SPECIFICATIONS AND DRAWINGS FOR 14.4/24.9 kV LINE CONSTRUCTION

West Florida Electric Cooperative Edition

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TABLE V

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = 2,000 Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	60	59	59
2 ACSR (6/1)	50	50	49	48	48	47
2 ACSR (7/1)	39	38	38	37	37	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	28
3/0 ACSR (6/1)	25	24	24	23	23	22
4/0 ACSR (6/1)	24	24	23	23	22	22
246.9 AAAC (7)	24	23	23	22	22	21
336.4 ACSR (18/1)	23	22	22	21	20	20
336.4 ACSR (26/7)	16	16	15	15	14	14
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	59	58	57
2 ACSR (6/1)	50	49	48	48	47	46
2 ACSR (7/1)	39	38	37	37	36	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	29
3/0 ACSR (6/1)	25	24	24	24	23	23
4/0 ACSR (6/1)	25	24	24	23	23	22
246.9 AAAC (7)	24	24	23	23	22	22
336.4 ACSR (18/1)	24	23	23	22	22	21
336.4 ACSR (26/7)	16	16	16	15	15	15
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	60	58	57	55	54	52
2 ACSR (6/1)	49	47	46	45	44	43
2 ACSR (7/1)	38	37	36	35	34	33
1/0 ACSR (6/1)	31	30	29	28	28	27
123.3 AAAC (7)	30	30	29	28	27	26
2/0 ACSR (6/1)	30	30	29	28	27	26
3/0 ACSR (6/1)	24	24	23	22	22	21
4/0 ACSR (6/1)	24	23	23	22	21	21
246.9 AAAC (7)	23	23	22	21	21	20
336.4 ACSR (18/1)	23	22	21	21	20	19
336.4 ACSR (26/7)	16	16	15	14	14	13

GENERAL CONSTRUCTION SPECIFICATIONS

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

The provision of 7 CFR section 1724.50 "Compliance with National Electrical Safety Code (NESC)" applies to all borrower electric system facilities regardless of the source of financing.

A borrower must ensure that its electric system, including all electric distribution, transmission, and generating facilities, is designed, constructed, operated, and maintained in accordance with all applicable provisions of the most current and accepted criteria of the National Electrical Safety Code (NESC) and all applicable and current electrical and safety requirements of any State or local governmental entity. This requirement applies to the borrower's electric system regardless of the source of financing. Copies of the NESC may be obtained from the Institute of Electrical and Electronic Engineers, Inc. at the following address:

IEEE Customer Service
445 Hoes Lane, PO Box 1331
Piscataway, NJ 088555-1331

Any electrical standard requirements established by RUS are in addition to, and not in substitution for or a modification of, the most current and accepted criteria of the NESC and any applicable electrical or safety requirements of any State or local governmental entity.

Overhead distribution circuits shall be constructed with not less than the Grade C strength requirements as described in section 26, Strength Requirements, of the NESC when subjected to the loads specified in NESC Section 25, Loadings for Grades B and C. Overhead transmission circuits shall be constructed with not less than the Grade B strength requirements as described in NESC Section 26.

The drawings of equipment and materials used in the construction assemblies are meant to depict the general categories of items found in RUS Informational Publication 202-1, "List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers," ("List of Materials"). Any drawing of any piece of equipment or material that resembles a specific product of a manufacturer is unintentional.

Materials to be used for construction are designated by one or more small alphabetic characters shown on the drawings and in the "ITEM" column in the material blocks. The borrower may use any material contained in the "List of Materials" from the category of material as designated by the corresponding small letter(s). For example, "b" designates a steel, pole top pin. The borrower may use, at its discretion, any of the applicable pole top pins from category "b" of the "List of Materials."

Similarly, the drawings of the bulletin show the use of three, 4 1/4 inch, ANSI Class 52-9A suspension insulators for 24.9/14.4 kV primary deadends. The borrower may use three, 6 inch, ANSI Class 52-1 or two, 9 inch, ANSI Class 52-4 suspension insulators, or one polymer distribution insulator, all of which are contained in category "k" in the "List of Materials." In the latter cases, the quantity ("QTY") of the insulators to be used must be modified accordingly.

The Federal Aviation Administration (FAA) requires (14 CFR part 77) that in cases where structures or conductors will exceed a height of 200 feet, or are within 20,000 feet of an airport, the nearest regional or area office of the FAA be contacted and FAA Form 7460-1 be filled if necessary.

CONDUCTOR INSTALLATION SPECIFICATIONS

Conductors must be handled with care. Conductors shall neither be trampled on nor run over by vehicles. Each reel shall be examined and the wire 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 the pole or crossarm if necessary to prevent binding while stringing.

Conductors shall be sagged in accordance with the conductor manufacturer's recommendations. All conductors shall be sagged evenly. The air temperature at the time and place of sagging shall be determined by a certified thermometer.

The sag of all conductors after stringing shall be in accordance with the engineer's instructions.

Conductors shall be spliced and dead-ended as shown on the construction drawings. There shall be not more than one splice per conductor in any span and splices shall be located at least 10 feet from the conductor support. No splices shall be located in Grade B crossing spans and preferably not in adjacent spans. Splices shall be installed in accordance with the manufacturer's specifications and recommendations.

All conductors shall be cleaned thoroughly by wirebrushing before splicing or installing connectors or clamps. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

Connectors and hot-line clamps suitable for the purpose shall be installed as shown on the drawings and also in accordance with the manufacturer's specifications and recommendations. On all hot-line clamp installations, the clamp and jumper shall be 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.

The use of stirrups to connect tap conductors (jumper wires) to primary conductors may be used if the following criteria are met:

- The stirrup and hot line clamp shall be sized to meet or exceed the current carrying capacity of the tap conductor or equipment jumper;
- All stirrup conductors shall be made of copper or bronze;
- All stirrup conductors shall be made of #2 copper equivalent or larger;

- All-purpose or aluminum hot line clamps shall not be used with stirrups;
- All stirrups, connectors, and clamps shall be installed in accordance with the manufacturer's specifications;
- Stirrups with two compression connectors are not to be used in areas of vibrating conductors;
- Stirrups are not to be used to connect main lines or heavily loaded tap lines.

Stirrups are not recommended to be used to connect reclosers, autotransformers, or line regulators. Stirrups and hot line clamps should not be used for sectionalizing tap and especially main lines for operational or maintenance purposes. Permanent compression or bolted type connectors should be used because of their better current carrying capabilities and reliability. Line switches, fused cutouts, or solid blade cutouts should be used at line locations where occasional line sectionalizing may be required.

At locations where permanent connections using compression or bolted type connectors are not desired, and where the installation or sectionalizing equipment is also not desired, then the standards specify the installation of hot line clamps (over armor rod on aluminum conductors).

CONSTRUCTION SPECIFICATIONS FOR POLE TOP ASSEMBLIES

Line designs which use high poles to clear obstacles such as railroads, must avoid upstrain on pin-type or post-type insulators on adjacent shorter poles.

The neutral conductor should be installed on the same side (preferably the road side) of all of the tangent and small angle poles throughout the length of the line.

Prior RUS approval is given if it is under the circumstances necessary to lower the neutral attachment on standard construction pole top assemblies an additional distance not exceeding 2 feet for the purpose of economically meeting conductor clearance requirements of the NESC.

Prior RUS approval is given if it is under the circumstances necessary to lower the neutral attachment on standard construction pole top assemblies an additional distance of up to 6 feet for the purpose of performing construction and future line maintenance on these assemblies from bucket trucks designed for such work.

With pin-type or post-type insulators, the conductor must be tied to the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type and post-type insulators must be tight on the pins and bracket, respectively, and the top groove must be in line with the conductor after tying.

Factory-formed ties must be installed in accordance with the manufacturer's specifications and recommendations.

A 3 inch by 3 inch (minimum), square, curved washer, item "d", shall be used abutting the pole when installing primary or neutral conductor deadend assemblies directly to the pole to mitigate the crushing of wood fibers and to facilitate the allowable longitudinal loading as given in the design parameters on the construction drawings.

A locknut must be installed with each nut and eyenut, on all machine, upset and double arming bolts, and all other threaded hardware such as insulator pins and studs.

The calculated "maximum line angle" values in the tables are based on the "designated maximum" transverse loading on insulator pins as specified by RUS, and the application of the appropriate overload factors from the 1997 edition of the NESC.

"Allowable longitudinal (or transverse) loading" values in the design parameters were derived from known or designated maximum strengths of materials to which the appropriate NESC safety factors have already been applied.

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SINGLE -PHASE PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VA1.0	SINGLE SUPPORT – MISCELLANEOUS (2 pages)
VA1.1	SINGLE SUPPORT – (TANGENT)
VA1.11	SINGLE SUPPORT ON CROSSARM
VA1.12G	SINGLE PHASE JUNCTION GUIDE
VA1.3	SINGLE SUPPORT
VA1.33N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VA1.33NT	SINGLE SUPORT ON POST INSULATOR – NARROW PROFILE - OFFSET
VA1.6N	SINGLE SUPPORT – NARROW PROFILE (TANGENT)
VA2.0	DOUBLE SUPPORT -MISCELLANEOUS
VA2.1	DOUBLE SUPPORT
VA2.21	DOUBLE SUPPORT ON CROSSARMS
VA2.91	DOUBLE SUPPORT ON CROSSARMS (ALLEY ARM)
VA3.1	SUSPENSION ANGLE
VA3.2, VA3.3	SUSPENSION ANGLE
VA4.1	DEADEND ANGLE (90 DEGREES-150 DEGREES)
VA4.2	DEADEND ANGLE (20 DEGREES – 90 DEGREES)
VA5.0	DEADEND - MISCELLANEOUS
VA5.1	SINGLE DEADEND
VA5.2, VA5.3, VA5.4	SINGLE DEADENDS
VA5.21, VA5.31	SINGLE DEADEND (ON CROSSARMS)

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VA5.5G	SINGLE PHASE TAP GUIDE
VA6.1	DOUBLE DEADEND (STRAIGHT)
VA6.2	DOUBLE DEADEND (FEED THROUGH)
VA6.21	DOUBLE DEADEND ON CROSSARMS
VA6.22G	DOUBLE DEADEND GUIDE (FEED THROUGH ON CROSS ARMS)

TABLE I

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = 500 Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	13	13	12	12	11	11
2 ACSR (6/1)	11	10	10	9	8	8
2 ACSR (7/1)	8	8	7	7	6	6
1/0 ACSR (6/1)	7	6	6	5	5	4
123.3 AAAC (7)	7	6	6	5	5	4
2/0 ACSR (6/1)	6	6	5	5	4	4
3/0 ACSR (6/1)	5	5	4	4	3	3
4/0 ACSR (6/1)	5	4	4	3	3	2
246.9 AAAC (7)	5	4	4	3	3	2
336.4 ACSR (18/1)	4	4	3	2	2	1
336.4 ACSR (26/7)	3	2	2	2	1	1
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	13	12	11	11	10	9
2 ACSR (6/1)	11	10	9	8	8	7
2 ACSR (7/1)	8	8	7	7	6	6
1/0 ACSR (6/1)	7	6	6	5	5	4
123.3 AAAC (7)	7	6	6	5	5	4
2/0 ACSR (6/1)	7	6	6	5	5	4
3/0 ACSR (6/1)	5	5	4	4	3	3
4/0 ACSR (6/1)	5	5	4	4	3	3
246.9 AAAC (7)	5	5	4	4	3	3
336.4 ACSR (18/1)	5	4	4	3	3	2
336.4 ACSR (26/7)	3	3	3	2	2	2
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	11	10	9	8	6	5
2 ACSR (6/1)	9	8	7	6	5	4
2 ACSR (7/1)	7	6	6	5	4	3
1/0 ACSR (6/1)	6	5	4	4	3	2
123.3 AAAC (7)	6	5	4	4	3	2
2/0 ACSR (6/1)	6	5	4	3	3	2
3/0 ACSR (6/1)	5	4	3	3	2	1
4/0 ACSR (6/1)	4	4	3	2	2	1
246.9 AAAC (7)	4	4	3	2	2	1
336.4 ACSR (18/1)	4	3	3	2	1	1
336.4 ACSR (26/7)	3	2	2	1	1	0

TABLE II

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = **750** Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	21	21	20	19	19	18
2 ACSR (6/1)	17	17	16	15	15	14
2 ACSR (7/1)	13	13	12	12	11	11
1/0 ACSR (6/1)	11	10	10	9	9	8
123.3 AAAC (7)	11	10	10	9	9	8
2/0 ACSR (6/1)	11	10	9	9	8	8
3/0 ACSR (6/1)	8	8	7	7	6	6
4/0 ACSR (6/1)	8	8	7	6	6	5
246.9 AAAC (7)	8	7	7	6	6	5
336.4 ACSR (18/1)	7	7	6	5	5	4
336.4 ACSR (26/7)	5	5	4	4	3	3
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	21	20	19	18	18	17
2 ACSR (6/1)	17	16	16	15	14	13
2 ACSR (7/1)	13	13	12	12	11	10
1/0 ACSR (6/1)	11	10	10	9	9	8
123.3 AAAC (7)	11	10	10	9	9	8
2/0 ACSR (6/1)	11	10	10	9	9	8
3/0 ACSR (6/1)	8	8	8	7	7	6
4/0 ACSR (6/1)	8	8	7	7	6	6
246.9 AAAC (7)	8	8	7	7	6	6
336.4 ACSR (18/1)	8	7	7	6	6	5
336.4 ACSR (26/7)	5	5	5	4	4	4
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	19	18	17	15	14	13
2 ACSR (6/1)	16	15	13	12	11	10
2 ACSR (7/1)	12	11	10	10	9	8
1/0 ACSR (6/1)	10	9	8	8	7	6
123.3 AAAC (7)	10	9	8	8	7	6
2/0 ACSR (6/1)	10	9	8	7	7	6
3/0 ACSR (6/1)	8	7	7	6	5	5
4/0 ACSR (6/1)	8	7	6	6	5	4
246.9 AAAC (7)	7	7	6	6	5	4
336.4 ACSR (18/1)	7	7	6	5	4	4
336.4 ACSR (26/7)	5	5	4	4	3	3

TABLE III

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = 1,000 Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	29	28	28	27	27	26
2 ACSR (6/1)	24	23	22	22	21	21
2 ACSR (7/1)	18	18	17	17	16	16
1/0 ACSR (6/1)	15	14	14	13	13	13
123.3 AAAC (7)	15	14	14	13	13	12
2/0 ACSR (6/1)	15	14	14	13	12	12
3/0 ACSR (6/1)	12	11	11	10	10	9
4/0 ACSR (6/1)	11	11	10	10	9	9
246.9 AAAC (7)	11	10	10	9	9	8
336.4 ACSR (18/1)	11	10	9	9	8	7
336.4 ACSR (26/7)	7	7	6	6	5	5
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	28	28	27	26	25	24
2 ACSR (6/1)	23	23	22	21	21	20
2 ACSR (7/1)	18	18	17	17	16	15
1/0 ACSR (6/1)	15	14	14	13	13	12
123.3 AAAC (7)	15	14	14	13	13	12
2/0 ACSR (6/1)	15	14	14	13	13	12
3/0 ACSR (6/1)	12	11	11	10	10	10
4/0 ACSR (6/1)	12	11	11	10	10	9
246.9 AAAC (7)	11	11	10	10	9	9
336.4 ACSR (18/1)	11	10	10	9	9	8
336.4 ACSR (26/7)	8	7	7	7	6	6
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	27	26	24	23	22	20
2 ACSR (6/1)	22	21	20	19	18	16
2 ACSR (7/1)	17	16	15	15	14	13
1/0 ACSR (6/1)	14	13	13	12	11	10
123.3 AAAC (7)	14	13	12	12	11	10
2/0 ACSR (6/1)	14	13	12	12	11	10
3/0 ACSR (6/1)	11	10	10	9	8	8
4/0 ACSR (6/1)	11	10	10	9	8	8
246.9 AAAC (7)	11	10	9	9	8	7
336.4 ACSR (18/1)	10	10	9	8	8	7
336.4 ACSR (26/7)	7	7	6	6	5	5

TABLE IV

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = **1,500** Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	45	44	44	43	42	42
2 ACSR (6/1)	37	36	35	35	34	33
2 ACSR (7/1)	28	28	27	27	26	26
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	16	16
4/0 ACSR (6/1)	18	17	17	16	16	15
246.9 AAAC (7)	17	17	16	16	15	15
336.4 ACSR (18/1)	17	16	15	15	14	14
336.4 ACSR (26/7)	12	11	11	10	10	9
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	44	44	43	42	41	40
2 ACSR (6/1)	36	36	35	34	33	33
2 ACSR (7/1)	28	28	27	27	26	25
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	17	16
4/0 ACSR (6/1)	18	18	17	17	16	16
246.9 AAAC (7)	18	17	17	16	16	15
336.4 ACSR (18/1)	17	17	16	16	15	15
336.4 ACSR (26/7)	12	12	11	11	11	10
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	43	41	40	39	37	36
2 ACSR (6/1)	35	34	33	32	30	29
2 ACSR (7/1)	27	26	25	25	24	23
1/0 ACSR (6/1)	22	22	21	20	19	19
123.3 AAAC (7)	22	21	21	20	19	18
2/0 ACSR (6/1)	22	21	21	20	19	18
3/0 ACSR (6/1)	18	17	16	16	15	14
4/0 ACSR (6/1)	17	17	16	15	15	14
246.9 AAAC (7)	17	16	16	15	14	14
336.4 ACSR (18/1)	17	16	15	14	14	13
336.4 ACSR (26/7)	12	11	11	10	10	9

TABLE V

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

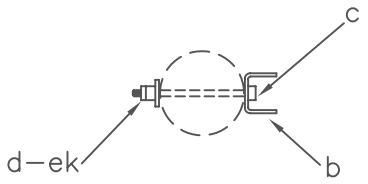
Designated Maximum Transverse Load = 2,000 Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	60	59	59
2 ACSR (6/1)	50	50	49	48	48	47
2 ACSR (7/1)	39	38	38	37	37	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	28
3/0 ACSR (6/1)	25	24	24	23	23	22
4/0 ACSR (6/1)	24	24	23	23	22	22
246.9 AAAC (7)	24	23	23	22	22	21
336.4 ACSR (18/1)	23	22	22	21	20	20
336.4 ACSR (26/7)	16	16	15	15	14	14
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	59	58	57
2 ACSR (6/1)	50	49	48	48	47	46
2 ACSR (7/1)	39	38	37	37	36	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	29
3/0 ACSR (6/1)	25	24	24	24	23	23
4/0 ACSR (6/1)	25	24	24	23	23	22
246.9 AAAC (7)	24	24	23	23	22	22
336.4 ACSR (18/1)	24	23	23	22	22	21
336.4 ACSR (26/7)	16	16	16	15	15	15
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	60	58	57	55	54	52
2 ACSR (6/1)	49	47	46	45	44	43
2 ACSR (7/1)	38	37	36	35	34	33
1/0 ACSR (6/1)	31	30	29	28	28	27
123.3 AAAC (7)	30	30	29	28	27	26
2/0 ACSR (6/1)	30	30	29	28	27	26
3/0 ACSR (6/1)	24	24	23	22	22	21
4/0 ACSR (6/1)	24	23	23	22	21	21
246.9 AAAC (7)	23	23	22	21	21	20
336.4 ACSR (18/1)	23	22	21	21	20	19
336.4 ACSR (26/7)	16	16	15	14	14	13

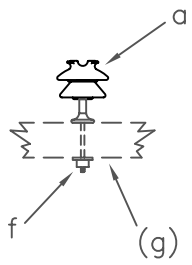
INDEX B

TWO-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

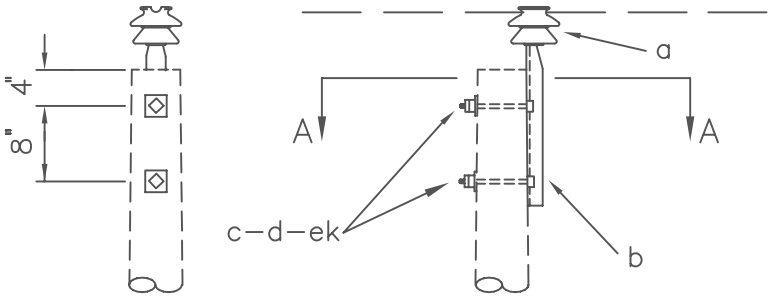
DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VB1.11	SINGLE SUPPORT ON CROSSARM (TANGENT)
VB1.13	SINGLE SUPPORT ON CROSSARM
VB1.14	SINGLE SUPPORT, NEUTRAL ON CROSSARM
VB1.33N	SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB1.34N	DOUBLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB1.35N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VB1.39N	DOUBLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB2.21	DOUBLE SUPPORT ON CROSSARMS
VB2.22	DOUBLE SUPPORT, NEUTRAL ON CROSSARMS
VB3.1	SUSPENSION ANGLE
VB4.1	DEADEND ANGLE (90 DEGREES – 150 DEGREES)
VB5.1	SINGLE DEADEND
VB5.21, VB5.31	SINGLE DEADEND ON CROSSARMS
VB6.21	DOUBLE DEADEND ON CROSSARMS
VB6.61	DOUBLE DEADEND – VERTICAL (SMALL CONDUCTORS)
VB5.72	SINGLE DEAD END ON CROSSARM – NARROW PROFILE



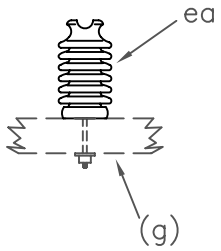
SECTION A–A



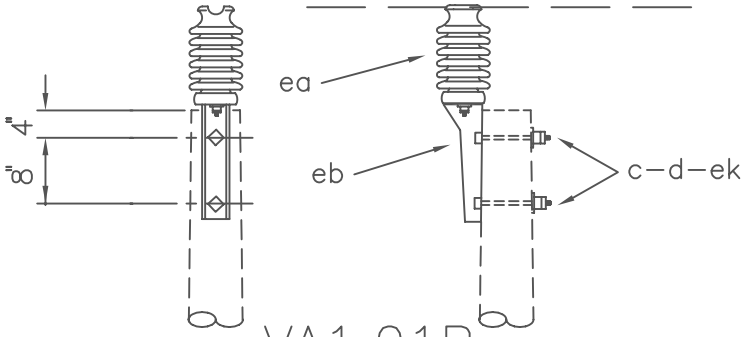
VA1.011
(VM5–5)



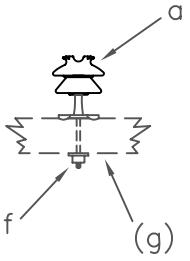
VA1.01
(VM5–2)



VA1.011P
(VM5–7)



VA1.01P
(M5–18)



VA1.011L

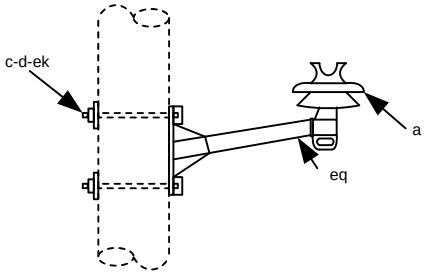
ASSEMBLY: VA1.		01	01P	011	011P	011L
ITEM	MATERIAL	QTY	QTY	QTY	QTY	QTY
a	Insulator, pin type (24.9/14.4 kV)	1		1		1
b	Pin, pole top, 20"	1				
c	Bolt, machine, 5/8" x req'd length	2	2			
d	Washer, square, 2 1/4"	2	2			
f	Pin, crossarm steel, 5/8" x 14"			1		
f	Pin, crossarm steel, clamp type					1
ea	Insulator, post type (24.9/14.4 kV)		1		1	
eb	Bracket, pole type		1			
ek	Locknuts	2	2			

DESIGN PARAMETERS:

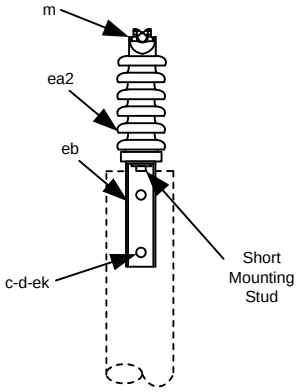
VA1.01: See TABLE I
VA1.01P: See TABLE II
VA1.011: See TABLE II
VA1.011P: See TABLE II
VA1.011L: See TABLE III

SINGLE SUPPORT–MISCELLANEOUS

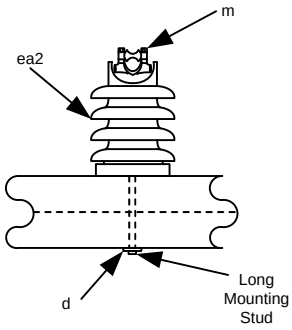
DEC1998	1–PHASE PRIMARY	VA1.0 (Page 1 of 2)
RUS	24.9/14.4 kV	(VM5–2,VM5–5, VM5–7,M5–18)



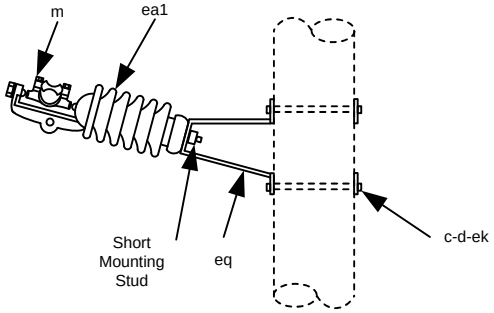
VA1.02



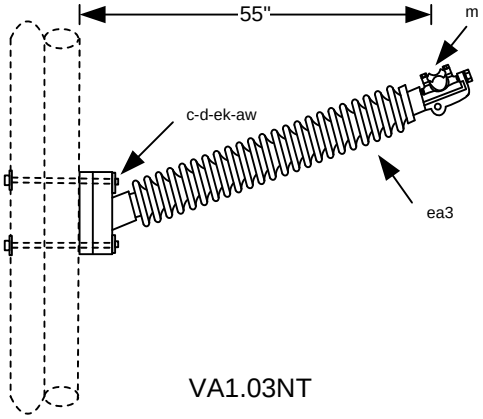
VA1.02P



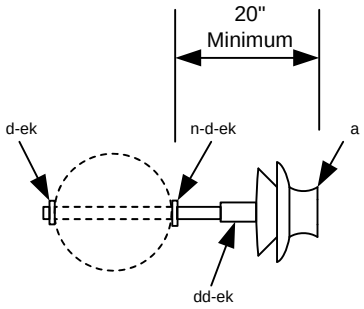
VA1.012P



VA1.03N



VA1.03NT



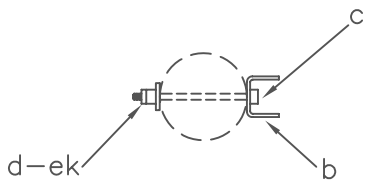
VA1.04

(VM5-4)

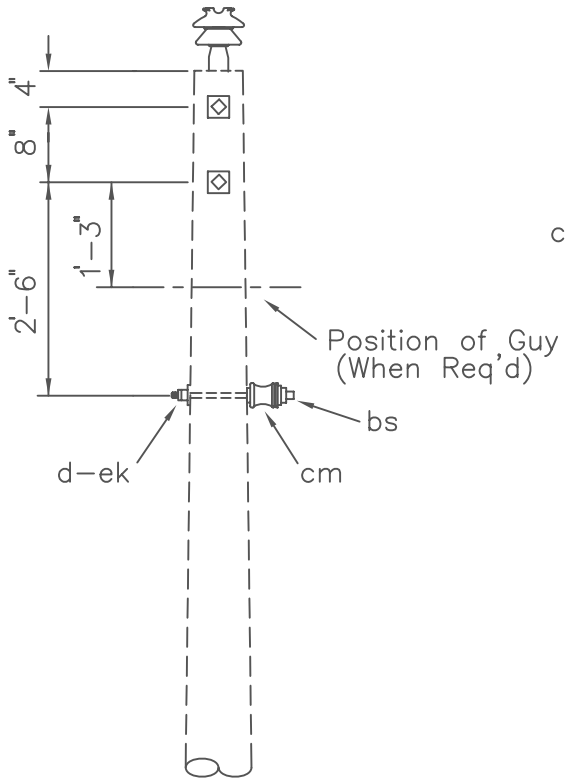
VA1.	.02	.02P	.012P	.03N	.03NT	.04
ITEM	MATERIAL	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.
a	Insulator, Pin Type	1					1
c	Bolt, machine, 5/8" x Required length	2	2		2	2	
d	Washer, Square 2 ¼"	2	2	1	2	2	2
m	Clamp, Trunnion, tangent		1	1	1	1	
n	Bolt, double arming, 5/8" x required length						1
dd	Adapter, Insulator						1
ea1	Insulator, Horizontal Clamp Type				1		
ea2	Insulator, Vertical Clamp Type			1			
ea3	Insulator, Horizontal Clamp Type, 5 foot		1			1	
eb	Bracket, pole type		1				
ek	Locknuts	2	2		2	2	3
eq	Bracket, side mount for Horizontal Post Insulator				1		
eq	Bracket, Standoff, fiberglass, 1 ½" dia.	1					
	Short Mounting Stud, ¾" x 1 ¾"		1		1		
	Long Mounting Stud, ¾" x 7"			1			
aw	Washer, Flat Spring				1	2	

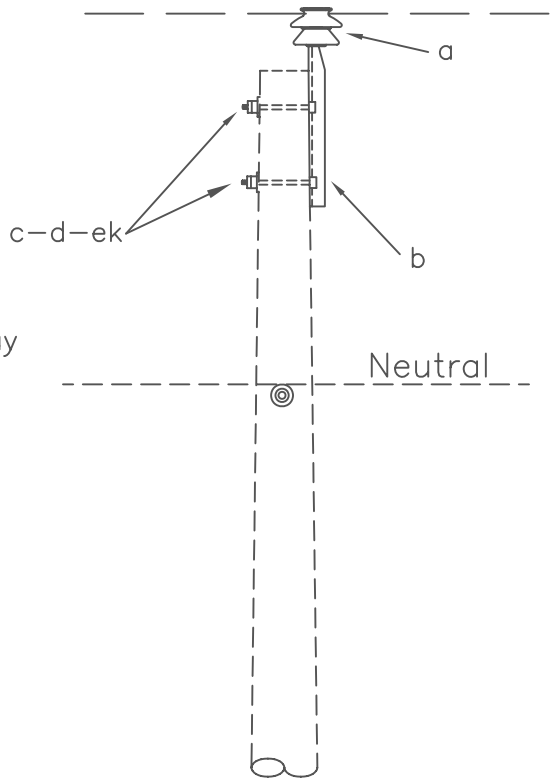
SINGLE SUPPORT – MISCELLANEOUS

2009	WFECA	1 – Phase Primary 24.9/14.4 kV	VA1.0 (Page 2 of 2)



PLAN





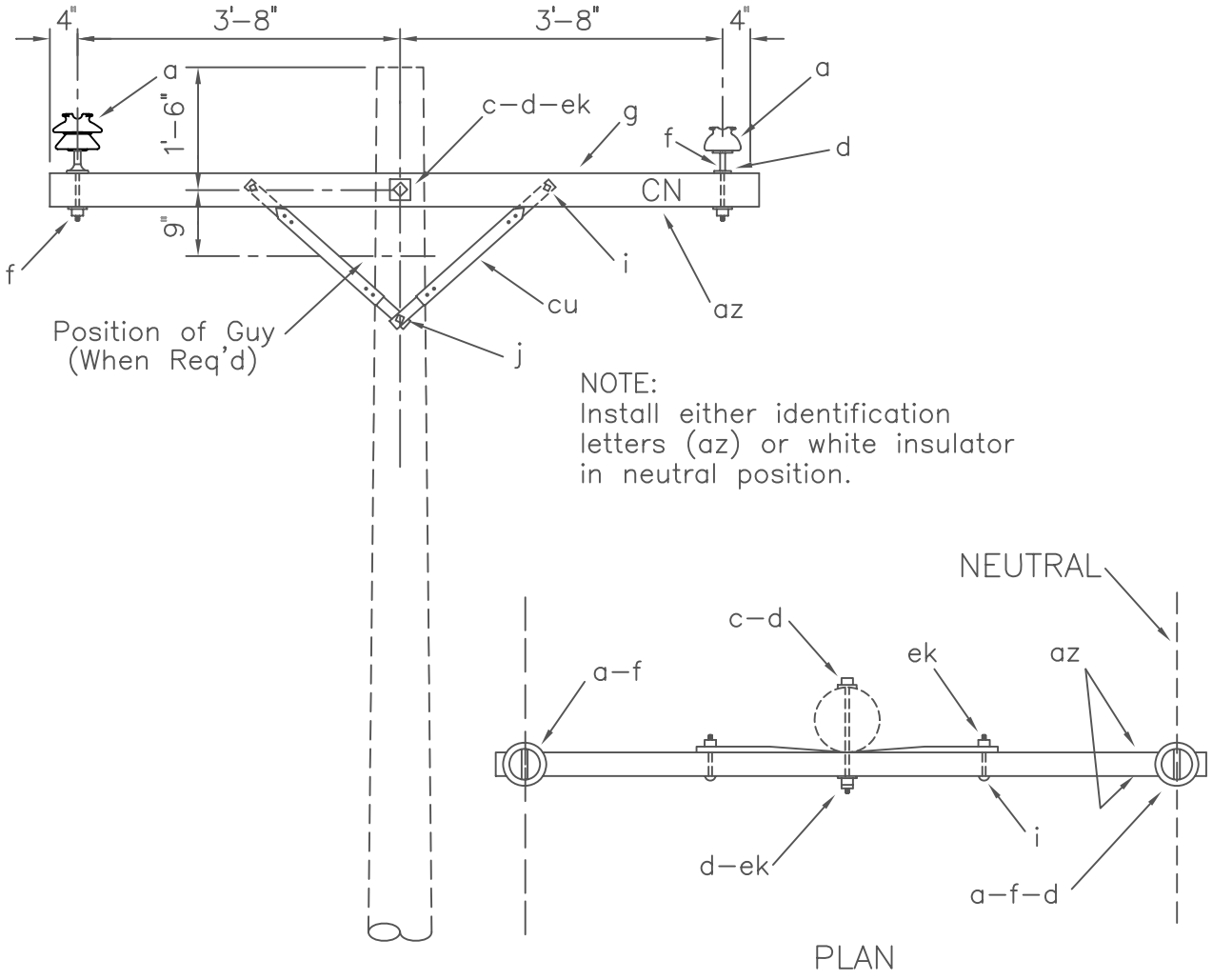
ITEM	MATERIAL	QTY
a	Insulator, pin type (24.9/14.4 kV)	1
b	Pin, pole top, 20"	1
c	Bolt, machine, 5/8" x req'd length	2
d	Washer, square 2 1/4"	3
bs	Bolt, single, upset	1
cm	Insulator, spool, 3"	1
ek	Locknuts	3

DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:
5° – Small Conductors
2° – Larger than #1/0

SINGLE SUPPORT (TANGENT)

DEC 1998	1 – PHASE PRIMARY	VA1.1
RUS	24.9/14.4 kV	(VA1)



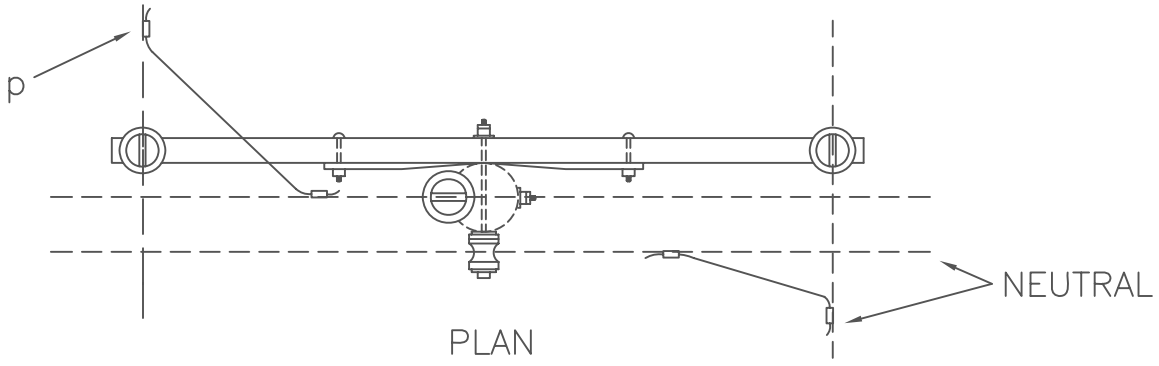
ITEM	QTY	MATERIAL
a	1	Insulator, pin type, 15 kV, white
a	1	Insulator, pin type (24.9/14.4 kV)
c	1	Bolt, machine, 5/8" x req'd length
d	3	Washer, square, 2 1/4"
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"
f	1	Pin, crossarm, steel, 5/8" x 14"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8' – 0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j	1	Screw, lag, 1/2" x 4"
az	4	Letters, 2" C, 2" N, with 1" nails
cu	2	Brace, 28"
ek	3	Locknuts

DESIGN PARAMETERS:

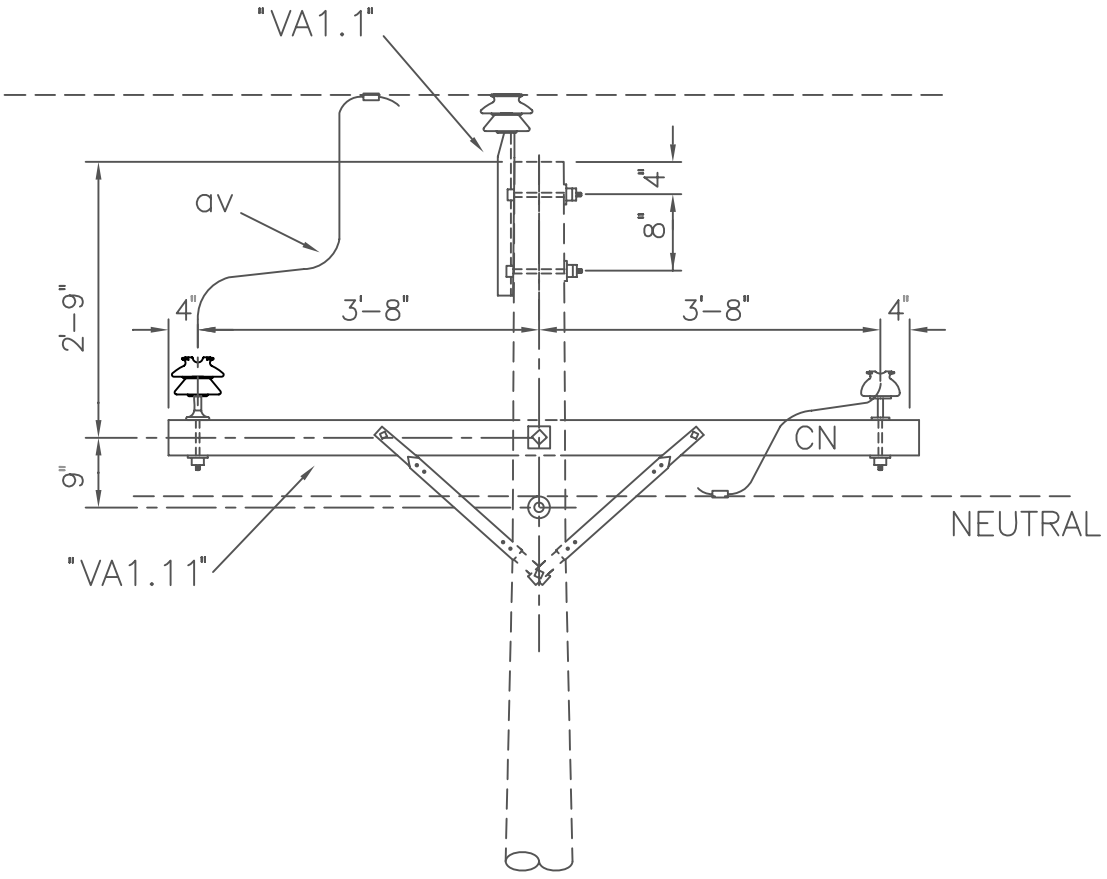
See TABLE II

SINGLE SUPPORT ON CROSSARM

DEC 1998	1 – PHASE PRIMARY	VA1.11
RUS	24.9/14.4 kV	(VA9–1)



PLAN



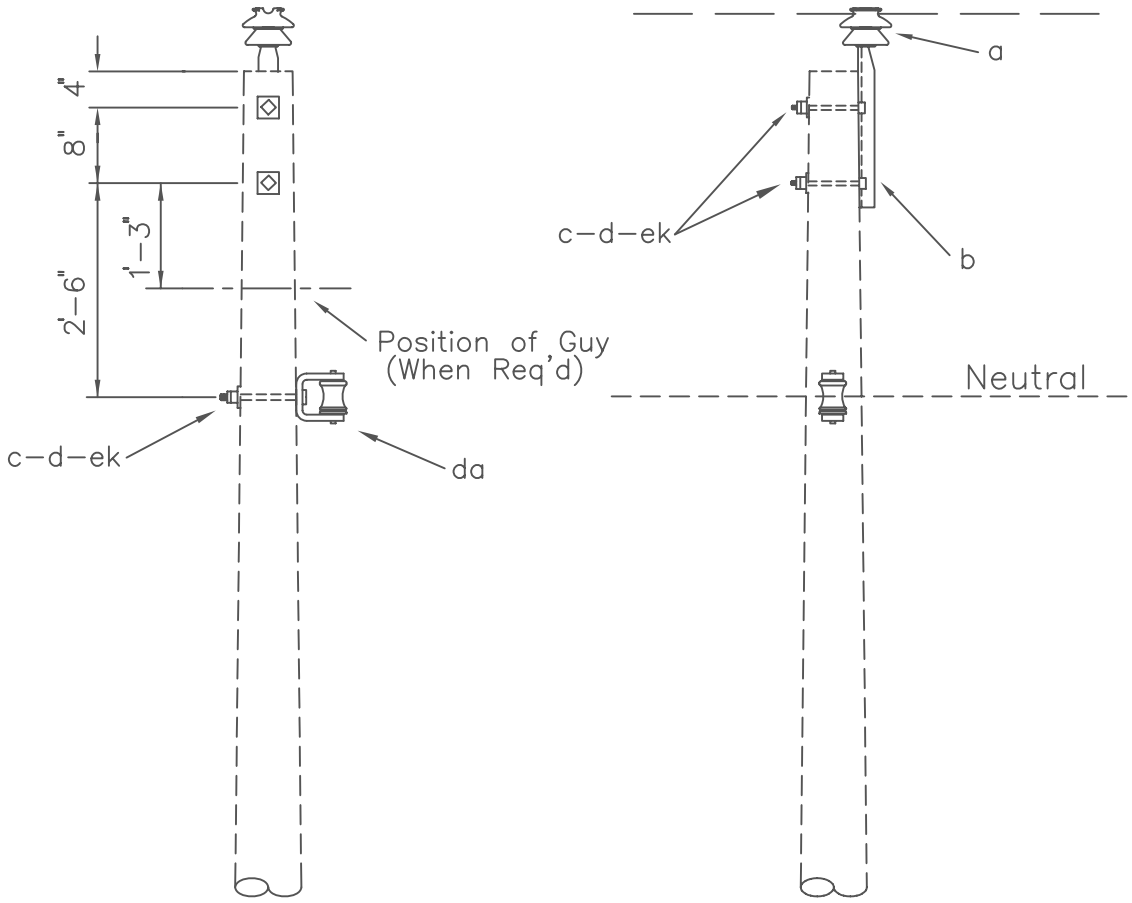
ITEM	QTY	MATERIAL
	1	VA1.1 Primary Assembly
	1	VA1.11 Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

DESIGN PARAMETERS:

See: "VA1.1"
"VA1.11"

SINGLE PHASE JUNCTION GUIDE

DEC 1998 RUS	1 – PHASE PRIMARY 24.9/14.4 kV	VA1.12G (VA22)



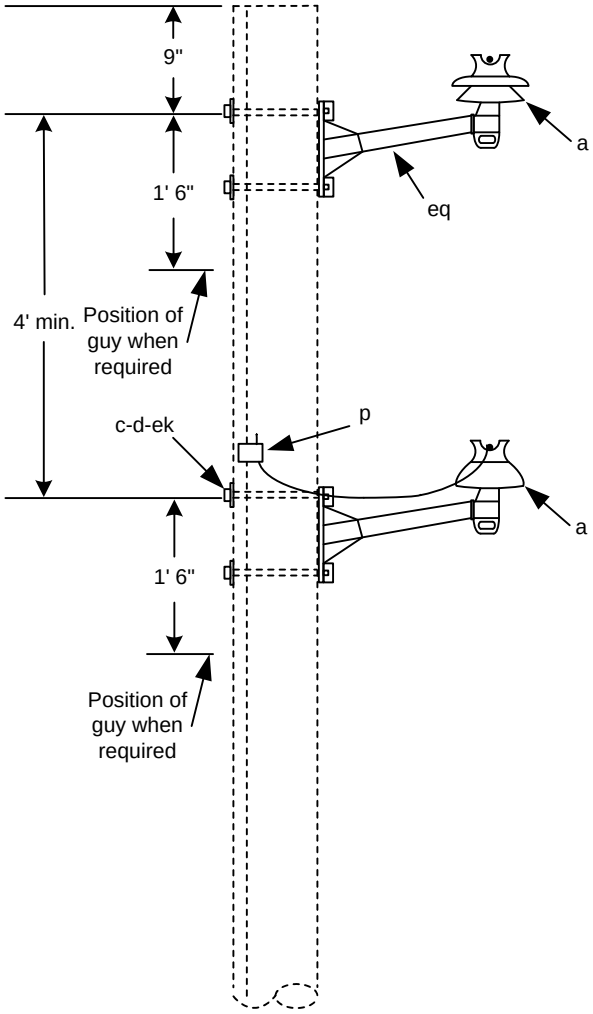
ITEM	QTY	MATERIAL
a	1	Insulator, pin type (24.9/14.4 kV)
b	1	Pin, pole top, 20"
c	3	Bolt, machine, 5/8" x req'd length
d	3	Washer, square, 2 1/4"
da	1	Bracket, insulated
ek	3	Locknuts

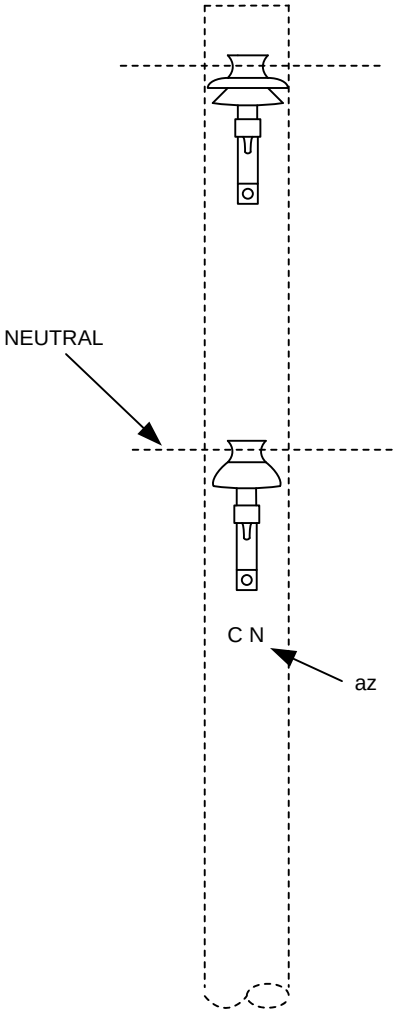
DESIGN PARAMETERS:

See TABLE I

SINGLE SUPPORT

DEC 1998	1 – PHASE PRIMARY	VA1.3
RUS	24.9/14.4 kV	(VA1)





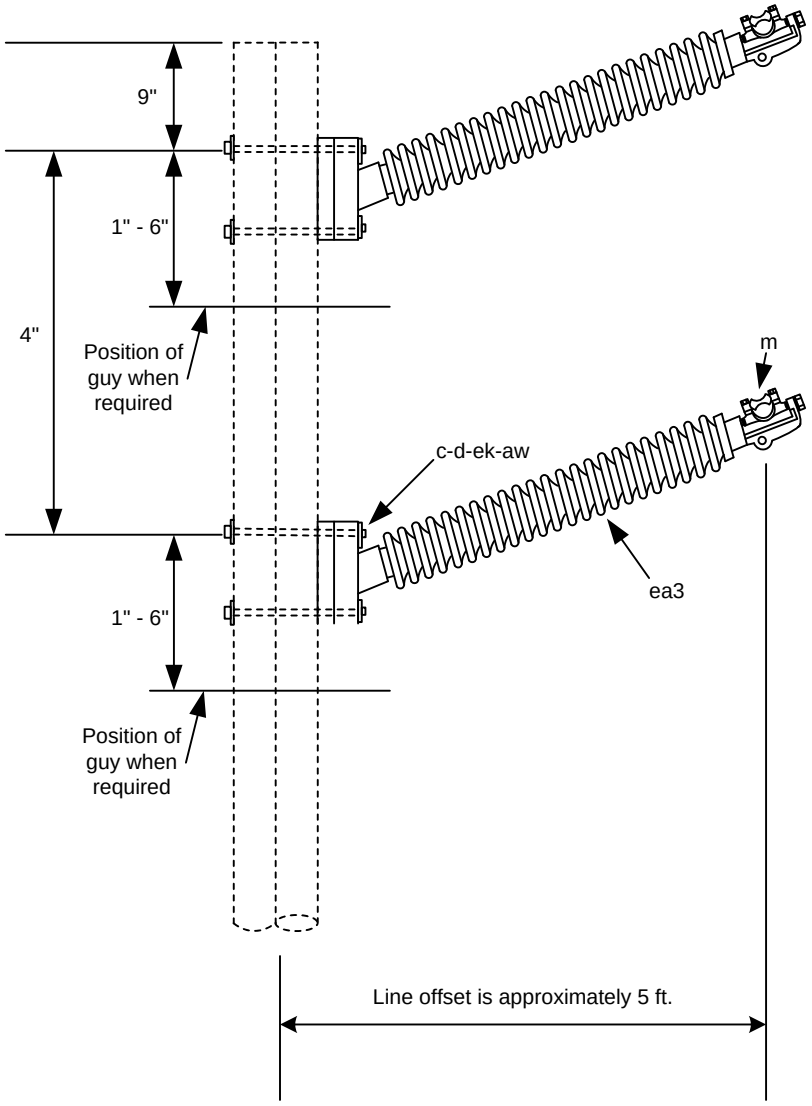
Notes:

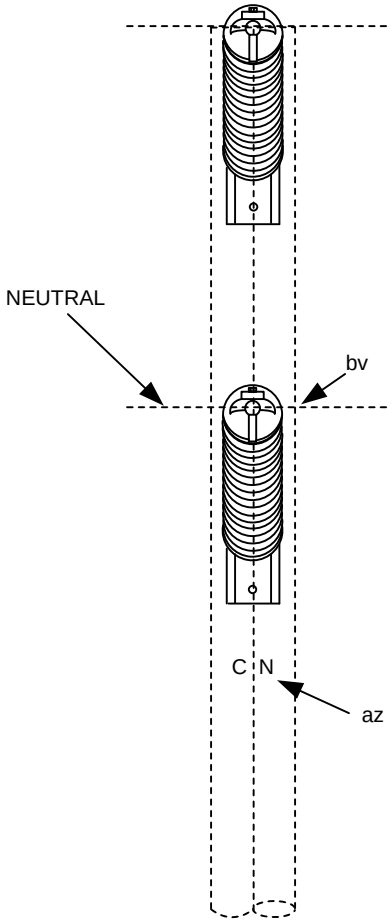
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Maximum Line Angle is 15°.
3. Install either identification letters (az) or white insulator in neutral position.

ITEM	QTY.	MATERIAL
a	2	Insulator, Pin Type
c	4	Bolt, machine, 5/8" x Required Length
d	4	Washer, 3”
p		Connectors, as required
ah	2	Tie, Insulator, formed Type
az	2	Letters, 2" C, 2" N, with 1" nails
ek	4	Locknut 5/8"
eq	2	Bracket, Standoff, fiberglass 1 ½” dia.

SINGLE SUPPORT ON FIBERGLASS BRACKET
- NARROW PROFILE
(SMALL CONDUCTORS)

2012	WFECA	1 - Phase Primary 24.9/14.4 kV	VA1.33N





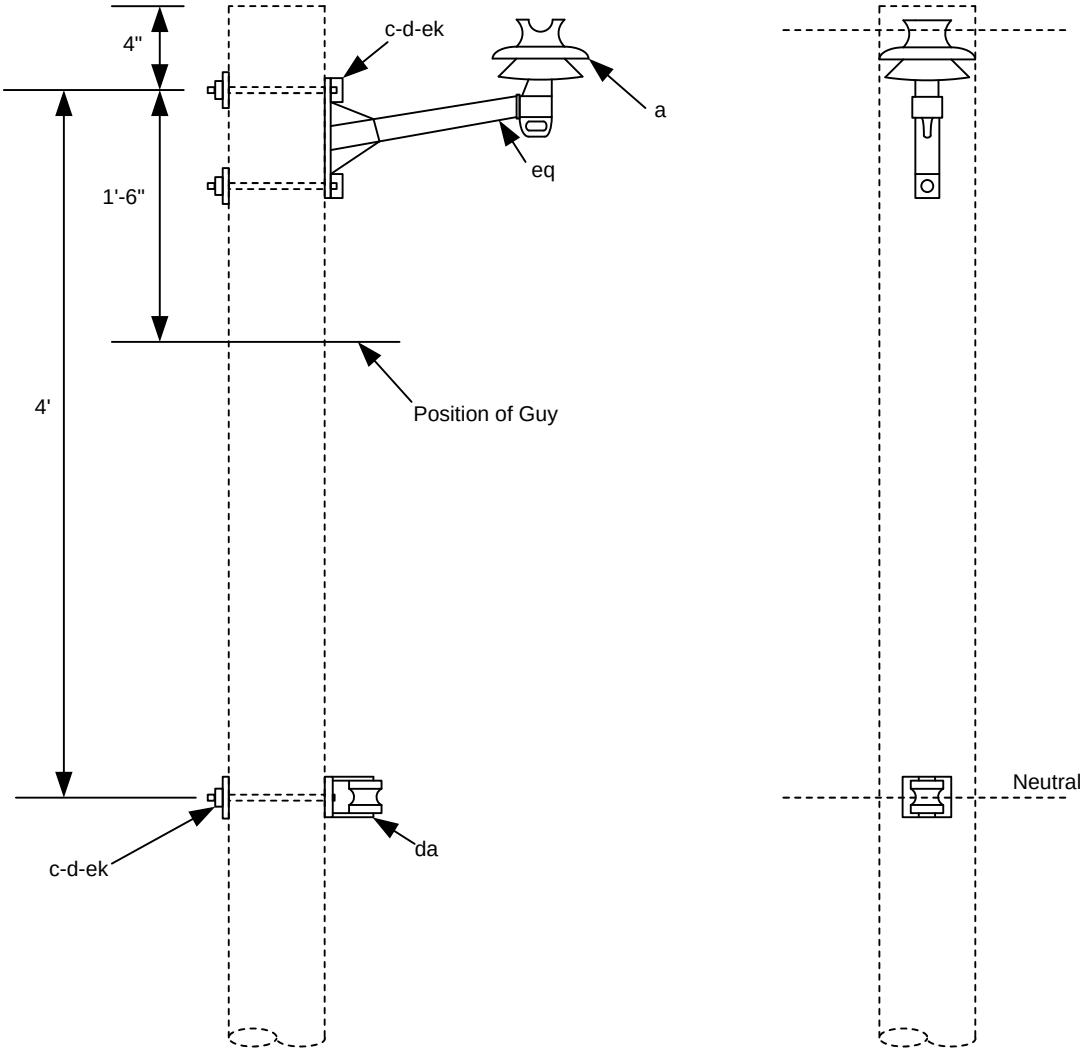
ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x Required Length
d	4	Washer, 3"
m	2	Clamp trunnion, tangent
p		Connectors, as required
aw	4	Washer, flat spring
az	2	Letters, 2" C, 2" N, with 1" nails
bv	2	Armor Rod
ea3	2	Insulator, Horizontal Clamp Type, 5 foot
ek	4	Locknut 5/8"

Notes:

1. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
2. Maximum Line Angle is 15°.
3. Consult with System Engineer before using.

SINGLE SUPORT ON POST INSULATOR - NARROW PROFILE - OFFSET

2013	WFECA	1 – Phase Primary 24.9/14.4 kV	VA1.33NT



Note:

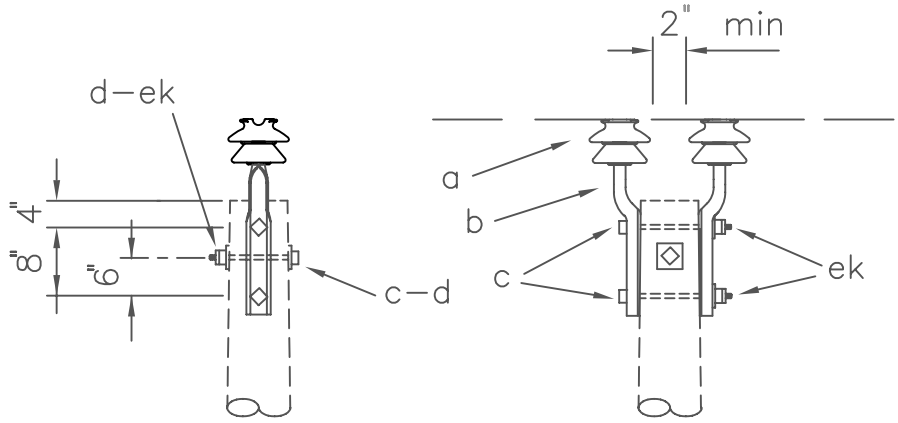
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

ITEM	QTY.	MATERIAL
a	1	Insulator, Pin Type
c	3	Bolt, machine, 5/8" x Required length
d	3	Washer, Square 2 ¼”
da	1	Bracket, Insulated
ah	2	Tie, Insulator, formed type
ek	3	Locknuts
eq	1	Bracket, Standoff, Fiberglass 1 ½” dia.

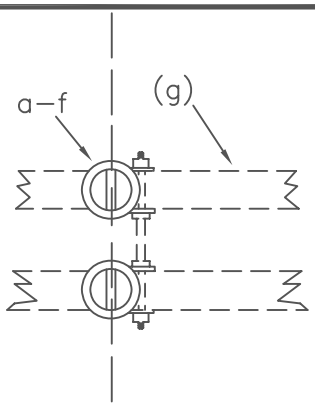
SINGLE SUPPORT – NARROW PROFILE (TANGENT)

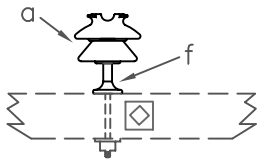
2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VA1.6N

NOTE:
Straight, 20" pole top pins (item 'b'), pole top brackets ('ec'), and pipe spacers ('dl') may be used instead of offset pole top pin (item 'b').

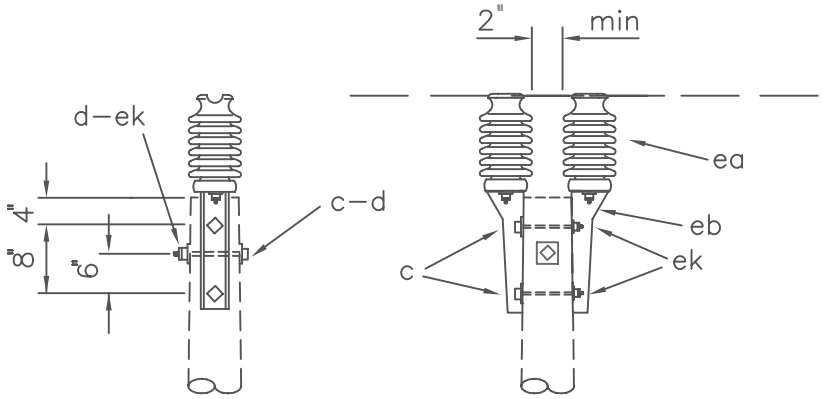


VA2.01

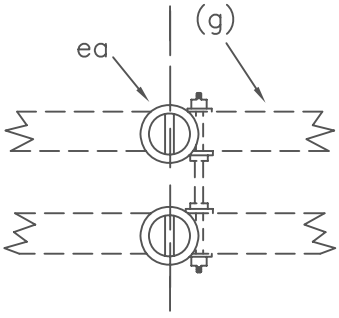


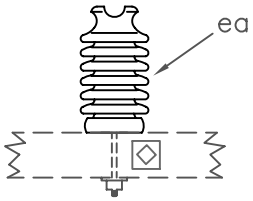


VA2.021



VA2.01P





VA2.021P

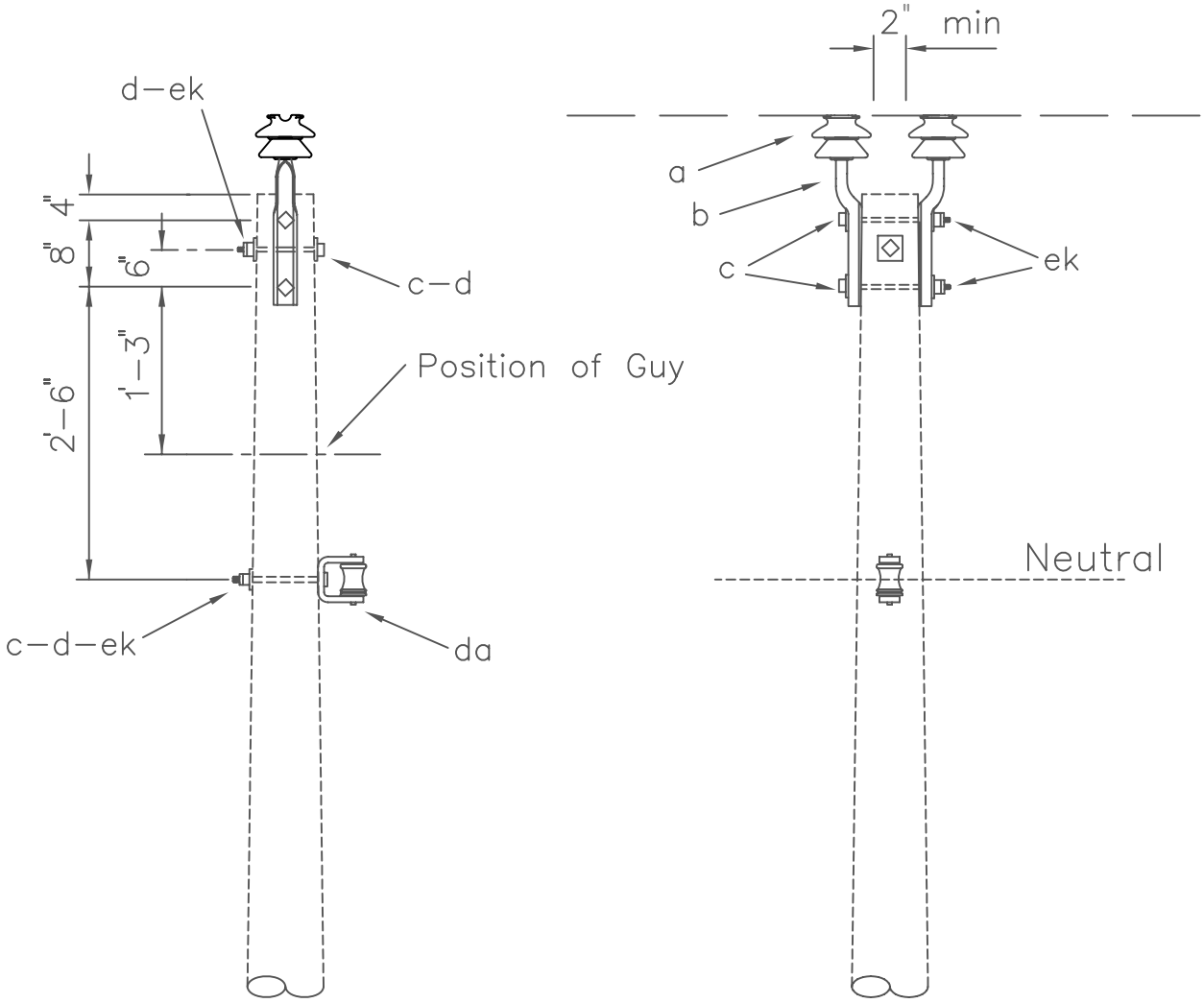
ASSEMBLY: VA2.		01	01P	021	021P
ITEM	MATERIAL	QTY	QTY	QTY	QTY
a	Insulator, pin type (24.9/14.4 kV)	2		2	
b	Pin, offset, pole top, 20"	2			
c	Bolt, machine, 5/8" x req'd length	3	3		
d	Washer, square, 2 1/4"	2	2		
f	Pin, crossarm steel, 5/8" x 14"			2	
ea	Insulator, post type (24.9/14.4 kV)		2		2
eb	Bracket, pole type		2		
ek	Locknuts	3	3		

DESIGN PARAMETERS:

VA2.01: See TABLE III
VA2.01P: See TABLE IV
VA2.021: See TABLE IV
VA2.021P: See TABLE IV

DOUBLE SUPPORT –MISCELLANEOUS

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA2.0
RUS		



* See note on drawing "VA2.0"

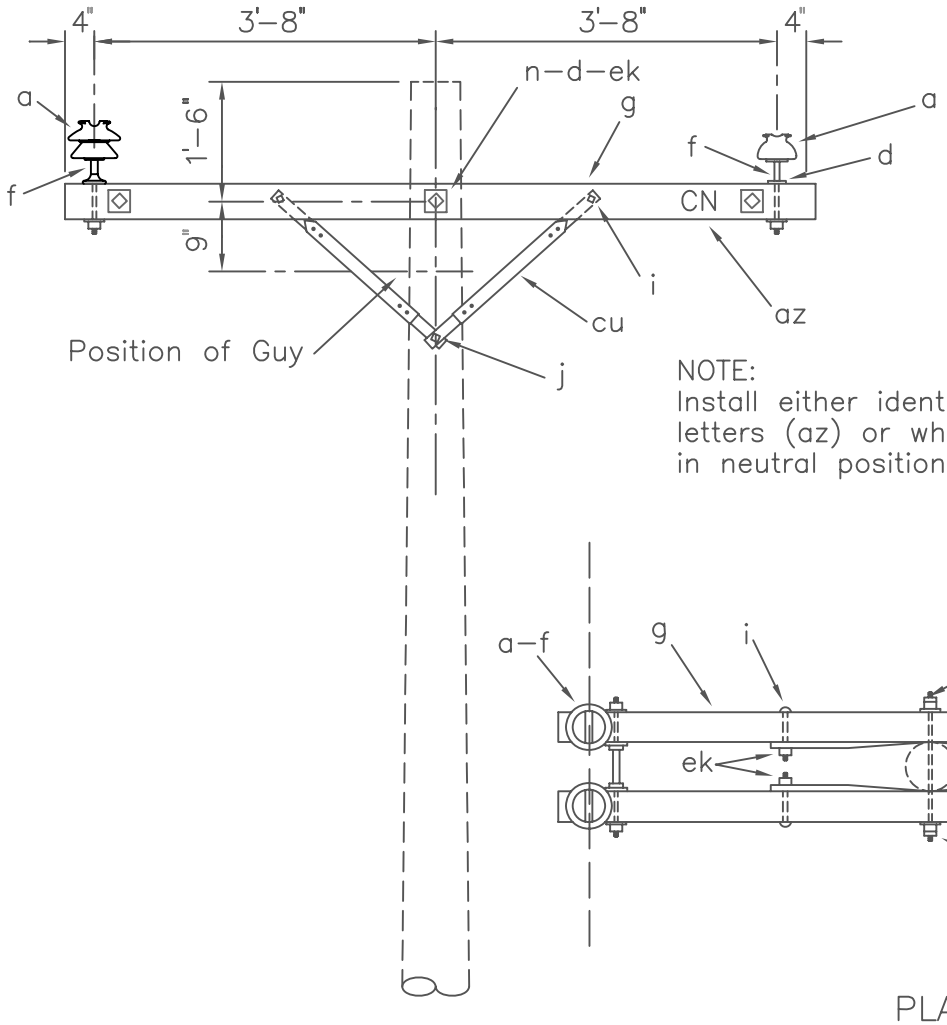
ITEM	QTY	MATERIAL
a	2	Insulator, pin type (24.9/14.4 kV)
b	2	Pin, offset, pole top *
c	4	Bolt, machine, 5/8" x req'd length
d	3	Washer, square, 2 1/4"
da	1	Bracket, insulated
ek	4	Locknuts

DESIGN PARAMETERS:

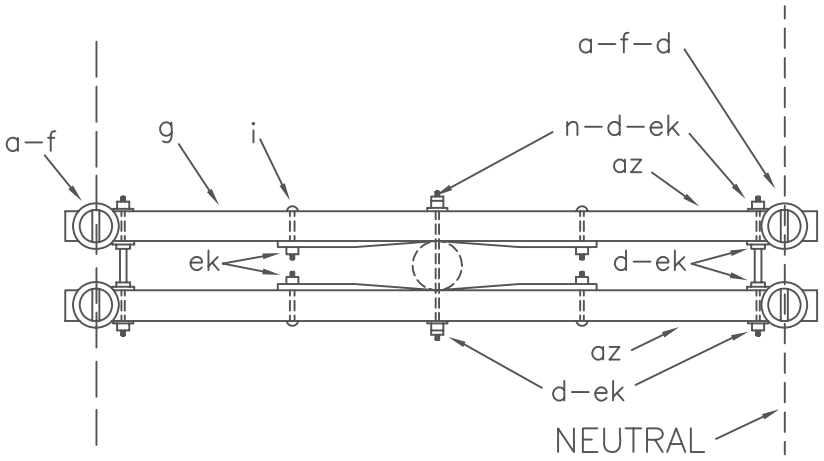
See TABLE III

DOUBLE SUPPORT

DEC 1998	1 – PHASE PRIMARY	VA2.1
RUS	24.9/14.4 kV	(VA2)



NOTE:
Install either identification letters (az) or white insulators in neutral position.



PLAN

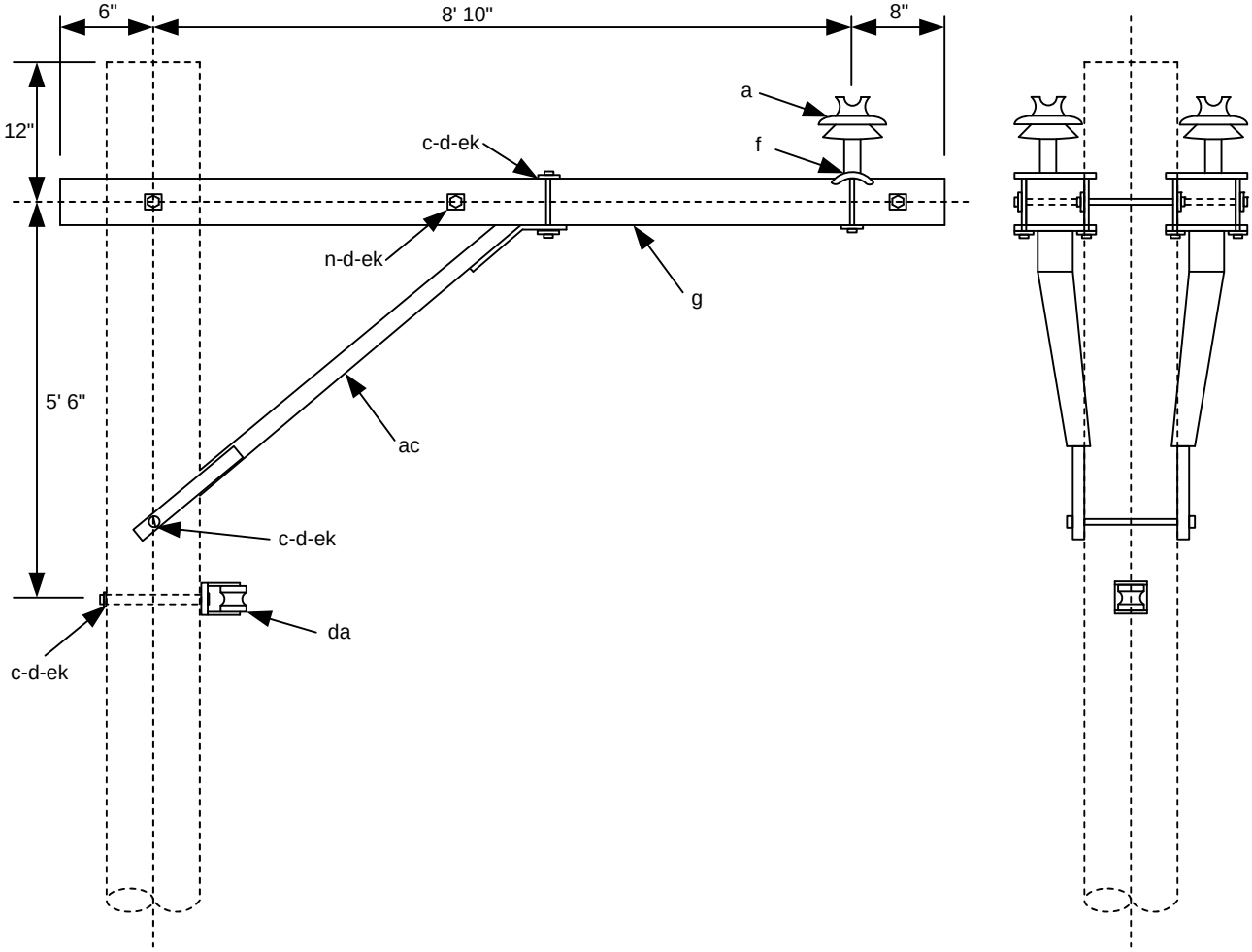
ITEM	QTY	MATERIAL
a	2	Insulator, pin type 15 kV white
a	2	Insulator, pin type (24.9/14.4 kV)
d	12	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
f	2	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8' 0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
n	3	Bolt, double arm, 5/8" x req'd length
az	4	Letters, 2" C, 2" N, with 1" nails
cu	4	Brace, 28"
ek	14	Locknuts

DESIGN PARAMETERS:

See TABLE IV

DOUBLE SUPPORT ON CROSSARMS

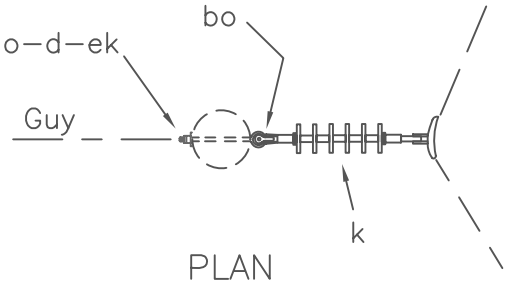
DEC 1998	1 – PHASE PRIMARY	VA2.21
RUS	24.9/14.4 kV	(VA9)



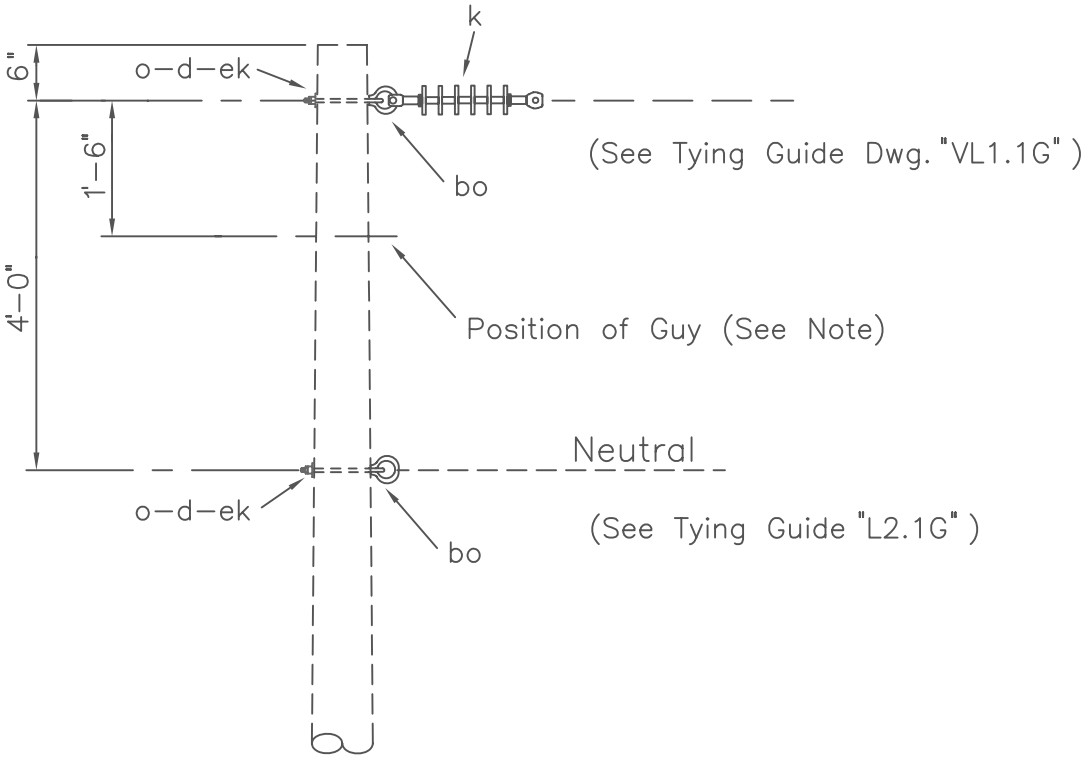
ITEM	QTY.	MATERIAL
a	2	Insulator, pin type 25 kV
c	2	Bolt, machine, ½" x required length
c	2	Bolt, machine, 5/8" x required length
d	8	Washer, square, 2 ¼" x 2 ¼" x 3/16"
d	1	Washer, square, curved, 3" x 3" x 3/16"
f	2	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'-0"
n	3	Bolt, double arming, 5/8" x required length
ac	2	Brace, alley arm, wood
da	1	Bracket, insulated
ek	12	Locknuts, 5/8"
ek	2	Locknuts, ½"

DOUBLE SUPPORT ON CROSSARMS
(ALLEY ARM)

2006	WFECA	1 – Phase Primary 24.9/14.4 kV	VA2.91 (VM31)



PLAN



NOTE: When more than one guy is required, install guys 6" below assemblies and install 12" guy strain insulator ("w") at top of primary guy.

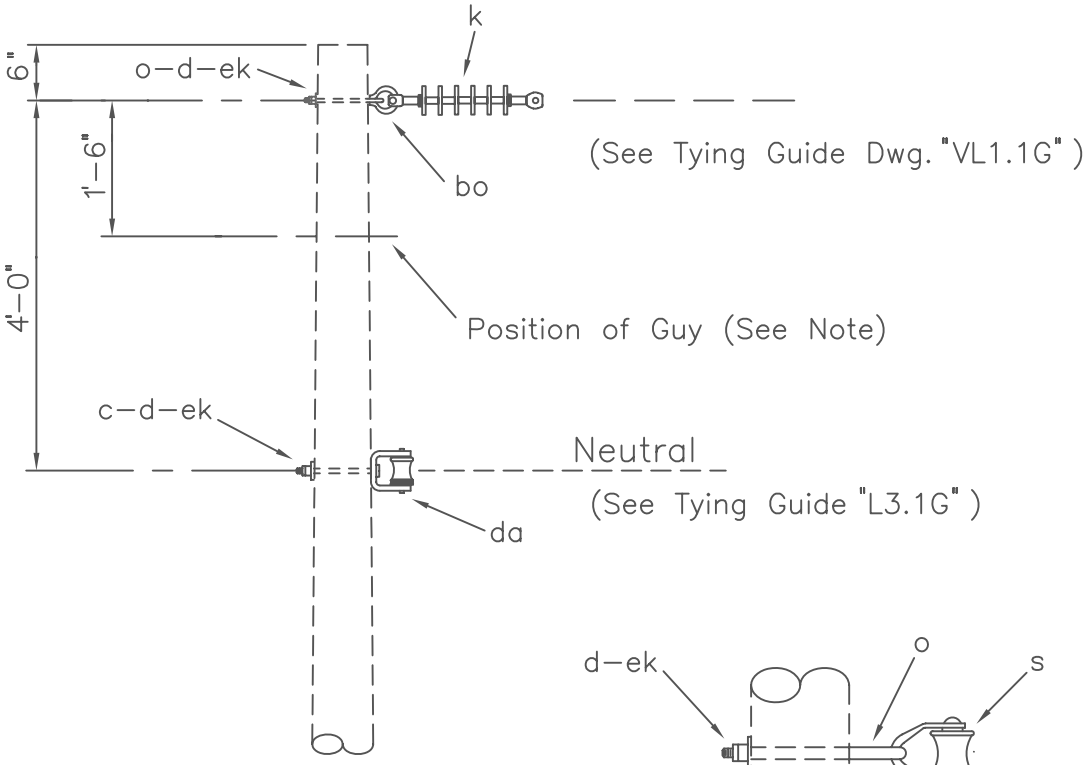
ITEM	QTY	MATERIAL
d	2	Washer, square, 3", curved
k	1	Insulator, 25 kV Polymer deadend
o	2	Bolt, eye, 5/8" x req'd length
bo	2	Shackle, anchor
ek	2	Locknuts

DESIGN PARAMETERS:

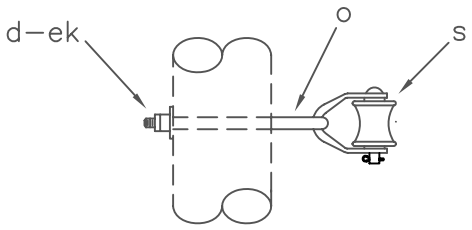
ALLOWABLE TRANSVERSE LOAD= 5000 lbs./Conductor
20° – 60°: #1/0 ACSR & Larger
30° – 60°: Smaller Conductors

SUSPENSION ANGLE

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA3.1 (VA3)
RUS		



VA3.2
(VA3)



VA3.3
(VA3)

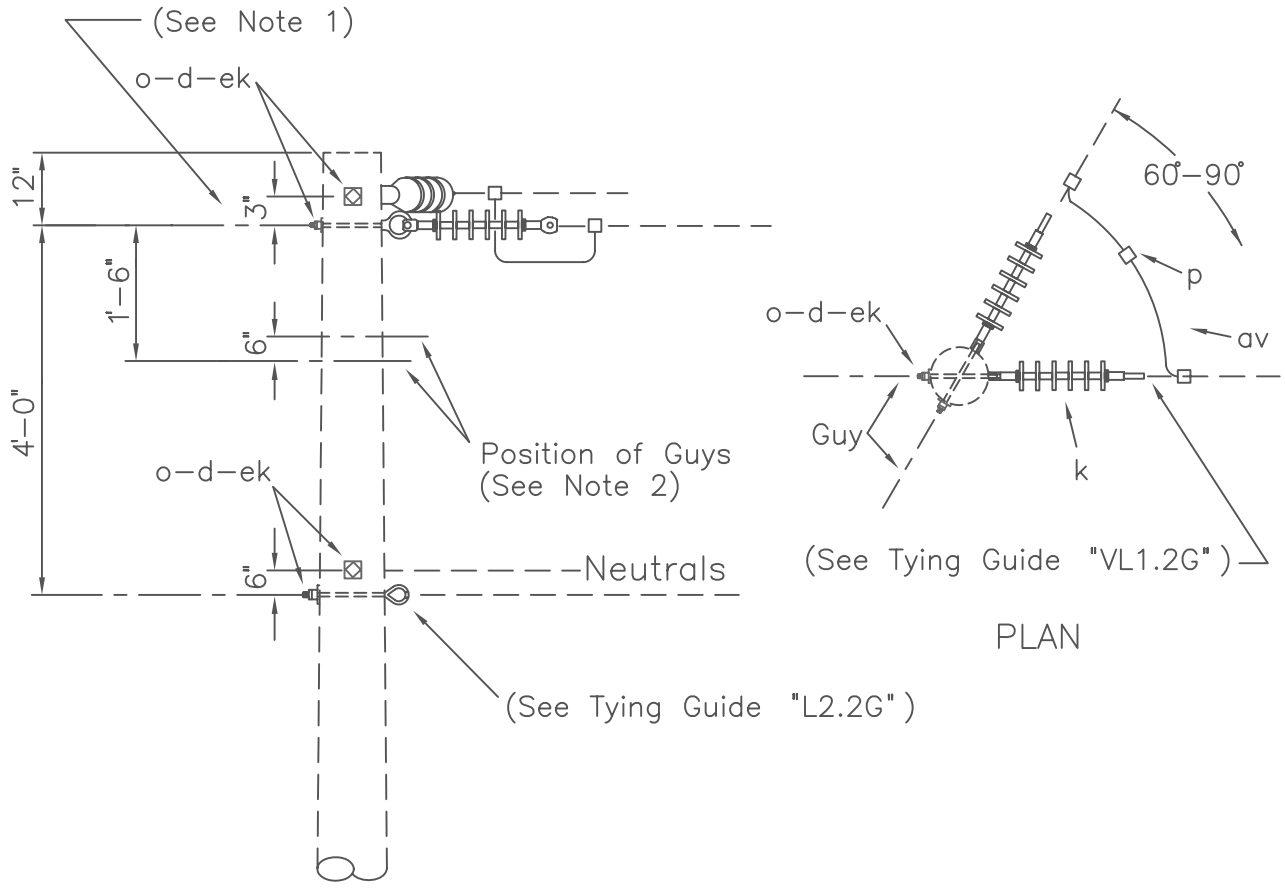
NOTE: When more than one guy is required, install guys 6" below assemblies and install 12" guy strain insulator ("w") at top of primary guy.

ASSEMBLY: VA3		.2	.3
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 5/8" x req'd length	1	
d	Washer, 3" , curved	2	2
k	Insulator, 25 kV Polymer Deadend	1	1
o	Bolt, eye, 5/8" x req'd length	1	2
s	Clevis, secondary, swinging, insulated		1
bo	Shackle, anchor	1	1
da	Bracket, insulated	1	
ek	Locknuts	2	2

DESIGN PARAMETERS:
See Tables VI and VII

SUSPENSION ANGLE

DEC 1998	1 – PHASE PRIMARY	VA3.2,VA3.3
RUS	24.9/14.4 kV	(VA3)



NOTES:

1. Separate 6" (top position only) when angle equals 90°.

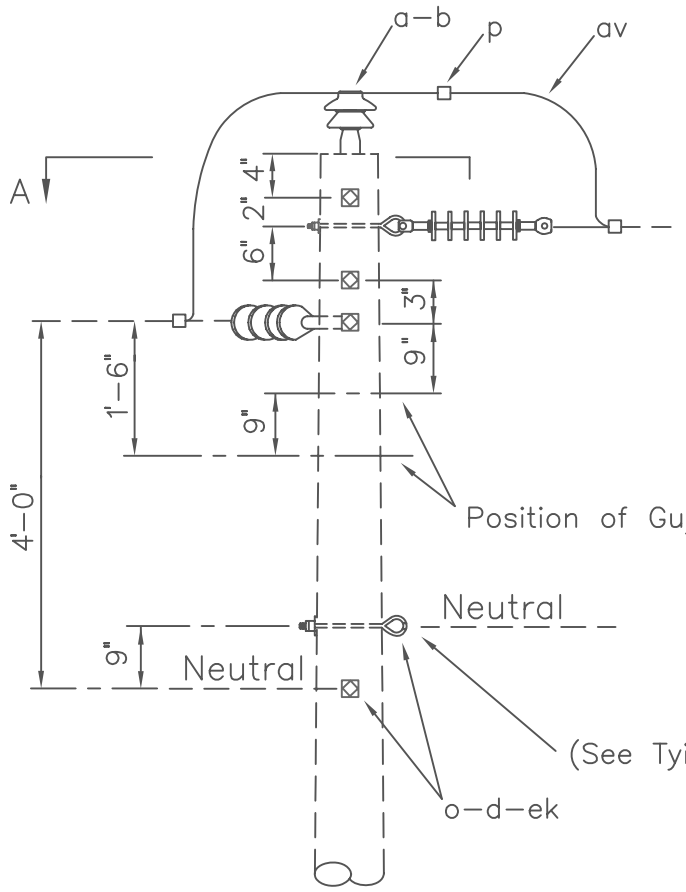
2. When additional guys are required, install guys 6" below deadend assemblies and use two VA5.4's or install 12" guy strain insulators ("w") at top of uppermost guys.

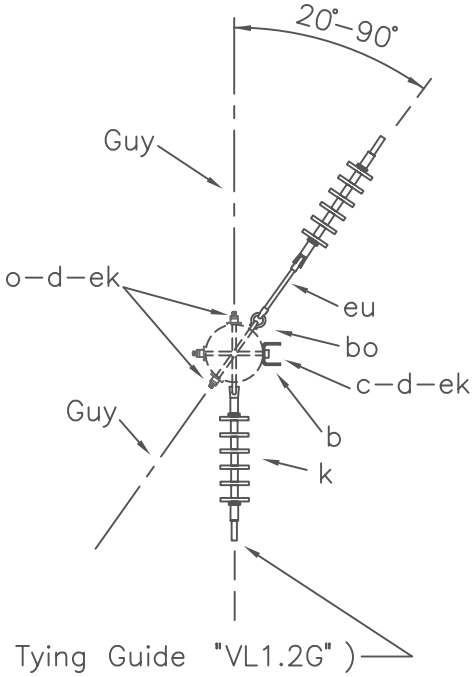
ITEM	QTY	MATERIAL
d	4	Washer, square, 3", curved
k	2	Insulator, 25 kV Polymer deadend
o	4	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
av		Jumpers, as req'd
ek	4	Locknuts

DESIGN PARAMETERS:
ALLOWABLE LONGITUDINAL
LOAD = 5000 lbs./Conductor

DEADEND ANGLE (90°–150°)

DEC 1998	1 – PHASE PRIMARY	VA4.1
RUS	24.9/14.4 kV	(VA4)





SECTION A–A

NOTE: Use 3" curved washers, "d", on eyebolts, "o".

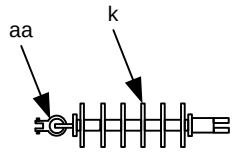
ITEM	QTY	MATERIAL
a	1	Insulator, pin type (24.9/14.4 kV)
b	1	Pin, pole top, 20"
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
d	4	Washer, square, 3," curved
k	2	Insulator, 25 kV Polymer deadend
o	4	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
av		Jumpers, as req'd
bo	1	Shackle, anchor
ek	6	Locknuts
eu	1	Link, extension, insulated, 12" min.

DESIGN PARAMETERS:

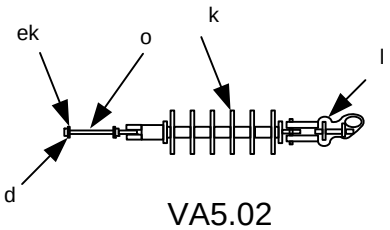
ALLOWABLE LONGITUDINAL LOAD = 5000 lbs./Conductor

DEADEND ANGLE (20°–90°)

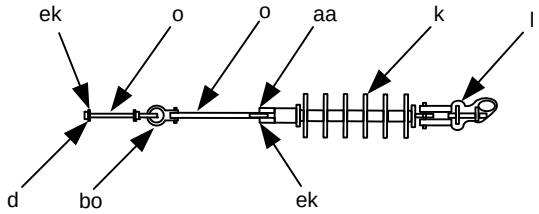
DEC 1998	1 – PHASE PRIMARY	VA4.2
RUS	24.9/14.4 kV	(VA4)



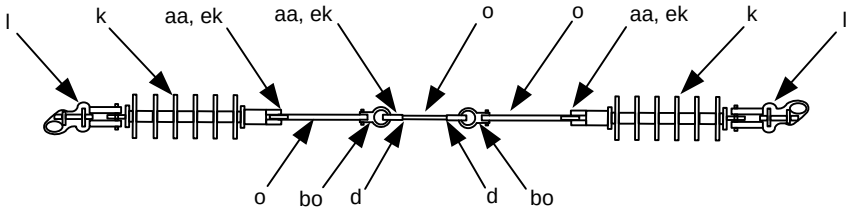
VA5.01
(VM5-20)



VA5.02
(VM5-24)



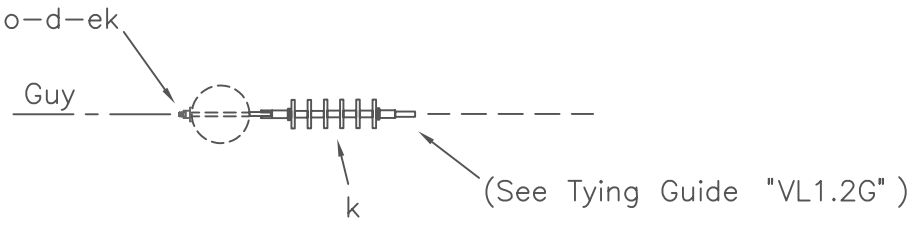
VA5.03
(VM5-8)

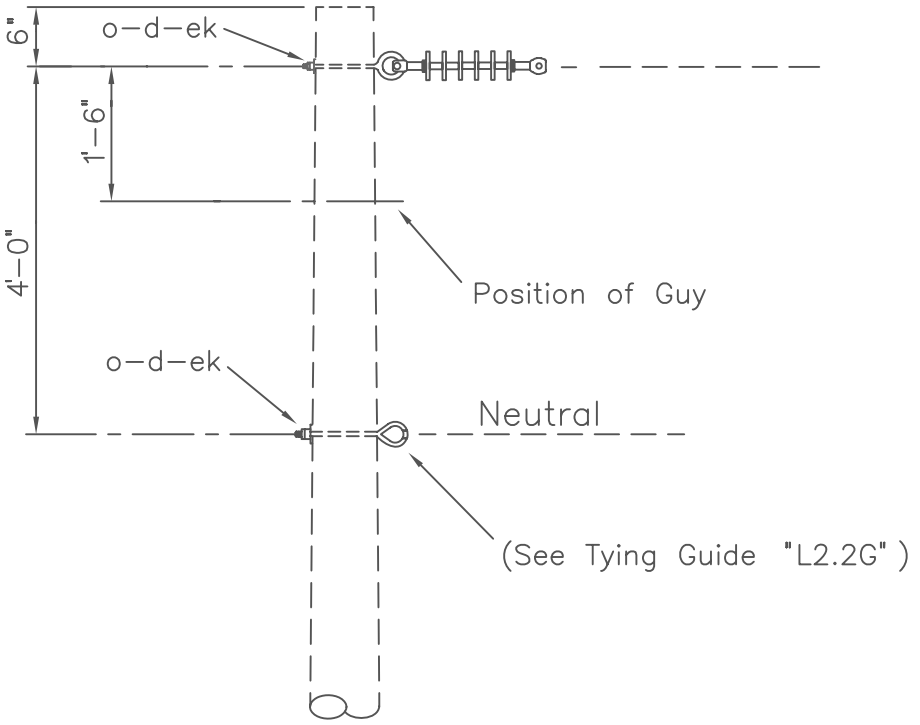


VA6.03

		VA5.01	VA5.02	VA5.03	VA6.03
ITEM	MATERIAL	QTY.	QTY.	QTY.	QTY.
d	Washer, 3"		1	1	2
k	Insulator, 25 kV Polymer Deadend	1	1	1	2
l	Bolt, eye, 5/8" x Required length		1	2	3
o	Clamp, deadend, Primary		1	1	2
aa	Nut, eye, 5/8"	1		1	3
bo	Shackle, anchor			1	2
ek	Locknuts		1	2	3

DEAD END – MISCELLANEOUS			
2012	WFECA	1 – Phase Primary 24.9/14.4 kV	VA5.0





NOTES:

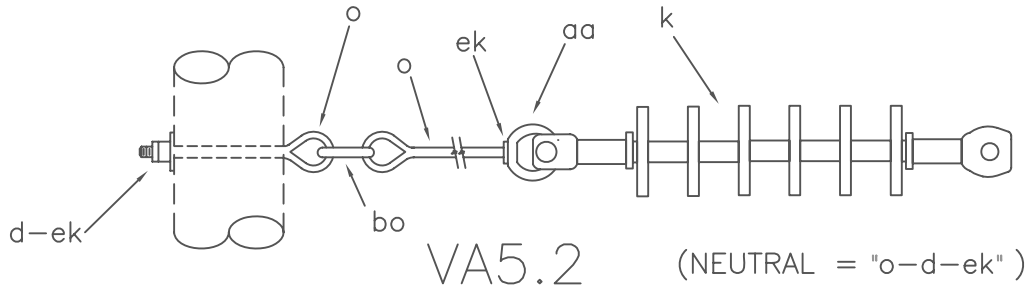
1. VA5.2, VA5.3 or VA5.4 may be used instead of assembly shown.
2. When more than one guy is required, install top guy 6" below primary assembly and use VA5.4 or install 12" guy strain insulator ("w") at top of guy.

ITEM	QTY	MATERIAL
d	2	Washer, square, 3", curved
k	1	Insulator, 25 kV Polymer Deadend
o	2	Bolt, eye, 5/8" x req'd length
ek	2	Locknuts

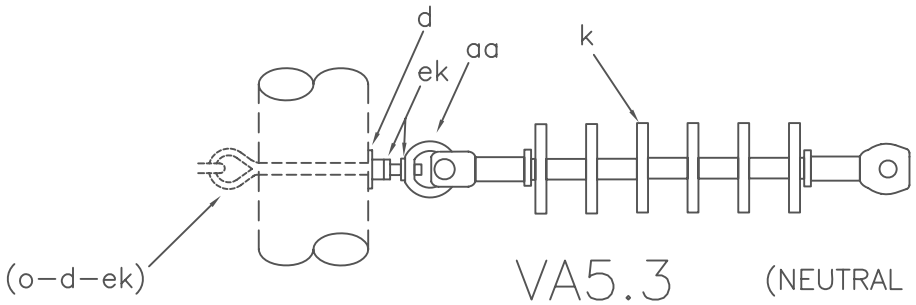
DESIGN PARAMETERS:
ALLOWABLE LONGITUDINAL LOAD = 5000 lbs./Conductor

SINGLE DEADEND

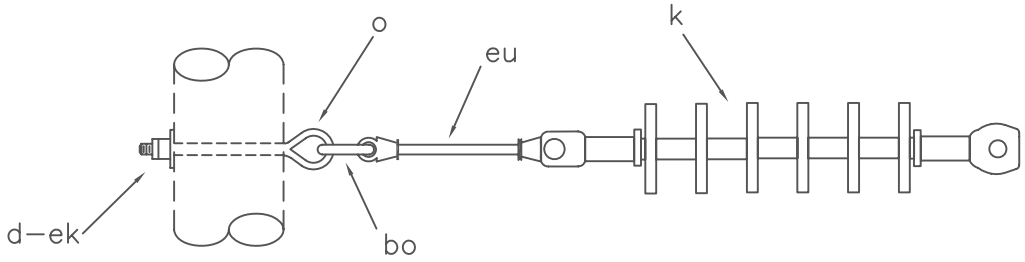
DEC 1998	1 – PHASE PRIMARY	VA5.1
RUS	24.9/14.4 kV	(VA5)



VA5.2 (NEUTRAL = "o–d–ek")



VA5.3 (NEUTRAL = "aa–ek")



VA5.4 (NEUTRAL = "o–d–ek")

NOTES:

1. See Assembly Drawing VA5.1
2. See Tying Guide Drawing VL1.2G
3. When connecting to existing bolt end, use eyenut "aa" and locknut "ek" instead of eyebolt assembly "o–d–ek"
4. If above assemblies used for primary angle assembly:
   (a) Rotate eyenut 90° & install anchor shackle "bo" in VA5.3
   (b) See Drawing VA3.1 and Tying Guide Drawing VL1.1G
5. Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "o") and eye nut (item "aa") on Assembly VA5.2.

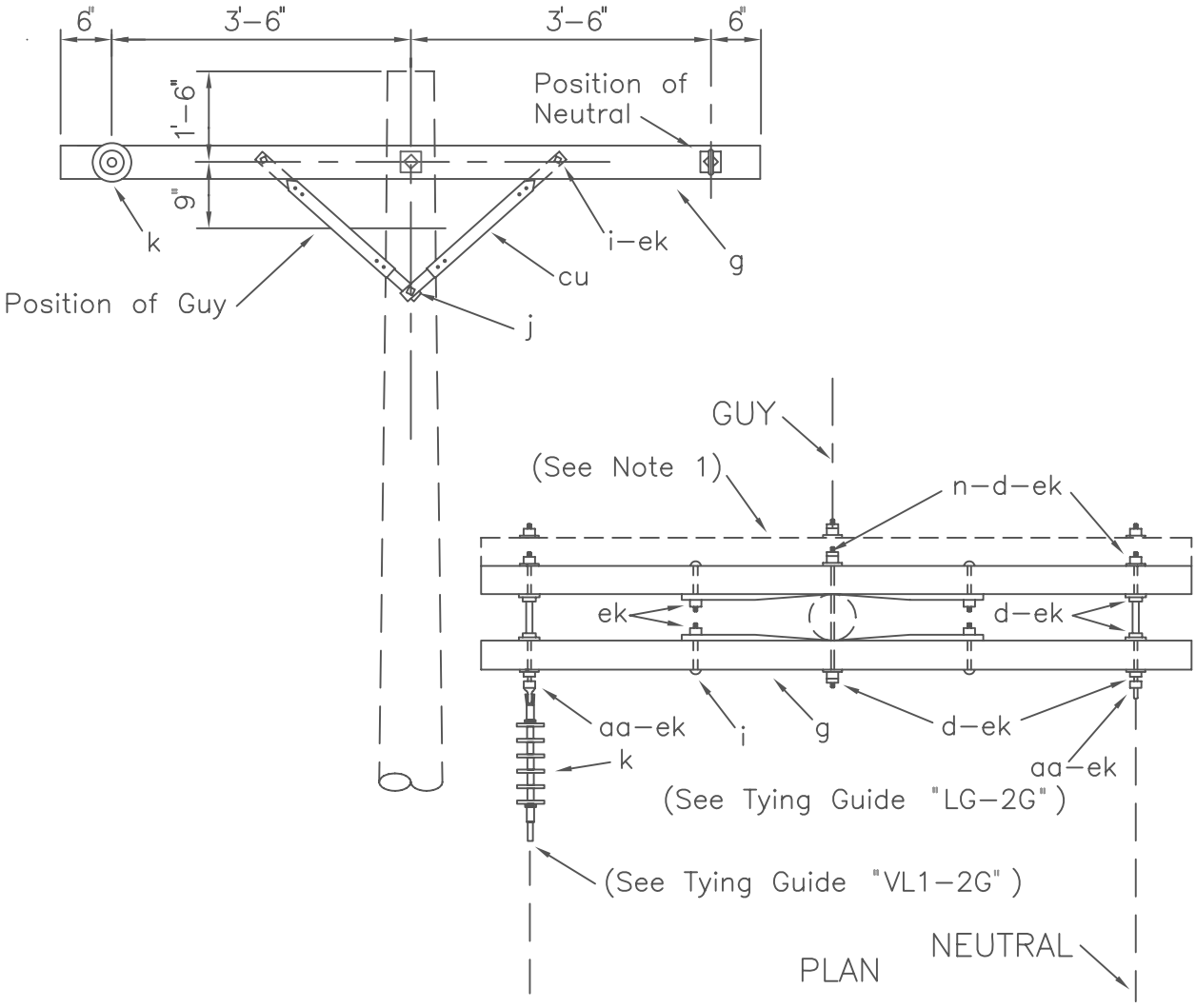
UNIT: VA5		.2	.3	.4
ITEM	MATERIAL (includes neutral assemblies)	QTY	QTY	QTY
d	Washer, square, 3", curved	2		2
k	Insulator, 25kV Polymer deadend	1	1	1
o	Bolt, eye, 5/8" x req'd length	3		2
aa	Nut, eye, 5/8"	1	2	
bo	Shackle, anchor	1		1
ek	Locknuts	3	3	2
eu	Link, extension, insulated, 12" min.			1

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL OR TRANSVERSE LOAD = 5000 lbs./Conductor

SINGLE DEADENDS

DEC 1998	1–PHASE PRIMARY	VA5.2,VA5.3,VA5.4
RUS	24.9/14.4 kV	(VA5–2,VA5–3 VA5–4)



NOTES:

1. Designate as VA5.31 for assembly with three crossarms.
2. Neither assembly suitable for Grade B construction.
3. Double arming eye bolt, item "dy," may be used instead of double arming bolt, item "n," and eyenut, item "aa."

ITEM	QTY	MATERIAL
d	10	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	1	Insulator, 25 kV Polymer deadend
n	3	Bolt,double arming,5/8" x req'd length
aa	2	Nut, eye, 5/8"
cu	4	Brace, 28"
ek	16	Locknuts

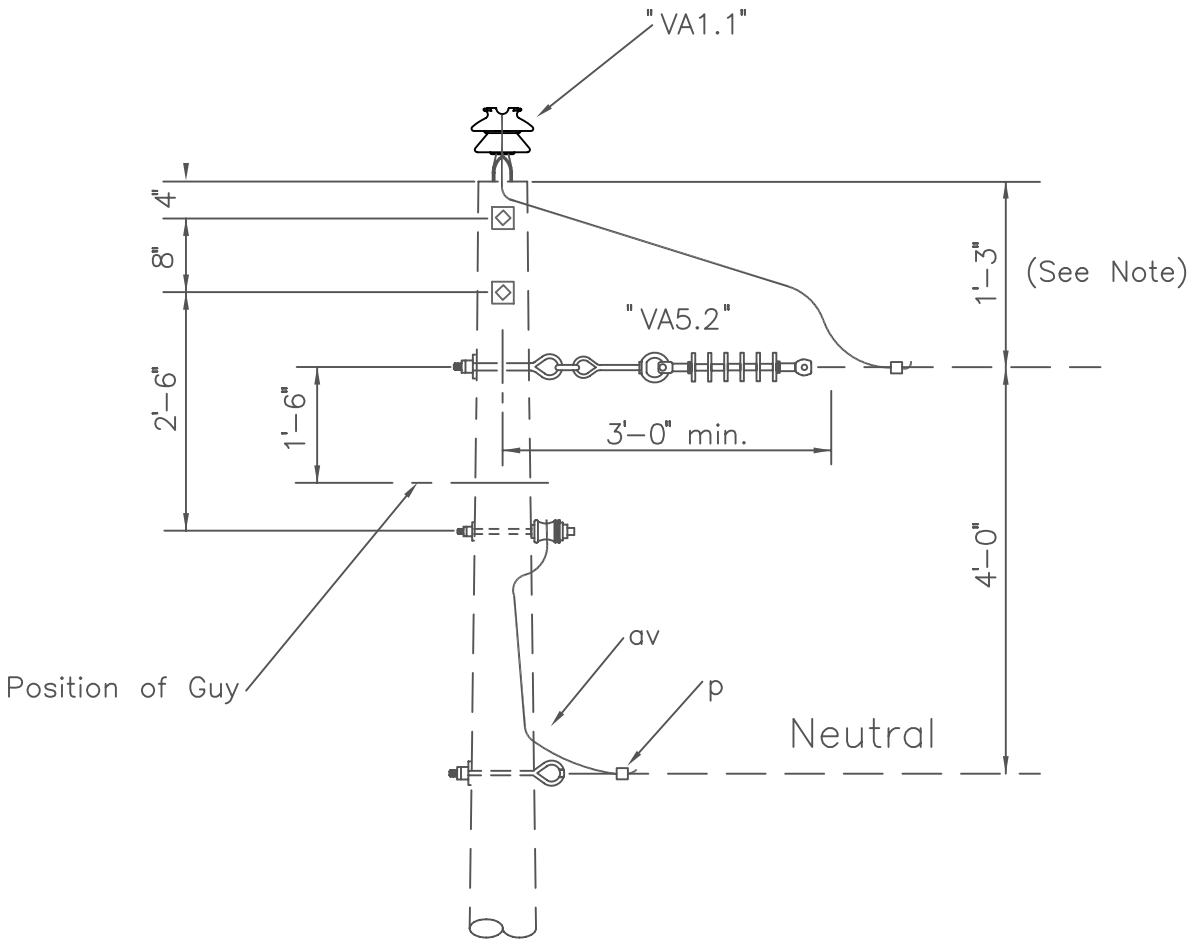
DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOADING (lbs/conductor) =

VA5.21: 2,000 (#2 ACSR max.)
VA5.31: 3,000 (#2/0 ACSR max.)

SINGLE DEADEND ON CROSSARMS

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA5.21, VA5.31 (VA7, VA7.1)
RUS		



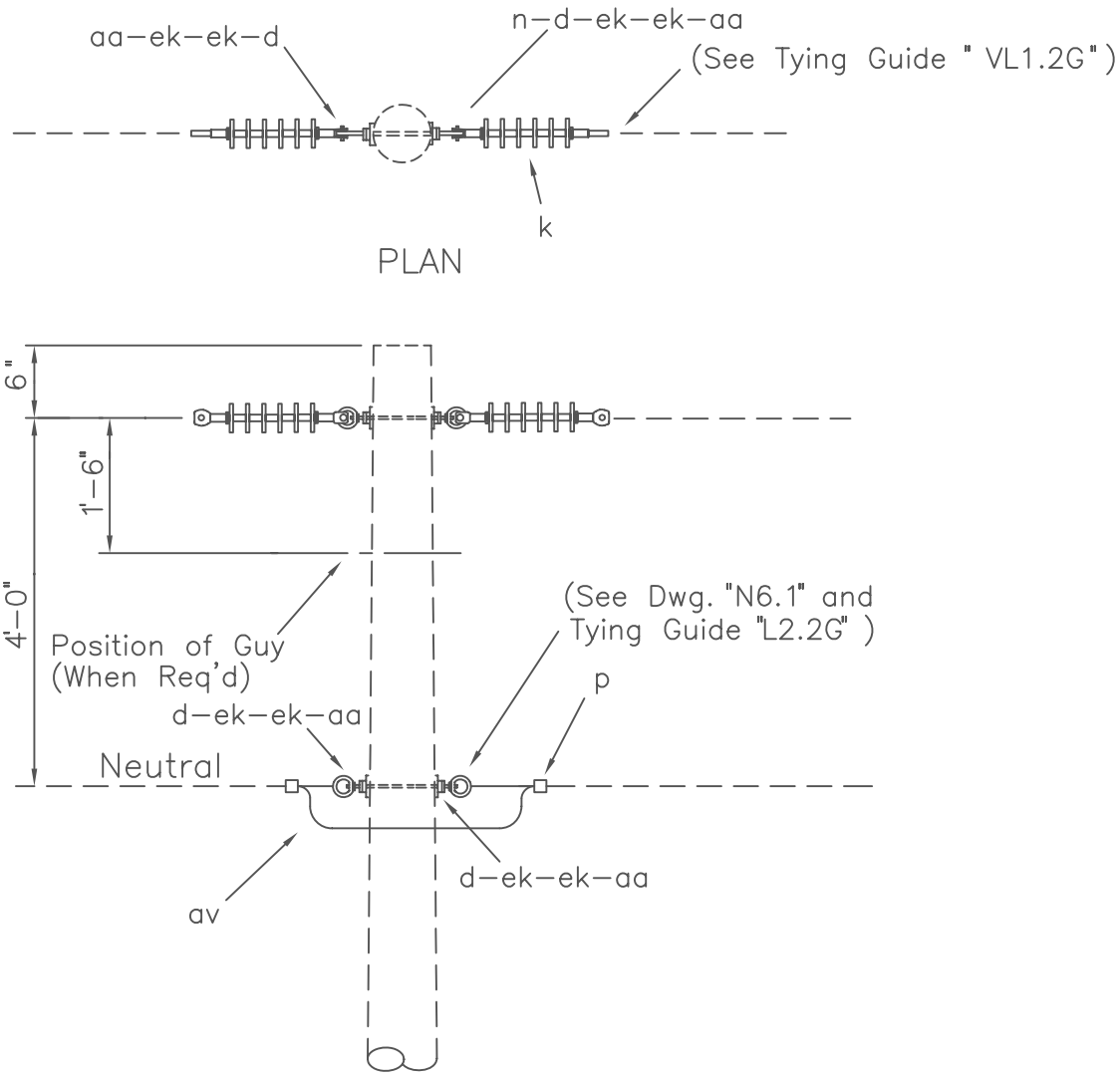
NOTE: Tap assembly may be installed 6" from top of pole when perpendicular to line. Raise neutral and guy attachment 9" also.

ITEM	QTY	MATERIAL
	1	VA1.1 Primary Assembly
	1	VA5.2 Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

DESIGN PARAMETERS:
ALLOWABLE LONGITUDINAL
LOAD = 5000 lbs./Conductor

SINGLE PHASE TAP GUIDE

DEC 1998	1 – PHASE PRIMARY	VA5.5G
RUS	24.9/14.4 kV	



ITEM	QTY	MATERIAL
d	4	Washer, square, 3", curved
k	2	Insulator, 25 kV Polymer deadend
n	2	Bolt,double arming,5/8" x req'd length
p		Connectors, as req'd
aa	4	Nut, eye, 5/8"
av		Jumpers, as req'd
ek	8	Locknuts

NOTE: Maximum line angle may be increased to 15° by installing anchor shackles, item "bo", to (horizontal) eyenuts and installing side guy as req'd.

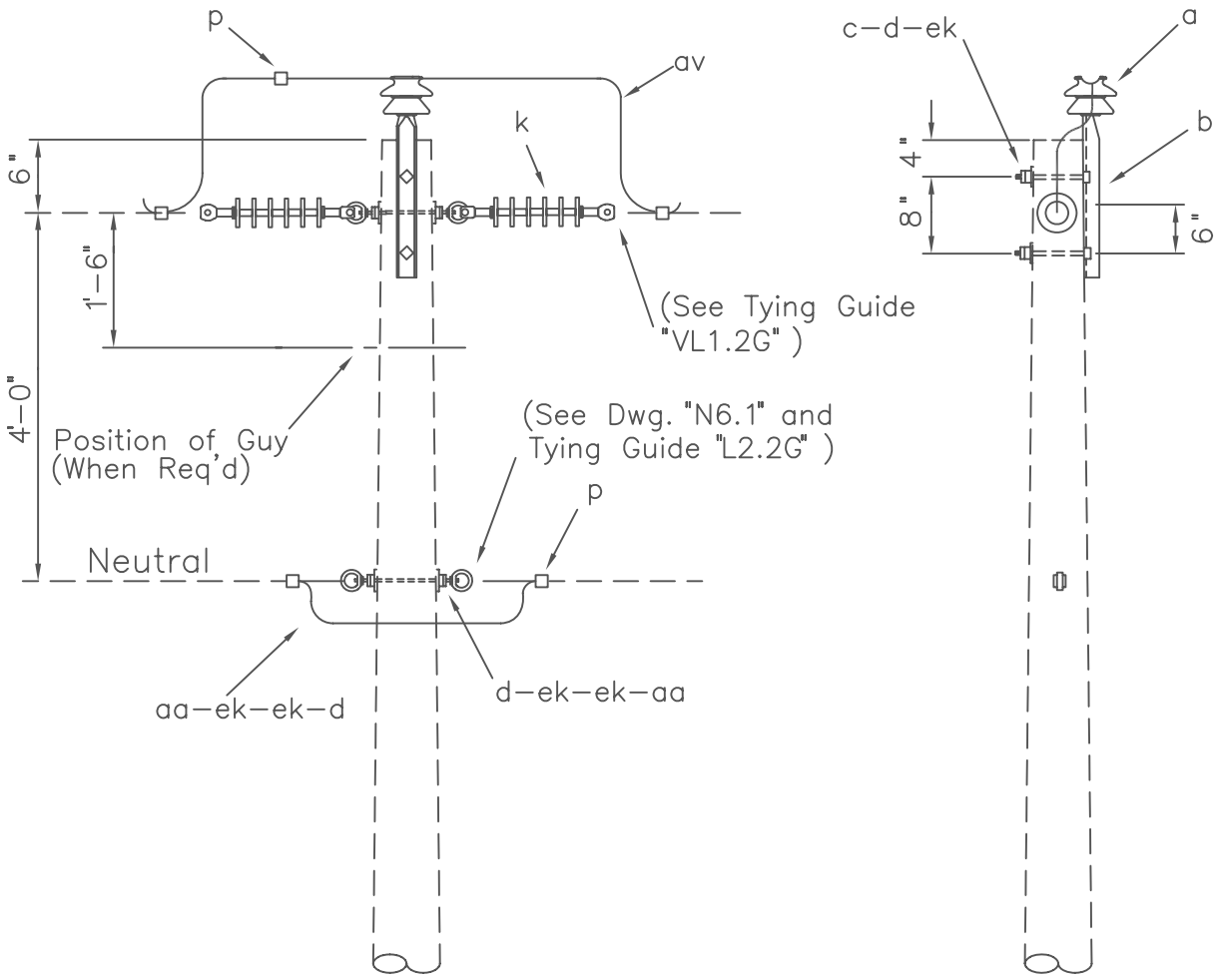
DESIGN PARAMETERS:

MAXIMUM ALLOWABLE LONGITUDINAL LOAD= 5000 lbs./Conductor

MAXIMUM LINE ANGLE = 5° (See Note)

DOUBLE DEADEND (STRAIGHT)

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA6.1 (VA6)
RUS		



ITEM	QTY	MATERIAL
a	1	Insulator, pin type (24.9/14.4 kV)
b	1	Pin, pole top, 20"
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
d	4	Washer, square, 3," curved
k	2	Insulator, 25 kV Polymer deadend
n	2	Bolt,double arming,5/8" x req'd length
p		Connectors, as req'd
aa	4	Nut, eye, 5/8"
av		Jumpers, as req'd
ek	10	Locknuts

NOTE: Maximum line angle may be increased to 15° by installing anchor shackles, item "bo", to (horizontal) eyenuts and installing side guy as req'd.

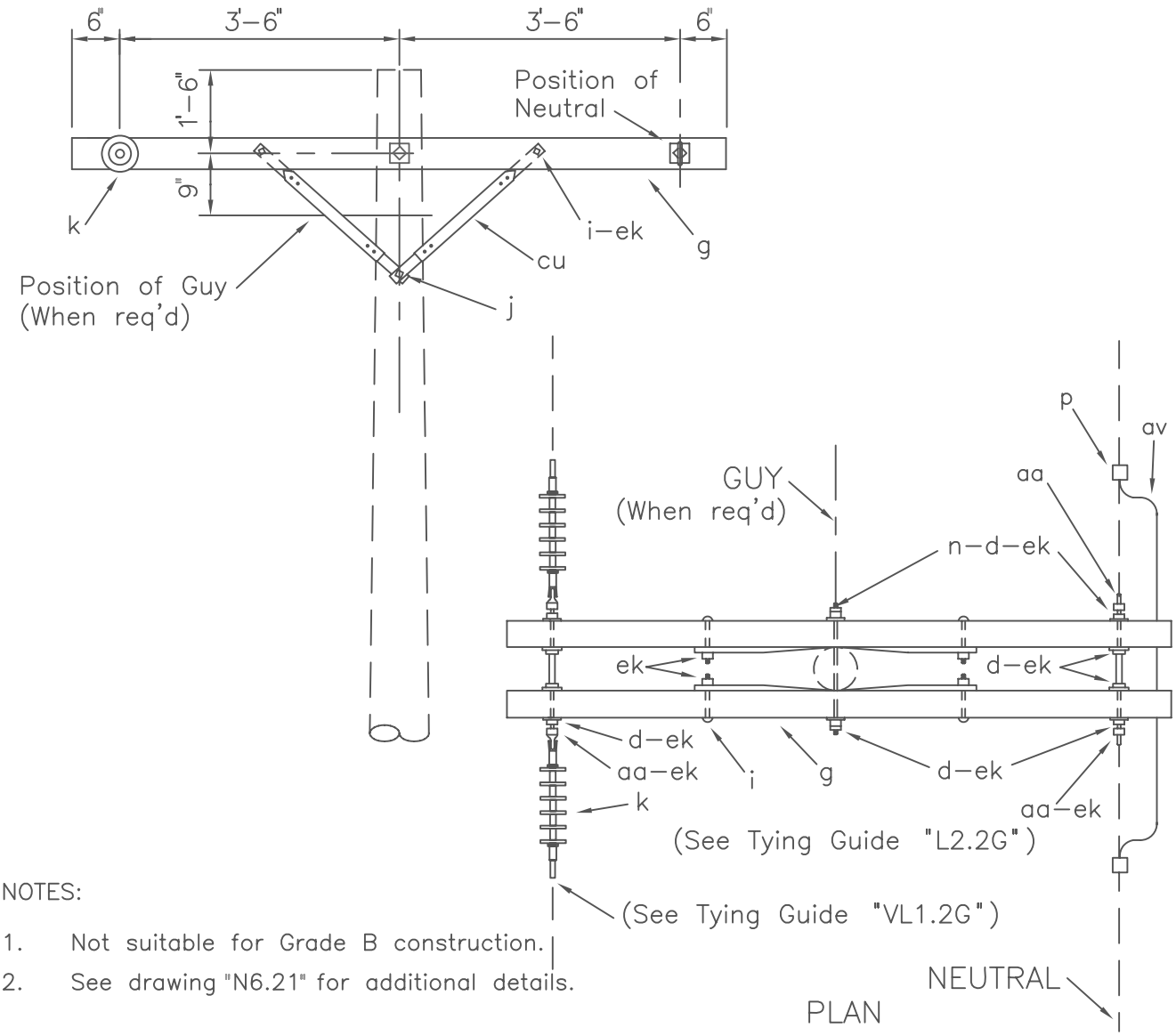
DESIGN PARAMETERS:

MAXIMUM ALLOWABLE LONGITUDINAL LOAD= 5000 lbs./Conductor

MAXIMUM LINE ANGLE = 5° (See Note)

DOUBLE DEADEND (FEED THROUGH)

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA6.2 (VA6)
RUS		



NOTES:

1. Not suitable for Grade B construction.
2. See drawing "N6.21" for additional details.

ITEM	QTY	MATERIAL
d	10	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	2	Insulator, 25 kV Polymer deadend
n	3	Bolt,double arming,5/8" x req'd length
p		Connectors, as req'd
aa	4	Nut, eye, 5/8"
av		Jumpers, as req'd
cu	4	Brace, wood, 28"
ek	18	Locknuts

NOTES:

3. Maximum line angle may be increased to 15° by installing anchor shackles, item "bo", to (horizontal) eyenuts and installing side guy as req'd.

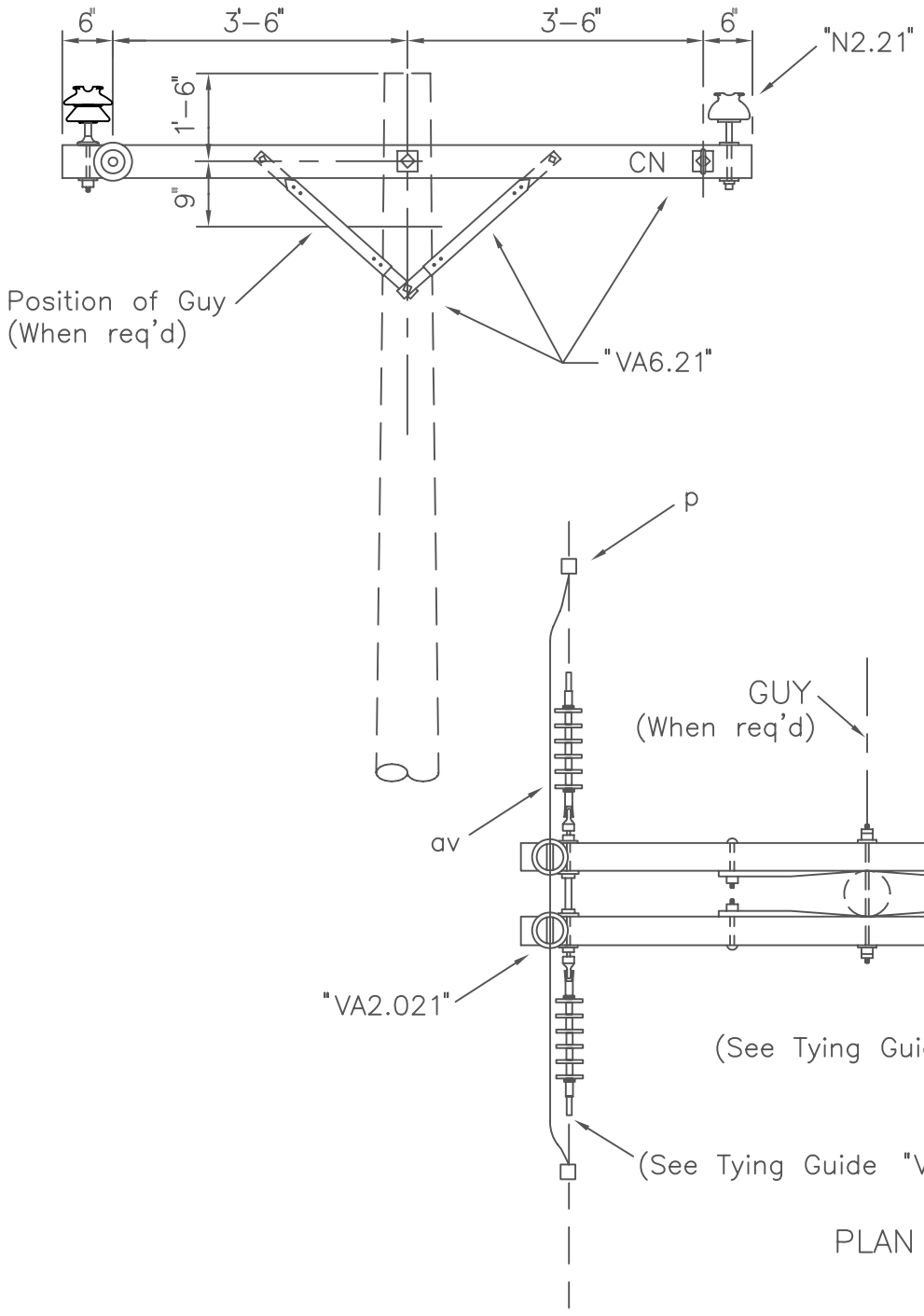
DESIGN PARAMETERS:

MAXIMUM ALLOWABLE UNBALANCED TENSION: 2,000 lbs./conductor

MAXIMUM ALLOWABLE LINE ANGLE = 5° (See Note 3)

DOUBLE DEADEND ON CROSSARMS

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA6.21 (VA8)
RUS		



ITEM	QTY	MATERIAL
	1	VA6.21 Primary Assembly
	1	VA2.021 Primary Assembly
	1	N2.21 Neutral Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

NOTE: Not suitable for grade B construction

DESIGN PARAMETERS:

ALLOWABLE UNBALANCED LONGITUDINAL TENSION: 2,000 lbs./conductor

MAXIMUM LINE ANGLE = 5° (See Dwg. VA6–21)

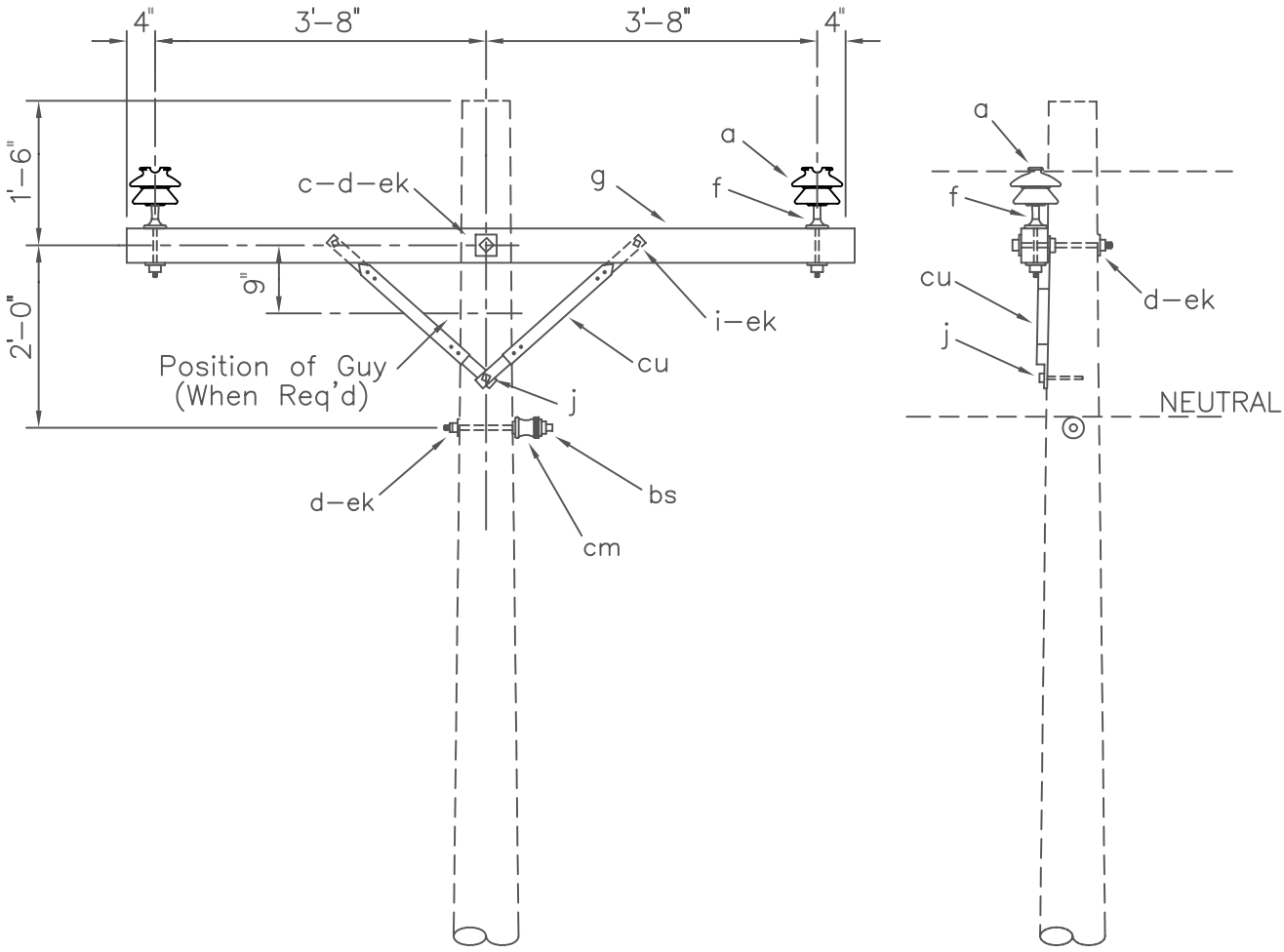
DOUBLE DEADEND GUIDE (FEED THROUGH ON CROSSARMS)

DEC 1998	1 – PHASE PRIMARY 24.9/14.4 kV	VA6.22G
RUS		

INDEX B

TWO-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VB1.11	SINGLE SUPPORT ON CROSSARM (TANGENT)
VB1.13	SINGLE SUPPORT ON CROSSARM
VB1.14	SINGLE SUPPORT, NEUTRAL ON CROSSARM
VB1.33N	SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB1.34N	DOUBLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB1.35N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VB1.39N	DOUBLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)
VB2.21	DOUBLE SUPPORT ON CROSSARMS
VB2.22	DOUBLE SUPPORT, NEUTRAL ON CROSSARMS
VB3.1	SUSPENSION ANGLE
VB4.1	DEADEND ANGLE (90 DEGREES – 150 DEGREES)
VB5.1	SINGLE DEADEND
VB5.21, VB5.31	SINGLE DEADEND ON CROSSARMS
VB6.21	DOUBLE DEADEND ON CROSSARMS
VB6.61	DOUBLE DEADEND – VERTICAL (SMALL CONDUCTORS)
VB5.72	SINGLE DEAD END ON CROSSARM – NARROW PROFILE



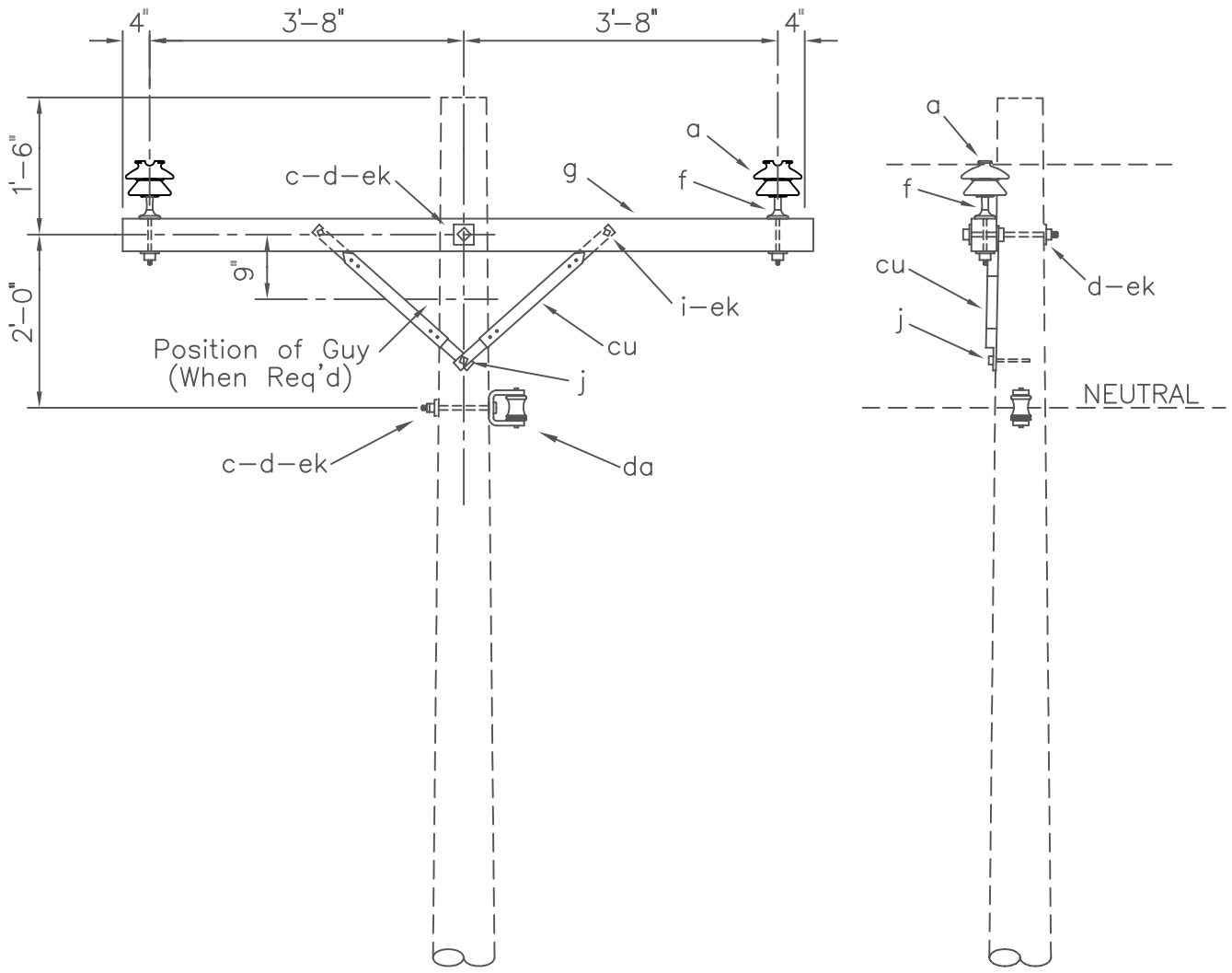
ITEM	MATERIAL	QTY
a	Insulator, pin type (24.9/14.4 kV)	2
c	Bolt, machine, 5/8" x req'd length	1
d	Washer, square, 2 1/4"	3
f	Pin, crossarm steel, 5/8" x 14"	2
g	Crossarm, 3 5/8" x 4 5/8" x 8'–0"	1
i	Bolt, carriage, 3/8" x 4 1/2"	2
j	Screw, lag, 1/2" x 4"	1
bs	Bolt, single, upset	1
cm	Insulator, spool, 3"	1
cu	Brace, 28"	2
ec	Bracket, offset, neutral	
ek	Locknuts	4

DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:
5° – Small Conductors
2° – Larger than #1/0

SINGLE SUPPORT ON CROSSARM (TANGENT)

DEC 1998	2 – PHASE PRIMARY 24.9/14.4 kV	VB1.11 (VB1)
RUS		



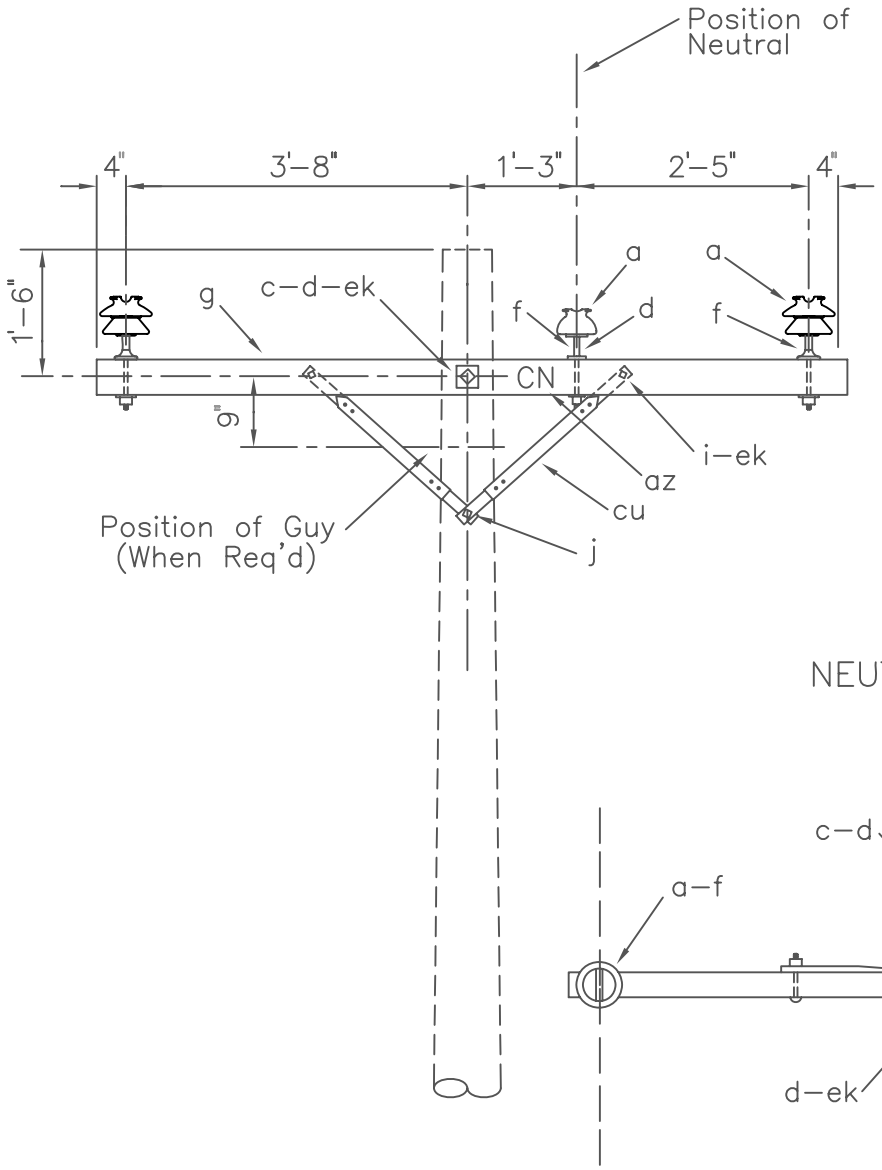
ITEM	QTY	MATERIAL
a	2	Insulator, pin type (24.9/14.4 kV)
c	2	Bolt, machine, 5/8" x req'd length
d	3	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 14"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8' – 0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j	1	Screw, lag, 1/2" x 4"
cu	2	Brace, 28"
da	1	Bracket, insulated
ek	4	Locknuts

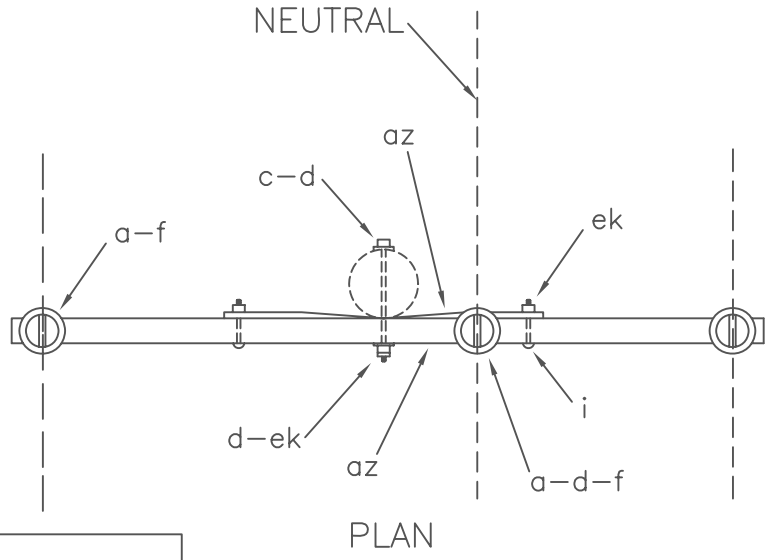
DESIGN PARAMETERS:

See TABLE II

SINGLE SUPPORT ON CROSSARM

DEC 1998	2 – PHASE PRIMARY	VB1.13
RUS	24.9/14.4 kV	(VB1)





PLAN

ITEM	QTY	MATERIAL
a	1	Insulator, pin type, 15 kV, white
a	2	Insulator, pin type (24.9/14.4 kV)
c	1	Bolt, machine, 5/8" x req'd length
d	3	Washer, square, 2 1/4"
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"
f	2	Pin, crossarm, steel, 5/8" x 14"
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"
az	4	Letters, 2" C, 2" N, with nails
cu	2	Brace, 28"
ek	3	Locknuts

NOTES:

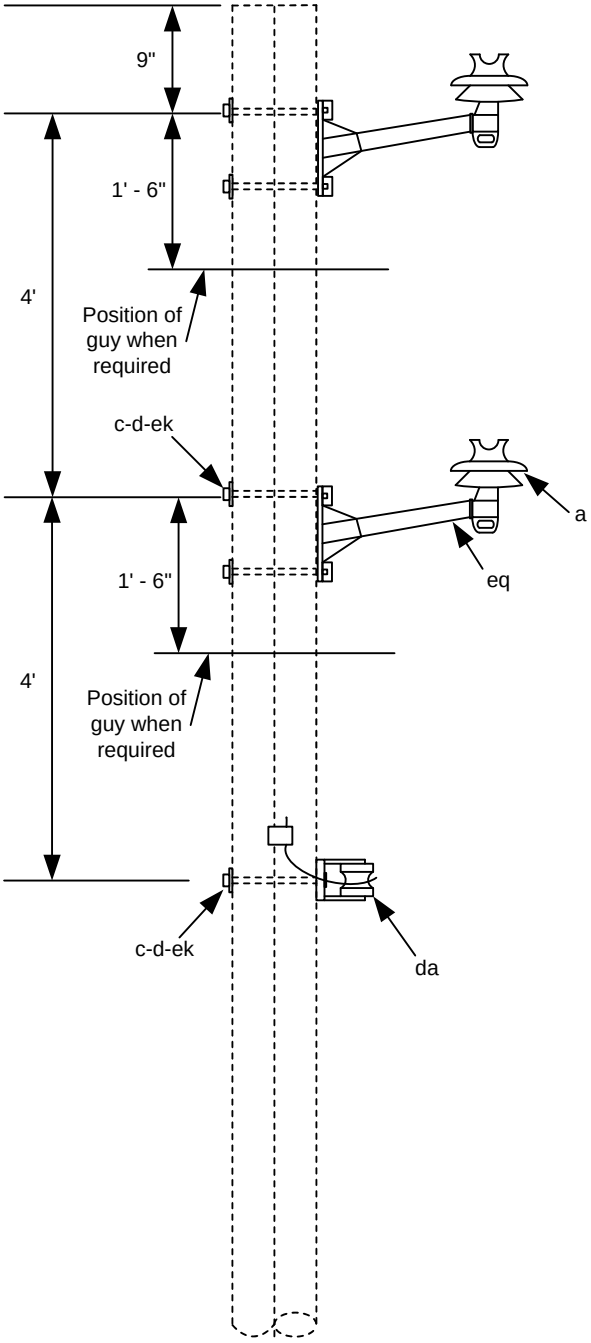
1. Install either identification letters (az) or white insulator in neutral position.
2. Where future construction to three–phase is likely, use construction similar to "VC1.41" and designate as "VB1.41".

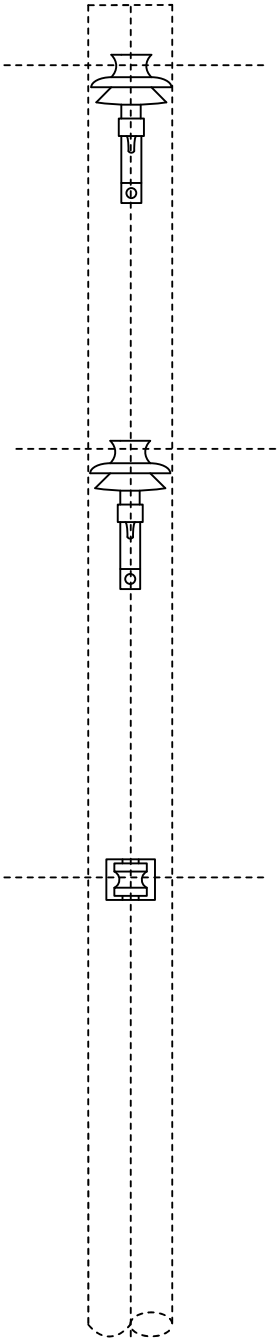
DESIGN PARAMETERS:

See TABLE II

SINGLE SUPPORT, NEUTRAL ON CROSSARM

DEC 1998	2–PHASE PRIMARY 24.9/14.4 kV	VB1.14 (VB9–1,VB9–3)
RUS		





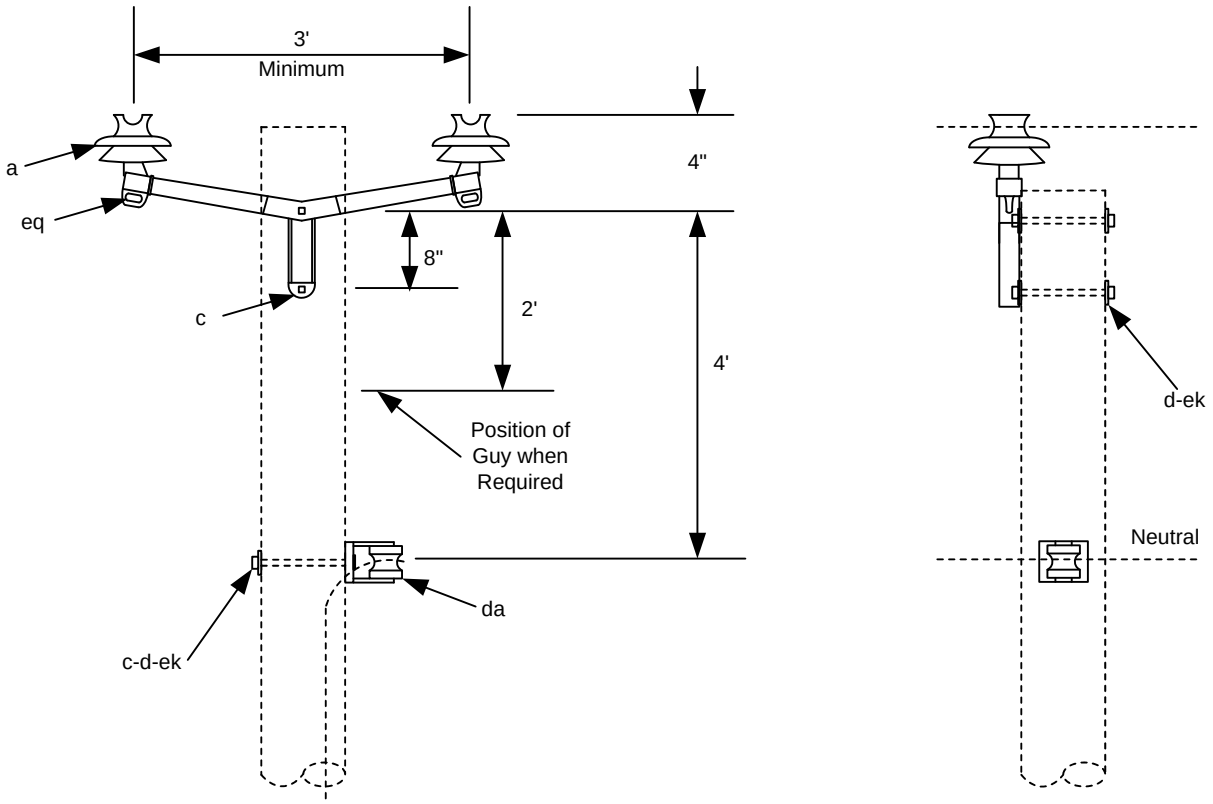
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Middle Conductor may be relocated to opposite side if required.
3. Maximum Line Angle is 15°.
4. Lower neutral an additional 4 feet if future 3 phase is anticipated.

ITEM	QTY.	MATERIAL
a	2	Insulator, Pin Type
c	5	Bolt, machine, 5/8" x Required Length
d	5	Washer, 2 ¼”
p		Connectors, as required
ah	2	Tie, Insulator, formed Type
da	1	Bracket, insulated
ek	5	Locknut 5/8"
eq	2	Bracket, Standoff, fiberglass 1 ½” dia.

SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)

2005	WFECA	2- Phase Primary 24.9/14.4 kV	VB1.33N

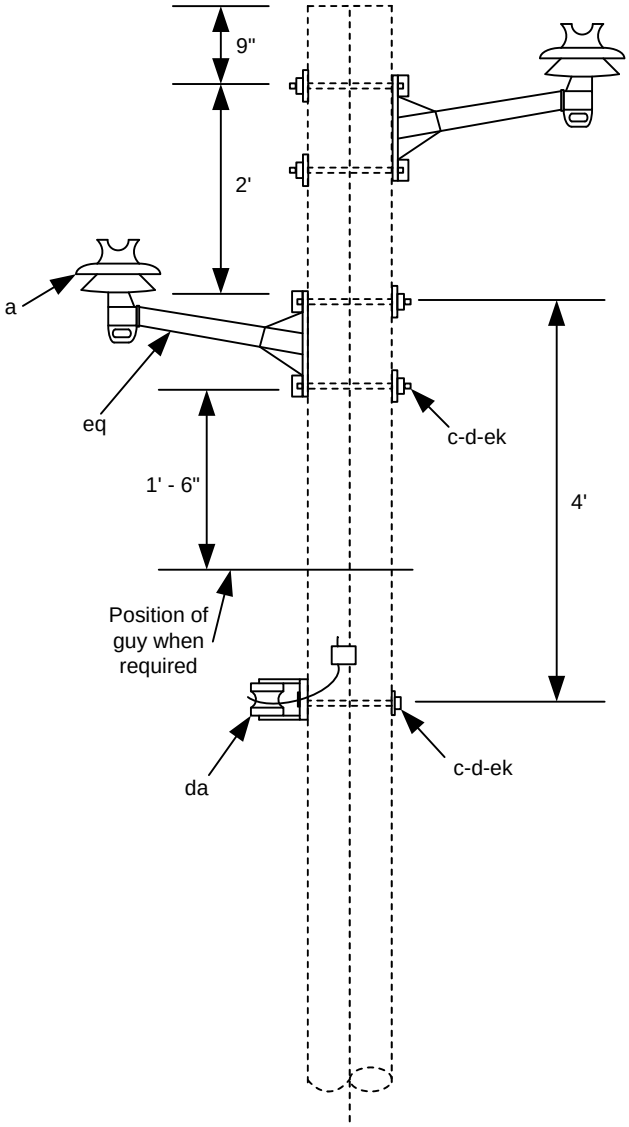


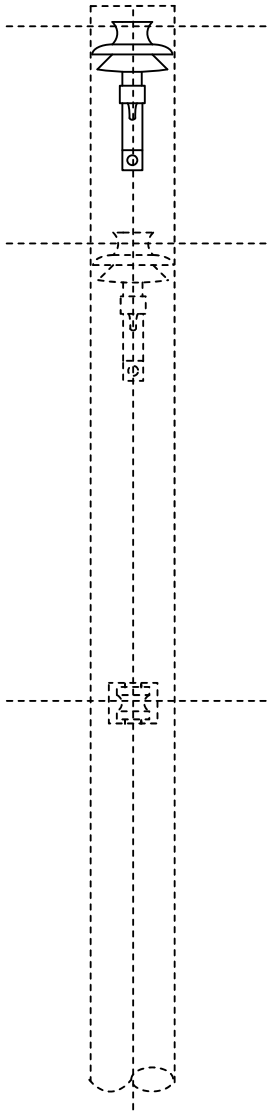
ITEM	QTY.	MATERIAL
a	2	Insulator, pin type
c	3	Bolt, machine, 5/8" x Required Length
d	3	Washer, 3"
da	1	Bracket, insulated
ek	3	Locknut 5/8"
eq	1	Bracket, standoff, double, fiberglass, 1 ½" dia.

DESIGN PARAMETERS (includes OLFs)
Maximum Transverse Load: 750# /cond
Allowable Line Angles,
8° - 1/0 AWG
18° - 4 AWG

DOUBLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)

2007	WFECA	2 – Phase Primary 24.9/14.4 kV	VB1.34N





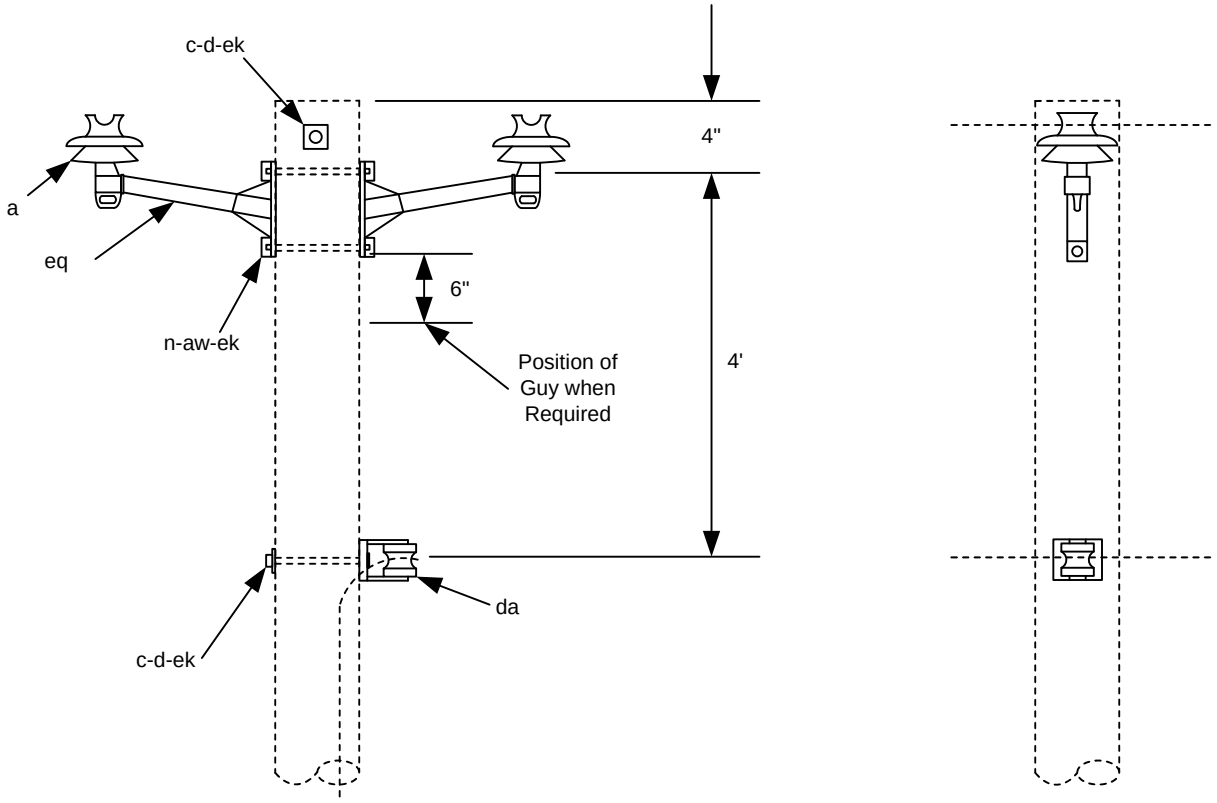
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Maximum Angle 19° for 4 ACSR
   9° for 1/0 ACSR
3. Lower neutral an additional 2 feet if future 3 phase is anticipated.

ITEM	QTY.	MATERIAL
a	2	Insulator, Pin Type
c	5	Bolt, machine, 5/8" x Required Length
d	5	Washer, 2 ¼”
p		Connectors, as required
ah	3	Tie, Insulator, Formed Type
da	1	Bracket, insulated
ek	5	Locknut 5/8"
eq	2	Bracket, Standoff, fiberglass, 1 ½” dia.

SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)

2005	WFECA	2 – Phase Primary 24.9/14.4 kV	VB1.35N



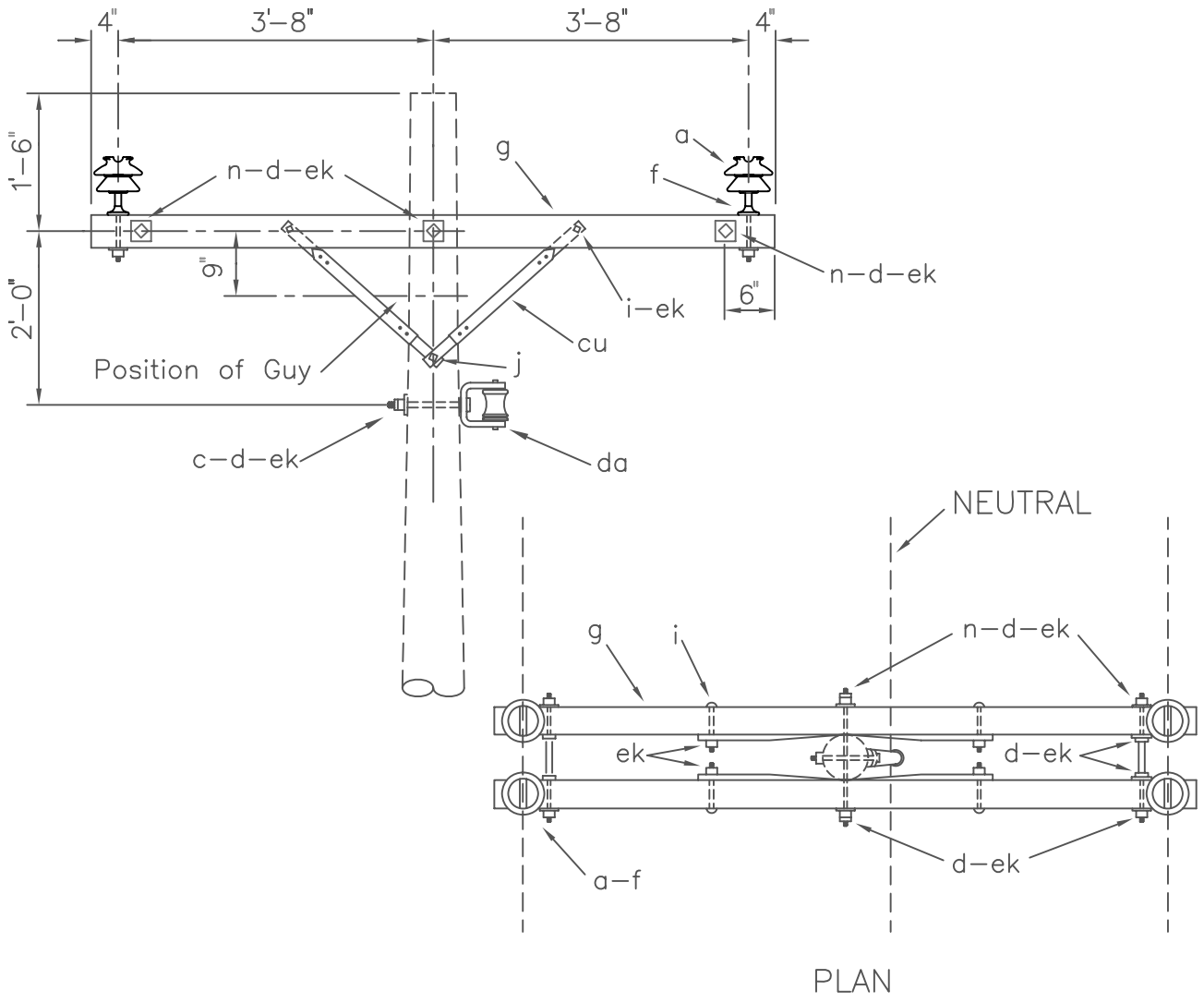
ITEM	QTY.	MATERIAL
a	2	Insulator, Pin Type
c	2	Bolt, machine, 5/8" x Required Length
d	3	Washer, 3"
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
ah	3	Tie, Insulator, Formed type
aw	2	Washer, flat spring
bv	3	Armor Rod
da	1	Bracket, insulated
ek	4	Locknut 5/8"
eq	2	Bracket, Standoff, fiberglass, 1 ½" dia.

Note:

1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2°.

SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)

2007	WFECA	2 – Phase Primary 24.9/14.4 kV	VB1.39N



PLAN

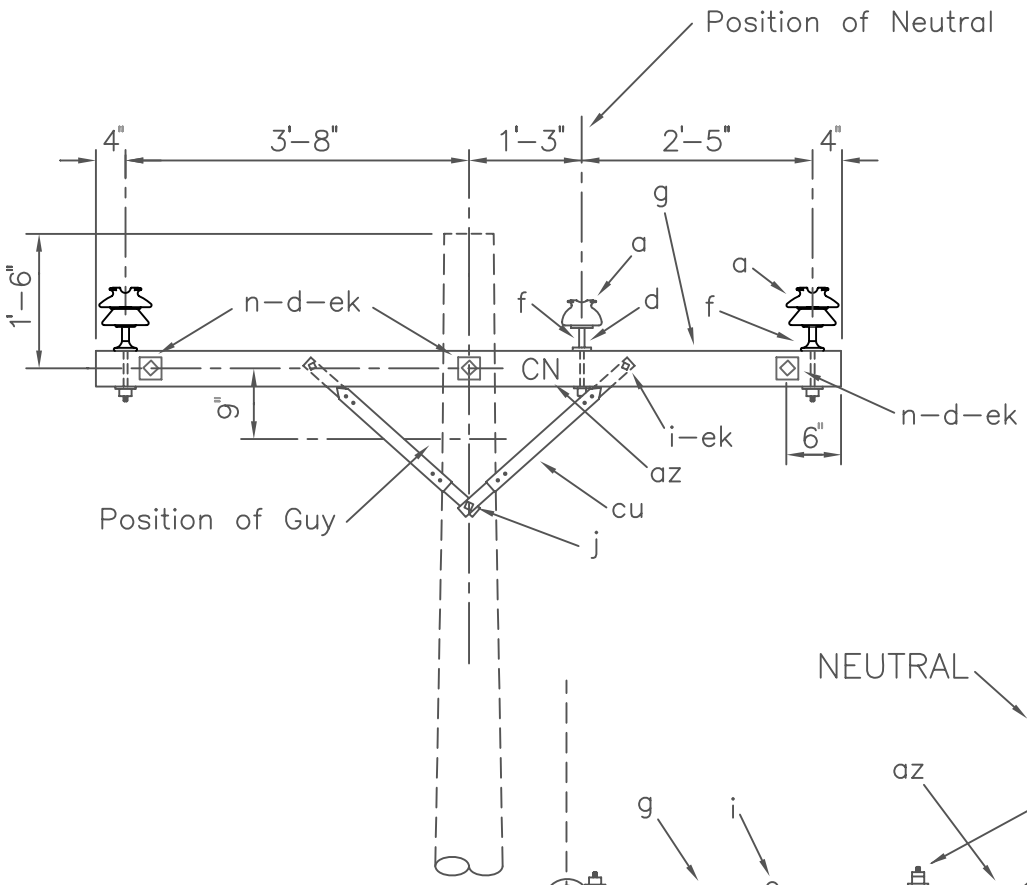
ITEM	QTY	MATERIAL
a	4	Insulator, pin type (24.9/14.4 kV)
c	1	Bolt, machine, 5/8" x req'd length
d	11	Washer, square, 2 1/4"
f	4	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8' 0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
n	3	Bolt, double arm, 5/8" x req'd length
cu	4	Brace, 28"
da	1	Bracket, insulated
ek	15	Locknuts

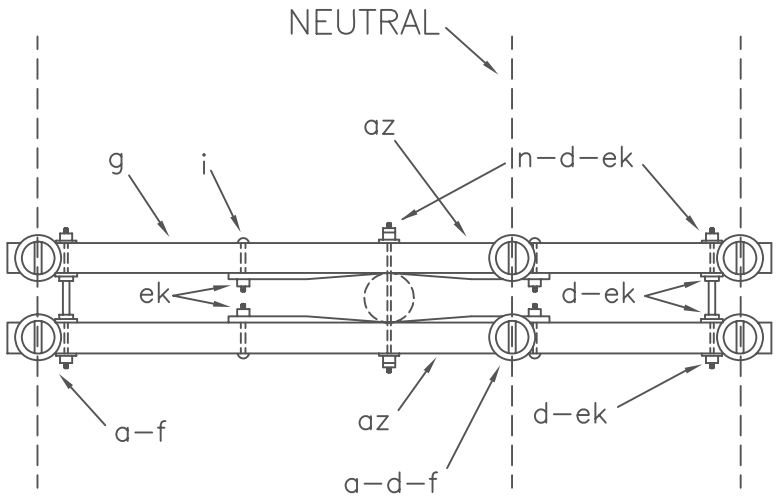
DESIGN PARAMETERS:

See TABLE IV

DOUBLE SUPPORT ON CROSSARMS

DEC 1998	2 – PHASE PRIMARY	VB2.21
RUS	24.9/14.4 kV	(VB2)





PLAN

ITEM	QTY	MATERIAL
a	2	Insulator, pin type, white, (15 kV)
a	4	Insulator, pin type (24.9/14.4 kV)
d	12	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
f	4	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8' – 0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
n	3	Bolt, double arm, 5/8" x req'd length
az	4	Letters, 2" C, 2" N, with nails
cu	4	Brace, 28"
ek	14	Locknuts

NOTES:

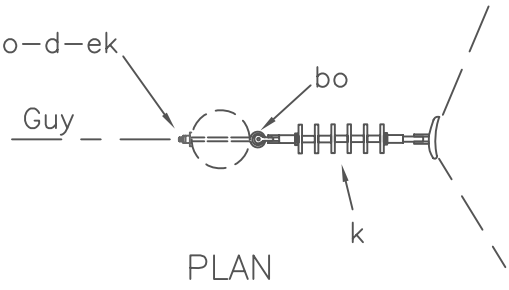
1. Install either identification letters (az) or white insulator in neutral position.
2. Where future construction to three–phase is likely, use construction similar to "VC2.51" and designate as "VB2.51".

DESIGN PARAMETERS:

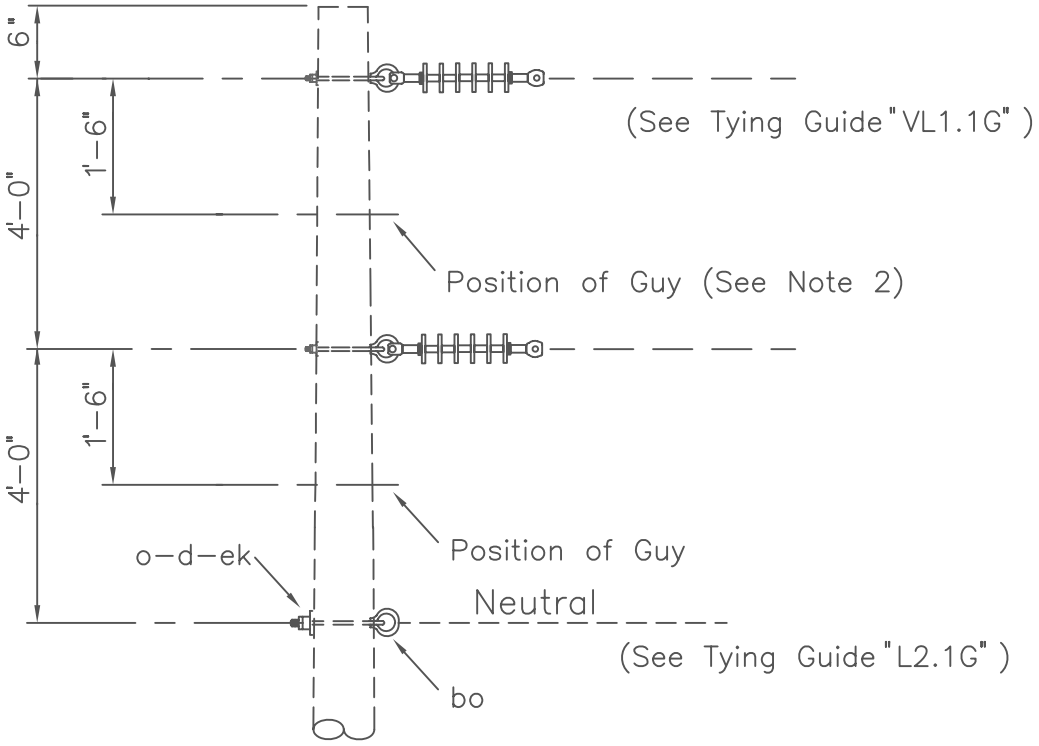
See TABLE IV

DOUBLE SUPPORT, NEUTRAL ON CROSSARMS

DEC 1998	2 – PHASE PRIMARY 24.9/14.4 kV	VB2.22 (VB9,VB9–2)
RUS		



PLAN



NOTES:

1. Assembly unit VA5.2 or VA5.4 may be substituted at the lower phase position if additional climbing space is desired.
2. When more guys are required, install guys 6" below assemblies and install 12" guy strain insulators ("w") at top of primary guys.

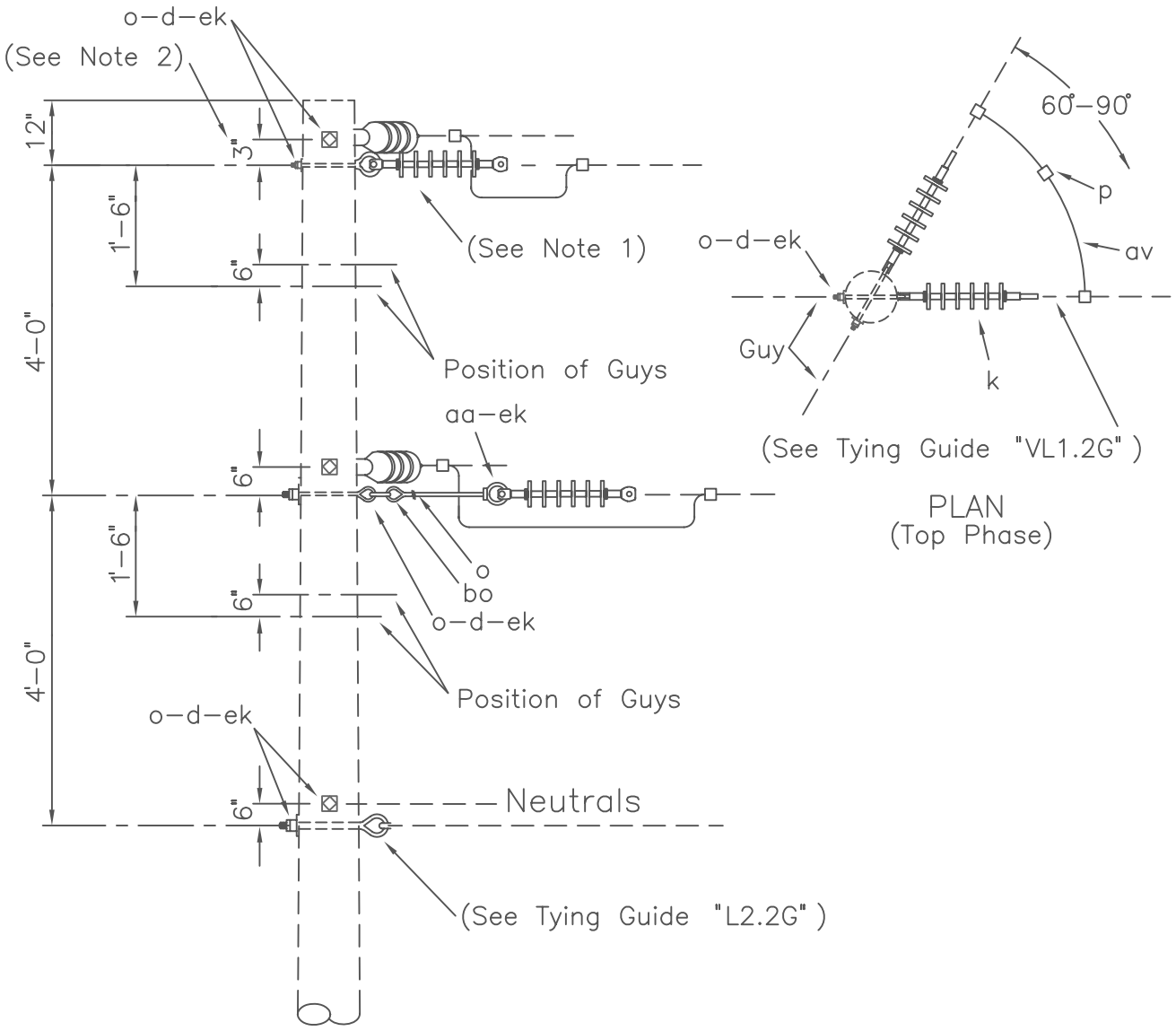
ITEM	QTY	MATERIAL
d	2	Washer, square, 3", curved
k	2	Insulator, 25 kV Polymer deadend
o	2	Bolt, eye, 5/8" x req'd length
bo	3	Shackle, anchor
ek	2	Locknuts

DESIGN PARAMETERS:

ALLOWABLE TRANSVERSE
LOAD= 5000 lbs./Conductor
20° – 60°: #1/0 ACSR & Larger
30° – 60°: Smaller Conductors

SUSPENSION ANGLE

DEC 1998	2 – PHASE PRIMARY	VB3.1
RUS	24.9/14.4 kV	(VB3)



NOTES:

1. VA5.2's, VA5.3's or VA5.4's may be used instead of assembly shown.
2. Separate 6" (top position only) when angle equals 90°

ITEM	QTY	MATERIAL
d	6	Washer, square, 3", curved
k	4	Insulator, 25 kV Polymer deadend
o	8	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
aa	2	Nut, eye, 5/8"
av		Jumpers, as req'd
bo	2	Shackle, anchor
ek	8	Locknuts

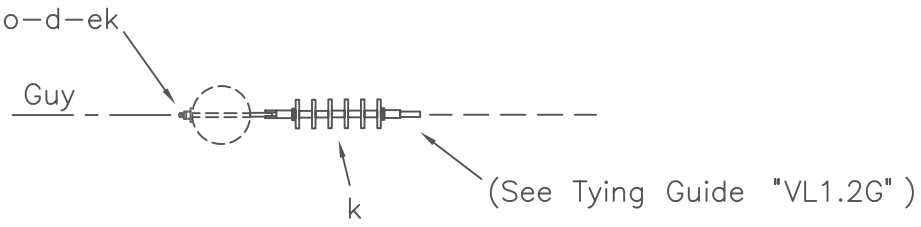
3. Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "o") and eye nut (item "aa").

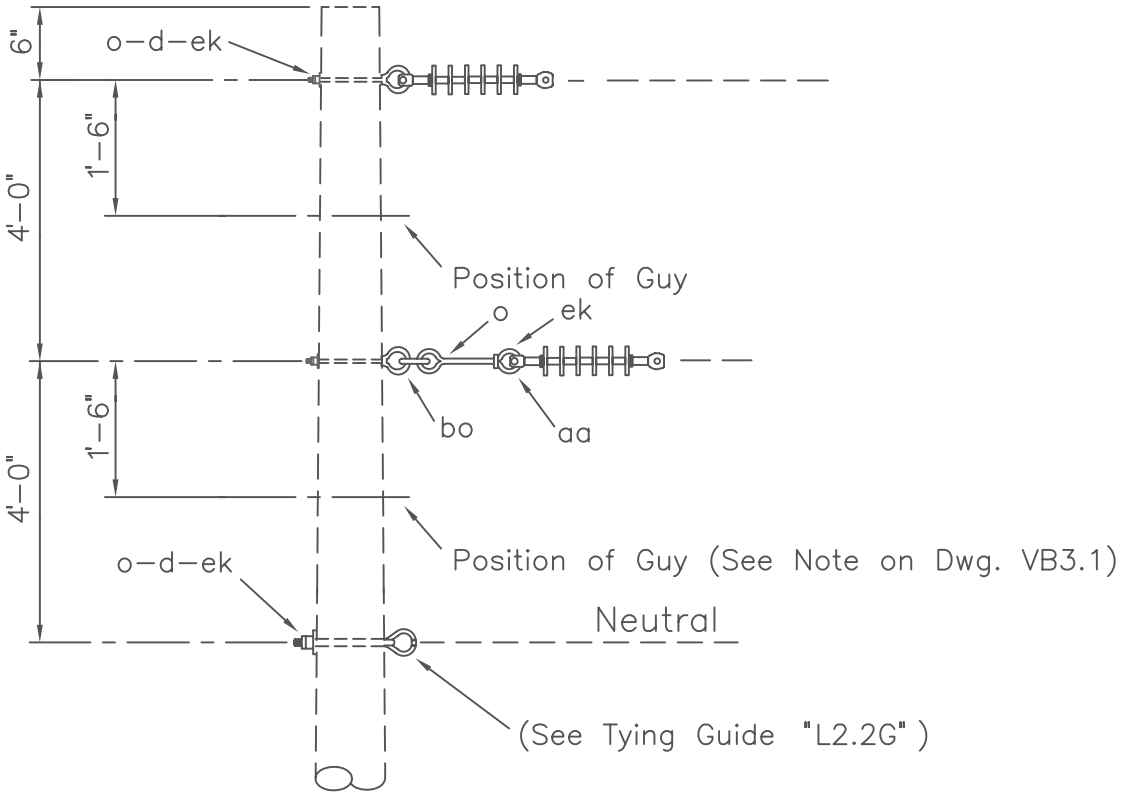
DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5000 lbs./Conductor

DEADEND ANGLE (90°–150°)

DEC 1998	2 – PHASE PRIMARY	VB4.1
RUS	24.9/14.4 kV	(VB4)





NOTES:

1. VA5.2, VA5.3 or VA5.4 may be substituted for the primary assemblies shown.
2. Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "o") and eye nut (item "aa").

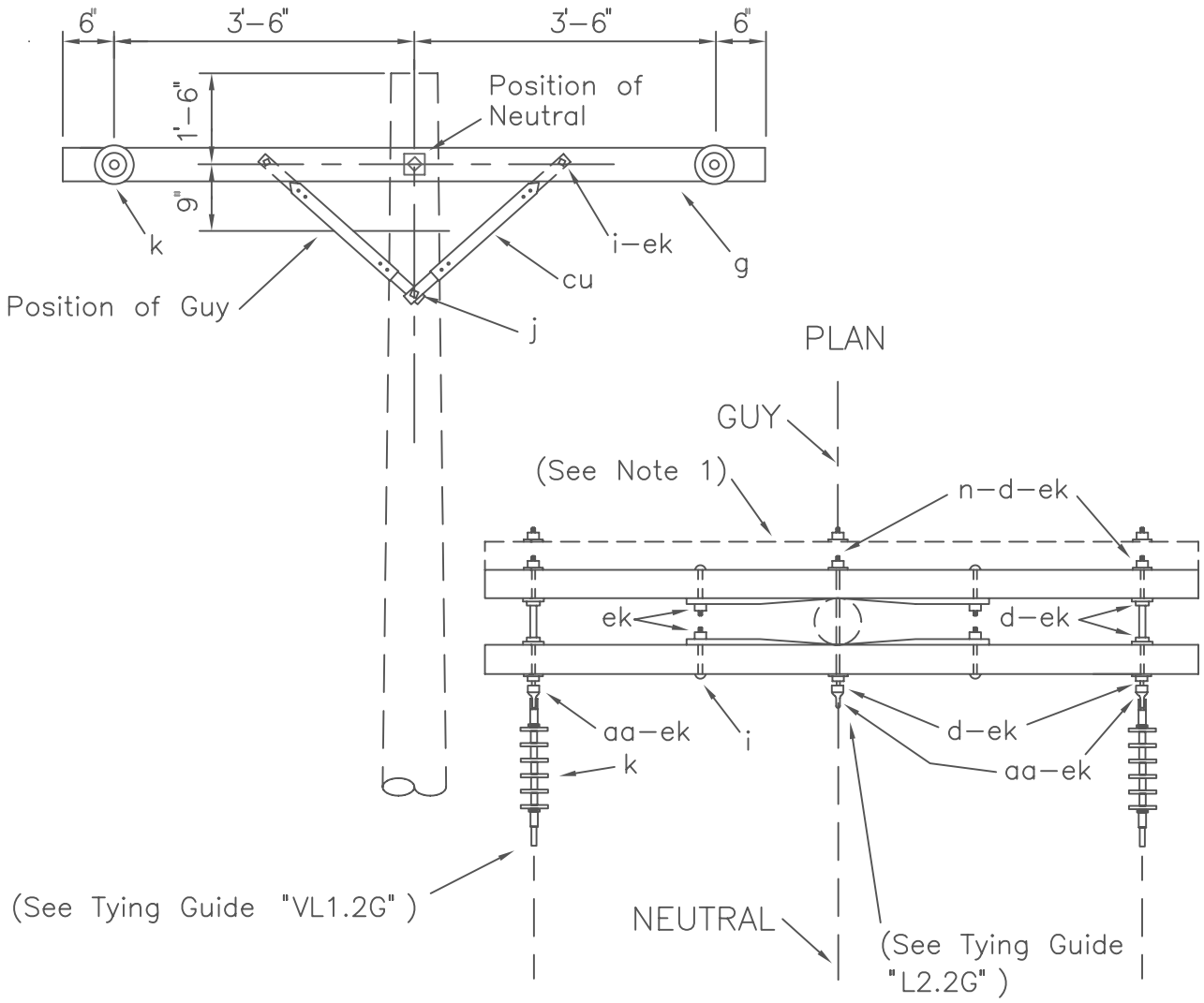
ITEM	QTY	MATERIAL
d	3	Washer, square, 3", curved
k	2	Insulator, 25 kV Polymer deadend
o	4	Bolt, eye, 5/8" x req'd length
aa	1	Nut, eye, 5/8"
bo	1	Shackle, anchor
ek	4	Locknuts

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5000 lbs./Conductor

SINGLE DEADEND

DEC 1998	2 – PHASE PRIMARY 24.9/14.4 kV	VB5.1 (VB5–1)
RUS		



NOTES:

1. Designate as VB5.31 for assembly with three crossarms.
2. Neither assembly suitable for Grade B construction.
3. Double arming eye bolt, item "dy," may be used instead of double arming bolt, item "n," and eyenut, item "aa."

ITEM	QTY	MATERIAL
d	10	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	2	Insulator, 25 kV Polymer deadend
n	3	Bolt,double arming,5/8" x req'd length
aa	3	Nut, eye, 5/8"
cu	4	Brace, 28"
ek	17	Locknuts

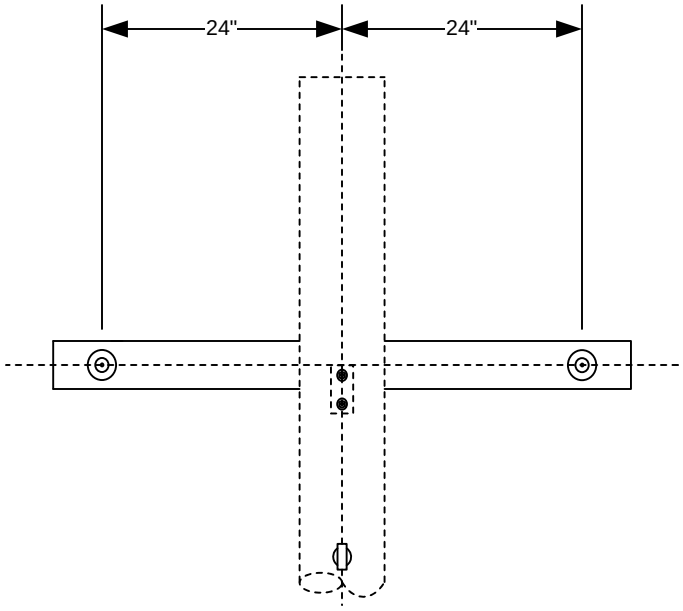
DESIGN PARAMETERS:

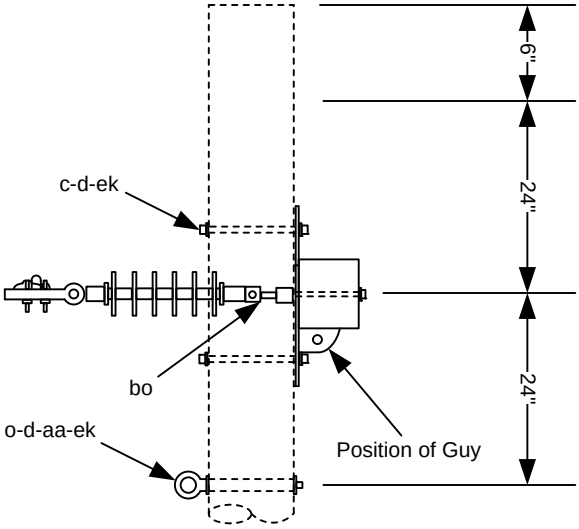
ALLOWABLE LONGITUDINAL LOADING (lbs/conductor) =

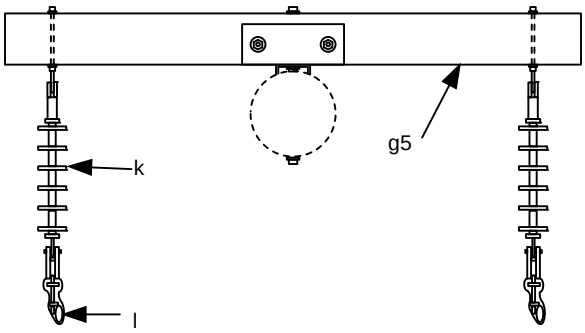
VB5.21: 2,000 (#2 ACSR)
VB5.31: 3,000 (#2/0 ACSR)

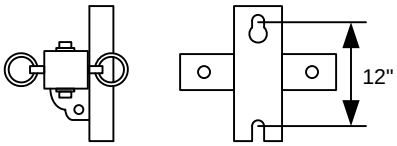
SINGLE DEADEND ON CROSSARMS

DEC 1998	2 – PHASE PRIMARY	VB5.21, VB5.31
RUS	24.9/14.4 kV	(VB7, VB7–1)









Mounting Plate Detail

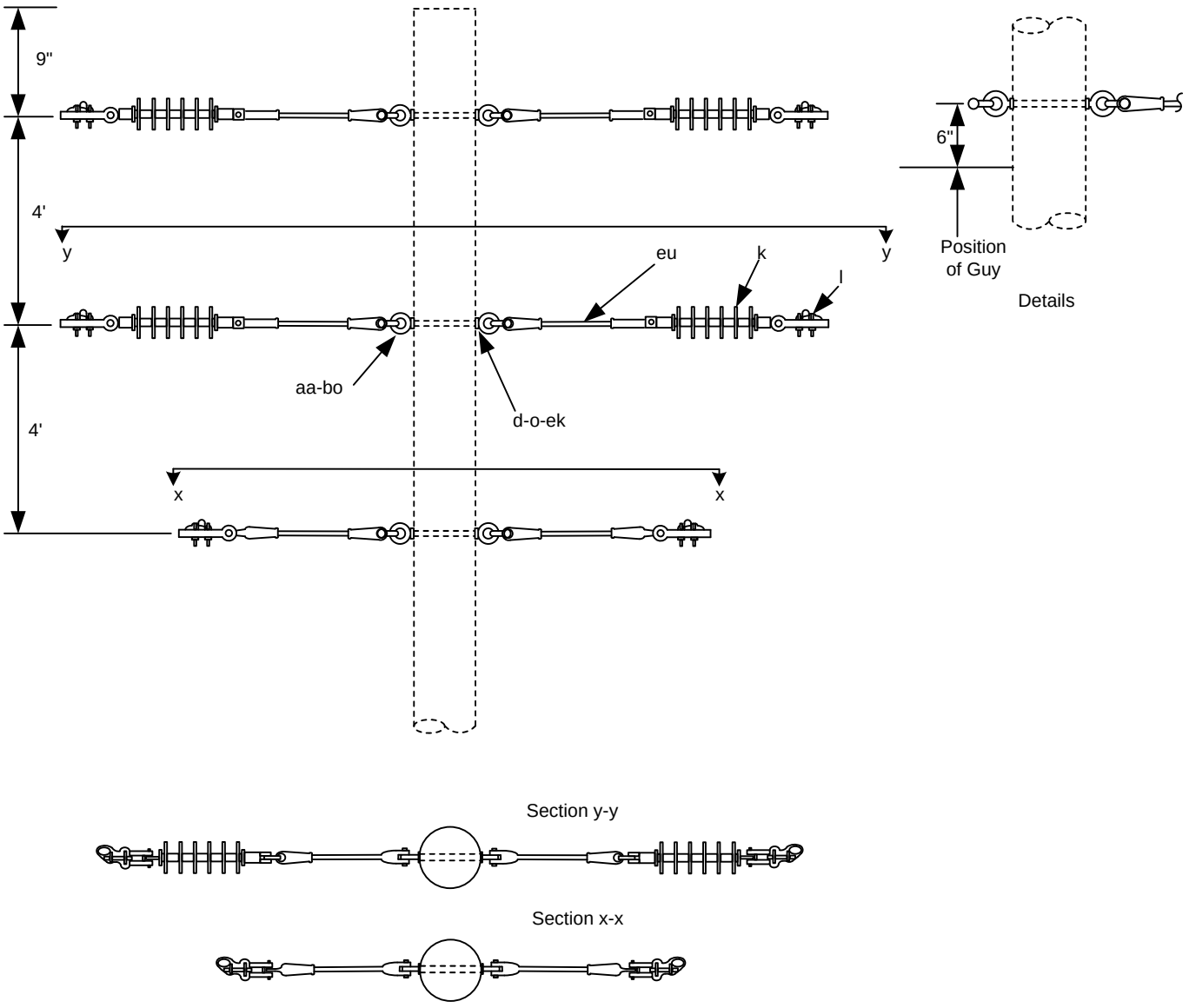
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	3	Washer, 3"
g5	1	Crossarm Assembly, 5' (Dead End)
k	2	Insulator, 25 kV Polymer Deadend
o	1	Bolt, eye, 5/8" x required length
l	2	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
bo	2	Shackle, Anchor
ek	3	Locknut, 5/8"

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

SINGLE DEAD END ON CROSSARM - NARROW PROFILE

2012	WFECA	2 – Phase Primary 24.9/14.4 kV	VB5.72N



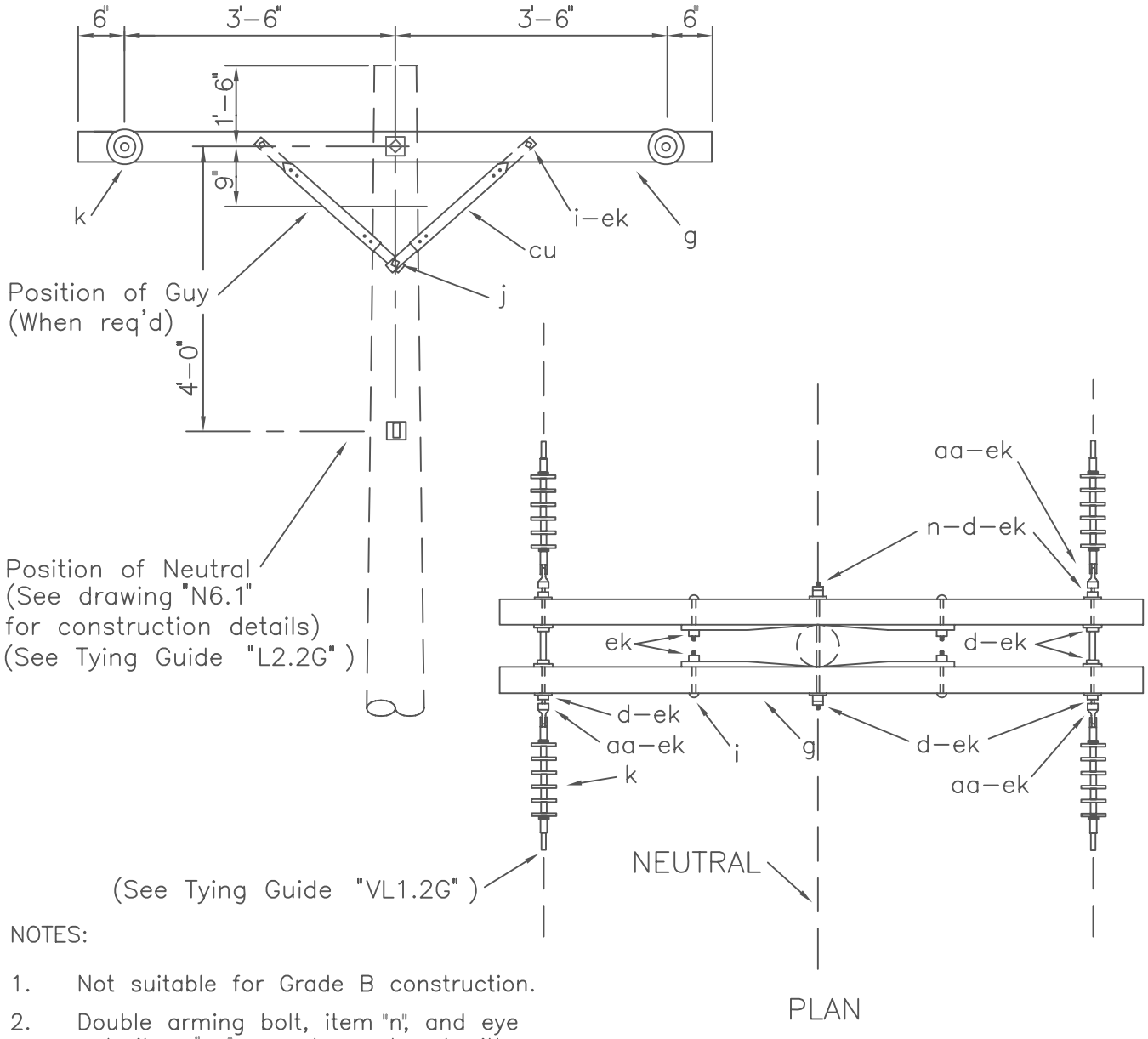
ITEM	QTY.	MATERIAL
d	6	Washer, 3"
k	4	Insulator, 25 kV Polymer deadend
l	4	Clamp, Dead end, Primary
l	2	Clamp, Dead end, Neutral
o	3	Bolt, Eye, 5/8" x required length
aa	3	Nut, eye, 5/8"
bo	6	Shackle, Anchor
ek	6	Locknut, 5/8"
eu	6	Link, extension, insulated, eye-clevis

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END - VERTICAL (SMALL CONDUCTORS)

2006	WFECA	2 – Phase Primary 24.9/14.4 kV	VB6.61



PLAN

NOTES:

1. Not suitable for Grade B construction.
2. Double arming bolt, item "n", and eye nut, item "aa", may be replaced with double arming eye bolt, item "dy".

ITEM	QTY	MATERIAL
d	12	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	4	Insulator, 25 kV Polymer deadend
n	4	Bolt,double arming,5/8" x req'd length
aa	6	Nut, eye, 5/8"
cu	4	Brace, 28"
ek	22	Locknuts

NOTES:

3. Maximum line angle may be increased to 15° by installing anchor shackles, item "bo", to (horizontal) eyenuts and installing side guy as req'd.

DESIGN PARAMETERS:

ALLOWABLE UNBALANCED LONGITUDINAL TENSION: 2,000 lbs./conductor

MAXIMUM LINE ANGLE = 5° (See Note 3)

DOUBLE DEADEND ON CROSSARMS

DEC 1998	2 – PHASE PRIMARY 24.9/14.4 kV	VB6.21 (VB8)
RUS		

TABLE V

MAXIMUM LINE ANGLES ON PIN INSULATOR ASSEMBLIES

Designated Maximum Transverse Load = 2,000 Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	60	59	59
2 ACSR (6/1)	50	50	49	48	48	47
2 ACSR (7/1)	39	38	38	37	37	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	28
3/0 ACSR (6/1)	25	24	24	23	23	22
4/0 ACSR (6/1)	24	24	23	23	22	22
246.9 AAAC (7)	24	23	23	22	22	21
336.4 ACSR (18/1)	23	22	22	21	20	20
336.4 ACSR (26/7)	16	16	15	15	14	14
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	60	60	60	59	58	57
2 ACSR (6/1)	50	49	48	48	47	46
2 ACSR (7/1)	39	38	37	37	36	36
1/0 ACSR (6/1)	32	31	31	30	30	29
123.3 AAAC (7)	31	31	30	30	29	29
2/0 ACSR (6/1)	31	31	30	30	29	29
3/0 ACSR (6/1)	25	24	24	24	23	23
4/0 ACSR (6/1)	25	24	24	23	23	22
246.9 AAAC (7)	24	24	23	23	22	22
336.4 ACSR (18/1)	24	23	23	22	22	21
336.4 ACSR (26/7)	16	16	16	15	15	15
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	60	58	57	55	54	52
2 ACSR (6/1)	49	47	46	45	44	43
2 ACSR (7/1)	38	37	36	35	34	33
1/0 ACSR (6/1)	31	30	29	28	28	27
123.3 AAAC (7)	30	30	29	28	27	26
2/0 ACSR (6/1)	30	30	29	28	27	26
3/0 ACSR (6/1)	24	24	23	22	22	21
4/0 ACSR (6/1)	24	23	23	22	21	21
246.9 AAAC (7)	23	23	22	21	21	20
336.4 ACSR (18/1)	23	22	21	21	20	19
336.4 ACSR (26/7)	16	16	15	14	14	13

INDEX C

THREE-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VC1.11	SINGLE SUPPORT ON CROSSARM (TANGENT)
VC1.11L	SINGLE SUPPORT ON CROSSARM (TANGENT) (LARGE CONDUCTORS)
VC1.11P	SINGLE SUPPORT ON CROSSARM – POST INSULATORS (LARGE CONDUCTORS)
VC1.13P	SINGLE SUPPORT ON CROSSARM – POST INSULATORS (LARGE CONDUCTORS)
VC1.21N	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE (LARGE CONDUCTORS)
VC1.22N	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE (LARGE CONDUCTORS)
VC1.23N	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE (LARGE CONDUCTORS)
VC1.23NT	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE - OFFSET (LARGE CONDUCTORS)
VC1.24N	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE (LARGE CONDUCTORS)
VC1.33N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VC1.35N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VC1.38N	SINGLE SUPPORT ON FIBERGLASS BRACKET – NARROW PROFILE (SMALL CONDUCTORS)
VC1.39N	SINGLE SUPPORT ON POST INSULATOR – NARROW PROFILE (LARGE CONDUCTORS)

THREE-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

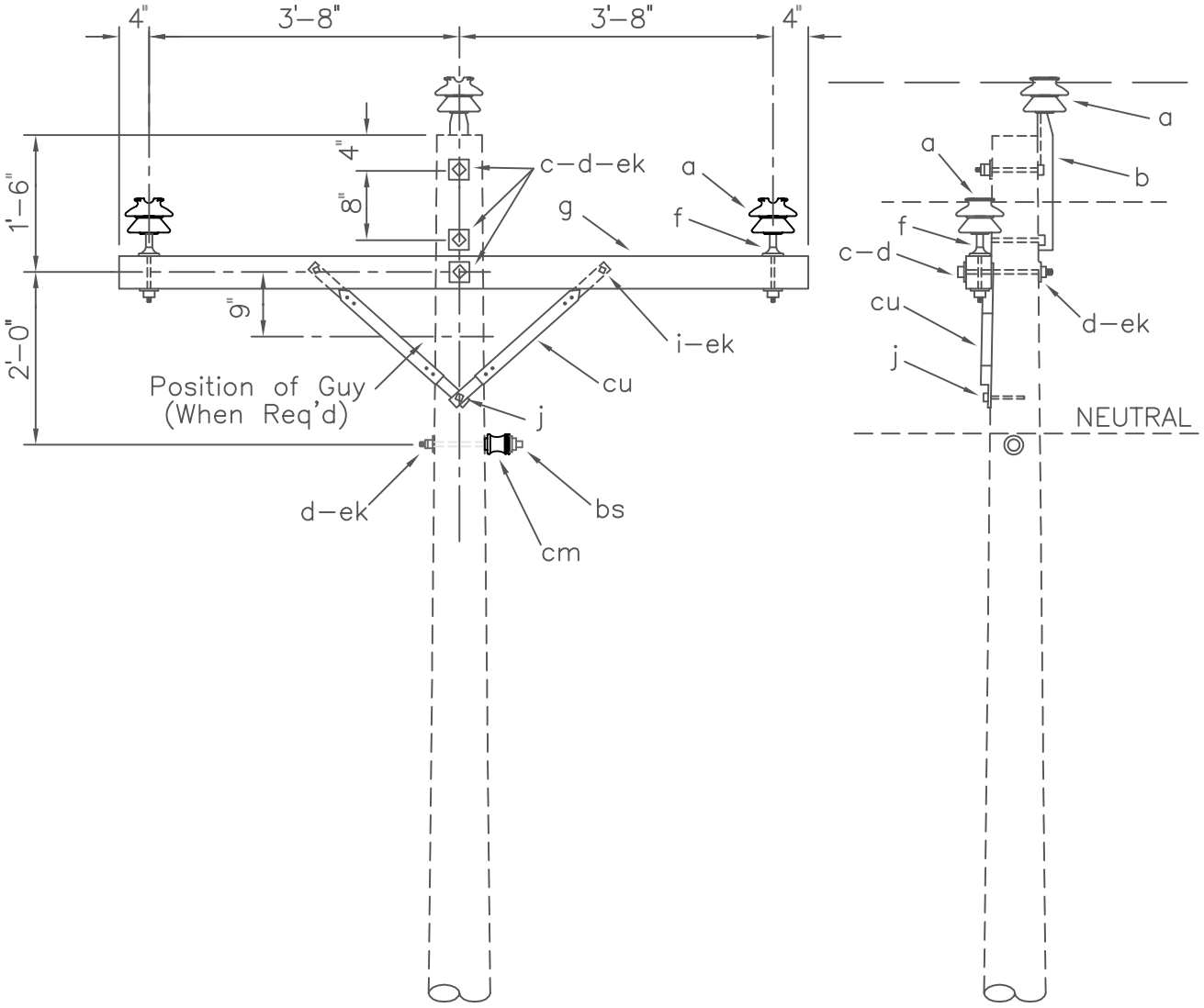
DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VC1.41	SINGLE SUPPORT, NEUTRAL ON CROSSARM
VC1.41L	SINGLE SUPPORT, NEUTRAL ON CROSSARM (LARGE CONDUCTORS)
VC1.41P	SINGLE SUPPORT, NEUTRAL ON CROSSARM – POST INSULATORS (LARGE CONDUCTORS)
VC1.42P	SINGLE SUPPORT, NEUTRAL ON CROSSARM – POST INSULATORS (LARGE CONDUCTORS)
VC1.53	SINGLE SUPPORT ON CROSSARM – (TANGENT) (LARGE CONDUCTORS)
VC1.81G	THREE-PHASE JUNCTION GUIDE
VC2.21	DOUBLE SUPPORT ON CROSSARM
VC2.21L	DOUBLE SUPPORT ON CROSSARM (LARGE CONDUCTORS)
VC2.51	DOUBLE SUPPORT, NEUTRAL ON CROSSARMS
VC2.51L	DOUBLE SUPPORT, NEUTRAL ON CROSSARMS (LARGE CONDUCTORS)
VC2.52	DOUBLE SUPPORT ON 10 FOOT CROSSARMS
VC2.52L	DOUBLE SUPPORT ON 10 FOOT CROSSARMS (LARGE CONDUCTORS)
VC2.91	DOUBLE SUPPORT ON CROSSARMS (ALLEY ARM)
VC3.1	SUSPENSION ANGLE
VC3.2L	SUSPENSION ANGLE (LARGE CONDUCTORS)
VC3.3L	SUSPENSION ANGLE (LARGE CONDUCTORS)

THREE-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VC4.1	DEADEND ANGLE (ACUTE)
VC4.2L	DEADEND ANGLE (LARGE CONDUCTORS)
VC4.3L	DEADEND ANGLE (LARGE CONDUCTORS)
VC4.4L	TRIPLE DEADEND (LARGE CONDUCTORS)
VC5.1	SINGLE DEADEND – VERTICAL
VC5.11G	SINGLE PHASE TAP GUIDE
VC5.21, VC5.31	SINGLE DEADEND ON CROSSARMS
VC5.2L	SINGLE DEADEND – VERTICAL (LARGE CONDUCTORS)
VC5.3L	SINGLE DEADEND – VERTICAL (LARGE CONDUCTORS)
VC5.71L	SINGLE DEADEND ON CROSSARM (LARGE CONDUCTORS)
VC5.72N	SINGLE DEADEND ON CROSSARM – NARROW PROFILE (LARGE CONDUCTORS)
VC5.73L	SINGLE DEADEND ON 12' CROSSARM (LARGE CONDUCTORS)
VC5.82G	THREE PHASE HORIZONTAL TAP GUIDE

THREE-PHASE PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VC6.21, VC6.31	DOUBLE DEADEND ON CROSSARMS
VC6.51	DOUBLE DEADEND ON 10 FOOT CROSSARMS (LARGE CONDUCTORS)
VC6.51L	DOUBLE DEADEND ON 10 FOOT CROSSARM (LARGE CONDUCTORS)
VC6.52	DOUBLE DEADEND ON 10 FOOT CROSSARMS (LARGE CONDUCTORS)
VC6.52G	DOUBLE DEADEND ON 10 FOOT CROSSARMS (FEED THROUGH GUIDE)
VC6.53	DOUBLE DEADEND ON 12' CROSSARM (LARGE CONDUCTORS)
VC6.61	DOUBLE DEADEND –VERTICAL (SMALL CONDUCTORS)
VC6.61L	DOUBLE DEADEND–VERTICAL (LARGE CONDUCTORS)
VC6.91G	DOUBLE DEADENDS (BUCKARMS) GUIDE



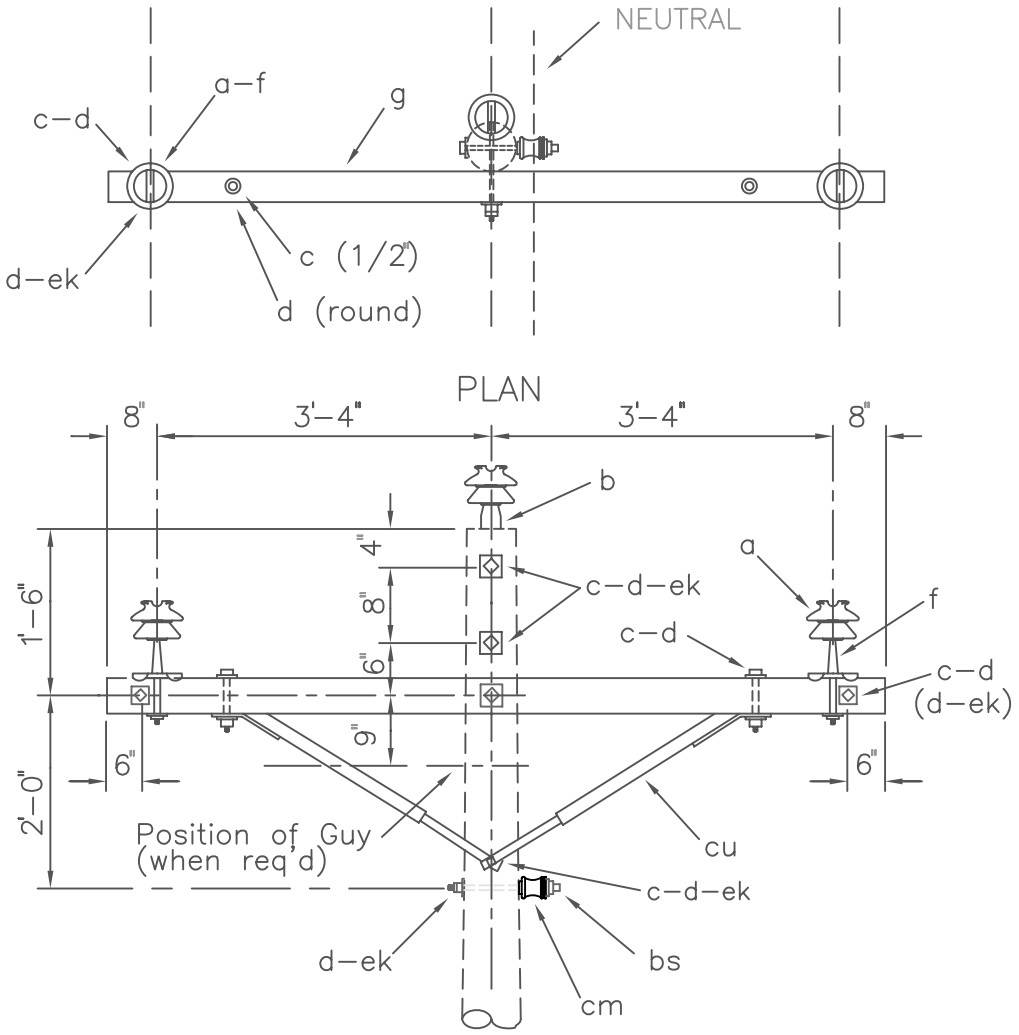
ITEM	MATERIAL	QTY
a	Insulator, pin type, (24.9/14.4 kV)	3
b	Pin, pole top, 20"	1
c	Bolt, machine, 5/8 x req'd length	3
d	Washer, square, 2 1/4"	5
f	Pin, crossarm, steel, 5/8" x 14"	2
g	Crossarm, 3 5/8" x 4 5/8" x 8'–0"	1
i	Bolt, carriage, 3/8" x 4"	2
j	Screw, lag, 1/2" x 4"	1
bs	Bolt, single, upset	1
cm	Insulator, spool, 3"	1
cu	Brace, 28"	2
ek	Locknuts	6

DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:
5° – Small Conductors
2° – Larger than #1/0

SINGLE SUPPORT ON CROSSARM (TANGENT)

DEC 1998	3 – PHASE PRIMARY	VC1.11
RUS	24.9/14.4 kV	(VC1)



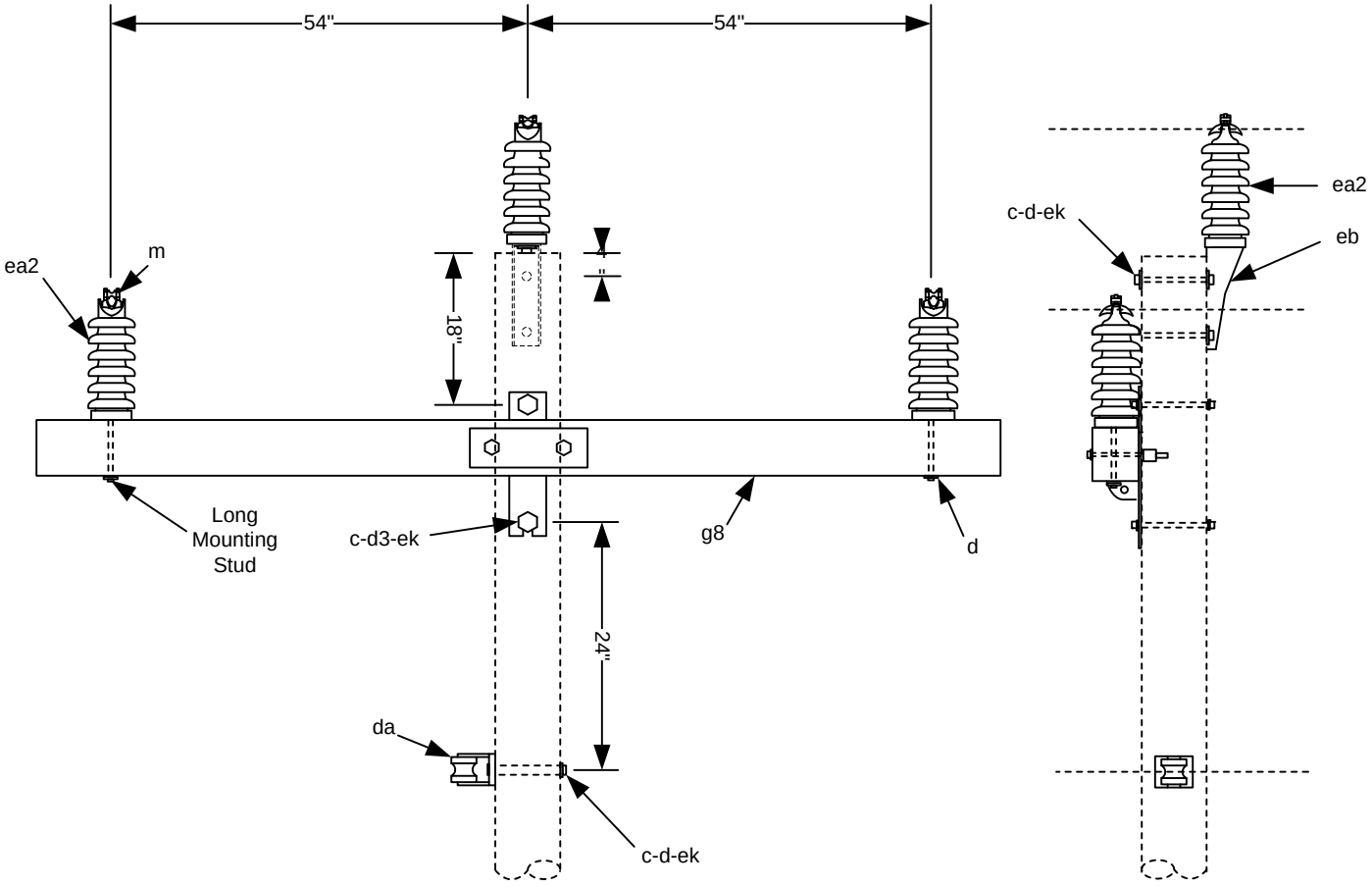
ITEM	MATERIAL	QTY
a	Insulator, pin type, (24.9/14.4 kv)	3
b	Pin, pole top, 20"	1
c	Bolt, machine, 1/2" x req'd length	2
c	Bolt, machine, 5/8" x req'd length	6
d	Washer, round, 1 3/8"	2
d	Washer, square, 2 1/4"	10
f	Pin, crossarm, clamp type	2
g	Crossarm, 3 5/8" x 4 5/8" x 8'–0"	1
bs	Bolt, single, upset "	1
cm	Insulator, spool, 3"	1
cu	Brace, wood, 60" span	1
ek	Locknuts	9

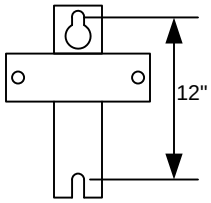
DESIGN PARAMETERS:

MAXIMUM LINE ANGLE:
2° – (Large Conductors)

SINGLE SUPPORT ON CROSSARM (TANGENT) (LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC1.11L
RUS	24.9/14.4 kV	(VC1–2)



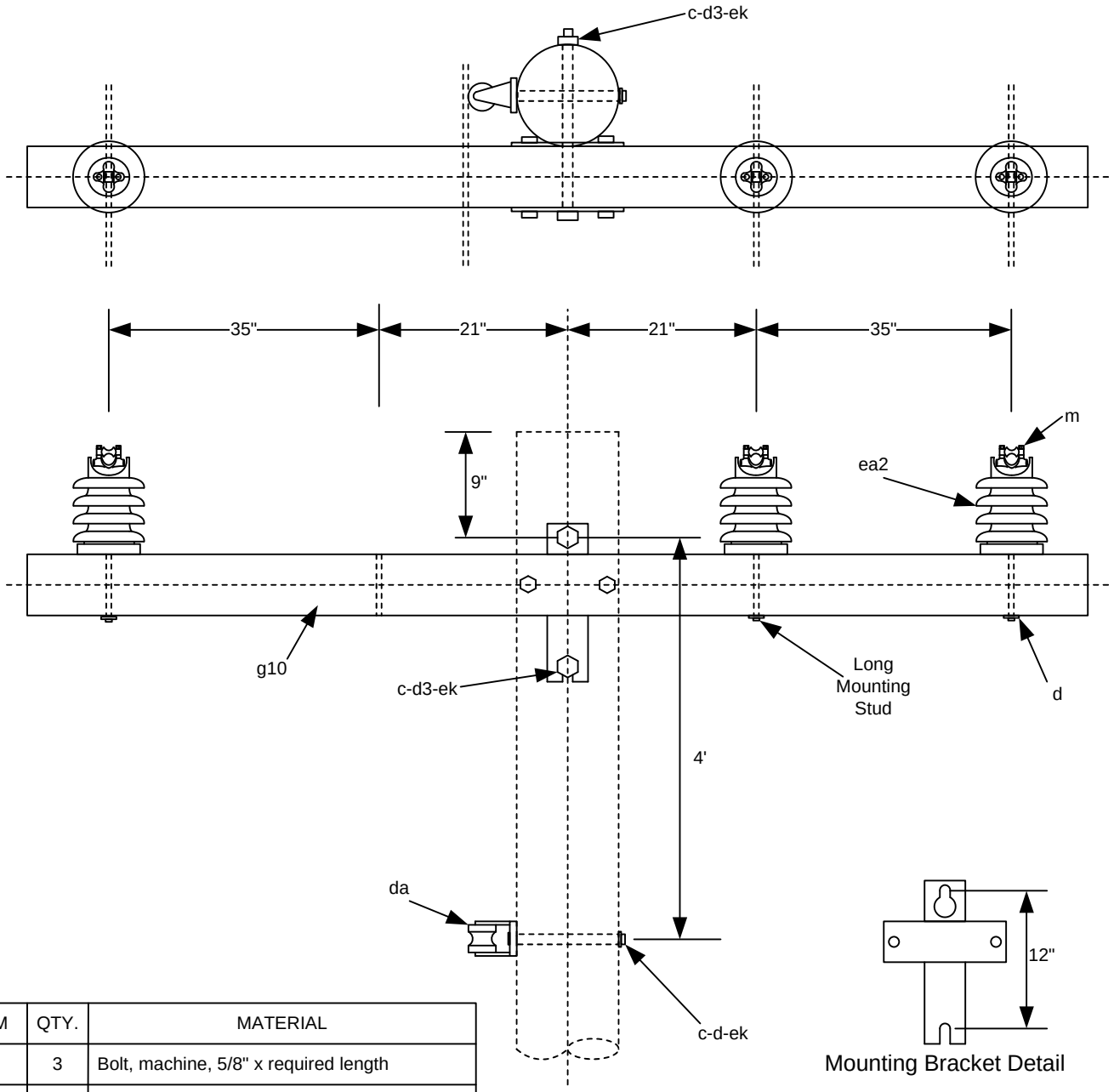


Mounting Bracket Detail

ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x required length
d3	5	Washer, 3" x 3", square, curved
g8	1	Crossarm Assembly, 8'
bv	4	Armor, Rod
ea2	3	Insulator, Vertical Clamp Type
	1	Short mounting stud, ¾" x 1 ¾"
	2	Long mounting stud, ¾" x 7"
m	3	Clamp, Trunnion
da	1	Bracket, Insulated
ek	5	Locknut, 5/8"
p		Connectors, as required

SINGLE SUPPORT ON CROSSARM -
POST INSULATORS (LARGE CONDUCTORS)

2015	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.11P



Mounting Bracket Detail

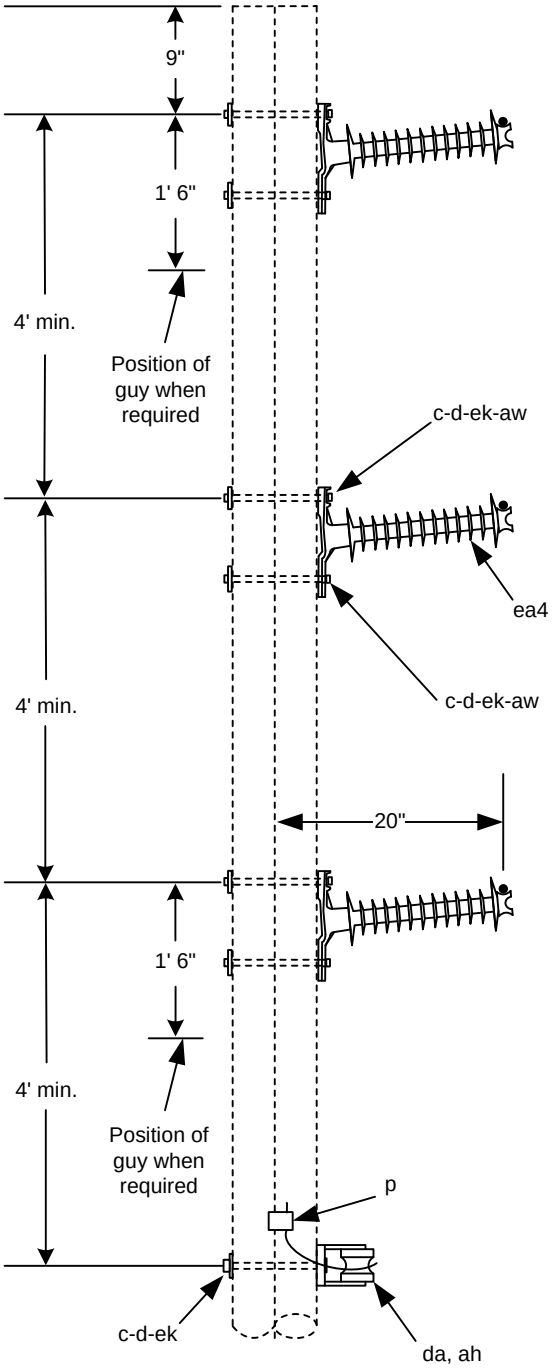
ITEM	QTY.	MATERIAL
c	3	Bolt, machine, 5/8" x required length
d	3	Washer, 2 ¼"
d3	3	Washer, 3" x 3", square, curved
g10	1	Crossarm Assembly, 10'
bv	4	Armor, Rod
ea2	3	Insulator, Vertical Clamp Type
	3	Long mounting stud, ¾" x 7"
m	3	Clamp, Trunnion
da	1	Bracket, Insulated
ek	6	Locknut, 5/8"
p		Connectors, as required

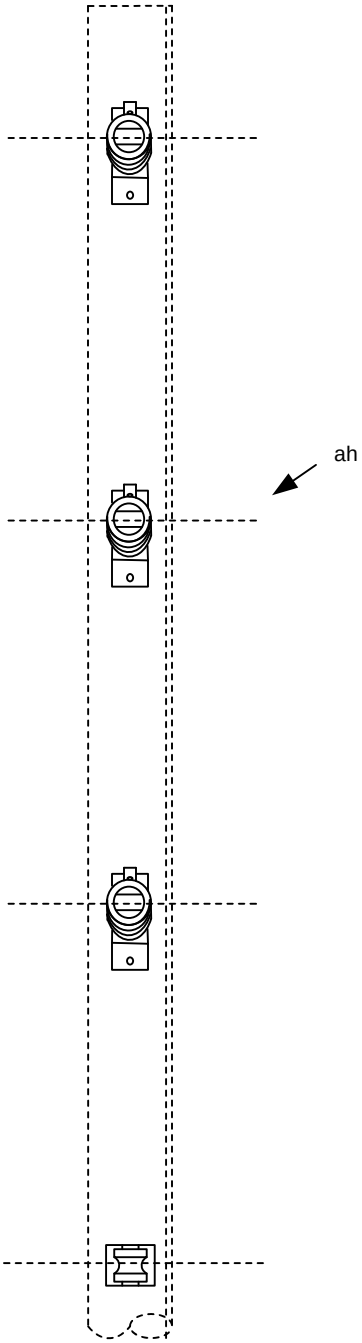
Note:

1. For Transmission Under Build add prefix "TUB-"
   Specify Clearance of Neutral to Final Grade

SINGLE SUPPORT ON CROSSARM - POST INSULATORS (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.13P (VC1-P)





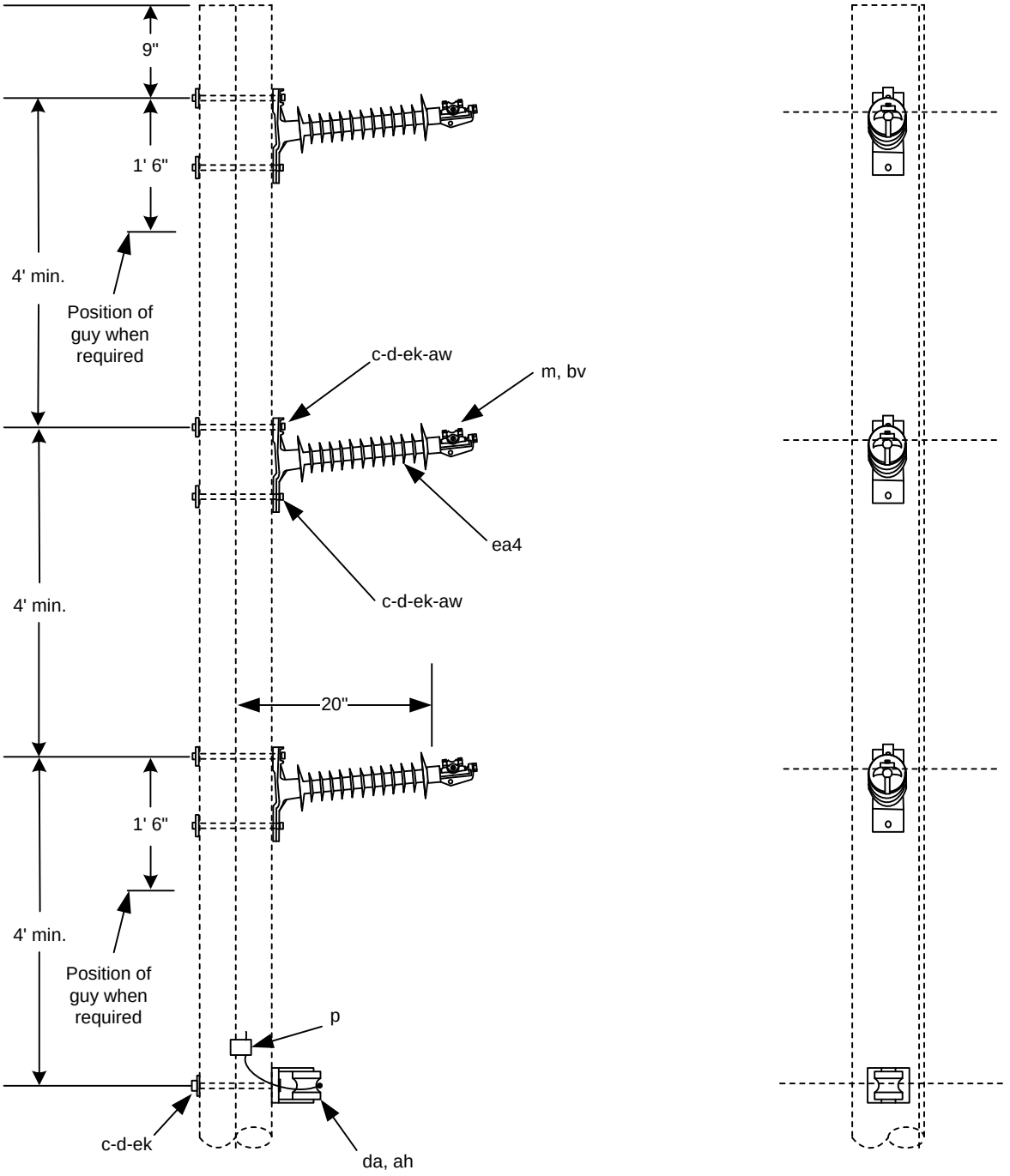
ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3" square
p		Connectors, as required
ah	3	Tie, insulator, formed type, primary
ah	1	Tie, insulator, formed type, neutral (spool tie)
aw	6	Washer, flat spring
da	1	Bracket, insulated
ea4	3	Insulator, Line Post F Type (¾" by 10 tap)
ek	7	Locknut 5/8"
	3	Short Mounting Stud, ¾" x 1 ¾"

Notes:

1. For Transmission Under Build add prefix "TUB-". Specify clearance of neutral to Final Grade.
2. Middle Conductor may be relocated to opposite side if required.
3. Maximum Line Angle - 4°

SINGLE SUPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2011	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.21N



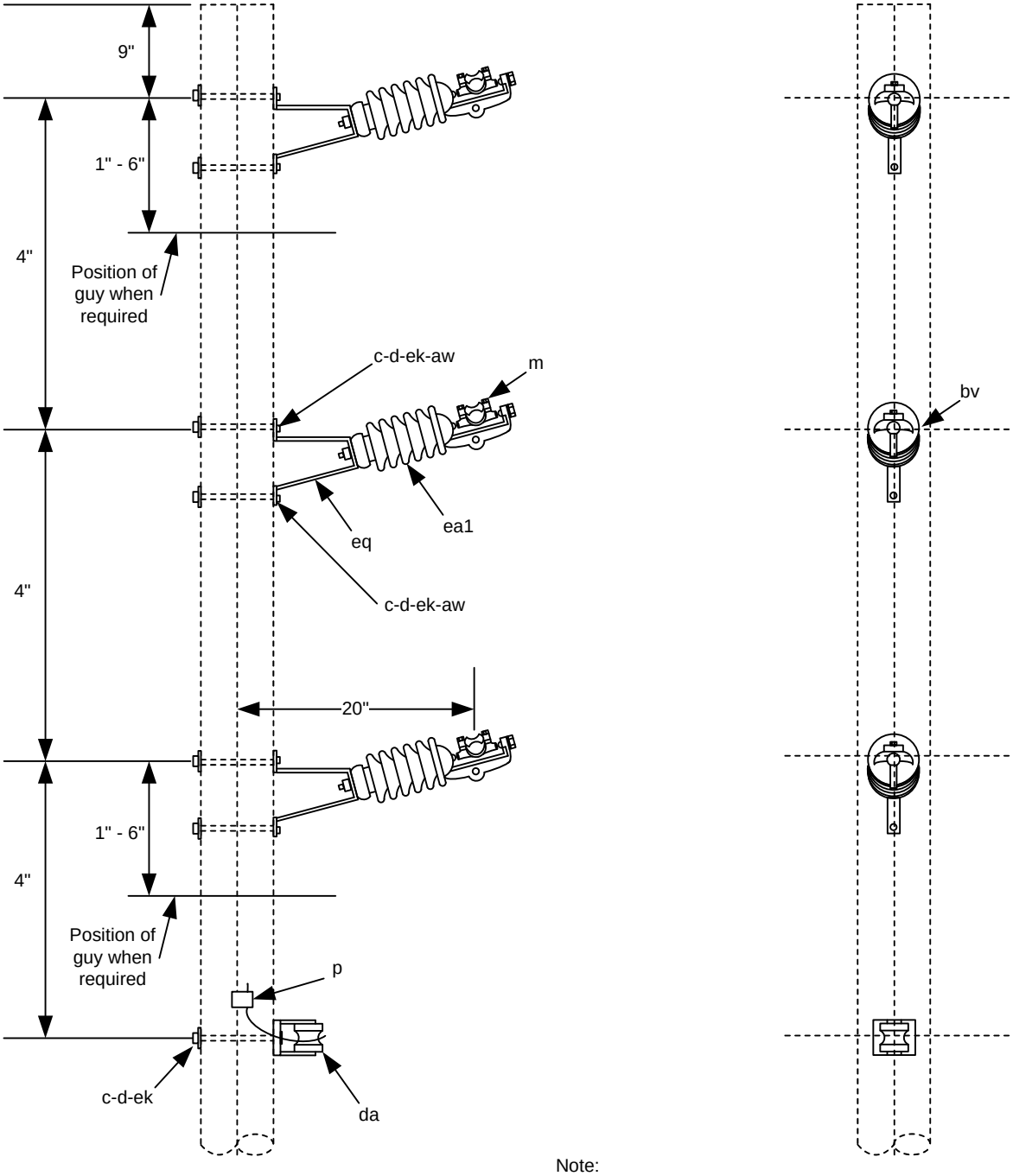
ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3" square
m	3	Clamp trunnion, tangent
p		Connectors, as required
bv	3	Armor Rod
ah	1	Tie, insulator, formed type, neutral (spool tie)
aw	6	Washer, flat spring
da	1	Bracket, insulated
ea4	3	Insulator, Horizontal Clamp Top & Gain Base
ek	7	Locknut 5/8"

Notes:

1. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
2. Middle Conductor may be relocated to opposite side if required.
3. Maximum Line Angle - 4°

SINGLE SUPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2012	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.22N



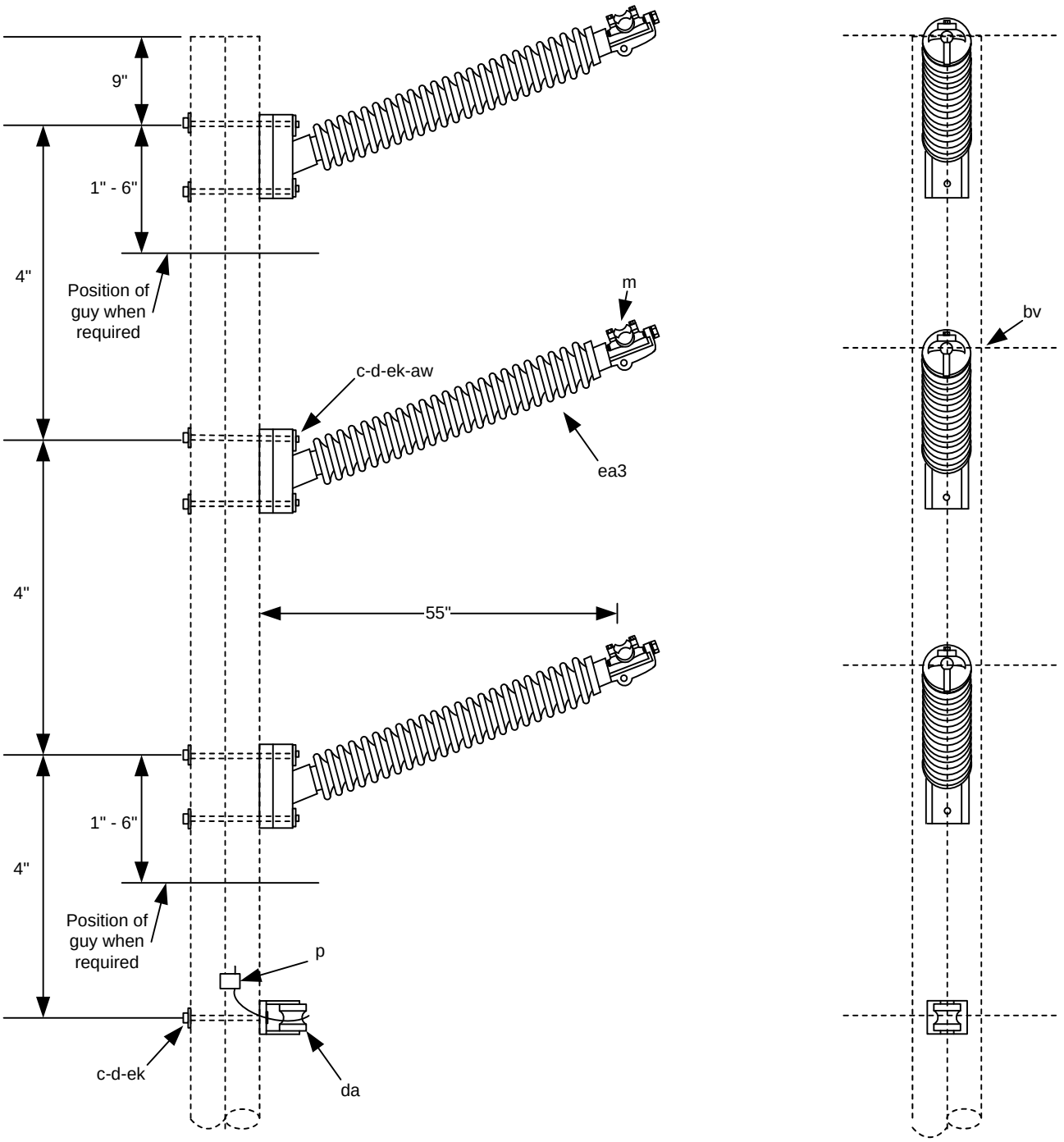
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
2. Middle Conductor may be relocated to opposite side if required.
3. Maximum Line Angle is 15°.

ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3"
m	3	Clamp trunnion, tangent
p		Connectors, as required
aw	6	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea1	3	Insulator, Horizontal Clamp Type
	3	Short Mounting Stud, ¾” x 1 ¾”
ek	7	Locknut 5/8"
eq	3	Bracket, side mount, for Horizontal Post Insulator

SINGLE SUPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.23N (VC1-HP1)



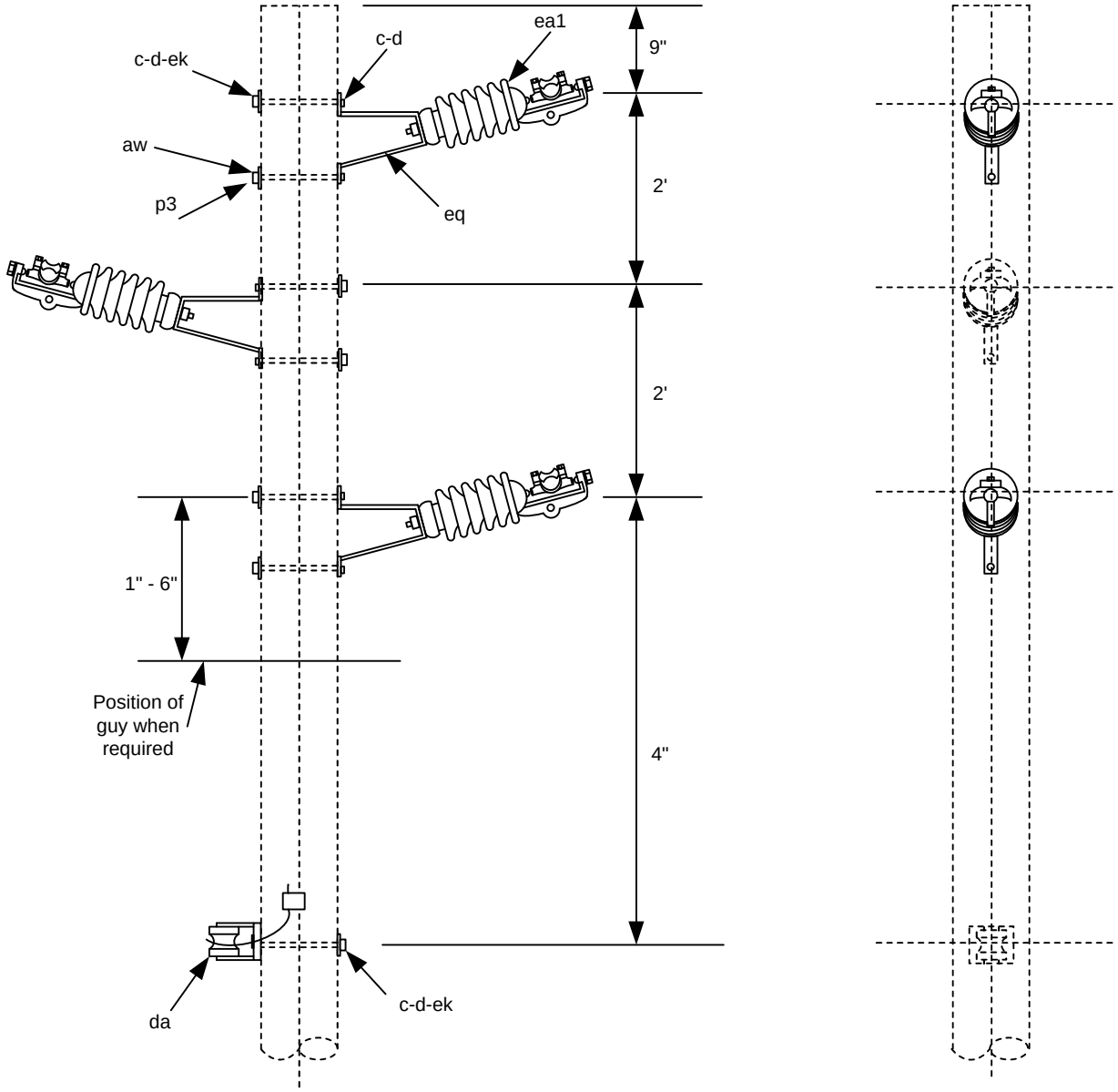
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
2. Maximum Line Angle is 4°.
3. Use with VA1.03NT if neutral conductor needs to be offset

ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3"
m	3	Clamp trunnion, tangent
p		Connectors, as required
aw	6	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea3	3	Insulator, Horizontal Clamp Type, 5 foot
ek	7	Locknut 5/8"

SINGLE SUPORT ON POST INSULATOR - NARROW PROFILE - OFFSET (LARGE CONDUCTORS)

2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.23NT



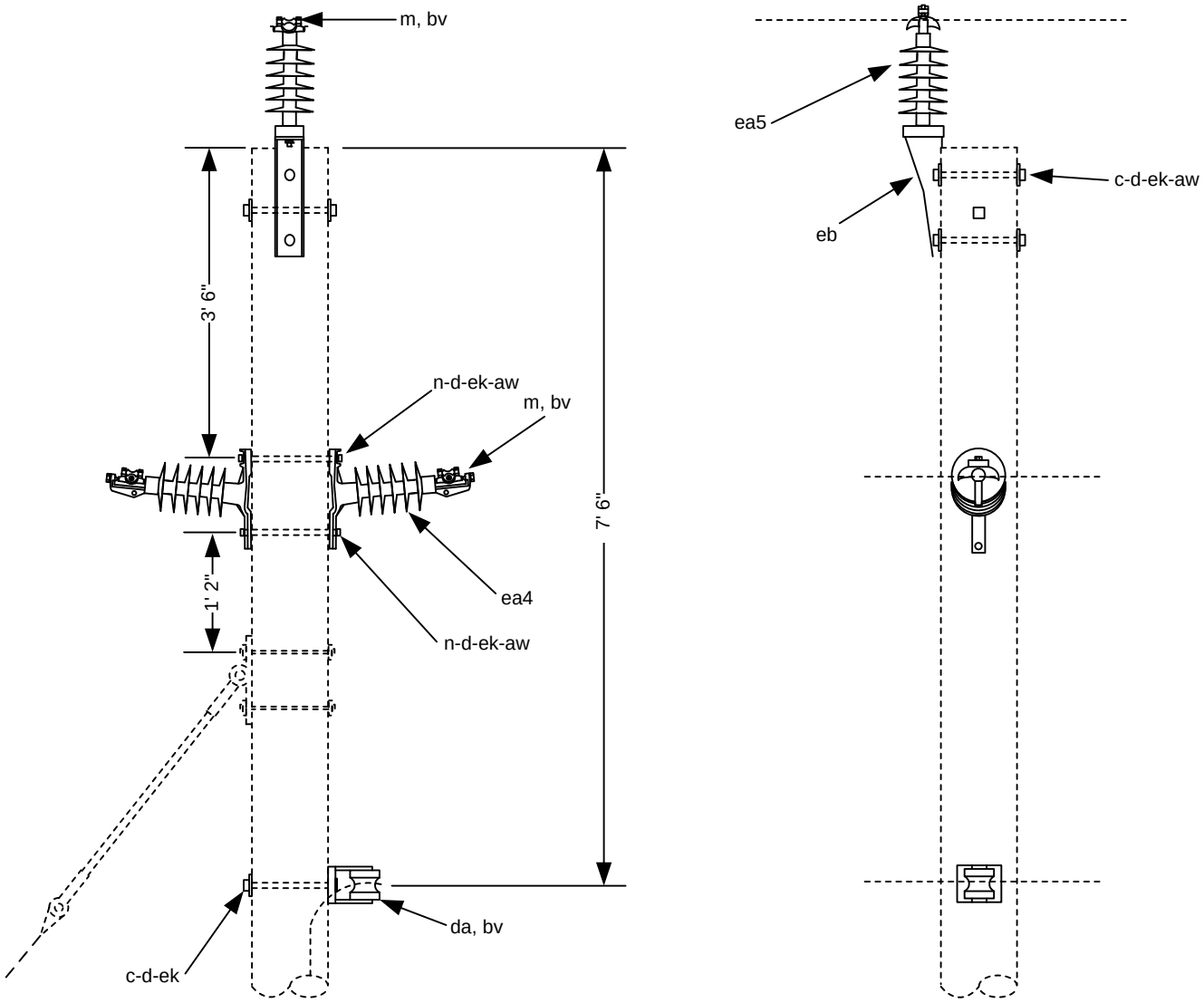
ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3"
m	3	Clamp trunnion, tangent
p		Connectors, as required
aw	6	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea1	3	Insulator, Horizontal Clamp Type
	3	Short mounting stud, ¾" x 1 ¾"
ek	7	Locknut 5/8"
eq	3	Bracket, side mount, for Horizontal Post Insulator

Note:

1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade
2. Maximum Line Angle is 3°.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.24N (VC1-HP2)



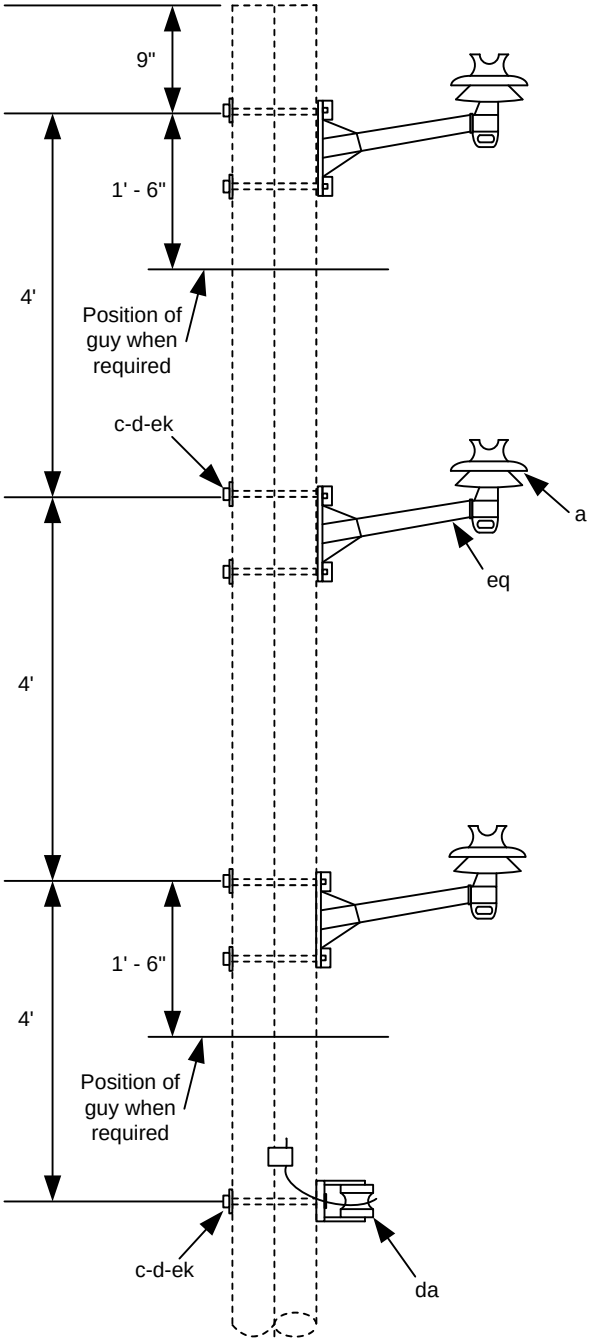
ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x Required Length
d	4	Washer, 3"
m	3	Clamp trunnion, tangent
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
aw	3	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea5	1	Insulator, Vertical Clamp Type
ea4	2	Insulator, Horizontal Clamp Type
	1	Short mounting stud, ¾" x 1 ¾"
eb	1	Bracket, pole top for Vertical Post Insulator
ek	8	Locknut 5/8"

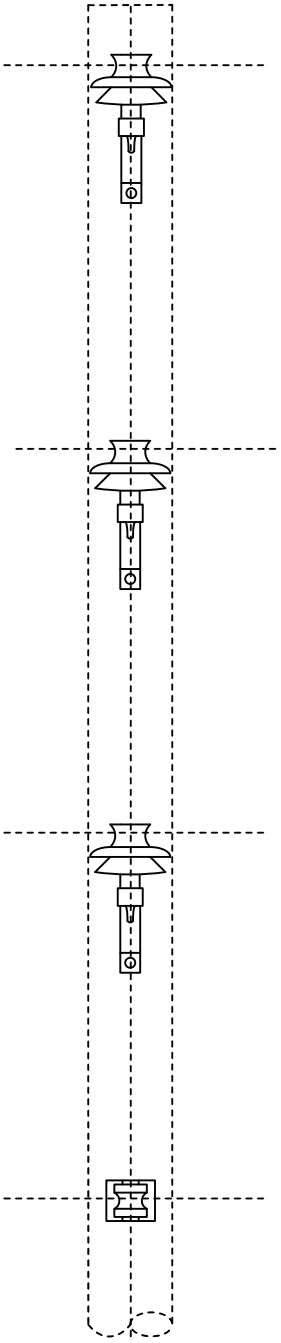
Notes:

1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2° for conductor larger than 1/0.
5. Maximum Line Angle is 5° for conductor 1/0 and smaller.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.32N





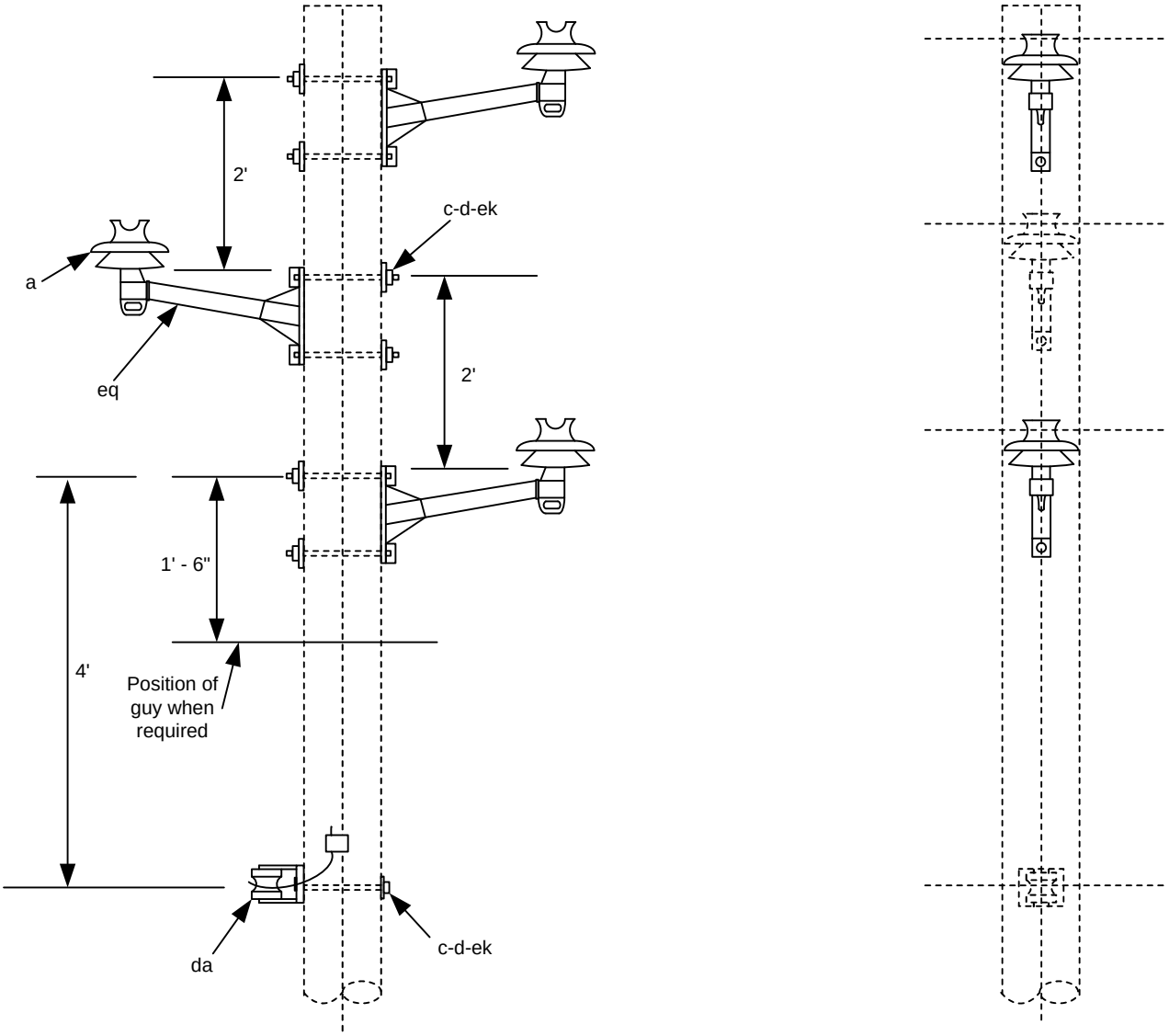
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Middle Conductor may be relocated to opposite side if required.
3. Maximum Line Angle is 15°.

ITEM	QTY.	MATERIAL
a	3	Insulator, Pin Type
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3"
p		Connectors, as required
ah	4	Tie, Insulator, formed Type
da	1	Bracket, insulated
ek	7	Locknut 5/8"
eq	3	Bracket, Standoff, fiberglass 1 ½” dia.

SINGLE SUPPORT ON FIBERGLASS BRACKET - NARROW PROFILE (SMALL CONDUCTORS)

2005	WFECA	3- Phase Primary 24.9/14.4 kV	VC1.33N (VC1-S1)



Note:

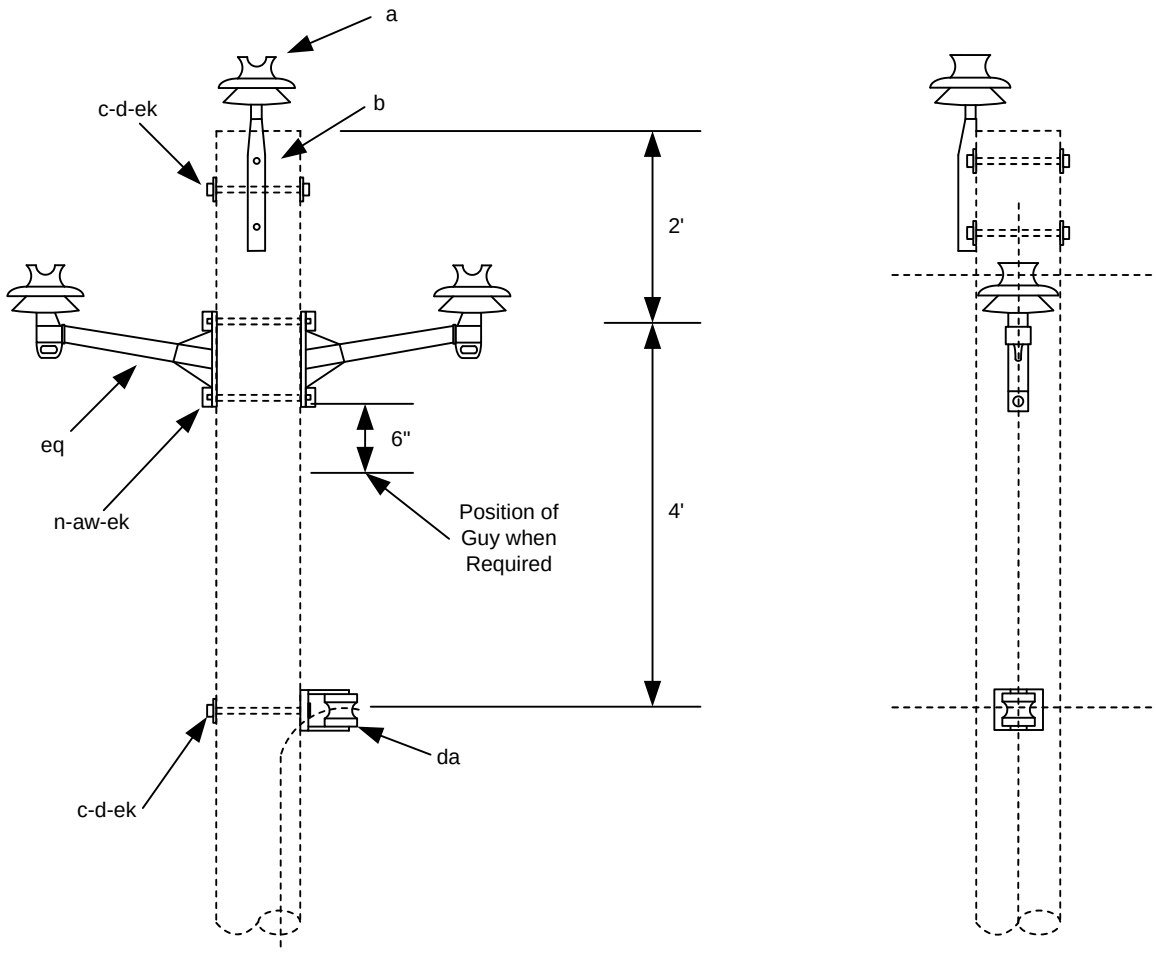
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

2. Maximum Angle 19° for 4 ACSR
   9° for 1/0 ACSR

ITEM	QTY.	MATERIAL
a	3	Insulator, Pin Type
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 3"
p		Connectors, as required
ah	4	Tie, Insulator, Formed Type
da	1	Bracket, insulated
ek	7	Locknut 5/8"
eq	3	Bracket, Standoff, fiberglass, 1 ½” dia.

SINGLE SUPPORT ON FIBERGLASS BRACKET
- NARROW PROFILE
(SMALL CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.35N (VC1-S2)



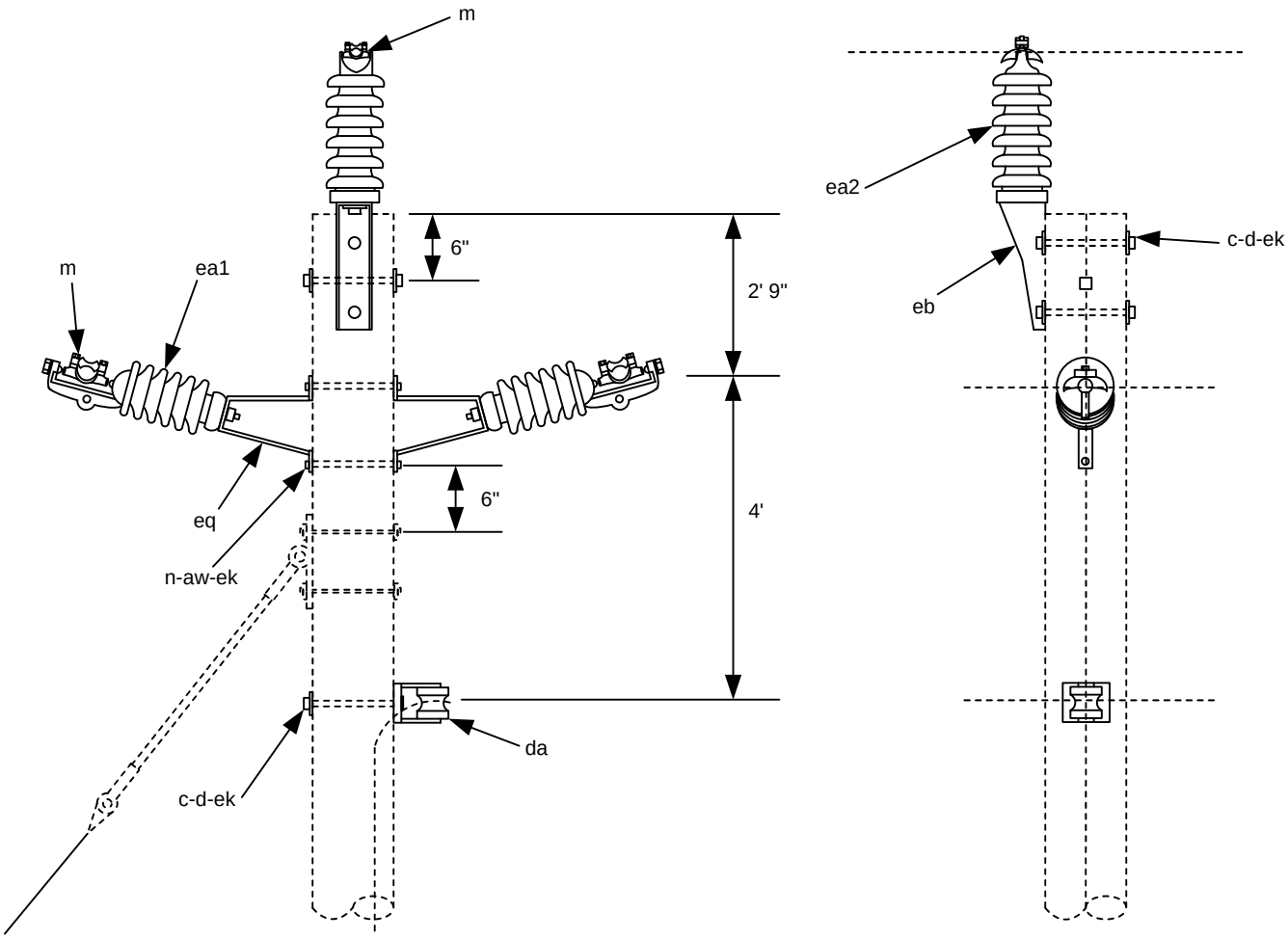
ITEM	QTY.	MATERIAL
a	3	Insulator, Pin Type
b	1	Pin, Pole Top, 20"
c	4	Bolt, machine, 5/8" x Required Length
d	4	Washer, 3"
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
ah	4	Tie, Insulator, Formed Type
aw	2	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ek	8	Locknut 5/8"
eq	2	Bracket, Standoff, fiberglass, 1 ½" dia.

Note:

1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2°.

SINGLE SUPPORT ON FIBERGLASS BRACKET
- NARROW PROFILE
(SMALL CONDUCTORS)

2007	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.38N



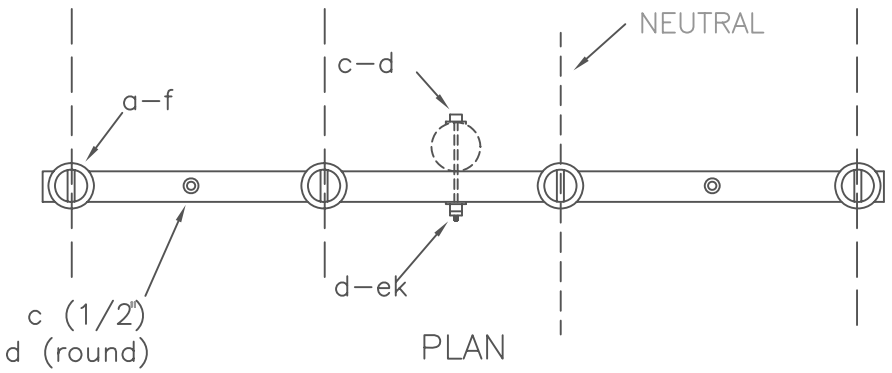
ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x Required Length
d	3	Washer, 3"
m	3	Clamp trunnion, tangent
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
aw	2	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea2	1	Insulator, Vertical Clamp Type
ea1	2	Insulator, Horizontal Clamp Type
	3	Short mounting stud, ¾" x 1 ¾"
eb	1	Bracket, pole top for Vertical Post Insulator
ek	8	Locknut 5/8"
eq	2	Bracket, side mount, for Horizontal Post Insulator

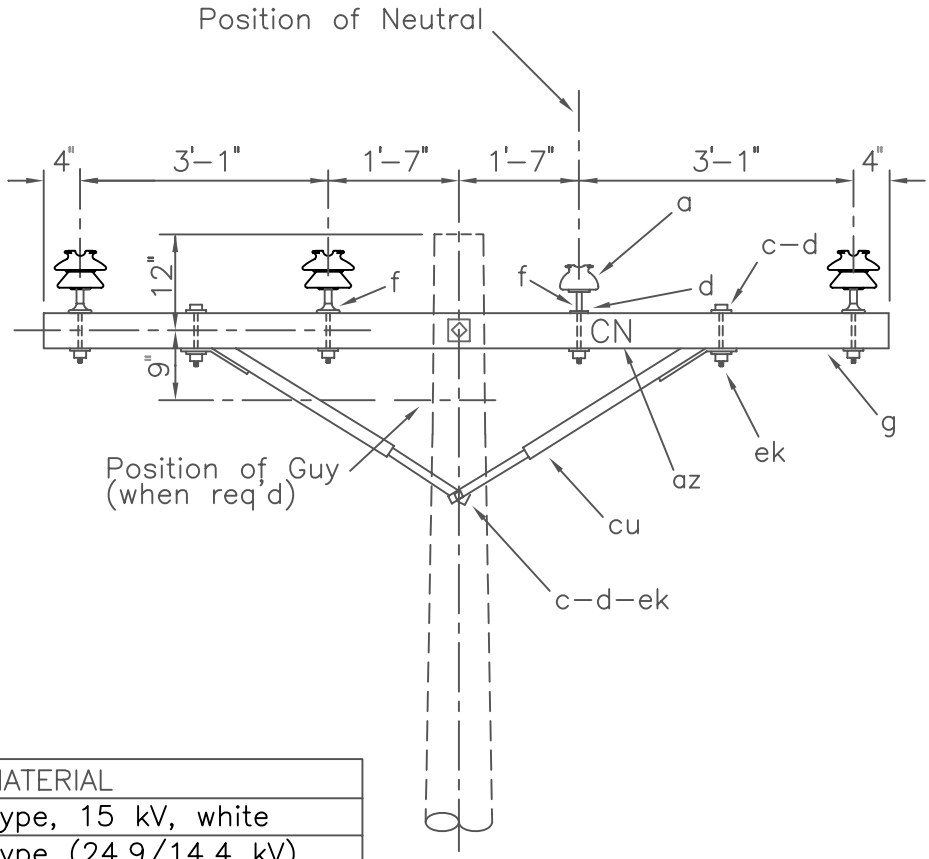
Note:

1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2°.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.39N (VC1-NP)





ITEM	QTY	MATERIAL
a	1	Insulator, pin type, 15 kV, white
a	3	Insulator, pin type (24.9/14.4 kV)
c	2	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, round, 1 3/8"
d	4	Washer, square, 2 1/4"
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"
f	3	Pin, crossarm, steel, 5/8" x 14"
g	1	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
az	4	Letters, 2" C, 2" N, with 1" nails
cu	1	Brace, wood, 60" span
ek	4	Locknuts

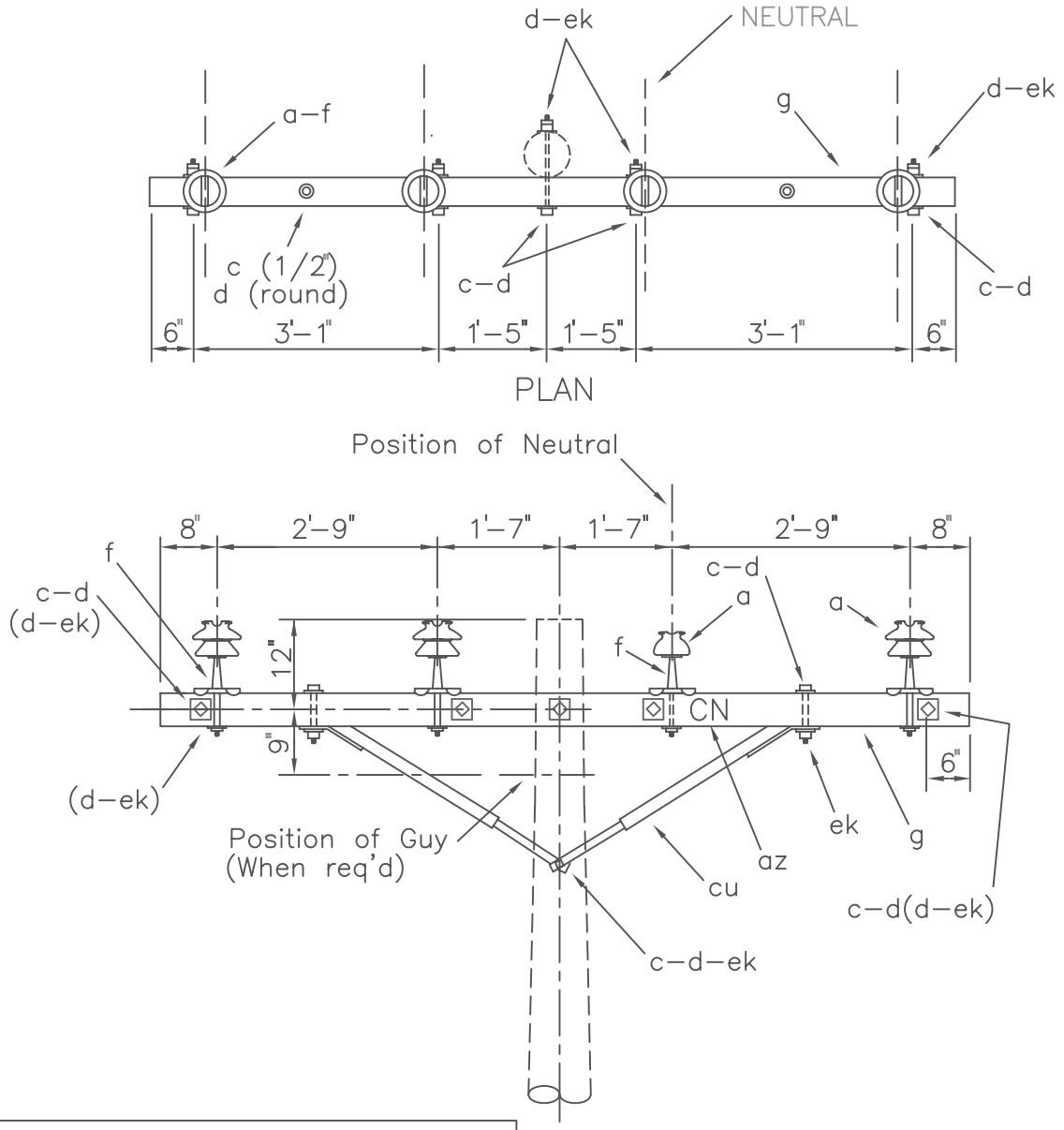
NOTE: Install either identification letters or white insulators in neutral position.

DESIGN PARAMETERS:

See TABLE II

SINGLE SUPPORT, NEUTRAL ON CROSSARM

DEC 1998	3 – PHASE PRIMARY	VC1.41
RUS	24.9/14.4 kV	(VC9–1)



ITEM	QTY	MATERIAL
a	1	Insulator, pin type, 15 kv, white
a	3	Insulator, pin type (24.9/14.4 kV)
c	2	Bolt, machine, 1/2" x req'd length
c	6	Bolt, machine, 5/8" x req'd length
d	2	Washer, round, 1 3/8"
d	11	Washer, square, 2 1/4"
f	4	Pin, crossarm, steel clamp type
g	1	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
az	4	Letters, 2" C, 2" N, with 1" nails
cu	1	Brace, wood, 60" span
ek	9	Locknuts

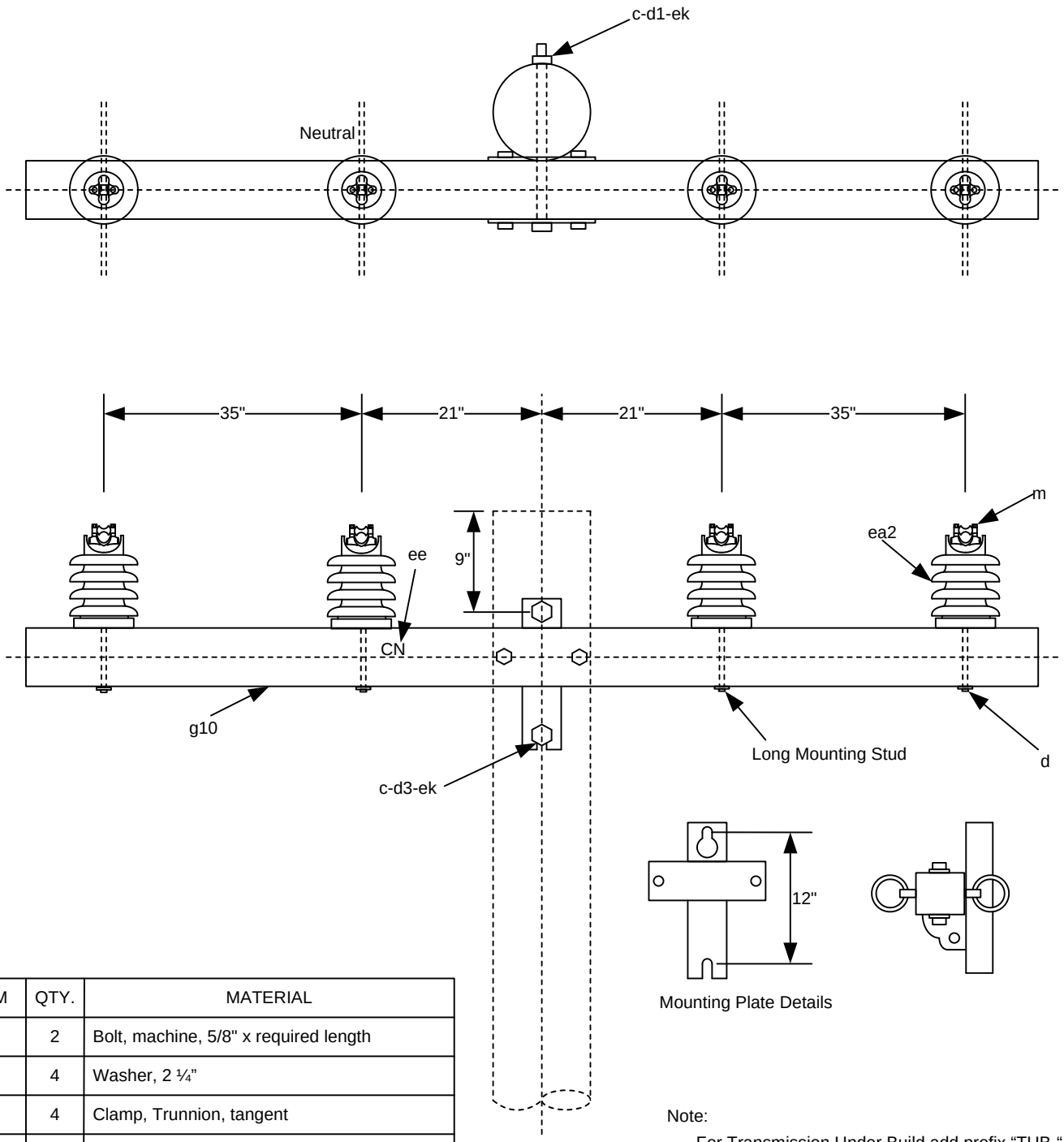
NOTE: Install either identification letters or white insulator in neutral position.

DESIGN PARAMETERS:

See TABLE III

SINGLE SUPPORT, NEUTRAL ON CROSSARM (LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC1.41L
RUS	24.9/14.4 kV	(VC9–3)



Mounting Plate Details

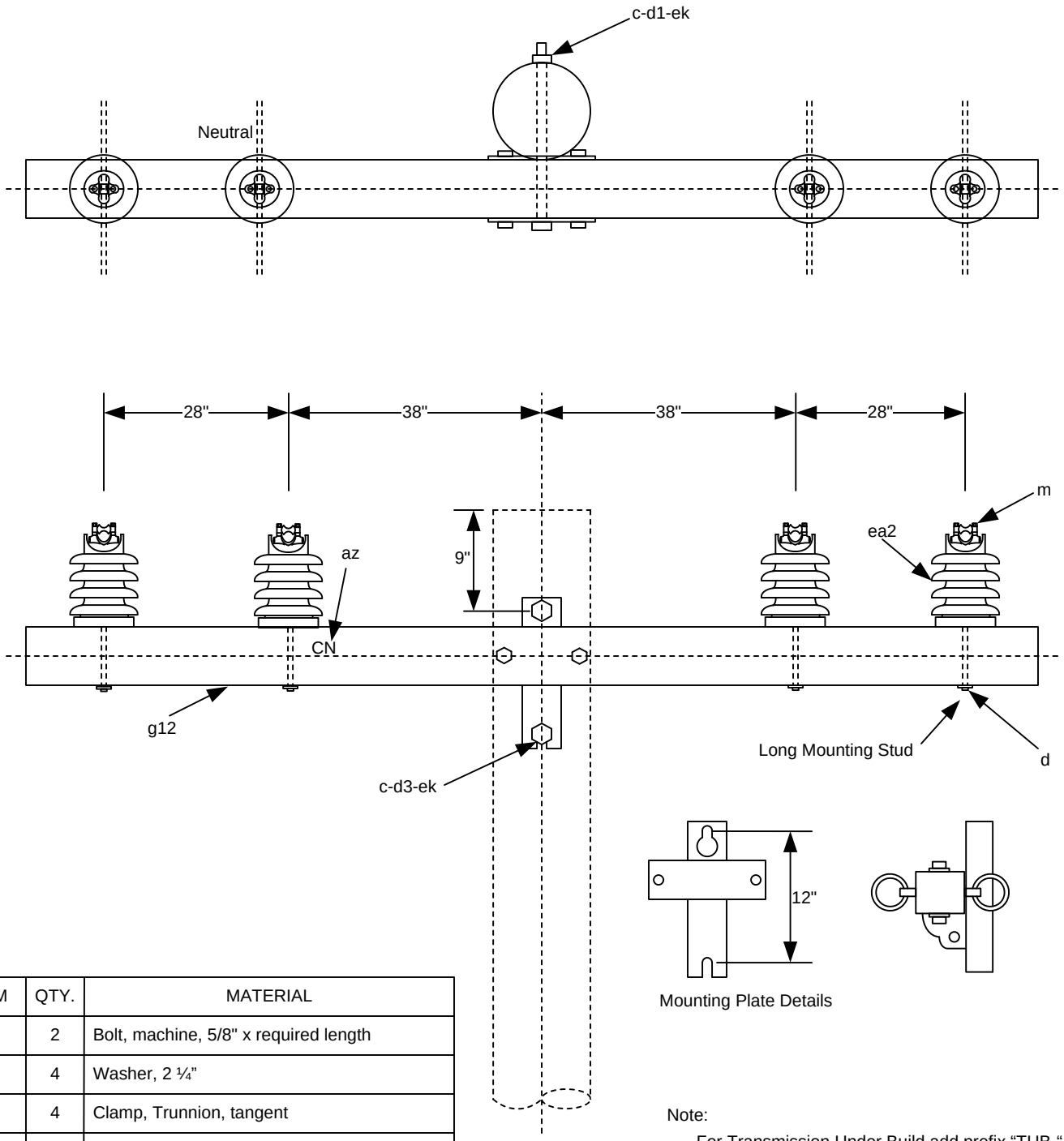
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	4	Washer, 2 ¼"
m	4	Clamp, Trunnion, tangent
p		Connectors, as required
az	4	Letters, 2-"C", 2-"N"
bv	4	Armor, Rod
d3	2	Washer, 3" x 3", square, curved
ea2	4	Insulator, Vertical Clamp Type
ek	6	Locknut, 5/8"
g10	1	Crossarm Assembly, 10'
	4	Long mounting stud, ¾" x 7"

Note:

1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade.
2. Maximum Line Angle is 2°

SINGLE SUPPORT, NEUTRAL ON CROSSARM POST INSULATORS (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.41P (VC9-P)



Mounting Plate Details

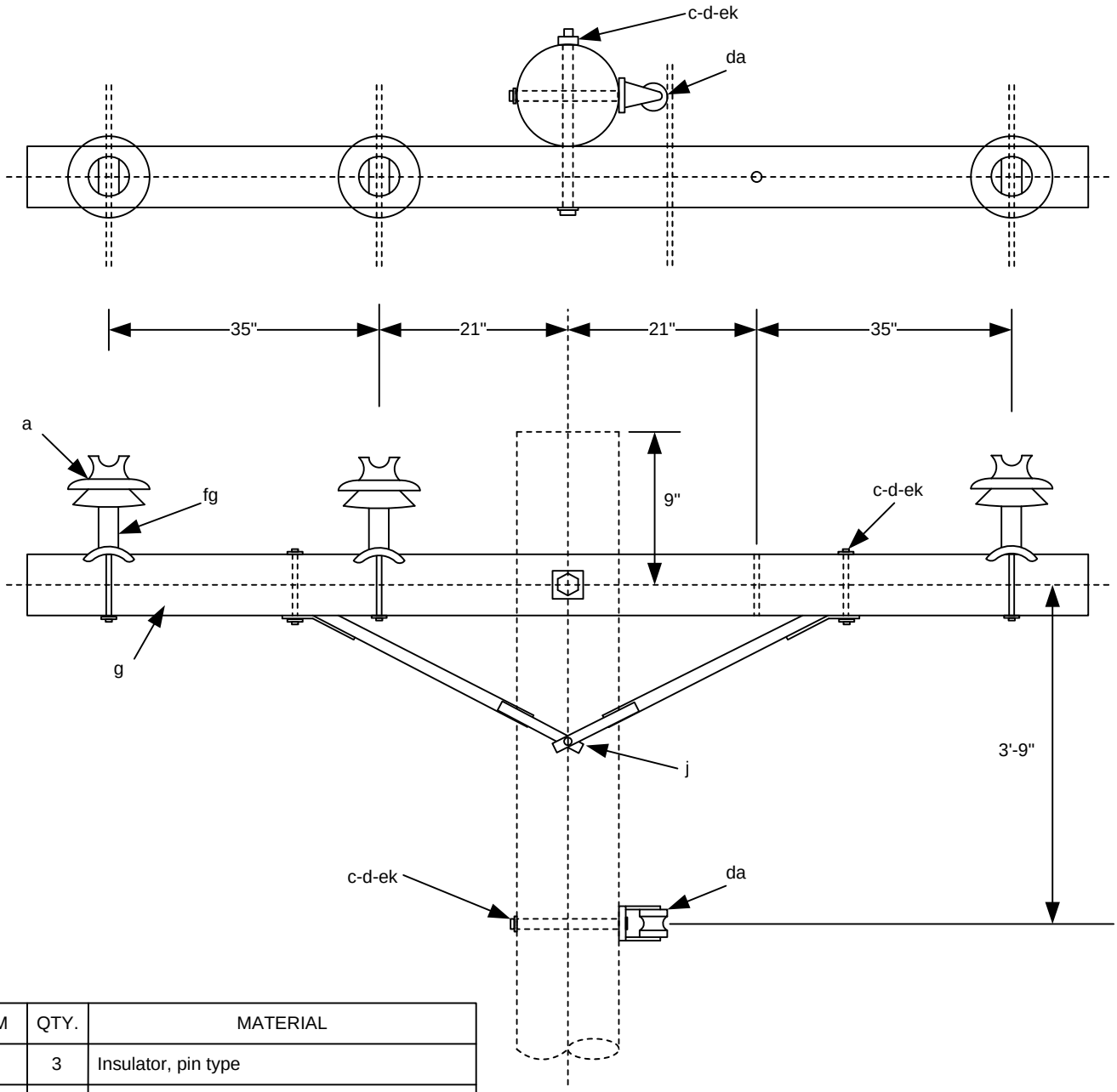
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	4	Washer, 2 ¼"
m	4	Clamp, Trunnion, tangent
p		Connectors, as required
az	4	Letters, 2-"C", 2-"N"
bv	4	Armor, Rod
d3	2	Washer, 3" x 3", square, curved
ea2	4	Insulator, Vertical Clamp Type
ek	6	Locknut, 5/8"
g12	1	Crossarm Assembly, 12', Tangent, HD
	4	Long mounting stud, ¾" x 7"

Note:

1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade.
2. Maximum Line Angle is 2°

SINGLE SUPPORT, NEUTRAL ON CROSSARM POST INSULATORS (LARGE CONDUCTORS)

2012	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.42P



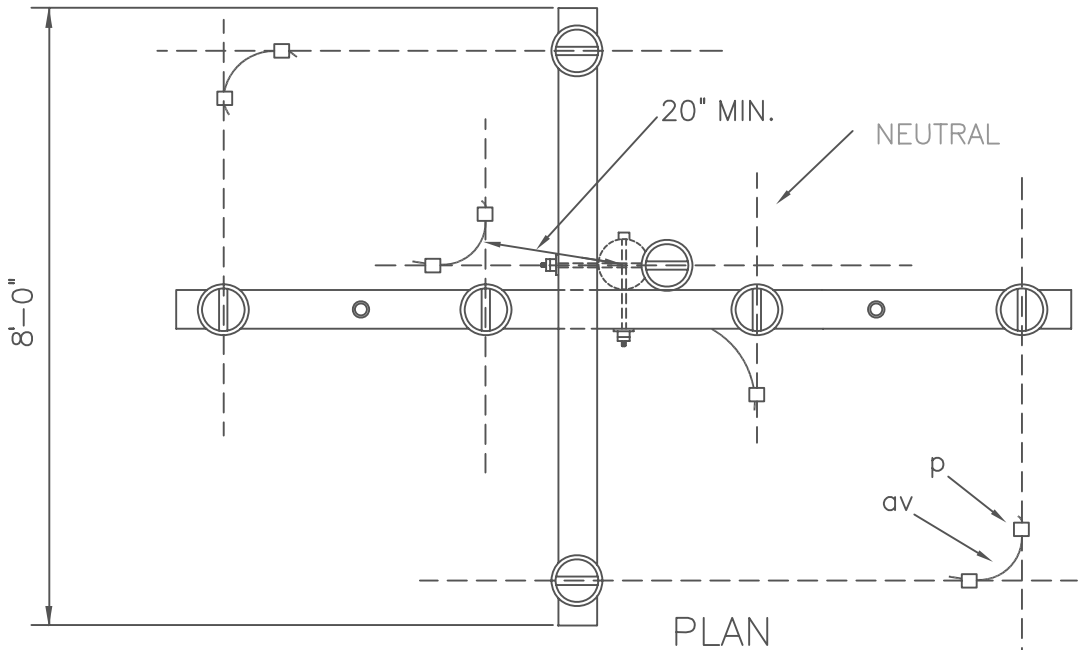
ITEM	QTY.	MATERIAL
a	3	Insulator, pin type
c	2	Bolt, machine, 5/8" x required length
c	2	Bolt, machine, ½" x required length
d	2	Washer, rd., 1 3/8" diam.
d3	2	Washer, 3"
fg	3	Pin, crossarm, steel, clamp type
g	1	Crossarm Assembly, 10'
j	1	Screw, lag ½" x 4"
cu	1	Brace, wood, 60" span
da	1	Bracket, Insulated
ek	2	Locknut, 5/8"

Note:

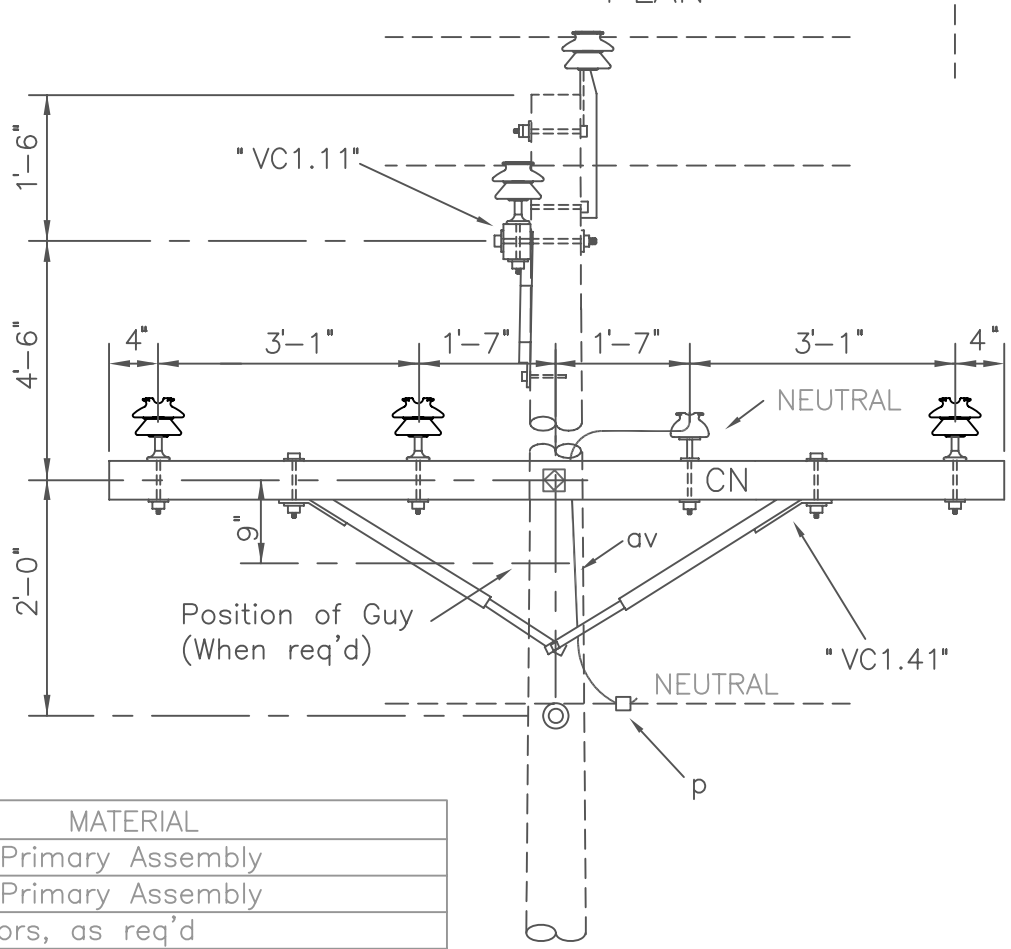
1. For Transmission Under Build add prefix "TUB-" Specify Clearance of Neutral to Final Grade
2. Maximum Angle = 2°

SINGLE SUPPORT ON CROSSARM (TANGENT)
(LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC1.53 (VC1-2A)



PLAN



ITEM	QTY	MATERIAL
	1	VC1.11 Primary Assembly
	1	VC1.41 Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

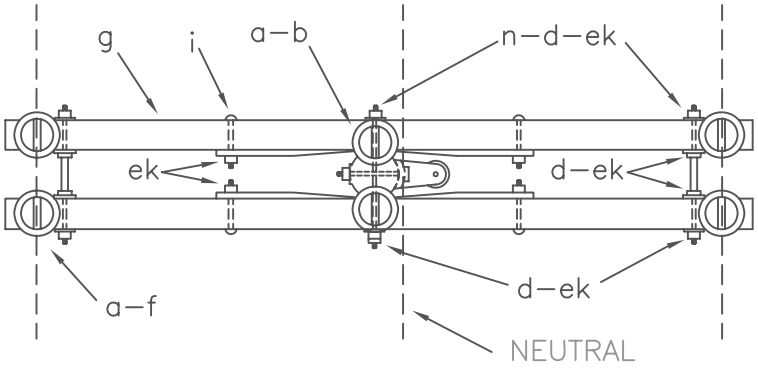
DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:

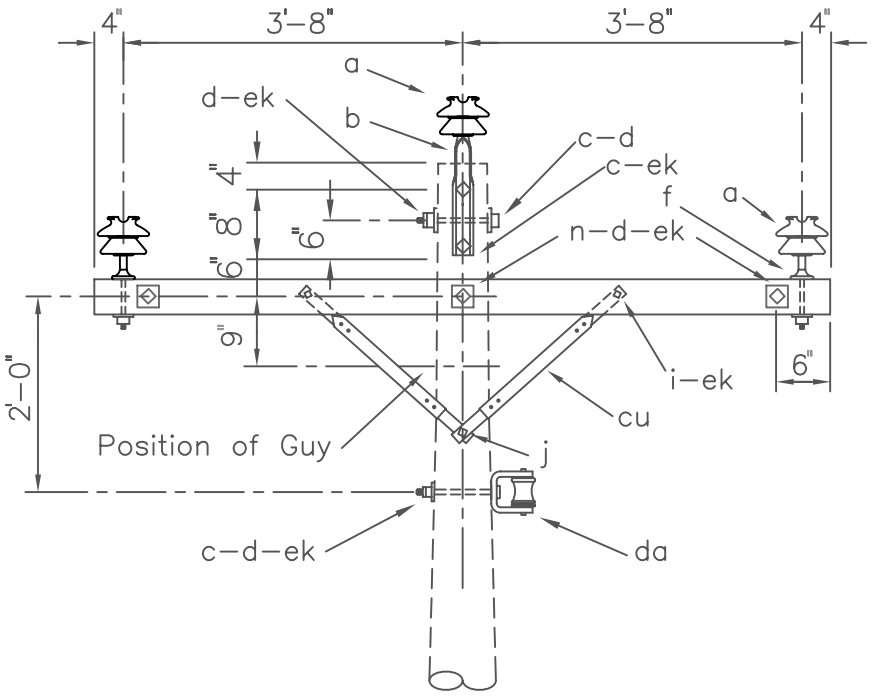
5° – Small Conductors
2° – Larger than #1/0

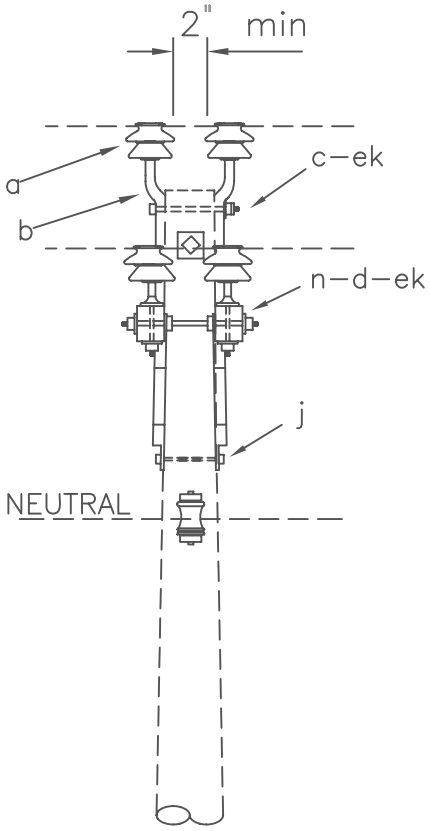
THREE PHASE JUNCTION GUIDE

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC1.81G
RUS		



PLAN





ITEM	QTY	MATERIAL
a	6	Insulator, pin type (24.9/14.4 kV)
b	2	Pin, offset, pole top *
c	4	Bolt, machine, 5/8" x req'd length
d	13	Washer, square, 2 1/4"
f	4	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8' 0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
n	3	Bolt, double arming, 5/8"xreq'd length
cu	4	Brace, 28"
da	1	Bracket, insulated
ek	18	Locknuts

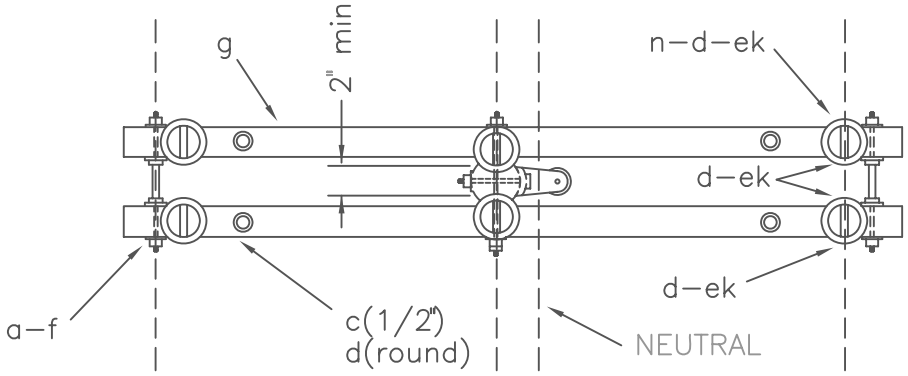
* See Note on Dwg. VA2.01

DESIGN PARAMETERS:

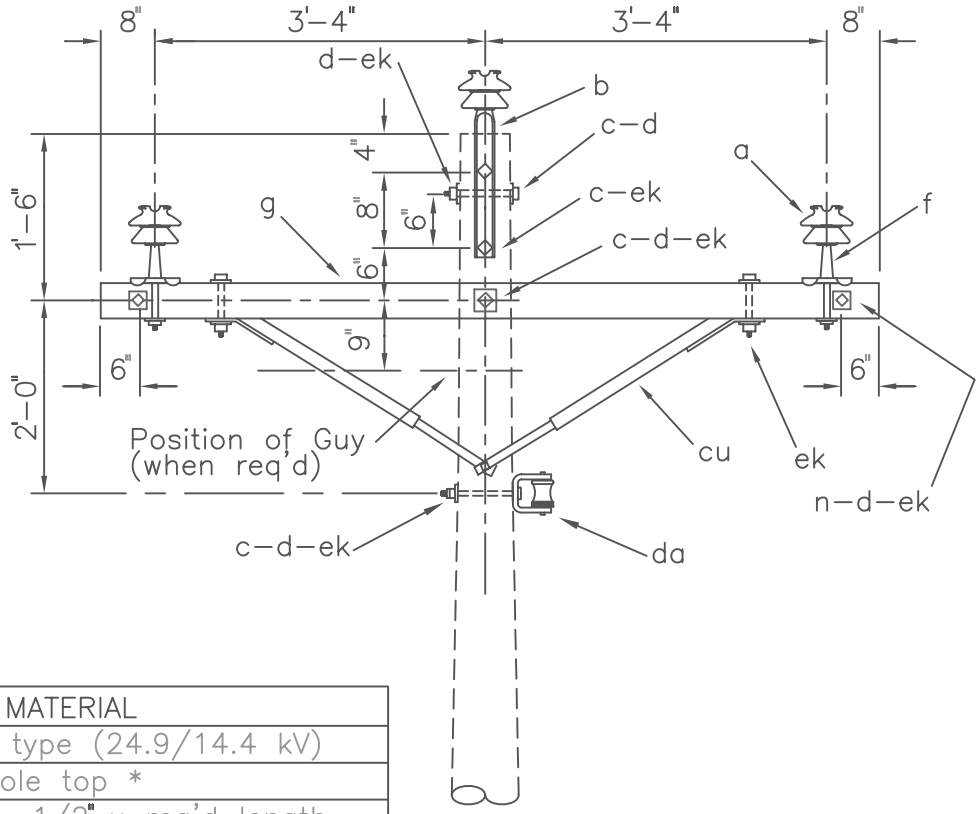
See TABLE III

DOUBLE SUPPORT ON CROSSARMS

DEC 1998	3 – PHASE PRIMARY	VC2.21
RUS	24.9/14.4 kV	(VC2)



PLAN



ITEM	QTY	MATERIAL
a	6	Insulator, pin type (24.9/14.4 kV)
b	2	Pin, offset, pole top *
c	4	Bolt, machine, 1/2" x req'd length
c	5	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	14	Washer, square, 2 1/4"
f	4	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 8' 0"
n	3	Bolt, double arming,5/8" x req'd length
cu	2	Brace, wood, 60" span
da	1	Bracket, insulated
ek	19	Locknuts

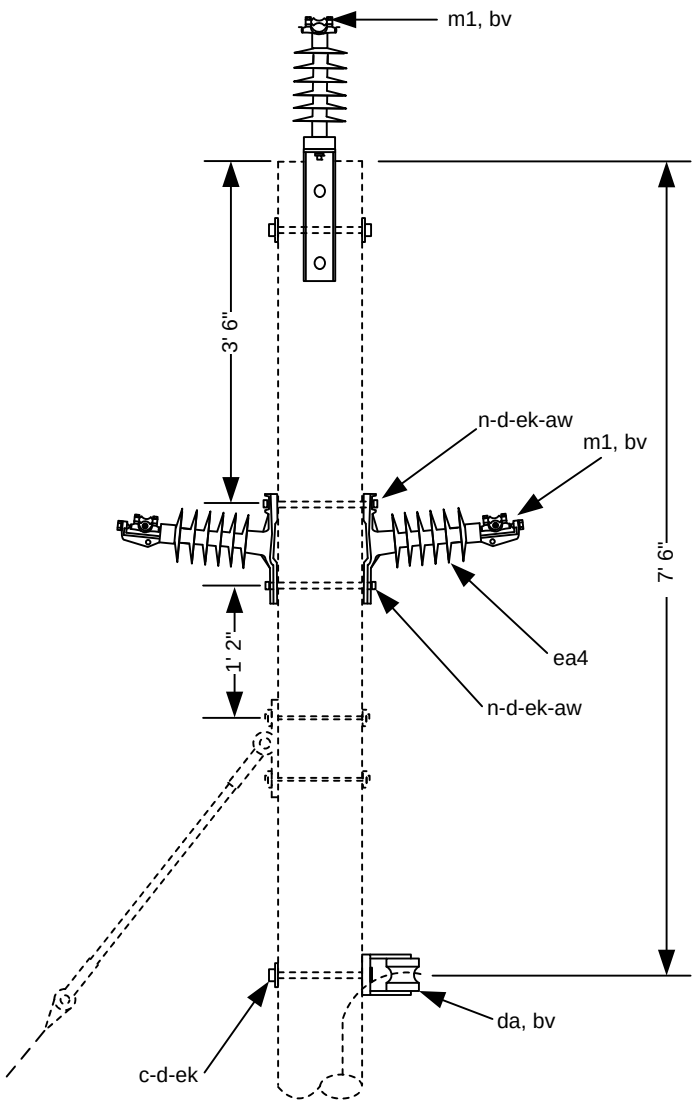
* See Note on Dwg. VA2.01

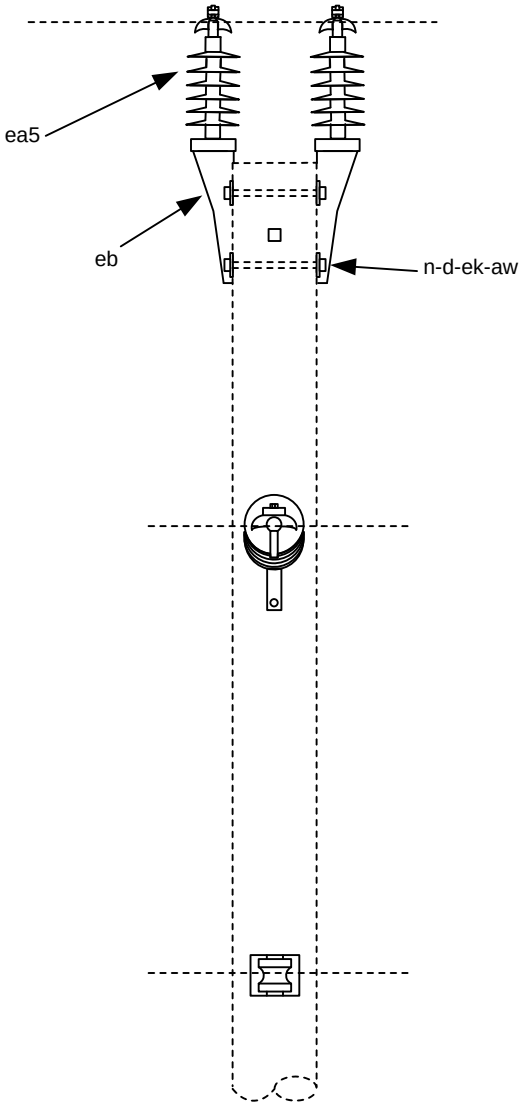
DESIGN PARAMETERS:

See TABLE III

DOUBLE SUPPORT ON CROSSARMS (LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC2.21L
RUS	24.9/14.4 kV	(VC1–3)





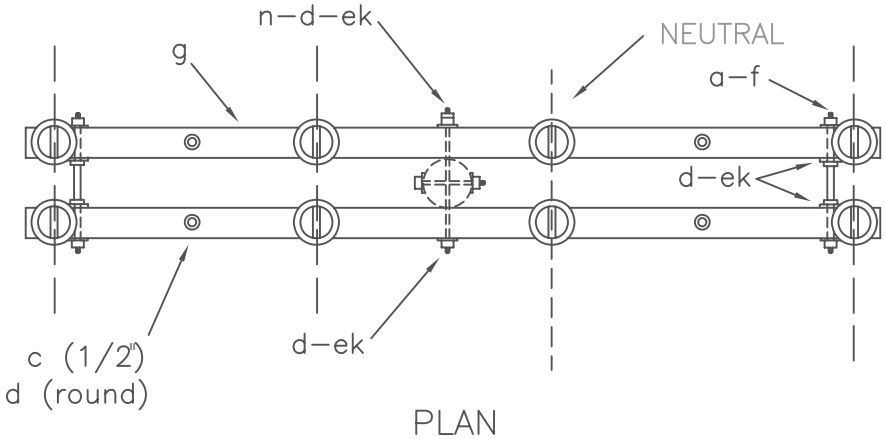
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x Required Length
d	4	Washer, 3"
m1	4	Clamp trunnion, angle
n	4	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
aw	4	Washer, flat spring
bv	4	Armor Rod
da	1	Bracket, insulated
ea5	2	Insulator, Vertical Clamp Type
ea4	2	Insulator, Horizontal Clamp Type
	2	Short mounting stud, ¾" x 1 ¾"
eb	2	Bracket, pole top for Vertical Post Insulator
ek	10	Locknut 5/8"

Notes:

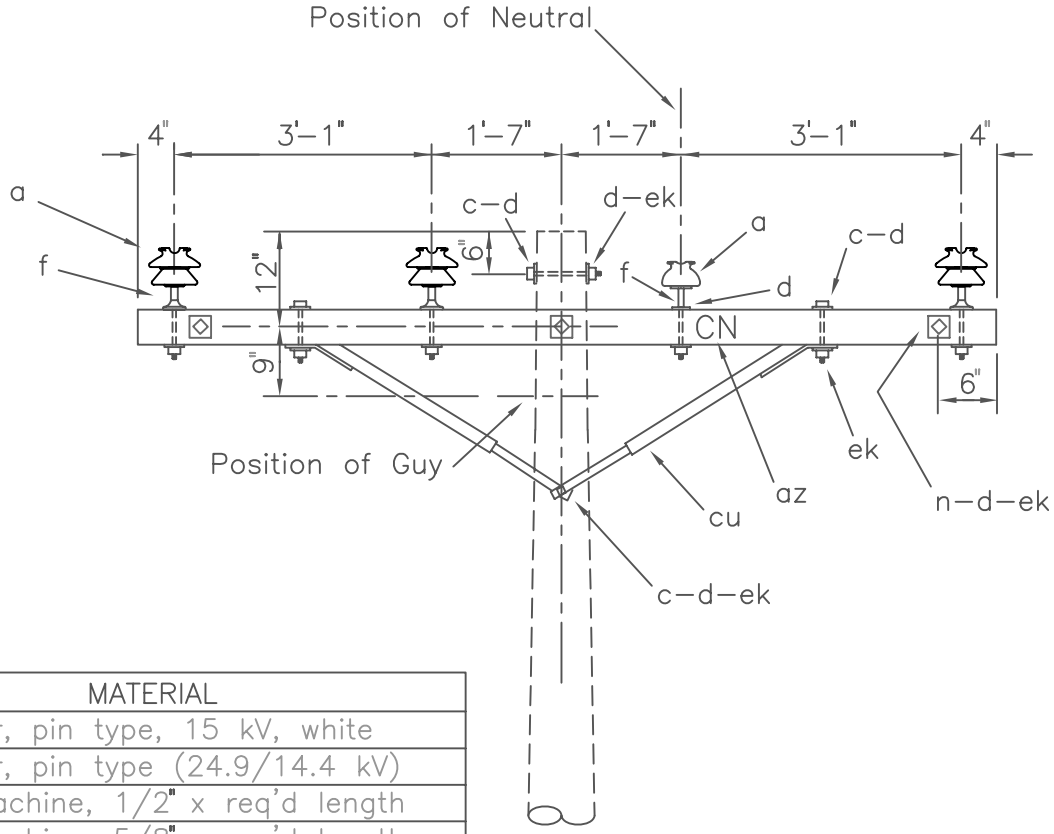
1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 3° for conductor larger than 1/0.
5. Maximum Line Angle is 7° for conductor 1/0 and smaller.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	VC2.32N



PLAN



ITEM	QTY	MATERIAL
a	2	Insulator, pin type, 15 kV, white
a	6	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	15	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
f	6	Pin, crossarm, steel, 5/8" X 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
n	3	Bolt double arming,5/8"x req'd length
az	4	Letters, 2" C, 2" N, with 1" nails
cu	2	Brace, wood, 60" span
ek	16	Locknuts

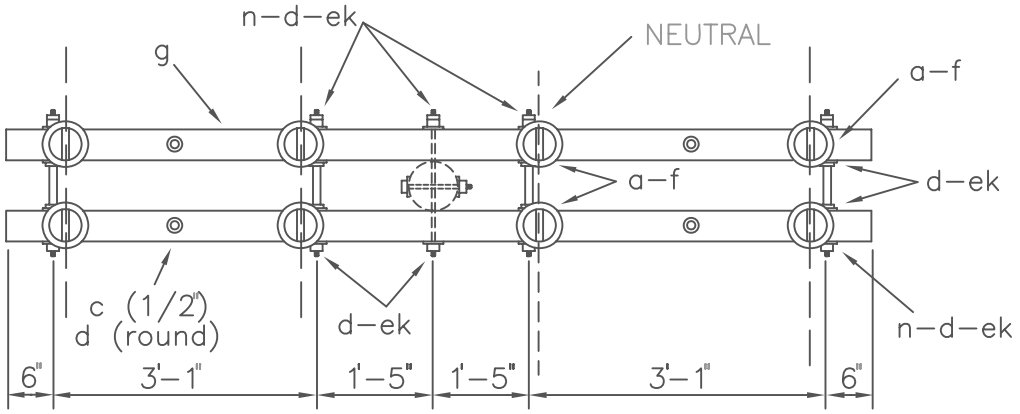
NOTE: Install either identification letters or white insulators in neutral position.

DESIGN PARAMETERS:

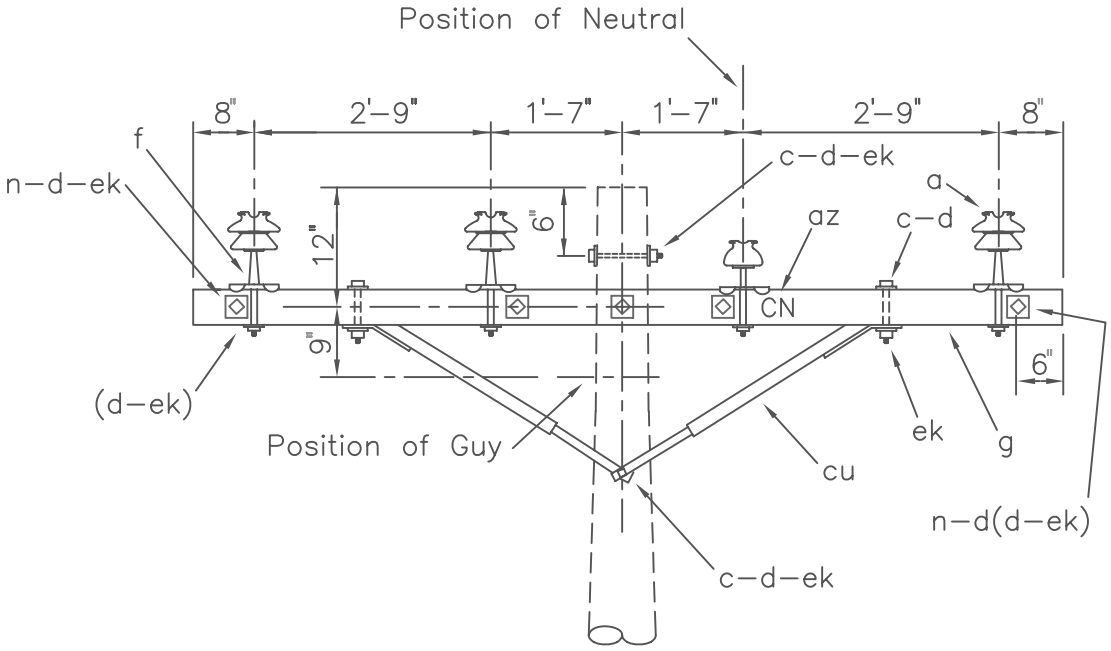
See TABLE IV

DOUBLE SUPPORT, NEUTRAL ON CROSSARMS

DEC 1998	3 – PHASE PRIMARY	VC2.51
RUS	24.9/14.4 kV	(VC9)



PLAN



ITEM	QTY	MATERIAL
a	2	Insulator, pin type, 15 kV, white
a	6	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8 "
d	21	Washer, square, 2 1/4"
f	8	Pin, crossarm, steel clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
n	5	Bolt, double arming,5/8"xreq'd length
az	4	Letters, 2" C, 2" N, with 1" nails
cu	2	Brace, wood, 60" span
ek	24	Locknuts

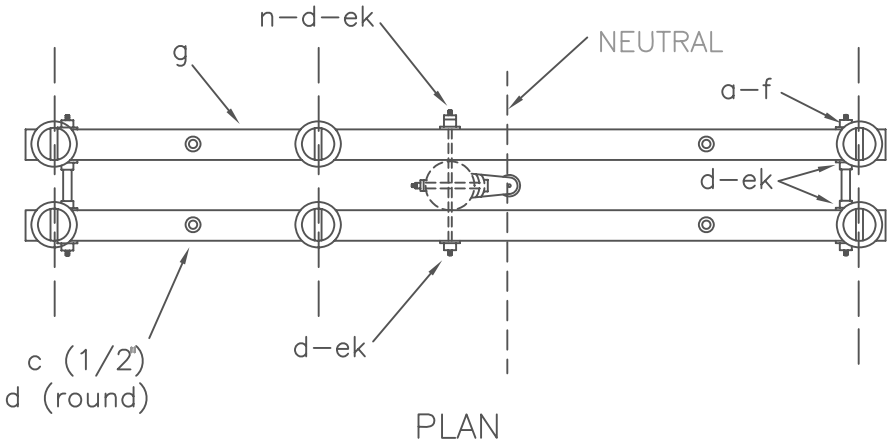
NOTE: Install either identification letters or white insulators in neutral position.

DESIGN PARAMETERS:

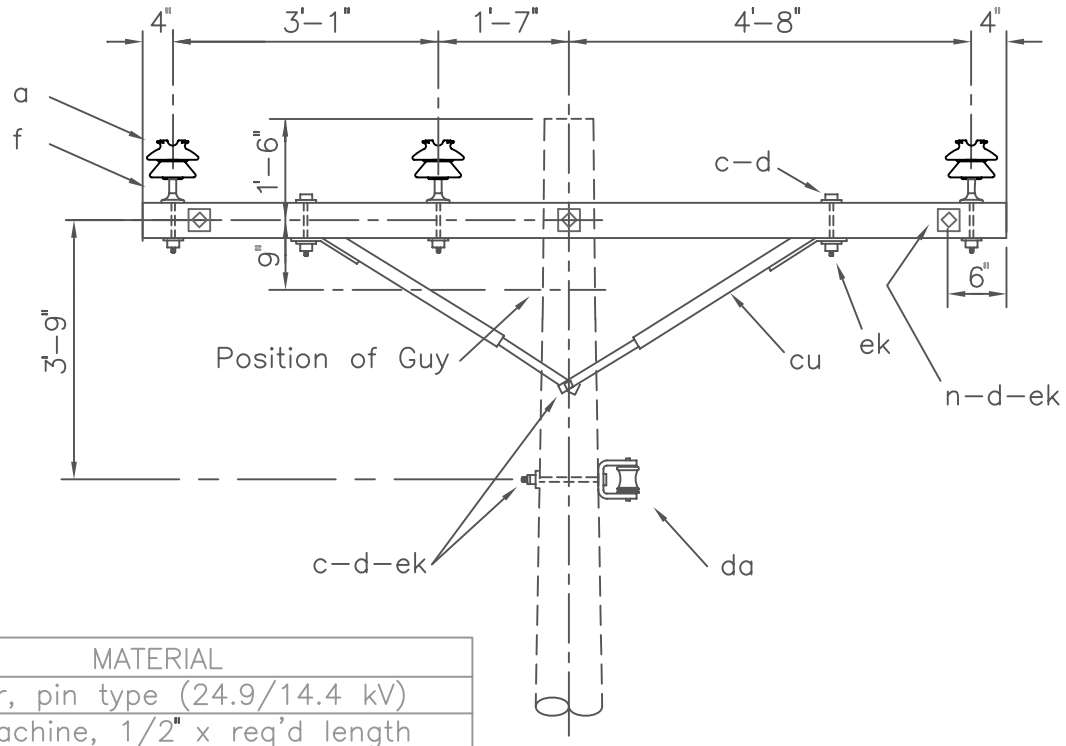
See TABLE V

DOUBLE SUPPORT, NEUTRAL ON CROSSARMS (LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC2.51L
RUS	24.9/14.4 kV	(VC9–2)



PLAN



ITEM	QTY	MATERIAL
a	6	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	12	Washer, square, 2 1/4"
f	6	Pin, crossarm, steel, 5/8" X 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
n	3	Bolt, double arm, 5/8" x req'd length
cu	2	Brace, wood, 60" span
da	1	Bracket, insulated
ek	16	Locknuts

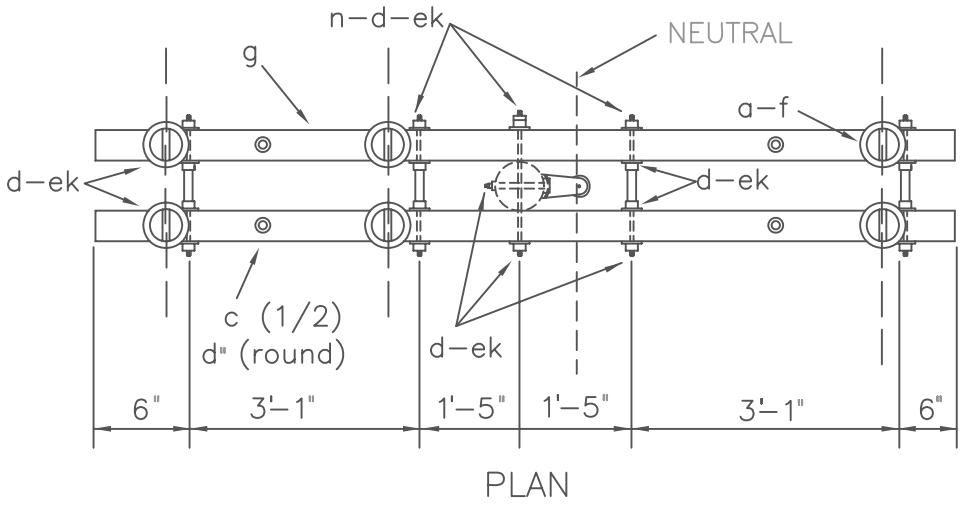
NOTE:
Neutral assembly may be installed on opposite side of pole when necessary to avoid midspan conductor clearance.

DESIGN PARAMETERS:

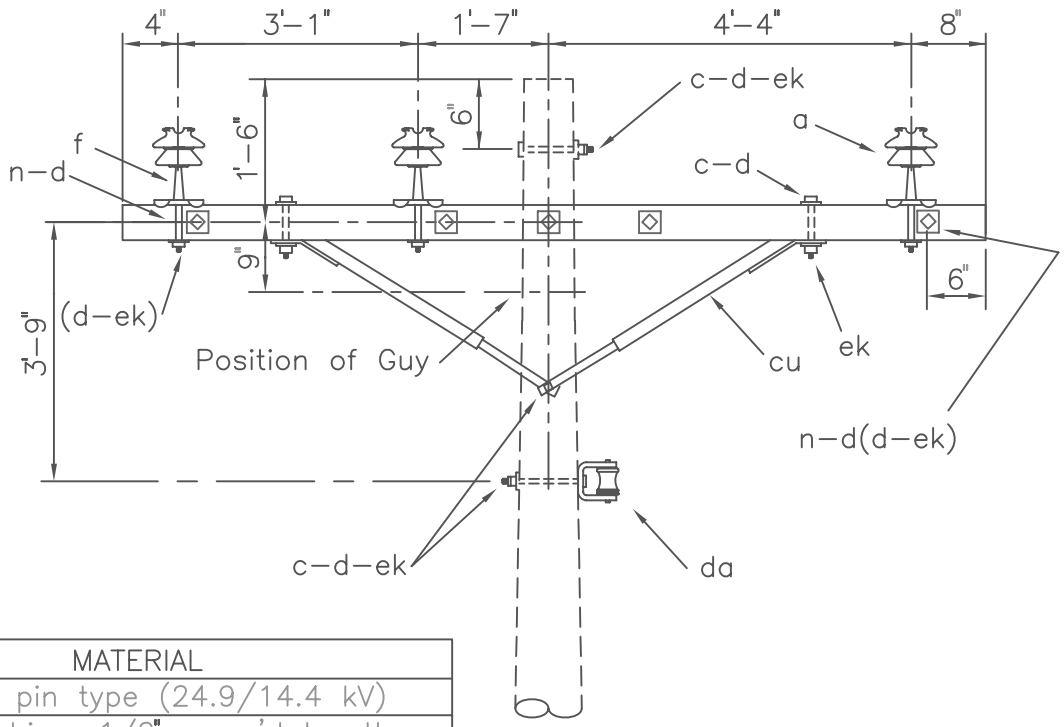
See TABLE IV

DOUBLE SUPPORT ON 10 FOOT CROSSARMS

DEC 1998	3 – PHASE PRIMARY	VC2.52
RUS	24.9/14.4 kV	(VC2–1)



PLAN



ITEM	QTY	MATERIAL
a	6	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	3	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	22	Washer, square, 2 1/4"
f	6	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
n	5	Bolt, double arm, 5/8" x req'd length
cu	2	Brace, wood, 60" span
da	1	Bracket, w/ 3" x 3" spool insulator
ek	25	Locknuts

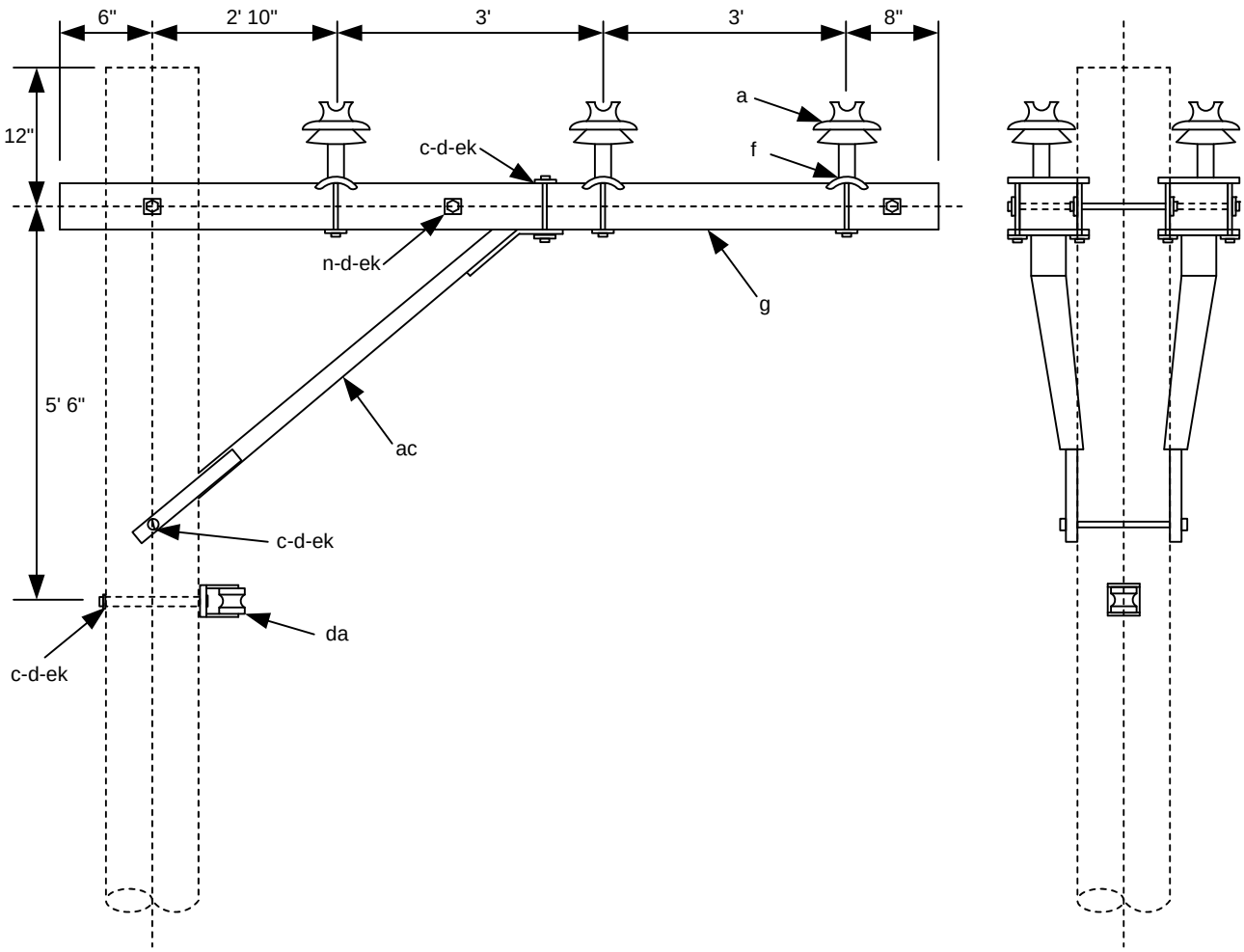
NOTE:
Neutral assembly may be installed on opposite side of pole when necessary to avoid midspan conductor clearance.

DESIGN PARAMETERS:

See TABLE V

DOUBLE SUPPORT ON 10 FOOT CROSSARMS (LARGE CONDUCTORS)

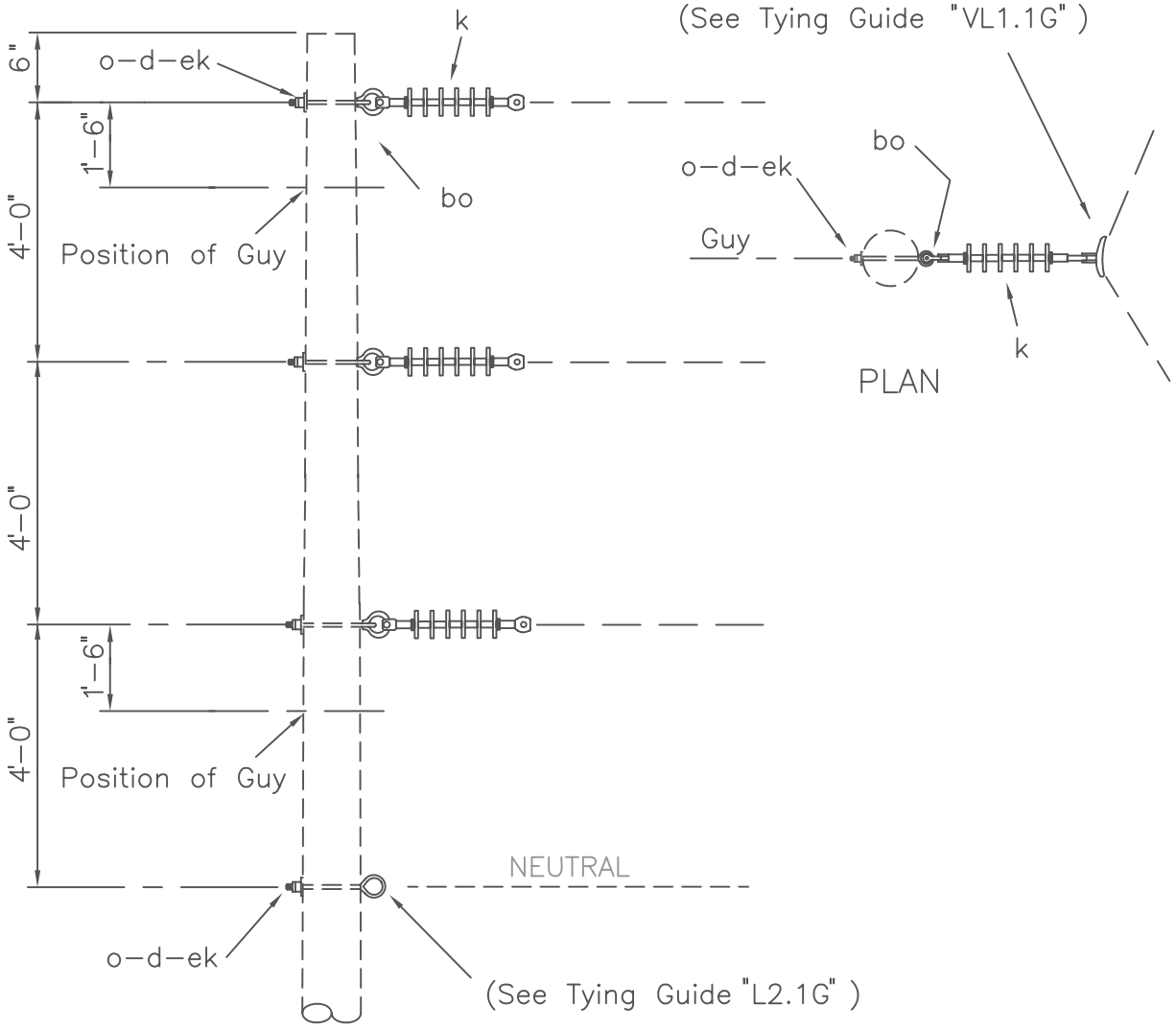
DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC2.52L (VC2–2)
RUS		



ITEM	QTY.	MATERIAL
a	6	Insulator, pin type 25 kV
c	2	Bolt, machine, ½" x required length
c	2	Bolt, machine, 5/8" x required length
d	8	Washer, square, 2 ¼" x 2 ¼" x 3/16"
d	1	Washer, square, curved, 3" x 3" x 3/16"
f	6	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'-0"
n	3	Bolt, double arming, 5/8" x required length
ac	2	Brace, alley arm, wood
da	1	Bracket, insulated
ek	12	Locknuts, 5/8"
ek	2	Locknuts, ½"

DOUBLE SUPPORT ON CROSSARMS
(ALLEY ARM)

2006	WFECA	3 – Phase Primary 24.9/14.4 kV	VC2.91



NOTE:

1. Assembly units "VA5.2" or "VA5.4" may be used if additional climbing space is desired.
2. If additional down guys are required, construct similar to Dwg. "E2.3G."
3. See Dwg. "N2.1," "N3.1" for alternate neutral assemblies for smaller conductors.

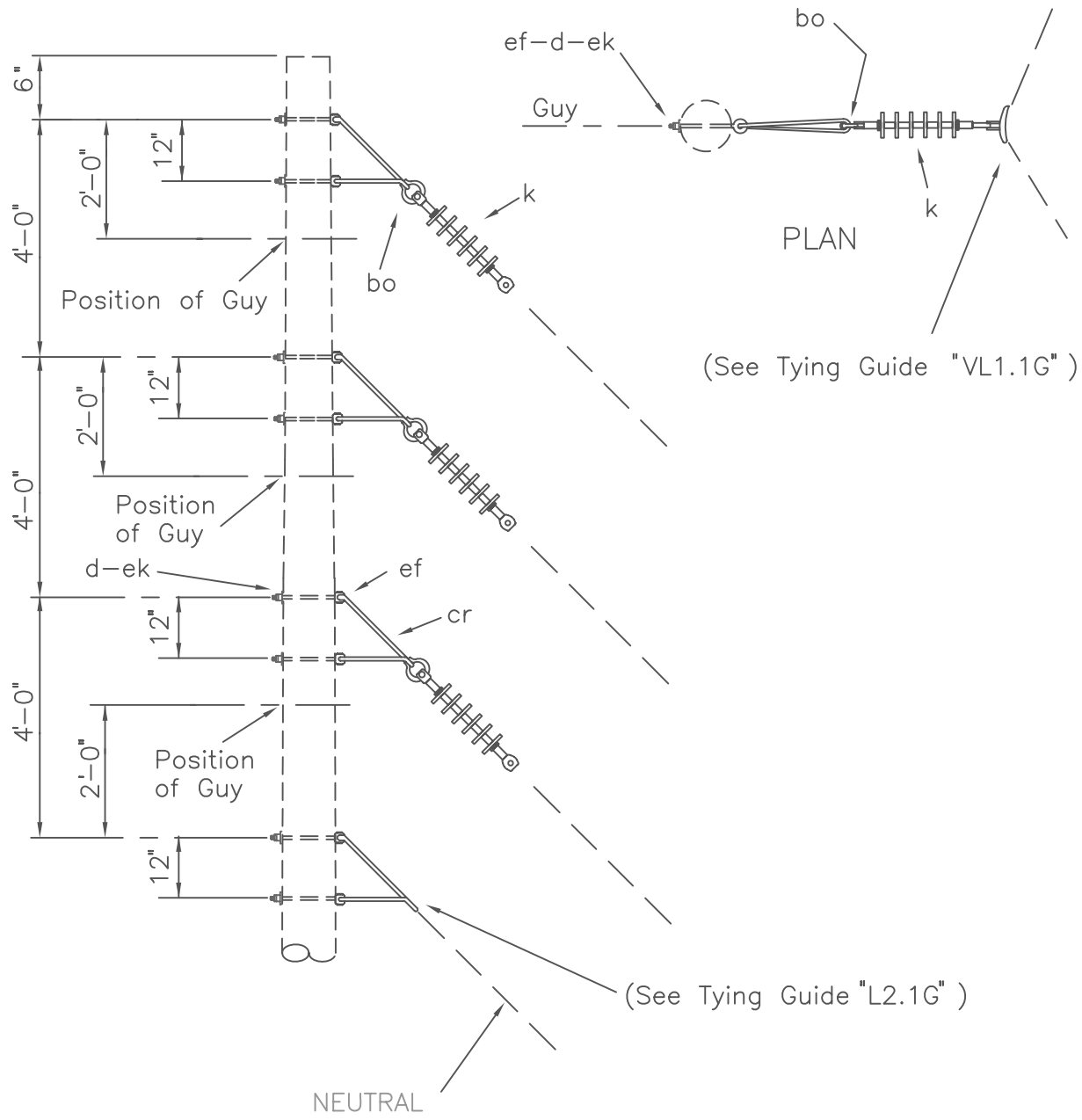
ITEM	QTY	MATERIAL
d	4	Washer, square, 3", curved
k	3	Insulator, 25 kV Polymer deadend
o	4	Bolt, eye, 5/8" x req'd length
bo	4	Shackle, anchor
ek	4	Locknuts

DESIGN PARAMETERS:

ALLOWABLE TRANSVERSE LOAD= 5000 lbs./Conductor
20° – 60°: #1/0 ACSR
30° – 60°: Smaller Conductors

SUSPENSION ANGLE

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC3.1 (VC3)
RUS		



ITEM	QTY	MATERIAL
d	8	Washer, square, 3", curved
k	3	Insulator, 25 kV Polymer Deadend
bo	3	Shackle, anchor
cr	4	Bracket, angle, 5/8"
ef	8	Bolt, clevis, 5/8" x req'd length
ek	8	Locknuts

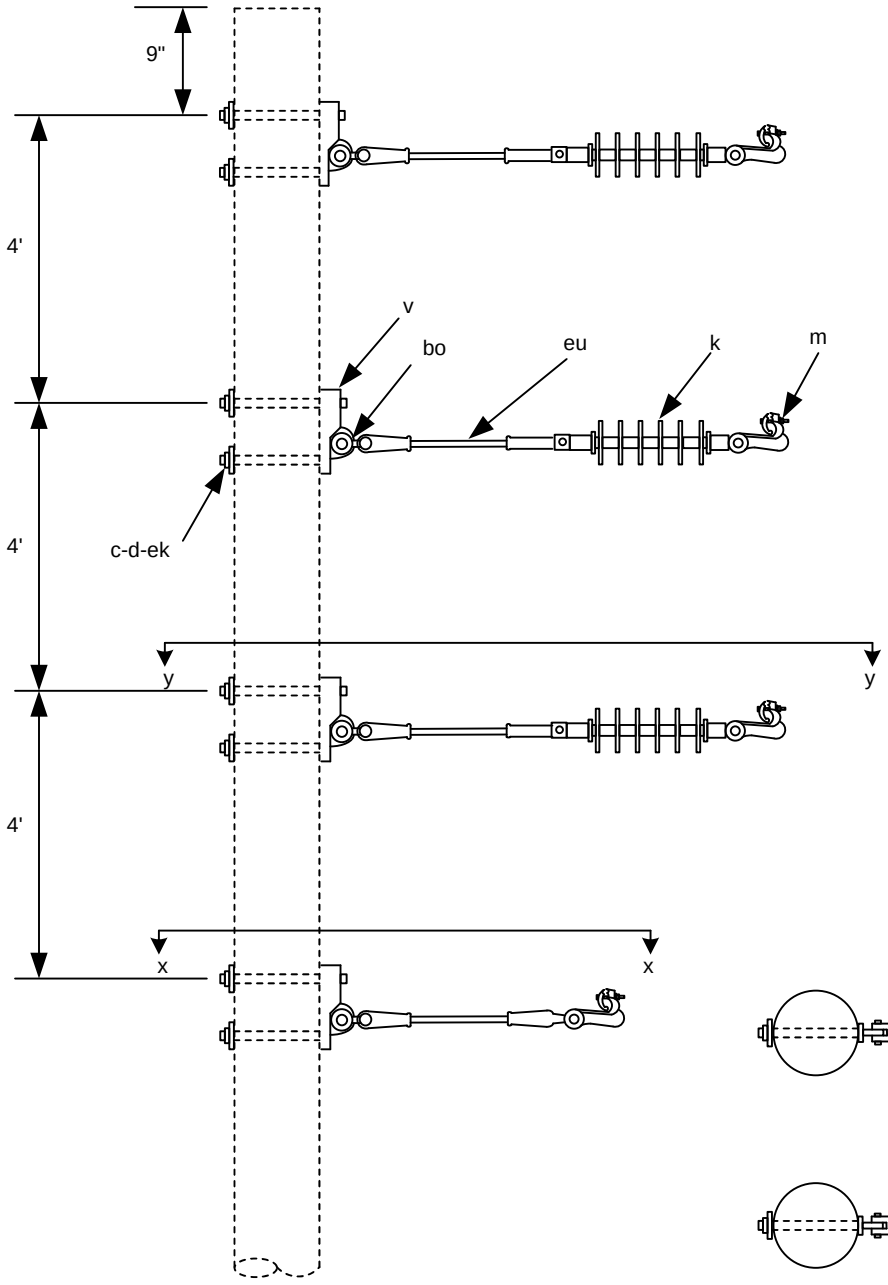
DESIGN PARAMETERS:

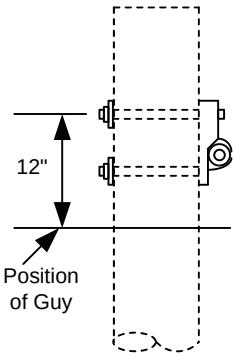
ALLOWABLE TRANSVERSE LOAD= 5000 lbs./Conductor

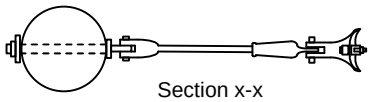
10° –30° Angles

SUSPENSION ANGLE (LARGE CONDUCTORS)

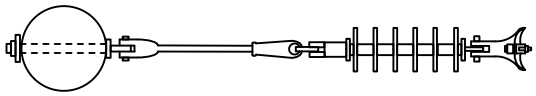
DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC3.2L (VC3–1)
RUS		







Section x-x



Section y-y

ITEM	QTY.	MATERIAL
c	8	Bolt, Machine, 5/8" x required length
d	8	Washer, 3"
k	3	Insulator, 25 kV Polymer Deadend
m	3	Clamp, Suspension, Primary
m	1	Clamp, Suspension, Neutral
v	4	Pole eye plate
bo	4	Shackle, Anchor
bv	4	Armor Rod
ek	8	Locknut, 5/8"
eu	4	Link, extension, insulated, eye-clevis

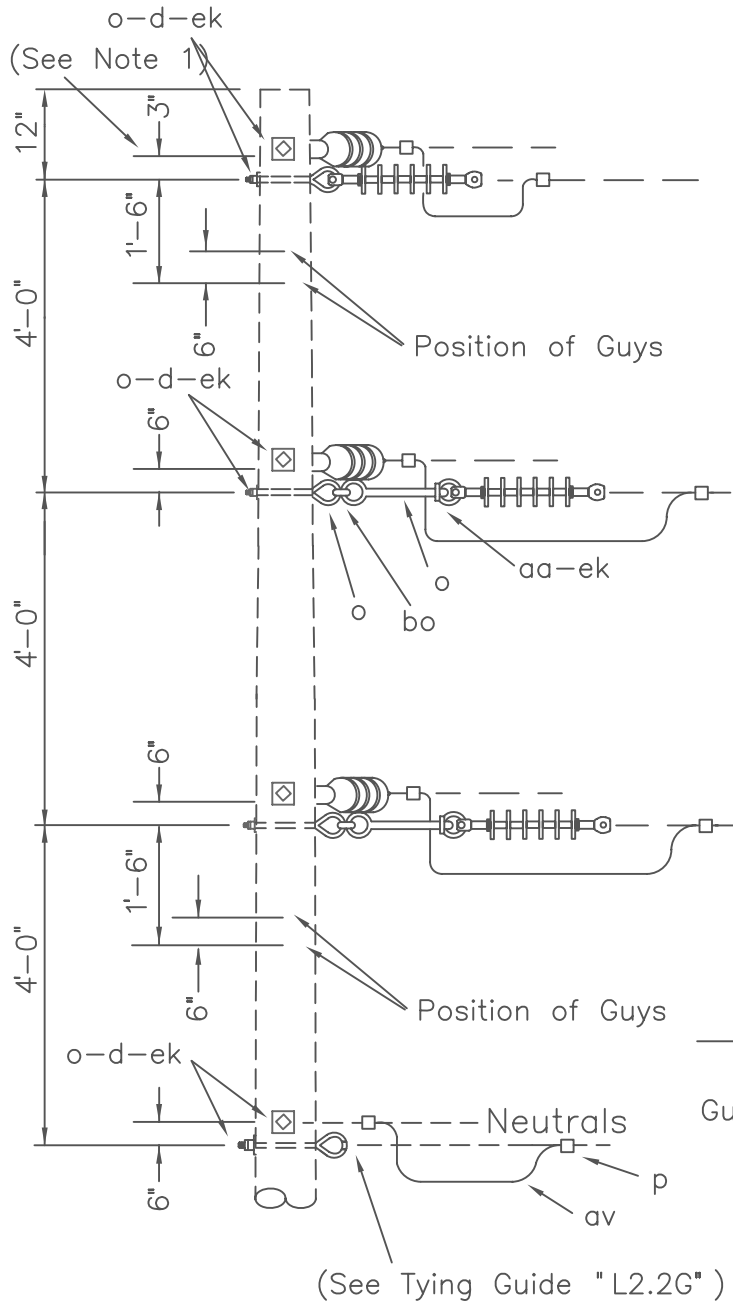
Note:

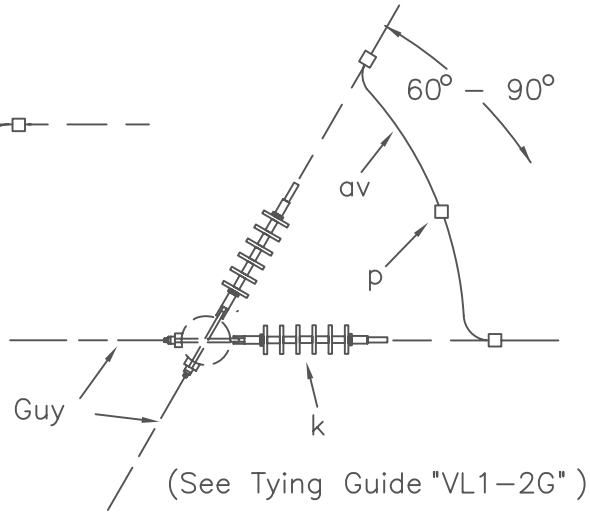
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

2. For 30° to 60° angles.

SUSPENSION ANGLE (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC3.3L (VC3-L)





PLAN
(Top Phase)

ITEM	QTY	MATERIAL
d	8	Washer, square, 3", curved
k	6	Insulator, 25 kV Polymer deadend
o	12	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
aa	4	Nut, eye, 5/8"
av		Jumpers, as req'd
bo	4	Shackle, anchor
ek	12	Locknuts

NOTES:

1. Separate 6" (top position only) when angle equals 90°.

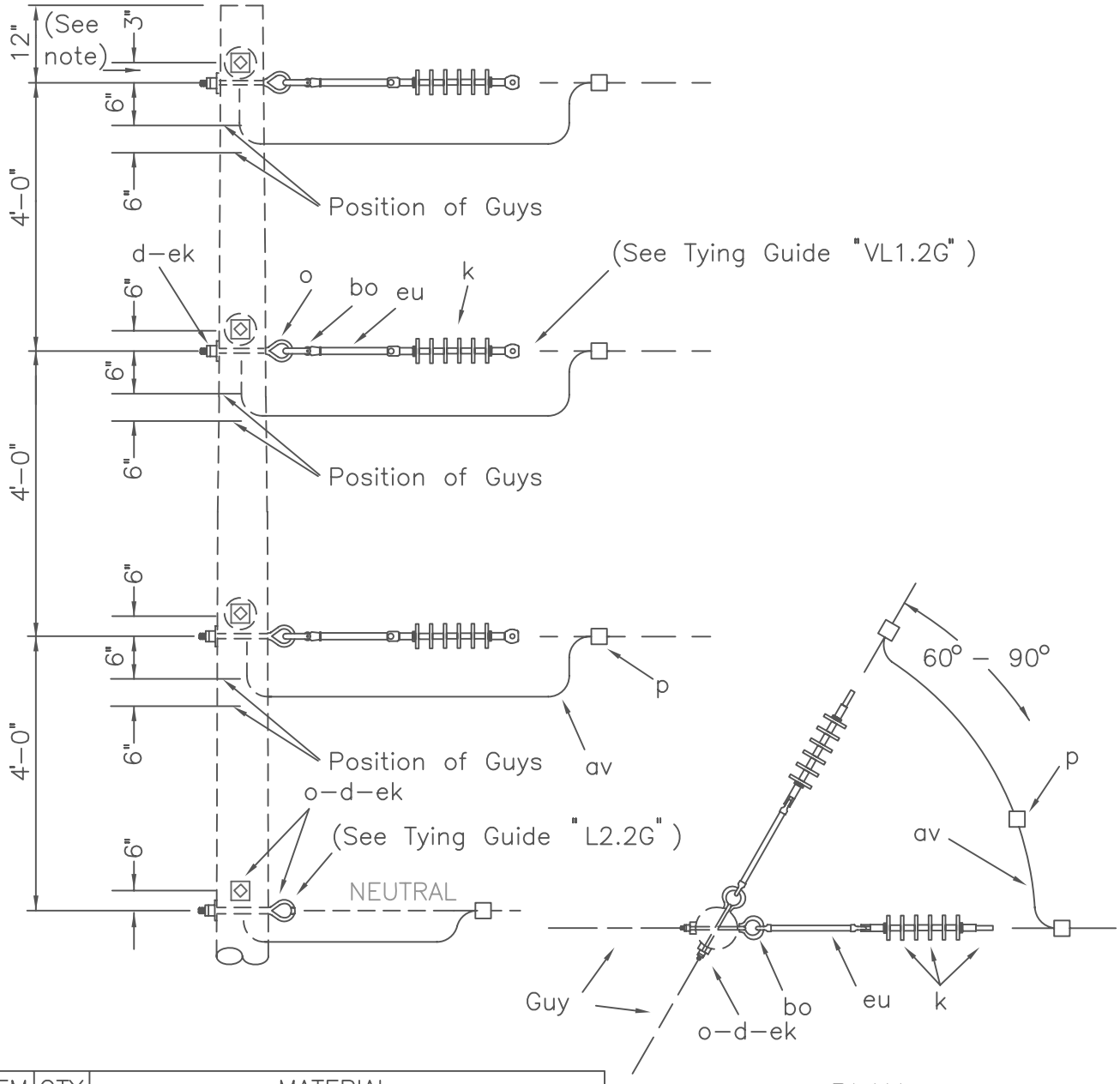
2. Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "o") and eye nut (item "aa").

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5,000 lbs./Conductor

DEADEND ANGLE (ACUTE)

DEC 1998	3 – PHASE PRIMARY	VC4.1
RUS	24.9/14.4 kV	(VC4–1)



PLAN

ITEM	QTY	MATERIAL
d	8	Washer, square, 3", curved
k	6	Insulator, 25 kV Polymer Deadend
o	16	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
av		Jumpers, as req'd
bo	8	Shackle, anchor
eu	6	Link, extension, insulated, 12" min
ek	12	Locknuts

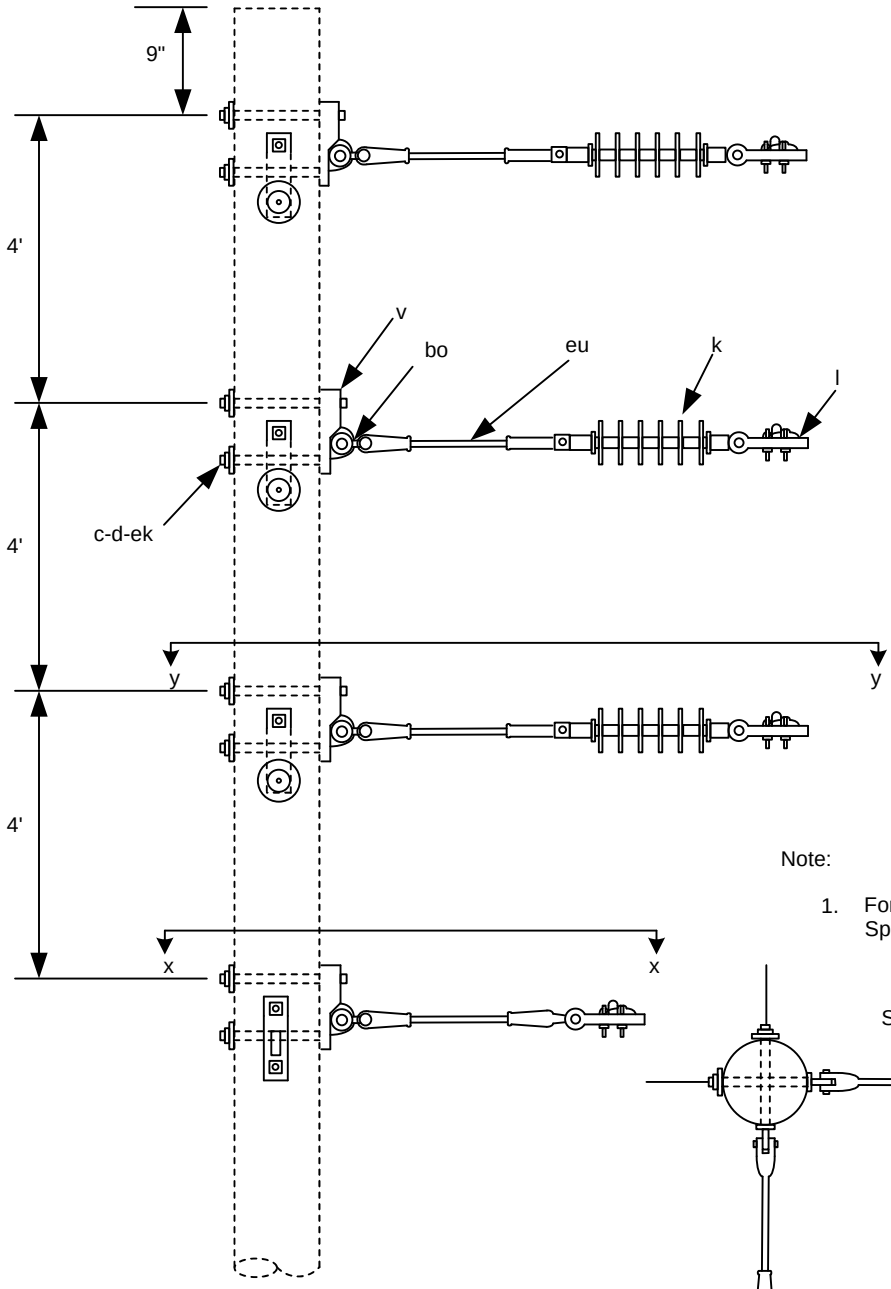
NOTE: Separate 6" (top position only) when angle equals 90°

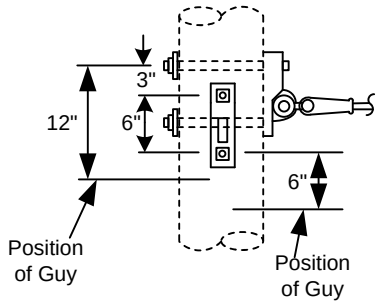
DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5,000 lbs./Conductor

DEADEND ANGLE (LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC4.2L
RUS	24.9/14.4 kV	(VC4–1L)

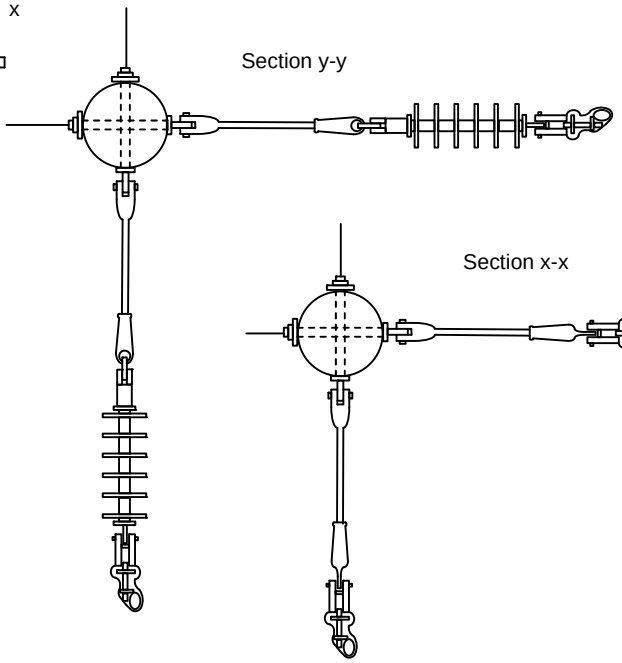


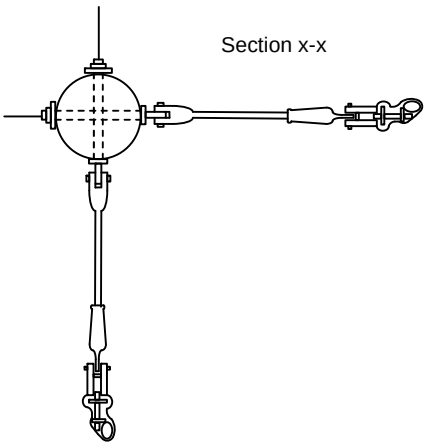


Details

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

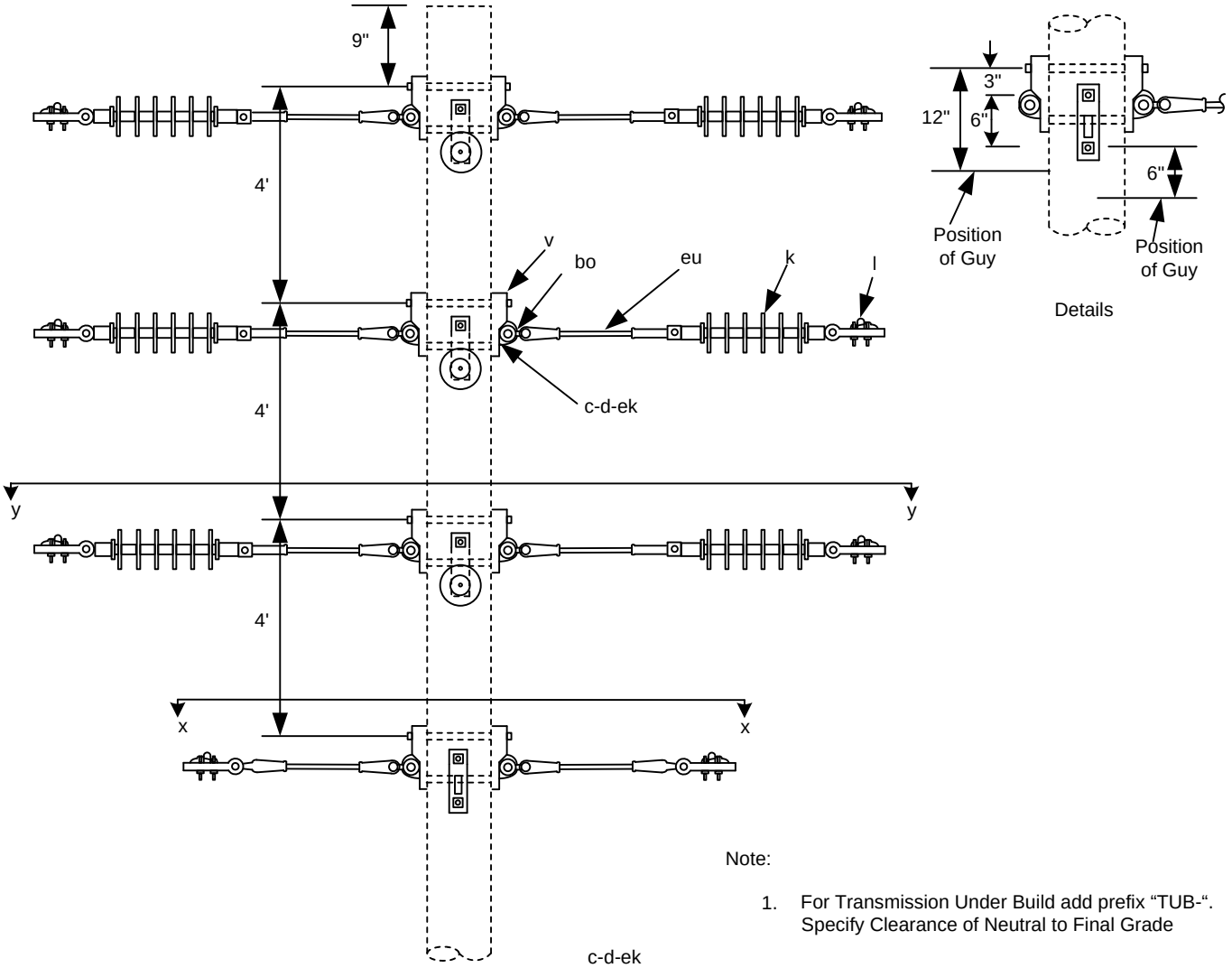




ITEM	QTY.	MATERIAL
c	16	Bolt, Machine, 5/8" x required length
d	16	Washer, 3"
k	6	Insulator, 25 kV Polymer Deadend
l	6	Clamp, Dead end, Primary
l	2	Clamp, Dead end, Neutral
v	8	Pole eye plate
bo	8	Shackle, Anchor
ek	16	Locknut, 5/8"
eu	8	Link, extension, insulated, eye-clevis

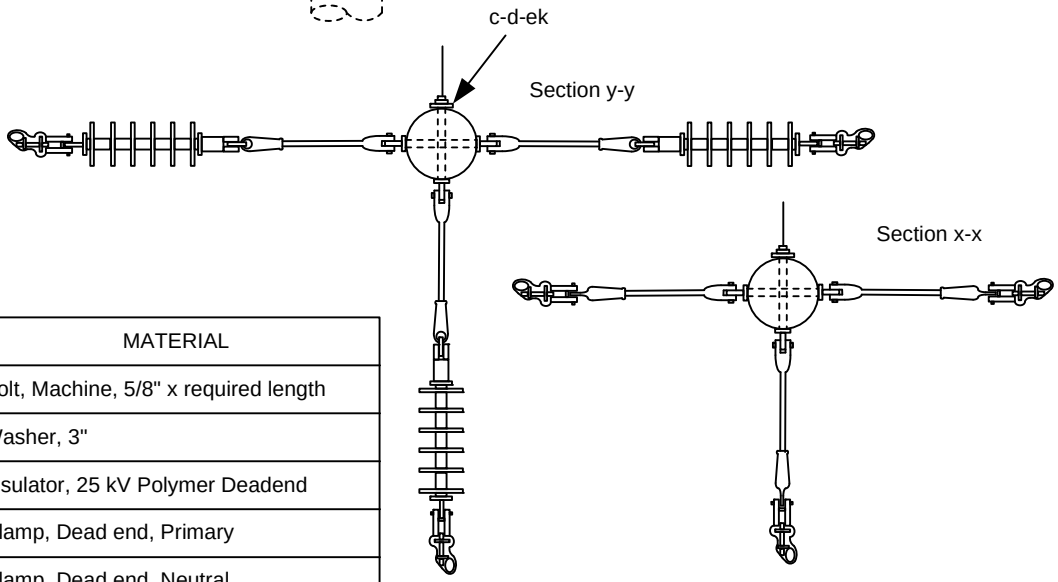
DEAD END ANGLE (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC4.3L (VC4-1L)



Note:

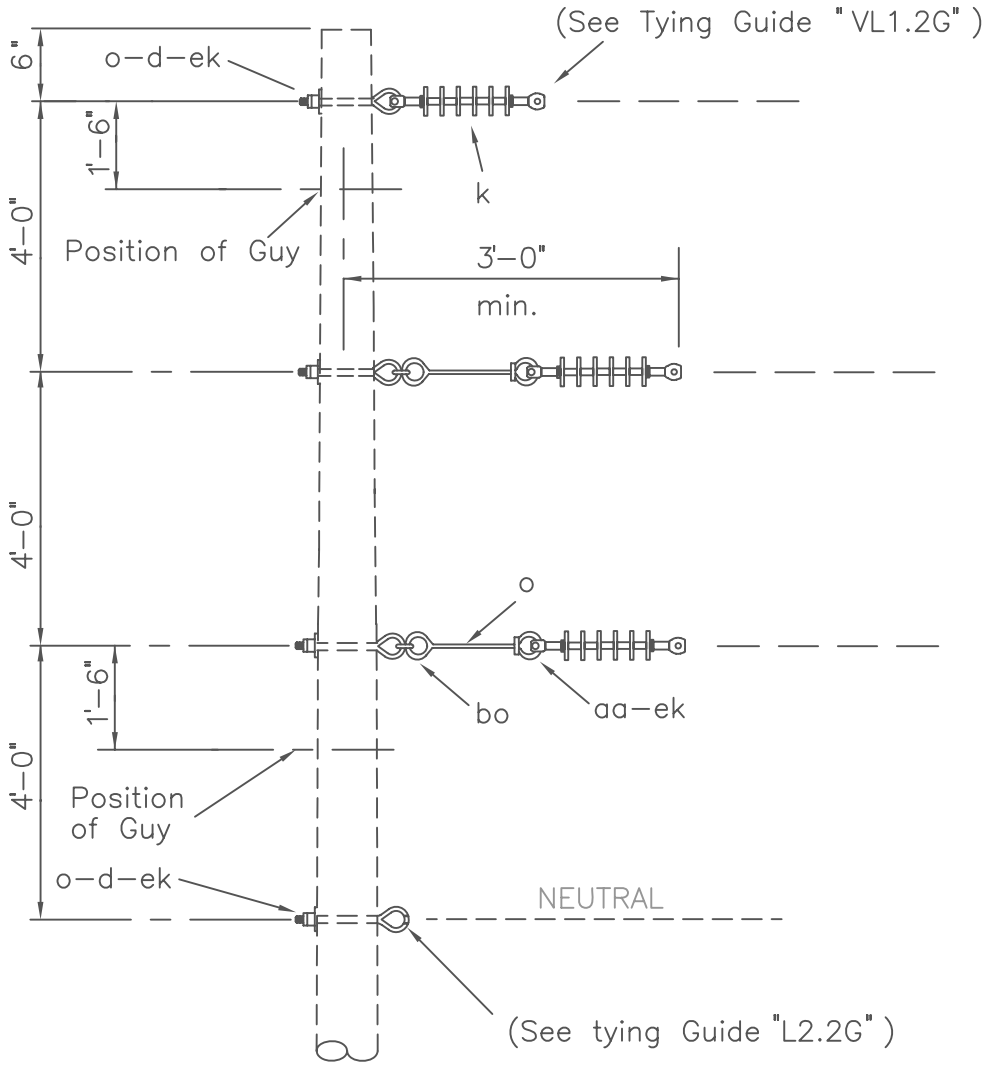
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade



ITEM	QTY.	MATERIAL
c	16	Bolt, Machine, 5/8" x required length
d	8	Washer, 3"
k	9	Insulator, 25 kV Polymer Deadend
l	9	Clamp, Dead end, Primary
l	3	Clamp, Dead end, Neutral
v	12	Pole eye plate
bo	12	Shackle, Anchor
ek	16	Locknut, 5/8"
eu	12	Link, extension, insulated, eye-clevis

TRIPLE DEAD END
(LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC4.4L (VC45-1L)



NOTE: Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "o") and eye nut (item "aa").

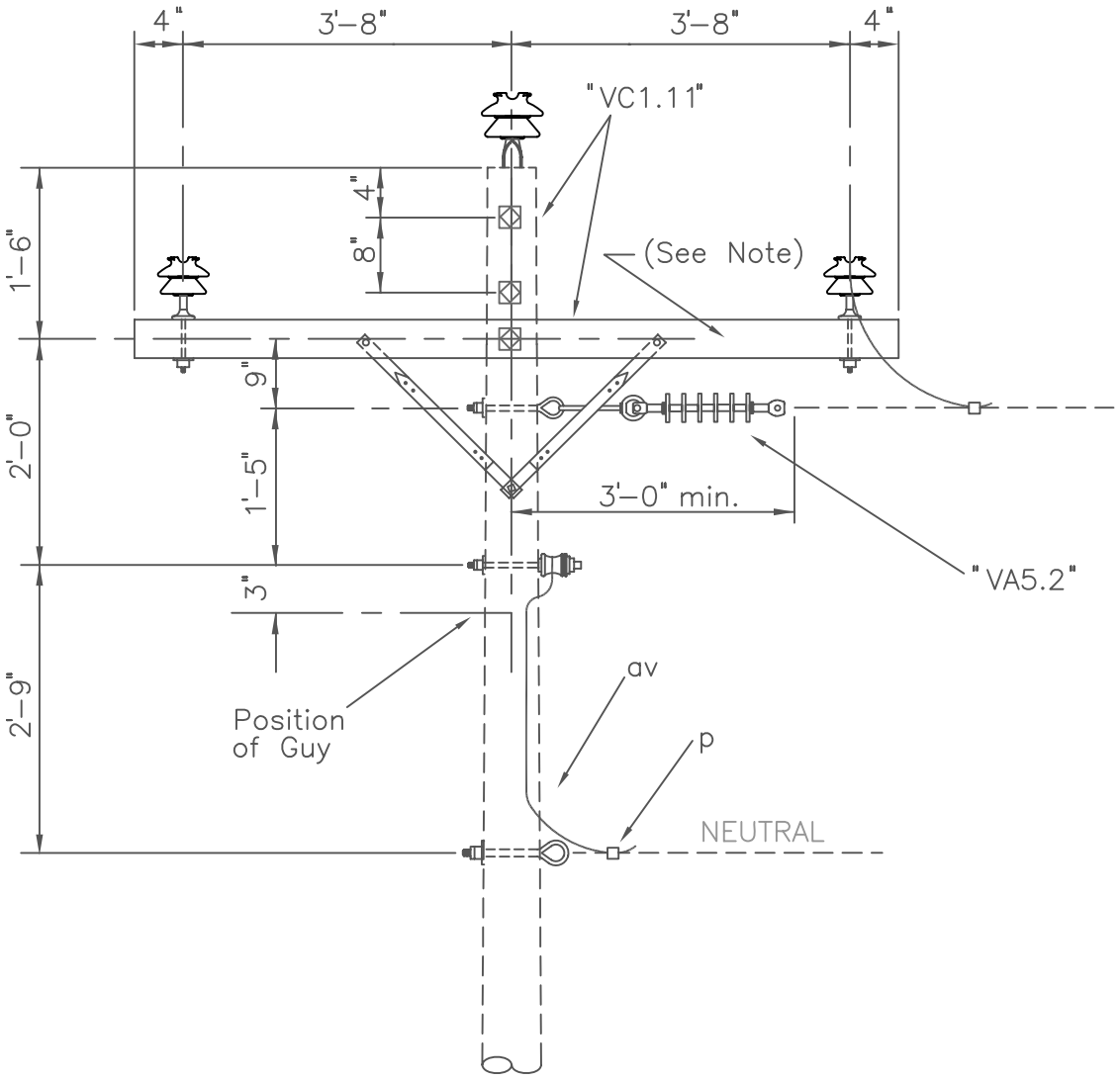
ITEM	QTY	MATERIAL
d	4	Washer, square, 3", curved
k	3	Insulator, 25 kV Polymer deadend
o	6	Bolt, eye, 5/8" x req'd length
aa	2	Nut, eye, 5/8"
bo	2	Shackle, anchor
ek	6	Locknuts

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5,000 lbs./Conductor

SINGLE DEADEND – VERTICAL

DEC 1998	3 – PHASE PRIMARY	VC5.1
RUS	24.9/14.4 kV	(VC5–1)



NOTES:

When tapping center phase, install post type insulator, "VA1.011P," horizontally on crossarm, 24 inches from center of pole and fasten jumper to insulator.

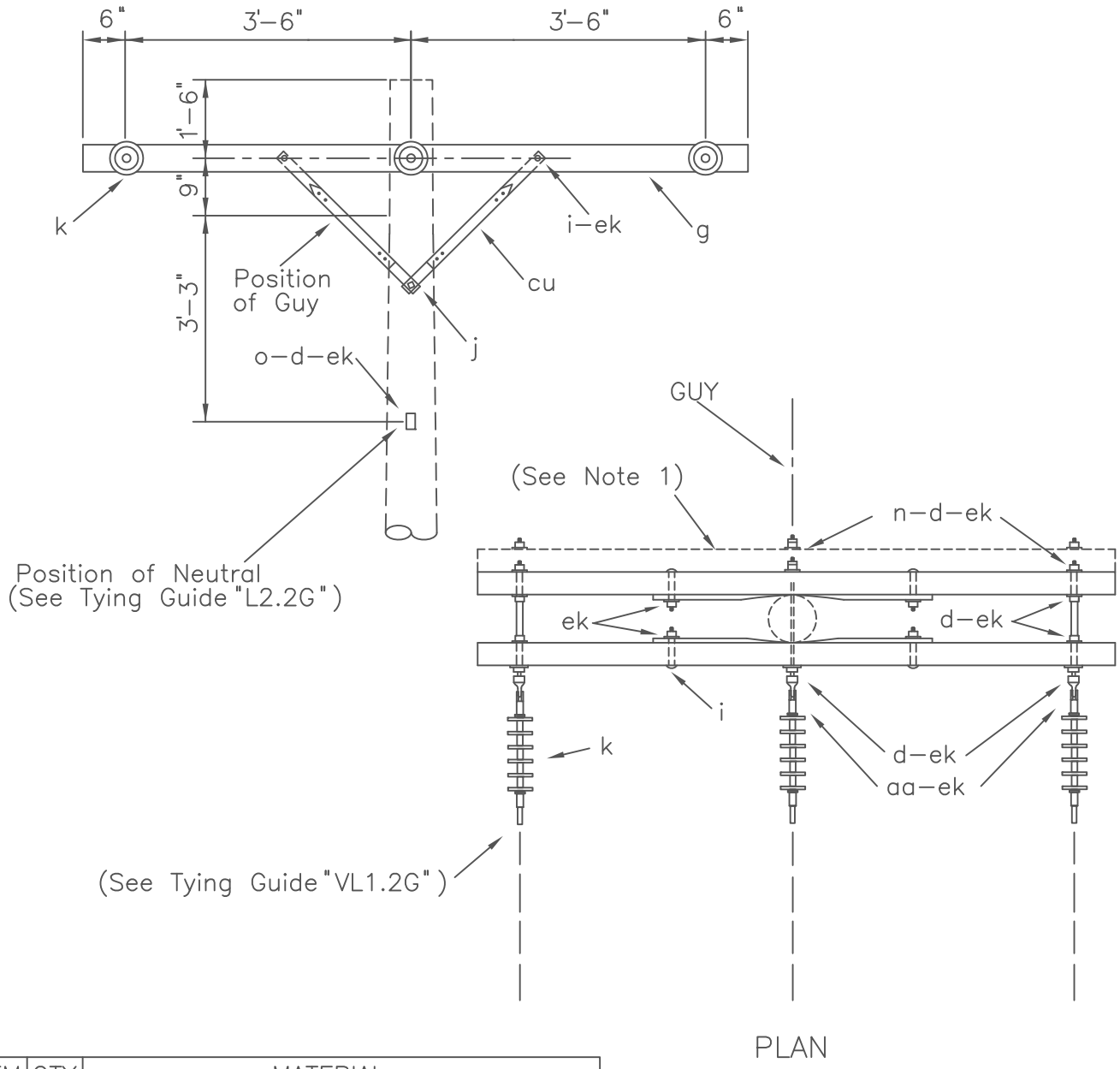
ITEM	QTY	MATERIAL
	1	"VC1.11" Primary Assembly
	1	"VA5.2" Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD = 5,000 lbs./Conductor

SINGLE PHASE TAP GUIDE

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC5.11G
RUS		



PLAN

ITEM	QTY	MATERIAL
d	11	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	3	Insulator, 25 kV Polymer deadend
n	3	Bolt,double arming,5/8" x req'd length
o	1	Bolt, eye, 5/8" x req'd length
aa	3	Nut, eye, 5/8"
cu	4	Brace, 28"
ek	18	Locknuts

NOTES:

1. Designate as VC5.31 for assembly with three crossarms.
2. Neither assembly suitable for Grade B construction.
3. Double arming eye bolt, item "dy," may be used instead of double arming bolt, item "n", and eye nut, item "aa."

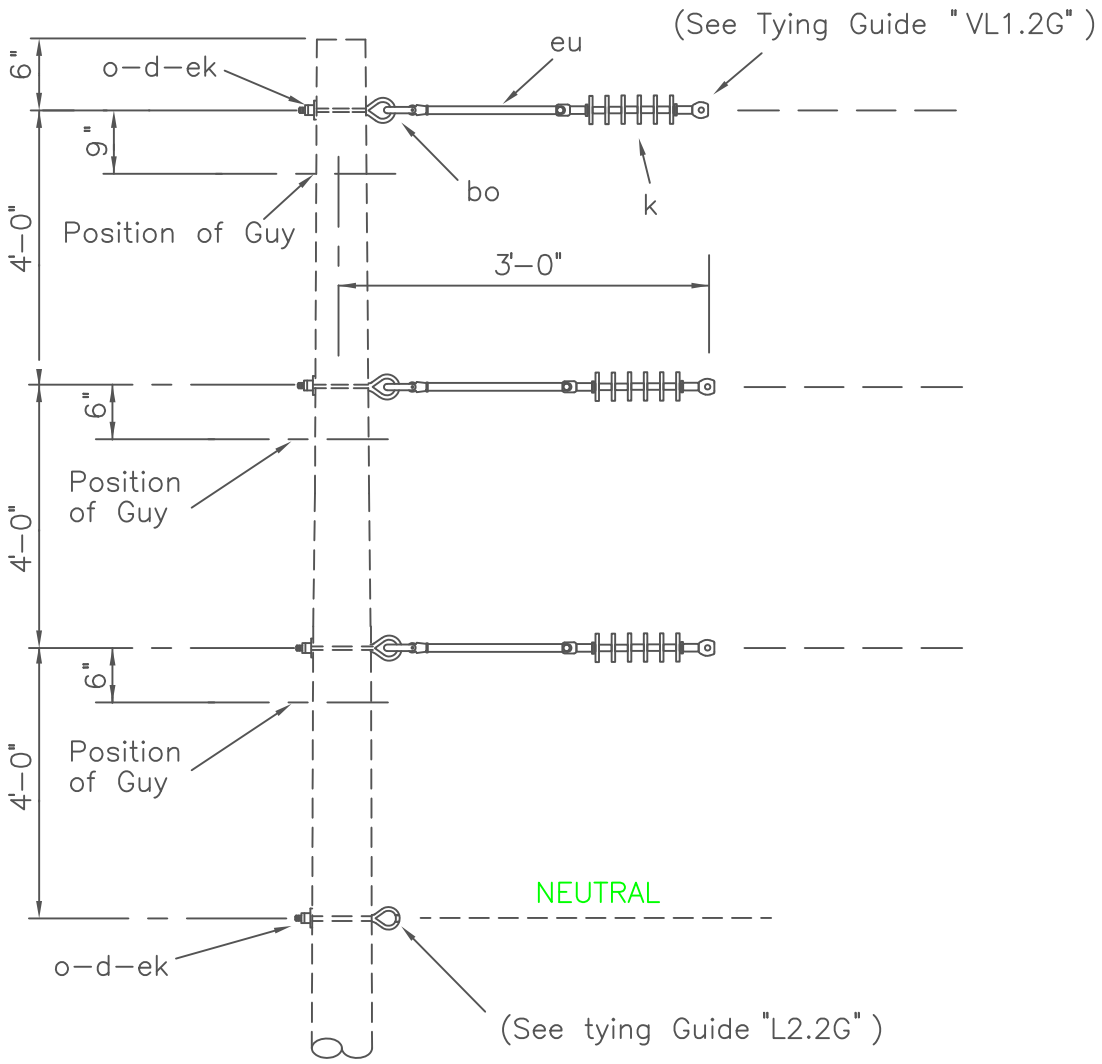
DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOADING (lbs./conductor) =

VC5.21: 2,000 (#2 ACSR)
VC5.31: 3,000 (#2/0 ACSR)

SINGLE DEADEND ON CROSSARMS

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC5.21, VC5.31 (VC7, VC7–1)
RUS		



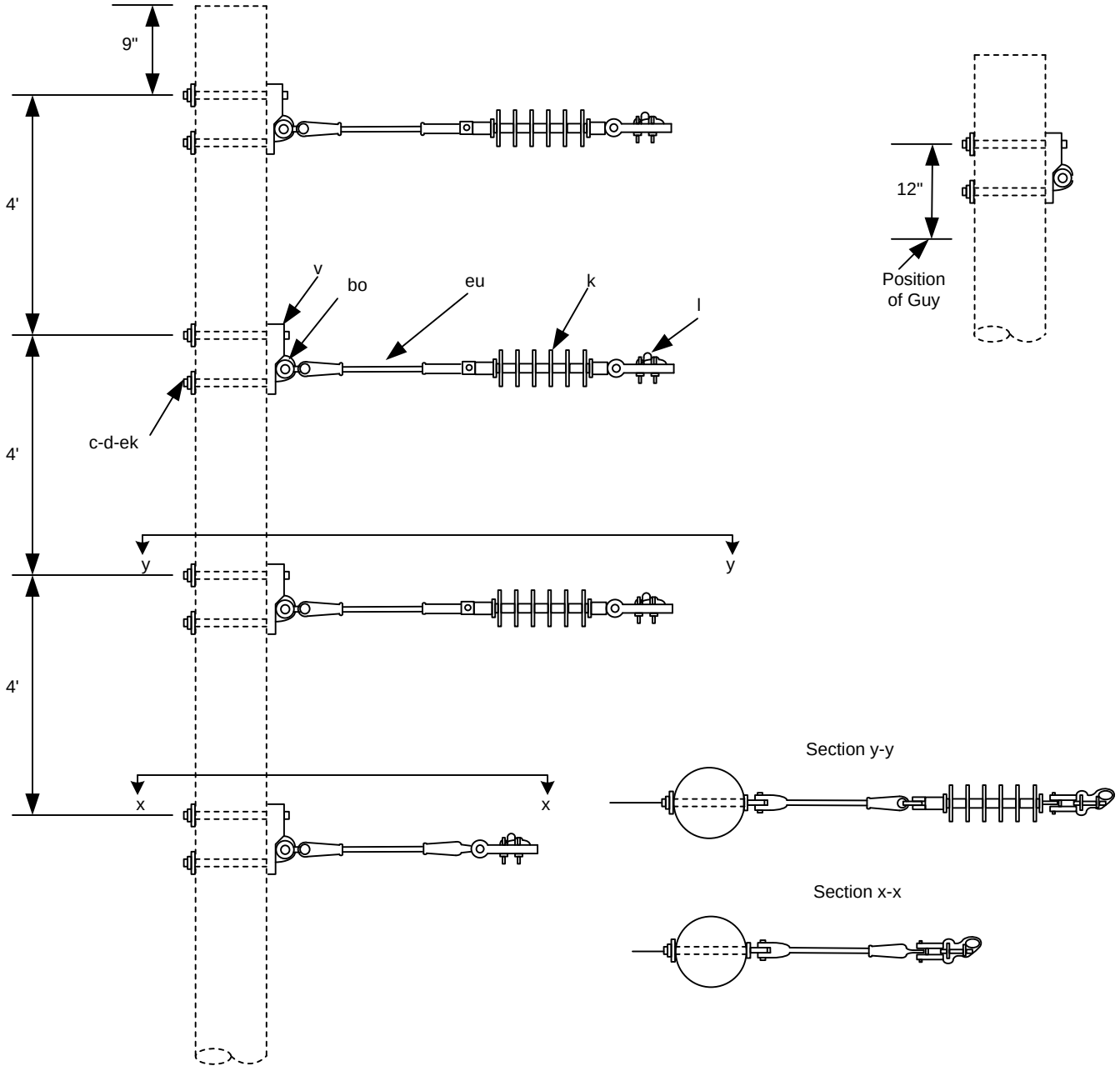
ITEM	QTY	MATERIAL
d	4	Washer, square, 3", curved
k	3	Insulator, 25 kV Polymer Deadend
o	4	Bolt, eye, 5/8" x req'd length
bo	3	Shackle, anchor
eu	3	Link, extension, insulated 12" mininum
ek	4	Locknuts

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL
LOAD = 5,000 lbs./Conductor

SINGLE DEADEND – VERTICAL
(LARGE CONDUCTORS)

DEC 1998	3 – PHASE PRIMARY	VC5.2L
RUS	24.9/14.4 kV	(VC5–1L)



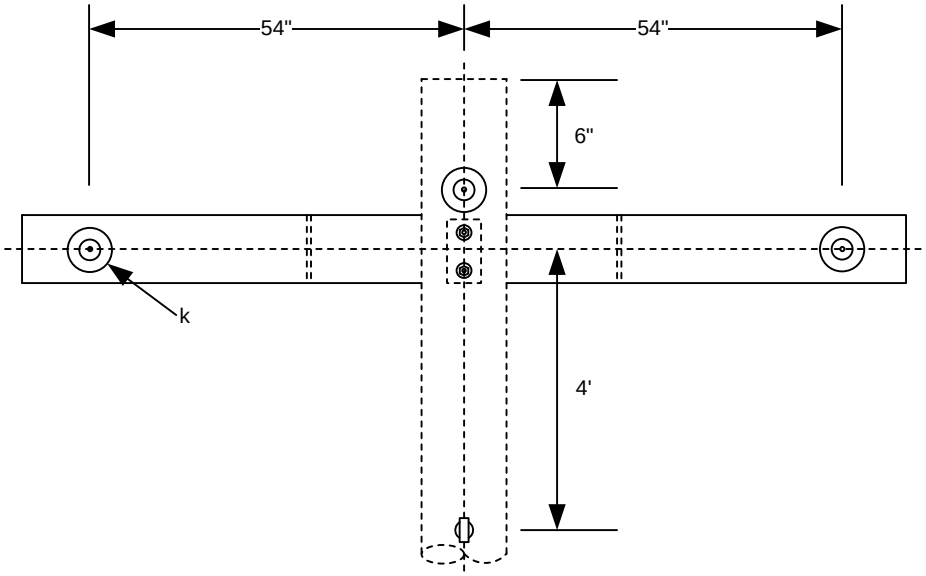
ITEM	QTY.	MATERIAL
c	8	Bolt, Machine, 5/8" x required length
d	8	Washer, 3"
k	3	Insulator, 25 kV Polymer Deadend
l	3	Clamp, Dead end, Primary
l	1	Clamp, Dead end, Neutral
v	4	Pole eye plate
bo	4	Shackle, Anchor
ek	8	Locknut, 5/8"
eu	4	Link, extension, insulated, eye-clevis

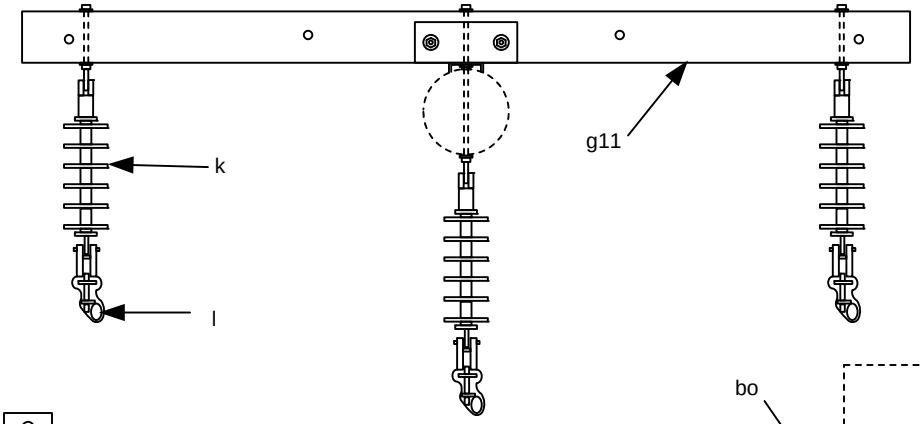
Note:

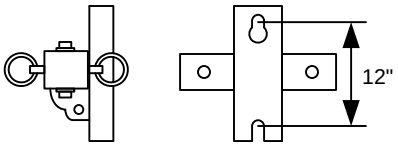
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

SINGLE DEADEND - VERTICAL (LARGE CONDUCTORS)

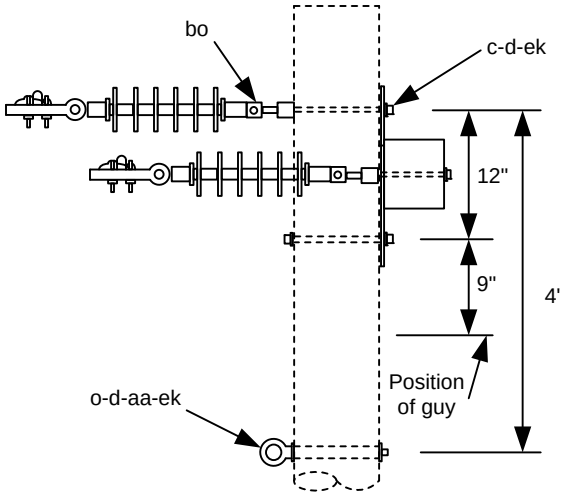
2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC5.3L (VC5-1L)







Mounting Plate Detail



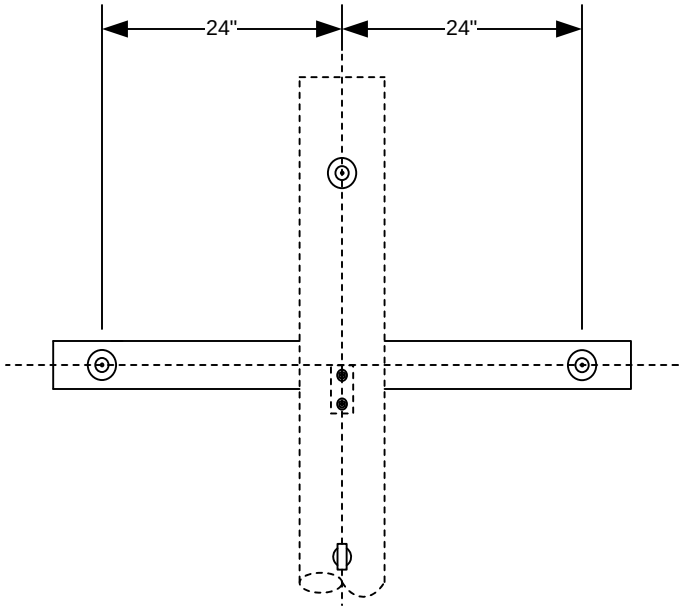
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	3	Washer, 3"
g11	1	Crossarm Assembly, 10' (Dead End)
k	3	Insulator, 25 kV Polymer Deadend
o	1	Bolt, eye, 5/8" x required length
l	3	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
bo	3	Shackle, Anchor
ek	3	Locknut, 5/8"

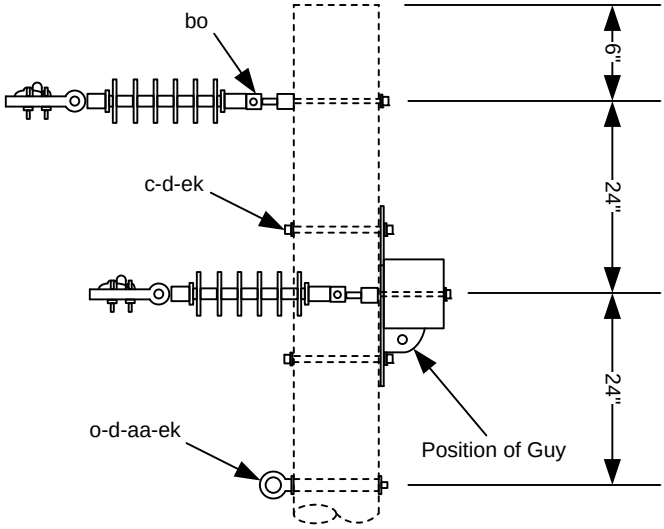
Note:

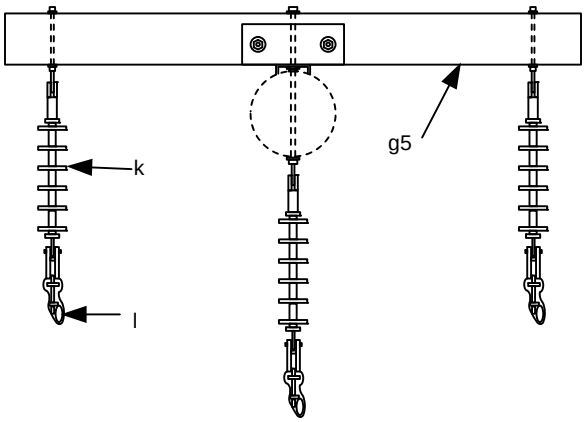
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

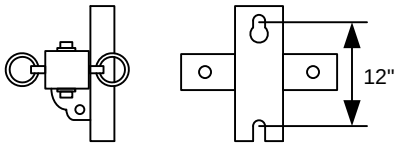
SINGLE DEAD END ON CROSSARM
(LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC5.71L (VC7-HD)









Mounting Plate Detail

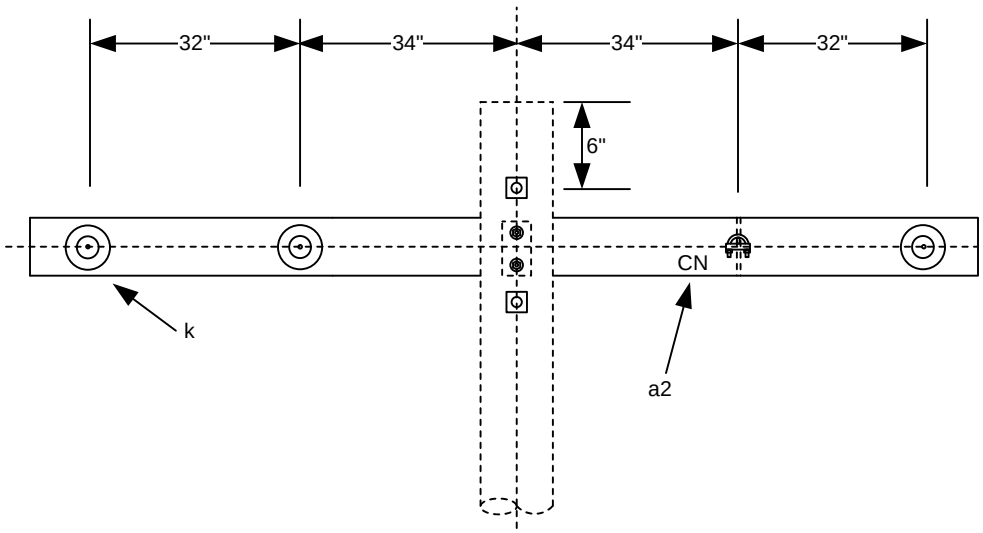
ITEM	QTY.	MATERIAL
c	3	Bolt, Machine, 5/8" x required length
d	4	Washer, 3"
g5	1	Crossarm Assembly, 5' (Dead End)
k	3	Insulator, 25 kV Polymer Deadend
o	1	Bolt, eye, 5/8" x required length
l	3	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
bo	3	Shackle, Anchor
ek	4	Locknut, 5/8"

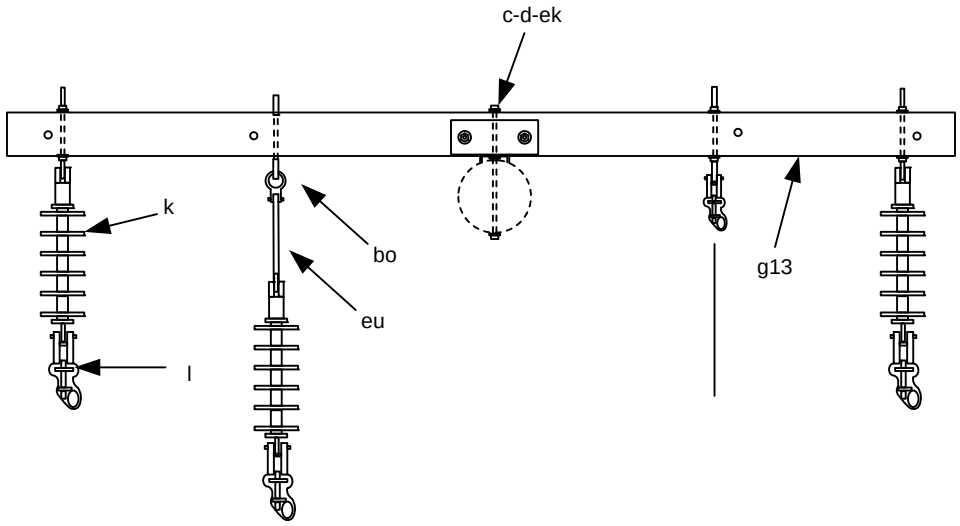
Note:

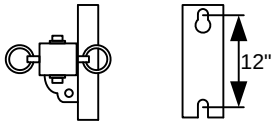
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

SINGLE DEAD END ON CROSSARM - NARROW PROFILE (LARGE CONDUCTORS)

2012	WFECA	3 – Phase Primary 24.9/14.4 kV	VC5.72N







Mounting Plate Details

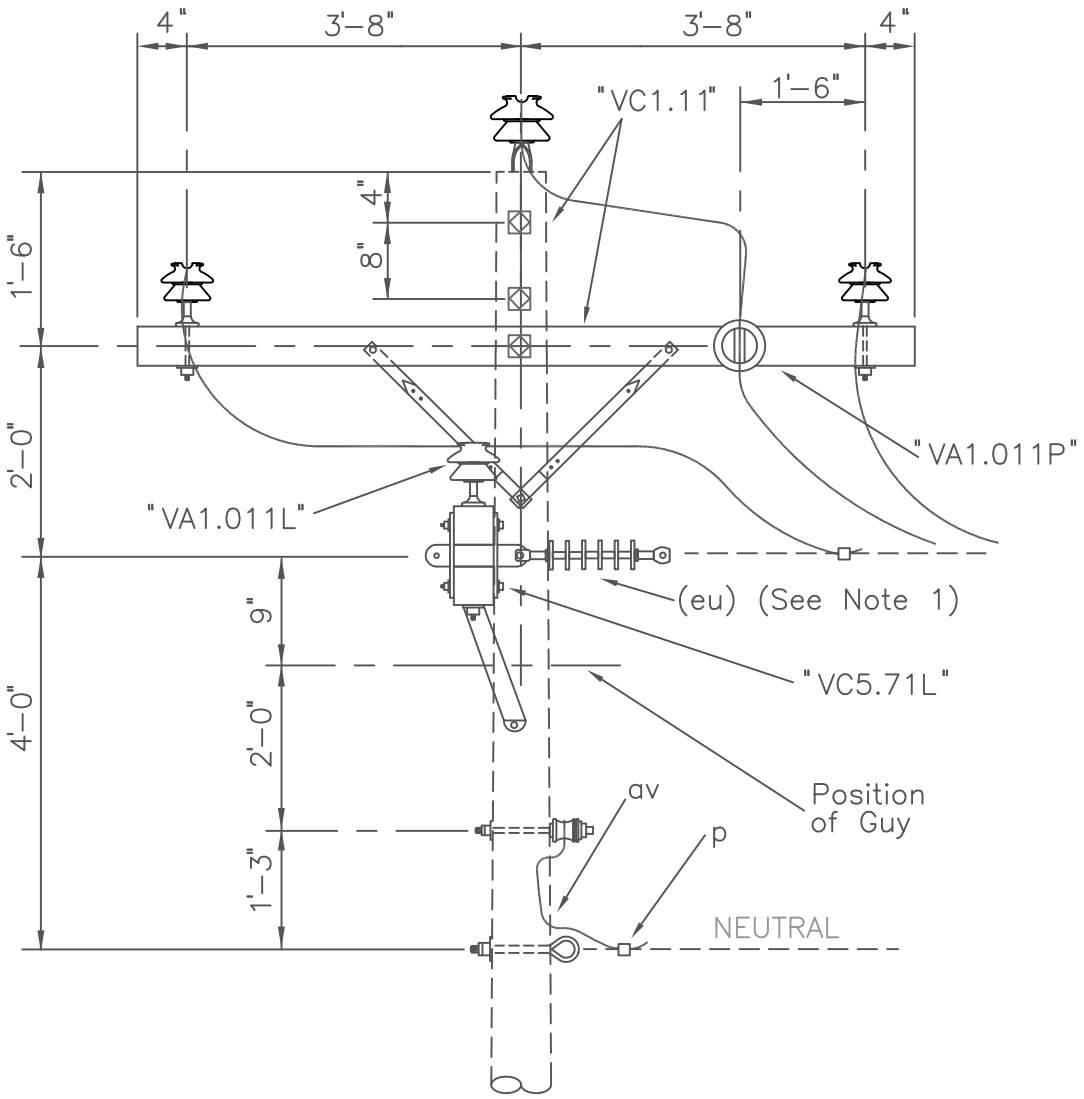
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 3/4" x required length
d	2	Washer, 3"
g13	1	Crossarm Assembly, 12' (Dead End)
k	3	Insulator, 25 kV Polymer Deadend
l	3	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
az	4	Letters, 2 – “c”, 2 – “n”
bo	1	Shackle, Anchor
ek	2	Locknut, 3/4"
eu	1	Link, extension, insulated

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

SINGLE DEAD END ON 12' CROSSARM
(LARGE CONDUCTORS)

2012	WFECA	3 – Phase Primary 24.9/14.4 kV	VC5.73



NOTES:

1. Install insulated extension link, item "eu," 12 inch mininum, in center phase of tap.
2. Three "VC5.1" vertical primary deadend assemblies, with adequately sized jumpers, is preferred construction.

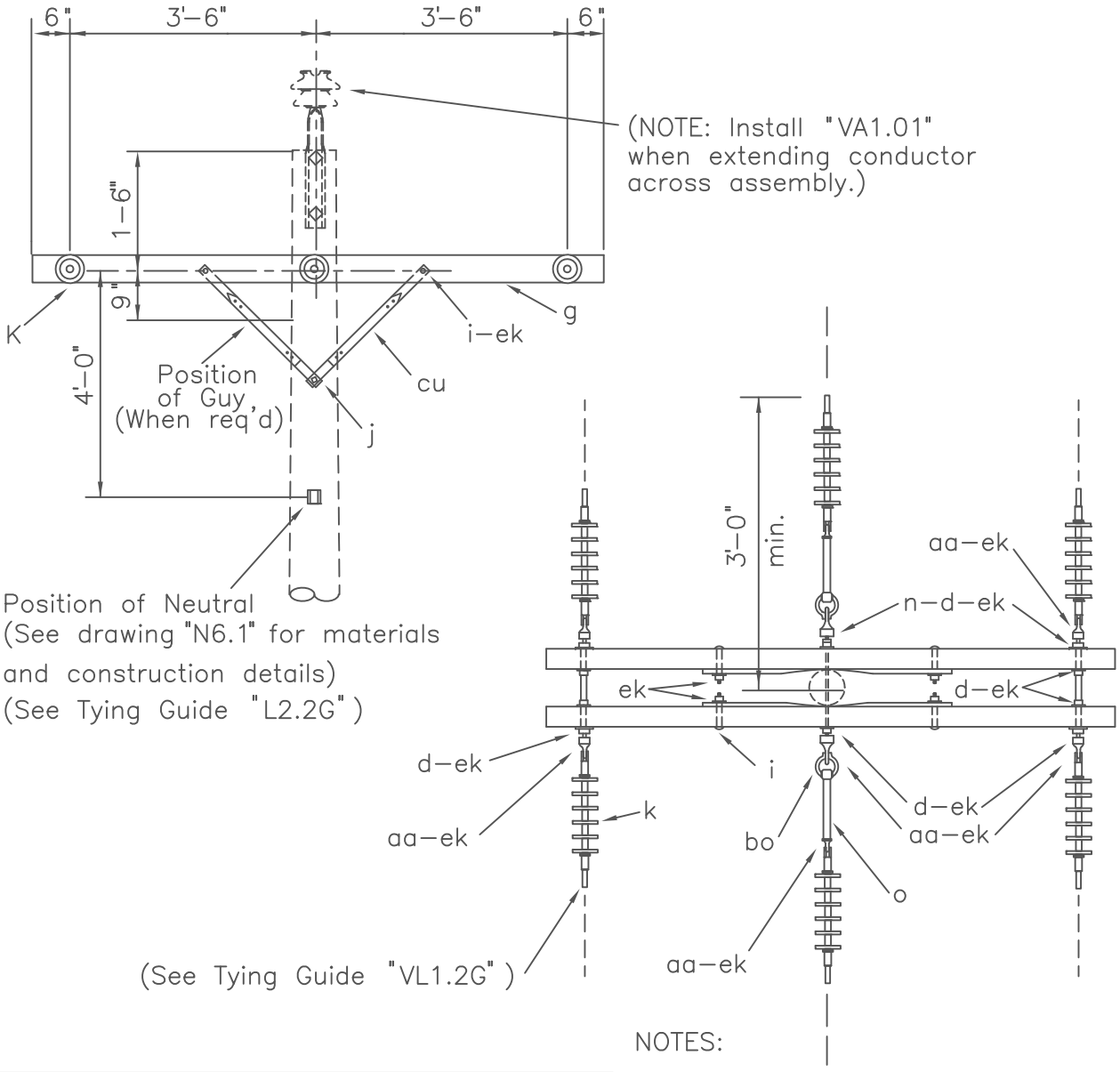
ITEM	QTY	MATERIAL
	1	VC1.11 Primary Assembly
	1	VA5.71L Primary Assembly
	1	VA1.011L Misc. Single Support
	1	VA1.011P Misc. Single Support
p		Connectors, as req'd
av		Jumpers, as req'd
eu	1	Link, extension, insulated

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD EQUALS LESSER OF:
5,000 lbs./Conductor, or
Manufacturer's Specifications

THREE PHASE HORIZONTAL TAP GUIDE

DEC 1998	3 – PHASE PRIMARY	VC5.82G
RUS	24.9/14.4 kV	



ITEM	QTY	MATERIAL
d	12	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	6	Insulator, 25 kV Polymer deadend
n	4	Bolt,double arming,5/8" x req'd length
o	2	Bolt, eye, 5/8" x req'd length
aa	8	Nut, eye, 5/8"
bo	2	Shackle, anchor
cu	4	Brace, 28"
ek	26	Locknuts

NOTES:

1. Not suitable for Grade B construction.
2. Double arming bolt, item "n," and eye nut, item "aa," may be replaced with double arming eye bolt, item "dy."
3. Maximum line angle may be increased to 15° by installing anchor shackles, item "bo," to (horizontal) eye nuts and installing side guys as req'd.
4. Designate as VC6.31 for assembly with three crossarms.

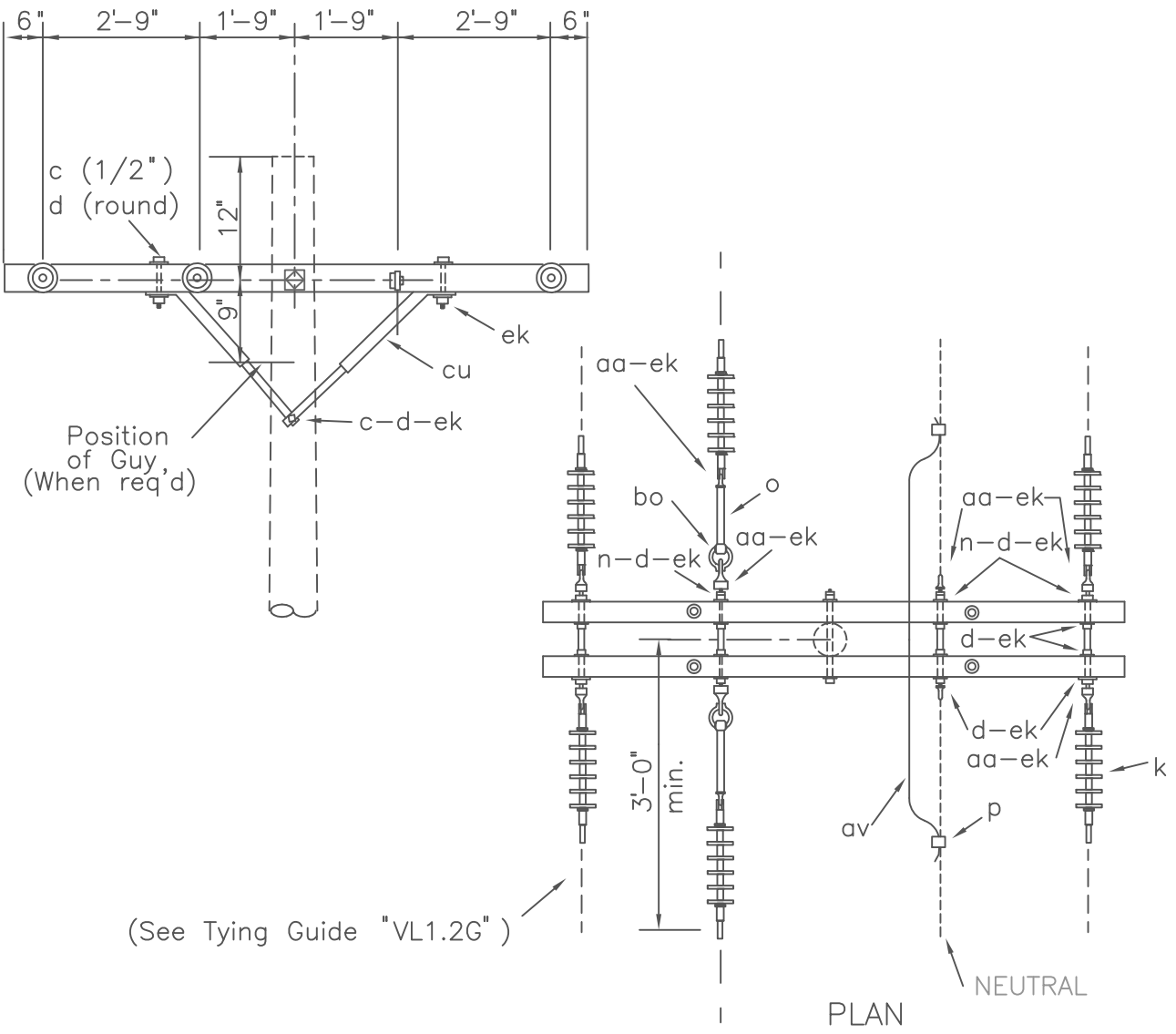
DESIGN PARAMETERS:

ALLOWABLE UNBALANCED LONGITUDINAL TENSION: (lbs./conductor)
VC6.21: 2,000 (#2 ACSR)
VC6.31: 3,000 (#2/0 ACSR)

MAXIMUM LINE ANGLE = 5°
(See Note 3)

DOUBLE DEADEND ON CROSSARMS

DEC 1998	3 – PHASE PRIMARY	VC6.21, VC6.31
RUS	24.9/14.4 kV	(VC8, VC8–3)



ITEM	QTY	MATERIAL
c	4	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	4	washer, round, 1 3/8"
d	19	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
k	6	Insulator, 25 kV Polymer Deadend
n	4	Bolt, double arm, 5/8" x req'd length
o	2	Bolt, eye, 5/8" x req'd length
aa	10	Nut, eye, 5/8"
bo	2	Shackle, anchor
cu	2	Brace, wood, 60" span
ek	26	Locknuts

NOTES:

1. Not suitable for Grade B construction.
2. Double arming bolt, item "n" and eye nut, item "aa", may be replaced with double arming eye bolt, item "dy."
3. Maximum line angle may be increased to 15° by installing anchor shackles, item "bo", to (horizontal) eye nuts and installing side guys as req'd.
4. See drawing "N6.21" for additional details.

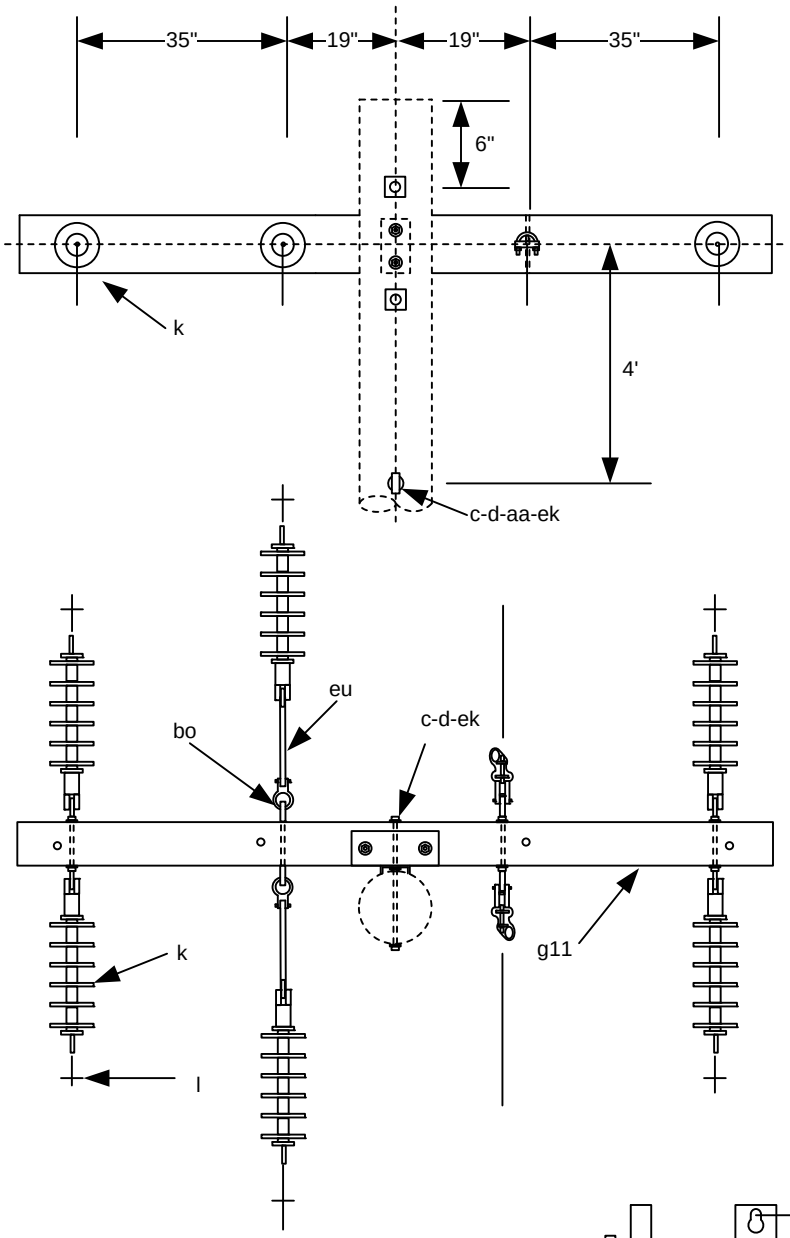
DESIGN PARAMETERS:

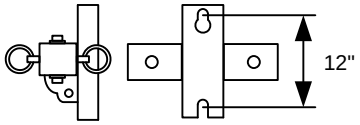
ALLOWABLE UNBALANCED LONGITUDINAL TENSION: 1,000 lbs./Conductor

MAXIMUM LINE ANGLE = 5°
(See Note 3)

DOUBLE DEADEND ON 10 FOOT CROSSARMS

DEC 1998	3 – PHASE PRIMARY	VC6.51
RUS	24.9/14.4 kV	(VC8–1)





Mounting Plate Detail

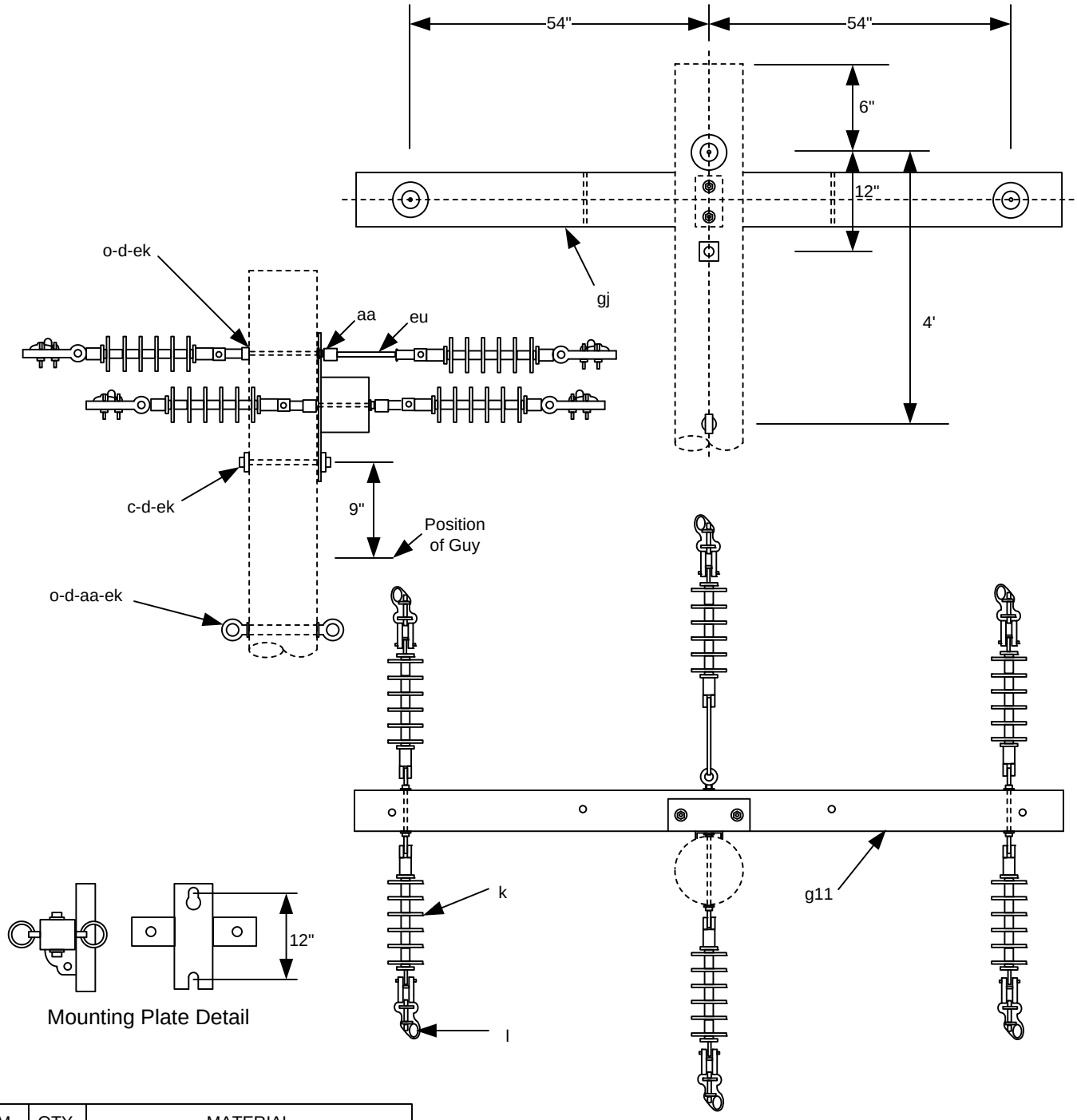
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	2	Washer, 3"
g11	1	Crossarm Assembly, 10' (Dead End)
k	6	Insulator, 25 kV Polymer Deadend
l	6	Clamp, deadend, Primary
l	2	Clamp, deadend, Neutral
bo	8	Shackle, Anchor
ek	3	Locknut, 5/8"
eu	2	Link, extension, insulated

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END ON 10 FOOT CROSSARM (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC6.51L (VC8-1HD)



Mounting Plate Detail

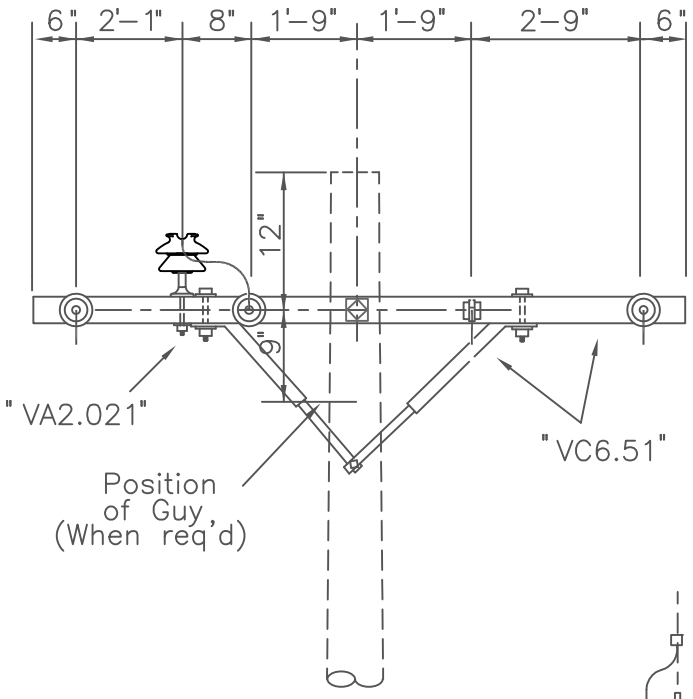
ITEM	QTY.	MATERIAL
c	1	Bolt, Machine, 5/8" x required length
d	4	Washer, 3"
g11	1	Crossarm Assembly, 10' (Dead End)
k	6	Insulator, 25 kV Polymer Deadend
l	6	Clamp, deadend, Primary
l	2	Clamp, deadend, Neutral
o	1	Bolt, eye, 5/8" x required length
aa	2	Nut, eye, 5/8"
bo	8	Shackle, Anchor
ek	3	Locknut, 5/8"
eu	1	Link, Extension, Insulated

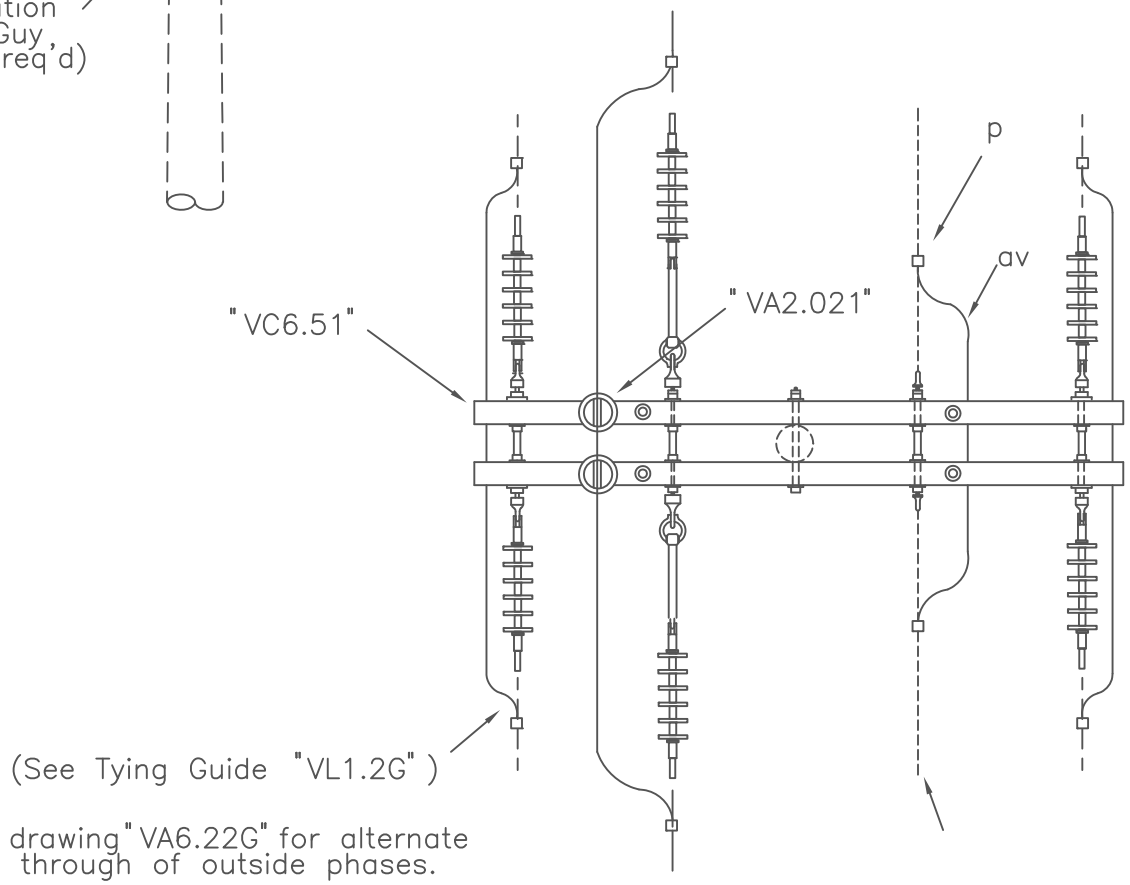
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END ON 10' CROSSARM (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC6.52 (VC8-HD)





PLAN

Note: See drawing "VA6.22G" for alternate feed through of outside phases.

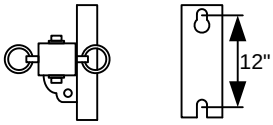
ITEM	QTY	MATERIAL
	1	VC6.51 Primary Assembly
	1	VA2.021 Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

DESIGN PARAMETERS:

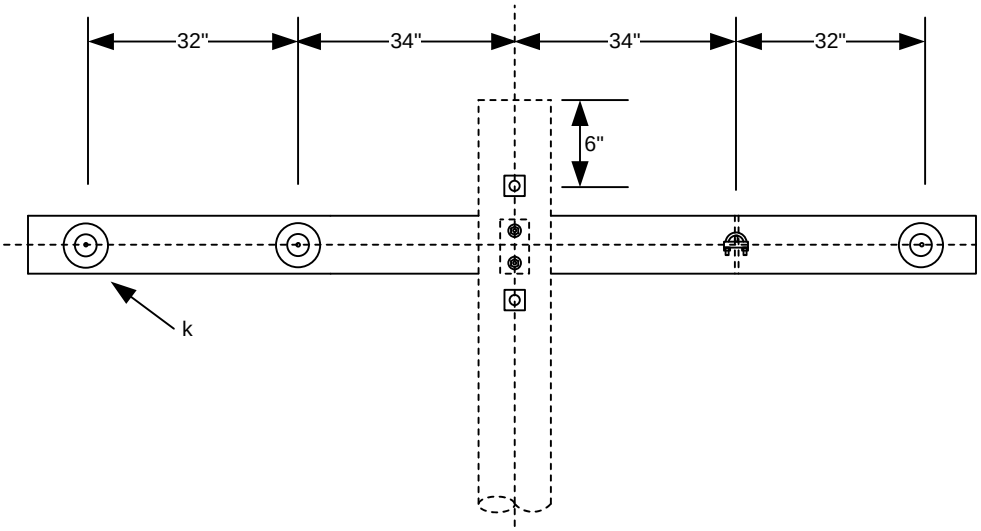
See: "VC6.51"
"VA2.021"

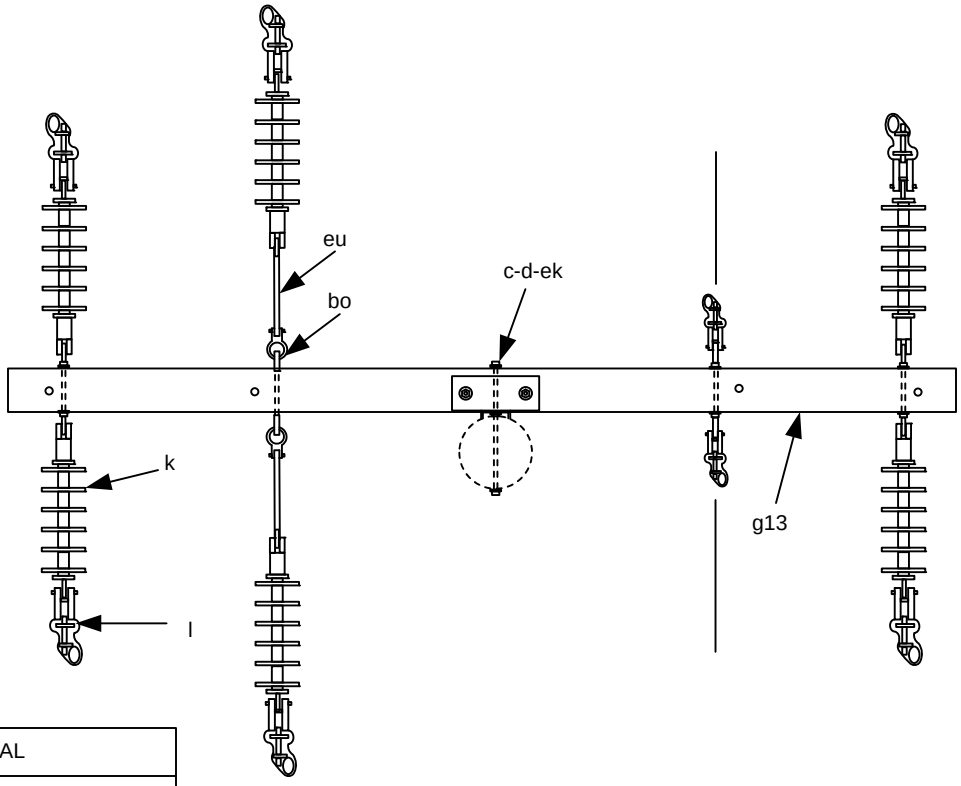
DOUBLE DEADEND ON 10 FOOT CROSSARMS (FEEDTHROUGH GUIDE)

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC6.52G
RUS		



Mounting Plate Details





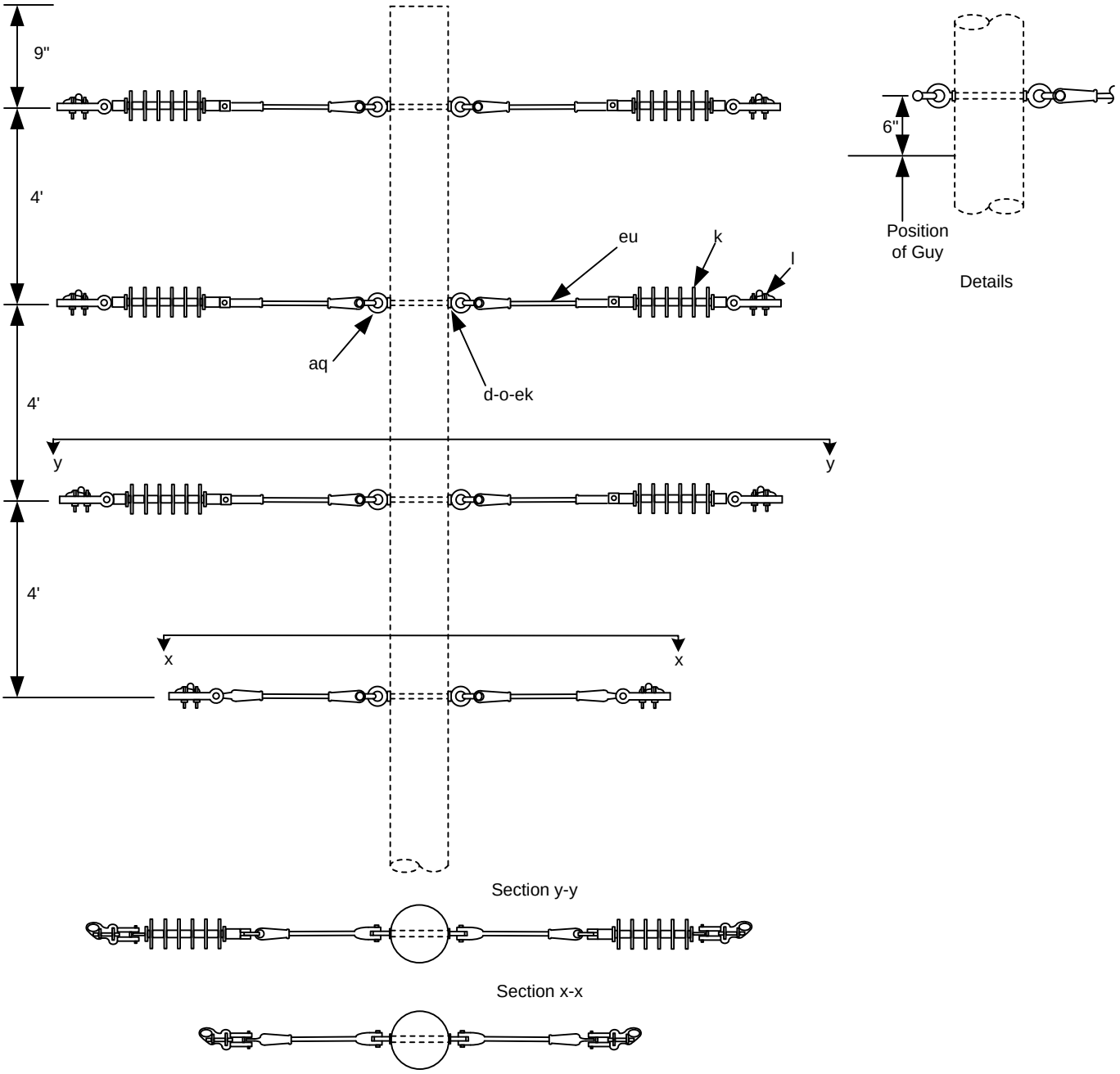
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 3/4" x required length
d	2	Washer, 3"
g13	1	Crossarm Assembly, 12' (Dead End)
k	6	Insulator, 25 kV Polymer Deadend
l	6	Clamp, deadend, Primary
l	2	Clamp, deadend, Neutral
bo	2	Shackle, Anchor
ek	3	Locknut, 3/4"
eu	2	Link, extension, insulated

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END ON 12' CROSSARM
(LARGE CONDUCTORS)

2012	WFECA	3 – Phase Primary 24.9/14.4 kV	VC6.53 (VC8-2HD)



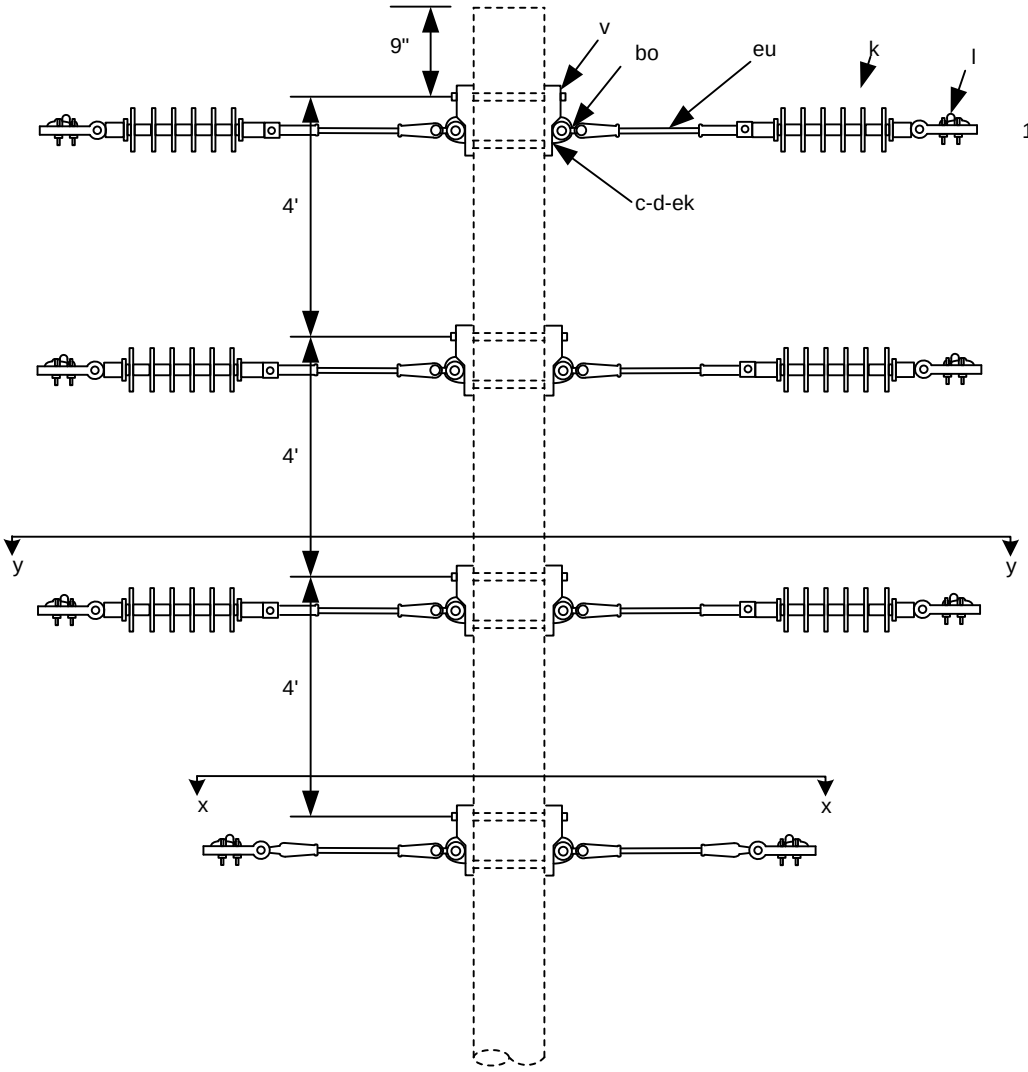
ITEM	QTY.	MATERIAL
d	8	Washer, 3"
k	6	Insulator, 25 kV Polymer deadend
l	6	Clamp, Dead end, Primary
l	2	Clamp, Dead end, Neutral
o	4	Bolt, Eye, 5/8" x required length
aa	4	Nut, eye, 5/8"
bo	8	Shackle, Anchor
ek	8	Locknut, 5/8"
eu	8	Link, extension, insulated, eye-clevis

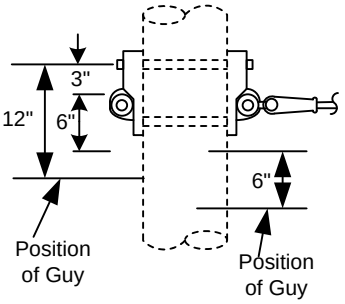
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END - VERTICAL (SMALL CONDUCTORS)

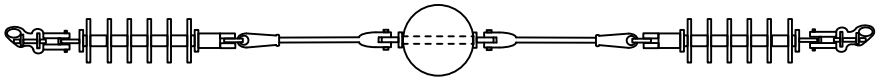
2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC6.61



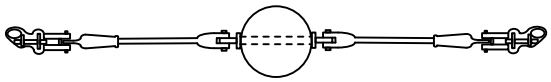


Details

Section y-y



Section x-x



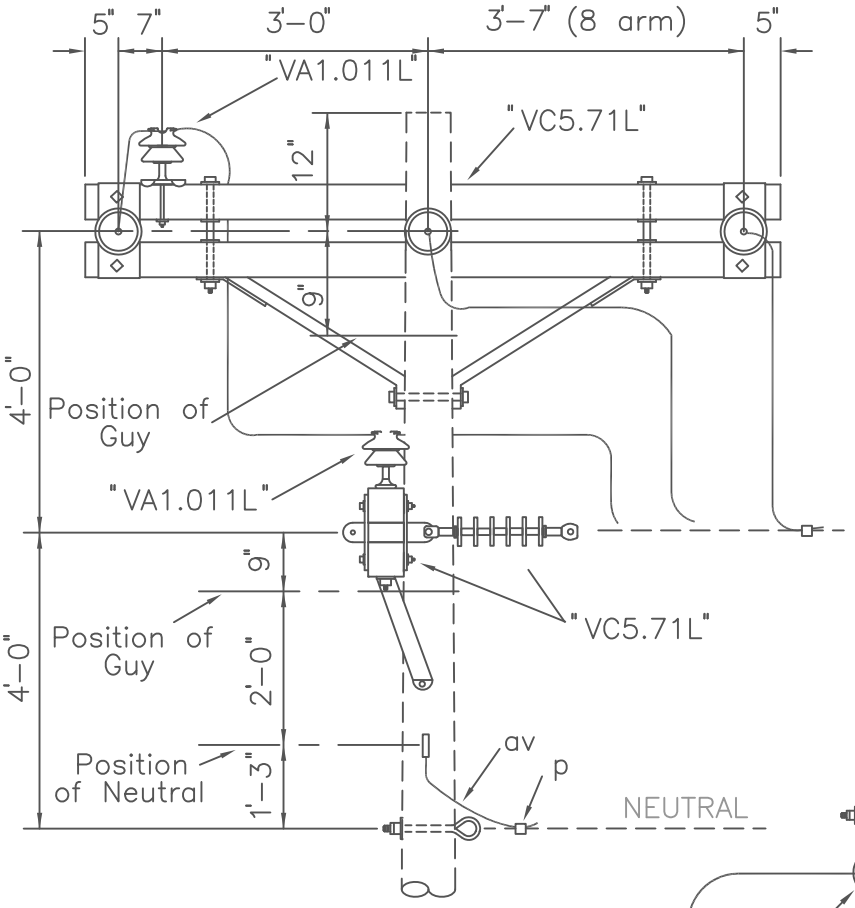
ITEM	QTY.	MATERIAL
c	8	Bolt, Machine, 5/8" x required length
d	8	Washer, 2 ¼"
k	18	Insulator, Suspension
l	6	Clamp, Dead end, Primary
l	2	Clamp, Dead end, Neutral
v	8	Pole eye plate
ek	8	Locknut, 5/8"
eu	8	Link, extension, insulated, eye-clevis

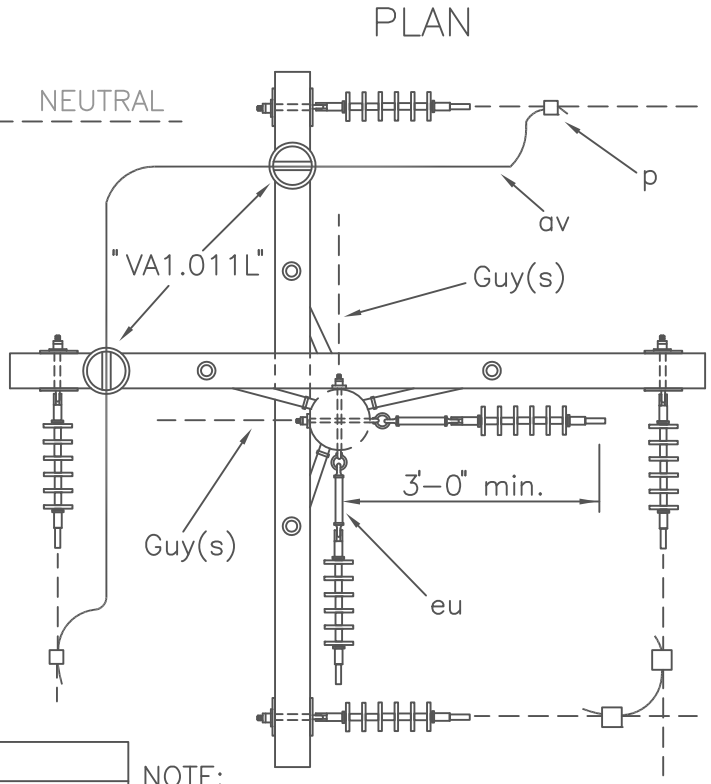
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

DOUBLE DEAD END - VERTICAL (LARGE CONDUCTORS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VC6.61L





ITEM	QTY	MATERIAL
	2	VC5.71L Primary (Crossarm) Assembly
	2	VA1.011L Misc. Single Support
p		Connectors, as req'd
av		Jumpers, as req'd
eu	2	Link, extension, insulated, 12" min.

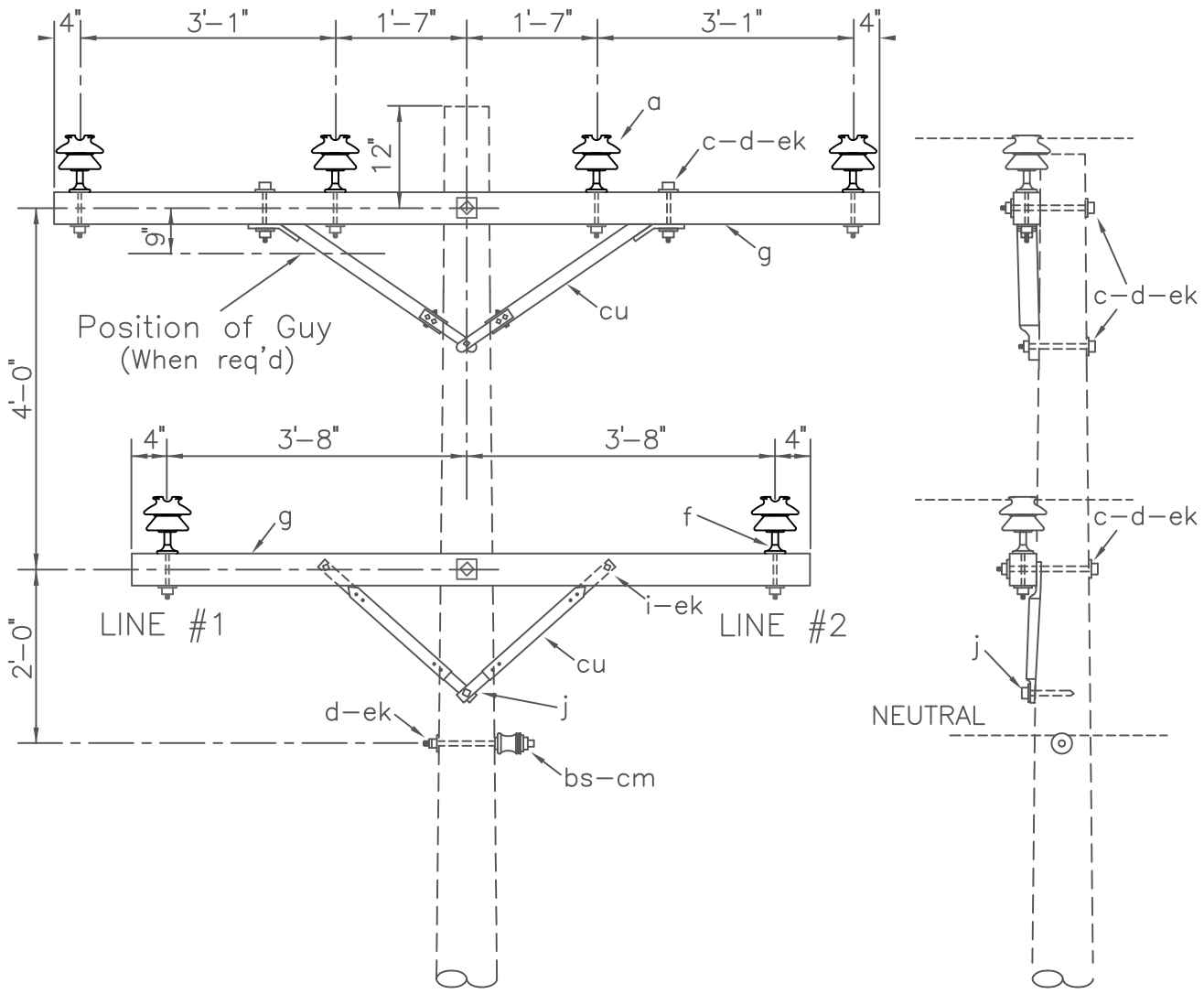
NOTE:
Vertical deadends, Dwg. "VC4.1," is preferred construction.

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD EQUALS LESSER OF:
5,000 lbs./Conductor, or
Manufacturer's Specifications

DOUBLE DEADENDS (BUCKARMS) GUIDE

DEC 1998	3 – PHASE PRIMARY 24.9/14.4 kV	VC6.91G
RUS		



ITEM	MATERIAL	QTY	
a	Insulater, pin type, (24.9/14.4 kV)	6	
c	Bolt, machine, 1/2" x req'd length	2	
c	Bolt, machine, 5/8 x req'd length	3	
d	Washer, round, 1 3/8"	2	
d	Washer, square, 2 1/4"	6	
f	Pin, crossarm, steel, 5/8" x 14"	6	
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	

ITEM	MATERIAL	QTY	
i	Bolt, carriage, 3/8" x 4 1/2"	2	
j	Screw, lag, 1/2" x 4"	1	
bs	Bolt, single, upset	1	
cm	Insulator, spool, 3"	1	
cu	Brace, 28"	2	
cu	Brace, wood, 60" span	1	
ec	Bracket, offset, neutral		
ek	Locknuts	8	

DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:
5° – Small Conductors
2° – Larger than #1/0

SINGLE SUPPORT ON CROSSARMS (TANGENT)

DEC 1998	DOUBLE CIRCUIT PRIMARY	VD1.81,
RUS	24.9/14.4 kV	(VDC–C1)

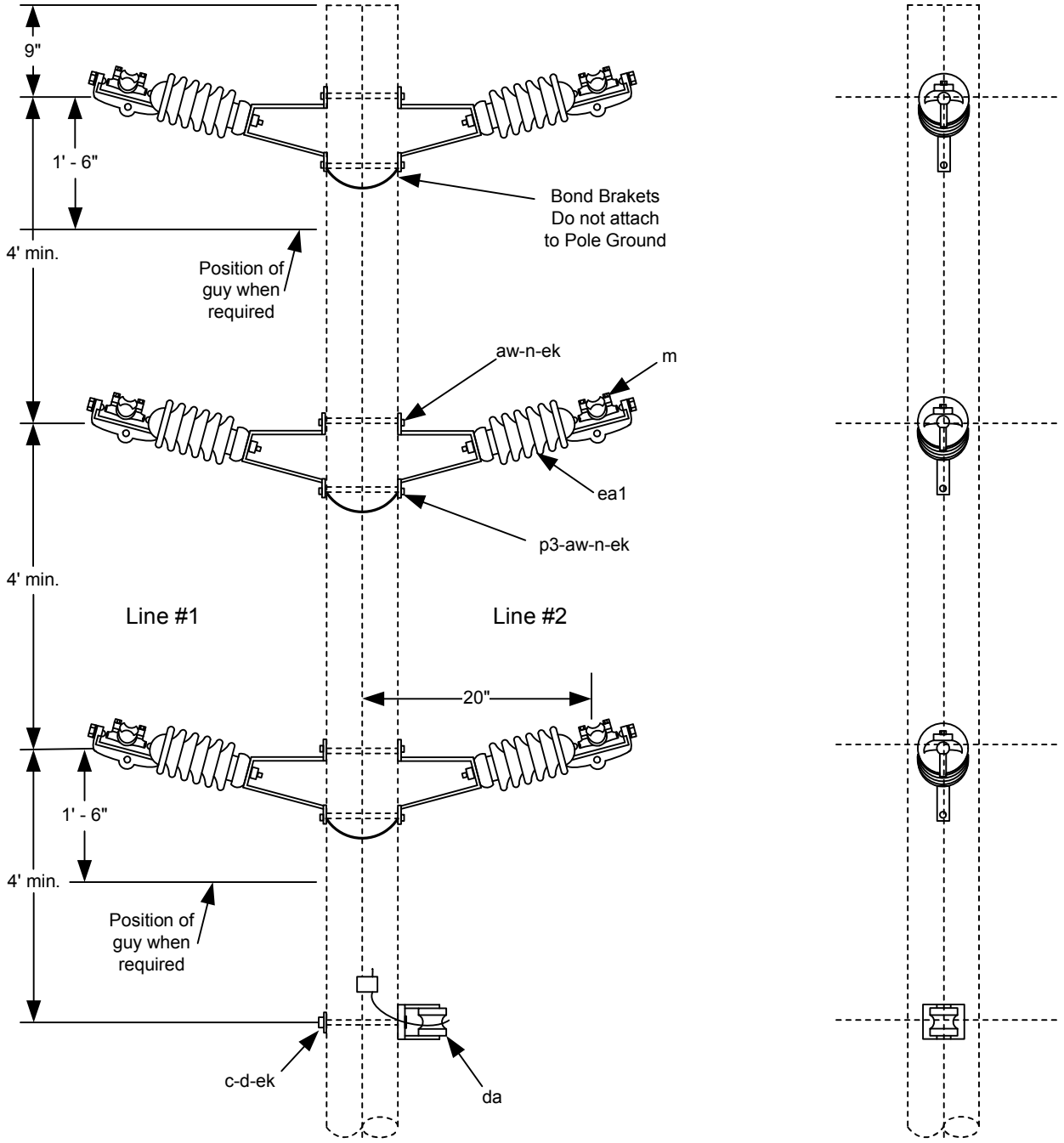
INDEX D

DOUBLE CIRCUIT PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VD1.21N	SINGLE PRIMARY SUPPORT ON POST INSULATOR NARROW PROFILE (LARGE CONDUCTORS)
VD1.22N	SINGLE PRIMARY SUPPORT ON POST INSULATOR NARROW PROFILE (LARGE CONDUCTORS)
VD1.23N	SINGLE PRIMARY SUPPORT ON POST INSULATOR NARROW PROFILE (LARGE CONDUCTORS)
VD1.24N	SINGLE PRIMARY SUPPORT ON POST INSULATOR NARROW PROFILE (LARGE CONDUCTORS)
VD1.25N	SINGLE PRIMARY SUPPORT ON POST INSULATOR NARROW PROFILE (LARGE CONDUCTORS)
VD1.42P	SINGLE SUPPORT ON CROSSARMS POST INSULATOR (LARGE CONDUCTORS)
VD1.81	SINGLE SUPPORT ON CROSSARMS (TANGENT)
VD1.83L	SINGLE SUPPORT ON CROSSARMS (LARGE CONDUCTORS)
VD2.91	DOUBLE SUPPORT ON CROSSARMS
VD2.91L	DOUBLE SUPPORT ON CROSSARMS (LARGE CONDUCTORS)
VD3.1G	SUSPENSION ANGLE GUIDE
VD3.1N	SUSPENSION ANGLE (LARGE CONDUCTORS)
VD4.1G	DEADEND ANGLE GUIDE
VD4.1N	DEADEND ANGLE (LARGE CONDUCTORS)
VD5.1N	SINGLE DEADEND-VERTICAL (LARGE CONDUCTORS)

DOUBLE CIRCUIT PRIMARY POLE TOP ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VD5.2	SINGLE DEADEND ON CROSSARM -VERTICAL (LARGE CONDUCTORS)
VD5.52	SINGLE DEADEND ON CROSSARM - (LARGE CONDUCTORS)
VD5.91G	THREE PHASE TAP GUIDE
VD6.1N	SINGLE DEADEND –VERTICAL LARGE CONDUCTORS)
VD6.2	DOUBLE DEADEND ON CROSSARM -VERTICAL (LARGE CONDUCTORS)
VD6.91	DOUBLE DEADENDS ON CROSSARMS (FEEDTHROUGH)



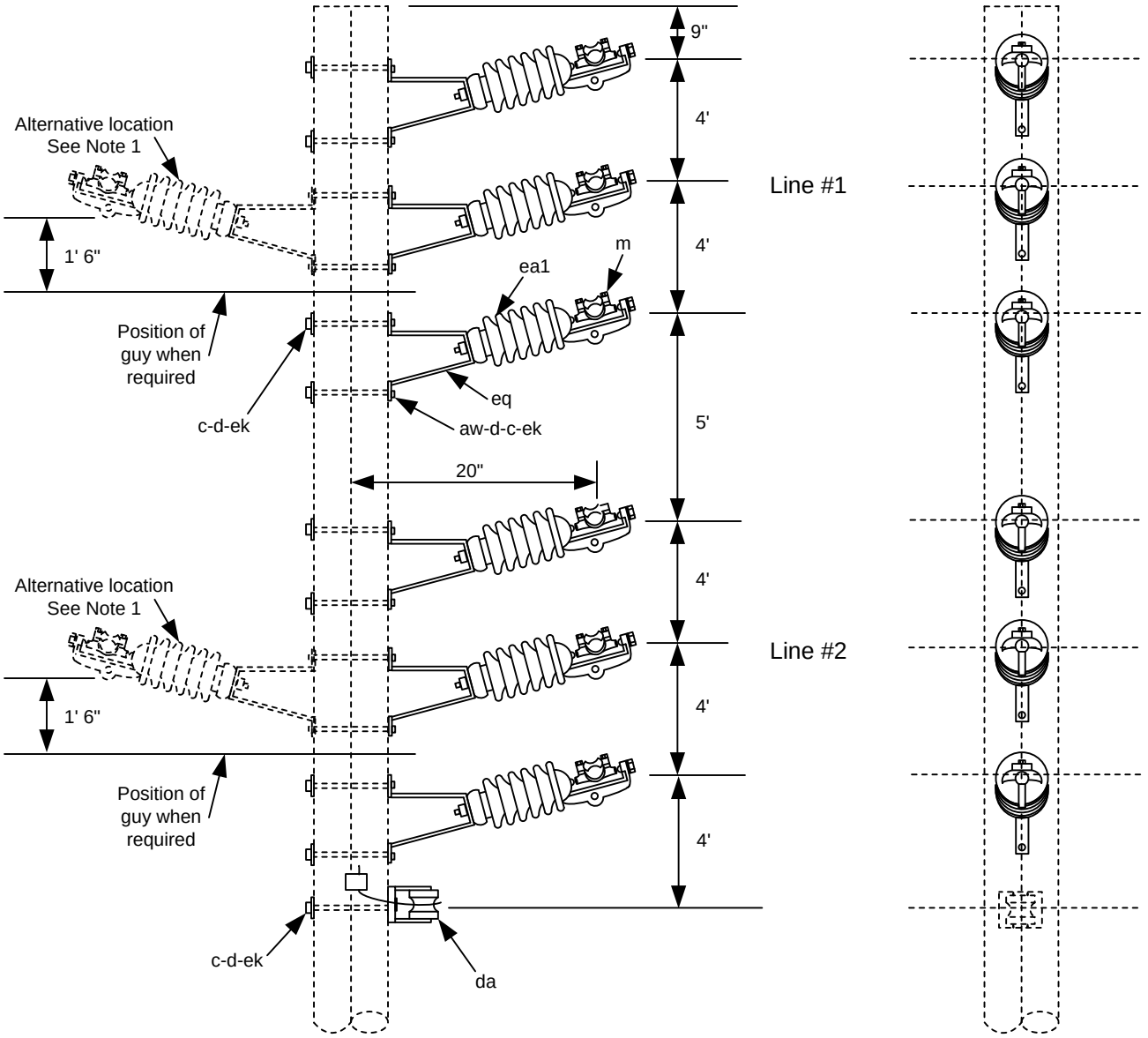
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, 3”
m	6	Clamp trunnion, tangent
n	6	Bolt, double arming, 5/8" x Required Length
p		Connectors, as required
aw	12	Washer, flat spring
bv	6	Armor Rod
da	1	Bracket, insulated
ea1	6	Insulator, Horizontal Post Type with short mounting stud
	6	Short Mounting Stud, ¾” x 1 ¾”
ek	13	Locknut 5/8"
eq	6	Bracket, side mount, for Horizontal Post Insulator
p3	6	Lug, Grounding, 5/8"

Note:

1. When conductor galloping is a concern, anti-galloping devices or increased horizontal phase separation may be necessary.
2. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
3. Maximum Line Angle is 2°.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.21N



Not to scale

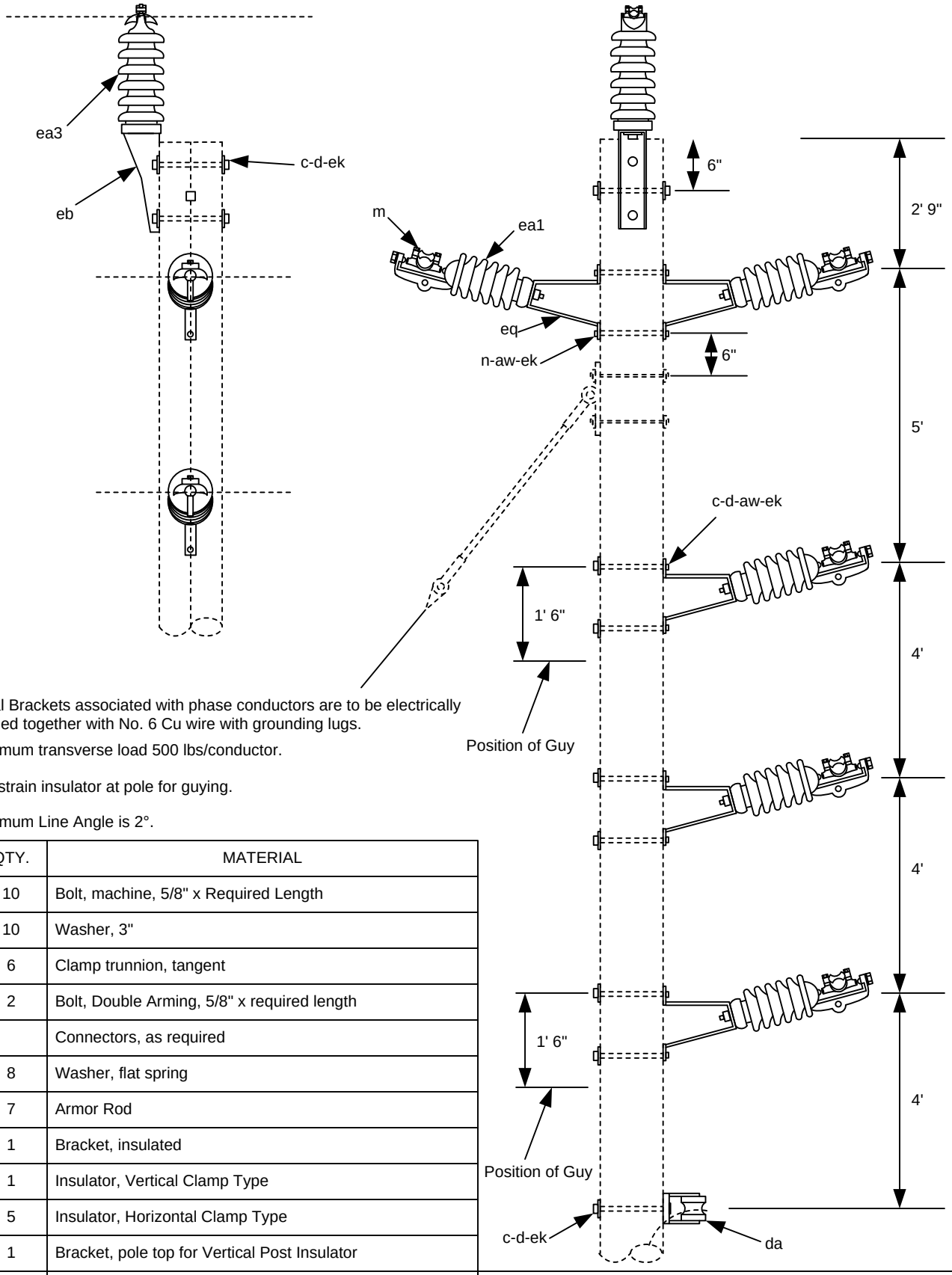
ITEM	QTY.	MATERIAL
c	13	Bolt, machine, 5/8" x Required Length
d	13	Washer, 3”
m	6	Clamp trunnion, tangent
p		Connectors, as required
aw	12	Washer, flat spring
bv	6	Armor Rod
da	1	Bracket, insulated
ea1	6	Insulator, Horizontal Post Type with short mounting stud
	6	Short mounting stud, ¾” x 1 ¾”
ek	13	Locknut 5/8"
eq	6	Bracket, side mount, for Horizontal Post Insulator

Note:

1. When conductor galloping is a concern, as for increased phase separation, the middle phase of each circuit may be relocated to the opposite side as indicated. Adjust vertical dimensions as necessary.
2. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
3. Span limit is 275' due to insulator strength.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.22N



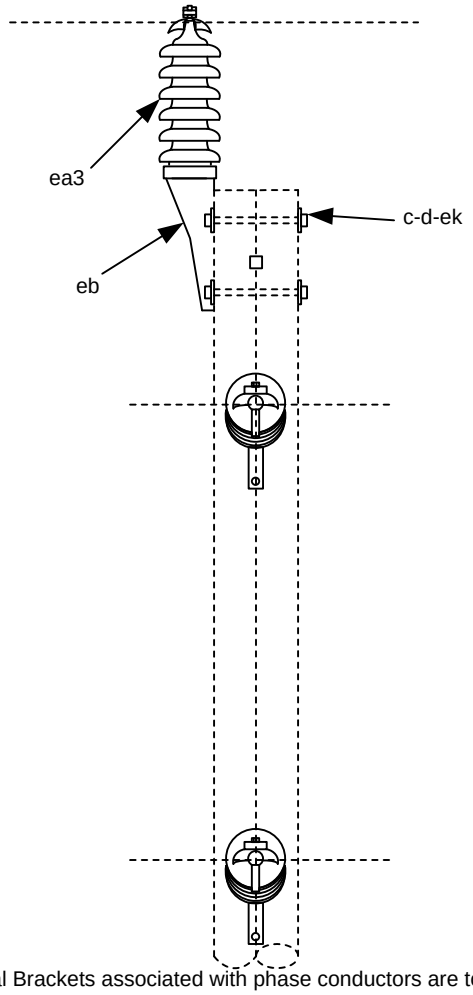
Note:

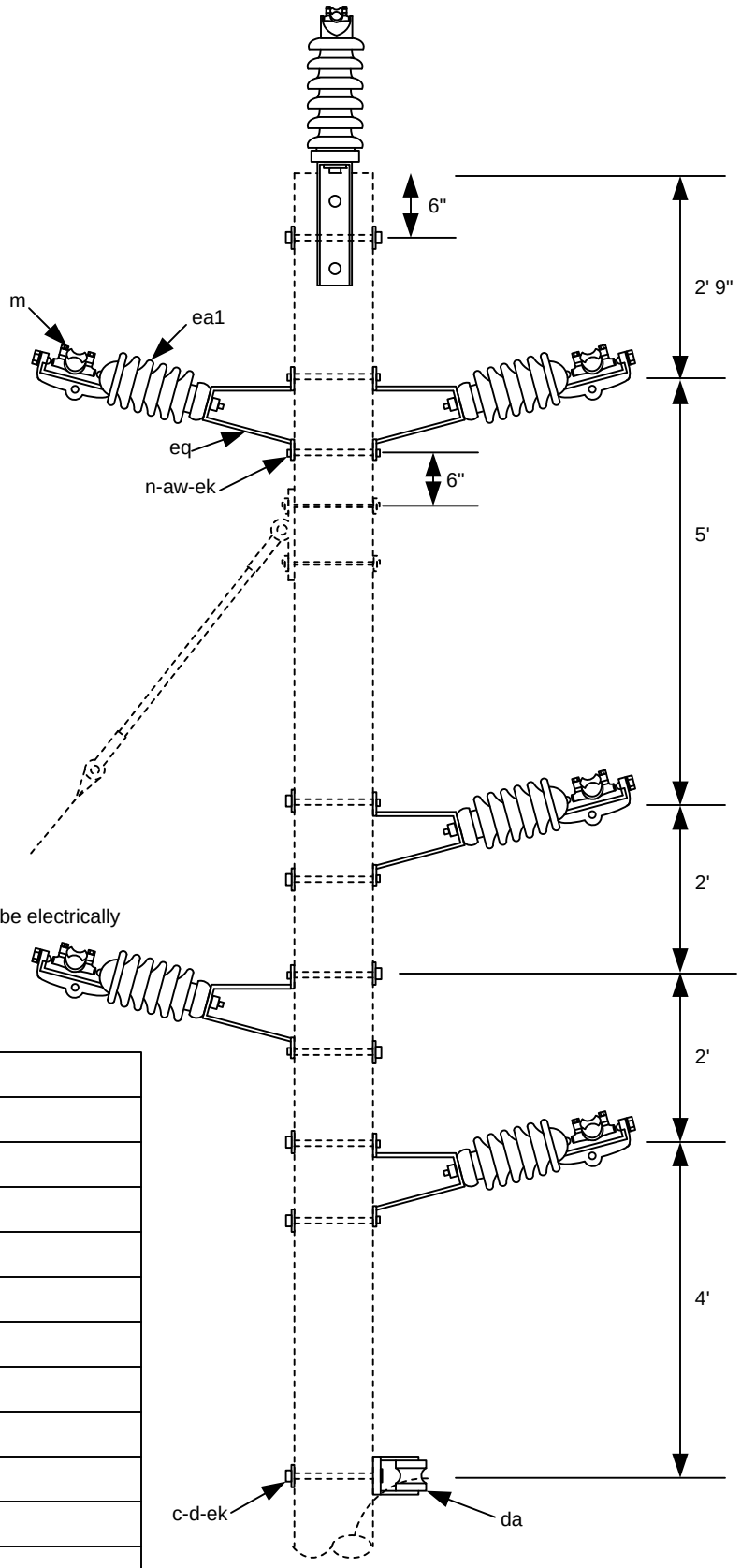
1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2°.

ITEM	QTY.	MATERIAL
c	10	Bolt, machine, 5/8" x Required Length
d	10	Washer, 3"
m	6	Clamp trunnion, tangent
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
aw	8	Washer, flat spring
bv	7	Armor Rod
da	1	Bracket, insulated
ea3	1	Insulator, Vertical Clamp Type
ea1	5	Insulator, Horizontal Clamp Type
eb	1	Bracket, pole top for Vertical Post Insulator
ek	14	Locknut 5/8"
eq	5	Bracket, side mount, for Horizontal Post Insulator
	6	Short mounting stud, ¾" x 1 ¾"

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2007	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.23N





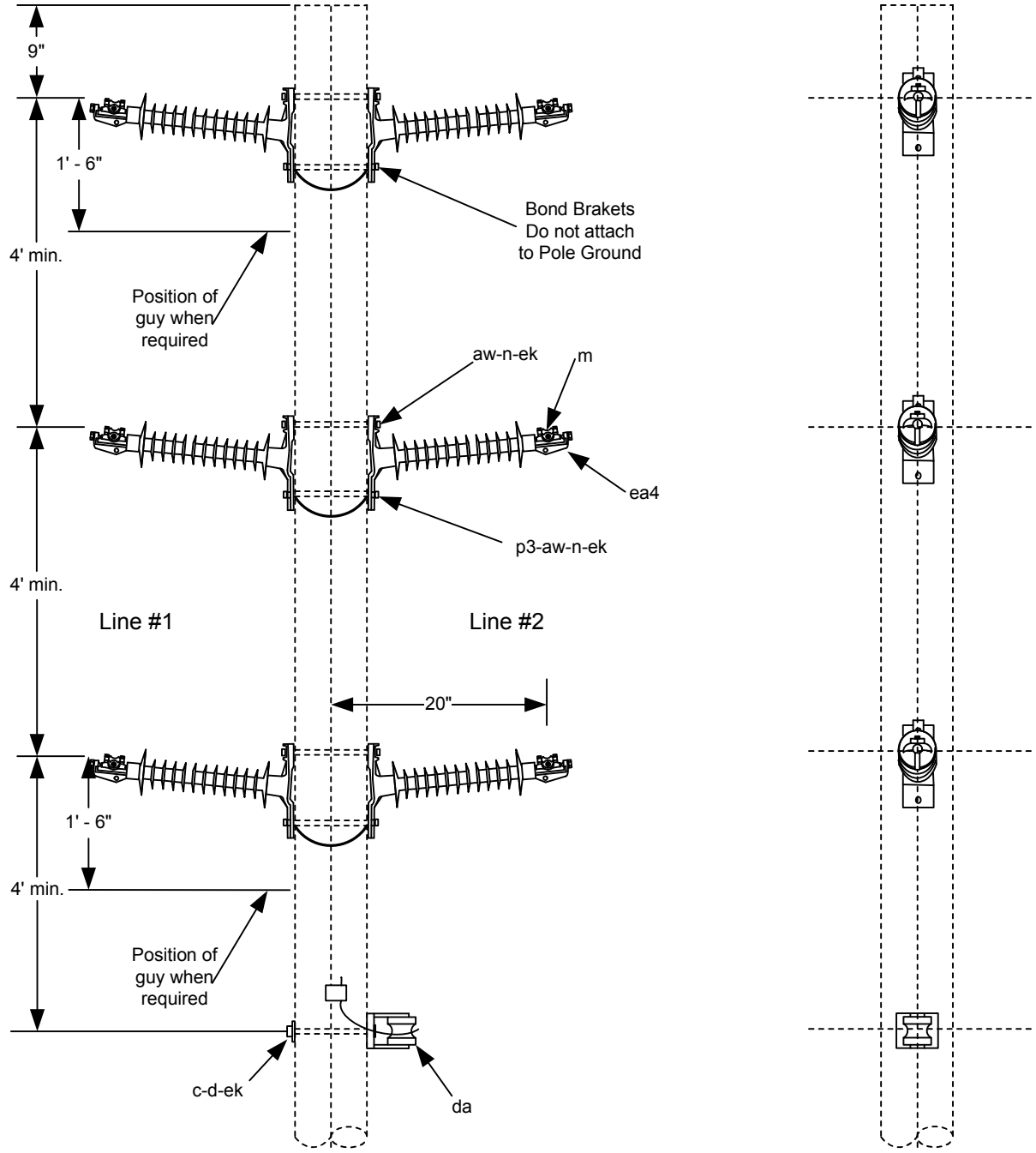
Note:

1. Metal Brackets associated with phase conductors are to be electrically bonded together with No. 6 Cu wire with grounding lugs.
2. Maximum transverse load 500 lbs/conductor.
3. Use strain insulator at pole for guying.
4. Maximum Line Angle is 2°.

ITEM	QTY.	MATERIAL
c	10	Bolt, machine, 5/8" x Required Length
d	10	Washer, 3"
m	6	Clamp trunnion, tangent
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
aw	8	Washer, flat spring
bv	7	Armor Rod
da	1	Bracket, insulated
ea3	1	Insulator, Vertical Clamp Type
ea1	5	Insulator, Horizontal Clamp Type
eb	1	Bracket, pole top for Vertical Post Insulator
ek	14	Locknut 5/8"
eq	5	Bracket, side mount, for Horizontal Post Insulator
	6	Short mounting stud, ¾" x 1 ¾"

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

2007	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.24N



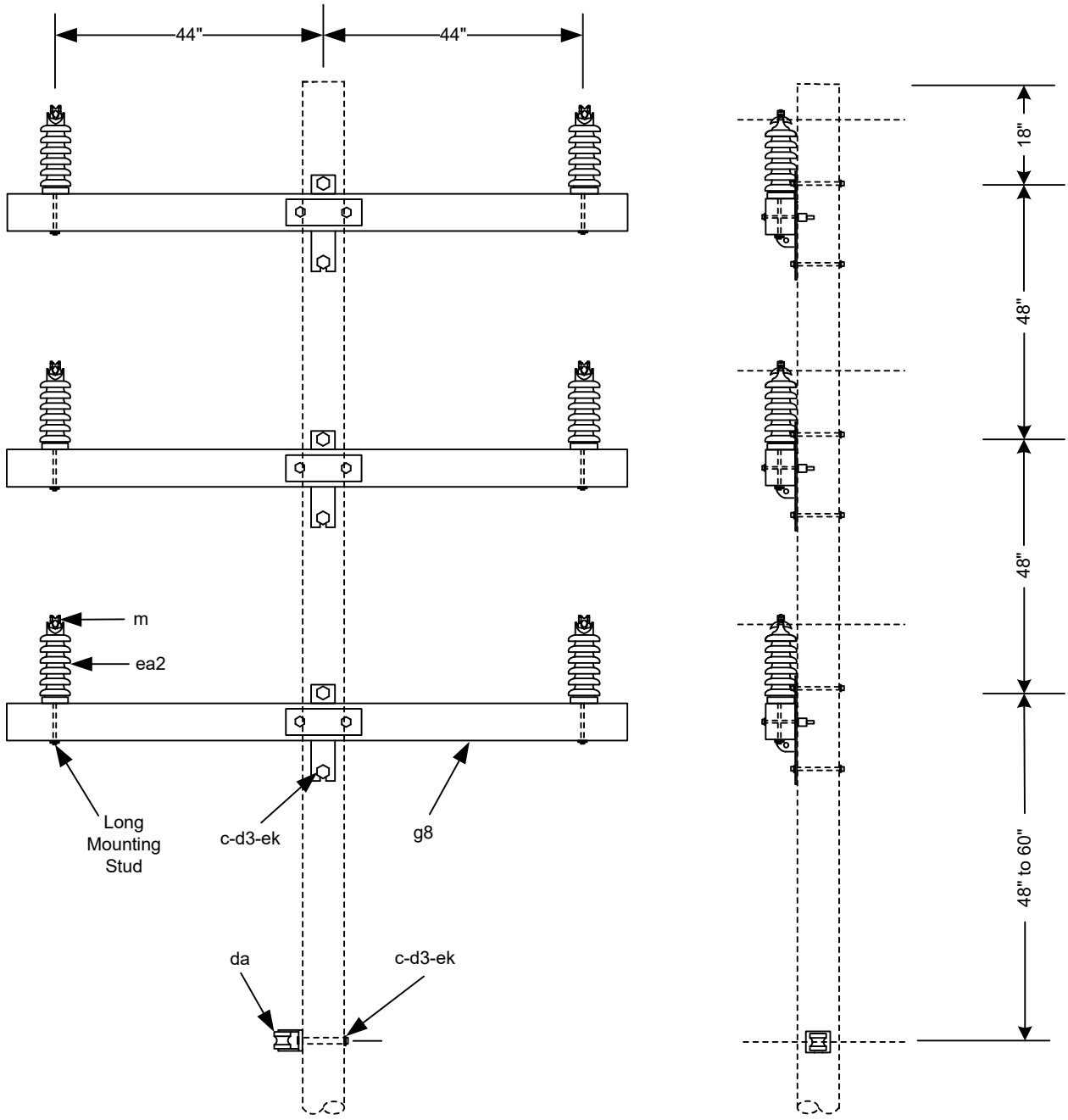
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, 3”
m	6	Clamp trunnion, tangent
n	6	Bolt, double arming, 5/8" x Required Length
p		Connectors, as required
aw	12	Washer, flat spring
bv	6	Armor Rod
da	1	Bracket, insulated
ea4	6	Insulator, Horizontal Post Type with short mounting stud
	6	Short Mounting Stud, ¾” x 1 ¾”
ek	13	Locknut 5/8"
eq	6	Bracket, side mount, for Horizontal Post Insulator
p3	6	Lug, Grounding, 5/8"

Note:

1. When conductor galloping is a concern, anti-galloping devices or increased horizontal phase separation may be necessary.
2. For Transmission Under Build add prefix “TUB-“. Specify clearance of neutral to Final Grade.
3. Maximum Line Angle is 2°.

SINGLE SUPPORT ON POST INSULATOR - NARROW PROFILE (LARGE CONDUCTORS)

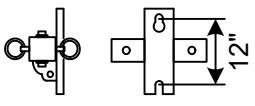
2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.25N



ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x required length
d3	7	Washer, 3" x 3", square, curved
g8	3	Crossarm Assembly, fiberglass, 8'
bv	7	Armor, Rod
ea2	6	Insulator, Vertical Clamp Type
		Long mounting stud, ¾" x 7"
m	6	Clamp, Trunnion
da	1	Bracket, Insulated
ek	5	Locknut, 5/8"
p		Connectors, as required

Note:

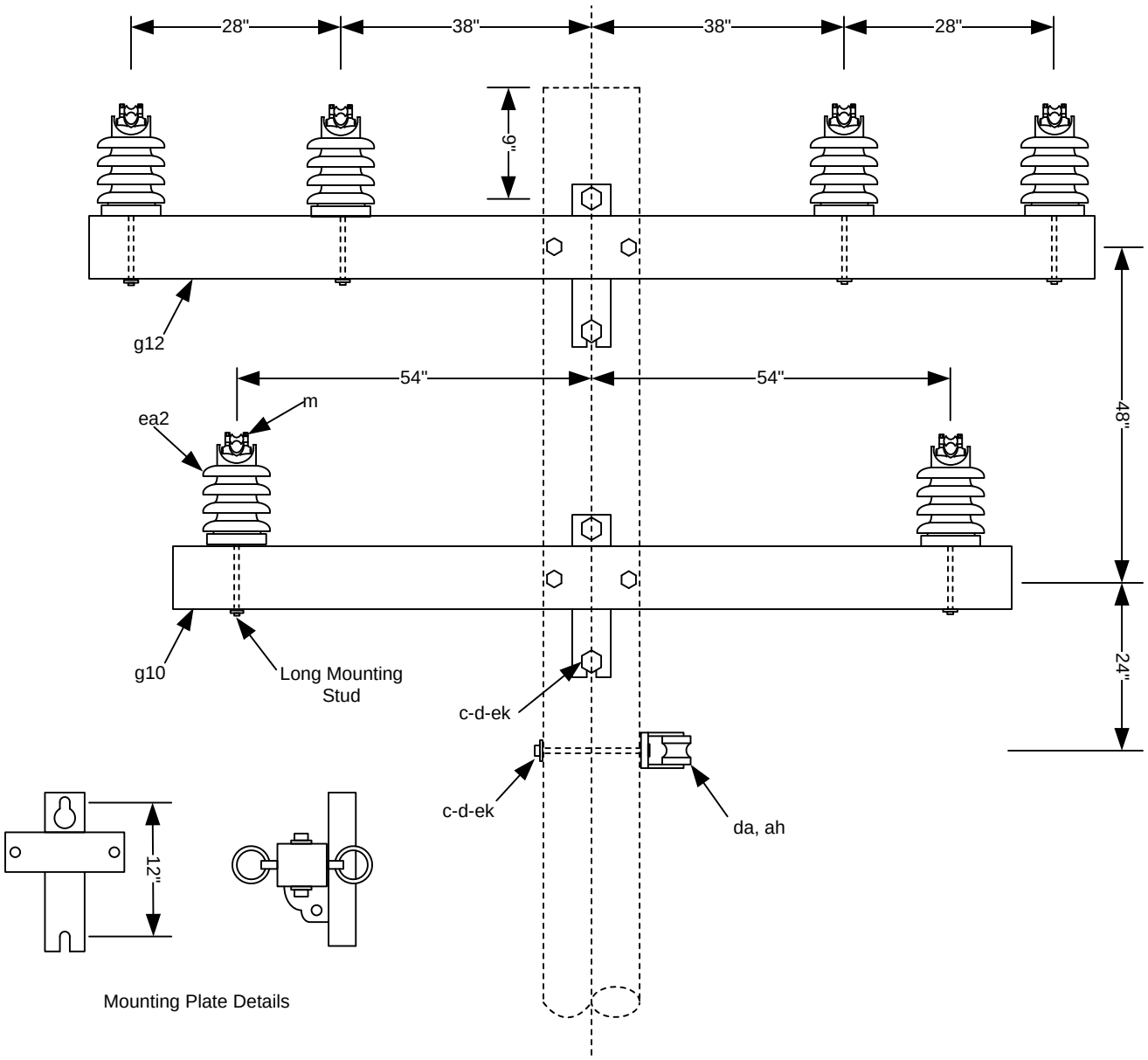
1. For Transmission Under Build add prefix "TUB-".
2. Specify Clearance of Neutral to Final Grade
3. Use Class 3 or larger pole



Mounting Plate Detail

SINGLE SUPPORT ON CROSSARMS - POST INSULATORS (LARGE CONDUCTORS)

2018	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.31



Mounting Plate Details

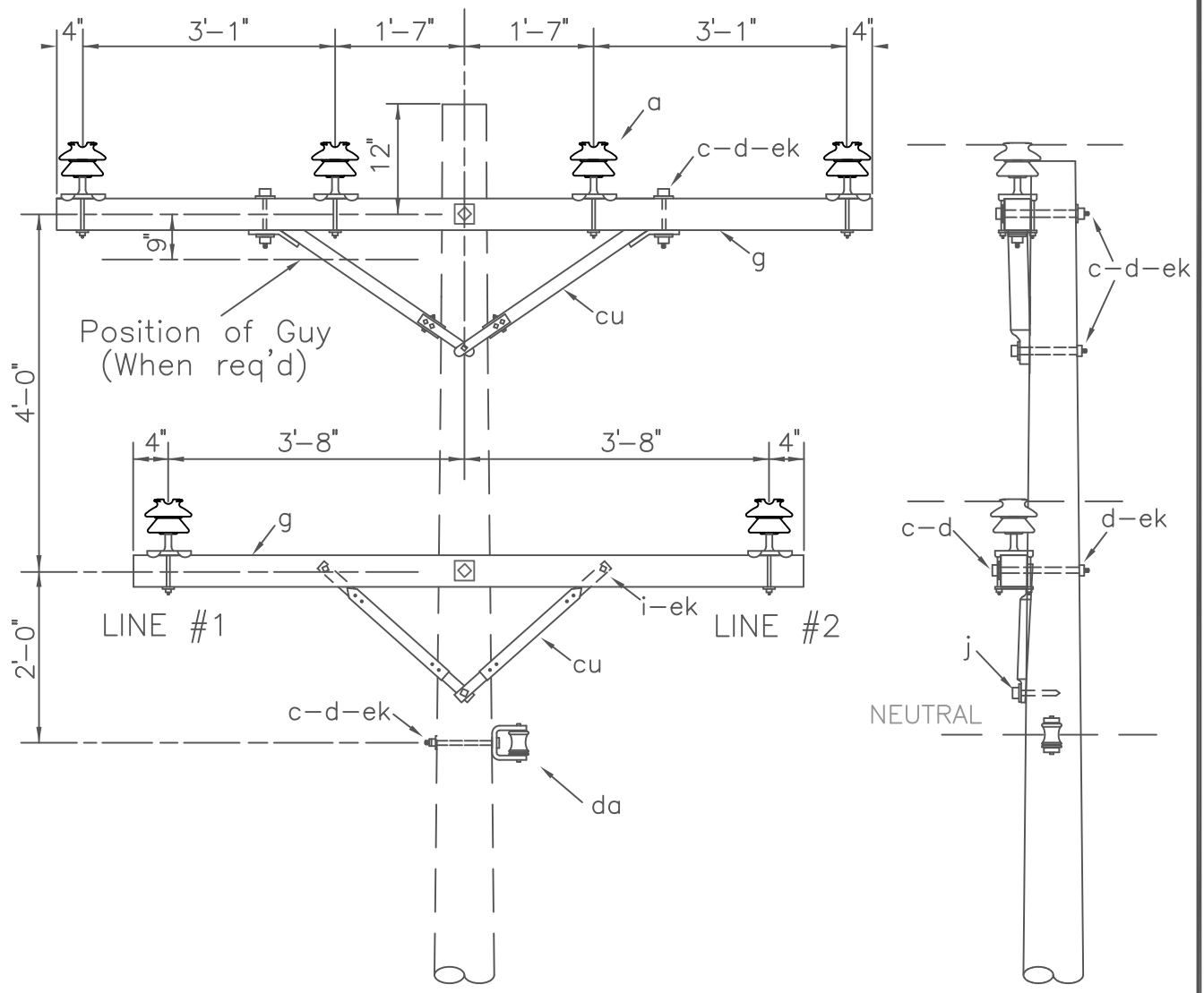
ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x required length
d	5	Washer, 3" x 3", square, curved
g10	1	Crossarm Assembly, 10' Tangent
g12	1	Crossarm Assembly, 12' Tangent
m	6	Clamp, Trunnion, tangent
p		Connectors, as required
ah	1	Tie, insulator, formed type, neutral (spool tie)
bv	6	Armor, Rod
da	1	Bracket, insulated
ea2	6	Insulator, Vertical Clamp Type
ek	5	Locknut, 5/8"
	6	Long mounting stud, ¾" x 7"

Note:

1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade.
2. Maximum Line Angle is 2°

SINGLE SUPPORT ON CROSSARMS
POST INSULATORS (LARGE CONDUCTORS)

2012	WFECA	Double Circuit Primary 24.9/14.4 kV	VD1.42P



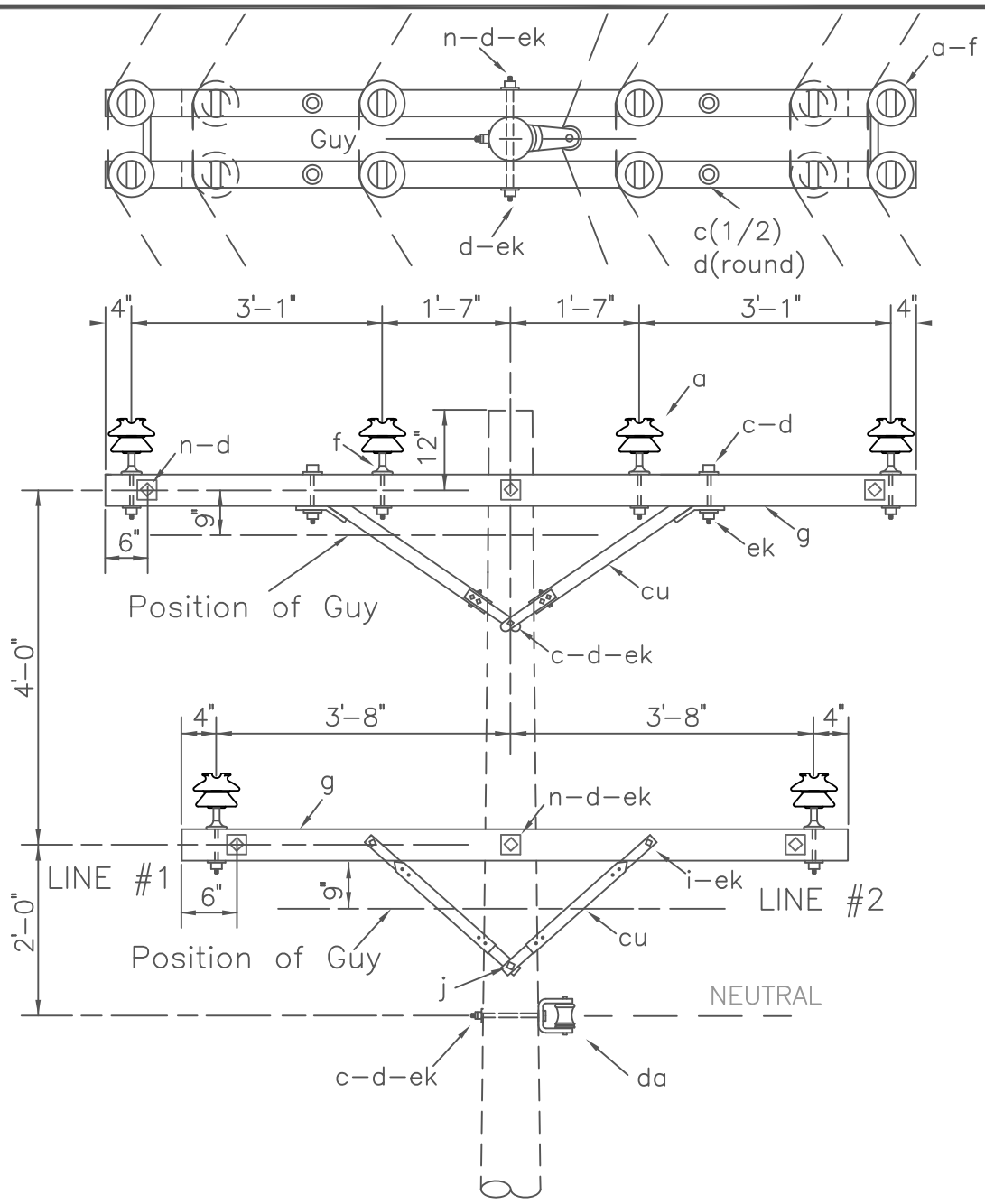
ITEM	QTY	MATERIAL
a	6	Insulator, pin type, (24.9/14.4 kV)
c	2	Bolt, machine, 1/2" x req'd length
c	3	Bolt, machine, 5/8" x length
d	2	Washer, round, 1 3/8"
d	6	Washer, square, 2 1/4"
fg	6	Pin, crossarm, steel, clamp type
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'–0"

ITEM	QTY	MATERIAL
g	1	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j	1	Screw, lag, 1/2" x 4"
cu	2	Brace, 28"
cu	1	Brace, wood, 60" span
da	1	Bracket, insulator
ek	8	Locknuts

DESIGN PARAMETERS:
See Table III

SINGLE SUPPORT ON CROSSARMS (LARGE CONDUCTORS)

DEC 1998	DOUBLE CIRCUIT PRIMARY	VD1.83L
RUS	24.9/14.4 kV	(VDC–C1L)



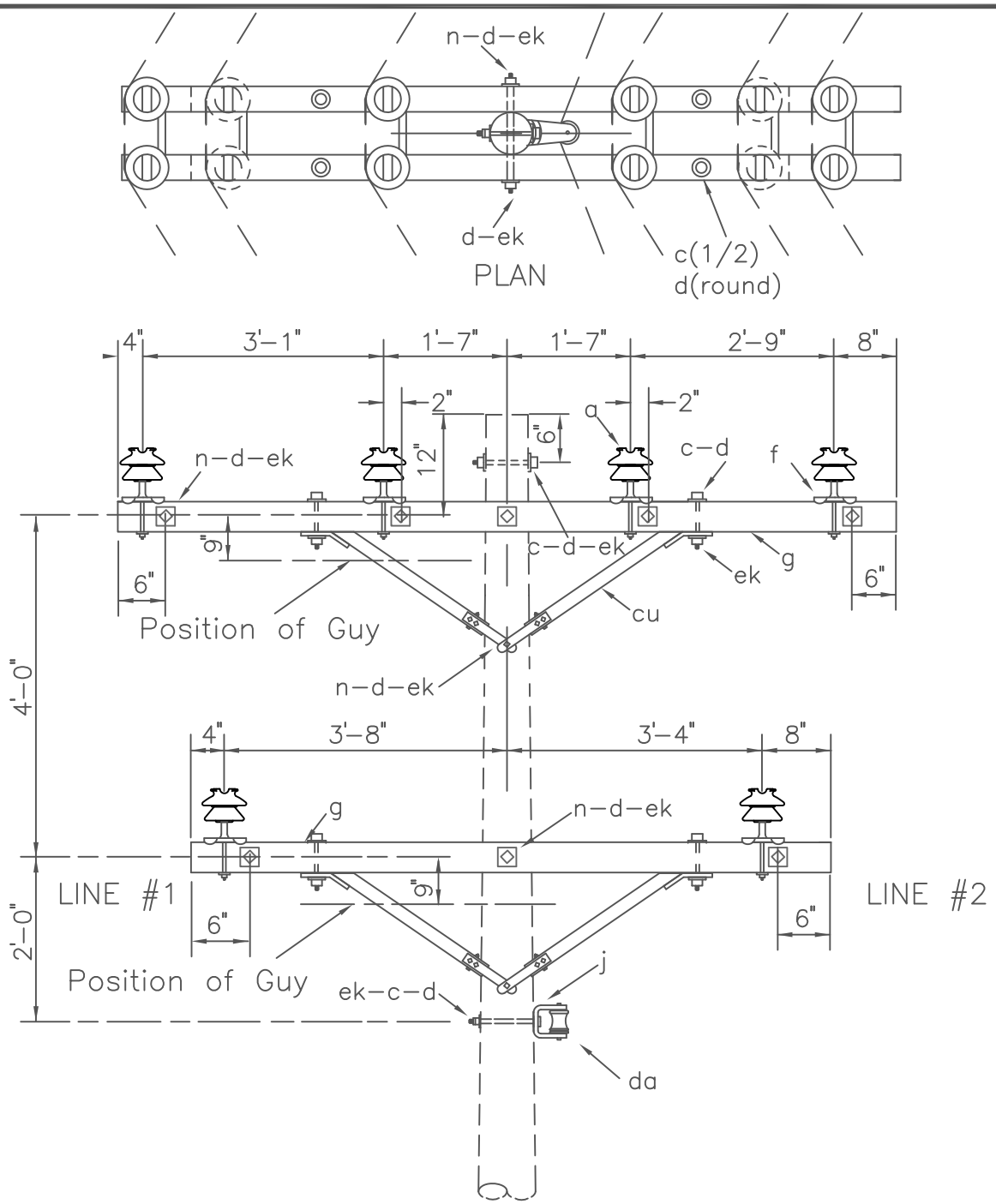
ITEM	QTY	MATERIAL
a	12	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x length
d	4	Washer, round, 1 3/8"
d	22	Washer, square, 2 1/4"
f	12	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"

ITEM	QTY	MATERIAL
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
n	6	Bolt,double arming, 5/8"xreq'd length
cu	4	Brace, 28"
cu	2	Brace, wood, 60" span
da	1	Bracket, insulated
ek	26	Locknuts

DESIGN PARAMETERS:
See Table IV

DOUBLE SUPPORT ON CROSSARMS

DEC 1998	DOUBLE CIRCUIT PRIMARY	VD2.91
RUS	24.9/14.4 kV	(VDC–C2–1)



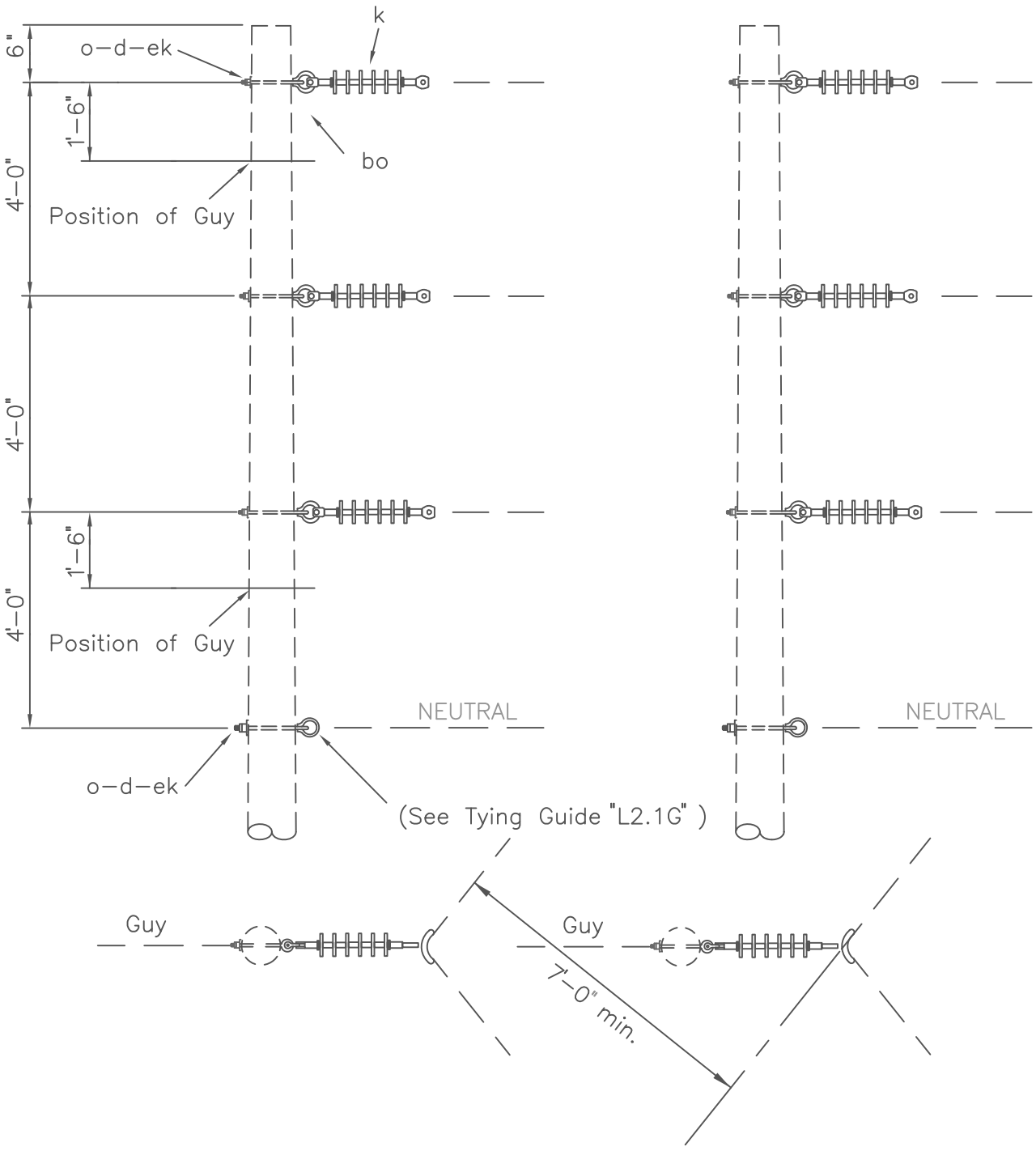
ITEM	QTY	MATERIAL
a	12	Insulator, pin type (24.9/14.4 kV)
c	8	Bolt, machine, 1/2" x req'd length
c	2	Bolt, machine, 5/8" x req'd length
d	8	Washer, round, 1 3/8" diam.
d	33	Washer, square, 2 1/4"
f	12	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"

ITEM	QTY	MATERIAL
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
j	2	Screw, lag, 1/2" x 4"
n	10	Bolt,double arming, 5/8" x req'd length
cu	4	Brace, wood, 60" span
da	1	Bracket, insulated
ek	42	Locknuts

DESIGN PARAMETERS:
See Table V

DOUBLE SUPPORT ON CROSSARMS (LARGE CONDUCTORS)

DEC 1998	DOUBLE CIRCUIT PRIMARY	VD2.91L
RUS	24.9/14.4 kV	(VDC–C2–1L)



NOTE: For large conductors, use two "VC3.2L" assemblies and designate as "VD3.2LG"

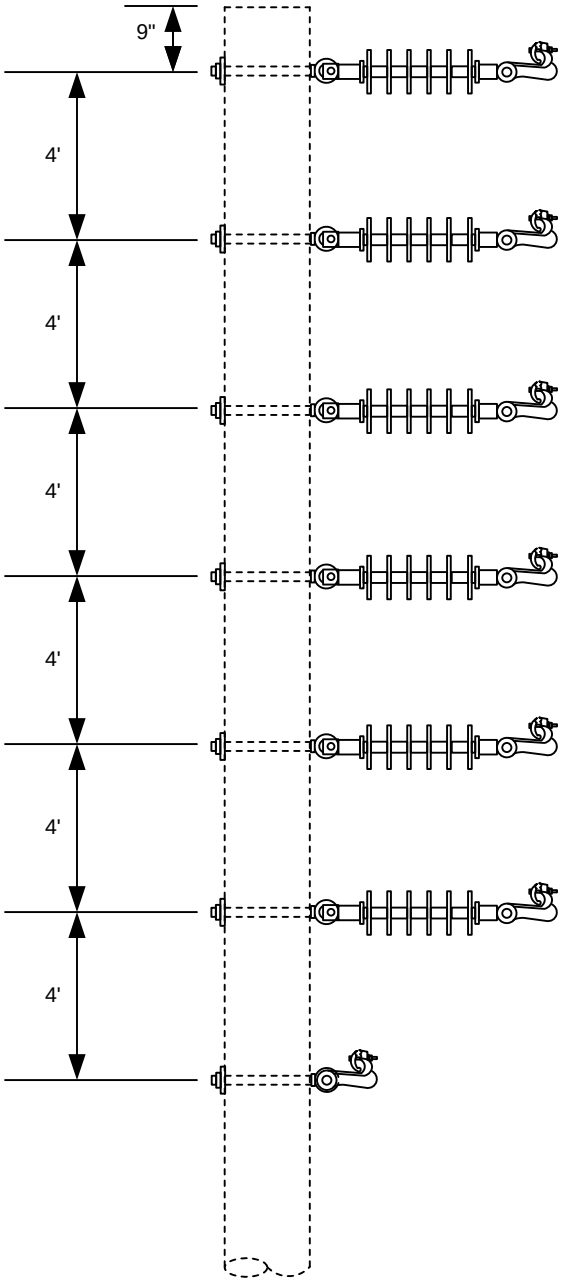
ITEM	QTY	MATERIAL
	2	"VC3.1" Primary Assembly Unit

DESIGN PARAMETERS:

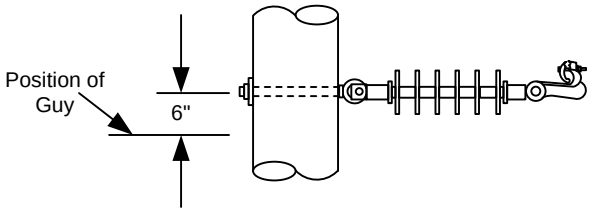
See: "VC3.1"
"VC3.2L"

SUSPENSION ANGLE GUIDE

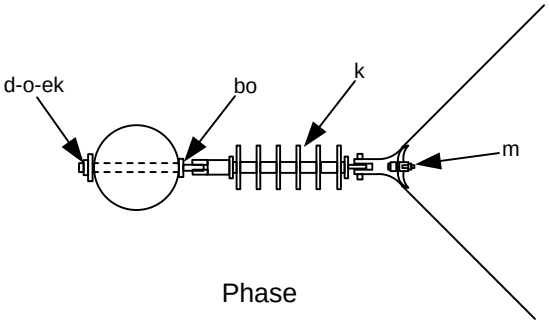
DEC 1998	DOUBLE CIRCUIT PRIMARY	VD3.1G
RUS	24.9/14.4 kV	(VDC–C3)



LINE #1

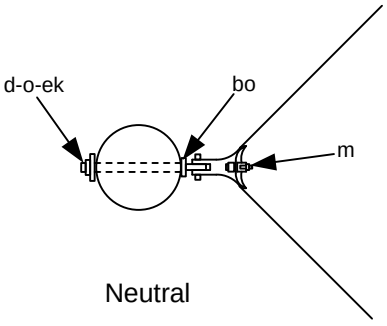


Guy Detail



Phase

LINE #2



Neutral

Not to scale.

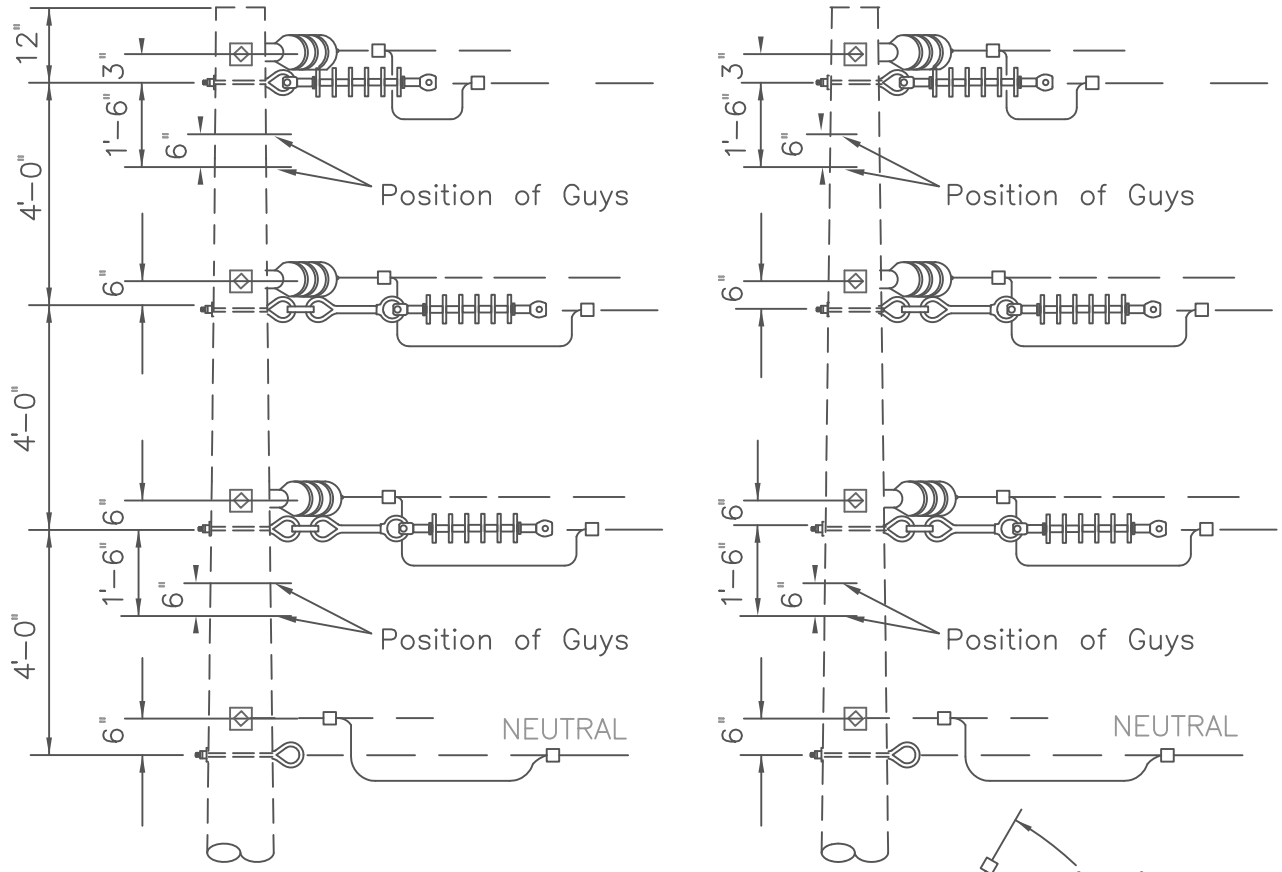
Note:

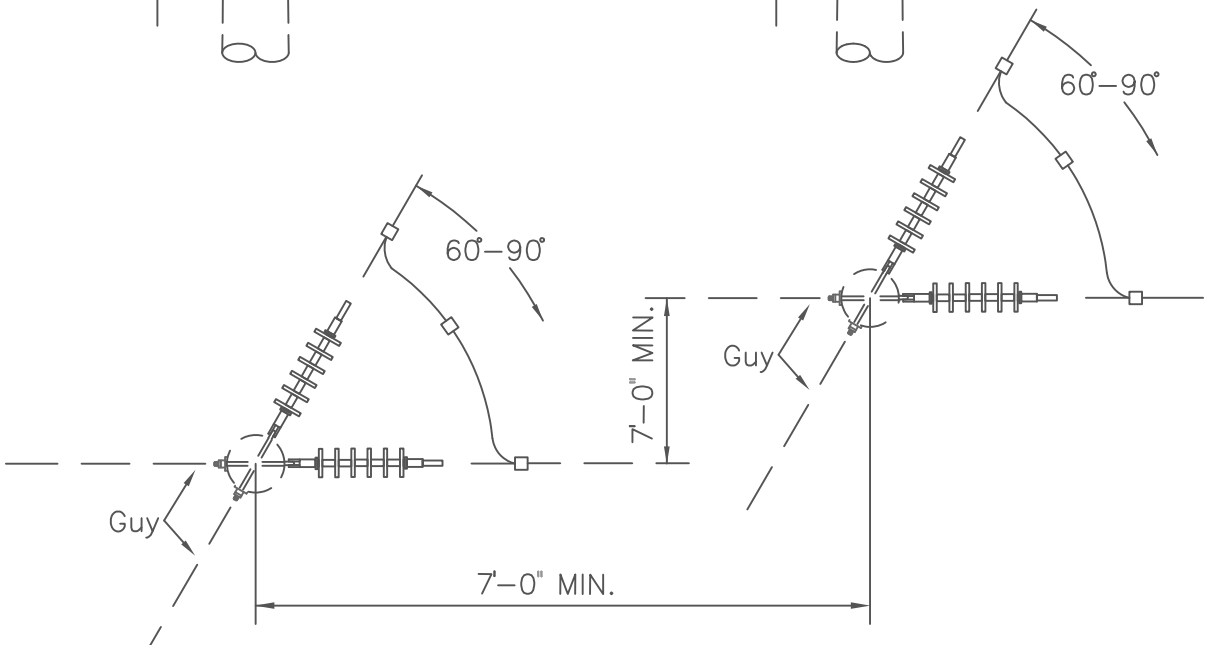
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. For 30° to 60° Angles.
3. Add Extension Links when required.

ITEM	QTY.	MATERIAL
d	7	Washer, 3"
k	6	Insulator, 25 kV Polymer Dead End
m	6	Clamp, Suspension, Primary
m	1	Clamp, Suspension, Neutral
o	7	Bolt, Eye, ¾" x required length
bo	7	Shackle, Anchor
bv	7	Armor Rod
ek	7	Locknut, 3/4"

SUSPENSION ANGLE
(LARGE CONDUCTORS)

2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD3.1N





NOTE: For large conductors, use two "VC4.2L" assemblies and designate as "VD4.2LG"

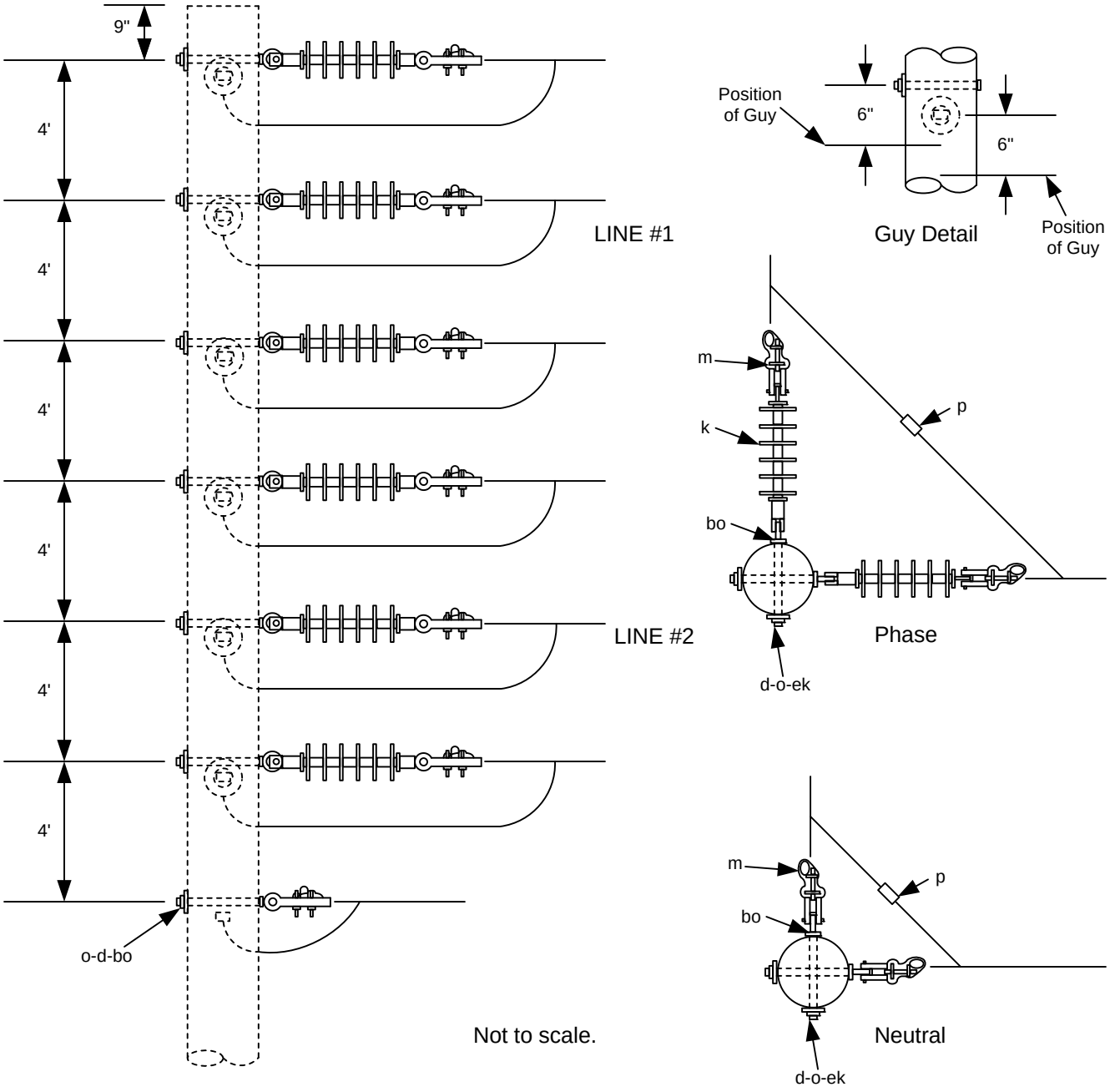
ITEM	QTY	MATERIAL
	2	"VC4.1" Primary Assembly Unit

DESIGN PARAMETERS:

See: "VC4.1"
"VC4.2L"

DEADEND ANGLE GUIDE

DEC 1998 RUS	DOUBLE CIRCUIT PRIMARY 24.9/14.4 kV	VD4.1G (VDC-C4-1)



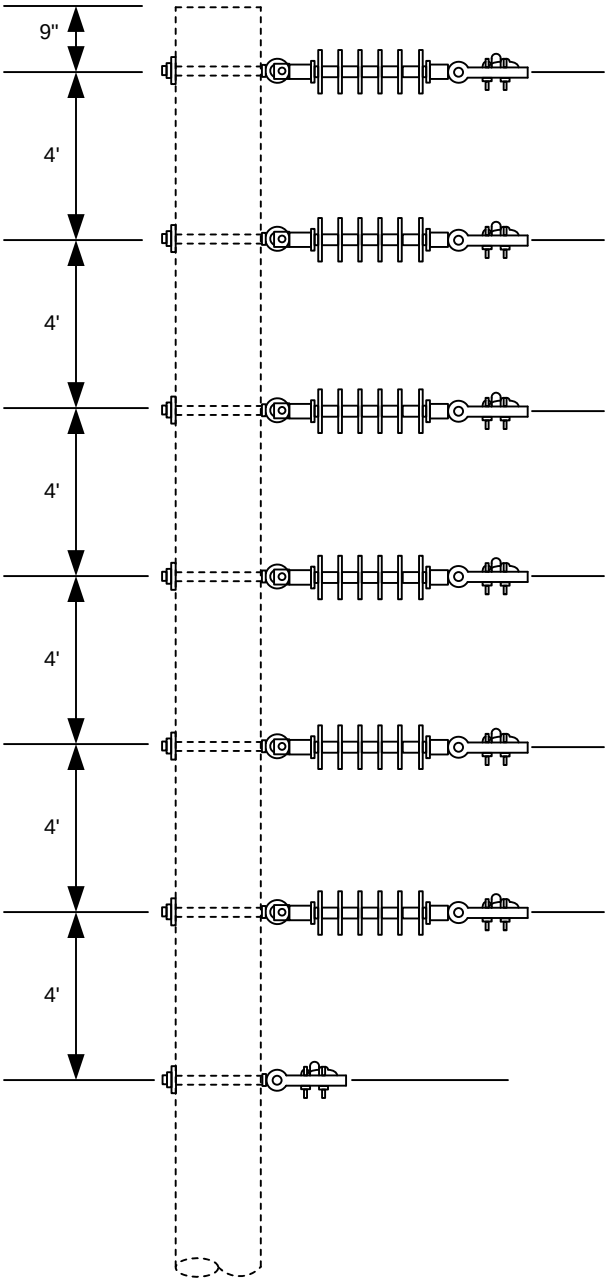
ITEM	QTY.	MATERIAL
d	14	Washer, 3”
k	12	Insulator, 25 kV Polymer Dead End
m	12	Clamp, Suspension, Primary
m	2	Clamp, Suspension, Neutral
o	14	Bolt, Eye, ¾" x required length
p		Connectors, as required
bo	14	Shackle, Anchor
ek	14	Locknut, ¾"

Note:

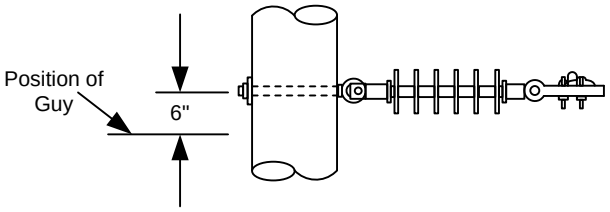
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. For 60° to 90° Angle
3. Add Extension Links when required.

DEAD END ANGLE (LARGE CONDUCTORS)

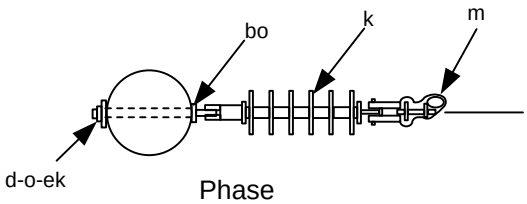
2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD4.1N



LINE #1

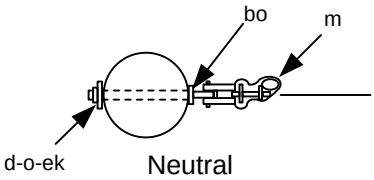


Guy Detail



Phase

LINE #2



Neutral

Not to scale.

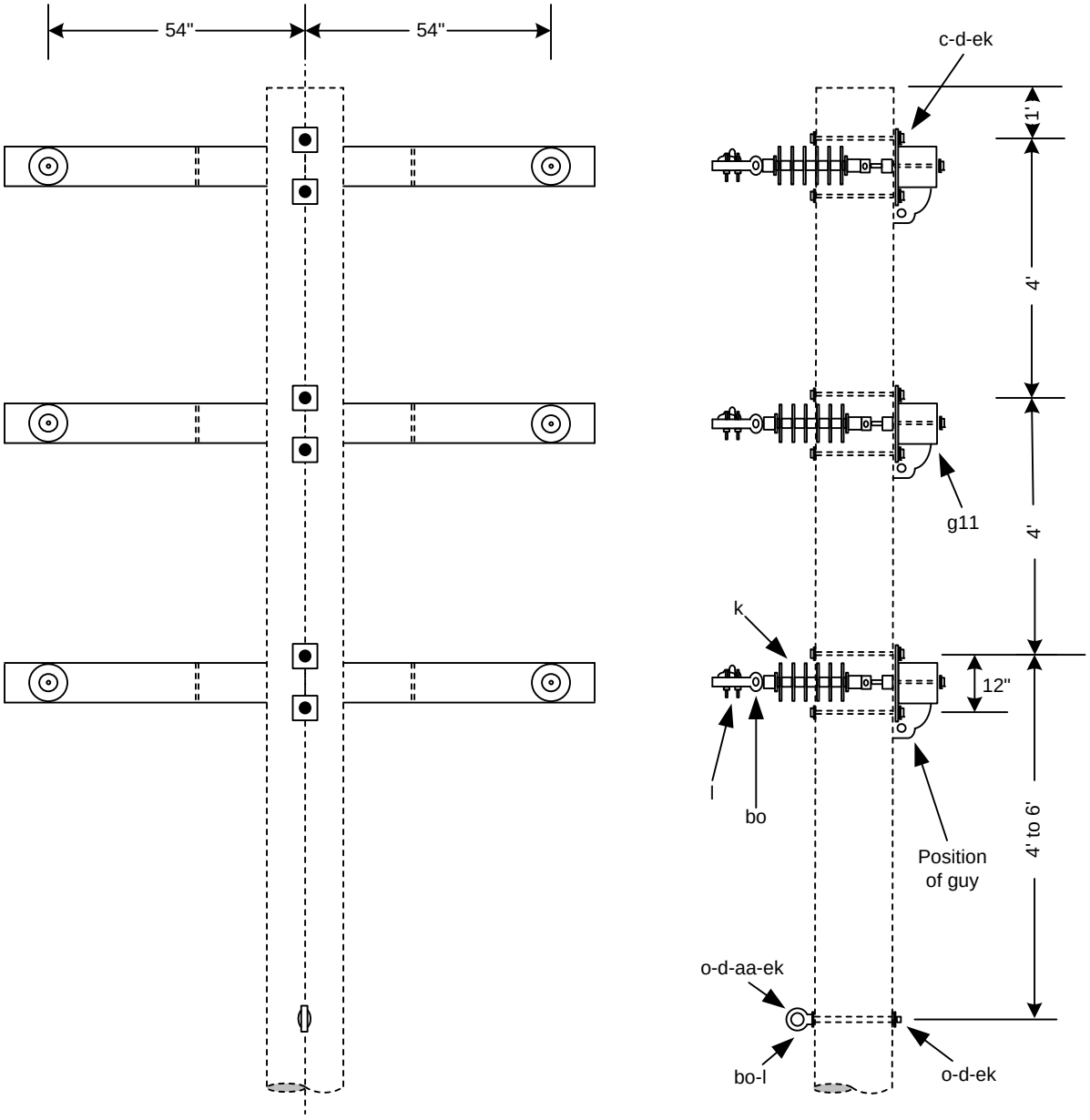
Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Add Extension Links when required.

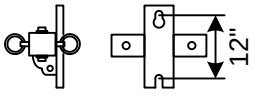
ITEM	QTY.	MATERIAL
d	7	Washer, 3”
k	6	Insulator, 25 kV Polymer Dead End
m	6	Clamp, Suspension, Primary
m	1	Clamp, Suspension, Neutral
o	7	Bolt, Eye, ¾” x required length
bo	6	Shackle, Anchor
ek	7	Locknut, ¾”

SINGLE DEAD END - VERTICAL
(LARGE CONDUCTORS)

2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD5.1N



ITEM	QTY.	MATERIAL
c	6	Bolt, Machine, 5/8" x required length
d	7	Washer, 3"
g11	3	Crossarm Assembly, 10' (Dead End)
k	6	Insulator, 25 kV Polymer Deadend
o	1	Bolt, eye, 5/8" x required length
l	6	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
bo	7	Shackle, Anchor
ek	7	Locknut, 5/8"

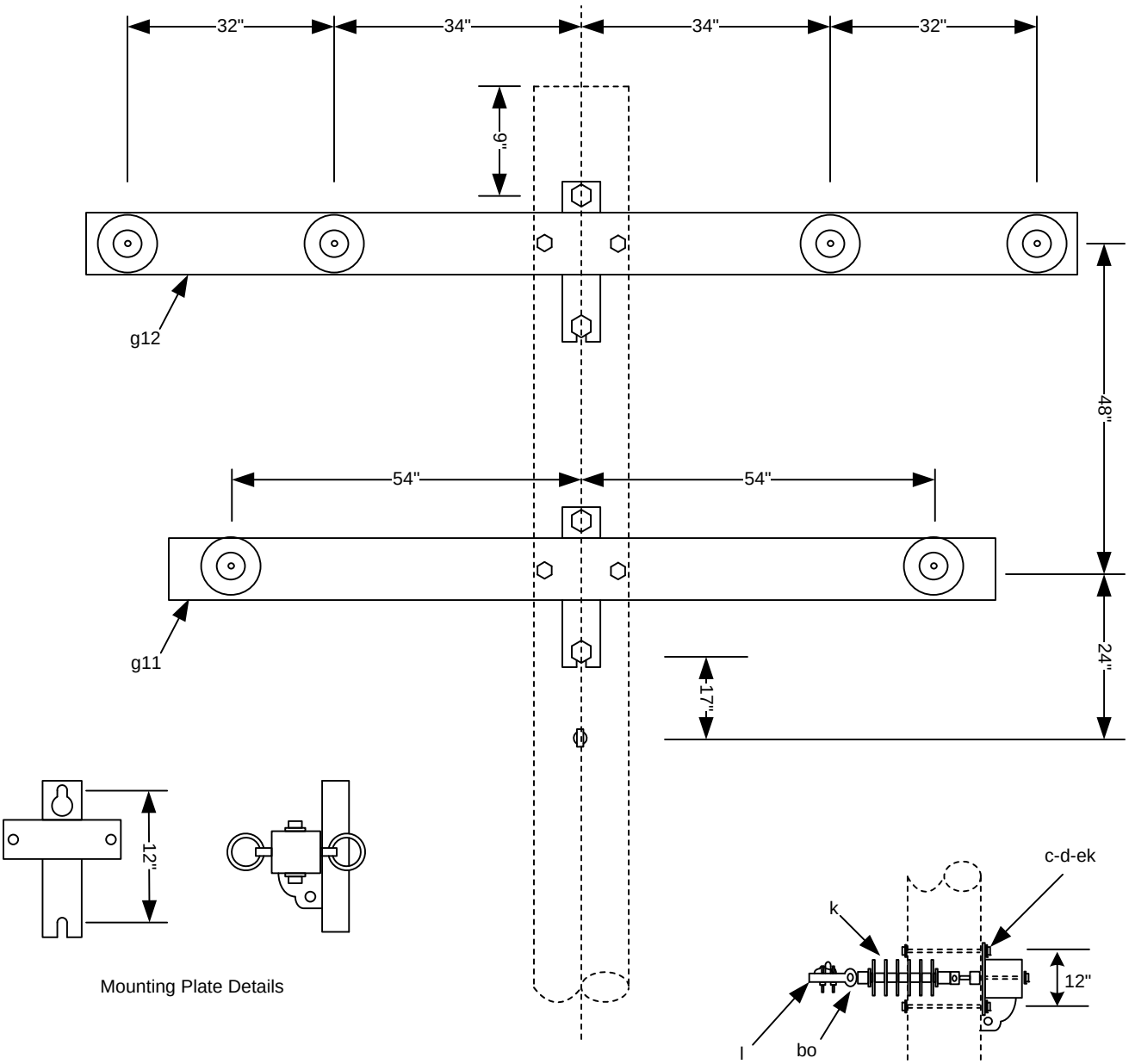


Mounting Plate Detail

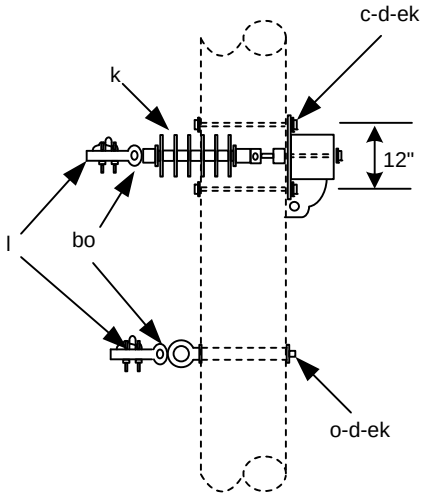
Note:
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade
2. Use Class 3 or larger pole

SINGLE DEADEND ON CROSSARM-VERTICAL (LARGE CONDUCTORS)

2007	WFECA	Double Circuit Primary 24.9/14.4 kV	VD5.2



Mounting Plate Details



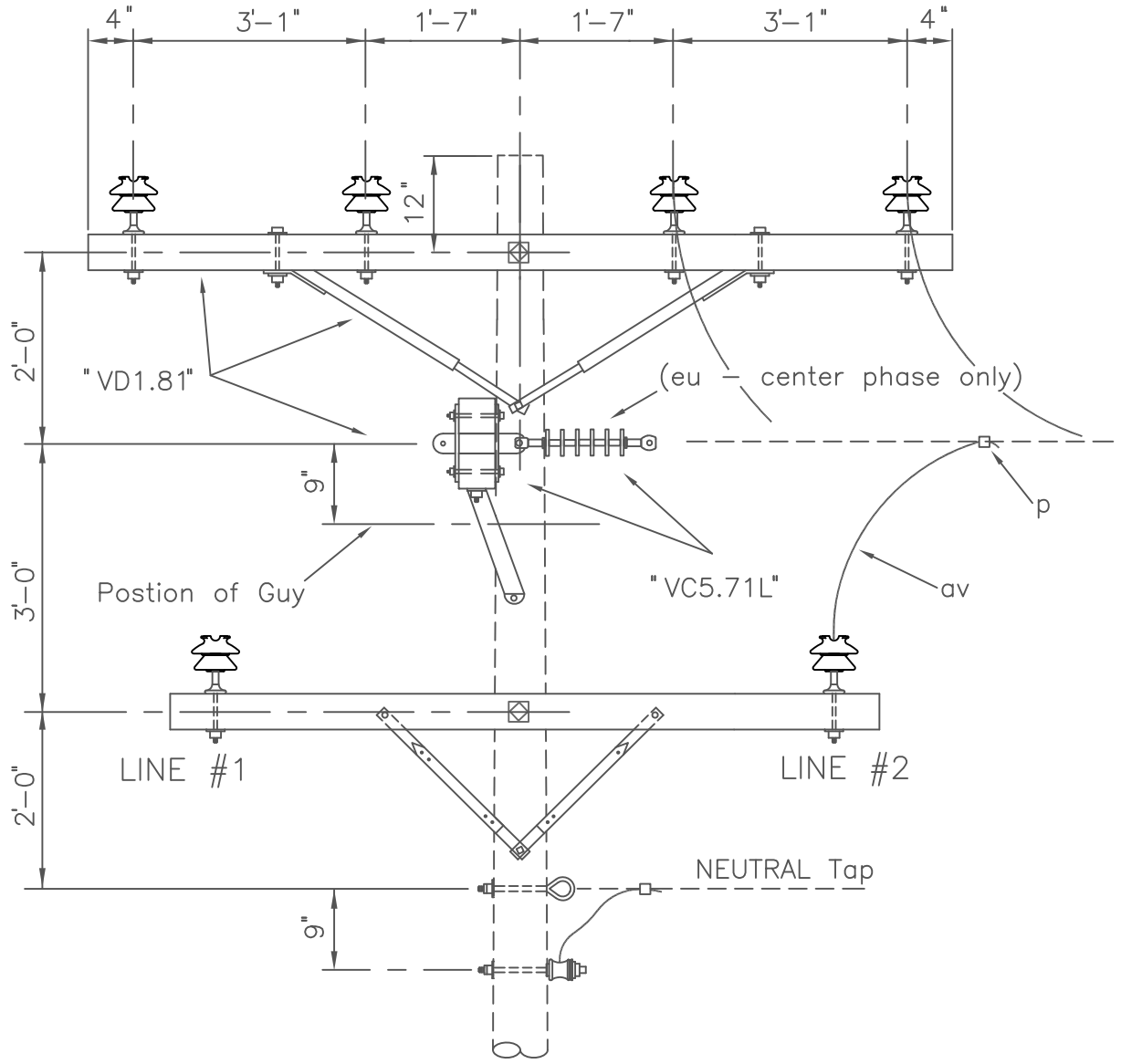
ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x required length
d	5	Washer, 3" x 3", square, curved
g11	1	Crossarm Assembly, 10' (Dead End)
g12	1	Crossarm Assembly, 12' (Dead End)
k	6	Insulator, 25 kV Polymer Deadend
l	6	Clamp, deadend, Primary
l	1	Clamp, deadend, Neutral
o	1	Bolt, eye, 5/8" x required length
p		Connectors, as required
bo	7	Shackle, Anchor
ek	5	Locknut, 5/8"

Note:

1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade.

SINGLE DEAD END ON CROSSARM (LARGE CONDUCTORS)

2012	WFECA	Double Circuit Primary 24.9/14.4 kV	VD5.52



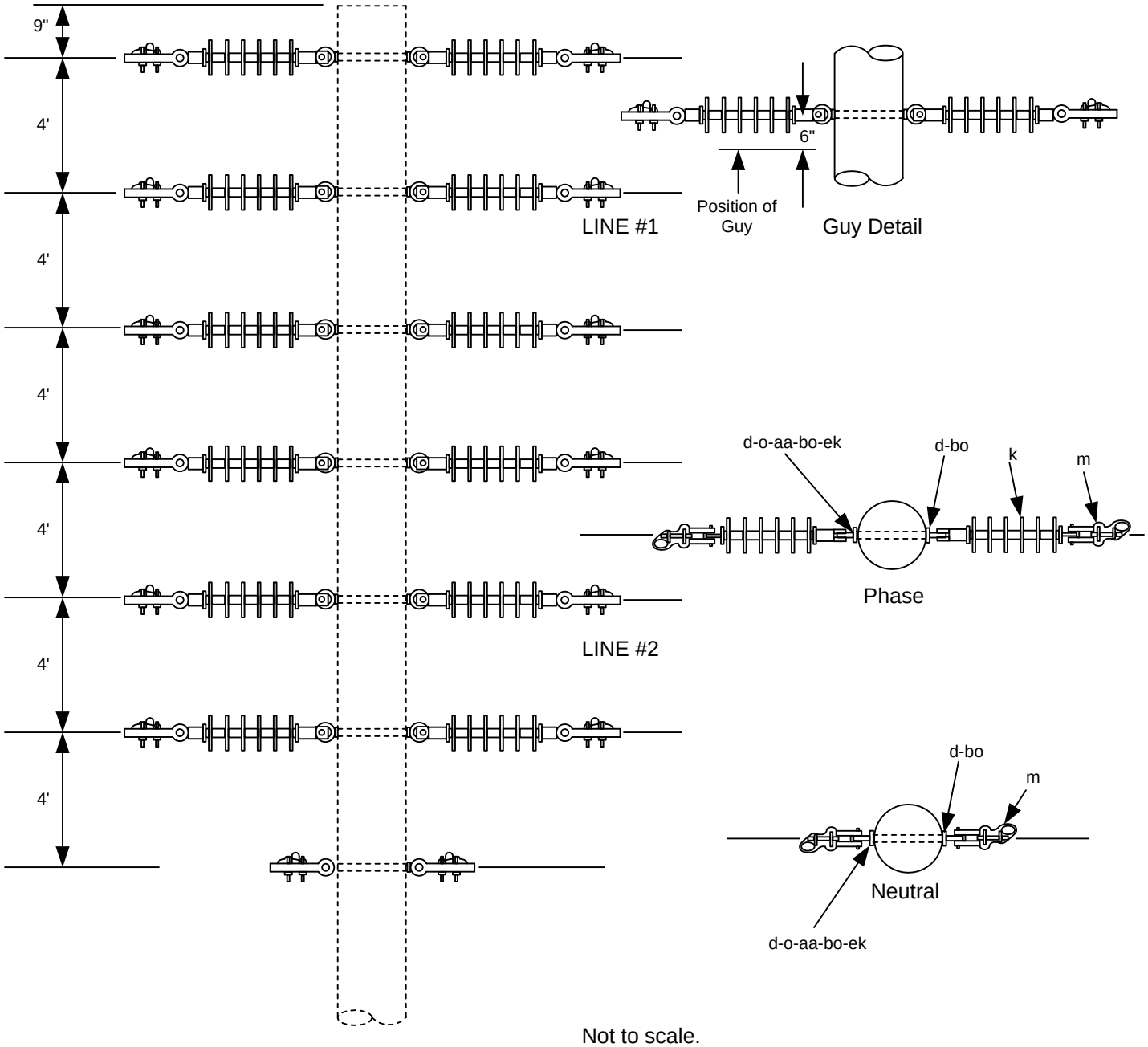
ITEM	QTY	MATERIAL
	1	VC5.71L Primary Assembly
	1	VD1.81 Primary Assembly
p		Connectors, as required
av		Jumpers, as required
eu		Link, extension, insulated, 12" min.

DESIGN PARAMETERS:

SEE: "VC5.71L"
"VD1.81"

THREE PHASE TAP GUIDE

DEC 1998	DOUBLE CIRCUIT PRIMARY 24.9/14.4 kV	VD5.91G
RUS		



Not to scale.

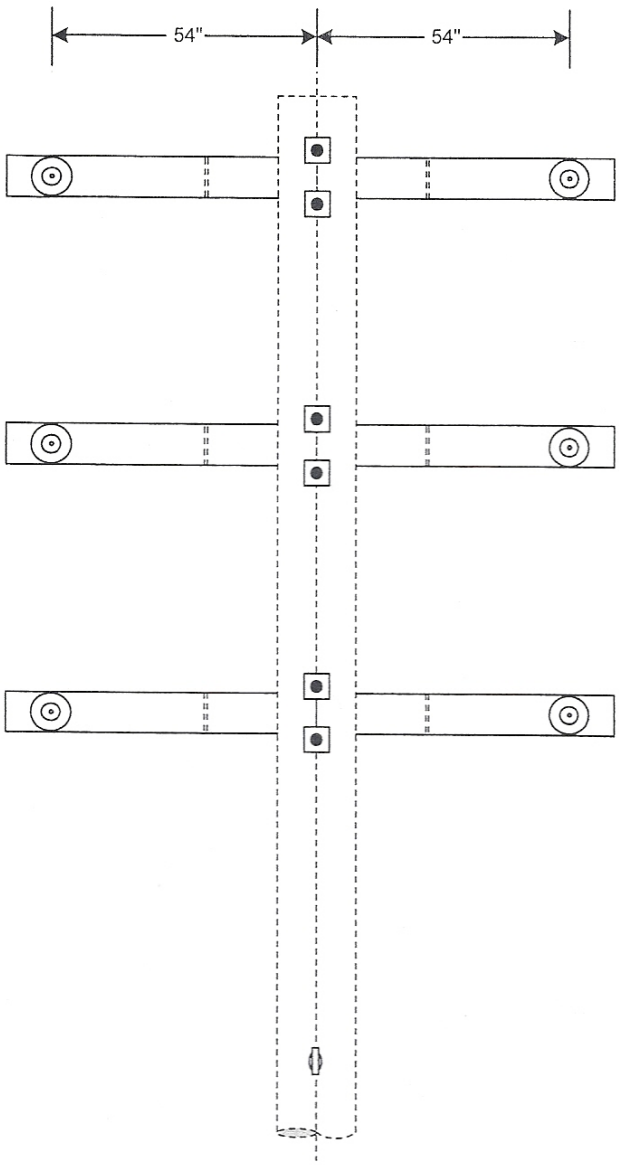
Note:

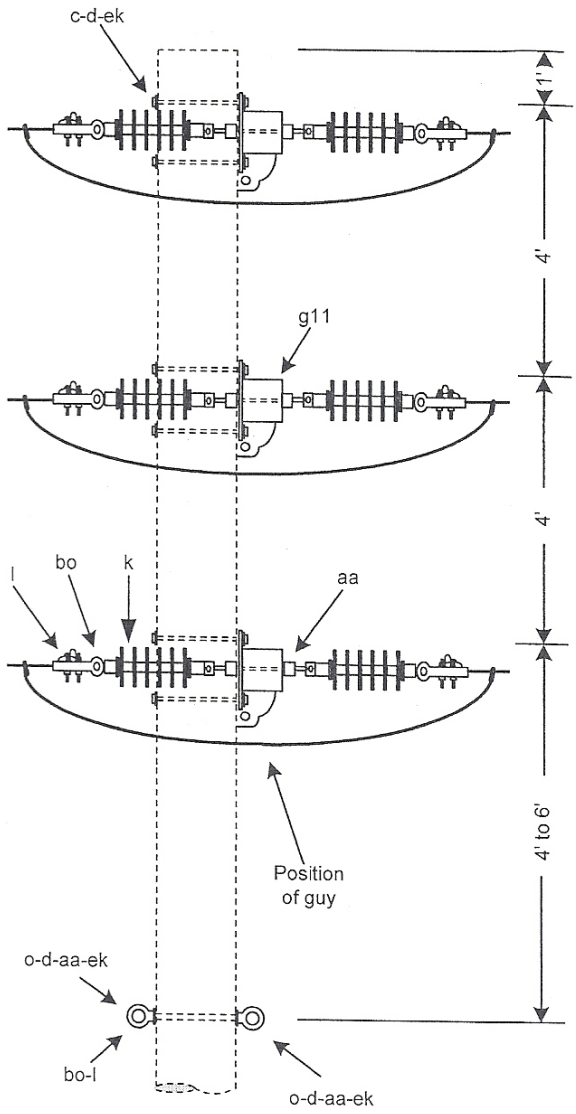
1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade
2. Maximum Line Angle is 2°.
3. Add Extension Links when required.

ITEM	QTY.	MATERIAL
d	14	Washer, 3"
k	12	Insulator, 25 kV Polymer Dead End
m	12	Clamp, Suspension, Primary
m	2	Clamp, Suspension, Neutral
o	7	Bolt, Eye, ¾" x required length
aa	7	Nut, Eye, ¾"
bo	14	Shackle, Anchor
ek	7	Locknut, ¾"

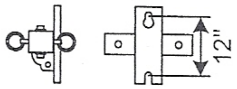
DOUBLE DEAD END - VERTICAL (LARGE CONDUCTORS)

2005	WFECA	Double Circuit Primary 24.9/14.4 kV	VD6.1N





ITEM	QTY.	MATERIAL
c	6	Bolt, Machine, 5/8" x required length
d	7	Washer, 3"
g11	3	Crossarm Assembly, 10' (Dead End)
k	12	Insulator, 25 kV Polymer Deadend
o	1	Bolt, eye, 5/8" x required length
l	12	Clamp, deadend, Primary
l	2	Clamp, deadend, Neutral
aa	7	Nut, Eye, 5/8"
bo	14	Shackle, Anchor
ek	7	Locknut, 5/8"

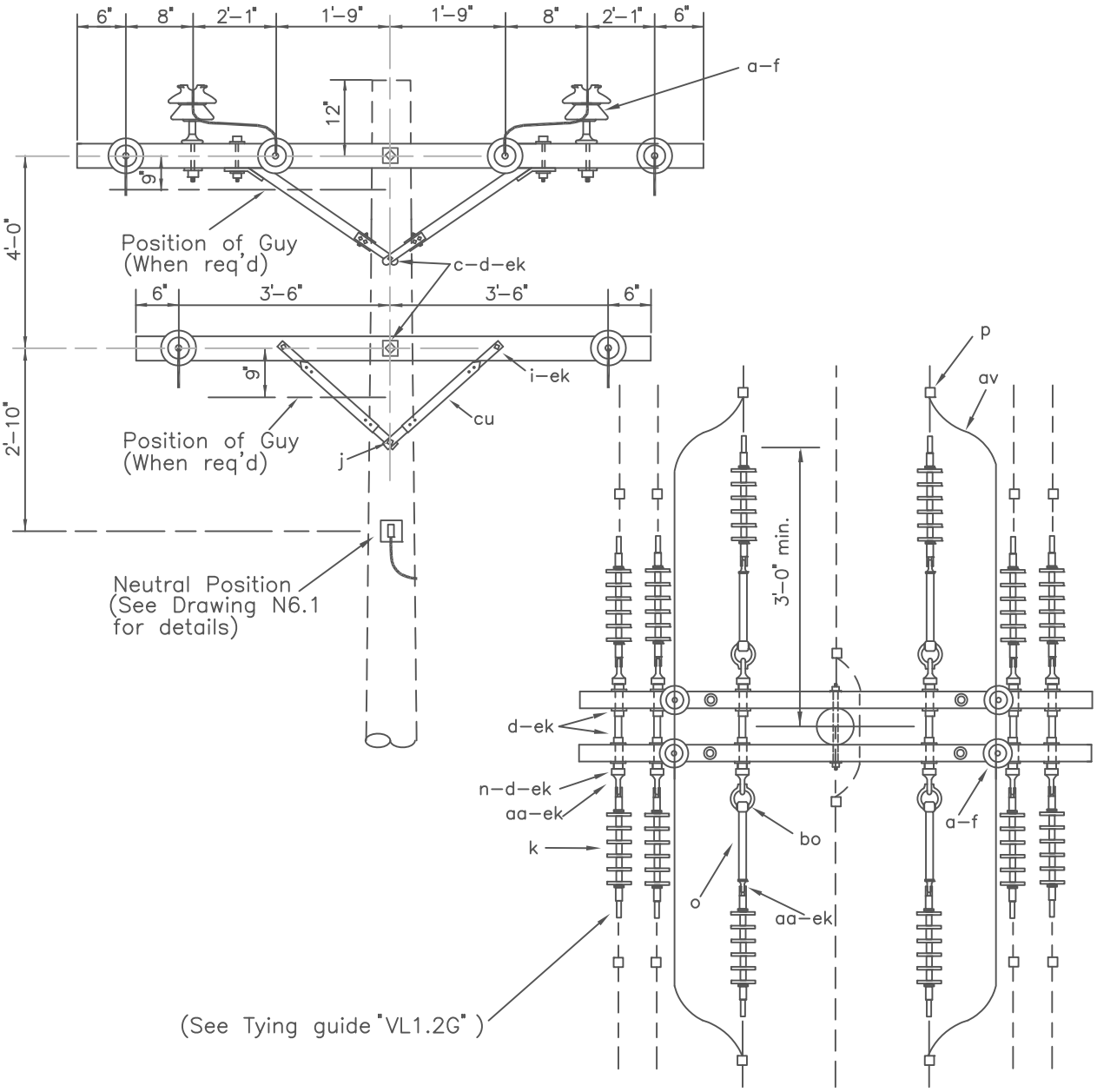


Mounting Plate Detail

Note:
1. For Transmission Under Build add prefix "TUB-". Specify Clearance of Neutral to Final Grade
2. Use Class 3 or larger pole

DOUBLE DEADEND ON CROSSARM- VERTICAL (LARGE CONDUCTORS)

2007	WFECA	Double Circuit Primary 24.9/14.4 kV	VD6.2



ITEM	QTY	MATERIAL
a	4	Insulator, pin type (24.9/14.4 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	3	Bolt, machine, 5/8" x length
d	4	Washer, round, 1 3/8"
d	31	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 14"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"
i	4	Bolt, carraige, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"

ITEM	QTY	MATERIAL
k	12	Insulator, 25 kV Polymer deadend
n	7	Bolt, double arm, 5/8 x req'd length
o	4	Bolt, eye, 5/8" x req'd length
p		Connectors, as req'd
aa	18	Nut, eye
av		Jumpers, as req'd
bo	4	Shackle, anchor
cu	2	Brace, wood, 60" span
cu	4	Brace, 28"
ek	51	Locknuts

DESIGN PARAMETERS:

ALLOWABLE UNBALANCED
LONGITUDINAL TENSION:
1,000 lbs./Conductor

(See Notes on Drawing "VC6.51")

DOUBLE DEADENDS ON CROSSARMS (FEEDTHROUGH)

DEC 1998	DOUBLE CIRCUIT PRIMARY	VD6.91
RUS	24.9/14.4 kV	

INDEX E

GUYING ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
E1.001	GUY MARKER
E1.01	SINGLE OVERHEAD GUY (THROUGH BOLT TYPE)
E1.1	SINGLE DOWN GUY (THROUGH BOLT TYPE)
E1.3L	SINGLE DOWN GUY INSULATED (POLE EYE PLATE TYPE)
E2.01	SINGLE OVERHEAD GUY (THROUGH BOLT TYPE)
E2.01L	SINGLE OVERHEAD GUY – HEAVY DUTY (POLE EYE PLATE TYPE)
E2.1	SINGLE DOWN GUY GUIDE – HEAVY DUTY (THROUGH BOLT TYPE)
E2.2G	DOUBLE DOWN GUY GUIDE – HEAVY DUTY (THROUGH BOLT TYPE)
E2.3G	THREE DOWN GUY GUIDE – HEAVY DUTY (THROUGH BOLT TYPE)
E3.1	SINGLE DOWN GUY (WRAPPED TYPE)
E5.1G	GUY STRAIN INSULATOR GUIDE
E5.2, E5.4, E5.8	GUY STRAIN INSULATOR
E6.3L	DOUBLE DOWN GUY INSULATED (POLE EYE PLATE TYPE)
E7.3L	TRIPLE DOWN GUY INSULATED (POLE EYE PLATE TYPE)
E8.3L	FOUR DOWN GUY INSULATED (POLE EYE PLATE TYPE)
E9.1	SIDEWALK GUY
E9.2	PUSH BRACE

CONSTRUCTION SPECIFICATIONS FOR GUYS

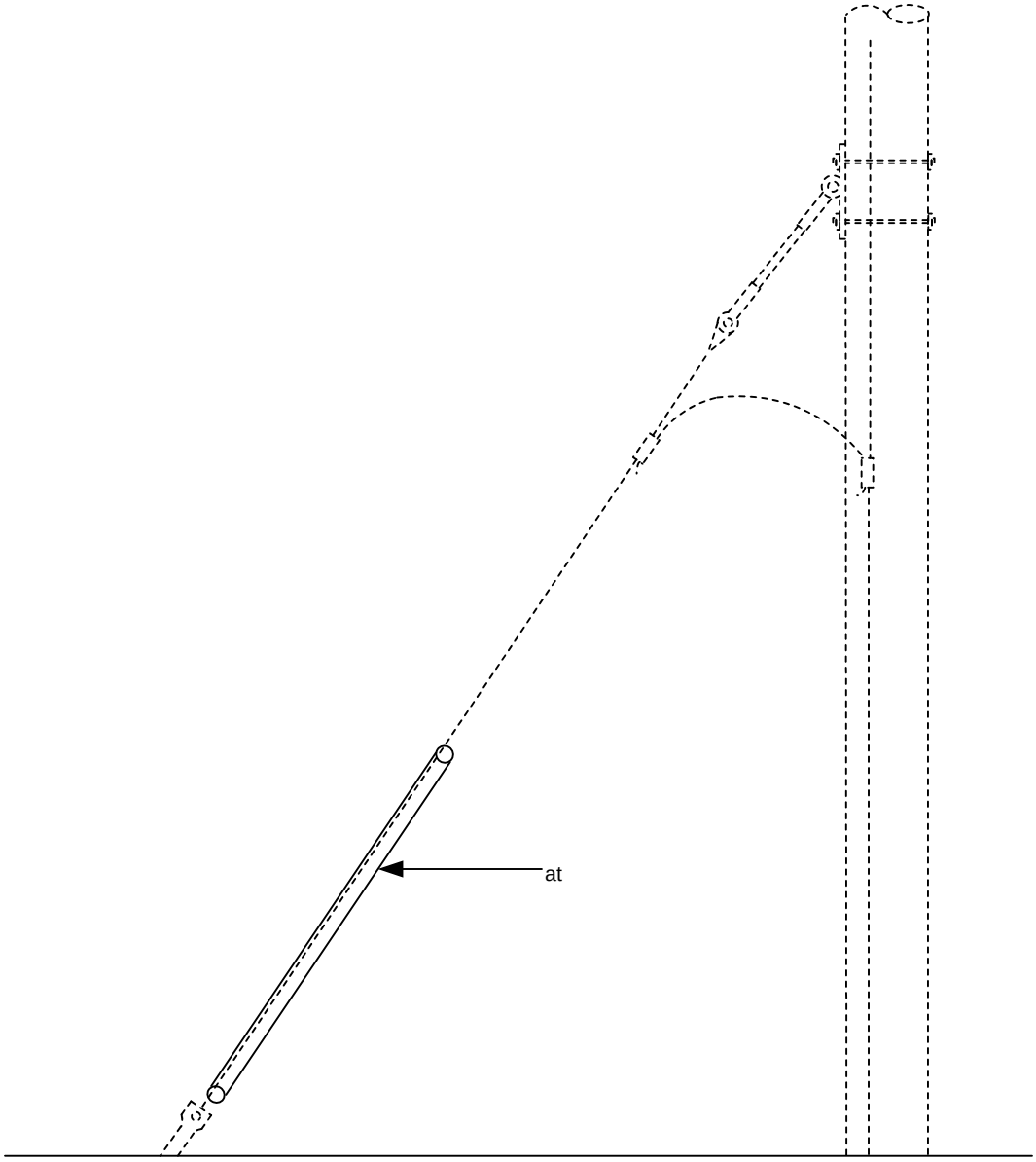
Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the construction drawings.

The grade of construction of the guys shall be the same as the structure or the highest grade required for any other conductors supported by the pole or structure.

Deadend structure guys shall be installed in line with the pull of conductors as nearly as practical. Bisector guys at an angle structure shall be installed as nearly as practical to the true bisector of the line angle.

A 1:1 slope for guy leads is recommended, especially on deadend structures. Minimum guy leads are not recommended.

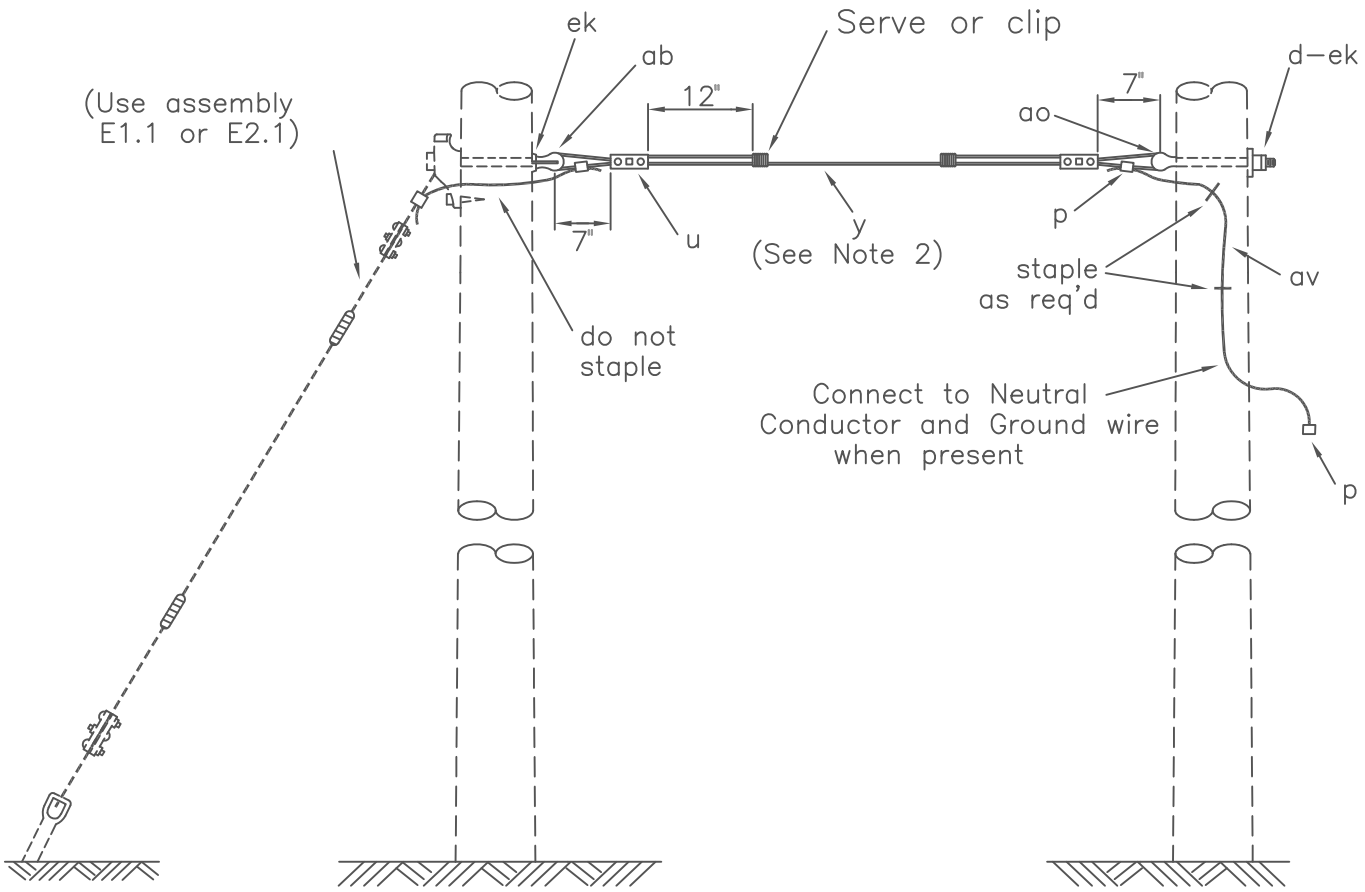
The applicable NESC safety factors have not been but must be applied to determine the "allowable guy wire tension" as denoted in the design parameters of the guying assembly units.



ITEM	QTY.	MATERIAL
at	1	Guy Marker, 8' minimum length

GUY MARKER

2005	WFECA	E1.001 (E3-10)



NOTES:

1. Other accepted and equivalent, heavy duty, guy deadends (item "u"), may be substituted for the 3–bolt clamps shown.
2. Specify guy wire size, type and required length.
3. Wrapped type overhead guys may be used. See drawing E3.1.

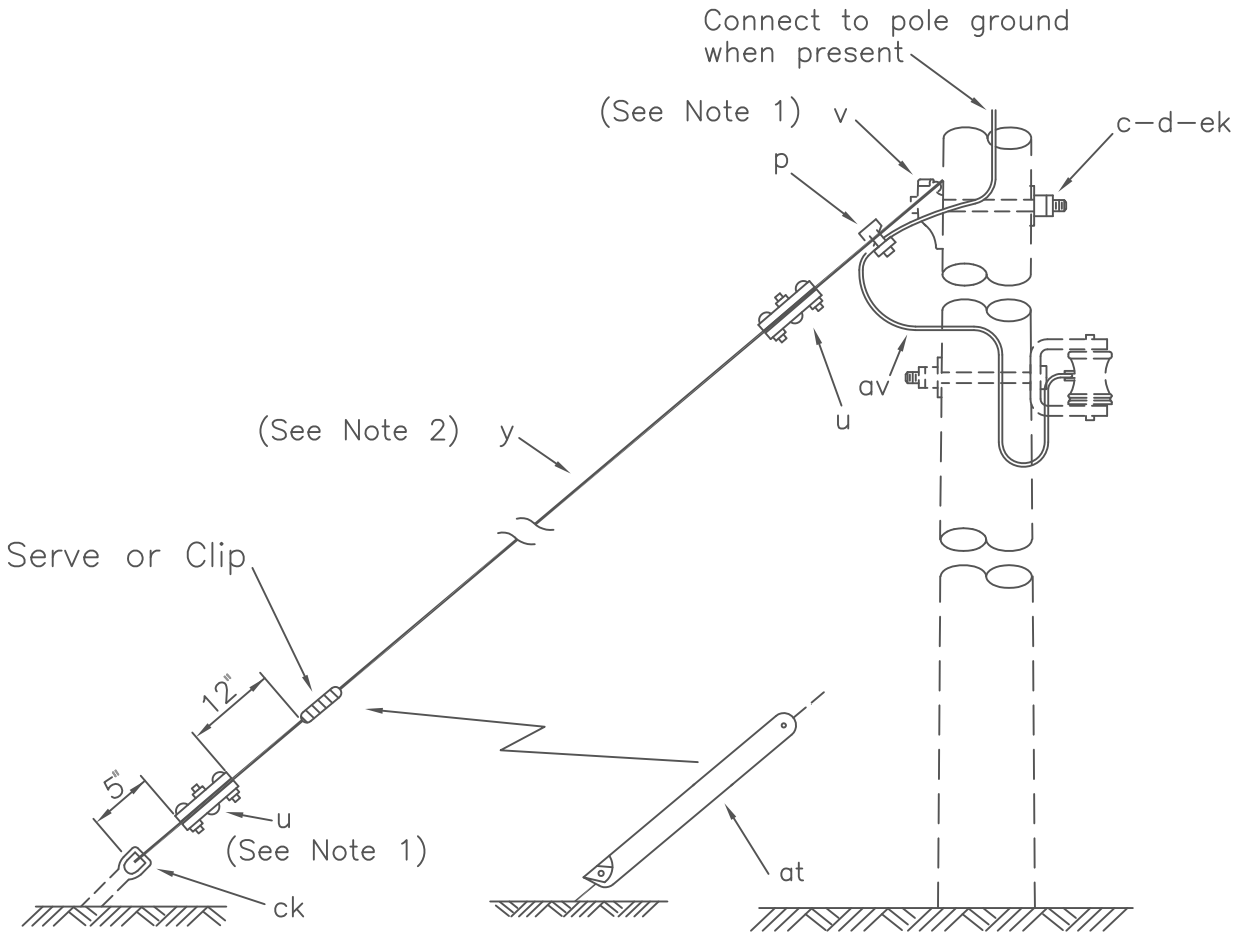
ITEM	MATERIAL	QTY
d	Washer, square, 2 1/4"	1
d	Washer, square, curved, 3" x 3"	
p	Connectors, guy bond and as req'd	
u	Deadend for guy strand, heavy duty	2
y	Guy wire, 8M x Length Required	
ab	Nut, thimble eye type, 5/8"	1
ab	Nut, thimble eye type, 3/4"	
ao	Bolt, thimble eye, 5/8" x req'd length	1
ao	Bolt, thimble eye, 3/4" x req'd length	
av	Jumpers, as req'd	
ek	Locknuts	2

DESIGN PARAMETERS:

MAXIMUM WORKING
LOAD = LESSER OF:
E1.01 5,200 lbs. HORIZONTAL
E2.01 8,500 lbs. HORIZONTAL
or ALLOWABLE GUY WIRE TENSION

SINGLE OVERHEAD GUY (THROUGH BOLT TYPE)

DEC 1998	8M Wire	E1.01
RUS		(E2–2)



NOTES:
1. Other accepted and equivalent guy deadend (item "u") and attachment (item "v") material may be substituted for the ones shown.
2. Specify guy wire size, type and required length.

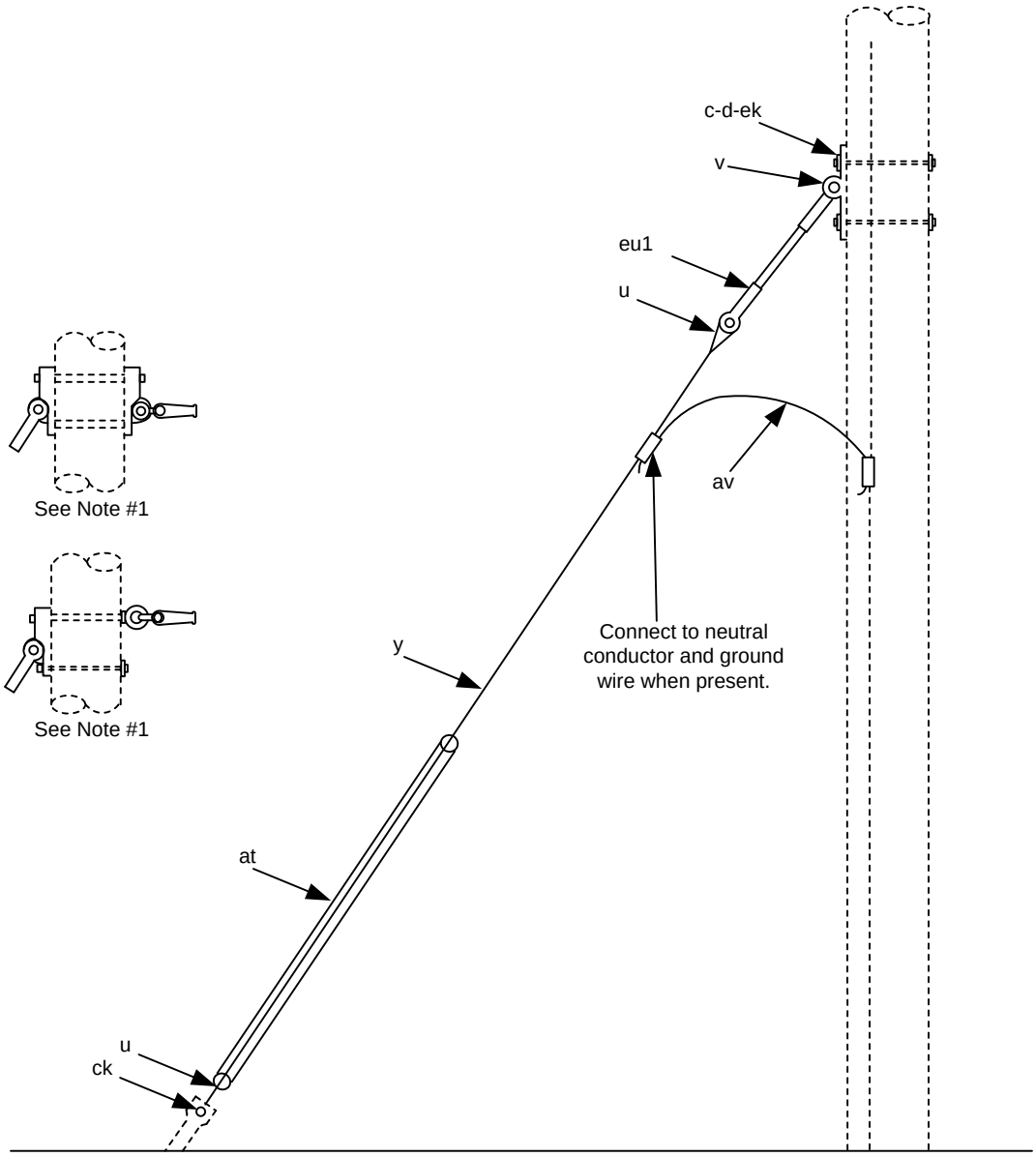
ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x req'd length
d	1	Washer, square, 2 1/4"
p		Connectors, guy bond and as req'd
u	2	Deadend for guy strand (See Note 1)
v	1	Guy attachment (See Note 1)
y		Guy wire, 8M x Length required
at	1	Guy marker
av		Jumpers, as req'd
ck	1	Clamp, anchor bonding
ek	1	Locknuts

DESIGN PARAMETERS:

MAXIMUM WORKING LOAD = LESSER OF 5,200 lbs HORIZONTAL OR ALLOWABLE GUY WIRE TENSION

SINGLE DOWN GUY (THROUGH BOLT TYPE)

DEC 1998	8M Wire	E1.1 (E1–2)
RUS		



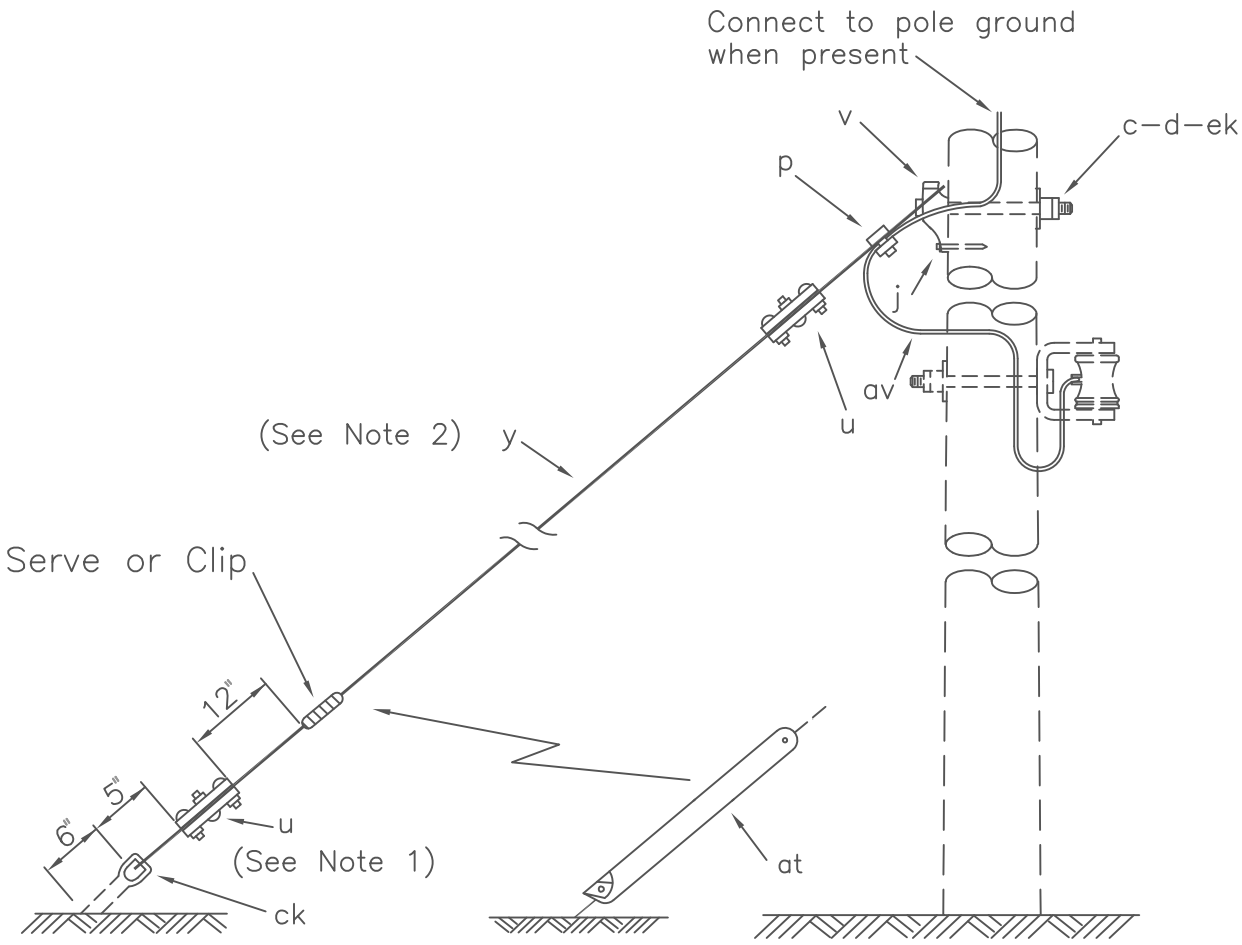
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	2	Washer, square, 3" curved, reinforced
p		Connector, compression, as required
eu1	1	Insulator, guy strain, 78", clevis – thimble eye
y		Guy wire, 7 strand, 10M, length required
u	2	Preform, guy deadend
av		Jumper, 6 cu, SD
ek	2	Locknut, 5/8"
v	1	Guy attachment, eye plate
at	1	Guy Marker, 8' minimum length
ck	1	Clamp, Anchor rod Bonding

Note:

1. Pole eye plates may be installed on existing bolts where practical.

SINGLE DOWN GUY INSULATED
(POLE EYE PLATE TYPE)

2005	WFECA	10M Wire	E1.3L (VE9-3L)



NOTES:

1. Other accepted and equivalent, heavy duty, guy deadend material (item "u") may be substituted for the ones shown.
2. Specify guy wire size, type and required length.

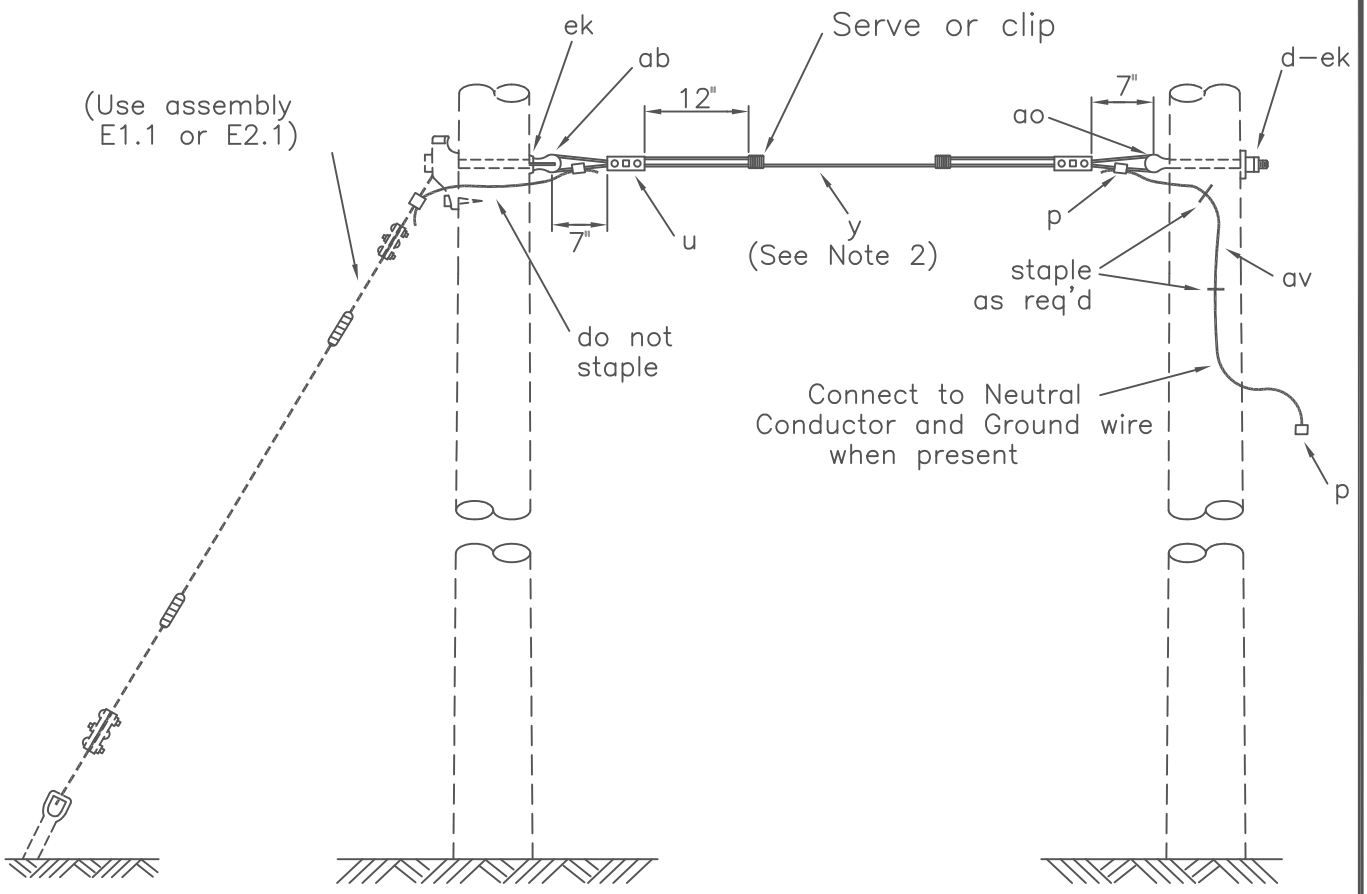
ITEM	QTY	MATERIAL
c	1	Bolt, machine, 3/4" x req'd length
d	1	Washer, square, 3", curved
p		Connectors, guy bond and as req'd
j	1	Screw, lag, 1/2" x 4"
u	2	Deadend for guy strand, heavy duty
v	1	Guy attachment, guy hook type
y		Guy wire, 10M x Length Required
at	1	Guy marker
av		Jumpers, as req'd
ck	1	Clamp, anchor bonding
ek	1	Locknuts

DESIGN PARAMETERS:

MAXIMUM WORKING LOAD =
LESSER OF 8,500 lbs. HORIZONTAL
or ALLOWABLE GUY WIRE TENSION

SINGLE DOWN GUY – HEAVY DUTY (THROUGH BOLT TYPE)

DEC 1998	10M Wire	E2.1 (E1–3)
RUS		



NOTES:

1. Other accepted and equivalent, heavy duty, guy deadends (item "u"), may be substituted for the 3–bolt clamps shown.
2. Specify guy wire size, type and required length.
3. Wrapped type overhead guys may be used. See drawing E3.1.

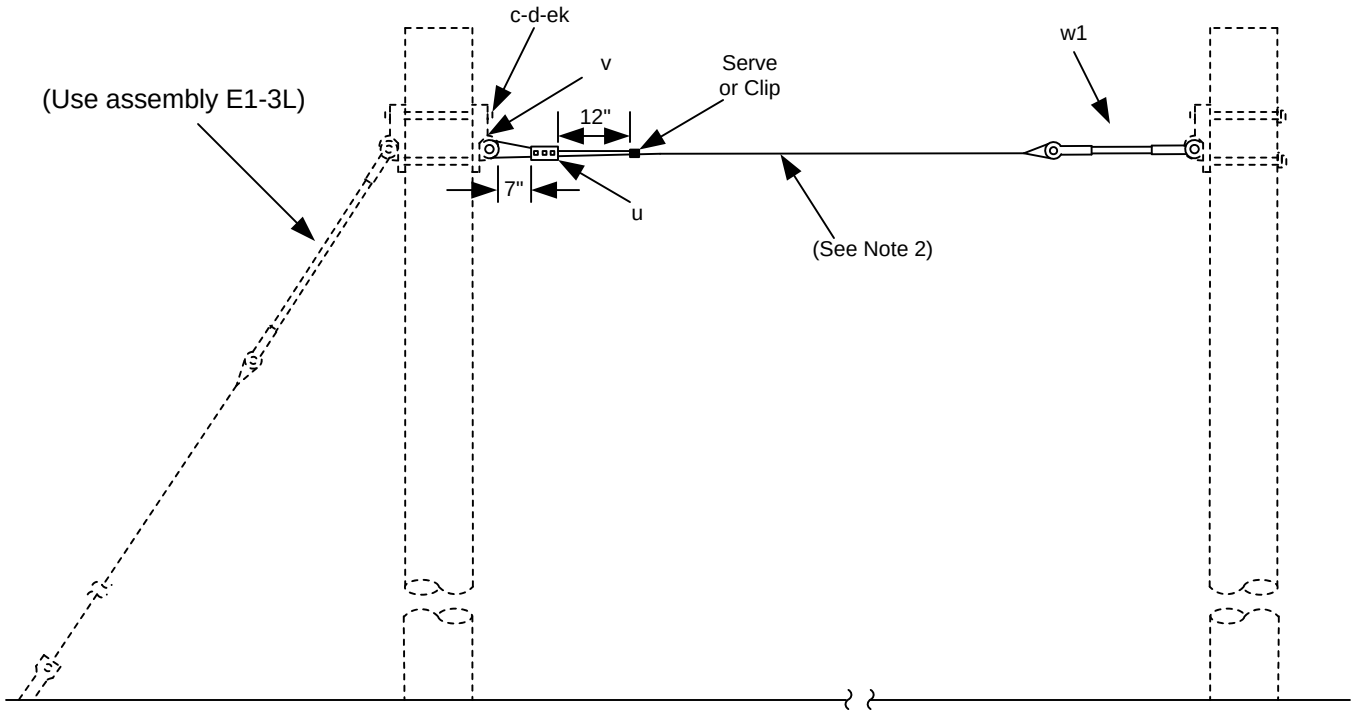
ITEM	MATERIAL	QTY
d	Washer, square, 2 1/4"	
d	Washer, square, curved, 3" x 3"	1
p	Connectors, guy bond and as req'd	
u	Deadend for guy strand, heavy duty	2
y	Guy wire, 10M x Length Required	
ab	Nut, thimble eye type, 5/8"	
ab	Nut, thimble eye type, 3/4"	1
ao	Bolt, thimble eye, 5/8" x req'd length	
ao	Bolt, thimble eye, 3/4" x req'd length	1
av	Jumpers, as req'd	
ek	Locknuts	2

DESIGN PARAMETERS:

MAXIMUM WORKING
LOAD = LESSER OF:
E1.01 5,200 lbs. HORIZONTAL
E2.01 8,500 lbs. HORIZONTAL
or ALLOWABLE GUY WIRE TENSION

SINGLE OVERHEAD GUY
(THROUGH BOLT TYPE)

DEC 1998	10M Wire	E2.01 (E2–3)
RUS		



DESIGN PARAMETERS:
E2.01L 8,500 lbs. Horizontal Or Allowable Guy Wire Tension

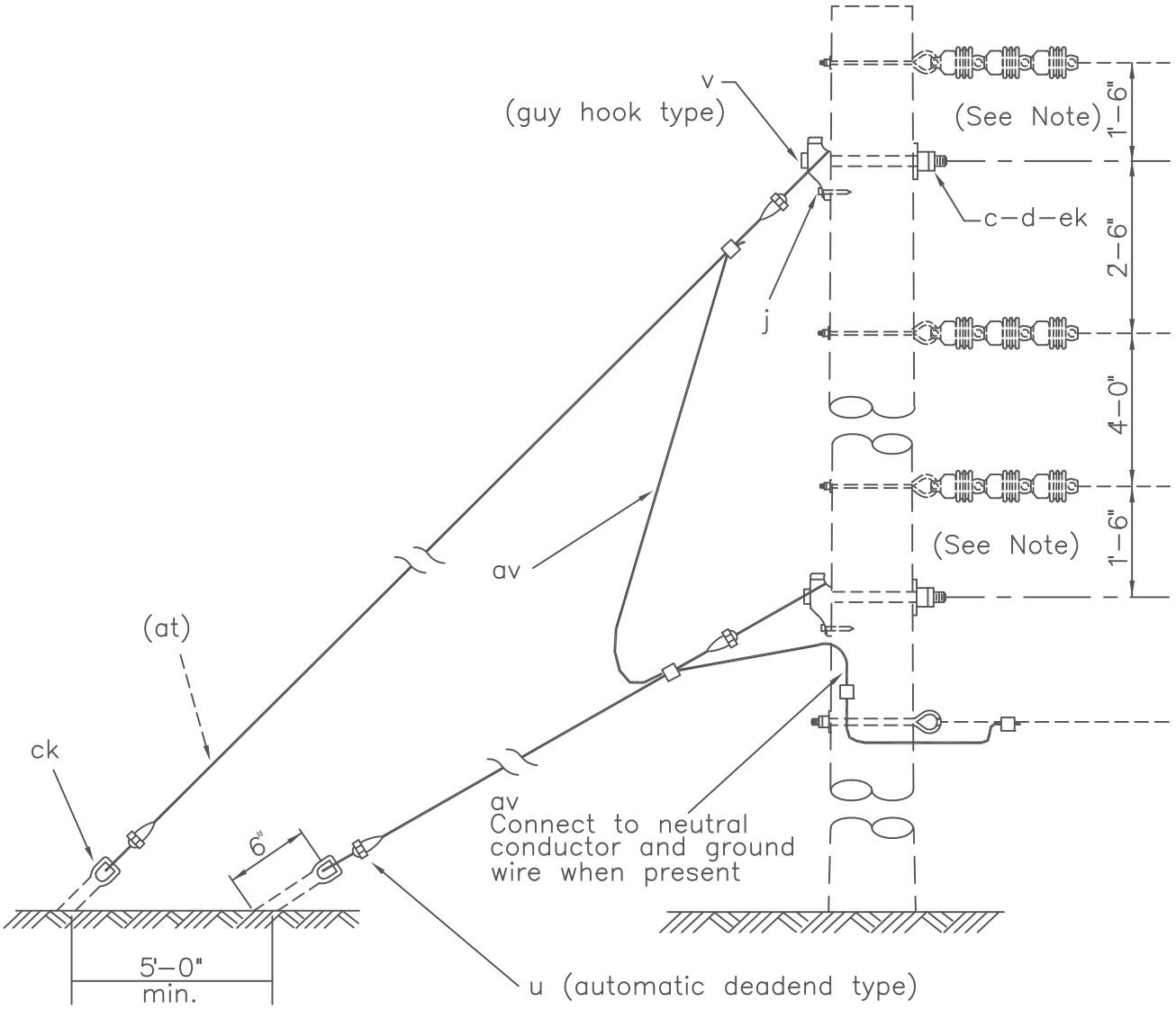
ITEM	QTY.	MATERIAL
c	4	Bolt, Machine, 5/8" x required length
d	4	Washer, square, 3" curved, reinforced
p		Connector, compression, as required
u	2	Preform, guy deadend
v	2	Guy attachment, eye plate
y		Guy wire, 7 strand, 10M, length required
av		Jumper, 6 cu, SD
ek	4	Locknut, 5/8"
w1	1	Insulator, guy strain, 78", clevis – thimble eye

Note:

1. Other accepted and equivalent, heavy duty, guy deadends (item "u") may be substituted for the 3-bolt clamps shown.
2. Specify guy wire size, type and required length.

SINGLE OVERHEAD GUY
(POLE EYE PLATE TYPE)

2007	WFECA	10M Wire	E2.01L (E2-3L)



NOTES:
Position guys as shown on applicable pole top assembly unit if different than shown here. If distance between primary assembly and down guy is less than 12", install (minimum 12") guy strain insulator,(item "w"), or insulated extension link, (item "eu"), (mininum 12"), in primary assembly.

The following single down guy assemblies may be used, (multiply material quantities by 2):

E1.1: Through Bolt Type
E2.1: Through Bolt Type, Heavy Duty (shown above)

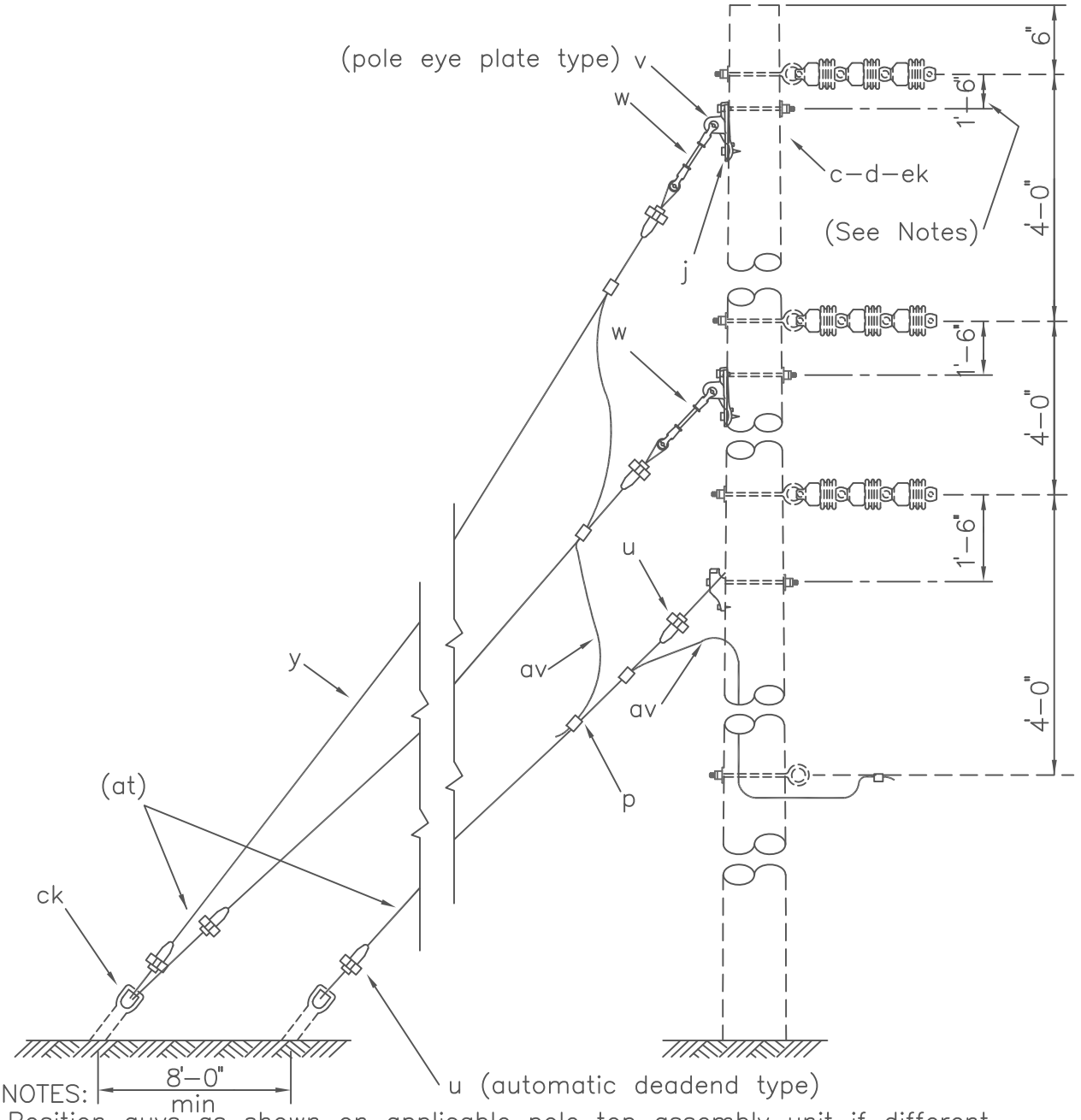
DESIGN PARAMETERS:

(See Single Down Guy drawings)

DOUBLE DOWN GUY GUIDE – HEAVY DUTY (THROUGH BOLT TYPE)

DEC 1998
RUS

E2.2G



NOTES:

Position guys as shown on applicable pole top assembly unit if different than shown here. If distance between primary assembly and down guy is less than 12", install (minimum 12") guy strain insulator,(item "w"), or insulated extension link, (item "eu"), (mininum 12"), in primary assembly.

The following single down guy assemblies may be used, (multiply material quantities by 3):

E1.1: Through Bolt Type

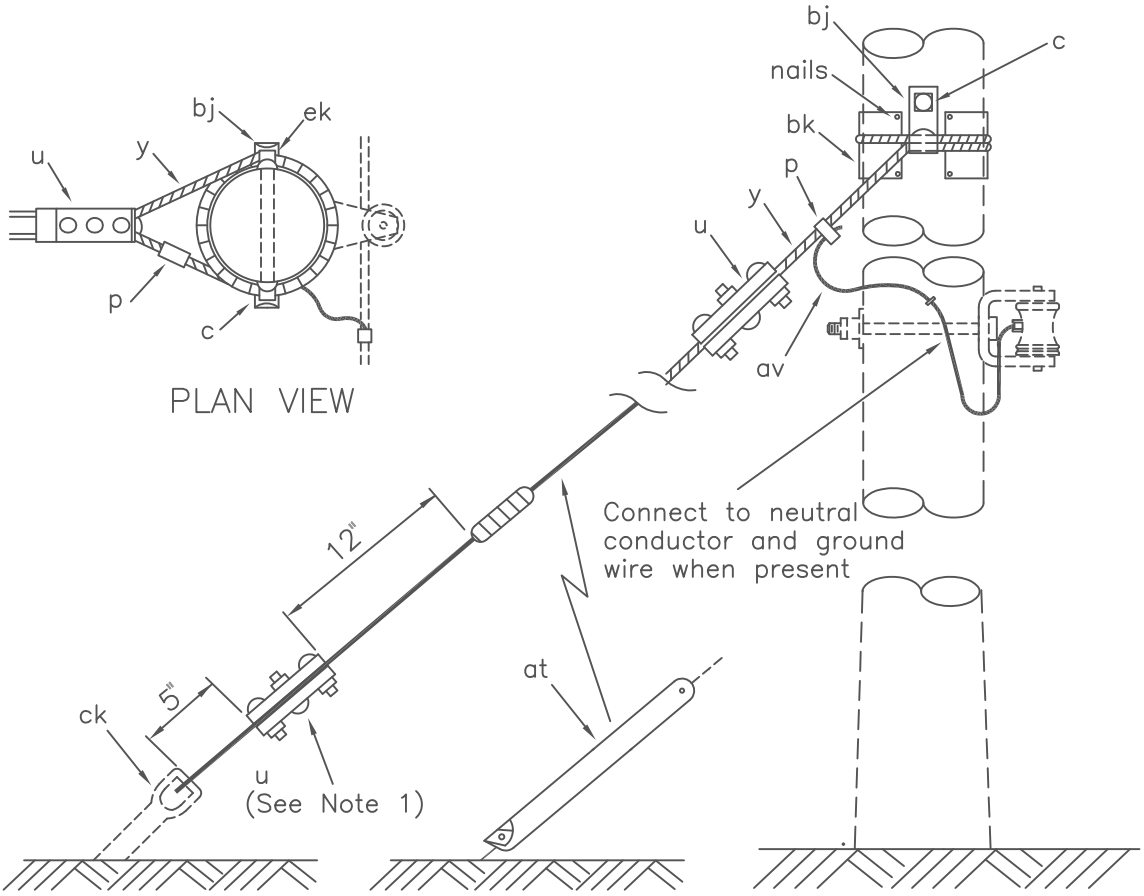
E1.2: Through Bolt Type, Heavy Duty (shown above)

DESIGN PARAMETERS:

(See Single Down Guy drawings)

THREE DOWN GUY GUIDE – HEAVY DUTY (THROUGH BOLT TYPE)

DEC 1998		E2.3G
RUS		



NOTES:

1. Other accepted and equivalent, heavy duty, guy clamps, (item "u"), may be substituted for the 3–bolt clamps shown
2. Specify guy wire size, type and required length.
3. Assembly E2.1 is preferred unit.

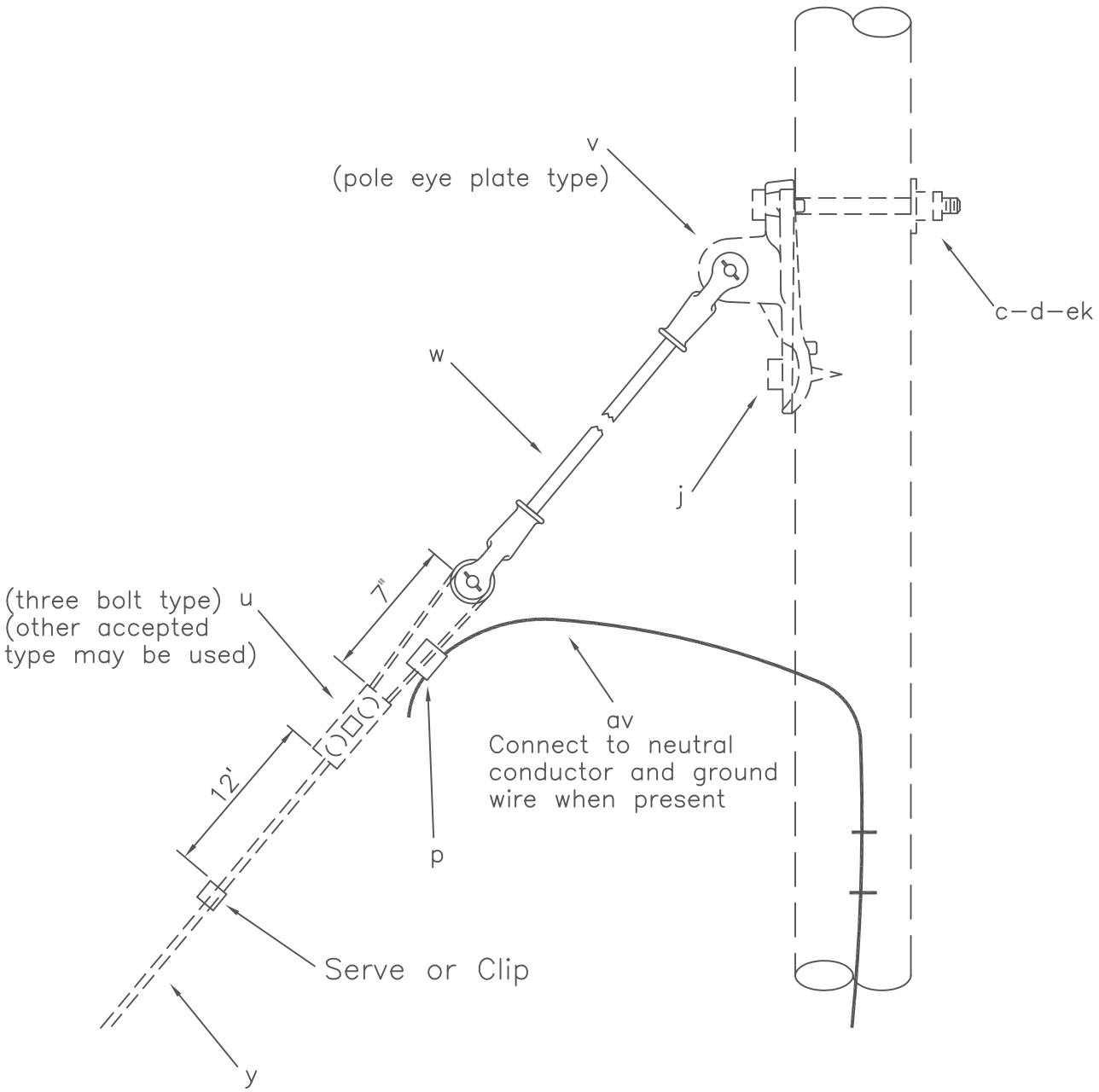
ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x req'd length
p		Connectors, guy bond and as req'd
u	2	Deadend for guy strand, heavy duty
y		Guy wire, as req'd (See Note 2)
at	1	Guy marker
av		Jumpers, as req'd
bj	2	Guy hook
bk	2	Guy Plate, 4" x 8", 14 gauge
ck	1	Clamp, anchor rod bonding
ek	1	Locknuts
	8	Nails, 8 penny galv.

DESIGN PARAMETERS:

MAXIMUM WORKING LOAD =
LESSER OF 8,500 lbs. HORIZONTAL
or ALLOWABLE GUY WIRE TENSION

SINGLE DOWN GUY (WRAPPED TYPE)

DEC 1998	10M WIRE	E3.1 (E3–2, E3–3)
RUS		



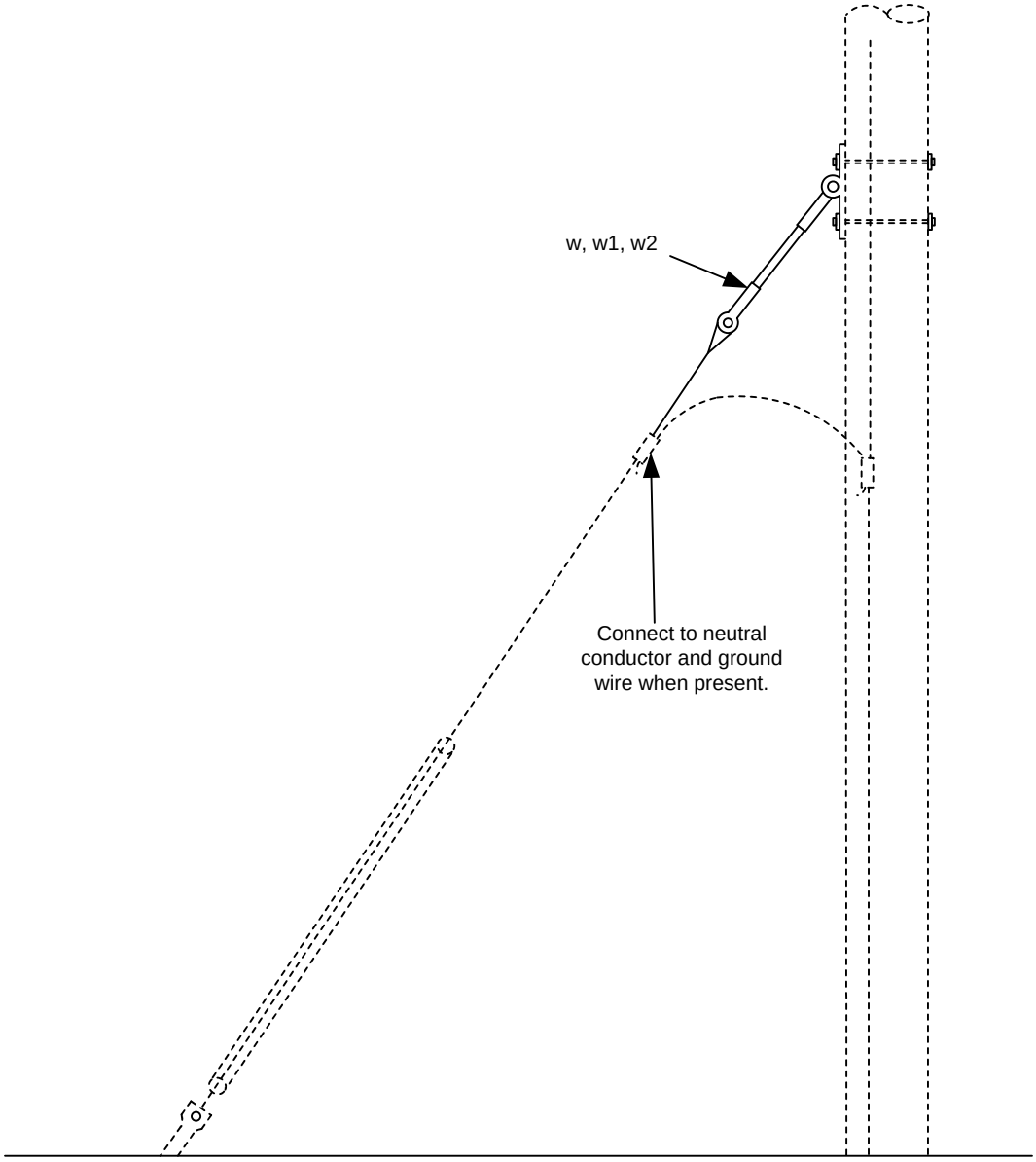
ITEM	MATERIAL
w	Insulator, guy strain

DESIGN PARAMETERS:

DESIGNATED MAXIMUM
WORKING LOAD = 8,500 lbs.

GUY STRAIN INSULATOR GUIDE

DEC 1998		E5.1G
RUS		



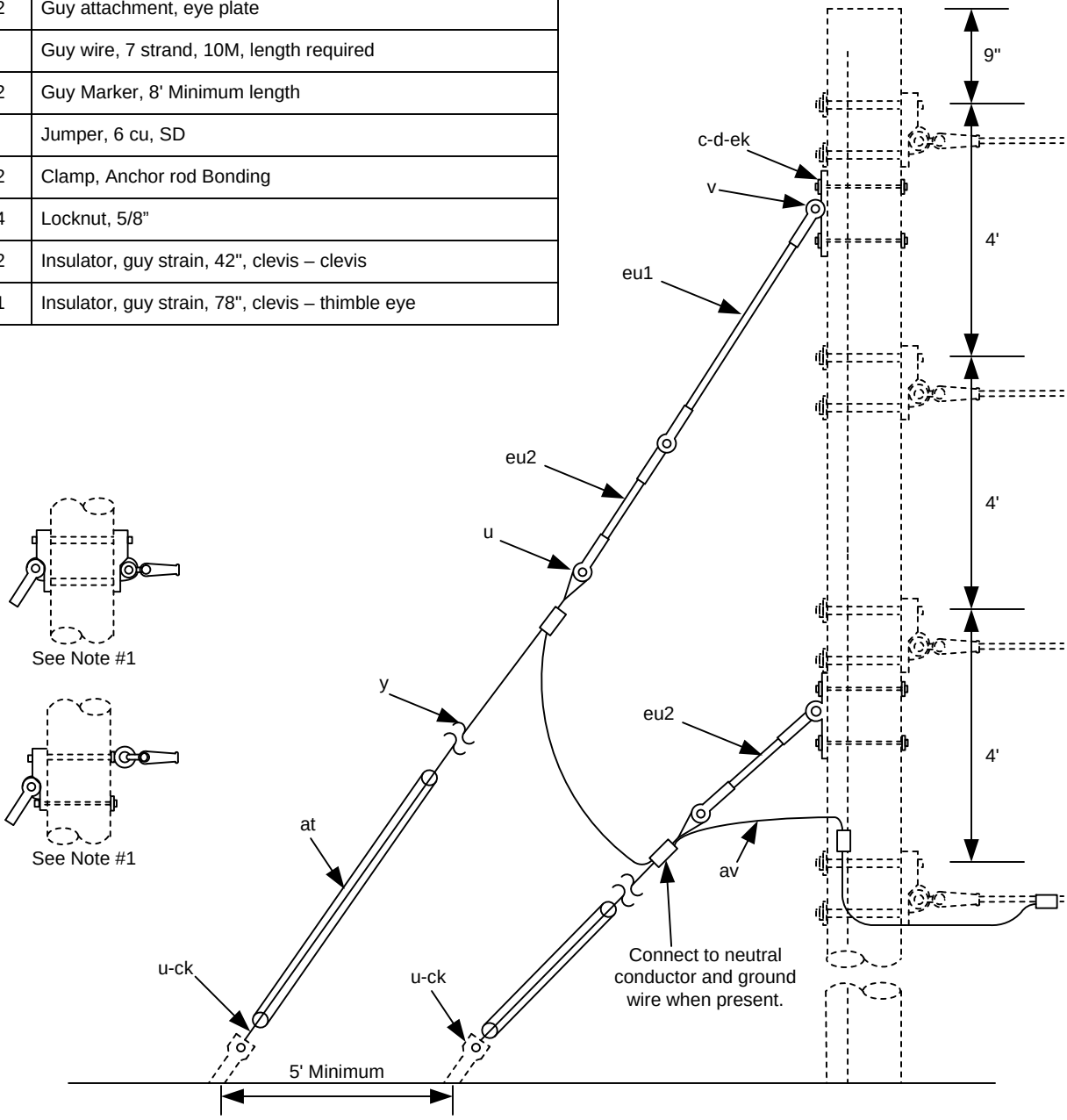
Note:

1. Specify E5.2 for 2 ft. GSI
2. Specify E5.4 for 4 ft. GSI
3. Specify E5.8 for 8 ft. GSI

E5.	2	4	8

ITEM	MATERIAL				Guy Strain Insulators			
w	Insulator, Guy Strain, 22", clevis-thimble eye	1						
w2	Insulator, Guy Strain, 42", clevis-thimble eye		1		2009	WFECA		E5.2 E5.4 E5.8
w1	Insulator, Guy Strain, 78", clevis-thimble eye			1				

ITEM	QTY.	MATERIAL
c	4	Bolt, Machine, 5/8” x required length
d	4	Washer, square, 3" curved, reinforced
p		Connector, compression, as required
u	4	Preform, guy deadend
v	2	Guy attachment, eye plate
y		Guy wire, 7 strand, 10M, length required
at	2	Guy Marker, 8' Minimum length
av		Jumper, 6 cu, SD
ck	2	Clamp, Anchor rod Bonding
ek	4	Locknut, 5/8”
eu2	2	Insulator, guy strain, 42", clevis – clevis
eu1	1	Insulator, guy strain, 78", clevis – thimble eye



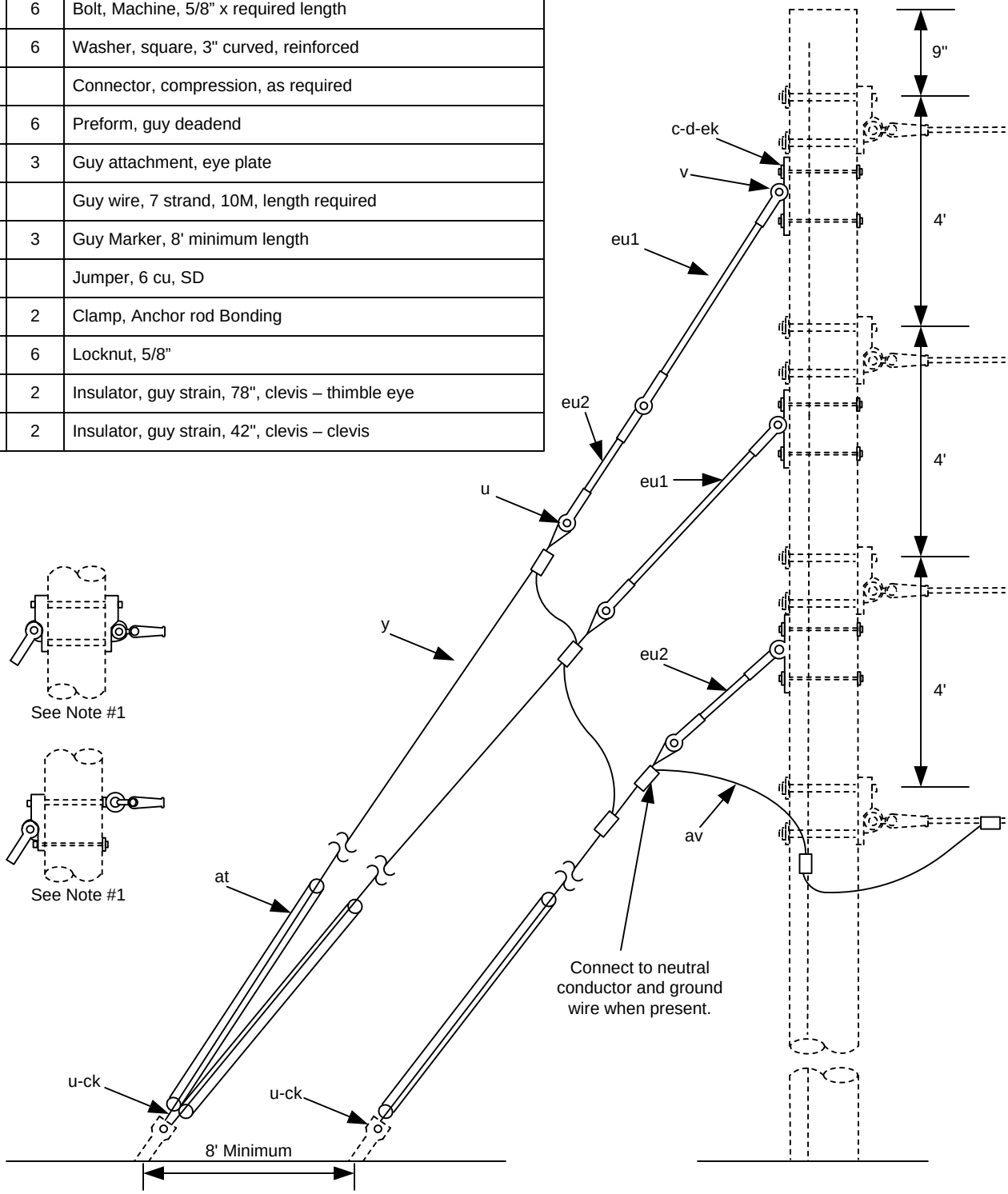
Note:

1. Pole eye plates may be installed on existing bolts where practical.

DOUBLE DOWN GUY INSULATED
(POLE EYE PLATE TYPE)

2005	WFECA	10M Wire	E6.3L (VE6-3L)

ITEM	QTY.	MATERIAL
c	6	Bolt, Machine, 5/8” x required length
d	6	Washer, square, 3" curved, reinforced
p		Connector, compression, as required
u	6	Preform, guy deadend
v	3	Guy attachment, eye plate
y		Guy wire, 7 strand, 10M, length required
at	3	Guy Marker, 8' minimum length
av		Jumper, 6 cu, SD
ck	2	Clamp, Anchor rod Bonding
ek	6	Locknut, 5/8”
eu1	2	Insulator, guy strain, 78", clevis – thimble eye
eu2	2	Insulator, guy strain, 42", clevis – clevis



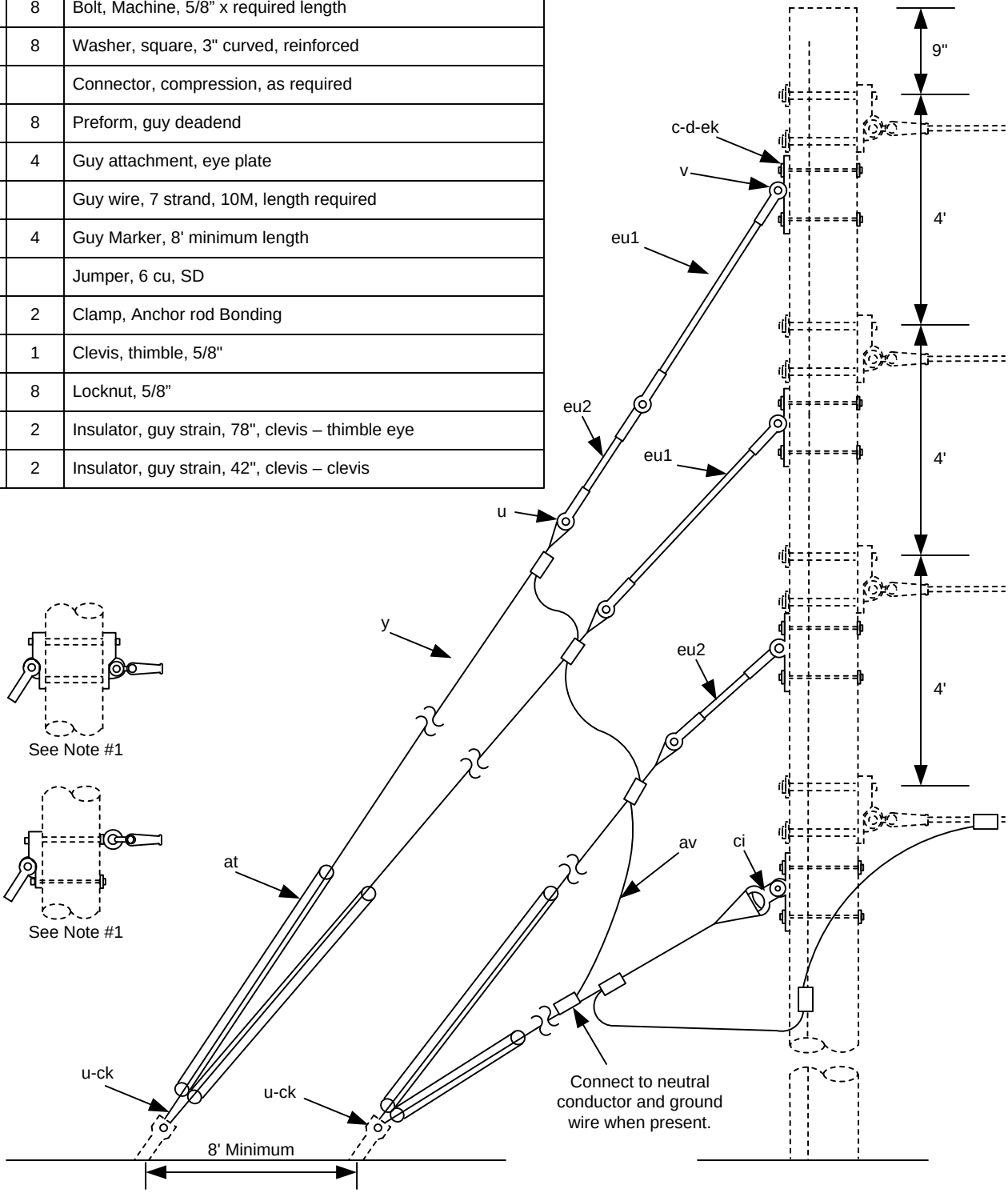
Note:

1. Pole eye plates may be installed on existing bolts where practical.

TRIPLE DOWN GUY INSULATED
(POLE EYE PLATE TYPE)

2005	WFECA	10M Wire	E7.3L (VE7-3L)

ITEM	QTY.	MATERIAL
c	8	Bolt, Machine, 5/8” x required length
d	8	Washer, square, 3" curved, reinforced
p		Connector, compression, as required
u	8	Preform, guy deadend
v	4	Guy attachment, eye plate
y		Guy wire, 7 strand, 10M, length required
at	4	Guy Marker, 8' minimum length
av		Jumper, 6 cu, SD
ck	2	Clamp, Anchor rod Bonding
ci	1	Clevis, thimble, 5/8"
ek	8	Locknut, 5/8”
eu1	2	Insulator, guy strain, 78", clevis – thimble eye
eu2	2	Insulator, guy strain, 42", clevis – clevis



Note:

1. Pole eye plates may be installed on existing bolts where practical.

FOUR DOWN GUY INSULATED
(POLE EYE PLATE TYPE)

2005	WFECA	10M Wire	E8.3L (VE8-3L)

Maximum Allowable Loading

Approx. Loading formula for Southern Yellow Pine Poles

$$F\ MAX = \frac{26\ C^{4}}{AB\ (A + 2B)}\ LBS.$$

F MAX = Max allowable load (lbs.)

C = Pole Circumference at 'P' (inches)

A = Distance from 'P' to fixed point (feet)

B = Distance from 'P' to load (feet)

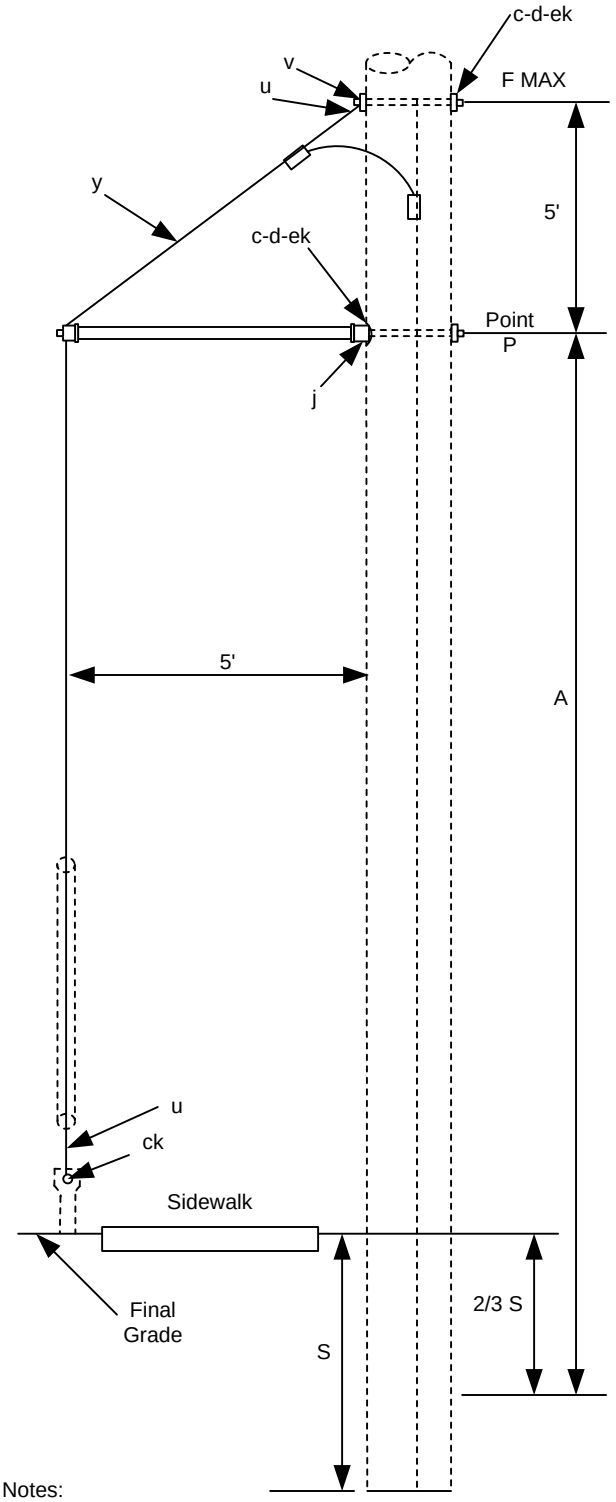
S = Setting Depth (feet)

Typical Max Allowable Loading

Pole Size (Feet)	Pole Class	Average Max Loading (Lbs.)
30	6	900
35	4	1300
40	4	1000

Minimum Pole Circumference at point 'P' (inches)

Distance from Top of Pole	30 ft. CL 6	35 ft. CL 4	40 ft. CL 4
5 ft.	18.9	22.9	22.9



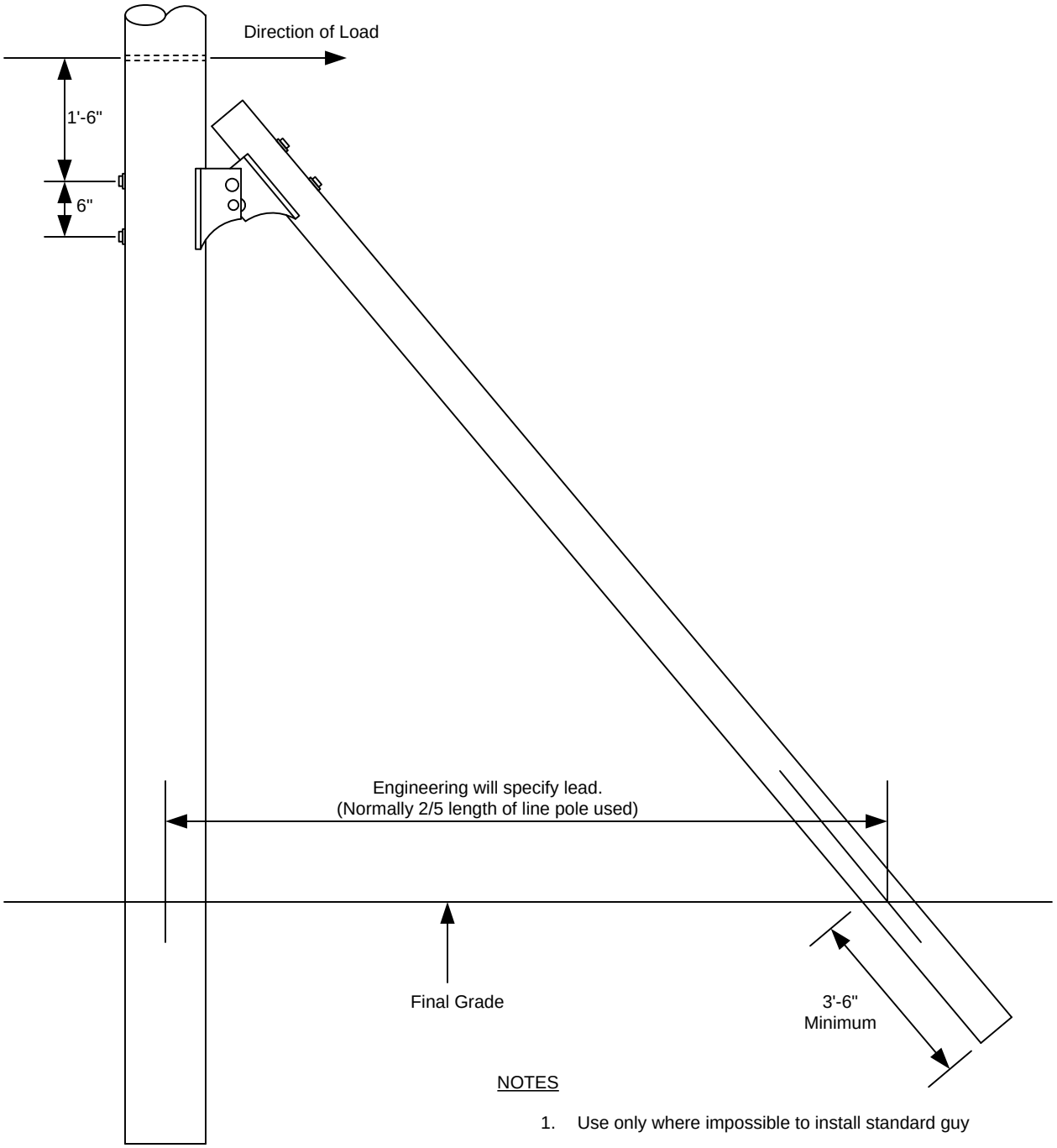
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	2	Washer, square, 3" curved, reinforced
j	4	Lag Screw, ½" x 4"
p		Connector, compression, as required
u	2	Preform, guy deadend
v	1	Guy attachment
y		Guy wire, 7 strand, 10M, length required
aq		Jumper, 6 cu, SD
ck	1	Clamp, Anchor rod Bonding
ek	2	Locknut, 5/8"
	1	Sidewalk Guy Fitting
	1	Sidewalk Guy Base
	1	Pipe, 2" x 5'

Notes:

1. Use only when regular guying is impractical.
2. To determine loading of special cases use formula shown
3. Use only with permission of Engineering Department

Sidewalk Guy

2005	WFECA	10M Wire	E9.1 (VE13-2)



NOTES

1. Use only where impossible to install standard guy
2. Down guy may be required on line pole to counteract up lift.
3. Use only with permission of Engineering Department

ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x required length
d	4	Washer, square, 3"
ek	4	Locknuts, 5/8"
	1	Pole
	1	Connector, angle spar

Push Brace

2005	WFECA		E9.2 (E14)

INDEX F

ANCHOR ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
F2.6, F2.8, F2.10, F2.12	SCREW ANCHORS, (POWER-INSTALLED)
F2.14, F2.14X	MULTIPLE HELIX ANCHOR & EXTENSIONS
F4.1, F4.2	SERVICE ANCHORS

CONSTRUCTION SPECIFICATIONS FOR ANCHORING

All anchors and rods shall be in line with the strain and shall be installed so that approximately 6 inches of the rod remains 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.

After a cone anchor has been set in place, the hole shall be backfilled with coarse crushed rock for 2 feet above the anchor and tamped during the filling. The remainder of the hole shall be backfilled and tamped with dirt.

The maximum load with overload factors transferred to the anchor should not exceed the designated maximum holding power given in the design parameters on the anchor assembly drawing. The rating is coordinated with the maximum holding power of average, class 5, soil conditions.

When the anchor is used in poorer soils, the holding power of the anchor should be derated. A suggested guide is to derate by 25 percent in class 6 soil and by 50 percent in class 7 soil. For class 8 soil it is usually necessary to use swamp anchors or power driven screw anchors which can penetrate the poor soil into firmer soil.

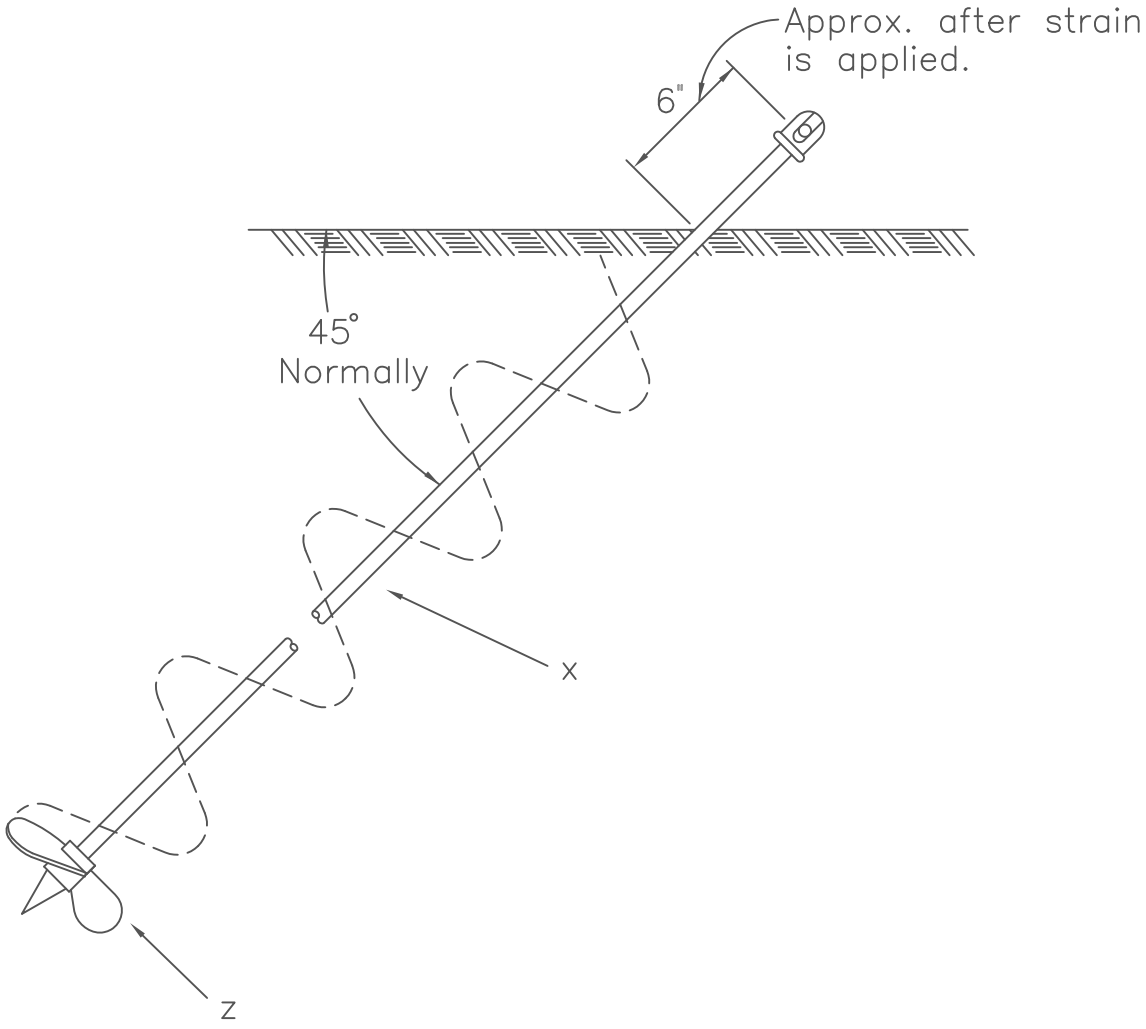
(See Table F)

Log type anchors are acceptable for use on distribution systems. Refer to the appropriate drawings in RUS Bulletin 1728F-811 "Electric Transmission Specifications and Drawings, 115 kV through 230 kV", for assembly units and construction details.

TABLE F

Soil Classifications

CLASS	ENGINEERING DESCRIPTION
0	Sound hard rock, unweatherd
1	Very dense and/or cemented sands; coarse gravel and cobbles
2	Dense fine sand; very hard silts and clays (may be preloaded)
3	Dense clayed sand sand gravel; very stiff to hard silts and clays
4	Medium dense sandy gravel; very stiff to hard silts and clays
5	Medium dense coarse sand and sandy gravels; stiff to very stiff silts and clays
6	Loose to medium dense fine to coarse sand; firm to stiff clays and silts
7	Loose fine sand; alluvium; loess; soft-firm clays; varved clays; fill
8	Peat; organic silts; inundated silts; fly ash



NOTE: Designated maximum holding power rating assumes proper installation in class 5 soil. See Appendix F for additional information.

	ASSEMBLY:	F2.6	F2.8	F2.10	F2.12
	Minimum Area (sq. in.)	90	100	120	135
ITEM	MATERIAL	QTY	QTY	QTY	QTY
x	Rod, anchor, thimble eye, 5/8" x 7'0"	1	1		
x	Rod, anchor, twin eye, 3/4 X 8'0			1	1
z	Anchor, screw type, power installed	1	1	1	1

DESIGN PARAMETERS:
DESIGNATED MAXIMUM
HOLDING POWER (lbs.)

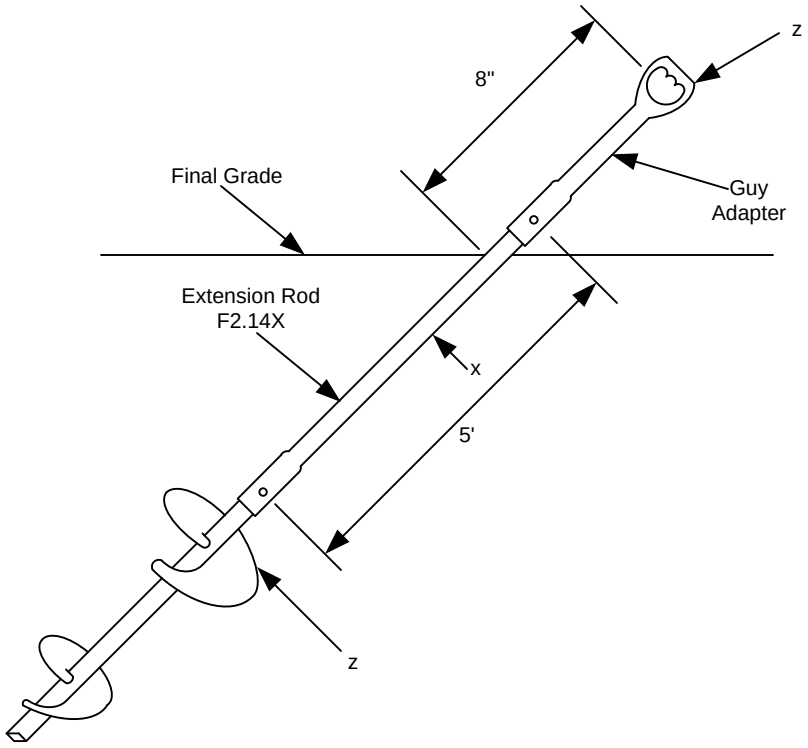
F2.6:	6,000
F2.8:	8,000
F2.10:	10,000
F2.12:	12,000

SCREW ANCHORS, (POWER INSTALLED)

DEC 1998

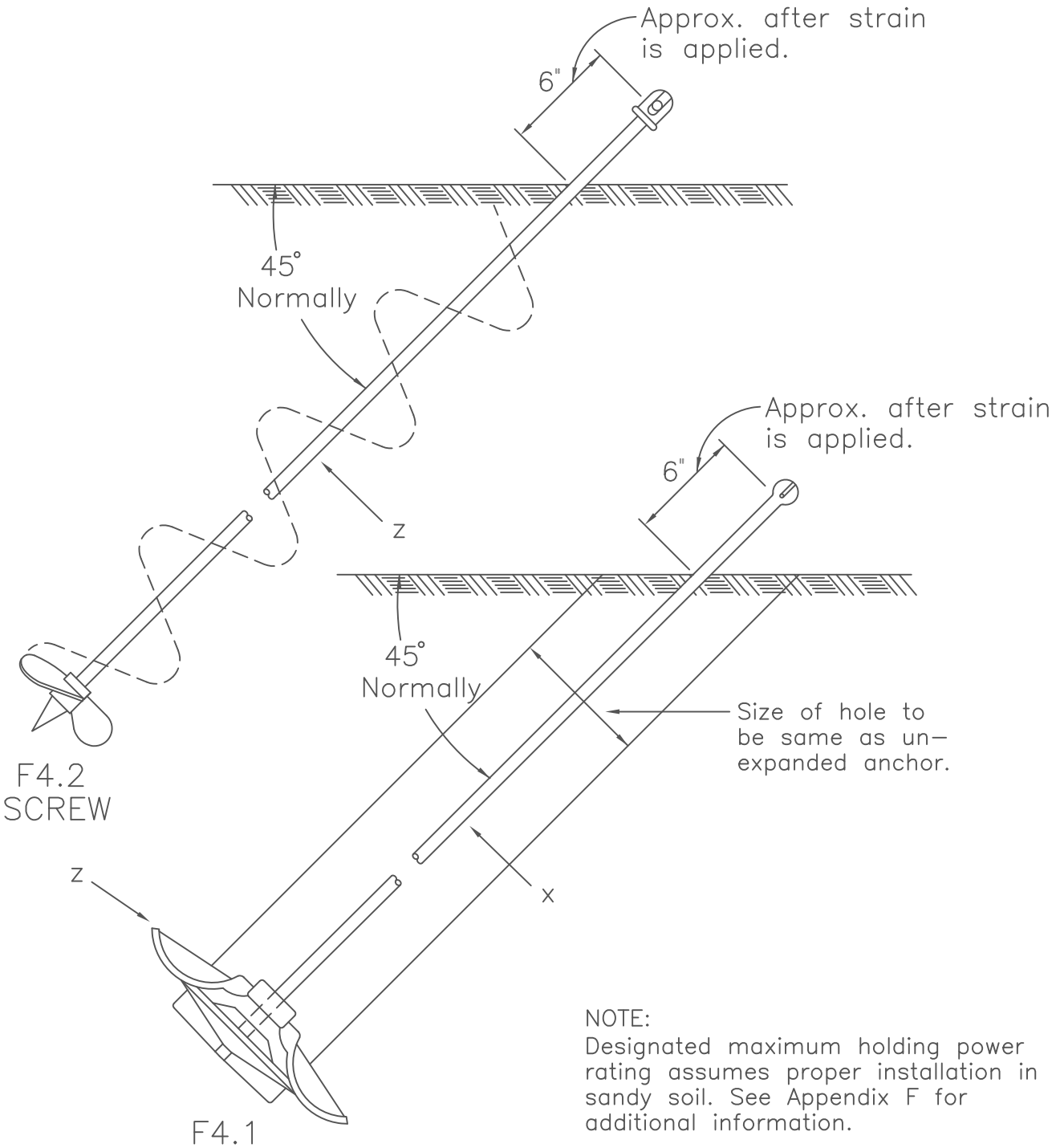
RUS

F2.6, F2.8, F2.10, F2.12
(F1–1S, F1–2S, F1–3S, F1–4S)



Anchor
F2.14

	F2.	14	14x	MULTIPLE HELIX ANCHORS & EXTENSIONS			
ITEM	MATERIAL	QTY.	QTY.				
z	Screw Anchor, Square Shaft, 8" x 10" Helix	1		2005	WFECA		F2.14, F2.14x
x	Extension Rod, Square Shaft, 5'		1				



NOTE:
Designated maximum holding power rating assumes proper installation in sandy soil. See Appendix F for additional information.

ASSEMBLY:		F4.1	F4.2
ITEM	MATERIAL	QTY	QTY
x	Rod, anchor, thimble eye type	1	
z	Anchor, service, expanding type	1	
z	Anchor, service, screw type		1

DESIGN PARAMETERS:

DESIGNATED MAXIMUM HOLDING POWER (lbs.)

F4.1: 2,500
F4.2: 2,500

SERVICE ANCHORS

DEC 1998		F4.1, F4.2
RUS		(F4–1E, F4–1S)

INDEX G

TRANSFORMER ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE DESCRIPTION)
VG1.0G	GUIDELINE FOR SINGLE PHASE CONVENTIONAL TRANSFORMER VERTICAL CONSTRUCTION (CUTOUT ON BRACKET)
G1.1G	TRANSFORMER INSTALLATION GUIDE SINGLE-PHASE, POLE-TYPE TRANSFORMER
G1.2G	RECOMMENDED MINIMUM POLE CLASS FOR A BANK OF THREE-PHASE TRANSFORMERS INSTALLED ON A SINGLE POLE
VG1.4	SINGLE-PHASE, CONVENTIONAL TRANSFORMER (CUTOUT ON CROSSARM)
VG1.5, VG1.6	SINGLE-PHASE, CONVENTIONAL TRANSFORMER (CUTOUT ON BRACKET)
VG2.1	TWO-PHASE TRANSFORMER BANK OPEN-WYE PRIMARY CENTER TAP GROUNDED OPEN-DELTA, 4 WIRE SECONDARY
VG3.0G	GUIDELINE FOR THREE-PHASE BANK VERTICAL CONSTRUCTION
VG3.01G	GUIDELINE FOR THREE-PHASE JUMPERS ON VERTICAL CONSTRUCTION
VG3.1	THREE-PHASE TRANSFORMER BANK UNGROUNDED-WYE PRIMARY CENTER-TAP GROUNDED DELTA, 4 WIRE SECONDARY
VG3.2	THREE-PHASE TRANSFORMER BANK UNDERGROUND WYE – PRIMARY CORNER GROUNDED DELTA, 3 WIRE SECONDARY

TRANSFORMER ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE DESCRIPTION)
VG3.3	THREE-PHASE TRANSFORMER BANK GROUNDED-WYE PRIMARY GROUNDED WYE, 4 WIRE SECONDARY
VG3.4	THREE-PHASE PLAFORM MOUNTED TRANSFORMER BANK UNGROUNDED-WYE PRIMARY CENTER-TAP GROUNDED DELTA, 4 WIRE SECONDARY
VG3.5	THREE-PHASE PLATFORM MOUNTED TRANSFORMER BANK GROUNDED-WYE PRIMARY GROUNDED WYE, 4 WIRE SECONDARY.

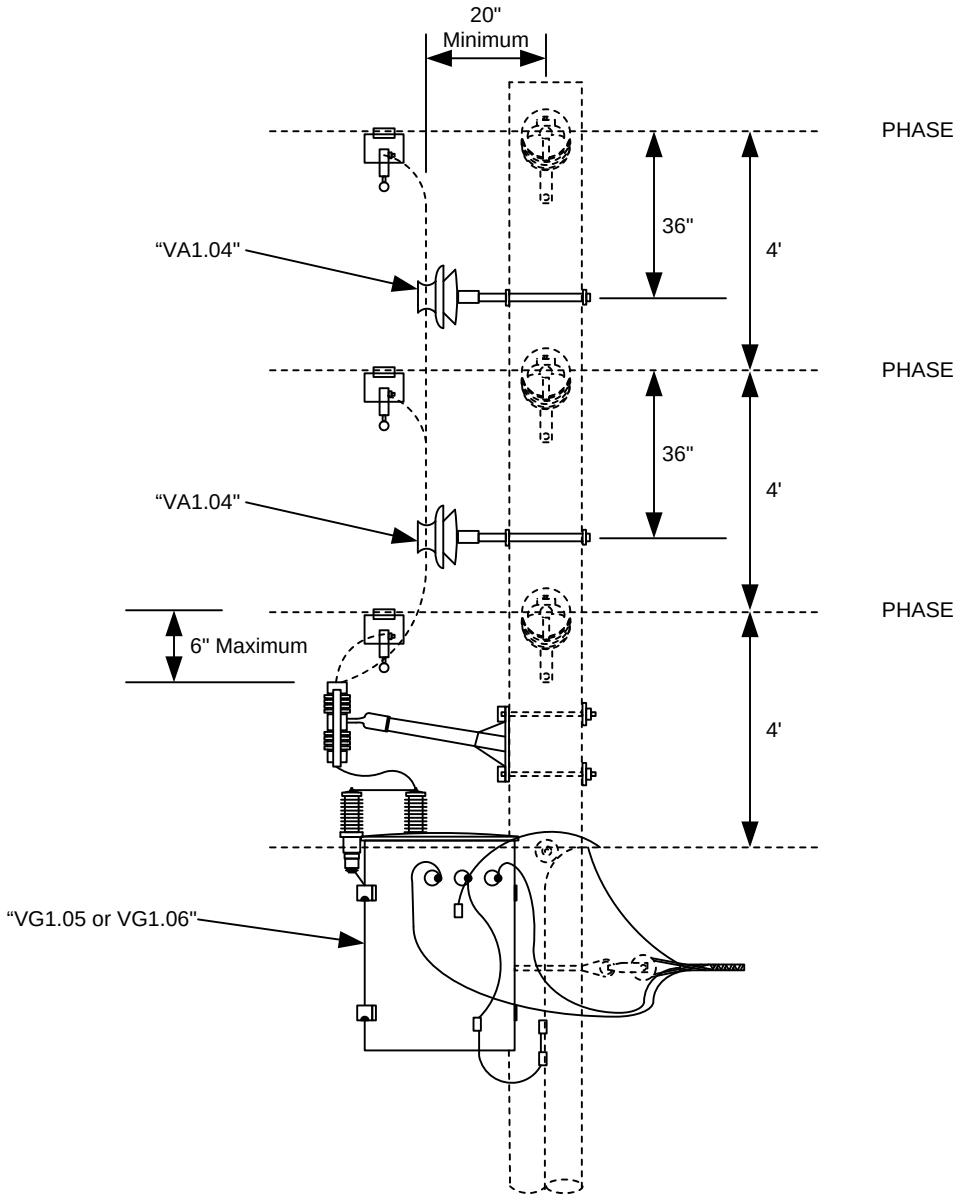
CONSTRUCTION SPECIFICATIONS FOR TAPS, JUMPERS, AND ARRESTERS

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 (2) bends in a vertical plane, or one (1) 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 may be 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 jumpers using a compression connector suitable for the bimetallic connection.

Where applicable, the external gap electrodes of surge arresters, combination arrester cutout units, and transformers mounted arresters shall be adjusted to the manufacturer's recommended spacing. Care shall be taken so that the adjusted gap is not disturbed when the equipment is installed.

It may be necessary, and is permissible, to lower the neutral attachment on standard construction pole top assemblies an additional distance not exceeding 2 feet to provide adequate clearance between cutout and single-phase, conventional distribution transformers.



Notes:

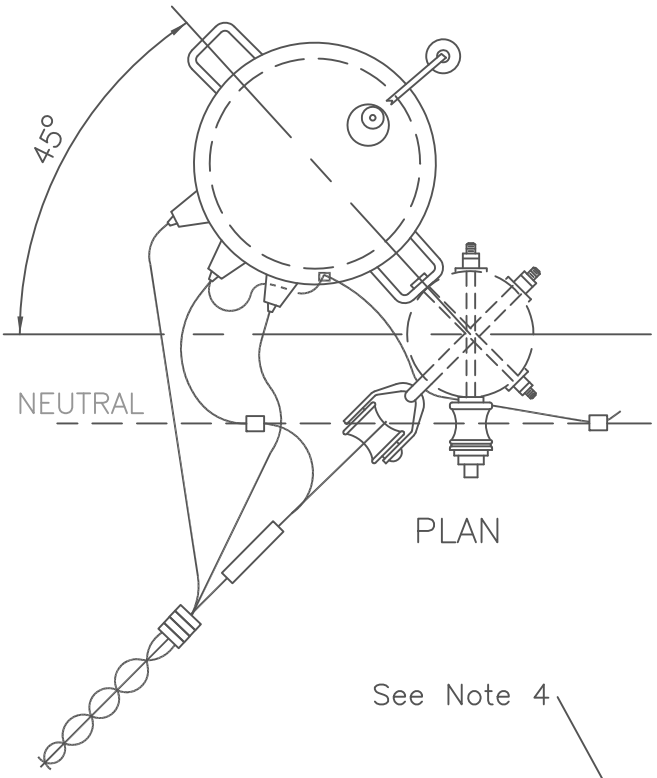
1. Add Assembly Unit VA1.04 as required.
2. Use with Assembly Units VG1.5 and VG1.6

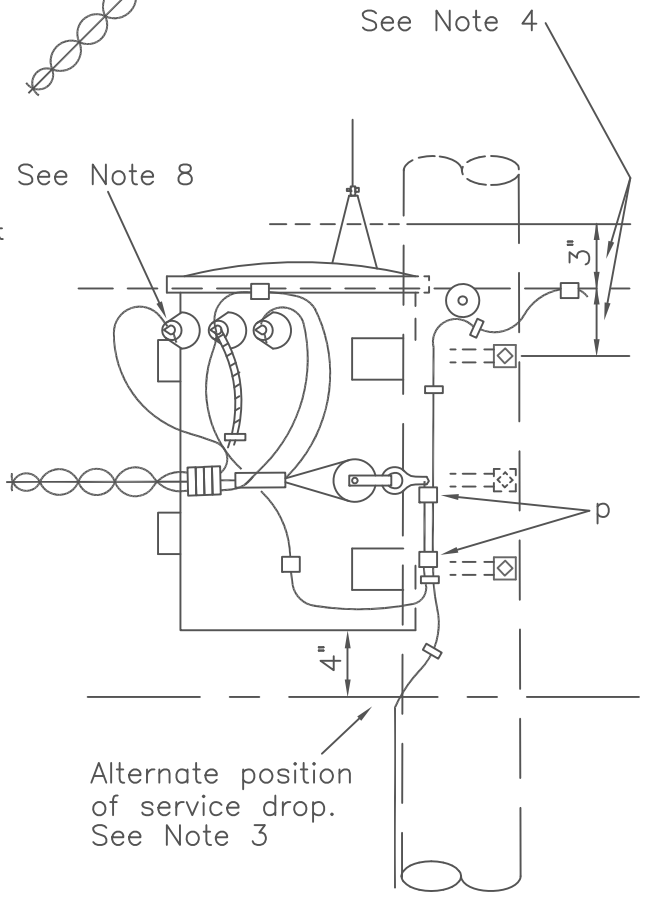
GUIDELINE FOR SINGLE PHASE CONVENTIONAL TRANSFORMER VERTICAL CONSTRUCTION (CUTOUT ON BRACKET)			
2005	WFECA	24.9/14.4 kV	VG1.0G

GUIDE FOR TRANSFORMER QUADRANT INSTALLATION		
When the SERVICE DROP in Quadrant:	Then install the TRANSFORMER in the Quadrant below: (Deadend Pole)	(Tangent Pole)
"A"	"C"	"C"*
"B"	"C"	"D"*
"C"	"A"	"A"
"D"	"A"	"B"

* May require lowering transformer 3" to avoid conflict between transformer and neutral.

PRI. NEUTRAL –> "A" | "B" / "C" | "D" "QUADRANTS"



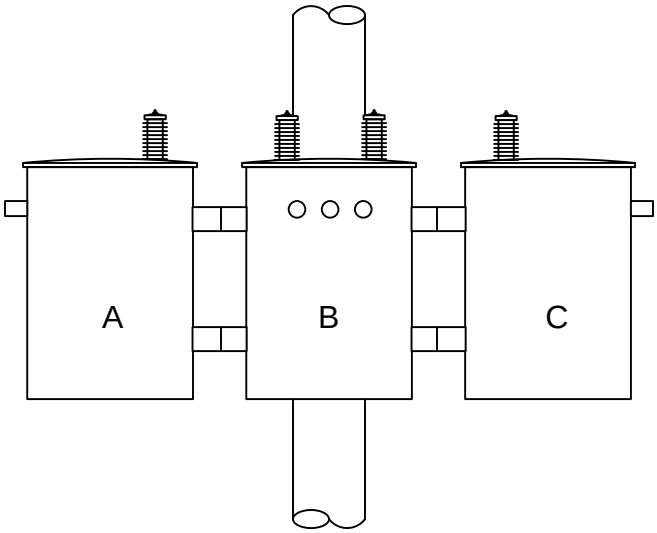


NOTES:

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

TRANSFORMER INSTALLATION GUIDE
SINGLE–PHASE, POLE–TYPE TRANSFORMER

DEC 1998		G1.1G
RUS		(M27–1)

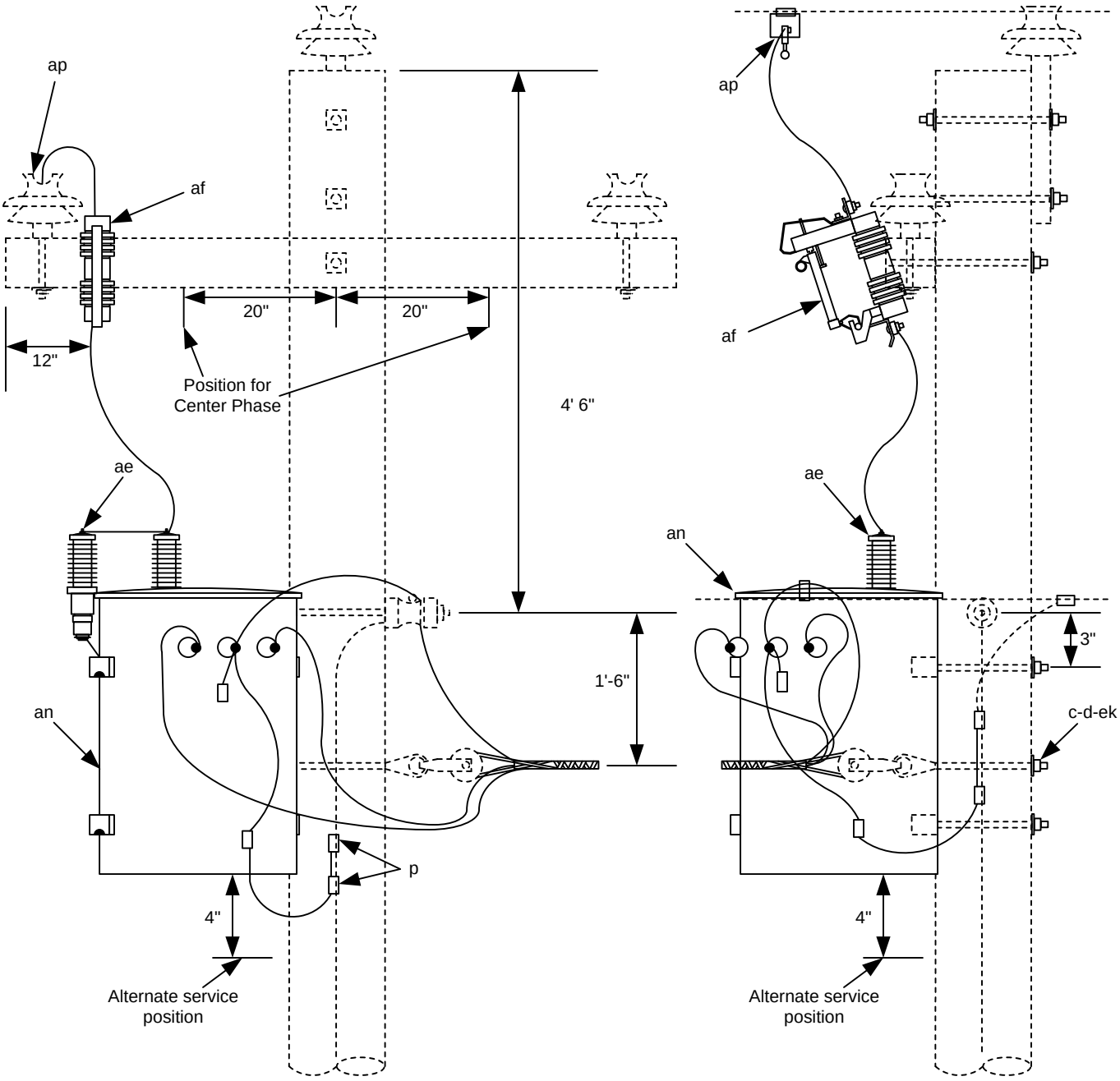


Transformer A&C (kVA)	Transformer B (kVA)										
	5	7.5	10	15	25	37.5	50	75	100	167	250
(2) 5	5	5	5	*	*	*	*	*	*	*	*
(2) 7.5		5	5	5	*	*	*	*	*	*	*
(2) 10			5	5	*	*	*	*	*	*	*
(2) 15				4	4	*	*	*	*	*	*
(2) 25					4	4	3	*	*	*	*
(2) 37.5						3	3	3	*	*	*
(2) 50							3	3	2	*	*
(2) 75								2	2	*	*
(2) 100									2	2	*
(2) 167										2	1
(2) 250											1

Note:

The kVA rating of transformer B cannot exceed twice the rating or either transformer A or C

Recommended Minimum Pole Class for a Bank of Three Transformers Installed on a Single Pole		
2005	WFECA	G1.2G



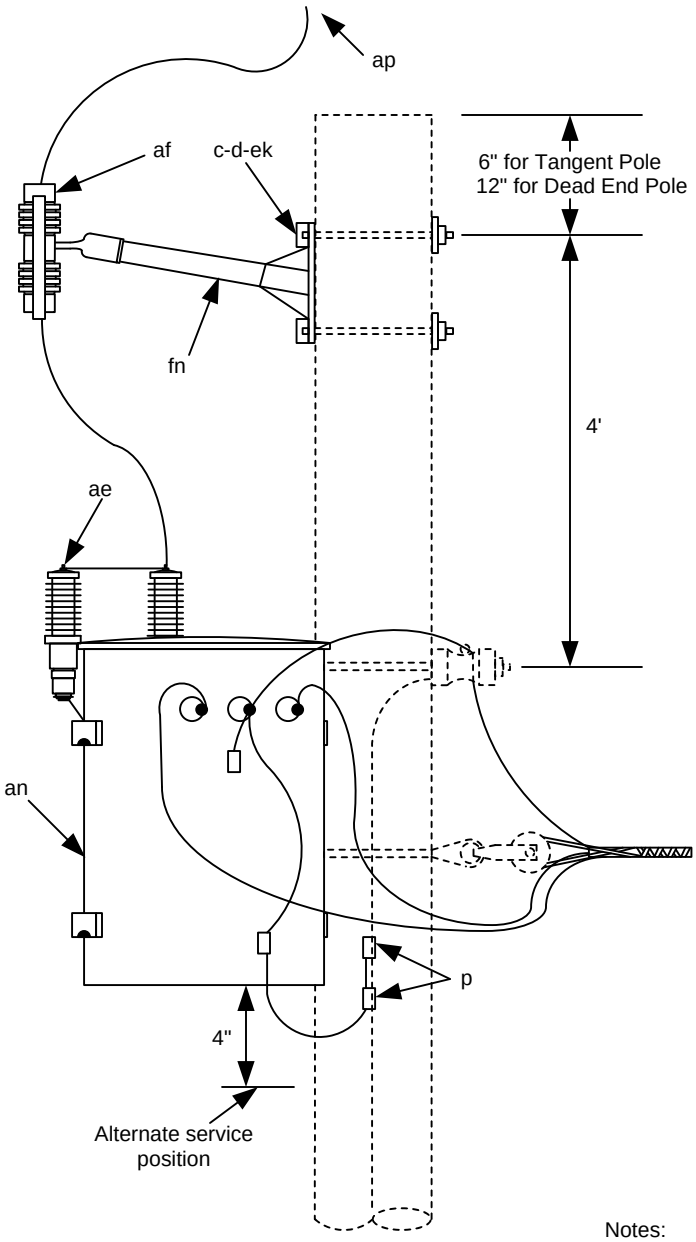
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, 2 ¼"
p		Connectors, as required
ae	1	Lightning arrester, 18 KV
af	1	Cutout, 27 KV
an	1	Transformer, 14.4/7.2 KV
ap	1	Clamp, Hot Line
ek	2	Locknuts, as required
	1	Bail (Compression Stirrup)

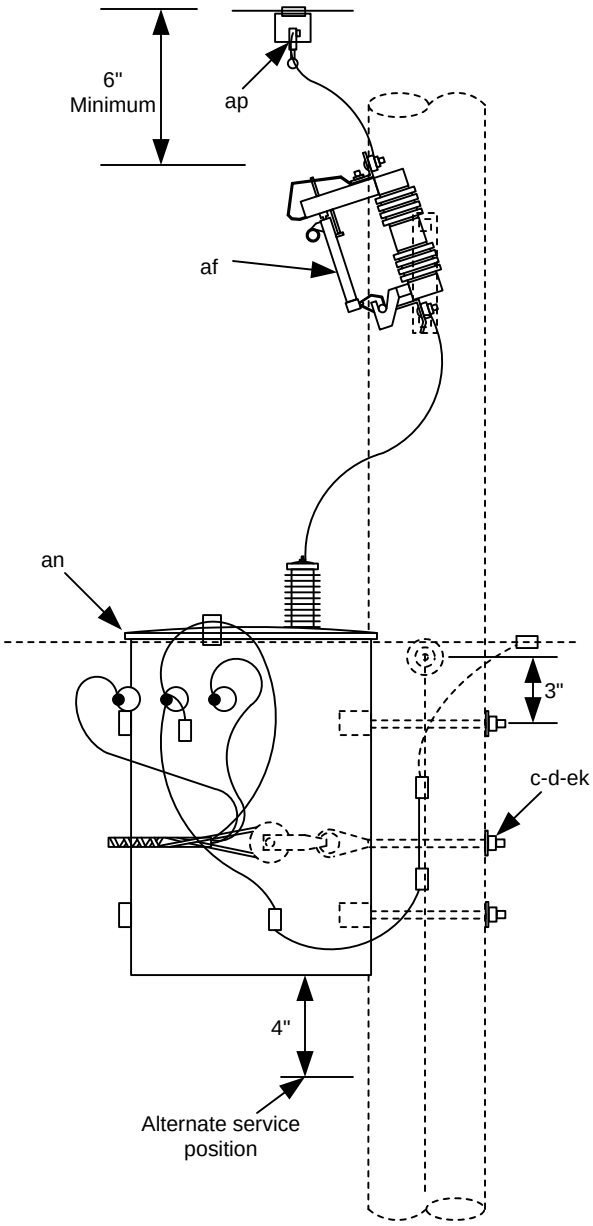
Notes:

1. Rotate Cutout so the Blade faces climbing face of pole
2. See Guide drawing G1.1G
3. Maintain minimum 12 inches Clearance from phase hardware to Ground.
4. Increase neutral spacing to maintain a minimum approach distance of 26 inches.

SINGLE PHASE CONVENTIONAL TRANSFORMER (CUTOUT ON CROSSARM)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VG1.4





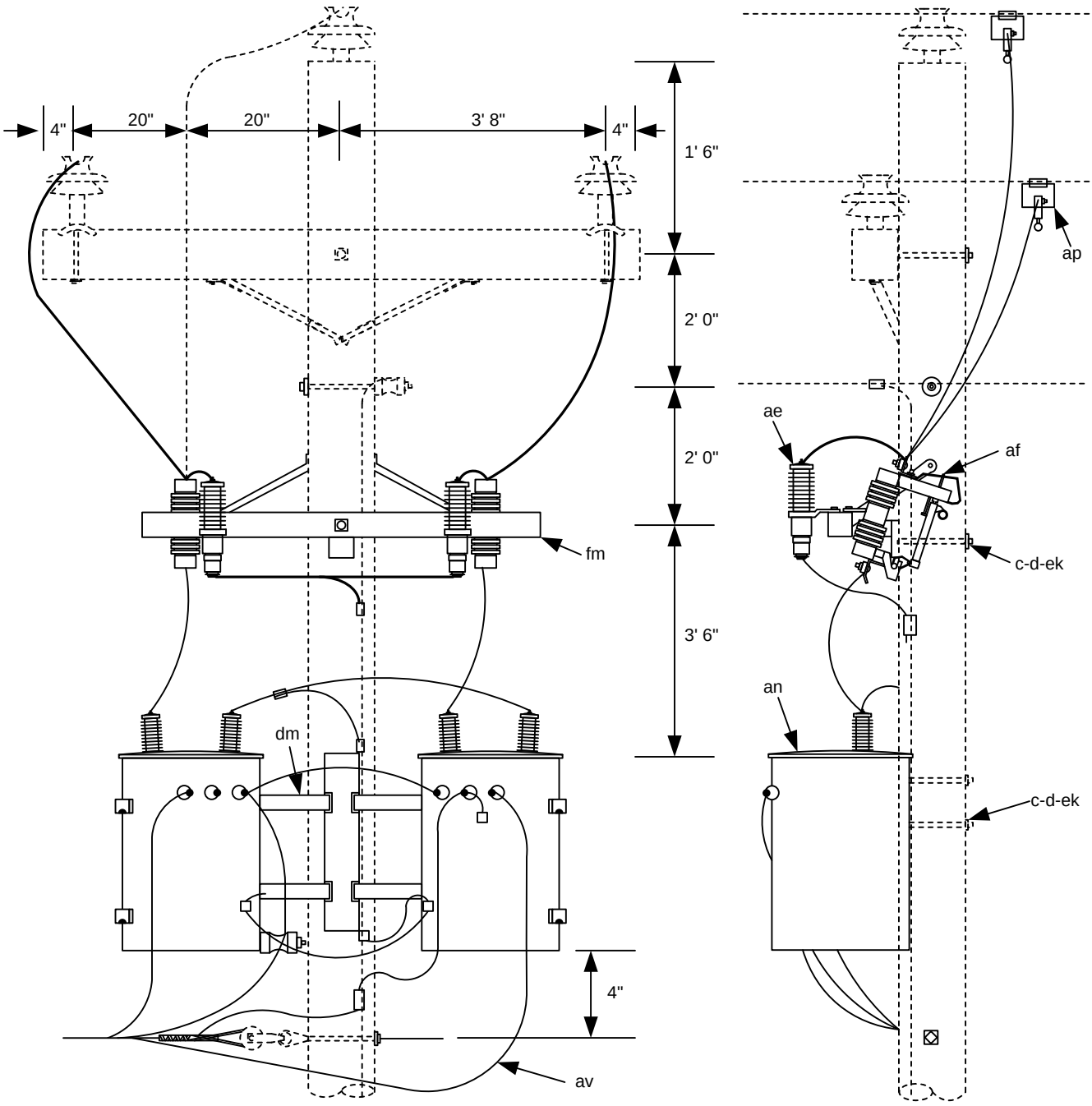
Notes:

1. Rotate Cutout so the Blade faces climbing face of pole
2. See Guide drawing G1.1G
3. Designate VG1.5 for Tangent Pole.
4. Designate VG1.6 for Dead End Pole.
5. When using a metal Cutout/Arrester Bracket, install Guy Strain Insulator in guy.
6. Maintain minimum 12 inches Clearance from phase hardware to Ground.
7. Increase neutral spacing to maintain a minimum approach distance of 26 inches.

ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x required length
d	4	Washer, square, 2 ½"
ae	1	Lightning arrester, 18 KV
an	1	Transformer, 14.4/7.2 KV
fn	1	Bracket, extension, Cutout/Arrester
ek	4	Locknuts, as required
af	1	Cutout, 27 KV
p		Connectors, as required
ap	1	Clamp, Hot Line
	1	Bail (Compression Stirrup)

SINGLE PHASE CONVENTIONAL TRANSFORMER (CUTOUT ON BRACKET)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VG1.5, VG1.6



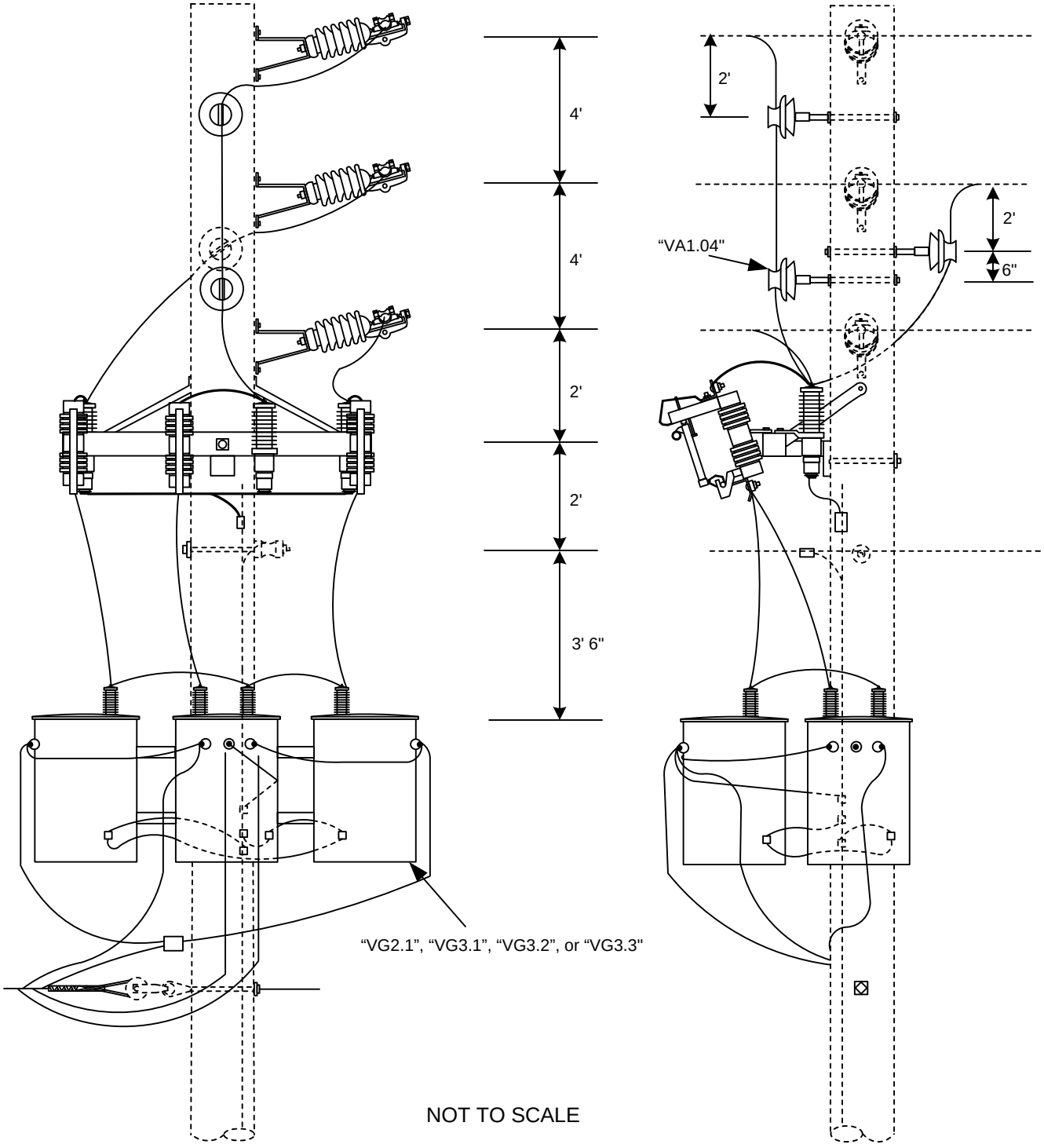
ITEM	QTY.	MATERIAL
c	3	Bolt, machine, 5/8" x required length
d	3	Washer, square, 2 ¼"
j	3	Screw, lag ½" x 4"
p		Connectors, as required
ae	2	Arrester, surge (18 kV)
af	2	Cutout, 27 kV
an	2	Transformer, 14.4 kV, conv.
ap	2	Clamp, Hot Line
bu	2	Connector, equipment ground
dm	1	Bracket, transformer
ek	3	Locknuts, 5/8"
fm	1	Bracket, extension, for mounting apparatus (3 ph)
	2	Bail (Compression Stirrup)

NOTE:

1. All transformer tanks must be grounded.
2. All transformer H2 Bushings mugs be grounded.
3. See Guidelines MG-8SOD or MG-15SOD for wiring and metering details.

TWO-PHASE TRANSFORMER BANK
OPEN—WYE PRIMARY
CENTER TAP GROUNDED DELTA
4 WIRE SECONDARY

2014	WFECA	2 – Phase Primary 24.9/14.4 kV	VG2.1 (VG210)

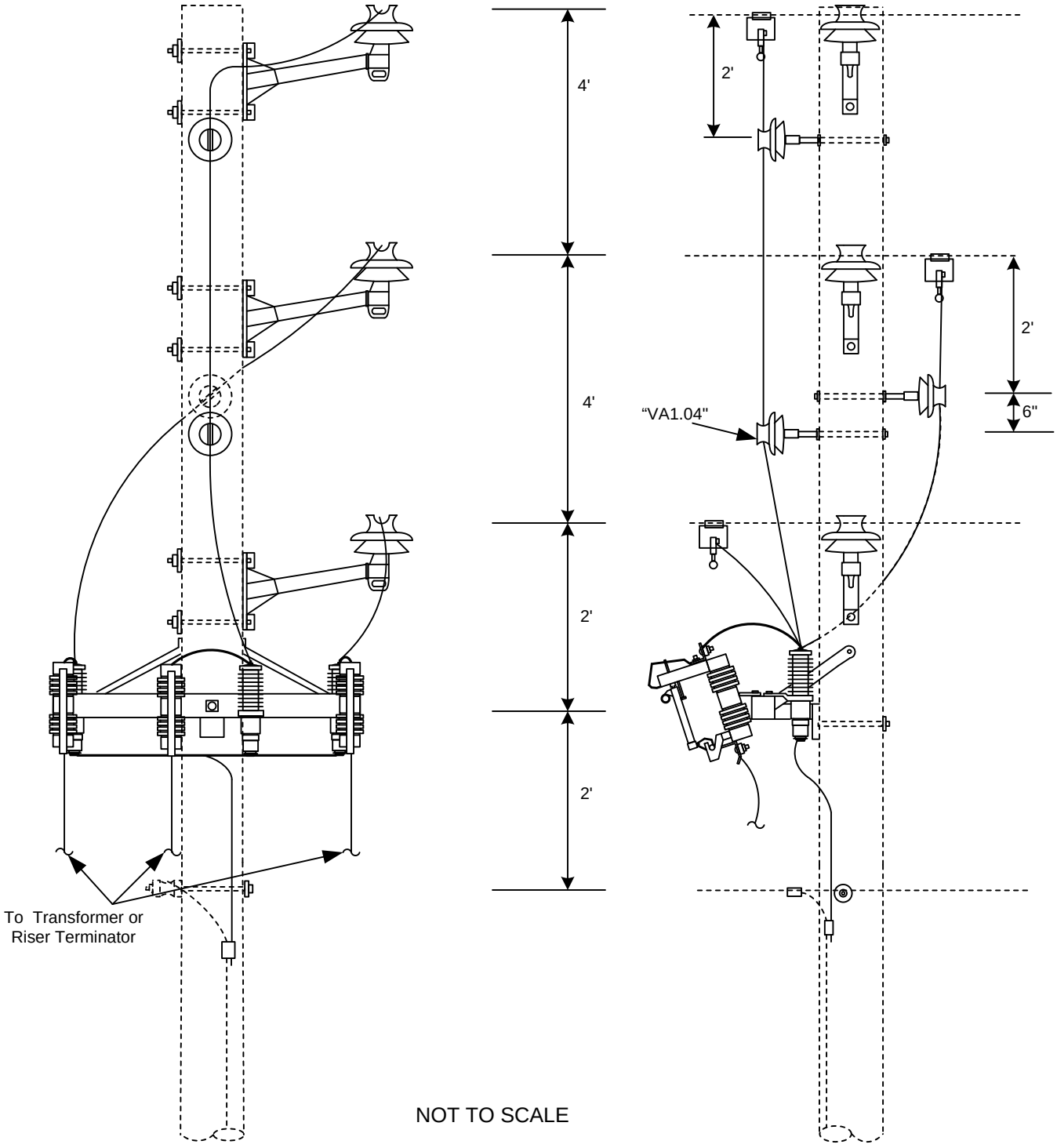


NOT TO SCALE

Notes:

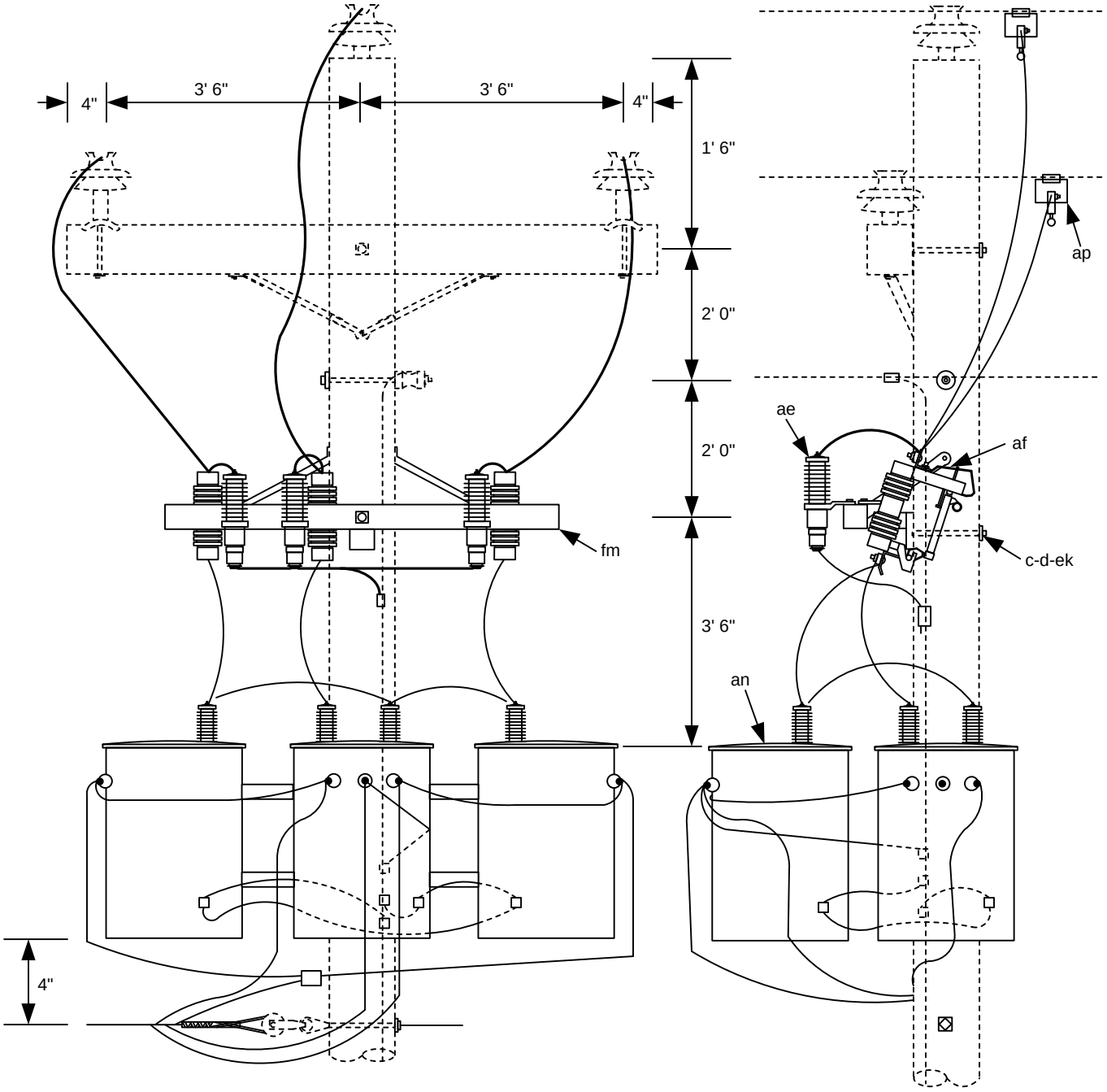
1. Add Assembly Units VA1.04 as required.
2. Use with Assembly Units VG2.1, VG3.1, VG3.2, or VG3.3.
3. For VG2.1, omit one transformer and associated equipment as required.

GUIDELINE FOR THREE PHASE TRANSFORMER BANK VERTICAL CONSTRUCTION			
2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.0G



NOT TO SCALE

GUIDELINE FOR THREE PHASE JUMPERS ON VERTICAL CONSTRUCTION			
2006	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.01G



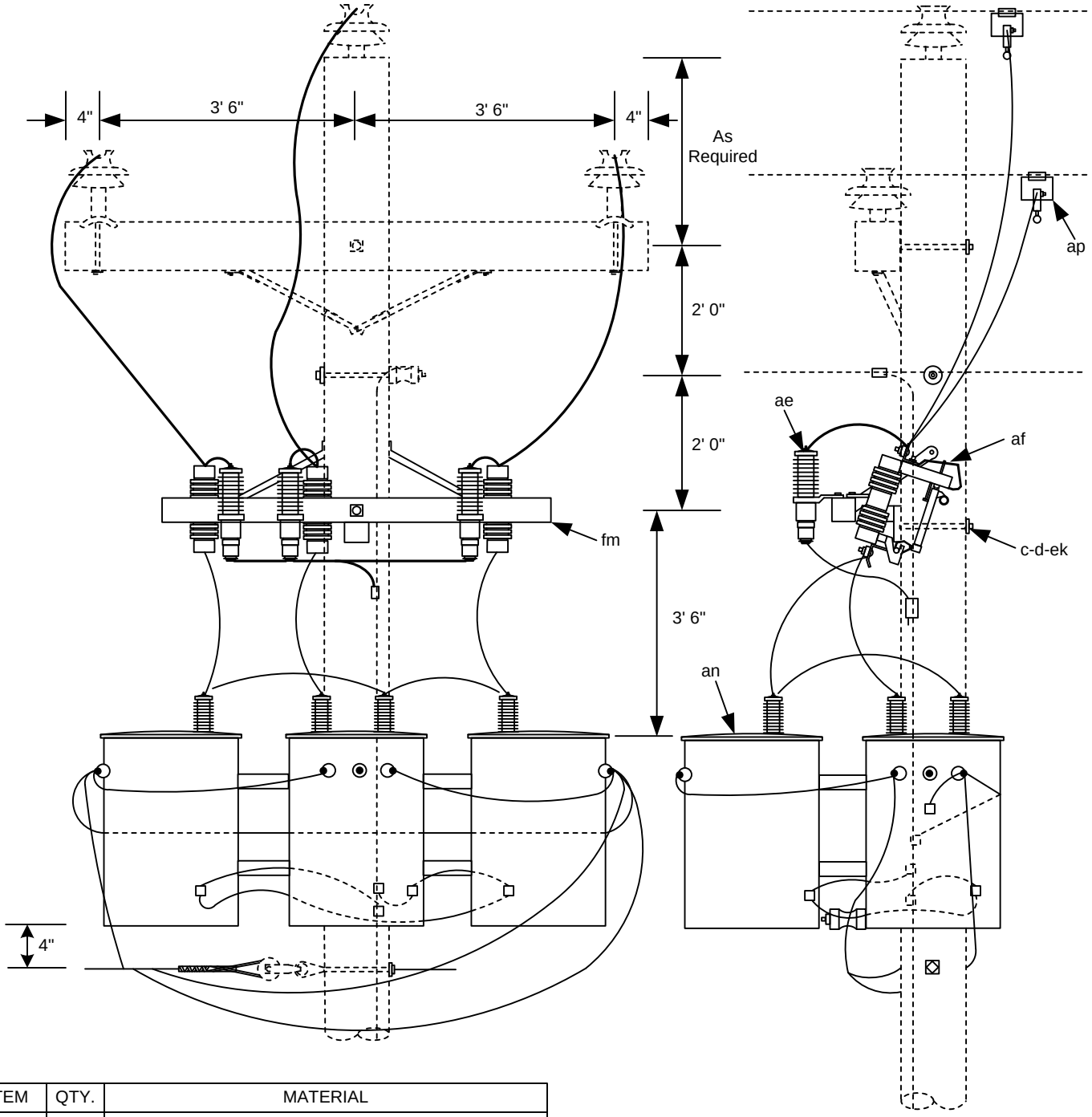
ITEM	QTY.	MATERIAL
c	3	Bolt, machine, 5/8" x required length
d	3	Washer, square, 2 ¼"
j	3	Screw, lag ½" x 4"
p		Connectors, as required
ae	3	Arrester, surge (18 kV)
af	3	Cutout, 27 kV
an	3	Transformer, 14.4 kV, conv.
ap	3	Clamp, hot line
bu	3	Connector, equipment Ground
dm	1	Bracket, transformer cluster
ek	3	Locknuts, 5/8"
fm	1	Bracket, extension, for mounting apparatus (3 ph)
	3	Bail (Compression Stirrup)

NOTE:

1. All transformer tanks must be grounded.
2. See Guidelines MG-8S or MG-15S for wiring and metering Details

THREE PHASE TRANSFORMER BANK UNGROUNDED – WYE PRIMARY CENTER-TAP GROUNDED DELTA 4 WIRE SECONDARY

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.1 (VG310)



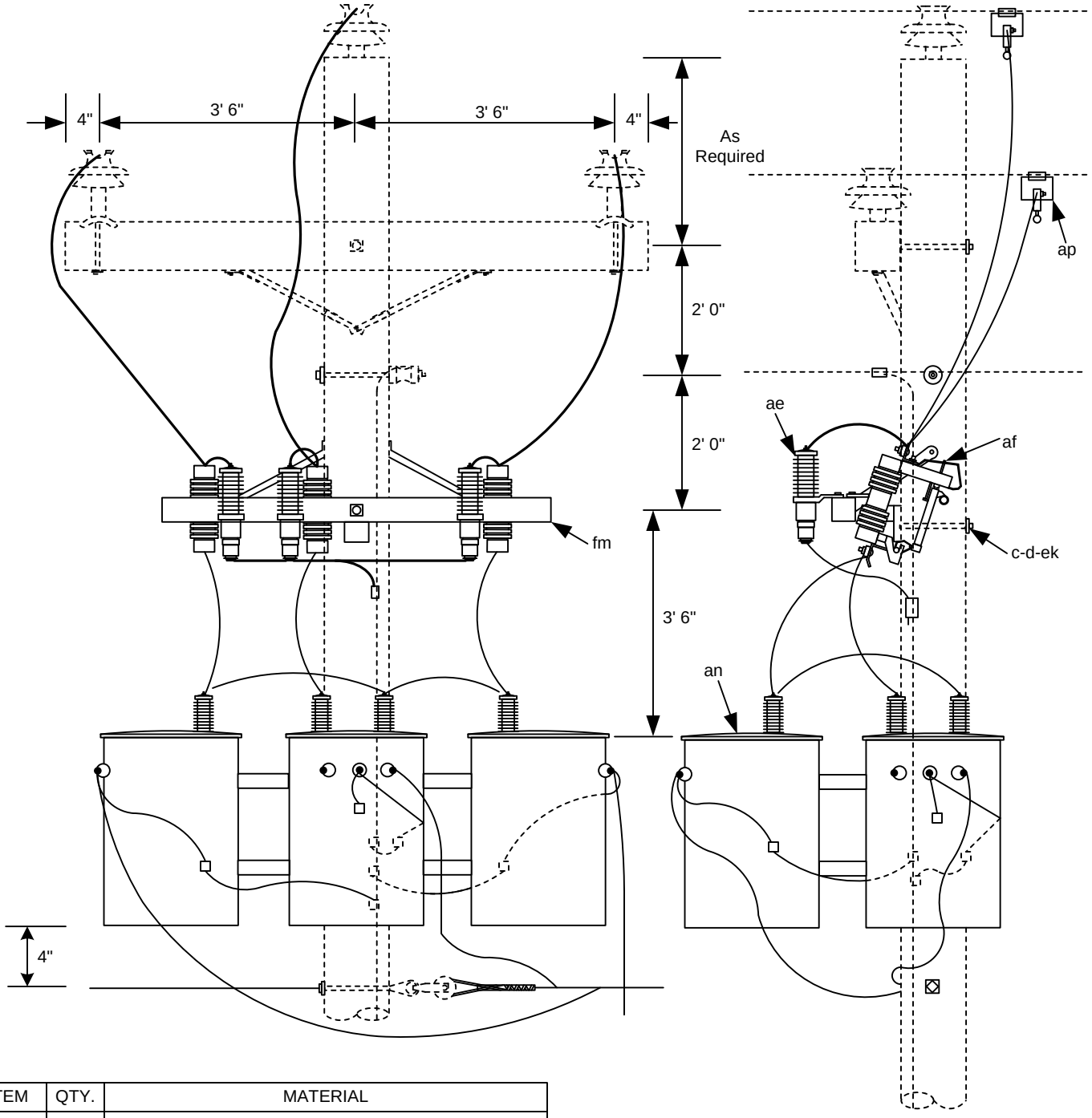
ITEM	QTY.	MATERIAL
c	3	Bolt, machine, 5/8" x required length
d	3	Washer, square, 2 ¼"
j	3	Screw, lag ½" x 4"
p		Connectors, as required
ae	3	Arrester, surge (18 kV)
af	3	Cutout, 27 kV
an	3	Transformer, 14.4 kV, conv.
ap	3	Clamp, hot line
bu	3	Connector, equipment Ground
dm	1	Bracket, transformer cluster
ek	3	Locknuts, 5/8"
fm	1	Bracket, extension, for mounting apparatus (3 ph)
	3	Bail (Compression Stirrup)

NOTE:

1. All transformer tanks must be grounded.
2. See Guideline MG-5S for wiring and meter details.

THREE PHASE TRANSFORMER BANK UNGROUNDED – WYE PRIMARY CORNER GROUNDED DELTA, 3 WIRE SECONDARY

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.2 (VG311)



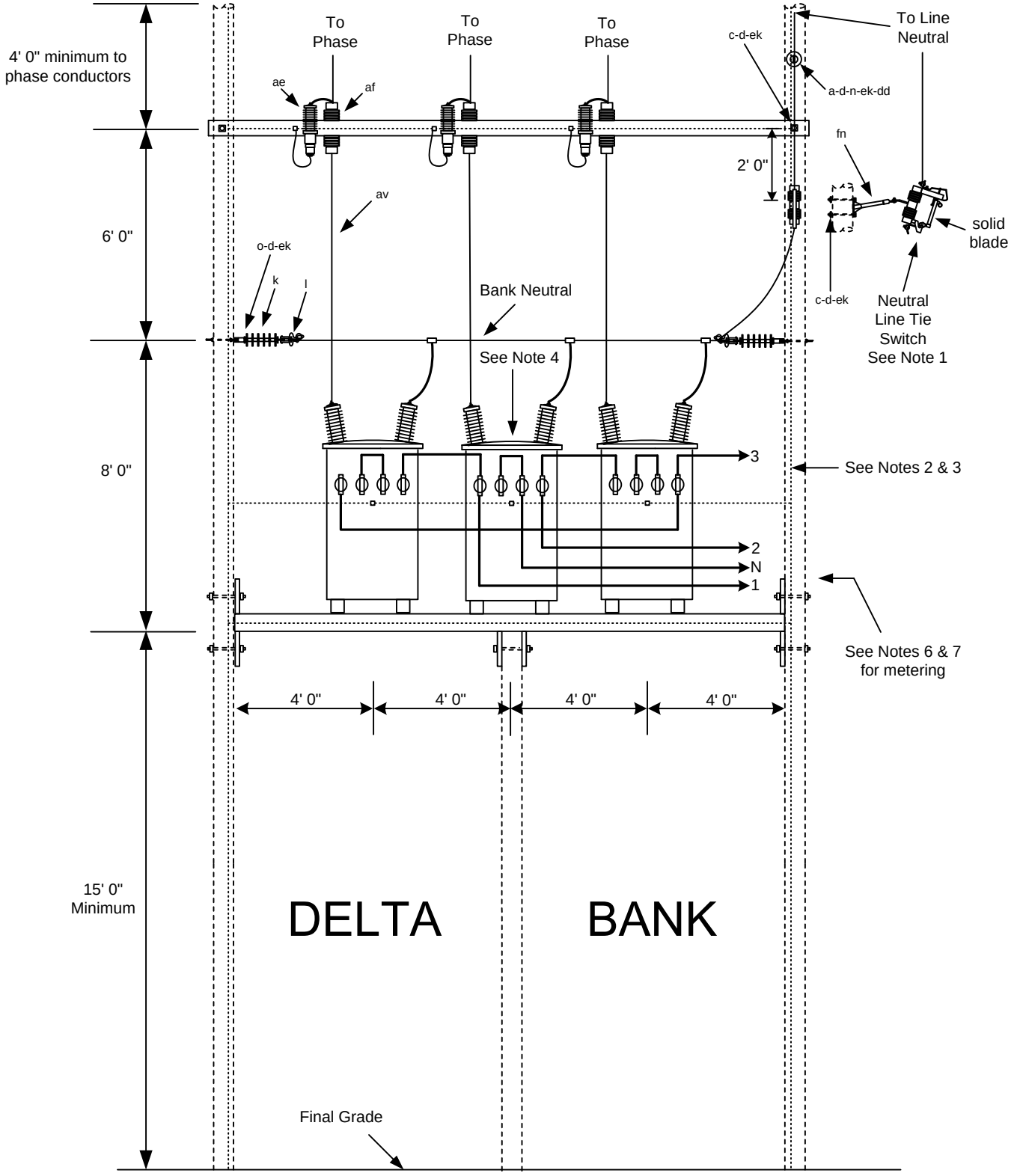
ITEM	QTY.	MATERIAL
c	3	Bolt, machine, 5/8" x required length
d	3	Washer, square, 2 ¼"
j	3	Screw, lag ½" x 4"
p		Connectors, as required
ae	3	Arrester, surge (18 kV)
af	3	Cutout, 27 kV
an	3	Transformer, 14.4 kV, conv.
ap	3	Clamp, hot line
bu	3	Connector, equipment Ground
dm	1	Bracket, transformer cluster
ek	3	Locknuts, 5/8"
fm	1	Bracket, extension, for mounting apparatus (3 ph)
	3	Bail (Compression Stirrup)

NOTE:

1. All transformer tanks must be grounded.
2. See Guidelines MG-9S or MG-16S for wiring and meter details.

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

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.3 (VG312)



*See page 2 for material list and notes

THREE PHASE PLATFORM MOUNTED TRANSFORMER BANK – UNGROUNDED – WYE PRIMARY CENTER TAPPED DELTA 4 WIRE SECONDARY (PAGE 1 OF 2)			
2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.4

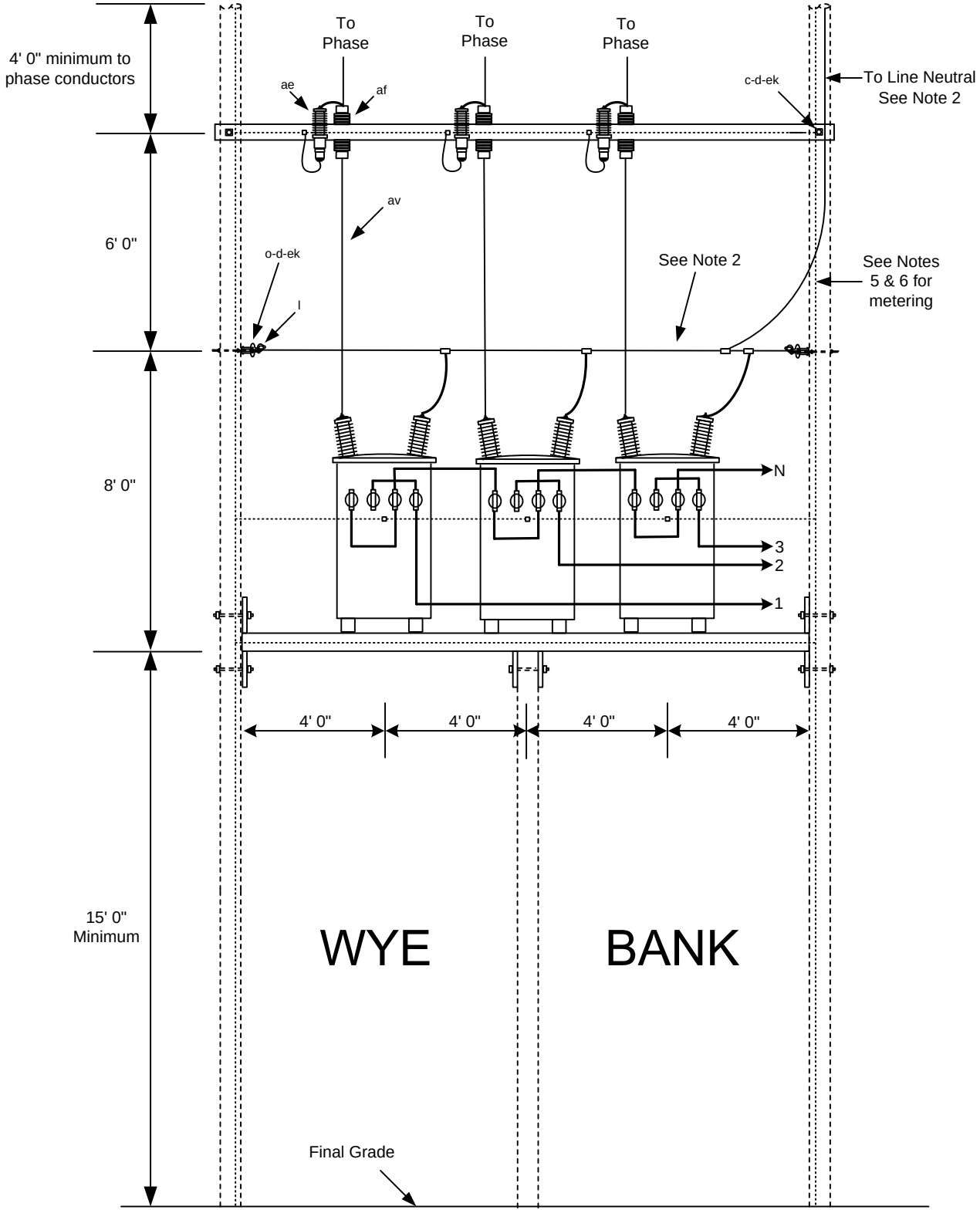
ITEM	QTY.	MATERIAL
a	1	Insulator, pin type (24.9/14.4 kV)
c	6	Bolt, Machine, 3/4" x required length
c	4	Bolt, Machine 5/8" x required length
d	6	Washer, square, 3", 11/16" hole
d	6	Washer, square, 3", 13/16" hole
k	2	Insulator, 25 kV Polymer deadend
l	2	Clamp, deadend
n	1	Bolt, Double Arming, 5/8" x required length
o	2	Bolt, eye, 5/8" x required length
p		Connectors as required
ae	3	Arrestor, Surge (18 kV)
af	4	Cutout 27 kV, load break
av		Jumpers, bare, stranded, as required
bu	6	Connector, grounding
dd	1	Adaptor, Insulator
ek	6	Locknuts, 3/4"
ek	9	Locknuts, 5/8"
fn	1	Bracket, extension, cutout/arrestor
	1	Overhead switch mount (Aluma form)
	1	Platform, 16', (Aluma form 3PAL-16)
	3	Transformers, size as required
	12	Terminal, bronze, straight bolt, cable to flat (Anderson SWH, SWL or SWHD)
	1	Cutout barrell, solid blade, load break

Notes:

1. After energizing bank, unground bank neutral (primary side) by opening Neutral Line Tie Switch
2. Only ground center transformer secondary bushings.
3. The conductor connecting the transformer bank secondary neutral to the line neutral shall be the same or greater ampacity as the line neutral.
4. Primary Line (not bank neutrals) and secondary neutrals must be inter-connected.
5. Call for pole top assemblies seperately.
6. Maintain 18" minimum seperation between primary jumpers and grounded objects or surfaces.
7. For CT'S and meter base use M8-8S.
8. See MG-8S for wiring and metering details.

THREE PHASE PLATFORM MOUNTED TRANSFORMER
BANK – UNGROUNDED – WYE PRIMARY
CENTER TAPPED DELTA 4 WIRE SECONDARY
(PAGE 2 OF 2)

2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.4



*See page 2 for material list and notes

THREE PHASE PLATFORM MOUNTED TRANSFORMER BANK – GROUNDED – WYE PRIMARY GROUNDED – WYE, 4 WIRE SECONDARY (PAGE 1 OF 2)			
2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.5

ITEM	QTY.	MATERIAL
c	6	Bolt, Machine, 3/4” x required length
c	2	Bolt, Machine 5/8" x required length
d	4	Washer, square, 3", 11/16" hole
d	6	Washer, square, 3", 13/16" hole
l	2	Clamp, deadend
o	2	Bolt, eye, 5/8" x required length
p		Connectors as required
ae	3	Arrestor, Surge (18 kV)
af	3	Cutout 27 kV, load break
av		Jumpers, bare, stranded, as required
bu	6	Connector, grounding
ek	6	Locknuts, 3/4”
ek	4	Locknuts, 5/8"
	1	Overhead switch mount (Aluma form)
	1	Platform, 16', (Aluma form 3PAL-16)
	3	Transformers, size as required
	12	Terminal, bronze, straight bolt, cable to flat (Anderson SWH, SWL or SWHD)

Notes:

1. Primary and secondary neutrals must be bonded and grounded.
2. The conductor connecting the transformer bank secondary neutral to the line neutral shall be the same or greater ampacity as the line neutral. Transformer Primary neutrals must be grounded.
3. Call for pole top assemblies seperately.
4. Maintain 18" minimum seperation between primary jumpers and grounded objects or surfaces.
5. For CT’S and meter base use M8-9S.
6. See MG-9S for wiring and metering details.

THREE PHASE PLATFORM MOUNTED TRANSFORMER BANK – GROUNDED – WYE PRIMARY GROUNDED – WYE, 4 WIRE SECONDARY (PAGE 2 OF 2)

2009	WFECA	3 – Phase Primary 24.9/14.4 kV	VG3.5

INDEX H

GROUNDING ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
H1.1	GROUNDING ASSEMBLY – GROUND ROD TYPE
H1.2	GROUNDING ASSEMBLY – SECTIONAL GROUND ROD TYPE

CONSTRUCTION SPECIFICATIONS FOR GROUNDING

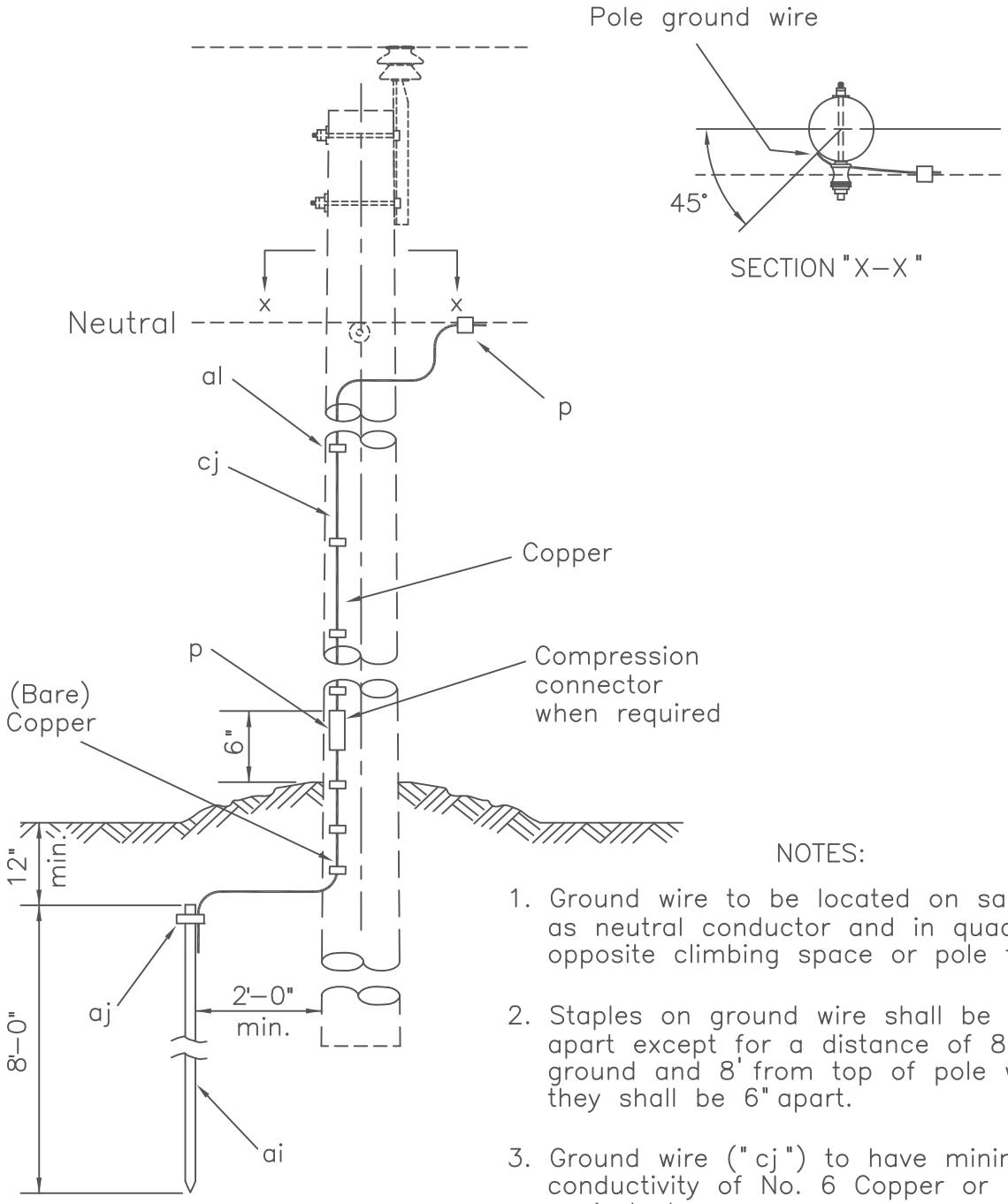
Ground rods shall be driven full length in undisturbed earth in accordance with the construction drawings. They shall be installed a minimum of 2 feet from the face of the pole. The top of the ground rods shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with an appropriate ground rod clamp and shall be secured to the pole with staples. The staples on the ground wire shall be spaced 2 feet part, except for a distance of 8 feet above the ground and 8 feet down from the top of the pole, as applicable, where they shall be 6 inches apart.

The connection between the ground rod and the system neutral should be made by one continuous piece of conductor, (the pole ground wire), and installed in the shortest and most direct path according to the construction drawings. If a splice is required, it shall be made using a compression type connector. Such a splice shall only be installed a minimum of 6 inches above the ground line. The pole ground wire shall be connected to the system neutral using a compression type connector.

All equipment shall have at least 2 connections from the frame, case, or tank to the multi-grounded system neutral conductor. The pole ground wire may be used for one or both of these connections.

All neutral conductors on the pole shall be connected directly to each other, and connected to the pole ground wire if present. Ground connections, in addition to the ones required and specified herein, are acceptable unless they add undue congestion on the structure.

All equipment ground wires, neutral conductors, downguys, messenger wires, and surge-protection ground wires shall be interconnected and attached to a common (pole) ground wire in accordance with the requirements of, or exempted by, the National Electrical Safety Code.



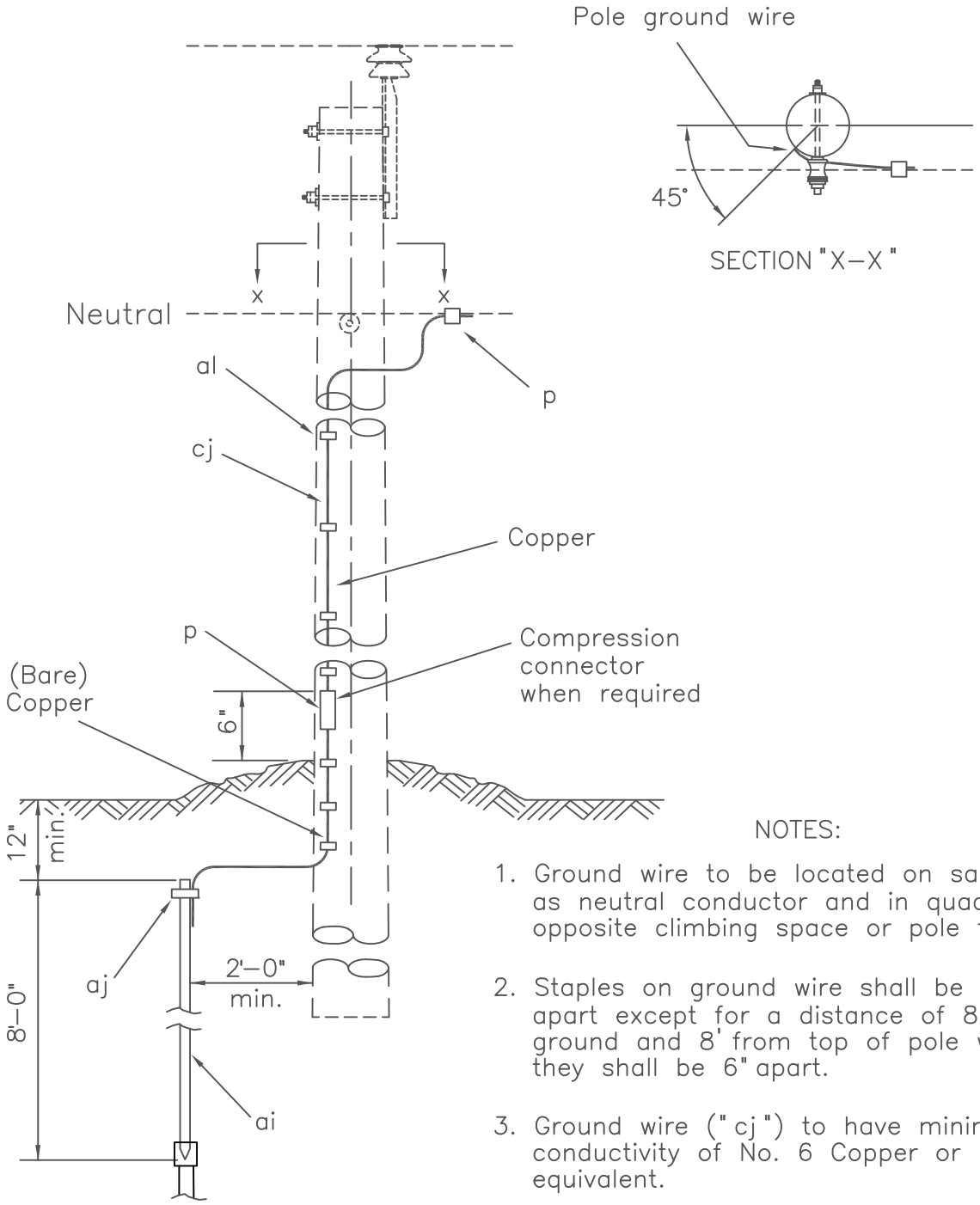
NOTES:

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' above ground and 8' from top of pole where they shall be 6" apart.
3. Ground wire ("cj") to have minimum conductivity of No. 6 Copper or equivalent.
4. Use copper plated ground rod, copper ground wire and staples.

ITEM	QTY	MATERIAL
p		Connector, compression, as req'd
ai	1	Rod, ground, 5/8" min. diameter
aj	1	Clamp, ground rod
al		Staple, ground wire, as req'd
cj		Wire, pole ground, as req'd

GROUNDING ASSEMBLY – GROUND ROD TYPE

DEC 1998		H1.1 (VM2–11)
RUS		



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' above ground and 8' from top of pole where they shall be 6" apart.
3. Ground wire ("cj") to have minimum conductivity of No. 6 Copper or equivalent.
4. Use copper plated ground rod, copper ground wire and staples.
5. Drive rods until a resistance reading below 25 ohms is obtained.

ITEM	QTY	MATERIAL
p		Connector, compression, as req'd
ai	1	Rod, ground, 5/8" min. diameter
aj		Clamp, ground rods as required
al		Staple, ground wire, as reg'd
cj		Wire, pole ground, as req'd
		Coupling,Ground Rod,5/8"as required

GROUNDING ASSEMBLY – SECTIONAL GROUND ROD TYPE

DEC 1998		H1.2
RUS		(VM2–11S)

INDEX J

SECONDARY ASSEMBLY UNITS

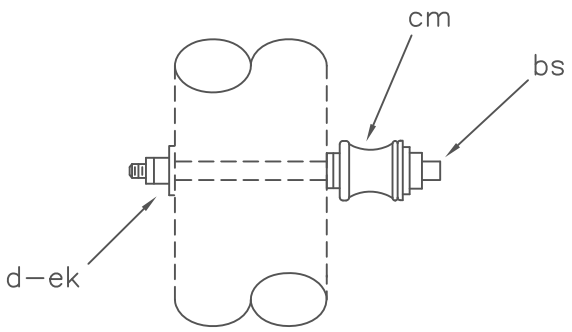
DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
J1.1, J1.2	SECONDARY ASSEMBLIES (SMALL ANGLE)
J2.1, J2.2	SECONDARY ASSEMBLIES (LARGE ANGLE)
J3.1, J4.1	SECONDARY ASSEMBLIES (DEADEND, MISC.)

CONSTRUCTION SPECIFICATIONS FOR SECONDARIES AND SERVICE DROPS

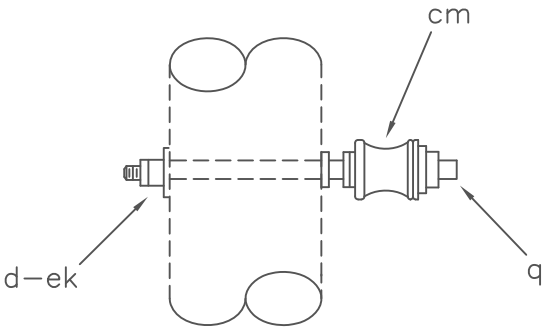
Secondary conductors may be bare or covered wires or multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturer's recommendations.

Conductors for secondary underbuild on primary lines have normally been, and still may be bare, except in those circumstances where other conditions, such as long primary span lengths, may necessitate that covered wires or service cable may be or should be used. Service drops shall be covered wire or service cable.

Secondaries and service drops shall be so installed as not to obstruct the climbing space on poles. There shall not be more than one splice per conductor in any span, and splices shall be located at least 10 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.



J1.1
(J8)



J1.2
(J5)

		J1.1	J1.2
ITEM	MATERIAL	QTY	QTY
d	Washer, 2 1/4" square	1	1
q	Bolt, double upset		1
bs	Bolt, single upset	1	
cm	Insulator, spool	1	1
ek	Locknuts	1	1

DESIGN PARAMETERS:

MAXIMUM LINE ANGLES

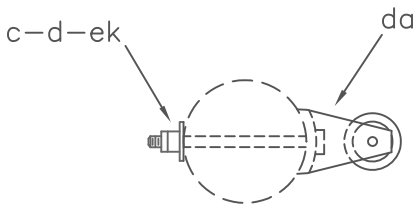
5° – Small Conductors
2° – Larger than #1/0

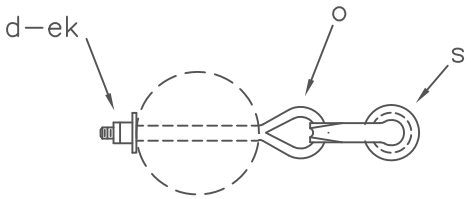
SECONDARY ASSEMBLIES
(SMALL ANGLE)

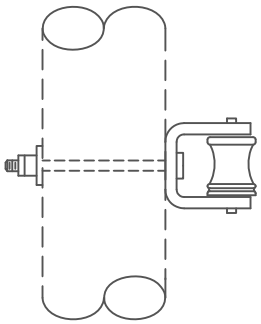
DEC 1998

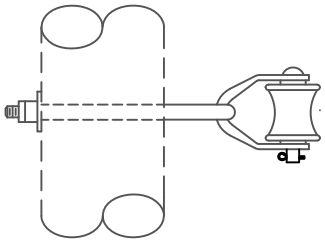
RUS

J1.1, J1.2
(J8, J5)









J2.1
(J10)

J2.2
(J7)

NOTE: See Tying Guide Drawing L3.1G

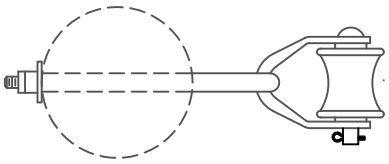
		J2.1	J2.2
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 5/8" X req'd length	1	
d	Washer, 2 1/4" square	1	1
o	Bolt, eye, 5/8" X req'd length		1
s	Clevis, secondary, swinging, insulated		1
da	Bracket, insulated	1	
ek	Locknuts	1	1

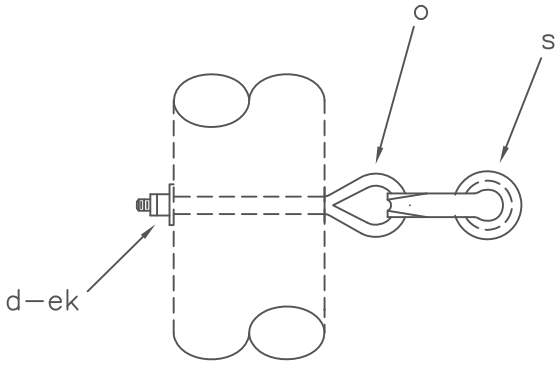
DESIGN PARAMETERS:
MAXIMUM LINE ANGLES

J2.1: 60°
J2.2: 60°

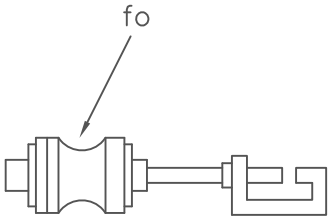
SECONDARY ASSEMBLIES
(LARGE ANGLE)

DEC 1998		J2.1, J2.2 (J10, J7)
RUS		





J3.1
(J6, J11)



J4.1
(J12)

NOTE: See Tying Guide Drawing L3.2G, L3.3G or L4.2G

		J3.1	J4.1
ITEM	MATERIAL	QTY	QTY
d	Washer, 2 1/4" square	1	
o	Bolt, eye, 5/8" x req'd length	1	
s	Clevis, secondary, swinging, insulated	1	
fo	Bracket, transformer secondary		1
ek	Locknuts	1	1

DESIGN PARAMETERS: (J3.1)

ALLOWABLE LONGITUDINAL LOADING:
1,500 lbs. (ANSI Class 53–2 Insulator)
2,250 lbs. (ANSI Class 53–4 Insulator)

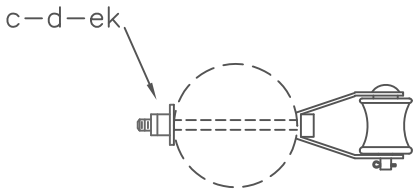
SECONDARY ASSEMBLIES
(DEADEND, MISC.)

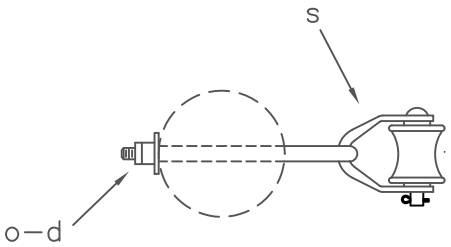
DEC 1998		J3.1, J4.1
RUS		(J6, J11, J12)

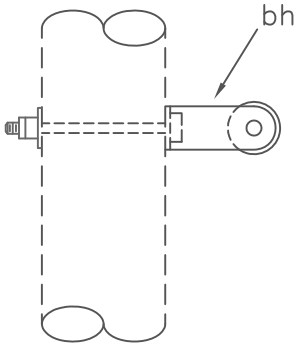
INDEX K

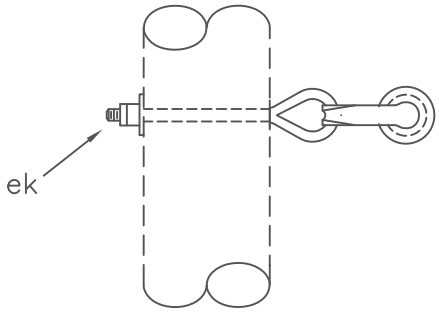
SERVICE ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
K1.1, K1.2	SERVICE ASSEMBLIES (POLE MOUNTED)
K1.3, K1.4	SERVICE ASSEMBLIES (POLE MOUNTED)
K2.1, K2.2, K2.3	SERVICE ASSEMBLIES
K3.1, K3.2	SERVICE ASSEMBLIES (MAST TYPE)
K4.1G	CABLE SERVICE ASSEMBLY GUIDE
K4.2G	MAST TYPE SERVICE ASSEMBLY GUIDE
K4.3G	POLE TYPE SERVICE ASSEMBLY GUIDE
K4.4G	YARD POLE METER INSTALLATION GUIDE









K1.1
(K10, K14L)

K1.2
(K14C)

NOTE: See Tying Guide drawings L3.2G, L3.3G, L4.1G or L4.2G

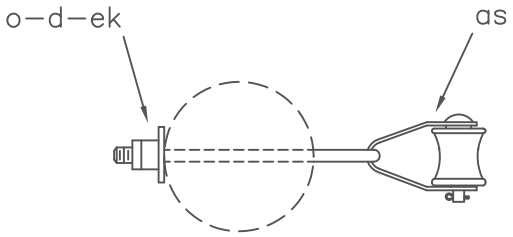
ASSEMBLY:		K1.1	K1.2
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 5/8" X req'd length	1	
d	Washer, 2 1/4" square	1	1
o	Bolt, eye, 5/8" X req'd length		1
s	Clevis, secondary, swinging, insulated		1
bh	Clevis, service, deadend, insulated	1	
ek	Locknuts	1	1

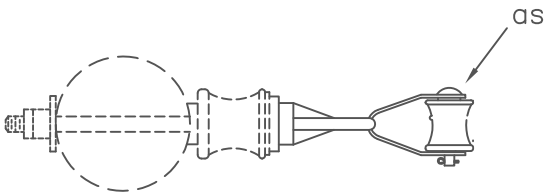
DESIGN PARAMETERS:

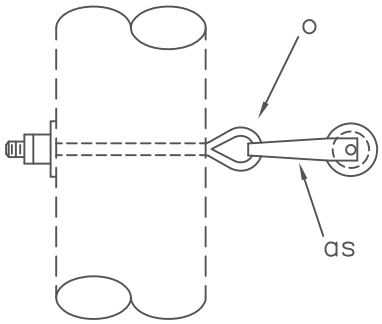
ALLOWABLE LONGITUDINAL LOADING:
1,500 lbs. (ANSI Class 53–2 Insulator)
2,250 lbs. (ANSI Class 53–4 Insulator)

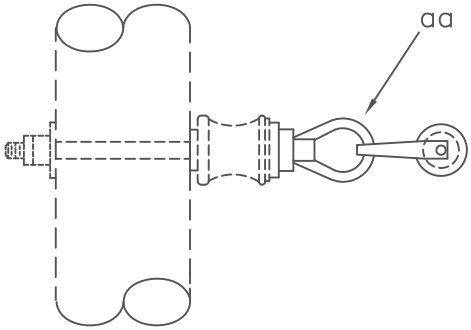
SERVICE ASSEMBLIES
(POLE MOUNTED)

DEC 1998		K1.1, K1.2
RUS		(K10, K14L, K14C)









K1.3
(K11, K11L)

K1.4
(K11C, K14)

NOTE: See Tying Guide Drawings L3.2G, L3.3G, L4.1G or L4.2G

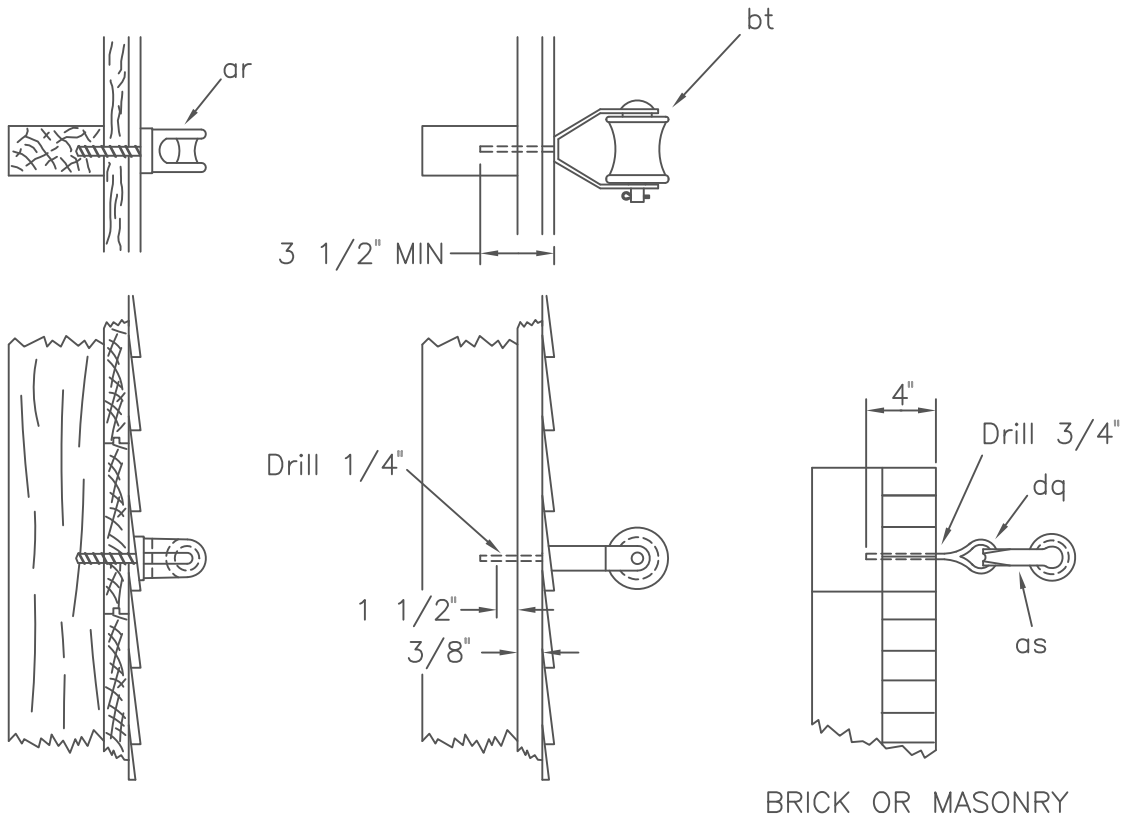
ASSEMBLY:		K1.3	K1.4
ITEM	MATERIAL	QTY	QTY
d	Washer, 2 1/4" square	1	
o	Bolt, eye, 5/8" X req'd length	1	
aa	Nut, eye		1
as	Clevis, service, swinging, insulated	1	1
ek	Locknuts	1	

DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOAD:
1,500 lbs. (ANSI Class 53–2 Insulator)
2,250 lbs. (ANSI Class 53–4 Insulator)

SERVICE ASSEMBLIES
(POLE MOUNTED)

DEC 1998		K1.3, K1.4
RUS		(K11,K11L,K11C,K14)



K2.1 (K10L)

K2.2 (K10C)

K2.3 (K10C)

NOTES:
1. Assembly K2.1 not suitable for large conductors or cable services
2. See Tying Guide Drawings L3.2G, L3.3G, L4.1G or L4.2G

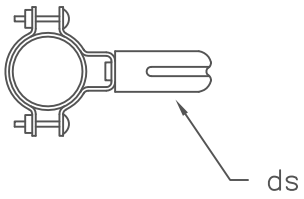
ASSEMBLY:		K2.1	K2.2	K2.3
ITEM	MATERIAL	QTY	QTY	QTY
ar	Wireholder	1		
as	Clevis, secondary, swinging, insulated			1
bt	Wireholder, clevis type insulated, #24 Woodscrew		1	
dq	Eye, screw, elliptical, 1/2" X 6"			1
	3/4" x 3 1/2" expansion shield			1

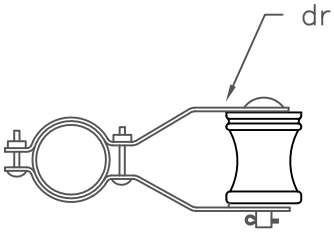
SERVICE ASSEMBLIES

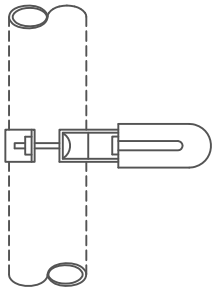
DEC 1998

RUS

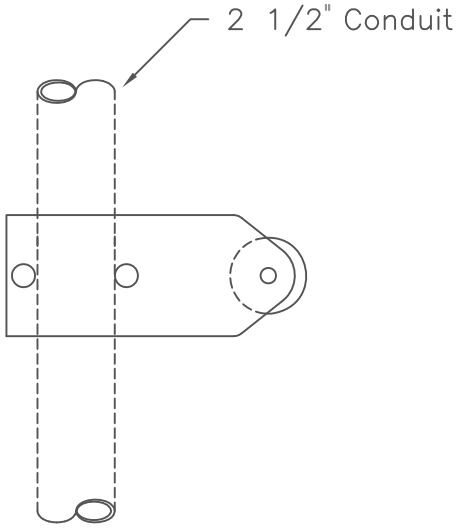
K2.1, K2.2, K2.3 (K10L, K10C)







K3.1
(K17, K17L)



K3.2
(K16C)

NOTES:
1. Assembly K3.1 not suitable for large conductors or cable services
2. See Tying Guide Drawings L3.2G, L3.3G, L4.1G or L4.2G

	ASSEMBLY:	K3.1	K3.2
ITEM	MATERIAL	QTY	QTY
dr	Clevis, conduit, insulated		1
ds	Wireholder, conduit	1	

DESIGN PARAMETERS:

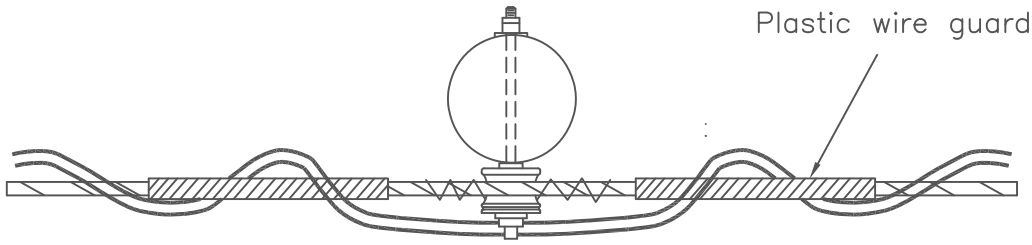
ALLOWABLE LOADING (lbs)

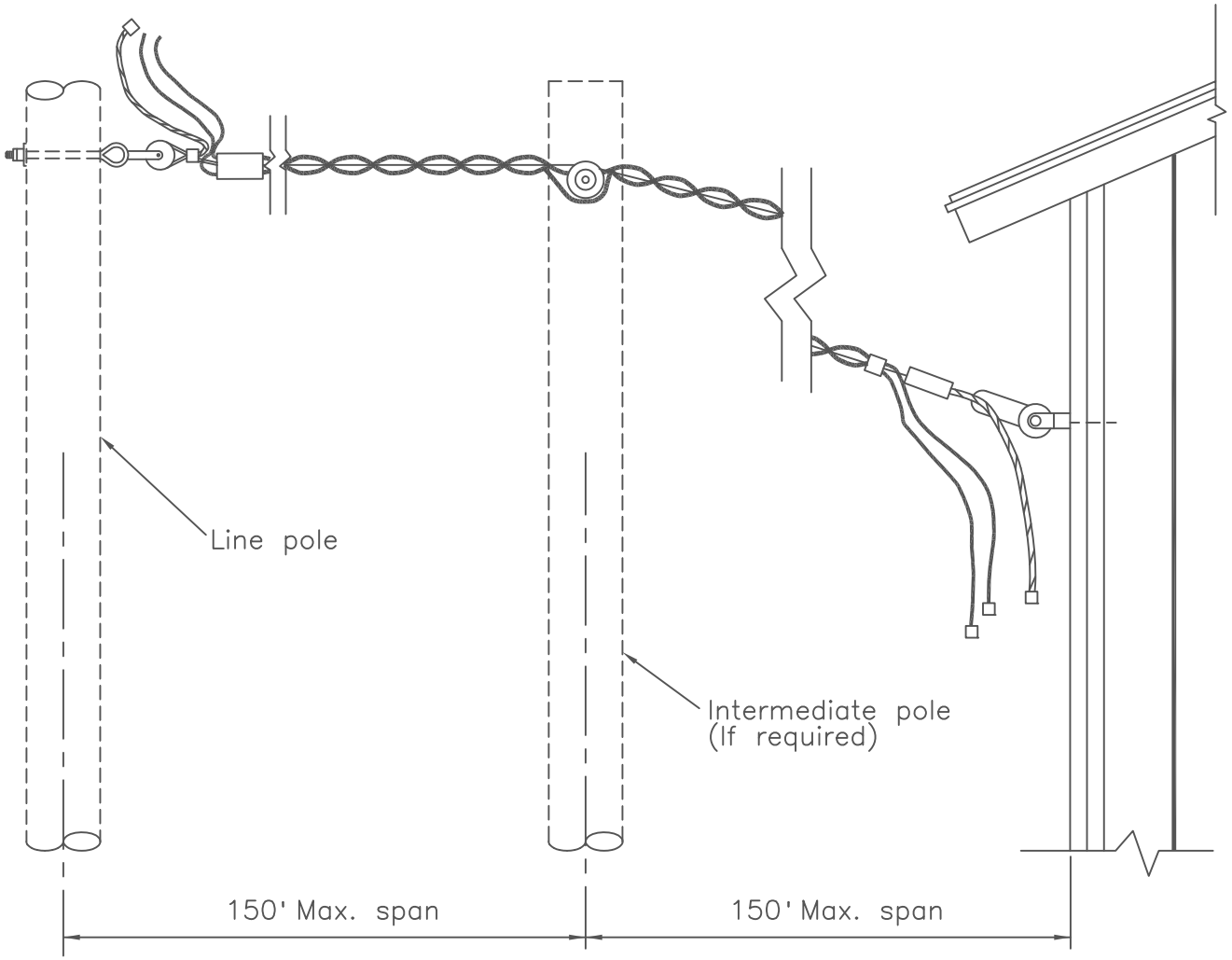
	Deadend	Cantilever
K3.1	1500	800
K3.2	1500	400

SERVICE ASSEMBLIES
(MAST TYPE)

DEC 1998
RUS

K3.1, K3.2
(K17, K17L, K16C)



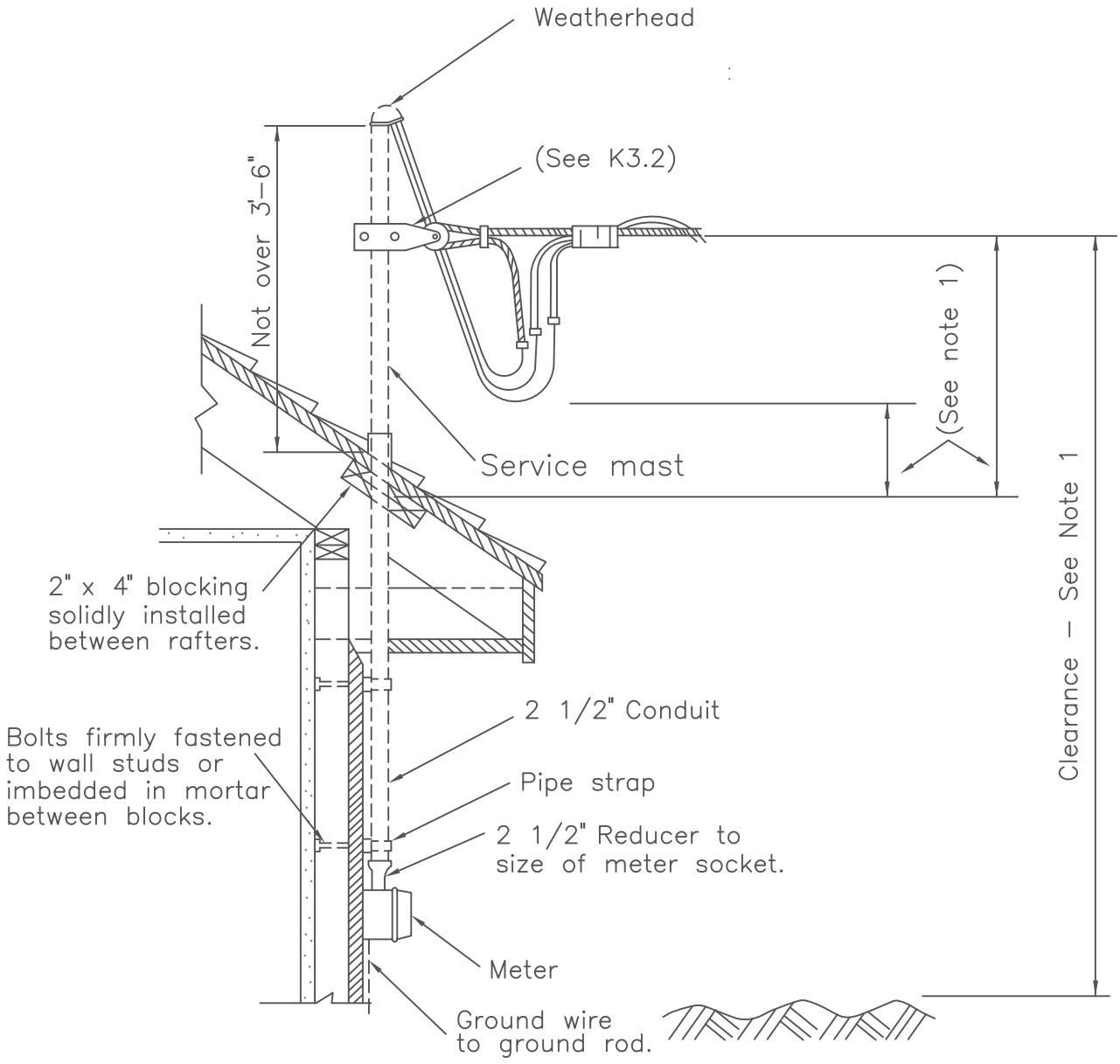


NOTES:

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.

CABLE SERVICE ASSEMBLY GUIDE

DEC 1998		K4.1G (M24)
RUS		



NOTES:

1. All clearances to be in conformance to the most stringent requirements of either the NESC, NEC or other codes of governmental or regulating authorities as applicable.

2. If length of conduit exceeds 10 feet, coupling is permitted on end adjacent to meter.

MAST TYPE SERVICE ASSEMBLY GUIDE

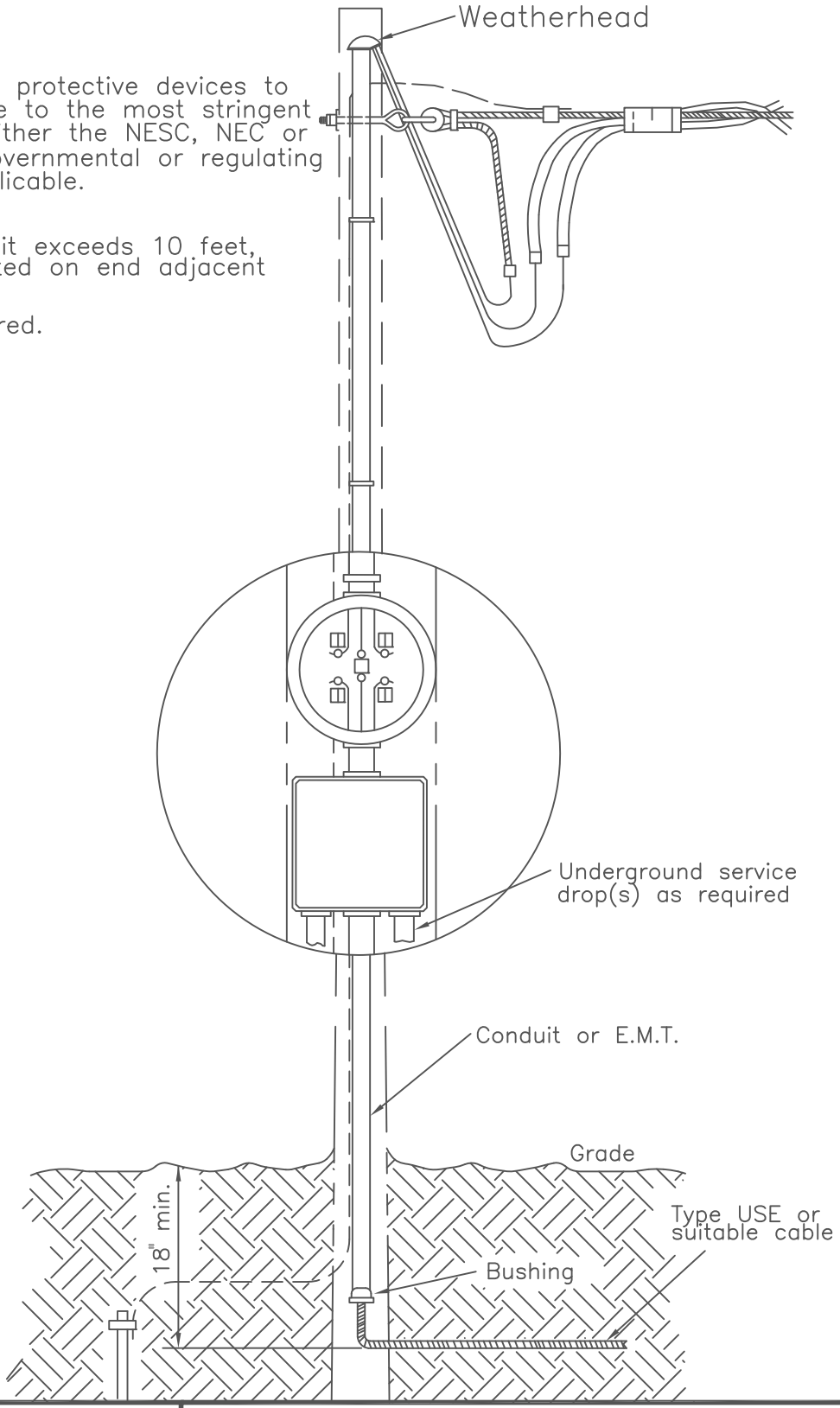
DEC 1998		K4.2G
RUS		(M24-10)

NOTES:

1. All Clearances and protective devices to be in conformance to the most stringent requirements of either the NESC, NEC or other codes of governmental or regulating authorities as applicable.

2. If length of conduit exceeds 10 feet, coupling is permitted on end adjacent to meter.

3. Guy pole as required.



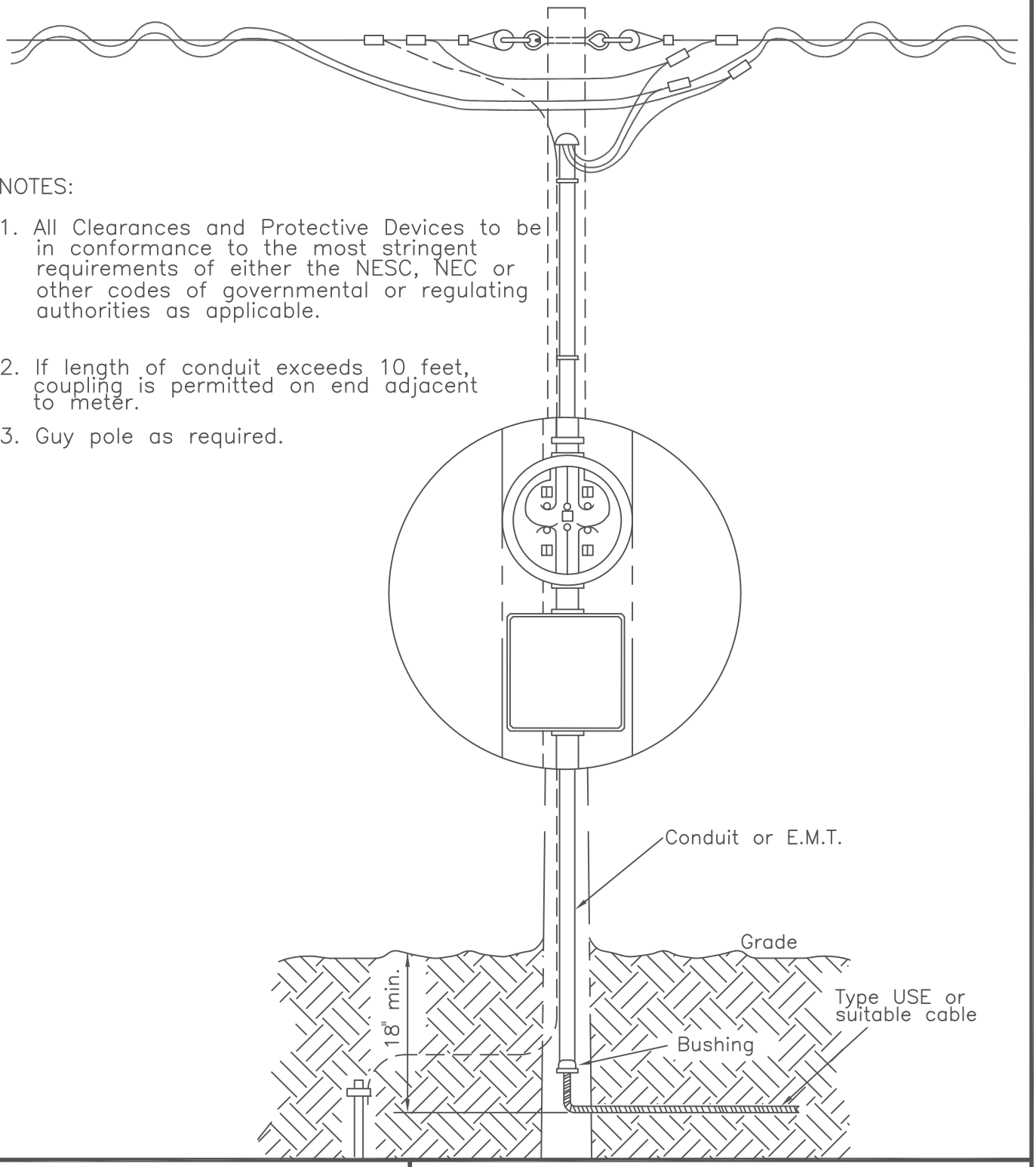
DESIGN PARAMETERS:
(See NOTE 1)

POLE TYPE SERVICE ASSEMBLY GUIDE

DEC 1998		K4.3G
RUS		

NOTES:

1. All Clearances and Protective Devices to be in conformance to the most stringent requirements of either the NESC, NEC or other codes of governmental or regulating authorities as applicable.
2. If length of conduit exceeds 10 feet, coupling is permitted on end adjacent to meter.
3. Guy pole as required.



DESIGN PARAMETERS:
(See NOTE 1)

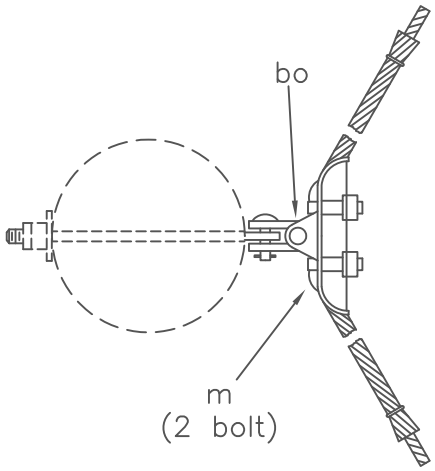
YARD POLE METER INSTALLATION GUIDE

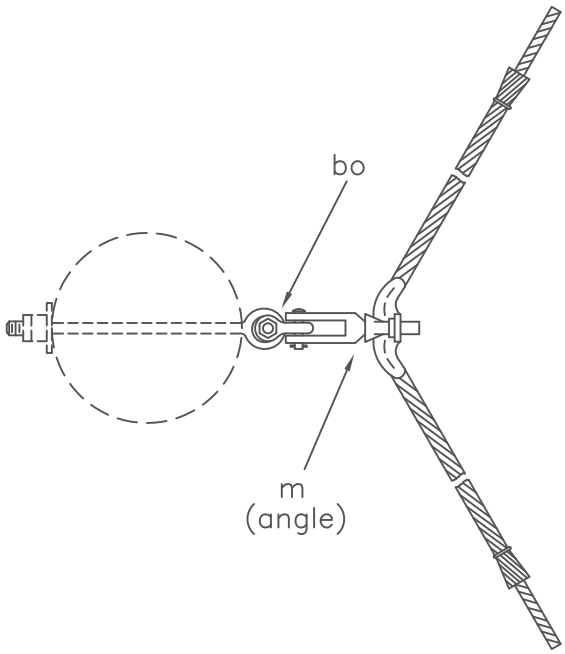
DEC 1998		K4.4G
RUS		(M8–9)

INDEX L

TYING GUIDES

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VL1.1G	TYING GUIDE PRIMARY ANGLE ASSEMBLIES
VL1.2G	TYING GUIDE PRIMARY DEADEND ASSEMBLIES
L2.1G	TYING GUIDE NEUTRAL ANGLE ASSEMBLIES
L2.2G	TYING GUIDE NEUTRAL DEADEND ASSEMBLIES
L3.1G	TYING GUIDE NEUTRAL & SECONDARY ANGLE ASSEMBLIES
L3.2G	TYING GUIDE NEUTRAL & SECONDARY DEADEND ASSEMBLIES (COPPER)
L3.3G	TYING GUIDE NEUTRAL & SECONDARY DEADEND ASSEMBLIES (ACSR)
L4.1G	TYING GUIDE SERVICE ASSEMBLIES
L4.2G	TYING GUIDE SERVICE ASSEMBLIES, CABLE





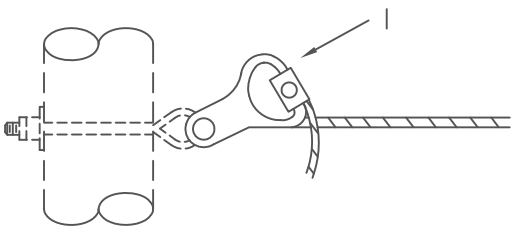
NOTES:

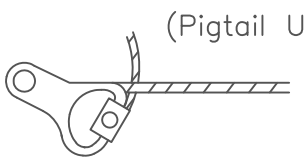
1. ACSR conductors require armor rods and clips (as shown).
2. Use angle suspension clamp with #2 or #4 ACSR only.

ITEM	MATERIAL
m	Clamp, 2 bolt, suspension (distribution)
m	Clamp, angle, suspension (distribution)
bo	Shackle, anchor
bv	Rods, armor (as req'd)

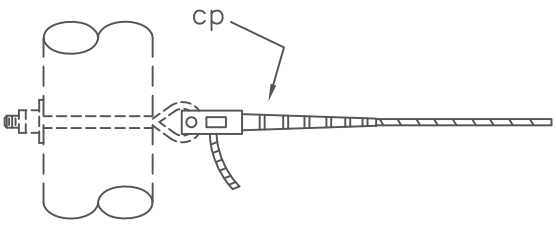
TYING GUIDE
NEUTRAL ANGLE ASSEMBLIES

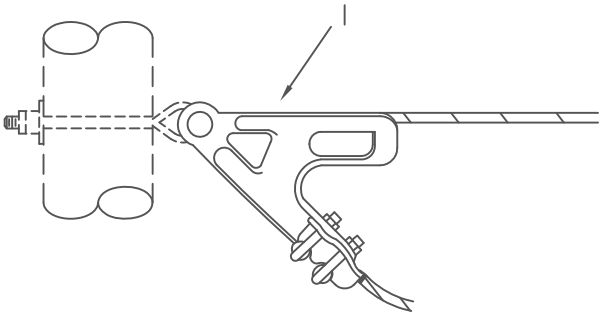
DEC 1998		
RUS		L2.1G





NOTE: For use with copper or copperweld–copper conductors only.





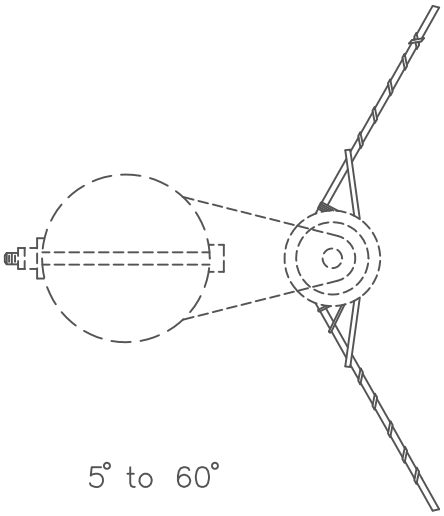
NOTES:

1. Item "by" may be substituted for item "cp" shown.
2. Specify "ej" clamp instead of "l" clamp for conductors larger than #4/0 ACSR.
3. Armor tape required for conductors in galvanized fittings not having aluminum liners.
4. Bend pigtails away from line conductors to avoid chafing.

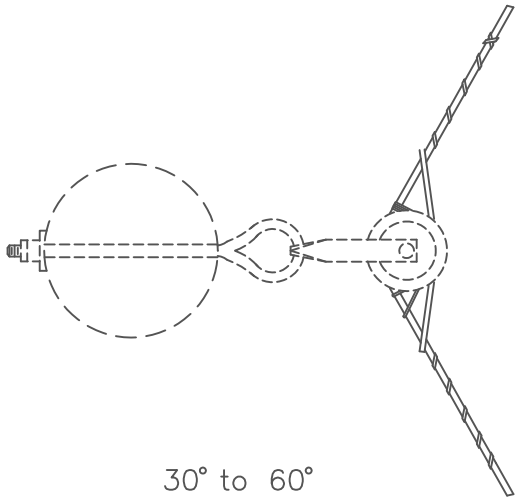
ITEM	MATERIAL
l	Clamp, deadend (distribution)
by	Deadend, automatic or formed type
cp	Deadend, compression type
ej	Clamp, deadend with socket eye

TYING GUIDE
NEUTRAL DEADEND ASSEMBLIES

DEC 1998		L2.2G
RUS		(M42–13)

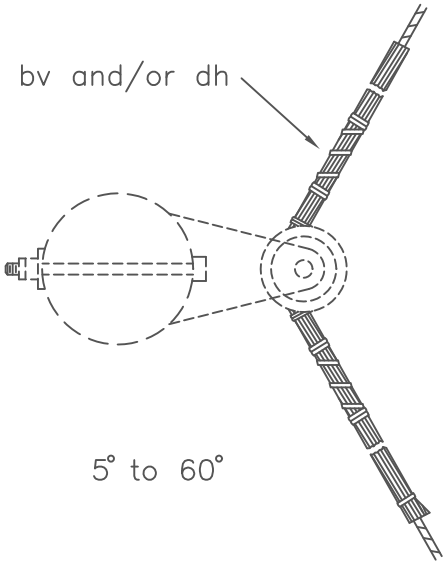


5° to 60°



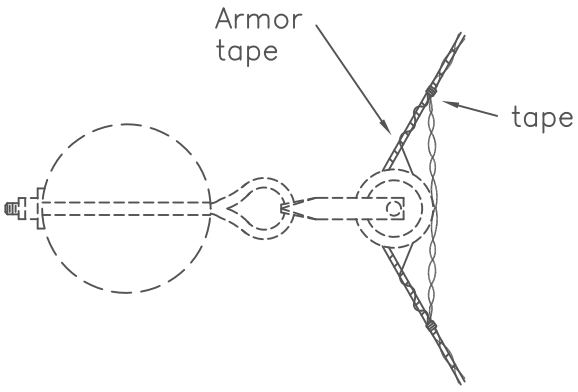
30° to 60°

For use with copper or copperweld–copper conductors.



5° to 60°

ACSR Conductors



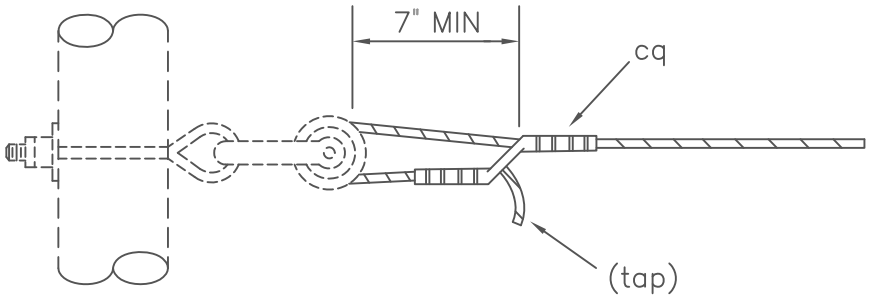
30° to 60°

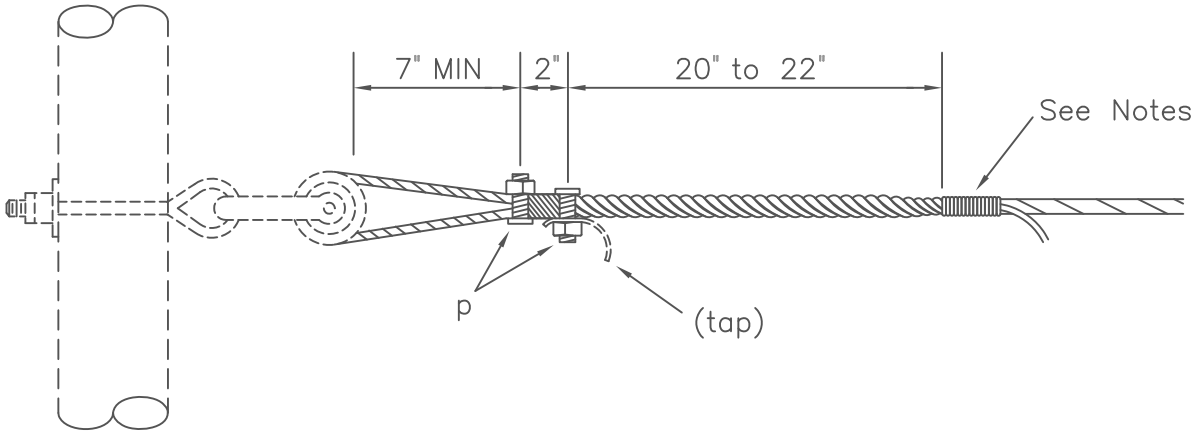
Self Supporting
Cable Conductors

ITEM	MATERIAL
bv	Rod, armor (formed type)
dh	Tie, insulator (formed type)

TYING GUIDE
NEUTRAL & SECONDARY
ANGLE ASSEMBLIES

DEC 1998		L3.1G
RUS		(M40–1, M40–10)





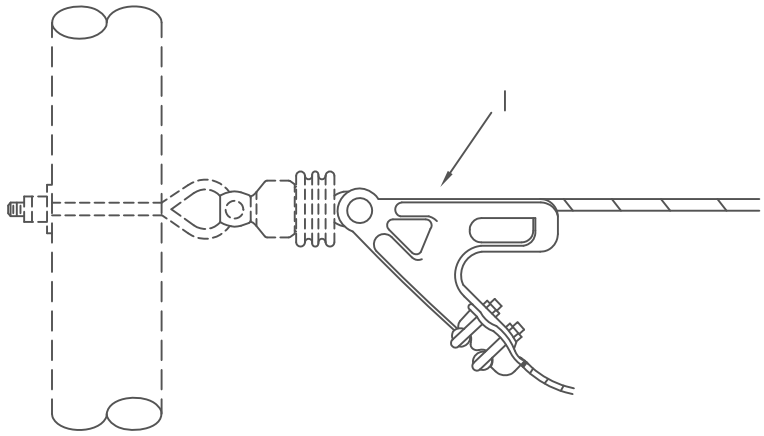
NOTES:

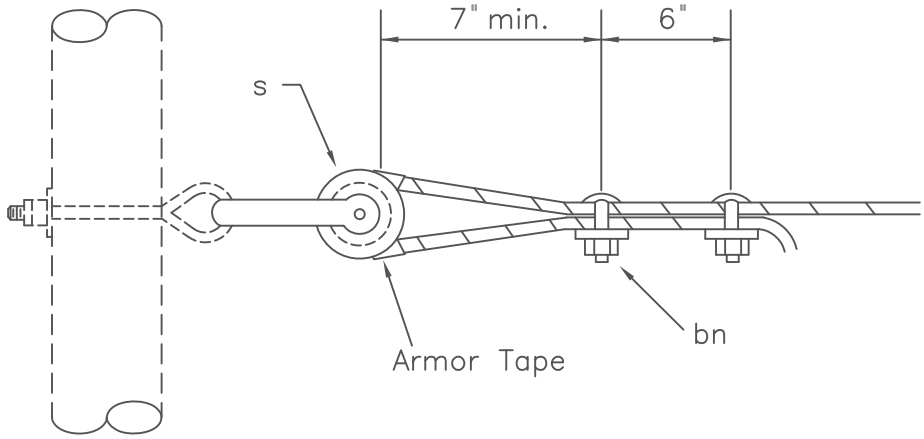
1. Bend all pigtails away from line conductor to avoid chafing.
2. Extend one strand of free end (the copperweld strand of copperweld–copper conductor) against line conductor. Wrap free ends of conductor along line conductor using same lay. Serve copper strands six turns each and then cut off.
3. For solid conductors, use same dimensions and install third connector "p" in lieu of serving.

ITEM	MATERIAL
p	Connectors, as req'd
cq	Deadend, secondary

TYING GUIDE
NEUTRAL & SECONDARY
DEADEND ASSEMBLIES (COPPER)

DEC 1998		L3.2G
RUS		(M42–3, M42–21)





NOTES:

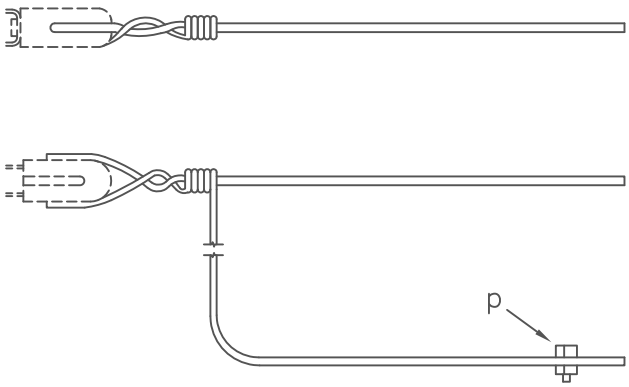
1. Armor tape wrapping to extend not more than two wraps beyond the mouth of deadend clamp or spool insulator.

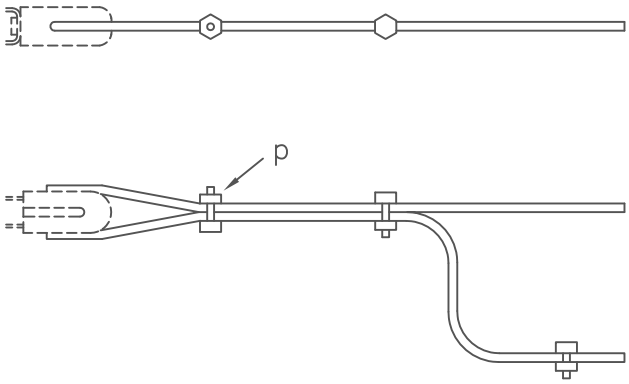
2. For #1/0 and larger, use spool with 3" minimum groove diameter.

ITEM	MATERIAL
i	Clamp, deadend
s	Clevis, secondary, swinging, insulated
bn	Clamp, loop deadend

TYING GUIDE NEUTRAL & SECONDARY DEADEND ASSEMBLIES (ACSR)

DEC 1998		L3.3G
RUS		(M42-11, M42-13)





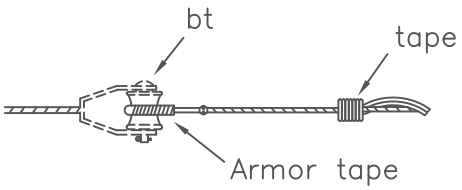
This type of construction should be used for small, aluminum weather–proof conductors.

NOTE: Service connectors (p) to be applied over bare wire and then taped as required.

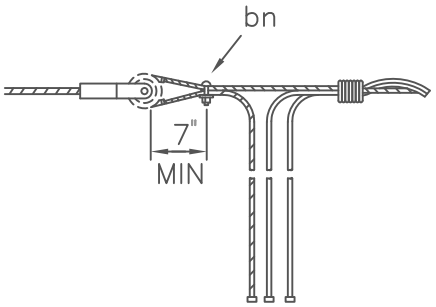
ITEM	MATERIAL
p	Connectors, as req'd

TYING GUIDE
SERVICE ASSEMBLIES

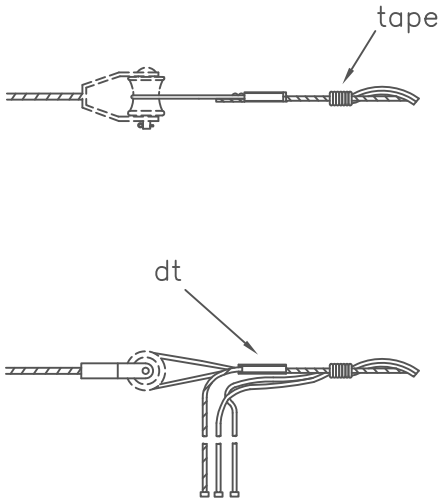
DEC 1998		
RUS		L4.1G



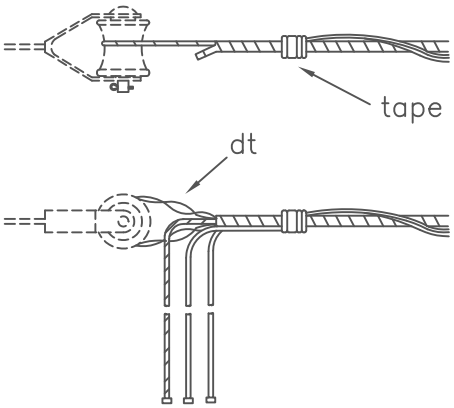
NOTE:
Groove diameter of insulator 1 3/4" min.



LOOP TYPE



WEDGE TYPE



PREFORMED TYPE

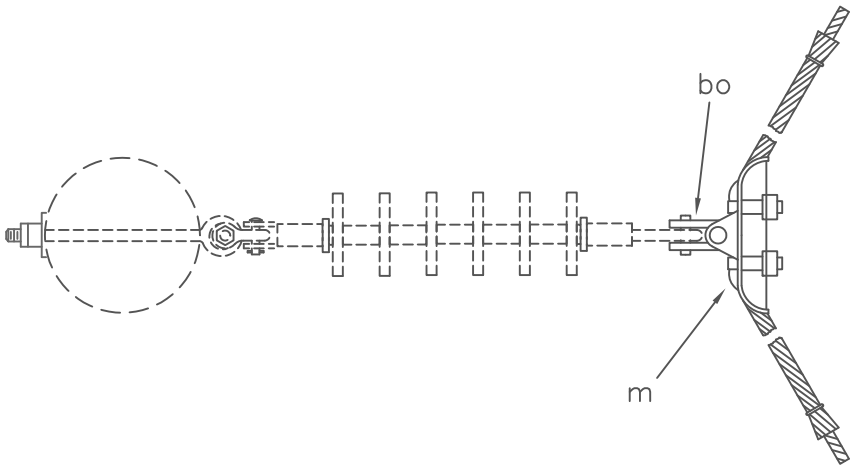
NOTES:

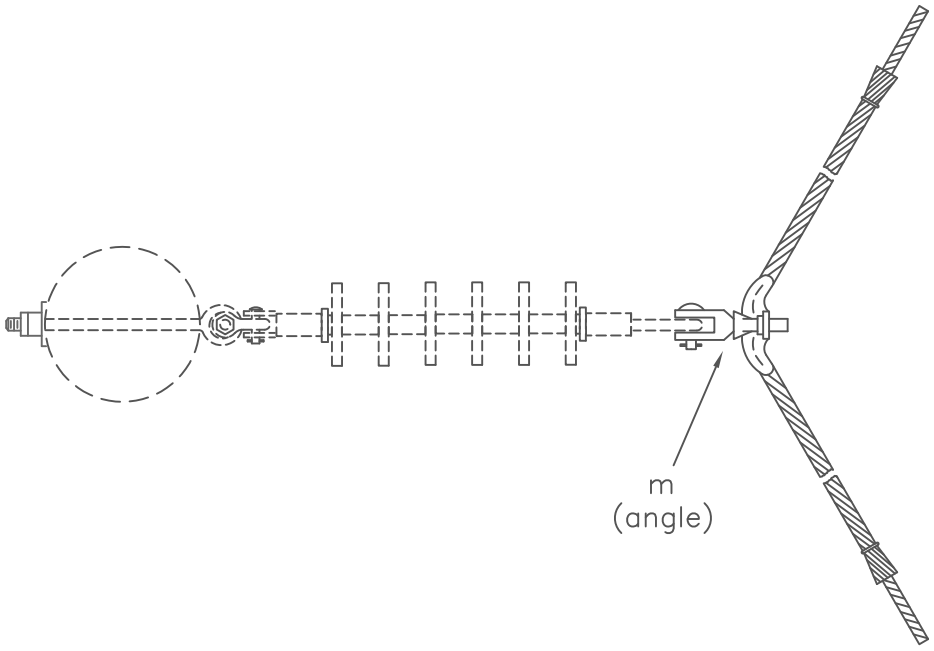
1. This type of construction should be for 3 or 4 conductor service cables with bare ACSR neutral.
   CAUTION: Not suitable for K2.1 or K3.1 Service Assemblies.
2. Service connectors (p) to be insulated, compression type.

ITEM	MATERIAL
dt	Service deadend, wedge type
dt	Service deadend, performed type
p	Connectors, as req'd
bn	Clamp, loop deadend

TYING GUIDE
SERVICE ASSEMBLIES, CABLE

DEC 1998		
RUS		L4.2G





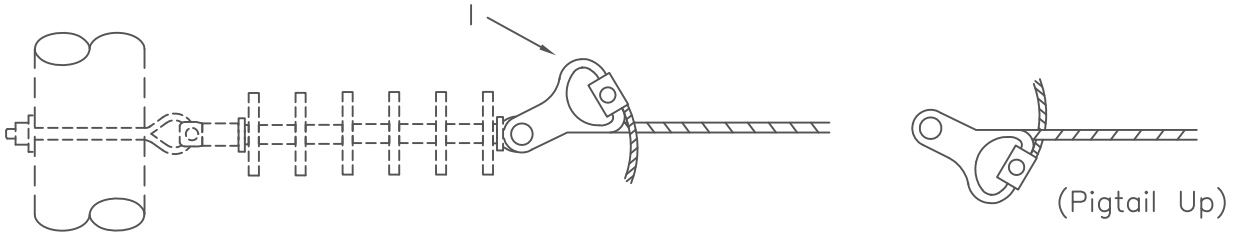
NOTES:

1. ACSR conductors require armor rods and clips (as shown).
2. Use angle suspension clamp with #2 or #4 ACSR only.

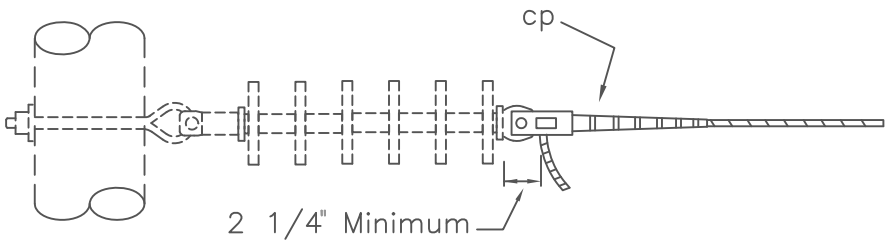
ITEM	MATERIAL
m	Clamp, 2 bolt, suspension (distribution)
m	Clamp, angle, suspension (distribution)
bo	Shackle, anchor
bv	Rods, armor (as req'd)

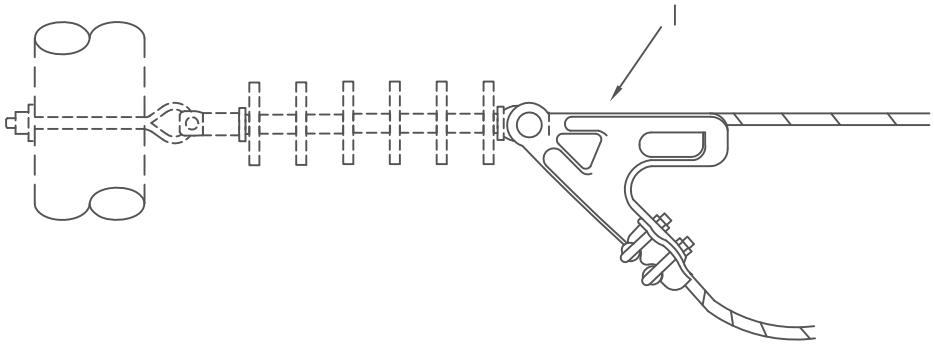
TYING GUIDE
PRIMARY ANGLE ASSEMBLIES

DEC1998	24.9/14.4 kV	VL1.1G (M41-1,M41-10,M42-3, M42-11, M42-21)
RUS		



NOTE: For use with copper or copperweld–copper conductors only.





NOTES:

1. Item "by" may be substituted for item "cp" shown.
2. Specify "ej" clamp instead of "I" clamp for conductors larger than #4/0 ACSR.
3. Armor tape required for conductors in galvanized fittings not having aluminum liners.
4. Bend pigtails away from line conductors to avoid chafing.

ITEM	MATERIAL
I	Clamp, deadend (distribution)
by	Deadend, automatic or formed type
cp	Deadend, compression type
ej	Clamp, deadend with socket eye

TYING GUIDE
PRIMARY DEADEND ASSEMBLIES

DEC 1998	24.9/14.4 kV	VL1.2G
RUS		(M42–13)

INDEX M

MISCELLANEOUS ASSEMBLY UNITS AND GUIDES

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M1.30G	RIGHT-OF-WAY CLEARING GUIDE
M3.15	STUB REINFORCING OF DISTRIBUTION LINE POLES
M3.21	ANGLE CONSTRUCTION GUIDE TURN TO RIGHT, CROSSARM TO VERTICLE CONSTRUCTION – 30 DEGREES TO 60 DEGREES
M3.22	ANGLE CONSTRUCTION GUIDE TURN TO LEFT, CROSSARM TO VERTICLE CONSTRUCTION – 30 DEGREES TO 60 DEGREES
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M3.3	GUIDE TO STAKES USED FOR POLE LOCATION
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M5.1	STRAY VOLTAGE ISOLATOR FOR SINGLE PHASE CONVENTIONAL TRANSFORMER
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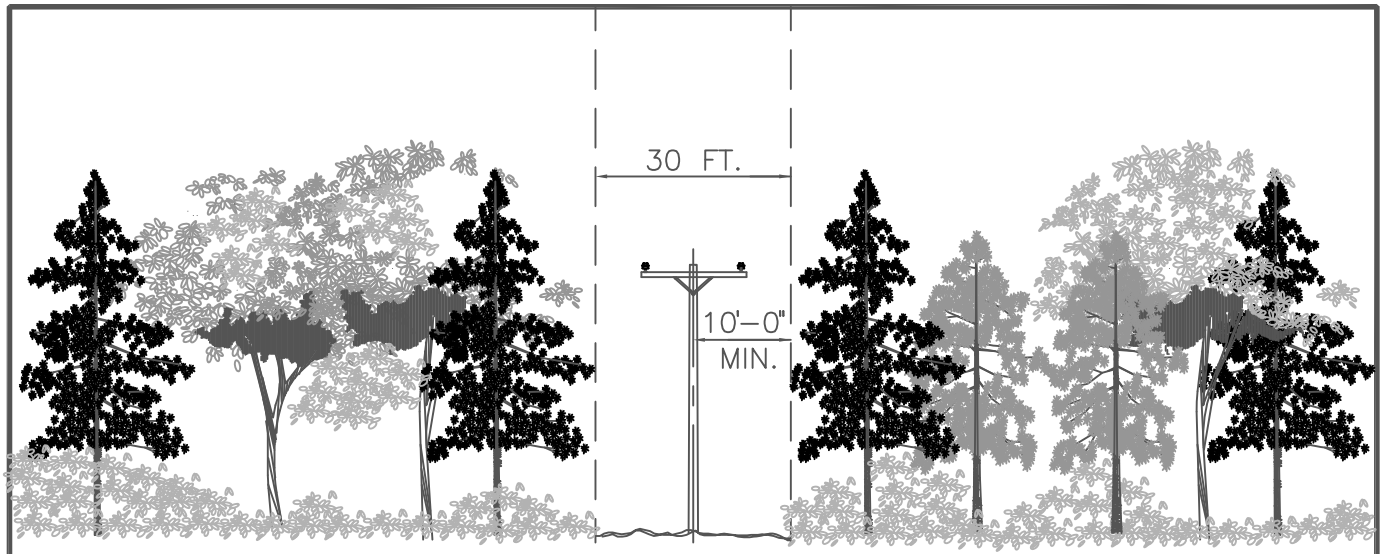
MISCELLANEOUS ASSEMBLY UNITS AND GUIDES

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
M12.0 (METAL, POLE MOUNT)	DANGER, WARNING AND INFORMATION SIGNS
AC 70/7460-1J	Advisory Circular - Markers
AC 70/7460-2K Objects that May	Advisory Circular - Proposed Construction or Alteration of Affect the Navigable Airspace

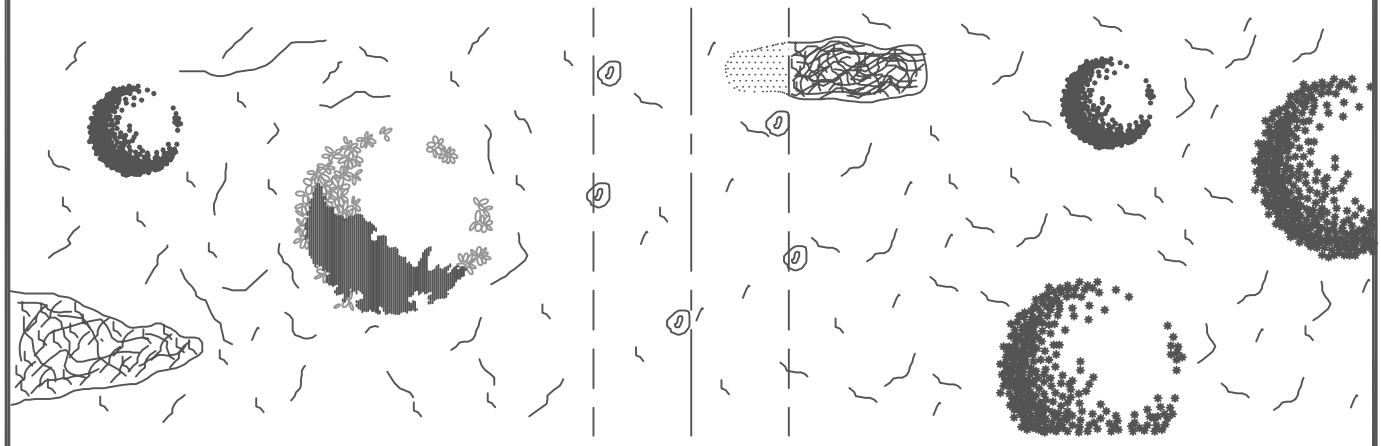
RIGHT-OF-WAY CLEARING SPECIFICATIONS

The right-of-way shall be prepared by removing trees, clearing underbrush, and trimming trees so that the right-of-way is cleared close to the ground and to the width specified. However, low growing shrubs, which will not interfere with the operation or maintenance of the line, shall be left undisturbed if so directed by the owner. Slash may be chipped and blown on the right-of-way if so specified.

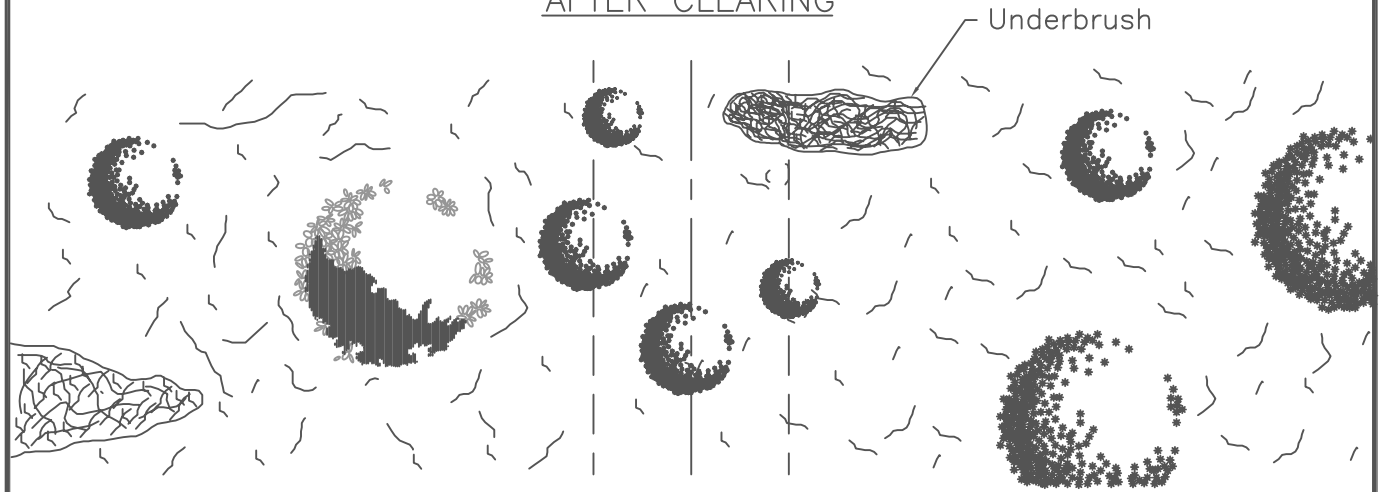
The landowner's written permission shall be received prior to cutting trees outside of the right-of-way. Trees fronting each side of the right-of-way shall be trimmed symmetrically unless otherwise specified. Dead trees beyond the right-of-way which would strike the line in falling shall be removed. 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.



ELEVATION



AFTER CLEARING



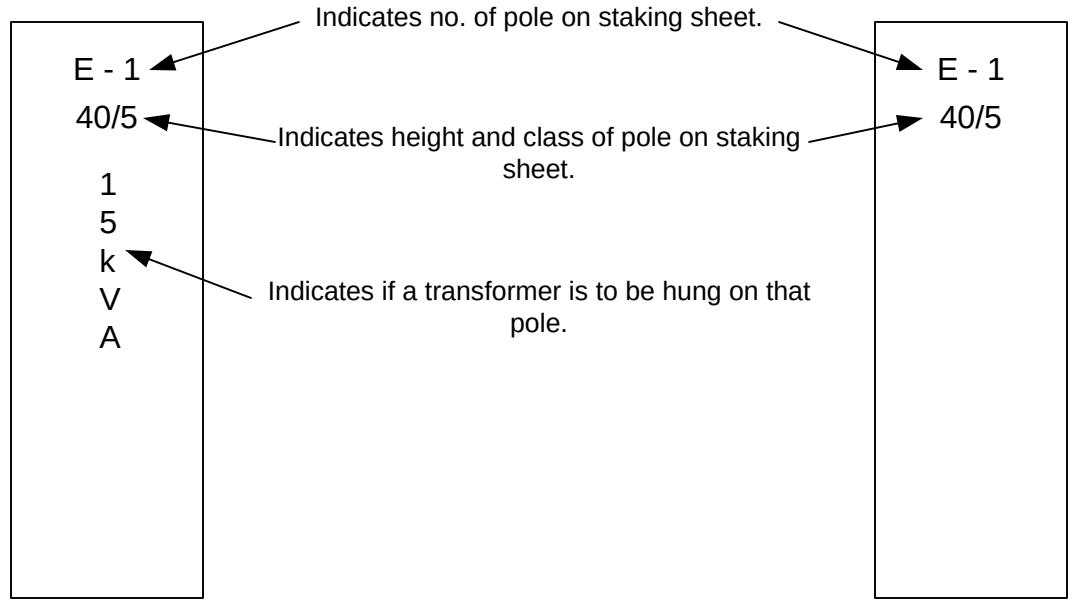
BEFORE CLEARING

NOTE:
Change suffix of drawing number to designate clearing width. (e.g. M1.30G specifies 30 foot wide clearing).

RIGHT–OF–WAY CLEARING GUIDE

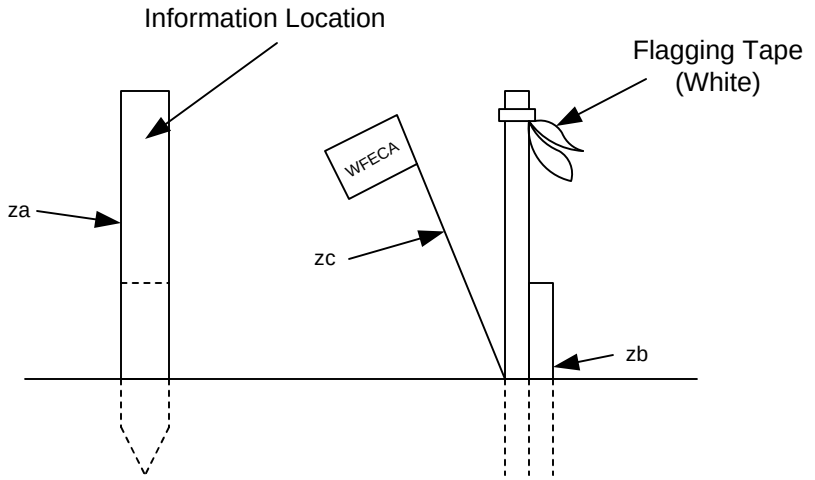
DEC 1998 RUS		M1.30G (R1)

STAKES INDICATING PRIMARY OR SERVICE POLE LOCATION

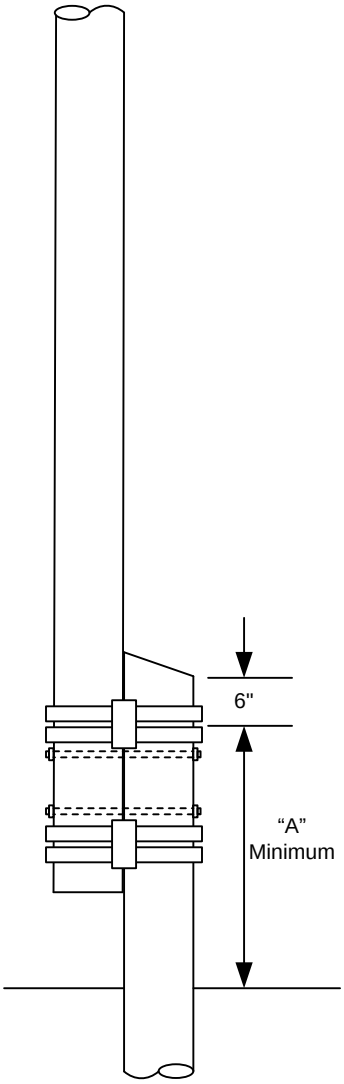


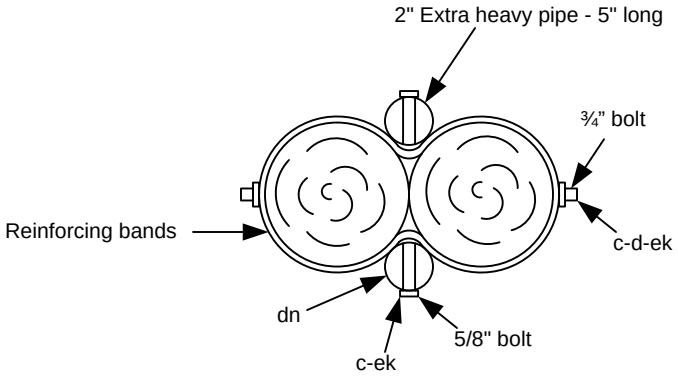
With Transformer

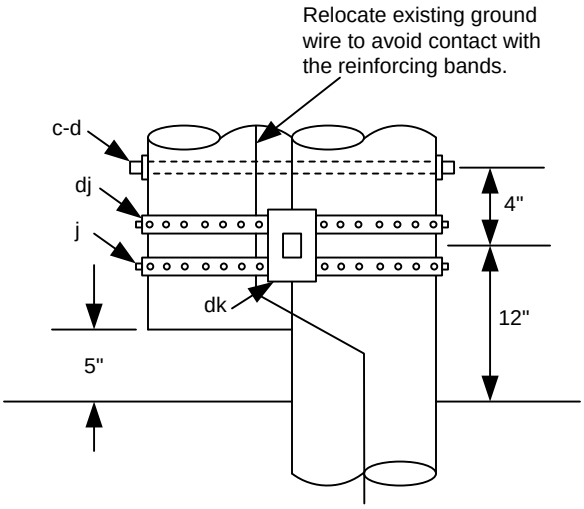
Without Transformer



ITEM	QTY.	MATERIAL	GUIDE TO STAKES FOR POLE LOCATION			
za	1	Lath				
zb	1	Hub Stake	2010	WFECA	24.9/14.4 kV	M3.3
zc		Wire Flag (White)				







Length of Pole	A	Min. Total length of stub
30'	5' 0"	10' 6"
35'	5' 0"	11' 0"
40'	5' 6"	11' 6"
45'	6' 0"	12' 6"
50'	6' 0"	13' 0"

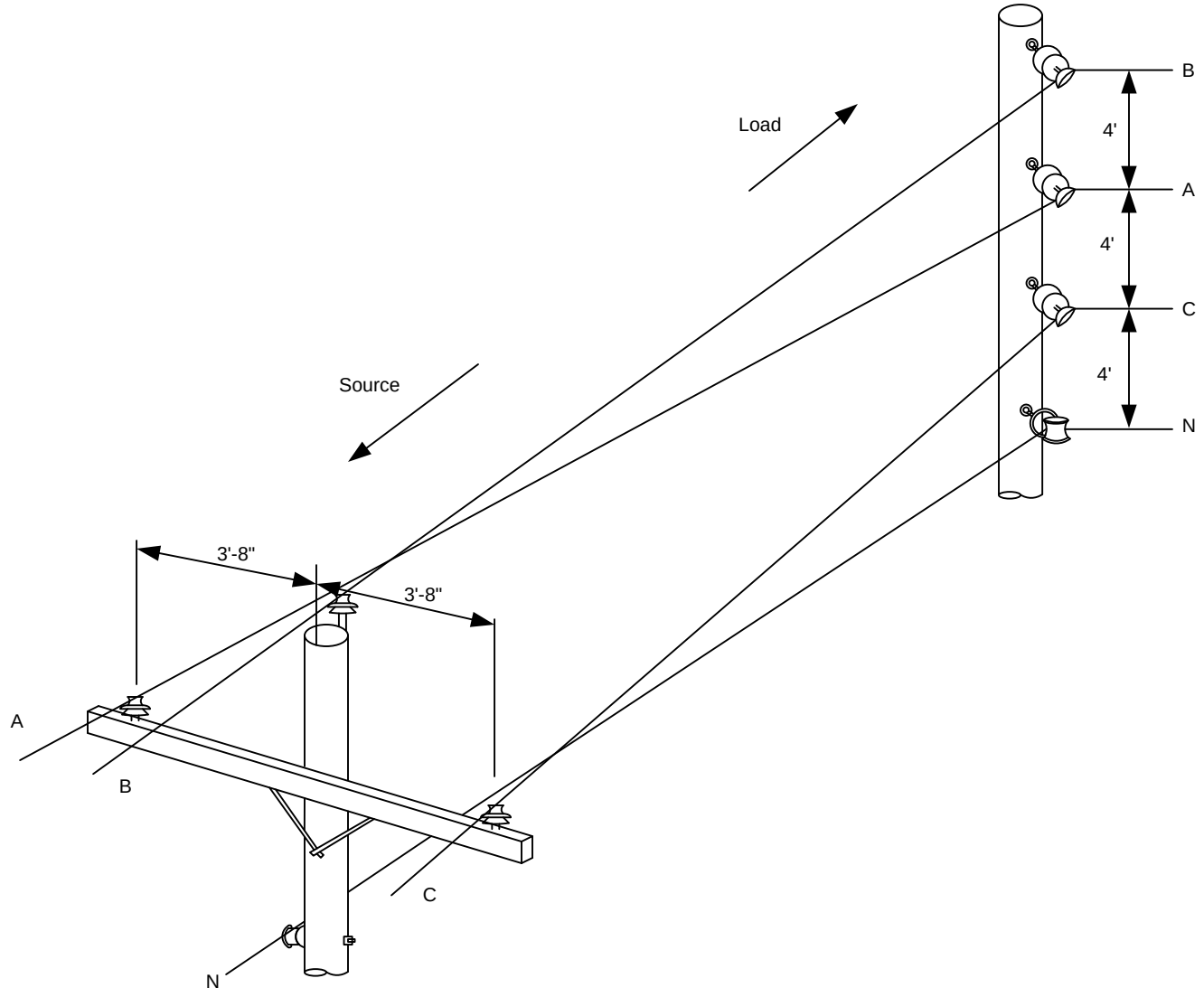
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, ¾" x required length
c	2	Bolt, Machine, 5//8" x required length
d	4	Washer, 2 ¼"
j	4	Screw, lag ½" x 4"
dj	4	Band, reinforcing, 12 gage x 2" x required length
dk	4	Pipe spacer, 2" extra heavy x 5" long
al		Staples, as required
ek	2	Locknut, ¾"
ek	2	Locknut, 5/8"

Note:

1. Position stub at side of pole (At right angle to direction of line and outside of angle.
2. Use reinforcing band for stubbing material as required.

STUB REINFORCING OF DISTRIBUTION LINE POLES

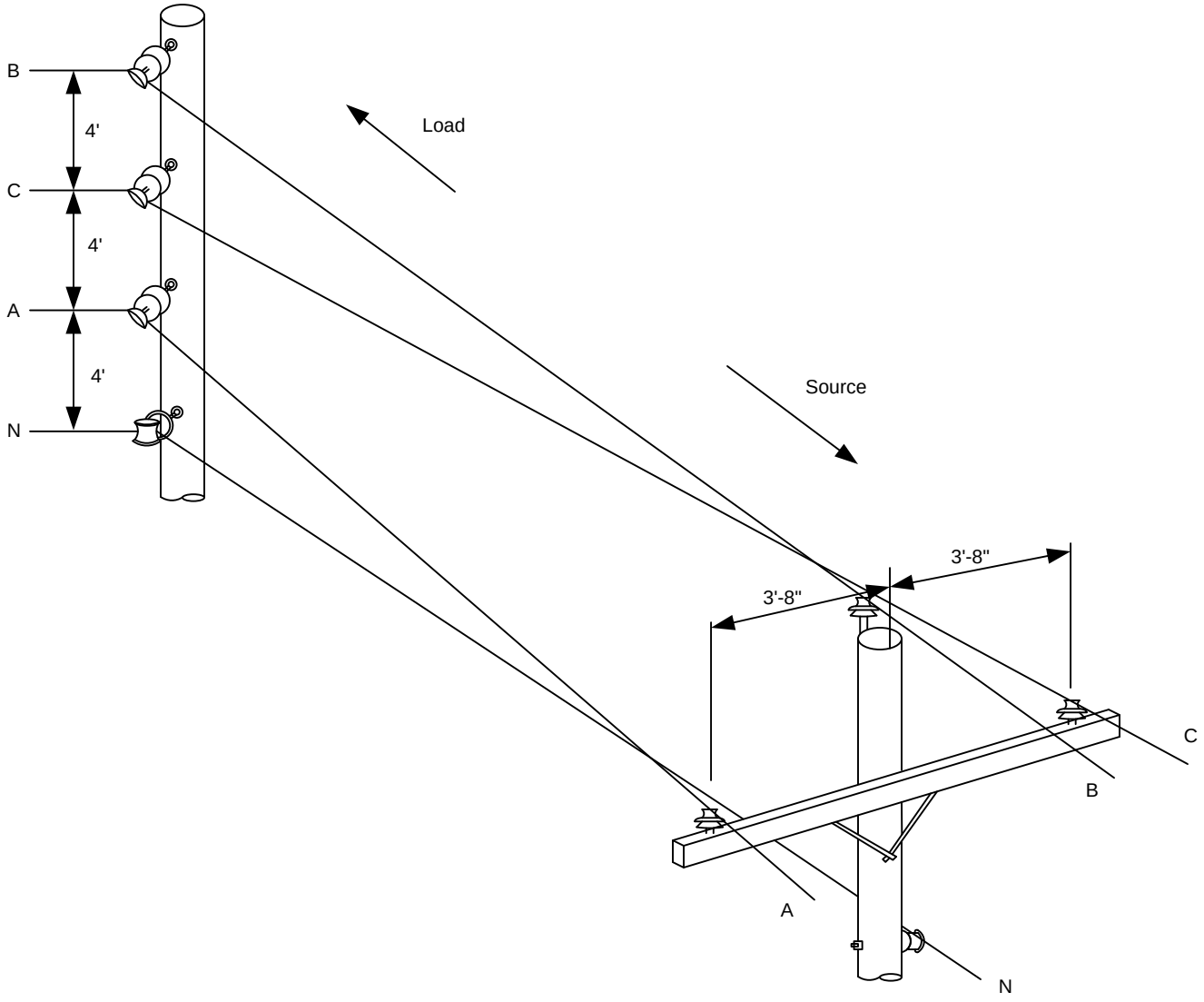
2005	WFECA	24.9/14.4 kV	M3.15 (M15)



Note:

1. For 60° to 90° angles use similar conductor arrangement with pole top assembly unit VC4.1 at angle pole.

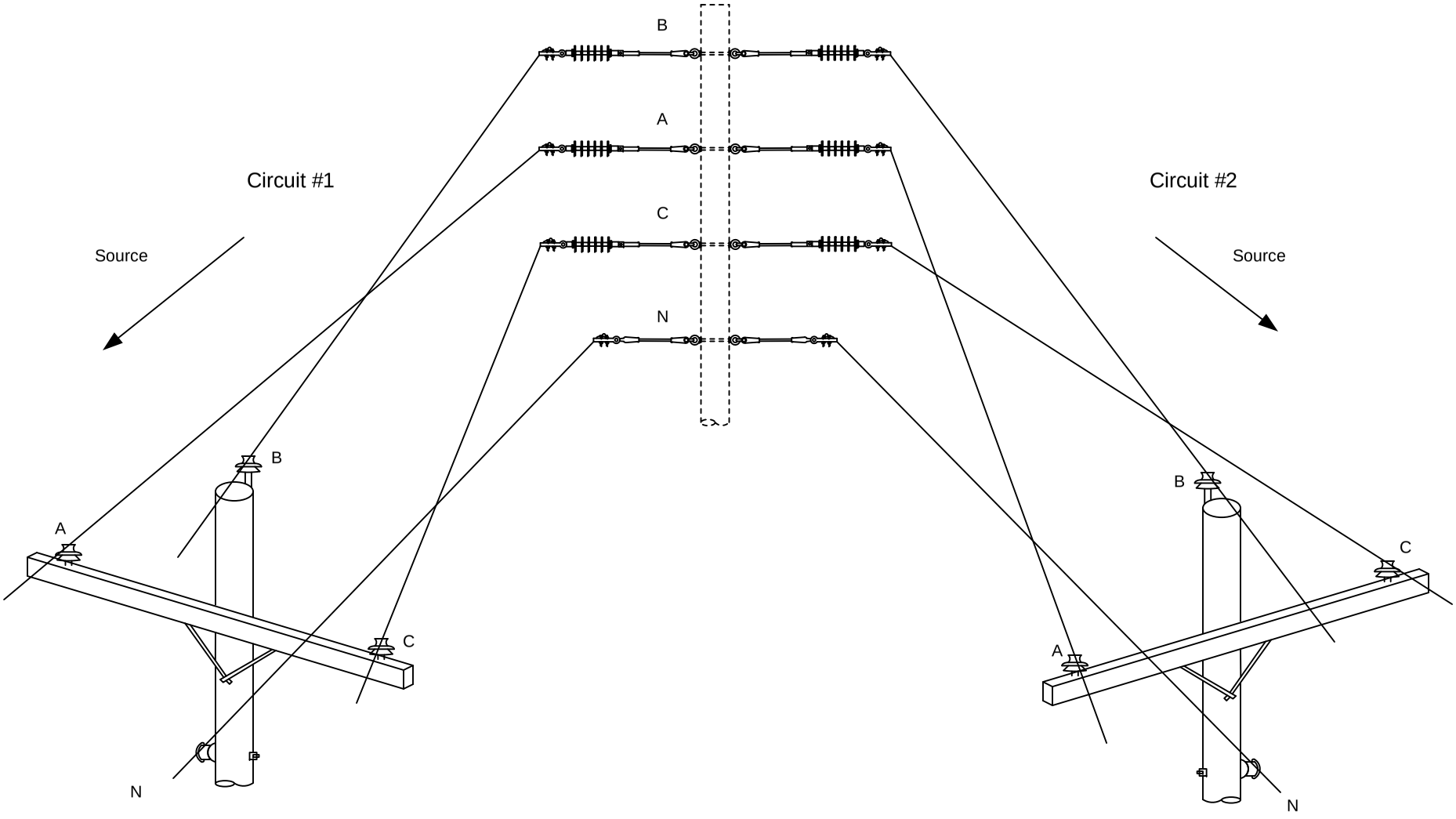
ANGLE CONSTRUCTION GUIDE TURN TO RIGHT CROSSARM TO VERTICAL CONST. – 30° to 60°			
2005	WFECA	24.9/14.4 kV	M3.21 (M21)



Note:

1. For 60° to 90° angles use similar conductor arrangement with pole top assembly unit VC4.1 at angle pole.

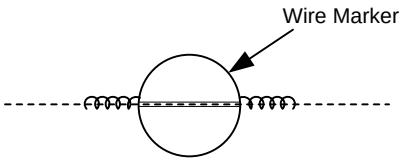
ANGLE CONSTRUCTION GUIDE TURN TO LEFT CROSSARM TO VERTICAL CONST. – 30° to 60°			
2005	WFECA	24.9/14.4 kV	M3.22 (M21)



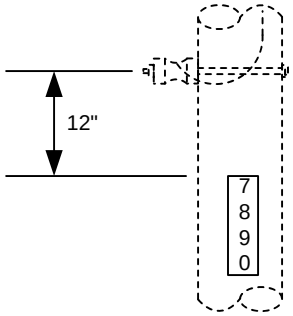
Note:

1. Always verify proper phasing before tying circuits.

GUIDE TO PHASING THREE PHASE CIRCUIT TO CIRCUIT AT OPEN POINT			
2005	WFECA	24.9/14.4 kV	M3.23



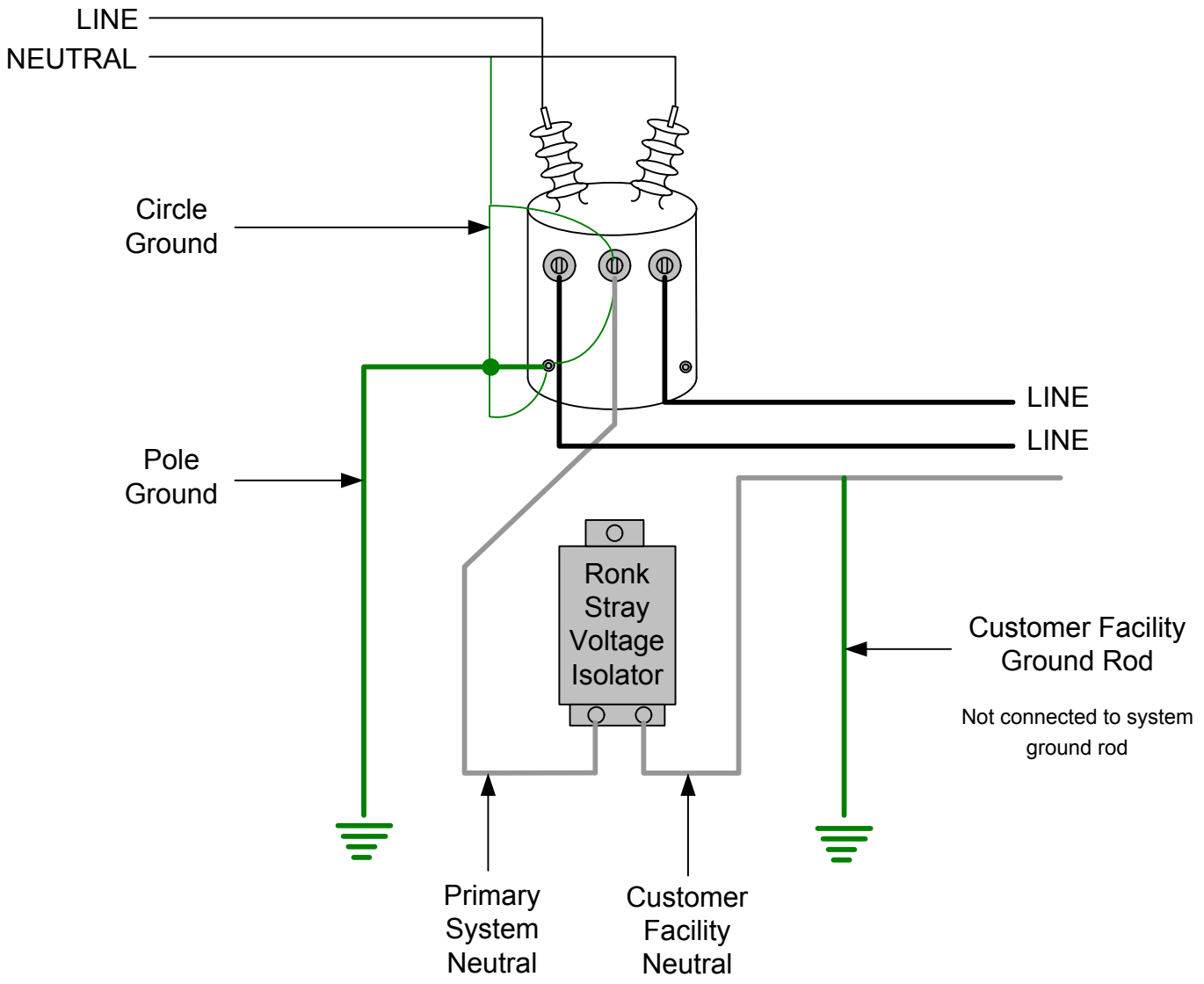
M4.1



M4.2

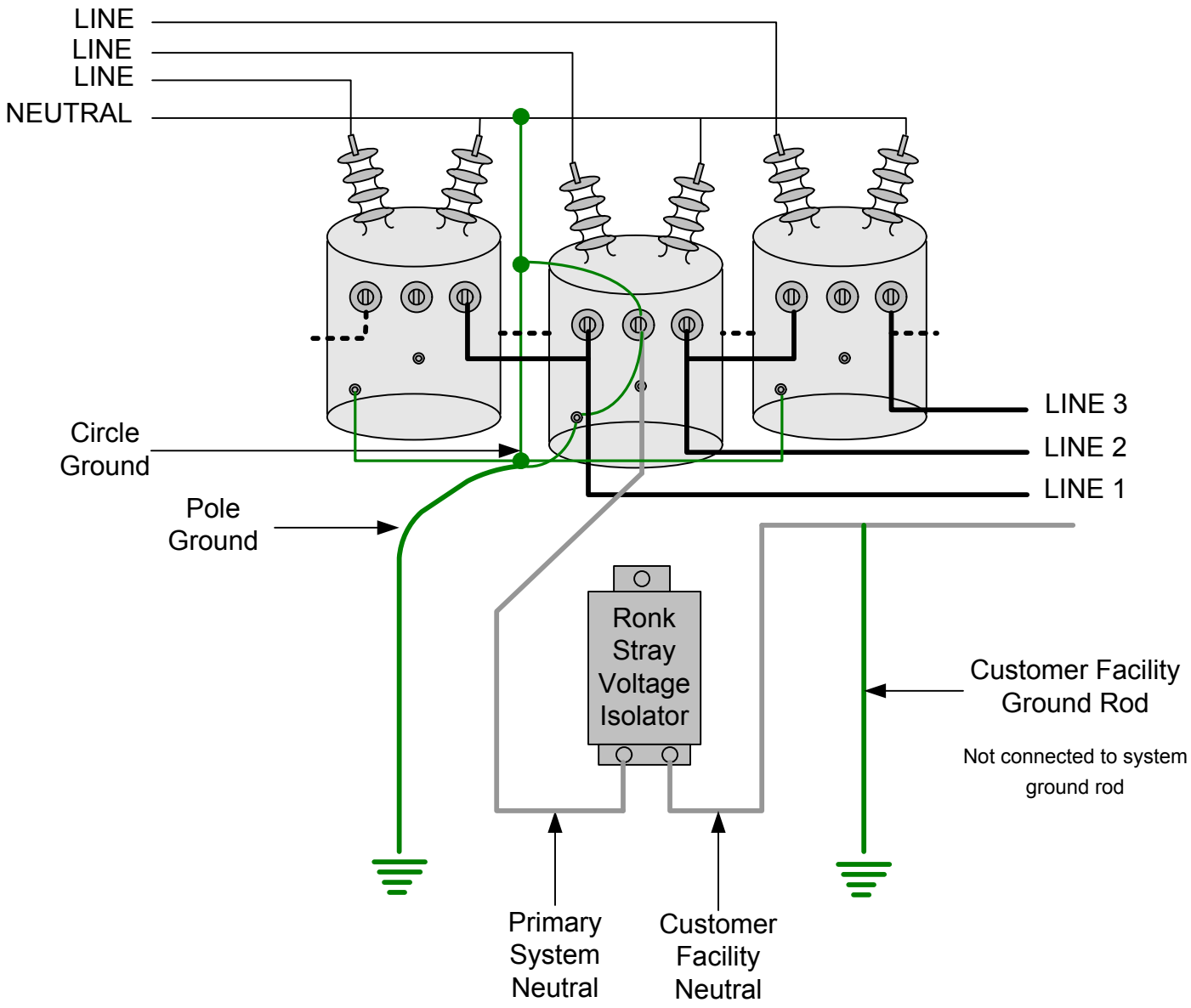
ITEM	MATERIAL	M4.1 QTY.	M4.2 QTY.
	Marker, Wire, 20" Minimum Diameter	1	
	Bracket, OCR/Switch Number		1

MISCELLANEOUS			
2005	WFECA	1 – Phase Primary 24.9/14.4 kV	M4.0



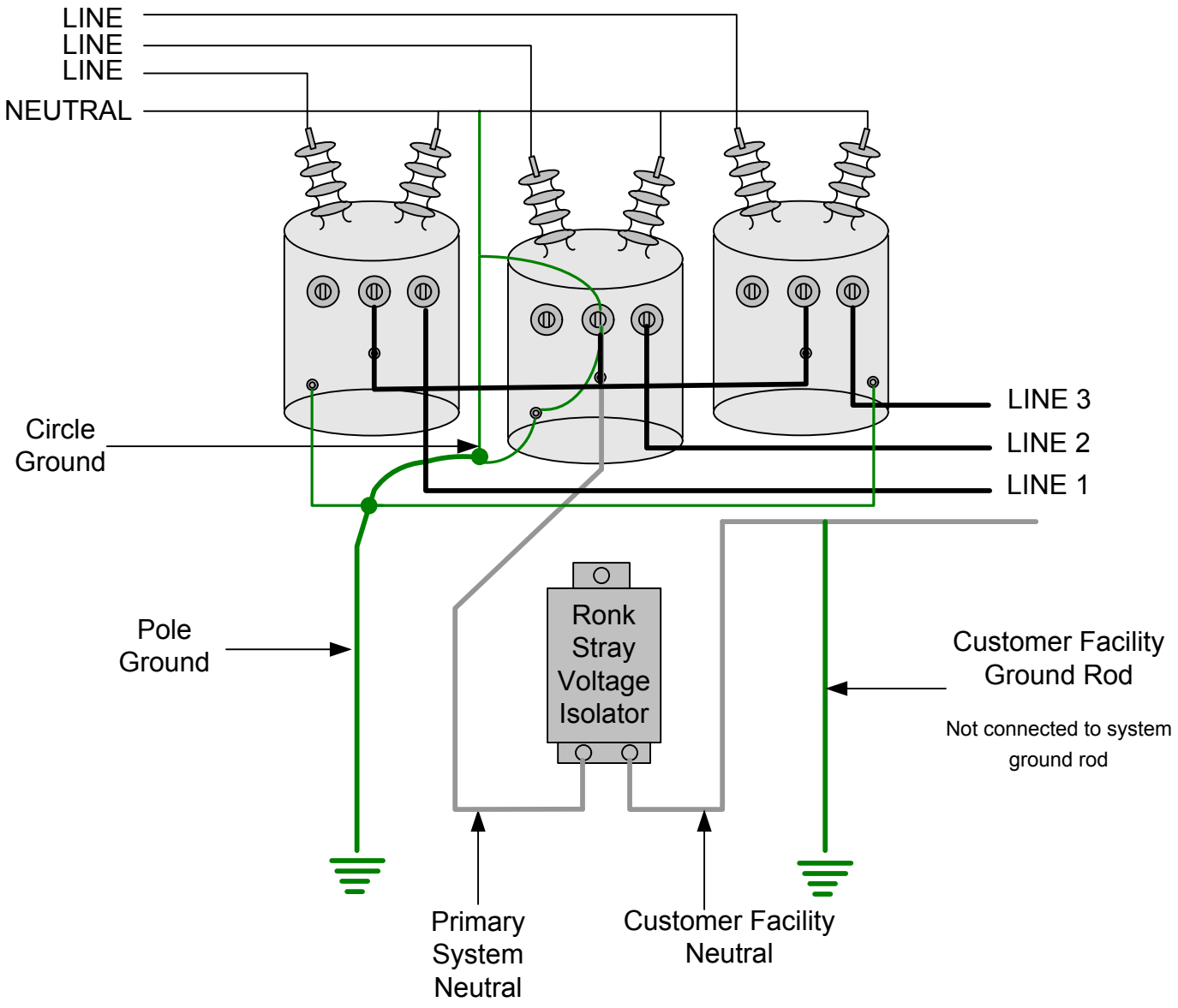
STRAY VOLTAGE ISOLATOR FOR
SINGLE PHASE CONVENTIONAL TRANSFORMER

ITEM	QTY.	MATERIAL	2013	WFECA	1 – Phase Primary 24.9/14.4 kV	M5.1
	1	Voltage Isolator				



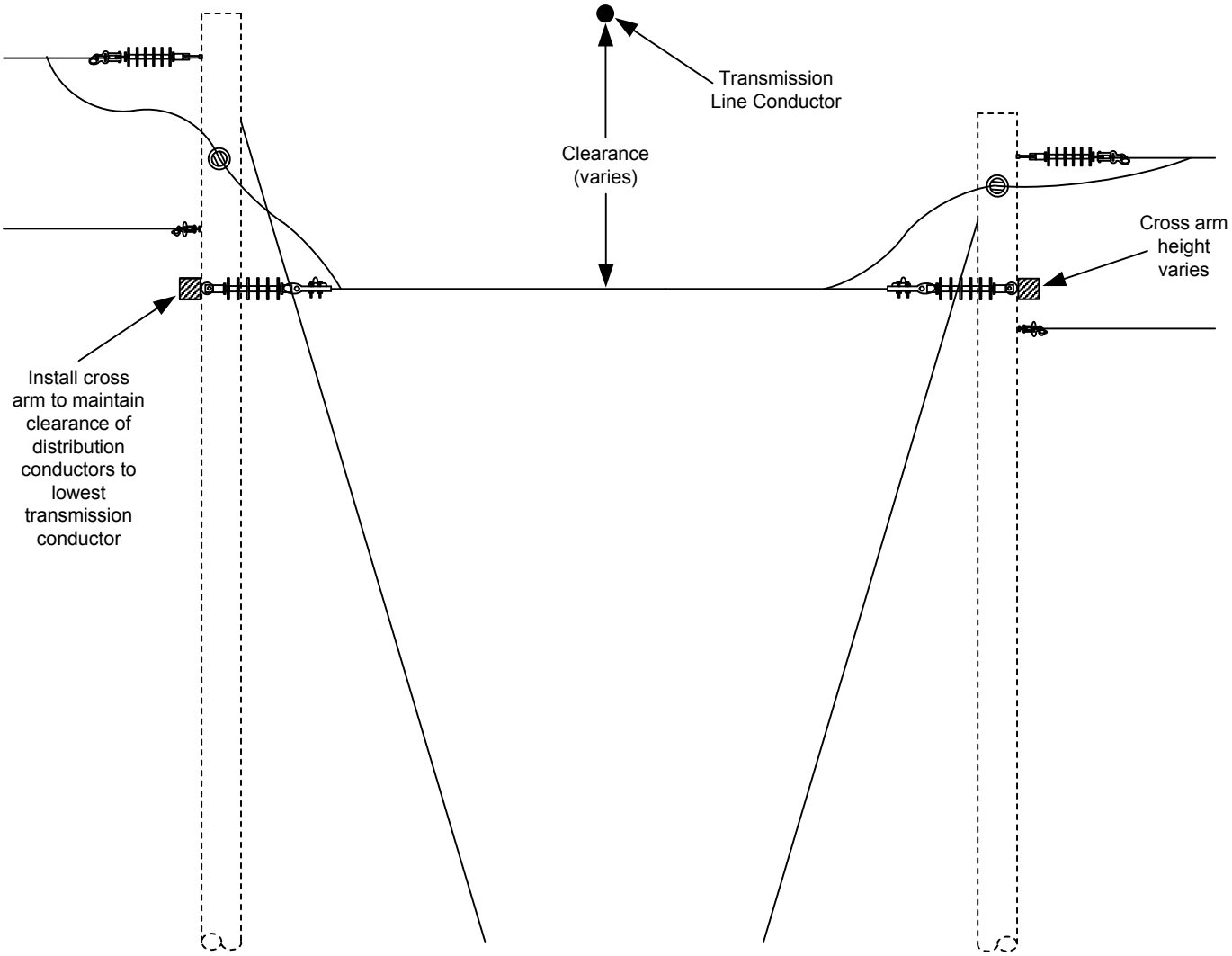
STRAY VOLTAGE ISOLATOR FOR
THREE PHASE CONVENTIONAL TRANSFORMER BANK
DELTA SECONDARY CONNECTION

ITEM	QTY.	MATERIAL				
	1	Voltage Isolator	2013	WFECA	3 – Phase Primary 24.9/14.4 kV	M5.2



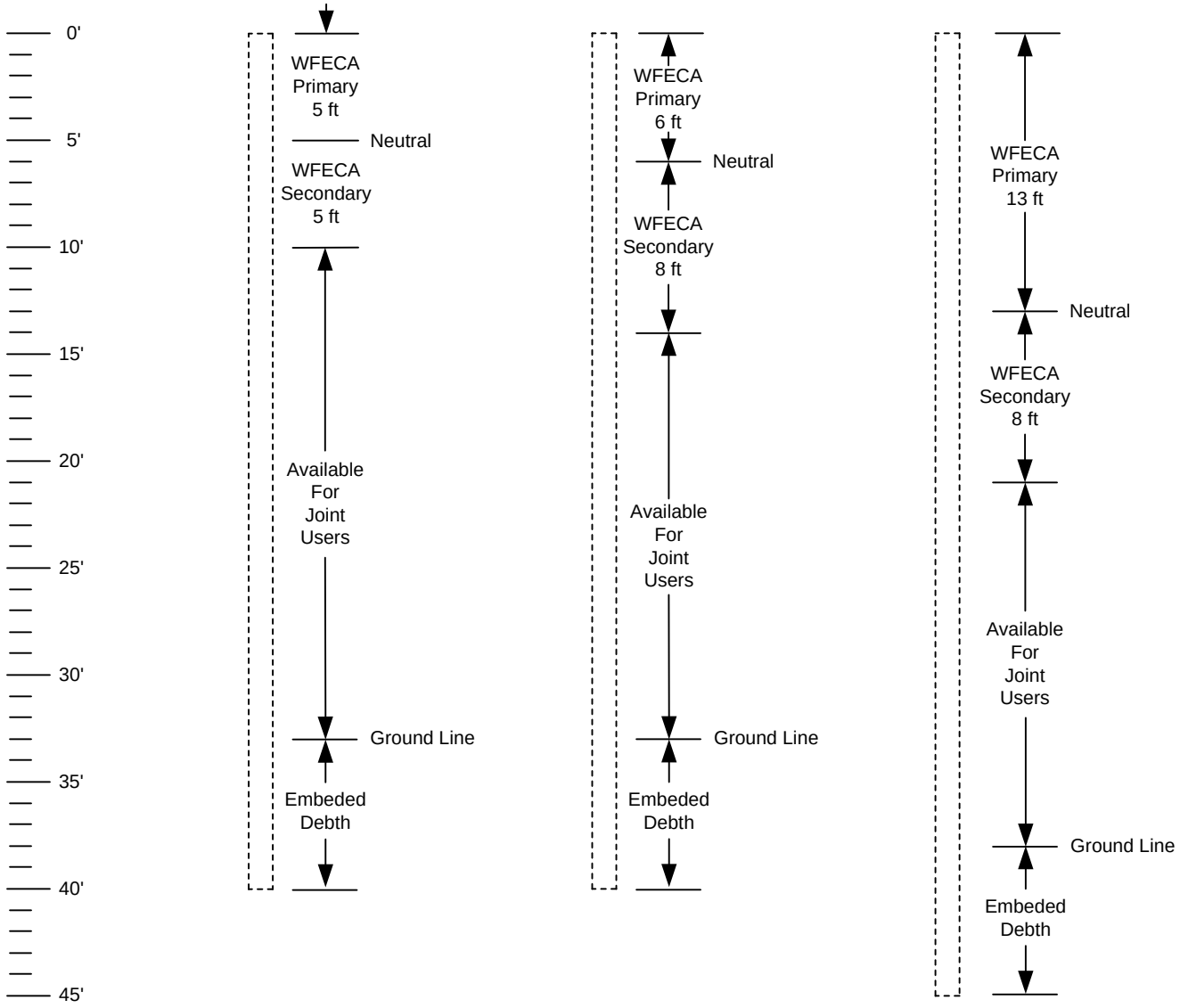
STRAY VOLTAGE ISOLATOR FOR
THREE PHASE CONVENTIONAL TRANSFORMER BANK
WYE SECONDARY CONNECTION

ITEM	QTY.	MATERIAL				
	1	Voltage Isolator	2013	WFECA	3 – Phase Primary 24.9/14.4 kV	M5.3



Notes: 1. Use assembly units VA5.1, VA5.21, VA1.04, E1.1, and F2.8.

GUIDELINE TO CROSSING UNDER LOW TRANSMISSION LINES			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	M6.1



Embeded Depth
35 or 40 ft pole - use 6 ft
45 or 50 ft pole - use 7 ft
55 or 60 ft pole - use 8 ft
65 or 70 ft pole - use 9 ft

Maximum Attachment Height of Joint Users

35 ft pole – 19 ft
40 ft pole – 24 ft
45 ft pole – 28 ft
50 ft pole – 33 ft
55 ft pole – 37 ft
60 ft pole – 42 ft
65 ft pole – 46 ft
70 ft pole – 51 ft

Maximum Attachment Height of Joint Users

35 ft pole – 15 ft
40 ft pole – 20 ft
45 ft pole – 24 ft
50 ft pole – 29 ft
55 ft pole – 33 ft
60 ft pole – 38 ft
65 ft pole – 42 ft
70 ft pole – 49 ft

Maximum Attachment Height of Joint Users

45 ft pole – 17 ft
50 ft pole – 22 ft
55 ft pole – 26 ft
60 ft pole – 31 ft
65 ft pole – 35 ft
70 ft pole – 40 ft

GUIDE TO JOINT USER MAXIMUM ATTACHMENT HEIGHTS

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	M7.1

M12.4

M12.6

M12.7

DANGER, WARNING AND INFORMATION SIGNS (METAL, POLE MOUNT)		
2011	WFECA	M12.0

FFA Regulations

U.S. Department of Transportation
Federal Aviation Administration
Advisory Circular AC 70/7460-1J
January 1, 1996

34. Markers
Markers used to highlight structures when it is impractical to make them conspicuous by painting. Markers may also be used in addition to aviation orange and white paint when additional conspicuity is necessary for aviation safety. They should be displayed in conspicuous positions on or adjacent to the structures so as to retain the general definition of the structure. They should be recognizable in clear air from a distance of at least 40000 feet (1219m) and in all directions, from which aircraft are likely to approach. Markers should be distinctively shaped, i.e. spherical, cylindrical, so they are not mistaken for items that are used to convey other information. They should be replaced when faded or otherwise deteriorated.

a. Spherical Markers. Spherical markers are used to identify overhead wires. Markers may be of another shape, i.e., cylindrical, provided the projected area of such markers will not be less than that presented by a spherical marker.

1. Size and Color.
(a) The diameter of the markers are used on extensive catenary wires across canyons, lakes, rivers, etc., should be not less than 36 inches (91cm).

Smaller 20-inch (51cm) spheres are permitted on less extensive power lines or on power lines below 50 feet (15m) above ground and within 1,500feet (458m) of an airport runway end. Each marker should be a solid color such as aviation orange, white, yellow.

2. Installations.
(a) Spacing. Markers should be spaced equally along the wire at intervals of approximately 200 feet (61m) or fraction thereof. Intervals between markers should be less in critical areas near runway ends (i.e., 30 to 50 feet). They should be displayed on the highest wire or by another means at the same height as the highest wire. Where there is more than one wire at the highest point, the markers may be installed alternately along each wire if the distance between adjacent markers meets the spacing standard. This method allows the weight and wind loading factors to be distributed.

(b) Pattern. An altering color scheme provides the most conspicuity against all backgrounds. Mark overhead wires by alternating solid colored markers of aviation orange, white and yellow. Normally, an orange sphere is placed at each end of a line and the spacing is adjusted (not to exceed 200 feet) to accommodate the rest of the markers. When less than four markers are used, they should all be aviation orange.

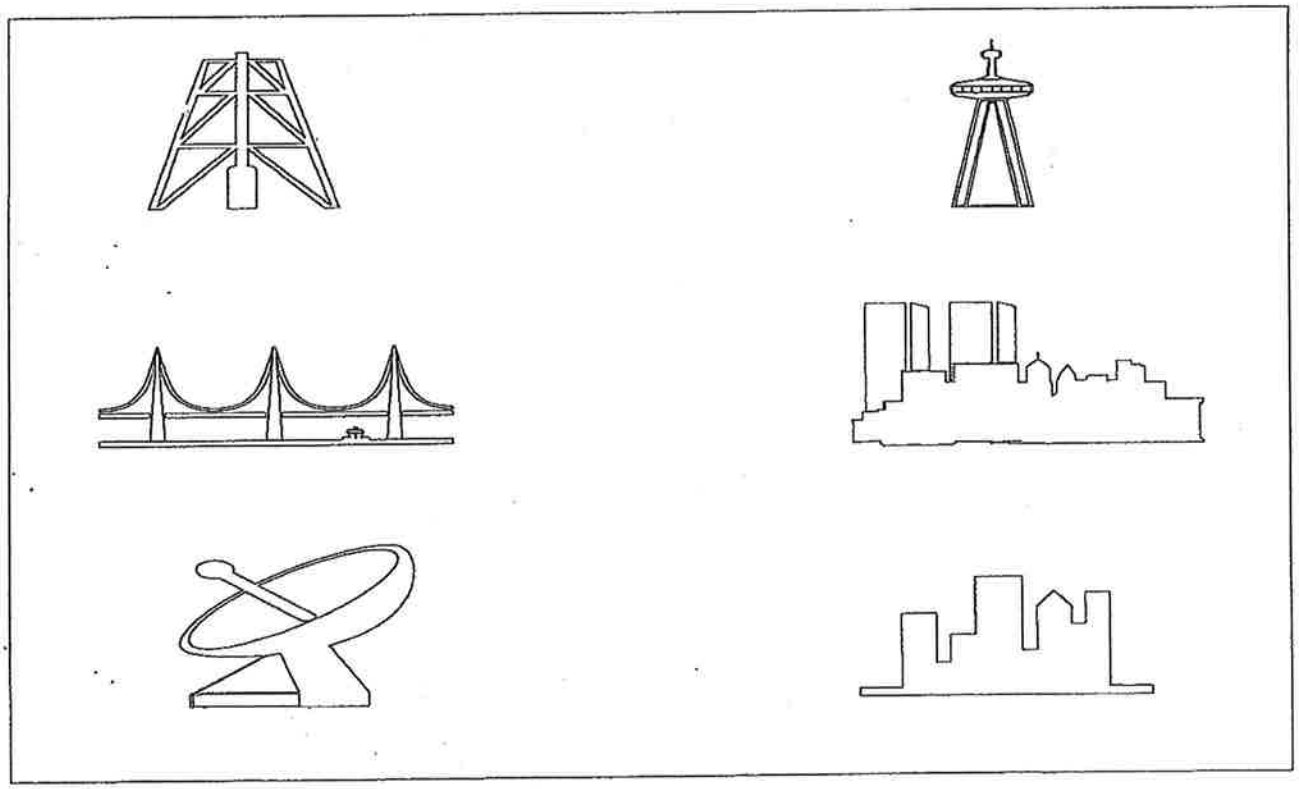
U.S. Department
of Transportation

Federal Aviation Administration

ADVISORY CIRCULAR

AC 70/7460-2K

Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace



Effective: March 1, 2000

Prepared by the Air Traffic Airspace Management Program

U.S. Department of Transportation

Federal Aviation Administration

ADVISORY CIRCULAR

Subject: PROPOSED CONSTRUCTION OR ALTERATION OF OBJECTS THAT MAY AFFECT THE NAVIGABLE AIRSPACE

Date: 3/1/00 **AC No:** 70/7460.2K

Initiated by: ATA-400

1. PURPOSE.

This Advisory Circular (AC) provides information to persons proposing to erect or alter an object that may affect the navigable airspace. The AC also explains the requirement to notify the Federal Aviation Administration (FAA) before construction begins and FAA's responsibility to respond to these notices in accordance with Title 14 Code of Federal Regulations (14 CFR) part 77, Objects Affecting Navigable Airspace. Additionally, the AC explains the process by which to petition the FAA's Administrator for discretionary review of the determinations issued by the FAA.

2. CANCELLATION.

AC 70/7460-2J, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace, dated 11/29/95, is cancelled.

3. BACKGROUND/AUTHORITY.

a. 49 U.S.C. Section 44718 mandates, in pertinent part, that "The Secretary of Transportation shall require a person to give adequate public notice...of the construction or alteration, establishment or extension, or the proposed construction, alteration, establishment, or expansion, of any structure...when the notice will promote:

(1) safety in air commerce, and

(2) the efficient use and preservation of the navigable airspace and of airport traffic capacity at public-use airports."

b. To this end, 14 CFR Part 77 was issued prescribing that notice shall be given to the Administrator of certain proposed construction or alteration.

4. EFFECTIVE DATE.

This advisory circular becomes effective March 1, 2000.

5. NOTICES.

a. WHY IS NOTIFICATION REQUIRED?

In administering 14 CFR Part 77, the FAA's prime objectives are to ensure the safe and efficient use of the navigable airspace. The FAA recognizes that there are varied demands for the use of airspace, both by aviation and nonaviation interests. When conflicts arise out of construction proposals, the FAA emphasizes the need for conserving the navigable airspace. Therefore, early notice of proposed construction or alteration provides the FAA the opportunity to:

(1) Recognize potential aeronautical hazards to minimize the adverse effects to aviation.

(2) Revise published data or issue a Notice to Airmen (NOTAM) to alert pilots to airspace or procedural changes made as a result of the structure.

(3) Recommend appropriate marking and lighting to make objects visible to pilots. Before filing FAA Form 7460-1, Notice of Proposed Construction or Alteration, construction sponsors should become knowledgeable in the different types of obstruction marking and lighting systems that meet FAA standards. Information about these systems can be obtained from the manufacturers. Proponents can then determine which system best meets their needs based on purchase, installation, and maintenance costs. The FAA will make every effort to accommodate the request.

(4) Depict obstacles on aeronautical charts for pilotage and safety.

b. WHO MUST FILE NOTICE?

Any person or an agent who intends to sponsor construction is required to submit notice to the Administrator if the proposed construction or alteration falls within any of the following categories:

(1) *Greater than 200 feet in height.* The proposed object would be more than 200 feet above ground level (AGL) at its location.

NOTE-
See FIG 1 and FIG 2.

Object Penetrates Airport/Seaplanes Base Surface

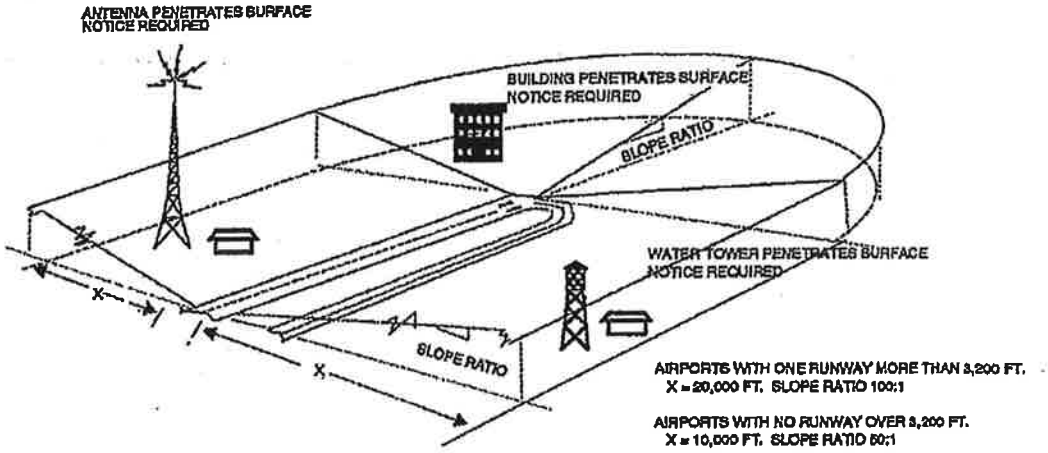


FIG 3

(b) *Heliport.* The proposed object would be within 5,000 feet of a heliport and would exceed a 25:1 horizontal slope (25 feet horizontally for each 1 foot vertically) from the nearest landing and takeoff area of that heliport.

NOTE-
See FIG 4.

Object Penetrates Heliport Surface

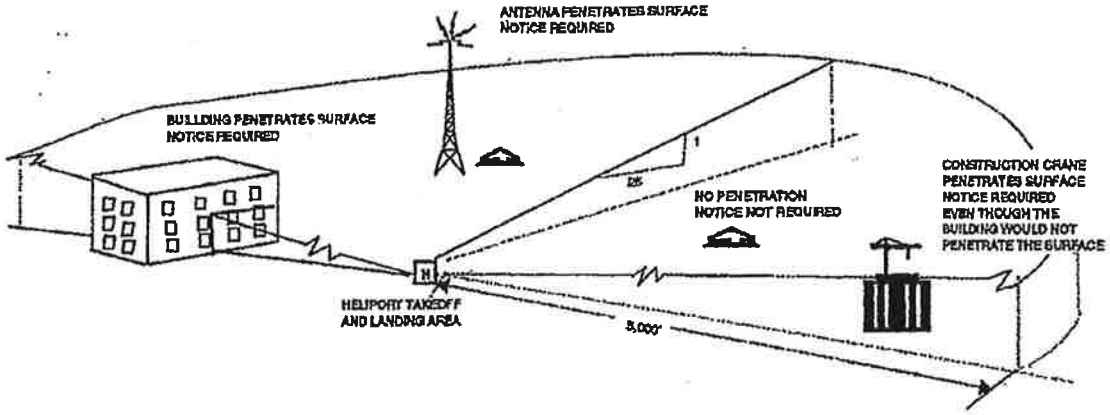


FIG 4

(3) Highways and Railroads. The proposed object is a traverse way which would exceed one or more of the standards listed in paragraphs a and b above, after the height of the object is adjusted upward as follows:

(a) Private road: 10 feet or the height of the highest mobile object that would traverse the roadway, whichever is greater.

(b) Other public roadways: 15 feet.

(c) Interstate Highways: 17 feet.

(d) Railroad: 23 feet.

(e) Waterway or any other thoroughfare not previously mentioned: an amount equal to the highest mobile object that would traverse the waterway or thoroughfare.

NOTE-
See FIG 5.

facilitate the FAA's analysis of the project. The completed form should be mailed to the Manager, Air Traffic Division, of the regional office having jurisdiction over the area within which the construction or alteration will occur.

NOTE-
Information on regional addresses may be found on the FAA's website at www.faa.gov/ats/ata/ata-400/oeaaa.htm or contact the FAA listed in local telephone books under United States Government.

f. PENALTY FOR FAILING TO PROVIDE NOTICE.

Persons who knowingly and willfully violate the notice requirements of 14 CFR part 77 are subject to a civil penalty.

g. COMPLIANCE RESPONSIBILITY.

A notice filed with the FAA does not relieve the proponent of compliance with laws, ordinances or regulations of any other Federal, state or local governmental entity.

h. ASSOCIATED PUBLICATIONS.

The following publications contain obstruction criteria, marking and lighting standards and specifications for lighting and paint.

(1) *Federal Aviation Regulations 14 CFR, part 77, Objects Affecting Navigable Airspace.* This part sets forth the requirements for notice to the FAA of proposed construction or alteration and provides standards for determining obstructions to navigable airspace. 14 CFR, part 77 (Stock No. 050-007-00276-9) may be ordered from:

Superintendent of Documents
U. S. Government Printing Office
Washington, DC 20402

(2) *Advisory Circulars.* FAA advisory circulars are available free of charge from:

Department of Transportation
TASC
Subsequent Distribution Office,
SVC-121.23
Ardmore East Business Center
3341 Q 75th Avenue
Landover, MD 20785

(a) *AC 70/7460-1,* Obstruction Marking and Lighting, describes the standards for marking and lighting structures such as buildings, chimneys, antenna towers, cooling towers, storage tanks, supporting structures of overhead wires, etc.

(b) *AC 150/5190-4,* A Model Zoning Ordinance to Limit Height or Objects Around Airports, provides a model-zoning ordinance to be used as a guide to control the height of objects around airports.

(c) *AC 150/5300-13,* Airport Design, includes planning information on electronic and visual navigational aids and air traffic control facility siting and clearance requirements that influence the physical layout of airports.

(d) *AC 150/5345-53,* Airport Lighting Equimpent Certification Program, addendum lists equipment model numbers and manufacturer's part numbers in compliance with item (e) below. The addendum is located on the Internet at the Office of Airports homepage: http://www.faa.gov/arp/arphome.htm under Advisory Circulars.

(e) *AC 150/5345-43,* Specification for Obstruction Lighting Equipment, contains specifications for equipment used in obstruction lighting systems.

(3) *Marking Specifications and Standards.* Aviation colors and paint standards and specifications are available from:

General Services Administration
Specifications Section
470 L'Enfant Plaza, Suite 8214
Washington, DC 20407

(4) *FAA Forms.* FAA forms are available free of charge from all FAA regional offices.

(a) *FAA Form 7460-1, Notice of Proposed Construction or Alteration,* is used to notify the FAA of proposed construction or alteration of an object that may affect the navigable airspace.

(b) *FAA Form 7460-2, Notice of Actual Construction or Alteration,* is used to notify the FAA of progress or abandonment, as requested on the form. The FAA regional office routinely includes this form with a determination when such information will be required. The information is used for charting purposes, to change affected aeronautical procedures and to notify pilots of the location of the structure.

i. ADMINISTRATIVE ASSISTANCE TO CONSTRUCTION PROPONENTS.

(1) Airspace specialists are available in each regional office to assist proponents in filing their notice. Proponents are encouraged to call in advance for appointments. Limited resources often prevent the specialist from responding spontaneously without advanced planning or preparation.

(2) To insure timely determinations, construction proponents must submit complete and accurate data. Lack of complete and accurate data could result in the return of the form. United States Geological Survey quadrangle maps are available at nominal costs to aid in determining

INSTRUCTIONS
FOR
NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION
(FAA Form 7460-1)

PLEASE TYPE or PRINT

ITEM #1. Please include the name, address, and phone number of a personal contact point as well as the company name.

ITEM #2. Please include the name, address, and phone number of a personal contact point as well as the company name.

ITEM #3. New Construction would be a structure that has not yet been built.
Alteration is a change to an existing structure such as the addition of a side mounted antenna, a change to the marking and lighting, a change to power and/or frequency, or a change to the height. The nature of the alternation shall be included in ITEM #21 "Complete Description of Proposal".

Existing would be a correction to the latitude and/or longitude, a correction to the height, or if filing on an existing structure which has never been studied by the FAA. The reason for the notice shall be included in ITEM #21 "Complete Description of Proposal".

ITEM #4. If Permanent, so indicate. If Temporary, such as a crane or drilling derrick, enter the estimated length of time the temporary structure will be up.

ITEM #5. Enter the date that construction is expected to start and the date that construction should be completed.

ITEM #6. Please indicate the type of structure. DO NOT LEAVE BLANK.

ITEM #7. In the event that obstruction marking and lighting is required, please indicate type desired. If no preference, check "other' and indicate "no preference'. DO NOT LEAVE BLANK. NOTE: High intensity lighting shall be used only for structures over 500'AGL. In the absence of high intensity lighting for structures over 500' AGL, marking is also required.

ITEM #8. If this is an existing tower that has been registered with the FCC, enter the FCC Antenna Structure Registration number here.

ITEM #9. and **#10.** Latitude and longitude must be geographic coordinates, accurate to within the nearest second or to the nearest hundredth of a second if known. Latitude and longitude derived solely from a hand-held GPS instrument is NOT acceptable. A hand-held GPS is only accurate to within 100 meters (328 feet) 95 per cent of the time. This data, when plotted, should match the site depiction submitted under ITEM #20.

ITEM #11. NAD 83 is preferred; however, latitude/longitude may be submitted in NAD 27. Also, in some geographic areas where NAD 27 and NAD 83 are not available other datums may be used. It is important to know which datum is used. DO NOT LEAVE BLANK.

ITEM #12. Enter the name of the nearest city/state to the site. If the structure is or will be in a city, enter the name of that city/state.

ITEM #13. Enter the full name of the nearest public-use (not private-use) airport (or heliport) or military airport (or heliport) to the site.

ITEM #14. Enter the distance from the airport or heliport listed in #13 to the structure.

ITEM #15. Enter the direction from the airport or heliport listed in #13 to the structure.

ITEM #16. Enter the site elevation above mean sea level and expressed in whole feet rounded to the nearest foot (e.g. 17' 3" rounds to 17', 17'6" rounds to 18'). This data should match the ground contour elevations for site depiction submitted under ITEM #20.

ITEM #17. Enter the total structure height above ground level in whole feet rounded to the next highest foot (e.g. 17'3" rounds to 18'). The total structure height shall include anything mounted on top of the structure, such as antennas, obstruction lights, lightning rods, etc.

ITEM #18. Enter the overall height above mean sea level and expressed in whole feet. This will be the total of ITEM #16 + ITEM #17.

ITEM #19. If an FAA aeronautical study was previously conducted, enter the previous study number.

ITEM #20. Enter the relationship of the structure to roads, airports, prominent terrain, existing structures, etc. Attach an 8-1/2" X 11" non-reduced copy of the appropriate 7.5 minute U.S. Geological Survey (USGS) Quadrangle Map MARKED WITH A PRECISE INDICATION OF THE SITE LOCATION. To obtain maps, Contact USGC at 1-800-435-7627 or via Internet at "http://mapping.usgs.gov". If available, attach a copy of a documented site survey with the surveyor's certification stating the amount of vertical and horizontal accuracy in feet.

ITEM #21.

- For transmitting stations, include maximum effective radiated power (ERP) and all frequencies.
- For antennas, include the type of antenna and center of radiation (Attach the antenna pattern, if available).
- For microwave, include azimuth relative to true north.
- For overhead wires or transmission lines, include size and configuration of wires and their supporting structures (Attach depiction).
- For each pole/support, include coordinates, site elevation, and structure height above ground level or water.
- For buildings, include site orientation, coordinates of each corner, dimensions, and construction materials,
- For alterations, explain the alteration thoroughly,
- For existing structures, thoroughly explain the reason for notifying the FAA (e.g. corrections, no record of previous study, etc.).

Filing this information with the FAA does not relieve the sponsor of this construction or alteration from complying with any other federal state or local rules or regulations. If you are not sure what other rules or regulations apply to your proposal, contact local/state aviation and zoning authorities.

Submit the 7460-1 form to the appropriate office.

Agency Display Of Estimated Burden For Notice of Landing Area Proposal

Paperwork Reduction Work Act Statement: This information is collected to evaluate the effect of proposed construction or alteration on air navigation and is not confidential. Providing this information is mandatory for anyone proposing construction or alteration that meets or exceeds the criteria contained in 14 CFR , part 77. We estimate that the burden of this collection is an average 19 minutes per response. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless R displays a currently valid OMB control number. The OMB control number for this collection is 2120-0001.

If you wish to comment on the accuracy of the estimate or make suggestions for reducing this burden, please direct your comments to OMB and the FAA at the following addresses:

Office of Management and Budget Paperwork Reduction Project 2120-0036 Washington, D.C. 20503	-and-	**U.S. Department of Transportation**, Federal Aviation Administration Airspace and Obstruction Evaluation Branch, ATP-240 800 Independence Avenue, S.W. Washington, D.C. 20591

Please Type or Print on This Form

Form Approved OMB No.2120-0001
Expiration Date: 7/31/07

U.S. Department of Transportation
Federal Aviation Administration

Failure To Provide All Requested Information May Delay Processing of Your Notice

Notice of Proposed Construction or Alteration

FOR FAA USE ONLY
Aeronautical Study Number

1. Sponsor *(person, company, etc. proposing this action):*
Attn. of: _____
Name: _____
Address: _____
_____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____

2. Sponsor's Representative *(if other than #1):*
Attn. of: _____
Name: _____
Address: _____
_____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____

3. Notice of: ☐ New Construction ☐ Alteration ☐ Existing

4. Duration: ☐ Permanent ☐ Temporary (____ months, ____ days)

5. Work Schedule: Beginning _____ End _____

6. Type: ☐ Antenna Tower ☐ Crane ☐ Building ☐ Power Line
☐ Landfill ☐ Water Tank ☐ Other _____

7. Marking/Painting and/or Lighting Preferred:
☐ Red Lights and Paint ☐ Dual - Red and Medium Intensity White
☐ White - Medium Intensity ☐ Dual - Red and high Intensity White
☐ White - High Intensity ☐ Other

8. FCC Antenna Structure Registration Number *(if applicable)*:
_____

9. Latitude: _____ ° _____ ' _____ , _____ "

10. Longitude: _____ ° _____ ' _____ , _____ "

11. Datum: ☐ NAD 83 ☐ NAD 27 ☐ Other

12. Nearest: City: _____ State _____

13. Nearest *Public-use* *(not private-use)* or Military Airport or Heliport:
_____

14. Distance from #13. to Structure: _____

15. Direction from #13. to Structure: _____

16. Site Elevation *(AMSL)*: _____ ft.

17. Total Structure Height *(AGL)*: _____ ft.

18. Overall Height (#16 + #17) *(AMSL)*: _____ ft.

19. Previous FAA Aeronautical Study Number *(if applicable)*:
_____ -OE

20. Description of Location: *(Attach a USGS 7.5 minute Quadrangle Map with the precise site marked and any certified survey)*

21. Complete Description of Proposal:

Frequency/Power (kW)	

Notice is required by 14 Code of Federal Regulations, part 77 pursuant to 49 U.S.C., Section 44718. Persons who knowingly and willingly violate the notice requirements of part 77 are subject to a civil penalty of $1,000 per day until the notice is received, pursuant to 49 U.S.C., Section 46301(a)

I hereby certify that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to mark and/or light the structure in accordance with established marking & lighting standards as necessary.

Date	Typed or Printed Name and Title of Person Filing Notice	Signature

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

§77.13 Construction or alteration requiring notice.

(a) Except as provided in §77.15, each sponsor who proposes any of the following construction or alteration shall notify the Administrator in the form and manner prescribed in §77.17.

(1) Any construction or alteration of more than 200 feet in height above the ground level at its site.

(2) Any construction or alteration of greater height than imaginary surface extending outward and upward at one of the following slopes:

(i) 1 00 to 1 for horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport specified in paragraph (a)(5) or this section with at least one runway more than 3,200 feet in actual length, excluding heliports.

(ii) 50 to 1 for horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport specified in paragraph (a)(5) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports.

(iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport specified in paragraph (a)(5) of this section.

(3) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 16 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a)(1) or (2) of this section.

(4) When requested by the FAA, any construction or alteration that would be in an instrument approach area (defined in the FAA standards governing instrument approach procedures) and available information indicates it might exceed a standard of Subpart C of this part.

(5) Any construction or alteration on any of the following airports (including heliports):

(i) An airport that is available for public use and is listed in the Airport Directory of the current Airman's Information Manual or in either the Alaska or Pacific Airman's Guide and Chart Supplement.

(ii) An airport under construction, that is the subject of a notice or proposal on file with the Federal Aviation Administration, and except for military airports, it is clearly indicated that airport will be available for public use.

(iii) An airport that is operated by an armed force of the United States.

(b) Each sponsor who proposes construction or alteration that is the subject of a notice under paragraph (a) of this section and is advised by an FAA regional office that a supplemental notice is required shall submit that notice on a prescribed form to be received by the FAA regional office at least 48 hours before the start of construction or alteration.

(c) Each sponsor who undertakes construction or alteration that is the subject of a notice under paragraph (a) of this section shall, within 5 days after that construction or alteration reaches its greatest height, submit a supplemental notice on a prescribed form to the FAA regional office having jurisdiction over the region involved, if –

(1) The construction or alteration is more than 200 feet above the surface level of its site; or

(2) An FAA regional office advises him that submission of the form is required.

§77.15 Construction or alteration not requiring notice.

No person is required to notify the Administrator for any of the following construction or alteration:

(a) Any object that would be shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features of equal or greater height, and would be located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that the structure so shielded will not adversely affect safety in air navigation.

(b) Any antenna structure of 20 feet or less in height except one that would increase the height of another antenna structure.

(c) Any air navigation facility, airport visual approach or landing air, aircraft arresting device, or meteorological device, of a type approved by the Administrator, or an appropriate military service on military airports, the location and height of which is fixed by its functional purpose.

(d) Any construction or alteration for which notice is required by any other FAA regulation.

§77.17 Form and time of notice

(a) Each person who is required to notify the Administrator under §77.13 (a) shall send one executed form set of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. Copies of FAA Form 7460-1 may be obtained from the headquarters of the Federal Aviation Administration and the regional offices.

(b) The notice required under §77.13 (a)(1) through (4) must be submitted at least 30 days before the earlier of the following dates –

(1) The date the proposed construction or alteration is to begin.

(2) The date an application for a construction permit is to be filed.

However, a notice relating to proposed construction or alteration that is subject to the licensing requirements of the Federal Communications Act may be sent to the FAA at the same time the application for construction is filed with the Federal Communications Commission, or at any time before that filing.

(c) A proposed structure or an alteration to an existing structure that exceeds 2,000 feet in height above the ground will be presumed to be a hazard to air navigation and to result in an inefficient utilization of airspace and the applicant has the burden of overcoming that presumption. Each notice submitted under the pertinent provisions of this part 77 proposing a structure in excess of 2,000 feet above ground, or an alteration that will make an existing structure exceed that height, must contain a detailed showing, directed to meeting this burden. Only in exceptional cases, where the FAA concludes that a clear and compelling showing has been made that it would not result in an inefficient utilization of the airspace and would not result in a hazard to air navigation, will a determination of no hazard be issued.

(d) In the case of an emergency involving essential public services, public health, or public safety that required immediate construction or alteration, the 30 day requirement in paragraph (b) of this section does not apply and the notice may be sent by telephone, telegraph, or other expeditious means, with an executed FAA Form 7460-1 submitted within five (5) days thereafter. Outside normal business hours, emergency notices by telephone or telegraph may be submitted to the nearest FAA Flight Service Station.

(e) Each person who is required to notify the Administrator by paragraph (b) or (c) of §77.13, or both shall send an executed copy of FAA Form 7460-2, Notice of Actual Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area involved.

ADDRESSES OF THE REGIONAL OFFICES

Alaska Region
AK
Alaskan Regional Office
Air Traffic Division, AAL-530
222 West An Avenue
Anchorage, AK 99513
Tel: 907-271-5893

Central Region
IA, KS, MO, NE
Central Regional Office
Air Traffic Division, ACE-520
80 East 12th Street
Kansas City, MO 64106
Tel: 816-426-3408 or 3409

Eastern Region
DC, DE, MD, NJ, NY, PA, VA, WV
Eastern Regional Office
Air Traffic Division, AEA-520
JFK International Airport
Fitzgerald Federal Building
Jamaica, NY 11430
Tel: 718-553-2616

Great Lakes Region
IL, IN, MI, MN, ND, OH, SD
Great Lakes Regional Office
Air Traffic Division, AGL-520
2300 East Devon Avenue
Des Plaines, IL 60018
Tel: 847-294-7568

New England Region
CT, MA, ME, NH, RI, VT
New England Regional Office
Air Traffic Division, ANE-520
12 New England Executive Park
Burlington, MA 01803-5299
Tel: 781-238-7520

Northwest Mountain Region
CO, ID, MT, OR, UT, WA, WY
Northwest Mountain Regional Office
Air Traffic Division, ANM-520
1601 Lind Avenue, SW
Renton, WA 98055-4056
Tel: 425-227-2520

Southern Region
AL, FL, GA, KY, MS, NC, PR
SC, TN, VI
Southern Regional Office
Air Traffic Division, ASO-520
1701 Columbia Avenue
College Park, GA 30337
Tel: 404-305-5585

Southwest Region
AR, LA, NM, OK, TX
Southwest Regional Office
Air Traffic Division, ASW-520
2601 Meacham Boulevard
Fort Worth, TX 76137-0520
Tel: 817-222-5531

Western Pacific Region
HI, CA, NV, AZ, GU
Western-Pacific Regional Office
Air Traffic Division, AWP-520
15000 Aviation Boulevard
Hawthorne, CA 90260
Tel: 310-725-6557

INSTRUCTIONS FOR COMPLETING FAA FORM 7460-1

PLEASE TYPE or PRINT

ITEM #1. Please include the name, address and phone number of a personal contact point as well as the company name.

ITEM #2. Please include the name, address and phone number of a personal contact point as well as the company name.

ITEM #3. New Construction would be a structure that has not yet been built.

Alteration is a change to an existing structure such as the addition of a side mounted antenna, a change to the marking and lighting, a change to power and/or frequency, or a change to the height. The nature of the alteration shall be included in **ITEM #21** "Complete Description of Proposal".

Existing would be a correction to the latitude and/or longitude, a correction to the height, or if filing on an existing structure which has never been studied by the FAA. The reason for the notice shall be included in **ITEM #21** "Complete Description of Proposal".

ITEM #4. If Permanent, so indicate. If Temporary, such as a crane or drilling derrick, enter the estimated length of time the temporary structure will be up.

ITEM #5. Enter the date that construction is expected to start and the date that construction should be completed.

ITEM #6. Please indicate the type of structure. **DO NOT LEAVE BLANK.**

ITEM #7. In the event that obstruction marking and lighting is required, please indicate type desired. If no preference, check "other" and indicate "no preference" **DO NOT LEAVE BLANK.** ***NOTE:*** *High intensity lighting shall be used only for structures over 500' AGL.* In the absence of high intensity lighting for structures over 500' AGL, marking is also required.

ITEM #8. If this is an existing tower that has been registered with the FCC, enter the FCC Antenna Structure Registration number here.

ITEM #9 and #10. Latitude and longitude must be geographic coordinates, accurate to within the nearest second or to the nearest hundredth of a second if known. Latitude and longitude derived solely from a **hand-held GPS instrument is NOT acceptable.** A hand-held GPS is only accurate to within 100 meters (328 *feet*) 95 percent of the time. This data, when plotted, should match the site depiction submitted under **ITEM #20.**

ITEM #11. NAD 83 is preferred; however, latitude and longitude may be submitted in NAD 27. Also, in some geographic areas where NAD 27 and NAD 83 are not available other datums may be used. It is important to know which datum is used. **DO NOT LEAVE BLANK.**

ITEM #12. Enter the name of the nearest city and state to the site. If the structure is or will be in a city, enter the name of that city and state.

ITEM #13. Enter the **full** name of the nearest public-use ***(not private-use)*** airport or heliport or military airport or heliport to the site.

ITEM #14. Enter the distance **from the airport or heliport listed in #13 to the structure.**

ITEM #15. Enter the direction **from the airport or heliport listed in #13 to the structure.**

ITEM #16. Enter the site elevation above mean sea level and expressed in whole feet rounded to the nearest foot (e.g. 17'3" rounds to 17', 17'6" rounds to 18'). This data should match the ground contour elevations for site depiction submitted under **ITEM #20.**

ITEM #17. Enter the total structure height **above ground level** in **whole feet** rounded to the **next highest foot** (e.g. 17'3" rounds to 18'). **The total structure height shall include anything mounted on top of the structure, such as antennas, obstruction lights, lightning rods, etc.**

ITEM #18. Enter the overall height above mean sea level and expressed in **whole feet.** This will be the total of **ITEM #16 + ITEM #17.**

ITEM #19. If an FAA aeronautical study was previously conducted, enter the previous study number.

ITEM #20. Enter the relationship of the structure to roads, airports, prominent terrain, existing structures, etc. Attach an 8-1/2" x 11" non-reduced copy of the appropriate 7.5 minute U.S. Geological Survey *(USGS)* Quadrangle Map MARKED WITH A PRECISE INDICATION OF THE SITE LOCATION. To obtain maps, contact USGC at 1-800-435-7627 or via internet at "http://mapping.usgs.gov". If available, attach a copy of a documented site survey with the surveyor's certification stating the amount of vertical and horizontal accuracy in feet.

ITEM #21.

- For transmitting stations, include maximum effective radiated power *(ERP)* and all frequencies.
- For antennas, include the type of antenna and center of radiation *(Attach the antenna pattern, if available).*
- For microwave, include azimuth relative to true north.
- For overhead wires or transmission lines, include size and configuration of wires and their supporting structures *(Attach depiction).*
- For **each** pole/support, include coordinates, site elevation, and structure height above ground level or water.
- For buildings, include site orientation, coordinates of **each** corner, dimensions, and construction materials.
- For alterations, explain the alteration thoroughly.
- For existing structures, thoroughly explain the reason for notifying the FAA *(e.g. corrections, no record or previous study, etc.).*

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INDEX N

NEUTRAL ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
N1.1, N1.2	NEUTRAL ASSEMBLIES – TANGENT
N1.11, N2.21	NEUTRAL SUPPORTS ON CROSSARMS
N2.1, N2.1L, N3.1	NEUTRAL ASSEMBLIES – LARGE ANGLE
N5.1, N5.2	NEUTRAL ASSEMBLIES – SINGLE DEADENDS
N6.1	NEUTRAL ASSEMBLY – DOUBLE DEADEND
N6.21	NEUTRAL ASSEMBLY – DOUBLE DEADEND ON CROSSARMS

TABLE VI

MAXIMUM LINE ANGLES ON SPOOL INSULATOR ASSEMBLIES

(ANSI Clss 53-2 Spool Insulator)

Designated Maximum Transverse Load = **1,500** Lbs./Conductor

CONDUCTOR SIZE	WIND SPAN (feet) 150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	45	44	44	43	42	42
2 ACSR (6/1)	37	36	35	35	34	33
2 ACSR (7/1)	28	28	27	27	26	26
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	16	16
4/0 ACSR (6/1)	18	17	17	16	16	15
246.9 AAAC (7)	17	17	16	16	15	15
336.4 ACSR (18/1)	17	16	15	15	14	14
336.4 ACSR (26/7)	12	11	11	10	10	9
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	44	44	43	42	41	40
2 ACSR (6/1)	36	36	35	34	33	33
2 ACSR (7/1)	28	28	27	27	26	25
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	17	16
4/0 ACSR (6/1)	18	18	17	17	16	16
246.9 AAAC (7)	18	17	17	16	16	15
336.4 ACSR (18/1)	17	17	16	16	15	15
336.4 ACSR (26/7)	12	12	11	11	11	10
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	43	41	40	39	37	36
2 ACSR (6/1)	35	34	33	32	30	29
2 ACSR (7/1)	27	26	25	25	24	23
1/0 ACSR (6/1)	22	22	21	20	19	19
123.3 AAAC (7)	22	21	21	20	19	18
2/0 ACSR (6/1)	22	21	21	20	19	18
3/0 ACSR (6/1)	18	17	16	16	15	14
4/0 ACSR (6/1)	17	17	16	15	15	14
246.9 AAAC (7)	17	16	16	15	14	14
336.4 ACSR (18/1)	17	16	15	14	14	13
336.4 ACSR (26/7)	12	11	11	10	10	9

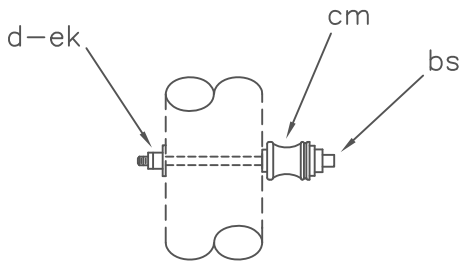
TABLE VII

MAXIMUM LINE ANGLES ON SPOOL INSULATOR ASSEMBLIES

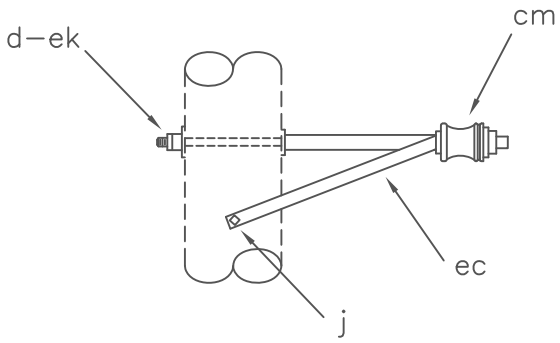
(ANSI Clss 53-4 Spool Insulator)

Designated Maximum Transverse Load = 1,500 Lbs./Conductor

	WIND SPAN (feet)					
CONDUCTOR SIZE	150	200	250	300	350	400
LIGHT LOADING DISTRICT						
4 ACSR (7/1)	45	44	44	43	42	42
2 ACSR (6/1)	37	36	35	35	34	33
2 ACSR (7/1)	28	28	27	27	26	26
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	16	16
4/0 ACSR (6/1)	18	17	17	16	16	15
246.9 AAAC (7)	17	17	16	16	15	15
336.4 ACSR (18/1)	17	16	15	15	14	14
336.4 ACSR (26/7)	12	11	11	10	10	9
MEDIUM LOADING DISTRICT						
4 ACSR (7/1)	44	44	43	42	41	40
2 ACSR (6/1)	36	36	35	34	33	33
2 ACSR (7/1)	28	28	27	27	26	25
1/0 ACSR (6/1)	23	23	22	22	21	21
123.3 AAAC (7)	23	22	22	21	21	20
2/0 ACSR (6/1)	23	22	22	21	21	20
3/0 ACSR (6/1)	18	18	17	17	17	16
4/0 ACSR (6/1)	18	18	17	17	16	16
246.9 AAAC (7)	18	17	17	16	16	15
336.4 ACSR (18/1)	17	17	16	16	15	15
336.4 ACSR (26/7)	12	12	11	11	11	10
HEAVY LOADING DISTRICT						
4 ACSR (7/1)	43	41	40	39	37	36
2 ACSR (6/1)	35	34	33	32	30	29
2 ACSR (7/1)	27	26	25	25	24	23
1/0 ACSR (6/1)	22	22	21	20	19	19
123.3 AAAC (7)	22	21	21	20	19	18
2/0 ACSR (6/1)	22	21	21	20	19	18
3/0 ACSR (6/1)	18	17	16	16	15	14
4/0 ACSR (6/1)	17	17	16	15	15	14
246.9 AAAC (7)	17	16	16	15	14	14
336.4 ACSR (18/1)	17	16	15	14	14	13
336.4 ACSR (26/7)	12	11	11	10	10	9



N1.1



N1.2
(M5–19)

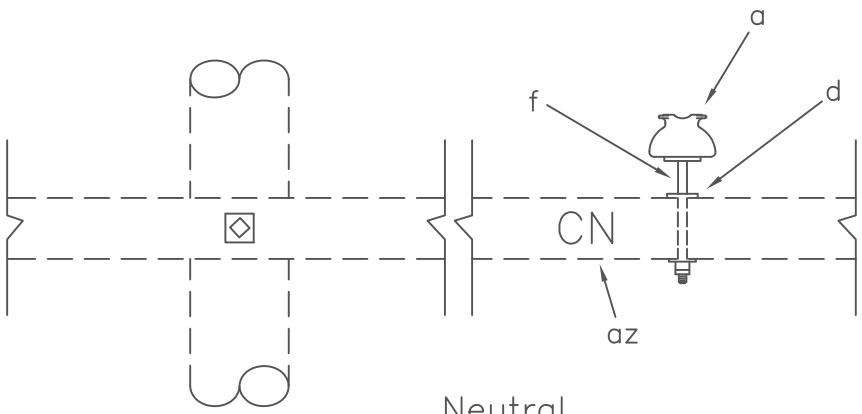
ASSEMBLY:		N1.1	N1.2
ITEM	MATERIAL	QTY	QTY
d	Washer, 2 1/4" square	1	1
j	Screw, lag, 1/2" x 4"		2
bs	Bolt, single, upset	1	
cm	Insulator, spool, 3"	1	1
ec	Bracket, offset neutral		1
ek	Locknuts	1	1

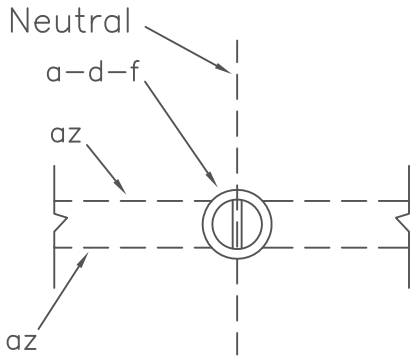
DESIGN PARAMETERS:

MAXIMUM LINE ANGLES:
5° – Small Conductors
2° – Larger than #1/0

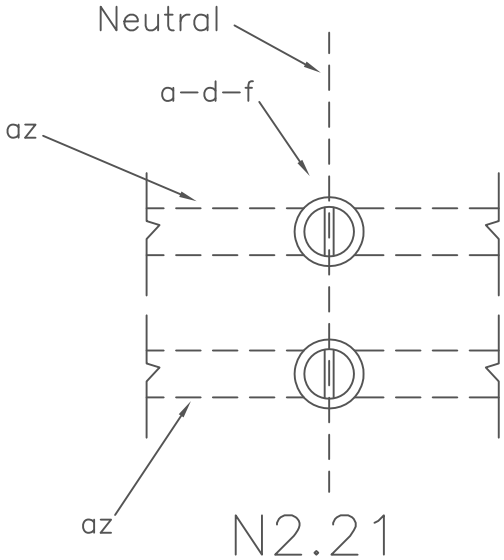
NEUTRAL ASSEMBLIES – TANGENT

DEC 1998		N1.1, N1.2
RUS		(N/A, M5–19)





N1.11



N2.21

NOTE: Install either identification letters (az) or white insulator.

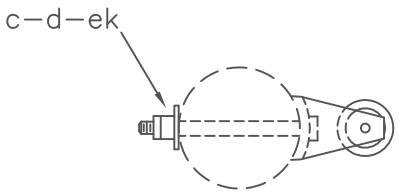
ASSEMBLY;		N1.11	N2.21
ITEM	MATERIAL	QTY	QTY
a	Insulator, pin type, 15 kV, white	1	2
d	Washer, 2 1/4" square	1	2
f	Pin, crossarm, steel, 5/8" x 10 3/4"	1	2
az	Letters, 2" C, 2" N, with 1" nails	4	4

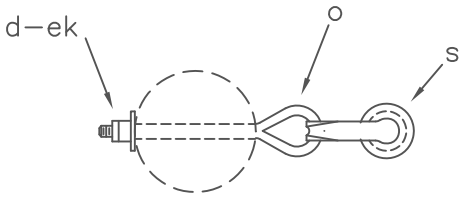
DESIGN PARAMETERS:

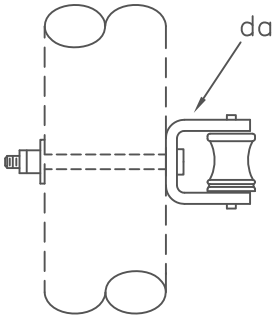
N1–11: See TABLE III
N2–21: See TABLE IV

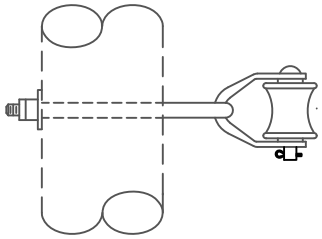
NEUTRAL SUPPORTS ON CROSSARMS

DEC 1998		N1.11, N2.21
RUS		









N2.1
(ANSI Class 53–2 Insulator)
N2.1L
(ANSI Class 53–4 Insulator)

N3.1

NOTE: See Tying Guide Drawing L3.1G

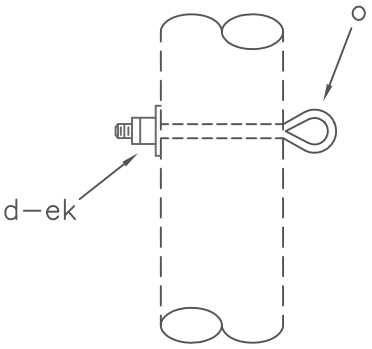
		N2.1	N2.1L	N3.1
ITEM	MATERIAL	QTY	QTY	QTY
c	Bolt, machine, 5/8" X req'd length	1	1	
d	Washer, 2 1/4" square	1	1	1
o	Bolt, eye, 5/8" X req'd length			1
s	Clevis, secondary, swinging, insulated			1
da	Bracket, with 3" x 1 3/4" spool insulator	1		
da	Bracket, with 3" x 3" spool insulator		1	
ek	Locknuts	1	1	1

DESIGN PARAMETERS:

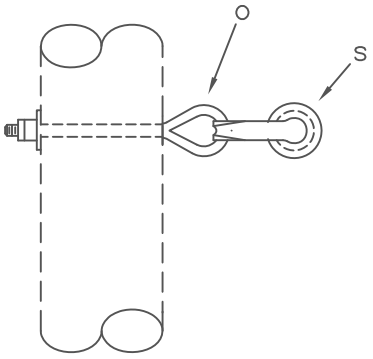
N2.1: See TABLE VI
N2.1L: See TABLE VII
N3.1: See TABLE VI

NEUTRAL ASSEMBLIES – LARGE ANGLE

DEC 1998		N2.1, N2.1L, N3.1
RUS		



N5.1



N5.2

NOTE: See Tying Guide Drawings; L2.2G, L3.2G or L3.3G

	ASSEMBLY;	N5.1	N5.2
ITEM	MATERIAL	QTY	QTY
d	Washer, square 3" curved	1	1
o	Bolt, eye, 5/8" X req'd length	1	1
s	Clevis, secondary, swinging, insulated		1
ek	Locknuts	1	1

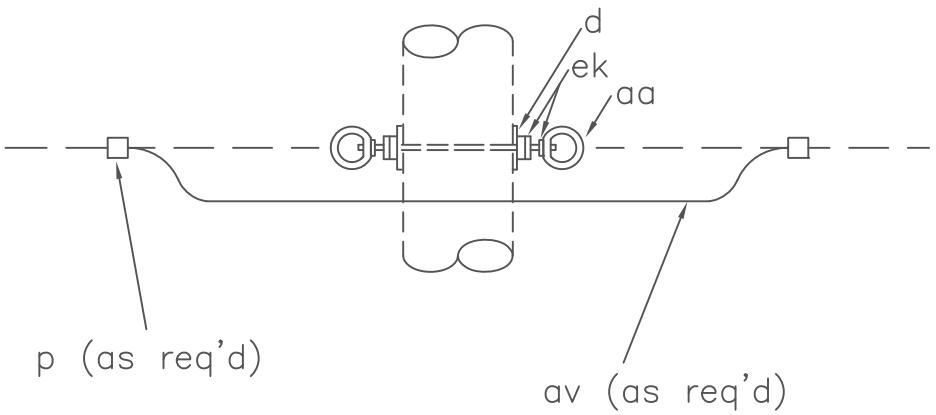
DESIGN PARAMETERS:

ALLOWABLE LONGITUDINAL LOADING:

N5.1 = 5,000 lbs.
N5.2 = 1,500 lbs.
(ANSI Class 53–2 Insulator)
N5.2 = 2,250 lbs.
(ANSI Class 53–4 Insulator)

NEUTRAL ASSEMBLIES (SINGLE DEADENDS)

DEC 1998		N5.1
RUS		N5.2



NOTE: See Tying Guide Drawings: L2.2G, L3.2G, L3.3G.

ITEM	QTY	MATERIAL
d	2	Washer, square 3" curve
n	1	Bolt,double arming,5/8" x req'd length
p		Connectors, as req'd
aa	2	Nut, eye, 5/8"
av		Jumpers, as req'd
ek	4	Locknuts

DESIGN PARAMETERS:

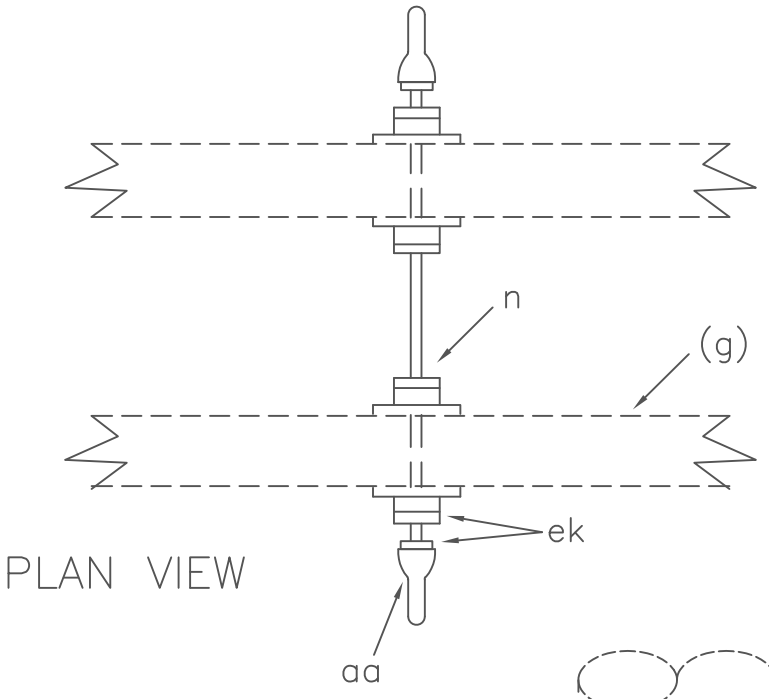
ALLOWABLE LONGITUDINAL LOADING: 5,000 lbs.

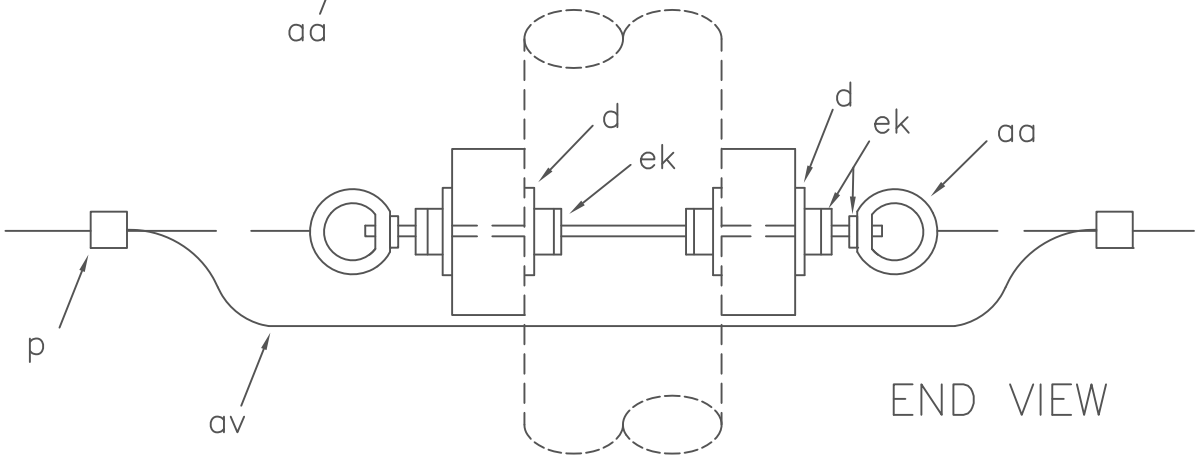
NEUTRAL ASSEMBLY – DOUBLE DEADEND

DEC 1998

RUS

N6.1





NOTES:

1. Not suitable for Grade B construction.
2. Doubling arming bolt, item "n" and eye nut, item "aa", may be replaced with doubling arming eye bolt, item "dy."
3. Maximum line angle may be increased to 15° by installing anchor shackles, item "bo" to (horizontally mounted) eye nuts and installing side guys.

ITEM	QTY	MATERIAL
d	4	Washer, square, 2 1/4"
n	1	Bolt,double arming,5/8" x req'd length
p		Connectors, as req'd
aa	2	Nut, eye, 5/8"
av		Jumpers, as req'd
ek	6	Locknuts

DESIGN PARAMETERS:

ALLOWABLE UNBALANCED TENSION:
(See drawings where assembly used)

ALLOWABLE LINE ANGLE = 5°
(See Note 3)

NEUTRAL ASSEMBLY – DOUBLE DEADEND ON CROSSARMS

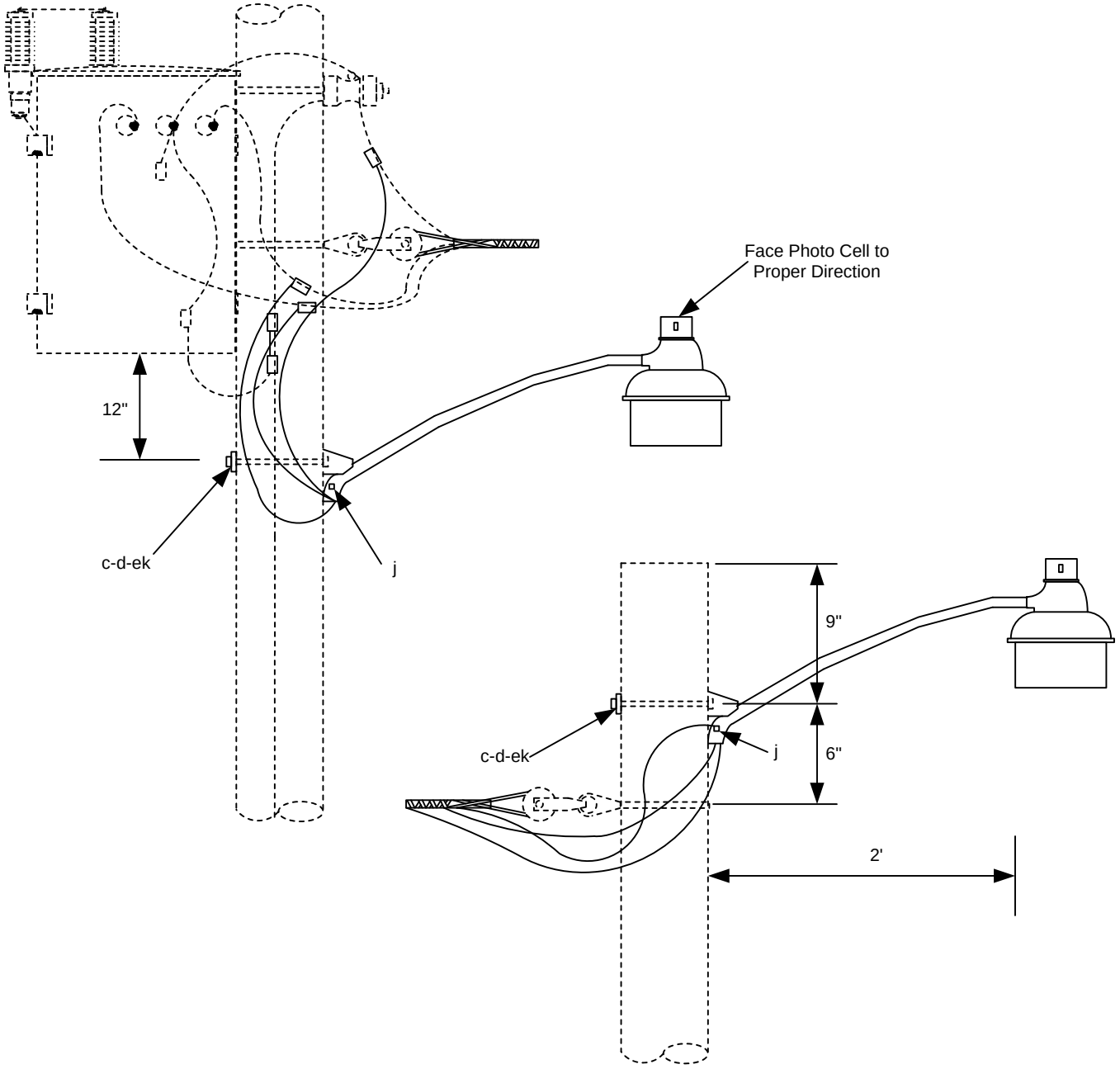
DEC 1998
RUS

N6.21

INDEX OL

OVERHEAD LIGHTING ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
OL1.1	SECURITY YARD LIGHT (UNMETERED)
OL2.1	STREET LIGHT- WOOD POLE COBRA HEAD STYLE (UNMETERED)
OL3.2	FLOOD LIGHT, 250 WATT (UNMETERED)
OL3.4	FLOOD LIGHT, 400 WATT (UNMETERED)
OL4.0G	LOW VOLTAGE POWER OUTLET FOR HOLIDAY LIGHTING WIRING DIAGRAM
OL4.1	LOW VOLTAGE POWER OUTLET FOR HOLIDAY LIGHTING
OL4.2	LOW VOLTAGE POWER OUTLET FOR HOLIDAY LIGHTING



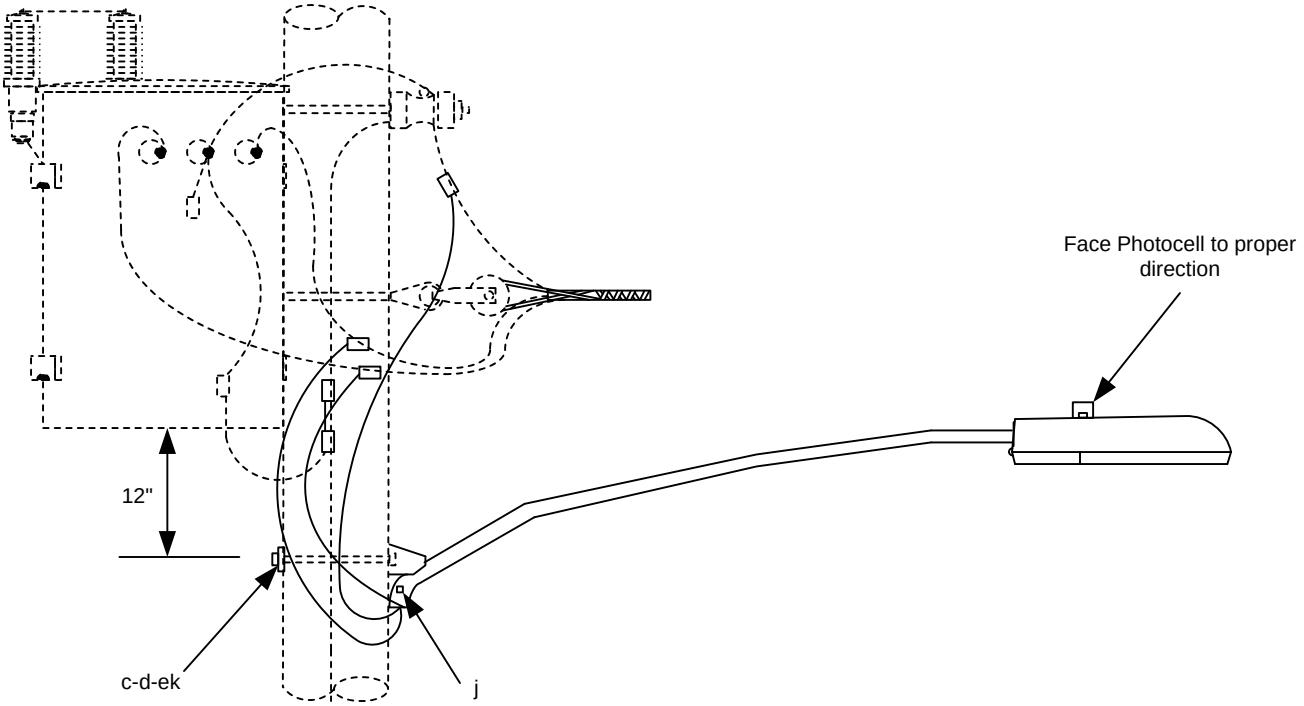
ITEM	QTY.	Material
c	1	Bolt, Machine, 5/8" x required length
d	1	Washer, square, 2 ¼”
j	2	Screw, lag, ½ x 4"
p		Connectors, as required
ek	1	Locknuts, 5/8"
	1	Yard light with Bracket
	10	Conductor, #12/2 UF, with Ground
	1	Photocell
	1	Bulb, 175MV or 100W H.P.S.

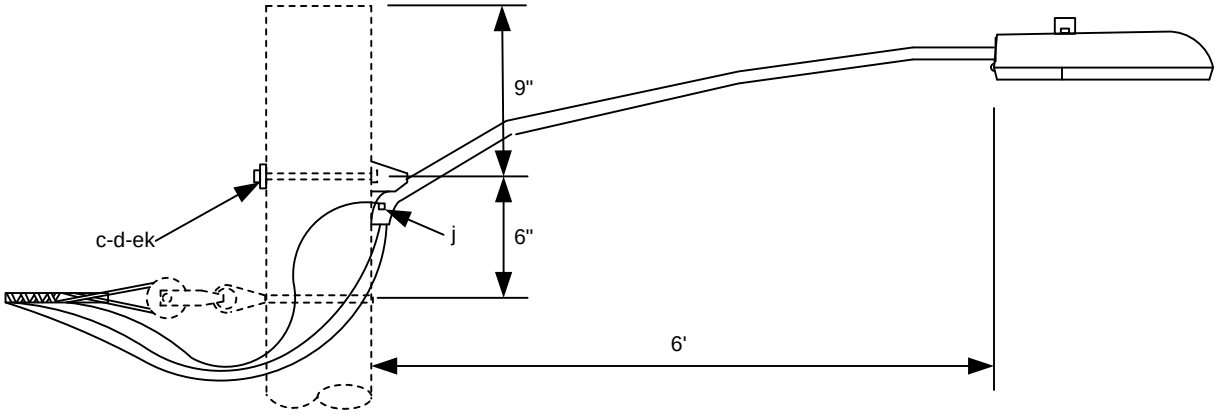
Note:

1. Minimum Mounting height is 20' 0"
2. Minimum Clearance to energized conductors is 2' 0"

SECURITY YARD LIGHT
(UNMETERED)

2005	WFECA	Overhead Lighting (120 V - 480 V)	OL1.1 (M26-5)





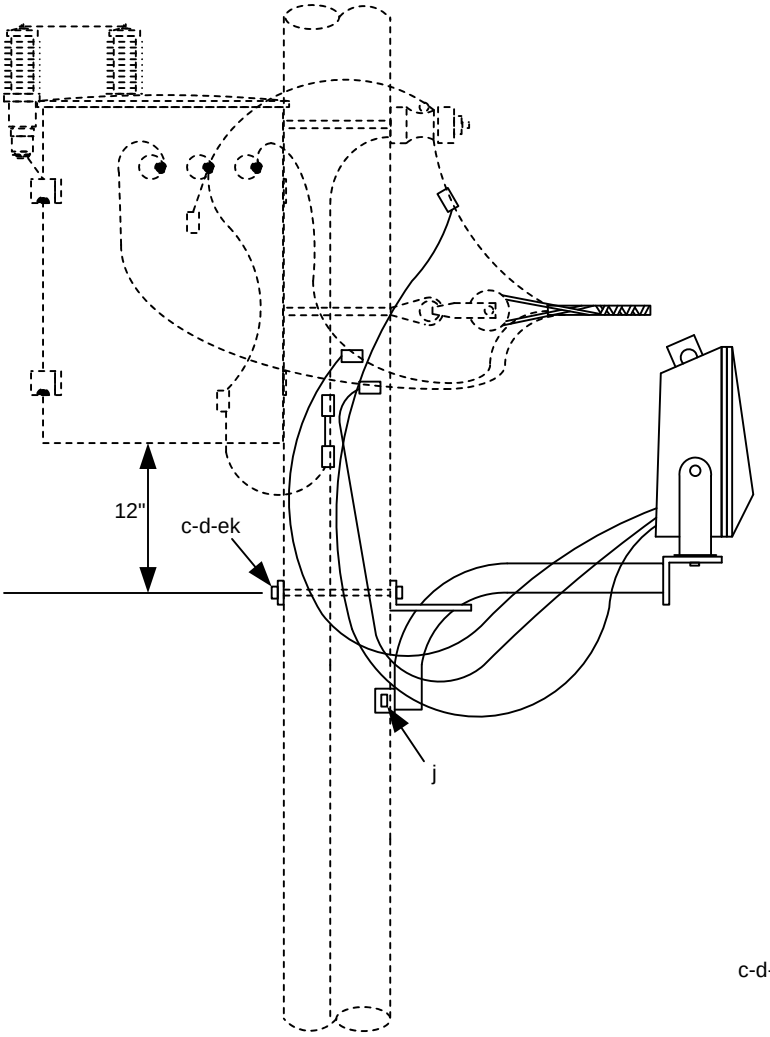
ITEM	QTY.	Material
c	1	Bolt, Machine, 5/8" x required length
d	1	Washer, square, 2 ¼"
j	2	Screw, lag, ½ x 4"
p		Connectors, as required
ek	1	Locknuts, 5/8"
	1	Luminaire, cobra style
	10	Conductor, #12/2 UF with Ground
	1	Photocell
	1	Bulb, 250W HPS
	1	Bracket, Cantilever, 6' for wood pole

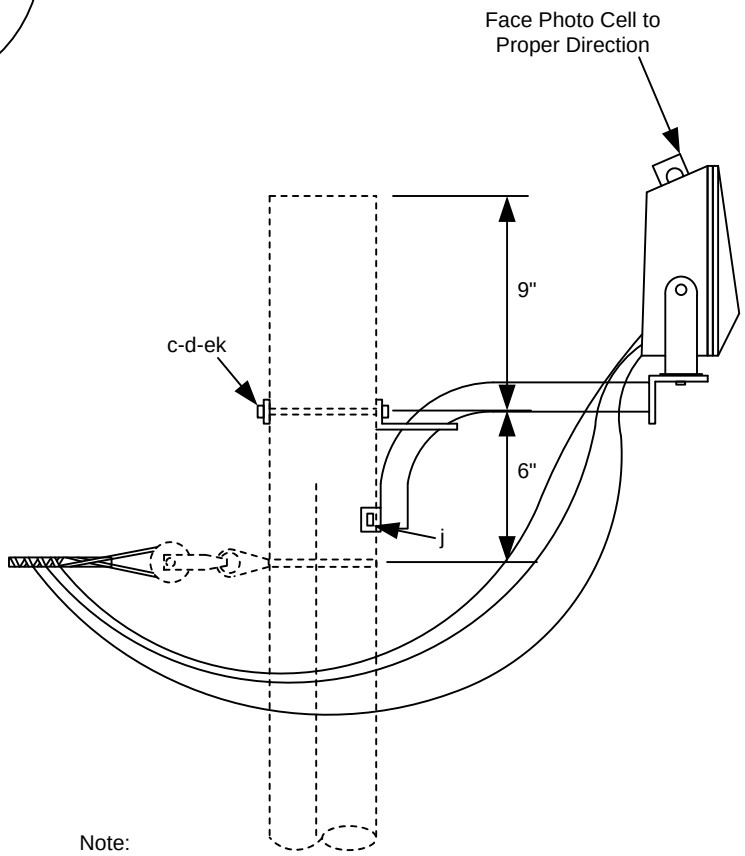
Note:

1. Minimum Mounting height is 20' 0"
2. Minimum Clearance to energized conductors is 2' 0"

STREET LIGHT – WOOD POLE
COBRA HEAD STYLE
(UNMETERED)

2011	WFECA	Overhead Lighting (120 V – 480 V)	OL2.1 (M26-5S)





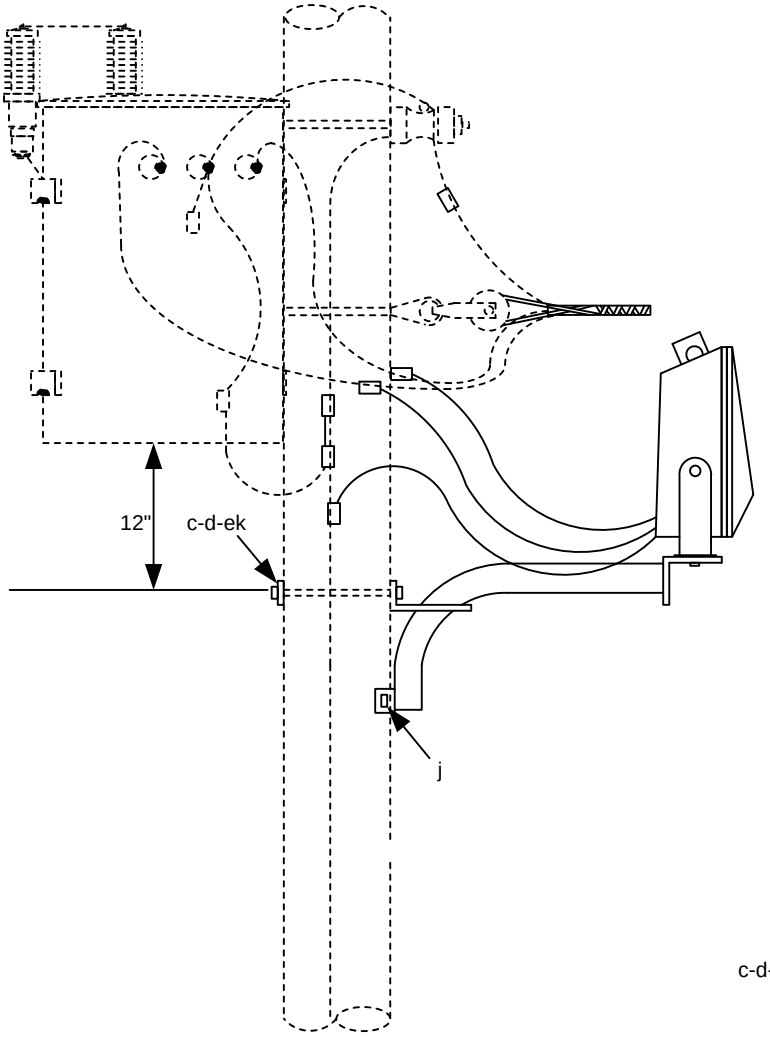
ITEM	QTY.	Material
c	1	Bolt, Machine, 5/8" x required length
d	1	Washer, square, 2 ¼"
j	2	Screw, lag, ½ x 4"
p		Connectors, as required
ek	1	Locknuts, 5/8"
	1	Flood Light, 250W
	10	Conductor, #12/2 UF with Ground
	1	Photocell
	1	Bulb, 250W MH or 250 HPS
	1	Bracket, Flood Light Mounting

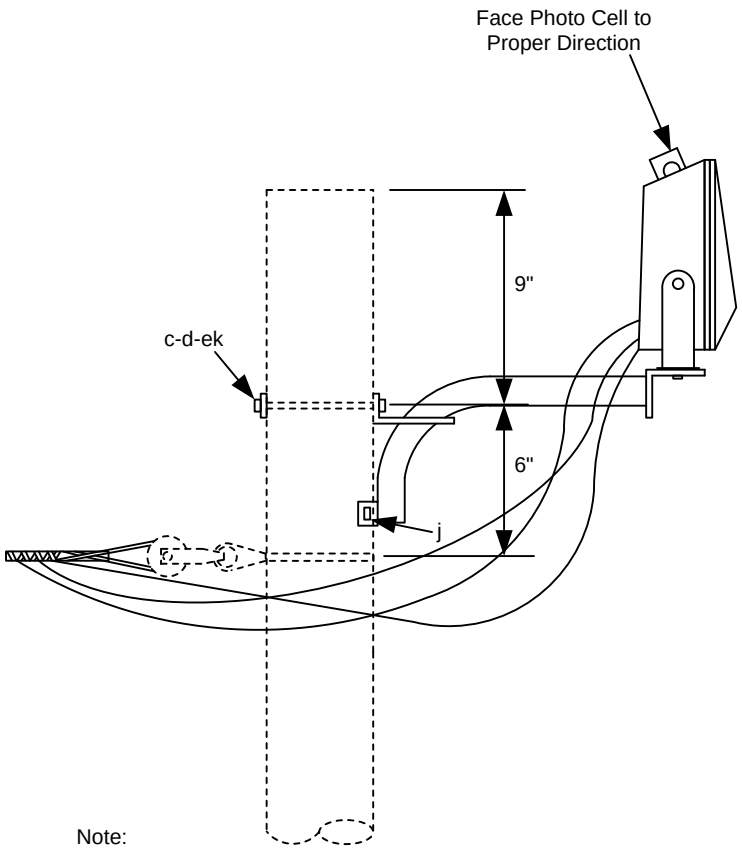
Note:

1. Minimum Mounting height is 20' 0"
2. Minimum Clearance to energized conductors is 2' 0"

FLOOD LIGHT, 250 WATT
(UNMETERED)

2005	WFECA	Overhead Lighting (120 V – 480 V)	OL3.2 (M26-250)





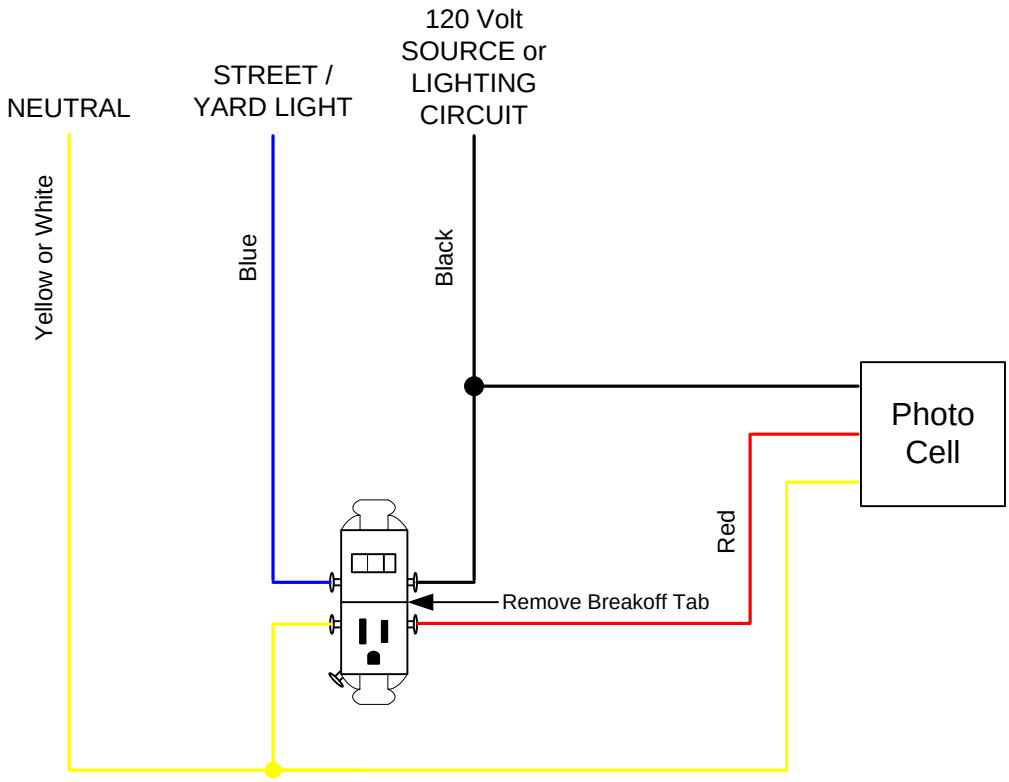
ITEM	QTY.	Material
c	1	Bolt, Machine, 5/8" x required length
d	1	Washer, square, 2 ¼"
j	2	Screw, lag, ½ x 4"
p		Connectors, as required
ek	1	Locknuts, 5/8"
	1	Flood Light, 400W, MH
	10	Conductor, #12/2 UF with Ground
	1	Photocell
	1	Bulb, 400W MH or 400W HPS
	1	Bracket, Flood Light Mounting

Note:

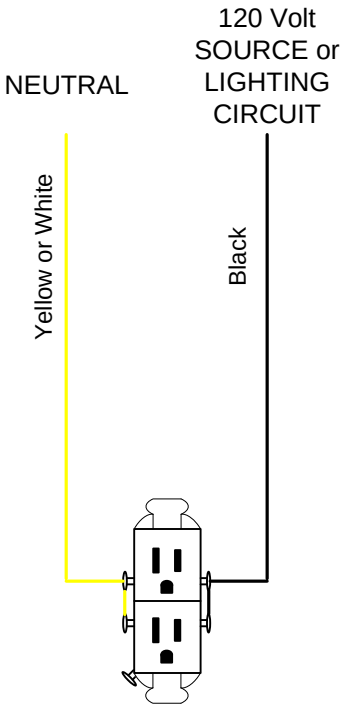
1. Minimum Mounting height is 20' 0"
2. Minimum Clearance to energized conductors is 2' 0"

FLOOD LIGHT, 400 WATT
(UNMETERED)

2005	WFECA	Overhead Lighting (120 V – 480 V)	OL3.4 (M26-400)

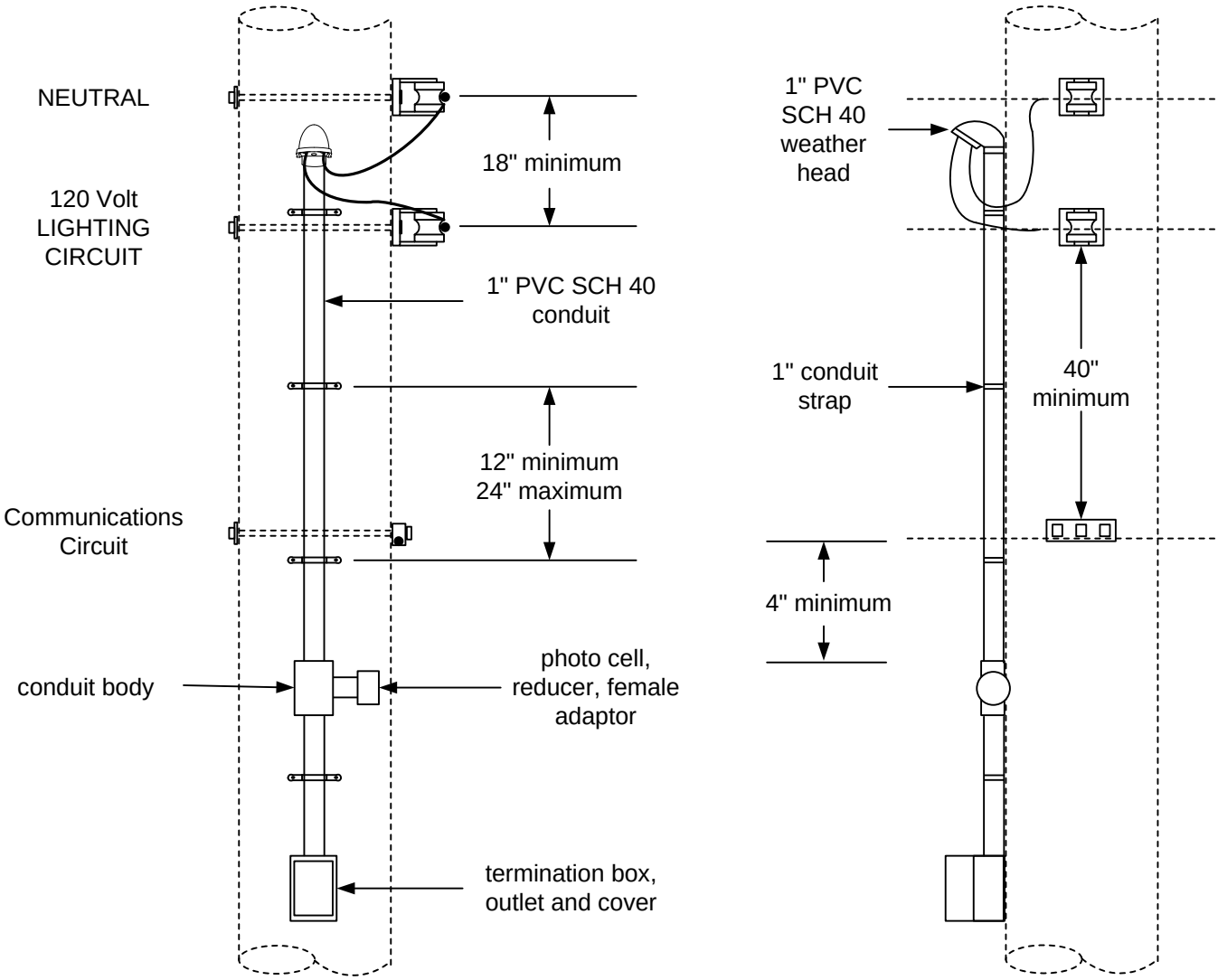


Use with Drawing OL4.1



Use with Drawing OL4.2

LOW VOLTAGE POWER OUTLET FOR HOLIDAY LIGHTING WIRING DIAGRAM		
2013	WFECA	OL4.0G



ITEM	QTY.	MATERIAL
	1	Reducer, 1" x ½", E950FD
	1	Female adaptor, 1", E942D
	1	Photo cell control, wire-in, FPFT-15
	1	Conduit Body, Type T, 1", E983F
	1	Termination box, 1", type FSE, E980FFN
	req.	Connectors
	1	Switch and Outlet, combination, 15A
	1	Cover, single gang, NEMA 3R, E9UVGRN2
	req.	Wood screw, 1 1/2" galvanized
gc	1	Conduit, 1" x 10', PVC, SCH 40, (10 ft stick)
sn	1	Weather head, 1" PVC, SCH 40, E998F
gd	req.	Straps, conduit, 1", 2 hole
	req.	Conductor, 12/2 UF

NOTES:

See Drawing OL4.0G for wiring diagram.

The drip loop may be located in the 40" communications worker safety zone. A clearance of at least 12" must be maintained between the drip loop and the communication cable or through bolt.

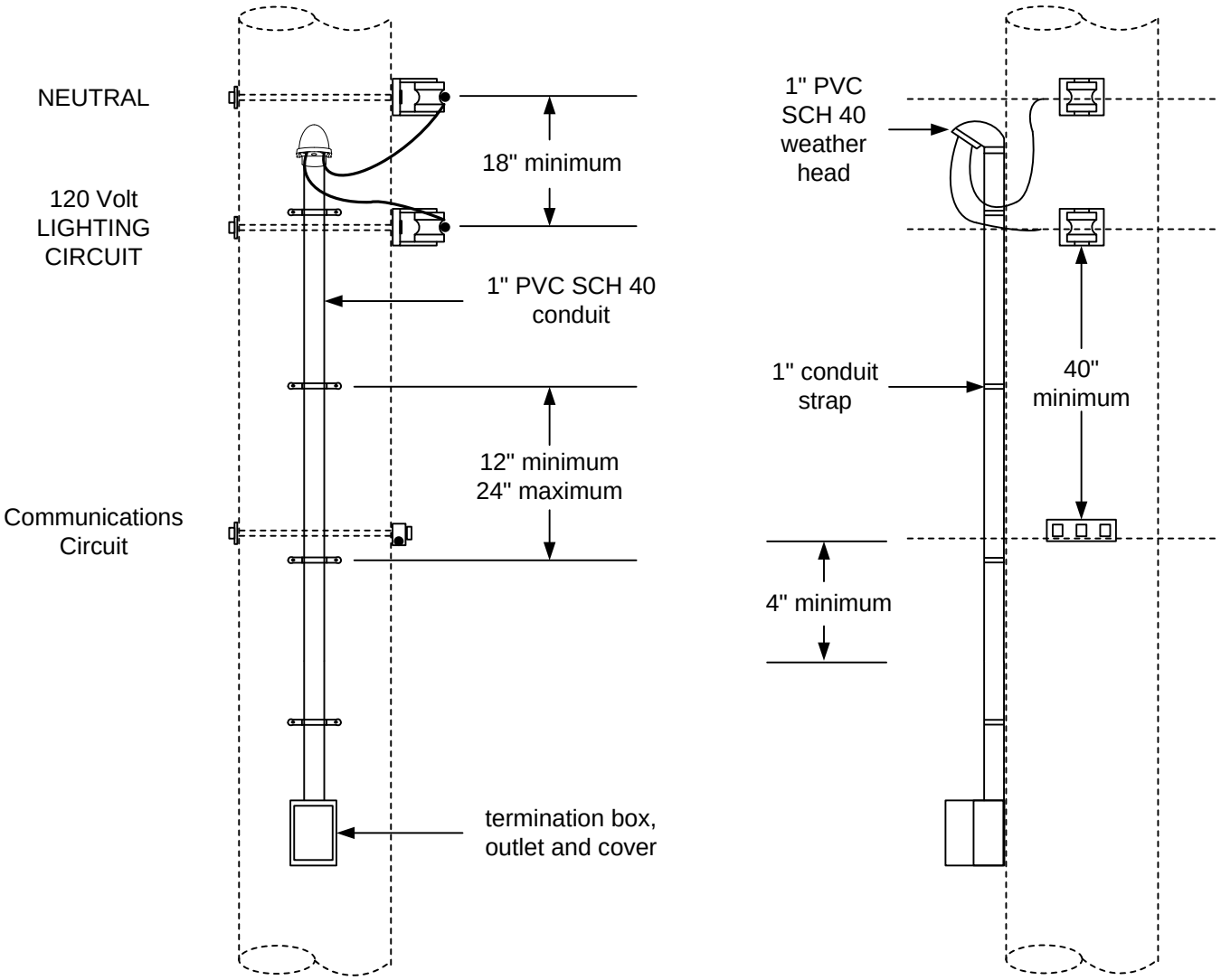
The minimum ground clearance to the bottom of the holiday fixture may be reduced to 12 ft in areas of restricted traffic or limited to pedestrians.

The minimum ground clearance to the bottom of the holiday fixture is 16 ft over roads, streets and areas subject to truck traffic.

The minimum ground clearance to the bottom of the holiday fixture may be reduced to 10 ft if the voltage is limited to 150 Volts to ground.

LOW VOLTAGE POWER OUTLET
FOR HOLIDAY LIGHTING

2013	WFECA	OL4.1



NOTES:

See Drawing OL4.0G for wiring diagram.

The drip loop may be located in the 40" communications worker safety zone. A clearance of at least 12" must be maintained between the drip loop and the communication cable or through bolt.

The minimum ground clearance to the bottom of the holiday fixture may be reduced to 12 ft in areas of restricted traffic or limited to pedestrians.

The minimum ground clearance to the bottom of the holiday fixture is 16 ft over roads, streets and areas subject to truck traffic.

The minimum ground clearance to the bottom of the holiday fixture may be reduced to 10 ft if the voltage is limited to 150 Volts to ground.

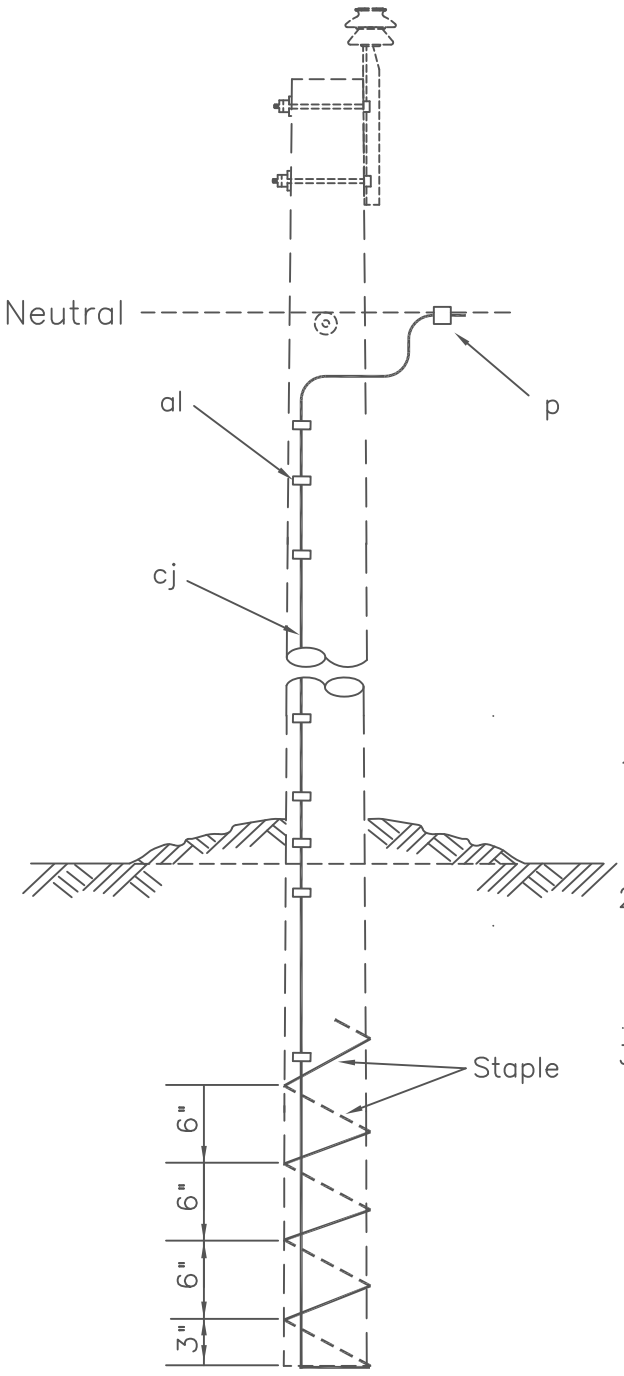
ITEM	QTY.	MATERIAL
	1	Termination box, 1", type FSE, E980FFN
	req.	Connectors
	1	Outlet, duplex, 15A
	1	Cover, single gang, NEMA 3R, E9UVGRN2
	req.	Wood screw, 1 1/2" galvanized
gc	1	Conduit, 1" x 10', PVC, SCH 40, (10 ft stick)
sn	1	Weather head, 1" PVC, SCH 40, E998F
gd	req.	Straps, conduit, 1", 2 hole
	req.	Conductor, 12/2 UF

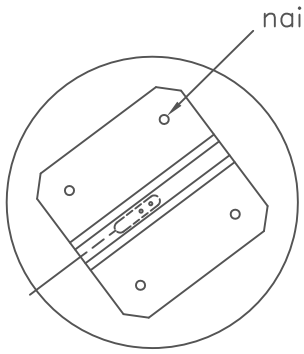
LOW VOLTAGE POWER OUTLET
FOR HOLIDAY LIGHTING

2013	WFECA	OL4.2

PROTECTION ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VP1.01, VP1.1	SURGE ARRESTER – SINGLE PHASE
VP1.1N	SURGE ARRESTER AND BRACKET – 1 SINGLE PHASE
VP1.2N	SURGE ARRESTERS AND BRACKET – 2 SINGLE PHASE
VP1.21N	SURGE ARRESTERS – 2 SINGLE PHASE VERTICAL (NARROW PROFILE)
VP1.3	SURGE ARRESTER – 3 SINGLE PHASE
VP1.3N	SURGE ARRESTERS AND BRACKET – 3 SINGLE PHASE
VP1.31N	SURGE ARRESTERS – 3 SINGLE PHASE VERTICAL (NARROW PROFILE)
P2.2, P2.3	POLE PROTECTION ASSEMBLE – WRAP-AROUND TYPE
VP3.1G	RAPTOR PROTCTION ASSEMBLY GUIDE SUPPORT ON 8 FOOT CROSSARMS (TANGENT)
VP3.2G	RAPTOR PROTECTION ASSEMBLY GUIDE SUPPORT ON 10 FOOT CROSSARMS (TANGENT)
VP3.3G	RAPTOR PROTECTION PERCH GUARDS – GUIDE





Plan View
Grounding plate (dh)

Designate assembly with grounding plate as "P2.3"

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' above ground and 8' from top of pole where they shall be 6" apart.
3. Copper ground wire ("cj") to have a minimum conductivity of No. 6 Copper or equivalent; use copper ground plate and staples, OR, use soft annealed iron, class C, 3–wire, 5/16" ground wire ("cj") and galvanized steel ground plate and staples.

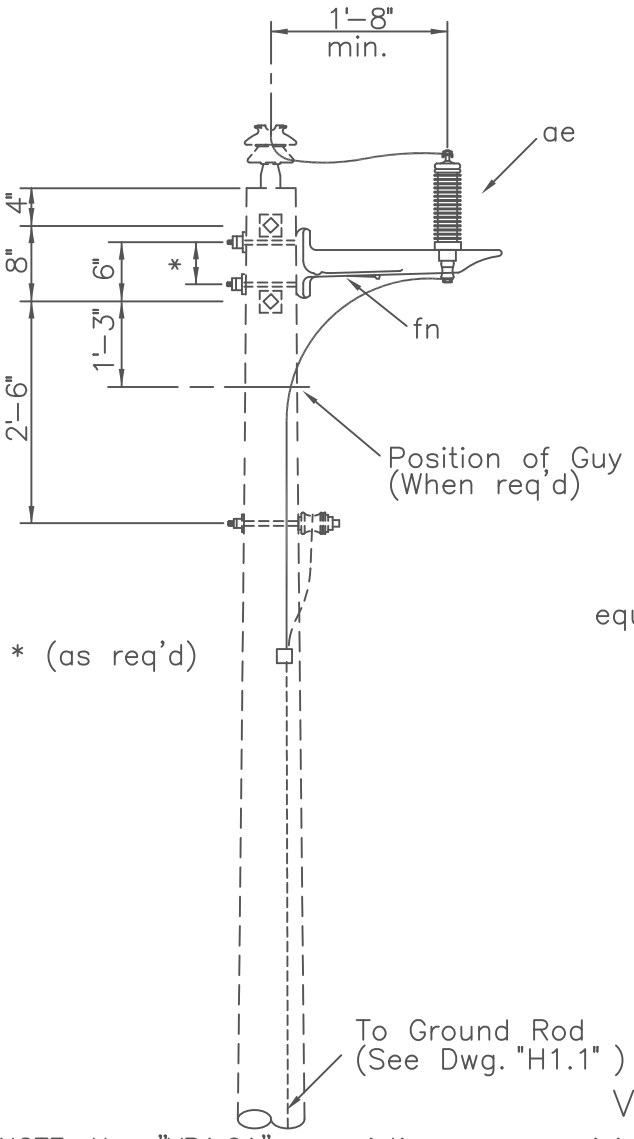
ASSEMBLY:		P2.2	P2.3
ITEM	MATERIAL	QTY	QTY
p	Connector, compression, as req'd		
al	Staples, ground wire, as req'd		
cj	Wire, pole ground, as req'd		
dh	Plate, grounding, butt type		1
	Nails, 1", galvanized, roofing		4

DESIGN PARAMETERS:

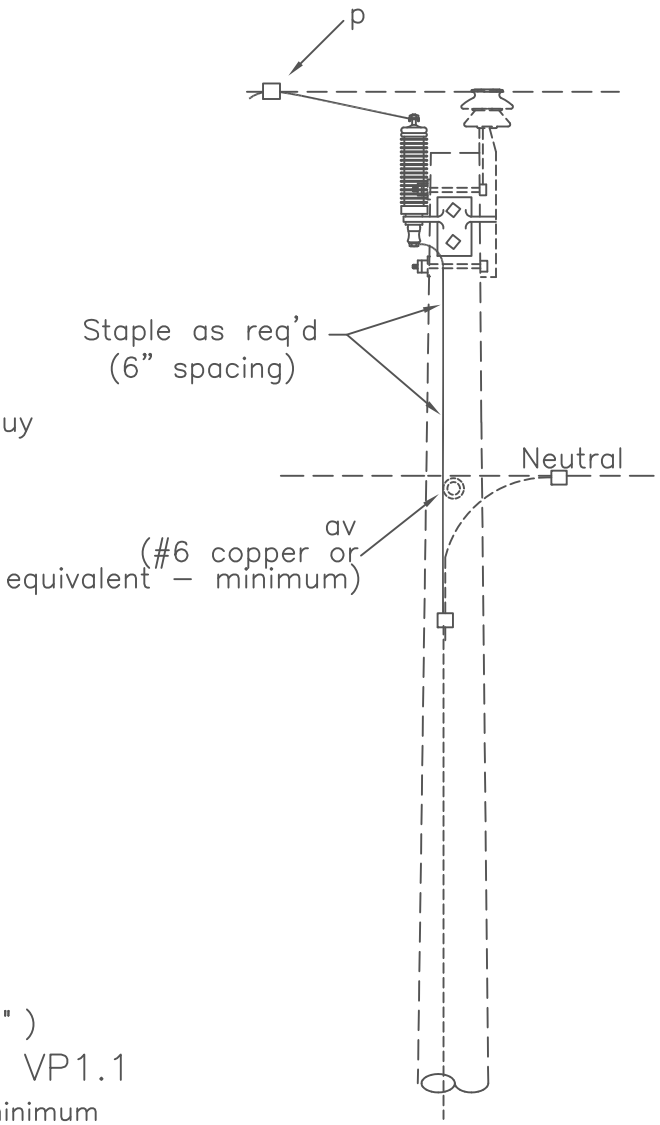
THIS ASSEMBLY CAN NOT BE COUNTED AS A SYSTEM GROUNDING ELECTRODE.

POLE PROTECTION ASSEMBLY – WRAP–AROUND TYPE

DEC 1998		P2.2, P2.3 (VM2–12A,VM2–12A2)
RUS		



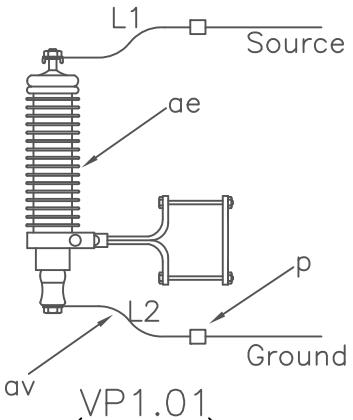
VP1.1



NOTE: Use "VP1.01" on existing arm, a minimum of 20" from center of pole.

Minimize lead lengths L1 and L2.

L1 + L2 should be less than 3 feet when possible

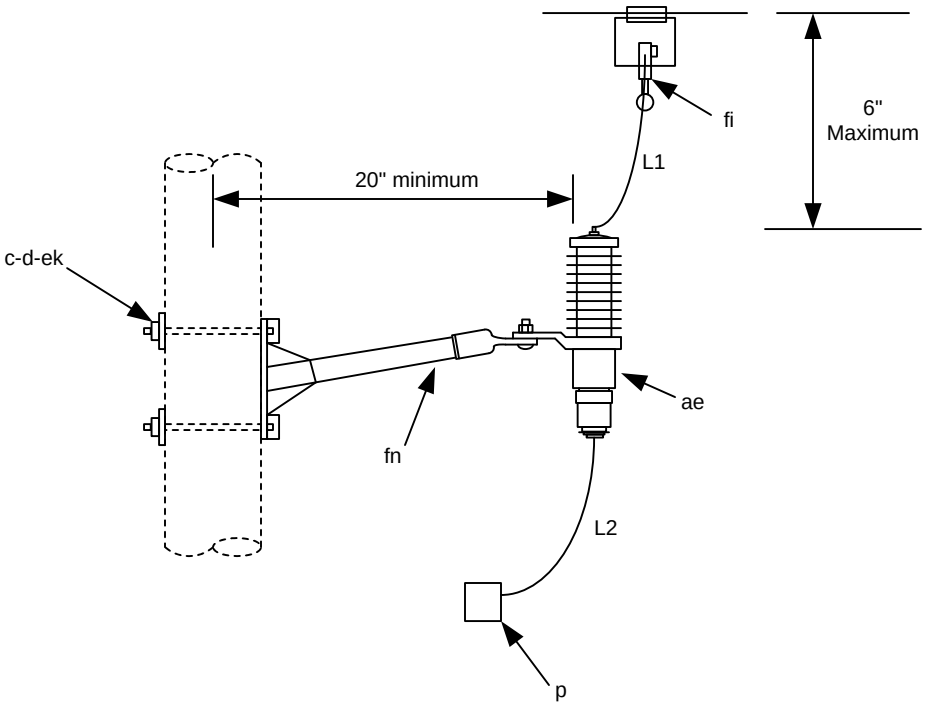


VP1.01
(VM5–6)

ASSEMBLY: VP1		.01	.1
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 5/8 x req'd length		2
d	Washer, square, 2 1/4		2
p	Connectors, as req'd		
ae	Arrester, surge, (18 kV)	1	1
av	Jumpers, as req'd		
fn	Bracket, cutout extension		1
ek	Locknuts		2

SURGE ARRESTERS – SINGLE PHASE

DEC 1998	1 – PHASE PRIMARY	VP1.01, VP1.1
RUS	24.9/14.4 kv	(VM5–6)



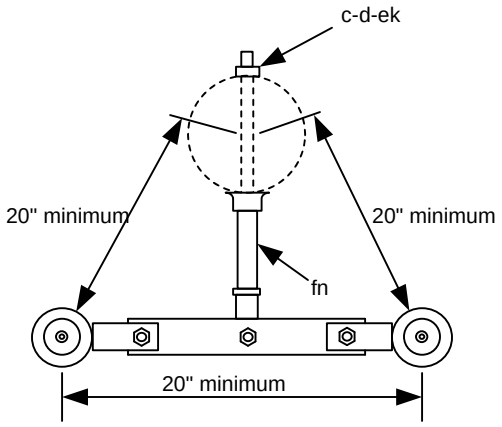
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, 2 ¼"
ae	1	Lightning Arrester, Surge, 18 kV
av		Jumpers, bare stranded as required
fn	1	Bracket, extension, cutout/arrester
ek	2	Locknuts, as required
p		Connectors, as required
fi	1	Connector, Hot Line
	1	Bail (Compression Stirrup)

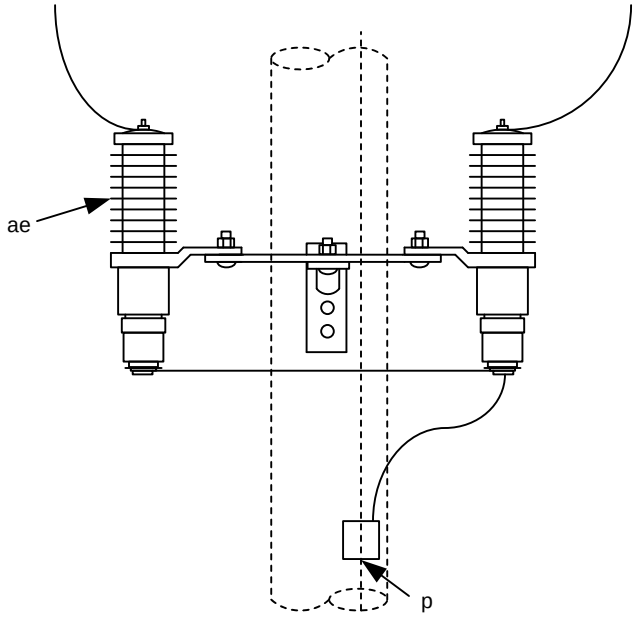
Note:

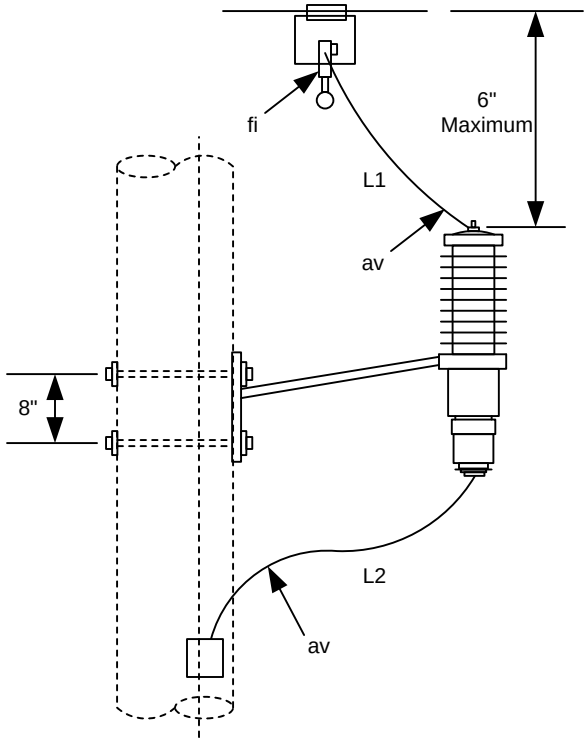
1. Minimize Lead lengths L1 and L2.
   L1 + L2 should be less than 3 feet when possible

SURGE ARRESTER – 1 SINGLE PHASE

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VP1.1N (VM5-61)







ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, 2 ¼"
ae	2	Lightning Arrester, Surge, 18 KV
av		Jumpers, bare stranded as required
fn	1	Bracket, extension, Cutout/Arrester
ek	4	Locknuts, as required
p		Connectors, as required
fi	2	Connector, Hot Line
	2	Bail (Compression Stirrup)

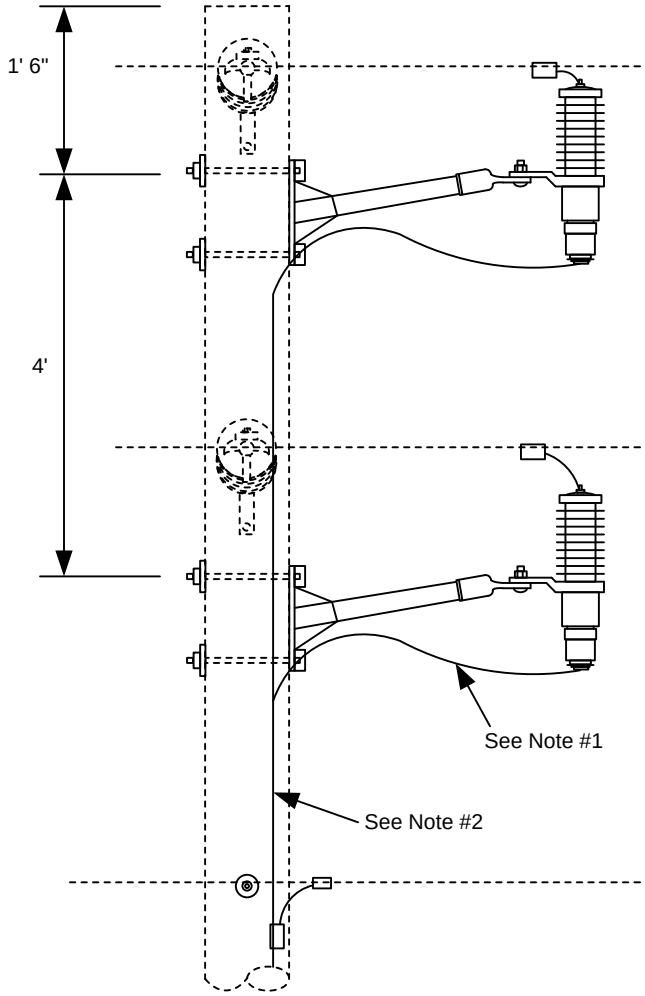
Note:

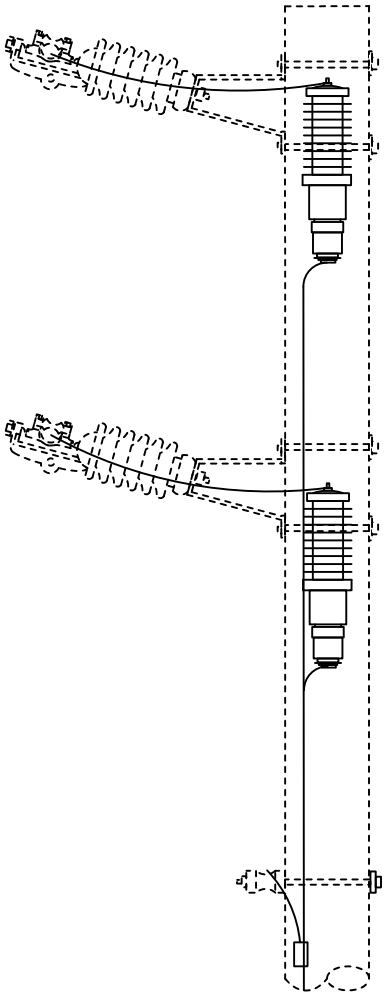
1. For Transmission Under Build add prefix “TUB-“. Specify Clearance of Neutral to Final Grade

2. Minimize Lead lengths L1 and L2. L1 + L2 should be less than 3 feet when possible

SURGE ARRESTERS – 2 SINGLE PHASE

2005	WFECA	2 – Phase Primary 24.9/14.4 kV	VP1.2N (VM5-62)





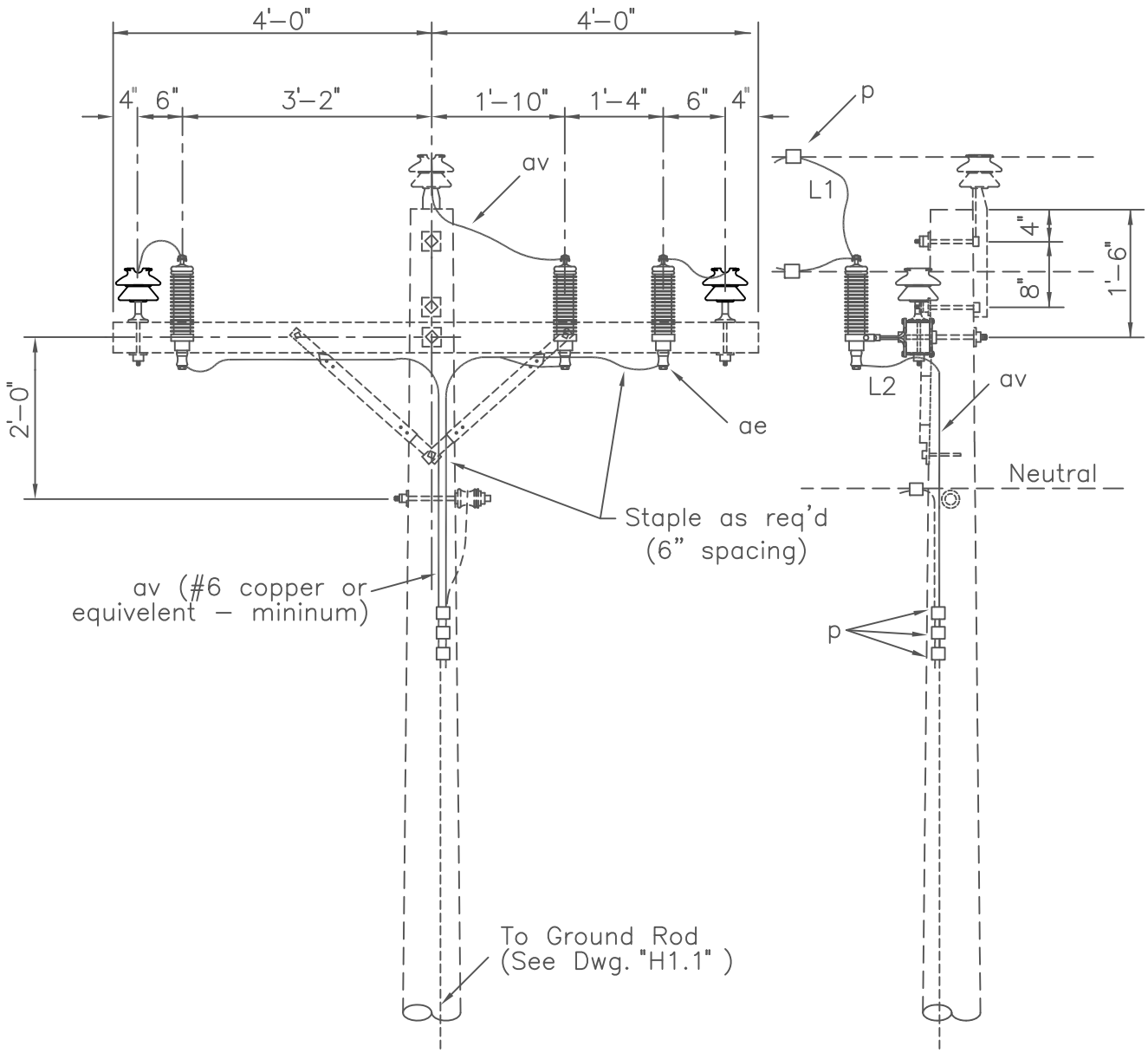
Note:

1. Keep arrester lead lengths as short as possible.
2. When phase conductor is larger than 266.8 kcmil, use #2 AWG (minimum) copper ground wire. #6 AWG (minimum) copper ground wire is sufficient when phase conductor is smaller than 266.8 kcmil.

ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x Required Length
d	4	Washer, 2 ¼"
p		Connectors, as required
ae	2	Arrester, Surge, 18 kV
av		Jumpers, bare, stranded, as required
ek	4	Locknut 5/8"
fi	2	Connector, Hot Line
fn	2	Bracket, extension, cutout/arrester
	2	Bail (Compression Stirrup)

SURGE ARRESTERS – 2 SINGLE PHASE VERTICAL (NARROW PROFILE)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VP1.21N

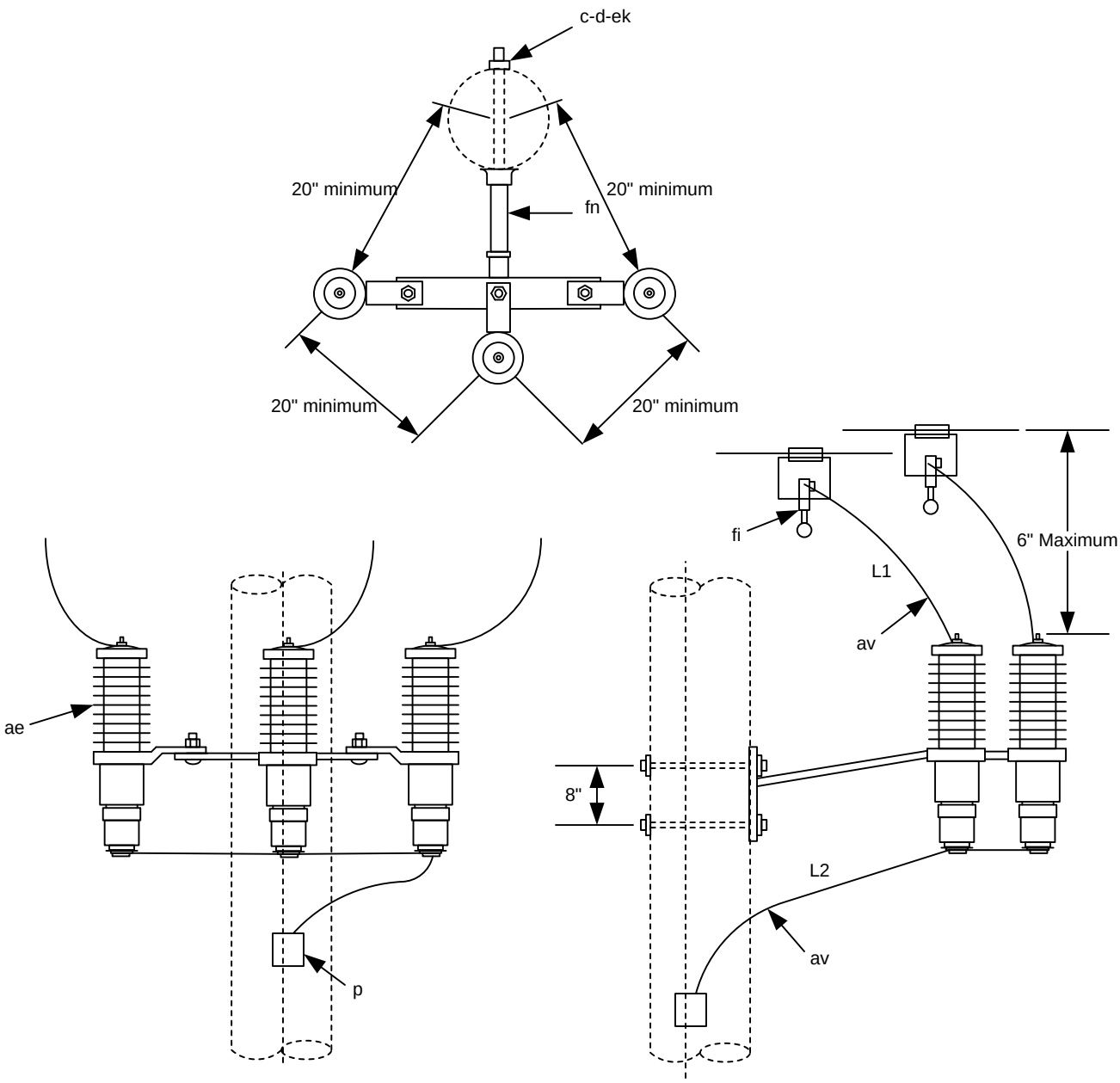


NOTE: Minimize lead lengths L1 and L2.
L1 + L2 should be less than 3 feet when possible

ITEM	QTY	MATERIAL
p		Connectors, as req'd
ae	3	Arrester, surge, (18 kv)
av		Jumpers, as req'd

SURGE ARRESTERS – 3 SINGLE PHASE

DEC 1998	3 – PHASE PRIMARY	VP1.3
RUS	24.9/14.4 kv	



ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, 2 ¼"
ae	3	Lightning Arrester, Surge, 18 KV
av		Jumpers, bare stranded, as required
fn	1	Bracket, extension, cutout/arrester
ek	2	Locknuts, as required
p		Connectors, as required
fi	3	Connector, Hot Line
	3	Bail (Compression Stirrup)

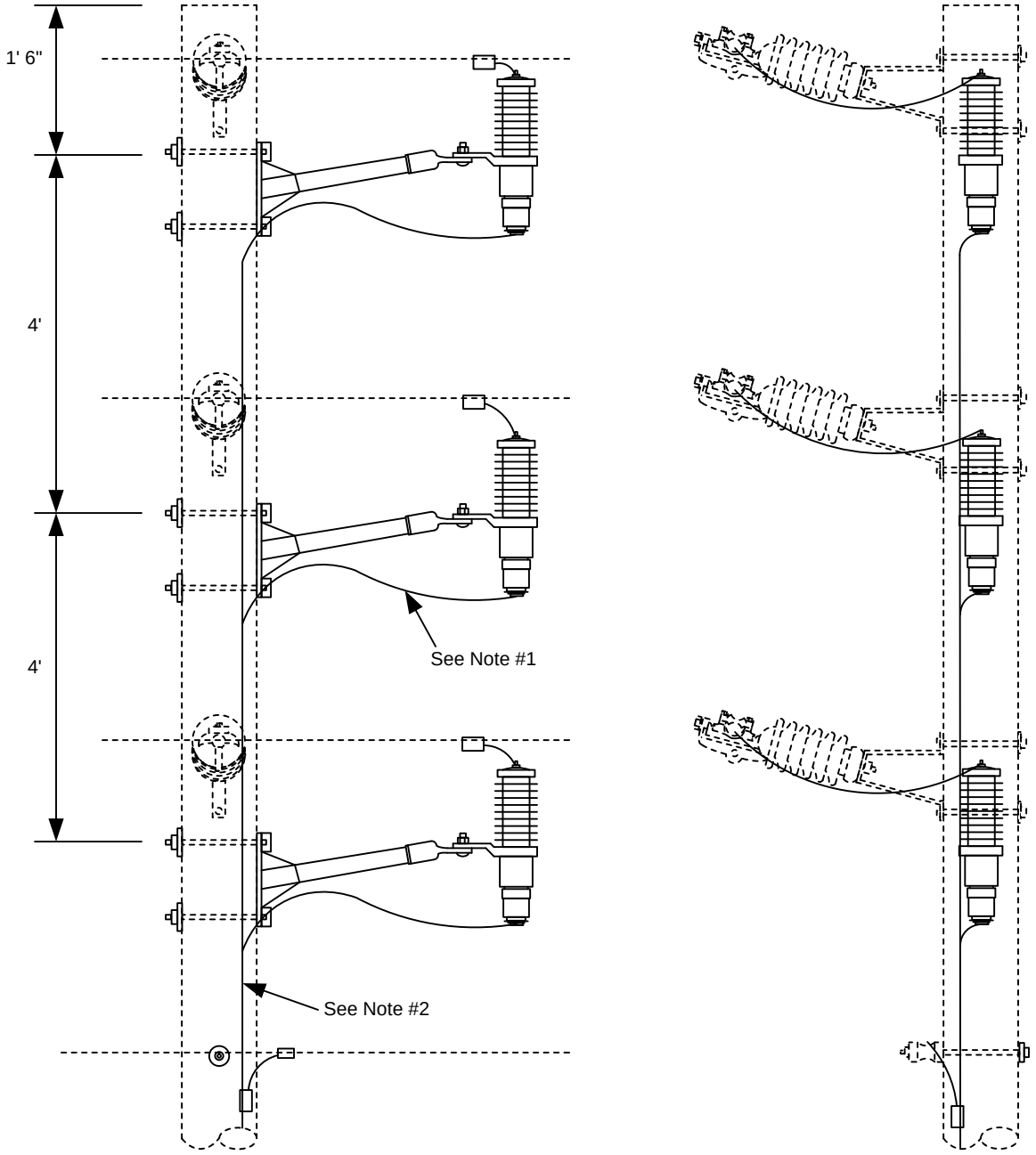
Note:

1. For Transmission Under Build add prefix “TUB-“.
   Specify Clearance of Neutral to Final Grade

2. Minimize Lead lengths L1 and L2.
   L1 + L2 should be less than 3 feet when possible

SURGE ARRESTERS – 3 SINGLE PHASE

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VP1.3N (VM5-63)



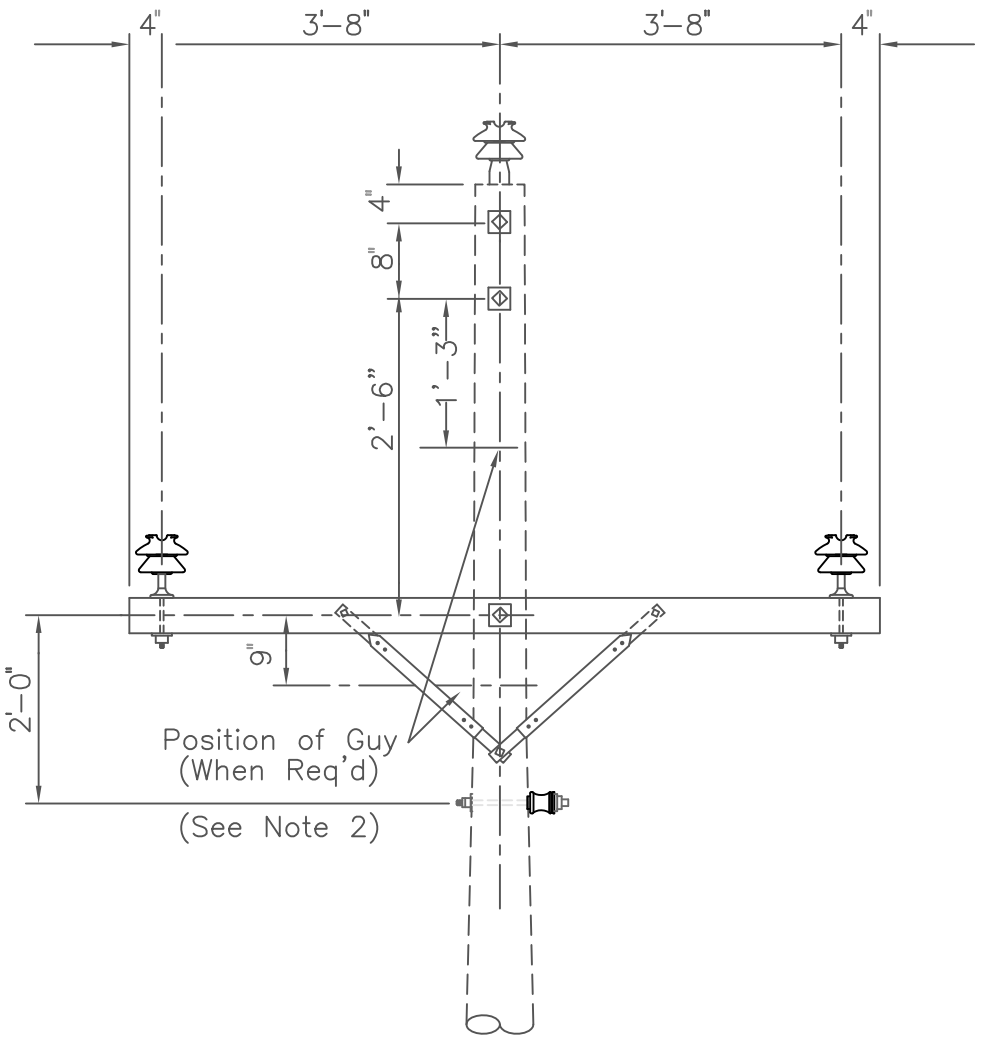
ITEM	QTY.	MATERIAL
c	6	Bolt, machine, 5/8" x Required Length
d	6	Washer, 2 ¼"
p		Connectors, as required
ae	3	Arrester, Surge, 18 kV
av		Jumpers, bare, stranded, as required
ek	6	Locknut 5/8"
fi	3	Connector, Hot Line
fn	3	Bracket, extension, cutout/arrester
	3	Bail (Compression Stirrup)

Note:

1. Keep arrester lead lengths as short as possible.
2. When phase conductor is larger than 266.8 kcmil, use #2 AWG (minimum) copper ground wire. #6 AWG (minimum) copper ground wire is sufficient when phase conductor is smaller than 266.8 kcmil.

SURGE ARRESTERS – 3 SINGLE PHASE VERTICAL (NARROW PROFILE)

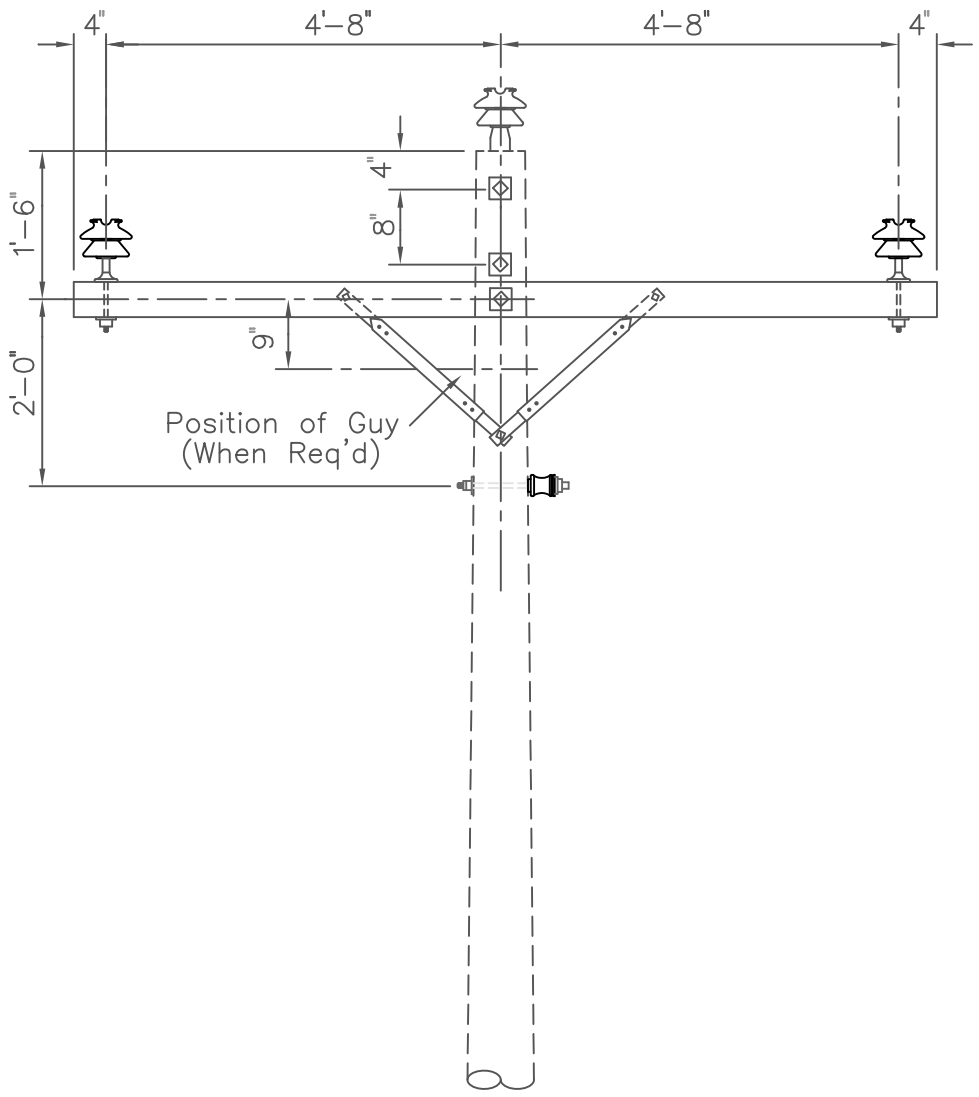
2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VP1.31N



NOTES:

1. See ''C1'', ''C2'', ''VC1'', and ''VC2'' drawings for additional construction details and materials.
2. All down guys must be insulated at top of pole.

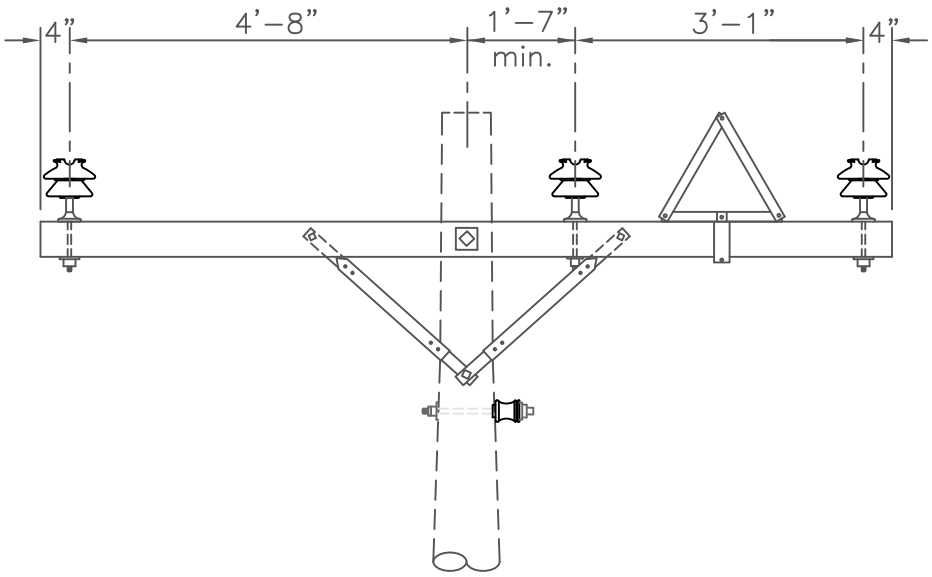
DESIGN PARAMETERS:	RAPTOR PROTECTION ASSEMBLY GUIDE SUPPORT ON 8 FOOT CROSSARMS (TANGENT)		
	DEC 1998 RUS	3 – PHASE PRIMARY 24.9/14.4 kV	VP3.1G

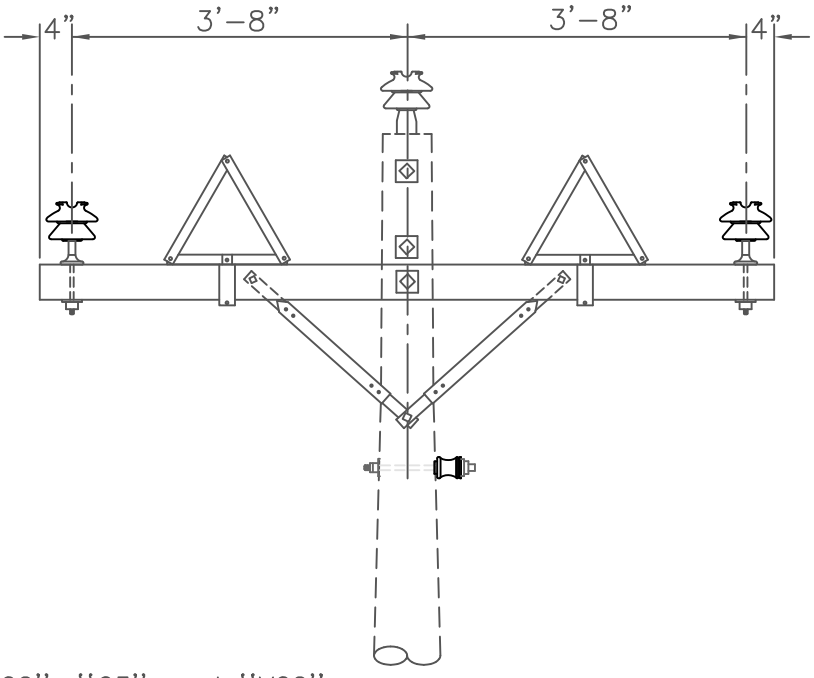


NOTE:

1. See ''C1'', ''C2'', ''VC1'', and ''VC2'' drawings for additional construction details and materials.

DESIGN PARAMETERS:	RAPTOR PROTECTION ASSEMBLY GUIDE SUPPORT ON 10 FOOT CROSSARMS (TANGENT)		
	DEC 1998 RUS	3 – PHASE PRIMARY 24.9/14.4 kV	VP3.2G





NOTE:

1. See ''C1'', ''C2'', ''C3'', and ''VC2'' drawings for additional construction details and materials.

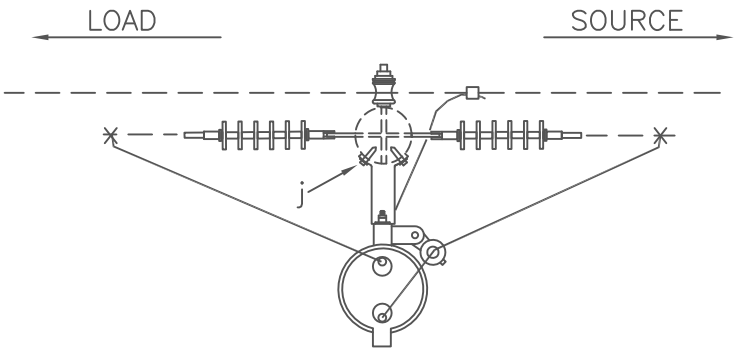
DESIGN PARAMETERS:

RAPTOR PROTECTION
PERCH GUARDS–GUIDE

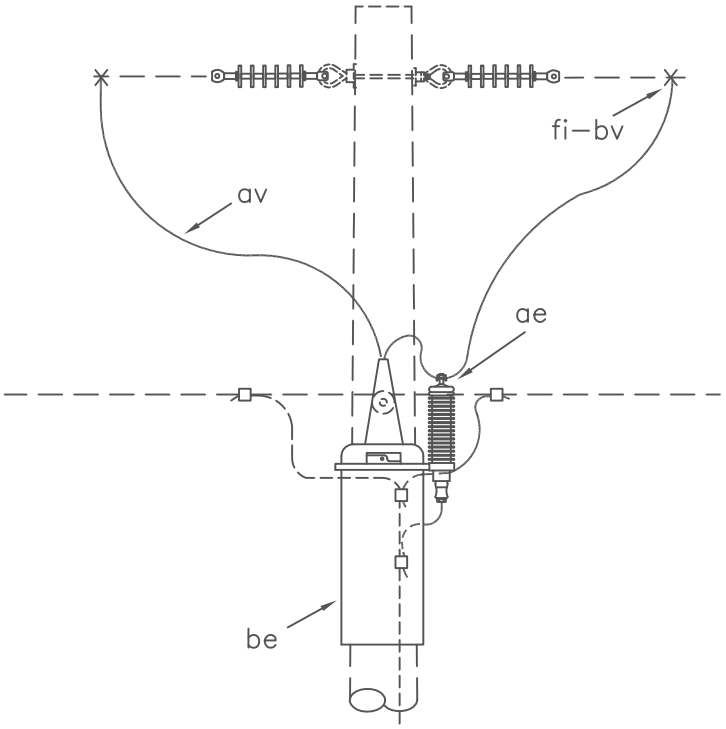
DEC 1998	3–PHASE PRIMARY	VP3.3G
RUS	24.9/14.4 kV	

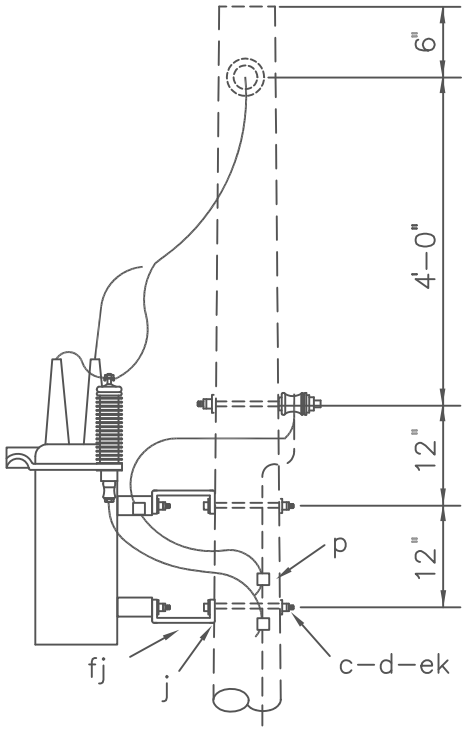
OIL CIRCUIT RECLOSER ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VR1.1	OIL CIRCUIT RECLOSER
VR1.2	OIL CIRCUIT RECLOSER (WITH BYPASS CUTOUT)
VR1.2T	OIL CIRCUIT RECLOSER (WITH BY-PASS CUTOUT AND TRANSFORMER)
VR2.2, VR3.2	(THREE) OIL CIRCUIT RECLOSERS (WITH BYPSS SWITCHES)
VR2.2T	(TWO) OIL CIRCUIT RECLOSERS (WITH BY-PASS CUTOUTS AND TRANSFORMER)
VR2.3T	(TWO) OIL CIRCUIT RECLOSERS (WITH BY-PASS CUTOUTS AND TRANSFORMER)
VR3.01	THREE PHASE ELECTRONIC RECLOSER COTROL
VR3.11	(THREE) OIL CIRCUIT RECLOSERS (WITH BY-PASS CUTOUTS)
VR3.11N	(THREE) OIL CIRCUIT RECLOSERS – NARROW PROFILE (WITH BY-PASS CUTOUTS)
VR3.30	THREE PHASE RECLOSER (WITH BY-PASS SWITCHES)
VR3.31	THREE PHASE RECLOSER (WITH BY- PASS SWITCHES)
VR3.32	THREE PHASE RECLOSER (WITH BY-PASS SWITCHES)



PLAN





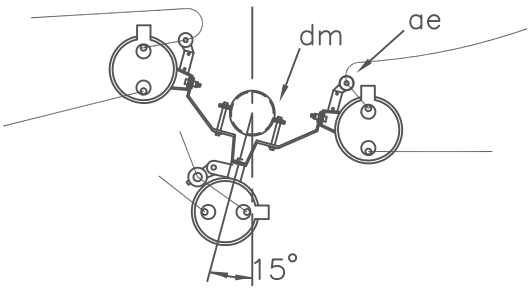
NOTE: The recloser terminal bushing connected to the coil should be connected to the source.

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
j	4	Screw, lag, 1/2" x 4"
p		Connector, as required
ae	1	Arrester, surge (18 kV)
av		Jumpers, stranded, as required

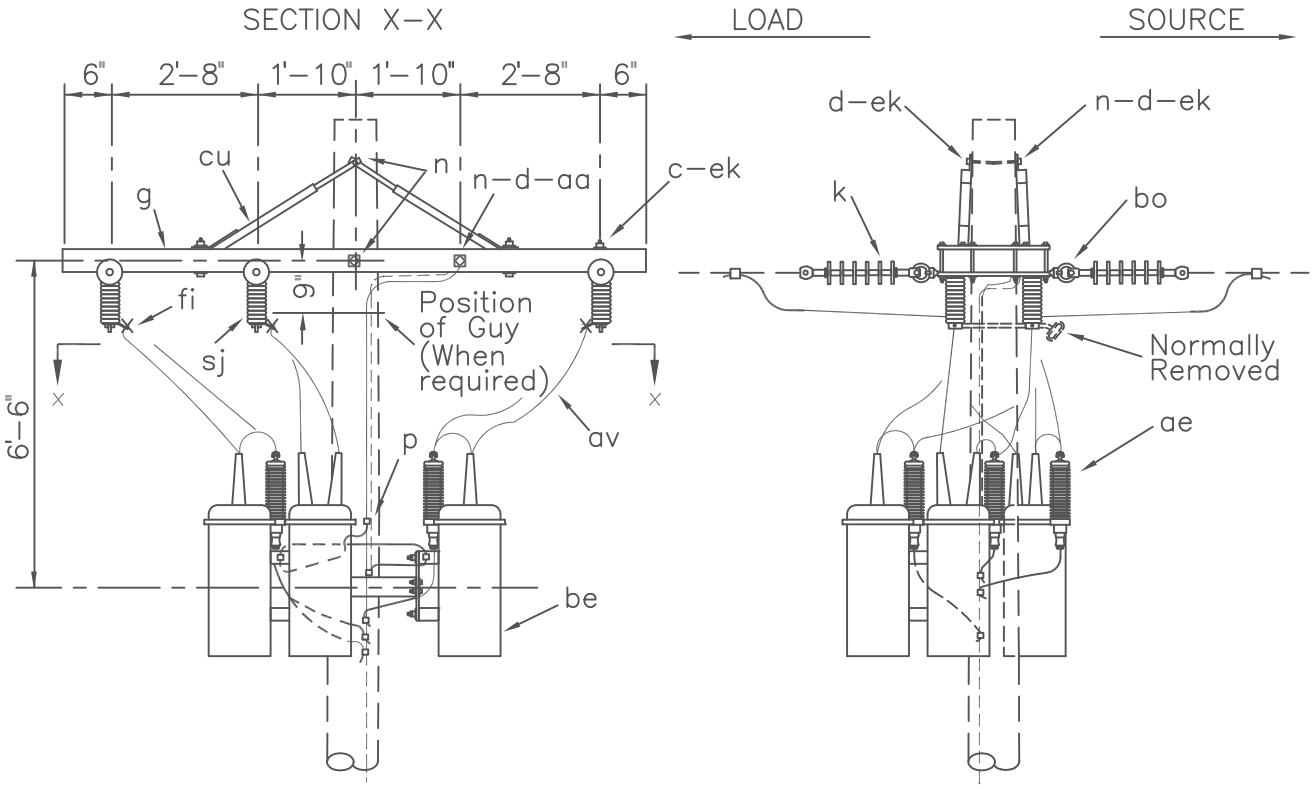
ITEM	QTY	MATERIAL
be	1	Recloser, oil circuit (14.4 kV)
bv		Rod, armor, as req'd
ek	2	Locknuts
fi	2	Connector, hot line
fj	2	Brackets, extension, 9" long

OIL CIRCUIT RECLOSER

DEC 1998	1 – PHASE PRIMARY	VR1.1
RUS	24.9/14.4 kV	(VM–10A)



SECTION X–X



NOTES:

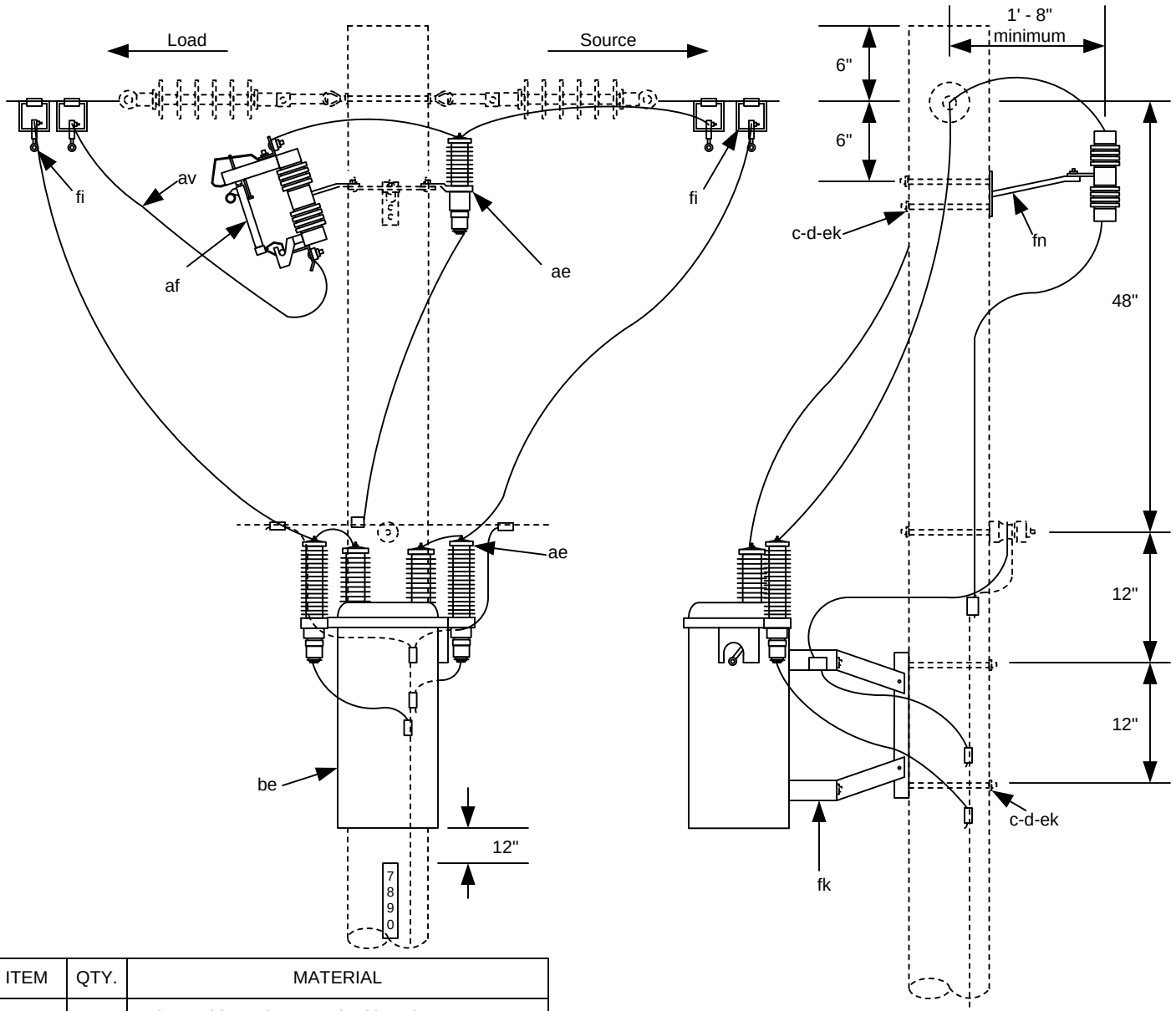
1. The recloser terminal bushing connected directly to the coil should be connected to the source.
2. For 2–phase installations, omit recloser and related items on center phase and designate as "VR2.2".
3. Each recloser tank shall have two connections to ground.

ITEM	QTY	MATERIAL
c	4	Bolt, machine, 1/2" x req'd length
c	12	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	8	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'–0"
k	6	Insulator, 25 kV Polymer Deadend
n	3	Bolt, double arm, 5/8" x req'd length
p		Connectors, as required
aa	2	Nut, eye, 5/8"
ae	3	Arresters, surge, (18 kV)

ITEM	QTY	MATERIAL
av		Jumpers, stranded, as req'd
be	3	Recloser, oil circuit (14.4 kV)
bo	6	Shackle, anchor
cu	2	Brace, wood, 60" span
dm	1	Bracket, cluster type with 14" adapter
		plate
ek	26	Locknuts
fi	6	Connector, hot line
sj	3	Switch, OCR, by–pass, (27 kV)

(THREE) OIL CIRCUIT RECLOSERS (WITH BYPASS SWITCHES)

DEC 1998	3–PHASE PRIMARY	VR2.2, VR3.2
RUS	24.9/14.4 kV	(VM3–24A,VM3–25A)



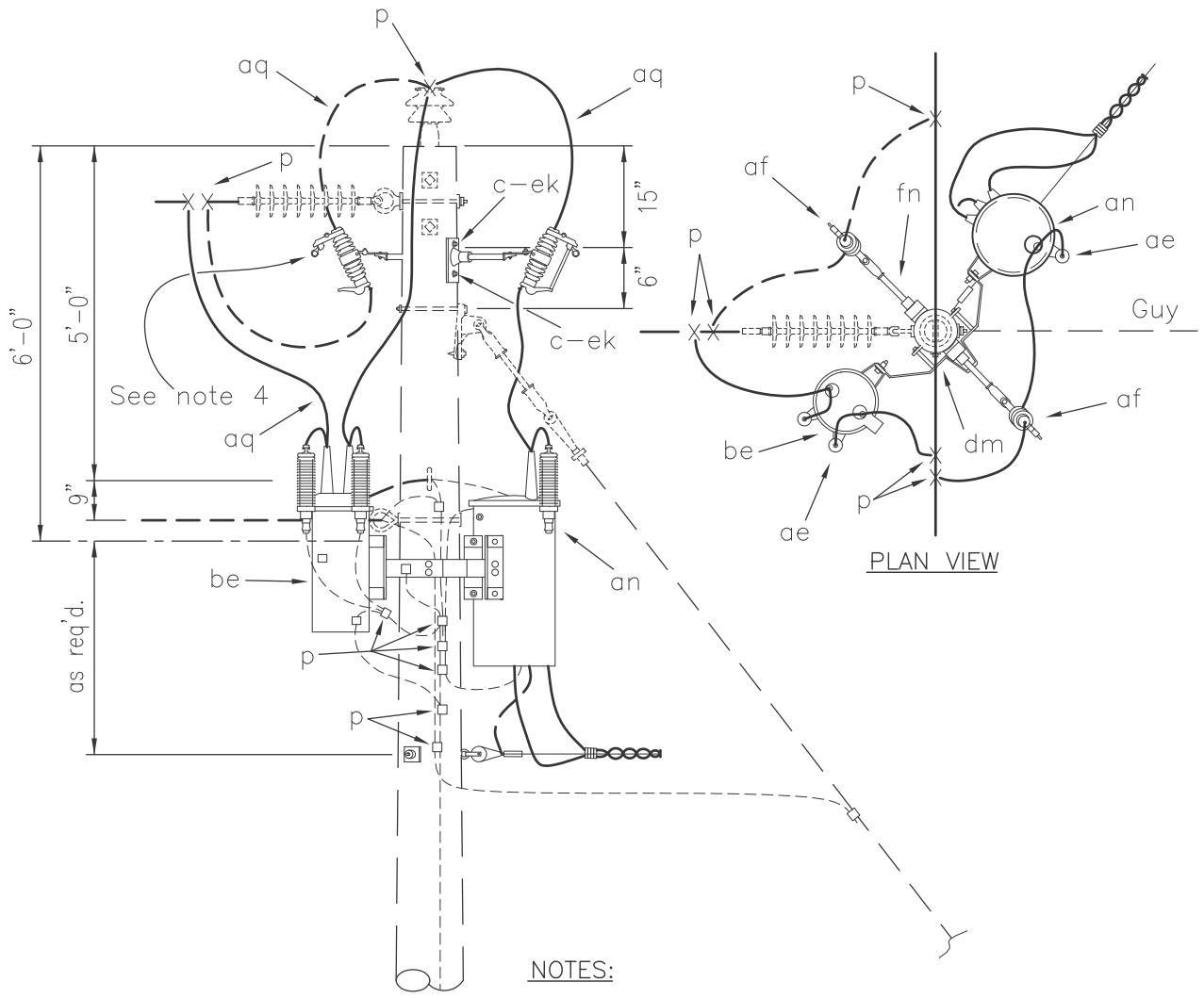
ITEM	QTY.	MATERIAL
c	4	Bolt, Machine, 5/8" x required length
d	4	Washer, square, 2 ¼”
j	3	Lag Screw ¼” x 4"
p		Connectors, as required
ae	3	Arrester, surge (18KV)
af	1	Cutout, Load Break, 27 kV
av		Jumpers, stranded, as required
be	1	Recloser, oil circuit (14.4 kV) Specify type and size
ek	4	Locknuts
fi	4	Connector, hot line
fk	1	Brackets, extension, OCR
fn	1	Bracket, extension, Cutout/Arrester
	1	Bracket, OCR/Switch Number
	4	Bail (Compression Stirrups)

NOTE:

1. Position Handle to Source Side
2. Bracket and Recloser must be Grounded
3. Add second Arrester to load side of OCR tank
4. The Recloser terminal bushing connected to the coil should be connected to the source

OIL CIRCUIT RECLOSER (WITH BYPASS CUTOUT)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VR1.2 (VM3-10A)



NOTES:

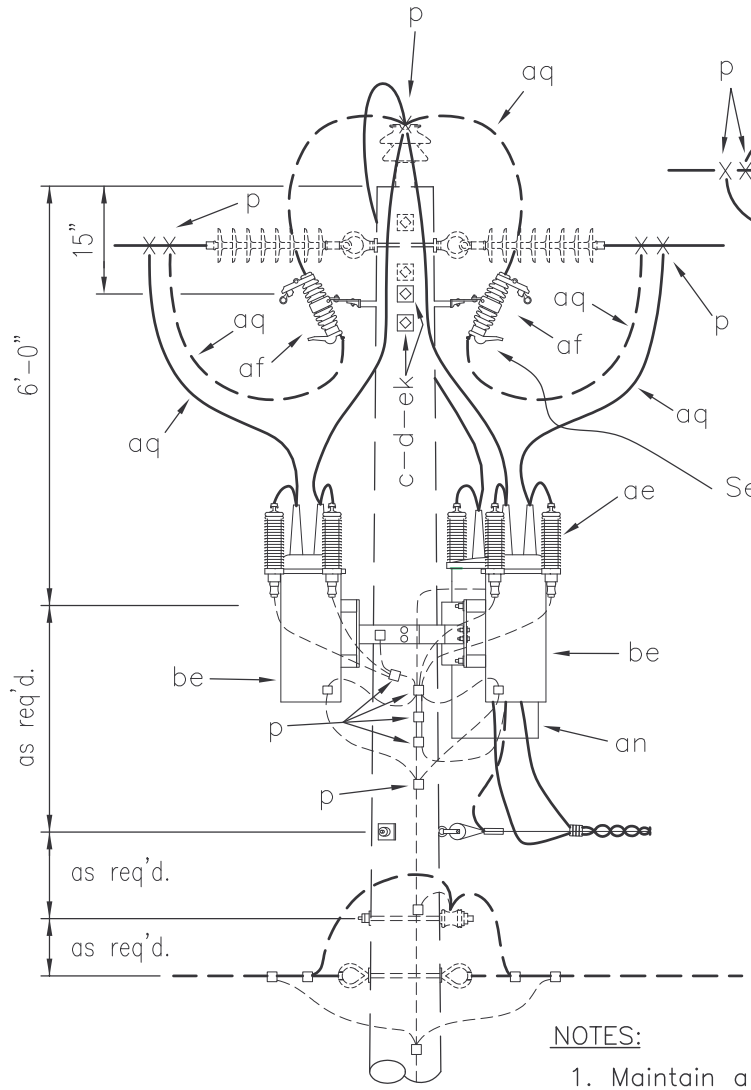
1. Need guy insulator if guy is required.
2. Main line neutral may need to be repositioned and double deadended on the pole.
3. Maintain a phase to ground clearance of 12 inches minimum.
4. Bypass fuse barrels are to be installed only when reclosers are bypassed. Assembly shown in normal operation without fuse barrels.

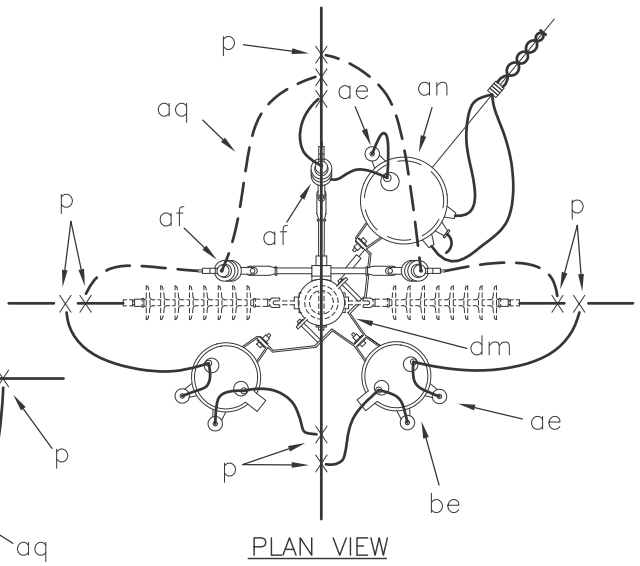
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length	aq		Jumpers, as req's
p		Connectors, as req'd	be	1	Recloser
ae	2	Arrester, surge	dm	1	Bracket, cluster type
af	1	Cutout, single shot (transformer)	ek		Locknuts, as req'd
af	1	Cutout, load break	fn	2	Bracket, extension 1 phase
an	1	Transformer, conventional			

OIL CIRCUIT RECLOSER

(WITH BYPASS CUTOUT & TRANSFORMER)

OCT. 2006	WEST FLORIDA ELECTRIC COOP.	NTS
file: FL17–VR1–2T	GRACEVILLE, FLORIDA	VR1.2T





PLAN VIEW

NOTES:

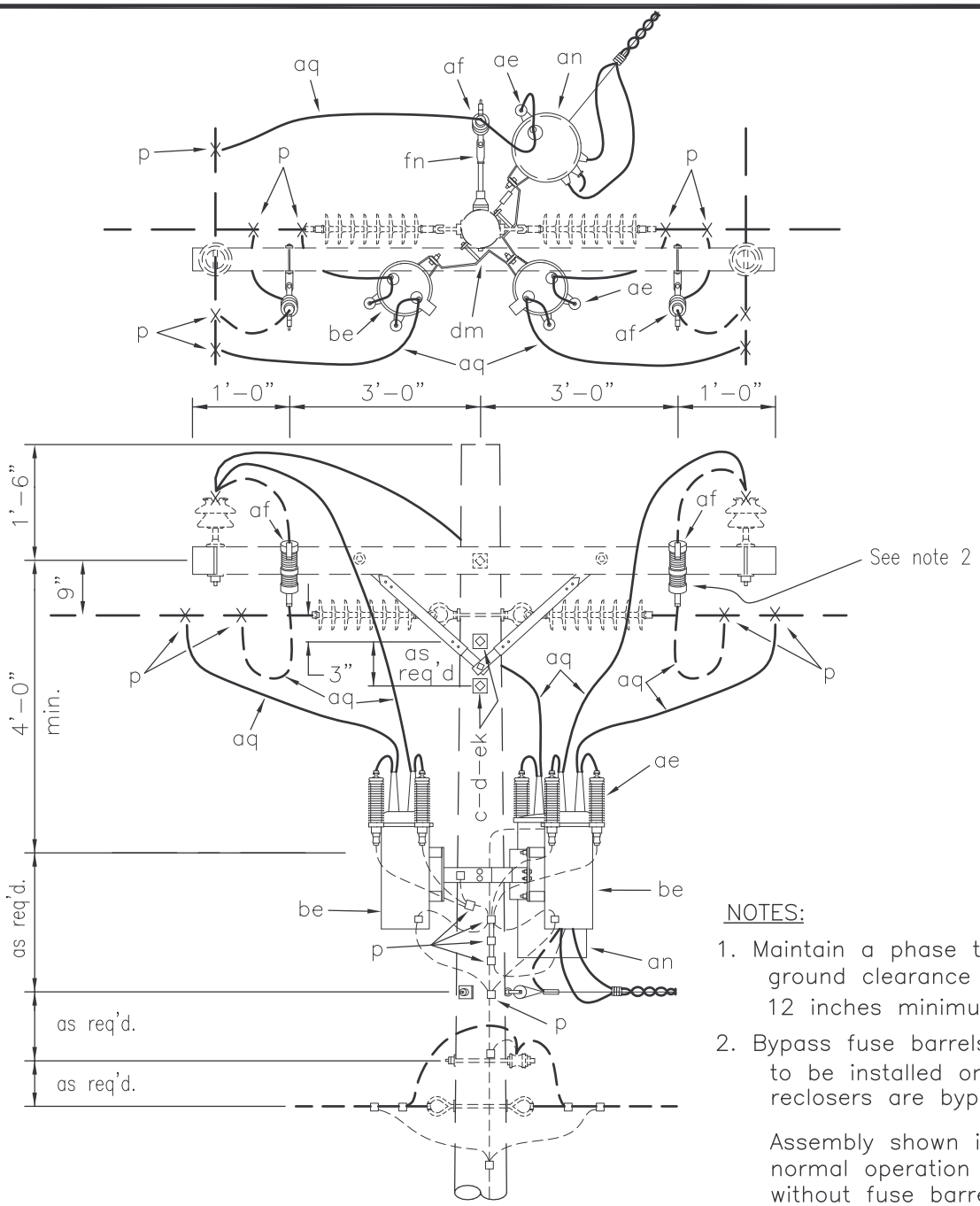
1. Maintain a phase to ground clearance of 12 inches minimum.

2. Bypass fuse barrels are to be installed only when reclosers are bypassed. Assembly shown in normal operation without fuse barrels.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolts, machine, 5/8" x req'd length	an	1	Transformer, conventional
d	2	Washers, square, 2 1/4"	aq		Jumpers, as req'd
p		Connectors, as req'd	be	2	Recloser
ae	4	Arrester, surge	dm	1	Bracket, cluster type
af	1	Cutout, single shot (transformer)	ek		Locknuts, as req'd
af	2	Cutout, load break		1	Bracket, 3 phase cutout & arrester

(TWO) OIL CIRCUIT RECLOSERS
(WITH BYPASS CUTOUTS & TRANSFORMER)

OCT. 2006	WEST FLORIDA ELECTRIC COOP.	NTS
file: FL17–VR2.2T	GRACEVILLE, FLORIDA	VR2.2T



NOTES:

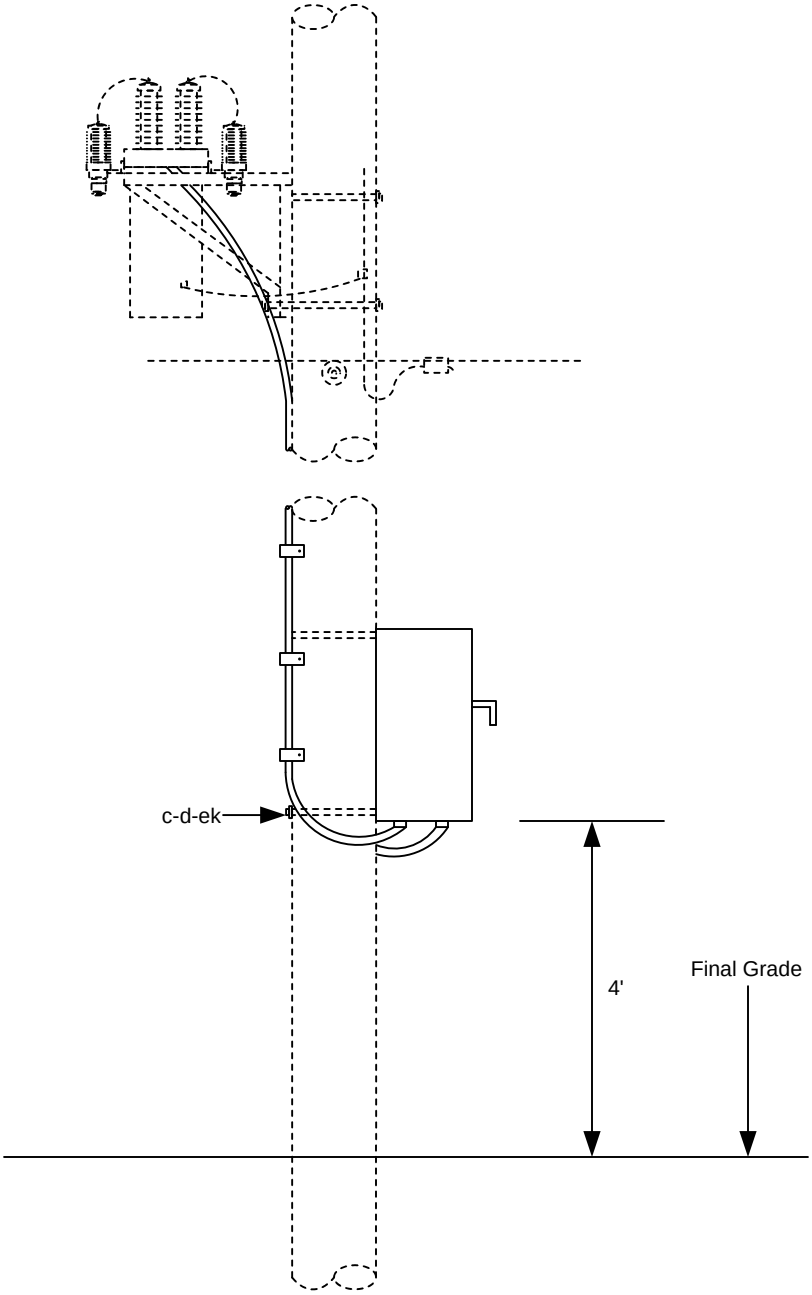
1. Maintain a phase to ground clearance of 12 inches minimum.
2. Bypass fuse barrels are to be installed only when reclosers are bypassed.

   Assembly shown in normal operation without fuse barrels.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolts, machine, 5/8" x req'd length	aq		Jumpers, as req'd
d	2	Washers, square, 2 1/4"	an	1	Transformer, conventional
p		Connectors, as req'd	be	1	Recloser
ae	4	Arrester, surge	dm	1	Bracket, cluster type
af	1	Cutout, single shot (transformer)	ek		Locknuts, as req'd
af	2	Cutout, load break	fn	1	Bracket, extension 1 phase

(TWO) OIL CIRCUIT RECLOSERS
(WITH BYPASS CUTOUTS & TRANSFORMER)

OCT. 2006	WEST FLORIDA ELECTRIC COOP.	NTS
file: FL17–VR2–3T	GRACEVILLE, FLORIDA	VR2.3T



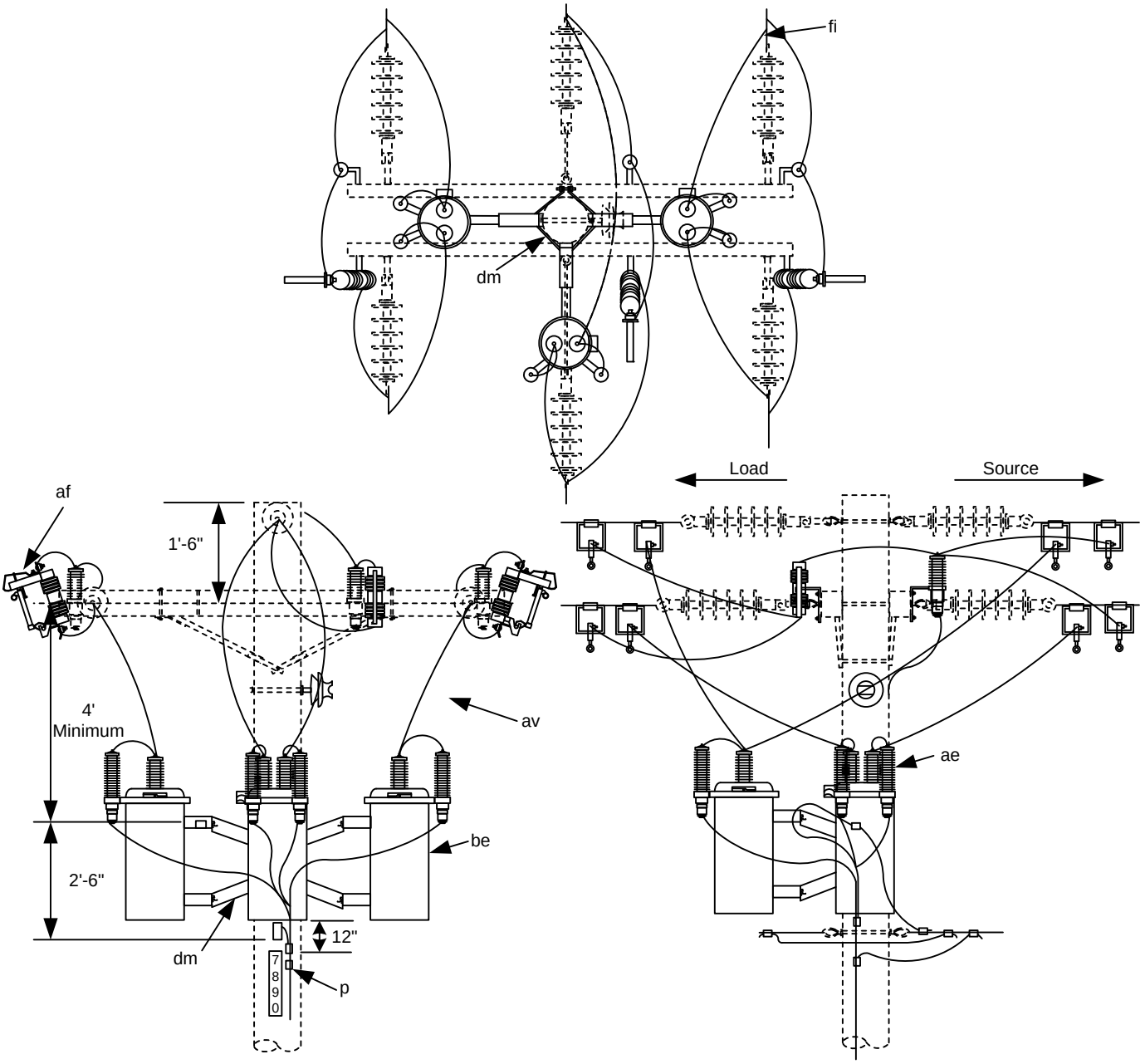
Note:

1. Specify Control Type

ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x Required Length
d	2	Washer, 2 ¼”
p		Connectors, as required
ek	2	Locknuts, 5/8"
	1	Recloser Control and Cables
	24	Pipe Strap, ¾”

THREE PHASE ELECTRONIC RECLOSER CONTROL

2005	WFECA	Recloser Control	VR3.01



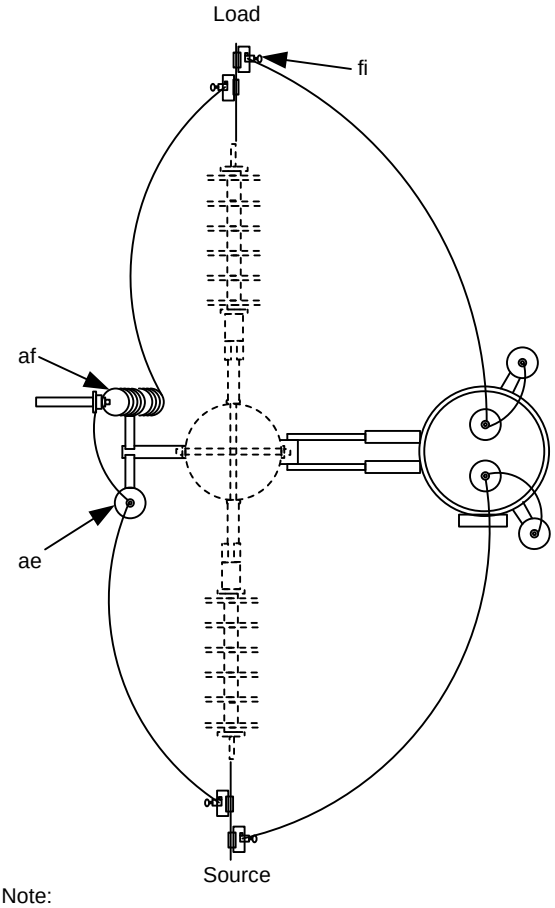
ITEM	QTY.	MATERIAL
a	1	Insulator, pin type, (24.9/14.4 kV)
c	2	Bolt, machine, 5/8" x required length
d	4	Washer, 2 ¼"
n	1	Bolt, Double arming, 5/8" x required length
p		Connectors, as required
ae	9	Arrester, surge (18KV)
af	3	Cutout, Load Break, 27 kV
av		Jumpers, stranded, as required
be	3	Recloser, oil circuit (14.4 kV)
dd	1	Adaptor, insulator
dm	1	Bracket, cluster type, with 14" adapter plate
ek	5	Locknuts, 5/8"
fi	12	Connector, hot line
	1	Bracket, OCR/Switch Number
	12	Bail (Compression Stirrup)

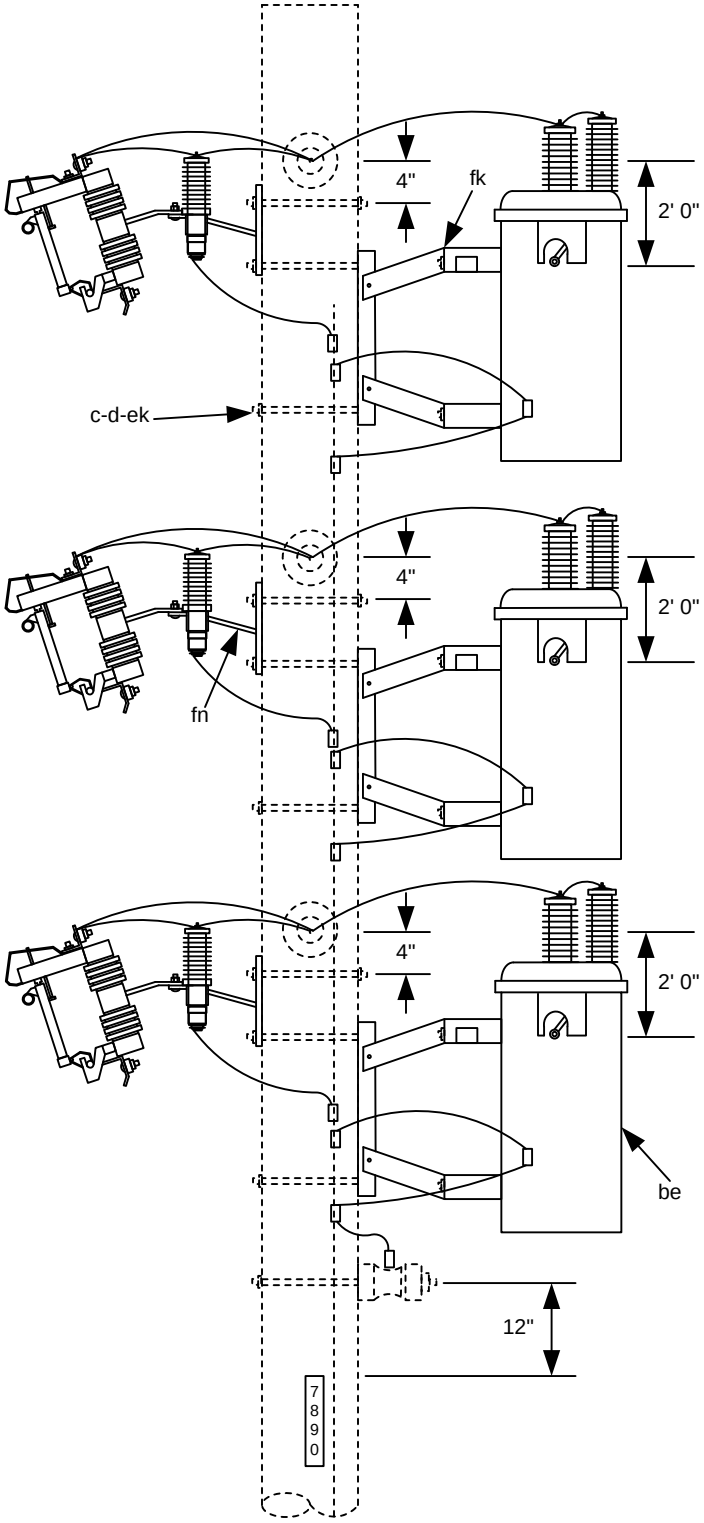
NOTE:

1. For Reclosers over 70 Amps, use assembly VR3.2
2. The recloser terminal bushing connected to the coil should be connected to the source
3. For 2-phase installations, omit recloser and related items on center phase and designate as “VR2.1”
4. Each recloser tank shall be connected to ground

(THREE) OIL CIRCUIT RECLOSERS (WITH BYPASS CUTOUTS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VR3.11 (VM3-20A)





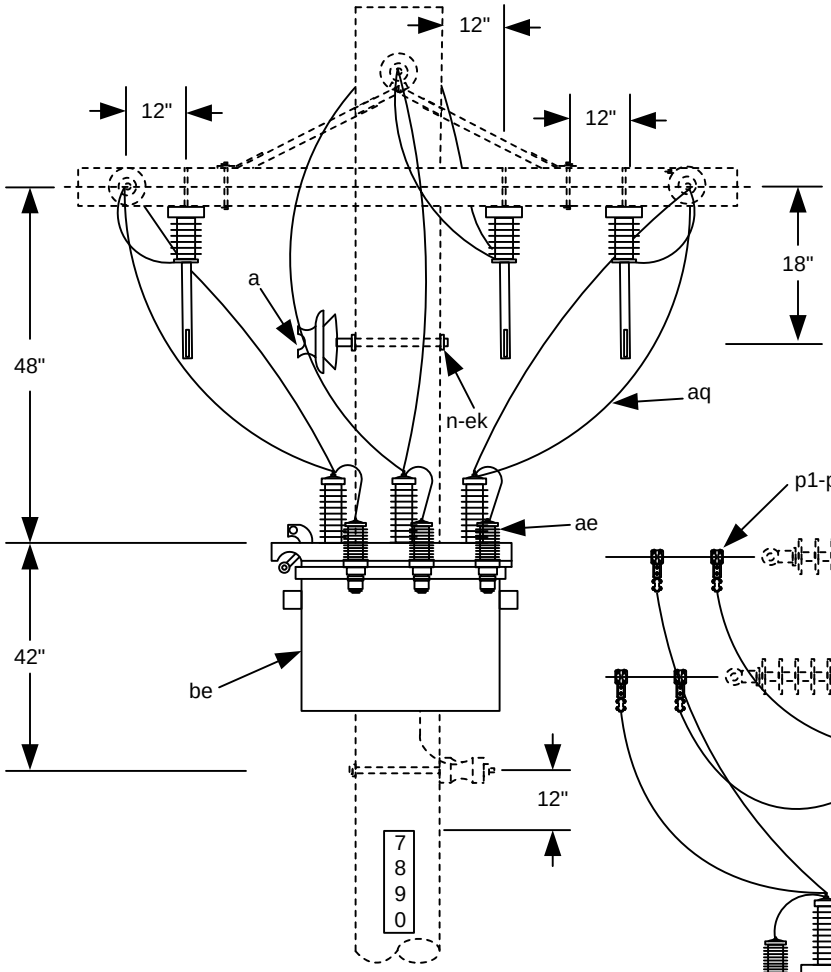
Note:

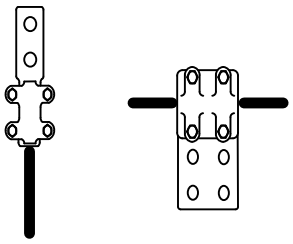
1. Add Second arrester to load side of OCR tank
2. Position Handle to Source Side
3. Bracket and Recloser must be Grounded
4. The Recloser terminal bushing connected directly to the coil shall be connected to the Source.
5. Each Recloser tank shall be connected to Ground

ITEM	QTY.	MATERIAL
c	12	Bolt, Machine, 5/8" x required length
d	12	Washer, square, 2 ¼”
j	3	Lag Screw, ½” x 4"
p		Connectors, as required
ae	9	Arrester, surge (18KV)
af	3	Cutout, Load Break, 27 kV
av		Jumpers, stranded, as required
be	3	Recloser, oil circuit (14.4 kV) Specify type and size
ek	12	Locknuts, 5/8"
fi	12	Connector, hot line
fk	3	Brackets, extension, OCR
fn	3	Bracket, extension, Cutout/Arrester
	1	Bracket, OCR/Switch Number
	12	Bail (Compression Stirrup)

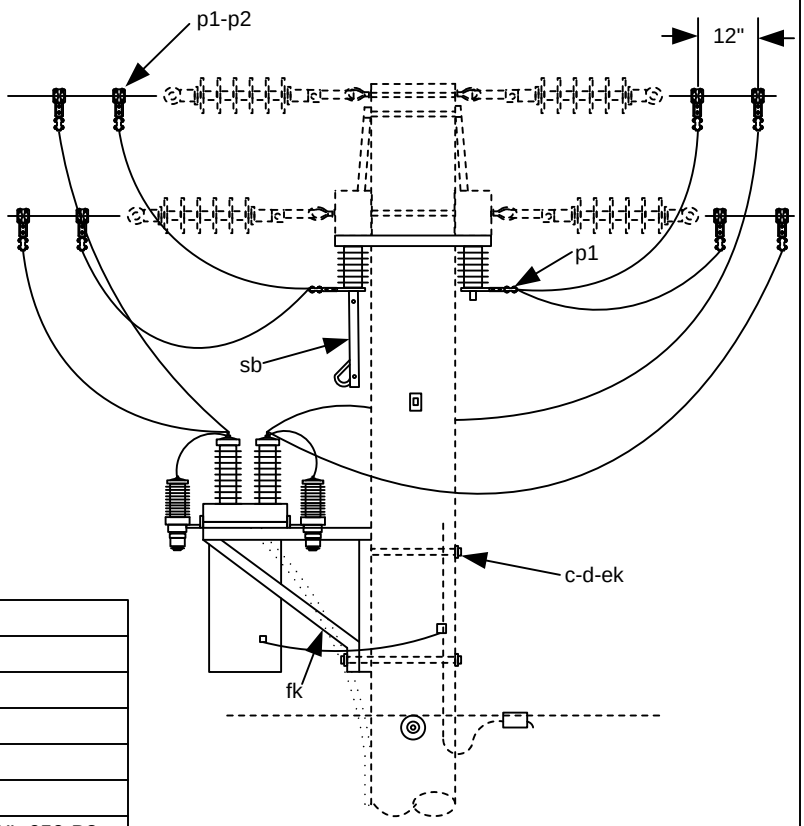
(THREE) OIL CIRCUIT RECLOSERS – NARROW PROFILE (WITH BYPASS CUTOUTS)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VR3.11N





Details



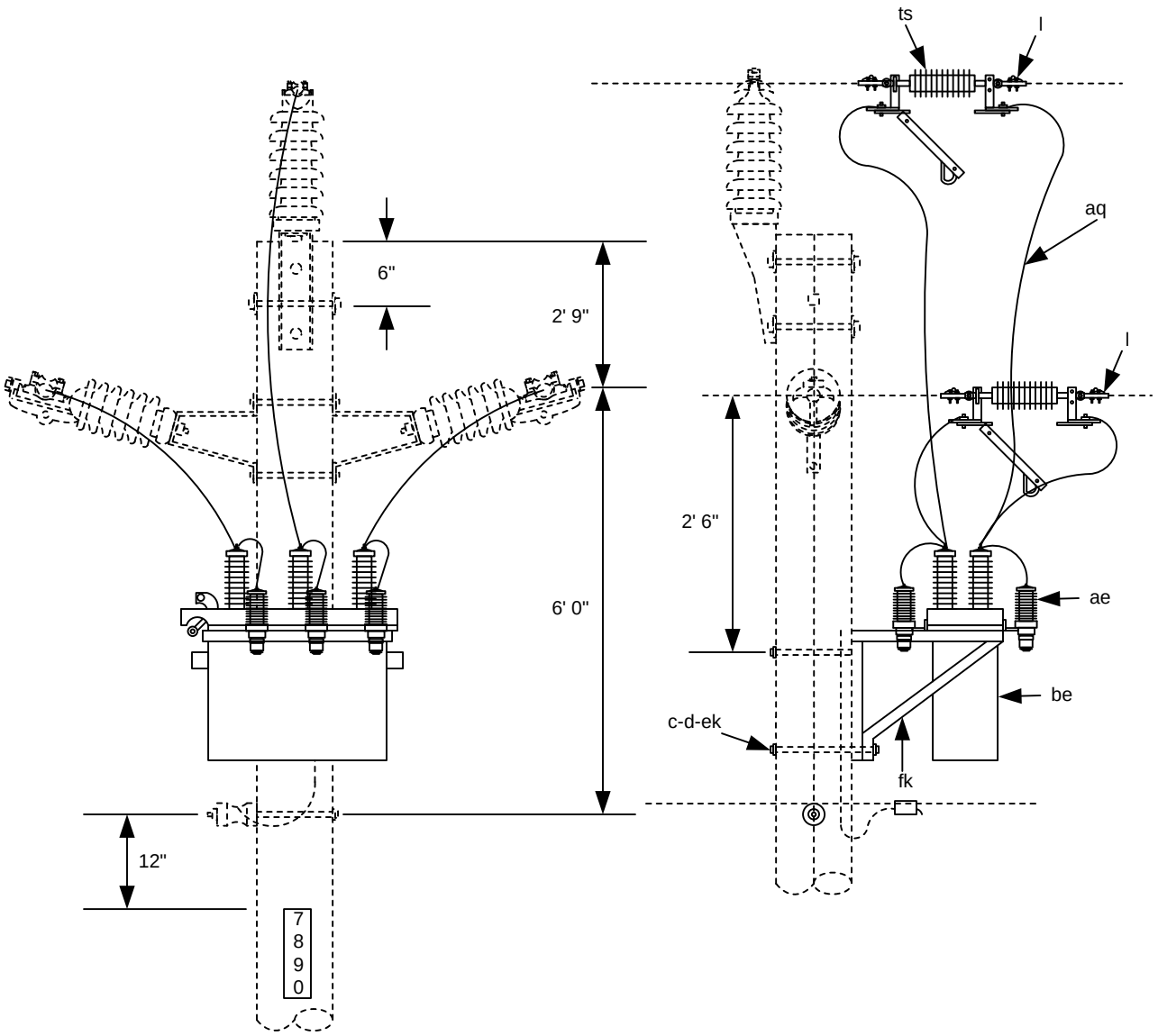
ITEM	QTY.	MATERIAL
	6	Protector, Wildlife
	36	Washer Flat, Bronze, ½"
	36	Nut, Bronze, ½"
	36	Bolt, machine, Bronze ½" x 1 ½"
	36	Lock Washer, Bronze, ½"
p1	12	Connector, Flat 2/0 to 500 MCM Anderson SWL-050-B2
p2	12	Connector, Tee #2 to 800 MCM - Anderson SF-1-C-3
a	1	Insulator, Pin Type
c	2	Bolt, machine, 5/8" x Required Length
d	4	Washer, 2 ¼"
n	1	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
ae	6	Arrester, Lightning, 18 kV
aq		Jumper, 250 THW Copper
be	1	Recloser, 3 Phase
cj		Ground Wire, No. 6 Copper
dd	1	Adapter, Insulator
ek	5	Locknuts, 5/8"
fk	1	Bracket, Recloser Mounting
sb	3	Switch, disconnect, 25 kV, 600 A
	1	Bracket, OCR/Switch Number

NOTE:

1. Position Handle to Source Side
2. Bracket and Recloser must be Grounded
3. Add second Arresters to load side of OCR tank
4. The Recloser terminal bushings connected to the coil should be connected to the source
5. See VR3.01 for Control details
6. Requires 120 V Source for Control
7. Lower neutral as required for clearance

THREE PHASE RECLOSER (WITH BY-PASS SWITCHES)

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	VR3.30



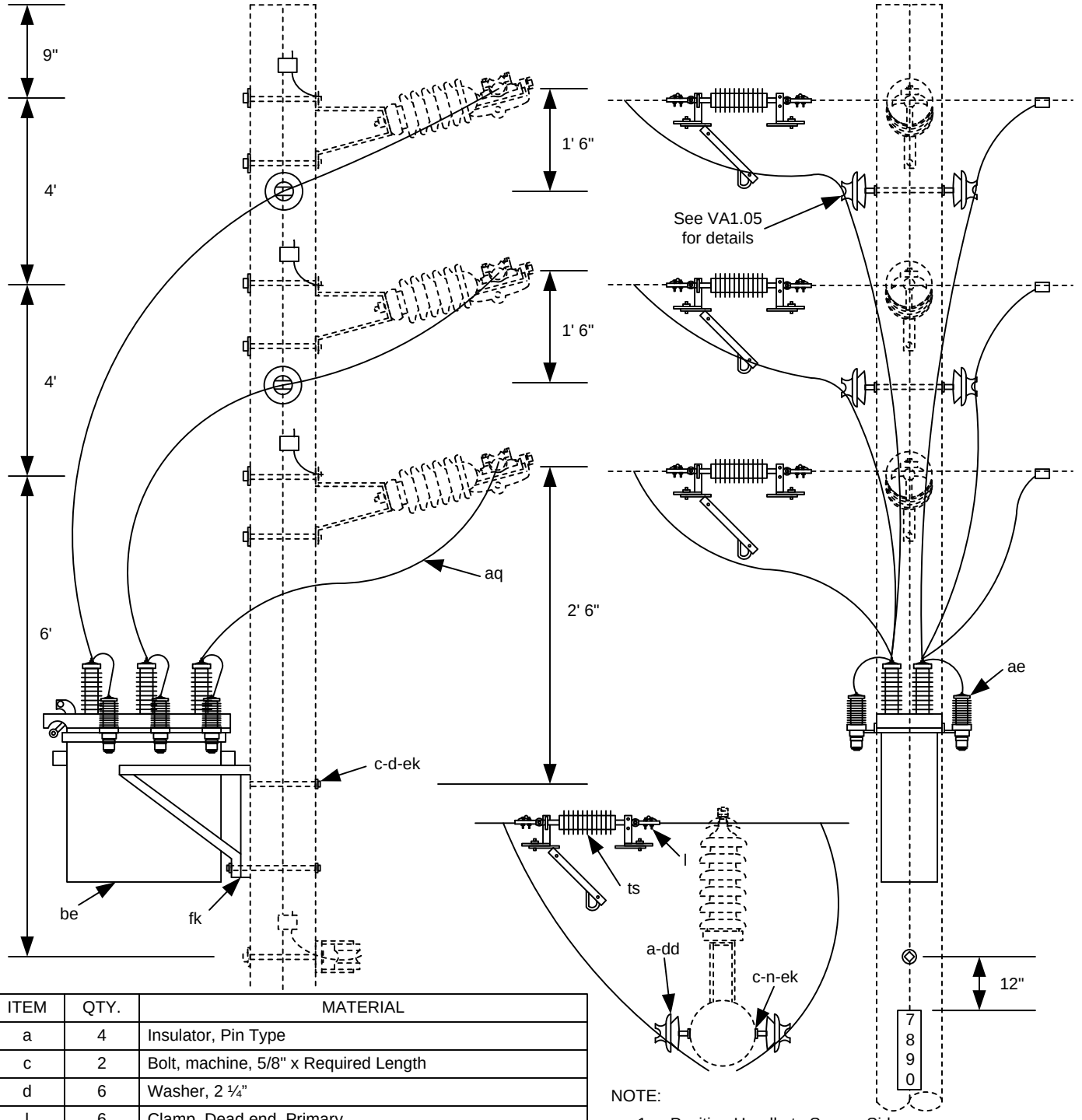
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x Required Length
d	2	Washer, 2 ¼"
l	6	Clamp, Deadend, Primary
p		Connectors, as required
ae	6	Arrester, Lightning, 18 kV
aq		Jumper, stranded wire, size and length as required
be	1	Recloser, 3 Phase
cj		Ground Wire, No.6 copper or equiv.
ek	2	Locknuts, 5/8"
fk	1	Bracket, Side-mount for Recloser
ts	3	Switch, Line-tension Disconnect
	1	Bracket, OCR/Switch Number

NOTE:

1. Position Handle to Source Side
2. Bracket and Recloser must be Grounded
3. Add second Arresters to load side of OCR tank
4. The Recloser terminal bushings connected to the coil should be connected to the source
5. See VR3.30C for Control details
6. Requires 120 V Source for Control
7. Lower Neutral 2' 0" for Clearance

THREE PHASE RECLOSER (WITH BY-PASS SWITCHES)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VR3.31



ITEM	QTY.	MATERIAL
a	4	Insulator, Pin Type
c	2	Bolt, machine, 5/8" x Required Length
d	6	Washer, 2 ¼"
l	6	Clamp, Dead end, Primary
n	2	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
ae	6	Arrester, Lightning, 18 kV
aq		Jumper, 4/0 THW Copper
be	1	Recloser, 3 Phase
cj		Ground Wire, No. 6 Copper
dd	4	Adapter, Insulator
ek	6	Locknuts, 5/8"
fk	1	Bracket, Recloser Mounting
ts	3	Switch, Line-Tension Disconnect
	1	Bracket, OCR/Switch Number

NOTE:

1. Position Handle to Source Side
2. Bracket and Recloser must be Grounded
3. Add second Arresters to load side of OCR tank
4. The Recloser terminal bushings connected to the coil should be connected to the source
5. See VR3.30C for Control details
6. Requires 120 V Source for Control
7. Lower neutral 2'0" for Clearance

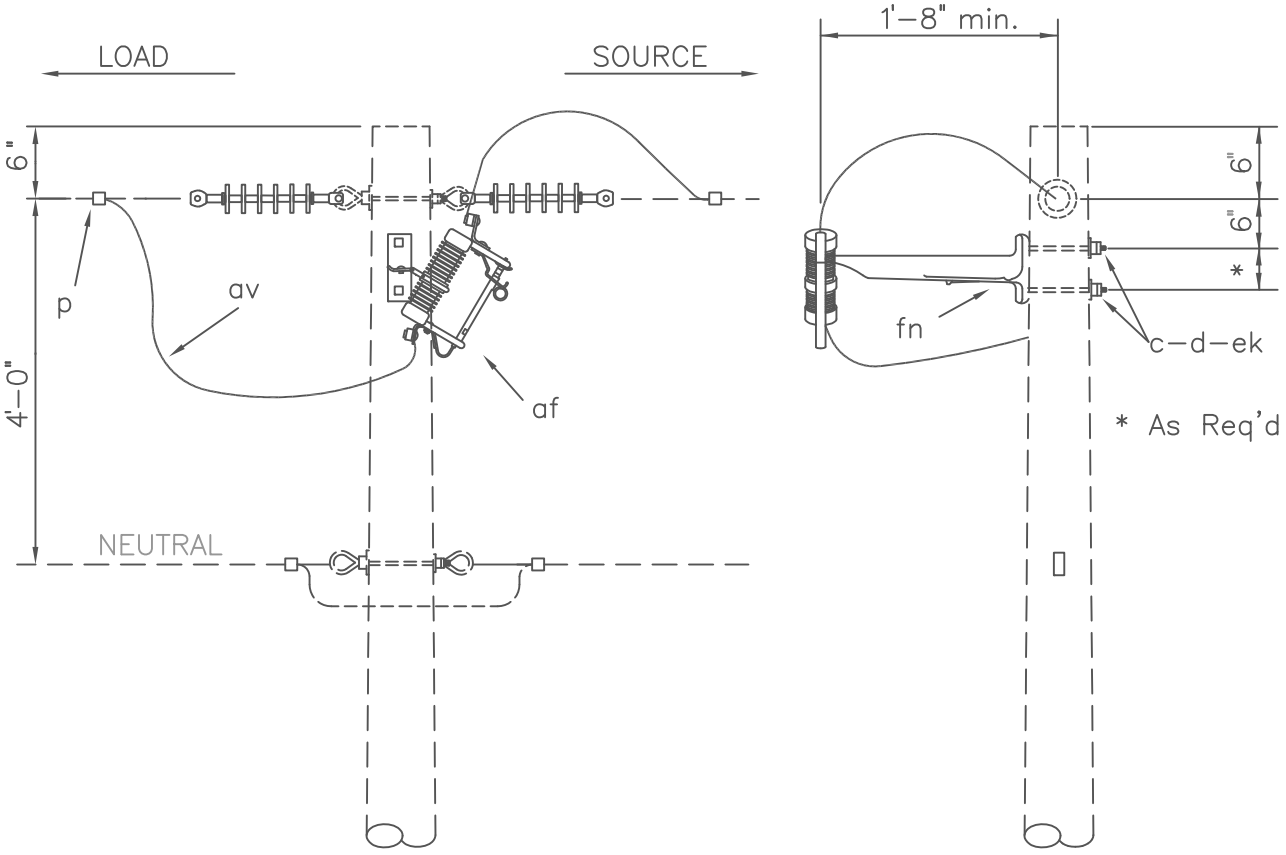
THREE PHASE RECLOSER (WITH BY-PASS SWITCHES)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VR3.32

INDEX S

SECTIONALIZIG ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VS1.01, VS1.02, VS2.01	MISCELANEOUS CUTOUTS AND DISCONECT SWITCH
VS1.1	CUTOUT – SINGLE PHASE
VS1.11	CUTOUT AND ARRESTER (ONE SINGLE PHASE)
VS1.1N	CUTOUT (ONE SINGLE PHASE)
VS1.3	CUTOUTS (THREE SINGLE-PHASE)
VS1.5	CUTOUT AND ARRESTER - CROSSARM MOUNTED (ONE SINGLE PHASE)
VS2.31	DISCONNECT SWITCHES (THREE SINGLE – PHASE)
VS2.31N	THREE SECTIONALIZING DISCONNECT SWITCHES
VS2.32	GROUP-OPERATED SWITCH (HORIZONTAL)
VS2.33	GROUP-OPERATED SWITCH (VERTICAL)

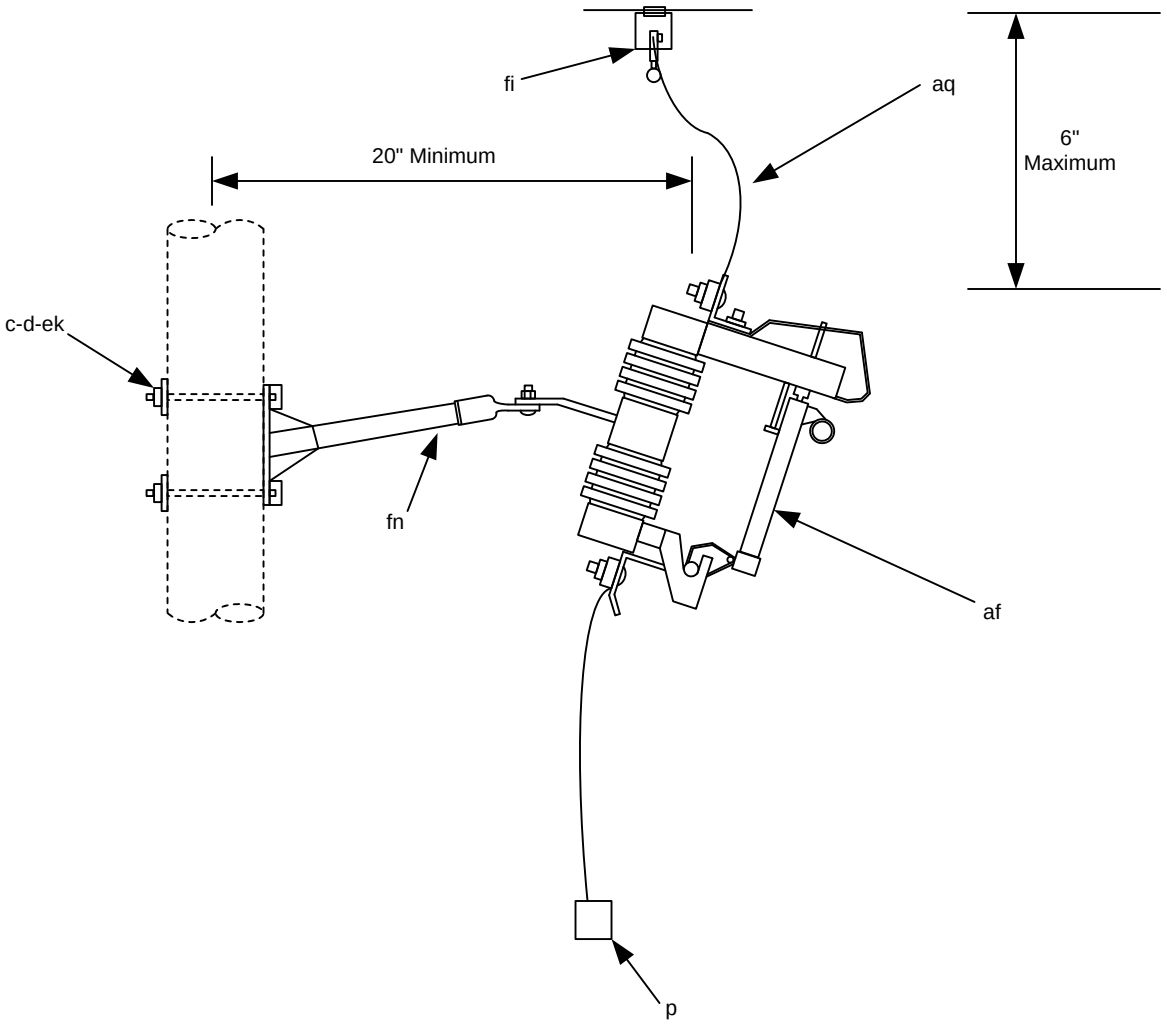


NOTE: Specify fuse size or solid blade

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
p	2	Connector, compression type
af	1	Cutout, distribution, open (27 kV)
av		Jumpers, as required
ek	2	Locknuts
fn	1	Bracket, extension

CUTOUT – SINGLE PHASE

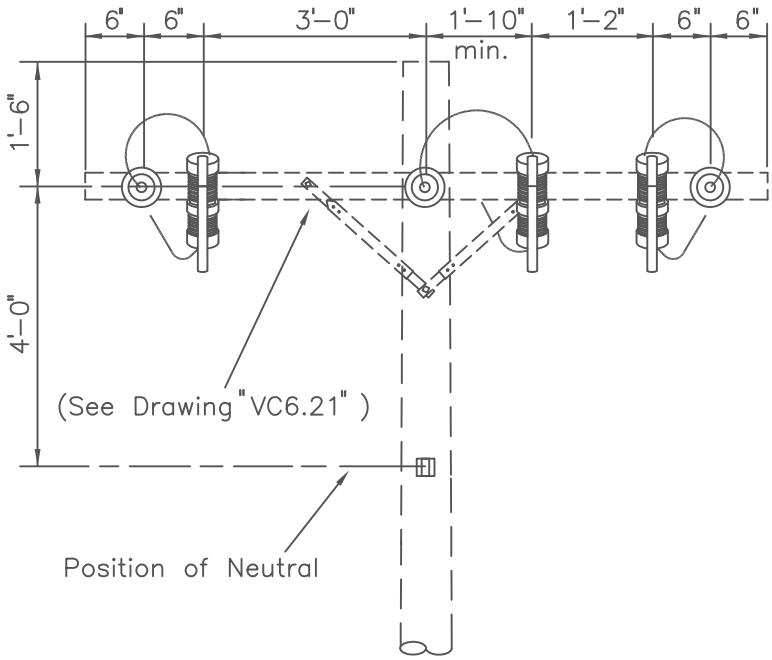
DEC 1998		
RUS	24.9/14.4 kV	VS1.1 (VM3–4)

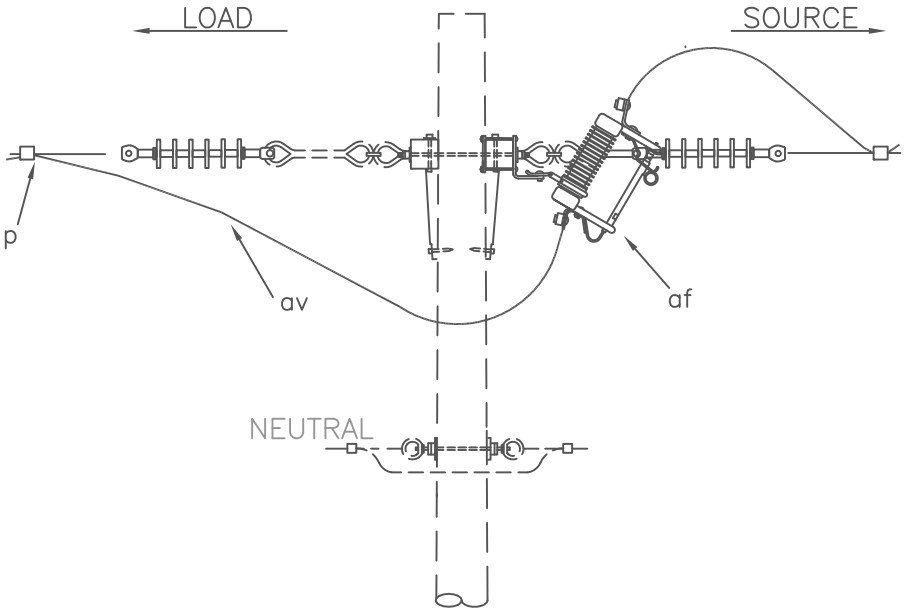


ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, curved, 3" x 3"
af	1	Cutout, 27 KV, Load Break
aq		Leads and Jumpers, as required
fn	1	Bracket, extension, Cutout/Arrester
ek	2	Locknuts, 5/8"
p		Connectors, as required
fi	1	Connector, Hot Line
	1	Bail (Compression Stirrup)

CUTOUT
(ONE SINGLE-PHASE)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VS1.1N (VM3-4)



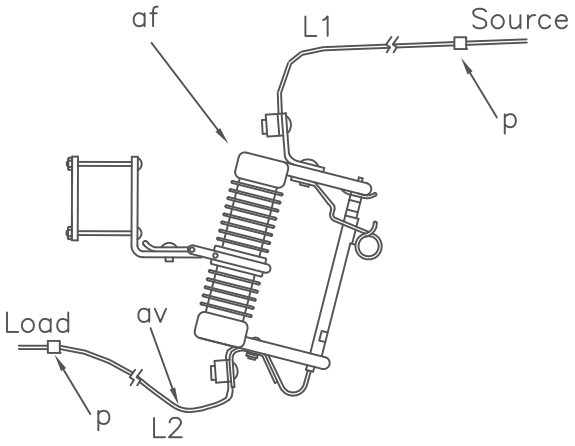


NOTES:
1. Specify fuse size or solid blade.
2. Mount cutouts so that blades face climbing face of pole.

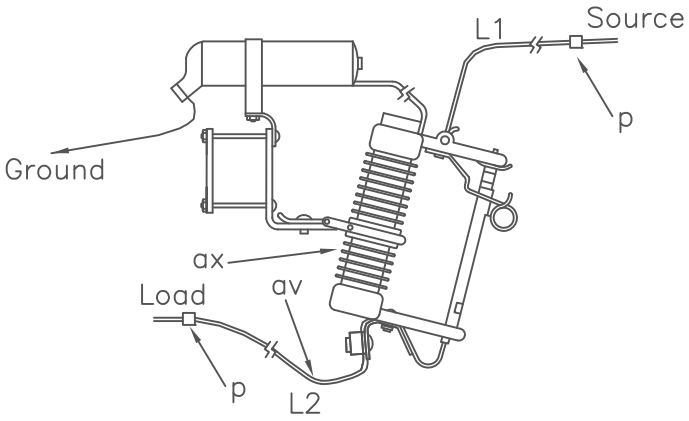
ITEM	QTY	MATERIAL
p	6	Connector, compression type
af	3	Cutout, distribution open (27 kV)
av		Jumpers, as req'd

CUTOUTS
(THREE SINGLE–PHASE)

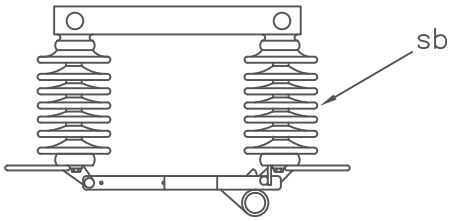
DEC 1998		
RUS	24.9/14.4 kV	VS1.3



VS1.01
(M5–9)



VS1.02
(M5–10)



VS2.01

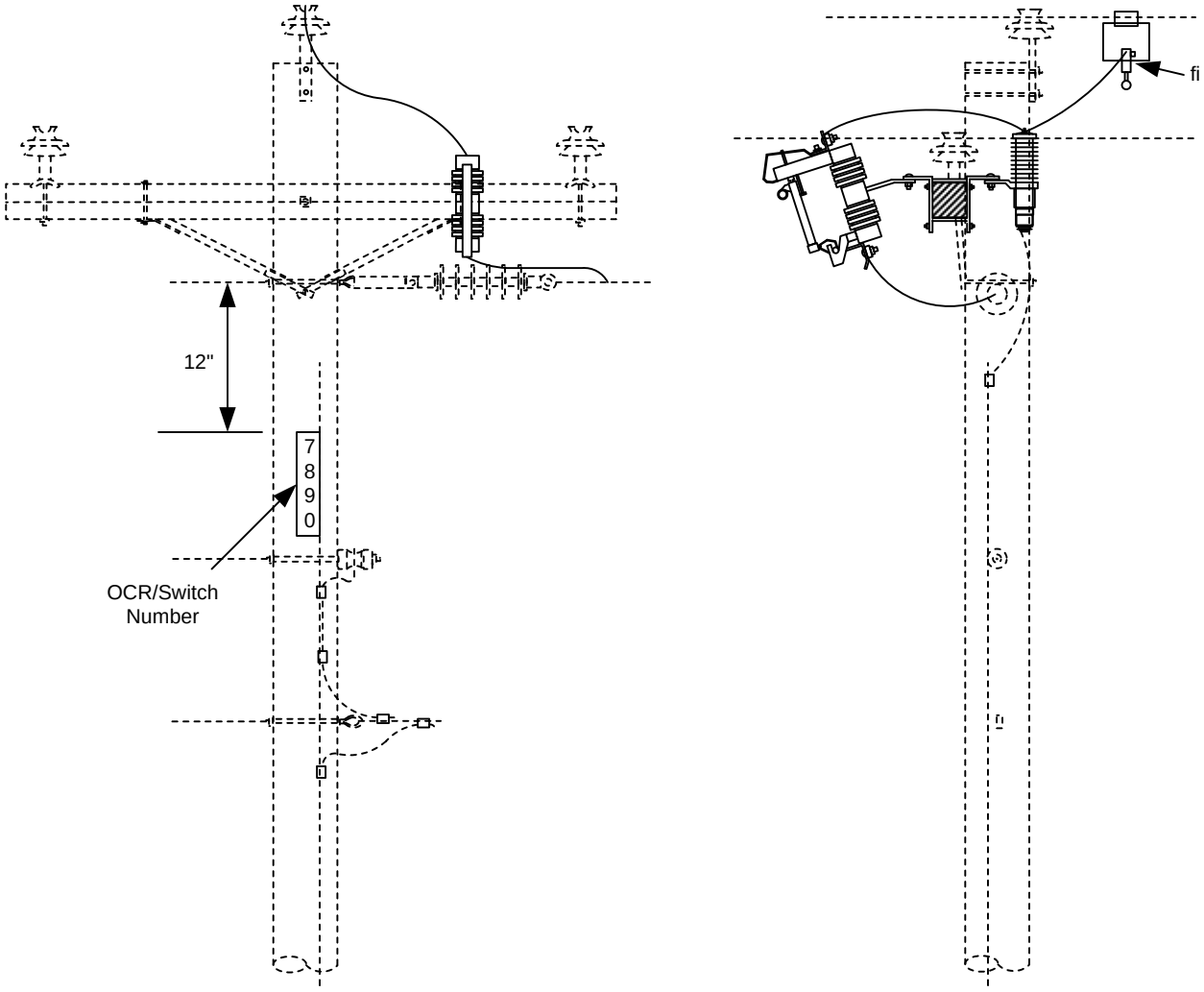
NOTES: Specify cutouts to be furnished with fuse tube or switch blade.

Minimize lead lengths L1 and L2.
L1 + L2 should be less than 3 feet when possible

ASSEMBLY: VS		1.01	1.02	2.01
ITEM	MATERIAL	QTY	QTY	QTY
p	Connector, as req'd			
af	Cutout, dist., open (27 kV)	1		
ax	Cutout, & Arrester Comb. (18 kV)		1	
av	Jumpers, as req'd			
sb	Switch, disconnect (27 kV)			1

MISCELLANEOUS CUTOUTS AND DISCONNECT SWITCH

DEC 1998	24.9/14.4 kV	VS1.01, VS1.02, VS2.01 (M5–9, M5–10)
RUS		



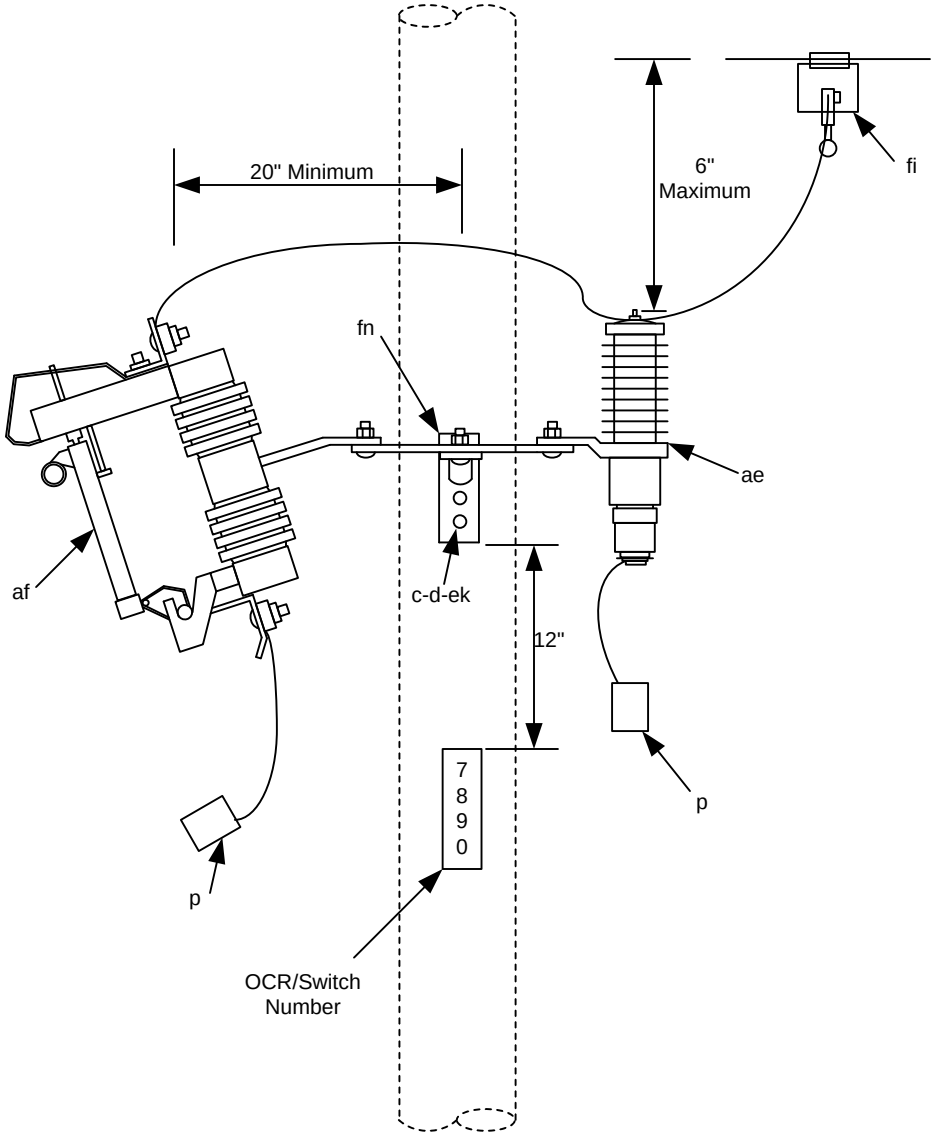
Note:

1. Install OCR/Switch Number ONLY for Section Taps

ITEM	QTY.	MATERIAL
ae	1	Lightning Arrester, 18 kV
af	1	Cutout, Load Break, 27 kV
aq		Leads and Jumpers, as required
fi	1	Connector, Hot Line
	1	Bail (Compression Stirrup)
	1	Bracket, OCR/Switch Number

CUTOUT AND ARRESTER -
CROSSARM MOUNTED
(ONE SINGLE PHASE)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VS1.5 (VM5-10)



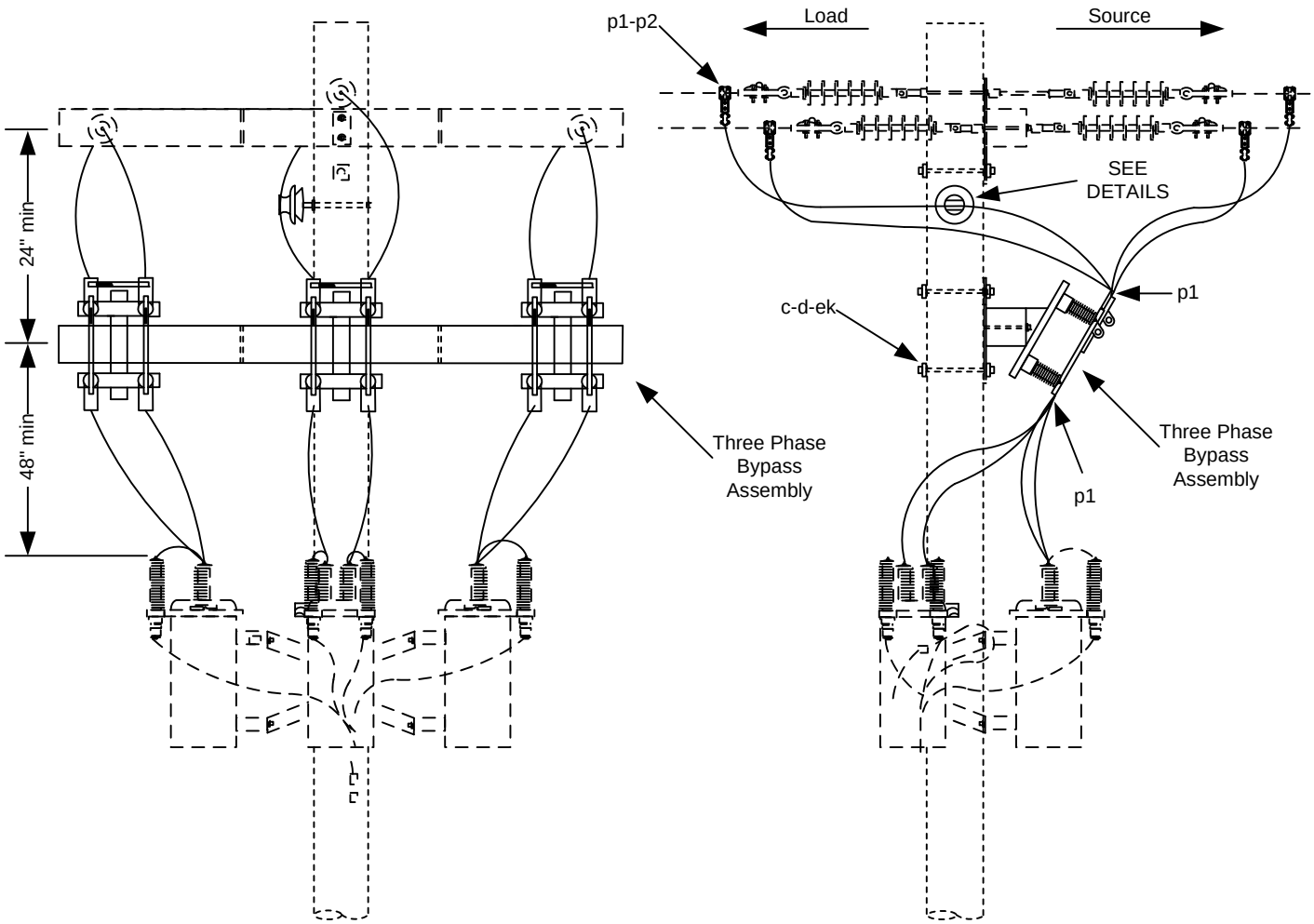
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length
d	2	Washer, square, curved, 3" x 3"
ae	1	Lightning arrester, 18 KV
aq		Leads and Jumpers, as required
fn	1	Bracket, extension, Cutout/Arrester
ek	2	Locknuts, 5/8"
af	1	Cutout, 25 KV, Load Break
p		Connectors, as required
fi	1	Connector, Hot Line
	1	Bracket, OCR/Switch Number
	1	Bail (Compression Stirrup)

Note:

1. Install OCR/Switch Number ONLY for Section Taps

CUTOUT AND ARRESTER (ONE SINGLE PHASE)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VS1.11 (VM3-4T)



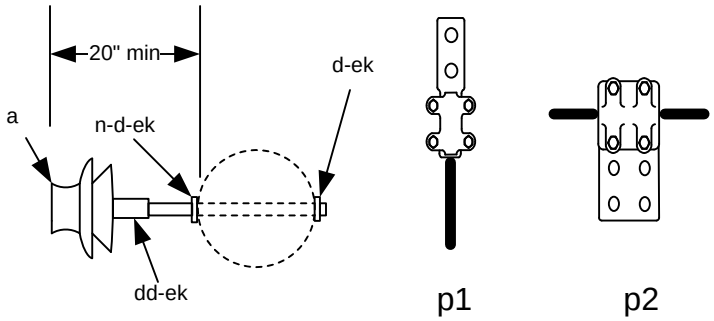
NOTES:

1. Use with assembly units VR3.2, VR3.11, VR3.30 and VR3.31.

2. Delete the assembly unit's bypass switches or cutouts.

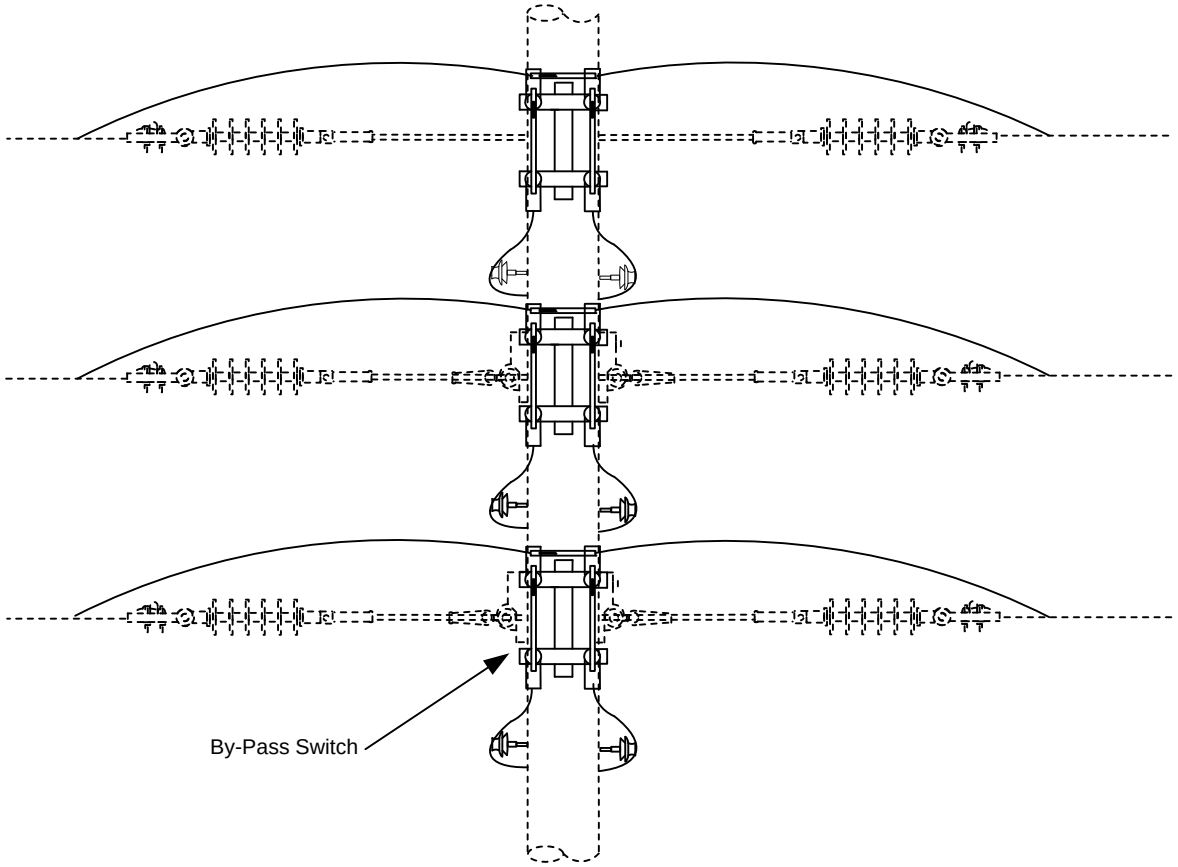
ITEM	QTY.	MATERIAL
	1	Three Phase Bypass Switch Assembly
a	1	Insulator, Pin Type
c	2	Bolt, Machine, 5/8" x required length
d	5	Washer, 3"
n	1	Bolt, double arming, 5/8" x required length
p		Connectors, as required
p1	18	Connector, Flat 2/0 to 500 MCM Anderson SWL-050-B2
p2	6	Connector, Tee #2 to 800 MCM - Anderson SF-1-C-3
aq		Jumpers, as required
dd	1	Adapter, Insulator
ek	5	Locknuts
	36	Bolt, Machine, Bronze ½" x 1 ½"
	36	Nut, Bronze ½"
	36	Washer, Bronze Split
	36	Washer, Flat ½" Bronze

DETAILS

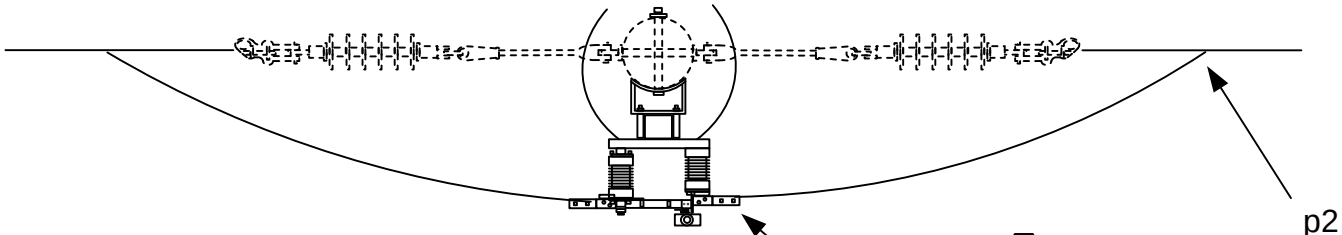


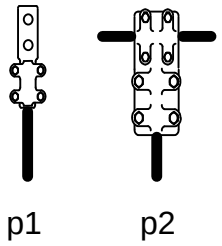
THREE PHASE BYPASS SWITCHES FOR RECLOSERS

2016	WFECA	3 – Phase Primary 24.9/14.4 kV	VS2.30



Reclosers not shown



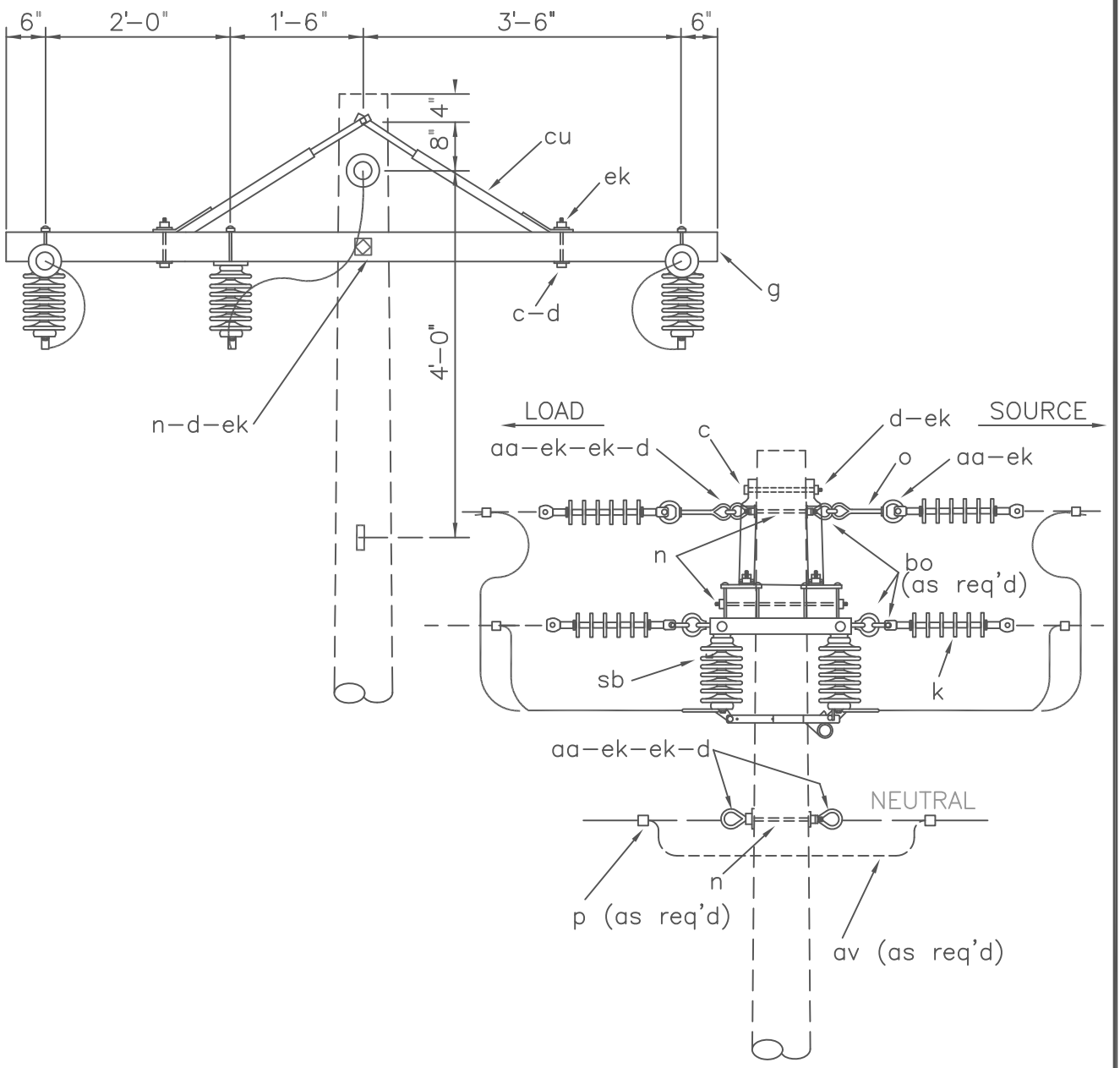


ITEM	QTY.	MATERIAL
a	6	Insulator, Pin Type
c	6	Bolt, Machine, 5/8" x required length
n	3	Bolt, double arming, 5/8" x required length
p1	6	Connector, Straight Bolt Terminal, Cable to Flat (2 hole)
p2	6	Connector, “T” Bolt Terminal, Cable to Cable
dd	6	Adapter, Insulator
d	12	Washer, 3” Square Curved
ek	24	Locknut, 5/8"
	3	By-Pass Switch, 1 phase, angled
	24	Carriage Bolt, Bronze ½” x 1 ½”
	24	Nut, Bronze ½”
	24	Washer, Bronze Split
	24	Washer, Flat ½” Bronze

Note: Reclosers not shown for clarity

BY-PASS SWITCHES (VERTICAL)

2017	WFECA	3 – Phase Primary 24.9/14.4 kV	VS2.30N



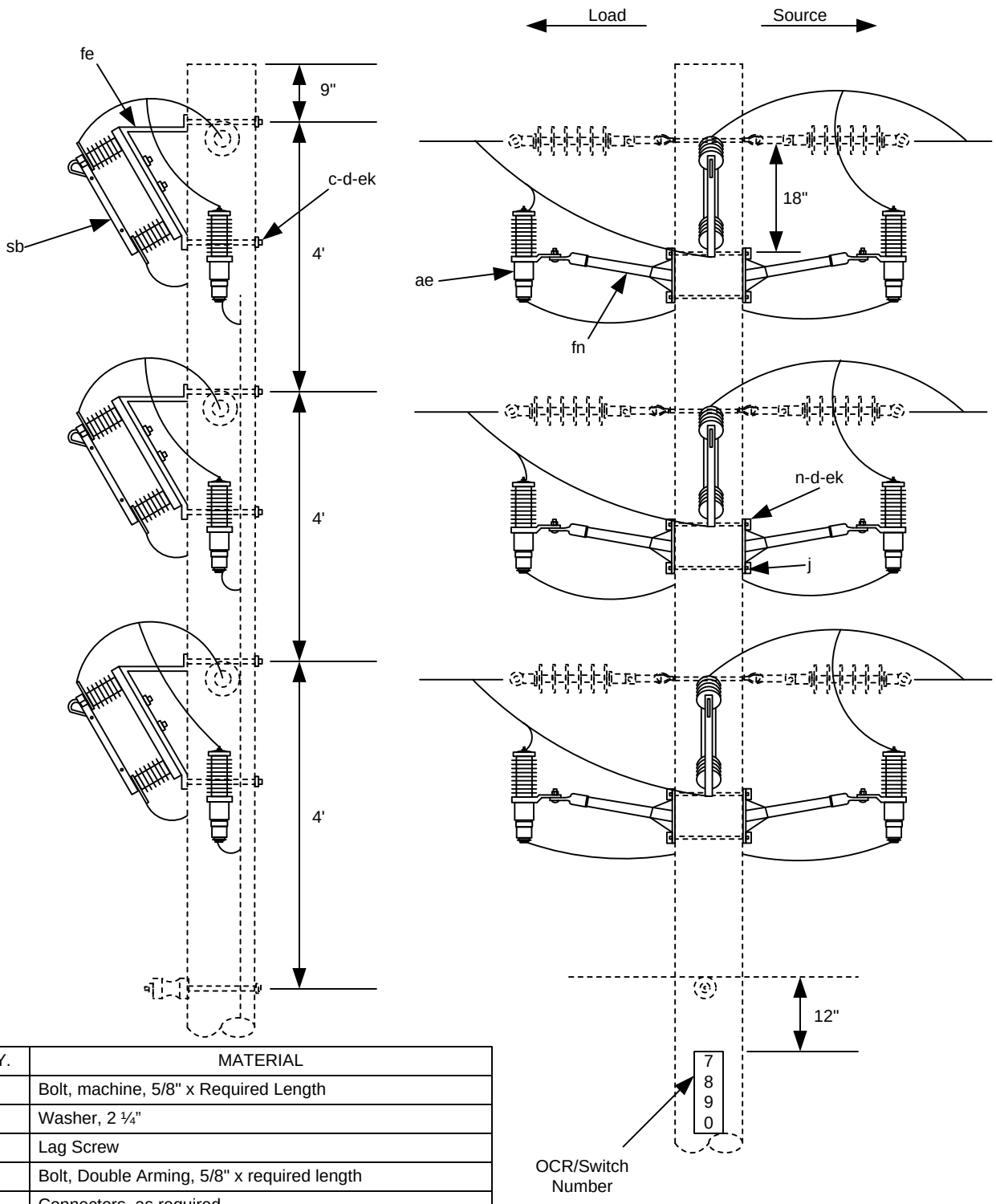
NOTE: For 2–phase installations, omit switch and related items on center phase and designate as "VS2.21".

ITEM	QTY	MATERIAL
c	4	Bolt, machine, 1/2" x req'd length
c	1	Bolt, machine, 5/8" x req'd length
d	4	Washer, round, 1 3/8"
d	3	Washer, square, 2 1/4"
d	4	Washer, square, 3", curved
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'–0"
k	6	Insulator, 25 kV Polymer Deadend
n	3	Bolt, double arm, 5/8" x req'd length

ITEM	QTY	MATERIAL
o	2	Bolt, eye, 5/8" x req'd length
p		Connectors, compression as required
aa	6	Nut, eye, 5/8"
av		Jumpers, as required
bo	6	Shackle, anchor
cu	2	Brace, wood, 60" span
sb	3	Switch, disconnect, 27 kV,
		with mounting hardware

DISCONNECT SWITCHES (THREE SINGLE–PHASE)

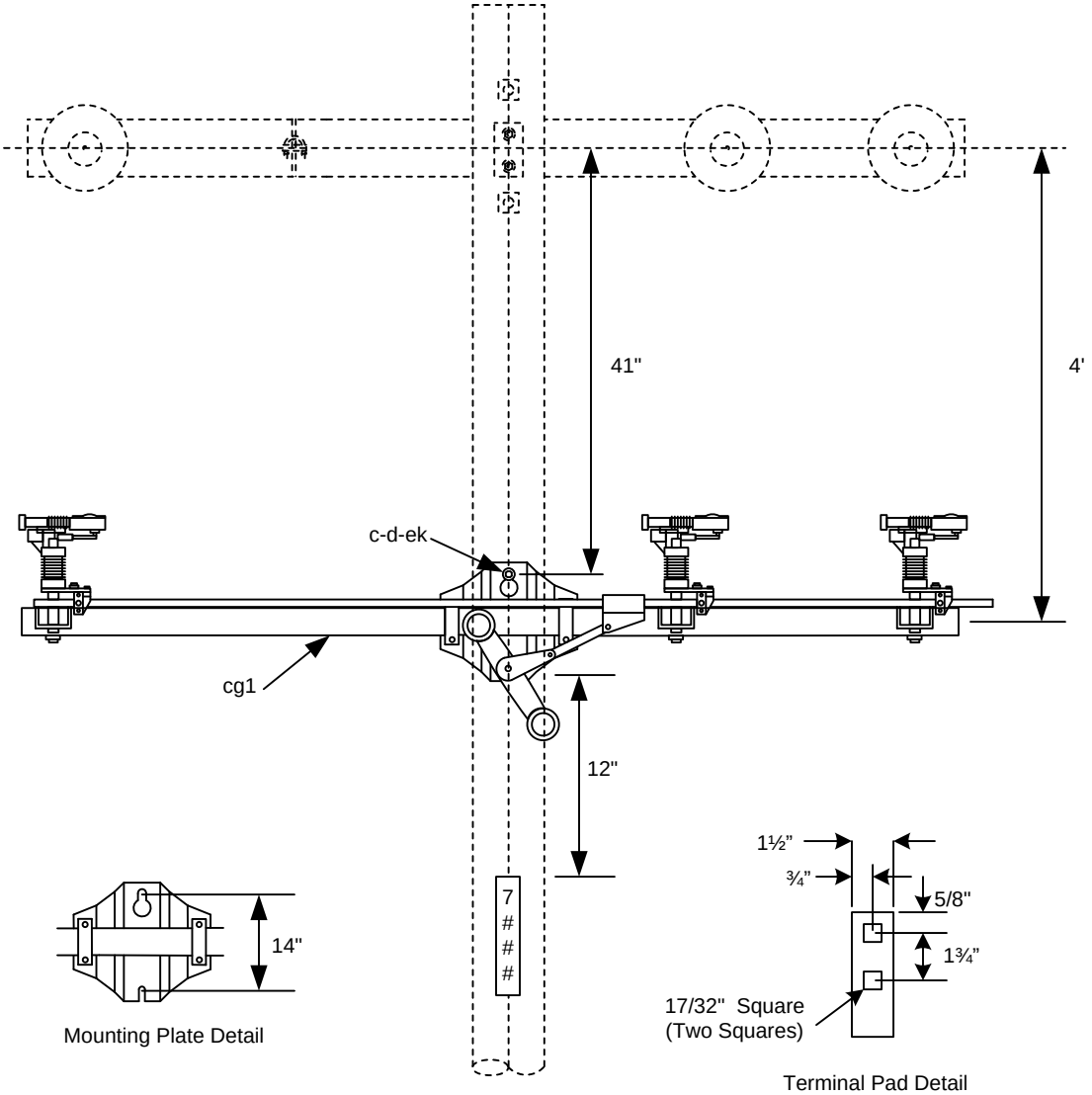
DEC 1998		VS2.31 (VM3–3)
RUS	24.9/14.4 kV	



ITEM	QTY.	MATERIAL
c	6	Bolt, machine, 5/8" x Required Length
d	12	Washer, 2 ¼"
j	6	Lag Screw
n	3	Bolt, Double Arming, 5/8" x required length
p		Connectors, as required
ae	6	Arrester, Lightning, 18 kV
aq		Jumpers, as required
cj		Ground Wire, No. 4 Copper
ek	12	Locknuts, 5/8"
fe	3	Bracket, Disconnect Switch
fn	6	Bracket, extension, Cutout/Arrester
sb	3	Switch, disconnect, 25 kV, 600 A
	1	Bracket, OCR/Switch Number

THREE SECTIONALIZING DISCONNECT SWITCHES

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VS2.31N



Mounting Plate Detail

Terminal Pad Detail

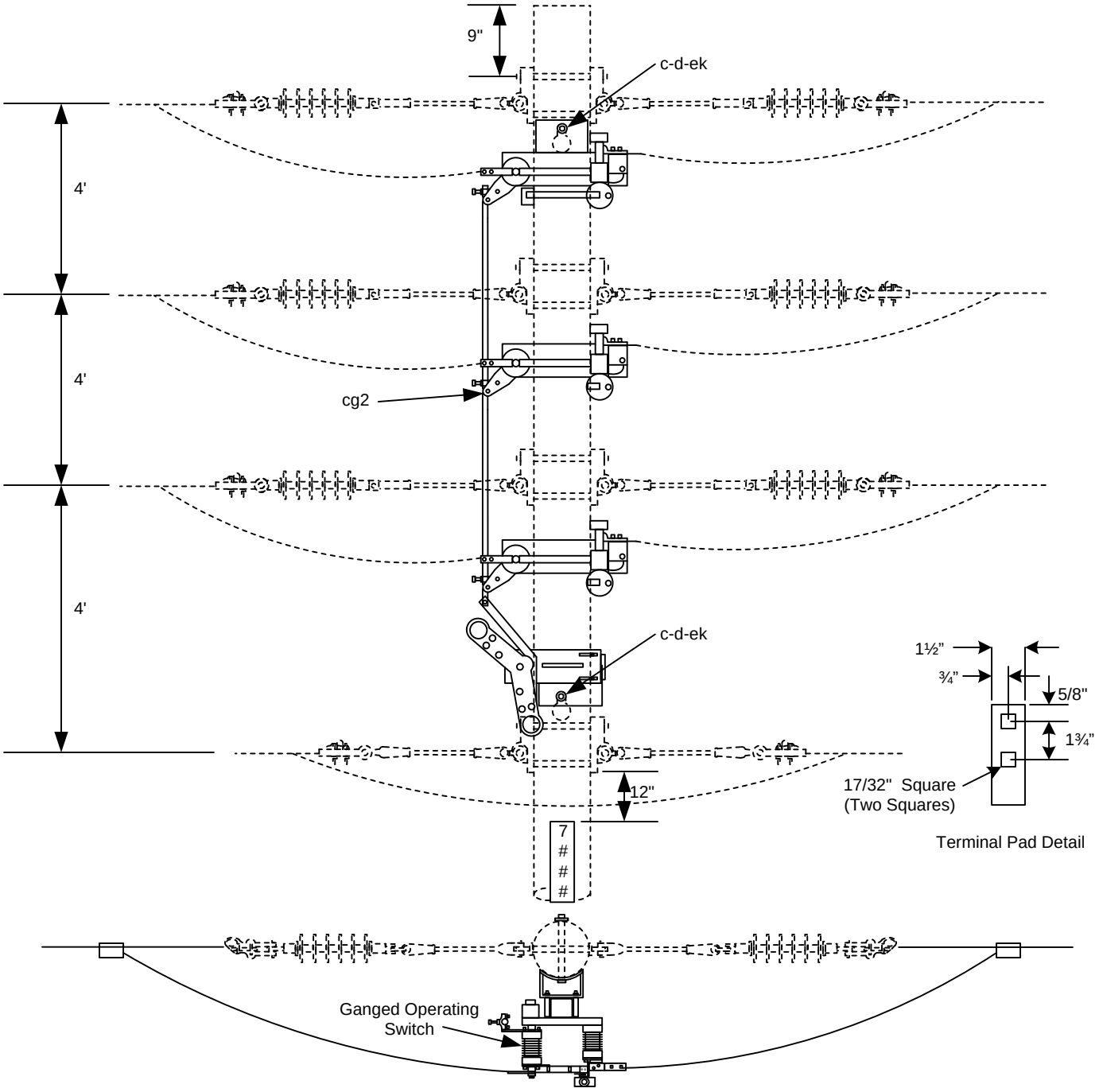
ITEM	QTY.	MATERIAL
c	2	Bolt, Machine, 5/8" x required length
d	2	Washer, 3" Square, Curved
p	6	Connector, Straight Bolt Terminal, Cable to Flat (2 hole)
cg1	1	Ganged Operating Switch, Upright Mounting Configuration Hookstick Operated
ae	6	Lightning Arrester, 18 KV
ek	2	Locknut, 5/8"
	1	Bracket, OCR/Switch Number
	12	Carriage Bolt, Bronze ½" x 1 ½"
	12	Nut, Bronze ½"
	12	Washer, Bronze Split
	12	Washer, Flat ½" Bronze
	1	Bracket, OCR/Switch Number

Note:

1. Lightning Arresters Not Shown for Clarity
2. For Transmission Under Build add prefix "TUB-".
3. Specify Clearance of Neutral to Final Grade

GROUP OPERATING SWITCH (HORIZONTAL)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VS2.32 (VM3-16)



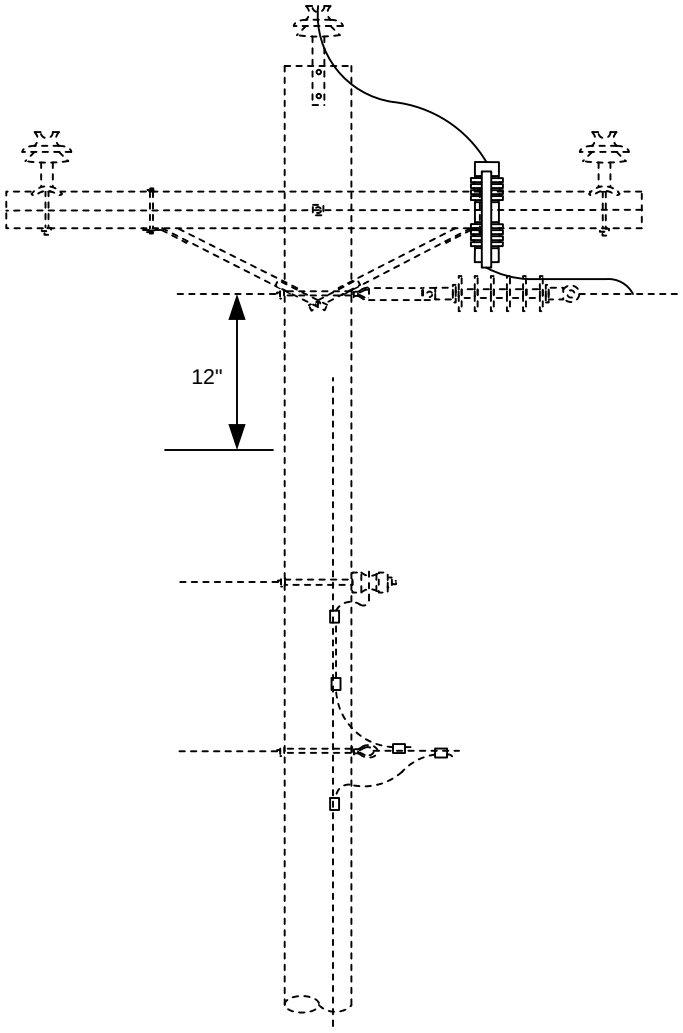
ITEM	QTY.	MATERIAL
p	6	Connector, Straight Bolt Terminal, Cable to Flat (2 hole)
c	2	Bolt, Machine, 5/8" x required length
d	2	Washer, 3" Square Curved
cg2	1	Ganged Operating Switch Tiered Outboard Mounting Configuration Hookstick Operated
ae	6	Lightning Arrester, 18 KV
ek	2	Locknut, 5/8"
	1	Bracket, OCR/Switch Number
	12	Carriage Bolt, Bronze ½" x 1 ½"
	12	Nut, Bronze ½"
	12	Washer, Bronze Split
	12	Washer, Flat ½" Bronze

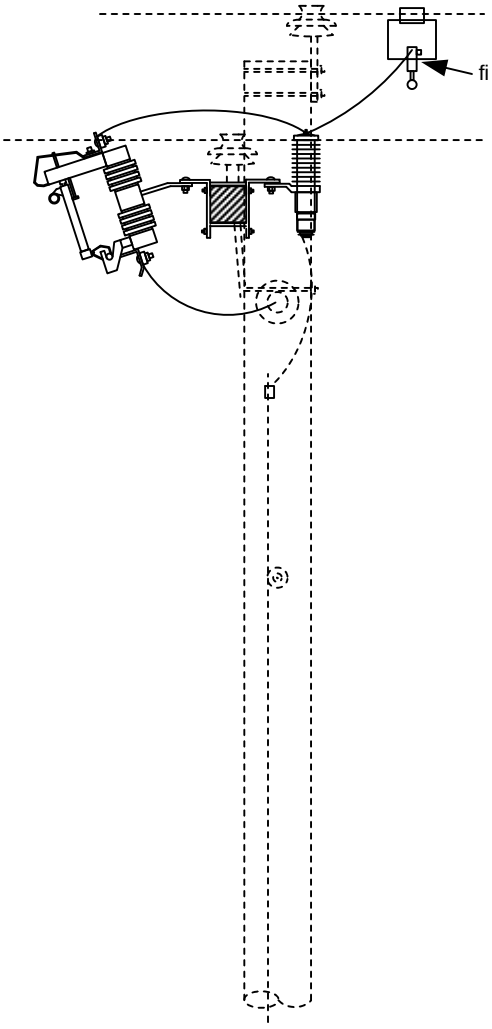
Note:

1. Lightning Arresters Not Shown for Clarity
2. For Transmission Under Build add prefix "TUB-".
3. Specify Clearance of Neutral to Final Grade

GROUP OPERATING SWITCH (VERTICAL)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VS2.33 (VM3-16V)





ITEM	QTY.	MATERIAL
ae	1	Lightning Arrester, 18 kV
af	1	Cutout, 27 kV
aq		Leads and Jumpers, as required
fi	1	Connector, Hot Line
	1	Bail (Compression Stirrup)

CUTOUT AND ARRESTER - CROSSARM MOUNTED (ONE SINGLE PHASE)

2012	WFECA	1 – Phase Primary 24.9/14.4 kV	VS5.10

INDEX W

WOOD POLES, CROSSARMS AND BRACES

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
W1.1G	POLE FRAMING GUIDE
W2.1G	CROSSARM DRILLING GUIDE
W3.1, W3.2	CROSSARM BRACES

CONSTRUCTION SPECIFICATIONS FOR POLES AND CROSSARMS

In distributing the poles, large, choice, dense poles shall be used at transformer, deadend, angle, and corner locations.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminal and deadends where the gains of the last two (2) poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm is located on the side of the pole away from the long span. On lines that curve, crossarms shall be installed on the side of the pole which faces the midpoint of the curve. On sloping terrain, crossarms shall be installed on the uphill side of the pole. Where pole top insulator brackets or pole top pins are used, they shall be located on the opposite side of the pole from the gain.

Poles shall be set in an alignment and plumb, except at corners, terminal, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors are in line.

Poles shall be raked against the conductor strain not less than 1 inch for each 10 feet of pole length nor more than 2 inches for each 10 feet of pole length after the conductors are installed at the required tension.

Pole backfill shall be thoroughly tamped in full depth. Excess dirt shall be banked around the pole.

TABLE W

Pole Setting Depths

The minimum depth for setting poles must be as follows:

Length of Pole (Feet)	Setting in Soil (Feet)	Setting in All Solid Rock (Feet)
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" depths must apply:

A. Where poles are to be set in soil;

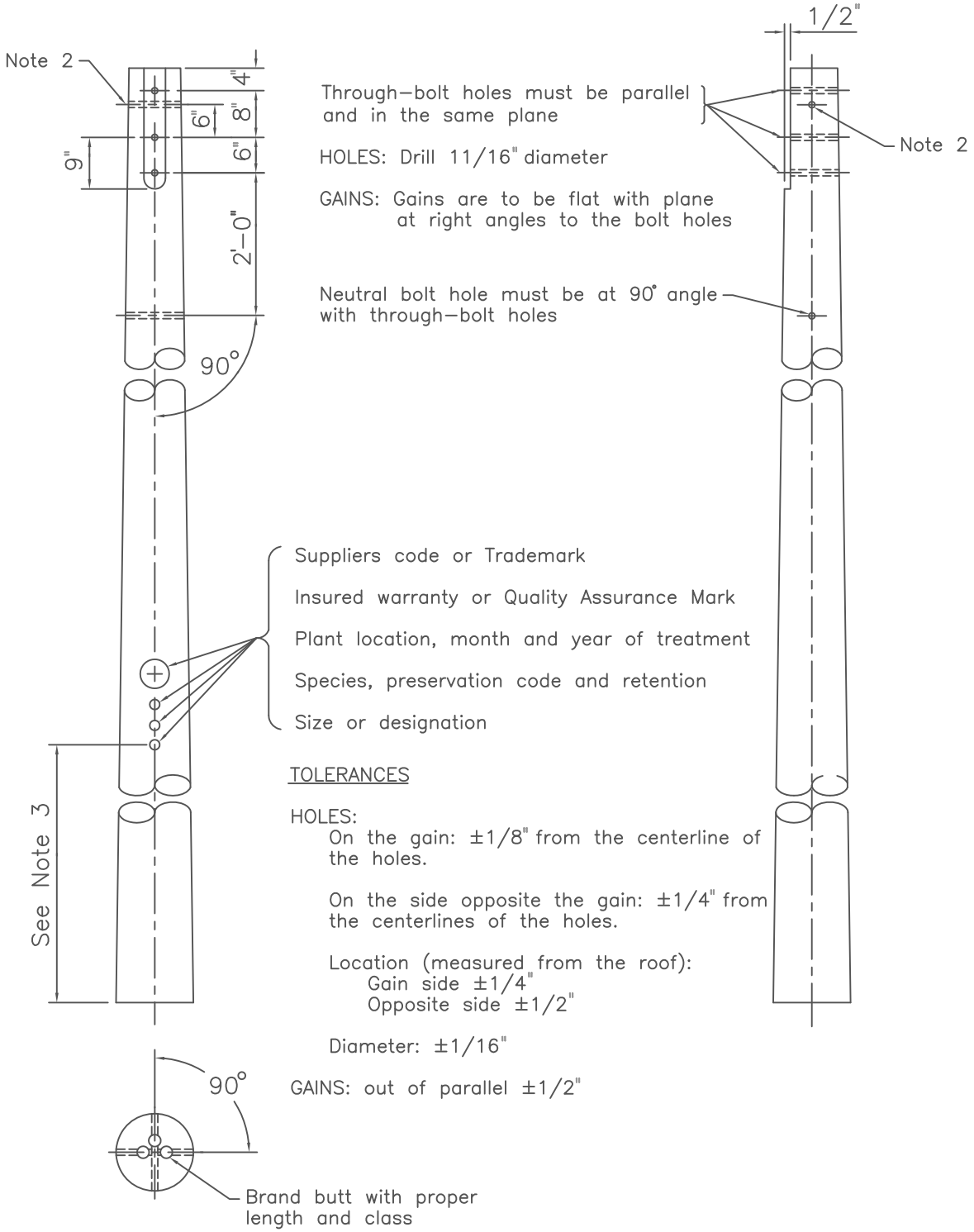
B. Where there is a layer of soil or more than two (2) feet in depth over solid rock;

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" depths must 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 must be the depth of the soil in addition to the depth specified under "Setting in All Solid Rock" provided, however, that such depth must not exceed the depth specified under "Setting in Soil."

On sloping ground, the depth of the hole must be measured from the low side of the hole.

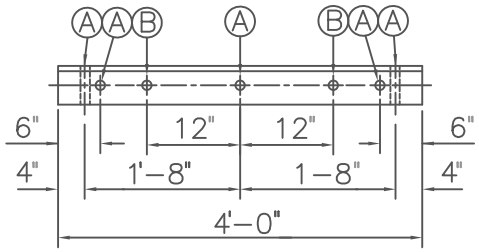


NOTES:

1. 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.
2. Anti–split bolt hole is optional and is to be drilled only when so specified by the purchaser.
3. Bottom of brand or center of metal disk shall be 10' ±2" from the pole butt for poles less than 55' in length; 14' ±2" for poles 55' and longer.

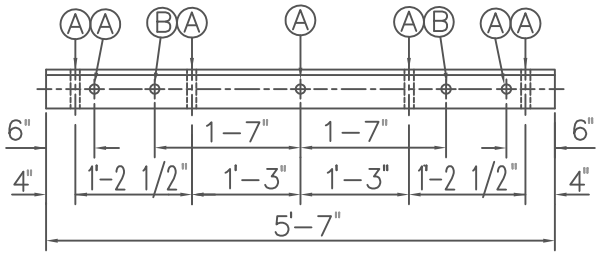
POLE FRAMING GUIDE

DEC 1998		W1.1G (M20)
RUS		

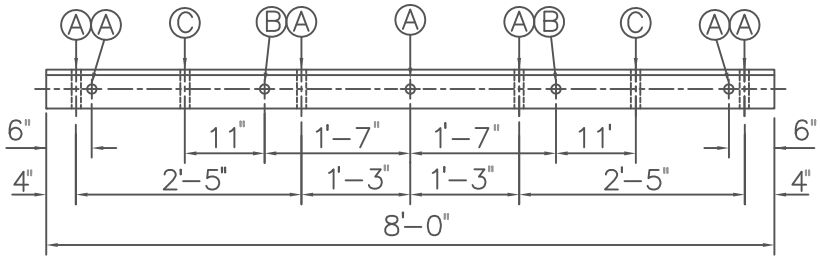


TYPE 01

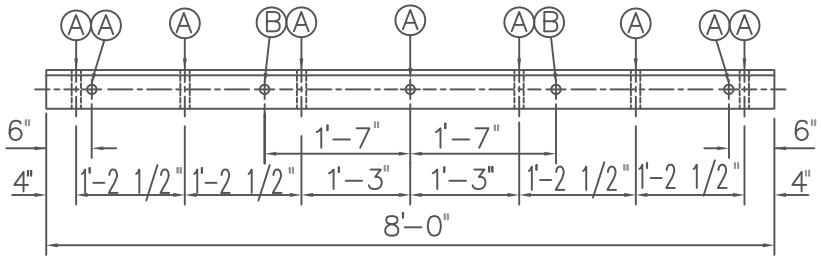
TOLERANCES AND SIZES OF HOLES			
NOMINAL		GO	NO GO
Ⓐ	11/16"	5/8"	3/4"
Ⓑ	7/16"	3/8"	1/2"
Ⓒ	9/16"	1/2"	5/8"



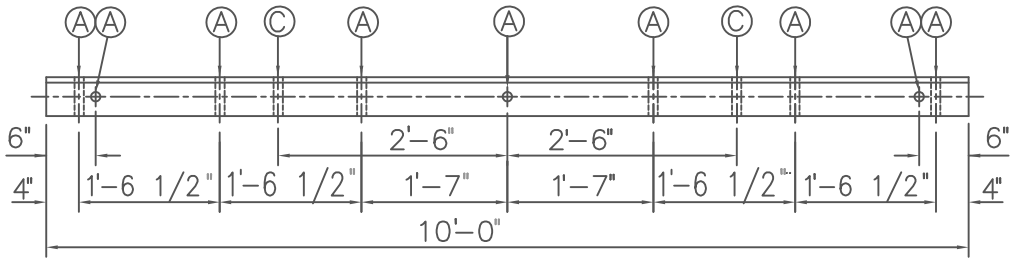
TYPE 02



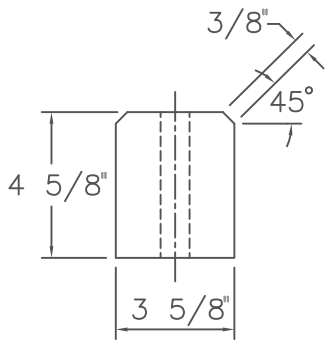
TYPE 03



TYPE 04



TYPE 05



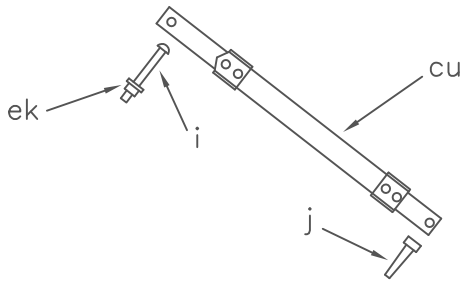
TYPICAL END SECTION

NOTES:

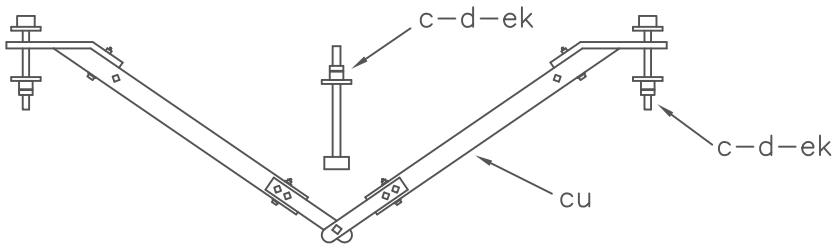
1. Holes are to be located within ±1/8"
2. Length of the crossarm is to be within ±1/4"
3. The tolerance of the cross section is +1/8" and −0" at time of manufacture.
4. All holes are to be drilled on centerlines of crossarm faces.

CROSSARM DRILLING GUIDE

DEC 1998		W2.1G (M19)
RUS		



W3.1
(M5–17)



W3.2
(M5–13)

		W3.1	W3.2
ITEM	MATERIAL	QTY	QTY
c	Bolt, machine, 1/2" x req'd length		2
c	Bolt, machine, 5/8" x req'd length		1
d	Washer, round, 1 3/8"		2
d	Washer, square, 2 1/4"		1
i	Bolt, carriage, 3/8" x 4 1/2"	1	
j	Screw, lag, 1/2" x 4"	1	
cu	Brace, wood, 28"	1	
cu	Brace, wood, 60"		1
ek	Locknuts	1	3

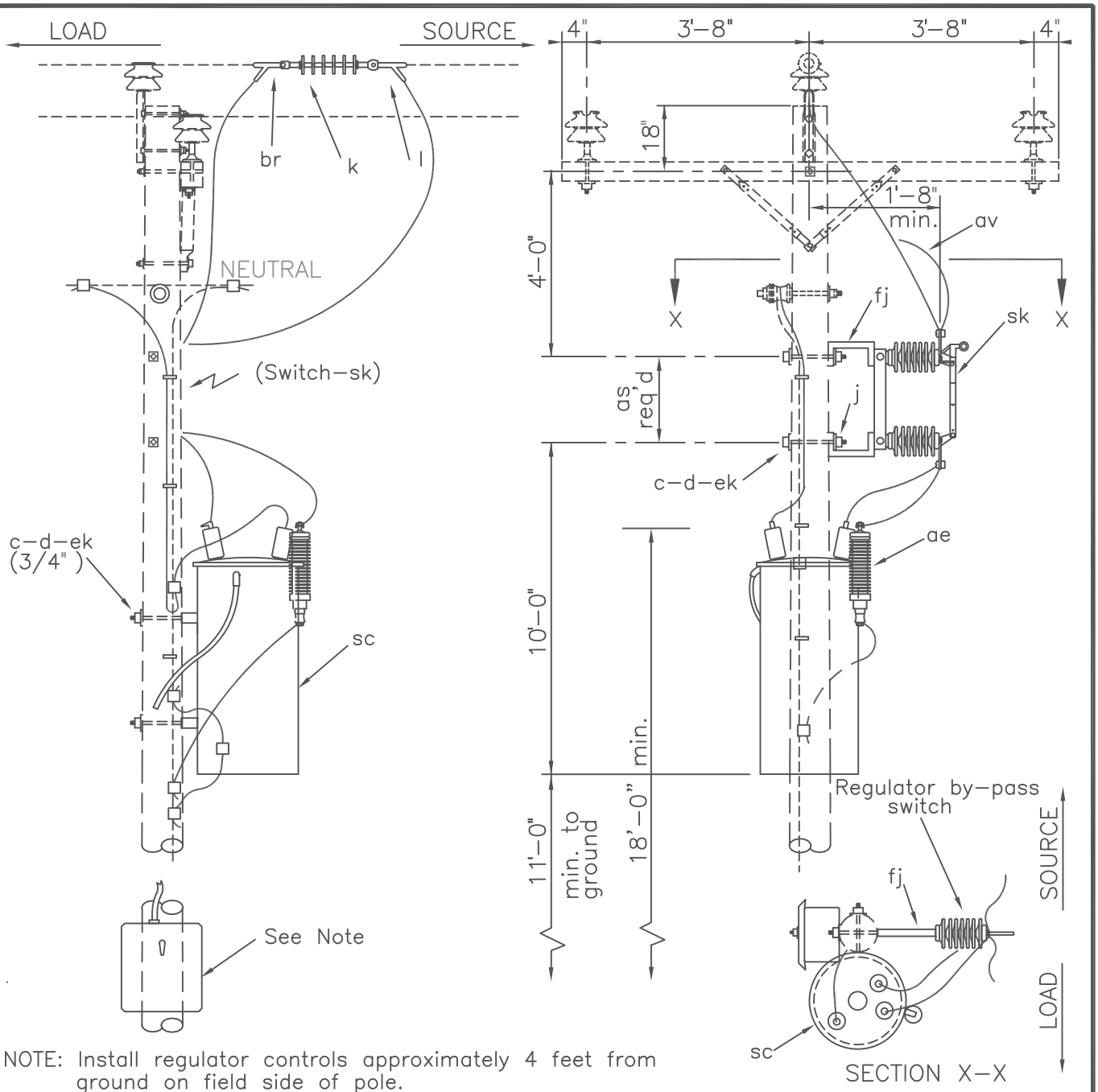
CROSSARM BRACES

DEC 1998		W3.1, W3.2
RUS		(M5–17, M5–13)

INDEX Y

VOLTAGE ALTERATION EQUIPMENT ASSEMBLY UNITS

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
VY1.1	VOLTAGE REGULATOR, POLE MOUNTED (ONE SINGLE-PHASE)
VY1.3	VOLTAGE REGULATORS, PLATFORM MOUNTED (THREE SINGLE-PHASE)
VY1.4	VOLTAGE REGULATORS, PLATFORM MOUNTED (THREE SINGLE PHASE, VERTICAL)
VY2.1	AUTOTRANSFORMER, POLE MOUNTED (ONE SINGLE-PHASE, STEP-DOWN/STEP-UP)
VY2.3	AUTOTRANSFORMERS, PLATFORM MOUNTED (THREE SINGLE-PHASE STEP-DOWN/STEP-UP)
VY2.4	STEP TRANSFORMERS, PLATFORM MOUNTED (THREE SINGLE PHASE, VERTICAL)
VY3.3	THREE-PHASE CAPACITOR BANK (450 KVAR AND BELOW)
VY3.4	AUTOMATICALLY SWITCHED THREE – PHASE CAPACITOR BANK
VY3.4G	AUTOMATICALLY SWITCHED CAPACITOR BANK CONTROL WIRING DETAILS



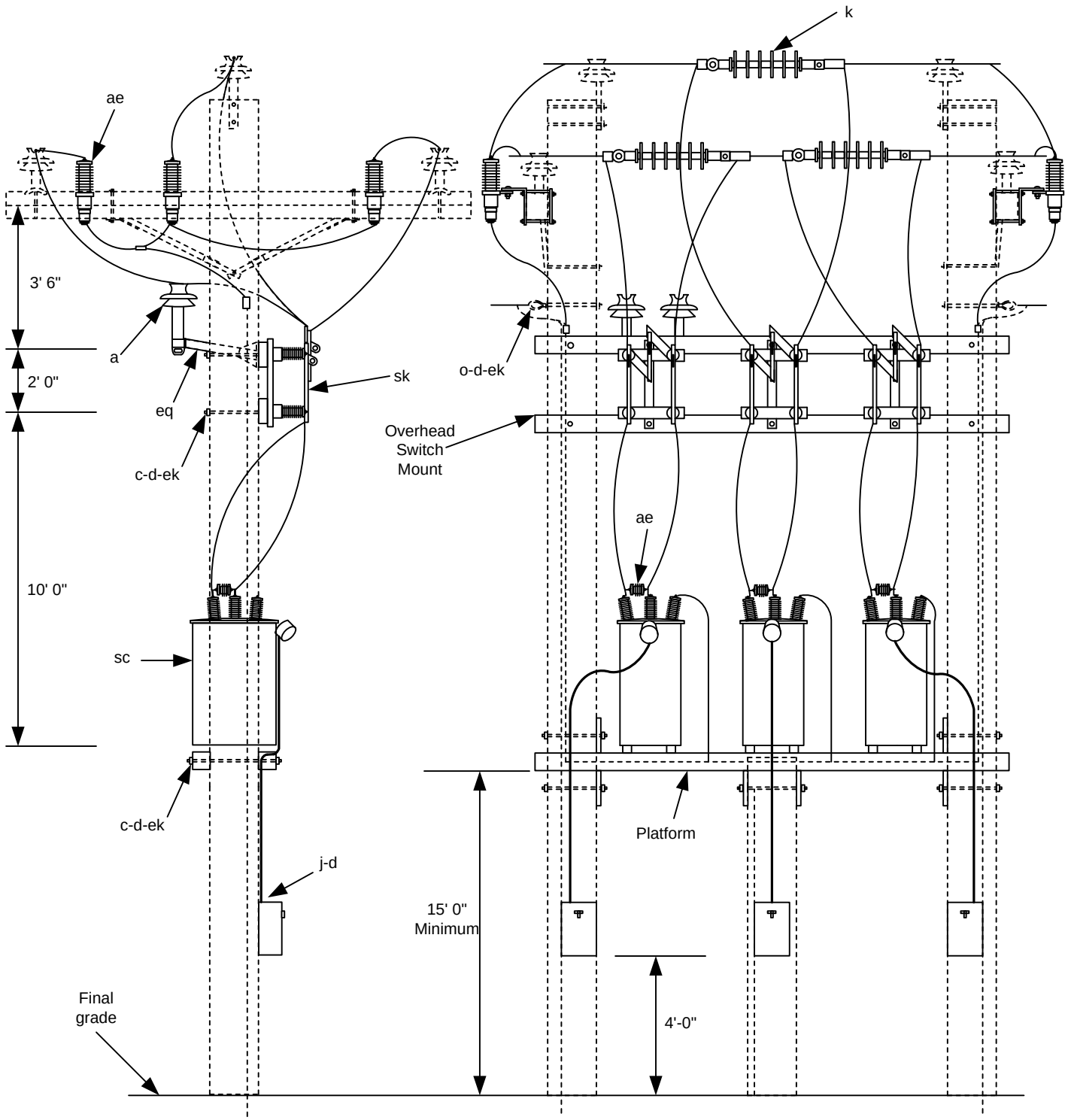
NOTE: Install regulator controls approximately 4 feet from ground on field side of pole.

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
c	2	Bolt, machine, 3/4" x req'd length
d	2	Washer, square, 2 1/4"
d	2	Washer, square, 3," curved
j	6	Screw, lag, 1/2" x 4"
k	1	Insulator, 25 kV Polymer Deadend
l	2	Clamp, deadend
p		Connectors, compression, as req'd
ae	1	Arrester, surge (18 kV)

ITEM	QTY	MATERIAL
av		Jumpers, bare, stranded, as req'd
br	1	Chain link
bu		Connector, grounding
fj	2	Bracket, extension, 9"
sc	1	Regulator, voltage, step–type
		24.9/14.4 kV
sk	1	Switch, regulator by–pass
ek	4	Locknuts

VOLTAGE REGULATOR, POLE MOUNTED (ONE SINGLE–PHASE)

DEC 1998		VY1.1
RUS	24.9/14.4 kV	(VM7–1)

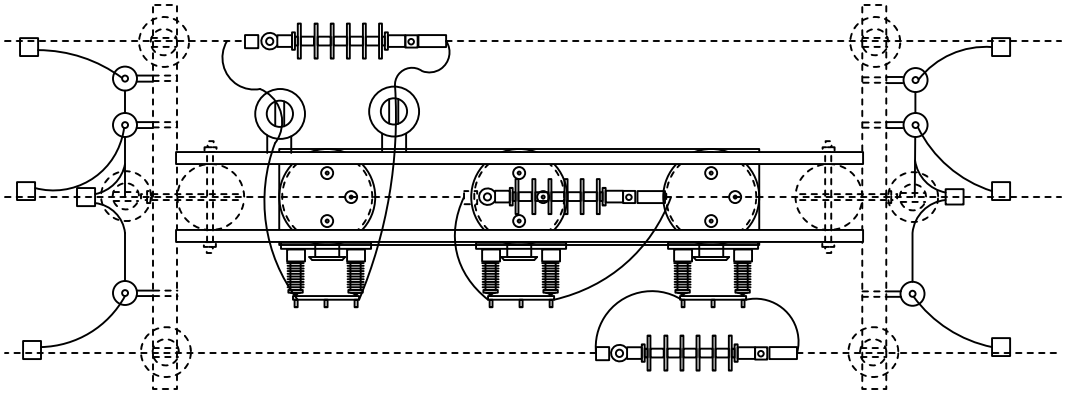


Notes:

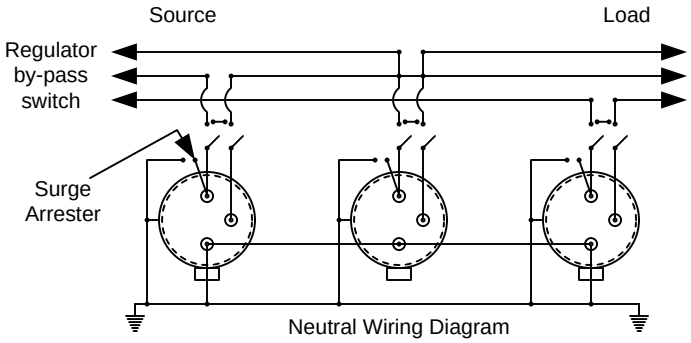
1. Each regulator must be bolted to the platform
2. Install control boxes on poles below regulators.

VOLTAGE REGULATORS, PLATFORM MOUNTED
(THREE SINGLE PHASE)
(PAGE 1 OF 2)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VY1.3 (VM7-3)



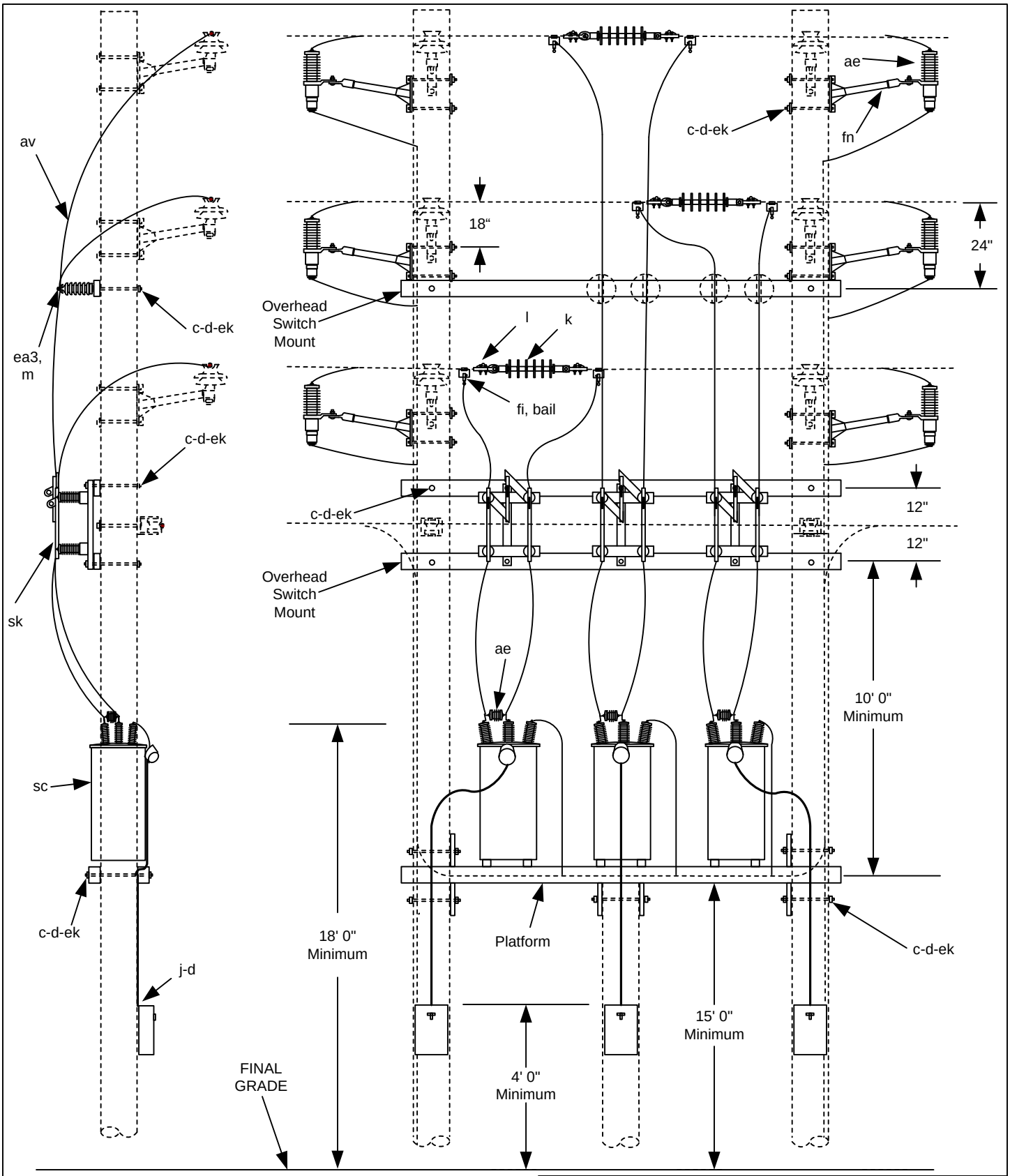
ITEM	QTY.	MATERIAL
a	2	Insulator, pin type
c	12	Bolt, Machine, ½" x required length
c	12	Bolt, Machine, 5/8" x required length
c	8	Bolt, Machine, ¾" x required length
d	28	Washer, round, 1 3/8" diameter
d	12	Washer, square, 2 ¼"
d	8	Washer, 3"
j	8	Screw, lag, ¼" x 4", as required
k	3	Insulator, 25 kV Polymer deadend
l	6	Clamp, deadend
o	2	Bolt, eye, 5/8" x required length
p		Connectors, as required
ae	6	Arrester, surge (18 kV)
ae	3	Arrester, by-pass (furnished by manufacturer)
av		Jumpers, bare, stranded, as required
bu	6	Connector, grounding
ek	12	Locknuts, 5/8"
ek	8	Locknuts, ¾"
ek	12	Locknuts, ½"
eq	2	Bracket, Standoff, fiberglass, 1 ½" dia.
fi	6	Clamp, Hot Line
sc	3	Regulator, voltage, step-type 24.9/14.4 kV
sk	3	Switch, regulator by-pass, 27kV
	2	Overhead Switch Mount (Aluma form)
	1	Platform, 16' (Aluma form 3PAL-16)
	6	Bail (Compression Stirrup)



Neutral Wiring Diagram

VOLTAGE REGULATORS, PLATFORM MOUNTED
(THREE SINGLE PHASE)
(PAGE 2 OF 2)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VY1.3 (VM7-3)

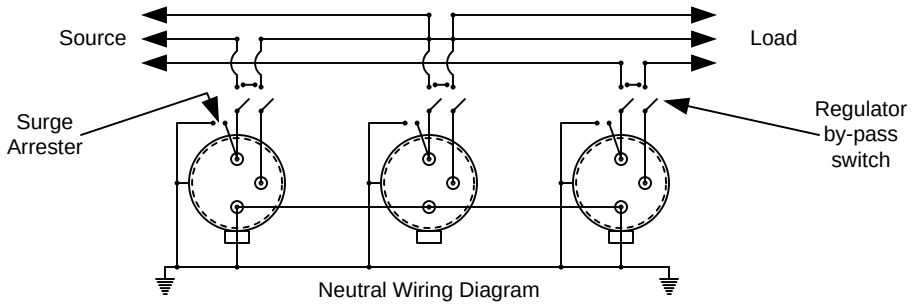


Notes:

1. Poles and Pole Top Assembly Unit are not included.
2. Use class 2 or larger poles.
3. Use two standard vertical identical pole top assembly units.
4. Size jumpers to primary conductor ampacity (minimum).

VOLTAGE REGULATORS, PLATFORM MOUNTED (THREE SINGLE PHASE, VERTICAL) (PAGE 1 OF 2)

2013	WFECA	3- Phase Primary 24.9/14.4 kV	VY1.4

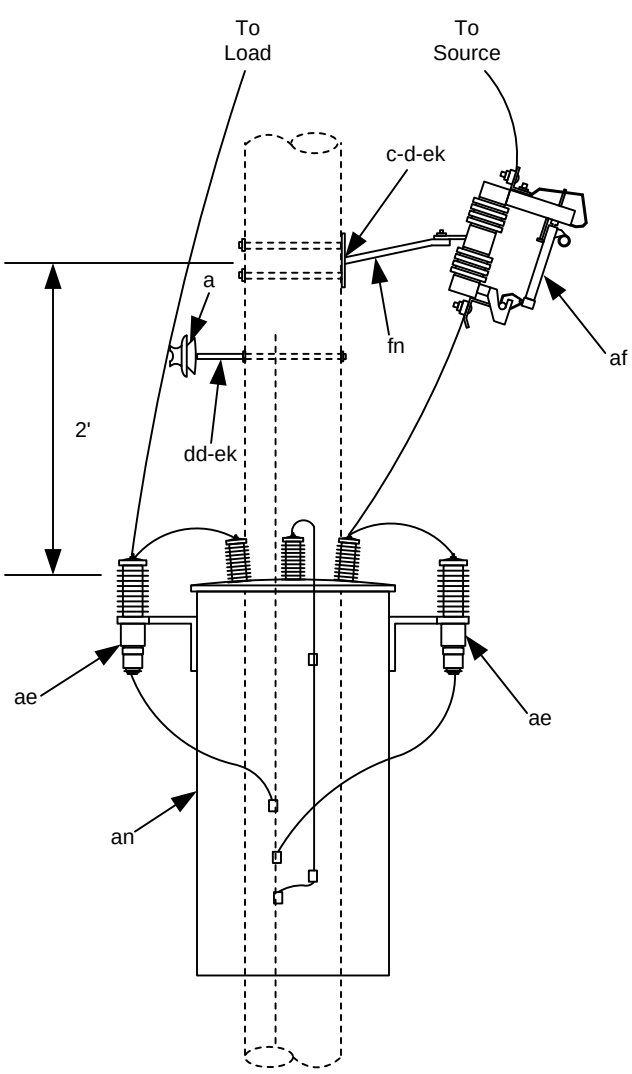


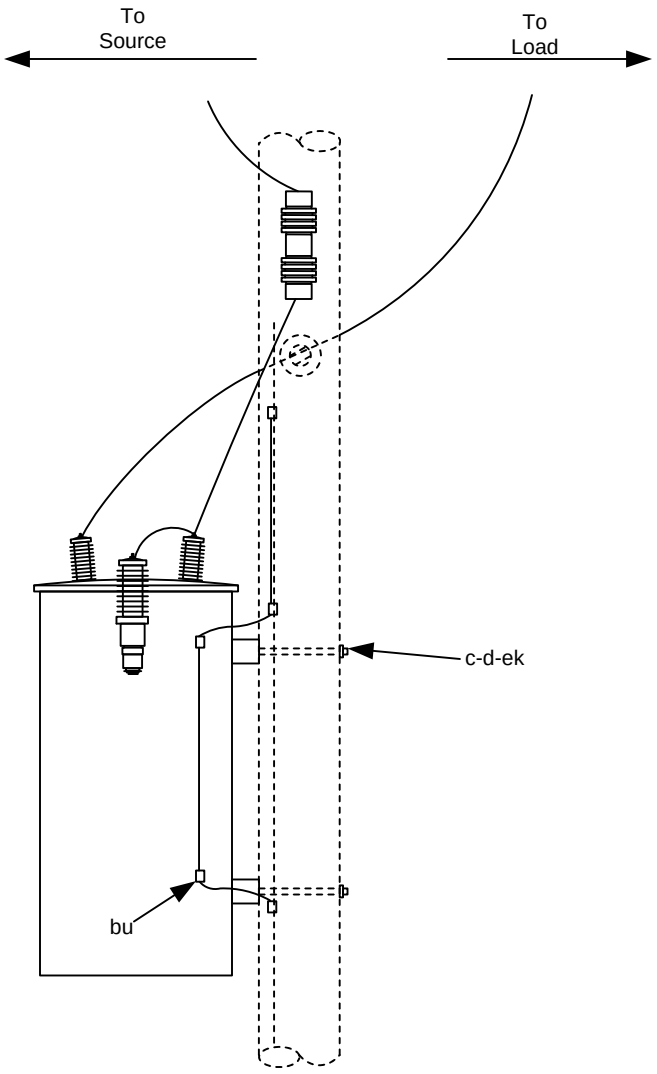
Neutral Wiring Diagram

ITEM	QTY.	MATERIAL
c	21	Bolt, Machine, 5/8” x required length
c	5	Bolt, Machine, ¾” x required length
d	21	Washer, square, 2 ¼”
d	5	Washer, square, 3"
j		Screw, lag, ¼" x 4", as required
k	3	Insulator, 25 kV Polymer deadend
l	6	Clamp, deadend, required
m	4	Clamp, trunnion, tangent
p		Connectors, as required
ae	6	Arrester, surge (18 kV)
ae	3	Arrester, by-pass (furnished by manufacturer)
av		Jumpers, bare, stranded, as required
bu	3	Connector, grounding
ea3	4	Insulator, Vertical Clamp Type
ek	21	Locknuts, 5/8"
ek	5	Locknuts, ¾”
fn	6	Bracket, Standoff, fiberglass, 1 ½” dia.
fi	6	Clamp, Hot Line
sc	3	Regulator, voltage, step-type 24.9/14.4 kV
sk	3	Switch, regulator by-pass, 27kV
	3	Overhead Switch Mount (Aluma form)
	1	Platform, 16' (Aluma form 3PAL-16)
	6	Bail (Compression Stirrup)

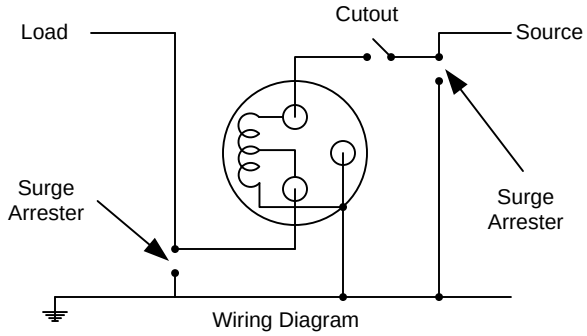
VOLTAGE REGULATORS, PLATFORM MOUNTED
(THREE SINGLE PHASE, VERTICAL)
(PAGE 2 OF 2)

2013	WFECA	3- Phase Primary 24.9/14.4 kV	VY1.4





ITEM	QTY.	MATERIAL
a	1	Insulator, Pin Type (24.9/14.4 kV)
c	2	Bolt, machine, ¾" x required length
c	3	Bolt, machine, 5/8" x required length
d	2	Washer, square, 3" curved
d	3	Washer, square, 2 ¼"
p		Connectors, compression, as required
ae	1	Arrester, surge (9 kV)
ae	1	Arrester, surge (18 kV)
af	1	Cutout, Load Break (27 kV)
an	1	Transformer, 14.4 kV/7.2 kV, specify size
av		Jumpers, bare, stranded, as required
bu	2	Connector, grounding
dd	1	Adapter, Insulator
ek	2	Locknuts, ¾"
ek	4	Locknuts, 5/8"
fi	2	Clamp, Hot Line
fn	1	Bracket, extension, Cutout/Arrester
	2	Bail (Compression Stirrup)



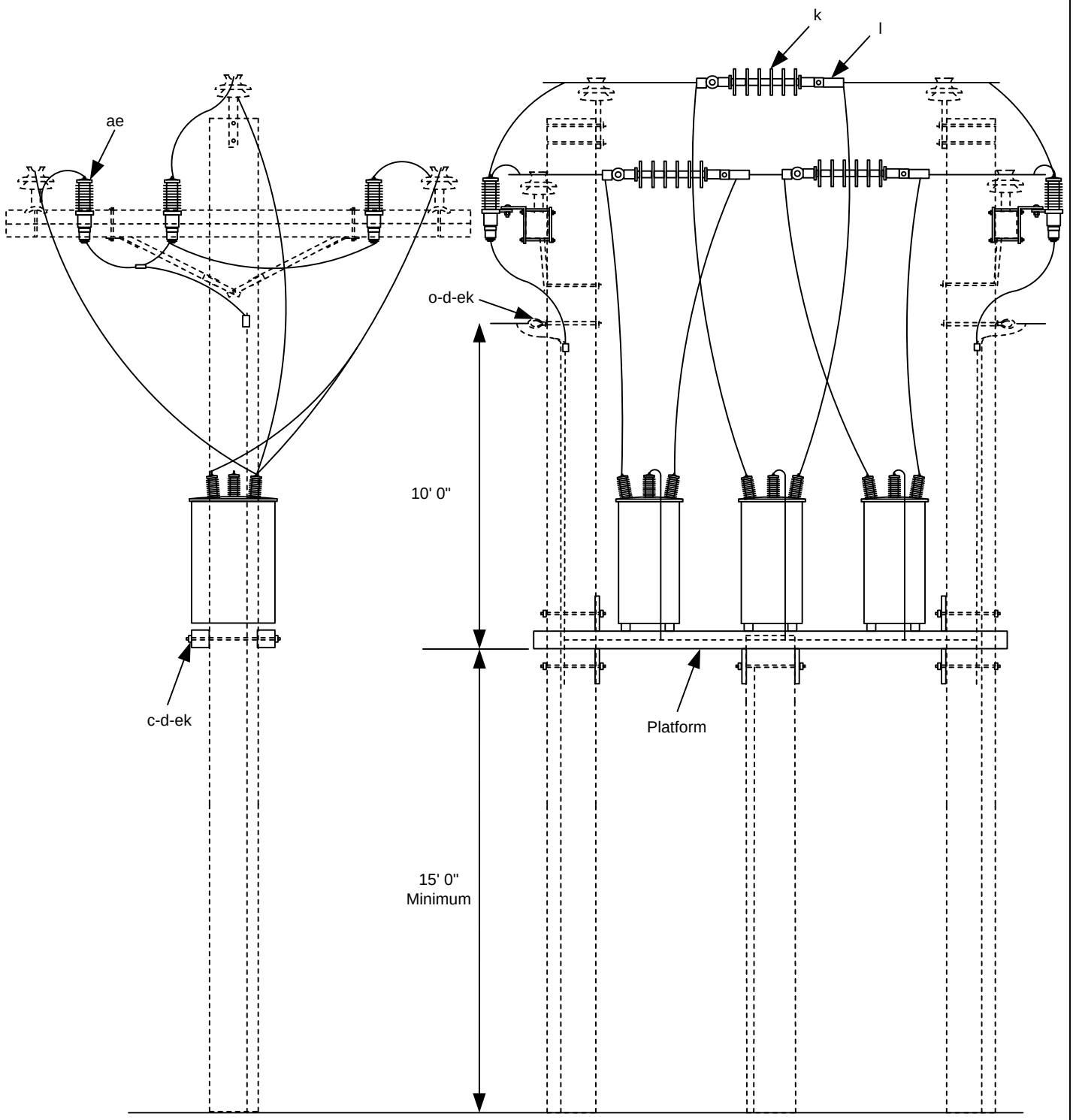
Wiring Diagram
14.4/7.2 kV Source

Notes:

1. Install 9 kV Arresters on 7.2 kV side.
2. Install 18 kV Arresters on 14.4 kV side.

AUTOTRANSFORMER, POLE MOUNTED (SINGLE PHASE, STEP-DOWN/STEP-UP)

2005	WFECA	1 – Phase Primary 24.9/14.4 kV	VY2.1 (VG150)

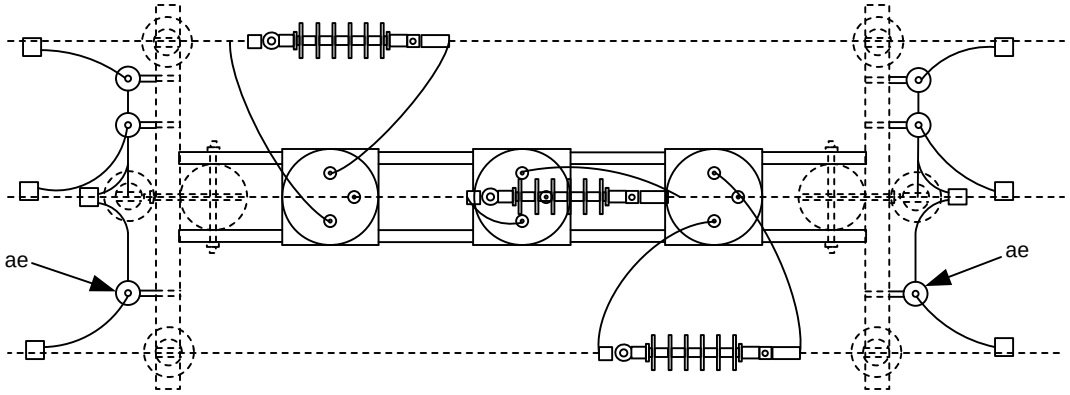


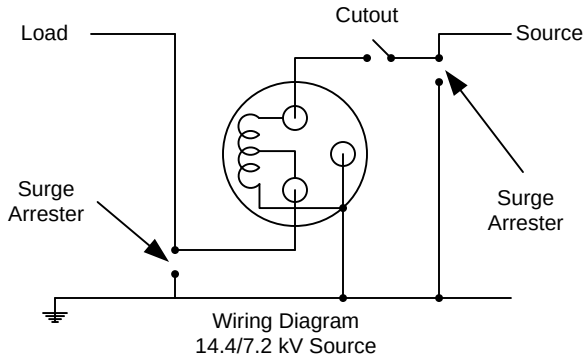
Notes:

1. Install 9 kV Arresters on 7.2 kV side.
2. Install 18 kV Arresters on 14.4 kV side.

AUTOTRANSFORMERS, PLATFORM MOUNTED
(THREE SINGLE PHASE STEP-DOWN/STEP-UP)
(PAGE 1 OF 2)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VY2.3



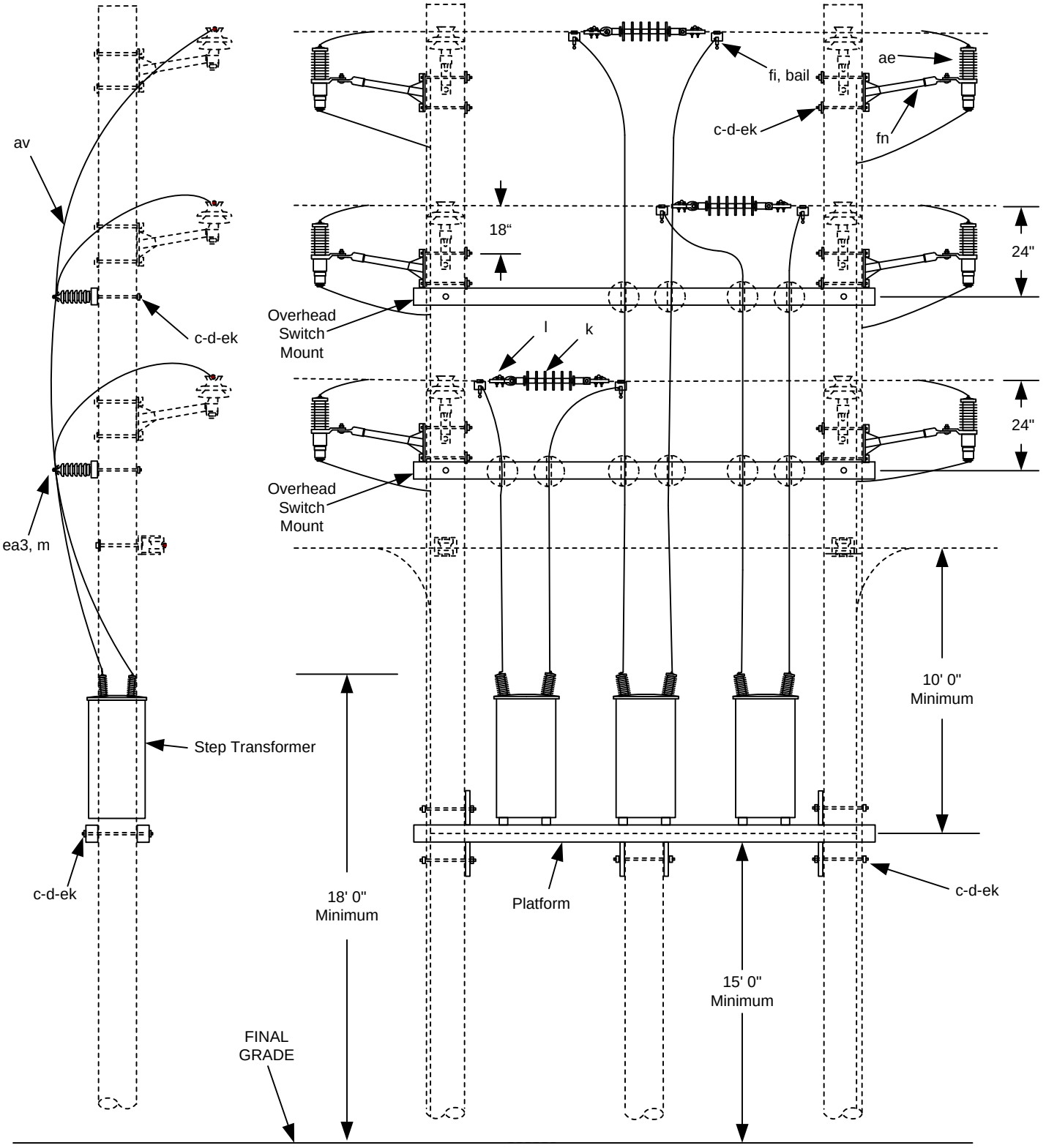


Wiring Diagram
14.4/7.2 kV Source

ITEM	QTY.	MATERIAL
c	8	Bolt, Machine, ¾" x required length
d	2	Washer, 5/8"
d	8	Washer, square, 3"
k	3	Insulator, 25 kV Polymer deadend
l	8	Clamp, deadend
o	2	Bolt, eye, 5/8" x required length
p		Connectors, as required
ae	3	Arrester, surge (18 kV)
ae	3	Arrester, surge (9 kV)
av		Jumpers, bare, stranded, as required
bu	6	Connector, grounding
ek	8	Locknuts, ¾"
ek	2	Locknuts, 5/8"
fi	12	Clamp, Hot Line
	3	AutoTransformer, 14.4/7.2 kV, specify size
	1	Platform, 16' (Aluma form 3PAL-16)
	12	Bail (Compression Stirrup)

AUTOTRANSFORMERS, PLATFORM MOUNTED
(THREE SINGLE-PHASE STEP-DOWN/STEP-UP)
(PAGE 2 OF 2)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VY2.3



Notes: 1. Poles and Pole Top Assembly Unit are not included.

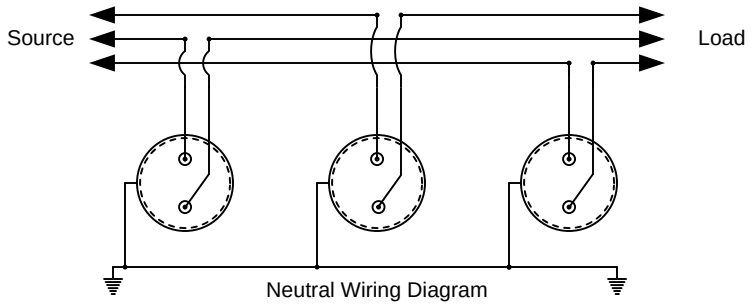
2. Use class 2 or larger poles.

3. Use two standard vertical identical pole top assembly units.

4. Size jumpers to primary conductor ampacity (minimum).

STEP TRANSFORMERS, PLATFORM MOUNTED (THREE SINGLE PHASE, VERTICAL) (PAGE 1 OF 2)

2013	WFECA	3- Phase Primary 24.9/14.4 kV	VY2.4

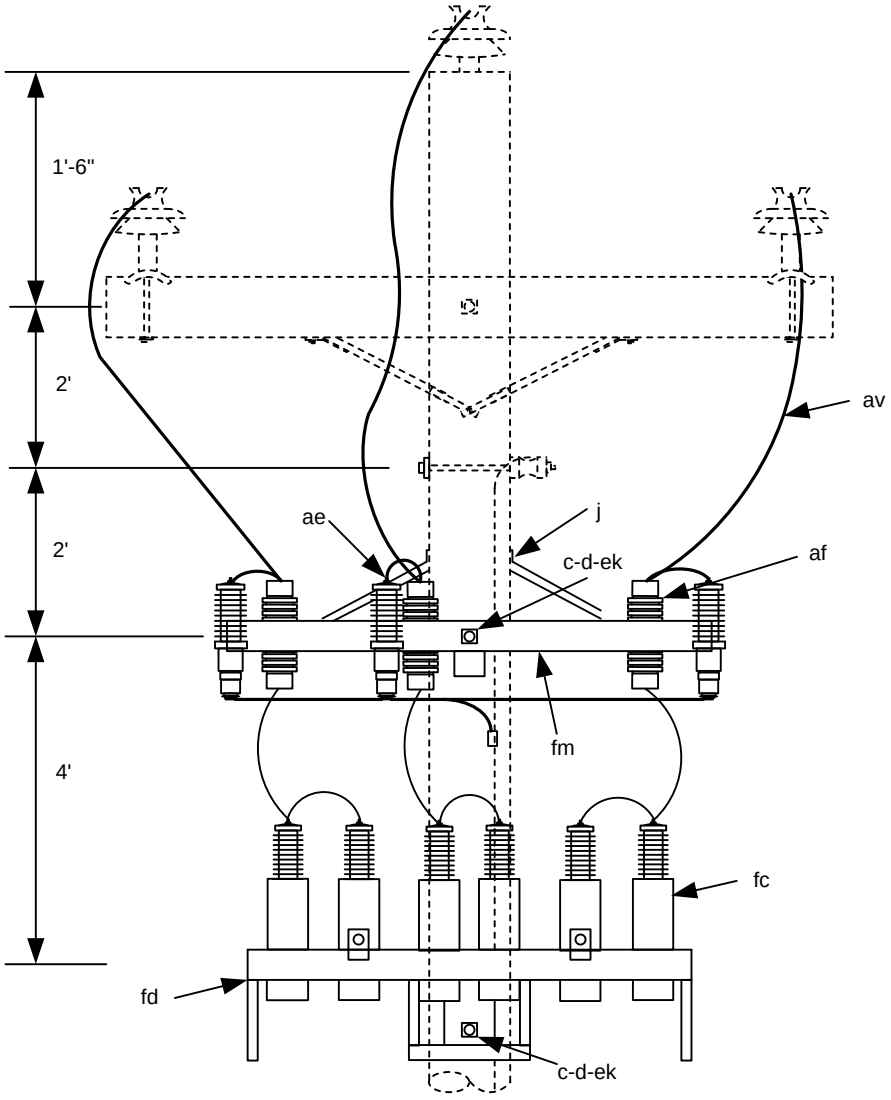


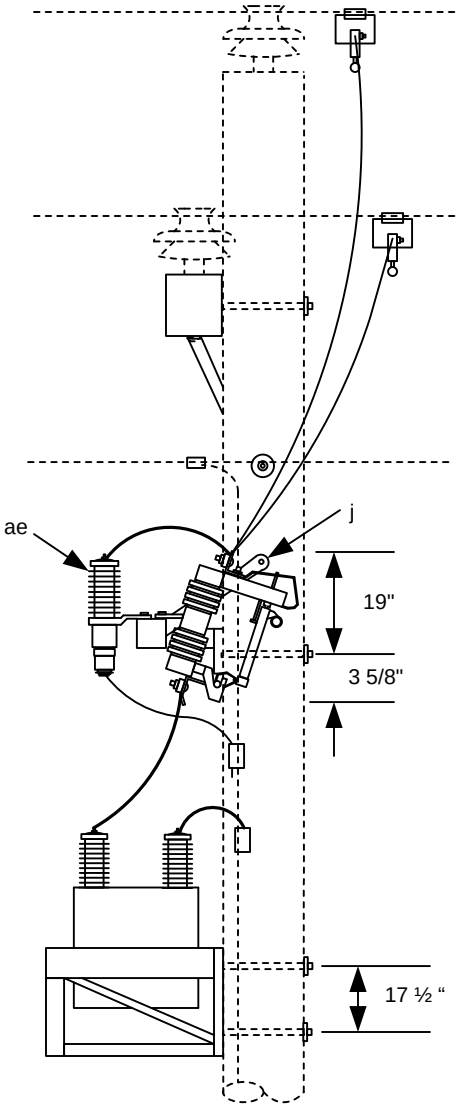
Neutral Wiring Diagram

ITEM	QTY.	MATERIAL
c	16	Bolt, Machine, 5/8” x required length
c	5	Bolt, Machine, ¾” x required length
d	21	Washer, square, 3"
j		Screw, lag, ¼" x 4", as required
k	3	Insulator, 25 kV Polymer deadend
l	6	Clamp, deadend, required
m	10	Clamp, trunnion, tangent
p		Connectors, as required
ae	6	Arrester, surge (18 kV)
av		Jumpers, bare, stranded, as required
bu	3	Connector, grounding
ea3	10	Insulator, Vertical Clamp Type
ek	15	Locknuts, 5/8"
ek	5	Locknuts, ¾”
fn	6	Bracket, Standoff, fiberglass, 1 ½” dia.
fi	6	Clamp, Hot Line
	3	Transformer, step-type 24.9/14.4 kV
	2	Overhead Switch Mount (Aluma form)
	1	Platform, 16' (Aluma form 3PAL-16)
	6	Bail (Compression Stirrup)

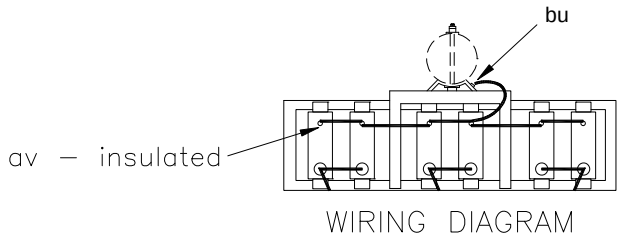
STEP TRANSFORMERS, PLATFORM MOUNTED
(THREE SINGLE PHASE, VERTICAL)
(PAGE 2 OF 2)

2013	WFECA	3- Phase Primary 24.9/14.4 kV	VY2.4





ITEM	QTY.	MATERIAL
c	3	Bolt, machine 5/8" x required length
d	4	Washer, square, 2 ¼"
j	1	Screw, lag, ½" x 4"
p		Connectors, as required
ae	3	Arrester, Lightning, 18kV
af	3	Cutout, Load Break, 27 kV
bu	1	Clamp, ground wire
ek	3	Locknuts, 5/8"
fc	3	Capacitor, short, 24.9/14.4 kV
fd	1	Hanger, Capacitor
fi	3	Connector, hot line
fm	1	Bracket, extension, for mounting apparatus (3ph)
	3	Bail, Compression Stirrup



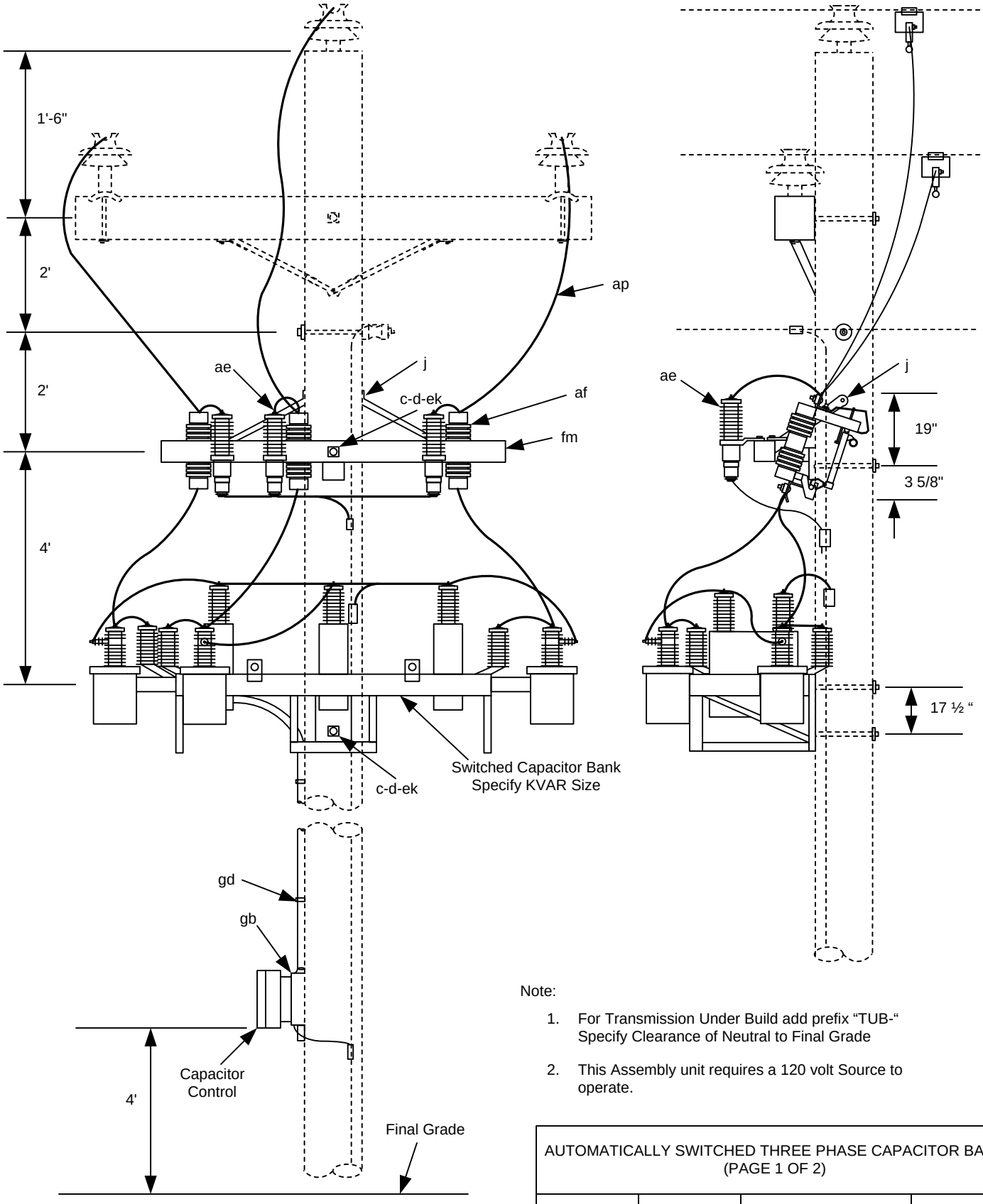
WIRING DIAGRAM

Note:

1. For Transmission Under Build add prefix "TUB-"
   Specify Clearance of Neutral to Final Grade
2. Specify Capacitor Bank Size.

THREE PHASE CAPACITOR BANK (450 KVAR AND BELOW)

2005	WFECA	3 – Phase Primary 24.9/14.4 kV	VY3.3 (VM9-13)



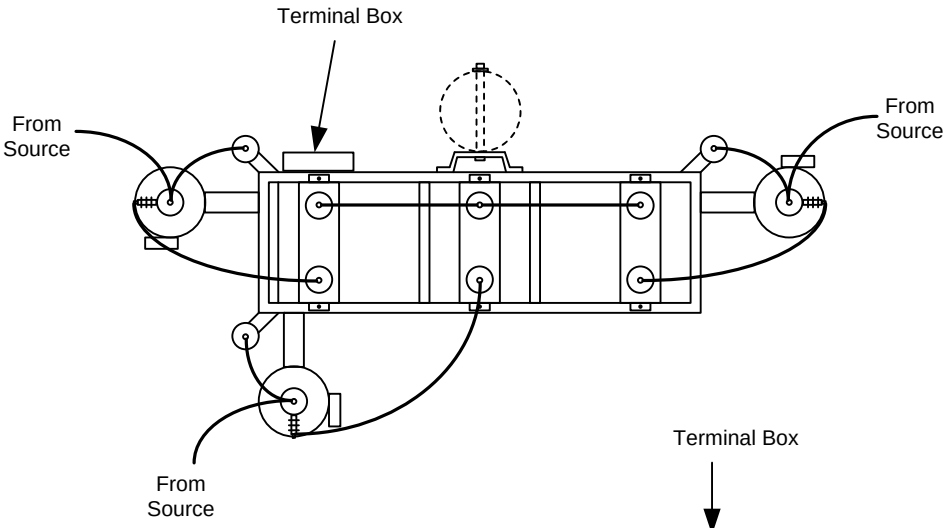
Note:

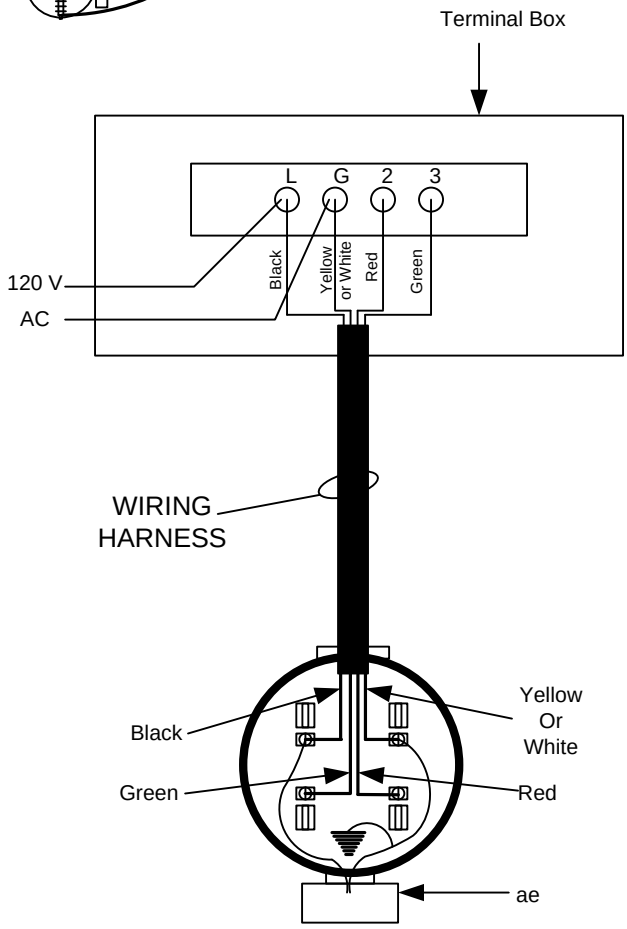
1. For Transmission Under Build add prefix "TUB-" Specify Clearance of Neutral to Final Grade
2. This Assembly unit requires a 120 volt Source to operate.

AUTOMATICALLY SWITCHED THREE PHASE CAPACITOR BANK (PAGE 1 OF 2)			
2011	WFECA	3 – Phase Primary 24.9/14.4 kV	VY3.4 (VM9-13AS)

Fuse Sizes

System Voltage kV	Capacitor Bank Size 3-Phase kVAR	Recommended Grounded – Y Fuse Link
7.2/ 12.47 kV	150 300 450 600 900 1200	8T 15T 20T 25T 40K 50K
14.4/ 24.9 kV	300 450 600 900 1200	8T 10T 15T 20T 25K





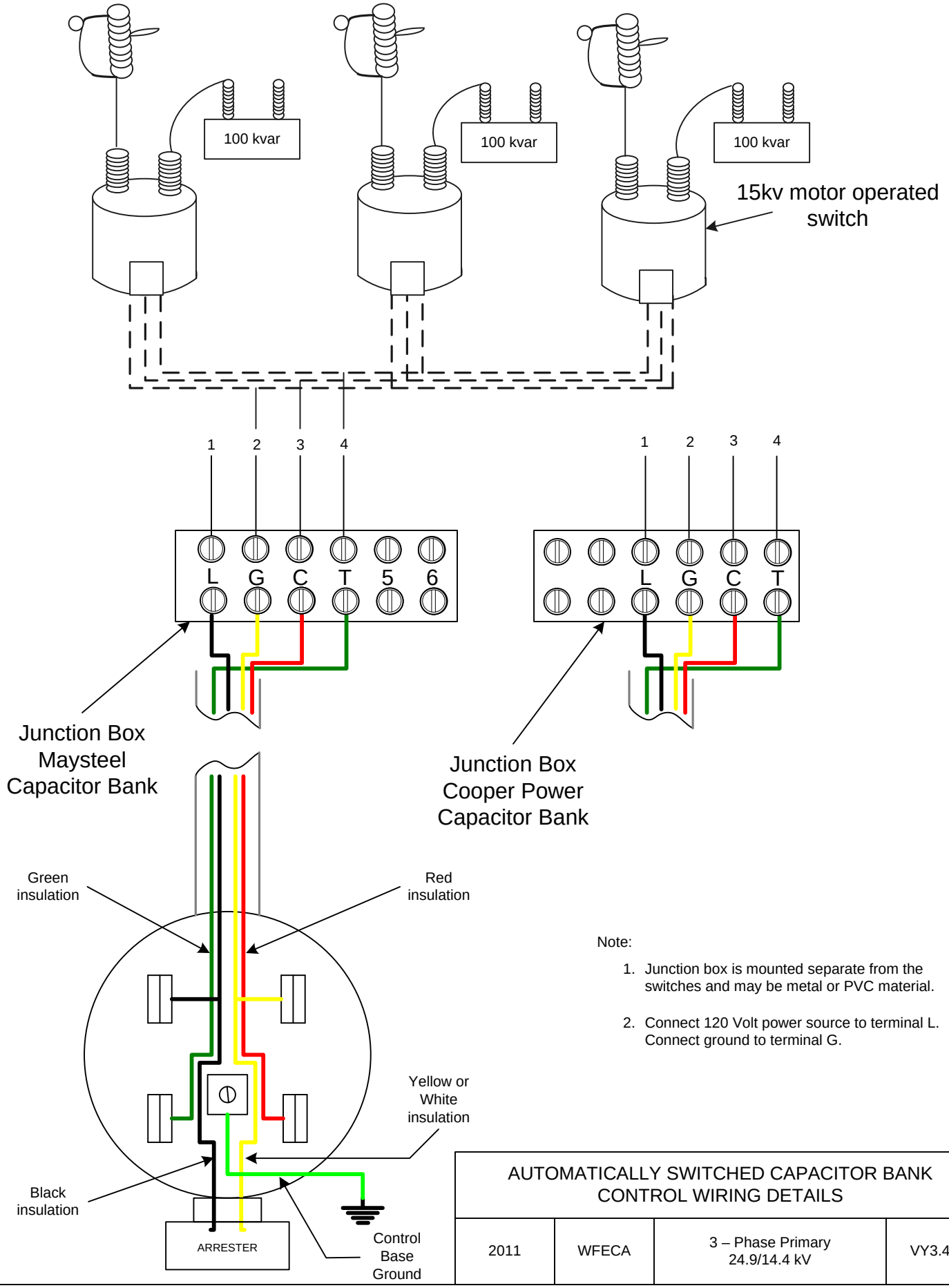
ITEM	QTY.	MATERIAL
c	3	Bolt, machine 5/8" x required length
d	3	Washer, square, 2 ¼"
j	4	Screw, lag, ½" x 4"
j	10	Screw, lag, 3/8" x 3"
p		Connectors, as required
ae	3	Arrester, Lightning, 18kV
ae	1	Arrester, Lightning, 120V
af	3	Cutout, Load break, 27 kV
fi	3	Connector, hot line
ek	3	Locknuts, 5/8"
fc	1	Capacitor Rack, Switched x required KVAR
fm	1	Bracket, extension, for mounting apparatus (3 ph)
gb	1	Meter base, 4 terminal with wiring harness
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
	1	Sweep, 1" PVC
	1	Capacitor Control w/ Wiring Harness
	1	Male Terminal Adaptor, 1" PVC
av	10'	12/3 UF with Ground
	3	Bail (Compression Stirrup)
	2	Coupling, 1" PVC

Note:

3. See drawing VY3.4G for control wiring details.

AUTOMATICALLY SWITCHED THREE PHASE CAPACITOR BANK (PAGE 2 OF 2)

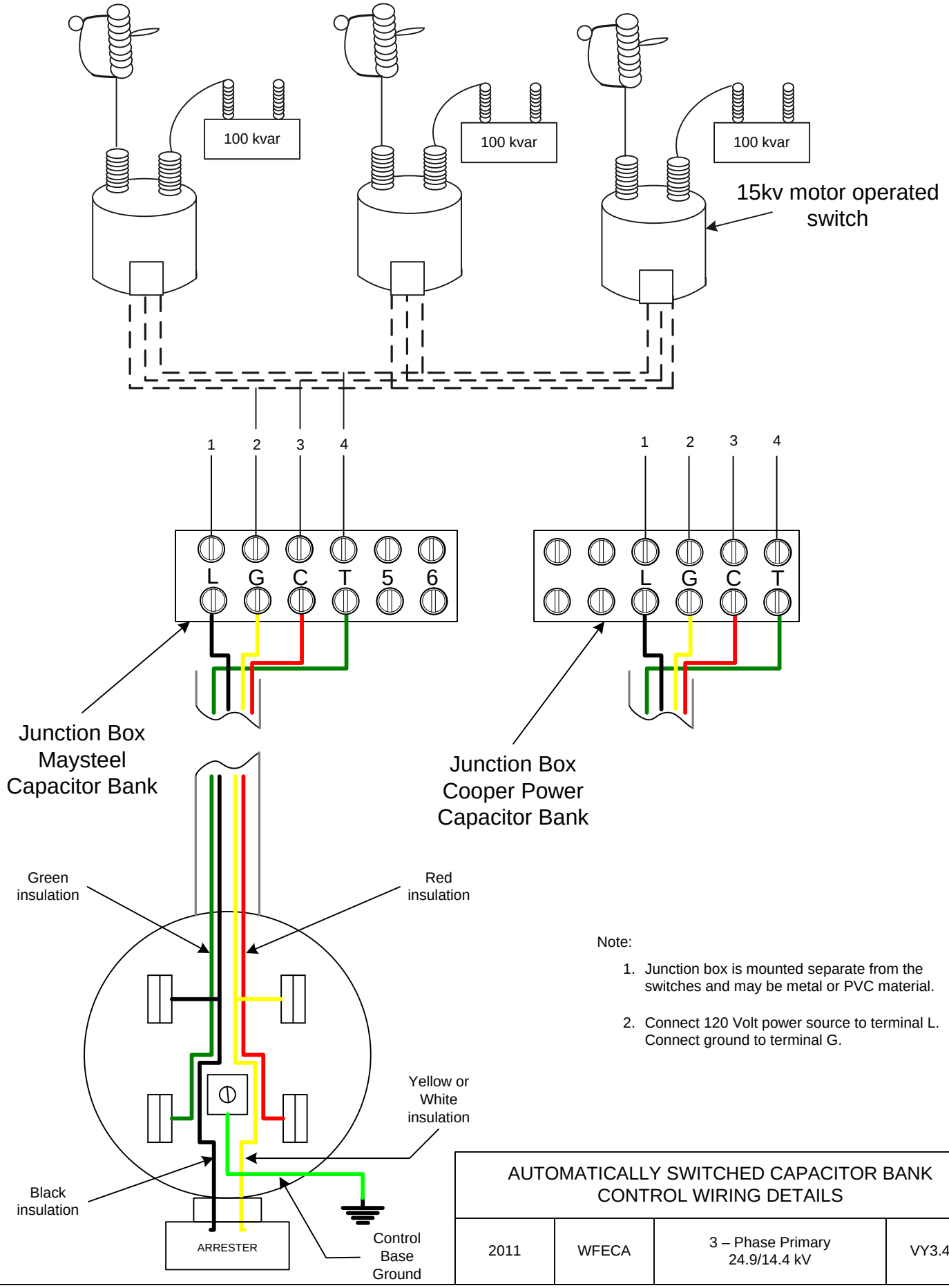
2011	WFECA	3 – Phase Primary 24.9/14.4 kV	VY3.4 (VM9-13AS)



Note:

1. Junction box is mounted separate from the switches and may be metal or PVC material.
2. Connect 120 Volt power source to terminal L. Connect ground to terminal G.

AUTOMATICALLY SWITCHED CAPACITOR BANK CONTROL WIRING DETAILS			
2011	WFECA	3 – Phase Primary 24.9/14.4 kV	VY3.4G



Note:

1. Junction box is mounted separate from the switches and may be metal or PVC material.
2. Connect 120 Volt power source to terminal L. Connect ground to terminal G.

AUTOMATICALLY SWITCHED CAPACITOR BANK CONTROL WIRING DETAILS			
2011	WFECA	3 – Phase Primary 24.9/14.4 kV	VY3.4G

APPENDIX 1

TABLE OF SELECTED SI TO METRIC CONVERSIONS

LENGTH

To Convert From	*To*	*Multiply By*	
foot (ft.)	meter (m)	3.048	E-01
inch (in.)	meter (m)	2.540	E-02
kilometer (km)	meter (m)	1.000	E+03
mile (mi.)	meter (m)	1.609344	E+03

AREA

To Convert From	*To*	*Multiply By*	
circular mil (cmil)	square meter	5.067075	E-10
square centimeter	square meter	1.000	E-04
square foot	square meter	9.290304	E-02
square kilometer	square meter	1.000	E+06
square mile	square meter	2.589988	E+06

FORCE

To Convert From	*To*	*Multiply By*	
kilogram force (kgf)	newton (N)	9.806650	
kip	newton (N)	4.448222	E+03
pound force (lbf)	newton (N)	4.448222	

MASS

To Convert From	*To*	*Multiply By*	
pound (avoirdupois) (lb)	kilogram (kg)	4.535924	E-01

APPENDIX 2

DERIVIATION OF MAXIMUM PERMISSIBLE LINE ANGLES

FORMULA:

Sin(O/2) = (P-(Fw*Sw*Ww))/2*Ft*T
(From RUS Bulletin 160-2, Section III-12-F)

CONSTANTS:

Wind Overload Capacity Factor (Fw): 2.00
(NOTE: Use 2.67 at crossings)
Wire Tension Overload Capacity Factor (Ft): 1.33
(From 1997 NESC, TABLE 253-2, Grade C)

CONDUCTOR DATA: (From RUS Bulletin 160-2, Table B-1)

Conductor Size	Strength	Maximum Tension	Design Tension (T)
4 ACSR (7/1)	2360	60%	1416
2 ACSR (6/1)	2850	60%	1710
2 ACSR (7/1)	3640	60%	2184
1/0 ACSR (6/1)	4380	60%	2628
123.3 AAC (7)	4460	60%	2676
2/0 ACSR (6/1)	5310	50%	2655
3/0 ACSR (6/1)	6620	50%	3310
4/0 ACSR (6/1)	8350	40%	3340
246.9 AAC (7)	8560	40%	3424
336.4 ACSR (18/1)	8680	40%	3472
336.4 ACSR (26/7)	14100	35%	4935

	WIND LOAD (Ww) by Loading District		
	LIGHT	MEDIUM	HEAVY
4 ACSR (7/1)	0.1928	0.2523	0.4190
2 ACSR (6/1)	0.2370	0.2720	0.4387
2 ACSR (7/1)	0.2438	0.2750	0.4417
1/0 ACSR (6/1)	0.2985	0.2993	0.4660
123.3 AAC (7)	0.2985	0.2993	0.4660
2/0 ACSR (6/1)	0.3353	0.3157	0.4823
3/0 ACSR (6/1)	0.3767	0.3340	0.5007
4/0 ACSR (6/1)	0.4223	0.3543	0.5210
246.9 AAC (7)	0.4223	0.3543	0.5210
336.4 ACSR (18/1)	0.5130	0.3947	0.5613
336.4 ACSR (26/7)	0.5408	0.4070	0.5737

SPECIFICATIONS AND DRAWINGS FOR UNDERGROUND ELECTRIC DISTRIBUTION

West Florida Electric Cooperative Edition

Revised April 29, 2015

INDEX

1. GENERAL

1.1 These specifications provide for the construction of underground distribution power facilities as specified by the owner. The owner is the organization contracting for the services and, when used in connection with RUS financed facilities, is synonymous with the term borrower as defined in §1710.2.

1.2 It is the responsibility of the borrower to ensure that all construction work shall be accomplished in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications, and the construction drawings.

1.3 If construction work is performed by the Owner's force account crews instead of a contractor, any reference to "Contractor" apply to the force account crews.

1.4 The provisions of section §1724.50, Compliance with National Electrical Safety Code (NESC) apply to all borrower electric system facilities regardless of the source of financing.

a. A borrower must ensure that its electric system, including all electric distribution, transmission, and generating facilities, is designed, constructed, operated, and maintained in accordance with all applicable provisions of the most current and accepted criteria of the NESC and all applicable and current electrical and safety requirements of any State or local government entity. Copies of the NESC may be obtained from the Institute of Electrical and Electronic Engineers, Inc., 345 East 47th Street, New York, New York 10017-2394. This requirement applies to the borrower's electric system regardless of the source of financing.

b. Any electrical standard requirements established by RUS are in addition to, and not in substitution for or a modification of, the most current and accepted criteria of the NESC and any applicable electrical or safety requirements of any State or local governmental entity.

c. Overhead distribution circuits shall be constructed with not less than the Grade C strength requirements as described in Section 26, Strength Requirements, of the NESC when subjected to the loads specified in NESC Section 25, Loadings for Grades B and C. Overhead transmission circuits shall be constructed with not less than the Grade B strength requirements as described in NESC Section 26.

2. STORAGE OF MATERIAL AND EQUIPMENT: It is the responsibility of the borrower to ensure that all material and equipment to be used in construction must be stored so as to be protected from deteriorating effects of the elements. If outdoor storage cannot be avoided, the material and equipment must 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: It is the responsibility of the borrower to ensure that the 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 borrower shall ensure that the ends of the cable be sealed at all times against moisture with suitable end caps. Where it is necessary to cut the cable, the ends will be terminated or sealed immediately after the cutting operation.

4. PLOWING

4.1 When cables are to be installed by plowing, it is the responsibility of the borrower to ensure that the plowing equipment 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.

4.2 The design of the plowshare must ensure 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 must be capable of extending the plow a minimum of 6 inches below the specified depth under all terrain conditions of plow utilization.

4.3 The borrower must ensure that equipment and construction methods used during construction cause minimum displacement of the soil. The slot made in the soil by the cable plows must be closed immediately by driving a vehicle track or wheel over the slot or by other suitable means.

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

4.5 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 by the borrower or the borrower's representative shall be furnished at all times at the site of plowing operations to assure compliance with these specifications.

4.6 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 must 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 must be uncovered a sufficient distance back for inspection by the Owner to determine whether the cable or wire has been damaged.

4.7 The cable must 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 must be completed promptly and in accordance with the written instruction of the Owner. The location of any such repair must be indicated on the staking sheet.

5. SPECIAL REQUIREMENTS FOR COORDINATION BETWEEN OWNER AND CONTRACTOR WHERE CABLE IS TO BE INSTALLED BY PLOWING

5.1 It is the responsibility of the borrower to ensure that the Contractor and the Owner shall jointly review the staking sheets 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, shall 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 shall consider and possibly approve any acceptable changes proposed by the Contractor. A representative of the Owner shall 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.

5.2 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 shall determine whether the cable is to be rerouted, trenched in rock or a change made to aerial construction. This decision shall be made promptly, and appropriate changes in units shall be made on the staking sheets. Such changes shall be in writing, dated, and initialed by the Owner.

5.3 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.

5.4 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 will 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

6.1 It is the responsibility of the borrower to ensure that all trenching depths specified are minimum as measured from the final grade to the top surface of the cable. The routing must 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 shall determine whether rerouting, rock trenching, plowing or other changes are necessary. Loose soil or crumbly rock shall 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.

6.2 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.

6.3 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.

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

6.5 Construction shall be arranged so that trenches may 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

7.1 It is the responsibility of the borrower to ensure that the cable must be placed in the trench as soon after the trenching operation as feasible. Wherever possible, cable must be payed out from the reel mounted on a moving vehicle or trailer. The reel must be supported so that it can turn easily without undue strain on the cable. The cable must be carefully placed in the trench by hand. All cable placement will be done under constant supervision by the borrower or the borrower's representative who assure that no damage to the cable occurs.

7.2 The cable must 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.

7.3 Where more than one cable is to be placed in a trench, the spacings required by the specifications must 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.

7.4 Sufficient slack, and in no case less than 24 inches, must 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 must be mechanically compacted at least 36 inches from all riser poles, pads, pedestals and terminal points.

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

13. SPECIAL PRECAUTIONS FOR CABLE SPLICES AND TERMINATIONS: It is the responsibility of the borrower to ensure that a portable covering or shelter must be available for use when splices or terminations are being prepared and when prefabricated terminations are being switched. The shelter must 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 must 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 should be applied afterwards in accordance with the manufacturer's recommendations. Whenever prefabricated cable devices are opened, the unenergized mating surfaces must be lubricated with silicone grease before the fittings are reconnected.

14. SECONDARY AND SERVICE CONNECTIONS

14.1 It is the responsibility of the borrower to ensure that a suitable inhibiting compound must be used with all secondary and service connections.

14.2 All secondary cable connections located below grade or in secondary pedestals must 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.

14.3 All transformer secondary phase terminal connections must be completely insulated. If the secondary phase terminals are threaded studs, the connection must be made with a pre-insulated secondary transformer connection block. If the transformer secondary phase terminals are insulated cable leads, connection must be made with a pre-insulated secondary connector block or with a secondary prefabricated splice when the transformer leads continue directly to the service.

14.4 If a transformer is so large that it must have secondary spades, the spades must be taped or otherwise insulated. Boots used for insulation must be taped so that they cannot be readily slipped off.

14.5 Secondary connections to terminals of pole-mounted transformers must 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 or providing a drip loop.

14.6 The secondary connections and insulation must have accommodations for all future and existing services as shown on the plans and specifications.

15. PEDESTALS: Where required, it is the responsibility of the borrower to ensure that pedestal stakes must 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 must be in place before the cable is installed. All pedestals should be approximately at the same height above finished grade.

16. INSPECTION AND INVENTORY OF BURIED UNITS: Before any backfilling operations are begun, it is the responsibility of the borrower to ensure that 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.

17. BACKFILLING

17.1 It is the responsibility of the borrower to ensure that 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 must be carefully compacted so that the cable will not be damaged.

17.2 Backfilling must be completed in such a manner that voids will be minimized. Excess soil must be piled on top and must be well tamped. All rock and debris must be removed from the site, and any damage to the premises repaired immediately.

17.3 Pieces of scrap cable or other material remaining after installation must not be buried in the trench as a means of disposal.

18. EQUIPMENT PADS: It is the responsibility of the borrower to ensure that 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 may be added to the site and thoroughly compacted. The pad shall be installed level at the specified elevation.

19. TRANSFORMERS: It is the responsibility of the borrower to ensure that 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.

20. EQUIPMENT ENCLOSURES: It is the responsibility of the borrower to ensure that 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.

21. UTILITY SAFETY SIGNS: It is the responsibility of the borrower to ensure that utility safety signs must be in accordance with ANSI Z535.2, Environmental and Facility Safety Signs, and shall be applied in accordance with RUS drawings. Copies of the ANSI Z535.2 may be obtained from the National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 1847, Rosslyn, Virginia 22209.

22. SACRIFICIAL ANODES: It is the responsibility of the borrower to ensure that 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.

23. GROUNDING

23.1 It is the responsibility of the borrower to ensure that all neutral conductors, grounding 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 or galvanized steel 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.

23.2 All pad-mounted equipment enclosures, including transformers, shall be grounded in such a manner that two separate grounding paths exist between the enclosure and the grounding rod(s).

24. CABLE LOCATION MARKERS: It is the responsibility of the borrower to ensure that location of permanent cable markers shall be as shown on the staking sheets.

25. INSTALLED CABLE AND ACCEPTANCE TESTS

25.1 It is the responsibility of the borrower to ensure that:

a. Continuity: After installation of the cable and prior to the high potential test specified below, authorized personnel shall 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, authorized personnel should perform high potential tests on each length of cable, with terminations in place but disconnected from the system.

25.2 The installation shall withstand for a minimum of 15 minutes a DC test potential as follows:

Primary URD Cable
(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:

a. 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.

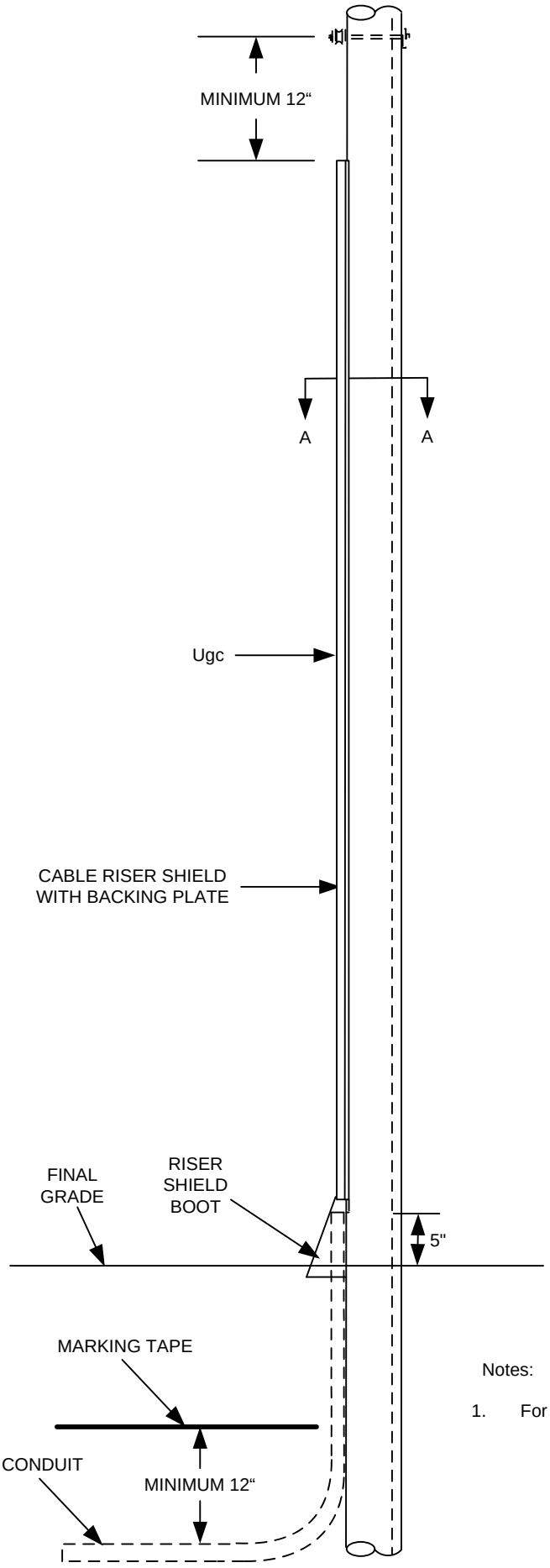
b. If applied in steps, the rate of increase of test voltage from one step to the next should be approximately uniform. The duration at each step shall be long enough for the absorption current to attain reasonable stabilization (1 minute minimum). Current and voltage readings should be taken at the end of each step duration. The number of steps should be from five to eight.

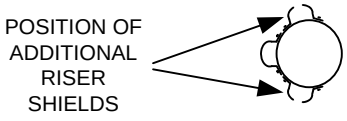
25.3 **Warning:** A hazardous voltage may still exist on the cable after the above testing has been completed. Therefore, before handling the cable, it is the responsibility of the borrower to ensure that the conductor shall be grounded to permit any charge to drain to earth.

INDEX A

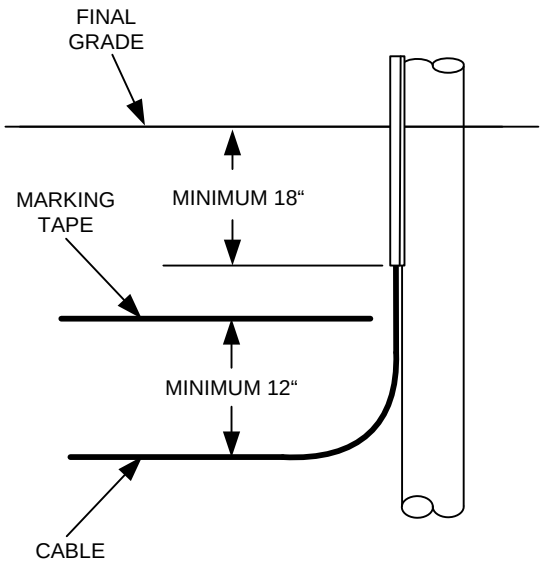
Primary and Secondary Terminal Pole Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UA1G	Guideline for Cable Shield Riser
UA2G	Guideline for Strapped Conduit Riser
UA3G	Guideline for Support Bracket Riser
UA1	Single Phase Cable Terminal Pole with 4 Inch Cable Riser Shield
UA1-1	Single Phase Cable Terminal Pole with 4 Inch Cable Riser Shield
UA2	Single Phase Cable Terminal Pole with 3 Inch Conduit Strapped To Pole
UA2-1	Single Phase Cable Terminal Pole with 3 Inch Conduit Strapped To Pole
UA3	Single Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UA3A	Additional Primary Cable Terminal with 3 Inch Conduit on Existing Pole With Existing Support Brackets
UA3-1	Single Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UB1	Two Phase Cable Terminal Pole with 4 Inch Cable Riser Shield
UB2	Two Phase Cable Terminal Pole with 3 Inch Conduit Strapped To Pole
UB3	Two Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UB3-1	Vertical Two Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UC1	Three Phase Cable Terminal Pole with 4 Inch Cable Riser Shield
UC2	Three Phase Cable Terminal Pole with 3 Inch Conduit Strapped To Pole
UC3	Three Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UC3-1	Vertical Three Phase Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UC6	Three Phase Cable Terminal Pole (600A) With 3 Inch Conduit and Support Brackets
UC6-1	Vertical Three Phase Cable Terminal Pole (600A) With 3 Inch Conduit and Support Brackets
UC7	Three Phase Cable Terminal Pole (600A) With Spare Cable and Conduit With 3 Inch Conduit and Support Brackets
UD3-1	Vertical Three Phase Cable Terminal Pole (600A) With 3 Inch Conduit and Support Brackets
UM5	Secondary Cable Terminal Pole with 2 Inch Riser Shield
UM5-1	Secondary Cable Terminal Pole with 4 Inch Riser Shield
UM5-2	Secondary Cable Terminal Pole with 3 Inch Conduit Strapped To Pole
UM5-3	Secondary Cable Terminal Pole with 3 Inch Conduit and Support Brackets
UM5-3A	Additional Secondary Cable Terminal with 3 Inch Conduit on Existing Pole With Existing Support Brackets
UX11	Connection of Terminator / Arrester to Overhead Line





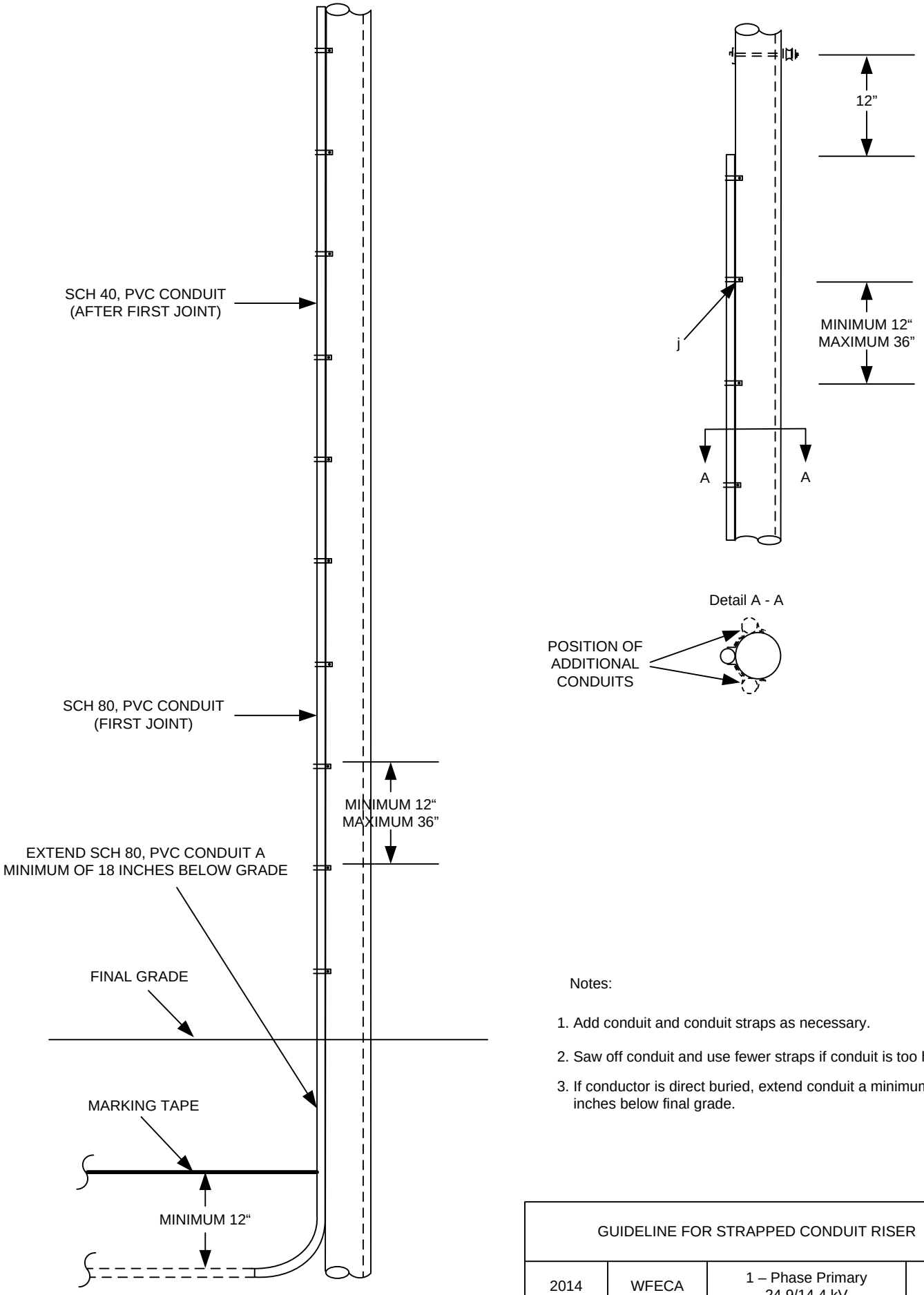
Detail A - A



Notes:

1. For direct buried cable, allow a minimum cable slack of 24" of bottom of riser.

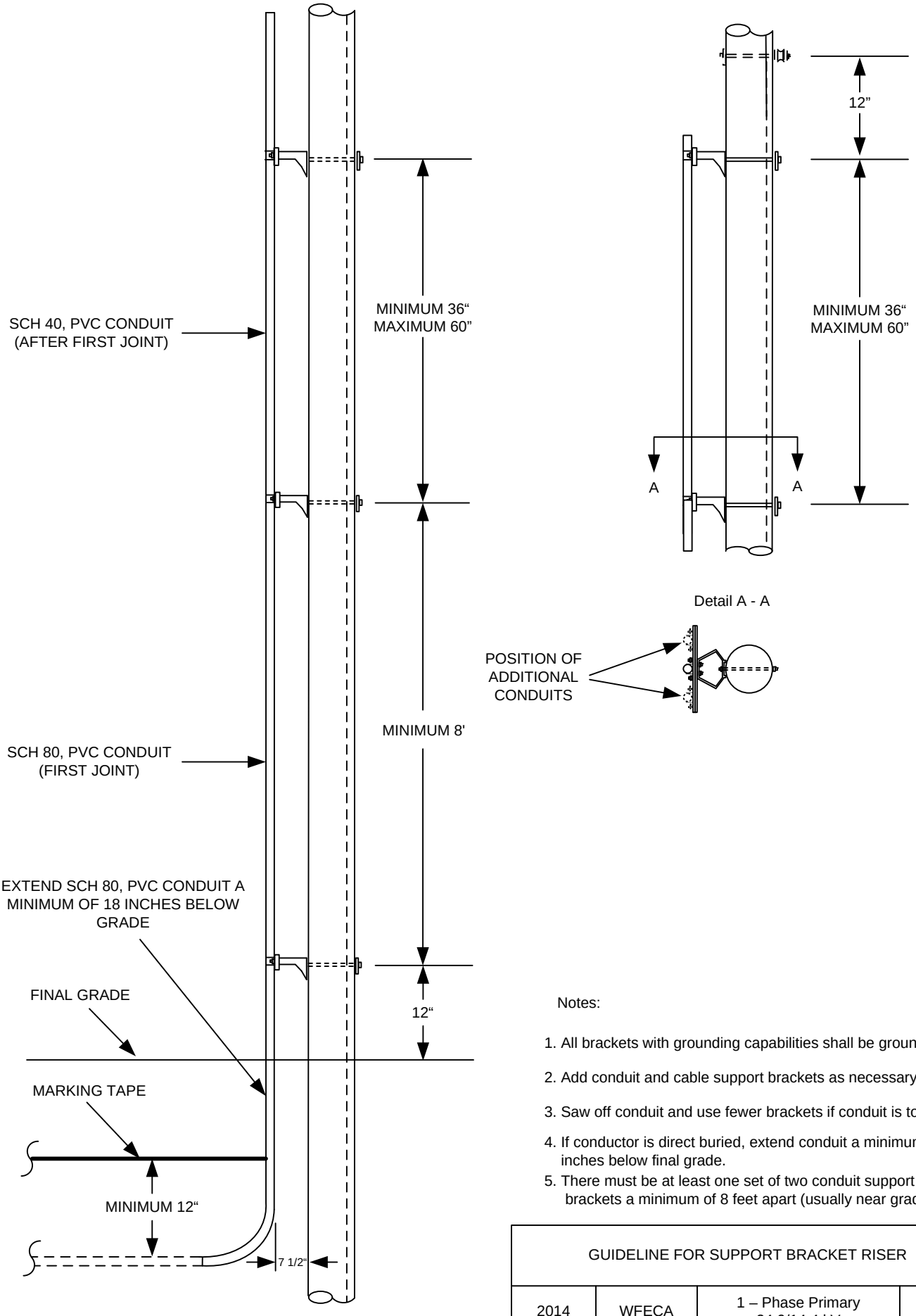
GUIDELINE FOR CABLE SHIELD RISER			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA1G



Notes:

1. Add conduit and conduit straps as necessary.
2. Saw off conduit and use fewer straps if conduit is too high.
3. If conductor is direct buried, extend conduit a minimum of 18 inches below final grade.

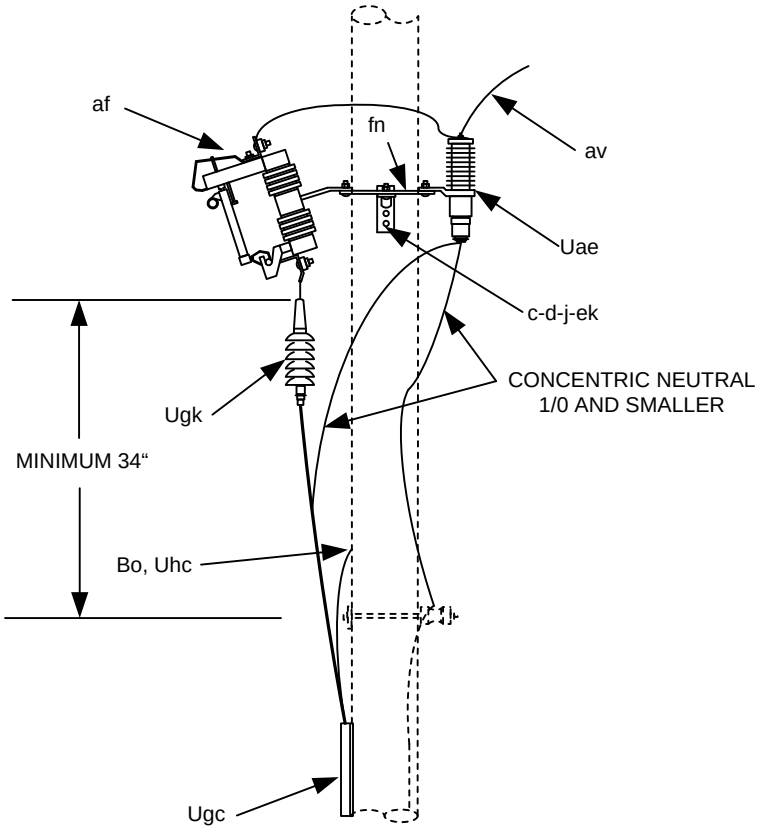
GUIDELINE FOR STRAPPED CONDUIT RISER			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA2G



Notes:

1. All brackets with grounding capabilities shall be grounded.
2. Add conduit and cable support brackets as necessary.
3. Saw off conduit and use fewer brackets if conduit is too high.
4. If conductor is direct buried, extend conduit a minimum of 18 inches below final grade.
5. There must be at least one set of two conduit support brackets a minimum of 8 feet apart (usually near grade).

GUIDELINE FOR SUPPORT BRACKET RISER			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA3G



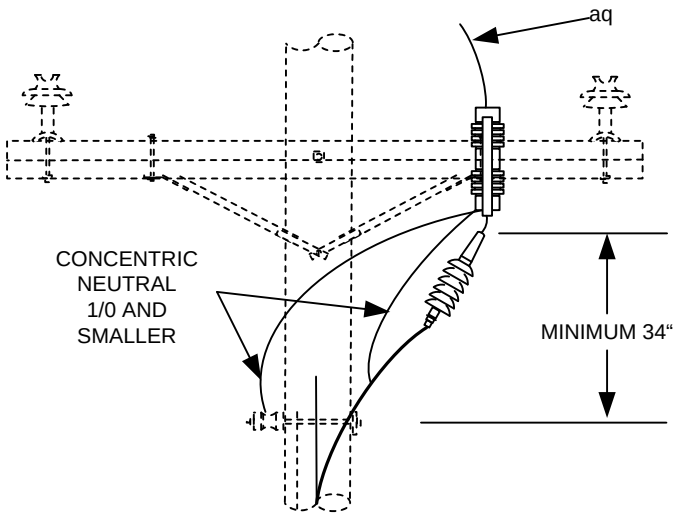
SEE DRAWING UA1G
FOR RISER DETAILS

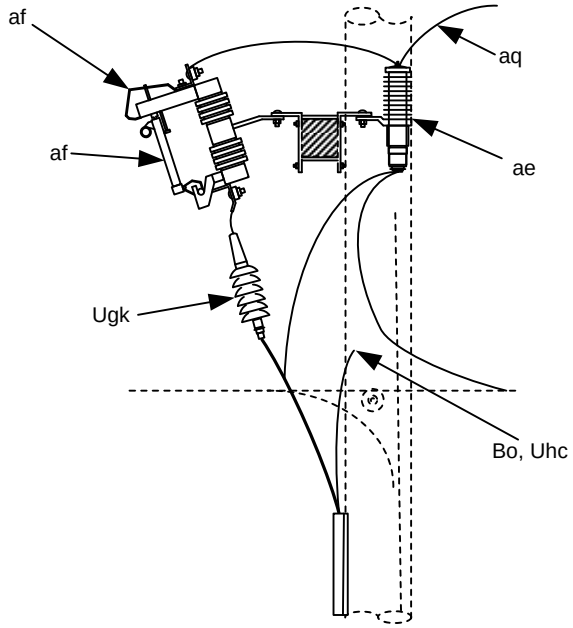
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	1	Screw, Lag, ½” x 4" (as required)
j	36	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	1	Cutout, Load Break
af	1	Fuse Link (as required)
av		Jumpers, as required
bo	1	Drive Hook, “J”
ek	1	Locknut, 5/8"
fn	1	Bracket, Extension, Cutout/Arrester
Uae	1	Arrester, surge, for riser
Ugc	3	Shield, cable riser, 4 in, with backing plate
Ugk	1	Cable termination 1/0
Uhc	1	Cable Support (wire strain holder)
Uhf	1	Terminator sealing Kit
	1	Seal, conduit, foam

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA1G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE WITH 4 INCH SHIELD AND BACKING PLATE			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA1





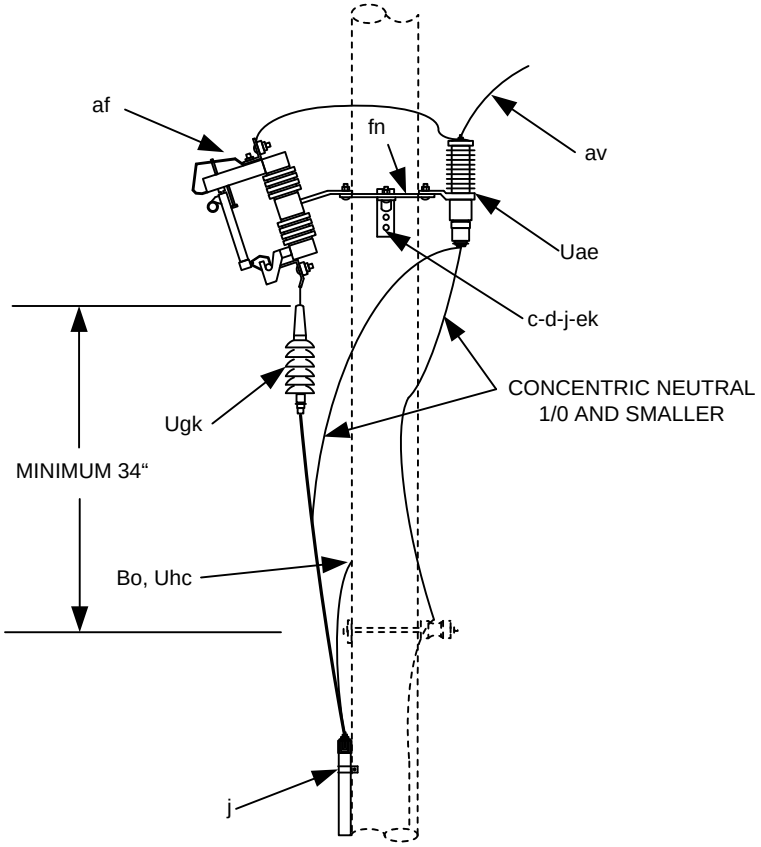
SEE DRAWING UA1G
FOR RISER DETAILS

ITEM	QTY.	MATERIAL
j	36	Screw, Lag, 3/8" x 3" (as required)
p		Connectors, as required
af	1	Cutout, Load Break
af	1	Fuse Link (as required)
av		Jumpers, as required
Uae	1	Arrester, 18 kV surge, for riser
Ugc	3	Shield, cable riser, 4 in, with backing plate
Uhc	1	Cable Support (wire strain holder)
Ugk	1	Cable termination 1/0
Uhf	1	Terminator sealing Kit
	1	Seal, conduit, foam

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA1G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE WITH 4 INCH SHIELD AND BACKING PLATE			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA1-1



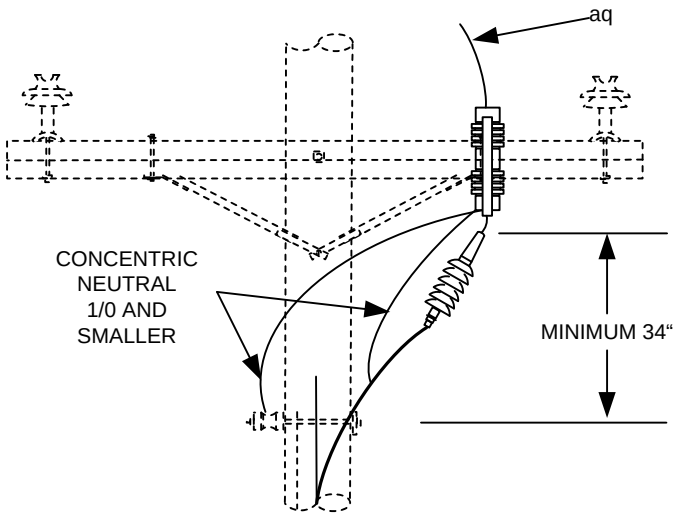
SEE DRAWING UA2G
FOR RISER DETAILS

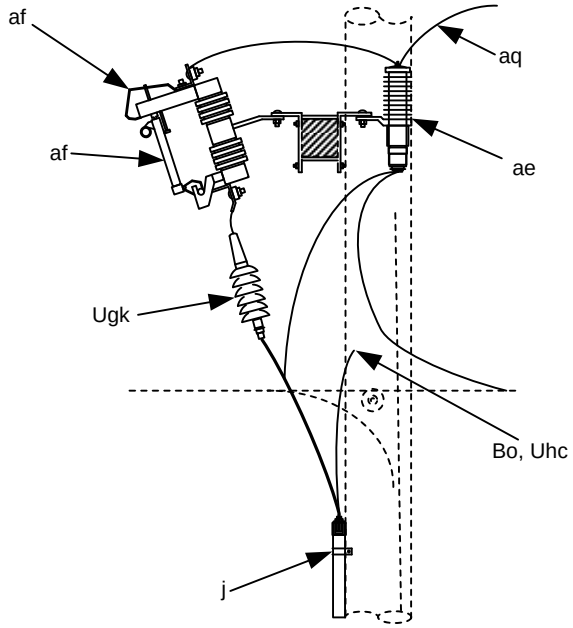
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	1	Screw, Lag, ½” x 4" (as required)
j	24	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	1	Cutout, Load Break
af	1	Fuse Link (as required)
av		Jumpers, as required
bo	1	Drive Hook, “J”
ek	1	Locknut, 5/8"
fn	1	Bracket, Extension, Cutout/Arrester
Uae	1	Arrester, surge, for riser
Ugk	1	Cable termination 1/0
Uhc	1	Cable Support (wire strain holder)
Uhf	1	Terminator sealing Kit
	1	Seal, conduit, 3" cap for 1/0 cable
Sn	2	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	1	Conduit, 3" PVC, sched. 80 (10' sect.)
	12	Conduit Strap, 3 inch
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA2G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT STRAPPED TO POLE			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA2





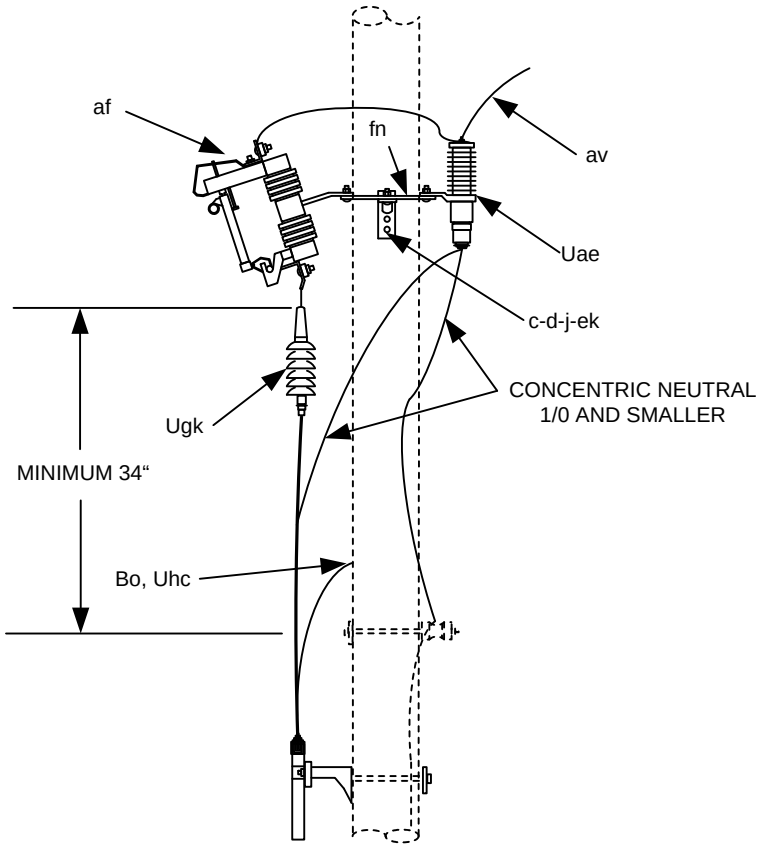
SEE DRAWING UA2G
FOR RISER DETAILS

ITEM	QTY.	MATERIAL
j	24	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	1	Cutout, Load Break
af	1	Fuse Link (as required)
av		Jumpers, as required
bo	1	Drive Hook, “J”
ek	1	Locknut, 5/8"
fn	1	Bracket, Extension, Cutout/Arrester
Uae	1	Arrester, surge, for riser
Ugk	1	Cable termination 1/0
Uhc	1	Cable Support (wire strain holder)
Uhf	1	Terminator sealing Kit
	1	Seal, conduit, 3" cap for 1/0 cable
Sn	2	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	1	Conduit, 3" PVC, sched. 80 (10' sect.)
	12	Conduit Strap, 3 inch
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA2G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT STRAPPED TO POLE			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA2-1



SEE DRAWING UA3G
FOR RISER DETAILS

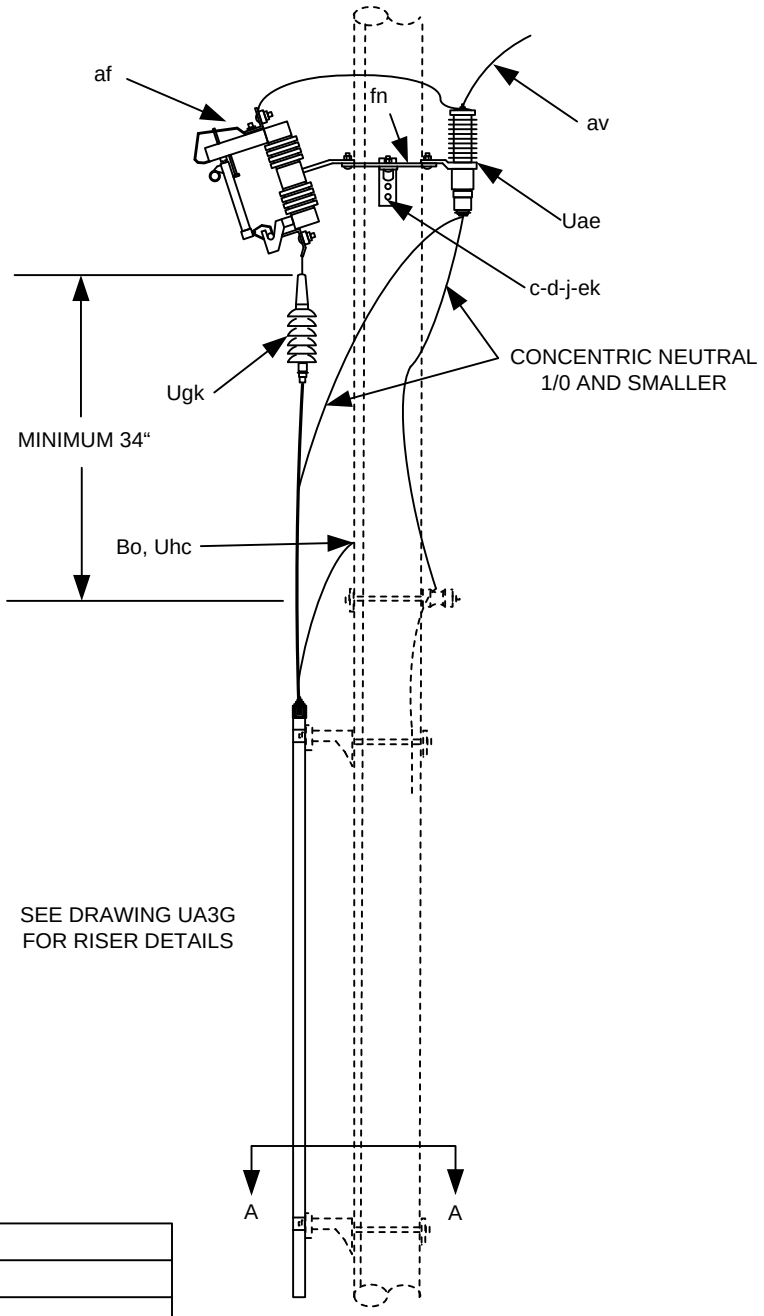
ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, 2 ¼”
j	7	Lag Screw, ½ x 4 inch
af	1	Cutout, Load Break
av	req	Jumpers, as required
bo	1	Drive Hook, “J”
ek	7	Locknut, 5/8 inch
fn	1	Bracket, Extension, Cutout/Arrester
Uae	1	Arrester, Surge, Riser
Ugk	1	Cable Termination (polymer), 27kV
Uhc	1	Cable Support (wire strain holder)
Uhf	1	Terminator sealing Kit
	5	Bracket, Conduit Support (Aluma-Form 6-CSO-12)
	5	Strap Kit, 3 inch, (Aluma-Form STK-3)
Sn	2	Conduit, 3 inch, Sch 40, (10 foot stick)
Sn	1	Conduit, 3 inch, Sch 80, (10 foot stick)
	1	Seal, Conduit, 3 inch Cap for Primary Cable
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

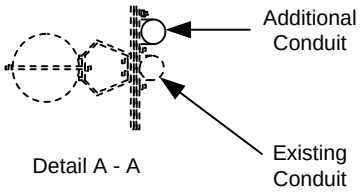
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA3





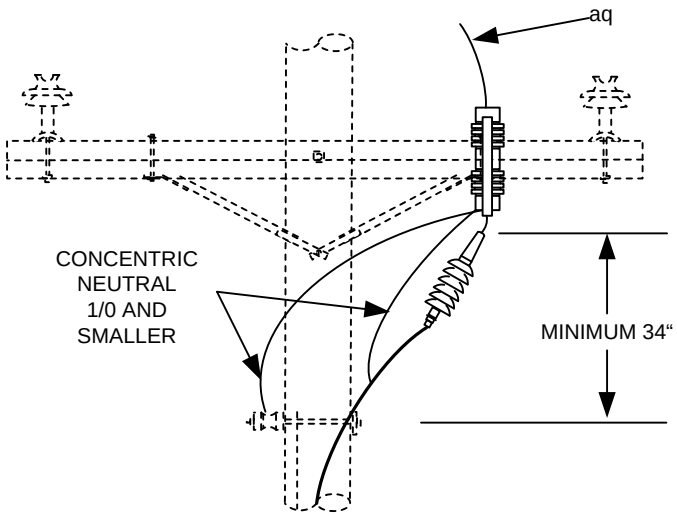
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, 2 ¼”
j	1	Lag Screw, ½ x 4 inch
af	1	Cutout, Load Break
av	req	Jumpers, as required
bo	1	Drive Hook, “J”
ek	1	Locknut, 5/8 inch
fn	1	Bracket, Extension, Cutout/Arrester
Uae	1	Arrester, Surge, Riser
Ugk	1	Cable Termination (polymer), 27kV
Uhc	1	Cable Support (wire strain holder)
Uhf	1	Terminator sealing Kit
	5	Strap Kit, 3 inch, (Aluma-Form STK-3)
Sn	2	Conduit, 3 inch, Sch 40, (10 foot stick)
Sn	1	Conduit, 3 inch, Sch 80, (10 foot stick)
	1	Seal, Conduit, 3 inch Cap for Primary Cable
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

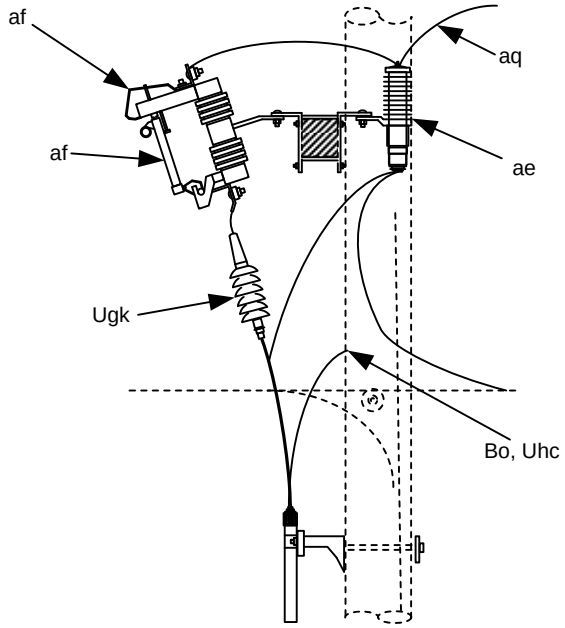
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

ADDITIONAL PRIMARY CABLE TERMINAL
WITH 3 INCH CONDUIT ON EXISTING POLE
WITH EXISTING SUPPORT BRACKETS

2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA3A





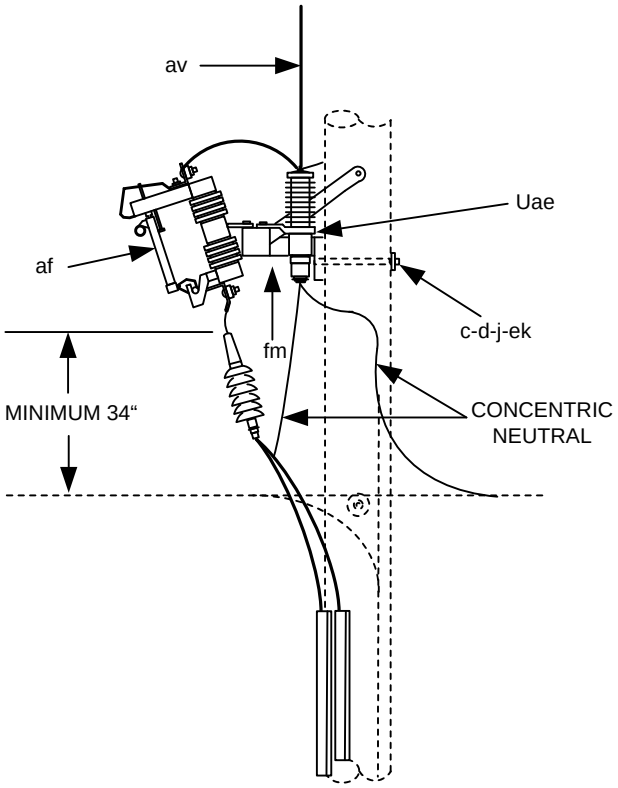
SEE DRAWING UA3G
FOR RISER DETAILS

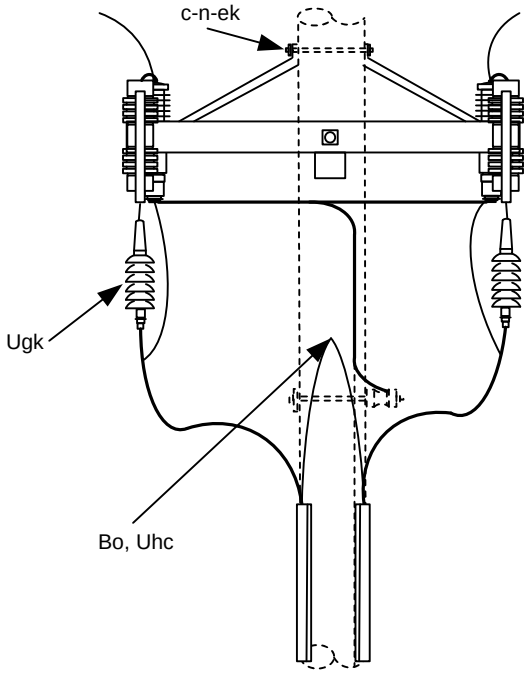
ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x Required Length
d	5	Washer, square 2-¼”
j	5	Screw, Lag, ½” x 4" (as required)
p		Connectors, as required
af	1	Cutout, Load Break
af	1	Fuse Link (as required)
av		Jumpers, as required
Uhc	1	Cable Support (wire strain holder)
ek	5	Locknut, 5/8"
Uae	1	Arrester, 18 kV surge, for riser
Uhc	1	Cable Support (wire strain holder)
Ugk	1	Cable termination 1/0
Uhf	1	Terminator sealing Kit
	5	Bracket, conduit support, 12 inch
	1	Seal, conduit, 3" cap for 1/0 cable
Sn	2	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	1	Conduit, 3" PVC, sched. 80 (10' sect.)
	5	Strap Kit, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

SINGLE PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT AND SUPPORT BRACKETS			
2014	WFECA	1 – Phase Primary 24.9/14.4 kV	UA3-1





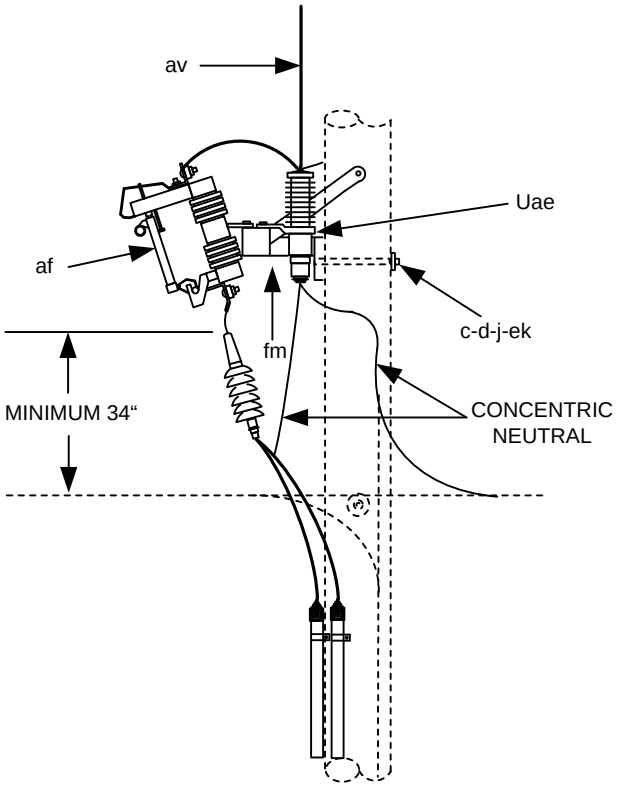
SEE DRAWING UA1G
FOR RISER DETAILS

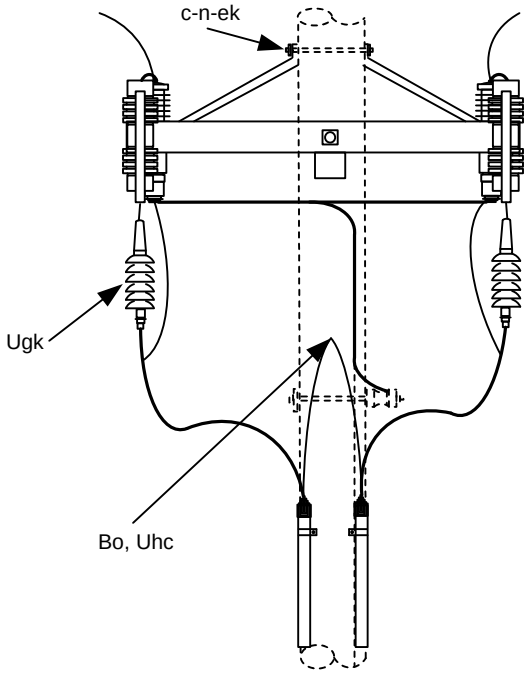
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	2	Screw, Lag, ½” x 4" (as required)
j	32	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	2	Cutout, Load Break
af	2	Fuse Link (as required)
av		Jumpers, as required
bo	2	Drive Hook, “J”
ek	1	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	2	Arrester, surge, for riser
Ugk	2	Cable termination 1/0
Uhc	2	Cable Support (wire strain holder)
Uhf	2	Terminator sealing Kit
	2	Seal, conduit, foam

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA1G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

TWO PHASE CABLE TERMINAL POLE WITH 4 INCH SHIELD AND BACKING PLATE			
2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UB1





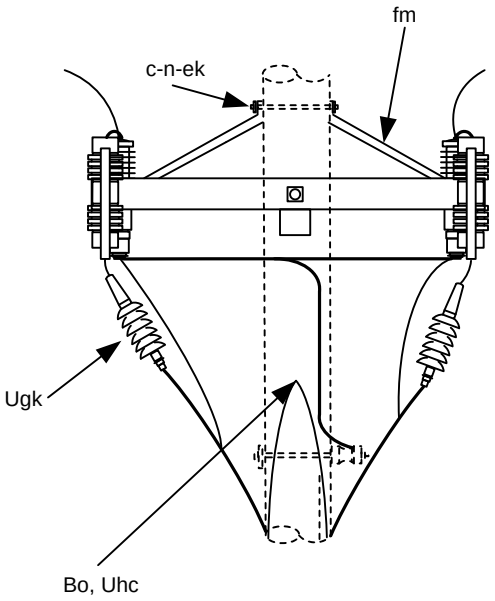
SEE DRAWING UA2G
FOR RISER DETAILS

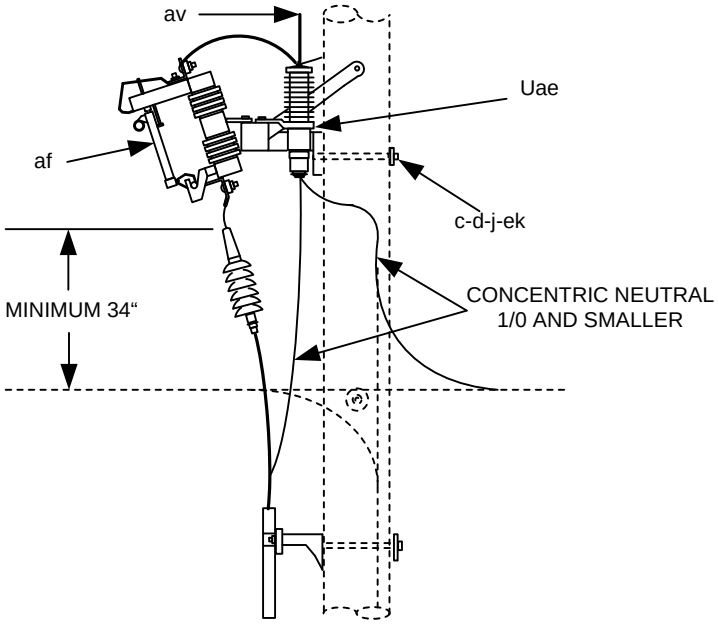
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	2	Screw, Lag, ½” x 4" (as required)
j	32	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	2	Cutout, Load Break
af	2	Fuse Link (as required)
av		Jumpers, as required
bo	2	Drive Hook, “J”
ek	1	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	2	Arrester, surge, for riser
Ugk	2	Cable termination 1/0
Uhc	2	Cable Support (wire strain holder)
Uhf	2	Terminator sealing Kit
	2	Seal, conduit, 3" cap for 1/0 cable
Sn	4	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	2	Conduit, 3" PVC, sched. 80 (10' sect.)
	16	Conduit Strap, 3 inch
Sn	2	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA2G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

TWO PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT STRAPPED TO POLE			
2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UB2





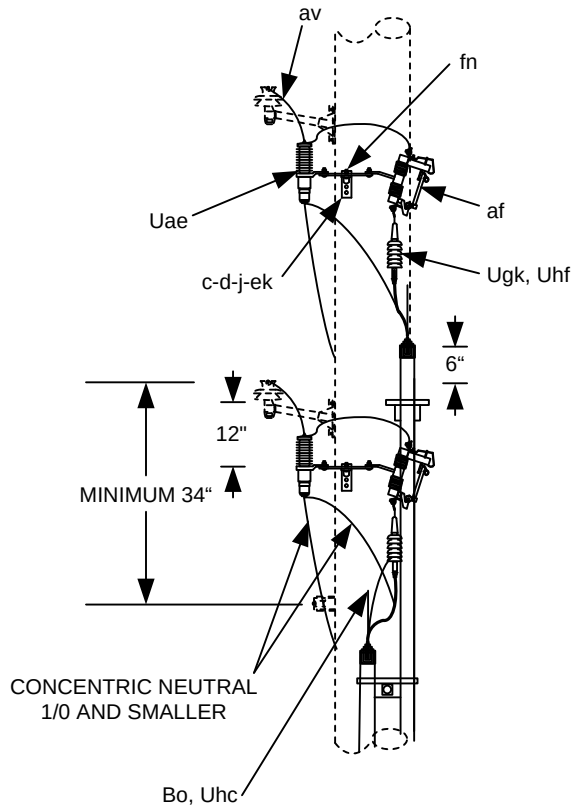
SEE DRAWING UAG3
FOR RISER DETAILS

ITEM	QTY.	MATERIAL
c	6	Bolt, machine, 5/8" x Required Length
d	6	Washer, square 2-¼”
j	6	Screw, Lag, ½” x 4" (as required)
p		Connectors, as required
af	2	Cutout, Load Break
af	2	Fuse Link (as required)
av		Jumpers, as required
bo	2	Drive Hook, “J”
ek	6	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	2	Arrester, surge, for riser
Ugk	2	Cable termination 1/0
Uhc	2	Cable Support (wire strain holder)
Uhf	2	Terminator sealing Kit
	5	Bracket, conduit support, 12 inch
	2	Seal, conduit, 3" cap for 1/0 cable
Sn	4	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	2	Conduit, 3" PVC, sched. 80 (10' sect.)
	10	Strap Kit, 3 inch
Sn	2	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

TWO PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT AND SUPPORT BRACKETS			
2014	WFECA	2 – Phase Primary 24.9/14.4 kV	UB3



SEE DRAWING UA3G
FOR RISER DETAILS

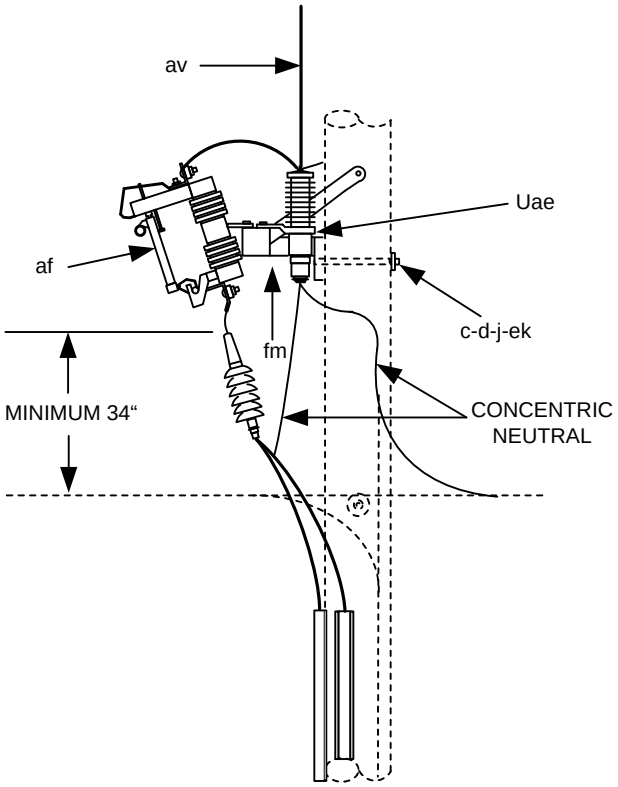
ITEM	QTY.	MATERIAL
c	9	Bolt, machine, 5/8" x Required Length
d	9	Washer, square 2-¼”
j	9	Lag Screw, ½ x 4 inch
p		Connectors, as required
af	2	Cutout, Load Break
af	2	Fuse Link (as required)
bo	2	Drive Hook, “J”
ek	9	Locknut, 5/8 inch
fn	2	Bracket, Extension, Cutout/Arrester
Uae	2	Arrester, surge, for riser
Ugk	2	Cable termination 1/0
Uhc	2	Cable Support (wire strain holder)
Uhf	2	Terminator sealing Kit
	6	Bracket, conduit support, 12 inch
	2	Seal, conduit, 3" cap for 1/0 cable
Sn	5	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	2	Conduit, 3" PVC, sched. 80 (10' sect.)
	11	Strap Kit, 3 inch
Sn	2	Conduit, 90 Sweep, 3 inch, 24" radius

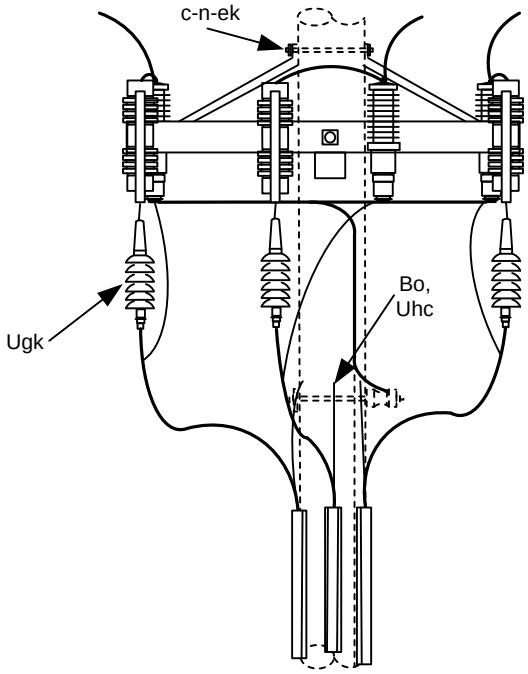
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

VERTICAL TWO PHASE CABLE TERMINAL POLE
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

2014	WFECA	2 – Phase Primary 24.9/14.4 kV	UB3-1





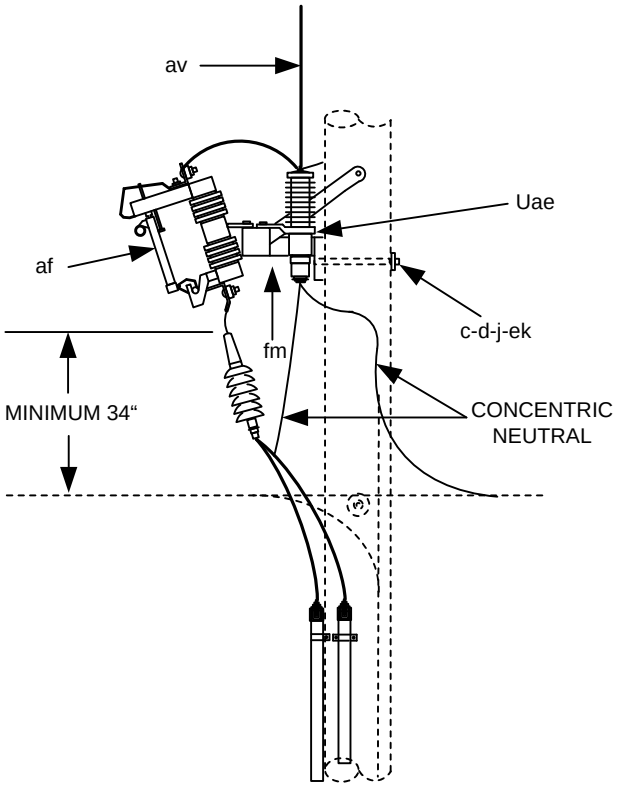
SEE DRAWING UA1G
FOR RISER DETAILS

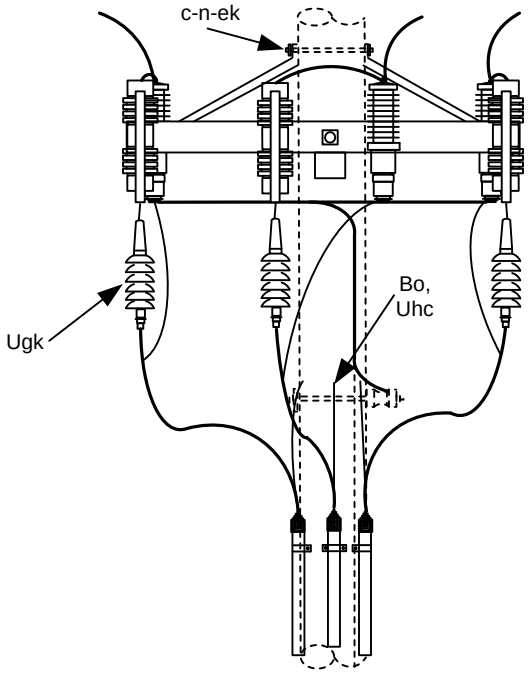
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	2	Screw, Lag, ½” x 4" (as required)
j	48	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	3	Cutout, Load Break
af	3	Fuse Link (as required)
av		Jumpers, as required
bo	3	Drive Hook, “J”
ek	1	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	3	Arrester, surge, for riser
Uhc	3	Cable Support (wire strain holder)
Ugk	3	Cable termination 1/0
Uhf	3	Terminator sealing Kit
	3	Seal, conduit, foam

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA1G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

THREE PHASE CABLE TERMINAL POLE WITH 4 INCH SHIELD AND BACKING PLATE			
2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UC1





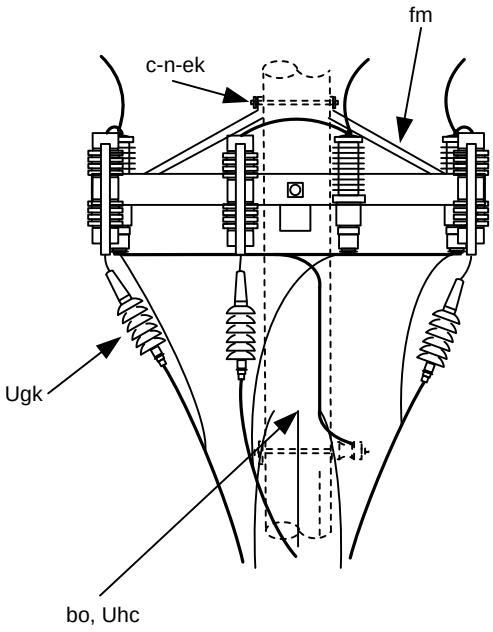
SEE DRAWING UA2G
FOR RISER DETAILS

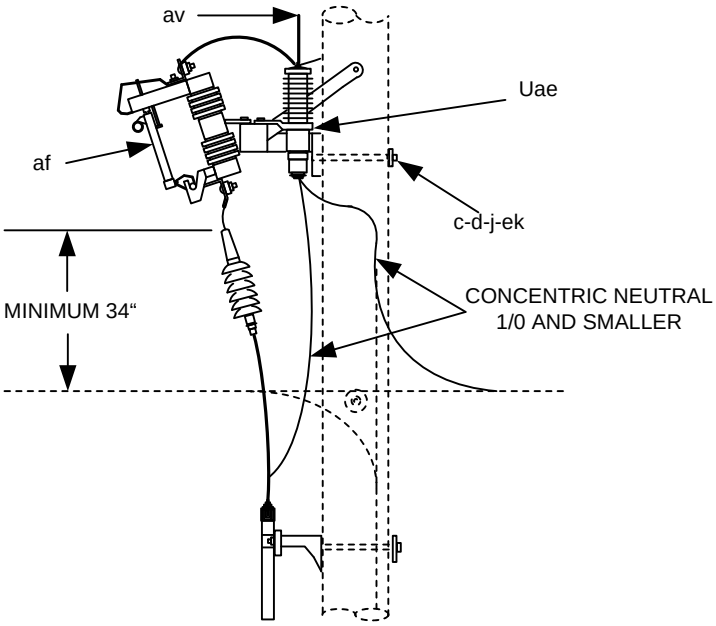
ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x Required Length
d	1	Washer, square 2-¼”
j	2	Screw, Lag, ½” x 4" (as required)
j	48	Screw, Lag, 3/8” x 3" (as required)
p		Connectors, as required
af	3	Cutout, Load Break
af	3	Fuse Link (as required)
av		Jumpers, as required
bo	3	Drive Hook, “J”
ek	1	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	3	Arrester, surge, for riser
Uhc	3	Cable Support (wire strain holder)
Ugk	3	Cable termination 1/0
Uhf	3	Terminator sealing Kit
	3	Seal, conduit, 3" cap for 1/0 cable
Sn	6	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	3	Conduit, 3" PVC, sched. 80 (10' sect.)
	24	Conduit Strap, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA2G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

THREE PHASE CABLE TERMINAL POLE WITH 3 INCH CONDUIT STRAPPED TO POLE			
2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UC2





SEE DRAWING UA3G
FOR RISER DETAILS

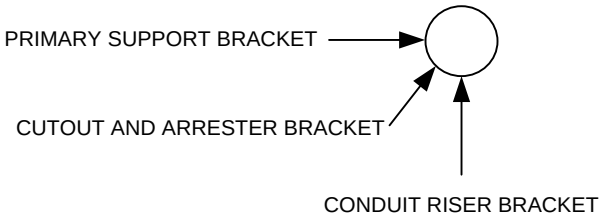
ITEM	QTY.	MATERIAL
c	6	Bolt, machine, 5/8" x Required Length
d	6	Washer, square 2-¼”
j	6	Screw, Lag, ½” x 4" (as required)
p		Connectors, as required
af	3	Cutout, Load Break
af	3	Fuse Link (as required)
av		Jumpers, as required
bo	3	Drive Hook, “J”
ek	6	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
Uae	3	Arrester, surge, for riser
Ugk	3	Cable termination 1/0
Uhc	3	Cable Support (wire strain holder)
Uhf	3	Terminator sealing Kit
	5	Bracket, conduit support, 12 inch
	3	Seal, conduit, 3" cap for 1/0 cable
Sn	6	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	3	Conduit, 3" PVC, sched. 80 (10' sect.)
	15	Strap Kit, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

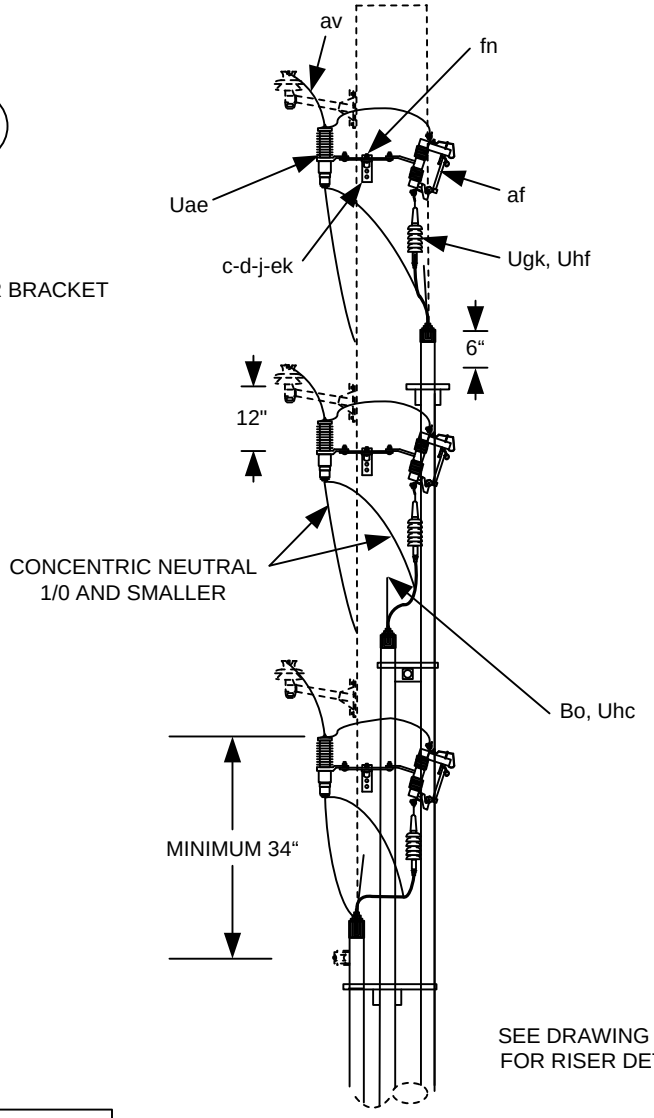
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

THREE PHASE CABLE TERMINAL POLE
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UC3





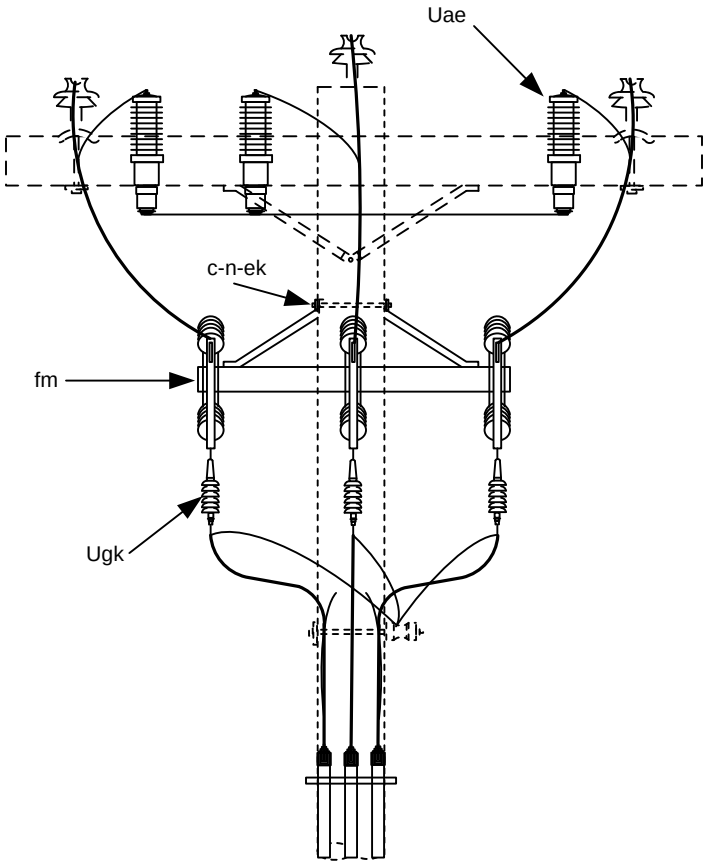
ITEM	QTY.	MATERIAL
c	10	Bolt, machine, 5/8" x Required Length
d	10	Washer, square 2-¼”
j	10	Lag Screw, ½ x 4 inch
p		Connectors, as required
af	3	Cutout, Load Break
af	3	Fuse Link (as required)
bo	3	Drive Hook, “J”
ek	10	Locknut, 5/8 inch
fn	3	Bracket, Extension, Cutout/Arrester
Uae	3	Arrester, surge, for riser
Ugk	3	Cable termination 1/0
Uhc	3	Cable Support (wire strain holder)
Uhf	3	Terminator sealing Kit
	7	Bracket, conduit support, 12 inch
	3	Seal, conduit, 3" cap for 1/0 cable
Sn	8	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	3	Conduit, 3" PVC, sched. 80 (10' sect.)
	18	Strap Kit, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

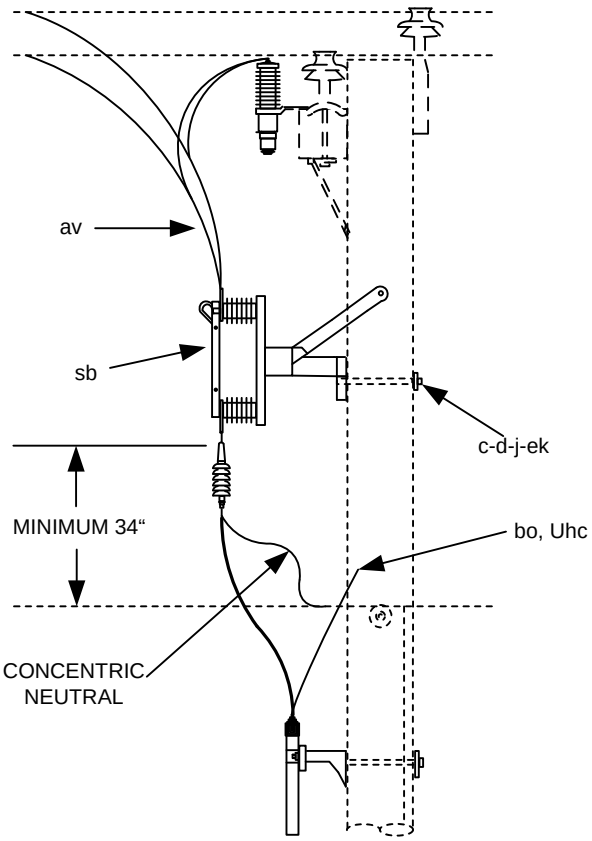
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

VERTICAL THREE PHASE CABLE TERMINAL POLE
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UC3-1





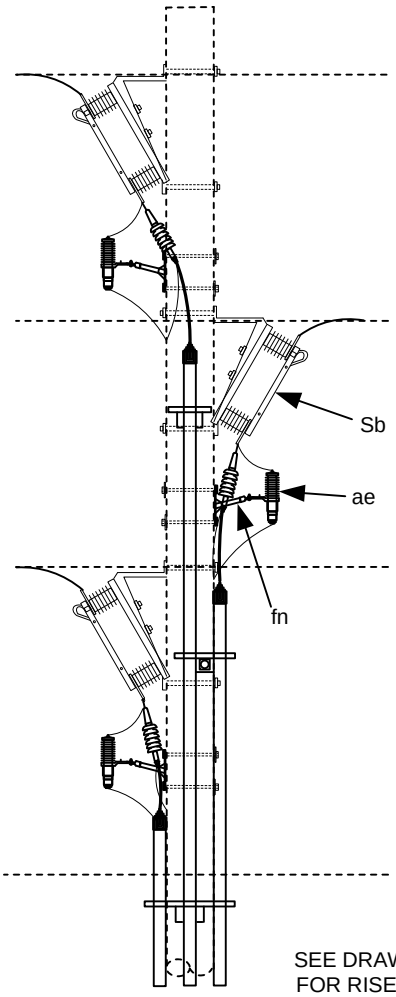
SEE DRAWING UA3G
FOR RISER DETAILS

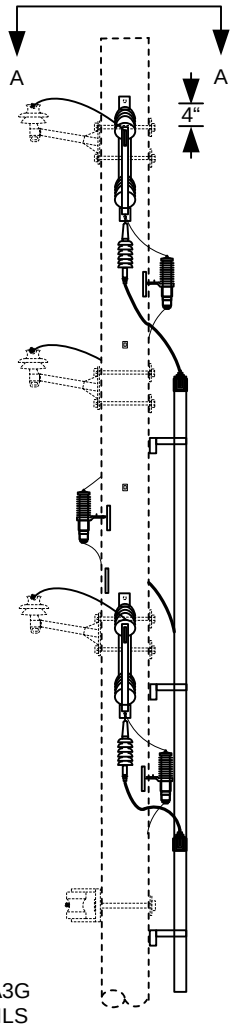
ITEM	QTY.	MATERIAL
c	6	Bolt, machine, 5/8" x Required Length
d	6	Washer, square 2-¼”
j	7	Screw, Lag, ½” x 4" (as required)
p		Connectors, as required
av		Jumpers, as required
bo	3	Drive Hook, “J”
ek	6	Locknut, 5/8"
fm	1	Ext. bracket for mounting apparatus
sb	3	Switch, disconnect, 25 kV, 600 A
Uae	3	Arrester, surge, for riser
Ugk	3	Cable termination
Uhc	3	Cable Support (wire strain holder)
Uhf	3	Terminator sealing Kit
	5	Bracket, conduit support, 12 inch
	3	Seal, conduit, 3" cap
Sn	6	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	3	Conduit, 3" PVC, sched. 80 (10' sect.)
	15	Strap Kit, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

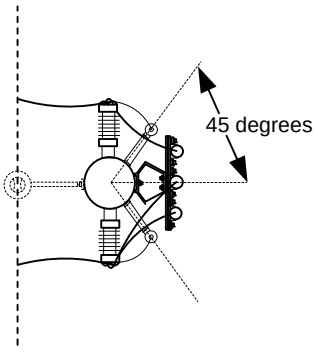
1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

THREE PHASE CABLE TERMINAL POLE (600 A) WITH 3 INCH CONDUIT AND SUPPORT BRACKETS			
2014	WFECA	3 – Phase Primary 24.9/14.4 kV	UC6

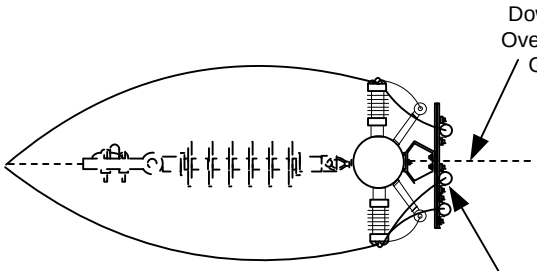




SEE DRAWING UA3G
FOR RISER DETAILS



Detail A - A



Alternate
Detail A - A

Offset center
conduit if guying
is required.

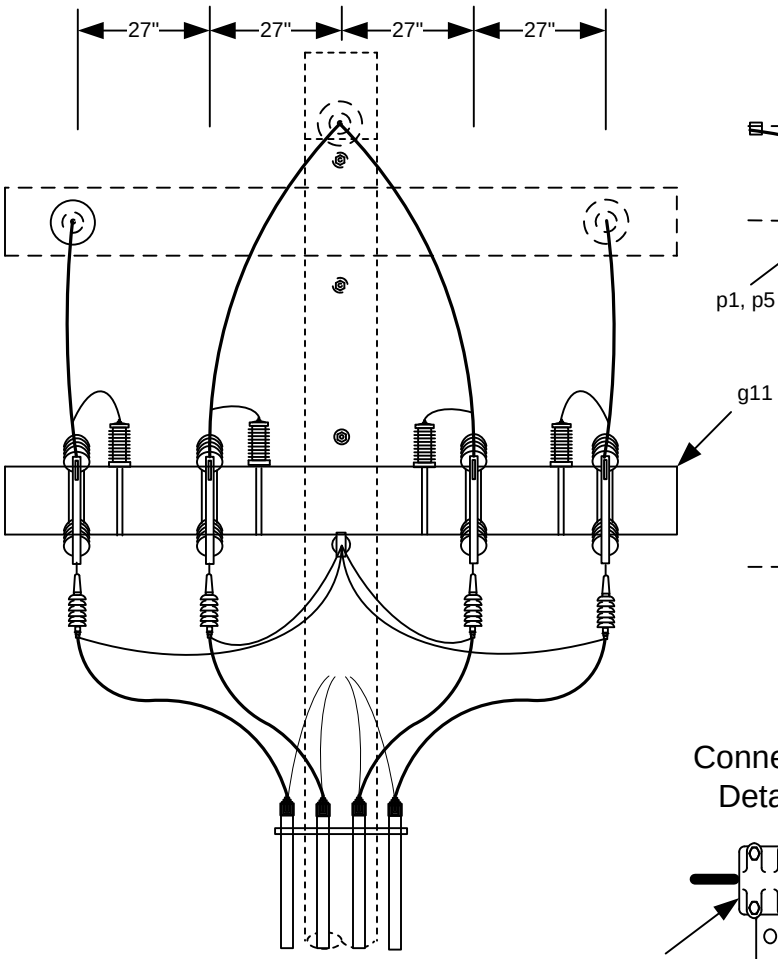
ITEM	QTY.	MATERIAL
c	19	Bolt, machine, 5/8" x Required Length
d	19	Washer, square 2-¼"
j	7	Lag Screw, ½ x 4 inch
p		Connectors, as required
bo	3	Drive Hook, "J"
ek	19	Locknut, 5/8 inch
fe	3	Bracket, Disconnect Switch
fn	3	Bracket, Extension, Cutout/Arrester
Uae	3	Arrester, surge, for riser
Ugk	3	Cable termination
Uhc	3	Cable Support (wire strain holder)
Uhf	3	Terminator sealing Kit
	7	Bracket, conduit support, 12 inch
	3	Seal, conduit, 3" cap
Sb	3	Switch, disconnect, 25 kV, 600 A
Sn	8	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	3	Conduit, 3" PVC, sched. 80 (10' sect.)
	18	Strap Kit, 3 inch
Sn	3	Conduit, 90 Sweep, 3 inch, 24" radius

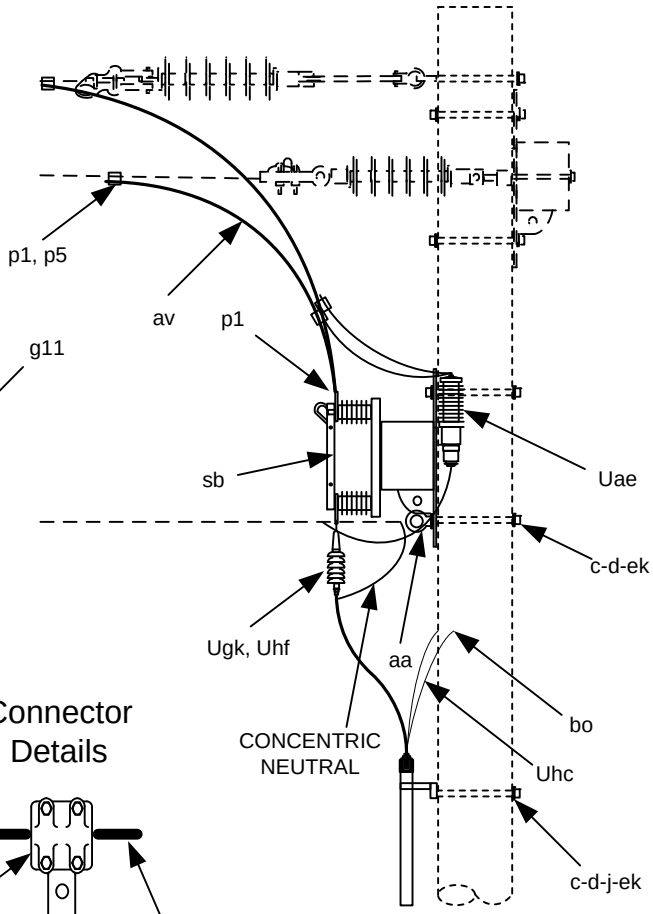
Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

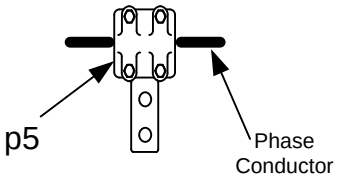
VERTICAL THREE PHASE CABLE TERMINAL POLE (600 A)
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

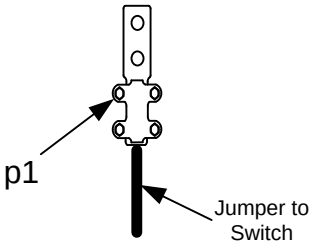
2015	WFECA	3 – Phase Primary 24.9/14.4 kV	UC6-1





Connector Details





SEE DRAWING UA3G
FOR RISER DETAILS

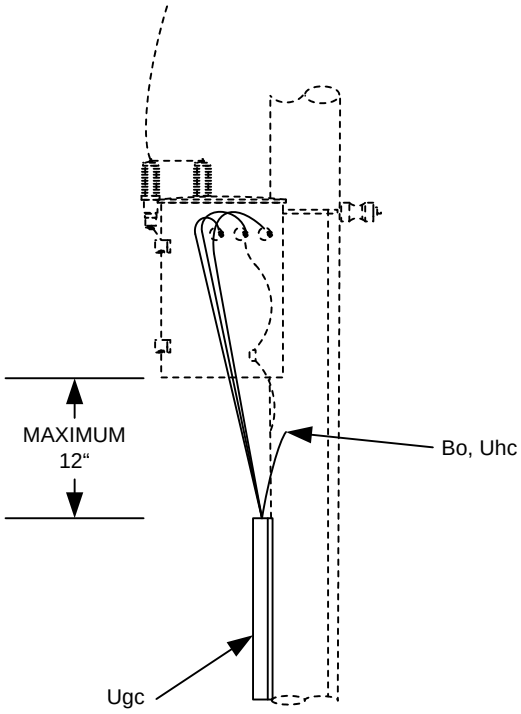
ITEM	QTY.	MATERIAL
c	7	Bolt, machine, 5/8" x Required Length
d	7	Washer, square 2-¼"
j	5	Screw, Lag, ½" x 4" (as required)
p		Connectors, as required
p1	8	Connector, Cable to Flat
p5	6	Connector, Cable to Flat Tee
	16	Bolt, Bronze, ½"x1½" w/ nut & split washer
aa	1	Nut, eye, 5/8"
av		Jumpers, as required
bo	4	Drive Hook, "J"
ek	7	Locknut, 5/8"
g11	1	Crossarm Assembly, 10' (Dead End)
sb	4	Switch, disconnect, 25 kV, 600 A
Uae	4	Arrester, surge, for riser
Ugk	4	Cable termination
Uhc	4	Cable Support (wire strain holder)
Uhf	4	Terminator sealing Kit
	5	Bracket, conduit support, 12 inch
	4	Seal, conduit, 3" cap
Sn	8	Conduit, 3" PVC, sched. 40 (10' sect.)
Sn	4	Conduit, 3" PVC, sched. 80 (10' sect.)
	20	Strap Kit, 3 inch
Sn	4	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. Do not bend cable within 6 inches of cable terminal base.
2. All energized parts must have an 18 foot clearance above grade and must be installed a minimum of 34 inches above the neutral conductor. Neutral may need to be lowered.
3. All brackets with grounding capabilities shall be grounded.
4. See Drawing UA3G for details on spacing and clearance of conduit support brackets.
5. Arrestor lead length should be less than 3 feet. See Drawing UX11 for guideline.

THREE PHASE CABLE TERMINAL POLE (600 A)
WITH SPARE CABLE AND CONDUIT
WITH 3 INCH CONDUIT AND SUPPORT BRACKETS

2015	WFECA	3 – Phase Primary 24.9/14.4 kV	UC7



SEE DRAWING UA1G
FOR RISER DETAILS

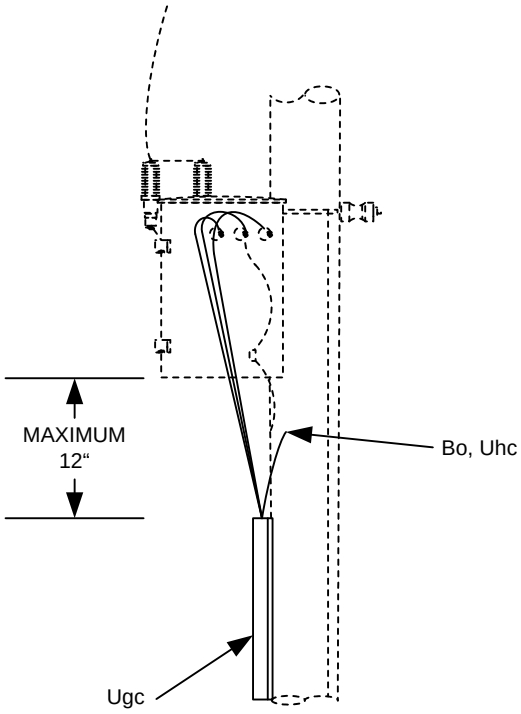
Notes:

1. See Drawing UA2G for details.

ITEM	QTY.	MATERIAL
j	60	Screw, Lag, 3/8” x 3" (as required)
bo	1	Drive Hook, “J”
Ugc	3	Shield, cable riser, 2 inch, with backing plate
Uhc	1	Cable Support (wire strain holder)
	1	Seal, conduit, foam

SECONDARY CABLE TERMINAL POLE
WITH 2 INCH SHIELD AND BACKING PLATE

2014	WFECA	Secondary	UM5



SEE DRAWING UA1G
FOR RISER DETAILS

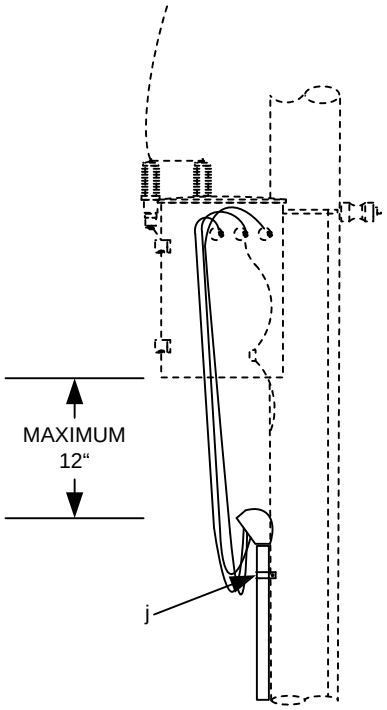
ITEM	QTY.	MATERIAL
j	60	Screw, Lag, 3/8” x 3" (as required)
bo	1	Drive Hook, “J”
Ugc	3	Shield, cable riser, 4 inch, with backing plate
Uhc	1	Cable Support (wire strain holder)
	1	Seal, conduit, foam

Notes:

1. See Drawing UA2G for details.

SECONDARY CABLE TERMINAL POLE
WITH 4 INCH SHIELD AND BACKING PLATE

2014	WFECA	Secondary	UM5-1



SEE DRAWING UA2G
FOR RISER DETAILS

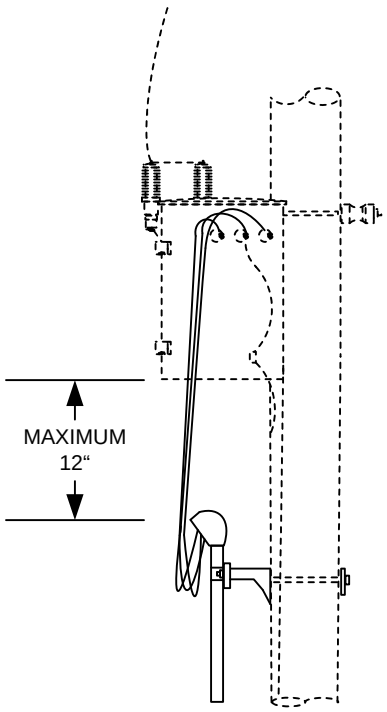
ITEM	QTY.	MATERIAL
j	24	Screw, Lag, 3/8” x 3" (as required)
Sn	1	Weatherhead, 3" PVC
	12	Conduit Strap, 3 inch
Sn	2	Conduit, 3 inch, Sch 40, (10 foot stick)
Sn	1	Conduit, 3 inch, Sch 80, (10 foot stick)
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

1. See Drawing UA2G for details.

SECONDARY CABLE TERMINAL POLE
WITH 3 INCH CONDUIT STRAPPED TO POLE

2014	WFECA	Secondary	UM5-2



SEE DRAWING UA3G
FOR RISER DETAILS

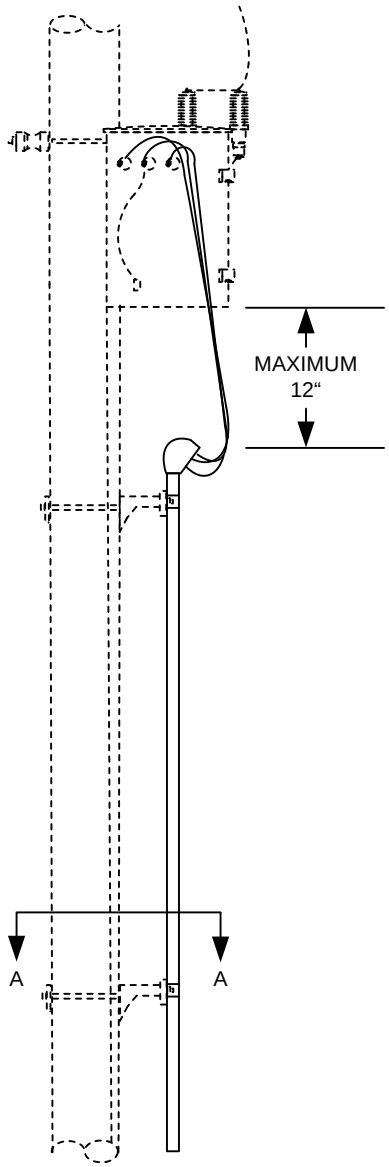
ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x Required Length
d	5	Washer, 2 ¼”
j	5	Lag Screw, ½ x 4 inch
ek	5	Locknut, 5/8 inch
Sn	1	Weatherhead, 3" PVC
	5	Bracket, Conduit Support (Aluma-Form 6-CSO-12)
	5	Strap Kit, 3 inch, (Aluma-Form STK-3)
Sn	2	Conduit, 3 inch, Sch 40, (10 foot stick)
Sn	1	Conduit, 3 inch, Sch 80, (10 foot stick)
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

Notes:

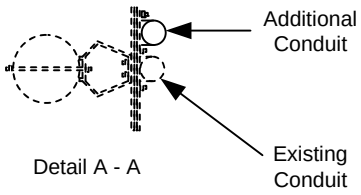
1. See Drawing UA3G for details on spacing and clearance of conduit support brackets.

SECONDARY CABLE TERMINAL POLE
WITH 3" CONDUIT AND SUPPORT BRACKETS

2014	WFECA	Secondary	UM5-3



SEE DRAWING UA3G
FOR RISER DETAILS



Detail A - A

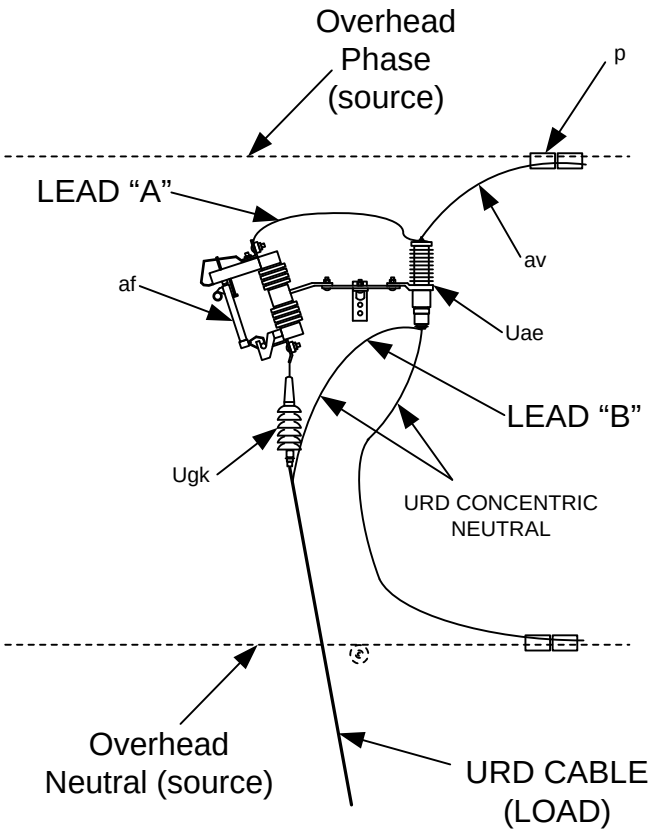
Notes:

1. See Drawing UA3G for details on spacing and clearance of conduit support brackets.

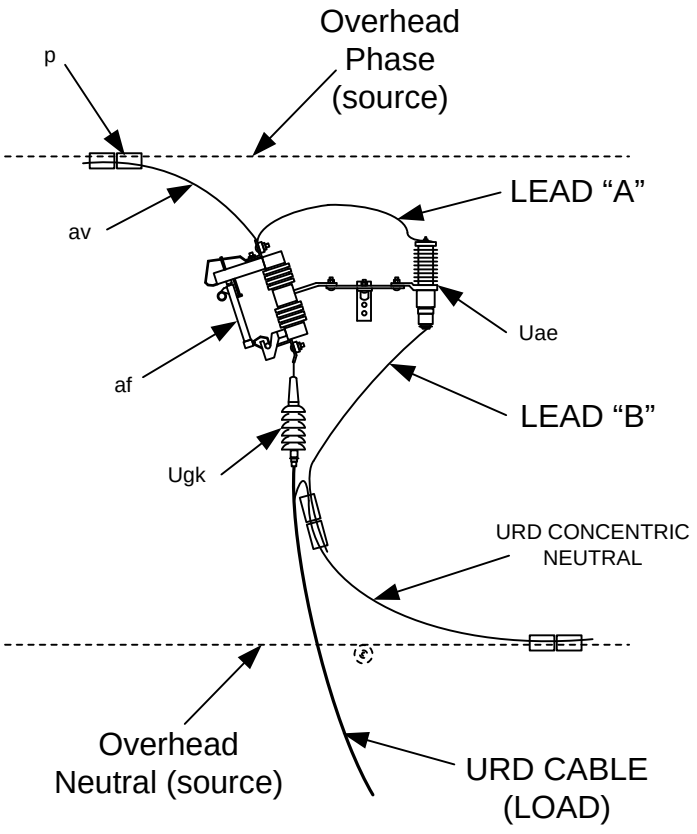
ITEM	QTY.	MATERIAL
Sn	1	Weatherhead, 3" PVC
	5	Bracket, Conduit Support (Aluma-Form 6-CSO-12)
	5	Strap Kit, 3 inch, (Aluma-Form STK-3)
Sn	2	Conduit, 3 inch, Sch 40, (10 foot stick)
Sn	1	Conduit, 3 inch, Sch 80, (10 foot stick)
Sn	1	Conduit, 90 Sweep, 3 inch, 24" radius

ADDITIONAL SECONDARY CABLE TERMINAL
WITH 3 INCH CONDUIT ON EXISTING POLE
WITH EXISTING SUPPORT BRACKETS

2011	WFECA	Secondary	UM5-3A



URD CABLE 1/0 AND SMALLER



URD CABLE 4/0 AND 500 MCM

NOTES:

1. LEAD WIRES SHOULD BE OF A SIZE EQUIVALENT TO URD CONDUCTOR.
2. ARRESTER LEAD LENGTH TOTAL (A + B) SHOULD BE LESS THAN THREE FEET WHENEVER PRACTICAL

ITEM		MATERIAL
p		Connectors, as required
aq		Leads and Jumpers
af		Cutout, 27 KV, Load Break
Uae		Arrester, surge, for riser
Ugk		Cable termination

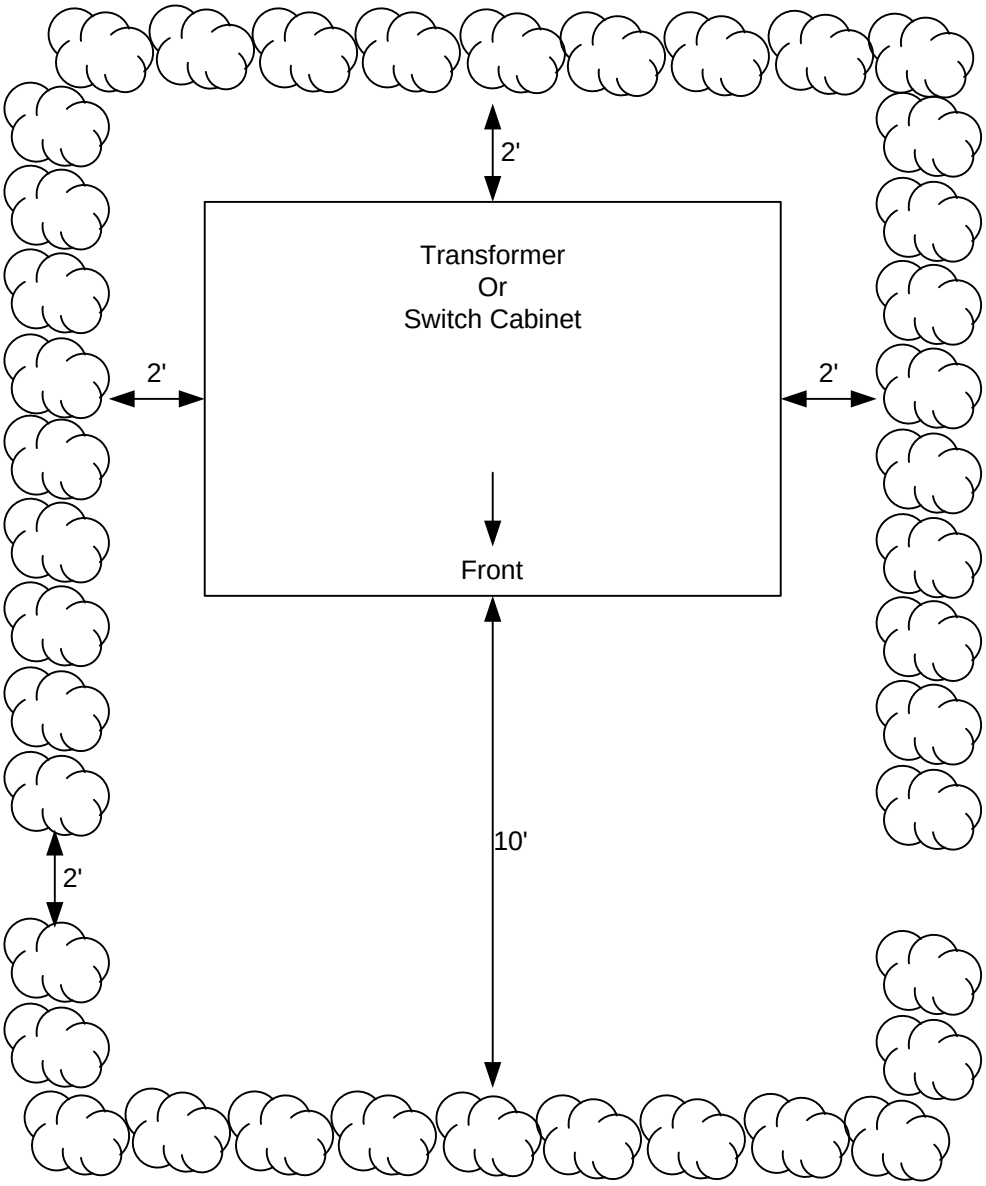
GUIDELINE FOR CONNECTION OF CUTOUT, ARRESTER AND TERMINATOR BETWEEN OVERHEAD AND UNDERGROUND LINES

2011	WFECA	3 – Phase Primary 24.9/14.4 kV	UX11

INDEX B

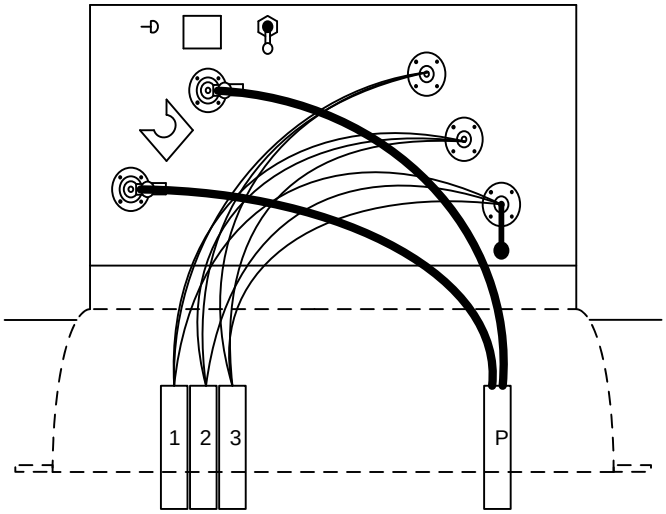
Transformer and Service Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UCX	Guideline for Clearance to Vegetation
UGX	Guideline for Cable Training and Conduit Sweeps to Single Phase Transformers
UG7	Single Phase Pad Mounted Transformer (Loop Feed)
UG17-2	Three Phase Pad Mounted Transformer (Loop Feed)
UGX1	Open Delta Connection with Single Phase Pad Mount Transformers
UGX2	(Feed) Switch Configuration in Pad Mount Transformer (T-Blade)
UMT-1	Typical Sitting Requirements for Pad Mounted Transformers
UJ1	Three Phase Transformer Connector Blocks
UJ2	Single Phase Transformer connector Blocks
UK1	Pedestal Secondary connector Blocks
UK5	Secondary Pedestal

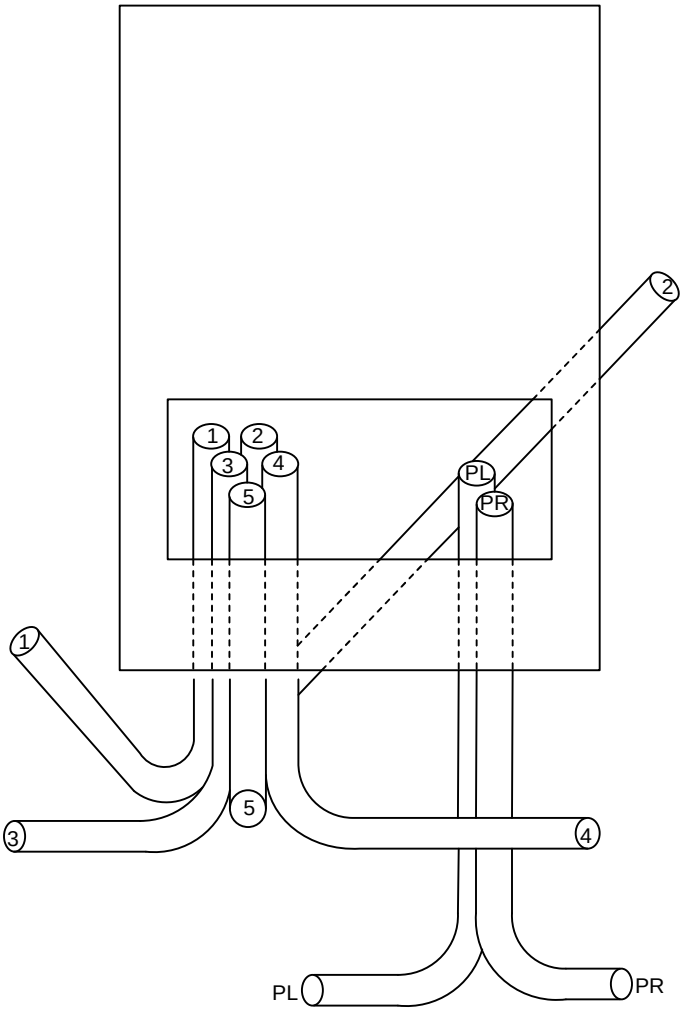


GUIDELINE FOR CLEARANCE TO VEGETATION		
2005	WFECA	UCX

CABLE TRAINING IN SINGLE PHASE TRANSFORMER



CONDUIT SWEEPS IN SINGLE PHASE TRANSFORMER



LEGEND:

P = PRIMARY

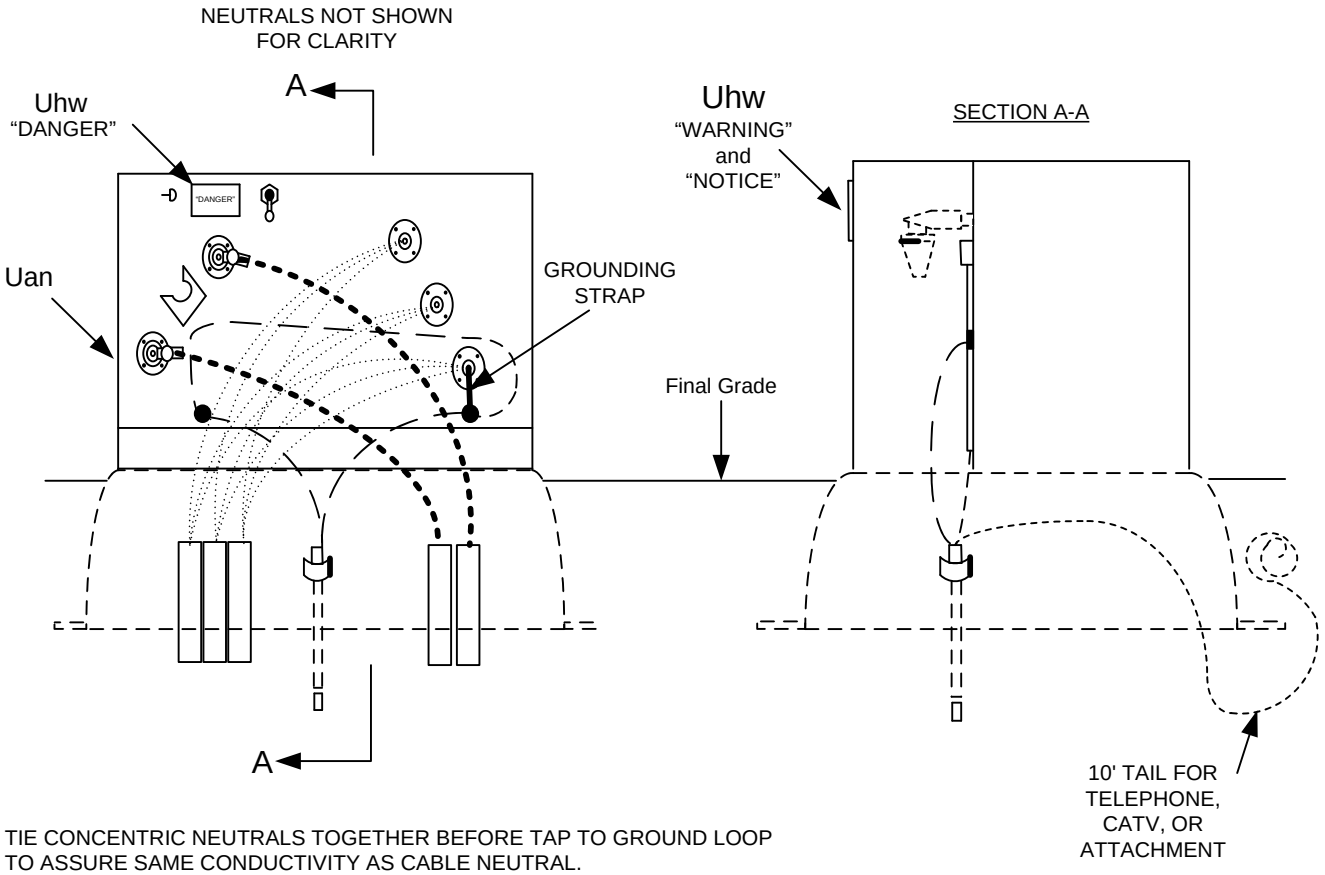
1,2,3,4,5 = SERVICES OR STREET LIGHTING

= CONDUIT

NOTES:

1. 90 DEGREE BENDS SHALL HAVE A 24 INCH OR GREATER RADIUS
2. CONDUITS WHICH ARE NOT NEEDED MAY BE OMITTED.
3. INSTALL VINYL END CAPS IN ALL CONDUIT ENDS. DO NOT GLUE CAPS.
4. INSTALL SECONDARY CABLES BEHIND PRIMARY CABLES
5. 90 DEGREE BENDS FOR FUTURE SERVICES MAY BE INSTALLED.

GUIDELINE FOR CABLE TRAINING AND CONDUIT SWEEPS TO SINGLE PHASE TRANSFORMERS		
2014	1 – Phase Primary 24.9/14.4 kV	UGX



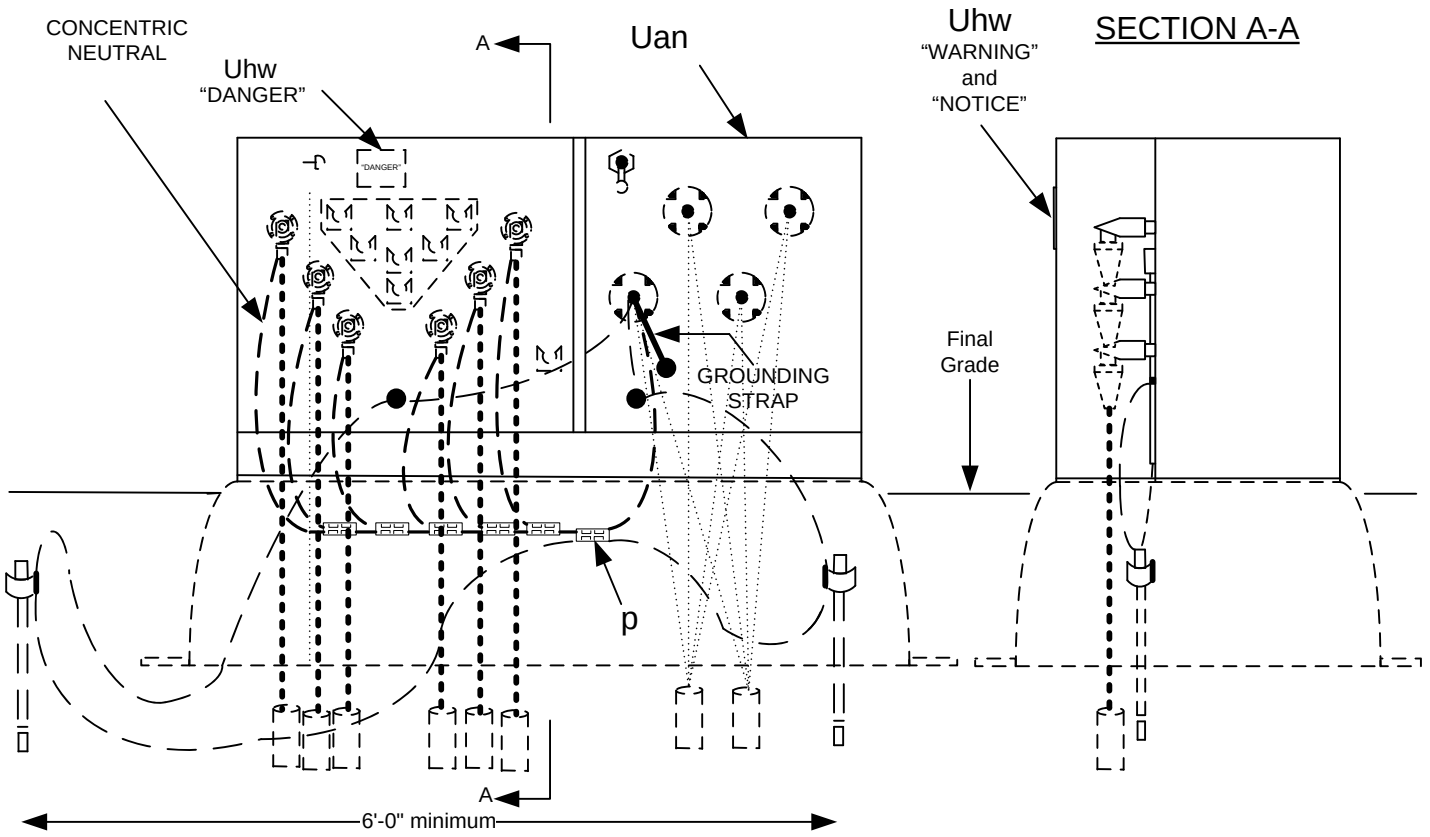
TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.

NOTES:

1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-1. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. SPECIFY kVA SIZE OF TRANSFORMER AND TRANSFORMER SECONDARY VOLTAGE.
4. SPECIFY GROUND SLEEVE UNIT UM1-7NC.
5. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
6. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-1A FOR DETAILS.
7. SEE GUIDELINES UTX, UM48-1A, UGX AND UMT-1.

ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Uan	1	Transformer, pad mounted, single phase
Uhw	2	Signs, "DANGER", "WARNING" and "NOTICE"
cj		Ground wire (See Note #2)

SINGLE PHASE PAD MOUNTED TRANSFORMER (LOOP FEED)		
2014	1 – Phase Primary 24.9/14.4 kV	UG7

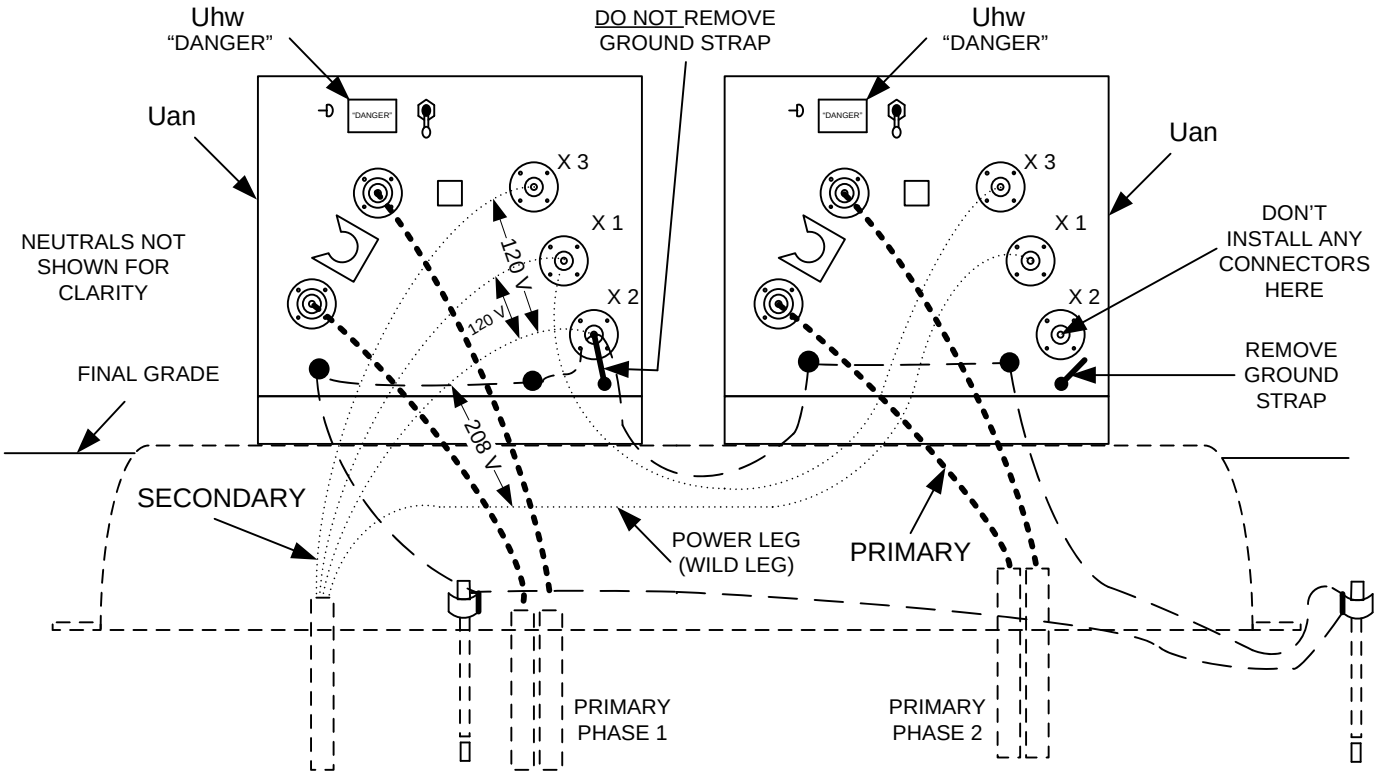


NOTES:

1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-2. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. SPECIFY kVA SIZE OF TRANSFORMER AND TRANSFORMER SECONDARY VOLTAGE.
4. SPECIFY GROUND SLEEVE UNIT UM1-6NCA (75 TO 300 kVA) OR UM1-6NCB (500 TO 1000 kVA).
5. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
6. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-2A FOR DETAILS.
7. ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO AVOID FERRORESONANCE
8. SEE GUIDELINES UG50X, UTX, UM48-2A, UGX2 AND UMT-1.

ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Uan	1	Transformer, pad mounted, three phase
Uhw	2	Signs, "DANGER", "WARNING" and "NOTICE"
cj		Ground wire (See Note #2)

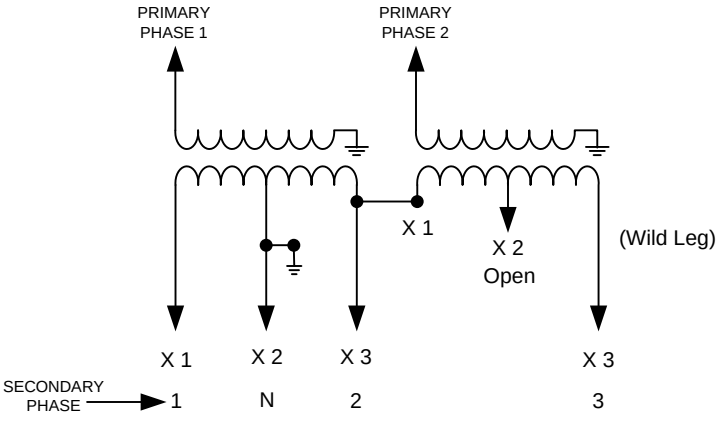
THREE PHASE PAD MOUNTED TRANSFORMER (LOOP FEED)		
2014	3 – Phase Primary 24.9/14.4 kV	UG17-2



NOTES:

1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-2. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. SPECIFY kVA SIZE OF TRANSFORMERS AND TRANSFORMERS SECONDARY VOLTAGE.
4. SPECIFY GROUND SLEEVE UNIT UM1-7NC-2.
5. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
6. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-2A FOR DETAILS.
7. SEE GUIDELINES UG50X, UTX, UM48-2A, UGX2 AND UMT-1.
8. SEE GUIDELINES MG-8SOD AND MG15SOD.

Signs, "DANGER" and "WARNING"

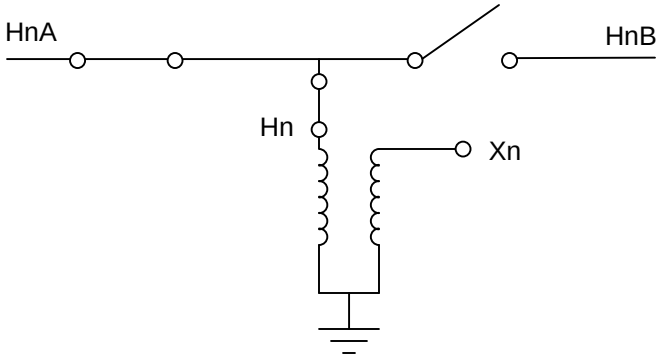


ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Uan	2	Transformer, pad mounted, single phase
Uhw	4	Signs, "DANGER", "WARNING" and "NOTICE"
cj		Ground wire (See Note #2)

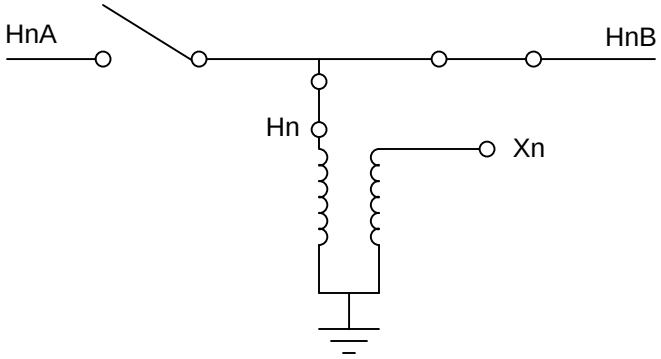
OPEN WYE-DELTA TRANSFORMER BANK
USING SINGLE PHASE PAD MOUNT TRANSFORMERS

2014	2 – Phase Primary 24.9/14.4 kV	UGX1

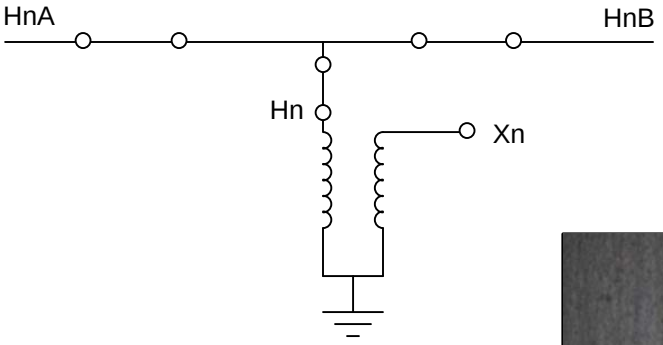
“A”
Secondary Energized From “A” Bushing



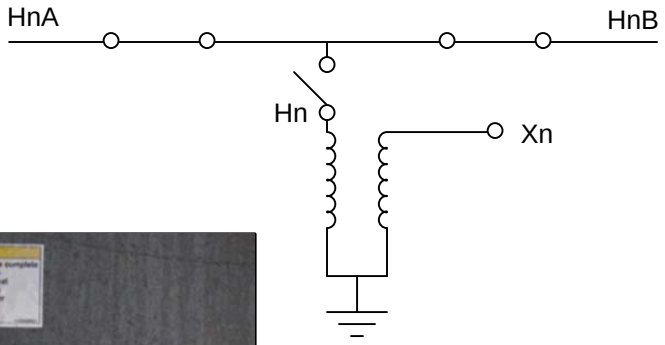
“B”
Secondary Energized From “B” Bushing



“A & B”
Secondary Energized “A” Bushing
Feeds Thru to “B” Bushing



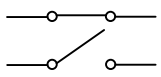
“FEED THRU”
Secondary Not Energized “A” Bushing
Feeds Thru to “B” Bushing



Legend

HnA = HnB = Primary Input

Xn = Secondary Output

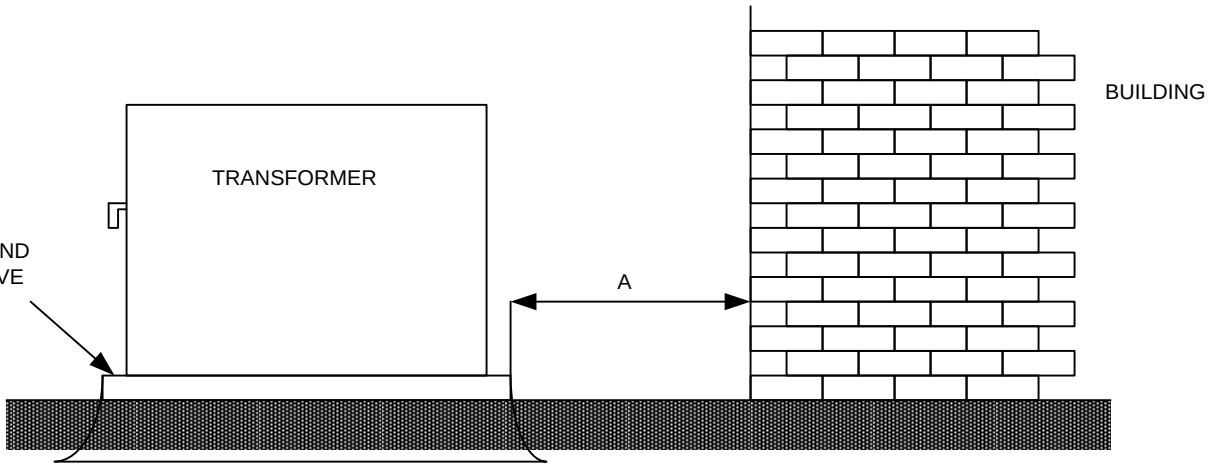


Closed Switch

Open Switch

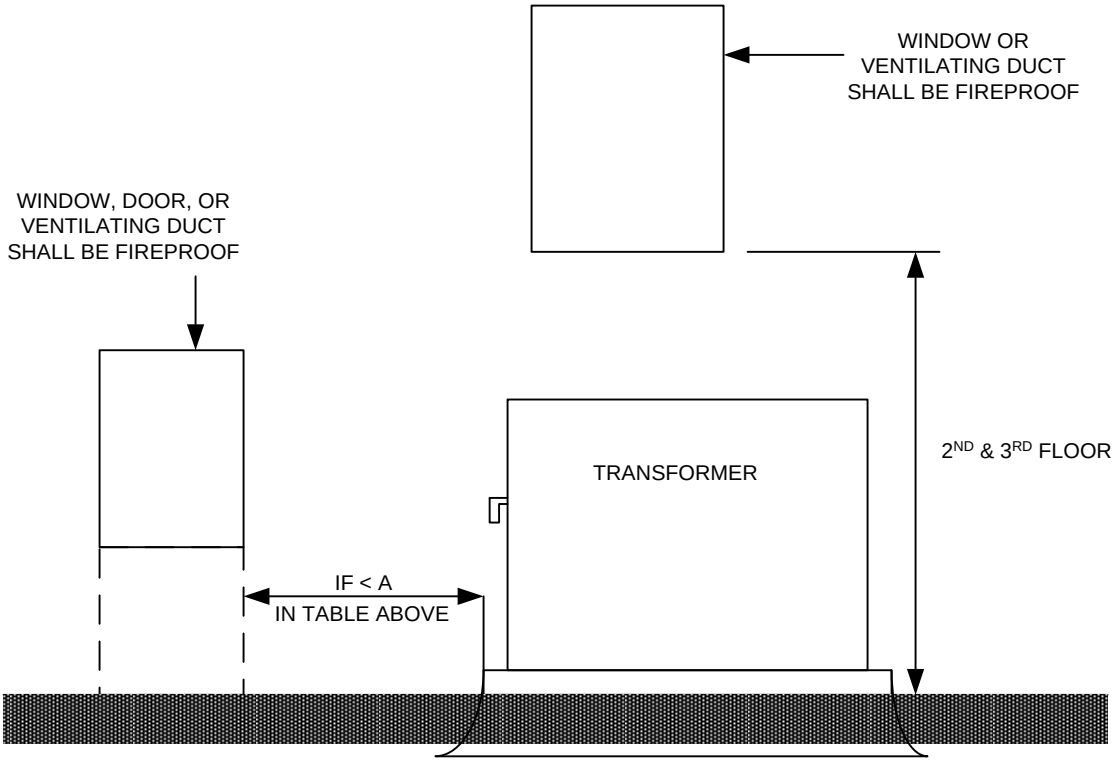
(Feed) Switch Configuration in Pad Mount Transformer (T-Blade)

2007	WFECA	UGX2



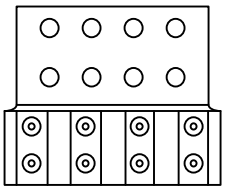
DIMENSION A	TRANSFORMER KVA	BUILDING WALL & EAVES
10'	0 - 75	NOT FIRE RESISTANT
20'	76 - 333	NOT FIRE RESISTANT
30'	334 AND LARGER	NOT FIRE RESISTANT
3'	ALL SIZES	FIRE RESISTANT (8" BRICK, ETC.)

ELEVATION VIEW

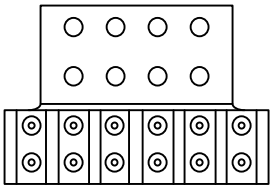


ELEVATION VIEW

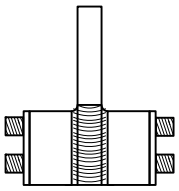
TYPICAL SITTING REQUIREMENTS FOR PAD-MOUNTED TRANSFORMERS		
2005	WFECA	UMT-1



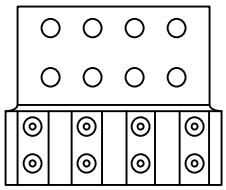
UJ1-4



UJ1-6

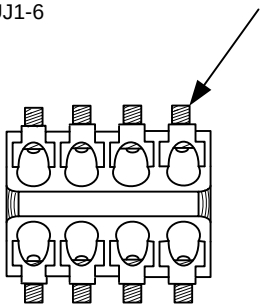


Side view



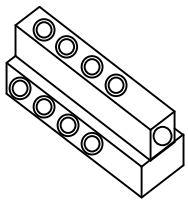
UJ1-8

Front view

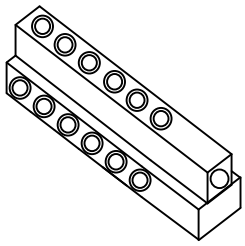


Top view

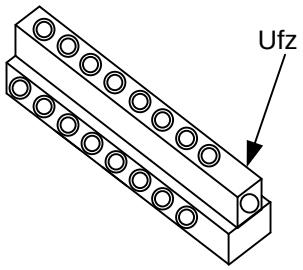
THREE PHASE TRANSFORMER CONNECTOR BLOCKS



UJ2-4



UJ2-6



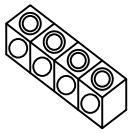
UJ2-8

SINGLE PHASE TRANSFORMER CONNECTOR BLOCKS

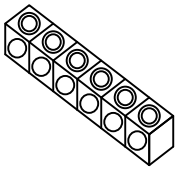
NOTE: INSULATED COVERS ARE NOT SHOWN.

ITEM	QTY	MATERIAL
Ufz		TRANSFORMER CONNECTOR BLOCKS,

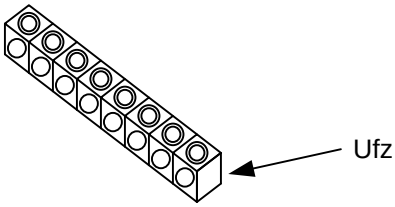
TRANSFORMER SECONDARY CONNECTOR BLOCKS		
2005	WFECA	UJ1-___ UJ2-___



UK1-4



UK1-6

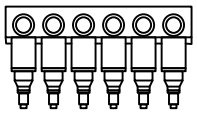


UK1-8

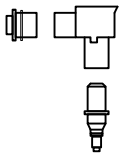
PEDESTAL CONNECTOR BLOCKS

NOTE: INSULATED COVERS ARE NOT SHOWN.

EXAMPLE OF UK1-6 WITH INSULATED COVER



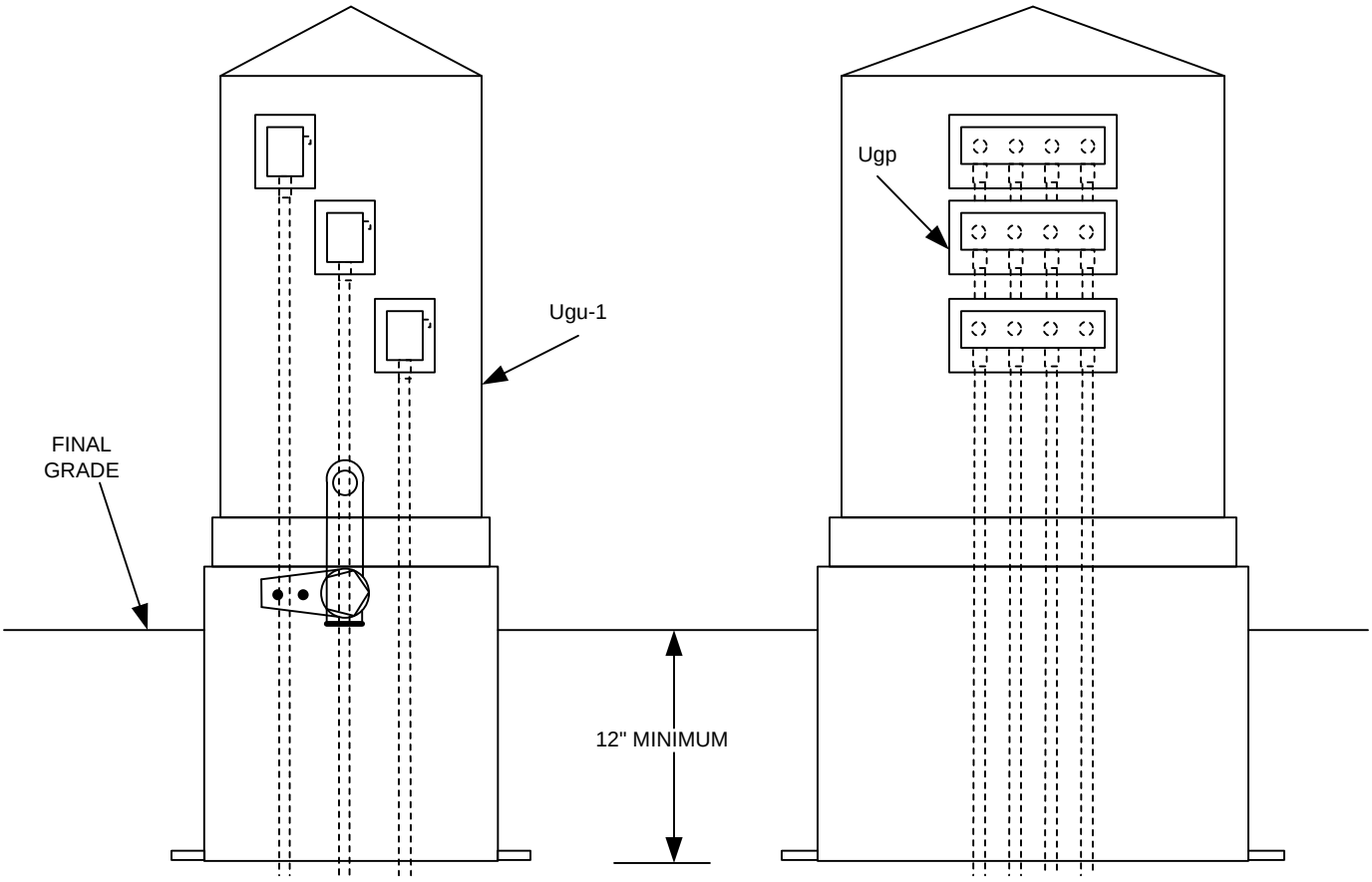
Front view



Side view

ITEM	QTY	MATERIAL
Ufz		CONNECTOR BLOCKS,

PEDESTAL SECONDARY CONNECTOR BLOCKS		
2005	WFECA	UK1-__



Notes:

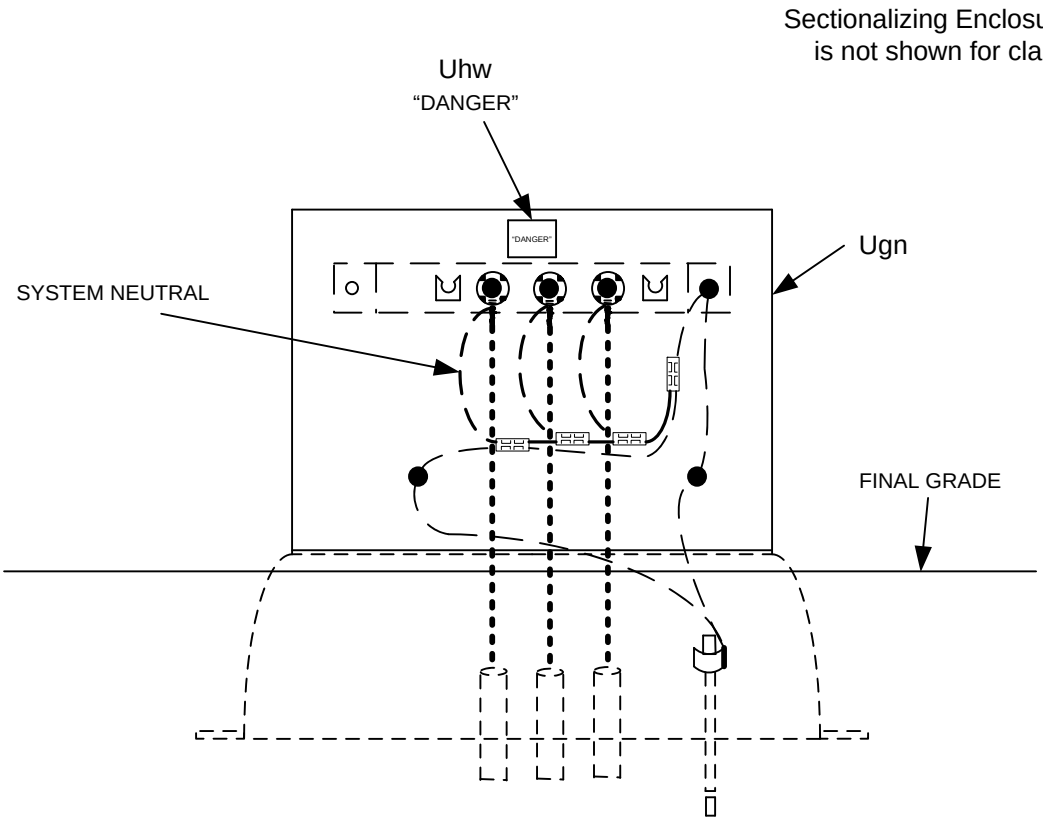
1. FOR FOUR WIRE SECONDARY, ADD ONE (1) UK1-____ UNIT.

ITEM	QTY	MATERIAL
Ugu-1	1	Secondary pedestal
Ugp	3	Pedestal blocks

SECONDARY PEDESTAL		
2005	WFECA	UK5

Sectionalizing, Grounding and Ground Sleeve Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UM3-14	Single Phase Pad Mounted Sectionalizing Enclosure
UM33	Multi Phase Sectionalizing Enclosure Direct Buried
UM33A	Multi Phase Sectionalizing Enclosure (One Piece Fiberglass) Direct Buried
UM1-6_	Ground Sleeve Assembly
UM1-7_	Ground Sleeve Assembly
UM1-7NC-2	Ground Sleeve Assembly
UM48-1	Grounding Assembly for Pad Mounted Single Phase Transformers and Enclosures
UM48-1A	Guideline for Concentric Neutral Connections (Single-Phase)
UM48-2	Grounding Assembly for Pad Mounted Multi Phase Transformers and Enclosures
UM48-2A	Guideline for Concentric Neutral Connections (Multi-Phase)



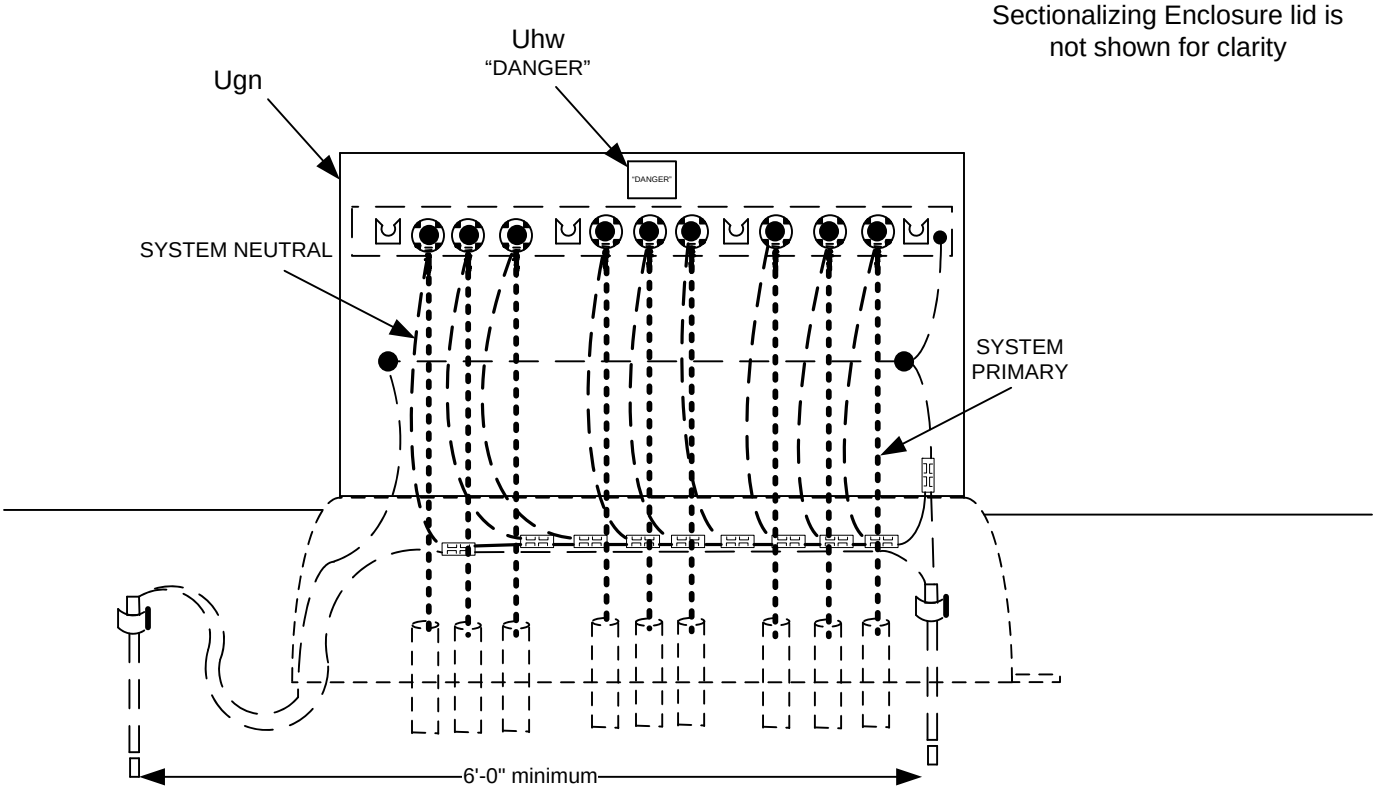
NOTES:

1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-1. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. SPECIFY GROUND SLEEVE UNIT UM1-7NC.
4. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
5. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-1A FOR DETAILS.
6. SEE GUIDELINES UTX AND UM48-1A.

ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Ugn	1	Enclosure, 1 Phase Sectionalizing
Uhw	2	Signs, "DANGER" and "WARNING"
cj		Ground wire (See Note #2)

SINGLE PHASE PAD MOUNTED SECTIONALIZING ENCLOSURE		
2014	1 – Phase Primary 24.9/14.4 kV	UM3-14

Sectionalizing Enclosure lid is not shown for clarity



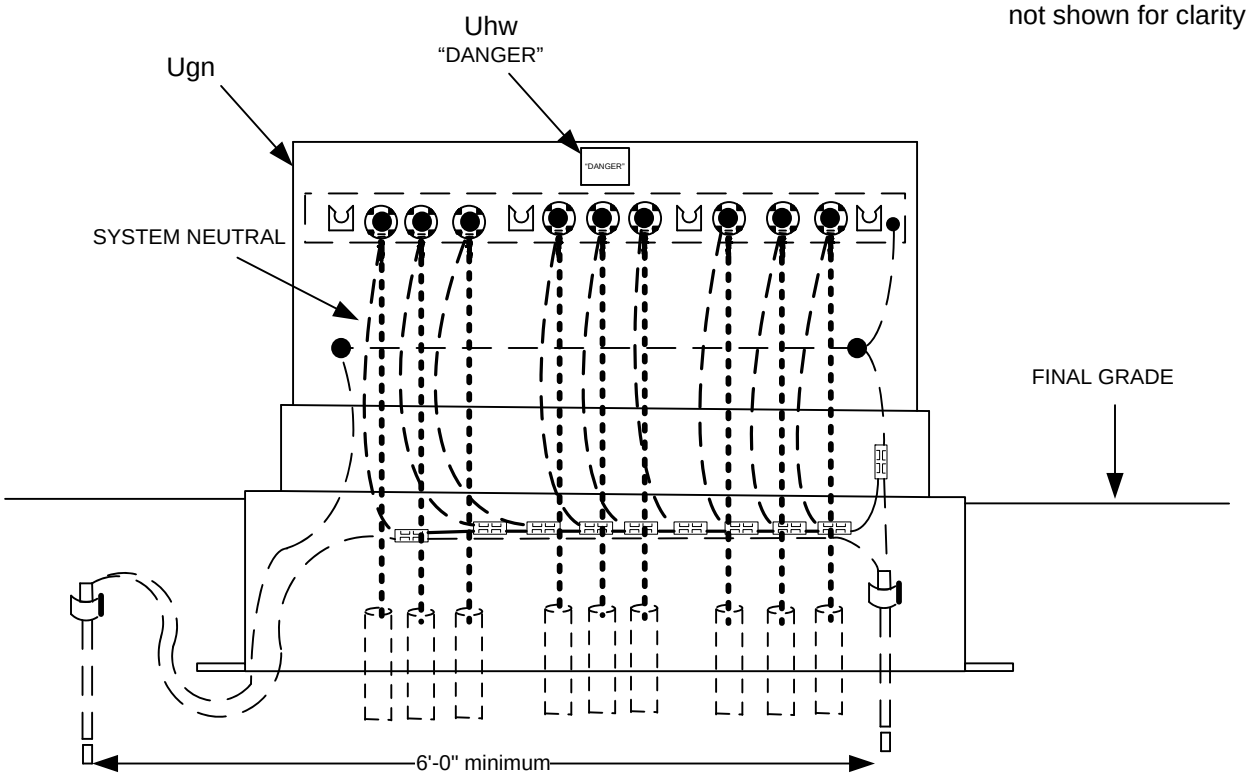
NOTES:

1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-2. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. SPECIFY GROUND SLEEVE UNIT UM1-7NCB.
4. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
5. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-2A FOR DETAILS.
6. SEE GUIDELINES UG50X, UTX AND UM48-2A.

ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Ugn	1	Enclosure
Uhw	2	Signs, "DANGER" and "WARNING"

MULTI-PHASE SECTIONALIZING ENCLOSURE SLEEVE MOUNTED		
2014	3 – Phase Primary 24.9/14.4 kV	UM33

Sectionalizing Enclosure lid is not shown for clarity



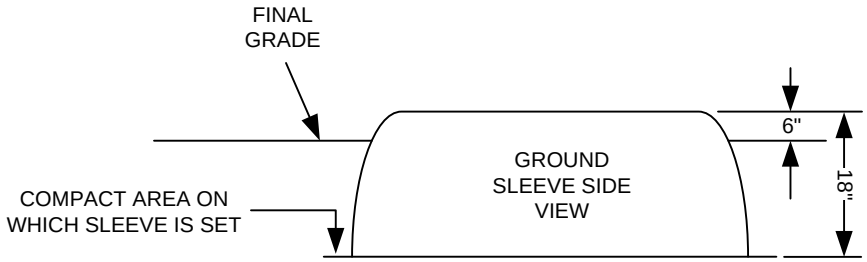
NOTES:

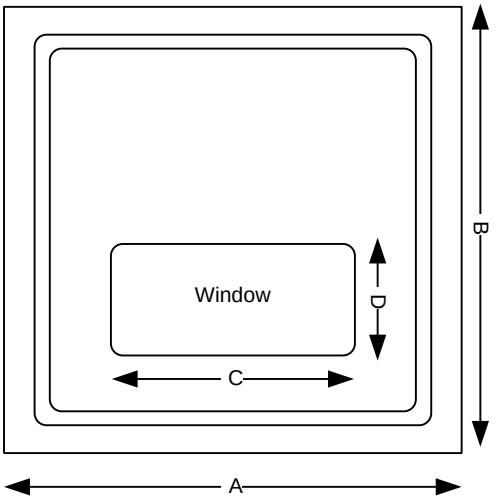
1. PROVIDE SUFFICIENT PRIMARY AND NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH GROUNDING UNIT UM48-2. SPECIFY MULTIPOINT TERMINATORS AND ELBOWS SEPARATELY.
3. INSTALL "DANGER" SIGN INSIDE OF TRANSFORMER. INSTALL "WARNING" SIGN ON OUTSIDE OF TRANSFORMER.
4. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-2A FOR DETAILS.
5. SEE GUIDELINES UG50X, UTX AND UM48-2A.

ITEM	QTY	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
Ugn	1	Enclosure, 3 Phase Sectionalizing
Uhw	3	Signs, "DANGER", "WARNING", "NOTICE"
cj		Ground Wire (See Note #2)

MULTI-PHASE SECTIONALIZING ENCLOSURE (ONE PIECE FIBERGLASS) DIRECT BURIED

2014	1 – Phase Primary 24.9/14.4 kV	UM33A





UNIT	FRONT	SIDE	WINDOW		USED FOR
UM1-6NCA	69"	65"	56"	16"	3 Ph Transformer 75-300 kVA
UM1-6NCB	75"	69"	58"	18"	3 Ph Transformer 500-1000 kVA
UM1-7NC	37"	43"	24"	16"	1 Phase Transformer All kVA
UM1-7NCA	37"	43"	21"	12"	1 Ph Sectionalizing Enclosure
					3 Ph Sectionalizing Enclosure

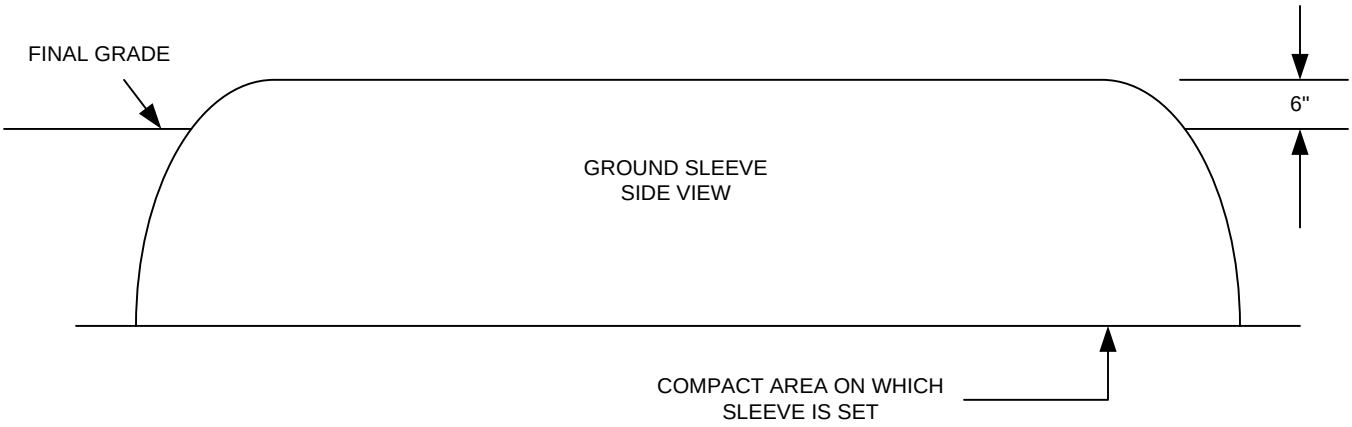
Notes:

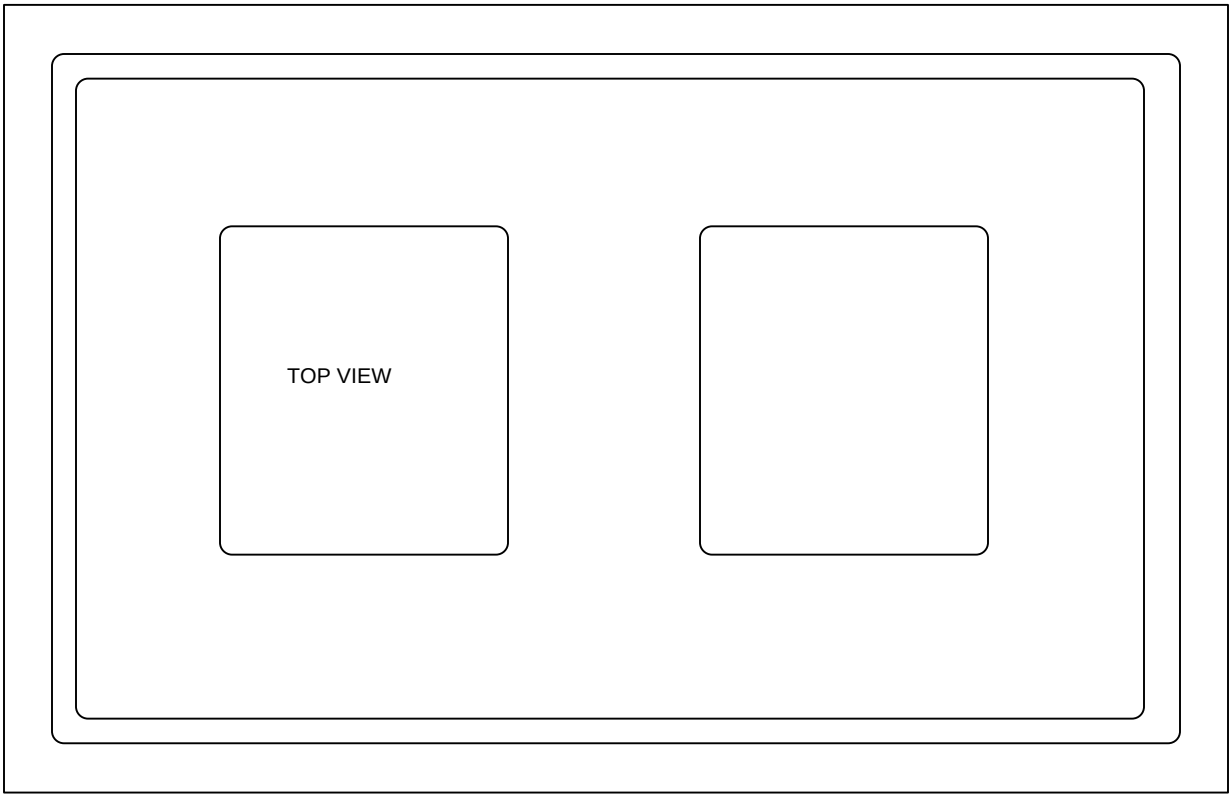
1. Designate UM1-6NCA for Three Phase Transformer (UG17-2), 75 to 300 KVA.
2. Designate UM1-6NCB for Three Phase Transformer (UG17-2), 500 to 1000 KVA.
3. Designate UM1-7NC for Single Phase Transformer (UG7).
4. Designate UM1-7NCA for Single Phase Sectionalizing Enclosure (Deferral Cabinet).

ITEM	QTY	MATERIAL
	1	Ground Sleeve

GROUND SLEEVE ASSEMBLY

2014	3 – Phase Primary 24.9/14.4 kV	UM1-6_____ UM1-7_____





Front

Note:

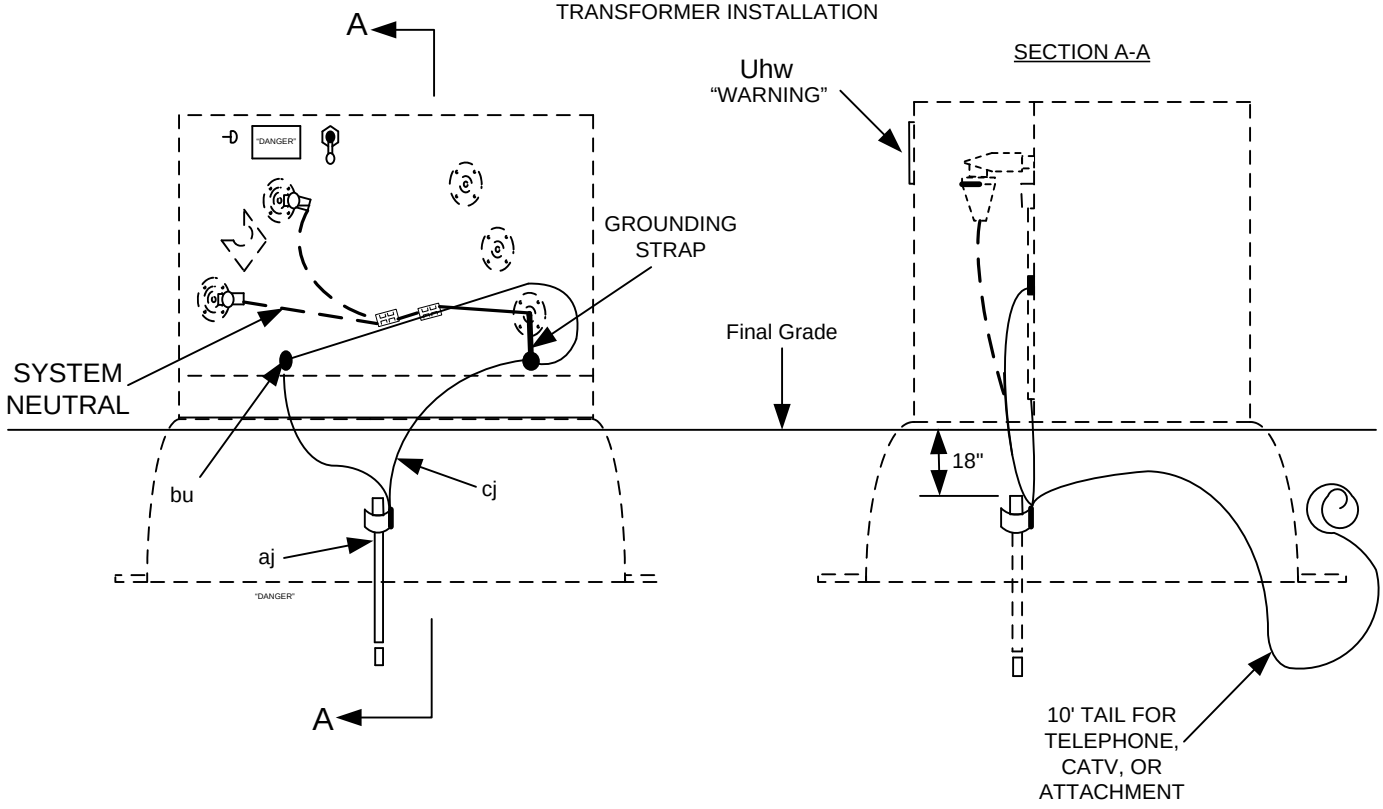
1. This Ground sleeve is used with UGX1 (Open Delta Bank) and two Single Phase Transformers.

ITEM	QTY	MATERIAL
	1	Ground Sleeve, 2 phase

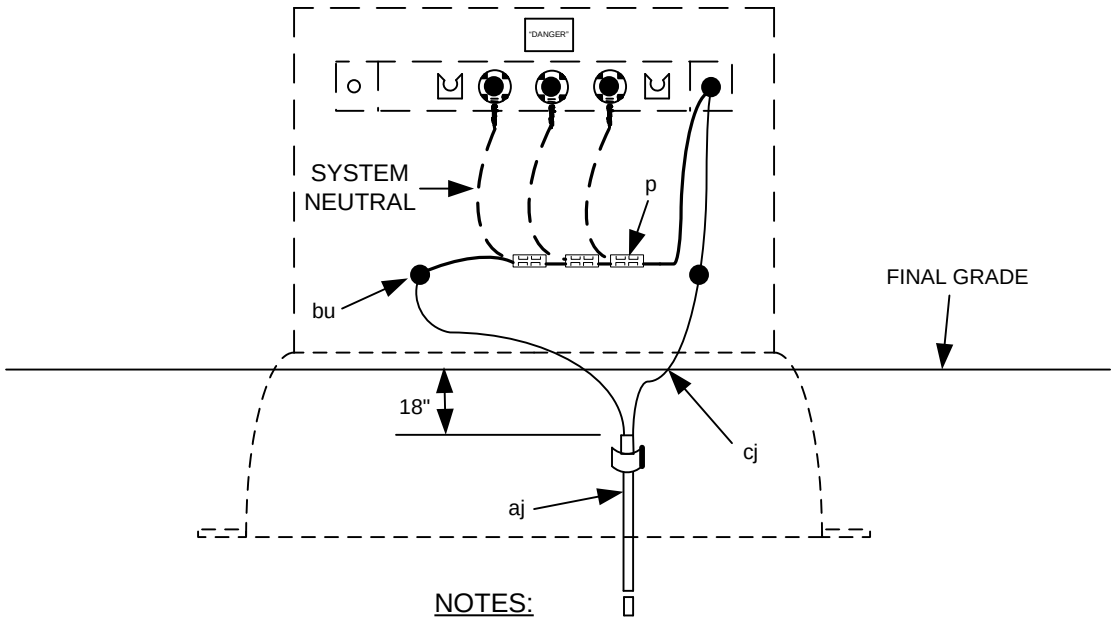
GROUND SLEEVE ASSEMBLY

2011	WFECA	UM1-7NC-2

TRANSFORMER INSTALLATION



SECTIONALIZING ENCLOSURE INSTALLATION



NOTES:

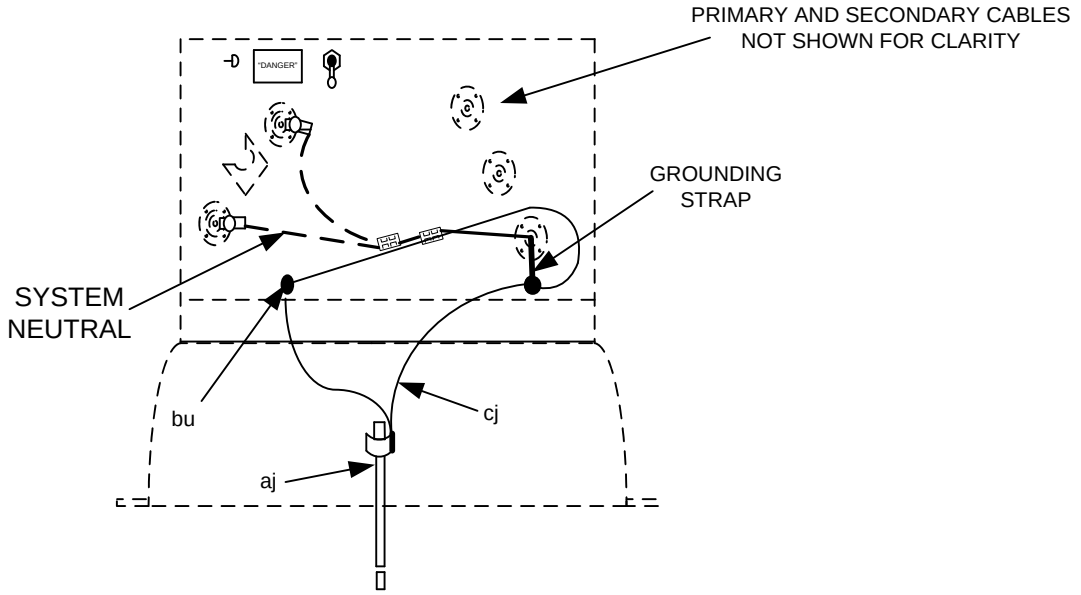
1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-1A FOR DETAILS.

ITEM	QTY	MATERIAL
bu	2	Connectors, Equipment Ground
ai	1	Ground rods
aj	1	Clamp, ground rod
cj	30	Ground wire, #4 copper
av		Jumpers, copper, as required

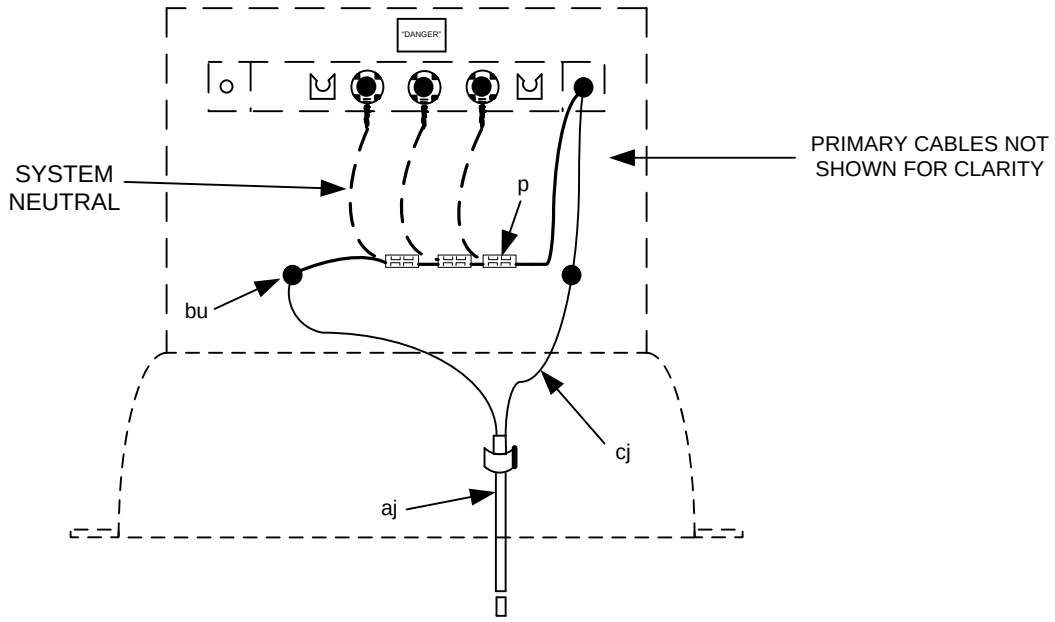
GROUNDING ASSEMBLY FOR PAD MOUNTED SINGLE PHASE TRANSFORMERS AND ENCLOSURES

2014	1 – Phase Primary 24.9/14.4 kV	UM48-1

TRANSFORMER INSTALLATION

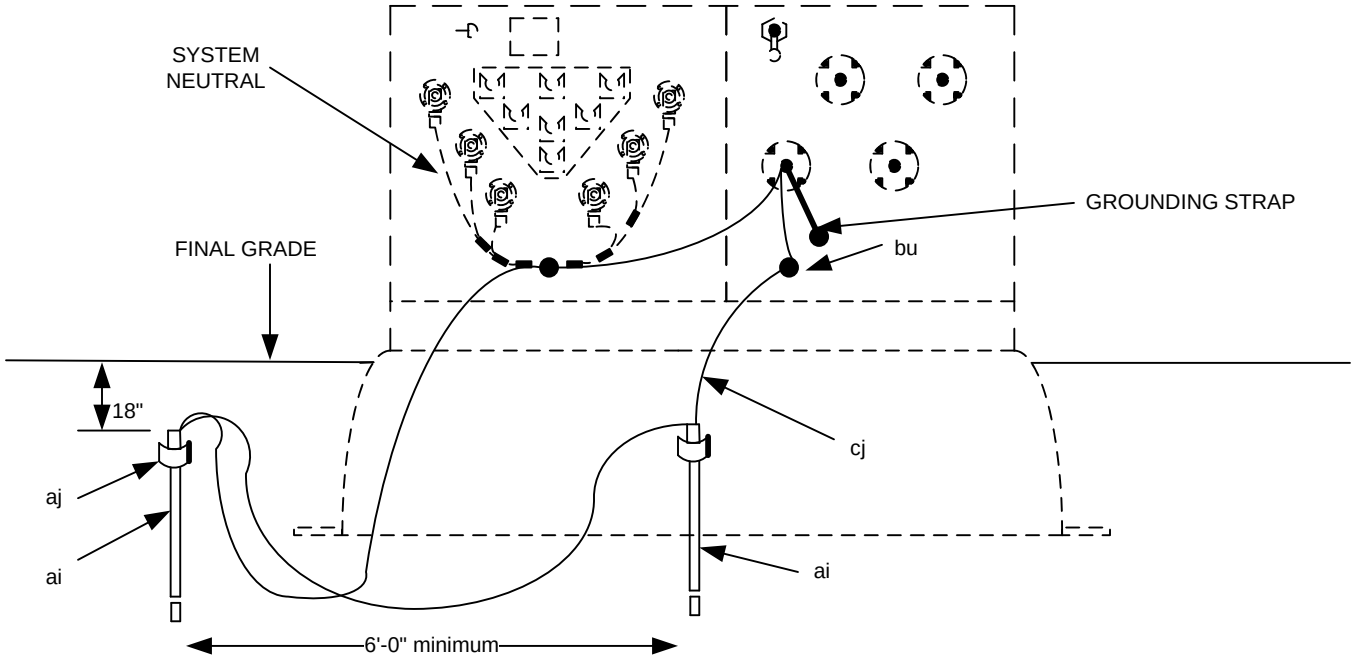


SECTIONALIZING ENCLOSURE INSTALLATION

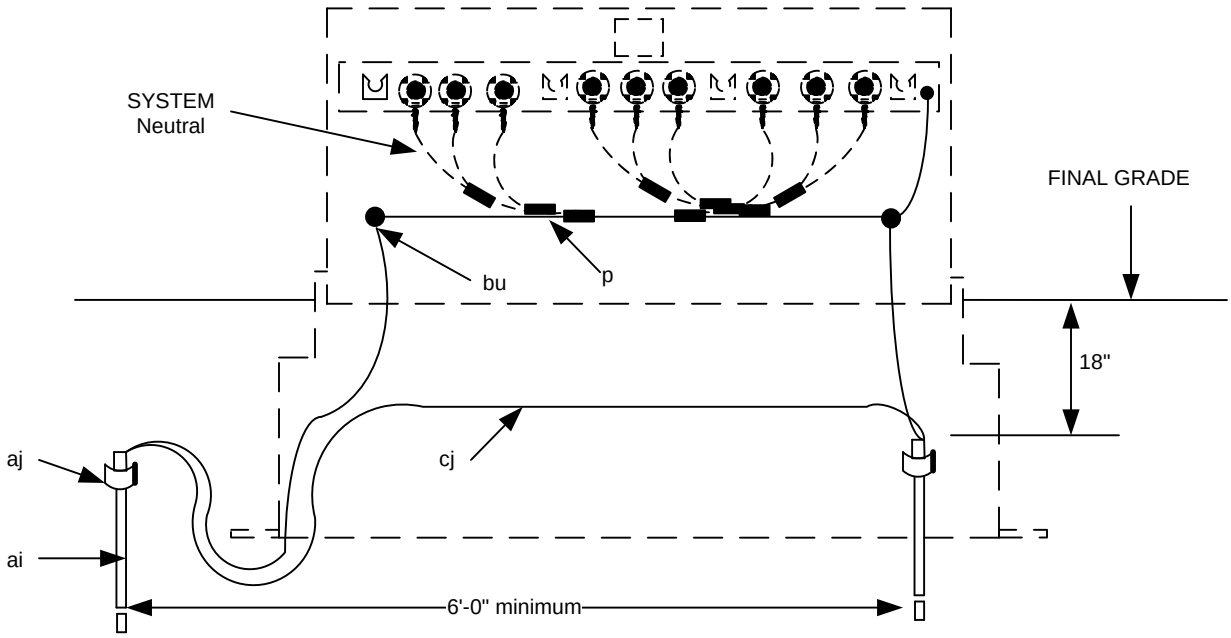


GUIDELINE FOR CONCENTRIC NEUTRAL CONNECTIONS (SINGLE-PHASE)		
2014	1 – Phase Primary 24.9/14.4 kV	UM48-1A

TRANSFORMER INSTALLATION



SECTIONALIZING ENCLOSURE INSTALLATION



NOTES:

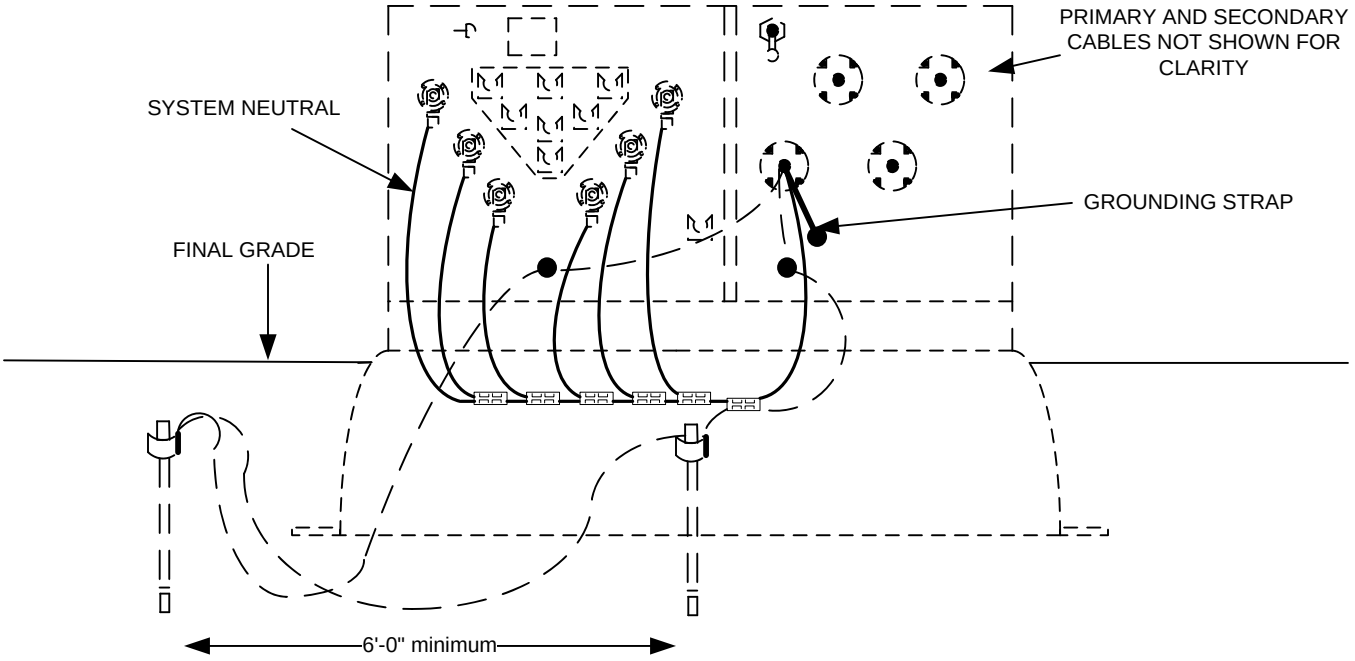
1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL. SEE UM48-2A FOR DETAILS.
2. INSTALL ONLY 1 ROD INSIDE ENCLOSURE.

ITEM	QTY	MATERIAL
ai	2	Ground rods
aj	2	Clamp, ground rod
av		Jumpers, copper, as required
cj	40	Ground wire, #4 copper min.
bu	2	Connectors, Equipment Ground

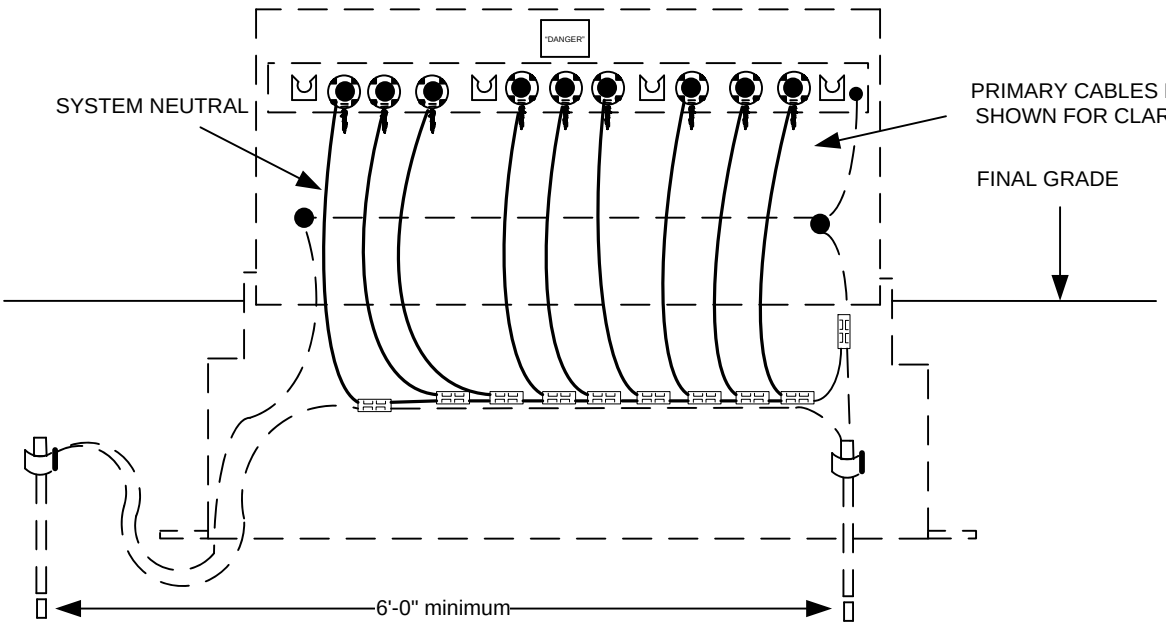
GROUNDING ASSEMBLY FOR PAD MOUNTED MULTI PHASE TRANSFORMERS AND ENCLOSURES.

2014	3 – Phase Primary 24.9/14.4 kV	UM48-2

TRANSFORMER INSTALLATION



SECTIONALIZING ENCLOSURE INSTALLATION

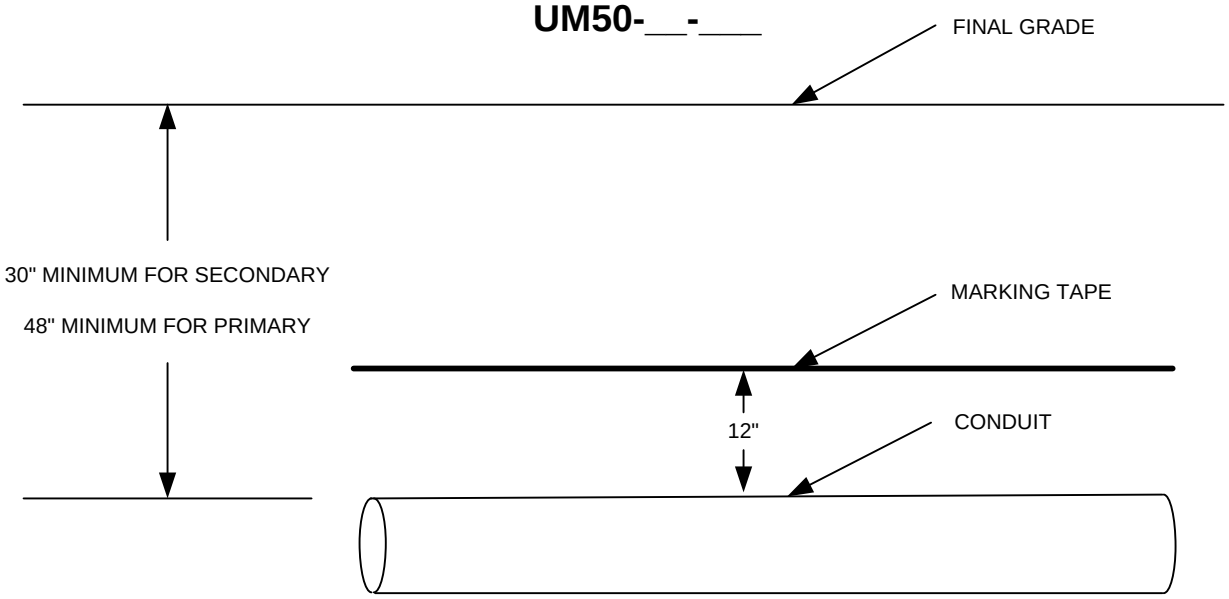


GUIDELINE FOR CONCENTRIC NEUTRAL CONNECTIONS (MULTI-PHASE)		
2014	3 – Phase Primary 24.9/14.4 kV	UM48-2A

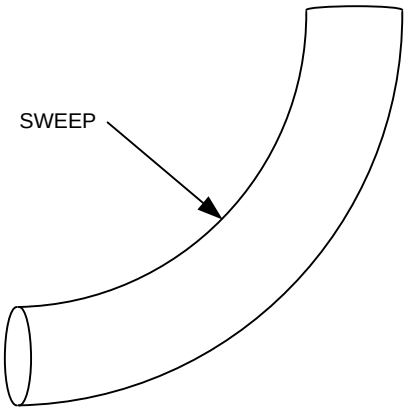
Cable and Conduit Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UM50	Miscellaneous Conduit Installation
UM50X	Guideline for Conduit Placement in Three Phase Equipment
UR2, UR2-1	Trenches for Direct Burial Cables and Conduits
UBX	Guideline for Risers, Shields to Conduit
UDX	Minimum Conduit Size
ULX	Guideline for Conduit Layout in Subdivisions
UPX	Guideline for Conduit in Pedestal
USX	Guideline for Utility Locates
UTX	Guideline for Cable Identification Tags
UX8	Temporary Conduit Termination (Conduit Type)
UX9	Temporary Conduit Termination (Ball Type)

UM50-__-____



UM50-__S



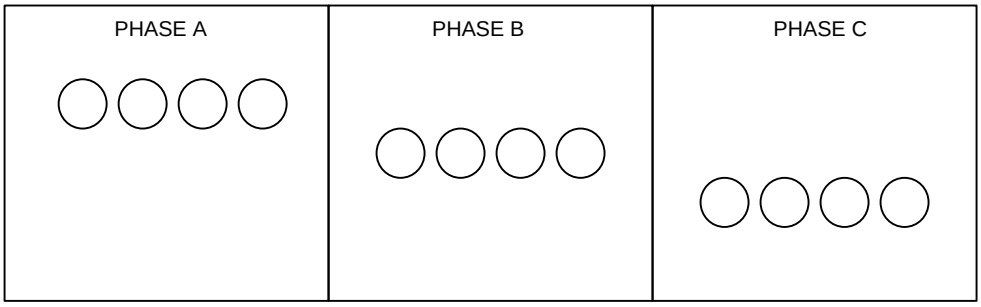
MATERIAL	UNIT
Conduit, 1" PVC Schedule 40	UM50-P4-1
Conduit, 2" Continuous, SER 13.5	UM50-C-2
Conduit, 2" PVC Schedule 40	UM50-P4-2
Conduit, 2" PVC Schedule 80	UM50-P8-2
Conduit, 3" Continuous, SER 13.5	UM50-C-3
Conduit, 3" PVC Schedule 40	UM50-P4-3
Conduit, 3" PVC Schedule 80	UM50-P8-3
Conduit Sweep, 90°, 1" PVC Sch.40, 1' radius	UM50-1S
Conduit Sweep, 90°, 2" PVC Sch.40, 2' Radius	UM50-2S
Conduit Sweep, 90°, 3" PVC Sch.40, 2' Radius	UM50-3S

NOTES:

1. SPECIFY CONDUCTOR UNIT SEPARATELY.
2. SPECIFY CONDUIT SIZE AND SCHEDULE

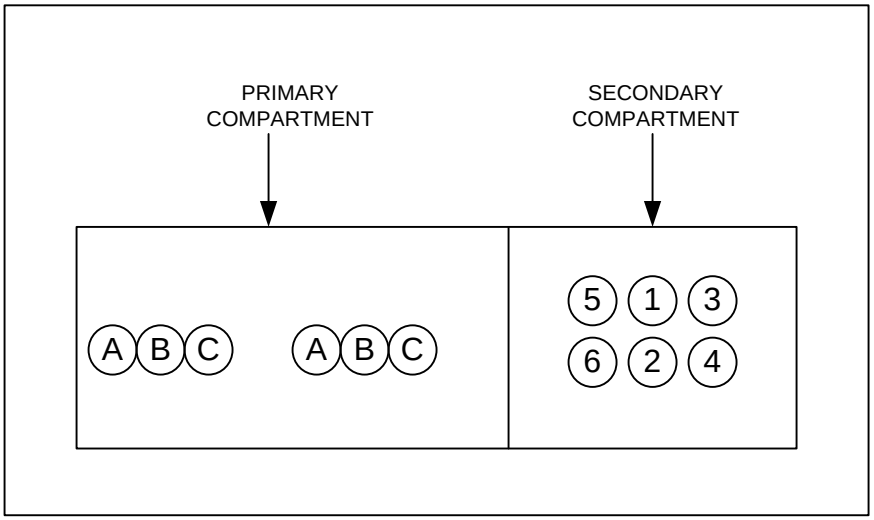
MISCELLANEOUS CONDUIT INSTALLATION		
2011	WFECA	UM50

CONDUIT DETAIL IN THREE PHASE SECTIONALIZING CABINET



TOP VIEW

CONDUIT DETAIL IN THREE-PHASE PADMOUNT TRANSFORMERS



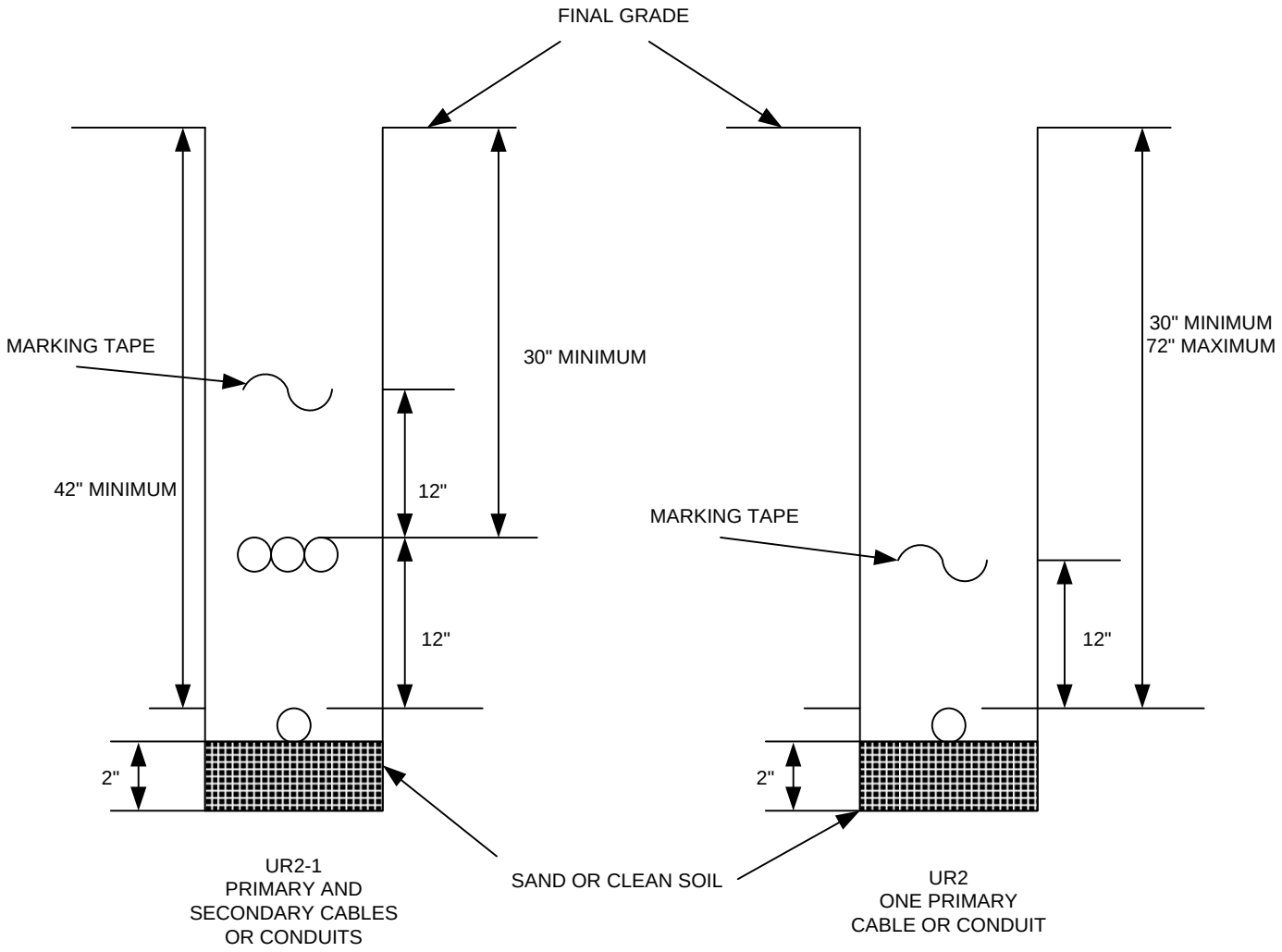
NOTES:

1. THERE WILL BE A MAXIMUM OF SIX 3" CONDUITS IN THE SECONDARY COMPARTMENT.

NOTES:

1. SEPARATE CONDUITS BY PHASE AS SHOWN BELOW.
2. CONDUITS TO EXTEND 2" UP FROM BOTTOM OF GROUND SLEEVE.
3. CONDUITS WHICH ARE NOT NEEDED MAY BE OMITTED.

GUIDELINE FOR CONDUIT PLACEMENT IN THREE PHASE EQUIPMENT		
2005	WFECA	UM50X

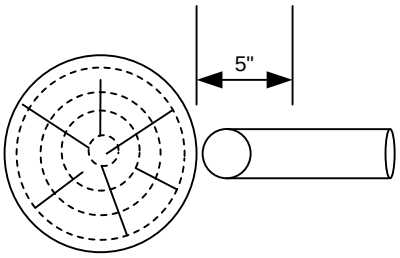


NOTES:

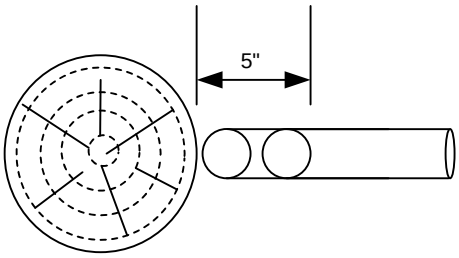
1. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
2. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE SANDY SOIL OR (c) WHERE MORE THAN ONE CABLE WILL INSTALLED IN TRENCH AND LAYING FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
3. WARNING TAPE IS REQUIRED TO BE PLACED ABOVE THE INSTALLED CABLE.

TRENCHES FOR DIRECT BURIAL CABLES AND CONDUITS		
2005	WFECA	UR2 UR2-1

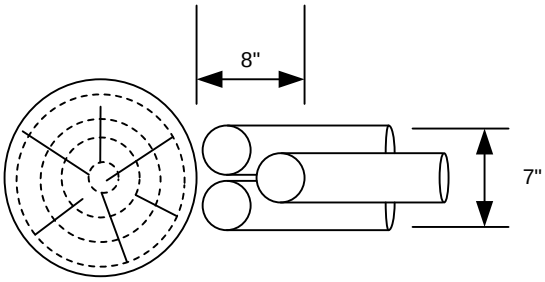
RISER DETAIL



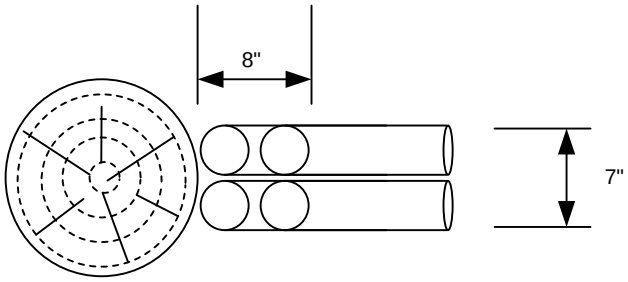
1 CONDUIT



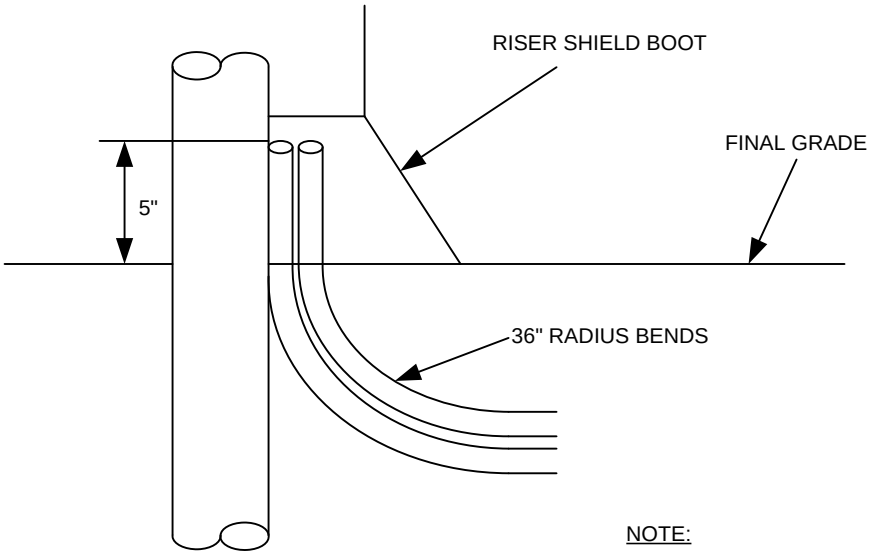
2 CONDUITS



3 CONDUITS



4 CONDUITS



NOTE:

1. CONDUITS SHALL BE PLACED AS CLOSE TO POLE AS POSSIBLE; AND ON THE SIDE OF POLE DETERMINED BY STAKING ENGINEER

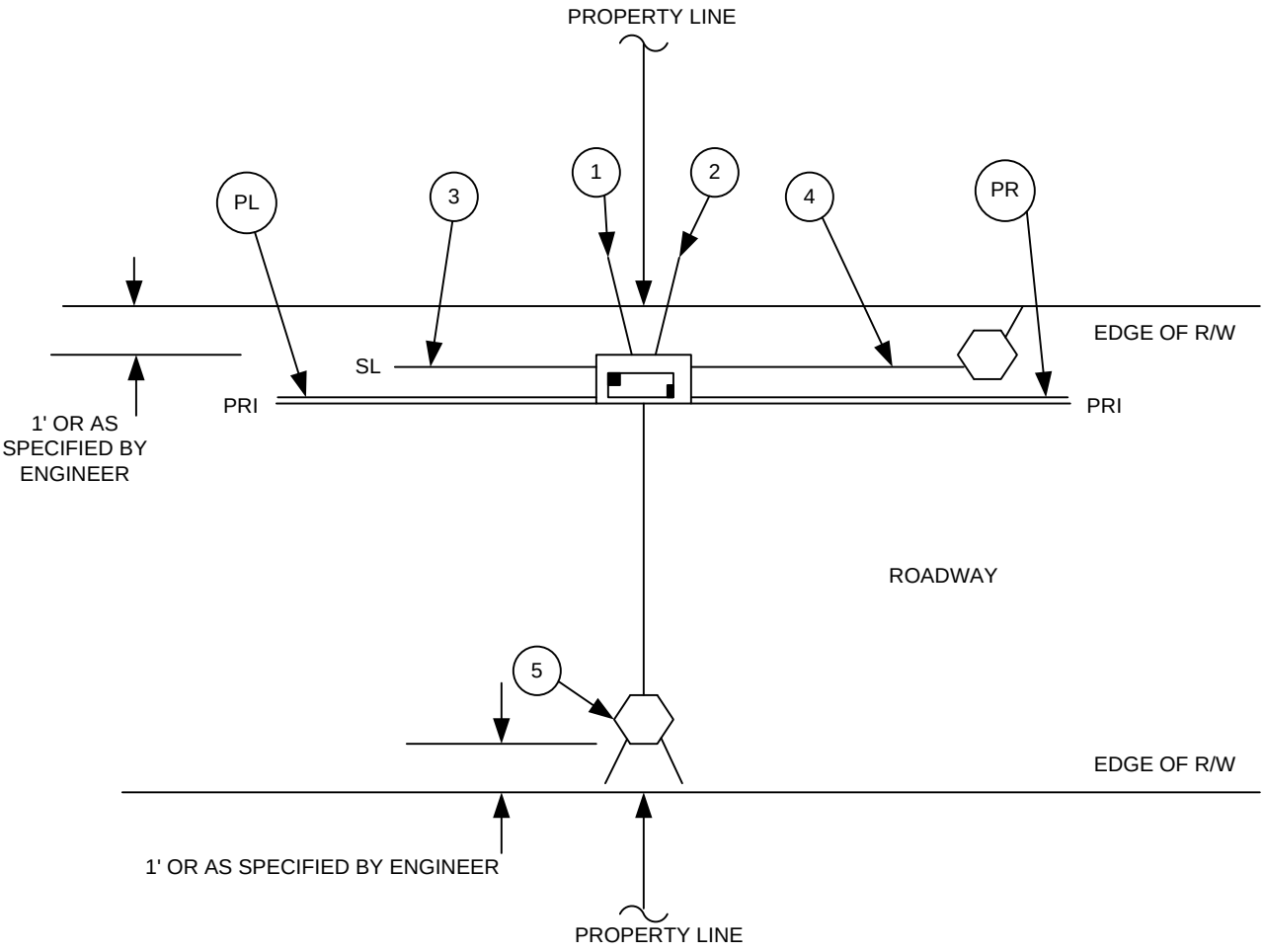
GUIDELINE FOR RISERS, SHIELDS TO CONDUIT		
2005	WFECA	UBX

Minimum Conduit Size

Conductor	1 Cable per Conduit	2 Cable per Conduit	3 Cable per Conduit	4 Cable per Conduit
1/0, 25 kV, 260 MIL, Full Neutral	2"	3"	4"	--
4/0, 25 kV, 260 MIL, 1/3 Neutral	2"	4"	4"	--
500, 25 kV, 260 MIL, 1/3 Neutral	3"	5"	5"	--
2, 600V, Service	2"	2"	2"	2"
1/0, 600V, Service	2"	2"	2"	2"
2/0, 600V, Service	2"	2"	2"	2"
4/0, 600V, Service	2"	2"	2"	3"
350, 600V, Service	2"	3"	3"	3"

Minimum Conduit Size		
2007	WFECA	UDX

TYPICAL CONDUIT LAYOUT IN SUBDIVISIONS

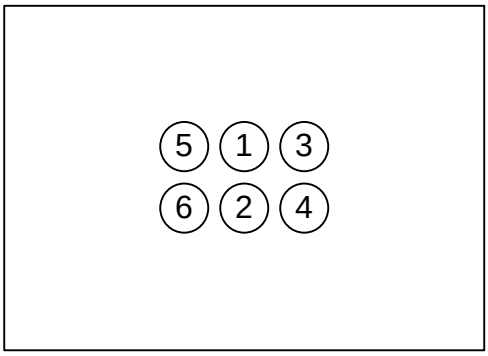


NOTE:

SERVICE OR LIGHTING CONDUITS WHICH ARE NOT NEEDED MAY BE OMITTED

GUIDELINE FOR CONDUIT LAYOUT IN SUBDIVISIONS		
2005	WFECA	ULX

CONDUIT DETAIL IN SECONDARY PEDESTAL



ROAD SIDE

NOTE: TOP OF ALL STUB-OUTS SHALL BE 2" ABOVE GRADE.

GUIDELINE FOR CONDUIT IN PEDESTAL		
2005	WFECA	UPX

COLOR CODE FOR MARKING UNDERGROUND UTILITY LINES

UTILITY	COLOR
ELECTRIC	RED
GAS-OIL-STEAM	YELLOW
COMMUNICATION (TELEPHONE-CATV)	ORANGE
WATER	BLUE
SEWER	GREEN
TEMPORARY SURVEY MARKINGS	PINK
PROPOSED EXCAVATION	WHITE

FLORIDA CALL SUNSHINE NUMBER	1-800-432-4770

CALL 48 HOURS BEFORE YOU DIG

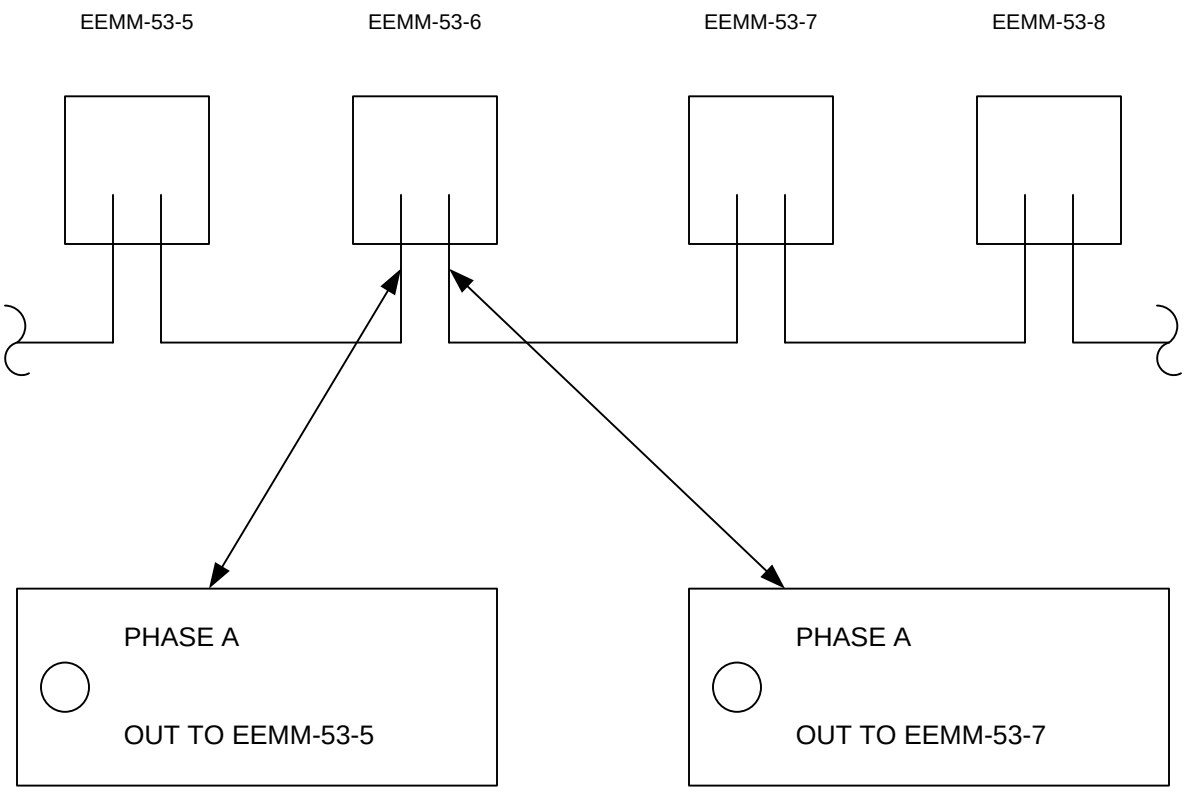
Call Sunshine at 1-800-432-4770 two business days before you dig, but no more than five days. Have information ready when calling: Company name/ address, contact person, phone number, location of dig site, extent and type of work, and date/start time of excavation.

Wait two business days for underground facilities to be marked.

Respect and protect the facility operator's marks.

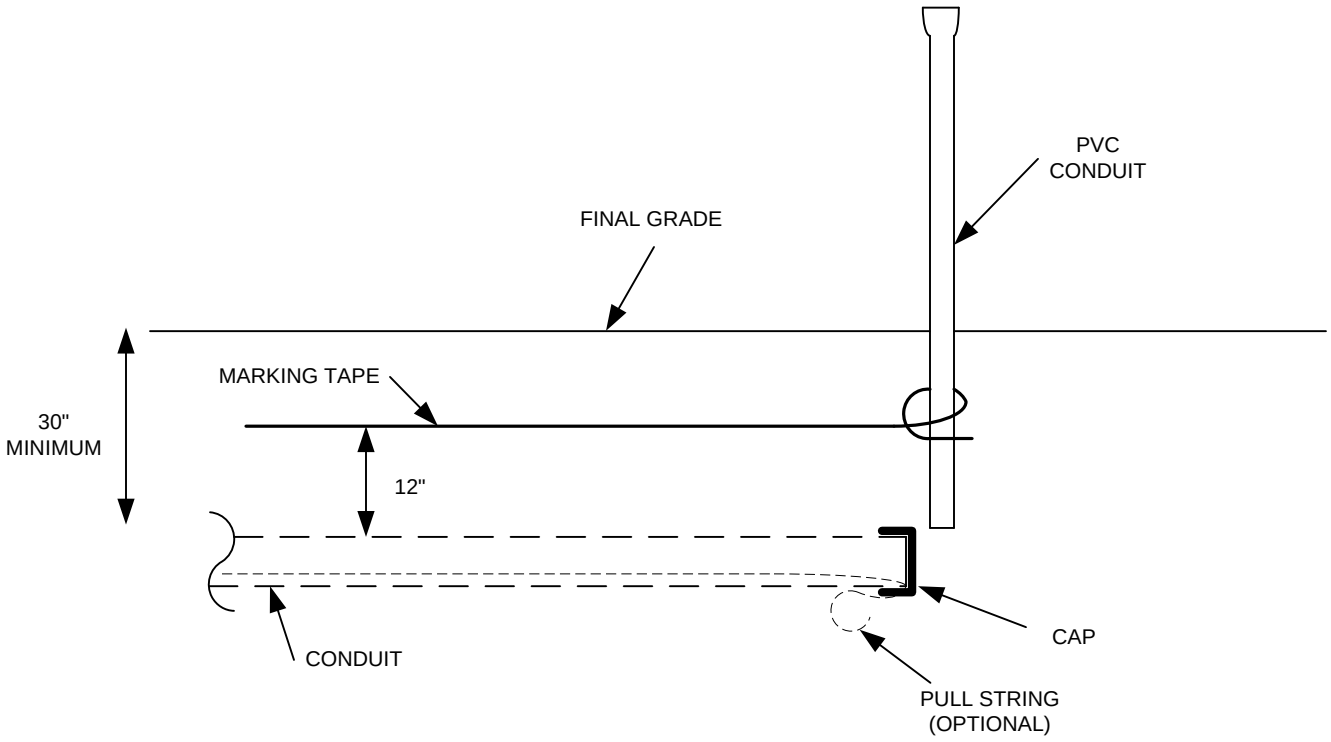
Dig with care! Always hand dig when within two feet on either side of any marked lines.

GUIDELINE FOR UTILITY LOCATES		
2005	WFECA	USX



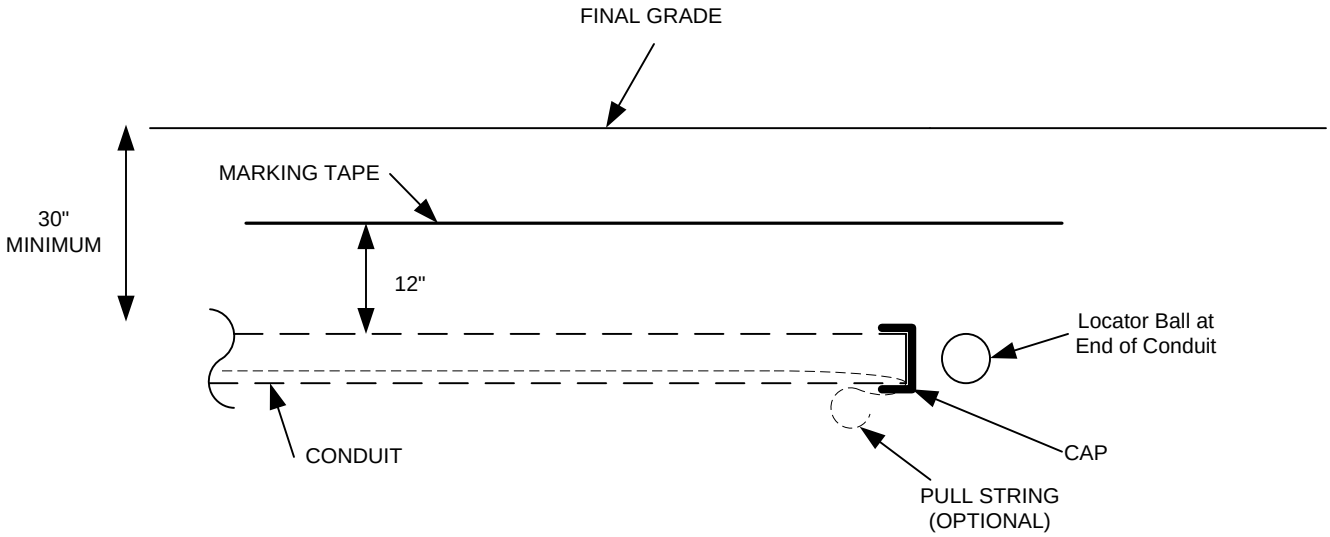
EXAMPLE OF CABLE TAGS FOR
SECTIONALIZING ENCLOSURE EEMM-53-6

GUIDELINE FOR CABLE IDENTIFICATION TAGS		
2005	WFECA	UTX



ITEM	QTY.	MATERIAL
	1	CONDUIT, 3" PVC, SCH 40, 10'
	1	VINYL CAP

TEMPORARY CONDUIT TERMINATION		
2005	WFECA	UX8



ITEM	QTY.	MATERIAL
	1	Locator Ball, Red
	1	Vinyl Cap

TEMPORARY CONDUIT TERMINATION		
2005	WFECA	UX9

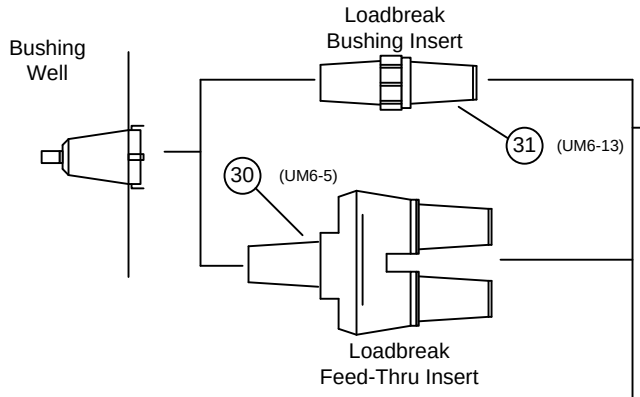
Miscellaneous Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UM6-1G	200 Amp Load Break Separable Connector Components
UM6-2G	Accessory List
UM6-3G	Guideline to Separable Dead Break Connectors 600 Amp Series
UM6-1	Load Break Elbow (200 A)
UM6-2	Fused Elbow Termination (200 A)
UM6-3	Dead Break Termination (600 A)
UM6-4	Fault Indicator
UM6-5	Feed Through Load Break Insert
UM6-6	Ground Rod Assembly
UM6-7	Bushing Well Plug (200 A)
UM6-8	Riser Shield (U Guard)
UM6-9	Conduit Cable Riser
UM6-10	Insulated Protective Cap (200 A)
UM6-11	Insulated Protective Cap (600 A)
UM6-12	Cable marker Assembly
UM6-13	Load Break Insert (200 A)
UM6-14	Dead Break Insert (600 A)
UM6-15	Stand-Off Insulator (200 A)
UM6-16	Conduit Support Bracket
UM6-16S	Conduit Strap Kit (3 inch)
UM6-17	Insulation Plug (600 A)
UM6-18	Backing Plate for U-Guard Riser Shield
UM6-19	Feed Through (200 A)
UM6-20	Two Point Junction (200 A)
UM6-21	Three Point Junction (200 A)
UM6-22	Four Point Junction (200 A)
UM6-23	Five Point Junction (200 A)
UM6-24	Riser Termination
UM6-25	Six Point Junction (200 A)
UM6-26	Indoor Stress Relief cone
UM6-28	In Line Primary Splice (for Jacketed Cable)
UM6-32	Boot or Sleeve – Insulated (600 Volt)
UM6-33	Surge Arrester
UM6-34	Dead Break Elbow Surge Arrester
UM6-35	Cutout Arrester Combination
UM6-36	Load Break Cutout
UM6-37	Parking Stand Arrester
UM6-39	Jacketed Cable Grounding Kits

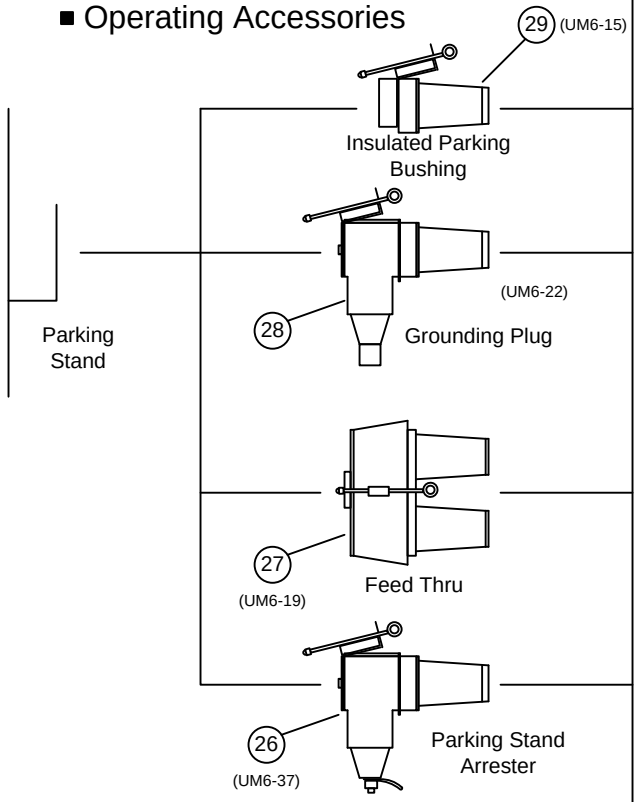
Miscellaneous Assemblies

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UM6-58	Connecting Plug 600 A
UM6-59	Bushing Adaptor 600 to 200 A
UM6-60	2 Point Junction 600 A
UM6-61	3 Point Junction 600 A
UM6-62	4 Point Junction 600 A
UM6-65	Insulated Parking Bushing 600 A
UM12	Danger, Warning and Information Signs (Vinyl, Cabinet Mount)
UM26-5C	Decorative Light Carriage Style (unmetered)
UM26-5V	Decorative Light Victorian Style (unmetered)
UM26-5S1	Single Arm Street Light Cobra head Style (unmetered)
UM26-5S2	Double Arm Street Light Cobra head Style (unmetered)
UAMI-1G	DCSI / ACLARA (TWACS) Grounding and Cable Routing
UAMI-2G	Conduit Layout Guidelines for DCSI / ACLARA (TWACS) Transformer

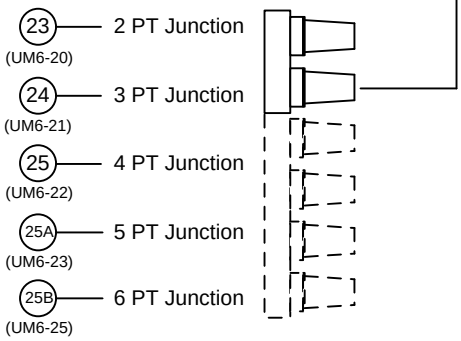
■ Cable to Equipment



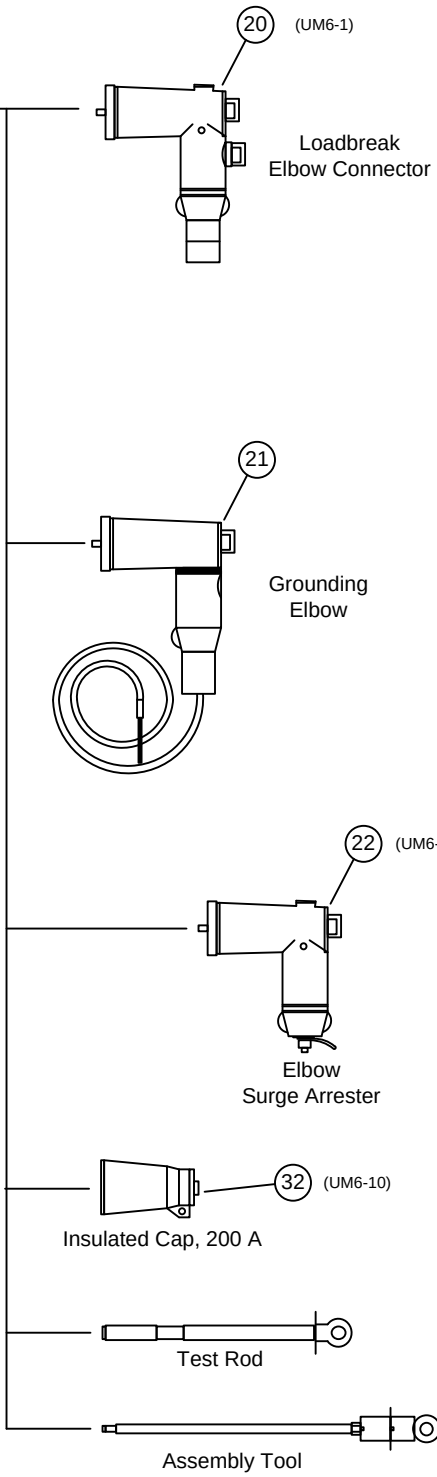
■ Operating Accessories



■ Operating Accessories (Multipoint Junctions)



■ Elbow Connector



Note: See UM6-2G for Accessory List

GUIDELINE TO 200 AMP LOADBREAK SEPARABLE CONNECTOR COMPONENTS

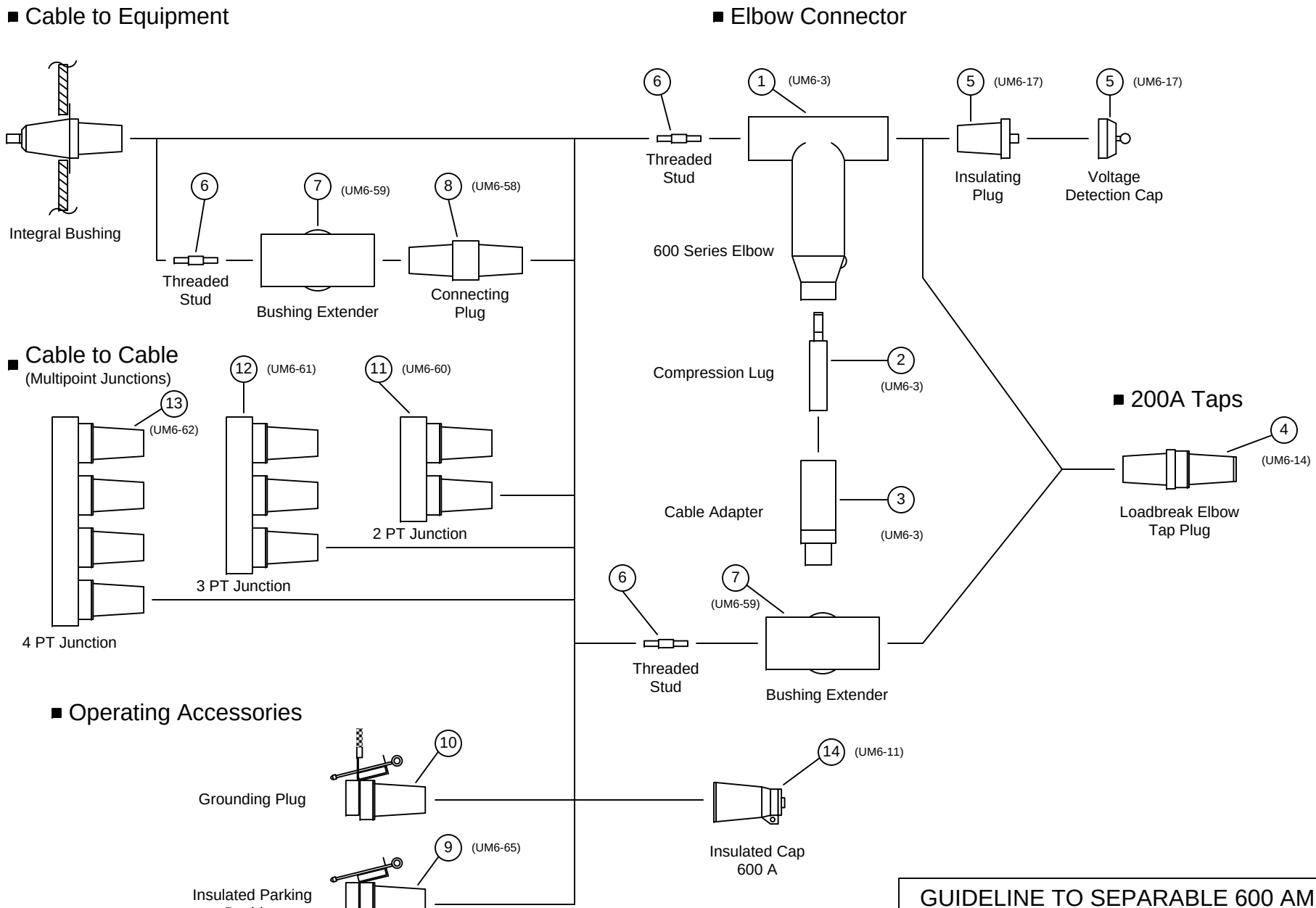
2014	3 – Phase Primary 24.9/14.4 kV	UM6-1G

ITEM	DESCRIPTION	ASSEMBLY UNIT
1	Elbow Connector, Dead Break, 600 A, ("Tee" Body Elbow)	UM6-3
2	Compression Lug, 600 A (for use with "Tee" Body Elbow)	UM6-3
3	Cable Adaptor (for use with "Tee" Body Elbow)	UM6-3
4	Load Break Elbow Tap Plug, 600 A to 200 A	UM6-14
5	Insulating Plug, 600 A with Cap	UM6-17
6	Threaded Stud (for use with "Tee" Body Elbow)	UM6-3
7	Bushing Extender, 600 A	UM6-59
8	Connecting Plug, 600 A to 600 A	UM6-58
9	Insulated Parking Stand, 600 A	UM6-65
10	Grounding Parking Stand, 600 A	N/A
11	Multipoint Junction, 600 A, Dead Break, 2 Way	UM6-60
12	Multipoint Junction, 600 A, Dead Break, 3 Way	UM6-61
13	Multipoint Junction, 600 A, Dead Break, 4 Way	UM6-62
14	Insulating Cap, 600 A	UM6-11
20	Elbow, Load Break, 200 A	UM6-1
21	Elbow, Grounding	N/A
22	Elbow Arrester, 18 kV	UM6-34
23	Multipont Junction, 200 A, Load Break, 2 Way	UM6-20
24	Multipont Junction, 200 A, Load Break, 3 Way	UM6-21
25	Multipont Junction, 200 A, Load Break, 4 Way	UM6-22
25A	Multipont Junction, 200 A, Load Break, 5 Way	UM6-23
25B	Multipont Junction, 200 A, Load Break, 6 Way	UM6-25
26	Parking Stand Arrester, 200 A	UM6-37
27	Feed Through, 200 A, Portable, Horizontal	UM6-19
28	Grounding Plug, 200 A (Standoff Bushing)	N/A
29	Insulated Parking Bushing, 200 A (Standoff Bushing)	UM6-15
30	Load Break Feed Through Insert, 200 A (Wishbone)	UM6-5
31	Load Break Bushing Insert, 200 A	UM6-13
32	Insulating Cap, 200 A	UM6-10

Note: See UM6-1G AND UM6-3G for Component Connectivity.

ACCESSORY LIST FOR 200 AMP LOAD BREAK AND 600 AMP DEAD BREAK CONNECTOR COMPONENTS

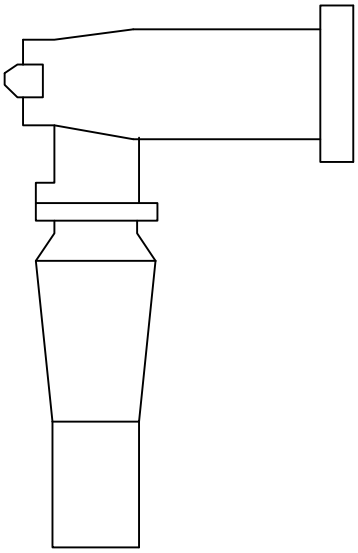
2014	3 – Phase Primary 24.9/14.4 kV	UM6-2G



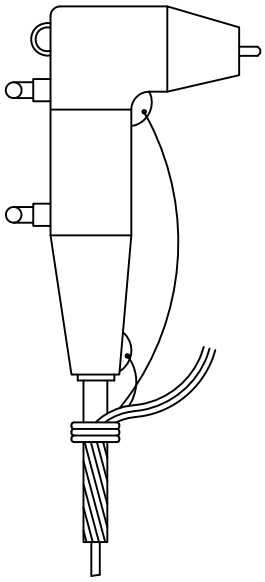
Note: See UM6-2G for Accessory List

GUIDELINE TO SEPARABLE 600 AMP DEAD BREAK CONNECTORS

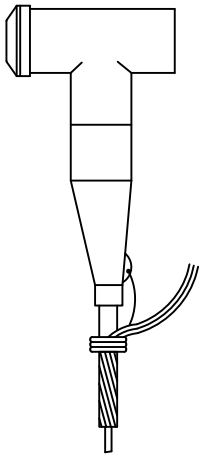
2014	3 – Phase Primary 24.9/14.4 kV	UM6-3G



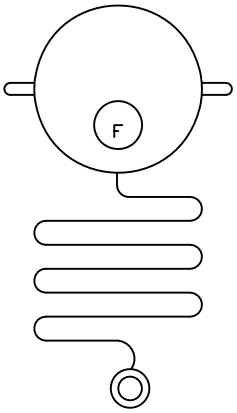
UM6-1 Uhp
LOAD BREAK ELBOW
(200 A)



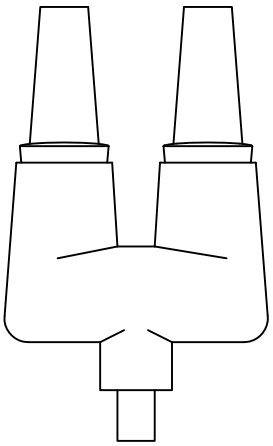
UM6-2 Uhp
FUSED ELBOW TERMINATION
(200 A)



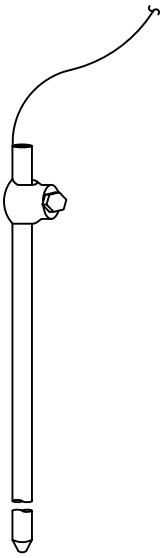
UM6-3 Uhb
DEAD BREAK TERMINATION
(600 A)



UM6-4 Ugo
FAULT INDICATOR



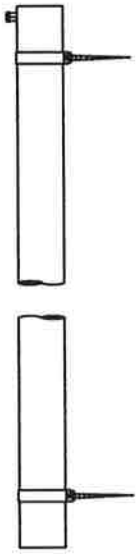
UM6-5 Uhb
FEED THROUGH LOAD BREAK INSERT



UM6-6 ai, aj, cj
GROUND ROD ASSEMBLY

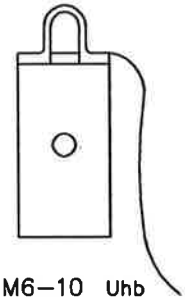
	MISCELLANEOUS ACCESSORIES	
	Page 1 of 8	UM6-__

UM6–7 Uhb
BUSHING WELL PLUG
(200 A)

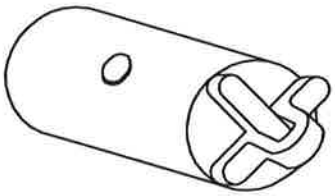


UM6–8 Ugc
RISER SHIELD (U GUARD)

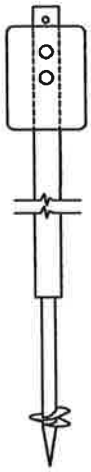
UM6–9 Ugc
CONDUIT CABLE RISER



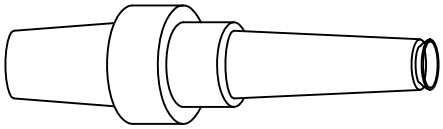
UM6–10 Uhb
INSULATED PROTECTIVE CAP
(200 A)



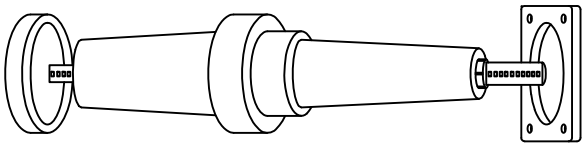
UM6–11 Uhb
INSULATED PROTECTIVE CAP
(600 A)



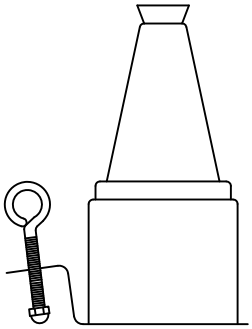
UM6–12 Uhx
CABLE MARKER ASSEMBLY



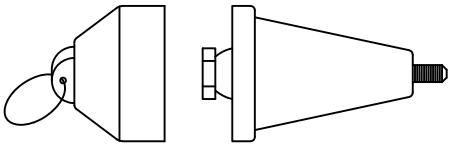
UM6-13 Uhb
LOAD BREAK INSERT
(200 A)



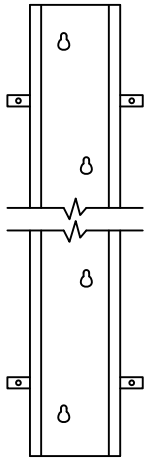
UM6-14 Uhb
DEADBREAK INSERT
(600 A)



UM6-15 Uhq
STAND-OFF INSULATOR
(200 A)

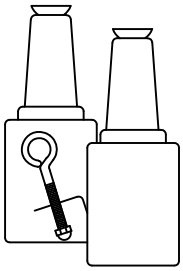


UM6-17 Uhb
INSULATING PLUG
600 AMP

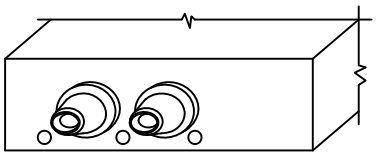


UM6-18
BACKING PLATE FOR
U-GUARD RISER SHIELD

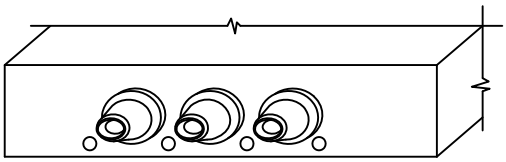
NOTE:
Use UM6-18 for 2" Backing Plate
Use UM6-18-4 for 4" Backing Plate



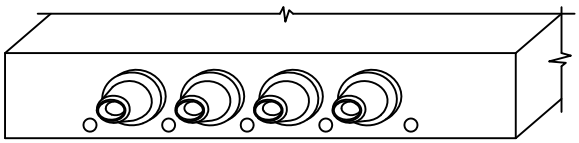
UM6-19 Uhq
FEED THROUGH
(200 A)



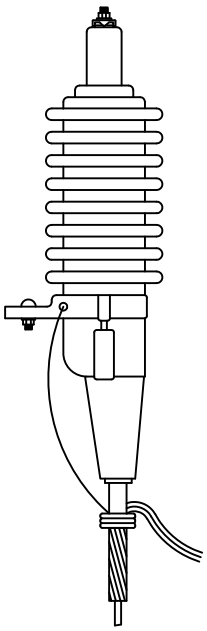
UM6-20 Uhq
TWO POINT JUNCTION
(200 A)



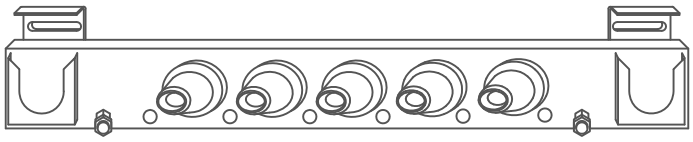
UM6-21 Uhq
THREE POINT JUNCTION
(200 A)



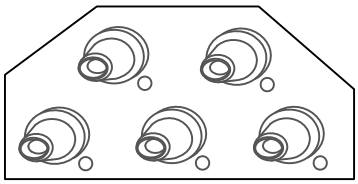
UM6-22 Uhq
FOUR POINT JUNCTION
(200 A)



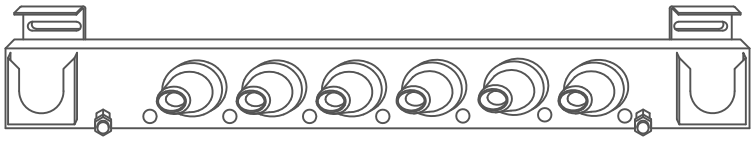
UM6-24 Ugk
RISER TERMINATION



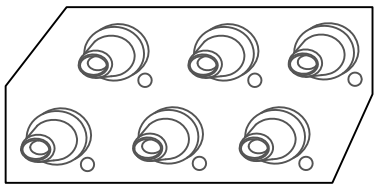
UM6-23 Uhq
FIVE POINT JUNCTION
(200 A)



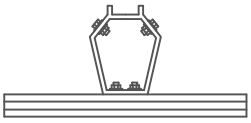
UM6-23 Uhq
FIVE POINT JUNCTION
(200 A)



UM6-25 Uhq
SIX POINT JUNCTION
(200 A)



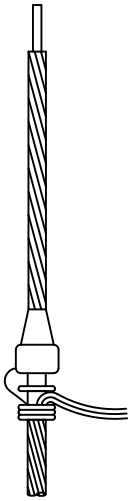
UM6-25 Uhq
SIX POINT JUNCTION
(200 A)



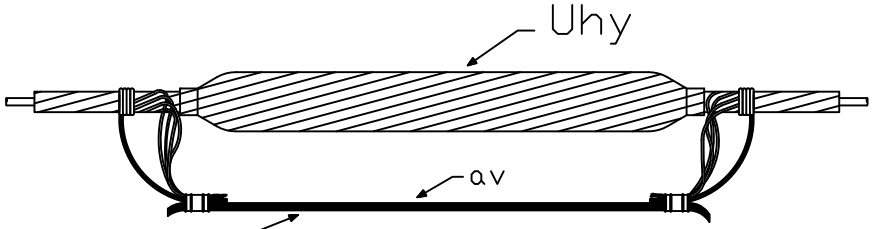
UM6-16

UM6-16S

	MISCELLANEOUS ACCESSORIES			
	2005	WFECA	Page 4A of 8	UM6-__

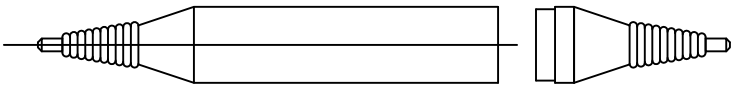


UM6-26 Ugk
INDOOR STRESS RELIEF CONE

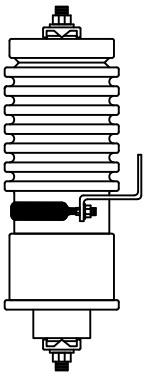


CONCENTRIC NEUTRAL
OR
EQUIVALENT EXTENSION

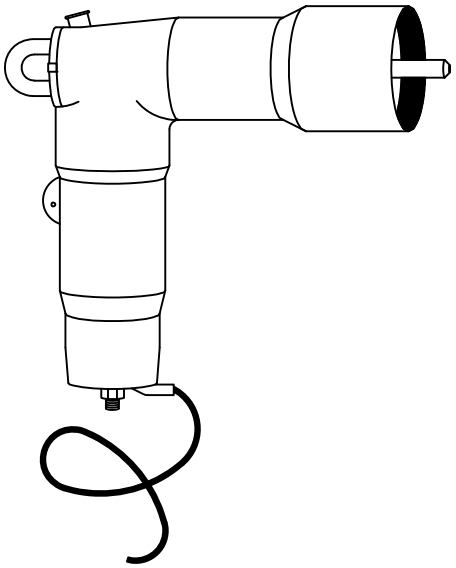
UM6-28 Uhy
IN LINE PRIMARY SPLICE
(FOR JACKETED CABLE)



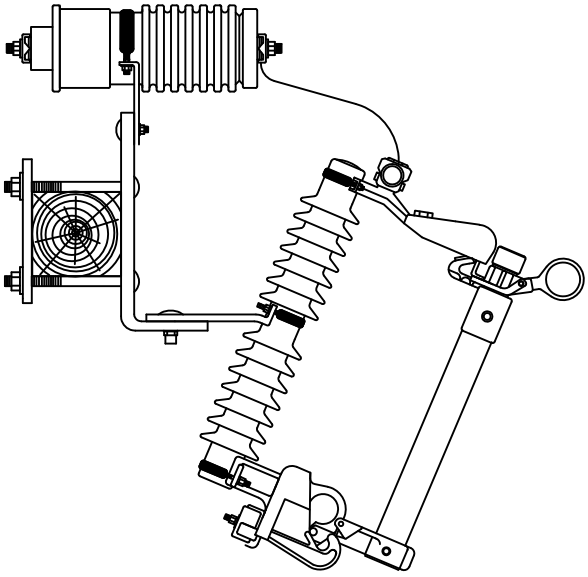
UM6-32 Ugq
BOOT OR SLEEVE - INSULATED
(600 VOLT)



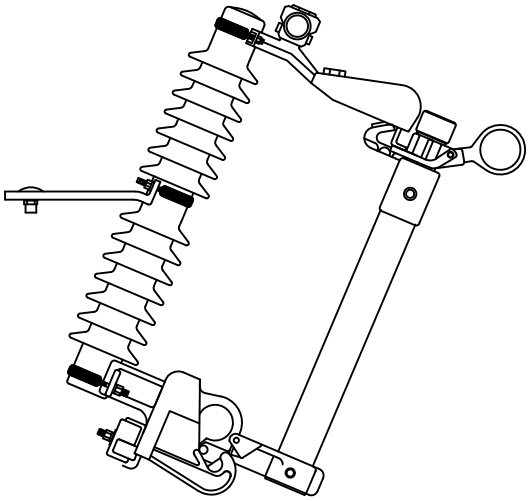
UM6-33 Uae
SURGE ARRESTER



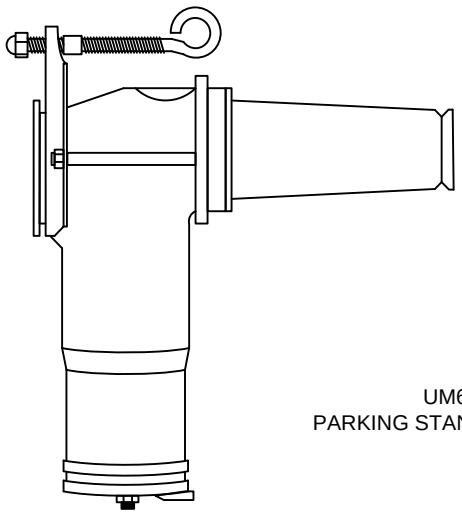
UM6-34 Uae
DEAD BREAK ELBOW
SURGE ARRESTER



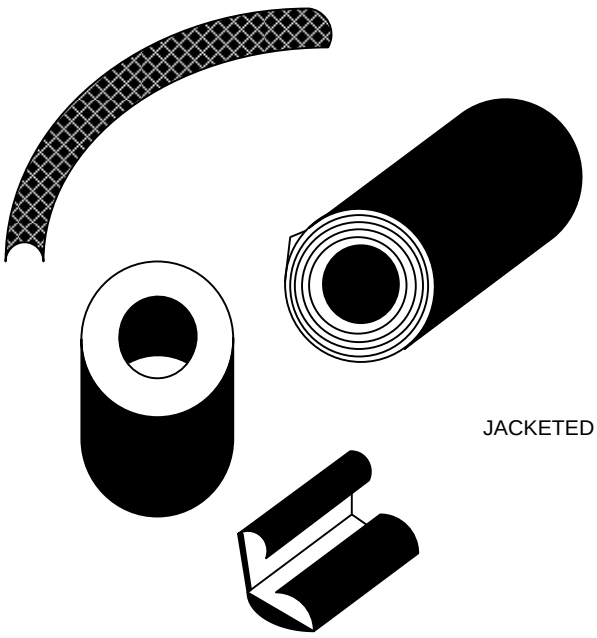
UM6-35 Uax
CUTOUT-ARRESTER COMBINATION



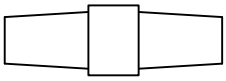
UM6-36 Uaf
LOAD BREAK CUTOUT



UM6-37
PARKING STAND ARRESTER

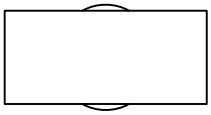


UM6-39
JACKETED CABLE GROUNDING KITS



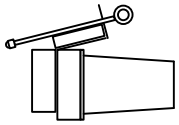
UM6-58

Connecting Plug
(600 A TO 600 A)



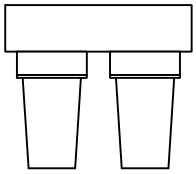
UM6-59

Bushing Extender
(600 A)



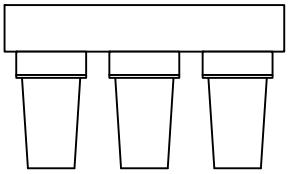
UM6-65

Insulated Parking Bushing
(600 A)



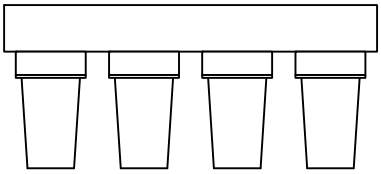
UM6-60

2 IPOINT JUNCTION (600 A)



UM6-61

3 POINT JUNCTION (600 A)



UM6-62

4 POINT JUNCTION
(600 A)

MISCELLANEOUS ACCESSORIES		
2015	Page 8A of 8	UM6-__

UM12-1

UM12-2

UM12-3

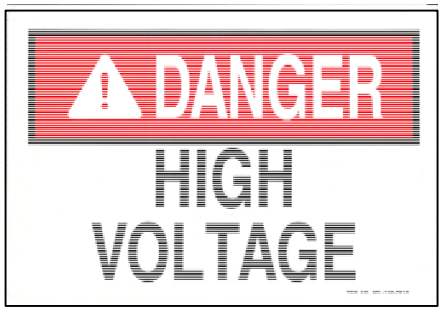
UM12-4

UM12-5

UM12-6

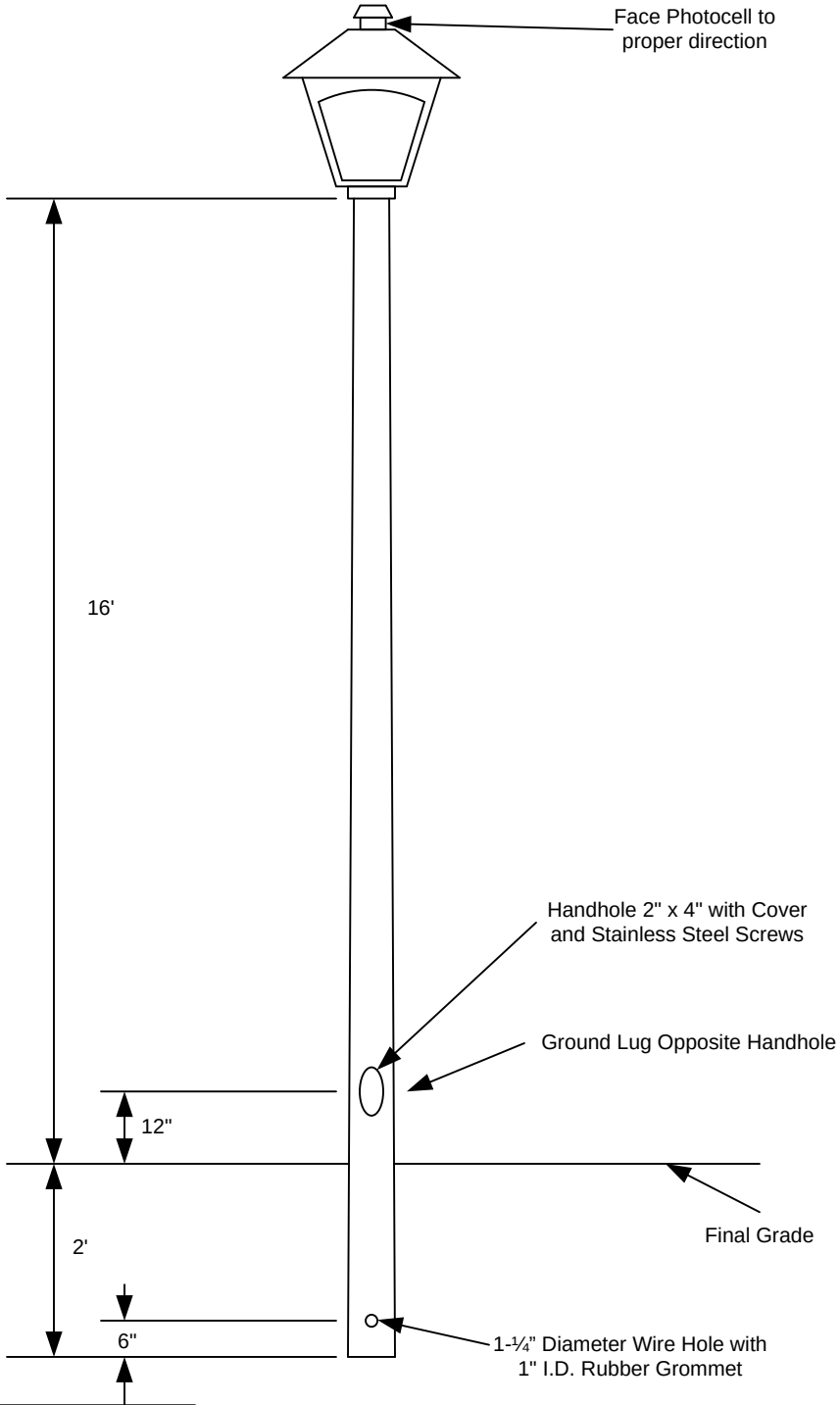
UM12-7

UM12-8



UM12-9

DANGER, WARNING AND INFORMATION SIGNS (VINYL, CABINET MOUNT)		
2014	WFECA	UM12 - ___

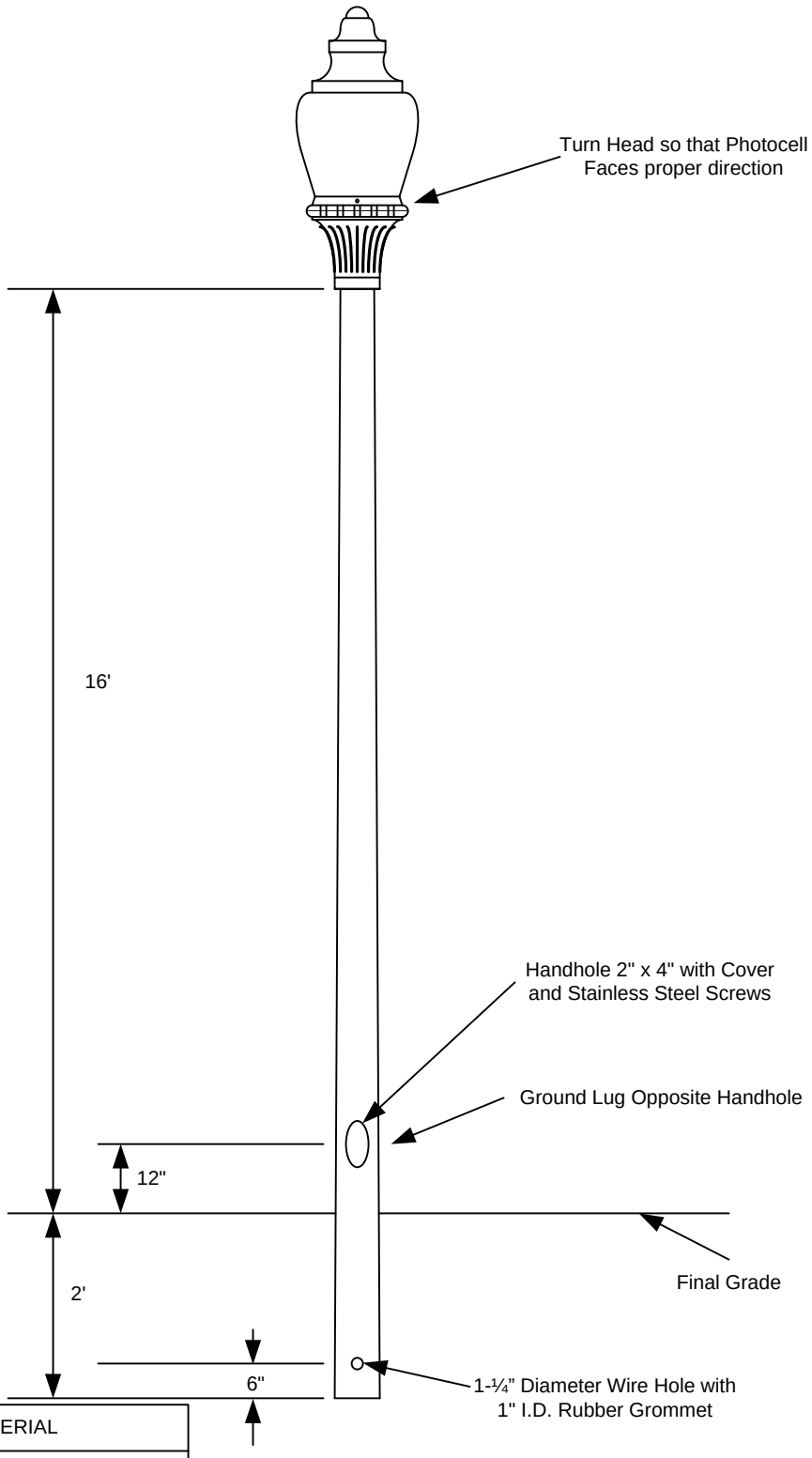


ITEM	QTY.	MATERIAL
	1	Pole, Aluminum 18'
	1	Photocell
	1	Lamp, 175W MH
	1	Fuse, 5 Amp, (FLM 5)
	1	Fuse holder
	1	Luminaire, Carriage Style
	30	Conductor, #12/2 UF with Ground

Note:

Do Not install Pole without Luminaire

Decorate Light Carriage Style (unmetered)		
2005	WFECA	UM26-5C

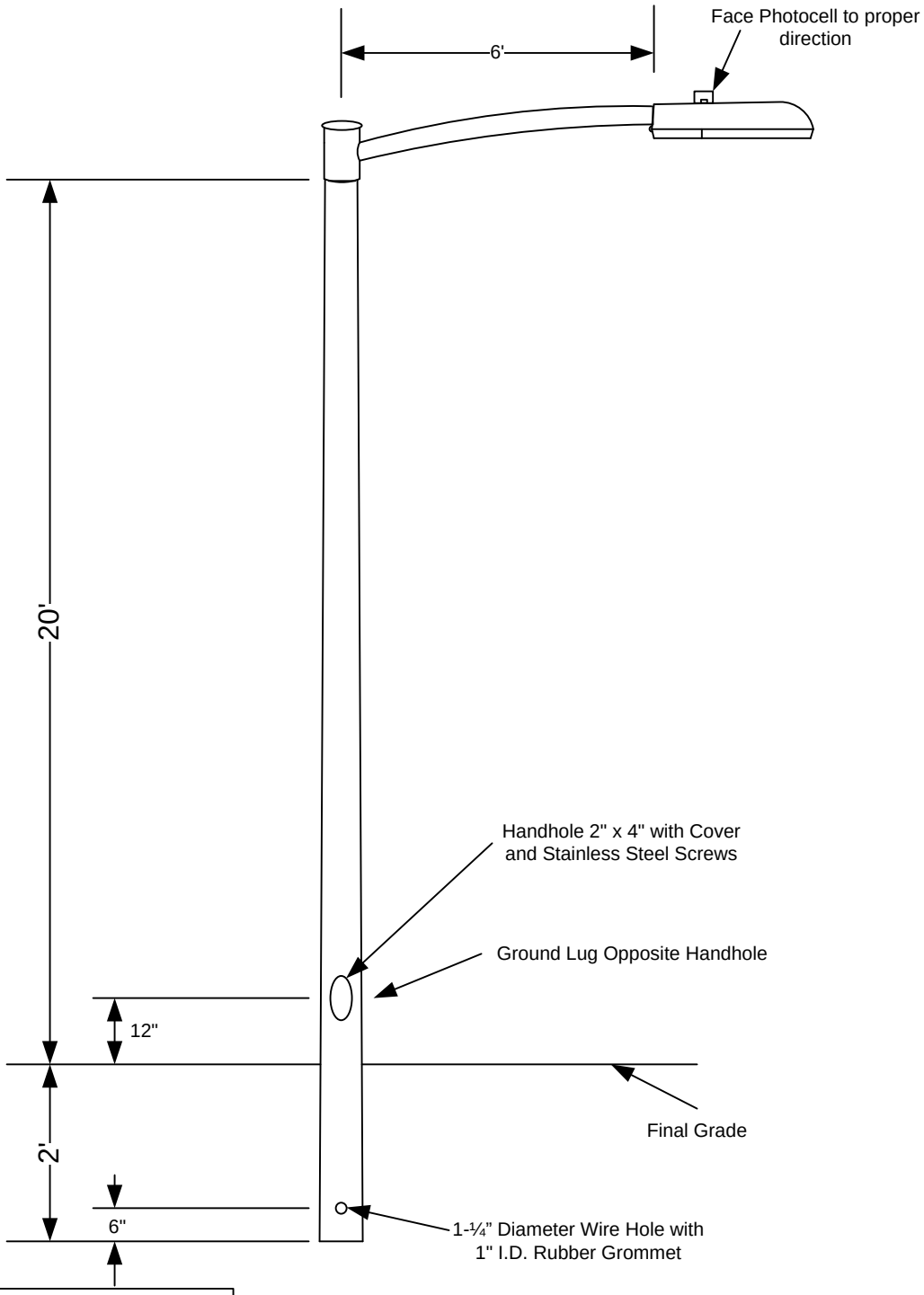


ITEM	QTY.	MATERIAL
	1	Pole, Aluminum 22'
	1	Photocell
	1	Lamp, 175W MH
	1	Fuse, 5 Amp, (FLM 5)
	1	Fuse holder
	1	Luminaire, Victorian (Acorn) Style
	30	Conductor, #12/2 UF with Ground

Note:

Do Not install Pole without Luminaire

Decorate Light Victorian Style (unmetered)		
2005	WFECA	UM26-5V

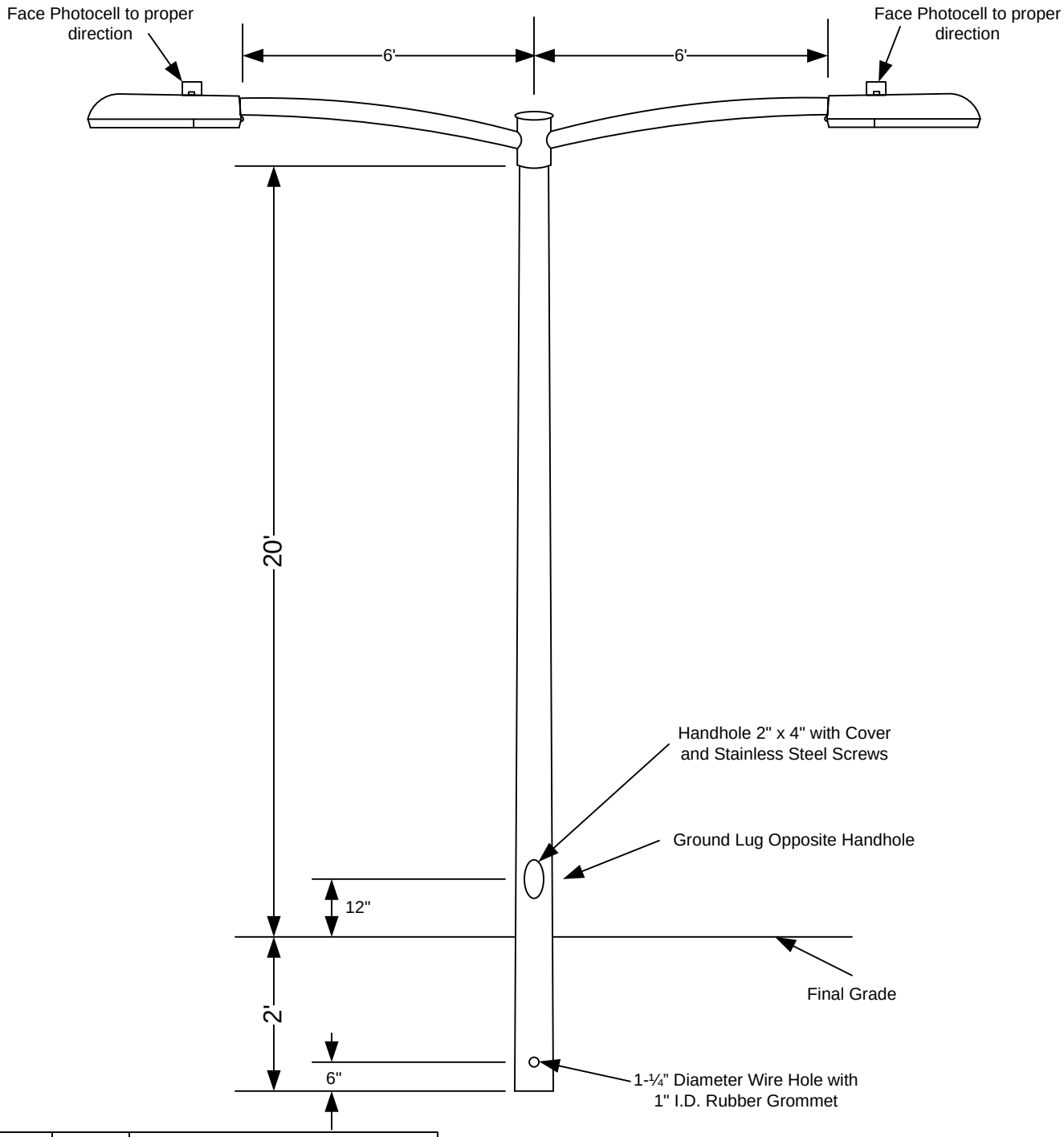


ITEM	QTY.	MATERIAL
	1	Pole, Aluminum 22'
	1	Photocell
	1	Lamp, 175W MH
	1	Fuse, 5 Amp, (FLM 5)
	1	Fuse holder
	1	UP Sweep bracket, Single
	1	Luminaire, Cobra Style
	30	Conductor, #12/2 UF with Ground

Note:

Do Not install Pole without Luminaire

Single Arm Street Light Cobrahead Style (unmetered)		
2014	WFECA	UM26-5S1

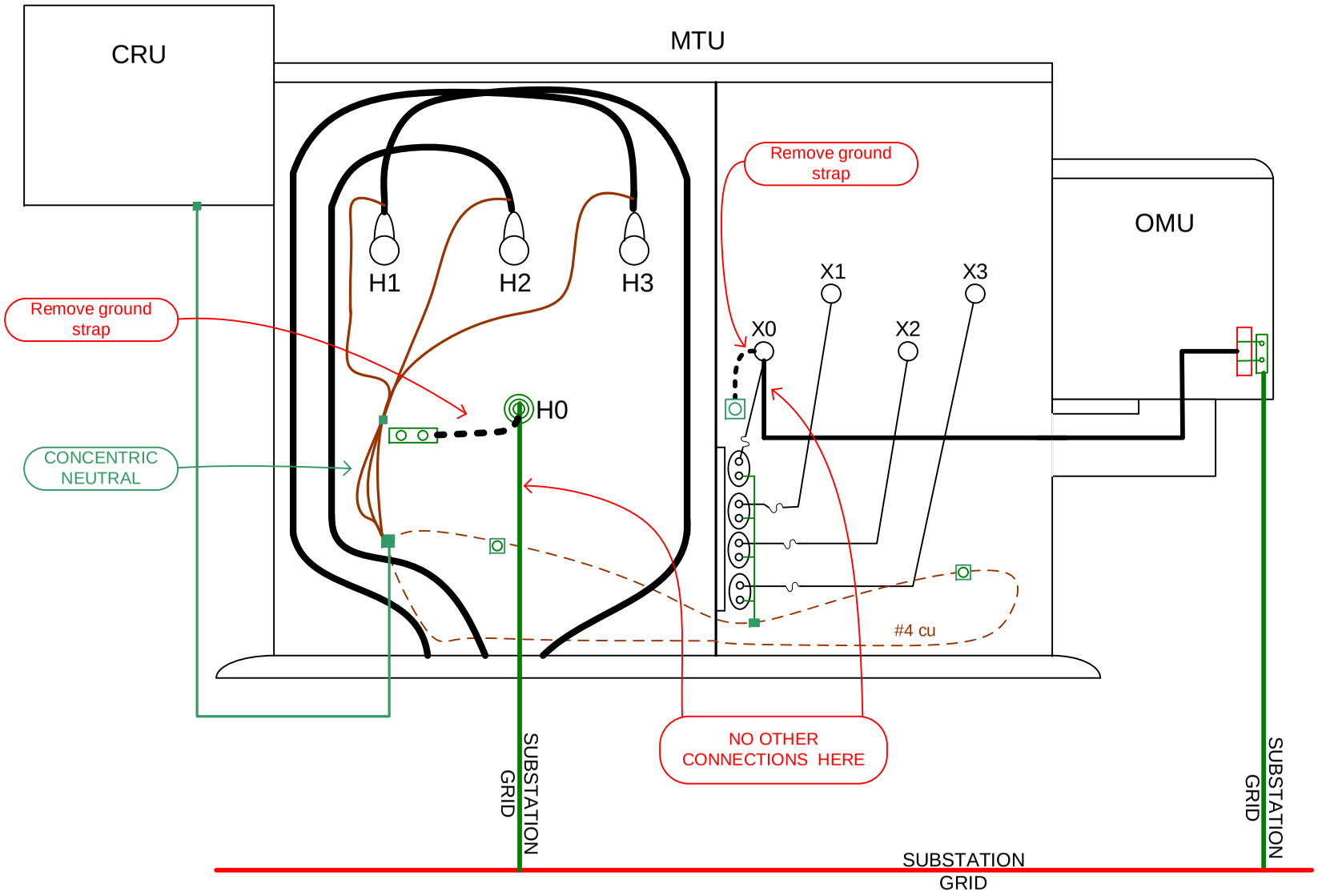


ITEM	QTY.	MATERIAL
	1	Pole, Aluminum 22'
	1	Photocell
	1	Lamp, 175W MH
	1	Fuse, 5 Amp, (FLM 5)
	1	Fuse holder
	1	UP Sweep bracket, Double
	2	Luminaire, Cobra Style
	40	Conductor #12/2 UF with Ground

Note:

Do Not install Pole without Luminaire

Double Arm Street Light Cobrahead Style (unmetered)		
2014	WFECA	UM26-5S2

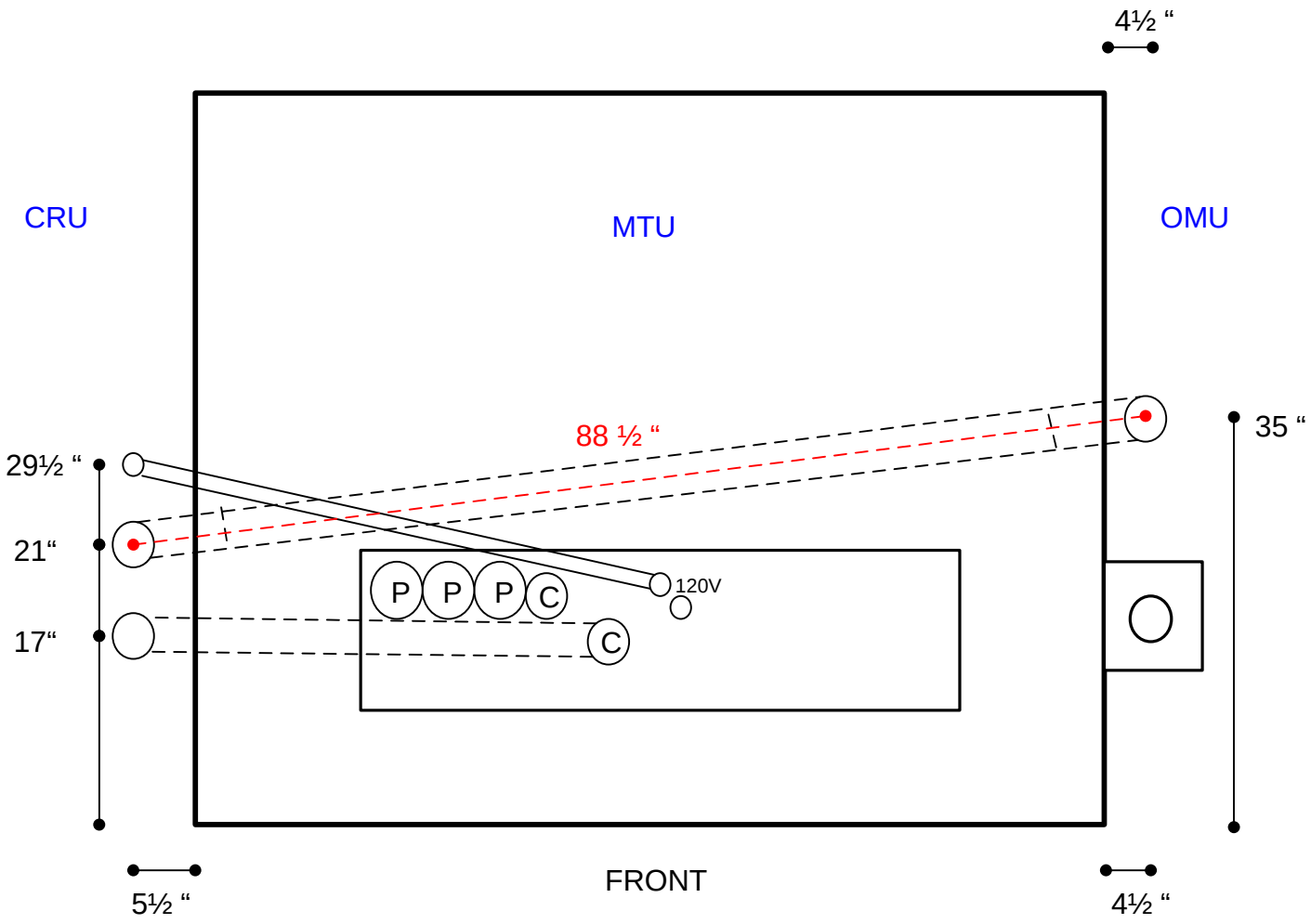


Notes:

1. Remove all tank grounds from H0 and X0 bushings
2. Bond #4 CU to concentric neutral *only*
3. Bond all concentric neutrals together
4. Bond capacitor grounding to #4 CU only
5. Bond CRU equipment ground to #4 CU
6. Verify Bonding of concentric neutrals to Substation ground

Original Drawing by
Greg Calloway
11-29-07

DCSI / ACLARA (TWACS) GROUNDING AND CABLE ROUTING		
2013	WFECA	UAMI-1G



P= PRIMARY CONDUCTOR

C= COMMUNICATIONS

INSTALL SWEEPS ON ENDS OF ALL PIPES ACCORDING TO PROPER SIZE

INSTALL 2’’ LB BETWEEN C PIPES

INSTALL 1’’ LB BETWEEN 120V PIPES

DISCONNECT GROUNDING STRAP FROM XO BUSHING (secondary neutral) BY REMOVING PADDLE CONNECTOR AND CASING BOLT. REPLACE PADDLE CONNECTOR.

ITEM	QTY.	MATERIAL
gc	1	Conduit, 1 Inch PVC SCH 40 (10 ft stick)
gc	2	Sweep, Conduit, 1 Inch PVC SCH 40
gc	4	Coupling, Conduit, 1 Inch PVC SCH 40
gc	1	Conduit Body, Type LB, 1 Inch PVC
gc	2	Conduit, 2 Inch PVC SCH 40 (10 ft stick)
gc	4	Sweep, Conduit, 2 Inch PVC SCH 40
gc	3	Coupling, Conduit, 2 Inch PVC SCH 40
gc	1	Conduit Body, Type LB, 2 Inch PVC

Original Drawing by
Greg Calloway
11-29-07

CONDUIT LAYOUT GUIDELINES
FOR ACLARA (TWACS) TRANSFORMER

2013	WFECA	UAMI-2G

SPECIFICATIONS AND DRAWINGS FOR ELECTRIC METERING AND SERVICE

West Florida Electric Cooperative Edition

Revised April 30, 2015

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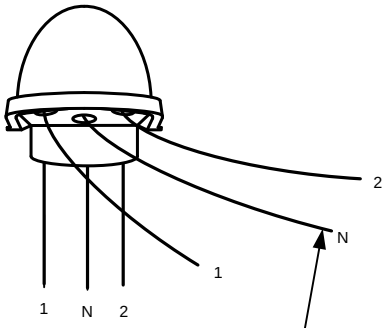
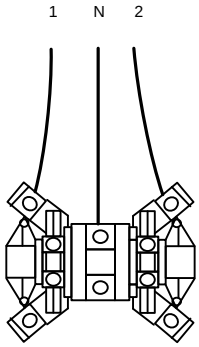
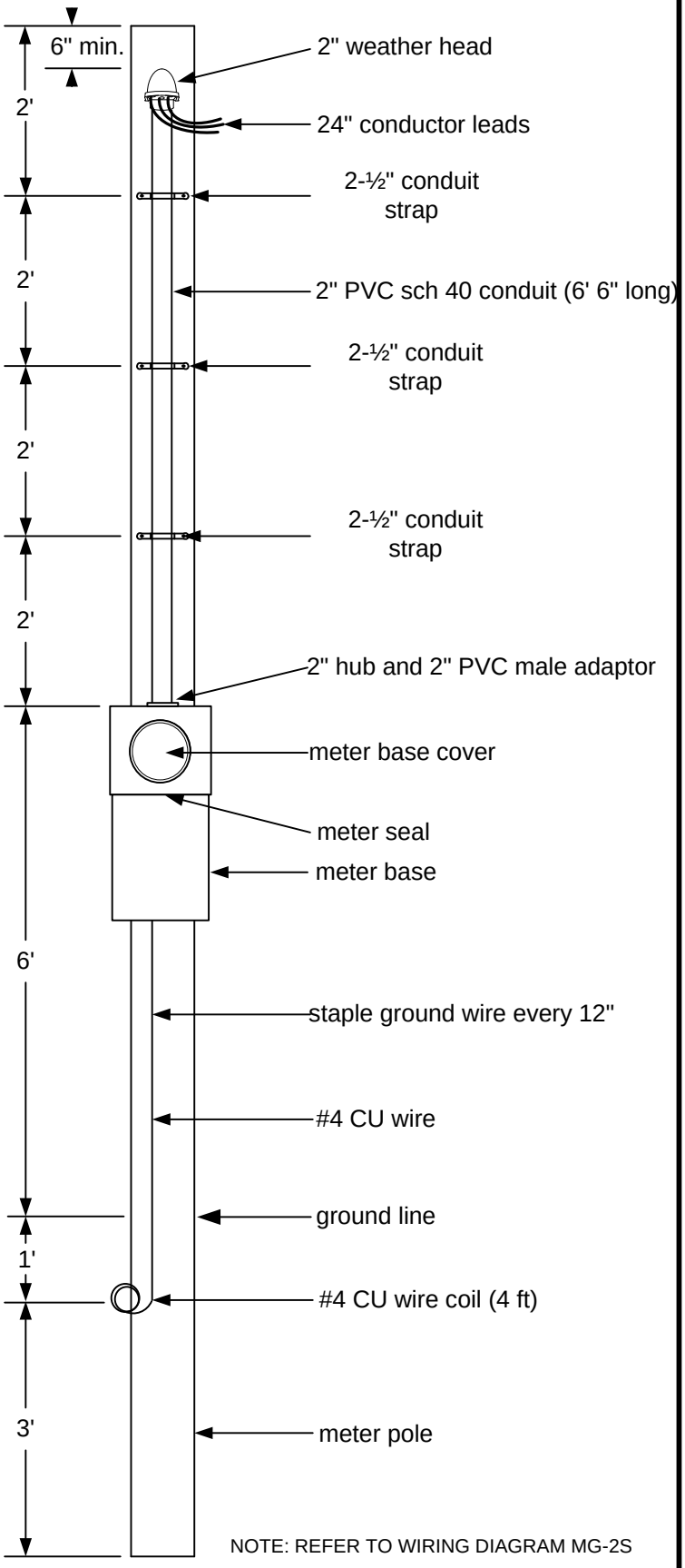
Meter Base Assemblies for Overhead Services



strip 2 inches of insulation from neutral lead



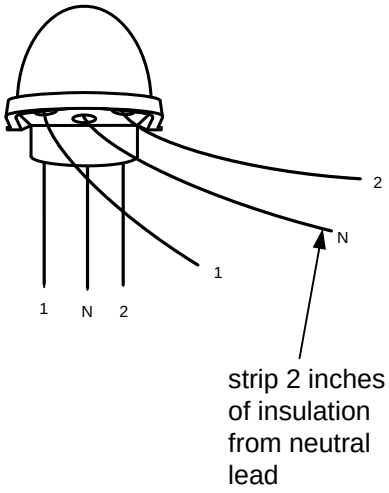


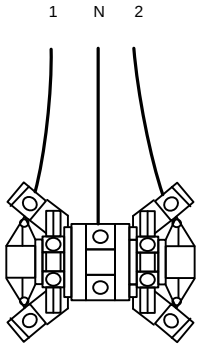
NOTE: REFER TO WIRING DIAGRAM MG-2S

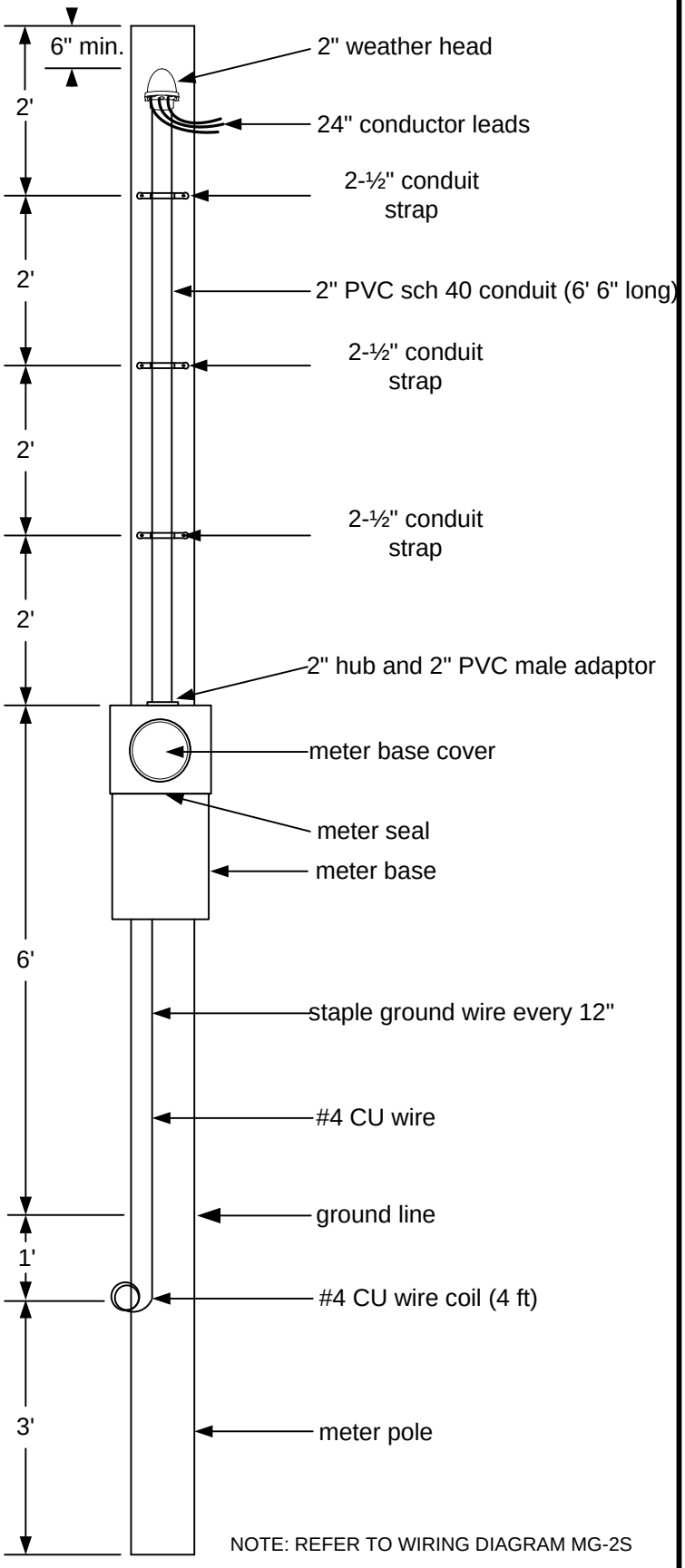
ITEM	QTY.	MATERIAL
	1	Pole, 18 ft, round pressure treated
	10	#4 SD CU Wire
p	1	Ground rod, 5/8" x 10', CWC
	1	Clamp, ground rod, 5/8"
sd	½	Staples, (1bs)
gb	1	Meter base, 4 terminal with 6 pak
j	2	Lag screw, 3/8" x 3"
	2	Washer, round, 1 ¼" OD x 14 GA, 9/16" hole
	1	Meter base hub, 2"
	1	Male adaptor, 2" PVC
gc	1	Conduit, 2" x 10', PVC, SCH 40, (10 ft stick)
sn	1	Weather head, 2" PVC
gd	4	Straps, conduit, 2 1/2", 2 hole
j	8	Lag screw, 1/4" x 2 1/2"
	30	Conductor, 2/0 CU, insulated

Overhead Meter Loop Pole
(without main breaker)

2011	WFECA	M8-2SA



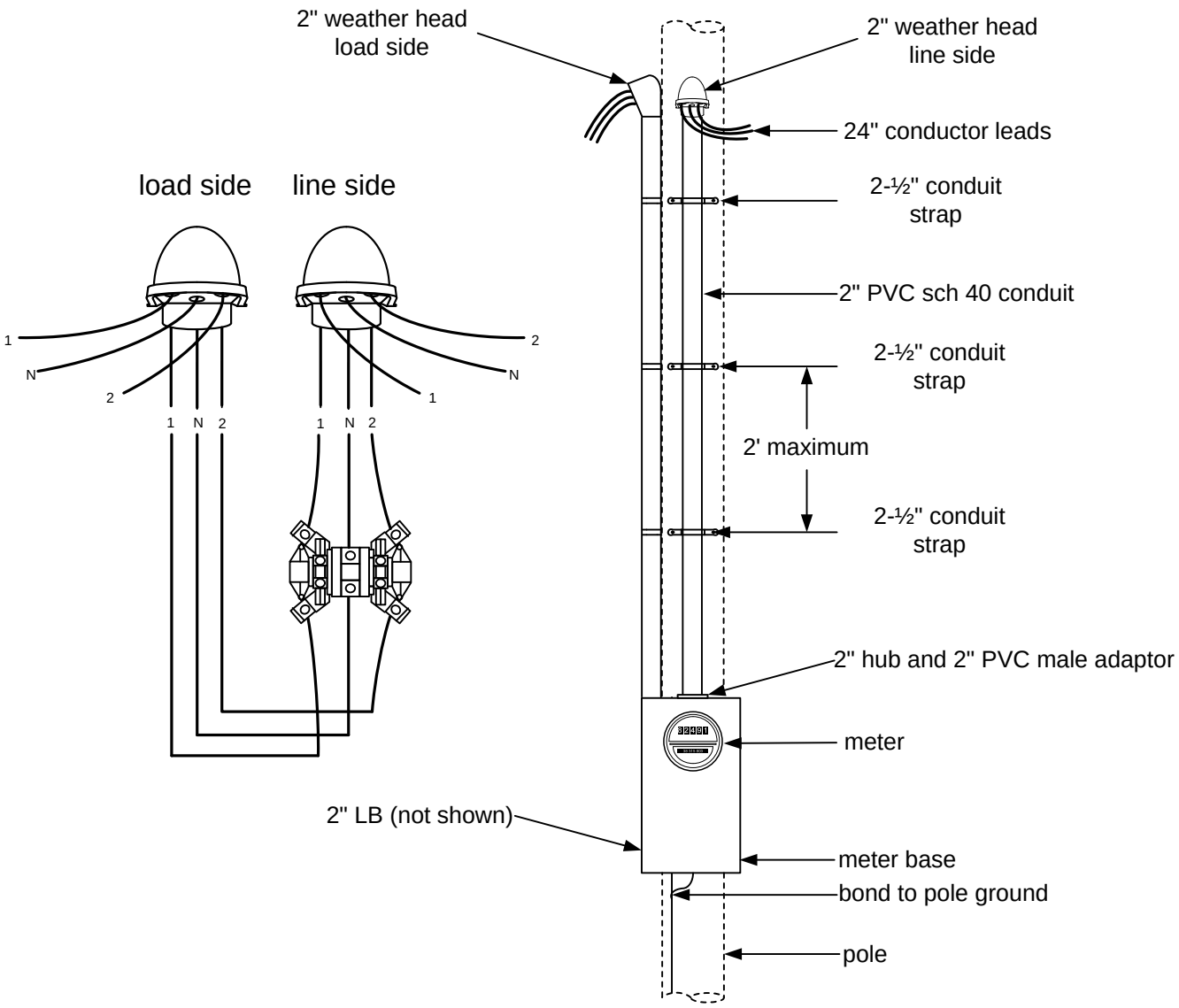




ITEM	QTY.	MATERIAL
	1	Pole, 18 ft, round pressure treated
	10	#4 SD CU Wire
p	1	Ground rod, 5/8" x 10', CWC
	1	Clamp, ground rod, 5/8"
sd	½	Staples, (1bs)
gb	1	Meter base, 4 terminal with 200 A C.B.
j	2	Lag screw, 3/8" x 3"
	2	Washer, round, 1 ¼" OD x 14 GA, 9/16" hole
	1	Meter base hub, 2"
	1	Male adaptor, 2" PVC
gc	1	Conduit, 2" x 10', PVC, SCH 40, (10 ft stick)
sn	1	Weather head, 2" PVC
gd	4	Straps, conduit, 2 1/2", 2 hole
j	8	Lag screw, 1/4" x 2 1/2"
	30	Conductor, 2/0 CU, insulated

NOTE: REFER TO WIRING DIAGRAM MG-2S

Overhead Meter Loop Pole (with 200 A main breaker)		
2011	WFECA	M8-2SB



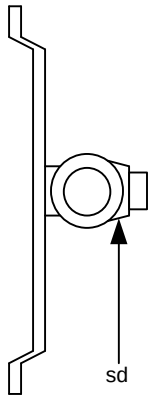
ITEM	QTY.	MATERIAL
	10	#4 SD CU Wire
sd	1	Staples, (1bs)
gb	1	Meter base, 4 terminal, 200 A
j	2	Lag screw, 3/8" x 3"
	2	Washer, round, 1 ¼" OD x 14 GA, 9/16" hole
	1	Meter base hub, 2"
	2	Male adaptor, 2" PVC
gc	1	Conduit LB, 2", PVC
gc	4	Conduit, 2" x 10', PVC, SCH 40, (10 ft stick)
sn	2	Weather head, 2" PVC
gd	16	Straps, conduit, 2 1/2", 2 hole
j	32	Lag screw, 1/4" x 2 1/2"
	60	Conductor, 2/0 CU, insulated

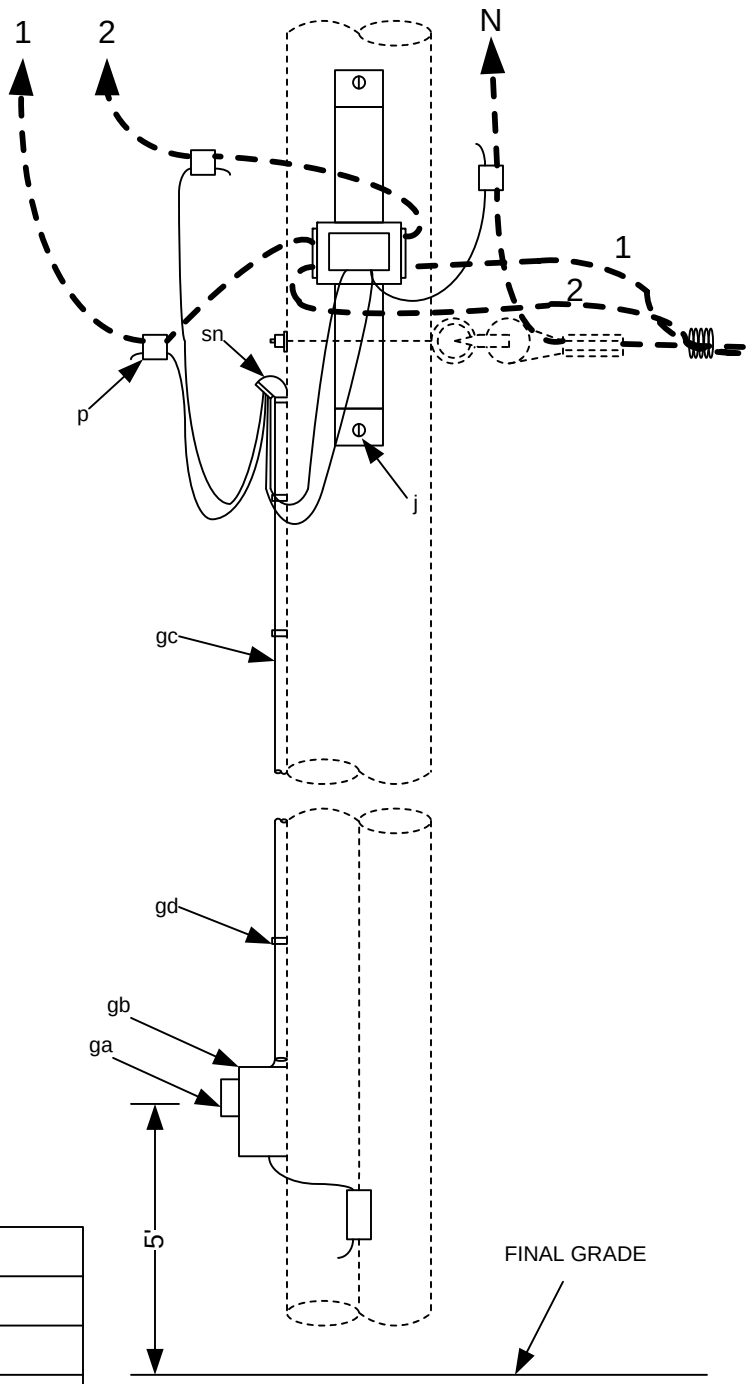
NOTE: 1. REFER TO WIRING DIAGRAM MG-2S

NOTE: 2. BOND METER BASE TO POLE GROUND.

NOTE: 3. ADD GROUND ROD IF MISSING

Overhead Meter Pole Mounted (with 200 A main breaker)		
2012	WFECA	M8-2SC

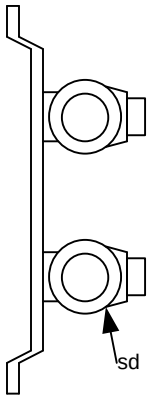


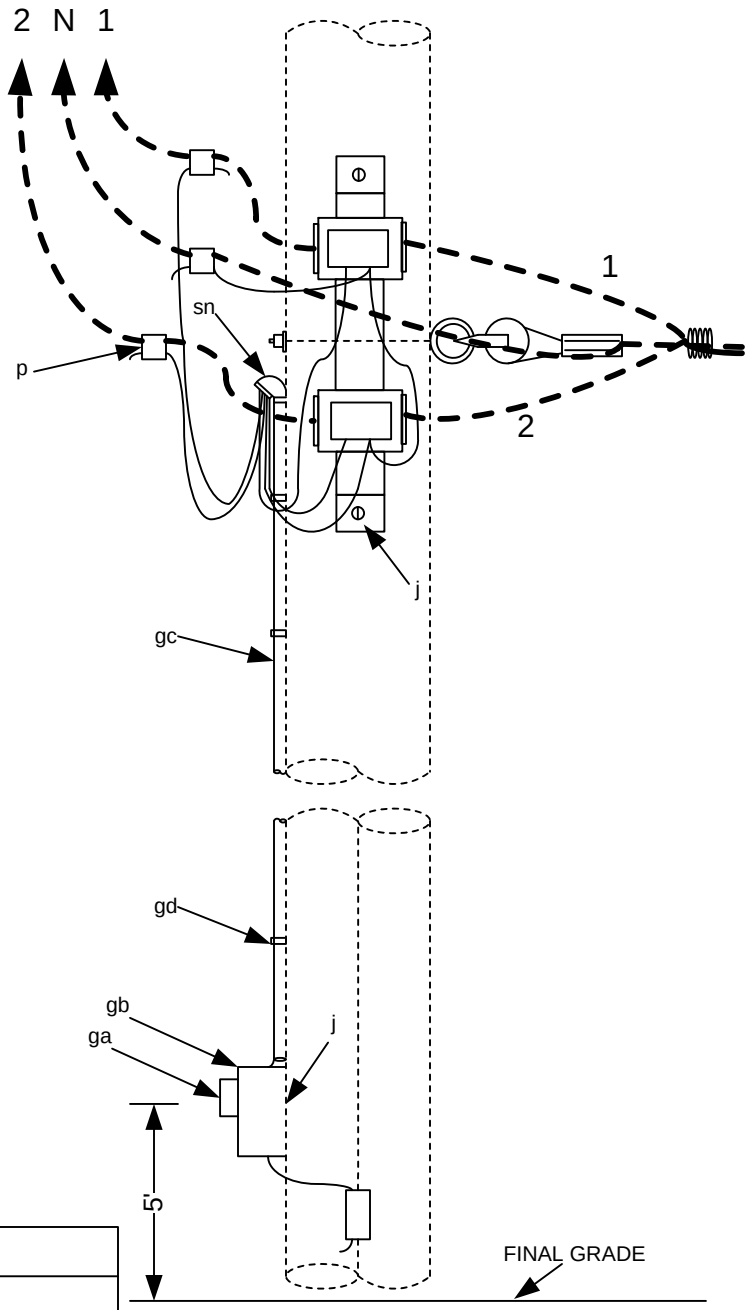


ITEM	QTY.	MATERIAL
	1	Male Terminal Adaptor, 1" PVC
j	10	Lag screw, 3/8" x 3"
j	2	Lag screw, ½" x 4"
p		Connectors, as required
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
gb	1	Meter base, 5 terminal with wiring harness
sd	1	Current transformer, window type
sn	1	Weather head, 1"
ga	1	Meter, Form 3S, class 20
	1	CT bracket
	5	#12 Copper Wire, Insulated, Solid

NOTE: REFER TO WIRING DIAGRAM MG-3S

METER BASE FOR OH SINGLE PHASE, THREE WIRE SERVICE - TRANSFORMER RATED (ONE CT)		
2005	WFECA	M8-3S

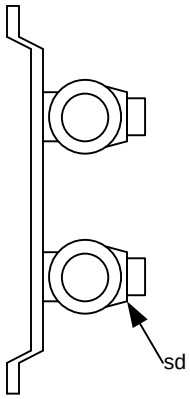


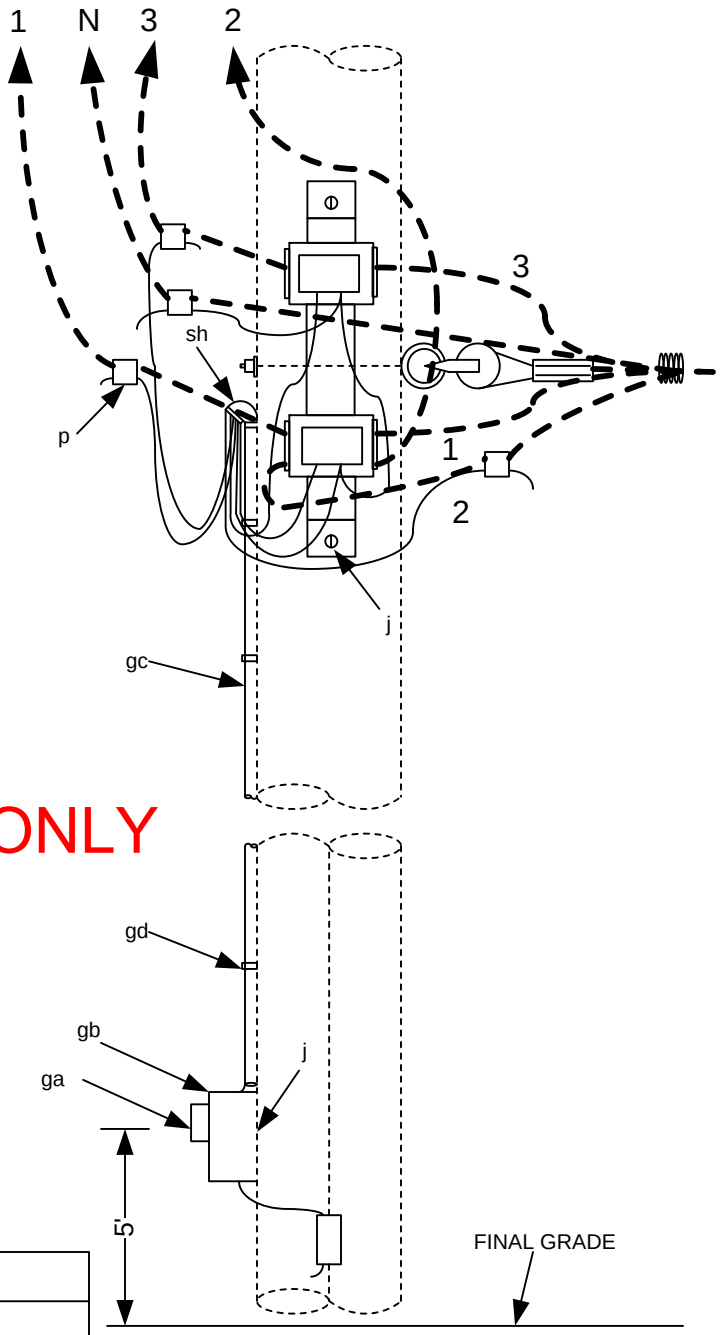


ITEM	QTY.	MATERIAL
	1	Male Terminal Adaptor, 1" PVC
j	10	Lag screw, 3/8" x 3"
j	2	Lag screw, ½" x 4"
p		Connectors, as required
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
gb	1	Meter base, 6 terminal with wiring harness
sd	2	Current transformer, window type
sn	1	Weather head, 1"
ga	1	Meter, Form 4S, class 20
	1	CT bracket
	5	#12 Copper Wire, Insulated, Solid

NOTE: REFER TO WIRING DIAGRAM MG-4S

METER BASE FOR OH SINGLE PHASE, THREE WIRE SERVICE - TRANSFORMER RATED (TWO CT's)		
2005	WFECA	M8-4S



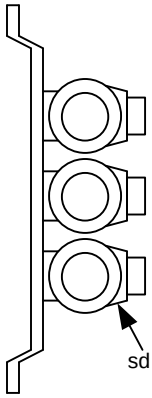


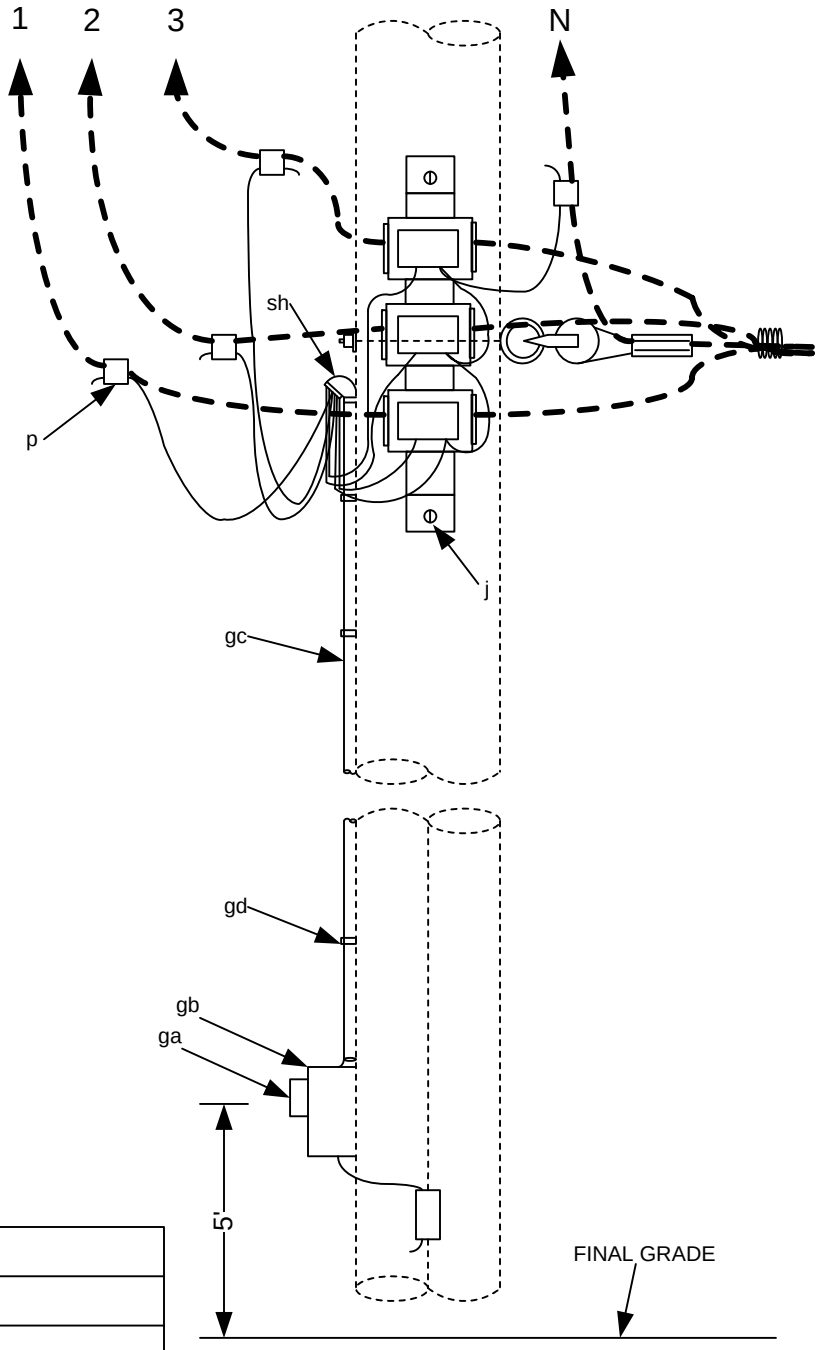
FOR MAINTENANCE ONLY

ITEM	QTY.	MATERIAL
	1	Male Terminal Adaptor, 1" PVC
j	10	Lag screw, 3/8" x 3"
j	2	Lag screw, ½" x 4"
p		Connectors, as required
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
gb	1	Meter base, 8 terminal with wiring harness
sd	2	Current transformer, window type
sn	1	Weather head, 1"
ga	1	Meter, Form 5S, class 20
	2	CT bracket
	5	#6 Copper Wire, Stranded, Insulated

NOTE: REFER TO WIRING DIAGRAM MG-5S

METER BASE FOR OH THREE PHASE, FOUR WIRE CENTER GROUNDED DELTA SERVICE - TRANSFORMER RATED		
2005	WFECA	M8-5S

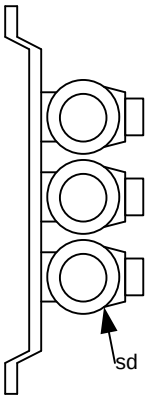


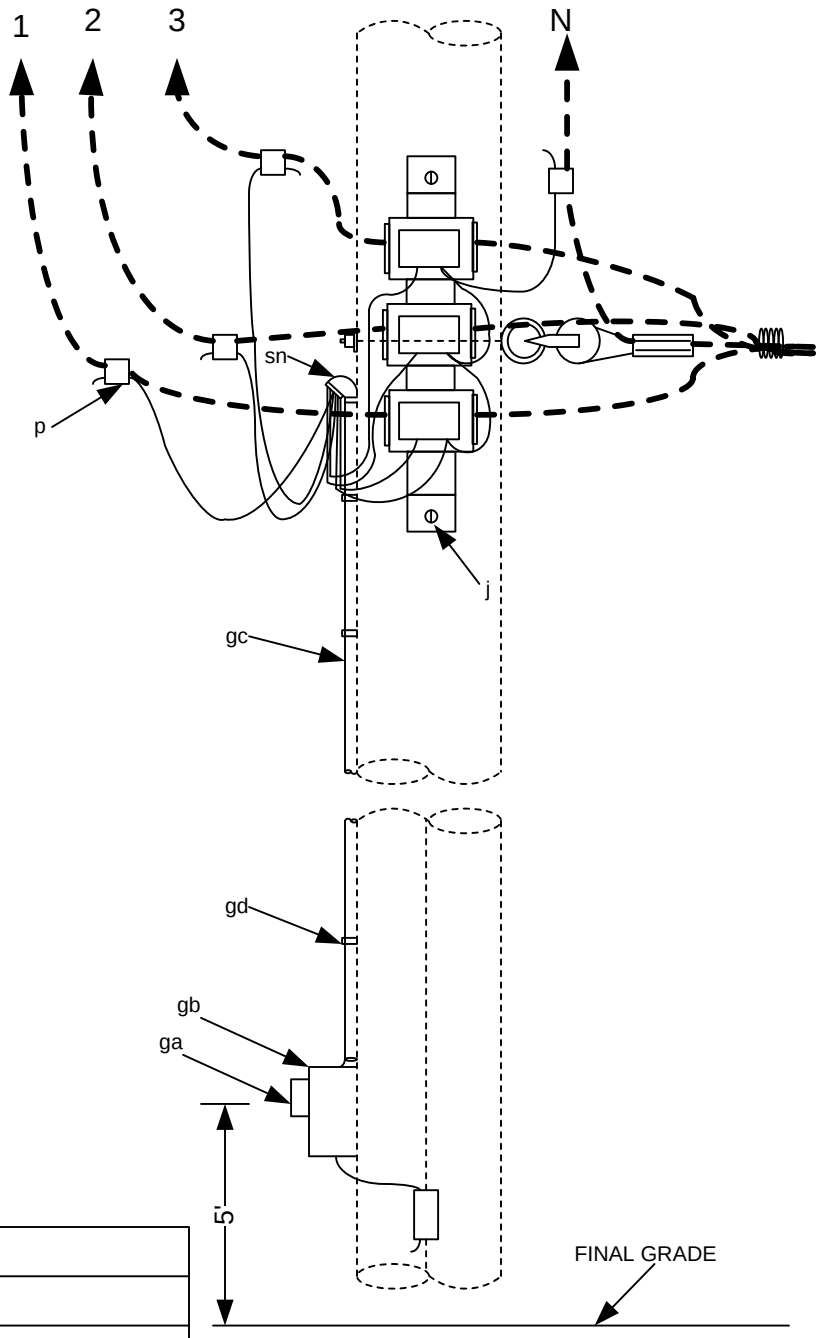


ITEM	QTY.	MATERIAL
	1	Male Terminal Adaptor, 1" PVC
j	8	Lag screw, 3/8" x 3"
j	4	Lag screw, ½" x 4"
p		Connectors, as required
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
gb	1	Meter base, 13 terminal with wiring harness
sd	3	Current transformer, window type
sn	1	Weather head, 1"
ga	1	Meter, Form 9S/8S, class 20
	1	CT bracket
	1	#6 Copper Wire, Stranded, Insulated

NOTE: REFER TO WIRING DIAGRAM MG-8S

METER BASE FOR OH THREE PHASE, FOUR WIRE CENTER GROUNDED DELTA SERVICE -TRANSFORMER RATED		
2005	WFECA	M8-8S

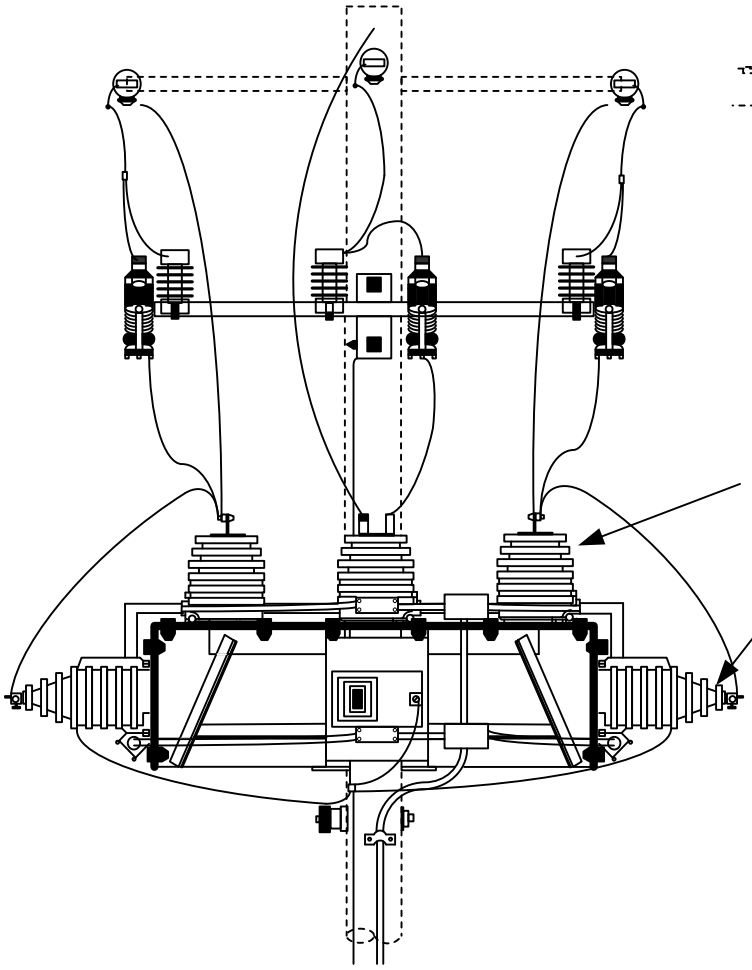


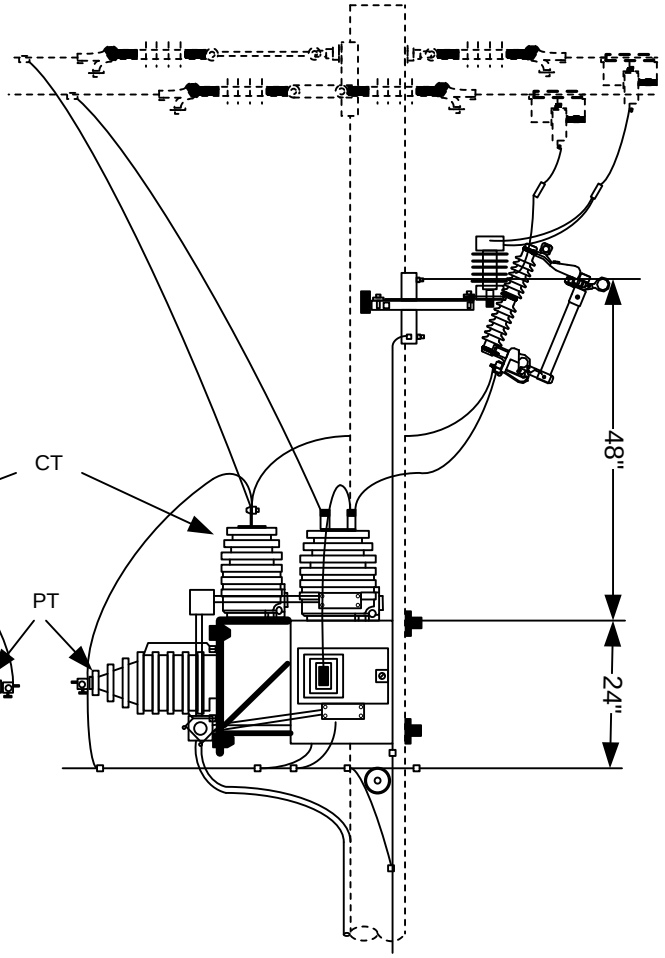


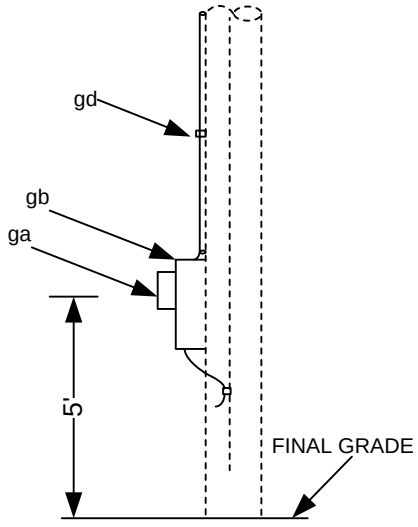
ITEM	QTY.	MATERIAL
	1	Male Terminal Adaptor
j	8	Lag screw, 3/8" x 3"
j	4	Lag screw, ½" x 4"
p		Connectors, as required
gc	2	Conduit, 1" x 10', PVC, SCH 40
gd	4	Straps, conduit, 1"
gb	1	Meter base, 13 terminal with wiring harness
sd	3	Current transformer, window type
sn	1	Weather head, 1"
ga	1	Meter, Form 9S/8S, class 20
	1	CT bracket
	5	#6 Copper Wire, Stranded, Insulated

NOTE: REFER TO WIRING DIAGRAM MG-9S

METER BASE FOR OH THREE PHASE, FOUR WIRE WYE SERVICE-TRANSFORMER RATED		
2005	WFECA	M8-9S







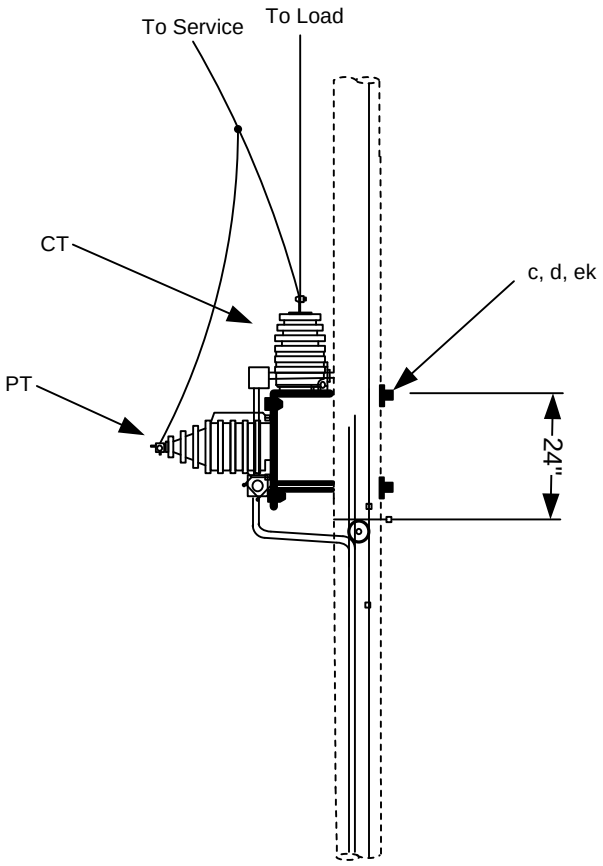
ITEM	QTY.	MATERIALS
fm	2	Bracket, Mounting C.T. and P.T. (3) (BAPMM6-54)
c	3	Bolts, 5/8" x as required
d	3	Washers, 2" x 2" square
af	3	Cutout, with Loadbreak
Uae	3	Surge Arrestor
sd	3	Transformer, Current, Primary
se	3	Transformer, Potential, Primary
ek	3	Locknuts, 5/8"
av		Jumpers, as required
p		Connectors, as required
al		Staples, as required
j	8	Lag Screws, 3/8" x 2 1/2"
j	6	Lag Screws, ½ x 4"
gc	2	Conduit, 1" x 10", PVC, SCH 40
gd	4	Straps, conduit, 1"
	8	Bolts, instrument mounting, provided in packaging
gc	25	Conduit, 1", Liquidtight Flexible
	16	Conduit, 1", Liquidtight connector
	2	Junction box, PVC
	2	Junction box, cover, PVC
gb	1	Meterbase, 13 terminal with wiring harness
	1	Conduit, Female adapter, 1" threaded, PVC
	1	Conduit, Male Terminal Adapter
	2	Conduit, couplings, 1" PVC
ga	1	Meter, Form 9s, class 20

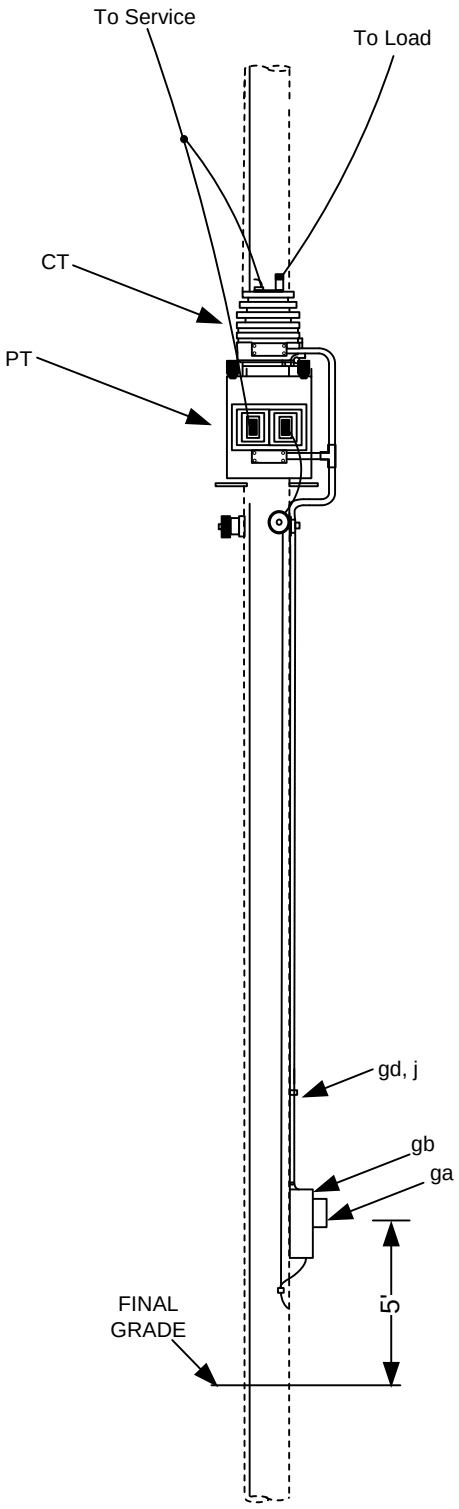
Note:

See MG-17 for CT and PT details.

See MG-10 and MG-13 for Wiring details

Primary Metering, Three Phase, Pole Mounted		
2011	WFECA	M8-10





Note:

See MG-17 for CT and PT details.

See MG-11 for Wiring details

Use with VS1.11 or VS1.5 for Sectionalizing

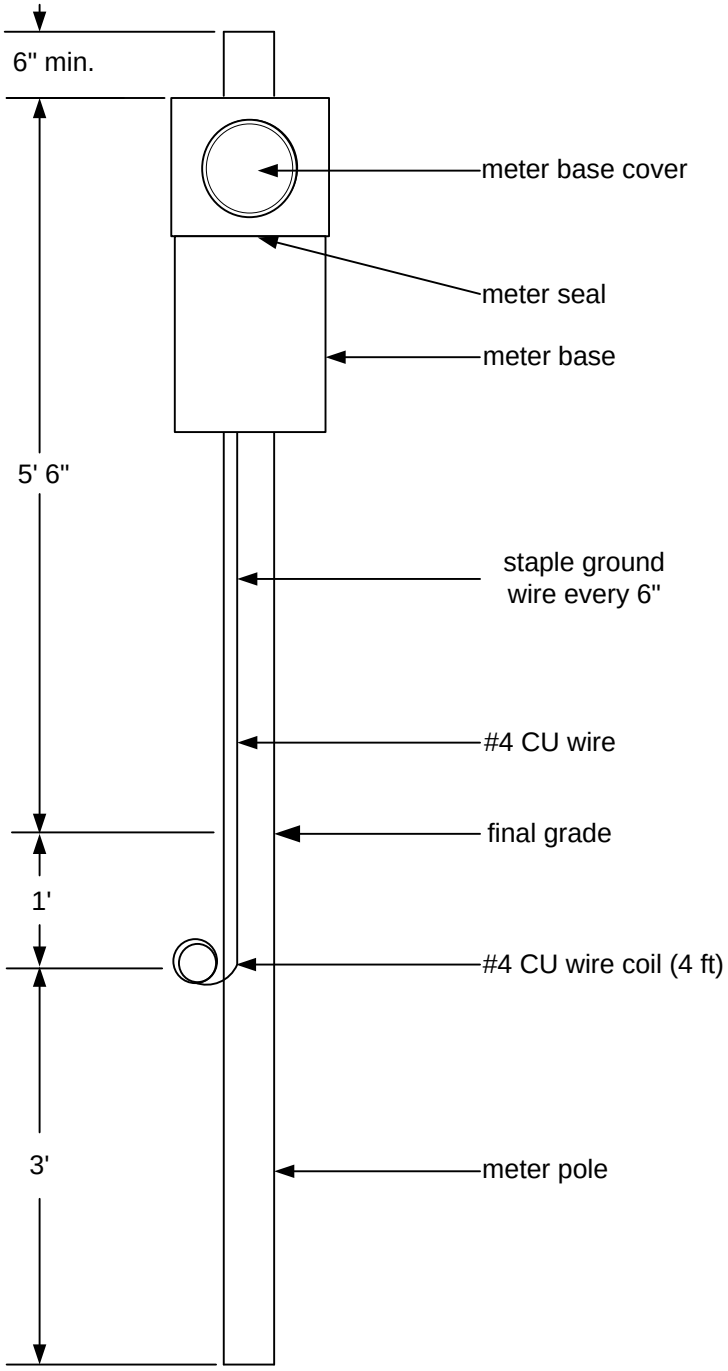
ITEM	QTY.	MATERIALS
fm	1	Bracket, Mounting C.T. and P.T.
c	2	Bolts, 5/8" x as required
d	2	Washers, 2" x 2" square
ek	2	Locknut, 5/8"
sd	1	Transformer, Current, Primary
se	1	Transformer, Potential, Primary
j	8	Lag Screws, 3/8" x 3"
j	6	Lag Screws, ½ x 4"
gc	2	Conduit, 1" x 10", PVC, SCH 40
gd	4	Straps, conduit, 1"
	8	Bolts, instrument mounting, provided in packaging
gc	25	Conduit, 1", Liquidtight Flexible
	16	Conduit, 1", Liquidtight connector
	1	Junction box, PVC
	1	Junction box, cover, PVC
gb	1	Meterbase, 5 terminal with wiring harness
	1	Conduit, Female adapter, 1" threaded, PVC
	1	Conduit, Male Terminal Adapter
	2	Conduit, couplings, 1" PVC
ga	1	Meter, Form 3S, class 20

Primary Metering, Single Phase, Pole Mounted		
2011	WFECA	M8-13

INDEX 2

Meter Base Assemblies for Underground Services

DRAWING NUMBER	DRAWING TITLE (DESCRIPTION)
UM8-2S	Underground Meter Base Loop Pole – (with 200A main breaker)
UM8-2SA	Underground Meter Base Loop Pole – (without main breaker)
UM8-3S	Meter Base for UG Single Phase, Three Wire Service – Transformer Rated (One CT)
UM8-4S	Meter Base for UG Single Phase, Three Wire Service – Transformer Rated (Two CTs)
UM8-8OD	Meter Base for UG Three Phase, Four Wire Service – Transformer Rated (Three CTs)
UM8-9S	Meter Base for UG Three Phase, Four Wire Center Grounded Delta Service – Transformer Rated (Three CTs)
UM8-9SA	Meter Base for UG Three Phase, Four Wire Center Grounded Delta Service – Transformer Rated (Three CTs)
UM8-10	Primary Metering, Three Phase, Pad Mounted
UM8-13	Primary Metering Single Phase Pole Mounted to Underground Cable
M8-15	Primary Metering Three Phase Pole Mounted to Underground Cable



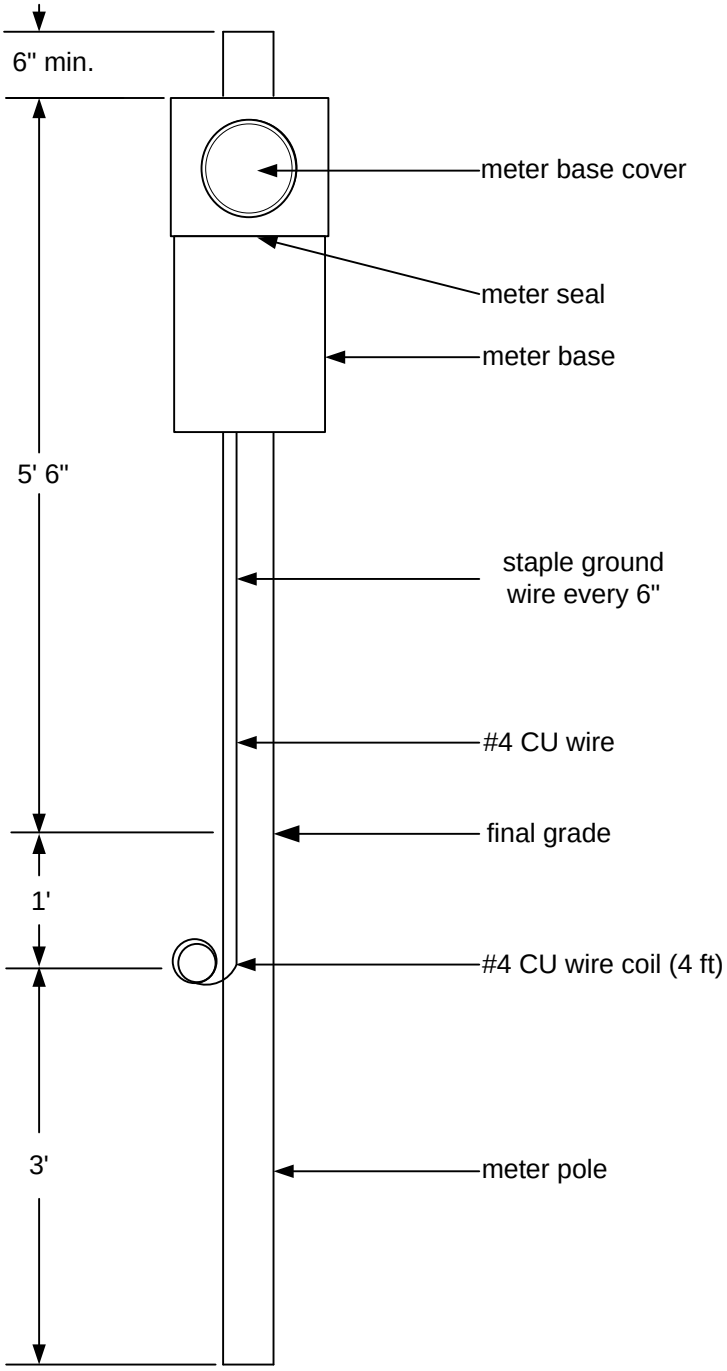
ITEM	QTY.	MATERIAL
	1	Pole, 6"x6"X10', square, pressure treated
	10	#4 SD CU Wire
aj	1	Ground rod, 5/8" x 10', CWC
ai	1	Clamp, ground rod, 5/8"
at	½	Staples, (1bs)
gb	1	Meter base, 4 terminal with 200 A main CB
j	2	Lag screw, 3/8" x 3"
	2	Washer, round, 1 ¼" OD x 14 GA, 9/16" hole
	1	Conduit, 3 inch, Sch 80, (10 foot stick)
	1	Conduit, 90 Sweep, 3 inch, 24" radius
	1	Conduit, Male Adaptor, 3 inch, w/ locking ring

CONDUIT NOT SHOWN

NOTES:

1. REFER TO WIRING DIAGRAM MG-2S FOR WIRING DETAILS.
2. REFER TO DRAWINGS GS-5 AND GS-5A FOR CONDUIT DETAILS.

UNDERGROUND LOOP METER POLE (WITH 200 A MAIN BREAKER)		
2011	WFECA	UM8-2S



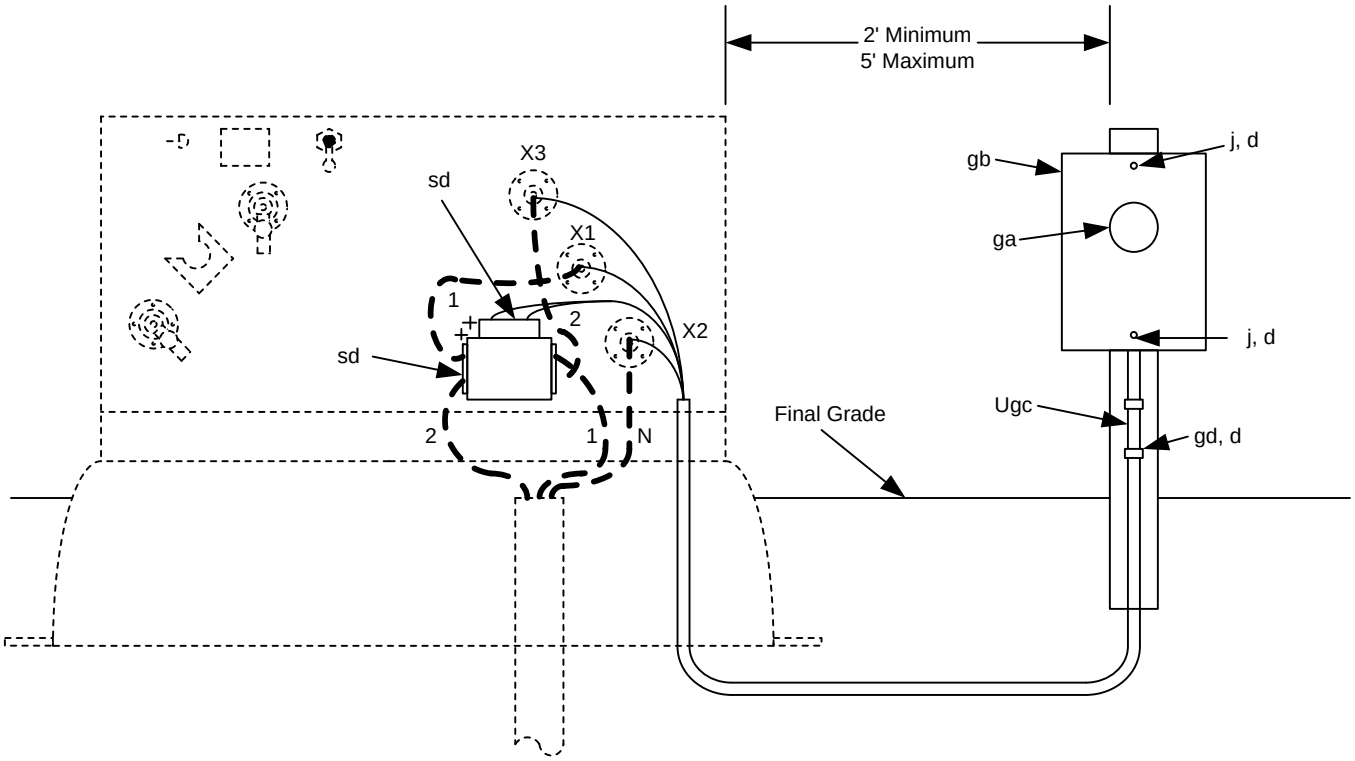
ITEM	QTY.	MATERIAL
	1	Pole, 6"x6"X10', square, pressure treated
	10	#4 SD CU Wire
aj	1	Ground rod, 5/8" x 10', CWC
ai	1	Clamp, ground rod, 5/8"
at	½	Staples, (1bs)
gb	1	Meter base, 4 terminal with 6 pak
j	2	Lag screw, 3/8" x 3"
	2	Washer, round, 1 ¼" OD x 14 GA, 9/16" hole
	1	Conduit, 3 inch, Sch 80, (10 foot stick)
	1	Conduit, 90 Sweep, 3 inch, 24" radius
	1	Conduit, Male Adaptor, 3 inch, w/ locking ring

CONDUIT NOT SHOWN

NOTES:

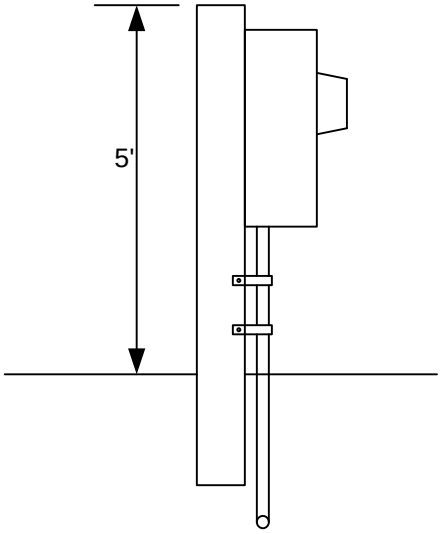
1. REFER TO WIRING DIAGRAM MG-2S FOR WIRING DETAILS.
2. REFER TO DRAWINGS GS-5 AND GS-5A FOR CONDUIT DETAILS.

UNDERGROUND LOOP METER POLE (WITHOUT 200 A MAIN BREAKER)		
2011	WFECA	UM8-2SA



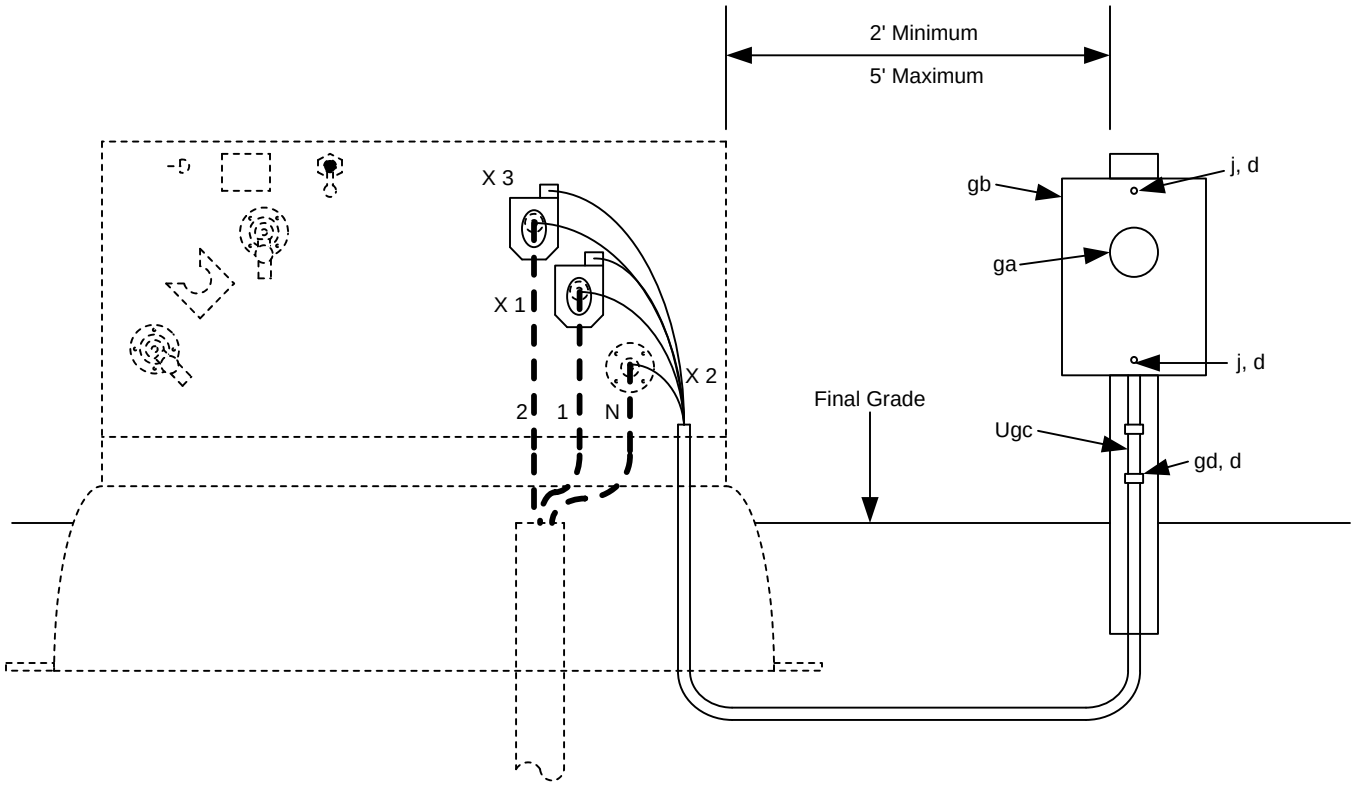
NOTE: INSTALL GROUND WIRE BETWEEN METER BASE AND TRANSFORMER GROUND

REFER TO WIRING DIAGRAM MG-3S



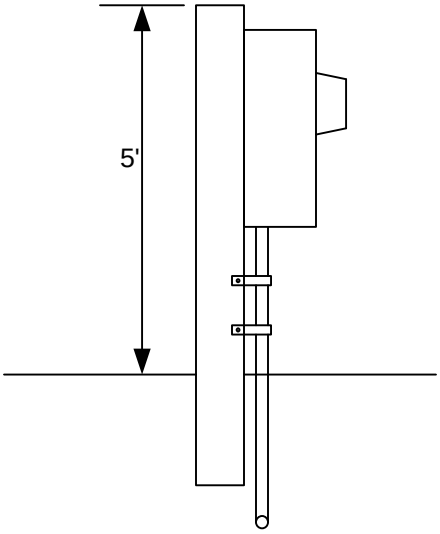
ITEM	QTY.	MATERIAL
	1	Locking Ring, 1"
ga	1	Meter Form, 3S
	1	Pole, 6" x 6" x 8', treated
	15	#6 Copper Wire, Insulated, Stranded
d	2	Washer, round 7/8" with 7/16" hole
j	2	Lag screw, ½" x 4"
sd	1	CT, Window Type
gb	1	Meter base, 5 Terminal with wiring harness
gd	2	Straps, Conduit, 1"
Ugc	2	Conduit, 1" x 10', PVC, SCH 40
Ugc	2	Conduit Sweep, 1" PVC, SCH 40
	1	Male Terminal Adaptor, 1" PVC
j	4	Lag Screw, 1/4" x 2 1/2"

METER BASE FOR UG SINGLE PHASE, THREE WIRE SERVICE – TRANSFORMER RATED (ONE CT)		
2011	WFECA	UM8-3S



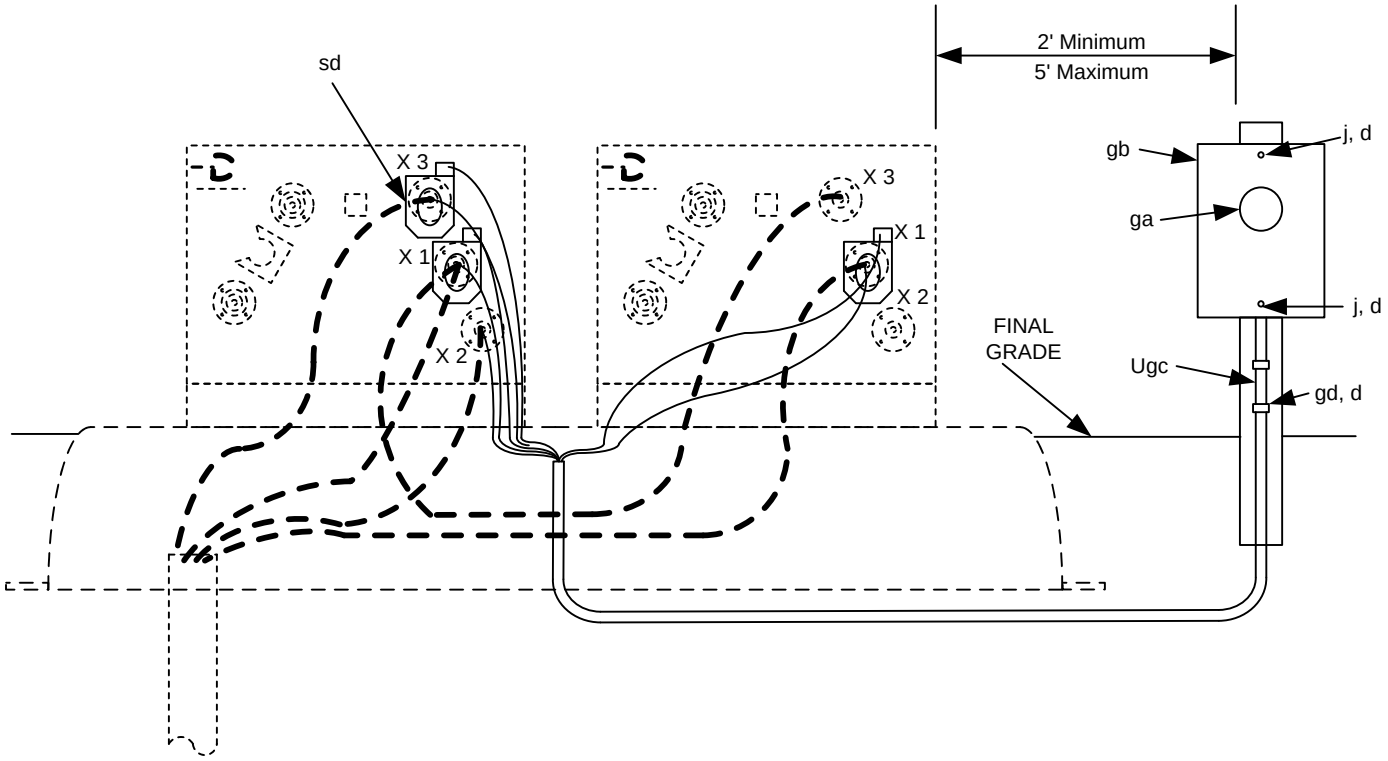
NOTE: INSTALL GROUND WIRE BETWEEN METER BASE AND TRANSFORMER GROUND

REFER TO WIRING DIAGRAM MG-4S



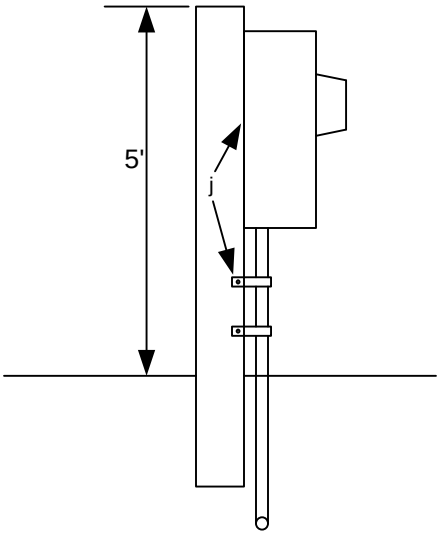
ITEM	QTY.	MATERIAL
	1	Locking Ring, 1"
ga	1	Meter Form, 4S
	1	Pole, 6" x 6" x 8', treated
	15	#6 Copper Wire, Insulated, Stranded
d	2	Washer, square 2" x 2"
j	2	Lag screw, ½" x 4"
sd	2	CT, Bushing Type
gb		Meter base, 6 Terminal with wiring harness
gd	2	Straps, Conduit, 1"
Ugc	2	Conduit, 1" x 10', PVC, SCH 40
Ugc	2	Conduit Sweep, 1" PVC, SCH 40
	1	Male Terminal Adaptor, 1" PVC
j	4	Lag Screw, 1/4" x 2 1/2"

METER BASE FOR UG SINGLE PHASE, THREE WIRE SERVICE – TRANSFORMER RATED (TWO CT)		
2011	WFECA	UM8-4S



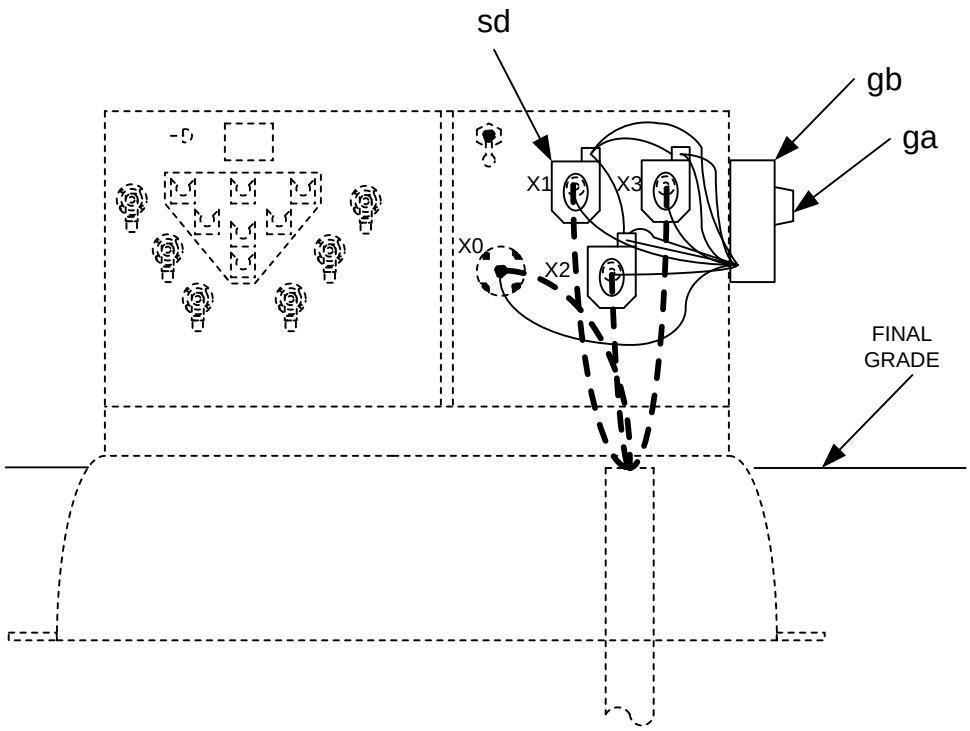
NOTE: INSTALL GROUND WIRE BETWEEN METER BASE AND TRANSFORMER GROUND.

REFER TO WIRING DIAGRAM MG-8SOD.



ITEM	QTY.	MATERIAL
	1	Locking Ring, 1"
ga	1	Meter Form, 8S
	1	Pole, 6" x 6" x 8', treated
	15	#6 Copper Wire, Insulated, Stranded
d	2	Washer, round 7/8" with 7/16" hole
j	2	Lag screw, ½" x 4"
sd	3	CT, Bushing Type
gb	1	Meter base, 13 Terminal with wiring harness
gd	2	Straps, Conduit, 1"
Ugc	2	Conduit, 1" x 10', PVC, SCH 40
Ugc	2	Conduit Sweep, 1" PVC, SCH 40
	1	Male Terminal Adaptor, 1" PVC
j	4	Lag Screw, 1/4" x 2 1/2"

METER BASE FOR UG THREE PHASE, FOUR WIRE SERVICE – TRANSFORMER RATED (THREE CT's)		
2011	WFECA	UM8-8SOD

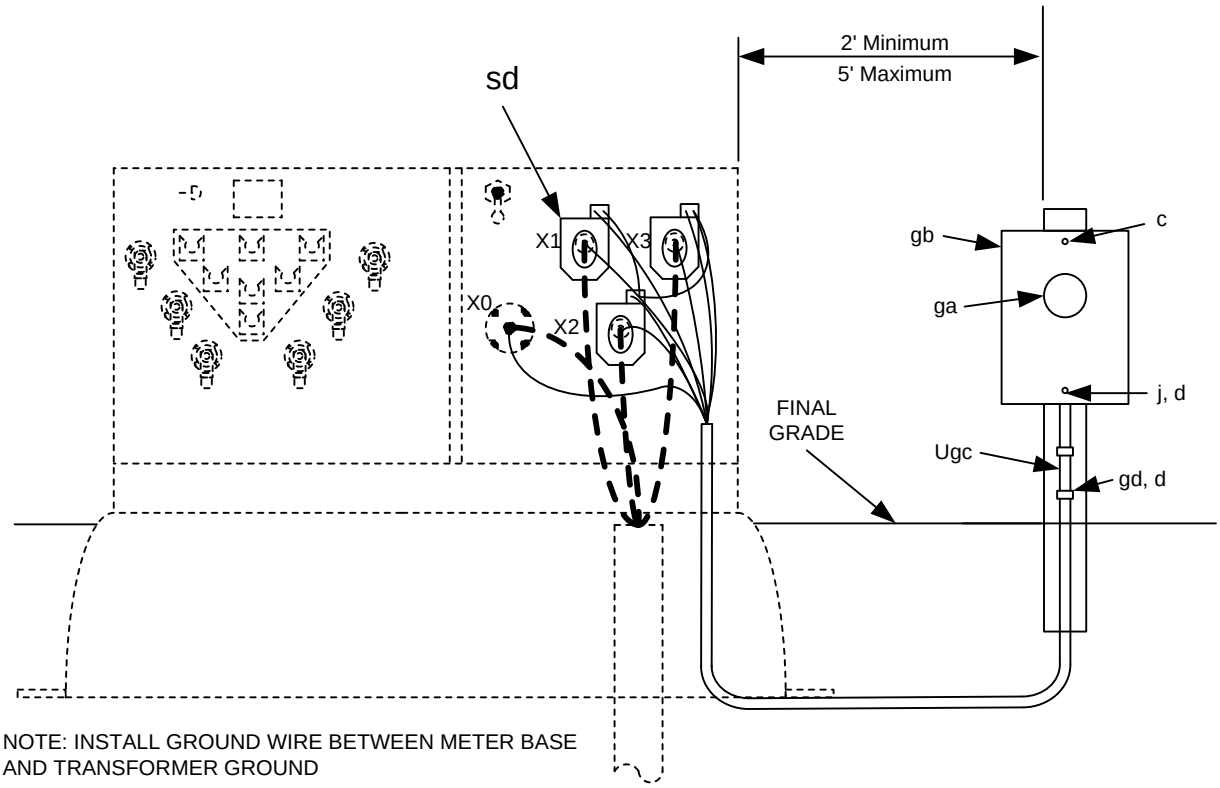


NOTE: INSTALL GROUND WIRE BETWEEN METER BASE AND TRANSFORMER GROUND

REFER TO WIRING DIAGRAM MG-9S

ITEM	QTY.	MATERIAL
	4	Bolt, 3/8" x 1"
	4	Lock washer, 3/8"
	4	Nut, 3/8"
ga	1	Meter Form, 9S
	7	#6 Copper Wire, Insulated, Stranded
sd	3	CT, Bushing Type
gb	1	Meter base, 13 Terminal with wiring harness
	1	Male Terminal Adaptor, 1" PVC
	1	Locking Ring, 1"

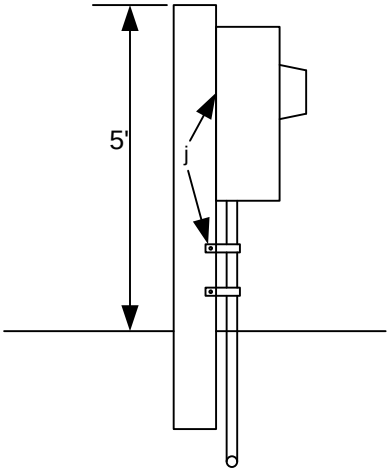
METER BASE FOR UG THREE PHASE, FOUR WIRE SERVICE – TRANSFORMER RATED (THREE CT's)		
2011	WFECA	UM8-9S



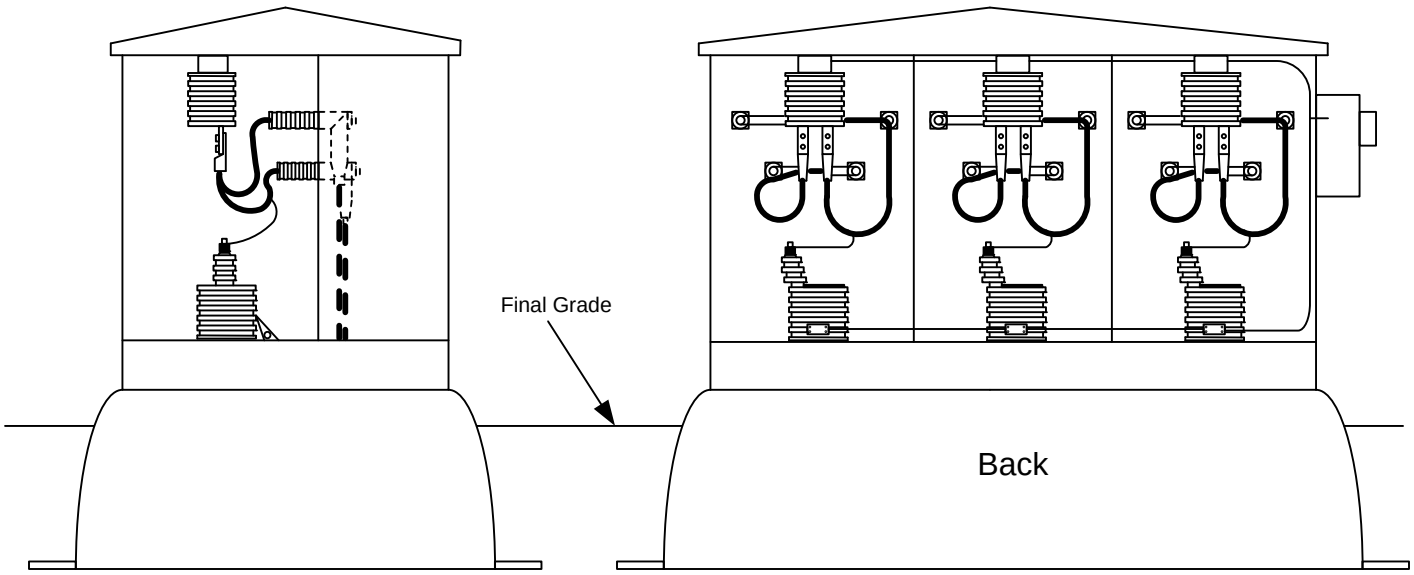
NOTE: INSTALL GROUND WIRE BETWEEN METER BASE AND TRANSFORMER GROUND

REFER TO WIRING DIAGRAM MG-9S

ITEM	QTY.	MATERIAL
	1	Locking Ring, 1"
ga	1	Meter Form, 9S
	1	Stub pole, 9'
	15	#6 Copper Wire, Insulated, Stranded
c	1	Machine bolt, ½" x 10"
d	1	Washer, square 2" x 2"
j	1	Lag screw, ½" x 4"
j	4	Lag screw, 3/8" x 4"
	3	CT, Bushing Type
ek	1	Locknut, ½"
gb	1	Meter base, 13 Terminal with wiring harness
	2	Straps, Conduit, 1"
Ugc	2	Conduit, 1" x 10', PVC SCH 40
Ugc	2	Conduit Sweep, 1", PVC SCH 40
	1	Male Terminal Adaptor, 1" PVC



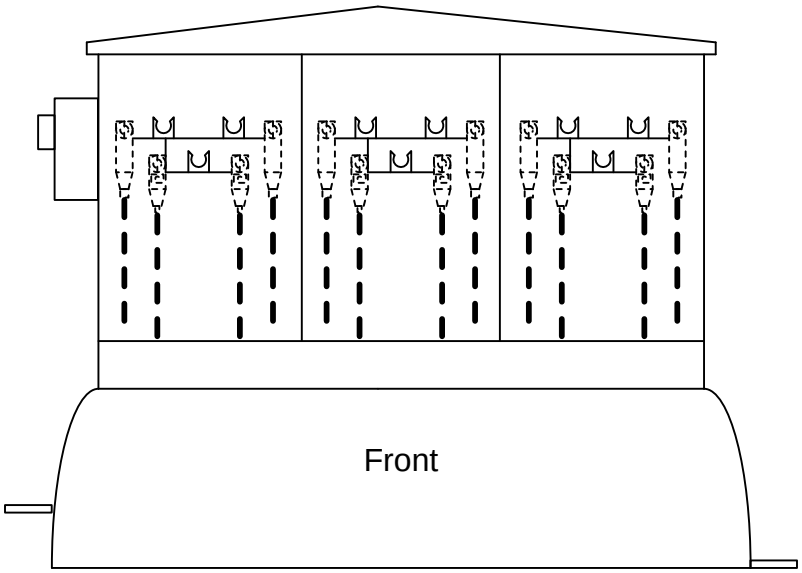
METER BASE FOR UG THREE PHASE, FOUR WIRE SERVICE – TRANSFORMER RATED (THREE CT's)		
2011	WFECA	UM8-9SA



NOTE:

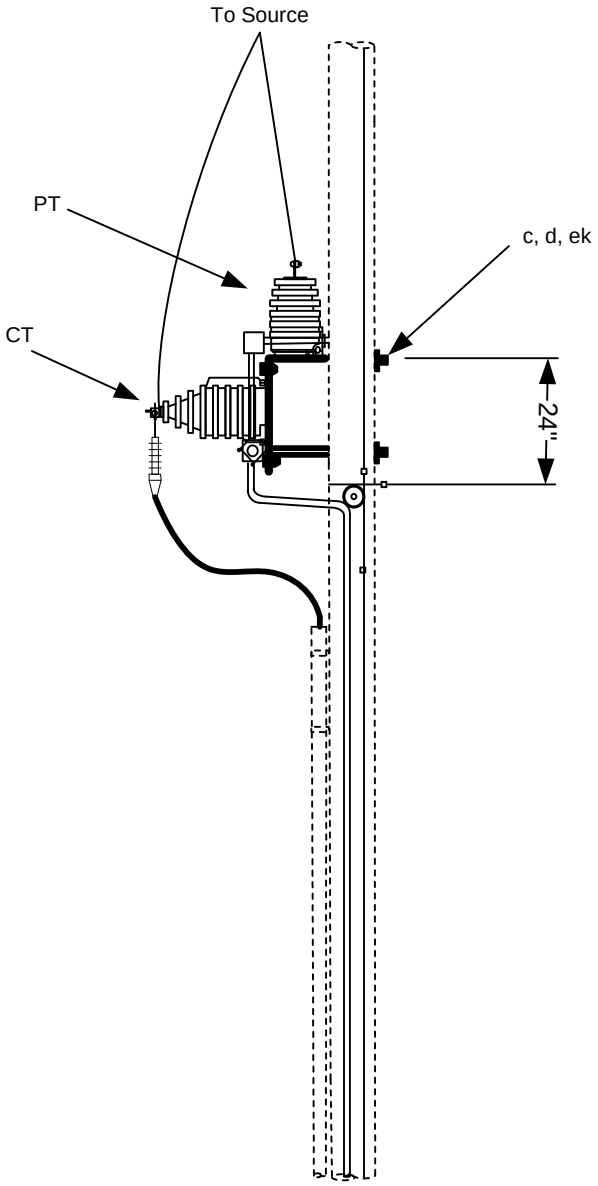
See MG-10 and MG-13 for wiring details.

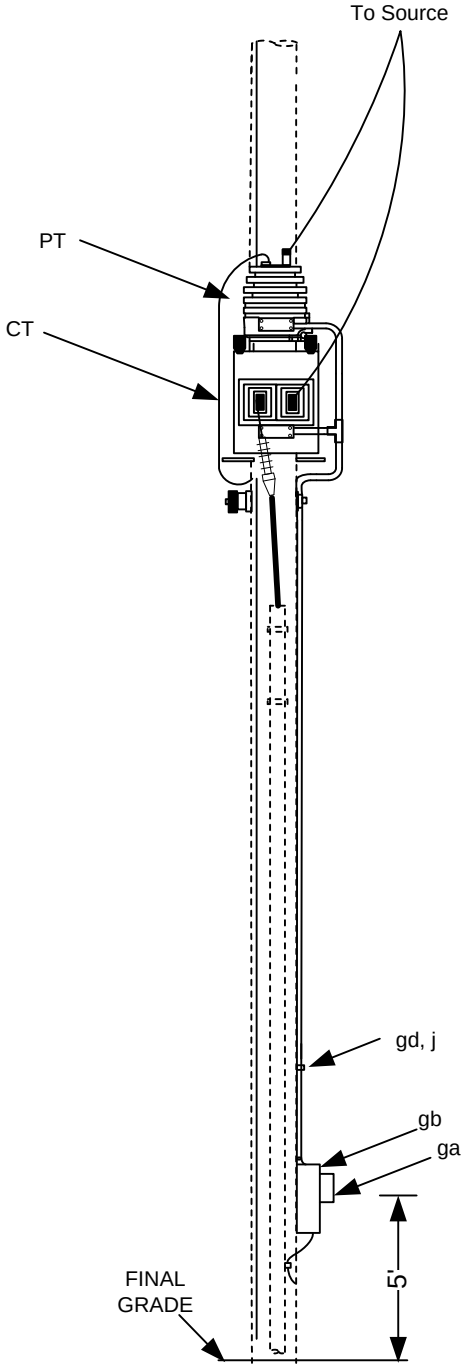
See MG-17 For CT and PT details.



ITEM	QTY.	MATERIAL
	1	Male Adaptor, 1" PVC
	1	Locking Ring, 1"
	1	Metering Enclosure, Pad Mount
	3	Transformer, Current, Primary
	3	Transformer, Potential, Primary
	1	Ground Sleeve, (GS 80 54 18 RT)
p		Connectors as required
gh	1	Meter Base, 13 Terminal with wiring harness
ga	1	Meter, Form 9S
	4	Bolt, 3/8" x 1"
	4	Washer, Lock, 3/8"
	4	Nut, 3/8"
	15	#6 Copper Wire, Insulated, Stranded

Primary Metering, Three Phase, Pad Mounted		
2011	WFECA	UM8-10





ITEM	QTY.	MATERIALS
fm	1	Bracket, Mounting C.T. and P.T.
c	2	Bolts, 5/8" x as required
d	2	Washers, 2" x 2" square
ek	2	Locknut, 5/8"
sd	1	Transformer, Current, Primary
se	1	Transformer, Potential, Primary
j	8	Lag Screws, 3/8" x 3"
j	6	Lag Screws, ½ x 4"
gc	2	Conduit, 1" x 10", PVC, SCH 40
gd	4	Straps, conduit, 1"
	8	Bolts, instrument mounting, provided in packaging
gc	25	Conduit, 1", Liquidtight Flexible
	16	Conduit, 1", Liquidtight connector
	1	Junction box, PVC
	1	Junction box, cover, PVC
gb	1	Meterbase, 5 terminal with wiring harness
	1	Conduit, Female adapter, 1" threaded, PVC
	1	Conduit, Male Terminal Adapter
	2	Conduit, couplings, 1" PVC
ga	1	Meter, Form 3S, class 20

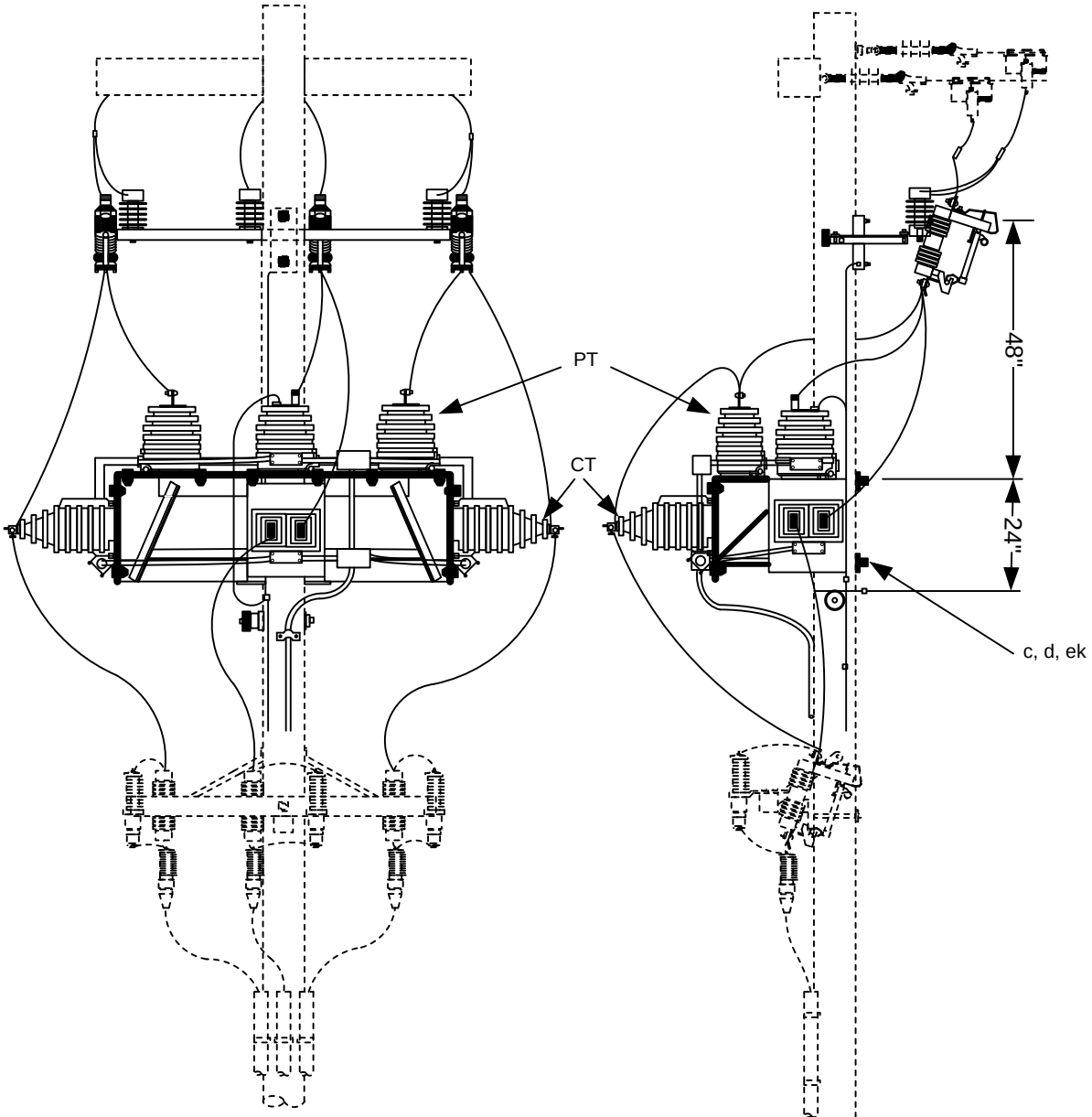
Note:

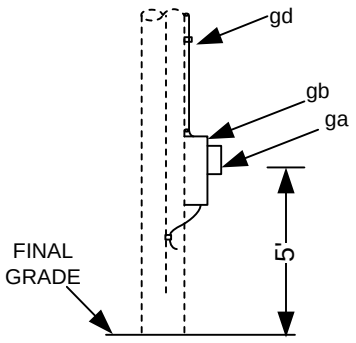
See MG-17 for CT and PT details.

See MG-11 for Wiring details

Use with VS1.11 or VS1.5 for Sectionalizing

Primary Metering Single Phase Pole Mounted to Underground Cable		
2011	WFECA	UM8-13





ITEM	QTY.	MATERIALS
fm	1	Bracket, Mounting C.T. and P.T. (3) (BAPMM6-54)
c	3	Bolts, 5/8" x as required
d	3	Washers, 2" x 2" square
af	3	Cutout, with Loadbreak
Uae	3	Surge Arrestor
sd	3	Transformer, Current, Primary
se	3	Transformer, Potential, Primary
ek		Locknuts, as required
av		Jumpers, as required
p		Connectors, as required
al		Staples, as required
j	8	Lag Screws, 3/8" x 3"
j	6	Lag Screws, ½ x 4"
gc	2	Conduit, 1" x 10", PVC, SCH 40
gd	4	Straps, conduit, 1"
	8	Bolts, instrument mounting, provided in packaging
gc	25	Conduit, 1", Liquidtight Flexible
	16	Conduit, 1", Liquidtight connector
	2	Junction box, PVC
	2	Junction box, cover, PVC
gb	1	Meterbase, 13 terminal with wiring harness
	1	Conduit, Female adapter, 1" threaded, PVC
	1	Conduit, Male Terminal Adapter
	2	Conduit, couplings, 1" PVC
ga	1	Meter, Form 9s, class 20

Note:

See MG-17 for CT and PT details.

See MG-10 and MG-13 for Wiring details

Primary Metering Three Phase Pole Mounted to Underground Cable		
2011	WFECA	M8-15

INDEX 3

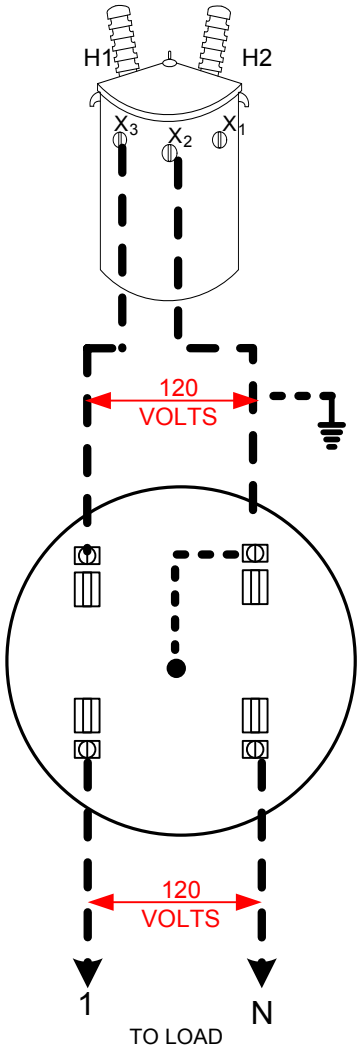
Wiring Diagrams and Guidelines for Meter Base Assemblies

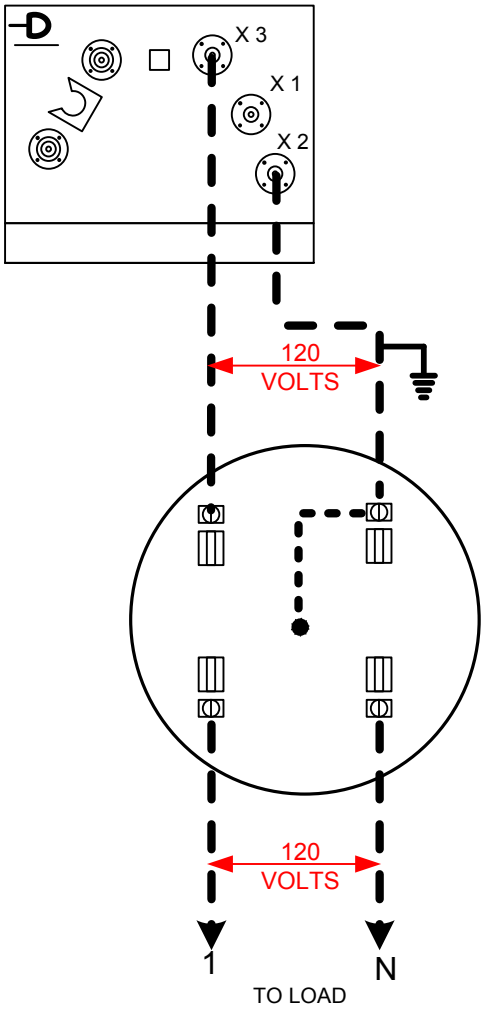
Type of Service	Meter Type	Meter Form	Meter Class	Related Meter Drawings	Related Meter Guidelines	Meter Base Type
Single Phase, 120 Volt, Two Wire	SC	1S	100		MG-1S	4 Terminal
Single Phase, 120/240 Volt, Three Wire	SC	2S	200, 320	M8-2SA, M8-2SB UM8-2S, UM8-2SA	MG-2S, MG-7	4 Terminal
		2K	400			
Single Phase, 120/208 Volt, Three Wire (Network Meter)	SC	12S	200		MG-7, MG-12S	5 Terminal
Three Phase, Four Wire, Center Grounded Delta	SC	15S	200, 320		MG-7, MG-15S	7 Terminal
		15K	480			
Three Phase, Four Wire, Center Grounded (Open) Delta	SC	15S	200		MG-7, MG-15SOD	7 Terminal
Three Phase, Four Wire, Wye	SC	16S	200, 320		MG-7, MG-16S, MG-16SUG	7 Terminal
		16K	480			
Single Phase, 120/240 Volt, Three Wire	TR	3S	20	M8-3S, UM8-3S	MG-3S, MG-7, MG-14	5 Terminal
Single Phase, 120/240 Volt, Three Wire	TR	4S	20	M8-4S, UM8-4S	MG-4S, MG-7, MG-14	6 Terminal
Three Phase, Four Wire, Center Grounded (Open) Delta	TR	5S	20	M8-8S, UM8-8SOD	MG-8S, MG-7, MG-8SOD, MG-13, MG-14	8 Terminal
Three Phase, Four Wire, Center Grounded Delta	TR	8S	20	M8-8S, UM8-8SOD	MG-8S, MG-7, MG-8SOD, MG-13, MG-14	13 Terminal
Three Phase, Four Wire, Wye	TR	9S	20	M8-9S, UM8-9S, UM8-9SA	MG-7, MG-9S, MG-13, MG-14, MG-9SUG	13 Terminal
Single Phase, Primary Metering	TR	3S	20	M8-13, UM8-13	MG-11, MG-17	5 Terminal
Three Phase, Primary Metering	TR	9S	20	M8-10, M8-15, UM8-10	MG-10, MG-13, MG-17	13 Terminal

SC = Self Contained
TR = Transformer Rated

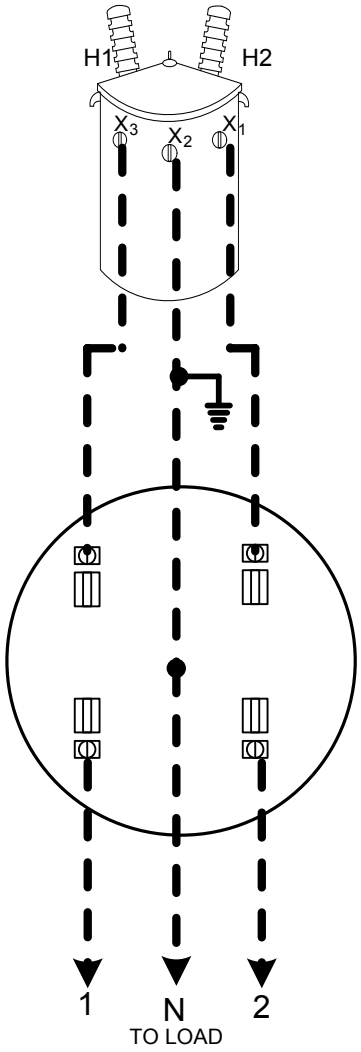
NOTES:

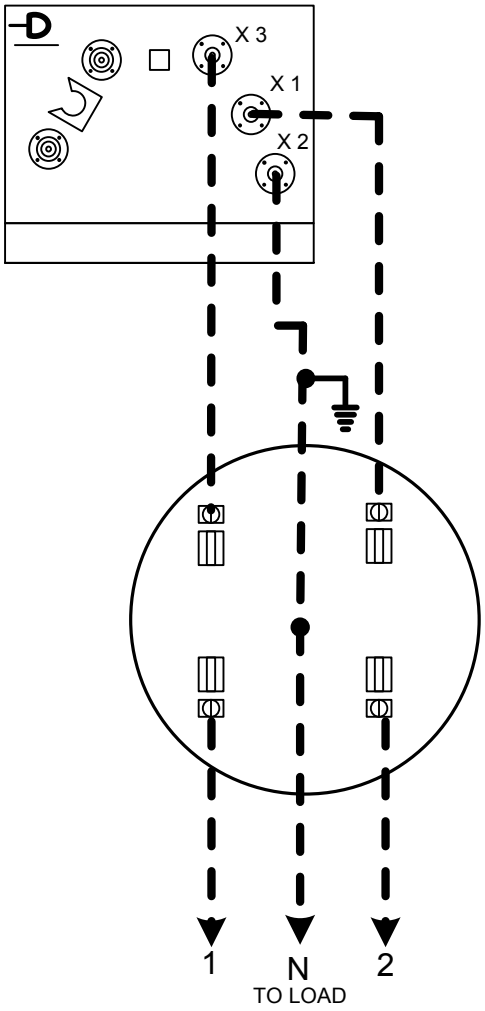
1. SIZE CURRENT TRANSFORMER TO ½ THE CAPACITY OF THE MIN DISCONNECT (MINIMUM 200:5)
2. SEE ALSO SERVICES GUIDELINES GS-1 THROUGH GS-14
3. METER FORMS 2K, 15K AND 16K USE “BOLT-IN” TYPE METERS.



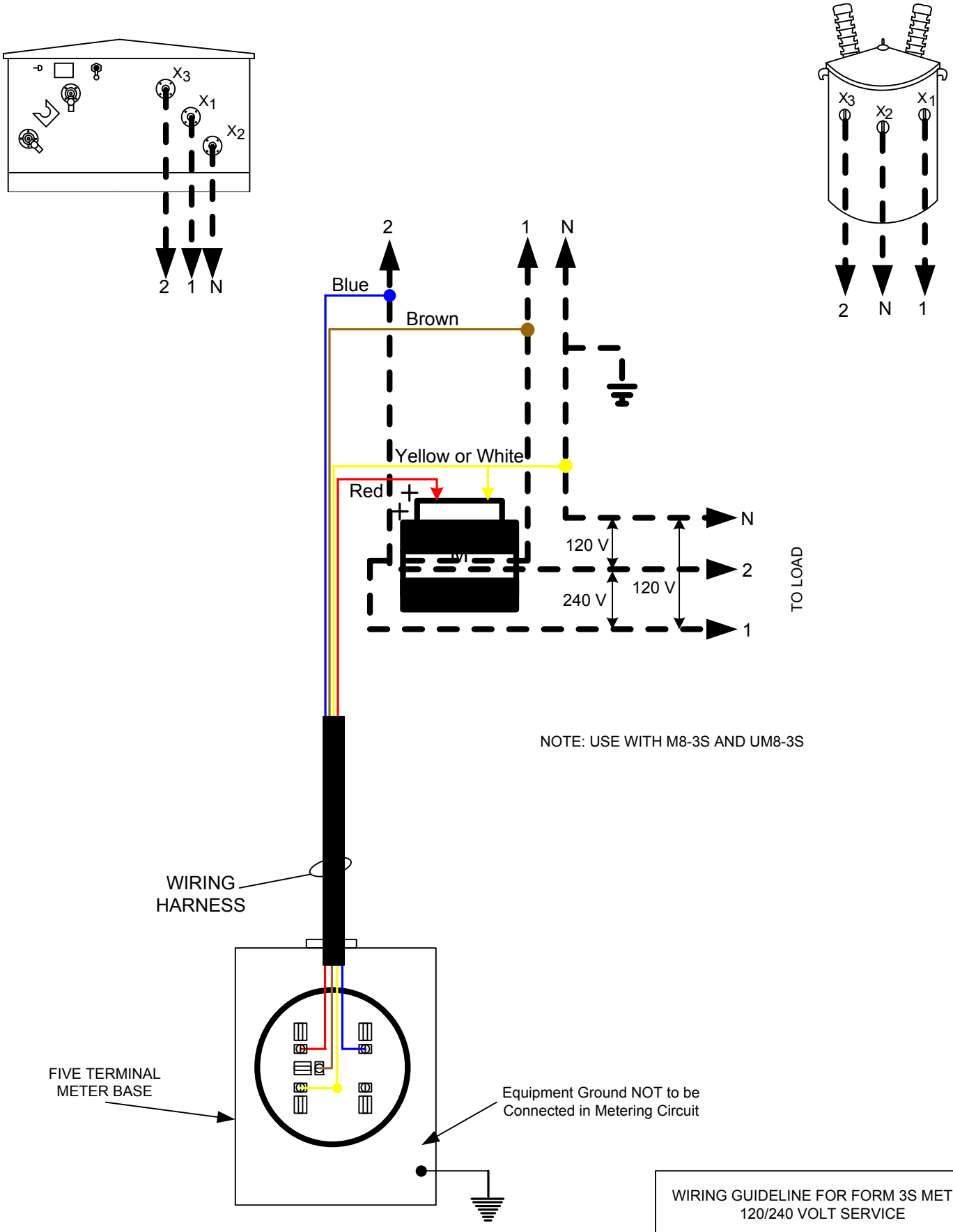


WIRING DIAGRAM FOR FORM 1S METER 120 VOLT 2 WIRE SINGLE PHASE SERVICE		
2005	WFECA	MG-1S

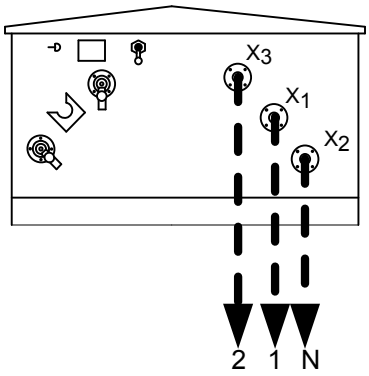


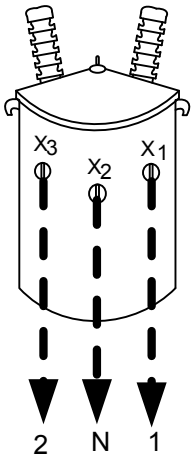


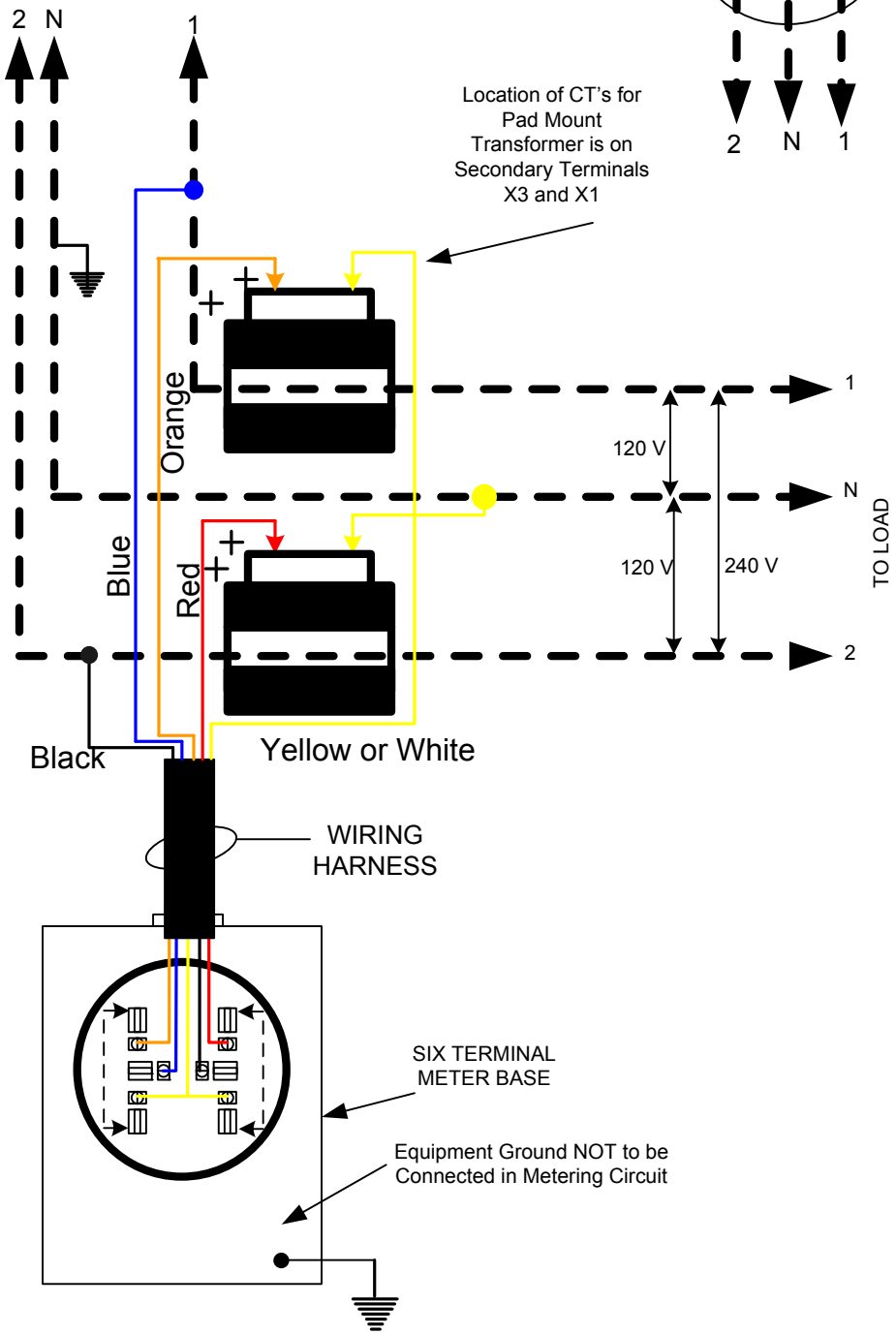
WIRING DIAGRAM FOR FORM 2S METER 120/240 VOLT SINGLE PHASE SERVICE		
2005	WFECA	MG-2S



WIRING GUIDELINE FOR FORM 3S METER 120/240 VOLT SERVICE		
2009	WFECA	MG-3S

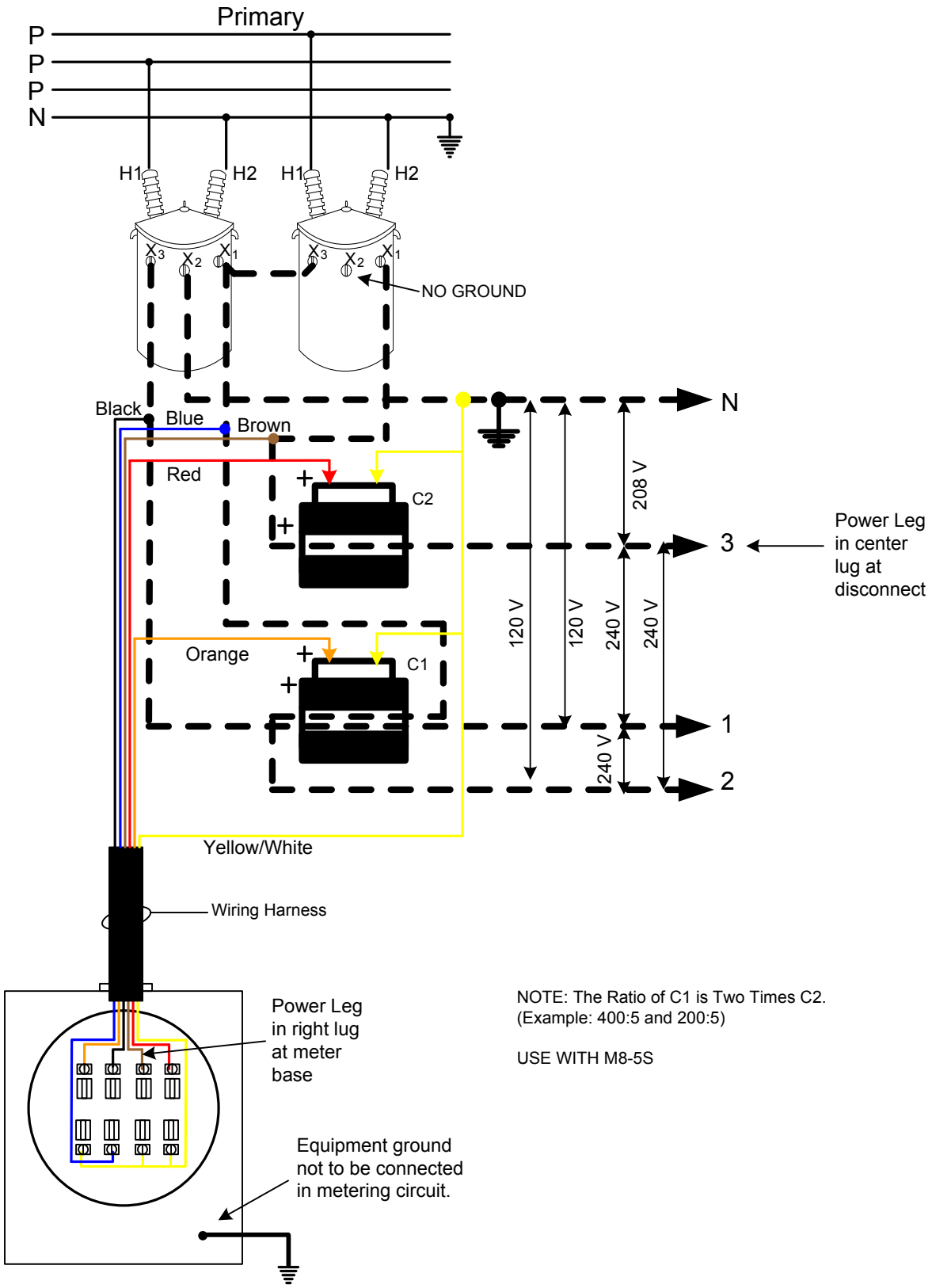






NOTE: USE WITH M8-4S AND UM8-4S

WIRING GUIDELINE FOR FORM 4S METER 120/240 VOLT SERVICE		
2005	WFECA	MG-4S

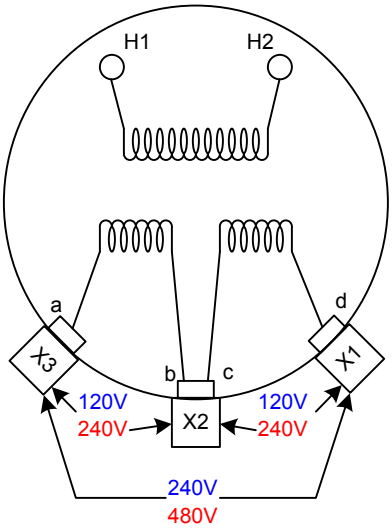


NOTE: The Ratio of C1 is Two Times C2.
(Example: 400:5 and 200:5)

USE WITH M8-5S

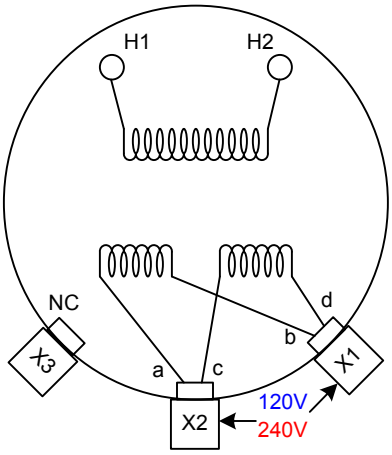
FOR MAINTENANCE ONLY

WIRING DIAGRAM FOR FORM 5S METER - 120/240 VOLT SERVICE		
2005	WFECA	MG-5S



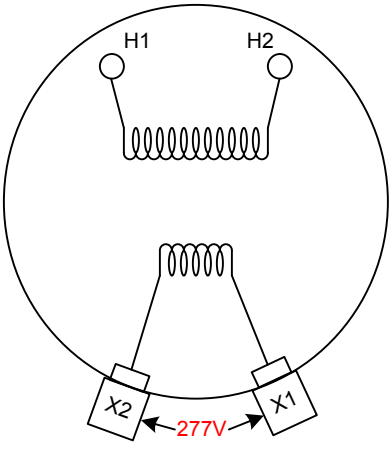
120/240 VOLT TRANSFORMER WIRED IN SERIES FOR SINGLE PHASE 120/240 VOLT (240/480 VOLT) SERVICE AND FOR THREE PHASE, FOUR WIRE, CENTERED GROUNDED DELTA SERVICE 120/240 V, 240/480 V

USE WITH MG-8S, MG-8SOD, MG-15S, MG-15SOD



120/240 VOLT TRANSFORMER WIRED IN PARALLEL FOR SINGLE PHASE, 120 VOLT (240 VOLT) SERVICE AND FOR THREE PHASE, FOUR WIRE, AWD 120/208 VOLT WYE SERVICE

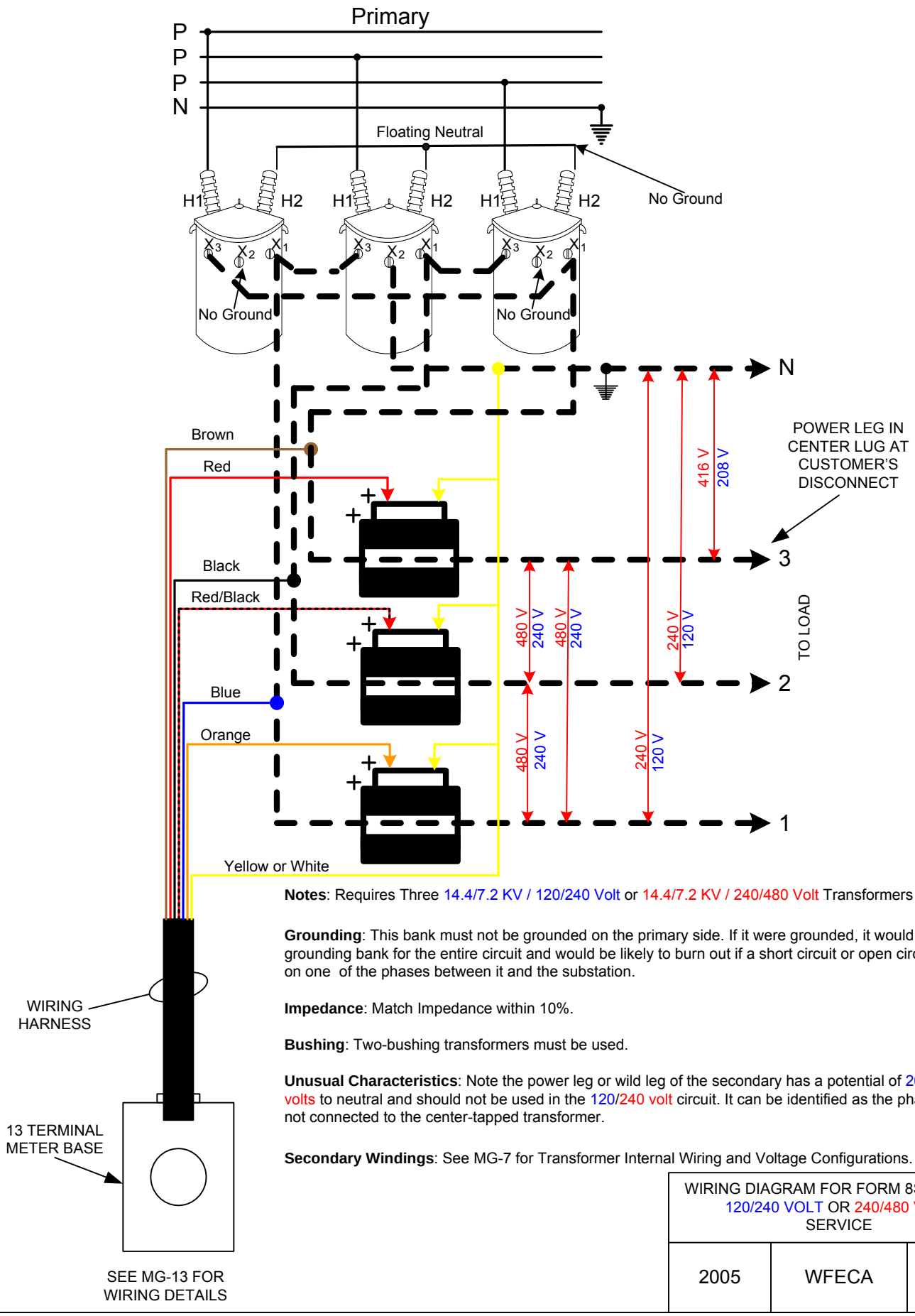
USE WITH MG-9S, MG-12S, MG-16S



277/480 VOLT TRANSFORMER WIRED FOR THREE PHASE, FOUR WIRE, 277/480 VOLT WYE SERVICE

USE WITH MG-9S

TRANSFORMER – INTERNAL WIRING AND VOLTAGE CONFIGURATIONS		
2005	WFECA	MG -7



Notes: Requires Three 14.4/7.2 KV / 120/240 Volt or 14.4/7.2 KV / 240/480 Volt Transformers

Grounding: This bank must not be grounded on the primary side. If it were grounded, it would act as a grounding bank for the entire circuit and would be likely to burn out if a short circuit or open circuit occurred on one of the phases between it and the substation.

Impedance: Match Impedance within 10%.

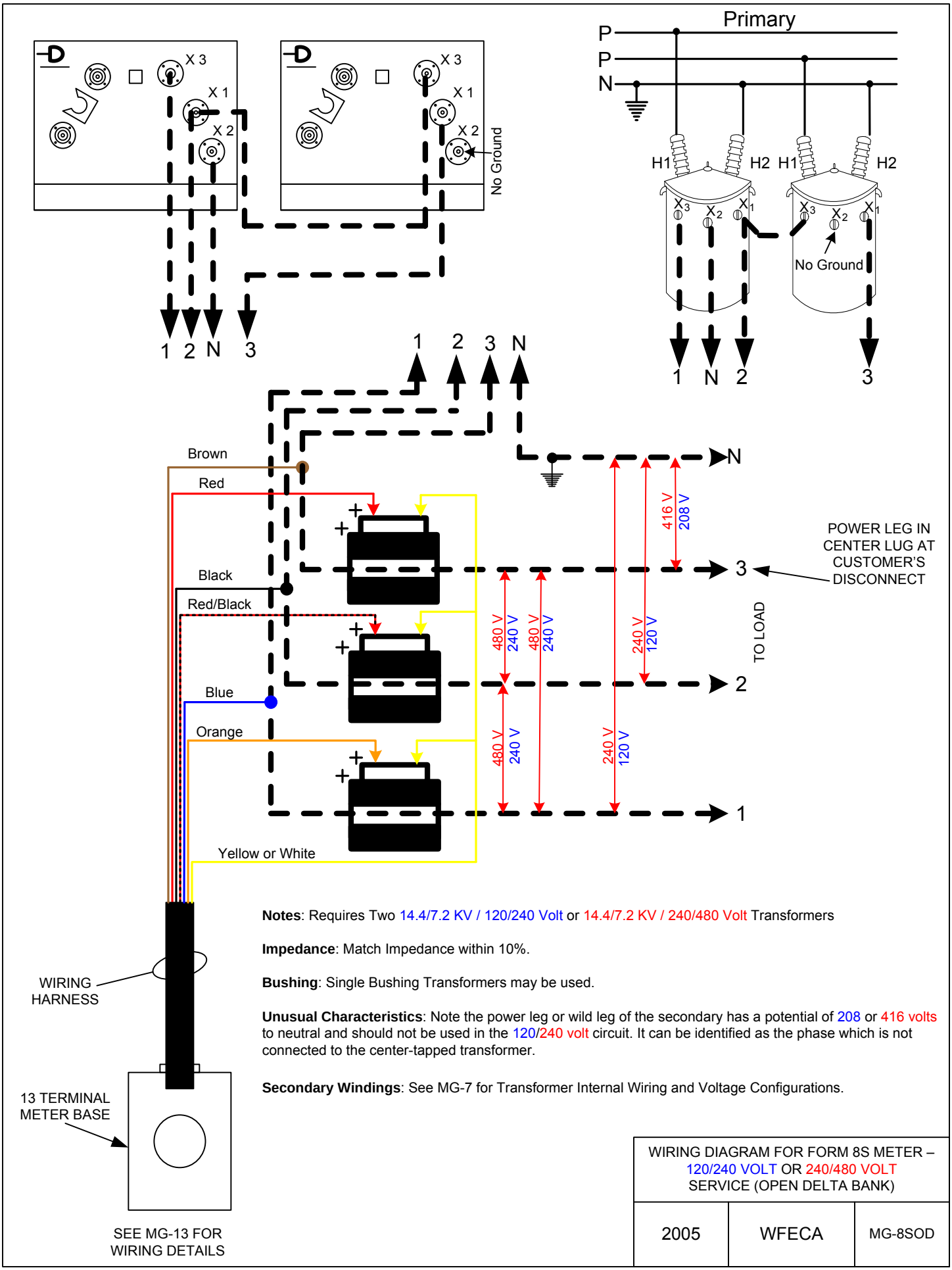
Bushing: Two-bushing transformers must be used.

Unusual Characteristics: Note the power leg or wild leg of the secondary has a potential of 208 or 416 volts to neutral and should not be used in the 120/240 volt circuit. It can be identified as the phase which is not connected to the center-tapped transformer.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING DIAGRAM FOR FORM 8S METER – 120/240 VOLT OR 240/480 VOLT SERVICE

2005	WFECA	MG-8S



Notes: Requires Two 14.4/7.2 KV / 120/240 Volt or 14.4/7.2 KV / 240/480 Volt Transformers

Impedance: Match Impedance within 10%.

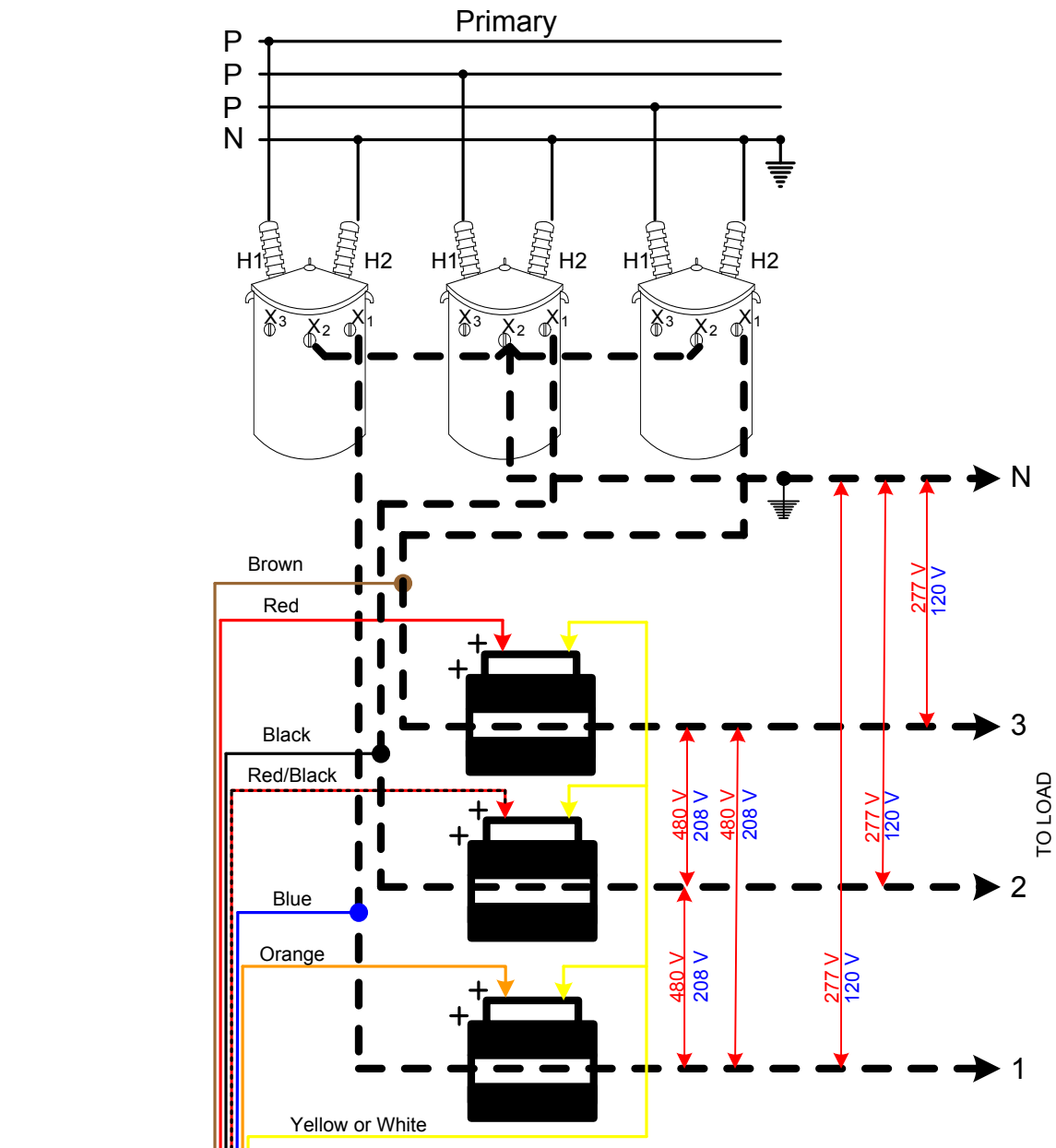
Bushing: Single Bushing Transformers may be used.

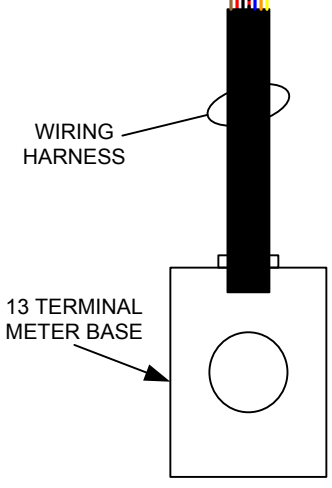
Unusual Characteristics: Note the power leg or wild leg of the secondary has a potential of 208 or 416 volts to neutral and should not be used in the 120/240 volt circuit. It can be identified as the phase which is not connected to the center-tapped transformer.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING DIAGRAM FOR FORM 8S METER – 120/240 VOLT OR 240/480 VOLT SERVICE (OPEN DELTA BANK)

2005	WFECA	MG-8SOD





Notes: Requires Three 14.4/7.2 KV / 120/240 V or 14.4/7.2 KV / 277 V Transformers

Grounding: The primary wye point of this bank must be tied to the system neutral and grounded. It must also be interconnected with the secondary neutral. If these connections are not made, dangerous voltages may develop on the secondary side.

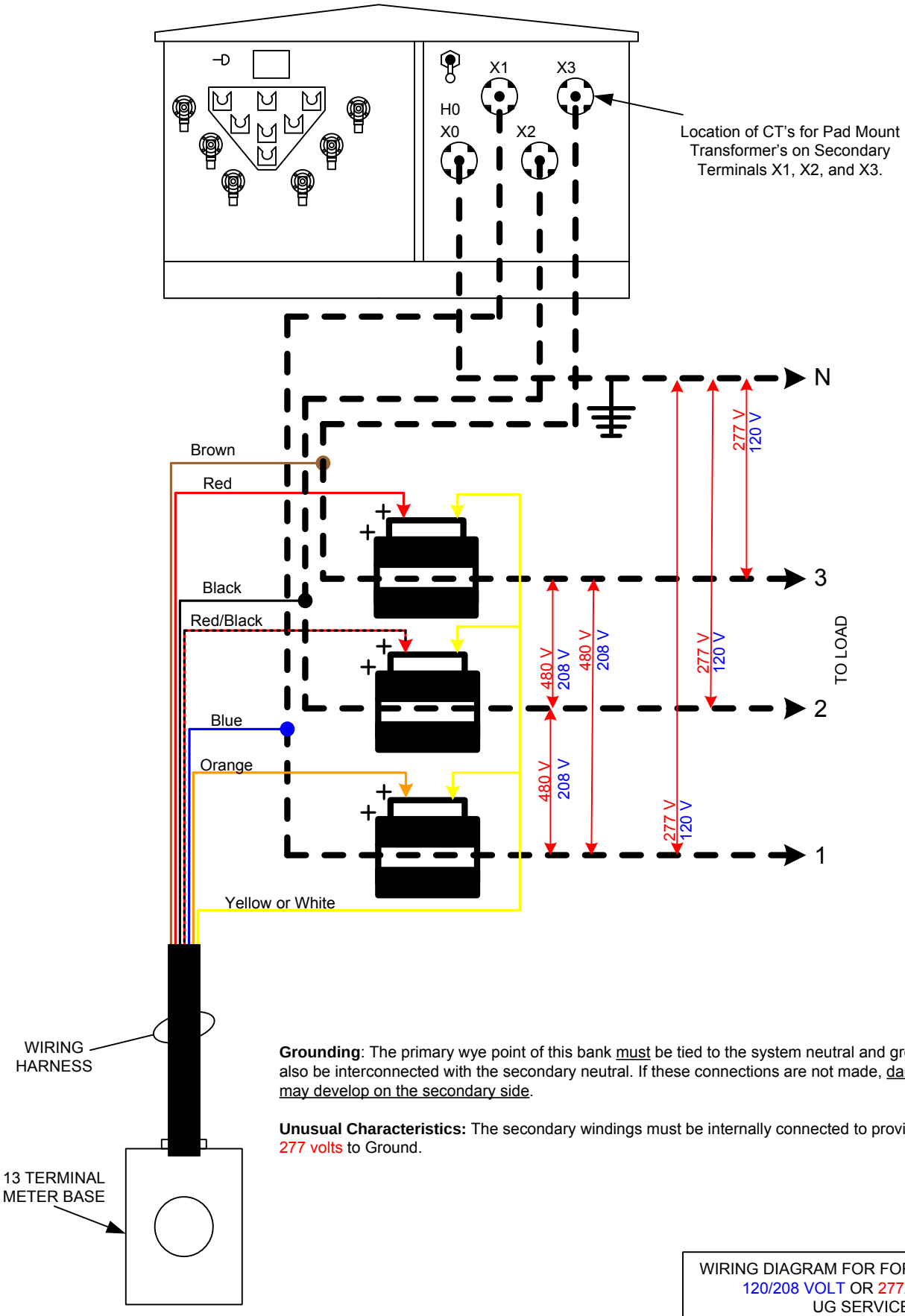
Impedance: It is not necessary that transformers be matched as to size, impedance, or exact voltage ratio.

Bushing: Single-bushing transformers may be used.

Unusual Characteristics: The secondary windings must be internally connected to provide 120 volts or 277 volts.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

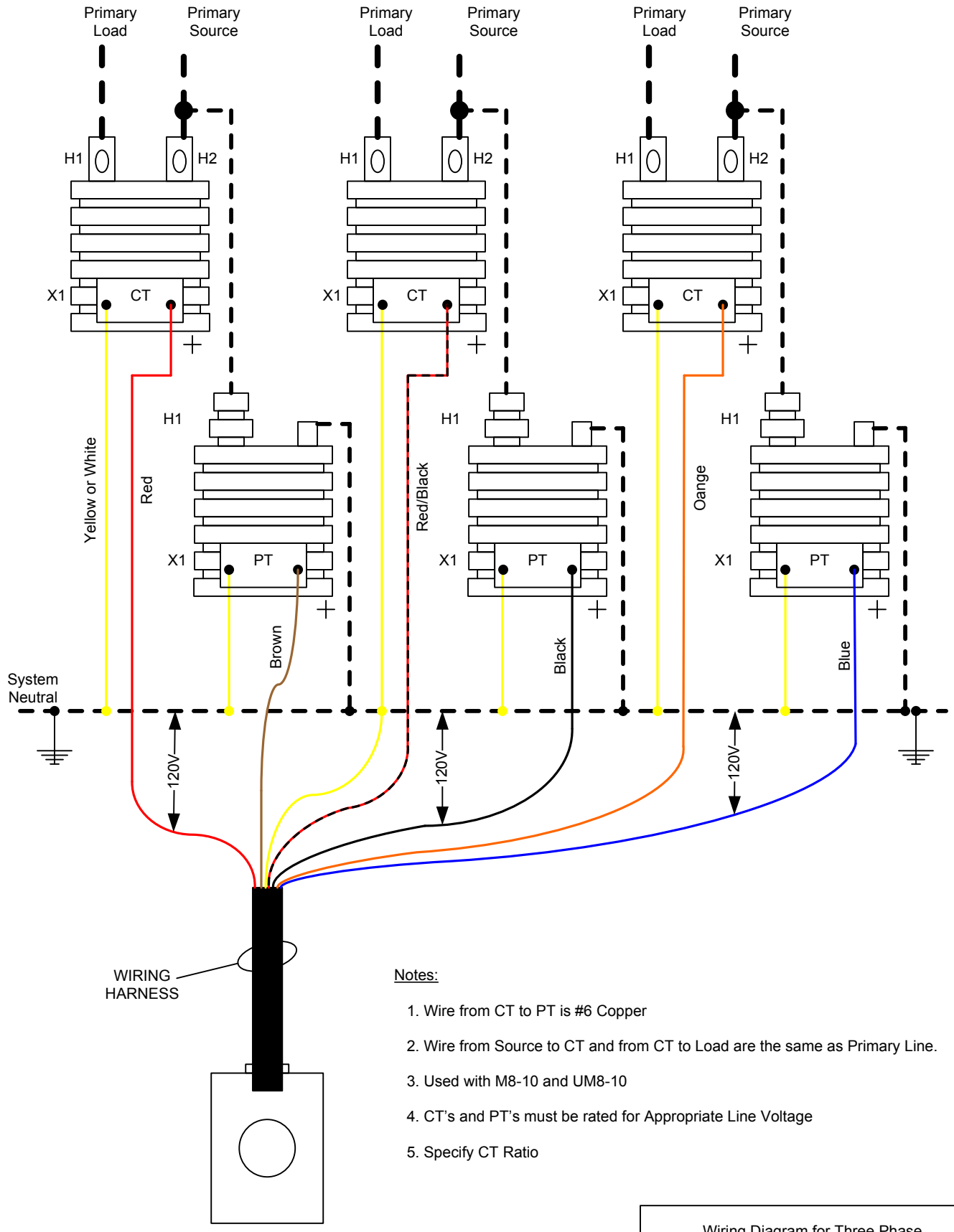
WIRING DIAGRAM FOR FORM 9S METER – 120/208 VOLT OR 277/480 VOLT OH SERVICE		
2005	WFECA	MG-9S



Grounding: The primary wye point of this bank must be tied to the system neutral and grounded. It must also be interconnected with the secondary neutral. If these connections are not made, dangerous voltages may develop on the secondary side.

Unusual Characteristics: The secondary windings must be internally connected to provide 120 volts or 277 volts to Ground.

WIRING DIAGRAM FOR FORM 9S METER – 120/208 VOLT OR 277/480 VOLT UG SERVICE		
2005	WFECA	MG-9SUG

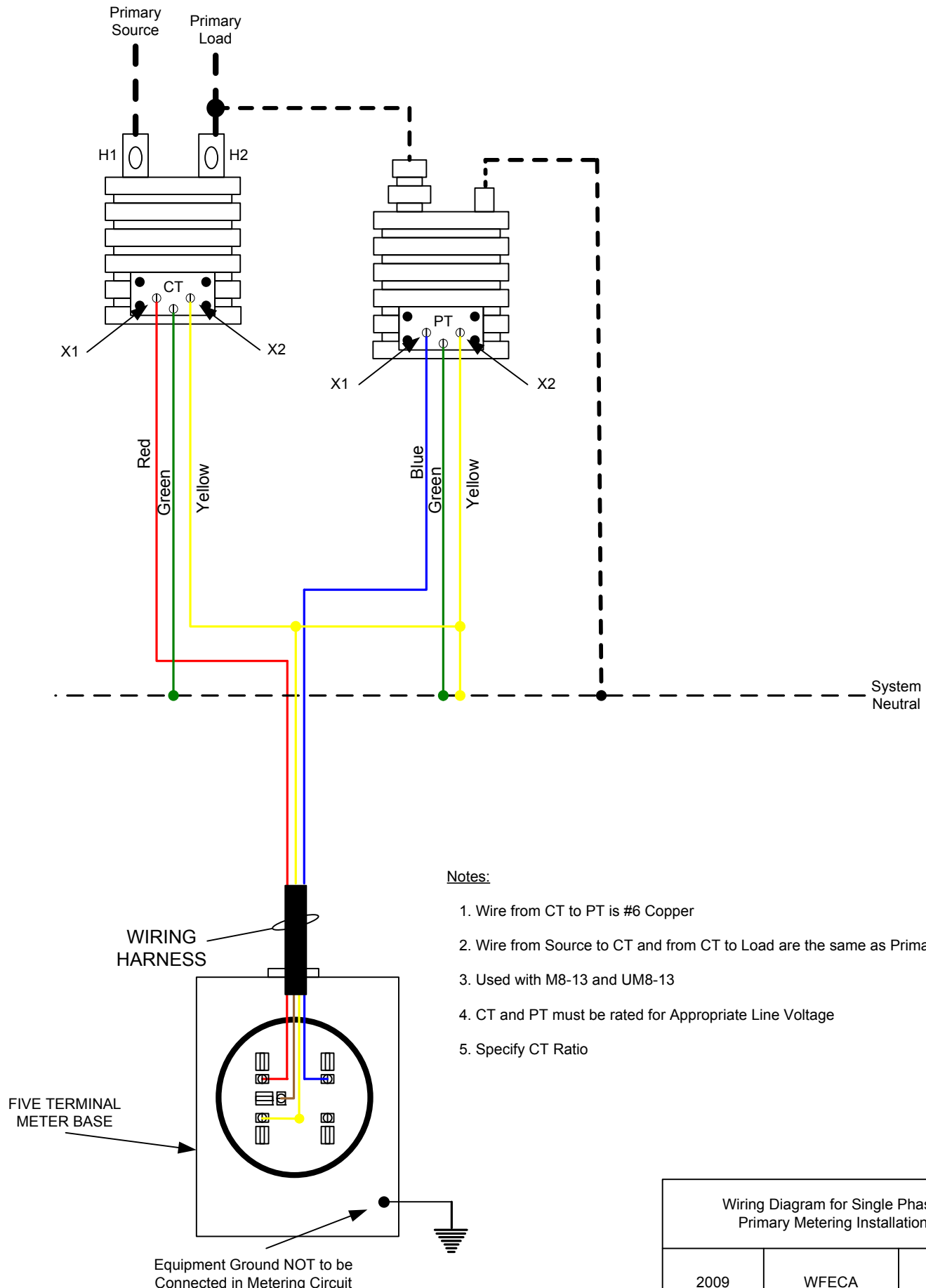


Notes:

1. Wire from CT to PT is #6 Copper
2. Wire from Source to CT and from CT to Load are the same as Primary Line.
3. Used with M8-10 and UM8-10
4. CT's and PT's must be rated for Appropriate Line Voltage
5. Specify CT Ratio

See MG-13 for Wiring Details

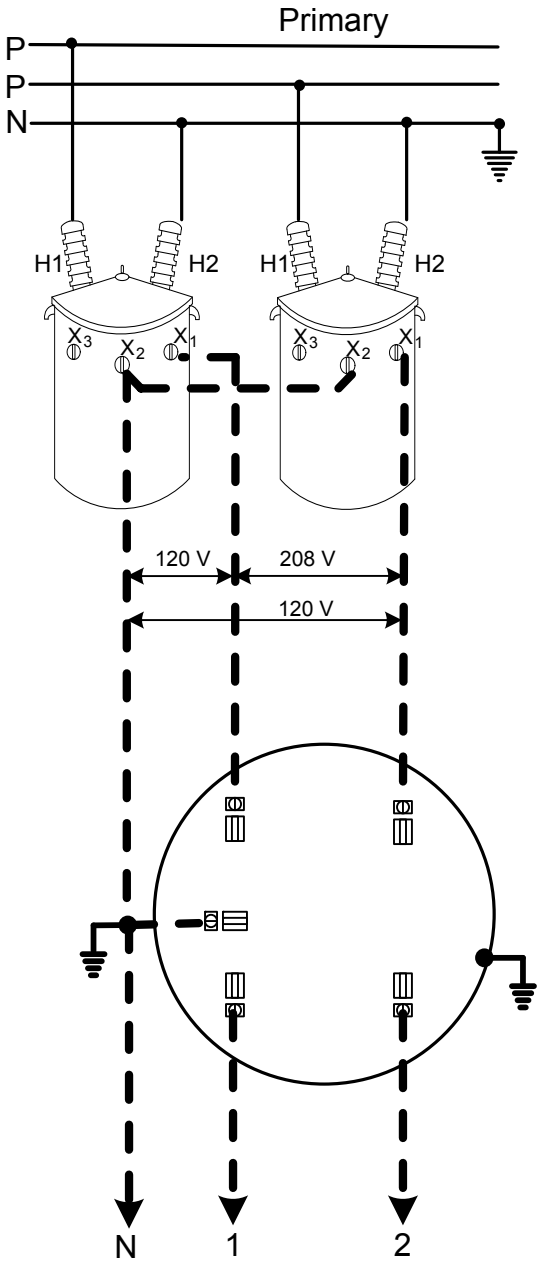
Wiring Diagram for Three Phase Primary Metering Installation		
2005	WFECA	MG-10



Notes:

1. Wire from CT to PT is #6 Copper
2. Wire from Source to CT and from CT to Load are the same as Primary Line.
3. Used with M8-13 and UM8-13
4. CT and PT must be rated for Appropriate Line Voltage
5. Specify CT Ratio

Wiring Diagram for Single Phase Primary Metering Installation		
2009	WFECA	MG-11



Note: Requires Two 14.4/7.2 KV / 120/240 V Transformers, could be part of a Three Phase Bank

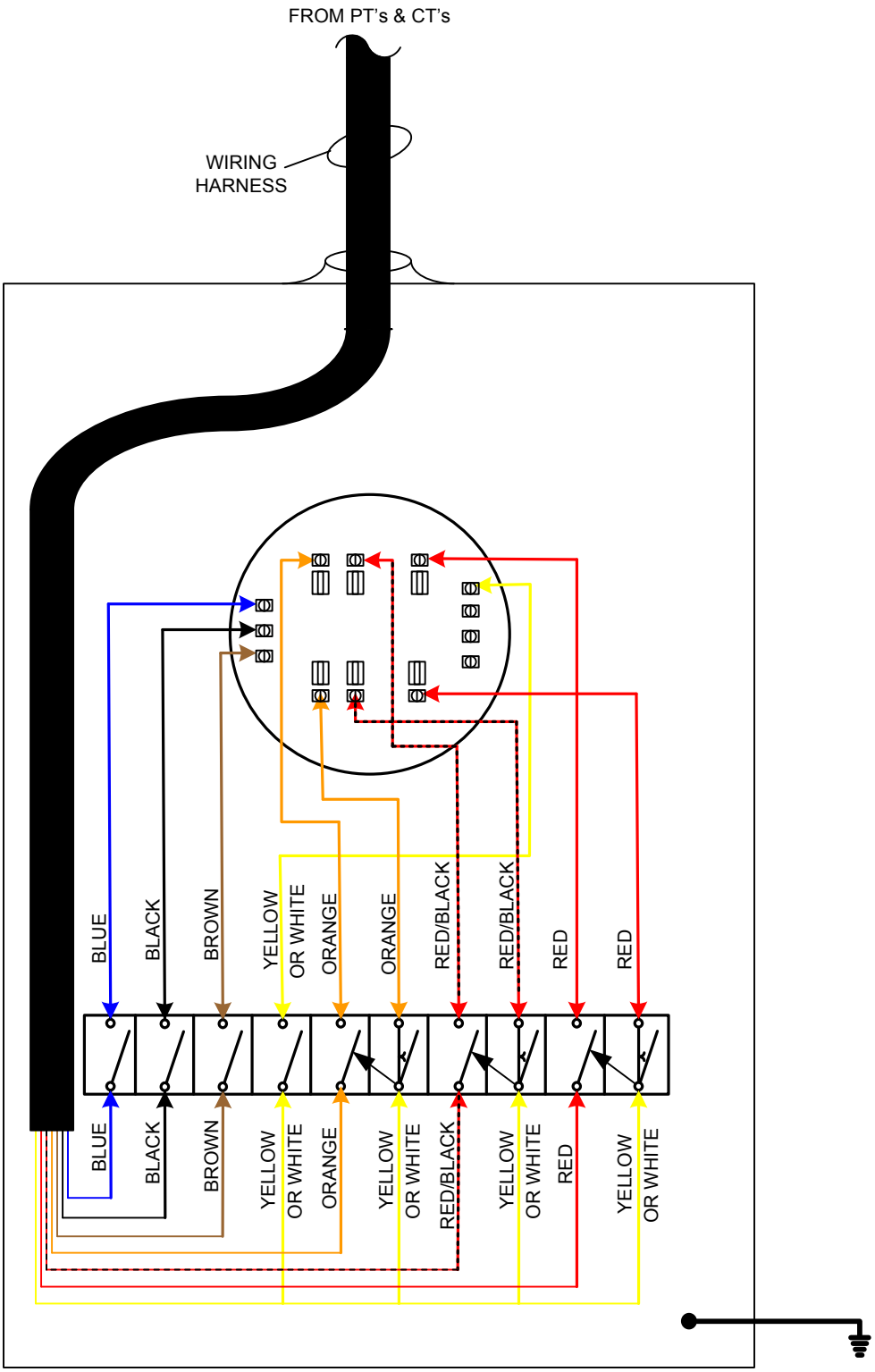
Grounding: The primary wye point of this bank must be tied to the system neutral and grounded. It must also be interconnected with the secondary neutral. If these connections are not made, dangerous voltages may develop on the secondary side.

Impedance: It is not necessary that transformers be matched as to size, impedance, or exact voltage ratio.

Unusual Characteristics: The secondary windings must be wound to provide 120 Volts to Ground.

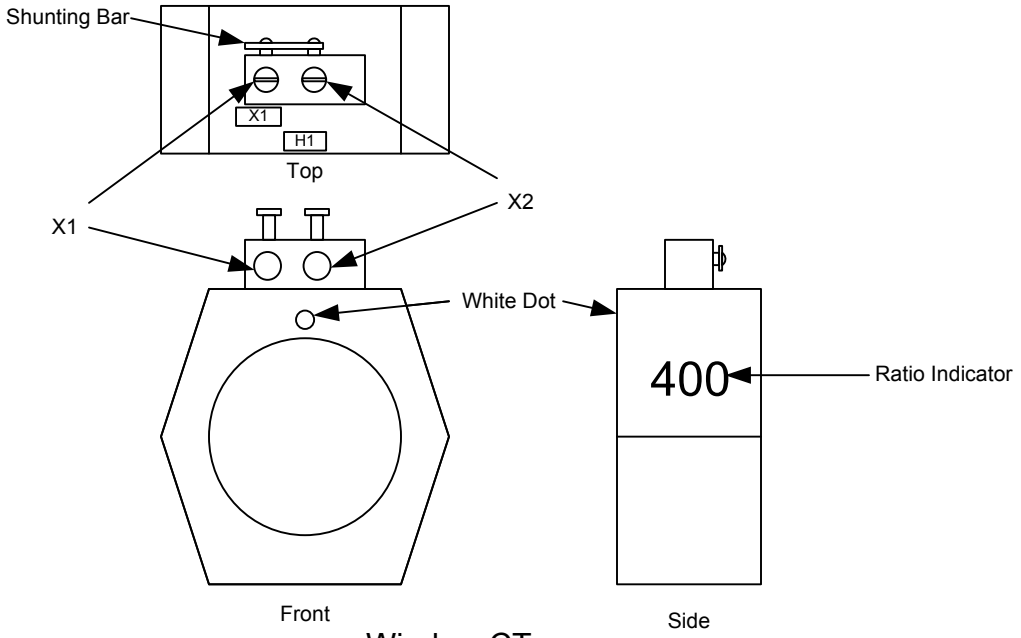
Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING DIAGRAM FOR FORM 12S METER (NETWORK METER)		
2005	WFECA	MG-12S

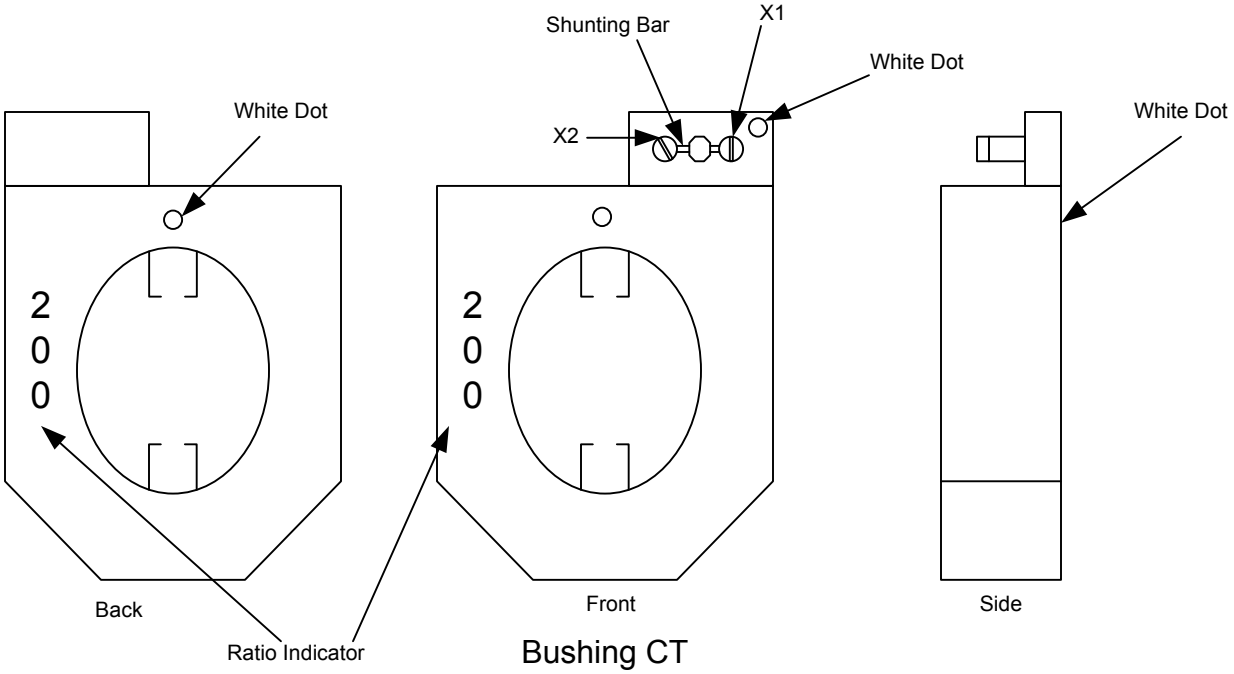


NOTE: Used with MG-8S, MG-8SOD, MG-9S, and MG-9SUG, and MG-10

WIRING GUIDELINE FOR 13 TERMINAL METER BASE WITH TEN POLE TEST BLOCK		
2005	WFECA	MG-13



Window CT

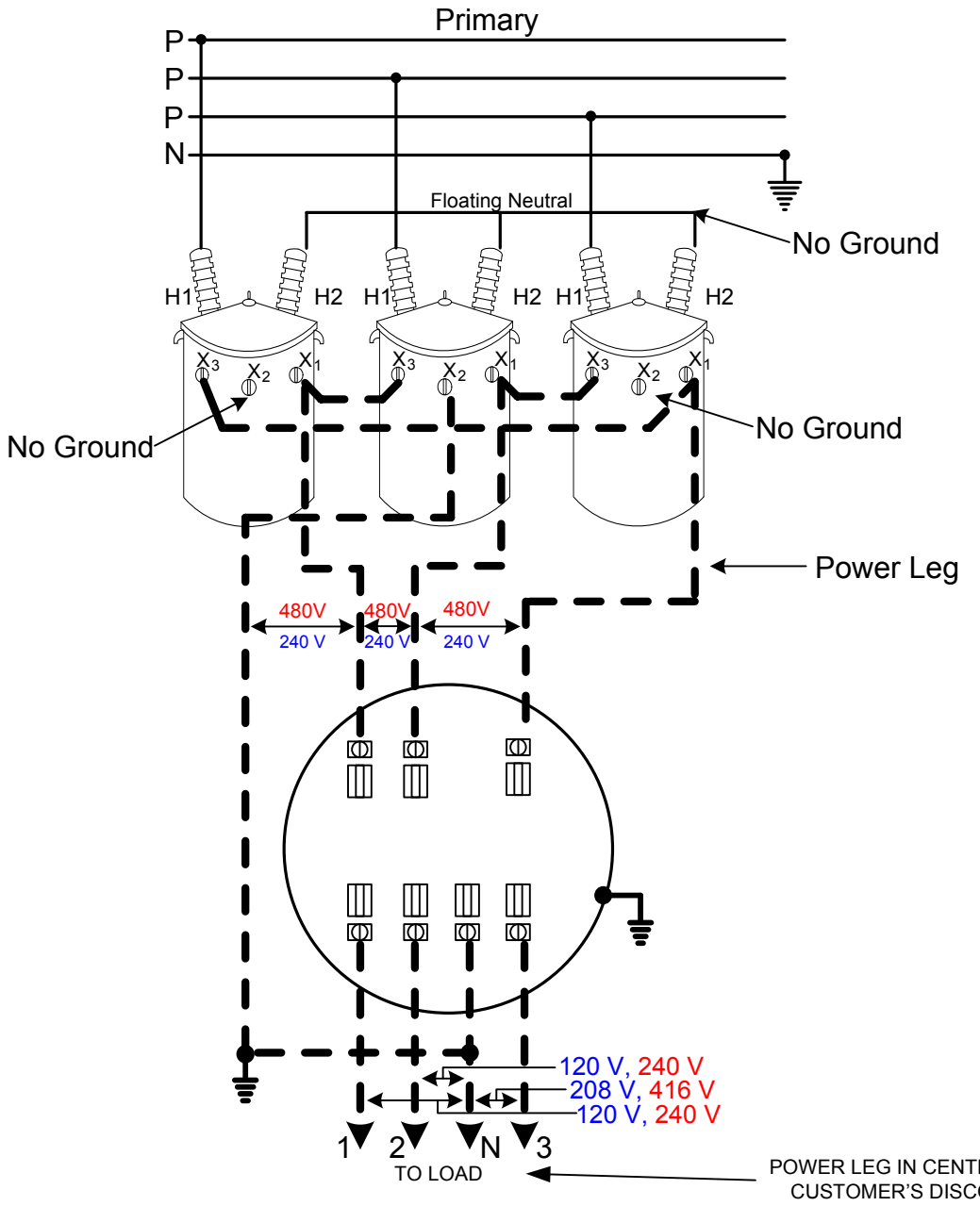


Bushing CT

NOTE:

H1 & X1 are indicated by a white dot, white square or “+” sign

CURRENT TRANSFORMER DETAILS		
2005	WFECA	MG-14



Notes: Requires Three 14.4/7.2 KV / 120/240 Volt or 14.4/7.2 KV / 240/480 Volt Transformers

Grounding: This bank must not be grounded on the primary side. If it were grounded, it would act as a grounding bank for the entire circuit and would be likely to burn out if a short circuit or open circuit occurred on one of the phases between it and the substation.

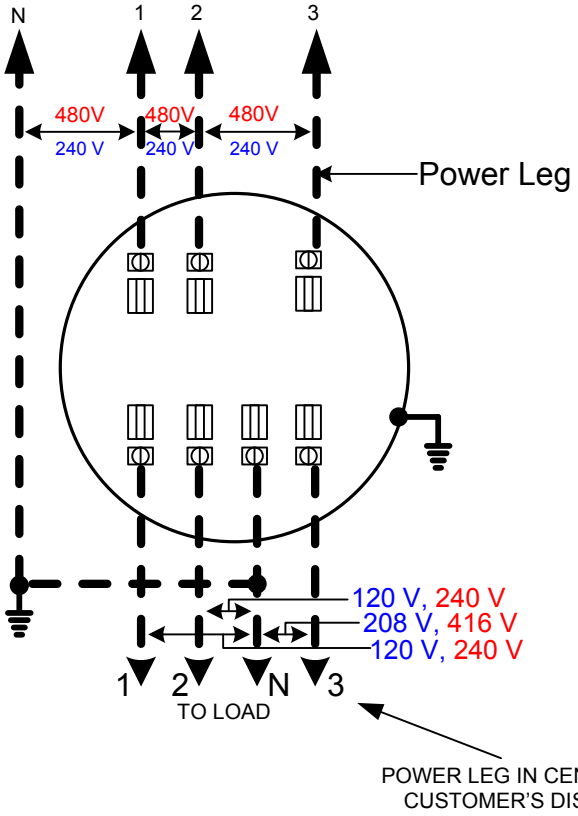
Impedance: Match Impedance within 10%.

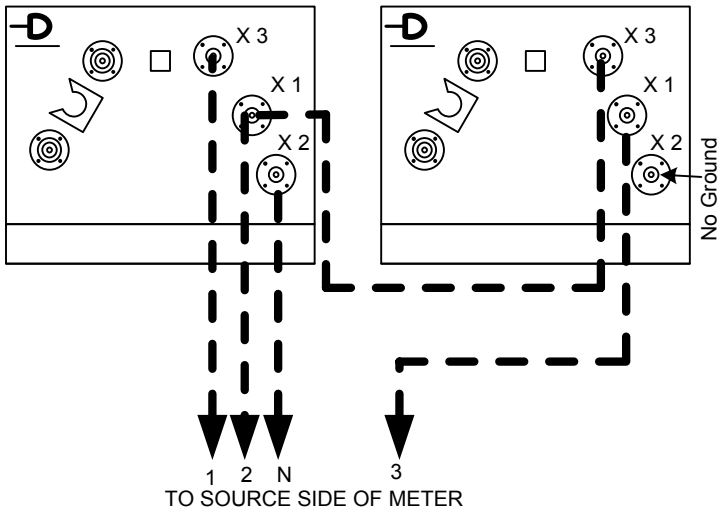
Bushing: Two-bushing transformers must be used.

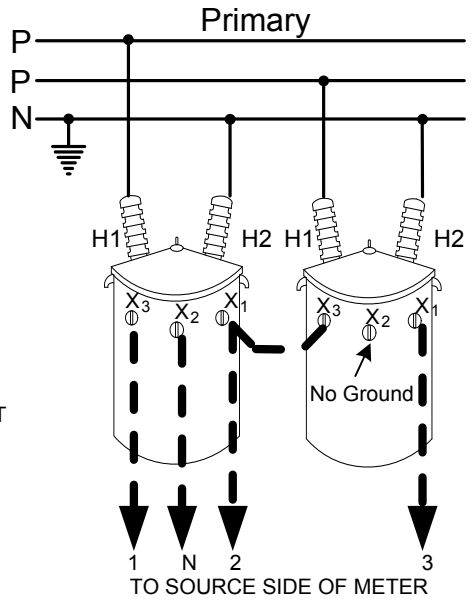
Unusual Characteristics: Note the power leg or wild leg of the secondary has a potential of 208 or 416 volts to neutral and should not be used in the 120/240 volt circuit. It can be identified as the phase which is not connected to the center-tapped transformer.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING GUIDELINE FOR FORM 15S OR 15K METER 120/240 VOLT OR 240/480 VOLT SERVICE		
2005	WFECA	MG-15S







Notes: Requires Two 14.4/7.2 KV / 120/240 V or 14.4/7.2 KV / 120/240 V Transformers

Grounding: Note that the primary neutral point is grounded and interconnects with the secondary neutral and ground.

Impedance: It is not necessary that impedances or voltage ratios be matched exactly. There is no limitation on ratio of two sizes that may be used.

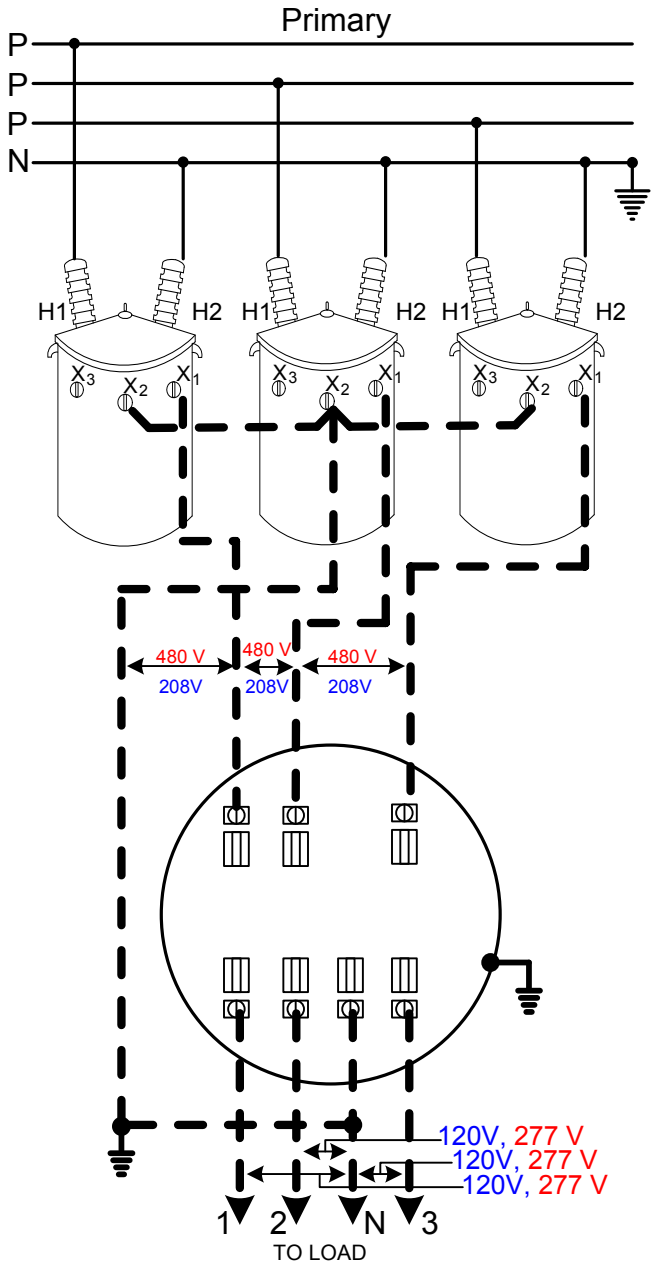
Bushing: Single-bushing transformers may be used if desired.

Unusual Characteristics: Note the power leg or wild leg of the secondary has a potential of 208 / 416 volts to neutral and should not be used in the 120/240 or 240/480 volt circuit. It can be identified as the phase which is not connected to the center-tapped transformer.

If the "Hi Leg" voltage is 416 or 832 volts the transformer polarity of one transformer is reversed. To correct, reverse one transformer's primary or secondary leads, or return to transformer shop to have connections internally corrected.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING GUIDELINE FOR 15S METER 120/240 VOLT OR 240/480 VOLT SERVICE (OPEN DELTA BANK)		
2005	WFECA	MG-15SOD



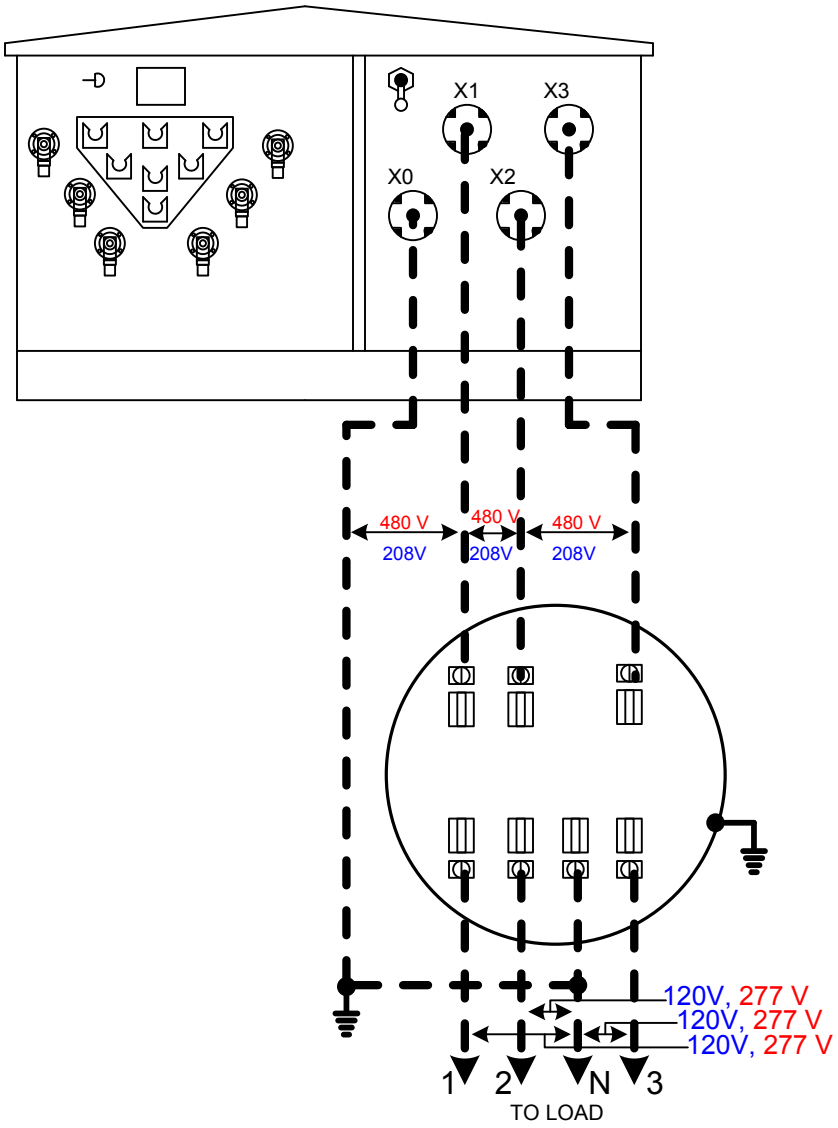
Grounding: The primary wye point of this bank must be tied to the system neutral and grounded. It must also be interconnected with the secondary neutral. If these connections are not made, dangerous voltages may develop on the secondary side.

Impedance: It is not necessary that transformers be matched as to size, impedance, or exact voltage ratio.

Unusual Characteristics: The secondary windings must be wound to provide 120 Volts or 277 Volts.

Secondary Windings: See MG-7 for Transformer Internal Wiring and Voltage Configurations.

WIRING GUIDELINE FOR FORM 16S OR 16K METER 120/208 VOLT OR 277/480 VOLT OH SERVICE		
2005	WFECA	MG-16S

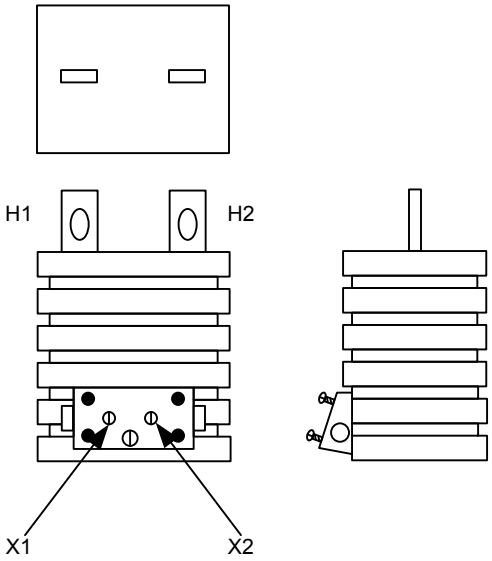


Grounding: The primary wye point of this bank must be tied to the system neutral and grounded. It must also be interconnected with the secondary neutral. If these connections are not made, dangerous voltages may develop on the secondary side.

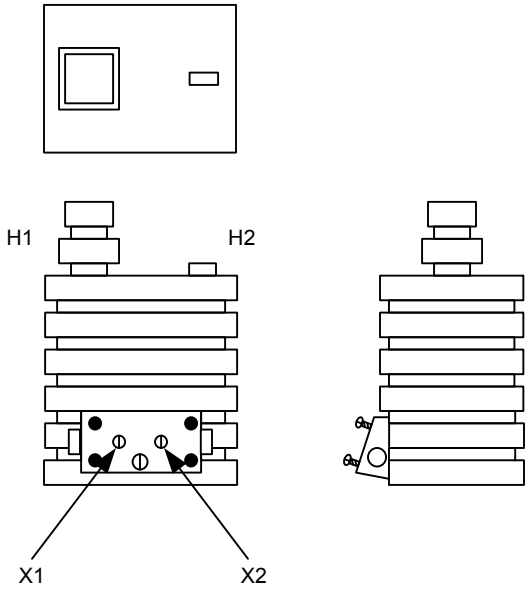
Unusual Characteristics: The secondary windings must be wound to provide 120 Volts or 277 Volts to Ground.

WIRING GUIDELINE FOR FORM 16S OR 16K METER 120/208 VOLT OR 277/480 VOLT UG SERVICE		
2005	WFECA	MG-16SUG

Primary Current Transformer (CT)

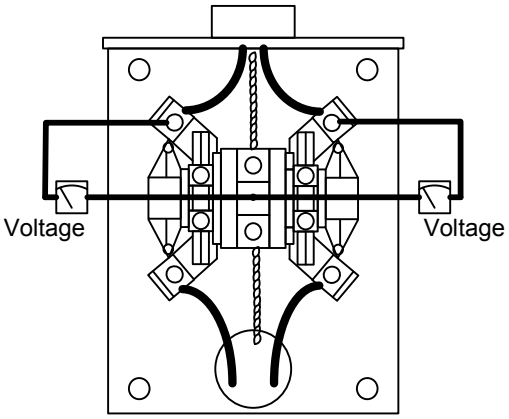


Primary Potential Transformer (PT)

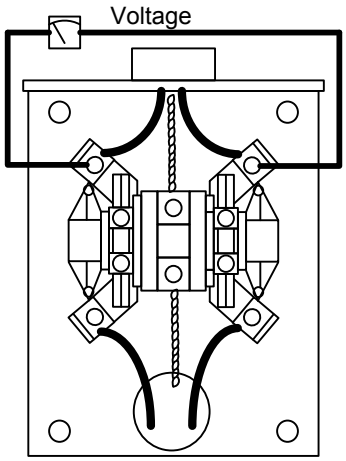


Primary CT and PT Details		
2005	WFECA	MG-17

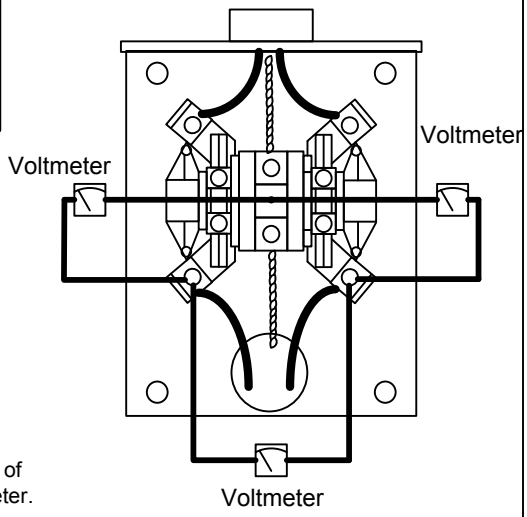
Type of Meter	Deviation	Voltage Hot Leg to Hot Leg	Voltage Hot Leg to Neutral		
			Leg 1	Leg 2	Leg 3
120v 2w	High Average Low	127 **120** 110	127 **120** 110	0 **0** 0	- - -
240v 3w	High Average Low	254 **240** 220	127 **120** 110	127 **120** 110	- - -
120v 3w/Net	High Average Low	220 **208** 190	127 **120** 110	127 **120** 110	- - -
120v 4w Y	High Average Low	220 **208** 190	127 **120** 110	127 **120** 110	127 **120** 110
240v 4w Δ	High Average Low	254 **240** 220	127 **120** 110	127 **120** 110	220 **208** 190
277/480v 4w Y	High Average Low	508 **480** 440	293 **277** 254	293 **277** 254	293 **277** 254



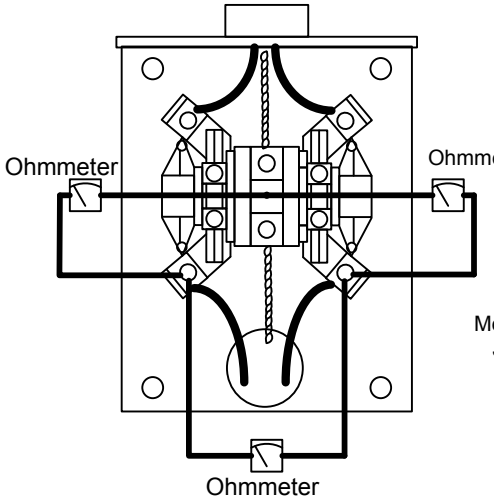
1. Check line-ground voltage on line side of socket.



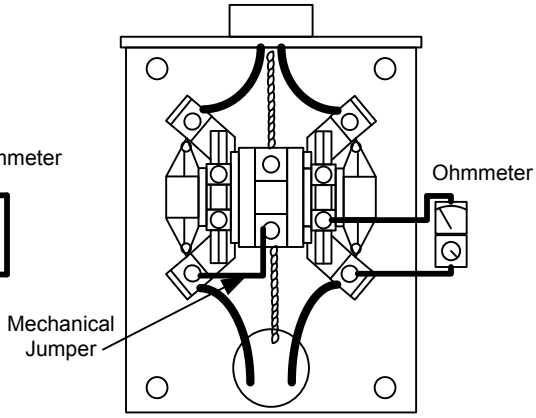
2. Check line-line voltage on line side of socket. Select correct watthour meter.



3. Check for feedback by checking line-ground and line-line voltage on load side of socket. For digital multimeters greater, than 10 volts could indicate feedback. For analog meters, voltage should be zero.



4. Check for customer faults or heavy load by checking line-line resistance and line-ground resistance with an ohmmeter.
Less than 10 ohms could indicate fault or heavy load. Take additional precautions.



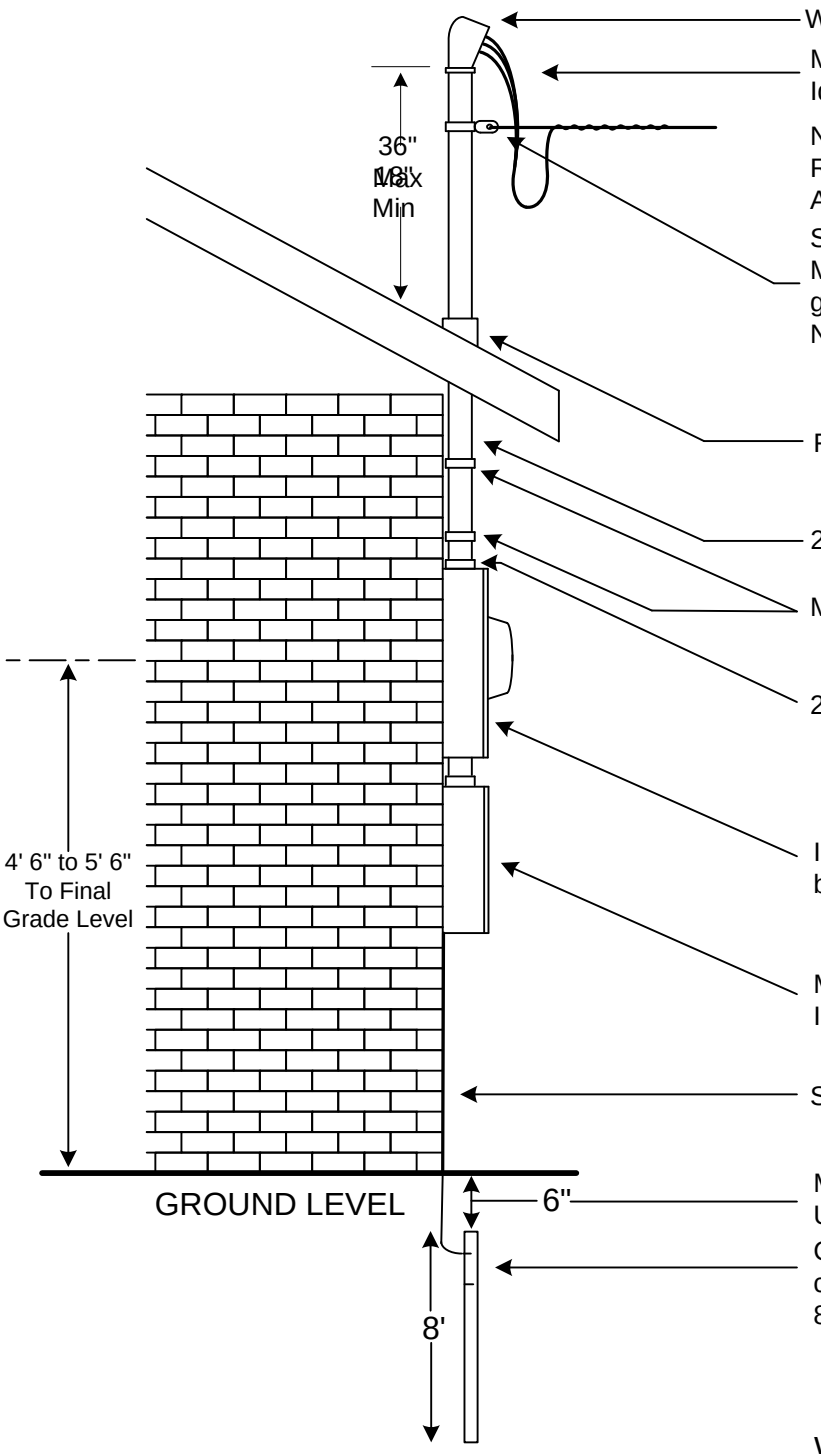
5. Complete circular path insures against “Sneak Circuits”.

Do not place ohmmeter across energized conductors.

Guidelines for Single-Phase Three Wire Meter Base Testing		
2005	WFECA	MG-19

INDEX 4

Service Guidelines



Weather Head

Minimum 18" Leads at Service Head
Identify Neutral by Removing 2" of Insulation

Note:
Reduce neutral approved according to NEC
All wire must have approved insulation

Service rack furnished by Cooperative.
Minimum attachment height 12' 0" above grade Clearance above roof as specified by NEC

Flashing

2" Conduit Minimum

Minimum of two (2) straps to hold conduit

2" replaceable hub

Install meter base so that meter face is between 4' 6" and 5' 6" to final grade.

Main disconnect panel
Installed inside or outside of house

Secure ground conductor every two (2) feet

Minimum 6" below grade
Use approved ground rod clamp

Ground conductor connected to 5/8' copper coated or 5/8" galvanized steel ground rod
8 ft. minimum length

Wire Size:

100 Amp Service - #4 AWG Copper
- #2 AWG Aluminum

150 Amp Service - #1 AWG Copper
- #2/0 AWG Aluminum

200 Amp Service - #2/0 AWG Copper
- #4/0 AWG Aluminum

Guide for Service Mask and Meter Base (Roof)

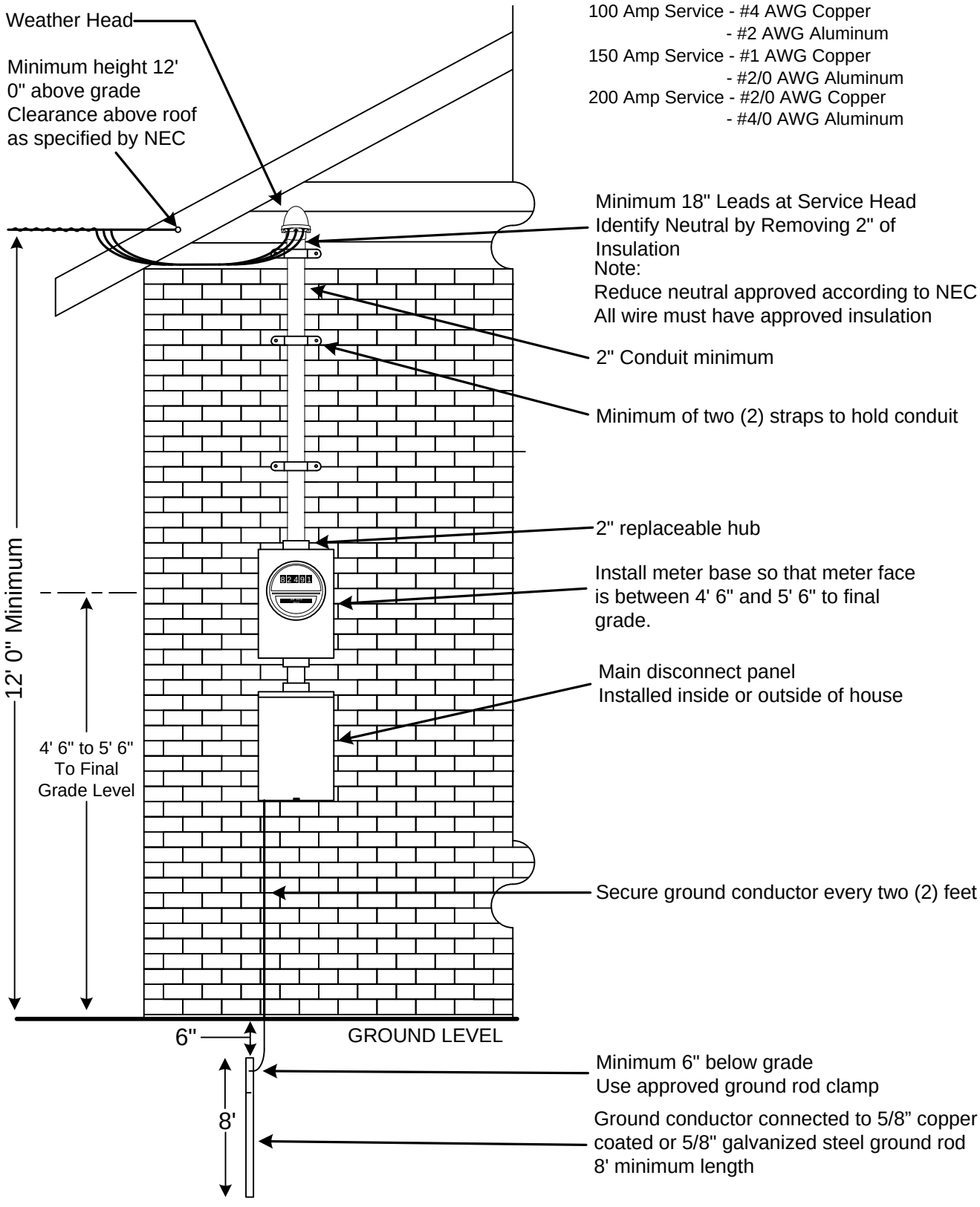
2013	WFECA	GS-1

Wire Size:

100 Amp Service - #4 AWG Copper
- #2 AWG Aluminum

150 Amp Service - #1 AWG Copper
- #2/0 AWG Aluminum

200 Amp Service - #2/0 AWG Copper
- #4/0 AWG Aluminum



Minimum 18" Leads at Service Head
Identify Neutral by Removing 2" of Insulation

Note:
Reduce neutral approved according to NEC
All wire must have approved insulation

2" Conduit minimum

Minimum of two (2) straps to hold conduit

2" replaceable hub

Install meter base so that meter face is between 4' 6" and 5' 6" to final grade.

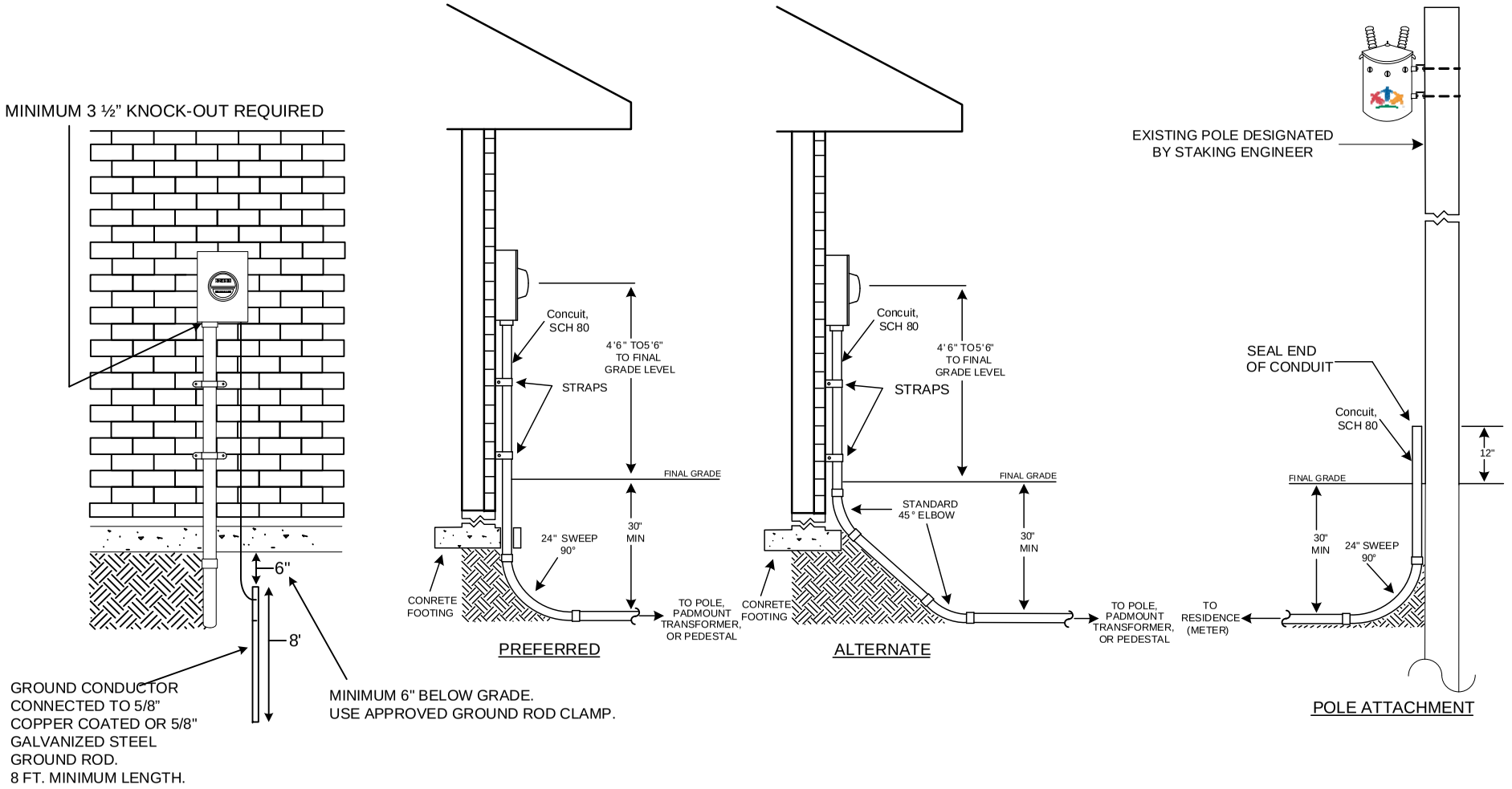
Main disconnect panel
Installed inside or outside of house

Secure ground conductor every two (2) feet

Minimum 6" below grade
Use approved ground rod clamp

Ground conductor connected to 5/8" copper coated or 5/8" galvanized steel ground rod
8' minimum length

Guide for Service Mask and Meter Base (Wall)		
2013	WFECA	GS-2

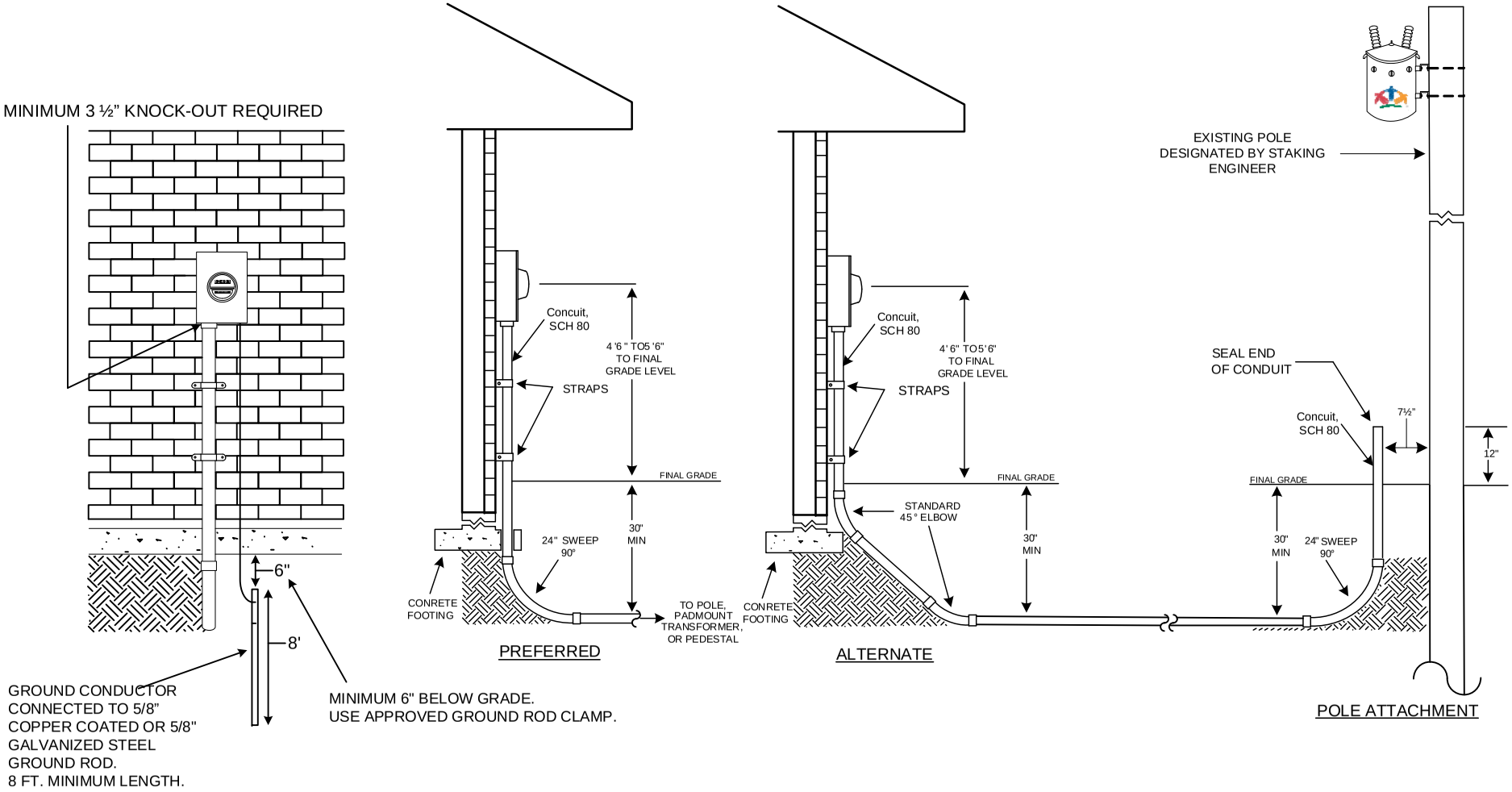


RESIDENTIAL ATTACHMENTS

Notes:

1. Pull line is to be installed in conduit run from meter base to pole
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed in undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit.
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter

Guide for Underground Meter Base		
2013	WFECA	GS-3

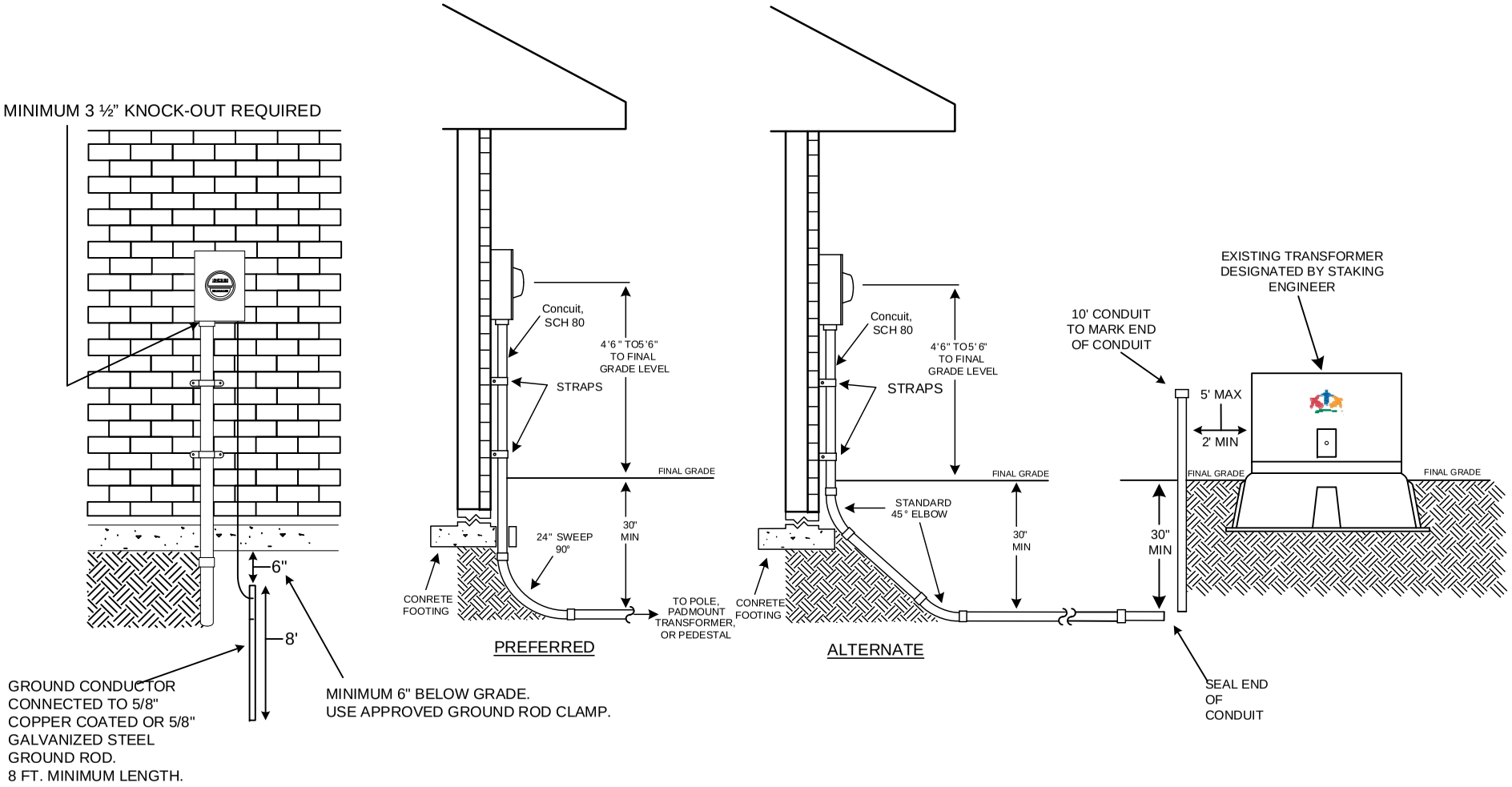


RESIDENTIAL ATTACHMENTS

Notes:

1. Pull line is to be installed in conduit run from meter base to pole
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed in undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit.
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole through the conduit and set meter
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor

Guide for Underground Meter Base		
2013	WFECA	GS-3A

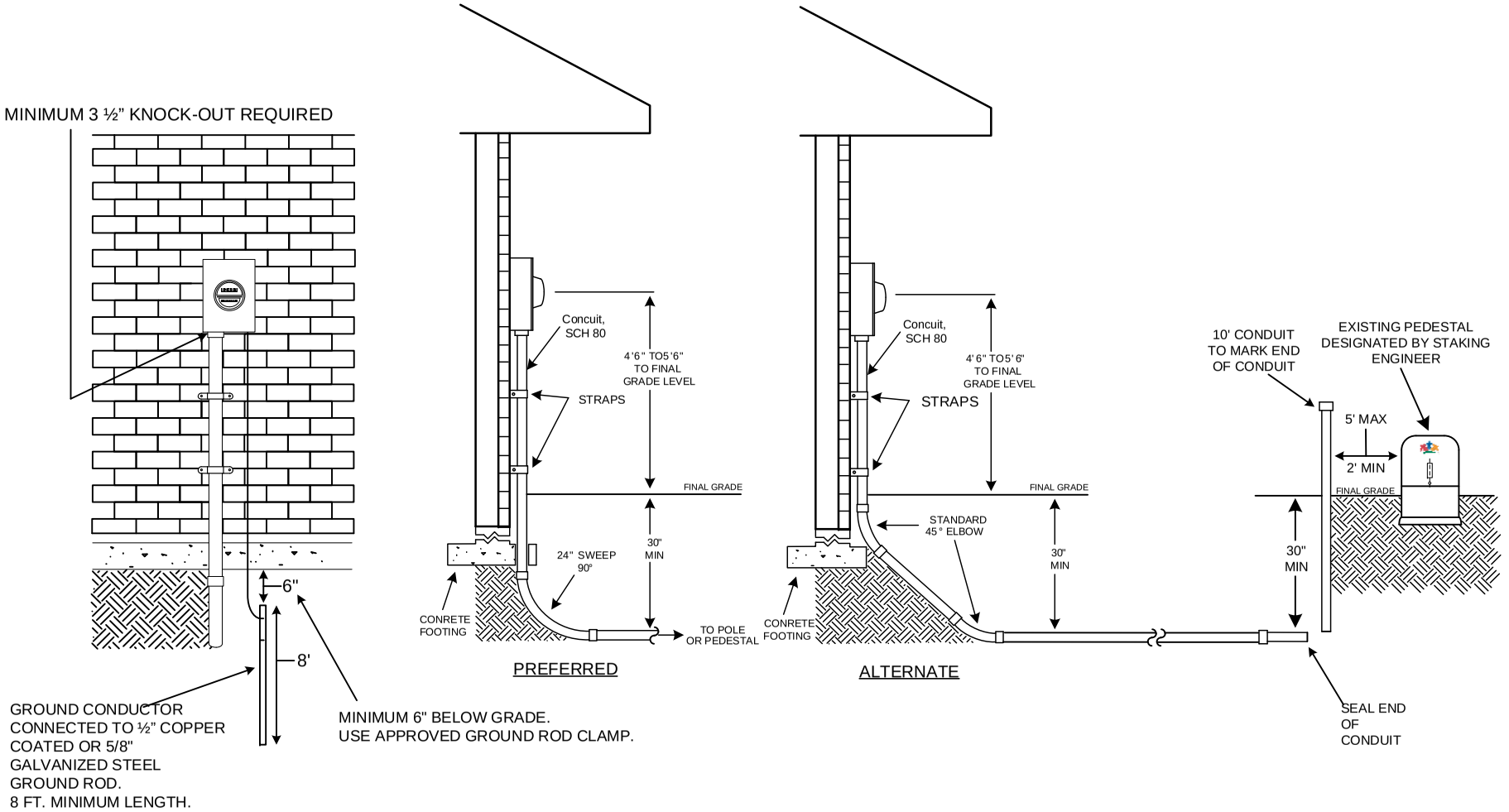


RESIDENTIAL ATTACHMENTS

Notes:

1. Pull line is to be installed in conduit run from meter base to pole
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed in undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit.
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter

Guide for Underground Meter Base		
2013	WFECA	GS-3B

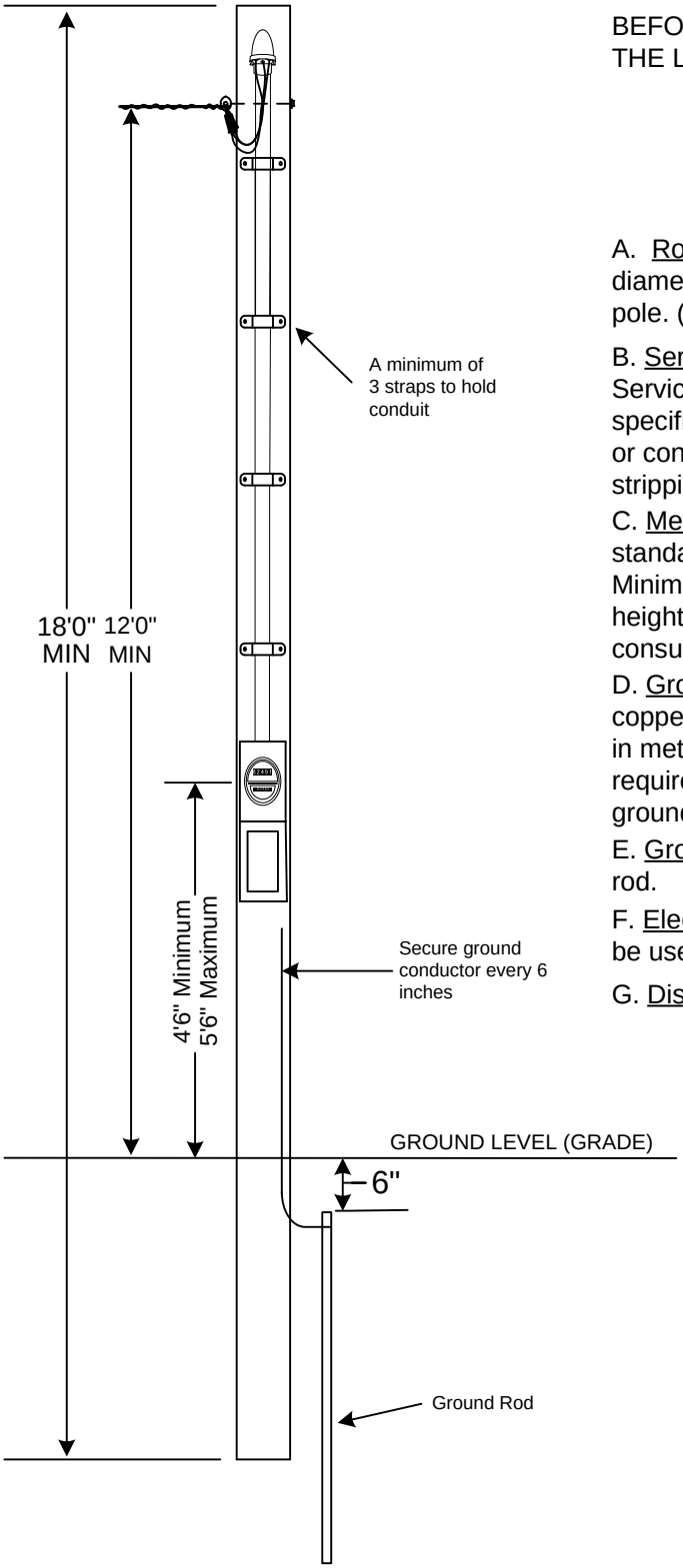


RESIDENTIAL ATTACHMENTS

Notes:

1. Pull line is to be installed in conduit run from meter base to pole
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed in undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter

Guide for Underground Meter Base		
2013	WFECA	GS-3C



BEFORE SETTING POLE, PLEASE CONTACT WFECA TO SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325

A. Round Pole -- 18'0" pressure treated milled pole. 5.5" minimum diameter at meter location and 5.5" minimum diameter at top of pole. (A square treated pole is not acceptable)

B. Service Entrance – Minimum 18" leads at point of service head. Service head to be **MINIMUM** of 12'0" above ground. Size of wire as specified by current National Electrical Code. Service entrance cable or conduit to be securely attached to pole. Identify neutral by stripping 2" of insulation.

C. Meter Socket – Sized according to electrical load. Shall be a standard weatherproof type socket or power pack (combination box). Minimum height of Meter Dials from ground is to be 4'6". Maximum height not to exceed 5'6" from ground. Socket to be furnished by consumer.

D. Ground Wire – Shall be a minimum size of #4 soft drawn bare copper for 200 amp. Ground wire shall be attached to grounding lug in meter socket. If attached to service lead wire a 2'0" lead is required. Ground wire shall be attached to ground rod with proper ground clamp.

E. Ground Rod – Shall be 5/8" X 8'0" copper weld or galvanized steel rod.

F. Electrical Connections – Conductors of dissimilar metals shall not be used in the meter socket. National Electrical Code 110-14.

G. Disconnect Switch – Shall be installed below the metering point.

3 WIRE SINGLE PHASE SERVICE

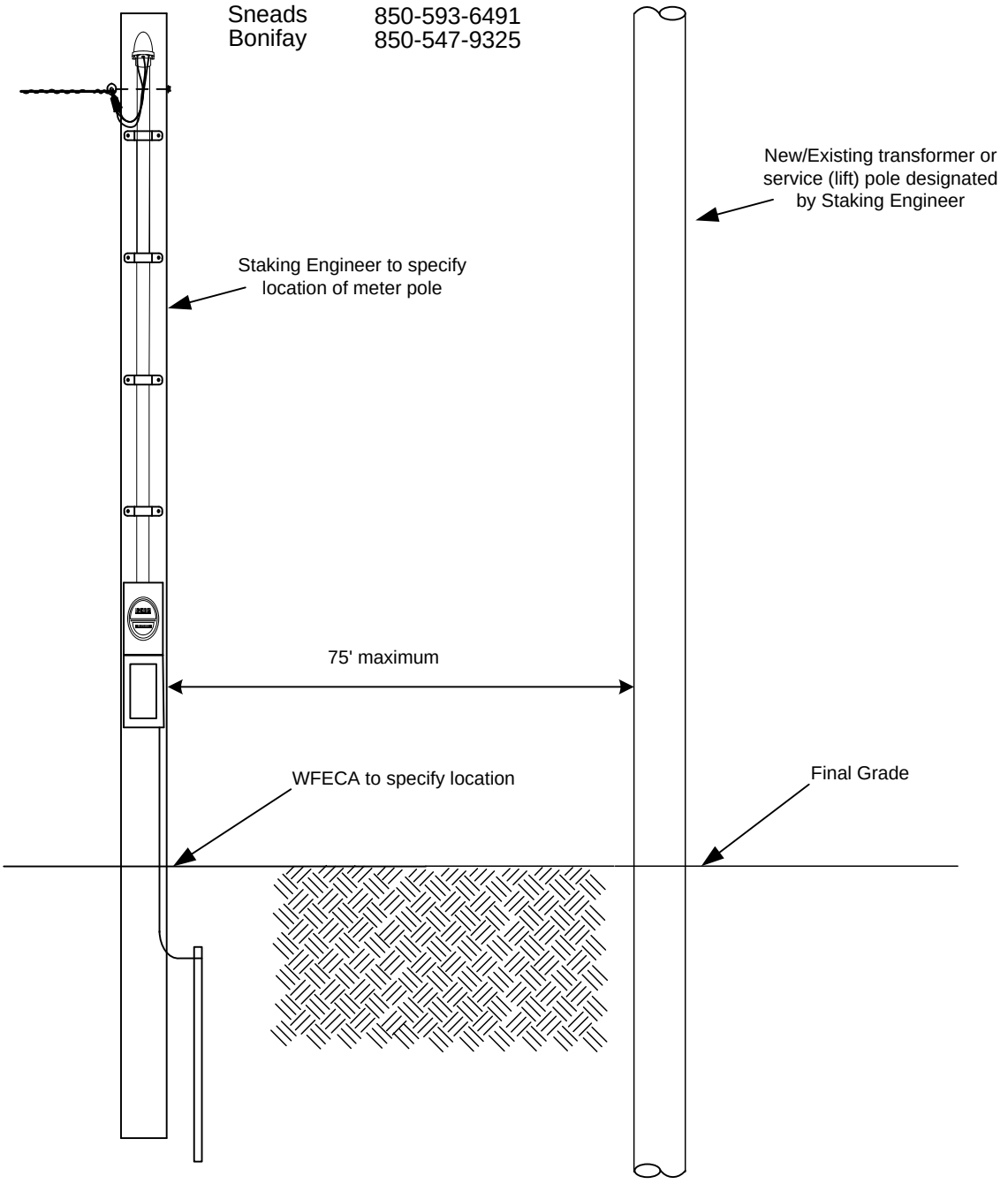
SIZE	ALUMINUM	COPPER
100 AMP	#2	#4
125 AMP	#1/0	#2
150 AMP	#2/0	#1
175 AMP	#3/0	#1/0
200 AMP	#4/0	#2/0

NOTE: MOBILE HOMES REQUIRE A FOURTH GROUND CONDUCTOR. SEE NATIONAL ELECTRICAL CODE FOR DETAILS.

Guide for Overhead Meter Loop Pole		
2013	WFECA	GS-4

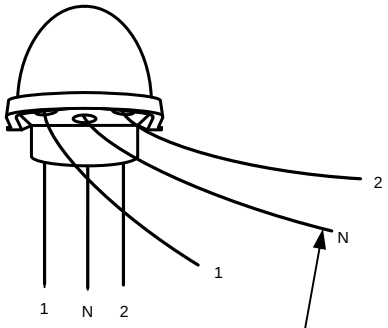
BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325

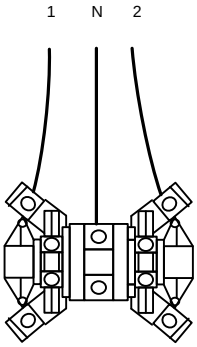


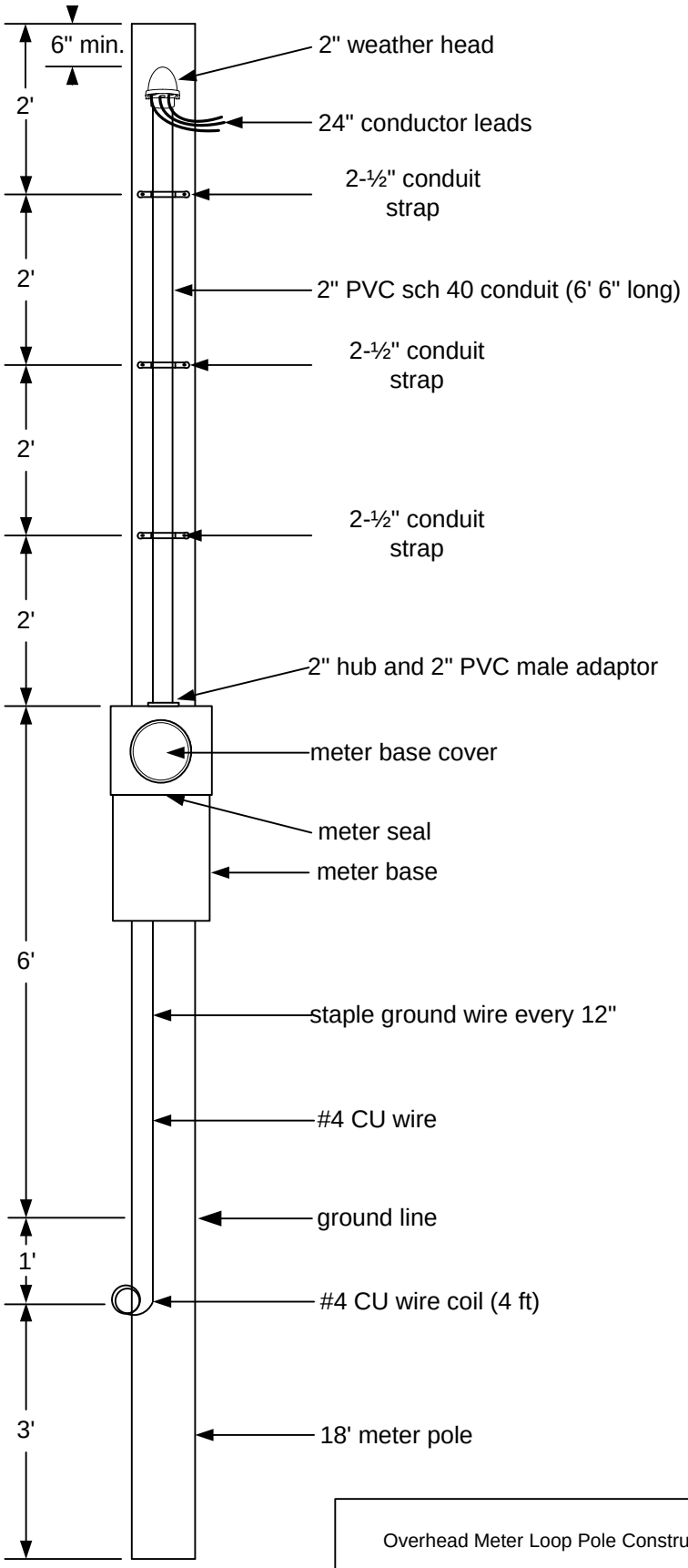
Notes:
1. All Conduit is to be PVC Electrical Conduit, Schedule 40
2. Customer furnishes and installs all material including meter base, pole and conductor from meter base to top of pole.
3. WFECA will furnish and install conductor from pole to meter loop pole.
4. WFECA will connect conductor to drip loop and transformer
5. See Drawing GS-4 for Construction Details.

Guide for Location of Overhead Meter Loop Pole Used Exclusively for Construction		
2013	WFECA	GS-4A

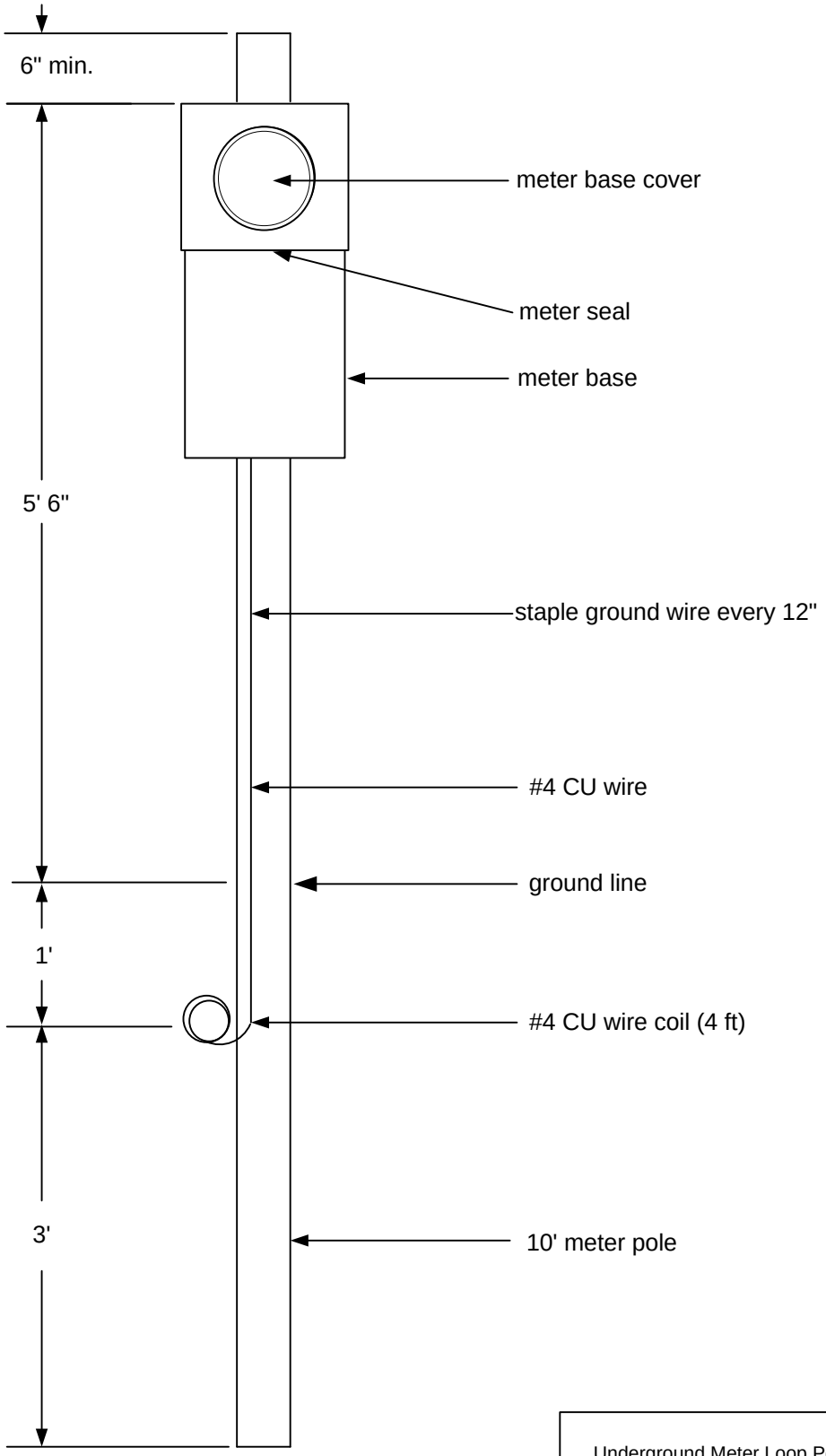


strip 2 inches of insulation from neutral lead





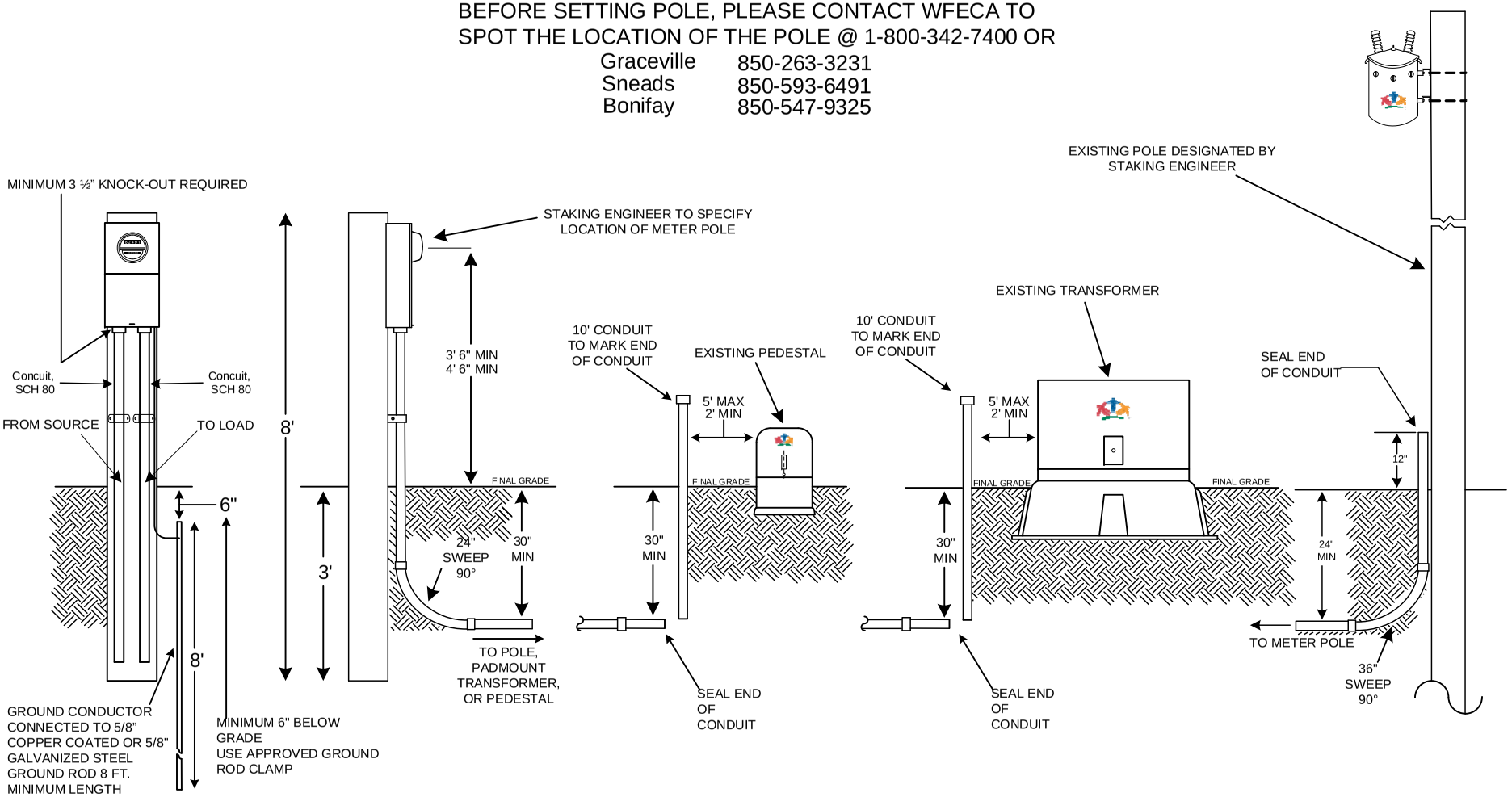
Overhead Meter Loop Pole Construction		
2011	WFECA	GS-4B



Underground Meter Loop Pole Construction		
2011	WFECA	GS-4C

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



Notes:

RESIDENTIAL ATTACHMENTS

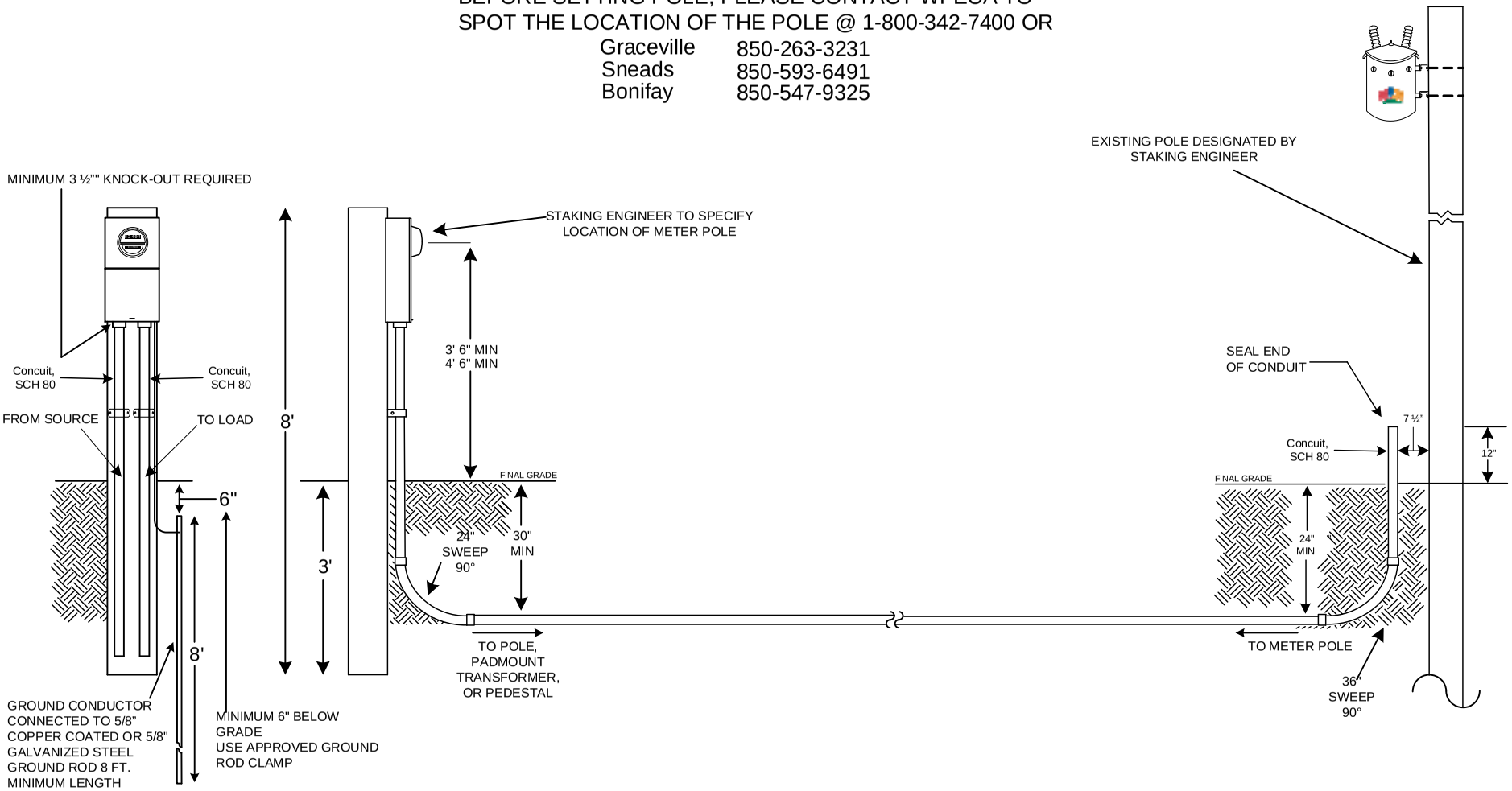
1. Pull line is to be installed in conduit run from meter base to pole or end of conduit
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed on undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter
8. The minimum post size is 6" round or 4" square
9. Meter loop poles for mobile homes require a main disconnect. (SEE NEC)

Guide for Underground Meter Base Loop Pole

2013	WFECA	GS-5

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



RESIDENTIAL ATTACHMENTS

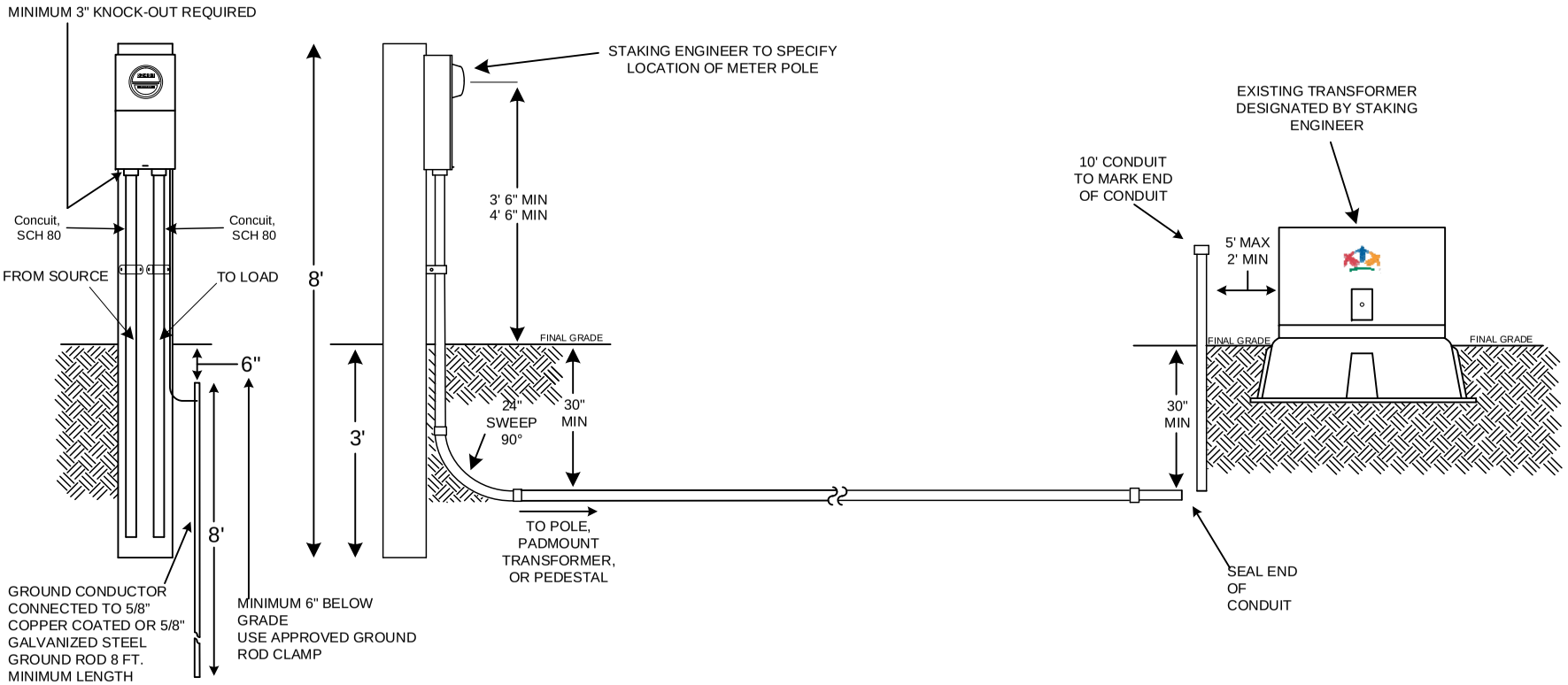
Notes:

1. Pull line is to be installed in conduit run from meter base to pole or end of conduit
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed on undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter
8. The minimum post size is 6" round or 4" square
9. Meter loop poles for mobile homes require a main disconnect. (SEE NEC)

Guide for Underground Meter Base Loop Pole		
2013	WFECA	GS-5A

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



Notes:

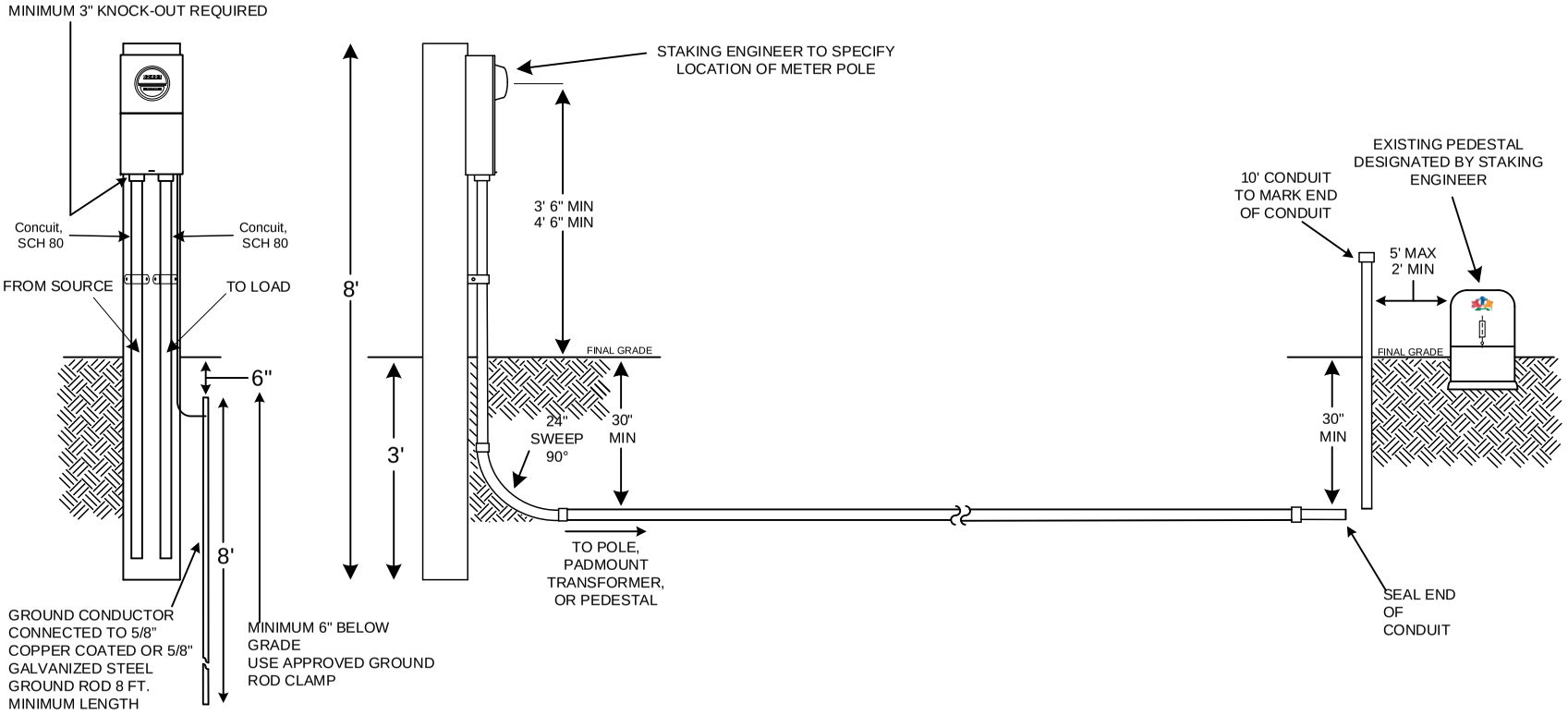
RESIDENTIAL ATTACHMENTS

1. Pull line is to be installed in conduit run from meter base to pole or end of conduit
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed on undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter
8. The minimum post size is 6" round or 4" square
9. Meter loop poles for mobile homes require a main disconnect. (SEE NEC)

Guide for Underground Meter Base Loop Pole		
2013	WFECA	GS-5B

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325

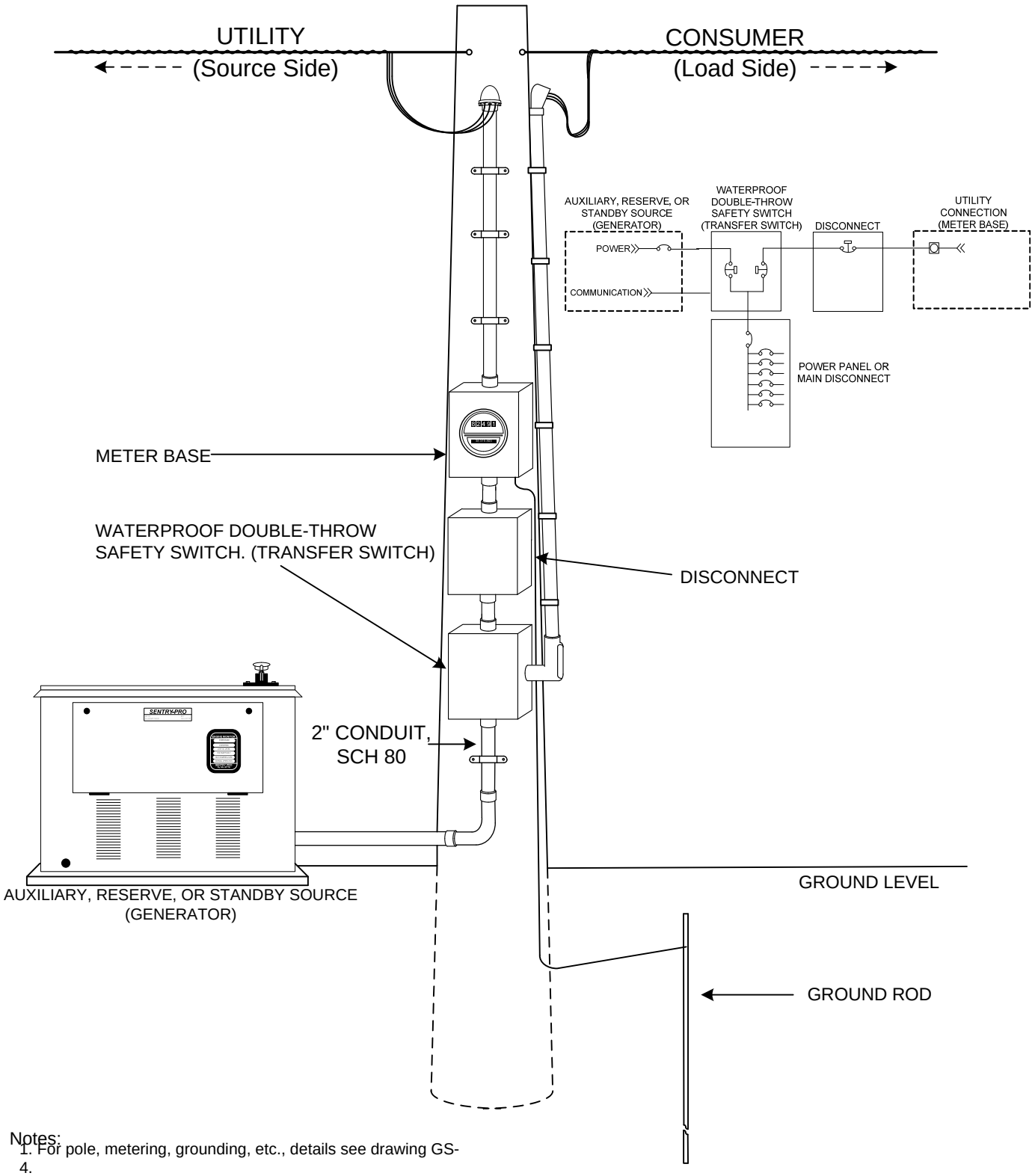


Notes:

RESIDENTIAL ATTACHMENTS

1. Pull line is to be installed in conduit run from meter base to pole or end of conduit
2. All conduit above 18" below Grade shall be 3" PVC Electrical Conduit, Schedule 80. Conduit below 18" below Grade may be Schedule 40. (WFECA will not accept service if conduit is improperly installed.)
3. Buried conduit to be installed on undisturbed or re-compacted soil
4. Do not install more than 2 sweeps in conduit
5. Customer furnishes and installs all material, including underground meter base and conduit from the meter base to a point designated by WFECA
6. WFECA will furnish and install conduit and weatherhead up the transformer pole
7. When final inspection is made by the Authority Having Jurisdiction, WFECA will pull the conductor through the conduit and set meter
8. The minimum post size is 6" round or 4" square
9. Meter loop poles for mobile homes require a main disconnect. (SEE NEC)

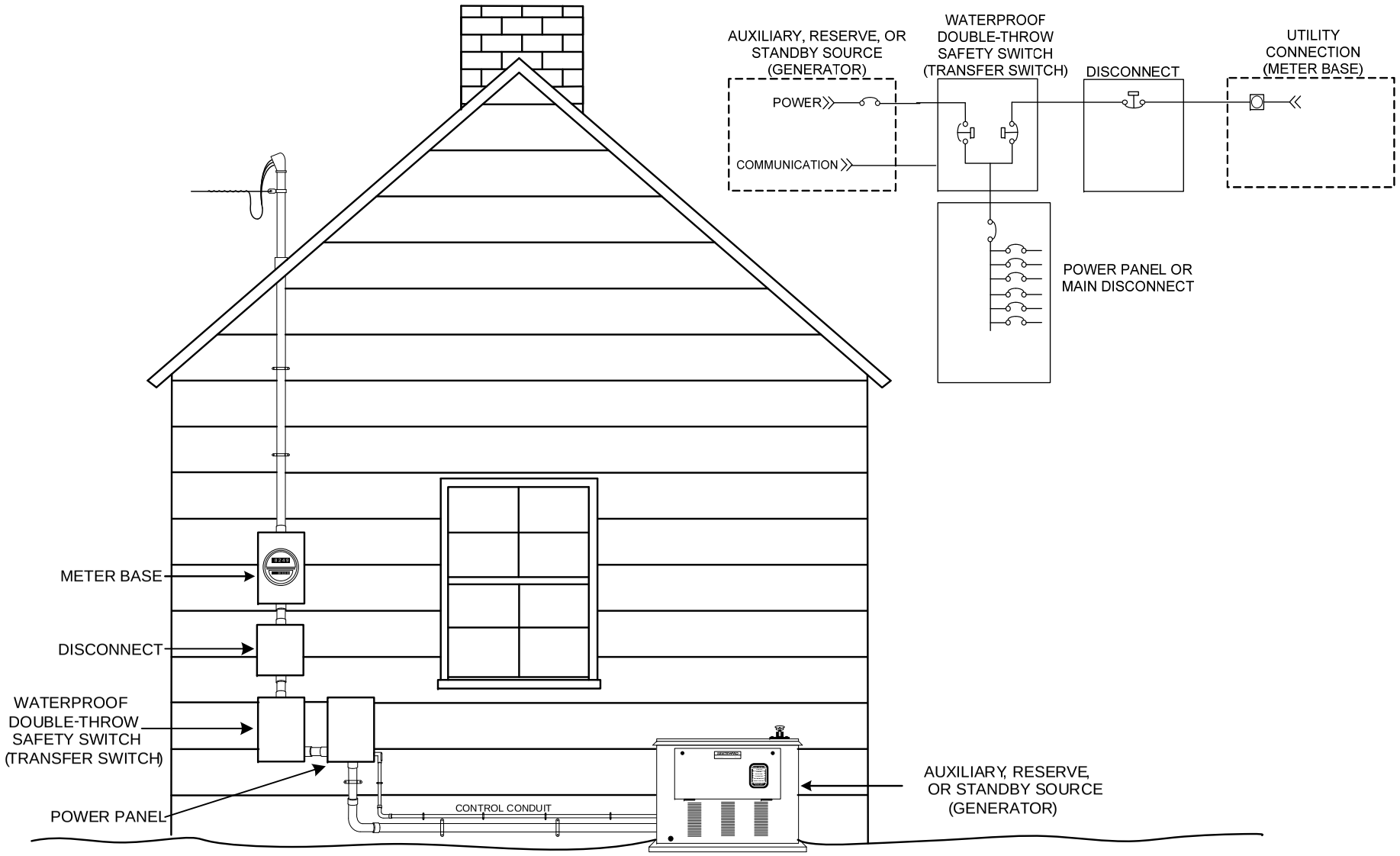
Guide for Underground Meter Base Loop Pole		
2013	WFECA	GS-5C



Notes:

1. For pole, metering, grounding, etc., details see drawing GS-4.

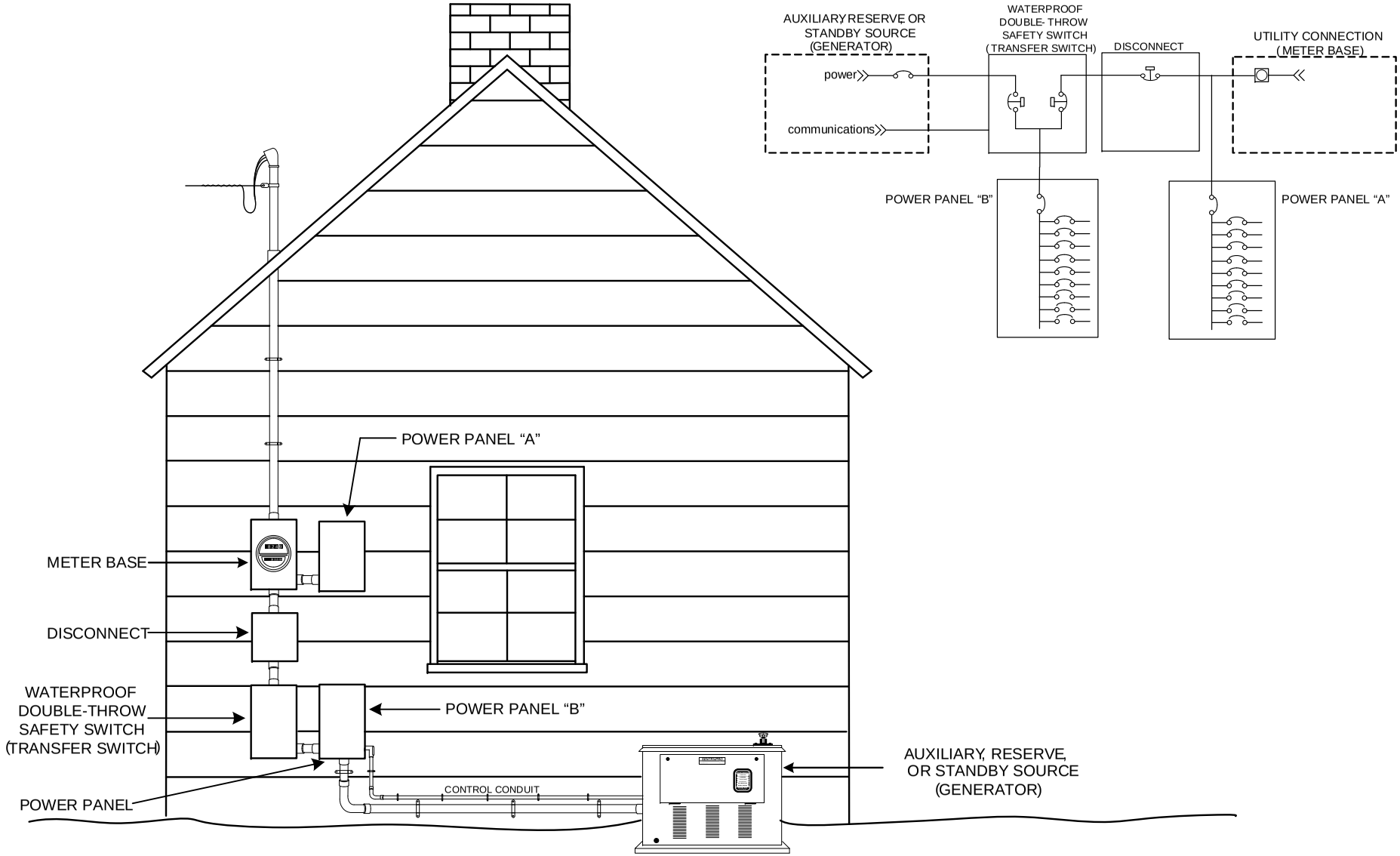
Guide for Auxiliary, Reserve, or Standby Source Service Switch		
2013	WFECA	GS-6



Notes: For metering, grounding, etc. details see drawings GS-1 and GS-2

Disclaimer: This document is intended as a guideline for a service with a switch. Actual construction of the service shall comply with the latest version of the National Electrical Code, the National Electrical Safety Code and any Federal, State, County or Municipal Codes, which ever is more stringent. Contact the Authority Having Jurisdiction (NEC 80.13) or its designated representative for specific details.

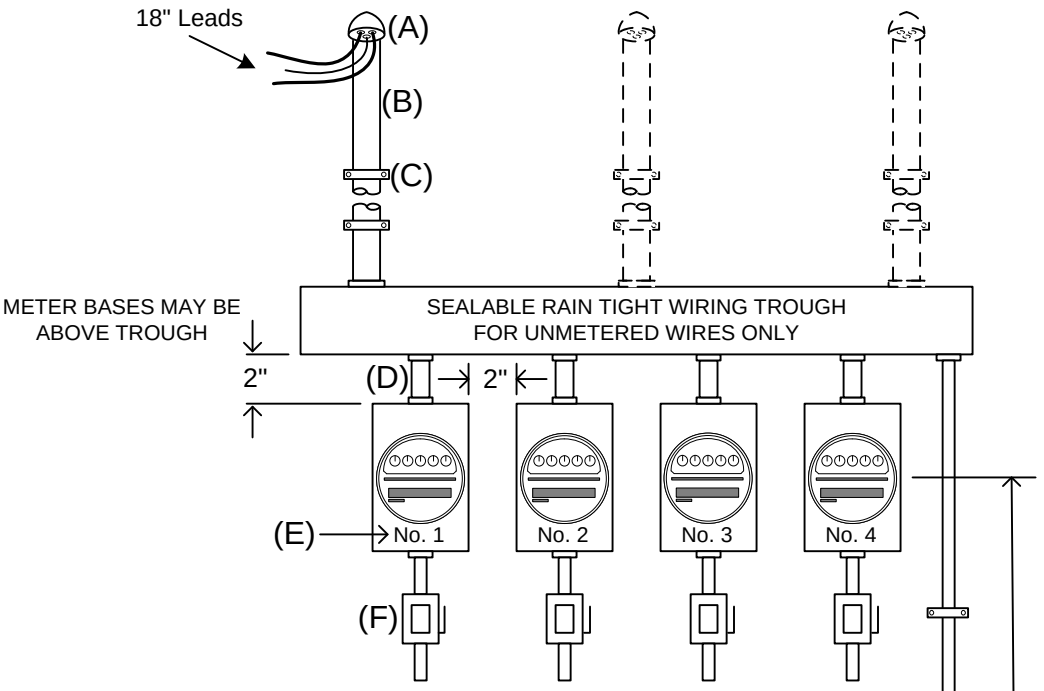
Guide for Auxiliary, Reserve, or Standby Source Service Switch for Residential Use Full Service		
2013	WFECA	GS-7



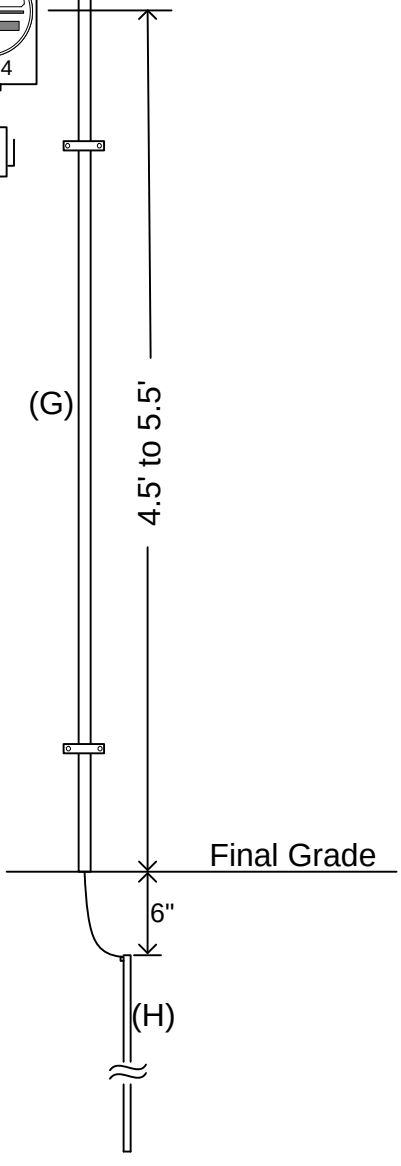
Notes: For metering, grounding, etc. details see drawings GS-1 and GS-2

Disclaimer: This document is intended as a guideline for a service with a switch. Actual construction of the service shall comply with the latest version of the National Electrical Code, the National Electrical Safety Code and any Federal, State, County or Municipal Codes, which ever is more stringent. Contact the Authority Having Jurisdiction (NEC 80.13) or its designated representative for specific details.

Guide for Auxiliary, Reserve, or Standby Source Service Switch for Residential Use Partial Service		
2013	WFECA	GS-8



Meter bases may be above trough

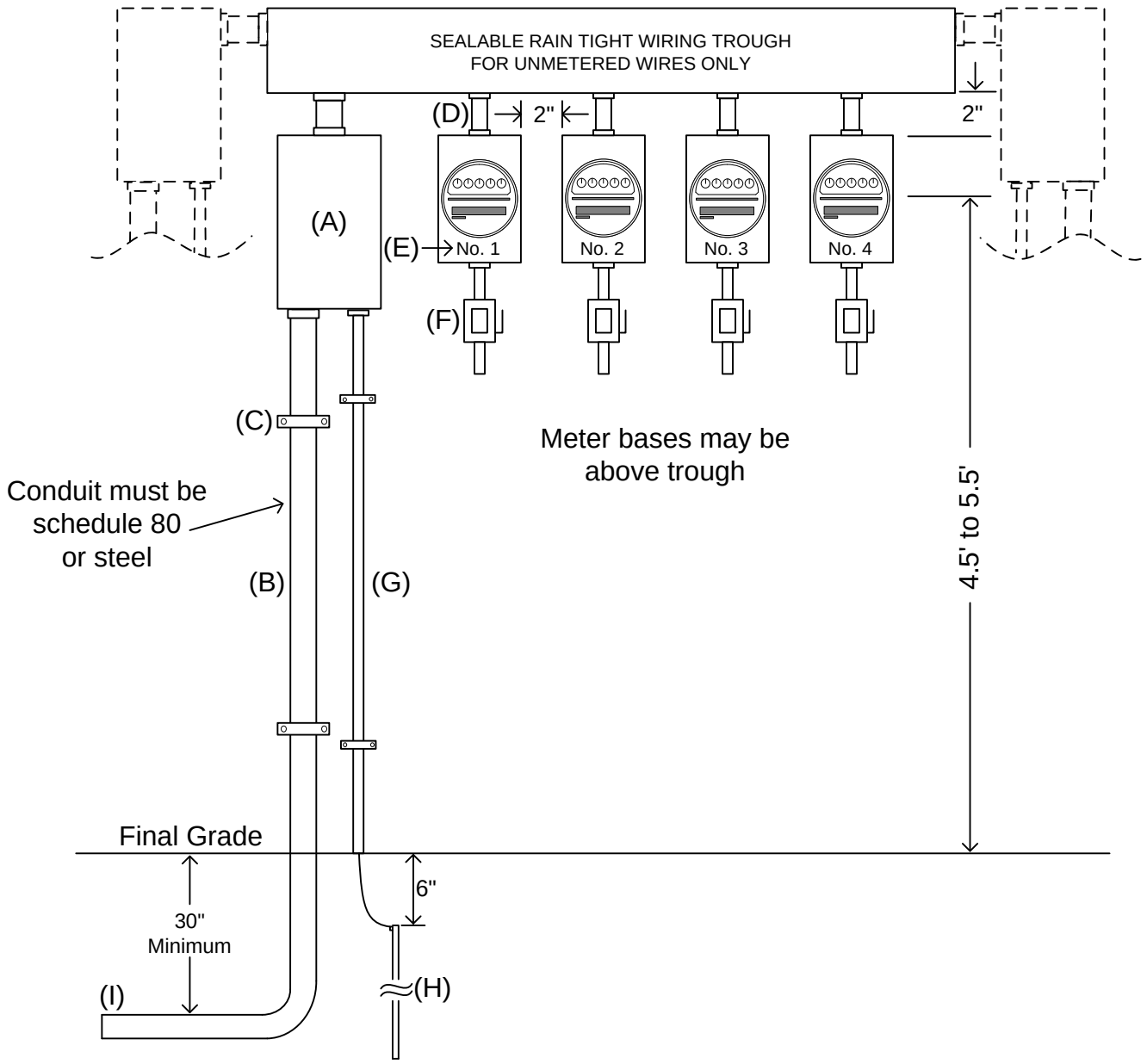


Notes:

Member Will: Furnish and install sealable rain tight trough, meters bases, and all required service entrance material. All bases and devices shall be bonded. Member shall identify meter base to service.

(A)- Weather head with service entrance conductors (Identify neutral by removing 2" of insulation)
(B)- Riser conduit- minimum 3" schedule 40 PVC or 3" rigid steel conduit
(C)- Pipe clamps- 4' intervals Minimum
(D)- Steel conduit bond both ends (between trough and meter base)
(E)- Meter base (identify no. of each apartment or building on base)
(F)- Member disconnect
(G)- All meter bases and devices shall be bonded with a conductor of No. 6 copper or larger; recommended non metallic conduit; or metallic conduit with both ends bonded to ground: No. 6 copper ground wire – continuous from meter bases to ground rod. (NEC 250-92-B)
(H)- Approved grounding electrode: (5/8' x 8' copper weld ground rod)

Guide for Group Metering Overhead Service (Maximum of 6 Meters)		
2013	WFECA	GS-9

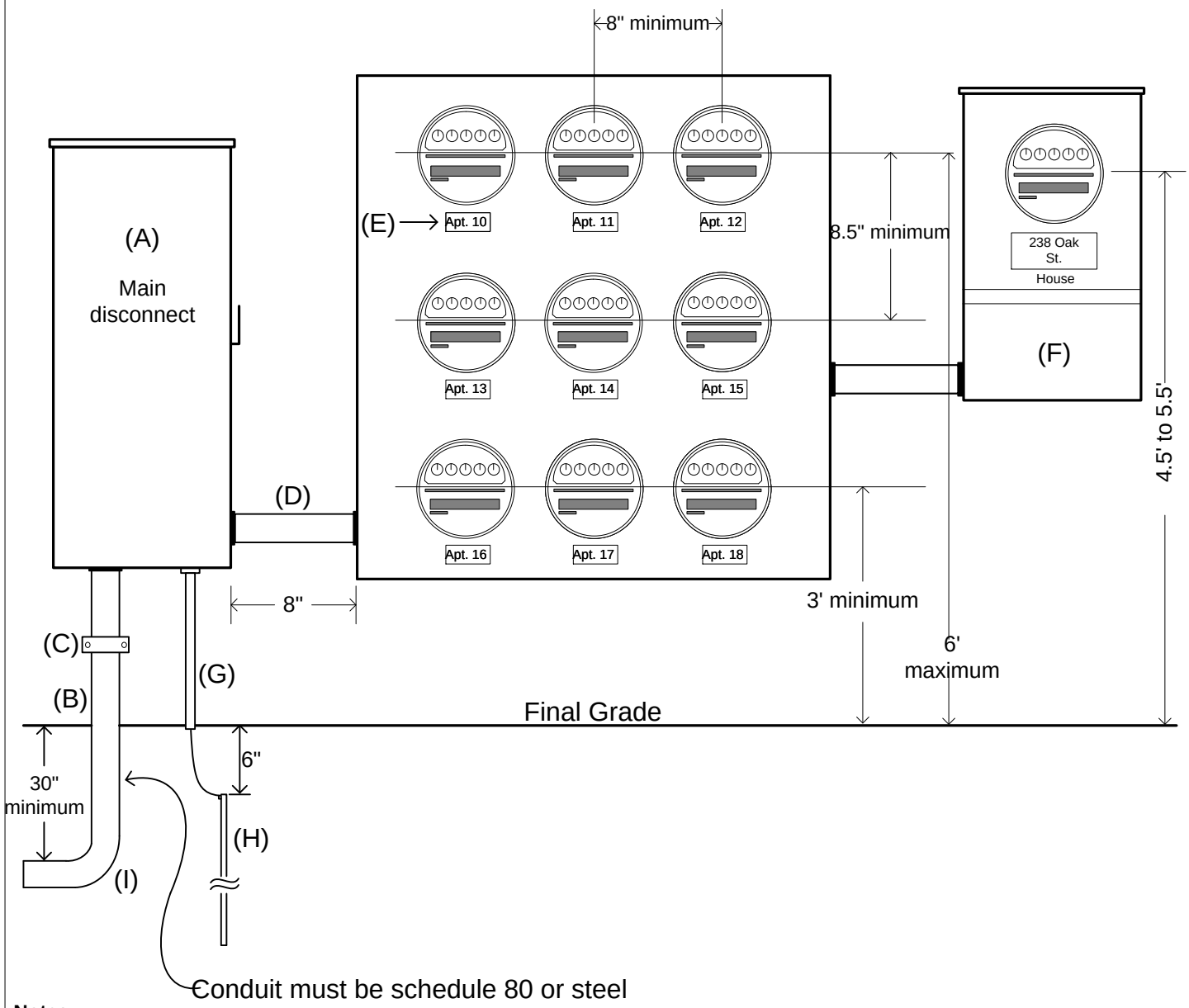


Notes:

Member Will: Furnish and install sealable rain tight trough meters bases, and all required service entrance material. All bases and devices shall be bonded. Member shall identify meter base to service.

(A)- Junction box 14"x 14"x 5" opening 3" maximum (3 optional locations)
Service entrance conductors minimum No. 6 copper or aluminum equivalent
(B)- Riser conduit- minimum 3" schedule 80 PVC or 3" rigid steel conduit
(C)- Pipe clamps- 4' intervals minimum
(D)- Steel conduit bond both ends (between trough and meter base)
(E)- Meter base (identify no. of apartments or buildings on base
(F)- Member disconnect
(G)- All meter bases and deices shall be bonded with a conductor of recommended non metallic conduit; or metallic conduit with both ends bonded to ground: No. 6 copper ground wire - continuous from meter bases to ground rod. (NEC 250-92-B)
(H)- Approved grounding electrode: 5/8' x 8' copper weld ground rod
(I)- To pole, pad mount transformer or pedestal: (See drawing GS-3 for details)

Guide for Group Metering Underground Service (Maximum of 6 Meters)		
2013	WFECA	GS-10

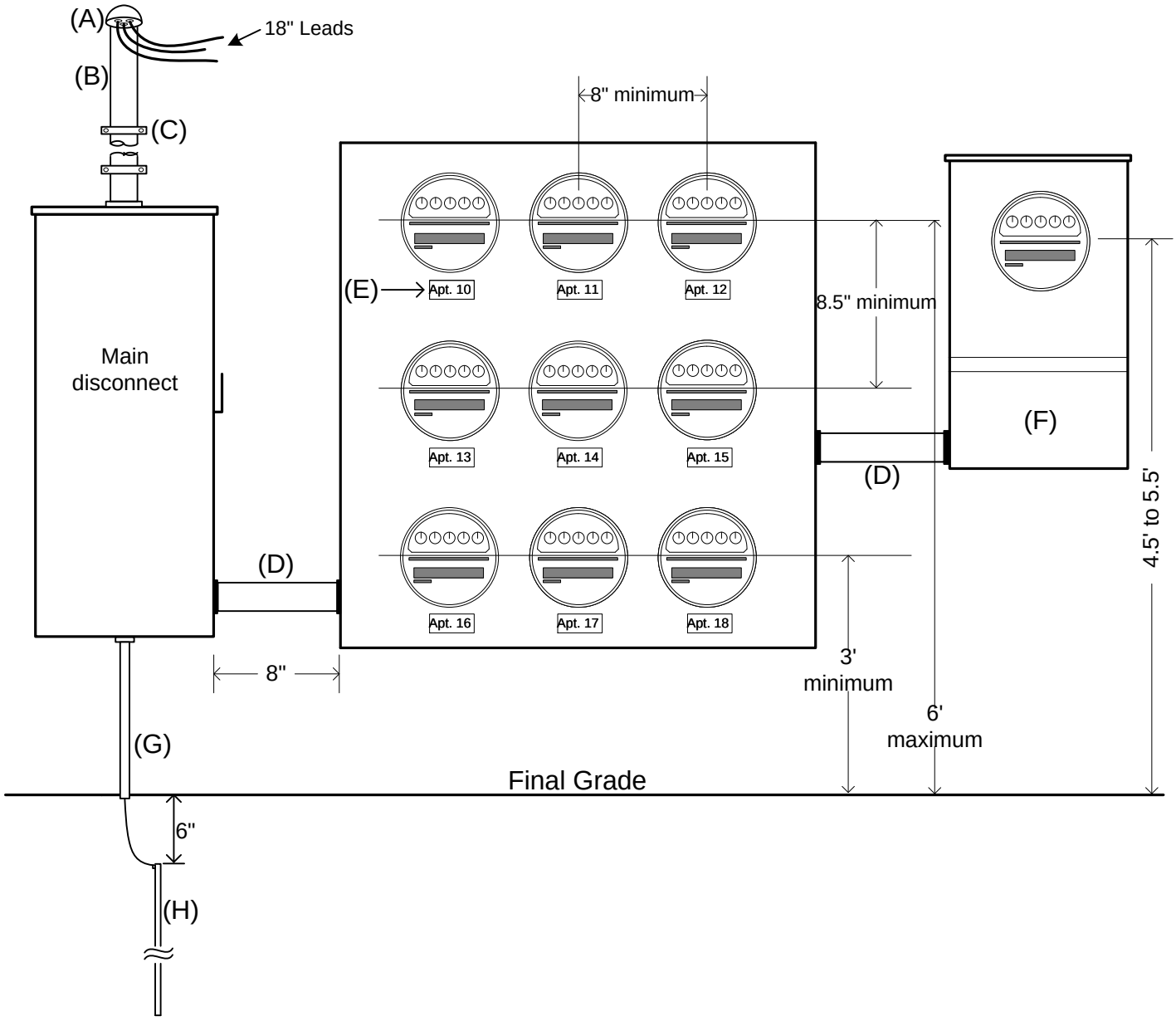


Notes:

Member Will: Furnish and install sealable rain tight trough meters bases, and all required service entrance material. All bases and devices shall be bonded. Member shall identify meter base to service.

(A)- Main disconnect
(B)- Riser conduit- minimum 3" schedule 80 PVC or 3" rigid steel conduit
(C)- Pipe clamps- 4' intervals minimum
(D)- Steel conduit bond both ends (between trough and meter base)
(E)- Meter base (identify no. of apartments or buildings on base
(F)- House meter base requires manual bypass.
(G)- All meter bases and deices shall be bonded with a conductor of recommended non metallic conduit; or metallic conduit with both ends bonded to ground: No. 6 copper ground wire continuous from meter bases to ground rod. (NEC 250-92-B)
(H)- Approved grounding electrode: 5/8' x 8' copper weld ground rod
(I)- To underground transformer or pedestal: (See drawing GS-3 for details)

Guide for Group Metering Underground Service (Over 6 Meters)		
2013	WFECA	GS-11



Notes:

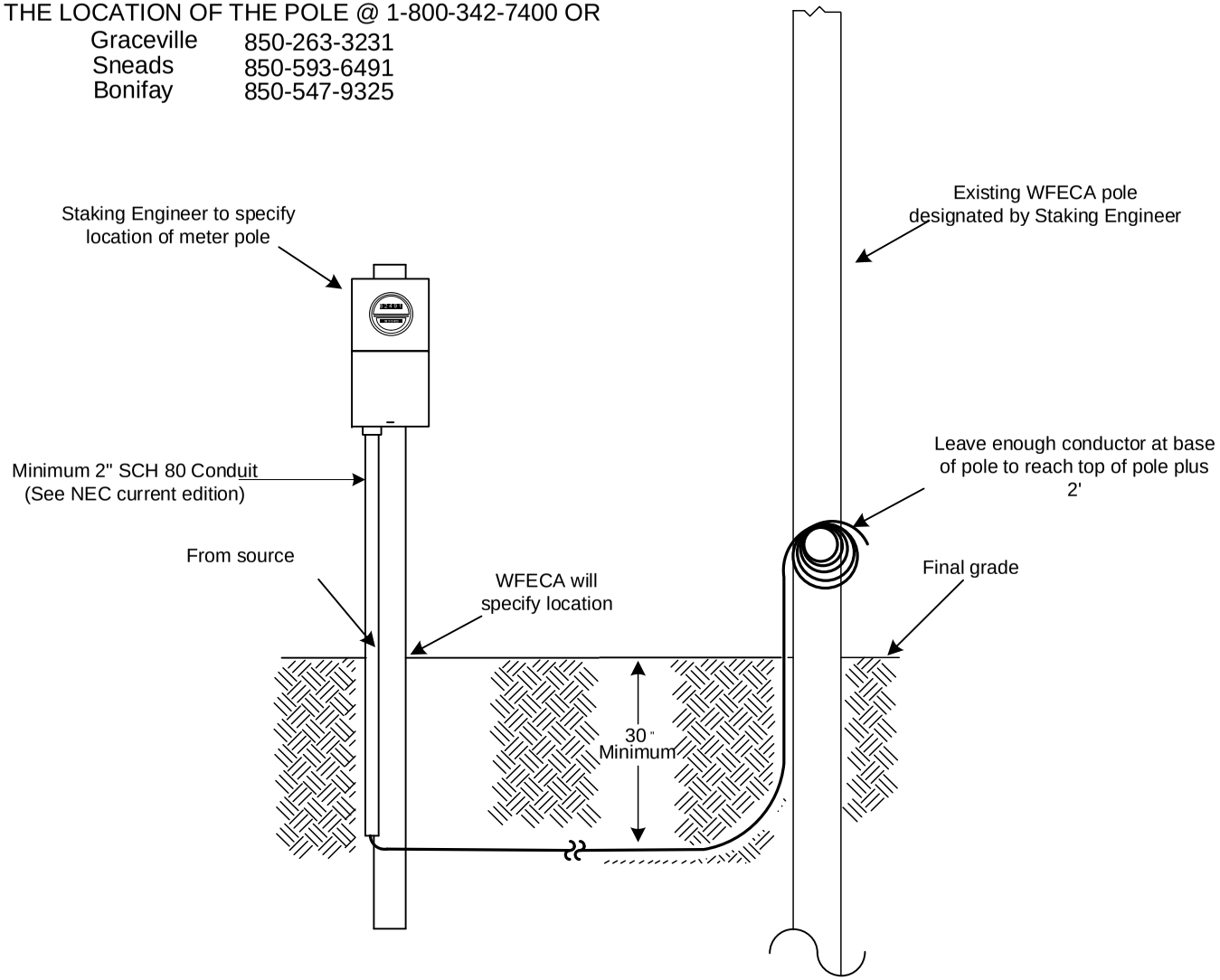
Member Will: Furnish and install sealable rain tight trough meters bases, and all required service entrance material. All bases and devices shall be bonded. Member shall identify meter base to service.

(A)- Weather head with service entrance conductors
(B)- Riser conduit- minimum 3" schedule 40 PVC or 3" rigid steel conduit (Identify neutral by removing 2" of insulation)
(C)- Pipe clamps- 4' intervals minimum
(D)- Steel conduit bond both ends (between trough and meter base)
(E)- Meter base (identify no. of apartments or buildings on base
(F)- House meter base requires manual bypass.
(G)- All meter bases and deices shall be bonded with a conductor of recommended non metallic conduit; or metallic conduit with both ends bonded to ground: No. 6 copper ground wire continuous from meter bases to ground rod. (NEC 250-92-B)
(H)- Approved grounding electrode: 5/8' x 8' copper weld ground rod

Guide for Group Metering Overhead Service (Over 6 Meters)		
2013	WFECA	GS-12

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



Notes:

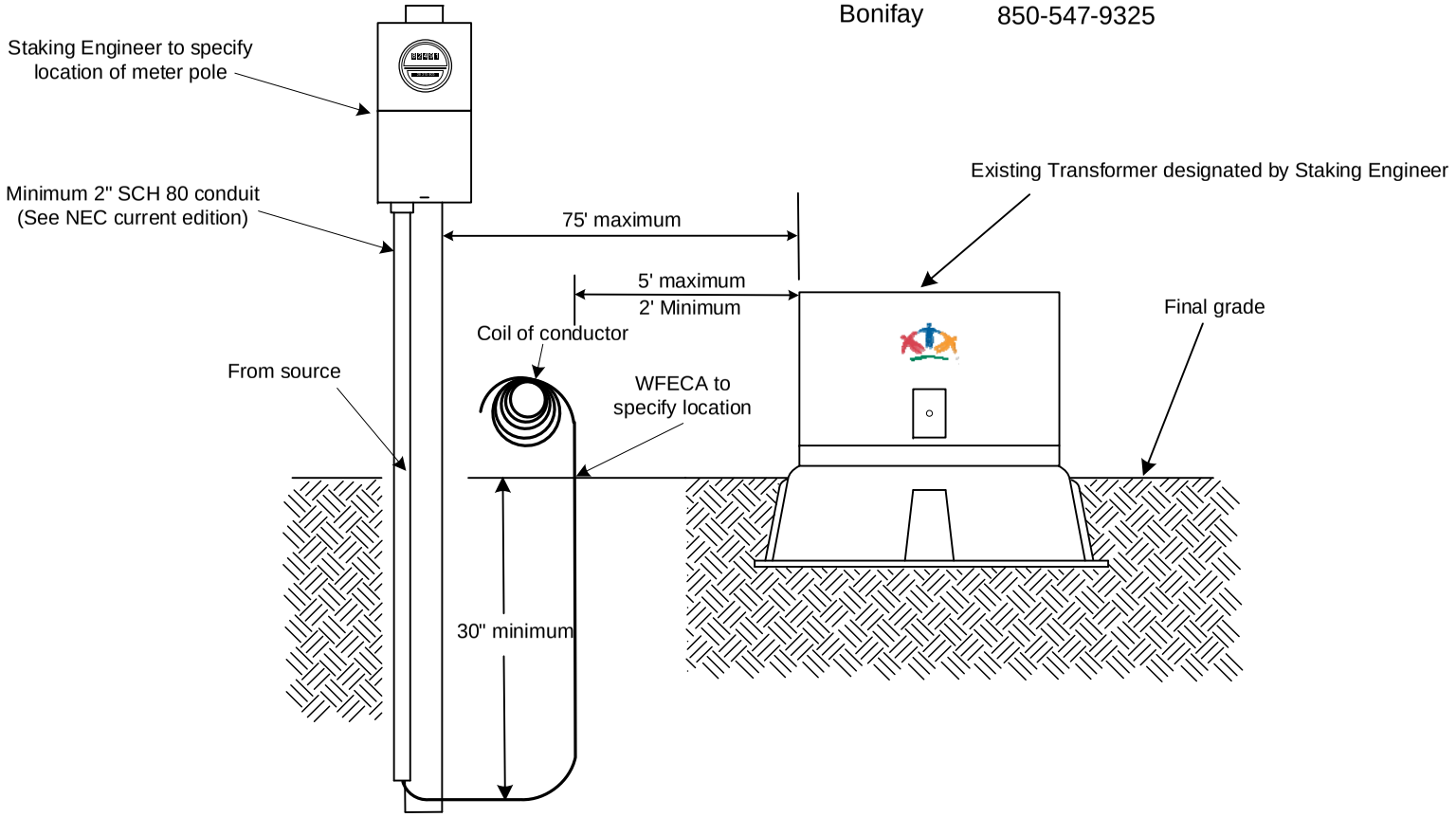
1. All conduit is to be PVC electrical conduit, schedule 80
2. All Conductor below grade will be of the direct buried type.
3. Customer furnishes and installs all material, including underground meter base, pole, and conductor from the meter base transformer.
4. WFECA will furnish and install conduit and weatherhead up the transformer pole. Consumer will furnish conductor.
5. WFECA will connect conductor to transformer.
6. For all other details see (GS-5)
7. Consumer is responsible for sizing Conductor.

Guide for Location of Underground Meter Base Loop Pole (Used Exclusively for Construction)

2013	WFECA	GS-13A

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO
SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



Notes:

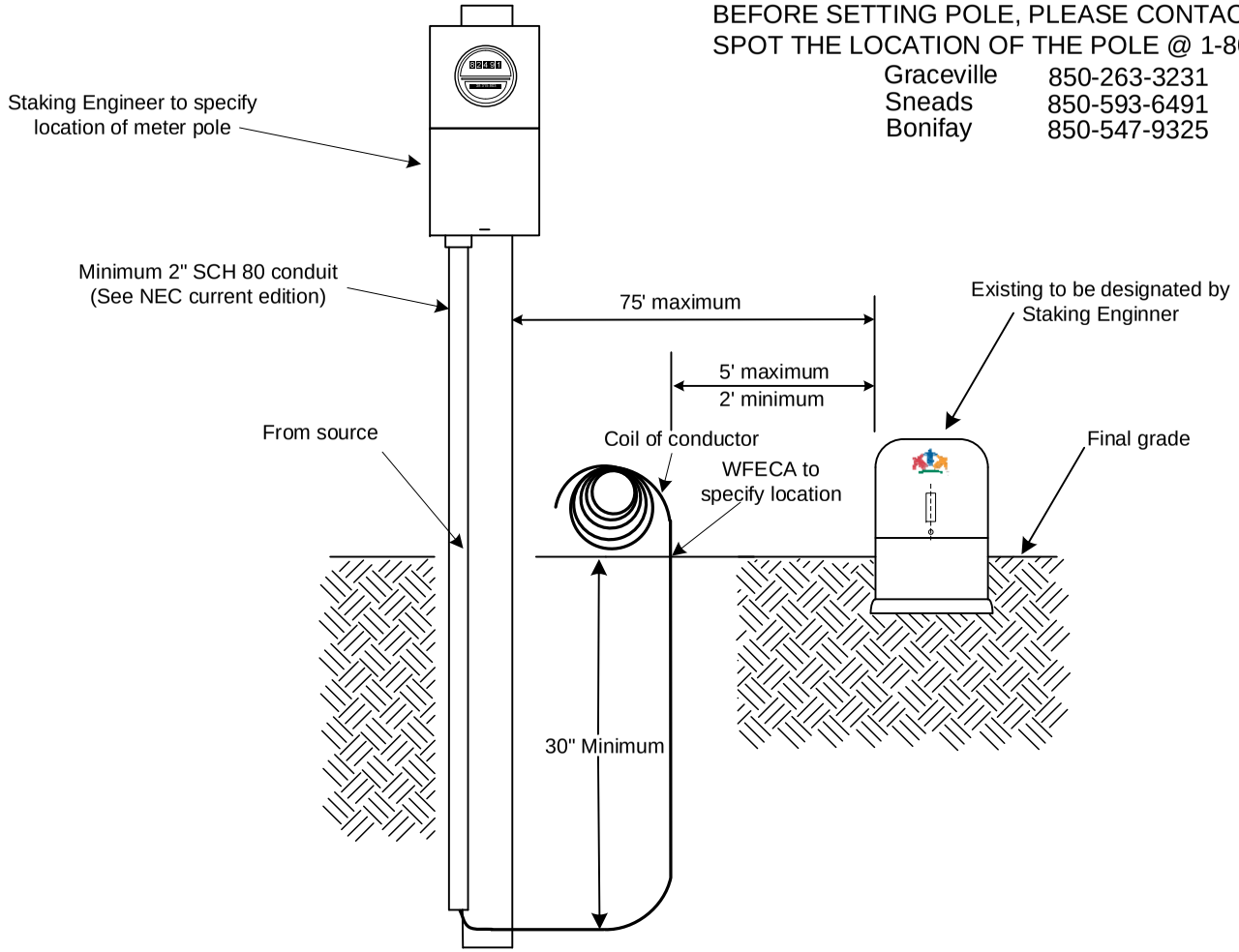
1. All conduit is to be PVC Electrical Conduit, Schedule 80
2. All conductor below Grade will be of the Direct Buried Type.
3. Customer furnishes and installs all material, including underground meter base, pole, and conductor from the meter base to transformer.
4. WFECA will connect conductor to pad mount transformer, consumer will furnish conductor.
5. The minimum post size is 6" round or 4" square
6. For all other details see (GS-5)
7. Consumer is responsible for sizing Conductor.

Guide for Location of Underground Meter Base Loop Pole at Pad Mount Transformer
(Used Exclusively for Construction)

2013	WFECA	GS-13B

BEFORE SETTING POLE, PLEASE CONTACT WFECA TO SPOT THE LOCATION OF THE POLE @ 1-800-342-7400 OR

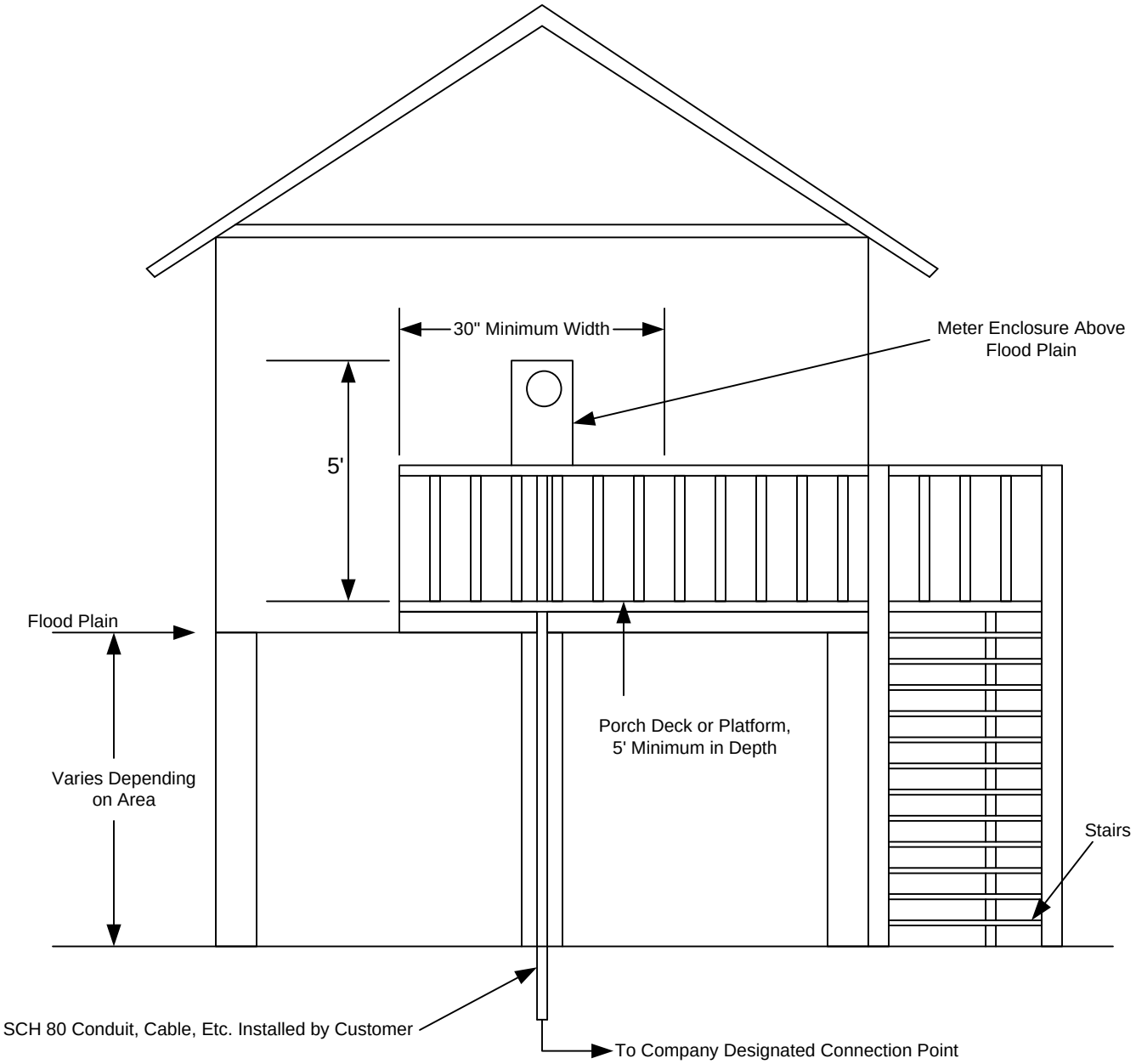
Graceville	850-263-3231
Sneads	850-593-6491
Bonifay	850-547-9325



Notes:

1. All conduit is to be PVC electrical conduit, schedule 80
2. All conductor below grade will be of the direct buried type.
3. Customer furnishes and installs all material, including underground meter base, pole, and conductor from the meter base to pedestal.
4. WFECA will connect conductor to secondary pedestal, consumer will furnish conductor.
5. The minimum post size is 6" round or 4" square
6. For all other details see (GS-5)
7. Consumer is responsible for sizing Conductor.

Guide for Location of Underground Meter Base Loop Pole at Secondary Pedestal **(Used Exclusively for Construction)**		
2013	WFECA	GS-13C



Notes:

PLATFORM 5' IN DEPTH IS ESTIMATED TO MEET 4' METER ENCLOSURE CLEARANCE REQUIREMENTS.

All PLATFORM AND STAIR CONSTRUCTION SHOULD BE PROVIDED BY THE CUSTOMER AND BUILT ACCORDING TO LOCAL BUILDING CODES.

GUIDELINE FOR METER ENCLOSURE INSTALLATIONS IN FLOOD ZONES		
2013	WFECA	GS-14