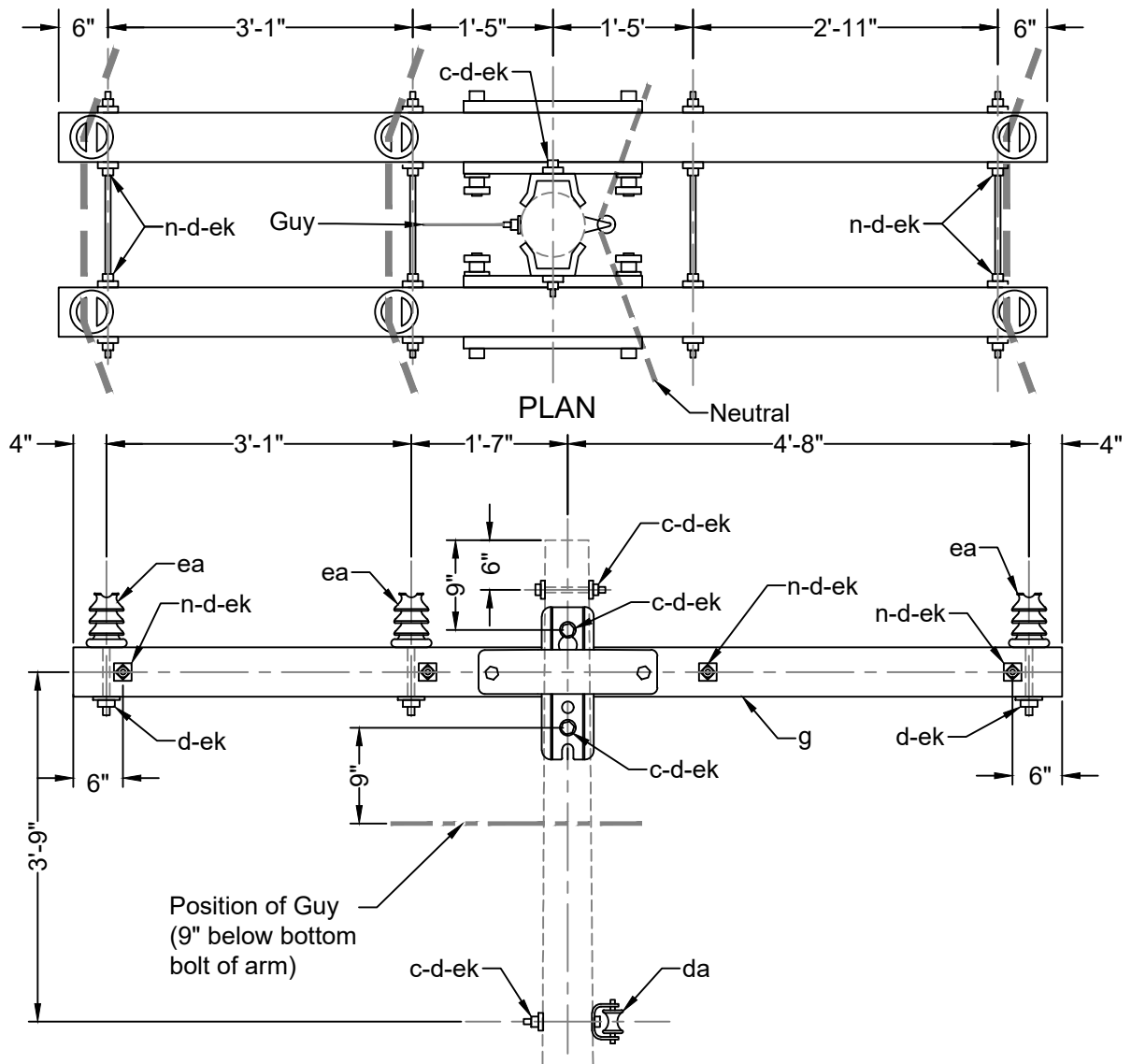
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT
(LARGE CONDUCTORS)

Revision Date

Nov 30, 2015



C2-2



NOTES:

Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	27	Washer, 2 1/4" square, 13/16" hole	ea	6	Insulator, post type
d	2	Washer, 3", square curved	ek		Locknuts, as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
n	4	Bolt, double arming, 5/8" x required length			

DESIGN LIMITS

Maximum transverse load:
2000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 3-PHASE

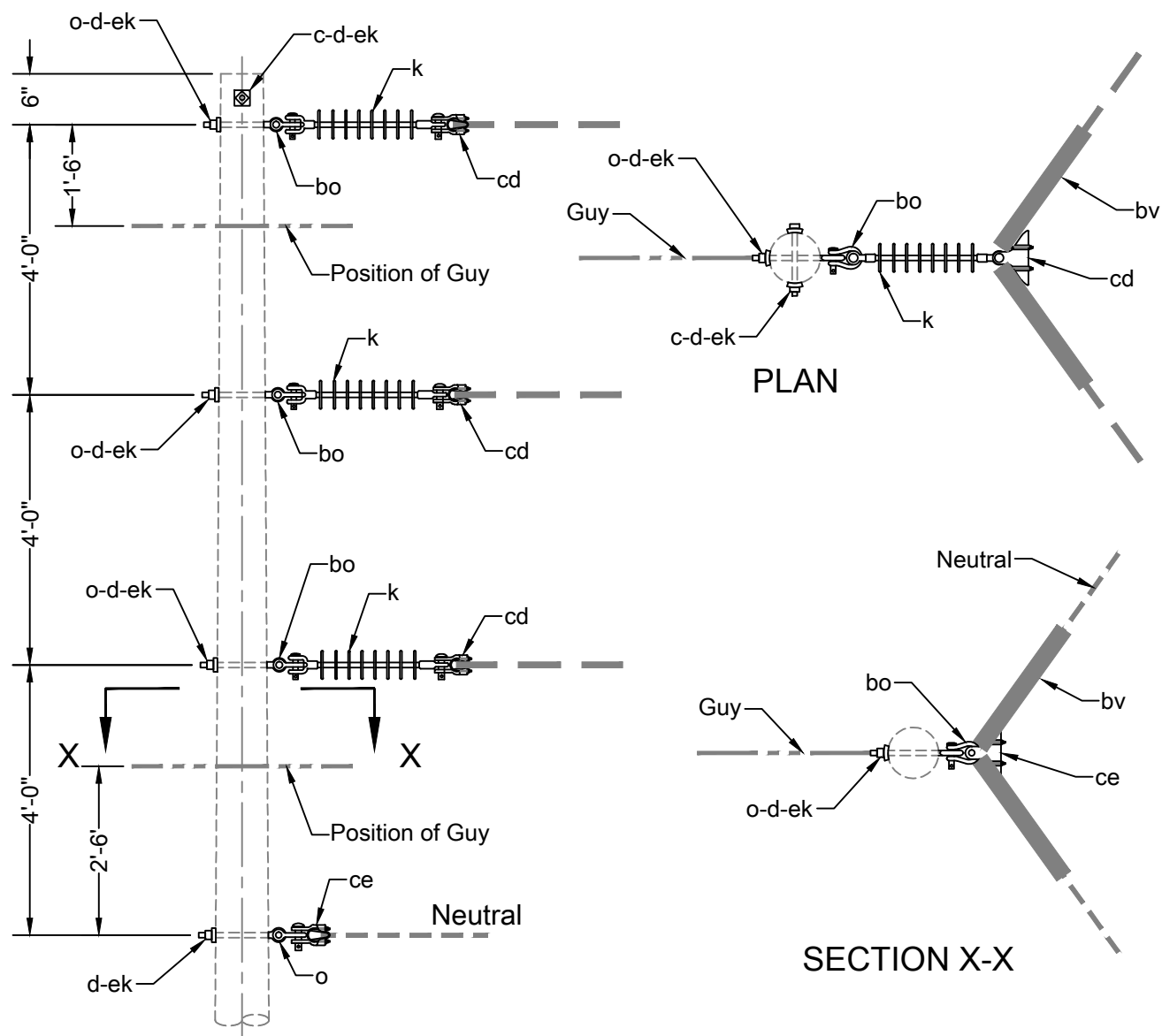
CROSSARM CONSTRUCTION - DOUBLE PRIMARY SUPPORT
(LARGE CONDUCTORS)

Revision Date

Dec. 20, 2022



C2-2PL



Note:

Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	bv	4	Rod, Armor, select size
d	6	Washer, square, 3", curved	cd	3	Angle assembly, primary
k	3	Insulator, suspension, epoxilator	ce	1	Angle assembly, neutral
o	4	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
bo	4	Shackle, anchor			

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor

Maximum line angle within load limits:
20° to 60° Angle.

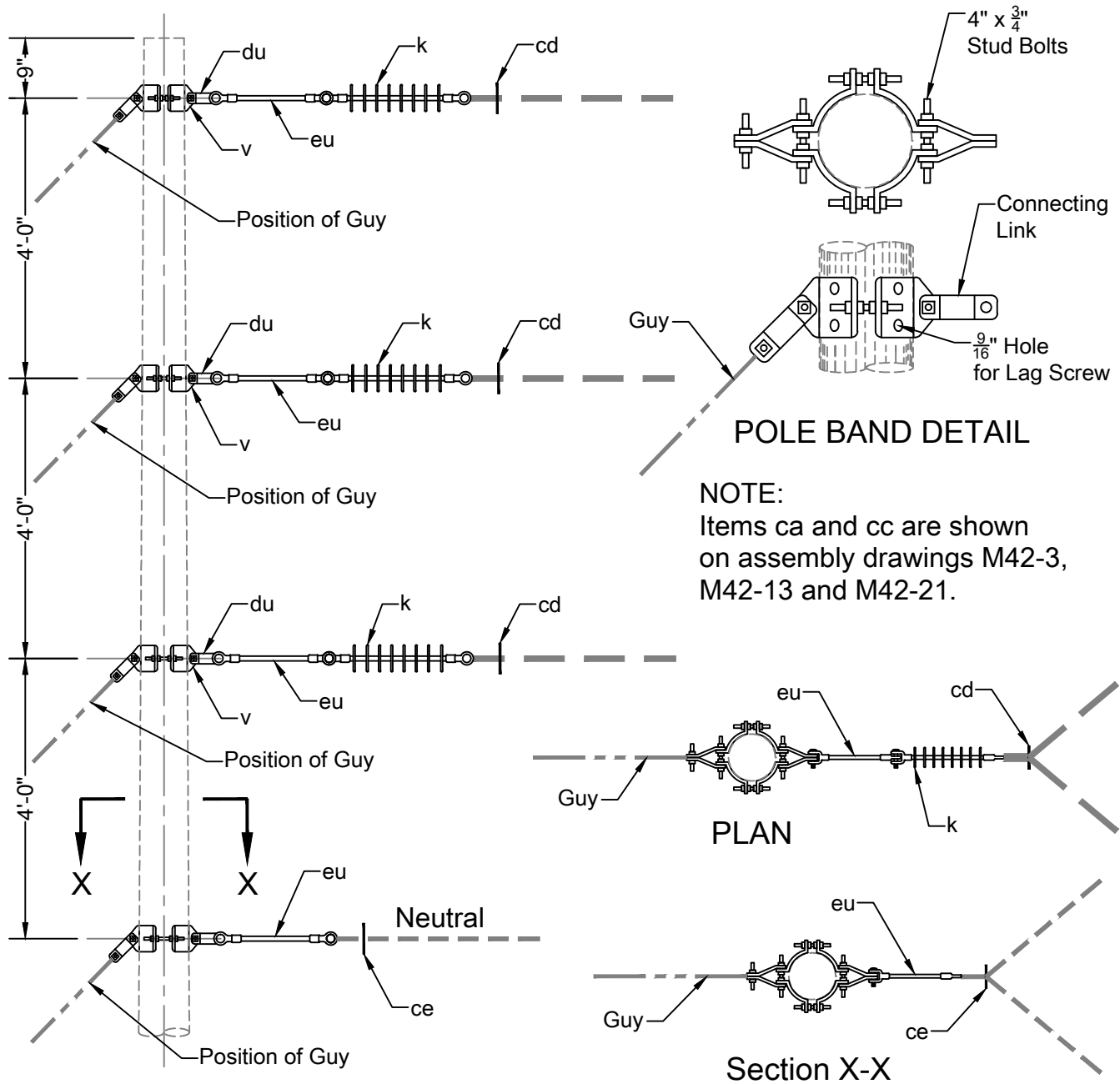
12.5 / 7.2 KV PRIMARY, 3-PHASE VERTICAL CONSTRUCTION - 20° TO 60° ANGLE

Revision Date

Dec 1, 2015



C3



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, Lag, 1/2" x 4"	aq	-	Jumpers, as required
k	3	Insulator, suspension, epoxilator	bv	4	Rod, armor, select size
p	-	Connectors, as required	du	8	Link, connecting
v	4	Pole band, required diameter	eu	4	Link, extension, insulated
			cd	3	Angle assembly, primary
			ce	1	Angle assembly, neutral

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor

Maximum line angle within load limits:
20° to 60° Angle.

7.2 / 12.5 KV - 3 PHASE

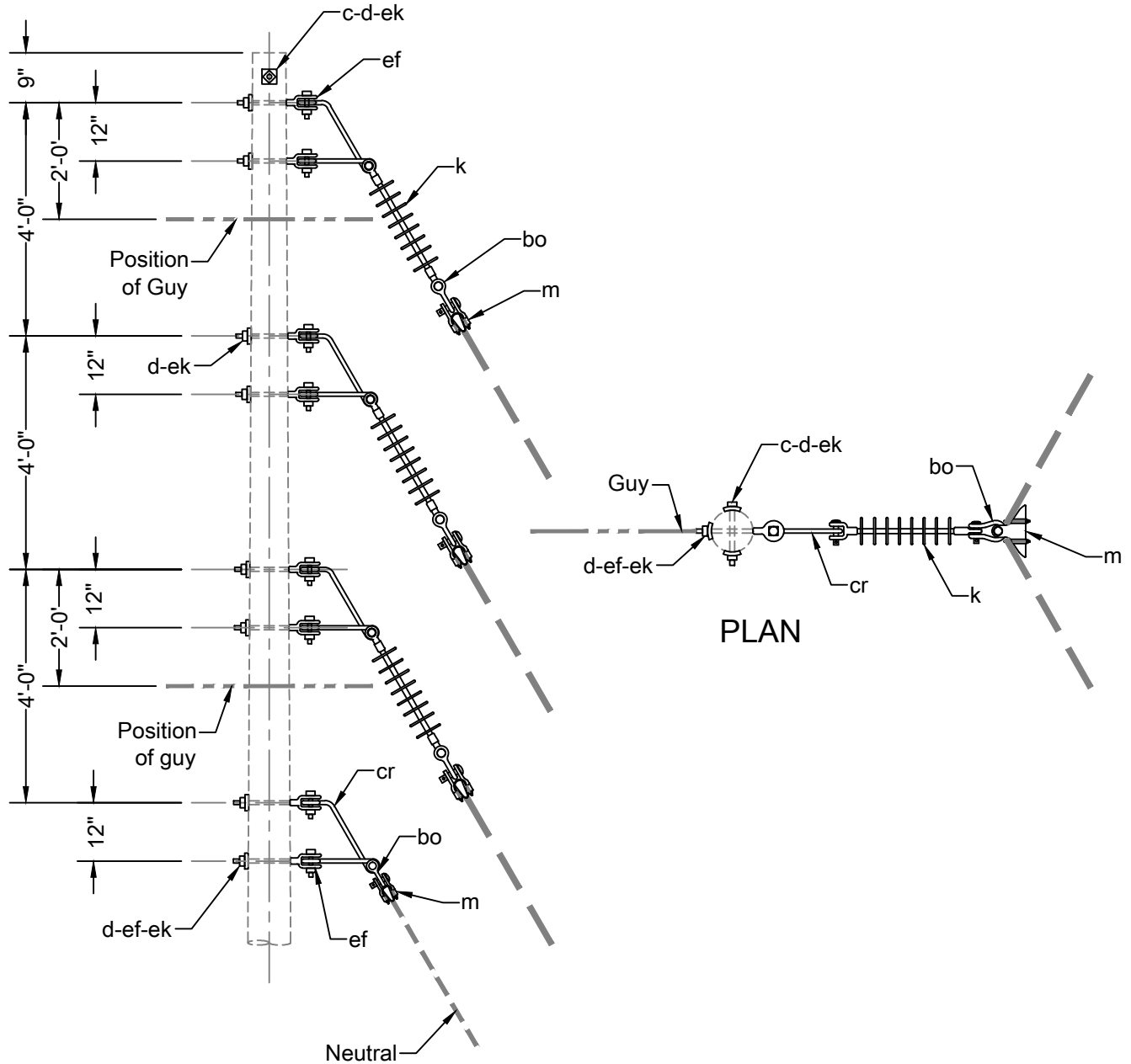
VERTICAL CONSTRUCTION - POLE BAND
(LARGE CONDUCTOR)

Revision Date

Dec 1, 2015



C3L



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	bo	4	Shackle, anchor
d	10	Washer, square, 3", curved	bv	4	Rod, armor, select size
k	3	Insulator, suspension, epoxilator	cr	4	Bracket, angle, 5/8"
m	4	Clamp, suspension	ef	8	Blot, clevis, 5/8" x required length
			ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor

Maximum line angle within load limits:
10° to 20° Angle.

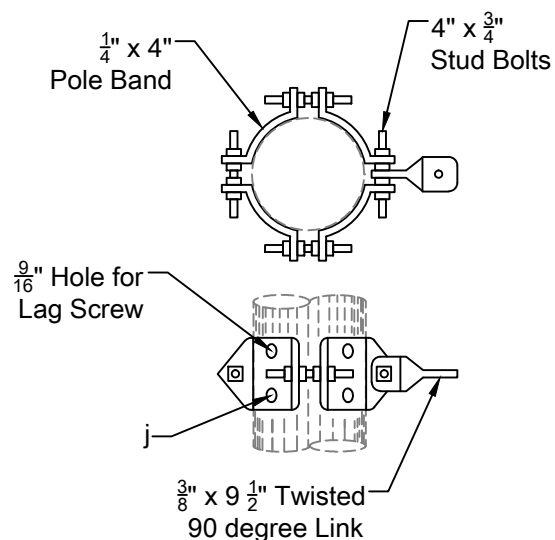
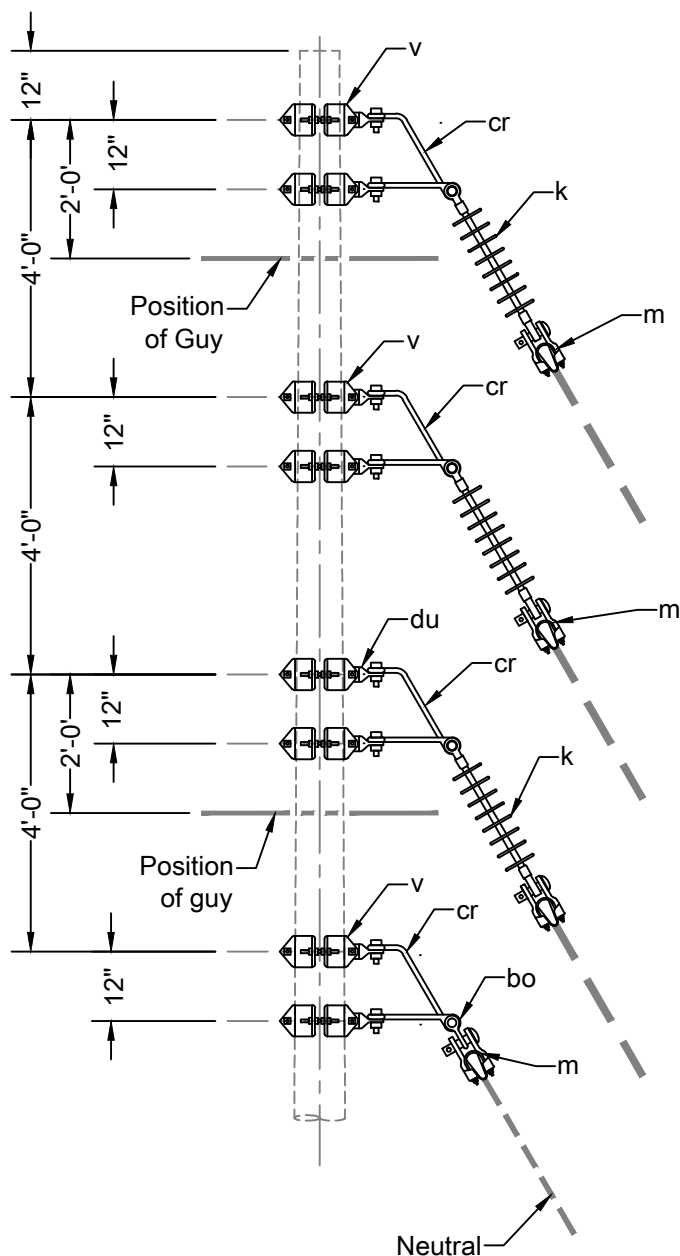
7.2 / 12.5 KV - 3 PHASE VERTICAL CONSTRUCTION - LARGE CONDUCTOR

Revision Date

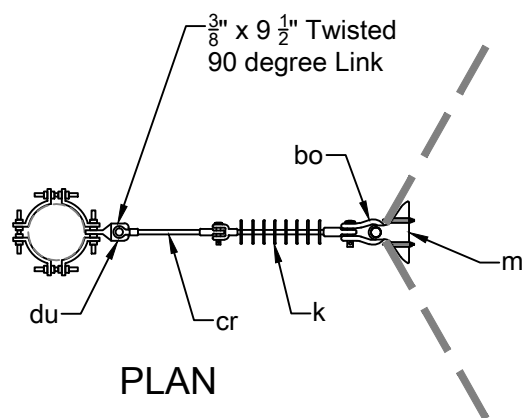
Dec 1, 2015



C3-1



POLE BAND DETAIL



PLAN

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	32	Screw, lag, 1/2" x 4"	bo	1	Shackle, anchor
k	3	Insulator, suspension, epoxilator	cr	4	Bracket, angle, 5/8"
m	4	Clamp, suspension	du	8	Link, Connecting, Twisted 90 degree
v	8	Pole Band, required diameter			

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor

Maximum line angle within load limits:
10° to 20° Angle.

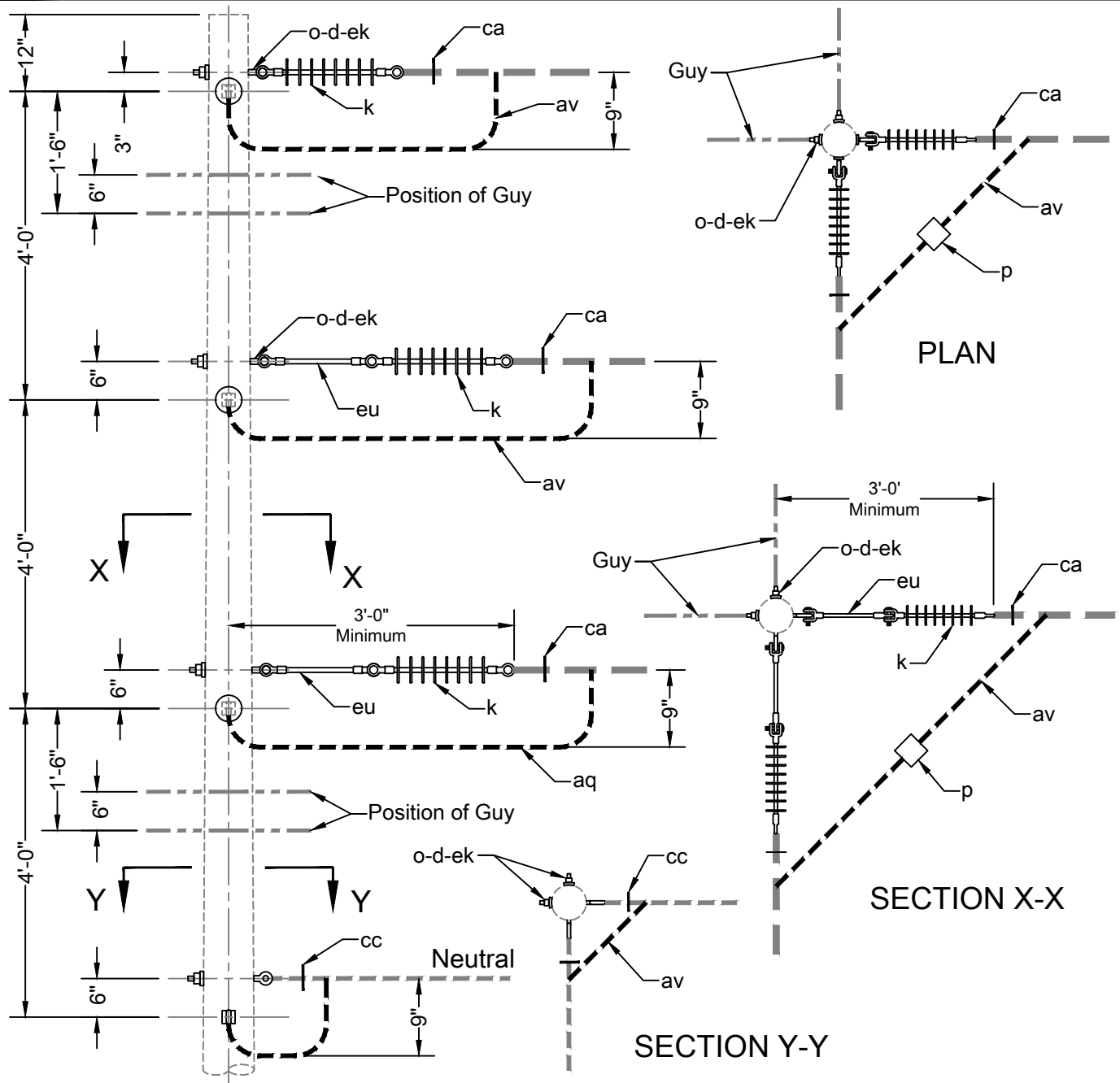
7.2 / 12.5 KV - 3 PHASE
VERTICAL CONSTRUCTION - LARGE CONDUCTOR

Revision Date

Dec 1, 2015



C3-1L



Item ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
d	8	Washer, square, 3", curved	av	-	Jumpers, as required
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
o	8	Bolt, eye, 5/8" x required length	cc	2	Deadend assembly, neutral
p	-	Connectors, as required	ek	-	Locknut, as required
eu	4	Insulator, fiberglass, strain			

DESIGN LIMITS

Maximum line angle within load limits:
60° to 90° Angle.

Modified to meet 2005 RUS Standards

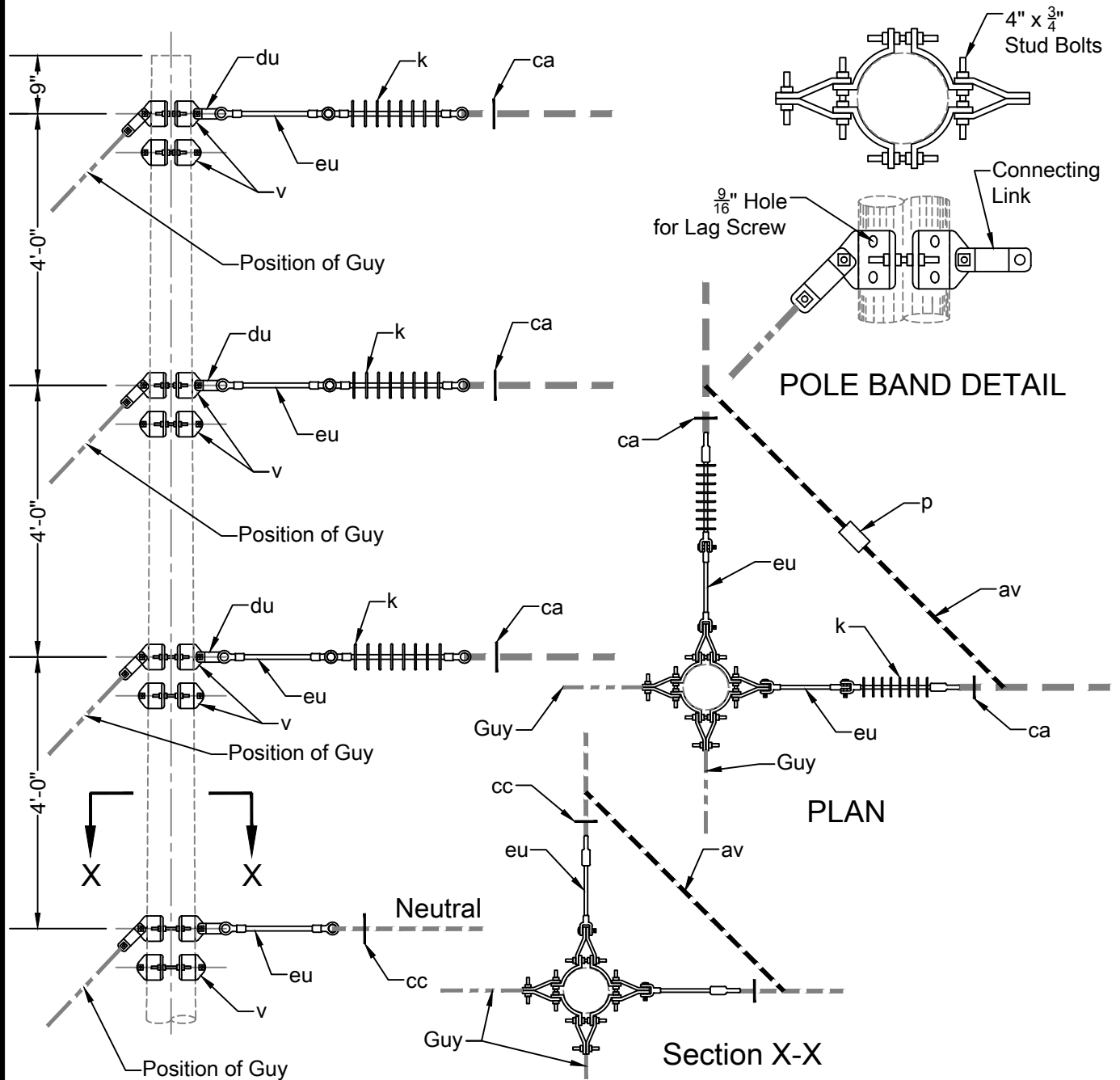
12.5 / 7.2 KV PRIMARY, 3-PHASE
VERTICAL CONSTRUCTION - 60° TO 90° ANGLE

Revision Date

Dec 1, 2015



C4-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
eu	8	Link, extension, insulated	av	-	Jumpers, as required
j	32	Screw, Lag, 1/2" x 4"	du	8	Link, connecting
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
p	-	Connectors, as required	cc	2	Deadend assembly, neutral
v	8	Pole band, required diameter			

NOTE:

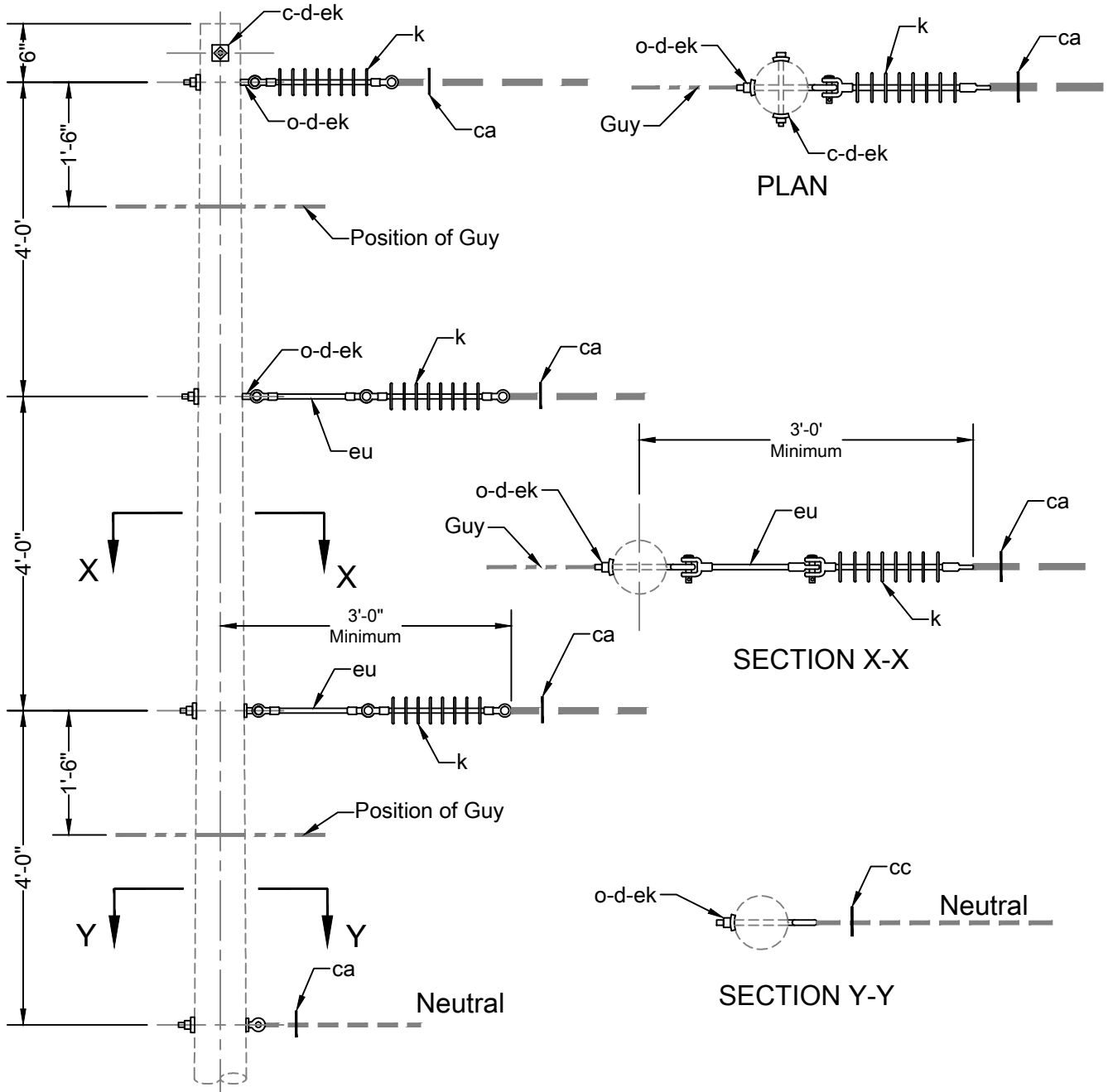
Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.

7.2 / 12.5 KV, 3-PHASE
 VERTICAL CONSTRUCTION - POLE BAND
 (LARGE CONDUCTOR)

Revision Date

Dec 1, 2015

**C4-1L**



Item ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	ca	3	Deadend assembly, primary
d	5	Washer, square, 3", curved	cc	1	Deadend assembly, neutral
k	3	Insulator, suspension, epoxilator	ek	-	Locknut, as required
o	4	Bolt, eye, 5/8" x required length			
eu	2	Insulator, fiberglass, strain			

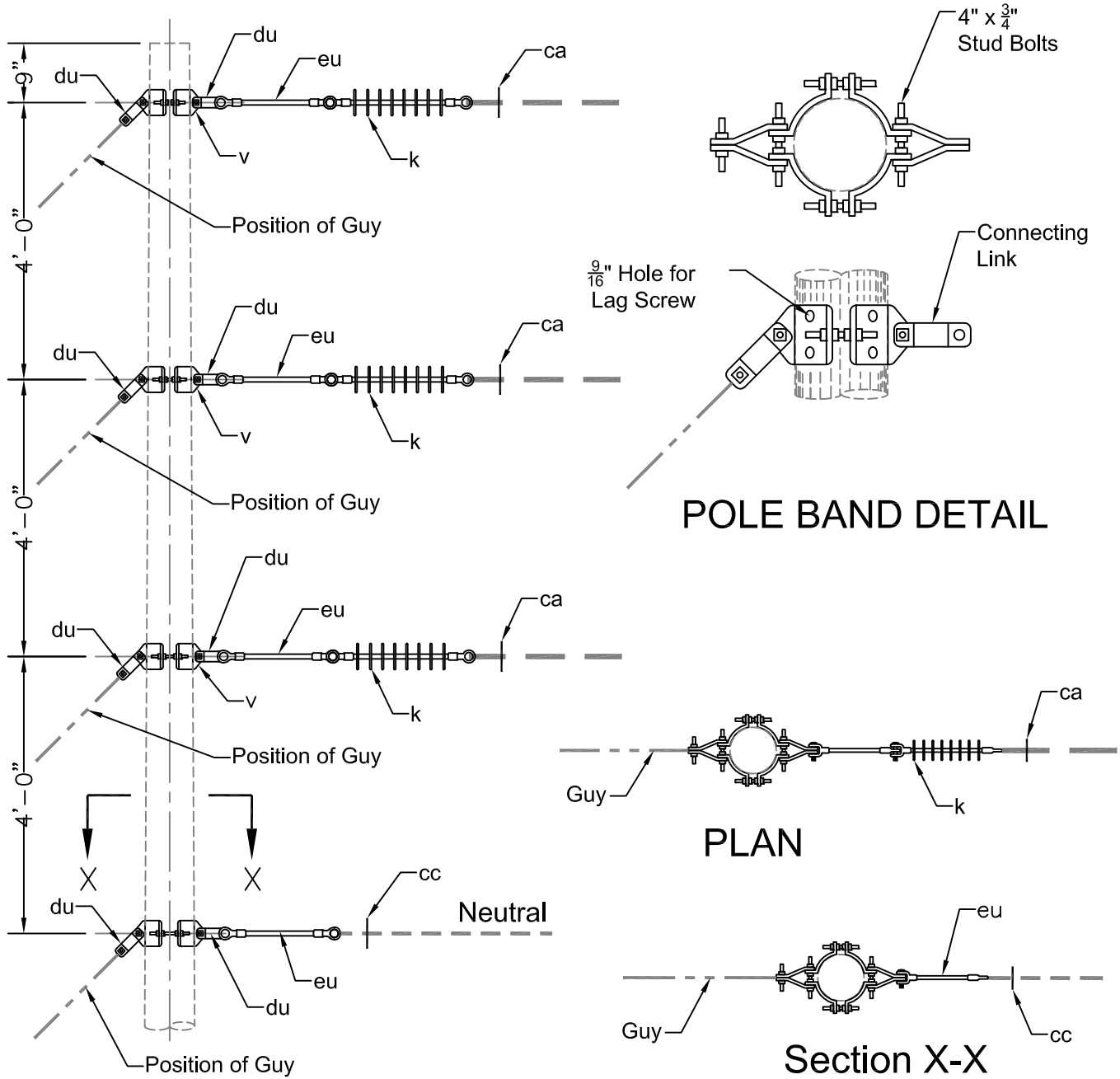
**12.5 / 7.2 KV PRIMARY, 3-PHASE
VERTICAL CONSTRUCTION - DEADEND (SINGLE)**

Revision Date

Dec 1, 2015



C5-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
eu	4	Link, extension, insulated	av	-	Jumpers, as required
j	16	Screw, Lag, 1/2" x 4"	du	8	Link, connecting (pair)
k	3	Insulator, suspension, epoxilator	ca	3	Deadend assembly, primary
p	-	Connectors, as required	cc	1	Deadend assembly, neutral
v	4	Pole band, required diameter			

NOTE:

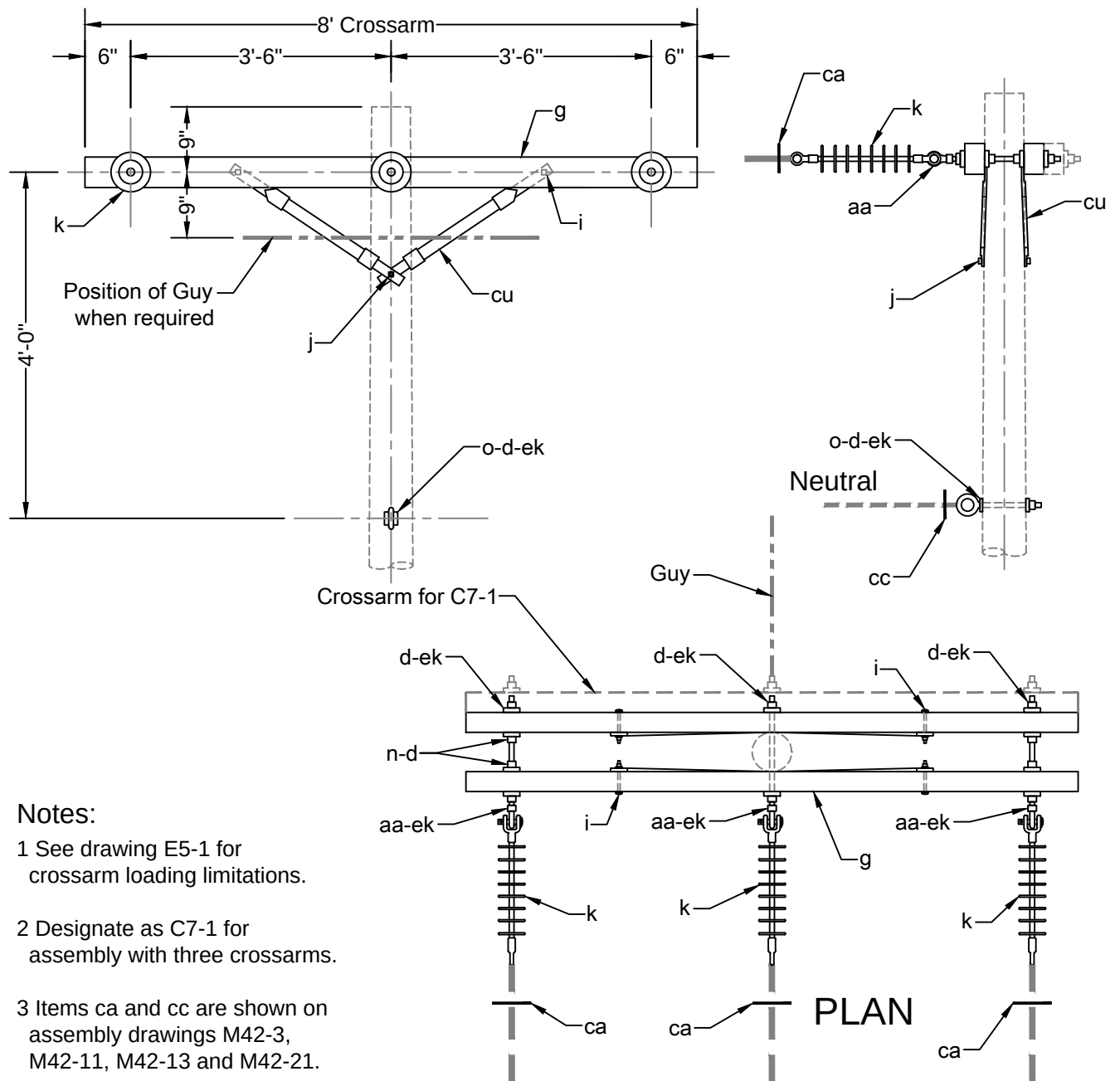
Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.

7.2 / 12.5 KV - 3 PHASE
 VERTICAL CONSTRUCTION - POLE BAND
 (LARGE CONDUCTOR)

Revision Date

Jan 21, 2021

**C5-1L**



Notes:

- 1 See drawing E5-1 for crossarm loading limitations.
- 2 Designate as C7-1 for assembly with three crossarms.
- 3 Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	10	Washer, 2 1/4" square, 13/16" hole	o	1	Bolt, eye, 5/8" x required length
d	2	Washer, square, 3" curved	aa	3	Nut, eye, 5/8"
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ca	3	Deadend assembly, primary
i	4	Bolt, carriage, 3/8" x 4 1/2"	cc	1	Deadend assembly, neutral
j	2	Screw, lag, 1/2" x 4"	cu	2	Brace, wood, 28" pair
k	3	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	3	Bolt, double arming, 5/8" x required length			

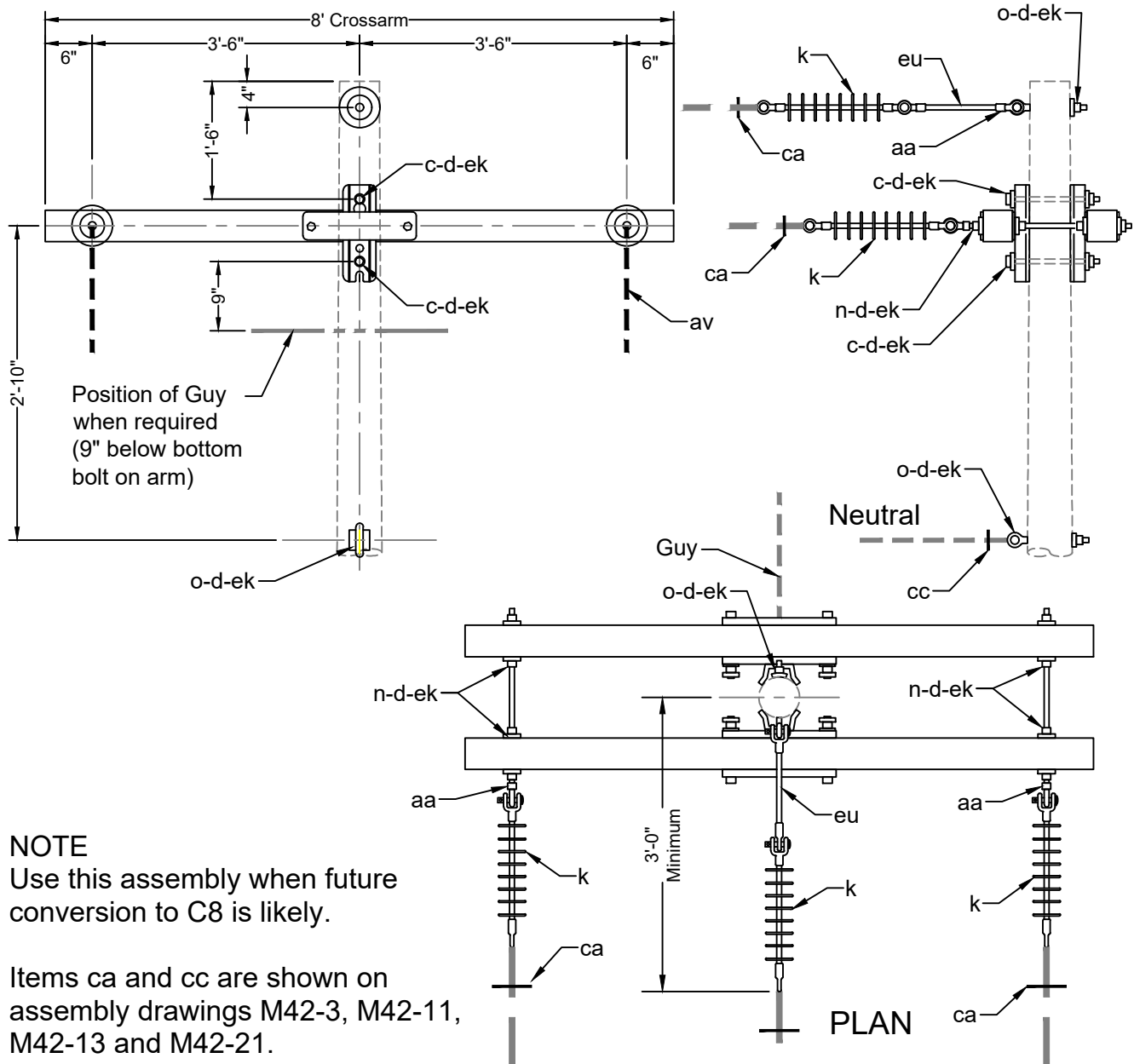
12.5 / 7.2 KV, 3-PHASE CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Feb 21, 2018



C7, C7-1



NOTE

Use this assembly when future conversion to C8 is likely.

Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	12	Washer, 2 1/4" square, 13/16" hole	aa	3	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers and leads as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ca	3	Deadend assembly, primary
k	3	Insulator, suspension, epoxilator	cc	1	Deadend assembly, neutral
n	3	Bolt, double arming, 5/8" x required length	ek	-	Locknuts, as required
o	2	Bolt, eye, 5/8" x required length	eu	1	Insulator, fiberglass, strain

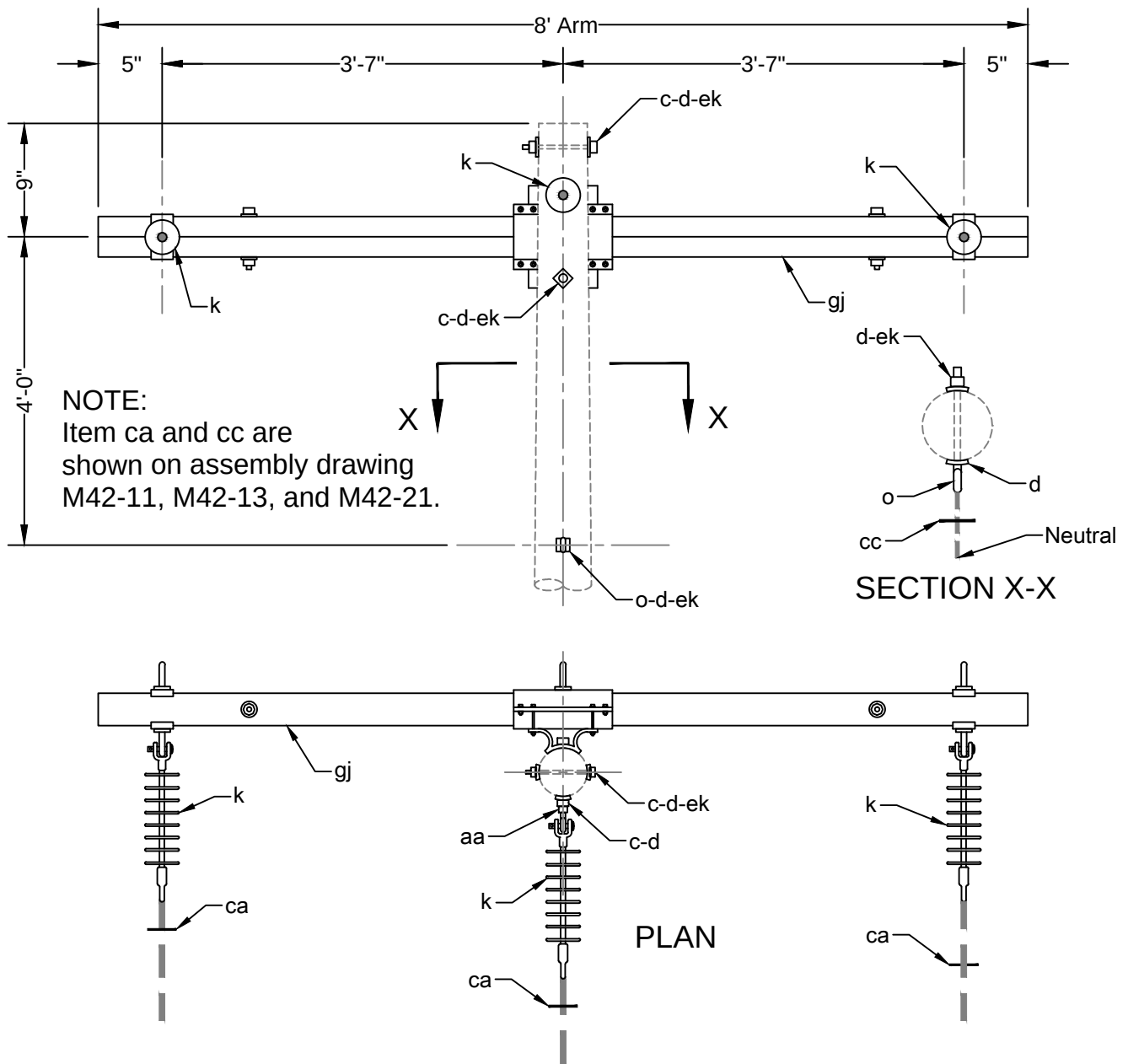
12.5 / 7.2 KV, 3-PHASE CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Dec. 27, 2022



C7-2



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 3/4"
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
k	3	Insulator, suspension, epoxilator 7.2 KV	gj	1	8' - Crossarm assembly, DE
o	1	Bolt eye, 5/8" x required length	ek	-	Locknuts, as required

For 336 ACSR & 477 ACSR
C7A/8 is preferred

7.2 / 12.5 KV, 3-PHASE

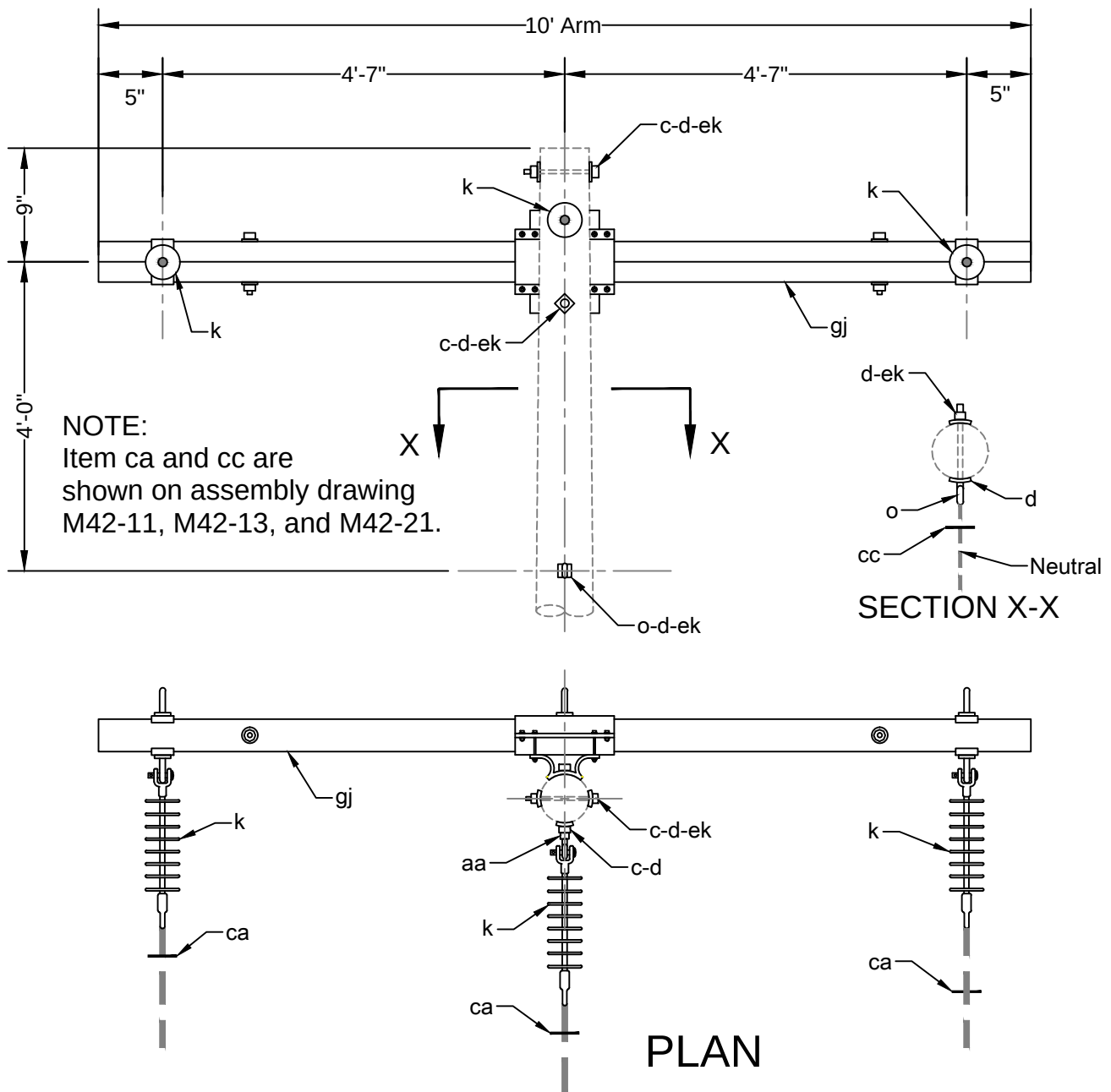
8' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

Feb 20, 2018



C7A/8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 3/4"
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
k	3	Insulator, suspension, epoxilator	gj	1	10' - Crossarm assembly, DE
o	1	Bolt eye, 5/8" x required length	ek	-	Locknuts, as required

For 336 ACSR & 477 ACSR
C7A/8 is Preferred

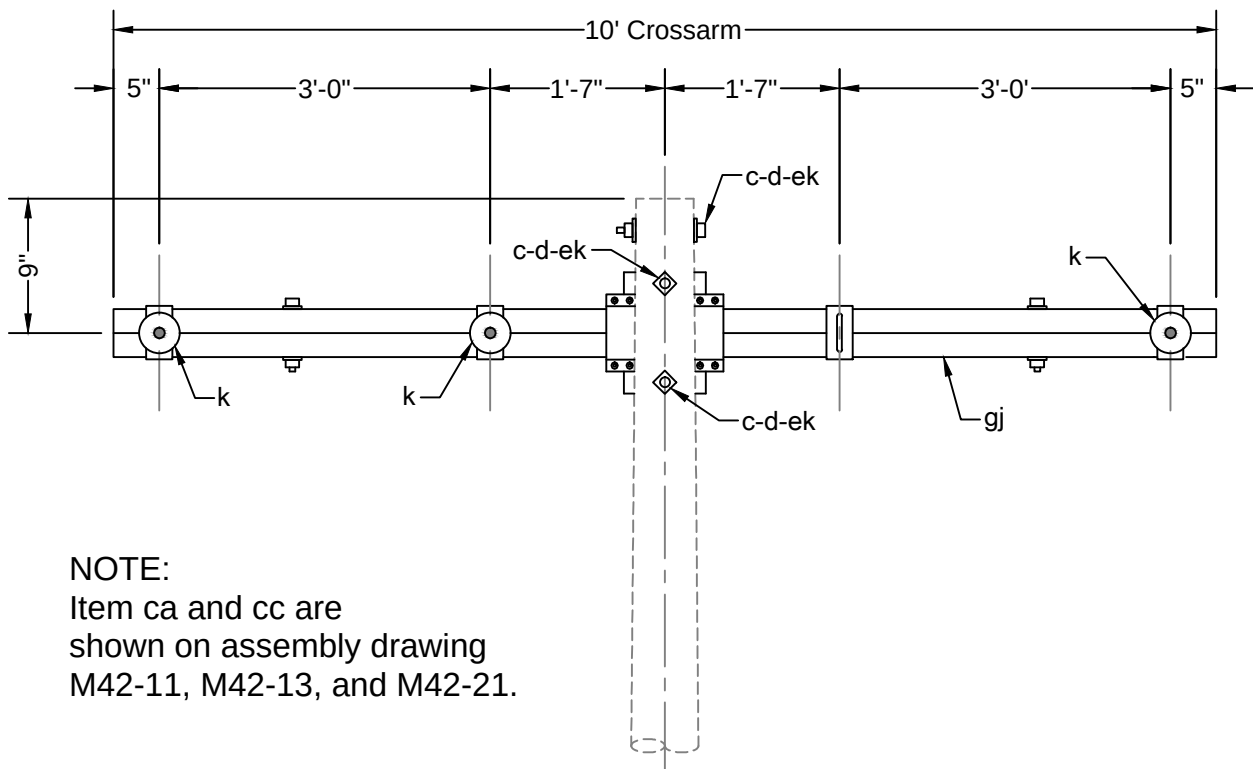
7.2 / 12.5 KV, 3-PHASE
10' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

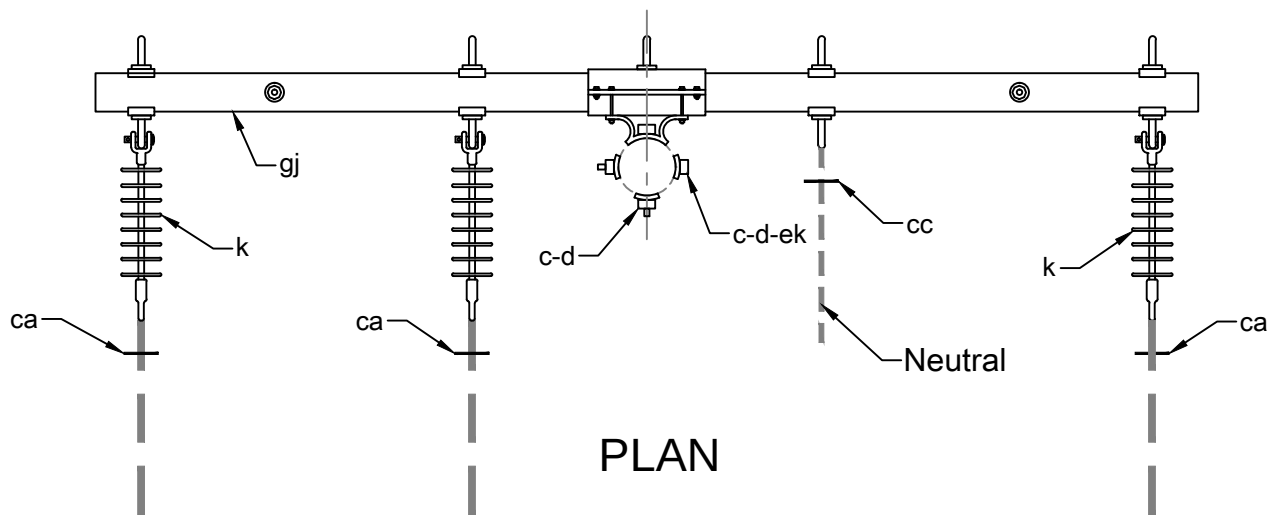
Feb 20, 2018



C7A/10



NOTE:
Item ca and cc are
shown on assembly drawing
M42-11, M42-13, and M42-21.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
c	1	Bolt, machine 5/8" x required length	cc	1	Deadend assembly, Neutral
d	4	Washer, Square, curved 3"	gj	1	Crossarm assembly, DE 10'
k	3	Insulator, suspension, epoxilator	ek	-	Locknuts, as required

7.2 / 12.5 KV, 3-PHASE

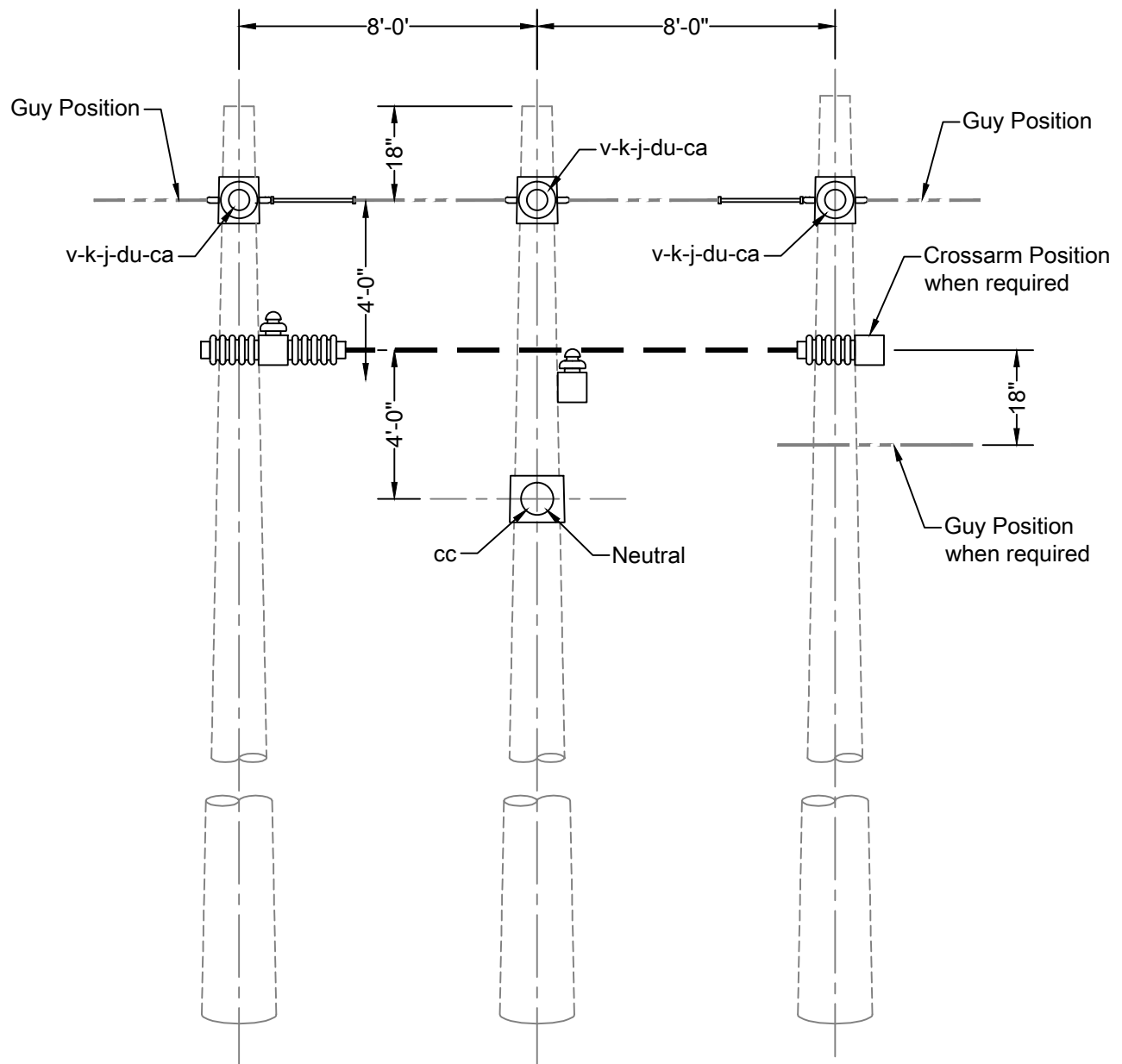
10' CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

Feb 16, 2018



C7A/10F



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
av	-	Jumpers, as required	j	12	Screw, lag, 1/2" x 4"
du	16	Link, connecting	k	3	Insulator, suspension
ek	-	Locknuts, as required	p	-	Connector, as required
			v	4	Pole Band, required diameter

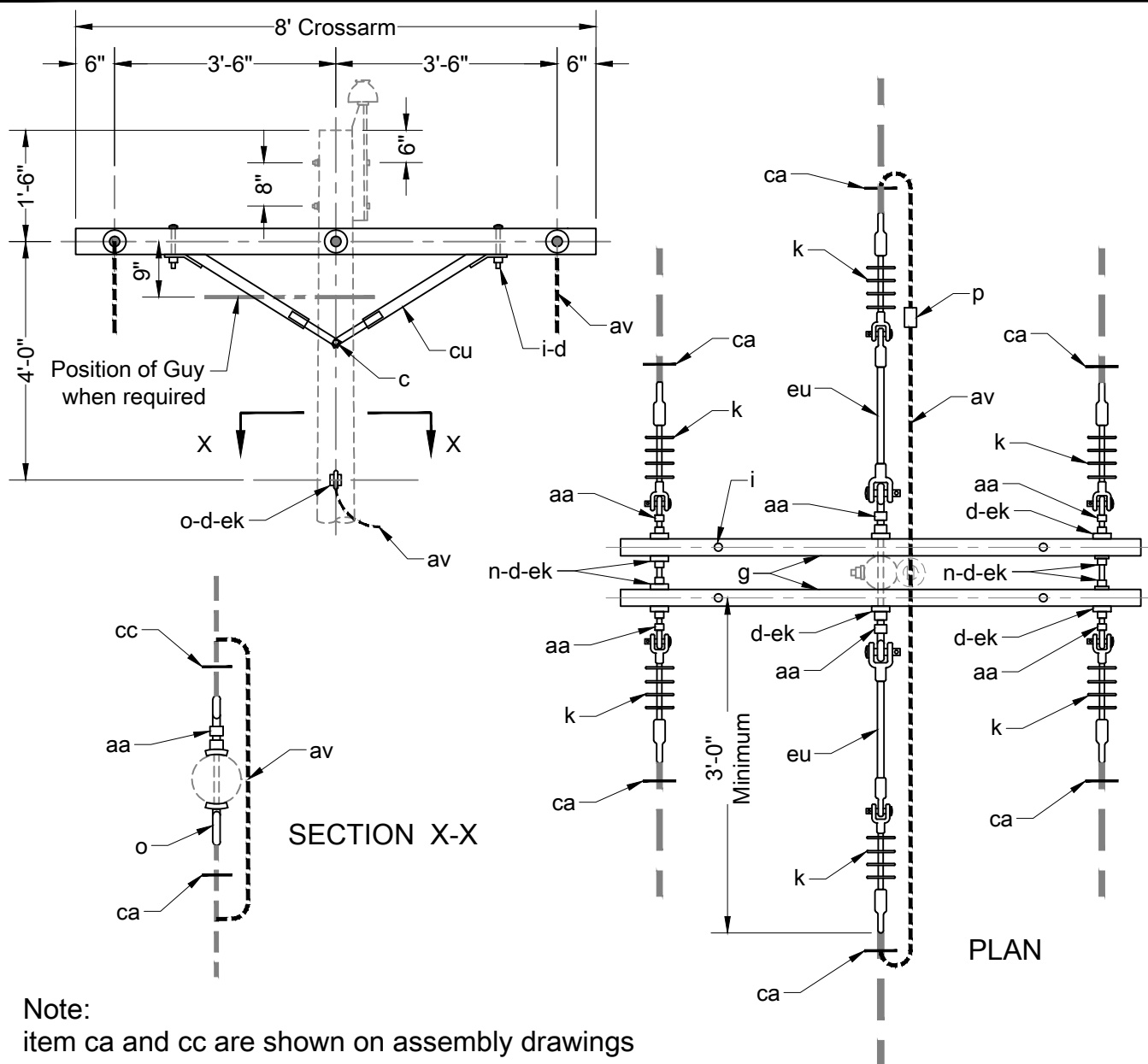
12.5 / 7.2 KV PRIMARY, 3 PHASE
3 POLE DEAD-END

Revision Date

Jan 25, 2016



C7-3P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	10	Washer, 2 1/4" square, 13/16" hole	aa	7	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers, and lead as required
g	2	Crossarm 3 3/4" x 4 3/4" x 8'-0"	ca	6	Deadend assembly, primary
i	4	Bolt, carriage, 1/2" x 4 1/2"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxilator	cu	2	Brace, wood, 60" span
n	3	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required

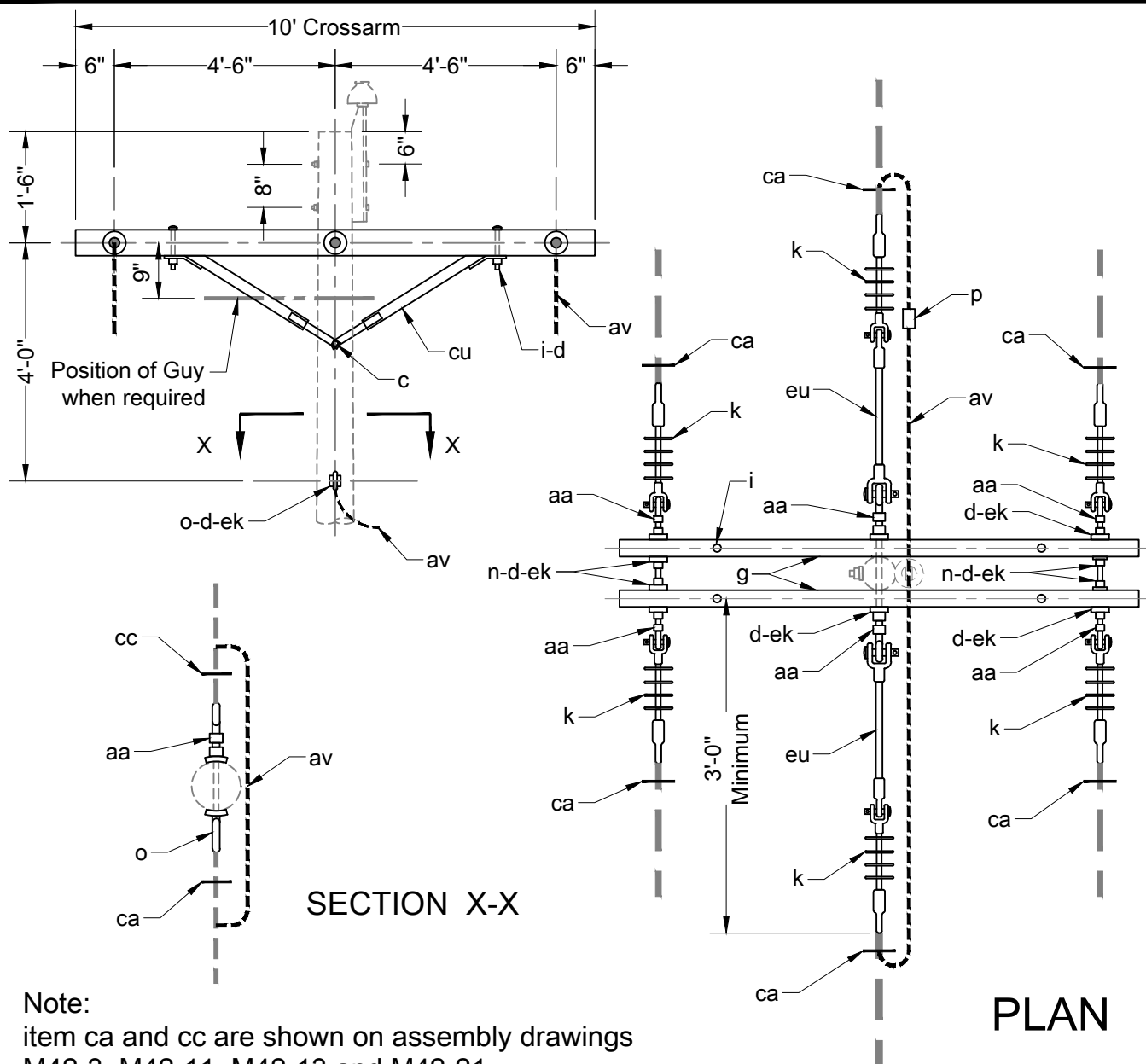
7.2 / 12.5 KV, 3-PHASE
8' CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Feb 21, 2018



C8



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	10	Washer, 2 1/4" square, 13/16" hole	aa	7	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers, and lead as required
g	2	Crossarm 3 3/4" x 4 3/4" x 10'-0"	ca	6	Deadend assembly, primary
i	4	Bolt, carriage, 1/2" x 4 1/2"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxilator	cu	2	Brace, wood, 60" span
n	3	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required

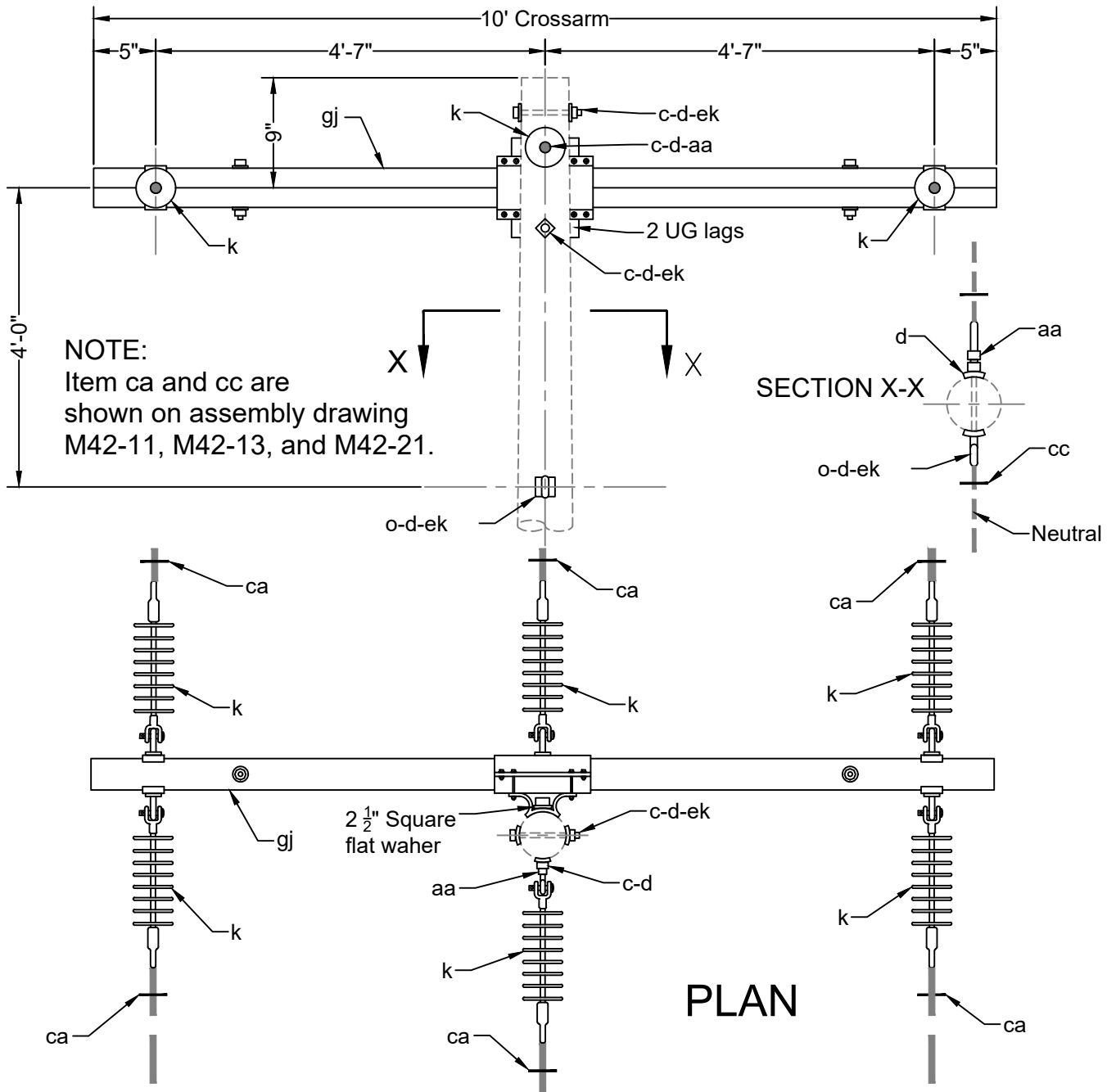
7.2 / 12.5 KV, 3-PHASE
10' CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Feb 21, 2018



C8X



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 5/8"
c	2	Bolt, machine 3/4" x required length	aa	1	Nut, eye, 3/4"
d	1	Washer, 2 1/2" square, flat, at top mount	ca	6	Deadend assembly, Primary
d	6	Washer, 3" Square, curved	cc	2	Deadend assembly, Neutral
k	6	Insulator, suspension, epoxilator	gj	1	10' Crossarm assembly, DE
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
				-	2 UG lags on bottom C8A10

For 336 ACSR & 477 ACSR
C8A/8 is Preferred

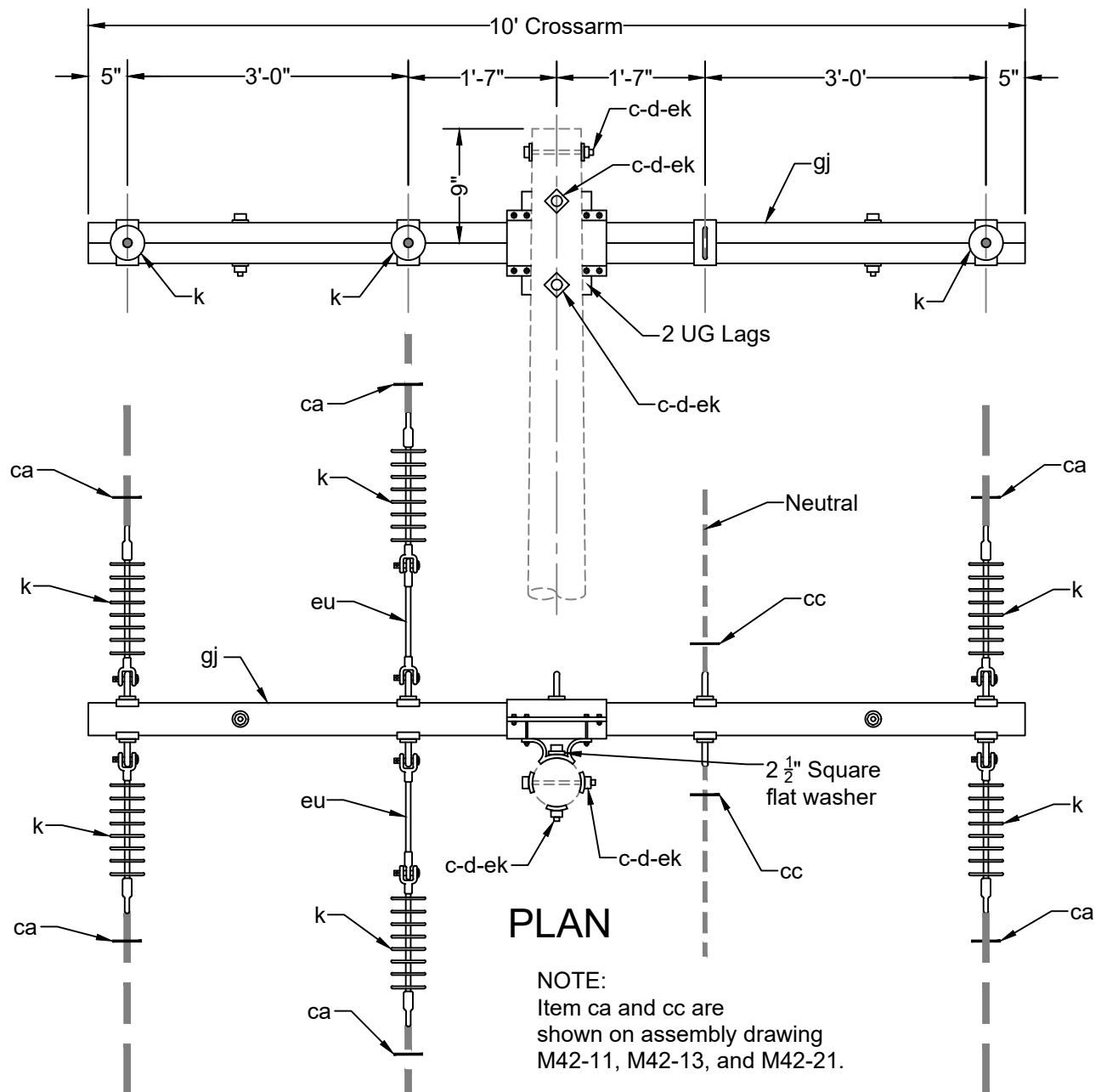
7.2 / 12.5 KV, 3-PHASE
10' - CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Jan. 16, 2023



C8A/10



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	6	Deadend assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend assembly, Neutral
d	4	Washer, Square, curved 3"	eu	2	Link, extension, insulated
d	1	Washer, 2 1/2" Square, flat, at top mount	gj	1	10' Crossarm assembly, DE
k	6	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
				2	UG Lags on bottom C8A/10F

C8A/10F

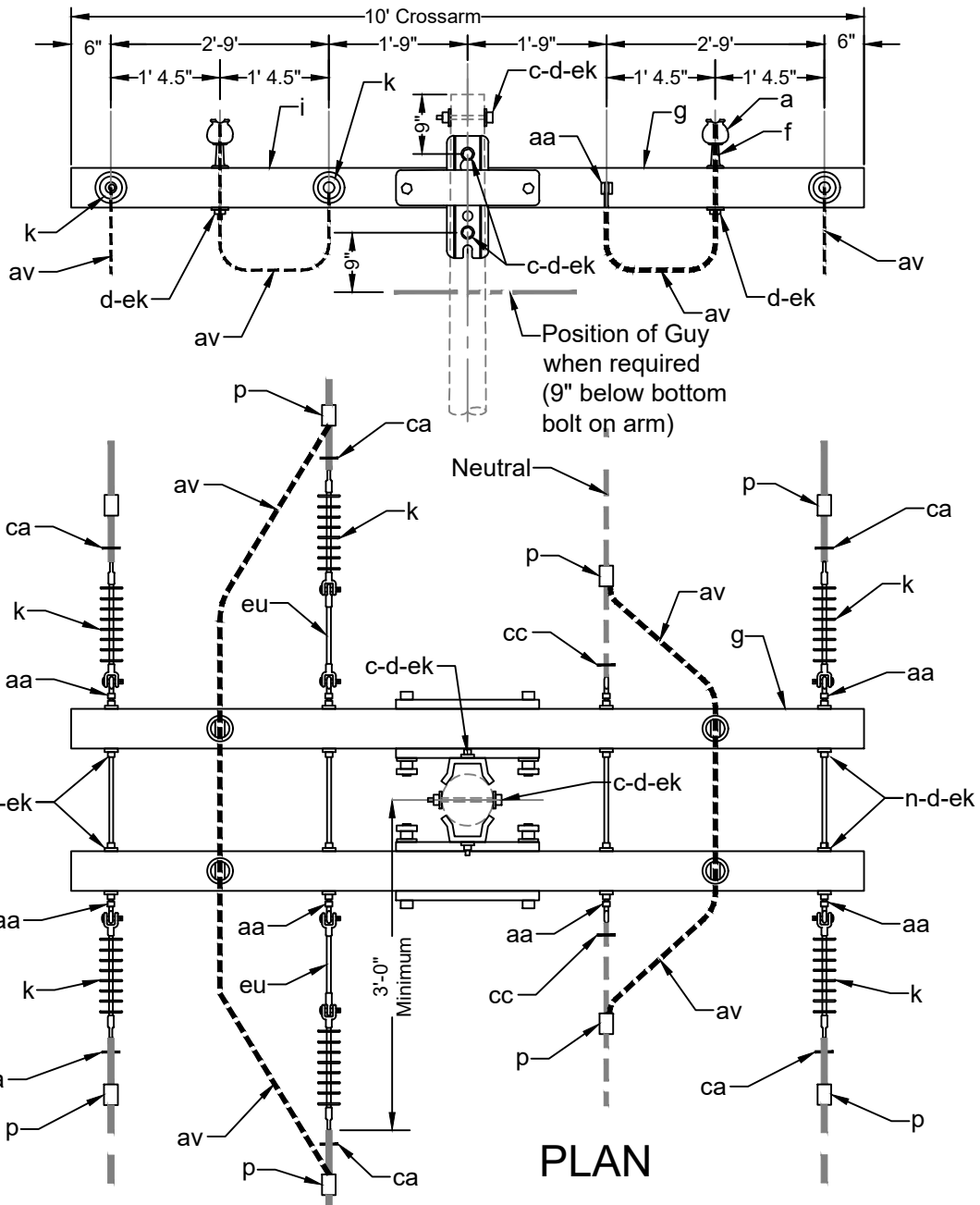
Revision Date

Jan. 17, 2023



C8A/10F

7.2 / 12.5 KV, 3-PHASE
CROSSARM CONSTRUCTION - DEAD END (DOUBLE)



PLAN

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	p	-	Connectors, as required
c	3	Bolt, machine, 5/8" x required length	aa	8	Nut, eye, 5/8"
d	24	Washer, 2 1/4" square, 13/16" hole	av	-	Jumper and leads as required
d	2	Washer, 2 1/4" square, curved	eu	2	Link, extension, fiberglass
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	ca	6	Deadend assembly, primary
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxitator	ek	-	Locknuts, as required
n	4	Bolt, double arming, 5/8" x required length			

Modified to meet
2005 RUS Standards

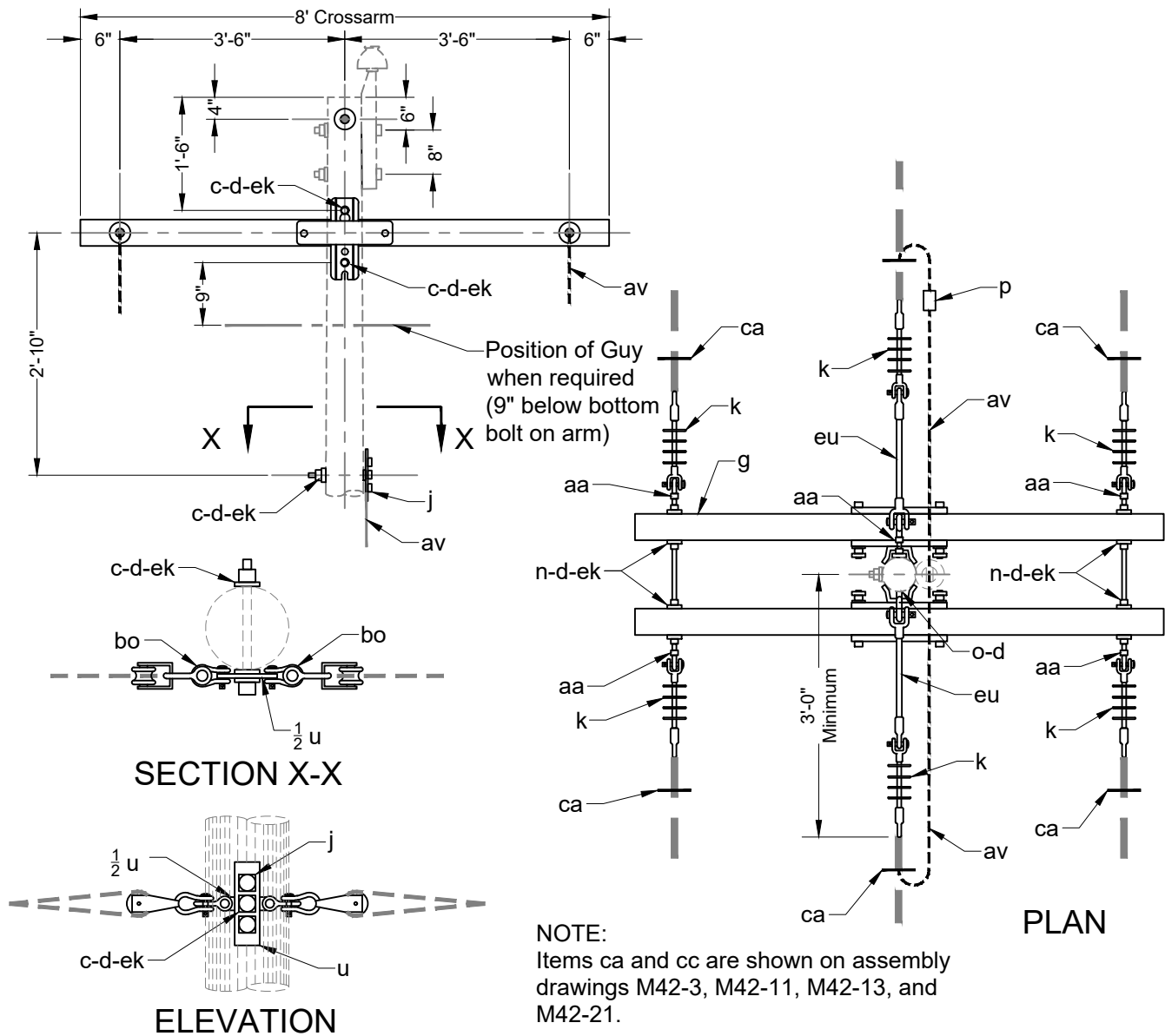
7.2/12.5 KV, 3-PHASE
CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Dec. 21, 2022



C8-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	u	1 1/2	Camp, guy, 6" heavy duty
d	14	Washer, 2 1/4" square, 13/16" hole	aa	5	Nut, eye, 5/8"
d	2	Washer, square 3", curved	av	-	Jumpers, and lead as required
g	2	Fiberglass Crossarm 3 3/4" x 4 3/4" x 8'	bo	4	Shackle, anchor
j	2	Screw, lag, 1/2" x 4"	ca	6	Deadend assembly, primary
k	6	Insulator, suspension, epoxilator	cc	2	Deadend assembly, neutral
n	2	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
p	-	Connectors, as required			

Modified to Meet
2005 RUS Standards

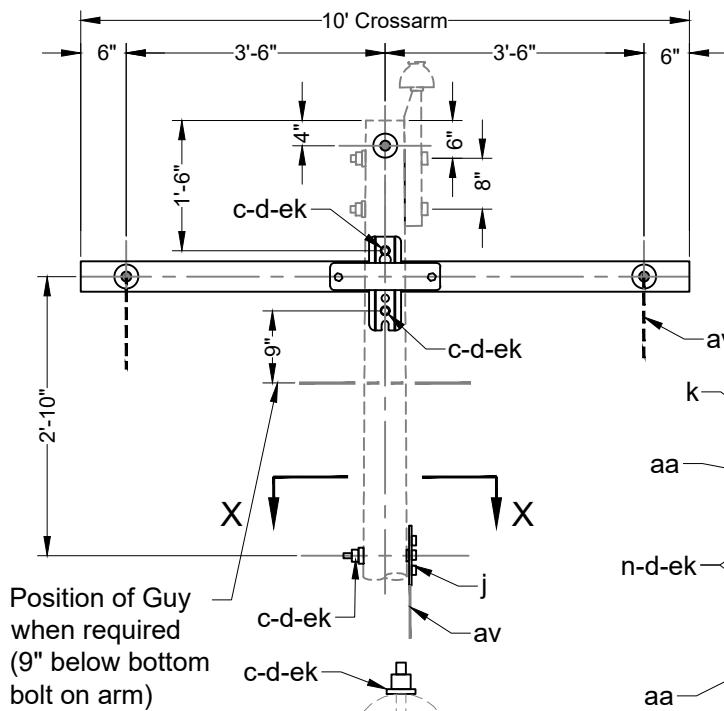
7.2 / 12.5 KV, 3-PHASE
8' CROSSARM CONSTRUCTION - DOUBLE DEAD END
(LARGE CONDUCTORS)

Revision Date

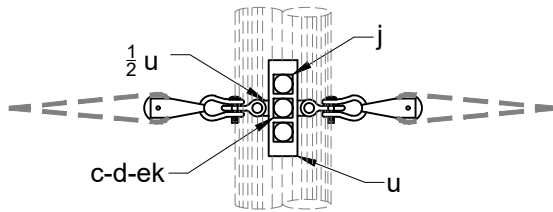
Dec. 21, 2022



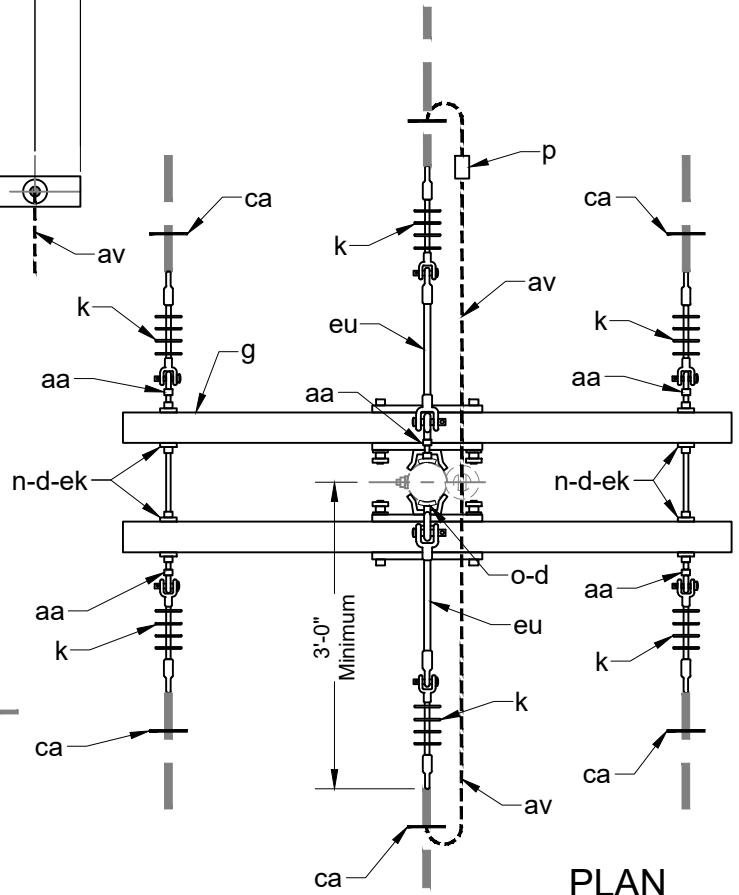
C8-2



SECTION X-X



ELEVATION



PLAN

NOTE:
Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	u	1 1/2	Camp, guy, 6" heavy duty
d	13	Washer, 2 1/4" square, 13/16" hole	aa	5	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers, and lead as required
g	2	Fiberglass Crossarm 3 3/4" x 4 3/4" x 10'	bo	4	Shackle, anchor
j	2	Screw, lag, 1/2" x 4"	ca	6	Deadend assembly, primary
k	6	Insulator, suspension, epoxilator	cc	2	Deadend assembly, neutral
n	2	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
p	-	Connectors, as required			

Modified to Meet
2005 RUS Standards

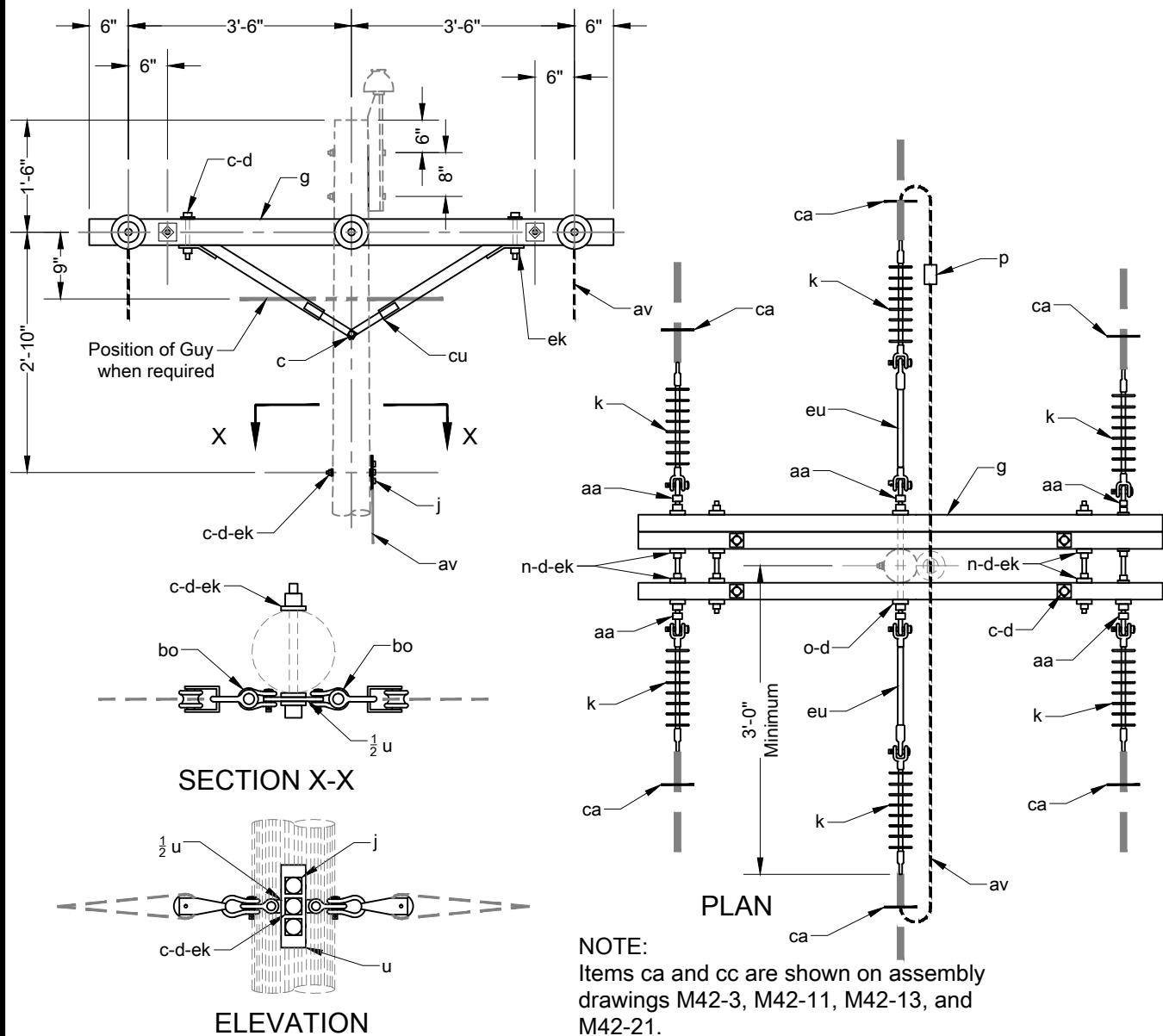
7.2 / 12.5 KV, 3-PHASE
10' CROSSARM CONSTRUCTION - DOUBLE DEAD END
(LARGE CONDUCTORS)

Revision Date

Dec. 21, 2022



C8-2X



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	u	1 1/2	Camp, guy, 6" heavy duty
c	4	Bolt, machine, 1/2" x required length	aa	5	Nut, eye, 5/8"
d	21	Washer, 2 1/4" square, 13/16" hole	av	-	Jumpers, and lead as required
g	3	Crossarm 3 3/4" x 4 3/4" x 8'	bo	4	Shackle, anchor
j	2	Screw. lag, 1/2" x 4"	ca	6	Deadend assembly, primary
k	6	Insulator, suspension, epoxilator	cc	2	Deadend assembly, neutral
n	5	Bolt, double arming, 5/8" x required length	cu	2	Brace, wood, 60" span
o	1	Bolt, eye, 5/8" x required length	eu	2	Link, extension, fiberglass
p	-	Connectors, as required	ek	-	Locknuts, as required

DESIGN PARAMETERS:
PERMITTED UNBALANCED
CONDUCTOR TENSION:
See Table A (Exhibit 2)

Maximum Line Angle = 5° Angle.

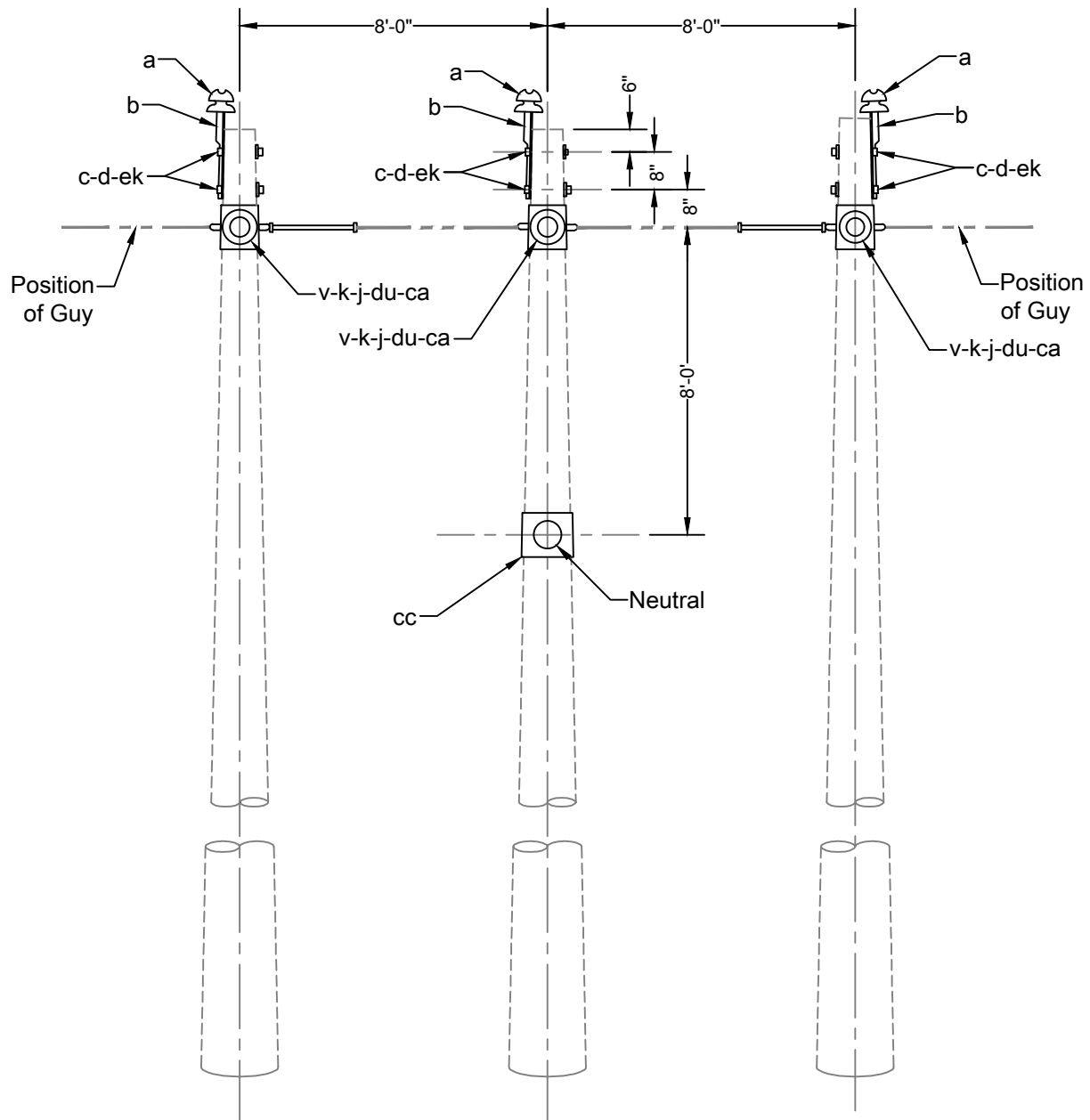
7.2 / 12.5 KV - 3 PHASE
CROSSARM CONSTRUCTION, DOUBLE DEADEND
LARGE CONDUCTORS WITH UNBALANCED LOADS

Revision Date

JAN 26, 2016



C8-3



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
a	3	Insulator, pin	ek	-	Lock nuts, as required
av	-	Jumpers, as required	du	24	Link, connecting
b	3	Pin, pole top	j	12	Screw, lag, 1/2" x 4"
c	6	Bolt, machine 5/8" x required length	k	6	Insulator, suspension
d	6	Washer, 2 1/4" square x 3/16", 13/16"	p	-	Connector, as required
			v	4	Pole Band, required diameter

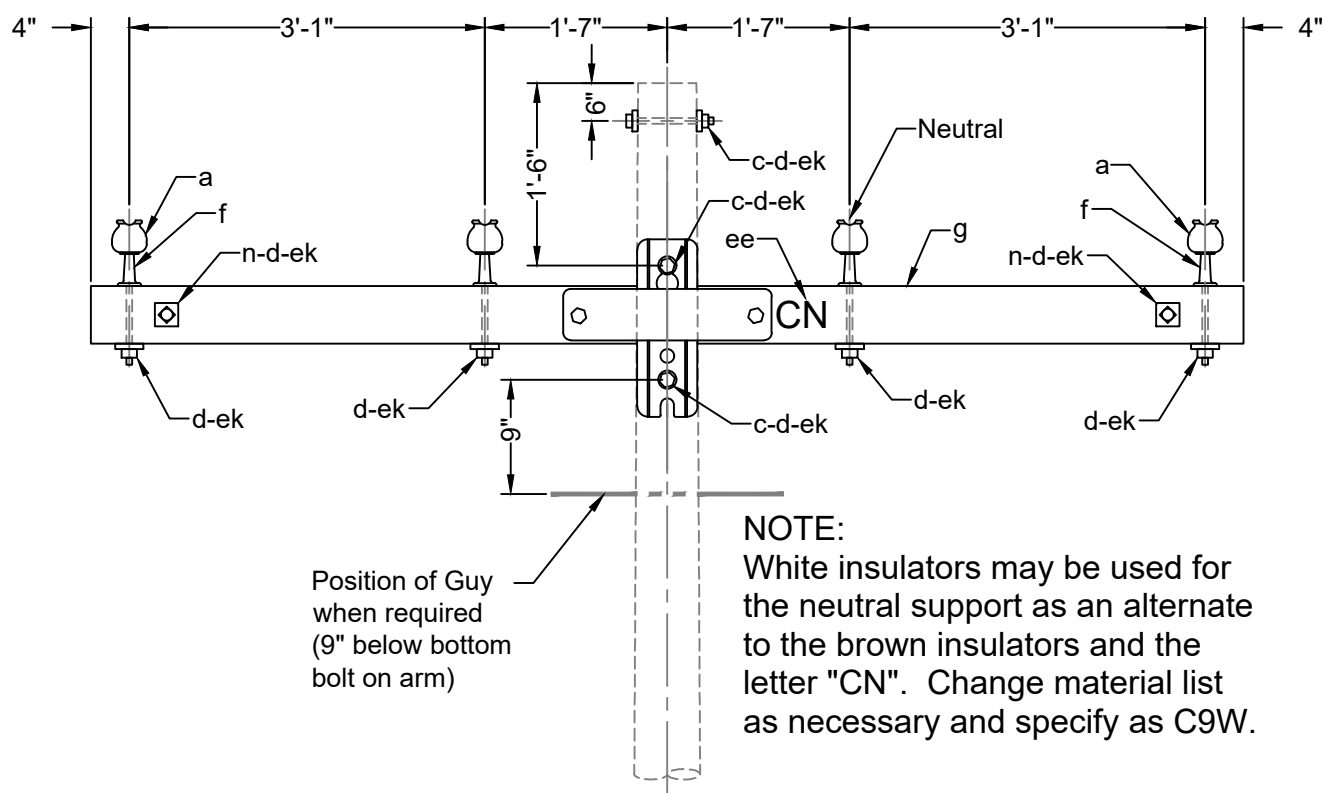
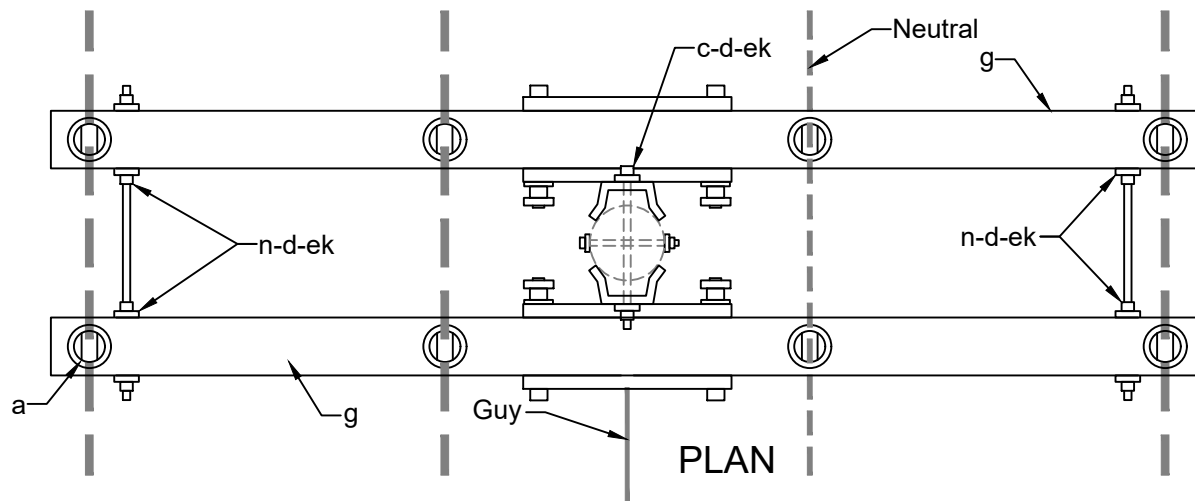
12.5 / 7.2 KV PRIMARY, 3 PHASE
3 POLE DEAD END (DOUBLE)

Revision Date

JAN 25, 2016



C8-3P



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	8	Insulator, pin type	n	3	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ee	4	Letters 2C, 2N with 1" nails
d	20	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, square, 3", curved			
f	8	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

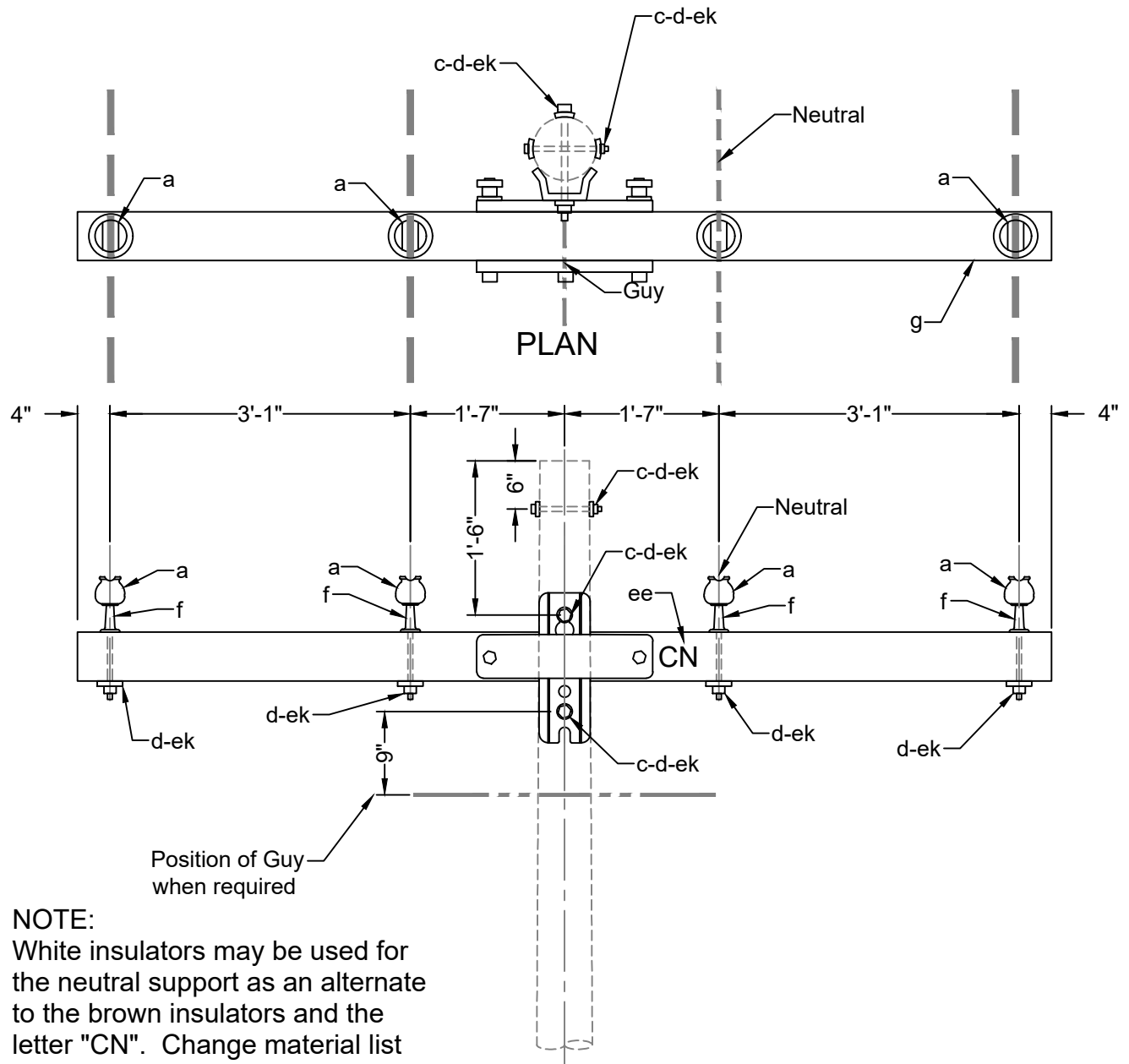
7.2 / 12.5 KV, 3-PHASE
CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 21, 2022



C9, C9W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	ee	4	Letters 2C, 2N with 1" nails
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	6	Washer, 2 1/4" square, 13/16" hole			
d	4	Washer, square, 3" curved			
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

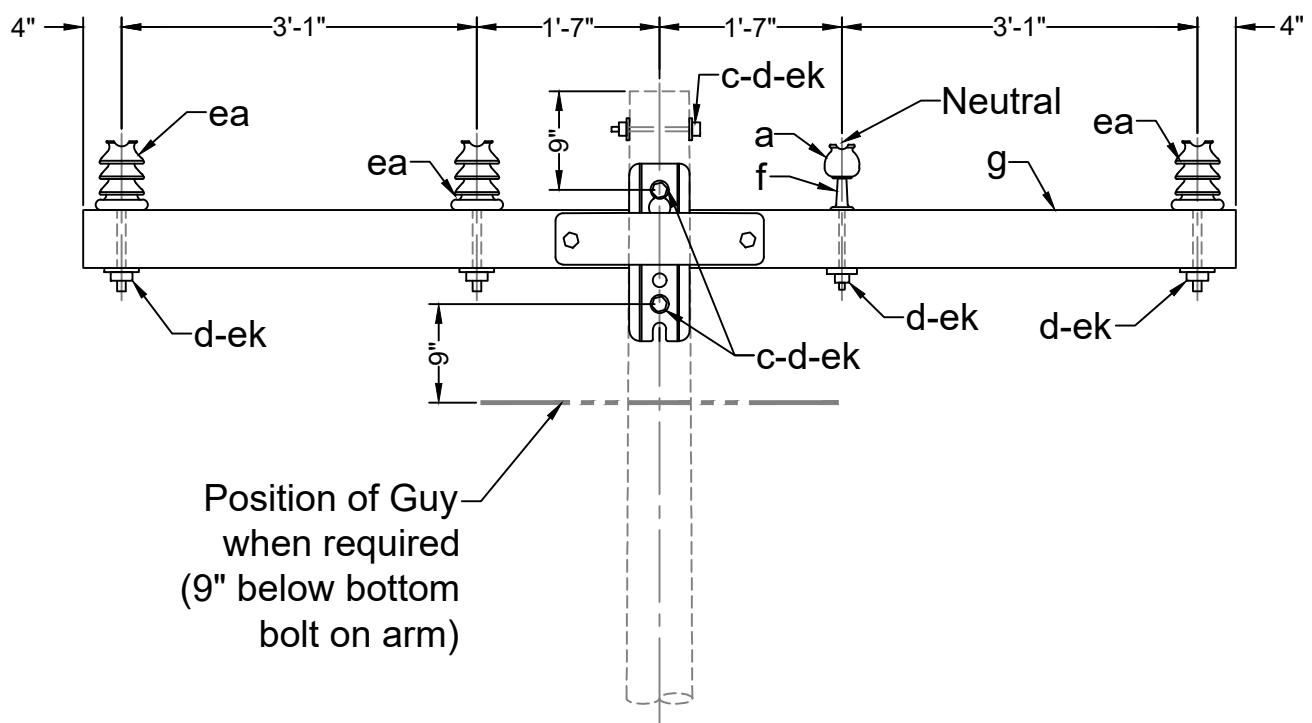
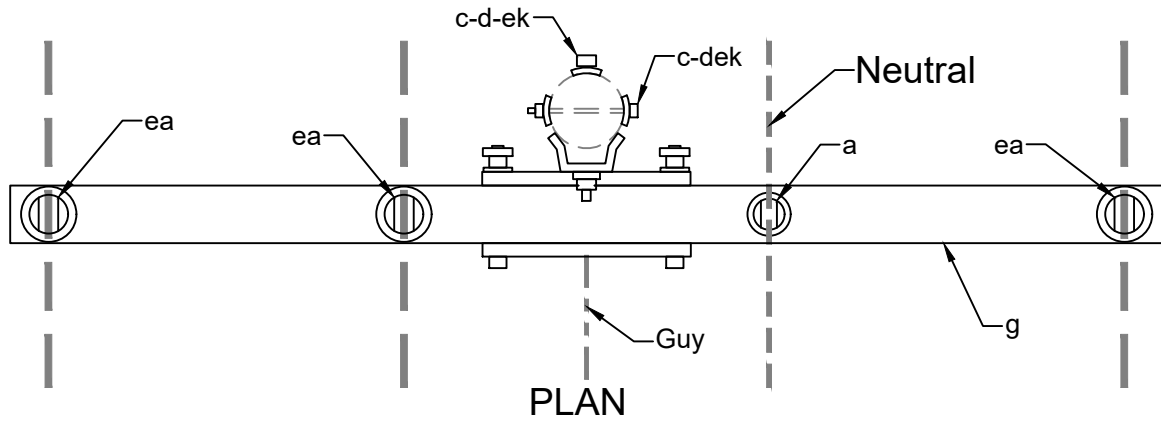
7.2 / 12.5 KV - 3-PHASE
CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 21, 2022



C9-1
C9-1W



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	ea	3	Insulator, post type
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	6	Washer, 2 1/4" square, 13/16" hole			
d	4	Washer, 3" square, curved			
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 3-PHASE

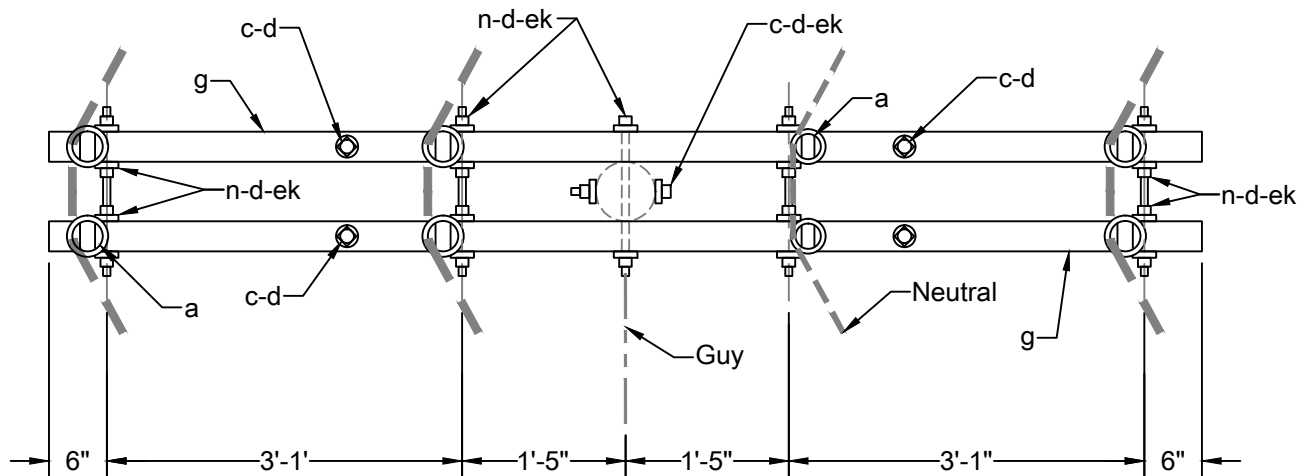
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT

Revision Date

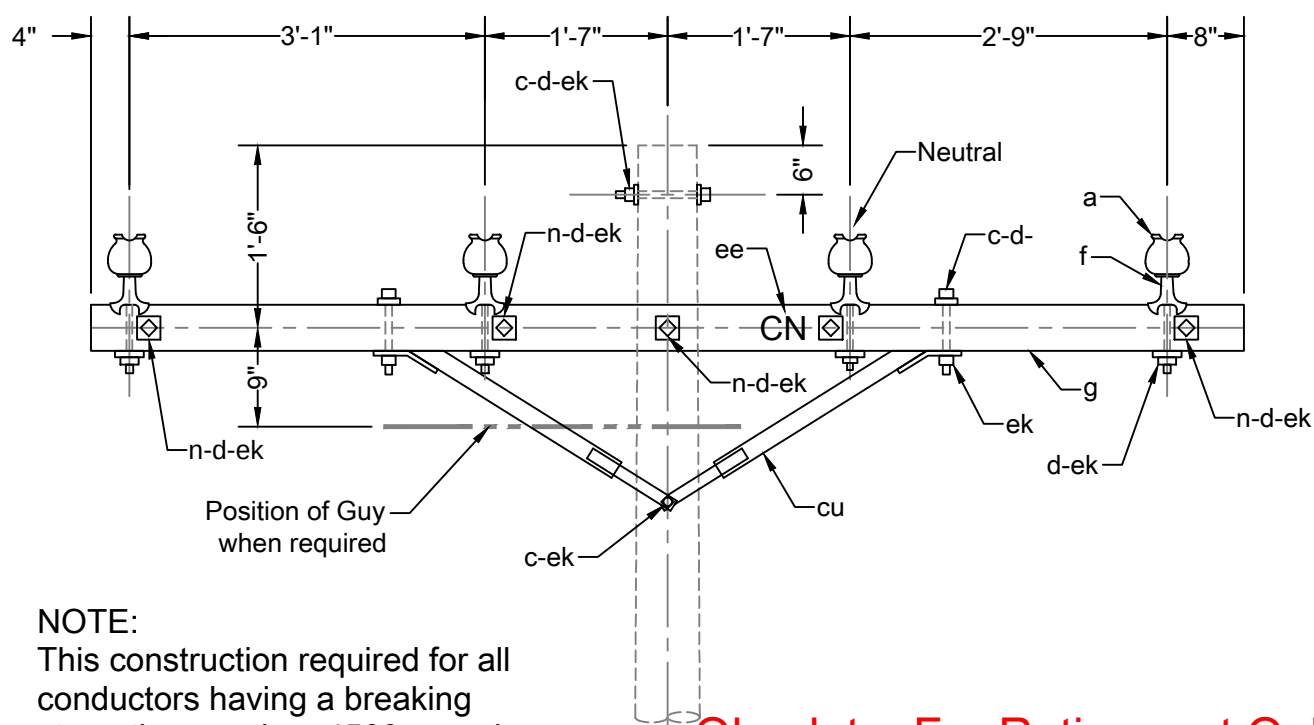
Dec. 21, 2022



C9-1P



PLAN



NOTE:

This construction required for all conductors having a breaking strength more than 4500 pounds.

Obsolete. For Retirement Only.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	8	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	2	Bolt, machine, 5/8" x required length	n	5	Bolt, double armed, 5/8" x required length
c	4	Bolt, machine, 1/2" x required length	cu	2	Brace, wood, 60" span
d	4	Washer, round, 1 3/8"	ee	4	Letters 2C, 2N with 1" nails
d	26	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	8	Pin, crossarm, steel, clamp type			

DESIGN LIMITS

Maximum transverse load:
2000 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV - 3 PHASE

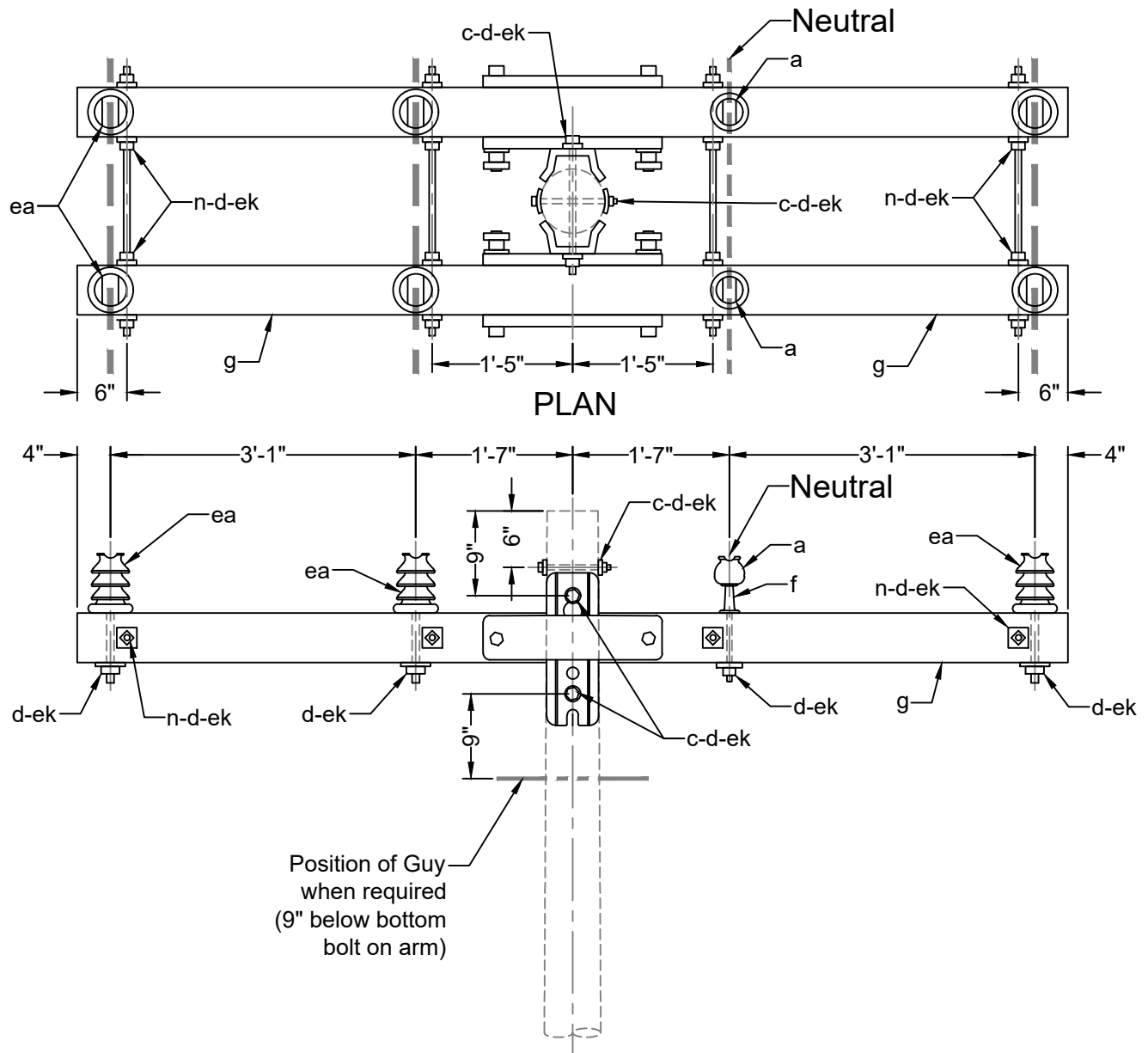
CROSSARM CONSTRUCTION - DOUBLE LINE ARM
(LARGE CONDUCTORS)

Revision Date

JAN 26, 2016



C9-2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	n	4	Bolt, double arming, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ea	6	Insulator, post type
d	28	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
5 Degrees

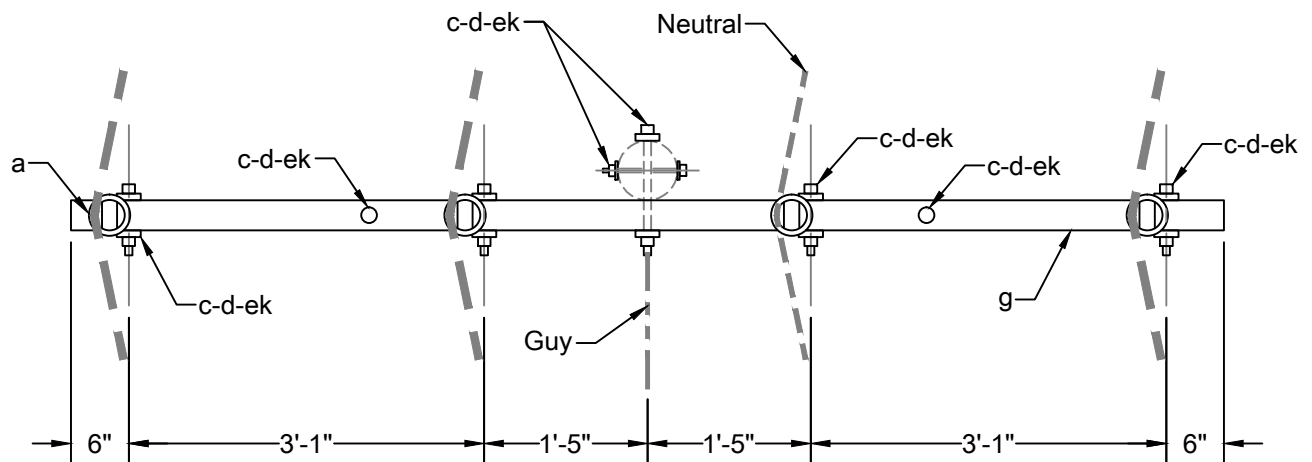
7.2 / 12.5 KV
3-PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT (LARGE CONDUCTOR)

Revision Date

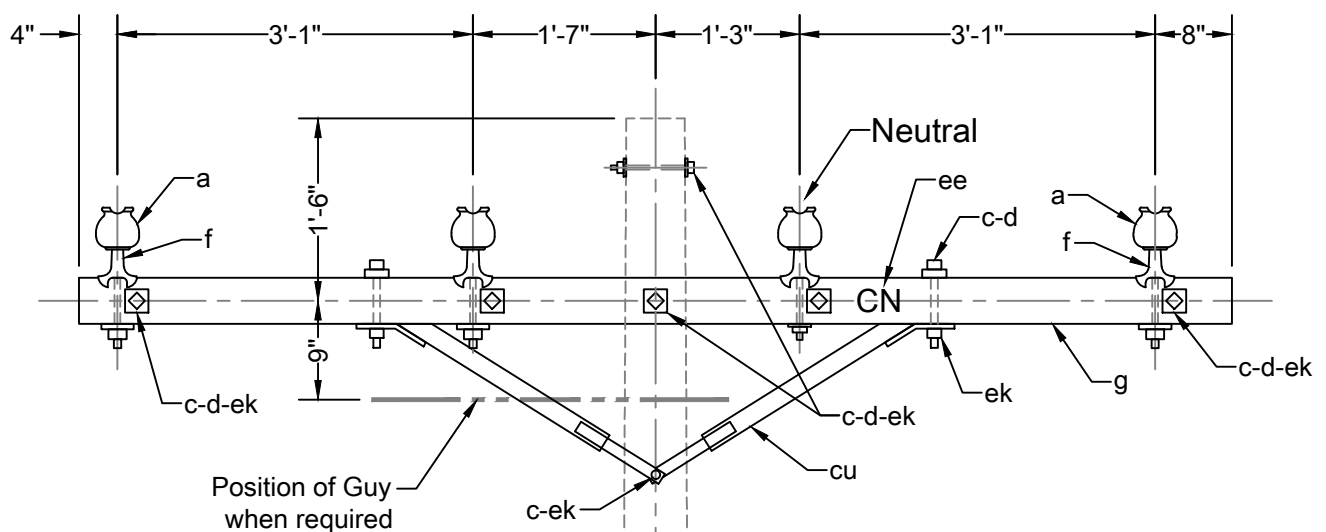
Dec 22, 2022



C9-2PL



PLAN



NOTE:

This construction required for all conductors having a breaking strength more than 4500 pounds.

Obsolete. For Retirement Only.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	7	Bolt, machine, 5/8" x required length	cu	1	Brace, wood, 60"span
c	2	Bolt, machine, 1/2" x required length	ee	4	Letters (2) C, (2) N with 1" nails
d	2	Washer, round, 1 3/8"	ek	-	Locknuts, as required
d	14	Washer, 2 1/4" square, 13/16" hole			
d	2	Washer, 3" square, curved			
f	4	Pin, crossarm, steel, clamp type			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV - 3 PHASE

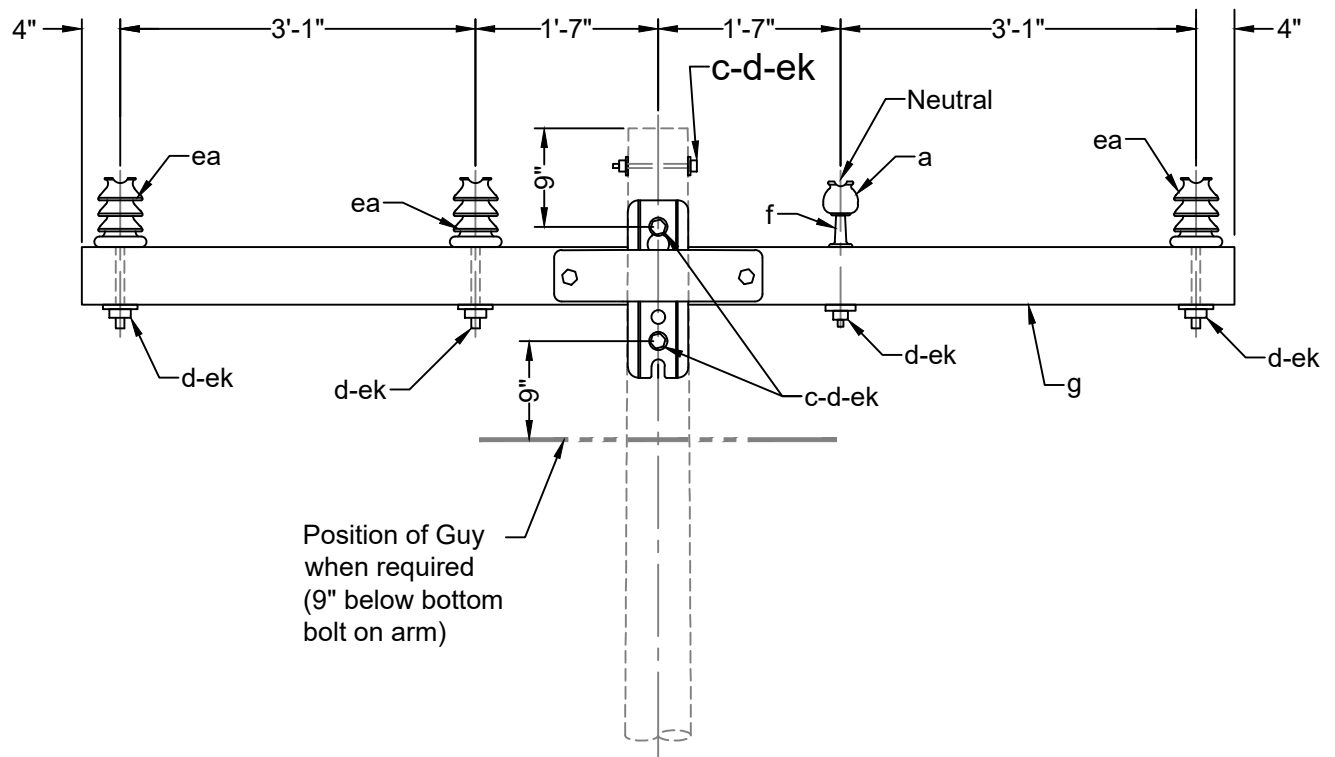
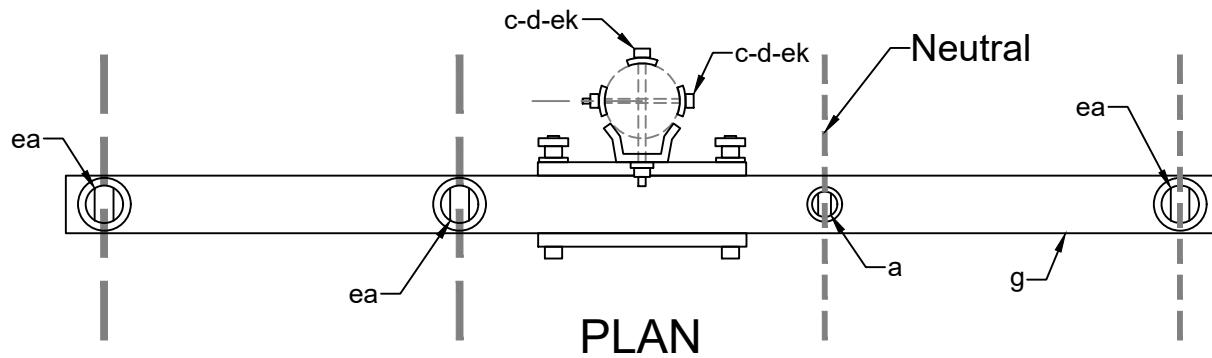
CROSSARM CONSTRUCTION - SINGLE LINE ARM
(LARGE CONDUCTORS)

Revision Date

JAN 26, 2016



C9-3



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	ea	3	Insulator, post type
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	6	Washer, 2 1/4" square, 13/16" hole			
d	4	Washer, 3" square, curved			
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within load limits:
5° Angle.

7.2 / 12.5 KV, 3-PHASE

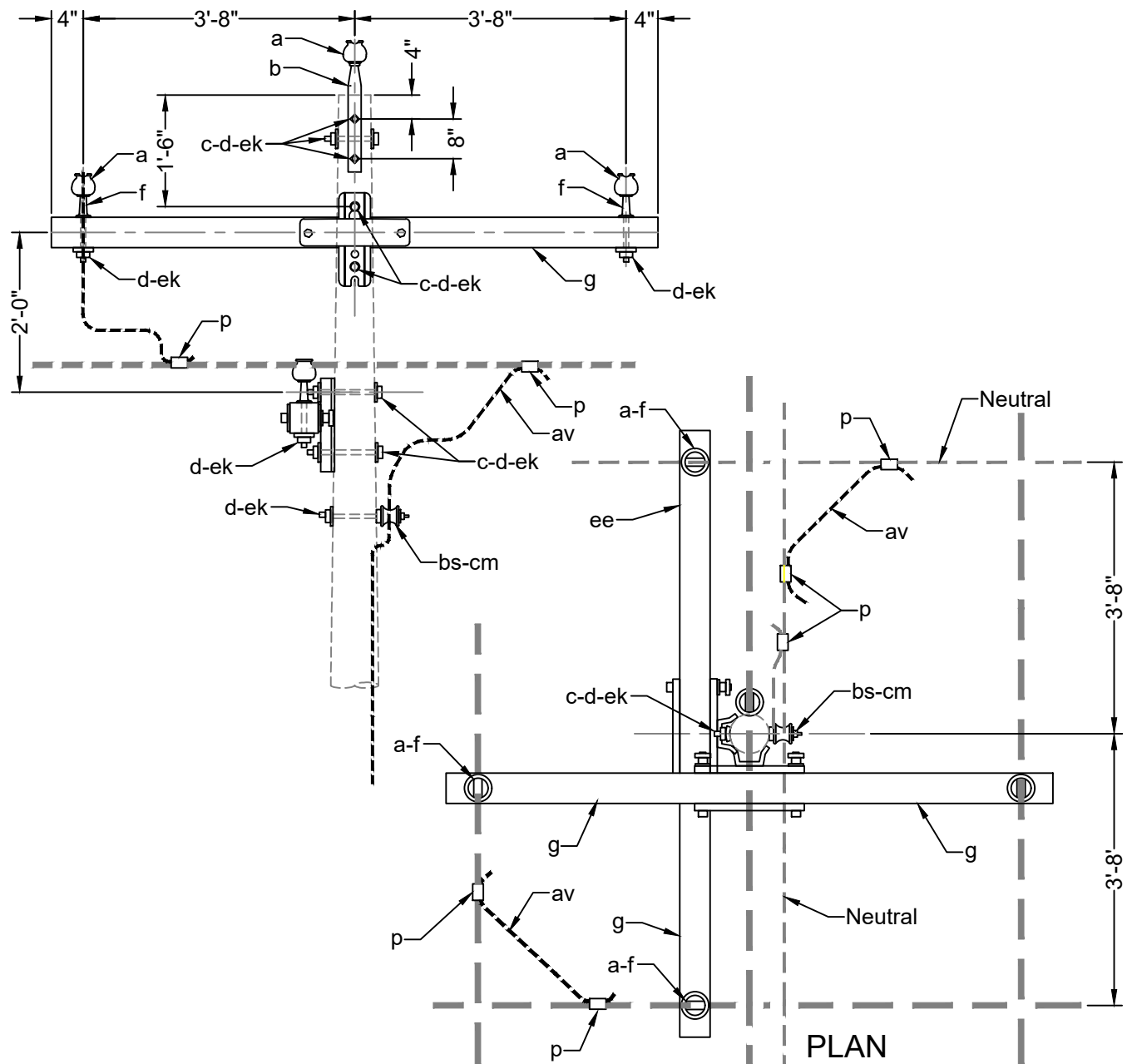
CROSSARM CONSTRUCTION - SINGLE PRIMARY SUPPORT
(LARGE CONDUCTOR)

Revision Date

Dec. 22, 2022



C9-3PL



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	5	Insulator, pin type	p	-	Connectors, as required
b	1	Pin, pole top, 20"	av	-	Jumpers
c	7	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	9	Washer, square, 2 1/4", 13/16" hole	ek	-	Locknuts, as required
d	8	Washer, square, 3", curved	ee	4	Letters, 2 "C", 2 "N", with 1" nails
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	cm	2	Spool insulator
g	2	Fiberglass Crossarm. 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
500 lbs per conductor

Maximum line angle within load limits:
5° Angle.

Modified to meet: 2005 RUS Standards

12.5 / 7.2 KV, 3-PHASE

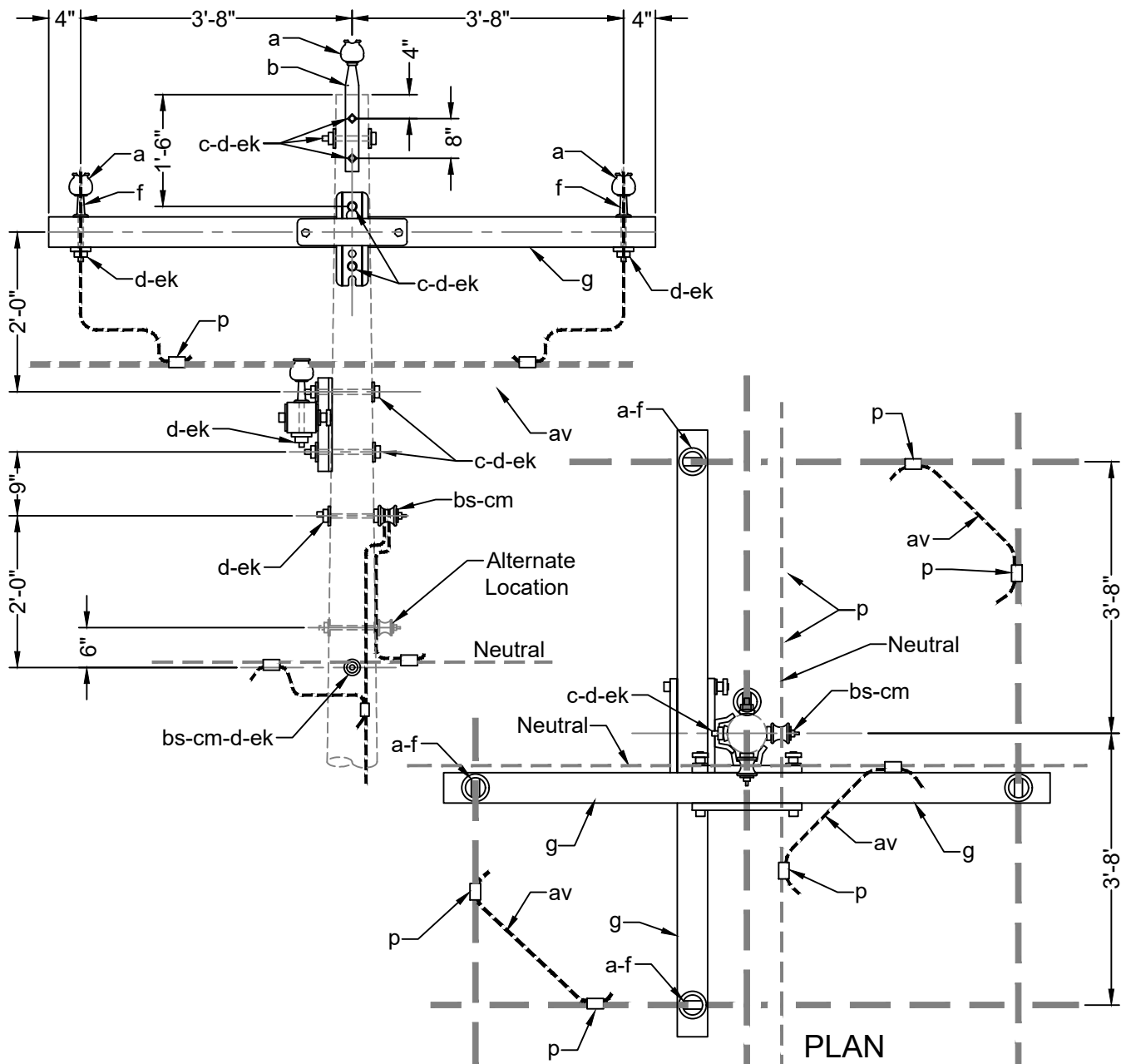
CROSSARM CONSTRUCTION - SINGLE PHASE JUNCTION

Revision Date

Dec. 27, 2022



C22



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	5	Insulator, pin type	p	-	Connectors, as required
b	1	Pin. pole top, 20"	av	-	Jumpers
c	7	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	10	Washer, square, 2 1/4" , 13/16" hole	ek	-	Locknuts, as required
d	8	Washer, square, 3", curved	ee	4	Letters, 2 "C", 2 "N", with 1" nails
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	cm	2	Spool insulator
g	2	Fiberglass Crossarm. 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS
Maximum transverse load:
500 lbs per conductor
Maximum line angle within load limits:
5° Angle.
Modified to meet: 2005 RUS Standards

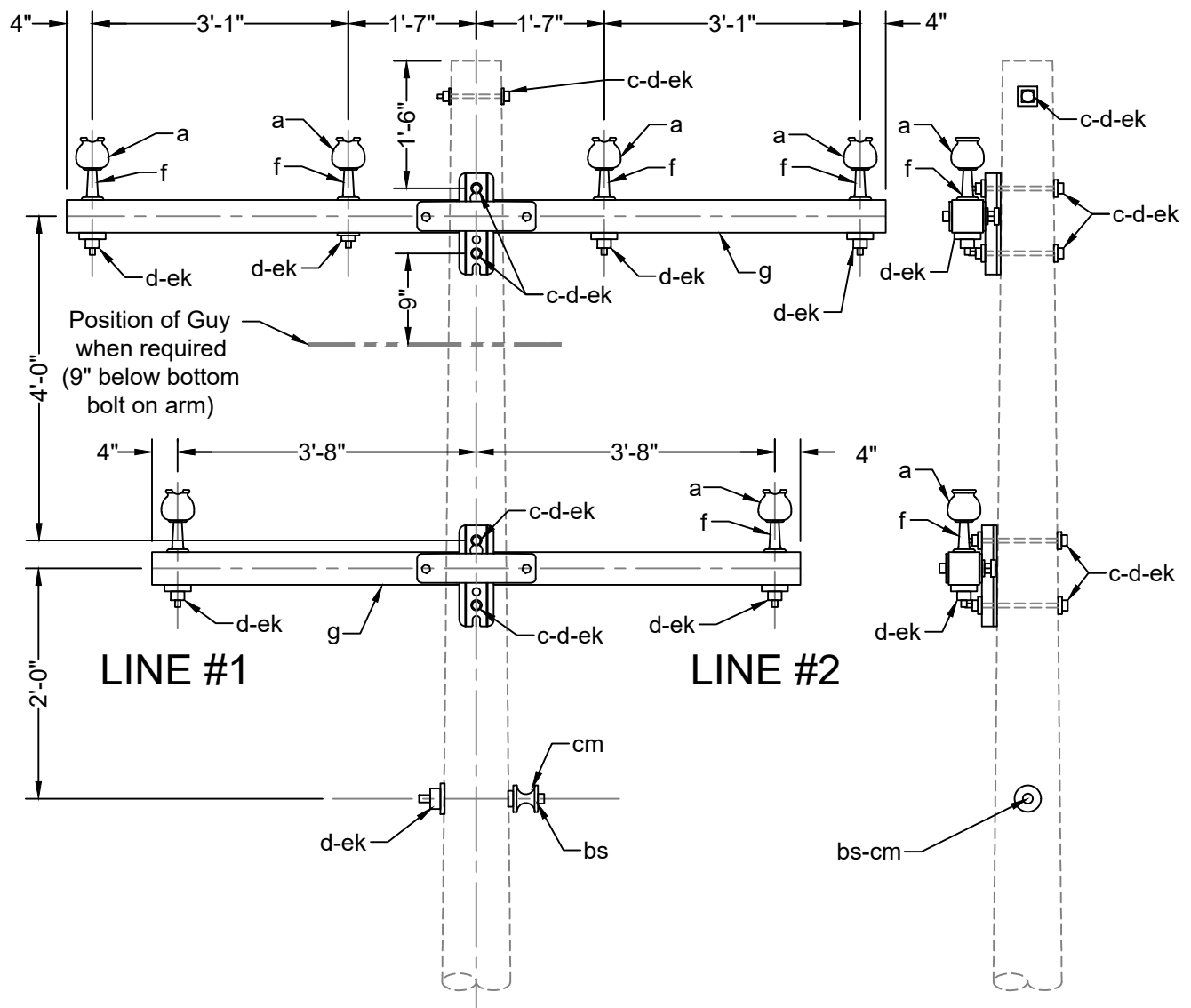
12.5 / 7.2 KV, 3-PHASE
CROSSARM CONSTRUCTION - 2 PHASE JUNCTION

Revision Date

Dec. 27, 2022



C24



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	cm	1	Spool insulator
c	5	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	11	Washer, square, 2 1/4"	ek	-	Locknuts, as required
d	6	Washer, 3" square, curved			
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
500 LBS. per conductor.

Maximum line angle within load limits:
5° Angle.

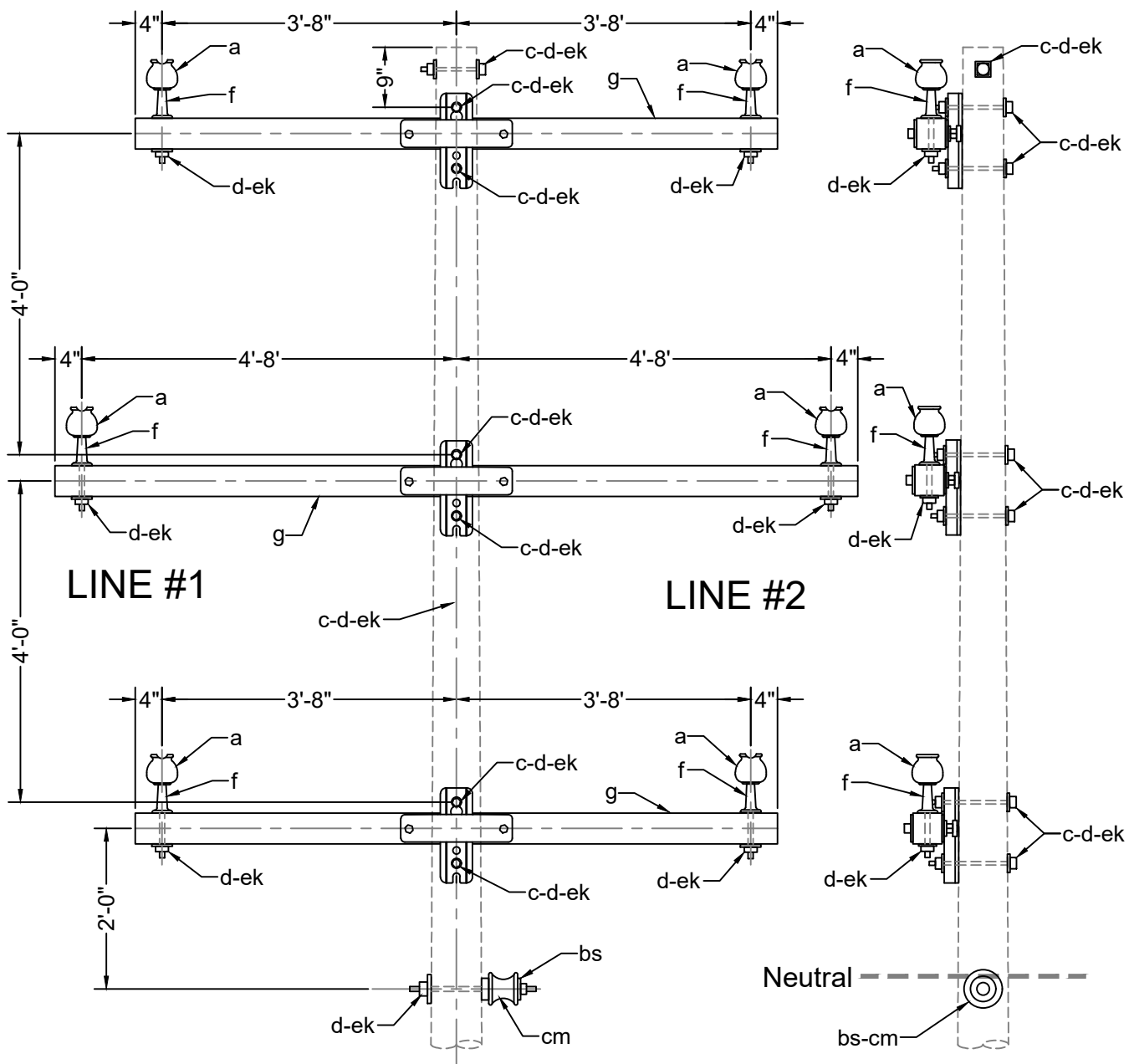
12.5 / 7.2 kv - 3 PHASE
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

JAN 4, 2023



DC-C1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	bs	1	Bolt, single upset
c	7	Bolt, machine, 5/8" x required length	cm	1	Spool insulator
d	13	Washer, square 2 1/4" x 13/16" hole	ek	-	Locknuts, as required
d	8	Washer, 3 " square, curved			
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within limits:
5° Angle.

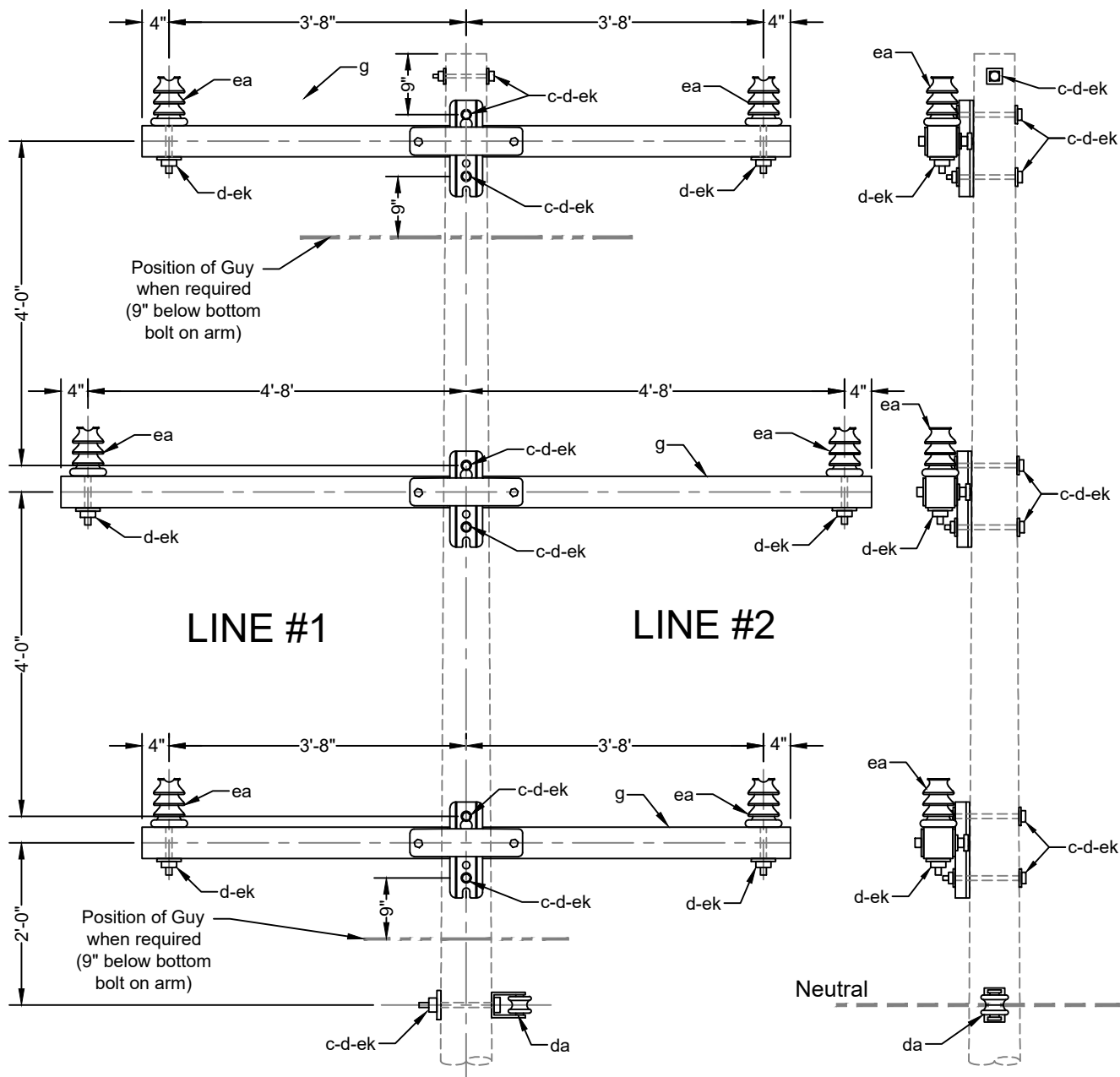
7.2 / 12.5 KV, 3-PHASE

CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT 3 CROSSARM TYPE

Revision Date

Jan. 4, 2023

**DC-C1A**



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 5/8" x required length	da	1	Bracket, insulator
d	13	Washer, square 2 1/4" x 13/16" hole	ea	6	Insulator, post type
d	8	Washer, 3" square, curved	ek	-	Locknuts, as required
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 3-PHASE

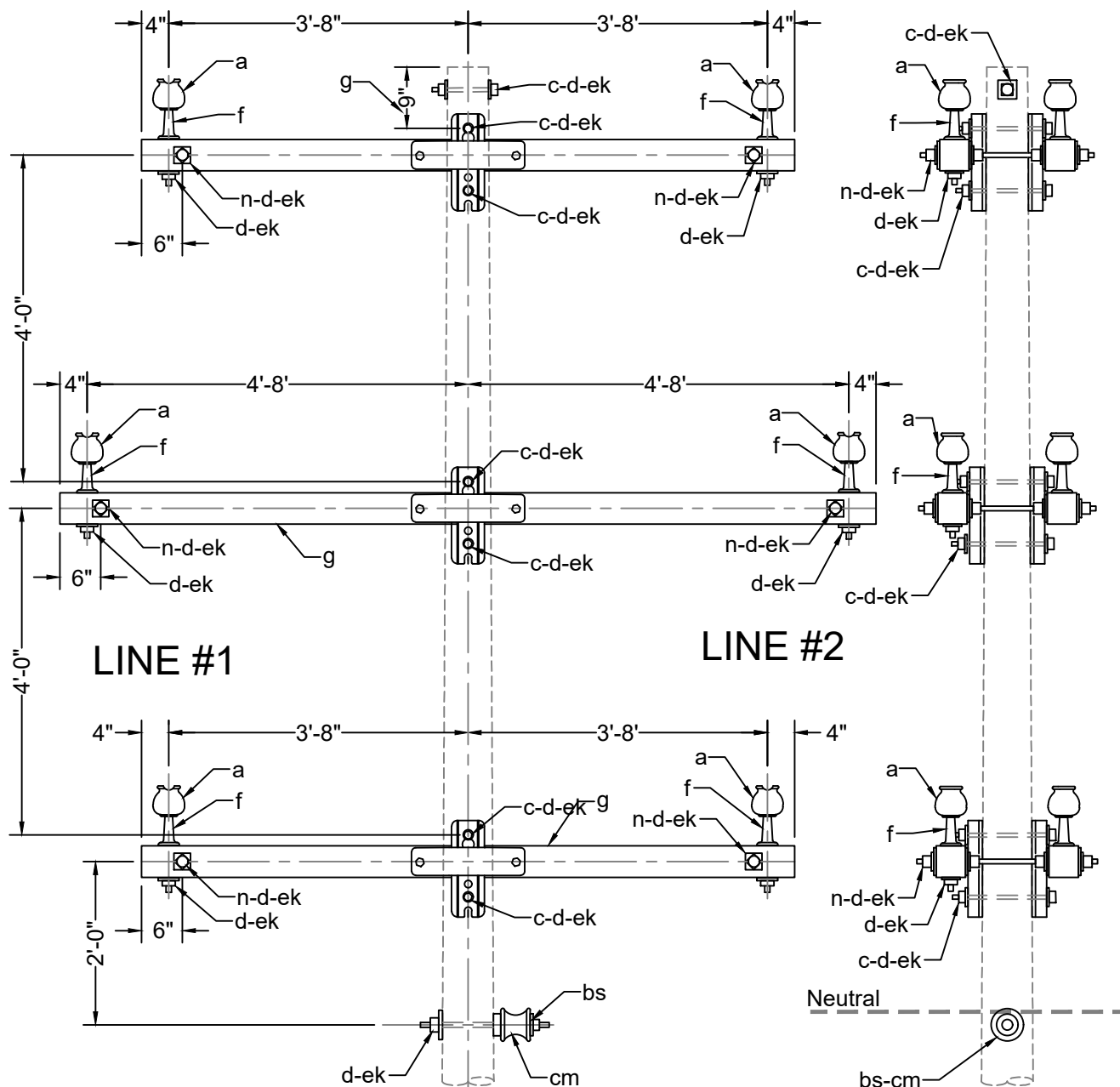
CROSSARM CONSTRUCTION-DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT (LARGE CONDUCTORS)

Revision Date

Jan. 4, 2023



DC-C1PL



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	12	Insulator, pin type	n	6	Bolt, double arming, 3/8" x required length
c	7	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	49	Washer, square 2 1/4" x 13/16" hole	cm	1	Spool insulator
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
f	12	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	4	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor

Maximum line angle within limits:
5° Angle.

7.2 / 12.5 KV, 3-PHASE

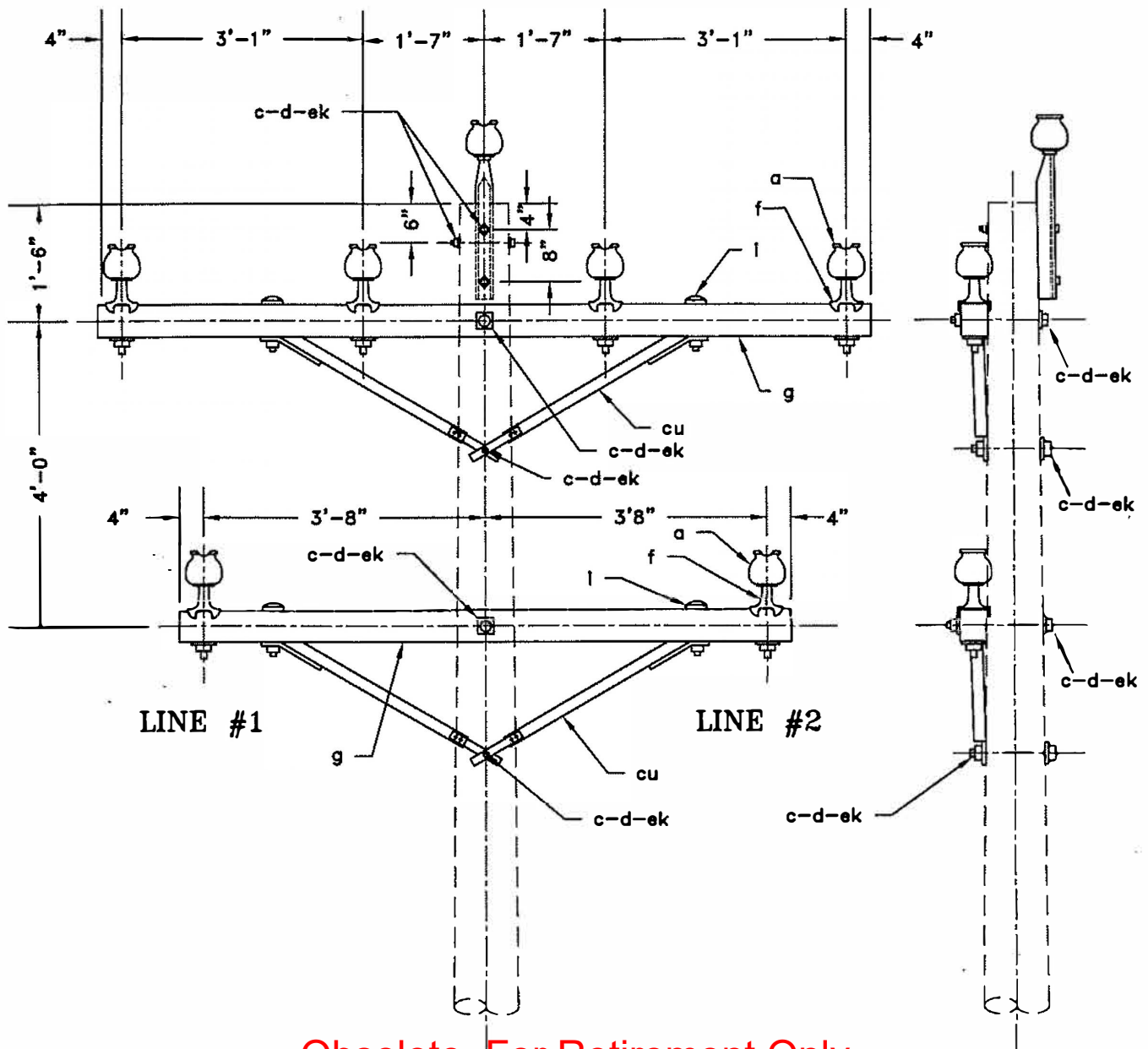
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT 3 CROSSARM TYPE

Revision Date

Jan. 4, 2023



DC-C1-1A



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	7	Insulator, pln type	cu	2	Brace, wood, 60" span
b	1	Pin, pole top, 20"	ek	-	Locknuts, as required
c	13	Bolt, machine, 5/8" x required length			
l	4	Bolt, carriage, 1/2" x required length			
d	6	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole			
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

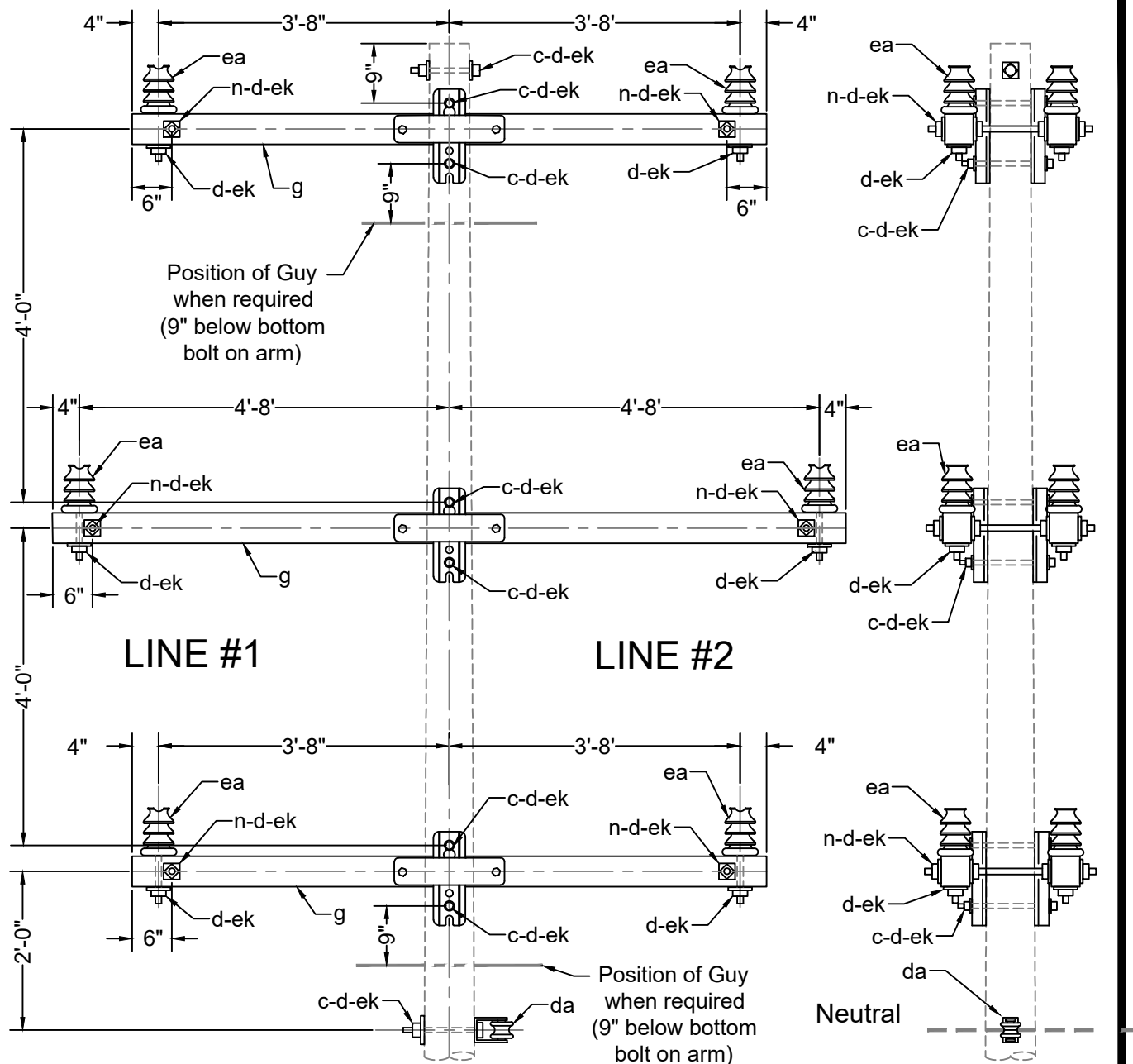
12.5/7.2 kv 3 PHASE
CROSSARM CONSTRUCTION- DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT, 2 CROSSARM TYPE

DATE

Nov 2003



DC-C1BLH



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 5/8" x required length	n	12	Bolt, double arming, 5/8" x required length
d	49	Washer, square 2 1/4" x 13/16" hole	da	1	Bracket, insulator
d	2	Washer, 3" square, curved	ea	12	Insulator, post type
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	ek	-	Locknuts, as required
g	4	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
2000 lbs. per conductor

Maximum line angle within load limits:
20° Angle.

7.2 / 12.5 KV, 3-PHASE

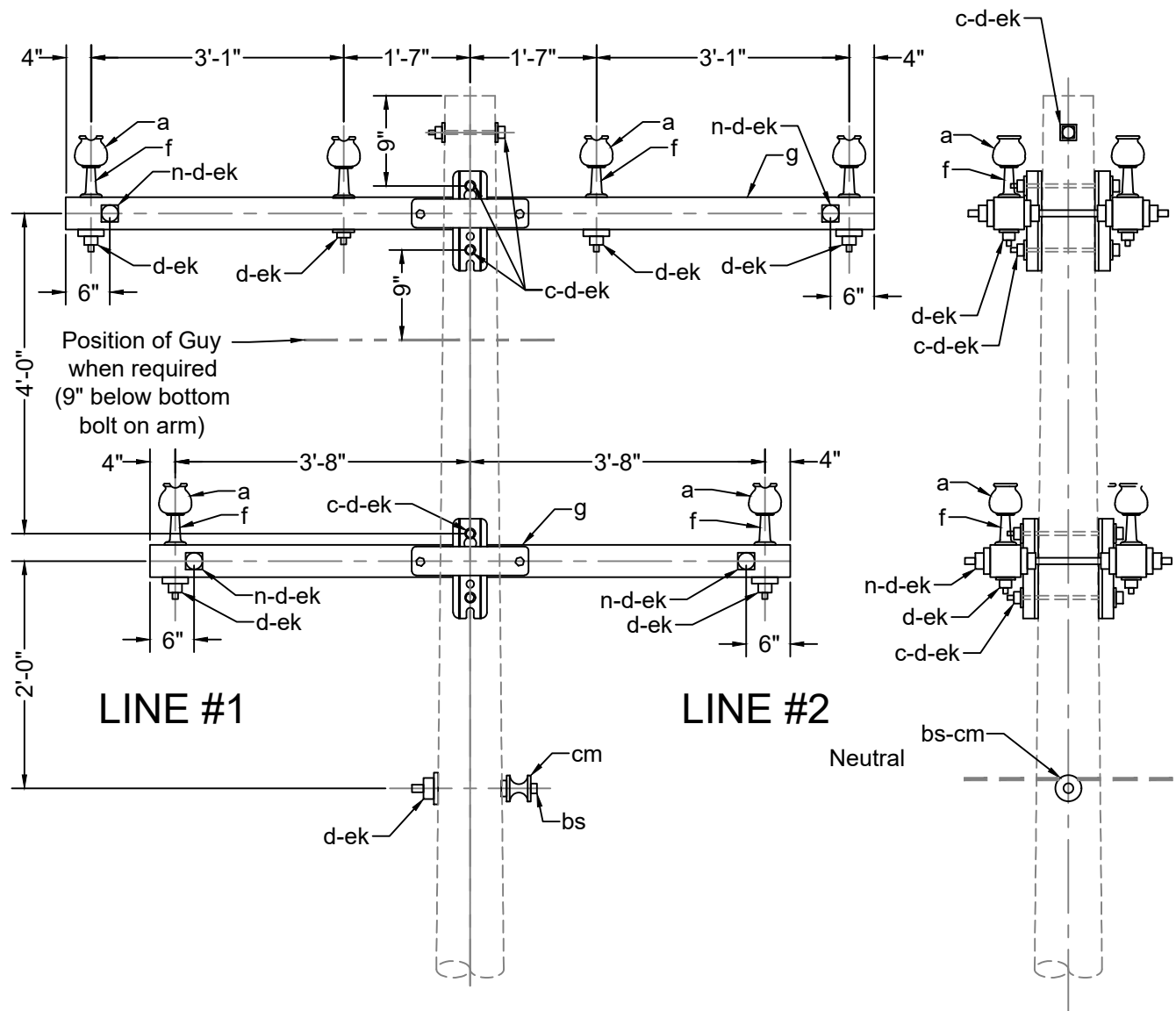
CROSSARM CONSTRUCTION-DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT (LARGE CONDUCTORS)

Revision Date

Jan. 5, 2023



DC-C1-3PL



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	12	Insulator, pin type	n	4	Bolt, double arming, 5/8" x required length
c	5	Bolt, machine 5/8" x required length	bs	1	Bolt, single upset
d	36	Washer, square, 2 1/4"	cm	1	Spool insulator
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
f	12	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/48" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor.

Maximum line angle within load limits:
5° Angle.

12.5 / 7.2 KV - 3 PHASE

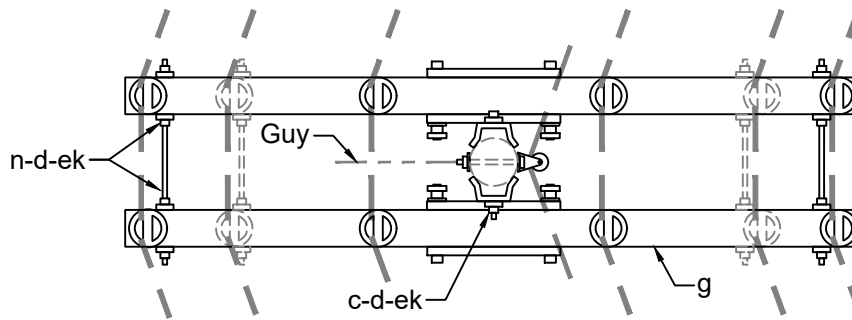
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

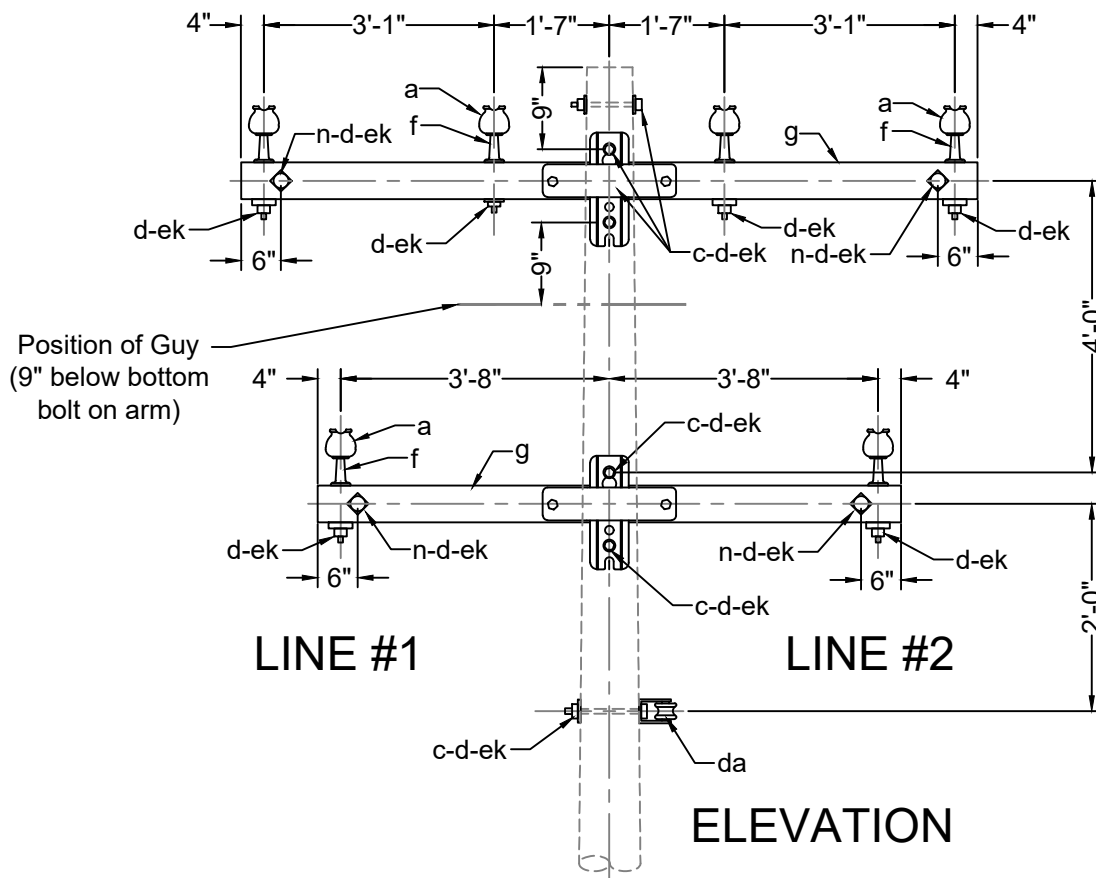
Jan. 5, 2023



DC-C2



PLAN



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	12	Insulator, pin type	n	4	Bolt, double arming, 5/8" x required length
c	6	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	37	Washer, square, 2 1/4"	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	12	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/48" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor.

Maximum line angle within load limits:
20° Angle.

12.5 / 7.2 KV - 3 PHASE

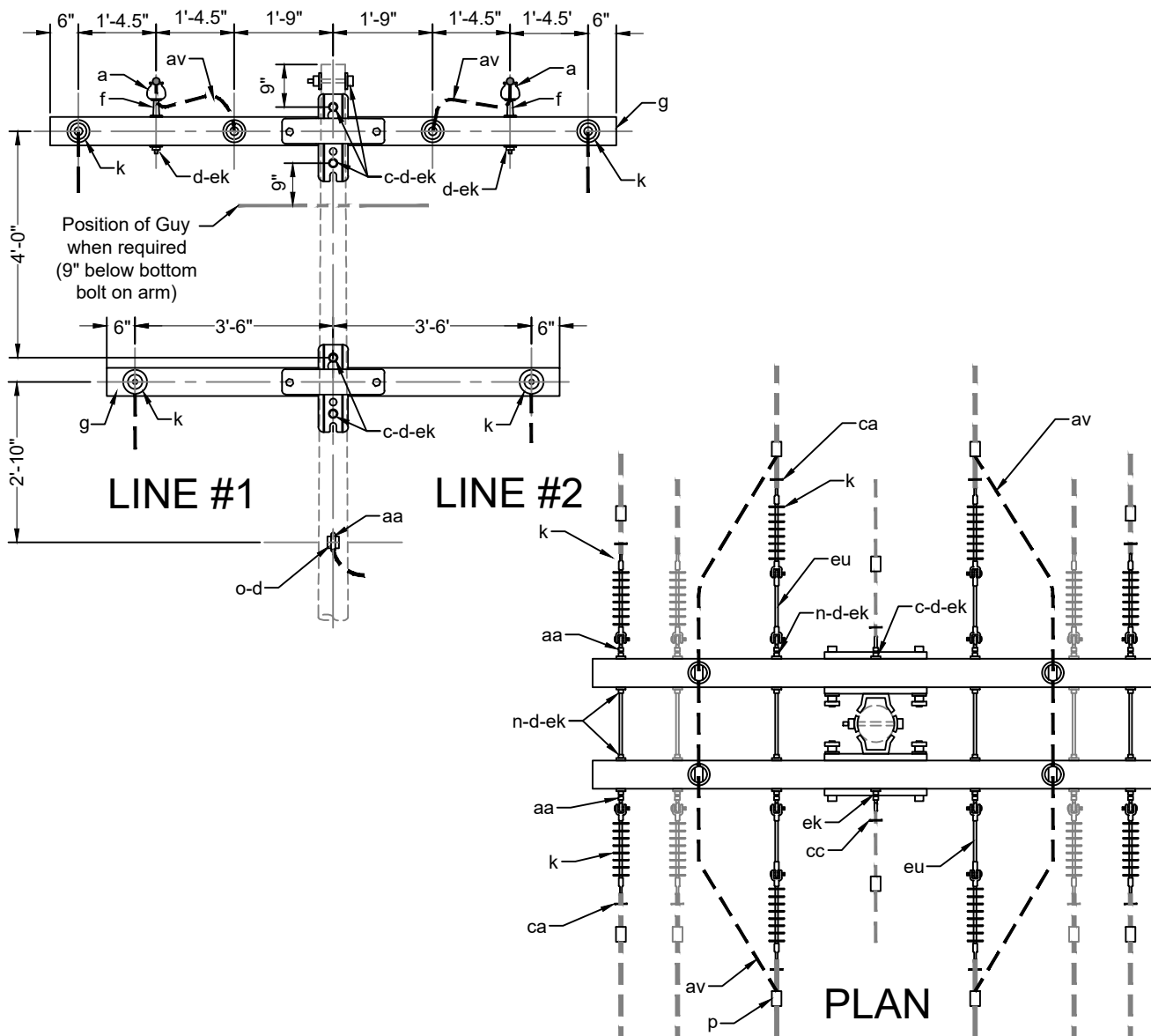
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

Jan. 5, 2023



DC-C2-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	p	-	Connectors, as required
c	5	Bolt, machine, 5/8" x required length	aa	13	Nut, eye, 5/8"
d	36	Washer, 2 1/4" square, 13/16" hole	av	-	Jumper and leads as required
d	2	Washer, 3" square, curved	bo	4	Shackle, anchor
f	4	Pin, crossarm, steel, 1 5/8" x 10 3/4"	eu	4	Link, extension, fiberglass
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	ca	12	Deadend assembly, primary
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	cc	2	Deadend assembly, neutral
k	24	Insulator, suspension, epoxitator	ek	-	Locknuts, as required
n	6	Bolt, double arming, 5/8" x required length			
o	5	Bolt, eye, 5/8" x required length			

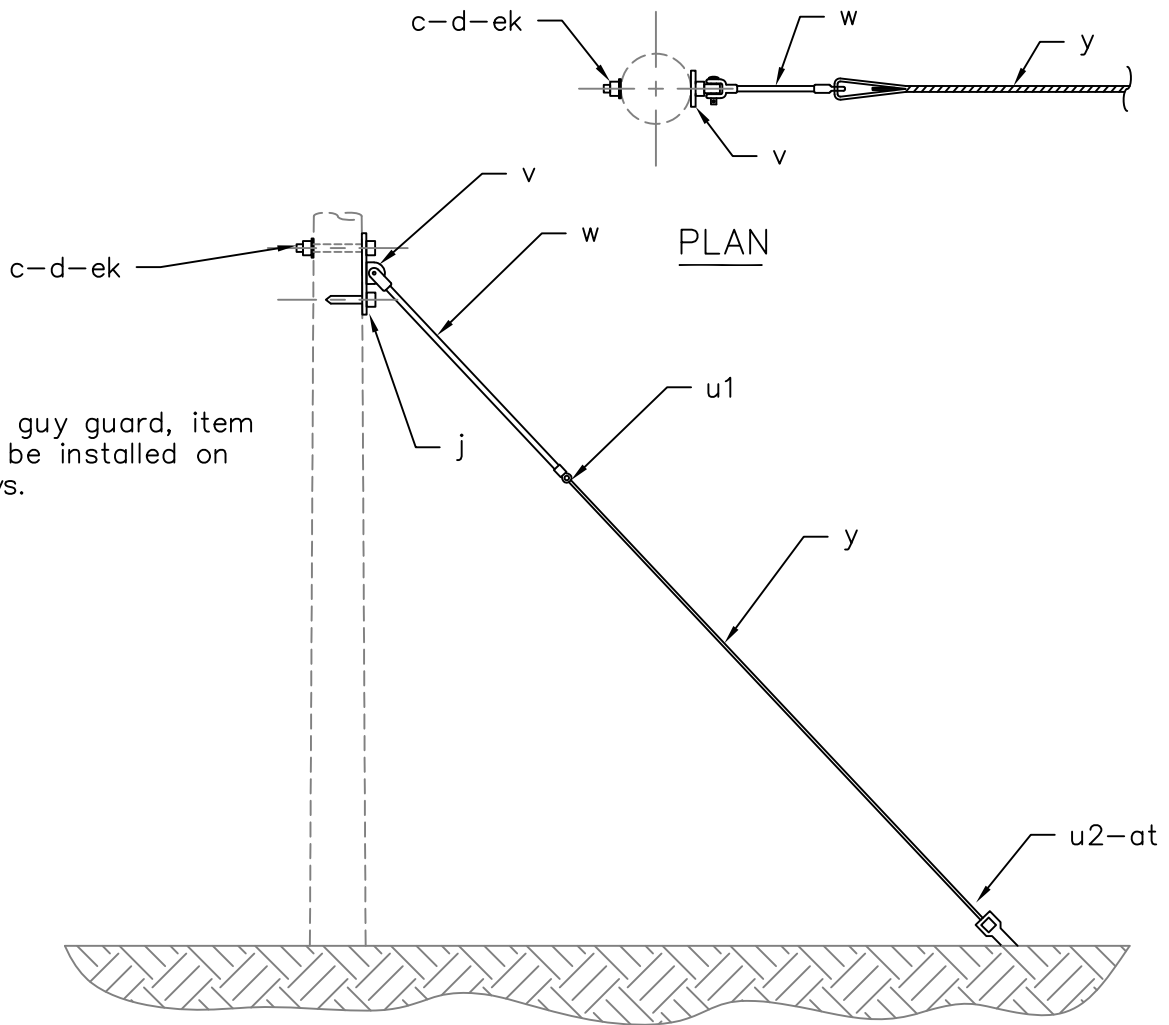
7.2 / 12.5 KV, 3-PHASE
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
DEADEND (DOUBLE)

Revision Date

Jan. 9, 2023



DC-C8



ITEM	M A T E R I A L	E1-2	E1-3
c	Bolt, machine, 5/8" x required length	1	
c	Bolt, machine, 3/4" x required length		1
d	Washer, square curved, 3"	1	
d	Washer, square curved, 4"		1
u1	Deadend for guy strand, preformed type	1	1
u2	Deadend, Strandvice, 3/8"	1	
u2	Deadend, Strandvice, 7/16"		1
v	Guy attachment, (Rating)	1 (13,500 lbs)	1 (21,000 lbs)
j	Screw, lag, 1/2" x 4"	1	1
w	Guy strain insulator, 7', Fiberglass	1	1
y	Guy wire, S.M. 7 strand by required length	3/8"	7/16"
at	Guy guard, plastic, 8' length	1	1
ek	Locknuts	1	1

For use on spans with conductor of
1/0 ACSR or smaller only. For
lines with larger conductors, use
units E1-2L and E1-3L.

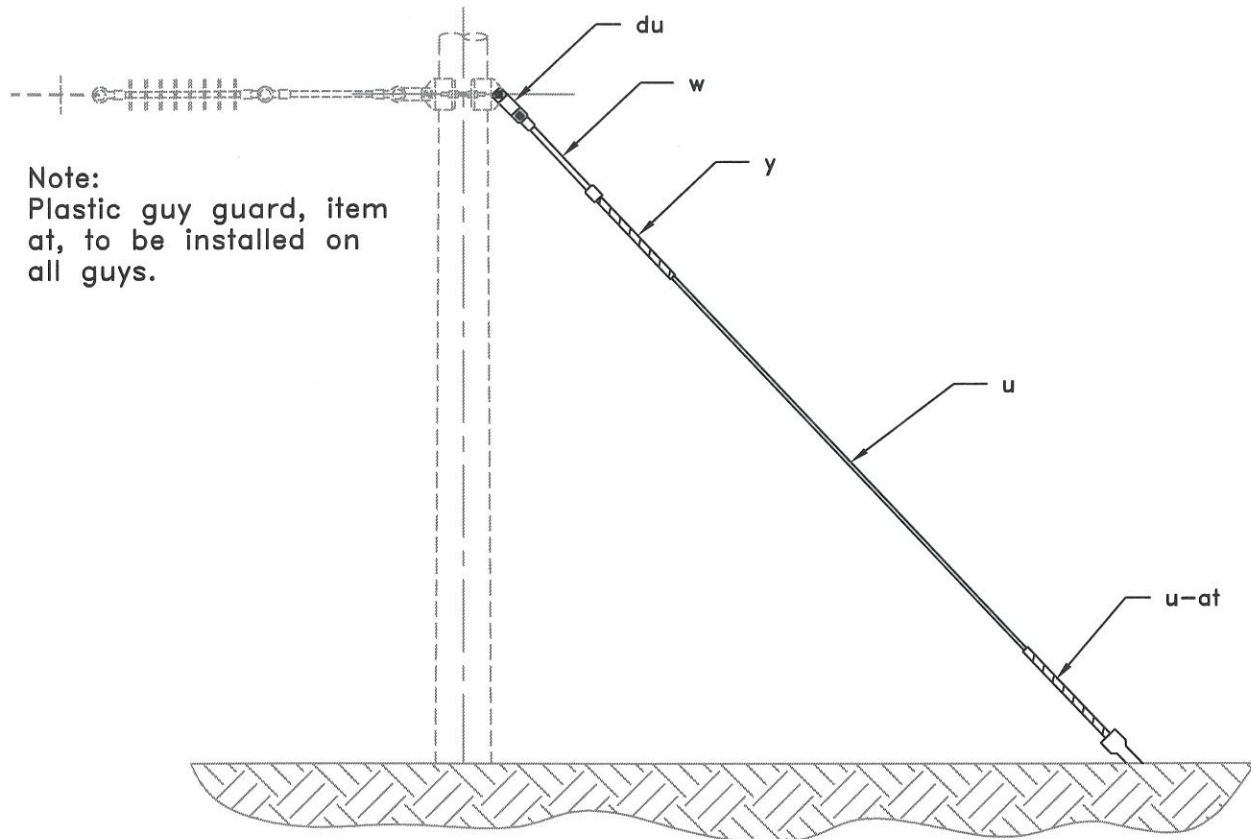
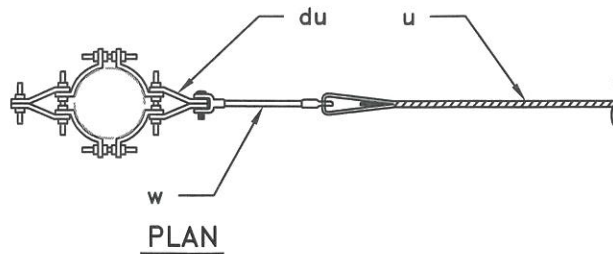
12.5 / 7.2 kV
SINGLE DOWN GUY
THROUGH BOLT TYPE

DATE

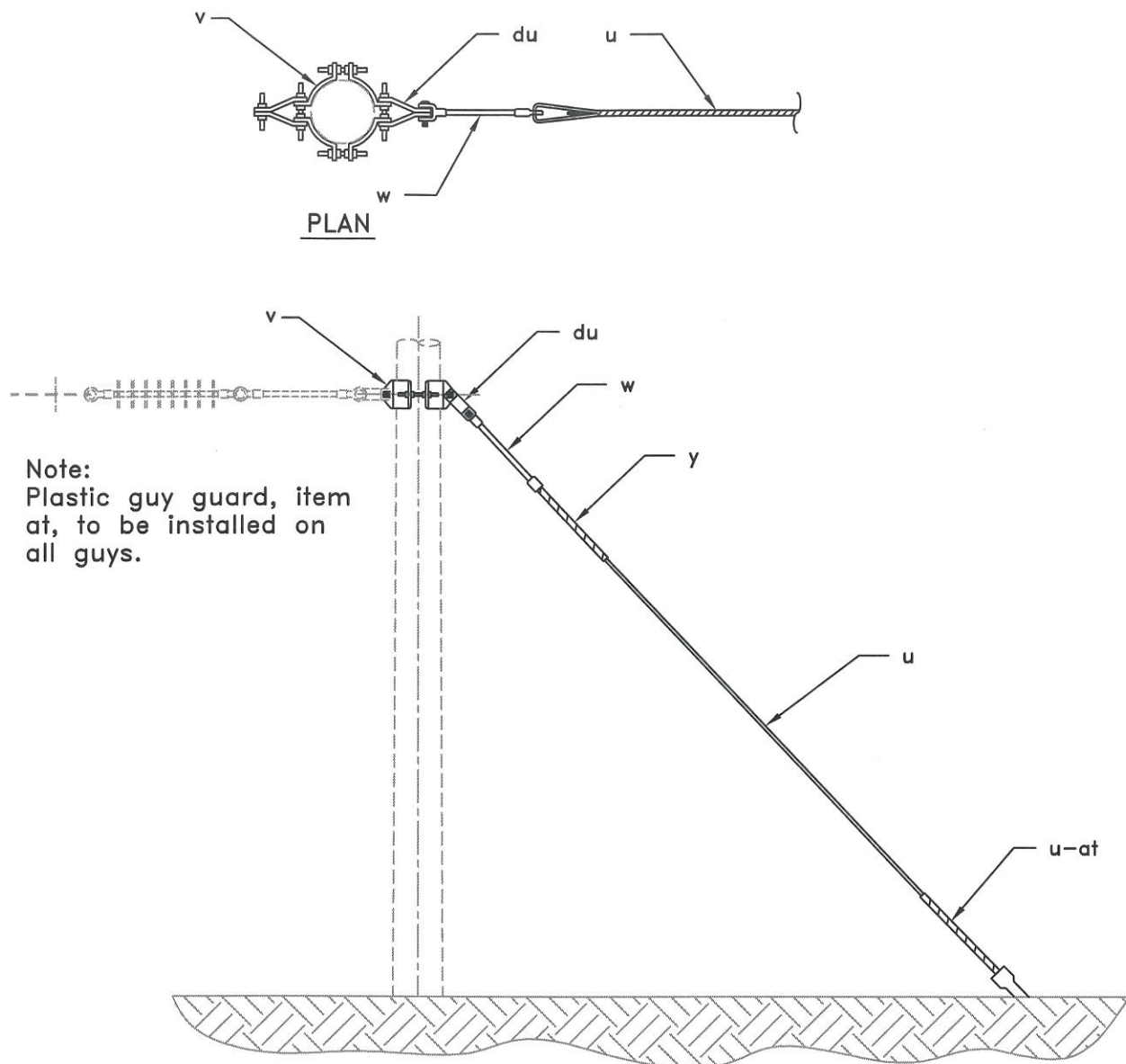
Mar 1, 2021



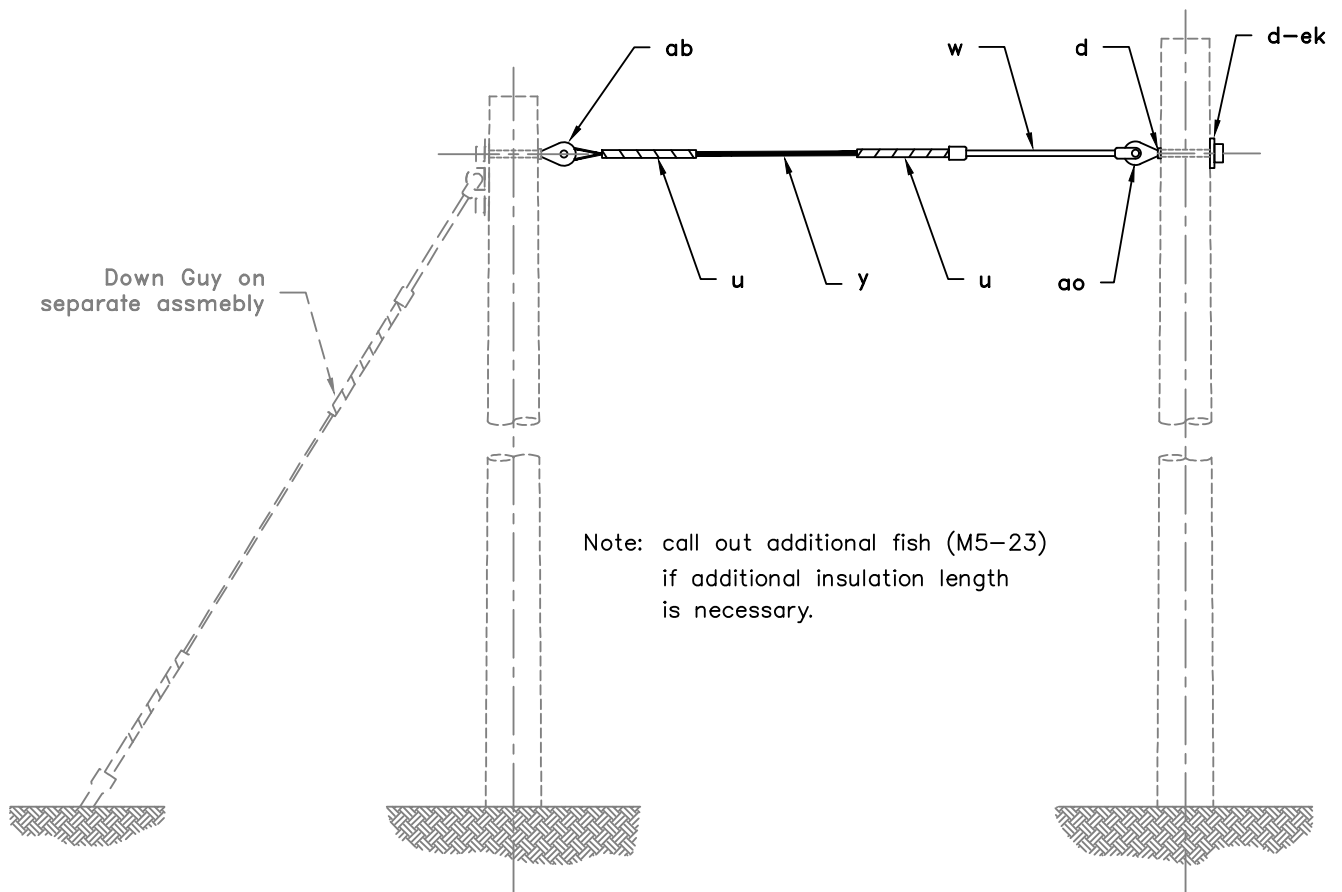
E1-2
E1-3



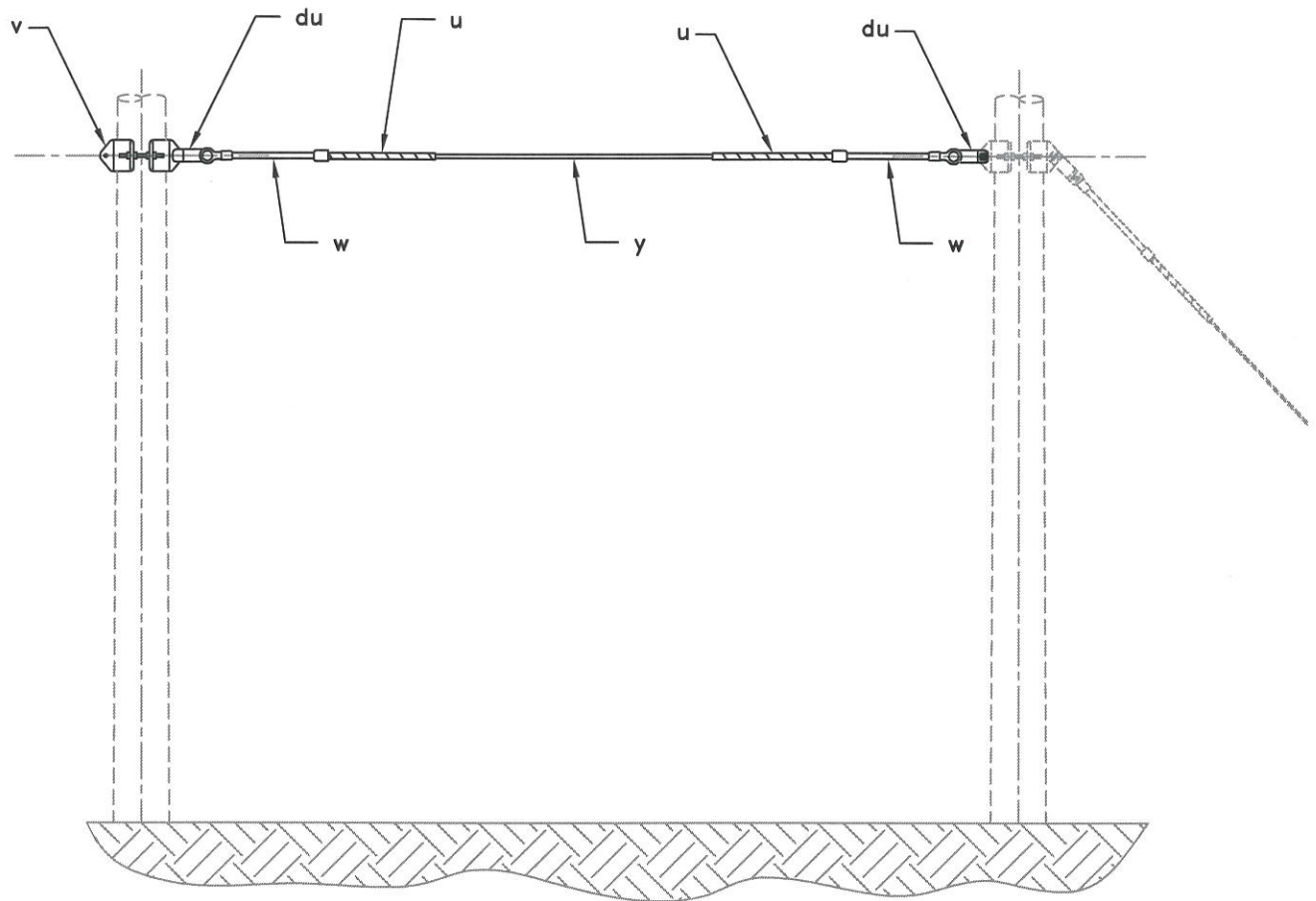
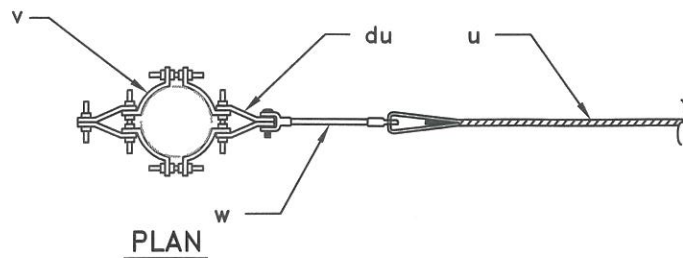
		ASSEMBLY UNIT	
ITEM	M A T E R I A L	E1-2G	E1-3G
u	Deadend, guy strand, preformed	2	2
w	Insulator, guy, strain	1	1
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
du	Connecting link	1	1
at	Guy guard, plastic 8" length	1	1
		12.5 / 7.2 kv SINGLE DOWN GUY EXISTING POLE BAND	
		DATE	E1-2G
		Sept. 8 2010	E1-3G
		 GRAND VALLEY POWER	



		ASSEMBLY UNIT	
ITEM	M A T E R I A L	E1-2L	E1-3L
u	Deadend, guy strand, preformed	2	2
v	Pole band, required diameter	1	1
w	Insulator, guy, strain	1	1
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
du	Connecting link	1	1
at	Guy guard, plastic 8" length	1	1
		12.5 / 7.2 kv SINGLE DOWN GUY WITH POLE BAND	
		DATE	E1-2L
		Sept 8, 2010	E1-3L
			



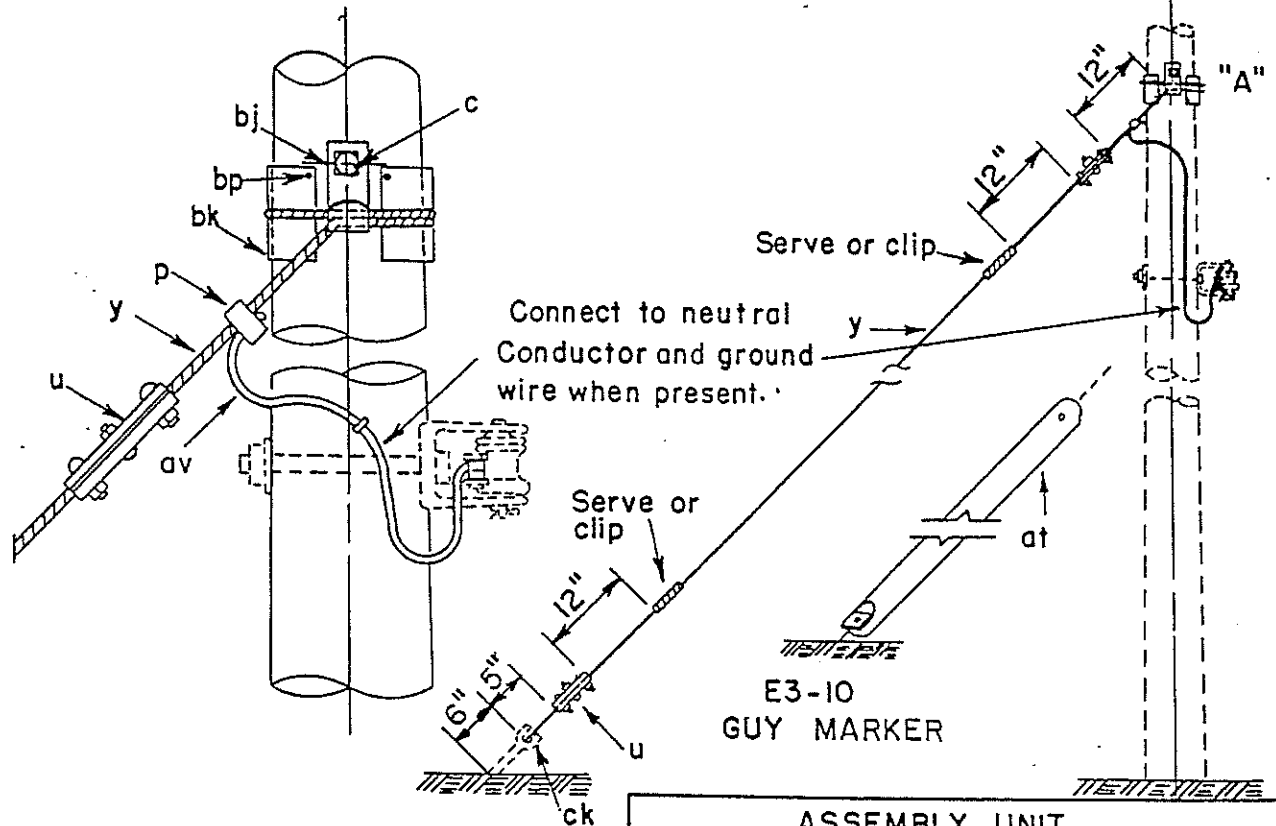
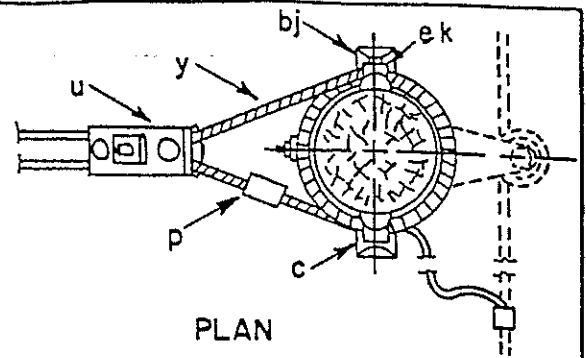
		A S S E M B L Y U N I T		
		E2-1	E2-2	E2-3
ITEM	M A T E R I A L	No. REQ'D.	No. REQ'D.	No. REQ'D.
ab	Nut, thimble type eye, 5/8"	1	1	—
ao	Bolt, eye type, 5/8"x required length	1	1	—
ab	Nut, thimble eye type, 3/4"	—	—	1
ao	Bolt, eye type, 3/4"x required length	—	—	1
d	Washer, square, curved, as required	(1) 3"	(1) 3"	(1) 4"
d	Washer, round, flat, 2 1/2"	1	1	1
u	Deadend for guy strand, performed	(2) 1/4"	(2) 3/8"	(2) 7/16"
y	Guy wire, 7 strand S.M. required length	1/4"	3/8"	7/16"
w	Guy strain insulator, 7', Fiberglass	1	1	1
ek	Locknuts, as required	1	1	1
		12.5 / 7.2 kV SINGLE OVERHEAD GUY THROUGH BLOT TYPE		
		DATE	 GRAND VALLEY POWER	E2-1 E2-2 E2-3
		Oct 20, 2020		



		ASSEMBLY UNIT	
ITEM	M A T E R I A L	E2-2G	E3-3G
u	Deadend, guy strand, preformed	2	2
v	Pole band, required diameter	1	1
w	Insulator, guy, strain	2	2
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
du	Connecting link	4	4
		12.5 / 7.2 kv SINGLE OVERHEAD GUY POLE BAND TYPE	
		DATE	E2-2G
		Sept 8, 2010	E3-3G
		 GRAND VALLEY POWER	

NOTES:

1. Other accepted and equivalent (item u) guy clamps may be substituted for the 3-bolt clamps shown.
2. Assemblies E1-2 and E1-3 (throughbolt type) are preferred units.



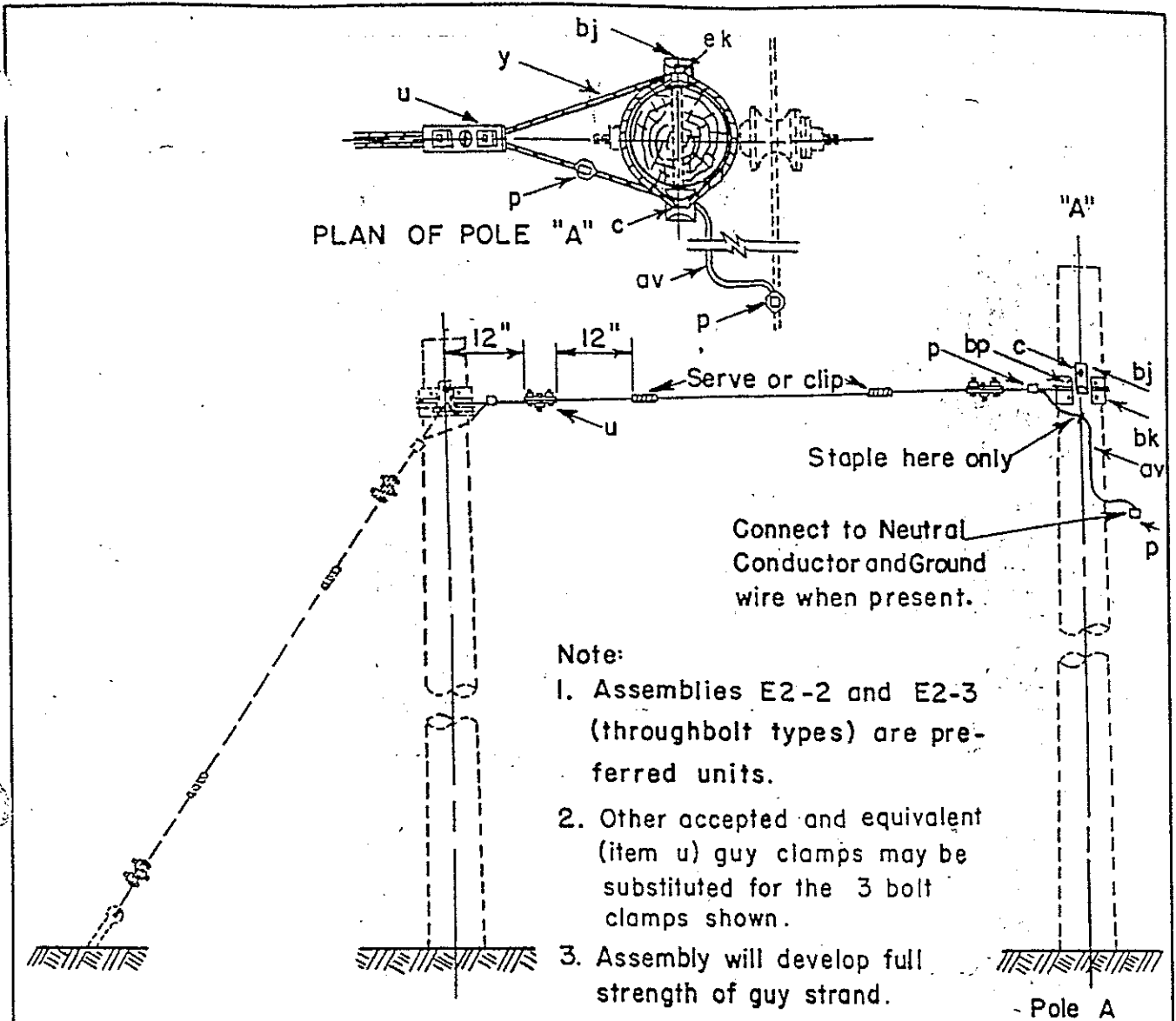
See guide drawings M30-1 and M30-2.

		ASSEMBLY UNIT		
		E3-2	E3-3	E3-10
				Guy Marker
ITEM	MATERIAL	No. REQ'D	No. REQ'D	
c	Bolt, machine, 5/8" x req'd length	1	1	
p	Connectors, as req'd			
u	Clamp, guy	2-Heavy Duty	2-Heavy Duty	
y	Guy Wire, S-M, 7-strand Req'd length by	3/8"	7/16"	
av	Jumper, #4 stranded AL. alloy or equip.	as req'd	as req'd	
at	Guy Marker, 8' min. length			1
bj	Guy Hook, J	2	2	
bk	Guy Plate, 4" x 8", 14 gauge	2	2	
bp	Nail, 8 penny, galv.	8	8	
ck	Clamp, anchor rod bonding	1	1	
ek	Locknuts, as required			
		12.5/7.2 kV		
		SINGLE DOWN GUY, WRAPPED TYPE		
		E3-2, E3-3, E3-10		
		Apr, 1983		

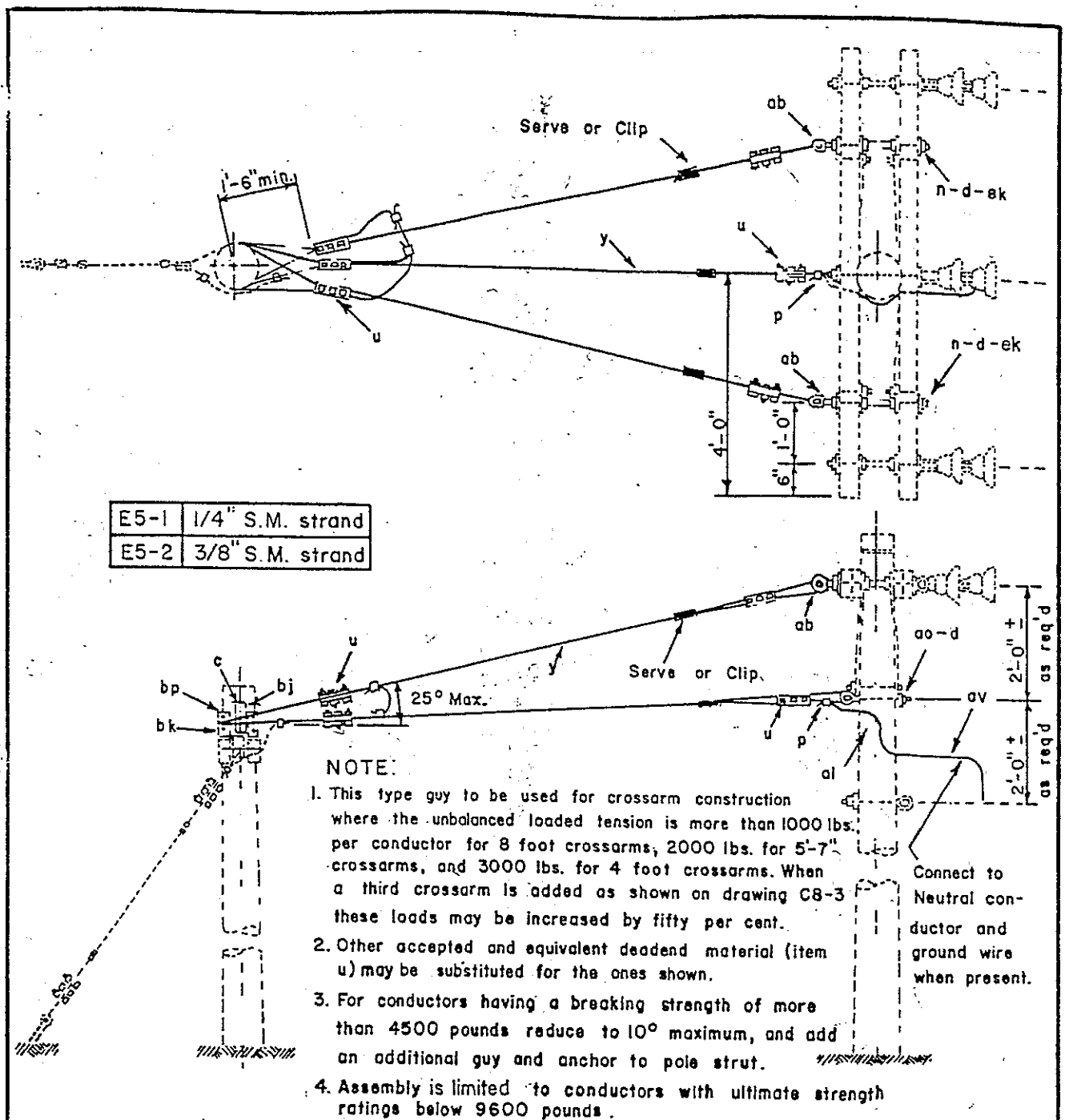
Feb. 18, 2016



E3-11



		ASSEMBLY UNIT			
		E4-2	E4-3		
		3/8" S.M.	7/16" S.M.		
ITEM	MATERIAL	No. Req'd	No. Req'd		
c	Bolt, machine, 5/8" x req'd length	1	1		
p	Connectors	as req'd	as req'd		
u	Deadend for guy strand	2	2		
y	Guy Wire, 7 strand	as req'd	as req'd		
av	Jumper, #4 stranded AL. alloy or equiv.	as req'd	as req'd		
bj	Guy Hook, J	2	2		
bk	Guy Plate, 4"x8", 1/4 gauge	2	2		
bp	Nail, 8 penny, galv.	8	8		
ek	Locknuts	as req'd	as req'd		
		12.5/7.2 KV			
		SINGLE OVERHEAD GUY, WRAPPED TYPE			
		Apr, 1983		E4-2, E4-3	

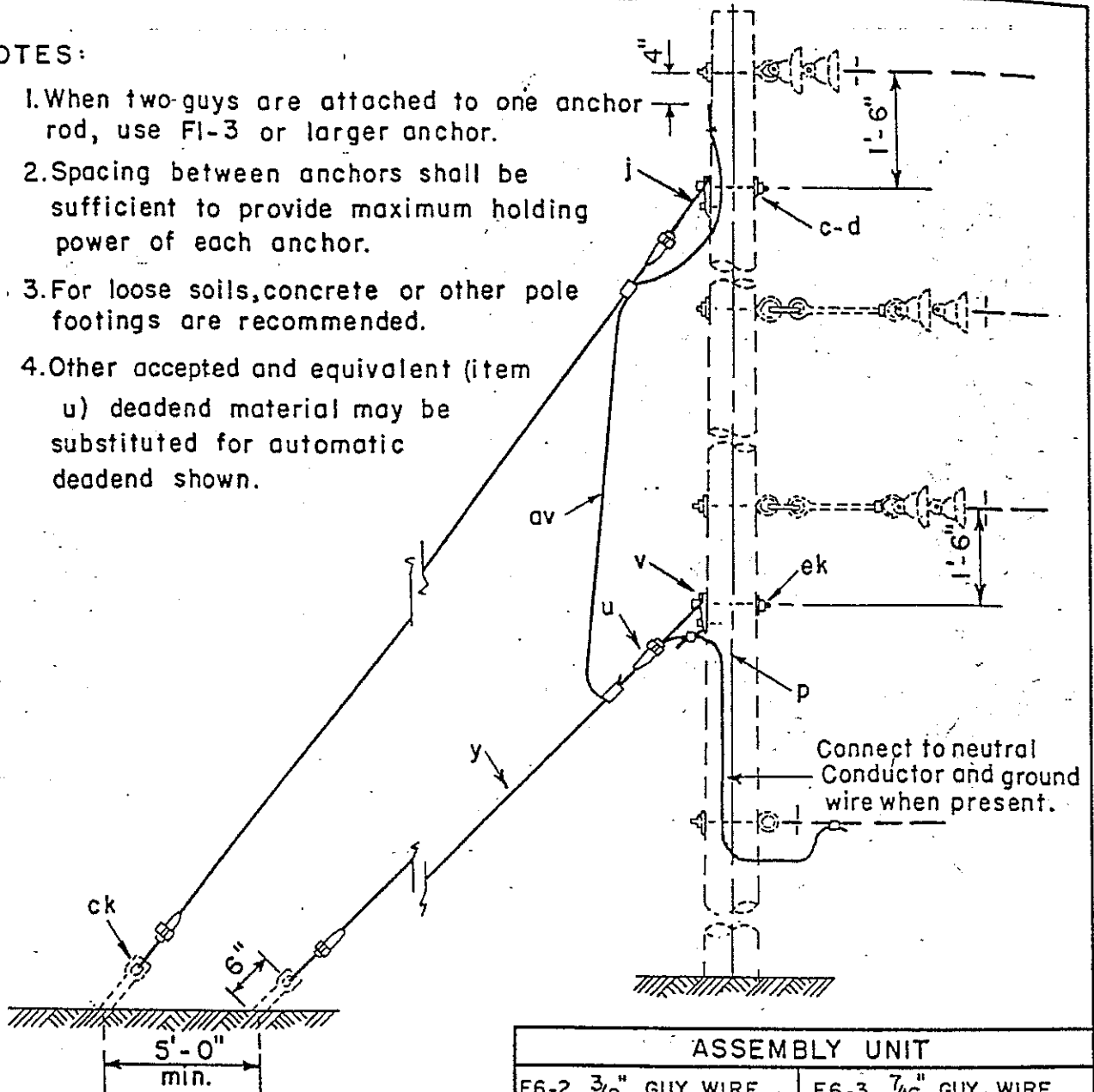


E5-1	1/4" S.M. strand
E5-2	3/8" S.M. strand

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
d	9	Washer, 2 1/4 x 2 1/4 x 3/16", 13/16" hole	ab	2	Nut, thimble type eye, 5/8"
n	2	Bolt, double arming, 5/8" x req'd. lg.	ao	1	Bolt, thimble type eye, 5/8" x req'd. lg.
p		Connectors, as req'd.	av		Jumper, #4 Alum. alloy or equiv.
u	6	Deadend for guy strand	al	1	Staple, ground wire
y		Wire, guy, 7 strand, as req'd.	bk	2	Guy Plate, 4" x 8", 14 gauge
c	1	Bolt, machine, 5/8" x req'd. length	bj	2	Guy Hook, J
ek		Locknuts, as required			
bp	8	Nail, 8 penny, galv.			
12.5/7.2 KV DEADEND GUY CROSSARM CONSTRUCTION					
Apr, 1983					
E5-1, E5-2					

NOTES:

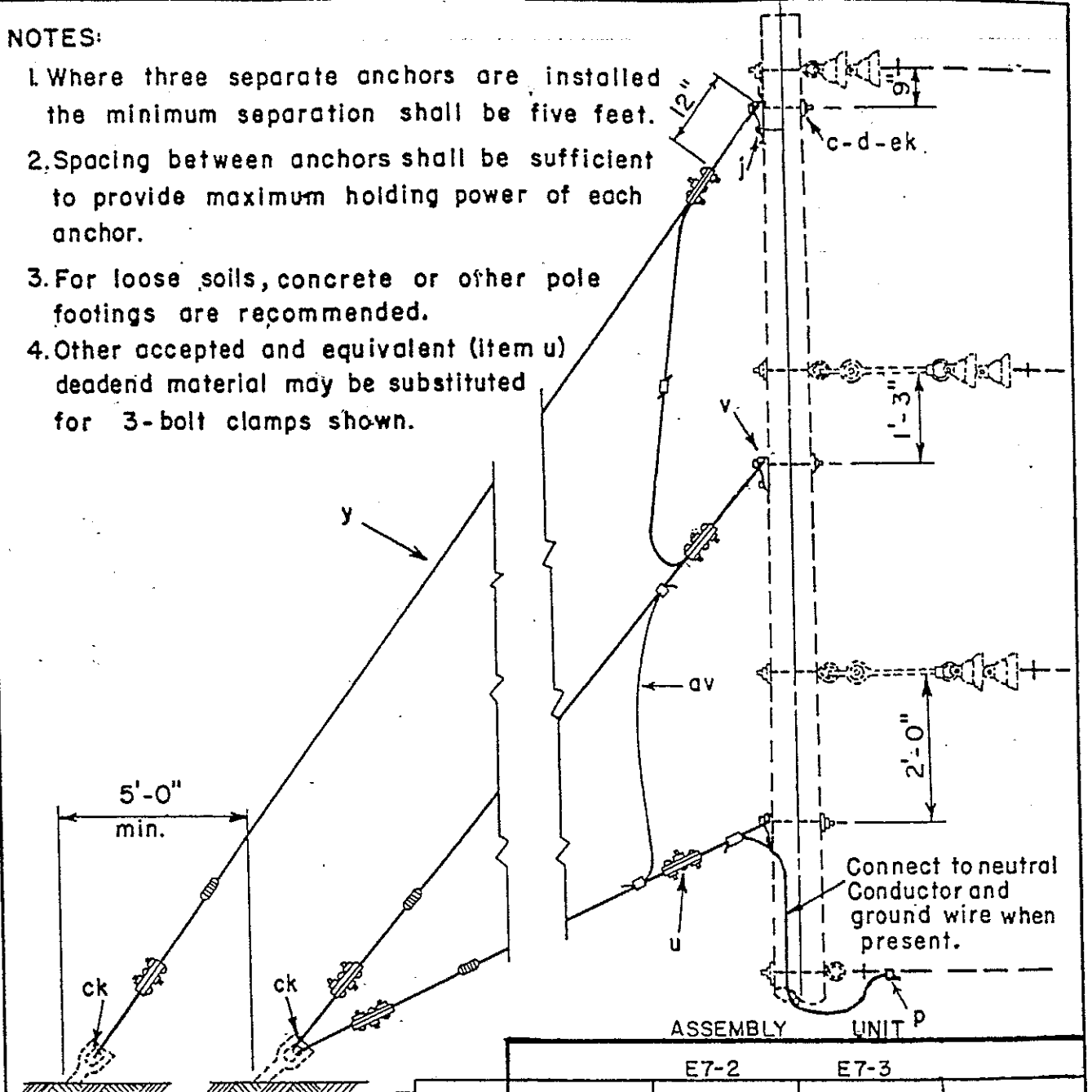
1. When two-guys are attached to one anchor rod, use F1-3 or larger anchor.
2. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
3. For loose soils, concrete or other pole footings are recommended.
4. Other accepted and equivalent (item u) deadend material may be substituted for automatic deadend shown.



		ASSEMBLY UNIT	
		E6-2 3/8" GUY WIRE	E6-3 7/16" GUY WIRE
ITEM	MATERIAL	No. Req'd	No. Req'd
c	Bolt, machine, 5/8" x req'd length	2	2
d	Washer, 3" x 3" x 5/16" curved		2
d	Washer, 2 1/4" x 2 1/4" x 3/16", 1 3/16" hole	2	
j	Screw, lag, 1/2" x 4"		2
p	Connectors, as req'd		
u	Deadend for guy strand	4	4
v	Guy attachment, Mall. Iron, Heavy Duty		2
v	Guy attachment, through bolt type	2	
y	Guy wire, S. M., 7-strand,	Req'd. Length	Req'd. Length
av	Jumpers, No. 4 stranded Al. alloy or equiv.	as required	as required
ck	Clamp, guy bond, as req'd		
ek	Locknuts, as required		
		12.5/7.2 kV DOUBLE DOWN GUY	
		Apr., 1983	E6-2, E6-3

NOTES:

1. Where three separate anchors are installed the minimum separation shall be five feet.
2. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
3. For loose soils, concrete or other pole footings are recommended.
4. Other accepted and equivalent (item u) deadend material may be substituted for 3-bolt clamps shown.



		E7-2		E7-3	
ITEM	MATERIAL	No. req'd	No. req'd		
c	Bolt, machine, 5/8" x req'd length	3	3		
d	Washer, curved, 3"x3"x 5/16"	3	3		
j	Screw, lag, 1/2" x 4"	3	3		
p	Connectors	as req'd	as req'd		
u	Deadend for guy strand	6	6		
v	Guy attachment	3-5200 lbs.	3-8500 lbs.		
y	Guy Wire, S.M., 7-strand req'd length by	3/8"	7/16"		
av	Jumpers, No. 4 stranded Al. alloy or equiv	as req'd	as req'd		
ck	Clamp, guy bond, as req'd.	12.5/7.2 kV THREE DOWN GUYS (LARGE CONDUCTORS)			
ek	Locknuts, as required				
		Apr., 1983		E7-2, E7-3	

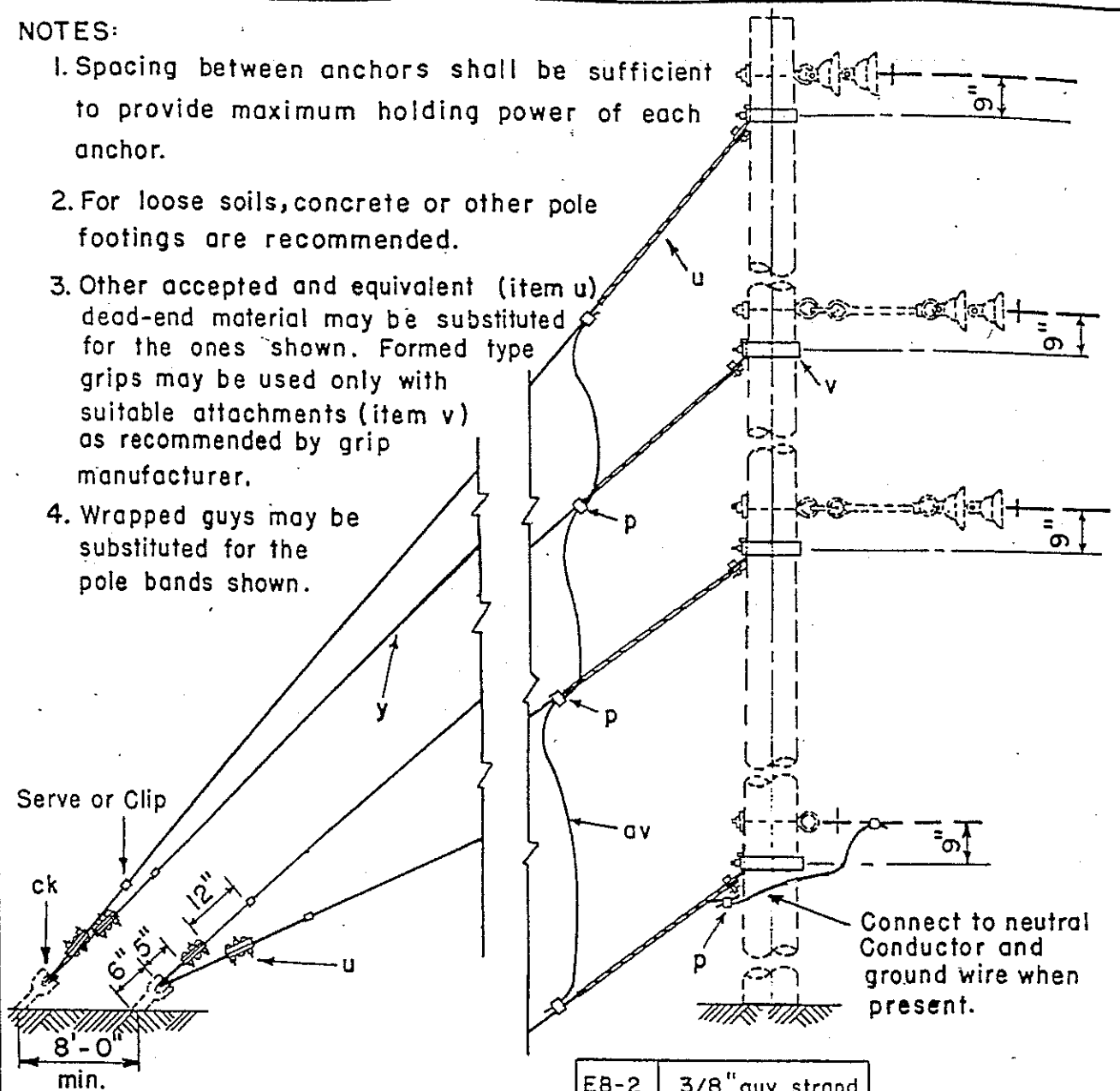
NOTES:

1. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.

2. For loose soils, concrete or other pole footings are recommended.

3. Other accepted and equivalent (item u) dead-end material may be substituted for the ones shown. Formed type grips may be used only with suitable attachments (item v) as recommended by grip manufacturer.

4. Wrapped guys may be substituted for the pole bands shown.



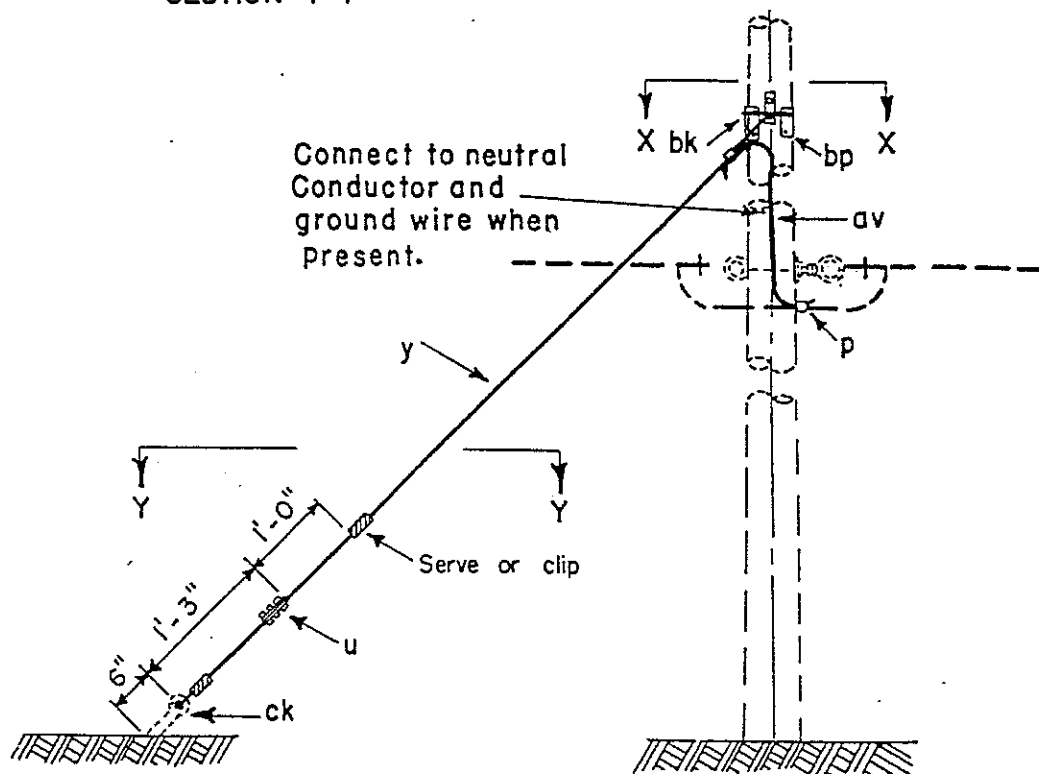
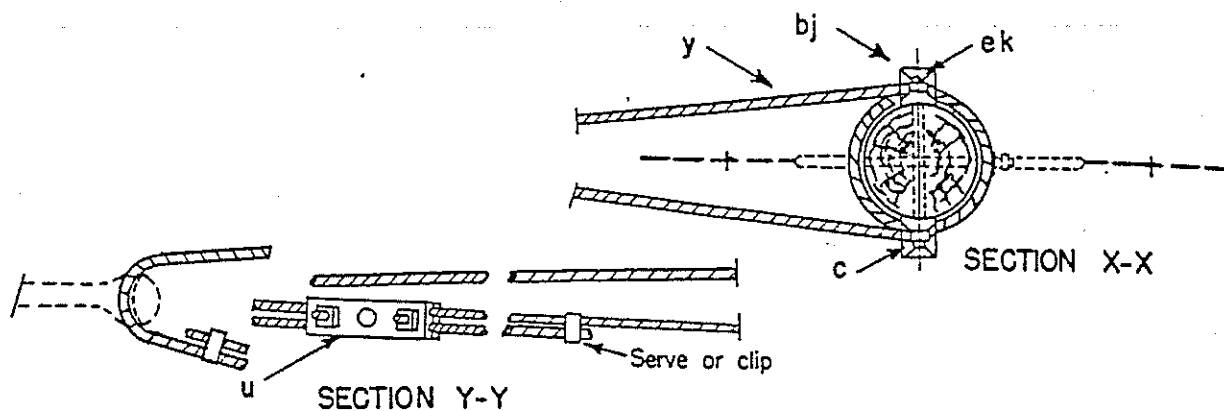
E8-2	3/8" guy strand
E8-3	7/16" guy strand

ITEM	MATERIAL	No. Required	
p	Connectors,	as req'd	
u	Deadend for guy strand	8	
v	Guy attachment, pole band type	4	
y	Guy Wire S.M. 7 strand	req'd length	
av	Jumpers, No. 4 stranded Al. alloy or equiv.	as required	
ck	Clamp, guy bonding	2	

12.5/7.2 kV
FOUR DOWN GUYS
(LARGE CONDUCTORS)

Apr., 1983

E8-2, E8-3



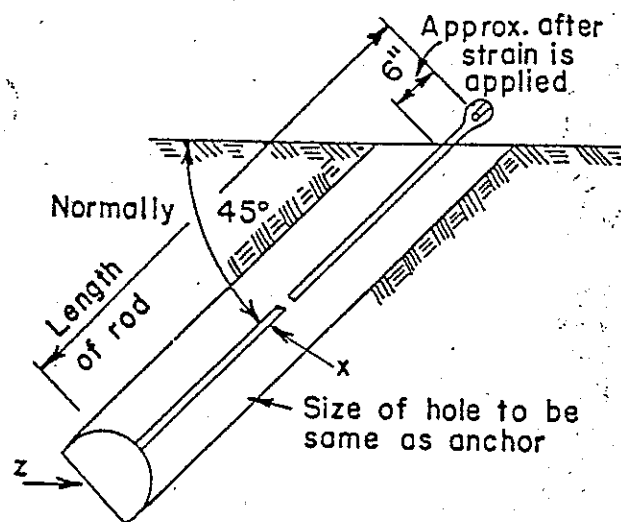
E11	1/4" guy strand
E12	3/8" guy strand

ITEM	MATERIAL	NO. REQ'D.			
c	Bolt, machine, 5/8" x req'd. length	1			
u	Deadend for guy strand	1			
y	Guy wire, 7 strand, S.M.	Req'd. Length			
ck	Clamp, anchor rod bonding	1			
bj	Guy hook, J	2			
bk	Guy plate, 4" x 8", 14 gauge	2			
bp	Nail, 8 penny, galv.	8			
av	Jumper, #4 stranded AL. alloy or equiv.				
p	Connectors, as req'd.				
ek	Locknuts, as required				
		12.5/7.2 kV SINGLE LOOP GUY, WRAPPED TYPE			
		Apr., 1983			E11, E12

GRAND VALLEY METERING STANDARDS SUMMARY

FM

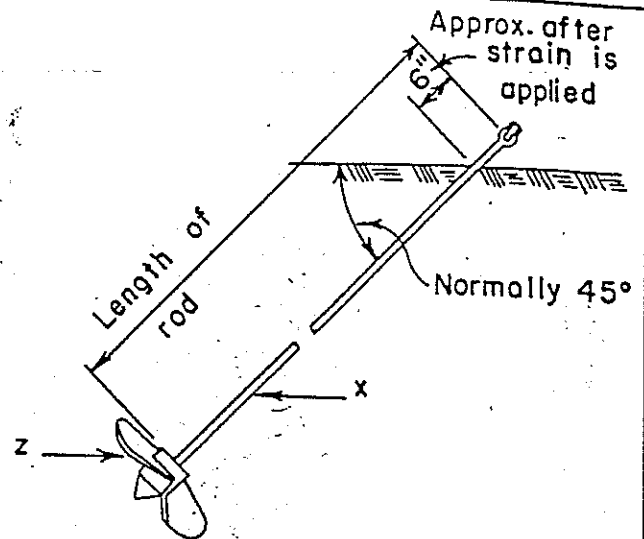
APPLICATION	FORM	CLASS	VOLTS	WIRE	STATOR	TERMINAL	SOCKET	LUGS/CONDUCTORS
1Ø	2S	100/200	240	3	1	4		
1Ø CT	3S	10	240	2	1	5		
1Ø 2 CT	4S	10	240	3	1½	6		
VØ DELTA	12S	100/200	120	3	2	5		
VØ 2 CT	5S	20	120	3	2	8		
3W DELTA	12S	100/200	240/480	3	2	5		
3W DELTA 2 CT	5S	20	240/480	3	2	8		
4W DELTA	15S	100/200	240/480	4	2½	7		
4W DELTA 2 CT	5S	20	240	3	2	8		
4W DELTA 3 CT	8S	20	120/240	4	2½	13		
			120/208					
4W Y 200A	14S	100/200	120/240	4	2½	7		
4W Y	16S	100/200	120/240	4	3	7		
4W Y 2 CT	5S	20	120/240	3	2	8		
4W Y 3 CT	5S	20	120/240	3	2	8		
			120/208					
4W Y 3 CT over 200	6S	20	277/480	4	2½	13		
4W Y 3 CT	9S	20	120/240	4	3	13		



CONE

FI-1C, FI-2C, FI-3C

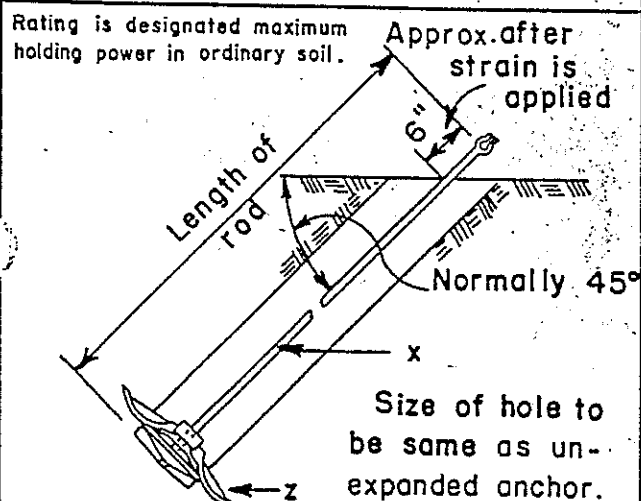
Rating is designated maximum holding power in hardpan and rocky soil.



SCREW

FI-1S, FI-2S, FI-3S, FI-4S

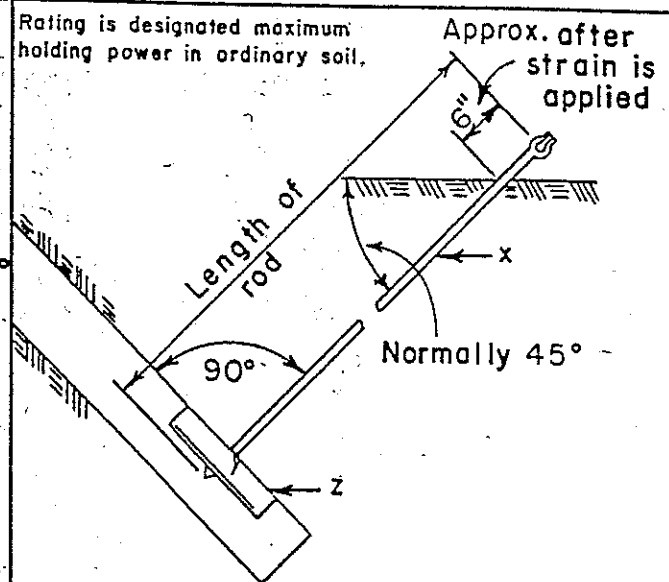
Rating is designated maximum holding power in ordinary soil.



EXPANDING

FI-1, FI-2, FI-3, FI-4

Note: Projection of anchor rods above earth may be increased to a max. of 12" in cultivated fields or other locations where necessary to prevent burying of the rod eye.



PLATE

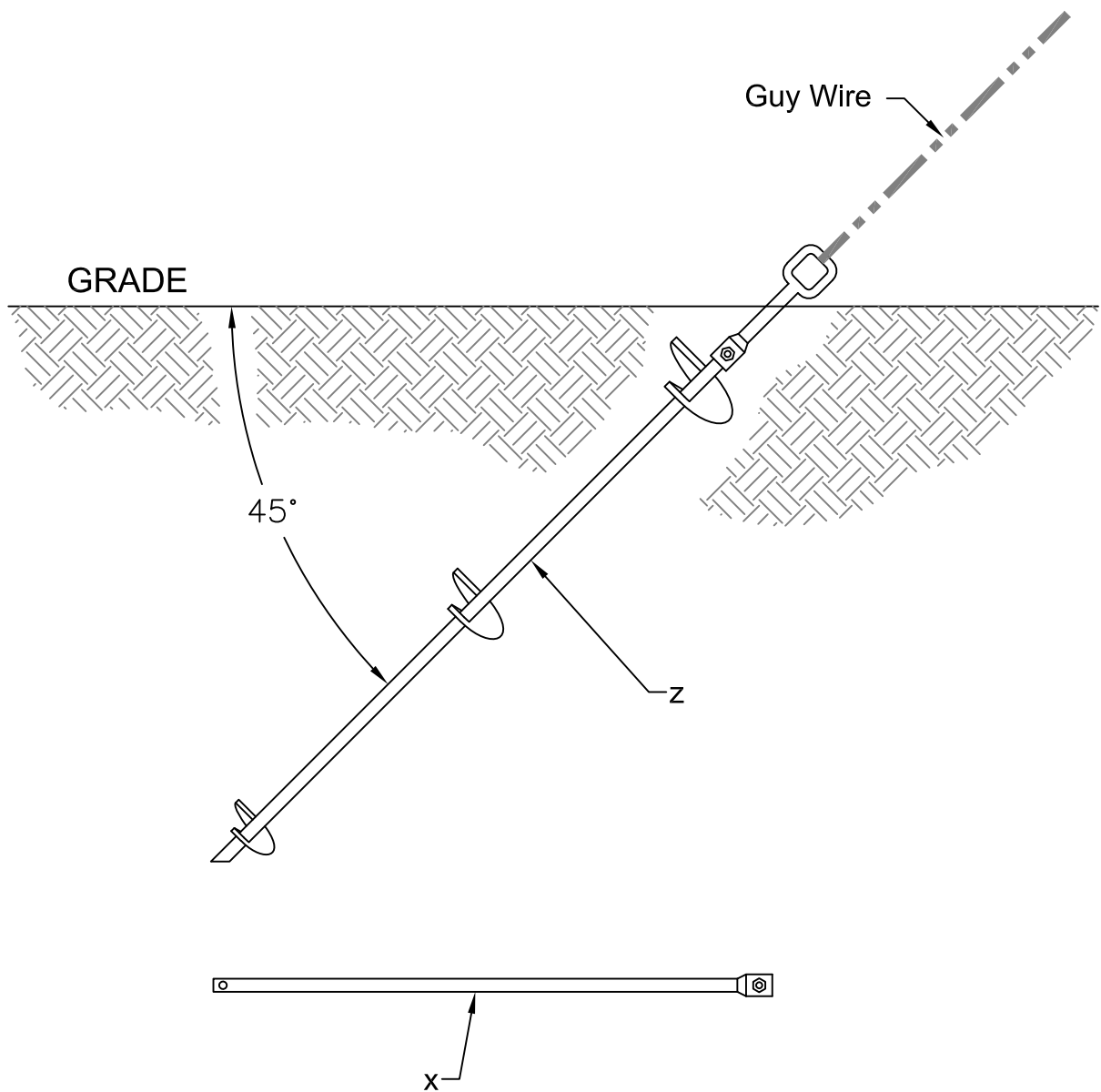
FI-1P, FI-2P, FI-3P, FI-4P

		ASSEMBLY UNIT			
Rating (pounds)		FI-1	FI-2	FI-3	FI-4
		6000	8000	10,000	12,000
ITEM	MATERIAL	NO.	NO.	NO.	NO.
x	Rod, anchor, thimble eye	1	5/8" x 7'-0"	1	5/8" x 7'-0"
x	Rod, anchor, twin eye			1	3/4" x 8'-0"
z	Anchor ----- type	1		1	1

LINE ANCHOR ASSEMBLIES

Apr., 1983

FI-1 TO FI-4



ITEM	MATERIAL	F1-2S	F1-4S
	Twin eye anchor rod	1	1
x	Extension rods, each 5'-0"	3	3
z	Double helix screw anchor, 3' length, 8" - 10" helix combo	1	
z	Triple helix screw anchor, 5' length, 8" - 10" - 12" helix combo		1

Max Holding Strength (Class 5 Soil):

F1-2S = 8,000 lbs

F1-4S = 12,000 lbs

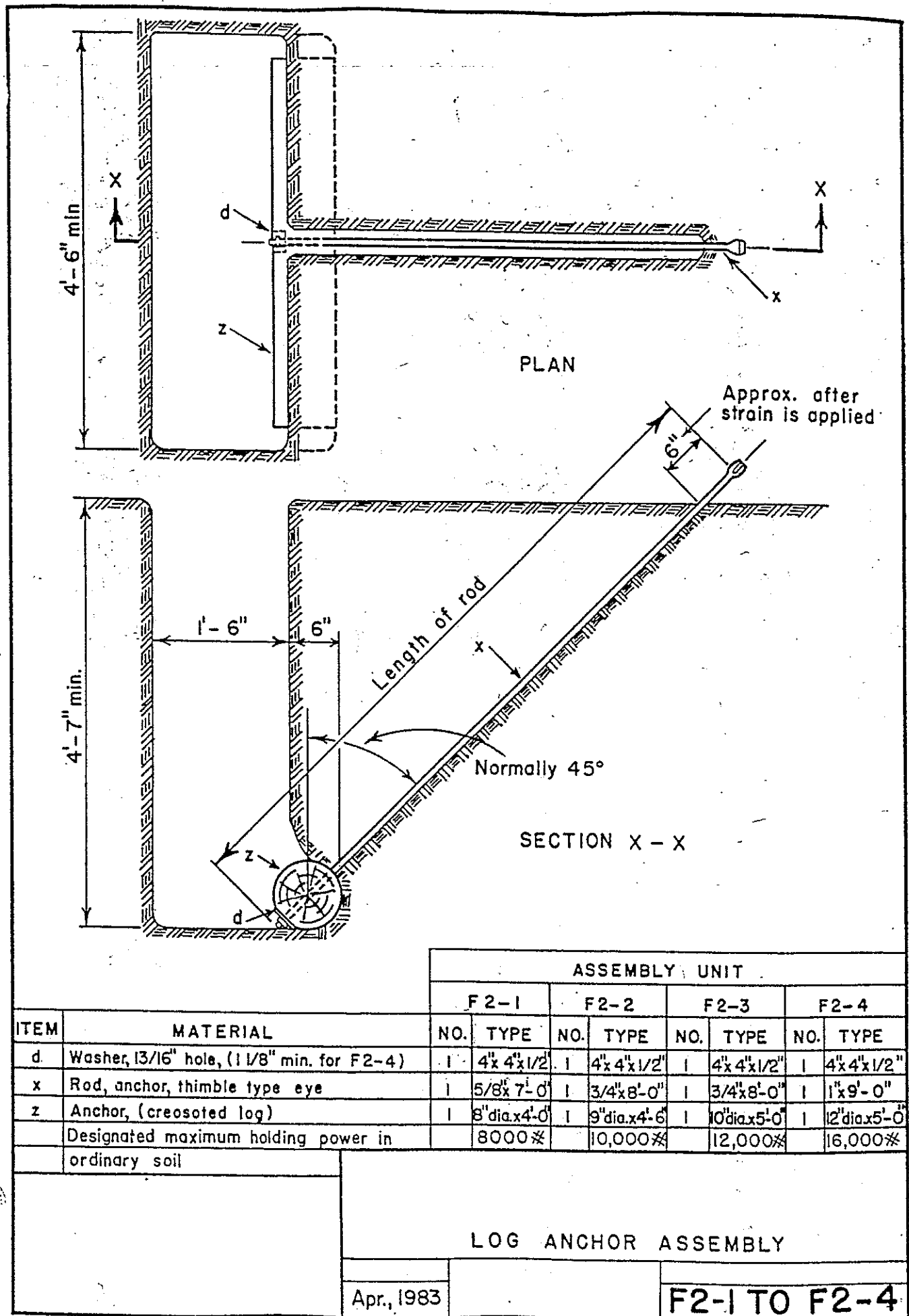
LINE ANCHOR ASSEMBLY POWER SCREW

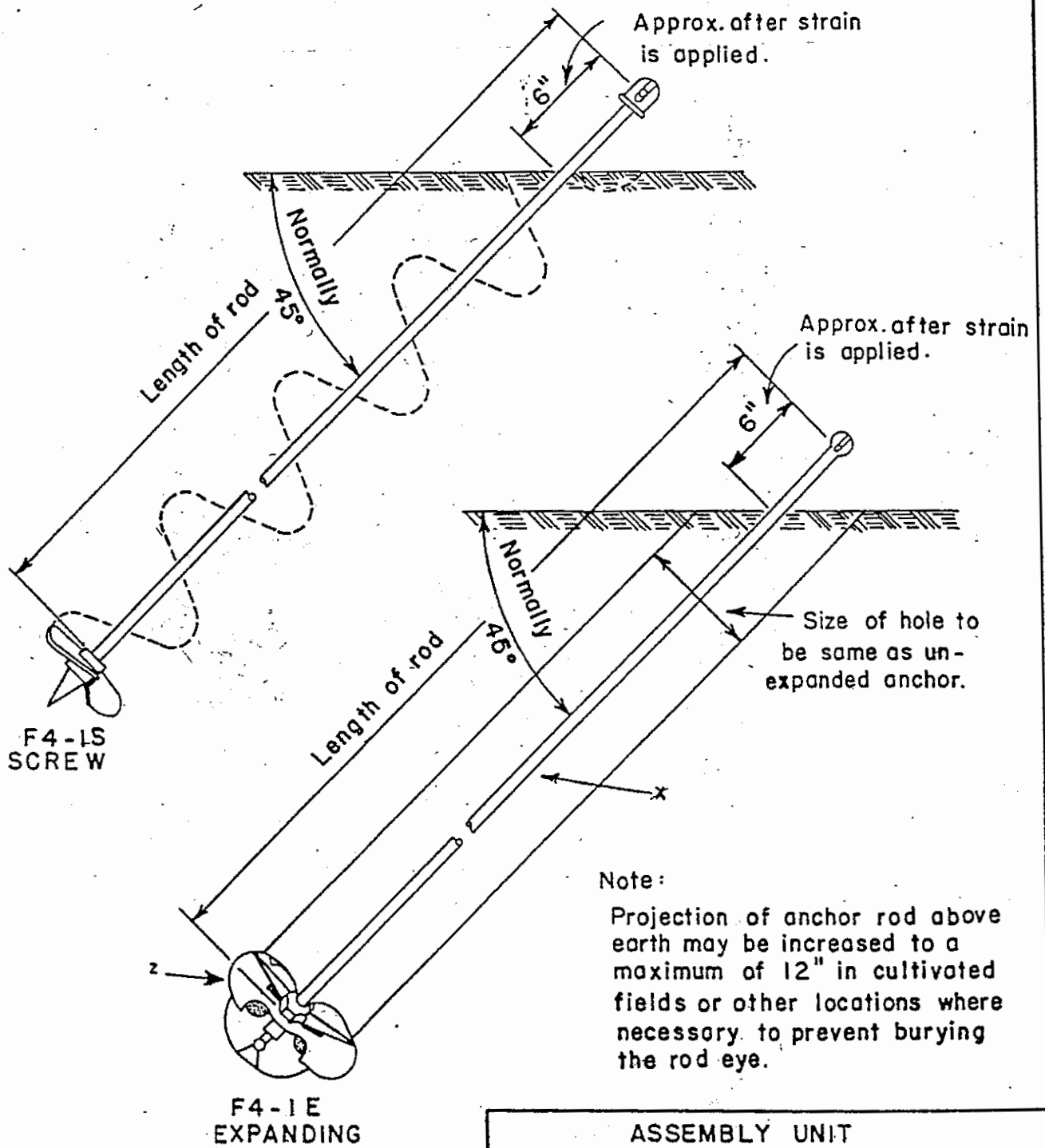
Revision Date

March 3, 2021



F1-2S
F1-4S



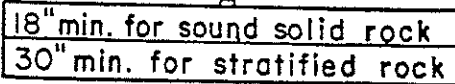


		ASSEMBLY UNIT					
		F4-1S		F4-1E			
ITEM	MATERIAL	NO.		NO.			
x	Rod, anchor, thimble type eye			1	5/8" x 6'-0"		
z	Anchor, service	1		1			
	Designated maximum holding power in sand		2500**		2500**		

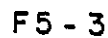
SERVICE ANCHOR ASSEMBLY

Apr., 1983

F4-1



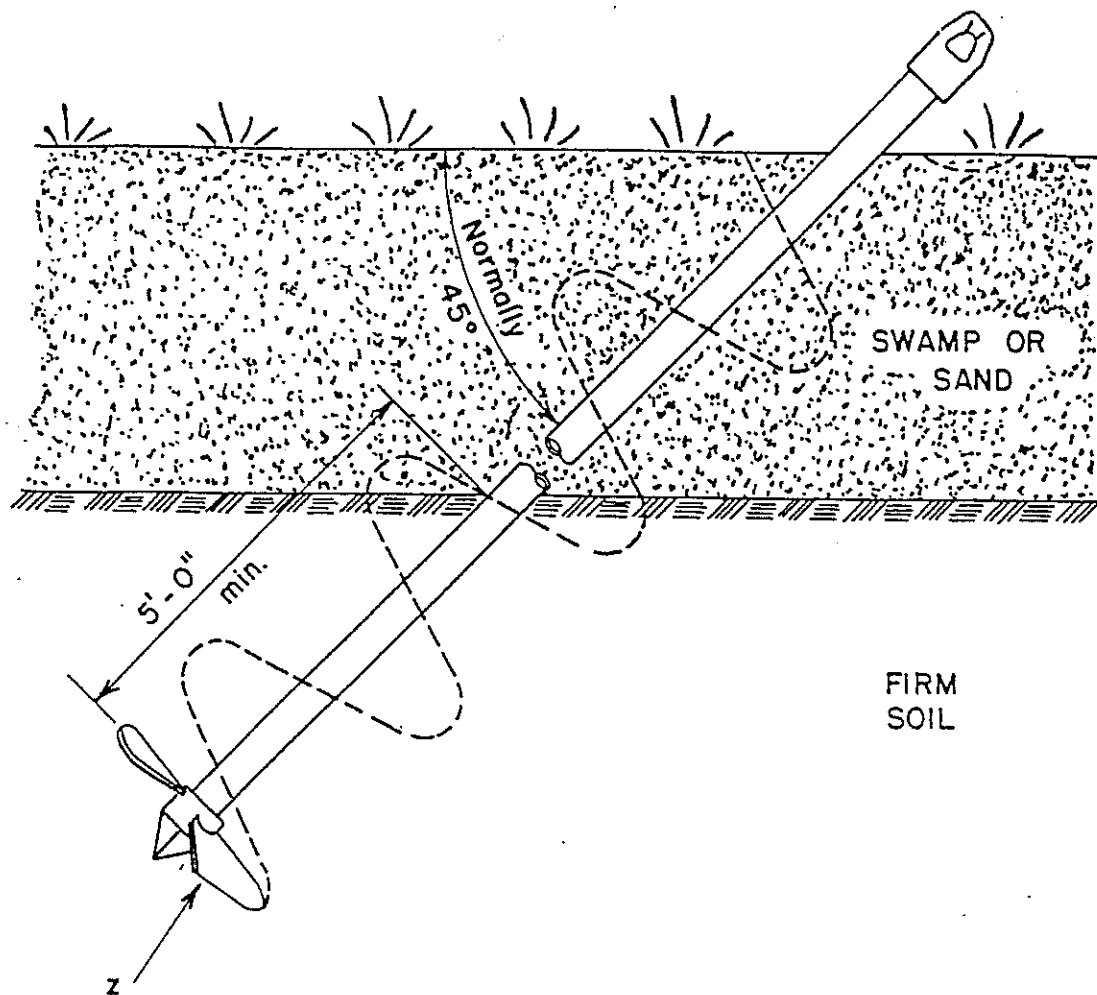
Guy Bolt	18"
Rock Anchor	15"



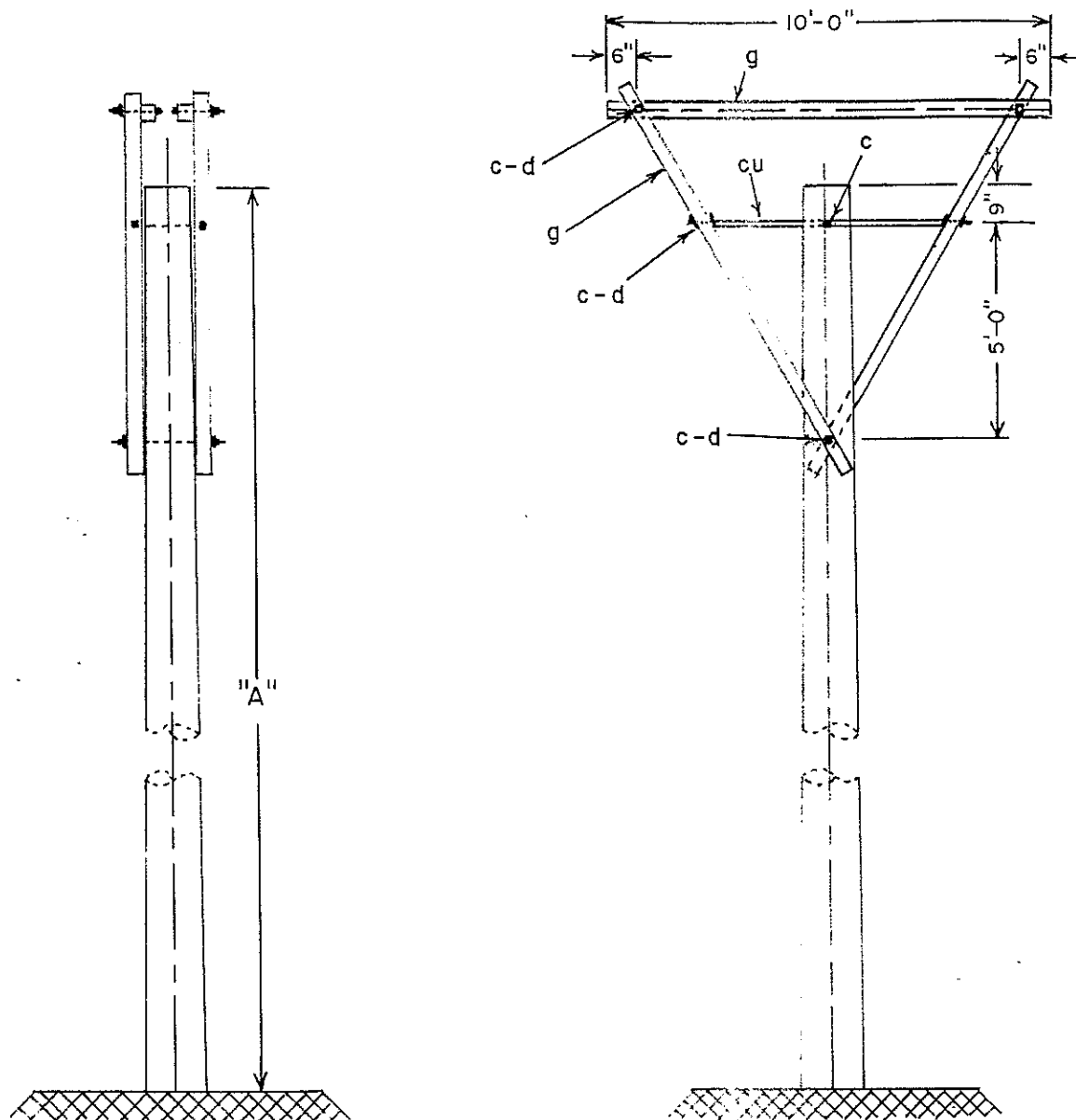
1. Only one guy shall be attached to a rock anchor. Where more than one guy is required space anchors 2 ft. minimum and where practical they shall be in direct line with pole.

2. Do not anchor to any boulder measuring less than 5ft. in two directions at right angles to each other.

F5-1 , F5-2 , F5-3



		ASSEMBLY UNIT							
		F6-1		F6-2		F6-3			
ITEM	MATERIAL	NO.	TYPE	NO.	TYPE	NO.	TYPE	NO.	TYPE
z	Anchor, swamp	1	10"	1	12"	1	15"		
	Designated maximum holding power		6000**		8000**		10,000**		
	Nut, thimble type eye	1		1		1			
	Pipe, galvanized, as req'd								
		SWAMP ANCHOR ASSEMBLY							
		Apr., 1983				F6-1, F6-2, F6-3			



"A" - Pole height as required for clearance over existing line

ITEM	No.	MATERIAL	ITEM	No.	MATERIAL
-	1	Pole, height and class as required	d	8	Washer, square, 2 1/4"
c	2	Bolt, machine, 1/2" x 6	g	3	Crossarm, 3 5/8" x 4 5/8" x 10'-0"
c	4	Bolt, machine, 5/8" x required length	cu	1	Brace, crossarm, 60" span

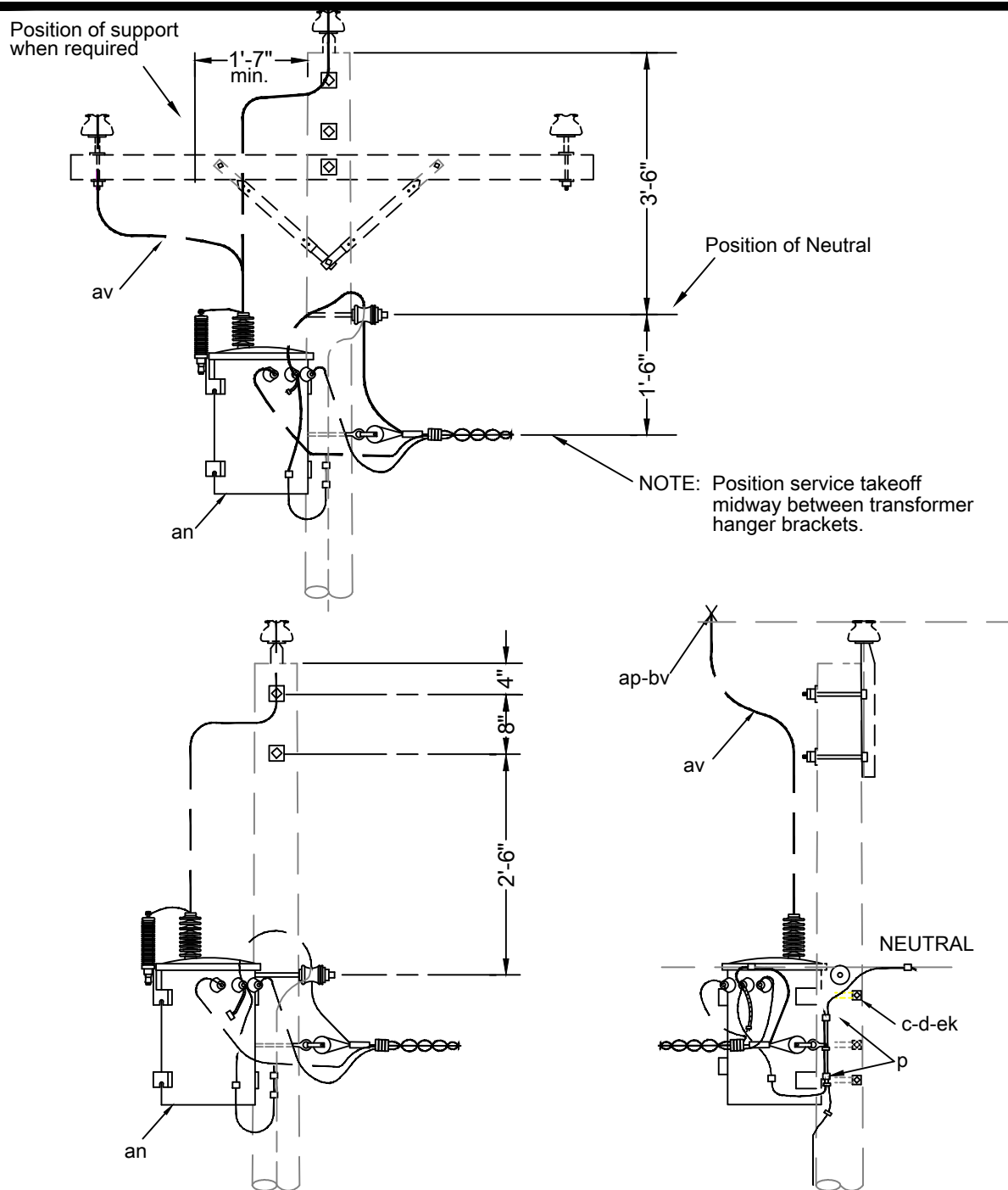
TEMPORARY GUARD POLE

FEB. 1993



GRAND VALLEY POWER

GP



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5/8" x required length	ap	1	Clamp, hot line
d	2	Washer, square, 2 1/4"	av	-	Jumpers, stranded, as required
p	-	Connectors, compression type, as required	bv	1	Rod, armor, as required
an	1	Transformer, 12.47kV, self-protected	ek	2	Locknuts

SINGLE PHASE, CSP TRANSFORMER TANGENT POLE

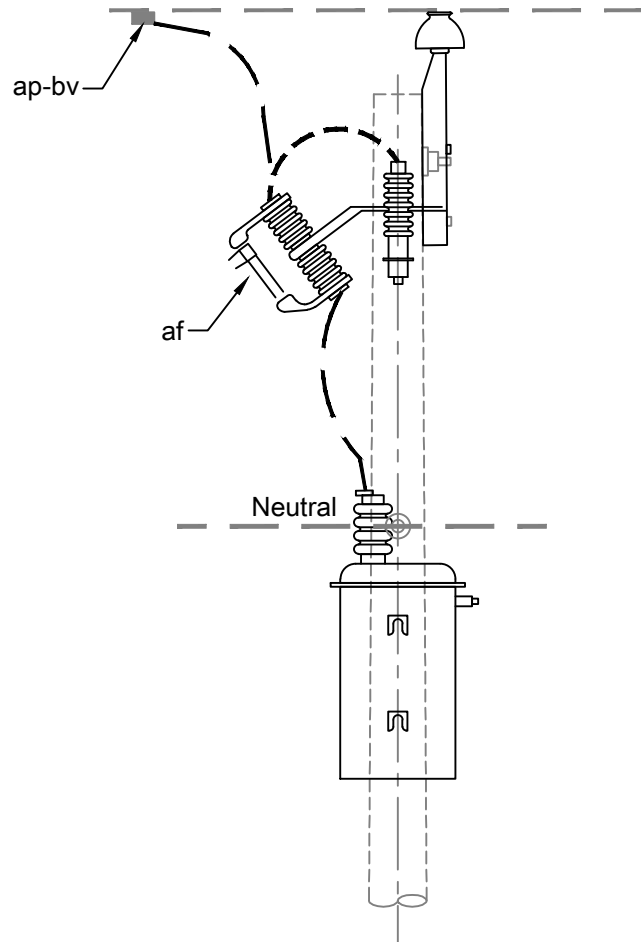
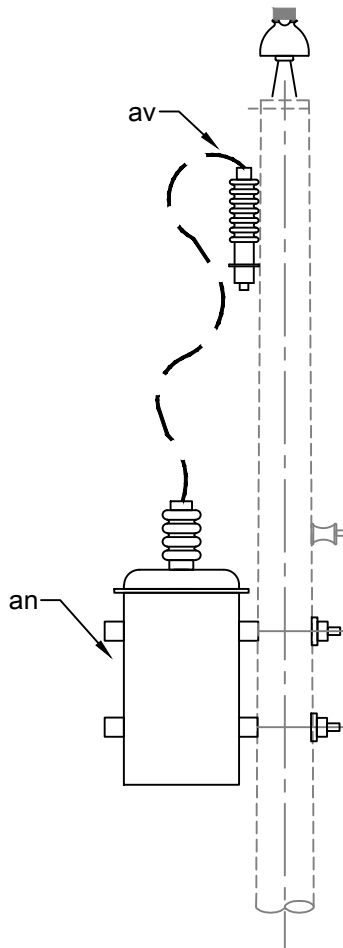
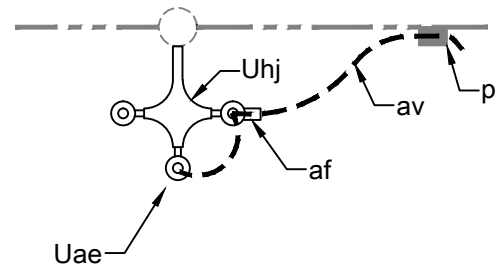
Revision Date

June 3, 2019



G105-, G136-

Note: Transformer can be substituted with 1/2 KVA or 1 1/2 KVA.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
p	-	Connectors, as required	an	1	Transformer (1 KVA Conventional)
ae	1	Surge arrester	ap	1	Clamp, hot line, tap assembly
av	-	Jumpers, stranded, as required	bv	1	Rod, armor
af	1	Cutout (Non-loadbreak type)	Uae	1	arrester dist (MOV)
af	1	Fuse link (Fuse with 1 Amp)	Uhj	1	Equipment support bracket

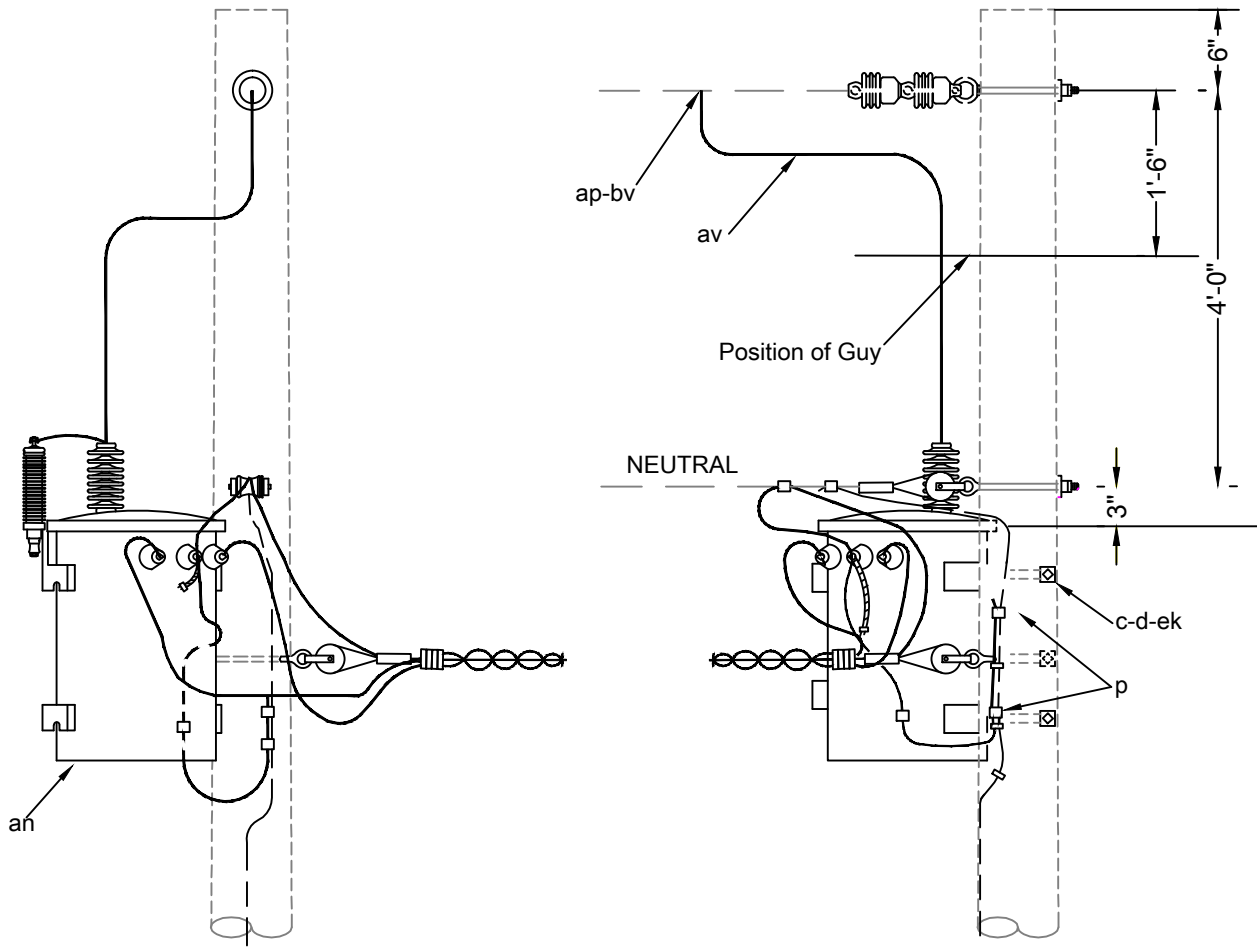
12.5/7.2 KV Single Phase Small Conventional Transformer

Revision Date

May 14, 2019



G105-1



Note: Install transformer so that primary neutral is 3 inches above bottom of transformer lid on both single-phase and three-phase primary assemblies. Do not disconnect transformer neutral without first disconnecting primary.

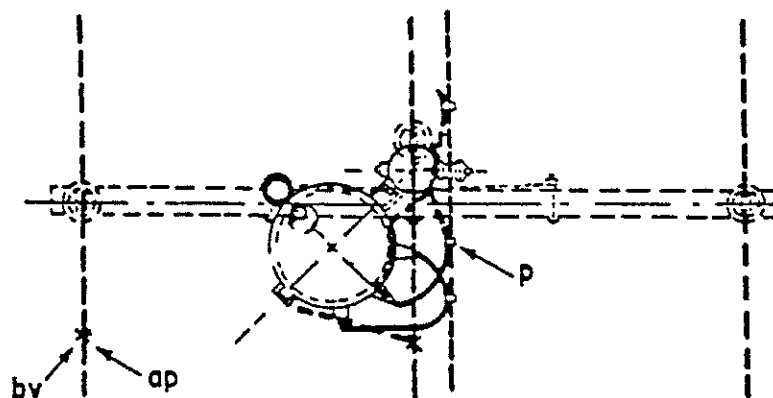
ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5/8" x required length	ap	1	Clamp, hot line
d	2	Washer, square, 2 1/4"	av	-	Jumpers, stranded, as required
p	-	Connectors, compression type, as required	bv	1	Rod, armor, as required
an	1	Transformer, 12.47kV, self-protected	ek	2	Locknuts

SINGLE PHASE, CSP TRANSFORMER
DEADEND POLE

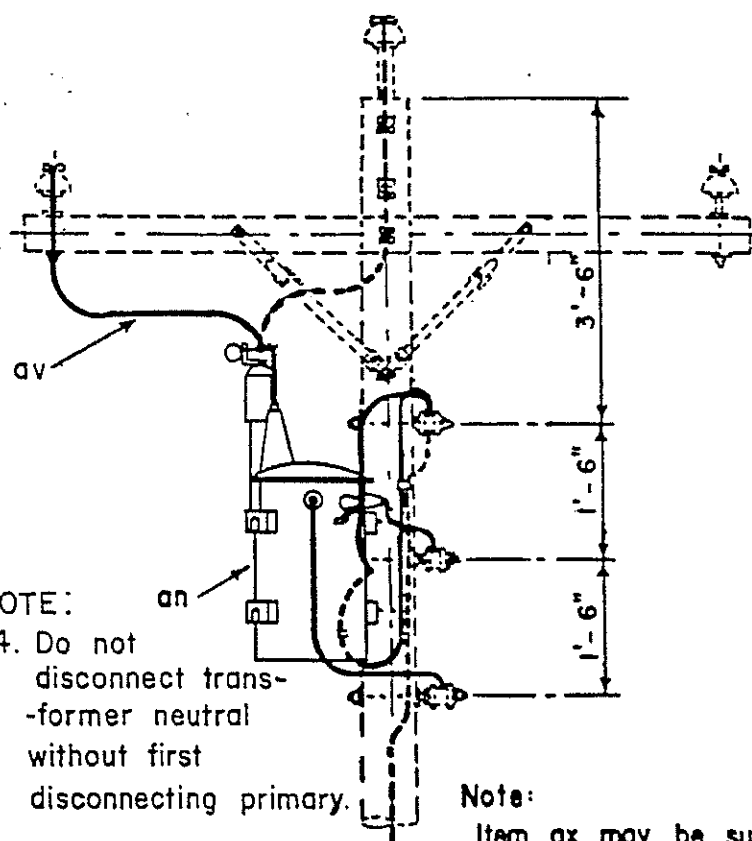
Revision Date
June 3, 2019



G106-



PLAN

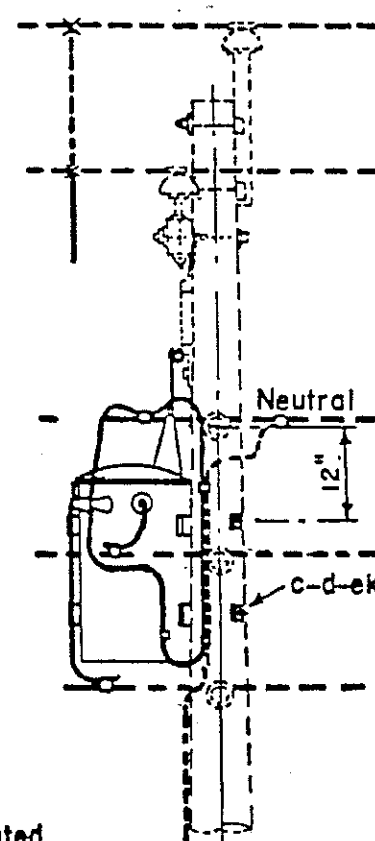


NOTE:

4. Do not disconnect transformer neutral without first disconnecting primary.

Note:

Item ax may be substituted for items ae and af.



- Notes: 1. Designate G39 for conventional transformer with tank mounted cutout and arrester, G67 for transformer with double gap and internal fuse and G136 for self protected transformer.
2. See guide drawings for details of transformer secondary and service connections.
3. Reverse for connection to other outside phase.

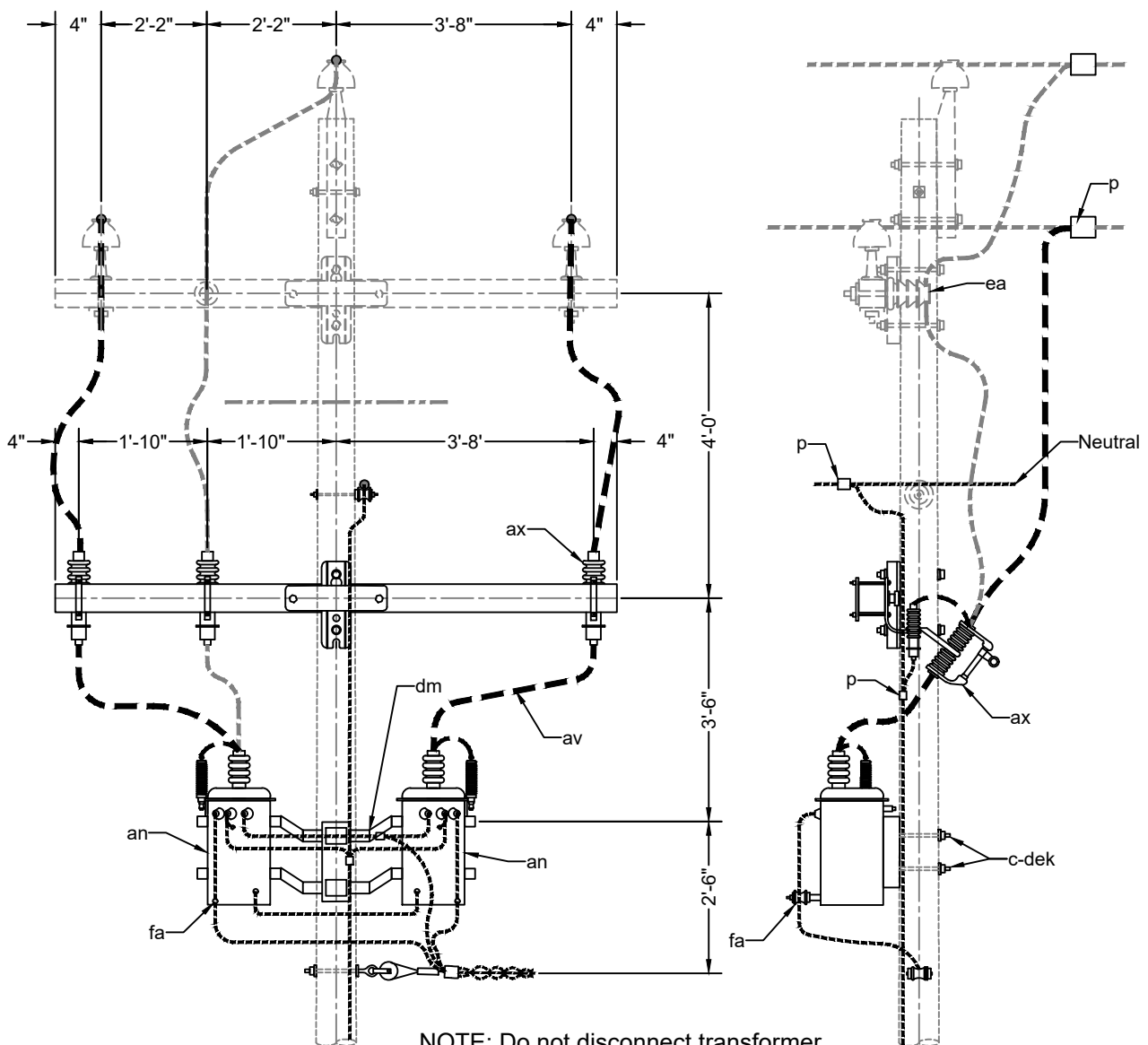
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x req'd. length	av		Jumpers, stranded, as required
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	af	1	Cutout, fuse, open link (G 39 only)
p		Connectors, as required	ae	1	Surge arrester (G 39 only)
an	1	Transformer	bv	1	Rods, armor
ap	1	Clamp, hot line, tap assembly	ek		Locknuts as required

12.5/7.2 kV
SINGLE PHASE TRANSFORMER
ON THREE PHASE CIRCUIT

G39, G67, G136

Apr., 1983

G39-G67-G136-



NOTE: Do not disconnect transformer neutral without first disconnecting primary.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	av	-	Jumper, secondary, weather-proof
d	5	Washer, 2 1/4" square, 13/16"hole	av	-	Jumper, primary, bore, stranded, as required
d	6	Washer, 3" square, curved	ax	2	Cutout and arrester, combination
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	dm	1	Bracket, transformer
p	2	Connector, conventional	fo	3	Transformer, secondary bracket
p	-	Connector, as required	ek	-	Locknuts , as required
an	2	Transformer, conventional, 50 kva maximum			

12.5 / 7.2 KV PRIMARY
TWO TRANSFORMERS, CLUSTER MOUNTED
OPEN WYE-OPEN DELTA FOR 120/240 VOLT POWER LOAD

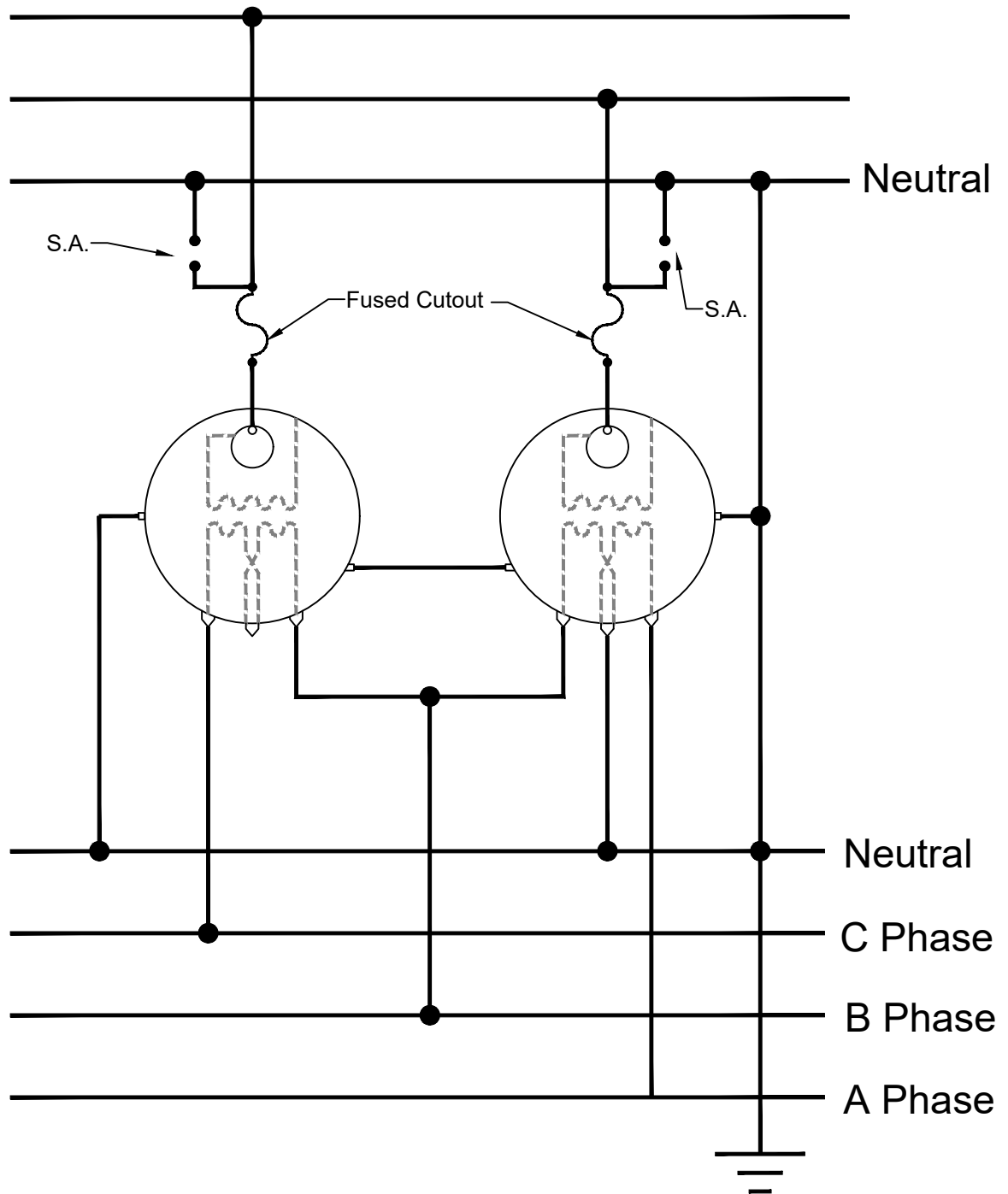
Revision Date

Jan. 11, 2023



G210-

12.5 / 7.2 KV



12.5 / 7.2 KV PRIMARY

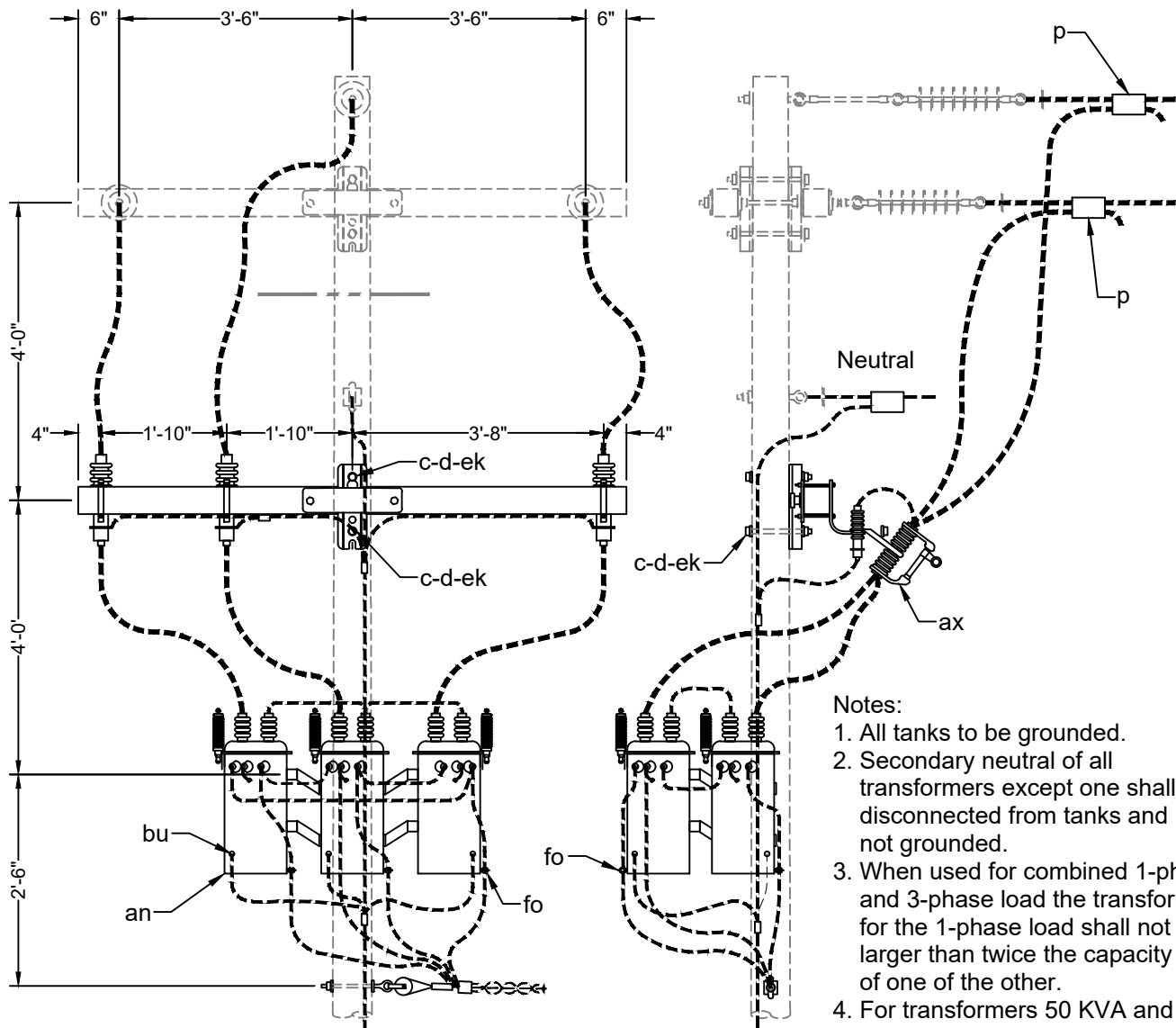
TWO TRANSFORMERS, CLUSTER MOUNTED
OPEN WYE-OPEN DELTA FOR 120/240 VOLT POWER LOAD

Revision Date

Jan. 11, 2023



G210-
Wiring Diagram



Notes:

1. All tanks to be grounded.
2. Secondary neutral of all transformers except one shall be disconnected from tanks and not grounded.
3. When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of one of the other.
4. For transformers 50 KVA and smaller, use one cluster bracket with adapter plates and dimension as shown on G311.

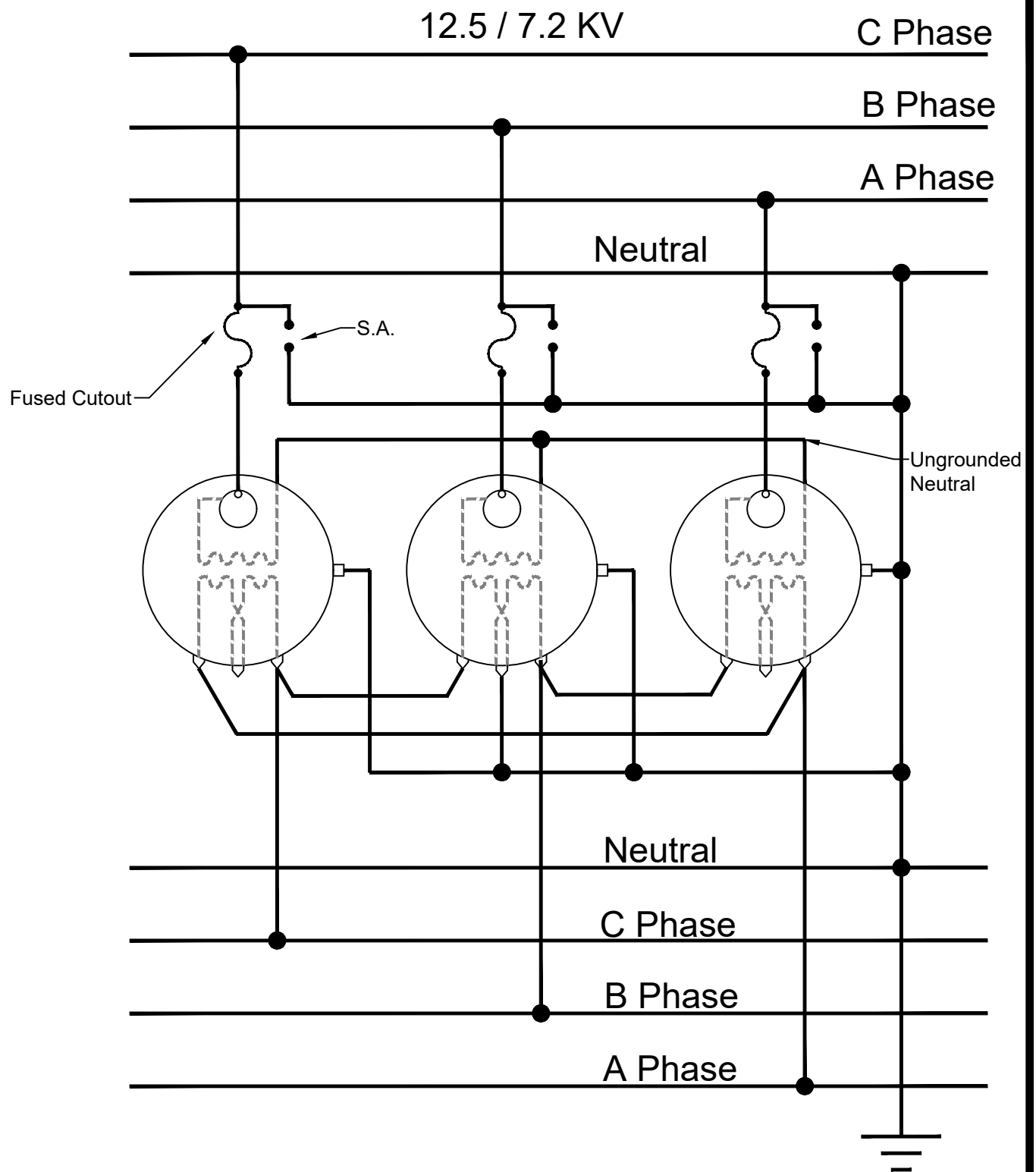
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	ax	3	Cutouts and arrester, combination
d	5	Washer, 2 1/4" square, 13/16" hole	bu	4	Connector, transformer grounding
d	4	Washer, square, 3" curved	cc	1	Deadend, assembly, neutral
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	dm	-	Bracket, transformer, cluster
p	-	Connector, compression type		1	Link, grounding
p	-	Connectors, as required	fo	3	Transformer secondary bracket
an	3	Transformer, 100 KVA maximum conventional	ek	-	Locknuts, as required
av	-	Jumpers and leads as required			

**12.5 / 7.2 KV 3-PHASE
THREE TRANSFORMERS CLUSTER MOUNTED
UNGROUND WYE-CENTER TAP GROUNDED DELTA
FOR 120/240 VOLT POWER LOADS**

Revision Date

Jan. 12, 2023

**G310-**



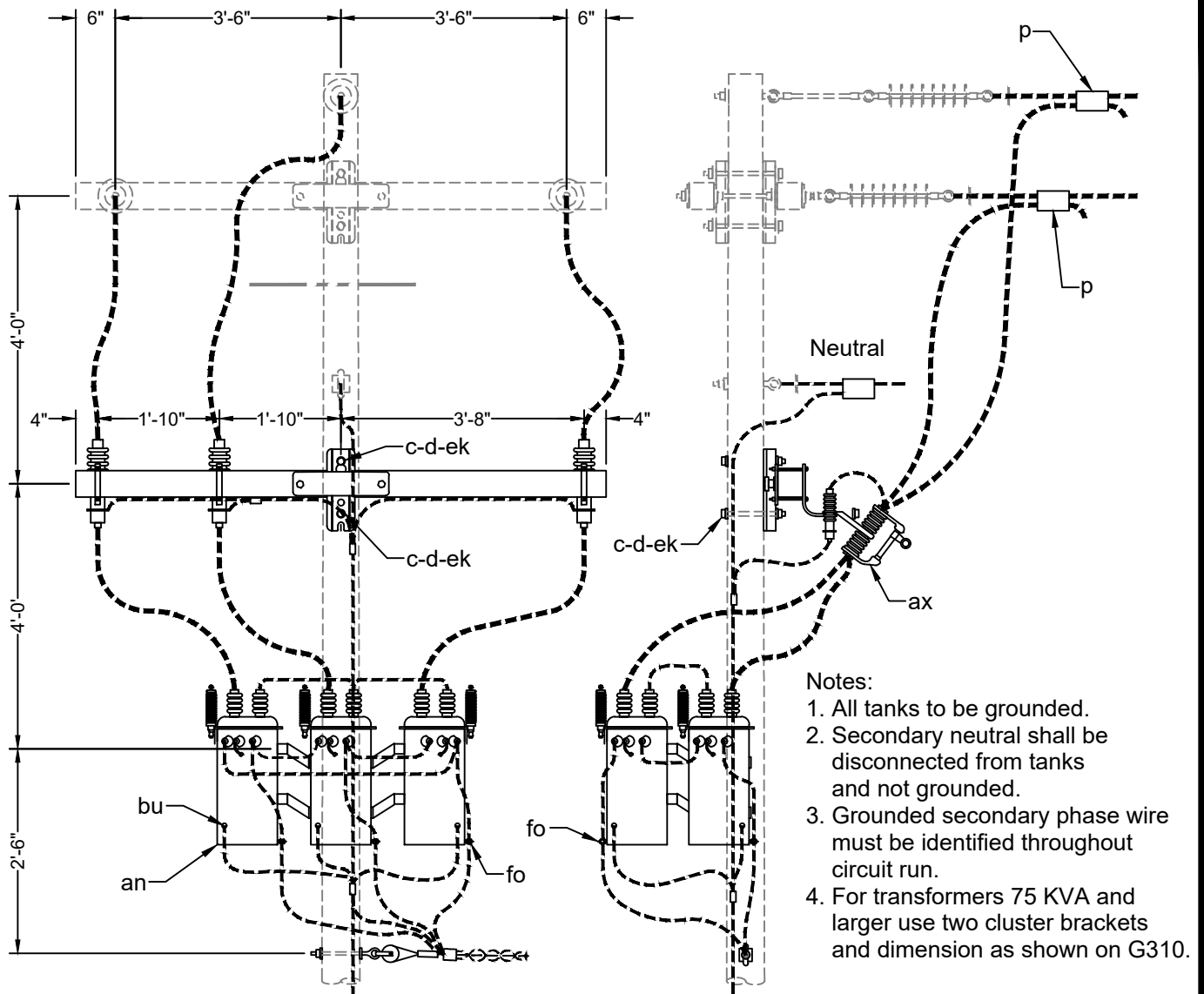
12.5 / 7.2 kv - 3 PHASE
 THREE TRANSFORMERS CLUSTER MOUNTED
 UNGROUNDED WYE-CENTER TAP GROUNDED DELTA
 FOR 120/240 VOLT LOADS

Revision Date

Jan. 13, 2023



G310-
 Wiring Diagram



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	ax	3	Cutouts and arrester, combination
d	5	Washer, 2 1/4" square, 13/16" hole	bu	4	Connector, transformer grounding
d	4	Washer, square, 3" curved	cc	1	Deadend, assembly, neutral
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	dm	-	Bracket, transformer, cluster
p	-	Connector, compression type		1	Link, grounding
p	-	Connectors, as required	fo	3	Transformer secondary bracket
an	3	Transformer, 100 KVA maximum conventional	ek	-	Locknuts, as required
av	-	Jumpers and leads as required			

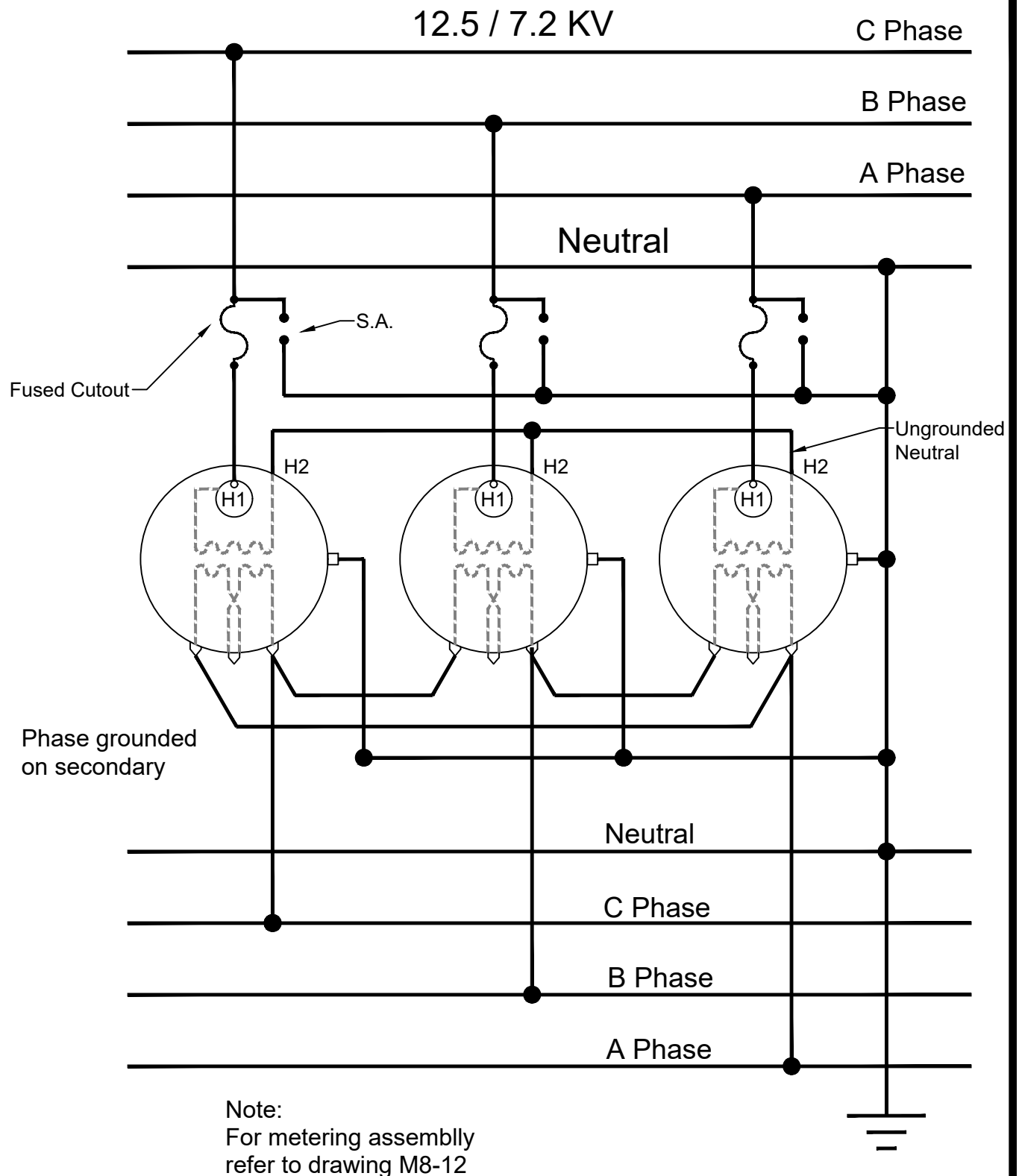
12.5 / 7.2 KV 3-PHASE
THREE TRANSFORMERS CLUSTER MOUNTED
UNGROUNDED WYE-CORNER GROUNDED DELTA
FOR 240 / 480 VOLT POWER LOADS

Revision Date

Jan. 13, 2023



G311-



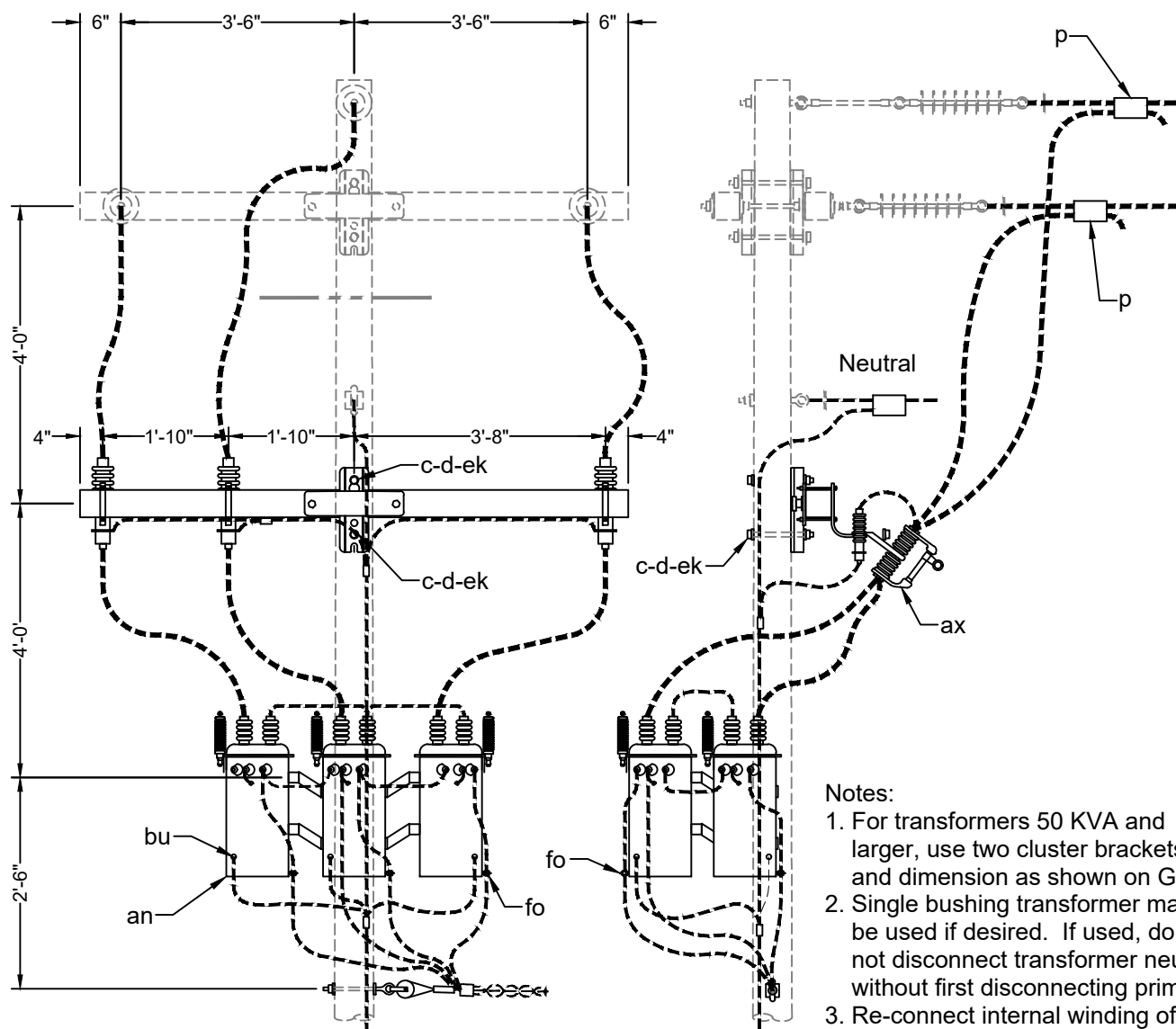
12.5 / 7.2 kv - 3 PHASE
THREE TRANSFORMERS CLUSTER MOUNTED
UNGROUND WYE - CORNER GROUNDED DELTA
FOR 240/480 VOLT LOADS

Revision Date

Jan. 13, 2023



G311-
Wiring Diagram



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	ax	3	Cutouts and arrester, combination
d	5	Washer, 2 1/4" square, 13/16" hole	bu	4	Connector, transformer grounding
d	4	Washer, square, 3" curved	cc	1	Deadend, assembly, neutral
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	dm	-	Bracket, transformer, cluster
p	-	Connector, compression type		1	Link, grounding
p	-	Connectors, as required	fo	3	Transformer secondary bracket
an	3	Transformer, 100 KVA maximum conventional	ek	-	Locknuts, as required
av	-	Jumpers and leads as required			

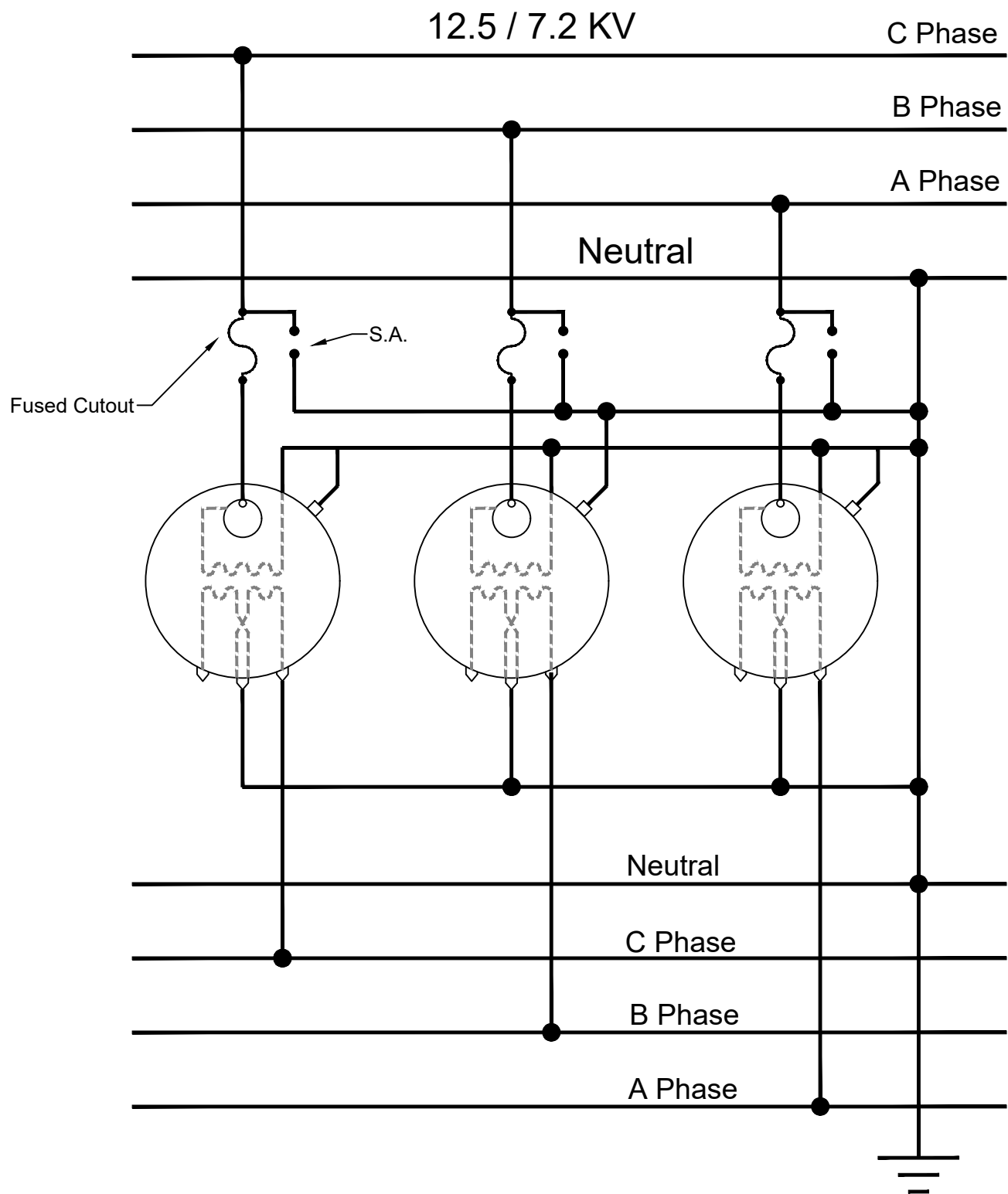
12.5 / 7.2 KV 3-PHASE
THREE TRANSFORMERS CLUSTER MOUNTED
4-WIRE GROUNDED WYE - GROUNDED WYE
FOR 208 / 120 VOLT POWER LOADS

Revision Date

Jan. 13, 2023



G312-



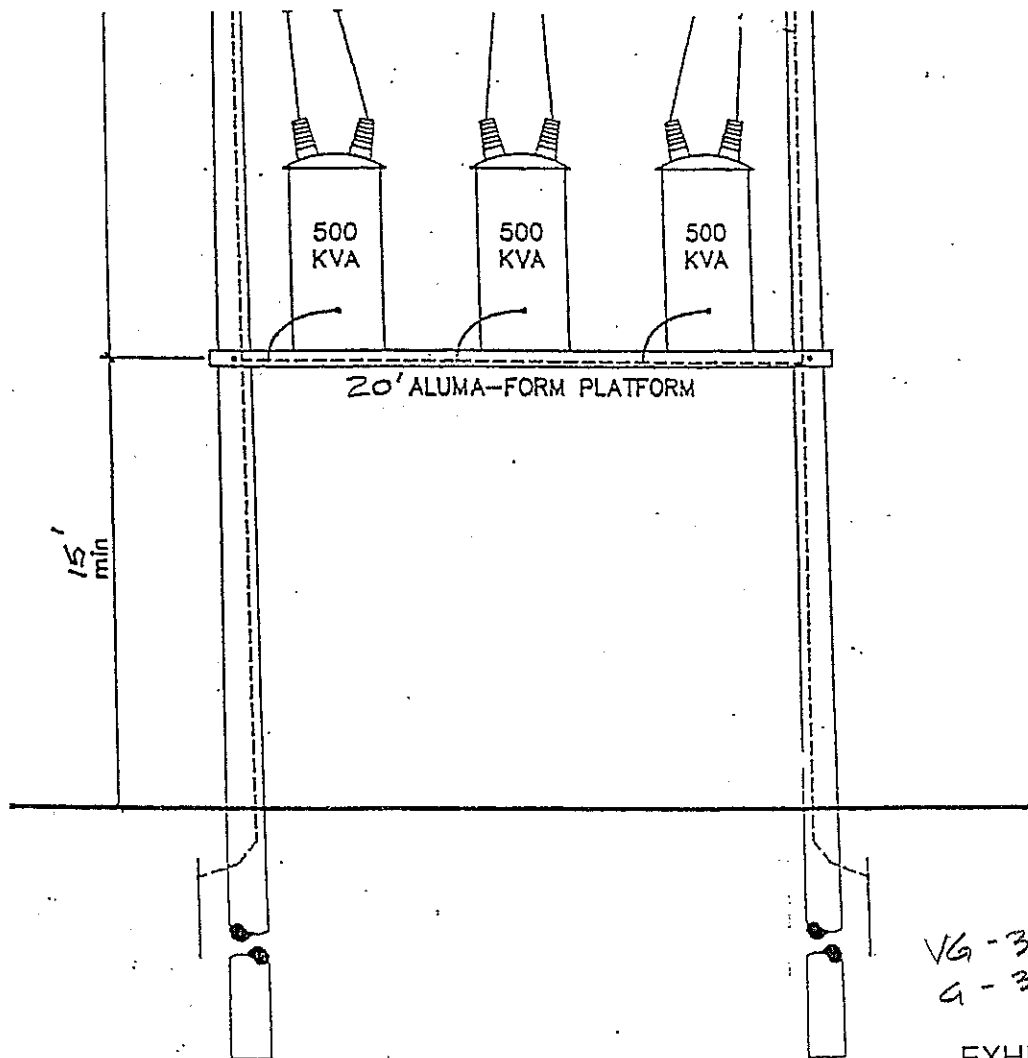
12.5 / 7.2 kv - 3 PHASE
 THREE TRANSFORMERS CLUSTER MOUNTED
 4-WIRE GROUNDED WYE - GROUNDED WYE
 FOR 208/120 VOLT LOADS

Revision Date

Jan. 13, 2023



G312-
 Wiring Diagram



VG-350, VG-500

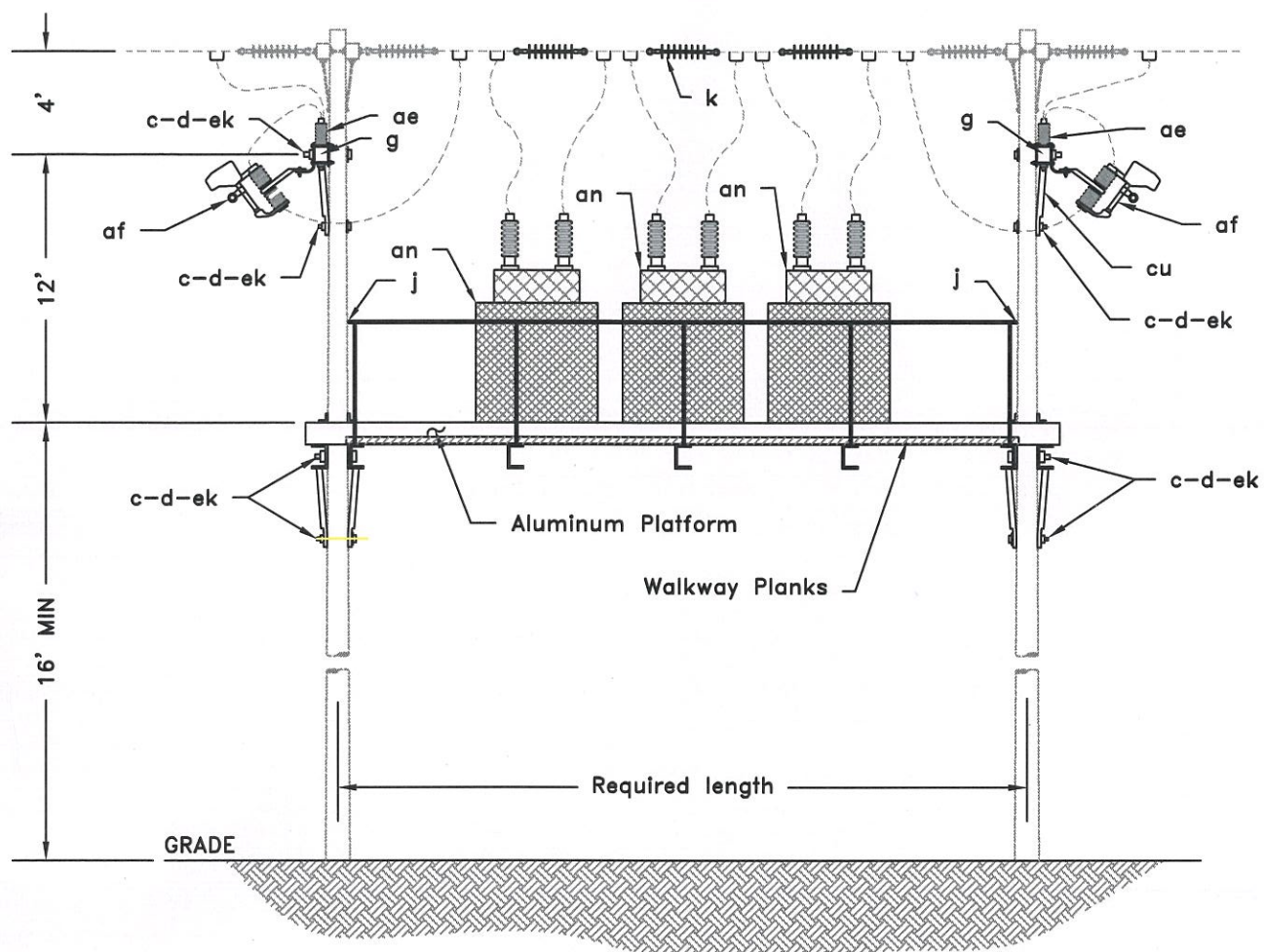
EXHIBIT C

25 (XFMOTL)

NO	DATE	REVISION	BY
1	9/1/88	ORIGINAL ISSUE	ESC

GRAND VALLEY
RURAL POWER LINES

TITLE:
7.2/12.5KV-14.4/24.9KV
STEPDOWN TRANSFORMER BANK



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
c	4	Bolt machine 1/2" x Required length	ae	3	Arrestors, 9 KV
c	4	Bolt machine 5/8" x Required length	ae	3	Arrestors, 18 KV
c	6	Bolt machine 3/4" x Required length	af	3	Cutouts, load break 7.2 KV
d	4	Washer round, 1 3/8" dia., 9/16" hole	af	3	Cutout, load break 14.4 KV
d	6	Washer, 2 1/4" x 2 1/4"	an	3	Transformers, 2:1
d	6	Washer, 4" x 4" curved	av	-	Jumpers as required
g	2	10' Crossarms, 3 5/8" x 4 5/8" x 10'	cu	2	Braces, wood 60" span
j	2	Screw, lag 1/2"	ek	-	Locknuts, as required
k	3	Insulator, suspension 14.4 KV	-	1	Aluminum Platform as required length
p	-	Connectors as required	-	4	Walkway Planks as required length

VG350 2:1 TRANSFORMERS

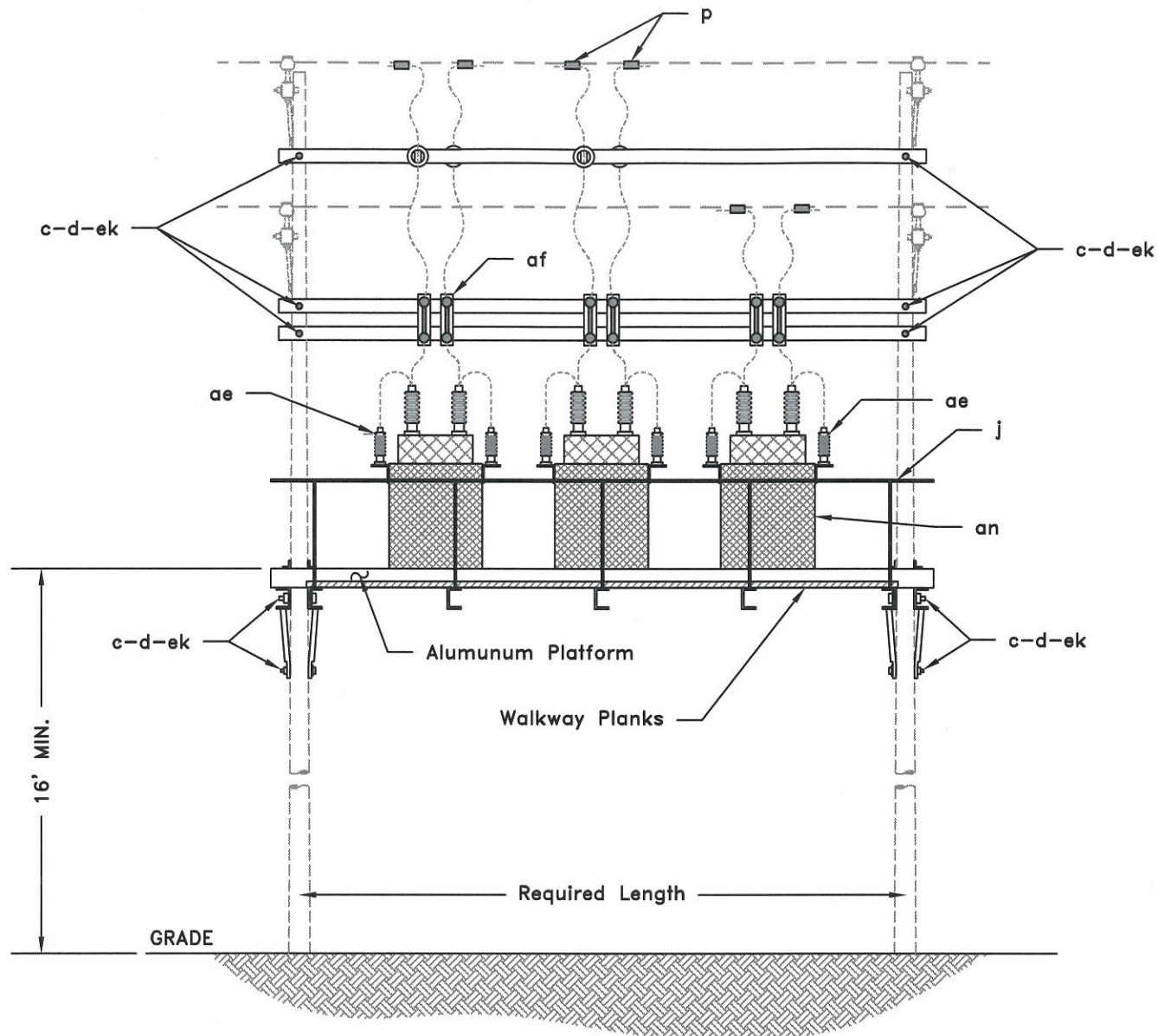
VG350

DATE

Sept 2009



VG350



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
c	6	Bolt machine 5/8" x Required length	ae	3	Arrestors, 9 KV
c	6	Bolt machine 3/4" x Required length	ae	3	Arrestors, 18 KV
d	4	Washer round, 1 3/8" dia., 9/16" hole	af	3	Cutouts, load break 7.2 KV
d	6	Washer, 2 1/4" x 21/4"	af	3	Cutout, load break 14.4 KV
d	6	Washer, 4" x 4" curved	an	3	Transformers, 2:1
j	2	Screw, lag 1/2"	av	-	Jumpers as required
p	-	Connectors as required	ek	-	Locknuts, as required
			-	1	Aluminum Platform as required length
			-	4	Walkway Planks as required length

VG350 2:1 TRANSFORMERS

VG350S

DATE

Sept 2009



VG350S

TRANSFORMER ASSEMBLY UNITS

<u>DRAWING NUMBERS</u>		<u>DRAWING TITLE (DESCRIPTION)</u>
1728F-804 (New)	Bulletin 50-3 (Old)	
G1.1G	(M27-1A)	TRANSFORMER INSTALLATION GUIDE SINGLE -PHASE, POLE-TYPE TRANSFORMER
G1.2G		POLE TYPE TRANSFORMER LOCATION GUIDE
G1.2	(G105-) (G136-)	SINGLE-PHASE, CSP TRANSFORMER (TANGENT POLE)
G1.3	(G106-)	SINGLE-PHASE, CSP TRANSFORMER (DEADEND POLE)
G1.4 G1.5		SINGLE-PHASE, CONVENTIONAL TRANSFORMER (TANGENT POLE)
G1.6		SINGLE-PHASE, CONVENTIONAL TRANSFORMER (DEADEND POLE)
G1.7	(G9-) (G39-)	SINGLE-PHASE, CONVENTIONAL TRANSFORMER (TANGENT POLE)
G1.8	(G10-)	SINGLE-PHASE, CONVENTIONAL TRANSFORMER (DEADEND POLE)
G2.1	(G210-)	TWO-PHASE TRANSFORMER BANK OPEN-WYE PRIMARY OPEN-DELTA, 4 WIRE SECONDARY
G2.1G		TRANSFORMER / METER CONNECTION GUIDE THREE-PHASE, OPEN-WYE - OPEN DELTA FOR 120/240 VOLT POWER LOADS
G3.1	(G310-)	THREE-PHASE TRANSFORMER BANK UNGROUND-ED-WYE PRIMARY CENTER-TAP GROUNDED DELTA, 4 WIRE SECONDARY
G3.1G		TRANSFORMER / METER CONNECTION GUIDE UNGROUND-ED WYE - CENTER TAP GROUNDED DELTA FOR 120/240 VOLT POWER LOADS

TRANSFORMER ASSEMBLY UNITS

<u>DRAWING NUMBERS</u>		<u>DRAWING TITLE (DESCRIPTION)</u>
1728F-804 (New)	Bulletin 50-3 (Old)	
G3.2	(G311-)	THREE-PHASE TRANSFORMER BANK UNGROUND WYE - PRIMARY CORNER GROUNDED DELTA, 3 WIRE SECONDARY
G3.2G		TRANSFORMER / METER CONNECTION GUIDE UNGROUND WYE - CORNER GROUNDED DELTA FOR 240 OR 480 VOLT POWER LOADS
G3.3	(G312-)	THREE-PHASE TRANSFORMER BANK GROUNDED-WYE PRIMARY GROUNDED WYE, 4 WIRE SECONDARY
G3.3G		TRANSFORMER / METER CONNECTION GUIDE GROUNDED WYE - GROUNDED WYE FOR 120/208 VOLT POWER LOADS

CONSTRUCTION SPECIFICATIONS FOR TRANSFORMERS

It may be necessary, and it is permissible, to lower the neutral attachment on standard single-phase conventional type transformer assemblies an additional distance not exceeding 2 feet to provide adequate clearances for cutouts.

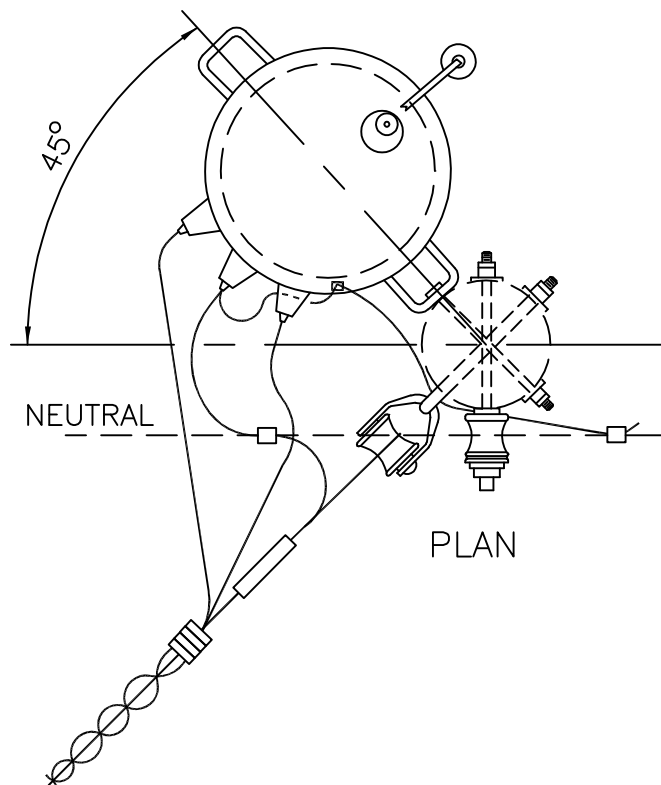
Where applicable, the external gap on surge arresters shall be set according to the manufacturer's recommended spacing.

The construction drawings for three-phase transformer banks (e.g., "G3.1") show cutouts (items "af") and arresters (items "ae") mounted adjacent to one another on the crossarm. However, a cutout and arrester, as shown, may be replaced with a combination cutout/arrester (item "ax"). This change will require a change in the assembly's material shown on the construction drawings. Moreover, the arresters may be mounted directly on the transformer tank. (The cutouts remain on the arm.) Any of the above mounting arrangements for three-phase transformer banks are acceptable; the choice is left to the design engineer.

The construction drawings for single-phase conventional transformer assemblies show surge arresters mounted directly on the transformer tank which maximizes transformer surge protection. Except for single-phase conventional transformers with open link fused cutouts (assemblies "G1.7" and "G1.8"), the arrester may be mounted on a crossarm, on a bracket (item "fn") adjacent to the cutout, or a combination cutout/arrester (item "ax") may be used. The choice of using any of these acceptable mounting arrangements is left to the design engineer.

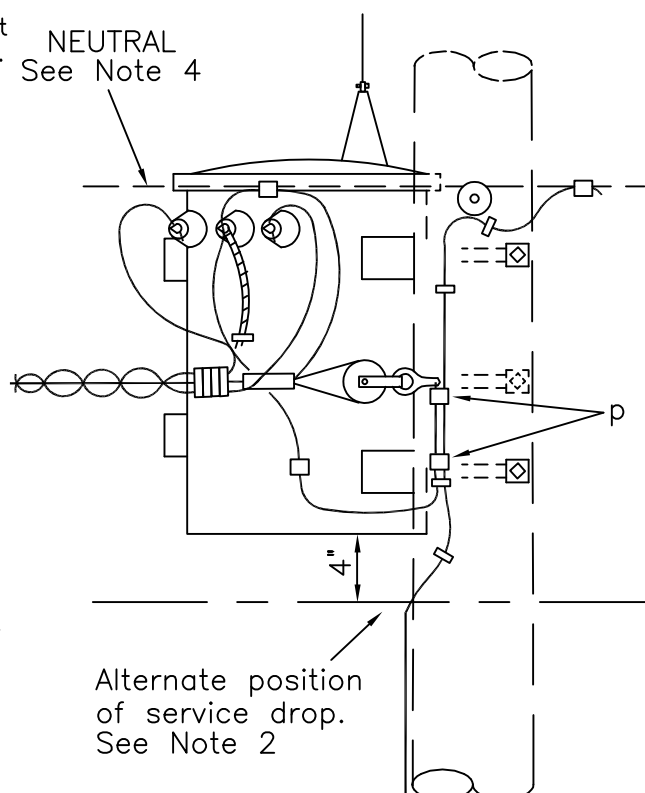
Tank-mounted arresters provide maximum surge protection to transformers because of the arresters' minimum lead lengths. However, when arresters are mounted directly on transformer tanks, the fused cutouts have less surge protection and are subject to more frequent operations. Nuisance operations on fused cutouts with minimal surge protection can be lessened with the use of dual-element fuses.

The wiring schematics on the three-phase transformer/meter connection guide drawings (e.g., "G3.1G") are based on single-phase transformers with additive polarity. ANSI Standard C57-12.20 specifies that all single-phase transformers larger than 200 kVA have subtractive polarity. If the transformer/meter connection guides are used for single-phase transformers larger than 200 kVA, the schematic diagrams will need to be modified accordingly.



NOTES:

1. Install transformer on tangent poles on a quadrant on the opposite side of pole from primary neutral.
2. When it is necessary to install transformer in the same quadrant as a service drop, attach the service drops 4 inches below the transformer.
3. Install transformer so that primary neutral is at same height as bottom of transformer lid on tangent poles, or 3 inches above transformer lid on deadend poles.
4. Use compression type connectors (item "p").
5. Standard aluminum alloy or standard soft-drawn copper is recommended for the grounding loop conductor.
6. Transformer secondary bushings are not to be used for bi-metal connections.
7. Cover secondary terminals with moisture seal and/or dress conductor ends downward to prevent entry of moisture. (Minimum bending radius is six times the overall cable diameter).



TRANSFORMER INSTALLATION GUIDE
SINGLE-PHASE, POLE-TYPE TRANSFORMER

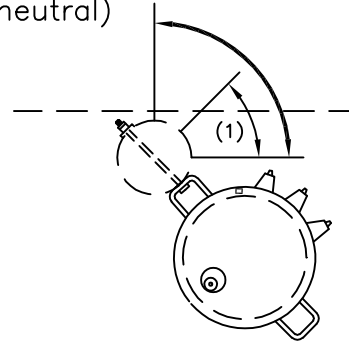
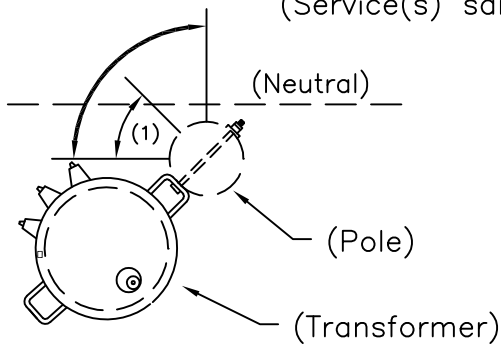
APRIL 2005

RUS

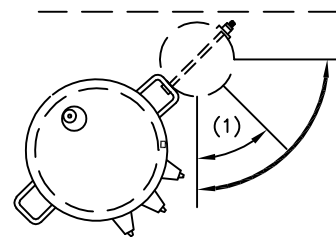
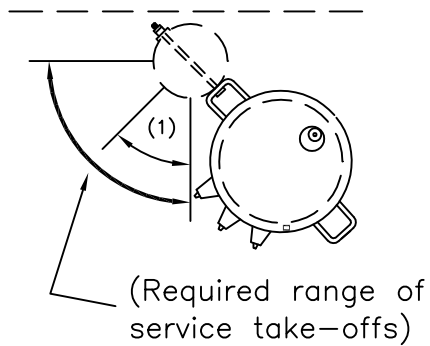
G1.1G
(M27-1A)

TANGENT POLES

(Service(s) same as neutral)

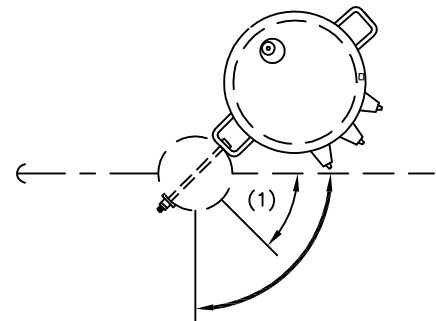
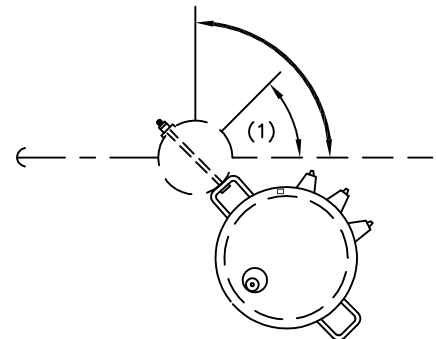
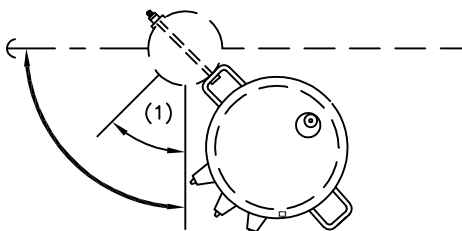
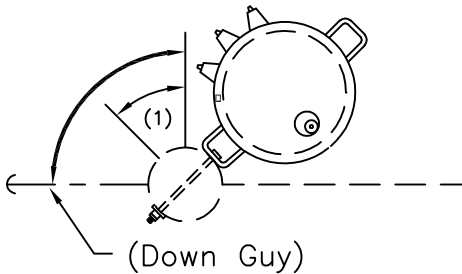


(Service(s) opposite side of neutral)



DEADEND POLES

(See Note 2)



NOTES:

1. Lower service(s) to 4 inches below transformer if necessary for adequate clearances.
2. Lower transformer so that neutral is 3 inches above transformer lid.

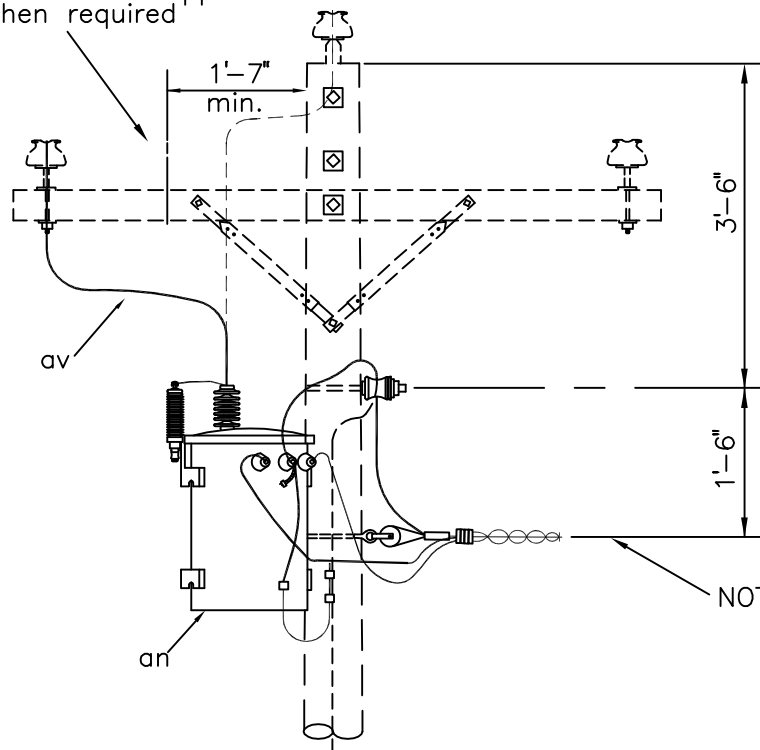
POLE TYPE TRANSFORMER LOCATION GUIDE

APRIL 2005

RUS

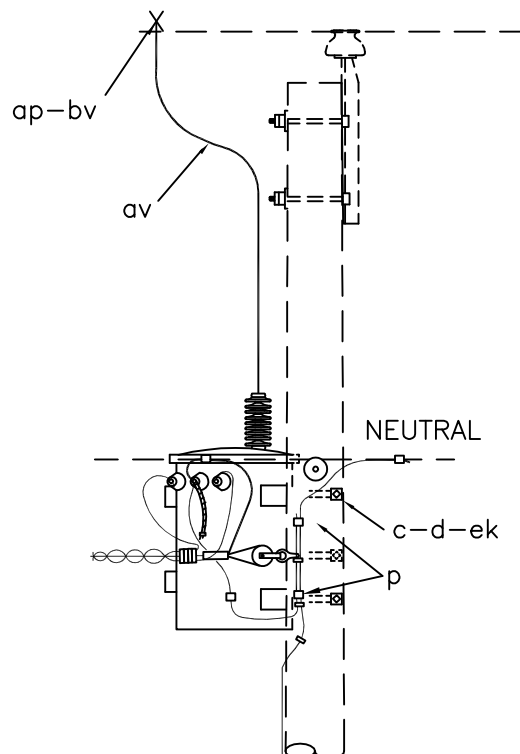
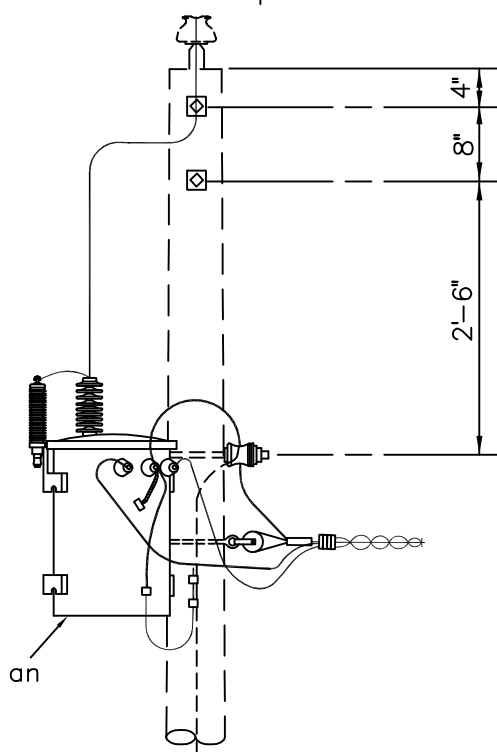
G1.2G

Position of support
when required



Position of Neutral

NOTE: Position service takeoff
midway between transformer
hanger brackets.



ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
P		Connectors,compression type,as req'd
an	1	Transformer, 12.47 kV, self-protected

ITEM	QTY	MATERIAL
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor (as req'd)
ek	2	Locknuts

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

SINGLE-PHASE, CSP TRANSFORMER
(TANGENT POLE)

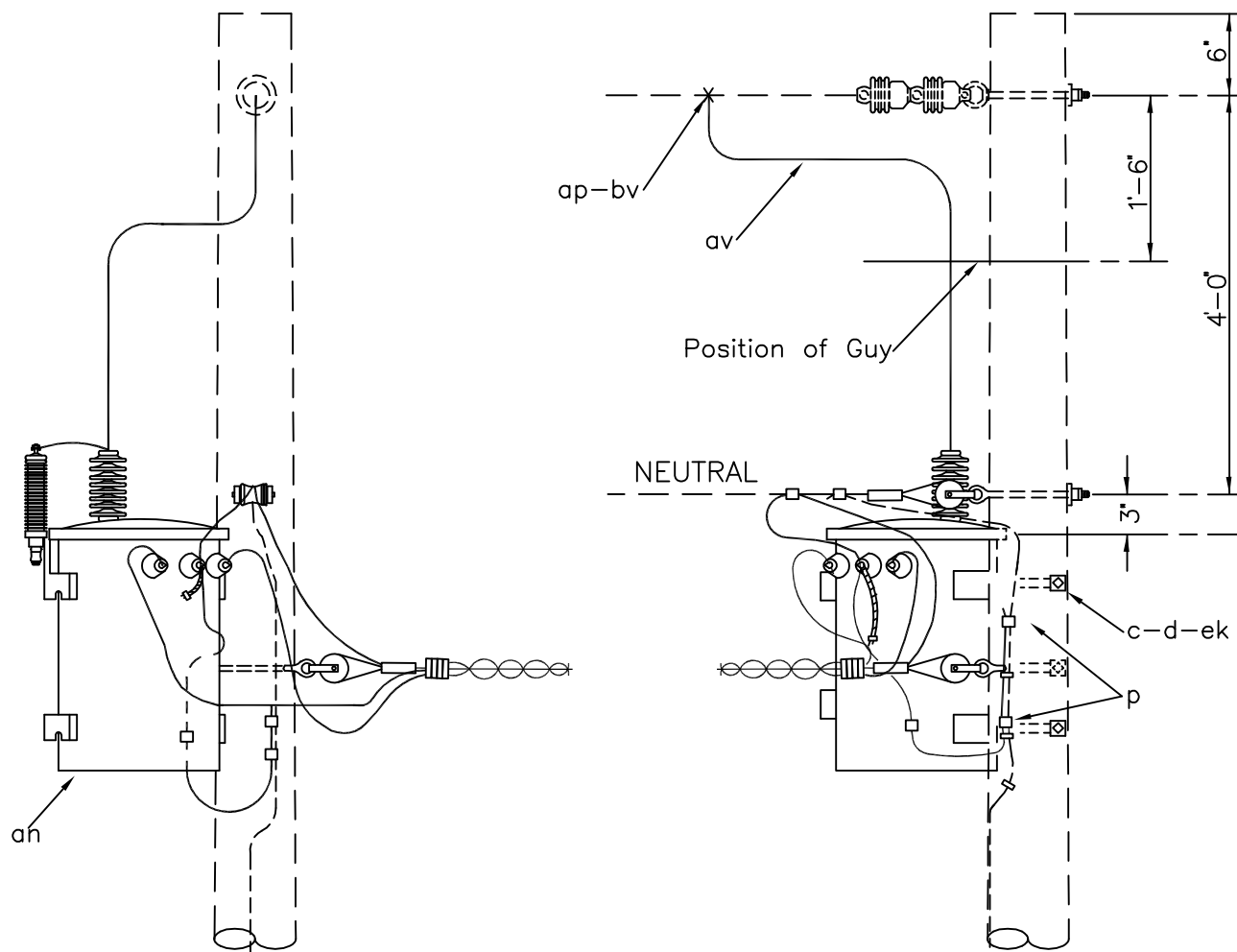
APRIL 2005

RUS

12.47/7.2 kV

G1.2

(G105-),(G136-)



NOTE: Install transformer so that primary neutral is 3 inches above bottom of transformer lid on both single-phase and three-phase primary assemblies. See drawing "C5.21" for three-phase deadend.

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
P		Connectors, compression type as req'd
an	1	Transformer, 12.47 kV, self protected

ITEM	QTY	MATERIAL
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor (as req'd)
ek	2	Locknuts

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

SINGLE-PHASE, CSP TRANSFORMER
(DEADEND POLE)

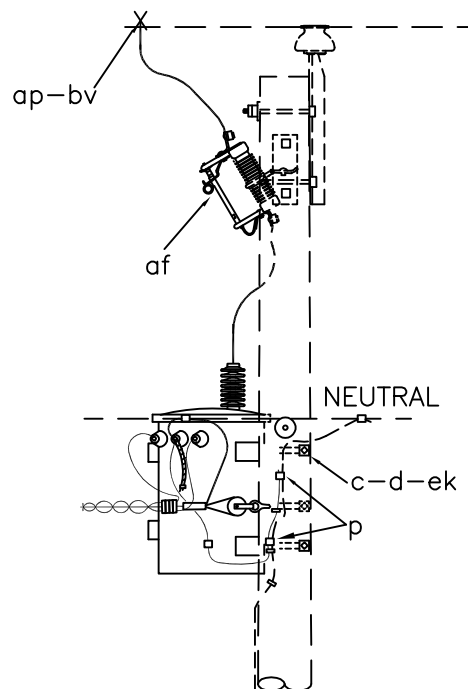
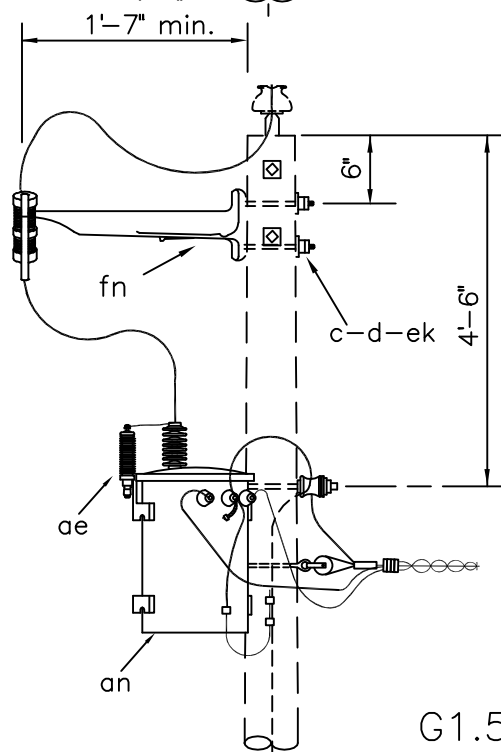
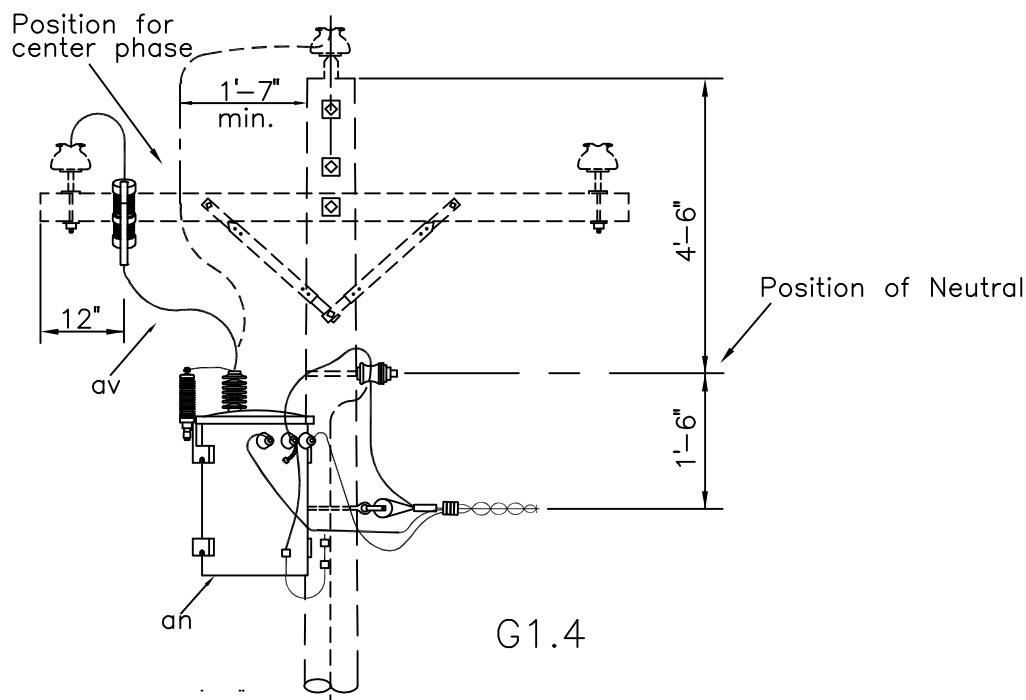
APRIL 2005

RUS

12.47/7.2 kV

G1.3

(G106-)



NOTE: Rotate cutout so the blade faces climbing face of pole.

ASSEMBLY: G1		.4	.5
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 5/8" x req'd length	2	4
d	Washer, square, 2 1/4"	2	4
p	Connectors, as req'd		
ae	Arrester, surge (9 kV)	1	1
af	Cutout, dist., open (15 kV)	1	1
an	Transformer, 12.47 kV, conventional	1	1

ASSEMBLY: G1		.4	.5
ITEM	MATERIAL	QTY	QTY
ap	Clamp, hot line	1	1
av	Jumpers, stranded, as req'd		
bv	Rod, armor, as req'd		
ek	Locknuts,	2	4
fn	Bracket, extension		1

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

SINGLE-PHASE, CONVENTIONAL TRANSFORMER
(TANGENT POLE)

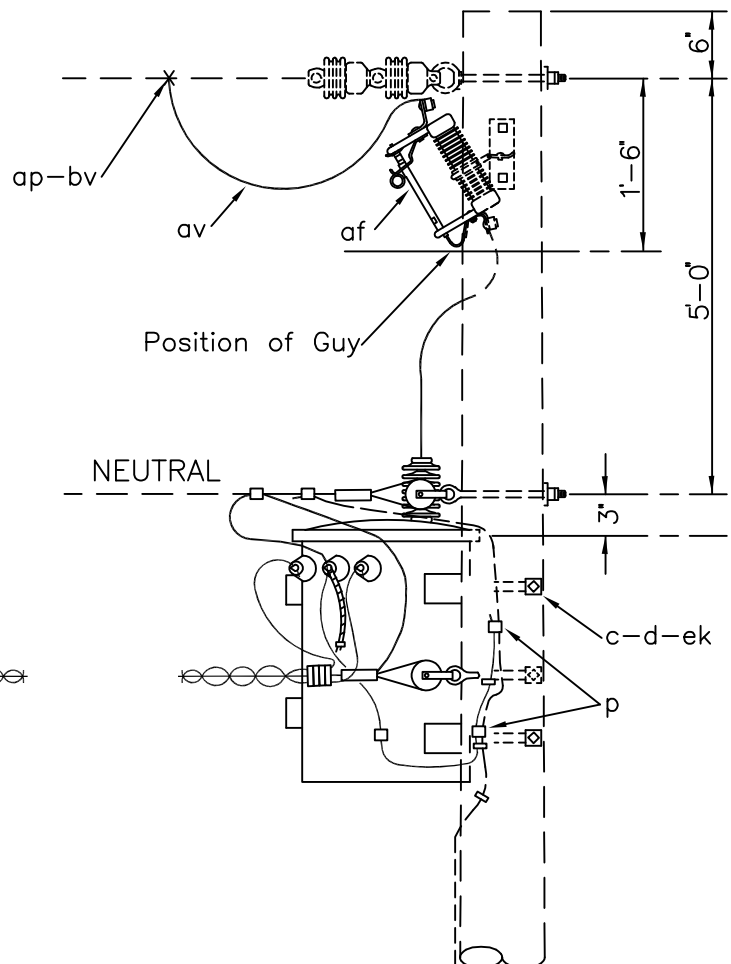
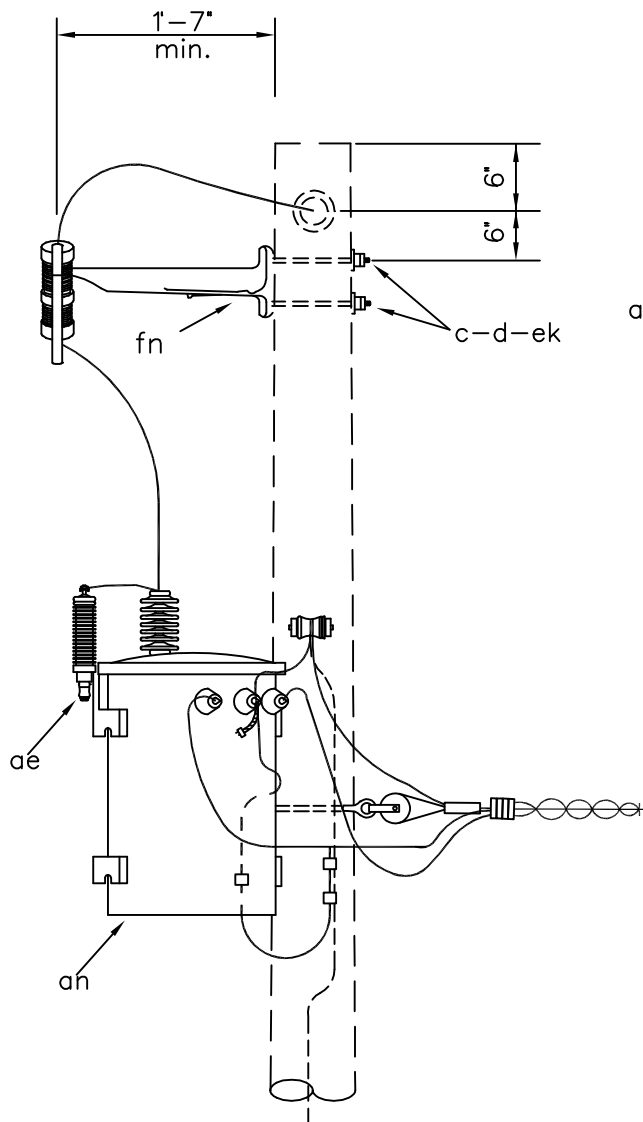
APRIL 2005

RUS

12.47/7.2 kV

G1.4

G1.5



NOTE: Rotate cutout so that the blade faces climbing face of pole.

ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x req'd length
d	4	Washer, square, 2 1/4"
P		Connectors, as req'd
ae	1	Arrester, surge (9 kV)
af	1	Cutout, dist. open (15 kV)
an	1	Transformer, 12.47 kV, conventional

ITEM	QTY	MATERIAL
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor as req'd
ek	4	Locknuts
fn	1	Bracket, extension

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

SINGLE-PHASE, CONVENTIONAL TRANSFORMER (DEADEND POLE)

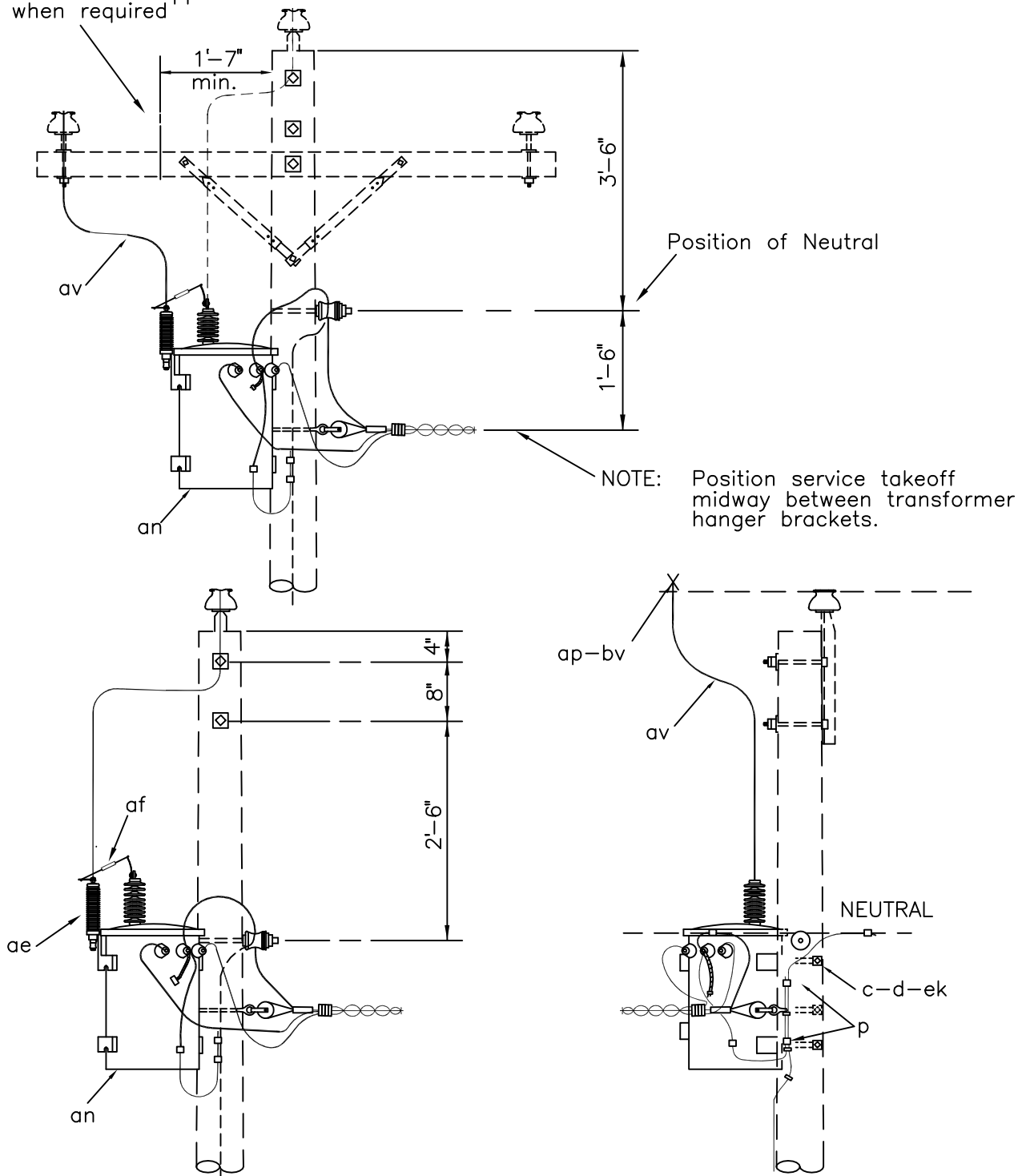
APRIL 2005

RUS

12.47/7.2 kV

G1.6

Position of support
when required



ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
P		Connectors,compression type,as req'd
an	1	Transformer, 12.47 kV, conventional
ae	1	Arrester, surge (9 kV)

ITEM	QTY	MATERIAL
af	1	Cutout, fuse, open link
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor (as req'd)
ek	2	Locknuts

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

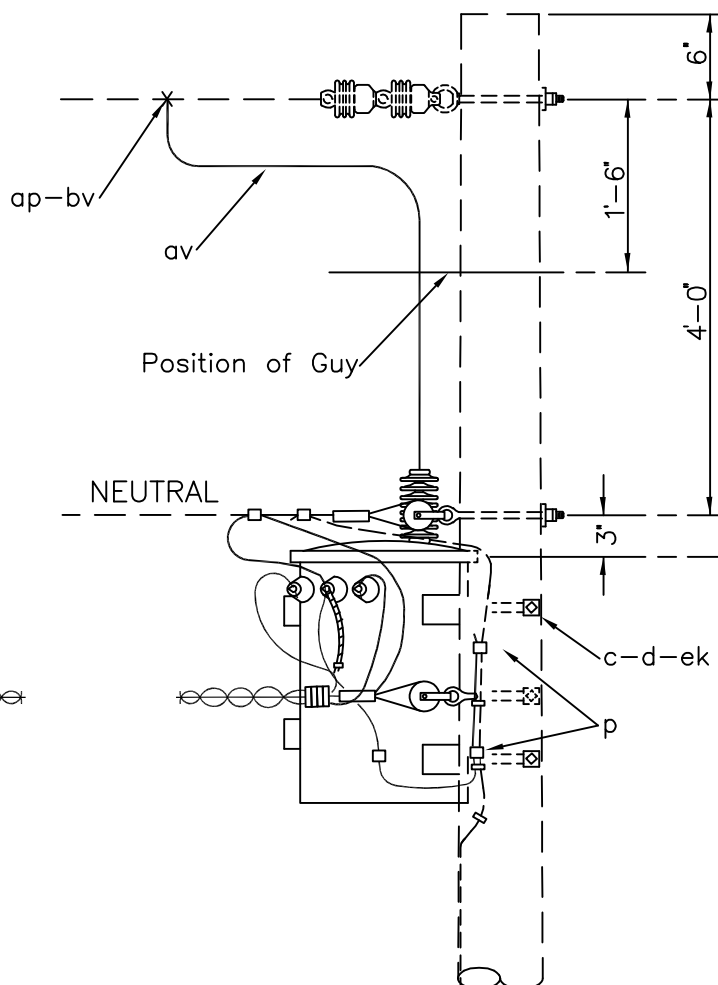
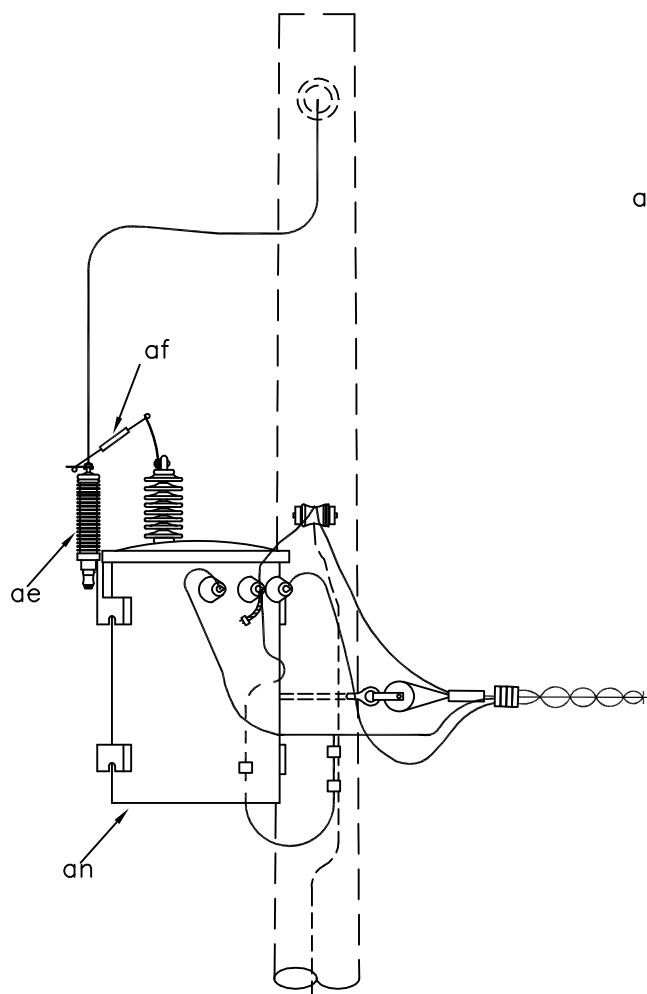
SINGLE-PHASE,
CONVENTIONAL TRANSFORMER
(TANGENT POLE)

APRIL 2005

RUS

12.47/7.2 kV

G1.7
(G9-),(G39-)



NOTE: Install transformer so that primary neutral is 3 inches above bottom of transformer lid on both single-phase and three-phase primary assemblies. See drawing "C5.21" for three-phase deadend.

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
P		Connectors, compression type as req'd
an	1	Transformer, 12.47 kV, conventional
ae	1	Arrester, surge (9 kV)

ITEM	QTY	MATERIAL
af	1	Cutout, fuse, open link
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor (as req'd)
ek	2	Locknuts

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

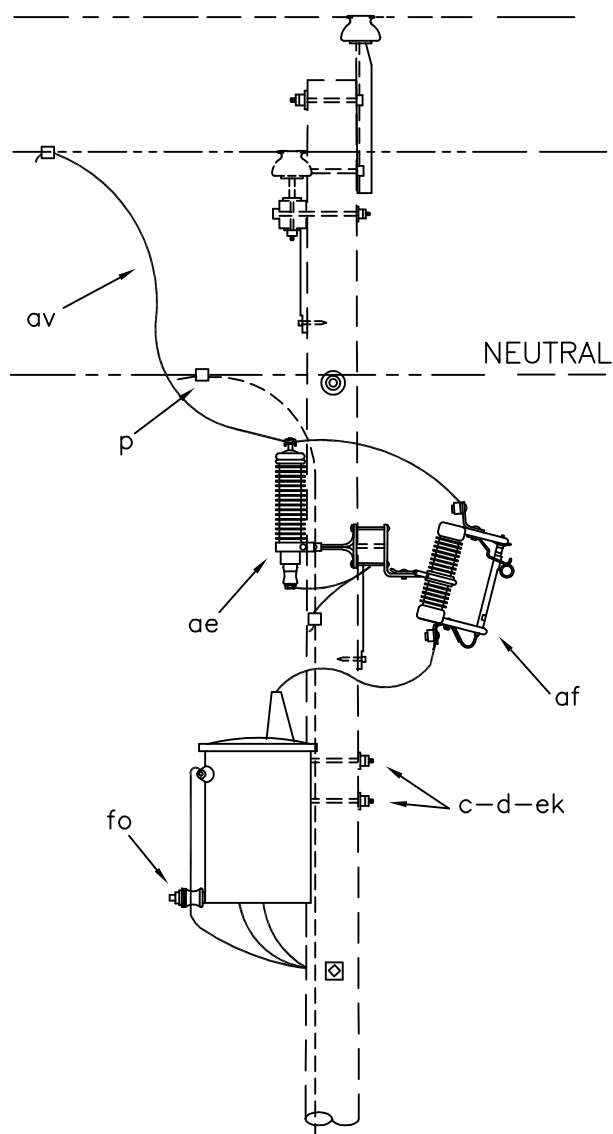
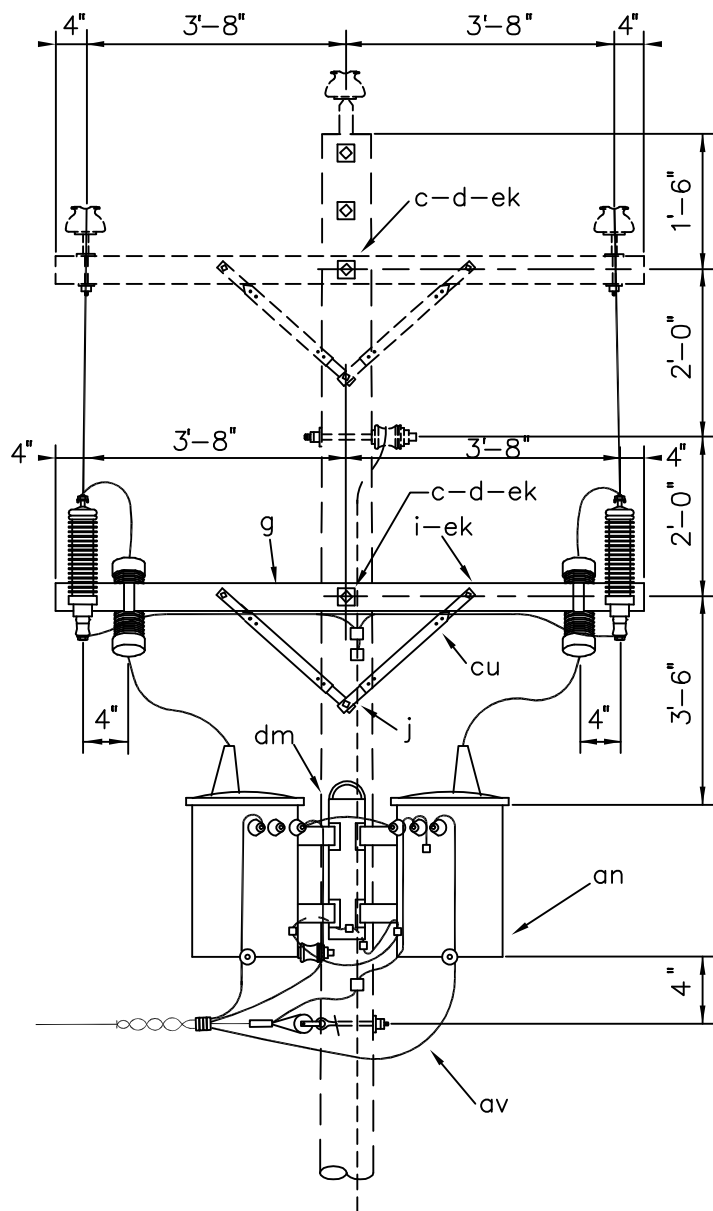
SINGLE-PHASE,
CONVENTIONAL TRANSFORMER
(DEADEND POLE)

APRIL 2005

RUS

12.47/7.2 kV

G1.8
(G10-)



ITEM	QTY	MATERIAL
c	3	Bolt, machine, 5/8" x req'd length
d	4	Washer, square, 2 1/4"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j	1	Screw, lag, 1/2" x 4"
p		Connectors, as req'd
p		Connectors, compression, as req'd
ae	2	Arrester, surge, (9 kV)

ITEM	QTY	MATERIAL
af	2	Cutout, dist. open (15 kV)
an	2	Transformer, 12.47 kV, conv.
av		Jumpers, bare, stranded, as req'd
av		Jumpers, service, as req'd
cu	2	Brace, 28"
dm	1	Bracket, transformer
ek	5	Locknuts
fo	2	Bracket, transformer, insul.

DESIGN PARAMETERS:

See Guide Drawing "G2.1G"

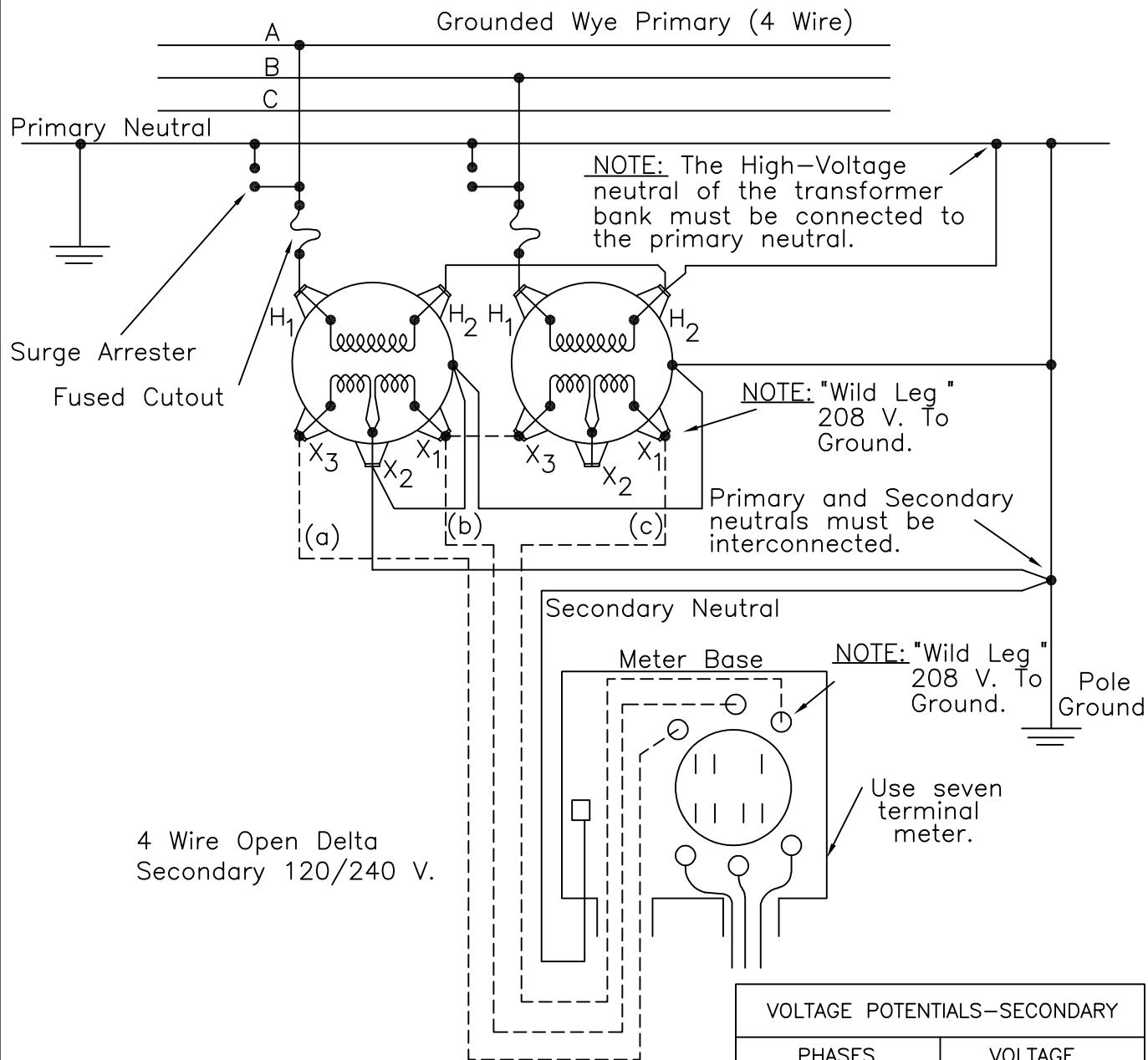
TWO-PHASE TRANSFORMER BANK OPEN-WYE PRIMARY OPEN-DELTA, 4 WIRE SECONDARY

APRIL 2005

RUS

12.47/7.2 kV

G2.1
(G210-)



APPLICATION: Used to supply large single-phase, 120/240 volt loads with small amount of three phase loads. Also used when only two phases of primary are available or during emergencies when one unit of a four-wire, wye-delta bank is disabled.

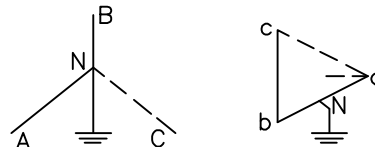
See drawing "G2.1" or "VG2.1" for construction details. One-bushing or two-bushing transformers may be used. Usually transformers of different KVA sizes are used.

BANK RATING: This bank has only 86.6% of the rating of the two units making up the three-phase bank and only 57.7% of the three-phase rating of a closed delta-delta bank of three transformers. Thus, it is relatively inefficient where three-phase loads predominate.

(Additive Polarity—See TRANSFORMER SPECIFICATIONS)

VOLTAGE POTENTIALS—SECONDARY	
PHASES	VOLTAGE
a-b	240 VOLTS
b-c	240 VOLTS
a-c	240 VOLTS
a-N	120 VOLTS
b-N	120 VOLTS
c-N	208 VOLTS

210° ANGULAR DISPLACEMENT



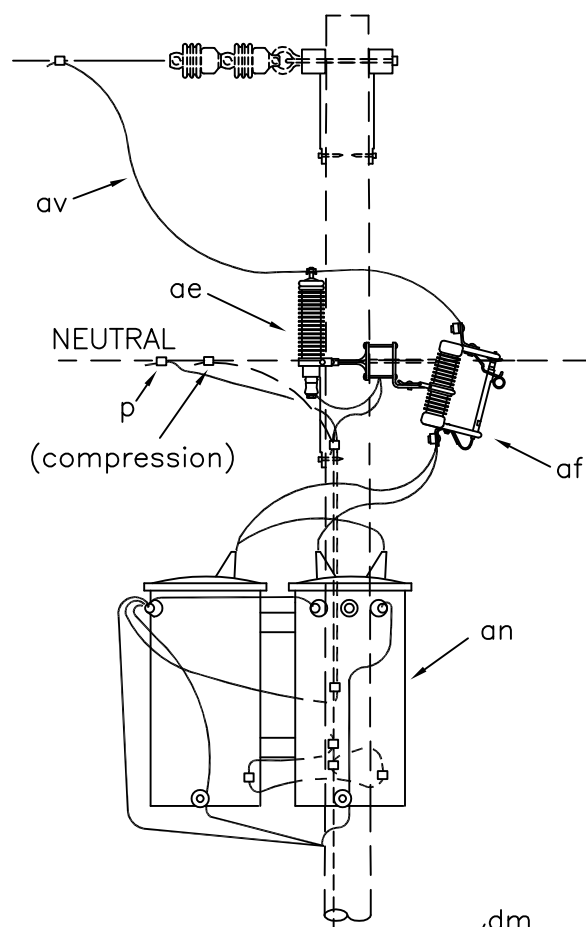
TRANSFORMER/METER CONNECTION GUIDE

THREE-PHASE, OPEN-WYE – OPEN DELTA FOR 120/240 VOLT POWER LOADS

APRIL 2005

RUS

G2.1G



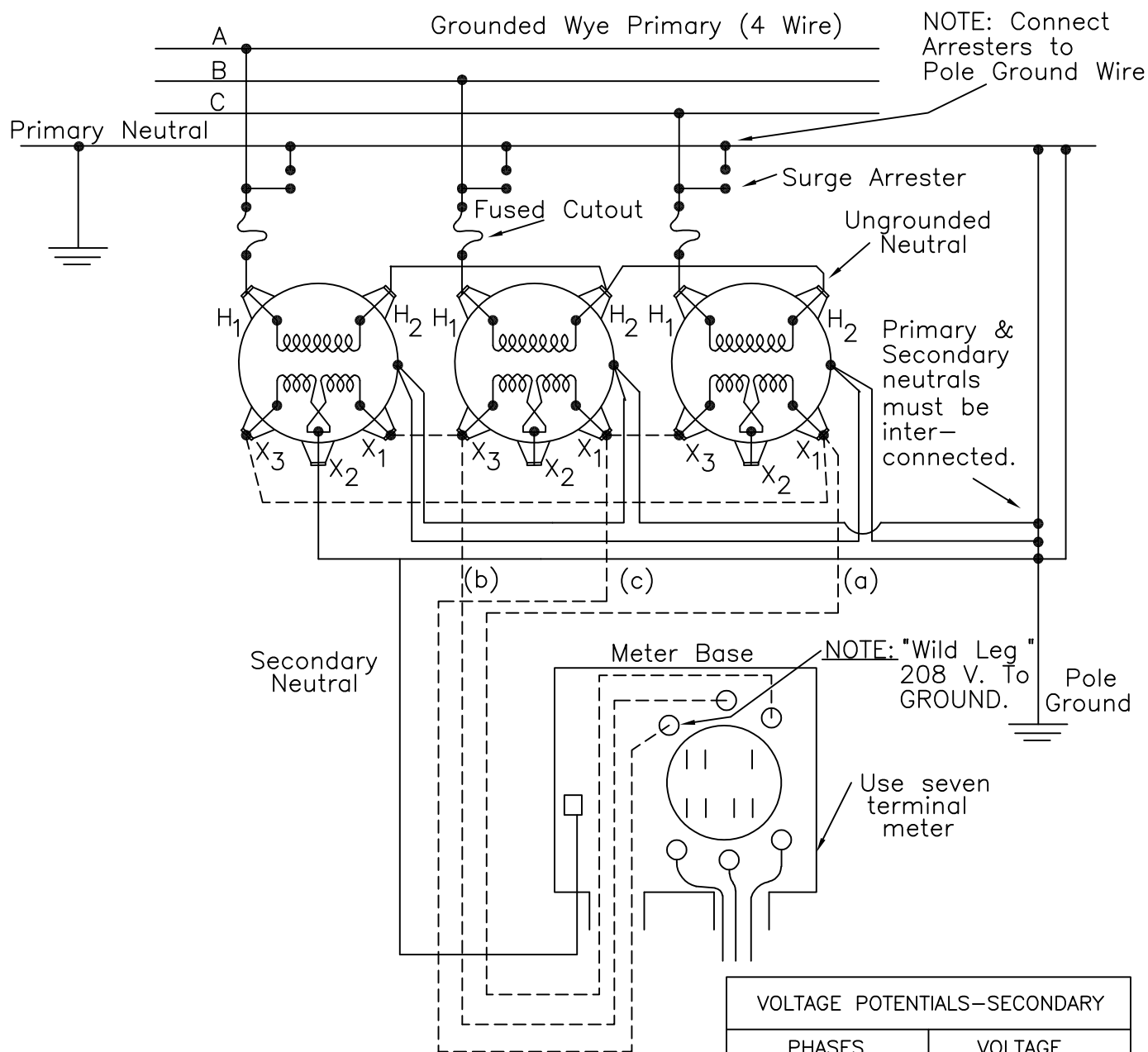
1. See Drawing "Q3.1" for additional connection and metering details.
2. All transformer tanks must be grounded.

ITEM	QTY	MATERIAL
af	3	Cutout, dist. open (15 kV)
an	3	Transformer, 12.47 kV, conventional
av		Jumpers, bare, stranded
av		Jumpers, service, as req'd
cu	2	Brace, 28"
dm	1	Bracket, transformer, cluster with
		adapter plates as req'd
ek	5	Locknuts
fo	3	Bracket, transformer, insulated

See Guide Drawing "G3.1G"

THREE-PHASE TRANSFORMER BANK
UNGROUND-WYE PRIMARY
CENTER-TAP GROUNDED DELTA, 4 WIRE SECONDARY

APRIL 2005	3 – PHASE PRIMARY 12.47/7.2 kV	G3.1
RUS		(G310–)



APPLICATION: Used to supply three-phase, 240 volt loads with small amounts of 120/240 volt single-phase loads.

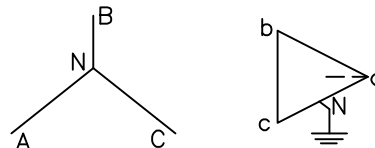
See drawing "G3.1" or "VG3.1" for construction details.

CAUTION: Only ground one secondary neutral bushing of the three transformers. Connecting the high-voltage neutral to the system neutral may cause the transformer bank to burn out. Largest transformer capacity should not be more than 2 times the smallest transformer kVA.

BANK RATING: The center tapped transformer carries 2/3 of the 120/240 volt single-phase load; each of the three units carry 1/3 of the 240 volt three-phase load.

VOLTAGE POTENTIALS—SECONDARY	
PHASES	VOLTAGE
a-b	240 VOLTS
b-c	240 VOLTS
a-c	240 VOLTS
a-N	120 VOLTS
b-N	120 VOLTS
c-N	208 VOLTS

210° ANGULAR DISPLACEMENT



(Additive Polarity—See TRANSFORMER SPECIFICATIONS)

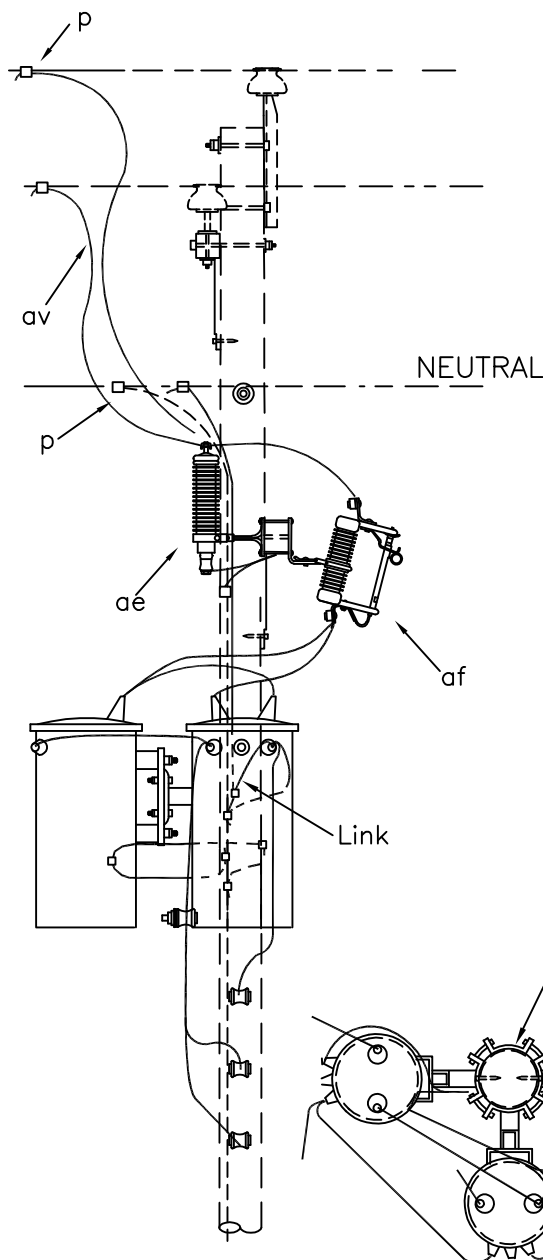
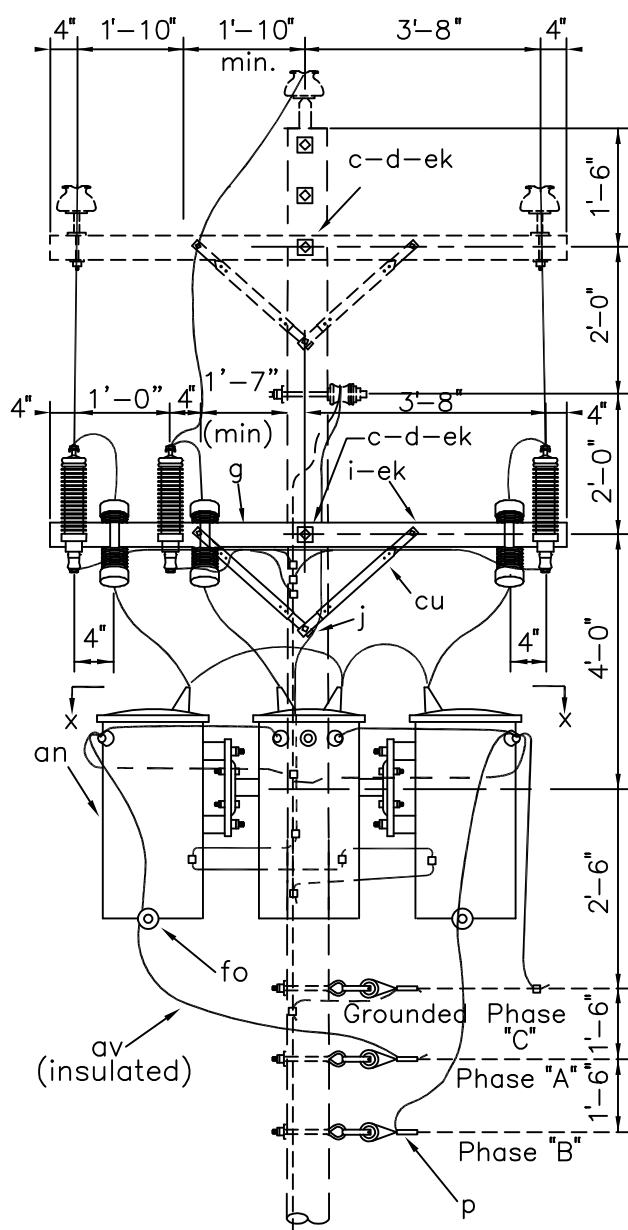
TRANSFORMER/METER CONNECTION GUIDE UNGROUNDED WYE – CENTER TAP GROUNDED DELTA FOR 120/240 VOLT POWER LOADS

APRIL 2005

3 – PHASE PRIMARY

RUS

G3.1G



NOTES:

1. See Drawing "Q3.2" for additional connection and metering details.
2. This transformer connection not recommended for new services.

SECTION X-X

ITEM	QTY	MATERIAL
d	2	Washer, square, 2 1/4"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag, 1/2" x 4", as req'd
n	1	Bolt, dble arm, 5/8" x req'd length
p		Connectors, as req'd
p		Connectors, compression, as req'd
ae	3	Arrester, surge, (9 kV)

ITEM	QTY	MATERIAL
af	3	Cutout, dist. open (15 kV)
an	3	Transformer, 12.47 kV, conventional
av		Jumpers, bare, stranded
av		Jumpers, service, as req'd
cu	2	Brace, 28"
dm	1	Bracket, transformer, cluster with adapter plates as req'd
ek	5	Locknuts
fo	3	Bracket, transformer, insulated

DESIGN PARAMETERS:

See Guide Drawing "G3.2G"

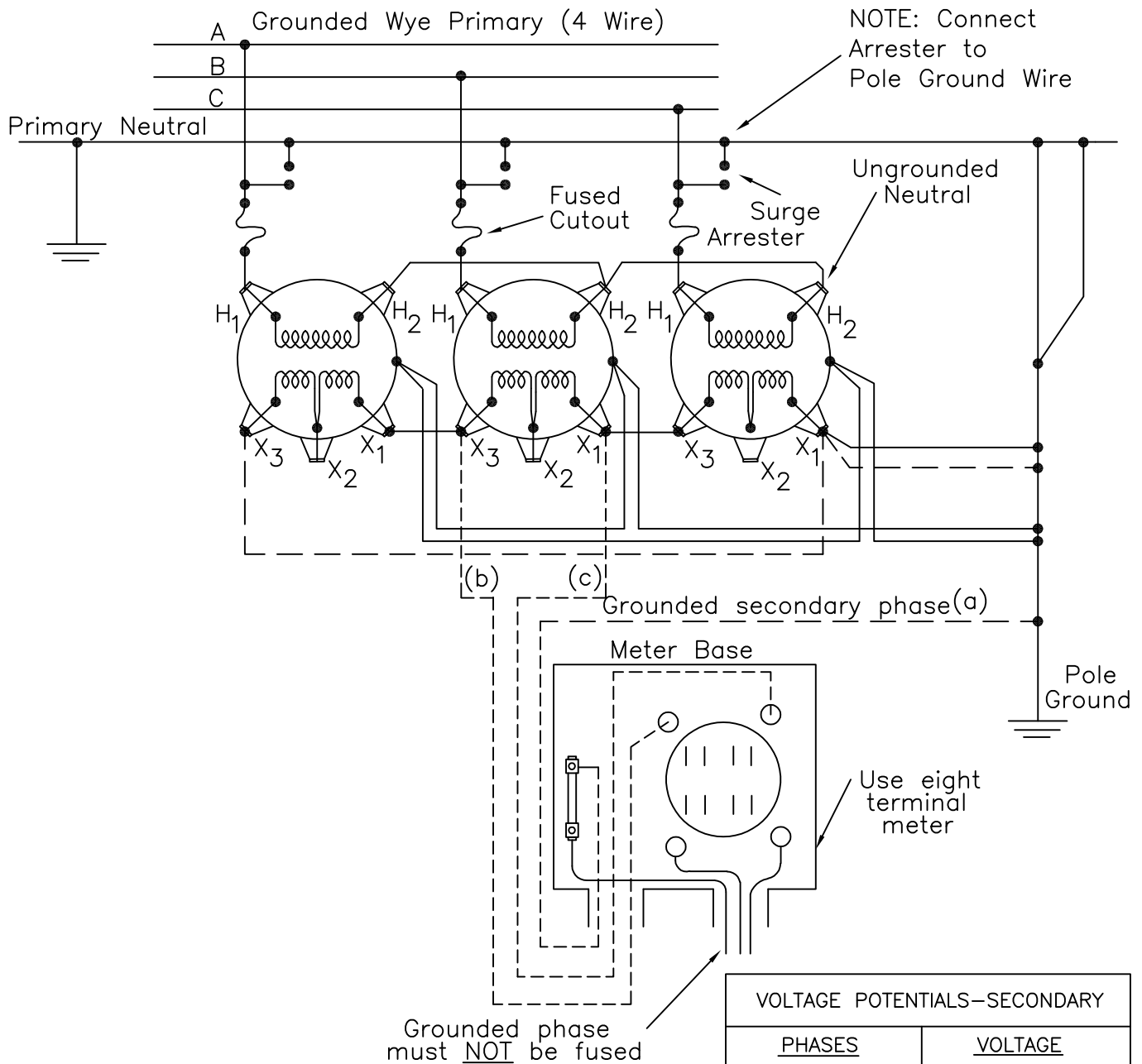
THREE-PHASE TRANSFORMER BANK
UNGROUND-WYE PRIMARY
CORNER GROUNDED DELTA, 3 WIRE SECONDARY

APRIL 2005

RUS

3 - PHASE PRIMARY
12.47/7.2 kV

G3.2
(G311-)



APPLICATION: Used to supply three-phase (only), 240 or 480 volt power loads.

See drawing "G3.2" or "VG3.2" for construction details.

BANK RATING: The maximum safe kVA rating of the bank is three times the kVA rating of the smallest transformer.

NOTES:

One-half of the above voltages apply when a 240 volt bank is used.

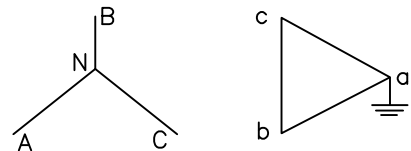
All tanks to be grounded.

Disconnect all secondary neutrals from tank and do not ground.

Do not ground bank on primary side. (If grounded, the bank would be a grounding bank for the entire circuit.)

The grounding secondary wire is a current carrying phase wire operating at ground potential and must be identified throughout the circuit run. It is not a neutral.

210° ANGULAR DISPLACEMENT



(Additive Polarity—
See TRANSFORMER SPECIFICATIONS)

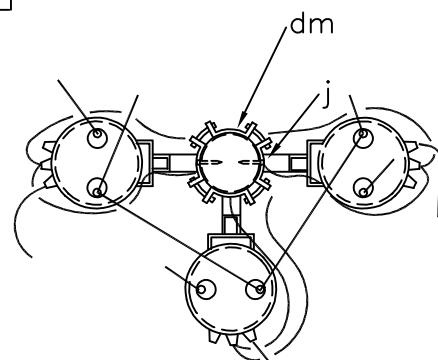
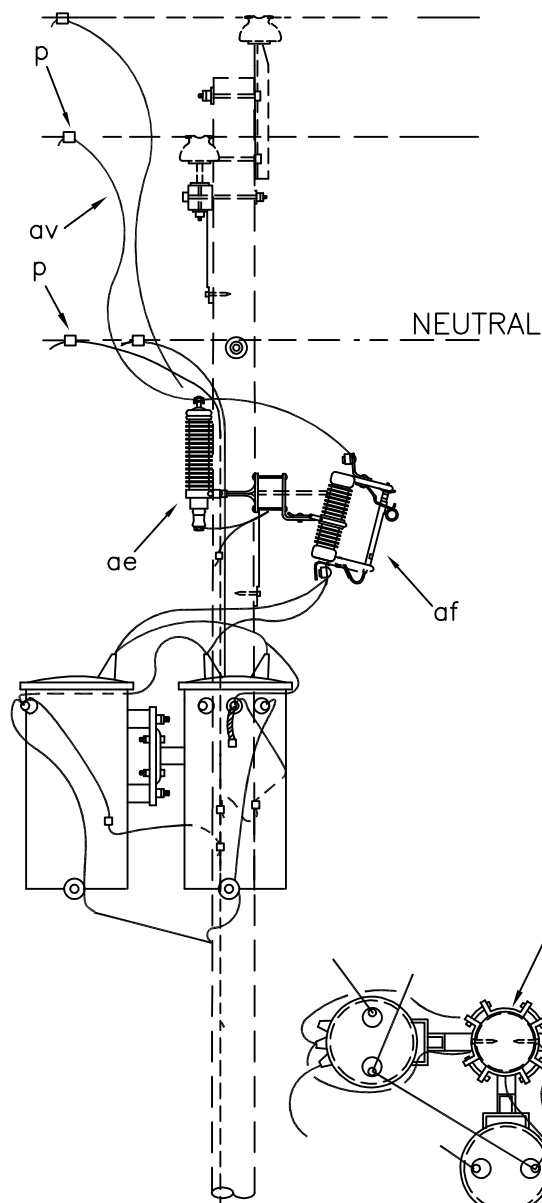
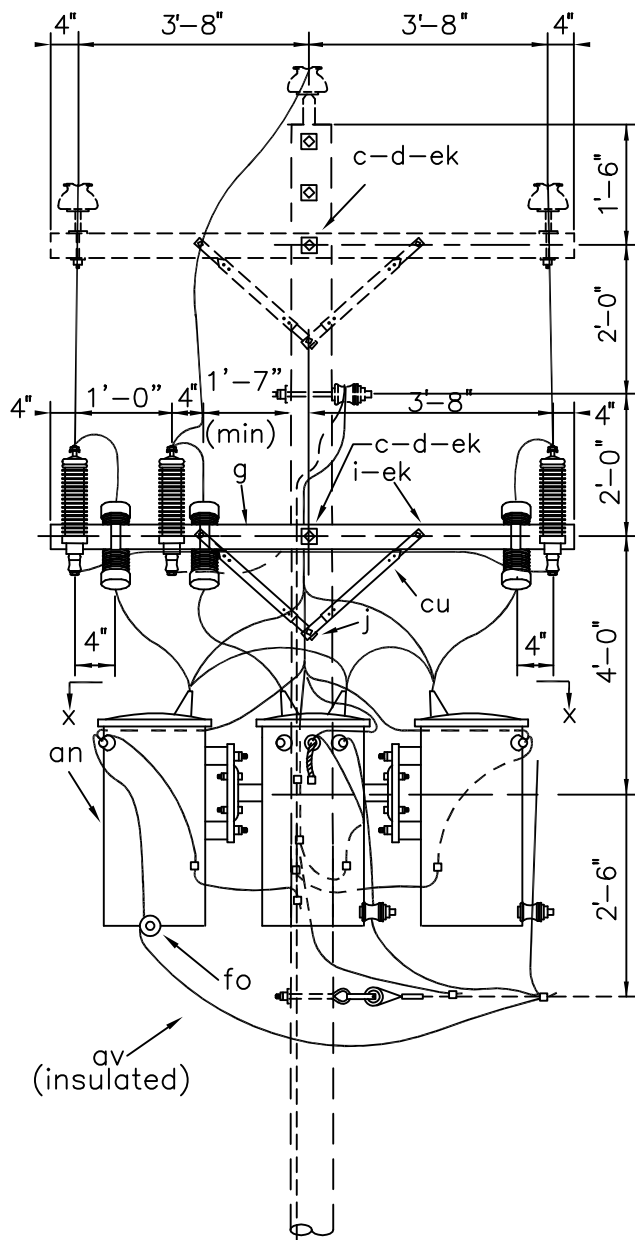
TRANSFORMER/METER CONNECTION GUIDE UNGROUND WYE – CORNER GROUNDED DELTA FOR 240 or 480 VOLT POWER LOADS

APRIL 2005

3 – PHASE PRIMARY

RUS

G3.2G



NOTES:

1. See Drawing "Q3.3" for additional connection and metering details.

ITEM	QTY	MATERIAL
d	2	Washer, square, 2 1/4"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag, 1/2" x 4", as req'd
n	1	Bolt, dble arm, 5/8" x req'd length
p		Connectors, as req'd
p		Connectors, compression, as req'd
ae	3	Arrester, surge, (9 kV)

ITEM	QTY	MATERIAL
af	3	Cutout, dist. open (15 kV)
an	3	Transformer, 12.47 kV, conventional
av		Jumpers, bare, stranded
av		Jumpers, service, as req'd
cu	2	Brace, 28"
dm	1	Bracket, transformer, cluster with adapter plates as req'd
ek	5	Locknuts
fo	3	Bracket, transformer, insulated

DESIGN PARAMETERS:

See Guide Drawing "G3.3G"

THREE-PHASE TRANSFORMER BANK
GROUNDED-WYE PRIMARY
GROUNDED WYE, 4 WIRE SECONDARY

APRIL 2005

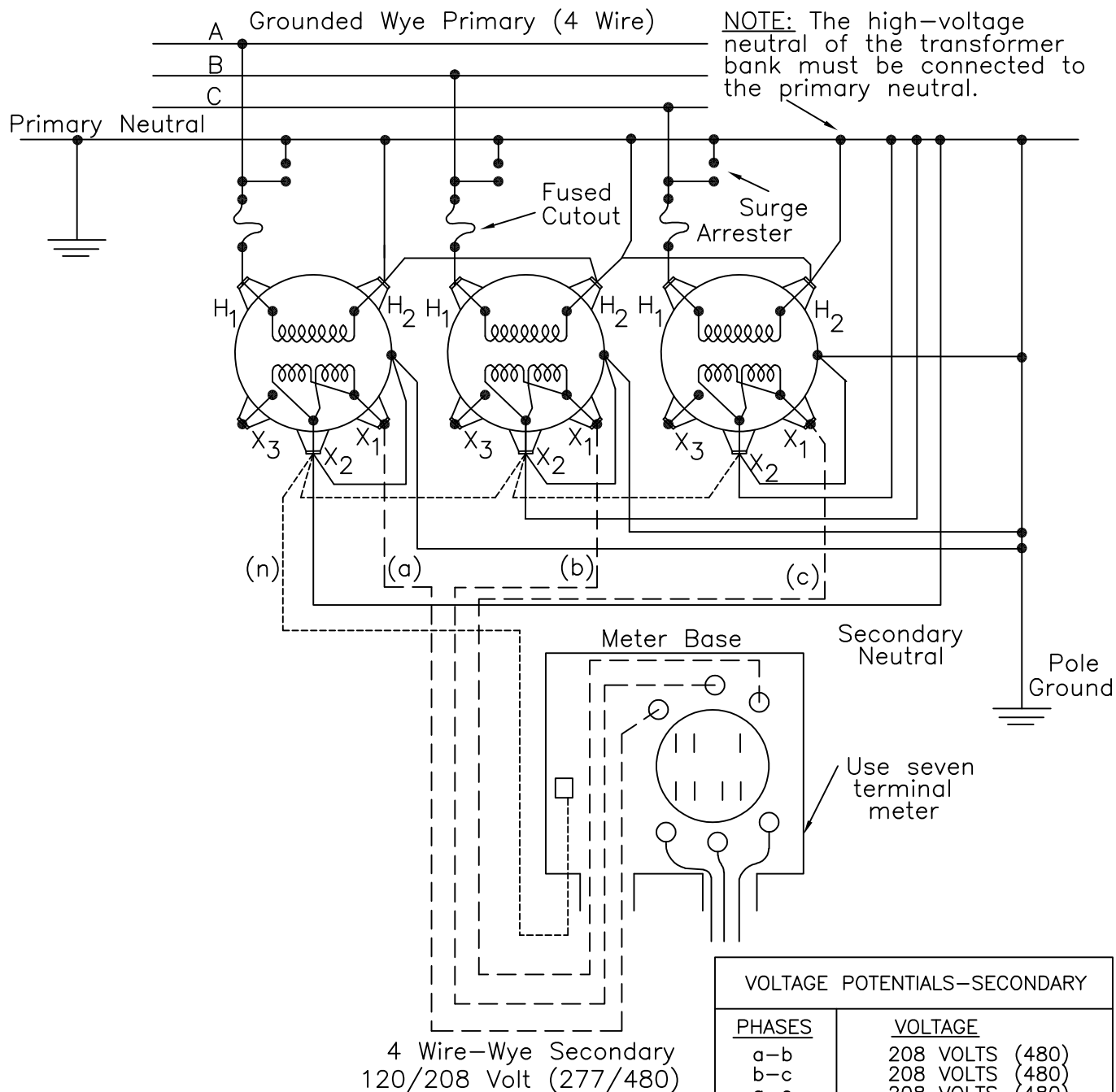
RUS

3 - PHASE PRIMARY

12.47/7.2 kV

G3.3

(G312-)



APPLICATION: Used to supply 120/208 volt single-phase and 208 volt, three-phase power loads.

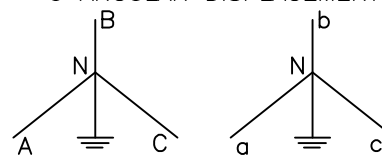
See drawing "G3.3" or "VG3.3" for construction details. Reconnect secondary windings of transformers as shown. Matched (impedance and kVA) transformers are usually used.

BANK RATING: Each unit will supply 1/3 of the three-phase load and all of the single-phase load connected to it.

CAUTION: The primary and secondary neutrals must be firmly tied together and grounded or else excessive secondary voltages may develop.

VOLTAGE POTENTIALS—SECONDARY	
PHASES	VOLTAGE
a-b	208 VOLTS (480)
b-c	208 VOLTS (480)
a-c	208 VOLTS (480)
a-N	120 VOLTS (277)
b-N	120 VOLTS (277)
c-N	120 VOLTS (277)

0° ANGULAR DISPLACEMENT



See TRANSFORMER SPECIFICATIONS)

TRANSFORMER/METER CONNECTION GUIDE

GROUNDWED WYE — GROUNDWED WYE

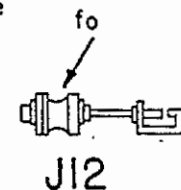
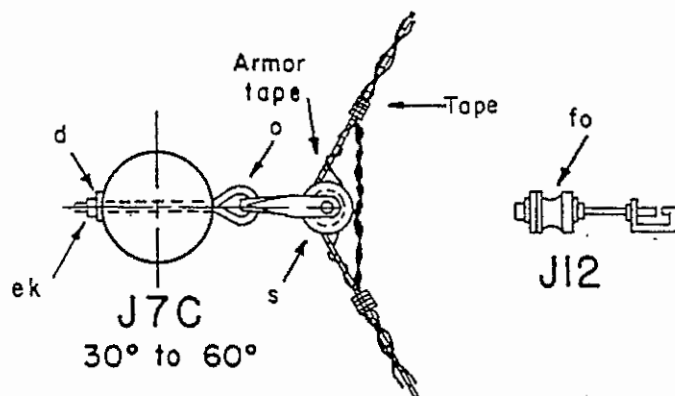
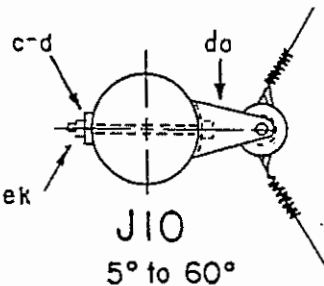
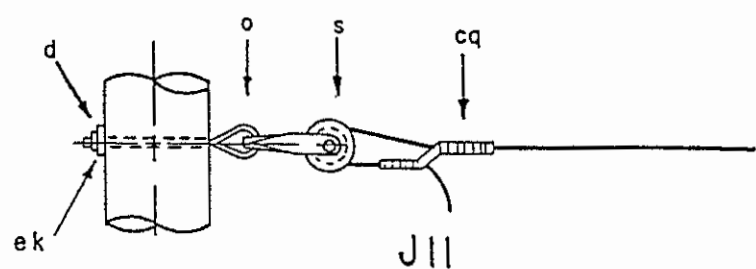
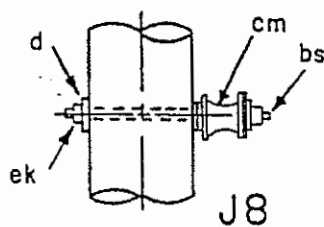
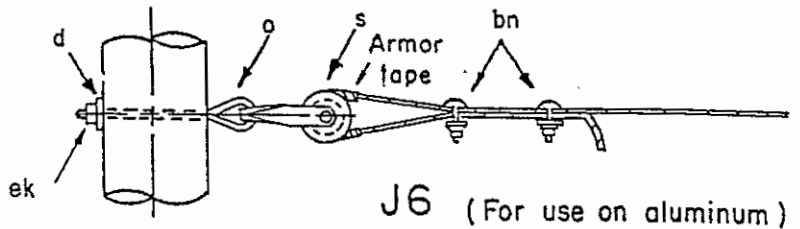
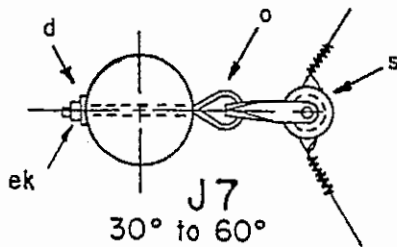
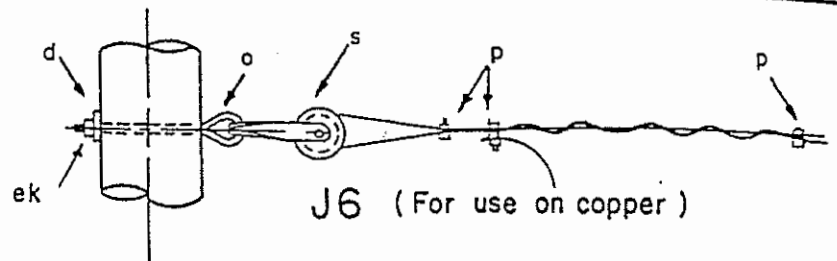
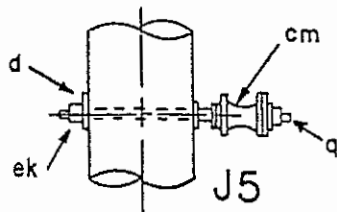
FOR 120/208 VOLT POWER LOADS

APRIL 2005

3 — PHASE PRIMARY

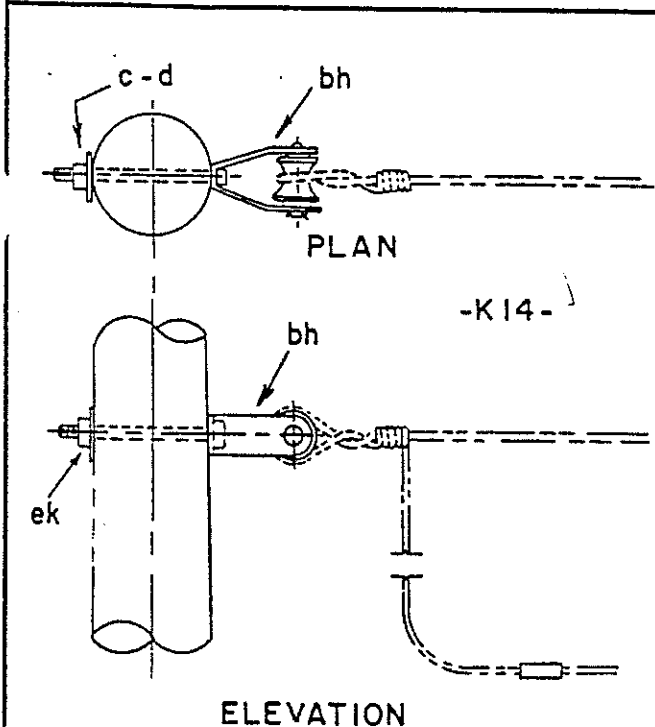
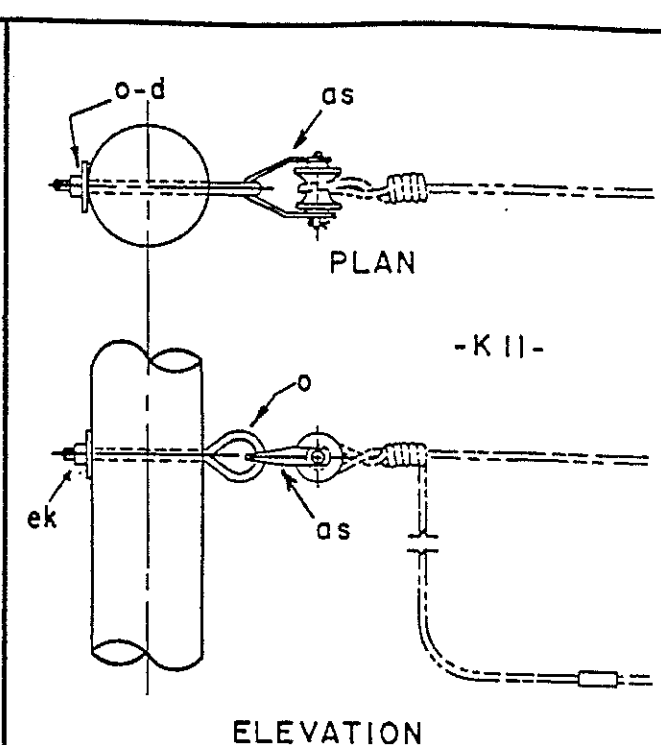
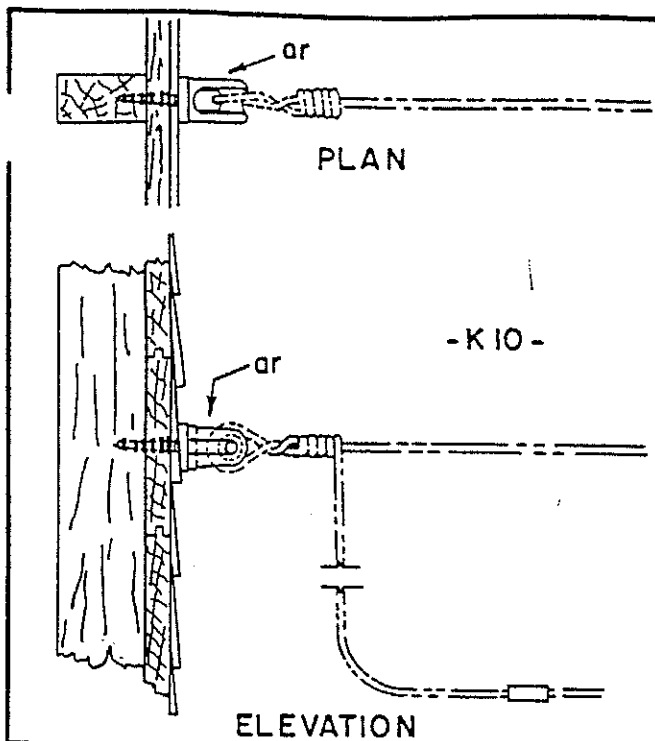
RUS

G3.3G



For use on Self Supporting
Service Cable

ITEM NO.	MATERIAL			MATERIAL
c	Bolt, machine, 5/8" x required length	bs		Bolt, single upset
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	bn		Clamp, loop, deadend
o	Bolt, eye, 5/8" x required length	cq		Sleeve, offset, splicing
p	Connectors, as required	da		Bracket, insulated
q	Bolt, double upset,	fo		Transformer secondary bracket
s	Clevis, secondary, swiveling, insulated	ek		Locknuts as required
cm	Insulator, spool			
SECONDARY ASSEMBLIES				
Apr., 1983				
J5 to J12				



Note:

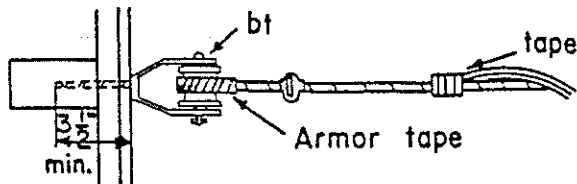
Service connectors to be insulated compression type.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	Bolt, machine, $\frac{5}{8}$ " x req'd length	as	Clevis, service, swinging, insulated
d	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	bh	Clevis, service, deadend, insulated
o	Bolt, eye, $\frac{5}{8}$ " x req'd length	ek	Locknuts as required
ar	Wire holder		

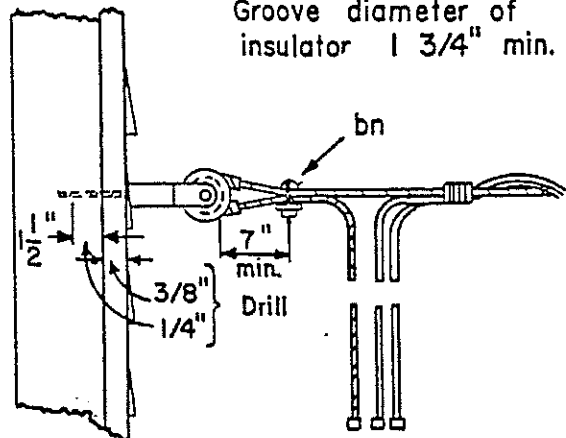
SERVICE ASSEMBLIES

Apr., 1983

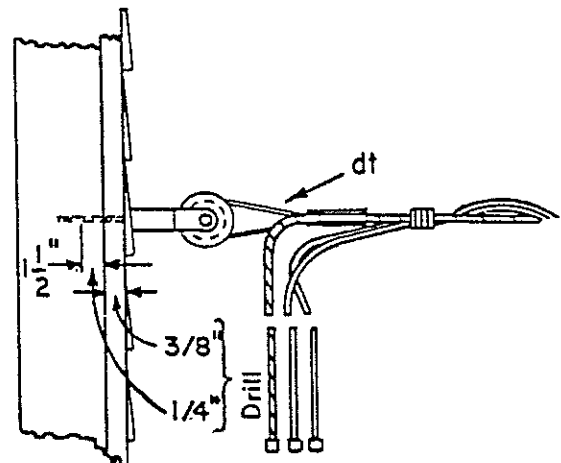
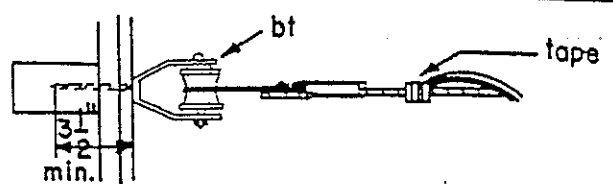
K10, K11, K14



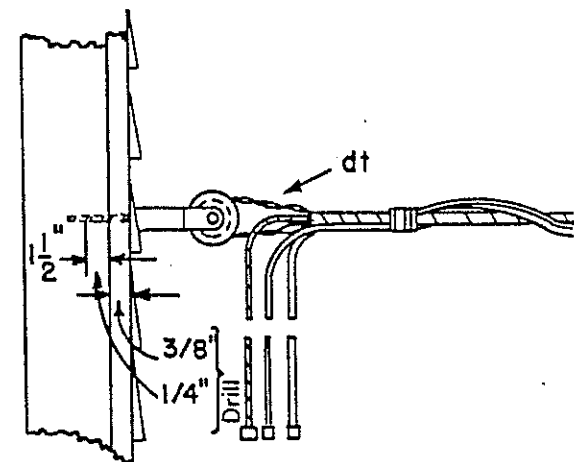
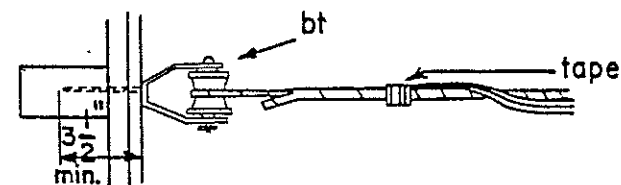
Note:
Groove diameter of
insulator 1 3/4" min.



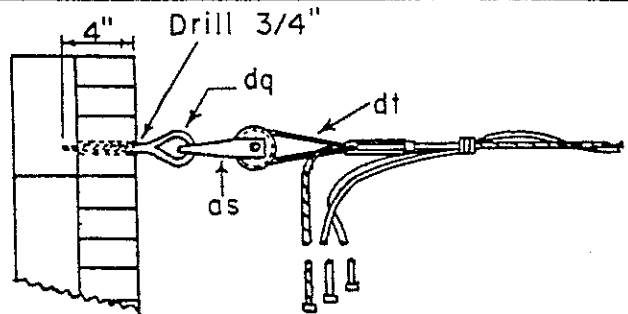
LOOP TYPE



WEDGE TYPE



FORMED TYPE

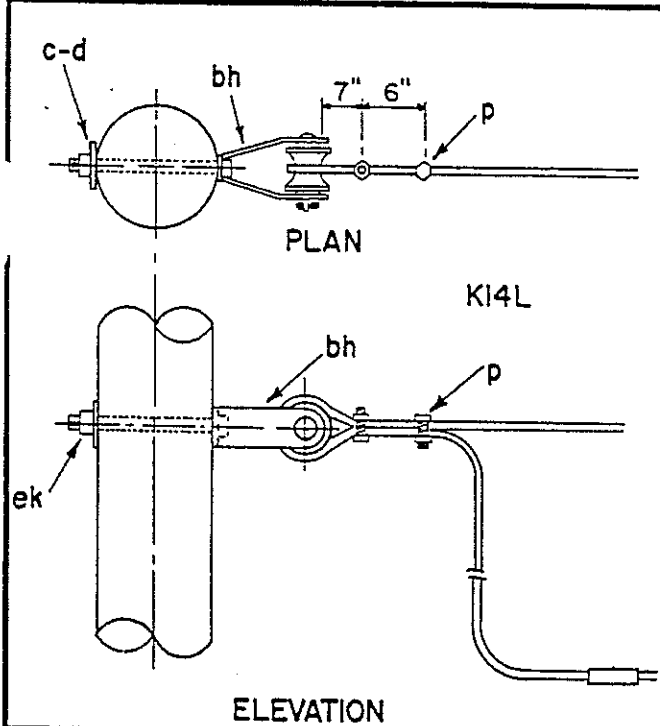
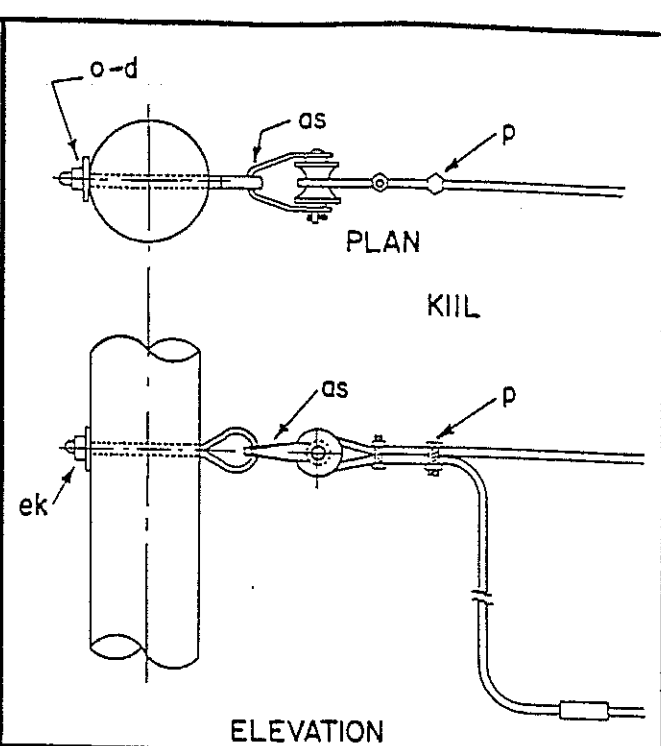
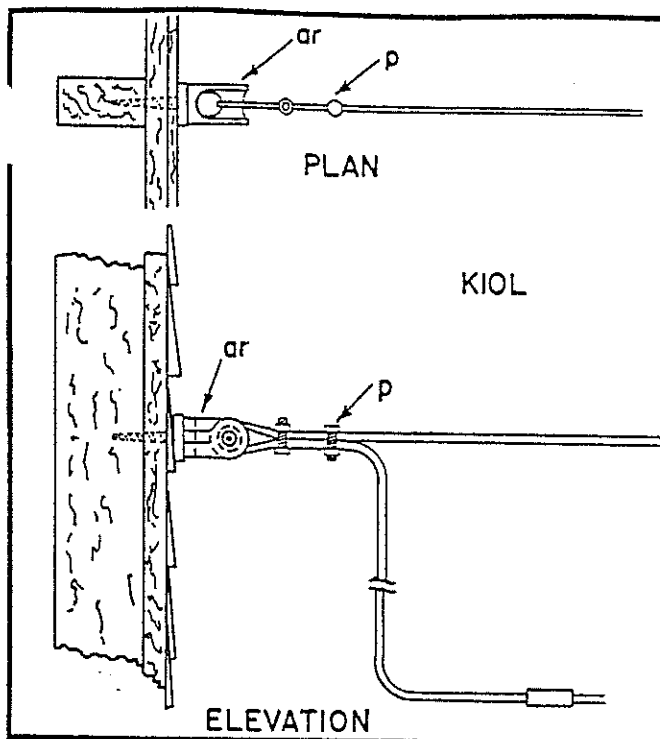


BRICK OR MASONRY

Notes:

Wedge and formed type service dead-ends in sizes shown on page dt of the List of Materials may be subst. for those shown on KIIC, KI4C, KI5C, and KI6C. This type construction should be used for 3 or 4 conductor service cables with bare ACSR neutral. Service connectors to be insulated compression type.

ITEM	MATERIAL	ITEM	MATERIAL
bt	Wireholder, clevis type, insulated.	dt	Service deadend, wedge type.
	#24 woodscrew,	dt	Service deadend, preformed type.
p	Connectors, as required.	dq	Eye screw, elliptical, 1/2" x 6"
bn	Clamp, loop deadend.		3/4" x 3 1/2" expansion shield
as	Clevis, service, insulated		
SERVICE ASSEMBLIES, CABLE			
K10C			
Apr., 1983			
KIOC			



NOTE 1:

This type construction should be used for No. 2 covered aluminum conductor and larger.

NOTE 2:

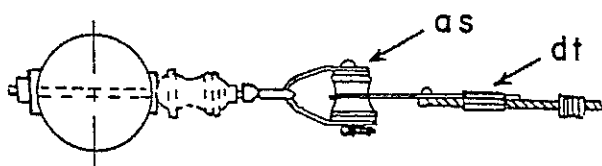
Service connectors to be insulated compression type.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	Bolt, machine, 5/8" x req'd. length	ar	Wireholder
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	as	Clevis, service, swinging, insulated
o	Bolt, eye, 5/8" x req'd. length	bh	Clevis, service, deadend, insulated
p	Connectors, as req'd.	ek	Locknuts, as required

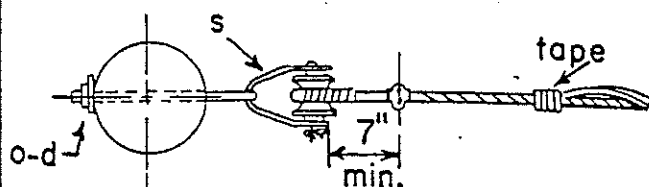
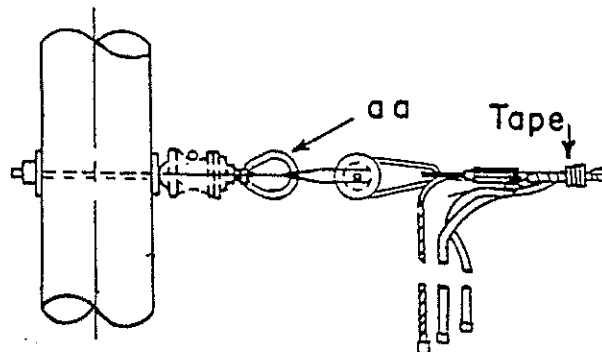
SERVICE ASSEMBLIES
(LARGE CONDUCTORS)

Apr., 1983

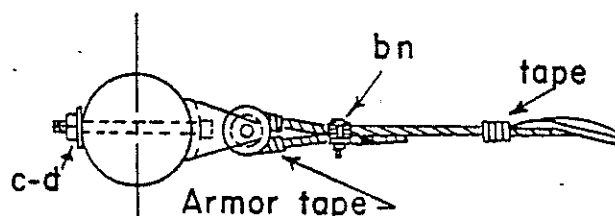
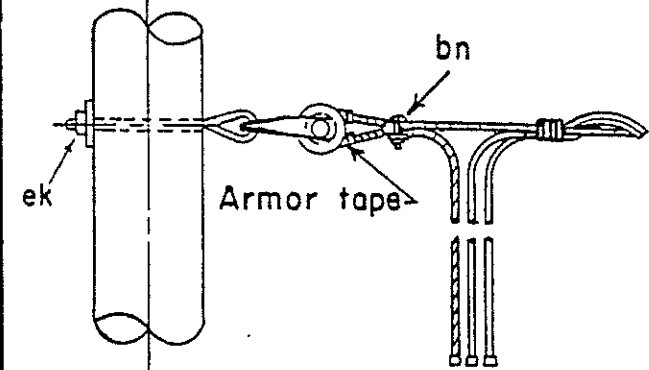
K10L, K11L, K14L



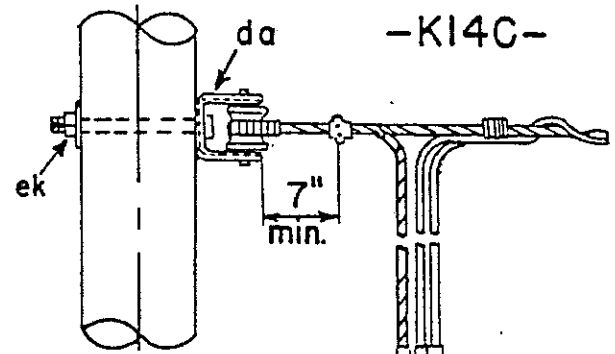
- KI5C -



- KI1C -



- KI4C -



NOTES

This type construction should be used for 3 or 4 conductor service cables with bare A.C.S.R. neutral.

Service connectors to be insulated compression type.

Groove diameter of insulators $1 \frac{3}{4}$ " minimum for loop deadends.

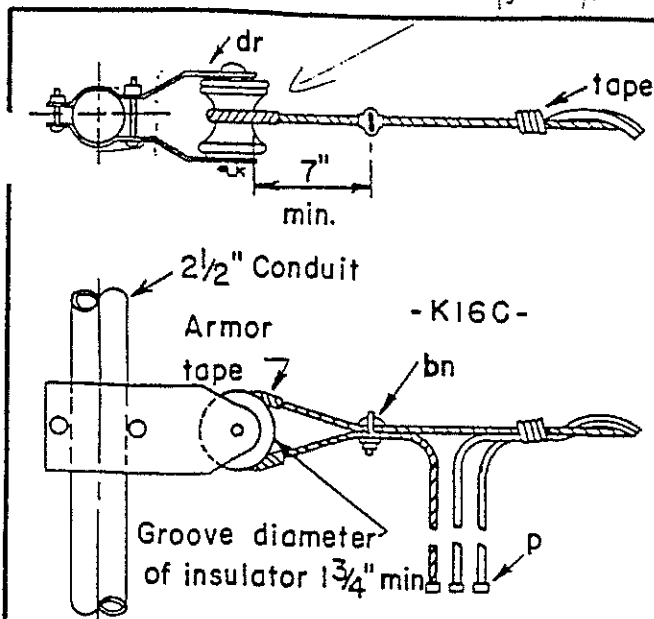
ITEM	MATERIAL	ITEM	MATERIAL
c	Bolt, machine, $\frac{5}{8}$ " x req'd. length	bn	Clamp, loop deadend
d	Washer, $2 \frac{1}{4}$ " x $2 \frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{3}{16}$ " hole	da	Bracket, insulated
o	Bolt, eye, $\frac{5}{8}$ " x req'd. length	as	Clevis, service swinging
s	Clevis, secondary, swinging, insul.	p	Connectors, as required
aa	Nut, eye	dt	Service deadend
ek	Locknuts, as required		

SERVICE ASSEMBLIES, CABLE

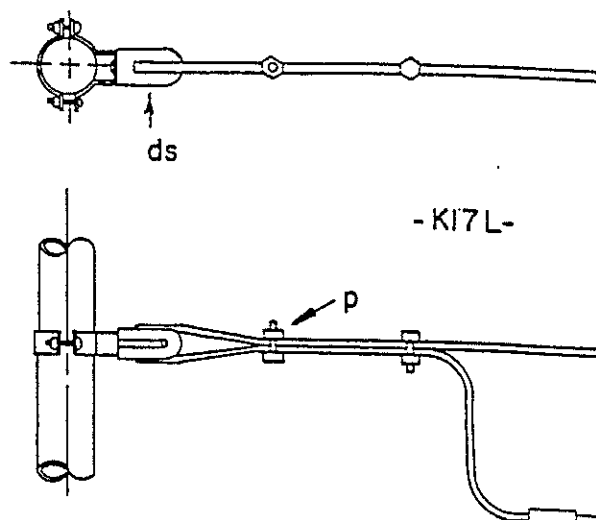
Apr., 1983

KI1C, KI4C, KI5C

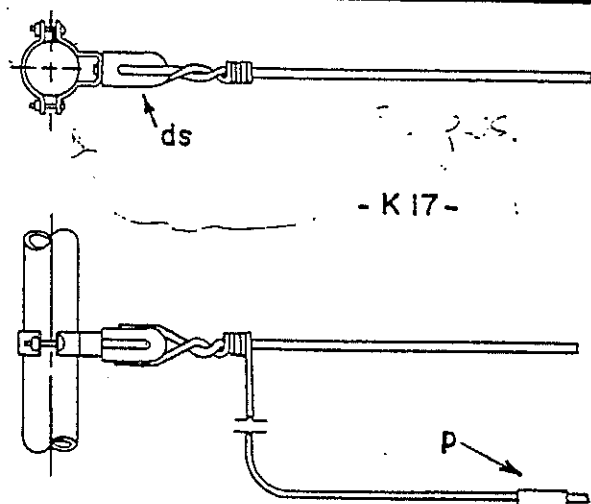
typical 331 & notes. 11/11/83 only 2-275" covered



NOTE: This type constr. should be used for three conductor service cables with bare ACSR neutral.



NOTE: This type constr. should be used for No. 2 covered aluminum conductor.



NOTES:

1. Service connectors to be insulated compression type.
2. For arrangement of service assembly units see drawing M24-10.

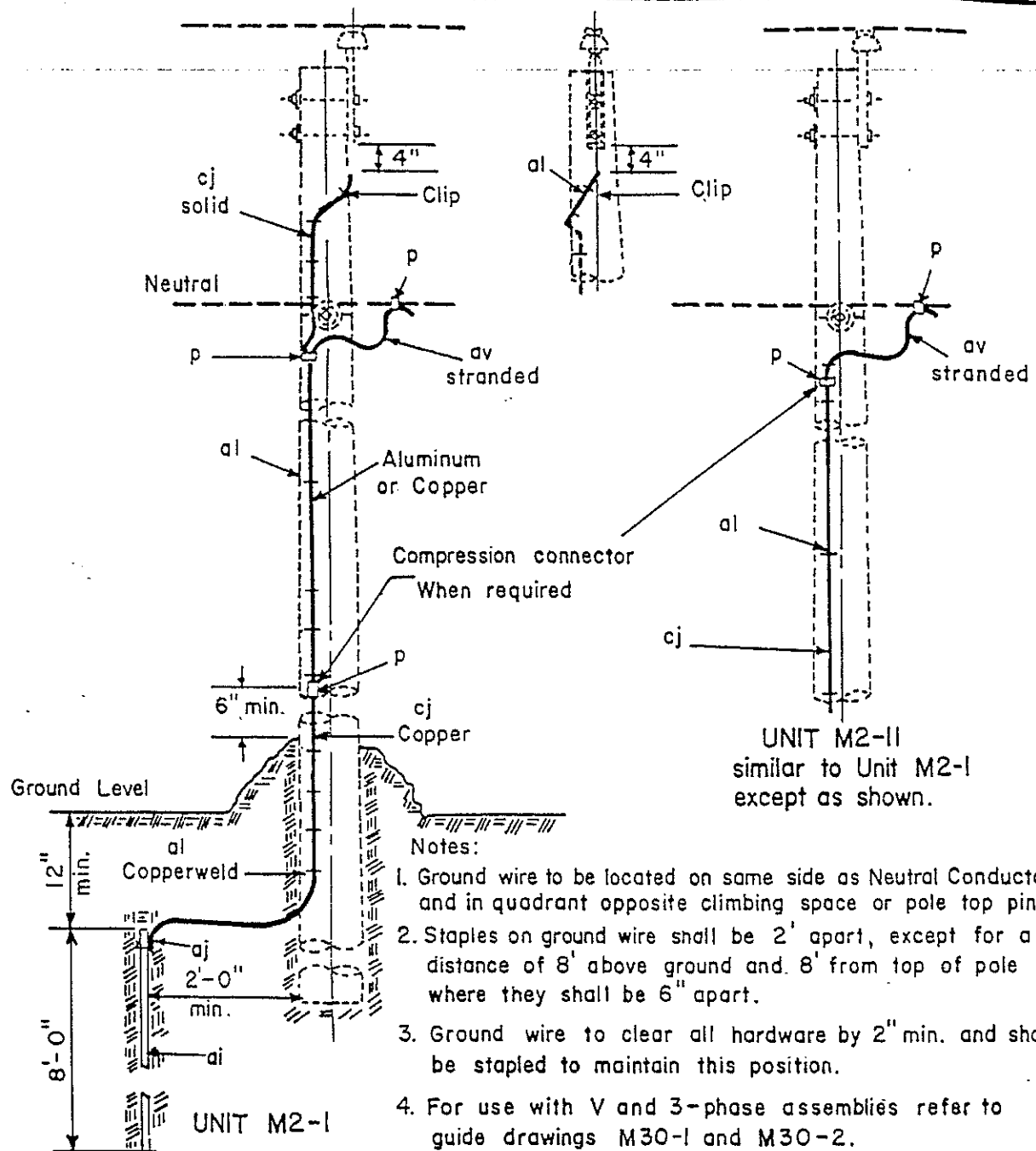
ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as req'd	dr	Clevis, conduit insulated
bn	Clamp, loop deadend	ds	Wireholder, conduit

SERVICE ASSEMBLIES (FOR RANCH TYPE HOUSES)

K16C, K17C, K17

Apr, 1983

K16C, K17L, K17

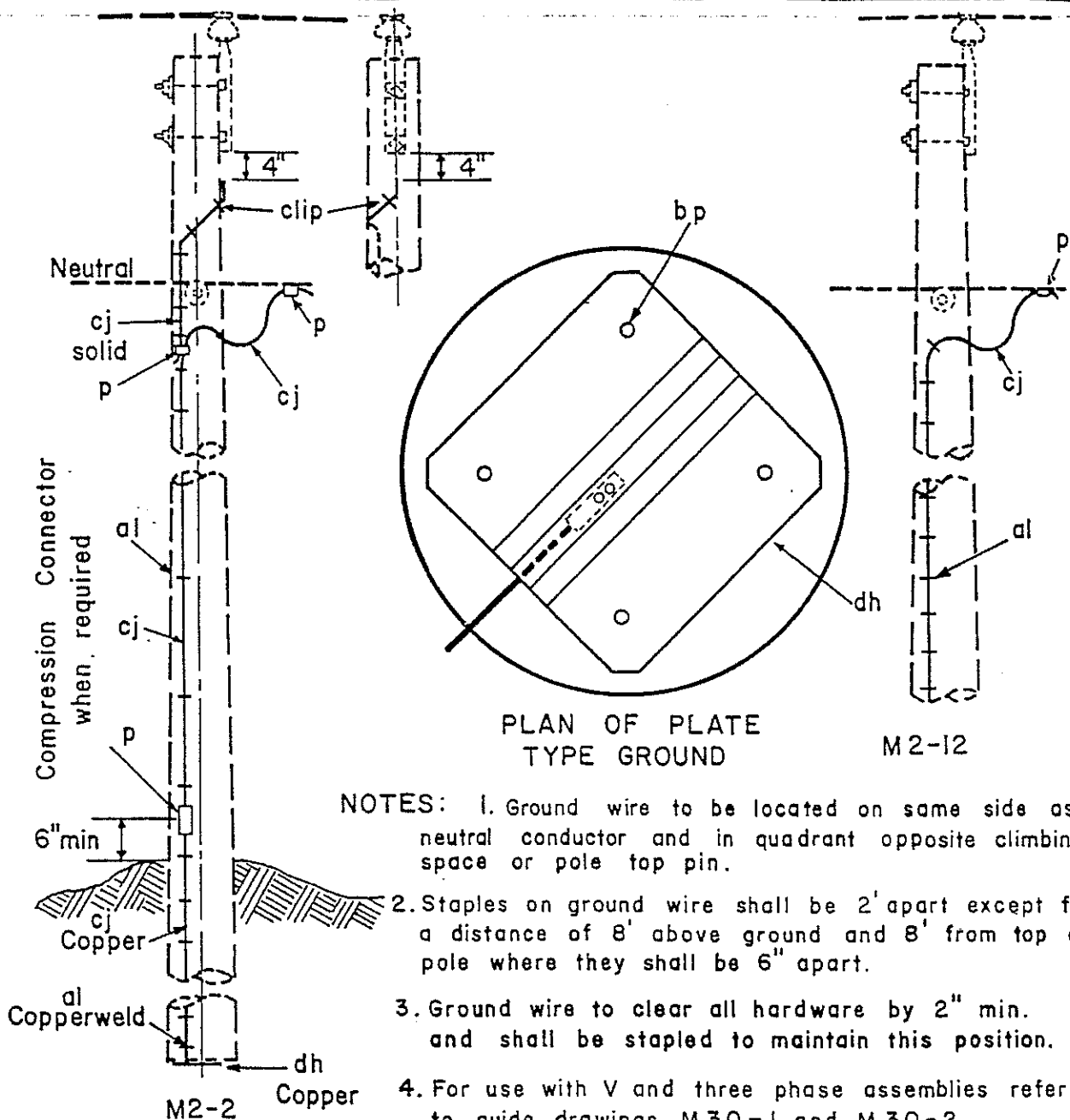


ITEM	MATERIAL	ASSEMBLY UNIT	
		M2-I	M2-II
P	Connector, compression	as req'd.	as req'd.
ai	Rod, ground, 5/8" minimum diameter	1	1
aj	Clamp, ground rod wire	1	1
al	Staples, ground wire (copper or steel to match ground wire)	as req'd.	as req'd.
al	Ground wire clip	1	
cj	Ground wire, minimum No. 6 copper or equiv. conductivity	as req'd.	as req'd.
av	Jumper, stranded, min. No 6 copper or equiv. conductivity	as req'd.	as req'd.

12.5/7.2 kV
GROUNDING ASSEMBLY - GROUND ROD TYPE

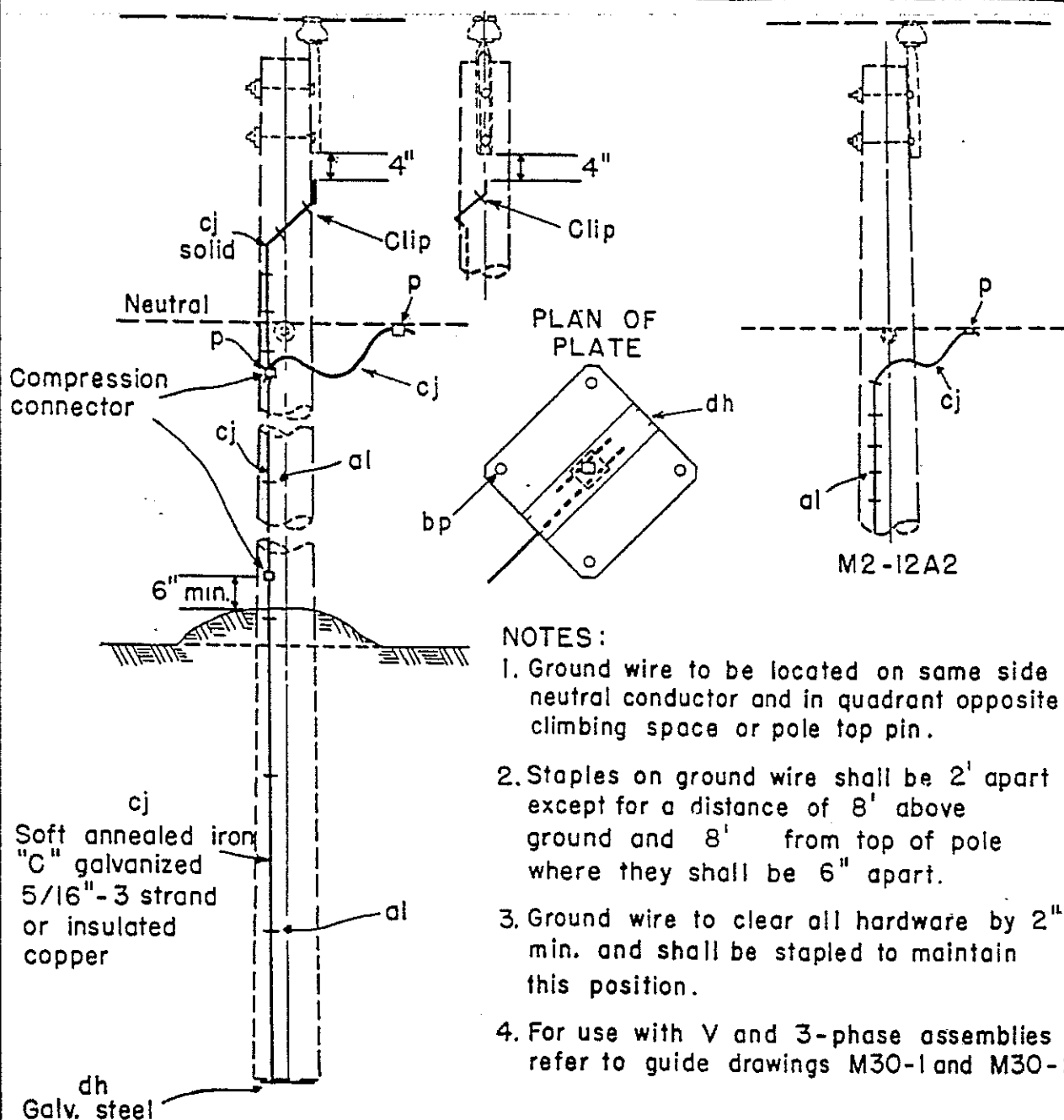
Apr., 1983

M2-I, M2-II



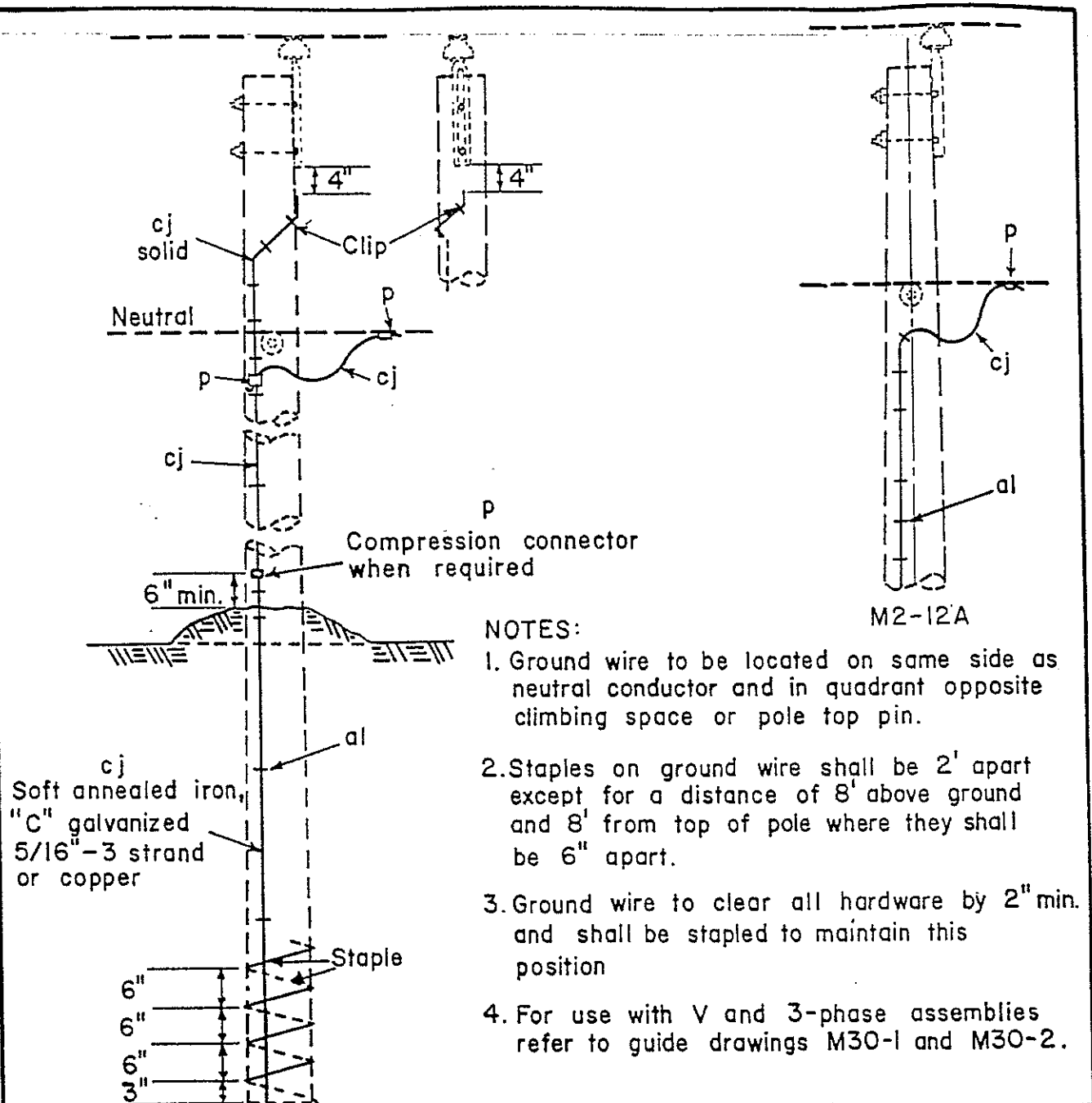
ITEM	MATERIAL	M2-2	M2-12
cj	Ground wire, min. No. 6 Copper or equiv. conductivity	as req'd.	as req'd.
dh	Grounding plate, butt type, copper	1	1
al	Staples, ground wire (copper or steel to match ground wire)	as req'd.	as req'd.
p	Connector, compression	as req'd.	
al	Ground wire clip	1	
bp	Nails, galvanized, 1"	4	4

M2-2, M2-12		12.5 / 7.2 kV POLE PROTECTION ASSEMBLY - PLATE TYPE	
		Apr, 1983	M2-2, M2-12



ITEM	MATERIAL	M2-2A2	M2-12A2
dh	Grounding plate, butt type, galv. steel	1	1
bp	Nails, galvanized, 1"	4	4
p	Connectors, compression	as req'd.	
cj	Ground wire, min. No.6 Copper or equivalent conductivity	as req'd.	as req'd.
al	Clip, ground wire	1	
al	Staples, ground wire (copper or steel to match ground wire)	as req'd.	as req'd.
cj	Ground wire, soft annealed iron, "C" galvanized 5/16"-3 strand	as req'd.	as req'd.

12.5/7.2 kV
POLE PROTECTION ASSEMBLY
PLATE TYPE

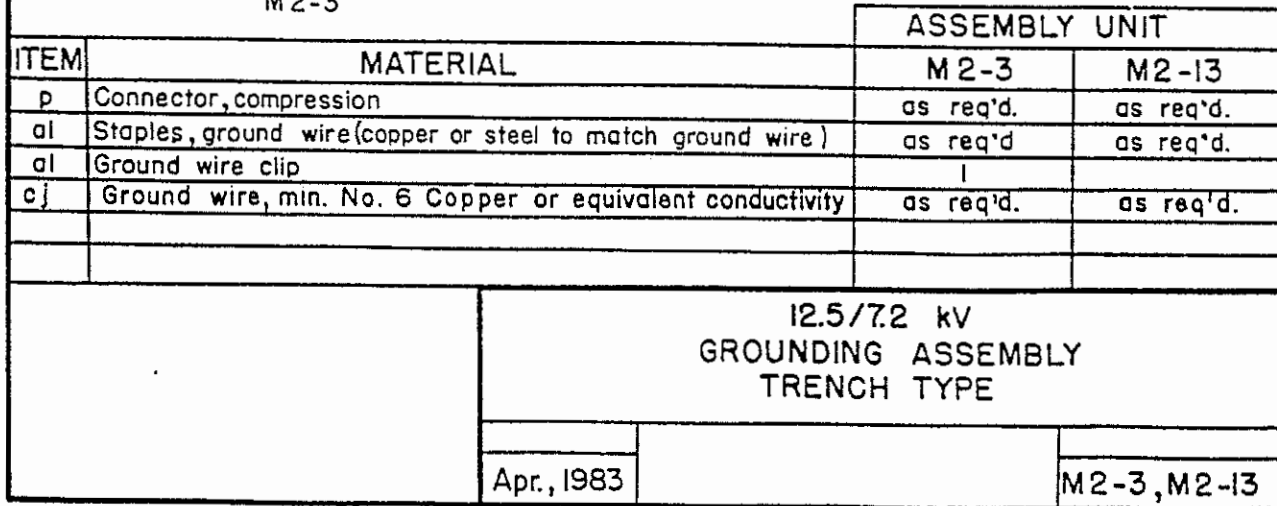


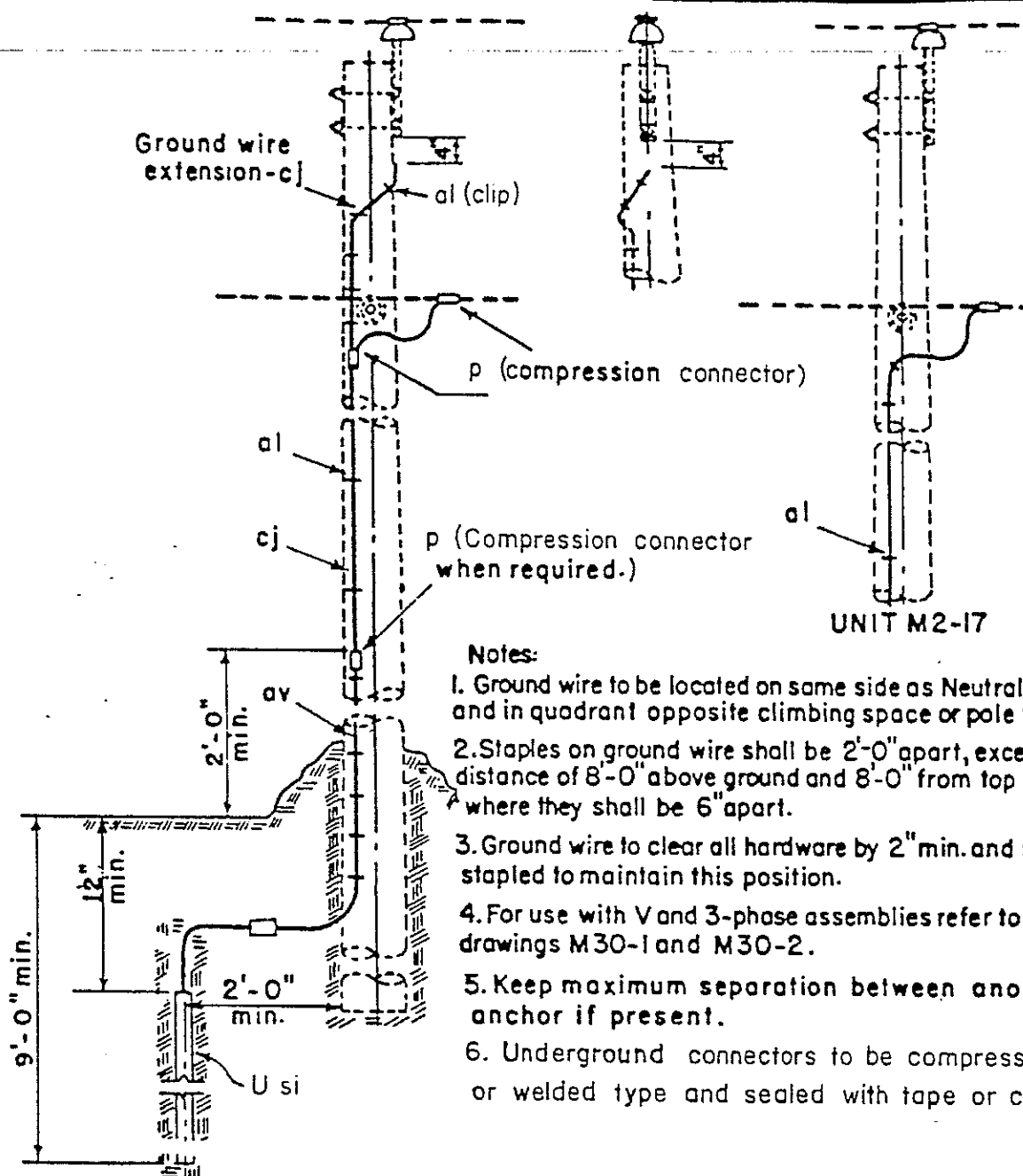
NOTES:

1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2' apart except for a distance of 8' above ground and 8' from top of pole where they shall be 6" apart.
3. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position
4. For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.

ITEM	MATERIAL	M2-2A	M2-12A
P	Connector, compression	as req'd.	
al	Clip, ground wire	1	
al	Staples, ground wire (copper or steel to match ground wire)	as req'd.	as req'd.
cj	Ground wire, min. No. 6 Copper or equivalent conductivity	as req'd.	as req'd.
cj	Ground wire, soft annealed iron, "C" galvanized 5/16"-3 strand	as req'd.	as req'd.

12.5/7.2 kV POLE PROTECTION ASSEMBLY WRAP-AROUND TYPE



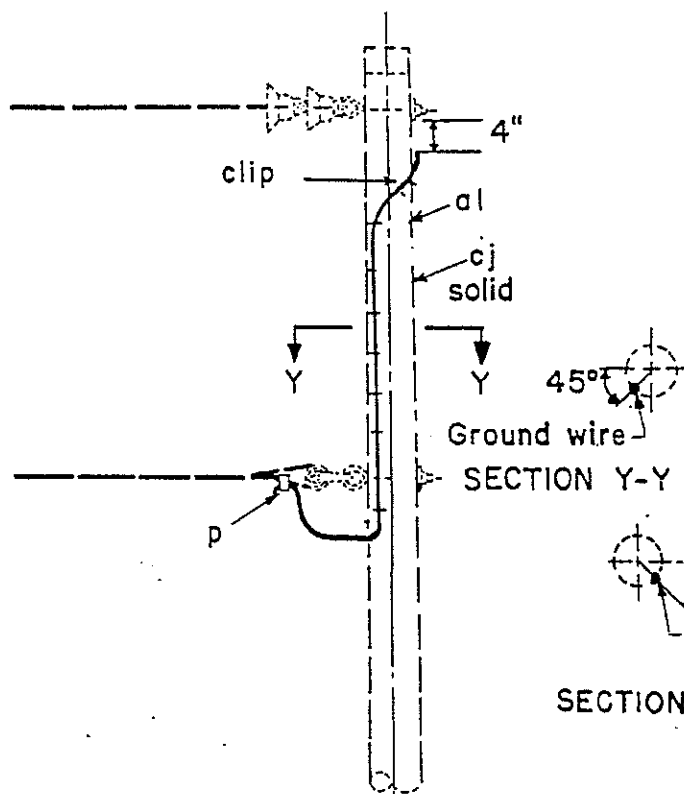


Notes:

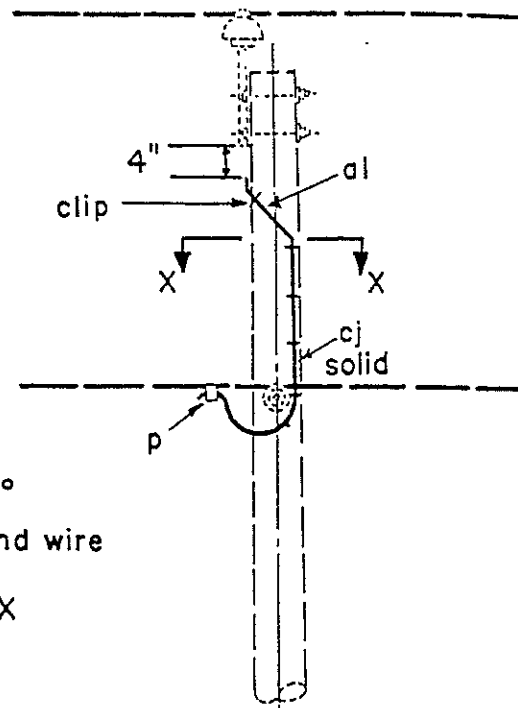
1. Ground wire to be located on same side as Neutral Conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
3. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.
4. For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.
5. Keep maximum separation between anode and anchor if present.
6. Underground connectors to be compression type or welded type and sealed with tape or compound.

See REA Bull. 161-23, part IV

		Assembly	Unit
ITEM	MATERIAL	M2-7	M2-17
P	Connector, compression as req'd.		
al	Staples, ground wire, (copper or steel to match and wire)	as req'd	as req'd
al	Ground wire clip	1	
av	Conductor, M.H.D. or S.D, copper, T.W insulated #12 AWG min.	as req'd	as req'd
cj	Ground wire, #6 S.D. copper or equivalent	as req'd	as req'd
cj	Ground wire, extension, #6 S.D. copper or equiv.	1	
U si	Anode, as specified, (See REA Bulletin 161-23 part IV page 7)		
GALVANIC ANODE ASSEMBLY			
M2-7, M2-17		Apr., 1983	M2-7, M2-17



DEADEND ARRANGEMENT

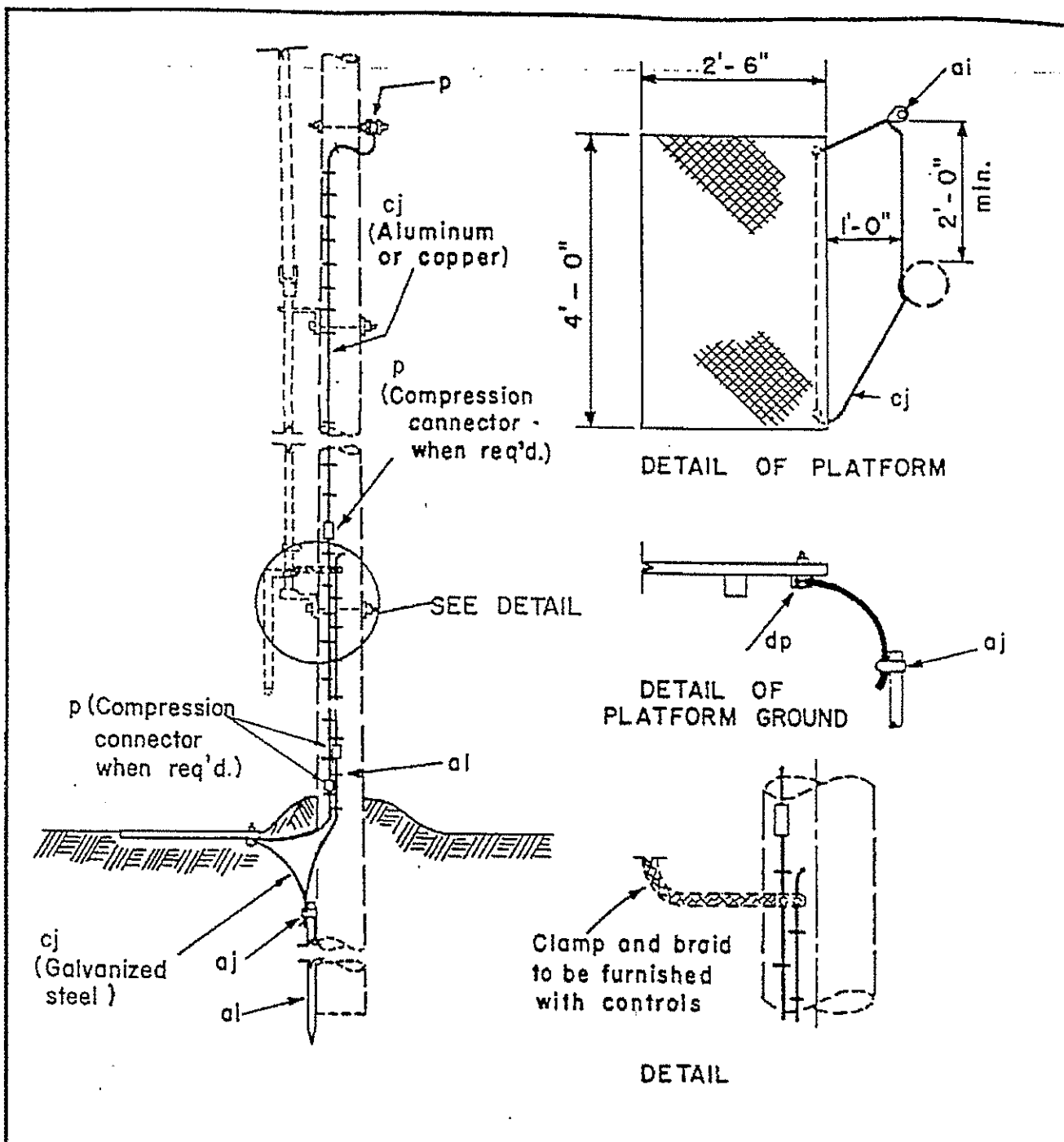


TANGENT ARRANGEMENT

NOTES:

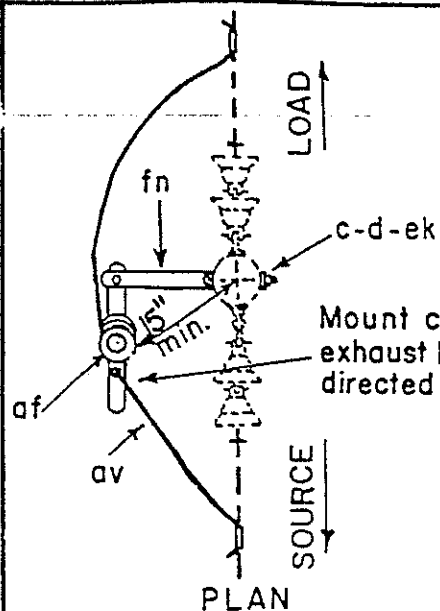
1. Ground wire to be located on same side as Neutral Conductor and in quadrant opposite climbing space.
2. Staples on ground wire to be 6" apart.
3. Ground wire to clear all hardware by 2" minimum and shall be stapled to maintain this position.
4. For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.

ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
p	1	Connector	al	1	Ground wire clip
al		Staples ground wire, as required	cj		Ground wire, minimum No.6 copper or equivalent conductivity, as req'd.
M2-9			12.5/7.2 kV		
			POLE TOP PROTECTION ASSEMBLY		
			Apr., 1983		
			M2-9		

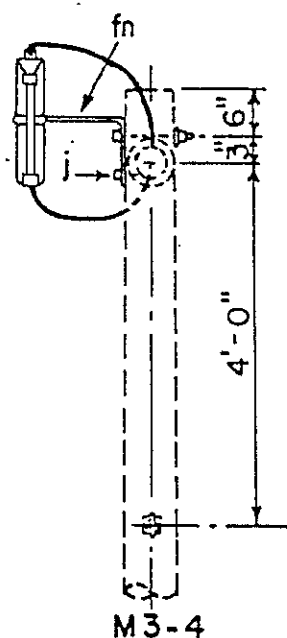
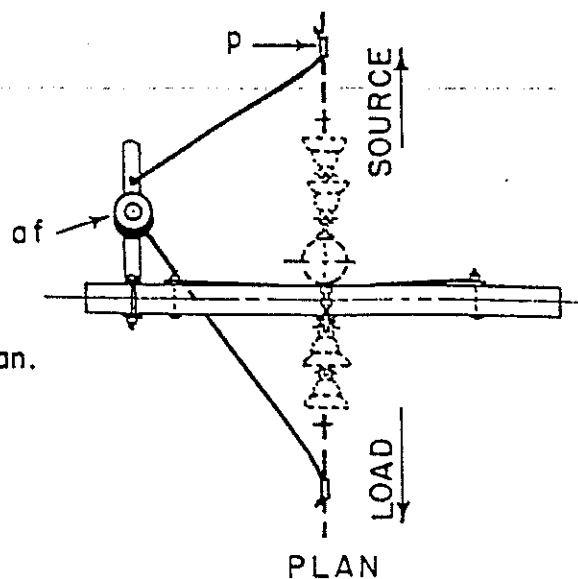


ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as required	cj	Ground wire, No. 2 copper or equiv. conductivity, as required
ai	1 Rod, ground, 5/8" dia. x 8' - 0" (galv.)	dp	2 Grounding connector and lockwasher
aj	1 Clamp, ground rod (galvanized steel)		1 Iron grounding platform plate (galv.)
al	Staples, ground wire, as required (galv.)		

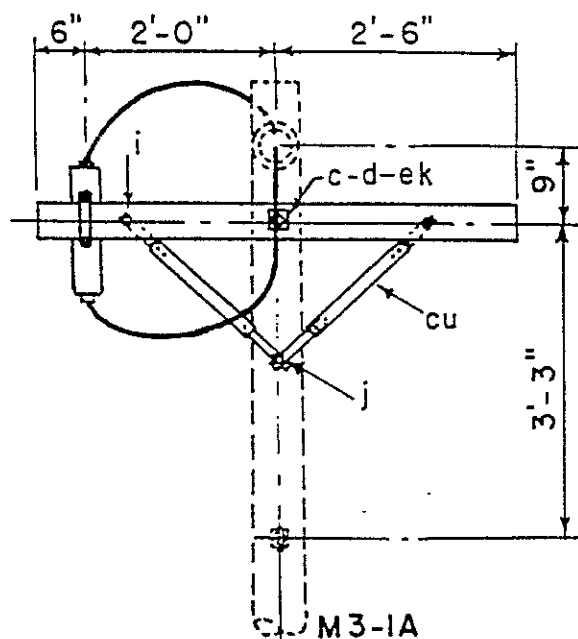
GROUNDING ASSEMBLY - PLATFORM TYPE
FOR SECTIONALIZING AIR BREAK SWITCH



Mount cutout so that exhaust blast is directed away from lineman.



M3-4



M3-1A

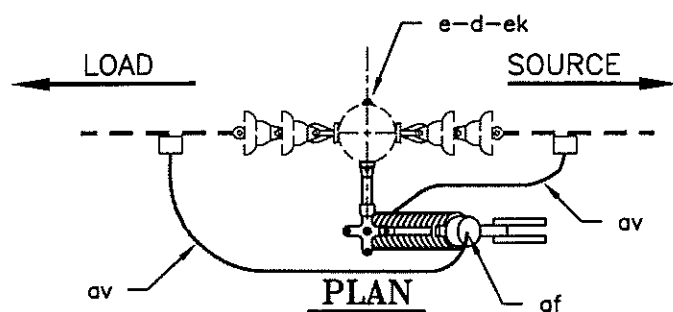
ITEM	MATERIAL	M3-4	M3-1A
		NO. REQUIRED	NO. REQUIRED
c	Bolt, machine, 5/8" x required length	1	1
d	Washer, 2 1/4" sq. x 3/16", 13/16" hole	1	2
g	Crossarm, 3 5/8" x 4 5/8" x 5'-0"		1
i	Bolt, carriage, 3/8" x 4 1/2"		2
j	Screw, lag, 1/2" x 4"	1	1
p	Connector, compression type	2	2
af	Cutout, fuse, single shot	1	1
av	Leads or jumpers as required		
cu	Brace, wood, 28"		2
fn	Bracket, extension, L type	1	
ek	Locknuts, as required		

12.5/7.2 kV, 1-PHASE
ONE SECTIONALIZING FUSE CUTOUT

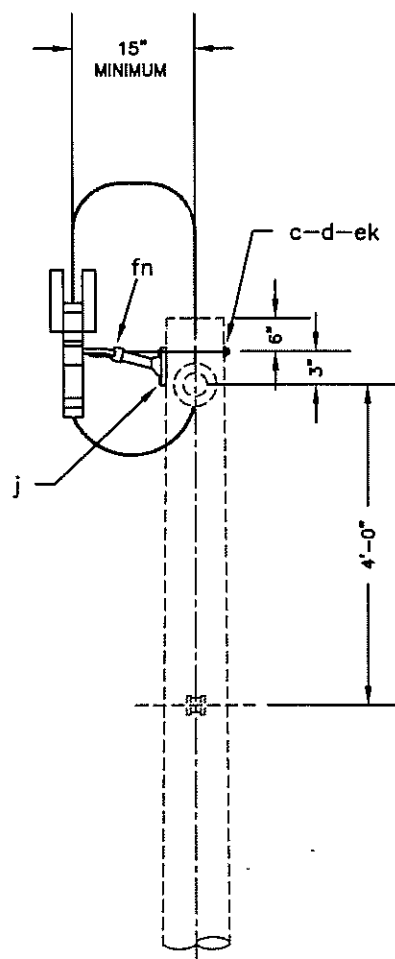
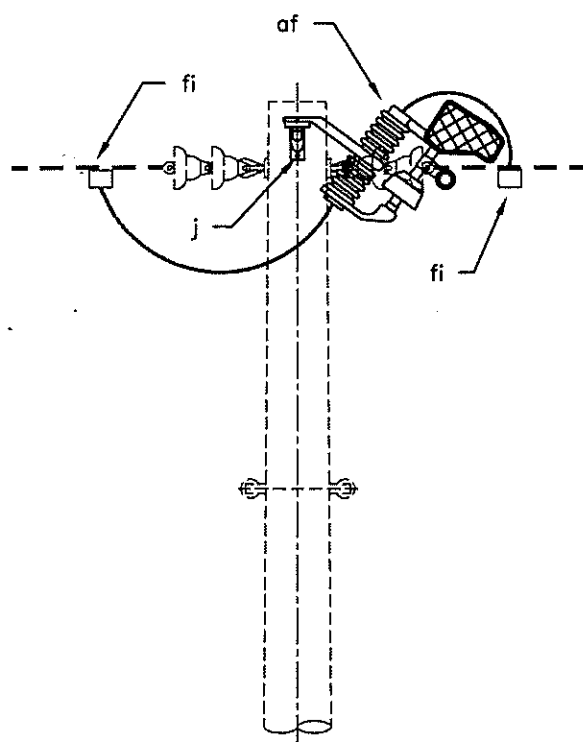
M3-1A, M3-4

Apr, 1983

M3-1A, M3-4



NOTE:
Mount cutout so that exhaust
blast is directed away from lineman.



ELEVATION

SIDE ELEVATION

ITEM	NO	M A T E R I A L	ITEM	NO	M A T E R I A L
c	1	Bolt, machine, 5/8" x required length	af	1	Loadbreak Cutout, Electronic Sectionalizer
d	1	Washer, 2 1/4" x 2 1/4" x 3/16"X 13/16 HOLE	av	2	Leads or jumpers as required
j	1	Screw, lag, 1/2" x 4"	fn	1	Bracket, cloverleaf
fi	2	Connector, hot line	ek	-	Locknuts, as required

Note: Hang fuse holder
on pole for emergency
situations.

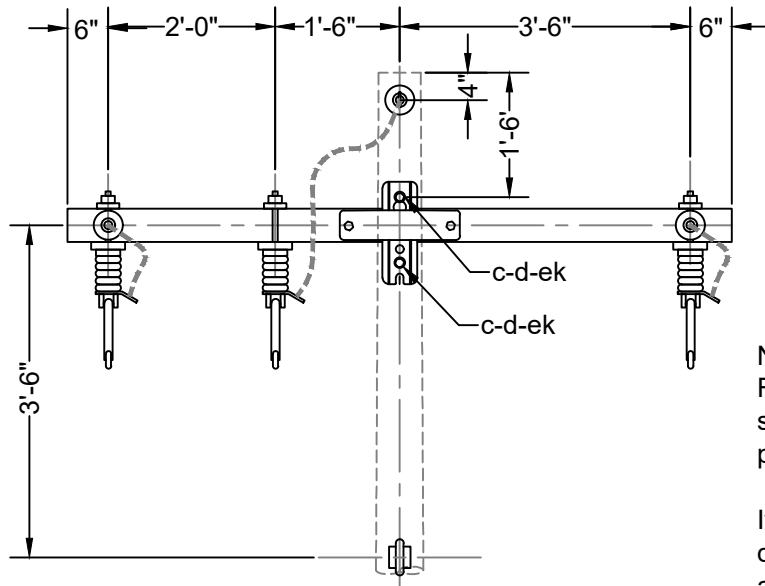
12.5 / 7.2 KV or 24.9 / 14.4 KV
SINGLE PHASE
ELECTRONIC SECTIONALIZER

Dec. 2007



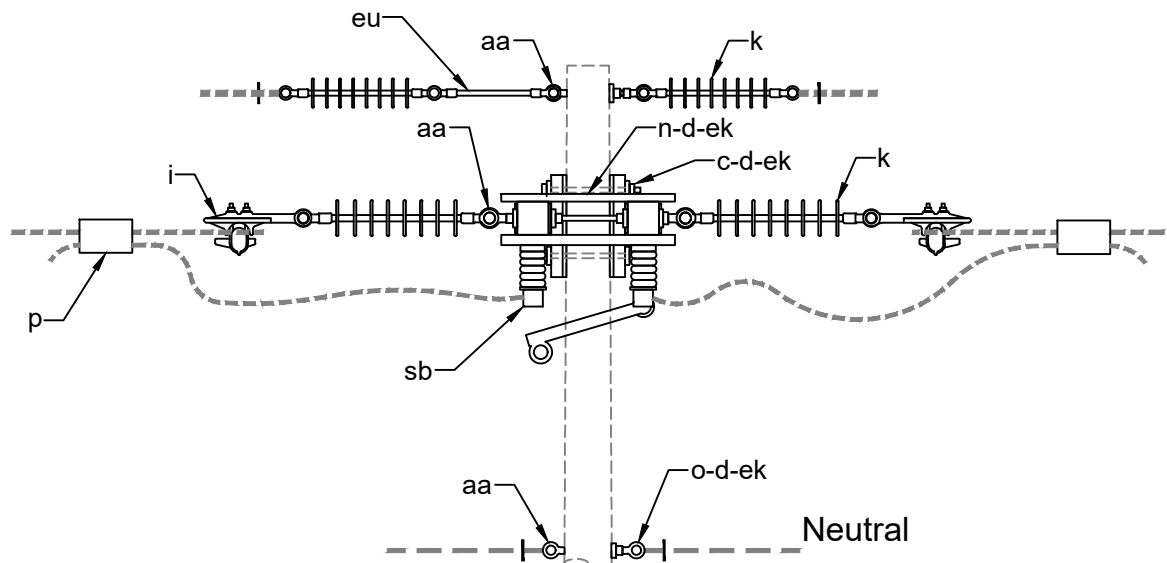
M3-4S

M3-2A, M3-3A



Note:
For V-Phase installations omit
switch and related items on center
phase. Designate as M3-2A.

Items cc is shown on assembly
drawings M42-3, M42-11, M42-13
and M42-21.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	12	Washer, 2 1/4" square, 13/16" hole	aa	4	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers and leads as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	bo	6	Shackle, anchor
i	6	Clamp, deadend	cc	2	Deadend assembly, neutral
k	12	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	2	Bolt, double arming, 5/8" x required length	eu	1	Insulator, fiberglass, strain
o	4	Bolt, eye, 5/8" x required length			

**12.5 / 7.2 KV, 3-PHASE
TWO OR THREE SECTIONALIZING
DISCONNECT SWITCHES**

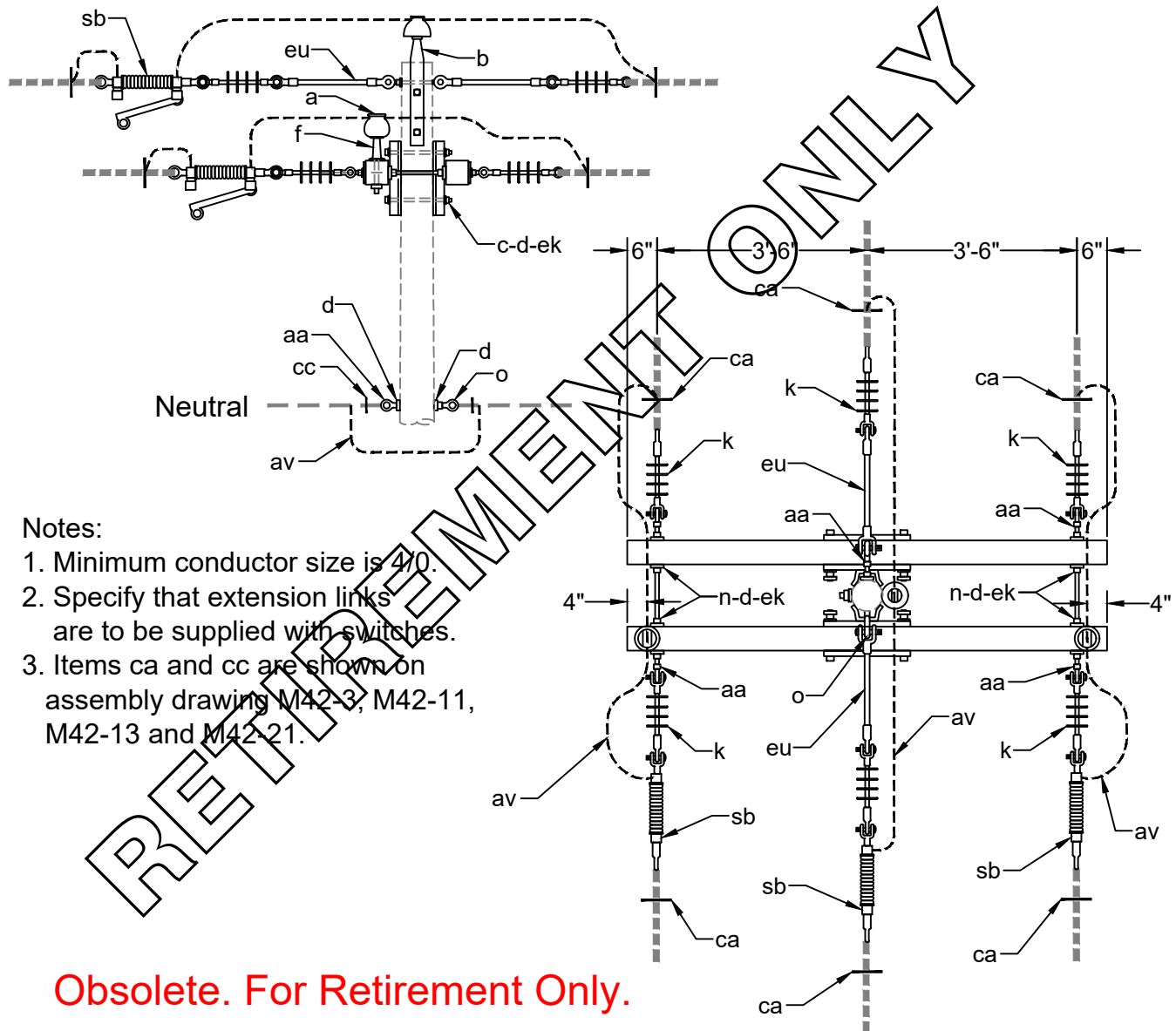
Revision Date

Jan. 16, 2023



M3-2A

M3-3A



Notes:

1. Minimum conductor size is 4/0.
2. Specify that extension links are to be supplied with switches.
3. Items ca and cc are shown on assembly drawing M42-3, M42-11, M42-13 and M42-21.

Obsolete. For Retirement Only.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	12	Washer, 2 1/4" square, 13/16" hole	aa	4	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers and leads as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	cc	2	Deadend assembly, neutral
i	6	Clamp, deadend	ek	-	Locknuts, as required
k	12	Insulator, suspension, epoxilator	eu	1	Insulator, fiberglass, strain
n	2	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	4	Bolt, eye, 5/8" x required length			

RETIREMENT ONLY
12.5 / 7.2 KV
LINE TENSION SWITCHES

Revision Date

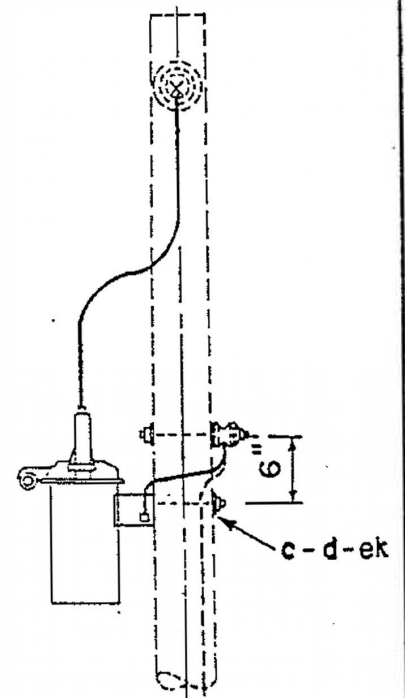
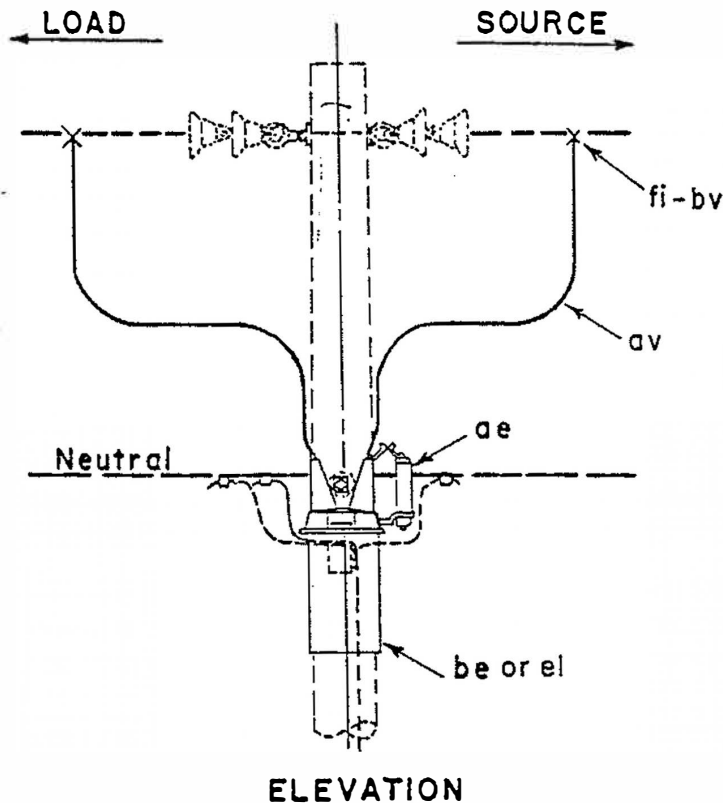
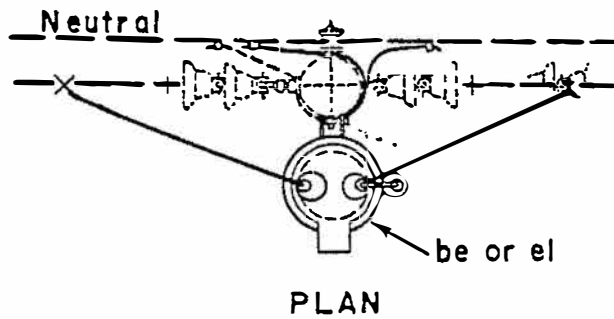
Jan. 17, 2023



M3-3B

NOTE:

The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted on the other side of the pole and the neutral deadended.



Obsolete. For Retirement Only.

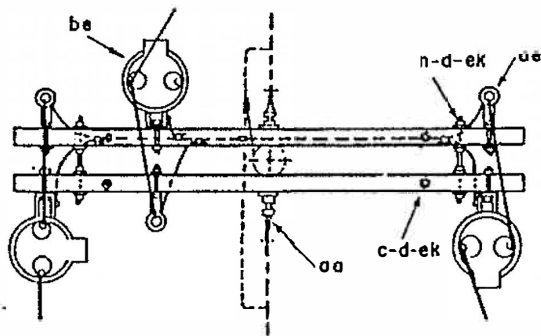
ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
C	1	Bolt, machine, $\frac{5}{8}$ " x req'd length	ae	1	Surge arrester
d	1	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ " $\frac{13}{16}$ " hole	bv	2	Rods, armor
p		Connectors, as required	el	1	Sectionalizer (M3-4I only)
			ek		Locknuts, as required
fi	2	Connector, hot line, tap assembly			
av		Jumpers, stranded, as required			
be	1	Recloser, oil circuit (M3-10 only)			

12.5 / 7.2 kV

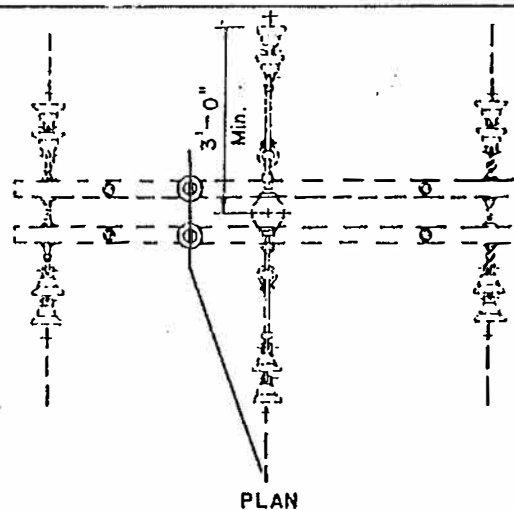
ONE SECTIONALIZER OR OIL CIRCUIT RECLOSER

Apr, 1983

M3-10, M3-4I

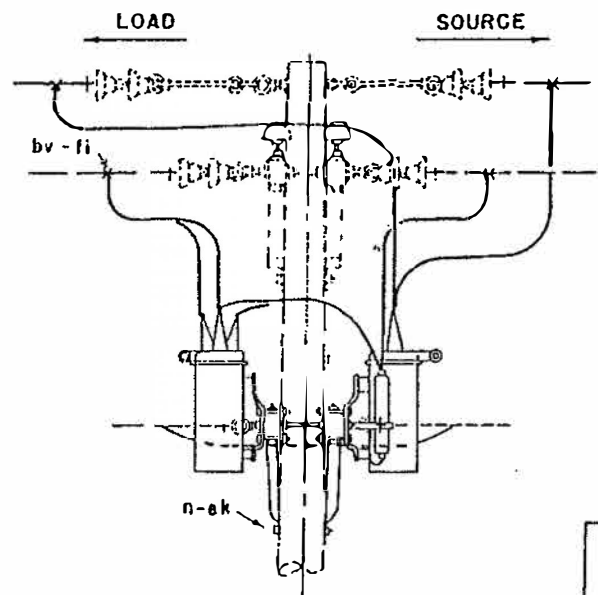
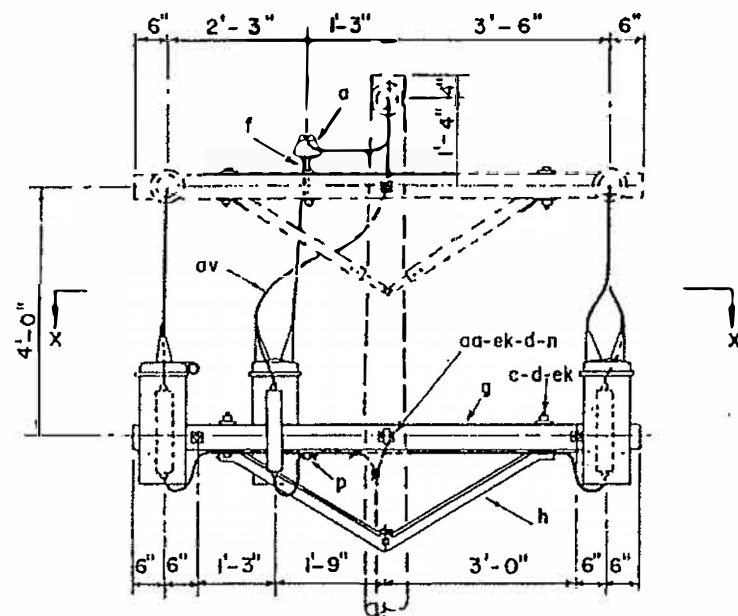


SECTION X-X



PLAN

ITEM	QTY	MATERIAL
a	2	Insulator, pin type
c	4	Bolt, machine, 1/2" x req'd. lg'th.
d	4	Washer, Rd. 1 3/8" dia. 5/16" hole
d	10	Washer, 2 1/4" x 2 1/4" x 3/16", 1/16" hole
f	2	Pin, crossarm, steel 5/8" x 10 3/4"
g	2	Crossarm, 3 1/8" x 4 3/8" x 8'-0"
h	2	Brace, 1 1/2" x 1 1/2" x 3/16", 60" span
n	4	Bolt, double arming, 5/8" x req'd. length
p		Connectors, as req'd.
aa	1	Nut, eye, 5/8"
ae	3	Surge arrester
av		Jumpers, stranded, as req'd.
be	3	Recloser, oil circuit
bv	6	Rods, armor
ek		Locknuts, as required
fi	6	Connector, hot line, top assembly



NOTES:

1. The recloser terminal bushing connected directly to the coil should be connected to the source.
2. For V-phase installation omit center phase; adjust material list and designate M3-11.
3. Each recloser tank shall have two separate connections to ground.

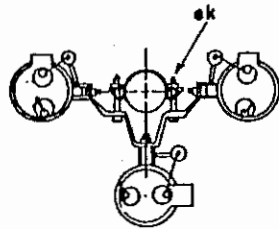
12.5/7.2 kV
2 OR 3-PHASE, THREE SECTIONALIZING
OIL CIRCUIT RECLOSERS

Apr., 1983

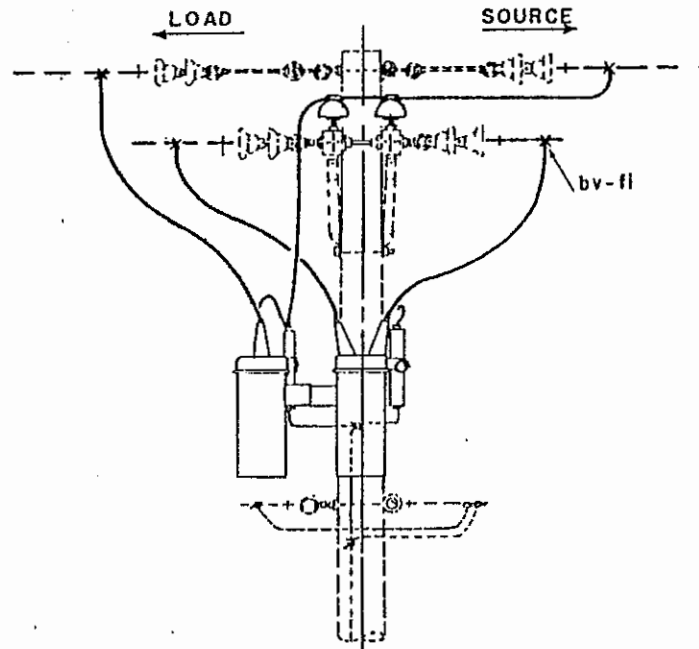
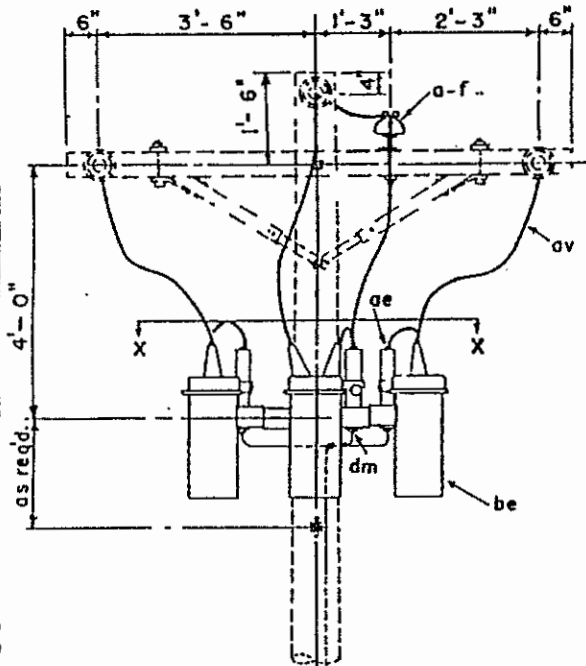
M3-11, M3-12

Obsolete. For Retirement Only.

M3-11A, M3-12A



SECTION X-X



ITEM	No.	MATERIAL
	Req'd	
f	2	Pin, crossarm, steel, 5/8"x10 3/4"
p		Connectors, as required
ae	3	Surge arrester
av		Jumpers, stranded, as req'd.
be	3	Recloser, oil circuit
by	6	Rods, armor
dm	1	Bracket, cluster type
ek		Locknuts, as required
fl	6	Connector, hot line, top assembly
a	2	Insulator, pin type

NOTES:

1. The recloser terminal bushing connected directly to the coil should be connected to the source.
2. For V Phase installations omit recloser and related items on center phase. Designate as assembly M3-11A
3. Each recloser tank shall have two separate connections to ground.

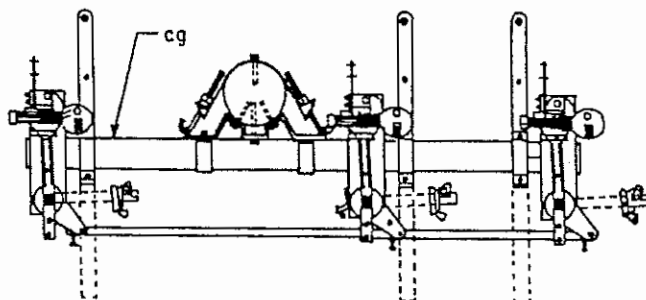
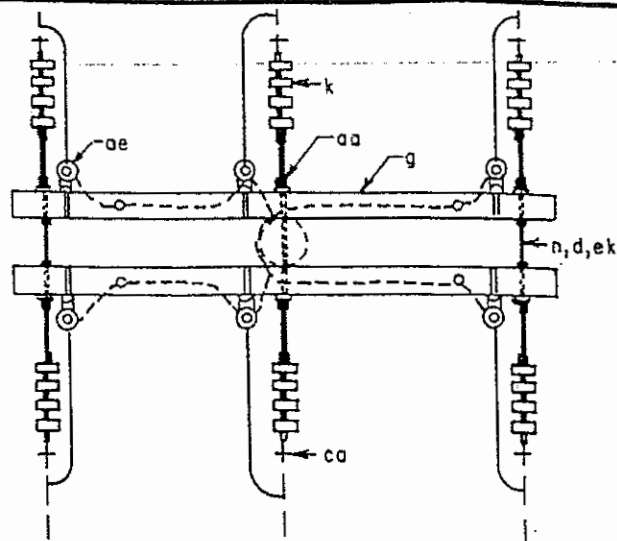
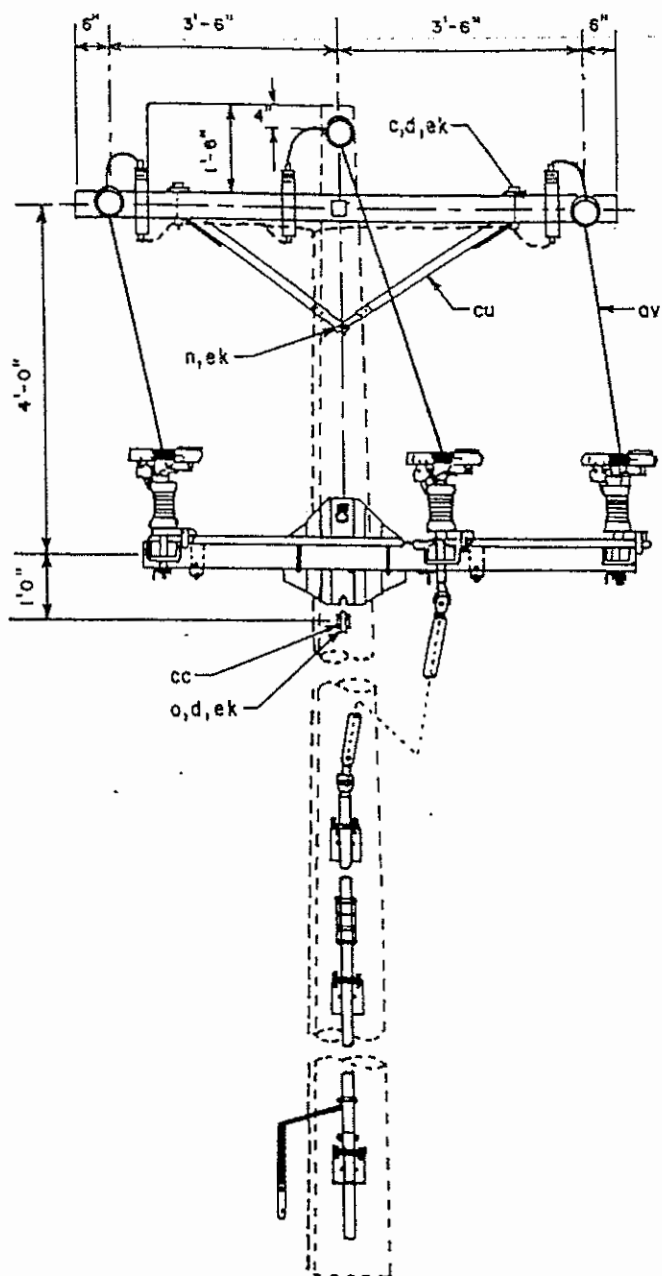
12.5/7.2 kV

2 OR 3 SECTIONALIZING OIL CIRCUIT RECLOSERS

Apr., 1983

M3-11A, M3-12A

M3-11A, M3-12A



NOTE -
Grounding unit M2-15A
required with this installation.

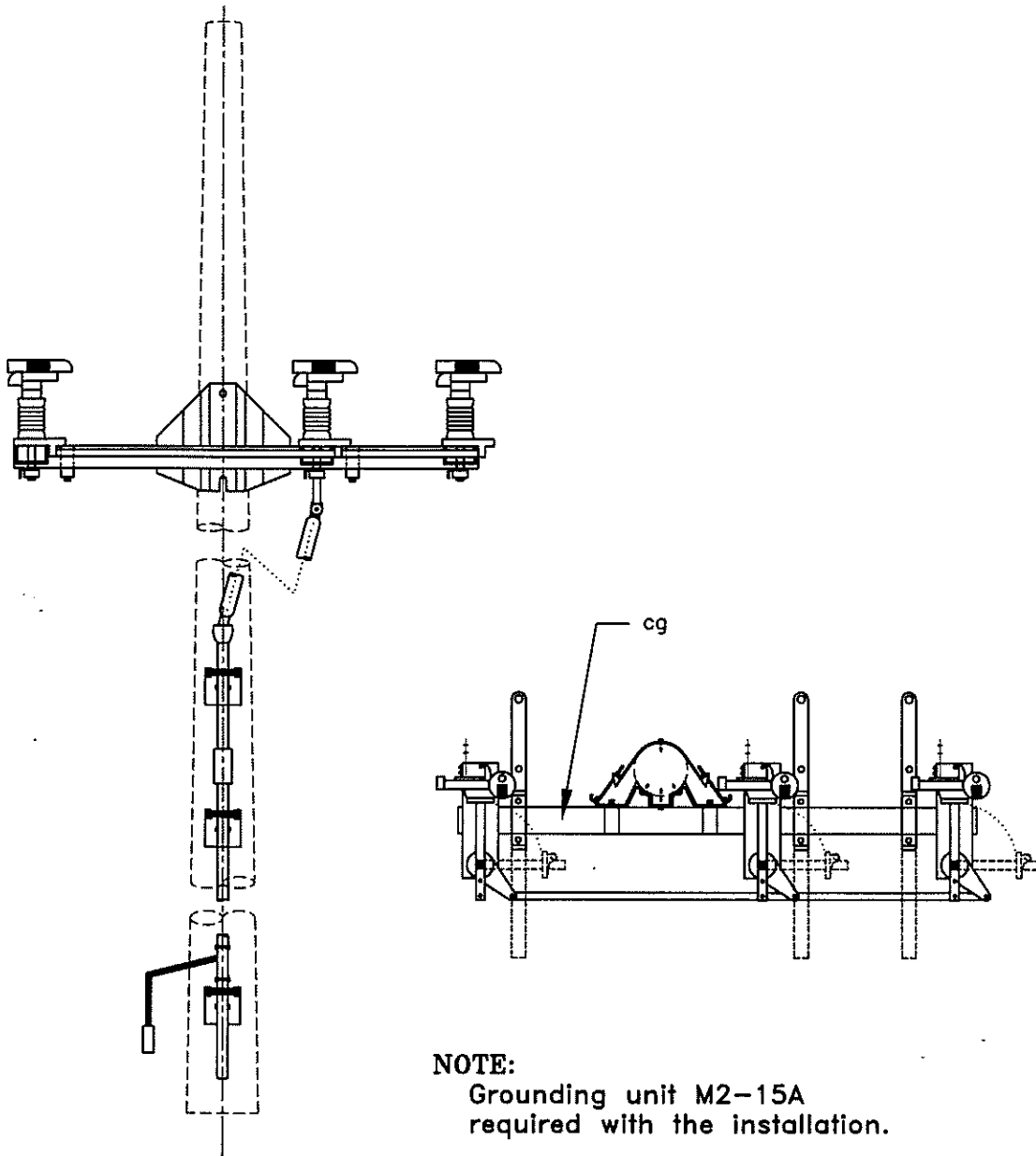
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x req'd. length	ae	6	Lightning arrester dist. class 9 KV
d	15	Washer, 2 1/4" x 2 1/4" x 3/16" hole	c	8	Bolt, machine, 5/8" x req'd. length
d	4	Washer, round, 1 3/8" diam, 9/16" hole	cg	1	Switch, airbreak, 3 pole unit 25 KV
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"			with operating mechanism,
k	6	Insulator, epoxy, suspension extension 7.2 KV			S&C Omni-Rupter Switch and
n	3	Bolt, double arming, 5/8" x req'd length			associated hardware
o	2	Bolt, eye, 5/8" x req'd length			
aa	6	Nut, eye, 5/8"			
bo	2	Shackle, anchor			
cu	2	Brace, wood, 60" span			

M3-15A

12.5 / 7.2 KV
SECTIONALIZING AIRBREAK SWITCH

Feb., 1990

M3-15A



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
ae	6	Lighting arrester dist. class 9KV	cg	1	Switch, air break, 3 pole unit 15 KV
		(not shown)			with operating mechanism
					S & C Omni - Rupter Switch and
					associated hardware

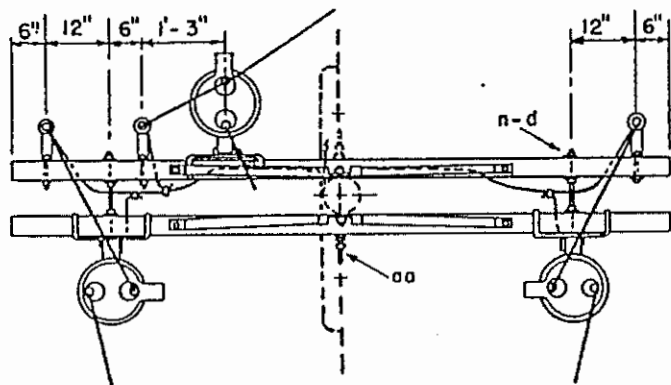
12.5 / 7.2 KV
LOADBREAK SWITCH

M3-15X

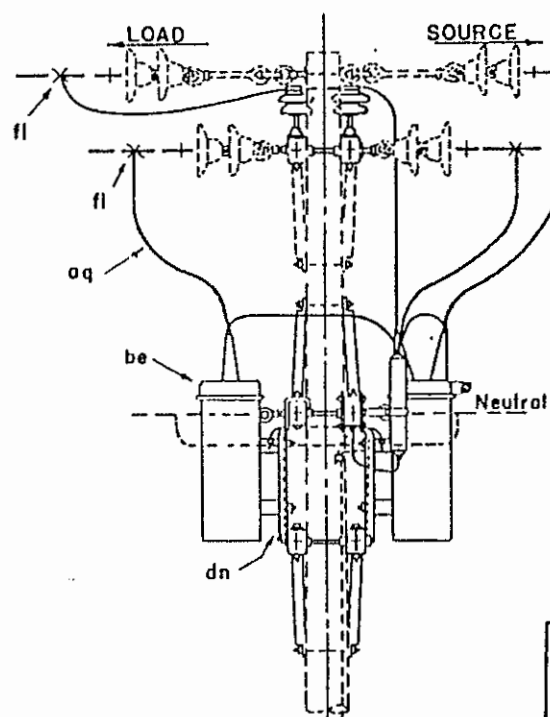
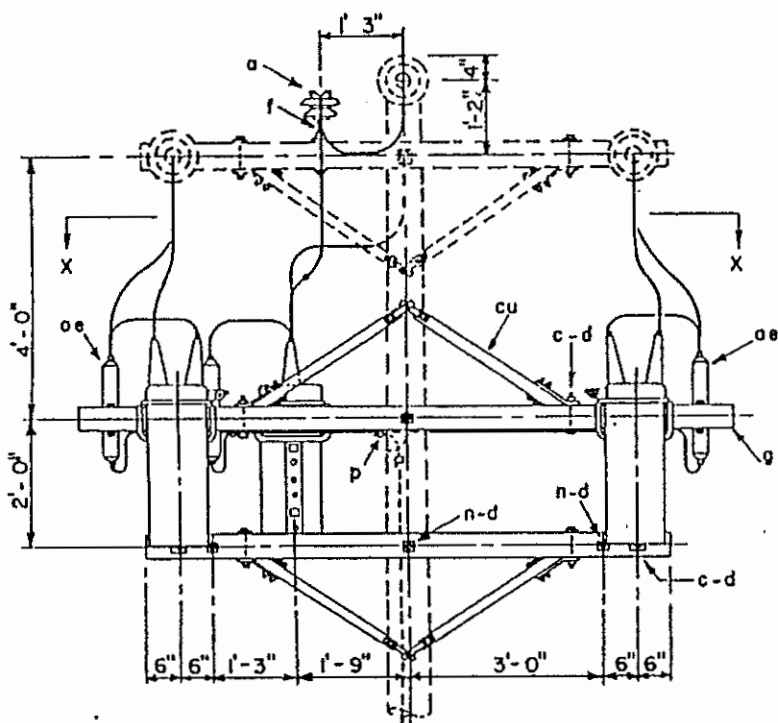
Oct 1999

GVA
GRAND VALLEY POWER

M3-15X



SECTION X-X



ITEM	NO	MATERIAL
a	2	Insulator, pin type
c	3	Bolt, machine, 5/8" x req'd length
c	8	Bolt, machine, 1/2" x req'd length
d	23	Washer, square 2 1/4"
d	8	Washer, 1 3/8" diam., 9/16" hole
f	2	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"
n	8	Bolt, double arming, 5/8" x req'd length
p		Connectors, as required
aa	1	Nut, eye, 5/8"
fl	6	Connector, hot line, tap assembly
aq		Jumpers or leads as required
ae	3	Lightning arrester
be	3	Recloser, oil circuit
cu	4	Brace, wood, 60" span
dn	3	Hanger, T-Crossarm, as required

*

* Specify this item to be furnished by the manufacturer.

Notes:

- 1 The recloser terminal bushing connected directly to the coil should be connected to the source.
- 2 The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.
- 3 For V-Phase installations omit recloser and related items on center phase. Designate as assembly VM 3-19.
- 4 Each recloser tank shall have two connections to ground.
- 5 Where suitable hanger is not furnished with the recloser a standard transformer hanger may be used as indicated.

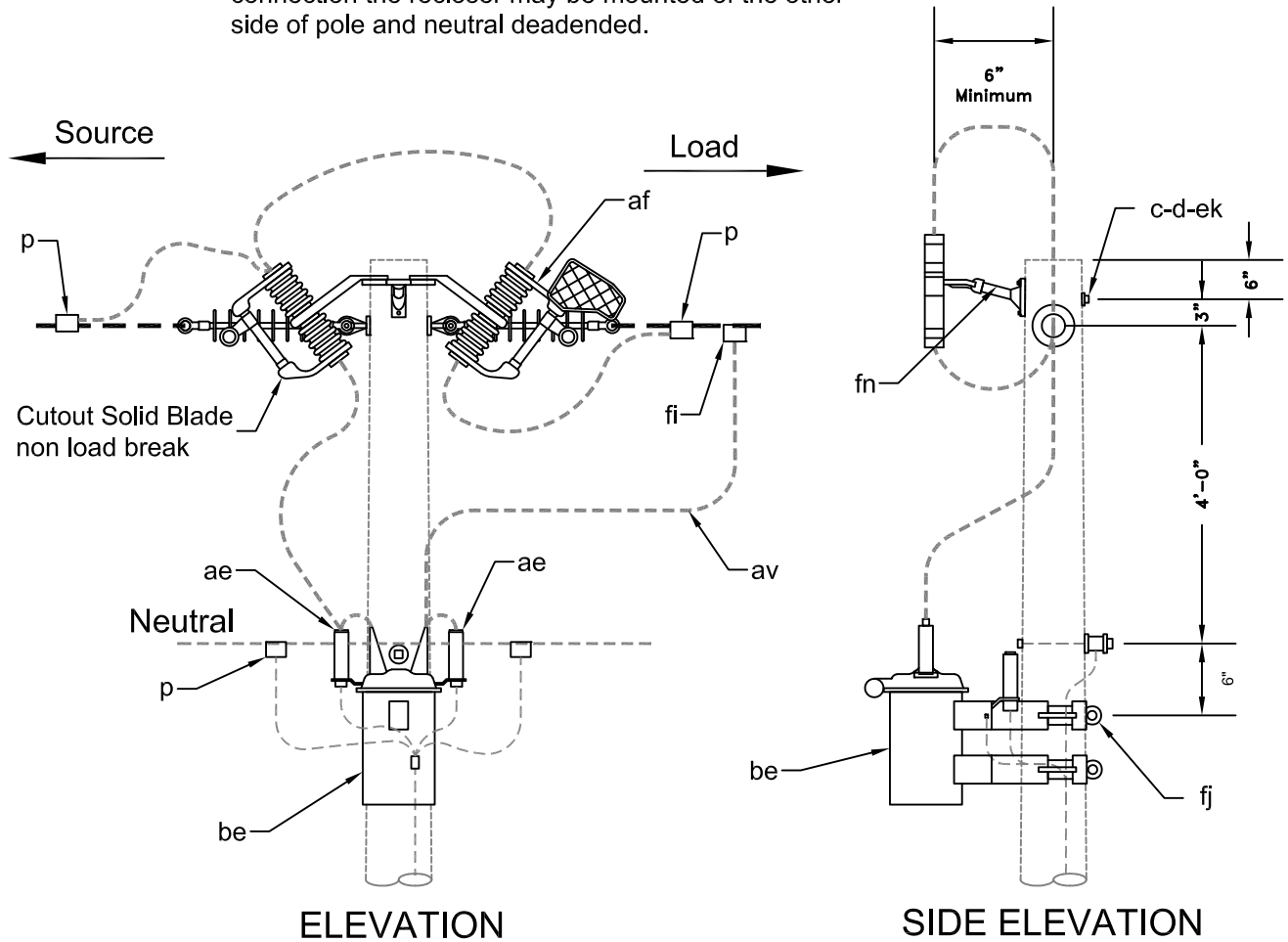
14.4/24.9KV. TWO OR THREE SECTIONALIZING
OIL CIRCUIT RECLOSERS

Jan. 1, 1963

VM 3-19, VM 3-20

NOTE:

The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted of the other side of pole and neutral deadended.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	2	Surge arrester
d	2	Washer, 2 1/4" square, 13/16" hole	af	1	Cutout, fused, load break
p	-	Connectors, as required	af	1	Cutout, solid blade non load break
fj	2	Bracket, extension, RSM-1	be	1	Recloser, oil circuit
fi	2	Connector, hot line	fn	1	Bracket, extension, cloverleaf
av	-	Jumpers, stranded, as required	ek	-	Locknuts, as required

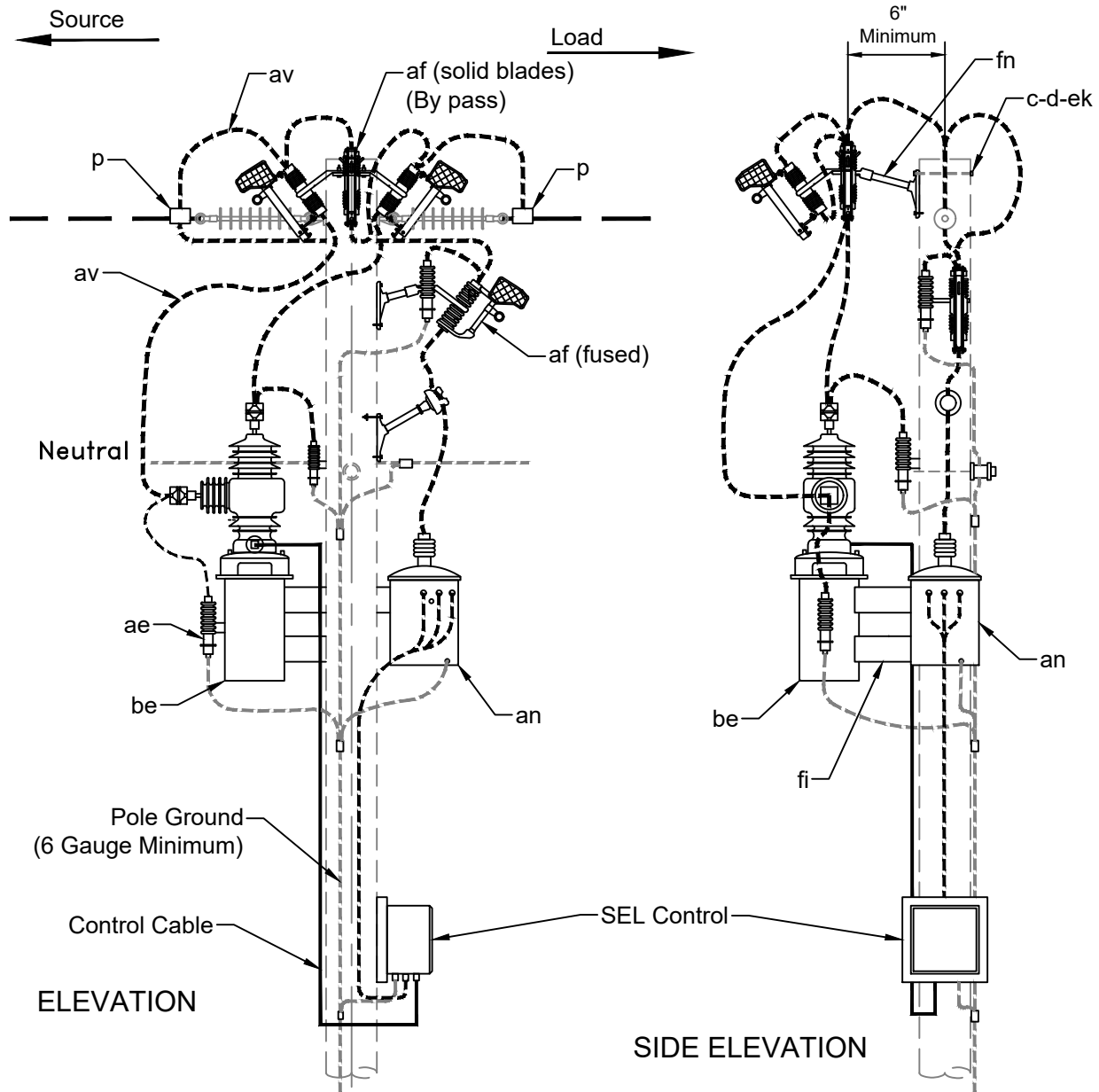
**SINGLE PHASE
OIL CIRCUIT RECLOSER
WITH BYPASS CUTOUT**

Revision Date

March 22, 2023



**M3-23B
VM3-23B**



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	2	Surge arrester
d	2	Washer, 2 1/4 " square, 13/16" hole	an	1	Transformer, 1 KVA
d	2	Washer, 3" square, curved	be	1	Recloser, oil circuit, Viper
fj	2	Bracket, extension, RSM-1	fn	2	Bracket, extension, cloverleaf
fi	2	Connector, hot line	p	-	Connectors, as required
af	1	Cutout, fused, load break	av	-	Jumpers, stranded, as required
af	3	Cutout, load break, solid blades	ek	-	Locknuts, as required
	3	Sticks 3 1/2" U Guard			

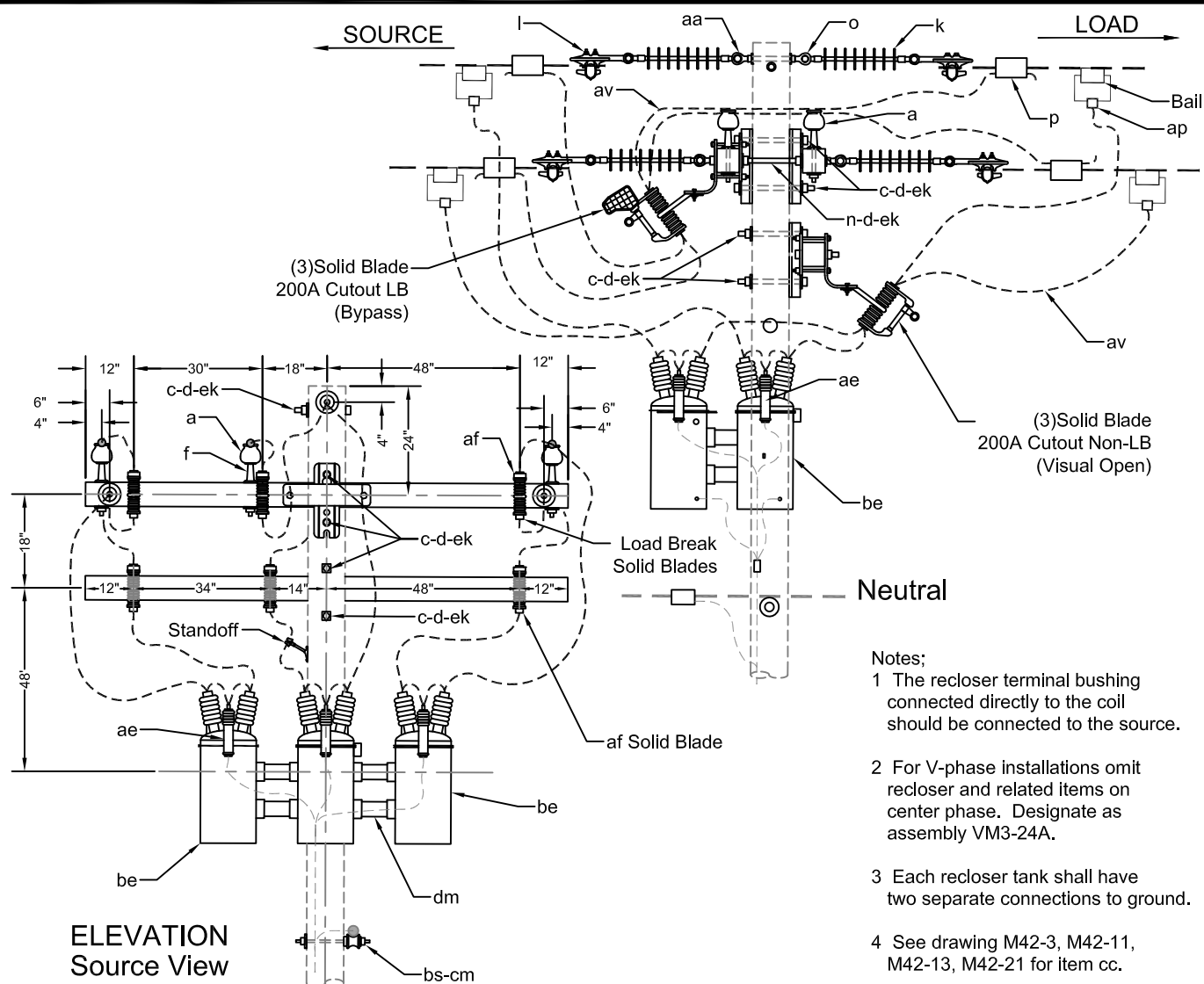
SINGLE PHASE CIRCUIT RECLOSER WITH BYPASS CUTOUT

Revision Date

Jan. 31, 2023



M3-23E
VM3-23E



- Notes;
- 1 The recloser terminal bushing connected directly to the coil should be connected to the source.
 - 2 For V-phase installations omit recloser and related items on center phase. Designate as assembly VM3-24A.
 - 3 Each recloser tank shall have two separate connections to ground.
 - 4 See drawing M42-3, M42-11, M42-13, M42-21 for item cc.

ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
a	7	Insulators, Pin type	o	1	Bolt, eye, 5/8" x required length
f	6	Pin, crossarm	aa	5	Nut, eye 5/8"
c	9	Bolt, machine 5/8" x required length	ae	6	Surge arrester
d	9	Washer, 2 1/4" square x 3/16 hole	be	3	Recloser, oil circuit
d	8	Washer, 3" square, curved	bs	1	Bolt, single upset
g	3	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 10'-0"	cm	1	Spool Insulator
k	6	Insulator, suspension	dm	2	Bracket, cluster type
l	6	Clamp, deadend	av	-	Jumpers, stranded, as required
n	2	Bolt, double arming, 5/8" x required length	ek		Locknuts, as required
p	-	Connector, hotline, tap assembly		6	Bail, hot line
af	3	Cutouts, 27 kV, Load Break, solid blades	ap	6	Clamp, Hot line
af	3	Cutouts, 15 kV, Non-load Break, solid blades		1	Standoff Bracket

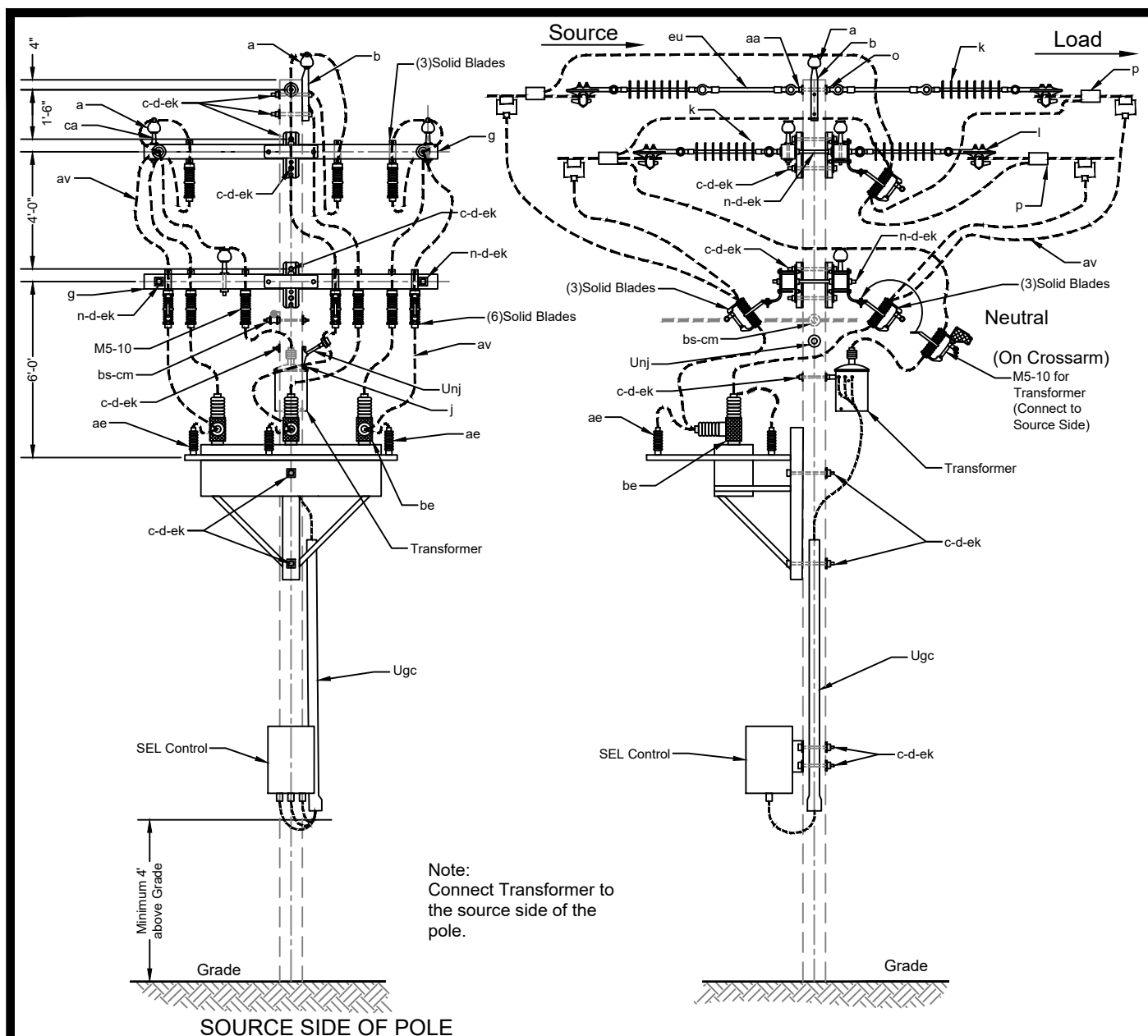
12.5 / 7.2 kV
HYDRAULIC OIL CIRCUIT RECLOSER BANK
WITH BY-PASS CUTOUTS

Revision Date

July 6, 2023



M3-24A
M3-25A



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
a	6	Insulator, Pin 7.2 kv	av	-	Jumpers, stranded, as required
b	1	Pin, pole top	be	1	Recloser, electronic with control
c	11	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	16	Washer, 2 1/4" square, 13/16" hole	cm	1	Spool insulator
d	9	Washer, 3" square, curved	ca	5	Pin, 5/8" x 10 3/4"
g	4	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 10'-0"	ek	--	Locknuts, as required
j	1	Lag, screw 1/2" x 4"	fi	6	Connector, hotline, tap assembly
k	6	Insulator, suspension	Ugc	20'	UG Guard, PV Mold, 3" Sch 80
l	6	Clamps, Deadend	Unj	1	Standoff Bracket (M5-27)
n	4	Bolt, double arming, 5/8" x required length		9	Cutouts - Solid Blade
o	1	Bolt, eye, 5/8" x required length		1	Transformer, (supplied with recloser)
p	-	Connector, as required		1	Combination Cutout / Arrester (M5-27)
aa	5	Nut, eye 5/8"			
ae	6	Surge Arrester			

M3-30

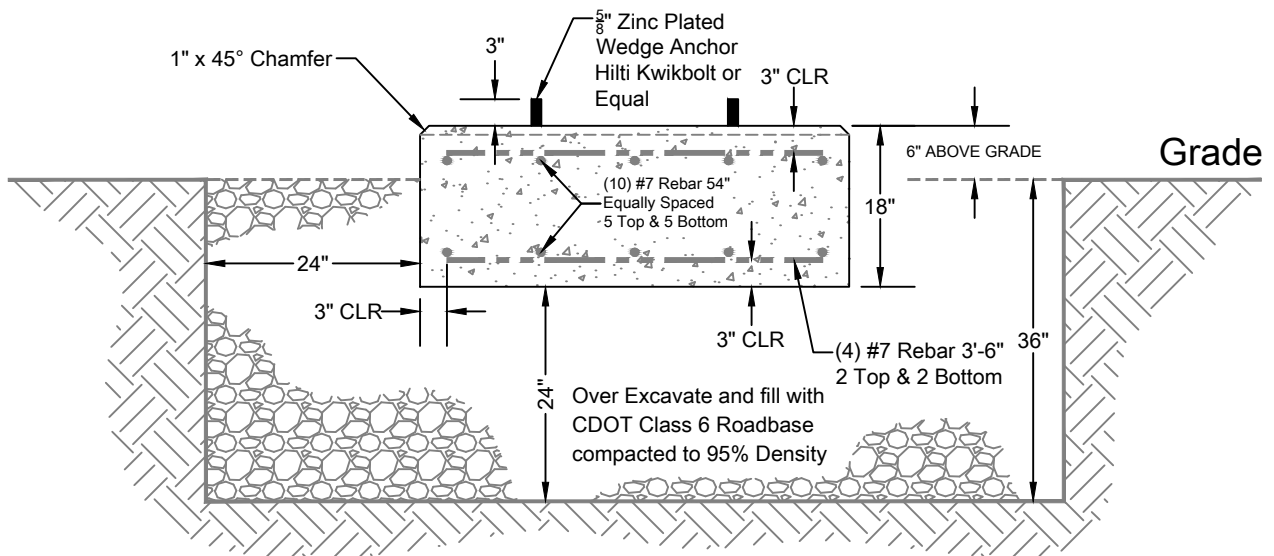
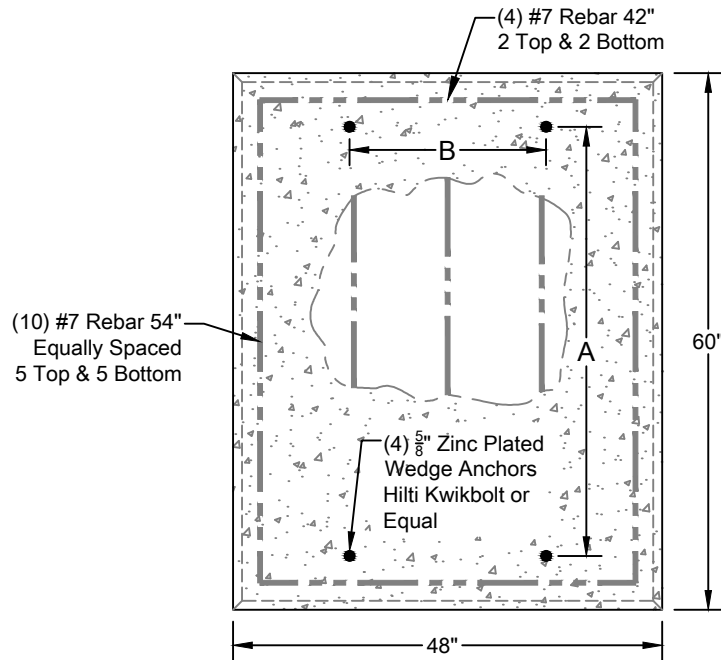
ELECTRONIC RECLOSER WITH CONTROL WITH BY-PASS SWITCH

Revision Date:

Feb. 1, 2023



M3-30
VM3-30



RECLOSER TYPE	DIM A	DIM B
VWE, VWVE, NOVA	48"	22"
VSA16	42.5"	22.5"

MATERIALS:

Concrete: Minimum 1.15 Cubic Yard

Class 6 Roadbase: Minimum 8 Cubic Yard

#7 Rebar - 54" (Qty 10)

#7 Rebar - 42" (Qty 4)

Notes:

Verify frame dimensions
before drilling

Use 4000 PSI Concrete

GRAND VALLEY POWER SUBSTATION RECLOSER FOUNDATION

Revision Date

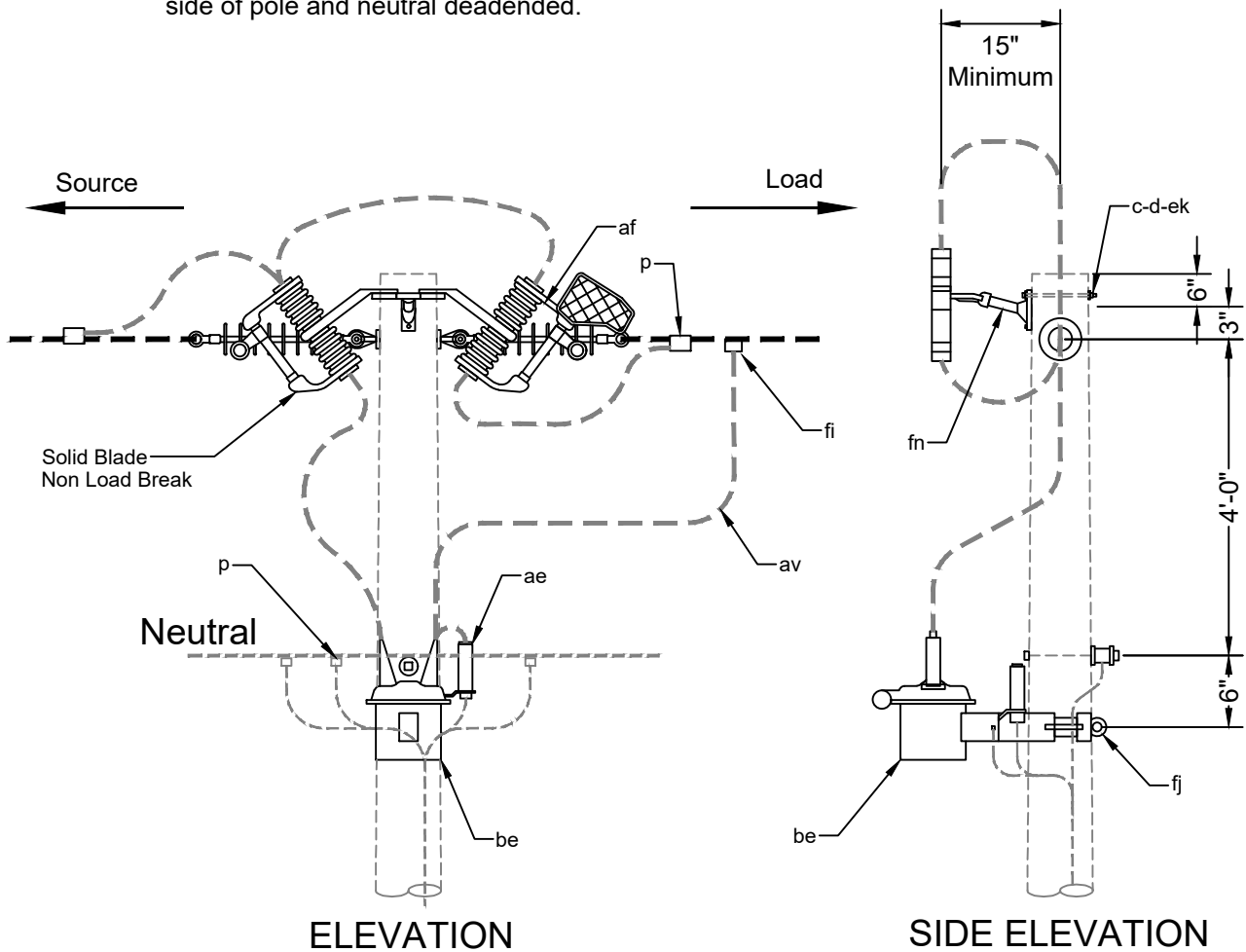
May 25, 2016



RECLOSER
FOUNDATION

NOTE:

The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted of the other side of pole and neutral deadended.



M3-41S

ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	1	Surge arrester
d	2	Washer, 2 1/4" square, 13/16" hole	af	1	Cutout, fused, load break
p	-	Connectors, as required	af	1	Cutout, Solid Blade non load break
fj	1	Bracket, extension, RSM-1	be	1	Sectionalizer, oil
fi	2	Connector, hot line	fn	1	Bracket, extension, cloverleaf
av	-	Jumpers, stranded, as required	ek	-	Locknuts, as required

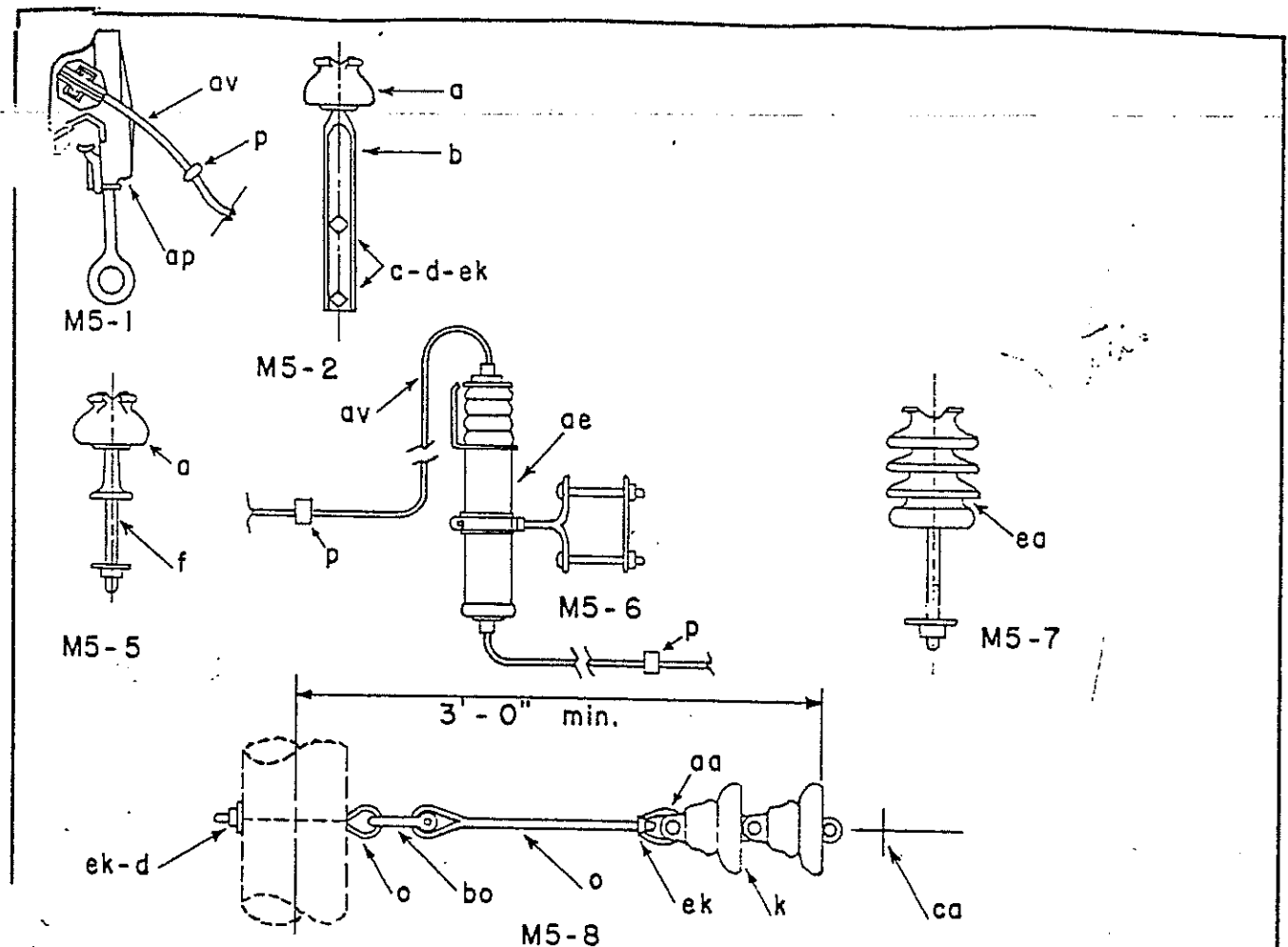
**12.5 / 7.2 KV
OIL SECTIONALIZER
WITH BYPASS CUTOUT**

Revision Date

Jan. 23, 2023



M3-41S



ITEM	MATERIAL	M5-1	M5-2			M5-5	M5-6	M5-7	M5-8
a	Insulator, pin type		1			1			
b	Pin, pole top, 20"		1						
c	Bolt, machine, 5/8"x req'd. length		2						
d	Washer, square, 2 1/4"		2					1	1
f	Pin, crossarm, steel, 5/8"x 10 3/4"					1			
k	Insulator, suspension								2
o	Bolt, eye, 5/8"x req'd. length								2
p	Connector	1					2		
aa	Nut, eye, 5/8"							1	1
ae	Lightning arrester						1		
ap	Clamp, hot line	1							
av	Jumper	1							
bo	Shackle, anchor								1
ea	Insulator, post type, 7" stud							1	
ek	Locknuts, as required								

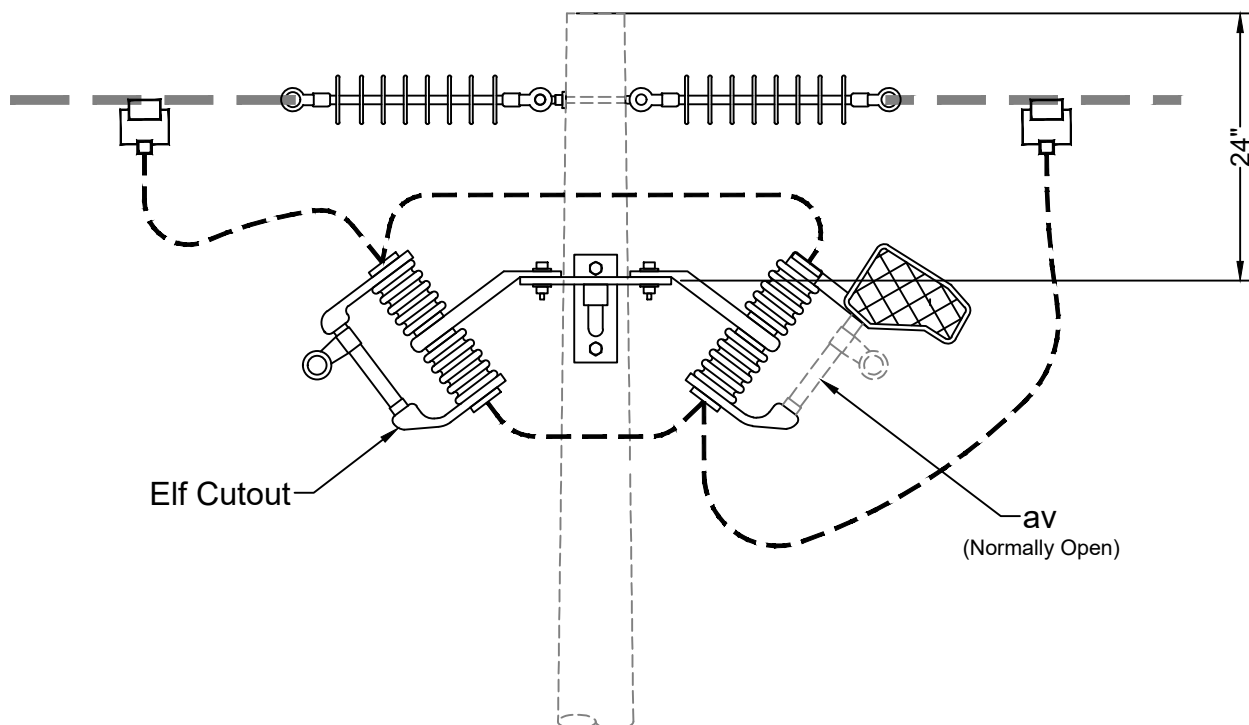
12.5/7.2 kV
MISCELLANEOUS PRIMARY ASSEMBLIES

Apr., 1983

M5-1 TO 8

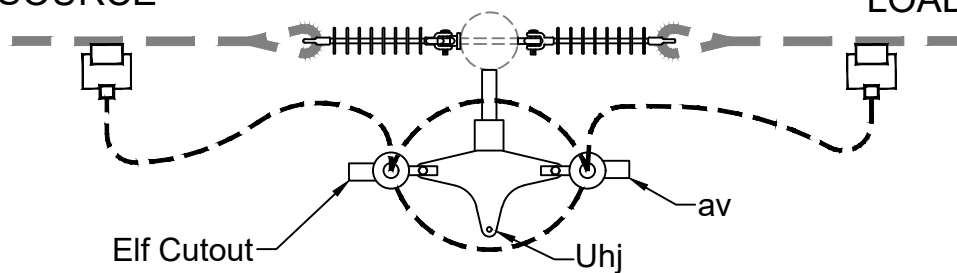
SOURCE

LOAD



SOURCE

LOAD



PLAN VIEW

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
av	1	Cutout, Type C, 25KV	Uhj	1	Cloverleaf extension
	1	Elf Fuse, (select size)			
	1	Cutout wildlife cover			

CURRENT LIMITING fuse

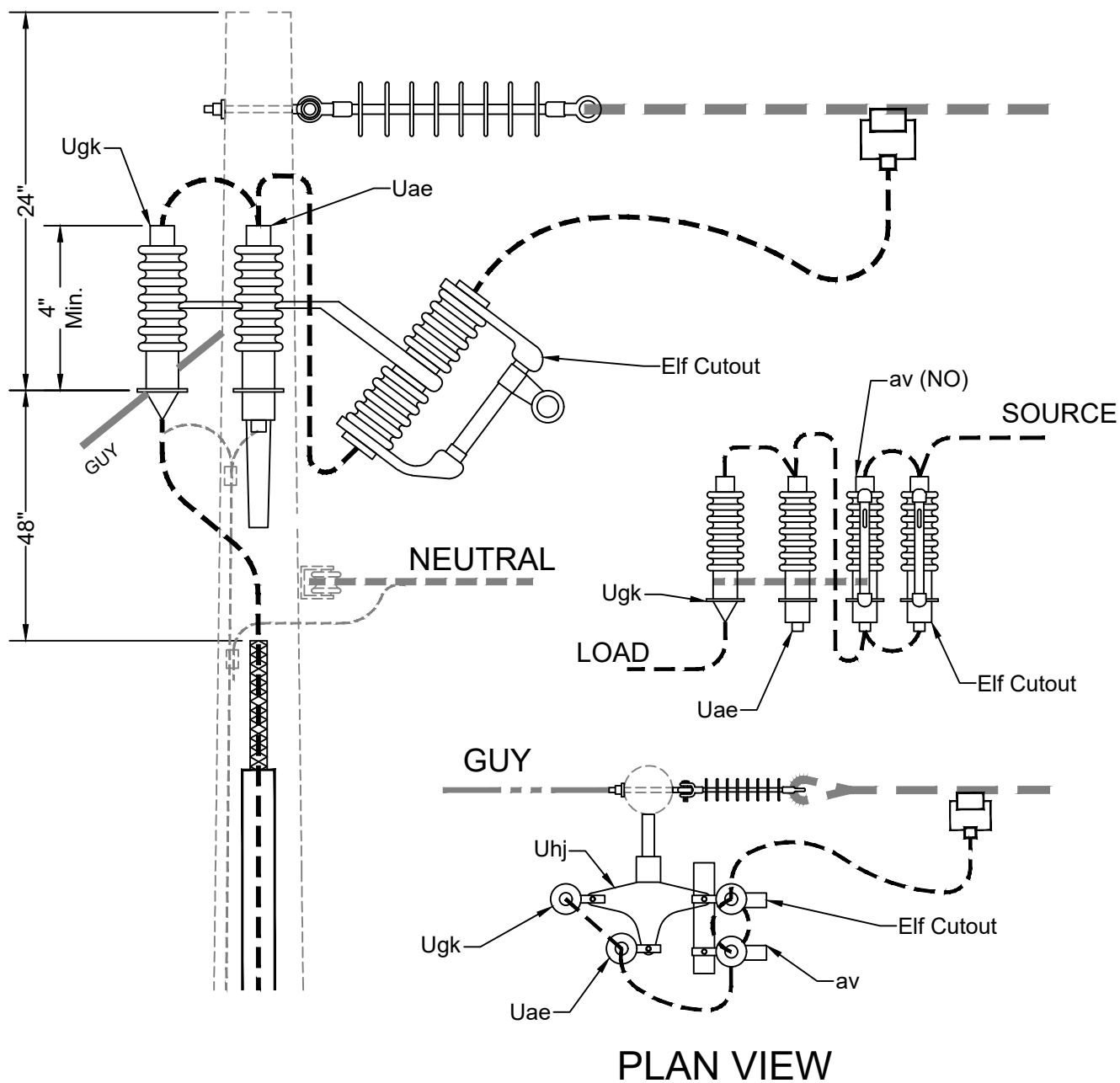
ELF FUSE AND CUTOUT - OH TAP APPLICATION

Revision Date

Feb. 1, 2023



M5-9F



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
av	1	Cutout, Type C, 25KV	Uae	1	Arrester, riser pole (MOV)
	1	Elf Fuse, (select size)	UGK	1	Cable termination
	1	Cutout wildlife cover	Uhj	1	Cloverleaf extension

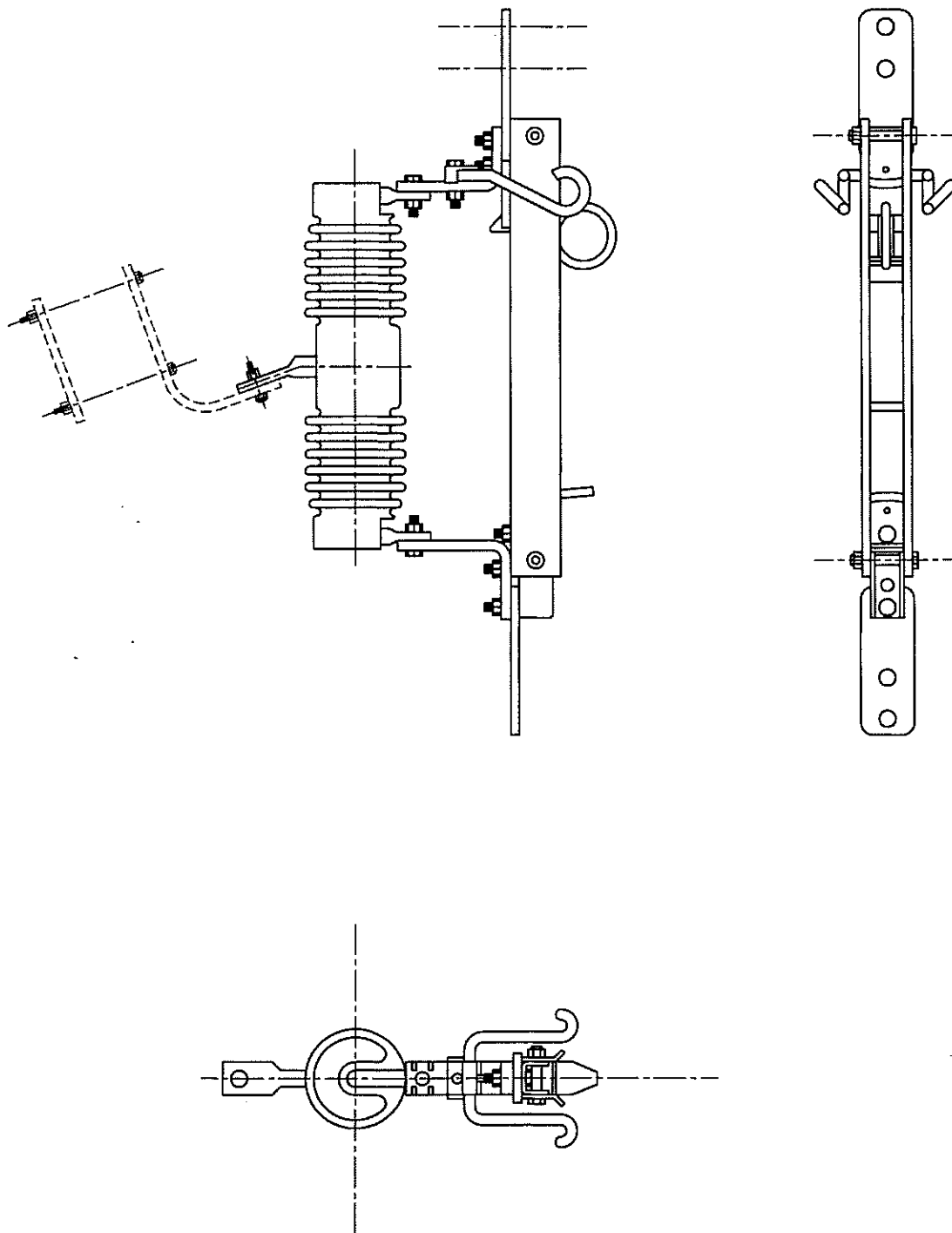
CURRENT LIMITING FUSE ELF FUSE AND CUTOUT - RISER APPLICATION

Revision Date

Feb. 2, 2023



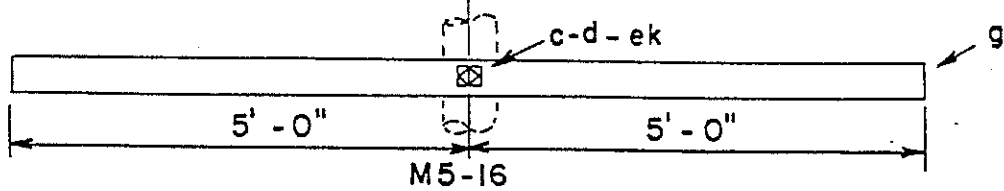
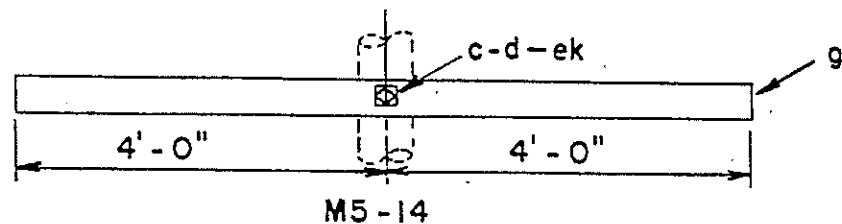
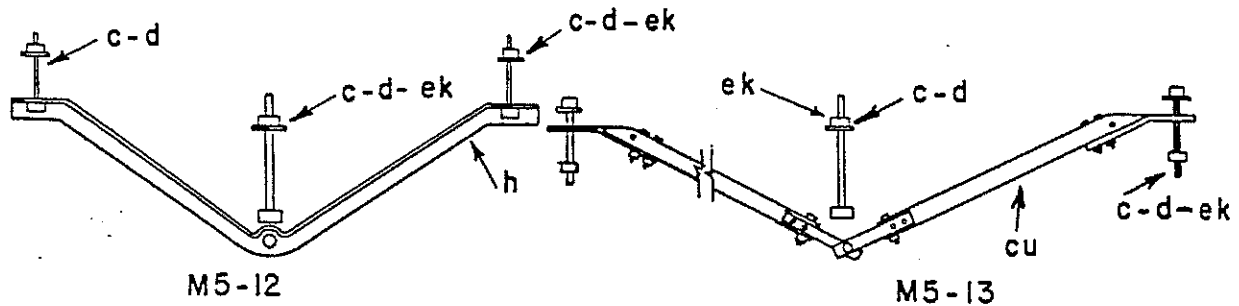
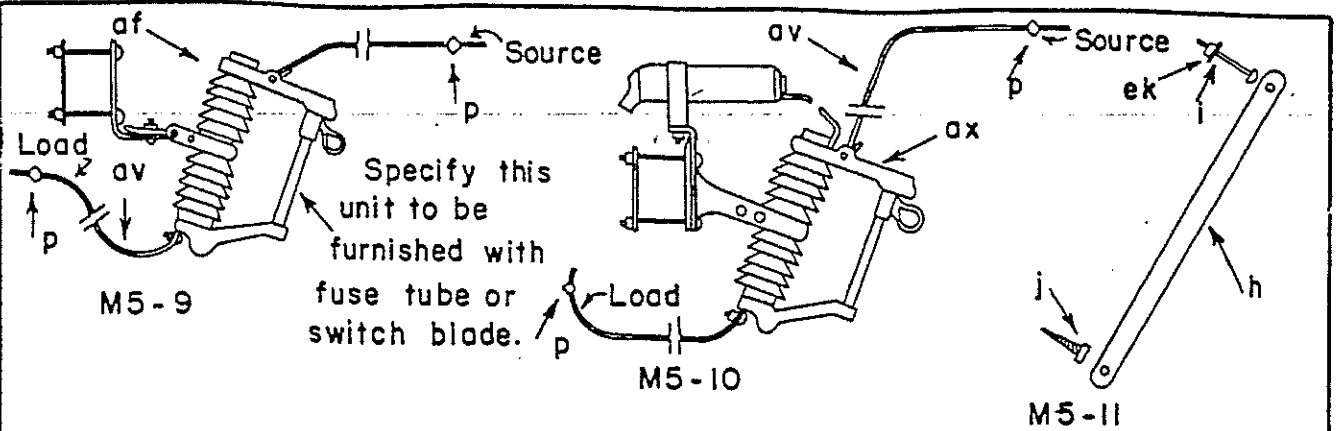
M5-9F



TYPE SID
DISCONNECT SWITCH



M5-9S

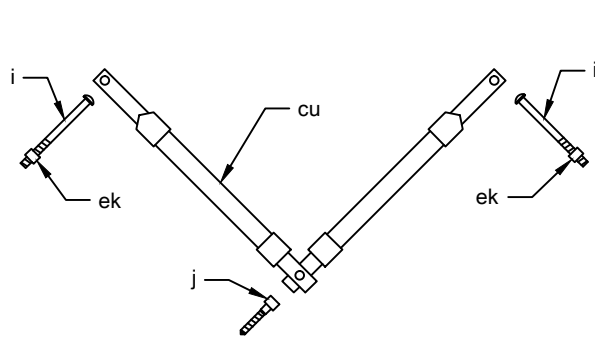


ITEM	MATERIAL	NUMBER REQUIRED							
		M5-9	M5-10	M5-11	M5-12	M5-13	M5-14		M5-16
c	Bolt, machine, 5/8" x req'd length				1	1	1		
c	Bolt, machine, 1/2" x req'd length				2	2			
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole				1	1	2		2
d	Washer, round, 1 3/8" dia., 9/16" hole				2	2			
g	Crossarm, 3 5/8" x 4 5/8" x 8'-0"						1		
g	Crossarm, 3 5/8" x 4 5/8" x 10'-0"								1
h	Brace, flat, 1 1/4" x 1/4" x 28"			1					
h	Brace, angle, 1 1/2" x 1 1/2" x 3/16", 60" span				1				
i	Bolt, carriage, 3/8" x 4 1/2"			1					
i	Screw, lag, 1/2" x 4"			1					
p	Connector	2	2						
af	Cutout, single-shot	1							
av	Jumper	2	2						
ax	Cutout and arrester combination		1						
cu	Brace, wood, 60" span					1			
ek	Locknuts, as required								

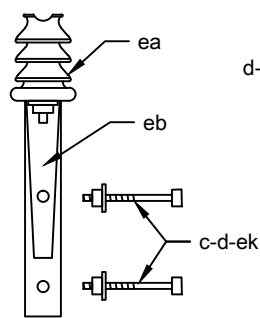
MISCELLANEOUS PRIMARY ASSEMBLIES

Apr, 1983

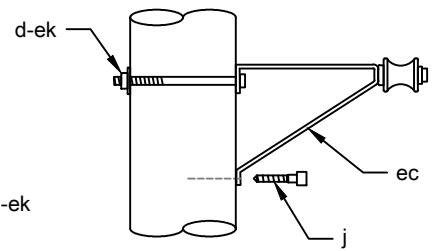
M5-9 TO 16



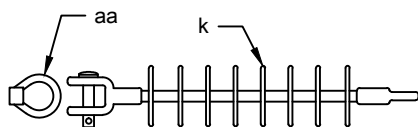
M5-17
(Come as a pair)



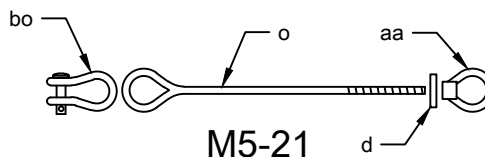
M5-18



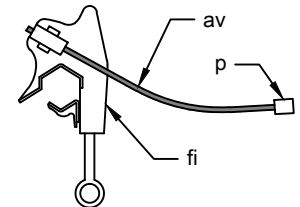
M5-19



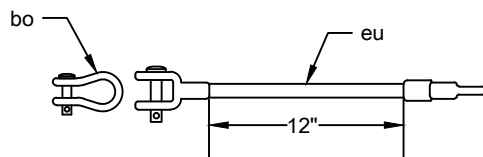
M5-20E



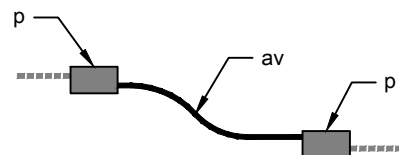
M5-21



M5-22



M5-23



M5-32

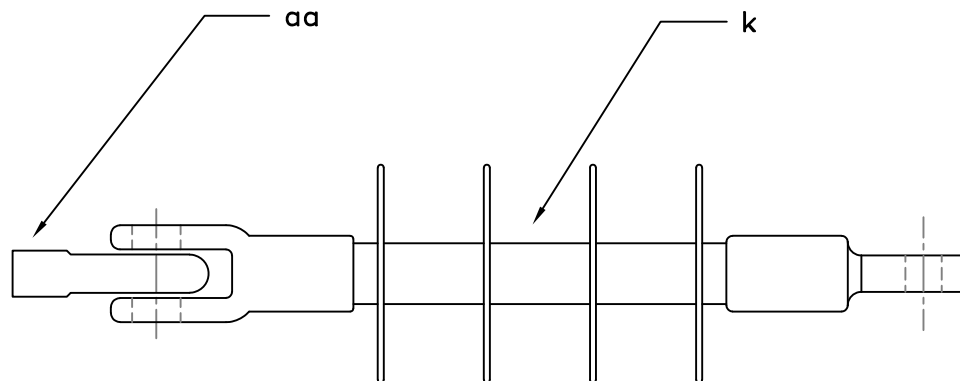
ITEM	MATERIAL	M5-17	M5-18	M5-19	M5-20E	M5-21	M5-22	M5-23	M5-32
c	Bolt, machine, 5/8"x required length		2						
d	Washer, Square 3"		2			1			
d	Washer, Square curved 3"			1					
i	Bolt, carriage 3"	2							
j	Screw, lag, 1/2" x 4 1/2"	1		1					
k	Insulator, suspension				1				
o	Bolt, eye, 5/8" x required length					1			
p	Connector, compression						1		2
aa	Eye nut				1	1			
av	Jumper						1		1
bo	Shackle, anchor					1		1	
cu	Brace, wood, 28"	2							
ea	Insulator, post type, 1 3/4" stud		1						
eb	Bracket, for post type insulator		1						
ec	Bracket, offset, neutral, insulated			1					
ek	Locknuts, as required								
eu	Link, extension, insulated							1	
fi	Connector, hot line						1		

MISCELLANEOUS PRIMARY ASSEMBLIES

Revision Date
December 5, 2019



M5-17 - 23
M5-32



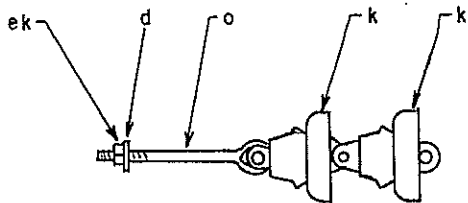
ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
k	1	Insulator, suspension			
aa	1	Eye nut			

**SUSPENSION INSULATOR
MISCELLANEOUS PRIMARY ASSEMBLY**

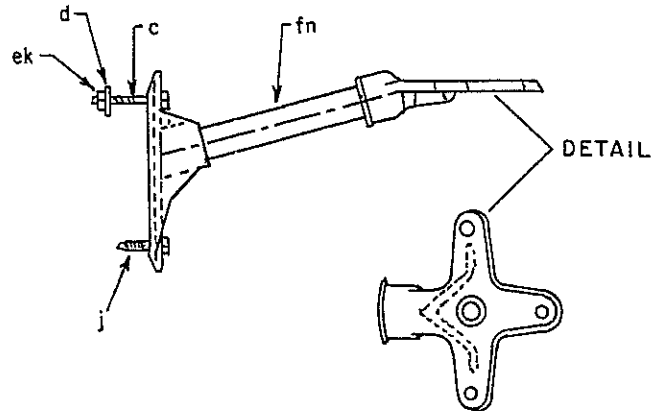
DATE
Oct 22, 1999



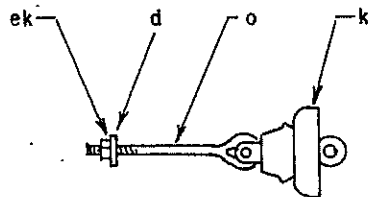
M5-20



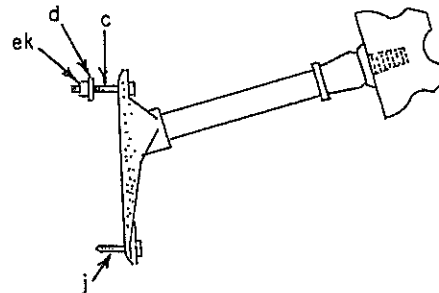
M5-24 (PRIMARY)



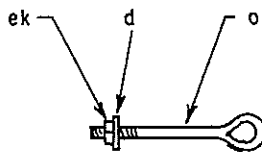
M5-29 (APPARATUS BRACKET)



M5-26
(NEUTRAL OR SECONDARY)



M5-27 (STANDOFF BRACKET)



M5-25 (NEUTRAL ONLY)

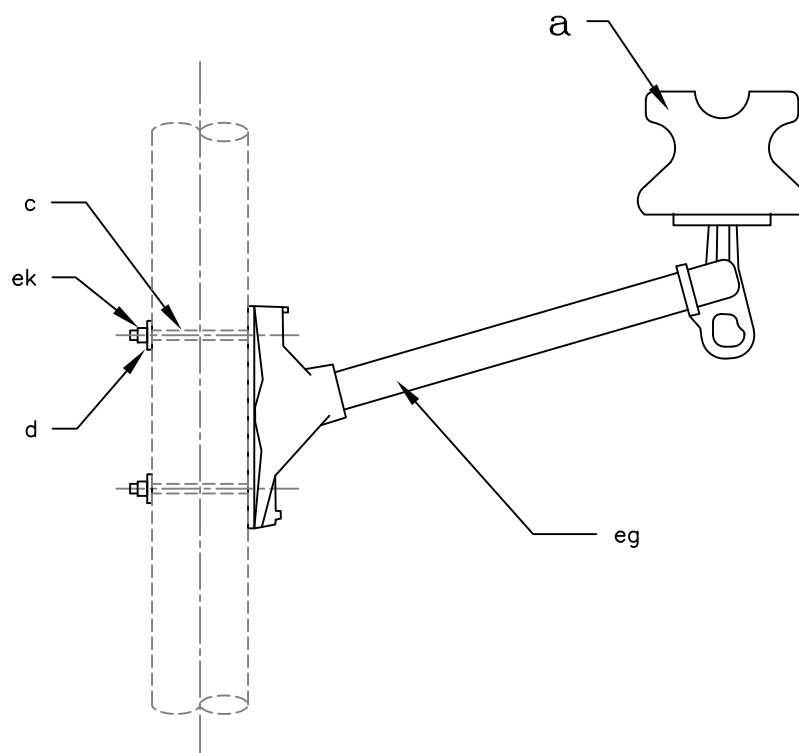
ITEM	MATERIAL	M5-24	M5-25	M5-26	M5-29	M5-27
a	Insulator, pin type					1
d	Washer, 2 1/4" square	1	1	1	1	1
k	Insulator, suspension	2		1		
o	Bolt, eye, 5/8" x req'd length	1	1	1		
ek	Locknuts as req'd.					
c	Bolt, machine, 5/8" x req'd. length				1	1
fn	Bracket, extension, clover leaf				1	
j	Screw, lag, 1/2" x 4"				1	1
—	Bracket, single standoff					1

12.5 / 7.2 KV
MISCELLANEOUS ASSEMBLIES

REVISED
MARCH 1993



M5-24 to M5-29

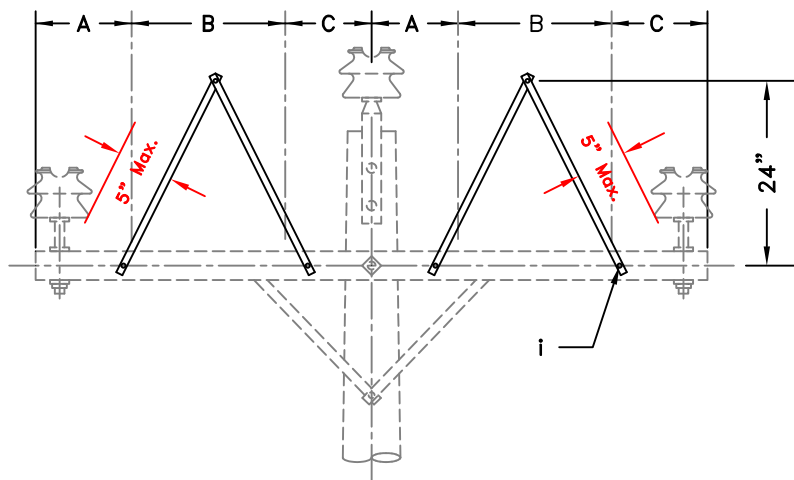


ITEM	NO	M A T E R I A L S	ITEM	NO	M A T E R I A L S
a	1	Insulator, pin type, 7200 volt			
d	2	Washer, 2 1/4" square			
c	2	Bolt, machine, 5/8" x required length			
eg	1	Bracket, standoff			
ek	—	Locknuts			

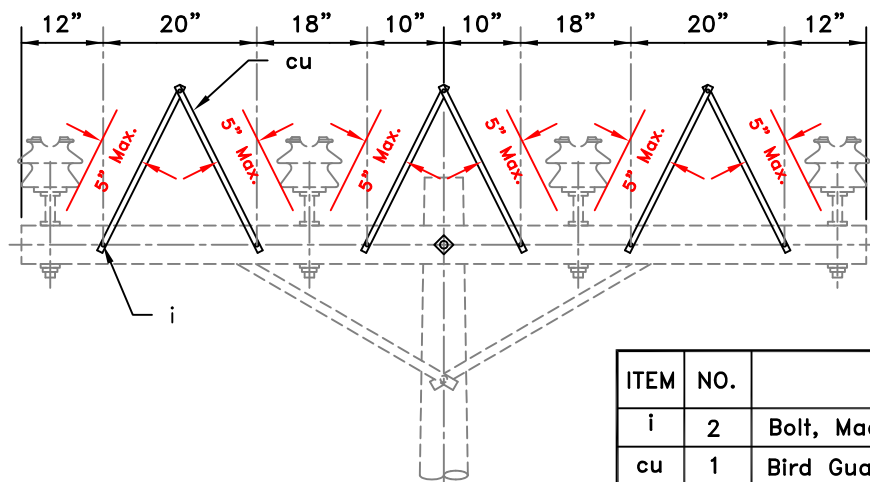
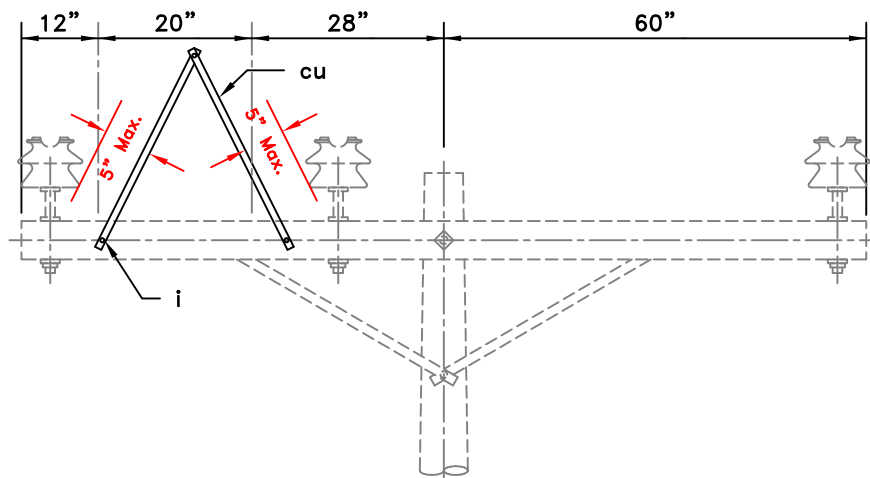
SINGLE PHASE STANDOFF BRACKET



M5-27A



	A	B	C
8' CROSSARM	14"	20"	14"
10' CROSSARM	20"	20"	20"



ITEM	NO.	M A T E R I A L
i	2	Bolt, Machine, 1/2" x 6"
cu	1	Bird Guard, fiberglass
d	2	Washer, round, 1 3/8" diameter, 9/16" hole

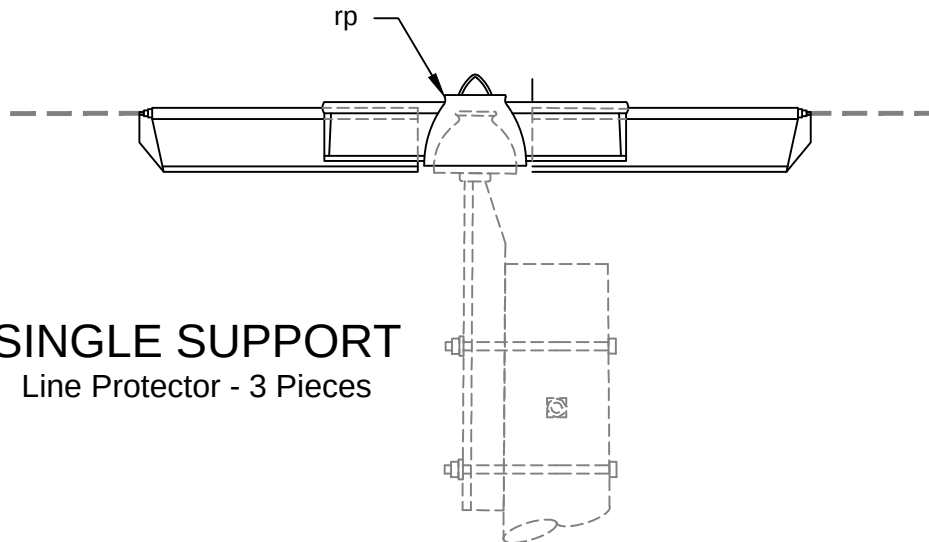
RAPTOR PROTECTION ASSEMBLY

DWG. BY: DSG

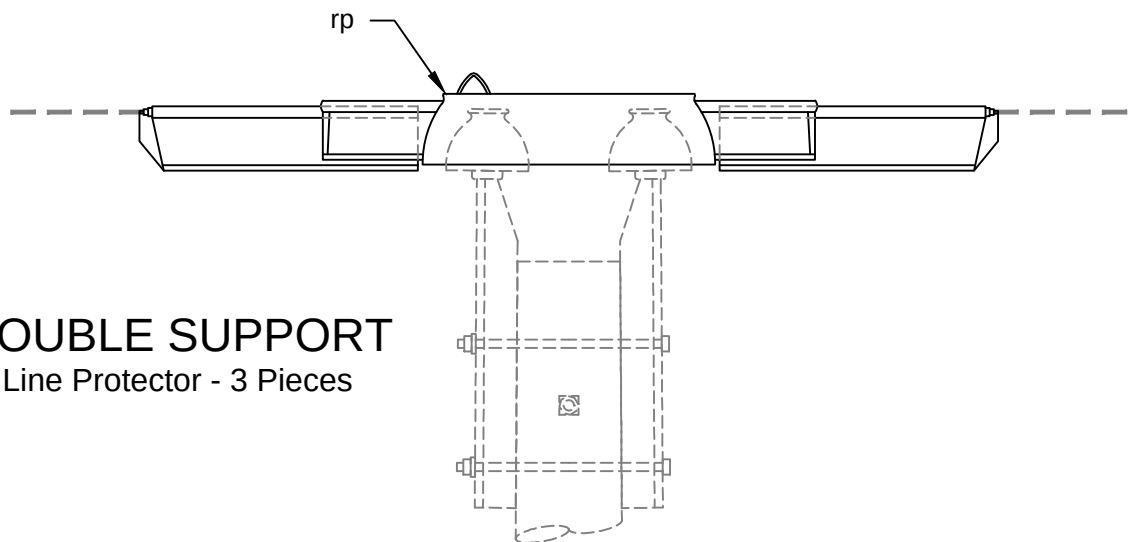
Feb 2007



M5-30



SINGLE SUPPORT
Line Protector - 3 Pieces



DOUBLE SUPPORT
Line Protector - 3 Pieces

	SINGLE SUPPORT	DOUBLE SUPPORT
12 KV Pin Insulator	KE1045AC	KE1131C
25 KV Pin Insulator	KE1045AF	KE1131F
POST Insulator	KE1045AC	KE1131C

Single Support - Overall Coverage Length of 72"

Double Support - Overall Coverage Length of 78"

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
rp	1	Line Protector - 3 piece			

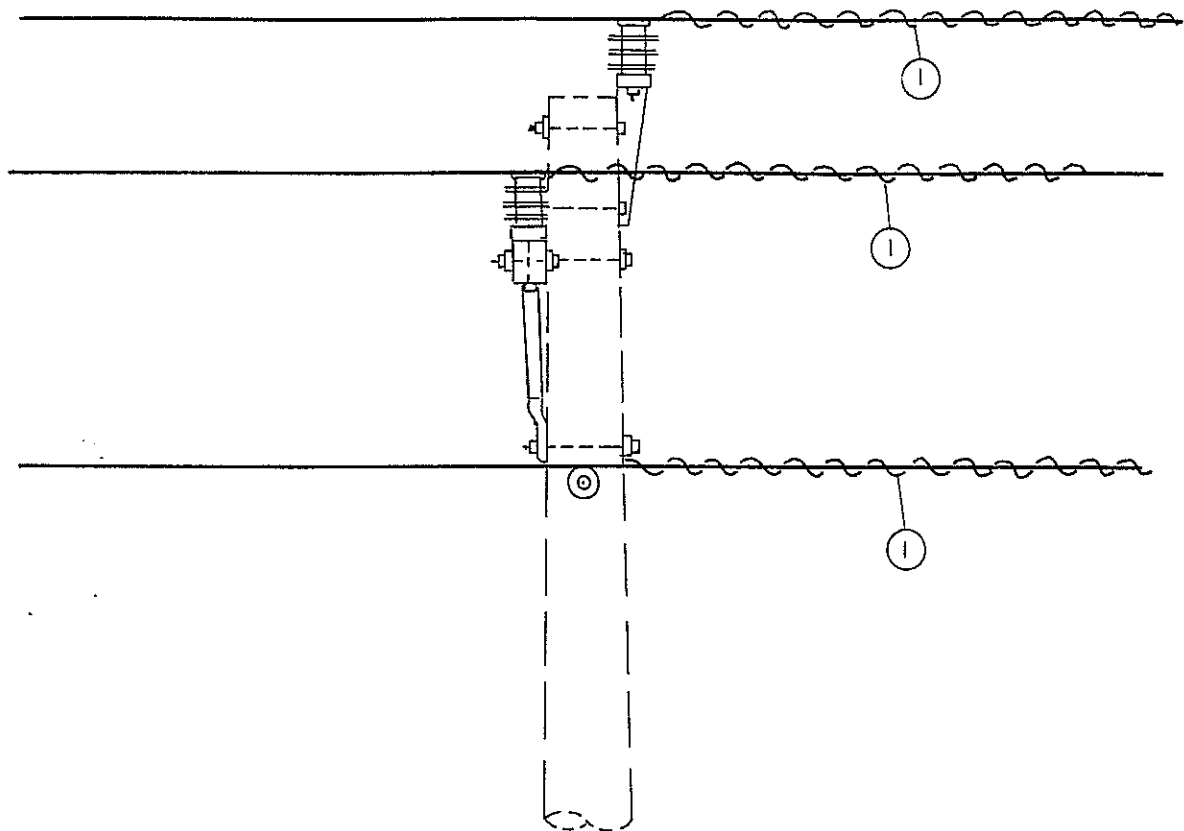
RAPTOR PROTECTION ASSEMBLY LINE PROTECTOR

Revision Date

Jan 5, 2016



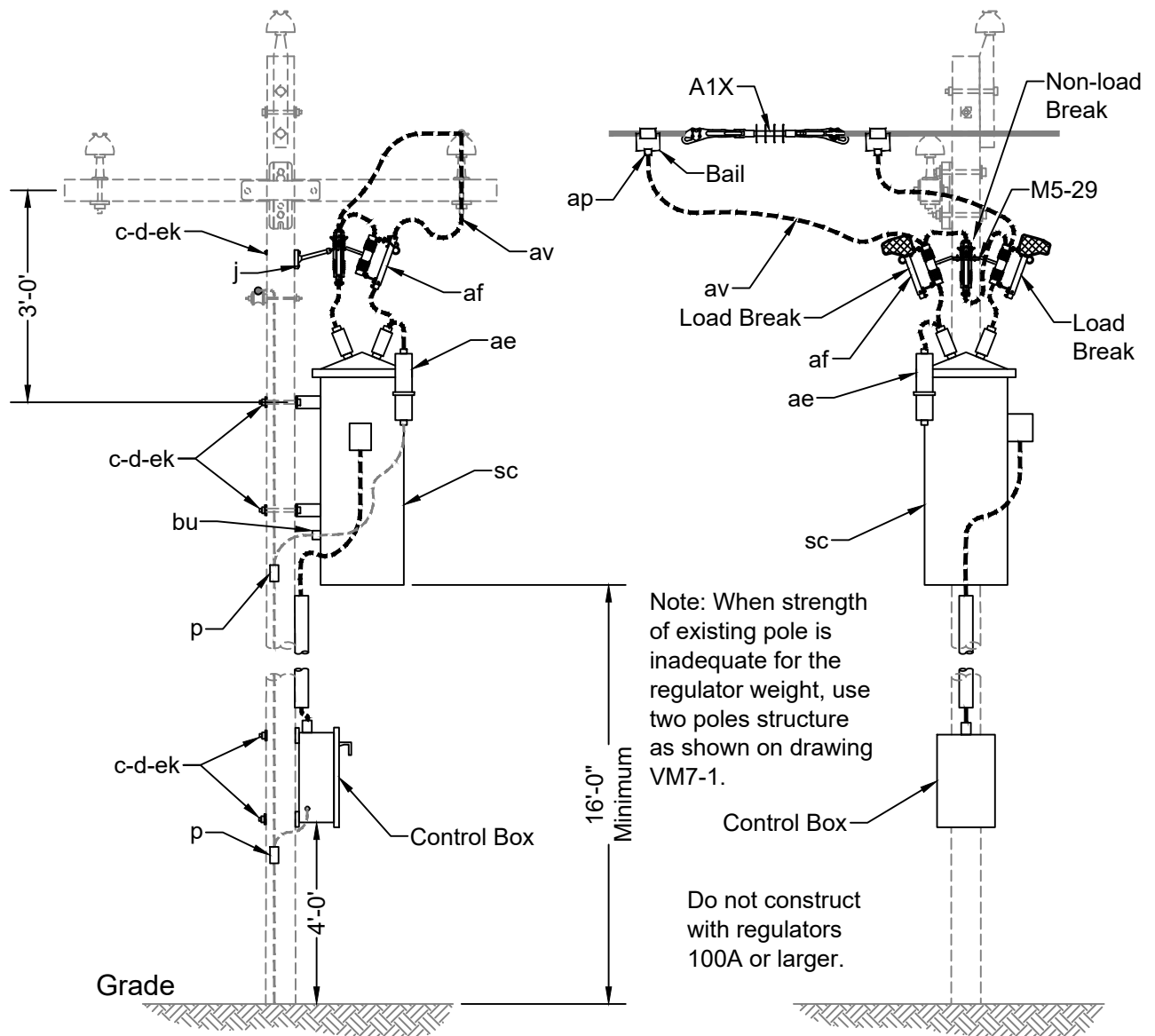
M5-30A



NOTE :

Damper to be installed approximately one hand width from point of support or end of armor rod.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
1	1	Spiral Vibration Damper			
			12.5 / 7.2 KV & 24.9 / 14.4 KV CONSTRUCTION SPIRAL VIBRATION DAMPER		
				 GRAND VALLEY POWER	M5-31
			1 / 8 / 93		



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	af	2	Cutout, Load Break, solid blades
d	5	Washer, 2 1/4" square, 13/16" hole	af	1	Cutout, Non-load Break, solid blades
d	5	Washer, 3" square, curved	ap	2	Clamp, hot line
j	1	Screw, lag, 1/2" x 4"	av	-	Jumpers, stranded, as required
p	-	Connectors as required	ek	-	Locknuts
bu	1	Connector, grounding	sc	1	Regulator, step type
ae	1	By-pass arrester		1	A1X
					M5-29
				2	Bail, hot line

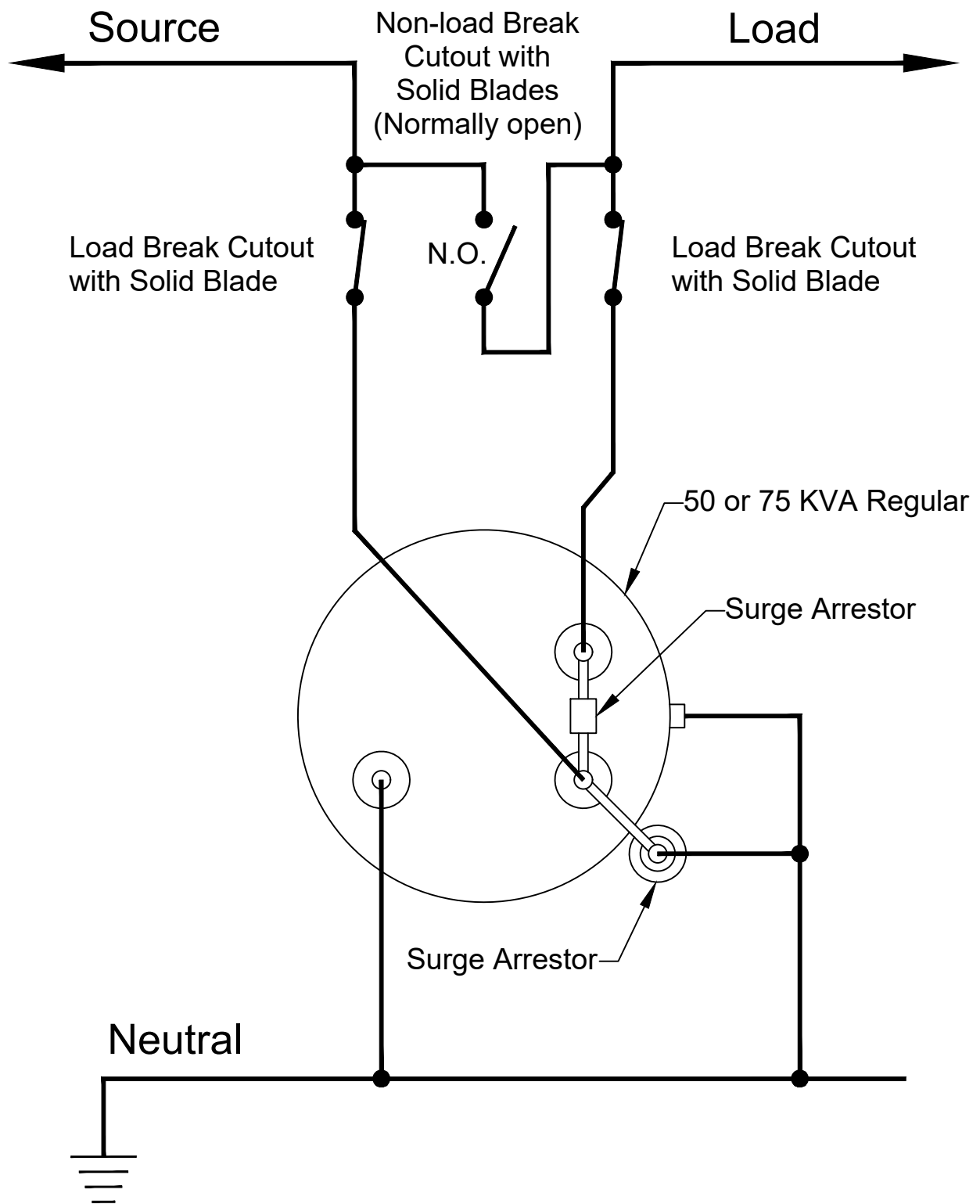
12.5 / 7.2 KV
ONE 50 or 75 KVA VOLTAGE REGULATOR
POLE MOUNTED

Revision Date:

Jan. 20, 2023



M7-11



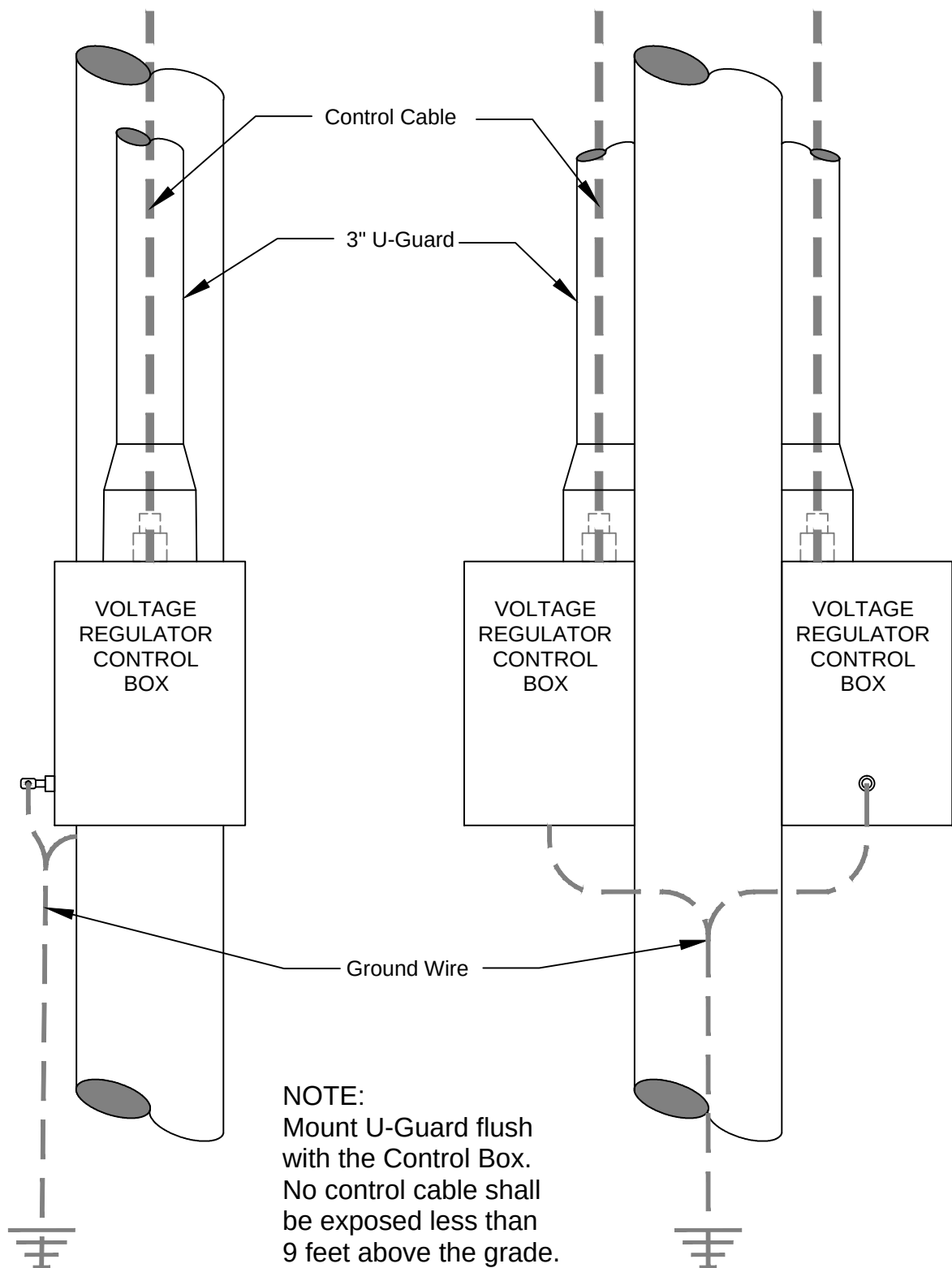
12.5 / 7.2 KV
50 or 75 KVA VOLTAGE REGULATOR
WIRING DIAGRAM

Revision Date

Jan. 20, 2023



M7-11
Wire Diagram



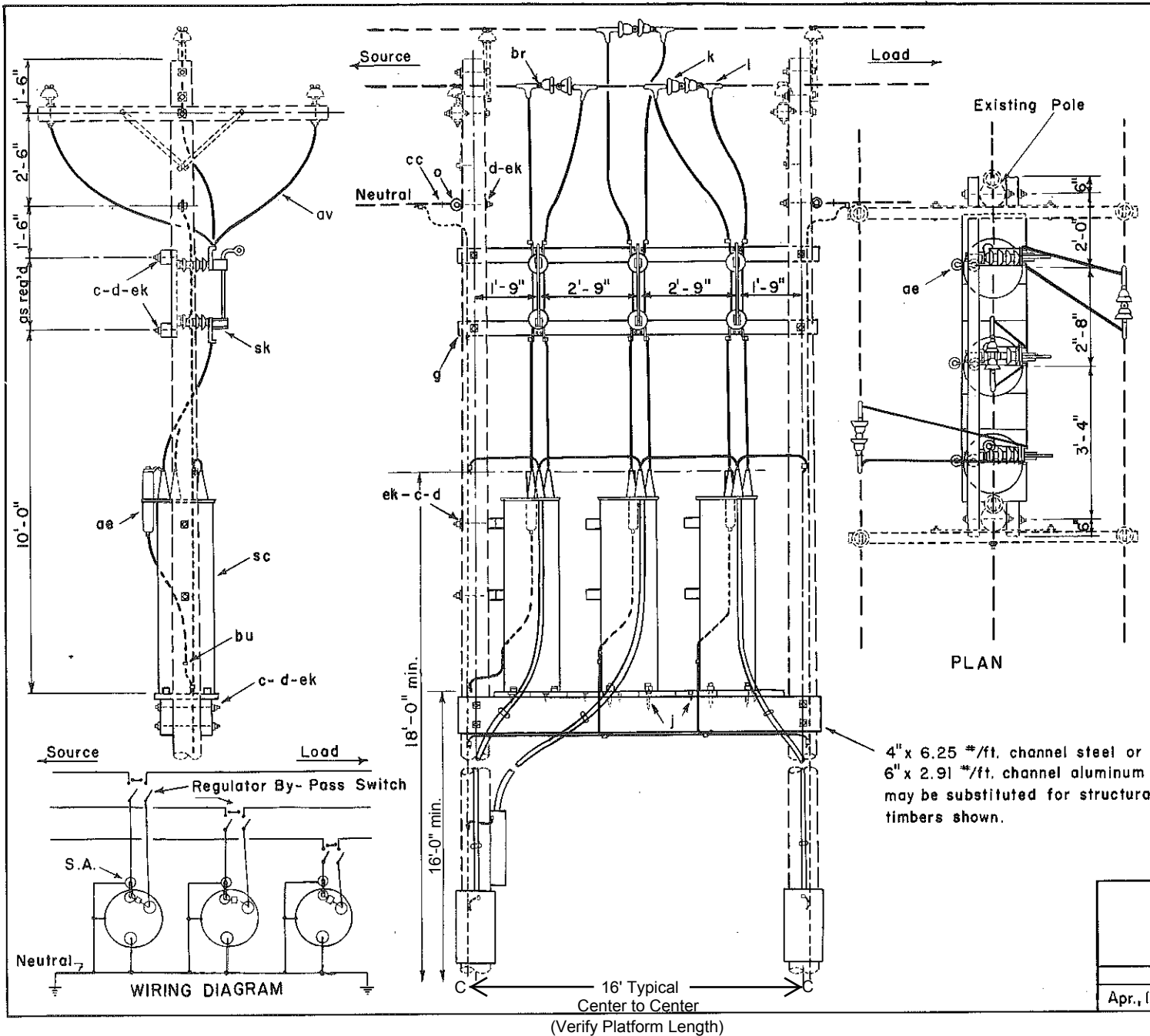
Control for:
M7-11
M7-13

VOLTAGE REGULATOR CONTROL GUIDE DRAWING

DATE

JAN 2015





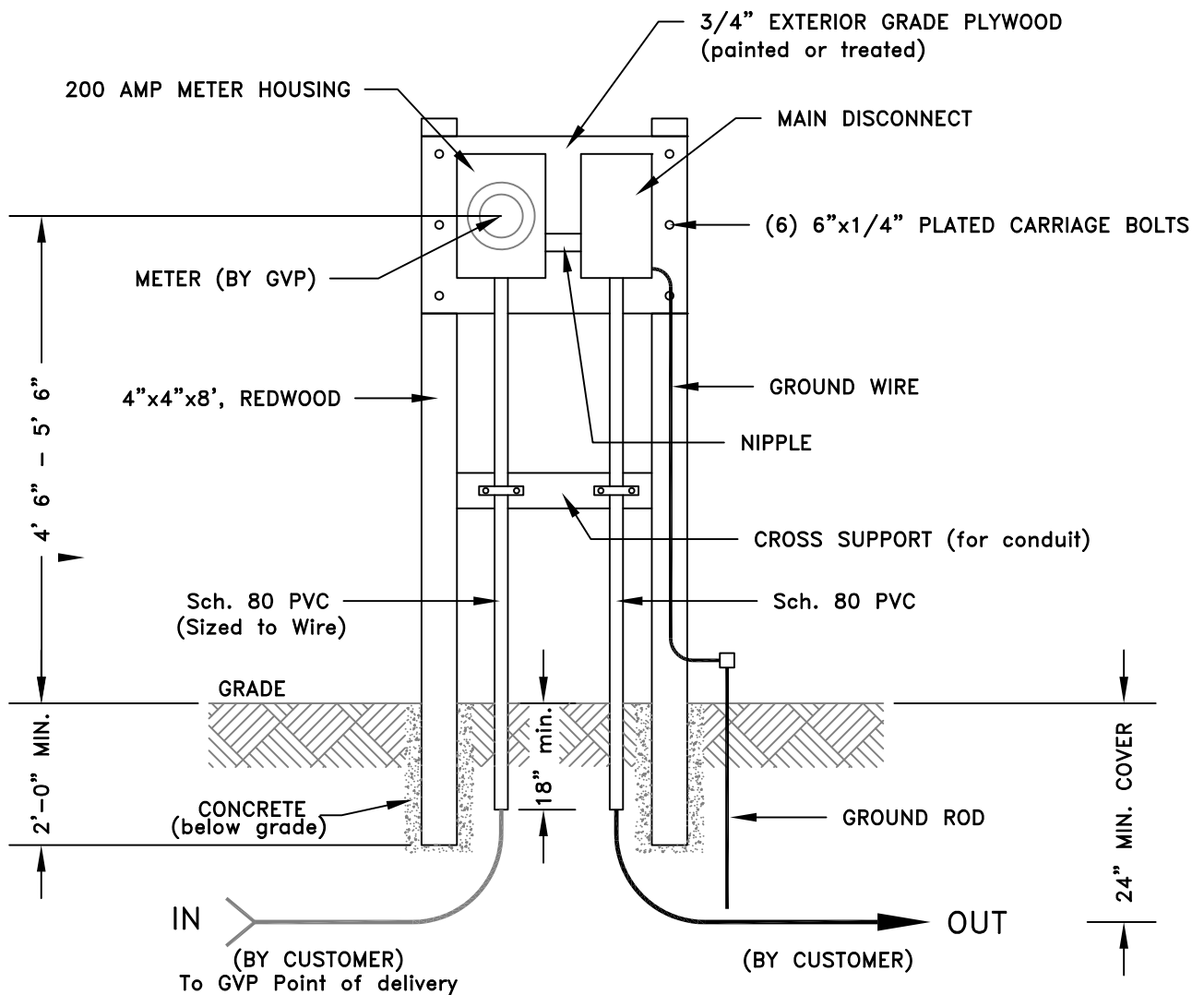
ITEM	No. REQ'D	MATERIAL
c	6	Bolt, machine, $\frac{5}{8}$ " x req'd. length
c	4	Bolt, machine, $\frac{3}{4}$ " x req'd. length
d	20	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", 13/16" hole
g	2	Crossarm, $3\frac{5}{8}$ " x $4\frac{5}{8}$ " x 10'-0"
j		Screw lag, $\frac{1}{2}$ " x 5", as req'd.
j	8	Screw lag, $\frac{5}{8}$ " x 6"
k	6	Insulator, suspension
l	6	Clamp, deadend
o	2	Bolt, eye, $\frac{5}{8}$ " x req'd. length
p		Connectors, as required
ae	3	Surge arrester
oe	3	By-pass arrester *
av		Jumpers, stranded, as required
br	3	Chain, link, $\frac{5}{8}$ " x $3\frac{1}{4}$ "
bu	3	Connector, solderless *
cc	2	Deadend assembly, neutral
sc	3	Regulator, step type
sk	3	Regulator by-pass switch
	2	Structural timber, 4" x 12" x 10'-0"
		Planks, 2" thick, length as req'd.
ek		Locknuts, as required
		Remote control kit with mounting hardware *
c	12	Bolt, machine, $\frac{1}{2}$ " x req'd. length

* Specify this item to be furnished by the regulator manufacturer.

Note: All structural timber and planks to be treated as per REA Specification DT-5B.

See drawings M42-3, M42-11, M42-13, M42-21 for item cc.

16' Typical
Center to Center
(Verify Platform Length)



1. Meter pedestal may also be constructed with pressure treated timbers; or may be constructed totally from "unistrut" galvanized steel channel.
2. Operable fault interruption disconnecting means mounted below meter socket; main circuit breaker, or fused disconnecting switch is required.
3. Grand Valley Power will furnish meter; customer is responsible for mounting meter socket, disconnecting means, conduits, grounds, and all other materials, and for Mesa County Electrical Inspection.
4. The center of the meter cover shall be 4' 6" to 5' 6" above the finished grade.
5. Bury underground wire with a minimum cover of 24".
6. Mesa County Electrical Inspection sticker must be present before service can be energized.
7. Grand Valley Power reserves the rights to request necessary modifications or reject the installation as suitable for service as necessary.

CUSTOMER'S METER PEDESTAL STANDARDS

DATE: 2/5/10

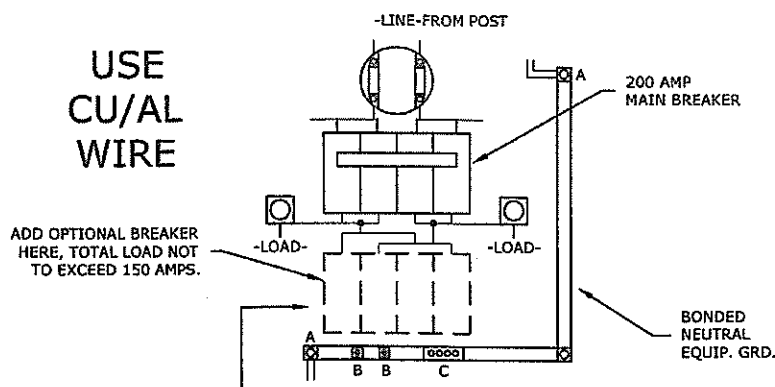


CONS-MP-1

GRAND VALLEY POWER METER PEDESTAL

TYPICAL WIRING DIAGRAM

USE
CU/AL
WIRE



SPACE FOR (4) SINGLE POLE, (2) DOUBLE POLE, OR (1) DOUBLE POLE AND (2) SINGLE POLE G.E. TYPE THHQL/THQL, ITE/SIEMENS TYPE Q, SQUARE D HOMELINE, OR CUTLER HAMMER BRYANT/WESTINGHOUSE TYPE BR BREAKERS. TOTAL LOAD AMPS NOT TO EXCEED 150 AMPS.

THE MAXIMUM SHORT CIRCUIT RATING OF THIS DEVICE IS 22,000 RMS SYMMETRICAL AMPERES AT A MAXIMUM OF 120/240 VAC. THE MAXIMUM SHORT CIRCUIT RATING OF THIS DEVICE IS 10,000 RMS SYMMETRICAL AMPERES AT MAXIMUM OF 120/240 VAC WHEN UTILIZING ITE/SIEMENS TYPE Q, SQUARE D HOMELINE, OR CUTLER HAMMER/BRYANT/WESTINGHOUSE TYPE BR BRANCH BREAKERS IN SERIES WITH THE G.E. MAIN BREAKER. REPLACEMENT CIRCUIT BREAKERS SHALL BE OF THE SAME MANUFACTURER AND TYPE DESIGNATION AND SHALL HAVE AN EQUAL OR GREATER SHORT CIRCUIT RATING. WATT-HOUR METER IS NOT INCLUDED IN SHORT CIRCUIT RATING.

WARNING: TO AVOID ACCIDENTAL CONTACT WITH LIVE PARTS, CLOSE ALL OPENINGS WITH BREAKERS OR FILLER PLATES, CAT. NO. 255A5002P1 FOR ONE-POLE FILLER PLATE OR 265A5003P2 FOR TWO-POLE FILLER PLATE.

OVER CURRENT PROTECTION

IF BREAKER TRIPS, HANDLE WILL BE IN INTERMEDIATE POSITION. TO RESTORE SERVICE:

1. MOVE HANDLE TO "OFF" POSITION.
2. THEN TO "ON" POSITION.

ALUMINUM TERMINATIONS: TO HELP GUARD AGAINST OVERHEATING WHEN CONNECTING ALUMINUM WIRE IN CU/AL LUG. REMOVE OXIDE FILM FROM WIRE AND PROTECT IT WITH OXIDE INHIBITING COMPOUND.

WIRE RANGE

CONNECTOR	COPPER		ALUMINUM	
	SOLID	STRD	SOLID	STRD
LINE - (METER SOCKET)	--	6-4/0	--	6-4/0
LOAD - (BASE LUGS)	--	1-4/0	--	1-4/0
NEUTRAL "A"	--	1-4/0	--	1-4/0
NEUTRAL / GROUND "B"	--	6-2/0	--	6-2/0
NEUTRAL / GROUND "C"	14-8	14-4	12-8	12-4

ENCLOSED PANELBOARD

MODEL NO. **R281C1P6H**

200 AMPS 120/240 VOLTS A-C
TYPE 3R ENCLOSURE

SUITABLE ONLY FOR USE AS
SERVICE EQUIPMENT.

USE ONLY 75 DEG.C (167 DEG.F) CONDUCTORS ON ALL FIELD INSTALLED LINE. LOAD AND NEUTRAL TERMINATIONS. USE 60 DEG.C (140 DEG.F) CONDUCTORS ON BRANCH CIRCUITS RATED 110A OR LESS.

WHEN CABINET HAS PROVISIONS FOR A CONDUIT HUB. SELECT FROM THE CHART BELOW.

CONDUIT SIZE	CLOSURE CAP	3/4	1	1 1/4	1 1/2	2	2 1/2
CAT. NO.	B01	B07	B10	B12	B15	B20	B25



DANGER

HAZARD OF ELECTRICAL
SHOCK OR BURN. TURN OFF
POWER BEFORE WORKING
INSIDE THIS EQUIPMENT

LUG TIGHTENING TORQUE (LB-IN)

SCREW TYPE	WIRE SIZE	TORQUE
SLOTTED	14-10	32-35
	8	36-40
	6-4	41-45
	3-2/0	45-50
INTERNAL HEX	3/16 ACROSS FLATS	108-120
	1/4 ACROSS FLATS	180-200
	5/16 ACROSS FLATS	248-275

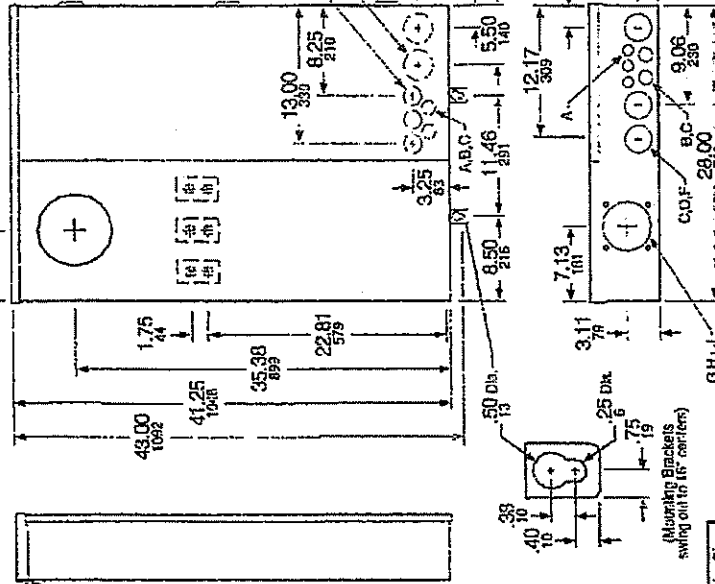
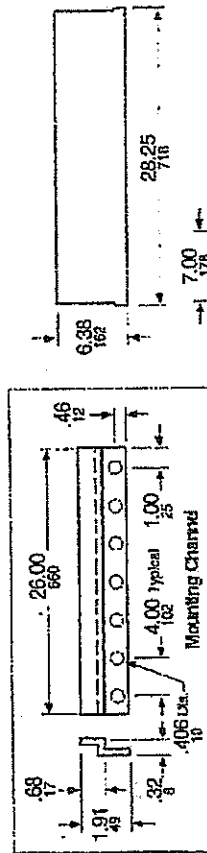
MIDWEST ELECTRIC PRODUCTS, INC.

P.O. BOX 910
MANKATO, MN. 56002-0910

MNP601201

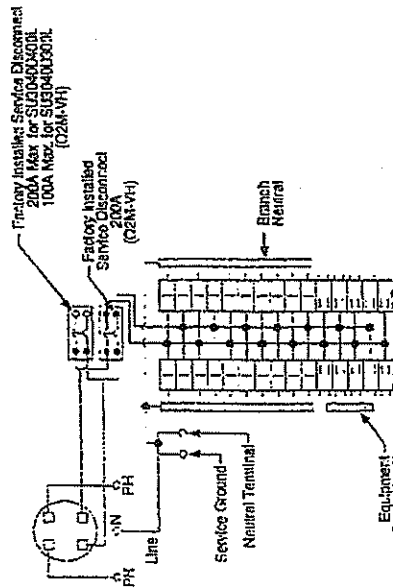
NOTE:

MAXIMUM WIRE SIZE, 200 AMP MAIN BREAKER,
4/0 COPPER OR ALUMINUM WIRE.

SQUARE D COMPANY
Schneider ElectricDENVER DISTRICT SALES OFFICE
4100 EAST MISSISSIPPI AVENUE, SUITE 1900
DENVER, CO 80222
303-756-5700 FAX 303-756-0604
E-Mail: johnsonw@squared.com**WILL JOHNSON**
RESIDENTIAL SALES ENGINEER**400 AMP. ALL-IN-ONE LOADCENTER**Dual Dimensions:
INCHES
Millimeters

Symbol	A	B	C	D	E	F	G	H	I	J
Current Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4

KNOCKOUTS

**SQUARE D**DWG. NO. **CSEDD-A-15****COMBINATION SERVICE ENTRANCE DEVICES**
Ringless All-In-One
Rainproof Surface/Semiflush NEMA Type 3R Enclosure
Outdoor**SQUARE D COMPANY**
Schneider ElectricDENVER DISTRICT SALES OFFICE
4100 E. MISSISSIPPI AVE., SUITE 1900
DENVER, CO 80248
303-756-5700 DIRECT 303-839-8644
MOBILE 303-882-5256 FAX 303-756-0604
E-Mail: starlipm@squared.com**MARY STARLIPER**
SALES ENGINEER

- One single pole, one plug-on space type HCM only
- Two-pole type HCM may plug-on two adjacent spaces.
- Two single pole, one plug-on space type HCMT or one single pole, one plug-on space type HCM. Two-pole type HCM or HCMT may plug-on two adjacent spaces.

Catalog Number	Maximum System Voltage	Making Ampere Rating	Spaces	Maximum Number of Single Pole Circuits	Short Circuit Rating	Main Wire Size AWG/kcmil AL/CU
SU30H00-000	120/240VAC, 1P/3W	400	30	40	22,000/10,000	Supplied with Lug pads - order lugs separately
SU30H00-000	208Y/120VAC, 1P/3W	300	30	40	22,000/10,000	

UL Listed 22,000/10,000 RMS symmetrical amperes short circuit rating with use of 10,000 AIC 70A max. branch breakers

NOTES: Finish - UL component recognized gray baked powder coat paint over cleaned phosphated steel.

Suitable only for use as service equipment.

UL Listed File E-6294.

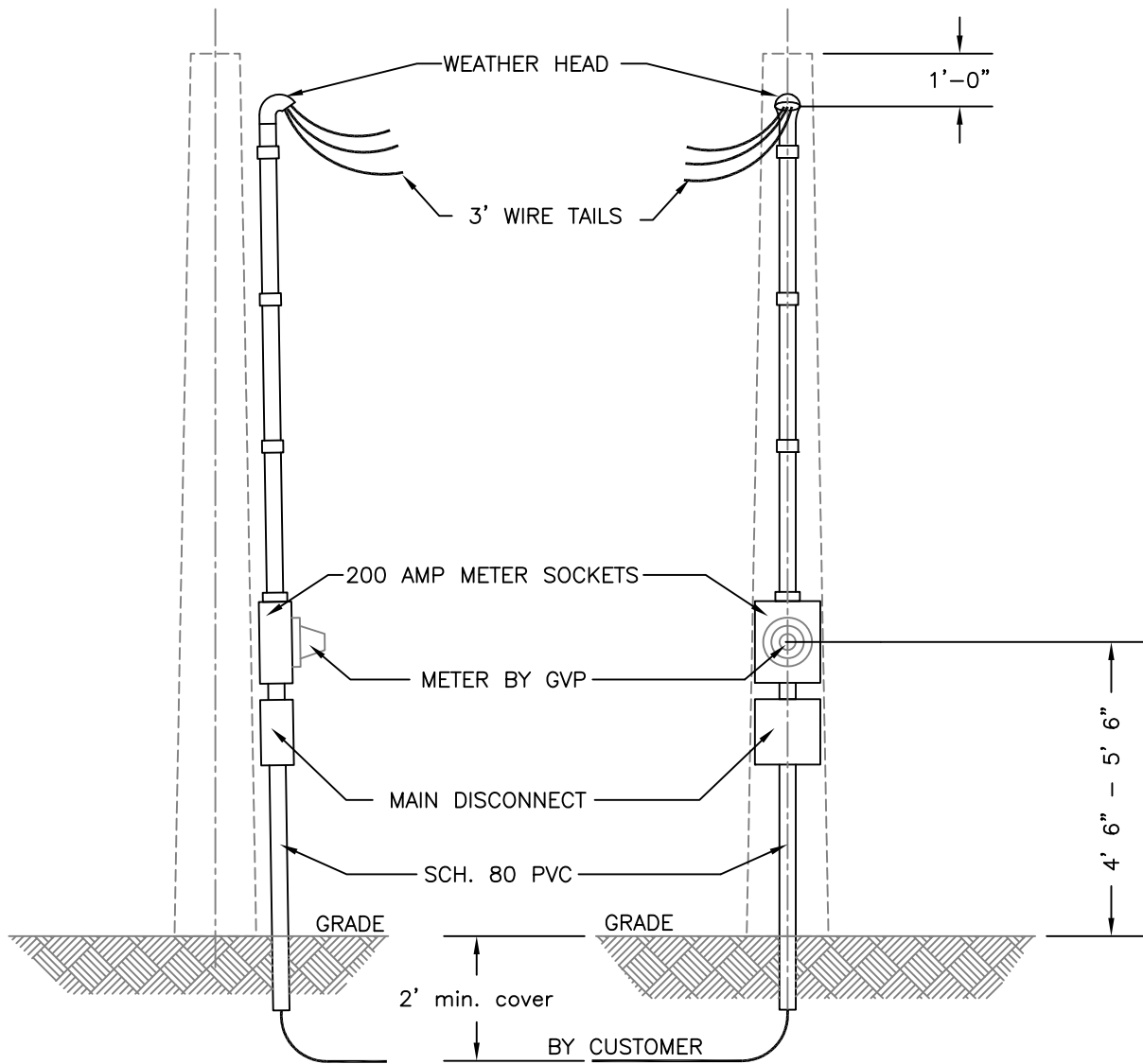
Suitable for underground service only.

Convertible to semiflush with SU00F flange kit.

Meets Electric Utility Service Equipment Requirements Committee standards.

Order No. 41700MS5556 New 96 Printed in U.S.A.

EXAMPLE



1. Meters will not be installed on high-voltage (Primary Lines) transformer poles.
2. All permanent meter poles will be set, owned and operated by Grand Valley Power.
3. Grand Valley Power will furnish and install the meter. Customer is responsible for furnishing and installing meter socket, disconnecting means, conduits, grounds, standoffs and all other materials.
4. The center of the meter cover shall be 4' 6" to 5' 6" above finished grade.
5. Operable fault interruption disconnecting means mounted below meter sockets; main circuit breaker, or fused disconnecting switch is required.
6. The weather head should be within 1 foot of Grand Valley Power attachment at the top of the meter pole.
7. Wire tails must extend out of the weather head 3 feet on the meter pole.
8. If secondary only is attached to pole, member may take his service from main switch back up using a same set of standoff brackets.
9. Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set.
10. Grand Valley Power reserves the rights to request necessary modification or reject the installation as suitable for service as necessary.

METER POLE STANDARDS SINGLE METER AND RISER

DWG BY: TA

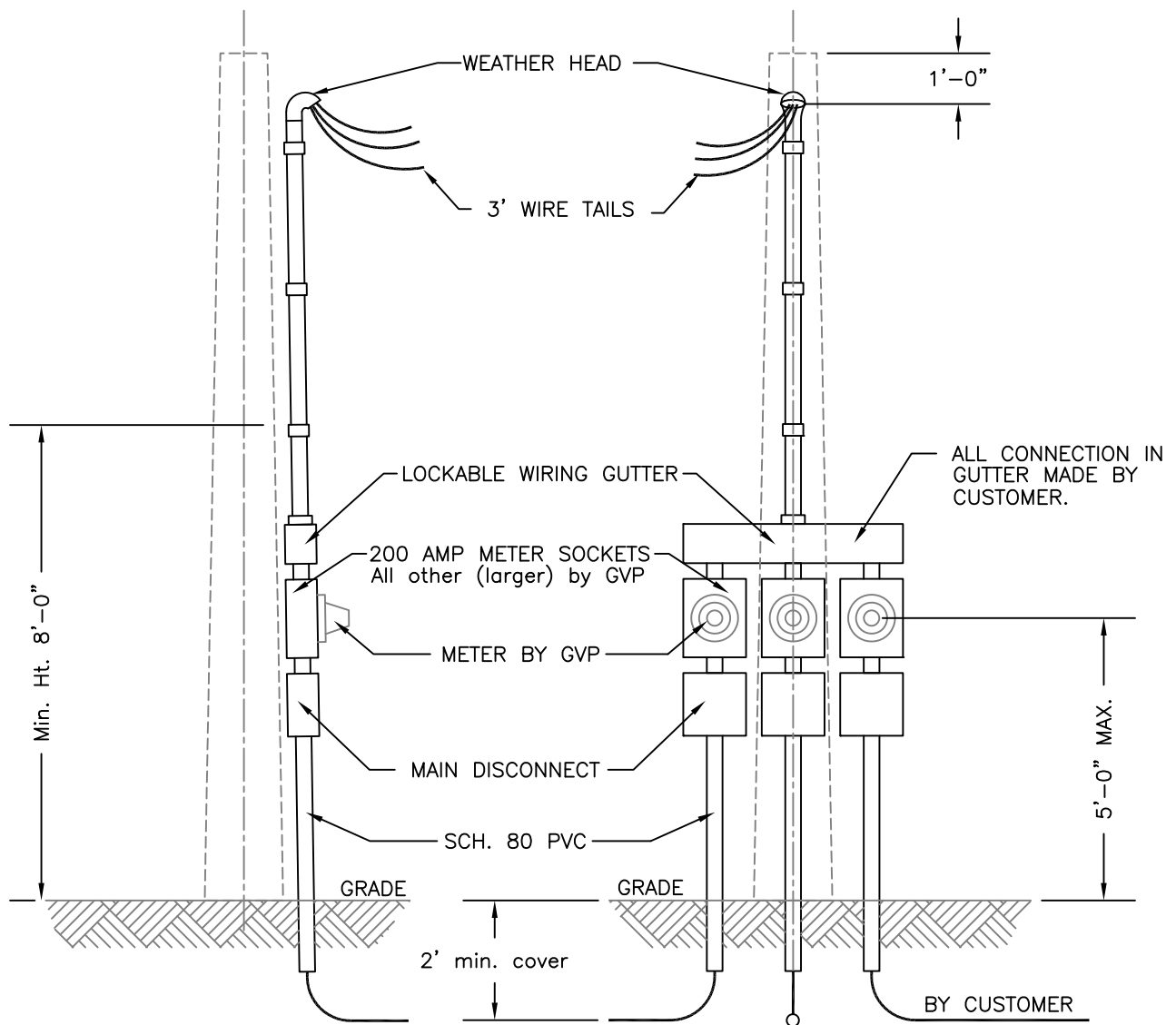
DATE: 7/21/08



M8-10

2. Meters will not be installed on high-voltage (Primary Lines) transformer poles.
3. All permanent meter poles will be set, owned and operated by Grand Valley Power.
4. Grand Valley will furnish and install the meter. Customer is responsible for furnishing and installing meter socket, disconnecting means, conduits, grounds, standoffs and all other materials.
5. Meter must be at 5 feet above grade.
6. **(1 set of brackets for both conduits)**
7. Operable fault interruption disconnecting means mounted below meter sockets; main circuit breaker, or fused disconnecting switch is required.
8. The weather head should be within 1 foot of Grand Valley Power attachment at the top of the meter pole.
9. Wire tails must extend out of the weather head 3 feet on the meter pole.
10. If secondary only is attached to pole, member may take his service from main switch back up pole on same set of standoff brackets.
11. Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set.
12. **Grand Valley Power reserves the rights to request necessary modification or reject the installation as suitable for service as necessary.**

M8-10A



1. Meters will not be installed on high-voltage (Primary Lines) transformer poles.
2. All permanent meter poles will be set, owned and operated by Grand Valley Power.
3. Grand Valley will furnish and install the meter. Customer is responsible for furnishing and installing meter socket, disconnecting means, conduits, grounds, standoffs and all other materials.
4. Meter must be at 5 feet above grade.
- 5.
6. Operable fault interruption disconnecting means mounted below meter sockets; main circuit breaker, or fused disconnecting switch is required.
7. The weather head should be within 1 foot of Grand Valley Power attachment at the top of the meter pole.
8. Wire tails must extend out of the weather head 3 feet on the meter pole.
9. If secondary only is attached to pole, member may take his service from main switch back up pole on same set of standoff brackets.
10. Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set.
11. **Grand Valley Power reserves the rights to request necessary modification or reject the installation as suitable for service as necessary.**

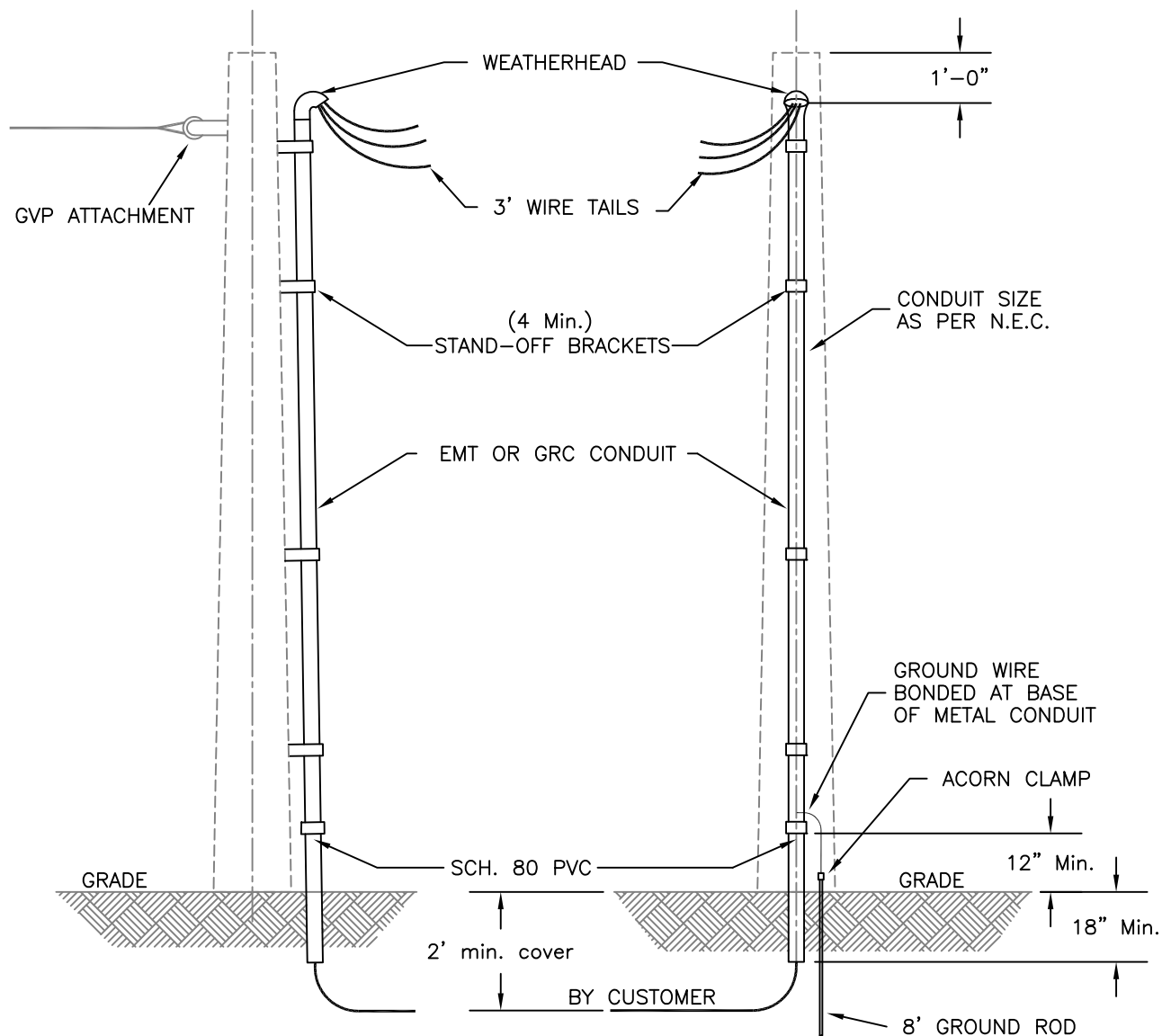
METER POLE STANDARDS MULTIPLE METERS AND GUTTER

DWG BY: DSG

DATE: 8/07/97



M8-10B



1. All permanent poles will be set, owned and operated by Grand Valley Power.
2. Grand Valley will furnish and install the pole. Customer is responsible for furnishing and installing conduits, grounds, stand-offs and all other materials.
3. Stand-off brackets provide 6" space from conduit (riser) to pole. Grand Valley Power requires four (4) stand-off brackets evenly spaced on the pole.
4. The weatherhead should be within 1 foot of Grand Valley Power attachment at the top of the meter pole.
5. Wire tails must extend out of the weatherhead 3 feet on the meter pole.
6. Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set.
7. **Grand Valley Power reserves the rights to request necessary modification or reject the installation as suitable for service as necessary.**

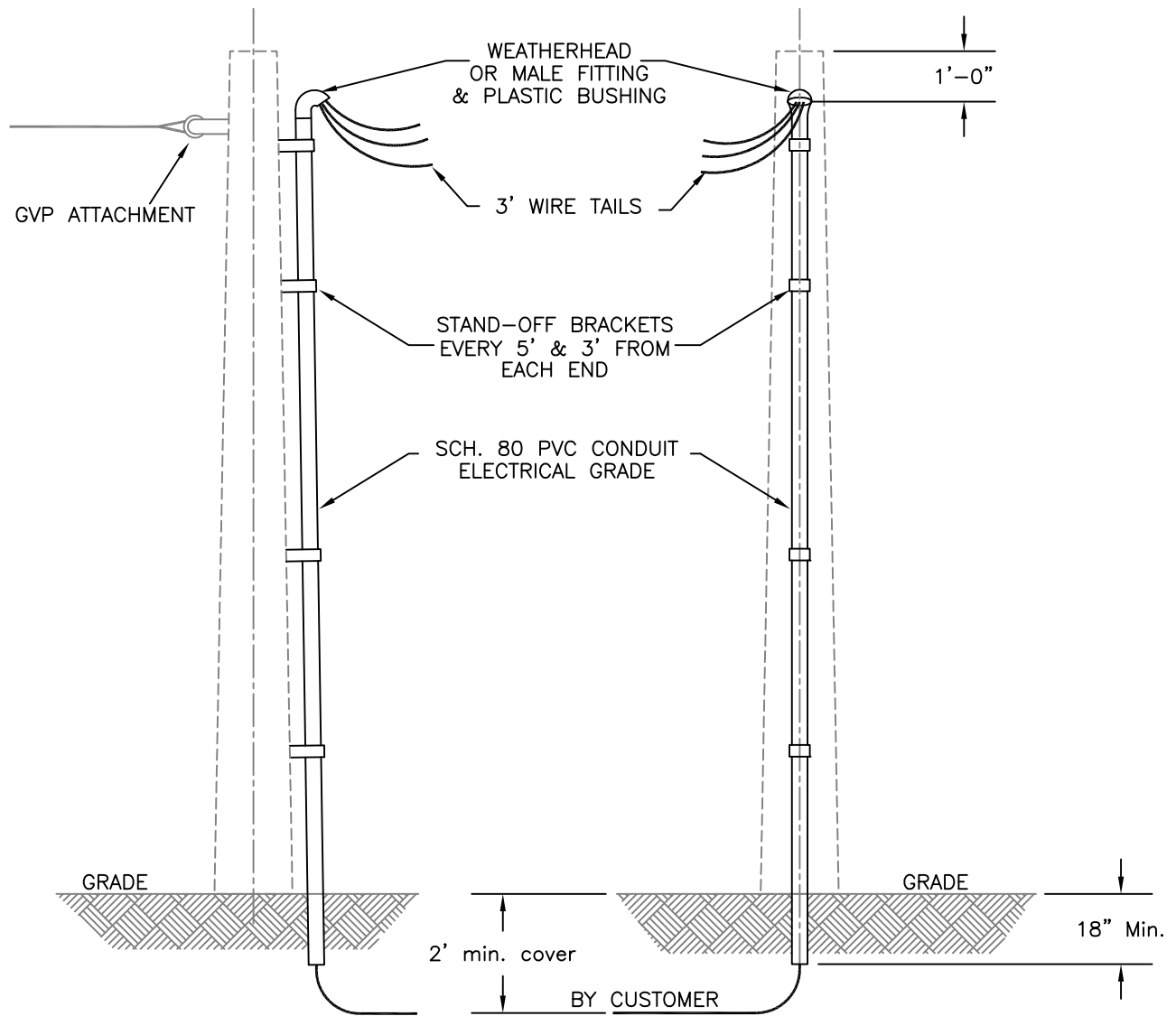
CONSUMER'S METAL RISER ON SECONDARY POLE

DWG BY: DSG

DATE: 8/8/96



M8-10C



1. All permanent poles will be set, owned and operated by Grand Valley Power.
2. Grand Valley will furnish and install the pole. Customer is responsible for furnishing and installing conduits, grounds, stand-offs and all other materials.
3. Stand-off brackets provide 6" space from conduit (riser) to pole. Grand Valley Power requires four (4) stand-off brackets evenly spaced on the pole.
4. The weatherhead should be within 1 foot of Grand Valley Power attachment at the top of the meter pole.
5. Wire tails must extend out of the weatherhead 3 feet on the meter pole.
6. Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set.
7. **Grand Valley Power reserves the rights to request necessary modification or reject the installation as suitable for service as necessary.**

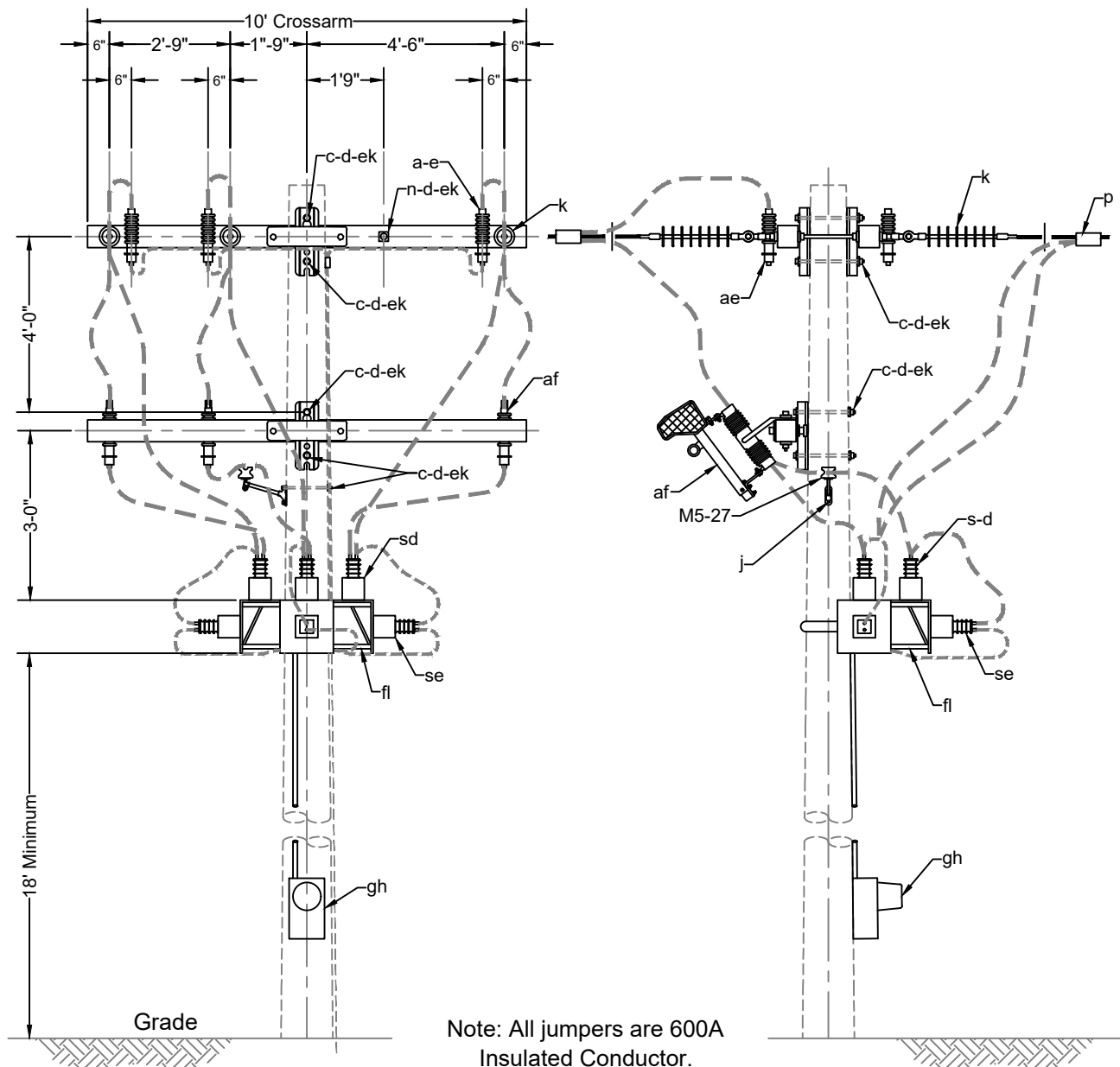
CONSUMER'S PVC RISER ON SECONDARY POLE

DWG BY: DSG

DATE: 8/8/96



M8-10D



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	af	3	Cutout, load break, solid blade
d	23	Washer, 2 1/4" square, 13/16" hole	ek		Locknuts, as required
d	2	Washer, 2 1/4" square, curved	gh		Meter box, meter and test block
g	3	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	sd	3	Transformer, current
j	1	Screw, lag, 1/2" x 4"	se	3	Transformer, potential
k	6	Insulator, suspension, epoxy	fl	1	Rack, primary metering
n	5	Bolt, double arming, 5/8" x required length			
p		Connectors, as required			
aa	6	Nut, eye, 5/8"			
ae	6	Lighting arrester			

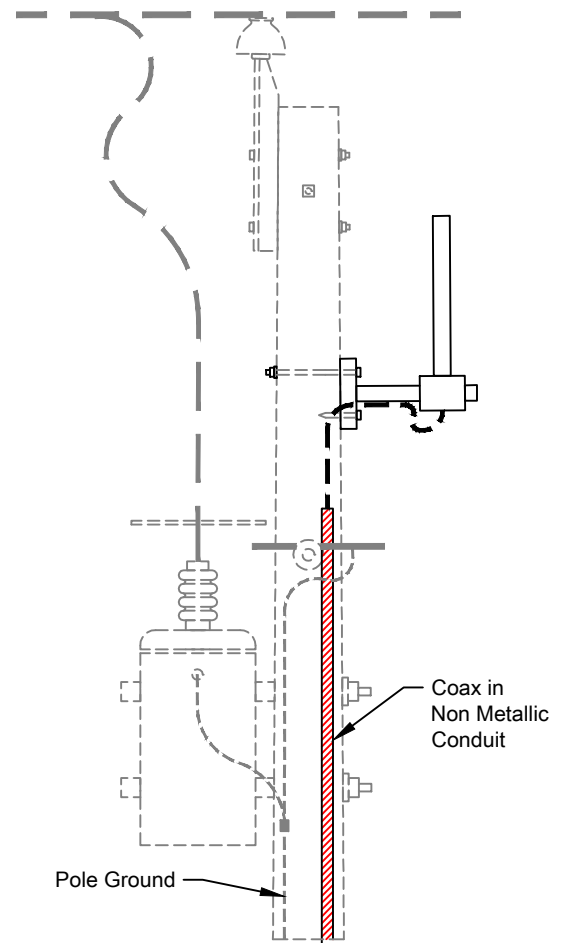
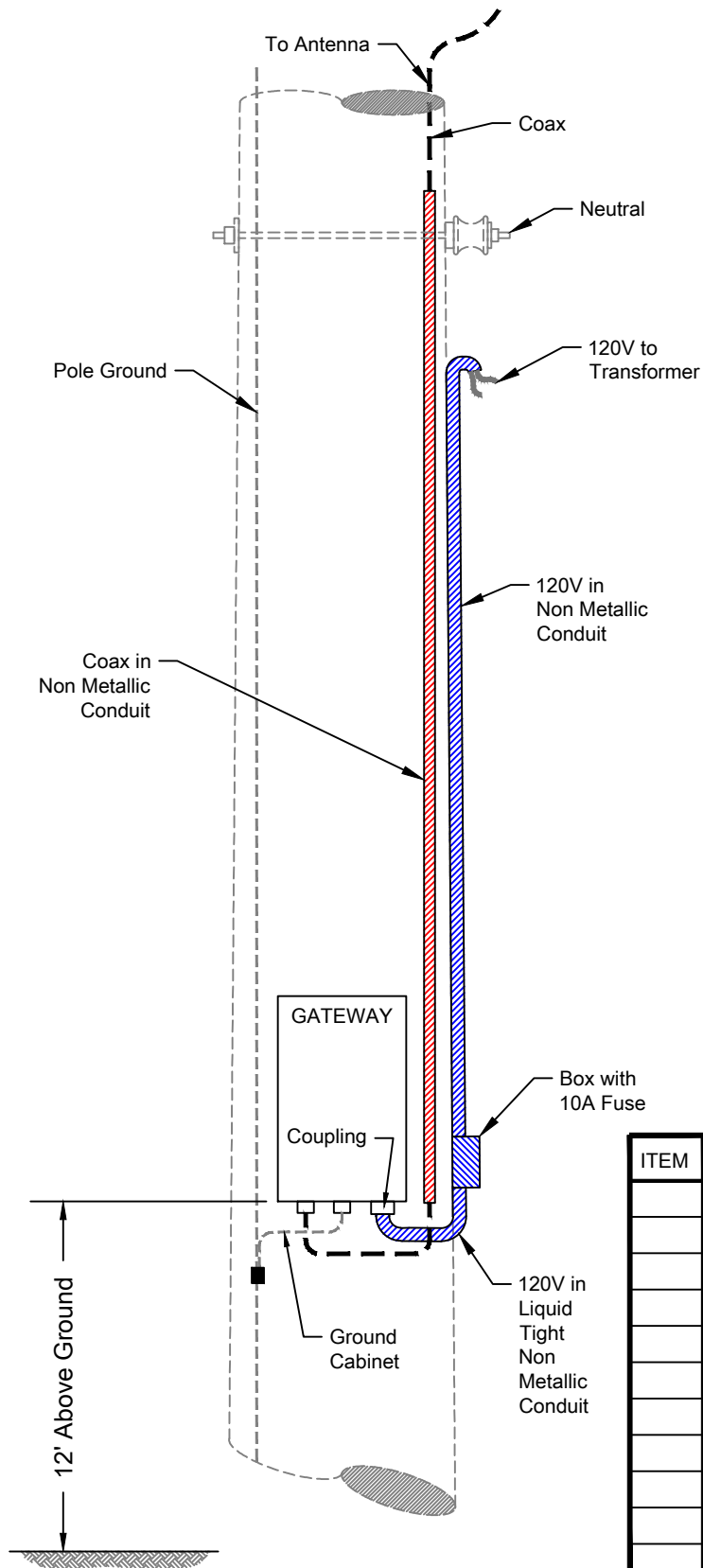
THREE PHASE METERING GUIDE THREE PHASE 4-WIRE WYE

Revision Date

Jan. 23, 2023



M8-15A
VM8-15A



ANTENNA
DETAIL

ITEM	NO.	MATERIAL
	1	Gateway
	1	Antenna Kit
	50'	Non Metallic Conduit
	2'	Liquid Tight Non-Metallic Conduit
	1	Weather Head
	3	Fitting, Various
	1	Bracket Fiberglass
	8	Clamp, Conduit
	1	Bolt, Machine 5/8"
	1	Lag, Screw
	1	Box, Junction with Fuse

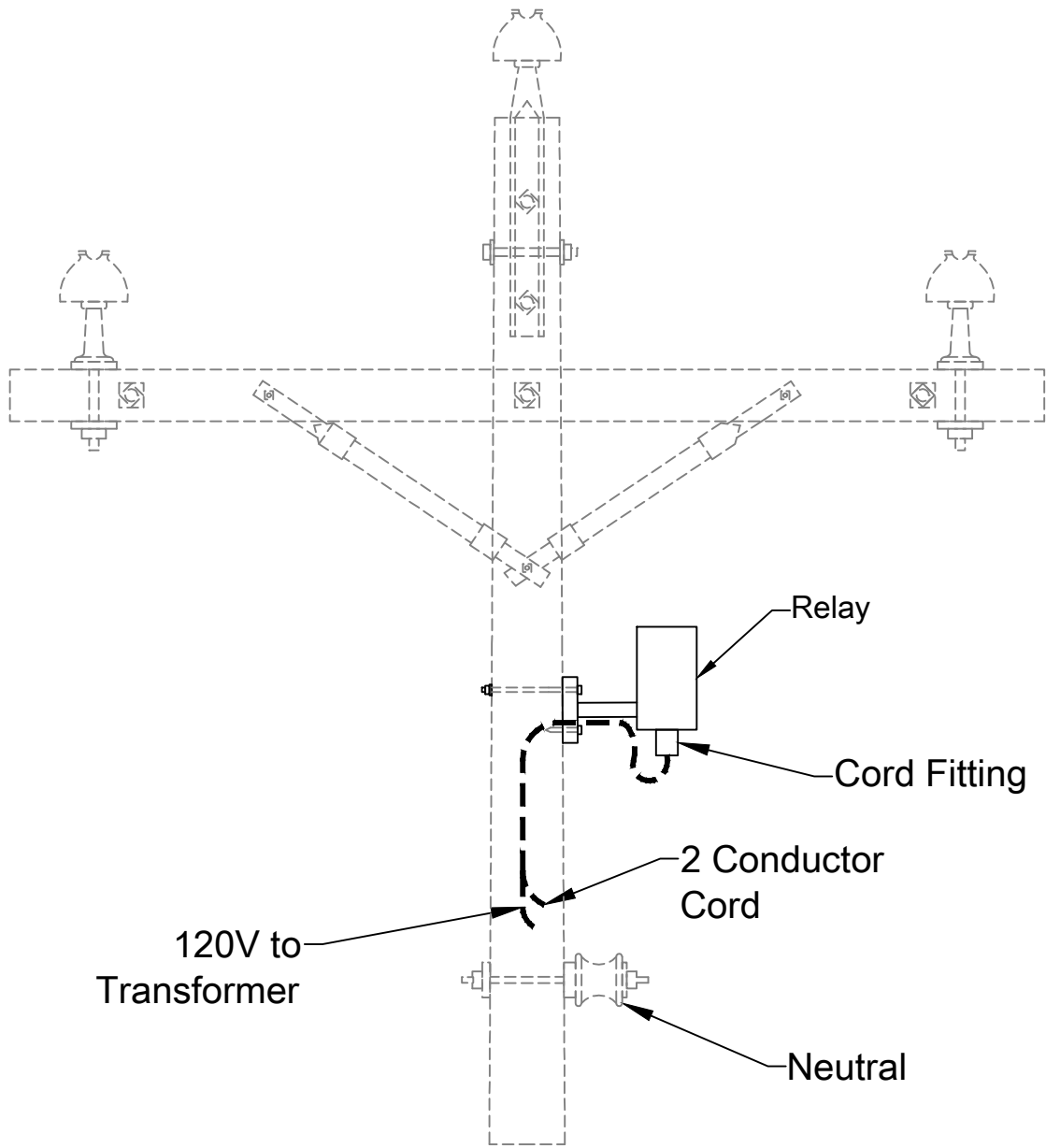
AMI GATEWAY

Revision Date

August 17, 2018



M8-20



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
	1	Bolt, Machine 5/8"		1	Relay
	1	lag, Screw		1	Cord Fitting
				10'	2 Conductor Cord
				1	Bracket, Fiberglass

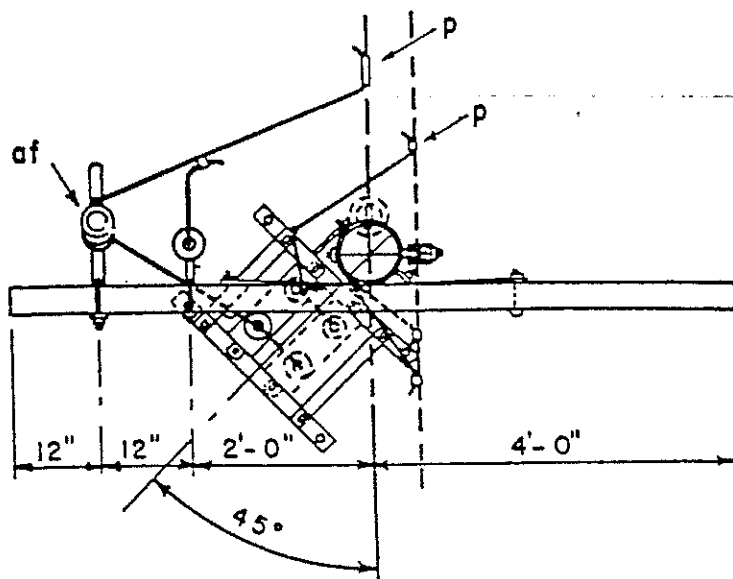
AMI RELAY

Revision Date

July 20, 2018

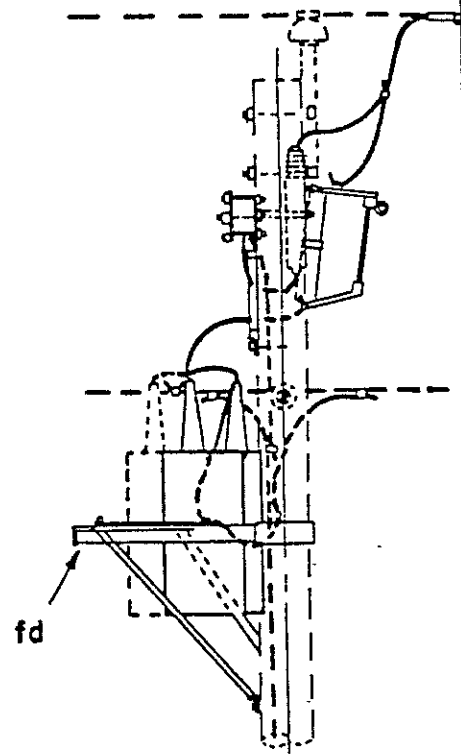
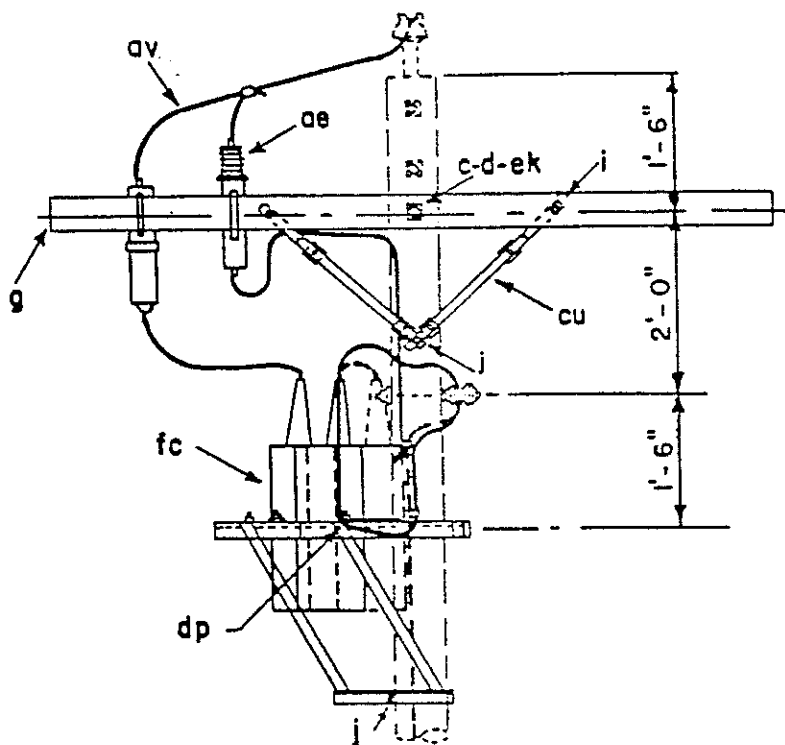


M8-21

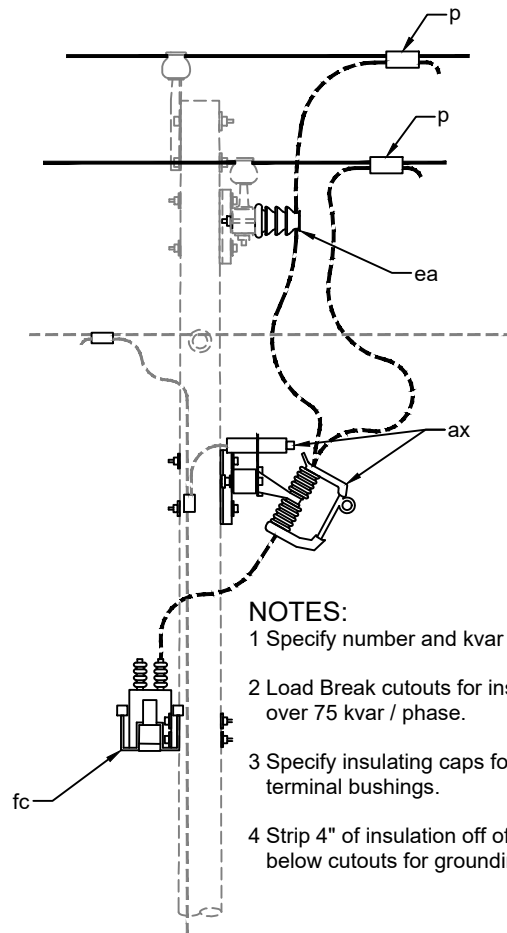
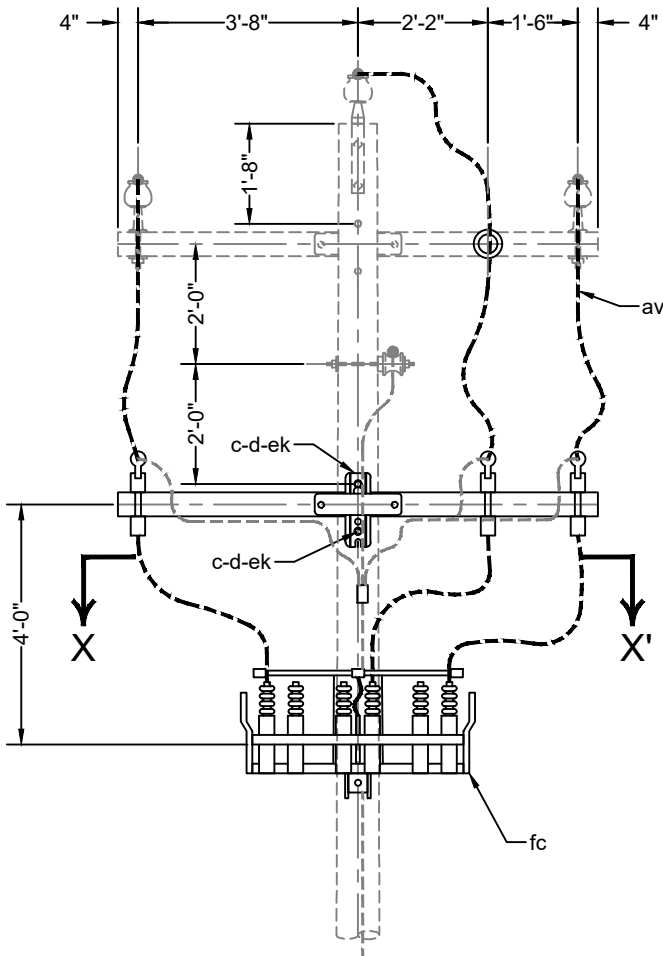


NOTES:

1. Specify number and kVAR required.
2. Load Break cutouts for installations over 75 kVAR.
3. Specify insulating caps for primary terminal bushings.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x req'd. length	p	1	Connector, compression type
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	p		Connectors, as required
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	ae	1	Surge arrester
cu	2	Brace, wood, 28"	af	1	Cutout, fuse
i	2	Bolt, carriage, 3/8" x 4 1/2"	av		Jumpers or Leads as required
j	1	Screw, lag, 1/2" x 4"	dp	1	Clamp, ground wire
fc		Capacitor, _____ kVA each	fd	1	Capacitor Hanger, pole mounted
ek		Locknuts			
12.5/7.2 kv					
SINGLE PHASE CAPACITOR ASSEMBLY					
Apr, 1983					
M9-11					



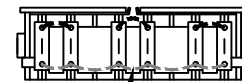
NOTES:

- 1 Specify number and kvar required.
- 2 Load Break cutouts for installations over 75 kvar / phase.
- 3 Specify insulating caps for primary terminal bushings.
- 4 Strip 4" of insulation off of Jumpers below cutouts for grounding.

SUGGESTED FUSING TABLE

kvar Connected to each Cutout	100
Fuse Size (Amp.)	15

Note : Care must be taken to coordinate fuse with sectionalizing plan.



Common Neutral

SECTION X-X'

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	ax	3	Cutout / Arrestor Combination
d	2	Washer, 2 1/4" square, 3/16" hole	dp	2	Clamp, ground wire
d	2	Washer, 3" square, curved	ea	1	Insulator, post type, with 7" stud
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	fc		Capacitor, _____ kvar each
p	3	Connector, compression type	fd	1	Hanger, cluster type
p		Connector, as required	ek		Locknuts, as required
av		Jumpers, stranded, as required			

12.5 / 7.2 KV

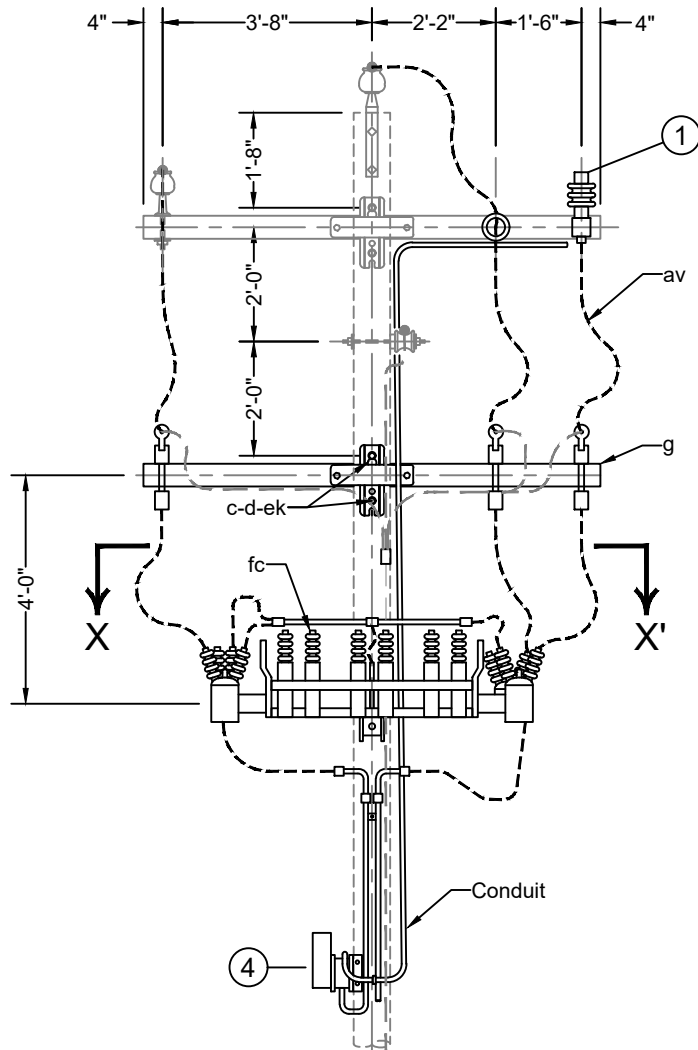
THREE PHASE FIXED CAPACITOR ASSEMBLY

Revision Date:

Jan. 24, 2023



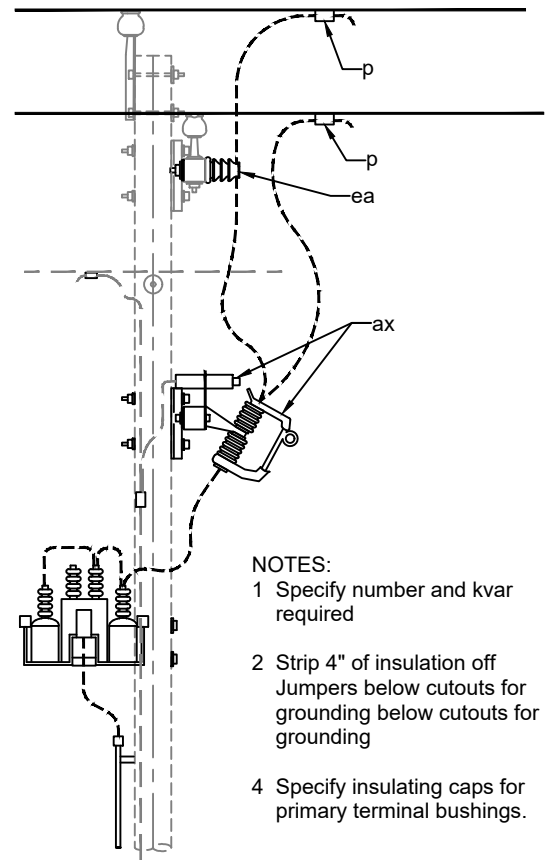
M9-13



SUGGESTED FUSING TABLE

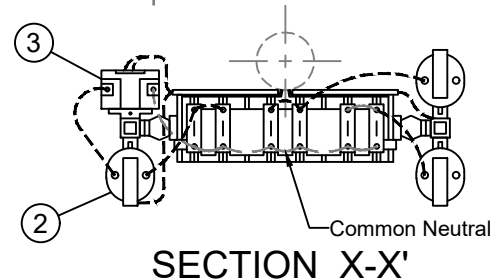
kvar Connected to each Cutout	100
Fuse Size (Amp.)	15

Note : Care must be taken to coordinate fuse with sectionalizing plan.



NOTES:

- 1 Specify number and kvar required
- 2 Strip 4" of insulation off Jumpers below cutouts for grounding below cutouts for grounding
- 4 Specify insulating caps for primary terminal bushings.



SECTION X-X'

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ea	1	Insulator, post type, with 7" stud
d	4	Washer, 2 1/4" square, 3/16" hole	fc		Capacitor, _____ kvar each
d	4	Washer, 3" square, curved	fd	1	Hanger, cluster type
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek		Locknuts, as required
p	3	Connector, compression type			
p		Connector, as required	1	1	Line post current sensor
av		Jumpers, stranded, as required	2	3	Oil switch
ax	3	Cutout / Arrestor Combination	3	1	Transformer
dp	2	Clamp, ground wire	4	1	Meter socket
				1	Control

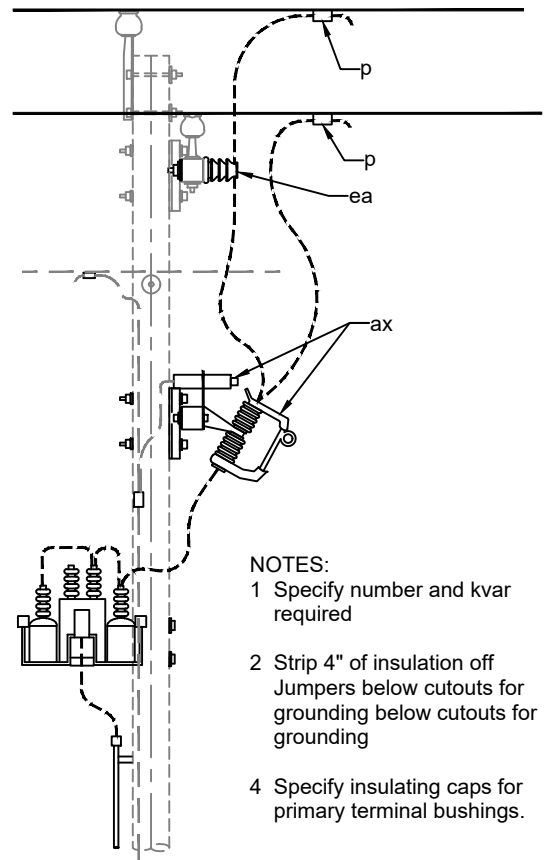
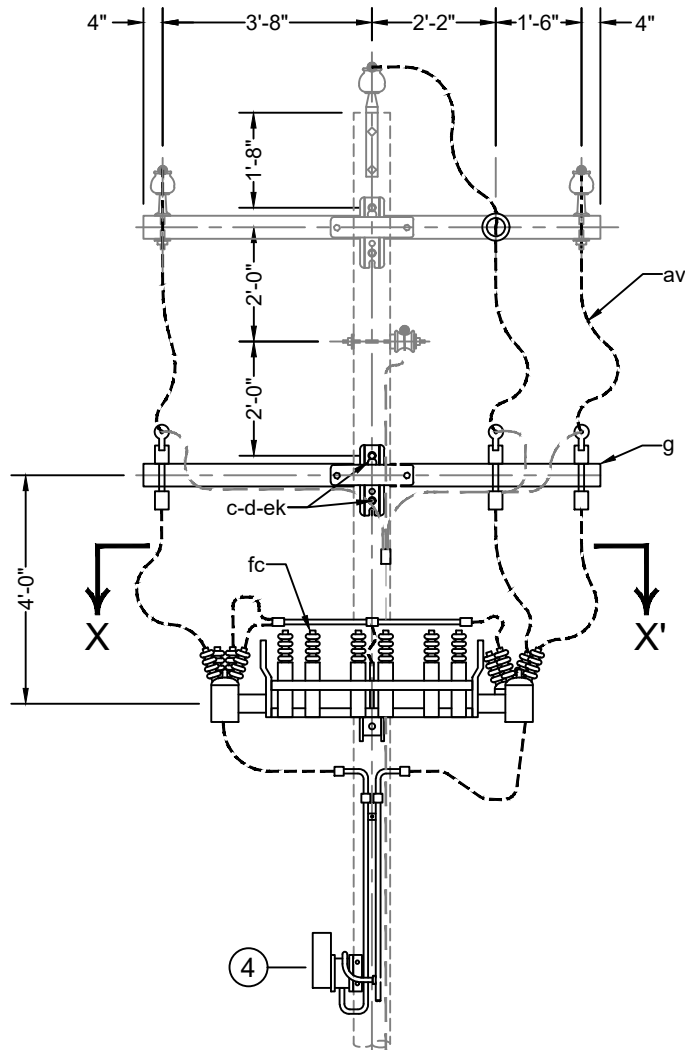
12.5 / 7.2 KV and 14.4 / 24.9 KVV THREE PHASE CAPACITOR ASSEMBLY

Revision Date:

Jasn. 25, 2023

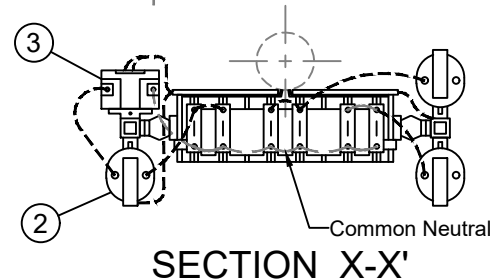


M9-13CS
VM9-13CS



NOTES:

- 1 Specify number and kvar required
- 2 Strip 4" of insulation off Jumpers below cutouts for grounding below cutouts for grounding
- 4 Specify insulating caps for primary terminal bushings.



SUGGESTED FUSING TABLE

kvar Connected to each Cutout	100
Fuse Size (Amp.)	15

Note : Care must be taken to coordinate fuse with sectionalizing plan.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ea	1	Insulator, post type, with 7" stud
d	4	Washer, 2 1/4" square, 3/16" hole	fc		Capacitor, _____ kvar each
d	4	Washer, 3" square, curved	fd	1	Hanger, cluster type
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek		Locknuts, as required
p	3	Connector, compression type			
p		Connector, as required			
av		Jumpers, stranded, as required	2	3	Oil switch
ax	3	Cutout / Arrestor Combination	3	1	Transformer
dp	2	Clamp, ground wire	4	1	Meter socket
				1	Control

**12.5 / 7.2 KV and 14.4 / 24.9 KVV
THREE PHASE CAPACITOR ASSEMBLY**

Revision Date:

Jan. 25, 2023

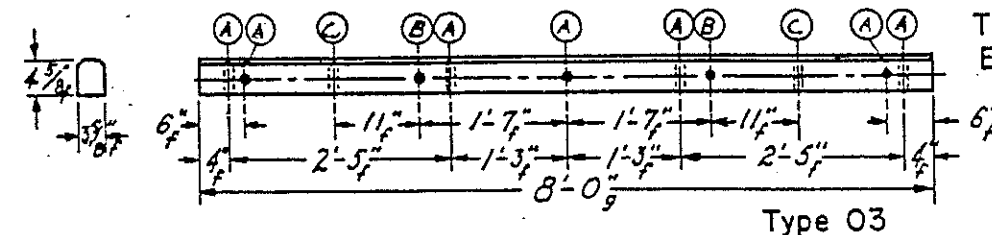
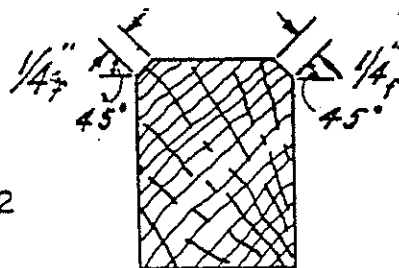
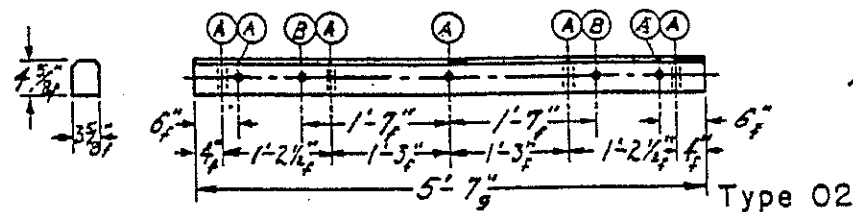


**M9-13TS
VM9-13TS**



TOLERANCES SIZES OF HOLES

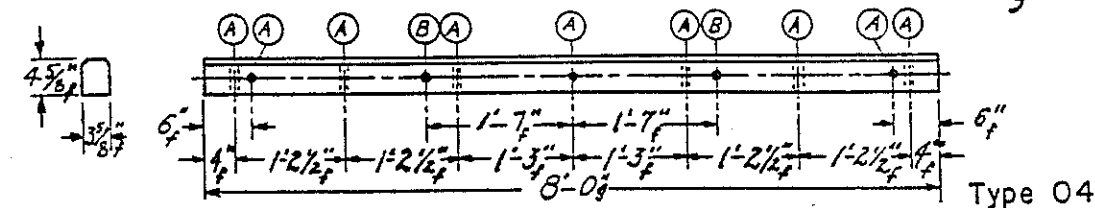
	Nominal	Go	No Go
(A)	$1\frac{1}{8}''$	$\frac{7}{8}''$	$\frac{3}{4}''$
(B)	$\frac{7}{8}''$	$\frac{3}{8}''$	$\frac{1}{2}''$
(C)	$9\frac{1}{16}''$	$\frac{1}{2}''$	$5\frac{5}{8}''$



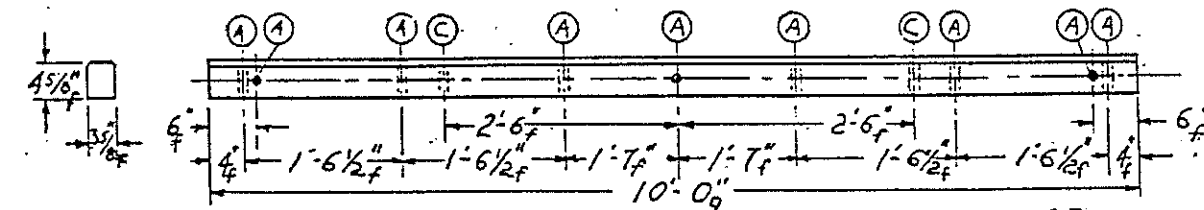
Type 03

TYPICAL
ENLARGED
SECTION

$f \text{ --- } \pm \frac{1}{8}''$
 $g \text{ --- } \pm \frac{1}{4}''$

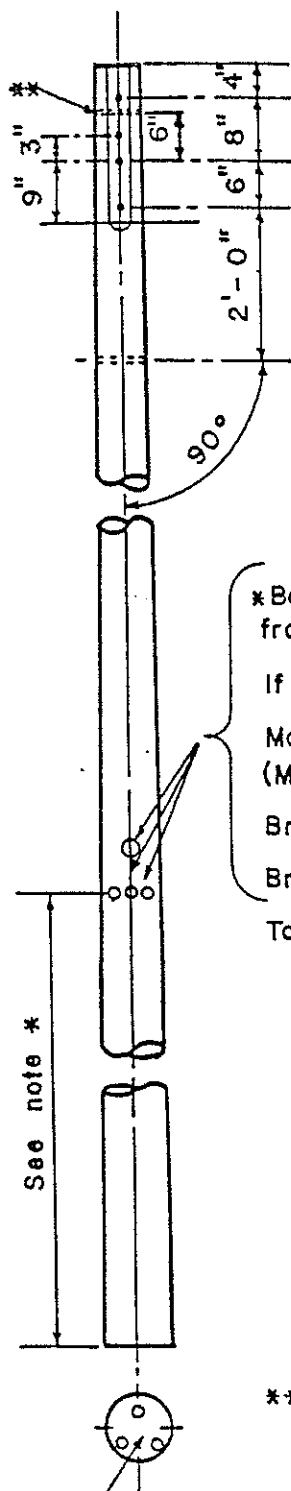


Type 04



Type 05

CROSSARM DRILLING GUIDE



Brand butt with proper length and class

Through-bolt holes must be parallel and in the same plane.

HOLES: Drill 1 1/16" diameter.

GAINS: Gains are to be flat with plane at right angles to bolt hole.

Neutral bolt hole must be at 90° angle with through-bolt holes.

All poles shorter than 50 feet must be bored, roofed and gained before treatment, except that Class 7 and smaller poles need not be gained unless requested by purchaser. Roofs may be flat or at a 15° angle at the producer's option.

*Bottom of brand or center of metal disk shall be 10'±1" from pole butt; 14'±1" mark for poles 55' and longer.

If insured warranted pole, Brand "IW".

Manufacturer's Mark and Date of Treatment, (Month and Year).

Brand with proper length and class.

Brand with species, preservative code and retention.

Tolerance:

Holes

On the gain ± 1/8" from the centerlines of the holes.

On the side opposite the gain ± 1/4" from the centerlines of the holes.

Location - measured from roof

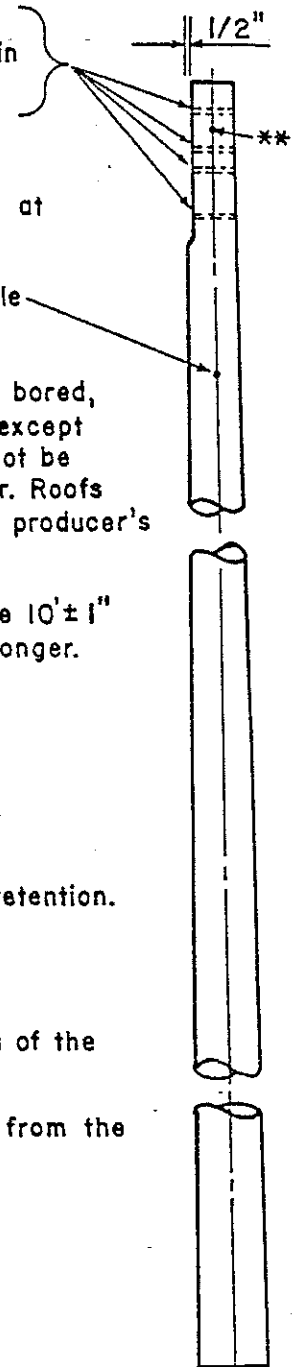
Gain side ± 1/4"

Opposite side ± 1/2"

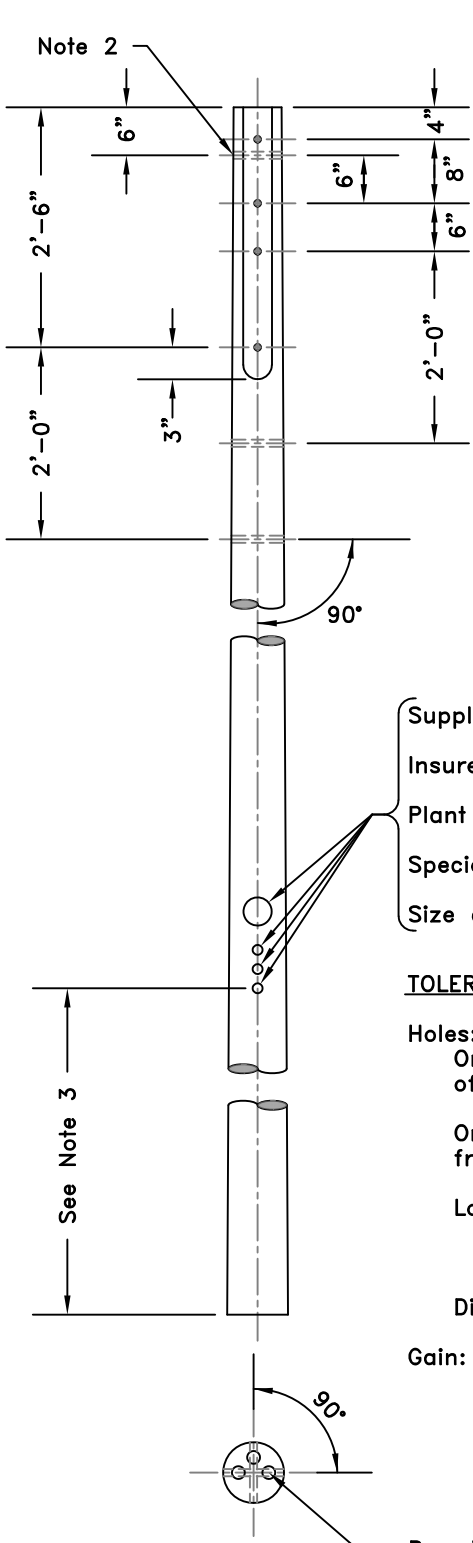
Diameter ± 1/16"

Gains out of parallel ± 1/2"

** Optional, anti-split bolt hole to be drilled only when so specified by the purchaser.



POLE FRAMING GUIDE

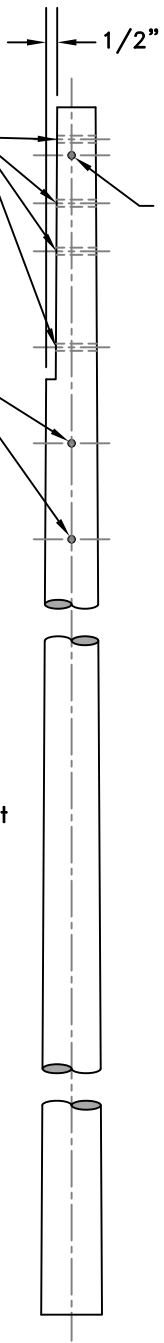


Through-bolt holes must be parallel and in the same plane (4 Required)

HOLES: Drill 11/16" diameter

GAINS: Gains are to be flat with plane at right angles to the bolt holes.

Neutral bolt holes must be at 90° angle with through-bolt holes



- Suppliers code of Trademark
- Insured warranty of Quality Assurance Mark
- Plant location, month and year of treatment
- Species, preservation code and retention
- Size or designation

TOLERANCES

- Holes:
 - On the gain: $\pm 1/8"$ from the centerline of the hole.
 - On the side opposite the gain: $\pm 1/4"$ from the centerlines of the holes.
- Location (measured from the roof):
 - Gain side $\pm 1/4"$
 - Opposite side $\pm 1/2"$
- Diameter: $\pm 1/16"$
- Gain: out of parallel $\pm 1/2"$

NOTES:

- All poles must be bored, roofed and gained before treatment. Roofs are flat.
- Anti-split bolt hole is to be drilled.
- Bottom of brand or center of metal disk shall be $10' \pm 2"$ from the pole butt for poles less than 55' in length; $14' \pm 2"$ for pole 55' and longer.

Brand but with proper length and class

GRAND VALLEY POWER POLE FRAMING GUIDE

DATE

Aug 2002

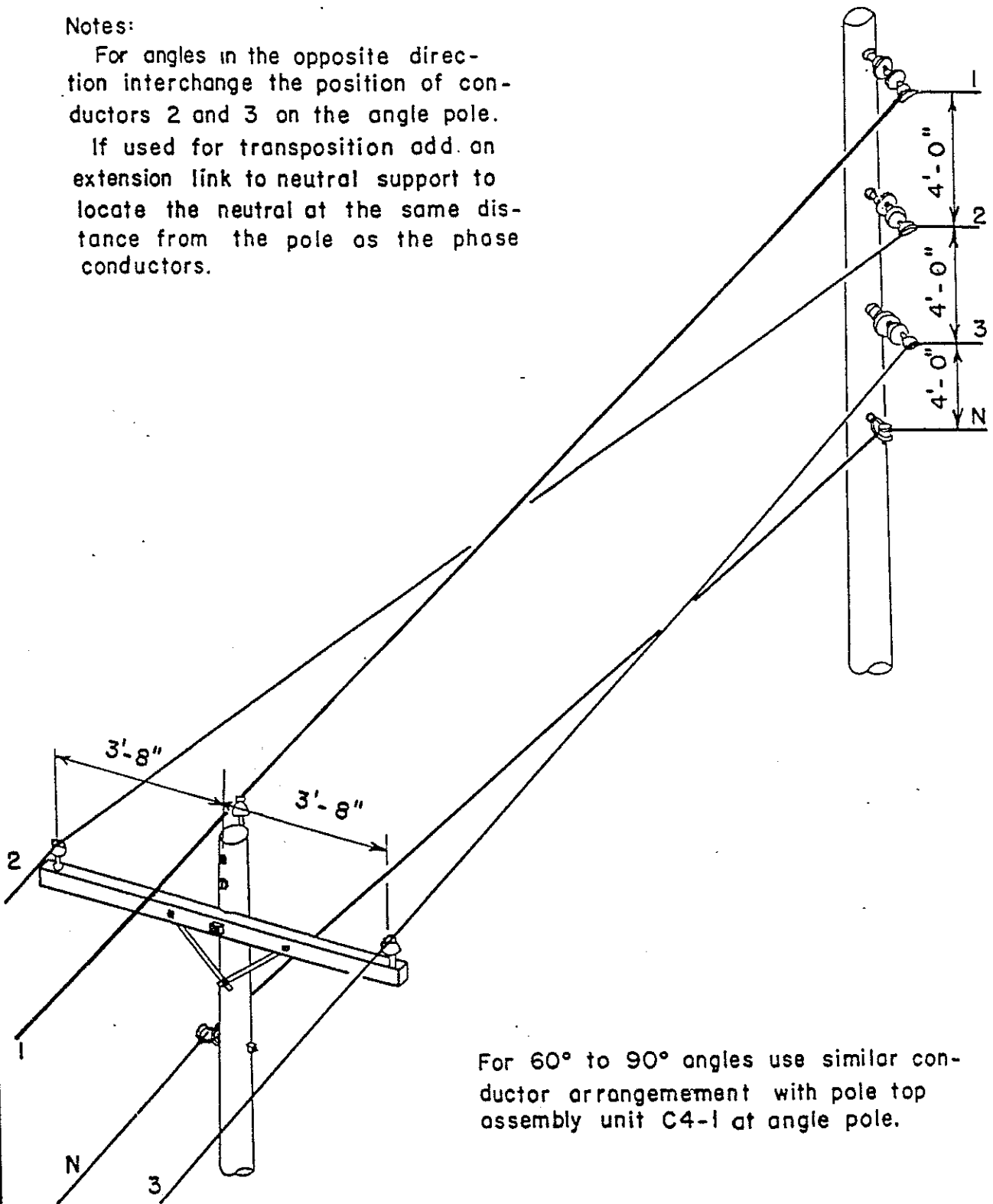


W1.1G

Notes:

For angles in the opposite direction interchange the position of conductors 2 and 3 on the angle pole.

If used for transposition add an extension link to neutral support to locate the neutral at the same distance from the pole as the phase conductors.



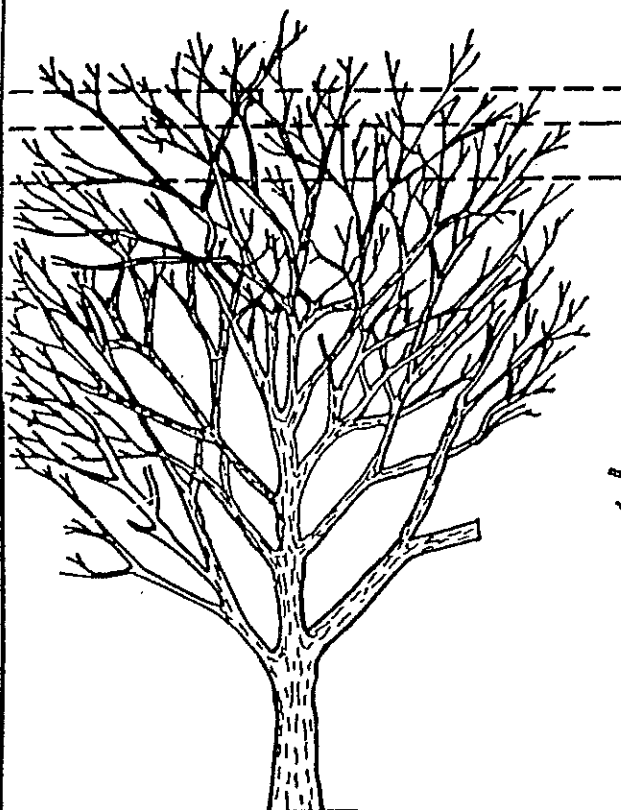
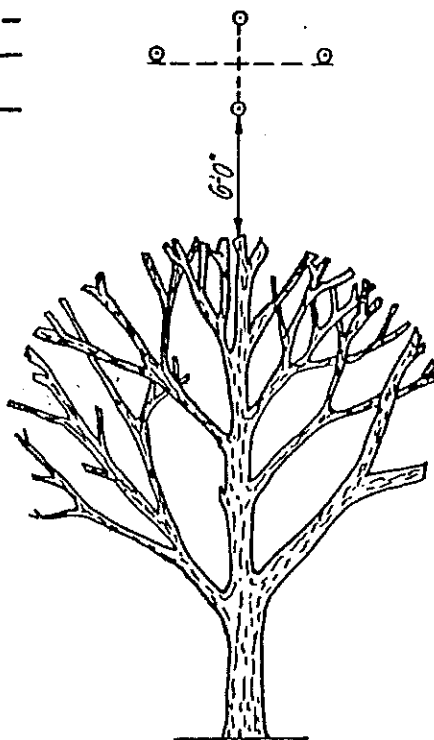
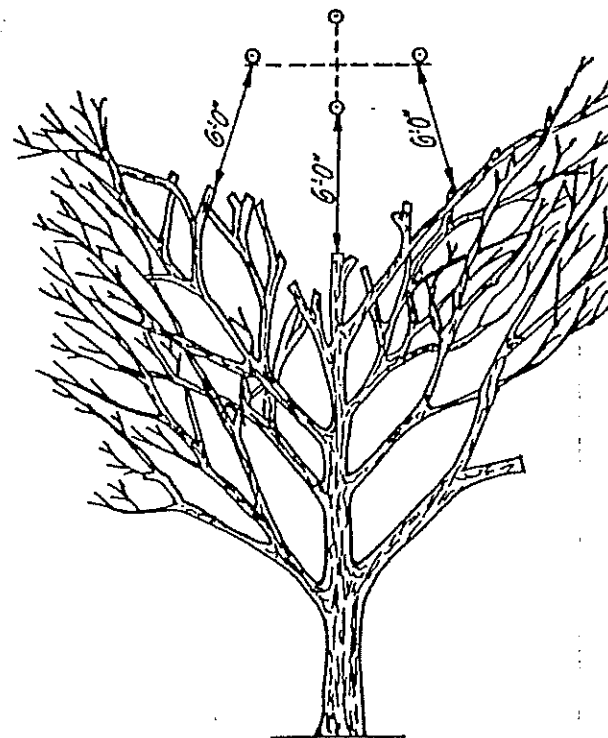
For 60° to 90° angles use similar conductor arrangement with pole top assembly unit C4-1 at angle pole.

ANGLE CONSTRUCTION GUIDE
CROSSARM TO VERTICAL CONST.- 30° TO 60° ANGLE

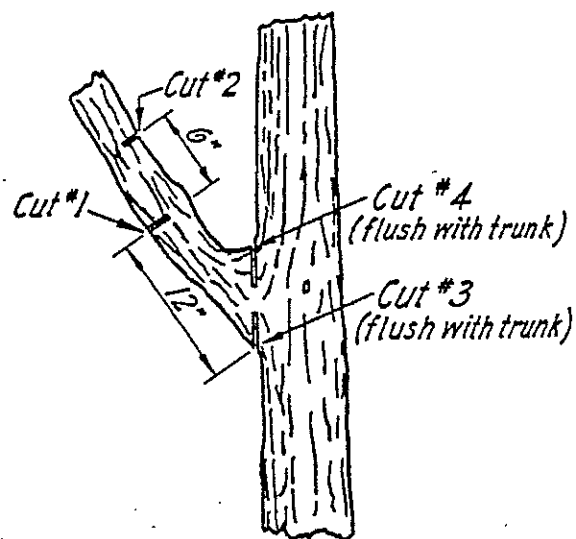
Apr., 1983

M21

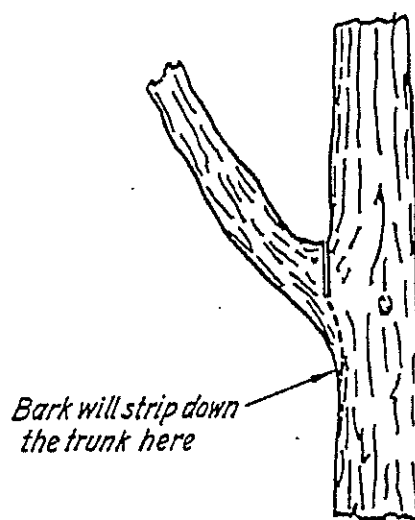
TREE TRIMMING GUIDE

*Before Trimming**Right Way**Wrong Way***Note:**

No parts of tree should be closer than 6'-0" from open wiring.
Trimming should leave tree with symmetrical appearance.



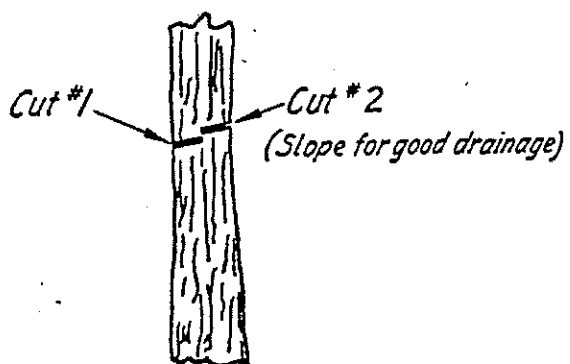
Right Way



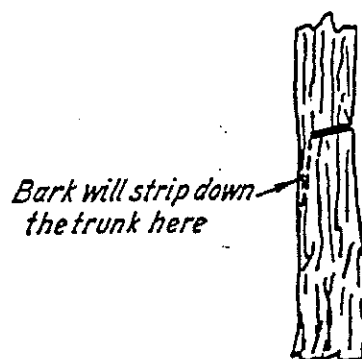
Wrong Way

*For small branches
omit Cuts #1 and #2*

REMOVAL OF HEAVY SIDE LIMB



Right Way



Wrong Way

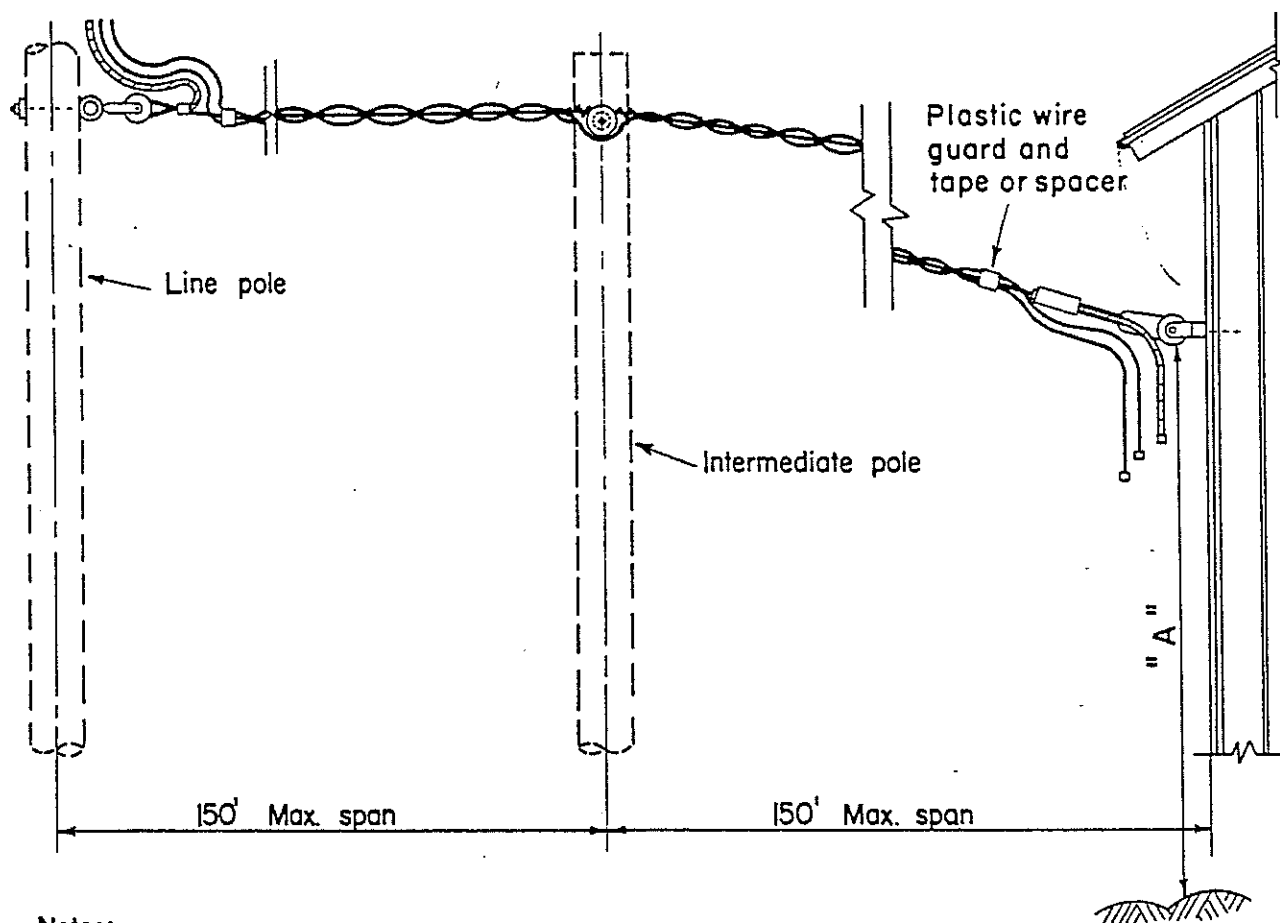
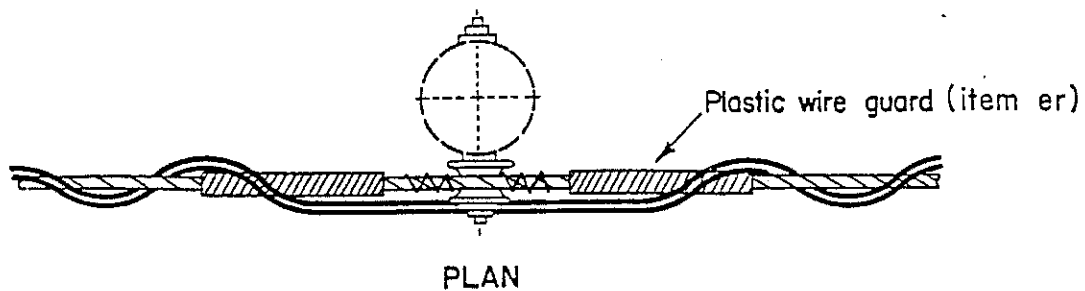
REMOVAL OF VERTICAL LIMB

NOTE: Coat final cut with tree paint.

TREE TRIMMING GUIDE

Apr., 1983

M22-2



Notes:

1. Services as short as possible are preferred.
2. Refer to secondary and service assemblies for construction details.
3. Service connectors to be insulated compression type.

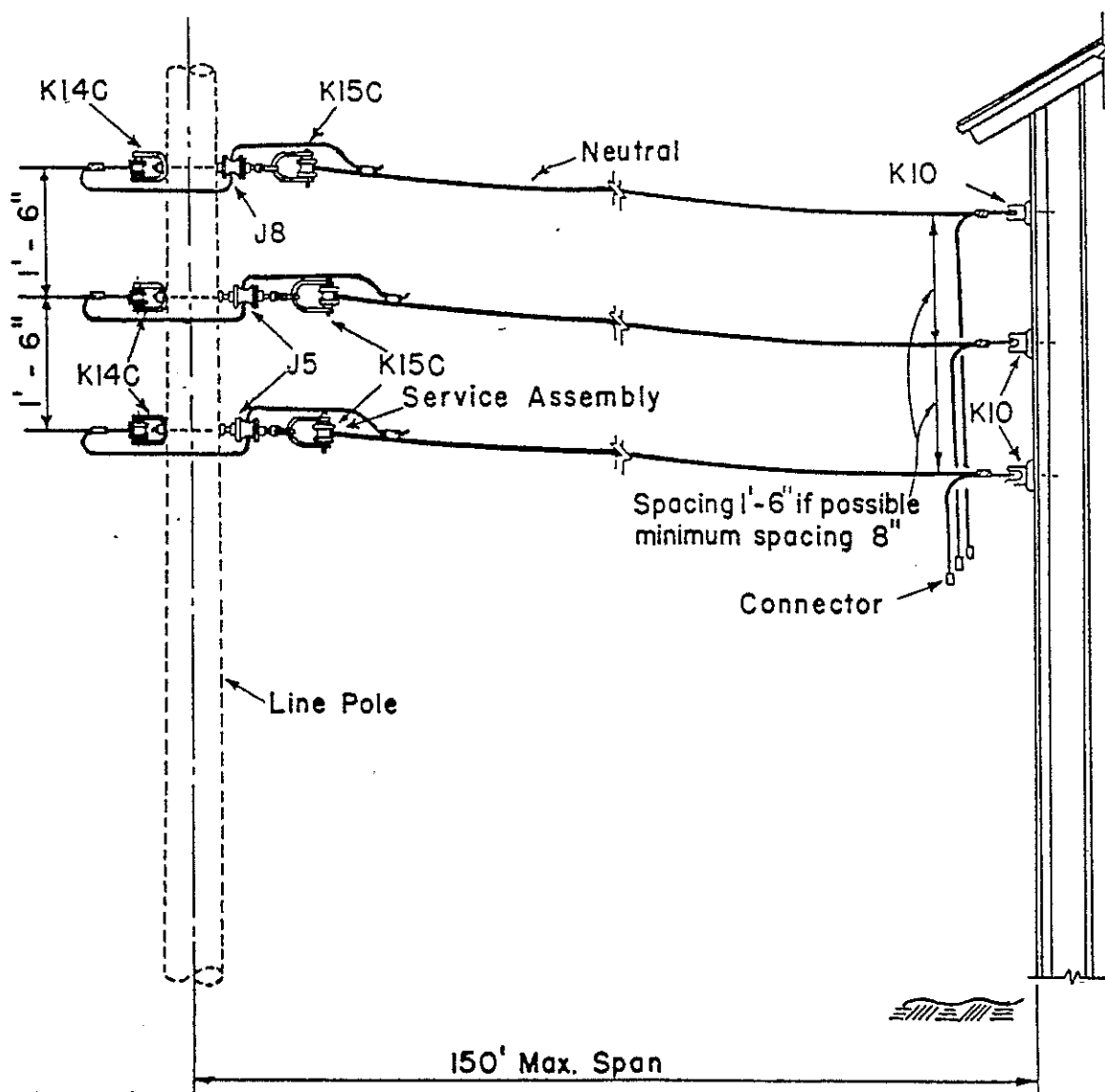
Clearance "A" minimum

To bottom of drip loop	10'
To service assembly and service drop conductor in span	12'

CABLE SERVICE ASSEMBLY GUIDE

Apr., 1983

M24



NOTES:

Service connectors to be insulated compression type.

Clearance from final grade to bottom of drip loop, to service assembly, and to service drop conductor in span shall be 12' minimum.

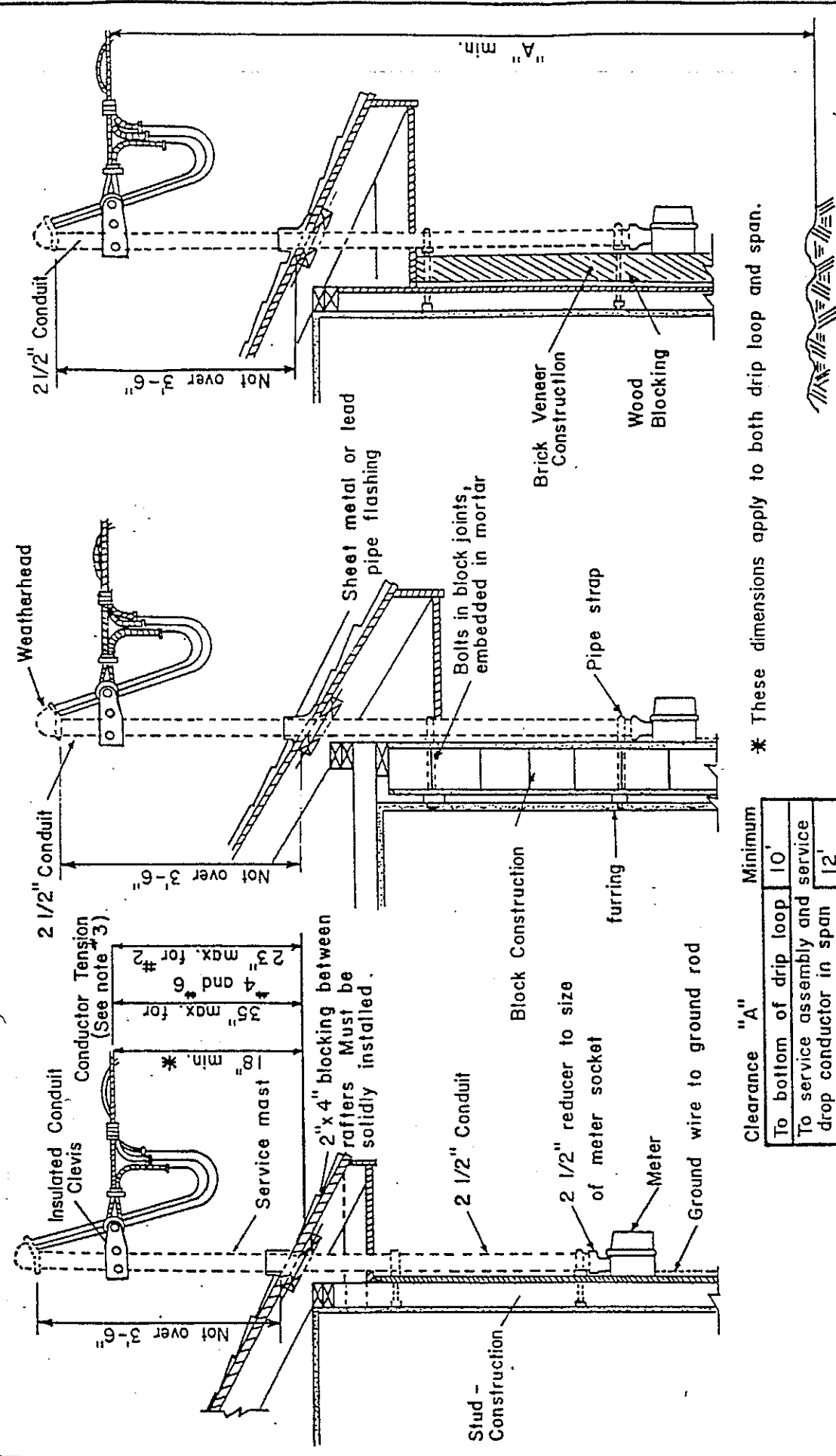
Insulation on covered conductor that is under strain should not be cut.

In brick or concrete walls use 3/8" expansion bolts or shields in 5/8" holes at least 2 1/2" deep, or wedge expanded eyebolts.

OPEN WIRE SECONDARY OR SERVICE ASSEMBLY GUIDE

Apr., 1983

M24-1



Clearance "A"		Minimum
To bottom of drip loop	10'	
To service assembly and service drop conductor in span	12'	

* These dimensions apply to both drip loop and span.

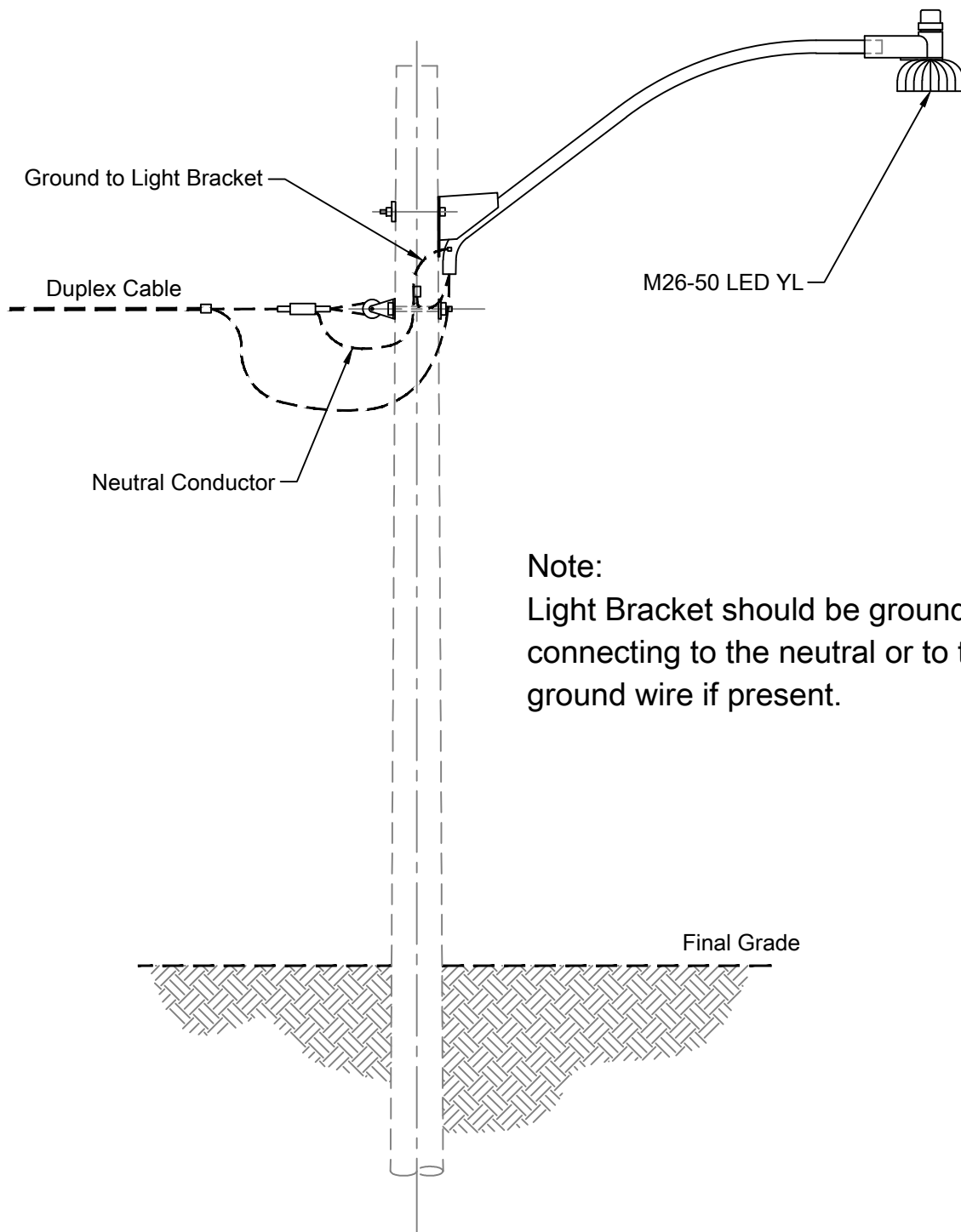
Notes:

1. If length of conduit exceeds ten feet, coupling will be permitted on end adjacent to meter.
2. Meter to be located 5'-6" from ground level.
3. Maximum tension of conductor not to exceed 50 % of ultimate strength.
4. For service assemblies see drawings K16C, K17, K17L.
5. Service connectors to be insulated compression type.

ASSEMBLY GUIDE OF SERVICE MAST FOR RANCH TYPE HOUSE

Apr., 1983

M24-10



YARD LIGHT STANDARD 50 LED - WOOD POLE

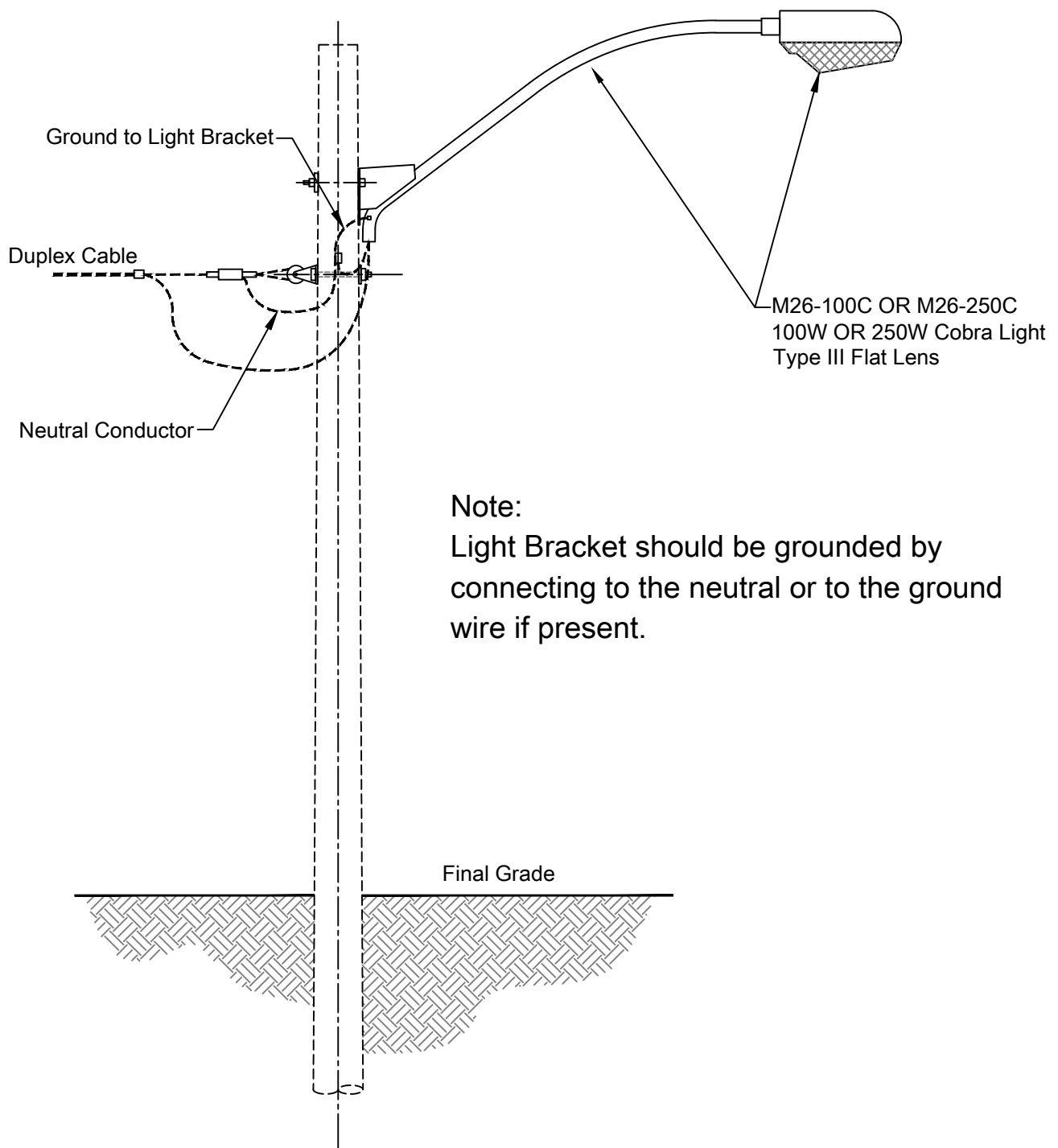
M26-100P

Revision Date

August 2017



M26-50 LED YL
Wood Pole



ROADWAY LIGHT STANDARD
100 W & 250 W COBRA LIGHT
ON A WOOD POLE

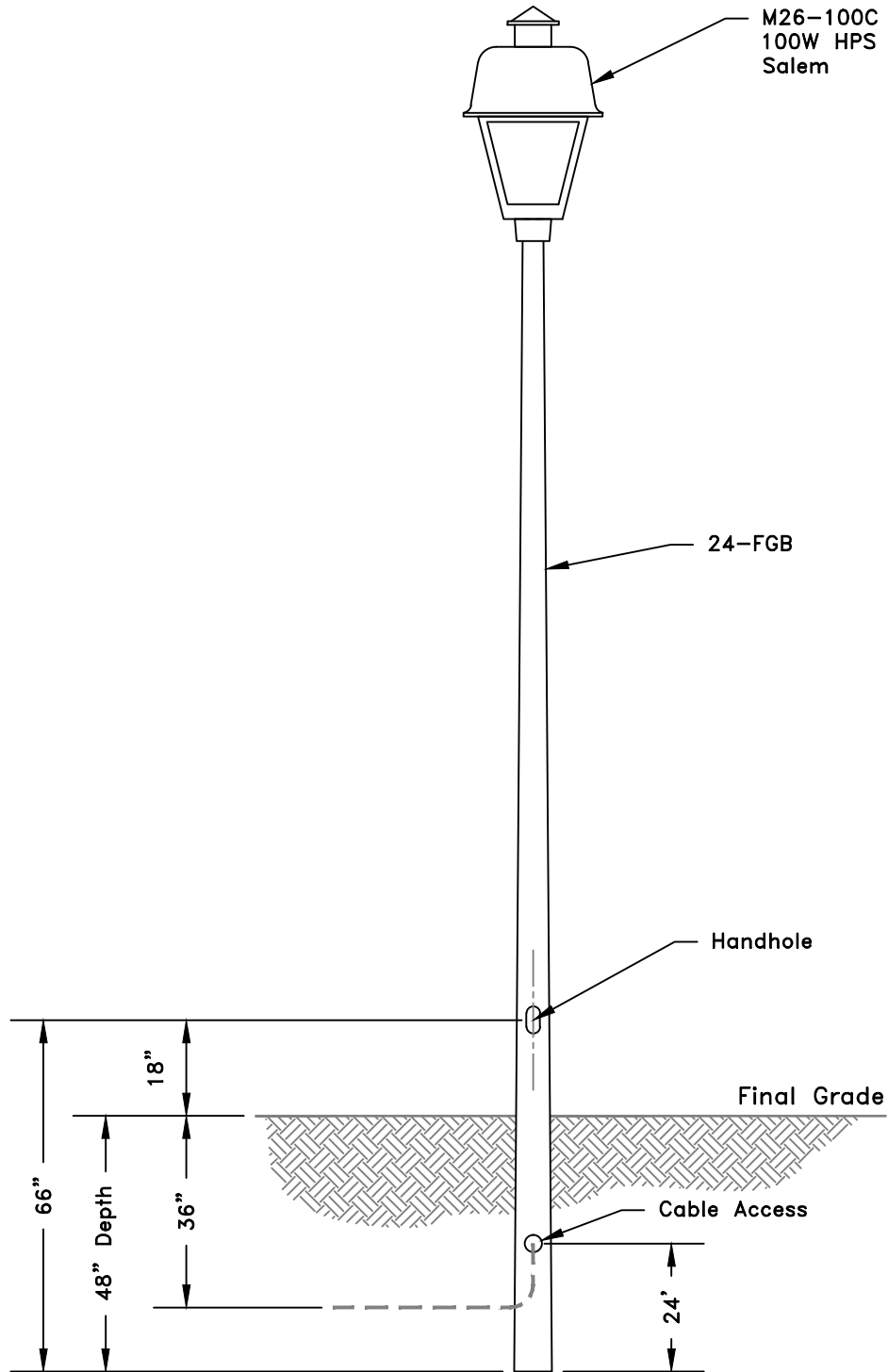
M26-100C

Revision Date

August 2017



M26-100C,
M26-250C



ROADWAY LIGHT STANDARD 100W HPS – SALEM

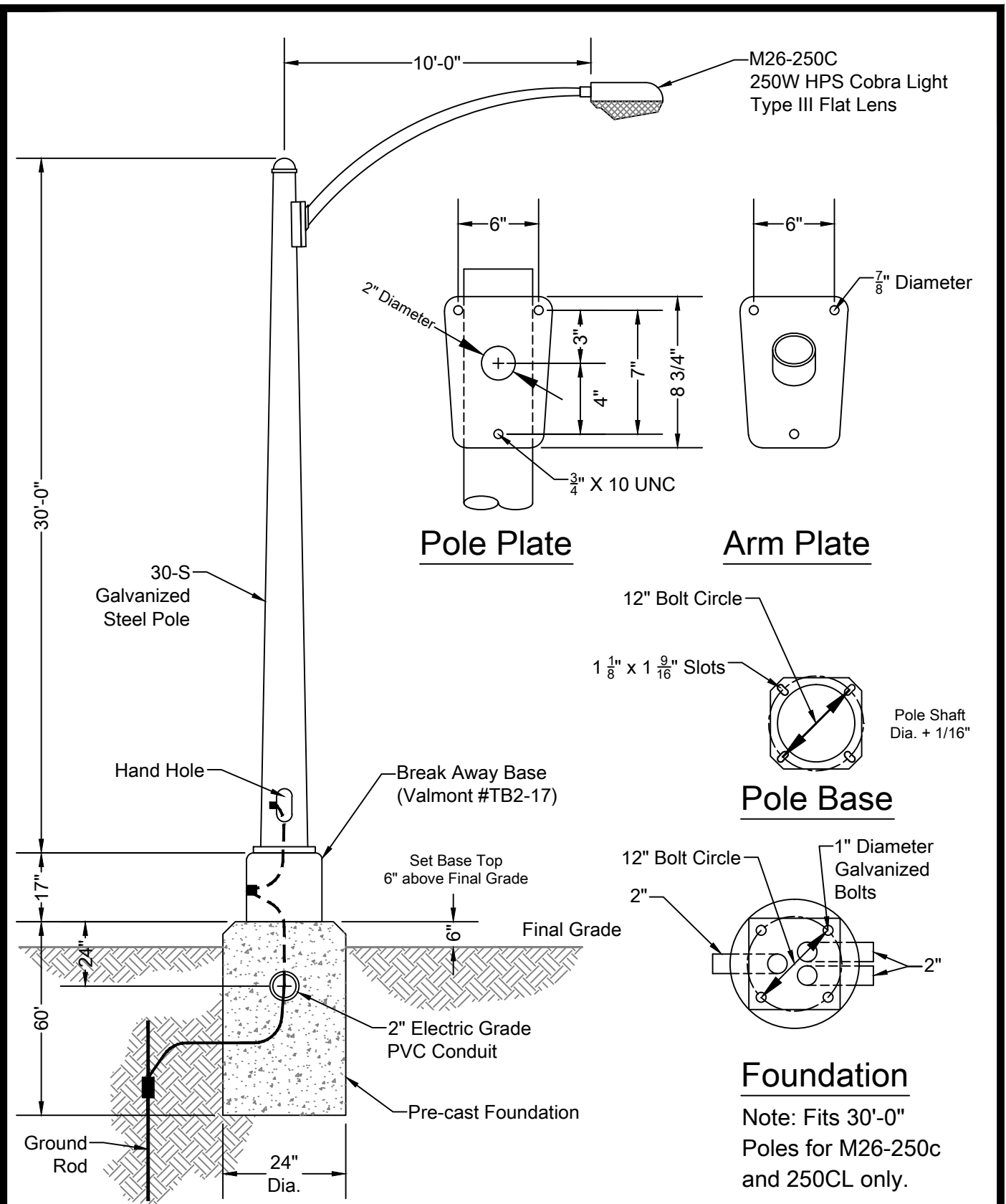
M26-100S

DWG BY: DSG

DATE: 1/31/2013



M26-100S,
Fiberglass Pole



Pole Plate

Arm Plate

Pole Base

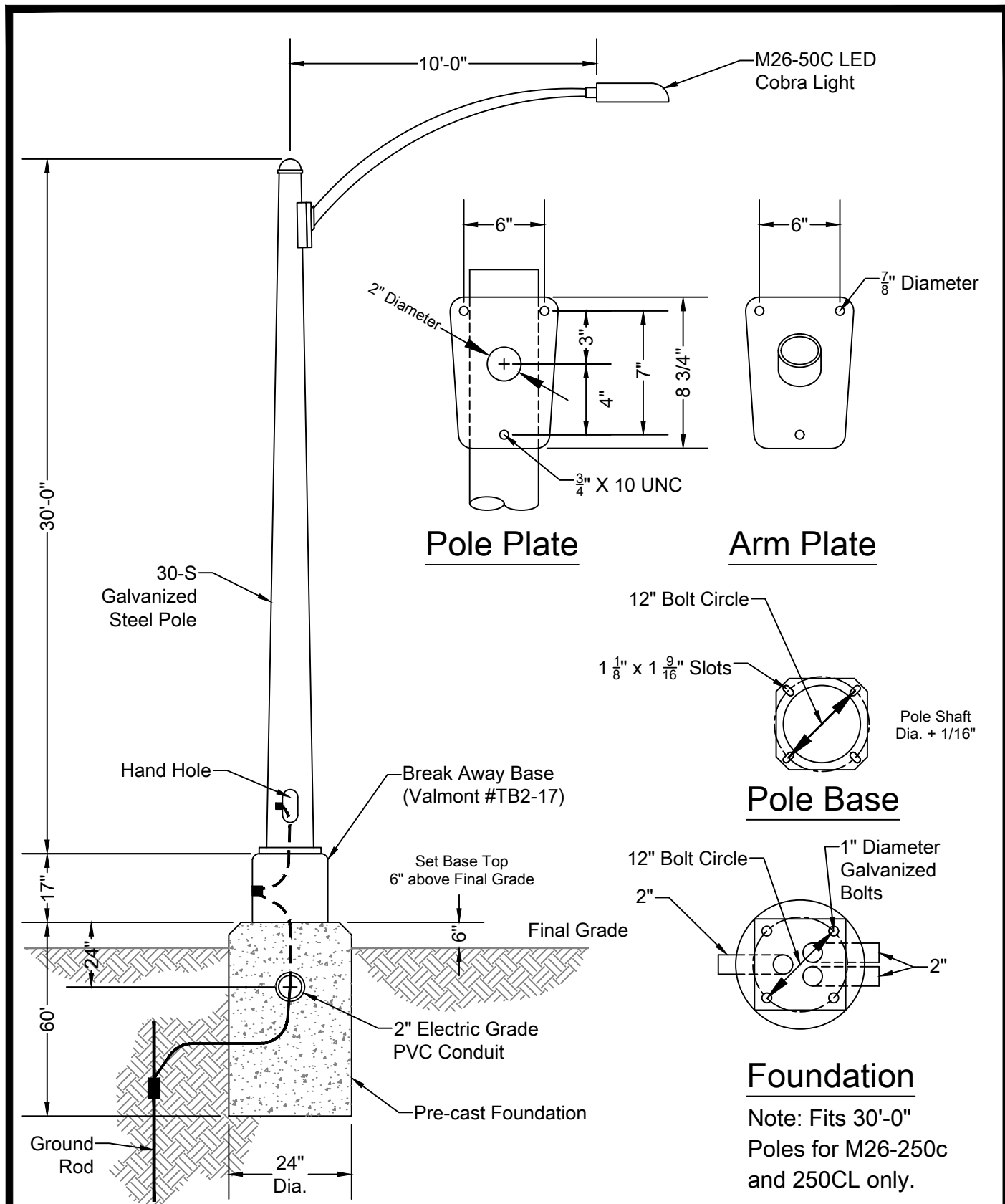
Foundation

Note: Fits 30'-0"
Poles for M26-250c
and 250CL only.

Note:
Connect the Break Away
Base and the Steel Pole
to the Ground Rod and
System Neutral.

**ROADWAY LIGHT STANDARD
250W COBRA LIGHT**

Revision Date		M26-250C* , 30-S
Dec 9, 2016		



Pole Plate

Arm Plate

Pole Base

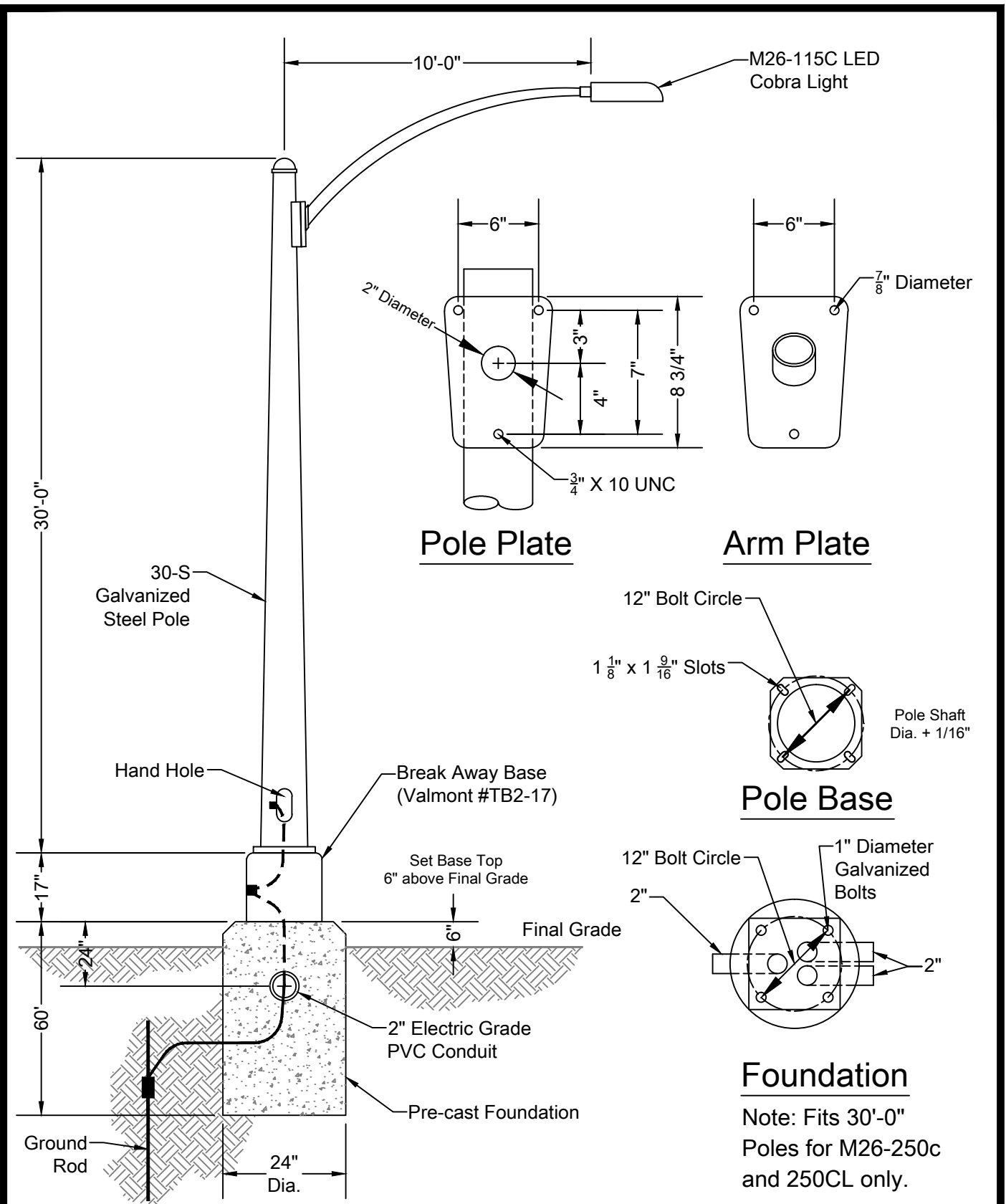
Foundation

Note: Fits 30'-0" Poles for M26-250c and 250CL only.

Note:
Connect the Break Away Base and the Steel Pole to the Ground Rod and System Neutral.

ROADWAY LIGHT STANDARD M26-50C LED COBRA LIGHT

Revision Date		M26-50C LED 30-S
April 29, 2020		



Pole Plate

Arm Plate

Pole Base

Foundation

Note: Fits 30'-0" Poles for M26-250c and 250CL only.

Note:
Connect the Break Away Base and the Steel Pole to the Ground Rod and System Neutral.

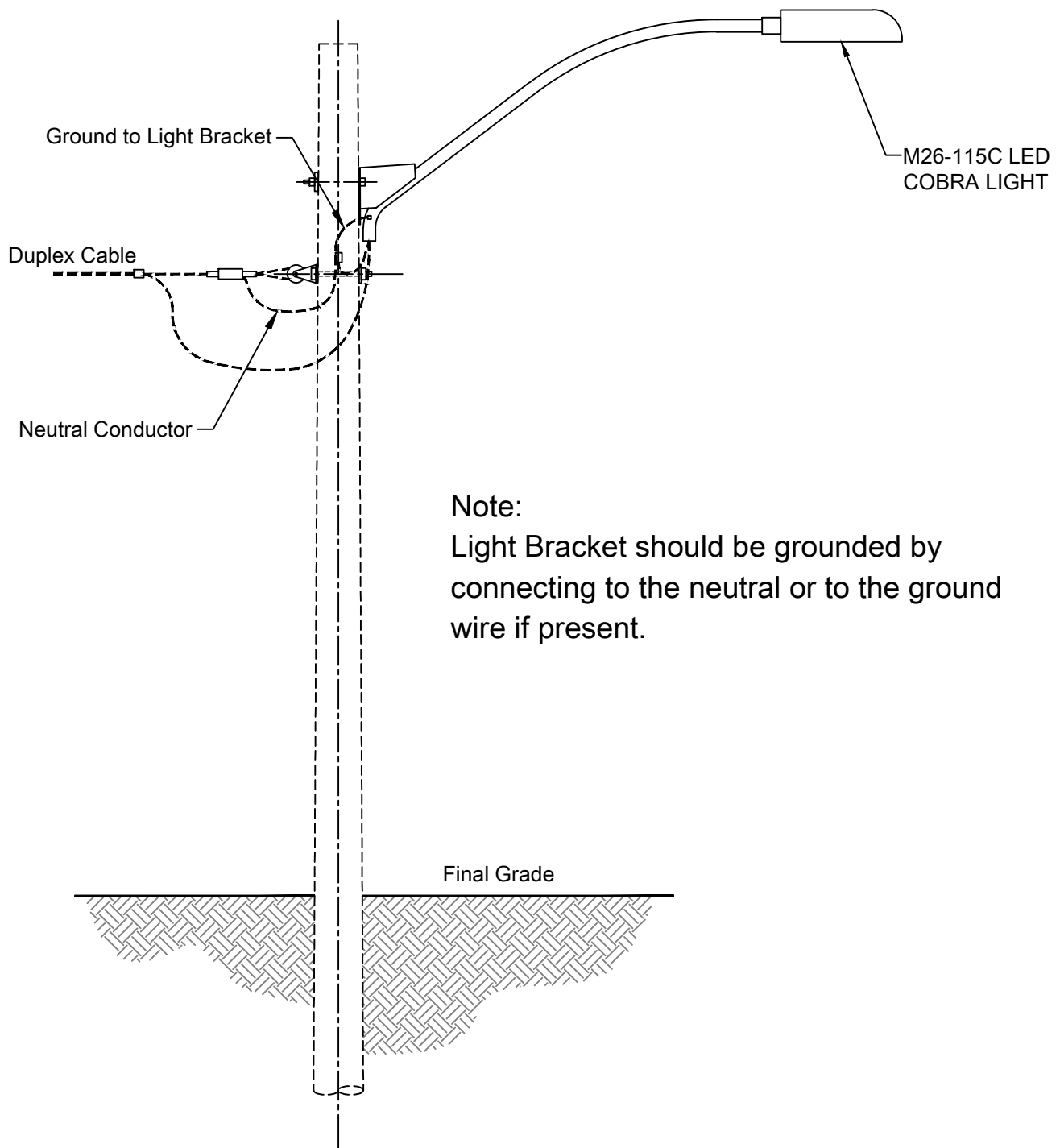
ROADWAY LIGHT STANDARD M26-115C LED COBRA LIGHT

Revision Date

April 18, 2018



M26-115C LED
30-S



ROADWAY LIGHT STANDARD
115W LED COBRA LIGHT
ON A WOOD POLE

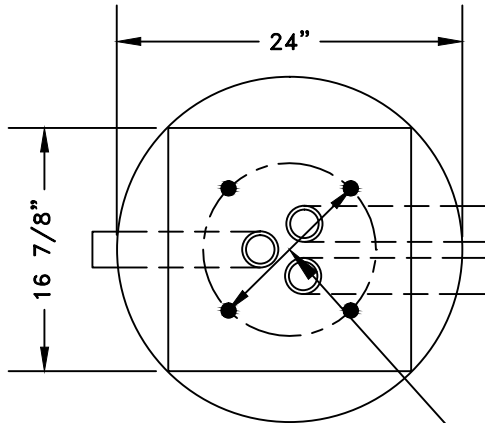
Revision Date

April 18, 2018



M26-115C
LED

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 12" DIAMETER BOLT CIRCLE, (4) 1" x 36" ANCHOR BOLTS
 (3) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS, 1850 LBS.



TOP VIEW

CONCRETE SPECIFICATION:

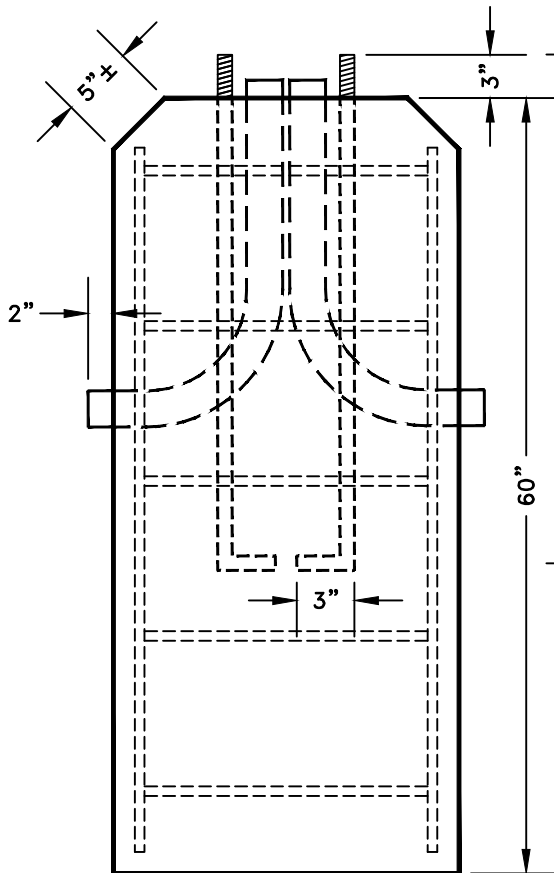
Type II cement plus pozzolith; minimum 5 1/2 bags of cement per cubic yard; maximum of 6 gallons of potable water per 94 pound bag of cement; 1 1/2 inch maximum aggregate size; minimum compressive strength shall be 4500 psi in 28 days

Anchor bolts and conduit to be supplied by manufacturer,

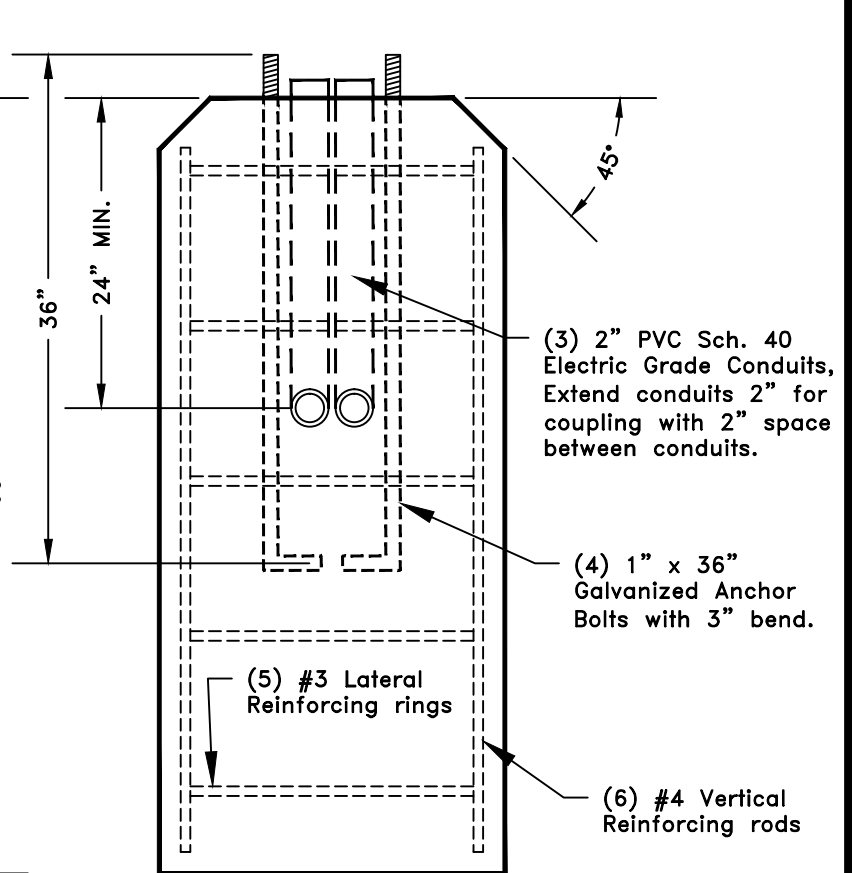
REINFORCEMENT:

The foundation shall have six No. 4 vertical reinforcing rods 52 inches long distributed equally on a 21 inch diameter and secured by five No. 4 lateral reinforcing rings with 12 inch overlap. The lateral reinforcement shall have 12 inches vertical spacing beginning 6 inches above bottom.

12" Bolt Circle



FRONT VIEW



SIDE VIEW

(3) 2" PVC Sch. 40 Electric Grade Conduits, Extend conduits 2" for coupling with 2" space between conduits.

(4) 1" x 36" Galvanized Anchor Bolts with 3" bend.

(5) #3 Lateral Reinforcing rings

(6) #4 Vertical Reinforcing rods

SHEET 1 OF 2
 FOUNDATION FOR
 30-S STEEL POLE

30-S Base

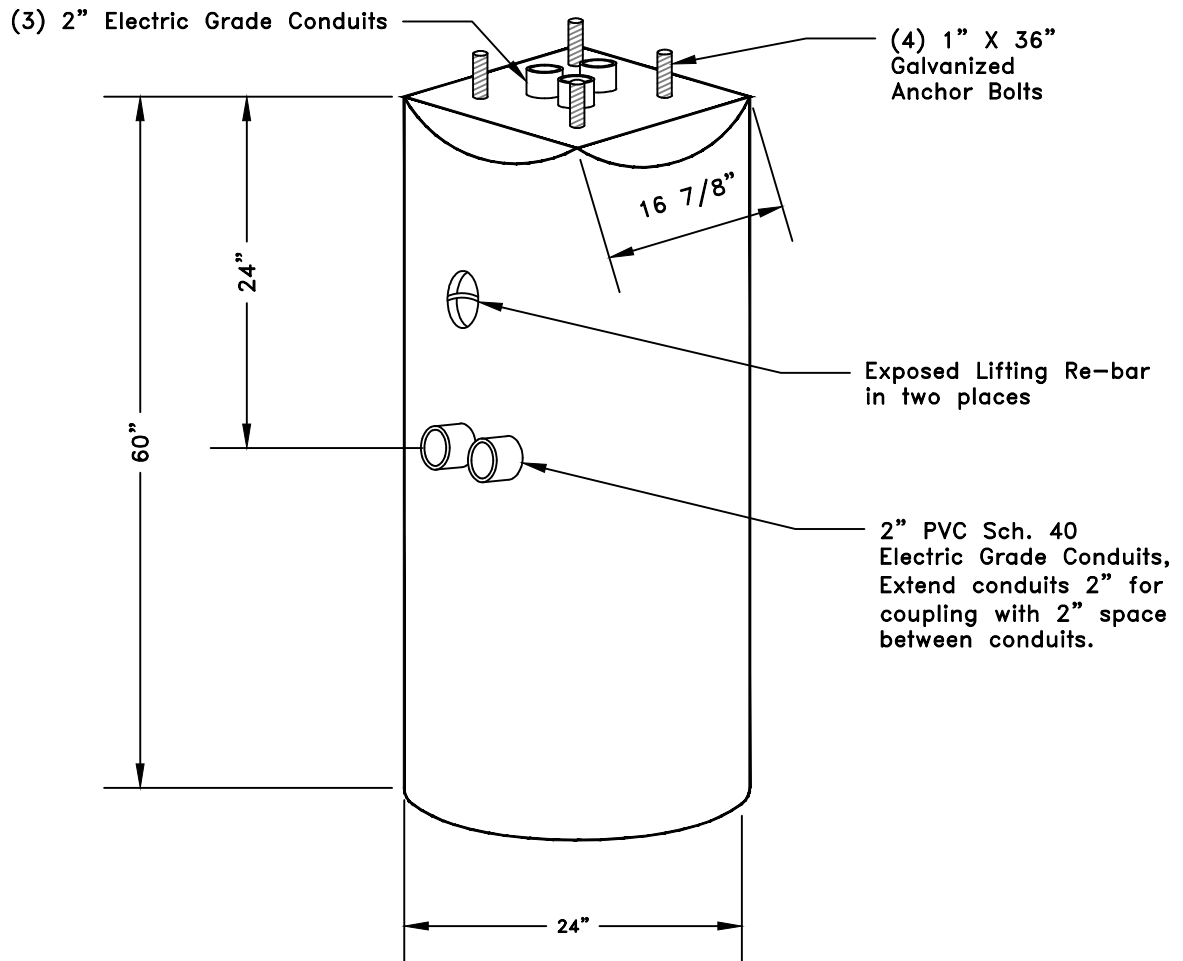
DWG: DSG

DATE: 2/6/2012



30-S
 BASE

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 12" DIAMETER BOLT CIRCLE, (4) 1" x 36" GALVANIZED ANCHOR BOLTS,
 (3) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS, 1850 LBS.



USE: To mount street light standards for City and State thoroughfares.

DIMENSIONS:	DIAMETER	24 INCHES
	HEIGHT	60 INCHES
ANCHOR BOLTS	4	
SIZE	1 INCHES X 36 INCHES	
BOLT CIRCLE	12 INCH	
CABLE ENTRANCE	3	
DIAMETER OF TUBE	2 INCHES	
DIAMETER OF HOLE	2 1/2 INCHES	
WEIGHT EACH, APPROX.	1850 POUNDS	

Foundation, street light, concrete, cylindrical, 24 inches diameter x 60 inches high, with 1 inch x 36 inch anchor bolts and three 2 inch diameter cable entrances; if conduit is not used, the cable entrances shall be 2 1/2 inches.

NOTE:
 If conduit is used, it shall extend from the outside edge of the foundation a minimum of 2 inches, with a 2" space between conduits.

30-S Base

SHEET 2 OF 2
 FOUNDATION FOR
 30-S STEEL POLE

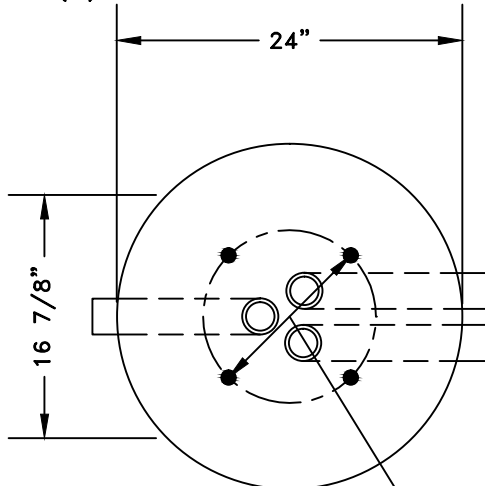
DWG: DSG

DATE: 2/6/2012



30-S
 BASE

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 12" DIAMETER BOLT CIRCLE, (4) 1" x 36" GALVANIZED ANCHOR BOLTS
 (3) 2" DIAMETER SCH. 40 PVC ELECTRIC GRADE CONDUITS, 1850 LBS.



TOP VIEW

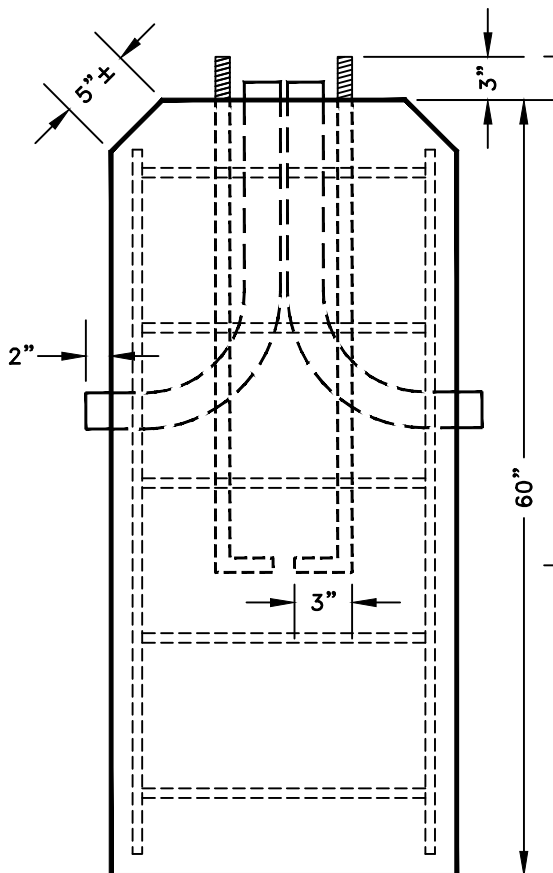
CONCRETE SPECIFICATION:

Type II cement plus pozzolith; minimum 5 1/2 bags of cement per cubic yard; maximum of 6 gallons of potable water per 94 pound bag of cement; 1 1/2 inch maximum aggregate size; minimum compressive strength shall be 4500 psi in 28 days

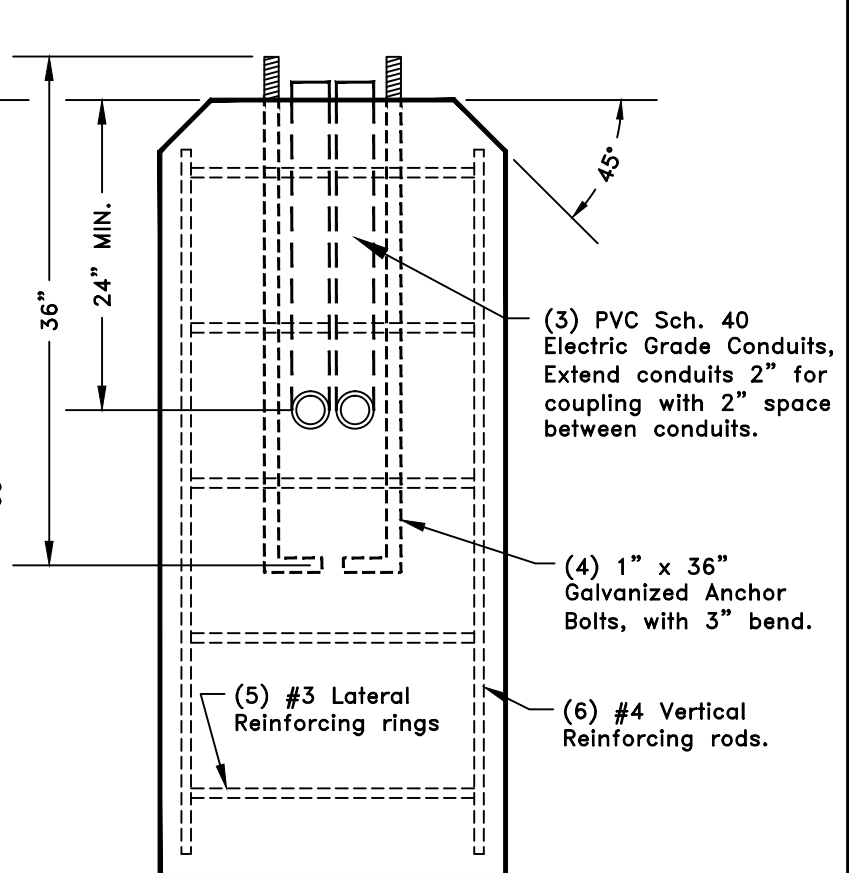
Anchor bolts and conduit to be supplied by manufacturer,

REINFORCEMENT:

The foundation shall have six No. 4 vertical reinforcing rods 52 inches long distributed equally on a 21 inch diameter and secured by five No. 4 lateral reinforcing rings with 12 inch overlap. The lateral reinforcement shall have 12 inches vertical spacing beginning 6 inches above bottom.



FRONT VIEW



SIDE VIEW

SHEET 1 OF 2
 FOUNDATION FOR
 30-SCL STEEL POLE

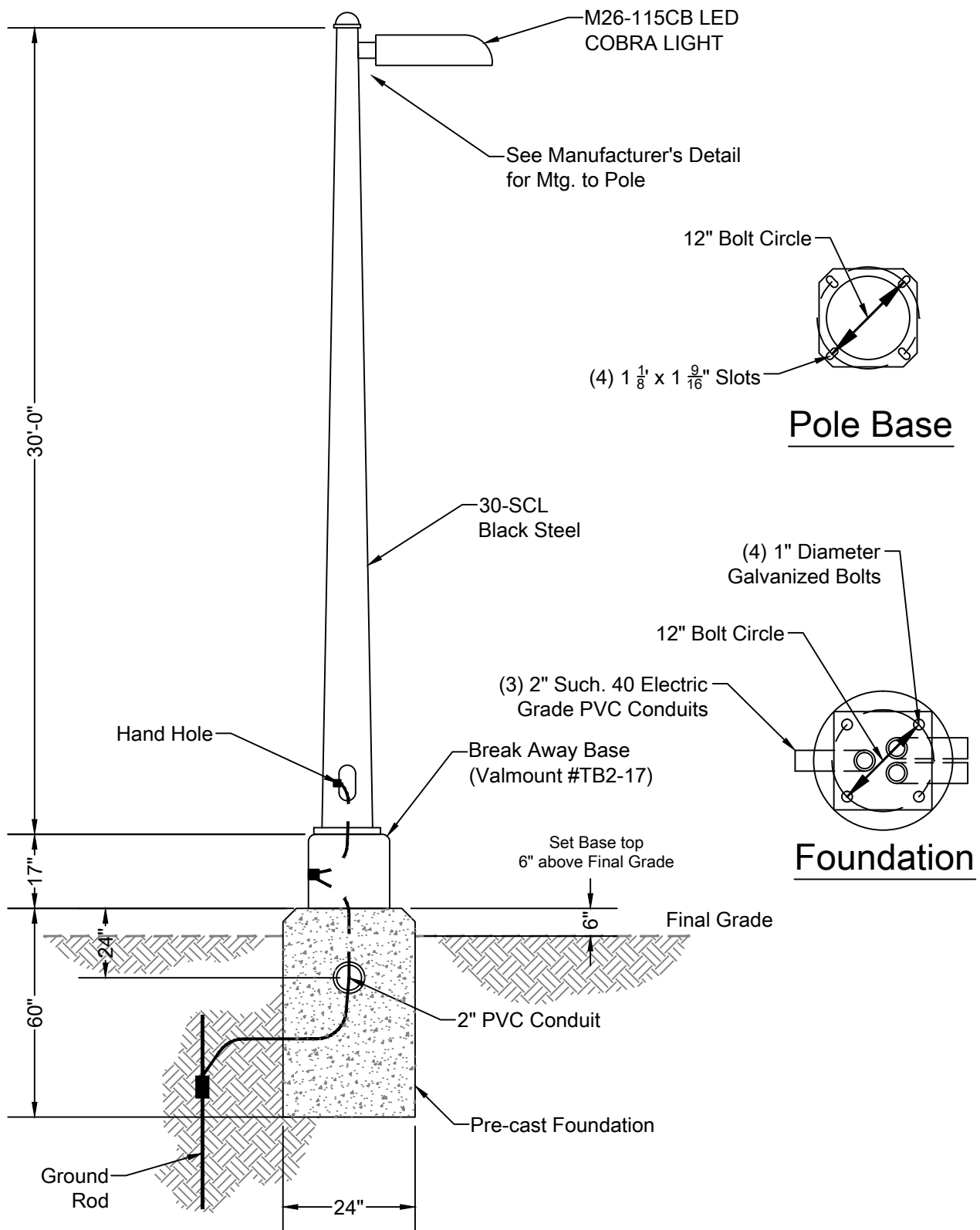
30-SCL Base

DWG: DSG

DATE: 2/6/2012



30-SCL
 BASE



Note:

Connect the Break Away Base and the Steel Pole to the Ground Rod and System Neutral.

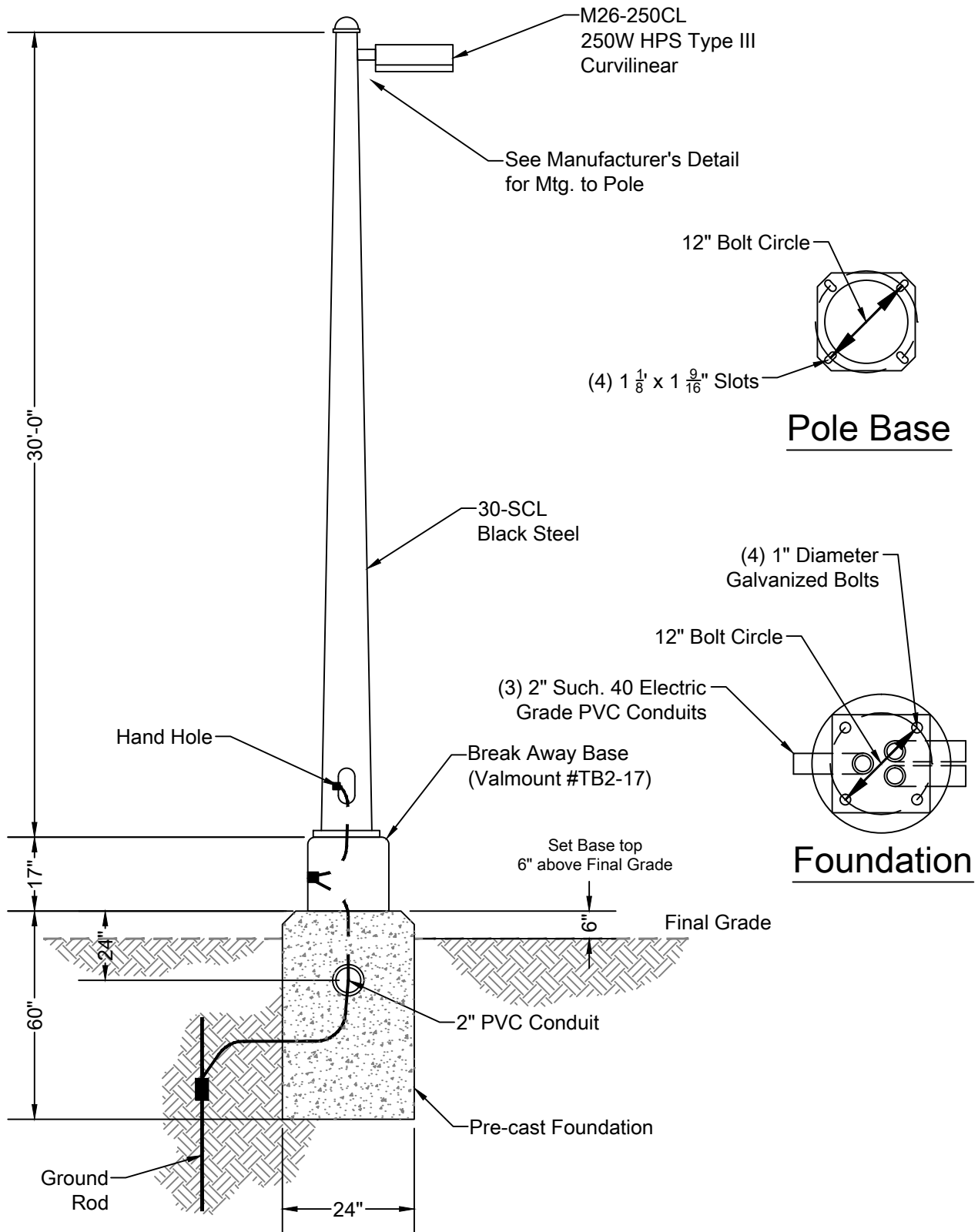
ORNAMENTAL STREET LIGHTING STANDARD 115W PS

Revision Date

Sept 10, 2019



M26-115CB
30-SCL



Note:

Connect the Break Away
Base and the Steel Pole
to the Ground Rod and
System Neutral.

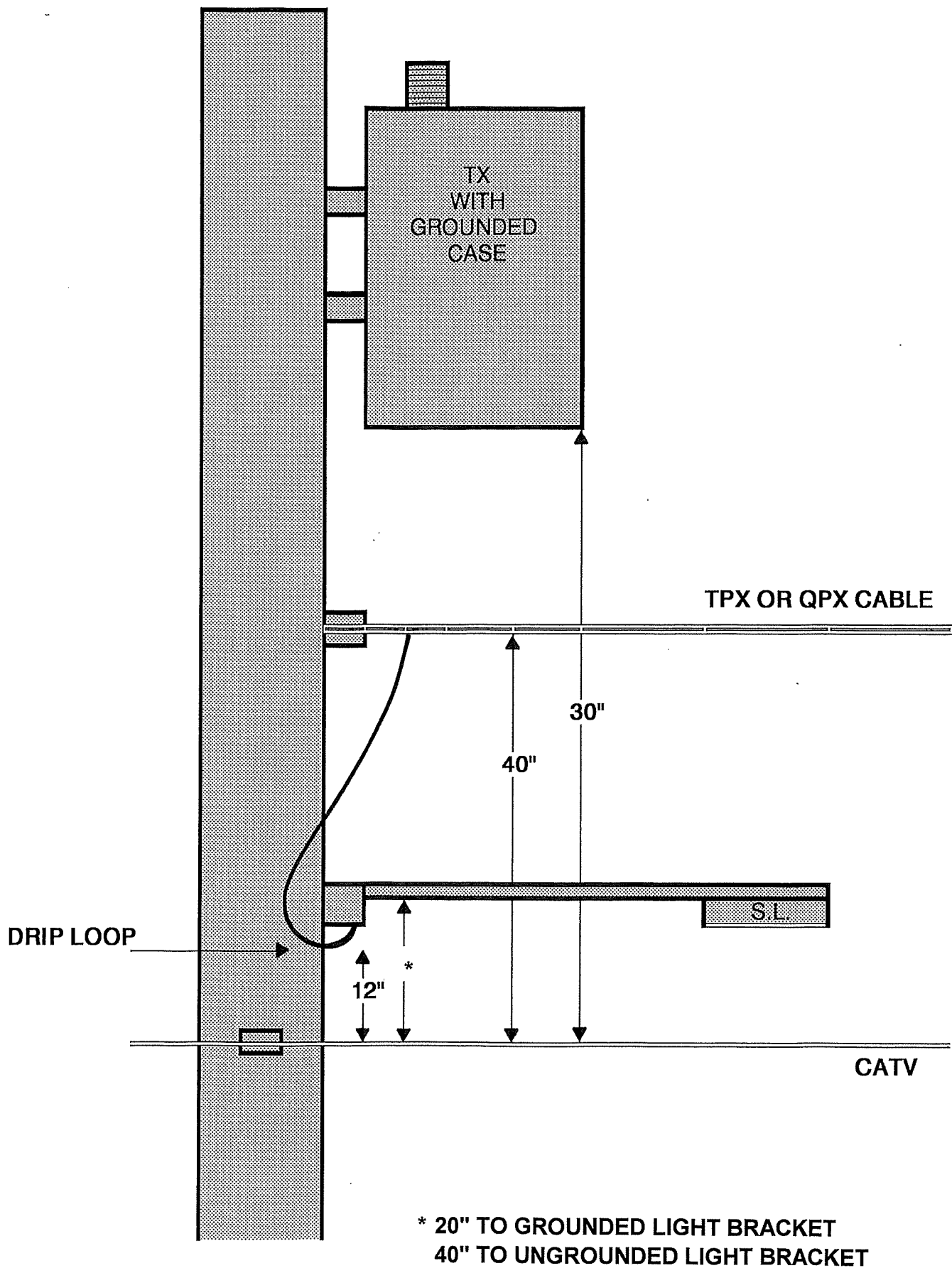
ORNAMENTAL STREET LIGHTING STANDARD 250W PS

Revision Date

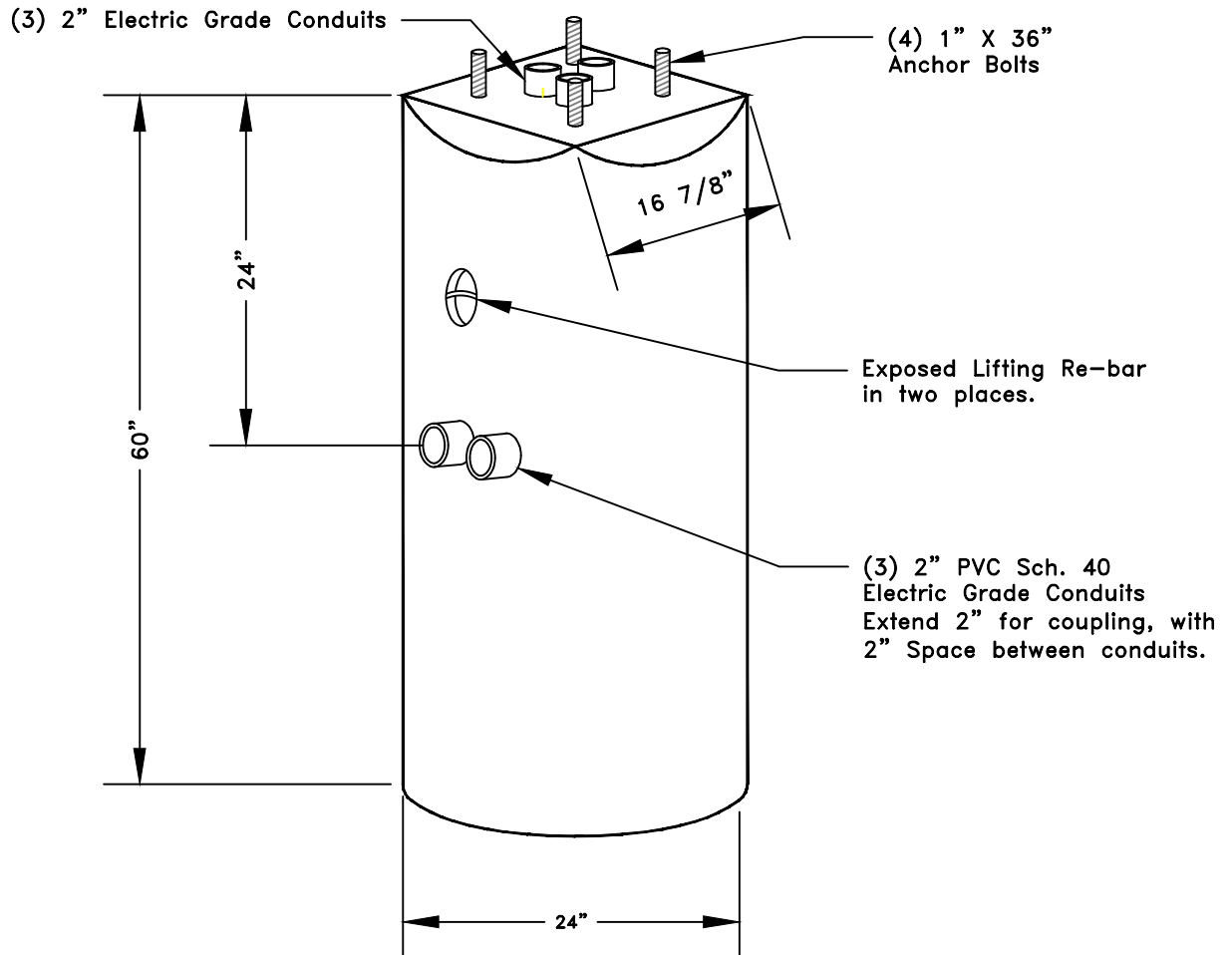
Sept 10, 2019



M26-250CL,
(For Retirement Only)



CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 12" DIAMETER BOLT CIRCLE, (4) 1" x 36" GALVANIZED ANCHOR BOLTS,
 (3) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS, 1850 LBS.



USE: To mount street light standards for City and State thoroughfares.

DIMENSIONS:	DIAMETER	24 INCHES
	HEIGHT	60 INCHES
ANCHOR BOLTS	4	
SIZE	1 INCHES X 36 INCHES	
BOLT CIRCLE	12 INCH	
CABLE ENTRANCE	3	
DIAMETER OF TUBE	2 INCHES	
DIAMETER OF HOLE	2 1/2 INCHES	
WEIGHT EACH, APPROX.	1850 POUNDS	

Foundation, street light, concrete, cylindrical, 24 inches diameter x 60 inches high, with 1 inch x 36 inch anchor bolts and three 2 inch diameter cable entrances; if conduit is not used, the cable entrances shall be 2 1/2 inches.

NOTE:
 If conduit is used, it shall extend from the outside edge of the foundation a minimum of 2 inches, with a 2" space between conduits.

30-SCL Base

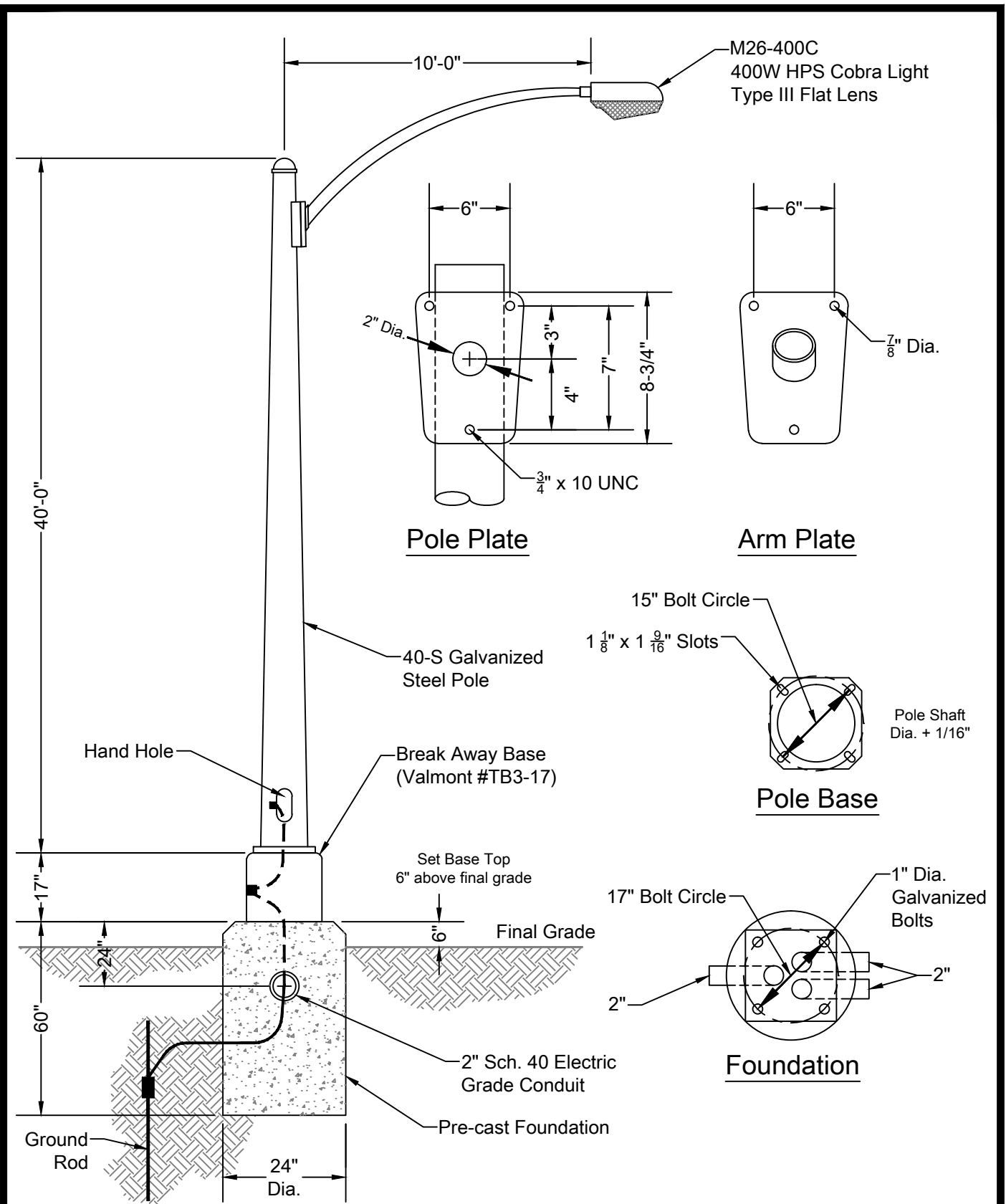
DWG: DSG

DATE: 2/6/2012



30-SCL
 BASE

SHEET 2 OF 2
 FOUNDATION FOR
 30-SCL STEEL POLE



Note:
Connect the Break Away Base and the Steel Pole to the Ground Rod and System Neutral.

ROADWAY LIGHT STANDARD 400W COBRA LIGHT

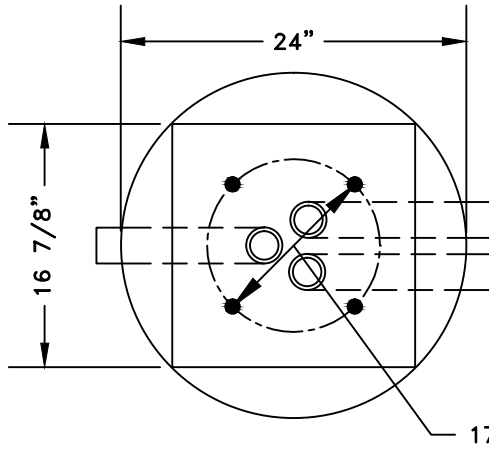
Revision Date

Dec 9, 2016



M26-400C,
40-S

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 17" DIAMETER BOLT CIRCLE, (4) 1" x 36" ANCHOR BOLTS,
 (3) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS, 1850 LBS.



TOP VIEW

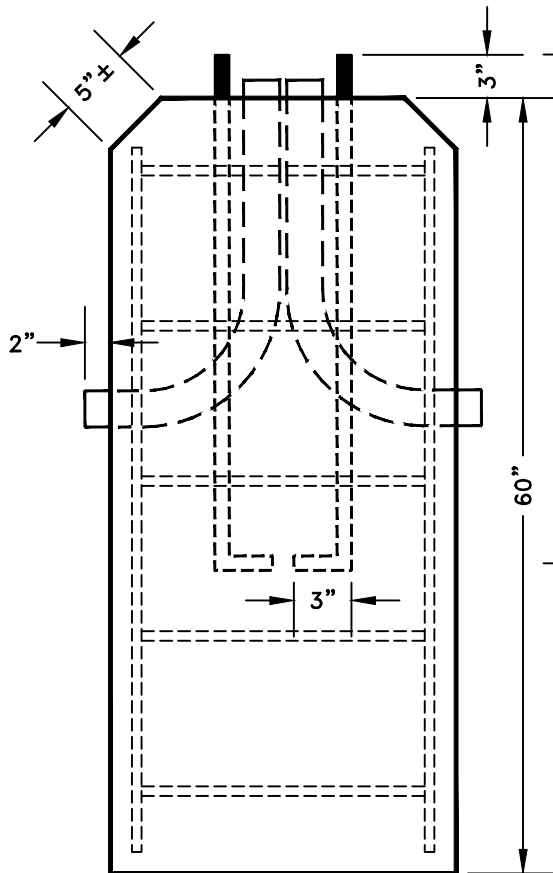
CONCRETE SPECIFICATION:

Type II cement plus pozzolith; minimum 5 1/2 bags of cement per cubic yard; maximum of 6 gallons of potable water per 94 pound bag of cement; 1 1/2 inch maximum aggregate size; minimum compressive strength shall be 4500 psi in 28 days

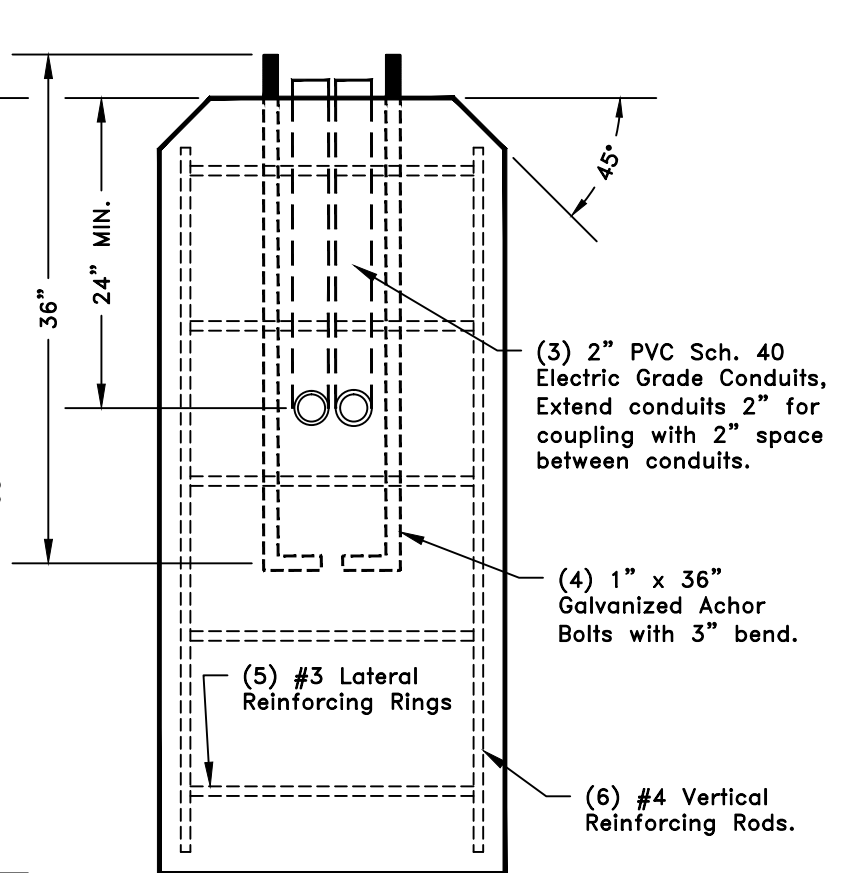
Anchor bolts and conduit to be supplied by manufacturer,

REINFORCEMENT:

The foundation shall have six No. 4 vertical reinforcing rods 52 inches long distributed equally on a 21 inch diameter and secured by five No. 4 lateral reinforcing rings with 12 inch overlap. The lateral reinforcement shall have 12 inches vertical spacing beginning 6 inches above bottom.



FRONT VIEW



SIDE VIEW

(3) 2" PVC Sch. 40 Electric Grade Conduits, Extend conduits 2" for coupling with 2" space between conduits.

(4) 1" x 36" Galvanized Anchor Bolts with 3" bend.

(5) #3 Lateral Reinforcing Rings

(6) #4 Vertical Reinforcing Rods.

SHEET 1 OF 2
 FOUNDATION FOR
 40-S STEEL POLE

40-S Base

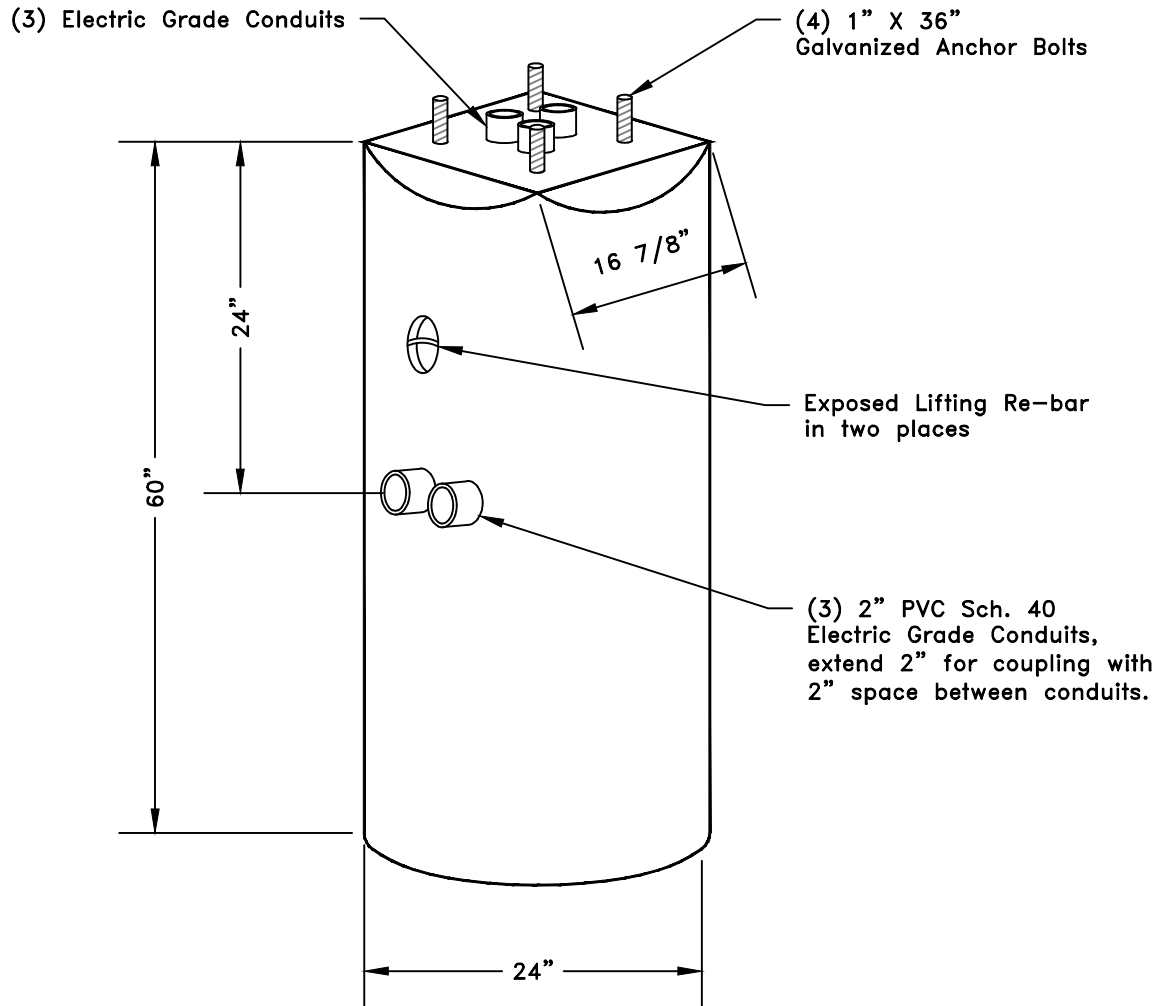
DWG: DSG

DATE: 1/24/2013



40-S BASE

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 60" HEIGHT
 17" DIAMETER BOLT CIRCLE, (4) 1" x 36" GALVANIZED ANCHOR BOLTS,
 (3) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS, 1850 LBS.



USE: To mount street light standards for City and State thoroughfares.

DIMENSIONS:	DIAMETER	24 INCHES
	HEIGHT	60 INCHES
ANCHOR BOLTS	SIZE	4
	BOLT CIRCLE	1 INCHES X 36 INCHES
		17 INCH
CABLE ENTRANCE	DIAMETER OF TUBE	3
	DIAMETER OF HOLE	2 INCHES
		2 1/2 INCHES

Foundation, street light, concrete, cylindrical, 24 inches diameter x 60 inches high, with 1 inch x 36 inch anchor bolts and three 2 inch diameter cable entrances; if conduit is not used, the cable entrances shall be 2 1/2 inches.

NOTE:
 If conduit is used, it shall extend from the outside edge of the foundation a minimum of 2 inches with a 2" space between conduits.

SHEET 2 OF 2
 FOUNDATION FOR
 40-S STEEL POLE

40-S Base

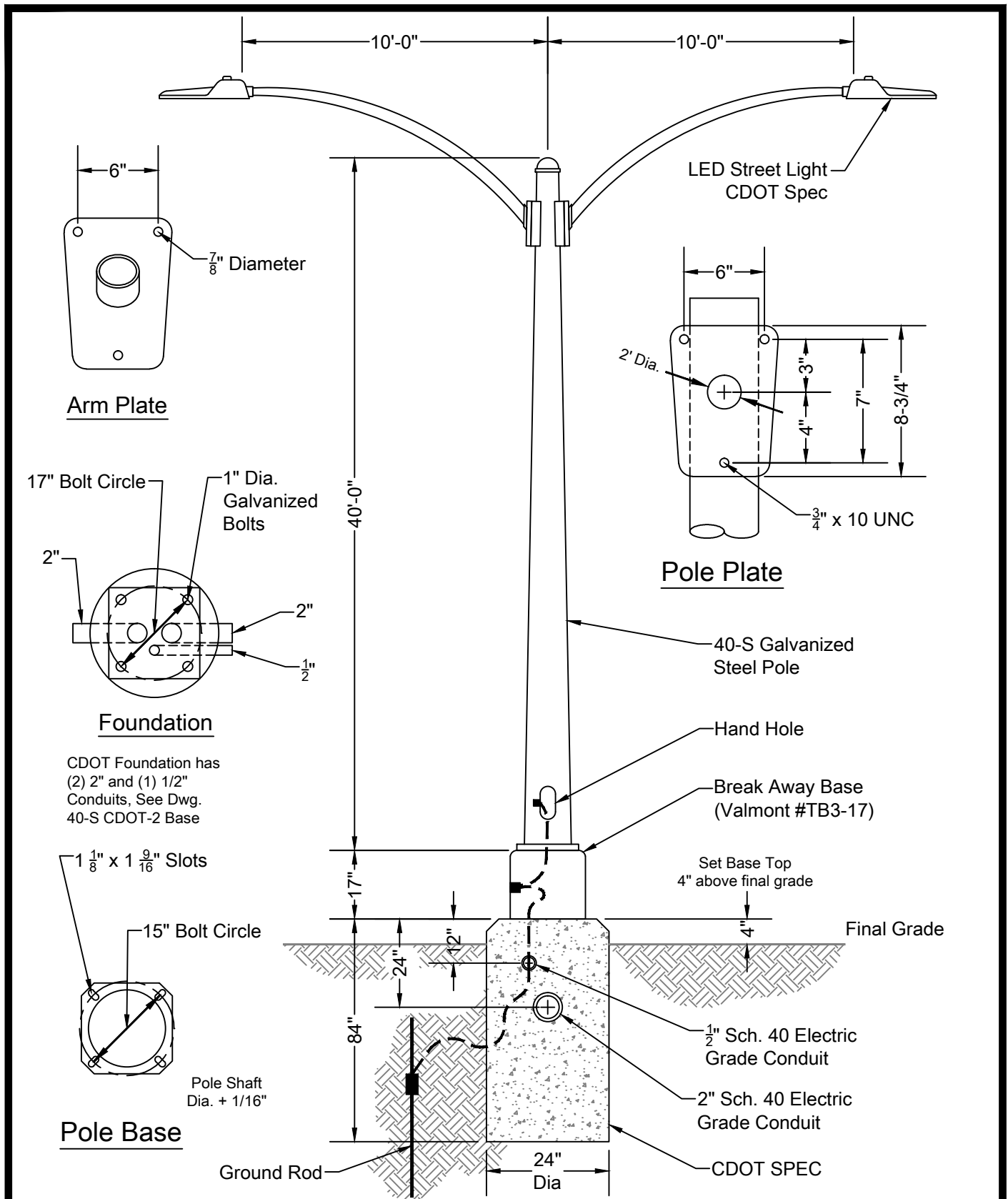
DWG: DSG

DATE: 1/24/2013



40-S BASE

M26-CDOT,
40-S CDOT-1



Note:

Connect the Break Away
Base and the Steel Pole
to the Ground Rod and
System Neutral.

40-S CDOT-2

ROADWAY LIGHT STANDARD DOUBLE LED COBRA LIGHT

Revision Date

Dec 9, 2016



M26-CDOT,
40-S CDOT-2

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 84" HEIGHT
 17" DIAMETER BOLT CIRCLE, (4) 1" x 36" ANCHOR BOLTS,
 (2) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS
 (1) 1/2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS

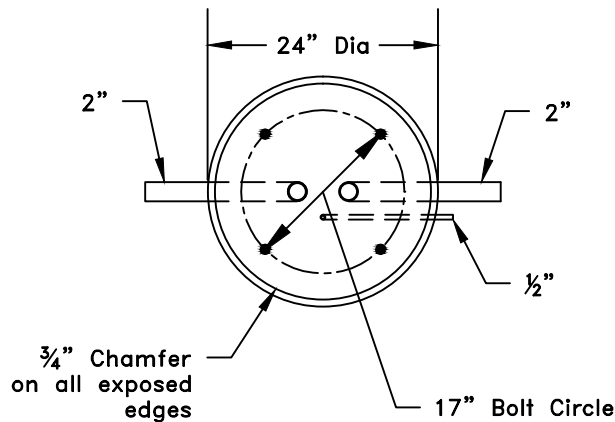
CONCRETE SPECIFICATION:

Type II cement plus pozzolith; minimum 5 1/2 bags of cement per cubic yard; maximum of 6 gallons of potable water per 94 pound bag of cement; 1 1/2 inch maximum aggregate size; minimum compressive strength shall be 4500 psi in 28 days

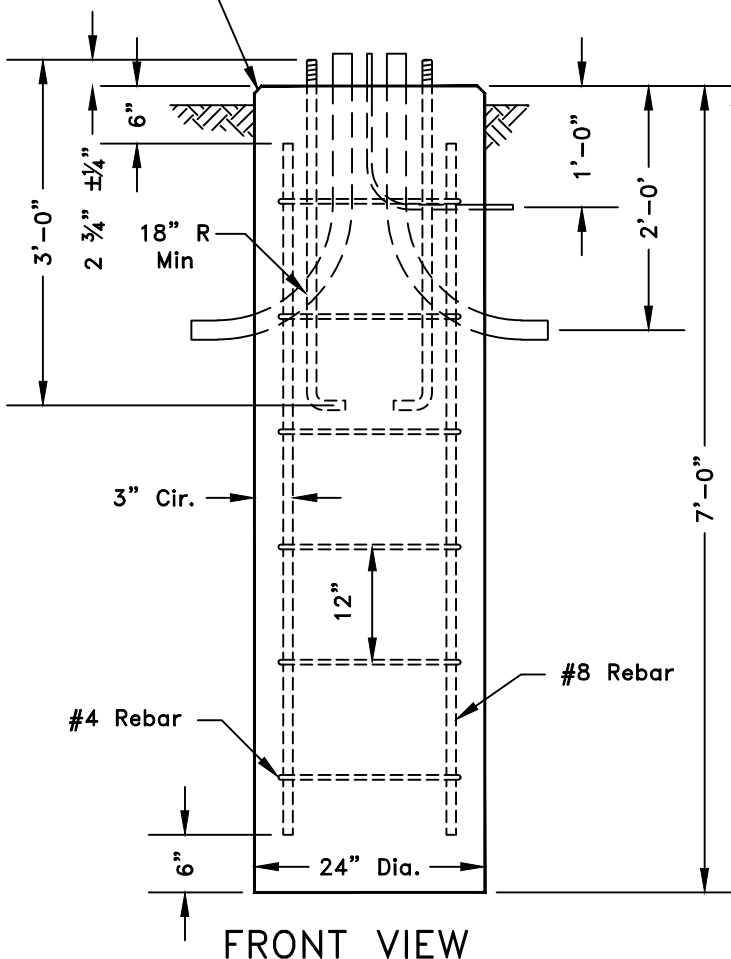
Anchor bolts and conduit to be supplied by manufacturer,

REINFORCEMENT:

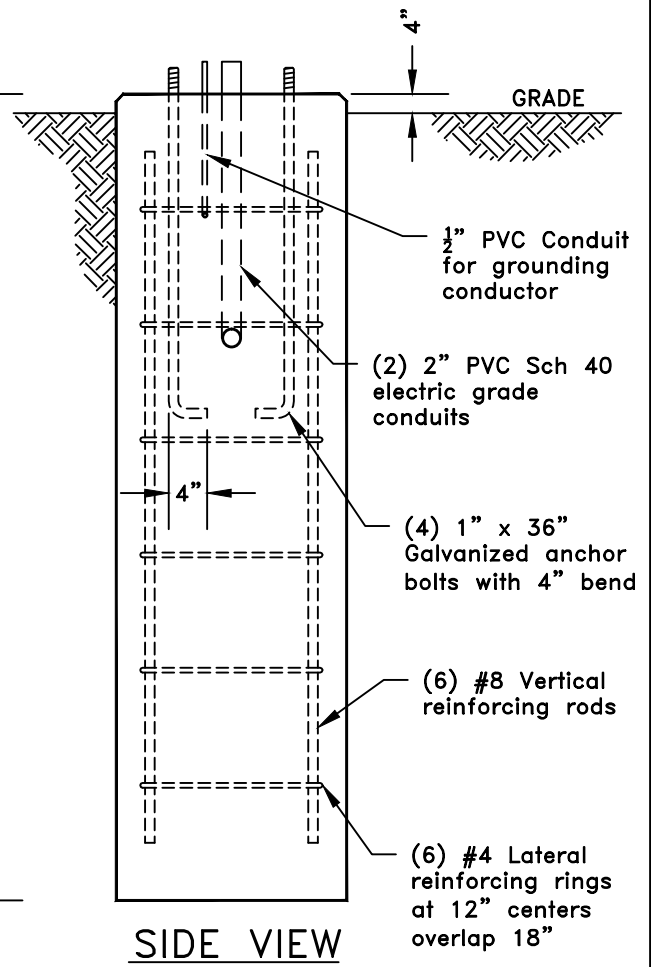
The foundation shall have (6) #8 vertical reinforcing rods 72 inches long distributed equally on a 18 inch diameter with a 6" spacing between top and bottom and secured by (6) #4 lateral reinforcing rings with 18 inch overlap. The lateral reinforcing rods shall have 12 inches vertical spacing.



TOP VIEW



FRONT VIEW



SIDE VIEW

FOUNDATION FOR
 40-S STEEL POLE - CDOT-1 BASE

40-S CDOT

DWG: DSG

DATE: 1/31/2013



40-S
 CDOT-1 BASE

CONCRETE STREET LIGHT FOUNDATION, 24" DIAMETER x 84" HEIGHT
 17" DIAMETER BOLT CIRCLE, (4) 1" x 36" ANCHOR BOLTS,
 (2) 2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS
 (1) 1/2" DIAMETER SCH. 40 ELECTRIC GRADE CONDUITS

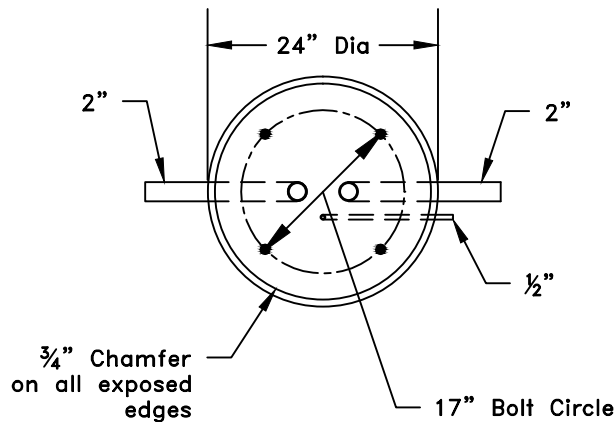
CONCRETE SPECIFICATION:

Type II cement plus pozzolith; minimum 5 1/2 bags of cement per cubic yard; maximum of 6 gallons of potable water per 94 pound bag of cement; 1 1/2 inch maximum aggregate size; minimum compressive strength shall be 4500 psi in 28 days

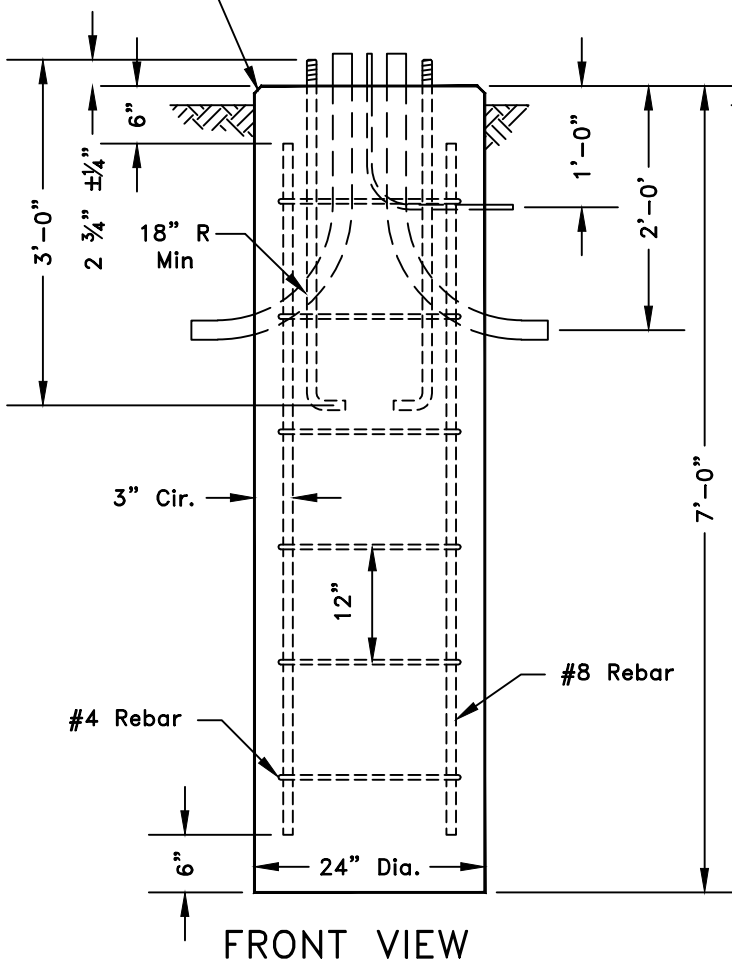
Anchor bolts and conduit to be supplied by manufacturer,

REINFORCEMENT:

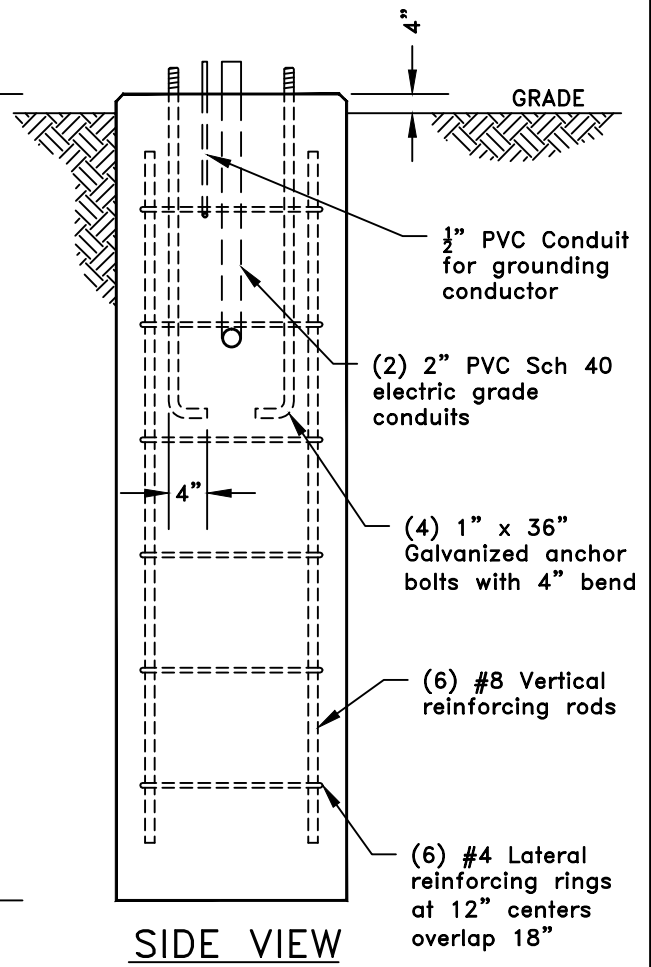
The foundation shall have (6) #8 vertical reinforcing rods 72 inches long distributed equally on a 18 inch diameter with a 6" spacing between top and bottom and secured by (6) #4 lateral reinforcing rings with 18 inch overlap. The lateral reinforcing rods shall have 12 inches vertical spacing.



TOP VIEW



FRONT VIEW



SIDE VIEW

FOUNDATION FOR
 40-S STEEL POLE - CDOT-2 BASE

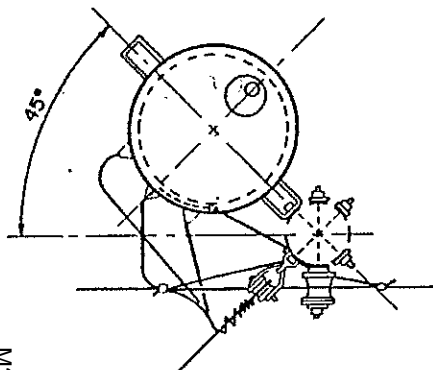
40-S CDOT

DWG: DSG

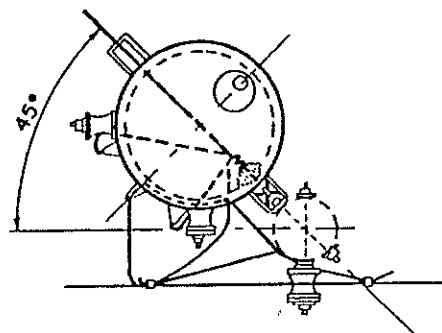
DATE: 1/31/2013



40-S
 CDOT-2 BASE

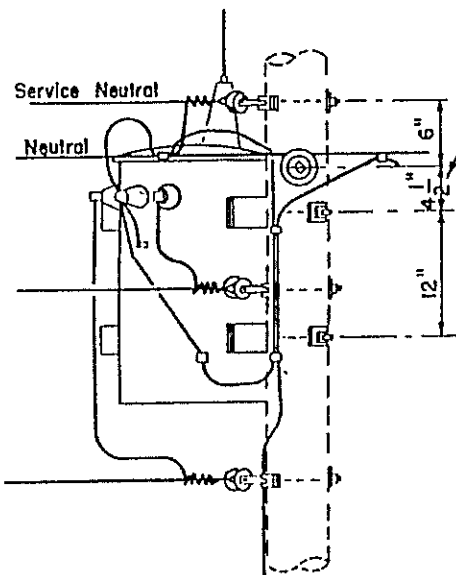


PLAN

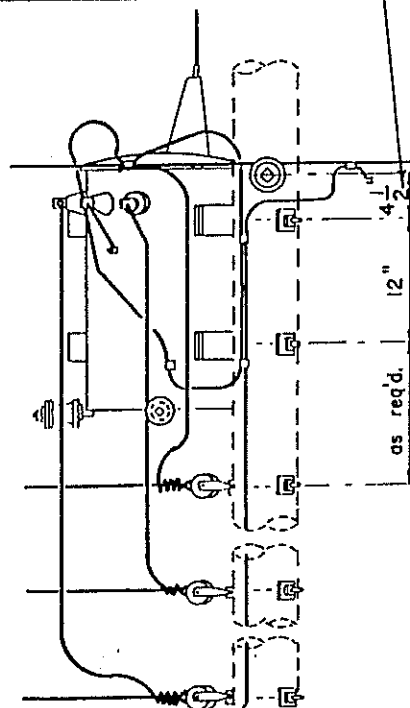


PLAN

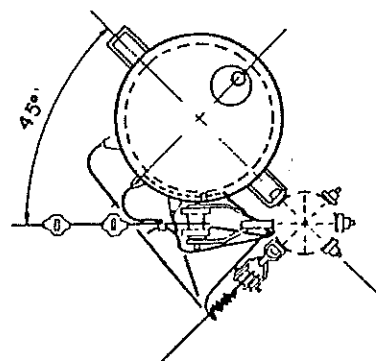
For multiphase primary line construction with the crossarm in the revised lower position, change this dimension to 12 inches.



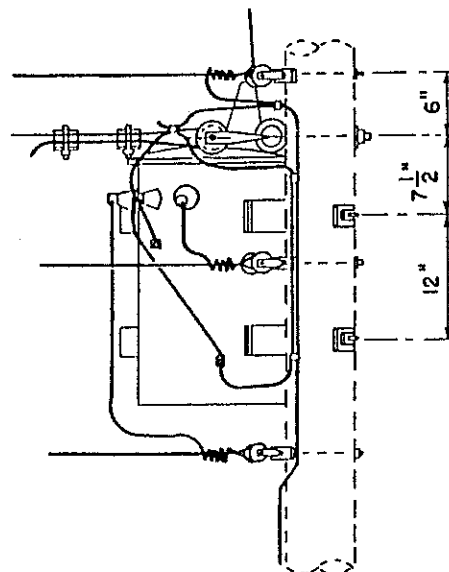
PRIMARY TANGENT
SERVICE TAKE-OFF AT
TRANSFORMER LEVEL



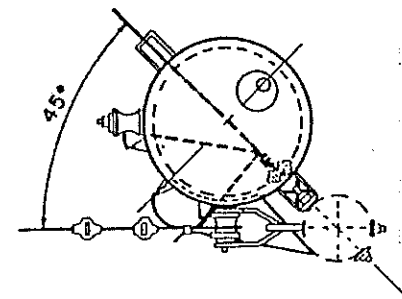
PRIMARY TANGENT
SERVICE TAKE-OFF BELOW
TRANSFORMER



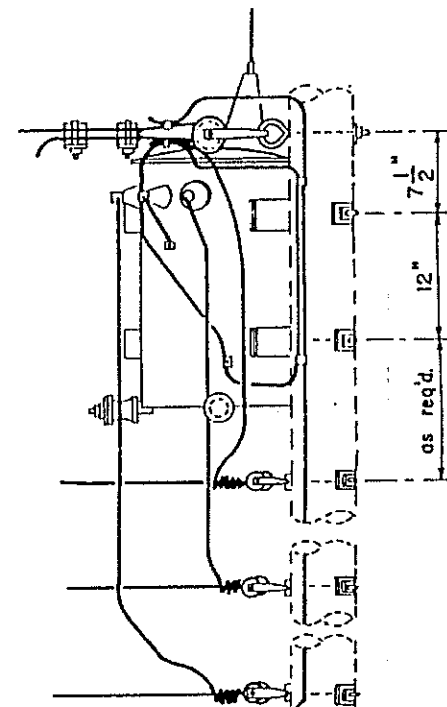
PLAN



PRIMARY DEADEND
SERVICE TAKE-OFF AT
TRANSFORMER LEVEL



PLAN



PRIMARY DEADEND
SERVICE TAKE-OFF BELOW TRANSFORMER

Note:

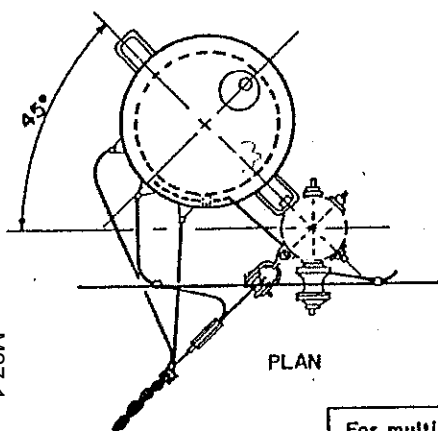
Transformers may be mounted in alternate positions and quadrants as practical in order to facilitate services in directions not shown.

TRANSFORMER CONNECTION GUIDE
OPEN WIRE SERVICES

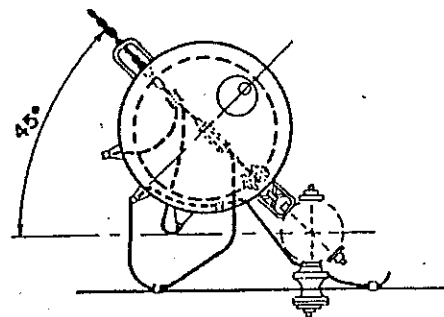
Apr, 1983

M27

M27-1

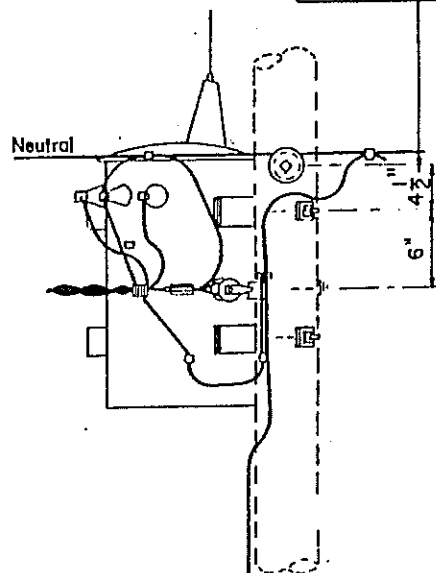


PLAN

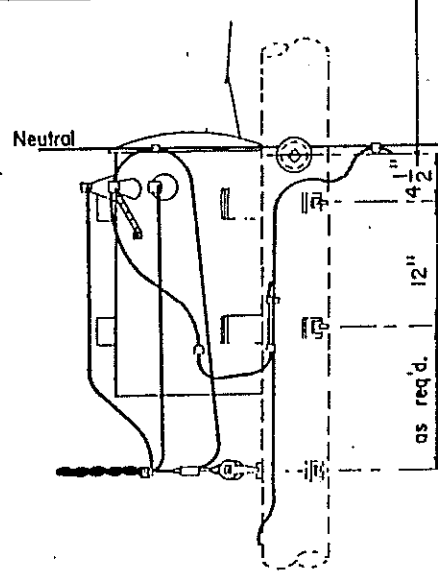


PLAN

For multiphase primary line construction with the crossarm in the revised lower position, increase this dimension to 12"



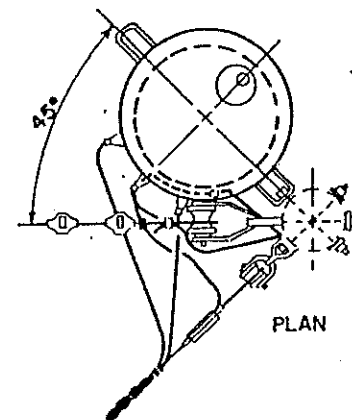
PRIMARY TANGENT
SERVICE TAKE-OFF AT
TRANSFORMER.



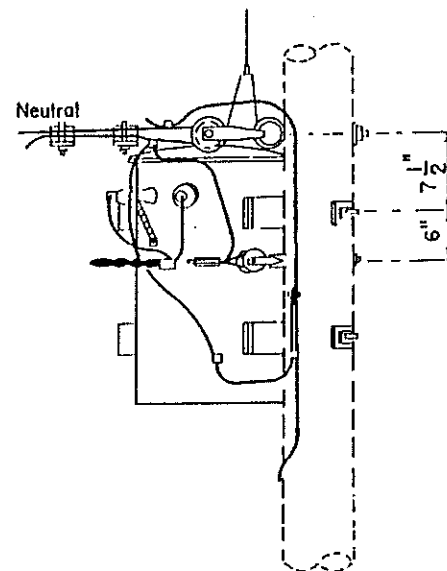
PRIMARY TANGENT
SERVICE TAKE-OFF
BELOW TRANSFORMER.

NOTES:

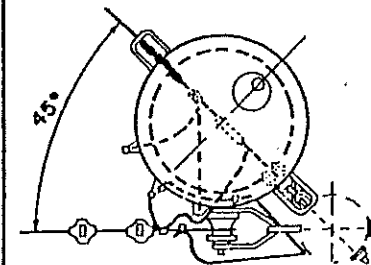
1. Secondary bushing not to be used for bi-metal connection.
2. Transformers may be mounted in alternative positions and quadrants as practical in order to facilitate services in directions not shown.
3. For more detail see Guide Drawing M27-1A.



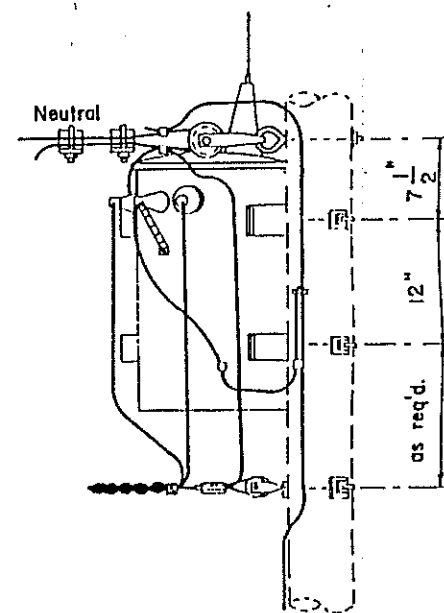
PLAN



PRIMARY DEADEND
SERVICE TAKE-OFF AT
TRANSFORMER.



PLAN



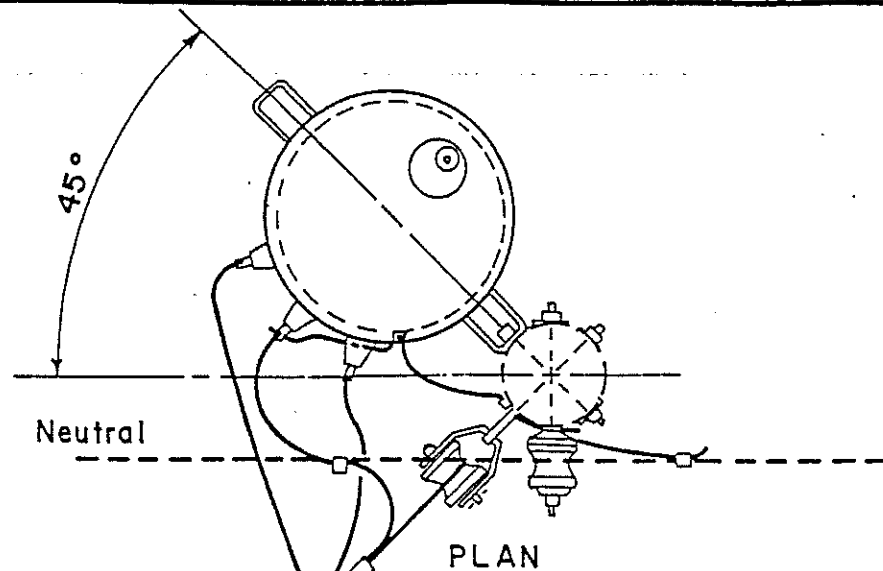
PRIMARY DEADEND
SERVICE TAKE-OFF BELOW
TRANSFORMER.

TRANSFORMER CONNECTION GUIDE
TRIPLEX CABLE SERVICES

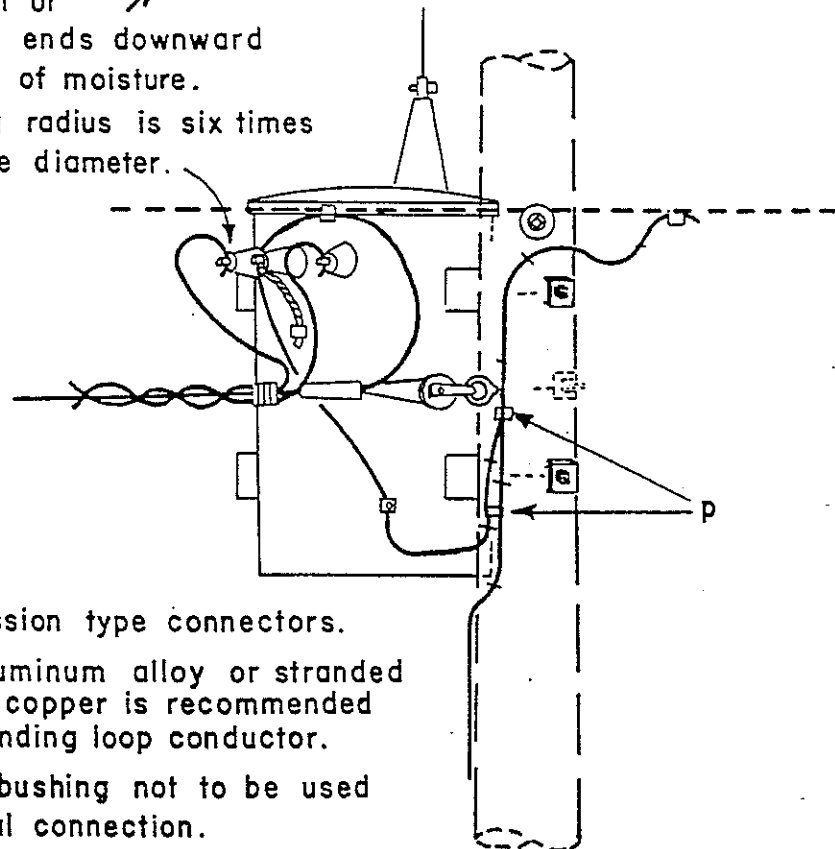
Apr., 1983

M27-1

M27-1



Cover secondary terminals with moisture seal or dress conductor ends downward to prevent entry of moisture.
Minimum bending radius is six times the overall cable diameter.



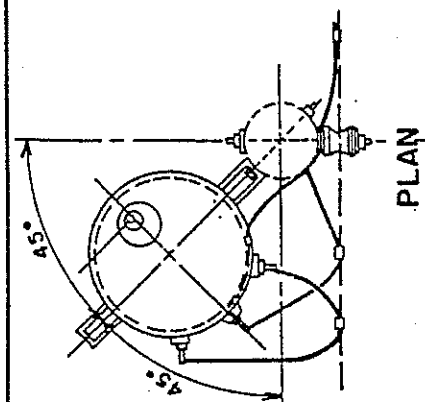
NOTES:

1. Use compression type connectors.
2. Stranded aluminum alloy or stranded soft-drawn copper is recommended for the grounding loop conductor.
3. Secondary bushing not to be used for bi-metal connection.

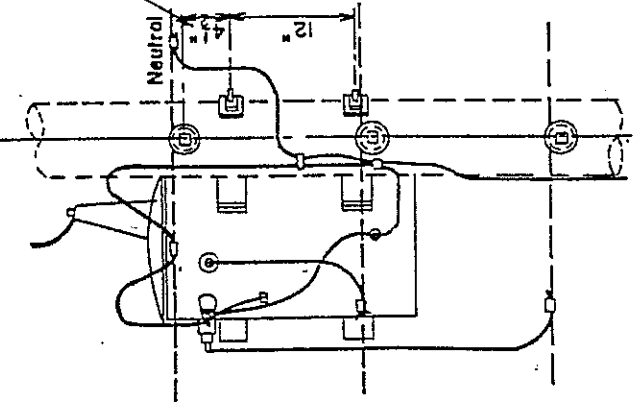
DETAIL OF ALTERNATIVE TRANSFORMER
CONNECTION
(PRIMARY TANGENT, SERVICE TAKE-OFF AT
TRANSFORMER)

Apr., 1983

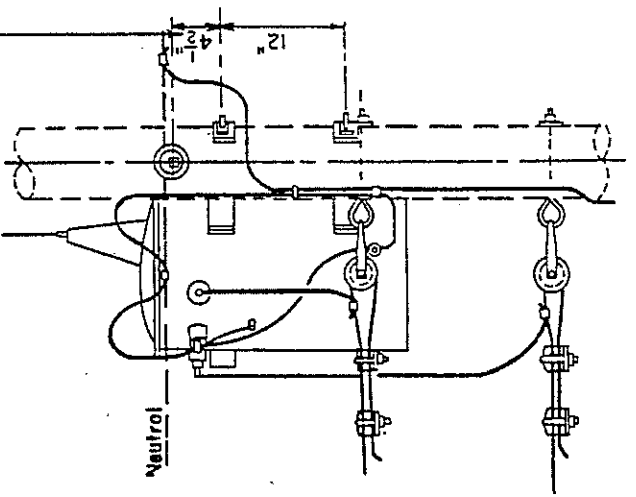
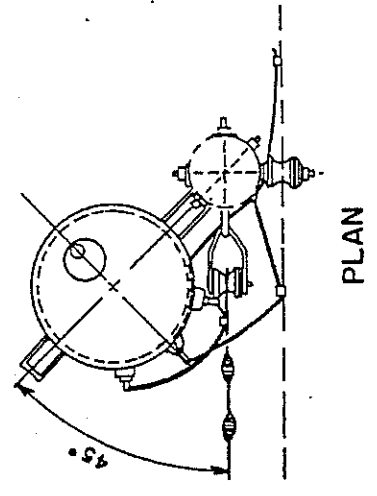
M27-1A



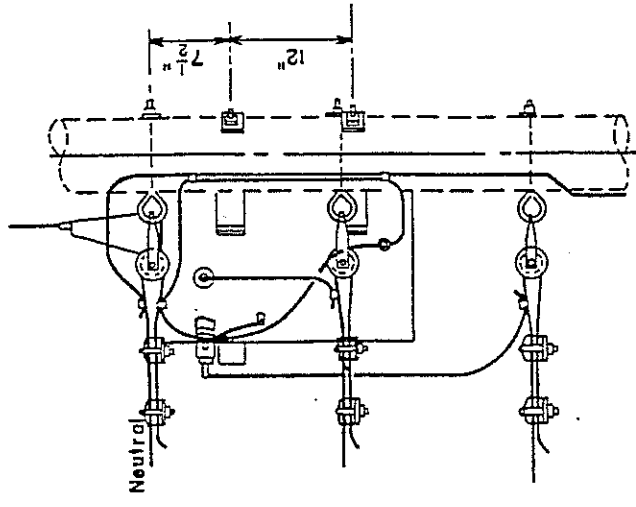
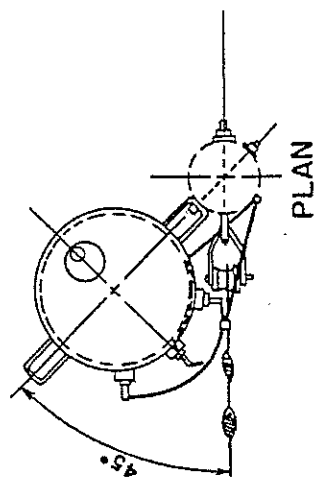
For multiphase primary line construction with the crossarm in the revised lower position, increase this dimension to 12 inches.



PRIMARY TANGENT
SECONDARY TANGENT



PRIMARY TANGENT
SECONDARY DEADEND

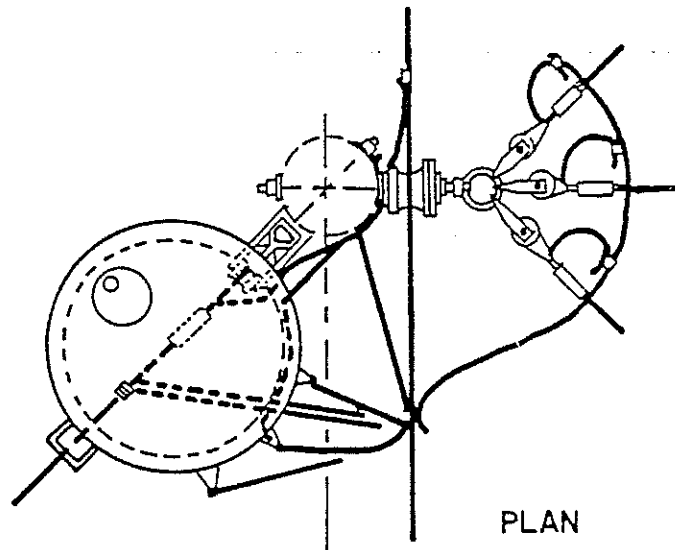


PRIMARY DEADEND
SECONDARY DEADEND

TRANSFORMER CONNECTION GUIDE
SECONDARY UNDERBUILD

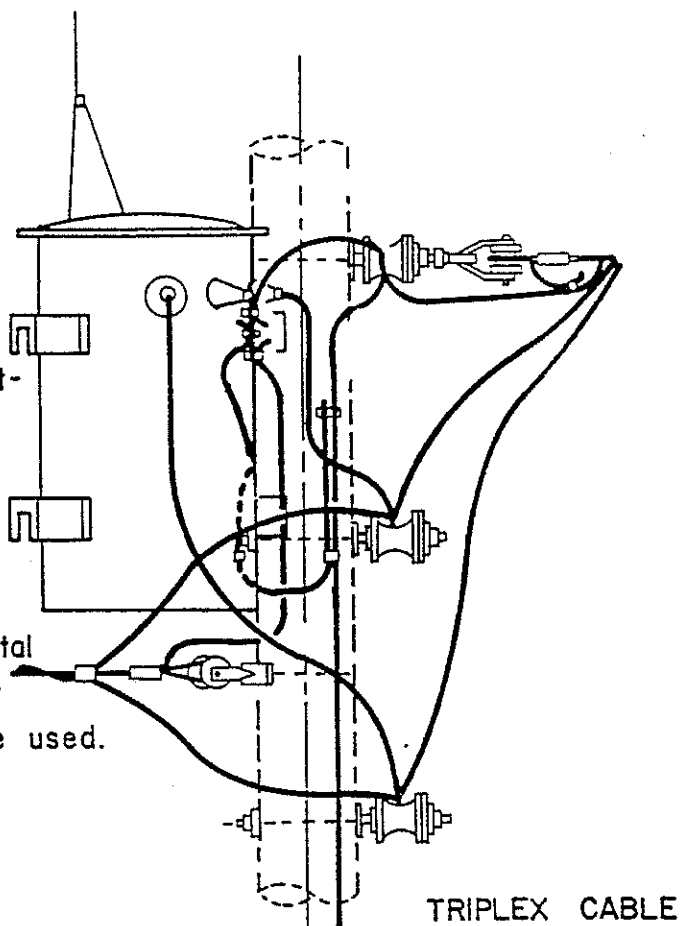
Apr., 1983

M27-2



NOTES:

1. Use compression type connectors.
2. Stranded aluminum alloy or stranded soft-drawn copper is recommended for the grounding loop conductor.
3. Secondary bushing not to be used for bi-metal connection. Spades or copper studs may be used.



TRANSFORMER CONNECTION AND SERVICE
TAKE-OFF GUIDE FROM SECONDARY

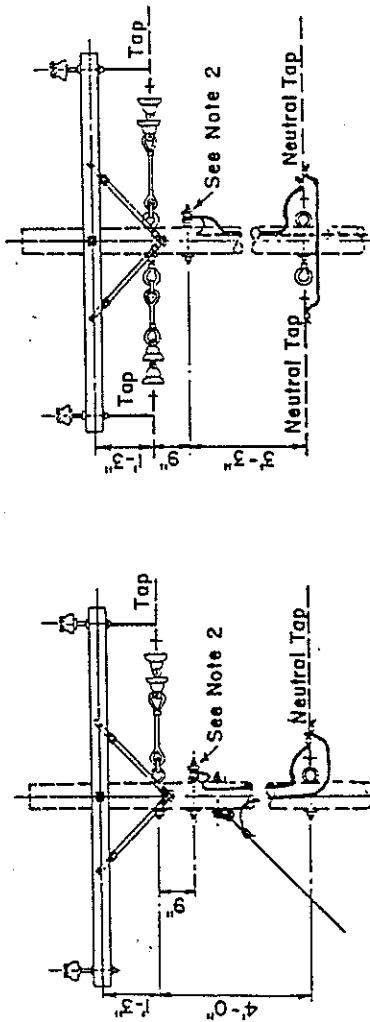
Apr., 1983

M28

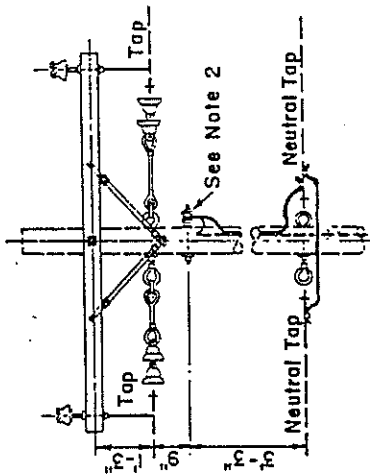
Notes:

1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.

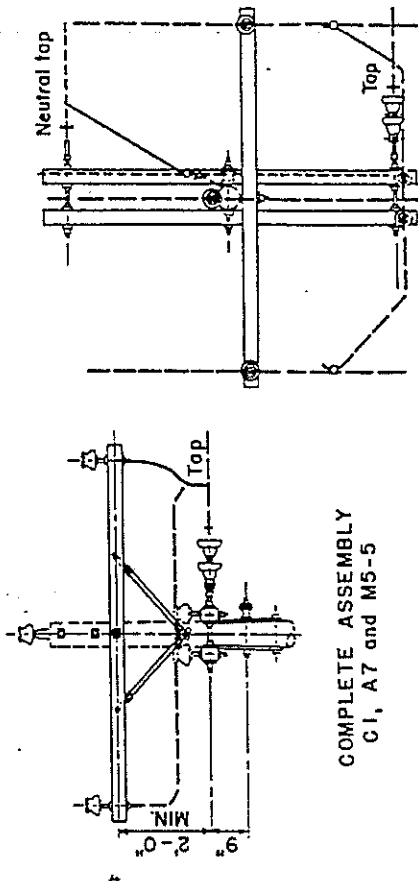
2. Where ground clearance permits mount all neutrals at lower level.



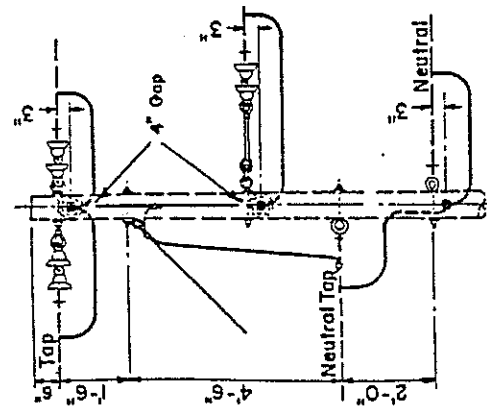
COMPLETE ASSEMBLY
A5-2 AND B1



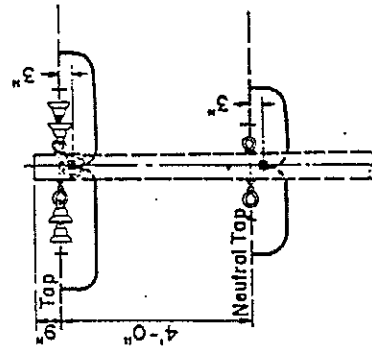
COMPLETE ASSEMBLY
A5-2, A5-2A and B1



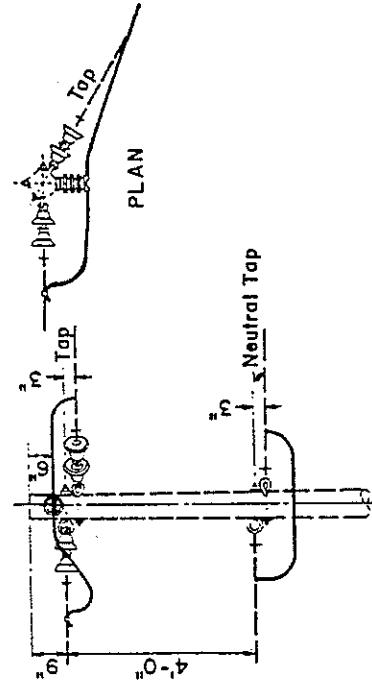
COMPLETE ASSEMBLY
C1, A7 and M5-5



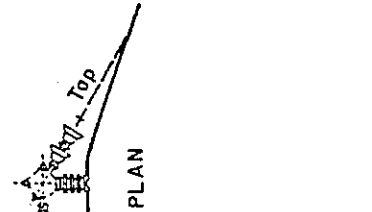
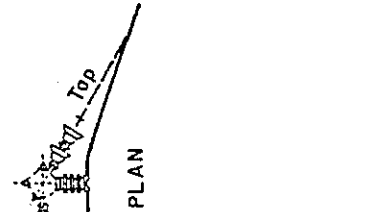
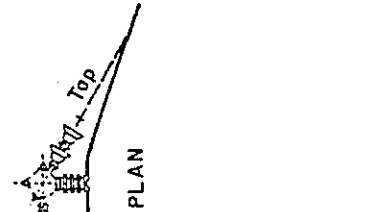
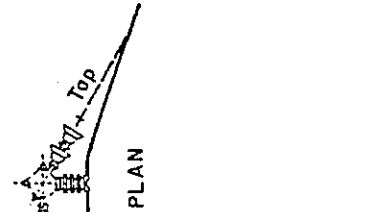
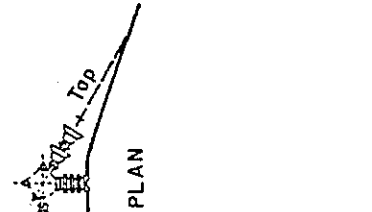
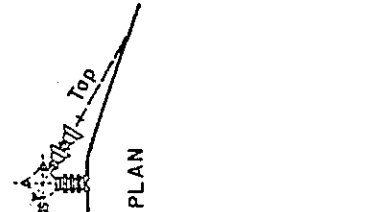
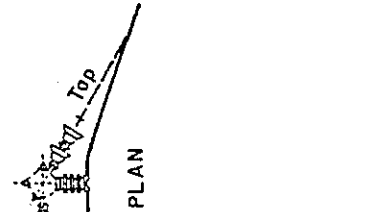
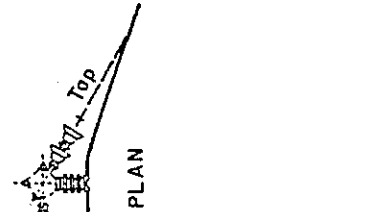
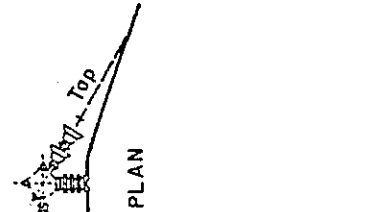
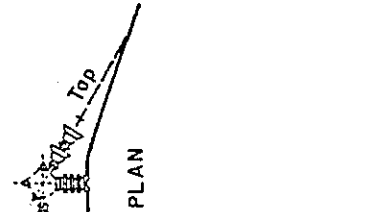
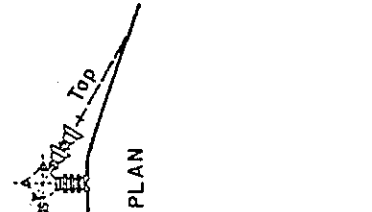
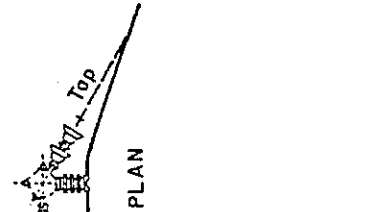
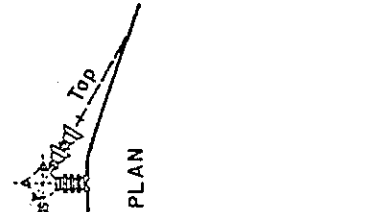
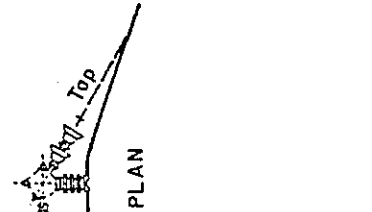
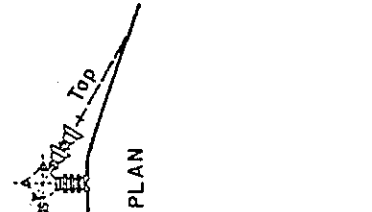
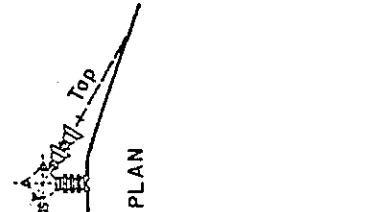
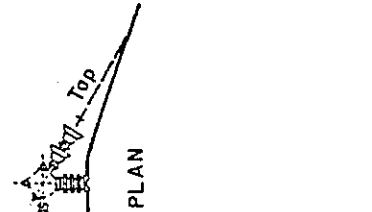
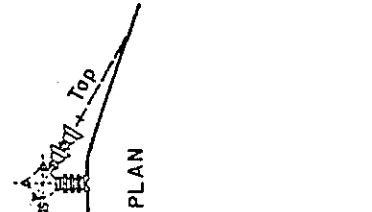
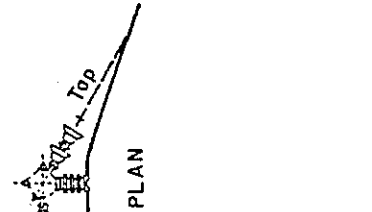
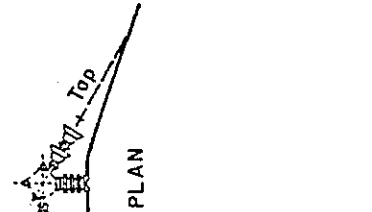
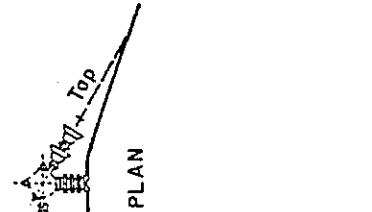
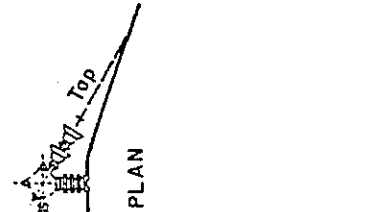
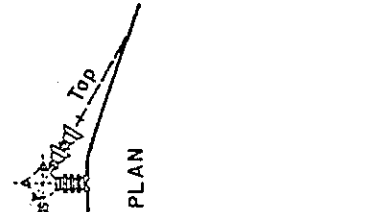
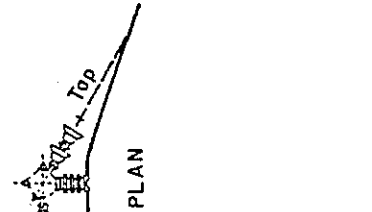
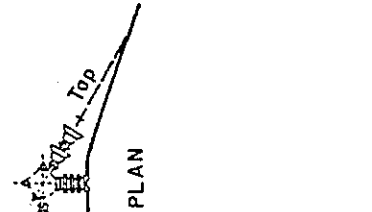
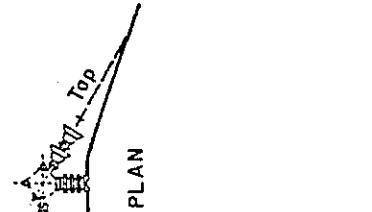
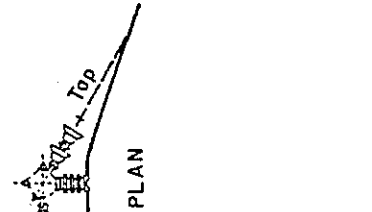
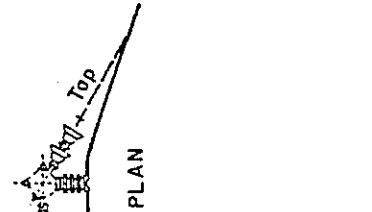
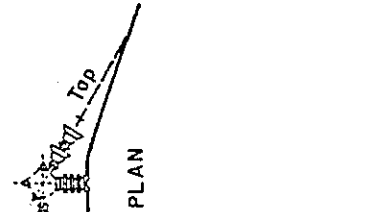
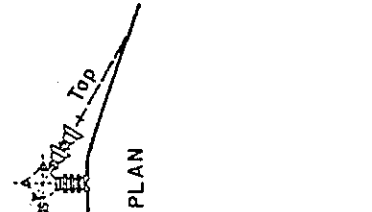
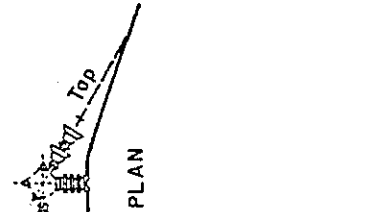
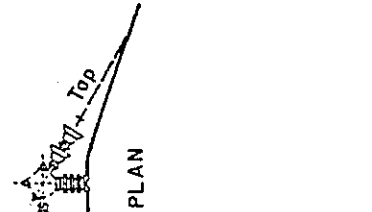
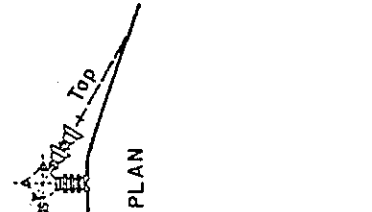
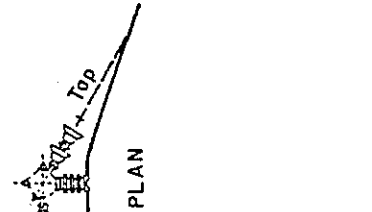
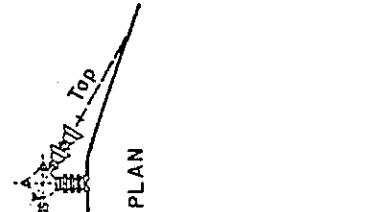
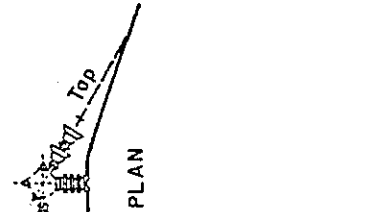
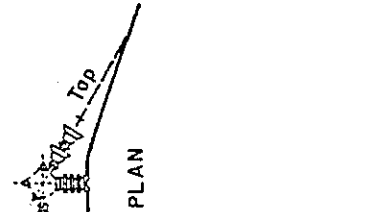
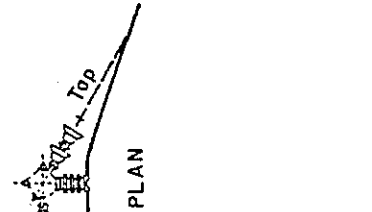
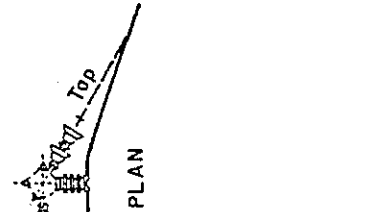
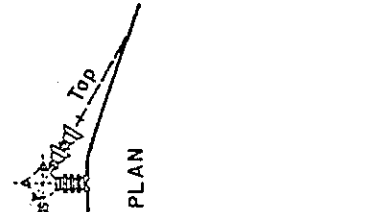
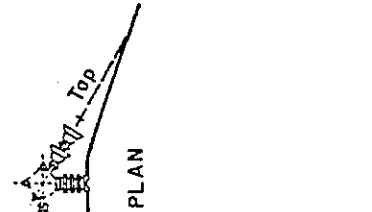
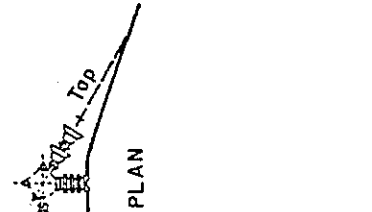
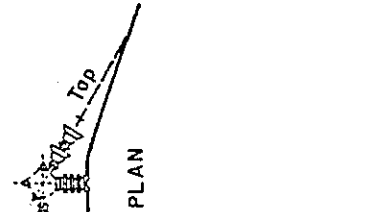
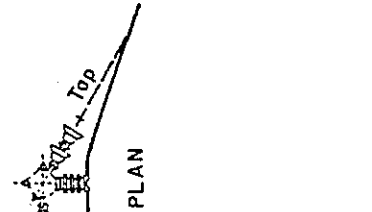
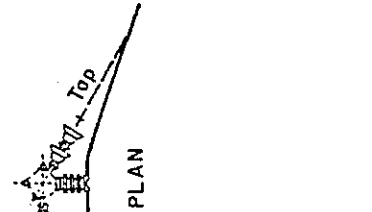
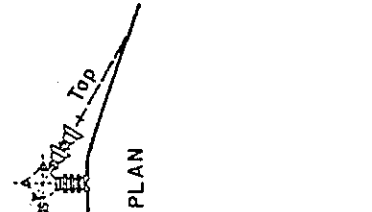
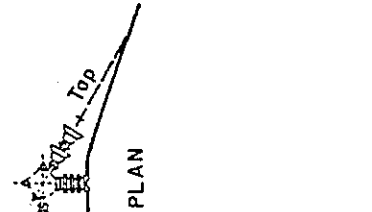
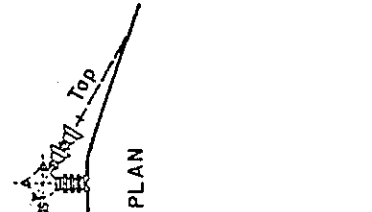
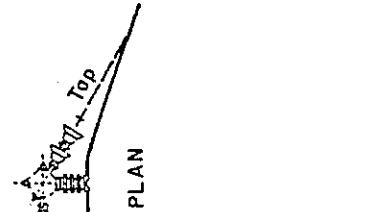
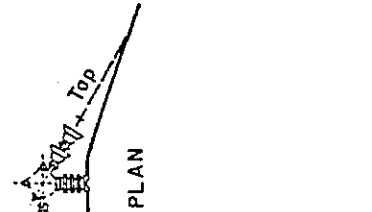
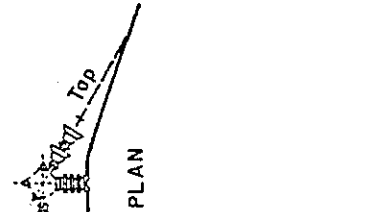
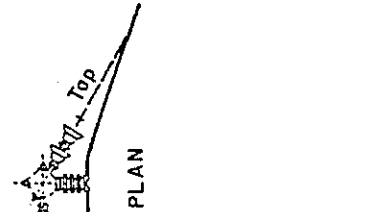
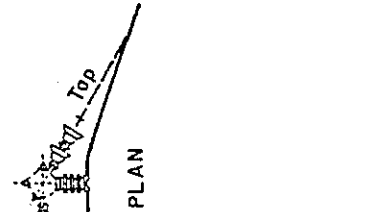
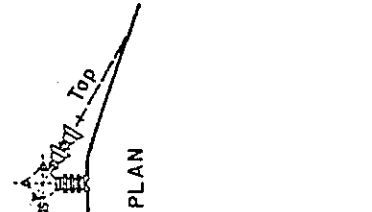
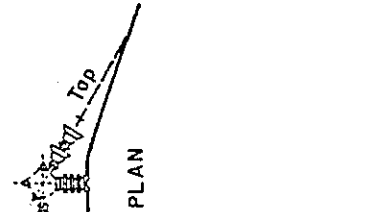
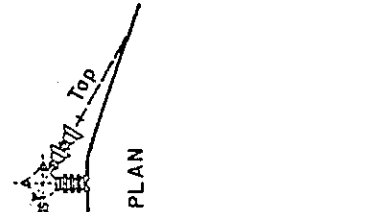
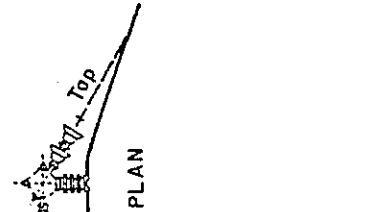
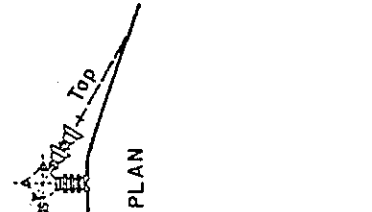
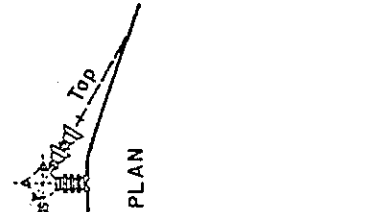
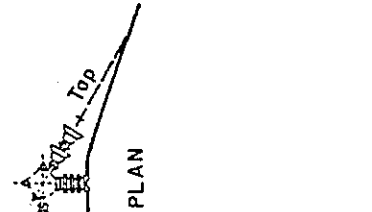
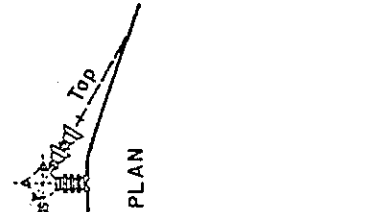
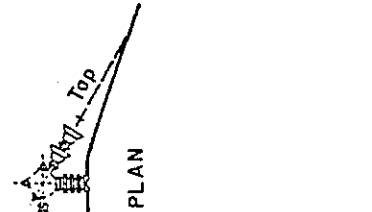
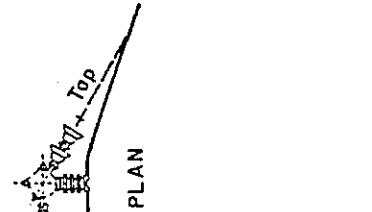
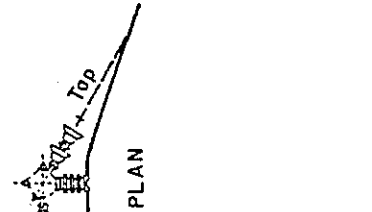
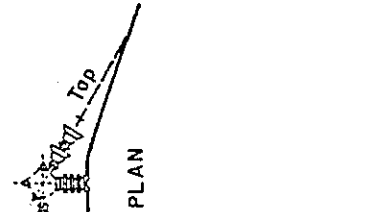
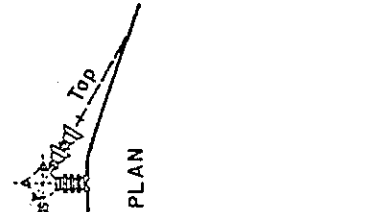
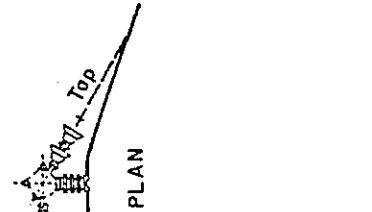
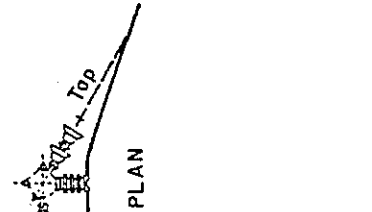
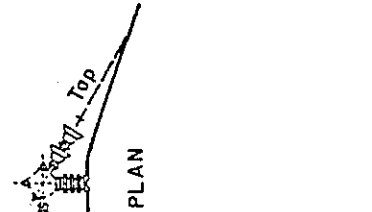
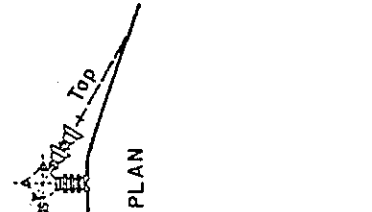
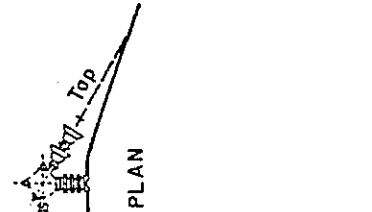
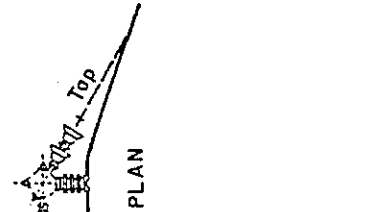
COMPLETE ASSEMBLY
A5-3 AND B4-1



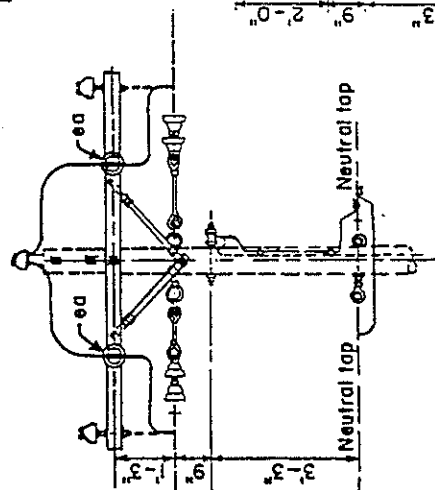
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A5-3 AND A4



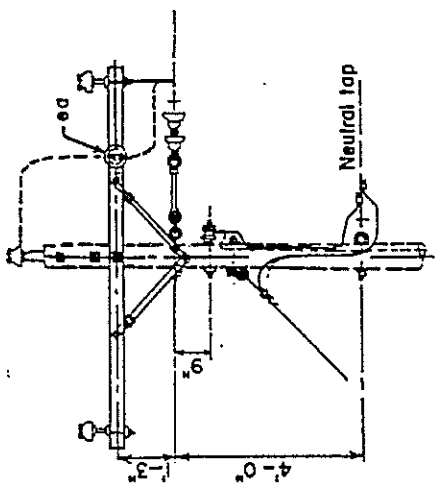
COMPLETE ASSEMBLY
A5-1, M5-7 and A5



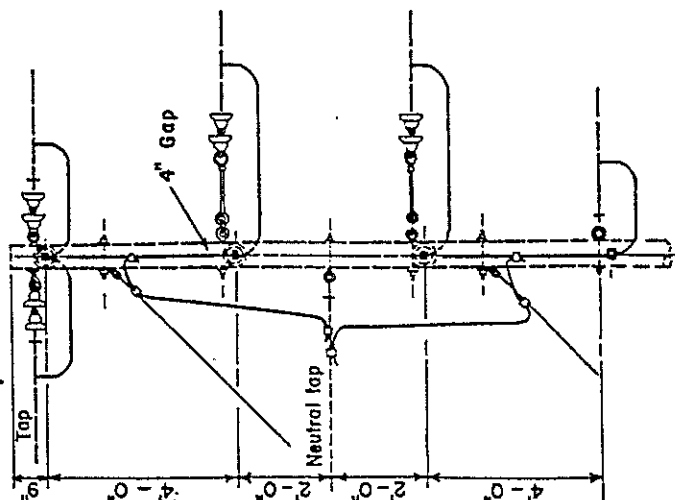
- Notes:
1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
 2. Where ground clearance permits mount all neutrals at lower level.



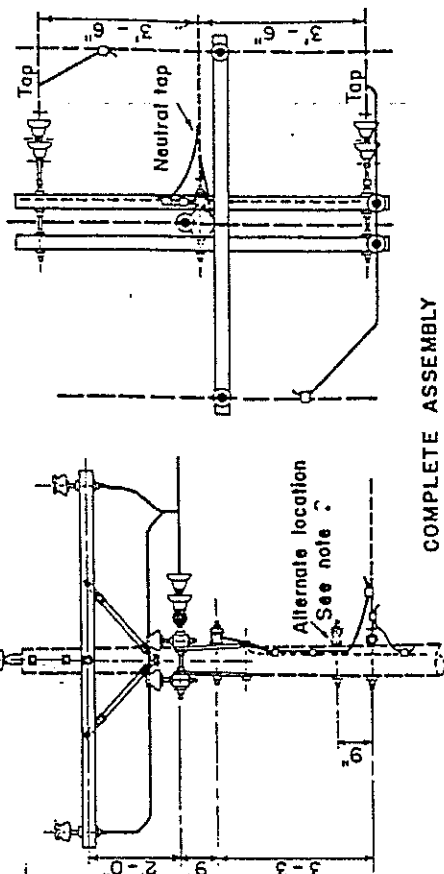
COMPLETE ASSEMBLY
A5-2, A5-2A, C1, AND M5-7 (if Needed)



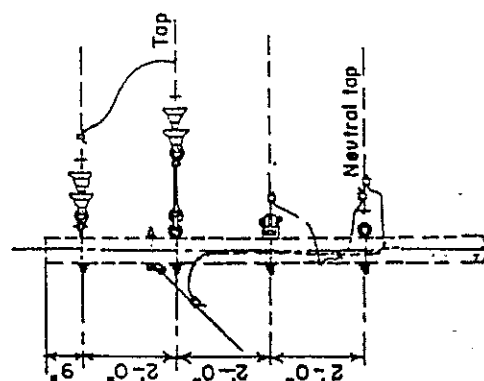
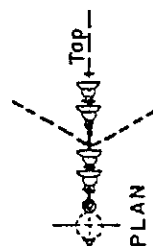
COMPLETE ASSEMBLY
A5-2, C1 AND M5-7 (if Needed)



COMPLETE ASSEMBLY
A5-3 AND C4-1



COMPLETE ASSEMBLY
C1, B7 and M5-5

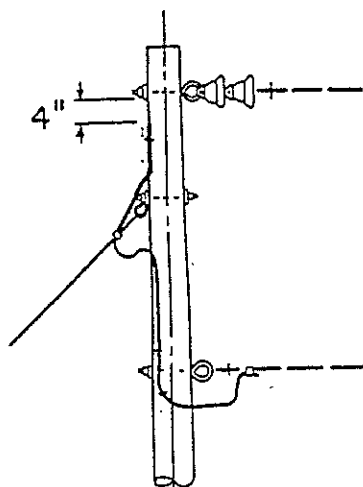


COMPLETE ASSEMBLY
A5-2 AND A3

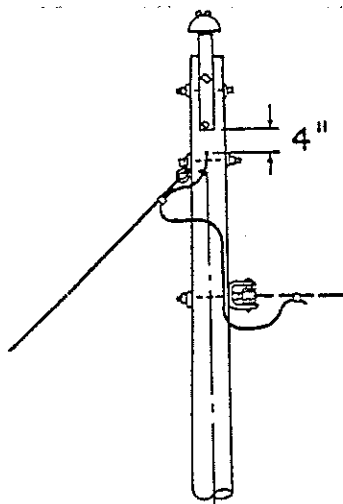
TAP ASSEMBLY GUIDE

Apr, 1983

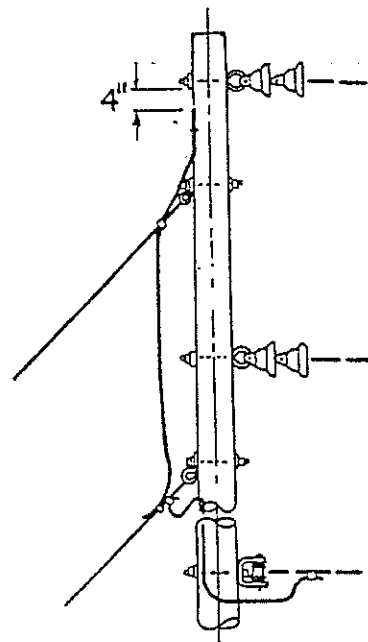
M29-2



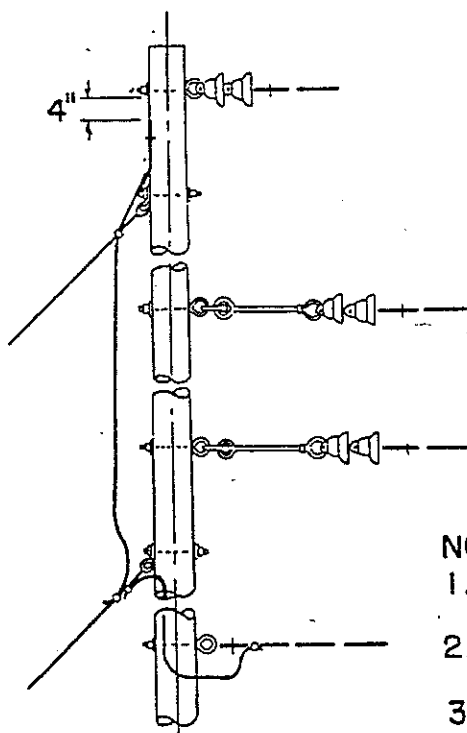
AT SINGLE PHASE ANGLES
AND DEADENDS



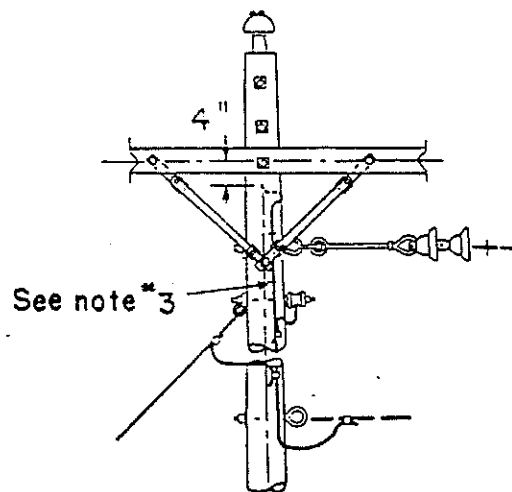
AT SINGLE
PHASE ANGLES



AT V-PHASE ANGLES
AND DEADENDS



AT THREE PHASE ANGLES
AND DEADENDS



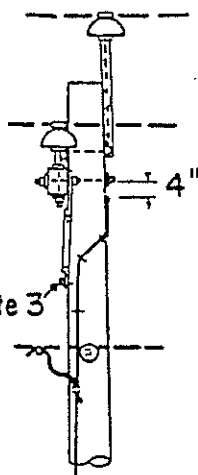
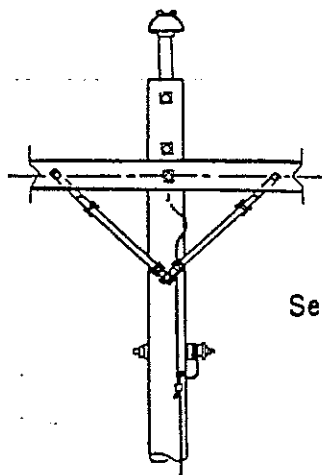
AT V OR THREE PHASE
TAP ASSEMBLY

NOTES:

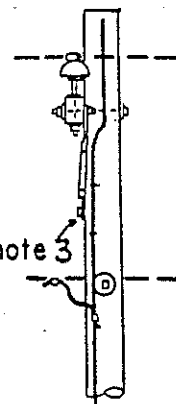
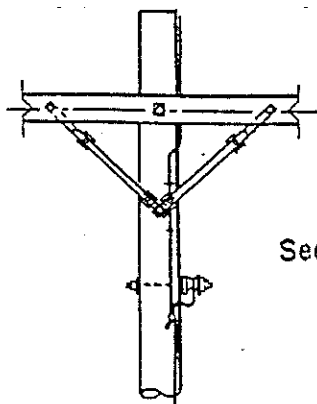
1. A solid conductor should be used for the pole top extension wire.
2. The jumper wire on system grounding assemblies should be stranded.
3. Position of staple is important. Maintain 4" min. distance from staple or clip to lag screw or eye bolt.
4. Maintain 2" min. spacing between ground wire and hardware associated with energized conductors.
5. An M2-12, 12A, 12A2 or M2-11 ground assembly may be added if desired.

12.5 / 7.2 kV

GUIDE FOR INSTALLATION OF GROUND WIRE
ABOVE NEUTRAL ON GUYED POLES



See note 3



See note 3

AT SINGLE ARM ASSEMBLIES WITH
POLE TOP PIN

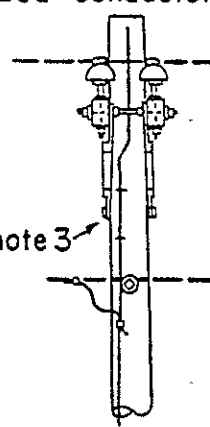
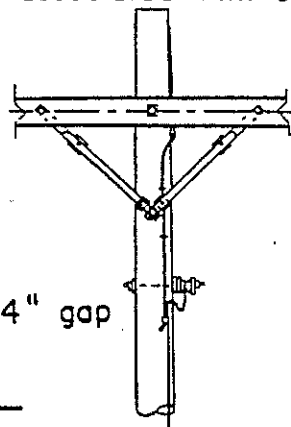
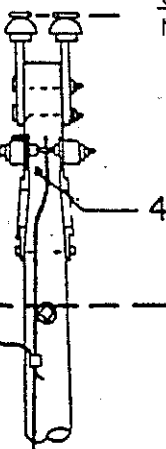
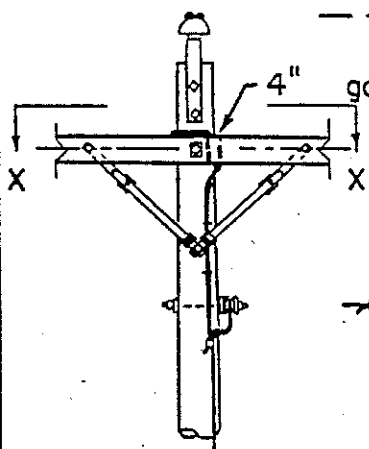
AT SINGLE ARM ASSEMBLIES WITH-
OUT POLE TOP PIN

NOTES:

1. A solid conductor should be used for the pole top extension wire.
2. The jumper wire on system grounding assemblies should be stranded.
3. Position of staple is important. Maintain 4" minimum distance from staple or clip to lag screw or eye bolt.
4. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.



Section X-X

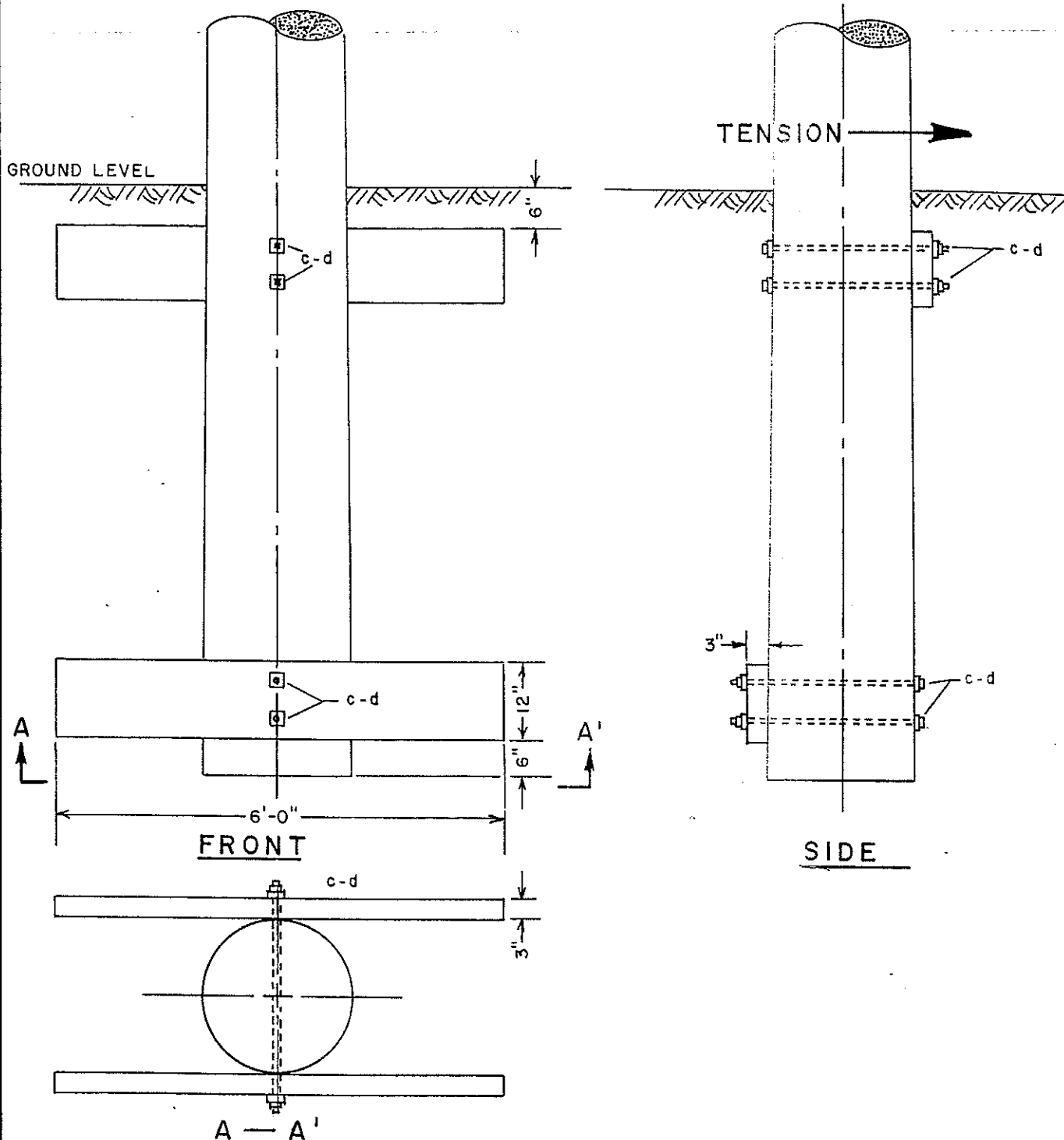


See note 3

AT DOUBLE ARM ASSEMBLIES
WITHOUT POLE TOP PINS

AT DOUBLE ARM ASSEMBLIES
WITH POLE TOP PINS

12.5/7.2 kV
GUIDE FOR INSTALLATION OF GROUND WIRE ABOVE
NEUTRAL ON POLES WITH BUTT WRAPPED OR
DRIVEN GROUNDS



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
	2	Pole Key, 6' x 12" x 3"			
c	4	Machine Bolt, 5/8" x Req'd length			
d	8	Square Washer 2 1/2"			

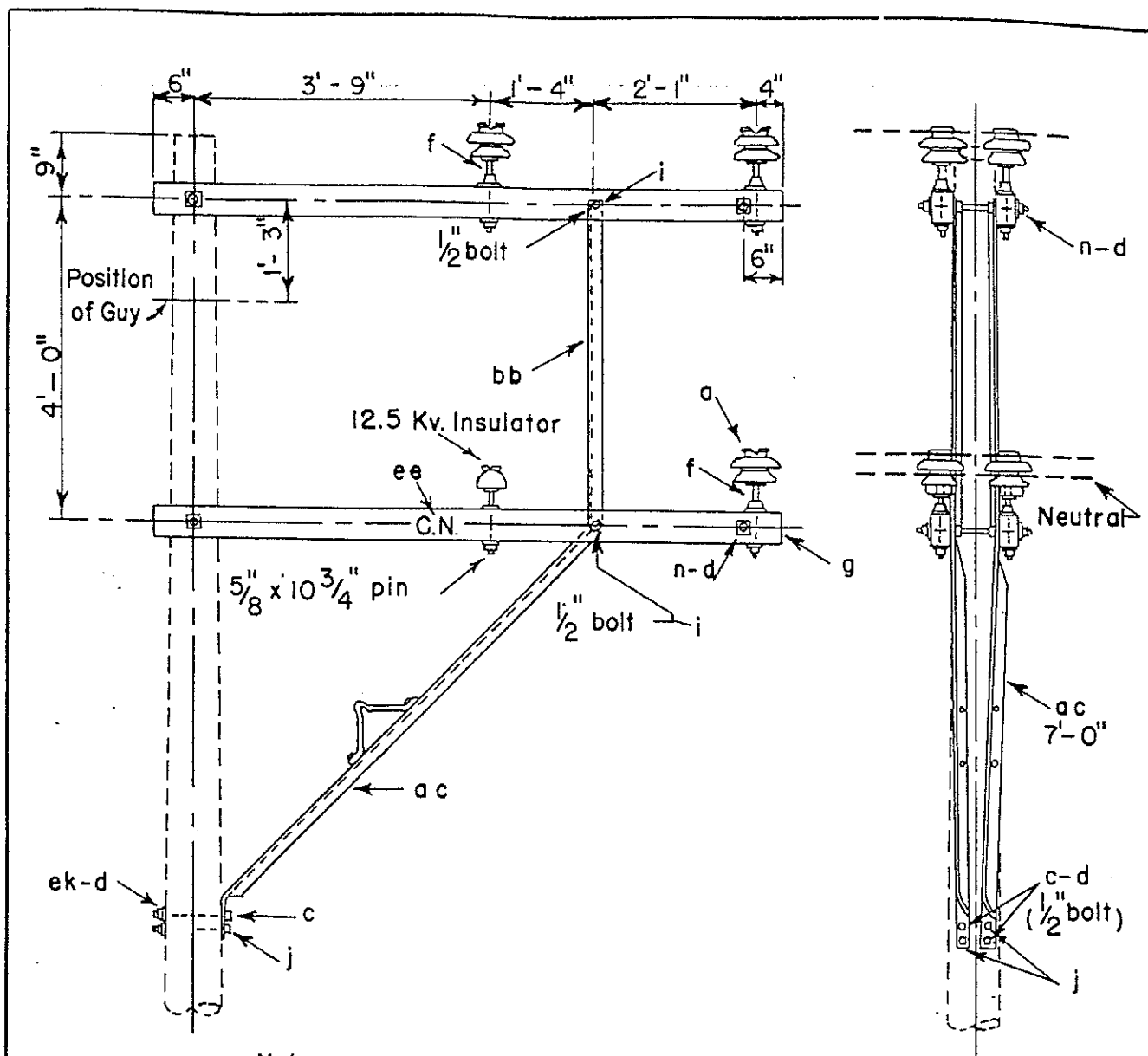
POLE KEY ASSEMBLY

M32-2

Aug. 9, 1993



M32 - 2

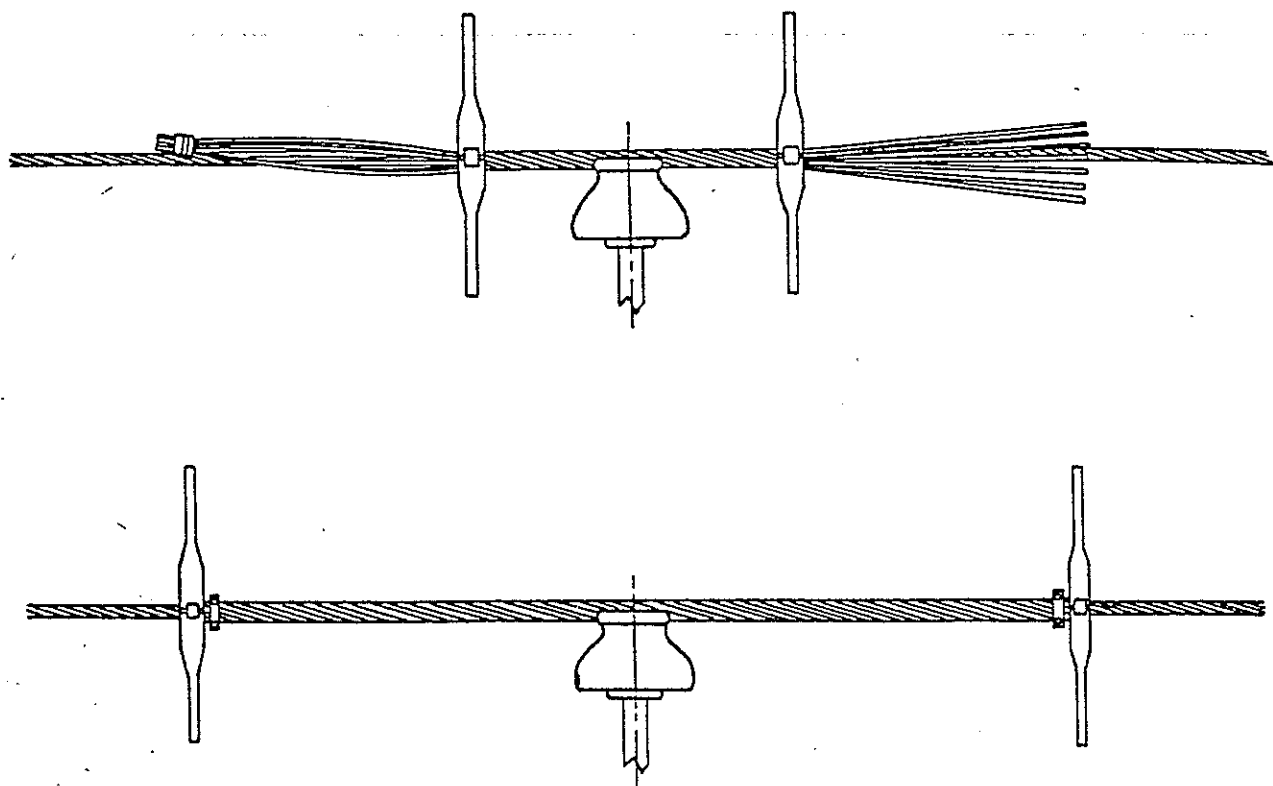


Notes:

1. Where these assemblies are required, span shall be shortened, as at crossings.
2. Position of conductors on single phase and V phase to be as directed.

UNIT	ASSEMBLY DESCRIPTION	NUMBER OF EACH ITEM REQUIRED											
		ek	a	c	d	f	g	i	j	n	ac	bb	ee
VM33-1	Single arm single phase	5	2	3	5	2	2	2	1	0	1	1	2
VM33-2	Double arm single phase	18	4	2	14	4	4	4	2	4	2	2	2
VM33-3	Single arm two phase	5	3	3	5	3	2	2	1	0	1	1	2
VM33-4	Double arm two phase	18	6	2	14	6	4	4	2	4	2	2	2
VM33-5	Single arm three phase	5	4	3	5	4	2	2	1	0	1	1	2
VM33-6	Double arm three phase	18	8	2	14	8	4	4	2	4	2	2	2
		PRIMARY											
		TWO SIDE ARMS (DOUBLE) FOR PRIMARY											
		Jan. 1, 1963		M33-1 TO M33-6									

ITEM	N0	M A T E R I A L	ITEM	N0	M A T E R I A L
a	4	Insulator, pin type	i	1	Bolt, carriage, 3/8" x 4 1/2"
b	1	Pin, pole top, 20"	j	1	Screw, lag, 1/2" x 4"
c	4	Bolt, machine, 5/8" x required length	ac	1	Crossarm brace, steel, 7' - 0"
d	3	Washer, square 2 1/4"	ee	4	Letters, (2) C, (2) N, with 1" nails
f	8	Pin, crossarm, steel, 5/8" x 10 3/4"	ek	-	Lock nuts, as required
g	1	Crossarm, 3 5/8" x 4 5/8" x 8' - 0"			



Note:

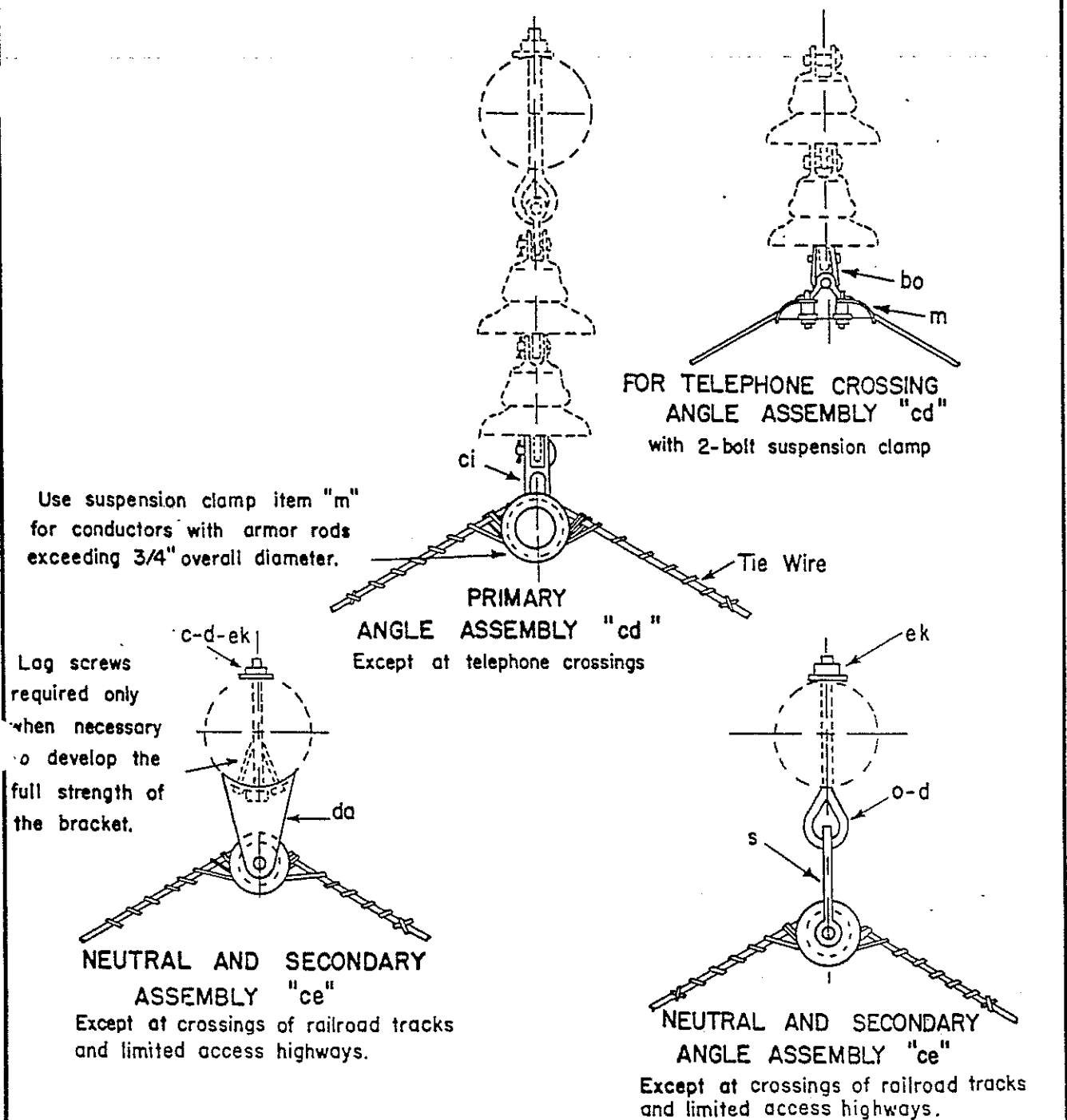
With tape still on one end of rods and other end threaded through wrenches so they open between the same two rods, center on conductor over point of support and close around conductor as shown above. Twist rods enough to give permanent set. Remove tape and slide wrenches half way to ends and repeat. Move wrenches to end of rods and twist. Attach clips and tighten before removing so end of rods will flare after removal. Rods should be twisted snugly with a smooth lay in same direction as lay of conductor. For further information and method of installing rods on angle see manufacturer's instructions for Construction.

Conductor Size	Support	
	Single	Double
	Twists	
*4 A.C.S.R.(6Al/1St.) & (7Al/1St.)	5-6	7-8
*2 A.C.S.R.(6Al/1St.) & (7Al/1St.)	6-7	8-9
*1/0 A.C.S.R. (6Al/1St.)	4-5	6-7
*2/0 A.C.S.R. (6Al/1St.)	5-6	7-8
*3/0 A.C.S.R. (6Al/1St.)	5-6	7-8
*4/0 A.C.S.R. (6Al/1St.)	5-6	7-8

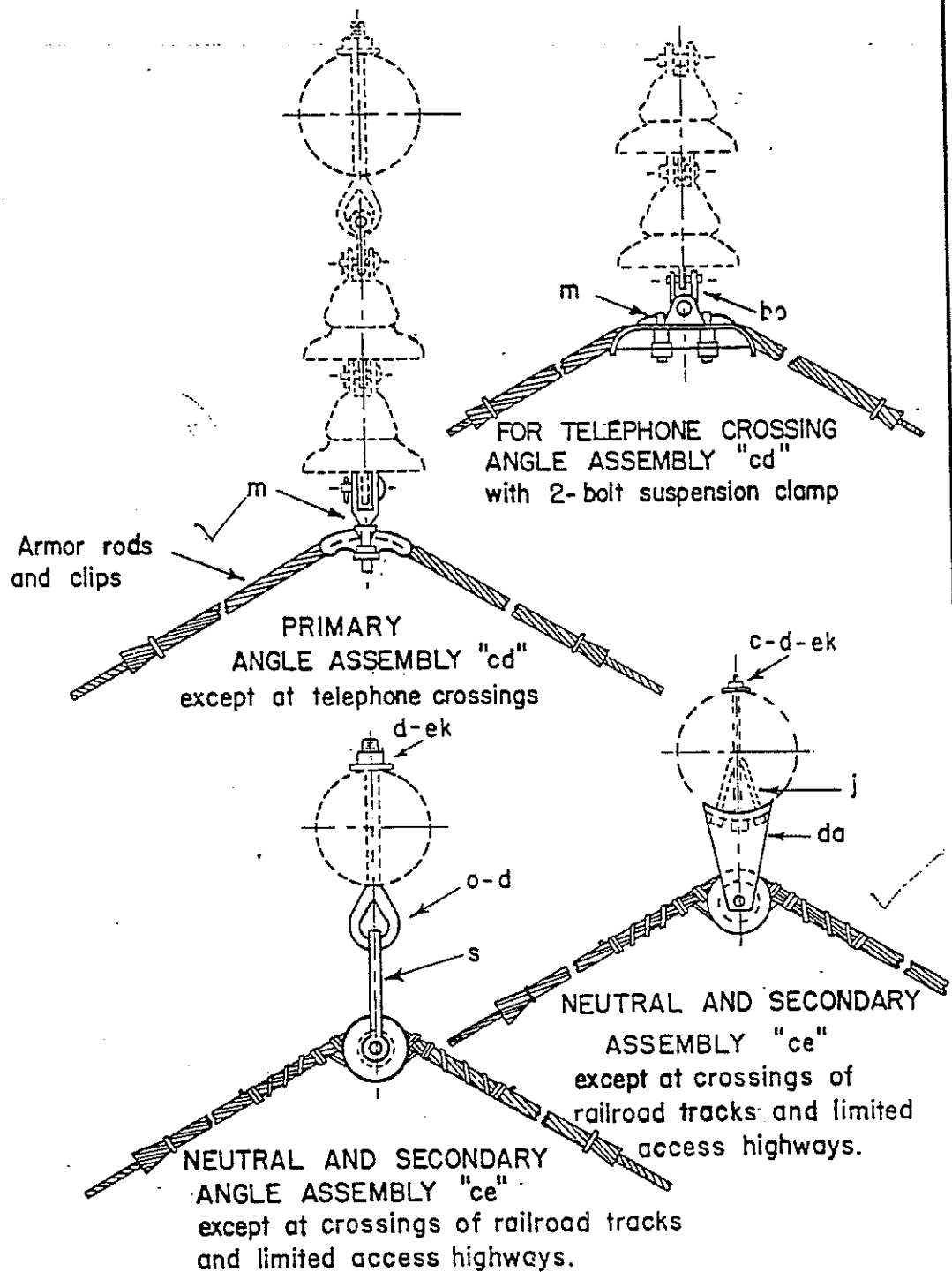
ARMOR RODS
A.C.S.R. CONDUCTOR

Apr., 1983

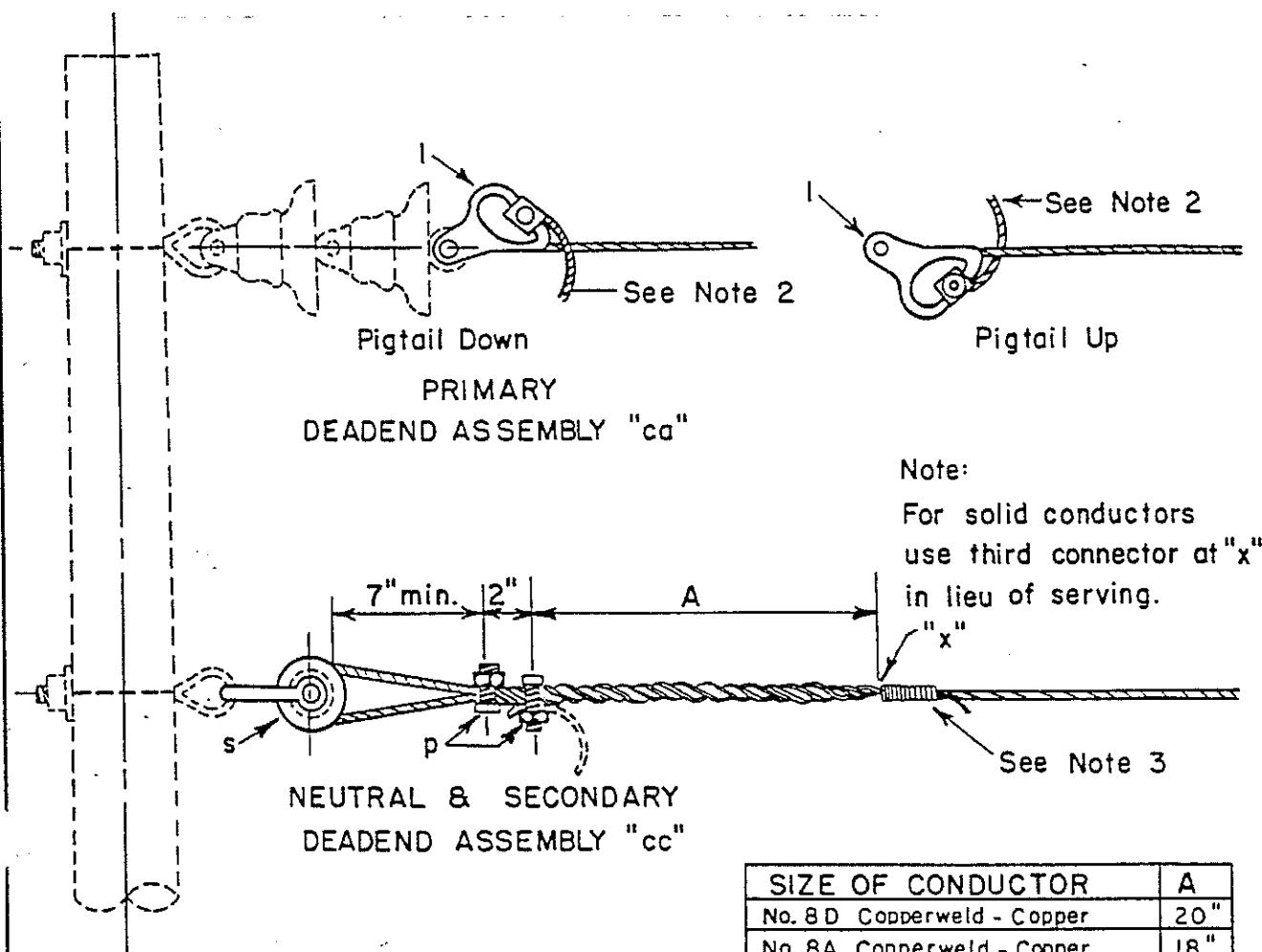
M40-11



ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	Bolt, machine, 5/8" x req'd. length	bo	Shackle, anchor
m	Clamp, suspension	da	Bracket, insulated
s	Clevis, secondary, swinging, insulated	ci	Clevis, thimble, side opening
ek	Locknuts, as required		
d	Washer, square, 2 1/4"		
j	Screw, lag, 1/2" x 4"		
o	Bolt, eye, 5/8" x req'd. length		
ANGLE ASSEMBLY GUIDE, VERTICAL CONSTRUCTION 30° TO 60° ANGLE, COPPER TYPE CONDUCTORS WITH FORMED TYPE ARMOR RODS			
Apr., 1983 M 41-1			



ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	Bolt, machine, 5/8" x req'd. length	bo	Shackle, anchor
m	Clamp, suspension	da	Bracket, insulated
s	Clevis, secondary, swinging, insulated	o	Bolt, eye, 5/8" x required length
ek	Locknuts, as required	ANGLE ASSEMBLY GUIDE, VERTICAL CONSTRUCTION 30° TO 60° ANGLE, ACSR CONDUCTORS WITH STRAIGHT OR FORMED TYPE ARMOR RODS	
d	Washer, square, 2 1/4"		
j	Screw, lag, 1/2" x 4"		
		Apr., 1983	M41-10



SIZE OF CONDUCTOR	A
No. 8 D Copperweld - Copper	20"
No. 8 A Copperweld - Copper	18"
No. 6 A Copperweld - Copper	20"
No. 4 A Copperweld - Copper	22"
No. 2 Copper, 3 - Strand	22"

Notes:

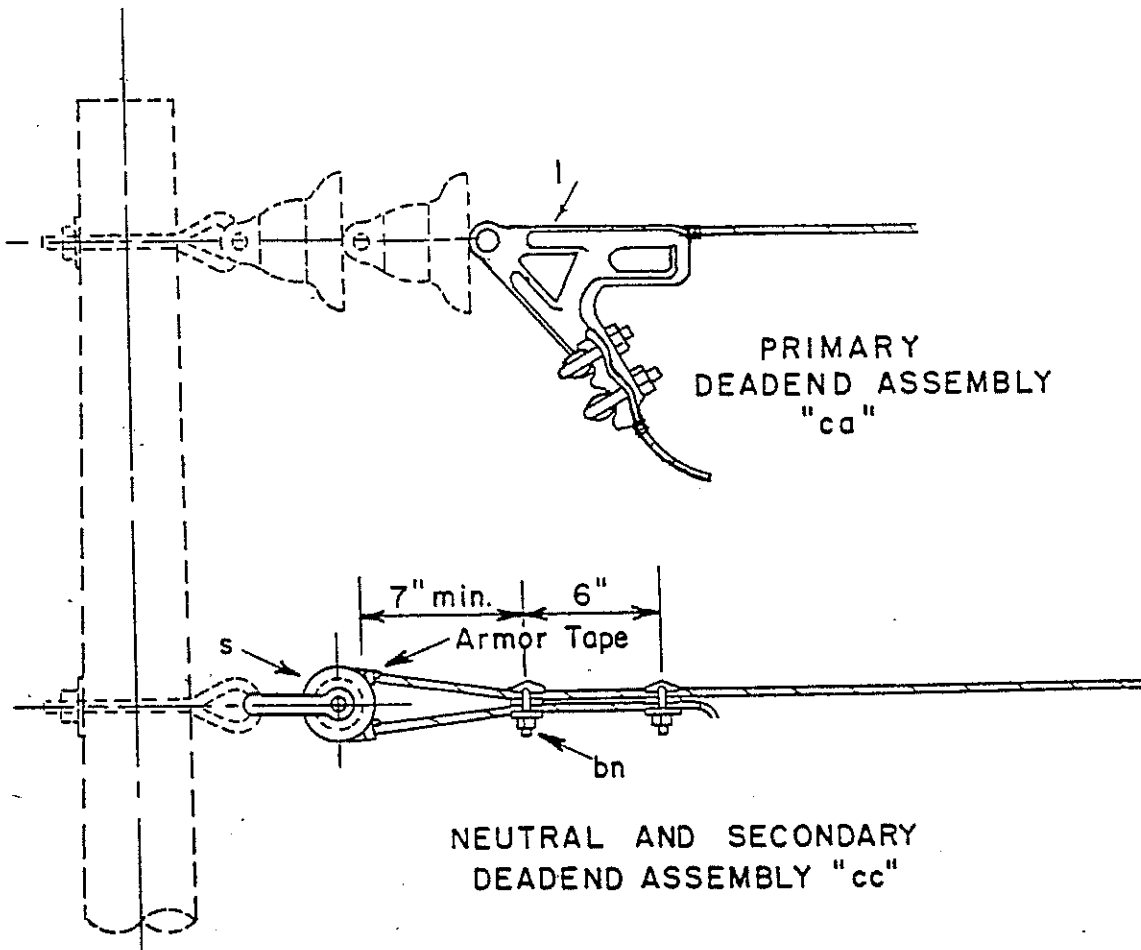
- 1.- For alternate method of deadending primary conductors, see Drawing M42-21.
- 2.- Bend pigtail away from line conductor to avoid chafing.
- 3.- Wrap free end of conductor along line conductor using same lay. Extend one strand of free end (for copperweld-copper this is the copperweld strand) against line conductor. Serve the other two strands six turns each and cut them off. (Always serve copper strand (s) first.) Bend extended strand away from line conductor and cut off.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
I		Clamp, deadend	s		Clevis, secondary, swinging, insul.
p		Connectors, as req'd			

DEADEND ASSEMBLY GUIDE - DEADEND CLAMP METH.
COPPERWELD COPPER & COPPER CONDUCTORS

Apr., 1983

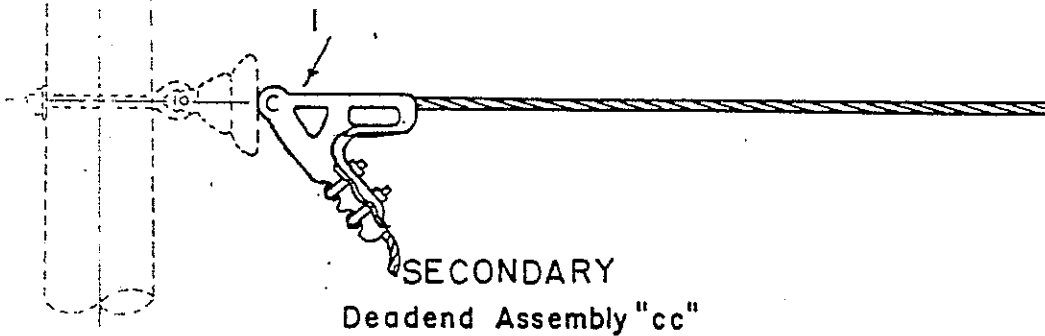
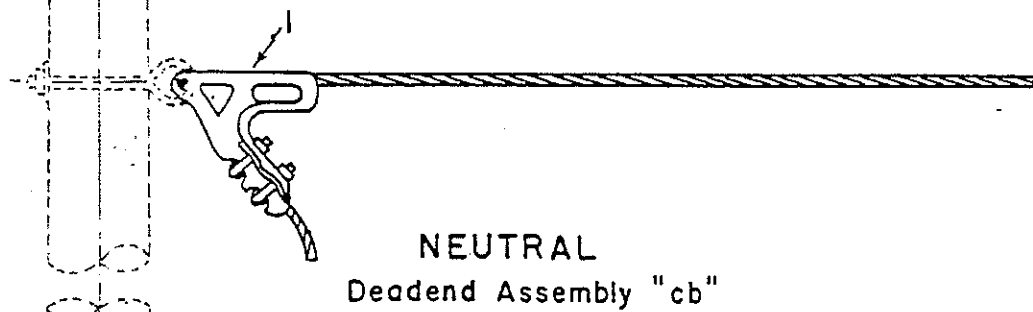
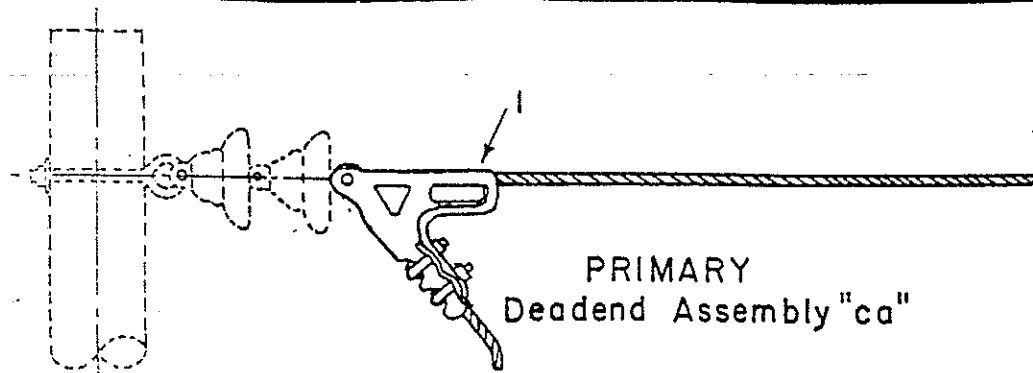
M42-3



Notes:

- 1.- Armor tape wrapping to extend not more than two wraps beyond the mouth of deadend clamp or spool insulator.
2. For 1/O and larger use spool of 3" min. groove diameter on neutral and secondary deadends.

ITEM	MATERIAL	ITEM	MATERIAL
I	Clamp, deadend		
s	Clevis, secondary, swinging, insulated		
bn	Clamp, loop deadend		
		DEADEND ASSEMBLY GUIDE	
		DEADEND CLAMP METHOD	
		A.C.S.R. CONDUCTORS	
		Apr, 1983	M42-11

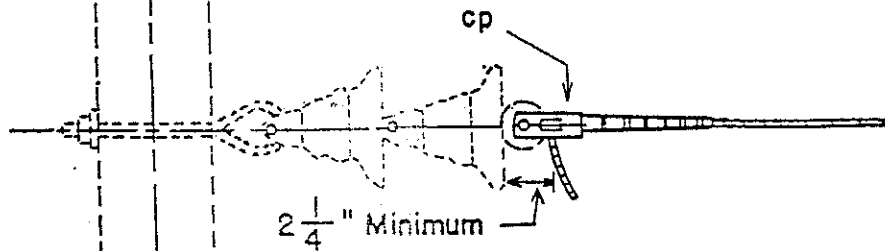


ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
1		Clamp, deadend			

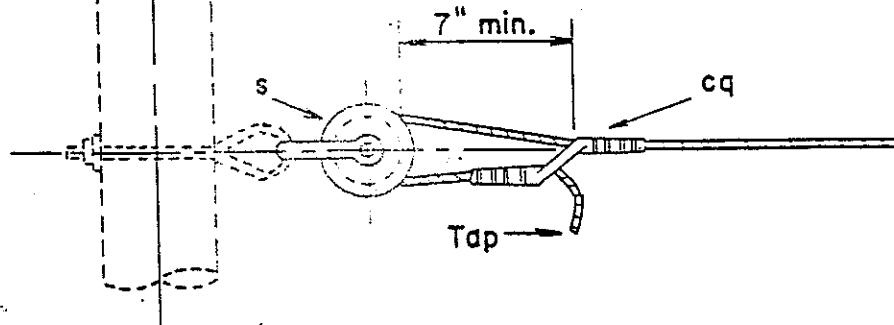
DEADEND ASSEMBLY GUIDE
(LARGE CONDUCTORS)

Note:

Item "by" may be substituted
for item "cp" shown.

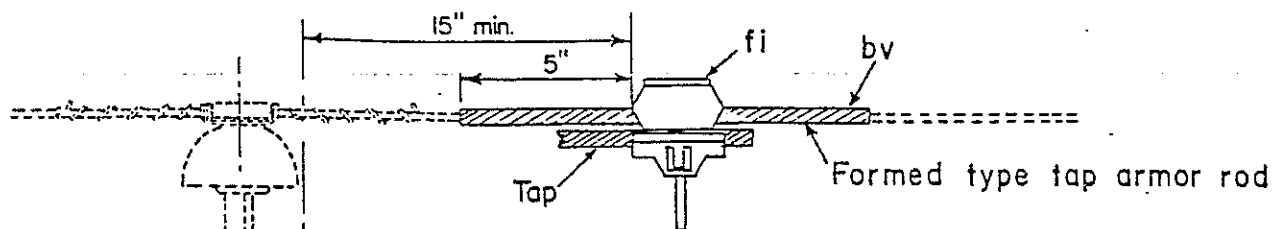


PRIMARY
DEADEND ASSEMBLY "ca"



NEUTRAL AND SECONDARY
DEADEND ASSEMBLY "cc"

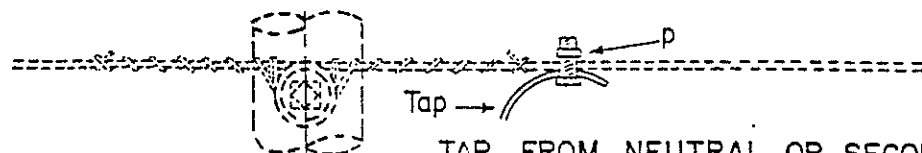
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
s		Clevis, secondary, swinging, insulated	cq		Sleeve, offset, splicing
cp		Sleeve, deadend, compression			
DEADEND ASSEMBLY GUIDE-COMPRESSION METHOD COPPER TYPE CONDUCTORS					
		Apr, 1983	M42-21		



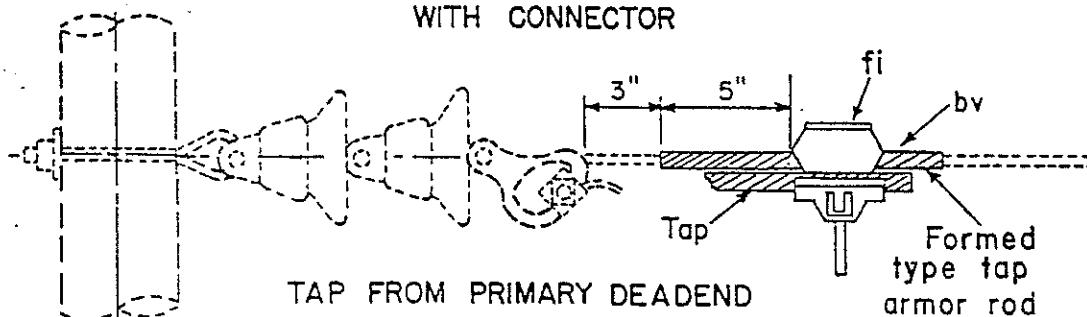
TAP FROM PRIMARY LINE

Note:

To be used on existing construction where full length armor rods were not installed.



TAP FROM NEUTRAL OR SECONDARY LINE WITH CONNECTOR



TAP FROM PRIMARY DEADEND WITH HOT LINE CLAMP

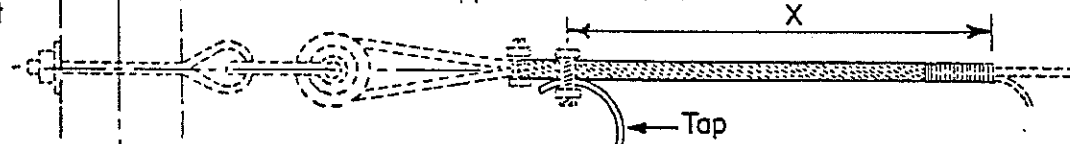
Notes:

1. Arrangement shown on M42-II may be used for neutral and secondary deadend if preferred.

2. When installing armor rods on existing lines, both conductor and armor rods should be wire brushed to provide clean contact surfaces. A corrosion inhibitor should be applied before or immediately after brushing.

3. Taps to be slack.

Add third connectors at "X" for solid copper conductors.



TAP FROM NEUTRAL OR SECONDARY DEADEND

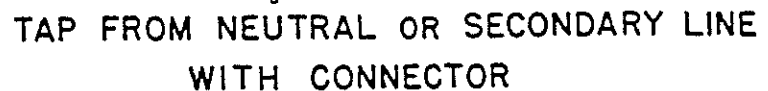
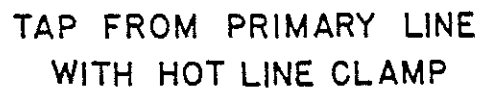
Size of solid conductor	X
No. 6 Copper	18"
No. 4 Copper	20"

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
P	Connectors, as required	bv	Tap armor rods, bronze
fi	Connector, hot line, tap assembly		

TAP ASSEMBLY GUIDE
COPPERWELD-COPPER AND COPPER CONDUCTORS

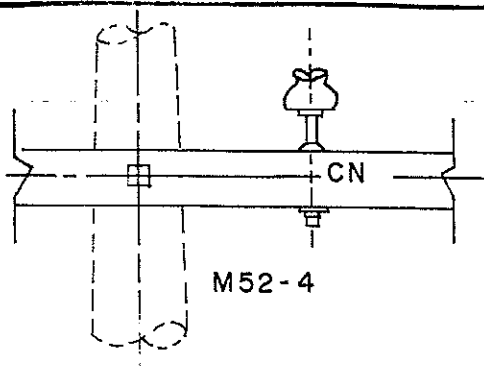
Apr., 1983

M43-4



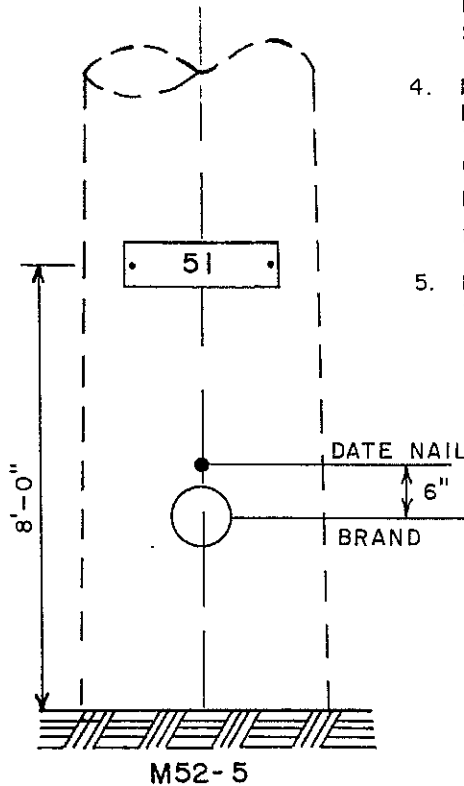
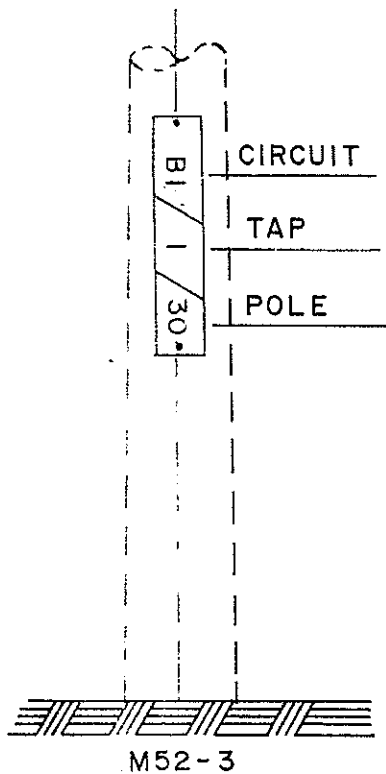
For tap without hot line clamp omit armor rods and extend pigtail.





NOTES:

1. NUMBERS AND LETTERS SHALL:
 - a) BE REFLECTIVE LETTERS ON ALUMINUM TAG, OPTIC YELLOW 3" HIGH FOR M52-3 AND M52-4.
 - b) BE 1" HIGH LETTERS ON PLASTIC TAG FOR M52-5
2. POLE NUMBERS SHALL FACE ROADS OR ACCESS.
3. ON POLES HAVING LIMITED CLIMBING SPACE DUE TO SPECIAL EQUIPMENT, POLE NUMBERS SHOULD BE SO LOCATED AS TO LEAVE CLIMBING SPACE QUADRANT UNOBSTRUCTED.
4. M52-3 TO BE INSTALLED ON ALL POLES WITH SPECIAL EQUIPMENT, TAPS, AND EVERY TENTH POLE OF MAIN LINE OR TAP. M52-5 TO BE INSTALLED ON ALL POLES NOT INCLUDED ABOVE.
5. M52-3 AND M52-5 SHALL BE CONNECTED TO POLE WITH 2" GALVANIZED NAILS.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
az		Pole number and letters as required			Nails as required
ee		Letters "CN" with 1" nails			

NEUTRAL IDENTIFICATION AND POLE NUMBERING GUIDE

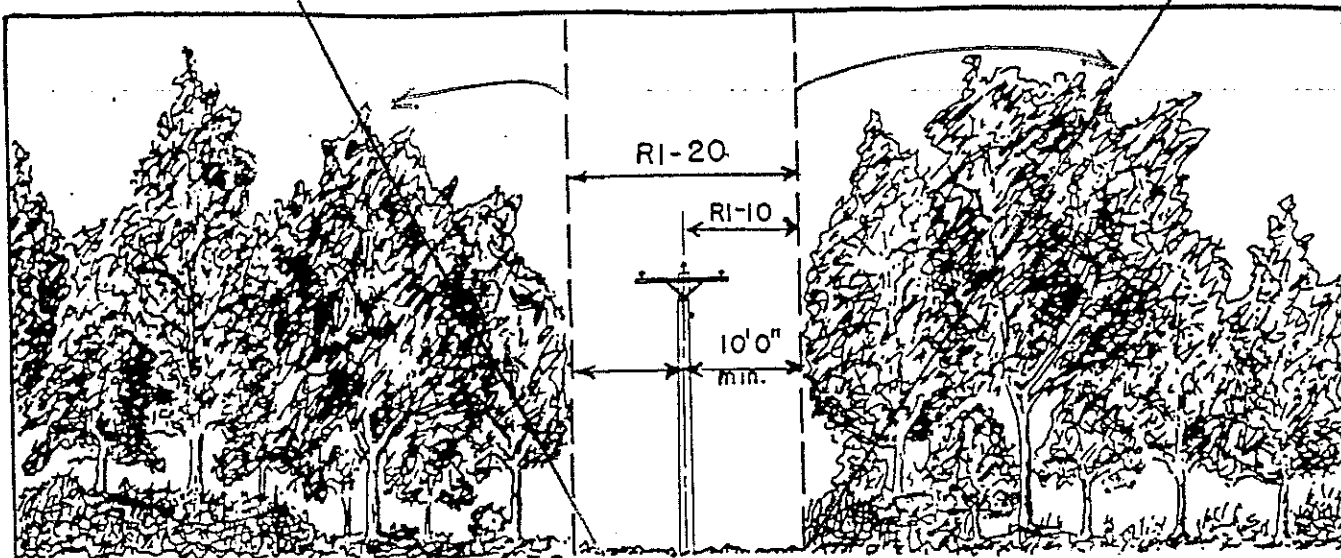
REVISED

Jan, 1993

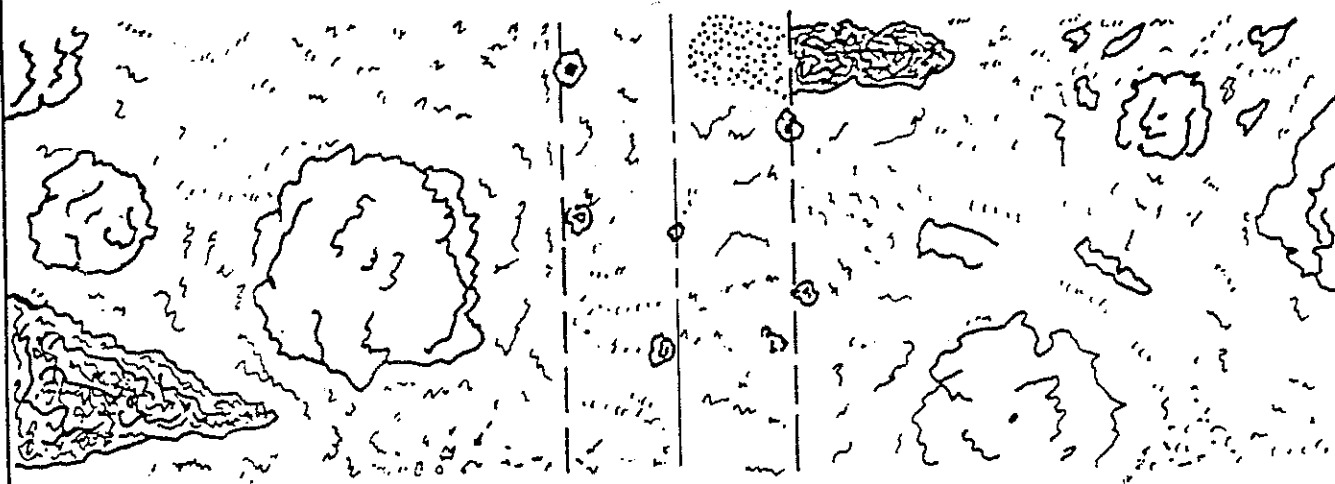


GRAND VALLEY POWER

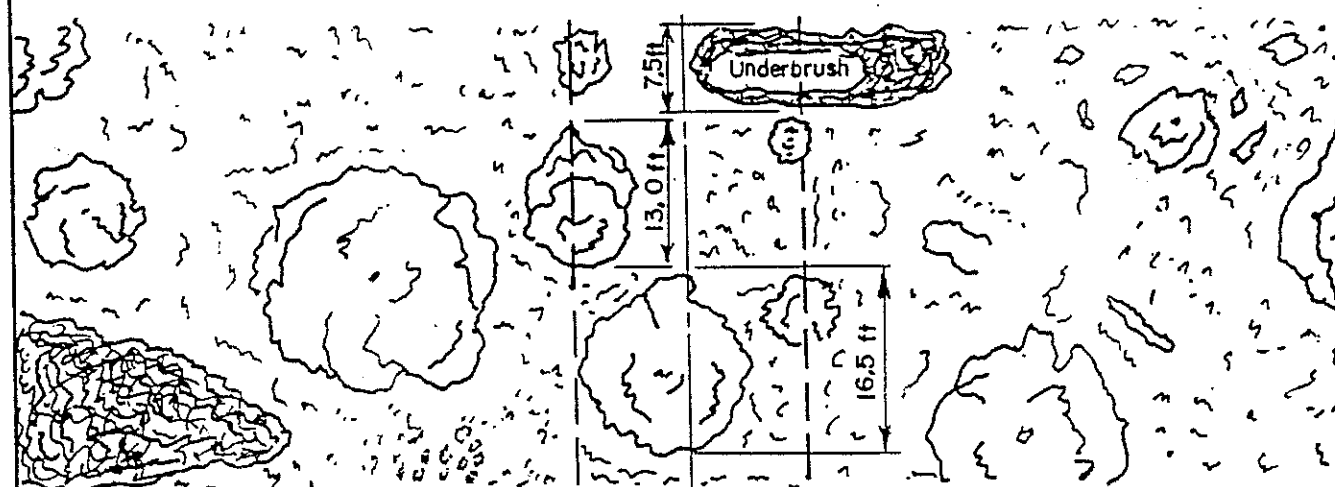
M52-3, M52-4, M52-5



ELEVATION



AFTER CLEARING



BEFORE CLEARING

CLEARING RIGHT-OF-WAY GUIDE

Apr., 1983

RI

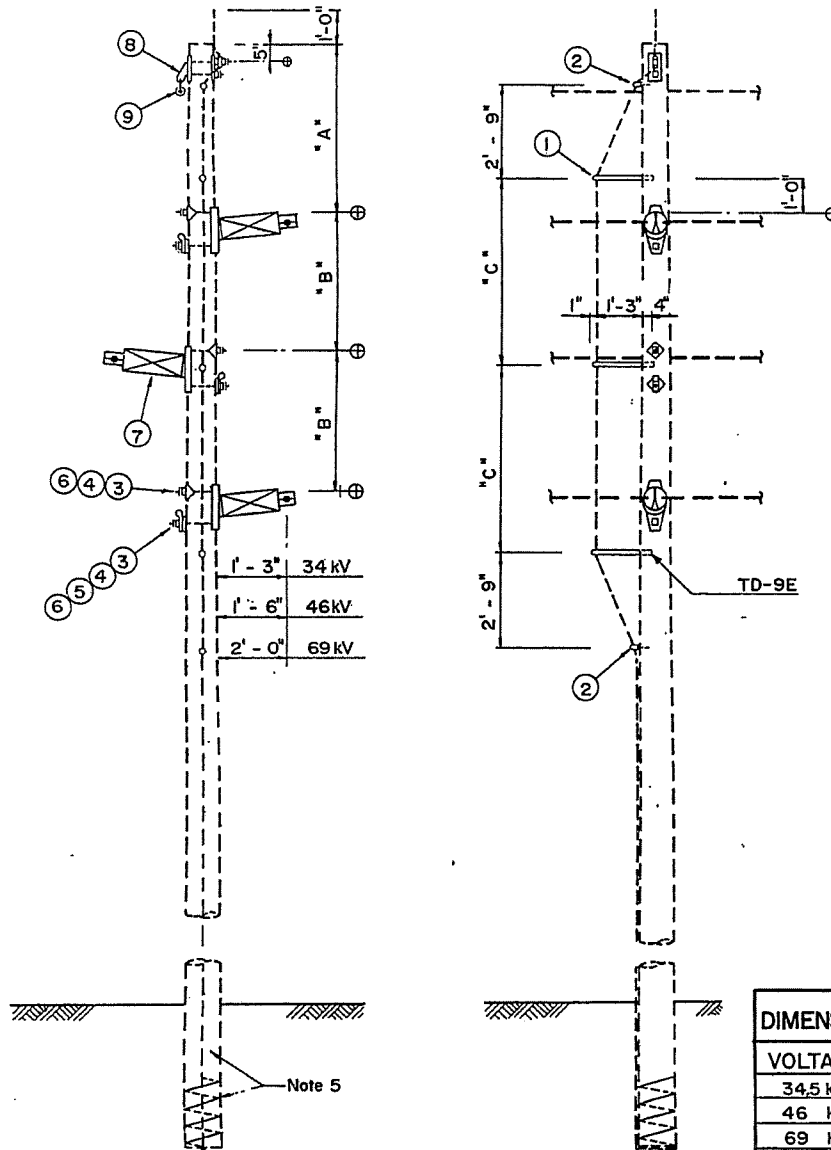
69G-69G LIST OF MATERIALS

DRG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
1	3	Rod, Fiberglass, 3/4" x 1'-8"			
2	2	Wireholder, w/#22 wood screw	ar		
3	6	3/4" Bolt, Machine, by req'd length	c		
4	6	Washer, Curved, 4" sq. x 1/4", 13/16" hole	d		
5	3	Washer, Spring, 13/16" hole	aw		
6	6	3/4" Locknut, MF Type	ek		
7	3	INSULATOR, HORIZONTAL POST, WITH CLAMP	-	TM-3 A	
8	1	OHGW SUPPORT ASSEMBLY	-	TM-6 B	
9	1	OHGW ASSEMBLY, TANGENT	-	TM-4 B	

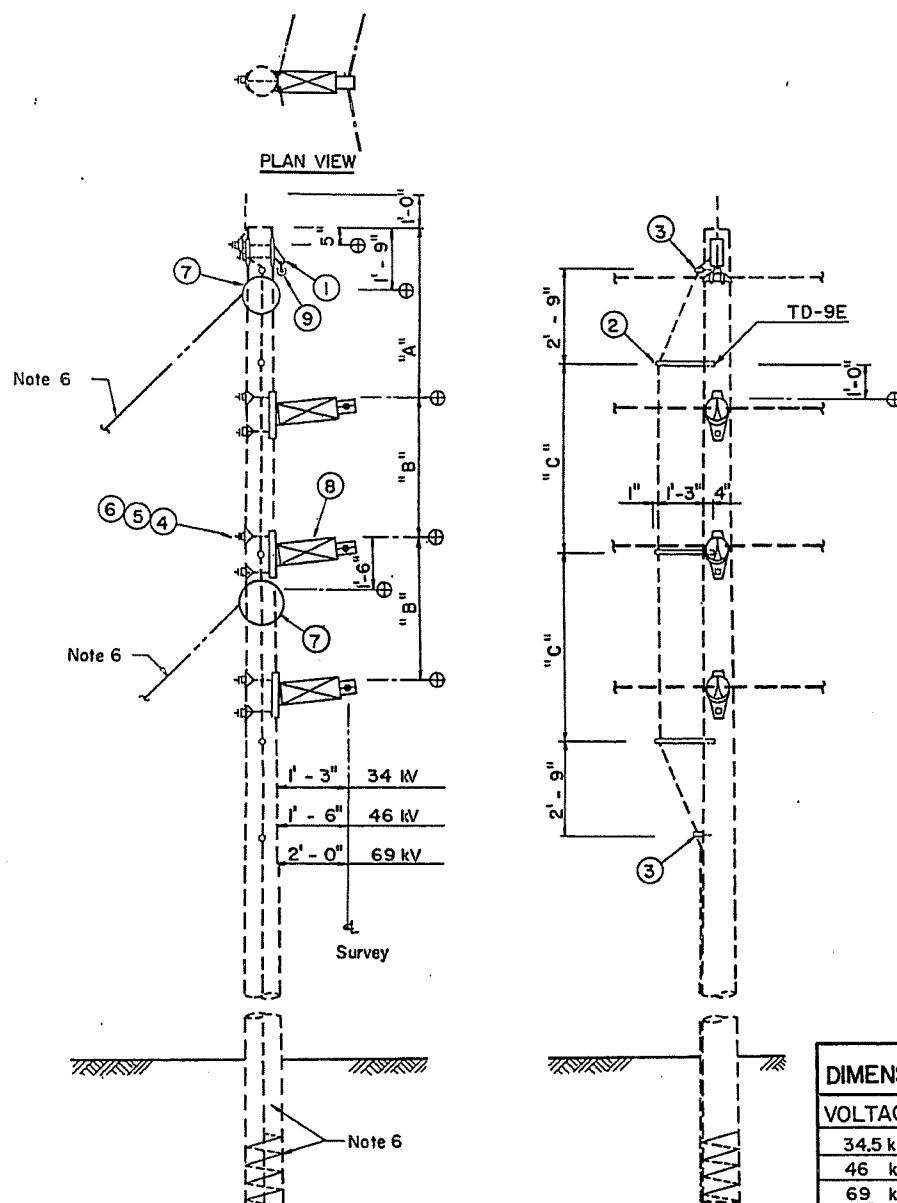
NOTES:

1. Metal shims should be used to adjust post insulator when brackets are located on uneven pole surfaces.
2. Strength limitations of horizontal post:
 - a. Maximum cantilever load 2,800 lbs.
 - b. Maximum tensile and compression 5,000 lbs.
(Loads a and b are simultaneous)
3. For strength limitations of overhead ground wire support assembly, see TM-6.
4. Drawing TE-1 gives guidance to subassembly alternatives.
5. The following materials are to be specified on the plan and profile drawings and staking sheets: POLE, POLE GROUNDING ASSEMBLY, AND ANY ADDITIONAL GROUNDING OR FOUNDATION UNITS.
6. Splice insulated wire to non-insulated wire at point at least 12 inches below where ground wire re-attaches to pole below bottom phase.

Also, strip insulation from wire at point where ground wire attaches to pole at the static to the top of the ground wire.



DIMENSIONS A, B, AND C				GRAND VALLEY RURAL POWER LINES, INC.	
VOLTAGE	A	B	C	TRANSMISSION LINE STRUCTURE	
34.5 kV	5' - 0"	4' - 0"	5' - 5"	TANGENT HORIZONTAL LINE POST (69 kV MAXIMUM)	
46 kV	5' - 6"	4' - 6"	5' - 11"		
69 kV	6' - 0"	5' - 0"	6' - 6"		
NO.	REVISION	DATE	Aug., 1986	(Raptor friendly)	TP-34G,46G,69G

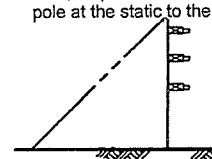


		LIST OF MATERIALS				
DRG REF.	TP - 34G TP - 46G TP - 69G		DESCRIPTION	ITEM	DET.	CODE No.
	B1	B2				
1	1	1	OHGW Support Assembly, double bolt	-	TM-6B	
2	3	3	Rod, Fiberglass, 3/4" x 1'-8"			
3	2	2	Wireholder, w/#22 wood screw	ar		
4	6	6	3/4" Bolt, Machine, by req'd length	c		
5	6	6	Washer, Curved, 4" sq. x 1/4", 13/16" hole	d		
6	6	6	3/4" Locknut, MF Type	ek		
7	1	2	GUY ATTACHMENT, DUTY	-	T6-25 C	
8	3	3	INSULATOR, HORIZONTAL POST WITH CLAMP	-	TM-3 A	
9	1	1	OHGW ASSEMBLY, TANGENT	-	TM-4 C	

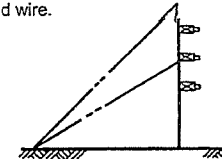
NOTES:

1. Metal shims should be used to adjust post insulator when brackets are located on uneven pole surfaces.
2. This structure is to be used for line angles up to 15 degrees.
3. Strength limitations of horizontal post:
 - a. Maximum cantilever load 2,800 lbs.
 - b. Maximum tensile load 5,000 lbs.
 (Loads a plus b are simultaneous)
4. Strength limitations of overhead ground wire support assembly, see TM-6B.
5. See drawing TE-1 for guidance to subassembly alternatives.
6. The following materials are to be specified on the plan and profile drawings and staking sheets: POLE, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS, AND ANY ADDITIONAL GROUNDING OR FOUNDATION UNITS.
7. Splice insulated wire to non-insulated wire at point at least 12 inches below where ground wire re-attaches to pole below bottom phase.

Also, strip insulation from wire at point where ground wire attaches to pole at the static to the top of the ground wire.

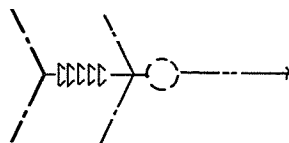


TYPE B1

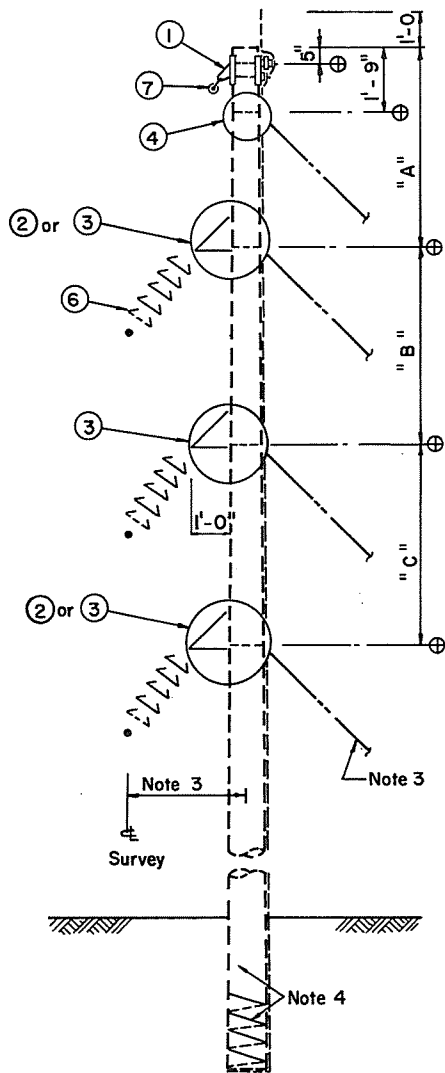
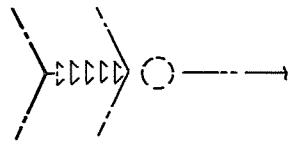


TYPE B2

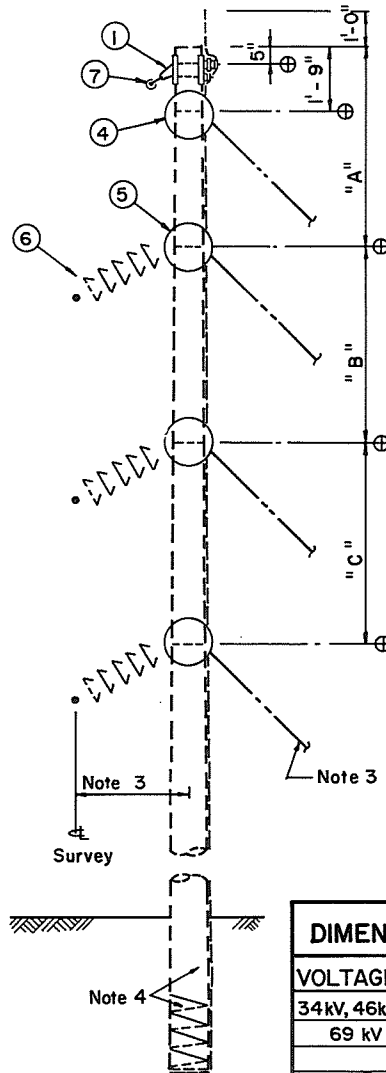
DIMENSIONS A, B, & C				GRAND VALLEY RURAL POWER LINES, INC.		
VOLTAGE	A	B	C	TRANSMISSION LINE STRUCTURE		
34.5 kV	6' - 0"	5' - 0"	6' - 5"	SMALL ANGLE HORIZONTAL LINE POST (69 kV MAXIMUM)		
46 kV	6' - 6"	5' - 6"	6' - 11"			
69 kV	7' - 0"	6' - 0"	7' - 6"			
No.	REVISION	DATE	Aug., 1986	(Raptor friendly)	TP-34GB, 46GB, 69GB	



PLAN VIEW

TS - 3G
TS - 3GA

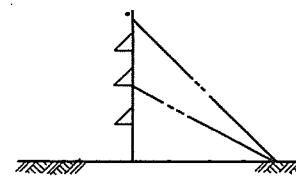
PLAN VIEW

TS - 4G
issued 03/98

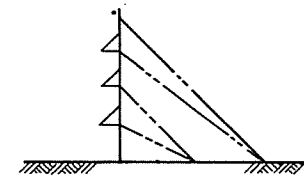
TS -				LIST OF MATERIALS			
DRG REF	3G	3GA	4G	DESCRIPTION	ITEM	DET.	CODE No.
1	1	1	1	OHGW Support Assembly, double bolt	-	TM-6B	
2	2	-	-	BRACKET ASSEMBLY, DUTY	-	TG-	
3	1	3	-	BRACKET & GUY ATTACH. DUTY	-	TG-	
4	1	1	1	GUY ATTACHMENT DUTY	-	TG-25 C	
5	-	-	3	GUY ATTACHMENT DUTY	-	TG-25E	
6	3	3	3	INSULATOR ASSEMBLY, ANGLE	-	TM-1 C	
7	1	1	1	OHGW ASSEMBLY, ANGLE	-	TM-4 A	

NOTES:

- Maximum line angle for TS-4G is 50 degrees.
- Drawing TE-1 gives guidance to subassembly alternatives.
- For guying arrangements and offset table, see drawing TMG-2G.
- The following materials are to be specified separately on the plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS, AND ANY ADDITIONAL GROUNDING OR POLE FOUNDATION UNITS.



TS - 3G

TS - 3GA
TS - 4G

DIMENSIONS A, B, & C

VOLTAGE	A	B	C
34 kV, 46 kV	6'-0"	6'-0"	6'-0"
69 kV	7'-0"	7'-0"	7'-0"

TRANSMISSION LINE STRUCTURE

MEDIUM AND LARGE VERTICAL ANGLES

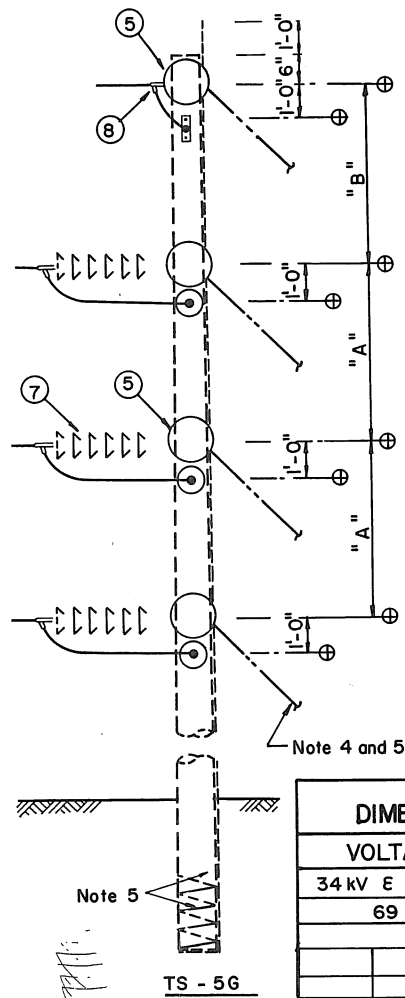
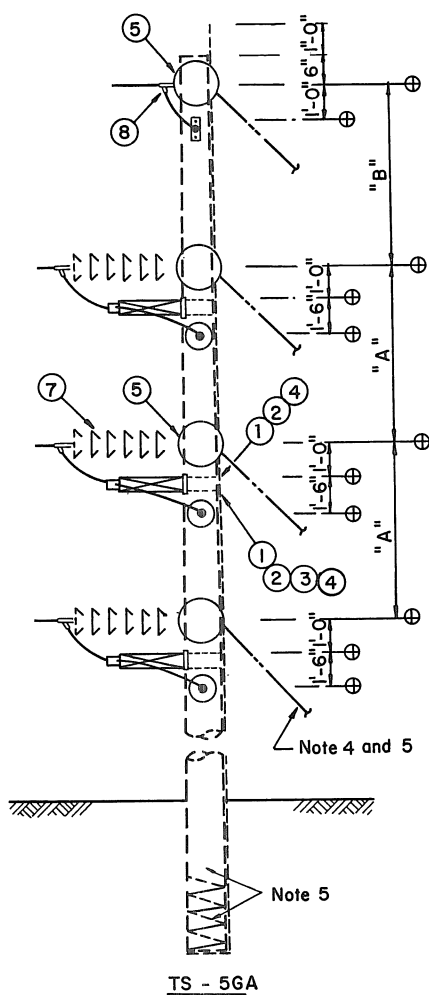
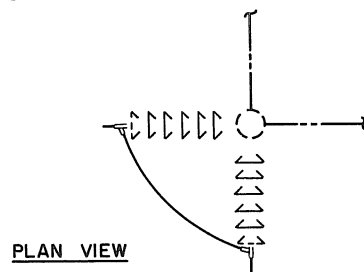
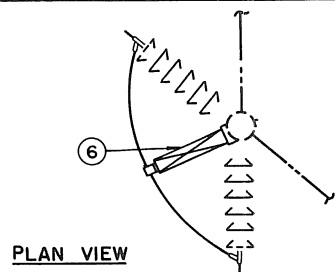
(69 kV MAXIMUM)

No.	REVISION	DATE
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Aug., 1986

TS-3G,3GA,4G

TS-4G



Reissued 03/98

TS - 5		LIST OF MATERIALS				
DRG. REF.	GA	G	DESCRIPTION	ITEM	DET.	CODE No.
1	6	-	3/4" Bolt, Machine, by req'd length	c		
2	6	-	Washer, Curved, 4" sq. x 1/4", 13/16" hole	d		
3	3	-	Washer, Spring, 13/16" hole	aw		
4	6	-	3/4" Locknut, MF Type	ek		
5	8	8	GUY ATTACHMENT, _____ DUTY	-	TG- 25E	
6	3	-	INSULATOR, HORIZONTAL POST, WITH CLAMP	-	TM-3A	
7	6	6	INSULATOR ASSEMBLY, DEADEND	-	TM-1E	
8	2	2	OHGW ASSEMBLY, DEADEND	-	TM-4E	

NOTES:

1. Metal shims should be used to adjust post insulators when brackets are located on uneven pole surfaces.
2. The minimum line angle for TS-5GA is 50 degrees. The maximum line angle for TS-5G is 90 degrees.
3. Drawing TE-1 gives guidance to subassembly alternatives.
4. For guying arrangements, see drawing TMG-26.
5. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS, AND ANY ADDITIONAL GROUNDING OR POLE FOUNDATION UNITS.

DIMENSIONS A & B			TRANSMISSION LINE STRUCTURE	
VOLTAGE	A	B	VERTICAL DOUBLE DEAD END	
34 kV & 46kV	6'-0"	6'-0"	(69 kV MAXIMUM)	
69 kV	7'-0"	7'-0"		
NO.	REVISION	DATE	Aug., 1986	
			TS-5G,5GA	

LIST OF MATERIALS

DRG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
		X-Arm Assembly, 3-5/8"x5-5/8", complete with brace and attaching hardware, fittings and bolts			
1	1				
2	3	3/4" Bolt, Machine, by req'd length			
3	4	5/8" Bolt, Machine, by req'd length	gz		
4	3	5/8" Bolt, Shoulder Eye			
5	4	1/2" Bolt, Washer Head w/Washer Nut			
6	10	Washer, Flat 2-1/4"sq.x3/16", 13/16"h			
7	3	Washer, Saddle, 13/16" hole			
8	6	3/4" Locknut, MF Type			
9	4	5/8" Locknut, MF Type			
10	4	1/2" Locknut, MF Type			
11	1	OHGW SUPPORT ASSEMBLY	-	TM-6	
12	3	INSULATOR ASSEMBLY, TANGENT	-	TM-A	
13	1	OHGW ASSEMBLY, TANGENT	-	TM-4	

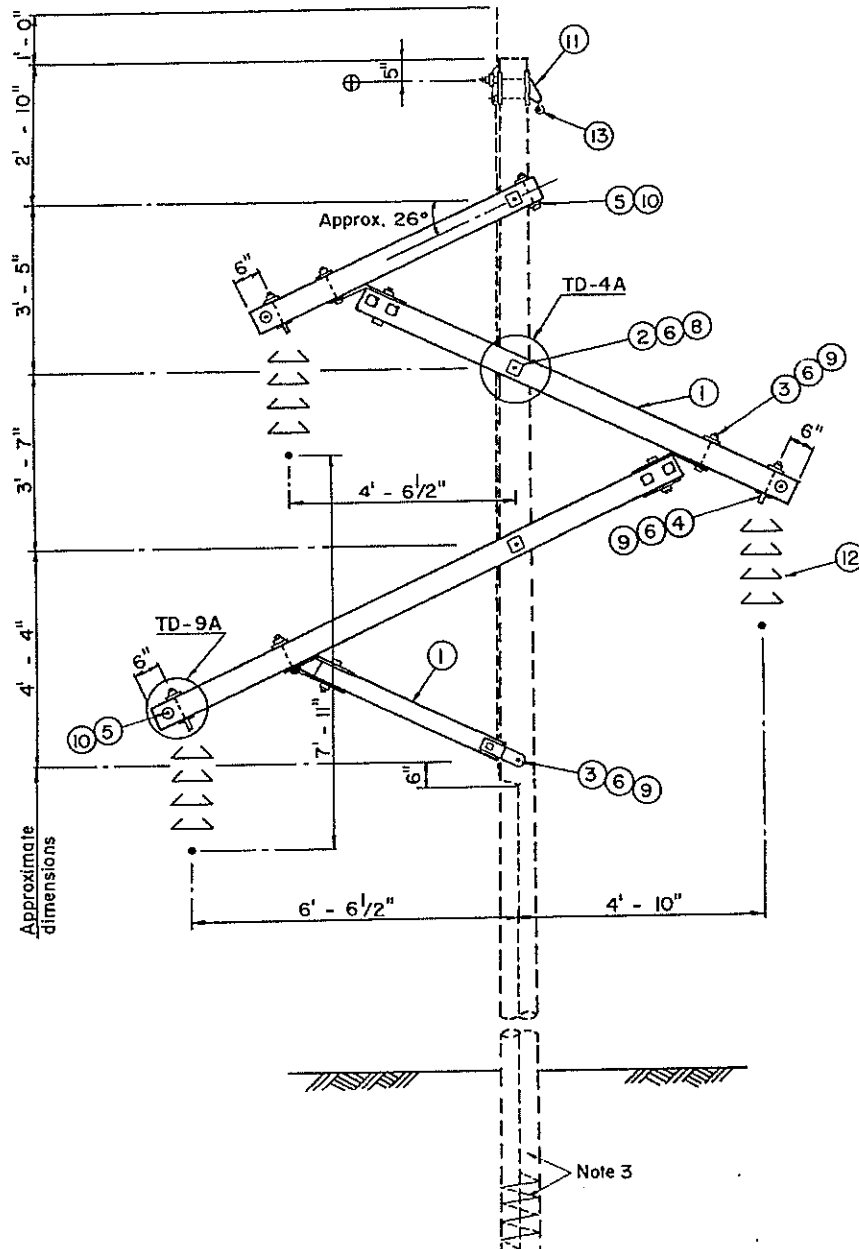
NOTES:

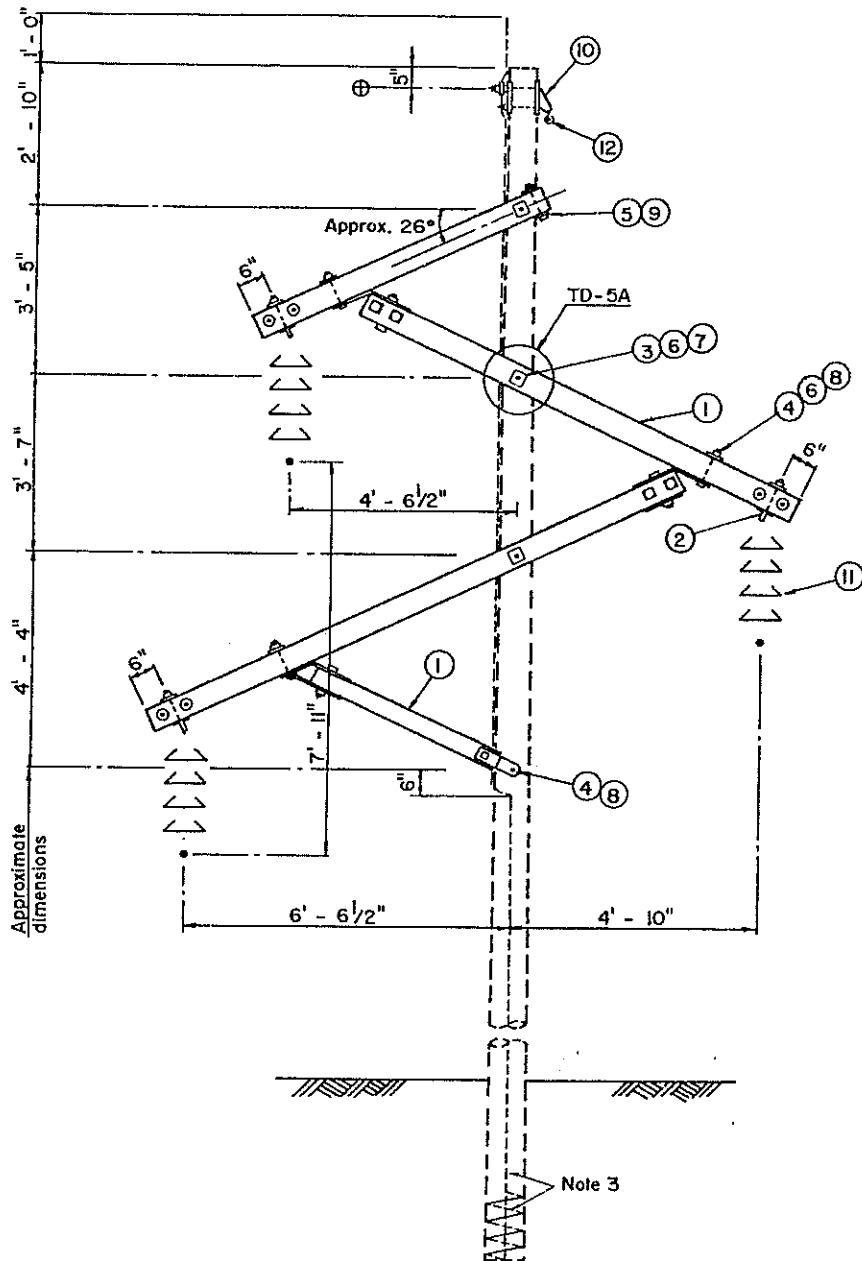
- For other requirements, see REA specification T-5.
- Drawing TE-1 gives guidance to subassembly alternatives.
- The following materials are to be specified on the plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY.

TRANSMISSION LINE STRUCTURE

TANGENT WISHBONE - SINGLE ARM
(69 kV MAXIMUM)

NO.	REVISION	DATE	Aug., 1986	TSZ - I
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LIST OF MATERIALS

DRG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
		Double X-Arm Assembly, 3-5/8"x5-5/8", complete with brace and attaching hardware, fittings and bolts			
1	1				
2	3	Spacer Assembly		TM-111	
3	3	3/4" Bolt, Machine, by req'd length			
4	7	5/8" Bolt, Machine, by req'd length	92		
5	2	1/2" Bolt, Washer Head w/Washer Nut			
6	12	Washer, Flat, 2-1/4"sq.x3/16", 13/16"h			
7	3	3/4" Locknut, MF Type			
8	7	5/8" Locknut, MF Type			
9	2	1/2" Locknut, MF Type			
10	1	OHGW SUPPORT ASSEMBLY	-	TM-6	
11	3	INSULATOR ASSEMBLY, TANGENT	-	TM-A	
12	1	OHGW ASSEMBLY, TANGENT	-	TM-4	

NOTES:

- For other requirements, see REA specification T-5.
- Drawing TE-1 gives guidance to subassembly alternatives.
- The following materials are to be specified on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY.

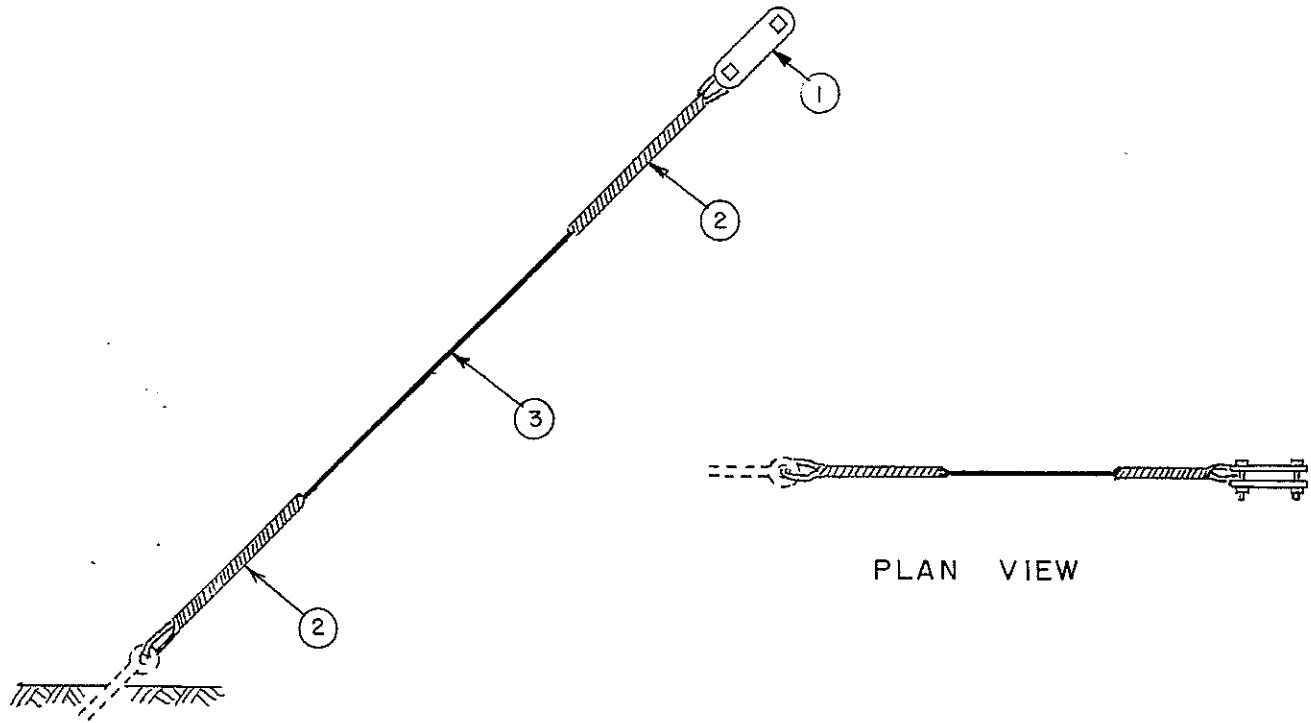
TRANSMISSION LINE STRUCTURE

TANGENT WISHBONE - DOUBLE ARMS

(69 kV MAXIMUM)

NO.	REVISION	DATE	Aug., 1986	TSZ-2
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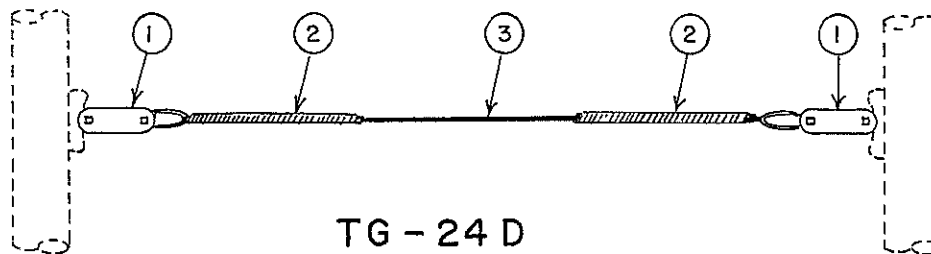
DRG REF	A	D	DESCRIPTION	ITEM	DET	
1	1	2	Guy Link Type 1	du	TG-92	
2	2	2	Guy Grip Preformed	u		
3	ft.	ft	Guy Wire	y		



PLAN VIEW

TG-24A

SINGLE GUY TO ONE ROD



TG-24D

OVERHEAD GUY

GUYING ASSEMBLIES

GUY LINK

(MEDIUM DUTY)

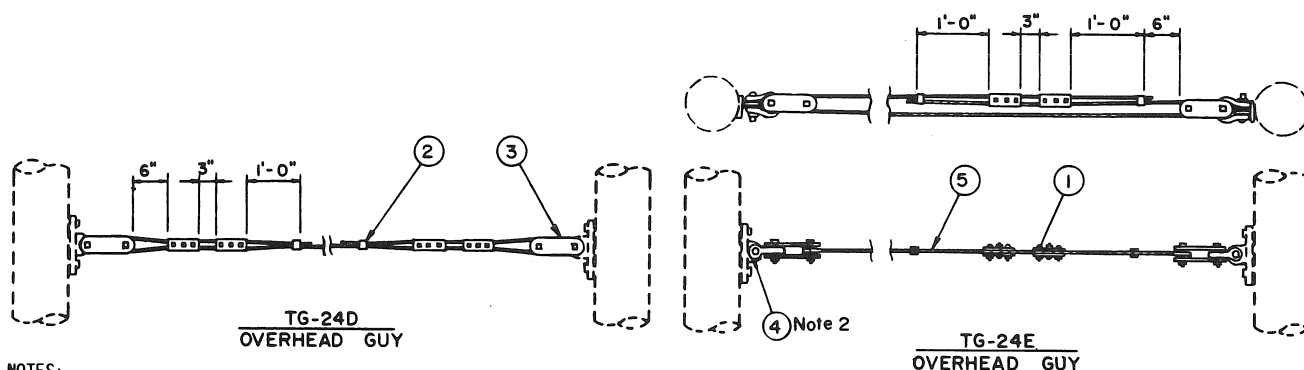
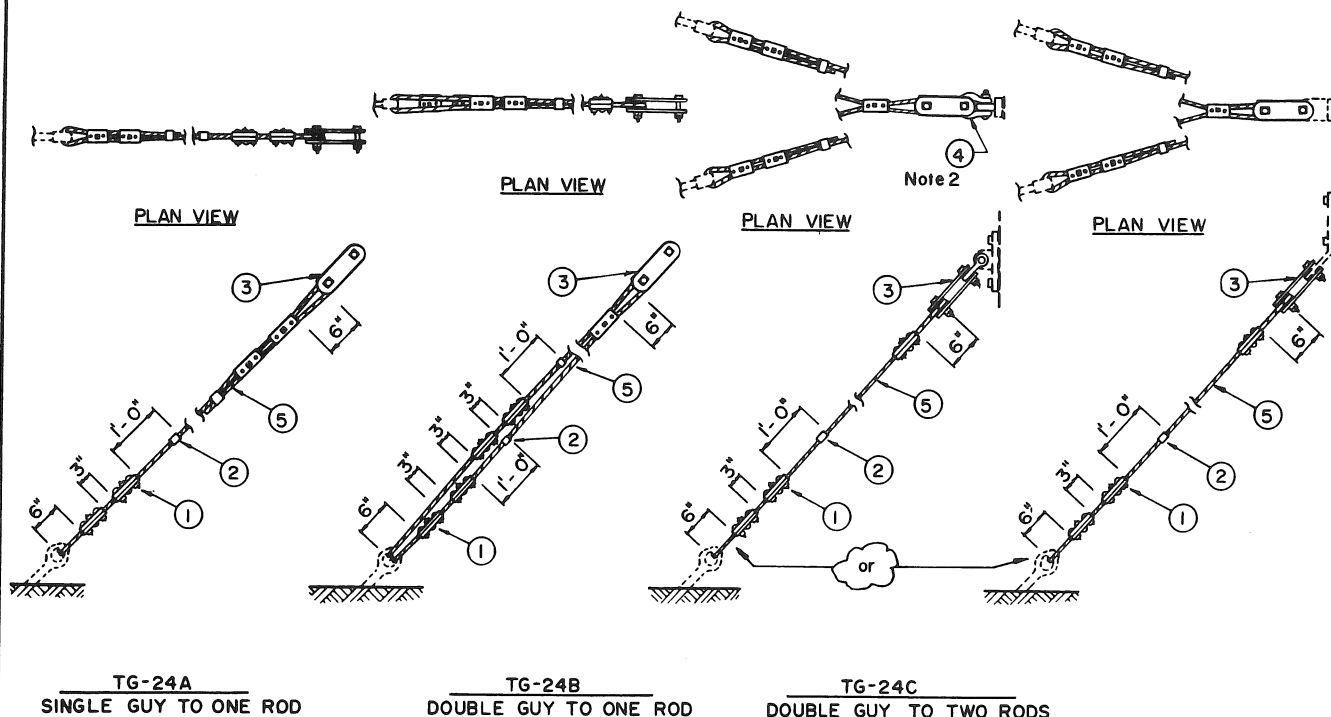
NOV 1993



GRAND VALLEY POWER

TG-24

TG - 24 (35,400 lbs. max.)						LIST OF MATERIALS			
DRG. REF.	A	B	C	D	E	DESCRIPTION	ITEM	DET.	CODE No.
1	4	5	5	4	2	Connector, 3 Bolt Guy Clamp, w5/8" bolt	u		
2	2	2	2	2	2	Guy Clip	dz		
3	1	1	1	2	2	Guy Link, Type 1		TG-92	
4	-	-	-	-	1	Anchor Shackle, 50,000 lbs.	bo		
5	ft.	ft.	ft.	ft.	ft.	GUY WIRE	y		
6									



NOTES:

- Guying assemblies are to be coordinated with the guy attachments. For example, if medium duty guy attachments are specified on the structure drawings, then medium duty guying assemblies are to be used.
- Anchor shackles may be required for orientating the guy assembly to the guy attachments for Assembly "C" and "E".
- The maximum size guy strand to be used with these assemblies is 7/16" E.H.S. galvanized steel or 20 M aluminum clad steel strand. The three bolt guy clamp is 6" long, heavy duty, and will accommodate a minimum size guy strand of 5/16".
- The capacity of a guy assembly is limited by either the strength of the guy strand or hardware. When aluminum clad guy strand is used, the capacity of the guy assembly should be limited to 80% of the rated breaking strength of the guy strand. The strength limitation of the TG-24D&E is 25,000 lbs.

- An anchor shackle may be required to attach the Link Assembly to the Deadend and Guying Pole Eye Plate, TG-27E.
- Assembly "C" is for normal guying. Do not use for spread guying.

GUYING ASSEMBLIES

GUY LINK (MEDIUM DUTY)

Reissued 03/98

TG-24

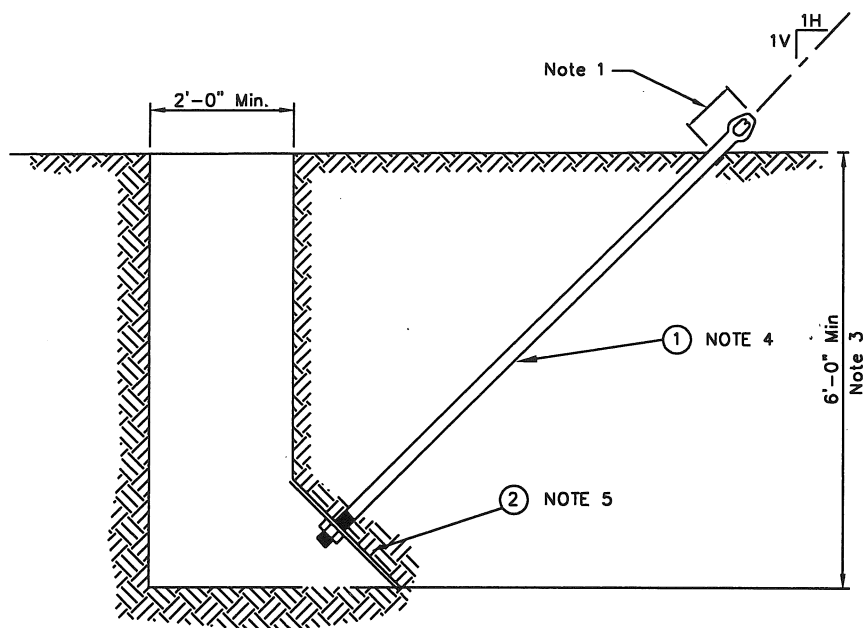
Diagram illustrating a bracket assembly with forces and dimensions:

- A horizontal force of **25,000 lb.** is applied to the left at the top of the bracket.
- A diagonal force of **35,400 lb.** is applied at the bottom right, acting downwards and to the left.
- The vertical distance between the points of application of the two forces is **1'-0"**.
- The horizontal distance from the vertical line of action of the 25,000 lb. force to the point of application of the 35,400 lb. force is **1'-0"**.
- The angle between the horizontal and the line of action of the 35,400 lb. force is labeled **IV**.
- Dimensions **1'-0"** and **1'-0"** are indicated with arrows.
- Labels **Note 2** and **Note 3** point to specific components of the assembly.
- Numbered circles (1) through (7) identify various parts of the bracket and its mounting.

TG-25 (Updated 1/2017)

LIST OF MATERIALS

DWG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
1	1	Rod, Anchor, Twin eye + nut	x		
2	1	Anchor, Plate	z		



TA-2P (OR) TA-3P

TA-2PC (OR) TA-3PC

NOTES:

- *1. Maximum projection after loading is 8 inches. Projection of anchor rods above earth may be increased to a maximum of 12 inches in cultivated fields or other locations where necessary to prevent burying of the rod eye.
2. If soil class at depth of anchor is worse than that shown, use another anchor type.
3. For guy slope of 2H:3V, minimum depth shall be 7'-0".
4. TA-2P, 3P units shall have galvanized rods and nuts. TA-2PC, 3PC units shall have copperplated rods and bronze nuts.
5. The anchor plates for the TA-2P,3P shall be galvanized or completely coated with an asphaltum base coating. The anchor plates for TA-2PC, 3PC shall be copperplated for protection against corrosion.
6. For other requirements, refer to RUS Specification T-3.

LOG ANCHOR UNITS AND CAPACITIES

UNIT No.	SOIL CLASS (MIN)	ULTIMATE CAPACITY (LB)	ANCHOR ROD SIZE (DRG. REF.)
TA-2P,2PC	5*	16,000	3/4" dia. x 8'-0" LONG
TA-3P,3PC	4*	24,000	1" dia. x 8'-0" LONG

ANCHORS

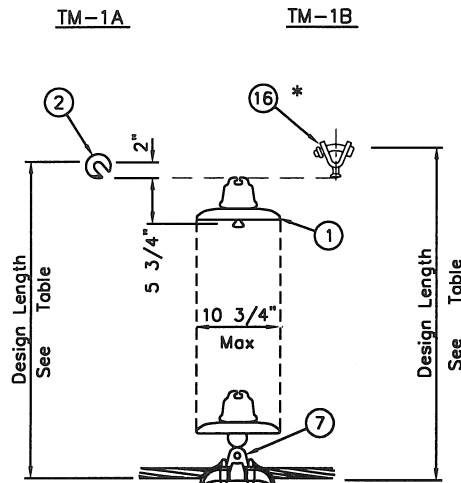
STEEL CROSS PLATE

1.*	SOIL CLASS, NOTE 1	03/98
NO.	REVISION	DATE

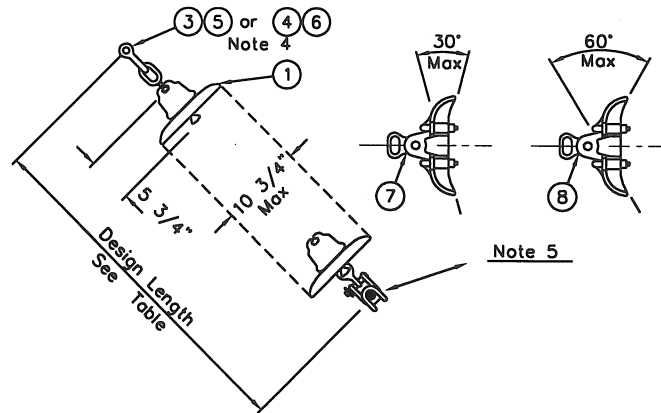
TA-2P,3P,2PC,3PC

LIST OF MATERIALS

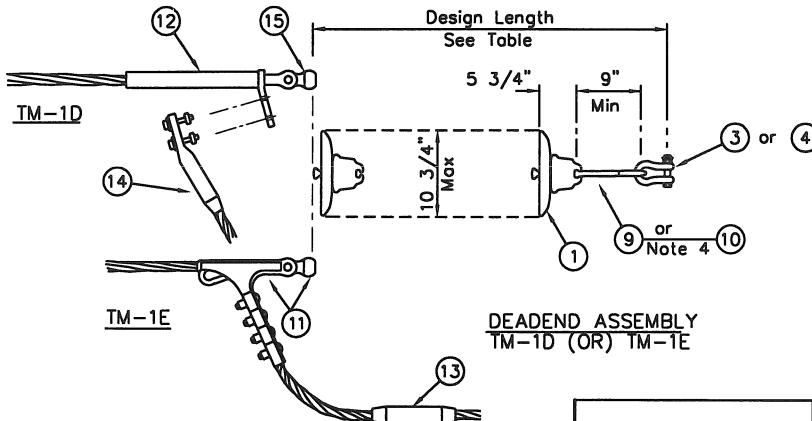
DWG. REF.	QTY.	DESCRIPTION	ITEM	DET.	CODE No.
1	-	Insulator,Suspen'n,5-3/4x10-3/4 max.	k		
2	-	Hook, Ball 30,000 lb.	eh		
3	-	Anchor Shackle 30,000 lb. BNC	bo		
4	-	Anchor Shackle 50,000 lb. BNC	bo		
5	-	Oval Eye, Ball 30,000 lb.			
6	-	Oval Eye, Ball 50,000 lb.			
7	-	Clamp,Suspension & Socket Eye;to 30°	el		
8	-	Clamp,Suspension & Socket Eye;to 60°	el		
9	-	Link, Extension, Oval Eye Ball,30k			
10	-	Link, Extension, Oval Eye Ball,50k			
11	-	Clamp, Bolted D.E. & Socket Eye	ej		
12	-	Clamp Compression D.E.	cp		
13	-	Jumper Connector, Compression	p		
14	-	Jumper Terminal, Compression			
15	-	Socket Adapter (Socket Eye or Clevis)	fh		
16	-	30k Ball Y-Clevis	ft		
17	-				



TANGENT ASSEMBLY
TM-1A (OR) TM-1B



ANGLE ASSEMBLY
TM-1C



DEADEND ASSEMBLY
TM-1D (OR) TM-1E

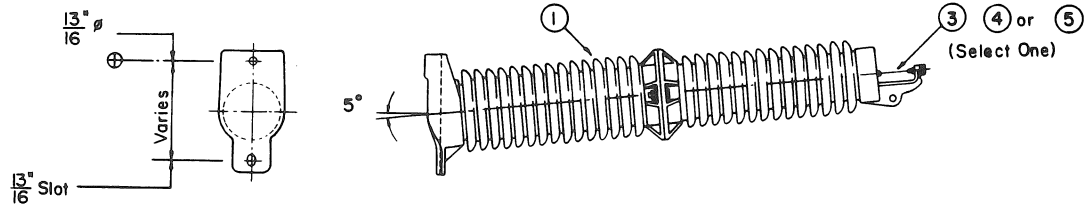
Notes:

- The table at the right shall be completed for each project.
- Suitable suspension clamps must be selected for the conductor being used. The following are to be considered: type of conductor, diameter of conductor (considering armor rods and/or liners), etc.
- Corona-free suspension clamps shall be used for 230 kv transmission lines.
- The capacity of the hardware must be equal to or greater than the M&E strength of the insulator units shown in the table at the right. Use items 4, 6 or 10 for 36,000 lb. insulators.
- Appropriate clamps shall be installed for line angles shown on the plan and profile:
 - For angles from 0 degrees to 30 degrees use dwg. ref. 7.
 - For angles from 30 degrees to 60 degrees use dwg. ref. 8.
- When specified by the engineer, the ball hook may be used for TM-1C.

-----kv	ASSEMBLY		
	TANGENT	ANGLE	DEADEND
Quantity of Units			
ANSI C29.2, Class			
M & E Strength (lb.)			
Assembly Weight (lb.)			
Design Length (in.)			
Color of Units			
INSULATOR ASSEMBLIES			
INSULATOR STRING WITH SUSPENSION CLAMP			
1,*	Add item 16,TM-1B	03/98	
NO.	REVISION	DATE	
			TM-1

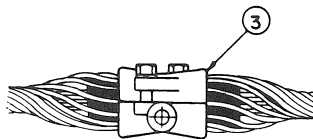
LIST OF MATERIALS

DRG. REF.	DESCRIPTION	ITEM	DET.	CODE No.
1	Insulator, Horizontal Post, with base	ea		
2	Insulator, Vertical Post, w/mtg. hdwr.			
3	Clamp, Cushioned Support			
4	Clamp, Post Suspension (to 15°)			
5	Clamp, Angle			

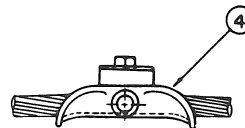
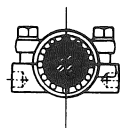


HORIZONTAL POST INSULATOR

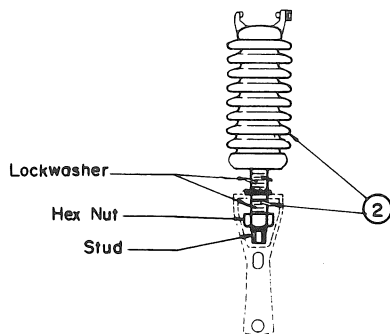
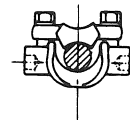
TM - 3A (DETAIL A)
TM - 3B (DETAIL B)
TM - 3C (DETAIL C)



CUSHIONED SUPPORT CLAMP
DETAIL A

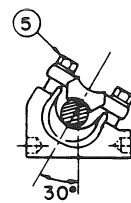


POST CLAMP
DETAIL B

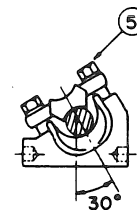


VERTICAL POST INSULATOR

TM - 3E (DETAIL A)
TM - 3F (DETAIL B)



LEFT TURN



RIGHT TURN

ANGLE CLAMP
DETAIL C

NOTES:

- The appropriate conductor clamp shall be used for the line angles shown on the plan-profile drawings. For line angles from:

- 0 degrees to 30 degrees TM-3A
- 0 degrees to 15 degrees TM-3B, 3E, 3F
- 15 degrees to 30 degrees TM-3C

INSULATOR ASSEMBLIES

LINE POST

Reissued 03/98

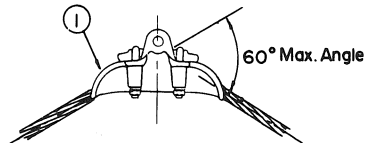
No.	REVISION	DATE
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Aug., 1986

TM-3

LIST OF MATERIALS

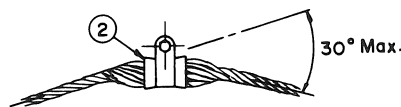
DRG. REF.	DESCRIPTION	ITEM	DET.	CODE No.
1	Clamp, Suspension (to 60°)	m		
2	Clamp, Cushioned Suspension	ei		
3	Clamp, Cushioned Susp. & Clevis Eye	ei		
4	Anchor Shackle, 30,000 lbs., BNC	bo		
5	Yolk Plate			
6	Clamp, Bolted Deadend	l		
7	Clamp, Compression Deadend	l		
8	Link, Extension, Clevis 6"			
9	Jumper Connector, Compression	p		
10	Jumper Terminal, Compression			
11	3 Bolt Clamp, 6"			



TANGENT CLAMP
TM - 4A

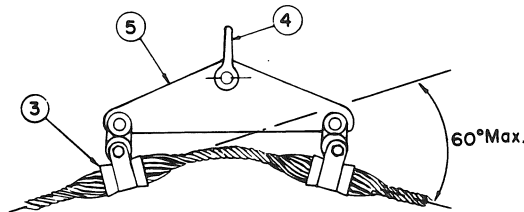


TANGENT ASSEMBLY
TM - 4B

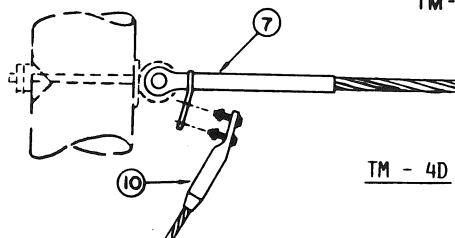


TYPE 1

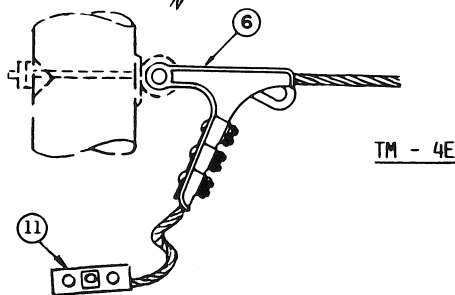
ANGLE ASSEMBLY
TM - 4C (Note 1)



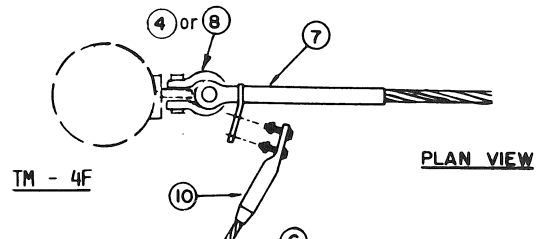
TYPE 2



TM - 4D

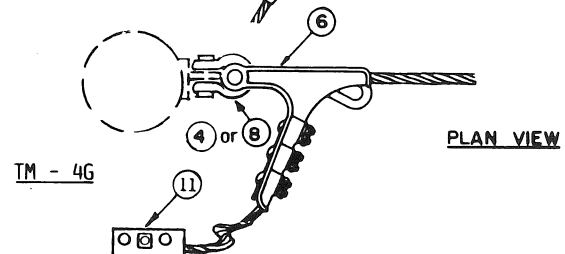


TM - 4E



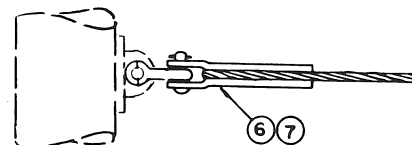
TM - 4F

PLAN VIEW



TM - 4G

PLAN VIEW



DEADEND ASSEMBLY

Notes:

1. The appropriate cushioned suspension angle assembly shall be installed for the line angles shown on the plan-profile drawings:

- For angles from 0 degrees to 30 degrees, use type 1.
- For angles from 30 degrees to 60 degrees, use type 2.

O.H.G.W. ASSEMBLIES

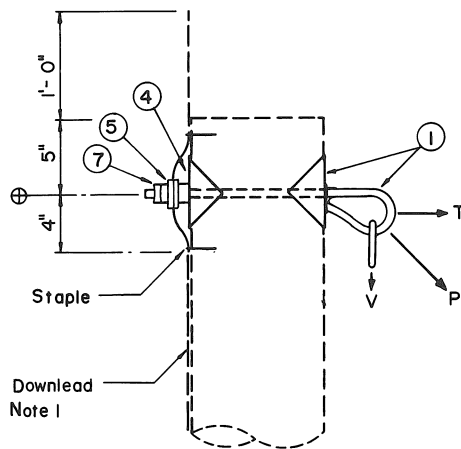
CUSHIONED SUSPENSION AND SUSPENSION CLAMP

Reissued 03/98

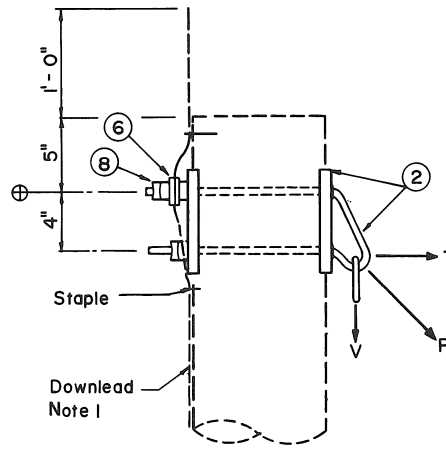
NO.	REVISION	DATE

TM-4

TM-6			LIST OF MATERIALS				
DWG. REF.	A	B	DESCRIPTION	ITEM	DET.	CODE No.	
1	1	-	Support, Single Bolt OHGW, 3/4" d.	ed			
2	-	1	Support, Double Bolt OHGW, 5/8" d.	ed			
3	-	-	5/8" Bolt, Washer Head, w/Washer Nut	c			
4	1	-	Washer, Curved, 4"sq.x 1/4", 13/16" hole	d			
5	1	-	3/4" Clamp, Groundwire + 1 nut	dp			
6	-	1	5/8" Clamp, Groundwire + 1 nut	dp			
7	1	-	3/4" Locknut, MF Type	ek			
8		2	5/8" Locknut, MF Type	ek			
9							



SINGLE BOLT O.H.G.W. SUPPORT
TM - 6A



DOUBLE BOLT O.H.G.W. SUPORT
TM - 6B

NOTES:

- For placement of downlead and staples see respective structure drawings and drawing TM-9.
- TM-6B is to be used for all single pole angle structures and H-frame structures.
- Designated strength limitations of the overhead ground-wire support assemblies are:

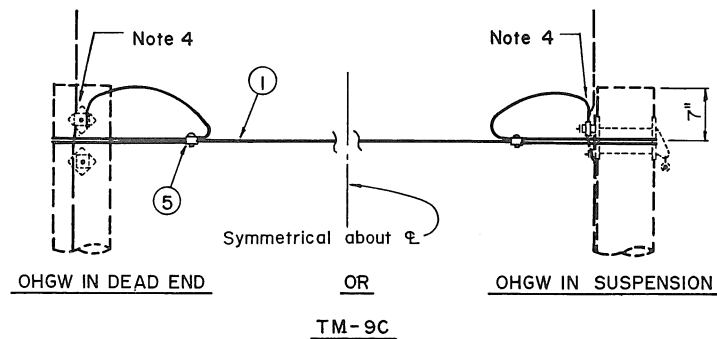
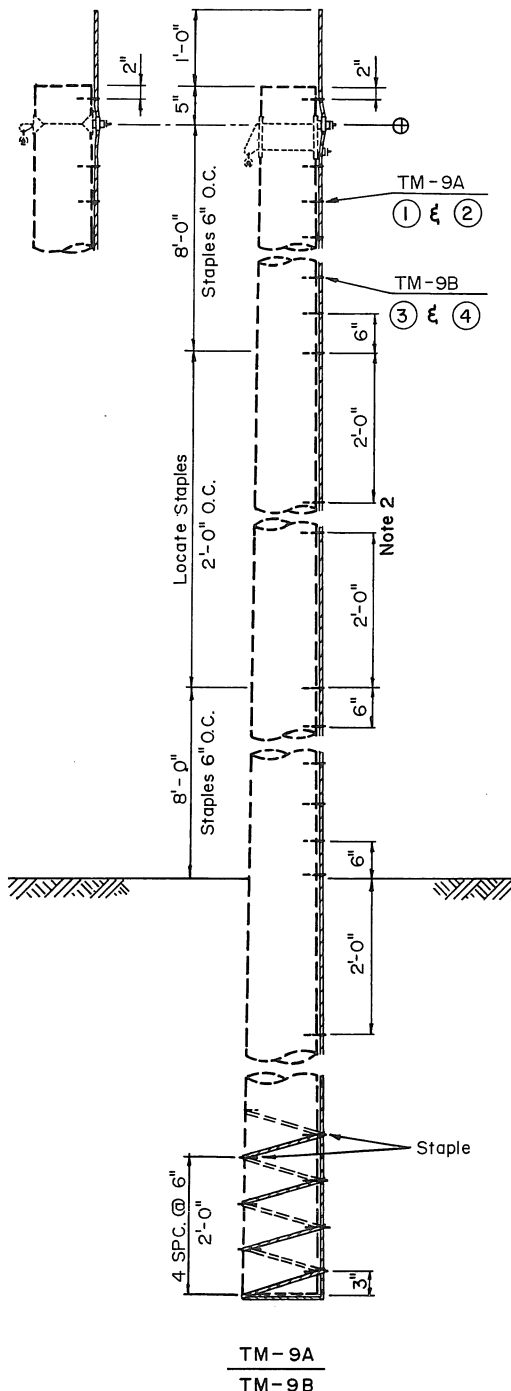
	Allowable Vertical Load
TM-6A	1,200 lbs.
TM-6B	1,600 lbs.

Reissued 03/98

NO.	REVISION	DATE
		Aug., 1986

O.H.G.W. SUPPORT ASSEMBLY	
SINGLE AND DOUBLE BOLT	
	TM-6

TM - 9				LIST OF MATERIALS			
DRG. REF.	A	B	C	DESCRIPTION	ITEM	DET.	CODE No.
1	ft.	-	ft.	5/16" Wire, soft annealed iron	cj		
2	lb.	-	-	2" x 1/2" Staples, galvanized steel	al		
3	-	ft.	-	#4 Wire AWG, copper or copperclad	cj		
4	-	lb.	-	1-1/2" x 3/8" Staples, copperclad	al		
5	-	-	2	Clamp, U-Bolt	u		



NOTES:

1. Orientate the download as shown on the transmission line structure drawings. On structures with X-Arms, the download shall be located and stapled so that it does not come in contact with the X-Arm or the through bolts.
2. Staple the download to the pole leaving one foot of wire projecting above the poles. Staples on the download shall be 2 feet apart, except for a distance of 8 feet above the ground and 8 feet from the top of the pole where they shall be 6 inches apart.
3. Carry the download under the bottom of the pole, and then wrap the download four turns back up the pole. Staple the groundwire to the pole at each wire crossing and on the opposite sides of the pole.
4. Terminate the tie wire for TM-9C at the groundwire clamp.

GROUNDING ASSEMBLIES

POLE GROUND AND BUTT WRAP

Reissued 03/98

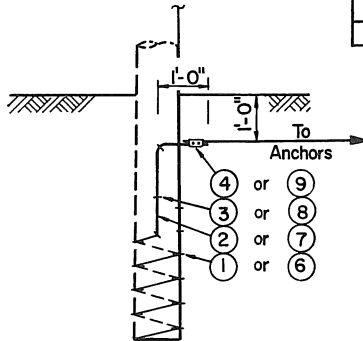
No.	REVISION	DATE	Aug., 1986

Aug., 1986

1 OF 2

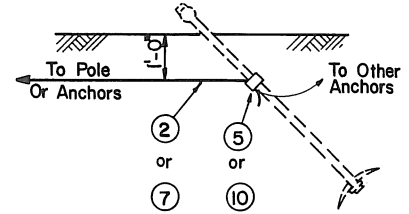
TM-9

		TM - 9		LIST OF MATERIALS		
DRG. REF	D, J, F, H, L, U	E, G, K, M, I	DESCRIPTION	ITEM	DET.	CODE No.
1	as req'd	-	Pole Ground & Butt Wrap	-	TM-9A	
2	ft.	-	5/16" Wire, soft annealed iron	cj		
3	as req'd	-	2" x 1/2" Staples, galvanized steel	al		
4	as req'd	-	Connector, compression, for item 2	p		
5	as req'd	-	Connector, galvanized steel			
6	-	as req'd	Pole Ground & Butt Wrap	-	TM-9B	
7	-	ft.	#4 Wire AWG, copper or copperclad	cj		
8	-	as req'd	1-1/2" x 3/8" Staples, copperclad	al		
9	-	as req'd	Connector, compression, for item 7	p		
10	-	as req'd	Connector, copper (or) bronze			

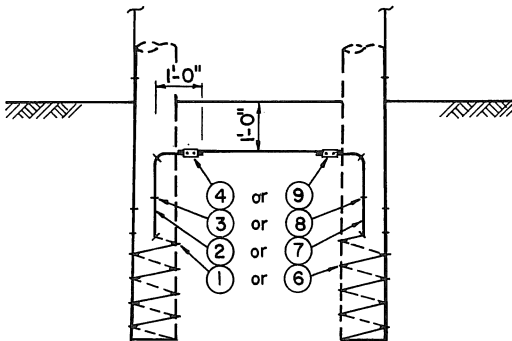


TM-9D()
TM-9E()

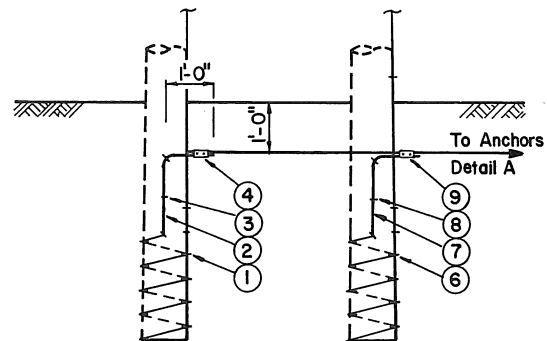
Note 4



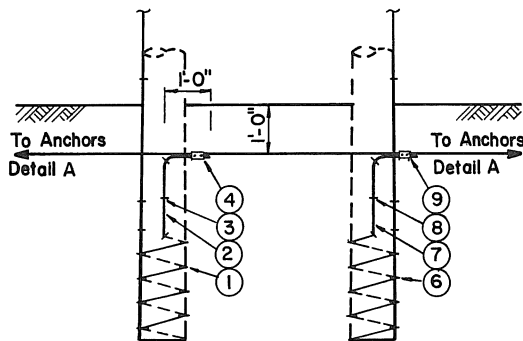
DETAIL A



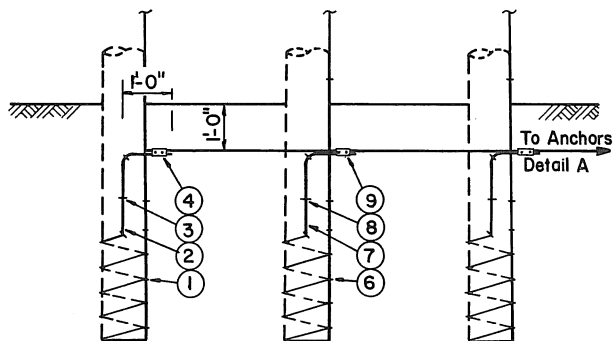
TM-9F()
TM-9G()



TM-9H()
TM-9I()



TM-9J()
TM-9K()



TM-9L()
TM-9M()

Notes:

- For other installation details, refer to sheet 1 of 2, TM-9.
- Grounding materials must be consistent with good corrosion prevention practices. When galvanized hardware and 5/16" iron wire are used, anchor rods shall be galvanized steel. When copper, copperclad or bronze hardware are used, anchor rods shall be copperclad.
- Bid items on this drawing include material to top of pole in accordance with sheet 1 of 2, TM-9.
- () indicates number of anchors.

GROUNDING ASSEMBLIES

MULTIPLE POLE AND ANCHOR GROUNDING

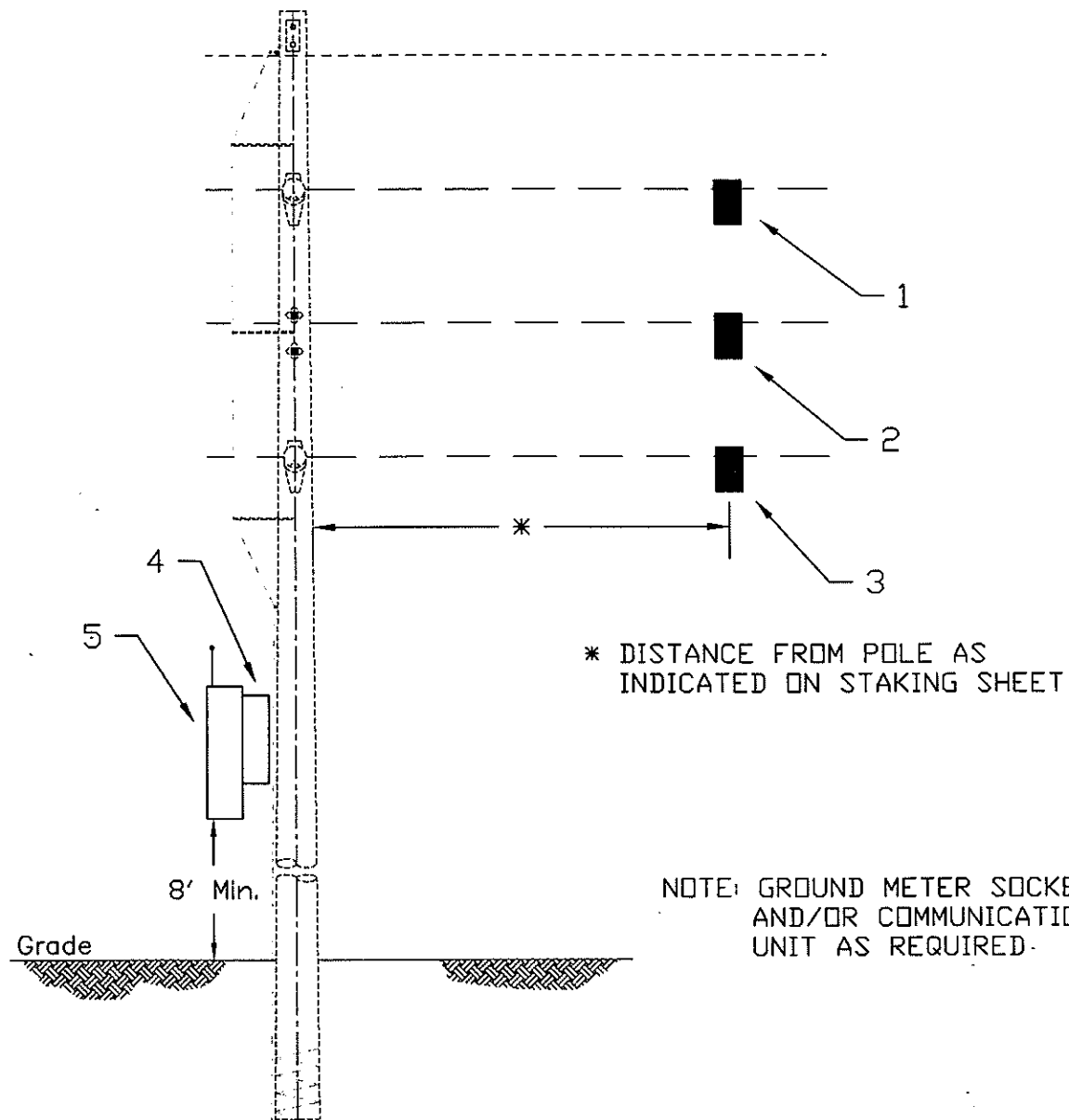
2 OF 2

TM-9

Reissued 03/98

NO.	REVISION	DATE

Aug., 1986

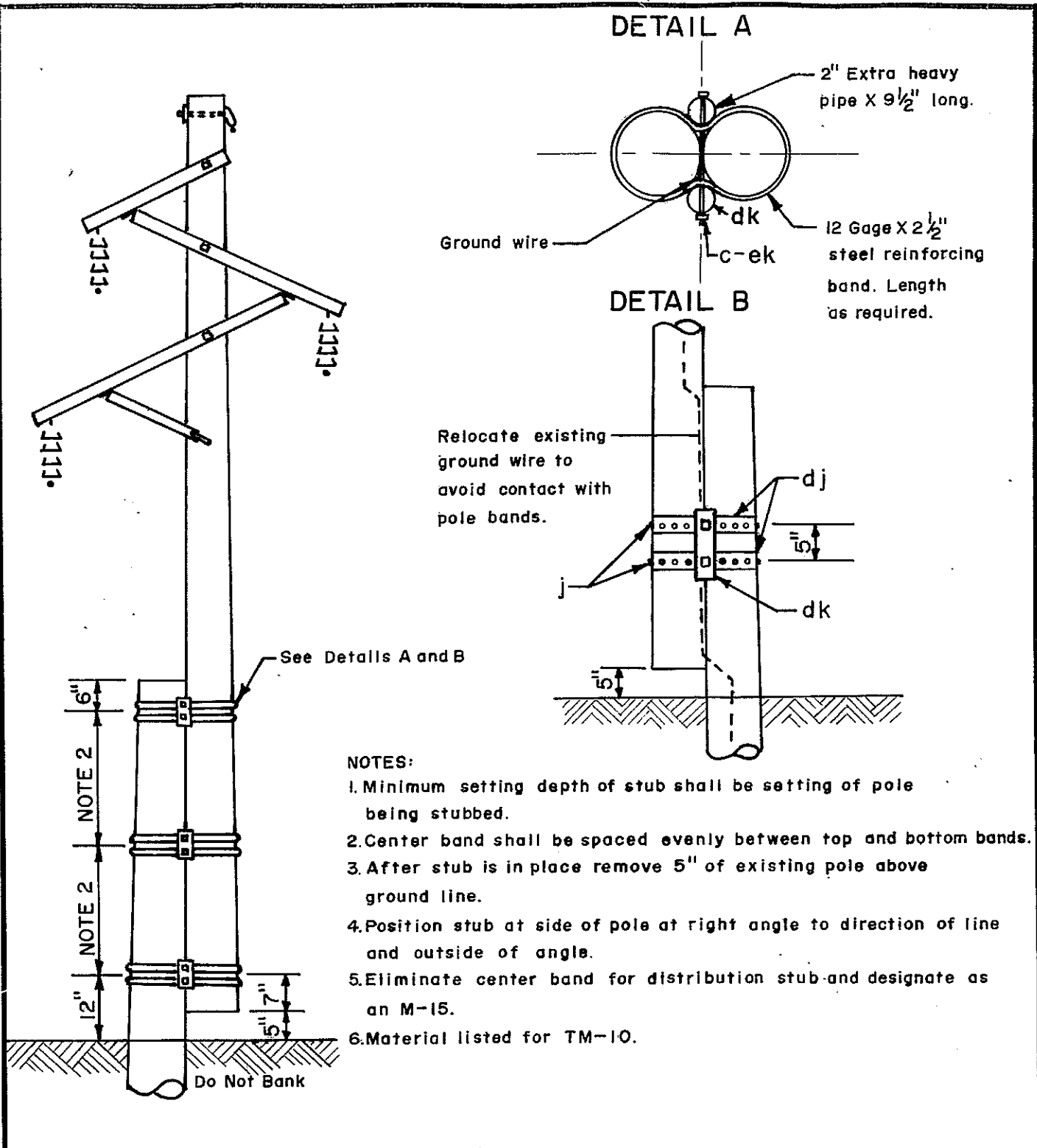


ITEM	QUANTITY	DESCRIPTION
1	1	69KV FAULT INDICATOR, A PHASE
2	1	69KV FAULT INDICATOR, B PHASE
3	1	69KV FAULT INDICATOR, C PHASE
4	1	METER SOCKET, RING TYPE
5	1	COMMUNICATION UNIT, 120V
	AS REQUIRED	CONDUIT, 1" PVC ELECTRICAL GRADE

69KV FAULT INDICATORS W/COMMUNICATIONS



TM-10



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	6	Bolt, machine, 5/8" X required length	dj	6	Band, reinforcing, 12 Ga. X 2 1/2" X req'd length
j	12	Screw, lag, 1/2" X 4"	dk	6	Pipe spacer, 2" extra heavy X 9 1/2" long
			ek		Locknut as required

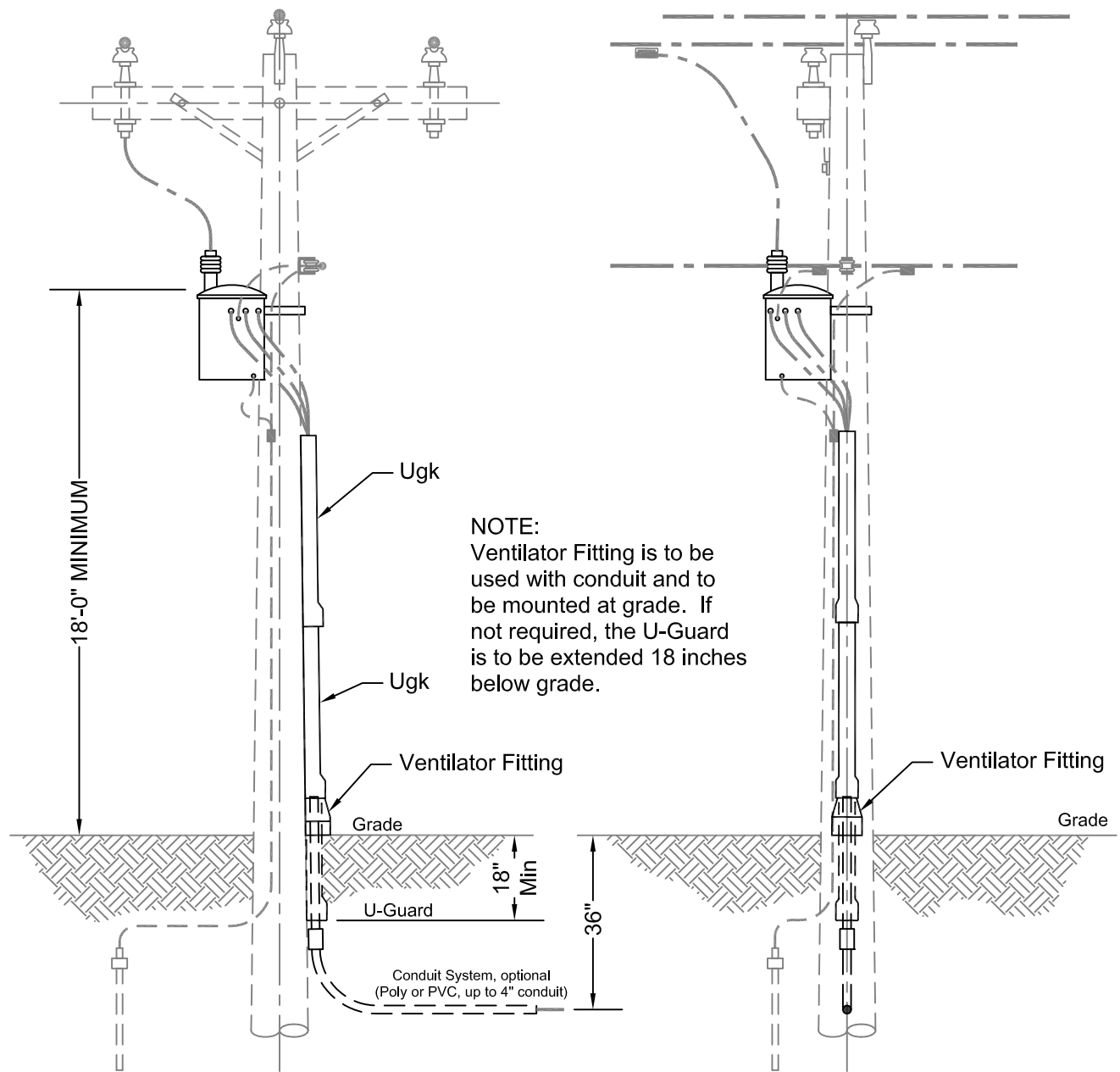
STUB REINFORCING OF TRANSMISSION & DISTRIBUTION POLES

TM-105

SCALE: NTS

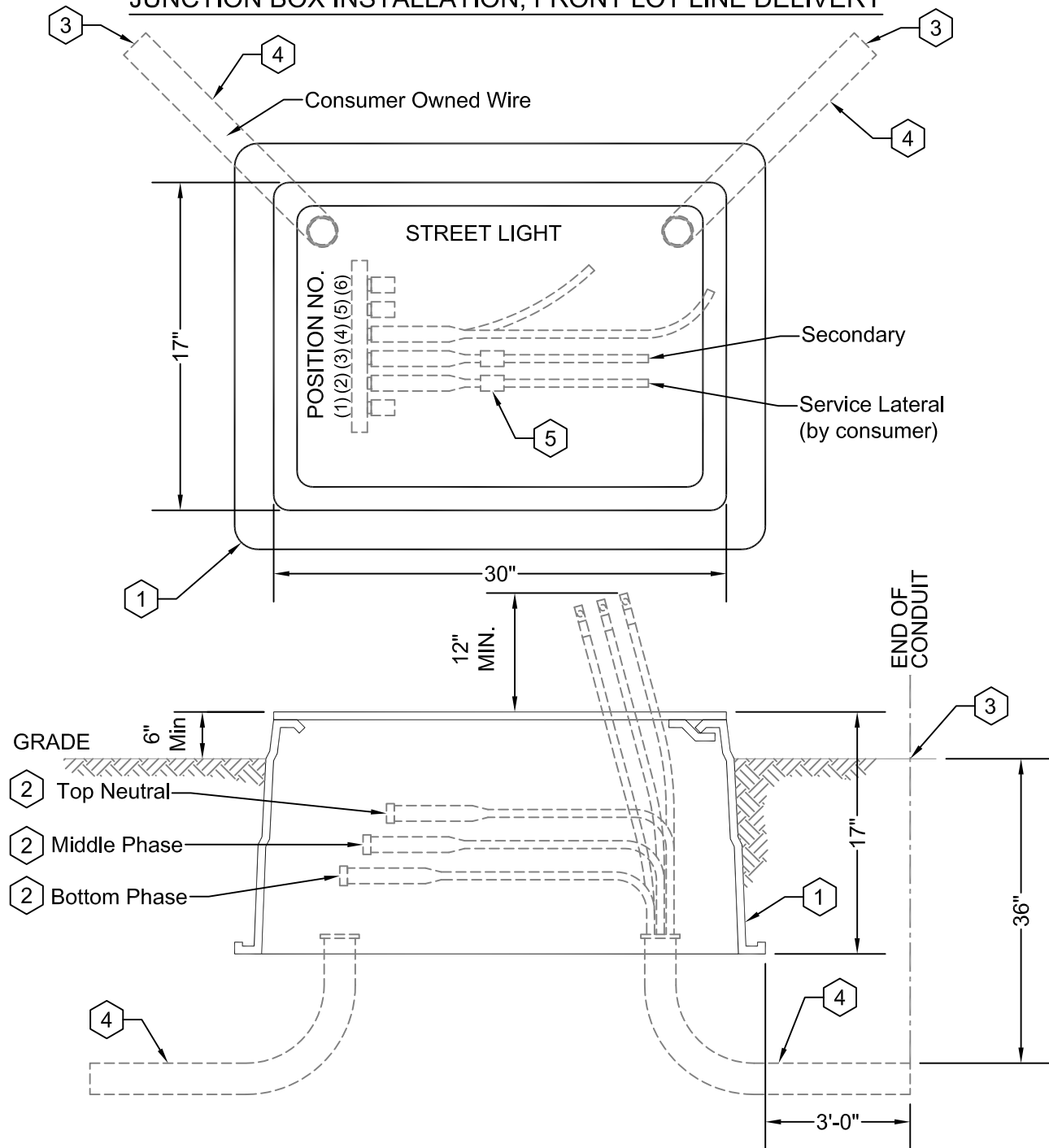
Nov. 1989

TM-105



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL	
Ugk	2-3	U-Guard, PV-Mold, 3" Sch. 80				
j	-	Screw, Lag 1/4" x 3" with washer				
-	1	Ventilator Fitting 3" riser w/UM5/3.5UA				
			PV - MOLD U-GUARD POLE RISER SYSTEM			
			Revision Date		 GRAND VALLEY POWER	UM5/3.5U, UM5/3.5UA
			July 20, 2016			

JUNCTION BOX INSTALLATION, FRONT LOT LINE DELIVERY



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
1		Junction Box - UK6	5		Cable Marker Tag, consumer owned UG
2		Terminal Lug-select size UJ1-6/UJ1-6N			Service Wire and ID on Meter Socket
3		Cable / Conduit Marker UM6-12S			
4		Flex Conduit UR5-3.0F			

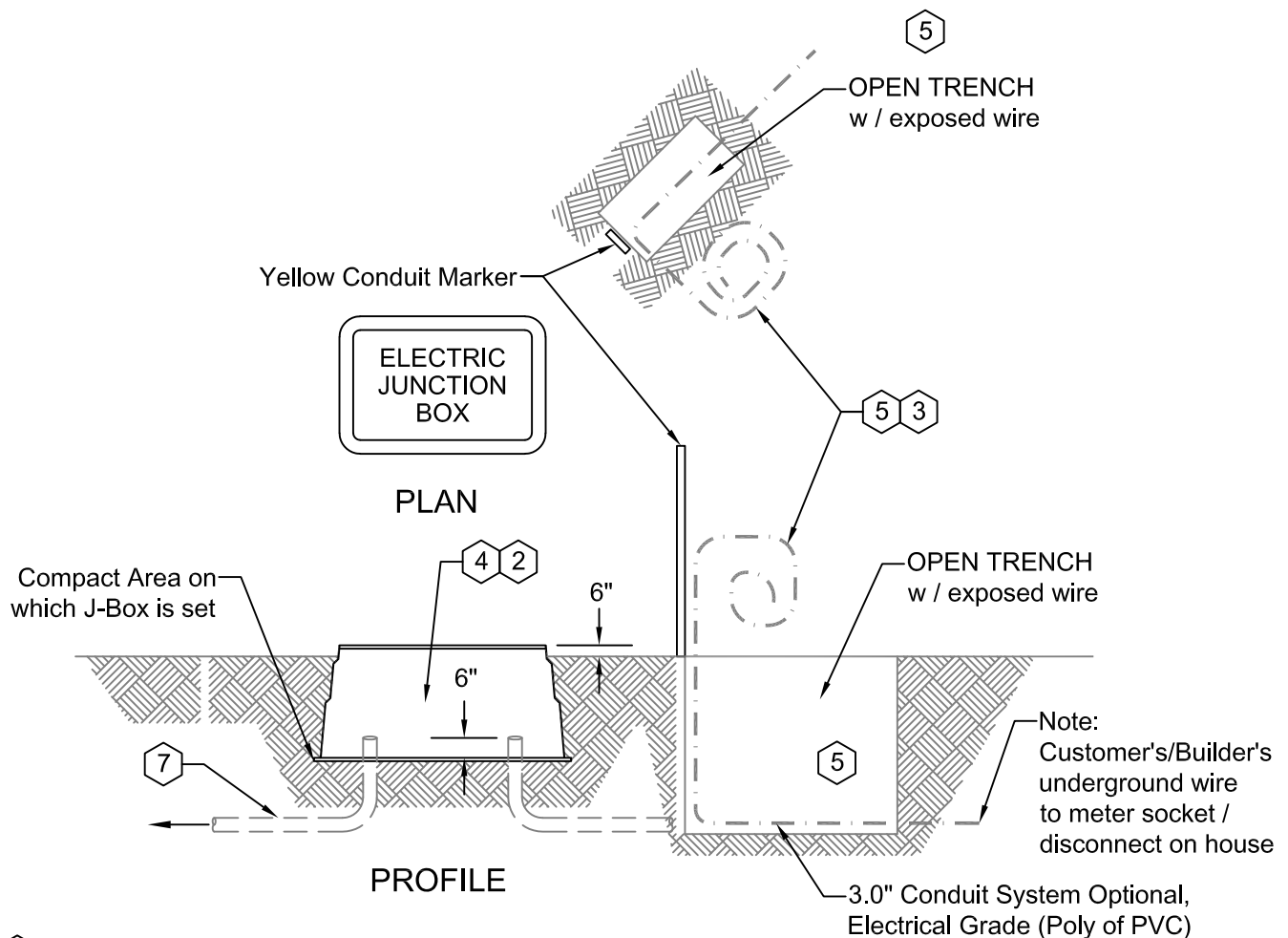
SECONDARY ASSEMBLY UNDERGROUND CABLE

Revision Date

July 25, 2016



UK6



- 1 "Front lot line" delivery is the GVP subdivision / lot standard with the meter located on the side / front of the house nearest to the junction box.
- 2 Service is provided at the front line by GVP to a grade level "Electrical Junction Box". The Consumer / Builder wire shall be terminated by GVP inside the junction box.
- 3 Underground service wire to the house is furnished and installed by the customer / builder from GVP Junction Box to the house.
- 4 Electric Junction Box is 17" x 30" x 17"D, furnished and installed by GVP.
- 5 Customer shall trench within 2'-0" to GVP electric junction box, which is marked by a yellow conduit marker. (DO NOT REMOVE THE YELLOW MARKER AND LEAVE THE TRENCH OPEN 2 FEET FROM THE YELLOW MARKER) Leave an additional 8'-0" of wire past the junction box , for GVP installation. (Same with temporary construction power setup).
- 6 Electric Junction Box shall not be installed until final grade is established.
- 7 Contractor / Developer conduit.
- 8 Mesa Count Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set for permanent or temporary service.
- 9 GRAND VALLEY POWER RESERVES THE RIGHT TO REQUEST NECESSARY MODIFICATION OR REJECT THE INSTALLATION AS SUITABLE FOR SERVICE AS NECESSARY.

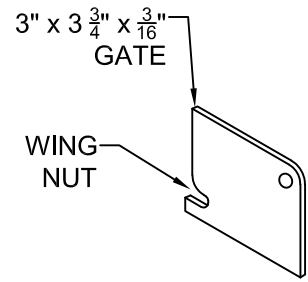
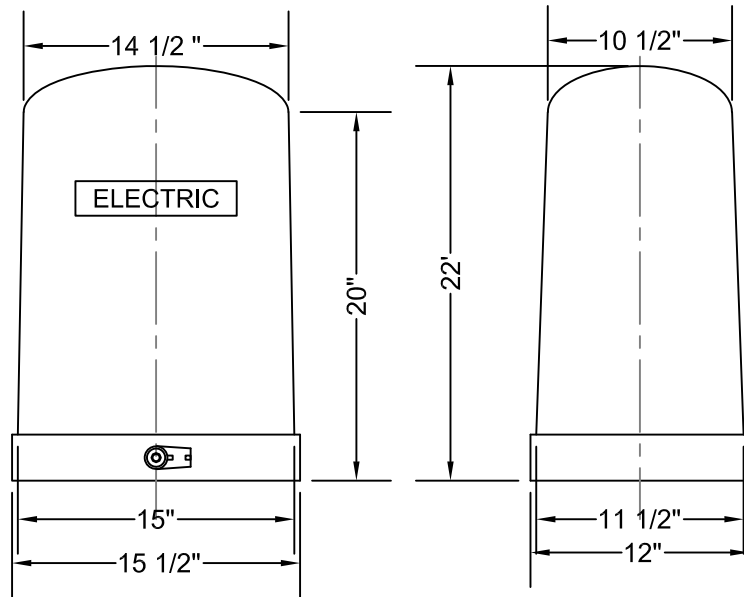
JUNCTION BOX STANDARD UNDERGROUND CONSTRUCTION

Revision Date

July 25, 2016

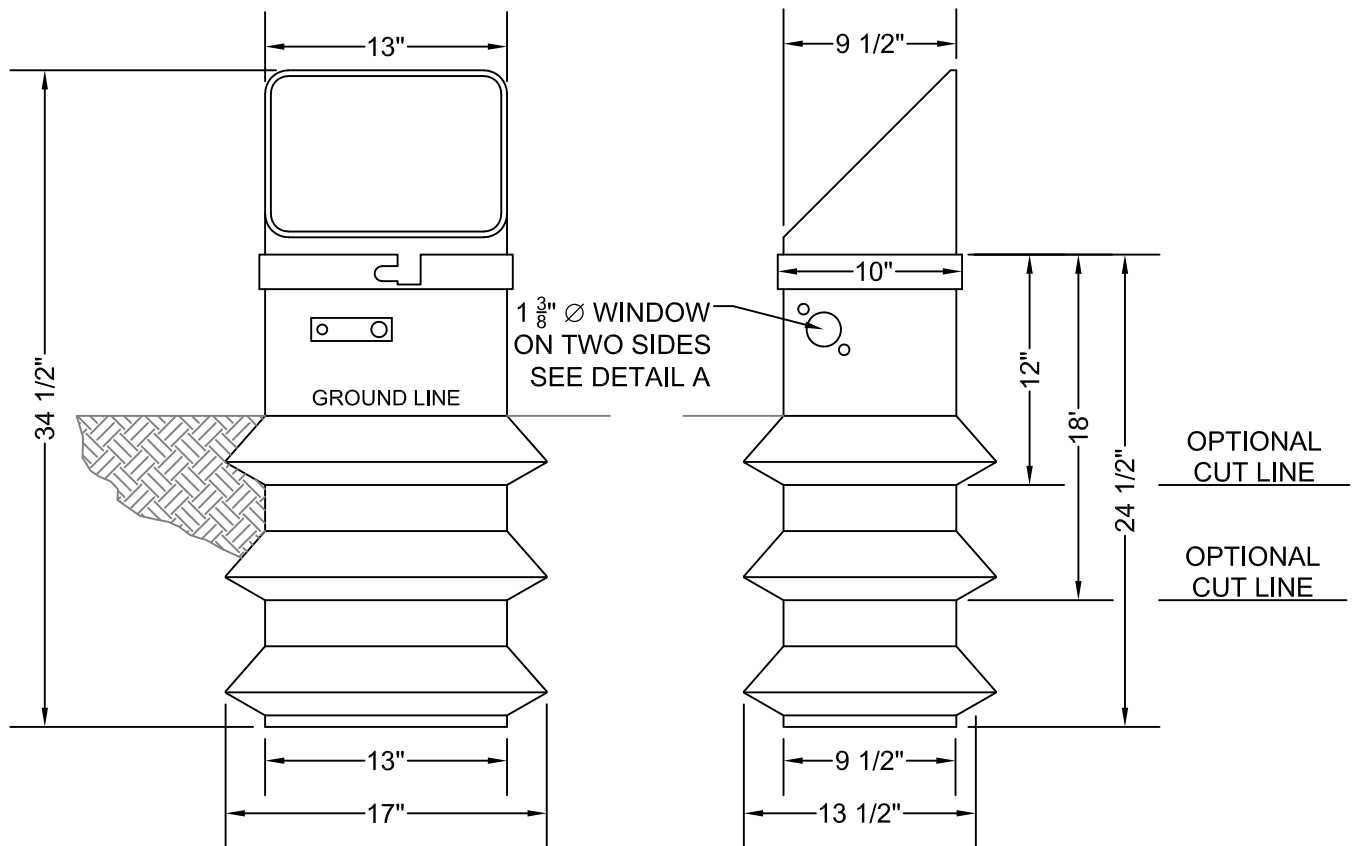


UK6-1



DETAIL A

PEDESTAL COVER



PEDESTAL

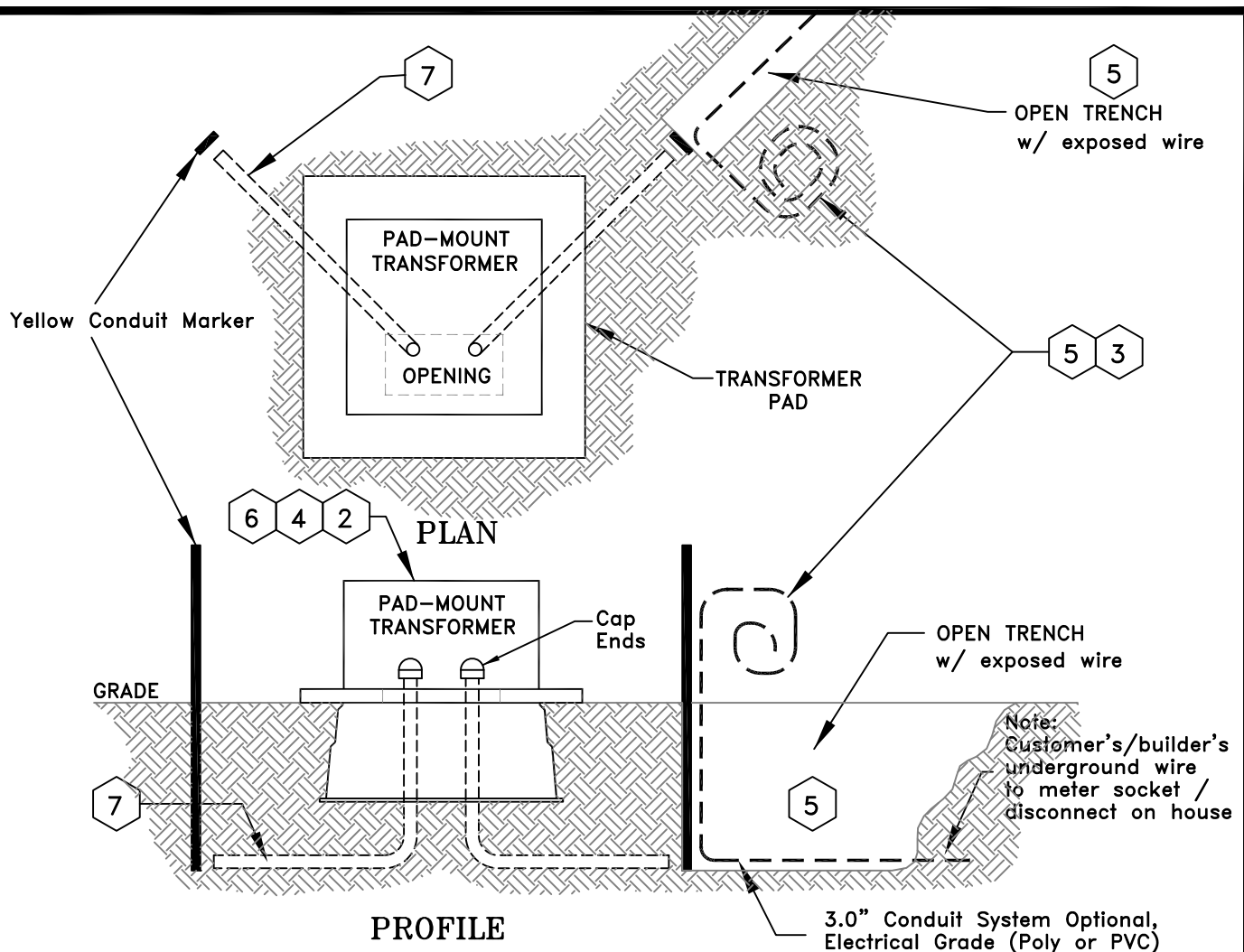
SECONDARY ASSEMBLY "ABOVE GRADE" JUNCTION BOX

Revision Date

July 25, 2016



UK6-1AG



- 1 "Front lot line" delivery is the GVP subdivision / lot standard with the meter located on the side / front of the house nearest to the Transformer.
- 2 Service is provided at the front lot line by GVP to a grade level "Pad-Mount Transformer".
- 3 Underground service wire to the house is furnished and installed by the customer/builder from GVP Transformer to the house.
- 4 The customer/builder wire shall be terminated by GVP inside the transformer. (Trans. 31"x35"x24"H)
- 5 Customer shall trench to the GVP yellow marker, (DO NOT REMOVE THE YELLOW MARKER. LEAVE THE TRENCH OPEN 2 FEET FROM THE YELLOW MARKER), and leave an addition 12'-0" of wire past the transformer, for GVP installation. (Same with temporary construction power setup)
- 6 GVP shall not install Transformer until final grade is established. (Trans Pad 42"x42")
- 7 GVP furnishes and installs necessary underground conduit from transformer to the yellow markers.
- 8 Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set for permanent or temporary service.
- 9 Grand Valley Power reserves the right to request necessary modifications or reject the installation as suitable for service as necessary.

TRANSFORMER SERVICE TERMINATION 1 POSITION, 2 POSITION

DWG. BY: DSG

DATE: 7/21/08



UK6-G1
UK6-G2

NOTE:

4" of select back fill must be added to the trench as a pad when rocky soil exists.
Over excavate to maintain 48" depth to electric primary.

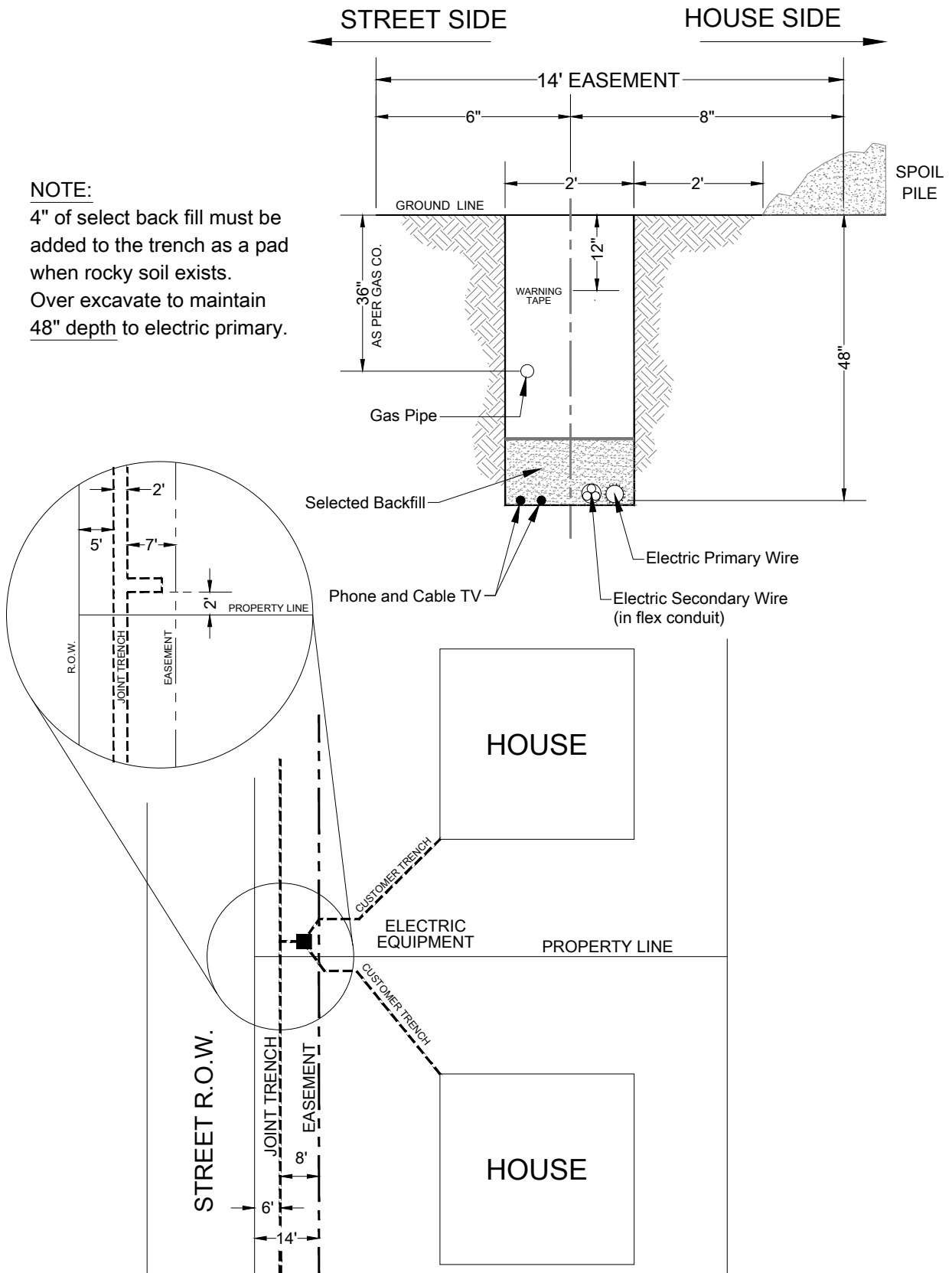
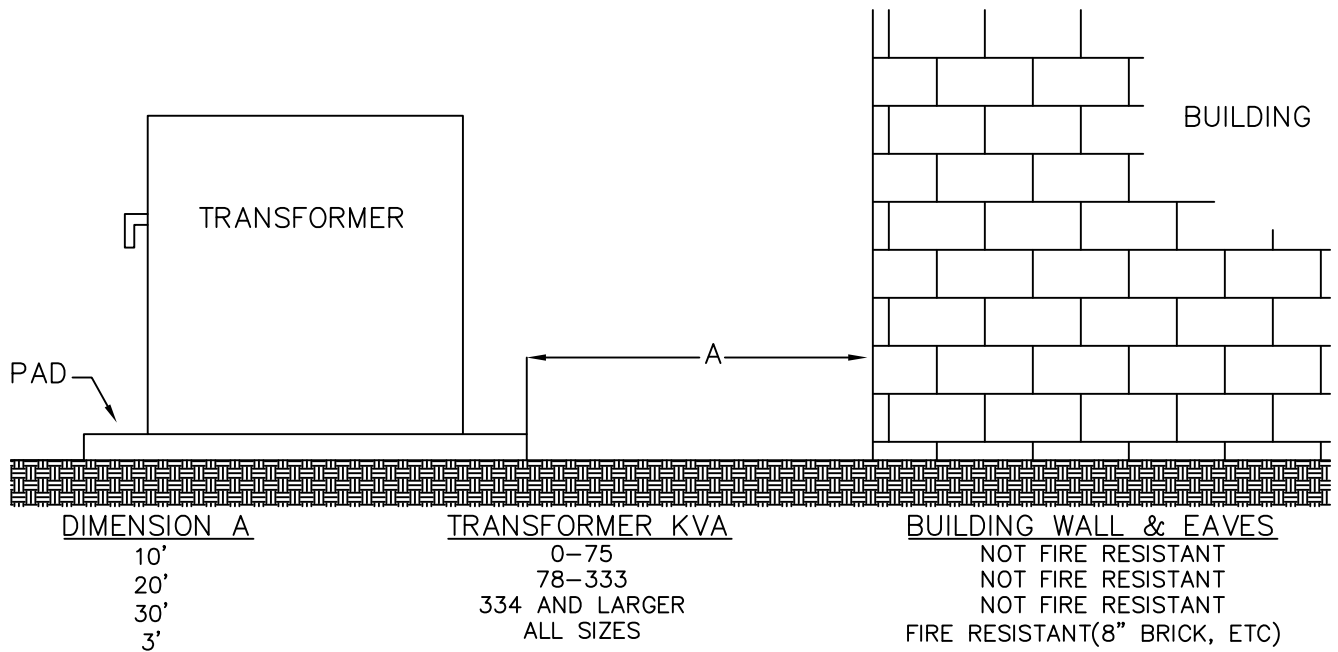


FIGURE 1
TRENCH SPECIFICATIONS / CONFIGURATION

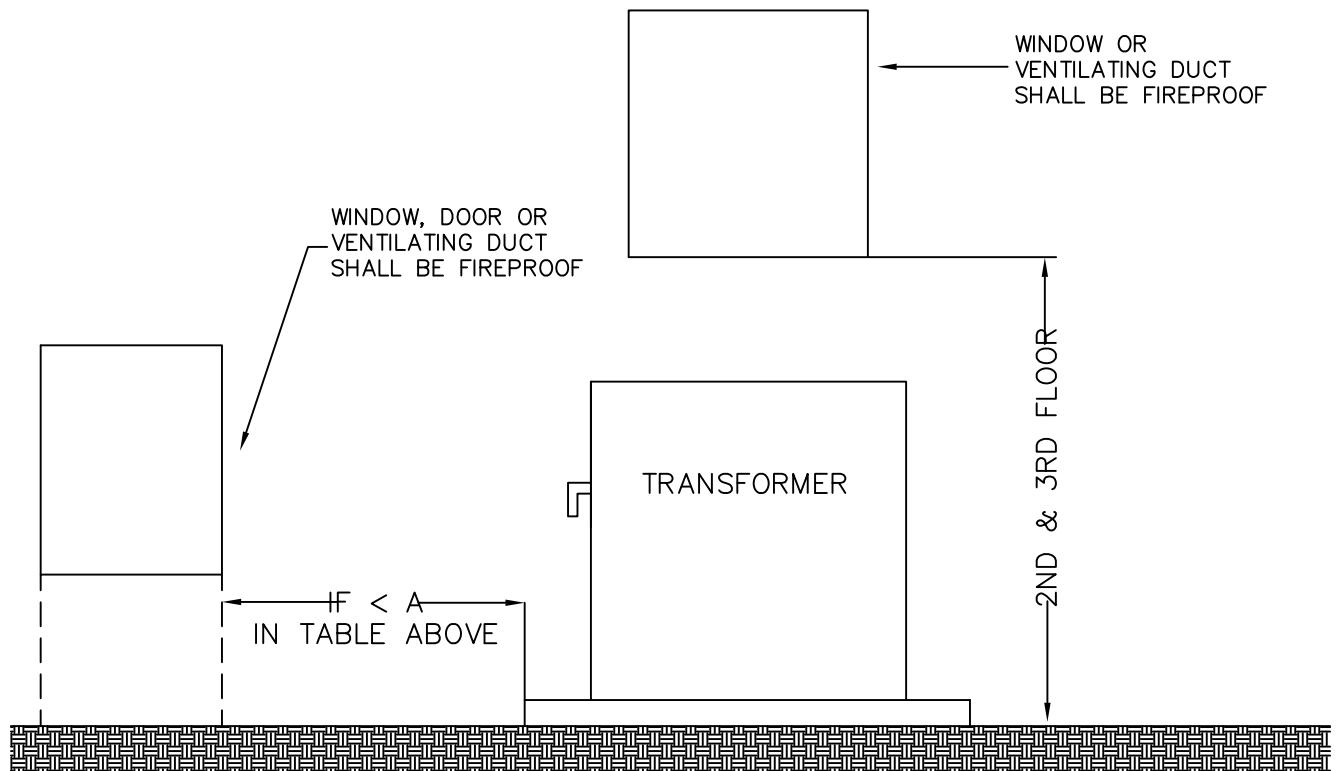
Revision Date
March 28, 2019



TRENCH 1



ELEVATION VIEW



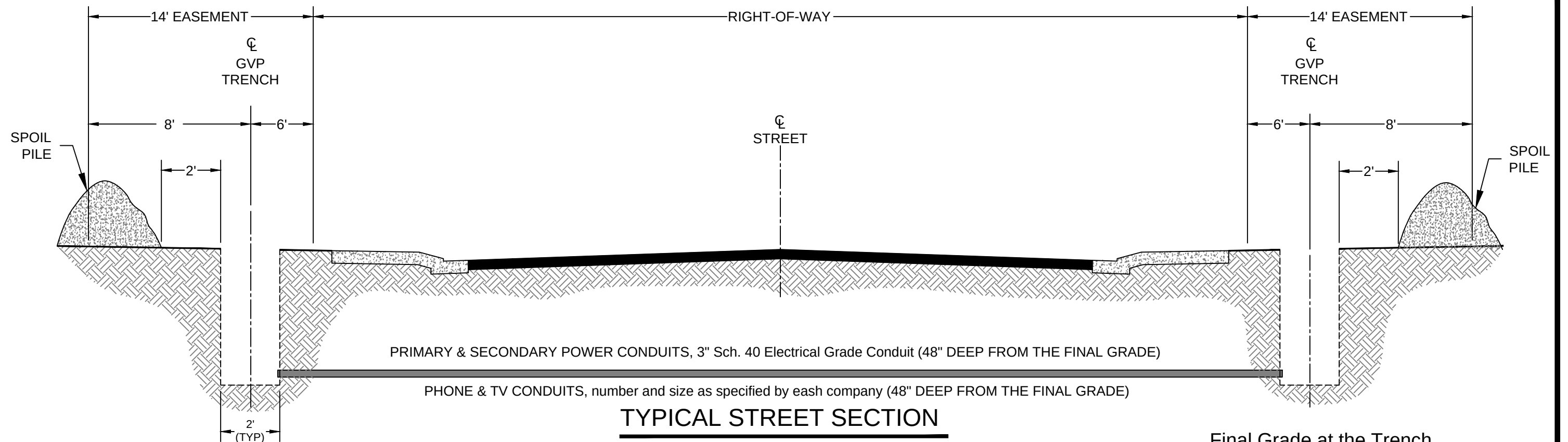
ELEVATION VIEW

PAD-MOUNT TRANSFORMER CLEARANCE SPECIFICATIONS

Revision Date:

04/18/19





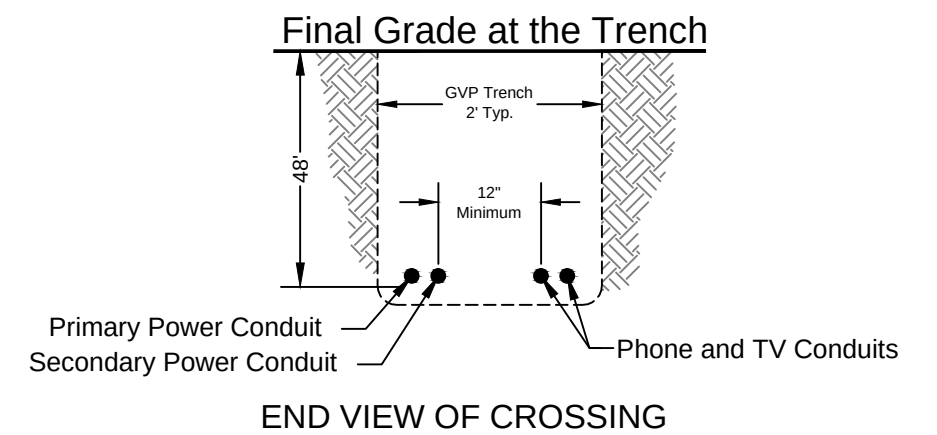
It is the general practice of GVP to allow the developer to supply and install road crossings for electrical facilities provided the following GVP requirements are met:

- 3" Schedule 40 Electrical Grade PVC conduit used, (Gray in Color) unless otherwise specified by GVP.
- Conduit buried at specified depth, (see sketch above).
- Both ends of conduit capped.
- Conduit locations specified by GVP map.
- Number of conduits as specified by GVP map.
- Conduit ends stubbed out 5 feet into easement on both sides.
- Conduit location marked with:
 - Electronic marker, (tracer wire) [Optional]
 - As-built of station location (2x4, Steel Post, etc..)
 - Some type of permanent marking system. [Optional] (on curb concrete, etc.)

If roads are surfaced in development before conduits are installed, open trenching or boring is required by the Developer.

GVP reserves the right to inspect the location, size and depth of crossing sleeves and reject the installation if not per above specifications.

WATER OR SEWER PIPE IS NOT
ACCEPTABLE - PLEASE CALL
FOR INSPECTION OR QUESTIONS:
(970) 242-0040



THIS DRAWING TO DEVELOPER WITH MAP
OF CROSSING AT TIME OF CONTRACT.

DATE __/__/__

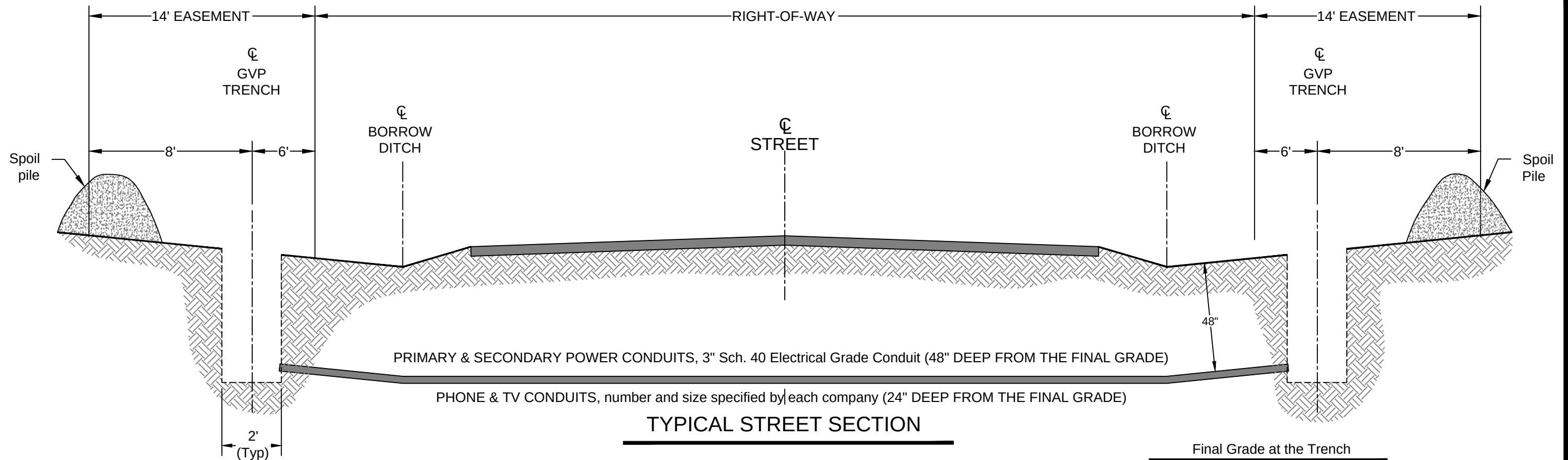
GRAND VALLEY POWER ROAD CROSSING SPECIFICATIONS

DATE: 1/16/2014

DRAWN: D.S.G



EXHIBIT "A"
1 OF 2



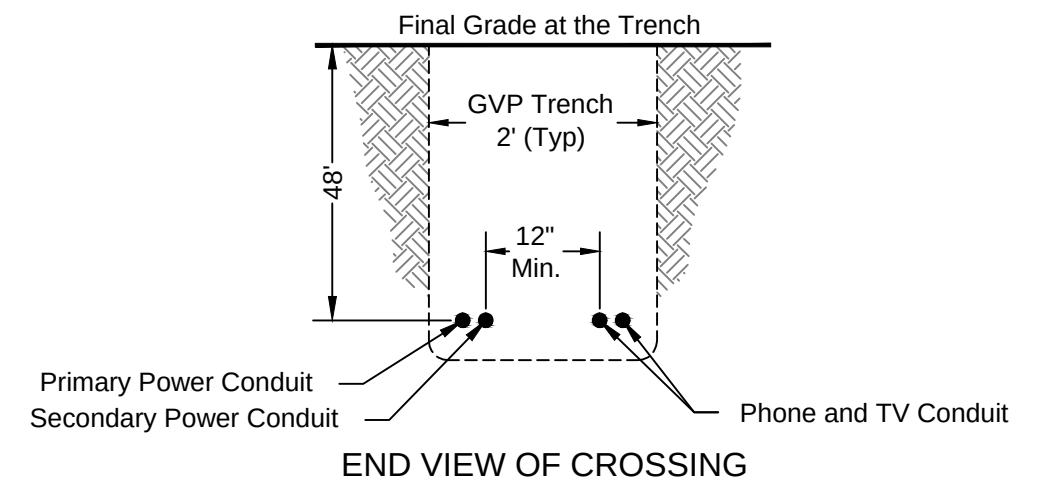
It is the general practice of GVP to allow the developer to supply and install road crossings for electrical facilities provided the following GVP requirements are met:

- A. 3" Schedule 40 Electrical Grade PVC conduit used, (Gray in Color) unless otherwise specified by GVP.
- B. Conduit buried at specified depth, (see sketch above).
- C. Both ends of conduit capped.
- D. Conduit locations specified by GVP map.
- E. Number of conduits as specified by GVP map.
- F. Conduit ends stubbed out 5 feet into easement on both sides.
- G. Conduit location marked with:
 - 1. Electronic marker, (tracer wire) [Optional]
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**THIS DRAWING TO DEVELOPER WITH MAP
OF CROSSING AT TIME OF CONTRACT.**

DATE __/__/__

GRAND VALLEY POWER ROAD CROSSING SPECIFICATIONS

Revision Date:

April 4, 2017



EXHIBIT "A"
2 OF 2

GRAND VALLEY POWER GUIDELINES FOR
CLEARANCES OF CABLE TV AND TELEPHONE CONDUCTORS
ABOVE GROUND, ROADWAYS, RAIL OR WATER SURFACES

Nature of surface underneath cable tv or telephone conductors	Cable TV or Telephone conductors
Where cable tv or telephone conductors or cables cross over or overhang	
1. Track rails of railroads	23.5
2. Roads, streets and other areas subject to truck traffic	15.5
2.a Non-residential driveways, parking lots and alleys	15.0
3. Residential driveways Where height of attachment will not allow 15.0 ft. clearance, may be reduced to:	15.0 11.5
4. Other land tranversed by vehicles, such as cultivated, grazing, forest, orchard, etc.	15.5
5. Spaces and ways subject to pedestrians or restricted traffic only Where height of attachment will not allow these clearances:	9.5
Where cable tv or telephone conductors or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway	
9. Roads, streets or alleys Where this construction crosses over or runs along alleys, driveways, or parking lots, may be reduced to:	15.5 15.0
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line Where the line along a road is located relative to fences, ditches, embankments, etc., so that only pedestrian traffic would be expected	13.0 9.5

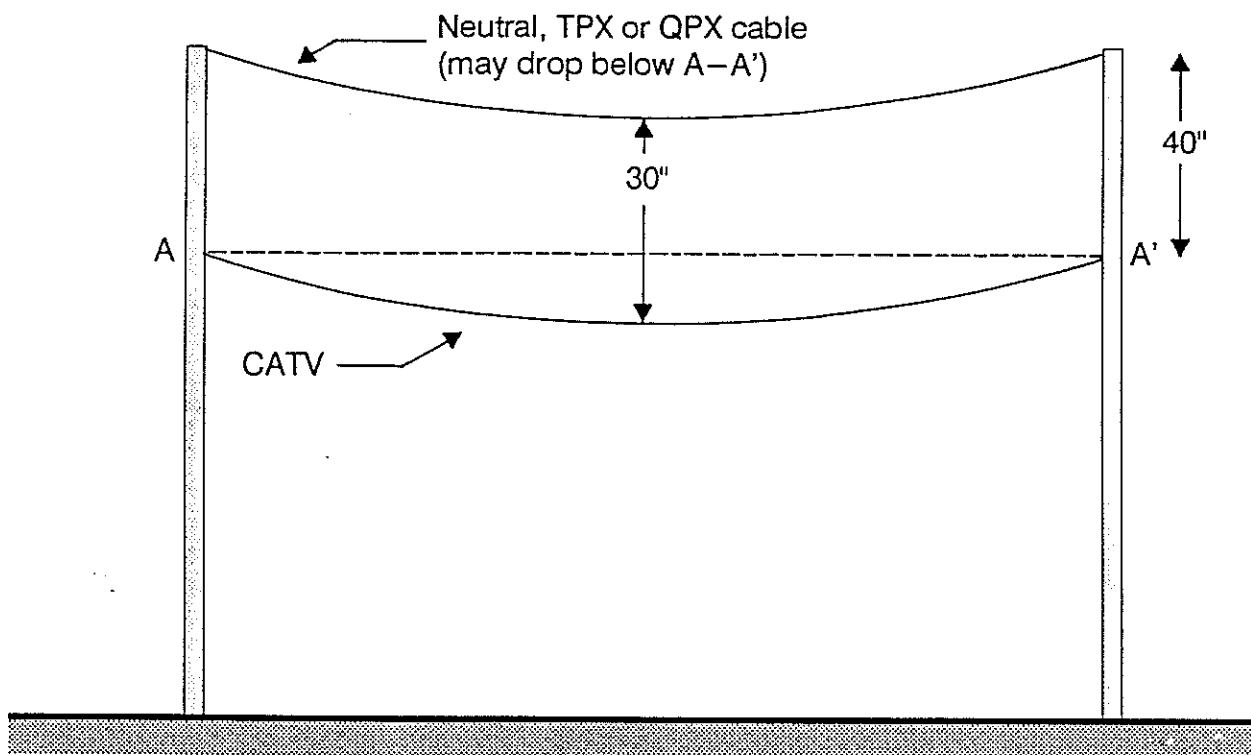
*All clearances are the minimum required at maximum sag per NESC
1997, Rule 232, Table 232-1*

GRAND VALLEY POWER GUIDELINES FOR
CLEARANCES OF CABLE TV OR TELEPHONE CONDUCTORS
TO POWER CONDUCTORS CARRIED ON THE SAME POLE

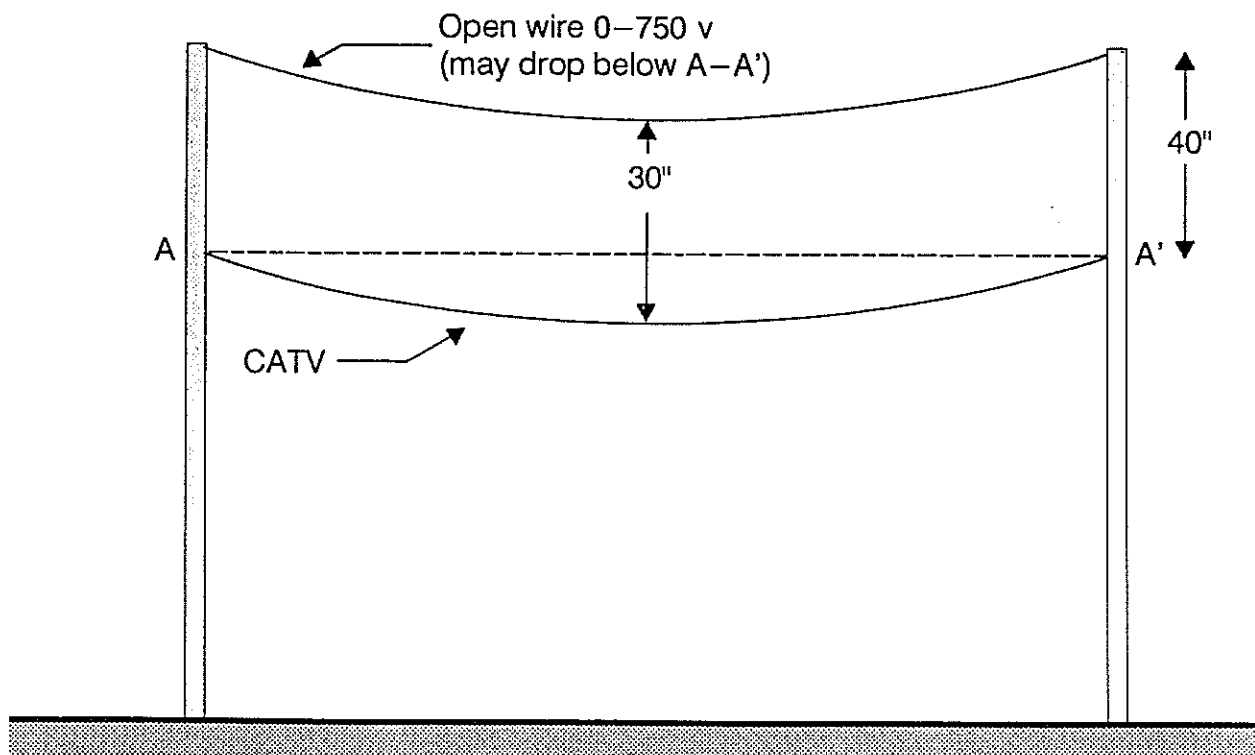
Power Conductor	Midspan clearance to CATV or phone (in)	Clearance at pole to CATV or phone (in)
1. Triplex and quadruplex cables	30	40
2. Grounded neutrals for 0-22 kv (L-N) circuits	30	40
3. Conductors 0-8.7 kv (L-N) - GVP 12.47 kv	30*	40
4. Conductors 14.4 kv (L-N) - GVP 24.9 kv	33*	43
5. Conductors 40 kv (L-N) - GVP 69 kv	40*	53

* Must be above line of sight

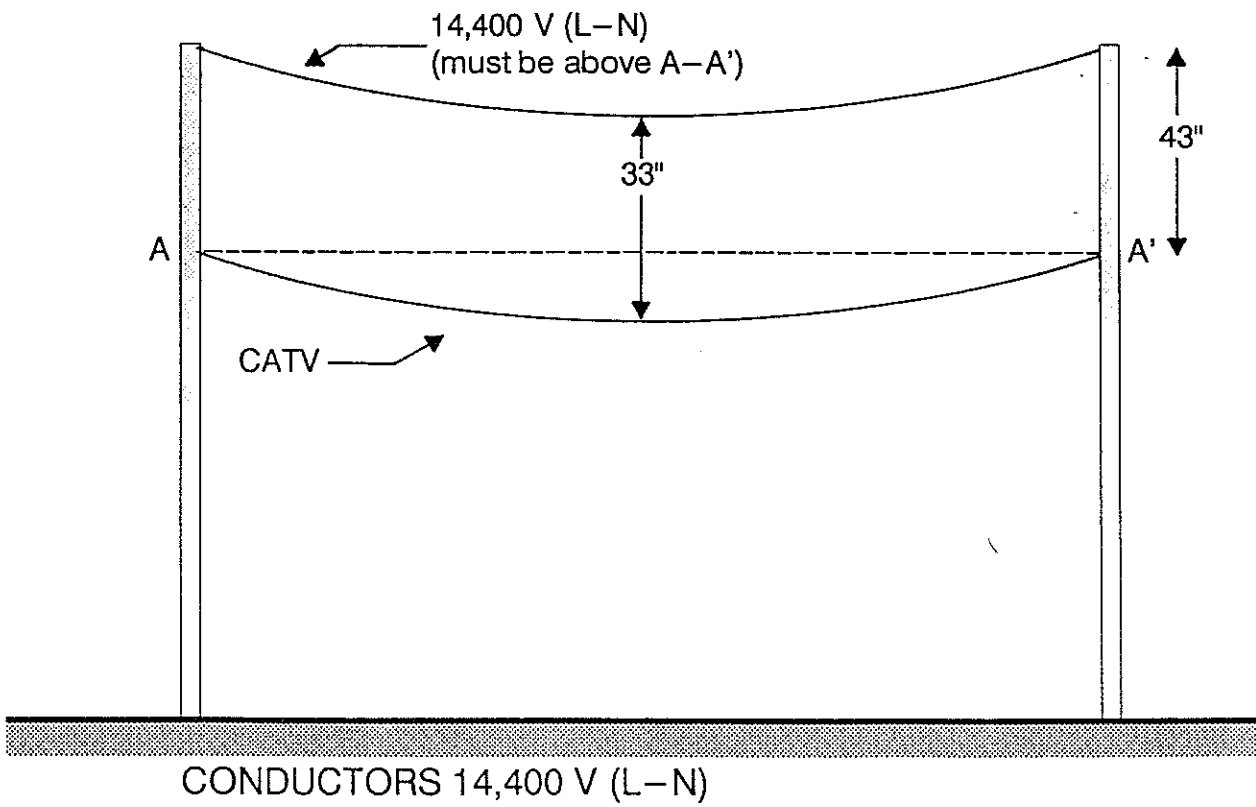
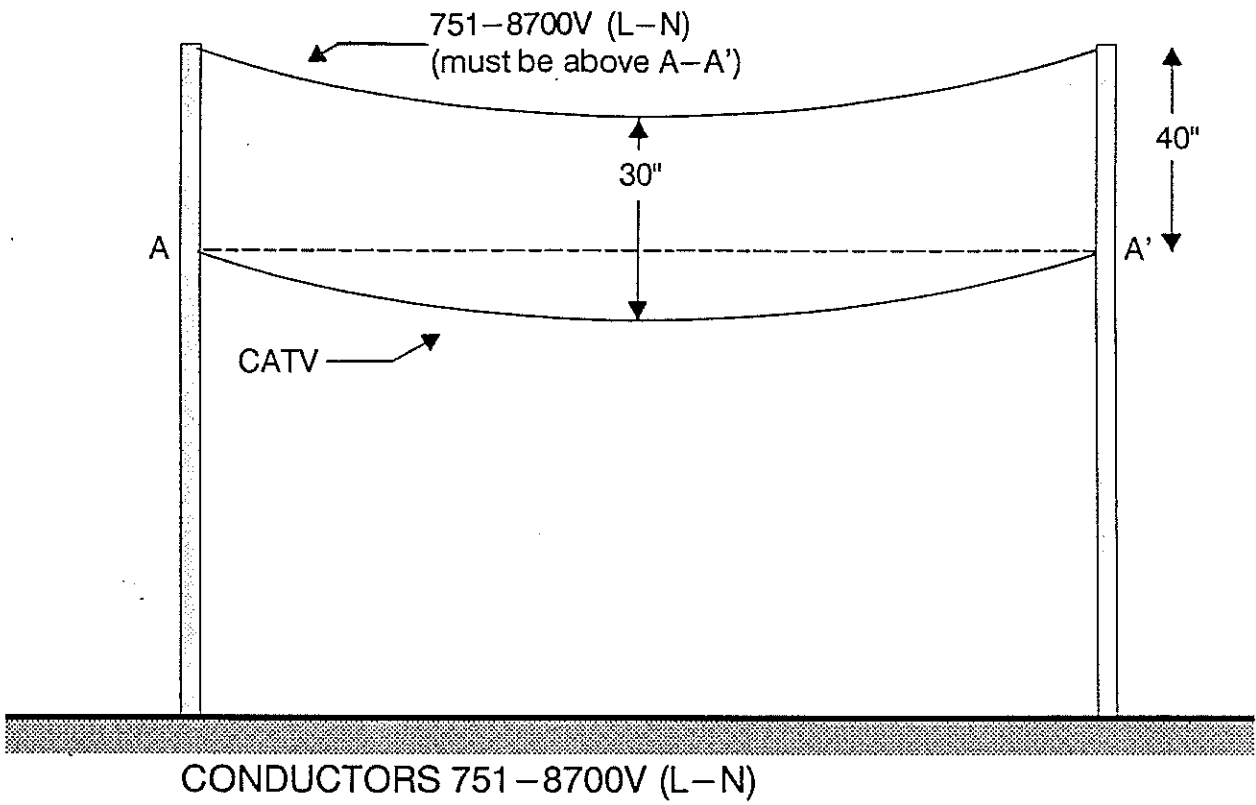
*All clearances are the minimum required with the upper conductor at maximum sag and
lower conductor at final sag, per NESC 1997, Rule 235, Table 235-5*

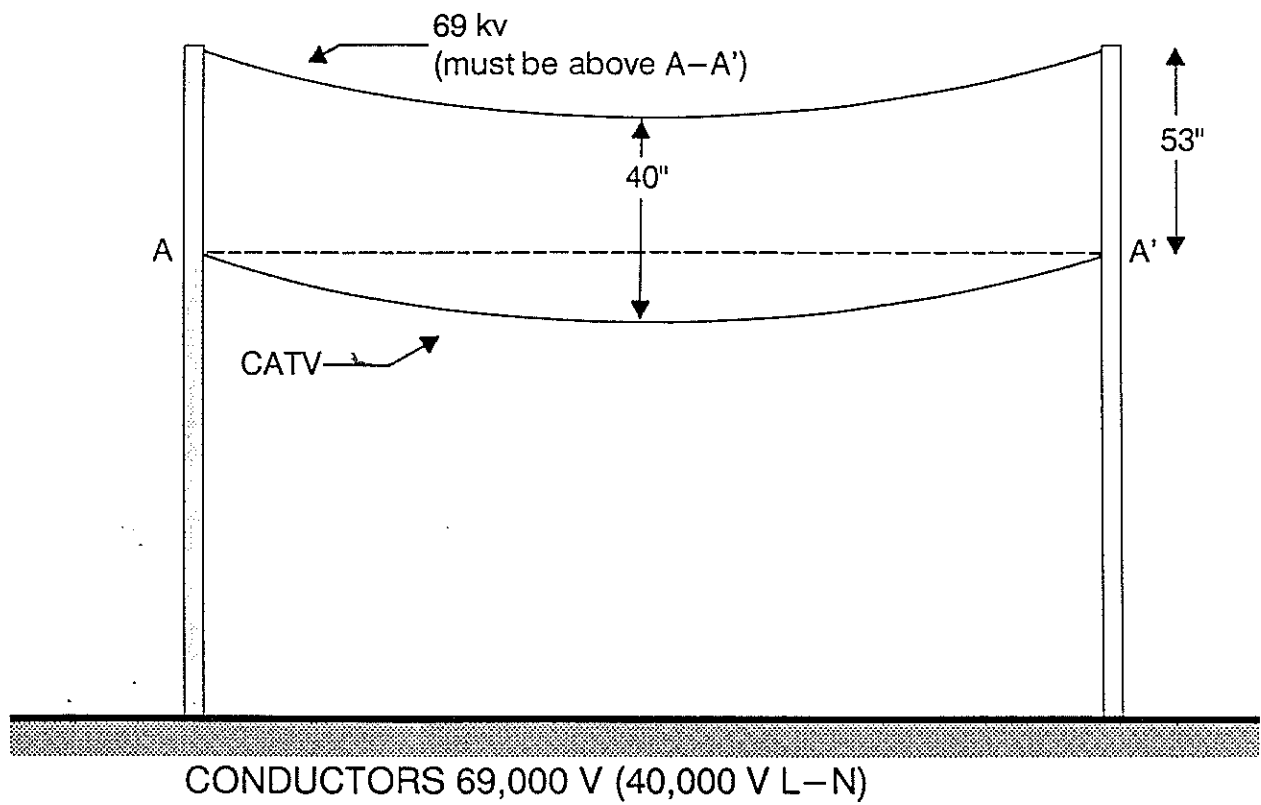


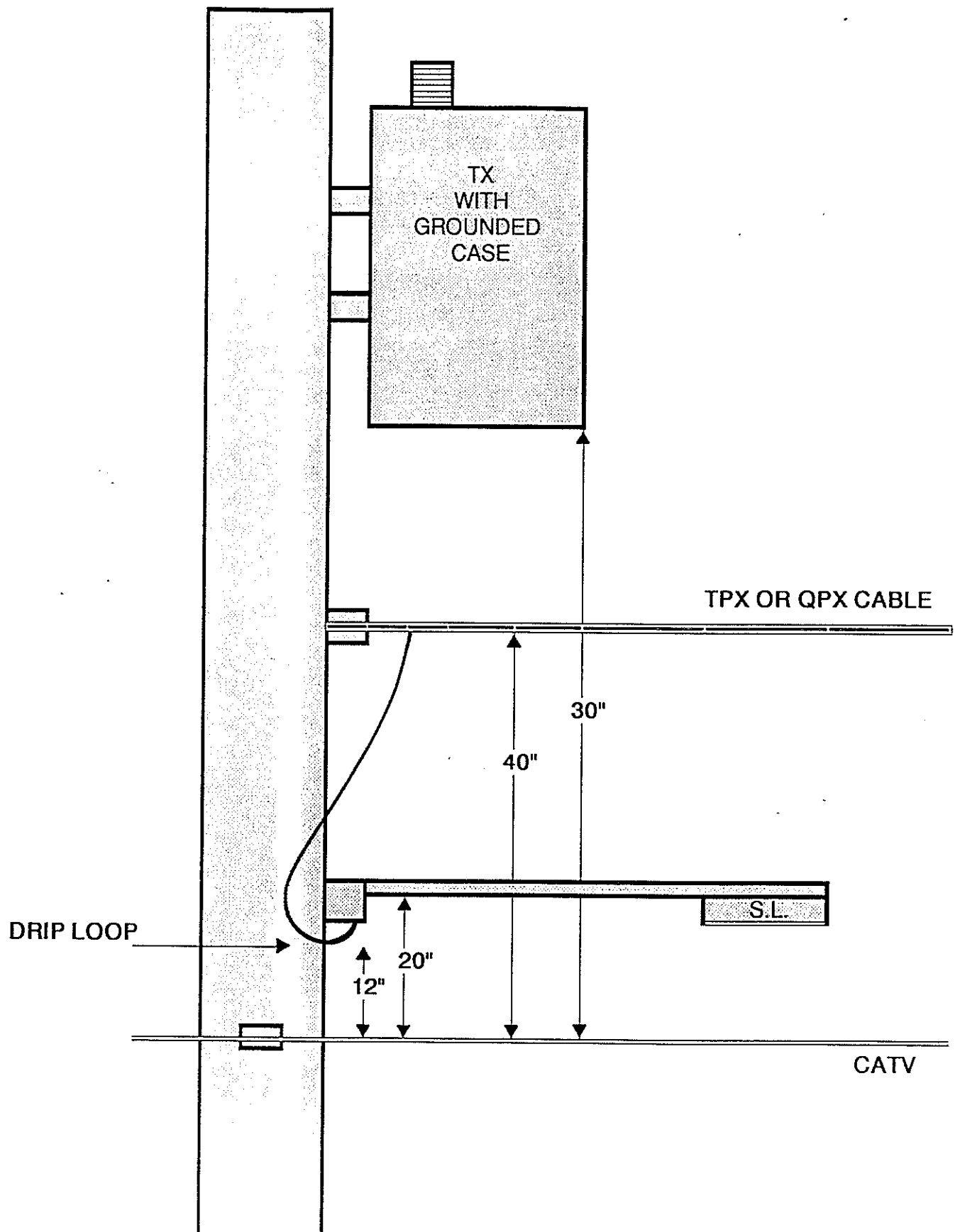
GROUNDED NEUTRALS FOR CIRCUITS UP TO 22 KV (L-N)
TRIPLEX AND QUADRUPLX CABLES

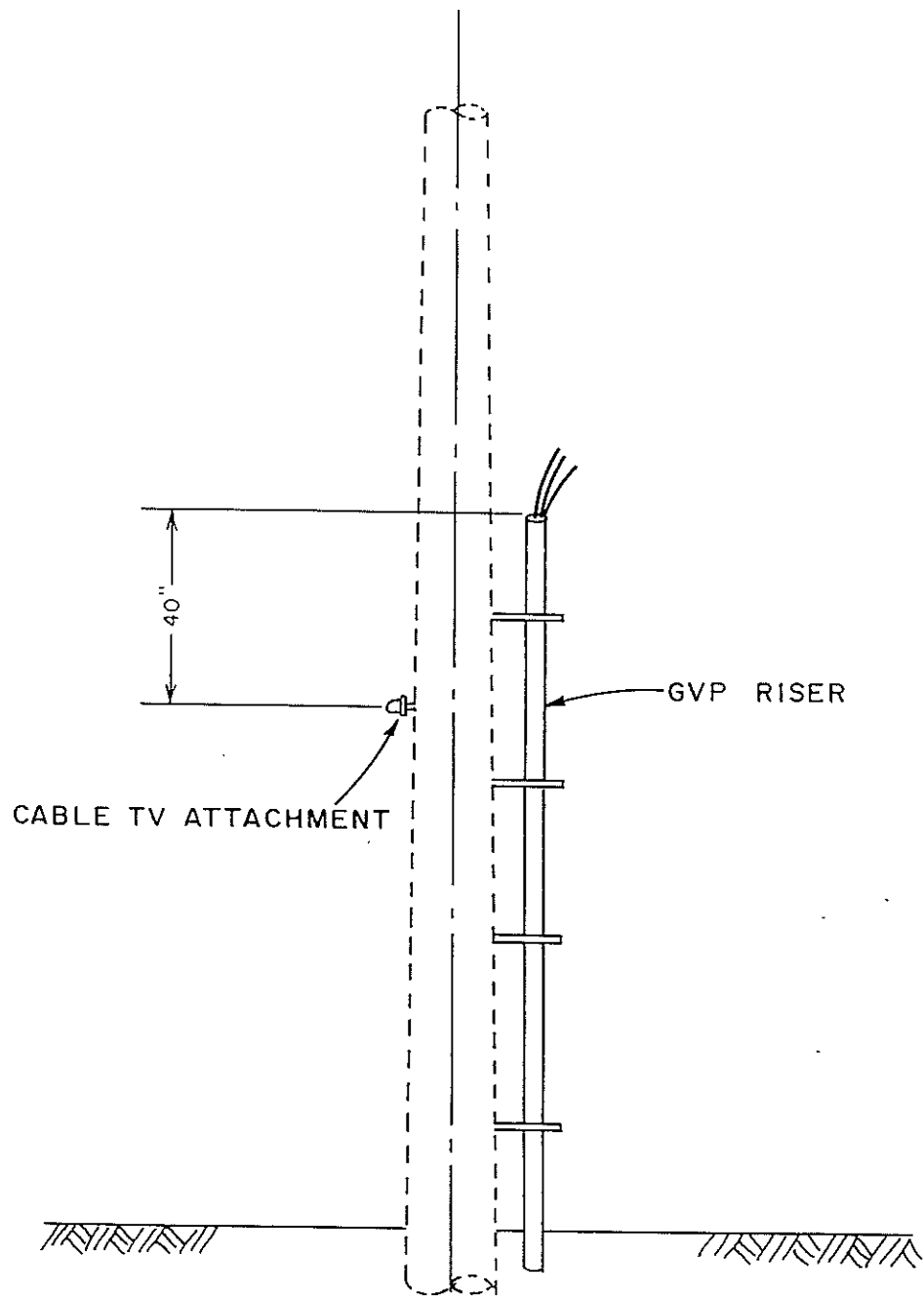


OPEN WIRE CONDUCTORS 0-750 VOLTS









CABLE TV TO GVP RISER
CLEARANCE

3/16/94



INDEX OF DRAWINGS

Primary Terminal Pole Assemblies:

UA1	Single Phase Cable Terminal Pole
UA2	Single Phase Cable Terminal Pole
UA3	Single Phase Cable Terminal Pole
UB1	Vee-Phase Cable Terminal Pole
UB2	Vee-Phase Cable Terminal Pole
UB3	Vee-Phase Cable Terminal Pole
UB4	Vee-Phase Cable Terminal Pole
UC1	Three Phase Cable Terminal Pole
UC2	Three Phase Cable Terminal Pole
UC3	Three Phase Cable Terminal Pole
UC4	Three Phase Cable Terminal Pole
UC5	Three Phase Cable Terminal Pole With Intermediate Arresters
UC6	Three Phase Cable Terminal Pole with Intermediate Arresters and Hook-Operated Disconnect Switches

Transformer Assemblies:

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UG7, UG7B	Single Phase Pad Mounted Transformer (Loop Feed)
UG9A, UG9A-1 UG9A-2, UG9A-3	Single Phase Pole Type Dead Front Transformer in Pad Mounted Enclosure
UG17, UG17B	Three Phase Pad Mounted Transformer (Radial Feed)
UG17-2, UG17-2B	Three Phase Pad Mounted Transformer (Loop Feed)
UG17-3, UG17-3B	Three Phase Pad Mounted Loop Feed Transformer with Radial Feed
UG23	Primary Riser Feeding Single Phase Transformer

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UK6	Secondary Assembly Underground Cable

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UM3E-3	Fuse Enclosure (200 - 600 AMP) Wiring Diagrams (Three Phase)

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UM8-2 Meter Pedestal Wood Post

UM8-3, UM8-3A Trough Type Meter Pedestal

UM8-4, UM8-4A Meter & Switch Installation Underground Source

UM8-5 Pad Mounted Switch Installation Underground Source

UM8-6 C.T. Meter Installation Single Phase

UM8-7 C.T. Meter Installation Three Phase

UM8-8 Meter Installation Underground Source to Overhead Load

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Jacketed Cable)

UM27-2 Sacrificial Anode for Equipment Ground Protection

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UX3	Single Phase Padmounted Transformer Deferred Unit Pad-Sleeve Type
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UX9	Temporary Primary or Secondary Cable Termination for Future Use
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UX13	Sample URD Inspection Form
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UX17	Jacketed Cable Grounding Installation (Tape)
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UX22	Secondary Riser Pole with Meter Socket
UX23	Temporary Service from an Underground Source
UX26	Temporary Installation of Neutral Jumper During Installation of Splice

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

Revision of Bulletin 50-6 (D-806)

Attached is revised REA Bulletin 50-6 (D-806), Specifications and Drawings for Underground Electric Distribution. The major changes from the January 1975 edition of this bulletin are as follows:

1. Inclusion of standard drawings for the installation of jacketed cable;
2. Inclusion of several guide drawings which provide "helpful hints" to accomplish various procedures;
3. Elimination of such obsolete items as submersible and direct-buried transformers and sectionalizers; and
4. Several changes to conform to the latest edition of the National Electrical Safety Code.

The changes are accomplished by adding several new construction drawings, revising some drawings included in the 1975 edition of the bulletin, and deleting some 1975 drawings. The resulting bulletin is a complete specification with which REA electric borrowers can construct their rural underground electric distribution systems using state-of-the-art materials, equipment, and construction methods.

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

February 27, 1990
Supersedes January 1975

BULLETIN 50-6 (D-806)

SUBJECT: Specifications and Drawings for Underground Electric Distribution

1. General

These specifications provide for the construction of underground distribution power facilities by the direct burial of cables, using either plowing methods or trenching, as specified by the Owner.

All construction work shall be done in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications, and the construction drawings.

If construction work is performed by the Owner's force account crews instead of a contractor, any reference to "Contractor" in the narrative portions or drawings of this bulletin shall apply to the force account crews.

The edition of the National Electrical Safety Code (ANSI C2) which is in effect in accordance with the "Effective Date" rule of ANSI C2 shall be followed, except where local regulations or other REA regulations are more stringent, in which case those regulations shall govern.

2. Storage of Material and Equipment

All material and equipment to be used in construction shall be stored so as to be protected from deteriorating effects of the elements. If outdoor storage cannot be avoided, the material and equipment shall be stacked on supports well above the ground line and protected from the elements as appropriate, and with due regard to public safety.

3. Handling of Cable

Cable shall be handled carefully at all times to avoid damage, and shall not be dragged across the ground, fences or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The ends of the cable shall be sealed at all times against moisture with suitable end caps. Where it is necessary to cut the cable, the ends shall be terminated or sealed immediately after the cutting operation.

4. Plowing

When cables are to be installed by plowing, the plowing equipment shall be subject to the approval of the Owner and the public authorities having jurisdiction over highway and road rights-of-way. The plow must be provided with a means to assure positive holddown of the plow blade to provide proper depth at all times.

The design of the plowshare shall be such that the cable passing through the plow will not be bent in a radius less than 12 times the outside diameter of the cable.

The equipment shall be capable of extending the plow a minimum of 6 inches below the specified depth under all terrain conditions of plow utilization.

The equipment and construction methods used during construction shall be such as to cause minimum displacement of the soil. The slot made in the soil by the cable plows shall be closed immediately by driving a vehicle track or wheel over the slot or by other suitable means.

Starting and terminating points of the plowing operation shall be excavated prior to cable installation to reduce possible cable damage and to assure sufficient burial depth.

During the plowing operation, care is to be exercised to feed the cable or wire into the ground through the plow loosely and at minimum tension. Besides using proper equipment and construction methods, supervision shall be furnished at all times at the site of plowing operations to assure compliance with these specifications.

If, during the plowing operation, the plow should strike a buried object or rock that would stop the equipment and necessitate removal of the plow from the ground, the plow shall be removed from the ground carefully and, if practical, without backing the plow. If it should be necessary to back the plow to remove it from the ground, the cable shall be uncovered a sufficient distance back for inspection by the Owner to determine whether the cable or wire has been damaged.

The cable shall be inspected carefully as it is payed out from the reel to be certain that it is free from visible defects. Every instance of damaged cable observed at any time, whether prior to installation, during installation, or when discovered by test or observation subsequent to installation in plant, shall be immediately called to the attention of the Owner. Repair or correction of such damage shall be done promptly and in accordance with the written instruction of the Owner. The location of any such repair shall be indicated on the staking sheet.

5. Special Requirements for Coordination between Owner and Contractor Where Cable is to be Installed by Plowing

The staking sheets shall be reviewed jointly in the field by the Contractor and the Owner prior to the start of construction. At that time, the Contractor shall propose any desirable changes or clarifications. These changes, if approved by the Owner, will be made and recorded on the staking sheets. No changes on the staking sheets shall be made by the Contractor without the prior written approval of the Owner. A representative of the Owner shall remain in the immediate vicinity of the plowing operations at all times and will consider and possibly approve any acceptable changes proposed by the Contractor. A representative of the Owner will also inspect any damage to cable and approve acceptable methods of repair or correction of such damage in accordance with the provisions of these specifications.

In the event that rock is encountered during the plowing operation so that the buried cable cannot be installed to the required minimum depths in soil, the Contractor shall determine for the Owner the nature and extent of the rock encountered. Based on this information, the Owner will determine whether the cable is to be rerouted, trenched in rock or a change made to aerial construction. This decision will be made promptly, and appropriate changes in units will be made on the staking sheets. Such changes shall be in writing, dated, and initialed by the Owner.

Due to the necessity of making on-the-spot corrections and changes on staking sheets, it may not be possible for the Owner to issue revised staking sheets to the Contractor in all cases. When changes are made, dated, and initialed by the Owner on a set of the Contractor's staking sheets, it shall be the Contractor's responsibility to transfer these changes to all other sets of staking sheets being used by the Contractor for construction purposes.

The Contractor shall provide a competent representative to work with the Owner on the inventory and inspection of buried cable units. The inventory of buried cable shall be made as soon after the plowing operation as practical to avoid later disagreements on the quantity of cable installed when changes are required in the project.

6. Trenching

All trenching depths specified are minimum as measured from the final grade to the top surface of the cable. The routing shall be as shown on the staking sheets and plans and specifications unless conditions encountered are such that changes are necessary to accomplish the work. In such event, the Owner shall be notified promptly. If rock or other difficult digging is involved, the Contractor shall determine the nature and extent of the difficulty, and the Owner will determine whether rerouting, rock trenching, plowing or other changes are necessary. Loose soil or crumbly rock will not be considered as "difficult digging." The trench widths specified are minimum and should be increased as necessary to obtain the required depths in loose soils.

Where trenches are intended for more than one cable, particular care must be taken to provide for extra depth and width to allow for soil falling into the trench during the laying of the first cables.

Care shall be exercised to minimize the likelihood of waterflow since this may cause trench damage and reduction in trench depth. If this occurs, the trench ~~must be cleared~~ to the specified depth before installing the cable.

All trenches shall follow straight lines between staked points to the greatest extent possible. Secondary and service trenches shall extend in a straight line from takeoff points wherever possible. The trenches shall be dug so that the bottom has a smooth grade. Large rocks, stones and gravel in excess of 1 inch shall be removed from the bottom of the trench. Where this cannot be done, a 2 inch bed of sand or clean soil shall be placed in the bottom of the trench.

Construction shall be arranged so that trenches will be left open for the shortest practical time to avoid creating a hazard to the public and to minimize the likelihood of collapse of the trench due to other construction activity, rain, accumulation of water in the trench, etc.

7. Installing Cable in Trench

The cable shall be placed in the trench as soon after the trenching operation as feasible. Wherever possible, cable shall be payed out from the reel mounted on a moving vehicle or trailer. The reel shall be supported so that it can turn easily without undue strain on the cable. The cable shall be carefully placed in the trench by hand. All cable placement shall be done under constant supervision to be certain that no damage to the cable occurs.

The cable shall be inspected carefully as it is removed from the reel in laying operations to be certain that it is free from visible defects. The Owner shall decide upon corrective action when defects are discovered.

Where more than one cable is to be placed in a trench, the spacings required by the specifications shall be observed. Care must be taken that any soil falling into the trench during the laying of the first cable does not reduce the clearances of the last cable below that specified. Should this occur, the excess soil must be removed carefully by hand or with equipment that will not damage the installed cables.

Sufficient slack, and in no case less than 24 inches, shall be left at all risers, transformer pads, pedestals and terminal points so that movements of cable after backfilling will not cause damaging strain on the cable or terminals. The cable trench shall be mechanically compacted 3'-0" minimum from all riser poles, pads, pedestals and terminal points.

When a hole contains equipment with a metal tank, cable shall be dressed carefully as shown in the drawings. It shall not be coiled at the bottom of the hole. The coiling of a cable around a metal equipment tank provides an undesirable electrical shield which prevents proper cathodic protection of the tank. Further, the cable shall be so positioned that it neither lies on nor rubs against the equipment tank.

The ends of all secondary cable terminated below ground shall be long enough to reach at least 12 inches above the top of the underground enclosure.

8. Minimum Bending Radius of Cable

The minimum bending radius of primary cable is 12 times the overall diameter of the cable. The minimum bending radius of secondary and service cable is six times the overall diameter of the cable. In all cases the minimum radius specified is measured to the surface of the cable on the inside of the bend. No cable bends shall be made within 6 inches of a cable terminal base.

9. Conduit

All exposed ends of conduit shall be plugged during construction to prevent the entrance of foreign matter and moisture into the conduit. Burrs or sharp projections which might injure the cable shall be removed. Riser shield or conduit shall extend at least 18 inches below grade at all riser poles. If full round conduit is used as a riser shield, an end bell shall be installed on the lower end to prevent damage to the cable.

10. Method of Calculating Minimum Conduit Size

Tables 1 through 4 list the minimum size of conduit necessary to accommodate certain numbers and sizes of underground power and secondary cables. The tables are based on the maximum fill requirements of the National Electrical Code which are 53% maximum fill for 1 cable in a conduit, 31% maximum fill for 2 cables in a conduit, and 40% maximum fill for 3 or more cables in a conduit. The trade sizes, inside diameters, and maximum areas of fill for various sizes of conduit are as follows:

Trade Size	Inside Dia.	Area	Area x 53%	Area x 31%	Area x 40%
(Inches)			(Square Inches)		
2	2.067	3.36	1.78	1.04	1.34
2-1/2	2.469	4.79	2.54	1.48	1.92
3	3.068	7.39	3.92	2.29	2.96
3-1/2	3.548	9.89	5.24	3.06	3.95
4	4.026	12.73	6.75	3.95	5.09
5	5.047	20.01	10.60	6.20	8.00
6	6.065	28.89	15.31	8.96	11.56

The cables shown in Tables 1 through 4 all have ICEA Class B concentric stranded conductors, unless an "S" indicating solid conductor appears beside the conductor AWG size. The listed cables have standard thicknesses of conductor shield, insulation, insulation shield, and jacket, and standard numbers and size of concentric neutral wires in accordance with ICEA and AEIC Specifications. If other than standard specifications are used for cable, or if other than stranded or solid conductor is used, the overall cross-sectional area of the cable should be calculated as follows:

For 15 kV or 25 kV Power Cable:

$$\text{Diameter} = C + 2CS + A + 2I + 0.030 + 2IS + 2N + 2J$$

Where, C = Diameter of the conductor.

CS = Thickness of the conductor shield.

Conductor Size (AWG or MCM)	Conductor Shield (Inches)
#2 - #4/0	0.015
250 - 500	0.020
600 - 1000	0.025

A = Addition factor

0.010 inches for 25 kV cable with conductor larger than # 4/0
0 for all other cable constructions

I = Insulation wall thickness

IS = Insulation Shield Thickness

Diameter Over Insulation *	Insulation Shield (Inches)
0 - 1.0	0.040
1.001 - 1.5	0.060
1.501 -	0.080

* Diameter Over Insulation = $C + 2CS + A + 2I$

N = Diameter of Concentric Neutral Wires

Conductor (AWG or MCM)	Neutral Wire Size	Diameter
Full Neutral	(AWG)	(Inches)
Through #1/0	#14	0.0641
#2/0, #3/0	#12	0.0808
#4/0, 250	#10	0.1019
350	#9	0.1144

J = Thickness of Outer Jacket

0.080 inches for conductors through 350 MCM

0.110 inches for conductors larger than 350 MCM

For 600 Volt Secondary Cable:

Diameter = $C + 2I$

Where, C = Diameter of the conductor.

I = Insulation wall thickness

Conductor Size (AWG or MCM)	Insulation Thickness (Inches)	
	Regular	Ruggedized
#4 - #2	0.060	0.060
#1 - #4/0	0.080	0.080
225 - 500	0.095	0.080

Regular insulation consists of one layer of low density polyethylene. Ruggedized design consists of two layers of equal thickness bonded together, an inner layer of low density polyethylene and an outer layer of high density polyethylene.

TABLE 1

Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

15 kV Cable - 220 Mil Insulation Wall

Conductor		Cables per Conduit / Neutral			
AWG or MQM	Diameter (In.)	1 Cable per Conduit Full	2 Cables per Conduit Full	3 Cables per Conduit Full	3 Cables per Conduit 1/3
2S *	0.2576	2	2	2	2
2	0.2920	2	2	2	2
1S	0.2893	2	2	2	2
1	0.3320	2	2	2	2
1/0S	0.3249	2	2	2	2
1/0	0.3720	2	2	2	2
2/0	0.4180	2	2-1/2	2-1/2	2-1/2
3/0	0.4700	2	2-1/2	2-1/2	2-1/2
4/0	0.5280	2	2-1/2	2-1/2	2-1/2
250	0.5750	2	3	3	3
350	0.6810	2	3	3-1/2	3
500	0.8130	2	3-1/2	4	4
750	0.9980	2-1/2	4	5	5
1000	1.1520	2-1/2	5	5	5

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless noted, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see page 5 for method of calculating.

TABLE 2
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

25 kV Cable - 260 Mil Insulation Wall

AWG or MCM	Conductor Diameter (In.)	Cables per Conduit / Neutral				
		1 Cable per Conduit Full	1/3	2 Cables per Conduit Full	1/3	3 Cables per Conduit Full
1S	0.2893	2	2	3	3	3-1/2
1	0.3320	2	2	3	3	3-1/2
1/0S	0.3249	2	2	3	3	3-1/2
1/0	0.3720	2	2	3-1/2	3-1/2	3-1/2
2/0	0.4180	2	2	3-1/2	3-1/2	3-1/2
3/0	0.4700	2	2	4	3-1/2	4
4/0	0.5280	2-1/2	2	4	4	4
250	0.5750	2-1/2	2	4	4	5
350	0.6810	2-1/2	2-1/2	5	5	5
500	0.8130		3		5	5
750	0.9980		3		6	6
1000	1.1520		3-1/2		6	#

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless noted, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see page 5 for method of calculating.

Indicates that a 6-inch conduit is not of sufficient size to accommodate three cables of this size without exceeding the maximum fill requirement.

TABLE 3
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

Conductor		25 kV Cable - 345 Mil Insulation Wall					
AWG or MCM	Diameter (In.)	Cables per Conduit / Neutral					
		1 Cable per Conduit Full	1/3	2 Cables per Conduit Full	1/3	3 Cables per Conduit Full	1/3
1S	0.2893	2	2	3-1/2	3-1/2	3-1/2	3-1/2
1	0.3320	2	2	3-1/2	3-1/2	4	4
1/0S	0.3249	2	2	3-1/2	3-1/2	4	4
1/0	0.3720	2	2	3-1/2	3-1/2	4	4
2/0	0.4180	2	2	4	4	4	4
3/0	0.4700	2	2	4	4	5	4
4/0	0.5280	2-1/2	2-1/2	5	4	5	5
250	0.5750	2-1/2	2-1/2	5	4	5	5
350	0.6810	2-1/2	2-1/2	5	5	5	5
500	0.8130		3		5		6
750	0.9980		3		6		6
1000	1.1520		3-1/2		6		#

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless noted, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see page 5 for method of calculating.

Indicates that a 6-inch conduit is not of sufficient size to accommodate three cables of this size without exceeding the maximum fill requirement.

TABLE 4
Minimum Size of Conduit Necessary
To Accommodate Secondary Underground Cable

600 Volt Secondary Cable

Conductor AWG or MCM	Diameter (Inches)	Cables per Conduit / Insulation Type					
		1 Cable per Conduit Regular	2 Cables per Conduit Regular	3 Cables per Conduit Regular	4 Cables per Conduit Regular	5 Cables per Conduit Regular	6 Cables per Conduit Regular
4S *	0.2043	2	2	2	2	2	2
4	0.2320	2	2	2	2	2	2
2S	0.2576	2	2	2	2	2	2
2	0.2920	2	2	2	2	2	2
1S	0.2893	2	2	2	2	2	2
1	0.3320	2	2	2	2	2	2
1/0S	0.3249	2	2	2	2	2	2
1/0	0.3720	2	2	2	2	2	2
2/0	0.4180	2	2	2	2	2	2
3/0	0.4700	2	2	2	2	2	2
4/0	0.5280	2	2	2	2	2	2
250	0.5750	2	2	2	2	2	2
350	0.6810	2	2	2	2	2	2
500	0.8130	2	2	2	2	2	2

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three or more cables in a conduit.

* S = Solid Conductor. Unless noted, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see page 5 for method of calculating.

Regular = Normal insulation. Ruggedized = Ruggedized, two-layer insulation. See page 6 for more information.

11. Installation in Conduit or Duct

Where cable must be pulled through conduit or duct, the operation shall be performed in such a way that the cable will not be damaged from strain or dragging. The cable shall be lubricated with a suitable cable lubricant prior to pulling into conduit or duct.

In placing primary cables, the stress applied while pulling into ducts or during other pulling operations shall not exceed the least of the following:

- a. Where a pulling eye is attached to the conductor, the maximum pulling strain in pounds shall not exceed .006 times the circular mil area for aluminum or .008 times the circular mil area for copper.
- b. Where a basket grip is placed over the cable, the pulling strain shall not exceed the lesser of (1) that calculated in a above or (2) 1000 pounds. The cable under the cable grip and 1 foot following it shall be severed and discarded after the pulling operation.
- c. In no case shall the maximum pulling tension exceed that recommended by the specific cable manufacturer.
- d. At bends, the maximum sidewall pressure recommended by the cable manufacturer shall not be exceeded.

12. Tagging of Cables at Termination Points

As the cables are laid, they shall be identified and tagged. The identification shall be of a permanent type, such as that done on plastic or corrosion resistant metal tags. The tag shall be securely attached to the cable. Paper or cloth tags are not acceptable.

13. Splices

Cable splices shall be of the pre-molded rubber, heat-shrink, or cold-shrink type, of the correct voltage rating and shall be installed in accordance with the splice manufacturer's instructions. Splices that depend solely on tape for a moisture barrier shall not be used.

Not more than one splice shall be permitted for each 2000 feet of cable installed unless authorized by the Owner. No bends shall be permitted within 12 inches of the ends of a splice. The cable or circuit numbers and the exact location of all splices shall be noted on the staking sheets (as built).

14. Primary Cable Termination and Stress Cones

Prefabricated stress cones or terminations shall be installed in accordance with the manufacturer's instructions at all primary cable terminals. They shall be suitable for the size and type of cable that they are used with and for the environment in which they will operate. Any indication of misfit, such as a loose or exceptionally tight fit, shall be called to the Owner's attention. The outer conductive surface of the termination shall be bonded to the system neutral. A heat-shrink or cold-shrink sleeve shall be installed to seal between the body of the termination and the cable jacket.

15. Special Precautions for Cable Splices and Terminations

A portable covering or shelter shall be available for use when splices or terminations are being prepared and when prefabricated terminations are being switched. The shelter shall be used as necessary to keep rain, snow and windblown dust off the insulating surfaces of these devices. Since cleanliness is essential in the preparation and installation of primary cable fittings, care shall be exercised to prevent the transfer of conducting particles from the hands to insulating surfaces. Mating surfaces shall be wiped with a solvent such as denatured alcohol to remove any possible accumulation of dirt, moisture or other conducting materials. A silicone grease or similar lubricant shall be applied afterwards in accordance with the manufacturer's recommendations. Whenever prefabricated cable devices are opened, the unenergized mating surfaces shall be lubricated with silicone grease before the fittings are reconnected.

16. Secondary and Service Connections

A suitable inhibiting compound shall be used with all secondary and service connections.

All secondary cable connections located below grade or in secondary pedestals shall be made with pre-insulated secondary connector blocks. Diving bells with open terminals, insulating boots or moisture barriers that depend solely on tape are not acceptable.

All transformer secondary phase terminal connections shall be completely insulated. If the secondary phase terminals are threaded studs, the connection shall be made with a pre-insulated secondary transformer connection block. If the transformer secondary phase terminals are insulated cable leads, connection shall be made with a pre-insulated secondary connector block or with a secondary prefabricated splice when the transformer leads continue directly to the service.

If a transformer is so large that it must have secondary spades, the spades shall be taped or otherwise insulated. Boots used for insulation shall be taped so that they cannot be readily slipped off.

Secondary connections to terminals of pole-mounted transformers shall be made so that moisture cannot get inside the cable insulation. This may be accomplished by covering the terminals and bare conductor ends with an appropriate moisture sealant (items in REA Bulletin 43-5, List of Materials Acceptable for Use on Systems of REA Electrification Borrowers).

The secondary connections and insulation shall have accommodations for all future and existing services as shown on the plans and specifications.

17. Pedestals

Where required, pedestal stakes shall be driven vertically into the bottom of the trench before cables are placed, and shall be located as shown on the staking sheets. Pedestal posts and supporting stakes shall be in place before the cable is installed. All pedestals should be approximately at the same height above finished grade.

18. Inspection and Inventory of Buried Units

Before any backfilling operations are begun, the Contractor and Owner shall jointly inspect all trenches, cable placement, risers, pedestal stakes, and other construction that will not be accessible after backfilling, and an inventory of units shall be taken. If corrections are required, a second inspection shall be made after completion of the changes.

19. Backfilling

The first 6 inches of trench backfill shall be free from rock, gravel or other material which might damage the cable jacket. In lieu of cleaning the trench, the Contractor may, at the Contractor's option, place a 2 inch bed of clean sand or soil under the cable and 4 inches of clean soil above the cable. Cleaned soil backfill when used shall contain no solid material larger than 1 inch. This soil layer shall be carefully compacted so that the cable will not be damaged.

Backfilling shall be completed in such a manner that voids will be minimized. Excess soil shall be piled on top and shall be well tamped. All rock and debris shall be removed from the site, and any damage to the premises repaired immediately.

Pieces of scrap cable or other material remaining after installation shall not be buried in the trench as a means of disposal.

20. Equipment Pads

The site for the pad shall be on undisturbed earth adjacent to but not over the trench. The site shall be cleared of all debris and excavated to the specified depth. Gravel or sand shall be added to the site and thoroughly compacted. The pad shall be installed level at the specified elevation.

21. Transformers

Transformers shall be handled carefully to avoid damage to the finish and shall be positioned in accordance with the staking sheets and the plans and specifications. Only qualified and experienced personnel shall be allowed to make connections and cable terminations.

22. Equipment Enclosures

Excavations for sleeve-type transformer pads and other below-grade enclosures shall be made so as to disturb the surrounding earth as little as practical. Enclosures shall be installed with side walls plumb. When enclosures are of fiber, plastic, or other semiflexible material, backfilling should be done with covers in place and with careful tamping so as to avoid distortion of the enclosure. When installation is complete, the cover of the enclosure shall not be lower than and not more than 2 inches higher than the grade specified by the Owner. Soil in the immediate vicinity shall be tamped and sloped away from the enclosure. At the Owner's option, the excess soil shall be removed from the site or spread evenly over the surface of the ground to the satisfaction of the Owner.

23. Warning Signs

Each equipment enclosure shall display a "Caution" sign placed so that it is visible to anyone attempting entry to the enclosure. Also, the equipment inside the enclosure shall display a "Danger" sign so that it is visible when the enclosure is open. (See Drawings UM12-1 and UM12-2.)

24. Sacrificial Anodes

Sacrificial anodes specified shall be installed with backfill package intact and connecting leads positioned for proper connection after the equipment is in place. Anodes shall neither be moved, positioned, lifted, nor lowered into place by pulling on the connecting leads.

Further information on the selection and installation of sacrificial anodes can be found in REA Bulletin 161-23, Underground Corrosion Control in Rural Electric Systems.

25. Grounding

All neutral conductors, ground electrodes, sacrificial anodes and groundable parts of equipment shall be interconnected. All interconnections shall be made as shown on the construction drawings. A copper-clad ground rod with minimum length of 8 feet shall be installed at all equipment locations as shown in the construction drawings and at all cable splices and taps.

All pad-mounted equipment enclosures, including transformers, shall be grounded in such a manner that two separate connections exist between the enclosure and the ground rod(s).

26. Cable Location Markers

Location of permanent cable markers shall be as shown on the staking sheets.

27. Cable Acceptance Tests

- a. Continuity: After installation of the cable and prior to the high potential test specified below, the Contractor and the Owner shall jointly perform a simple continuity test on the system. This can easily be accomplished by grounding the conductor at the source and checking for continuity from the end of each tap with an ohmmeter or with a battery and ammeter.
- b. High Potential: After successful continuity tests, the Contractor and the Owner jointly shall perform high potential tests on each length of cable, with terminations in place but disconnected from the system.

The installation shall withstand for a minimum of 15 minutes a dc test potential as follows:

Primary URD Cable (XLP, XLP-TR, and EPR)		
Rated Voltage	Insulation Thickness Inches	Field dc Acceptance Test Voltage
15 kV	.220	64.0 kV
25 kV	.260	80.0 kV
25 kV	.345	100.0 kV

The voltage may either be increased continuously or in steps to the maximum test value.

- (1) If increased continuously, the rate of increase of test voltage should be approximately uniform and increasing to maximum voltage in not less than 10 seconds and in not more than approximately 60 seconds.
- (2) If applied in steps, the rate of increase of test voltage from one step to the next should be approximately uniform. The duration at each step shall be long enough for the absorption current to attain reasonable stabilization (1 minute minimum). Current and voltage readings should be taken at the end of each step duration. The number of steps should be from five to eight.

Warning:

A hazardous voltage may still exist on the cable after the above testing has been completed. Therefore, before handling the cable, the conductor shall be grounded to permit any charge to drain to earth.

Jack Van Mark

Acting
Administrator

Attachments:

- Attachment A - Index of Drawings
- Attachment B - Construction Drawings

Index:

CONSTRUCTION:

Underground Distribution

DESIGN, SYSTEM:

Underground Distribution Construction

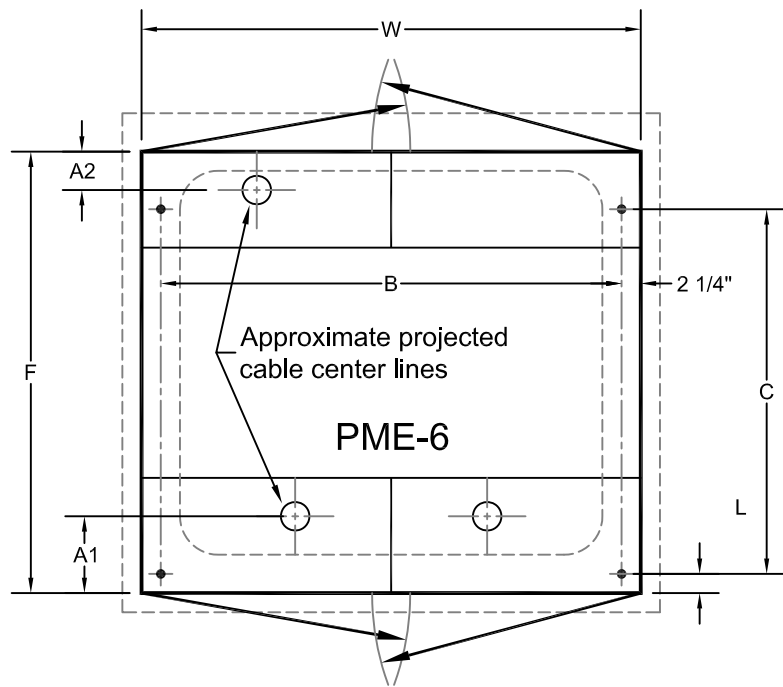
SPECIFICATIONS AND STANDARDS:

Distribution Facilities:

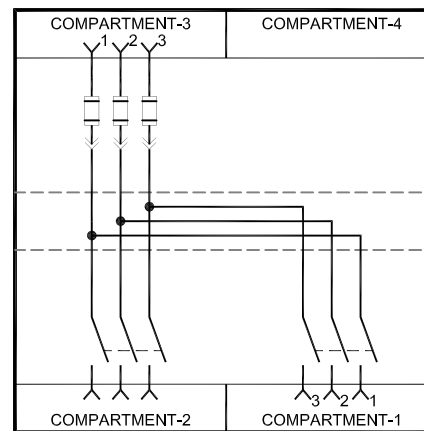
Underground Distribution

UNDERGROUND DISTRIBUTION:

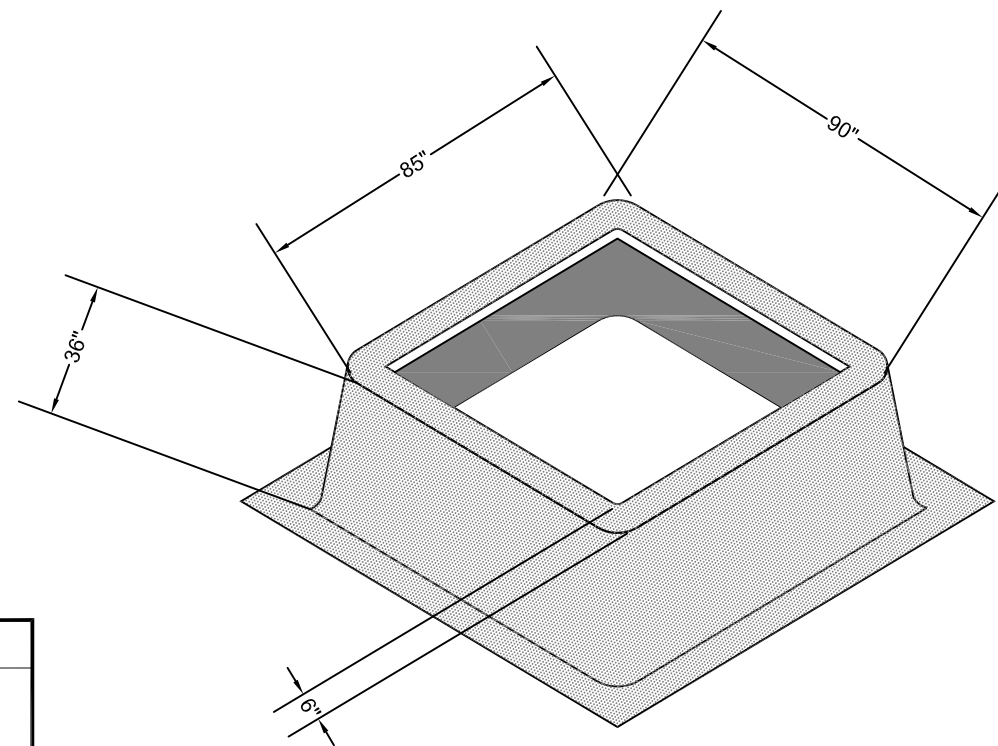
Specifications and Drawings



ANCHOR BOLT PLAN



CONNECTION DIAGRAM



SWITCH GEAR BASE

- 1 12" Road Base for drainage leveling
- 2 Set 12" above final grade

WILDEWOOD SUBDIVISION
PME-6 SWITCHGEAR
INSTALLATION DETAILS

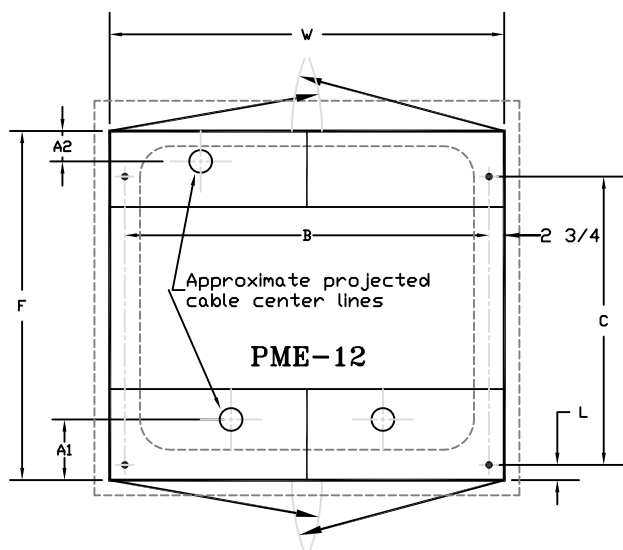
Kv, Nominal	A1	A2	B	C	D	E	F	G	H	J	K	L	M	W
25	17 3/8	7	78 1/2	52	84 3/4	12 7/8	79 1/2	8 1/4	50	6	12	13 3/4	43 1/8	84

Revision Date

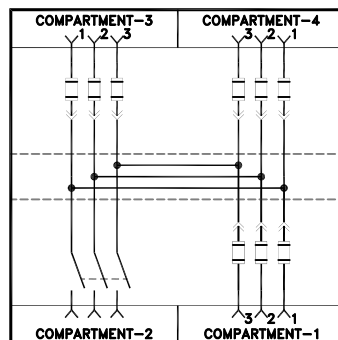
July 26, 2016



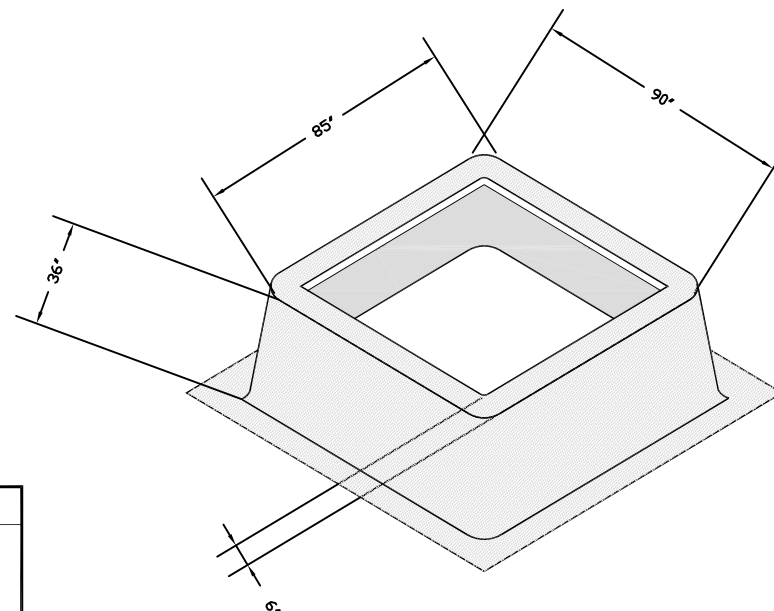
PME-6



ANCHOR BOLT PLAN



CONNECTION DIAGRAM



SWITCH GEAR BASE

1

12" Road Base for drainage leveling

2

Set 12" above final grade

Kv, Nominal	A1	A2	B	C	D	E	F	G	H	J	K	L	M	W
25	18 1/2	8 1/8	78 1/2	52	84 3/4	12 7/8	81 3/4	8 1/4	50	6	12	14 7/8	42 1/2	84

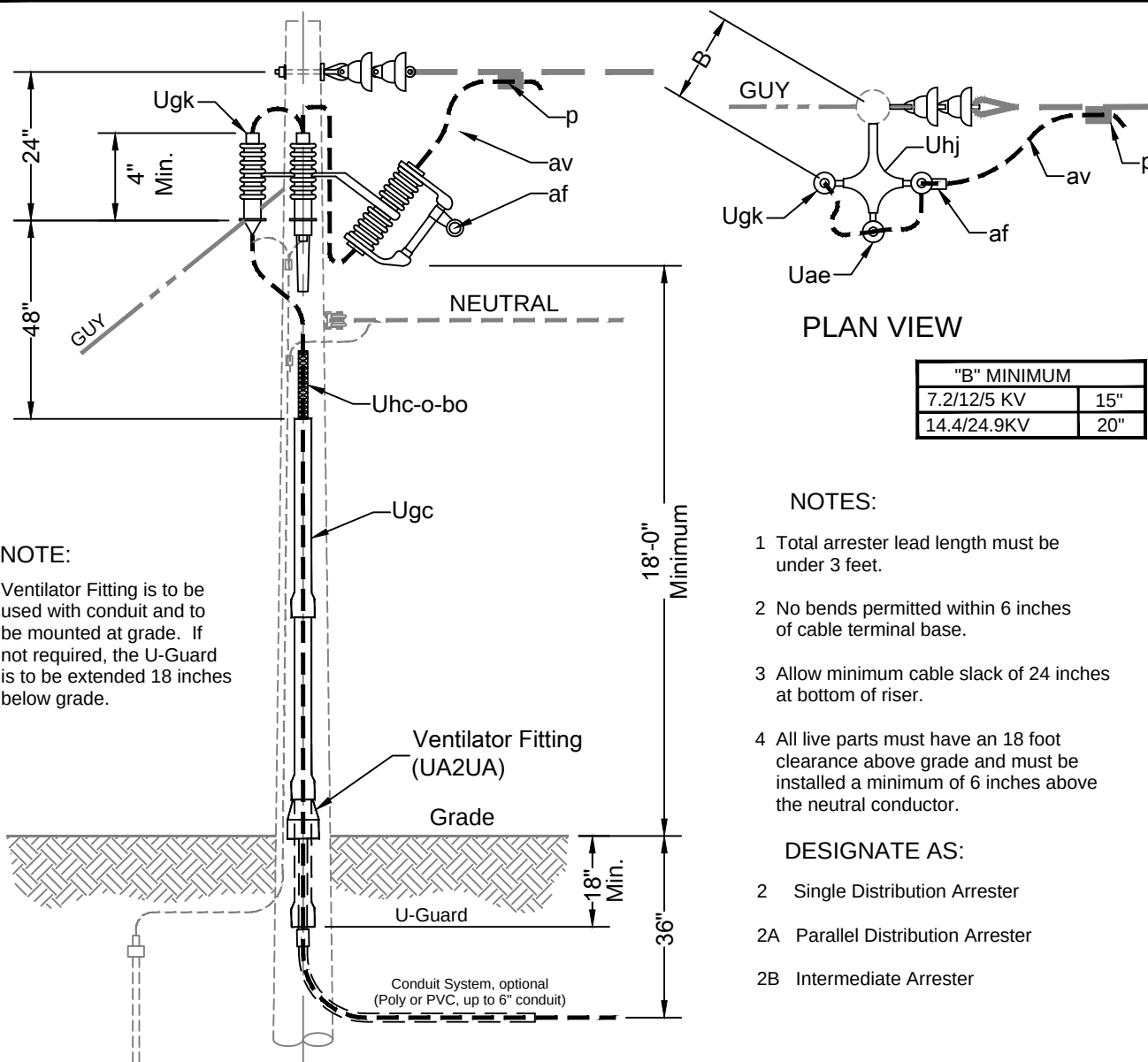
PME-12 SWITCHGEAR INSTALLATION DETAILS

DATE: 02/26/08

DRAWN: T.A.



PME-12



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	bo	1	Anchor, shackle.
d	3	Washer, square 2 1/4"	ek	-	Locknuts, as required
p	-	Connectors, as required	Uae	1*	arrester, riser pole (MOV)
j	1	Screw, lag 1/2" x 4", as required	Ugc	-	U-Guard, PV-Mold, 3" Sch. 40
j	36	Screw, lag 1/4" x 2 1/2"	-	1	Ventilator Fitting, 3" riser (UA2UA)
o	1	Eye bolt	Ugk	1	Cable termination
af	1	Fuse link	Uhc	1	Cable support
av	1	Cutout (load break type)	Uhj	1	Equipment support bracket
av	-	Jumpers, as required (cover)			

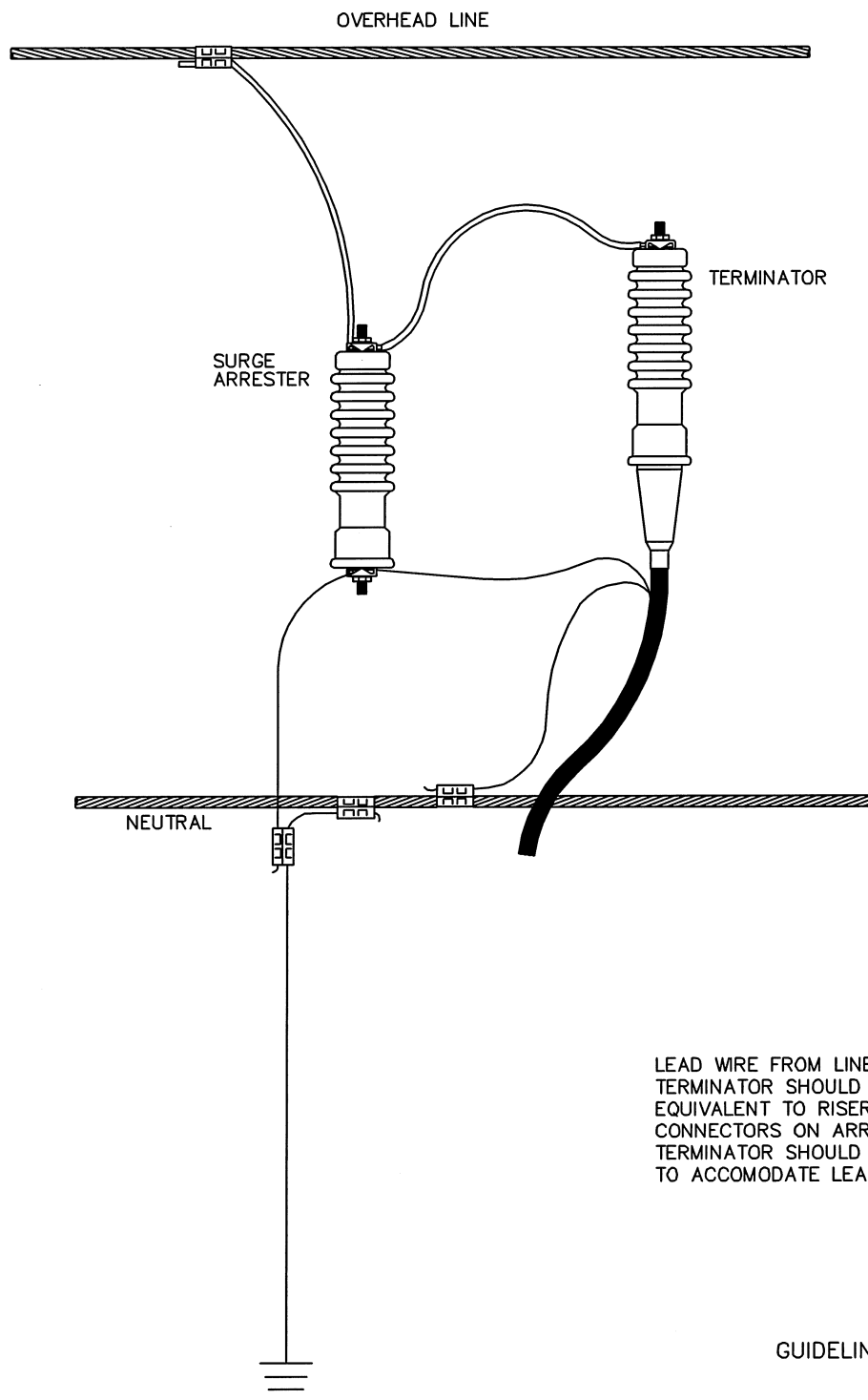
7.2 / 12.5 KV - SINGLE PHASE CABLE TERMINAL POLE

Revision Date

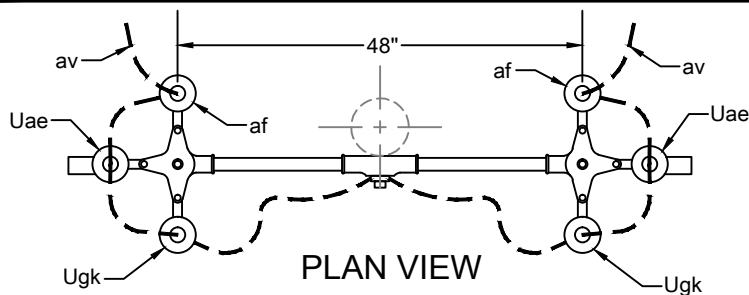
Feb. 18, 2016



UA2U

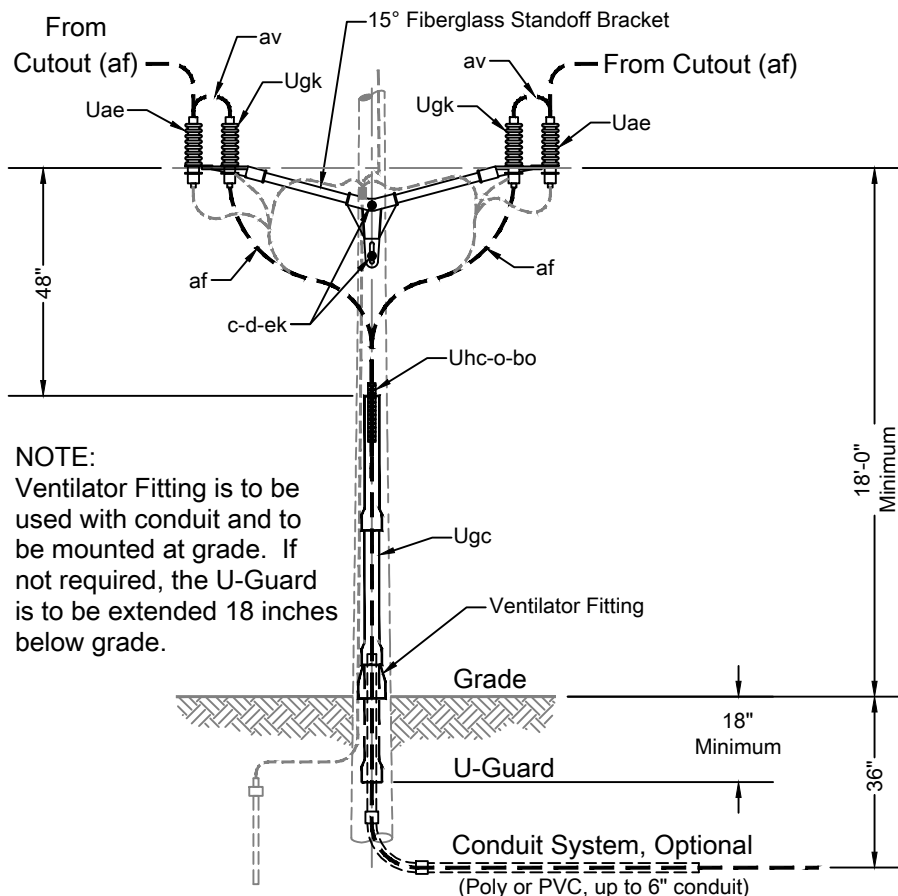


CONNECTION OF TERMINATOR / ARRESTER TO OVERHEAD LINE		
	2000	UX11



NOTES:

- 1 Total arrester lead length must be under 3 feet.
- 2 No bends permitted within 6 inches of cable terminal base.
- 3 Allow minimum cable slack of 24 inches at bottom of riser.
- 4 All live parts must have an 18 foot clearance above grade and must be installed a minimum of 6 inches above the neutral conductor.



NOTE:

Ventilator Fitting is to be used with conduit and to be mounted at grade. If not required, the U-Guard is to be extended 18 inches below grade.

DESIGNATE AS:

- 2 Single Distribution Arrester
- 2A Parallel Distribution Arrester
- 2B Intermediate Arrester
- *6 Arresters to be installed on parallel arrester applications.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	3	Washer, square 2 1/4"	fm	1	Mounting bracket
j	36	Screw, lag 1/4" x 2 1/2"	Uae	2	Arrester, riser pole (MOV)
o	1	Eye Bolt	Ugc	2-3	U-Guard, PV-Mold, 4" Sch. 40
p	-	Connectors, as required	-	1	Ventilator Fitting, 4" riser.
af	2	Cutout (load break type)	Ugk	2	Cable termination
av	-	Jumpers, as required (covered)	Uhc	2	Cable support
bo	1	Anchor, shackle.			

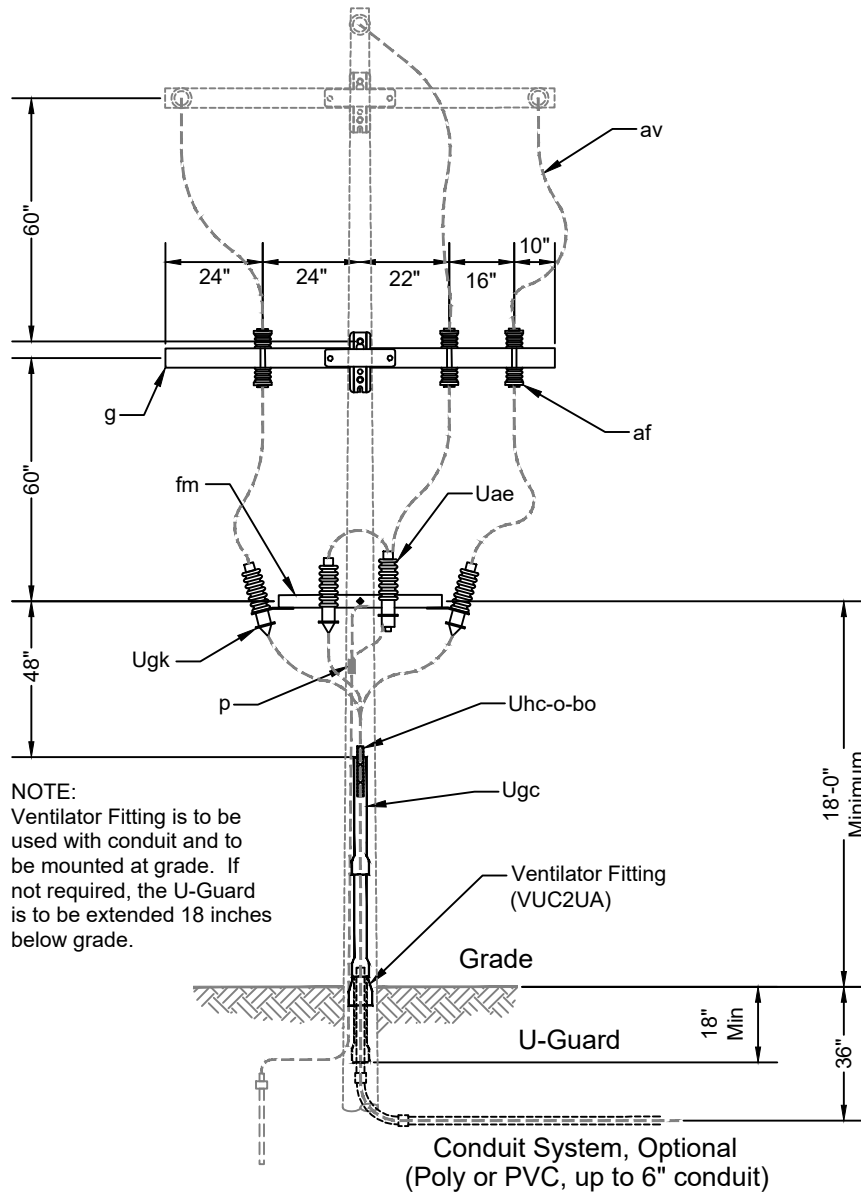
7.2 / 12.5 KV - TWO PHASE CABLE TERMINAL POLE

Revision Date

Feb. 23, 2016



UB2



NOTES:

- 1 Total arrester lead length must be under 3 feet.
- 2 No bends permitted within 6 inches of cable terminal base.
- 3 Allow minimum cable slack of 24 inches at bottom of riser.
- 4 All live parts must have a 18 foot clearance above grade and must be installed a minimum of 6 inches above the neutral conductor.

DESIGNATE AS:

- 2 Single Distribution Arrester
- 2A Parallel Distribution Arrester
- 2B Intermediate Arrester
- *6 Arresters to be installed on parallel arrester applications

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	bo	1	Anchor, shackle.
d	3	Washer, square 2 1/4"	ek	-	Locknuts, as required
d	3	Washer, 3" square, curved	fm	1	Mounting bracket
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	Uae	3*	Arrester, riser pole (MOV)
j	36	Screw, lag 1/4" x 2 1/2"	Ugc	2-3	U-Guard, PV-Mold, 4" Sch. 40
o	1	Eye Bolt	-	1	Ventilator Fitting, 4" riser (VUC2UA)
p	-	Connectors, as required	Ugk	3	Cable termination
af	3	Cutout (load break type)	Uhc	3	Cable support
av	-	Jumpers, as required (cover)			

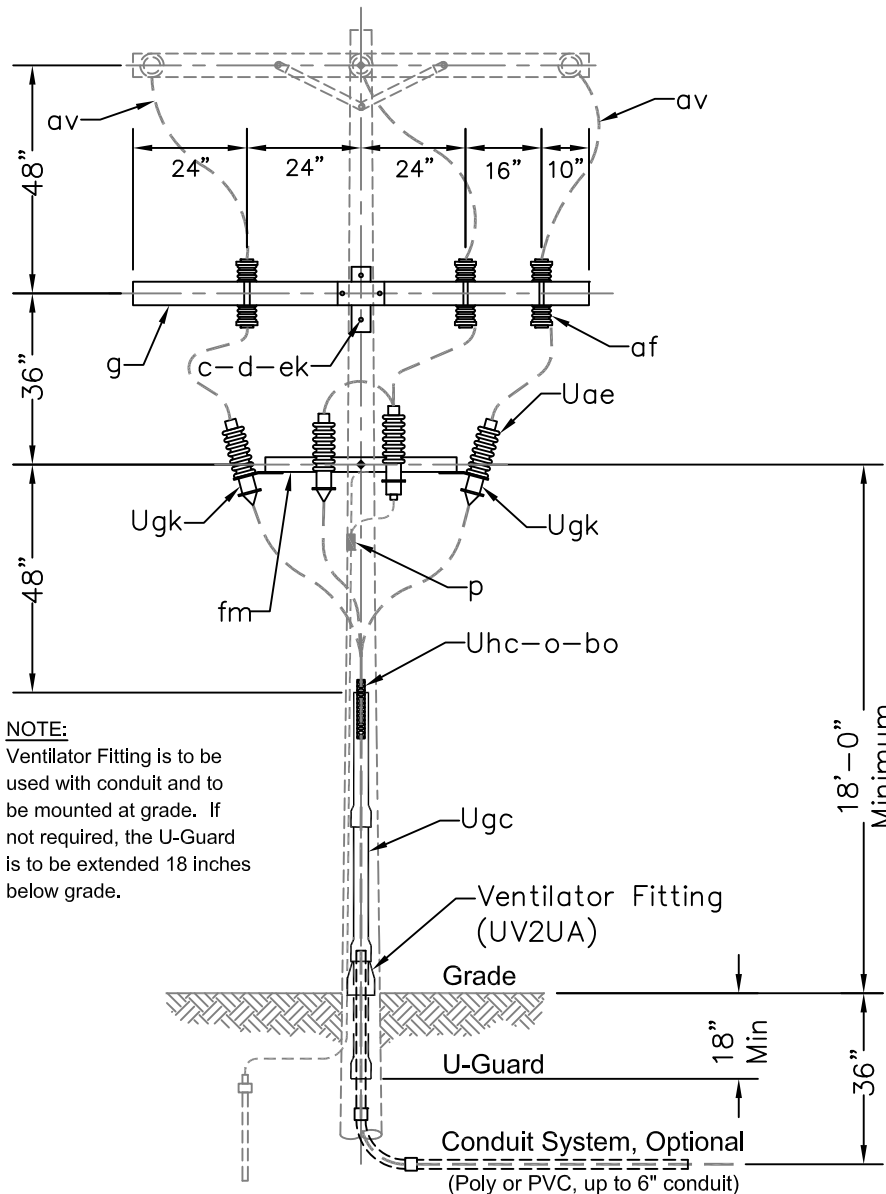
THREE PHASE CABLE TERMINAL POLE

Revision Date

Jan. 31, 2023



UC2U
VUC2U



NOTE:
Ventilator Fitting is to be used with conduit and to be mounted at grade. If not required, the U-Guard is to be extended 18 inches below grade.

NOTES:

- 1 Used on 600-Amp circuits in lieu of UC2U with fused cutout.
- 2 Total arrester lead length must be under 3 feet.
- 3 No bends permitted within 6 inches of cable terminal base.
- 4 Allow minimum cable slack of 24 inches at bottom of riser.
- 5 All live parts must have an 18 foot clearance above grade and must be installed a minimum of 6 inches above the neutral conductor.
- 6 Connections to overhead conductor shall be bolted-tee in lieu of hotline clamps.

DESIGNATE AS:

- 2 Single Distribution Arrester
- 2A Parallel Distribution Arrester
- 2B Intermediate Arrester
- *6 Arresters to be installed on parallel arrester applications.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	bo	1	Anchor, shackle.
d	6	Washer, square 2 1/4"	cu	2	Brace, wood, 28"
g	1	Crossarm, 8' Fiberglass, PUP1 #TB2000	ek	-	Locknuts, as required
j	1	Screw, lag 1/2" x 4"	fm	1	Mounting bracket
j	36	Screw, lag 1/4" x 2 1/2"	Uae	3	Arrester, riser pole (MOV)
o	1	Eye Bolt	Ugc	2-3	U-Guard, PV-Mold, 4" Sch. 40
p	-	Connectors, as required	-	1	Ventilator Fitting, 4" riser (UC2UA)
af	3	Cutout - 600-Amp solid blade	Ugk	3	Cable termination
av	-	Jumpers, as required (cover)	Uhc	3	Cable support

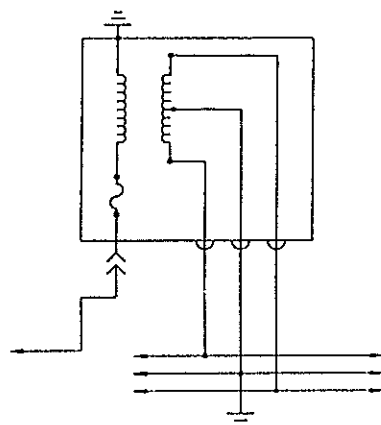
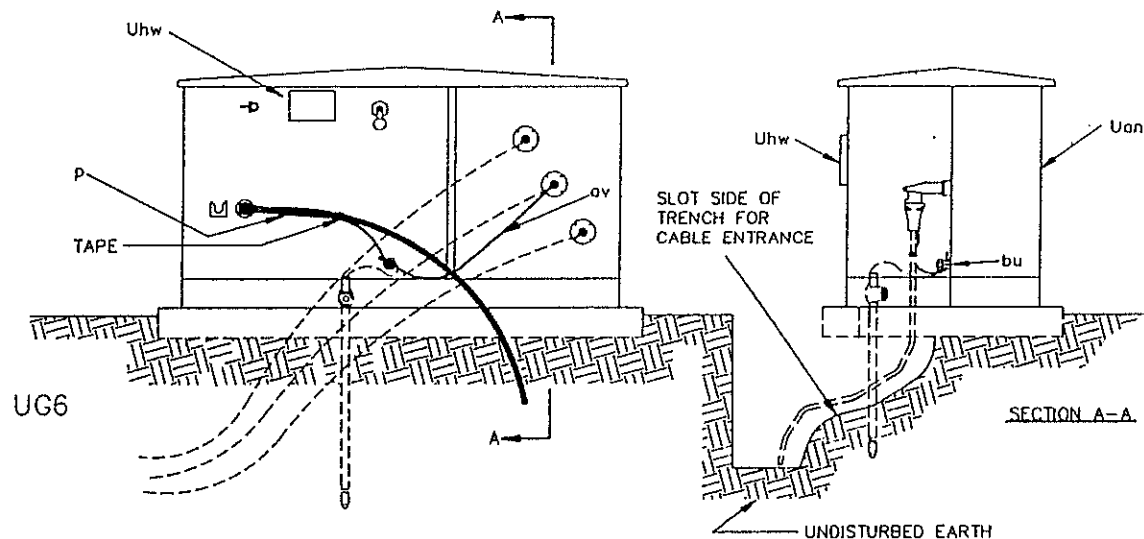
7.2 / 12.5 KV - THREE PHASE CABLE TERMINAL POLE - 600-AMP

Rev. Date

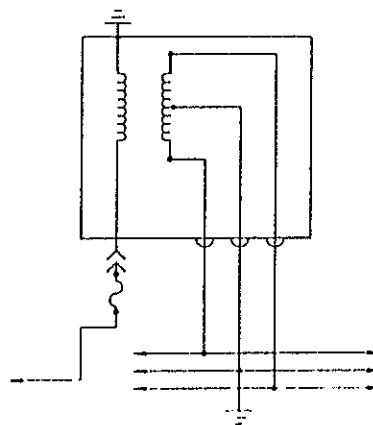
Feb 1, 2021



UC2UL



WIRING DIAGRAM
UG6



WIRING DIAGRAM
UG6-1

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG6	UG6B	SINGLE TERMINATION TYPE WITH INTERNAL FUSE
UG6-1	UG6-1B	SINGLE TERMINATION TYPE WITH FUSED LOAD BREAK ELBOW

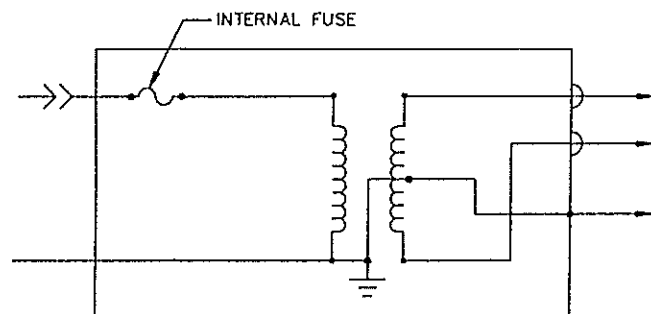
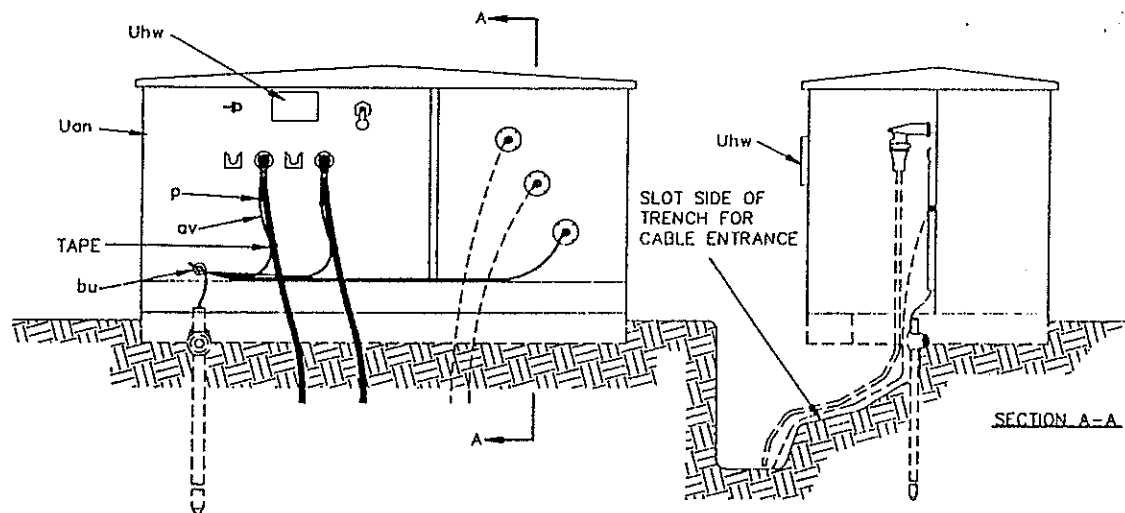
ITEM	QTY.	MATERIAL
P		Connectors, as required
av		Jumpers, copper as required
bu	1	Connector, equipment ground
Uan	1	Transformer, pad mounted, single primary load break bushing and internal fuse (UG6 & UG6B)
Uan	1	Transformer, pad mounted, single primary load break bushing (UG6-1 & UG6-1B)
Uhw	2	Signs, "DANGER" and "CAUTION"
		Tape, as required

NOTES:

- ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO MINIMIZE FERRO-RESONANCE.
- PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIL CABLES AS SHOWN.
- INSTALL WITH UNIT UM4B-1 OR OTHER GROUNDING UNIT.
- SPECIFY PAD OR SLEEVE SEPARATELY.
- INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "CAUTION" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

SINGLE PHASE
PAD-MOUNTED TRANSFORMER
(RADIAL FEED)

UG6, UG6B
UG6-1, UG6-1B



WIRING DIAGRAM
UG7

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG7	UG17B	UNIT WITH INTERNAL FUSE

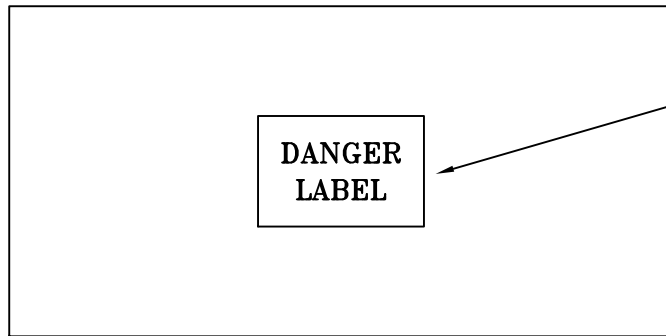
ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
bu	1	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase with one load break bushing per phase and internal fuses (UG7 & UG17B)
Uhw	2	Signs, "DANGER" and "CAUTION"
		Ground wire (See Note #3)
		Tape, as required

NOTES:

- ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO MINIMIZE FERRO-RESONANCE.
- PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
- INSTALL WITH UNIT UM48-1 OR OTHER GROUNDING UNIT.
- SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
- INSTALL "DANGER" SIGN ON TRANSFORMER AND "CAUTION" SIGN ON ENCLOSURE.

SINGLE PHASE
PAD MOUNTED TRANSFORMER
(LOOP FEED)

UG7
UG7B



DANGER
LABEL

DANGER
LABEL

INSIDE LID

CABINET OR
TRANSFORMER
NUMBER

NORMAL
OPEN

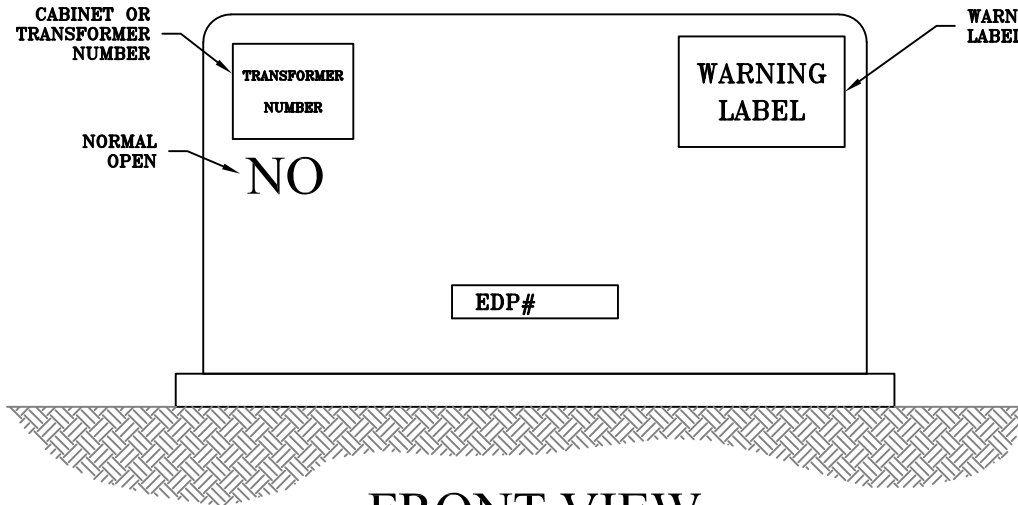
TRANSFORMER
NUMBER

NO

WARNING
LABEL

WARNING
LABEL

EDP#



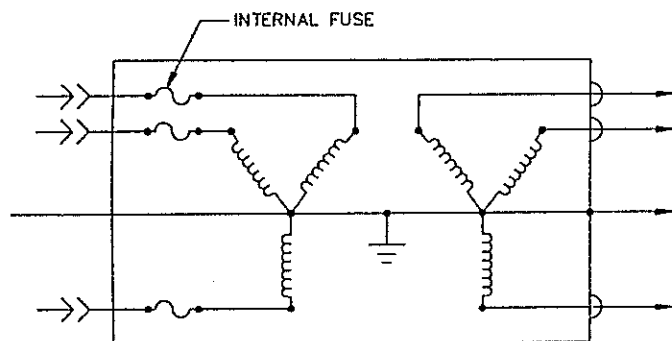
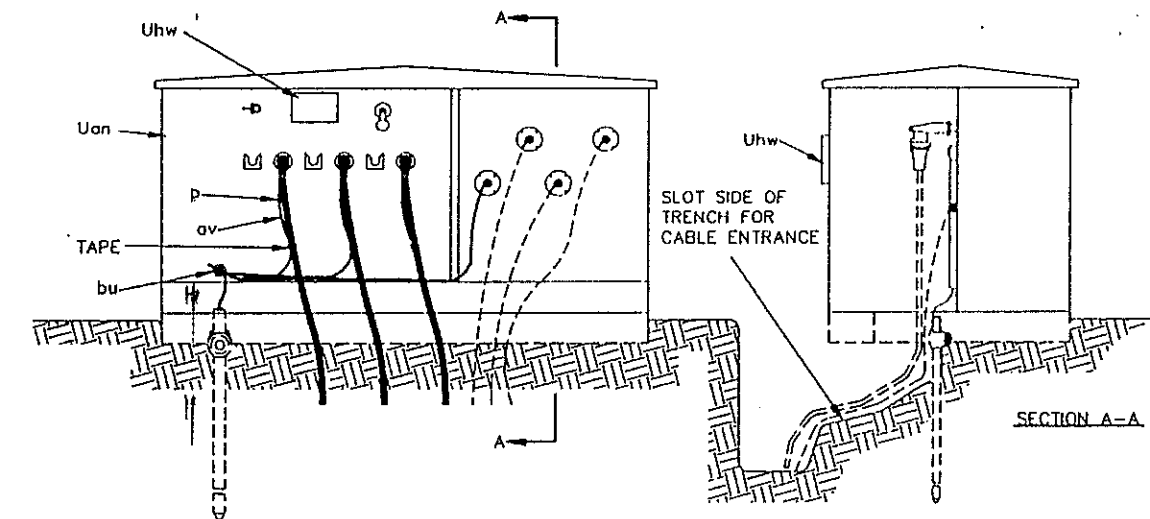
FRONT VIEW

SWITCH CABINET AND PADMOUNT TRANSFORMER LABELING GUIDELINES

DATE: 05/17/99

DRAWN: DSG





WIRING DIAGRAM

UG 17

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17	UG17B	UNIT WITH INTERNAL FUSE

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
bu	1	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase with one load break bushing per phase and internal fuses (UG17 & UG17B)
Uhw	2	Signs, "DANGER" and "CAUTION"
		Ground wire (See Note #3)
		Tape, as required

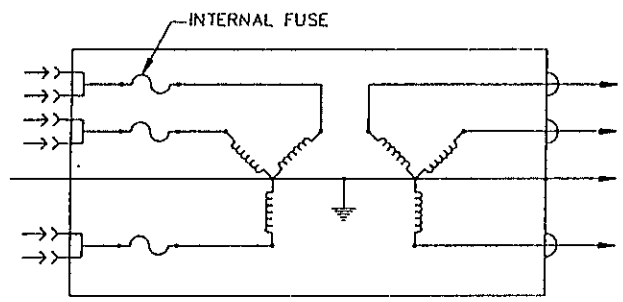
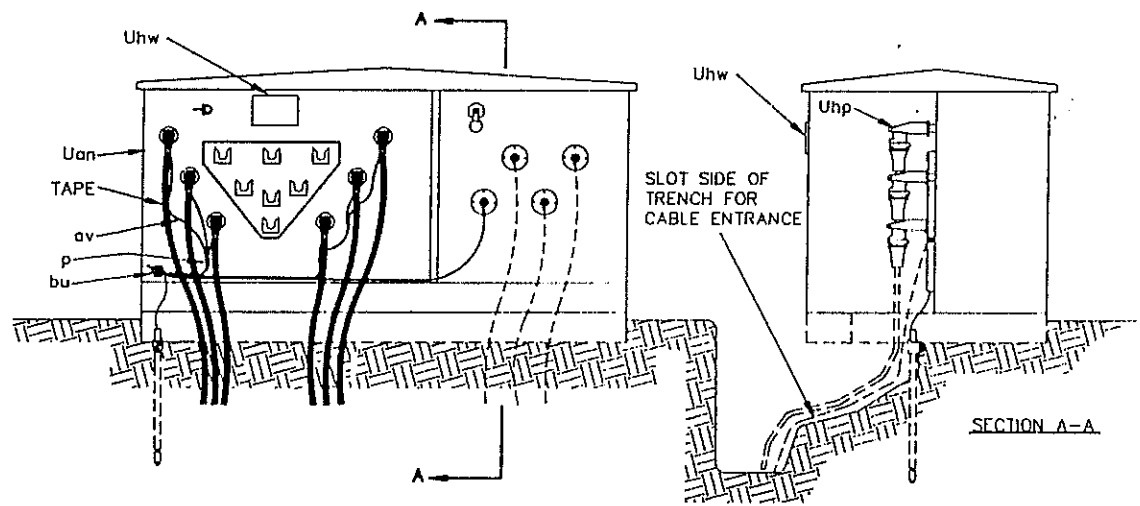
NOTES:

1. ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO MINIMIZE FERRO-RESONANCE.
2. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIL CABLES AS SHOWN.
3. INSTALL WITH UNIT UM4B-1 OR OTHER GROUNDING UNIT.
4. SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
5. INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "CAUTION" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

UG17

THREE PHASE PAD MOUNTED
TRANSFORMER
(RADIAL FEED)UG17
UG17B

UG17-2, UG17-2B



WIRING DIAGRAM
UG17-2

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper, as required
bu	1	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase with two load break bushings per phase and internal fuse.
Uhw	2	Signs, "DANGER" and "CAUTION"
		Tape, as required
		Ground wire (See Note #3)

NOTES:

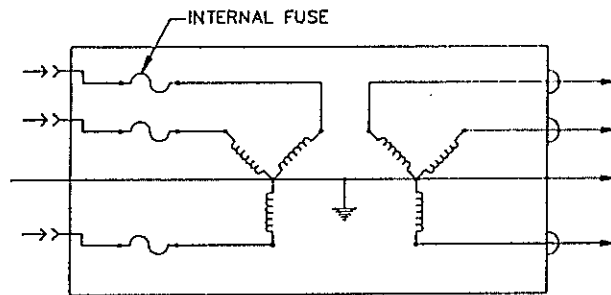
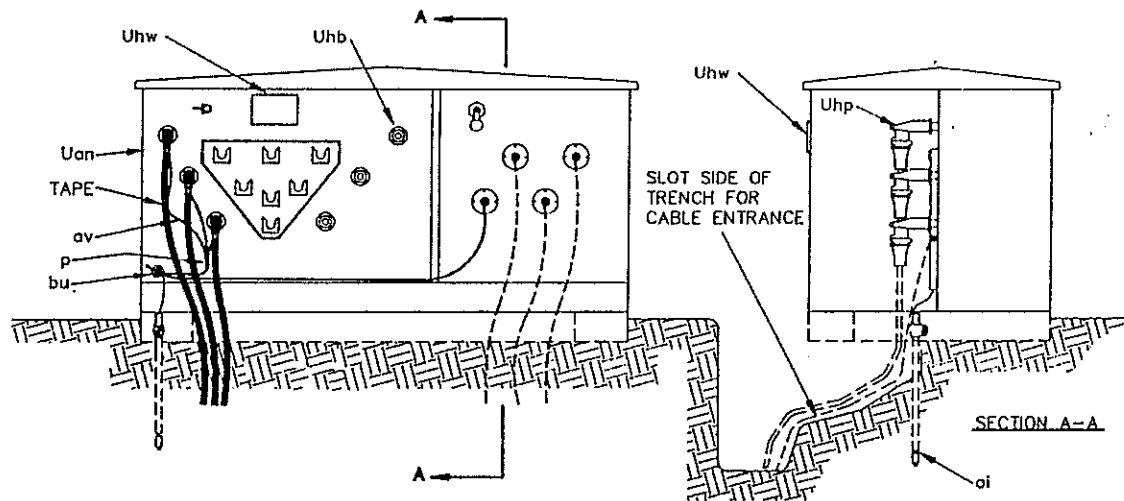
1. ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO AVOID FERRO-RESONANCE.
2. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING ASSEMBLY UM48-1 OR OTHER.
4. SPECIFY KVA SIZE OF TRANSFORMER.
5. SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
6. INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "CAUTION" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17-2	UG17-2B	UNIT WITH INTERNAL FUSE

THREE PHASE PAD MOUNTED TRANSFORMER (LOOP FEED)		
		UG17-2 UG17-2B

UG17-2



WIRING DIAGRAM

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper, as required
bu	1	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase, with two load break bushings per phase and internal fuse.
Uhb	3	Insulated covers
Uhw	2	Signs, "DANGER" and "CAUTION"
		Tape, as required
		Ground wire (See Note #3)

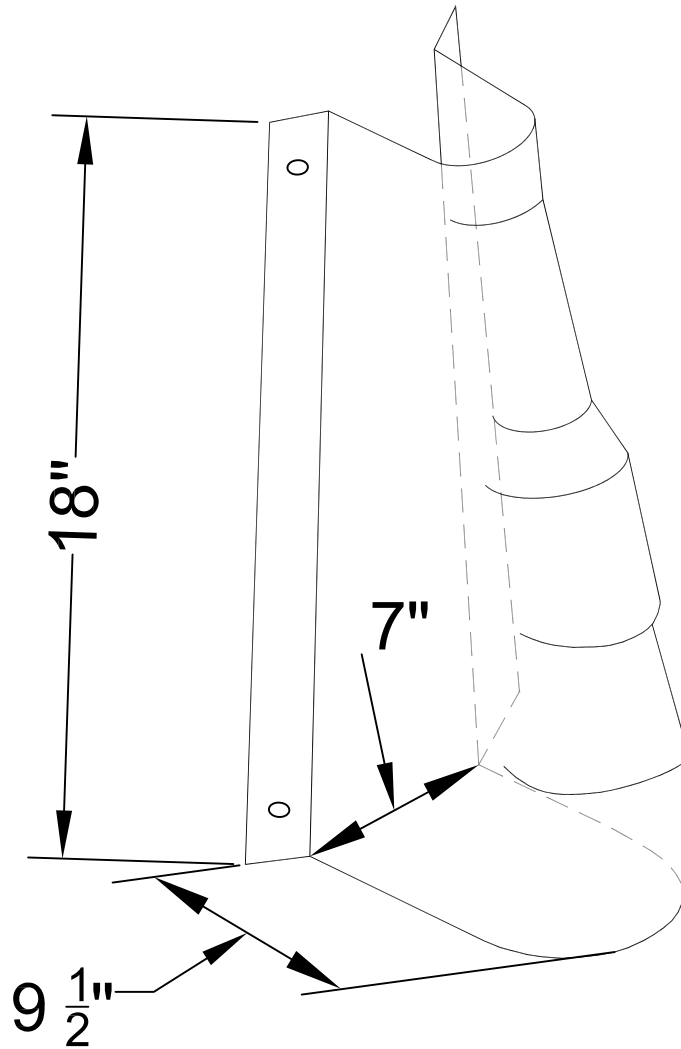
NOTES

- ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO AVOID FERRO-RESONANCE.
- PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIL CABLES AS SHOWN.
- INSTALL WITH GROUNDING ASSEMBLY UM4B-1 OR OTHER.
- SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
- INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "CAUTION" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17-2R	UG17-2BR	UNIT WITH INTERNAL FUSE

THREE PHASE PAD MOUNTED LOOP FEED TRANSFORMER WITH RADIAL FEED		
		UG17-3 UG17-3B



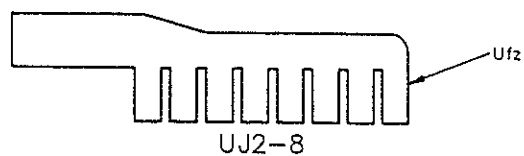
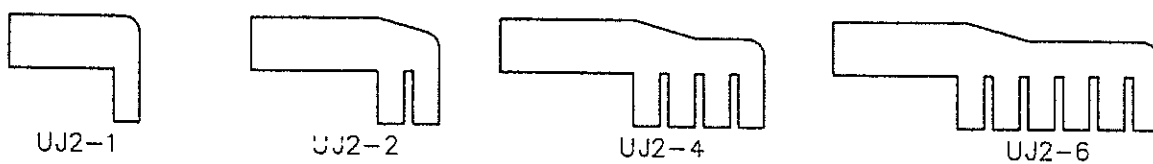
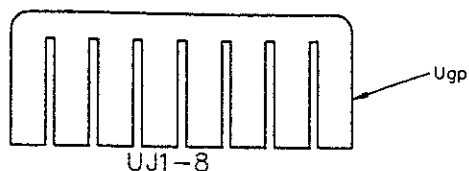
VENTILATOR FITTING FOR UC2U & UM5/4UA

Revision Date

July 26, 2016



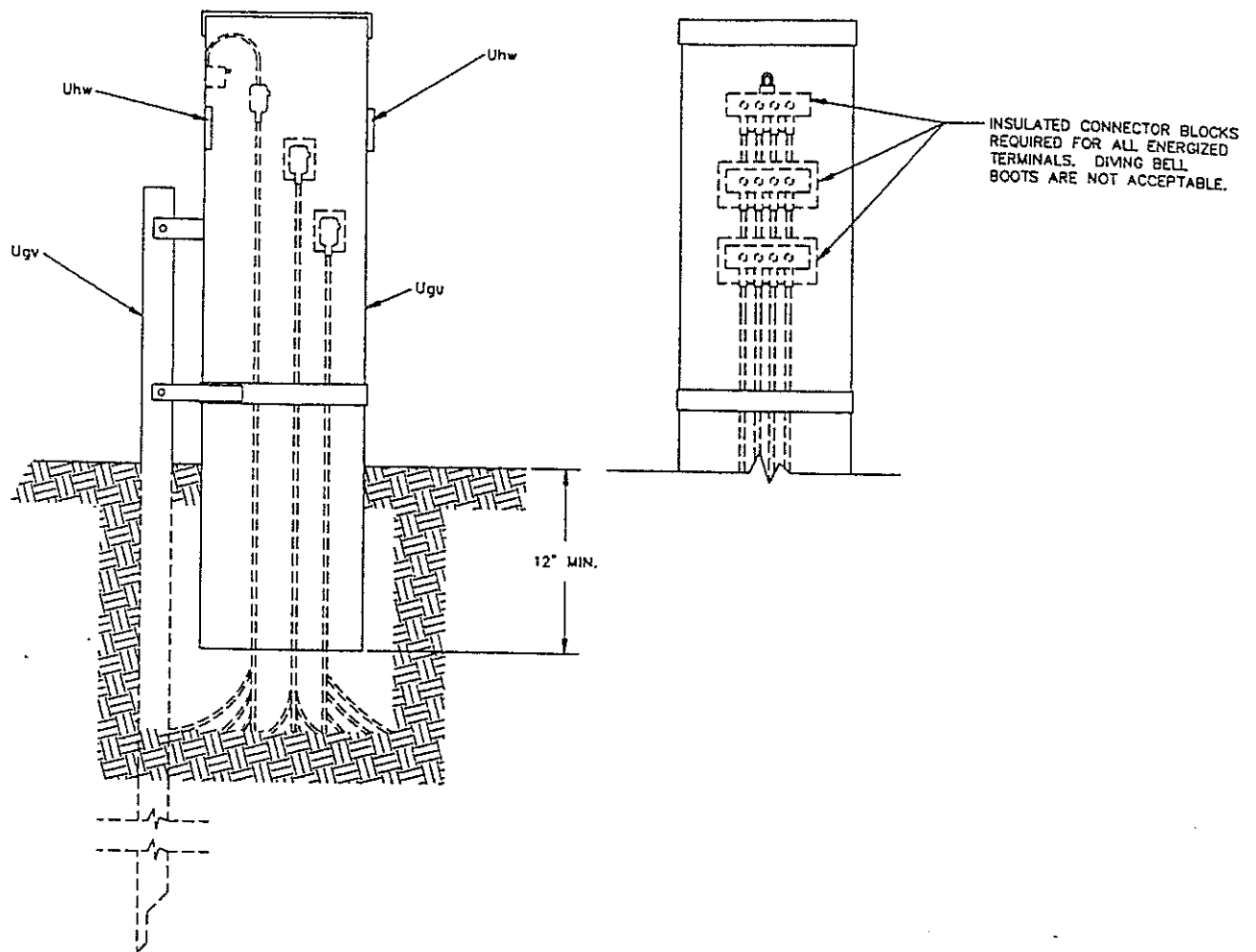
Ugm



ITEM	QTY.	MATERIAL
Ufz		Transformer connector blocks, as required
Ugp		Connector blocks, as required

SECONDARY CONNECTOR BLOCKS

UJ1—
UJ2—



NOTES:

INSTALL "DANGER" SIGN ON OUTSIDE OF PEDESTAL.

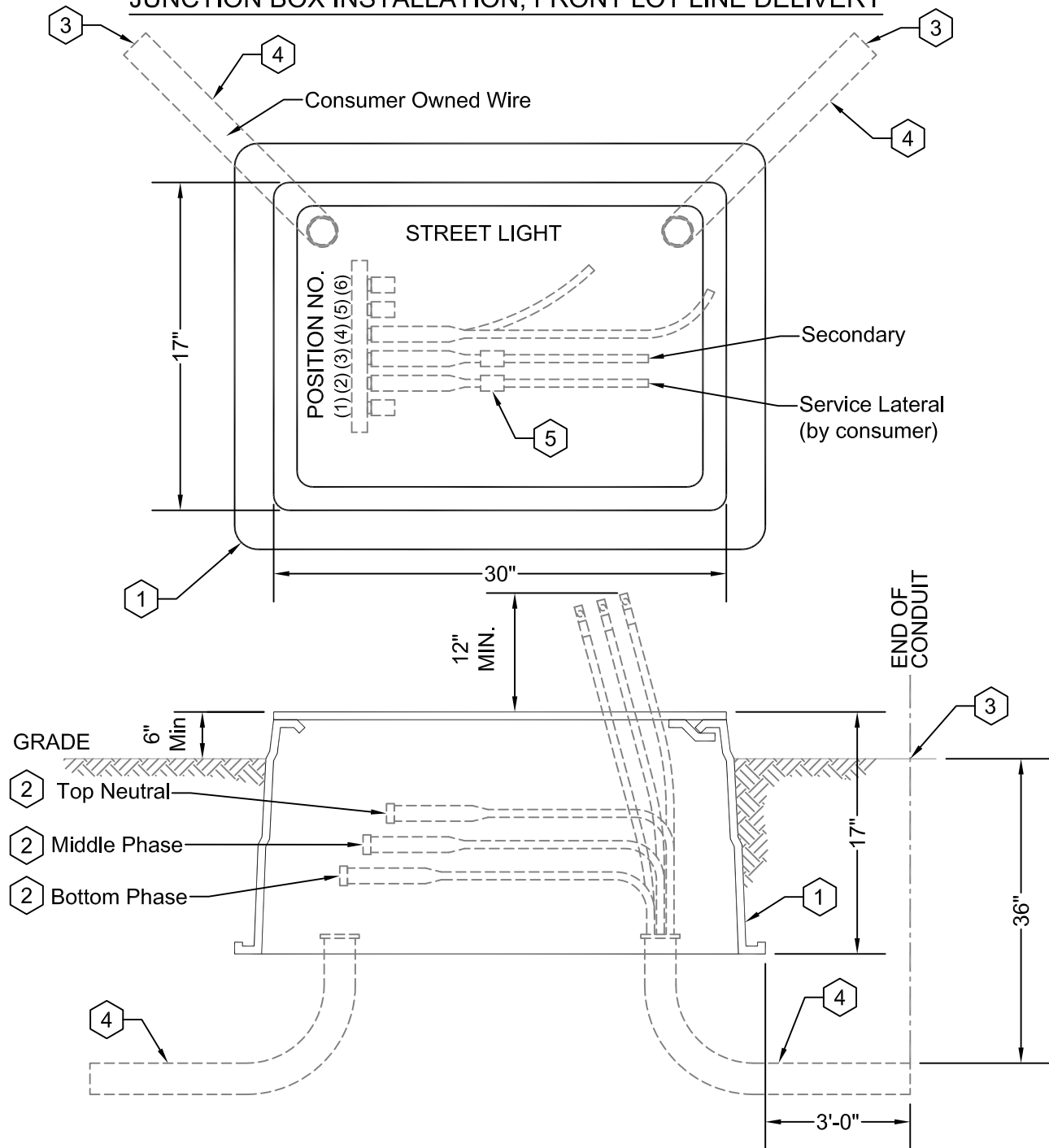
ITEM Ugv OPTIONAL - SEE PEDESTAL MANUFACTURER'S SPECIFICATIONS
AND RECOMMENDATIONS.

ITEM	QTY.	MATERIAL
Ugu	1	Power pedestal
Ugv	1	Stake
Uhw	1	Sign, "DANGER"

SECONDARY ASSEMBLY
UNDERGROUND CABLE

UK5

JUNCTION BOX INSTALLATION, FRONT LOT LINE DELIVERY



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
1		Junction Box - UK6	5		Cable Marker Tag, consumer owned UG
2		Terminal Lug-select size UJ1-6/UJ1-6N			Service Wire and ID on Meter Socket
3		Cable / Conduit Marker UM6-12S			
4		Flex Conduit UR5-3.0F			

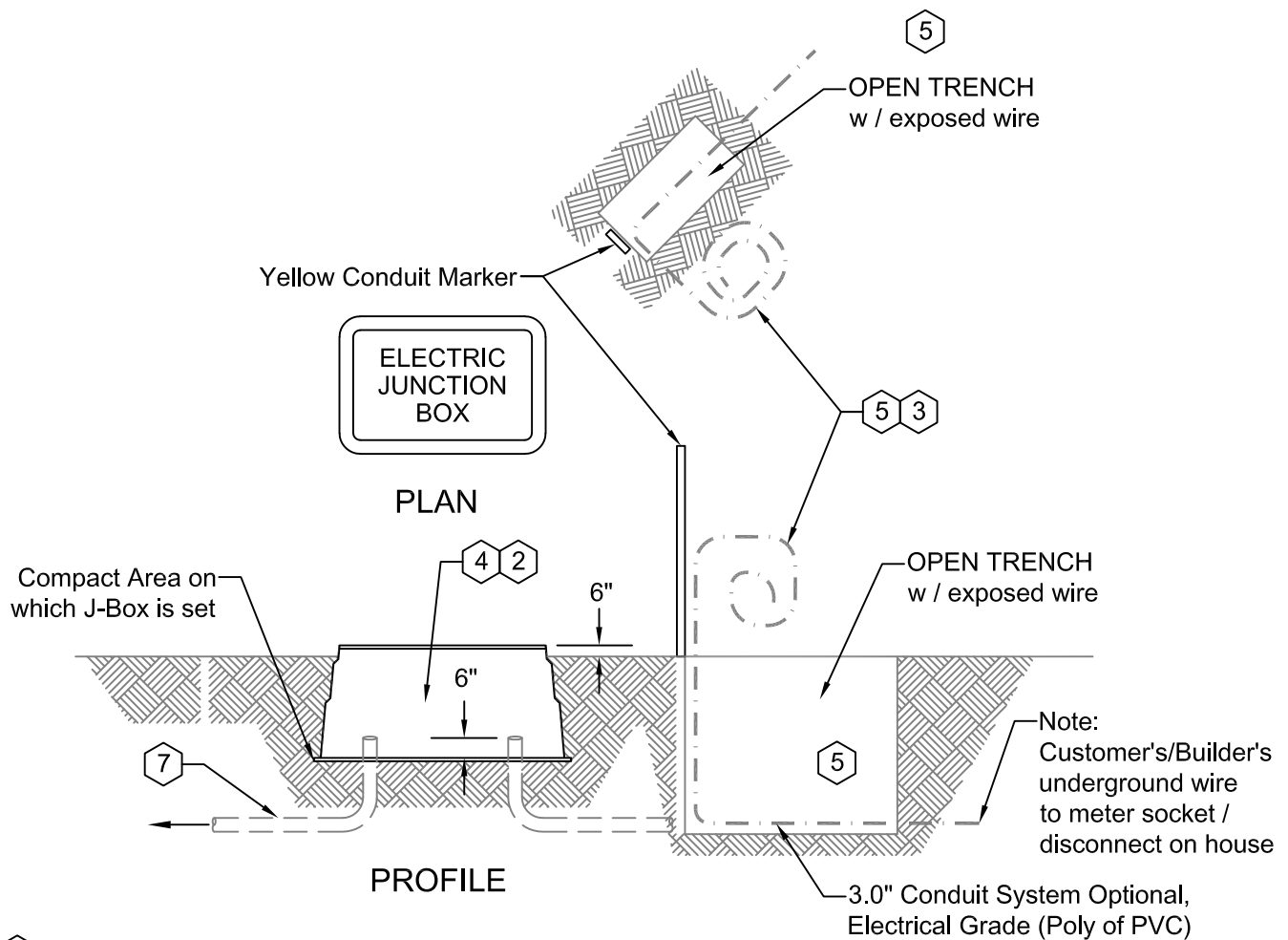
SECONDARY ASSEMBLY UNDERGROUND CABLE

Revision Date

July 25, 2016



UK6



- 1 "Front lot line" delivery is the GVP subdivision / lot standard with the meter located on the side / front of the house nearest to the junction box.
- 2 Service is provided at the front line by GVP to a grade level "Electrical Junction Box". The Consumer / Builder wire shall be terminated by GVP inside the junction box.
- 3 Underground service wire to the house is furnished and installed by the customer / builder from GVP Junction Box to the house.
- 4 Electric Junction Box is 17" x 30" x 17"D, furnished and installed by GVP.
- 5 Customer shall trench within 2'-0" to GVP electric junction box, which is marked by a yellow conduit marker. (DO NOT REMOVE THE YELLOW MARKER AND LEAVE THE TRENCH OPEN 2 FEET FROM THE YELLOW MARKER) Leave an additional 8'-0" of wire past the junction box , for GVP installation. (Same with temporary construction power setup).
- 6 Electric Junction Box shall not be installed until final grade is established.
- 7 Contractor / Developer conduit.
- 8 Mesa Count Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set for permanent or temporary service.
- 9 GRAND VALLEY POWER RESERVES THE RIGHT TO REQUEST NECESSARY MODIFICATION OR REJECT THE INSTALLATION AS SUITABLE FOR SERVICE AS NECESSARY.

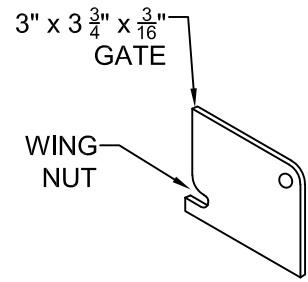
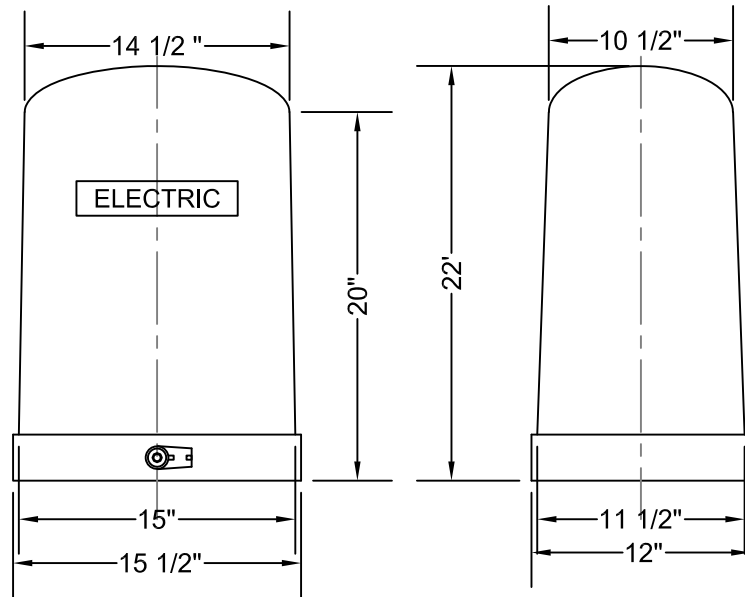
JUNCTION BOX STANDARD UNDERGROUND CONSTRUCTION

Revision Date

July 25, 2016

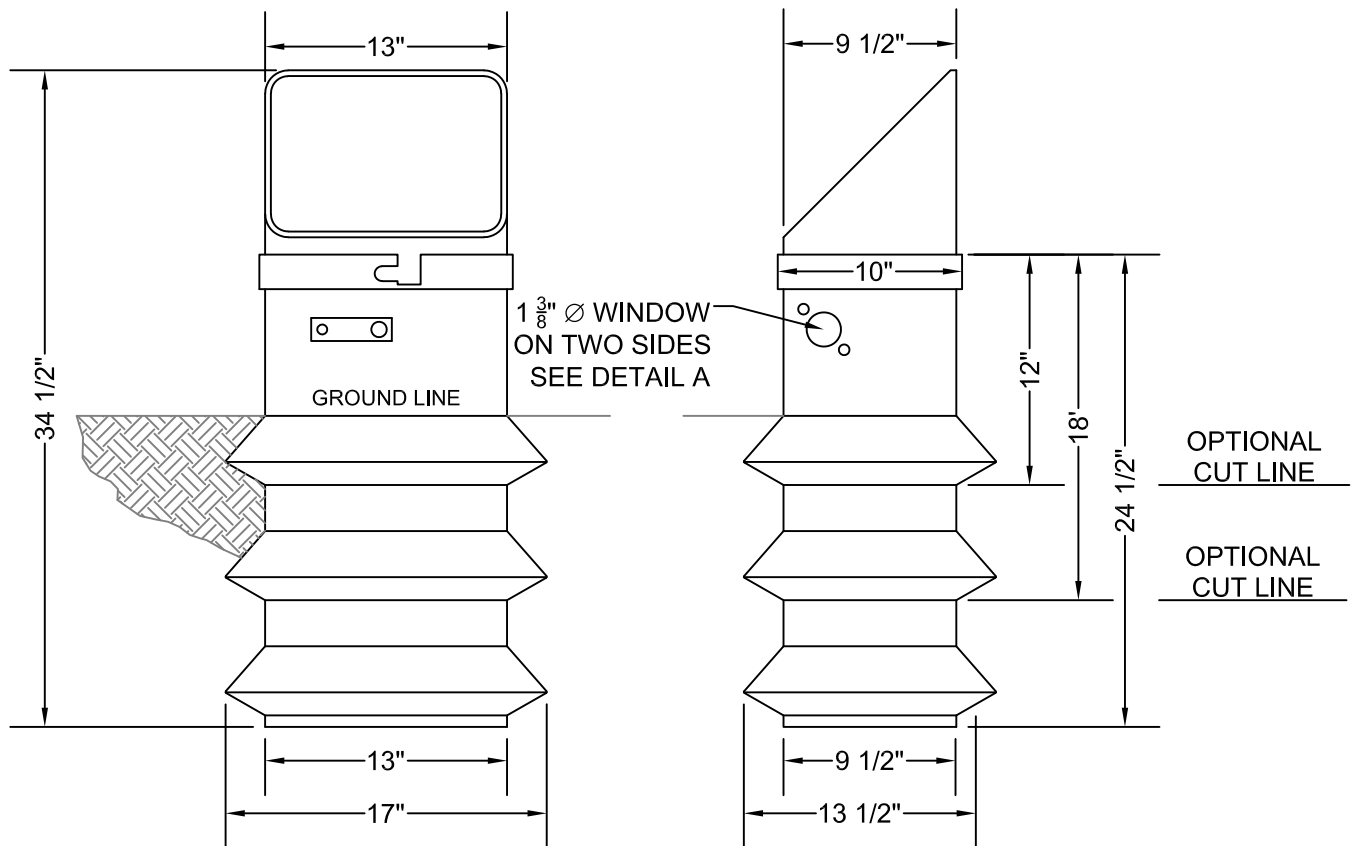


UK6-1



DETAIL A

PEDESTAL COVER



PEDESTAL

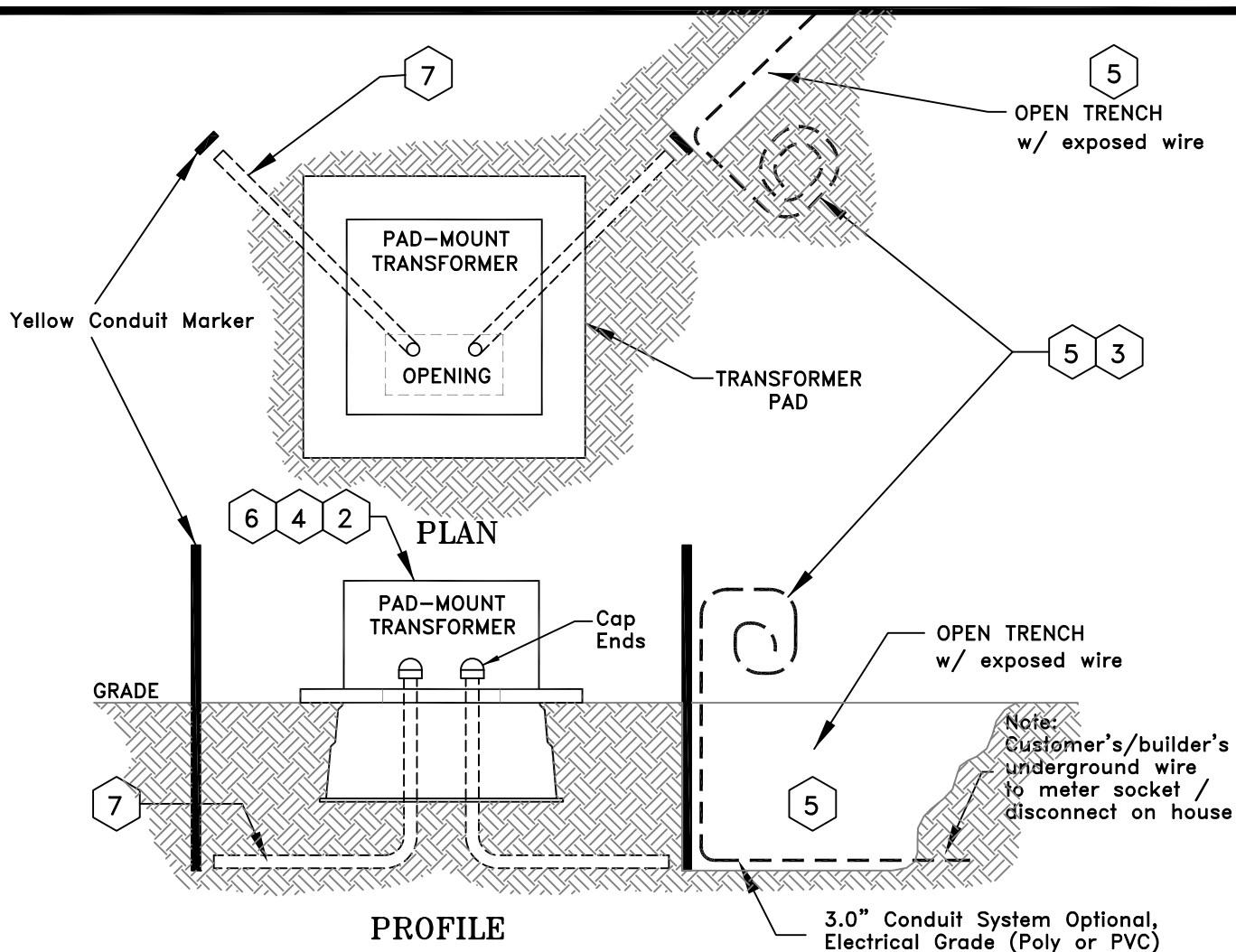
SECONDARY ASSEMBLY "ABOVE GRADE" JUNCTION BOX

Revision Date

July 25, 2016



UK6-1AG



- 1 "Front lot line" delivery is the GVP subdivision / lot standard with the meter located on the side / front of the house nearest to the Transformer.
- 2 Service is provided at the front lot line by GVP to a grade level "Pad-Mount Transformer".
- 3 Underground service wire to the house is furnished and installed by the customer/builder from GVP Transformer to the house.
- 4 The customer/builder wire shall be terminated by GVP inside the transformer. (Trans. 31"x35"x24"H)
- 5 Customer shall trench to the GVP yellow marker, (DO NOT REMOVE THE YELLOW MARKER. LEAVE THE TRENCH OPEN 2 FEET FROM THE YELLOW MARKER), and leave an addition 12'-0" of wire past the transformer, for GVP installation. (Same with temporary construction power setup)
- 6 GVP shall not install Transformer until final grade is established. (Trans Pad 42"x42")
- 7 GVP furnishes and installs necessary underground conduit from transformer to the yellow markers.
- 8 Mesa County Electrical Inspection sticker, or approval of responsible agency, is required before the meter can be set for permanent or temporary service.
- 9 Grand Valley Power reserves the right to request necessary modifications or reject the installation as suitable for service as necessary.

TRANSFORMER SERVICE TERMINATION 1 POSITION, 2 POSITION

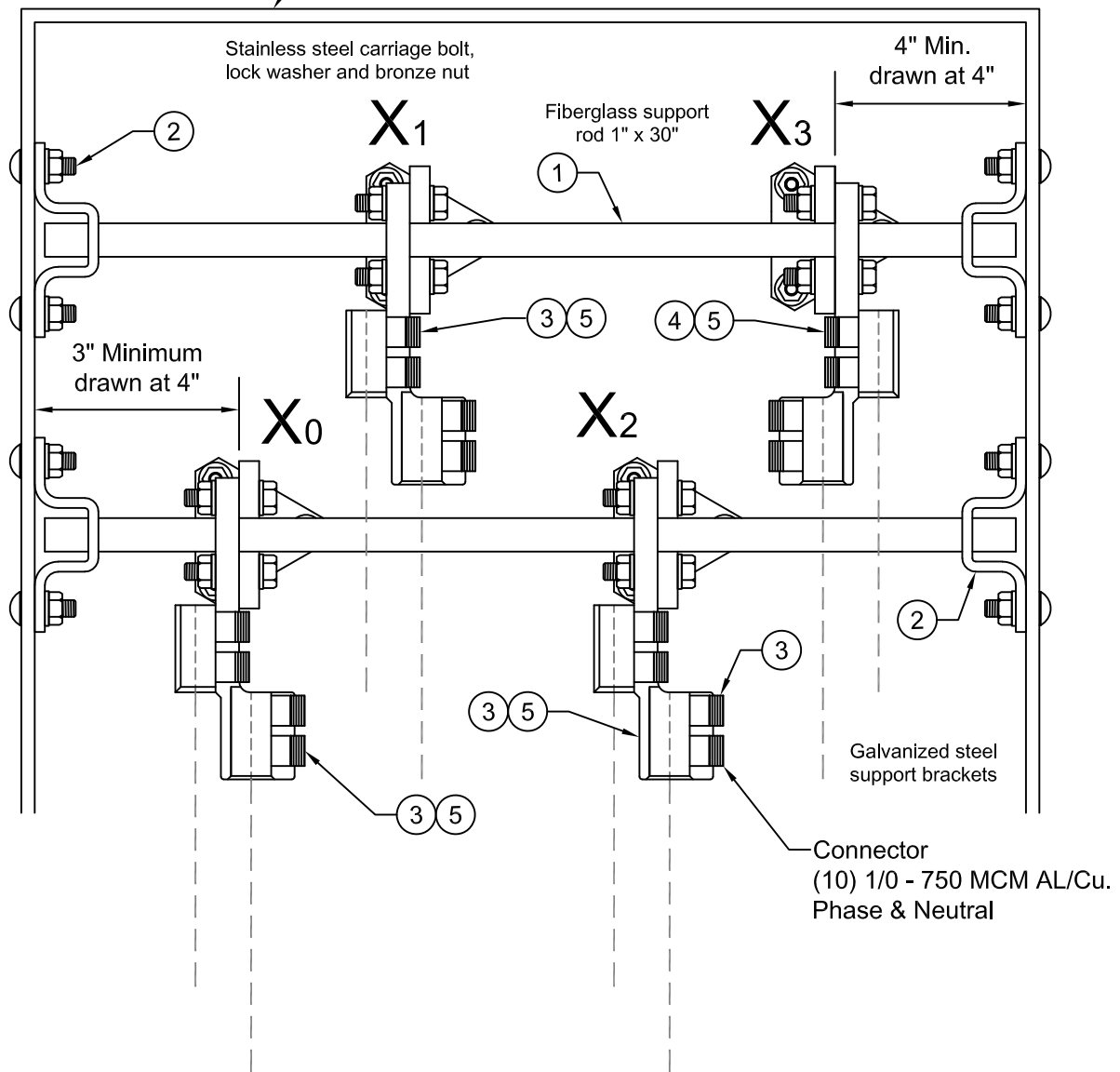
DWG. BY: DSG

DATE: 7/21/08



UK6-G1
UK6-G2

Padmount Transformer
Secondary Compartment 225-2500 KVA



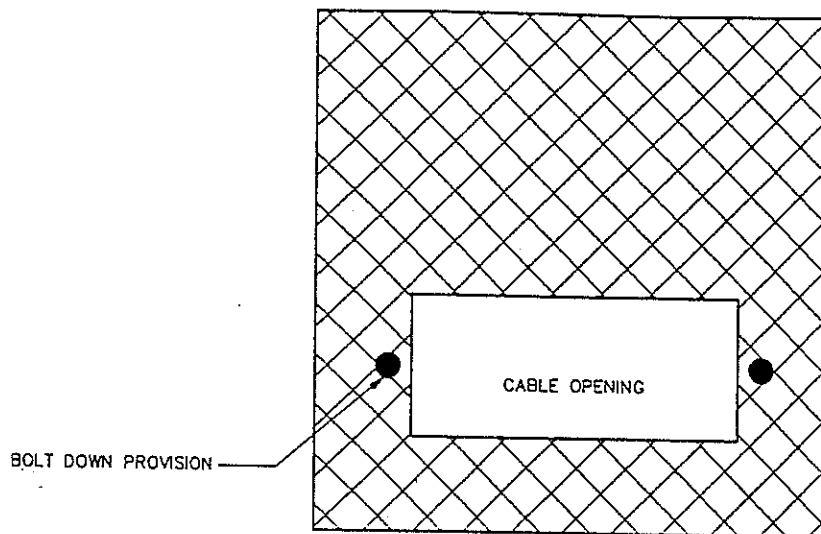
ITEM	NO.	MATERIAL
1	2	Fiberglass Rods - 1" x 30"
2	2 sets	End Brackets and Hardware
3	3	Homac ZBT 7969 RC, Right Hand
4	1	Homac ZBT 7969 LC, Left Hand
5	3	PVC Boots, SD 2163-2 V2 - 480V AC

SUPPORT FOR SECONDARY SPADE BUS BAR EXTENSIONS

Revision Date

July 22, 2016

UK7



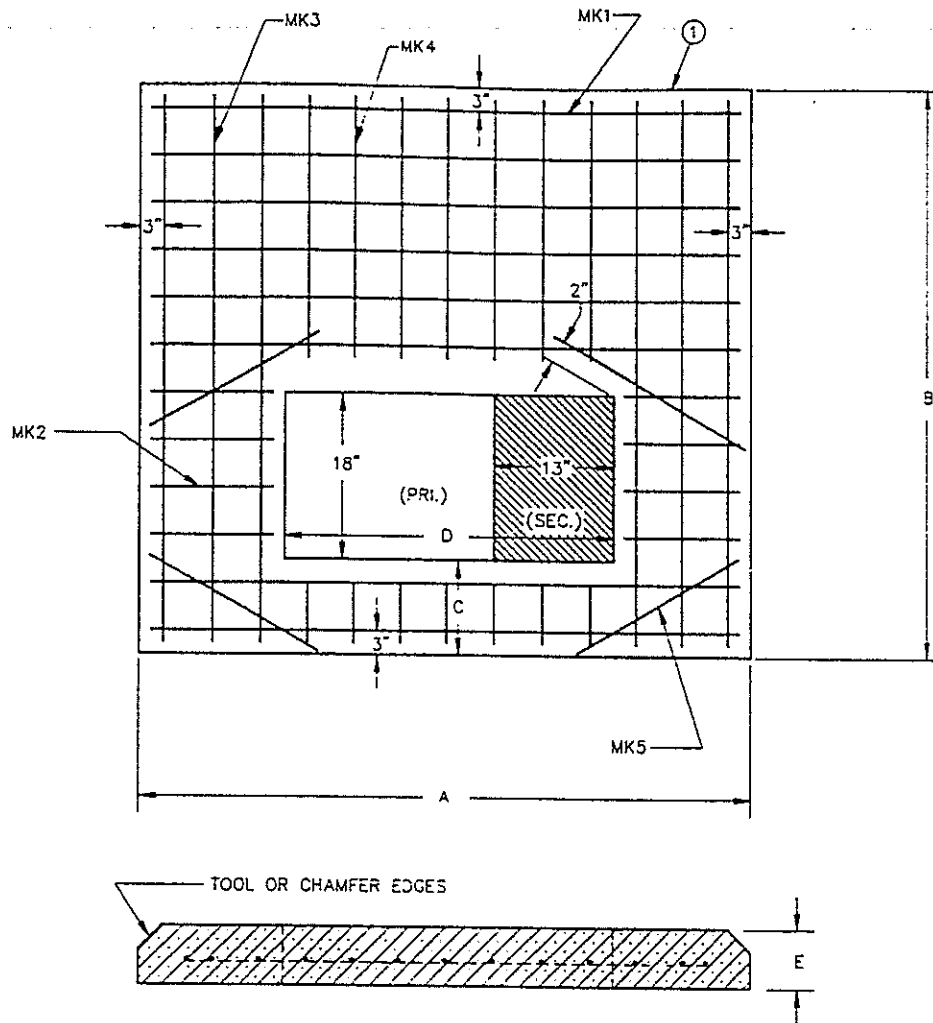
NOTES:

1. PAD ASSEMBLIES INCLUDE SITE PREPARATION, BEDDING AND DRAINAGE.
2. EQUIPMENT SHALL BE SECURED TO PAD IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
3. CABLE OPENING AND PAD DIMENSIONS SHALL BE AS REQUIRED.

UNIT DESIGNATION:

UM1-5C CONCRETE
UM1-5NC NON-CONCRETE

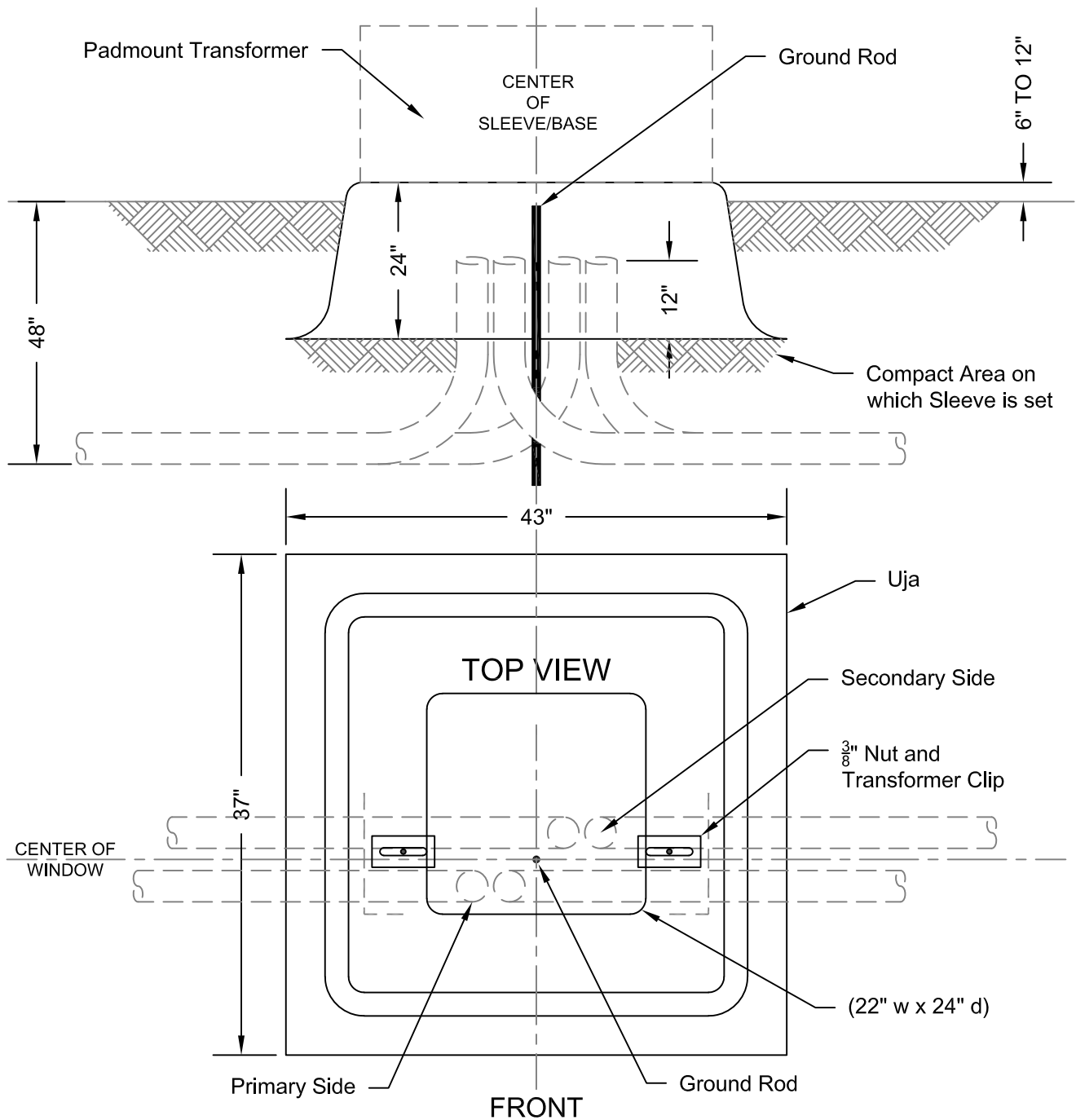
		PAD ASSEMBLIES	
			UM1-5C UM1-5NC



PAD	3-PHASE TRANSF. KVA	DIMENSIONS IN INCHES					REINFORCING BARS				
		A	B	C	D	E	MK1	MK2	MK3	MK4	MK5
#1	75, 112 1/2, 150, 225, 300, 500	76	62	10	42	6	7 #4 70"	4 #4 10"	6 #4 57"	6 #4 28"	4 #4 26"
#2	750, 1000	104	100	10	54	8	12 #4 98"	6 #4 19"	6 #4 94"	7 #4 66"	4 #4 29"

NOTES:

1. CONCRETE TESTING, 4000 POUNDS PER SQUARE INCH; 4% TO 6% ENTRAINED AIR, 3/4" MAXIMUM SIZE AGGREGATE.
2. REINFORCING STEEL, ATSM-A615 GRADE 60, PLACE APPROX. 6" O.C. EACH WAY AND SECURELY TIED TOGETHER.
3. MINIMUM CONCRETE COVER OVER REINFORCING STEEL 2 INCHES UNLESS NOTED.
4. WOOD FLOAT FINISH, LEAVING NO DEPRESSIONS.



NOTE:
THIS UNIT MAY CONSIST OF A ONE PIECE UNIT OR
4 SEPARATE WALL SECTIONS.

UNIT DESIGNATIONS:
UN1-7C CONCRETE
UNI-7NC NON-CONCRETE

ITEM	No.	MATERIALS	ITEM	No.	MATERIALS
Uja	1	Fiberglass Box Pad 37"x43"x24"D			

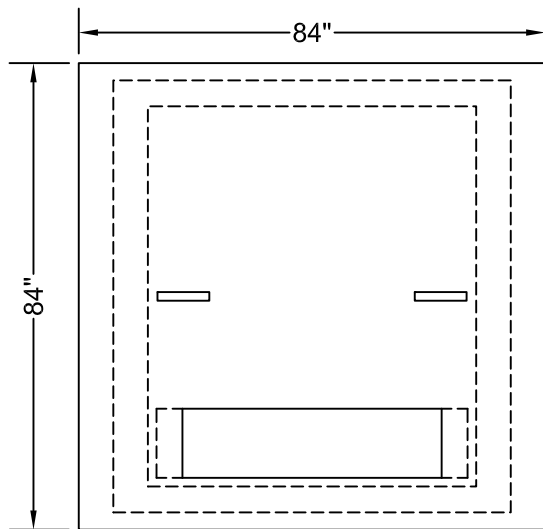
NOTE:
A yellow conduit marker will be
used when consumer wire will be
terminated directly into the
transformer. See note 5, on
Junction Box Standard, sheet
UK6-1.

GROUND SLEEVE ASSEMBLY

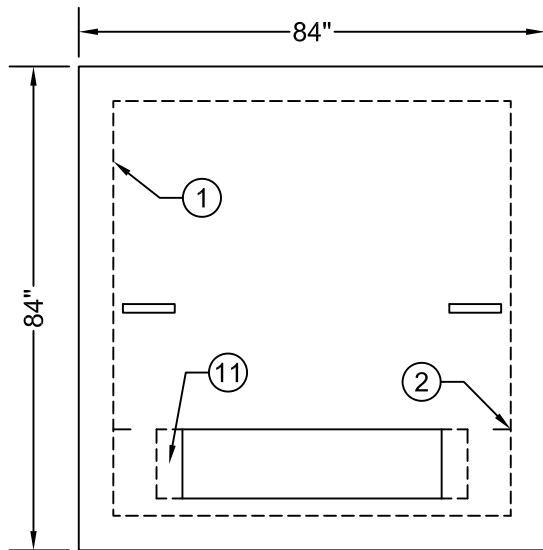
Revision Date
July 19, 2016



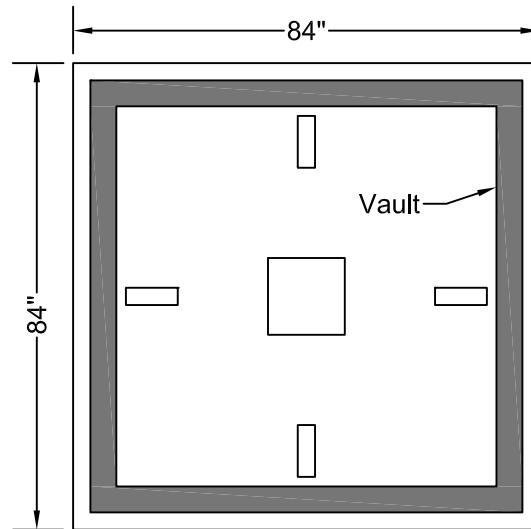
UM1-7C
UM1-7NC



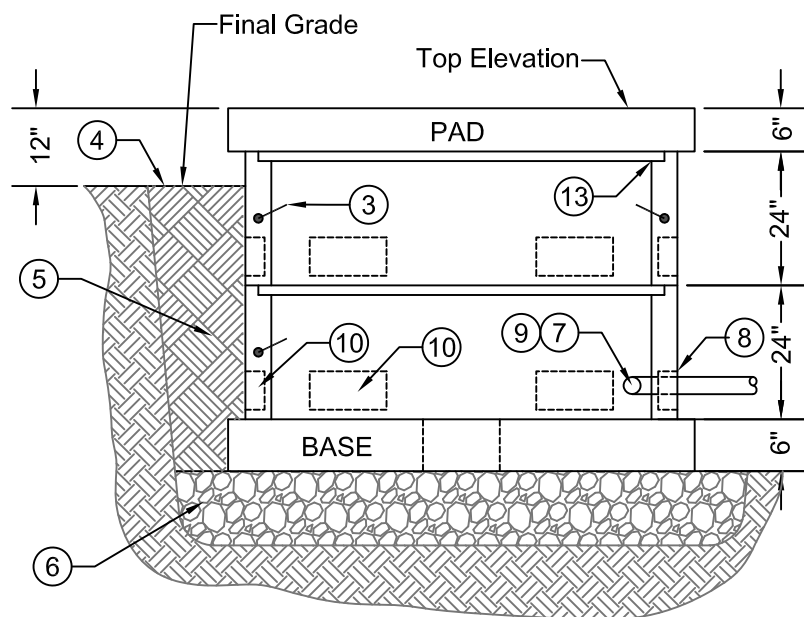
PAD CENTERED ON VAULT



TRANSFORMER ON PAD



VAULT PLACED ON BASE AS SHOWN



NOTES:

- ① Typical transformer outline.
- ② Back edge of transformer opening.
- ③ Lifting handles, total of two.
- ④ Final grade, 12 inches below "TOP" Elevation of Pad.
- ⑤ Backfill to be well compacted.
- ⑥ Soil under Base to be well "Compacted" with an addition of 12 inches of washed rock under Base. "Level Base carefully".
- ⑦ Secondary conduits per nec. maximum of 15-4" conduits. Location to be specified by GVP.
- ⑧ Conduit opening in vault shall be grouted.
- ⑨ Secondary conduit ends shall be sealed to keep water out of conduit.
- ⑩ Four knockouts, 8" x 14".
- ⑪ Knockouts when required for added space.
- ⑫ For consumers installing secondaries. Cable tails shall be 20 feet long.
- ⑬ Pad shall be set on Vault without "sealer" tape.

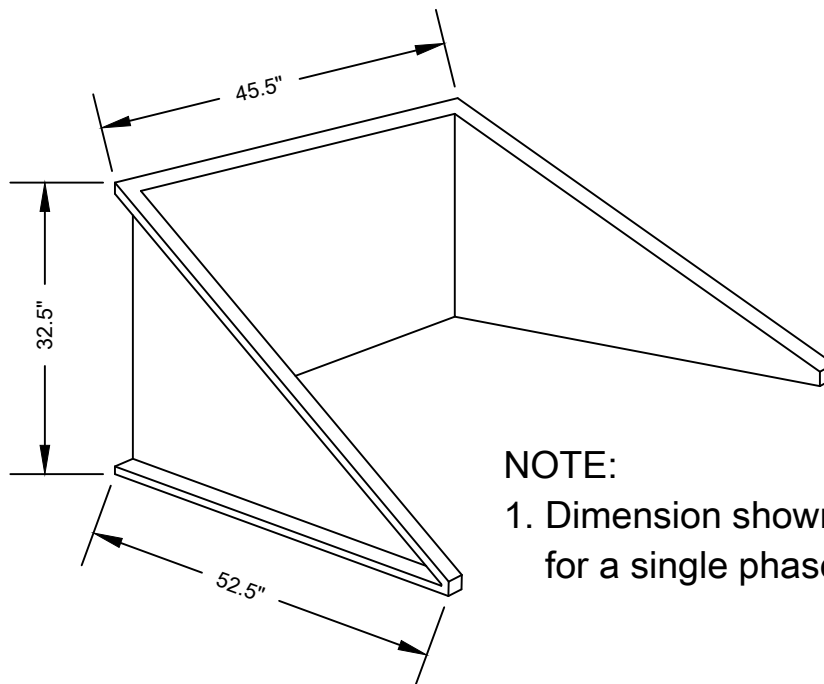
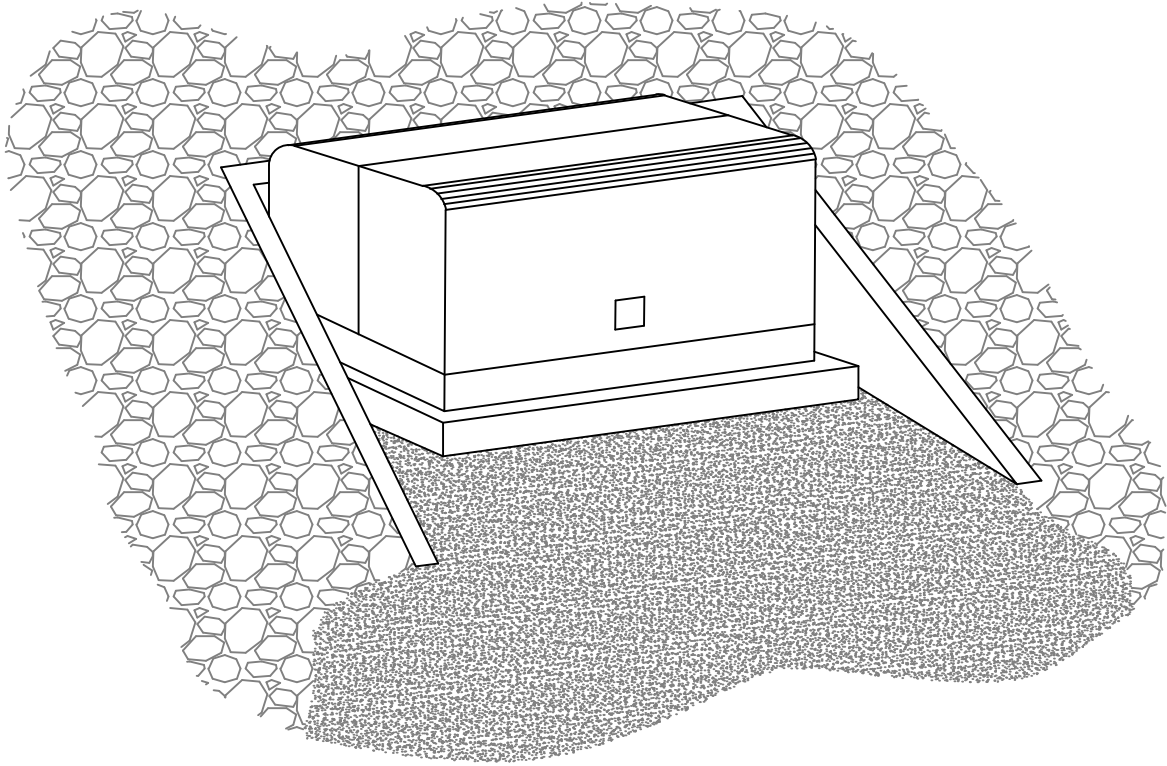
QTY.		APPROX. WT.	HC MAT#
1 Pad	=	3300 lbs.	40500
1 Base	=	4700 lbs.	40200
2 Vault	=	5200 lbs.	40800

THREE PHASE TRANSFORMER
(300 kVA & LARGER)
PAD, BASE, AND VAULT

Revision Date
April 5, 2023



UM1-11S



NOTE:

1. Dimension shown are sized for a single phase transformer.

NORDIC PART NUMBER
59506310

SINGLE PHASE HILL HOLDER

Revision Date

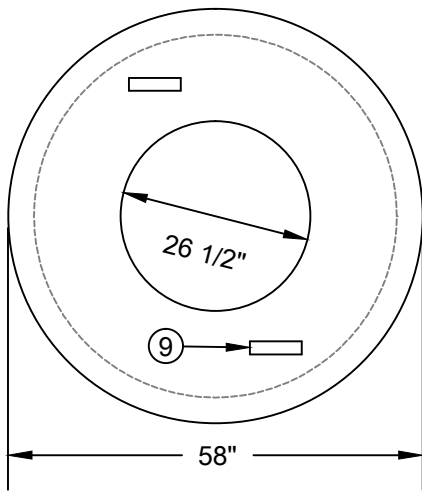
Nov 19, 2019



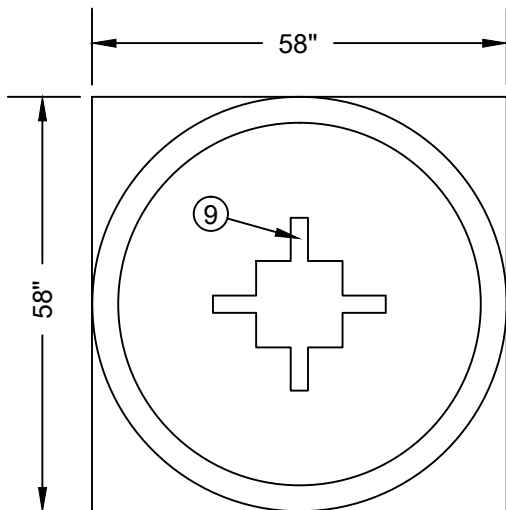
UM1-HH

NOTES:

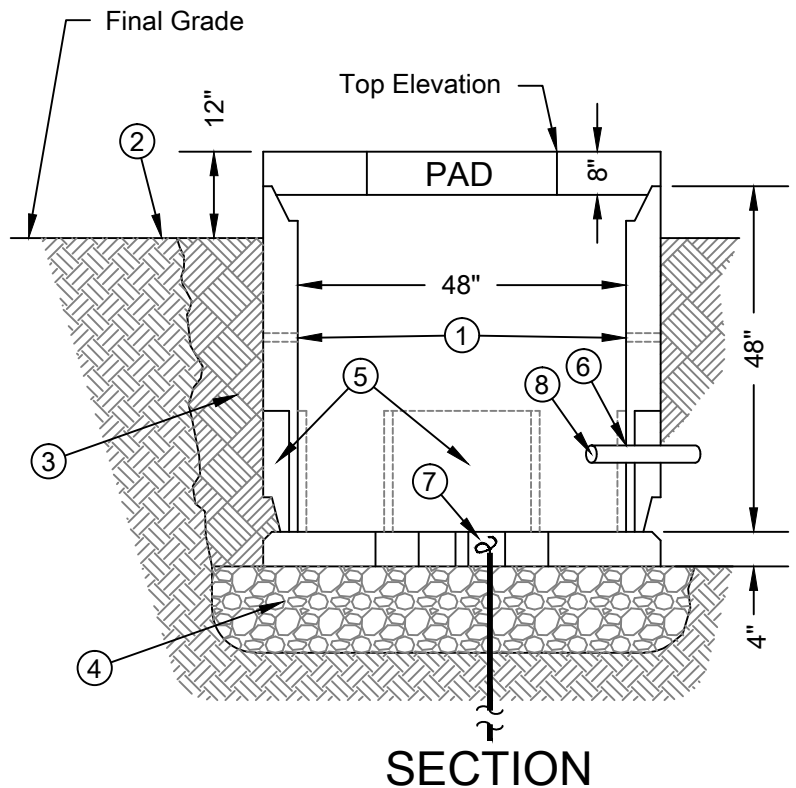
- ① 3/4" Hole, total of four.
- ② Final grade, 12" below "TOP ELEVATION" of Pad.
- ③ Backfill to be well compacted.
- ④ Soil under Base to be well "compacted" with an addition of 12" of washed rock under base, "LEVEL BASE CAREFULLY".
- ⑤ Four knockouts 16" x 18".
- ⑥ Conduit(s) installed through knockouts shall be grouted.
- ⑦ Bond #2 Copper into Ground System with rod and neutral.
- ⑧ Conduit ends to be sealed (with or without cable.)
- ⑨ Lifting holes.



PAD CENTERED ON VAULT



VAULT CENTERED ON BASE



APPROXIMATE WEIGHT	H.C. MAT. #
PAD = 1300 LBS.	40400
BASE = 1100 LBS.	40150
VAULT = 3500 LBS.	40750

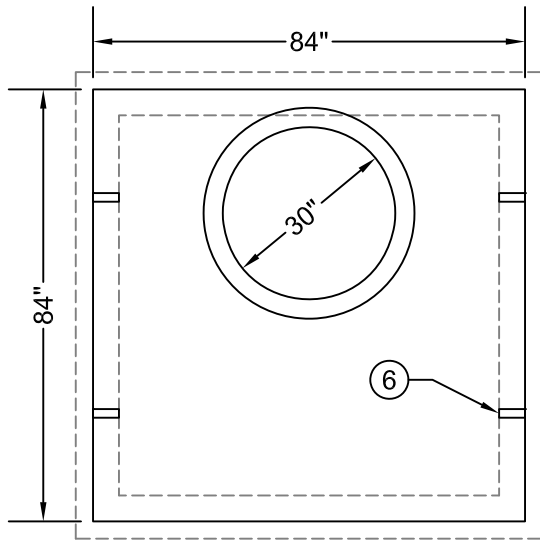
SPLICE VAULT

Revision Date

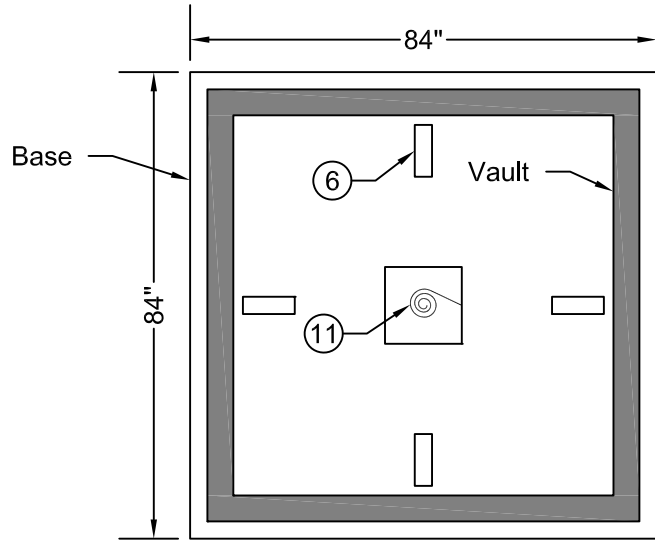
July 13, 2016



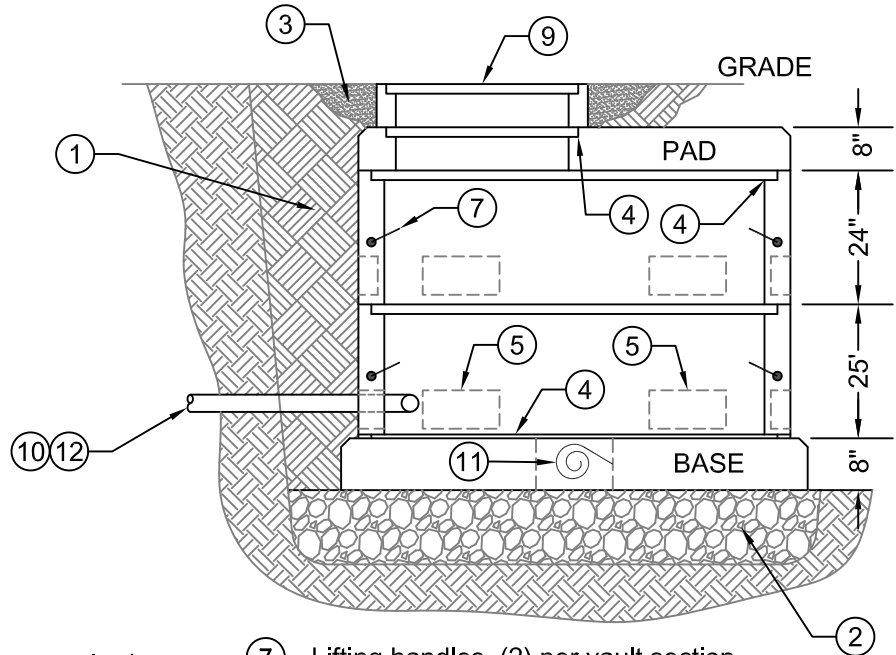
UM-30



PAD CENTERED ON VAULT



VAULT PLACED
ON BASE AS SHOWN



NOTES:

- ① Backfill shall be well compacted as required.
- ② Soil under Base to be well "Compacted" with an addition of 12" of washed rock under Base. "Level Base carefully".
- ③ Wet sand shall be compacted around grade riser.
- ④ All pieces shall be joined with a tar type sealant.
- ⑤ Eight knockouts 8" x 12" in each vault sections.
- ⑥ Lifting holes.
- ⑦ Lifting handles, (2) per vault section.
- ⑧ Cable racks as required. Refer to cable rack detail.
- ⑨ Grade riser.
- ⑩ Conduit(s) installed through knockouts shall be grouted.
- ⑪ Bond #2 copper into ground system with rod and neutral.
- ⑫ Conduit ends shall be sealed in vault (with or without cables).

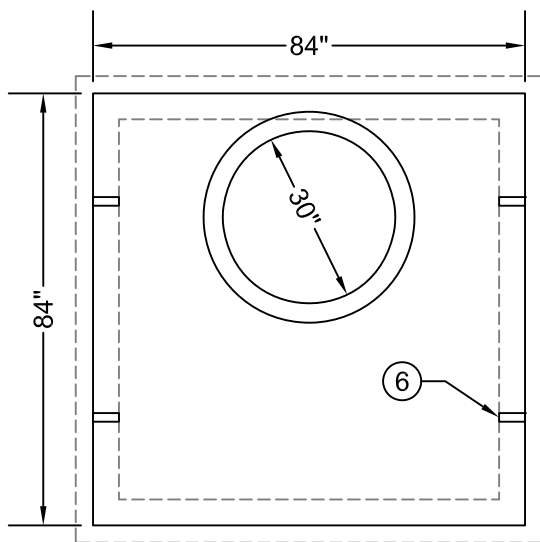
QTY.		APPROX. WT.	HC MAT#
1 Pad	=	4200 lbs.	40420
1 Base	=	3600 lbs.	40200
2 Vault	=	3000 lbs.	40800

SPLICE VAULT (FEEDER)

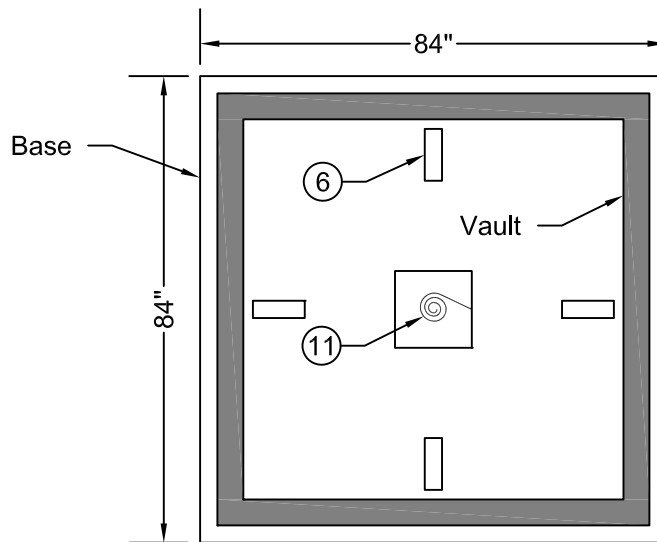
Revision Date
July 21, 2016



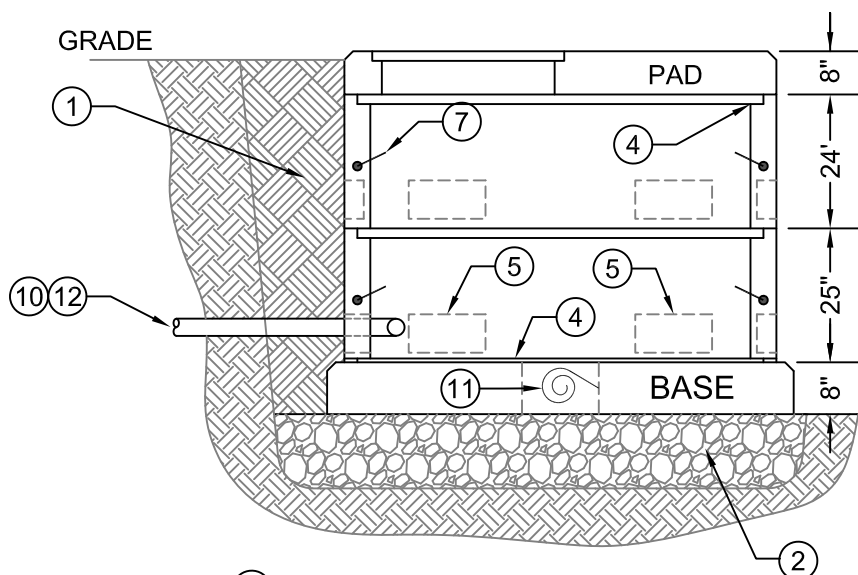
UM1-35L



PAD CENTERED ON VAULT



VAULT PLACED ON BASE AS SHOWN



NOTES:

- ① Backfill shall be well compacted as required.
- ② Soil under Base to be well "Compacted" with an addition of 12" of washed rock under Base. "Level Base carefully".
- ③
- ④ All pieces shall be joined with a tar type sealant.
- ⑤ Eight knockouts 8" x 12" in each vault sections.
- ⑥ Lifting holes.
- ⑦ Lifting handles, (2) per vault section.
- ⑧ Cable racks as required. Refer to cable rack detail.
- ⑨
- ⑩ Conduit(s) installed through knockouts shall be grouted.
- ⑪ Bond #2 copper into ground system with rod and neutral.
- ⑫ Conduit ends shall be sealed in vault (with or without cables).

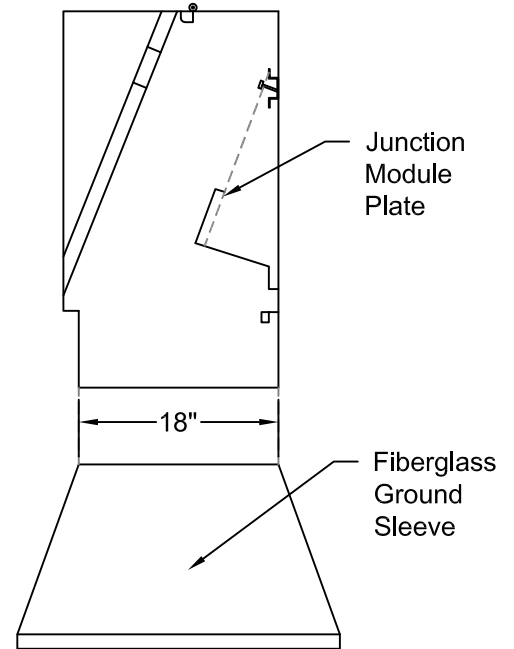
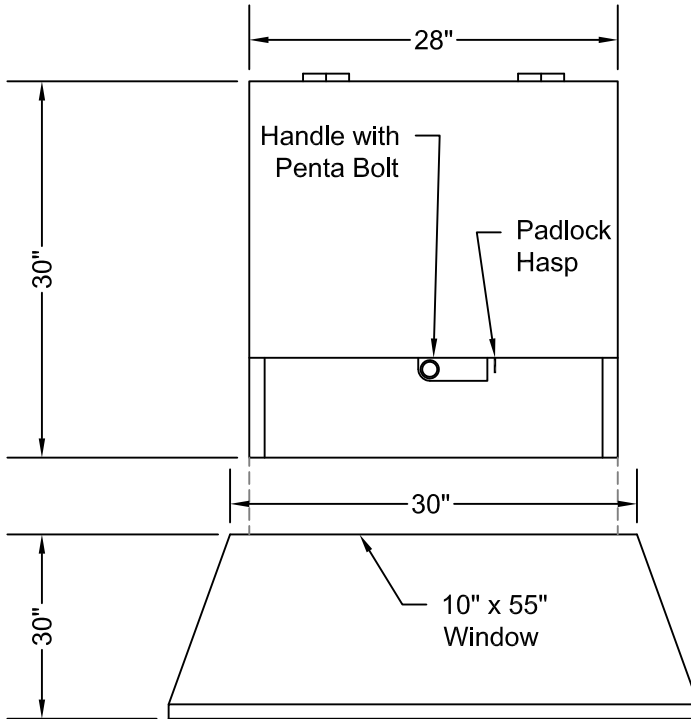
QTY.	APPROX. WT.	HC MAT#
1 Pad	= 4200 lbs.	40430
1 Base	= 3600 lbs.	40200
2 Vault	= 3000 lbs.	40800

SPLICE VAULT (FEEDER)

Revision Date
July 20, 2016



UM1-35L
FLUSH



NOTES:

1 The following Units/Assemblies are not be a part of the Unit.

SPECIFY SEPARATELY:

- A Multipoint Termination and other Accessories
- B Fused or Non-fused Loadbreak Elbows.
- C Grounding Assemblies.
- D Pad or Sleeve Assemblies (if required)

2 All Neutrals and Metallic Non-current carrying parts shall be interconnected and grounded.

MALTON EQUIPMENT COMPANY
#MEH30218

3 Install "CAUTION" Sign on outside surface of Enclosure and "DANGER" Sign inside Enclosure.

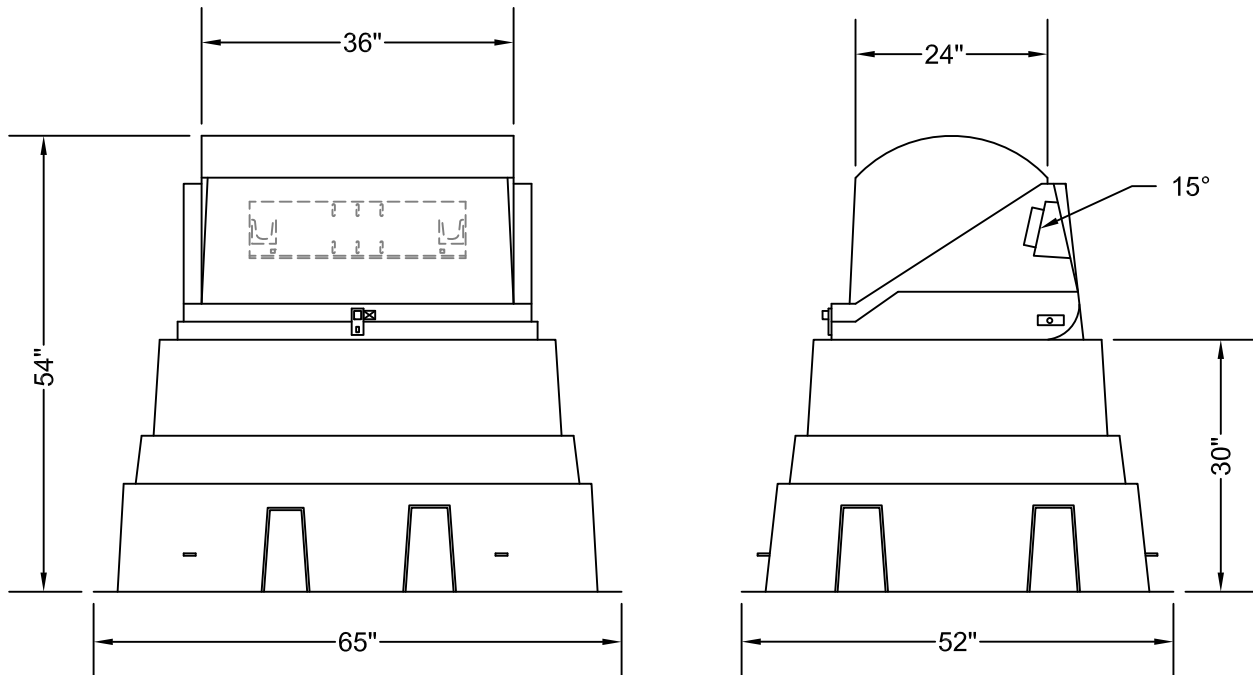
SINGLE PHASE SECTIONALIZING CABINET

Revision Date

July 20, 2016



UM3-14



NOTES:

1. Specify Separately:
 - A. Stainless Mounting Plate
 - B. #2 Bare Strand Ground
 - C. Pad or Sleeve Assemblies (if required)
 - D. Specify Module Assembly for # of Positions:
 - 2 Positions: UM6-20
 - 3 Positions: UM6-21, VUM6-21
 - 4 Positions: UM6-22, VUM6-22
 - 5 Positions: UM6-22/5
2. DT, indicates Desert Tan.
MG, indicates Munsell Green.
3. Install "CAUTION" Sign on outside surface of Enclosure and "DANGER" Sign inside Enclosure.
4. Enclosure can be used with 15 kV or 25 kV with applicable module.
5. Unit can also be called out to use as a secondary junction box when extra room is required.

SINGLE PHASE SECTIONALIZING CABINET

NORDIC Part #:
ND-362454-XX-110-4XX2-W1A

Revision Date

June 2, 2021



UM3-14F
VUM3-14F

FIG. 1A

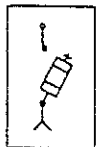
SINGLE PHASE
RADIAL FEED
1 - FUSE

FIG. 1B

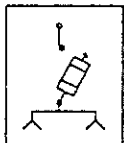
SINGLE PHASE
LOOP FEED
1 - FUSE

FIG. 1C

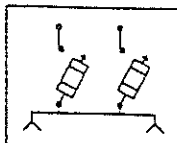
SINGLE PHASE
LOOP FEED
2 - FUSE

FIG. 1D

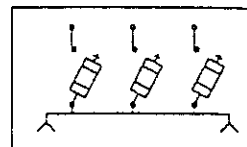
SINGLE PHASE
LOOP FEED
3 - FUSE

FIG. 1E

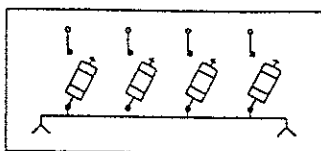
SINGLE PHASE
LOOP FEED
4 - FUSE

FIG. 1F

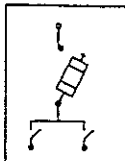
SINGLE PHASE
LOOP FEED
1 - FUSE

FIG. 1G

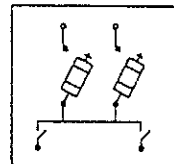
SINGLE PHASE
LOOP FEED
2 - FUSE

FIG. 2A

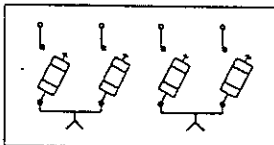
TWO PHASE
RADIAL FEED
2 - FUSE

FIG. 2B

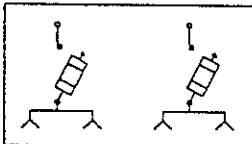
TWO PHASE
LOOP FEED
1 - FUSE

FIG. 2C

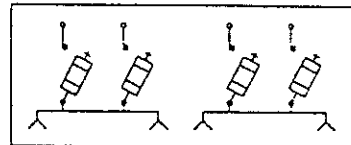
TWO PHASE
LOOP FEED
2 - FUSE

FIG. 2D

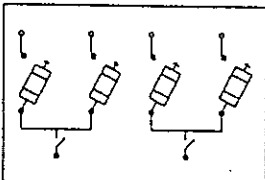
TWO PHASE
RADIAL FEED
2 - FUSE

FIG. 2E

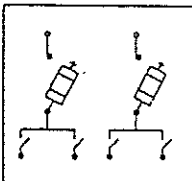
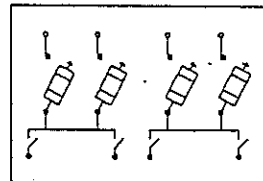
TWO PHASE
RADIAL FEED
1 - FUSE

FIG. 2F

TWO PHASE
LOOP FEED
2 - FUSE

— FUSE

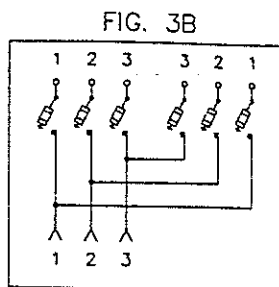
— TERMINATIONS CAN BE WITH ELBOWS, STRESS CONES OR TERMINATORS

— LOADBREAK ELBOW LINE SWITCHING

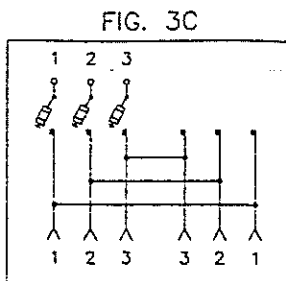
— SINGLE POLE SOLID BLADE SWITCHING

SINGLE POLE SWITCHING
200 AMP FUSE ENCLOSURE INSTALLATION
WIRING DIAGRAMS
(SINGLE PHASE AND TWO PHASE)

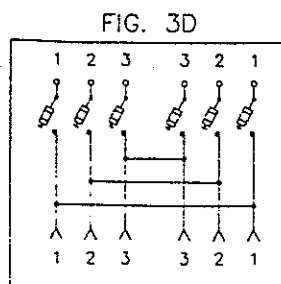
UM3E-1
UM3E-2



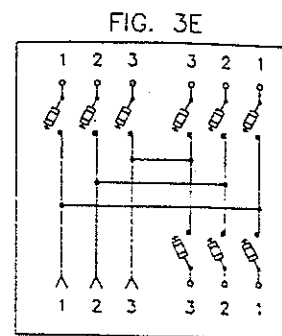
ELBOW SWITCH
2 - FUSE



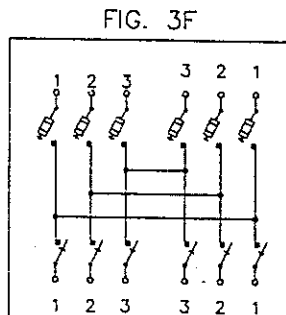
ELBOW SWITCH
1 - FUSE



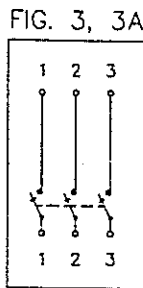
ELBOW SWITCH
2 - FUSE



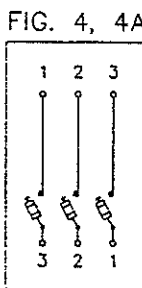
ELBOW SWITCH
3 - FUSE



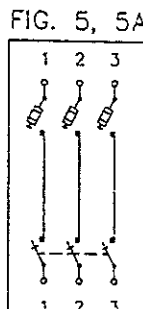
SINGLE POLE SWITCH
2 - FUSE



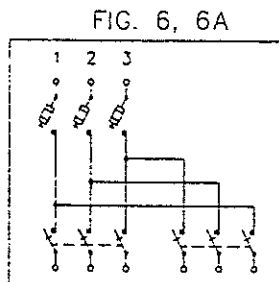
THREE PHASE
SWITCH



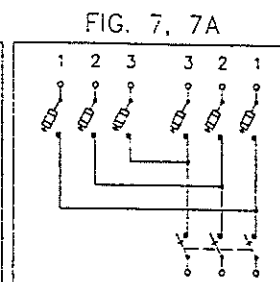
THREE PHASE
SINGLE POLE
SWITCH OR
FUSE



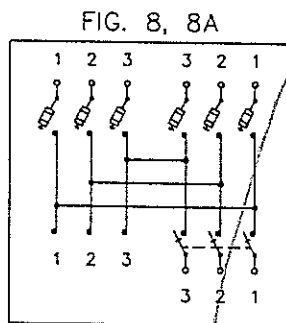
THREE PHASE
SWITCH
1 - FUSE



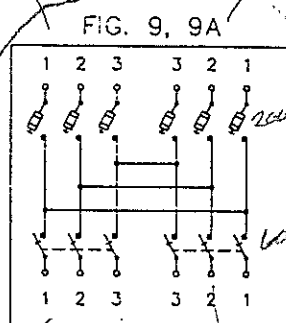
THREE PHASE
SWITCHES
1 - FUSE



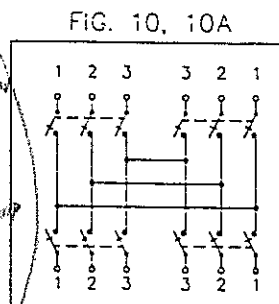
THREE PHASE
SWITCH
2 - FUSE



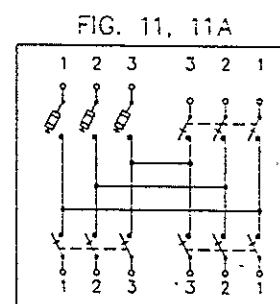
THREE PHASE SWITCH
2 - FUSE
1 - TERMINAL



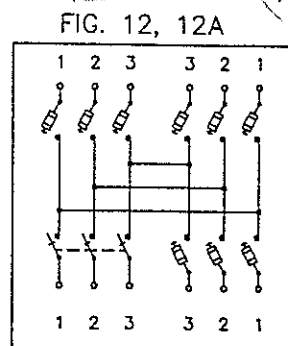
THREE PHASE SWITCHES
2 - FUSES



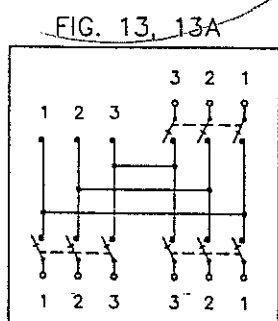
THREE PHASE SWITCHES



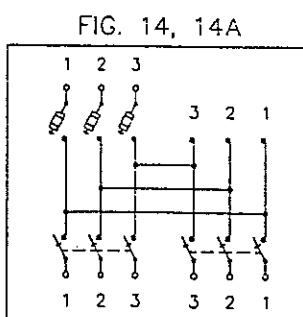
THREE PHASE SWITCHES
1 - FUSE



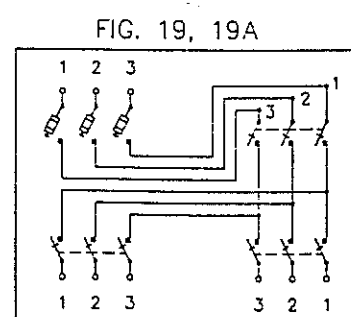
THREE SWITCH
3 - FUSES



THREE PHASE SWITCHES
1 - TERMINAL



THREE PHASE SWITCHES
1 - FUSE
1 - TERMINAL



THREE PHASE SWITCHES
THREE PHASE SWITCHED / FUSE TAP

EXAMPLE:

FIG. 3 = 600 AMP MAIN
LINE SWITCH

FIG. 3A = 200 AMP MAIN
LINE SWITCH

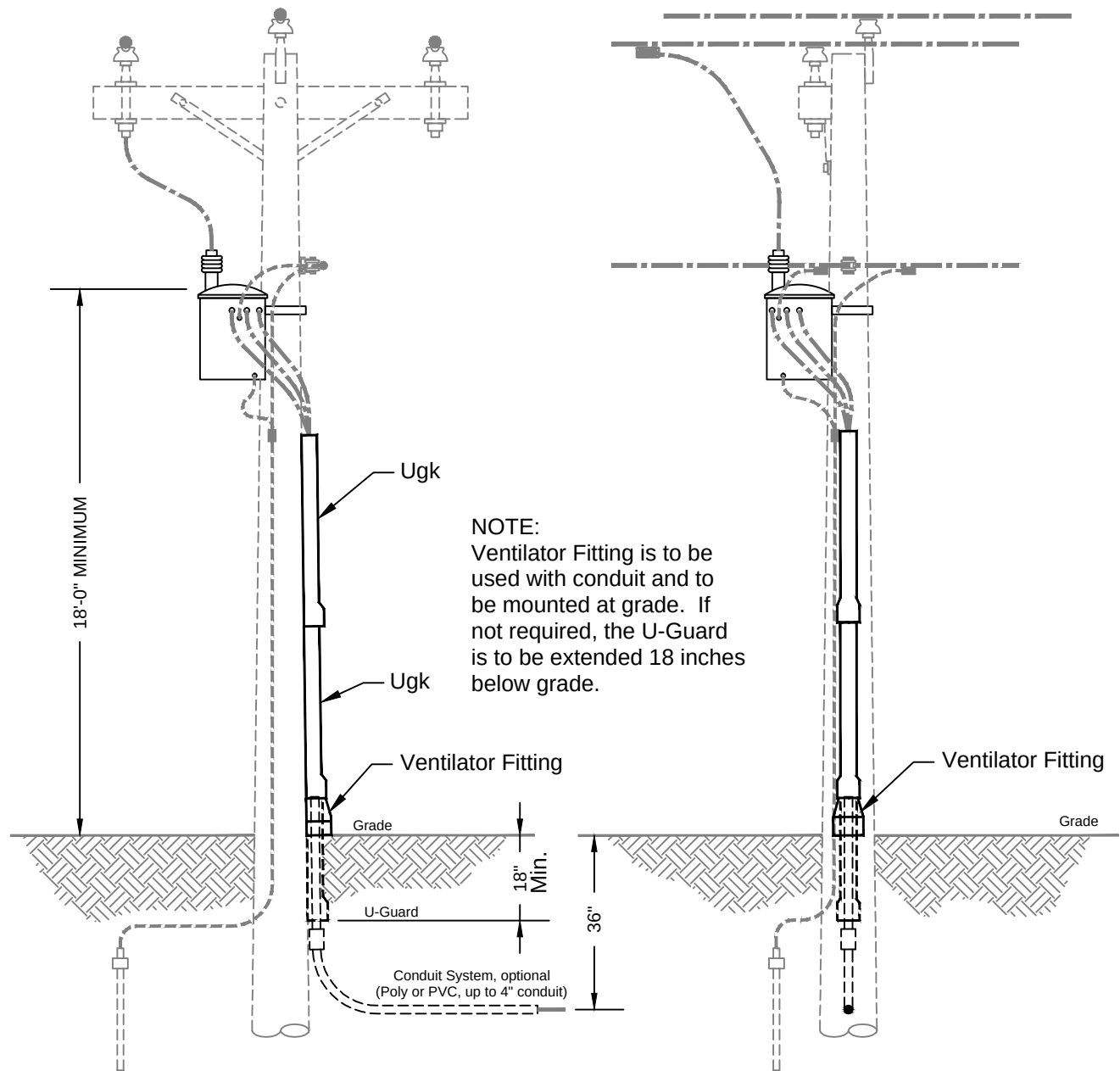
— FUSE

• - TERMINATIONS CAN BE
WITH ELBOWS, STRESS
CONES OR TERMINATORS

— LOADBREAK ELBOW LINE
SWITCHING

FUSE ENCLOSURE (200 - 600 AMP)
WIRING DIAGRAMS
(THREE PHASE)

UM3E-3



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
Ugk	2-3	U-Guard, PV-Mold, 3" Sch. 80			
j	-	Screw, Lag 1/4" x 3" with washer			
-	1	Ventilator Fitting 3" riser w/UM5/3.5UA			

UM5/3.5U , UM5/3.5UA

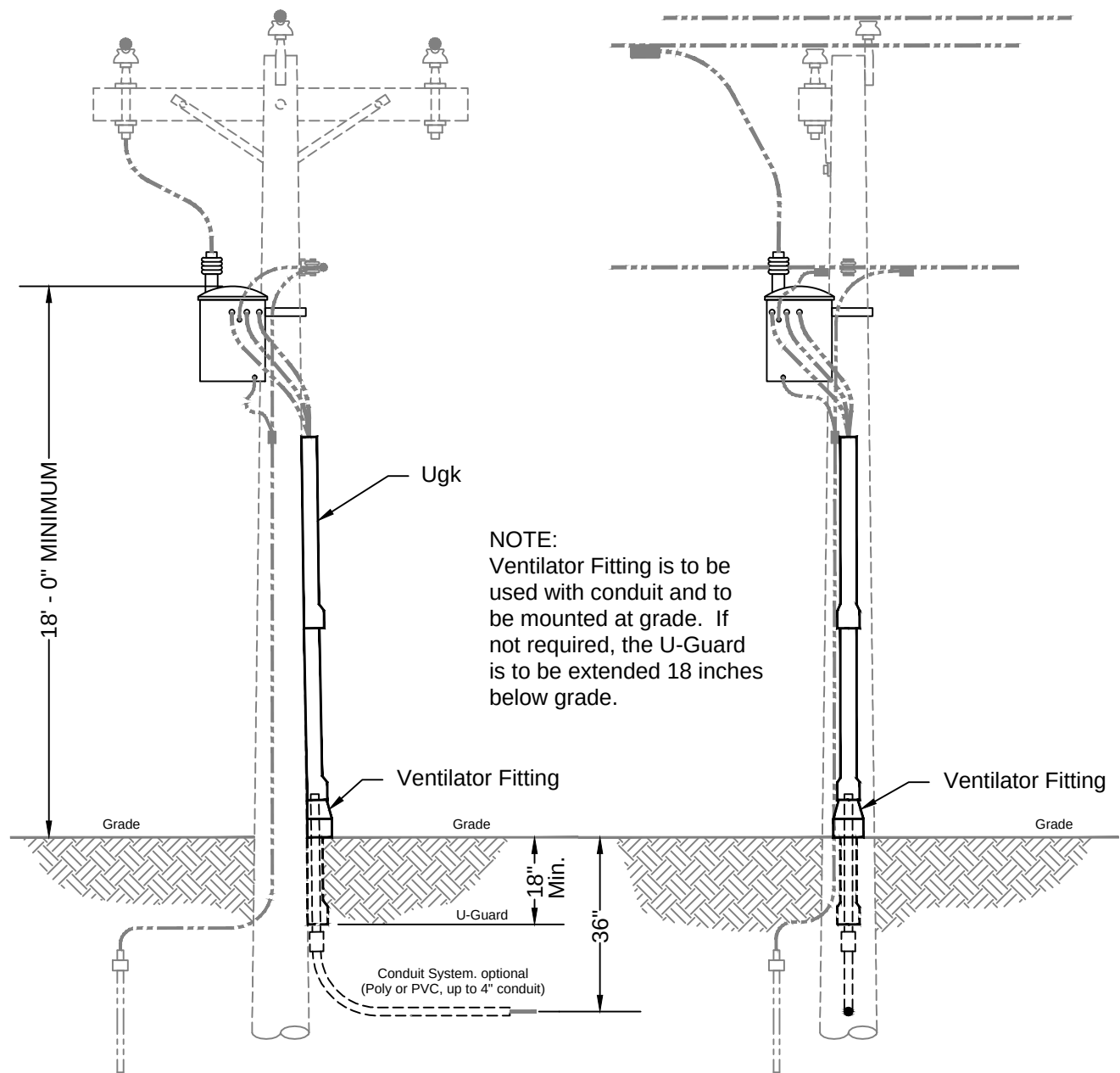
PV - MOLD U-GUARD POLE RISER SYSTEM

Drawn By: DSG

Aug 14, 2013



UM5/3.5U,
UM5/3.5UA



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
Ugk	2-3	U-Guard, PV-Mold, 4" Sch. 80			
j	-	Screw, Lag 1/4" x 3" with washer			
-	1	Ventilator Fitting 4" riser w/UM5/4UA			

UM5/4U , UM5/4UA

PV - MOLD U-GUARD POLE RISER SYSTEM

Drawn By: DSG

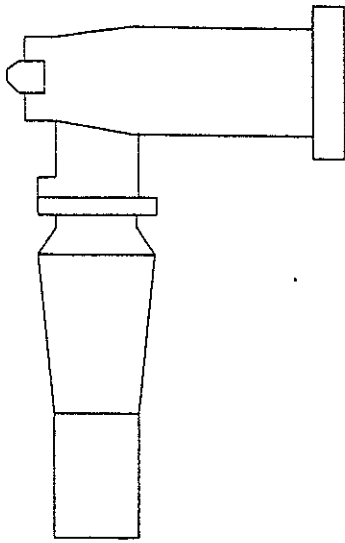
Aug 14, 2013



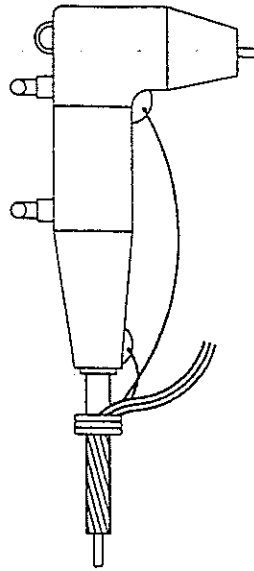
UM5/4U,
UM5/4UA

INDEX OF UNDERGROUND ACCESSORIES

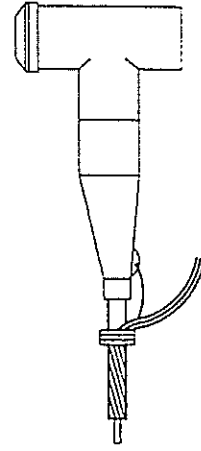
<u>Item</u>	<u>Number</u>	<u>Description</u>
Page 1 of 7:		
U hp	UM6-1	Load break elbow (200 A.)
U hp	UM6-2	Fused elbow termination (200 A.)
U hb	UM6-3	Dead break termination (600 A.)
U go	UM6-4	Fault indicator
U hb	UM6-5	Feed through load break insert
ai, ak, cj	UM6-6	Ground rod assembly
Page 2 of 7:		
U hb	UM6-7	Bushing well plug
U gc	UM6-8	Riser shield (U-Guard)
U gc	UM6-9	Conduit cable riser
U hb	UM6-10	Insulated protective cap (200 A.)
U hb	UM6-11	Insulated protective cap (600 A.)
U hx	UM6-12	Cable marker assembly
Page 3 of 7:		
U hb	UM6-13	Load break insert (200 A.)
U hb	UM6-14	Deadbreak insert (600 A.)
U hq	UM6-15	Stand-off insulator (200 A.)
U hq	UM6-16	Stand-off insulator (600 A.)
U hb	UM6-17	Insulating plug 600 A. connector
U gc	UM6-18	Backing plate for U-Guard riser shield
Page 4 of 7:		
U hq	UM6-19	Feed-through (200 A.)
U hq	UM6-20	Two point junction (200 A.)
U hq	UM6-21	Three point junction (200 A.)
U hq	UM6-22	Four point junction (200 A.)
U hb	UM6-23	Tee connector (three point junction) (600 A.)
U gk	UM6-24	Porcelain outdoor termination
Page 5 of 7:		
U gk	UM6-25	Modular or unitized non-ceramic termination
U gk	UM6-26	Indoor stress relief cone
U hb	UM6-27	Cable lead termination
U hy	UM6-28	In line primary splice
U hy	UM6-29	Wye primary splice
Page 6 of 7:		
U hb	UM6-30	Single entrance load break cable tap (200 A.)
U hb	UM6-31	Double entrance load break cable tap (200 A.)
U gq	UM6-32	Boot or sleeve (insulated) (600 A.)
U ae	UM6-33	Surge arrester
Page 7 of 7:		
U ae	UM6-34	Deadbreak elbow surge arrester
U ax	UM6-35	Cutout-arrester combination
U af	UM6-36	Load break cutout



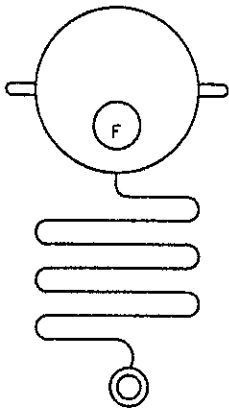
UM6-1 Uhp
LOAD BREAK ELBOW
(200 A)



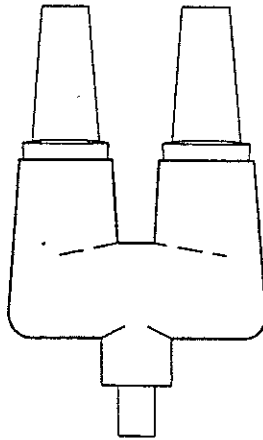
UM6-2 Uhp
FUSED ELBOW TERMINATION
(200 A)



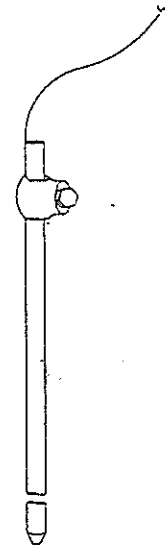
UM6-3 Uhb
DEAD BREAK TERMINATION
(600 A)



UM6-4 Ugo
FAULT INDICATOR

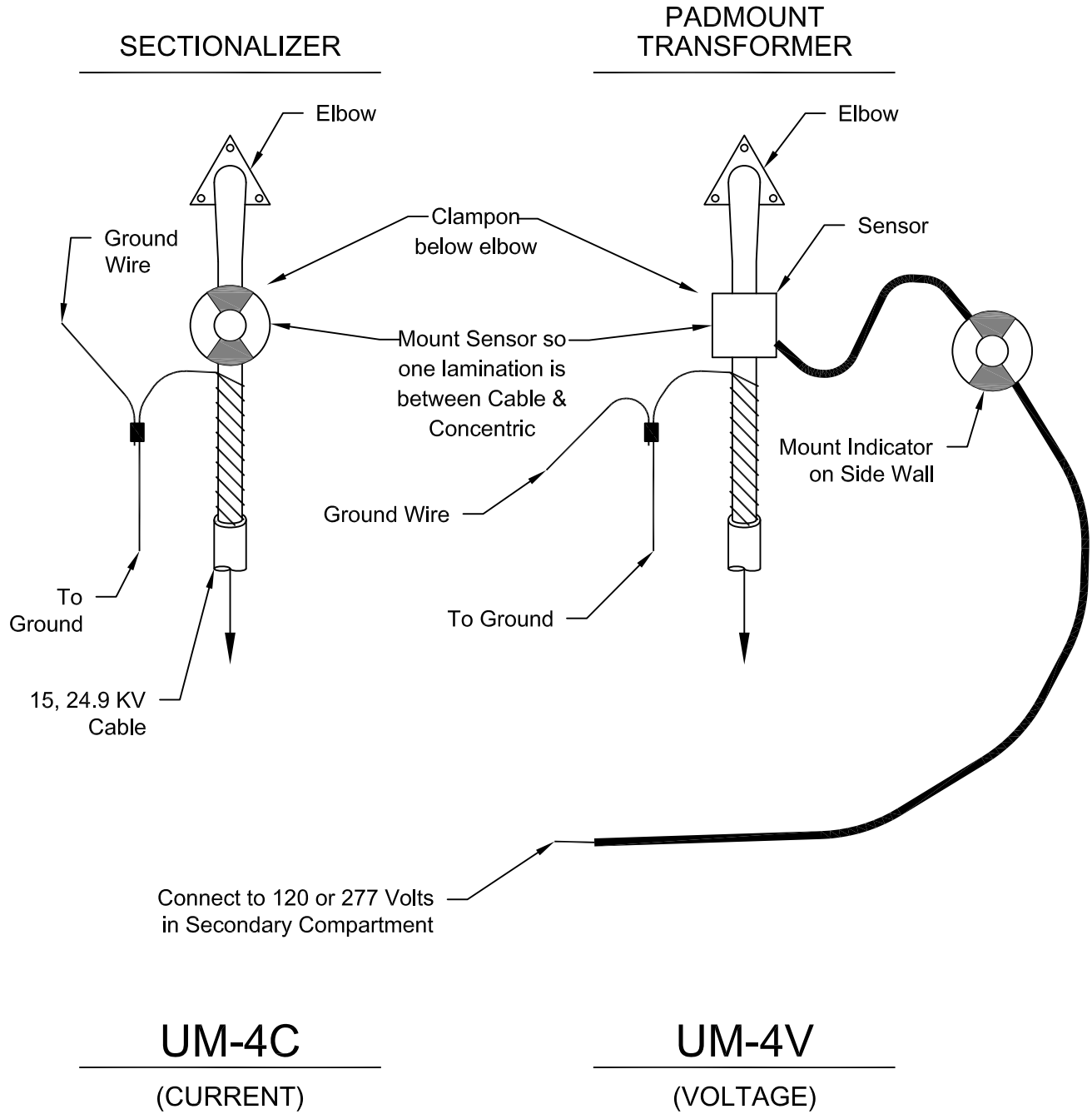


UM6-5 Uhb
FEED THROUGH LOAD BREAK INSERT



UM6-6 ai, aj, cj
GROUND ROD ASSEMBLY

MISCELLANEOUS ACCESSORIES



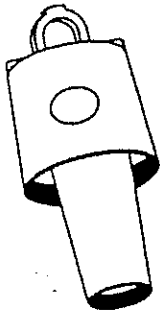
MISCELLANEOUS ACCESSORIES
VOLTAGE & CURRENT FAULT INDICATORS

Revision Date

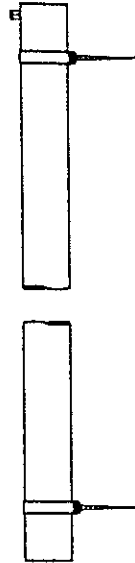
July 19, 2106



UM6-4C
UM6-4V



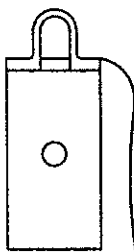
UM6-7 Uhb
BUSHING WELL PLUG
(200 A)



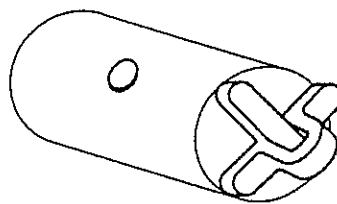
UM6-8 Ugc
RISER SHIELD (U GUARD)



UM6-9 Ugc
CONDUIT CABLE RISER



UM6-10 Uhb
INSULATED PROTECTIVE CAP
(200 A)



UM6-11 Uhb
INSULATED PROTECTIVE CAP
(600 A)

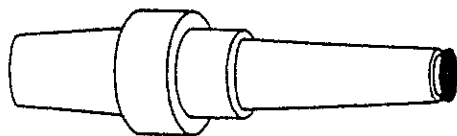


UM6-12 Uhx
CABLE MARKER ASSEMBLY

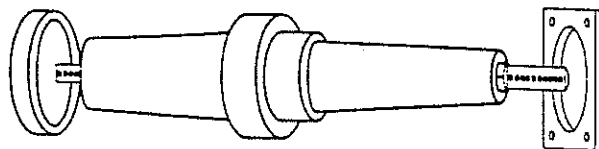
MISCELLANEOUS ACCESSORIES

Page 2 of 7

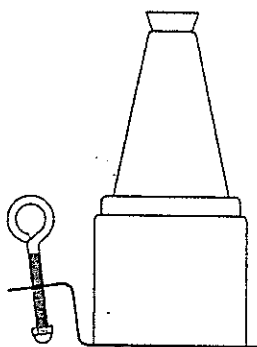
UM6-—



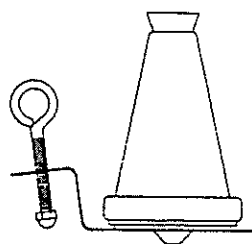
UM6-13 Uhb
LOAD BREAK INSERT
(200 A)



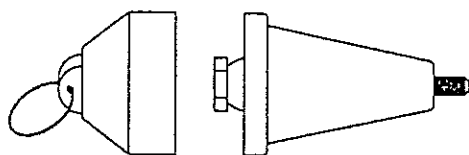
UM6-14 Uhb
DEADBREAK INSERT
(600 A)



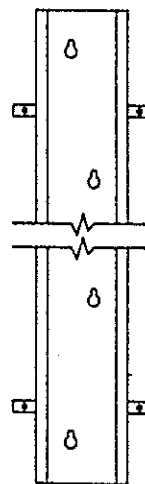
UM6-15 Uhq
STAND-OFF INSULATOR
(200 A)



UM6-16 Uhq
STAND-OFF INSULATOR
(600 A)

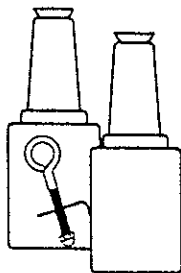


UM6-17 Uhb
INSULATING PLUG
600 AMP CONNECTOR

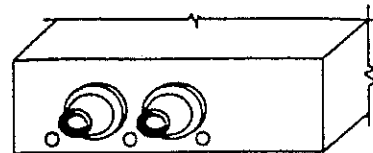


UM6-18
BACKING PLATE FOR
U-GUARD RISER SHIELD

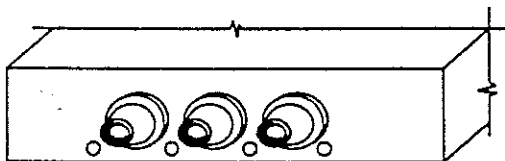
MISCELLANEOUS ACCESSORIES



UM6-19 Uhq
FEED THROUGH
(200 A)



UM6-20 Uhq
TWO POINT JUNCTION
(200 A)



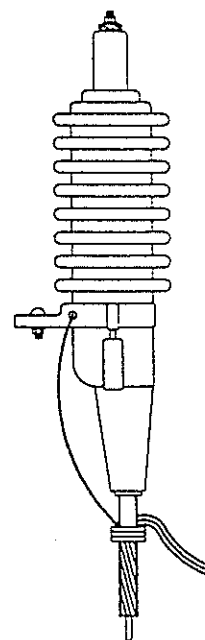
UM6-21 Uhq
THREE POINT JUNCTION
(200 A)



UM6-22 Uhq
FOUR POINT JUNCTION
(200 A)



UM6-23 Uhq
TEE CONNECTOR
(THREE POINT JUNCTION)
(600 A)

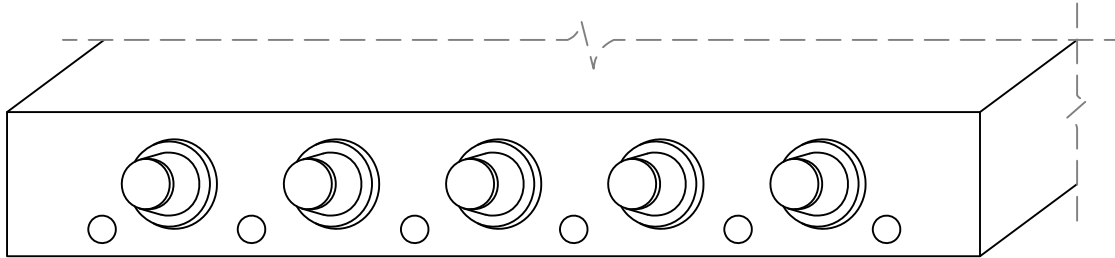


UM6-24 Ugk
PORCELAIN OUTDOOR TERMINATION

MISCELLANEOUS ACCESSORIES

Page 4 of 7

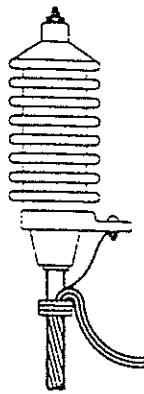
UM6—



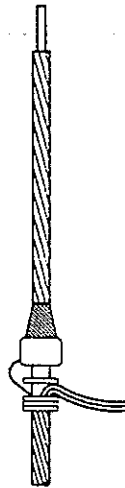
UM6-22/5 Uhq Five Point Junction (200A)

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL

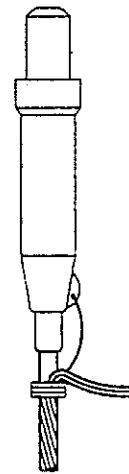
	MISCELLANEOUS ACCESSORIES		
	Revision Date	 GRAND VALLEY POWER	UM6-22/5
	July 19, 2016		



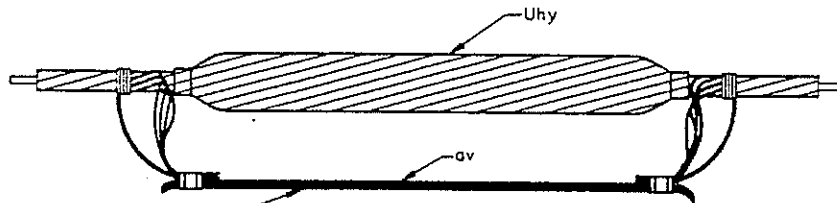
UM6-25 Ugk
MODULAR OR UNITIZED
NON-CERAMIC TERMINATION



UM6-26 Ugk
INDOOR STRESS RELIEF CONE

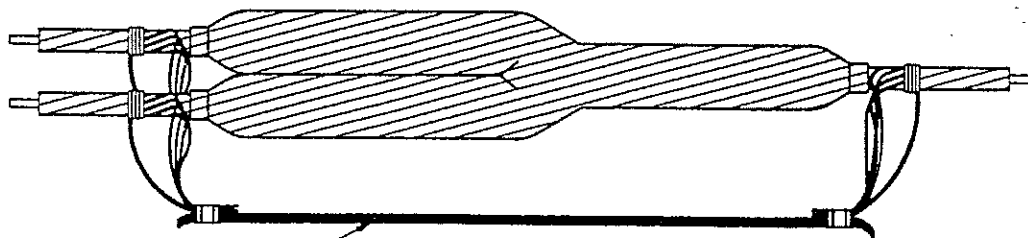


UM6-27 Uhb
CABLE LEAD TERMINATION



CONCENTRIC NEUTRAL
OR
EQUIVALENT EXTENSION

UM6-28 Uhy
IN LINE PRIMARY SPLICE
(FOR JACKETED CABLE)



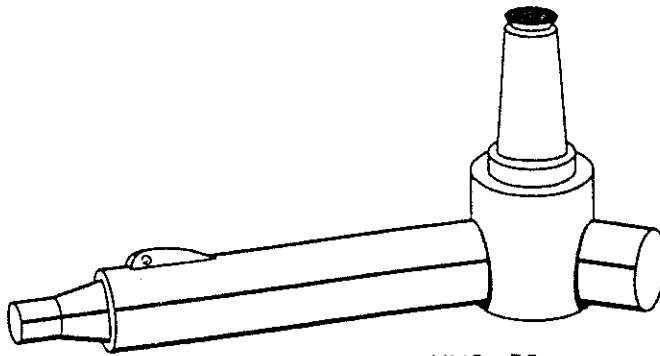
CONCENTRIC NEUTRAL
OR
EQUIVALENT EXTENSION

UM6-29 Uhy
WYE PRIMARY SPLICE

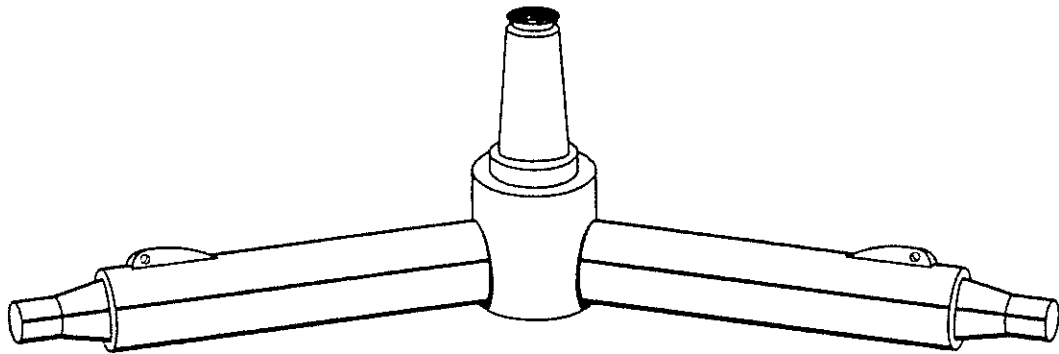
MISCELLANEOUS ACCESSORIES

Page 5 of 7

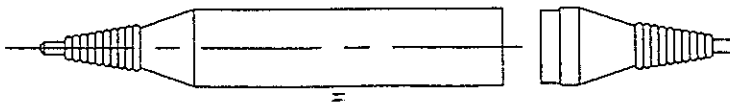
UM6—



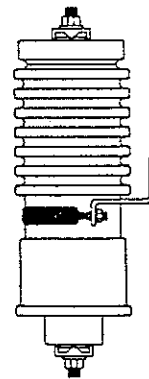
UM6-30 Uhb
SINGLE ENTRANCE LOAD BREAK
CABLE TAP
(200 A)



UM6-31 Uhd
DOUBLE ENTRANCE LOAD BREAK
CABLE TAP
(200 A)

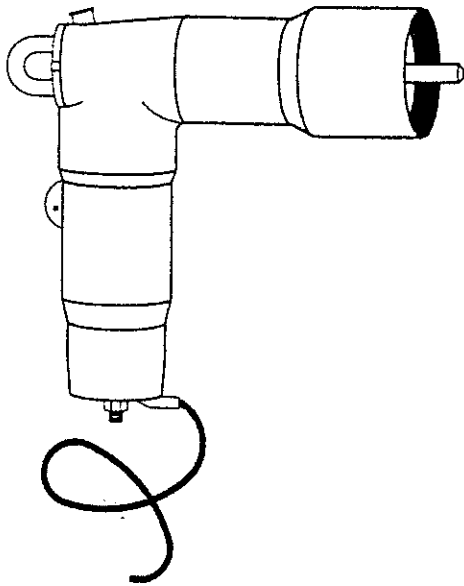


UM6-32 Ugq
BOOT OR SLEEVE - INSULATED
(600 VOLT)



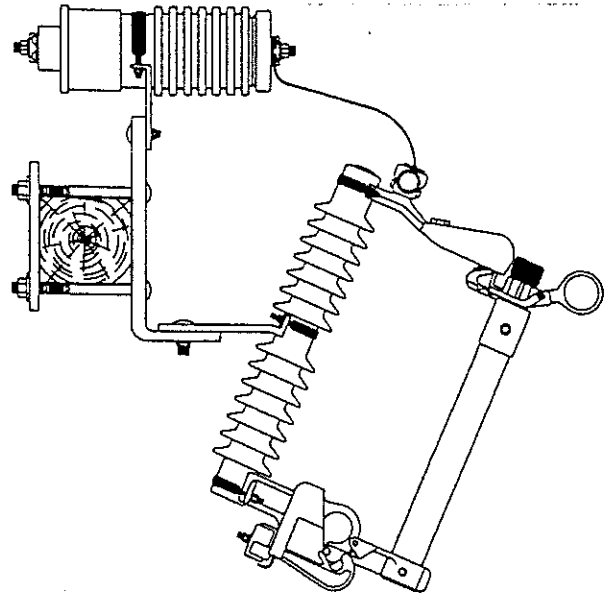
UM6-33 Uoe
SURGE ARRESTER

MISCELLANEOUS ACCESSORIES

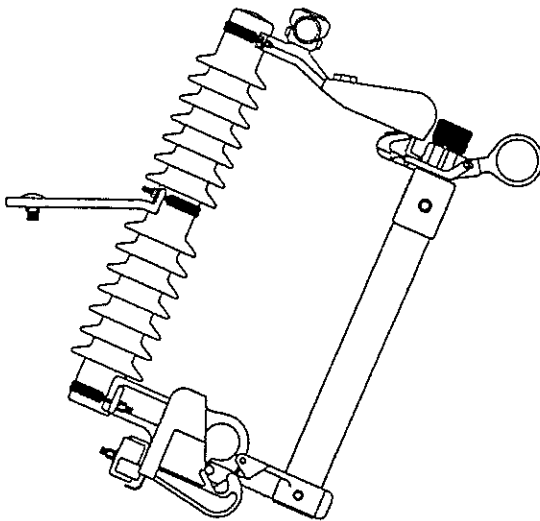


UM6-34 Uae
DEAD BREAK ELBOW
SURGE ARRESTER

$\frac{1}{2}$ UM6-34 P
(PARKING STRAND
ON BACK)
SEE NEXT PAGE



UM6-35 Uax
CUTOUT-ARRESTER COMBINATION



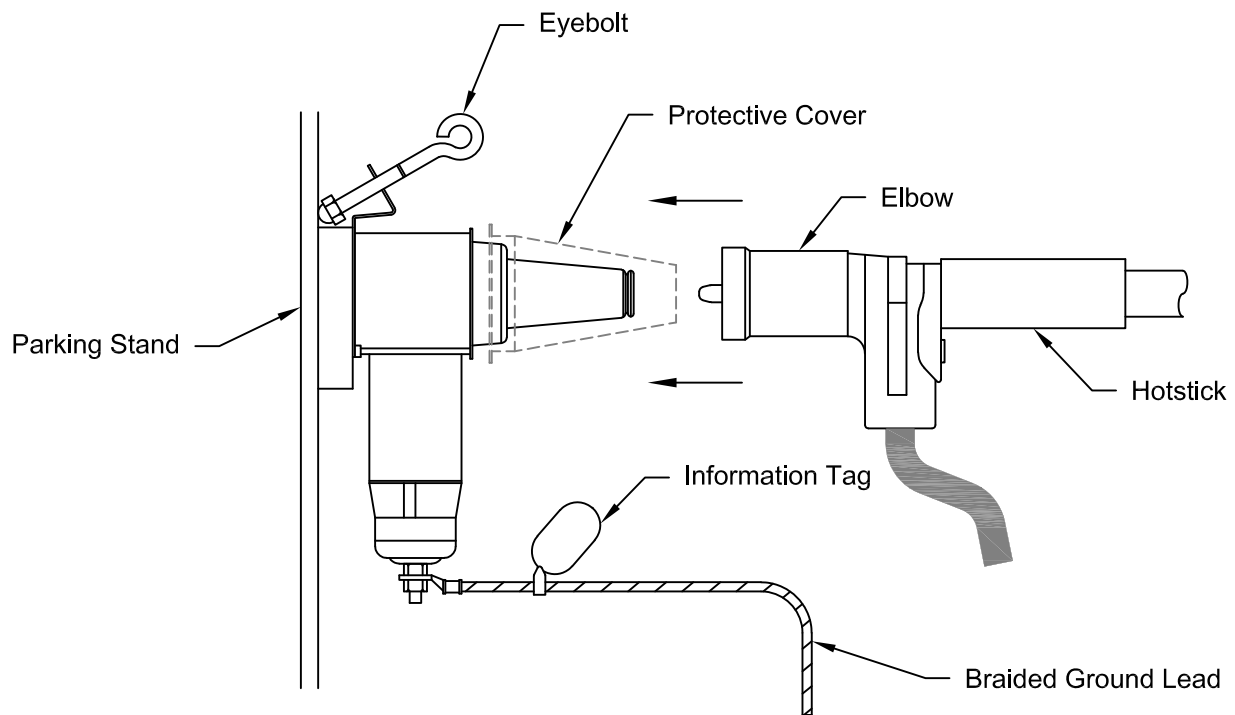
UM6-36 Uaf
LOAD BREAK CUTOUT

MISCELLANEOUS ACCESSORIES

Page 7 of 7

UM6-—

Parking Stand Arrester is designed to provide Plug-in Surge Protection for URD Systems; typical applications loop system open points(s).



UM6-34p, 8.4Kv MCOV
12.47 L-L

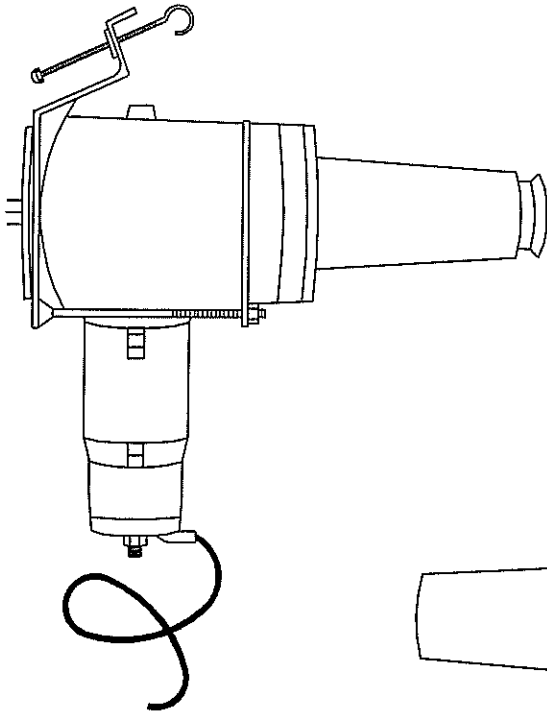
PARKING STAND ARRESTER

Revision Date

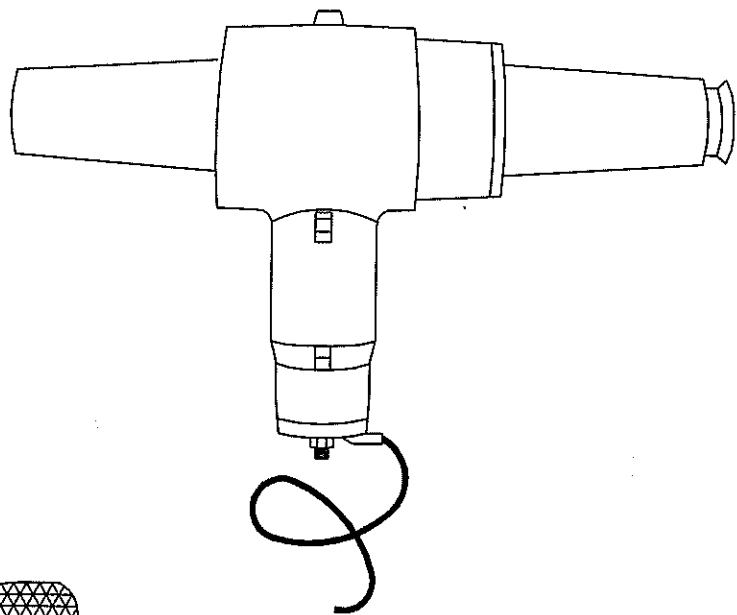
July 19, 2016



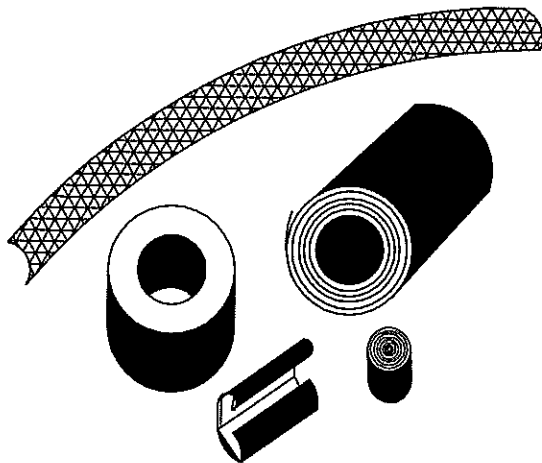
UM6-34P



UM6-37 Uae
PARKING STAND ARRESTER



UM6-38 Uae
BUSHING ARRESTERS



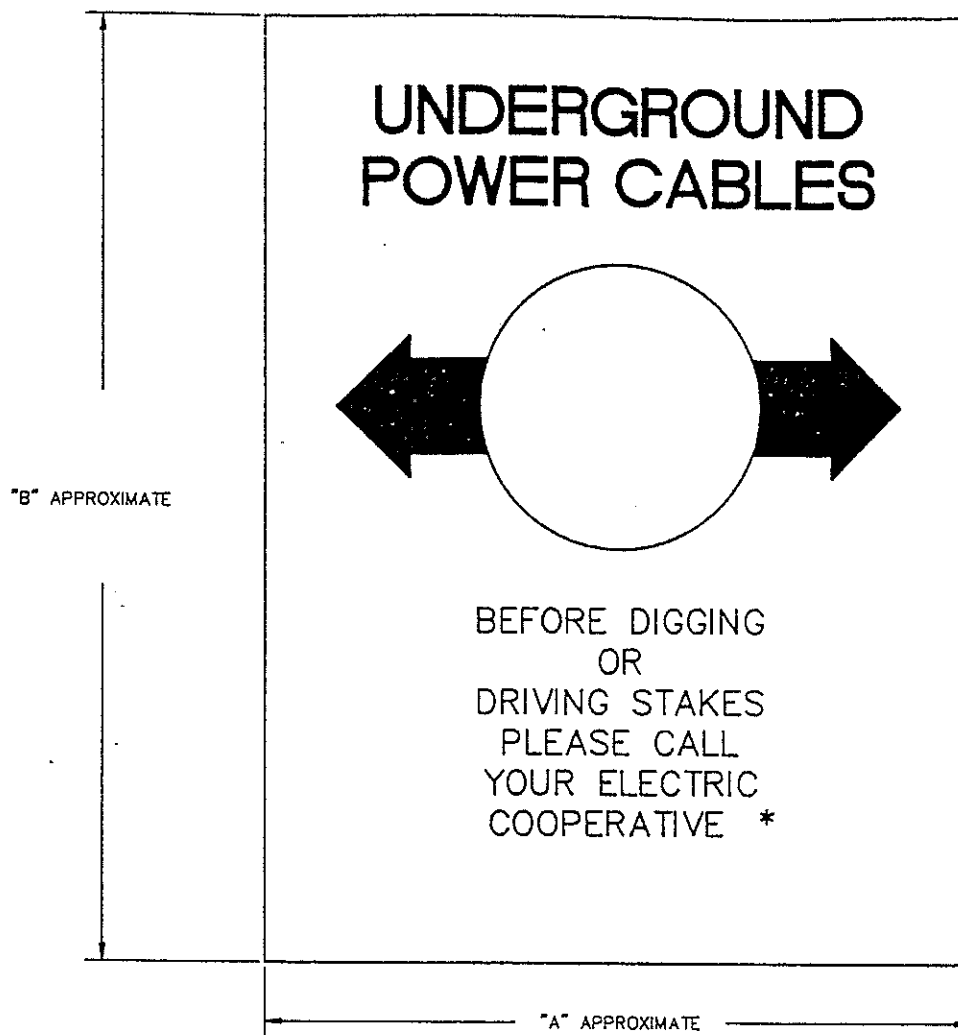
UM6-39 Uhf
JACKETED CABLE GROUNDING KITS

MISCELLANEOUS ACCESSORIES

2000

Page 8 of 8

UM6-__



* COOPERATIVE NAME AND TELEPHONE NUMBER MAY BE INSERTED AS AN ALTERNATE.

NOTES:

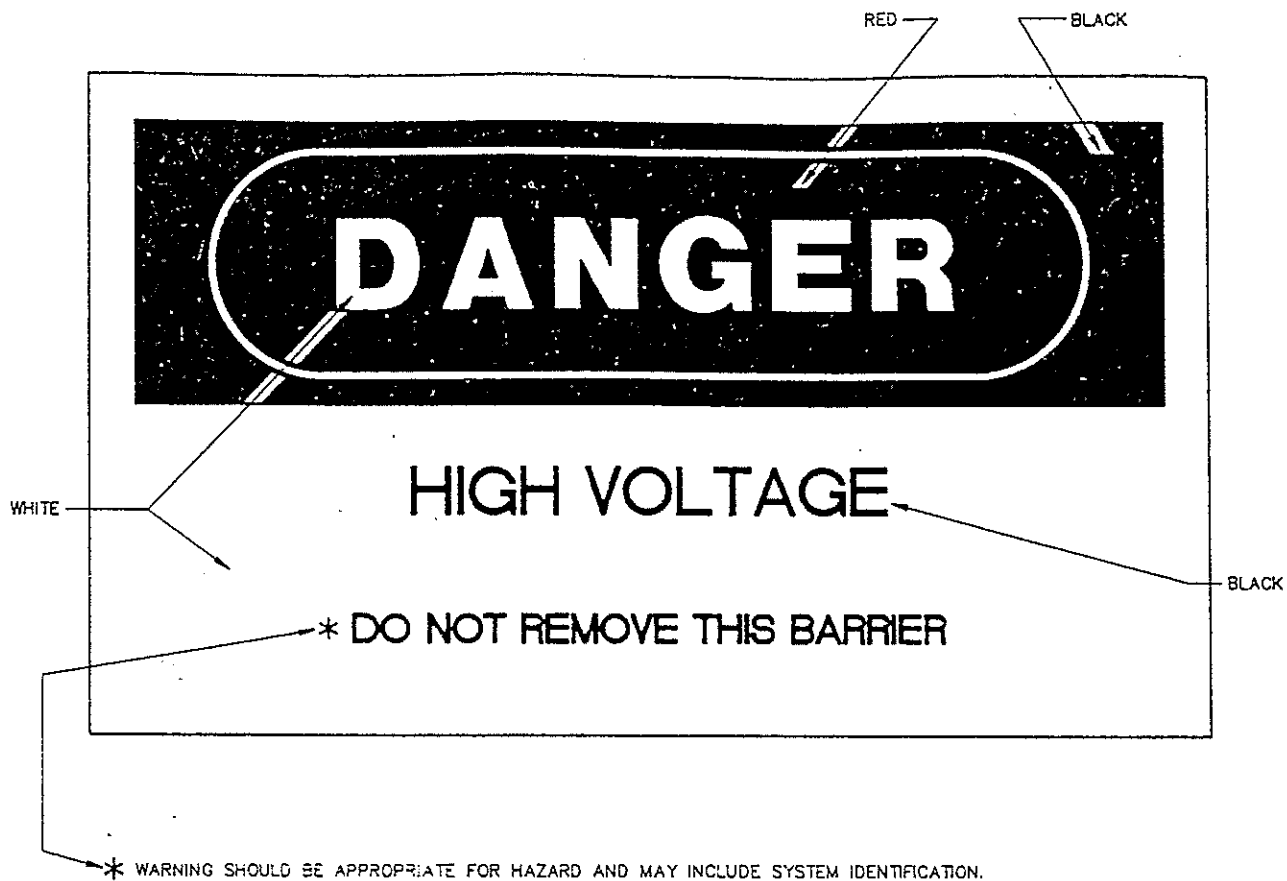
BACKING MATERIAL SHALL BE 16 GAUGE GALVANIZED STEEL, OR EQUAL.

SIGN SHALL HAVE A YELLOW BACKGROUND WITH BLACK LETTERS.

SIGN SHALL BE SUPPORTED AND DISPLAYED AS SPECIFIED BY OWNER.

WIDTH ("A")	HEIGHT ("B")
4"	5"
7"	12"
3"	12"

		WARNING SIGN CABLE ROUTE	
			UM12



NOTES:

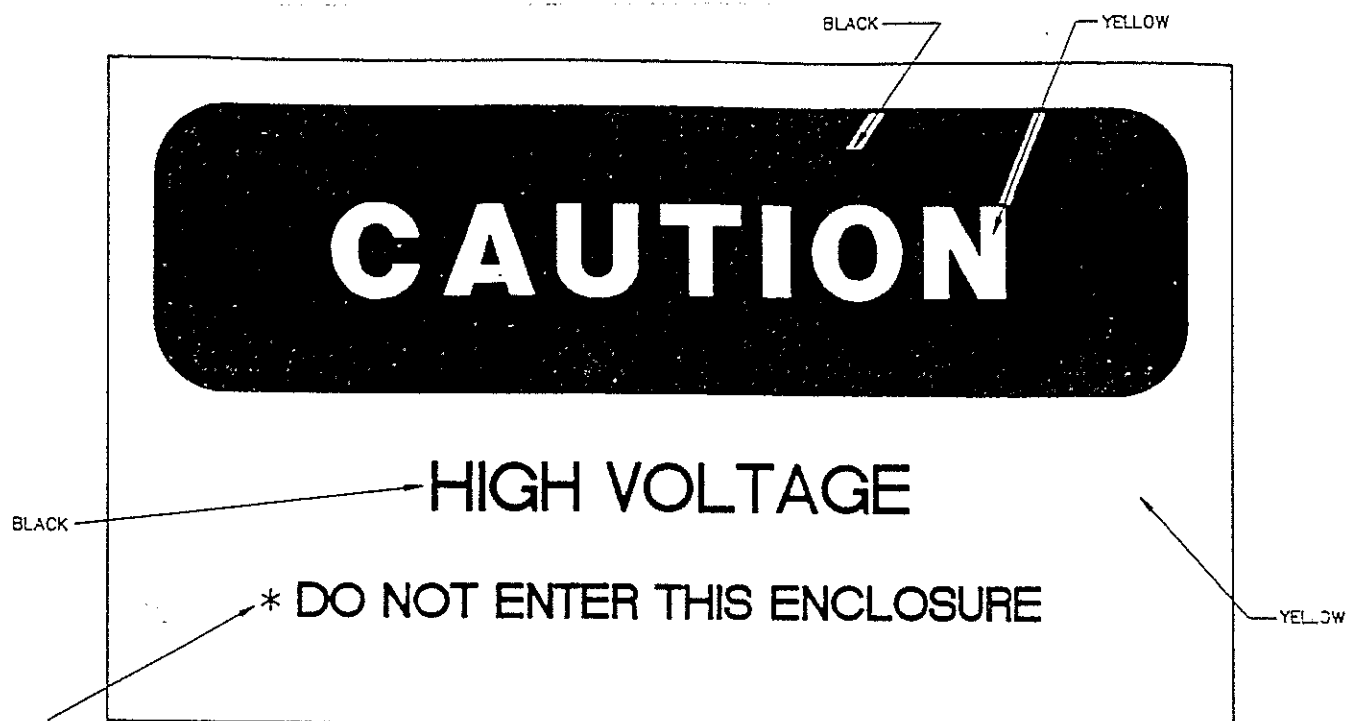
DANGER SIGNS SHOULD BE USED ONLY WHERE AN IMMEDIATE HAZARD EXISTS, FOR EXAMPLE, ON INTERIOR BARRIERS GUARDING EXPOSED HIGH VOLTAGE PARTS. (ITEM Uhw)

STANDARD PROPORTIONS ALL DIMENSIONS IN INCHES

SIGN SIZE Min. Height Width	BLACK RECTANGULAR PANEL Height Width	RED OVAL Height Width	WORD DANGER Height
3 1/2 x 5	1 5/8 x 4 11/16	1 7/16 x 4 1/4	23/32
7 x 10	3 1/4 x 9 3/8	2 7/8 x 8 1/2	1 7/16
10 x 14	4 5/8 x 13 3/8	4 1/8 x 11 7/8	2 1/16
14 x 20	6 1/2 x 19 3/8	5 3/4 x 17	2 7/8
20 x 28	9 1/4 x 27 3/8	8 1/4 x 23 7/8	4 1/8

WARNING SIGN
DANGER

UM12-1



* WORDING SHOULD BE APPROPRIATE FOR HAZARD AND MAY INCLUDE SYSTEM IDENTIFICATION

NOTE:

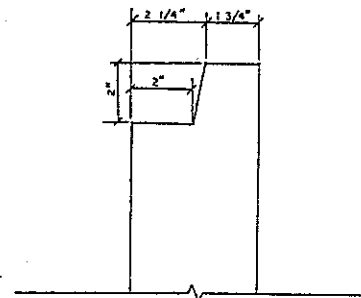
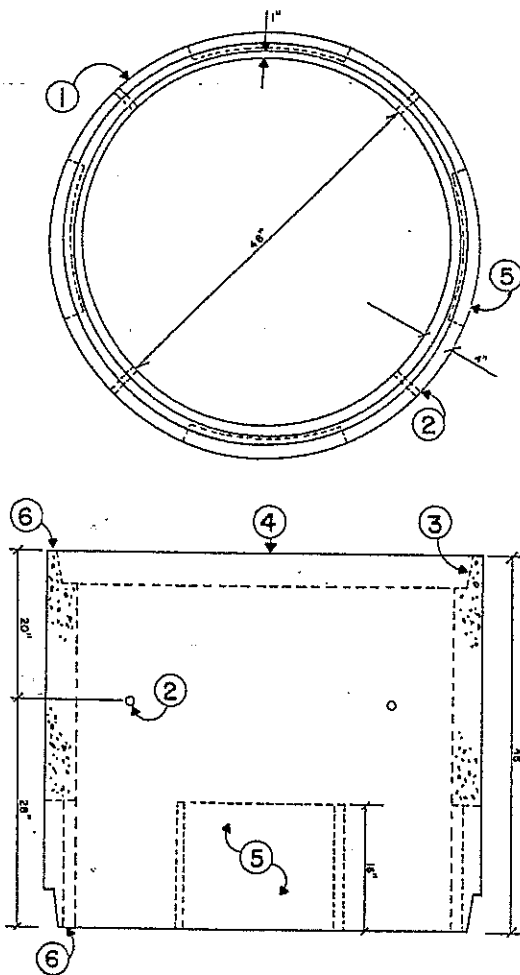
CAUTION SIGNS SHALL BE USED ONLY TO WARN AGAINST POTENTIAL HAZARDS, FOR EXAMPLE, ON EXTERIOR OF PAD MOUNTED EQUIPMENT. (ITEM UHw)

STANDARD PROPORTIONS ALL DIMENSIONS IN INCHES

SIGN SIZE		BLACK RECTANGULAR PANEL		WORD CAUTION
Height	Width	Height	Width	Height
3 1/2 x 5		1 1/8 x 4 11/16		5/16
7 x 10		2 1/4 x 9 3/8		1 5/8
10 x 14		3 1/4 x 13 3/8		2 1/4
14 x 20		3 3/4 x 19 3/8		2 3/4
20 x 28		4 1/4 x 27 3/8		3 1/4

WARNING SIGN $\frac{1}{2}$ POST
CAUTION

UM12-2



TOP EDGE DETAIL
Scale: 3"=1'

NOTES,

- ① $f'_c = 3000$ psi. Reinforcement not shown but is required by ASTM C478. $F_y = 40,000$ psi.
- ② 3/4" I.D. Steel sleeve completely through wall (4).
- ③ See Top Edge Detail. Tongue & groove to be compatible.
- ④ Direction of loading. Maximum load to be carried is 50,000 lbs.
- ⑤ 16"X18" knockout placed symmetrically at bottom edge (4). Concrete thickness shall be 1" on inside wall of knockout.
- ⑥ Surfaces to be flat & smooth so assembled vault will provide a steady, horizontal platform.

Weight = 2500 lbs.

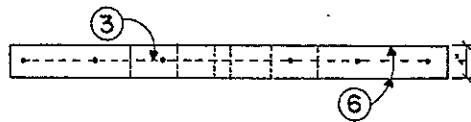
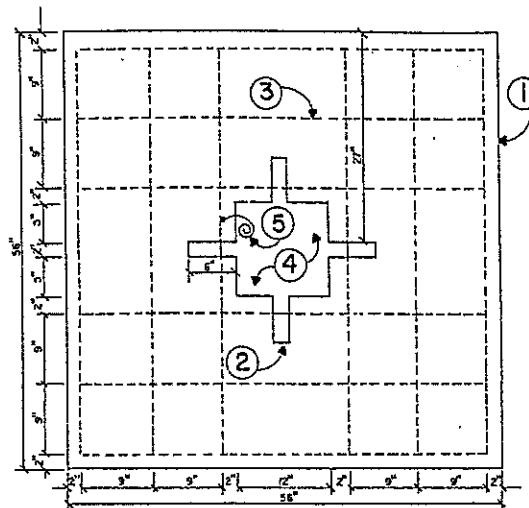
DATE	REVISIONS & PURPOSE

VAULT SPECIFICATIONS
4'X 4' ROUND VAULT 40750

DATE 3-18-87

SCALE 3/4" = 1'

TELETYPE POST 1198510



NOTES,

- ① $f'c = 3000$ psi. $F_y = 40,000$ psi.
All bars are #5.
- ② Four lifting holes completely through base which expose reinforcement.
- ③ Bars located mid-depth in base.
Bars are #5.
- ④ 12"X12" hole completely through base.
- ⑤ 24" long #2 stranded copper conductor brazed to rebar and brought out into hole. Coil so will not be damaged by shipping.
- ⑥ Top & bottom surfaces to be flat & smooth so assembled vault will provide a steady, horizontal platform.

DATE	REVISIONS & PURPOSE

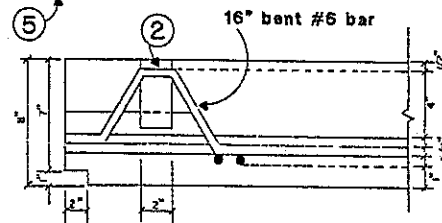
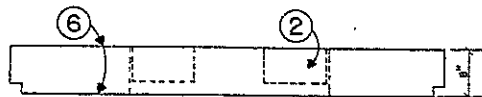
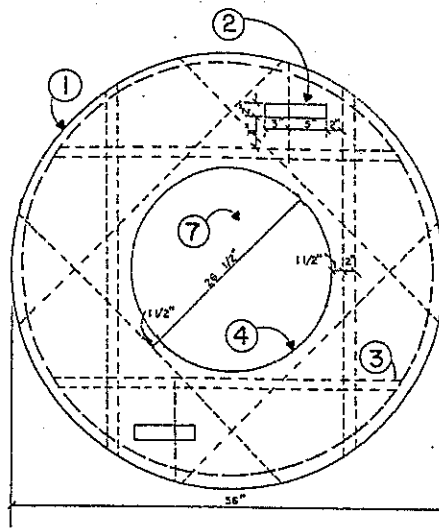
DATE 3-17-87

SCALE 3/4" = 1'

Weight = 1100 lbs.

VAULT
SPECIFICATIONS

SMALL BASE
40150



EDGE DETAIL
Scale: 1 1/2"=1'

NOTES,

- ① $f'c = 3000$ psi. $F_y = 40,000$ psi.
All bars are #6.
- ② Two lifting holes located symmetrically. See edge detail.
- ③ Lowest bars in pad with 1" clear cover from bottom. Bars are #6. (Remaining bars shall be placed as low as possible.)
- ④ Pad cast with UM30 manhole ring & cover inserted in hole. Refer to attached spec. Ring to be flush with top of pad.
- ⑤ Pad tongue. See edge detail.
- ⑥ Top & bottom surfaces to be flat & smooth so assembled vault will provide a steady, horizontal platform.
- ⑦ Manhole ring and cover supplied with this pad shall be traffic rated (H20). Ring shall have 26 1/2" ID opening. Cover shall have a hole completely thru located on the perimeter for lifting.

Weight = 1300 lbs.

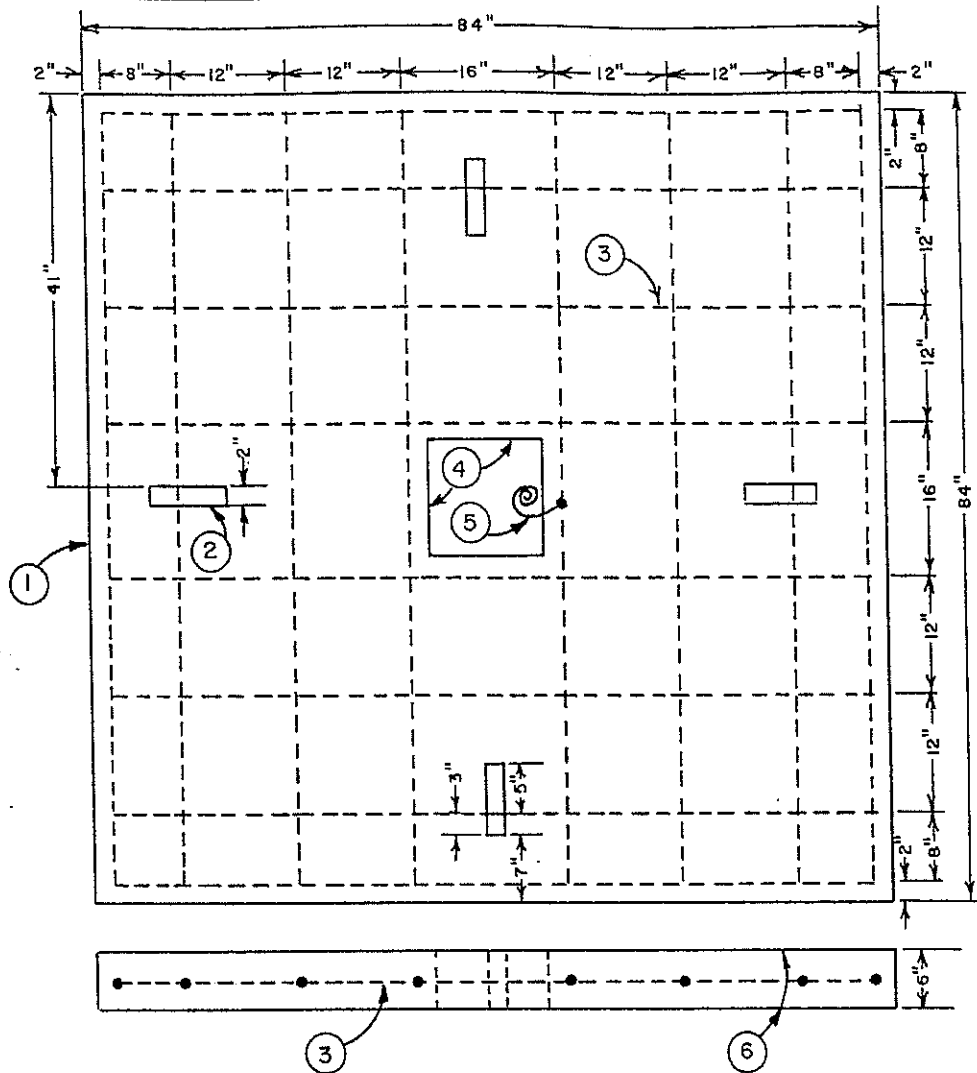
DATE	REVISIONS & PURPOSE

DATE 3-16-97

SCALE 3/4" = 1'

VAULT
SPECIFICATIONS

4' ROUND MANHOLE PAD
40400



NOTES:

- (1) $f'_c = 3000$ psi. $F_y = 40,000$ psi.
All bars are # 6.
- (2) Four lifting holes completely through base which expose reinforcement.
- (3) Bars located mid-depth in base
Bars are # 6.
- (4) 12" x 12" hole completely through base.
- (5) 24" long # 2 stranded copper conductor brazed to rebar and brought out into hole. Coil so will not be damaged by shipping.
- (6) Top and bottom surfaces to be flat and smooth so assembled vault will provide a steady, horizontal platform

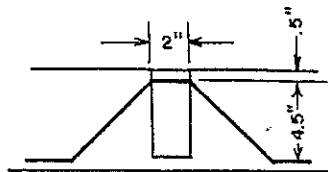
Weight = 3600 lbs

VAULT SPECIFICATIONS LARGE BASE 40200

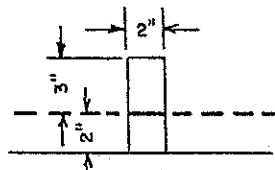
SEPT. 1992



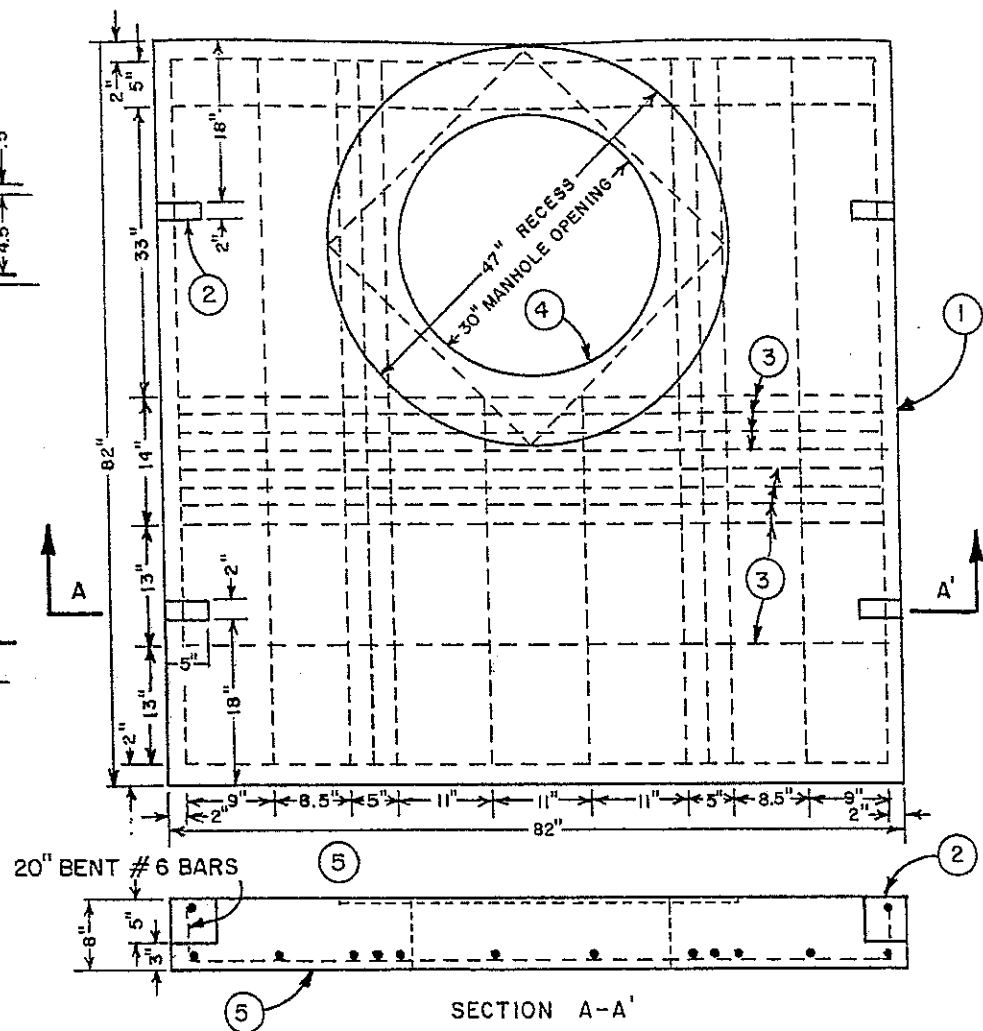
LIFT HOLE DETAILS



PROFILE



PLAN



NOTES

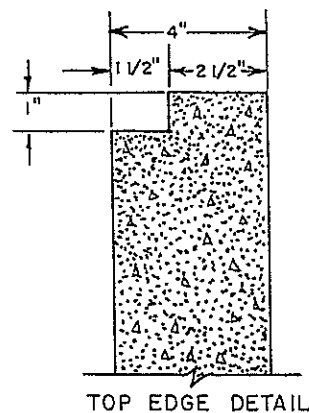
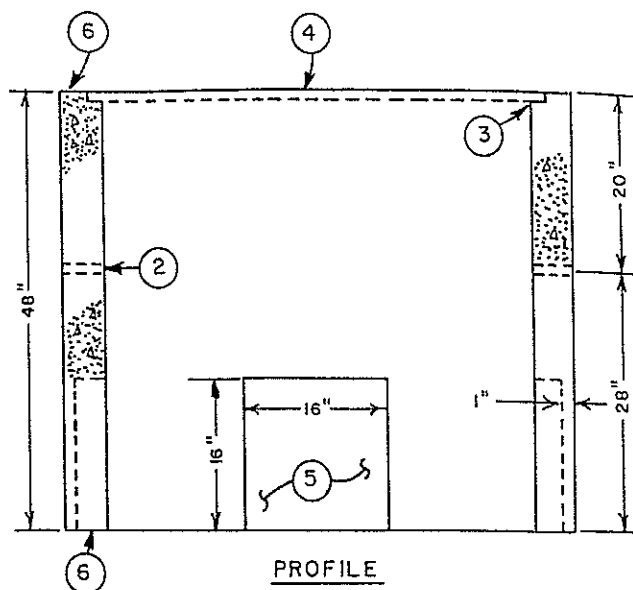
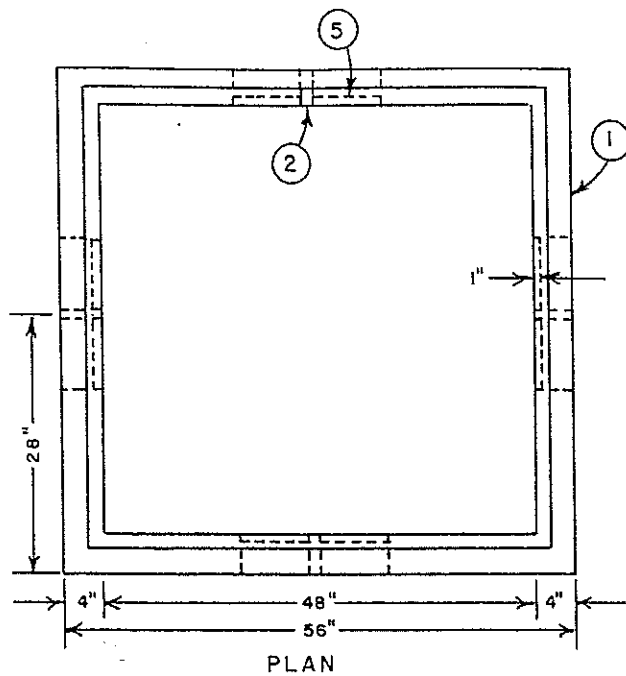
- ① $f'_c = 3000$ psi. $F_y = 40,000$ psi.
All bars are # 6.
- ② Four lifting holes. See Lift Hole Details.
- ③ Lowest bars with 1" clear cover from bottom.
Remaining bars shall be as low in pad as possible.
Bars are # 6.
- ④ 30" diameter hole completely through pad.
Recess is 1/2" deep to accept grade riser.
- ⑤ Top and bottom surfaces to be flat and smooth so
assembled vault will provide a steady, horizontal
platform.

VAULT SPECIFICATIONS LARGE MANHOLE PAD 40420

DATE: 5/12/94

DRAWN BY:
D.S.G.





NOTES:

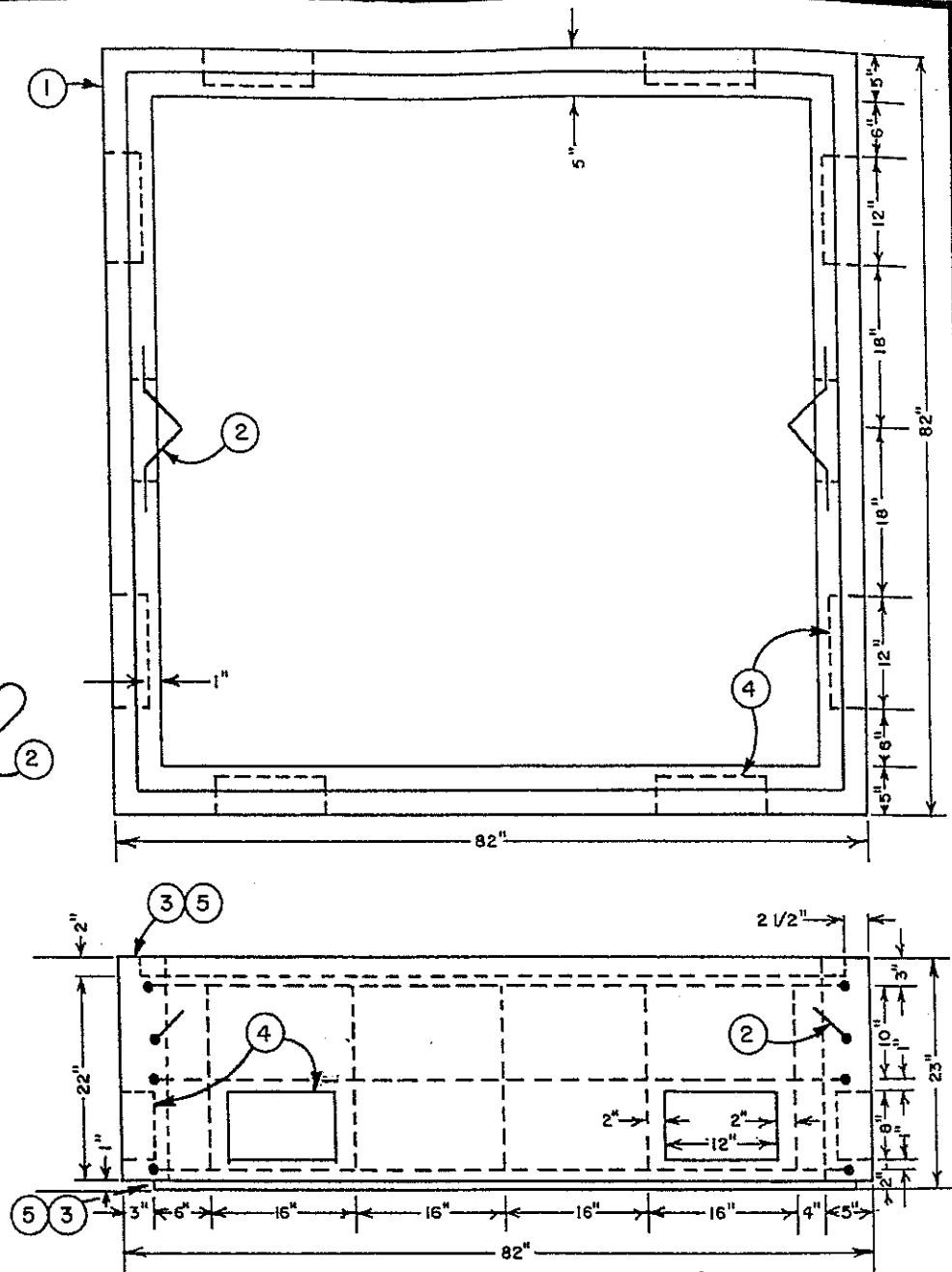
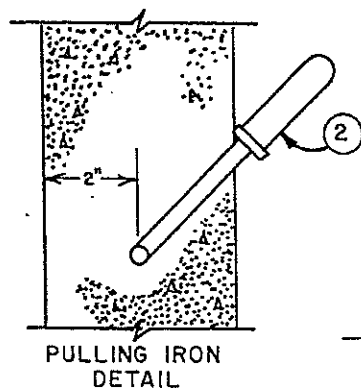
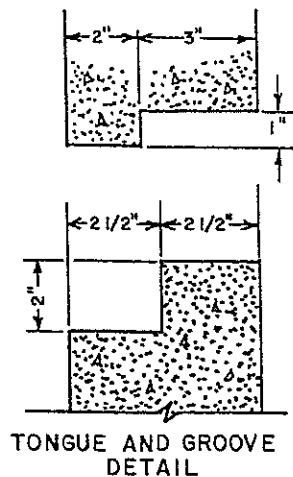
- ① $f'_c = 3000$ psi. $F_y = 40,000$ psi Reinforcement not shown but is required by ASTM C478
- ② 3/4" I.D. Steel sleeve completely through wall (4)
- ③ SEE TOP DETAIL
- ④ Direction of loading. Maximum load to be carried is 50,000 lbs.
- ⑤ 16" x 18" knockout centered at bottom of each face of vault. Concrete thickness shall be 1" on inside wall of knockout.
- ⑥ Surface to be flat and smooth so assembled vault will provide a steady, horizontal platform.

Weight = 3500 lbs.

VAULT SPECIFICATIONS
4' x 4' x 4' SQUARE VAULT
40700

SEPT 1992





① $f'_c = 3000$ psi $F_y = 40,000$ psi
All bars are # 5.

② Two Pennsylvania Insert Corporation pulling irons
(supplied by owner) welded to wall reinforcement.
Angle iron up to bring shield into contact with
concrete. See Detail.

③ See Tongue and Groove Detail

④ Eight 8"x12" knockouts with 1" thick
concrete on inside face

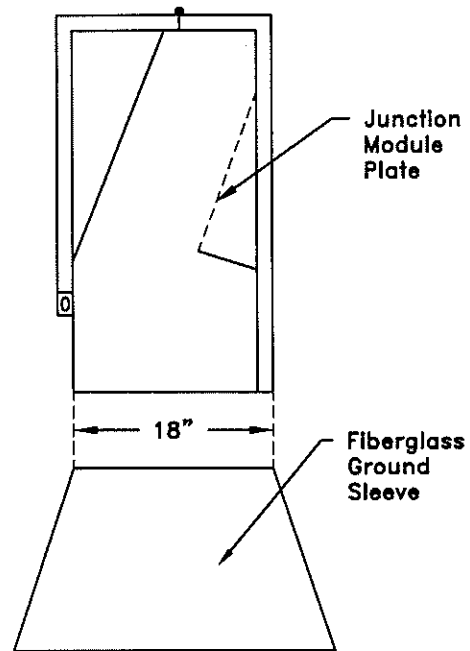
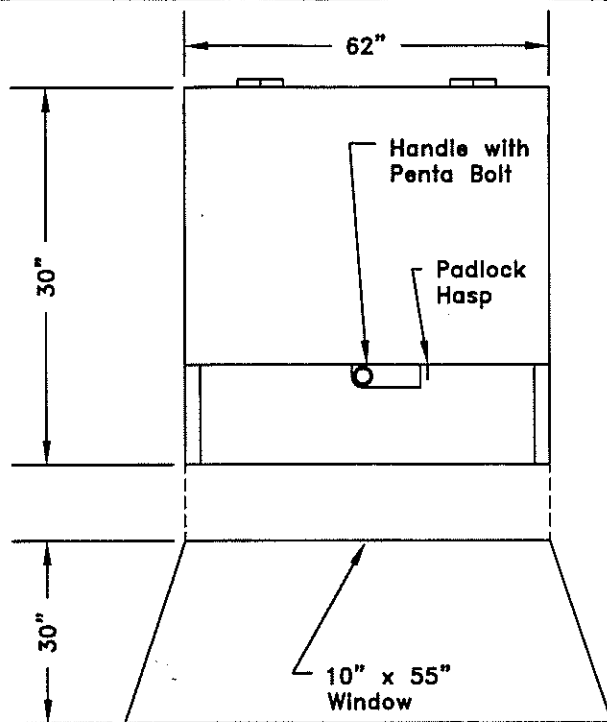
⑤ Top and bottom surface to be flat and
smooth so assembled vault will provide
a steady, horizontal platform.

Weight = 3000 lbs.

VAULT SPECIFICATIONS
6' x 6' x 2' SQUARE VAULT
40800

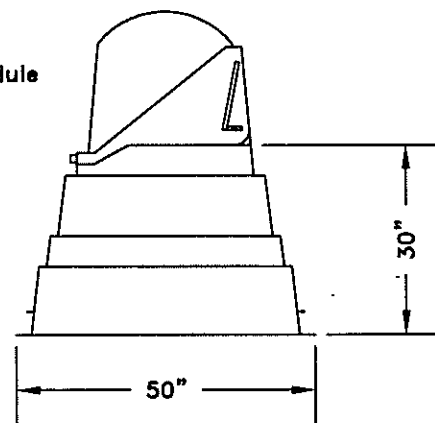
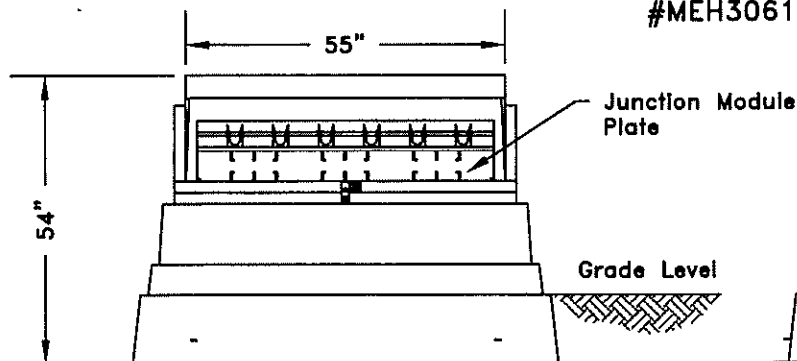
SEPT 1992





UM33

MALTON EQUIPMENT COMPANY
#MEH30618



UM33F

NORDIC FIBERGLASS
#RC3-552454-MG-PB58-4152-W3A

NOTES:

- 1 The following Units/Assemblies may not
be a part of the Unit.
SPECIFY SEPARATELY:

A Multipoint Termination and other Accessories
B Fused or Non-fused Loadbreak Elbows.
C Grounding Assemblies.
D Pad or Sleeve Assemblies (if required)

- 2 All Neutrals and Metallic Non-current carrying
parts shall be interconnected and grounded.

- 3 Install "CAUTION" Sign on outside surface of
Enclosure and "DANGER" Sign inside Enclosure.

- 4 Style I is the Preferred cabinet for
Commercial, Subdivision w/future
3Ø Taps.

- 5 Style II can be used for express
3Ø Circuits w/o 3Ø Taps.

THREE PHASE SECTIONALIZING CABINET

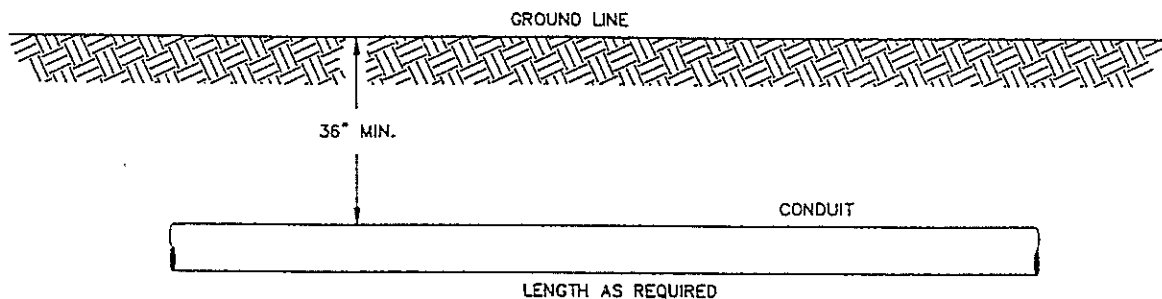
DATE

Jan 2004



GRAND VALLEY POWER

UM33
UM33F



SPECIFICATION NUMBER CODES:
UM50-(P or S)-(DIAMETER)

EXAMPLE: UM50-S-3
IS 3" STEEL CONDUIT

NOTE:
SPECIFY TRENCH UNIT SEPARATELY.

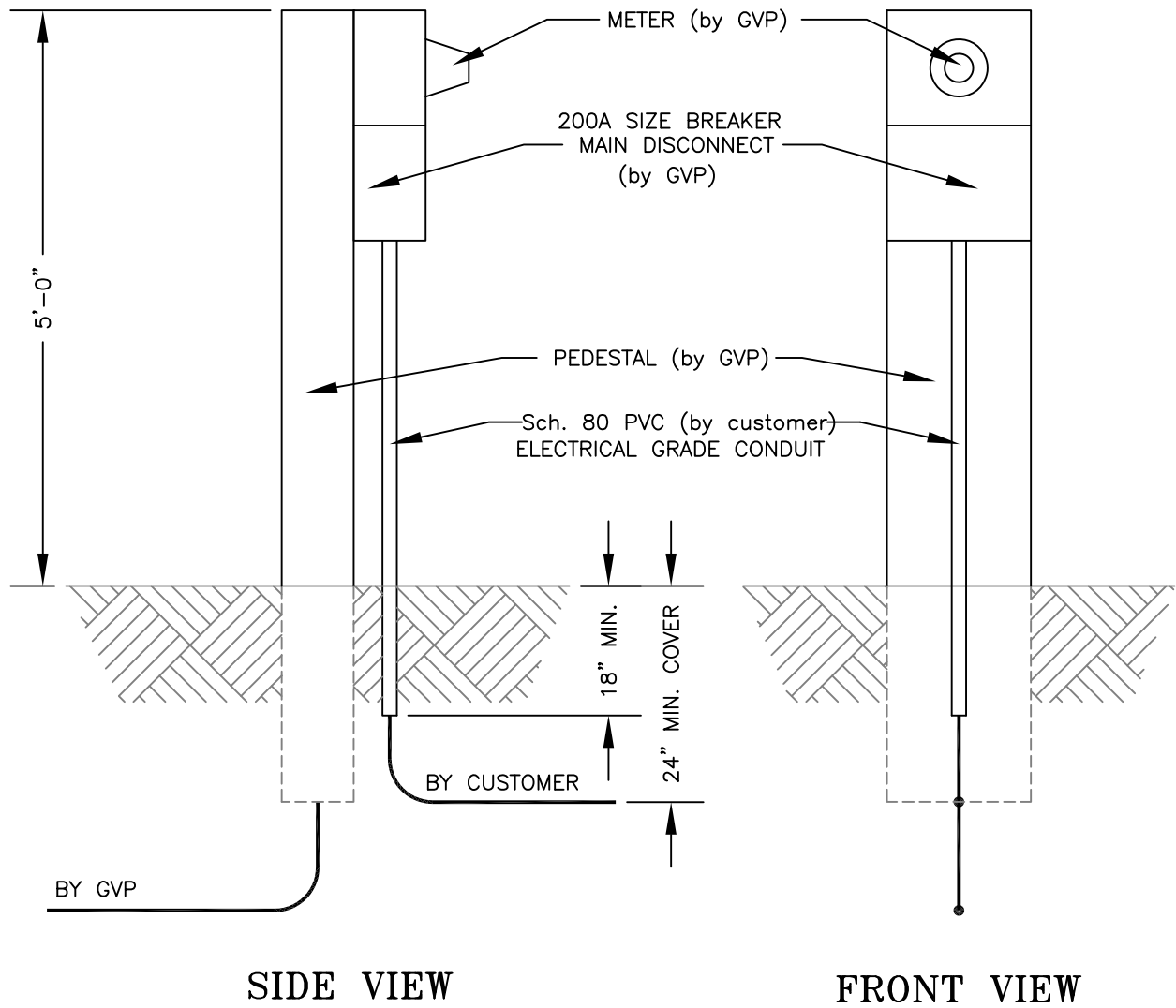
MATERIAL	-P-2	-P-3	-P-4	-P-5	-P-6
1-2" P.V.C. Conduit	1				
1-3" P.V.C. Conduit		1			
1-4" P.V.C. Conduit			1		
1-5" P.V.C. Conduit				1	
1-6" P.V.C. Conduit					1
	-S-2	-S-3	-S-4	-S-5	-S-6
1-2" Steel Conduit	1				
1-3" Steel Conduit		1			
1-4" Steel Conduit			1		
1-5" Steel Conduit				1	
1-6" Steel Conduit					1

MISCELLANEOUS CONDUIT
INSTALLATION

UM50-__-__

UM50-S

UM50-P



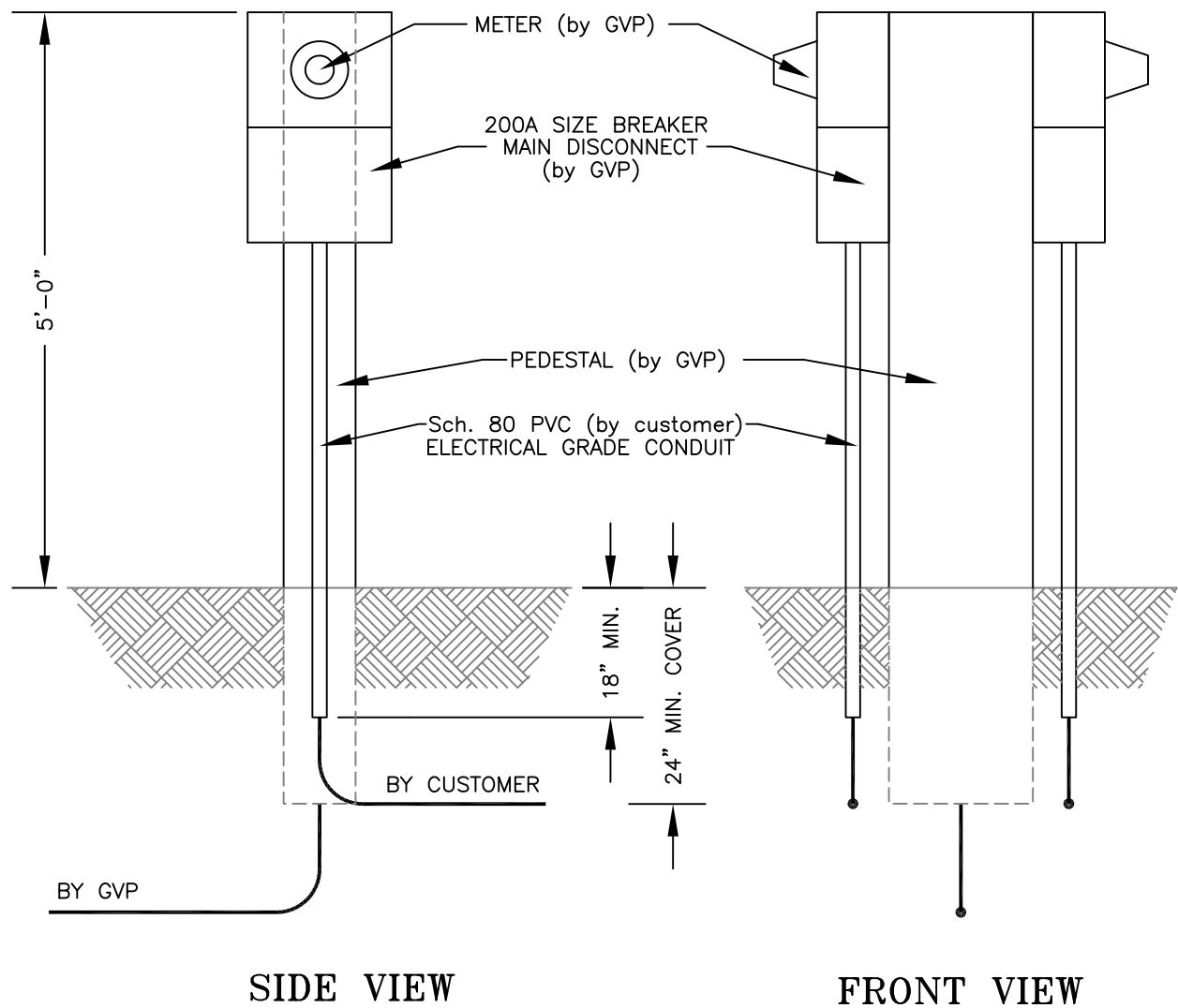
SINGLE METER PEDESTAL STANDARDS

DWG BY: DSG

DATE: 6/14/95



UMP-1



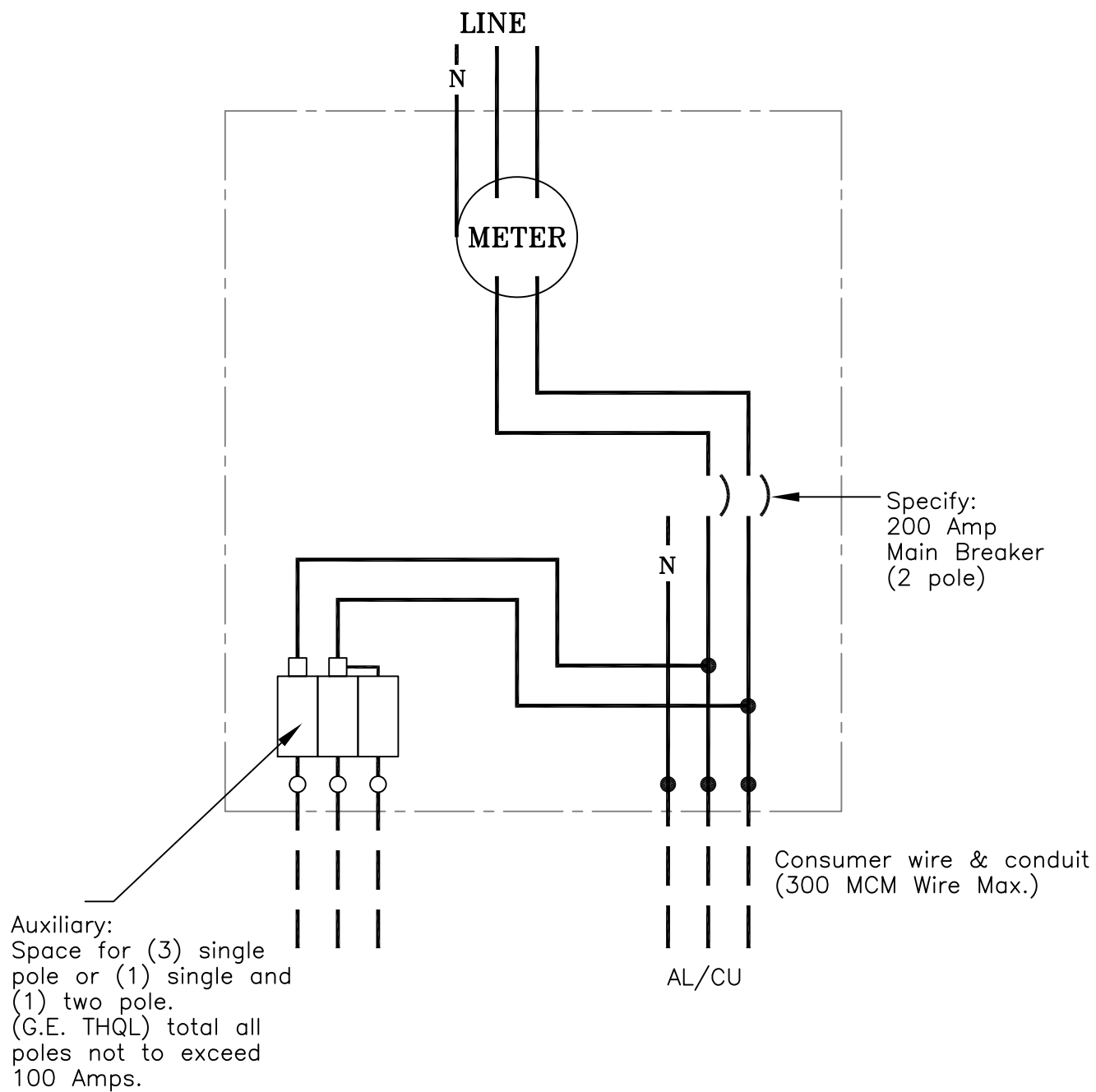
DUAL METER PEDESTAL STANDARDS

DWG BY: DSG

DATE: 6/14/95



UMP-2



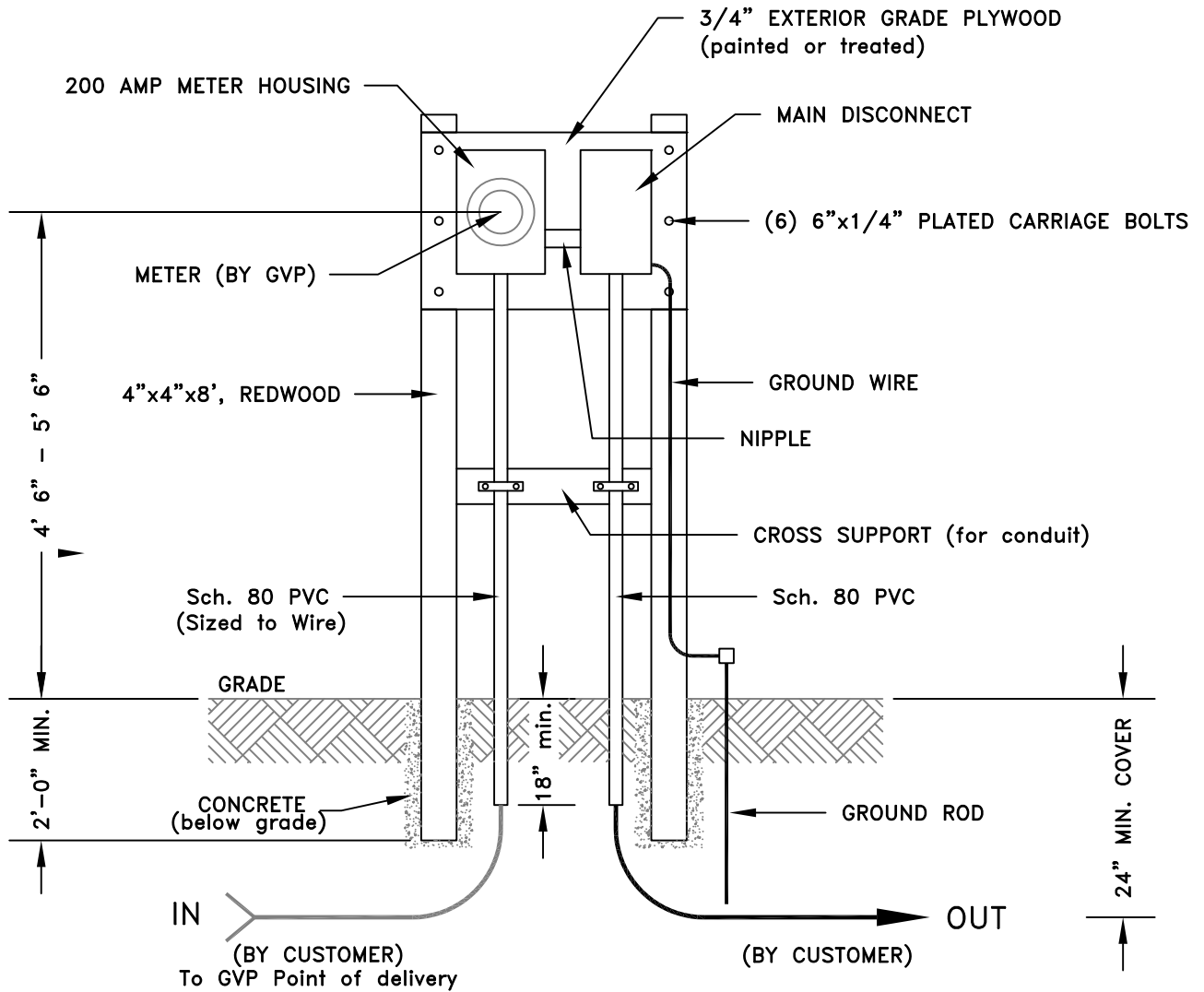
TYPICAL WIRING DIAGRAM METER PEDESTAL

DWG BY : DSG

DATE : 6/20/95



UMP-W



1. Meter pedestal may also be constructed with pressure treated timbers; or may be constructed totally from "unistrut" galvanized steel channel.
2. Operable fault interruption disconnecting means mounted below meter socket; main circuit breaker, or fused disconnecting switch is required.
3. Grand Valley Power will furnish meter; customer is responsible for mounting meter socket, disconnecting means, conduits, grounds, and all other materials, and for Mesa County Electrical Inspection.
4. The center of the meter cover shall be 4' 6" to 5' 6" above the finished grade.
5. Bury underground wire with a minimum cover of 24".
6. Mesa County Electrical Inspection sticker must be present before service can be energized.
7. Grand Valley Power reserves the rights to request necessary modifications or reject the installation as suitable for service as necessary.

CUSTOMER'S METER PEDESTAL STANDARDS

DATE: 2/5/10



CONS-MP-1

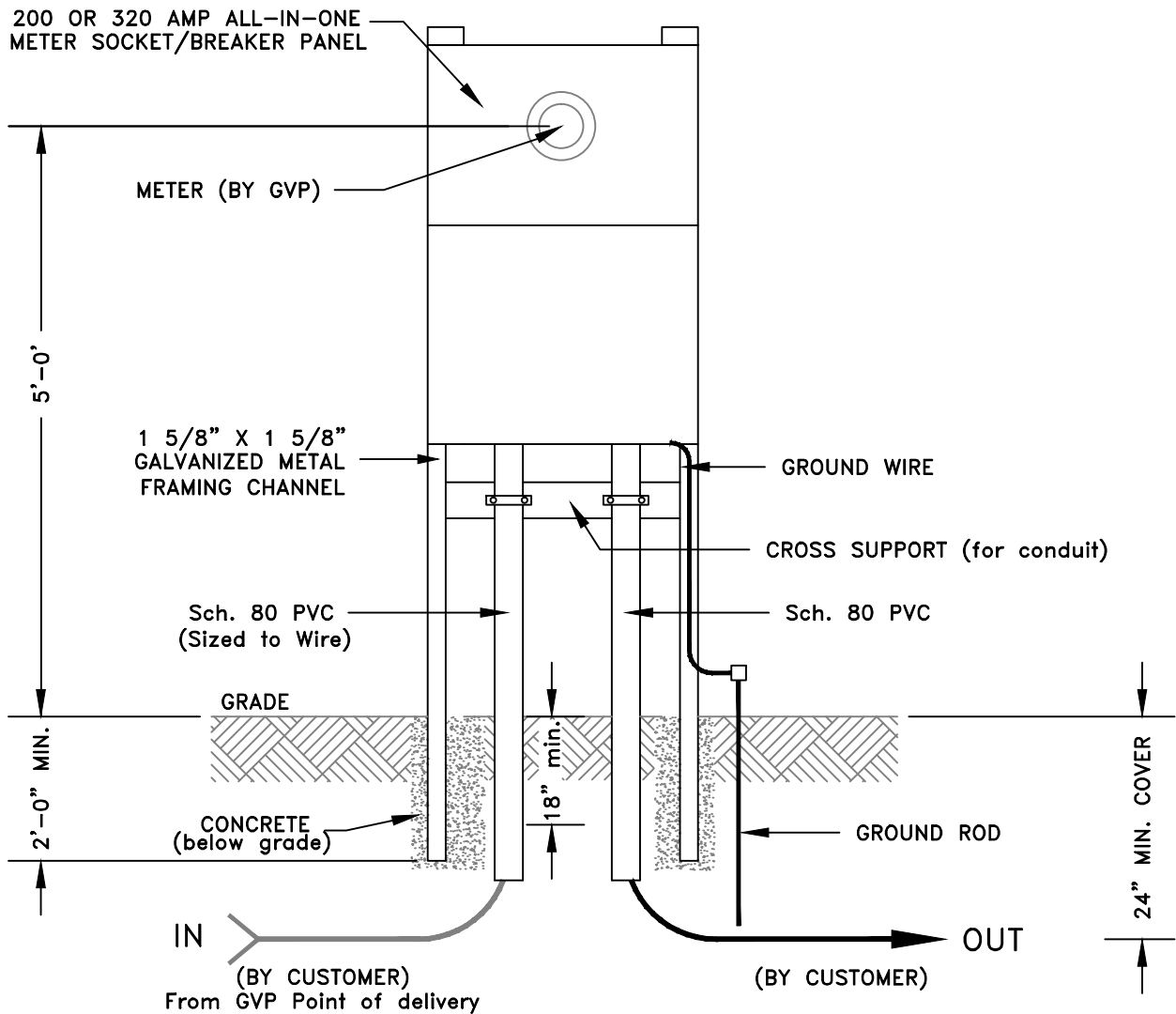
1. Meter pedestal may also be constructed with pressure treated timbers; or may be constructed totally from "unistrut" galvanized steel channel.
2. Operable fault interruption disconnecting means mounted below meter socket; main circuit breaker, or fused disconnecting switch is required.
3. Grand Valley Power will furnish meter; customer is responsible for mounting meter socket, disconnecting means, conduits, grounds, and all other materials, and for Mesa County Electrical Inspection.
4. Meter must be at 5 feet above grade.
5. Bury underground wire with a minimum cover of 24".
6. Mesa County Electrical Inspection sticker must be present before service can be energized.
7. *Grand Valley Power reserves the rights to request necessary modifications or reject the installation as suitable for service as necessary.*

CUSTOMER'S METER PEDESTAL MULTIPLE METERS & GUTTER



GRAND VALLEY POWER

CONS-MP-2



1. Meter pedestal may also be constructed with 4x4 redwood or pressure treated timbers; or may be constructed totally from "unistrut" 1 5/8" x 1 5/8" galvanized metal framing channel.
2. Operable fault interruption disconnecting means, main circuit breaker, or fused disconnecting switch is required.
3. Grand Valley Power will furnish meter; customer is responsible for mounting meter socket, breaker panel, disconnecting means, conduits, grounds, and all other materials, and for Mesa County Electrical Inspection.
4. The center of the meter cover shall be 5' above the finished grade.
5. Bury underground wire with a minimum cover of 24".
6. Mesa County Electrical Inspection sticker must be present before service can be energized.
7. Grand Valley Power reserves the rights to request necessary modifications or reject the installation as suitable for service as necessary.

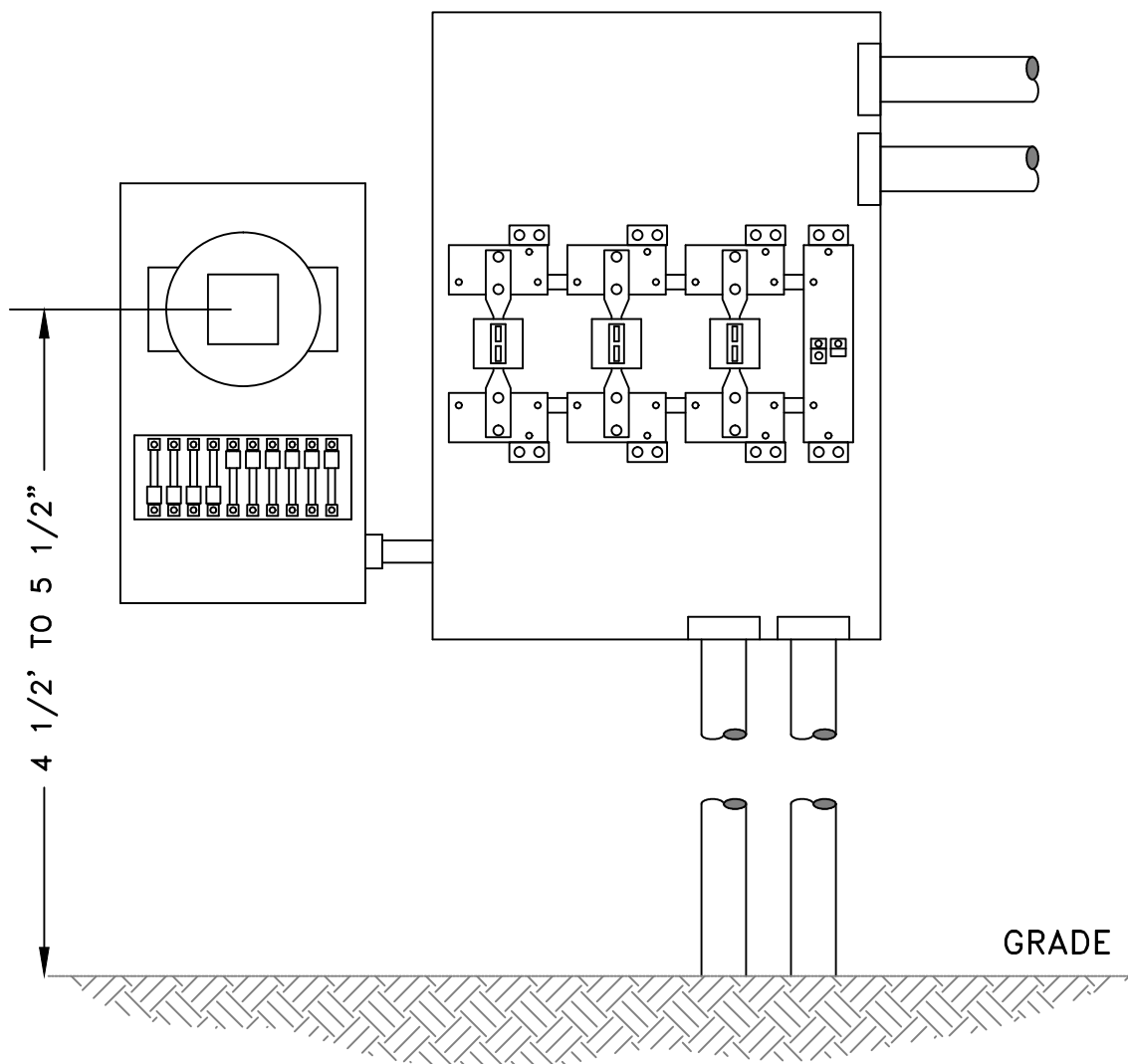
CUSTOMER'S METER PEDESTAL STANDARDS

CONS-MP-3

DATE: 11/29/12



CONS-MP-3



- 1 Use the knockouts in the meter cabinet to connect the conduit between the Meter Base and the C.T. Cabinet.
- 2 Conduit needs to be installed so that the wiring in the cabinets can be pulled freely and without severe bends. Grand Valley Power will be installing the wiring for the C.T.s and for the ground.
- 3 If the C.T. cabinet is to be installed inside of a building and the center knockout is used, the conduit needs to be installed so that the wire can be pulled freely and without severe bends.
- 4 The conduit connecting cabinets needs to be 1" EMT or IMC.
- 5 C.T.s are to be installed with the polarity marked with H1 or with white marks facing the line side.

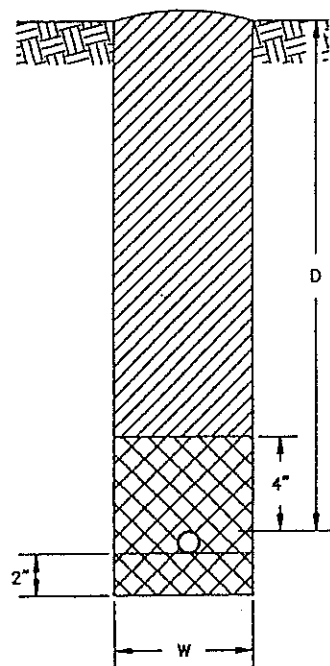
METER BASE / CURRENT TRANSFORMER INSTALLATION GUIDE

DATE

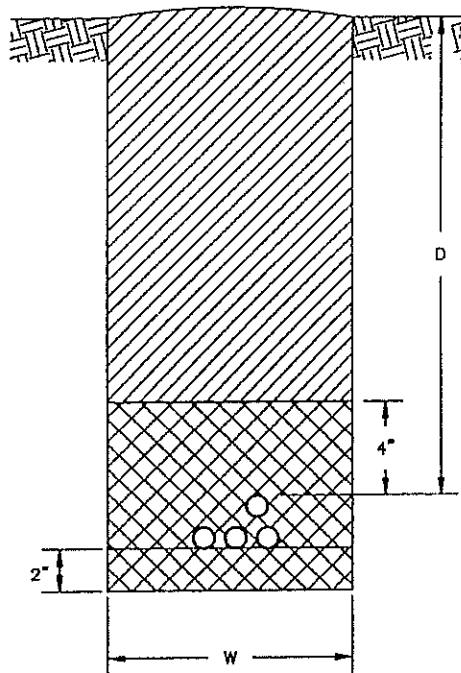
5/10/2011



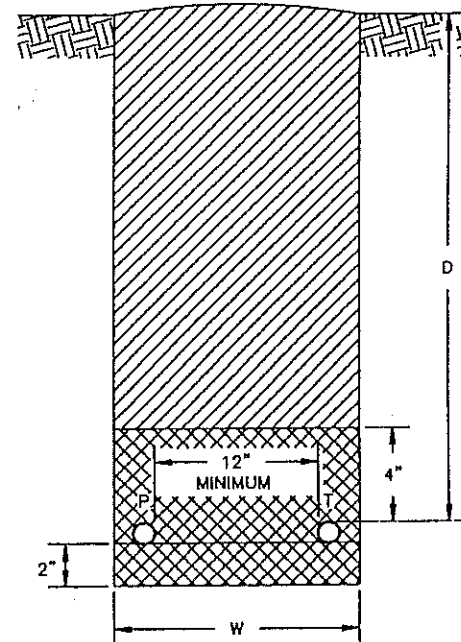
CT-1



UR2 (D x W)
TRENCHING UNIT
ONE CABLE OR
CABLE ASSEMBLY



UR2-1 (D x W)
TRENCHING UNIT
MULTIPLE POWER CABLES
PRIMARY, SECONDARY OR SERVICE

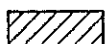


UR2-2 (D x W)
TRENCHING UNIT
POWER AND TELEPHONE CABLE

LEGEND



SAND OR CLEAN SOIL



COMPACTED BACKFILL UNLESS OTHERWISE SPECIFIED



UNDISTURBED EARTH

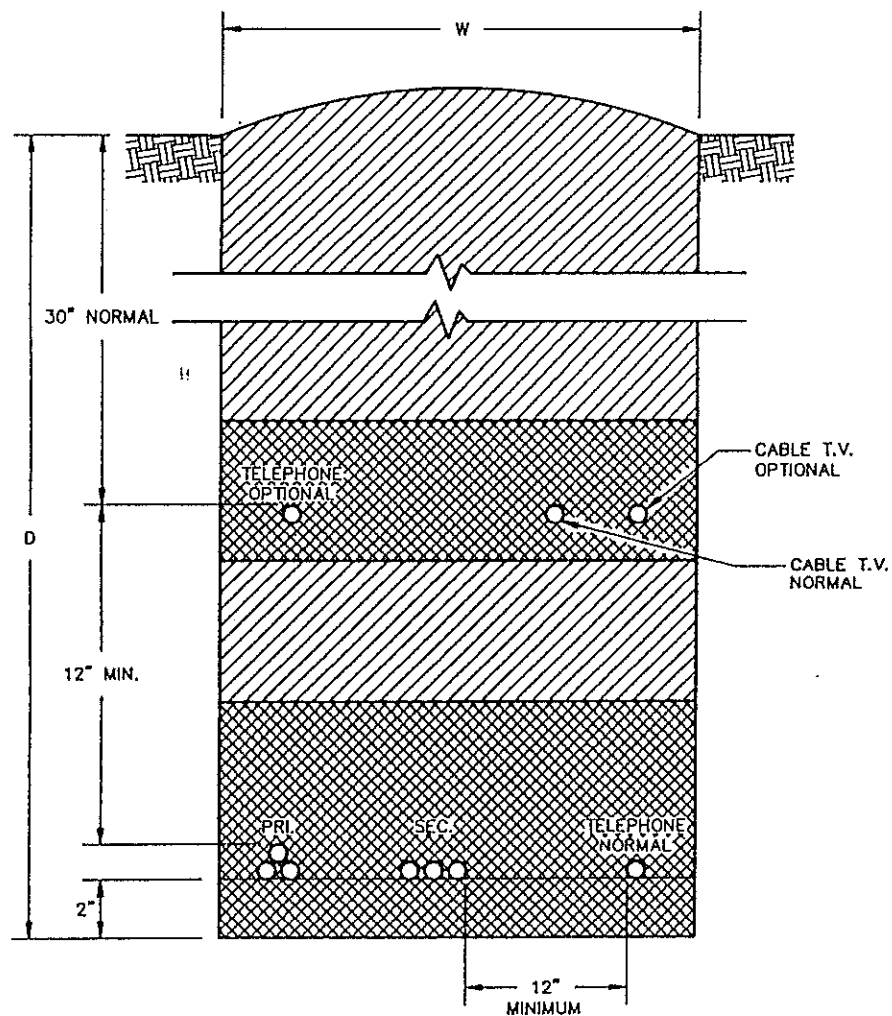
NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL BE INSTALLED IN TRENCH AND LAYING FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
5. BACKFILLING IS PART OF ALL TRENCHING UNITS INCLUDING JOINT-USE TRENCHES.

UR2 to UR2-2

TRENCHES FOR DIRECT
BURIAL CABLES

UR2
TO
UR2-2



PRI. = PRIMARY SUPPLY CABLES
SEC. = SECONDARY OR STREETLIGHT WRES

URT-NT = NORMAL TRENCH 42" - 48" DEPTH
URT-ST = SUPER TRENCH 60" + DEPTH
W = 18" - 24" NORMAL

NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE AND SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL BE INSTALLED IN TRENCH AND LAYING OF FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
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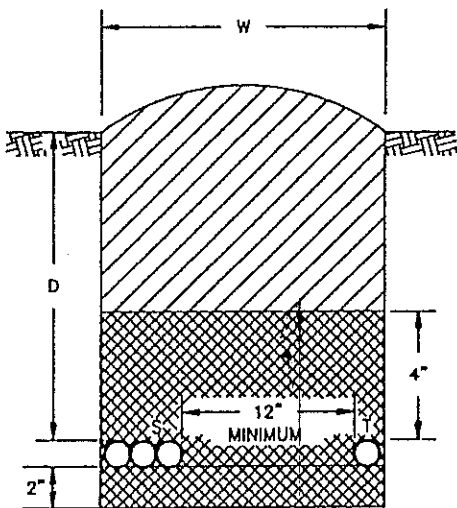
LEGEND

-  BEDDING SAND OR CLEAN SOIL
 COMPACTED BACKFILL, UNLESS OTHERWISE SPECIFIED
 UNDISTURBED EARTH

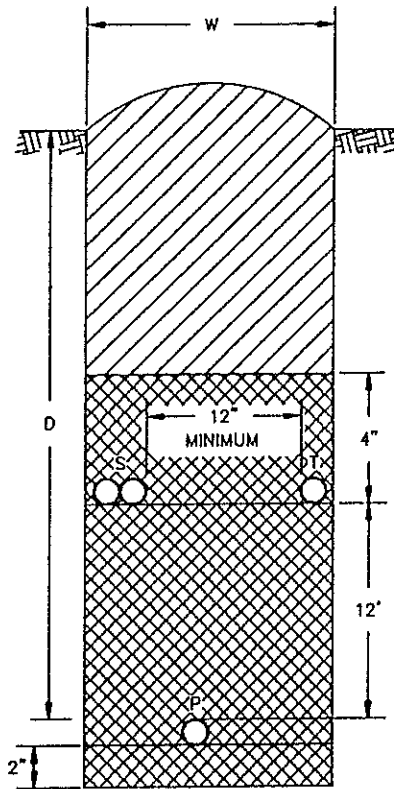
UR2-NT UR2-ST

TRENCHES FOR DIRECT BURIAL CABLE

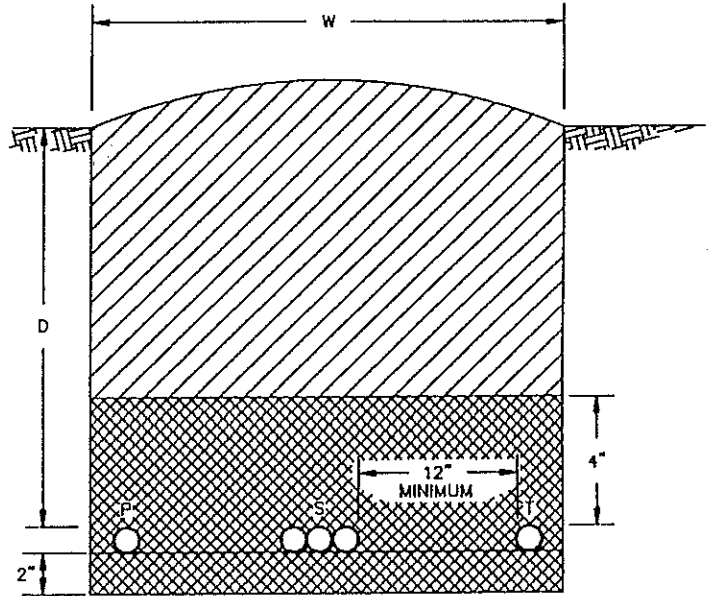
UR2-NT
UR2-ST



UR2-3 (D x W)
SERVICE OR SECONDARY
AND
TELEPHONE

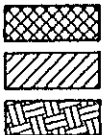


UR2-4 (D x W)
PRIMARY
AND
SECONDARY OR TELEPHONE



UR2-5 (D x W)
PRIMARY, SECONDARY
AND
TELEPHONE

LEGEND



BEDDING SAND OR CLEAN SOIL

COMPACTED BACKFILL, UNLESS OTHERWISE SPECIFIED

UNDISTURBED EARTH

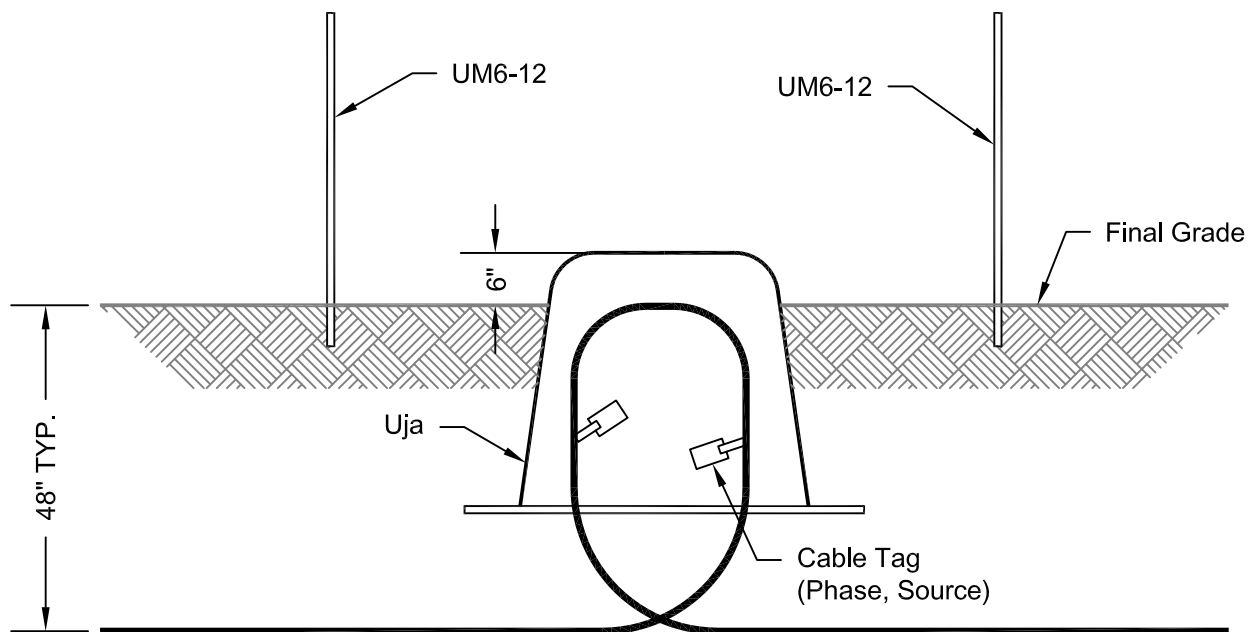
NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE AND SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL BE INSTALLED IN TRENCH AND LAYING OF FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
5. BACKFILLING IS PART OF ALL TRENCHING UNITS INCLUDING JOINT-USE TRENCHES.

UR2-3 to UR2-5

TRENCHES FOR DIRECT BURIAL CABLES

UR2-3
TO
UR2-5



INSTALLATION NOTES:

1. Loop cable to provide sufficient length for terminating in future transformer or transclosure.

ITEM	QTY.	MATERIAL
Uja	1	Looping Pedestal (30" L x 8" D x 30" H)
UM6-12	2	Marker, underground cable

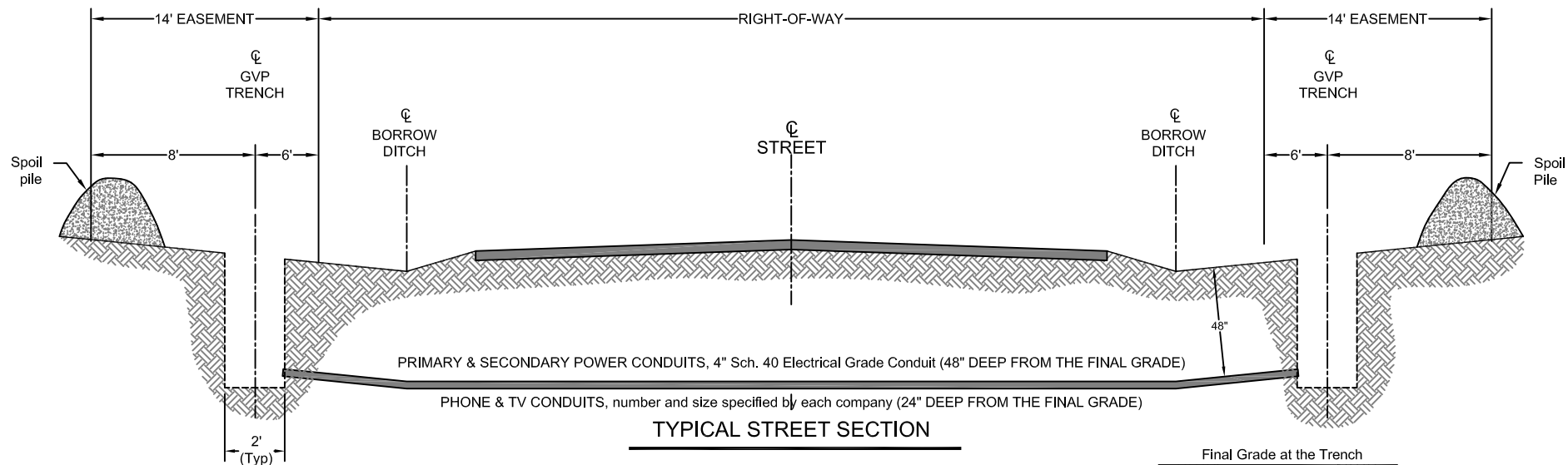
SINGLE PHASE LOOPING PEDESTAL

Revision Date

July 19, 2016



UX3



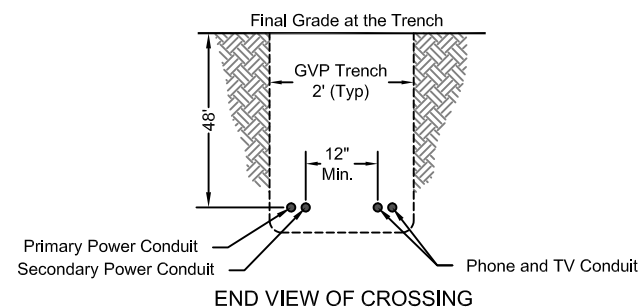
It is the general practice of GVP to allow the developer to supply and install road crossings for electrical facilities provided the following GVP requirements are met:

- A. 4" Schedule 40 Electrical Grade PVC conduit used, (Gray in Color) unless otherwise specified by GVP.
- B. Conduit buried at specified depth, (see sketch above).
- C. Both ends of conduit capped.
- D. Conduit locations specified by GVP map.
- E. Number of conduits as specified by GVP map.
- F. Conduit ends stubbed out 5 feet into easement on both sides.
- G. Conduit location marked with:
 1. Electronic marker, (tracer wire) [Optional]
 2. As-built of station location (2x4, Steel Post, etc..)
 3. Some type of permanent marking system. [Optional] (on curb concrete, etc.)

If roads are surfaced in development before conduits are installed, open trenching or boring is required by the Developer.

GVP reserves the right to inspect the location, size and depth of crossing sleeves and reject the installation if not per above specifications.

**WATER OR SEWER PIPE IS NOT
ACCEPTABLE - PLEASE CALL
FOR INSPECTION OR QUESTIONS:
(970) 242-0040**



**THIS DRAWING TO DEVELOPER WITH MAP
OF CROSSING AT TIME OF CONTRACT.**

DATE __/__/__

GRAND VALLEY POWER ROAD CROSSING SPECIFICATIONS

Revision Date:
February 17, 2020



EXHIBIT "A"
2 OF 2

NOTE:

4" of select back fill must be added to the trench as a pad when rocky soil exists.

Over excavate to maintain 48" depth to electric primary.

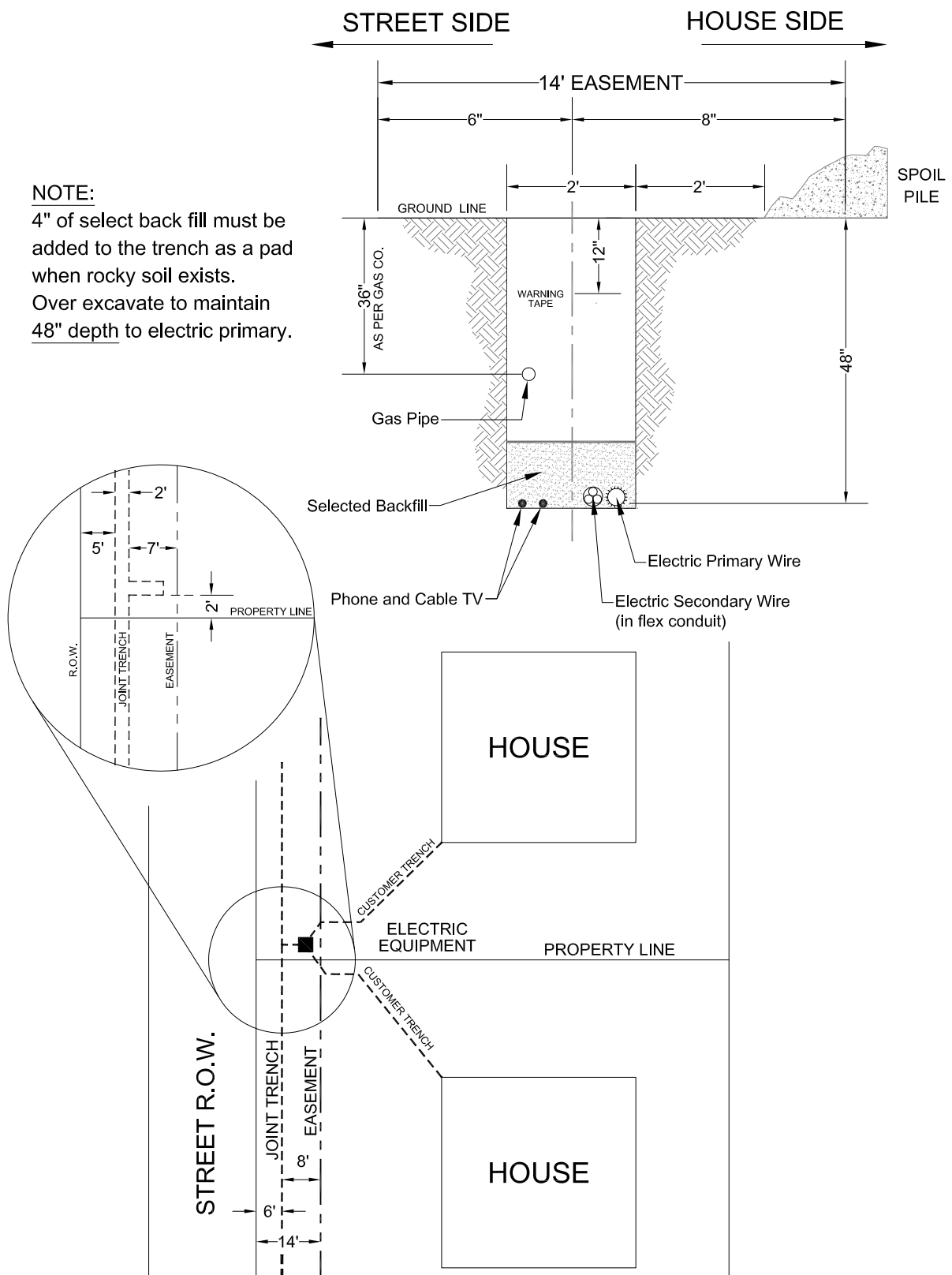


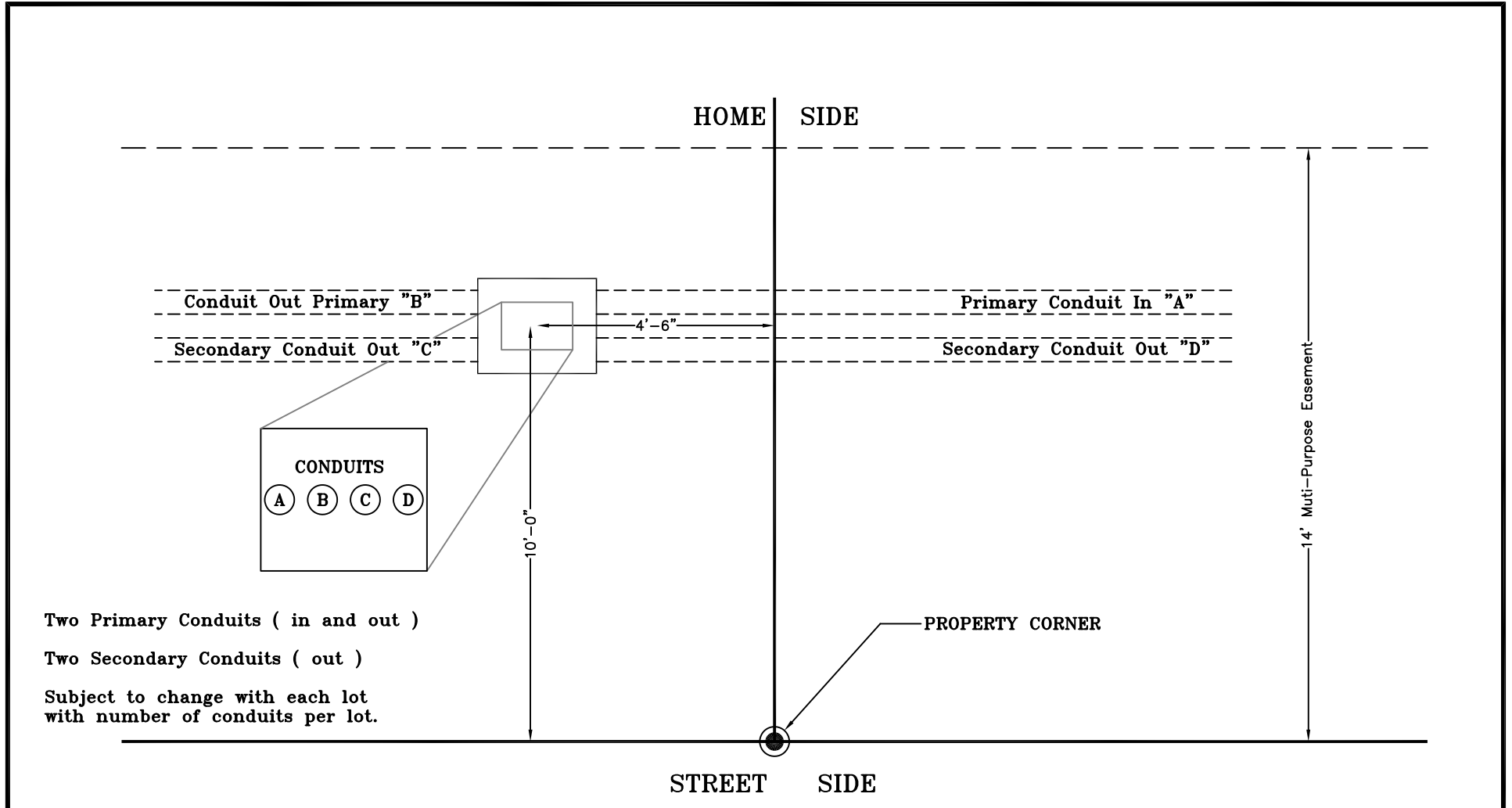
FIGURE 1
TRENCH SPECIFICATIONS / CONFIGURATION

Revision Date

Dec. 13, 2020



UR2



THIS DRAWING TO DEVELOPER WITH MAP OF
CROSSING AT TIME OF CONTRACT.

DATE ___/___/___

GRAND VALLEY POWER
CONDUIT STUB LOCATION

DATE: 10/14/99

DRAWN: D.S.G



SPECIFICATIONS FOR CONSTRUCTION1. General

All construction work shall be done in a thorough and workman-like manner in accordance with the Staking Sheets, Plans and Specifications, and the Construction Drawings.

The Sixth Edition of the National Electrical Safety Code shall be followed except where local regulations are more stringent, in which case local regulations shall govern.

2. Distributing Poles

In distributing the poles, large, choice, close-grained poles shall be used for transformer, deadend, angle, and corner poles.

3. Pole Setting

The minimum depth for setting poles shall be as follows:

<u>Length of Pole (feet)</u>	<u>Setting in Soil (feet)</u>	<u>Setting in All Solid Rock (feet)</u>
20	4.0	3.0
25	5.0	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0

"Setting in Soil" specifications shall apply:

- a. Where poles are to be set in soil.
- b. Where there is a layer of soil of more than two (2) feet in depth over solid rock.
- c. Where the hole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

"Setting in All Solid Rock" specifications shall apply where poles are to be set in solid rock and where the hole is substantially vertical, approximately uniform in diameter and large enough to permit the use of tamping bars the full depth of the hole.

Where there is a layer of soil two (2) feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to

the depth specified under "Setting in All Solid Rock" provided, however, that such depth shall not exceed the depth specified under "Setting in Soil."

On sloping ground, the depth of the hole always shall be measured from the low side of the hole.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.

Poles shall be set in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line.

Poles shall be raked against the conductor strain not less than one inch for each ten feet of pole length nor more than two inches for each ten feet of pole length after conductors are installed at the required tension.

Pole backfill must be thoroughly tamped the full depth. Excess dirt must be banked around the pole.

4. Grading of Line

When using high poles to clear obstacles such as buildings, foreign wire crossings, railroads, etc., there shall be no upstrain on pin-type insulators in grading the line each way to lower poles.

5. Guys and Anchors

Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the Construction Drawings.

All anchors and rods shall be in line with the strain and shall be so installed that approximately six inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.

When a cone anchor is used, the hole, after the anchor has been set in place, shall be backfilled with coarse crushed rock for two feet above the anchor, tamping during the filling with the remainder of the hole to be backfilled and tamped with dirt.

6. Locknuts

A locknut shall be installed with each nut, eyenut or other fastener on all bolts or threaded hardware such as insulator pins, upset bolts, double arming bolts, etc.

7. Conductors

Conductors must be handled with care. Conductors shall not be tramped on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing.

The neutral conductor should be maintained on one side of the pole (preferably the road side) for tangent construction and for angles not exceeding 30 degrees.

With pin-type insulators the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type insulators shall be tight on the pins and on tangent construction the top groove must be in line with the conductor after tying in.

For neutral and secondary conductors on poles, insulated brackets (Material Item da) may be substituted for the single and double upset bolts on angles of 0° to 5° in locations known to be subject to considerable conductor vibration.

All conductors shall be cleaned thoroughly by wirebrushing before splicing or the installation of a connector or clamp. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

8. Splices and Deadends

Conductors shall be spliced and deadended as shown on the Construction Drawings. There shall be not more than one splice per conductor in any span and splicing sleeves shall be located at least ten feet from the conductor support. No splices shall be located in Grade B crossing spans and preferably not in the adjacent spans.

9. Taps and Jumpers

Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the Construction Drawings it will be provided by at least two bends in a vertical plane, or one in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.

All leads on equipment such as transformers, reclosers, etc., shall be a minimum of #6 copper conductivity. Where aluminum jumpers are used, a

connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a suitable aluminum compression sleeve.

10. Hot-Line Clamps and Connectors

Connectors and hot-line clamps suitable for the purpose shall be installed as shown on Guide Drawings. On all hot-line clamp installations, the clamp and jumper shall be so installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected. This applies in all cases, even where the line layout is such that the tap line is in actuality the main back to the power source.

11. Lightning Arrester Gap Settings

The external gap electrodes of lightning arresters, combination arrester-cutout units, and transformer mounted arresters shall be adjusted to the manufacturers' recommended spacing. Care shall be taken that the adjusted gap is not disturbed when the equipment is installed.

12. Conductor Ties

Ties shall be in accordance with Construction Drawings. Hot-line ties shall not be used at Grade "B" crossings.

13. Sagging of Conductors

Conductors shall be sagged in accordance with the conductor manufacturers' recommendation. All conductors shall be sagged evenly. The air temperature at the time and place of sagging shall be determined by a certified etched glass thermometer.

The sag of all conductors after stringing shall be in accordance with the conductor manufacturers' recommendations, except that a maximum increase of three inches of the specified sag in any span will be acceptable. However, under no circumstances will a decrease in the specified sag be allowed.

14. Secondaries and Service Drops

Secondary conductors may be bare or covered wires or multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturers' recommendations.

Conductors for secondary underbuild on primary lines will normally be bare except in those instances where prevailing conditions may limit primary span lengths to the extent that covered wires or service cables may be used. Service drops shall be covered wire or service cable.

Secondaries and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in

any span, and splicing sleeves shall be located at least ten feet from the conductor support. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run.

15. Grounds

Ground rods shall be driven full length in undisturbed earth in accordance with the Construction Drawings. The top shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with a clamp and secured to the pole with staples. The staples on the ground wire shall be spaced two feet apart except for a distance of eight feet above the ground and eight feet down from the top of the pole where they shall be six inches apart.

All equipment shall have at least two connections from the frame, case or tank to the multi-grounded neutral conductor.

The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.

16. Clearing Right-of-Way

In preparing the right-of-way, trees shall be removed, underbrush cleared and trees trimmed so that the right-of-way shall be clear from the ground up and of the width required. Trees fronting each side of the right-of-way shall be trimmed symmetrically unless otherwise specified. Dead trees beyond the right-of-way which would strike the line in falling shall be removed. Leaning trees beyond the right-of-way which would strike the line in falling and which would require topping if not removed shall either be removed or topped except that shade, fruit, or ornamental trees shall be trimmed and not removed unless otherwise authorized.

Where RCL units are specified, the right-of-way shall be cleared in accordance with the specifications and, in addition, all stumps one-half inch in diameter and larger shall be sprayed in accordance with the following specifications:

A mixture consisting of eight pounds acid equivalent of a low volatile 2, 4, 5-T ester (2 gallons of concentrate) mixed with 48 gallons of No. 2 fuel oil shall be used for spraying. The mixture shall be agitated thoroughly during mixing and application to ensure a uniform distribution of the chemical throughout the oil.

The entire periphery of each stump to be treated shall be sprayed by thoroughly saturating the bark from freshly cut surface to ground line, including exposed roots, until runoff is effected at ground line. Bark shall not be wet from dew, fog or rain at time spraying is done.

Spraying shall be performed in such manner, at such pressure, and under such wind conditions that drift of spray material to adjacent vegetation will be avoided. Spraying should be performed the same day that brush and tree cutting removal work is completed but in no event later than 72 hours from the time tree cutting is performed. If moisture or wind conditions prevent treatment in accordance with the above, spraying shall be performed as soon thereafter as possible.

To facilitate application, supervision and inventory of RC assembly units, the spray solution shall be colored by the addition of an oil soluble red dye suitable for use in the 2, 4, 5-T ester and oil mixture. The dye shall be equivalent to "Oil Red" or "Red O."

INDEX OF CONSTRUCTION DRAWINGS

Single-Phase:

VA1, VA1A	0° to 5° angle, single primary support
VA1-1, VA1-1A	0° to 5° angle, double primary support
VA1-2	0° to 5° angle, double primary and neutral supports
VA2	Double primary supports, maximum transverse loading -- 500 Lbs./pin (5° to 30° maximum angle)
VA2-3	Double primary and neutral supports, maximum transverse loading -- 500 Lbs./pin (5° to 30° maximum angle)
VA3	Vertical construction, 30° to 60° angle
VA4	Vertical construction, 60° to 90° angle
VA5	Vertical deadend (single)
VA5-1, VA5-2, VA5-2A	Single phase tap
VA5-3, VA5-4	Single phase tap
VA6	Vertical Deadend (double)
VA7, VA7-1	Crossarm construction--deadend (single)
VA8	Crossarm construction--deadend (double)
VA9	Crossarm construction--double line arm
VA9-1	Crossarm construction--single line arm

Two-Phase:

VB1, VB1A	Crossarm construction--0° to 5° angle, single primary support
VB1-1, VB1-1A	Crossarm construction--0° to 5° angle, double primary support
VB2	Crossarm construction--double primary supports, maximum transverse loading--750 Lbs./pin (5° to 30° maximum angle)
VB3, VB3A	Vertical construction--30° to 60° angle
VB4-1, VB4-1A	Vertical construction--60° to 90° angle
VB5-1, VB5-1A	Vertical construction--deadend (single)
VB7, VB7-1	Crossarm construction--deadend (single)
VB8	Crossarm construction--deadend (double)
VB9, VB9-2	Crossarm construction--double line arm
VB9-1, VB9-3	Crossarm construction--single line arm

Three-Phase:

VC1, VC1B	Crossarm construction--0° to 5° angle, single primary support
VC1-1, VC1-1A	Crossarm construction--0° to 5° angle, double primary support
VC1-2	Crossarm construction--0° to 2° angle (large conductors)
VC1-3	Crossarm construction--0° to 5° angle, double primary support (large conductors)

VC1-4	Crossarm construction--2° to 5° angle (large conductors)
VC1-5	Crossarm construction--single primary support with overhead neutral
VC-2	Crossarm construction--double primary support, maximum transverse loading--500 Lbs./pin (5° to 30° maximum angle)
VC2-1	Crossarm construction--double primary support, maximum transverse loading--750 Lbs./pin (5° to 30° maximum angle)
VC2-2	Crossarm construction--double primary support, large conductors, maximum transverse loading--1000 Lbs./pin (5° to 30° maximum angle)
VC3	Vertical construction--30° to 60° angle
VC3L	Vertical construction--30° to 60° angle (large conductors)
VC3-1	Vertical construction--10° to 20° angle (large conductors)
VC4-1	Vertical construction--60° to 90° angle
VC4-1L	Vertical construction--60° to 90° angle (large conductors)
VC5-1	Vertical construction--deadend (single)
VC5-1L	Vertical construction--deadend (single) (large conductors)
VC7, VC7-1	Crossarm construction--deadend (single)
VC8	Crossarm construction--deadend (double)
VC8-1	Crossarm construction--deadend (double)
VC8-2	Crossarm construction--deadend (double) (large conductors)
VC8-3	Crossarm construction--deadend (double) (large conductors with unbalanced loads)
VC9	Crossarm construction--double line arm
VC9-1	Crossarm construction--single line arm
VC9-2	Crossarm construction--double line arm, 0° to 5° angle (large conductors)
VC9-3	Crossarm construction--single line arm (large conductors)

Three-Phase, Double Circuit:

VDC-C1	Crossarm construction--0° to 5° angle, single primary support (2 crossarm type)
VDC-C1B	Crossarm construction--0° to 5° angle, single primary support with overhead neutral (2 crossarm type)
VDC-C1L	Crossarm construction--0° to 5° angle, single primary support (2 crossarm type) (large conductors)
VDC-C2-1	Crossarm construction--5° to 30° angle (2 crossarm type)
VDC-C2-1L	Crossarm construction--double primary supports, maximum transverse loading--1000 Lbs./pin (2 crossarm type) (large conductors) 5° to 30° maximum angle
VDC-C3	Vertical construction--30° to 60° angle
VDC-C4-1	Vertical construction--60° to 90° angle
VE1-1, VE1-2, VE1-3	Single down guy, through-bolt type
E2-1, E2-2, E2-3	Single overhead guy, through-bolt type
E3-2, E3-3, E3-10	Single down guy, wrapped type
E4-2, E4-3	Single overhead guy, wrapped type
VE5-1, VE5-2	Deadend guy, crossarm construction
VE6-2, VE6-3	Double down guy

VE7-2L, VE7-3L	Three down guys (large conductors)
VE8-2L, VE8-3L	Four down guys (large conductors)
E11, E12	Single loop guy, wrapped type

Anchor Assemblies:

F1-1 to F1-4	Line anchor assemblies
F2-1 to F2-4	Log anchor assemblies
F4-1	Service anchor assemblies
F5-1, F5-2, F5-3	Rock anchor assemblies
F6-1, F6-2, F6-3	Swamp anchor assembly

Transformer Assemblies:

VG10, VG66, VG106	Single phase transformer at deadend
VG10	Conventional transformer with tank-mounted cutout and arrester
VG66	Transformer with double gap and internal fuse
VG106	Self protected transformer
VG19, VG65, VG105	Single phase transformer at one-phase tangent
VG19	Conventional transformer with tank mounted cutout and arrester
VG65	Transformer with double gap and internal fuse
VG105	Self protected transformer
VG39, VG67, VG136	Single phase transformer on three-phase circuit
VG39	Conventional transformer with tank mounted cutout and arrester
VG67	Transformer with double gap and internal fuse
VG136	Self protected transformer
GL50, VG150	One autotransformer
VG210	Two transformers, cluster-mounted, open wye, for 120/240 volt power loads
VG310	Three transformers, cluster-mounted, ungrounded wye delta, for 120/240 volt power loads
VG311	Three transformers, cluster-mounted, three wire, grounded delta, for 240 or 480 volt power loads
VG312	Three transformers, cluster-mounted, four wire, grounded wye-grounded wye, for 120/208 volt power loads

Secondary Assemblies:

J5 to J12	Secondary assemblies
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Service Assemblies:

K10, K11, K14	Single conductors
K10C	Cable
K10L, K11L, K14L	Large conductors

K11C, K14C, K15C	Cable
K16C, K17L, K17	Ranch-type houses

Miscellaneous Assemblies:

VM2-11	Grounding assembly--ground rod type
VM2-11A	Grounding assembly--ground rod type
VM2-12	Pole protection assembly--butt type
VM2-12A, VM2-12A2	Pole protection assembly--wrap-around type(A): Plate type (A2)
M2-15	Grounding assembly--ground rod type for sectionalizing air break switch
VM3-1A, VM3-4	One sectionalizing fuse cutout
VM3-2, VM3-3	Two or three sectionalizing disconnect switches
VM3-10A	One sectionalizing oil circuit recloser
VM3-16	Sectionalizing airbreak switch
VM3-19, VM3-20	Two or three sectionalizing oil circuit reclosers
VM3-19A, VM3-20A	Two or three sectionalizing oil circuit reclosers
VM3-23	One sectionalizing oil circuit recloser with by-pass switch
VM3-24, VM3-25	Two or three sectionalizing oil circuit reclosers with by-pass switches
VM3-24A, VM3-25A	Two or three sectionalizing oil circuit reclosers with by-pass switches
VM5-1 to 8	Miscellaneous primary assemblies
M5-9 to 16	Miscellaneous primary assemblies
M5-17 to 23	Miscellaneous primary assemblies

Regulators:

VM7-1	One voltage regulator assembly, platform mounted
VM7-3	Three voltage regulators, platform mounted

Metering Assembly Guide Drawings:

M8	Secondary metering, single phase, 120/240 volts
M8-6	Secondary metering, three phase, 120/240 volts, 4-wire delta
M8-9	Yard pole meter installation, pump service carried underground
M8-10	Yard pole meter installation, all building services carried underground
M8-11	Secondary metering, three phase, 120/208 volts, 4-wire grounded wye
M8-12	Secondary metering, three phase, 240 volts, 3-wire corner grounded delta

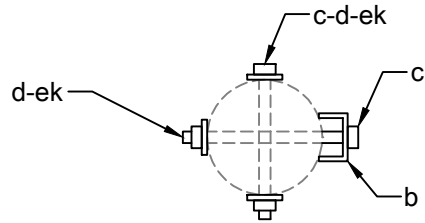
cing Horn Assemblies:

VM10-14	Single phase, arcing horn assembly guide
VM10-15	Three phase, arcing horn assembly guide

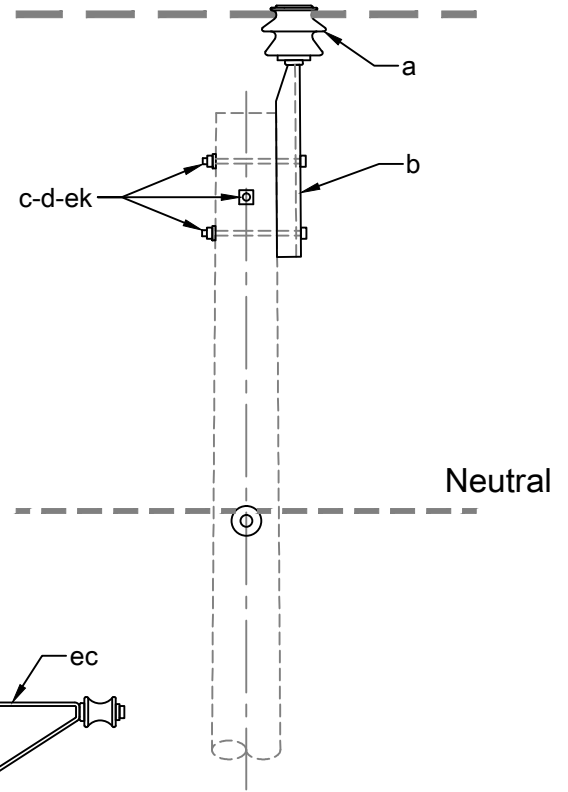
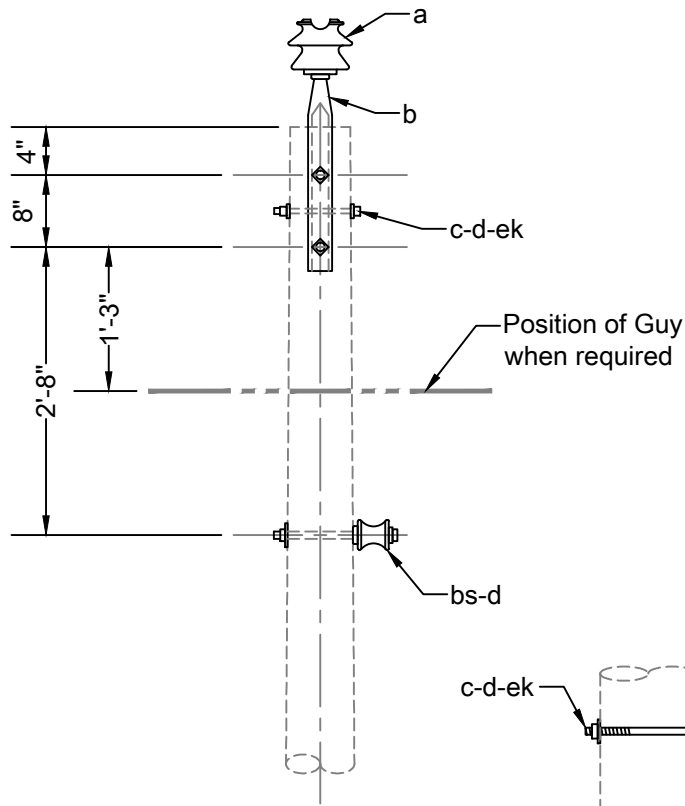
Side Drawings:

M19	Crossarm drilling guide
M20	Pole framing guide
M21	Angle construction guide, crossarm to vertical construction, 30° to 60° angle
M22-1	Tree trimming guide
M22-2	Tree trimming guide
M24	Cable service assembly guide
M24-1	Open wire service assembly guide
M24-10	Assembly guide of service mast for ranch-type house
M26-5	Security light installation guide (unmetered)
M27	Transformer connection guide, open wire services
M27-1	Transformer connection guide, triplex cable services
M27-2	Transformer connection guide, secondary underbuild
M28	Transformer connection and service take-off guide from secondary
VM29-1	Tap assembly guide
VM33-1 to VM33-6	Side arm assemblies
M40-1A	Tying guide--single insulator, one piece tie--copper type conductors with preformed armor rods
M40-1A2	Tying guide--single insulator, two piece tie, copper type conductors with preformed armor rods
M40-8	Hot line tying guide--copper type conductors with preformed armor rods
M40-10	Tying guide--single insulator, aluminum tie wire, ACSR conductor, straight or preformed armor rods
M40-11	Armor rods, ACSR conductors
M40-12	Preformed armor rods, ACSR conductors
M40-13	Preformed armor rods, copper type conductors
M40-17	Tying guide--double insulator, aluminum tie wire, ACSR conductor, straight or preformed armor rods
M40-6	Hot line tying guide, single insulator aluminum tie wire, ACSR conductor with straight or preformed armor rods
M40-16	Hot line tying guide, double insulator aluminum tie wire, ACSR conductor with straight or preformed armor rods
M40-19	Hot line tying guide, single insulator pre-coiled aluminum tie wire, ACSR conductor with straight or preformed armor rods

M41-1	Angle assembly guide, vertical construction, 30° to 60° angle, copper type conductors with preformed rods
M41-10	Angle assembly guide, vertical construction, 30° to 60° angle, ACSR conductors with straight or preformed armor rods
M42-3	Deadend assembly guide, deadend clamp method, copperweld copper and copper conductors
M42-11	Deadend assembly guide, deadend clamp method, ACSR conductors
M42-13	Deadend assembly guide, large conductors
M42-21	Deadend assembly guide, compression method, copper type conductors
M43-4	Tap assembly guide, copperweld copper and copper conductors
M43-10	Tap assembly guide, ACSR conductors
M45-20	Splicing guide, compression type, copper type conductors
M45-21	Splicing guide, compression type, ACSR conductor
M45-22	Splicing guide, compression type, ACSR conductors, 2/0 and larger 1/0 optional
M52-3, M52-4	Neutral identification and pole numbering guide
R1	Clearing right-of-way guide



Pole Top Pin Assembly



Specify VA1-1A for
Offset Neutral Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	bs	1	Bolt, single upset, insulated, (VA1 only)
b	1	Pin, pole top, 20"	ek	-	Locknuts, as required
c	3	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2 1/4"			(ADDITIONAL MATERIALS FOR VA1A)
d	2	Washer, 3" square, curved	c	1	Bolt, machine 5/8" x required length
			j	1	Screw, lag, 1/2" x 4", (VA1A only)
			ec	1	Bracket, offset, insulated, (VA1A only)

14.4 / 24.9 KV PRIMARY, 1-PHASE
0 TO 5° ANGLE, SINGLE PRIMARY SUPPORT

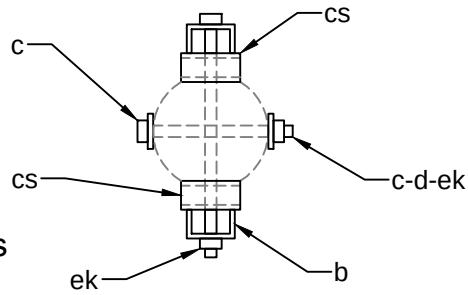
Revision Date

Jan 22, 2020

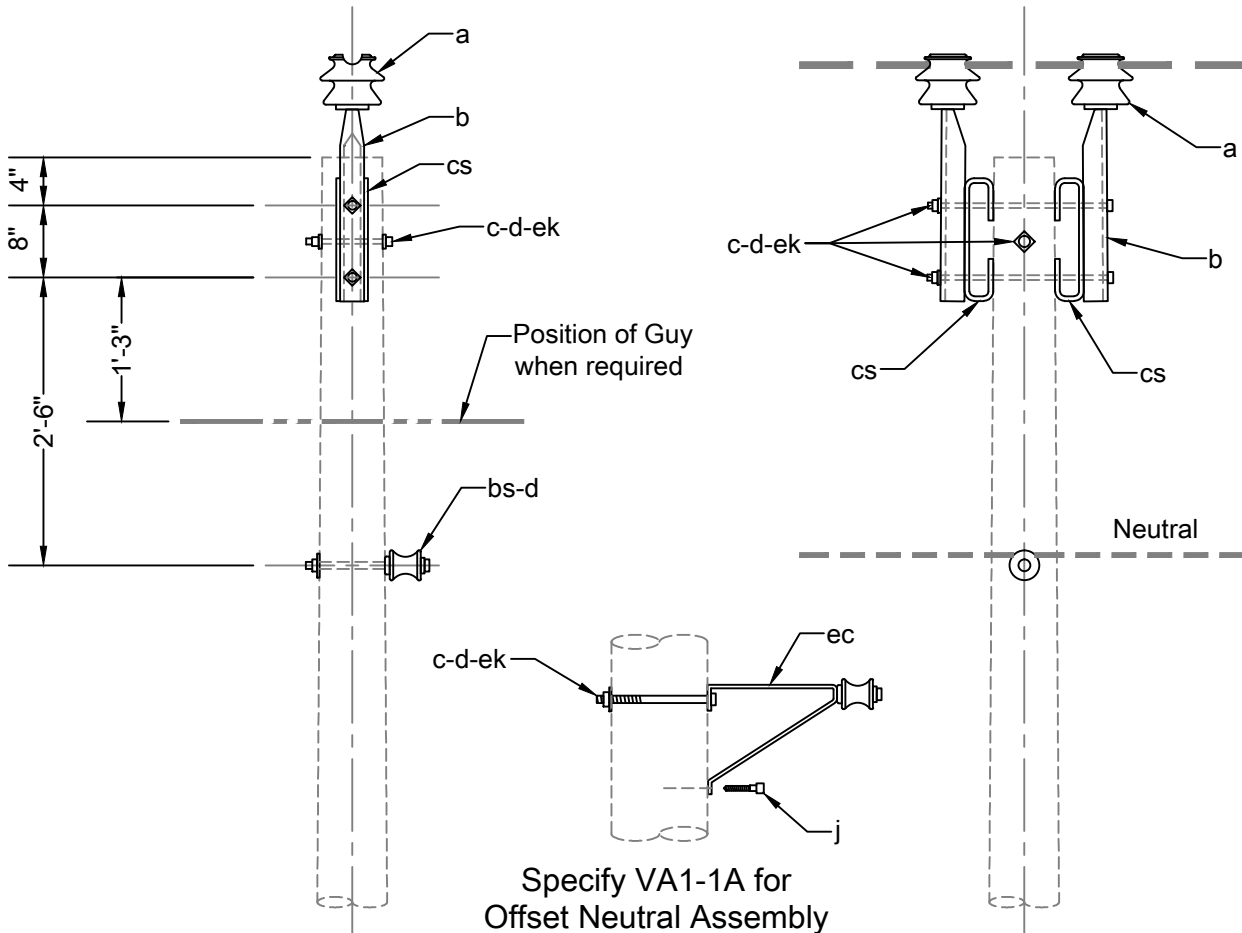


VA1
VA1A

Pole to be gained on both sides, to provide a flat surfaces for the brackets.



Pole Top Pin Assembly



Specify VA1-1A for Offset Neutral Assembly

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	ek	-	Locknuts, as required
b	2	Pin, pole top, 20"	cs	2	Bracket, pole top, 1/4" x 3"
c	3	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2 1/4"			(ADDITIONAL MATERIAL FOR VA1-1A)
d	2	Washer, 3" square, curved	c	1	Bolt, machine 5/8" x required length
bs	1	Bolt, single upset, insulated, (VA1-1 only)	j	1	Screw, lag, 1/2" x 4", (VA1-1A only)
			ec	1	Bracket, offset, insulated, (VA1-1A only)

14.4 / 24.9 KV PRIMARY, 1-PHASE 0 TO 5° Angle, Single Primary Support

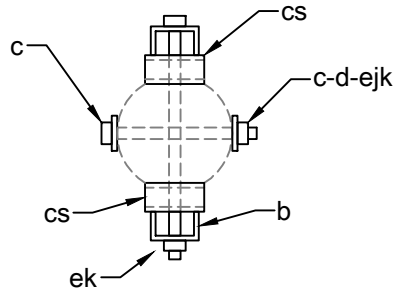
Revision Date

Aug 16, 2016

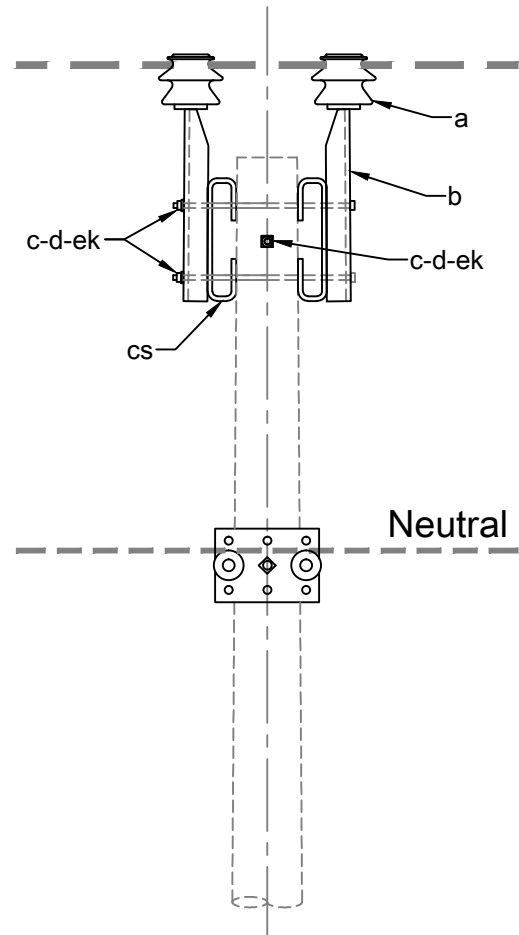
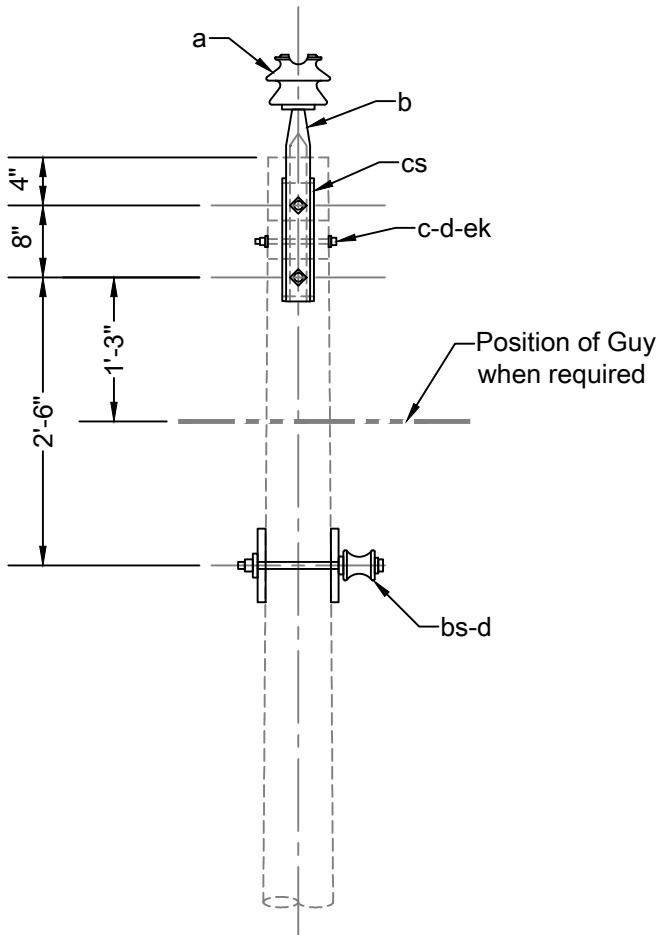


VA1-1
VA1-1A

Pole to be gained on both sides, to provide a flat surfaces for the brackets.



Pole Top Pin Assembly



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	ek	-	Locknuts, as required
b	2	Pin, pole top, 20"	cs	2	Bracket, pole top, 1/4" x 3"
c	3	Bolt, machine, 5/8" x required length	en	2	Plate, double support
d	1	Washer, square, 2 1/4"			
d	2	Washer, 3" square, curved			
bs	2	Bolt, single upset, insulated			

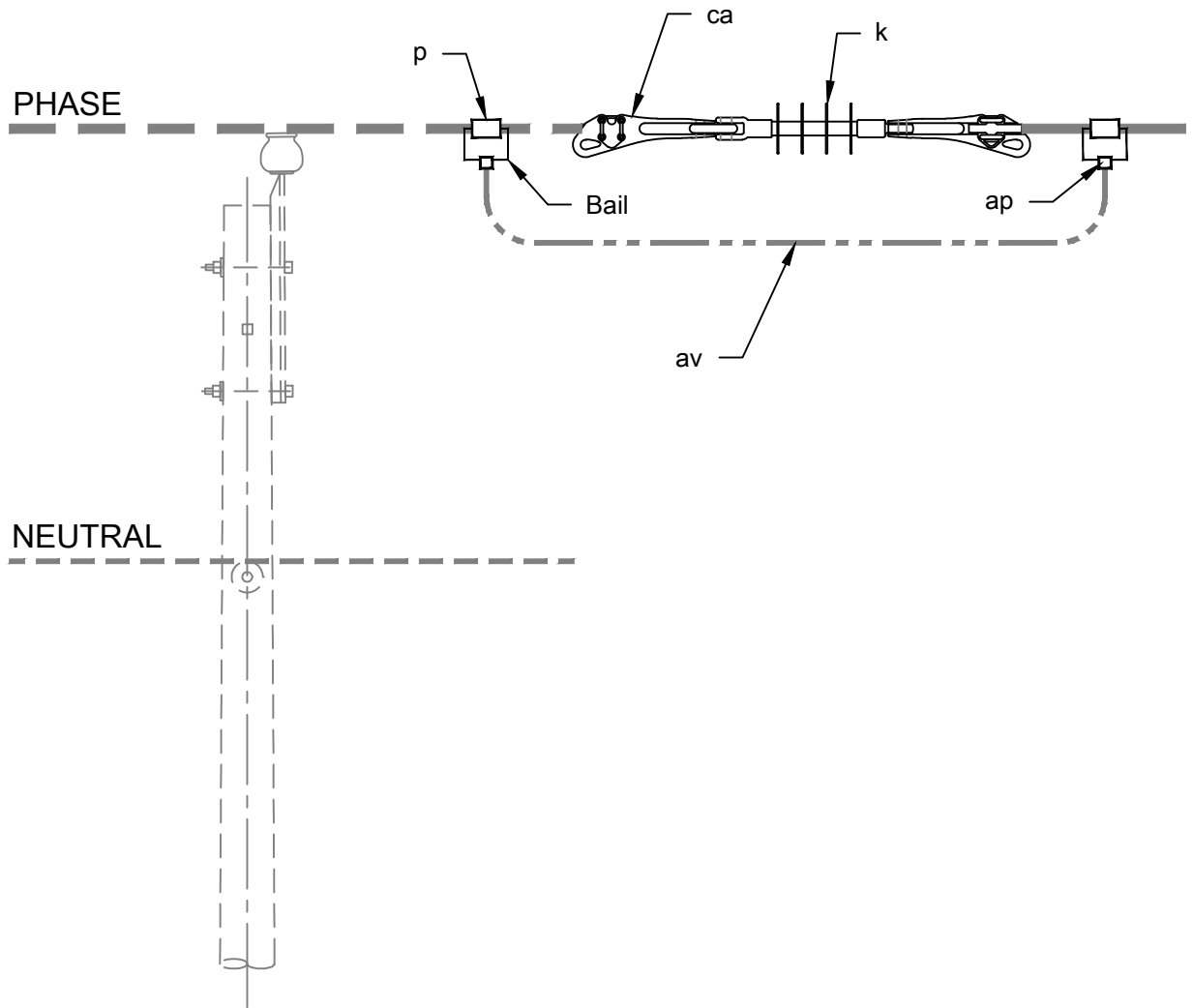
14.4 / 24.9 KV PRIMARY, 1-PHASE
0° TO 5° ANGLE, DOUBLE PRIMARY AND NEUTRAL SUPPORTS

Revision Date

Jan 22, 2020



VA1-2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
k	1	Insulator, suspension epoxilator	ap	2	Clamp, hot line
p	2	Connectors, crimpit as required	av	-	Jumper, as required
-	2	Bail, hot line	ca	2	Deadend assembly, primary

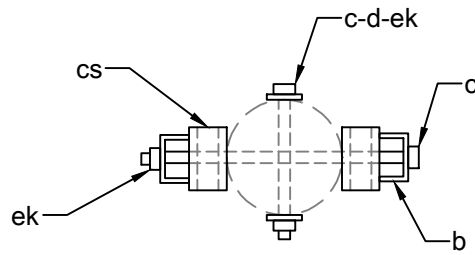
14.4 / 24.9 KV PRIMARY, 1 - PHASE SECTIONALIZING IN CONDUCTOR DEADEND

Revision Date

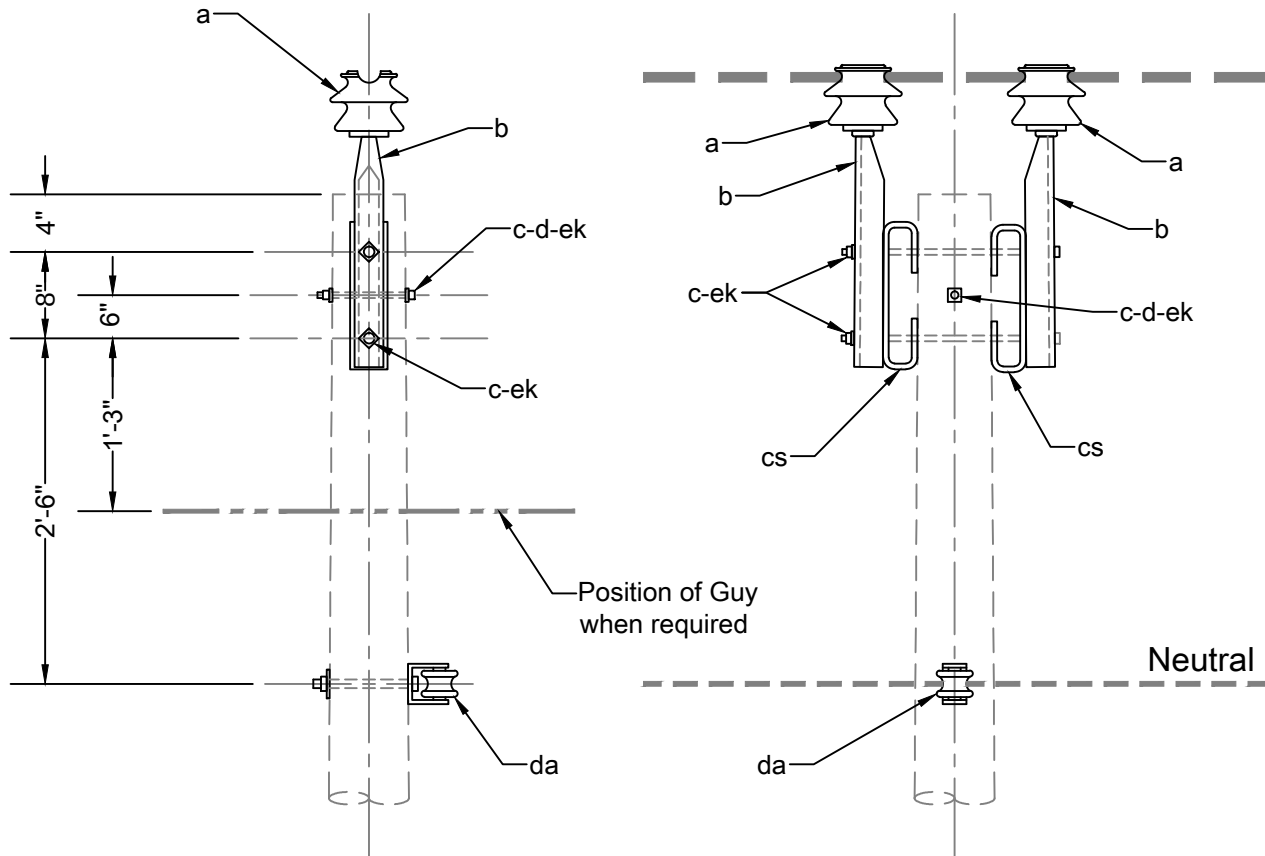
Jan. 22, 2020



VA1X



Pole Top Pin Assembly



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	cs	2	Bracket, pole top, 1/4" x 3"
b	2	Pin, pole top, 20"	da	1	Bracket, insulated
c	4	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	3	Washer, 3" square, curved			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per pin

Maximum line angle within load limits:
5° to 30° Angle

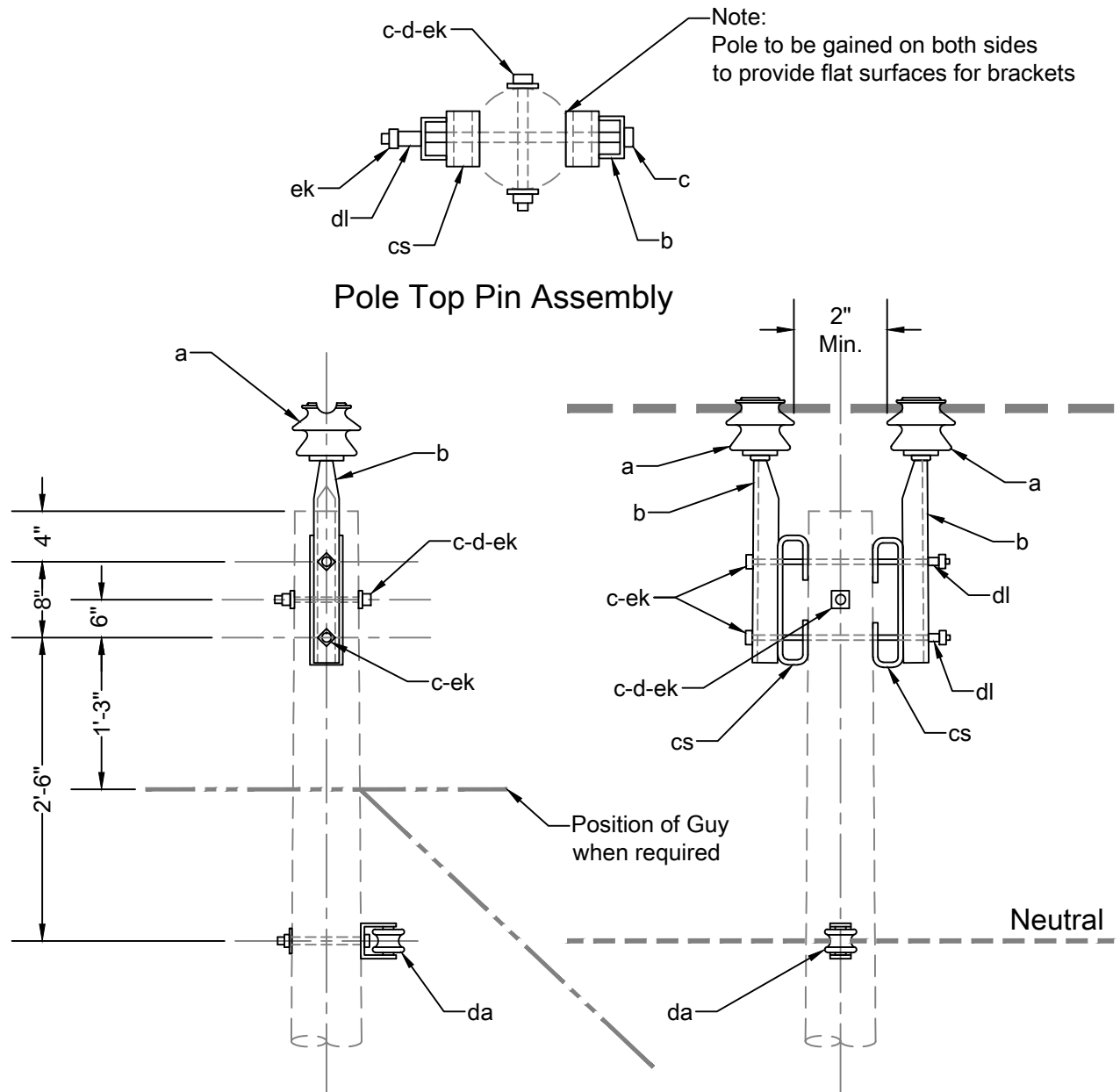
14.4 / 24.9 KV PRIMARY, 1 PHASE DOUBLE PRIMARY SUPPORT

Revision Date

Jan 4, 2016



VA2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	cs	2	Bracket, pole top, 1/4" x 3"
b	2	Pin, pole top, 20"	da	1	Bracket, insulated
c	4	Bolt, machine, 5/8" x required length	dl	2	Pipe spacer, pole pin, 3/4" dia. x 1 1/2"
d	3	Washer, 3" square, curved	ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
500 lbs. per pin

Maximum line angle within load limits:
5° to 30° Maximum Angle

14.4 / 24.9 KV PRIMARY, 1 PHASE DOUBLE PRIMARY SUPPORT

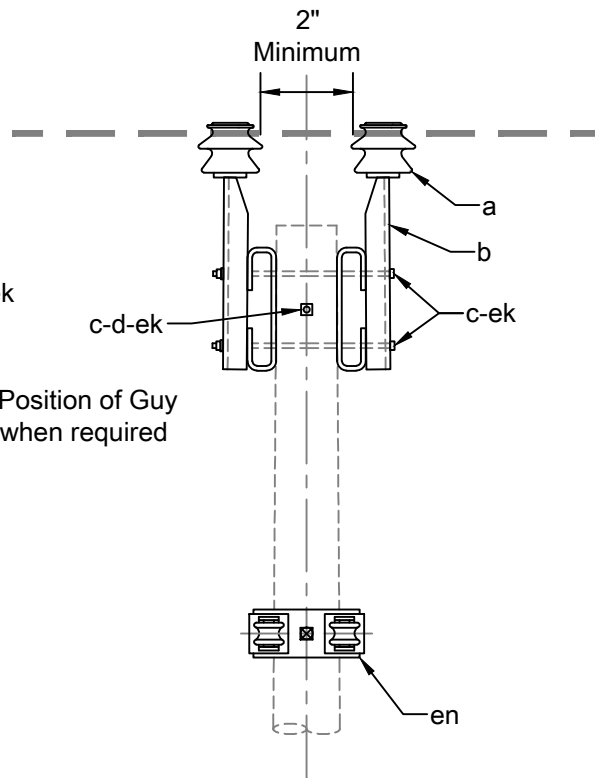
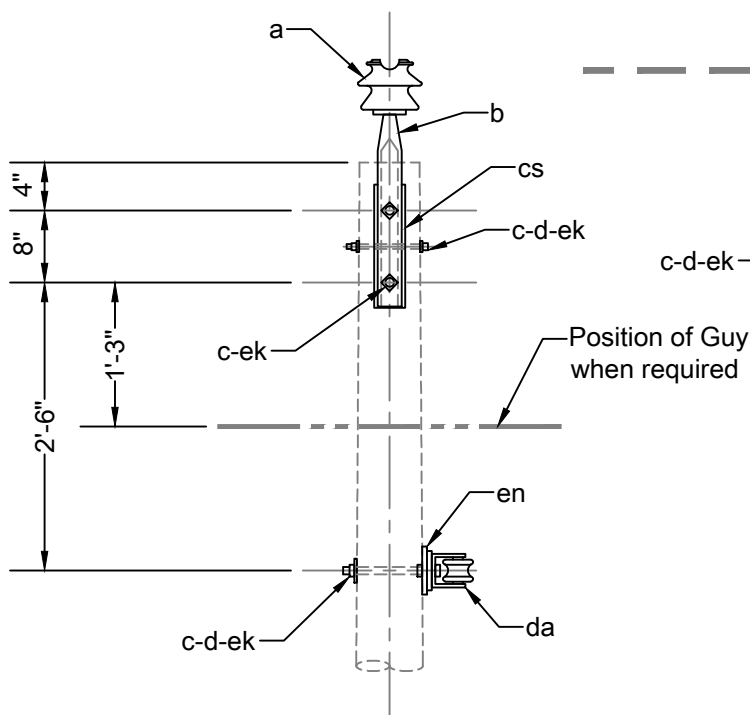
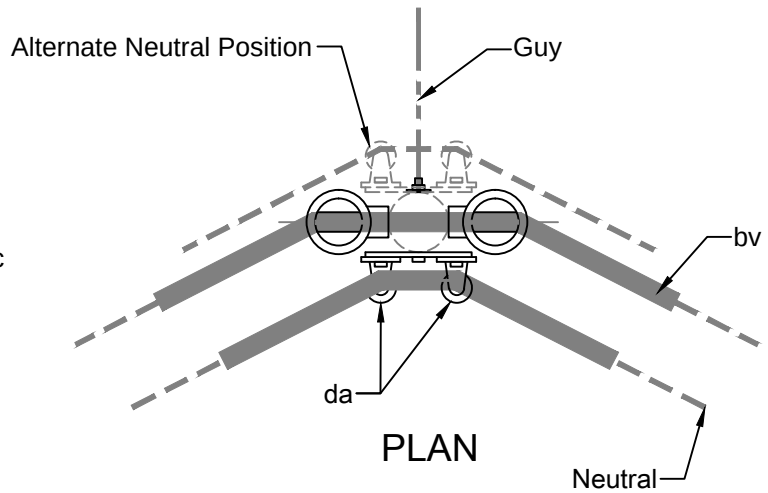
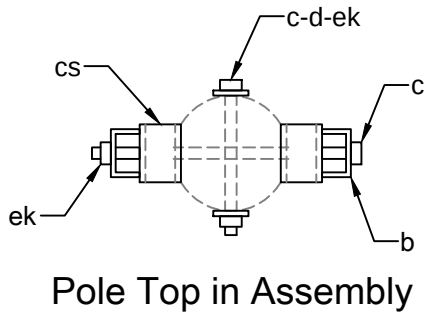
Revision Date

Jan 4, 2016



VA2A

Note:
Pole to be gained on
both sides to provide
flat surfaces for brackets.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	bv	2	Rod, armor, selected size
b	2	Pin, pole top, 20"	da	1	Bracket, insulated
c	6	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	1	Washer, square, 2 1/4" x 13/16" hole	en	1	Plate, double support
d	3	Washer, 3" square, curved			
cs	1	Bracket, pole top, 1/4" x 3"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per pin
Maximum line angle within load limits:
5° to 30°

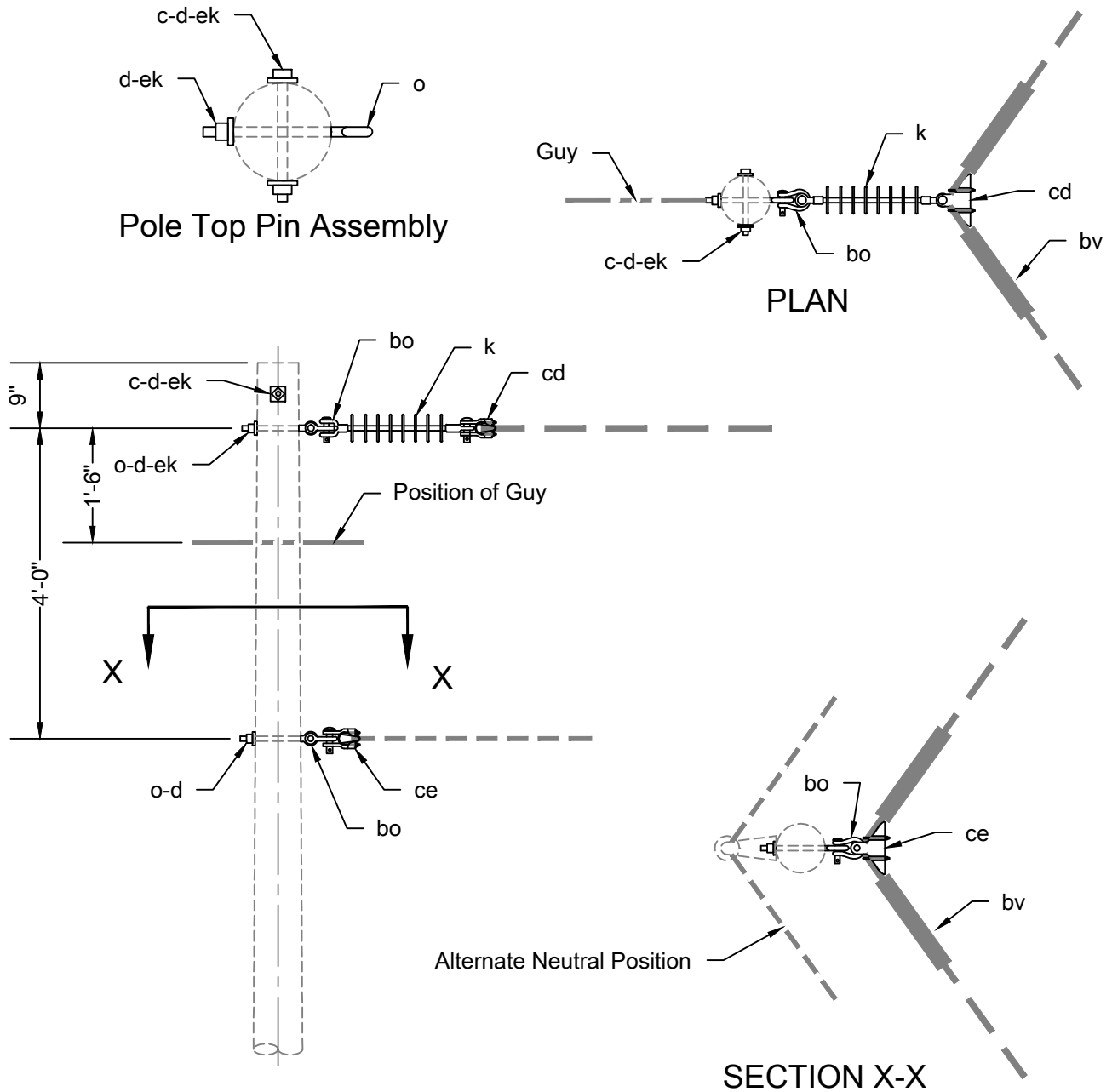
14.4 / 24.9 KV PRIMARY, 1-PHASE DOUBLE PRIMARY AND NEUTRAL SUPPORTS

Revision Date

Jan 5, 2016



VA2-3



Note: Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	bv	2	Rod, Armor, select size
d	4	Washer, square, 3" curved	cd	1	Angle assembly, primary
k	1	Insulator, suspension, epoxilator	ce	1	Angle assembly, neutral
o	2	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
bo	2	Shackle, anchor			

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor.

Maximum line angle within load limits:
20° to 60°

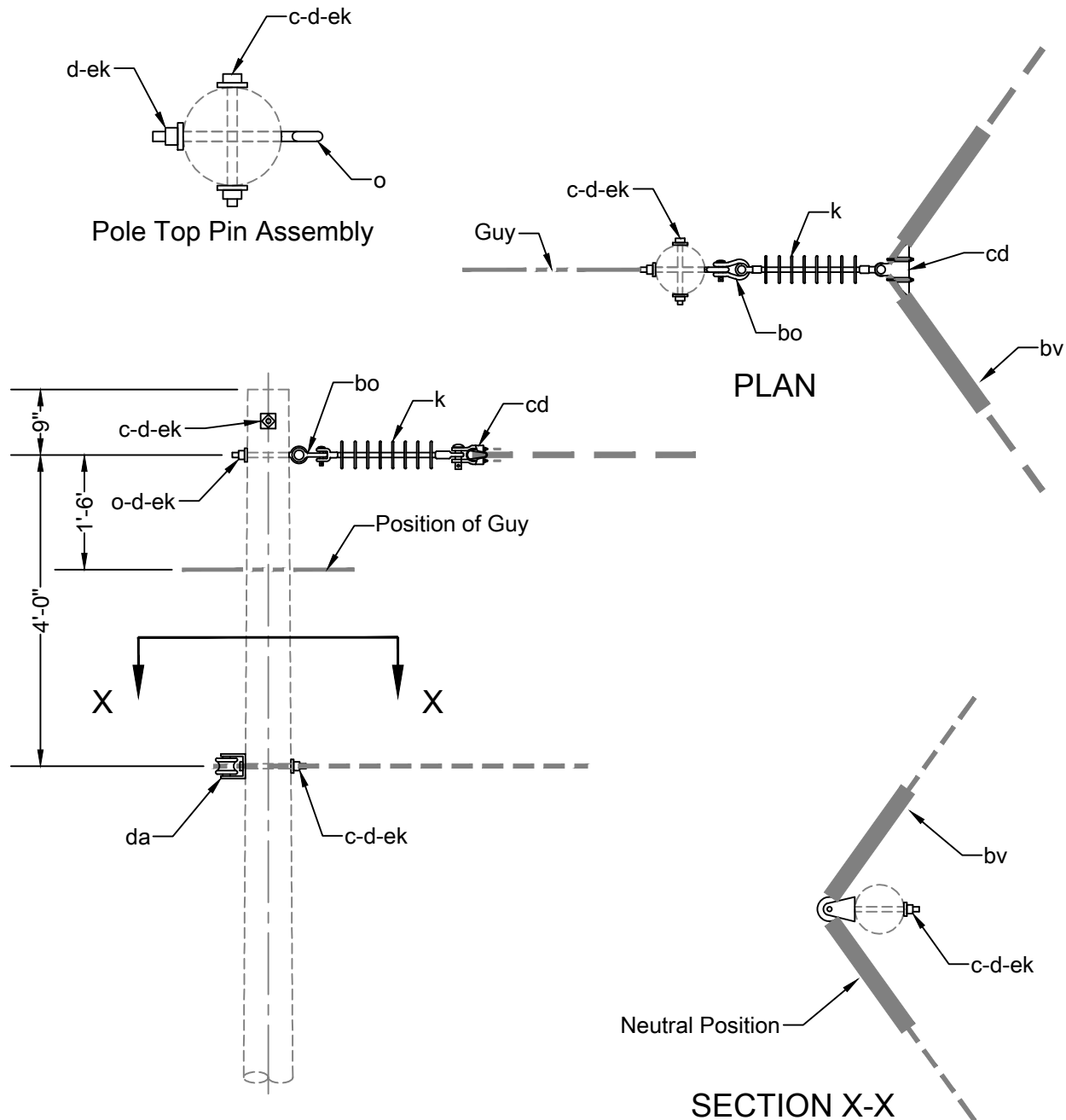
14.4 / 24.9 KV PRIMARY, 1-PHASE
30° TO 60° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Jan 22, 2020



VA3



ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	bv	2	Rod, Armor, required size
d	2	Washer, square, 2 1/4"	cd	1	Angle assembly, primary
d	2	Washer, square, 3" curved	da	1	Bracket, insulated, J10
k	1	Insulator, suspension, 25kv epoxilator	ek	-	Locknut, as required
o	2	Bolt, eye, 5/8" x required length			
bo	1	Shackle, anchor			

DESIGN LIMITS

Maximum transverse load: 4000 lbs.
4000 lbs. per conductor.

Maximum line angle within load limits:
20° to 60° Angle

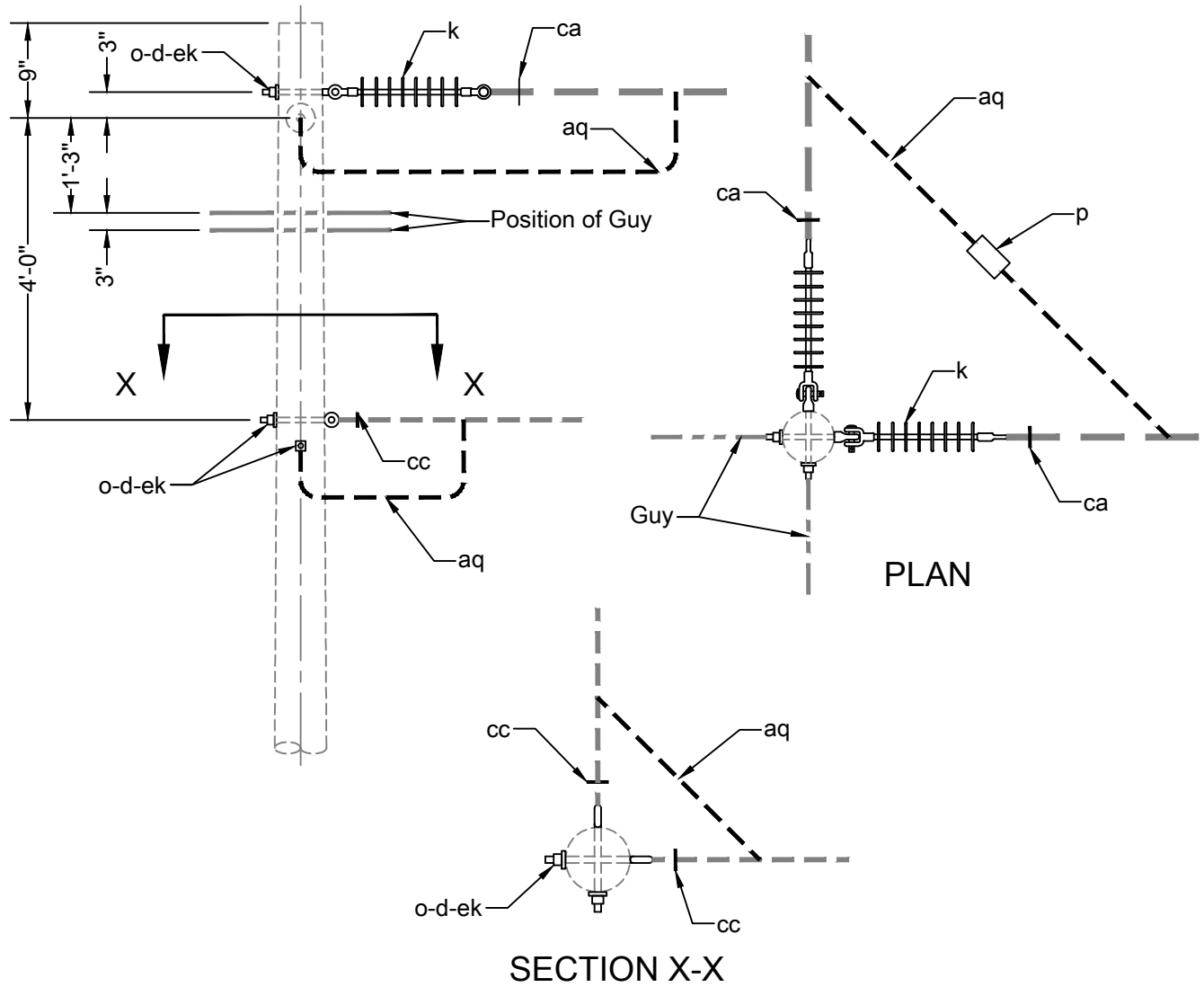
14.4 / 24.9 KV PRIMARY, 1-PHASE
30° TO 60° ANGLE, SINGLE PRIMARY SUPPORT

Revision date

Jan 22, 2020



VA3B



Note: Item ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
d	4	Washer, square, 3" curved	ca	2	Deadend assembly, primary
k	2	Insulator, suspension, epoxilator	cc	2	Deadend assembly, neutral
o	4	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
p	-	Connectors, as required	aq	-	Jumpers, as required

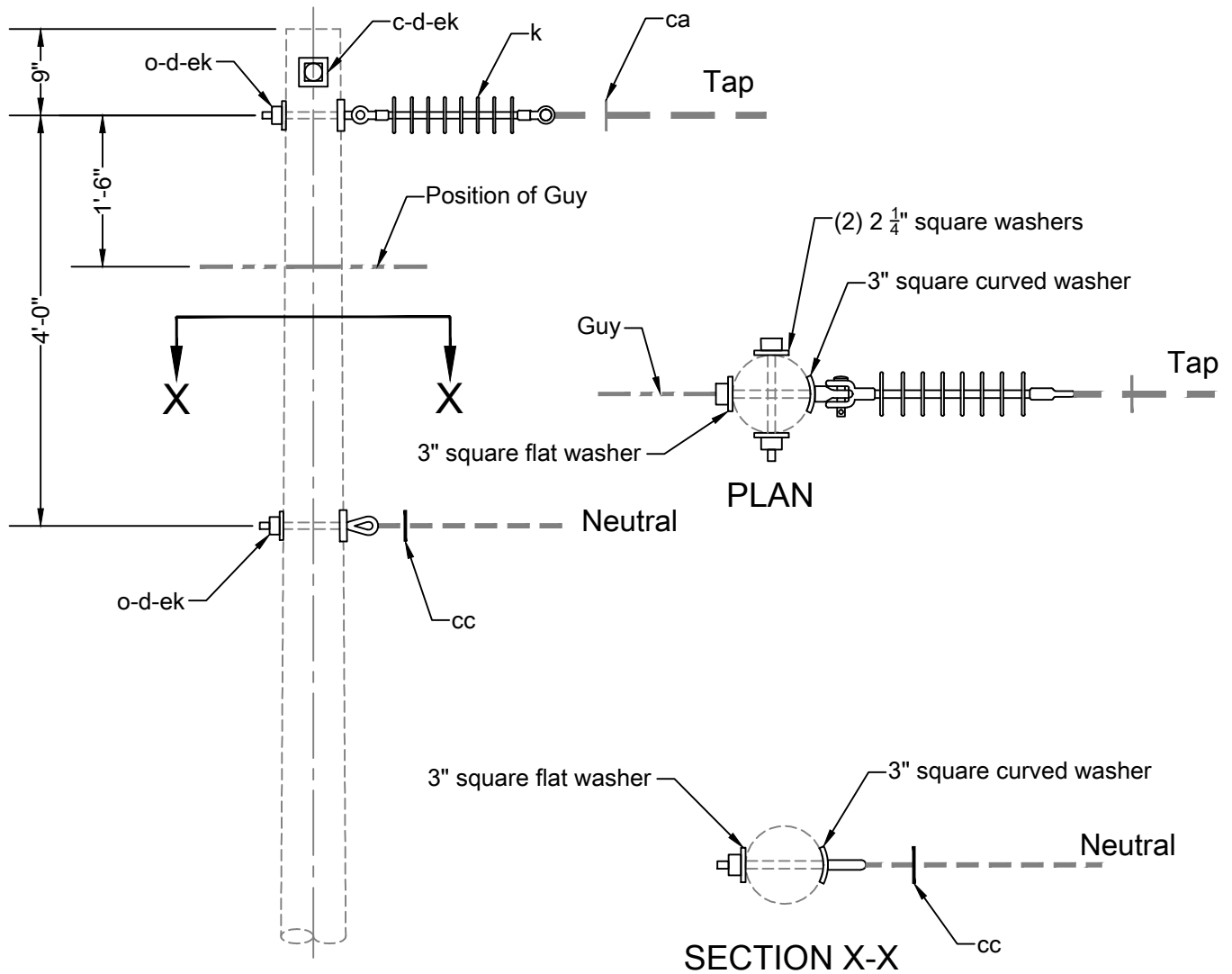
14.4 / 24.9 KV PRIMARY, 1-PHASE
60° TO 90° ANGLE, SINGLE PRIMARY SUPPORT

Revision Date

Jan 22, 2020



VA4



Note:

Item ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	o	2	Bolt, eye, 5/8" x required length
d	2	Washer, square, 2 1/4"	ca	1	Deadend assembly, primary
d	2	Washer, square, 3" flat	cc	1	Deadend assembly, neutral
d	2	Washer, square, 3" curved	ek	-	Locknut, as required
k	1	Insulator, suspension, epoxilator			

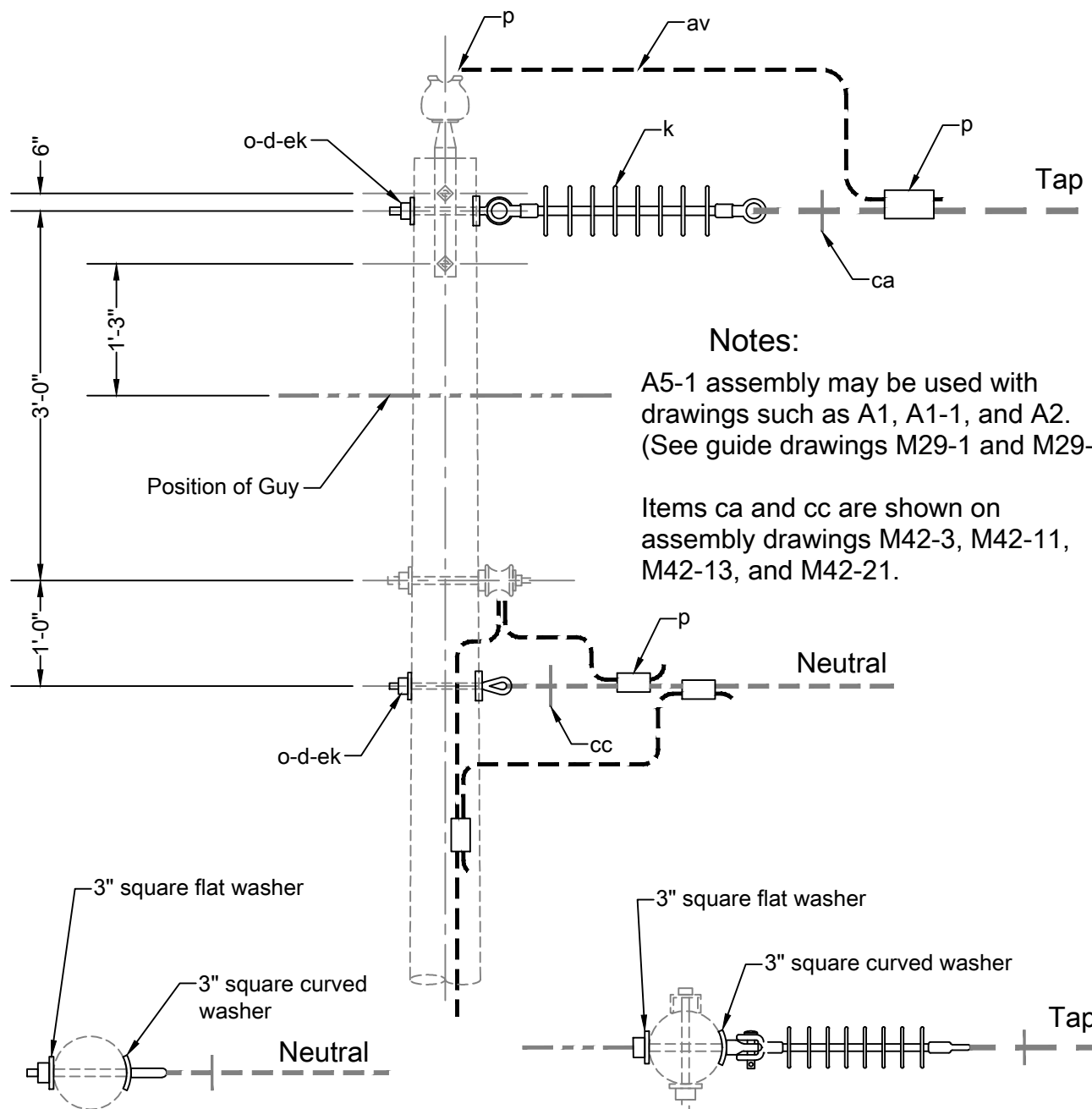
14.4 / 24.9 KV PRIMARY, 1-PHASE
DEADEND (SINGLE) , SINGLE PRIMARY SUPPORT

Revision Date

Jan 6, 2016



VA5



PLAN

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 3" curved	av	-	Jumpers and leads, as required
d	2	Washer, square, 3" flat	ca	1	Deadend assembly, primary
k	1	Insulator, suspension, epoxilator	cc	1	Deadend assembly, neutral
o	2	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
p	-	Connectors, as required			

Modified to meet
2005 RUS Standards.

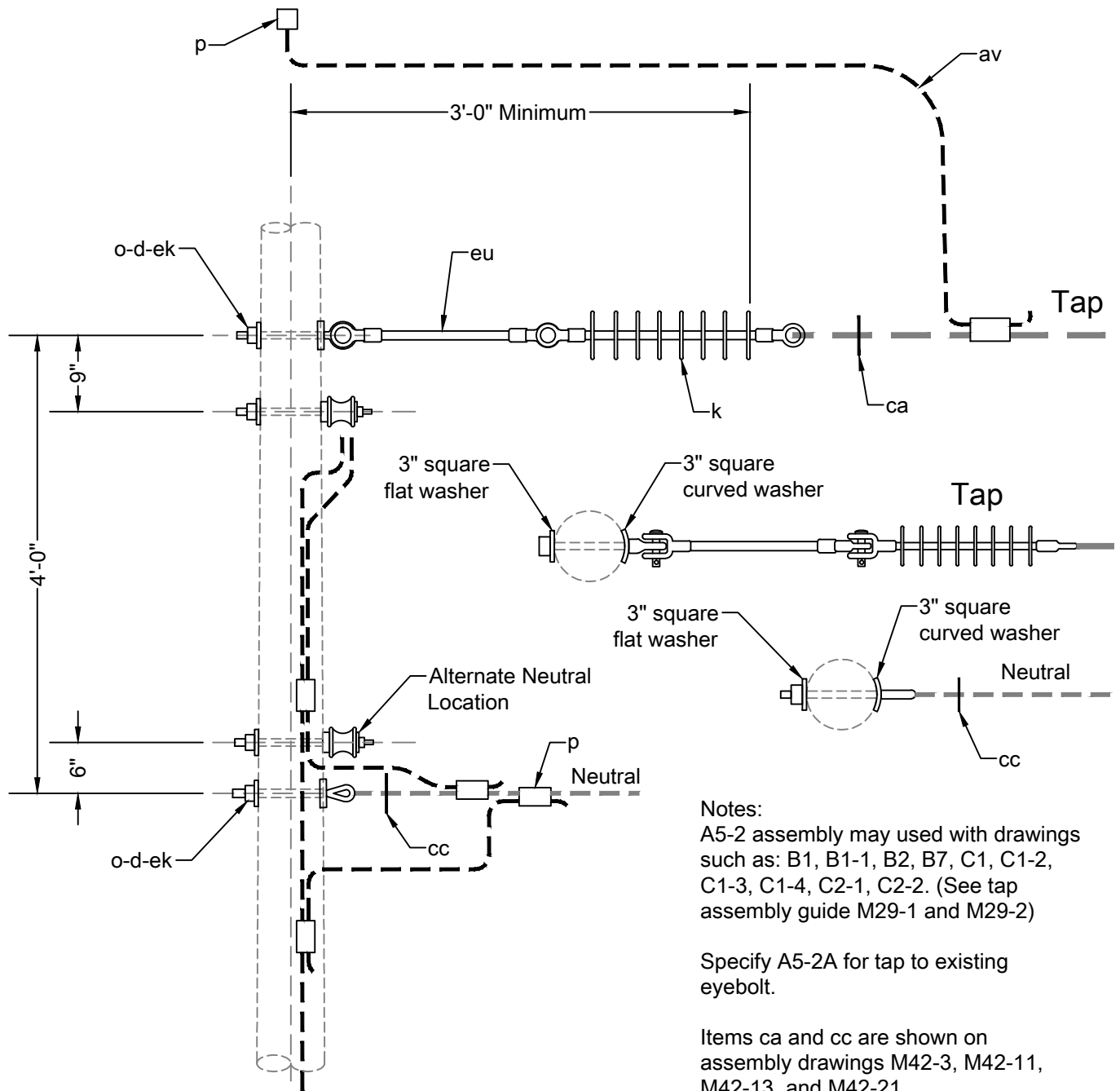
14.4 / 24.9 KV PRIMARY
SINGLE PHASE TAP

Revision Date

JAN 6, 2016



VA5-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 3" curved	aa	2	Nut, eye, 5/8 (A5-2A only)
d	2	Washer, square, 3" flat	av	-	Jumpers and leads, as required
k	1	Insulator, suspension, epoxylator	ca	1	Deadend assembly, primary
o	2	Bolt, eye, 5/8" x required length	cc	1	Deadend assembly, neutral
p	-	Connectors, as required	ek	-	Locknuts, as required
			eu	1	Link, extension, insulated

Modified to meet
2005 RUS Standards.

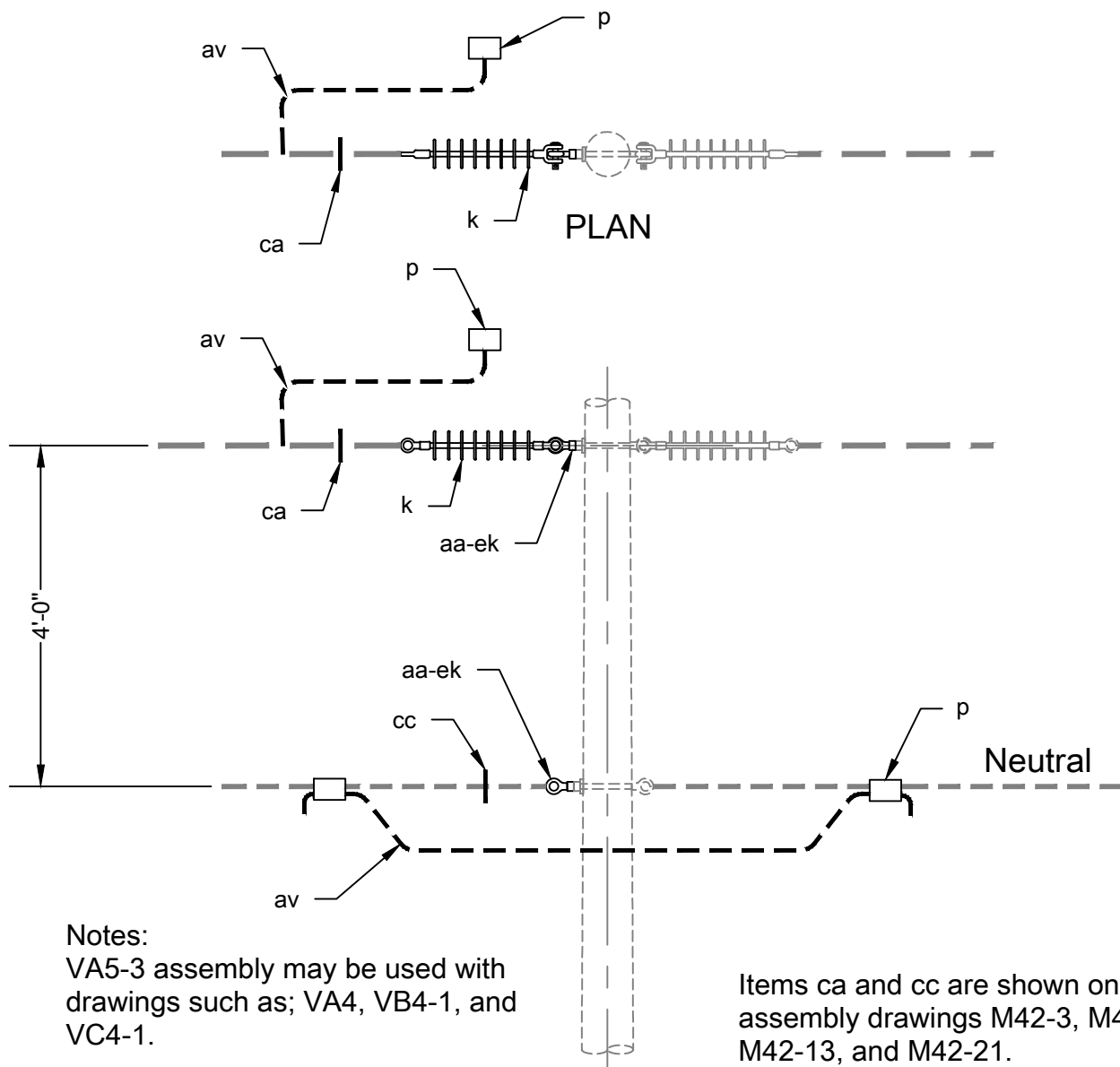
14.4 / 24.9 KV PRIMARY SINGLE PHASE TAP

Revision Date

JAN 6, 2016



VA5-2
VA5-2A



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
k	1	Insulator, suspension, epoxilator	av	-	Jumpers, as required
p	-	Connectors, as required			
aa	2	Nut, eye, 5/8"			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	-	Locknuts, as required			

Modified to meet
2005 RUS Standards.

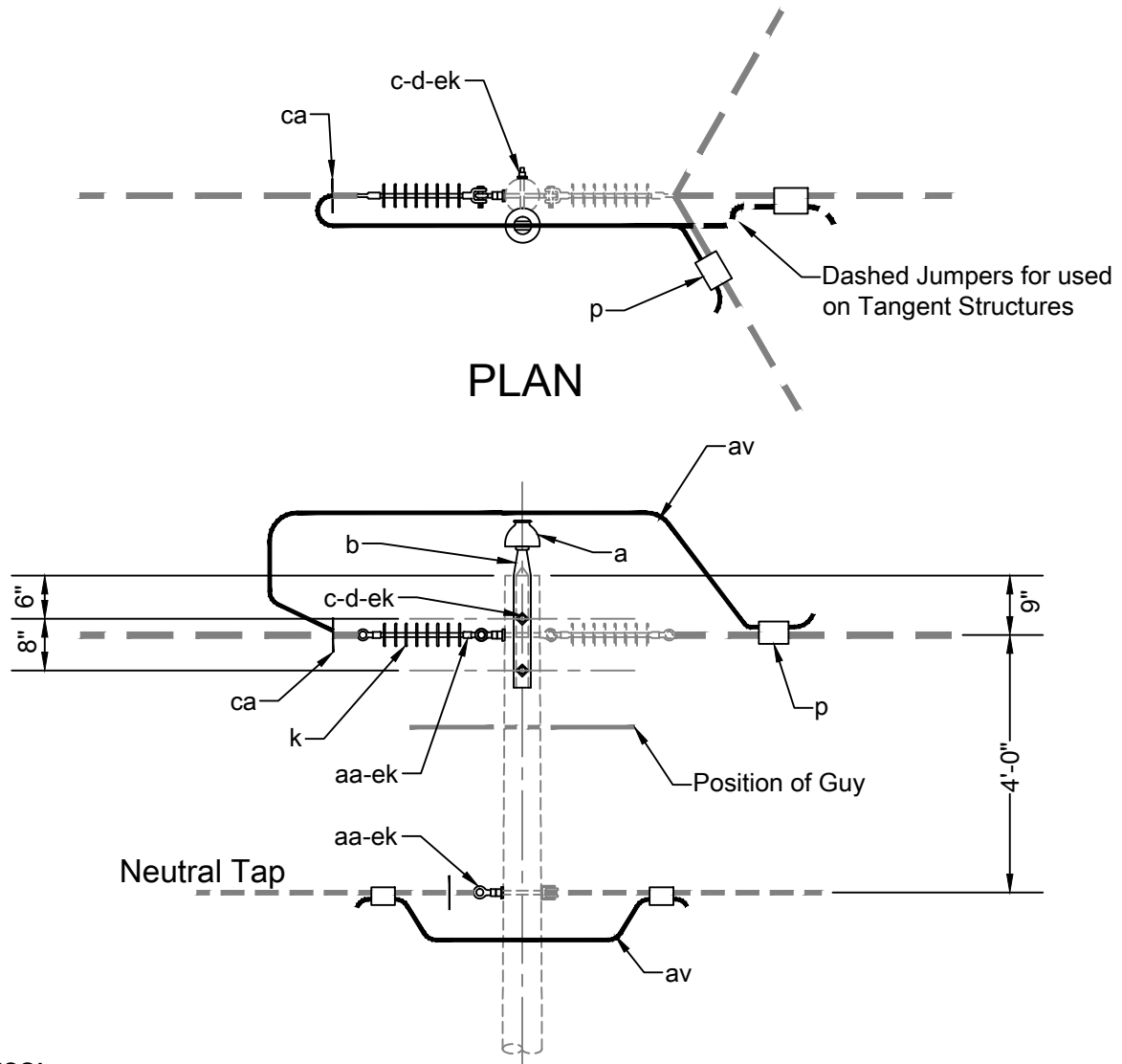
14.4 / 24.9 KV PRIMARY
SINGLE PHASE TAP

Revision Date

Jan 6, 2016



VA5-3



Notes:

VA5-4 assembly may be used with VA3, VA5, VB3, VB5-1, VC3, and VC5-1 structures.

Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

See guide drawings VM29-1 and VM29-2.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	1	Insulator, pin type	av	-	Jumpers, as required
b	1	Pin, pole top, 20"	ca	1	Deadend assembly, primary
c	2	Bolt, machine, 5/8" x required length	cc	1	Deadend assembly, neutral
d	2	Washed, 2 1/4" square	ek	-	Locknuts, as required
k	1	Insulator, suspension, epoxilator			
p	-	Connectors, as required			
aa	2	Nut, eye, 5/8"			

Modified to meet
2005 RUS Standards

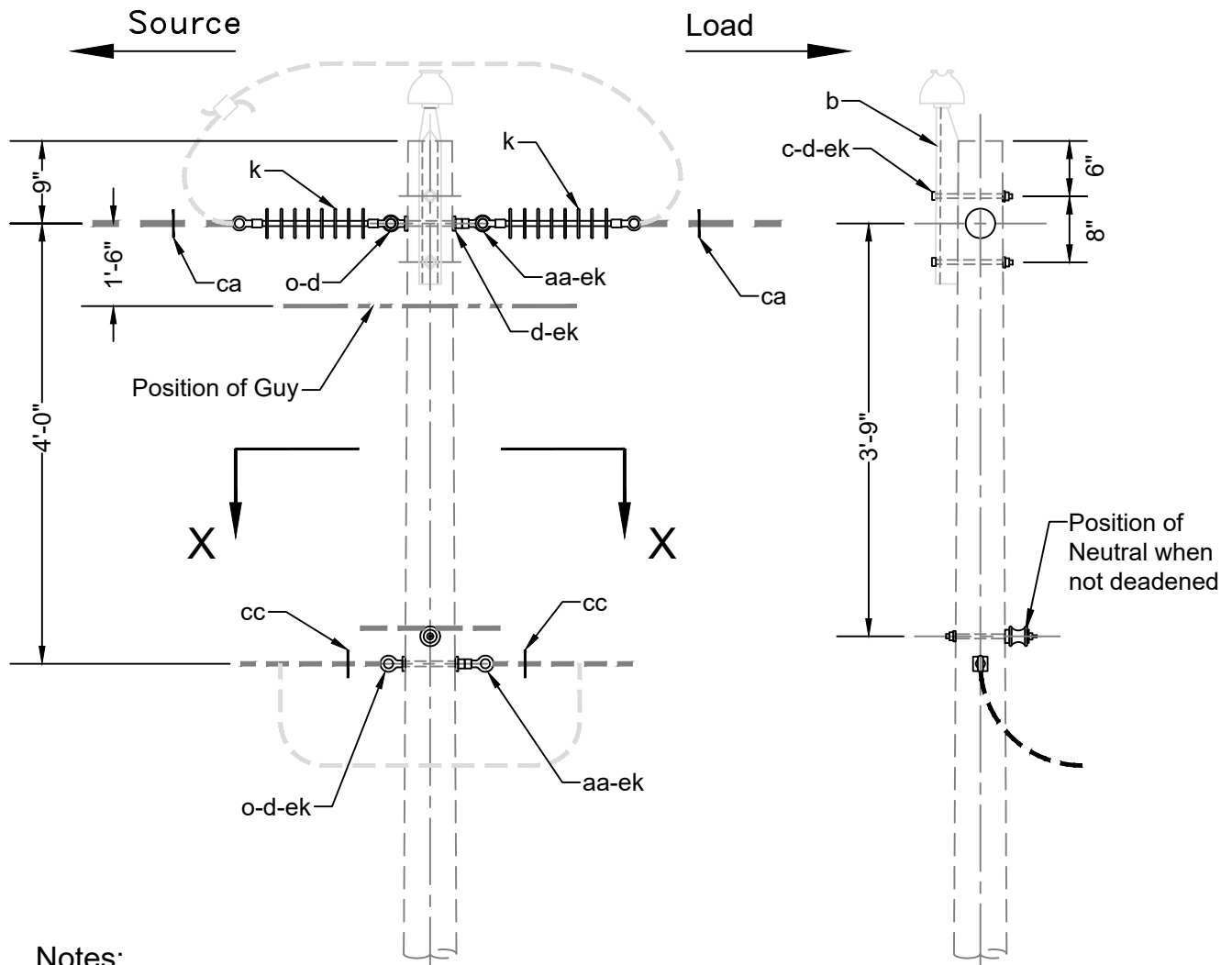
**14.4 / 24.9 KV PRIMARY
SINGLE PHASE TAP**

Revision date

JAN 6, 2016

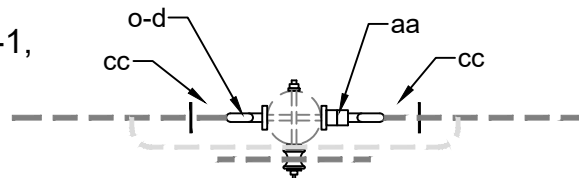


VA5-4



Notes:

VA6 may be used with drawings such as VM3-1A, VM3-10, VM3-41, VM3-23, VM5-1, VM5-4, VM5-2 (as shown). Items ac and aa are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.



For Feed Through use Unit VA6-1

SECTION X-X

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
b	1	Pin, pole top, 20"	o	2	Bolt, eye, 5/8" x required length
c	2	Bolt, machine, 5/8" x required length	aa	2	Nut, eye, 5/8"
d	2	Washed, 2 1/4" Square,	ca	1	Deadend assembly, primary
d	4	Washed, square, 3" curved	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknuts, as required

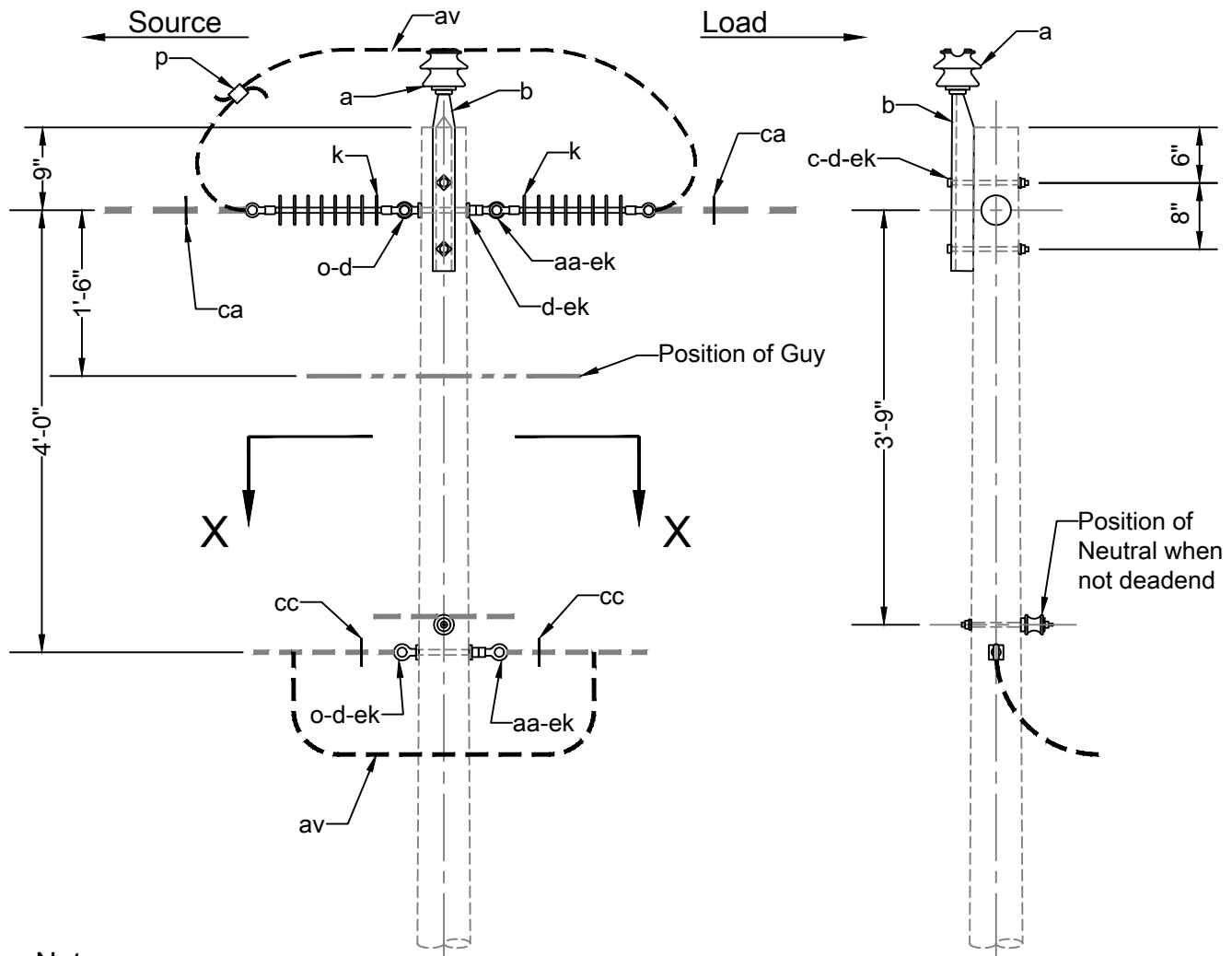
14.4 / 24.9 KV PRIMARY, 1 PHASE
VERTICAL DEADEND (DOUBLE)

Revision Date

April 30, 2020



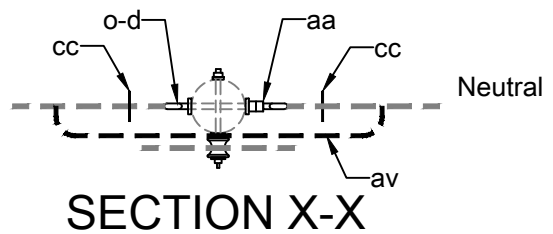
VA6



Notes:

VA6 may be used with drawings such as VM3-1A, VM3-10, VM3-41, VM3-23, VM5-1, VM5-4, VM5-2 (as shown).

Items ac and aa are shown on assembly drawings M42-3, M42-11, M42-13 and M42-21.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	p	-	Connectors, as required
b	1	Pin. pole top, 20"	aa	2	Nut, eye, 5/8"
c	2	Bolt, machine, 5/8" x required length	av	-	Jumpers, as required
d	2	Washed, 2 1/4" square	ca	1	Deadend assembly, primary
d	4	Washed, square, 3" curved	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
o	2	Bolt, eye, 5/8" x required length			

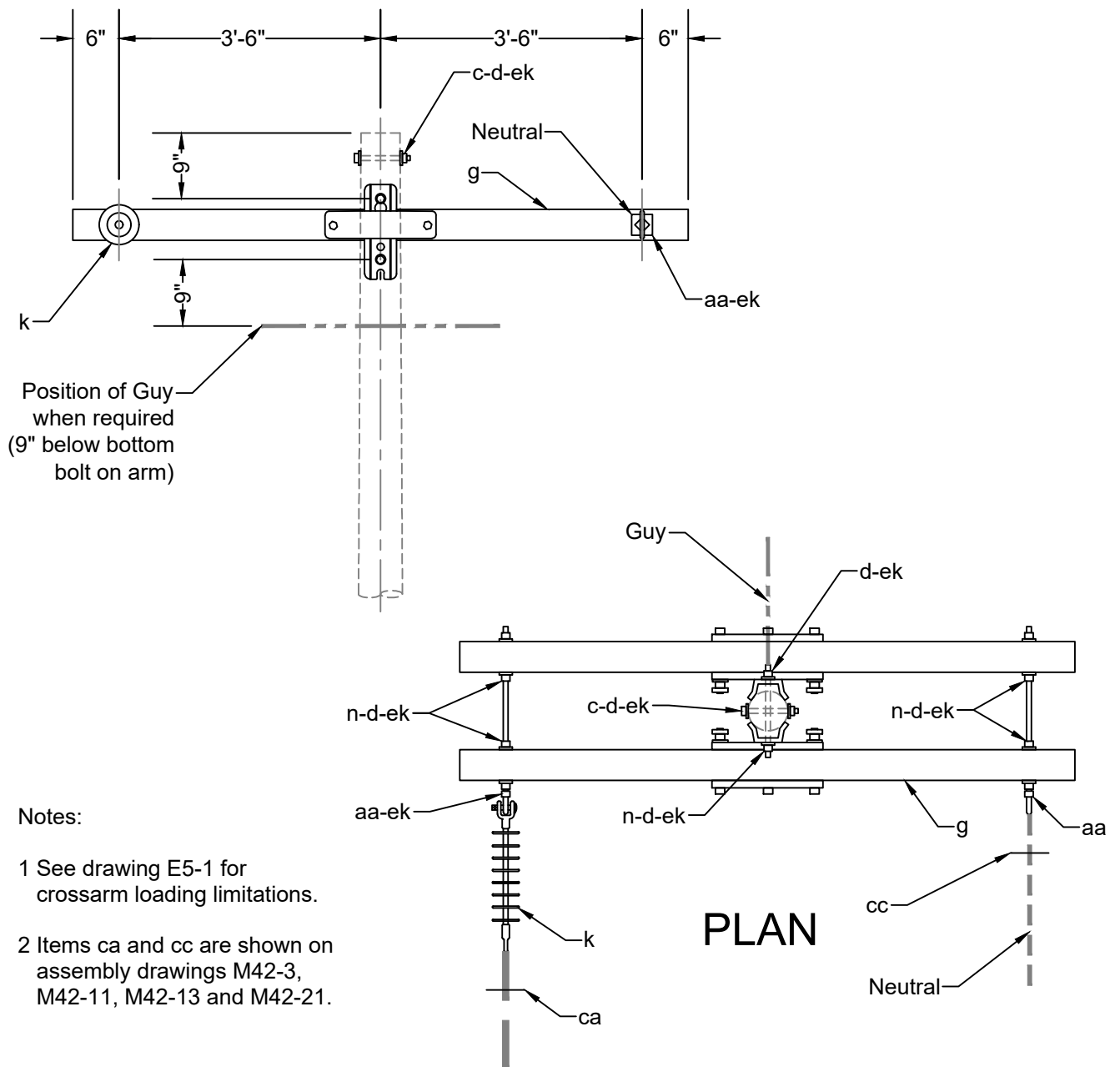
14.4 / 24.9 KV PRIMARY, 1 PHASE
VERTICAL DEADEND (DOUBLE FEED THROUGH)

Revision Date

April 30, 2020



VA6-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	n	2	Bolt, double arming, 5/8" x required length
d	12	Washer, 2 1/4" square, 13/16" hole	aa	2	Nut, eye, 5/8"
d	2	Washer, 3" square, curved	ca	1	Deadend assembly, primary
g	2	Fiberglass Crossarm 3 3/4" x 4 3/4" x 8'-0"	cc	1	Deadend assembly, neutral
k	1	Insulator, suspension, expoxilator	ek	-	Locknuts, as required

14.4 / 24.9 KV PRIMARY, 1-PHASE

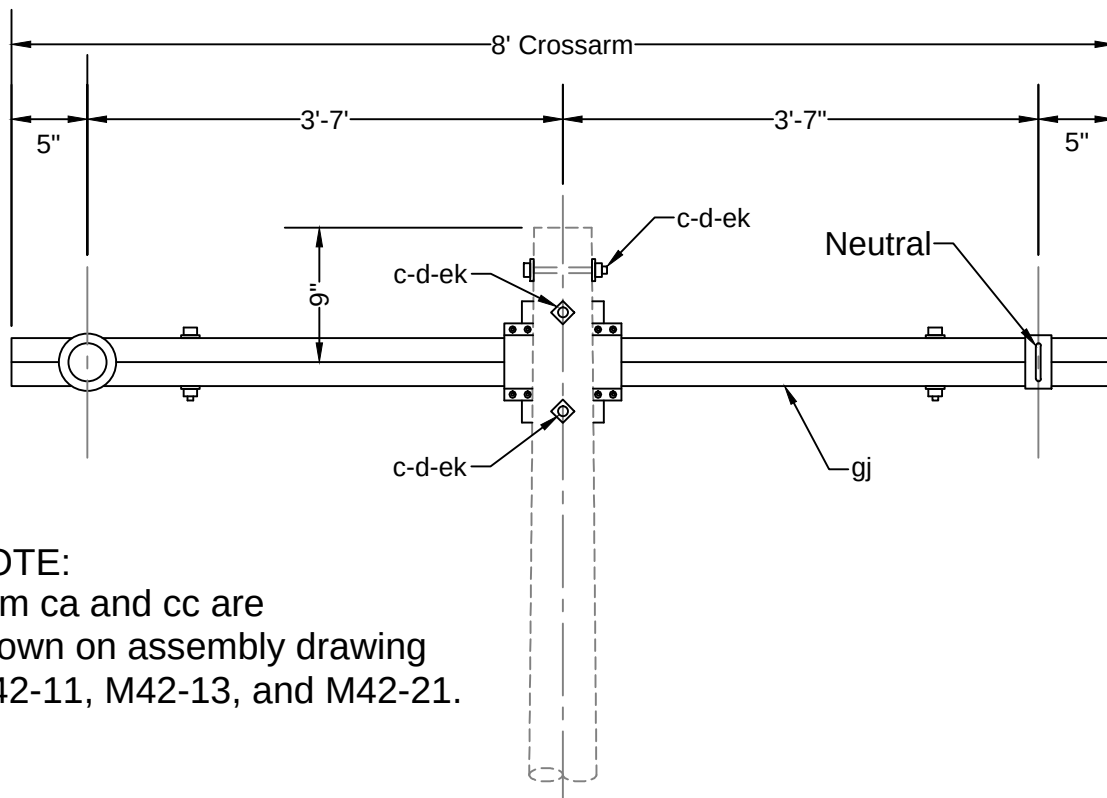
CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

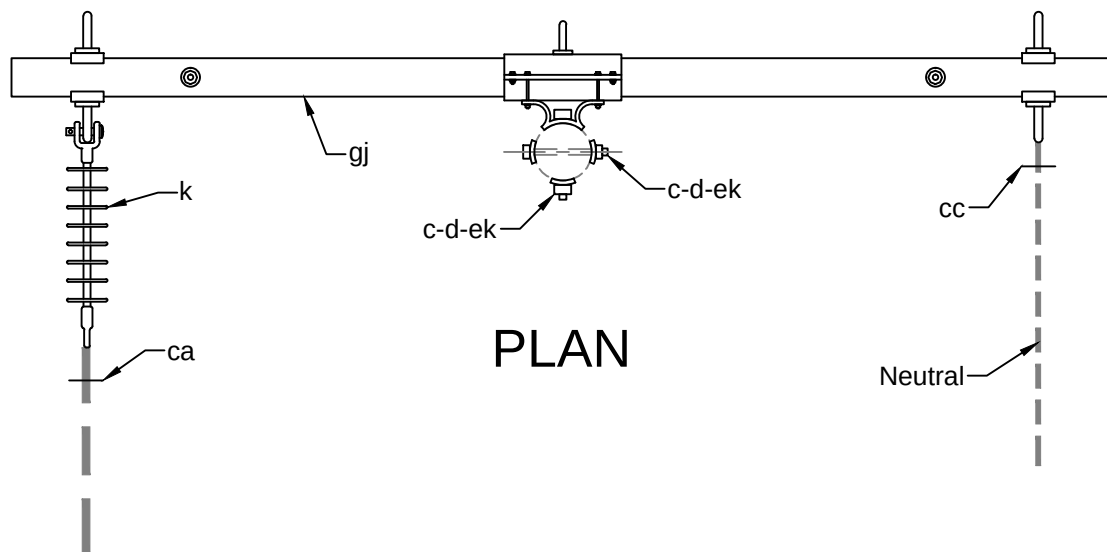
Dec. 12, 2022



VA7



NOTE:
Item ca and cc are
shown on assembly drawing
M42-11, M42-13, and M42-21.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ek	-	Locknuts, as required
c	2	Bolt, machine 3/4" x required length	gj	1	8' Crossarm assembly, DE
k	1	Insulator, suspension, epoxilator	ca	1	Deadend assembly, Primary
d	4	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral

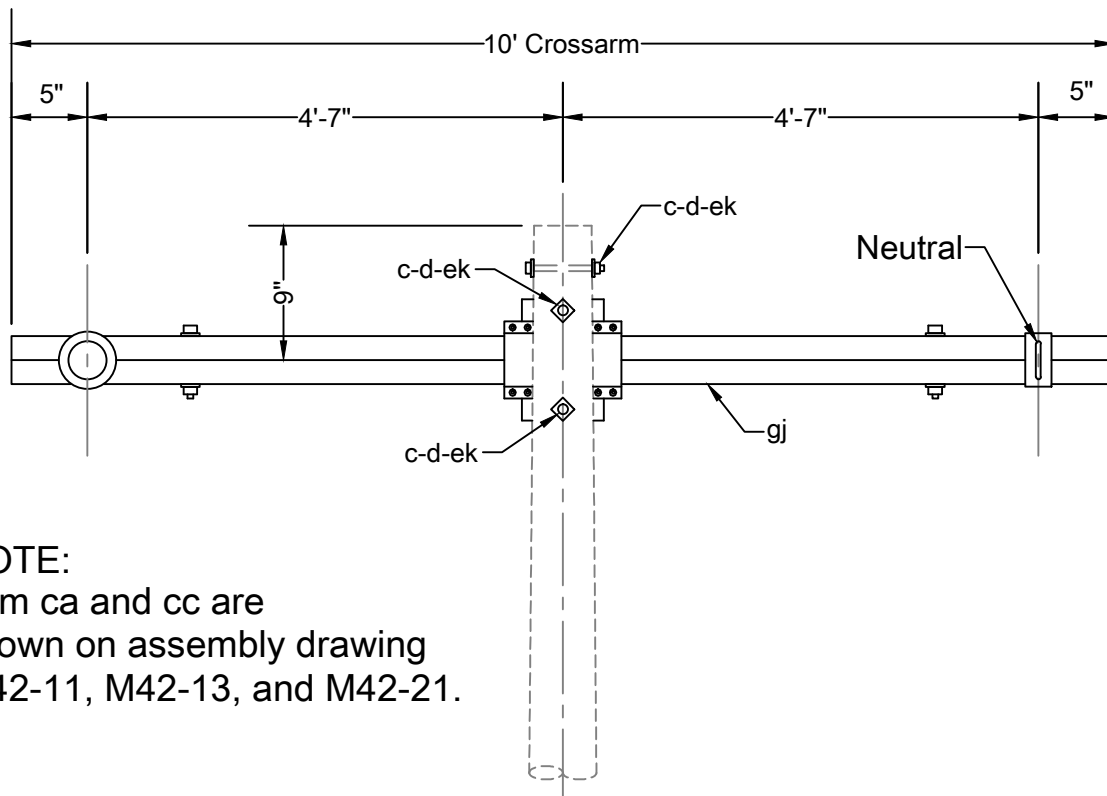
14.4 /24.5 KV PRIMARY , 1-PHASE
8 ' CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

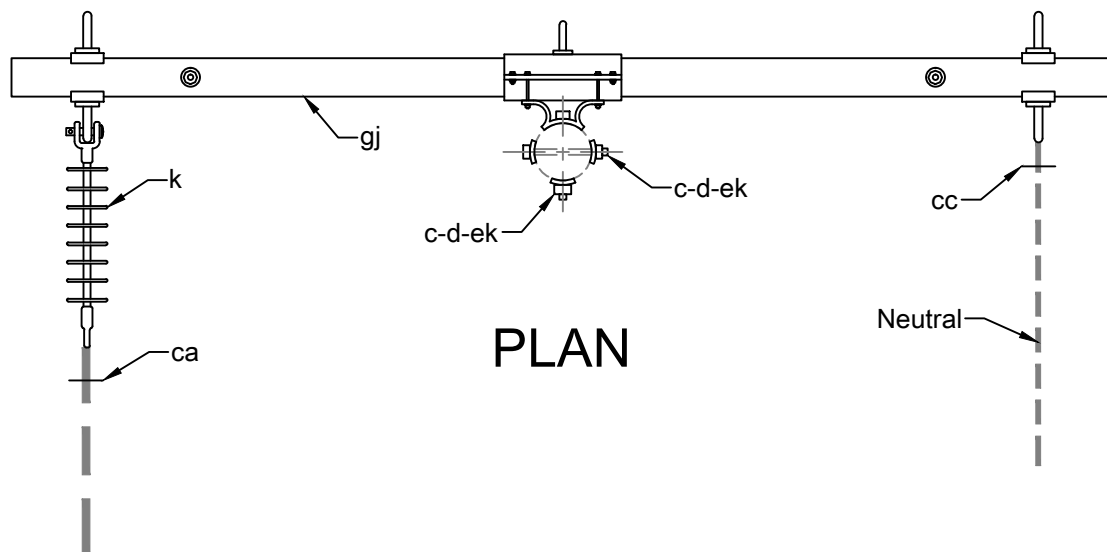
Feb 21, 2018



VA7A/8



NOTE:
Item ca and cc are
shown on assembly drawing
M42-11, M42-13, and M42-21.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ek	-	Locknuts, as required
c	2	Bolt, machine 3/4" x required length	gj	1	Crossarm assembly, DE 10'
k	1	Insulator, suspension, epoxilator	ca	1	Deadend assembly, Primary
d	4	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral

14.4 / 24.9 KV PRIMARY , 1-PHASE

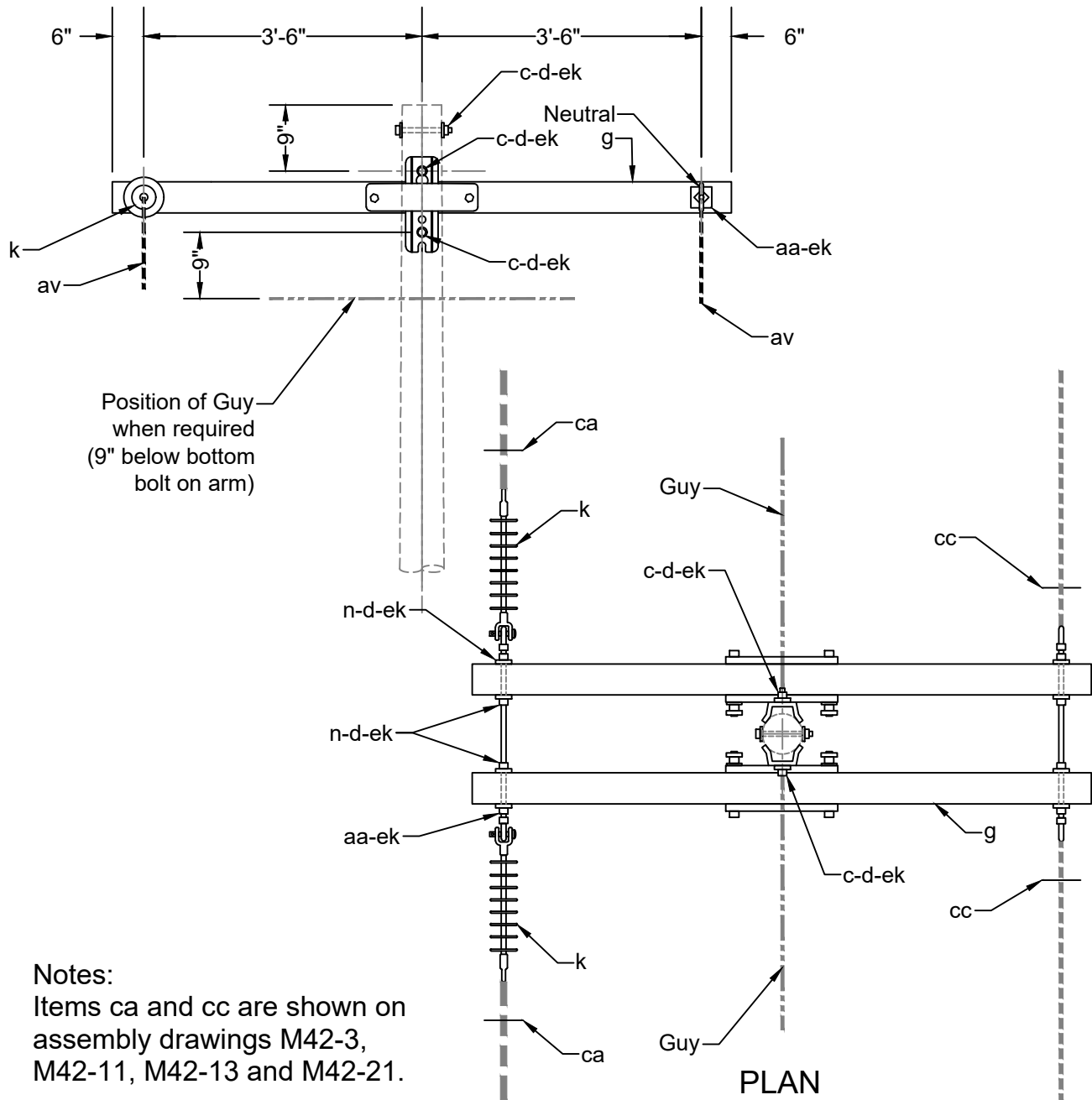
10' CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Feb 21, 2018



VA7A/10



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	aa	4	Nut, eye, 5/8"
d	2	Washer, 3" square, curved	av	-	Jumpers
d	12	Washer, 2 1/4" square, 13/16" hole	ca	2	Deadend assembly, primary
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	cc	2	Deadend assembly, neutral
k	2	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	2	Bolt, double arming, 5/8" x required length			

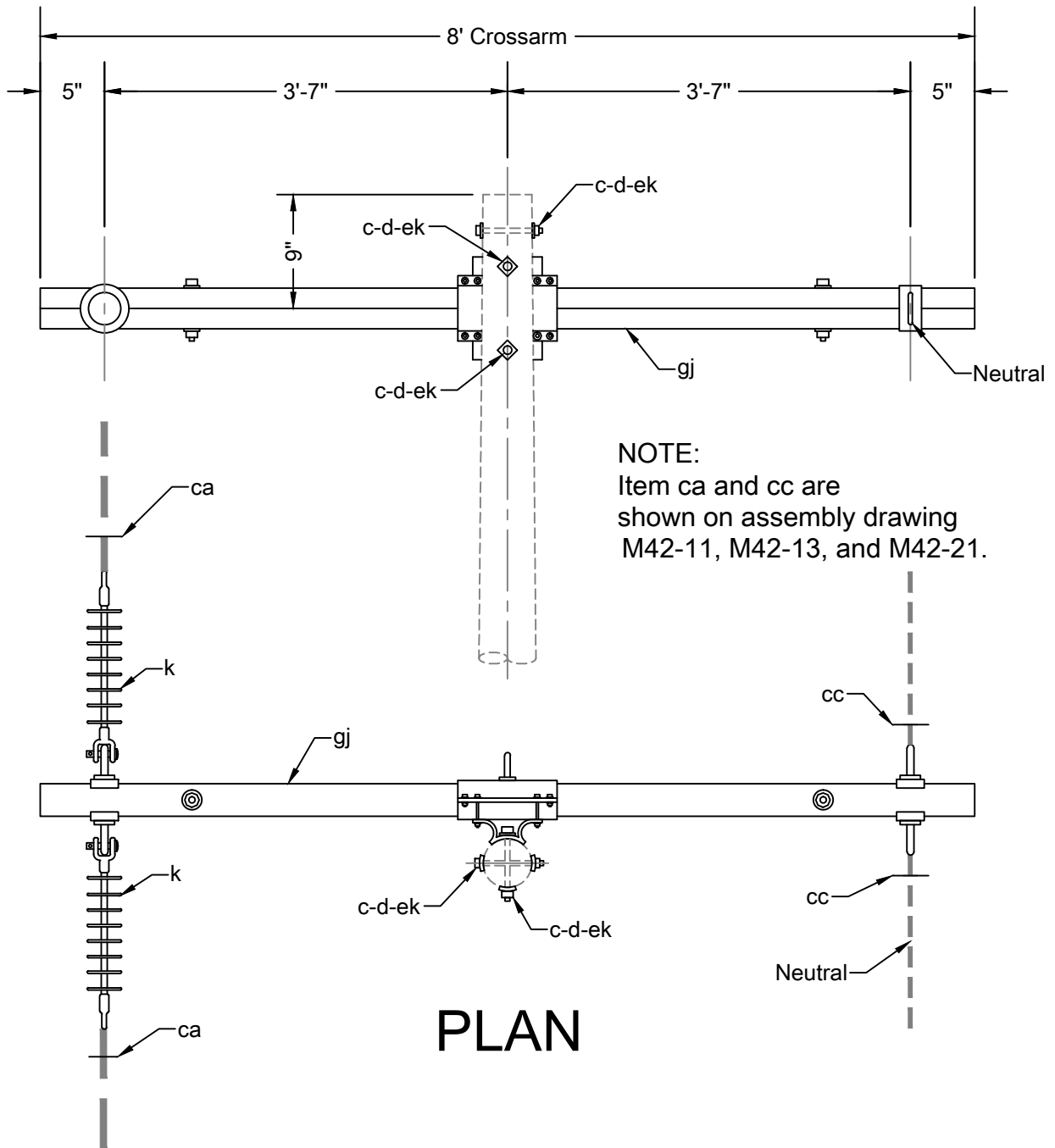
14.4 / 24.9 KV PRIMARY, 1-PHASE CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Dec. 12, 2022



VA8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	2	Deadend Assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend Assembly, Neutral
k	2	Insulator, suspension, epoxilator	gj	1	8' Crossarm Assembly, DE
d	4	Washer, Square, curved 3"	ek	-	Locknuts, as required
av	-	Jumpers, as required			

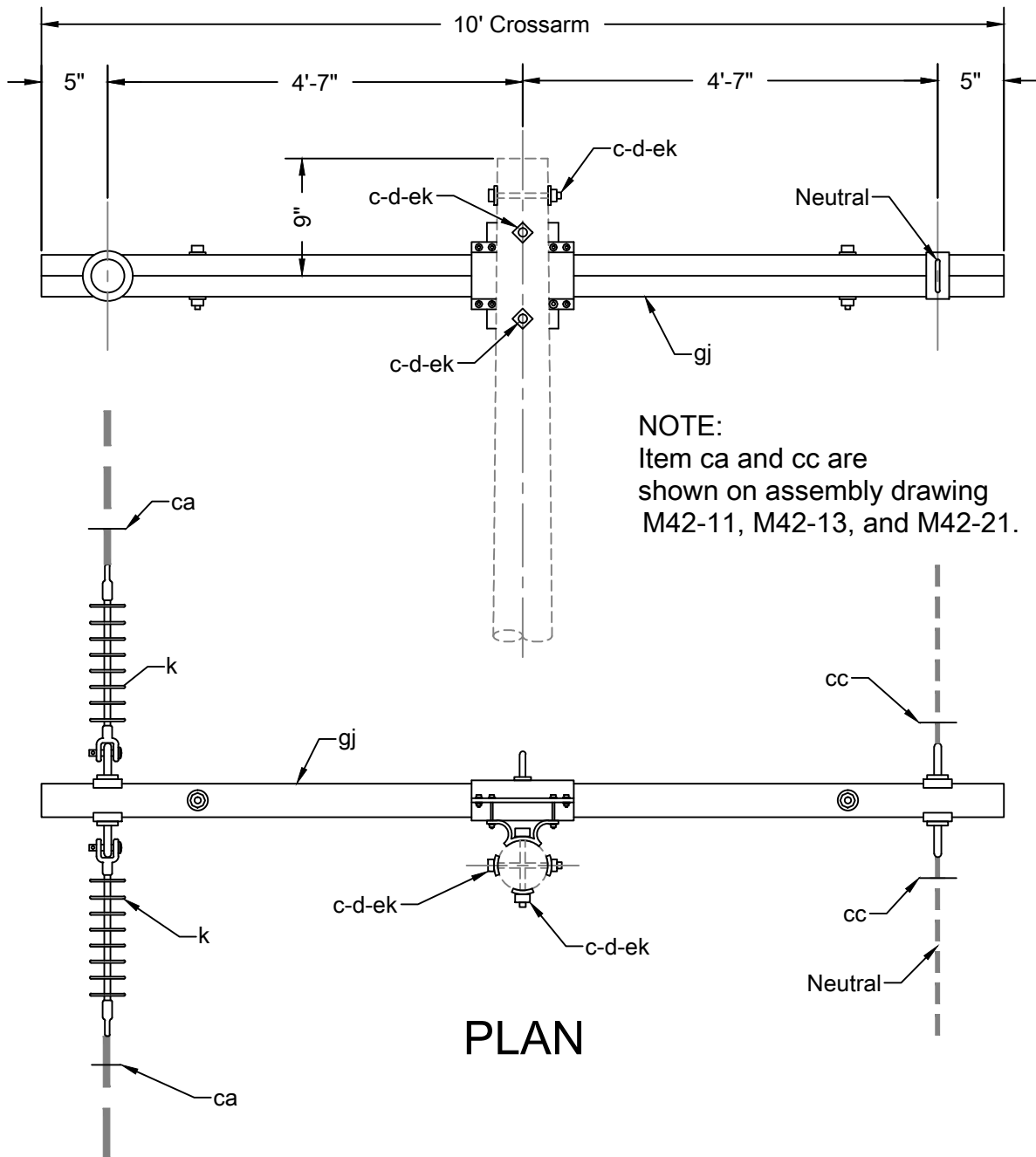
14.4 / 24.9 KV PRIMARY, 1-PHASE
8' CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Feb 21, 2018



VA8A/8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	2	Deadend assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend assembly, Neutral
k	2	Insulator, suspension, epoxilator	gj	1	10' Crossarm assembly, DE
d	4	Washer, Square, curved 3"	ek	-	Locknuts, as required
av	-	Jumpers, as required			

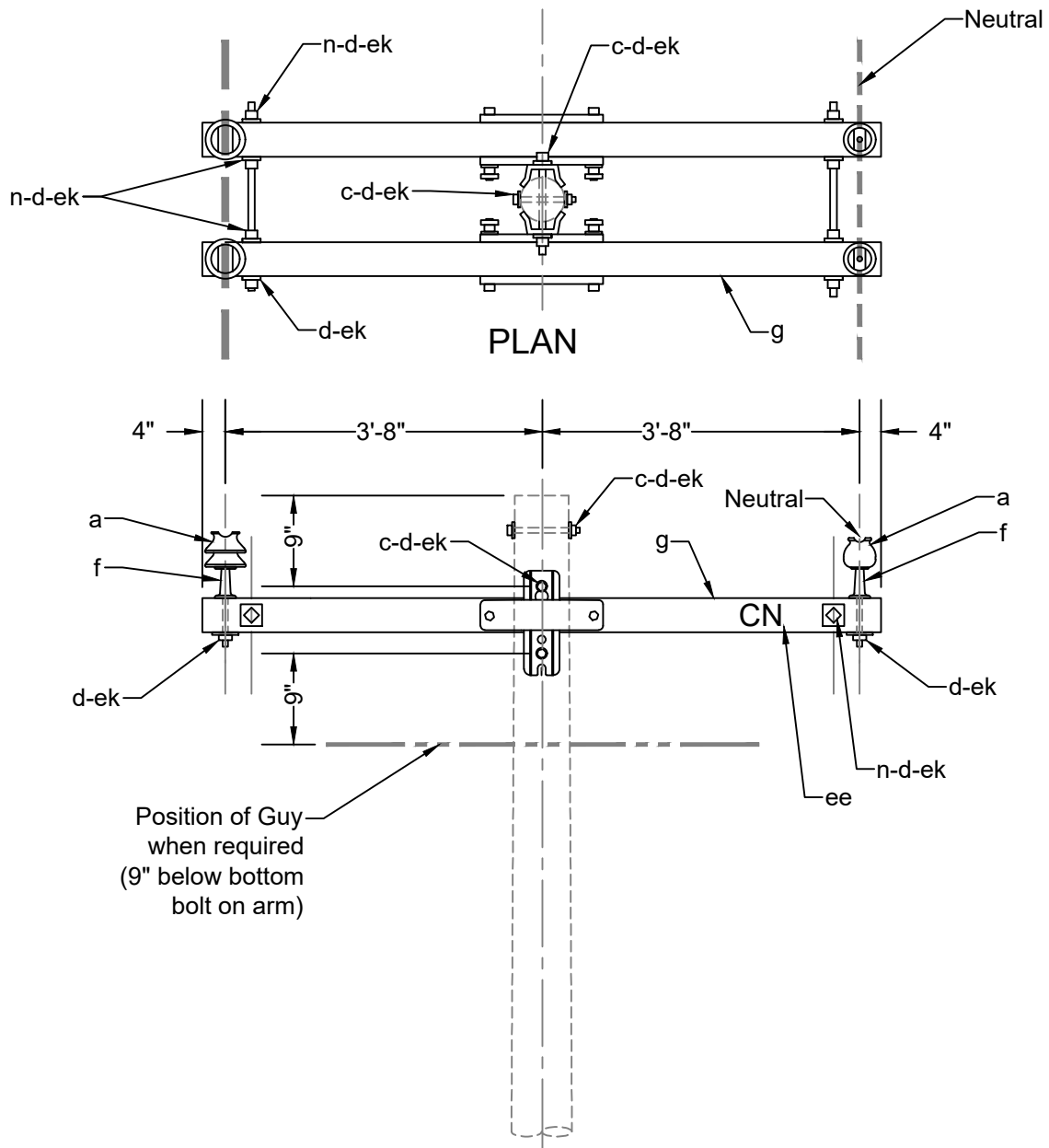
14.4 / 24.9 KV PRIMARY, 1-PHASE
10' CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Feb 21, 2018



VA8A/10



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved	ee	4	Letters 2C, 2N with 1" nails
d	16	Washer, 2 1/4" square, 13/16" hole			
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'0"			

14.4 / 24.9 KV PRIMARY, 1-PHASE

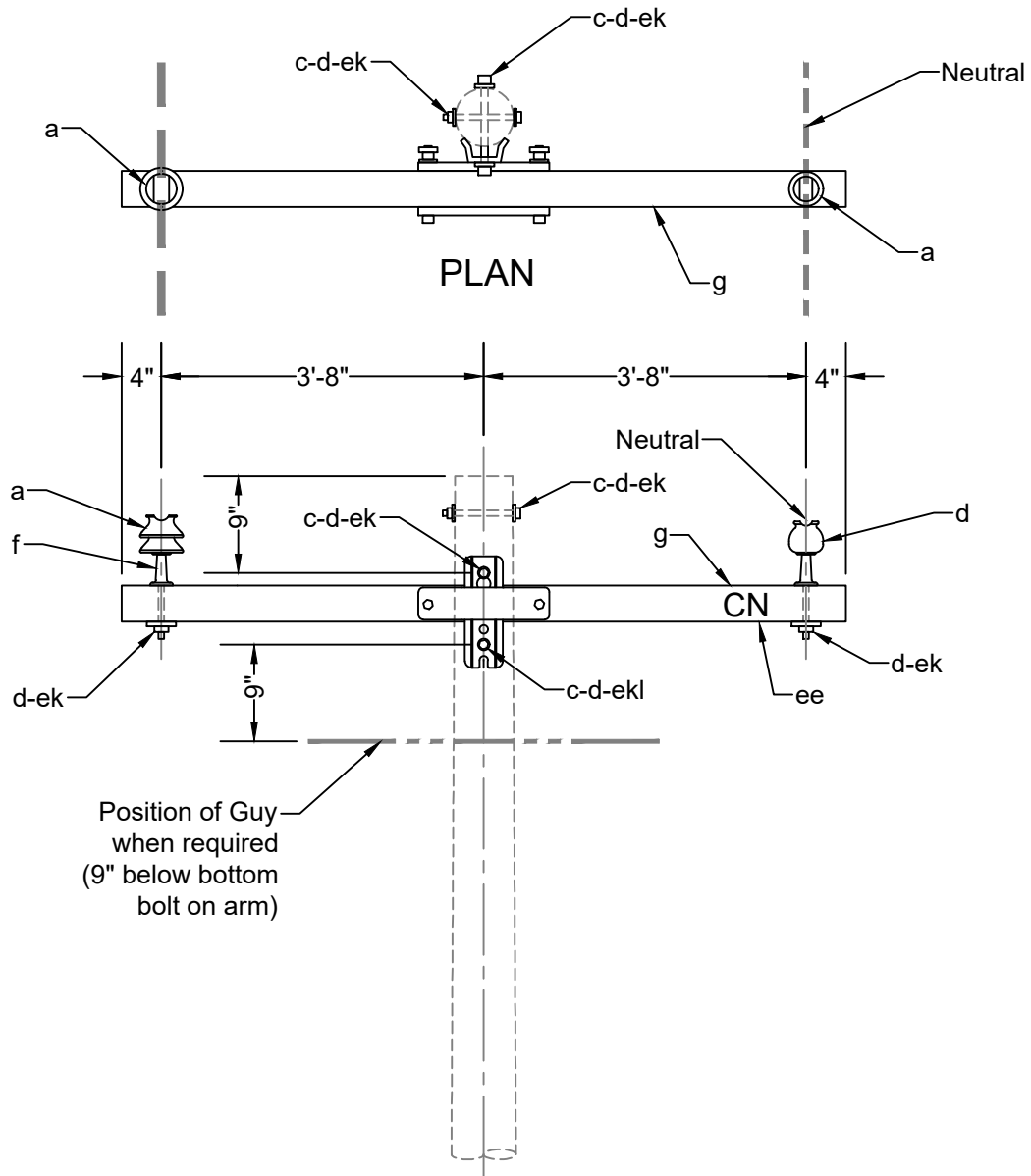
CROSSARM CONSTRUCTION - DOUBLE LINE ARM

Revision Date

Dec. 12, 2022



VA9



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
c	3	Bolt, machine, 5/8" x required length	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"
d	4	Washer, 2 1/4" Square	ee	4	Letters 2C, 2N with 1" nails
d	4	Washer, 3" Square, curved	ek	-	Locknuts, as required

14.4 / 24.9 KV PRIMARY, 1-PHASE

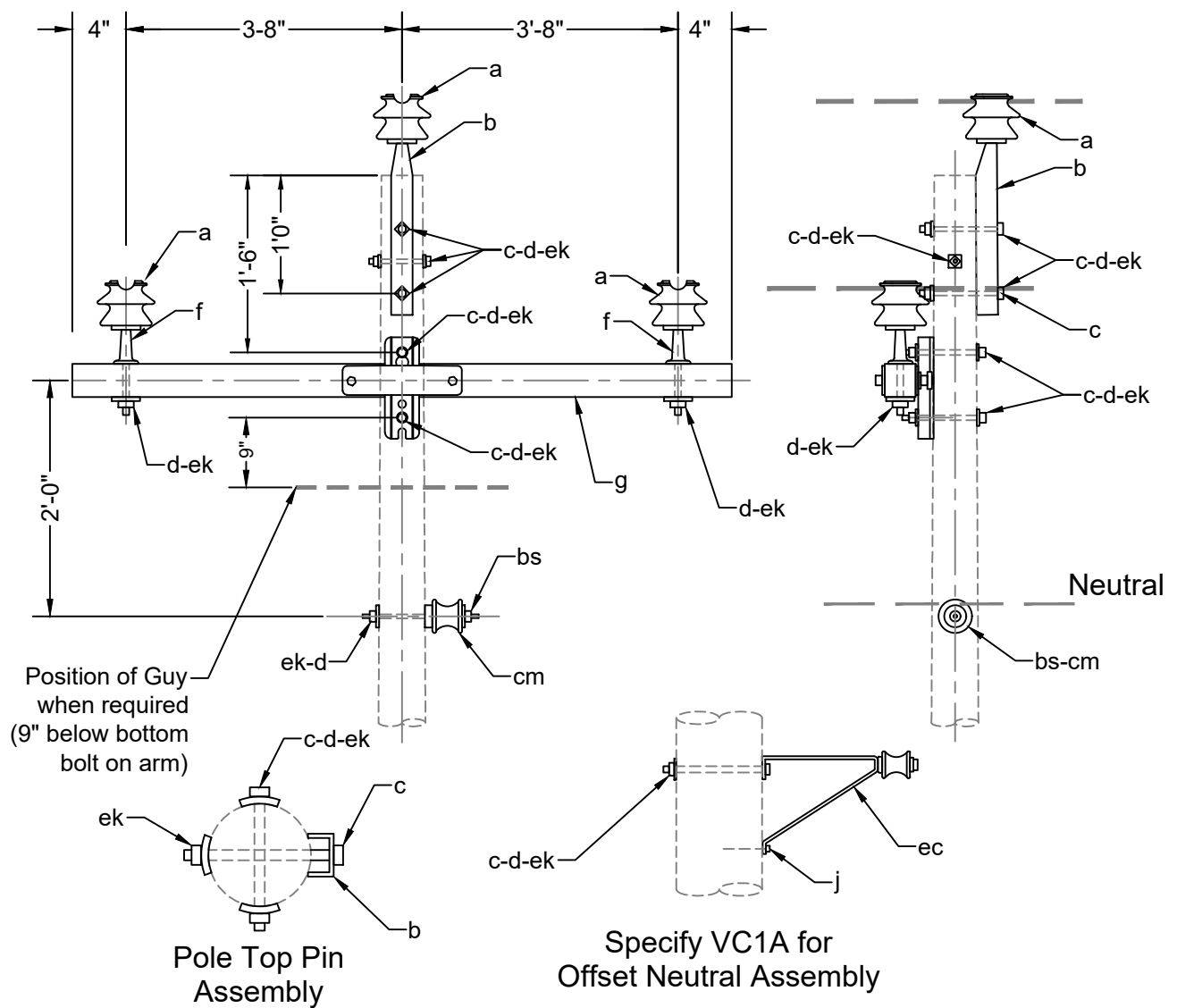
CROSSARM CONSTRUCTION - SINGLE LINE ARM

Revision Date

Dec. 12, 2022



VA9-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type			(ADDITIONAL MATERIALS FOR VC1A)
b	1	Pin, pole top, 20"	c	1	Bolt, machine, 5/8" x required length
c	5	Bolt, machine, 5/8" x required length	d	1	Washer, 2 1/4" square, 13/16"hole
d	5	Washer, 2 1/4" square, 13/16"hole	j	1	Screw, lag, 1/2" x 4" (VC1A only)
d	6	Washer, 3" square, curved	ec	1	Bracket, offset, insulated (VC1A only)
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			
ek	-	Locknuts			
bs	1	Bolt, single upset, (VC1 only)			
cm	1	Spool insulator, (VC1 only)			

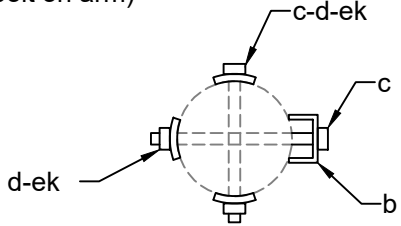
14.4 / 24.9 KV, 3 PHASE
CROSSARM CONSTRUCTION, SINGLE PRIMARY SUPPORT

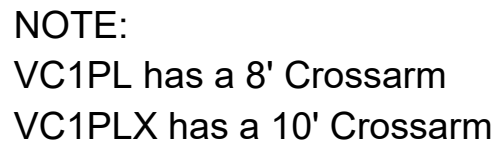
Revisions Date

Dec 28, 2022



VC1
VC1A

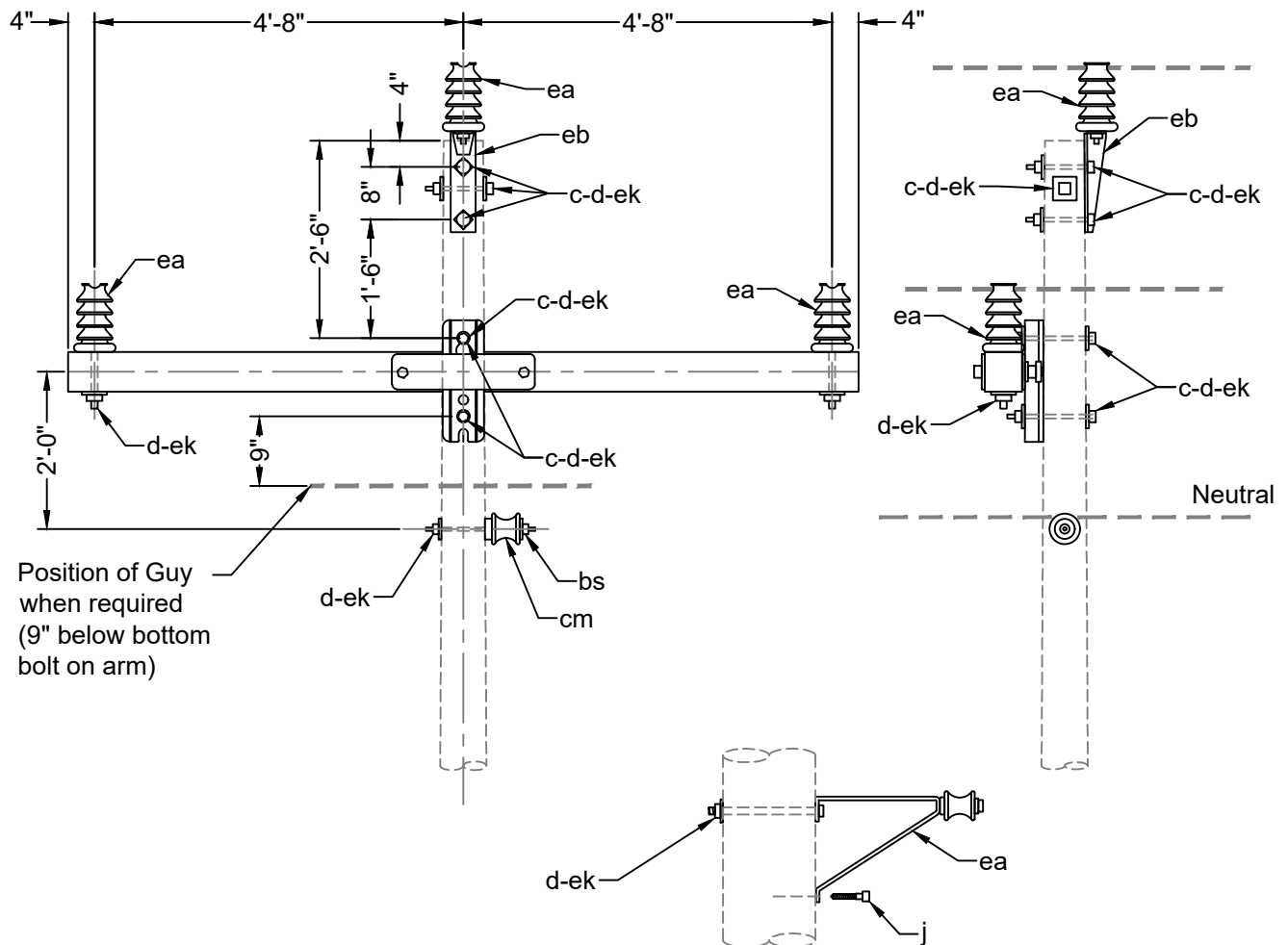
VC1R
VC1AR



DESIGN LIMITS
Maximum transverse load:
750 lbs per conductor
Maximum line angle within
load limits : 5°

Revision Date
Dec. 28, 2022

VC1PL
VC1PLX



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8"x required length			(ADDITIONAL MATERIALS FOR VC1APR)
d	5	Washer, 2 1/4" square	c	8	Bolt, machine, 5/8"x required length
d	6	Washer, 3" square curved	j	1	Screw, lag, 1/2" x 4" (VC1APR only)
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	ec	1	Bracket, offset, insulated (VC1APR only)
ek	-	Locknuts			
bs	1	Bolt, single upset			
cm	1	Spool insulator			
ea	3	Insulator, post type			
eb	1	Bracket, pole top			

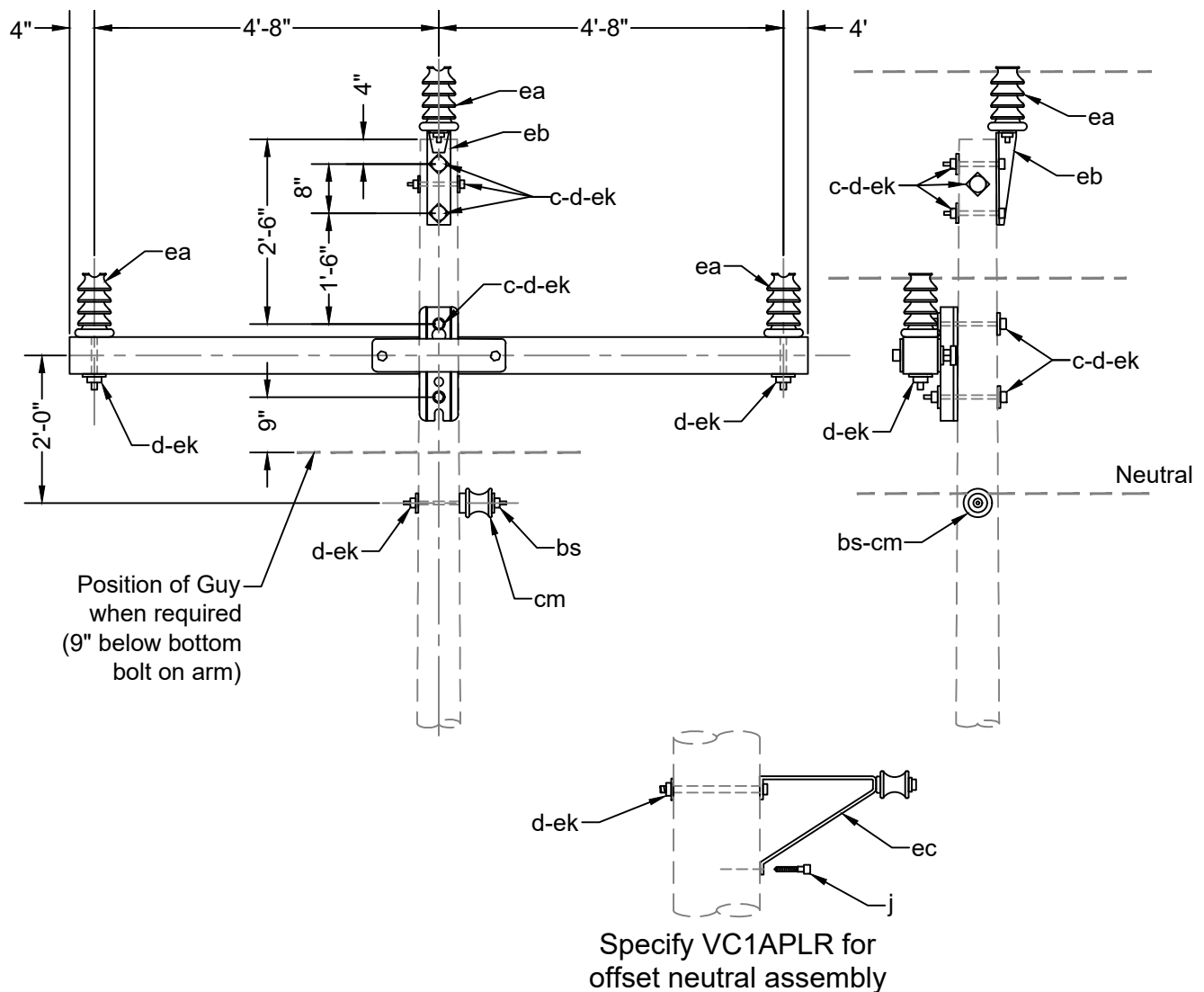
14.4 / 24.9 KV, 3 PHASE
 RAPTOR PROTECTION, CROSSARM CONSTRUCTION
 SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

Revision Date

Dec 26, 2019



**VC1PR
VC1APR**



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8"x required length			(ADDITIONAL MATERIAL FOR C1APLR)
d	5	Washer, 2 1/4" square, 13/16" hole	c	1	Bolt, machine, 5/8" x required length
d	6	Washer, 3" square curved, 13/16" hole	d	1	Washer, 2 1/4" square, 13/16" hole
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	j	1	Screw, lag, 1/2" x 4" (C1APLR)
bs	1	Bolt, single upset	ec	1	Bracket, offset, insulated (C1APLR)
cm	1	Spool insulator			
ea	3	Insulator, post type			
eb		Bracket, pole top			
ek	-	Locknuts			

DESIGN LIMITS:

Max. transverse load:

750 lbs per conductor

Max. line angle within load limits:

5° Angle

14.4 / 24.9 KV, 3 PHASE

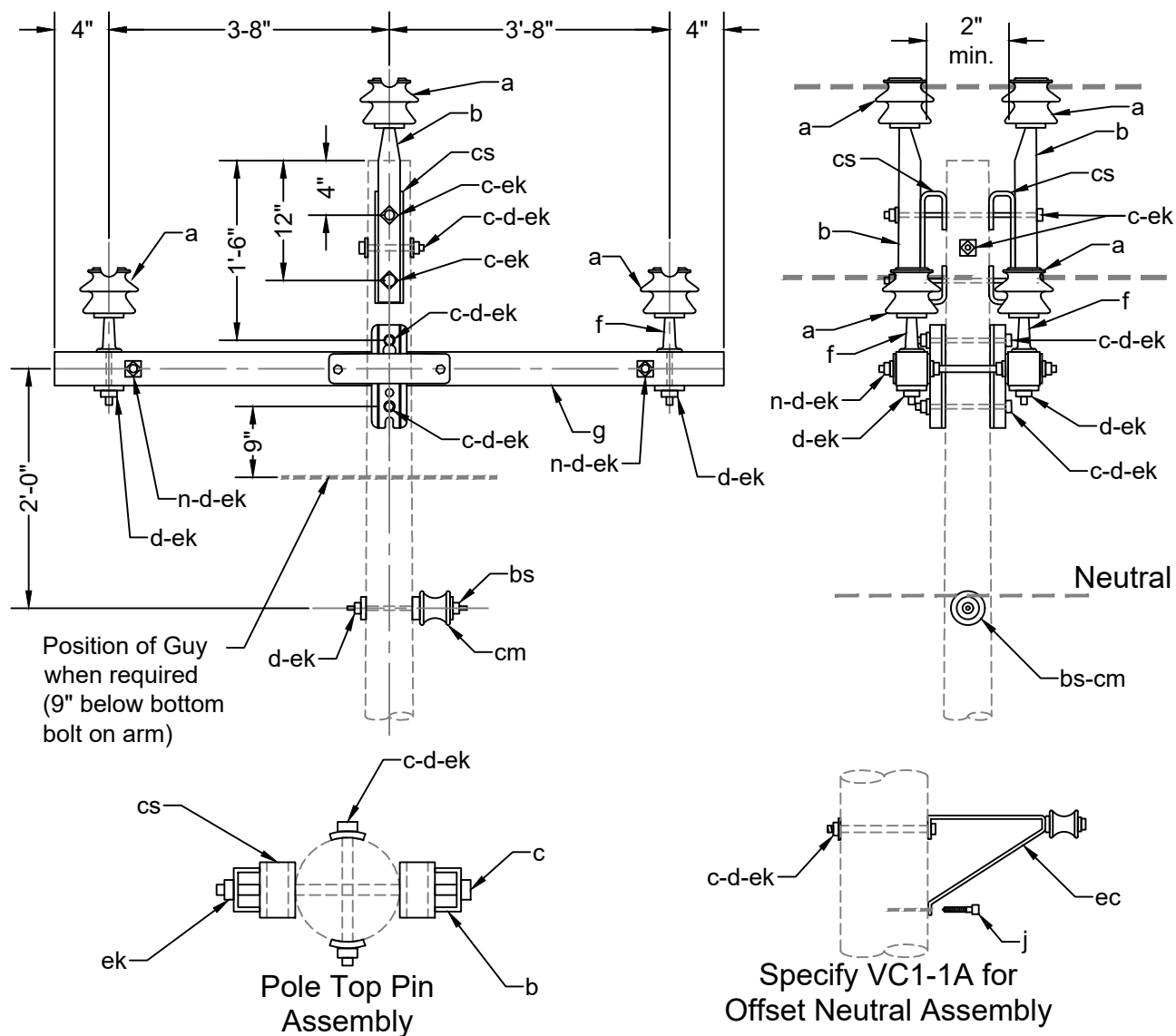
RAPTOR PROTECTION, CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT, (LARGE CONDUCTORS)

Revision Date

Dec. 30, 2022



VC1PLR
VC1APLR



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	cm	1	Spool insulator, (VC1-1 only)
b	2	Pin, pole top, 20"	cs	2	Bracket, pole top
c	5	Bolt, machine, 5/8" x required length	ek	-	Locknuts
d	17	Washer, 2 1/4" square, 13/16" hole			
d	2	Washer, 3" square, curved			(ADDITIONAL MATERIAL FOR VC1-1A)
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	c	1	Bolt, machine, 5/8" x required length
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"	d	1	Washer, 2 1/4" square, 13/16" hole
n	2	Bolt, double arming, 5/8 x required length	ec	1	Bracket, offset, insulated (VC1-1A only)
bs	1	Bolt, single upset, (VC1-1 only)	j	1	Screw, lag, 1/2" x 4" (VC1-1A only)

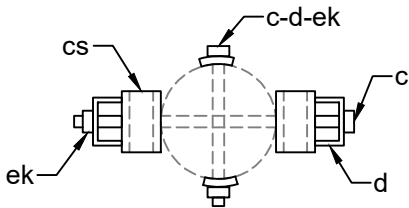
14.4 / 24.9 KV, 3 - PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

Revision Date

Dec. 30, 2022



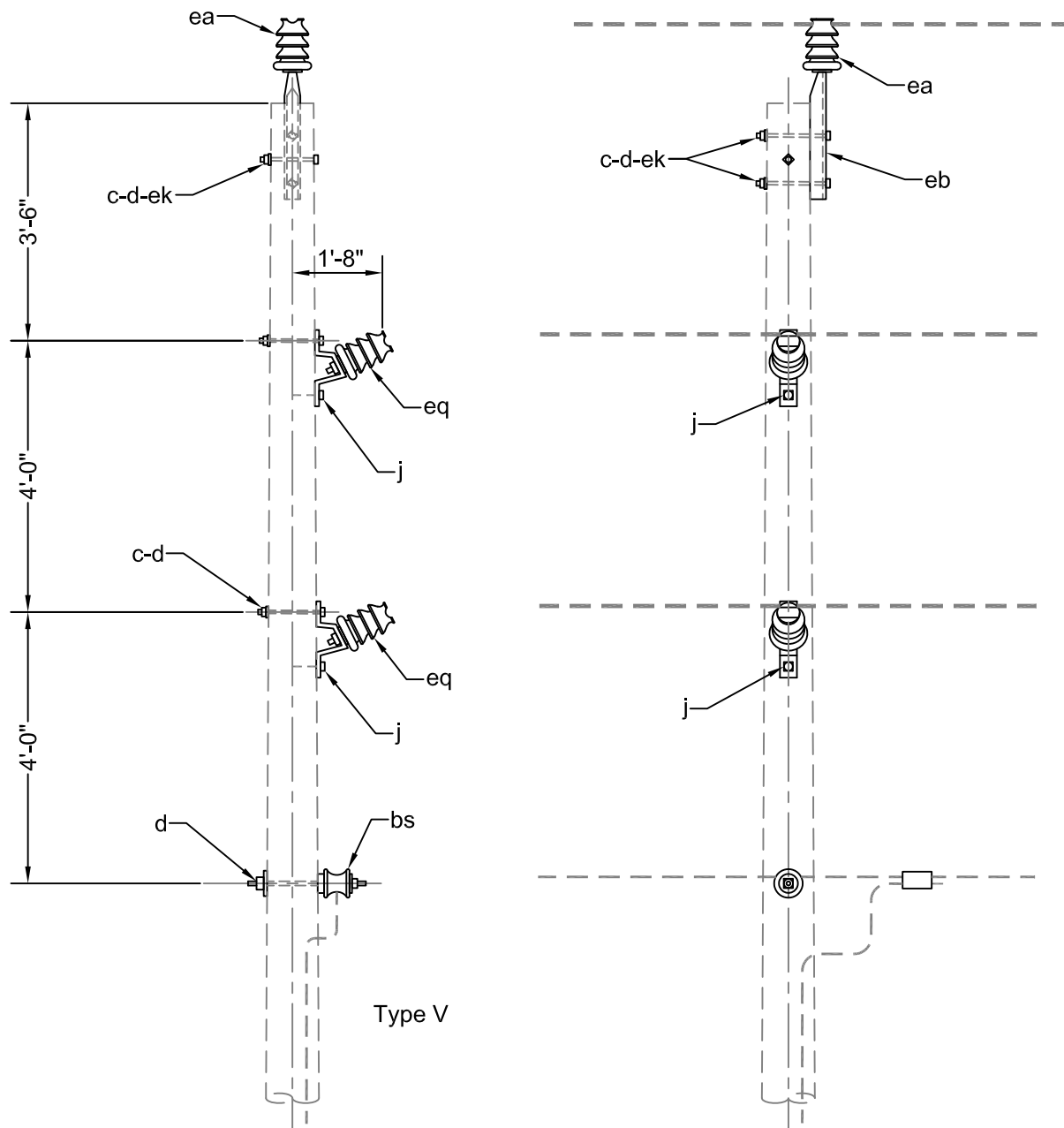
VC1-1
VC1-1A



14.4 / 24.9 KV, 3 PHASE
RAPTOR PROTECTION, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT AT 0° TO 5 ° ANGLE

Dec. 30, 2022

VC1-1R
VC1-1AR



Note: Lower phase may be mounted on other side of pole.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	ea	3	Insulator, post type 25 kv
d	7	Washer, square, 2 1/4"	eb	1	Bracket, pole top
j	2	Screw, lag, 1/2" x 4"	ek	-	Locknuts, as required
bs	1	Bolt, single upset, insulated	eq	2	Insulator bracket, single

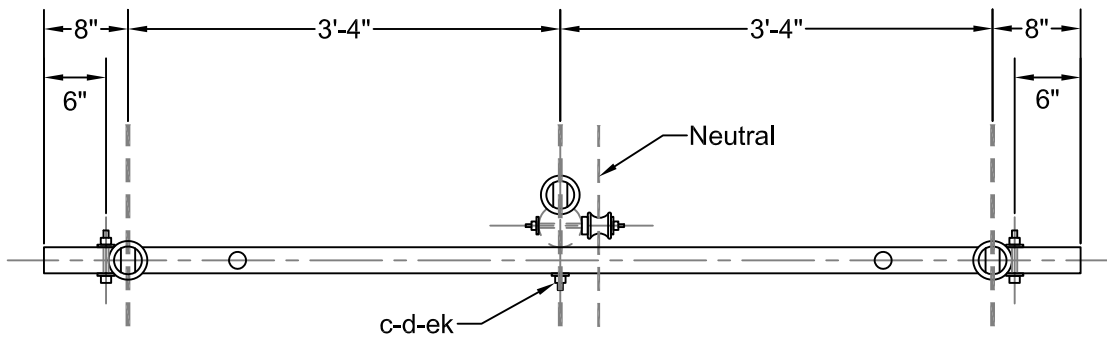
14.4 / 24.9 KV, 3 PHASE
 VERTICAL CONSTRUCTION, SINGLE PRIMARY SUPPORT
 at 0° to 2° angle

Revision Date

Jan 3, 2020

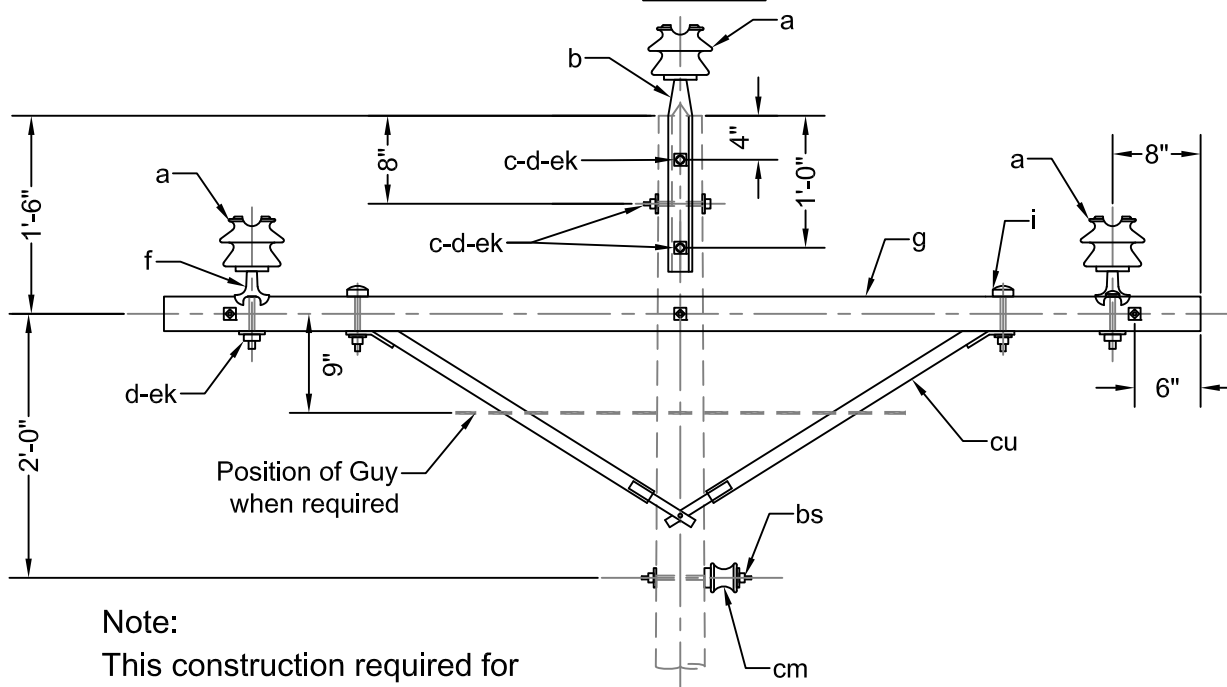


VC1S



Obsolete. For Retirement Only. Use Post Insulator Unit.

PLAN



Note:

This construction required for all conductors having a breaking strength of more than 4500 pounds.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type	bs	1	Bolt, single upset
b	1	Pin, pole top, 20"	cm	1	Spool insulator
c	7	Bolt, machine, 5/8" x required length	cu	1	Brace, wood, 60" span
d	10	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" Square curved, 13/16" hole			
f	2	Pin, crossarm, clamp type			
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'-0"			
i	2	Bolt, carriage, 1/2" x required length			

DESIGN LIMITS

Maximum transverse load :
500 lbs. per conductor.

Maximum line angle within load
limits 2° angle

14.4 / 24.9 KV, 3 PHASE

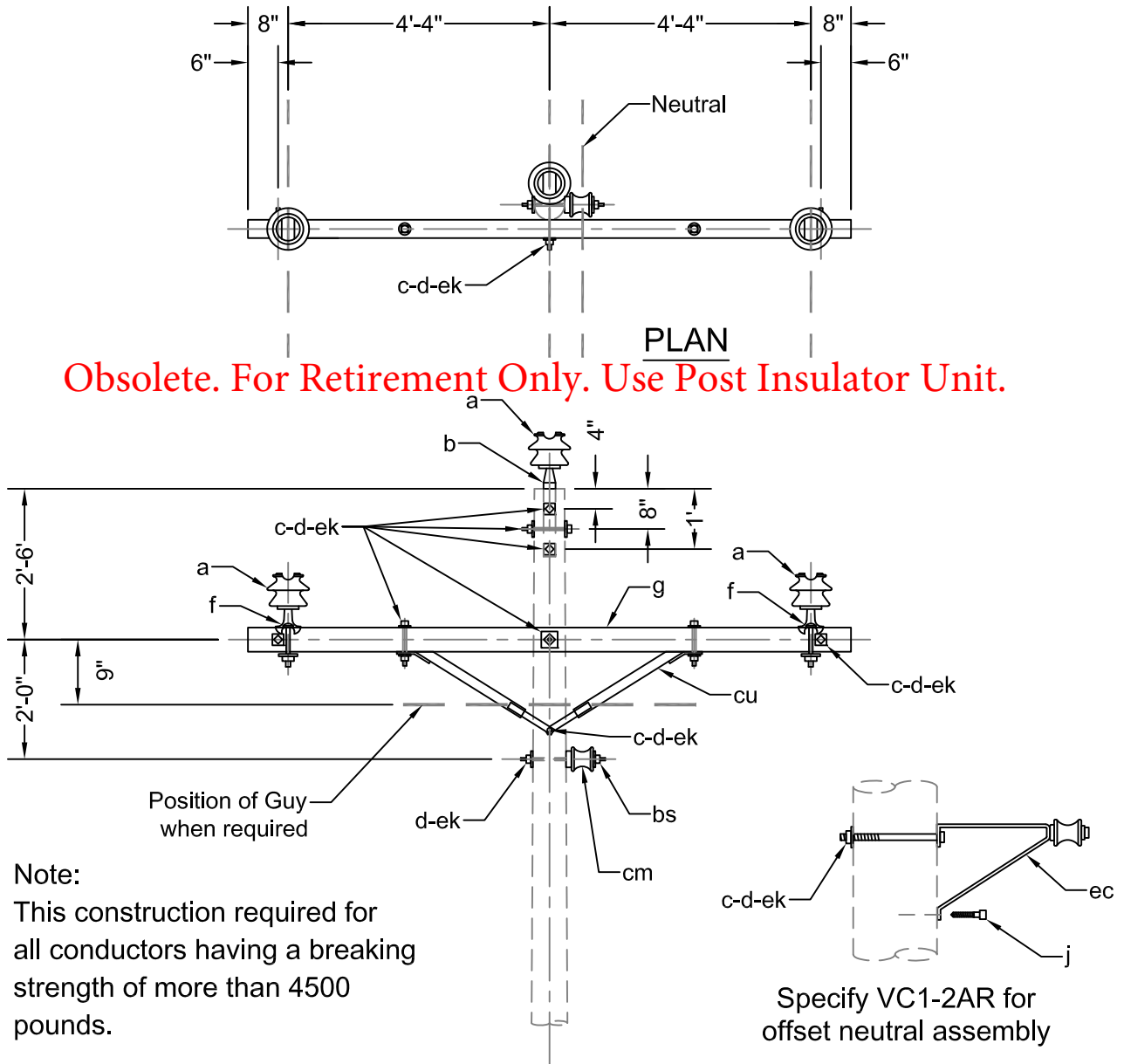
CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

Revision Date

Jan 3, 2020



VC1-2



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type	cu	1	Brace, wood, 60" span
b	1	Pin, pole top, 20"	ek	-	Locknuts, as required
c	7	Bolt, machine, 5/8" x required length	cm	1	Spool insulator
c	2	Bolt, machine, 1/2" x required length			
d	10	Washer, 2 1/4" square, 13/16" hole			(ADDITIONAL MATERIAL FOR C1-2AR)
d	2	Washer, round, 1 3/8" diameter., 9/16" hole	c	1	Bolt, machine, 5/8" x required length
d	2	Washer, 3" square curved, 13/16" hole	d	1	Washer, 2 1/4" square, 13/16" hole
f	2	Pin, crossarm, clamp type	j	1	Screw, lag, 1/2" x 4" (C1-2AR only)
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"	ec	1	Bracket, offset, insulated (C1-2AR only)
bs	1	Bolt, single upset			

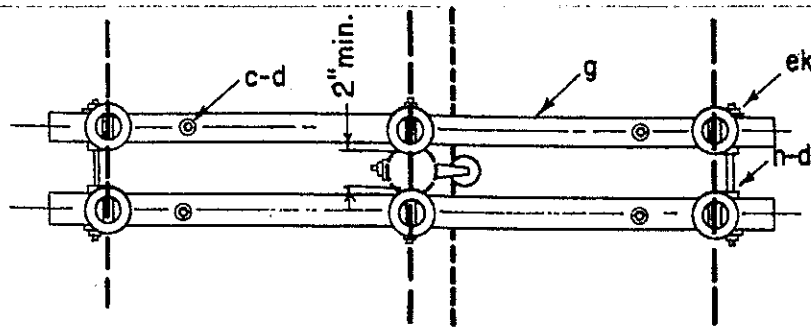
DESIGN LIMITS
Maximum transverse load:
500 lbs per conductor
Maximum line angle within
load limits: 2° angle

14.4 / 24.9 KV, 3 PHASE
RAPTOR PROTECTION, CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

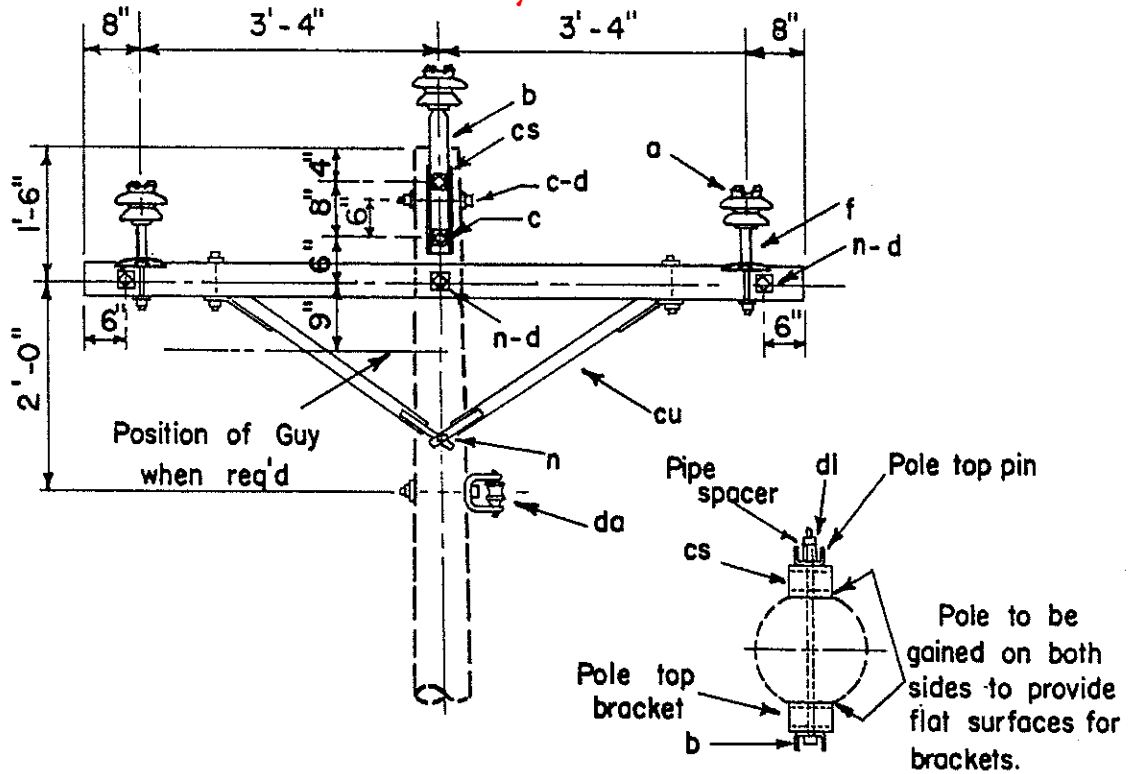
Revision Date
Jan 3, 2020



VC1-2R
VC1-2AR



Obsolete. For Retirement Only. Use Post Insulator Unit.



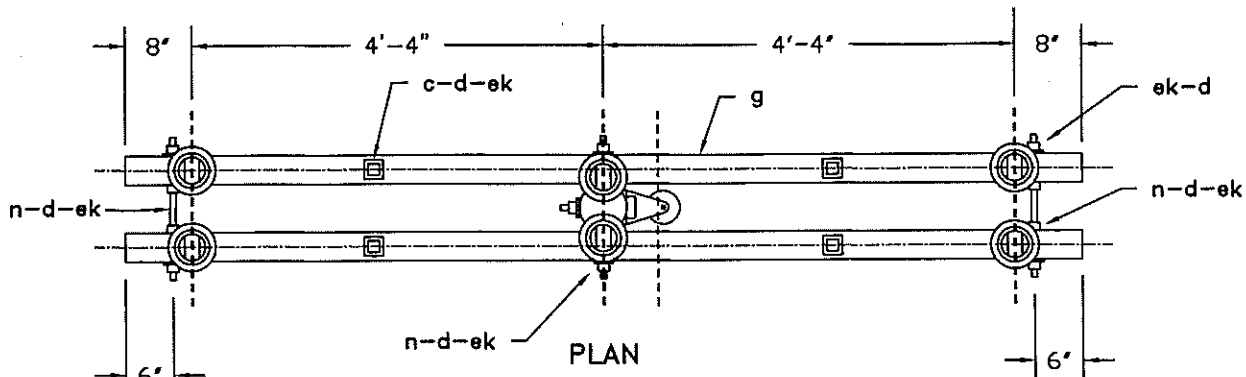
POLE TOP PIN ASSEMBLY

ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
a	6	Insulator, pin type		g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0"	
b	2	Pin, pole top, 20"		n	4	Bolt, double arming, 5/8" x req'd. length	
c	4	Bolt, machine, 5/8" x req'd. length		cs	2	Pole top bracket	
c	4	Bolt, machine, 1/2" x req'd. length		cu	2	Brace, wood, 60" span	
d	13	Washer, square 2 1/4"		da	1	Bracket, insulated	
d	4	Washer, rd., 1 3/8" diam.		dl	2	Pipe spacer, 3/4" dia. x 1 1/2"	
f	4	Pin, crossarm, steel, clamp type		ek		Locknuts	

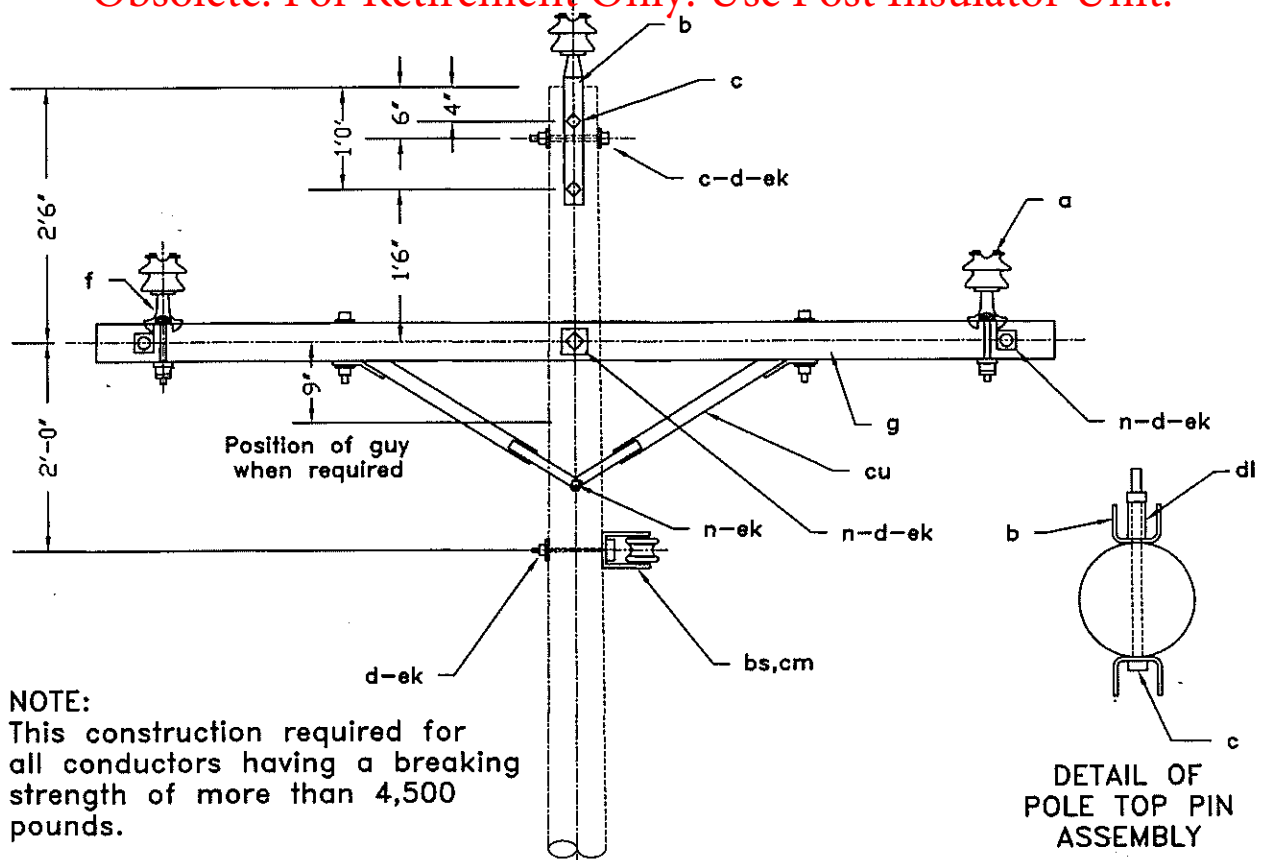
14.4/24.9 KV, 3- PHASE
CROSSARM CONSTRUCTION-DOUBLE PRIMARY SUPPORT
0° TO 5° ANGLE (LARGE CONDUCTORS)

Jan. 1, 1963

VCI-3



Obsolete. For Retirement Only. Use Post Insulator Unit.



NOTE:

This construction required for all conductors having a breaking strength of more than 4,500 pounds.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
a	6	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
b	2	Pin. pole top, 20"	n	3	Bolt, double arming, 5/8" x req'd length
c	4	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
c	4	Bolt, machine, 1/2" x required length	cm	1	Spool insulator
d	11	Washer, 2 1/4" square, 13/16 hole	cu	2	Brace, wood, 60" span
d	4	Washer, round, 1 3/8" dia., 9/16" hole	dl	2	Pipe spacer, 3/4" dia. x 1 1/2"
d	2	Washer, square curved, 3"	ek		Locknuts, as required
f	4	Pin, crossarm, steel, clamp type			

0° to 5°

RAPTOR PROTECTION

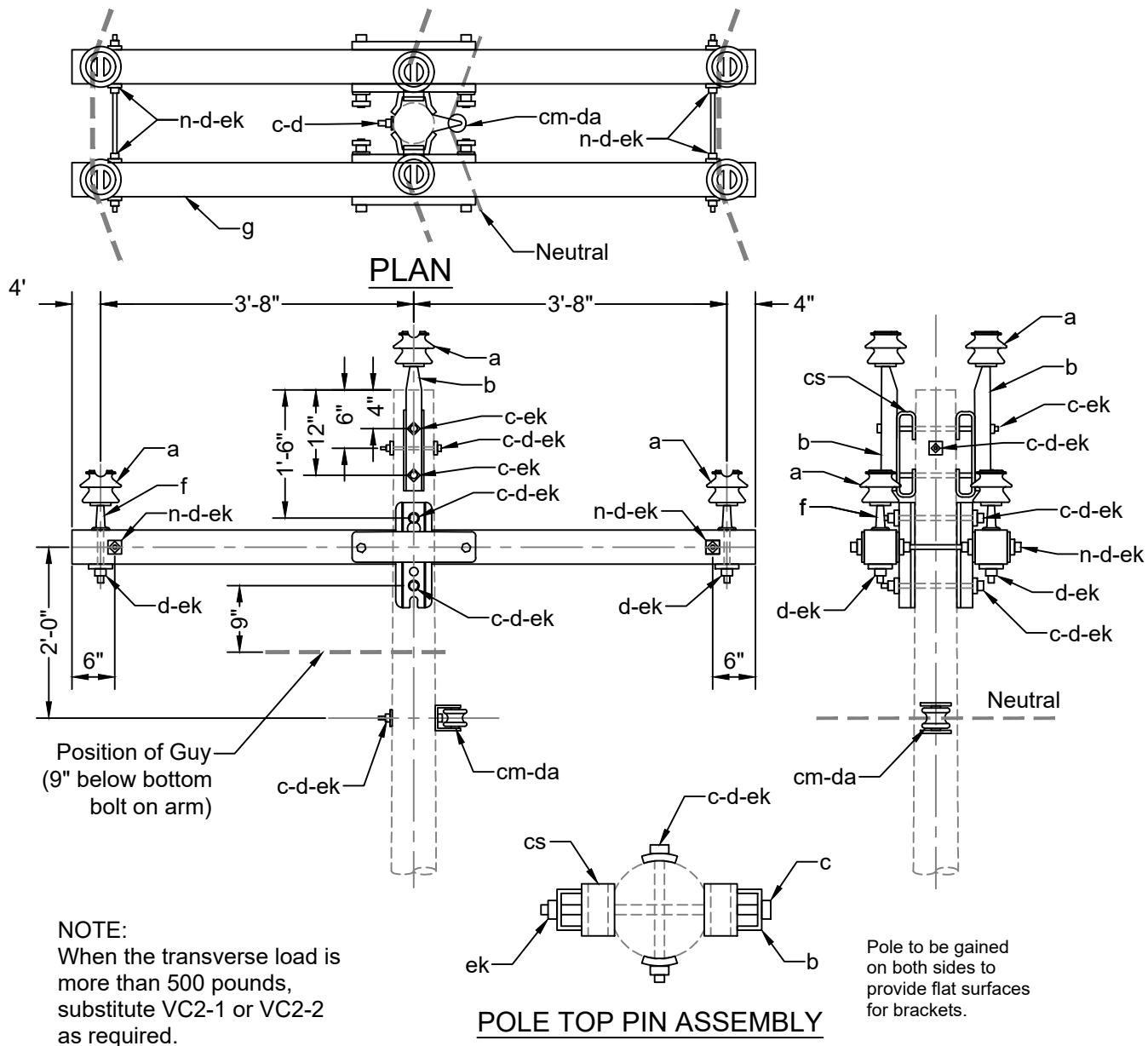
14.4/24.9 KV, 3 - PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT, (LARGE CONDUCTORS)

DWG BY: DSG

DATE: 3/2/07



VC1-3R



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	bv	4	Rod, armor, selected size
b	2	Pin, pole top, 20"	cm	1	Spool insulator (Neutral)
c	6	Bolt, machine, 5/8" x required length	cs	2	Pole top, bracket
d	17	Washer, 2 1/4" square, 13/16" hole	da	1	Bracket, insulated (Neutral)
d	2	Washer, 3" square, curved	ek	-	Locknuts
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			
n	2	Bolt, double arming, 5/8 x required length			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within
load limits: 5 to 30°

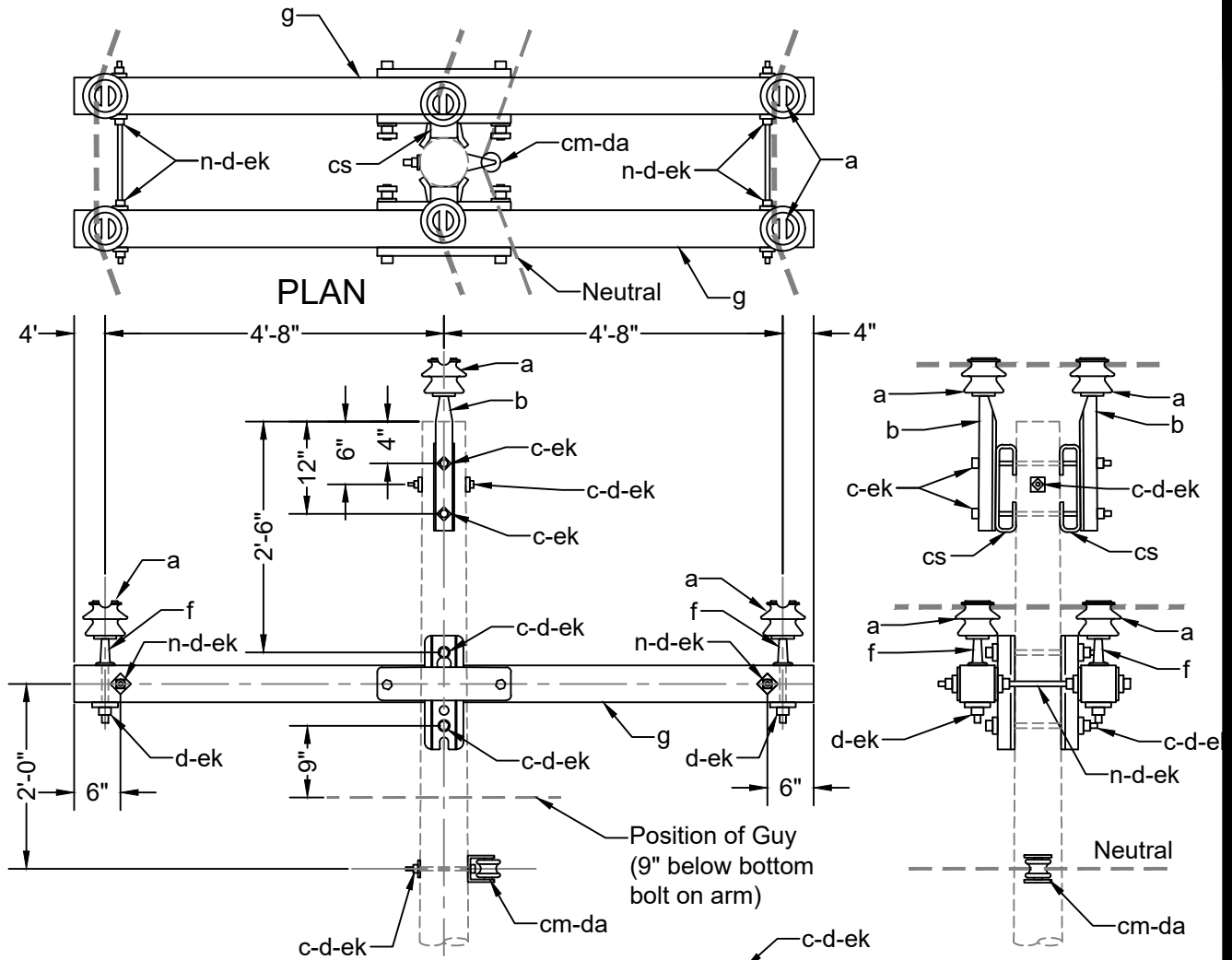
14.4 / 24.9 KV, 3 PHASE

CROSSARM CONSTRUCTION, DOUBLE PRIMARY SUPPORT

Revision Date

Dec. 30, 2022

VC2



NOTE:
When the transverse load is more than 500 pounds per pin, substitute VC2-1 or VC2-2 as required.

Pole to be gained on both sides to provide flat surface for brackets

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	n	3	Bolt, double arming, 5/8 x required length
b	2	Pin, pole top, 20"	bv	4	Rod, armor, selected size
c	6	Bolt, machine, 5/8" x required length	cm	1	Spool Insulator
d	17	Washer, 2 1/4" square, 13/16" hole	cs	2	Pole top bracket
d	2	Washer, 3" square, curved	da	1	Bracket, insulated (Neutral)
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"	ek	-	Locknuts
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
500 lbs. per conductor

Maximum line angle within
load limits: 5 to 30°

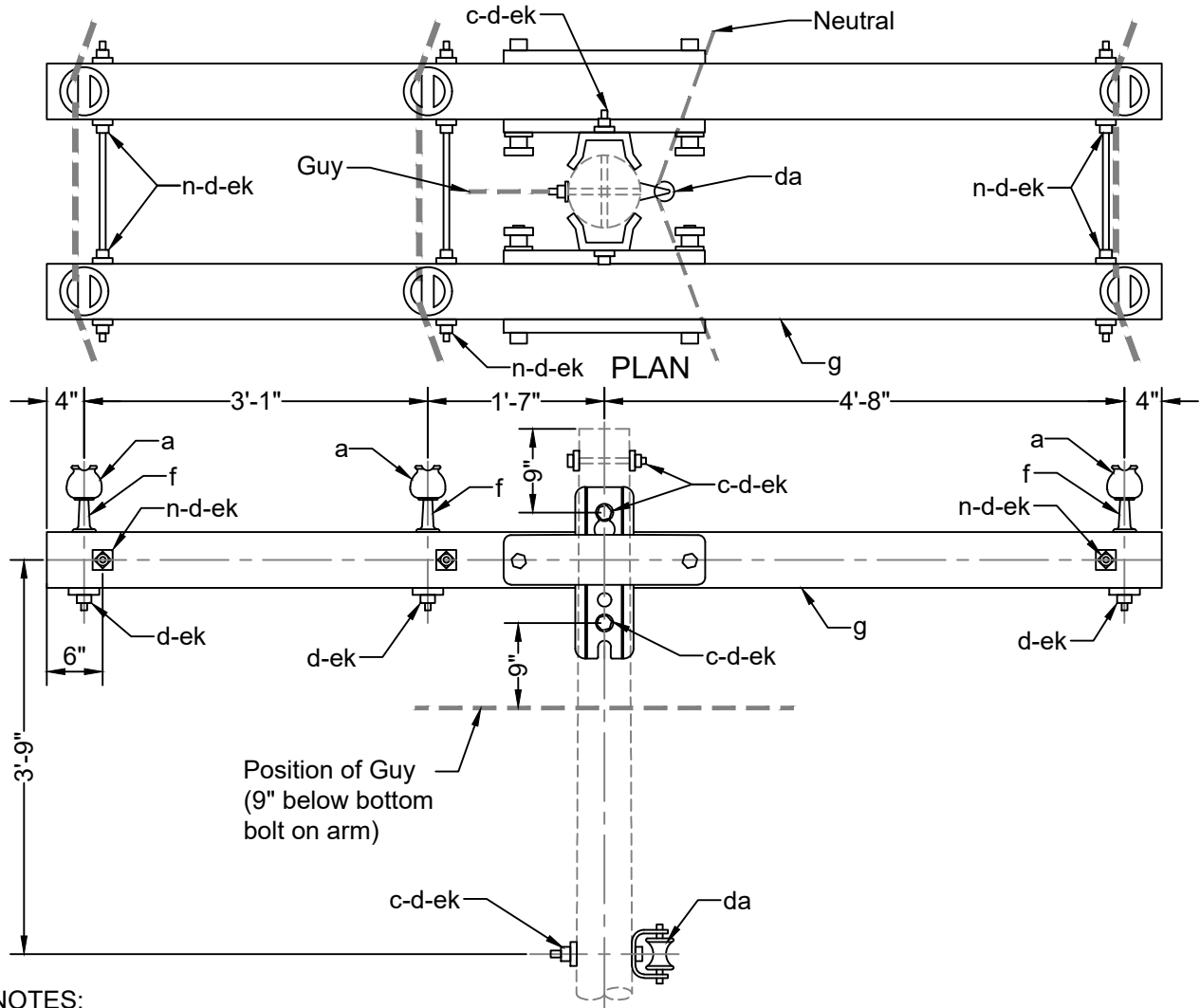
14.4 / 24.9 KV, 3 PHASE
RAPTOR PROTECTION, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

Revision Date:

Jan. 3, 2023



VC2R



NOTES:

Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.

Neutral may also be mounted on the crossarm.

When the transverse load is more than 750 pounds per pin install a 2 1/4" x 2 1/4" x 3/16" washer on the top of the crossarm for each pin.
If the load is more than 1500 pounds, use the construction shown on VC2-2.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	n	3	Bolt, double arming, 5/8" x required length
c	4	Bolt, machine, 5/8" x required length	bv	4	Rod, armor, selected size
d	23	Washer, 2 1/4" square x 13/16 hole	da	1	Bracket, insulated
d	2	Washer, 3" square, curved	ek		Locknuts, as required
f	6	Pin, cross arm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

DESIGN LIMITS

Maximum transverse load:
750 lbs. per pin

Maximum line angle within
load limits: 5° to 30°

14.4 / 24.9 KV, 3 PHASE

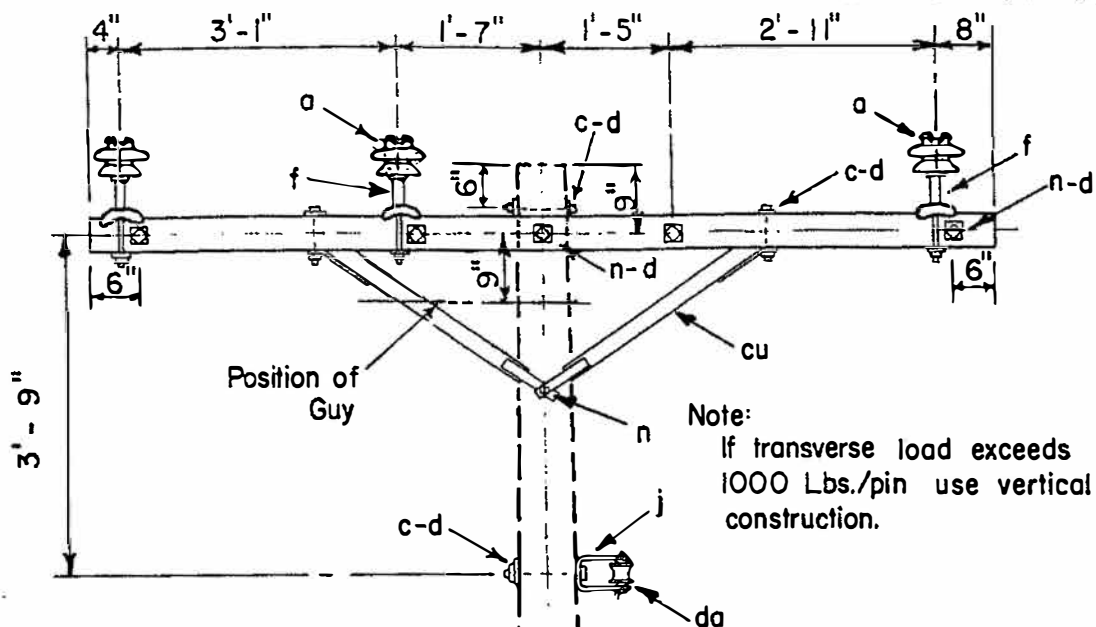
CROSSARM CONSTRUCTION, DOUBLE PRIMARY SUPPORT

Revision Date:

Jan. 3, 2023

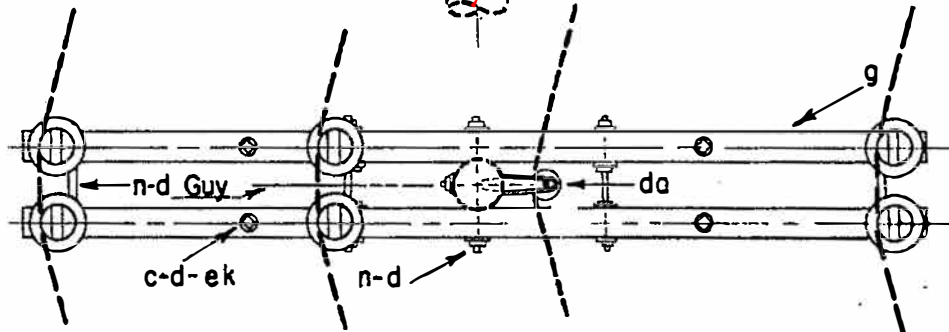


VC2-1



Obsolete. For Retirement Only. Use Post Insulator Unit.

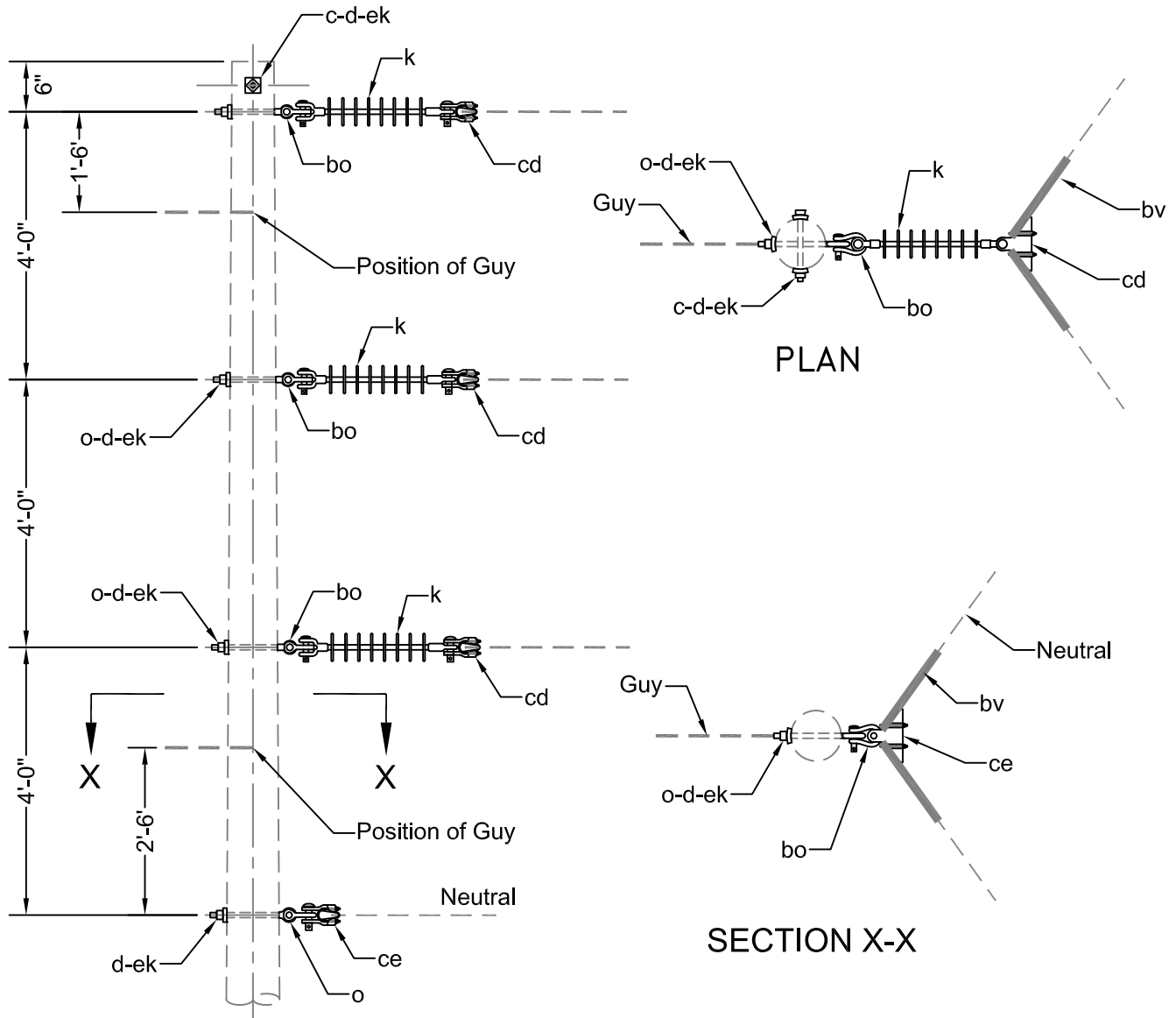
PLAN



Notes:

1. Side groove of insulator must always be larger than the overall diameter of conductor including armor rods when required.
2. Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.
3. This construction required for all conductors having a breaking strength of more than 4,500 pounds.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10' - 0"
c	2	Bolt, machine, 5/8" x req'd. length	j	2	Screw, lag, 1/2" x 4"
c	4	Bolt, machine, 1/2" x req'd. length	n	6	Bolt, double arming, 5/8" x req'd. length
d	21	Washer, square 2 1/4"	cu	2	Brace, wood, 60" span
d	4	Washer, rd., 1 3/8" diam.	da	1	Bracket, insulated
f	6	Pin, crossarm, steel, clamp type	ek		Locknuts
14.4/24.9 KV, 3-PHASE CROSSARM CONSTRUCTION-DOUBLE PRIMARY SUPPORT (LARGE CONDUCTORS) MAXIMUM TRANSVERSE LOADING— 1000 LBS. / PIN					
5° TO 30° MAX. ANGLE					
Jan. 1, 1963				VC2-2	

**Note:**

Item cd and ce are shown on assembly drawings M41-1 and M41-10.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	bv	4	Rod, Armor, select size
d	6	Washer, square, 3", curved	cd	3	Angle assembly, primary
k	3	Insulator, suspension, epoxilator	ce	1	Angle assembly, neutral
o	4	Bolt, eye, 5/8" x required length	ek	-	Locknut, as required
bo	4	Shackle, anchor			

DESIGN LIMITS

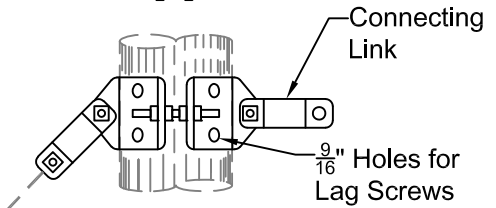
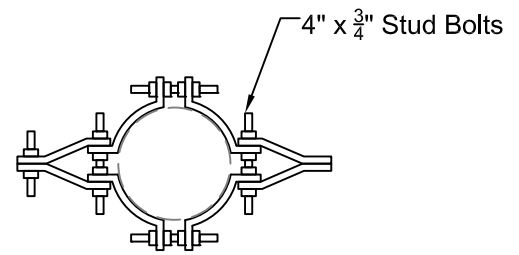
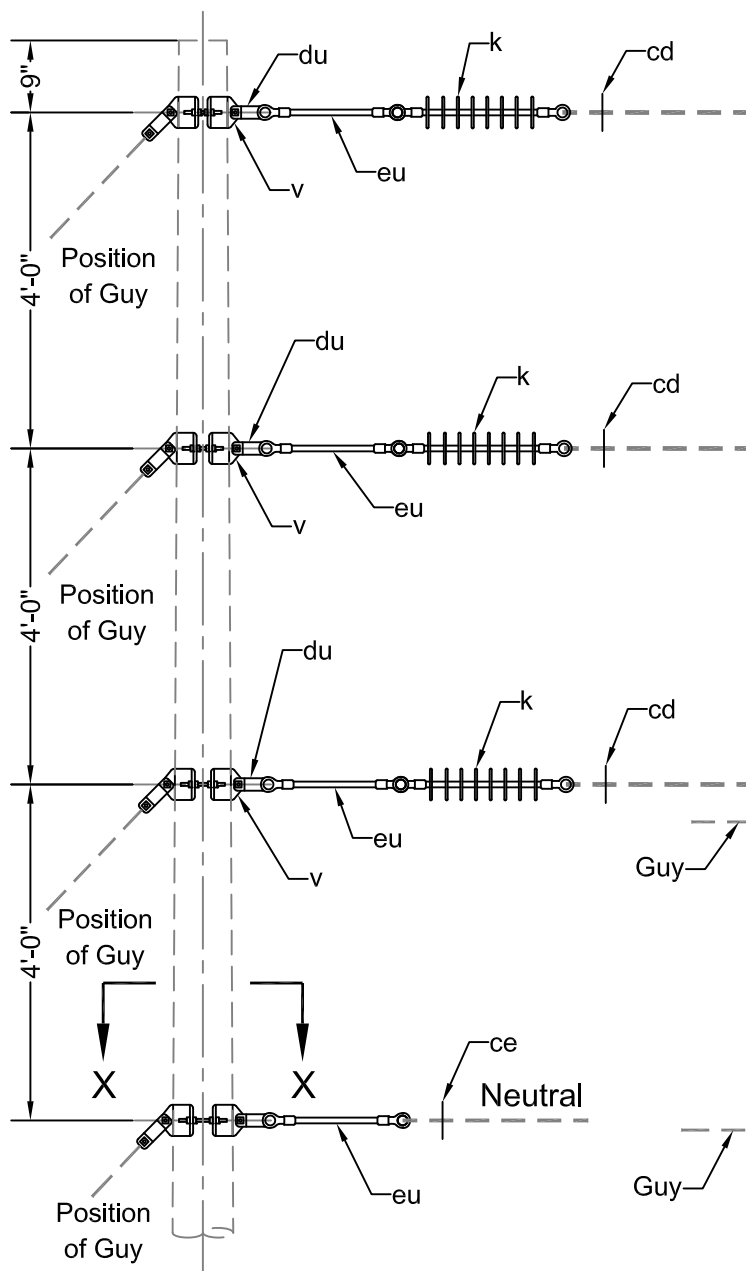
Maximum transverse load:
4000 lbs. per conductor
Maximum line angle within
limits: 20° to 60° angle

14.4 / 24.9 KV PRIMARY, 3-PHASE VERTICAL CONSTRUCTION - 20° TO 60° ANGLE

Revision Date

Jan. 3, 2020

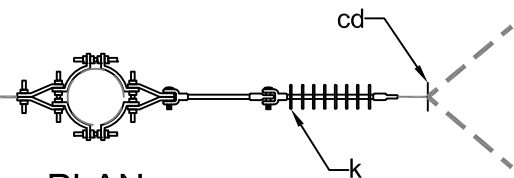
**VC3**



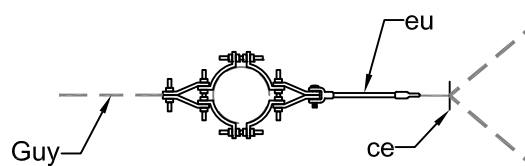
POLE BAND DETAIL

NOTE:

Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.



PLAN



Section X-X

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, Lag, 1/2" x 4"	aq	-	Jumpers, as required
k	3	Insulator, suspension, epoxilator	bv	4	Rod, armor, select size
p	-	Connectors, as required	du	8	Link, connecting
v	4	Pole band, required diameter	eu	4	Link, extension, insulated
			cd	3	Angle assembly, primary
			ce	1	Angle assembly, neutral

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor
Maximum line angle within
limits: 30° - 60°

14.4 / 24.9 KV - 3 PHASE

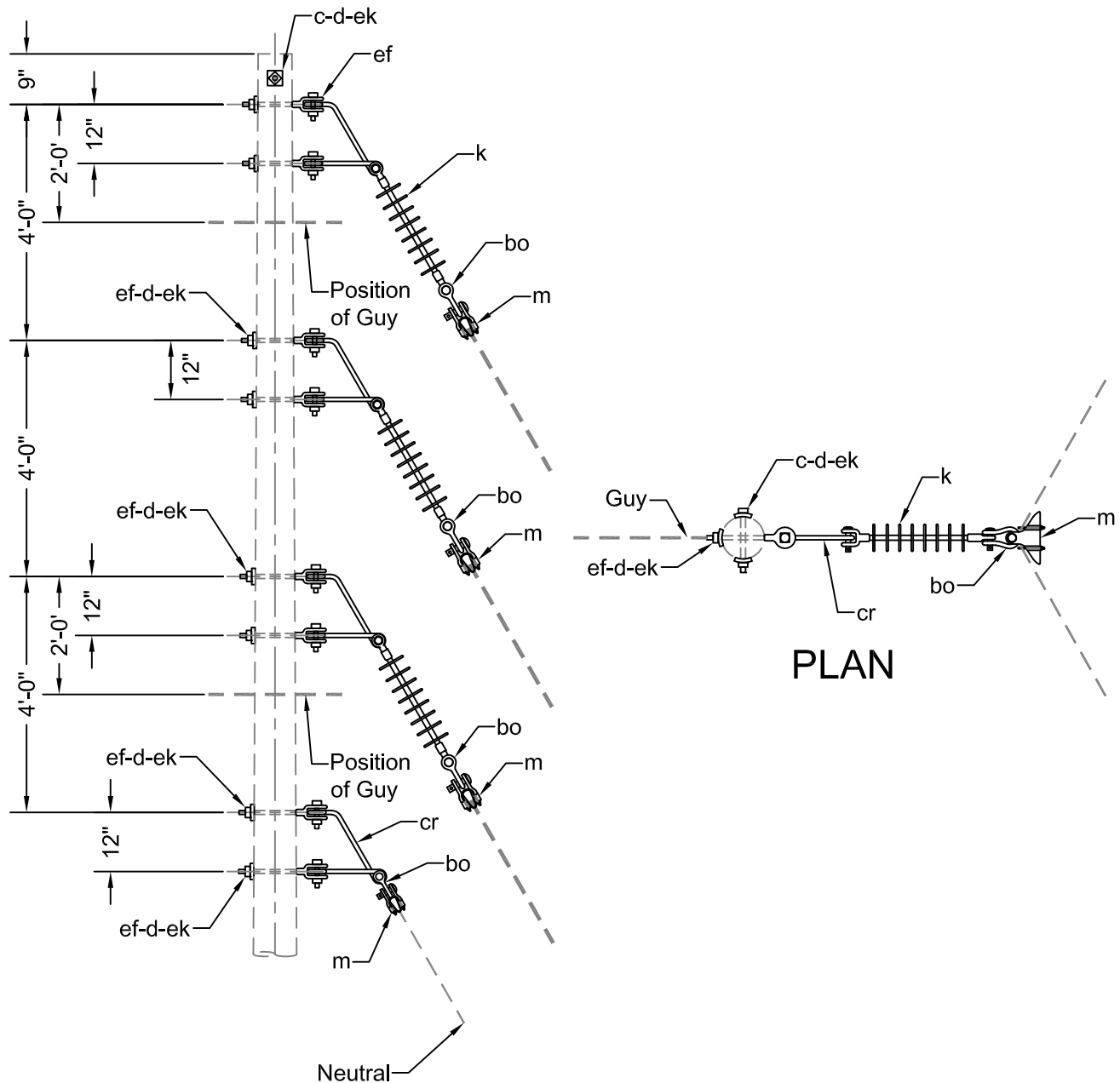
VERTICAL CONSTRUCTION, POLE BAND
(LARGE CONDUCTOR)

Revision Date:

Jan. 9, 2020



VC3L



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	bo	4	Shackle, anchor
d	10	Washer, square, 3", curved	bv	4	Rod, armor, select size
k	3	Insulator, suspension, epoxilator	cr	4	Bracket, angle, 5/8"
m	4	Clamp, suspension	ef	8	Bolt, clevis, 5/8" x required length
			ek	-	Locknuts, as required

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor
Maximum line angle within
load limits: 10°-20°

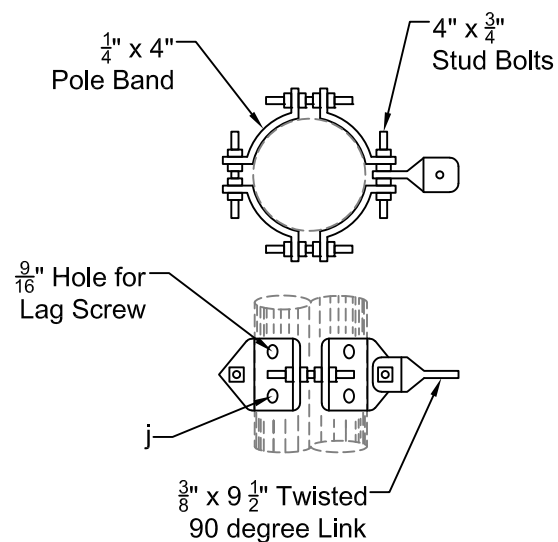
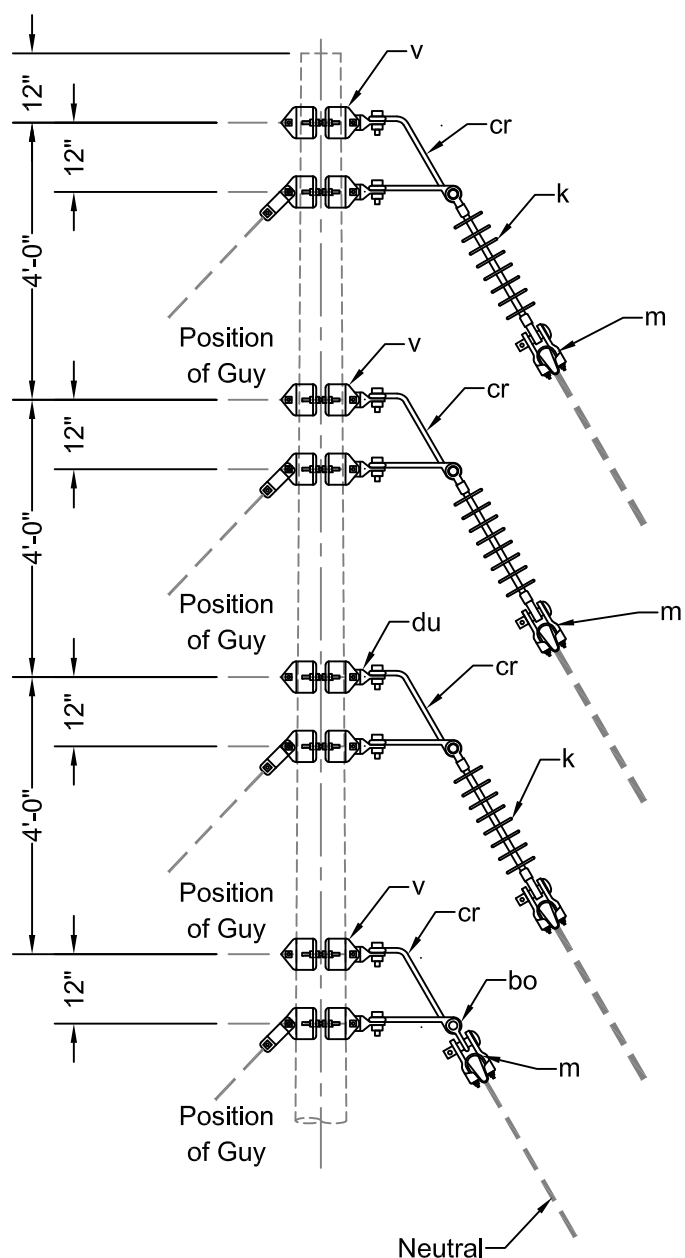
14.4 / 24.9 KV - 3 PHASE

VERTICAL CONSTRUCTION
(LARGE CONDUCTOR)

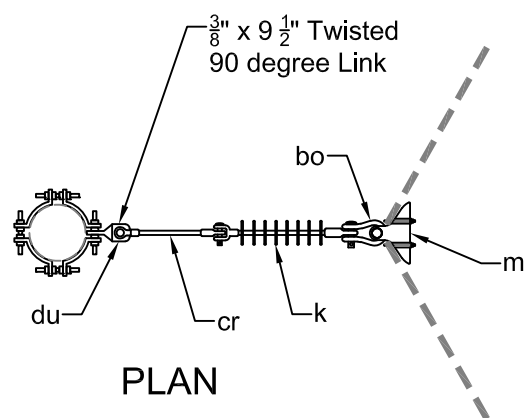
Revision Date:

Jan. 14, 2020

**VC3-1**



POLE BAND DETAIL



PLAN

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	32	Screw, lag, 1/2" x 4"	bo	1	Shackle, anchor
k	3	Insulator, suspension, epoxilator	cr	4	Bracket, angle, 5/8"
m	4	Clamp, suspension	du	8	Link, Connecting, Twisted 90 degree
v	8	Pole Band, required diameter			

DESIGN LIMITS

Maximum transverse load:
4000 lbs. per conductor

Maximum line angle within load limits:
10° to 20° Angle.

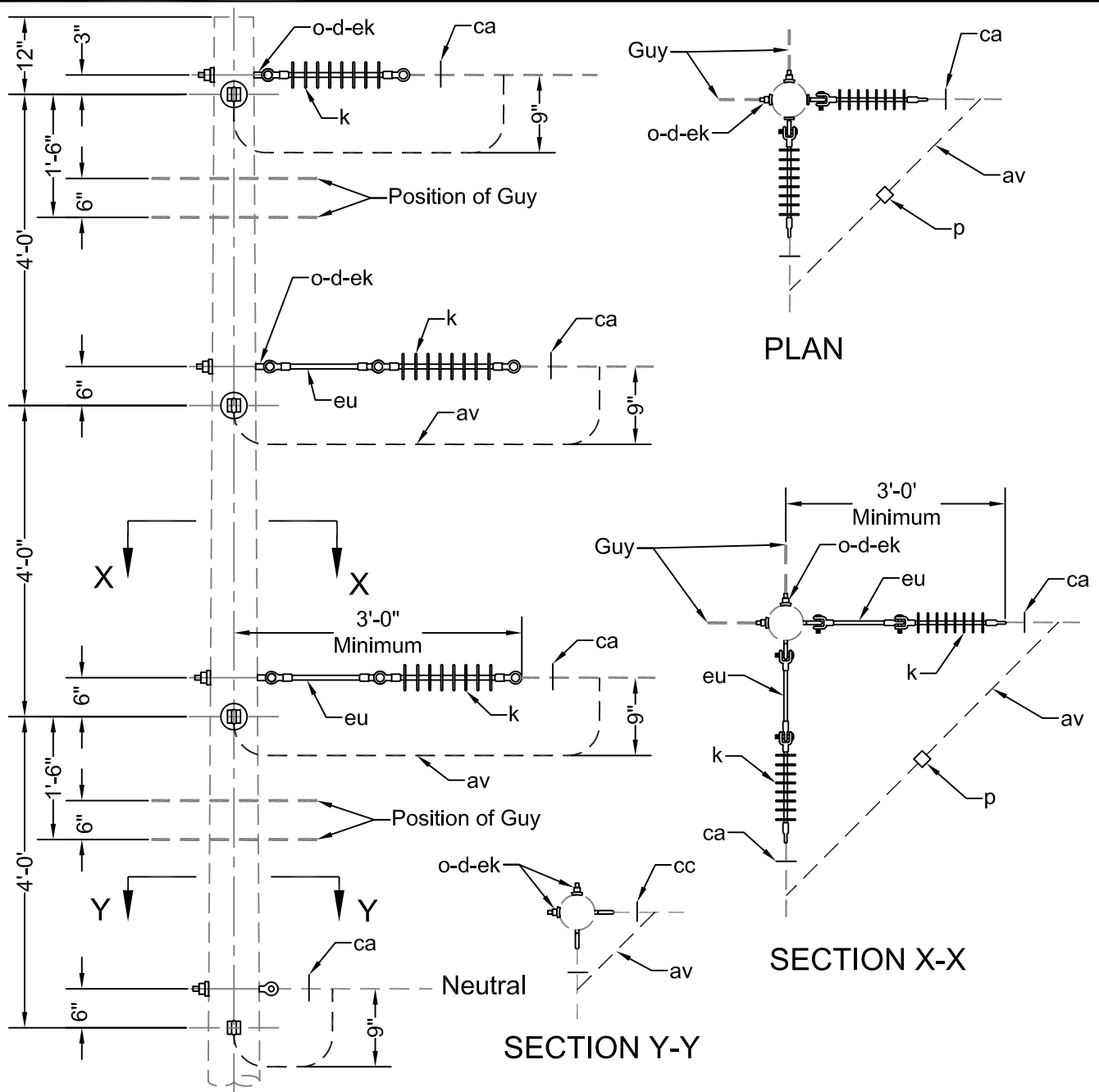
14.4 / 24.9 KV - 3 PHASE

VERTICAL CONSTRUCTION - LARGE CONDUCTOR

Revision Date

Jan. 14, 2020

**VC3-1L**



ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
d	8	Washer, square, 3", curved	av	-	Jumpers, as required
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
o	8	Bolt, eye, 5/8" x required length	cc	2	Deadend assembly, neutral
p	-	Connectors, as required	ek	-	Locknut, as required
eu	4	Insulator, fiberglass, strain			

DESIGN LIMITS

Maximum line angle within limits: 60° to 90°

Modified to meet 2005 RUS Standards.

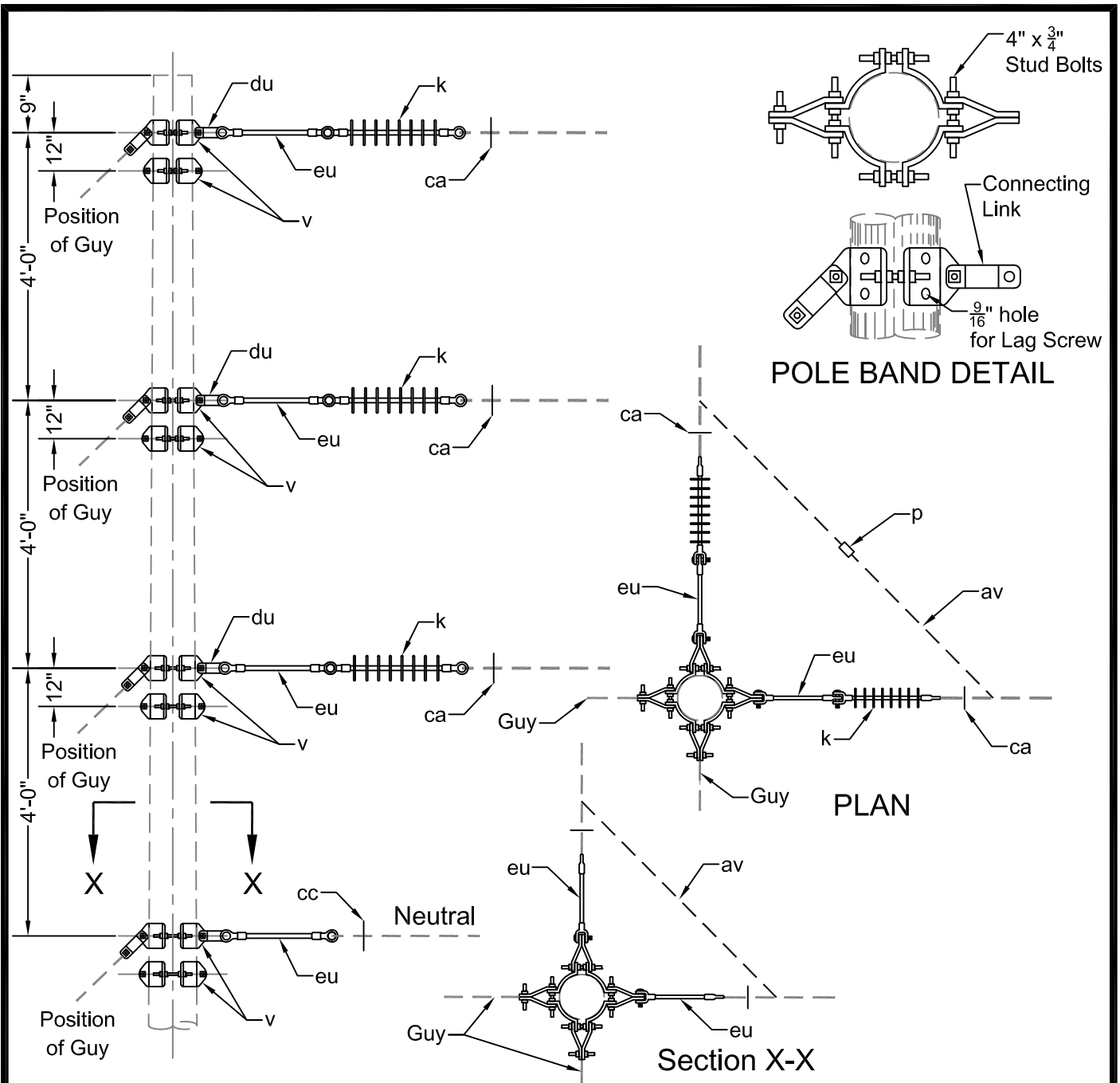
14.4 / 24.9 KV, 3-PHASE
VERTICAL CONSTRUCTION - 60° TO 90° ANGLE

Revision Date:

Jan. 15, 2020



VC4-1



ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
eu	8	Link, extension, insulated	av	-	Jumpers, as required
j	32	Screw, Lag, 1/2" x 4"	du	8	Link, connecting
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
p	-	Connectors, as required	cc	2	Deadend assembly, neutral
v	8	Pole band, required diameter			

NOTE:

Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.

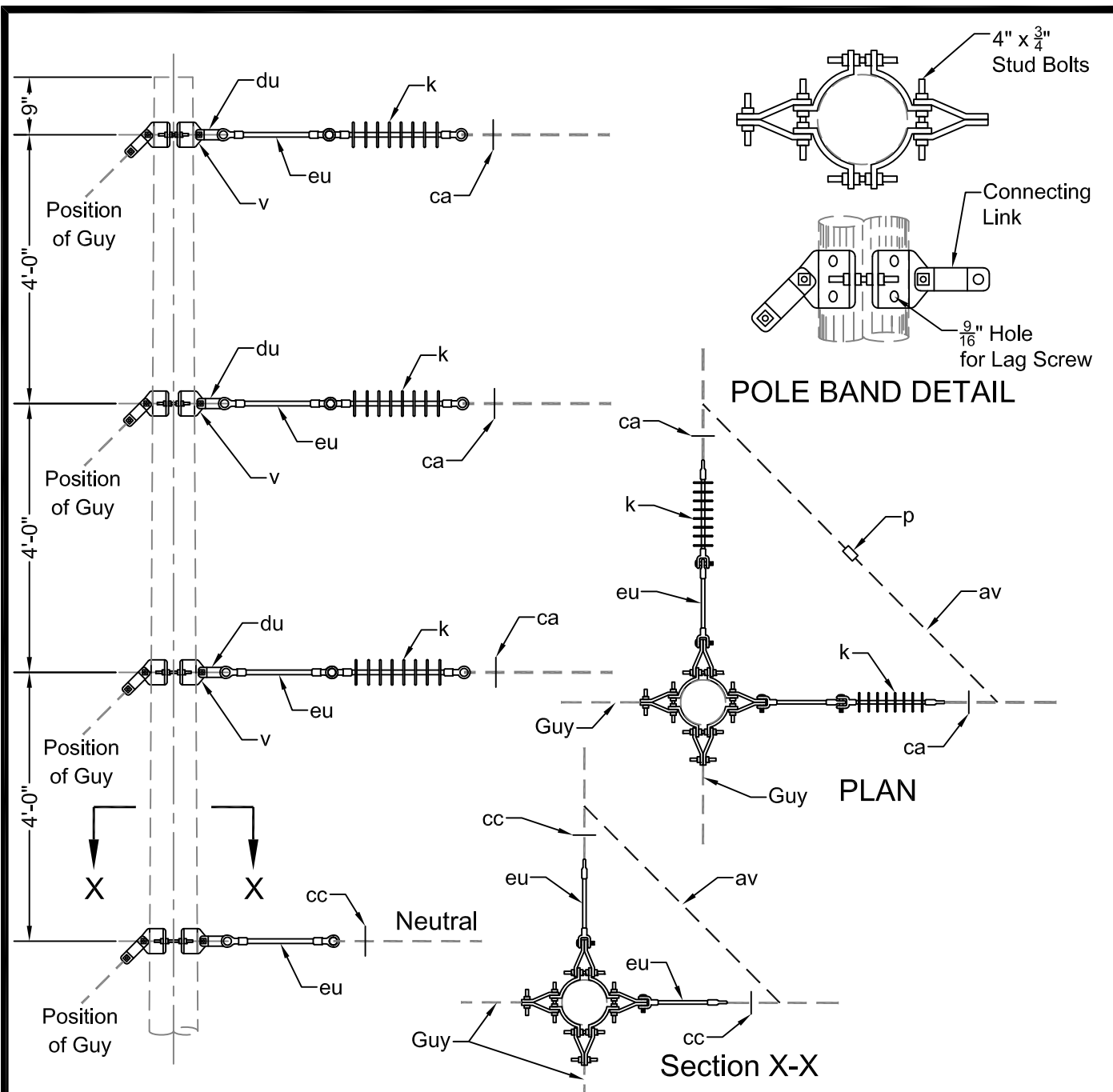
14.4 / 24.9 KV, 3 PHASE
VERTICAL CONSTRUCTION, POLE BAND
(LARGE CONDUCTOR)

Revision Date:

Jan. 15, 2020



VC4-1L



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	32	Screw, Lag, 1/2" x 4"	av	-	Jumpers, as required
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
p	-	Connectors, as required	cc	2	Deadend assembly, neutral
v	4	Pole band, required diameter	eu	8	Link, extension, insulated

NOTE:

Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.

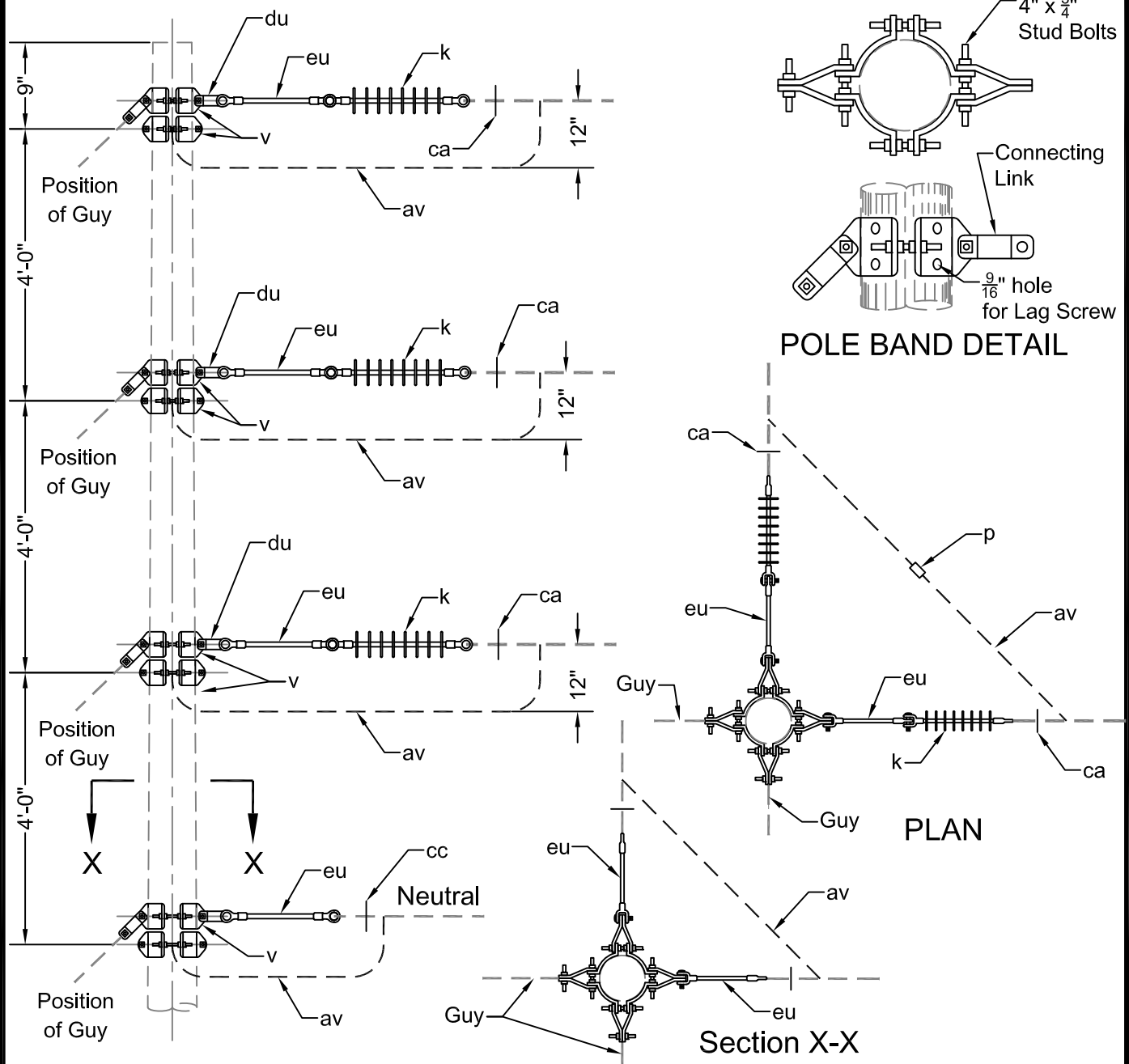
14.4 / 24.9 KV 3 PHASE
VERTICAL CONSTRUCTION - 60° TO 90° ANGLE
POLE BAND, LARGE CONDUCTOR

Revision Date

Jan. 15, 2020



VC4-4L



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
eu	8	Link, extension, insulated	av	-	Jumpers, as required
j	32	Screw, Lag, 1/2" x 4"	du	8	Link, connecting
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
p	-	Connectors, as required	cc	2	Deadend assembly, neutral
v	8	Pole band, 4 way assembly, w/ 3/4" threaded rod			

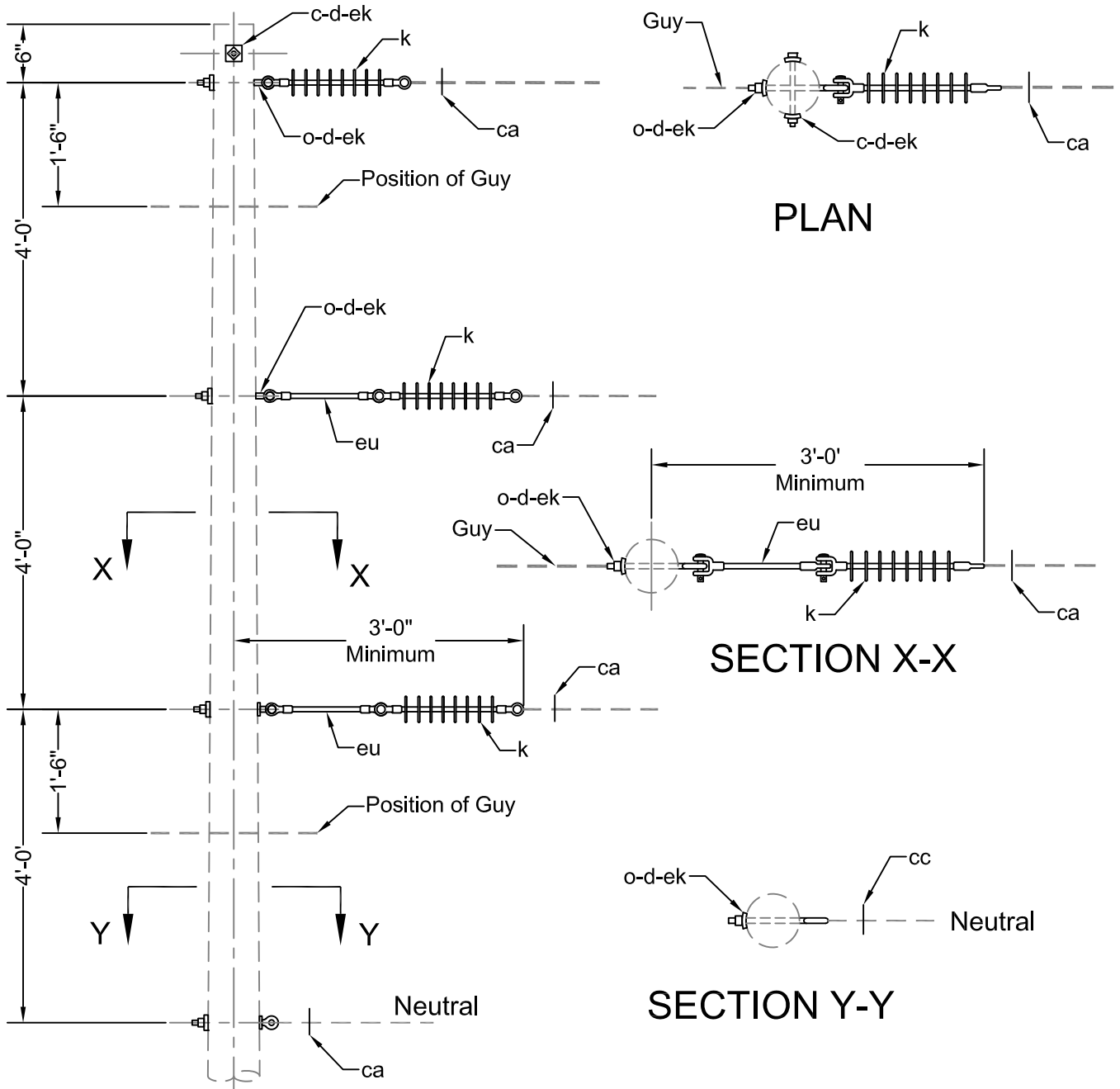
14.4 / 24.9 KV, 3 PHASE
 VERTICAL CONSTRUCTION - 60° TO 90° ANGLE
 POLE BAND, LARGE CONDUCTOR

Revision Date:

Jan. 15, 2020



VC4-8L



Item ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

ITEM	NO.	MATERIALS	ITEM	NO.	MATERIALS
c	1	Bolt, machine, 5/8" x required length	ca	3	Deadend assembly, primary
d	5	Washer, square, 3", curved	cc	1	Deadend assembly, neutral
k	3	Insulator, suspension, epoxilator	ek	-	Locknut, as required
o	4	Bolt, eye, 5/8" x required length			Jumper as required
eu	2	Insulator, fiberglass, strain			

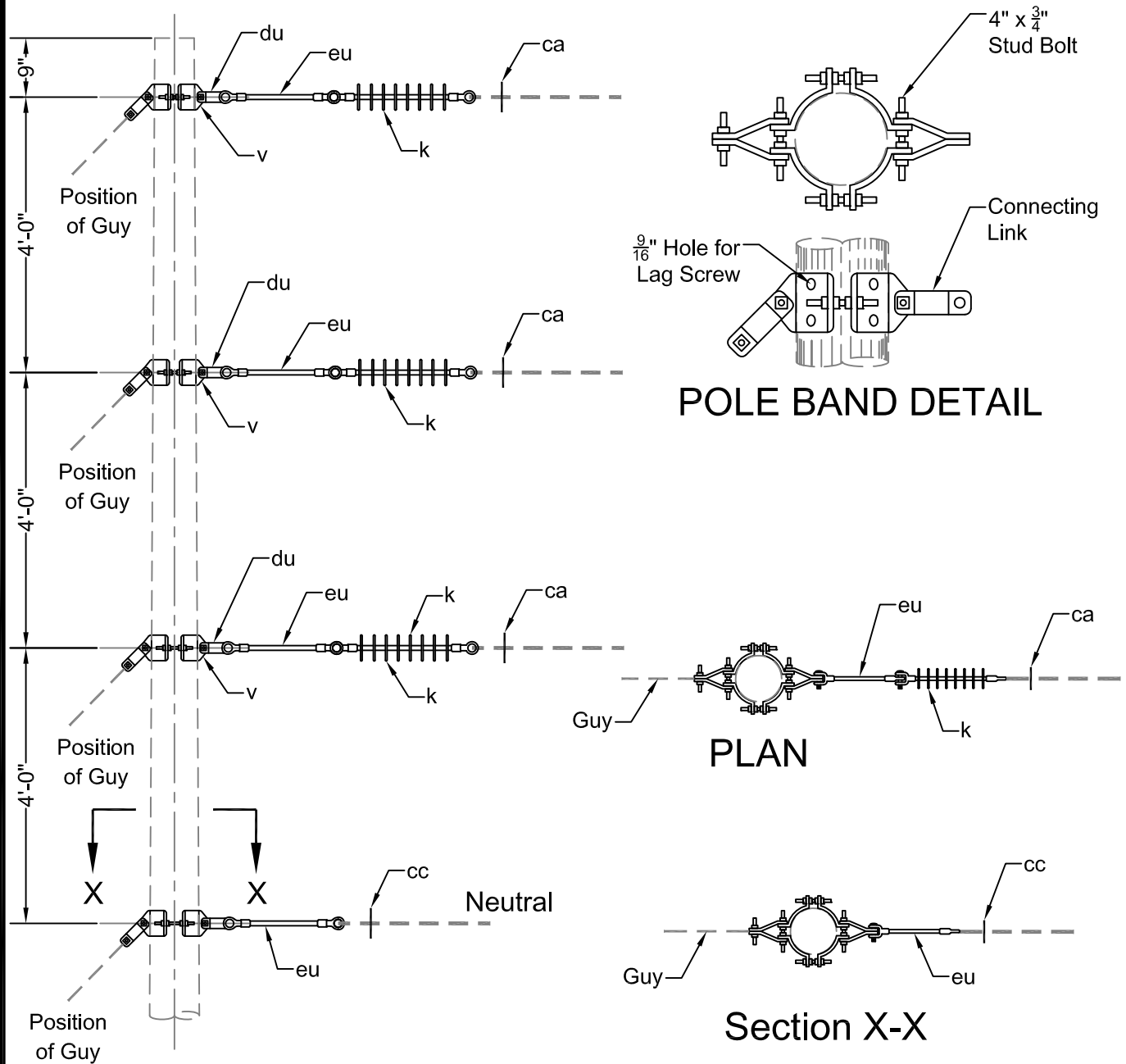
14.4/24.9 KV, 3-PHASE
VERTICAL CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Jan 15, 2020



VC5-1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
eu	4	Link, extension, insulated	av	-	Jumpers, as required
j	16	Screw, Lag, 1/2" x 4"	du	4	Link, connecting
k	3	Insulator, suspension, epoxilator	ca	3	Deadend assembly, primary
p	-	Connectors, as required	cc	1	Deadend assembly, neutral
v	4	Pole band, required diameter			

NOTE:

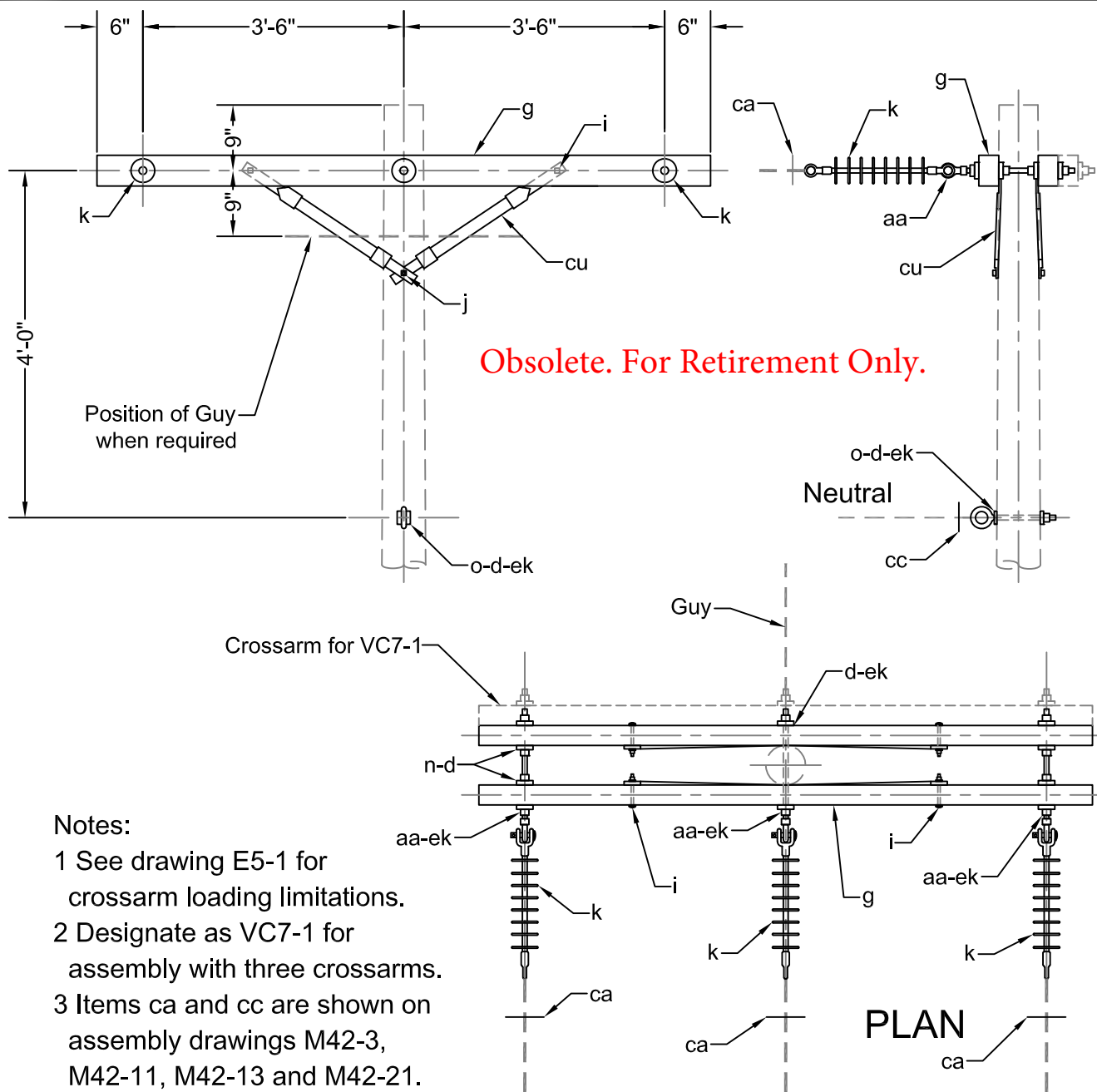
Items ca and cc are shown on assembly drawings M42-3, M42-13 and M42-21.

14.4 / 24.9 KV - 3 PHASE
 VERTICAL CONSTRUCTION, POLE BAND
 (LARGE CONDUCTOR)

Revision Date

Jan. 16, 2020

**VC5-1L**



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	10	Washer, 2 1/4" square, 13/16" hole	o	1	Bolt, eye, 5/8" x required length
d	2	Washer, square, 3" curved	aa	3	Nut, eye, 5/8"
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'-0"	ca	3	Deadend assembly, primary
i	4	Bolt, carriage, 3/8" x 4 1/2"	cc	1	Deadend assembly, neutral
j	2	Screw, lag, 1/2" x 4"	cu	2	Brace, wood, 28" pair
k	3	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
n	3	Bolt, double arming, 5/8" x required length			Jumpers as required

Not for large conductors
For 336 & 477 ACSR
use VC7A/8

14.4 / 24.9 KV, 3 PHASE

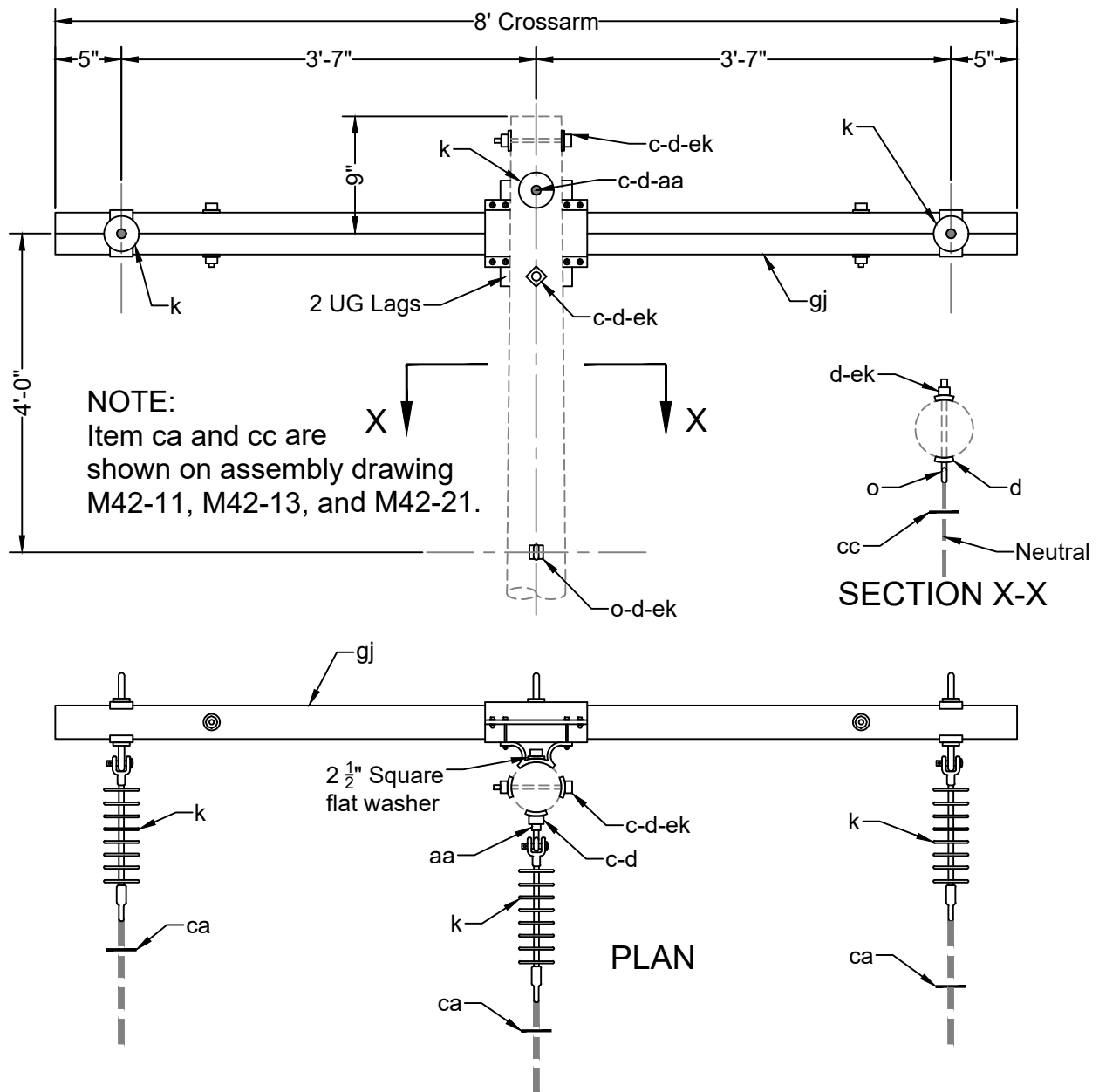
CROSSARM CONSTRUCTION, DEADEND (SINGLE)

Revision Date

Jan 16, 2020



VC7
VC7-1



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 3/4"
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
d	1	Washer, 2 1/2" Square, flat, at top mount	gj	1	8' - Crossarm assembly, DE
k	3	Insulator, suspension, epoxilator 7.2 KV	ek	-	Locknuts, as required
o	1	Bolt eye, 5/8" x required length		2	UG Lags on bottom VC7A/8

For 336 ACSR & 477 ACSR
VC7A/8 is Preferred

VC7A/8, VC7A/10

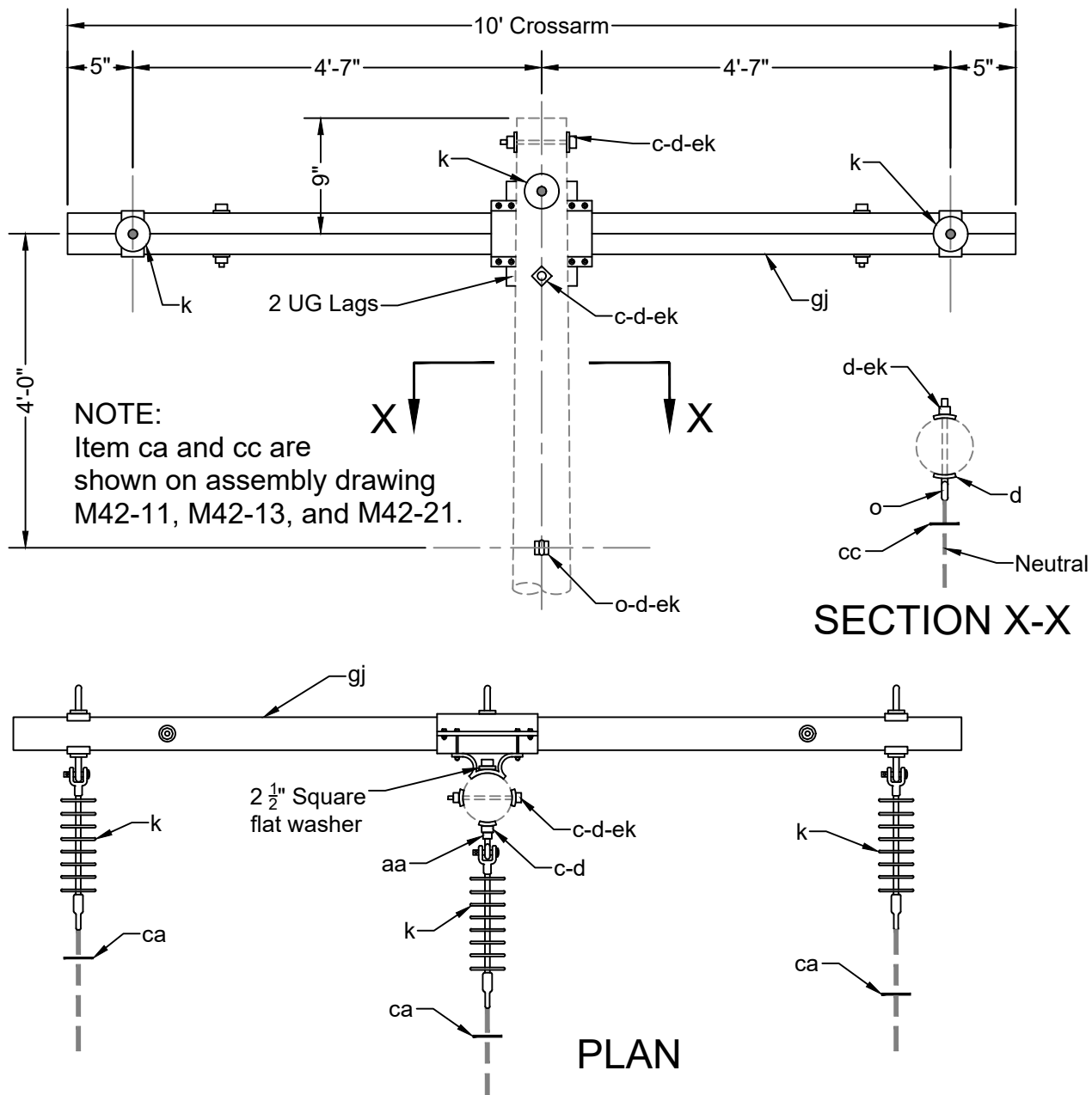
14.4 / 24.9 KV, 3-PHASE
8' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

Jan 16, 2020



VC7A/8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 3/4"
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
d	1	Washer, 2 1/2" Square, flat, at top mount	gj	1	10' - Crossarm assembly, DE
k	3	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
o	1	Bolt eye, 5/8" x required length		1	UG Lags on bottom VC7A/10

For 336 ACSR & 477 ASCR
VC7A/8 is Preferred

14.4 / 24.9 KV, 3-PHASE

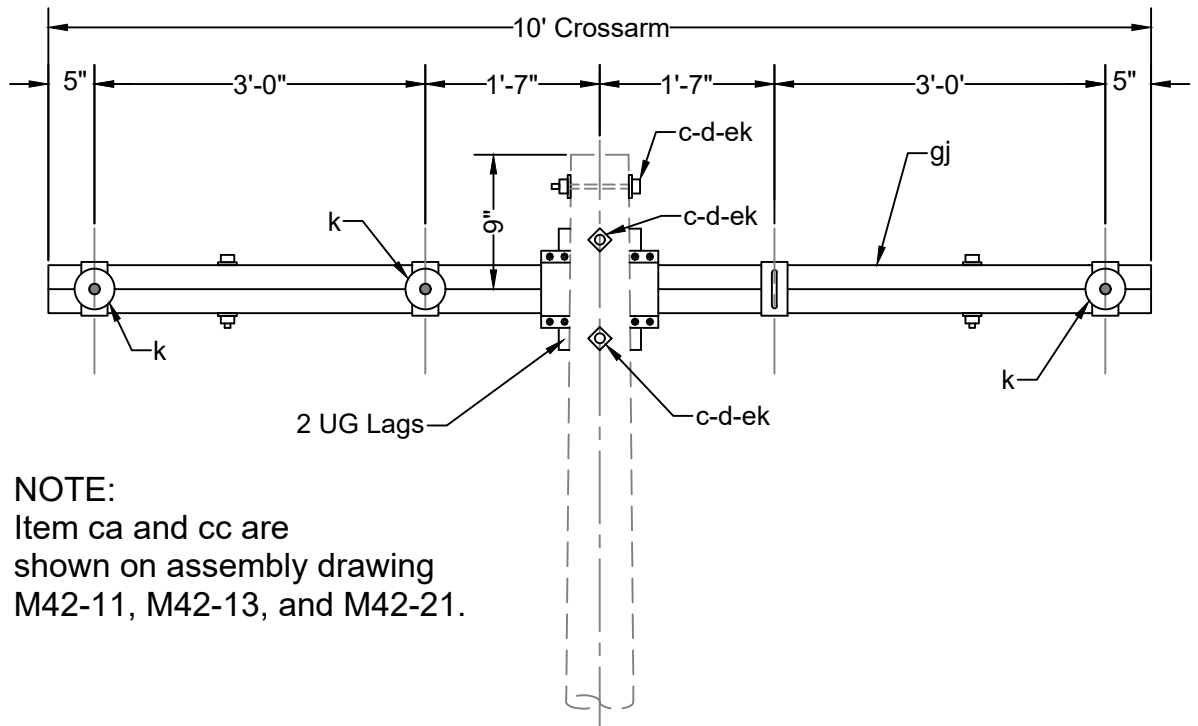
10' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

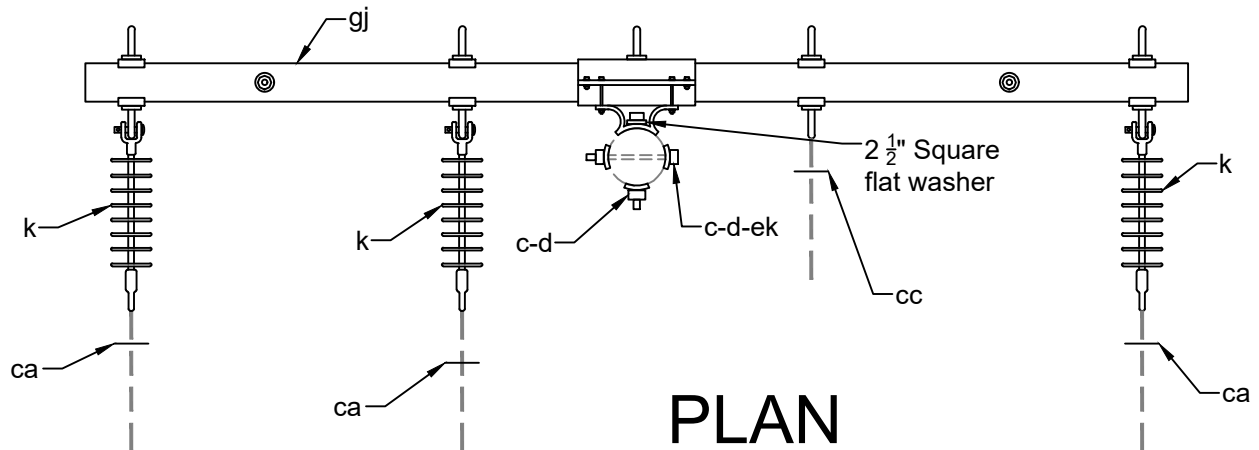
Jan. 17, 2023



VC7A/10



NOTE:
Item ca and cc are
shown on assembly drawing
M42-11, M42-13, and M42-21.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
c	1	Bolt, machine 5/8" x required length	cc	1	Deadend assembly, Neutral
d	4	Washer, Square, curved 3"	gj	1	10' Crossarm assembly, DE
d	1	Washer, 2 1/2" Square, flat, at top mount	ek	-	Locknuts, as required
k	3	Insulator, suspension, epoxilator		1	UG Lags on bottom VC7A/10F

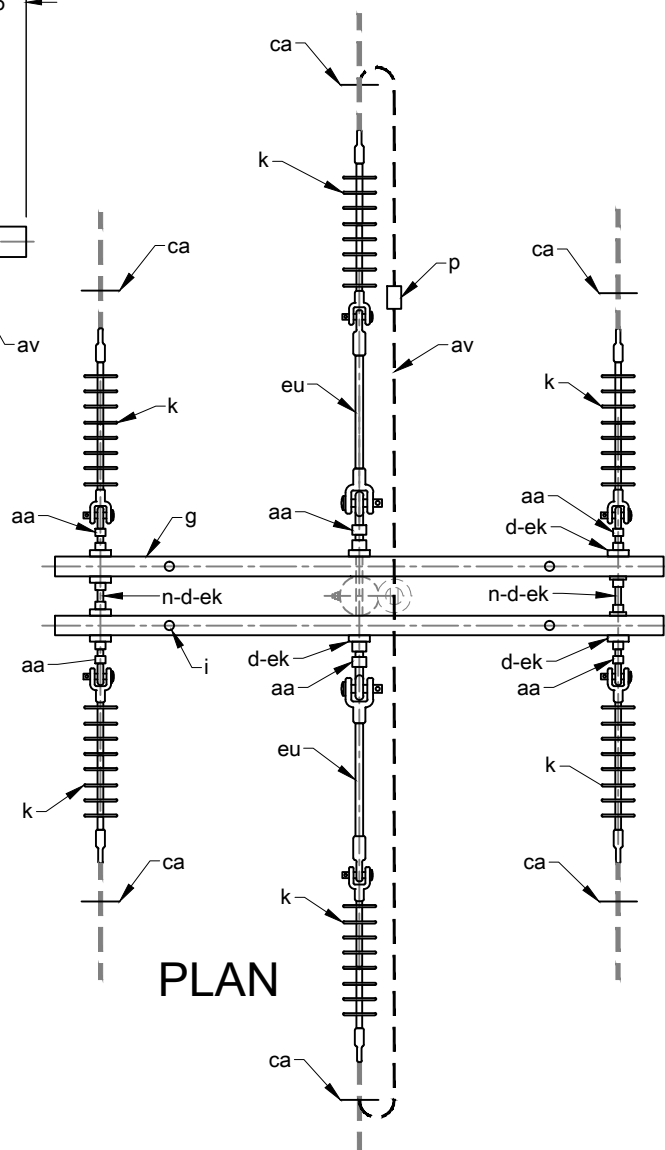
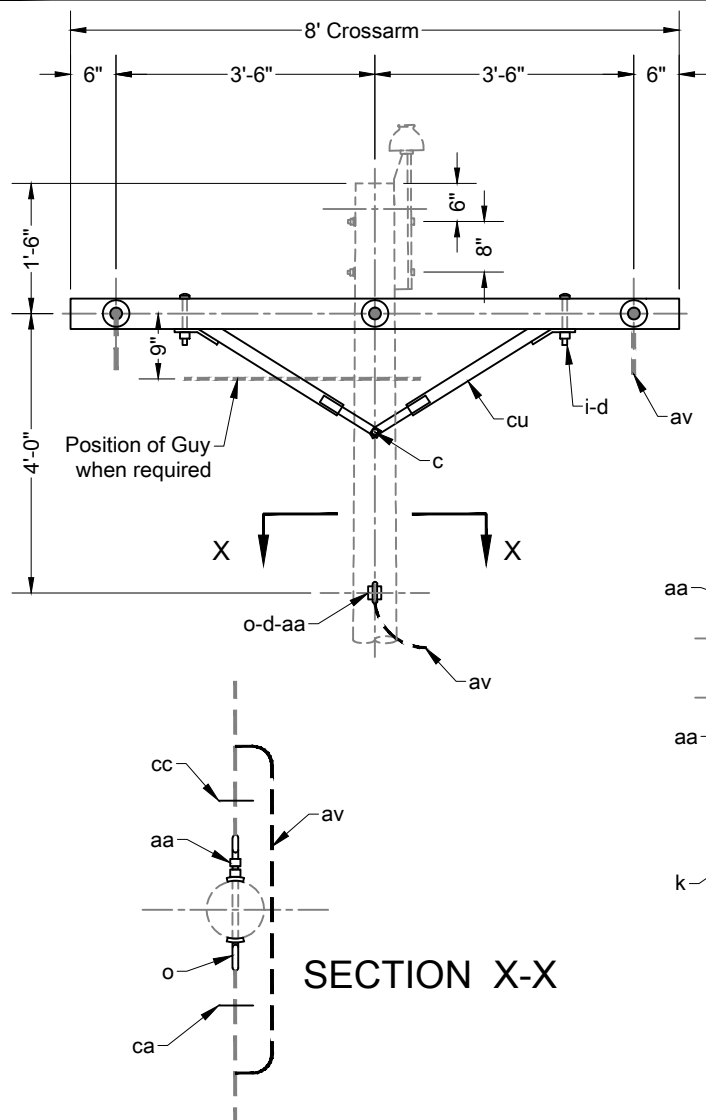
14.4 / 24.9 KV, 3-PHASE
CROSSARM CONSTRUCTION - DEAD END (SINGLE)

VC7A/10F

Revision Date
Jan 17, 2020



VC7A/10F



Note:
item ca and cc are shown on assembly drawings
M42-3, M42-11, M42-13 and M42-21.

Obsolete. For Retirement Only. Use Pupi Deadend Unit.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	10	Washer, 2 1/4" square, 13/16" hole	aa	7	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers, and lead as required
g	2	Crossarm 3 3/4" x 4 3/4" x 8'-0"	ca	6	Deadend assembly, primary
i	4	Bolt, carriage, 1/2" x 4 1/2"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxilator	cu	2	Brace, wood, 60" span
n	3	Bolt, double arming, 5/8" x req'd length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required

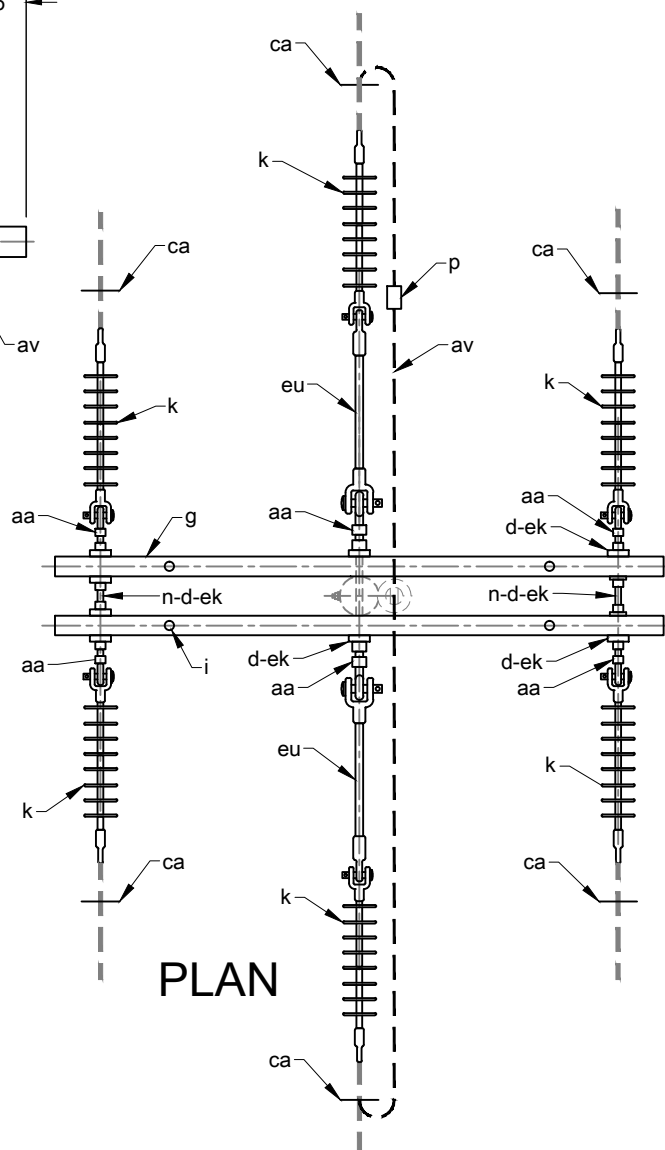
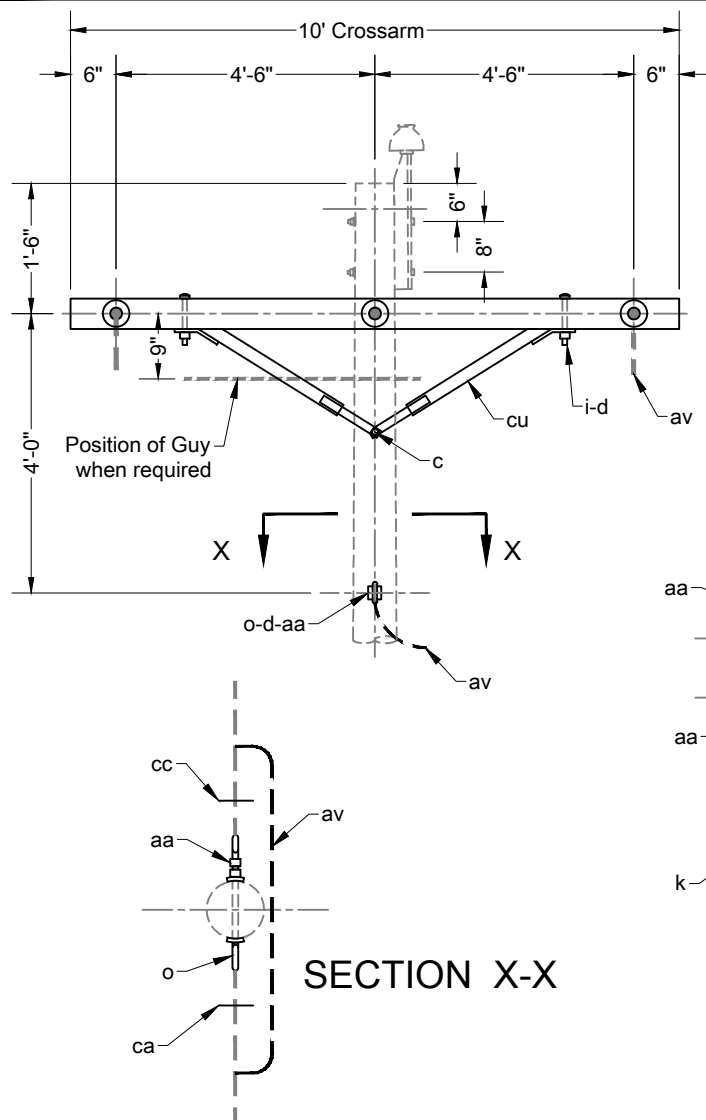
VC8 , VC8X

Feb 20, 2018

14.4 / 24.9 KV, 3-PHASE
8' CROSSARM CONSTRUCTION
DEADEND (DOUBLE)



VC8



Note:
item ca and cc are shown on assembly drawings
M42-3, M42-11, M42-13 and M42-21.

Obsolete. For Retirement Only. Use Pupi Deadend Unit.

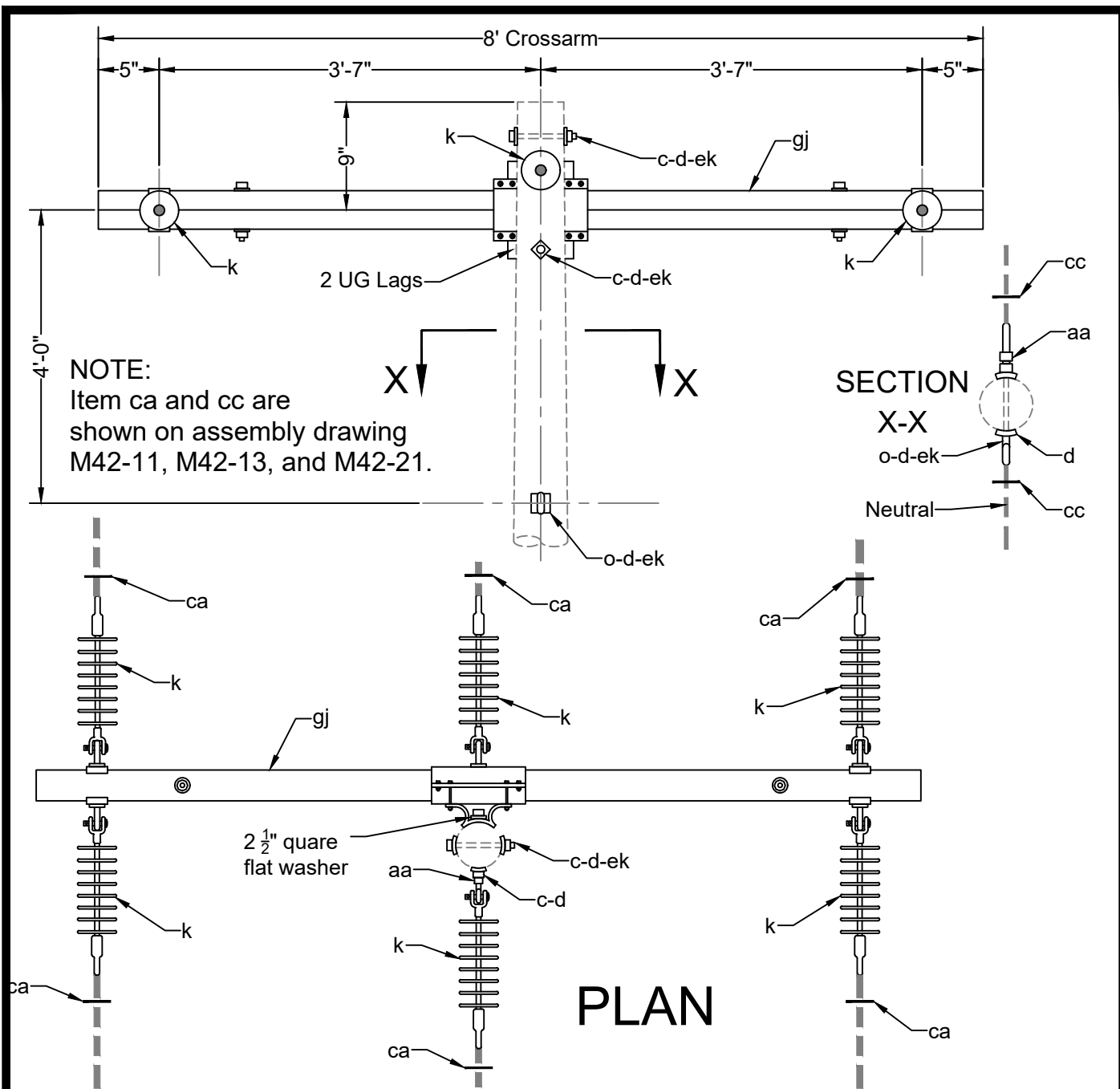
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	p	-	Connectors, as required
d	10	Washer, 2 1/4" square, 13/16" hole	aa	7	Nut, eye, 5/8"
d	2	Washer, square, 3" curved	av	-	Jumpers, and lead as required
g	2	Crossarm 3 3/4" x 4 3/4" x 8'-0"	ca	6	Deadend assembly, primary
i	4	Bolt, carriage, 1/2" x 4 1/2"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxilator	cu	2	Brace, wood, 60" span
n	3	Bolt, double arming, 5/8" x req'd length	eu	2	Link, extension, fiberglass
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required

14.4 / 24.9 KV, 3-PHASE
10' CROSSARM CONSTRUCTION
DEADEND (DOUBLE)

Feb 20, 2018



VC8X



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 5/8"
c	2	Bolt, machine 3/4" x required length	aa	1	Nut, eye, 3/4"
d	6	Washer, 3" Square, curved	ca	6	Deadend assembly, Primary
d	1	Washer, 2 1/2" Square, flat, at top mount	cc	2	Deadend assembly, Neutral
k	6	Insulator, suspension, epoxilator	gj	1	8' Crossarm assembly, DE
o	1	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
				2	UG Lags on bottom VC8A/8

For 336 ACSR & 477 ACSR
VC8A/8 is Preferred

VC8A/8

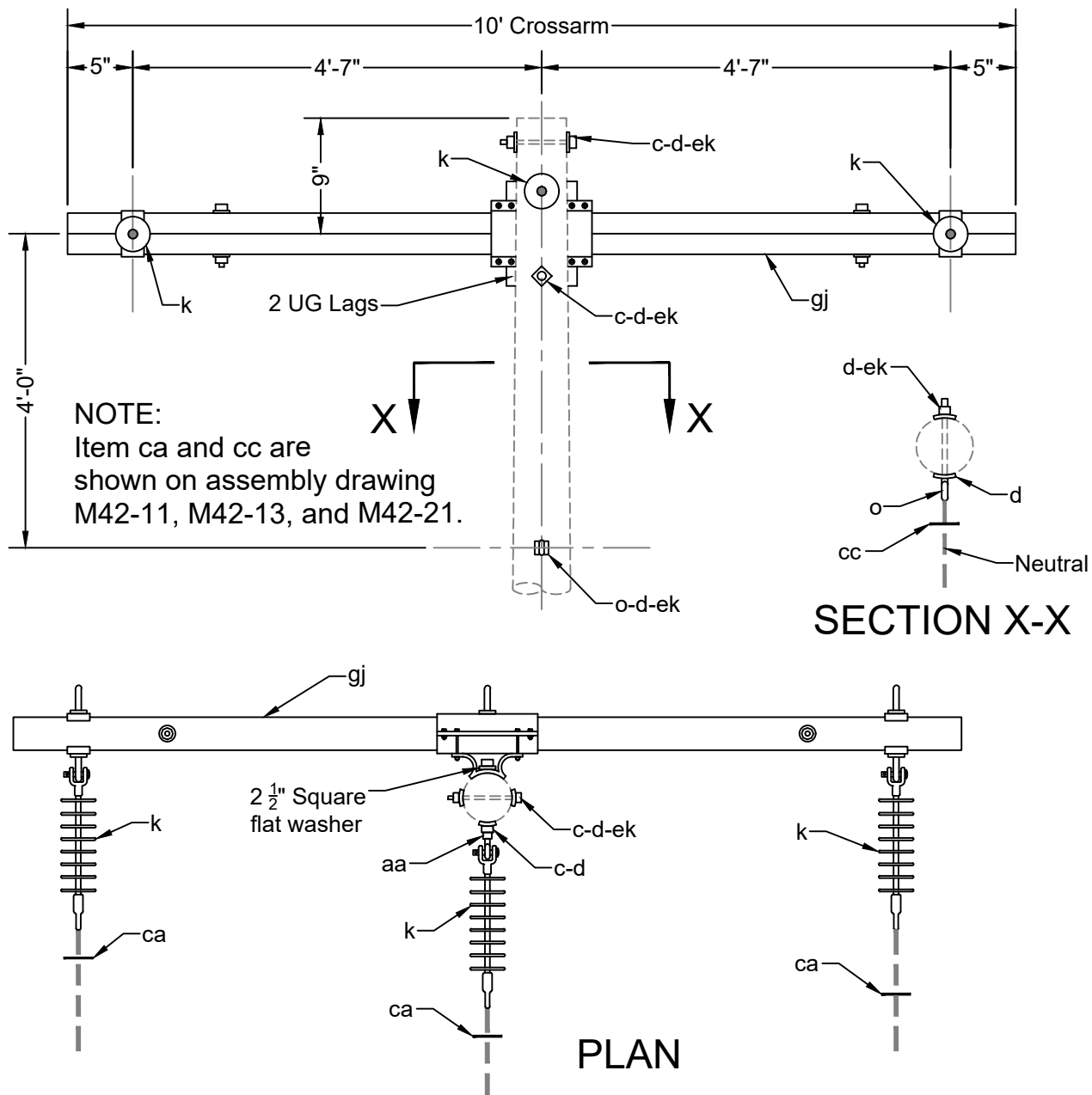
14.4 / 24.9 KV, 3-PHASE
8' - CROSSARM CONSTRUCTION - DEAD END (DOUBLE)

Revision Date

Jan. 17, 2023



VC8A/8



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	aa	1	Nut, eye, 3/4"
c	2	Bolt, machine 3/4" x required length	ca	3	Deadend assembly, Primary
d	6	Washer, Square, curved 3"	cc	1	Deadend assembly, Neutral
d	1	Washer, 2 1/2" Square, flat, at top mount	gj	1	10' - Crossarm assembly, DE
k	3	Insulator, suspension, epoxilator	ek	-	Locknuts, as required
o	1	Bolt eye, 5/8" x required length		1	UG Lags on bottom VC7A/10

For 336 ACSR & 477 ASCR
VC7A/8 is Preferred

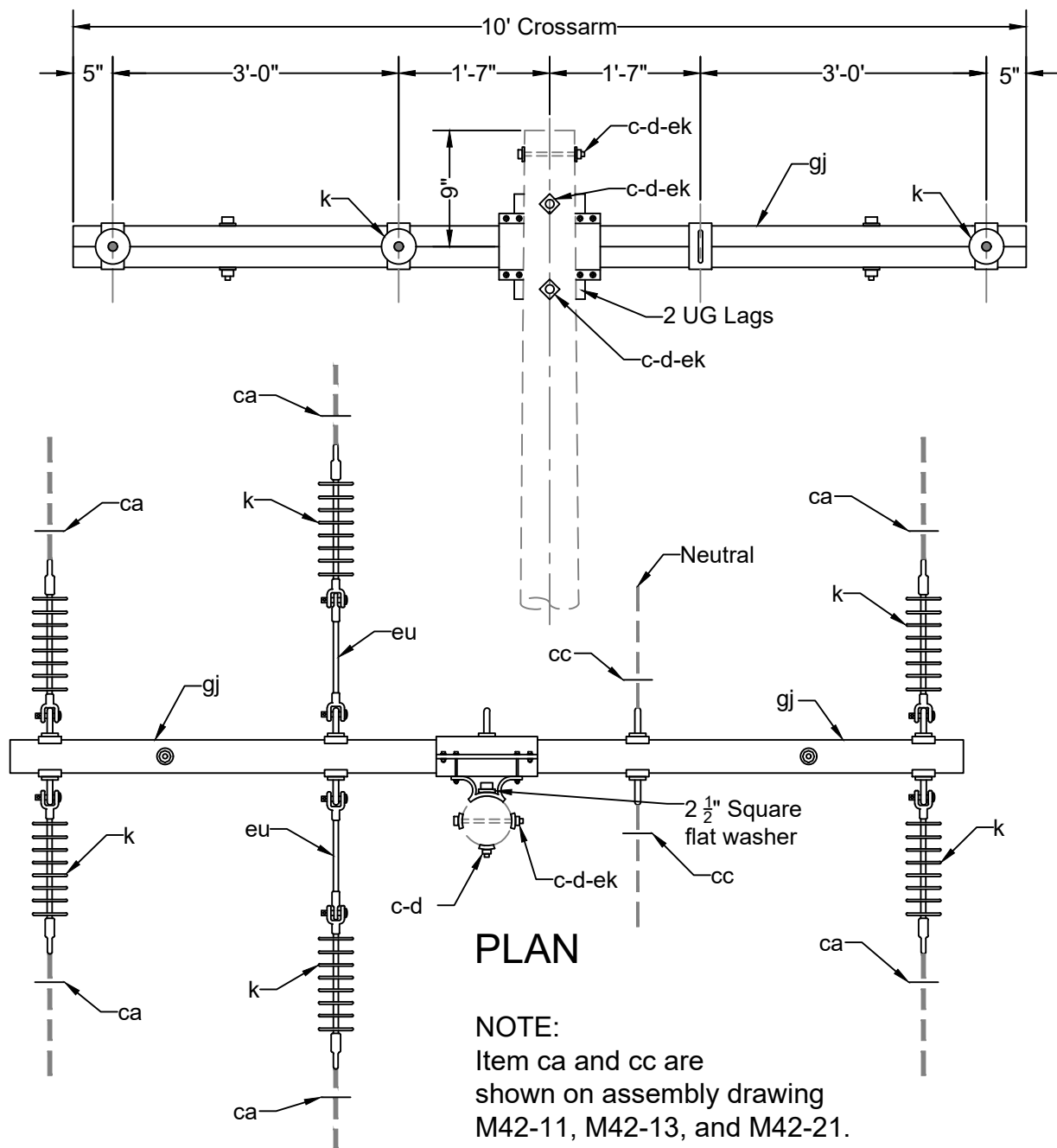
14.4 / 24.9 KV, 3-PHASE
10' - CROSSARM CONSTRUCTION - DEAD END (SINGLE)

Revision Date

Jan. 17, 2023



VC7A/10



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	1	Bolt, machine 5/8" x required length	ca	6	Deadend assembly, Primary
c	2	Bolt, machine 3/4" x required length	cc	2	Deadend assembly, Neutral
d	4	Washer, Square, curved 3"	eu	2	Link, extension, insulated
d	1	Washer, 2 1/2" Square, flat, at top mount	gj	1	10' Crossarm assembly, DE
k	6	Insulator, suspension, epoxilator 14.4 KV	ek	-	Locknuts, as required
				1	UG Lags on bottom VC8A/10F

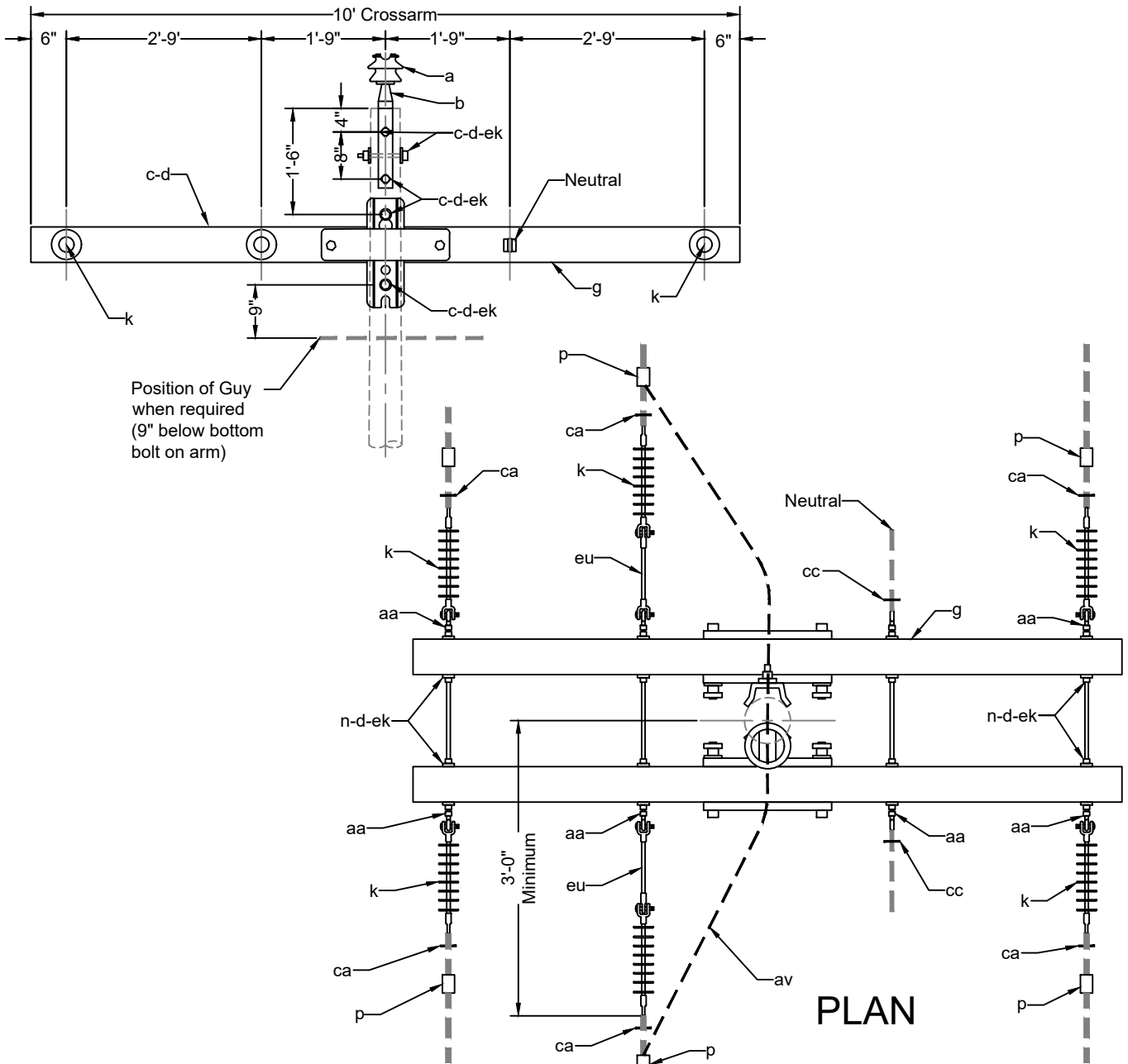
14.4 / 24.9 KV, 3-PHASE
10' CROSSARM CONSTRUCTION - DEADEND (SINGLE)

Revision Date

Jan. 17, 2023



VC8A/10F



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	n	4	Bolt, double arming, 5/8" x required length
b	1	Pin, pole top, 20"	p	-	Connectors, as required
c	5	Bolt, machine, 5/8" x required length	aa	8	Nut, eye, 5/8"
d	20	Washer, 2 1/4" square, 13/16" hole	av	-	Jumper and leads as required
d	4	Washer, Square, curved 3"	eu	2	Link, extension, fiberglass
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	ca	6	Deadend assembly, primary
k	6	Insulator, suspension, epoxilator 14.4 kv	cc	2	Deadend assembly, neutral
			ek	-	Locknuts, as required

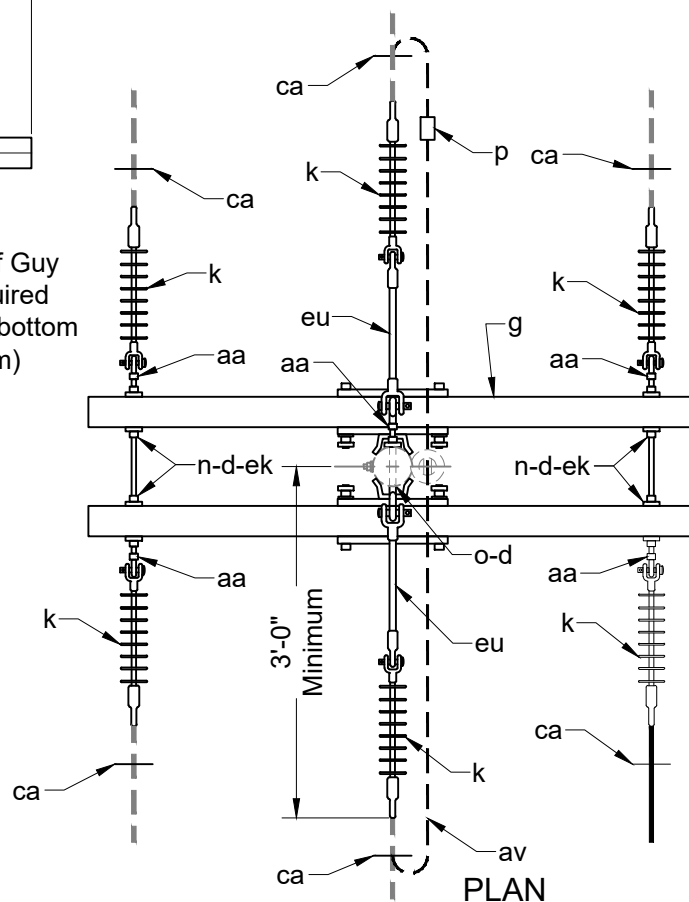
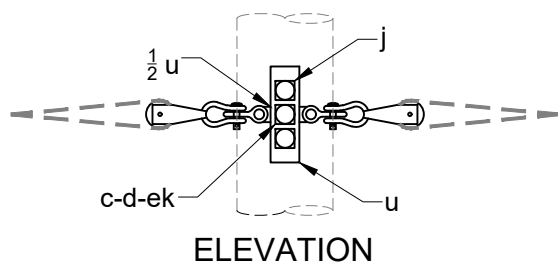
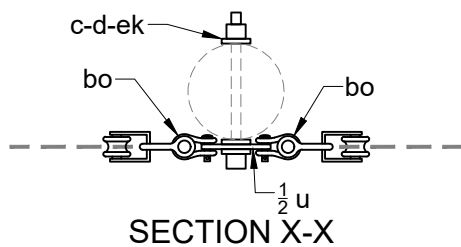
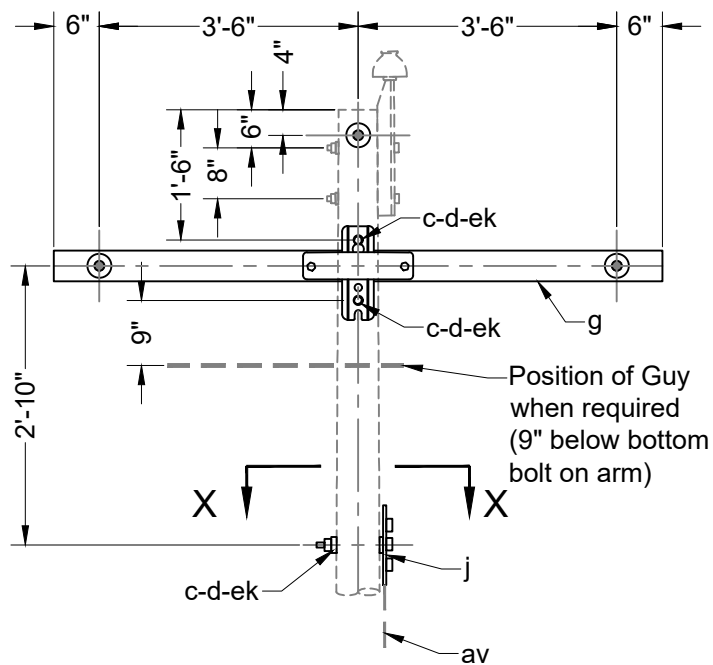
14.4 / 24.9 , 3-PHASE
CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Revision Date

Jan. 3, 2023



VC8-1



NOTE:
Items ca and cc are shown on assembly drawings M42-3, M42-11, M42-13, and M42-21.

VC8-2 = 8' Crossarm
VC8-2X = 10' Crossarm

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	u	1 1/2	Camp, guy, 6" heavy duty
d	13	Washer, 2 1/4" square, 13/16" hole	aa	5	Nut, eye, 5/8"
g	2	Fiberglass Crossarm 3 3/4" x 4 3/4" x 8' (10')	av	-	Jumpers, and lead as required
j	2	Screw, lag, 1/2" x 4"	bo	4	Shackle, anchor
k	6	Insulator, suspension, epoxilator	ca	6	Deadend assembly, primary
n	2	Bolt, double arming, 5/8" x required length	cc	2	Deadend assembly, neutral
o	1	Bolt, eye, 5/8" x required length	eu	2	Link, extension, fiberglass
p	-	Connectors, as required	ek	-	Locknuts, as required

Modified to Meet
2005 RUS Standards

14.4 / 24.9 KV, 3 PHASE
CROSSARM CONSTRUCTION, DOUBLE DEADEND
(LARGE CONDUCTORS)

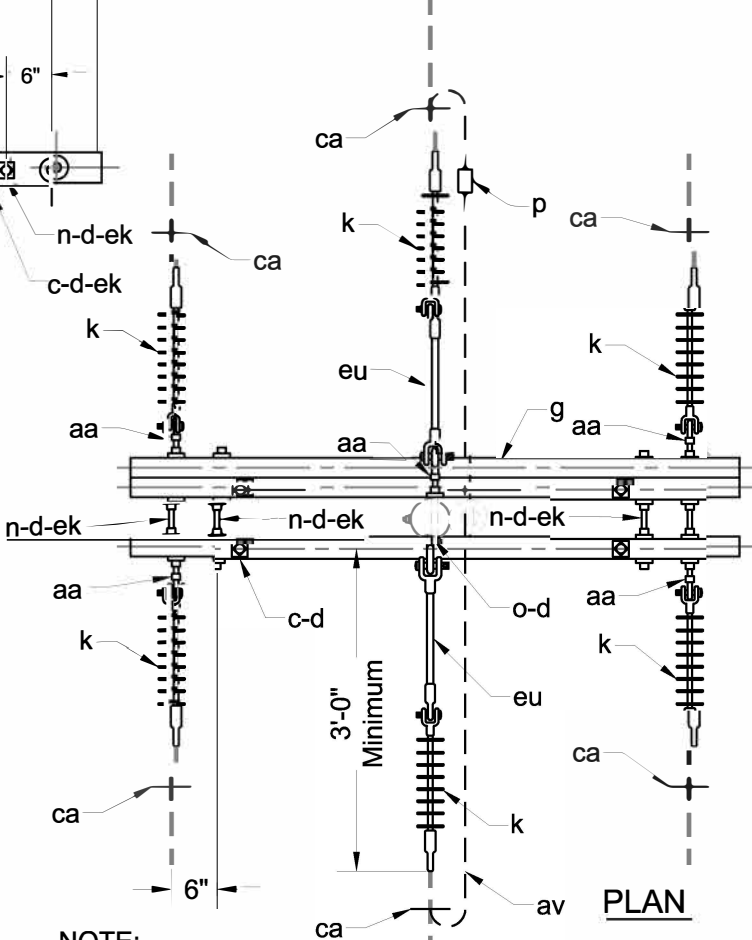
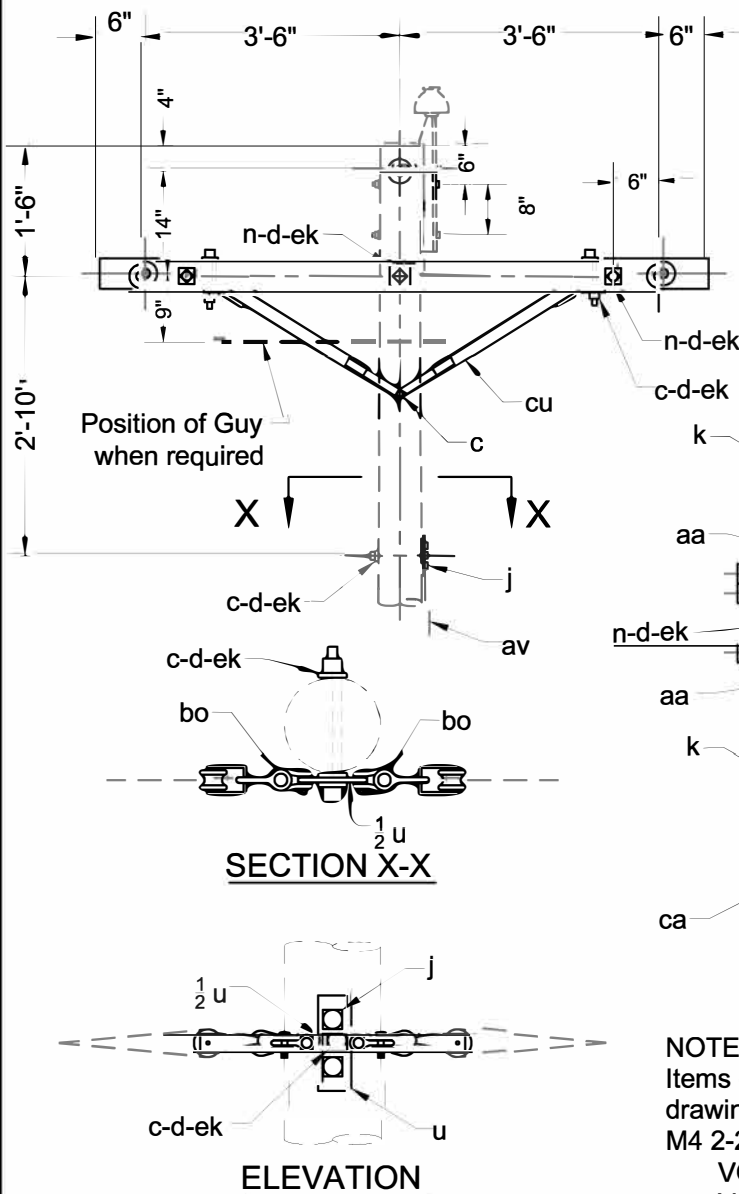
Revision Date
Jan. 3, 2023



VC8-2
VC8-2X

VC8-3

Obsolete. For Retirement Only.



NOTE:
Items ca and cc are shown on assembly drawings M4 2-3,M4 2-11,M4 2-13,and M4 2-21.
VC8-2 = 8' Crossarm
VC8-2X = 10' Crossarm

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	u	1 1/2	Camp, guy, 6" heavy duty
c	4	Bolt, machine, 1/2" x required length	aa	7	Nut, eye, 5/8"
d	21	Washer, 2 1/4" square, 13/16" hole	av	-	Jumpers, and lead as required
d	4	Washer, round, 1 3/8"	bo	6	Shackle, anchor
g	3	Crossarm 3 3/4" x 4 3/4" x 8' (10')	ca	6	Deadend assembly, primary
j	2	Screw, lag, 1/2" x 4"	cc	2	Deadend assembly, neutral
k	6	Insulator, suspension, epoxilator 14.4 kv	cu	2	Brace, wood, 60" span
n	3	Bolt, double arming, 5/8" x required length	eu	2	Link, extension, fiberglass
o	3	Bolt, eye, 5/8" x required length	ek	-	Locknuts, as required
p	-	Connectors, as required			

Modified to Meet
2005 RUS Standards

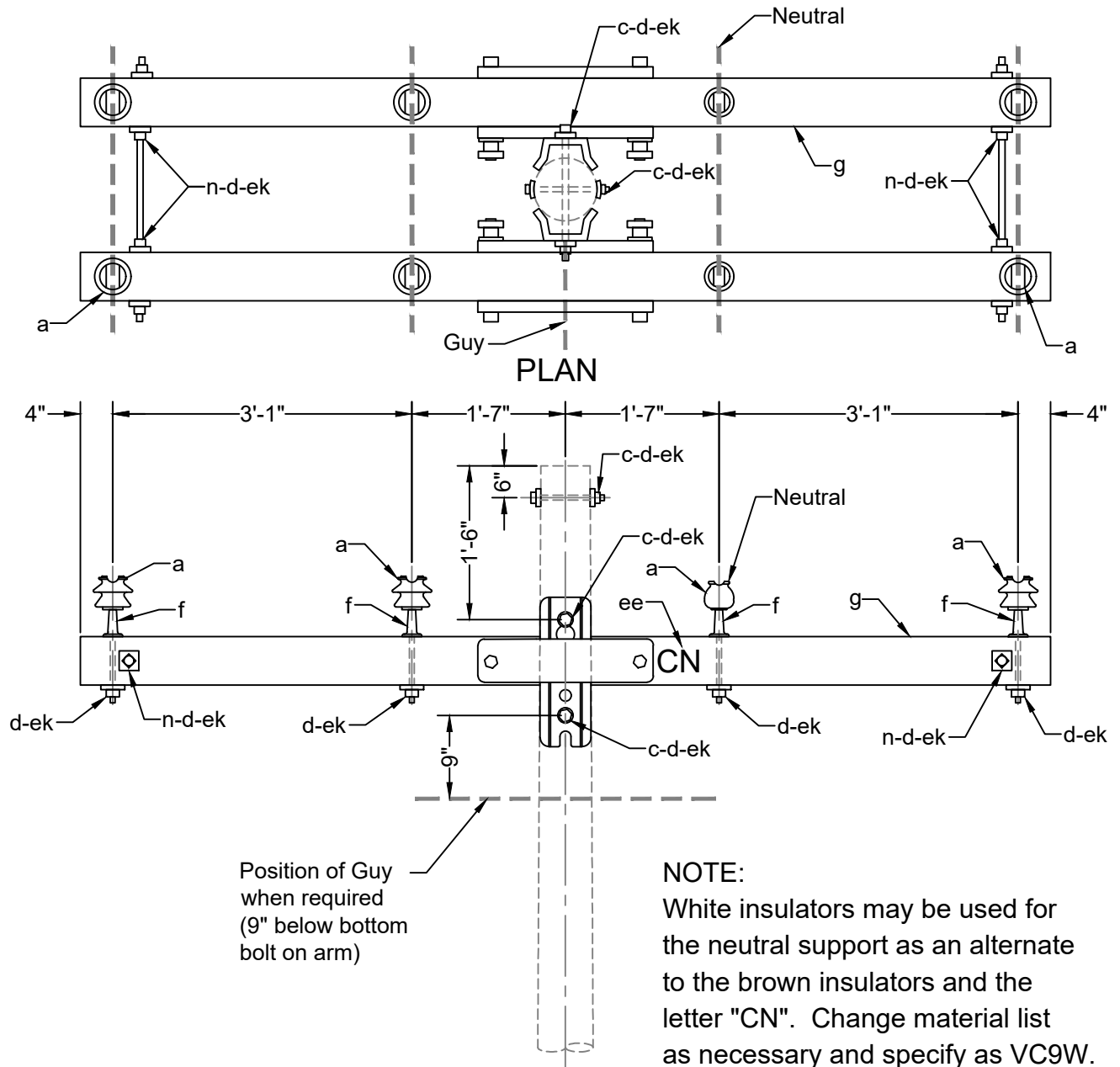
14.4 / 24.9 KV, 3 PHASE
3-PHASE CROSSARM CONSTRUCTION, DOUBLE DEADEND
(LARGE CONDUCTORS)

Revision Date

Jan. 20, 2020


GRAND VALLEY POWER

VC8-3



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	8	Insulator, pin type	n	2	Bolt, double armed, 5/8" x required length
c	3	Bolt, machine, 5/8" x required length	ee	4	Letters 2C, 2N with 1" nails
d	20	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, square, 3", curved			
f	8	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

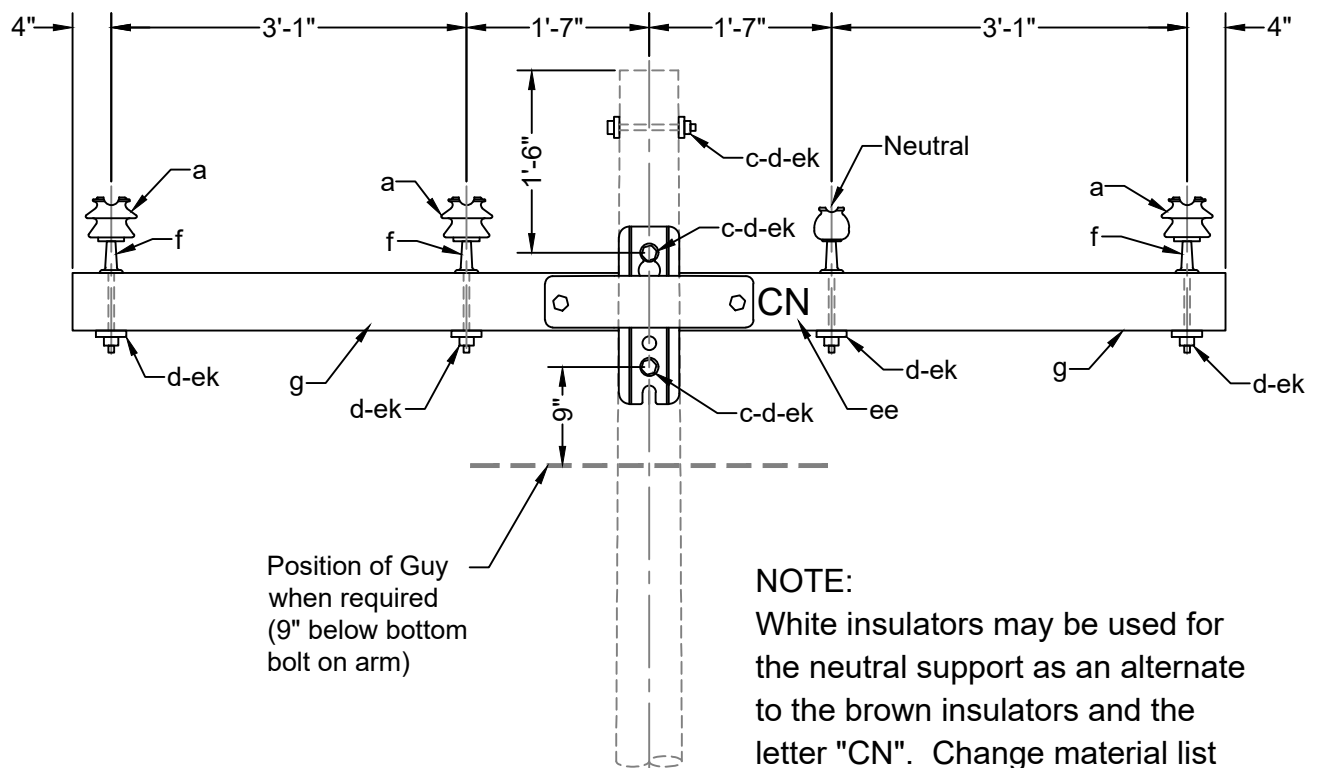
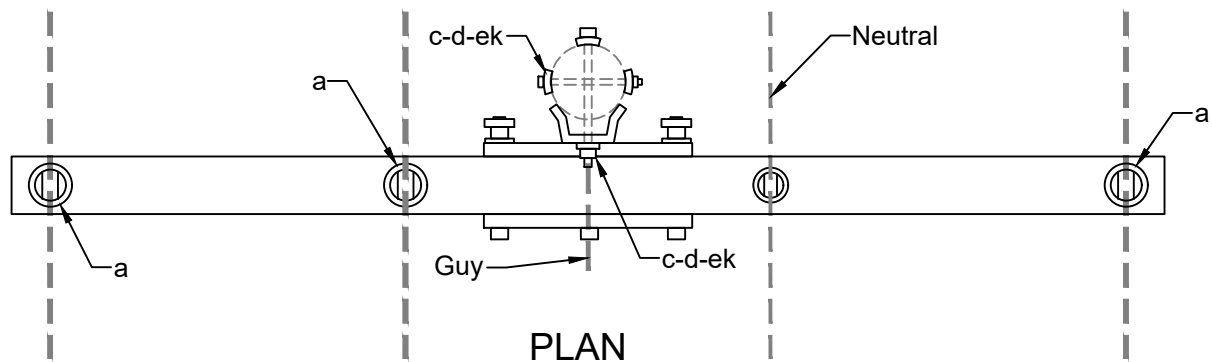
14.4 / 24.9 KV, 3 PHASE
CROSSARM CONSTRUCTION, DOUBLE LINE ARM

Revision Date

Jan. 3, 2023



VC9
VC9W



NOTE:

White insulators may be used for the neutral support as an alternate to the brown insulators and the letter "CN". Change material list as necessary and specify as VC9-1W.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	ee	4	Letters 2C, 2N with 1" nails
c	3	Bolt, machine, 5/8" x required length	ek	-	Locknuts, as required
d	6	Washer, 2 1/4" square, 13/16" hole			
d	4	Washer, square, 3" curved			
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

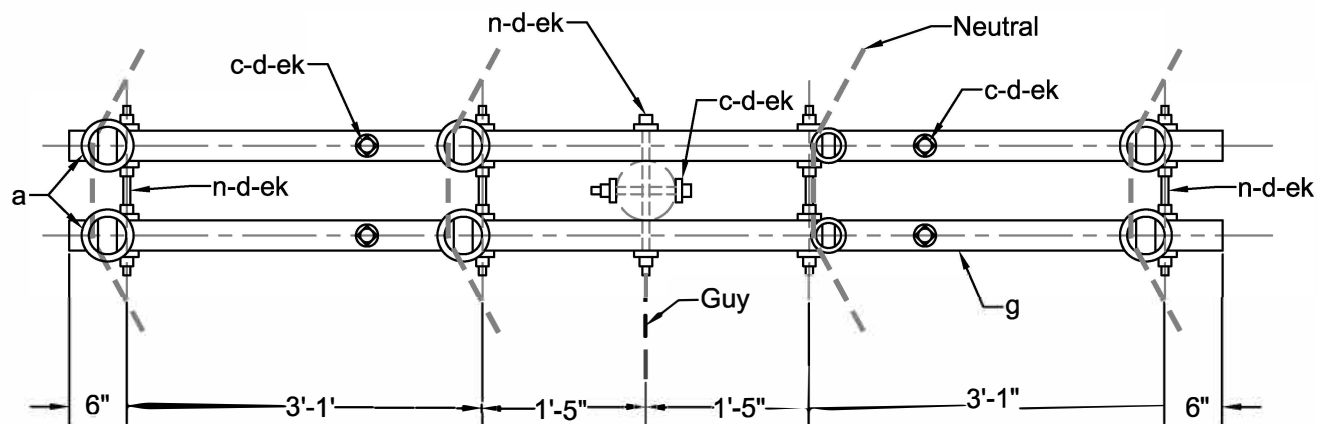
14.4 / 24.9 KV, 3 PHASE
CROSSARM CONSTRUCTION, SINGLE ARM

Revision Date

Jan. 3, 2023

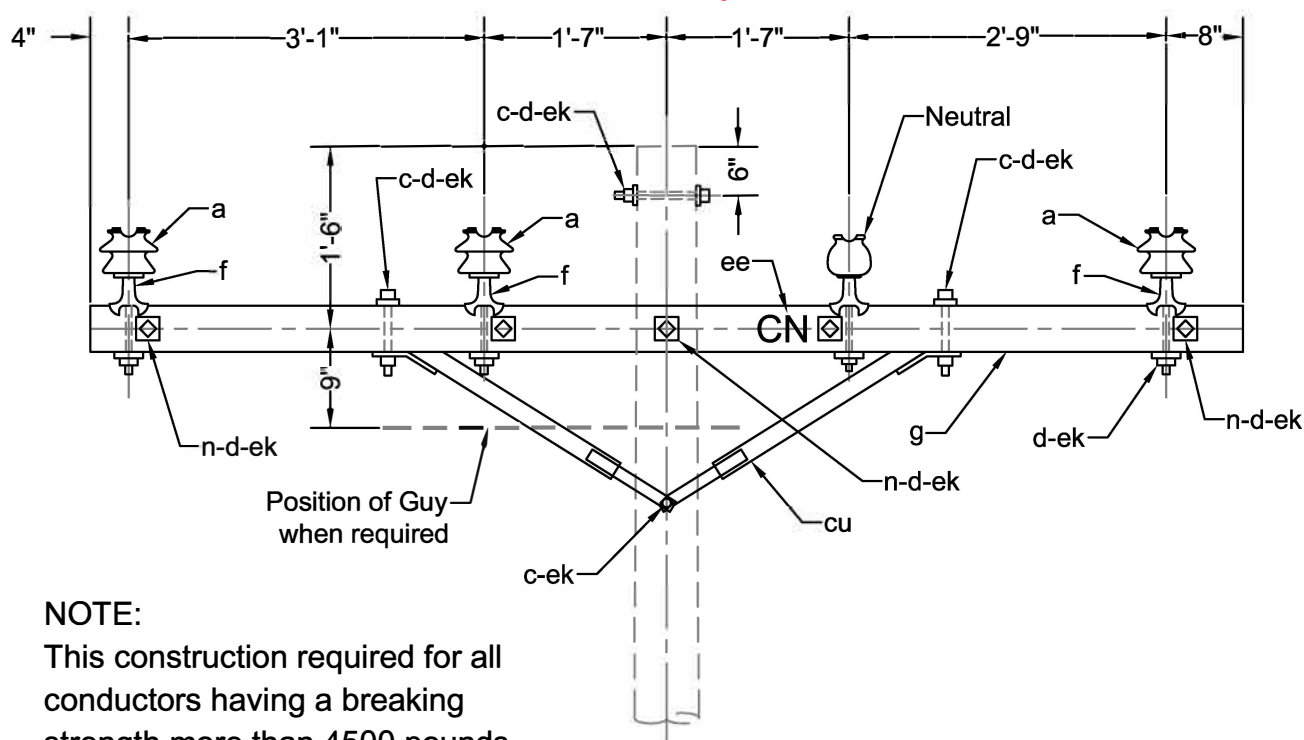


VC9-1
VC9-1W



PLAN

Obsolete. For Retirement Only. Use Post Insulator Unit.

**NOTE:**

This construction required for all conductors having a breaking strength more than 4500 pounds.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	8	Insulator, pin type	g	2	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	2	Bolt, machine, 5/8" x required length	n	5	Bolt, double armed, 5/8" x required length
c	4	Bolt, machine, 1/2" x required length	cu	2	Brace, wood, 60" span
d	4	Washer, round, 1 3/8"	ee	4	Letters 2C, 2N with 1" nails
d	26	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	8	Pin, crossarm, steel, clamp type			

DESIGN LIMITS

Maximum transverse loads:
2000 lbs. per conductor

Maximum line angle within
load limits: 5° Angle

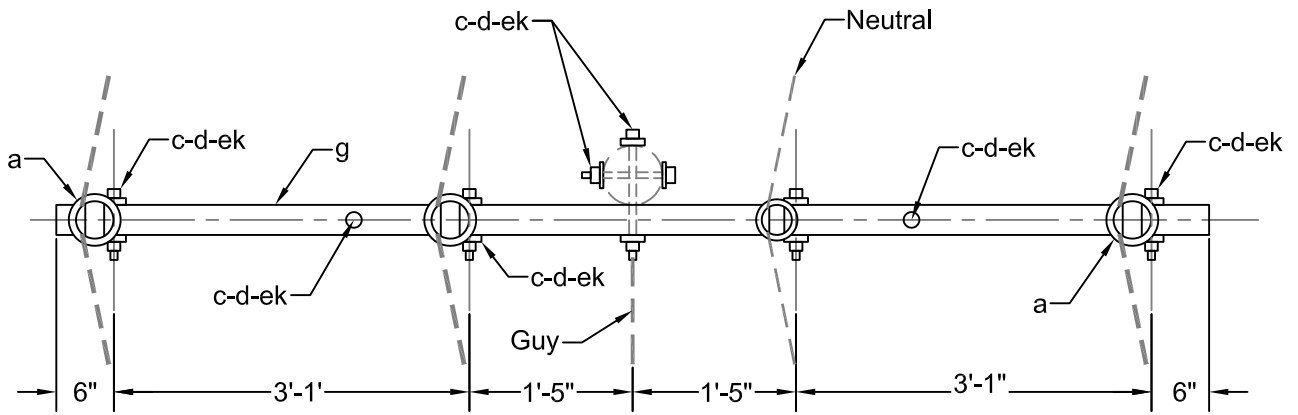
14.4 / 24.9 KV, 3 PHASE

CROSSARM CONSTRUCTION - DOUBLE LINE ARM
ANGLE (LARGE CONDUCTORS)

Revision Date

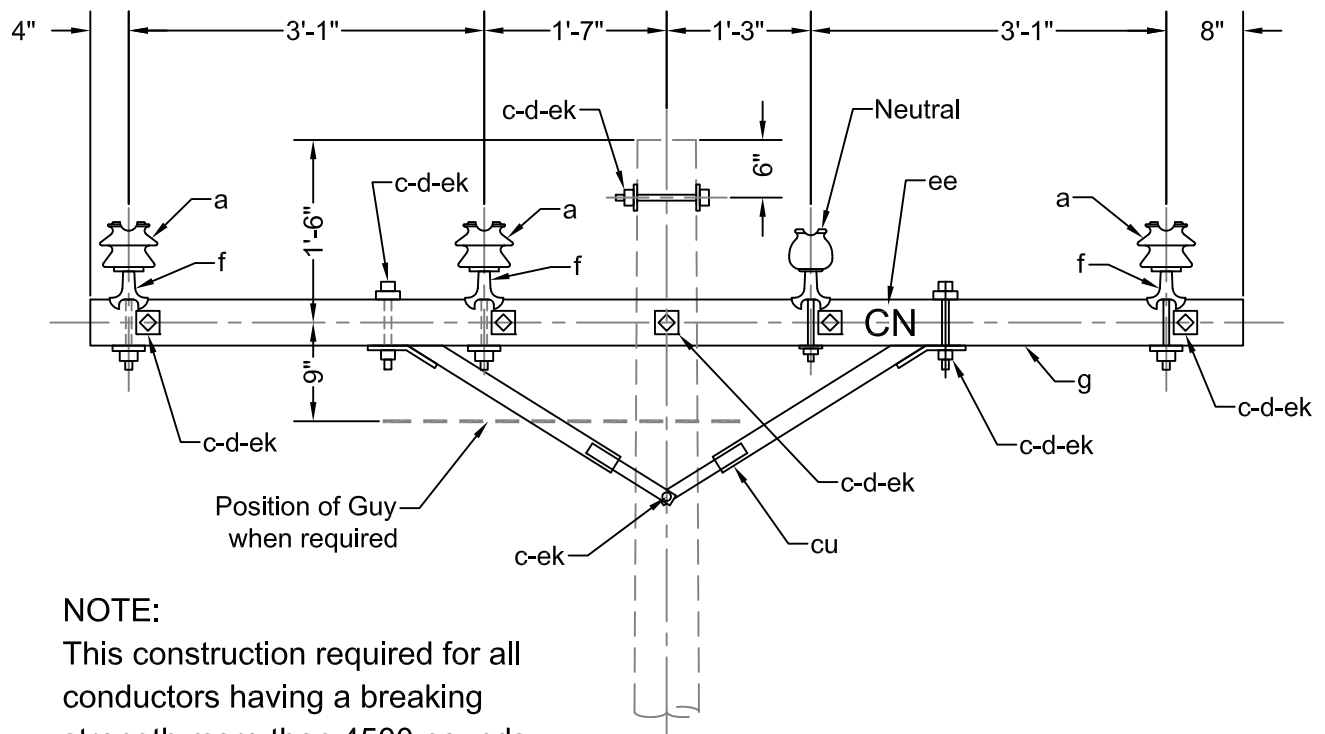
Jan. 21, 2020

**VC9-2**



PLAN

Obsolete. For Retirement Only. Use Post Insulator Unit.

**NOTE:**

This construction required for all conductors having a breaking strength more than 4500 pounds.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type	f	4	Pin, crossarm, steel, clamp type
c	8	Bolt, machine, 5/8" x required length	g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
c	2	Bolt, machine, 1/2" x required length	cu	1	Brace, wood, 60"span
d	2	Washer, round, 1 3/8"	ee	4	Letters (2) C, (2) N with 1" nails
d	14	Washer, 2 1/4" square, 13/16" hole	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			

DESIGN LIMITS

Maximum transverse loads:
1000 lbs. per conductor

Maximum line angle within
load limits: 5° Angle

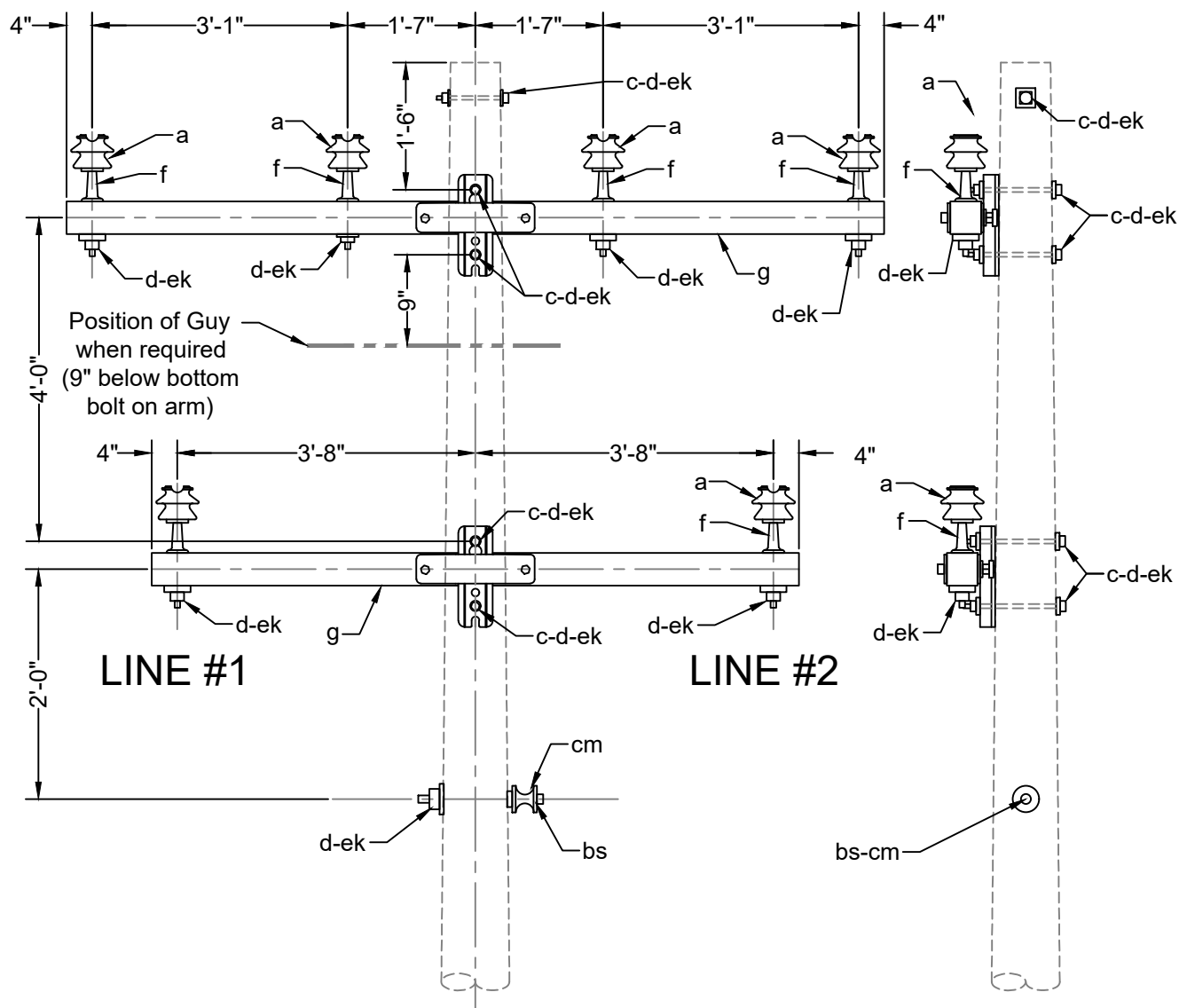
14.4 / 24.9 KV, 3 PHASE

CROSSARM CONSTRUCTION - SINGLE LINE ARM
(LARGE CONDUCTORS)

Revision Date

Jan. 21, 2020

**VC9-3**



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type	cm	1	Spool insulator
c	5	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	11	Washer, square, 2 1/4"	ek	-	Locknuts, as required
d	6	Washer, 3" square, curved			
f	6	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
500 LBS. per conductor.

Maximum line angle within load limits:
5° Angle.

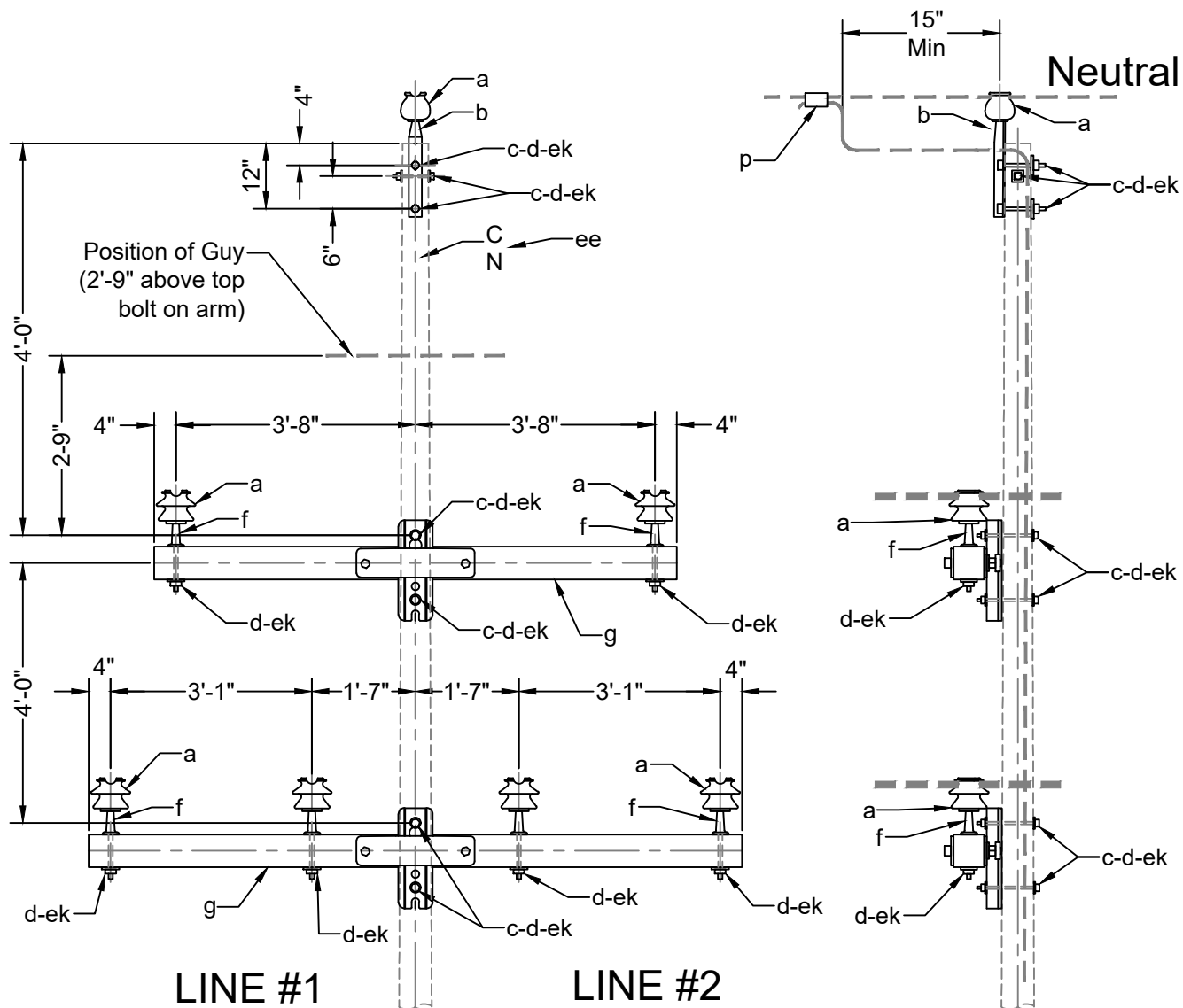
14.4 /24.9 kv - 3 PHASE
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

JAN 4, 2023



VDC-C1



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type (14.4 / 24.9 kv)	g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"
a	1	Insulator, pin type (7.2 / 12.5 kv)	p		Connectors, as required
b	1	Pin, Pole top	ee	4	Letters (2) C, (2) N with 1" nails
c	7	Bolt, machine, 5/8" x required length	ek		Locknuts
d	4	Washer, 2 1/4" square			
d	8	Washer, 3" square curved			
f	6	Pin, Crossarm, steel, 5/8" x 14"			
g	1	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"			

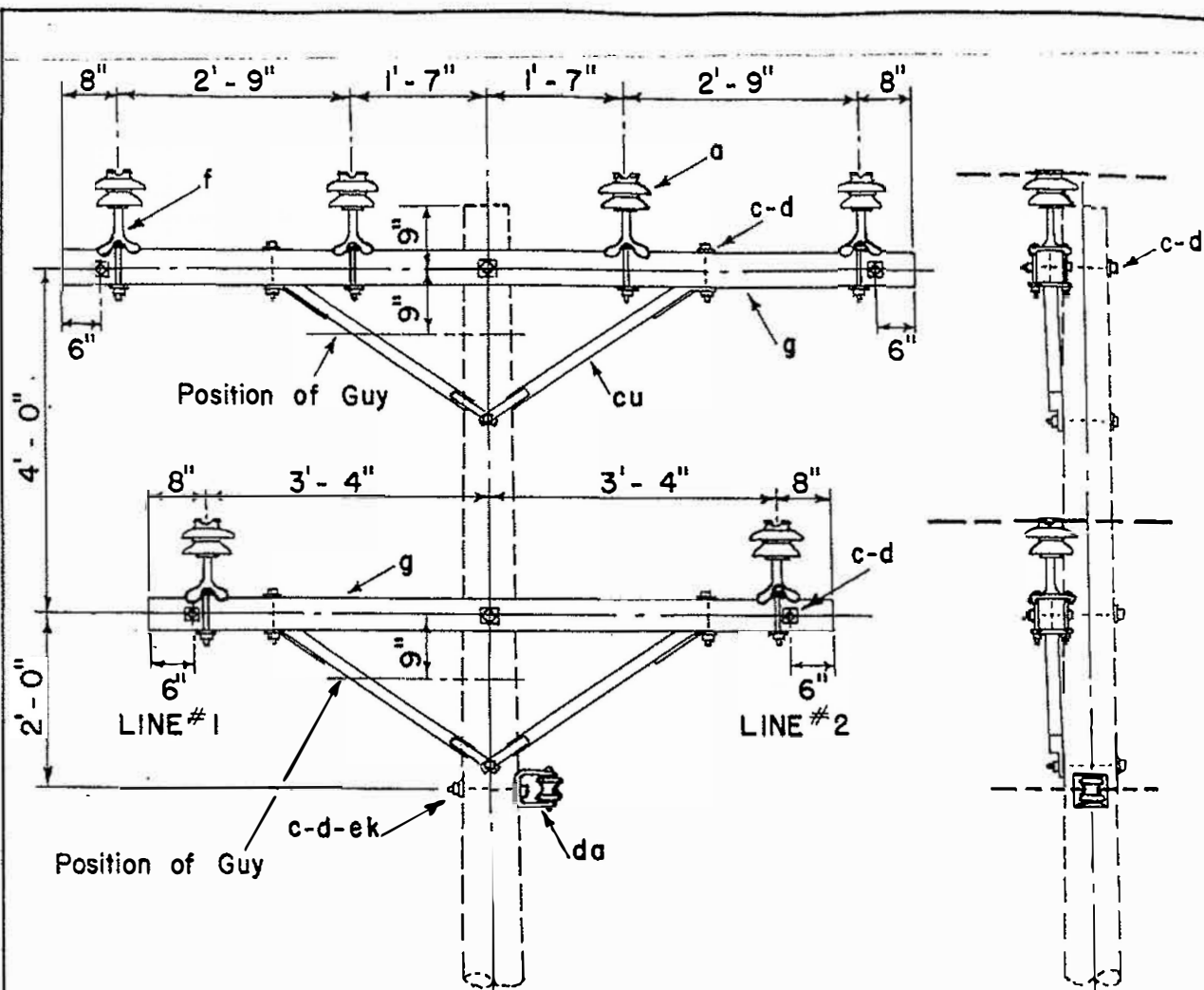
14.4 / 24.9 KV, 3 PHASE
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT WITH OVERHEAD NEUTRAL
AT 0° TO 5° ANGLE

Revision Date

Jan. 10, 2023



VDC-C1B

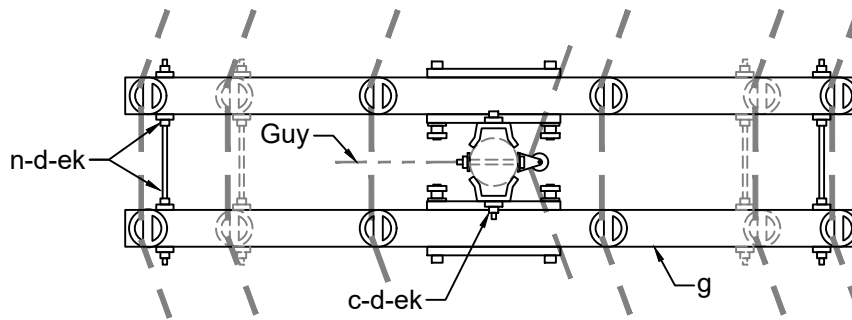


Note:

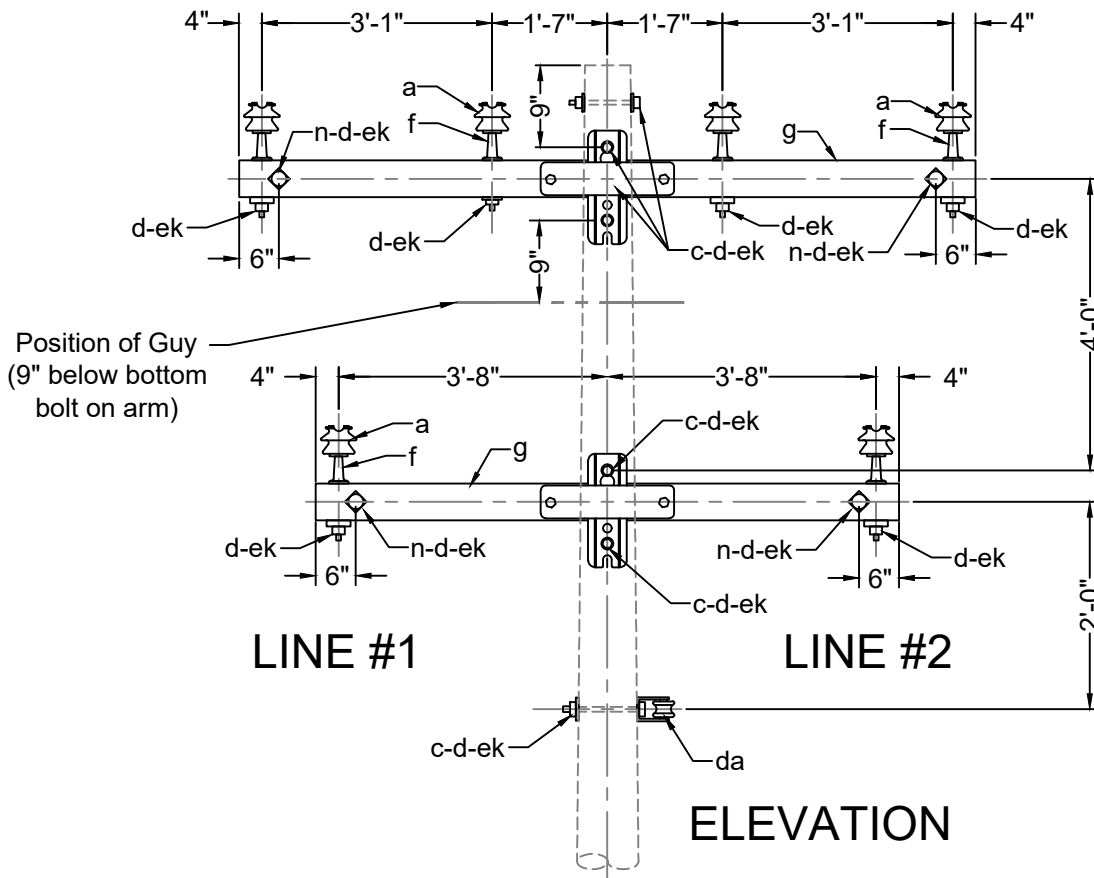
This construction required for all conductors having a breaking strength of more than 4500 pounds.

Obsolete. For Retirement Only. Use Post Insulator Unit.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
a 6	Insulator, pin type	g 1	Crossarm, 3 3/4" x 4 3/4" x 8'-0"
c 9	Bolt, machine, 5/8" x req'd. length	cu 2	Brace, wood, 60" span
c 4	Bolt, machine, 1/2" x req'd. length	da 1	Bracket, insulated
d 15	Washer, square, 2 1/4"	ek	Locknuts
d 4	Washer, round, 1 3/8" diam.		
f 6	Pin, crossarm, steel, clamp type		
g 1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"		
14.4 / 24.9 KV 3-PHASE CROSSARM CONSTRUCTION DOUBLE CIRCUIT (LARGE CONDUCTORS) 0° TO 5° ANGLE			
Jan. 1, 1963		VDC-CIL	



PLAN



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	12	Insulator, pin type	n	4	Bolt, double arming, 5/8" x required length
c	6	Bolt, machine, 5/8" x required length	da	1	Bracket, insulated
d	37	Washer, square, 2 1/4"	ek	-	Locknuts, as required
d	2	Washer, 3" square, curved			
f	12	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/48" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor.

Maximum line angle within load limits:
5° to 30° Angle.

14.4 / 24.9 KV - 3 PHASE

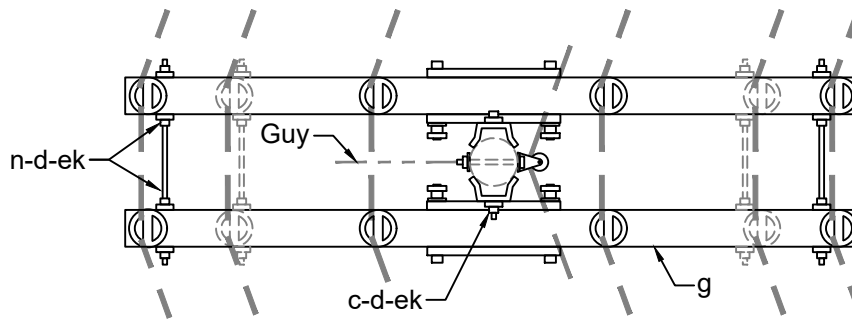
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

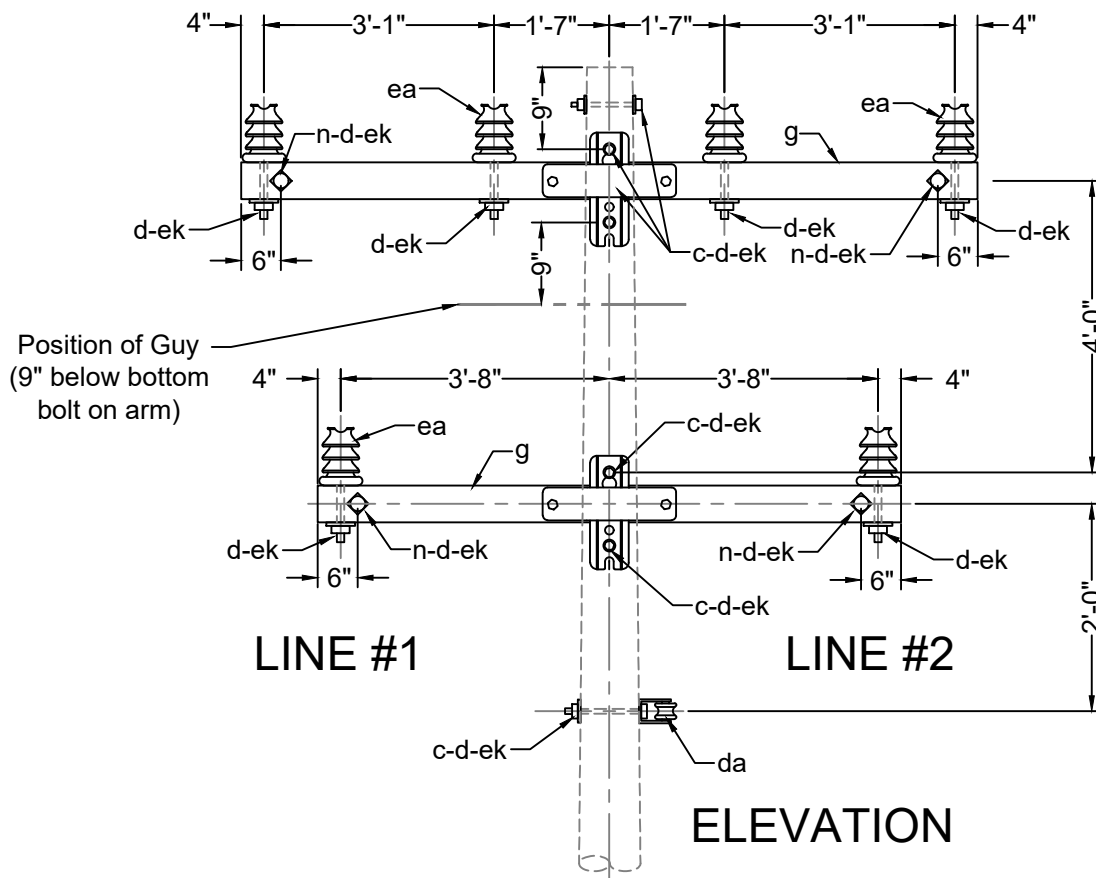
Jan. 10, 2023



VDC-C2-1



PLAN



ELEVATION

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	6	Bolt, machine, 5/8" x required length	n	4	Bolt, double arming, 5/8" x required length
d	37	Washer, square, 2 1/4"	da	1	Bracket, insulated
d	2	Washer, 3" square, curved	ek	-	Locknuts, as required
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/48" x 10'-0"			
g	2	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 8'-0"			
ea	12	Insulator, post type			

DESIGN LIMITS

Maximum transverse load:
1000 lbs. per conductor.

Maximum line angle within load limits:
5° to 30° Angle.

14.4 / 24.9 KV - 3 PHASE

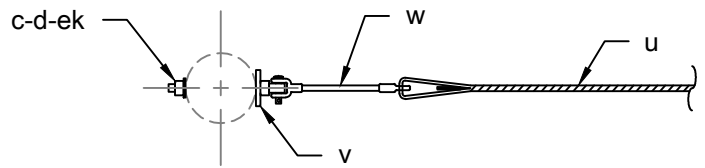
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT, 2 CROSSARM TYPE

Revision Date

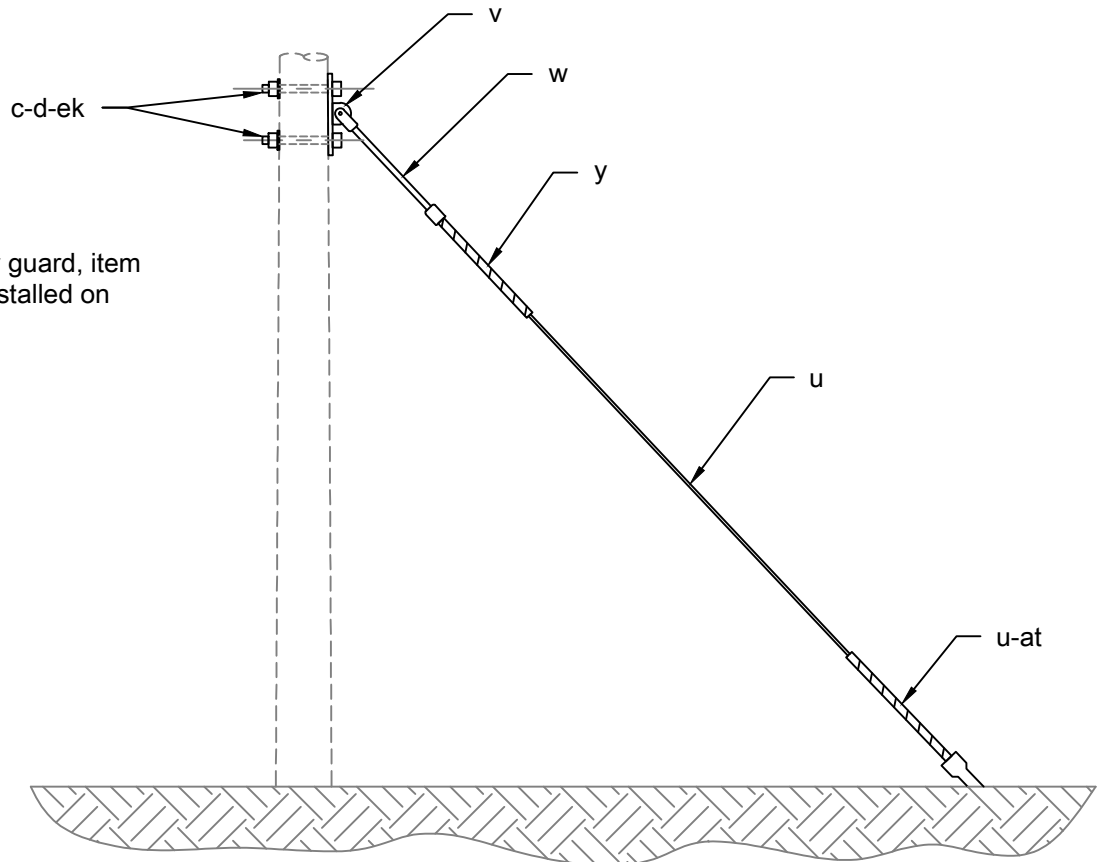
Jan. 11, 2023

**VDC-C2-1L**

VE1-2, VE1-3



PLAN



Note:
Plastic guy guard, item
at, to be installed on
all guys.

ITEM	MATERIAL	VE1-2	VE1-3
c	Bolt, machine, 5/8" x required length	1	1
c	Bolt, machine, 3/4" x required length	1	1
d	Washer, square curved, 4"	1	1
d	Washer, square curved, 3"	1	1
u	Deadend for guy strand, preformed type	2	2
v	Guy attachment, Heavy Duty, (21,000 lbs)	1	1
w	Guy strain insulator, Fiberglass	1	1
y	Guy wire, S.M. 7 strand by required length	3/8"	7/16"
at	Guy guard, plastic, 8' length	1	1
ek	Locknuts	1	1

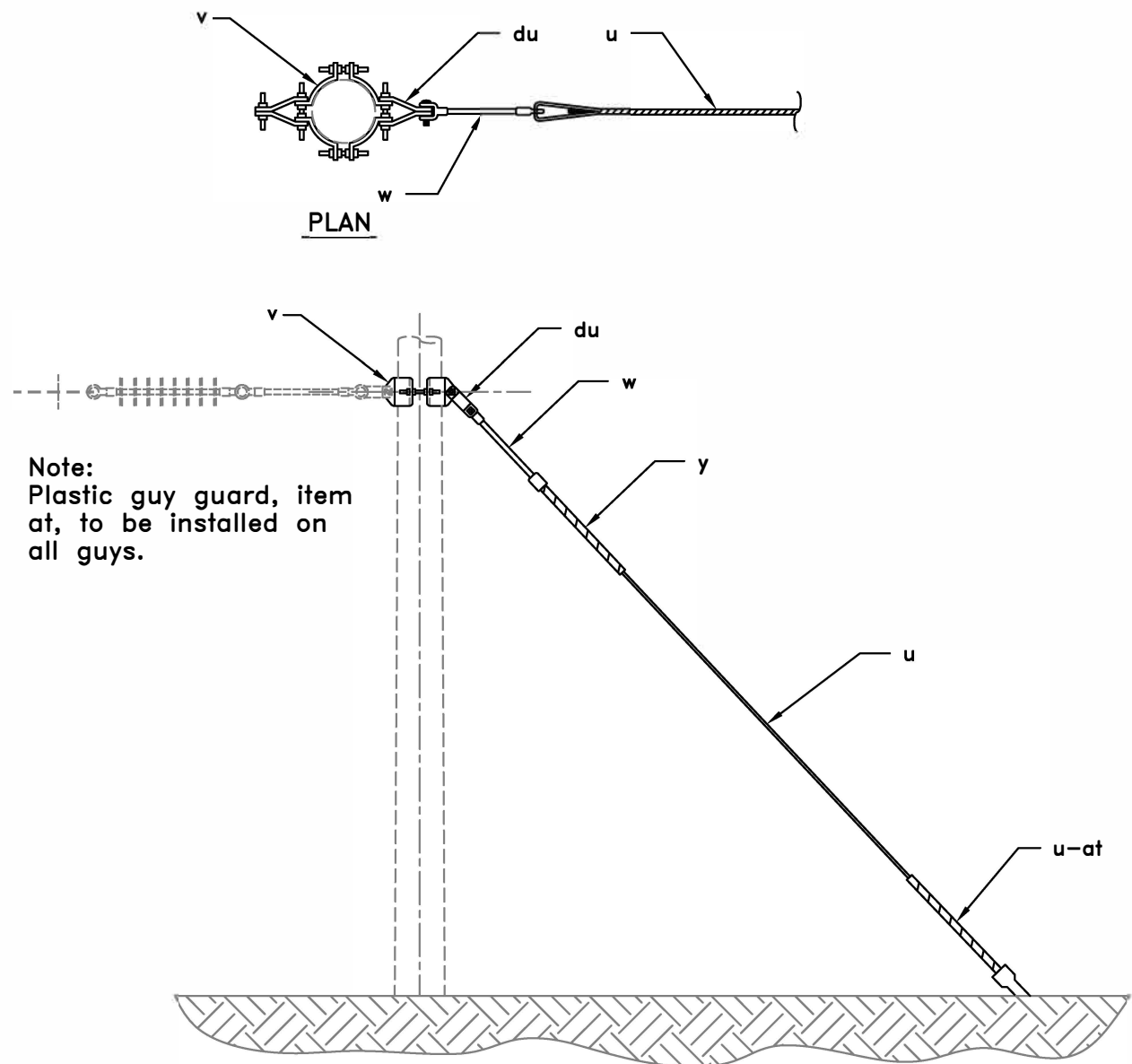
24.9/14.4 kv
SINGLE DOWN GUY
THROUGH BOLT TYPE

DATE

Oct 18, 2018



VE1-2
VE1-3



ITEM	M A T E R I A L	ASSEMBLY UNIT	
		VE1-2L	VE1-3L
u	Deadend, guy strand, preformed	2	2
v	Pole Band, Required Diameter	1	1
w	Insulator, guy, strain	1	1
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
du	Connecting link	1	1
at	Guy guard, plastic 8" length	1	1

24.9/14.4 kV
SINGLE DOWN GUY
WITH POLE BAND

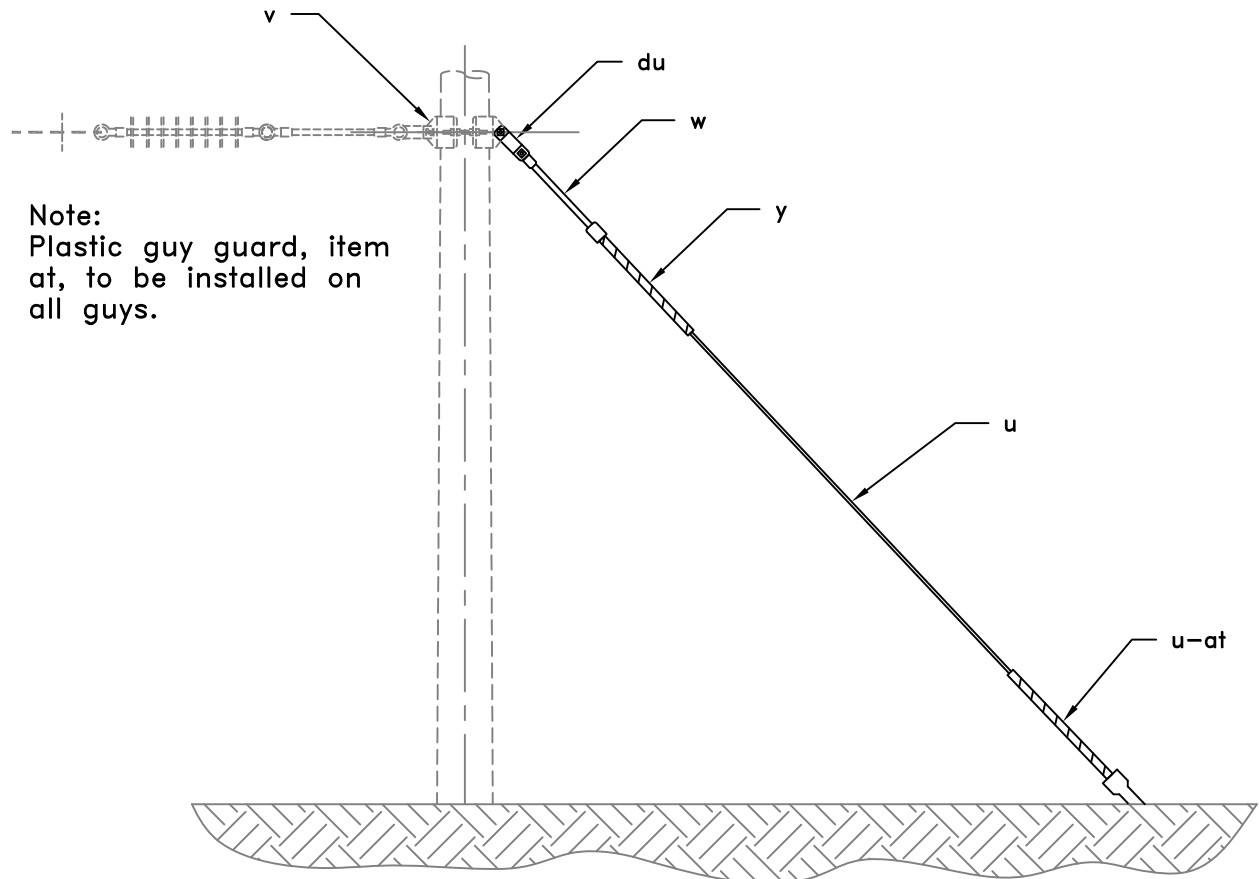
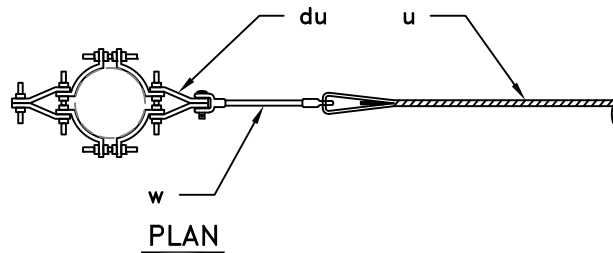
DATE

Sept 8, 2010

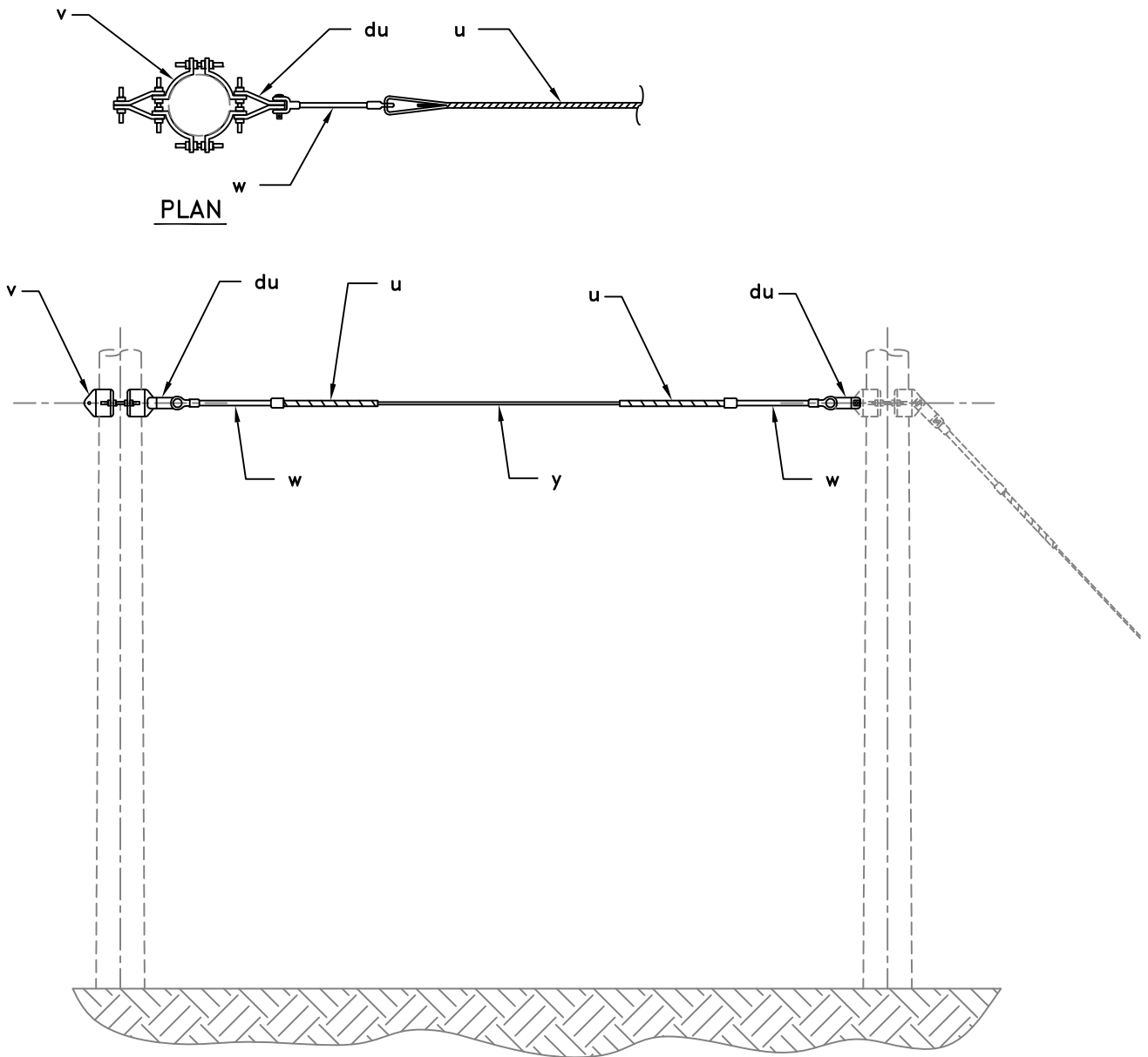


VE1-2L
VE1-3L

VE1-2G, VE1-3G



		ASSEMBLY UNIT	
ITEM	M A T E R I A L	VE1-2G	VE1-3G
u	Deadend, guy strand, preformed	2	2
w	Insulator, guy, strain	1	1
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
at	Guy guard, plastic 8" length	1	1
du	Connecting link	1	1
		24.9/14.4 kV SINGLE DOWN GUY EXISTING POLE BAND	
		DATE	VE1-2G
		Sept 8, 2010	VE1-3G
		 GRAND VALLEY POWER	



ITEM	M A T E R I A L	ASSEMBLY UNIT	
		VE2-2G	VE3-3G
u	Deadend, guy strand, preformed	2	2
v	Pole band, required diameter	1	1
w	Insulator, guy, strain	2	2
y	Guy strand, S.M. 7 strand (size x required length)	3/8"	7/16"
du	Connecting link	2	2

24.9/14.4 kv
SINGLE OVERHEAD GUY
POLE BAND TYPE

DATE

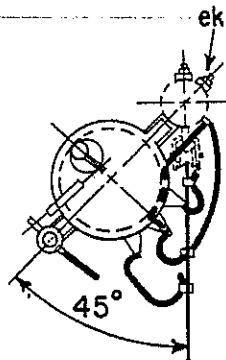
Sept 8, 2010



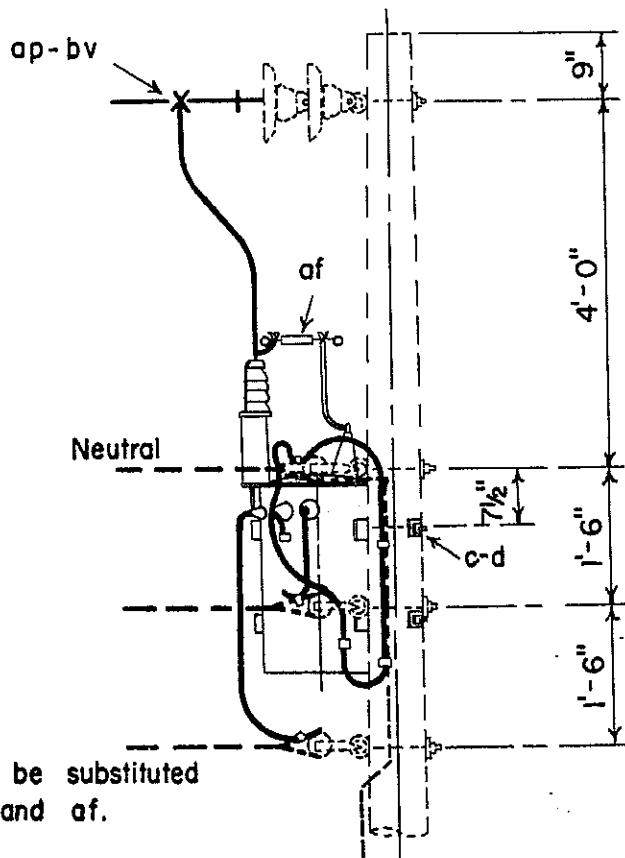
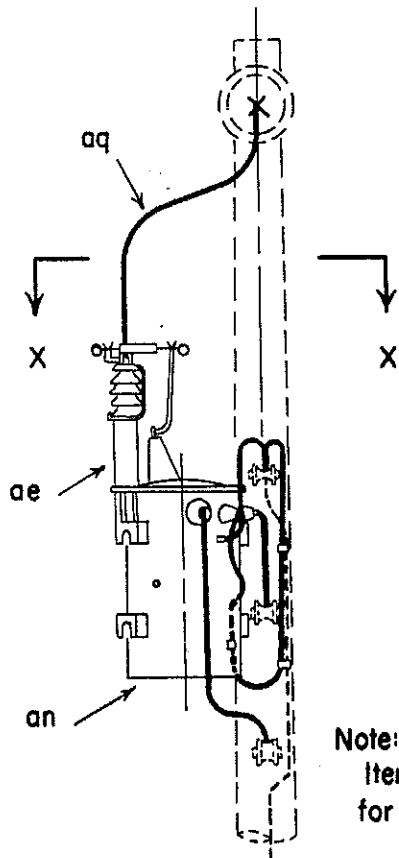
VE2-2G
VE3-3G

Notes:

1. Designate VG10 for conventional transformer with tank mounted cutout and arrester, VG66 for transformer with double gaps and internal fuse, VG106 for self protected transformer.
2. See guide drawings for details of transformer secondary and service connections.



SECTION X-X



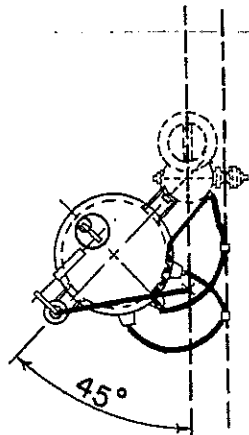
Note:
Item ax may be substituted
for items ae and af.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 2	Bolt, machine, 5/8" x req'd. length	an 1	Transformer
d 2	Washer, square, 2 1/4"	ap 1	Clamp, hot line, top assembly
p	Connectors, as required	aq	Jumpers, stranded, as required
ae 1	Lightning arrester (VG10 only)	bv 1	Rods, armor
af 1	Cutout, fuse, open link (VG10 only)	ek	Locknuts

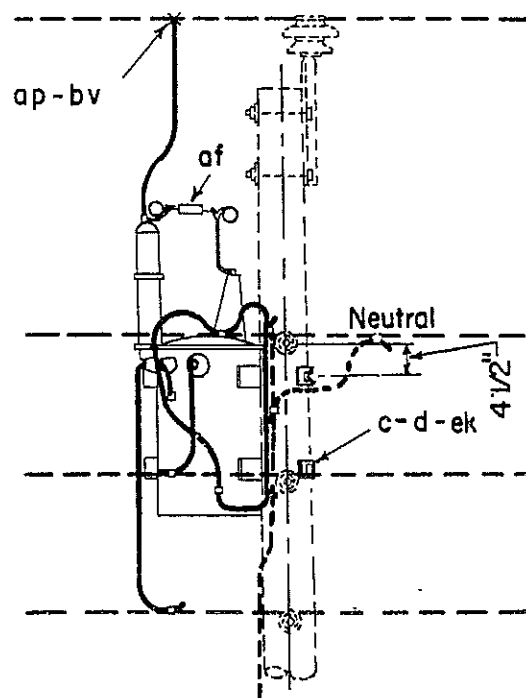
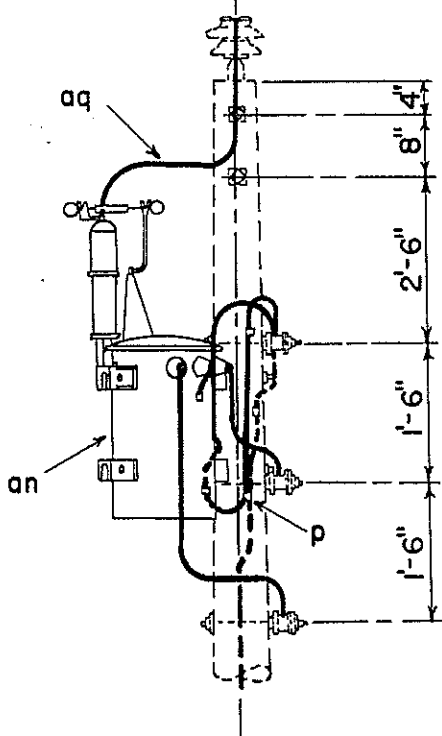
14.4/24.9 KV.
SINGLE PHASE TRANSFORMER
AT DEADEND

Jan. 1, 1963

VG10, VG66, VG106



PLAN



Notes:

1. Designate VG19 for conventional transformer with tank mounted cutout and arrester, VG65 for transformer with double gap and internal fuse, VG105 for self protected transformer.
2. See guide drawings for details of transformer secondary and service connections.

ITEM	No.	MATERIAL	ITEM	No.	MATERIAL
c	2	Bolt, machine, 5/8" x req'd. length	an	1	Transformer
d	2	Washer, square, 2 1/4"	ap	1	Clamp, hot line, top assembly
p		Connectors, as required	aq		Jumpers, stranded, as required
ae	1	Lightning arrester (VG19 only)	bv	1	Rods, armor
af	1	Cutout, fuse, single shot (VG19 only)	ek		Locknuts

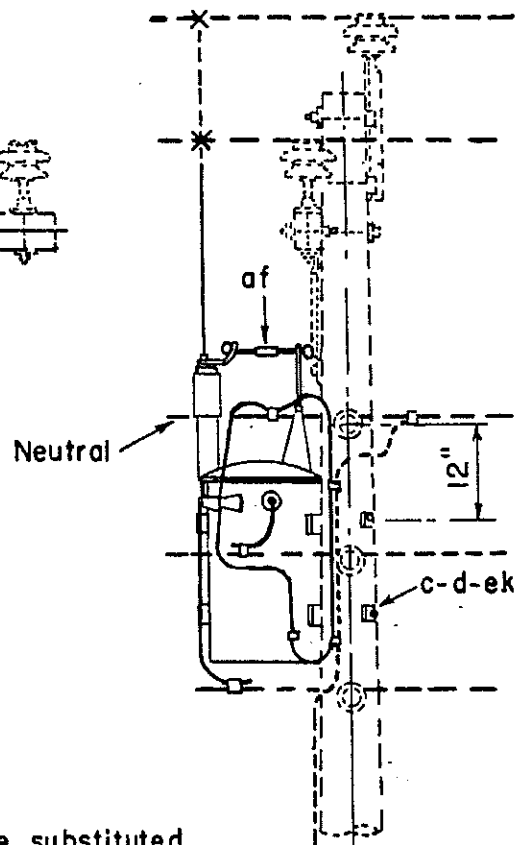
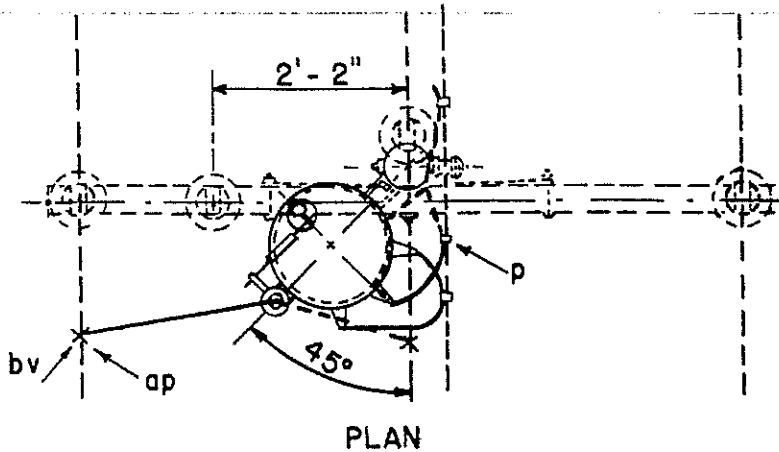
14.4/24.9 KV.
SINGLE PHASE TRANSFORMER
AT 1-PHASE TANGENT

Jan. 1, 1963

VG19, VG65, VG105

Notes: 1. Designate VG39 for conventional transformer with tank mounted cutout and arrester, VG67 for transformer with double gap and internal fuse and VG136 for self protected transformer.

2. See guide drawings for details of transformer secondary and service connections.
3. Reverse for connection to other outside phase.



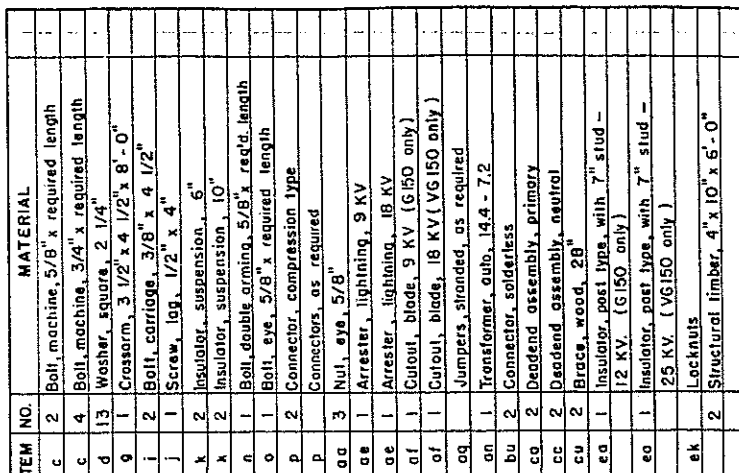
Note:
Item ax may be substituted
for items ae and af.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 2	Bolt, machine, 5/8" x req'd length	aq	Jumpers, stranded, as required
d 2	Washer, square 2 1/4"	af 1	Cutout, fuse, open link (VG 39 only)
p	Connectors, as required	ae 1	Lightning arrester (VG 39 only)
an 1	Transformer	bv 1	Rods, armor
ap 1	Clamp, hot line, tap assembly	ek	Locknuts

14.4/24.9 KV.
SINGLE PHASE TRANSFORMER
ON THREE PHASE CIRCUIT

Jan. 1, 1963

VG39-VG67-VG136-



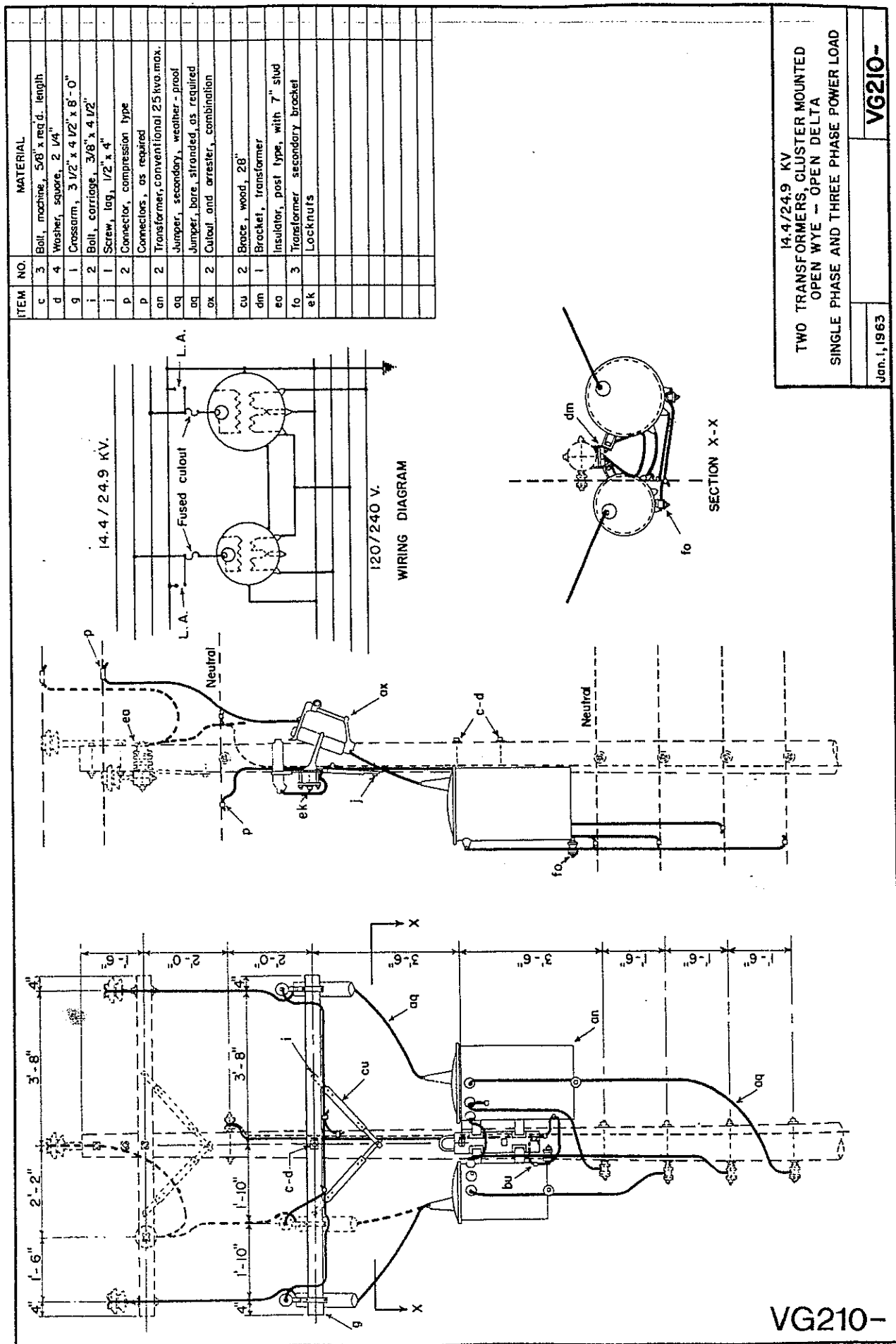
* Specify this item to be furnished by the transformer manufacturer.

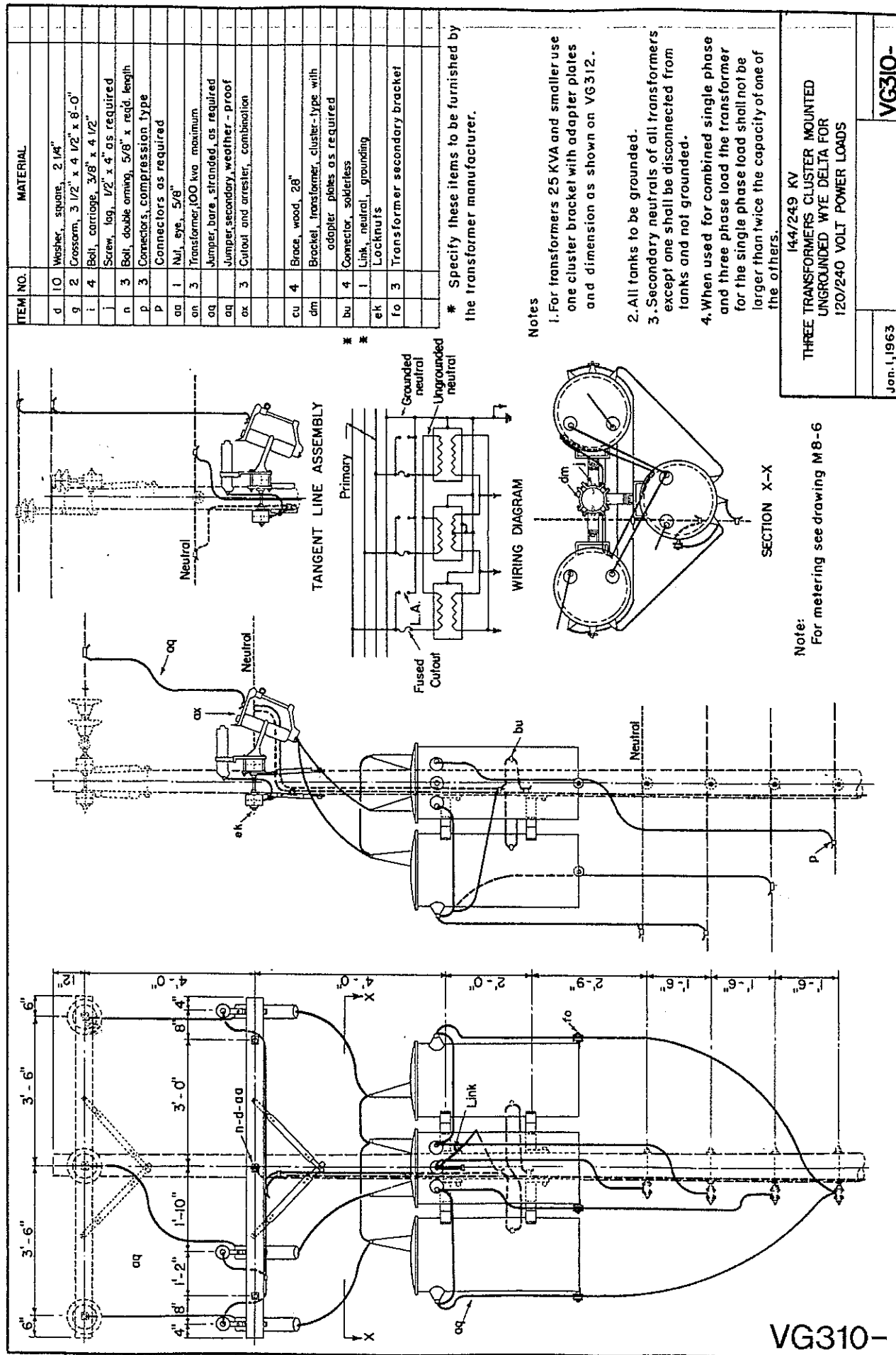
Notes:

2. Designate as G150 when 72/12.5 KV is the source and VG150 when 14.4/24.9 KV is the source. Strike out items, (af and eo) in material list which do not apply.

14.4/24.9 KV -- 7.2 /12.5 KV
ONE AUTO TRANSFORMER

Jan. 1, 1963





Note:
For metering see drawing M8-6

SECTION X-X

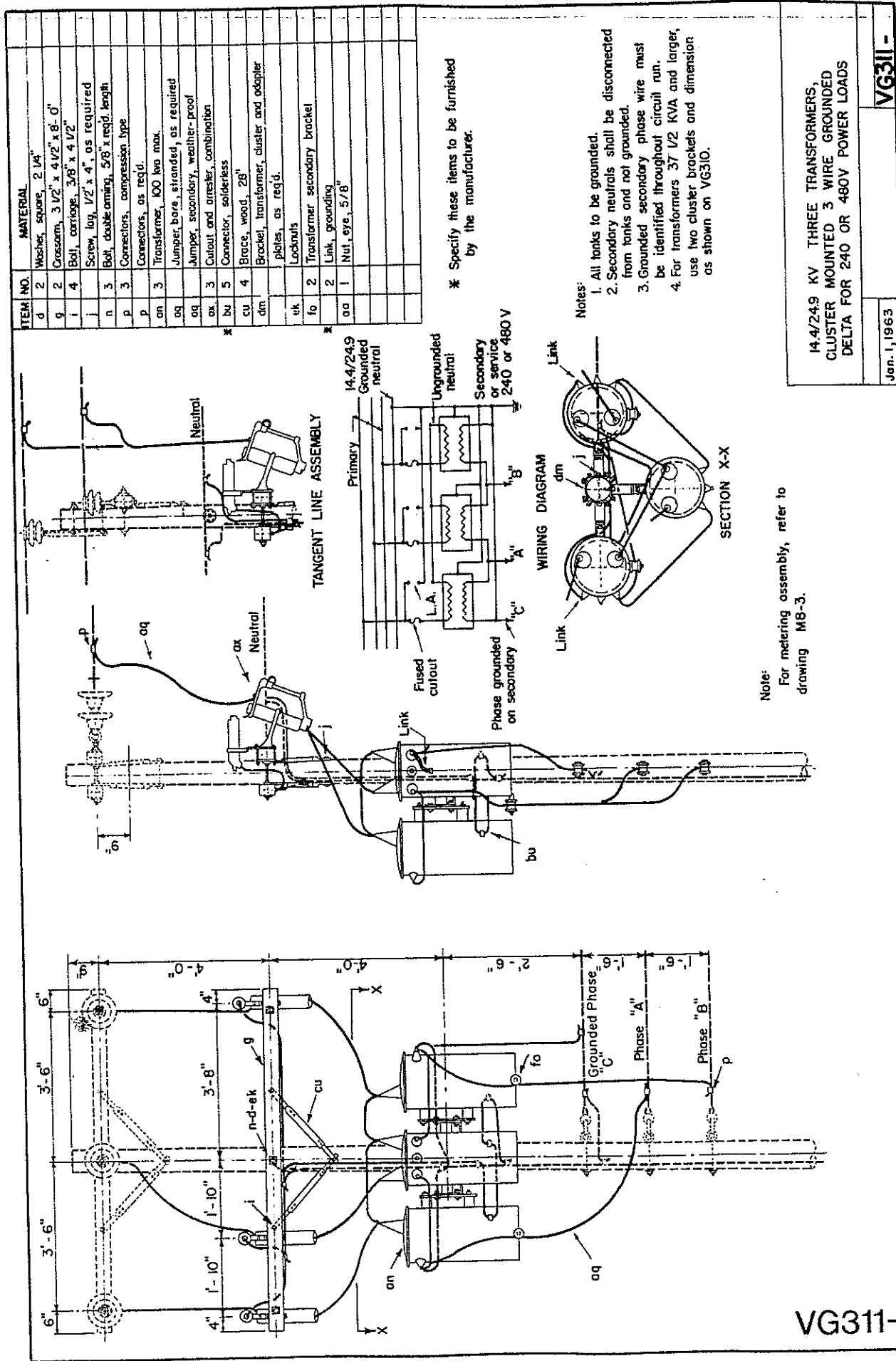
WIRING DIAGRAM

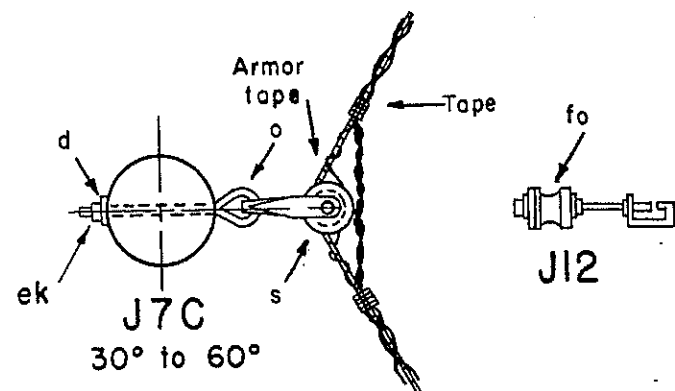
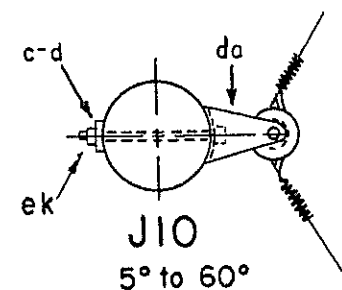
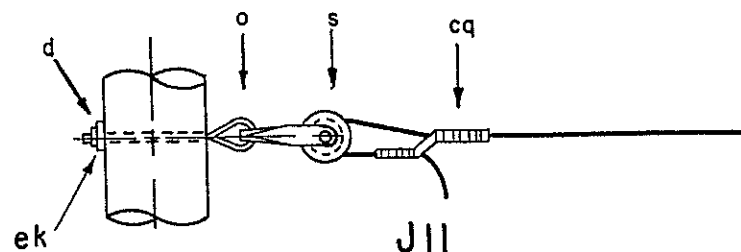
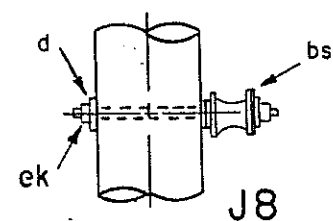
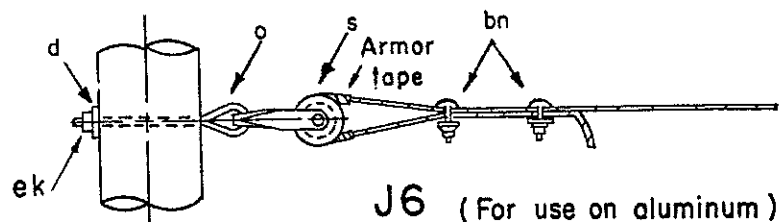
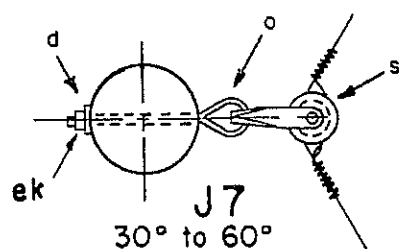
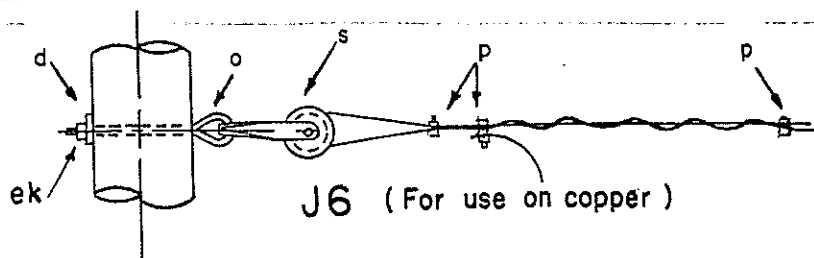
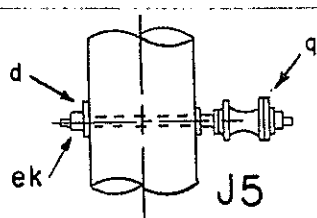
TANGENT LINE ASSEMBLY

VG310-

Jan. 1, 1963

144/249 KV
THREE TRANSFORMERS CLUSTER MOUNTED
UNGROUND WYE DELTA FOR
120/240 VOLT POWER LOADS





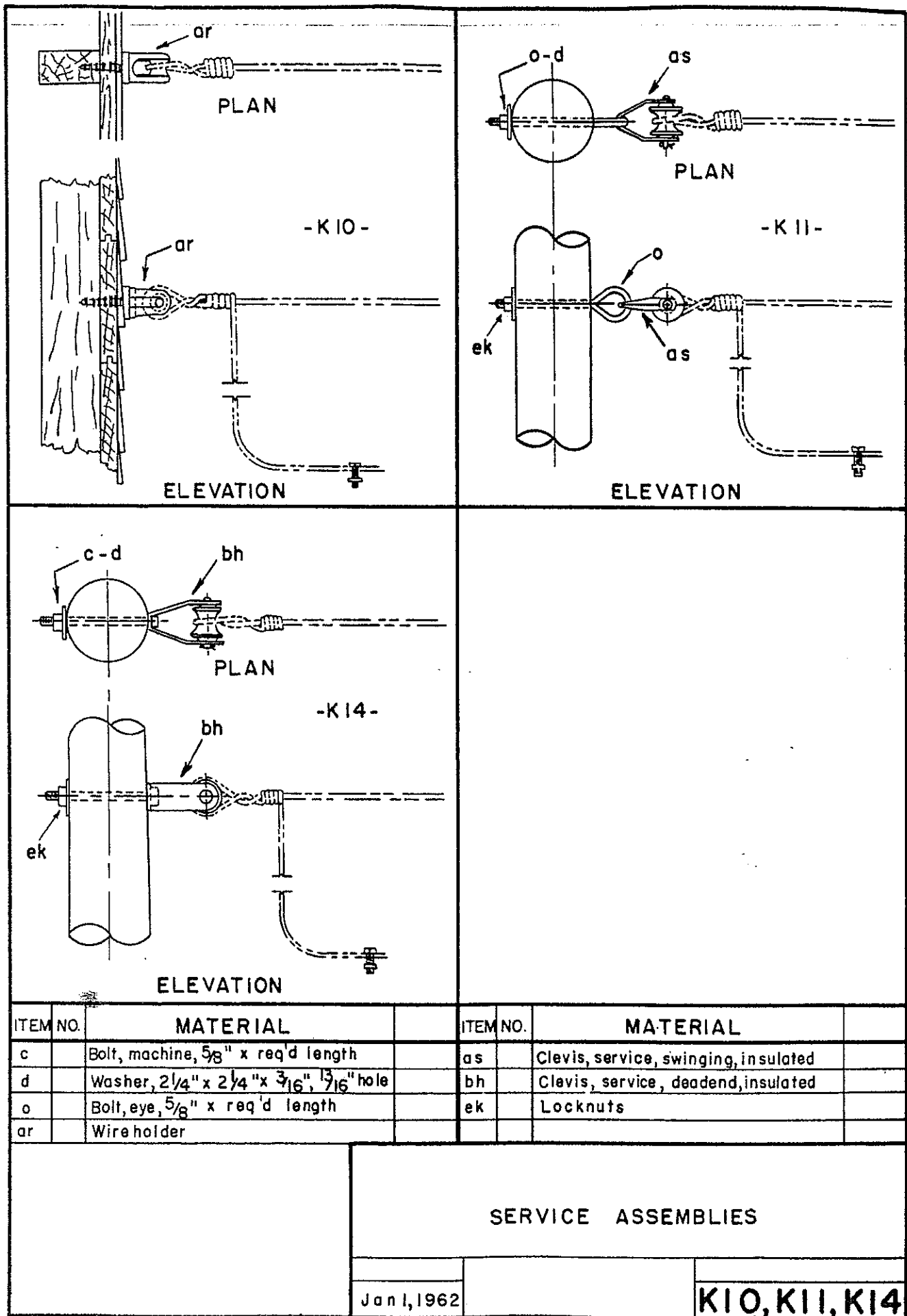
For use on Self Supporting
Service Cable

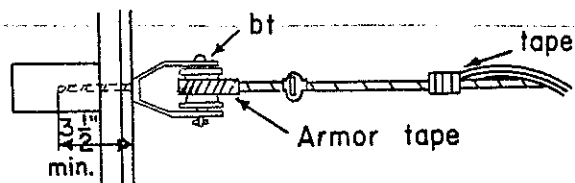
ITEM NO.	MATERIAL		MATERIAL
c	Bolt, machine, 5/8" x required length	bs	Bolt, single upset insulated
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	bn	Clamp, loop, deadend
o	Bolt, eye, 5/8" x required length	cq	Sleeve, offset, splicing
p	Connectors, as required	da	Bracket, insulated
q	Bolt, double upset, insulated	fo	Transformer secondary bracket
s	Clevis, secondary, swinging, insulated	ek	Locknuts

SECONDARY ASSEMBLIES

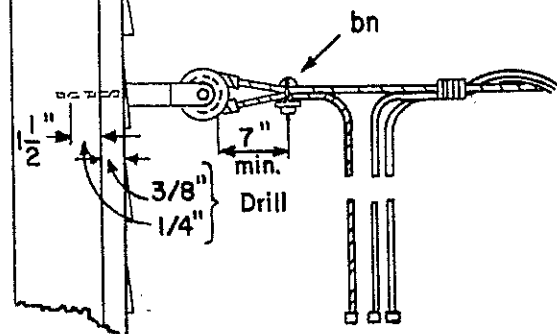
Jan 1, 1962

J5 to J12

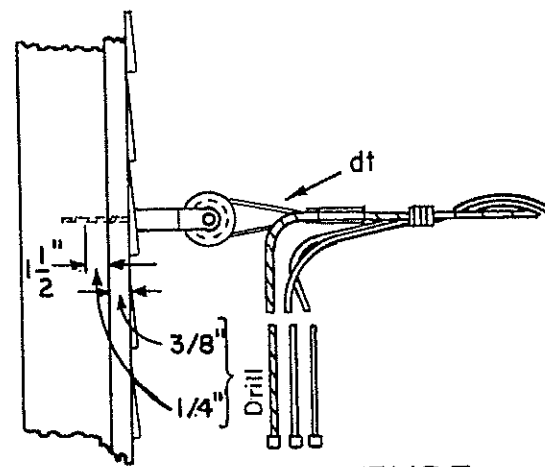
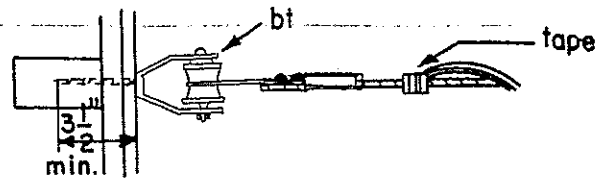




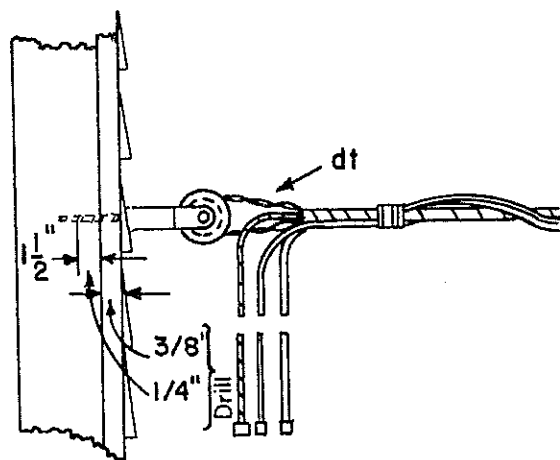
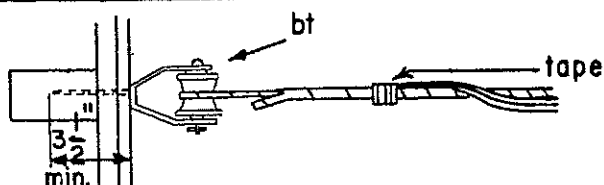
Note:
Groove diameter of
insulator 1 3/4" min.



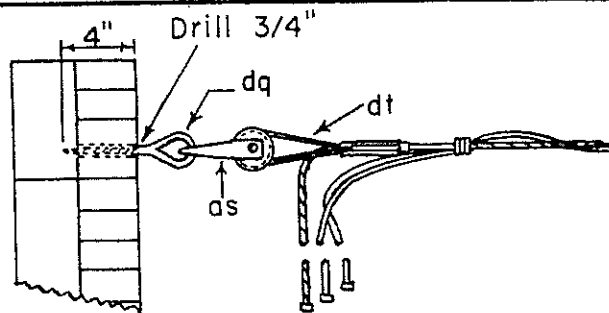
LOOP TYPE



WEDGE TYPE



PREFORMED TYPE

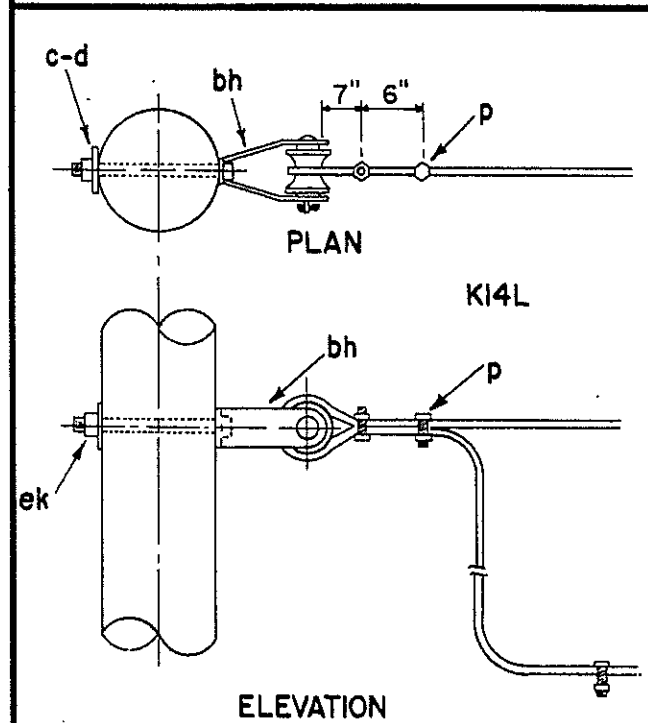
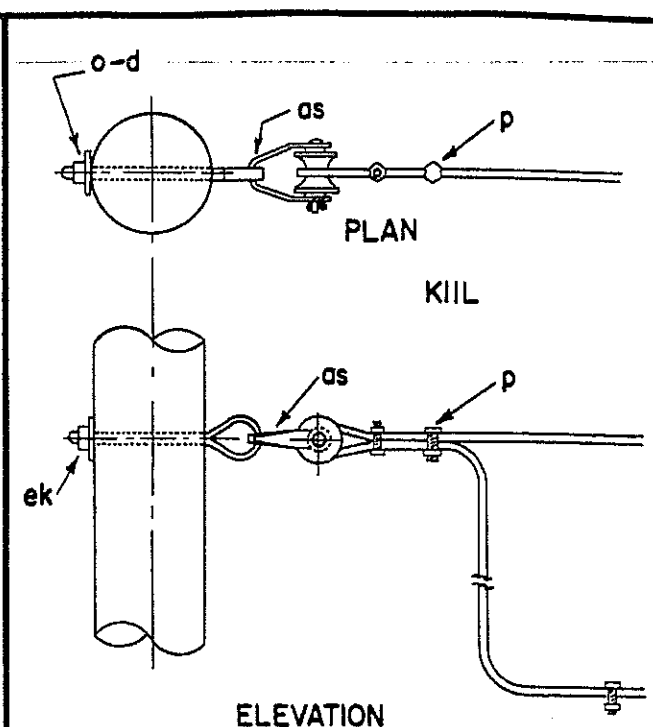
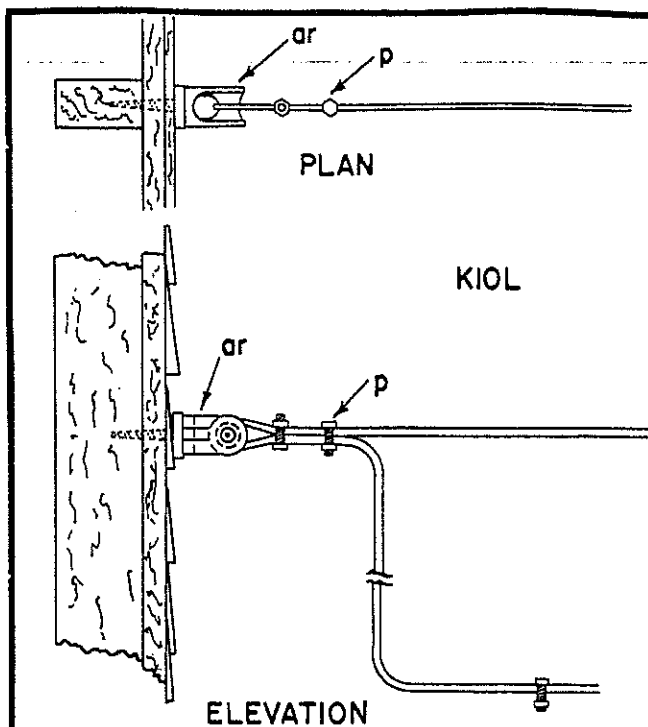


BRICK OR MASONRY.

Notes:

Wedge and preformed service dead-ends in sizes shown on page dt of the List of Materials may be subst. for those shown on KIIC, KI4C, KI5C, and KI6C. This type construction should be used for 3 or 4 conductor service cables with bare ACSR neutral.

ITEM	MATERIAL	ITEM	MATERIAL
bt	Wireholder, clevis type, #24 woodscrew, insulated.	dt	Service deadend, wedge type.
p	Connectors, as required.	dt	Service deadend, preformed type.
bn	Clamp, loop deadend.	dq	Eye screw, elliptical, 1/2" x 6"
as	Clevis, service, insulated		3/4" x 3 1/2" expansion shield
SERVICE ASSEMBLIES, CABLE			
Jan 1, 1962		KIOC	



NOTE 1:

This type construction should be used for No. 2 aluminum weatherproof conductor and larger.

NOTE 2:

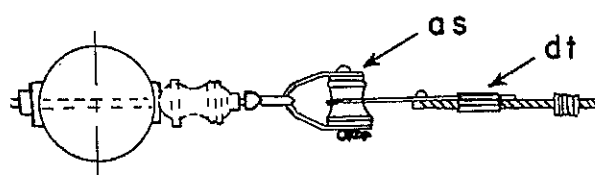
Connectors to be applied over bare wire and then taped as required.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	Bolt, machine, 5/8" x req'd. length	ar	Wireholder
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	as	Clevis, service, swinging, insulated
o	Bolt, eye, 5/8" x req'd. length	bh	Clevis, service, deadend, insulated
p	Connectors, as req'd.	ek	Locknuts

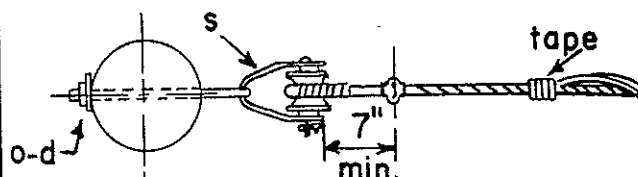
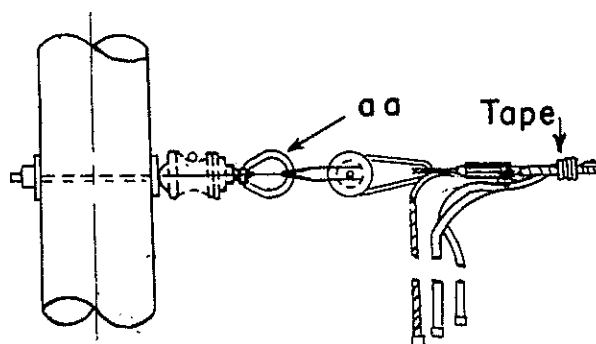
**SERVICE ASSEMBLIES
(LARGE CONDUCTORS)**

Jan 1, 1962

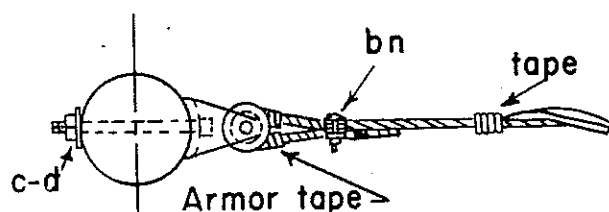
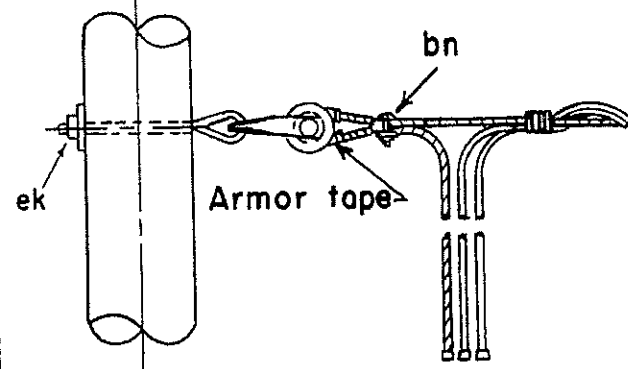
KIOL, KIIL, KI4L



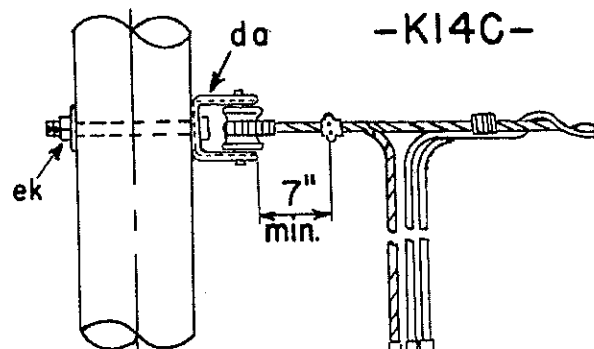
- KI5C -



- KIIC -



- KI4C -

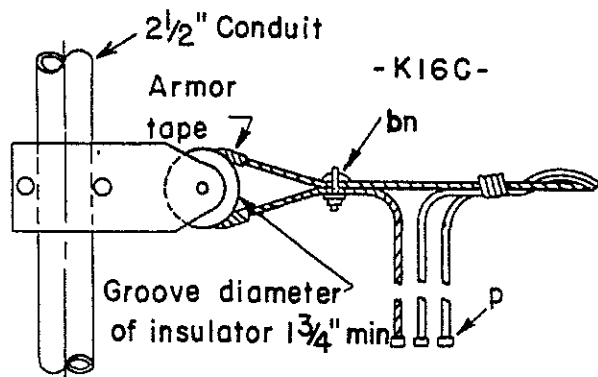
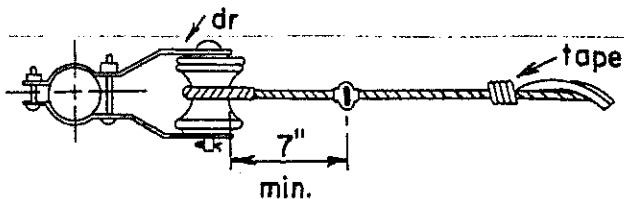


NOTES

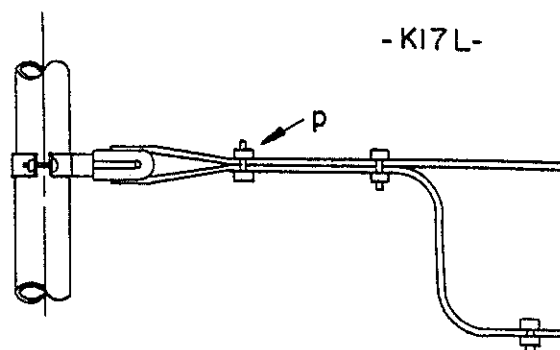
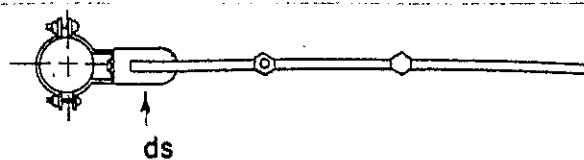
This type construction should be used for 3 or 4 conductor service cables with bare A.C.S.R. neutral.

Groove diameter of insulators $1 \frac{3}{4}$ " minimum for loop deadends.

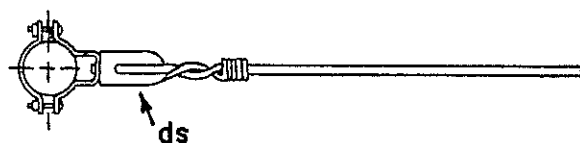
ITEM	MATERIAL	ITEM	MATERIAL
c	Bolt, machine, $\frac{5}{8}$ " x req'd. length	bn	Clamp, loop deadend
d	Washer, $2 \frac{1}{4}$ " x $2 \frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	da	Bracket, insulated
o	Bolt, eye, $\frac{5}{8}$ " x req'd. length	as	Clevis, service swinging
s	Clevis, secondary, swinging, insul.	p	Connectors, as required
aa	Nut, eye	dt	Service deadend
ek	Locknuts		
SERVICE ASSEMBLIES, CABLE			
Jan 1, 1962			
KIIC, KI4C, KI5C			



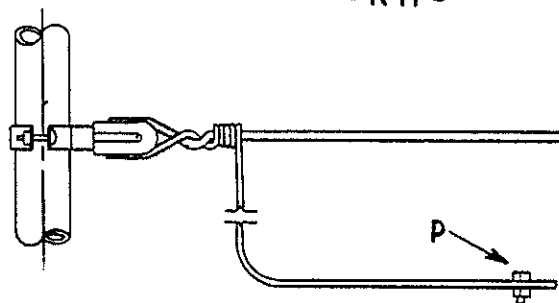
NOTE: This type constr. should be used for three conductor service cables with bare ACSR neutral.



NOTE: This type constr. should be used for No.2 aluminum weather-proof conductor.



- K17 -



NOTES:

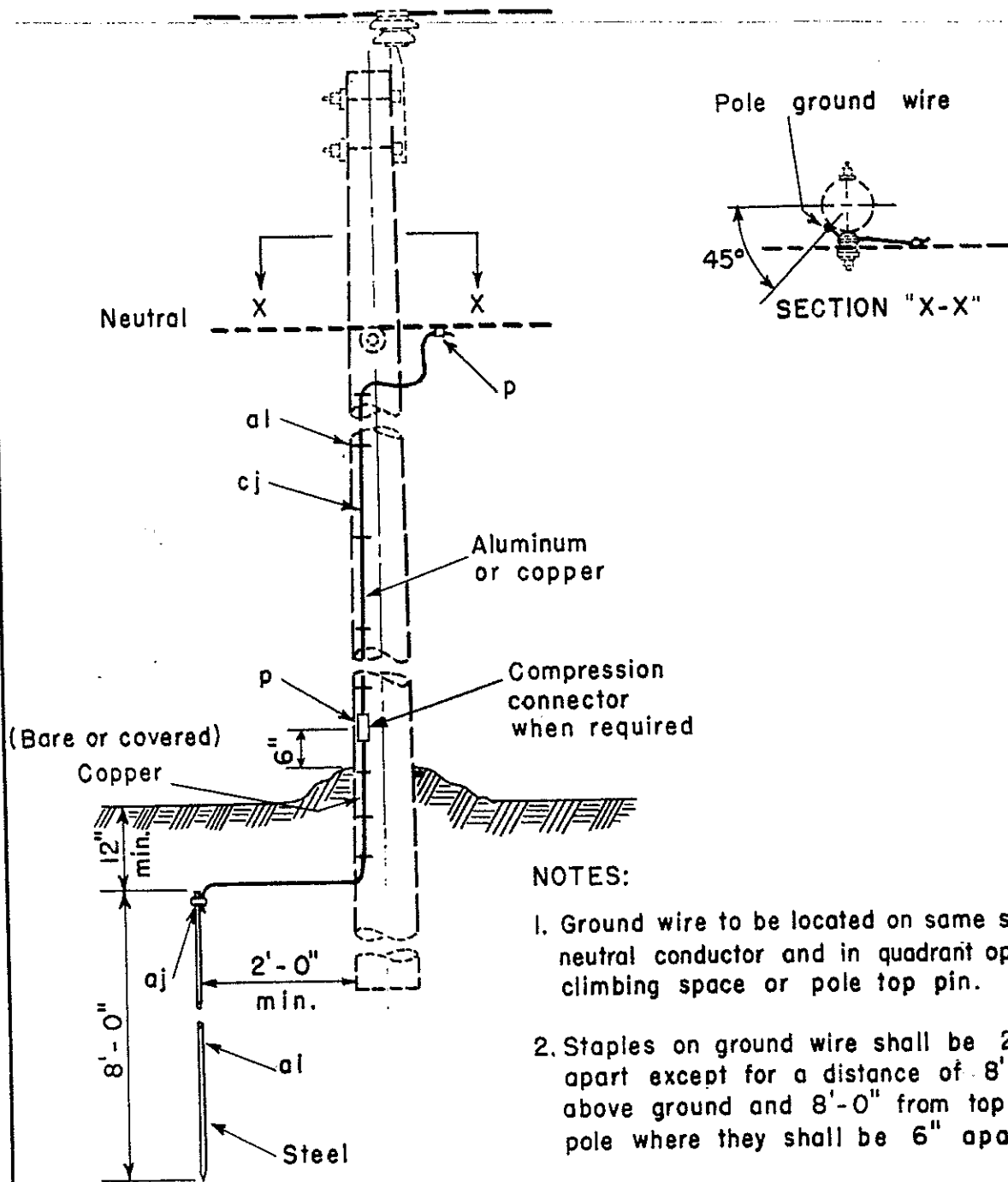
1. Connectors to be applied over bare wire and then taped as req'd.
2. For arrangement of service assembly units see drawing M24-10.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
p		Connectors, as req'd	dr		Clevis, conduit insulated
bn		Clamp, loop deadend	ds		Wireholder, conduit

SERVICE ASSEMBLIES (FOR RANCH TYPE HOUSES)

Jan 1, 1962

K16 C, K17L, K17



NOTES:

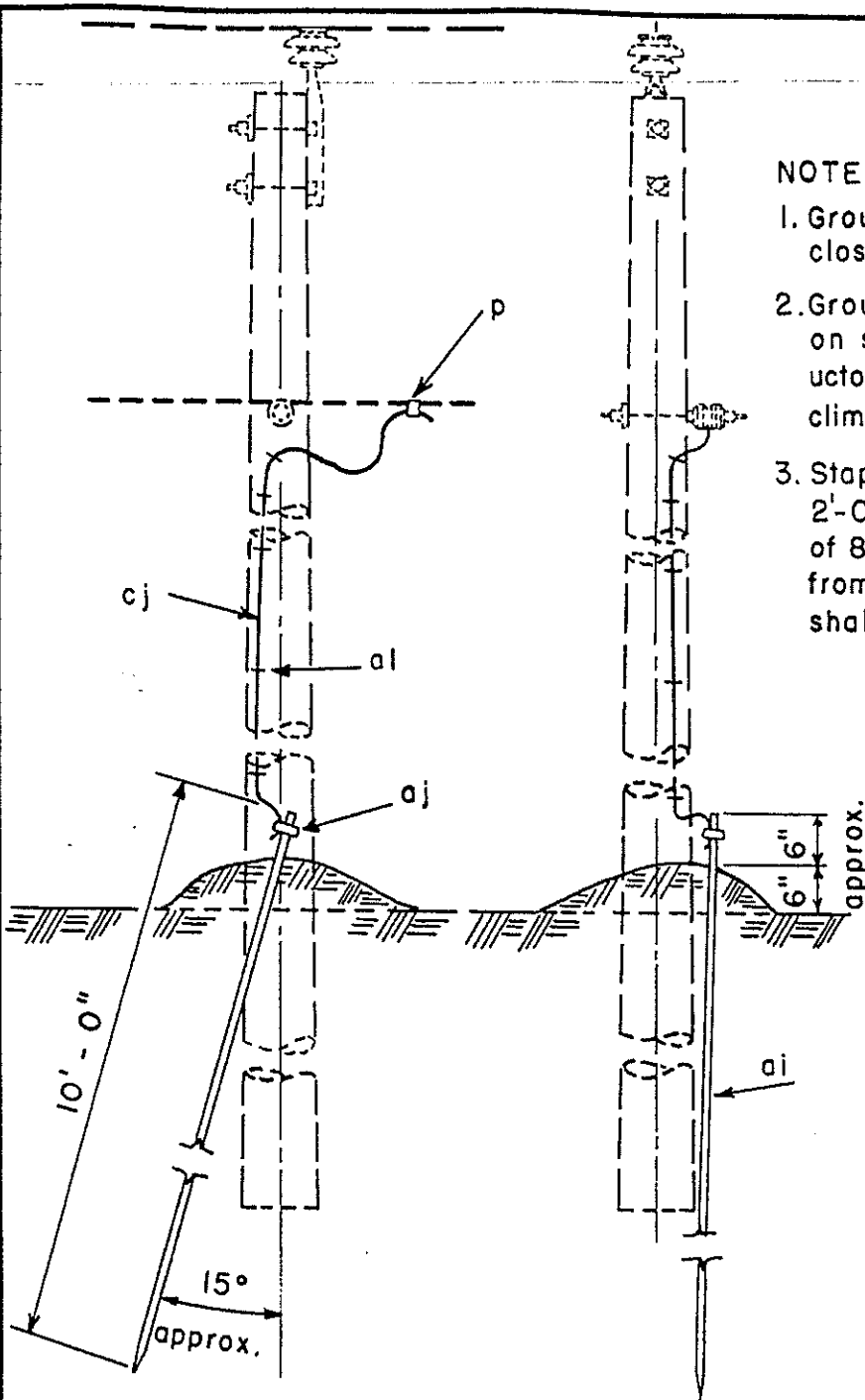
1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as required	cj	Ground wire, No. 6 copper or equiv. conductivity, as required
ai	1 Rod, ground, steel, 5/8" dia. min.		
aj	1 Clamp, ground rod		
al	Staples, ground wire, as required		

GROUNDING ASSEMBLY - GROUND ROD TYPE

Apr., 1969

VM2-11



NOTES:

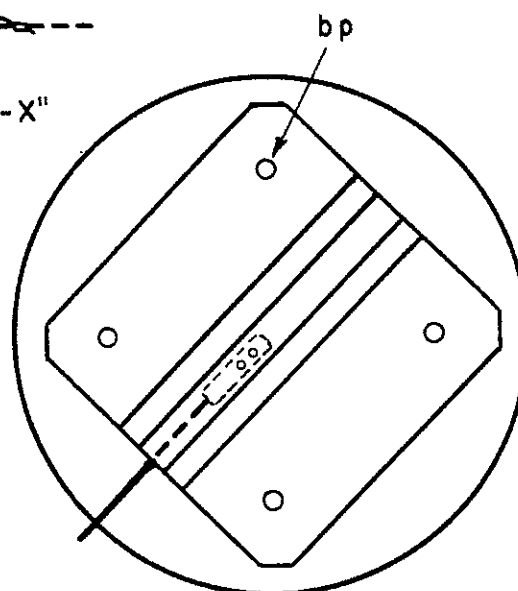
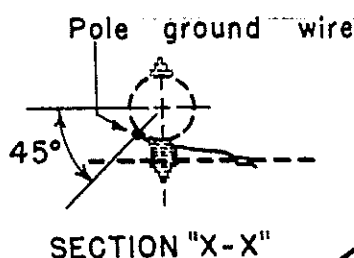
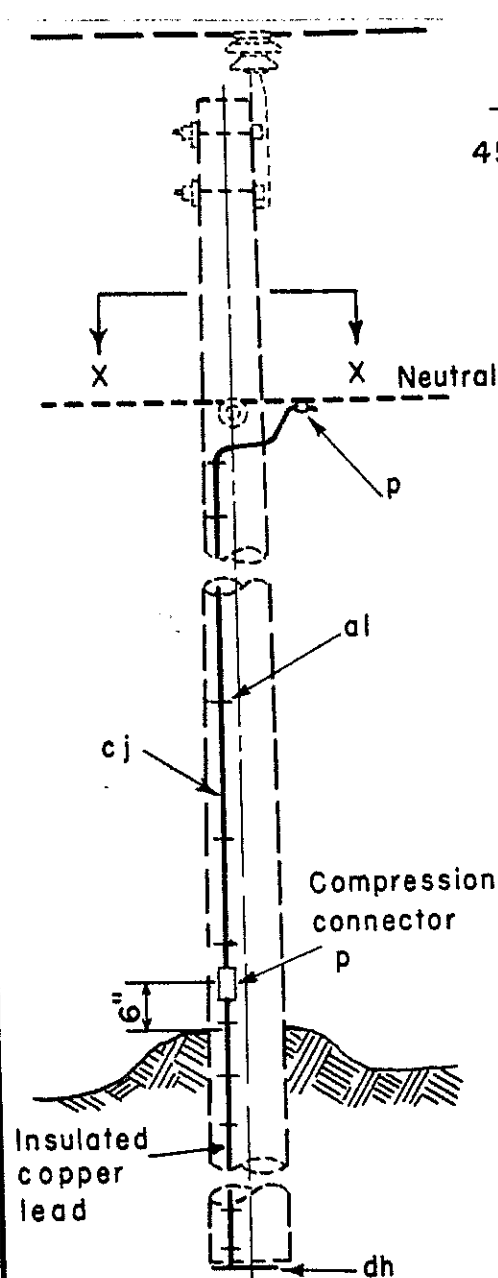
1. Ground rod to be driven as close to pole as practical.
2. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
3. Staples on ground wire shall be 2'-0" apart except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as required	al	Staples, ground wire, as required
ai	1 Rod, ground, galv. steel, 10'-0" x 5/8" dia., minimum	cj	Ground wire, No. 4 AWG aluminum, as required
aj	1 Clamp, ground rod, tamper proof		

GROUNDING ASSEMBLY - GROUND ROD TYPE

Apr., 1969

VM2-11A



PLAN OF PLATE TYPE GROUND

NOTES:

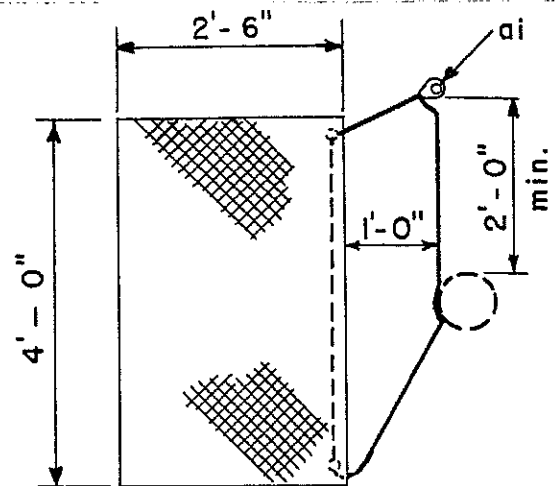
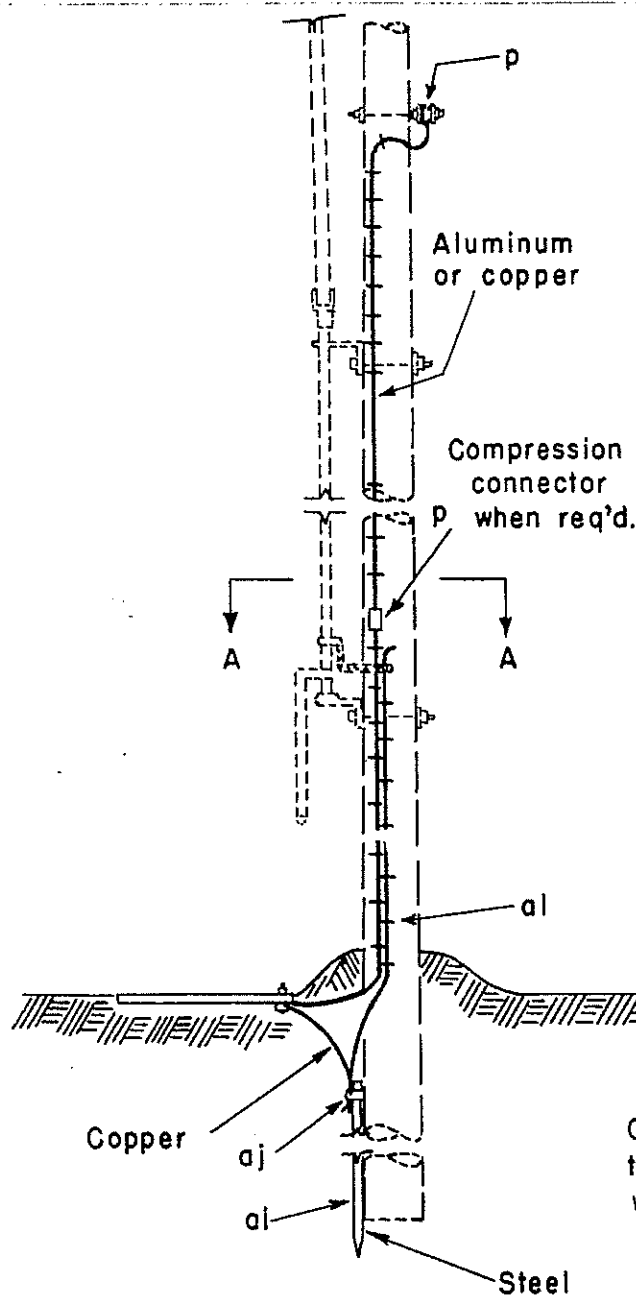
1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as required	cj	Ground wire, No. 4 aluminum, or equivalent, as required
p	Connector, compression		
al	Staples, ground wire, as required	dh	Grounding plate, butt type, galv. steel, with insulated copper lead
bp	4 Nails, galvanized, 1", roofing		

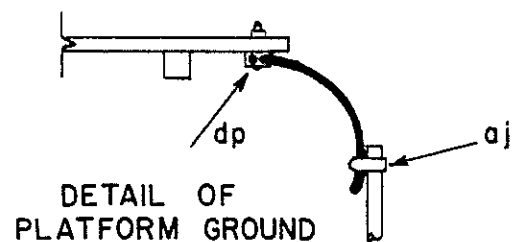
POLE PROTECTION ASSEMBLY - PLATE TYPE

Apr., 1969

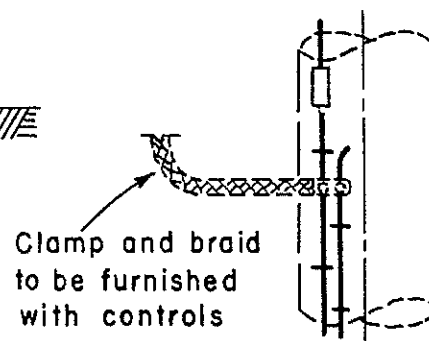
VM2-12



DETAIL OF PLATFORM



DETAIL OF PLATFORM GROUND



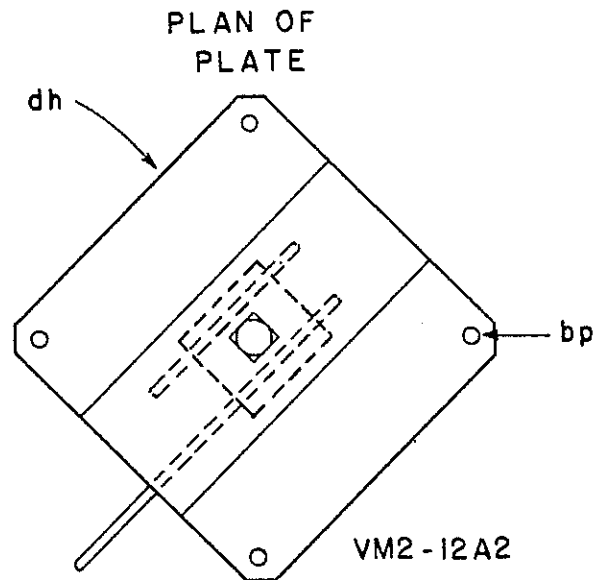
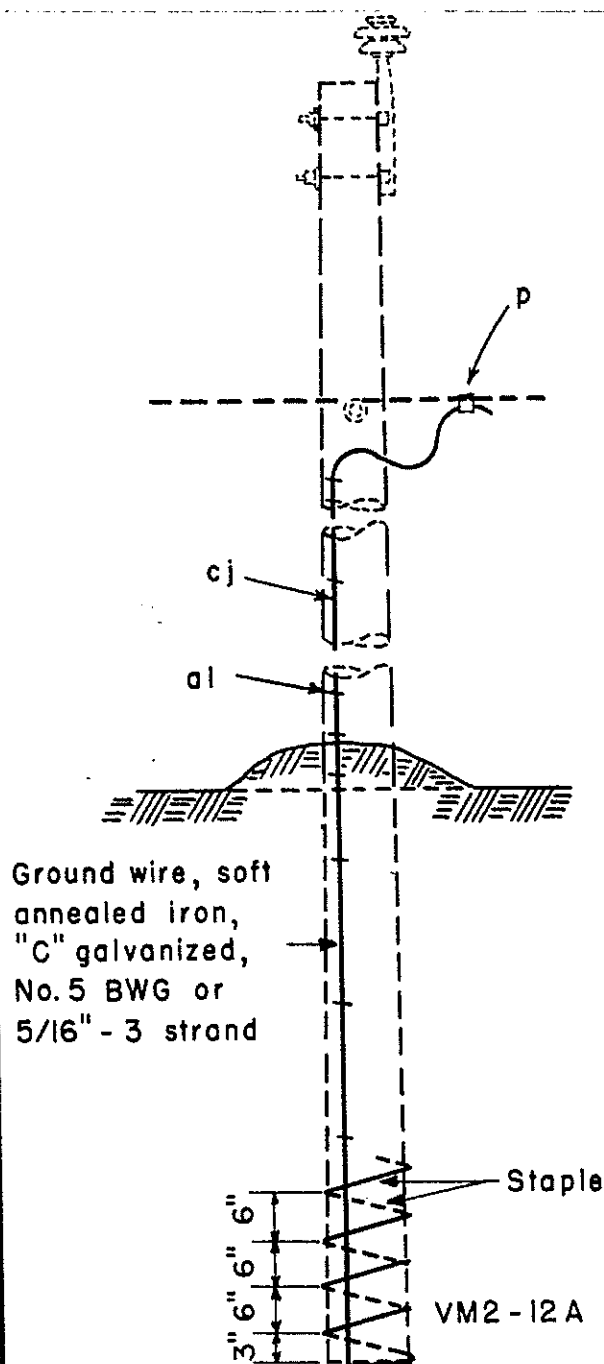
DETAIL OF SECTION "A-A"

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
p	Connectors, as required	cj	Ground wire, No. 2 copper or equiv. conductivity, as required
ai	1 Rod, ground, steel, 5/8" dia. x 8'-0"	dp	2 Grounding connector and lockwasher
aj	1 Clamp, ground rod		1 Grounding iron platform plate
al	Staples, ground wire, as required		

GROUNDING ASSEMBLY - PLATFORM TYPE
FOR SECTIONALIZING AIR BREAK SWITCH

Apr. 1969

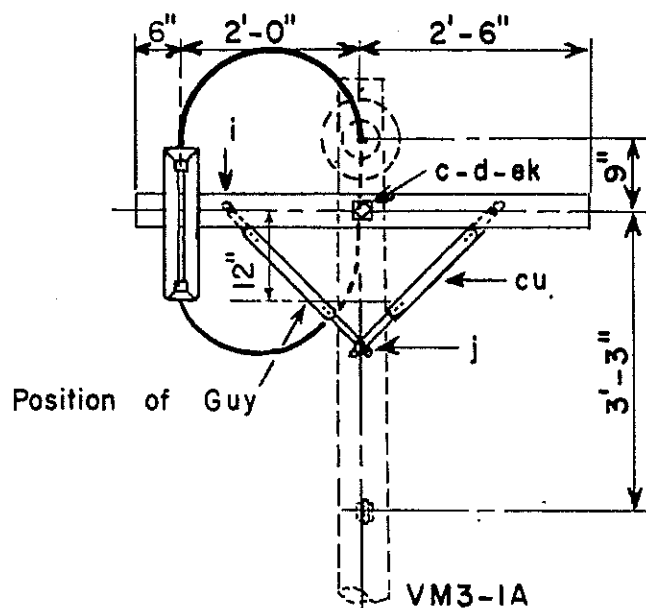
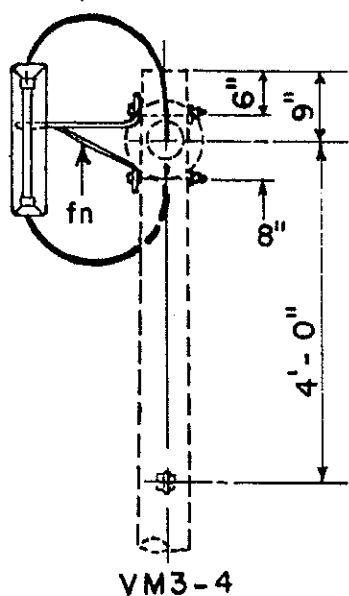
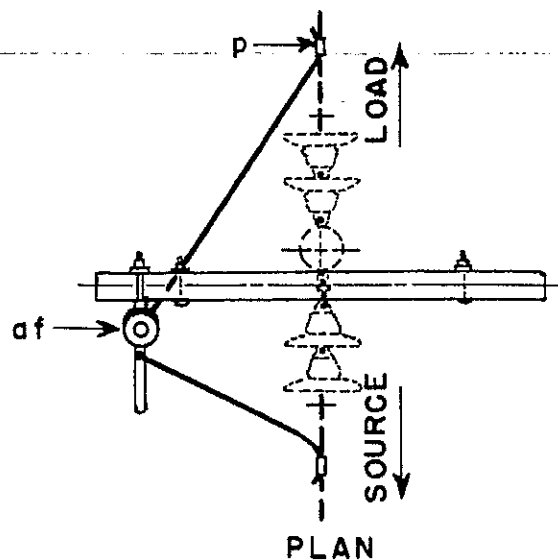
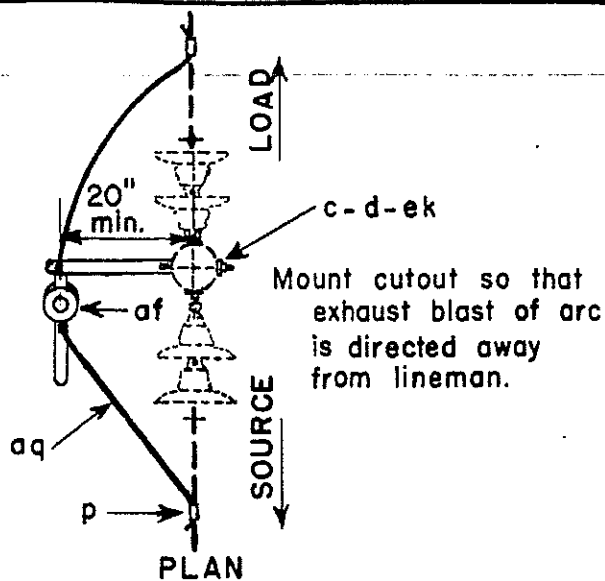
M2 - 15



NOTES:

1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.

ITEM	MATERIAL	ASSEMBLY UNIT	
		VM2 - 12 A	VM2-12A2
p	Connectors	as req'd.	as req'd.
a l	Staples, ground wire	as req'd.	as req'd.
b p	Nails, galvanized, 1", round head	—	4
c j	Ground wire, soft annealed iron, "C" galvanized, No.5 BWG or 5/16" - 3 strand	as req'd.	as req'd.
dh	Grounding plate, butt type, galvanized steel	—	1
POLE PROTECTION ASSEMBLY WRAP-AROUND TYPE (A): PLATE TYPE (A2)			
Apr. 1969		VM2-12A, VM2-12A2	



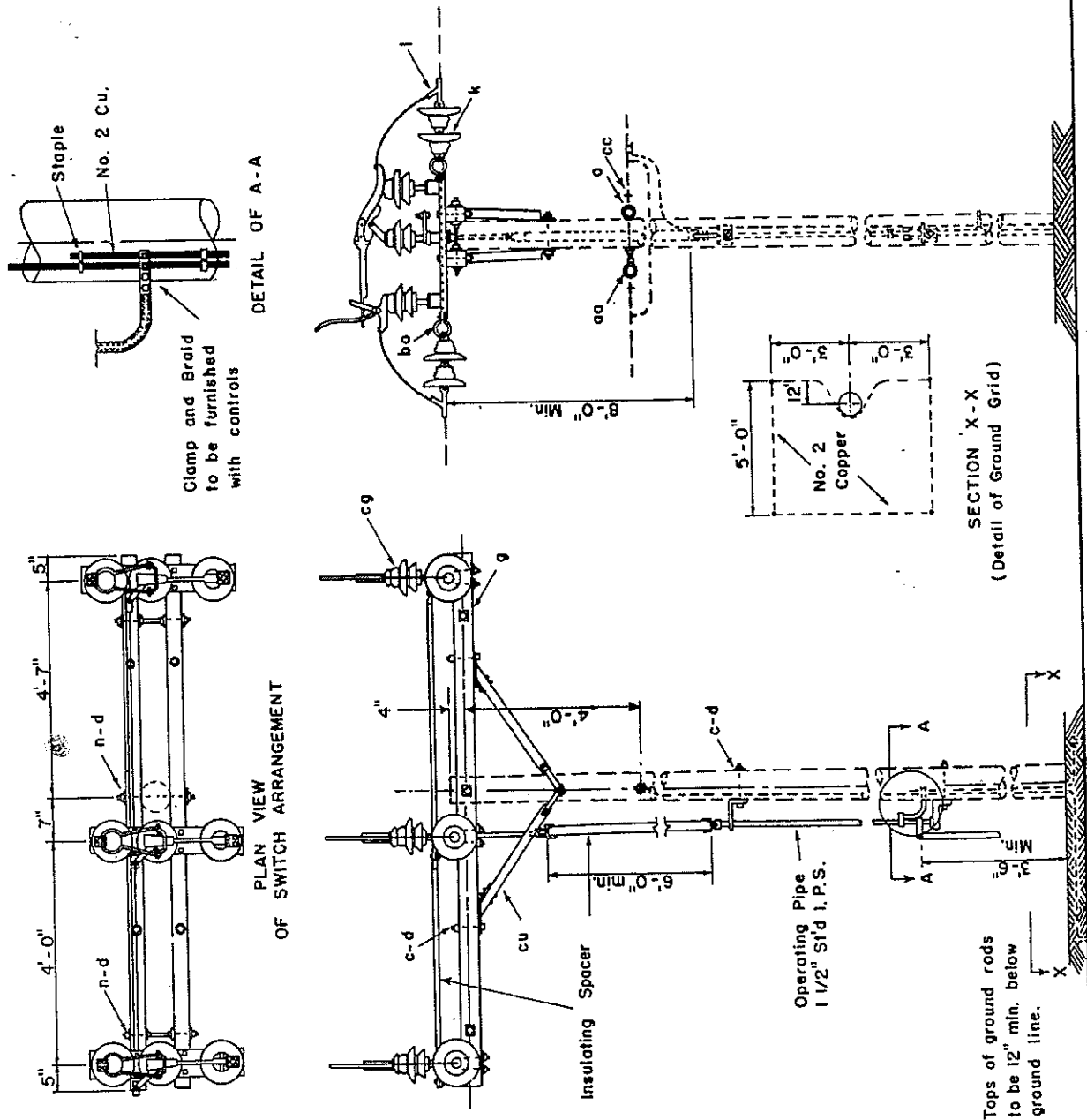
ITEM	MATERIAL	VM3-4	VM3-1A
		NO. REQUIRED	NO. REQUIRED
c	Bolt, machine, 5/8" x required length	2	1
d	Washer, square, 2 1/4"	2	2
g	Crossarm, 3 1/2" x 4 1/2" x 5'-0"		1
i	Bolt, carriage, 3/8" x 4 1/2"		2
j	Screw, lag, 1/2" x 4"		1
p	Connector, compression type	2	2
af	Cutout, fuse, single shot	1	1
aq	Leads or jumpers as required		
cu	Brace, wood, 28"		2
ek	Locknuts		
fn	Bracket, extension	1	

14.4/24.9 KV., 1-PHASE
ONE SECTIONALIZING FUSE CUTOUT

Jan. 1, 1963

VM3-1A, VM3-4

ITEM NO	MATERIAL
c 14	Bolt, machine, 5/8" x req'd length
c 4	Bolt, machine, 1/2" x req'd length
d 25	Washer, 2-1/4" x 2-1/4", 13/16" hole
d 4	Washer, rd., 1-3/8" dia., 9/16" hole
g 2	Grossorm, 3-3/4" x 4-3/4" x 10'-0"
k 12	Insulator, suspension, 10"
l 6	Clamp, deadend
n 4	Bolt, double arming, 5/8" x req'd length
bo 6	Shackle, anchor
cg 1	Switch, airbreak, 3 pole unit
cu 1	25 kv. with operating mechanism
cc 2	Brace, wood, 60" span
o 1	Deadend assembly, neutrals
aa 1	Bolt, eye, 5/8"
ek 1	Nut, eye, 5/8"
	Locknuts



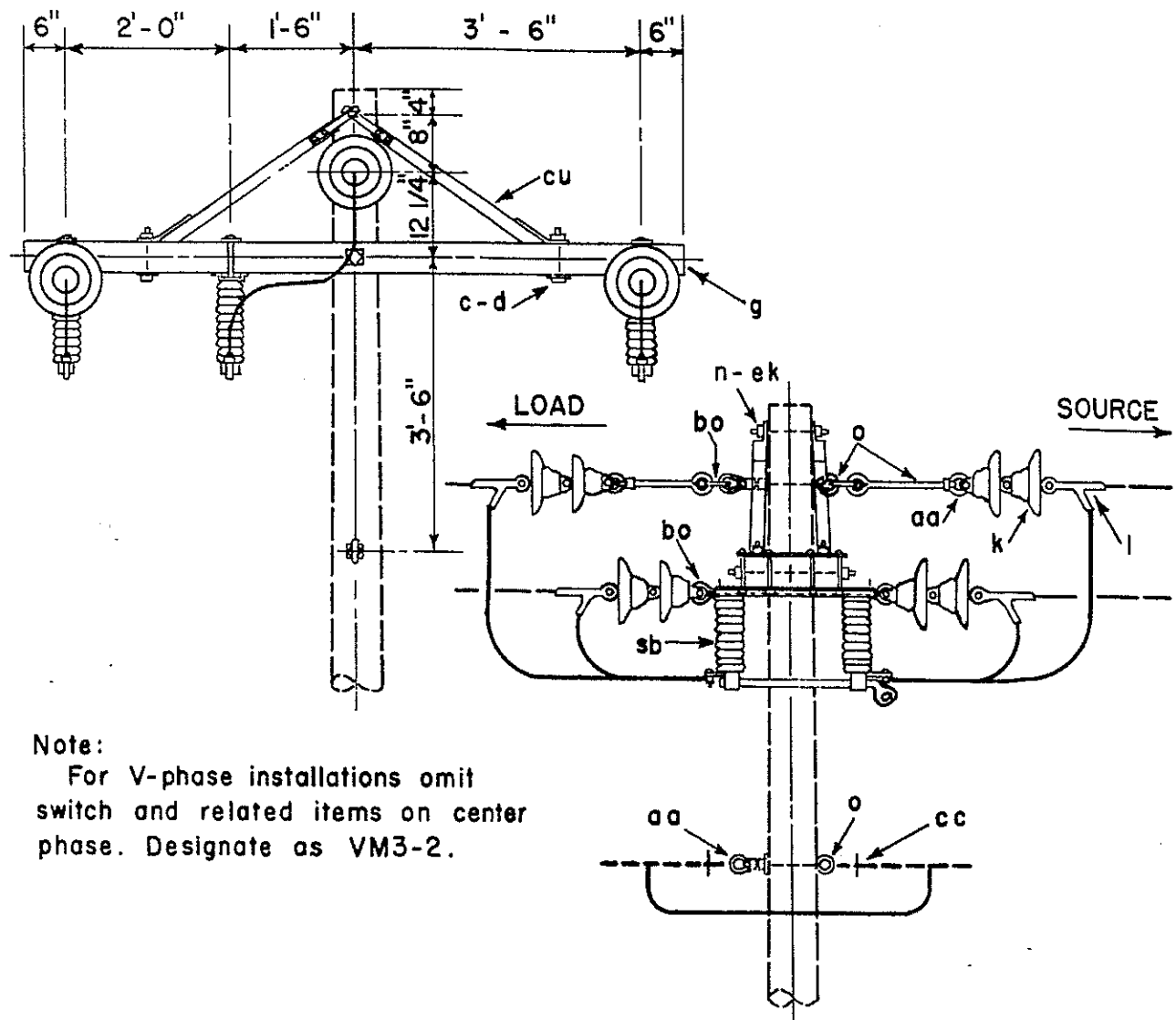
Note:
For grounding assembly, see
drawing M2-15

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
SECTIONALIZING AIR BREAK SWITCH

Jan. 1, 1963

VM3-16

LB



Note:

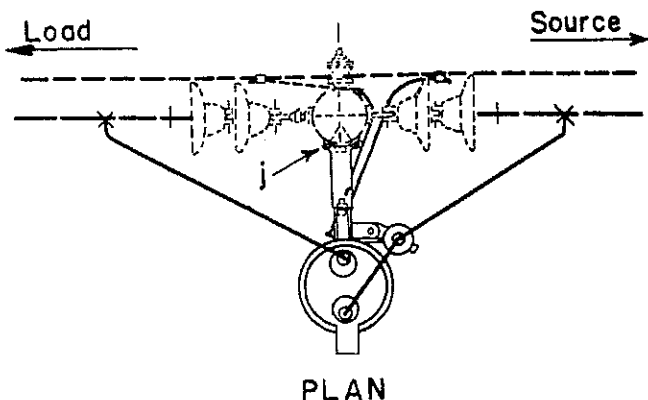
For V-phase installations omit switch and related items on center phase. Designate as VM3-2.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2"x req'd. length	aq		Jumpers, as required
d	4	Washer, round, 1 3/8" dia.	bo	6	Shackle, anchor
d	3	Washer, square, 2 1/4"	cc	2	Deadend assembly, neutral
g	2	Crossarm, 3 1/2"x 4 1/2"x 8'-0"	cu	2	Brace, crossarm, wood, 60" span
l	6	Clamp, deadend	ek		Locknuts
n	2	Bolt, double arming, 5/8"x req'd. lgth.	sb	3	Switch, disconnect, 25 KV, with mounting hardware
o	4	Bolt, eye, 5/8"x required length	k	12	Insulator, suspension, 10"
p		Connectors, as required			
aa	4	Nut, eye, 5/8"			

14.4/24.9 KV
TWO OR THREE SECTIONALIZING
DISCONNECT SWITCHES

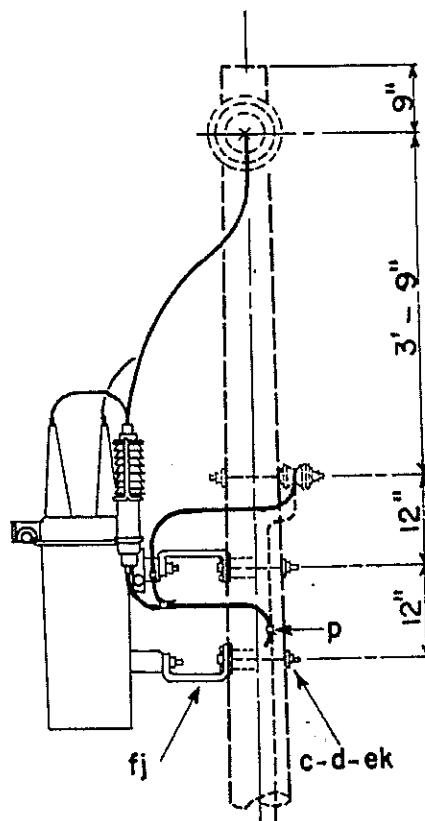
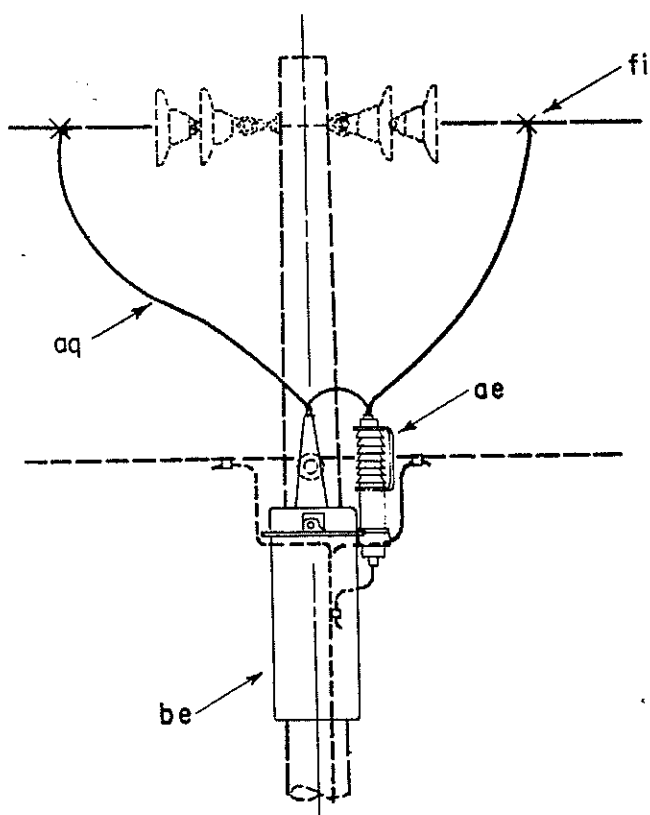
Jan. 1, 1963

VM3-2, VM3-3



Note:

The recloser terminal bushing connected directly to the coil should be connected to the source.

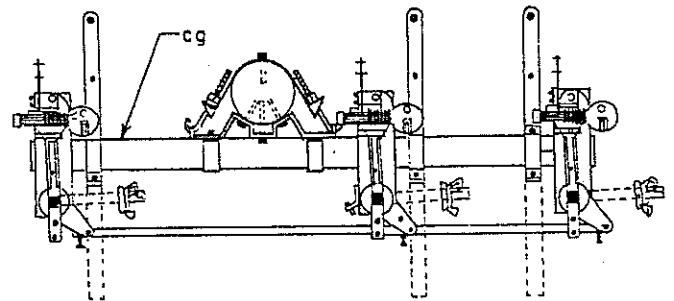
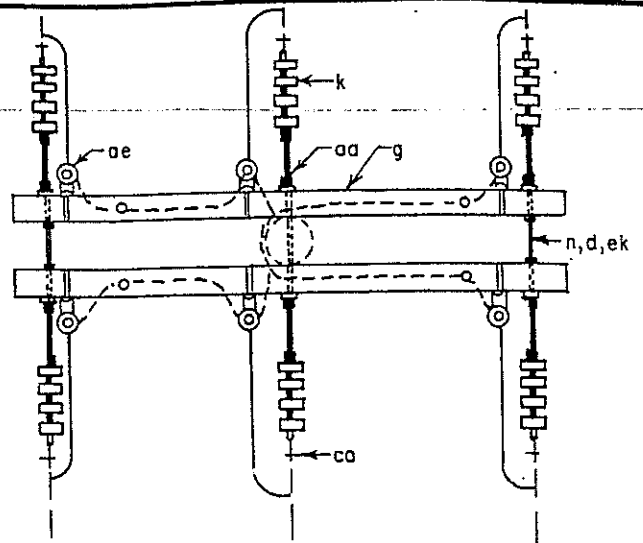
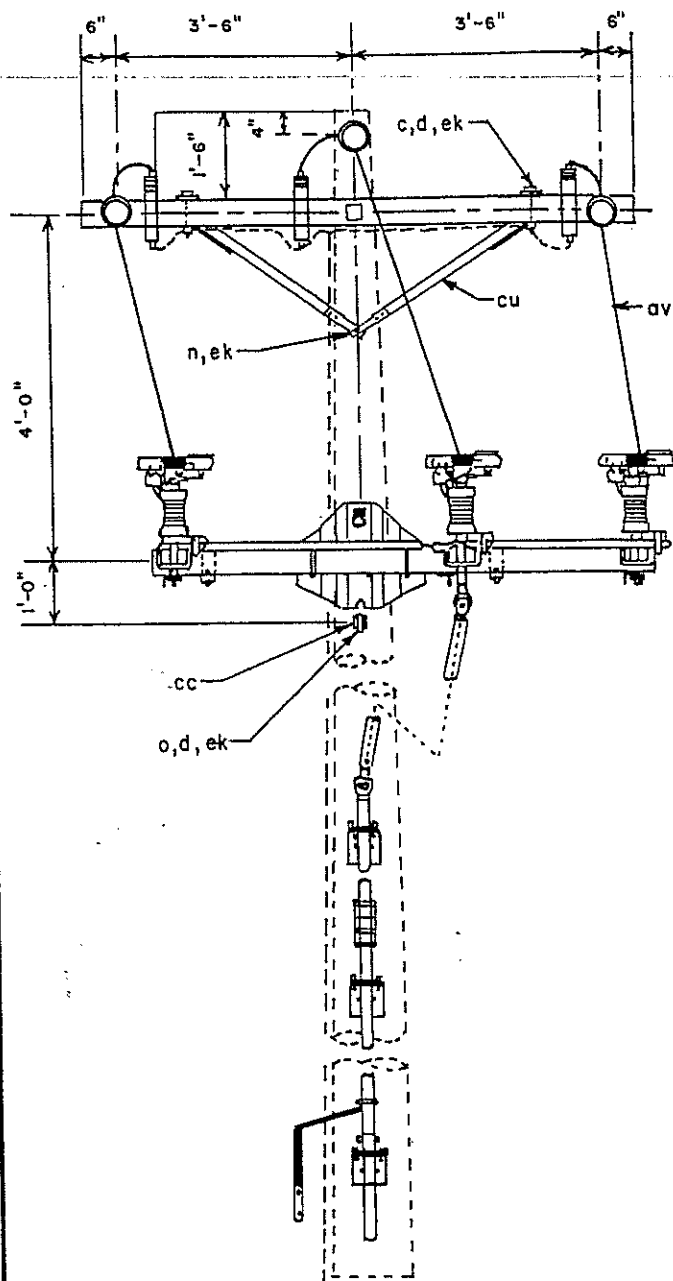


ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x req'd. length	be	1	Recloser, oil circuit
d	2	Washer, square, 2 1/4"	ek		Locknuts
j	4	Screw, lag, 1/2" x 4"	fi	2	Connector, hot line
ae	1	Arrester, lightning	fj	2	Bracket, extension, 9" long
aq		Jumpers, stranded, as required	p		Connectors, as required

14.4 / 24.9 KV
ONE SECTIONALIZING OIL CIRCUIT RECLOSER

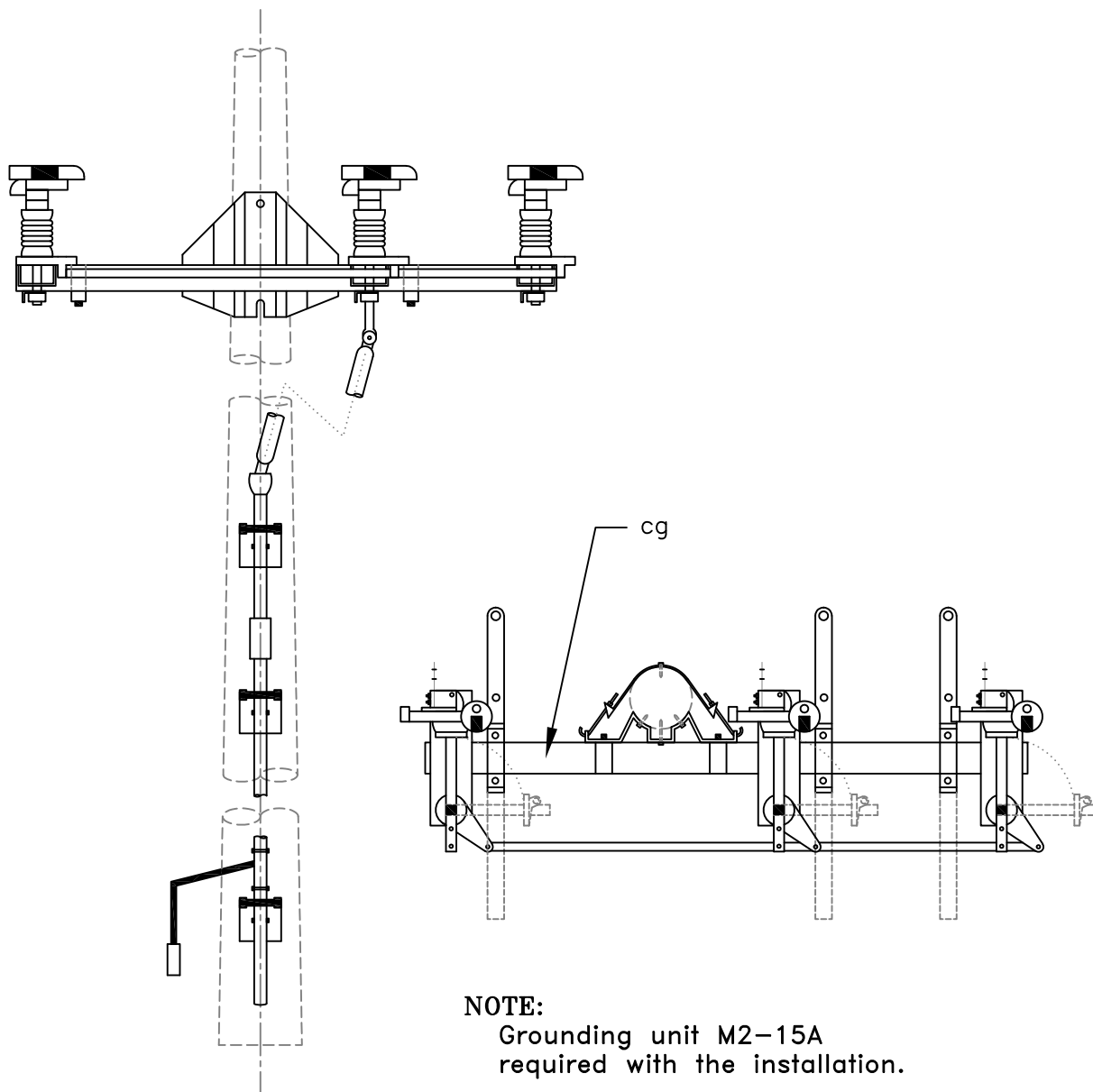
Jan. 1, 1963

VM3-10A



NOTE:
Grounding unit M2-15A
required with this installation

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x req'd. length	ae	6	Lightning arrester dist. class 18 KV
d	8	Washer, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	c	8	Bolt, machine, 5/8" x req'd. length
d	4	Washer, round, 1 3/8" diam., 9/16" hole	cg	1	Switch, airbreak, 3 pole unit 25 KV
g	2	Cross arm, 3 1/2" x 4 1/2" x 8'-0"			with operating mechanism,
k	6	Insulator, epoxy, suspension extension 14.4 KV			S & C Omni-Rupter Switch and
n	3	Bolt, double arming, 3/4" x req'd. length			associated hardware
o	2	Bolt, eye, 3/4" x req'd. length	d	14	Washer, 2 1/4" x 2 1/4" x 13/16" hole
aa	6	Nut, eye, 3/4"			
bo	2	Shackle, anchor 3/4"			
cu	2	Brace, wood, 60" span			
					24.9 / 14.4 KV SECTIONALIZING AIRBREAK SWITCH
					Feb., 1990
					VM3-15A



NOTE:
Grounding unit M2-15A
required with the installation.

ITEM	NO.	M A T E R I A L	ITEM	NO.	M A T E R I A L
ae	6	Lighting arrester dist. class 18 KV	cg	1	Switch, air break, 3 pole unit 25 KV
		(not shown)			with operating mechanism
					S & C Omni - Rupter Switch and
					associated hardware

24.9 /14.4 KV
LOADBREAK SWITCH

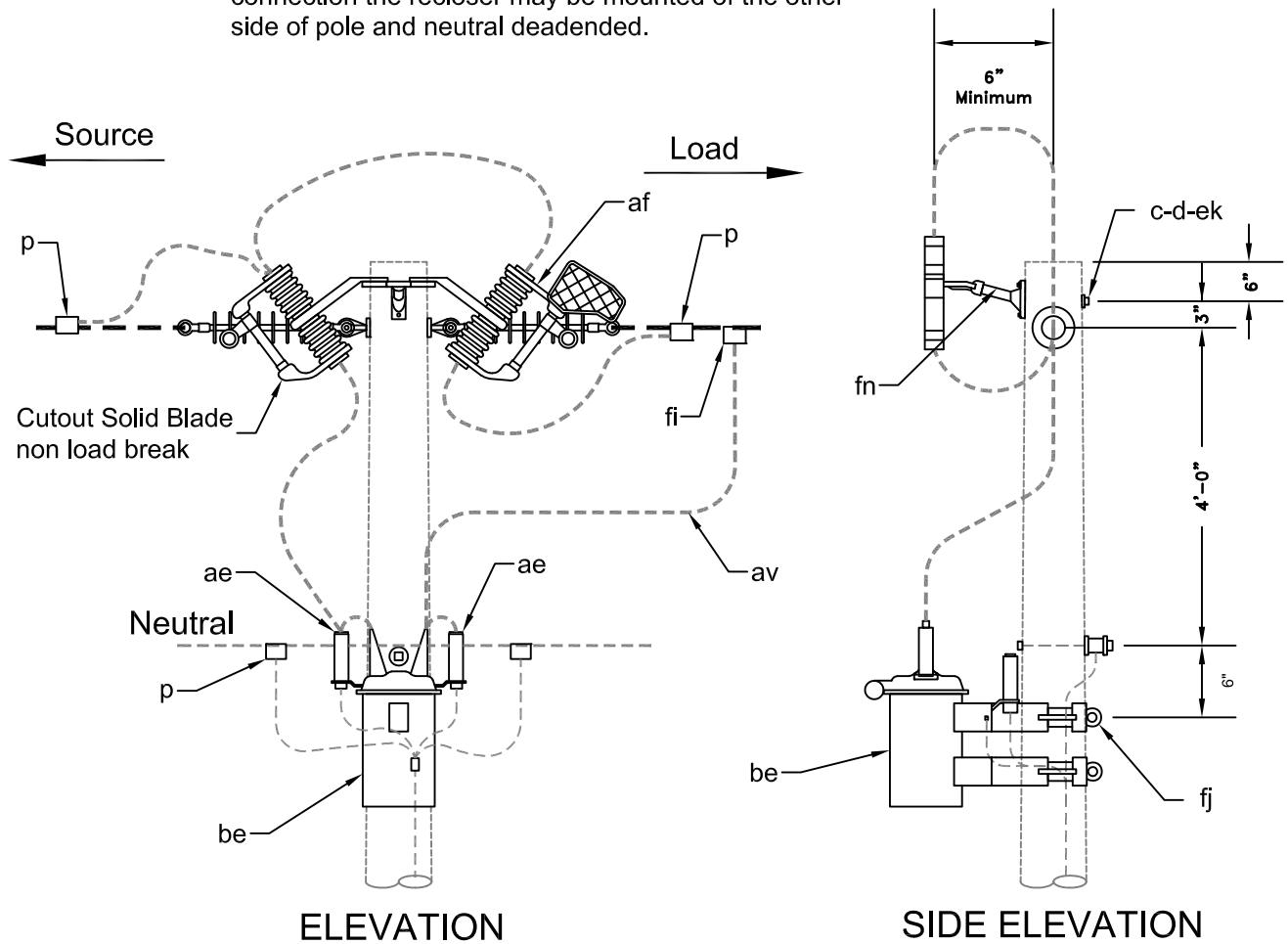
Aug 14, 2009



VM3-15X

NOTE:

The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted of the other side of pole and neutral deadended.



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	2	Surge arrester
d	2	Washer, 2 1/4" square, 13/16" hole	af	1	Cutout, fused, load break
p	-	Connectors, as required	af	1	Cutout, solid blade non load break
fj	2	Bracket, extension, RSM-1	be	1	Recloser, oil circuit
fi	2	Connector, hot line	fn	1	Bracket, extension, cloverleaf
av	-	Jumpers, stranded, as required	ek	-	Locknuts, as required

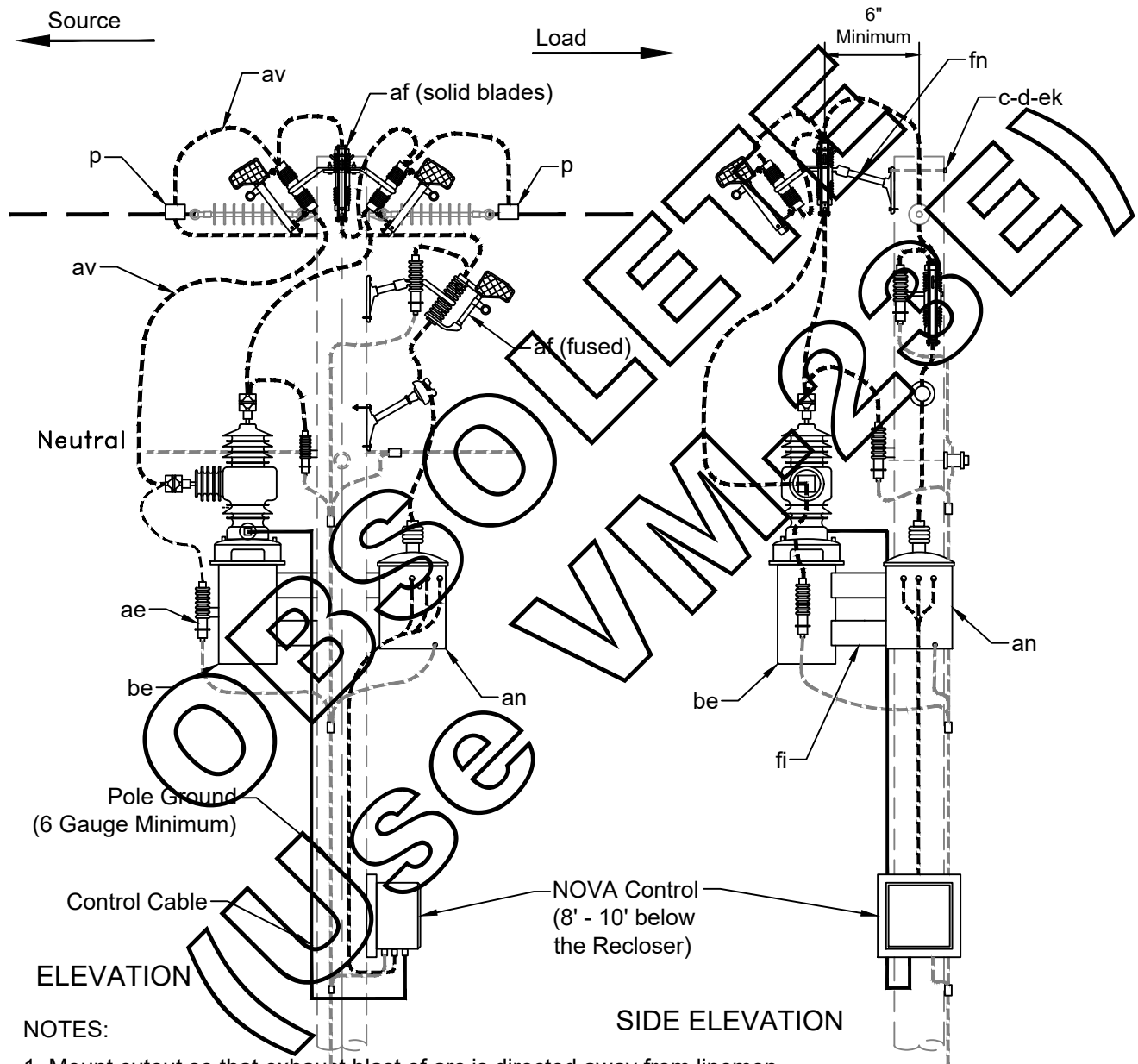
**SINGLE PHASE
OIL CIRCUIT RECLOSER
WITH BYPASS CUTOUT**

Revision Date

March 22, 2023



**M3-23B
VM3-23B**



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	2	Surge arrester
d	2	Washer, 2 1/4 " square, 13/16" hole	an	1	Transformer, 1 KVA
d	2	Washer, 3" square, curved	be	1	Recloser, oil circuit, NOVA
fj	2	Bracket, extension, RSM-1	fn	2	Bracket, extension, cloverleaf
fi	2	Connector, hot line	p	-	Connectors, as required
af	1	Cutout, fused, load break	av	-	Jumpers, stranded, as required
af	3	Cutout, fused, load break, solid blades	ek	-	Locknuts, as required

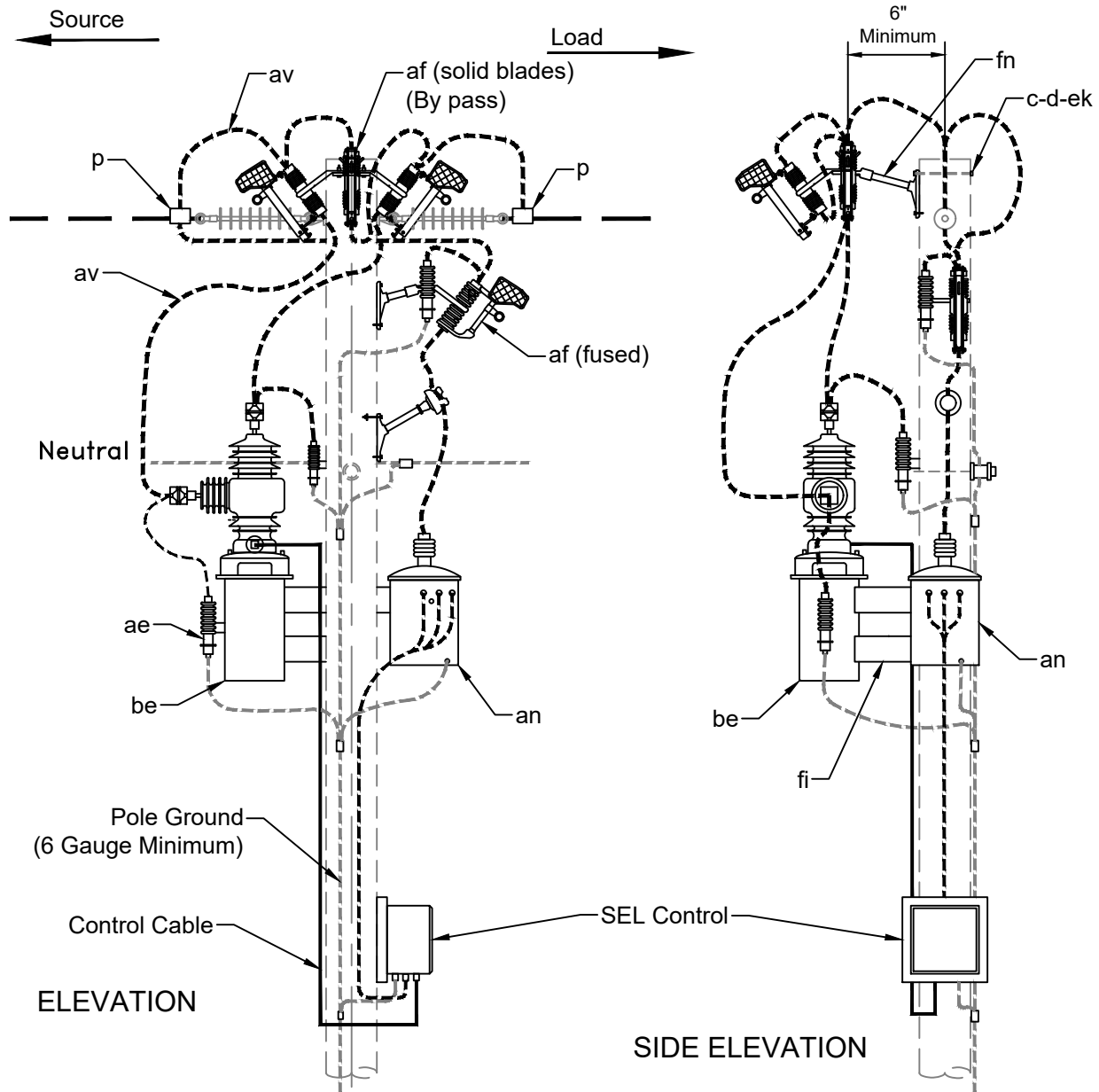
24.9 / 14.4 KV
NOVA CIRCUIT RECLOSER
WITH BYPASS CUTOUT

Revision Date

Jan. 24, 2023



VM3-23C



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
c	2	Bolt, machine, 5.8" x required length	ae	2	Surge arrester
d	2	Washer, 2 1/4 " square, 13/16" hole	an	1	Transformer, 1 KVA
d	2	Washer, 3" square, curved	be	1	Recloser, oil circuit, Viper
fj	2	Bracket, extension, RSM-1	fn	2	Bracket, extension, cloverleaf
fi	2	Connector, hot line	p	-	Connectors, as required
af	1	Cutout, fused, load break	av	-	Jumpers, stranded, as required
af	3	Cutout, load break, solid blades	ek	-	Locknuts, as required
	3	Sticks 3 1/2" U Guard			

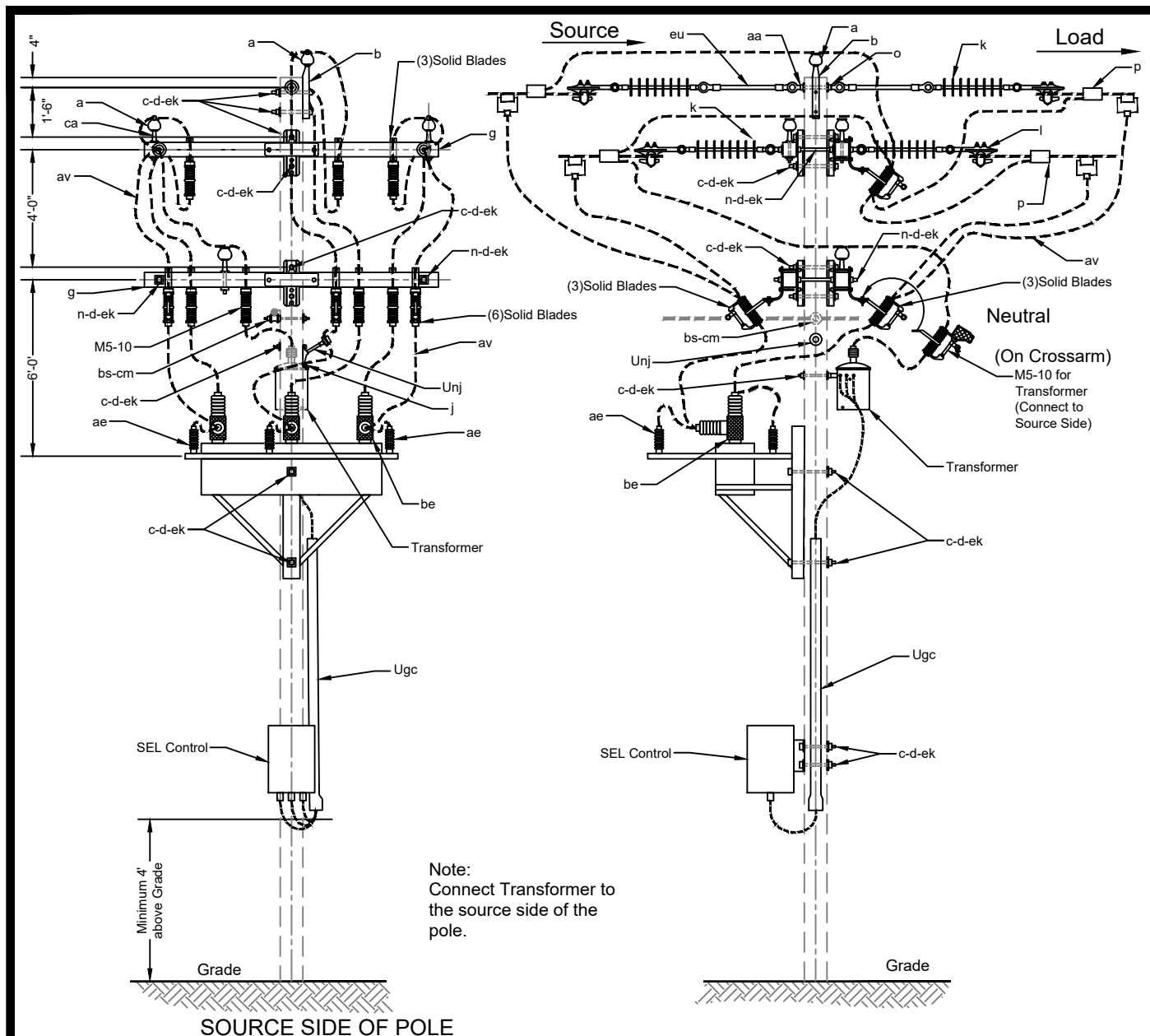
SINGLE PHASE CIRCUIT RECLOSER WITH BYPASS CUTOUT

Revision Date

Jan. 31, 2023



M3-23E
VM3-23E



ITEM	NO	MATERIAL	ITEM	NO	MATERIAL
a	6	Insulator, Pin 7.2 kv	av	-	Jumpers, stranded, as required
b	1	Pin, pole top	be	1	Recloser, electronic with control
c	11	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset
d	16	Washer, 2 1/4" square, 13/16" hole	cm	1	Spool insulator
d	9	Washer, 3" square, curved	ca	5	Pin, 5/8" x 10 3/4"
g	4	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 10'-0"	ek	--	Locknuts, as required
j	1	Lag, screw 1/2" x 4"	fi	6	Connector, hotline, tap assembly
k	6	Insulator, suspension	Ugc	20'	UG Guard, PV Mold, 3" Sch 80
l	6	Clamps, Deadend	Unj	1	Standoff Bracket (M5-27)
n	4	Bolt, double arming, 5/8" x required length		9	Cutouts - Solid Blade
o	1	Bolt, eye, 5/8" x required length		1	Transformer , (supplied with recloser)
p	-	Connector, as required		1	Combination Cutout / Arrester (M5-27)
aa	5	Nut, eye 5/8"			
ae	6	Surge Arrester			

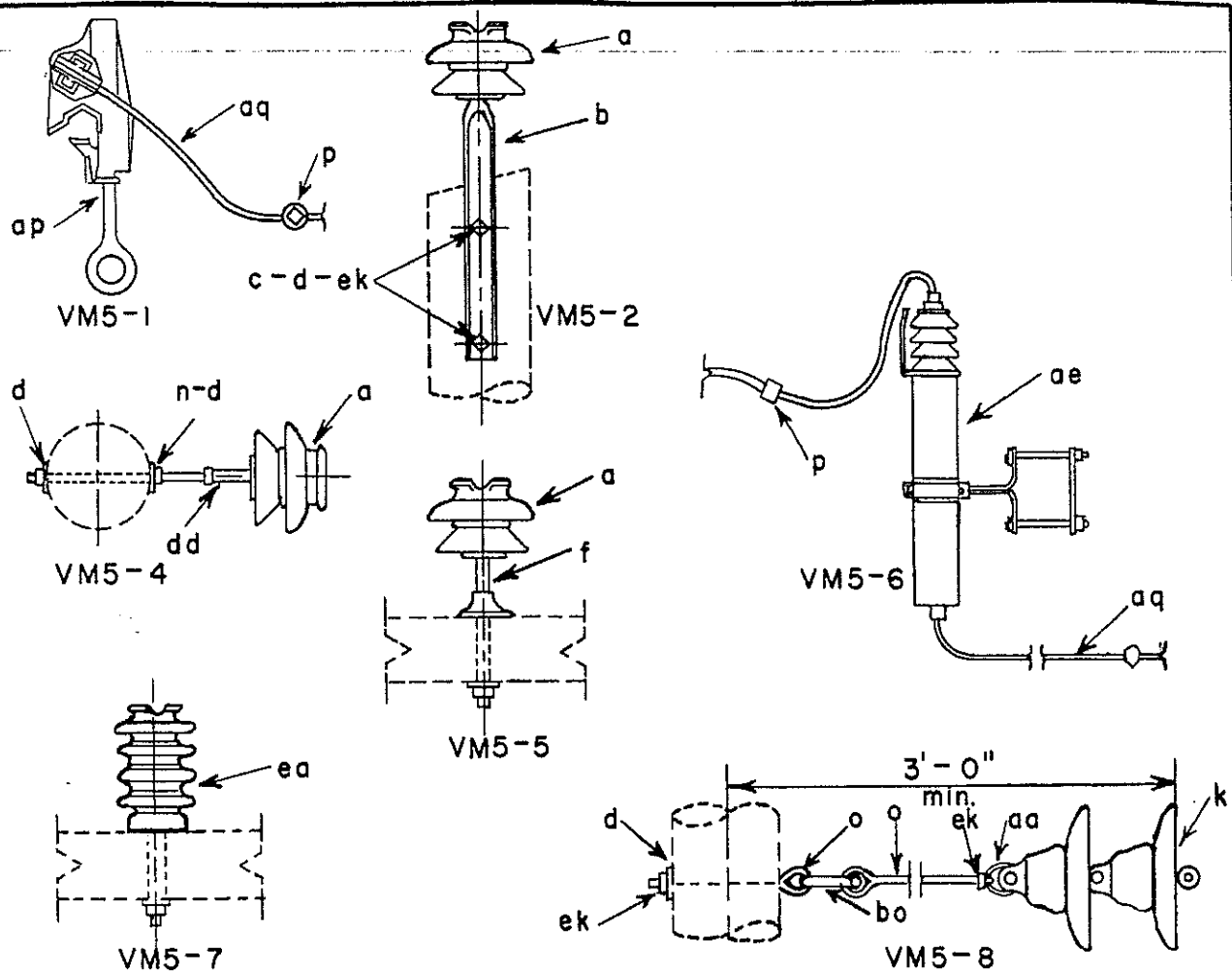
ELECTRONIC RECLOSER WITH CONTROL WITH BY-PASS SWITCH

Revision Date:

Feb. 1, 2023



M3-30
VM3-30

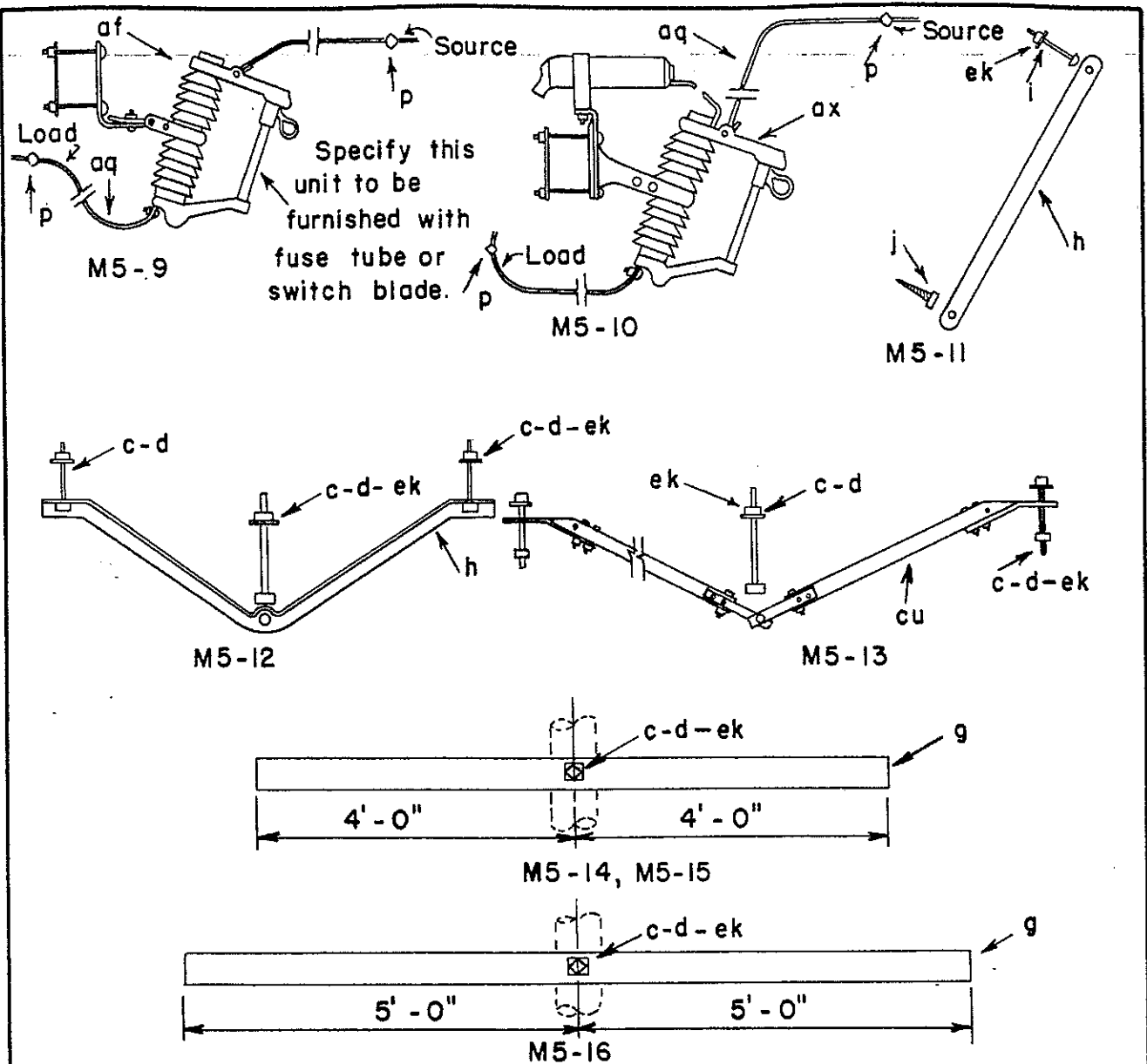


ITEM	MATERIAL	VM5-1	VM5-2	VM5-4	VM5-5	VM5-6	VM5-7	VM5-8
a	Insulator, pin type		1	1	1			
b	Pin, pole top		1-20"					
c	Bolt, machine, 5/8" x req'd length		2					
d	Washer, 2 1/4" sq.		2	2				1
f	Pin, crossarm, steel, 5/8" x 14"				1			
k	Insulator, suspension							2
n	Bolt, double arming, 5/8" x req'd length			1				
o	Bolt, eye, 5/8" x req'd length							2
p	Connector	1				2		
aa	Nut, eye, 5/8"							1
ae	Lightning arrester					1		
ap	Clamp, hot line	1						
aq	Jumper	1				2		
bo	Shackle, anchor							1
dd	Adapter, insulator			1				
ea	Insulator, post type, 7" stud						1	
ek	Locknuts		2	3				2

14.4/24.9 KV.
MISCELLANEOUS PRIMARY ASSEMBLIES

Jan. 1, 1963

VM5-1 TO 8

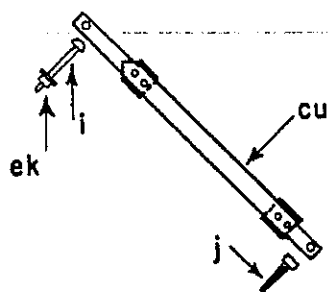


ITEM	MATERIAL	NUMBER REQUIRED							
		M5-9	M5-10	M5-11	M5-12	M5-13	M5-14	M5-15	M5-16
c	Bolt, machine, 5/8" x req'd length				1	1	1	1	
c	Bolt, machine, 1/2" x req'd length				2	2			
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole				1	1	2	2	2
d	Washer, round, 1 3/8" dia., 9/16" hole				2	2			
g	Crossarm, 3 1/2" x 4 1/2" x 8'-0"						1		
g	Crossarm, 3 3/4" x 4 3/4" x 10'-0"								1
h	Brace, flat, 1 1/4" x 1/4" x 28"			1					
h	Brace, angle, 1 1/2" x 1 1/2" x 3/16", 60" span				1				
i	Bolt, carriage, 3/8" x 4 1/2"			1					
j	Screw, lag, 1/2" x 4"			1					
p	Connector	2	2						
af	Cutout, single-shot	1							
aq	Jumper	2	2						
ax	Cutout and arrester combination		1						
cu	Brace, wood, 60" span					1			
ek	Locknuts			1	3	3	1	1	1
g	Crossarm, 3 3/4" x 4 3/4" x 8'-0"								

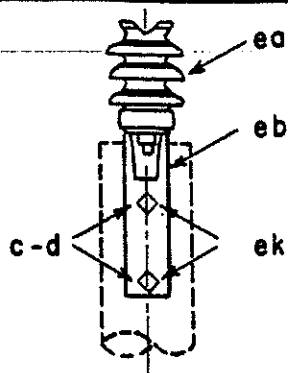
MISCELLANEOUS PRIMARY ASSEMBLIES

Jan 1, 1962

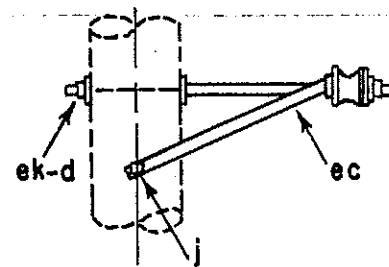
M5-9 TO 16



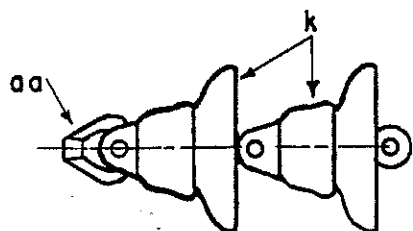
M5 - 17



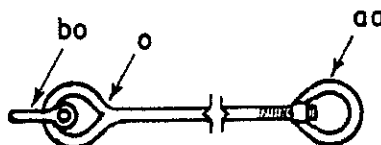
M5 - 18



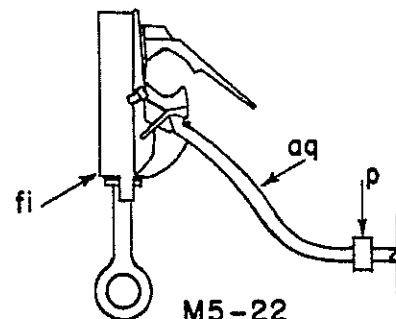
M5 - 19



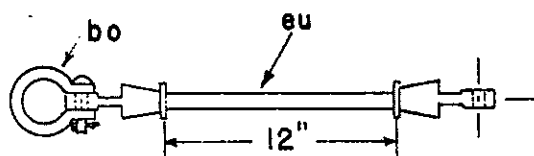
M5 - 20



M5-21



M5-22



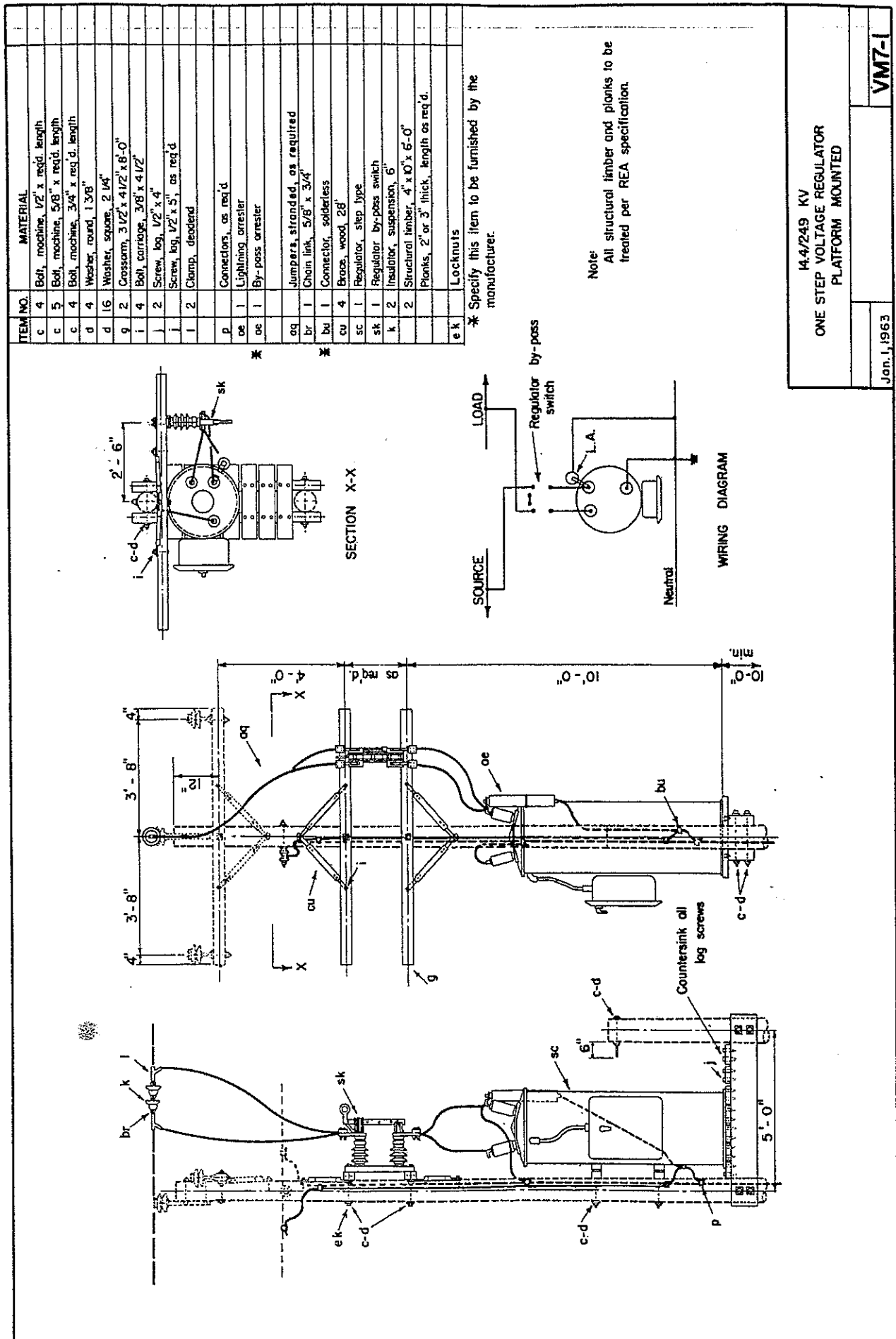
M5 - 23

ITEM	MATERIAL	M5-17	M5-18	M5-19	M5-20	M5-21	M5-22	M5-23
c	Bolt, machine, 5/8"x required length		2					
d	Washer, 2 1/4" square		2	1				
l	Bolt, carriage, 3/8"x 4 1/2"	1						
j	Screw, lag, 1/2" x 4"	1		2				
k	Insulator, suspension				2			
ea	Insulator, post type, 1 3/4" stud		1					
eb	Bracket, for post type insulator		1					
ec	Bracket, offset, neutral, insulated			1				
ek	Locknuts	1	2	1				
cu	Brace, wood, 28"	1						
aa	Eye nut				1	1		
bo	Shackle, anchor					1		1
o	Bolt, eye, 5/8" x req'd. length					1		
fi	Connector, hot line						1	
aq	Jumper						1	
p	Connector						1	
eu	Link, extension, insulated							1

MISCELLANEOUS PRIMARY ASSEMBLIES

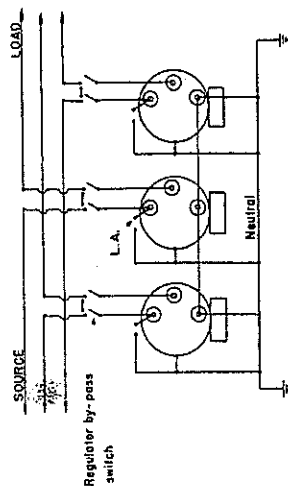
Jan. 1, 1962

M5-17 T023

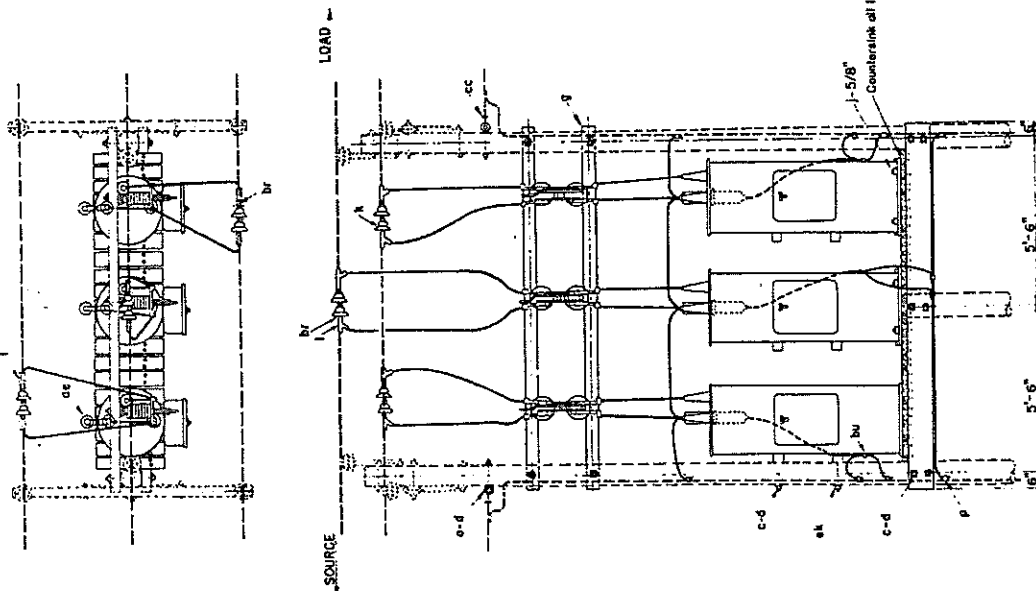
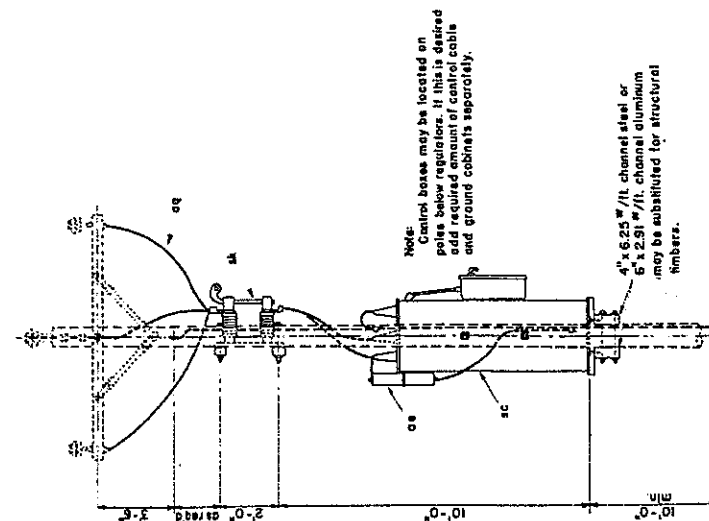


Notes:

1. All structural lumber and planks to be treated as per REA specifications.
2. When mounting lugs for direct pole mounting are not provided, all regulators must be bolted to platform.



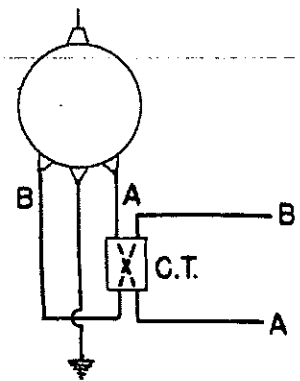
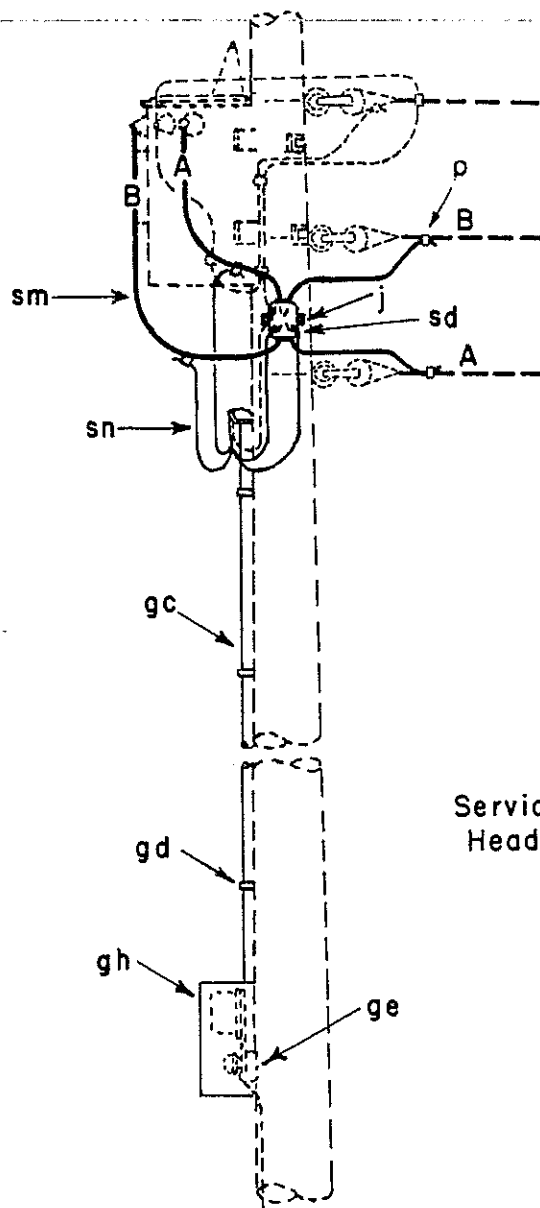
WIRING DIAGRAM



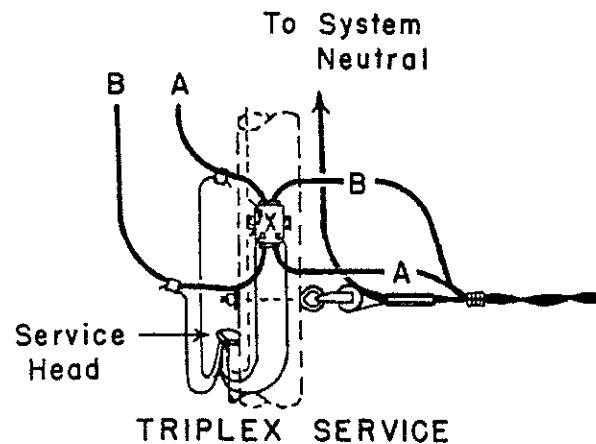
14.4/24.9KV., 3-PHASE
STEP VOLTAGE REGULATOR ASSEMBLY

1983

VM 7-3



Note: WIRING DIAGRAM
For more detailed wiring diagram,
see REA Bulletin 161-12

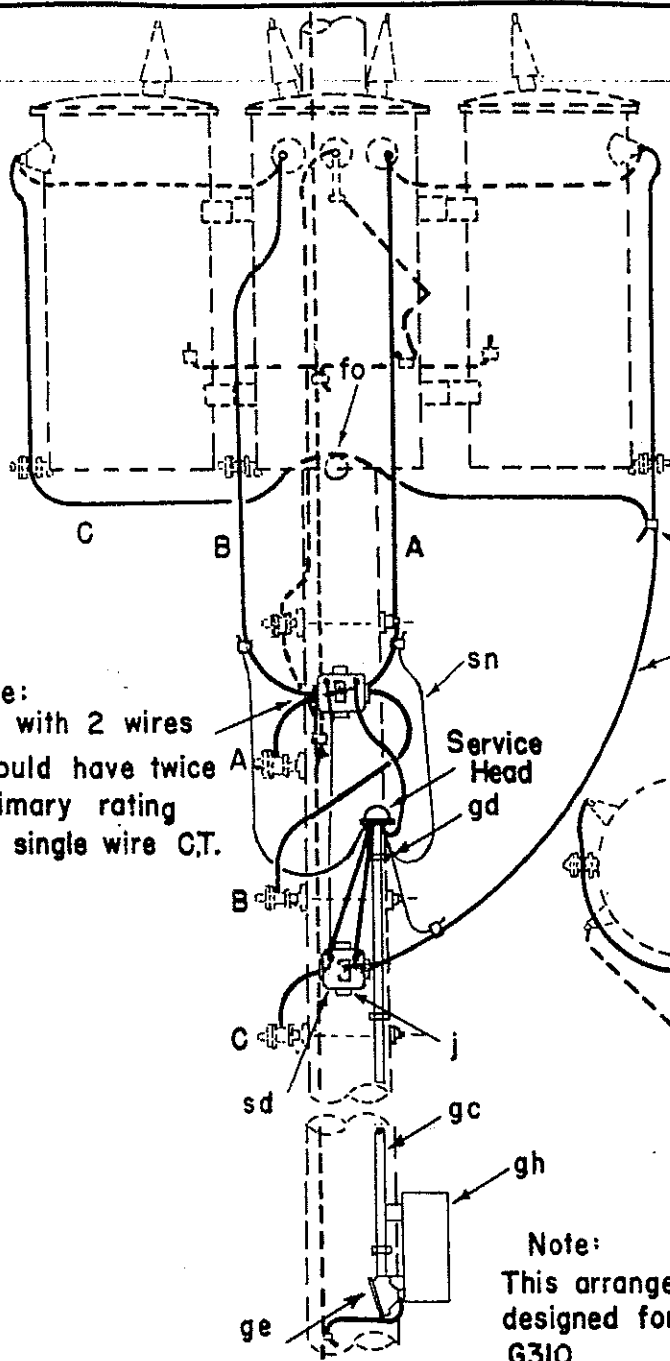


ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
j 2	Screw, lag, 1/2" x 4"	sd 1	Transformer, current
p	Connectors, as required	sm	Wire, No. 12, insul. for current
gc	Conduit, 1 1/4", as required	sn	Wire, No. 14, insul. for potential
gd	Straps, conduit, as required	l	Service head
ge	Condulet, type "LB"		
gh	Meter box, meter and test block		

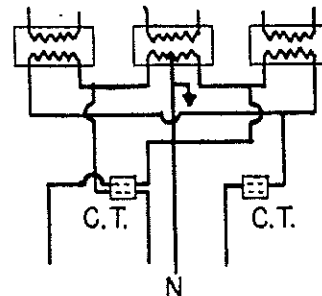
SECONDARY METERING GUIDE
SINGLE PHASE 120 / 240 VOLTS

Jan 1, 1962

M8

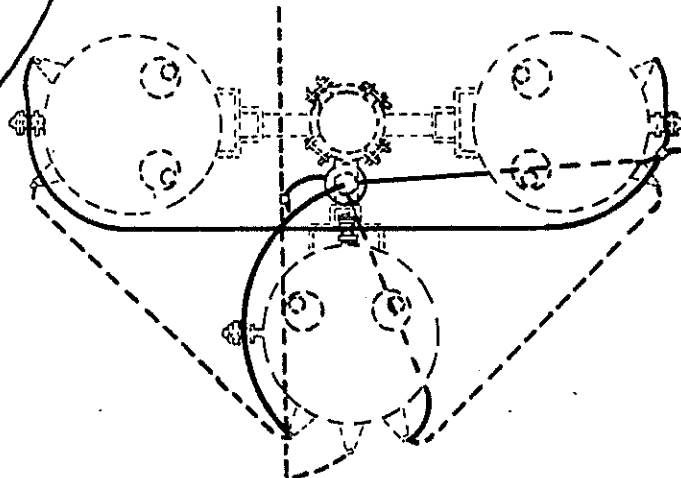


Note:
C.T. with 2 wires
should have twice
primary rating
of single wire C.T.



WIRING DIAGRAM
FOR INSTRUMENT TRANSFORMERS

Note:
For more detailed wiring
diagram, see REA
Bulletin 161-12



PLAN

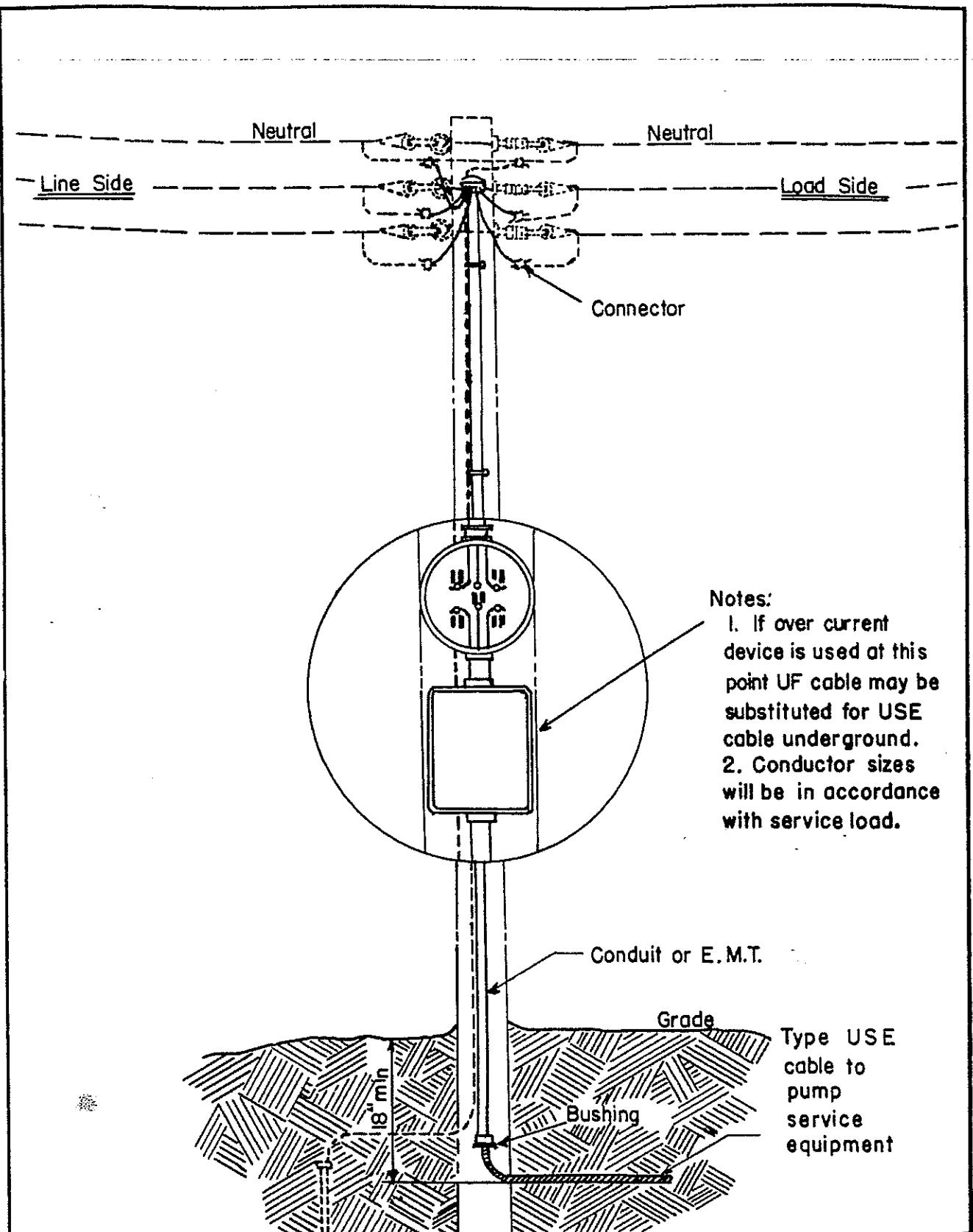
Note:
This arrangement of metering equipment is
designed for use with the transformer drawings
G310

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, lag, 1/2" x 4"	gh	1	Meter box, meter and test block
p		Connectors, as required	sd	2	Transformer, current
			l		Service Head
gc		Conduit, 1 1/4" as required	sm		Wire, No. 12, insul. for current
ge	1	Condulet, type "LB"	sn		Wire, No. 14, insul. for potential
gd		Straps, conduit, as required			
fo	1	Transformer secondary bracket			

SECONDARY METERING GUIDE
THREE PHASE 120/240 VOLTS
4 WIRE DELTA

Jan 1, 1962

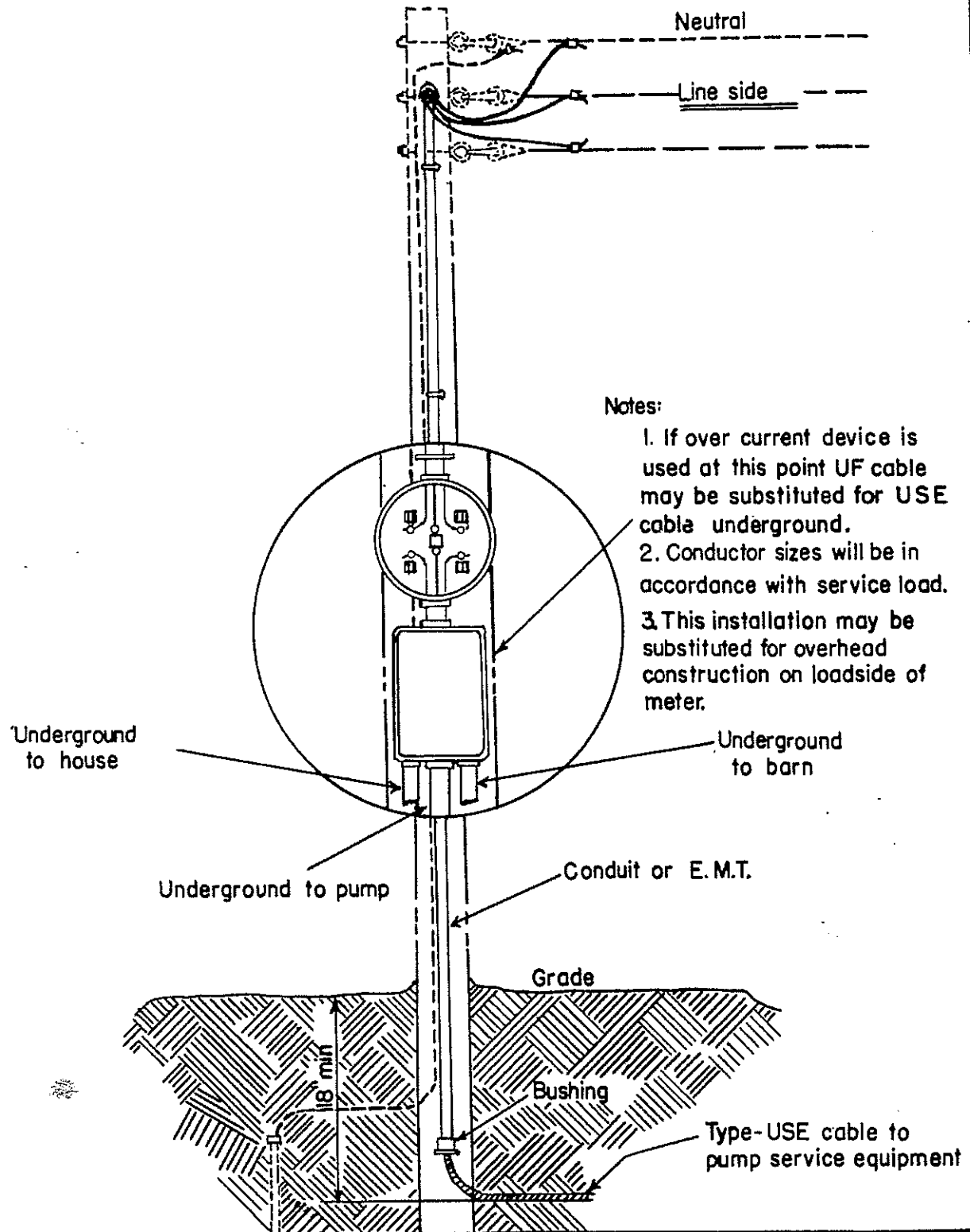
M8-6



GUIDE TO YARD POLE METER INSTALLATION
(SHOWING PUMP SERVICE CARRIED
UNDERGROUND)

Jan 1, 1962

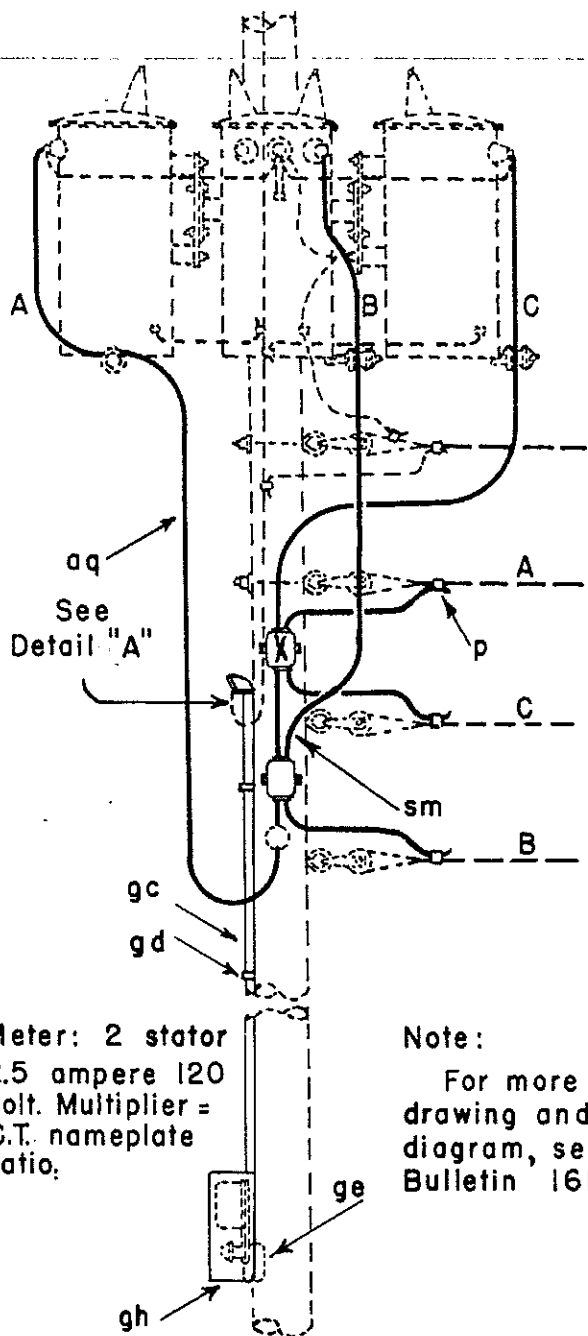
M8-9



GUIDE TO YARD POLE METER INSTALLATION
(SHOWING ALL BUILDING SERVICES CARRIED
UNDERGROUND)

Jan 1, 1962

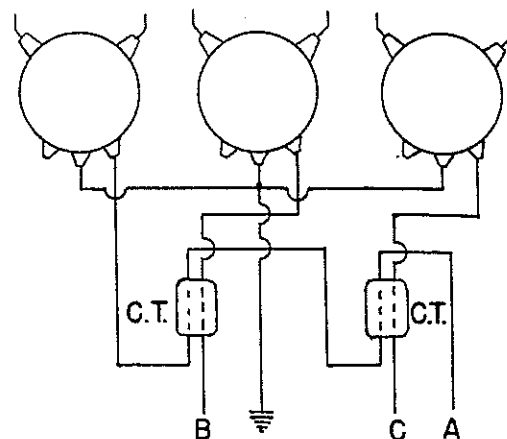
M8-10



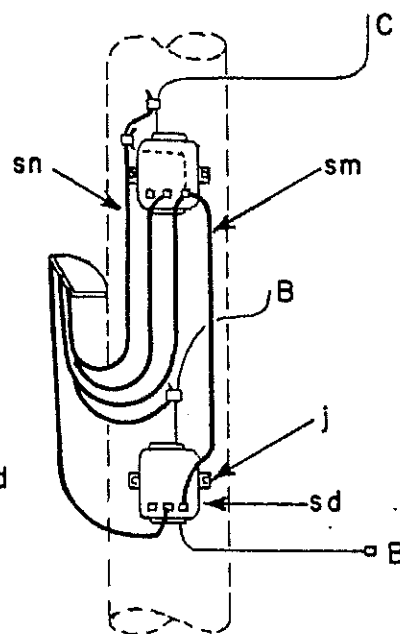
Meter: 2 stator
2.5 ampere 120
volt. Multiplier =
C.T. nameplate
ratio.

Note:

For more detailed
drawing and wiring
diagram, see REA,
Bulletin 161 - 12



WIRING DIAGRAM



DETAIL "A"

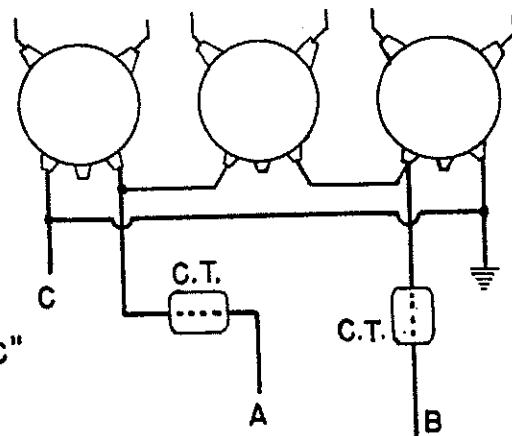
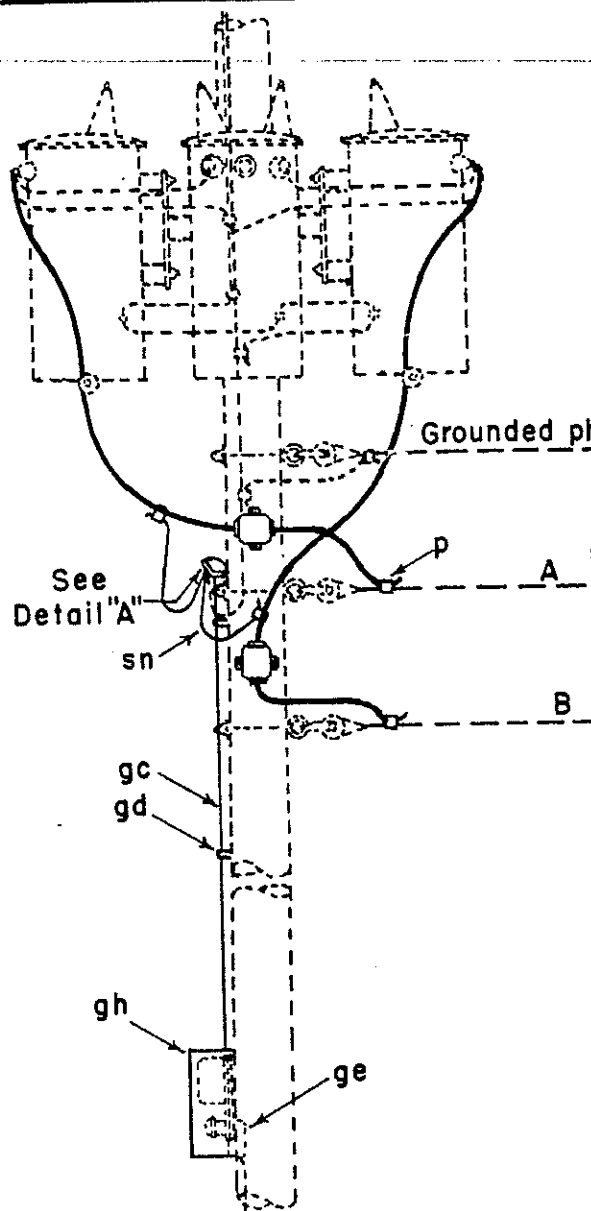
Connections from C.T.'s to Service Head

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, lag	gh	1	Meter box, meter and test block
p		Connectors, as required	sd	2	Transformer, current
aq		Jumpers, insulated	sm		Wire, No. 12, insul. for current
gc		Conduit, 1 1/4", as required	sn		Wire, No. 14, insul. for potential
gd		Straps, conduit, as required		1	Service Head
ge	1	Condulet, type "LB"			

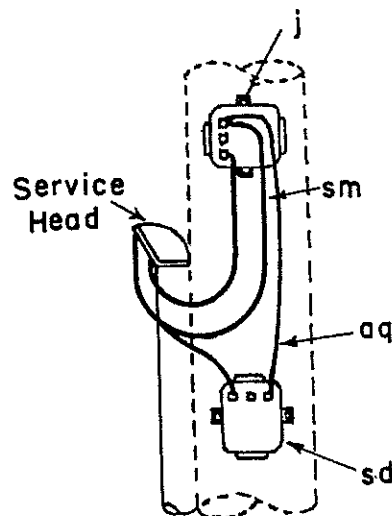
SECONDARY METERING GUIDE
THREE PHASE, 120/208 VOLTS
4 WIRE GROUNDED WYE

Jan 1, 1962

M8-11



Note:
For more detailed wiring diagram, see
REA Bulletin 161-12



DETAIL "A"
Connections from C.T.'s to Service Head

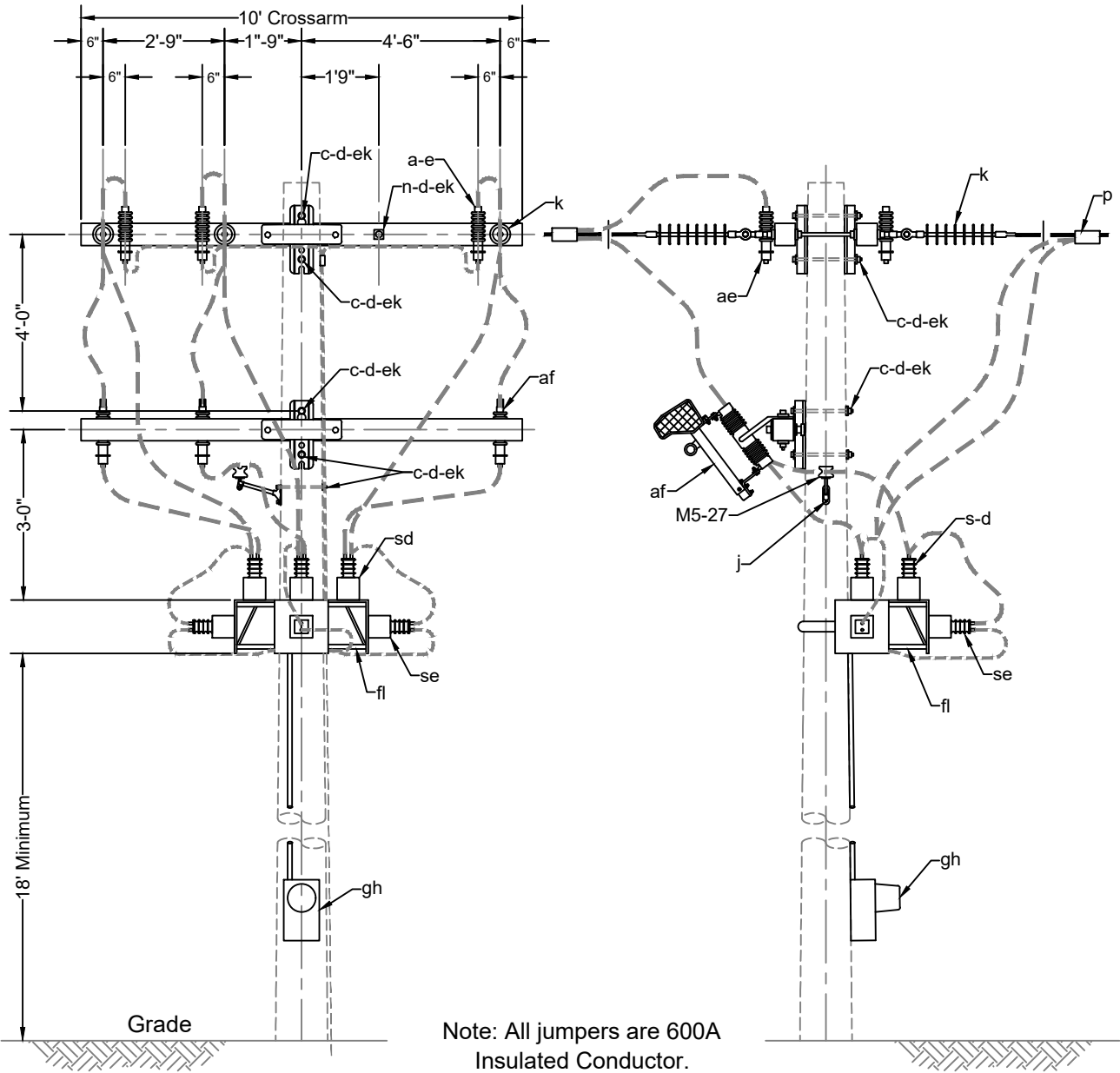
ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
j 4	Screw, lag, 1/2" x 4"	sd 2	Transformer, current
p	Connectors, as required	sm	Wire, No. 12, insul. for current
i	Service head	sn	Wire, No. 14, insul. for potential
gc	Conduit, 1 1/4", as required	aq	Jumper
gd	Straps, conduit, as required		
ge 1	Condulet, type "LB"		
gh 1	Meter box, meter and test block		

SECONDARY METERING GUIDE
THREE PHASE 240 VOLTS
3 WIRE CORNER GROUNDED DELTA

Jan 1, 1962

M8-12

VM8-15A



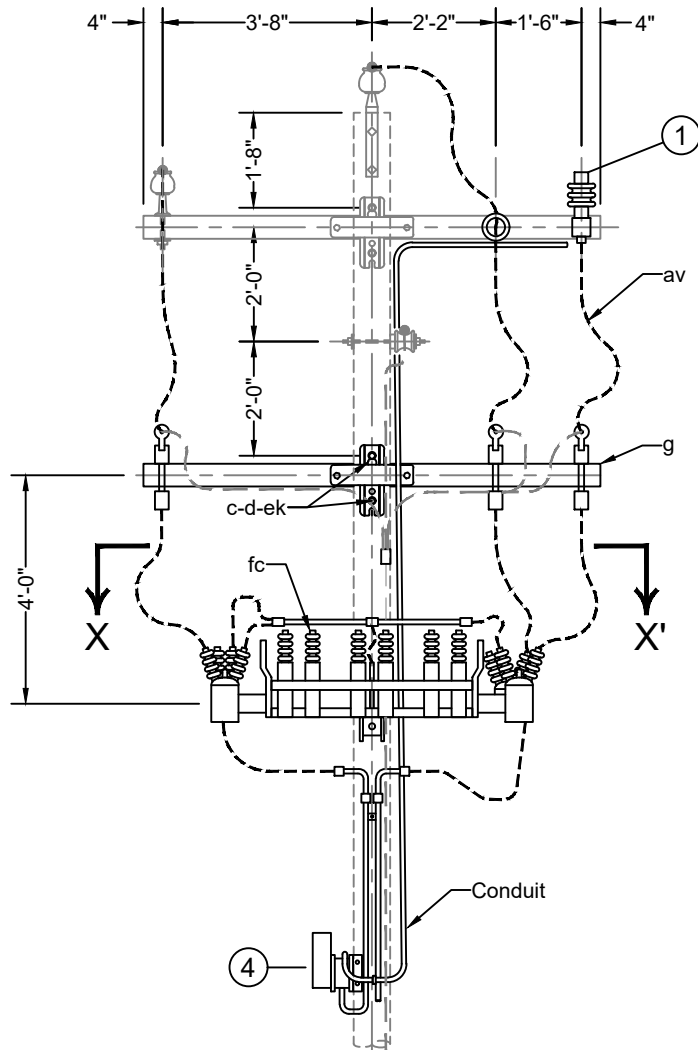
ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	5	Bolt, machine, 5/8" x required length	af	3	Cutout, load break, solid blade
d	23	Washer, 2 1/4" square, 13/16" hole	ek		Locknuts, as required
d	2	Washer, 2 1/4" square, curved	gh		Meter box, meter and test block
g	3	Fiberglass Crossarm, 3 3/4" x 4 3/4" x 10'-0"	sd	3	Transformer, current
j	1	Screw, lag, 1/2" x 4"	se	3	Transformer, potential
k	6	Insulator, suspension, epoxy	fl	1	Rack, primary metering
n	5	Bolt, double arming, 5/8" x required length			
p		Connectors, as required			
aa	6	Nut, eye, 5/8"			
ae	6	Lighting arrester			

THREE PHASE METERING GUIDE
THREE PHASE 4-WIRE WYE

Revision Date
Jan. 23, 2023



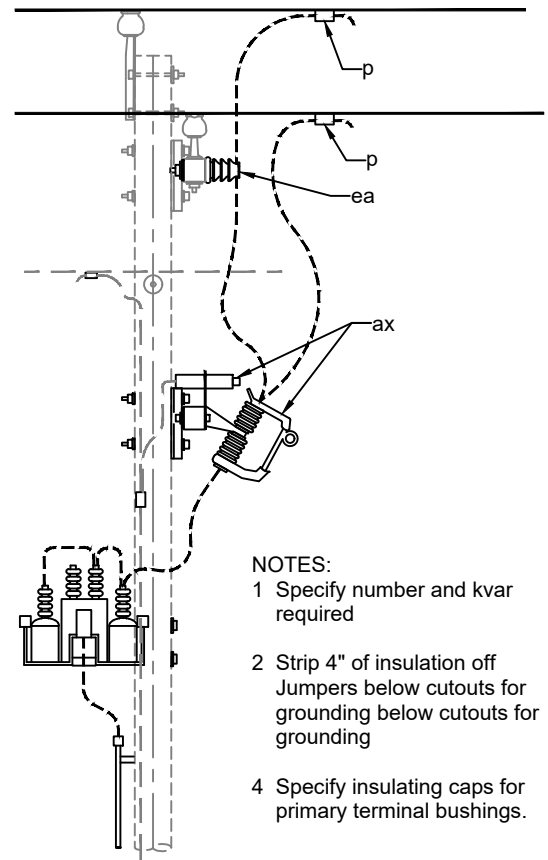
M8-15A
VM8-15A



SUGGESTED FUSING TABLE

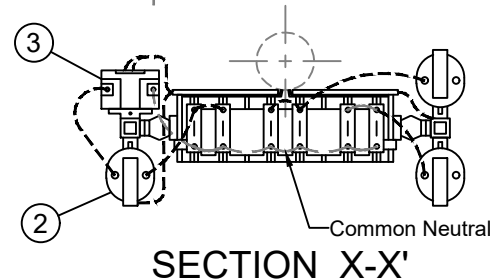
kvar Connected to each Cutout	100
Fuse Size (Amp.)	15

Note : Care must be taken to coordinate fuse with sectionalizing plan.



NOTES:

- 1 Specify number and kvar required
- 2 Strip 4" of insulation off Jumpers below cutouts for grounding below cutouts for grounding
- 4 Specify insulating caps for primary terminal bushings.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ea	1	Insulator, post type, with 7" stud
d	4	Washer, 2 1/4" square, 3/16" hole	fc		Capacitor, _____ kvar each
d	4	Washer, 3" square, curved	fd	1	Hanger, cluster type
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek		Locknuts, as required
p	3	Connector, compression type			
p		Connector, as required	1	1	Line post current sensor
av		Jumpers, stranded, as required	2	3	Oil switch
ax	3	Cutout / Arrestor Combination	3	1	Transformer
dp	2	Clamp, ground wire	4	1	Meter socket
				1	Control

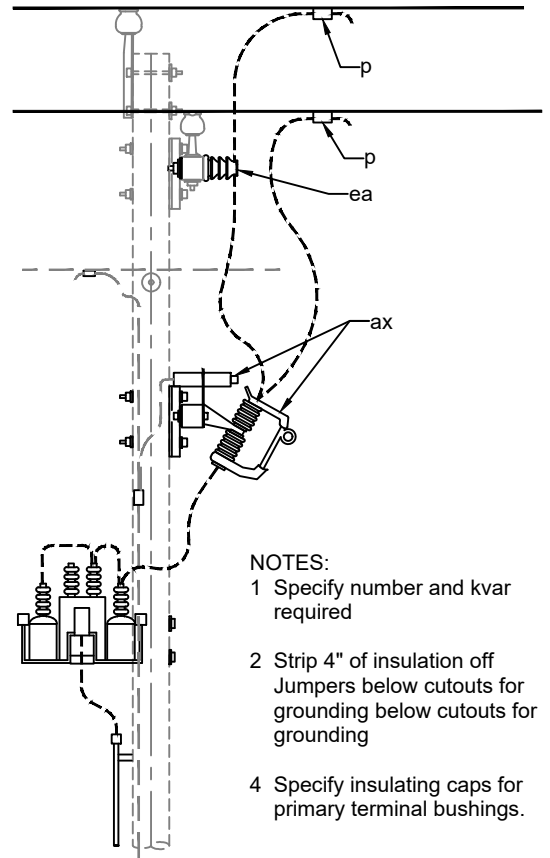
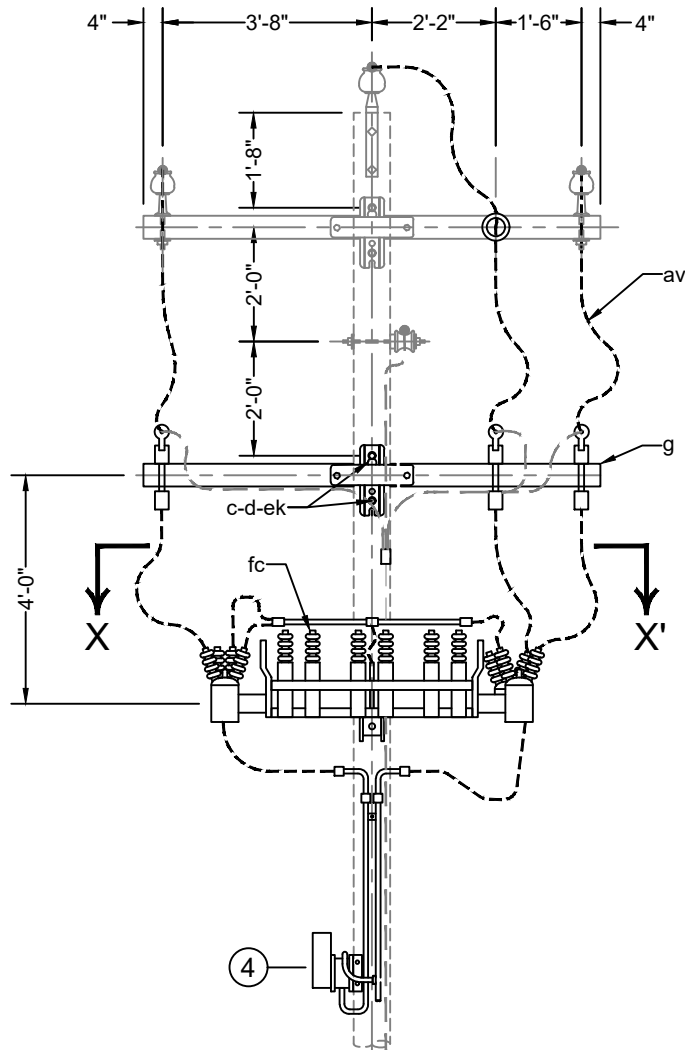
12.5 / 7.2 KV and 14.4 / 24.9 KVV THREE PHASE CAPACITOR ASSEMBLY

Revision Date:

Jasn. 25, 2023

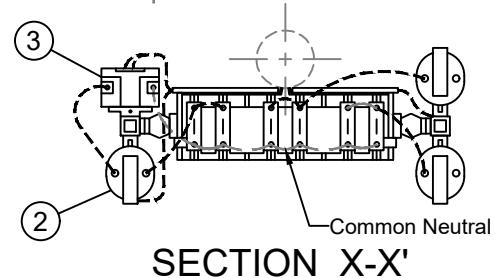


M9-13CS
VM9-13CS



NOTES:

- 1 Specify number and kvar required
- 2 Strip 4" of insulation off Jumpers below cutouts for grounding below cutouts for grounding
- 4 Specify insulating caps for primary terminal bushings.



SUGGESTED FUSING TABLE

kvar Connected to each Cutout	100
Fuse Size (Amp.)	15

Note : Care must be taken to coordinate fuse with sectionalizing plan.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ea	1	Insulator, post type, with 7" stud
d	4	Washer, 2 1/4" square, 3/16" hole	fc		Capacitor, _____ kvar each
d	4	Washer, 3" square, curved	fd	1	Hanger, cluster type
g	1	Fiberglass Crossarm, 3 5/8" x 4 5/8" x 8'-0"	ek		Locknuts, as required
p	3	Connector, compression type			
p		Connector, as required			
av		Jumpers, stranded, as required	2	3	Oil switch
ax	3	Cutout / Arrestor Combination	3	1	Transformer
dp	2	Clamp, ground wire	4	1	Meter socket
				1	Control

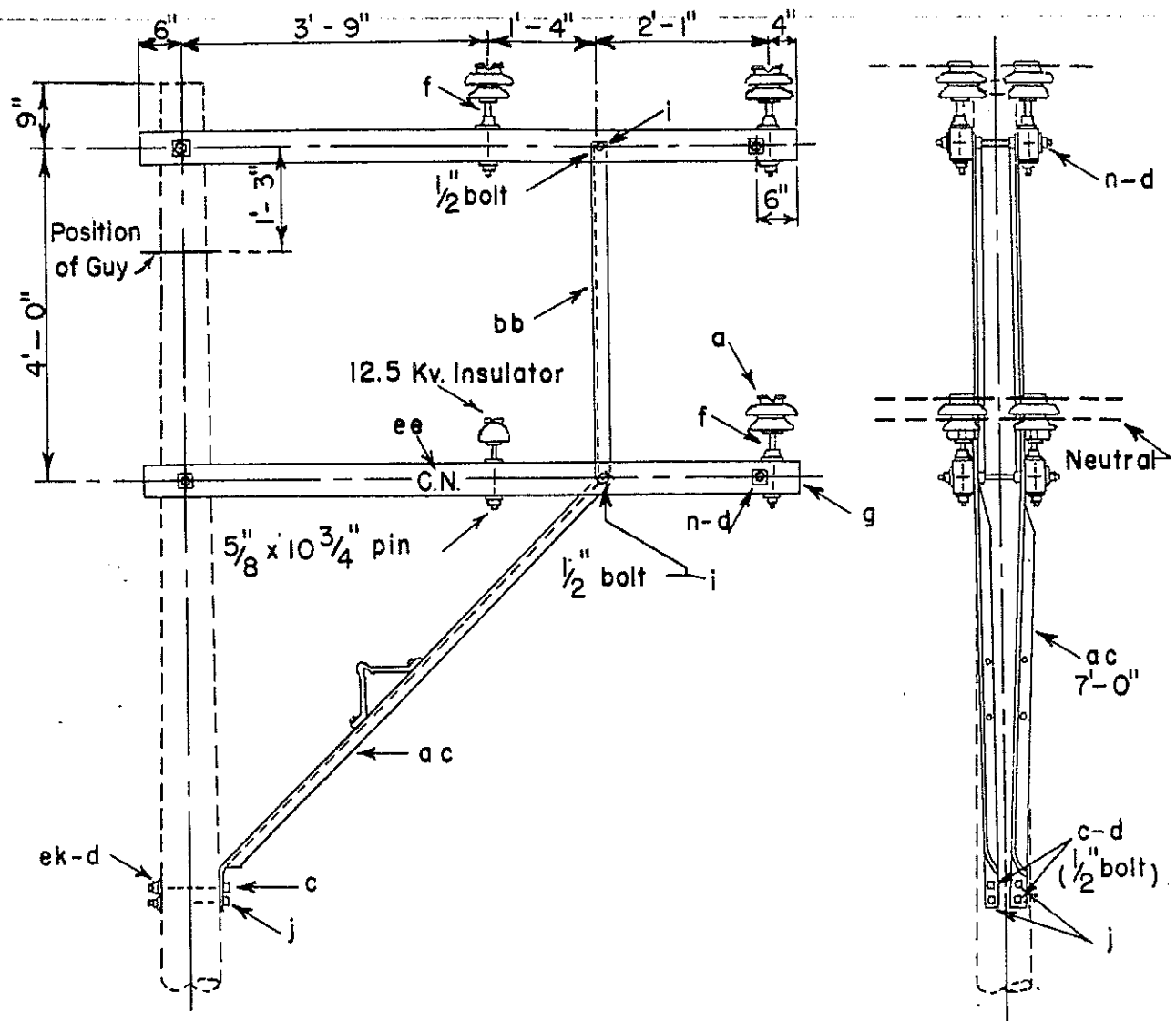
**12.5 / 7.2 KV and 14.4 / 24.9 KVV
THREE PHASE CAPACITOR ASSEMBLY**

Revision Date:

Jan. 25, 2023



**M9-13TS
VM9-13TS**



Notes:

1. Where these assemblies are required, span shall be shortened, as at crossings.
2. Position of conductors on single phase and V phase to be as directed.

UNIT	ASSEMBLY	NUMBER OF EACH ITEM REQUIRED											
	DESCRIPTION	ek	a	c	d	f	g	i	j	n	ac	bb	ee
VM33-1	Single arm single phase	5	2	3	5	2	2	2	1	0	1	1	2
VM33-2	Double arm single phase	18	4	2	14	4	4	4	2	4	2	2	2
VM33-3	Single arm two phase	5	3	3	5	3	2	2	1	0	1	1	2
VM33-4	Double arm two phase	18	6	2	14	6	4	4	2	4	2	2	2
VM33-5	Single arm three phase	5	4	3	5	4	2	2	1	0	1	1	2
VM33-6	Double arm three phase	18	8	2	14	8	4	4	2	4	2	2	2
		14.4/24.9 KV. PRIMARY											
		TWO SIDE ARMS (DOUBLE) FOR PRIMARY											
		VM33-1 TO VM33-6											
		Jan. 1, 1963											