1100
OVERHEAD TRANSFORMERS

3/13/2023

~	F1	Fuse Schedule – Overhead Transformers
~	T1	Transformer Field Stenciling Code
~	T3,T3H	Pole Mounted Transformer and Cutout on Pole
~	T4,T4H	Pole Mounted Transformer and Cutout on Crossarm
~	T5	Overhead Service Installation Guideline
~	T21	Crossarm Construction - Two Transformers - Open Wye Primary
~	T23	Twiggy Construction - Two Transformers - Open Wye Primary
~	T31	Three Transformers - Grounded Y - Grounded Y
~	T32	Three Transformers - Closed Δ - Closed Δ
~	TC2A	1Ø & 3Ø, 2-Winding Boost or Buck Xfmr Bank - Installation & Removal Procedure
~	TC3	3Ø Open Δ for 120/240 3Ø 4-wire, 240 3Ø 3-wire, 480v 3Ø 3-wire
~	TC4	3Ø Open-Y Open-Δ for 120/240 3Ø 4-wire, 240 3Ø 3-wire, 480v 3Ø 3-wire
~	TC5	3Ø Δ-Δ for 120/240 3Ø 4-wire, 240 3Ø 3-wire, 480v 3Ø 3-wire
~	TC5A	3Ø Δ-Δ Closed Banks for 120/240 3Ø 4-wire, 240 3Ø 3-wire, 480v 3Ø 3-wire
~	TC6	3Ø Δ-Y for 120/208 or 277/480v Service
~	TC7	3Ø Y-Y for 120/208 or 277/480v Service
~	TC8	3Ø Y-Δ for 240v 3Ø 3-wire 480v 3Ø 3-wire
~	TC10	3Ø Transformer Connections
~	TC11	3Ø Transformer Connections
C	TL1	Transformer Lead Sizes - Overhead Secondary
~	TL2	Large Transformer Lead Size - Overhead

N New Standard
R Redrawn Standard
C Changed Standard
~ No Change

7.2 kV Wye-Connected Primary Overhead Transformers

kVA	Transformer Stock Numbers			Primary Transformer Fusing *2*6		Minimum Upstream OH Fuse *4*6	
	BM 120/240	BR 240/480	BW 277/480	Size	S/N	Size	S/N
5/10*1	Obsolete			5 A ✲	678	10 A	680
15	1346			5 A	678	10 A	680
25	1347	1356	2041	10 A	680	20 A	682
37.5	1348	1357 (REQ)		15 A	681	25 A	683
50	1349		2236	20 A	682	30 A	684
75	1350		2669	30 A	684	50 A	686
100	1351		2670	40 A	685	65 A	687
167			2671	65 A	687	100 A	689
250 ✲			2053	80 A	688	125 A *5	690

12 kV Delta-Connected Primary Overhead Transformers

kVA	Transformer Stock Numbers			1 or 2Ø Delta Primary				3Ø Delta Primary *3			
				Primary Transformer Fusing *6		Minimum Upstream OH Fuse Size *4*6		Primary Transformer Fusing *6		Minimum Upstream OH Fuse Size *4*6	
	CM 120/240	CR 240/480	CW 277/480	Size	S/N	Size	S/N	Size	S/N	Size	S/N
5/10*1	Obsolete	Obsolete	Obsolete	5 A	678	10 A	680	5 A	678	10 A	680
15	1358	1365		5 A	678	10 A	680	5 A	678	10 A	680
25	1359	1366	2234	7 A	679	15 A	681	10 A	680	20 A	682
37.5	1360	1367		10 A	680	20 A	682	15 A	681	25 A	683
50	1361	1934		15 A	681	25 A	683	20 A	682	30 A	684
75	1362			20 A	682	30 A	684	30 A	684	50 A	686
100	1363	1370	1979	25 A	683	40 A	685	40 A	685	65 A	687
167	1364	1371	1376	40 A	685	65 A	687	65 A	687	100 A	689
250	1978	1832		65 A	687	100 A	689	80 A	688	125 A *5	690
333 ✲		1372		See Systems Engineering							
500 ✲		1373 (REQ)	2055 (OBS)								

*1 5 and 10kVA are not stocked. Cannot be used for new services.
*2 For Y-banked transformers fuse each phase by its 1Ø rating.
*3 For 3Ø delta banks use two fuses of the same size for lighter and one fuse for the two power transformers.
*4 Upstream fuses should use the same fuse rating for all phases. Use largest fuse size for application while considering up/downstream fuses, conductor, and loading. Check with Systems Engineering as needed.
*5 125 A fuse must be approved by Systems Engineering.
*6 Overhead fuses used in cutout gates are Kearney Type 200 (N).

Rev. 2 - Added stock numbers, upstream fuses, and notes.

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CONSTRUCTION STANDARDS

FUSE SCHEDULE
OVERHEAD TRANSFORMERS

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	Redrawn	in CAD
2	7/10/20	KJP	

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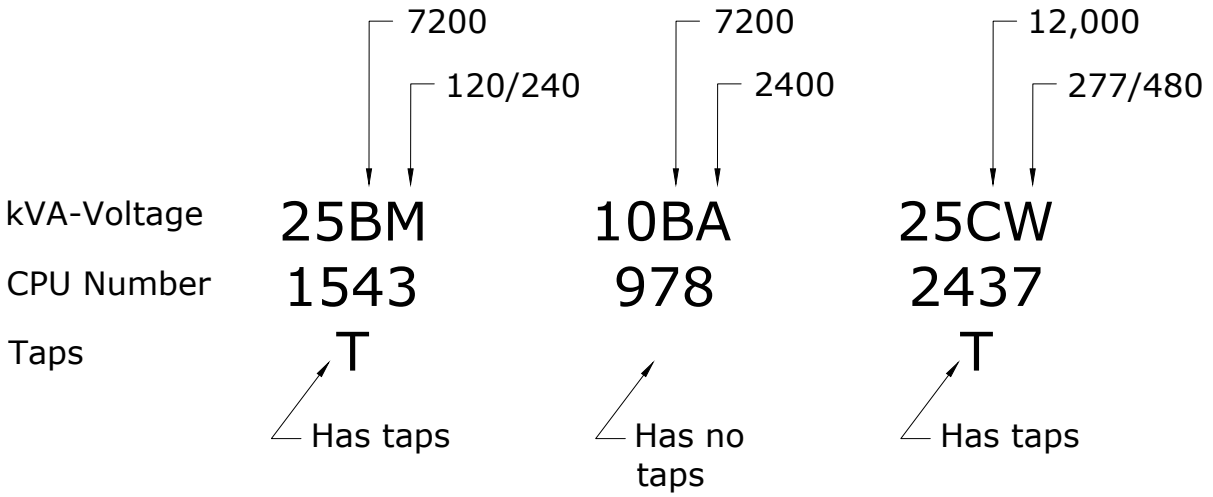
Transformer Stenciling Codes

PRIMARY	
CODE	VOLTAGE
A	2,400(Obsolete)
B	7,200
C	12,000

SECONDARY	
CODE	VOLTAGE
A	2,400(Obsolete)
L	120/208
M	120/240
R	240/480
W	277/480



Tap Settings

The transformer specifications call for taps on all transformers. Each tap changes the voltage 2 ½%. Assuming that 100% is 120v, each tap will change secondary voltage by 3 volts.

Some single-bushing overhead transformers with "B" primary voltage rating have four taps below 100% (97 ½%, 95%, 92 ½% and 90%). The rest have two taps above (102 ½% and 105%) and two taps below (97 ½% and 95%). There are some two-bushing "B" voltage rating transformers. They may have 4 taps below or 2 above/2 below.

Two-bushing overhead transformers with "C" primary voltage rating and all padmount transformers have four taps below 100% (97 ½%, 95%, 92 ½%, and 90%).

The taps are not load-tap changing so the transformer must be de-energized to change the tap. The taps actually change the windings ratio (N_P/N_S). At 100% for 12470GrdY/7200, N_P/N_S=7200/120=60. At 95%, N_P/N_S=7200/123=58.5. At 105%, N_P/N_S=7200/114= 63.2.

Rev 2: Updated voltage codes, combined with Std T1A, and added additional transformer information.

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CONSTRUCTION STANDARDS

GENERAL TRANSFORMER INFORMATION

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	Redrawn	in CAD
2	12/9/22	CRM	GM

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Taps are lowered to raise the voltage and raised to lower the voltage. For example, going from 100% to 97 ½% tap position will raise the secondary voltage. Going from 100% to 102 ½% tap position will lower the secondary voltage.

Tapped Areas

CPU has tapped areas from 92 ½% to 100%. The tapped areas are indicated on the feeder maps. The tap used will depend on the voltage rating of the transformer.

Any transformer with a "B" voltage rating is rated 12470GrdY/7200v. These are single-bushing overhead transformers and all padmount transformers. There are some two-bushing overhead transformers on the system that also have this rating. The winding ratio for transformers at this voltage rating is 60 at 100%.

Transformers with a "C" voltage rating are rated 12,000v. These are most of the two-bushing overhead transformers. The 3Ø rating for these transformers is 12,000v and the 1Ø rating is 6928v. The winding ratio for transformers in this group is 57.7 at 100%. Since these transformers have a lower voltage rating than the system voltage of 12470/7200v, their tap setting will be two taps above the "B" tap setting.

For example, in the 100% tap areas, "B" transformers will be set at the 100% tap rating to get 120v at the secondary. For "C" transformers, the winding ratios are different. At 100%, N_P/N_S=6928/120=57.7. At 105%, N_P/N_S=6928/114=60.8. Installing a "C" transformer in the 100% tap area at the 100% tap would result in 7200v/57.7=124.8v at the secondary. This would be on the high-side of allowable voltage limits. Putting the "C" transformer on the 105% tap would change the ratio to 7200v/60.8 and the secondary voltage would be 118.5v.

Tap Markings

Each manufacturer has a different way of marking the tap positions and there is no consistency. Some use letters, some uses Arabic numbers, some use Roman numerals, some use voltage levels and some just state the tap percentage. It is important to look at the nameplate of each transformer to determine the correct tap setting. Even among the manufacturers that use letters for the steps, some use A=100% and some use A=105%. The transformer nameplate will be the only way to ensure that the proper tap setting is used.

Overhead Bank Impedances

When matching impedances for overhead transformers that will be connected in a bank, or replacing a burnt out transformer within a bank, make sure that the impedances are within ±25% of each other. For example, if the impedances on a bank of transformers is 3.25% and one needs to be replaced, the replacement should have an impedance between 2.44% and 4.06%.

When paralleling two 1Ø transformers or two 3Ø banks, the impedances between the 1Ø transformers or the two banks should be within ±7.5% of each other.

Rev 2: Updated voltage codes, combined with Std T1A, and added additional transformer information.

Transformer Polarity

By industry standards, all 1Ø distribution transformers 200kVA and smaller, having primary voltages 8660 volts and below (winding voltage) have additive polarity. All other 1Ø transformers have a subtractive polarity. Polarity only applies to 1Ø distribution transformers so 3Ø padmount transformers do not have polarity.

By the standard above, all "B" voltage transformers (12470 GrdY/7200) below 200kVA would be additive polarity. All "C" voltage transformers (12,000v) regardless of size are subtractive because their winding voltage is above 8660 volts.

Polarity does not apply to 3Ø transformers.

Terminal Markings

By industry standards for 1Ø overhead transformers, the high-voltage terminal marked H_1 is brought out on the left-hand terminal of the high-voltage group as seen when facing the highest voltage side of the case from the secondary bushing side, and other "H" terminals are brought out in numerical order from left to right.

For 1Ø overhead transformers, the low-voltage x_1 bushing is on the right when facing the low-side of the transformer for additive polarity (H_1 is diagonally located across from x_1). The x_1 bushing is on the left when facing the low-side of the transformer for subtractive polarity (H_1 is located directly across from x_1). See Figure 1 and Figure 2.

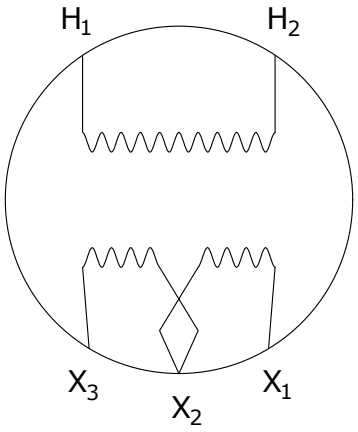


Figure 1: Additive Polarity

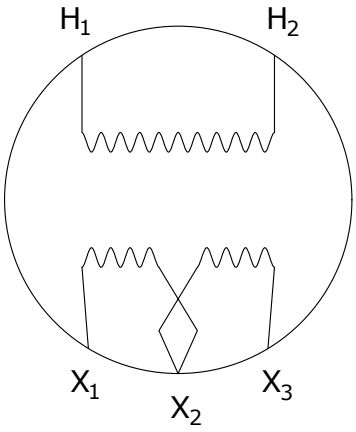


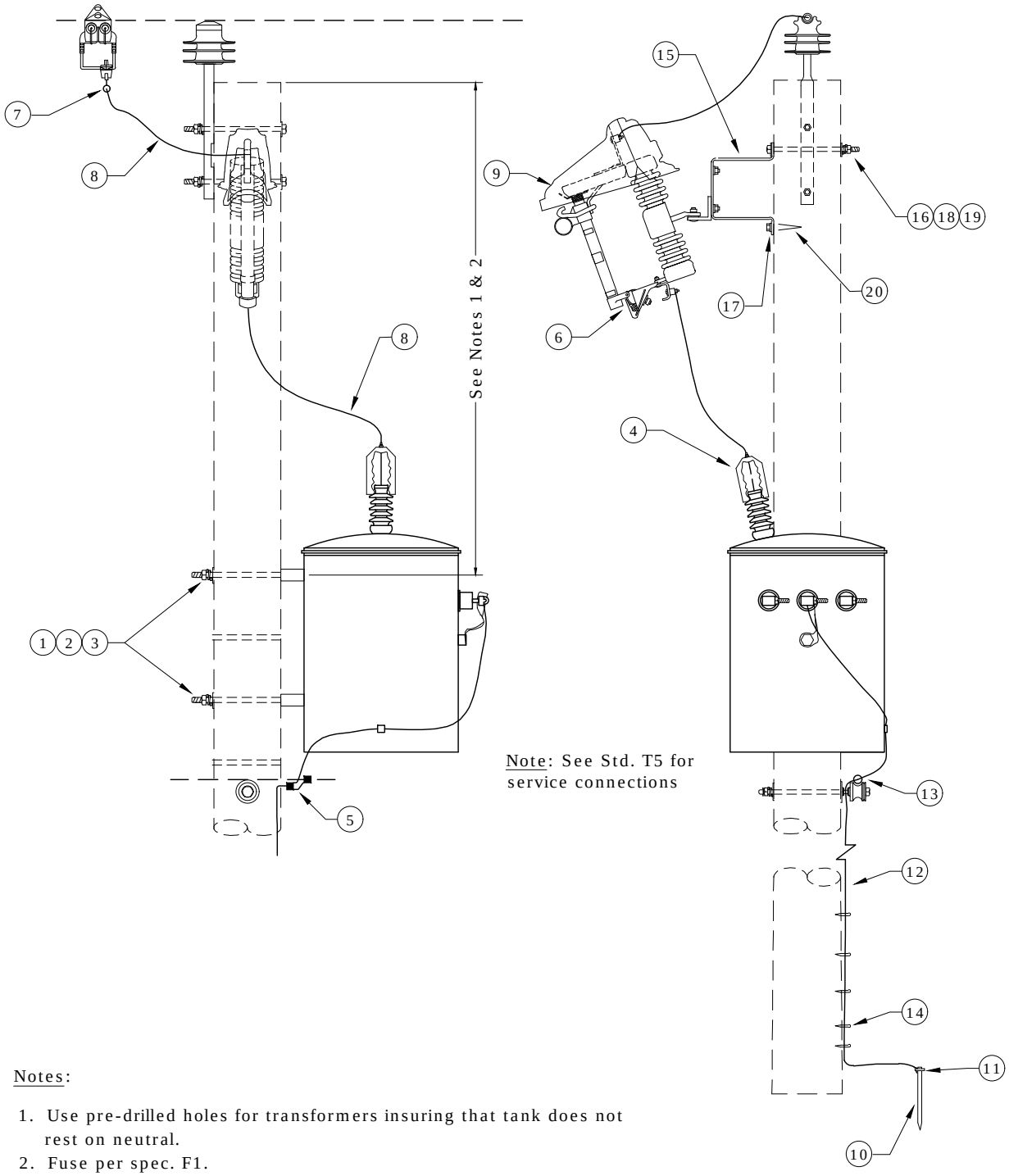
Figure 2: Subtractive Polarity

Rev 2: Updated voltage codes, combined with Std T1A, and added additional transformer information.

Available Transformers for New Services

Primary Voltage	Secondary Voltage	Type	Ø's	Taps	Size (S/N)
Padmount					
12470GrdY/7200	240/120	Pad	1	4 Below	**25**(1317), **50**(1318), **75**(1320), **100**(1322)
12470GrdY/7200	208/120	Pad	3	4 Below	**75**(1328), **150**(1329), **300**(1331), **500**(1332), **750**(1333), **1000**(1334)
12470GrdY/7200	480/277	Pad	3	4 Below	**75**(1337), **150**(1338), **300**(1340), **500**(1341), **750**(1342), **1000**(1343), **1500**(1344)
12470GrdY/7200	480/240	Pad	1	4 Below	**50**(2016)
Overhead					
12470GrdY/7200	120/240	Pole	1	4 Below	**15**(1346), **25**(1347), **37.5**(1348), **50**(1349), **75**(1350), **100**(1351)
12470GrdY/7200	240/480	Pole	1	4 Below	**25**(1356), **37.5**(1357), **50**(1934)
12470GrdY/7200	277	Pole	1	2 Above 2 Below	**25**(2041), **50**(2236), **75**(2669), **100**(2670), **167**(2671), **250**(2053)
12000	120/240	Pole	1	2 Above 2 Below	**15**(1358), **25**(1359), **37.5**(1360), **50**(1361), **75**(1362), **100**(1363), **167**(1364), **250**(1978)
12000	240/480	Pole	1	2 Above 2 Below	**15**(1365), **25**(1366), **37.5**(1367), **100**(1370), **333**(1372)
12000	277	Pole	1	2 Above 2 Below	**25**(2234), **100**(1979), **167**(1376)

Rev 2: Updated voltage codes, combined with Std T1A, and added additional transformer information.



Note: See Std. T5 for service connections

Notes:

1. Use pre-drilled holes for transformers insuring that tank does not rest on neutral.
2. Fuse per spec. F1.
3. Call for hot line stirrup separately:
4. 75KVA and larger use T3H.

WIRE SIZE	S/N
#6 SLD-#6 STR Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Rev 3: Changed to copperweld ground and corrections.

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CONSTRUCTION STANDARDS

POLE MOUNTED TRANSFORMER
AND CUTOUT ON POLE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	

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Rev 3: Changed to copperweld ground and corrections.

ITEM NO.	DESCRIPTION	T3 ADDITIONAL MATERIAL QTY.	T3 ADDITIONAL MATERIAL S/N	T3H ADDITIONAL MATERIAL QTY.	T3H ADDITIONAL MATERIAL S/N
1	Washer, Sq. Flat 5/8" x 2 1/4" x 2 1/4" (3/4" For T3H)	2	1412	2	1413
2	Bolt, Machine 5/8" x 14" Galv. (3/4" For T3H)	2	156	2	174
3	Washer, Lock, Spring, Double Coil 5/8" (3/4" For T3H)	2	2217✡	2	2218
4	Wildlife Guard, Transformer Bushing	1	721	1	721
5	Connector, Crimpet, Cu 6/4-4/4 (4C4)	1	450	1	450
ITEM NO.	DESCRIPTION	CO100 QTY.	CO100 S/N	CO100 QTY.	CO100 S/N
6	Cutout 100 Amp.	1	2532	1	2532
7	Clamp Hot Line, GP1530	1	284	1	284
8	Conductor, Wire Cu 1/C #4 7STR, Insulated, Red	15	2512	15	2512
9	Wildlife Guard, Cutout (Non-loadbreak), Gray	1	2547	1	2547
ITEM NO.	DESCRIPTION	N1 QTY.	N1 S/N	N1 QTY.	N1 S/N
10	Ground Rod 5/8" x 8'	1	1124	1	1124
11	Ground Rod Clamp, 5/8", Bronze, Small	1	281	1	281
12	Conductor, Copperweld #4	36	1512✡	36	1512✡
13	Connector, Cabelock YP26 AU 2 Al/Cu 2/0 - #2 STR	1	413	1	413
14	Staple, Ground Wire, Barbed, Galv., 1 1/2"	10	2707✡	10	2707✡
ITEM NO.	DESCRIPTION	CO1 QTY.	CO1 S/N	CO1 QTY.	CO1 S/N
15	Cutout Pole-mount Bracket	1	219	1	219
16	Machine Bolt 5/8" x 10" Galv.	1	154	1	154
17	Washer, Flat Round Galv. 1/2"	1	1394	1	1394
18	Washer, Square Flat 5/8" x 2 1/4" x 2 1/4"	1	1412	1	1412
19	Washer, Spring 5/8"	1	2217	1	2217
20	Screw, Lag 1/2" x 3" Drive Point	1	1131	1	1131

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CONSTRUCTION STANDARDS

POLE MOUNTED TRANSFORMER
AND CUTOUT ON POLE

REVISIONS

R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	

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T3,T3H

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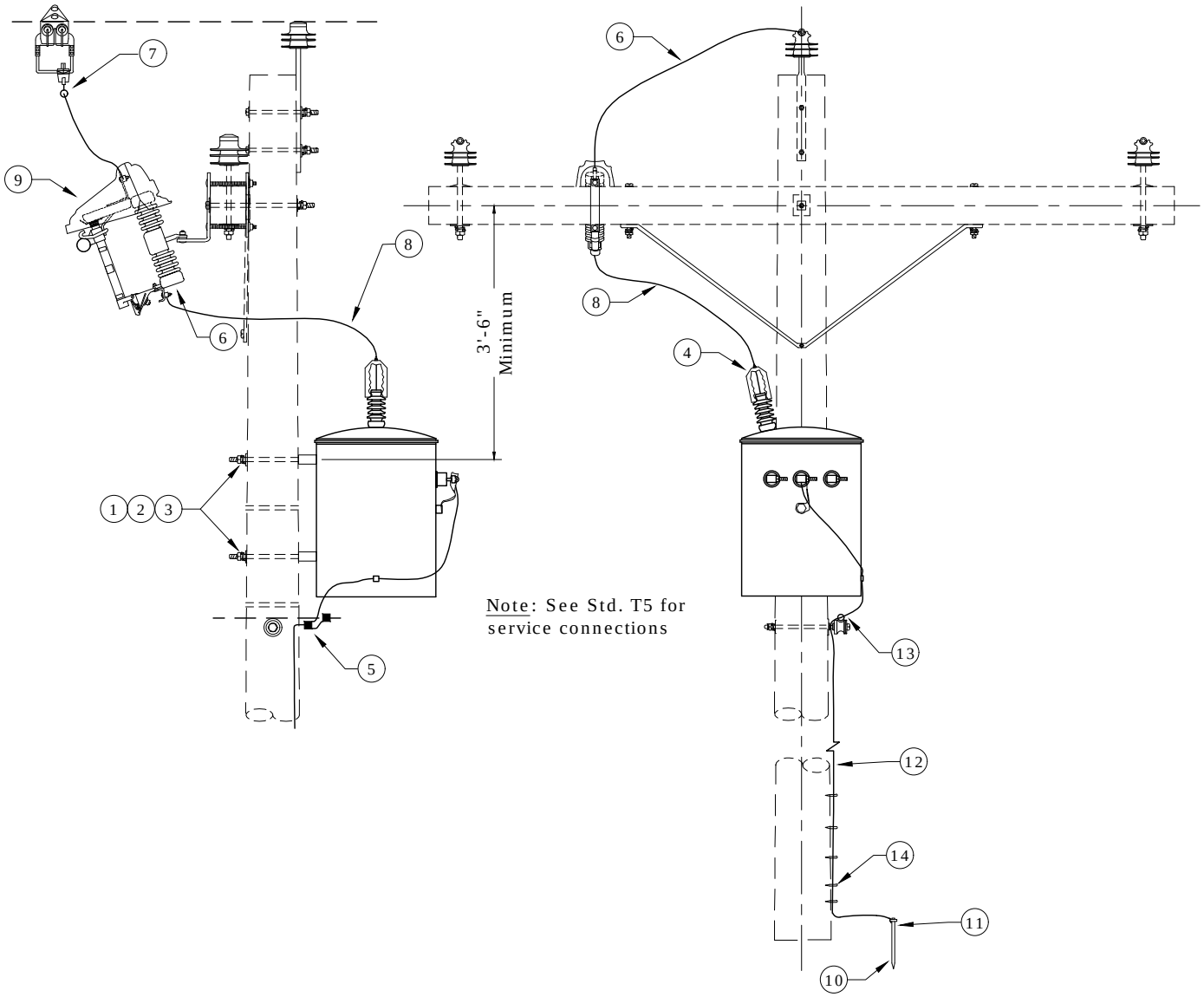
SECTION 1100



Note: See Std. T5 for service connections

Notes:

1. Use pre-drilled holes for transformers insuring that tank does not rest on neutral.
2. Fuse per Std. F1.
3. Call for hot line stirrup separately:
4. 75KVA and larger use T4H.

WIRE SIZE	S/N
#6 SLD-#6 STR Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Rev 2: Changed to copperweld ground and corrections.

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CONSTRUCTION STANDARDS

POLE MOUNTED TRANSFORMER AND CUTOUT ON CROSSARM

REVISIONS			
R	DATE	ENGR	OPS
0	3/02	REDRAWN	IN CAD
1	1/13/10	CM	AH
2	5/31/12	KJP	

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Rev 2: Changed to copperweld ground and corrections.

ITEM NO.	DESCRIPTION	T4 ADDITIONAL MATERIAL QTY.	T4 ADDITIONAL MATERIAL S/N	T4H ADDITIONAL MATERIAL QTY.	T4H ADDITIONAL MATERIAL S/N
1	Bolt, Machine 5/8" x 14" Galv. (3/4" For T4H)	2	156	2	174
2	Washer, Lock, Spring, Double Coil 5/8" (3/4" For T4H)	2	2217✡	2	2218
3	Washer, Sq. Flat 5/8" x 2 1/4" x 2 1/4" (3/4" For T4H)	2	1412	2	1413
4	Wildlife Guard, Transformer Bushing	1	721	1	721
5	Connector, Crimpet, Cu 6/4-4/4 (4C4)	1	450	1	450
ITEM NO.	DESCRIPTION	CO100 QTY.	CO100 S/N	CO100 QTY.	CO100 S/N
6	Cutout 100 Amp.	1	2532	1	2532
7	Clamp Hot Line, GP1530	1	284	1	284
8	Conductor, Wire Cu 1/C #4 7STR, Insulated, Red	15	2512	15	2512
9	Wildlife Guard, Cutout (Non-loadbreak, Gray)	1	2547	1	2547
ITEM NO.	DESCRIPTION	N1 QTY.	N1 S/N	N1 QTY.	N1 S/N
10	Ground Rod 5/8" x 8'	1	1124	1	1124
11	Ground Rod Clamp, 5/8", Bronze, Small	1	281	1	281
12	Conductor, Copperweld #4	36	1512✡	36	1512✡
13	Connector, Cabelock YP26 AU 2 Al/Cu 2/0 - #2 STR	1	413	1	413
14	Staple, Ground Wire, Barbed, Galv., 1 1/2"	10	2707✡	10	2707✡

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CONSTRUCTION STANDARDS

POLE MOUNTED TRANSFORMER
AND CUTOUT ON CROSSARM

REVISIONS			
△R	DATE	ENGR	OPS
0	3/02	REDRAWN	IN CAD
1	1/13/10	CM	AH
2	5/31/12	KJP	

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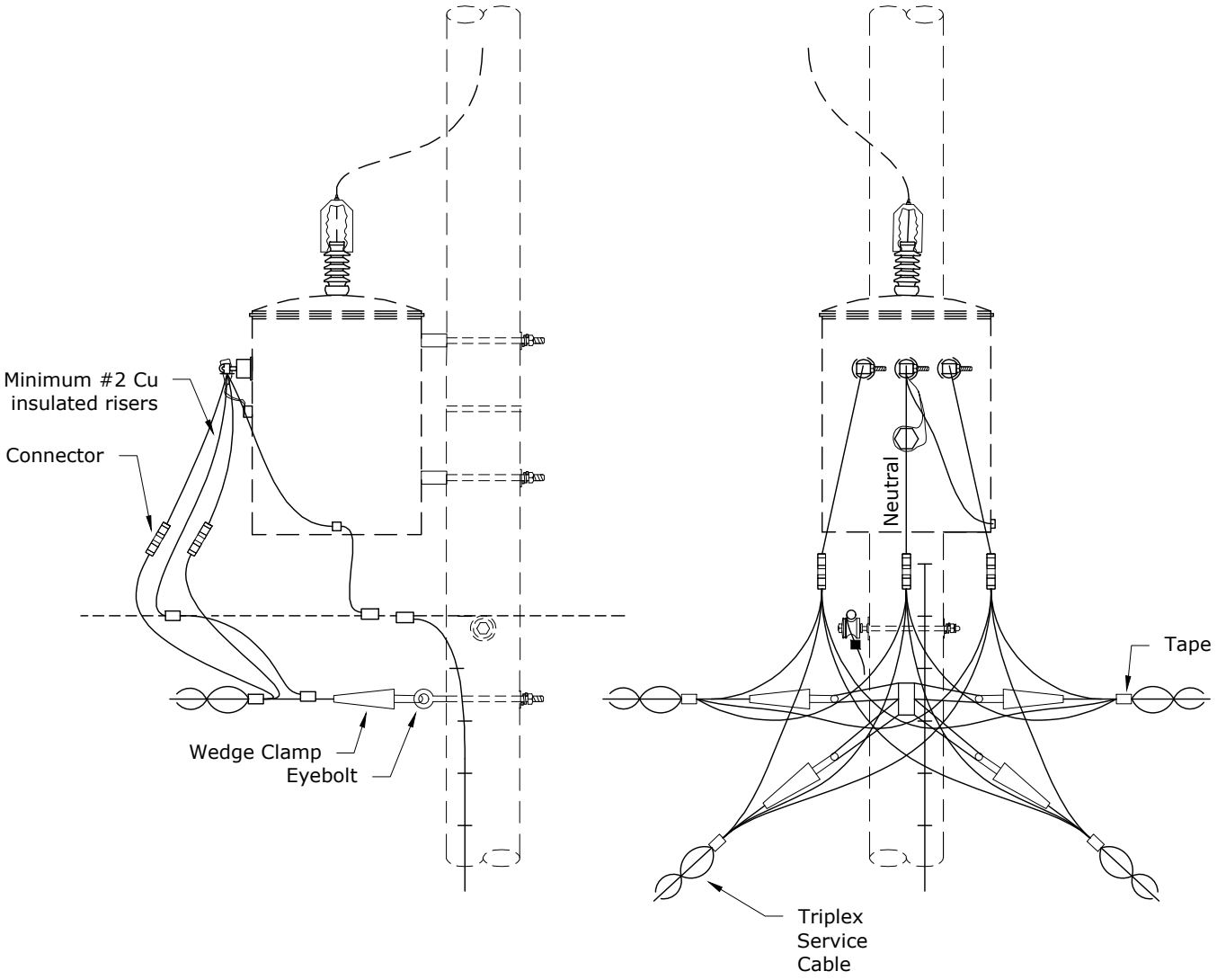

Note: See Stds T3 and T4 in Section 1100 for primary material. See Stds SE1, SE1A, and SE3 in Section 410 for secondary material.

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CONSTRUCTION STANDARDS

OVERHEAD SERVICE
INSTALLATION GUIDELINE

REVISIONS			
R	DATE	ENGR	OPS

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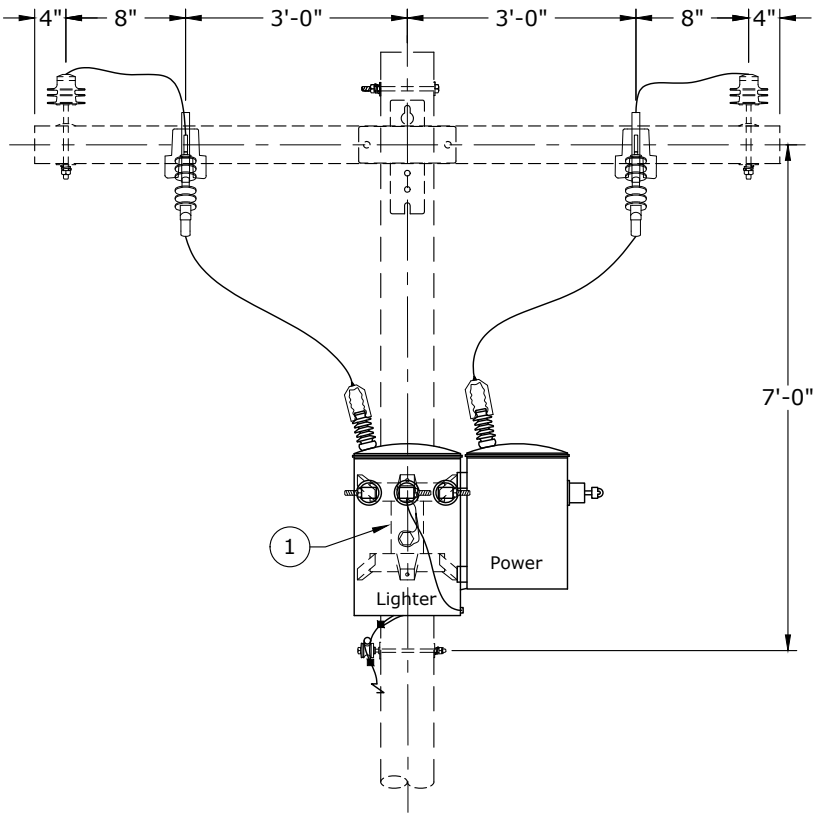

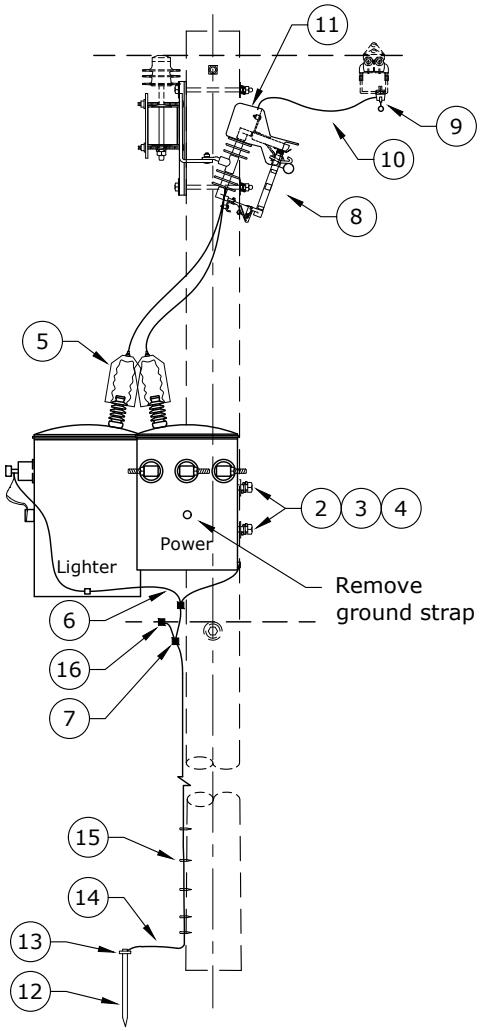

Notes:

1. See table for maximum weight on poles.
2. The lighter pot shall always be connected to the leading phase.
3. All tanks to be grounded.
4. Ground H2 bushing on all two-bushing transformers.
5. Use pre-drilled holes for transformers ensuring that tank does not rest on neutral.
6. For transformer secondary lead sizes, see
   Std TL1 - Transformer Lead Sizes Overhead Secondary, or
   Std TL2 - Large Transformer Lead Size Overhead Secondary.
7. For secondary connections see Std TC4 - Open Wye.
8. Call out on drawing as follows: T21-10-37 1/2

   Transformer sizes
9. Maximum motor size shall be 15 hp.
10. Fuse per Std F1 - Fuse Schedule Overhead Transformers.
11. Call for hot line stirrup separately. See table for size.

Class	Max Weight
4	1750 lb
2	3200 lb
1	4000 lb

Stirrup Size	S/N
#6 Solid -#6 Str Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Rev. 4 - Changed to wing transformer mount.

Clark Public Utilities

CONSTRUCTION STANDARDS

CROSSARM CONSTRUCTION
TWO TRANSFORMERS
OPEN WYE PRIMARY

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

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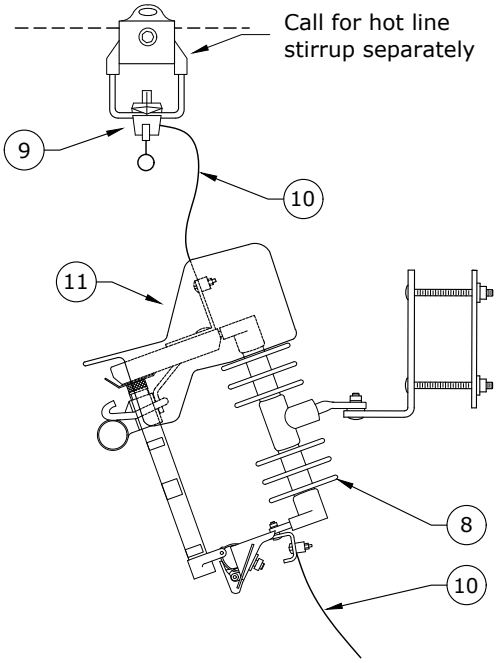
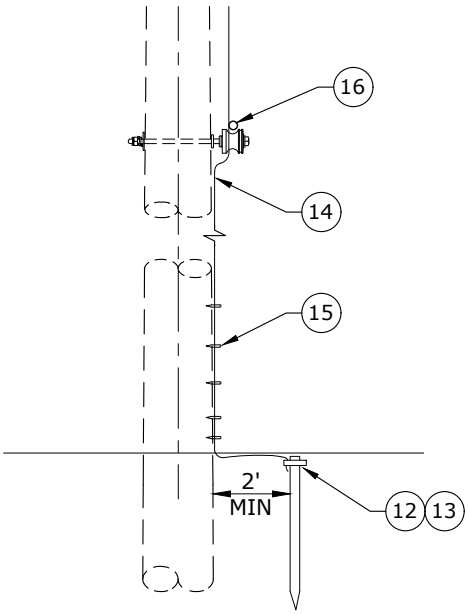


CO100



N1

Rev. 4 - Changed to wing transformer mount.

ITEM NO.	DESCRIPTION	T21 ADDITIONAL MATERIAL QTY.	S/N
1	Mount, Transfomer, Triple Wing, Al, 100 kVA Max	1	904
2	Bolt, Machine 3/4" x 16" Galv, 18,350 lb Ultimate	2	175
3	Washer, Curved, Square, Cast, 3" x 3" x 3/8" With 13/16" Hole, Galv	2	1392
4	Washer, Lock, Spring, Double Coil, Galv, 3/4"	2	2218
5	Guard, Wildlife, Tranformer Bushing	2	721
6	Conductor, OH, Cu, #4, Solid, Bare, Soft Drawn, 1C	15	376
7	Connector, Crimpet, Cu, Run & Tap #6 Sol - #4 Str (4C4)	2	450
ITEM NO.	DESCRIPTION	CO100 (2) QTY.	S/N
8	Cutout, Polymer, Universal, 100 Amp, 16 kA Asymmetrical	2	2532
9	Clamp, Hot Line, GP1530, Line #6 Solid - 400 MCM, Tap #6 Solid - 4/0 Str, Cu Only	2	284
10	Conductor, OH, 600V, Cu, #4, 7-Str, XLPE, 60 mil, Soft-drawn, 1C, RHW-2	30	391✲
11	Guard, Wildlife, Cutout, Polymer	2	2928
ITEM NO.	DESCRIPTION	N1 QTY.	S/N
12	Rod, Ground, 5/8" x 8'	2	1124
13	Clamp, Ground Rod, 5/8", Small, Bronze	2	281
14	Conductor, Copper-Clad Steel, Black w/ Green Strip, #4 Cu Equivalent, 40% Annealed	100	1512
15	Staple, Ground, Barbed, Galvanized, 1 1/2"	40	2707
16	Connector, H-Tap, Al/Cu, Run #2-2/0 Str - Tap #6-#1 Str	1	413

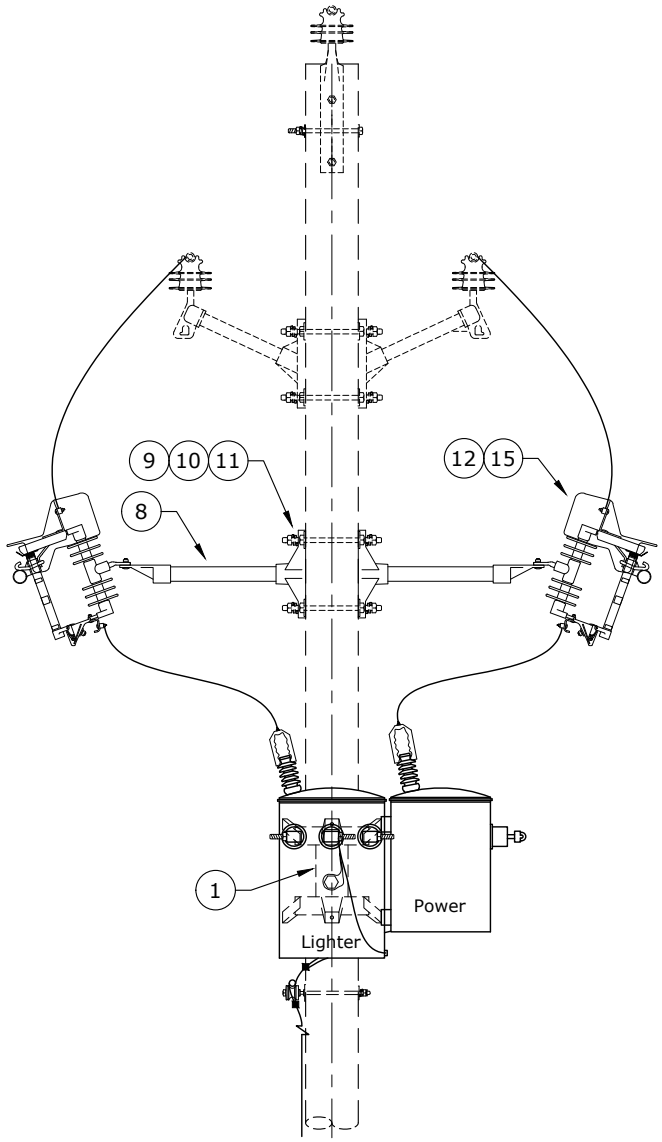
Clark Public Utilities

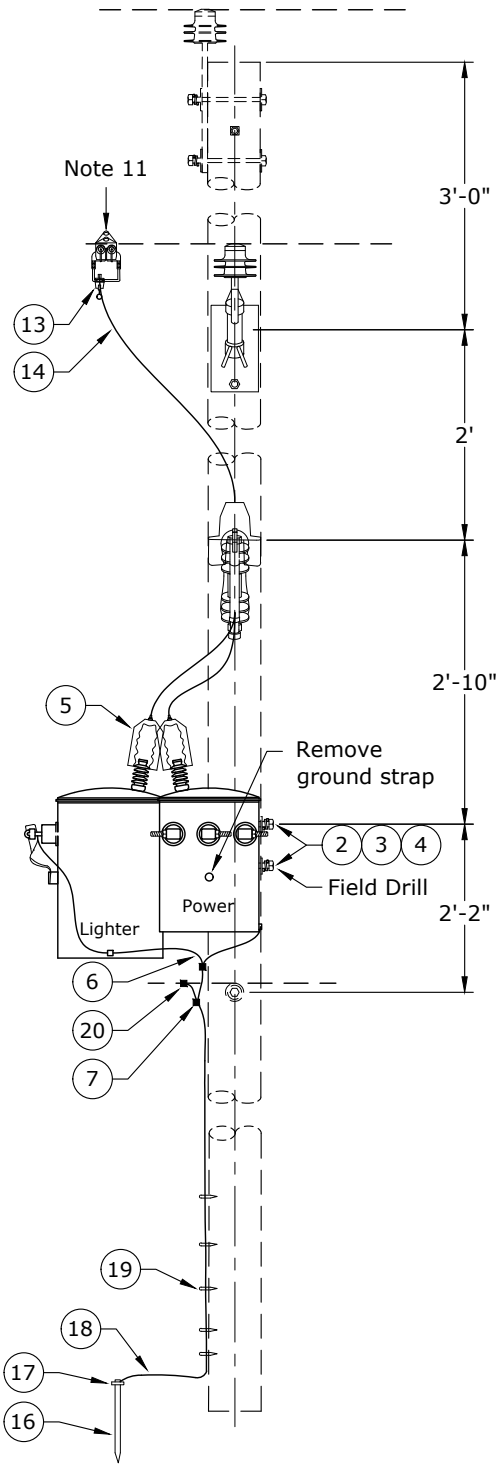
CONSTRUCTION STANDARDS

CROSSARM CONSTRUCTION
TWO TRANSFORMERS
OPEN WYE PRIMARY

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

PAGE:		CAD FILE:	APP: ELM	SECTION
2 of 2	T21	T21	DATE: 1/31/80	1100





Notes:

1. See table for maximum weight on poles.
2. The lighter pot shall always be connected to the leading phase.
3. All tanks to be grounded.
4. Ground H2 bushing on all two-bushing transformers.
5. Use pre-drilled holes for transformers ensuring that tank does not rest on neutral.
6. For transformer secondary lead sizes, see
   Std TL1 - Transformer Lead Sizes Overhead Secondary, or
   Std TL2 - Large Transformer Lead Size Overhead Secondary.
7. For secondary connections see Std TC4 - Open Wye.
8. Call out on drawing as follows: T23-10-37 1/2

   Transformer sizes
9. Maximum motor size shall be 15 hp.
10. Fuse per Std F1 - Fuse Schedule Overhead Transformers.
11. Call for hot line stirrup separately. See table for size.

Stirrup Size	S/N
#6 SLD-#6 STR Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Class	Max Weight
4	1750 lb
2	3200 lb
1	4000 lb

Rev. 4 - Changed to wing transformer mount and fiberglass cutout mounts.

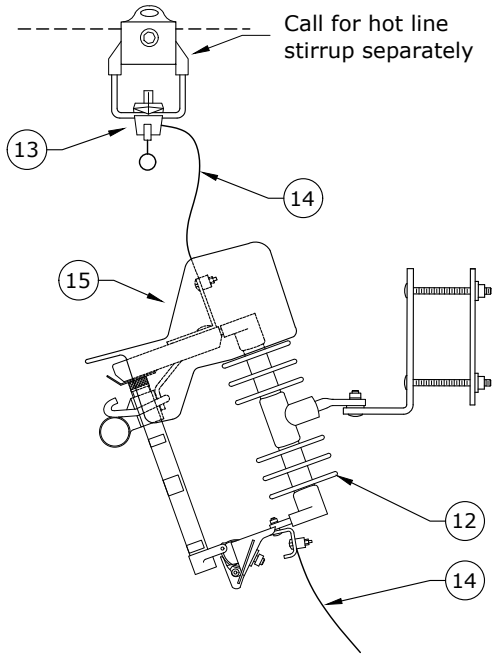
Clark Public Utilities

CONSTRUCTION STANDARDS

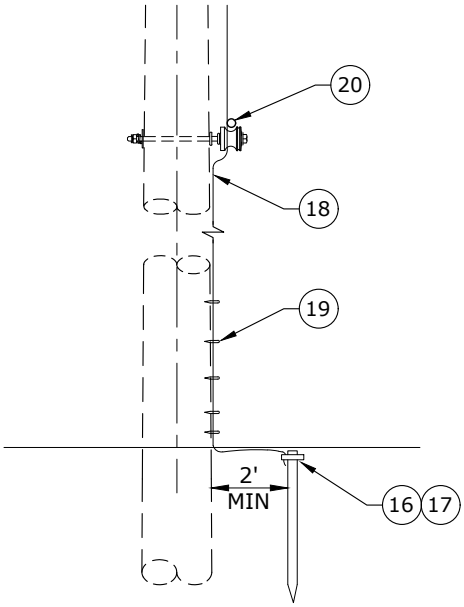
TWIGGY CONSTRUCTION
TWO TRANSFORMERS
OPEN WYE PRIMARY

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 2	T23	T23	DATE: 1/31/80	1100



CO100



N1

Rev. 4 - Changed to wing transformer mount and fiberglass cutout mounts.

T23

ITEM NO.	DESCRIPTION	ADDITIONAL MATERIAL QTY.	S/N
1	Mount, Transfomer, Triple Wing, Al, 100 kVA Max	1	904
2	Bolt, Machine 3/4" x 16" Galv, 18,350 lb Ultimate	2	175
3	Washer, Curved, Square, Cast, 3" x 3" x 3/8" With 13/16" Hole, Galv	2	1392
4	Washer, Lock, Spring, Double Coil, Galv, 3/4"	2	2218
5	Guard, Wildlife, Tranformer Bushing	2	721
6	Conductor, OH, Cu, #4, Solid, Bare, Soft Drawn, 1C	15	376
7	Connector, Crimpet, Cu, Run & Tap #6 Sol - #4 Str (4C4)	2	450
8	Bracket, Cutout Mount, 1 Phase, 18" Fiberglass	2	2998
9	Bolt, Double Arm, 5/8" x 18", Galv., 12,400 lb Ultimate Tensile	2	82
10	Washer, Flat Round Galv., 5/8"	4	1395
11	Washer, Lock, Spring, Double Coil, Galv., 5/8"	4	2217

ITEM NO.	DESCRIPTION	CO100 (2) QTY.	S/N
12	Cutout, Polymer, Universal, 100 Amp, 16 kA Asymmetrical	2	2532
13	Clamp, Hot Line, GP1530, Line #6 Solid - 400 MCM, Tap #6 Solid - 4/0 Str, Cu Only	2	284
14	Conductor, OH, 600V, Cu, #4, 7-Str, XLPE, 60 mil, Soft-drawn, 1C, RHW-2	30	391☼
15	Guard, Wildlife, Cutout, Polymer	2	2928

ITEM NO.	DESCRIPTION	N1 QTY.	S/N
16	Rod, Ground, 5/8" x 8'	2	1124
17	Clamp, Ground Rod, 5/8", Small, Bronze	2	281
18	Conductor, Copper-Clad Steel, Black w/ Green Strip, #4 Cu Equivalent, 40% Annealed	100	1512
19	Staple, Ground, Barbed, Galvanized, 1 1/2"	40	2707
20	Connector, H-Tap, Al/Cu, Run #2-2/0 Str - Tap #6-#1 Str	1	413

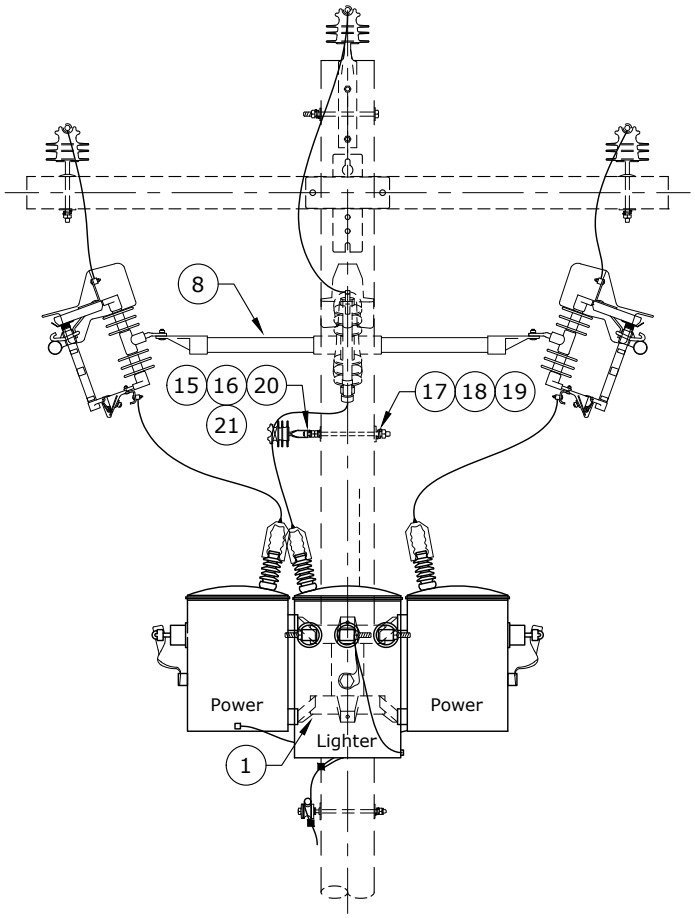
Clark Public Utilities

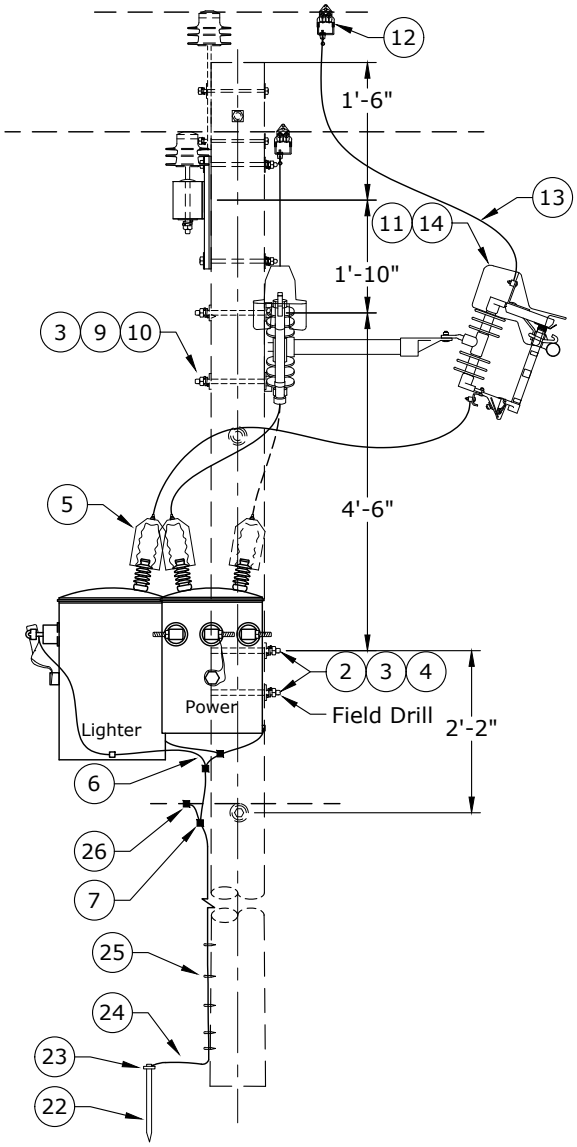
CONSTRUCTION STANDARDS

TWIGGY CONSTRUCTION
TWO TRANSFORMERS
OPEN WYE PRIMARY

REVISIONS			
R	DATE	ENGR	OPS
1	3/02	REDRAWN	IN CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

PAGE:	CAD FILE:	APP: ELM	SECTION
2 of 2	T23	DATE: 1/31/80	1100





Notes:

1. See table for maximum weight on poles.
2. To determine the total transformer weight take three times the weight of the heaviest.
3. All tanks to be grounded.
4. Ground the H2 bushing on all two-bushing transformers.
5. Use pre-drilled holes for transformers, ensuring that tank does not rest on neutral.
6. For transformer secondary lead sizes, see
   Std TL1 - Transformer Lead Sizes Overhead Secondary, or
   Std TL2 - Large Transformer Lead Size Overhead Secondary.
7. For secondary connections see the Std TC7 - Grounded Wye-Wye.
8. Call out on drawing as follows: T31-25-25-25

   Transformer sizes
9. Fuse per Std F1 - Fuse Schedule Overhead Transformers.
10. Call for hot line stirrup separately. See table for size.

Class	Max Weight
4	1750 lb
2	3200 lb
1	4000 lb

Stirrup Size	S/N
#6 Solid -#6 Str Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Rev. 4 - Changed to wing transformer mount and fiberglass equipment mount.

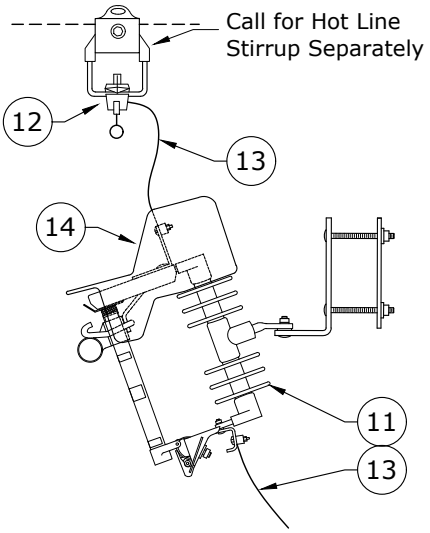
Clark Public Utilities

CONSTRUCTION STANDARDS

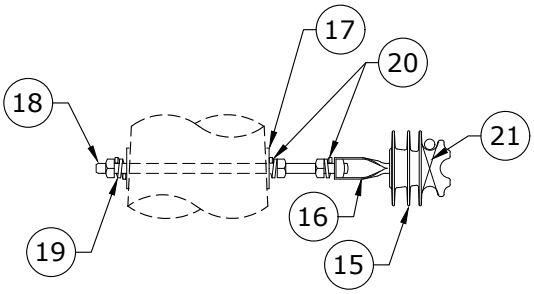
THREE TRANSFORMERS
GROUNDED Y - GROUNDED Y

REVISIONS			
R	DATE	ENGR	OPS
1	7/02		
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

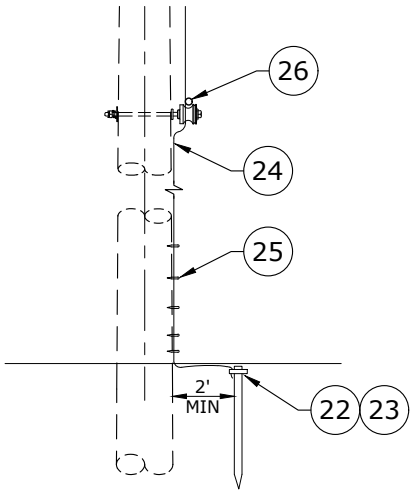
PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 2	T31	T31	DATE: 1/31/80	1100



CO100



PR20TREE



N1

Rev. 4 - Changed to wing transformer mount and fiberglass equipment mount.

T31

ITEM NO.	DESCRIPTION	ADDITIONAL MATERIAL QTY.	S/N
1	Mount, Transfomer, Triple Wing, Al, 100 kVA Max	1	904
2	Bolt, Machine 3/4" x 16" Galv, 18,350 lb Ultimate	2	175
3	Washer, Curved, Square, Cast, 3" x 3" x 3/8" With 13/16" Hole, Galv	4	1392
4	Washer, Lock, Spring, Double Coil, Galv, 3/4"	2	2218
5	Guard, Wildlife, Tranformer Bushing	3	721
6	Conductor, OH, Cu, #4, Solid, Bare, Soft Drawn, 1C	20	376
7	Connector, Crimpet, Cu, Run & Tap #6 Sol - #4 Str (4C4)	3	450
8	Bracket, Cutout Mount, 3 Phase, 18" Fiberglass	2	2999
9	Bolt, Machine, 5/8" x 16", Galv, 12,400 lb Ultimate Tensile	2	157
10	Washer, Lock, Spring, Double Coil, Galv, 5/8"	2	2217
ITEM NO.	DESCRIPTION	CO100 (3) QTY.	S/N
11	Cutout, Polymer, Universal, 100 Amp, 16 kA Asymmetrical	3	2532
12	Clamp, Hot Line, GP1530, Line #6 Solid - 400 MCM, Tap #6 Solid - 4/0 Str, Cu Only	3	284
13	Conductor, OH, 600V, Cu, #4, 7-Str, XLPE, 60 mil, Soft-drawn, 1C, RHW-2	45	391 ✲
14	Guard, Wildlife, Cutout, Polymer	3	2928
ITEM NO.	DESCRIPTION	PR20TREE QTY.	S/N
15	Insulator, Pin, C Neck, Polymer	1	1968
16	Pin, Adapter	1	959
17	Washer, Curved, Square, Cast, 3" x 3" x 3/8" Thick x 13/16" Hole	2	1392
18	Bolt, Double Arm, 5/8" x 16" Galv., 12,400 lbs Ultimate Tensile	1	81
19	Washer, Lock, Spring, Double Coil, Galv., 5/8"	1	2217
20	Washer, Lock, Spring, Single Coil, Galv., 5/8"	2	1403
21	Wire, Tie, Al #4 Solid with 45mil TPR Jacket	11	3012
ITEM NO.	DESCRIPTION	N1 QTY.	S/N
22	Rod, Ground, 5/8" x 8'	2	1124
23	Clamp, Ground Rod, 5/8", Small, Bronze	2	281
24	Conductor, Copper-Clad Steel, Black w/ Green Stripe, #4 Cu Equivalent, 40% Annealed	100	1512
25	Staple, Ground, Barbed, Galvanized, 1 1/2"	40	2707
26	Connector, H-Tap, Al/Cu, Run #2-2/0 Str - Tap #6-#1 Str	1	413

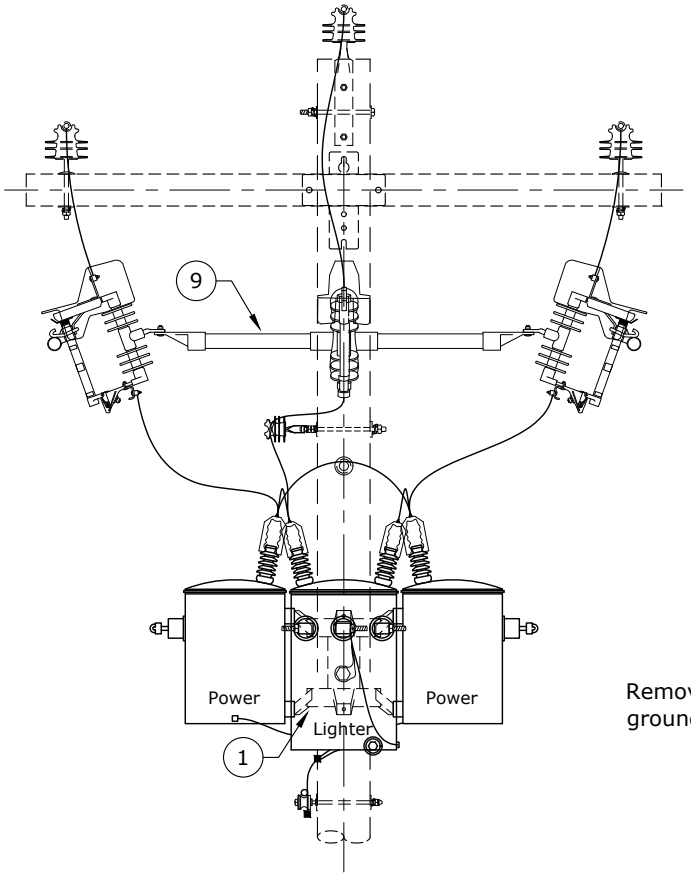
Clark Public Utilities

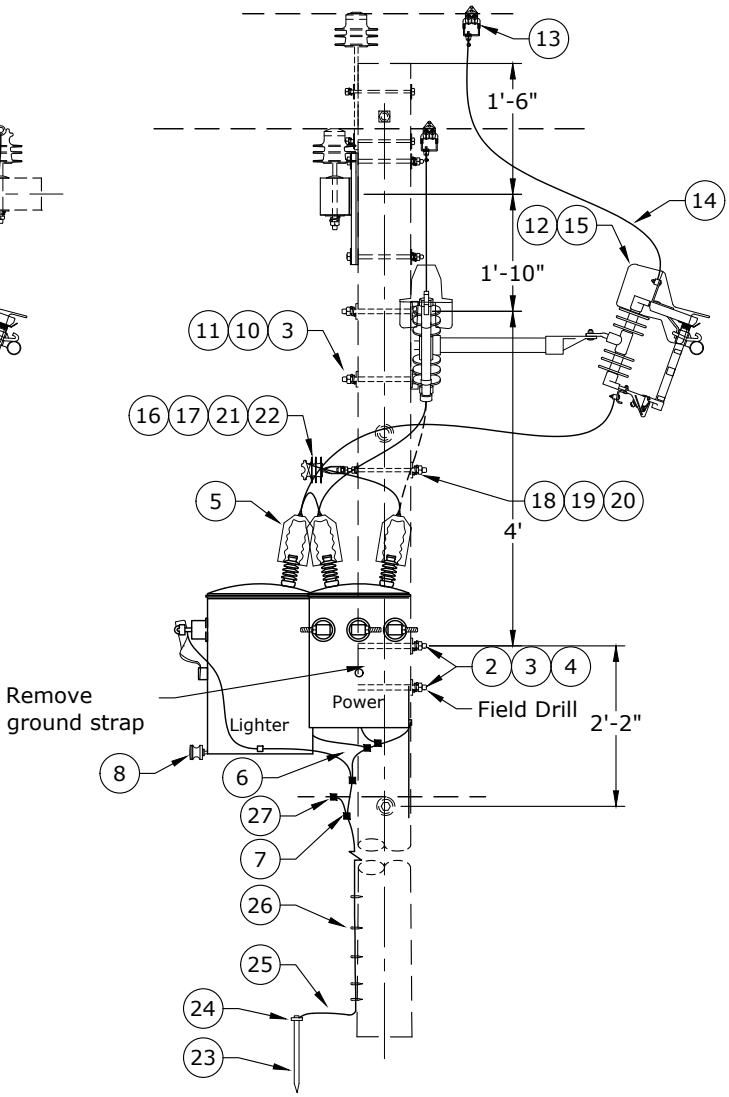
CONSTRUCTION STANDARDS

THREE TRANSFORMERS
GROUNDED Y - GROUNDED Y

REVISIONS			
R	DATE	ENGR	OPS
1	7/02		
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

PAGE:		CAD FILE:	APP: ELM	SECTION
2 of 2	T31	T31	DATE: 1/31/80	1100





Notes:

1. See chart for maximum weight on poles.
2. To determine the total transformer weight take three times the weight of the heaviest.
3. All tanks to be grounded.
4. Use pre-drilled holes for transformers, ensuring that tank does not rest on neutral.
5. For transformer secondary lead sizes, see
   Std TL1 - Transformer Lead Sizes Overhead Secondary, or
   Std TL2 - Large Transformer Lead Size Overhead Secondary.
6. For secondary connections see the Std TC5 - Delta-Delta.
7. Transformer impedances must satisfy Std TC5A - Delta-Delta Impedance Matching.
8. Call out on drawing as follows: T32-25-50-25
   Transformer sizes
9. Fuse per Std F1 - Fuse Schedule Overhead Transformers.
10. Call for hot line stirrup separately. See table for size.

Class	Max Weight
4	1750 lb
2	3200 lb
1	4000 lb

Stirrup Size	S/N
#6 SLD-#6 STR Cu	2338
#4-2/0 Al/Cu	2339
397 MCM Al/Cu	2340
795 MCM Al/Cu	2341

Rev. 4 - Changed to wing transformer mount and fiberglass cutout mount.

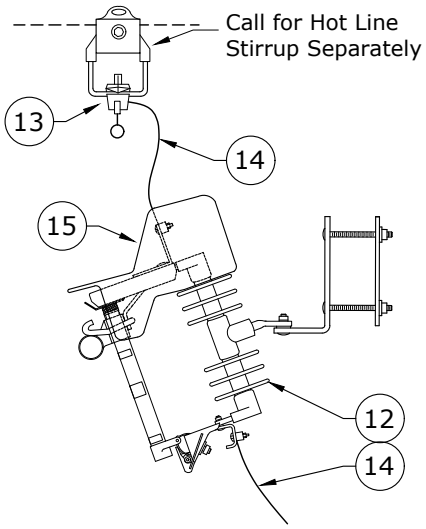
Clark Public Utilities

CONSTRUCTION STANDARDS

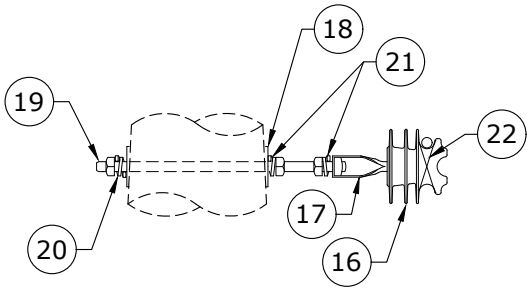
THREE TRANSFORMERS
CLOSED Δ - CLOSED Δ

REVISIONS			
R	DATE	ENGR	OPS
1	7/02	Redrawn	in CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

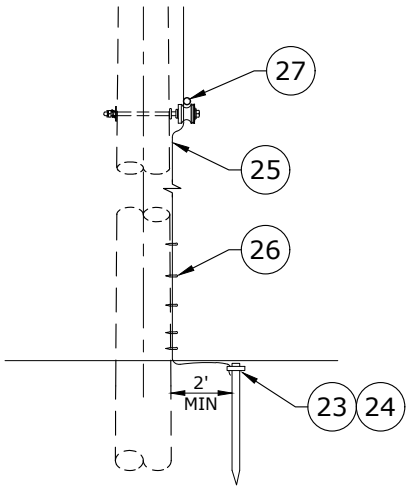
PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 2	T32	T32	DATE: 1/31/80	1100



CO100



PR20TREE



N1

Rev. 4 - Changed to wing transformer mount and fiberglass cutout mount.

ITEM NO.	DESCRIPTION	T23 ADDITIONAL MATERIAL QTY.	S/N
1	Mount, Transfomer, Triple Wing, Al, 100 kVA Max	1	904
2	Bolt, Machine 3/4" x 16" Galv, 18,350 lb Ultimate	2	175
3	Washer, Curved, Square, Cast, 3" x 3" x 3/8" With 13/16" Hole, Galv	4	1392
4	Washer, Lock, Spring, Double Coil, Galv, 3/4"	2	2218
5	Guard, Wildlife, Tranformer Bushing	6	721
6	Conductor, OH, Cu, #4, Solid, Bare, Soft Drawn, 1C	20	376
7	Connector, Crimpet, Cu, Run & Tap #6 Sol - #4 Str (4C4)	4	450
8	Bracket, Transformer Clearance with Insulator	1	234
9	Bracket, Cutout Mount, 3 Phase, 18" Fiberglass	2	2999
10	Bolt, Machine, 5/8" x 16", Galv., 12,400 lb Ultimate Tensile	2	157
11	Washer, Lock, Spring, Double Coil, Galv, 5/8"	2	2217
ITEM NO.	DESCRIPTION	CO100 (3) QTY.	S/N
12	Cutout, Polymer, Universal, 100 Amp, 16 kA Asymmetrical	3	2532
13	Clamp, Hot Line, GP1530, Line #6 Solid - 400 MCM, Tap #6 Solid - 4/0 Str, Cu Only	3	284
14	Conductor, OH, 600V, Cu, #4, 7-Str, XLPE, 60 mil, Soft-drawn, 1C, RHW-2	45	391☼
15	Guard, Wildlife, Cutout, Polymer	3	2928
ITEM NO.	DESCRIPTION	PR20TREE QTY.	S/N
16	Insulator, Pin, C Neck, Polymer	1	1968
17	Pin, Adapter	1	959
18	Washer, Curved, Square, Cast, 3" x 3" x 3/8" Thick x 13/16" Hole	2	1392
19	Bolt, Double Arm, 5/8" x 16" Galv., 12,400 lbs Ultimate Tensile	1	81
20	Washer, Lock, Spring, Double Coil, Galv., 5/8"	1	2217
21	Washer, Lock, Spring, Single Coil, Galv., 5/8"	2	1403
22	Wire, Tie, Al #4 Solid with 45mil TPR Jacket	11	3012
ITEM NO.	DESCRIPTION	N1 QTY.	S/N
23	Rod, Ground, 5/8" x 8'	2	1124
24	Clamp, Ground Rod, 5/8", Small, Bronze	2	281
25	Conductor, Copper-Clad Steel, Black w/ Green Stripe, #4 Cu Equivalent, 40% Annealed	100	1512
26	Staple, Ground, Barbed, Galvanized, 1 1/2"	40	2707
27	Connector, H-Tap, Al/Cu, Run #2-2/0 Str - Tap #6-#1 Str	1	413

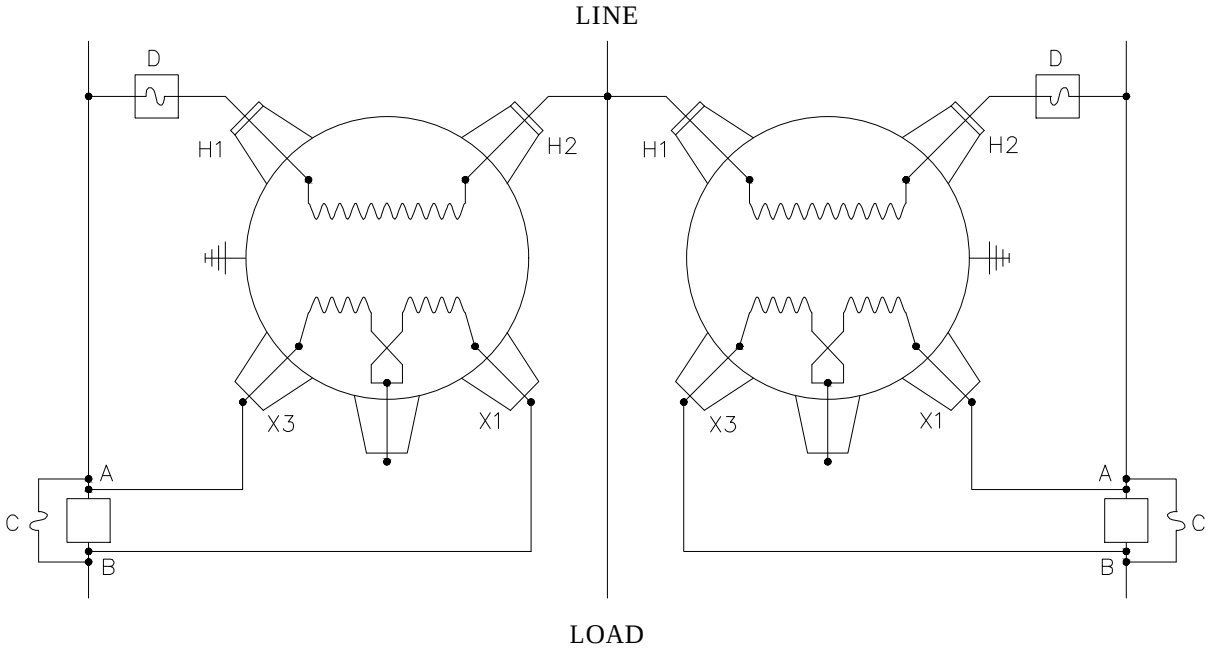
Clark Public Utilities

CONSTRUCTION STANDARDS

THREE TRANSFORMERS
CLOSED Δ - CLOSED Δ

REVISIONS			
R	DATE	ENGR	OPS
1	7/02	Redrawn	in CAD
2	1/13/10	CM	AH
3	5/31/12	KJP	
4	12/9/22	CRM	GM

PAGE:		CAD FILE:	APP: ELM	SECTION
2 of 2	T32	T32	DATE: 1/31/80	1100



INSTALLATION PROCEDURE:

1. Cut in breaker between point "A" & "B" while keeping circuit closed with a jumper. Install C/O fused just above line current at "C". Close C/O and remove jumper.
2. Install slugged C/O at "D", leave open and connect primary leads to line and transformer.
3. Connect other side of high voltage winding to the line.
4. Install leads from secondary side of transformer to points "A"&"B" as required by desired installation.
5. Repeat procedure for other side.
6. Close C/O at "D" which blows fuse at "C".
7. Remove C/O at "C".
8. Jumper out C/O at "D" and remove.

REMOVAL PROCEDURE:

1. Install fused C/O at "D". Use transformer size fuse.
2. Install slugged C/O at "C", -leave open.
3. Repeat procedure for other side.
4. CLose C/O at "C" which blows fuse at "D". Transformers are now out of circuit but still HOT.
5. Remove transformer secondary leads at points "A"&"B".
6. Remove primary leads. Transformers are now dead.
7. Remove breaker between points "A"&"B" or install jumper.
8. Remove C/O at "C".

Notes:

1. For 1Ø installations follow same procedure.
2. When it is desireable to leave bank in for future use, stop at step 4 of removal procedure.

CAUTION

1. When C/O's are left in the circuit they must be slugged.
2. Do not open "D" when "C" is open.
3. Install case ground before energizing bank.

WARNING:

The transformer should not be fused or have any device by which it can be readily disconnected. The primary must never be opened while the secondary position carries current, as dangerous voltages will be induced by the series winding.

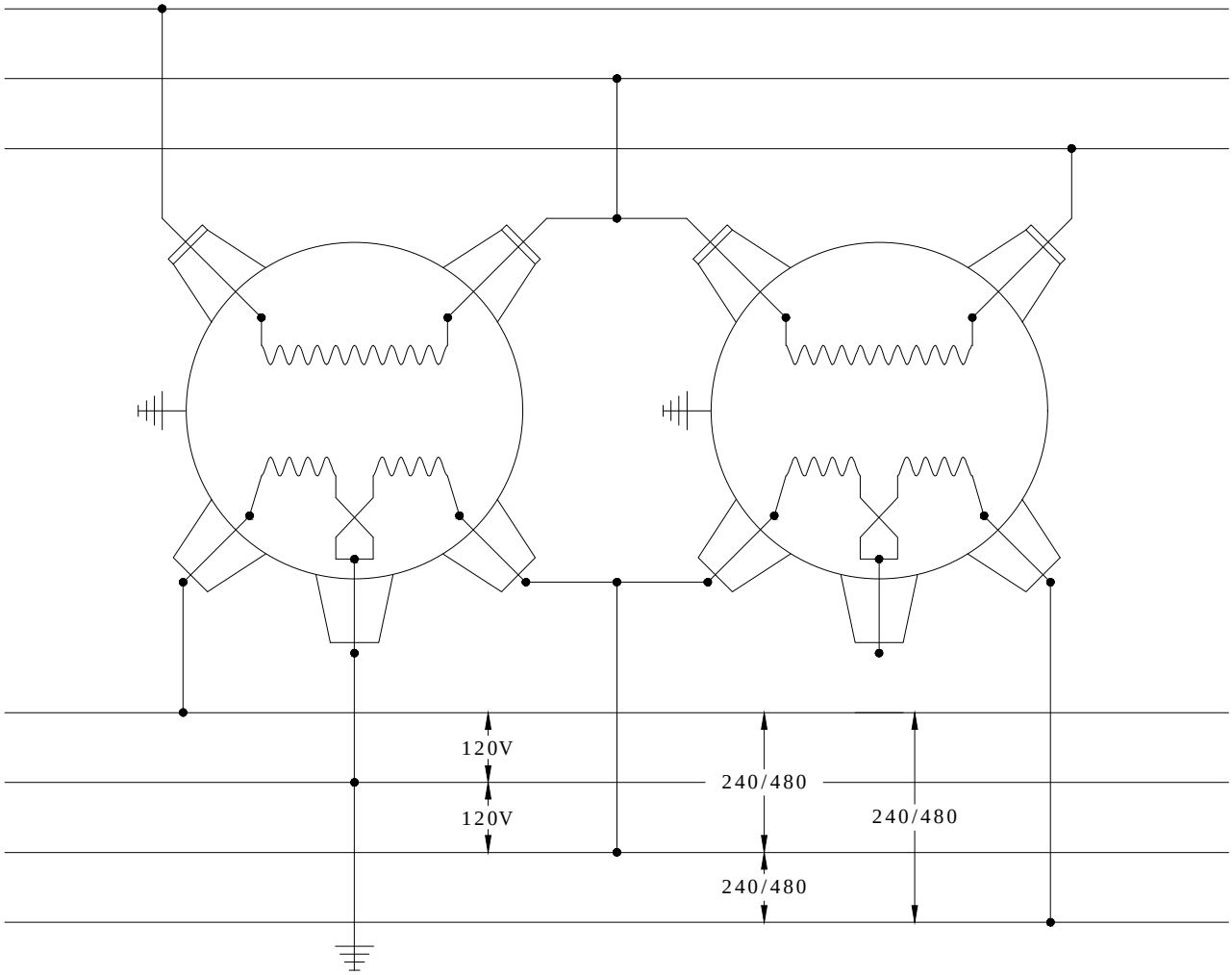
Clark Public Utilities

CONSTRUCTION STANDARDS

1Ø & 3Ø, 2 WINDING BOOST OR BUCK
TRANSFORMER BANK
INSTALLATION & REMOVAL PROCEDURE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		
1 REDRAWN IN CAD			

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC2A	TC2A	DATE: 1/31/80	1100



Notes:

1. Extend case ground wire to secondary neutral bushing on lighter transformer only.
2. For 3Ø 3 wire omit neutral installation and secondary grounds.

Clark Public Utilities

CONSTRUCTION STANDARDS

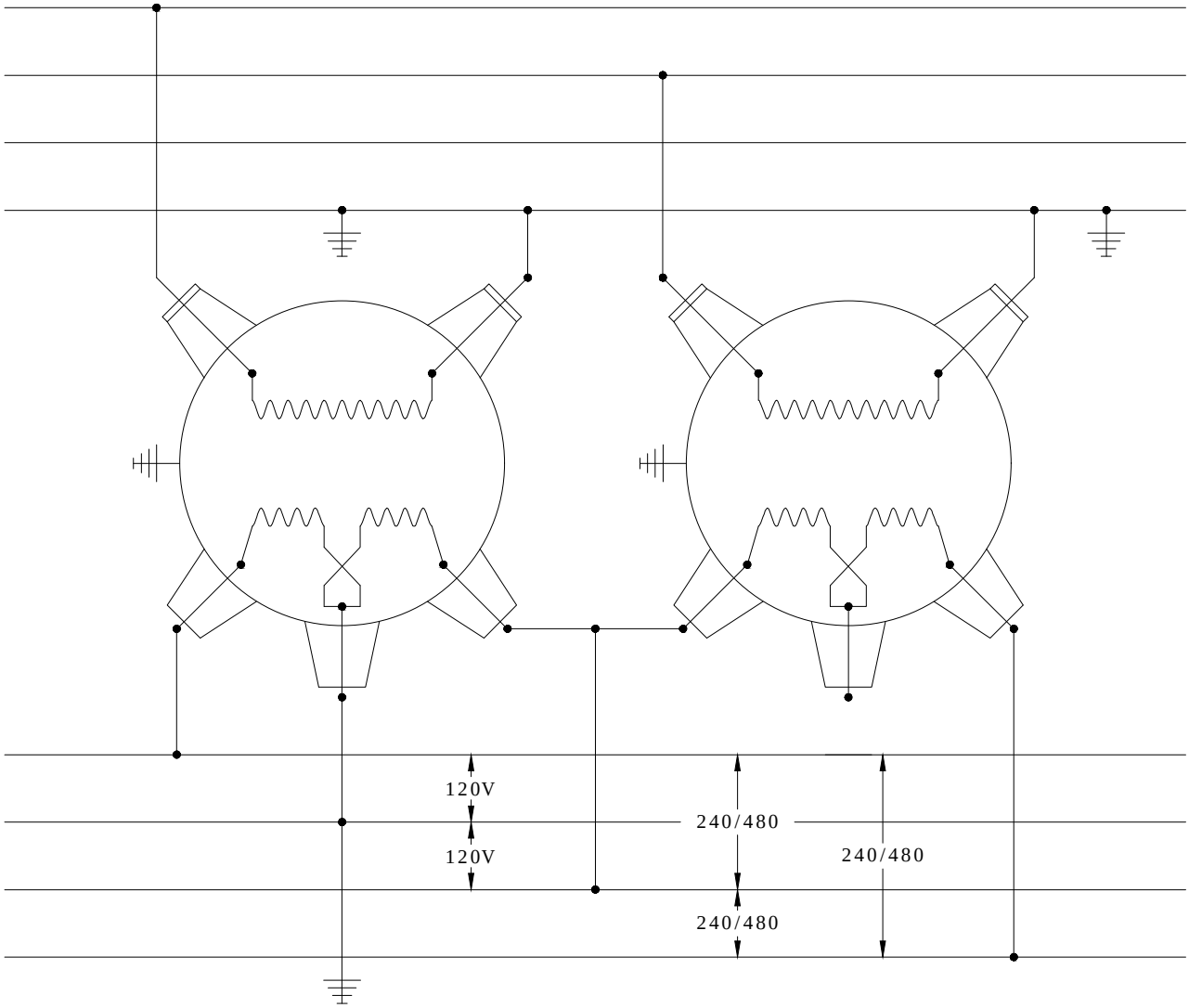
3Ø OPEN DELTA
FOR 120/240 3Ø 4-WIRE,
240 3Ø 3-WIRE, 480V 3Ø 3-WIRE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		

1 REDRAWN IN CAD

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC3	TC3	DATE: 1/31/80	1100

Y-PRIMARY (4 WIRE)



Notes:

1. Extend case ground wire to secondary neutral bushing on lighter transformer only.
2. For 3Ø 3 wire omit neutral installation and secondary grounds.

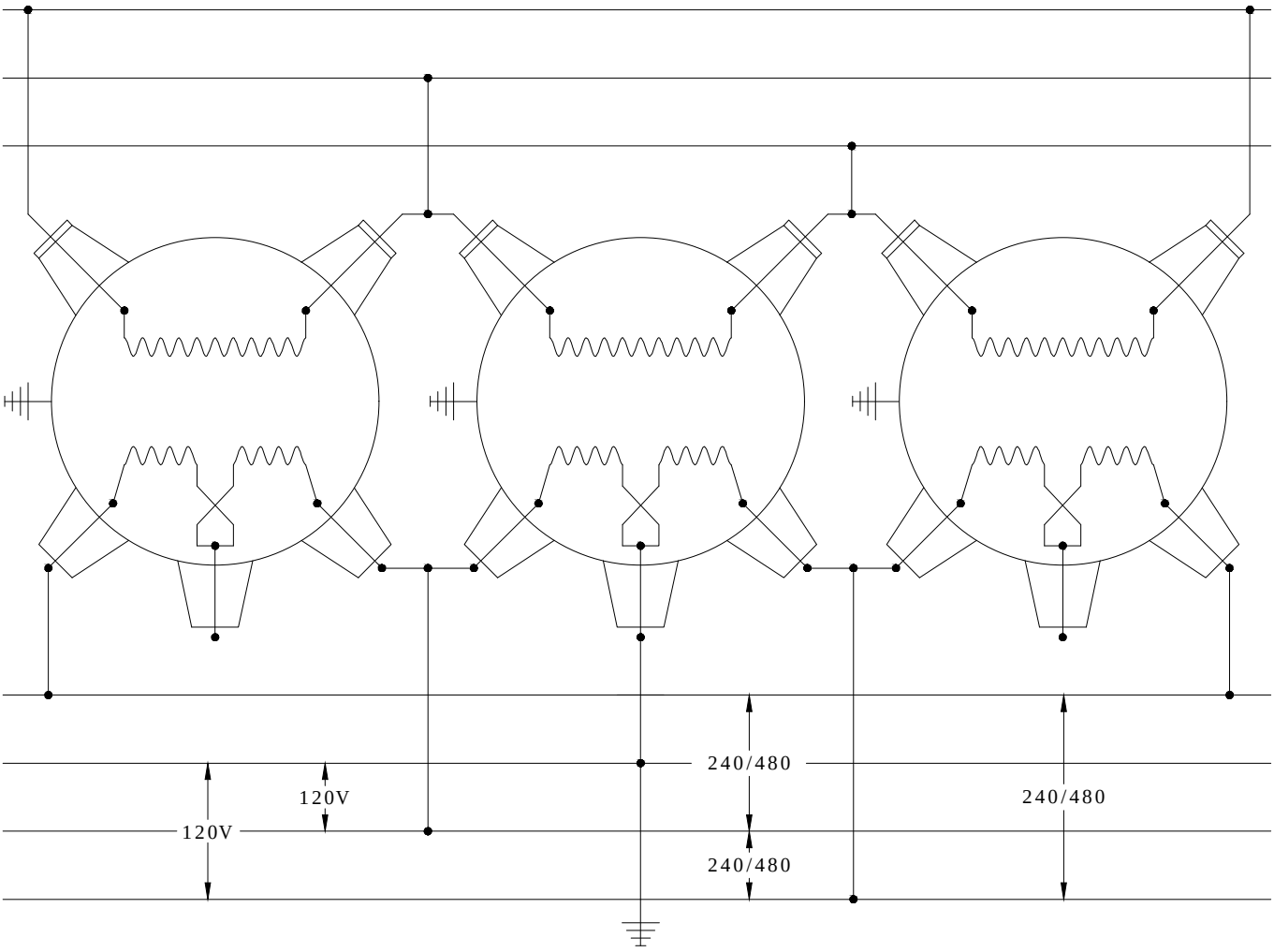
Clark Public Utilities

CONSTRUCTION STANDARDS

3Ø OPEN-WYE OPEN-DELTA
FOR 120/240 3Ø 4-WIRE,
240 3Ø 3-WIRE, 480V 3Ø 3-WIRE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		
1 REDRAWN IN CAD			

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC4	TC4	DATE: 1/31/80	1100



Notes:

1. Extend case ground wire to secondary neutral bushing on lighter transformer only.
2. For 3Ø 3 wire omit neutral installation and secondary grounds.

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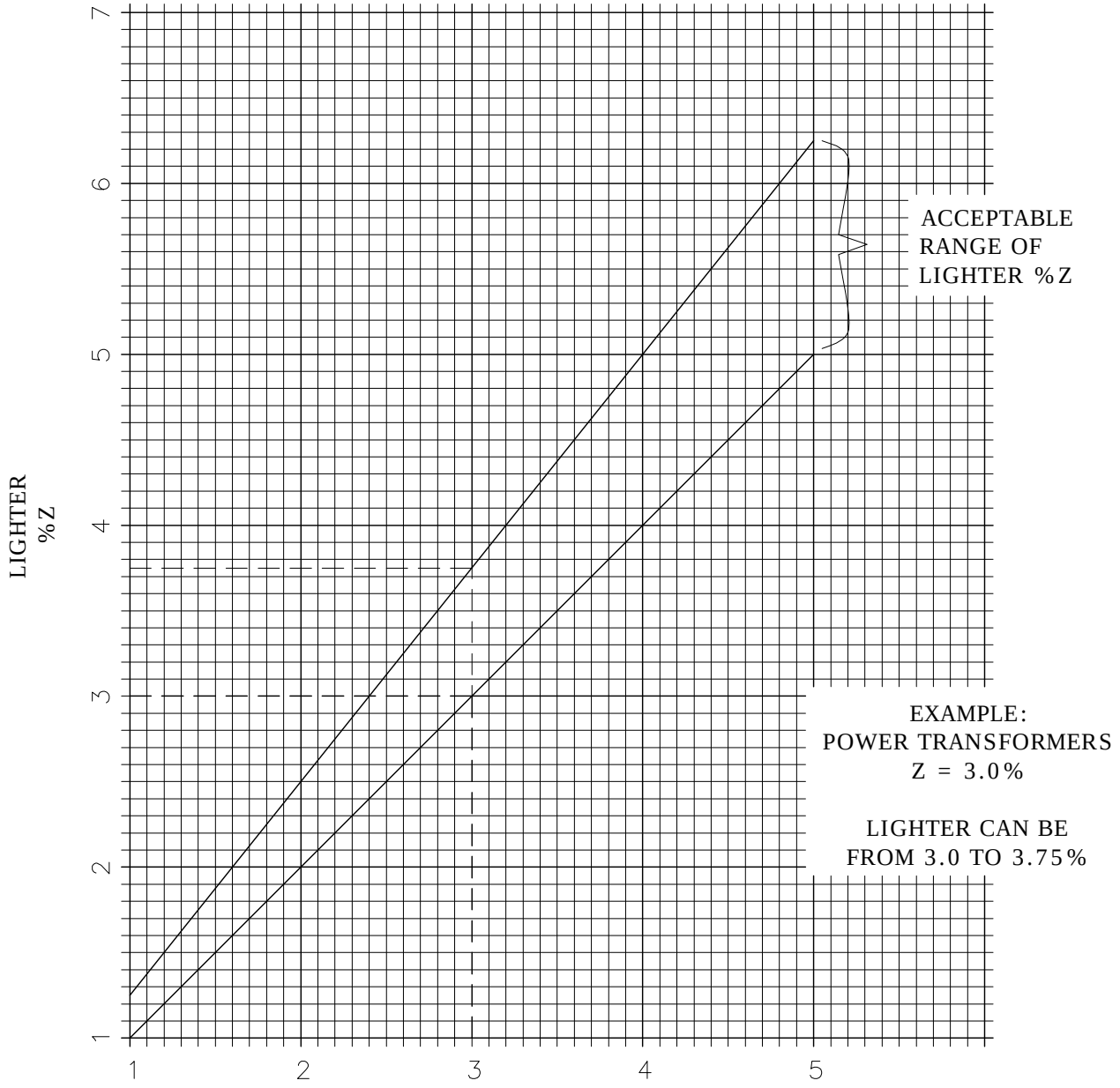
CONSTRUCTION STANDARDS

3Ø DELTA-DELTA
FOR 120/240 3Ø 4-WIRE,
240 3Ø 3-WIRE, 480V 3Ø 3-WIRE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		
1 REDRAWN IN CAD			

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC5	TC5	DATE: 1/31/80	1100



POWER TRANSFORMERS

Notes:

1. Voltages and tap position must match on all three transformers.
2. Impedances should be matched. If not, the lighter may have up to 25% higher impedance than either power transformer.
3. If the impedances in note 2 can not be obtained, go to the next larger KVA.
4. If a power transformer must be replaced it must match the existing unit. If this is not possible then replace both transformers.

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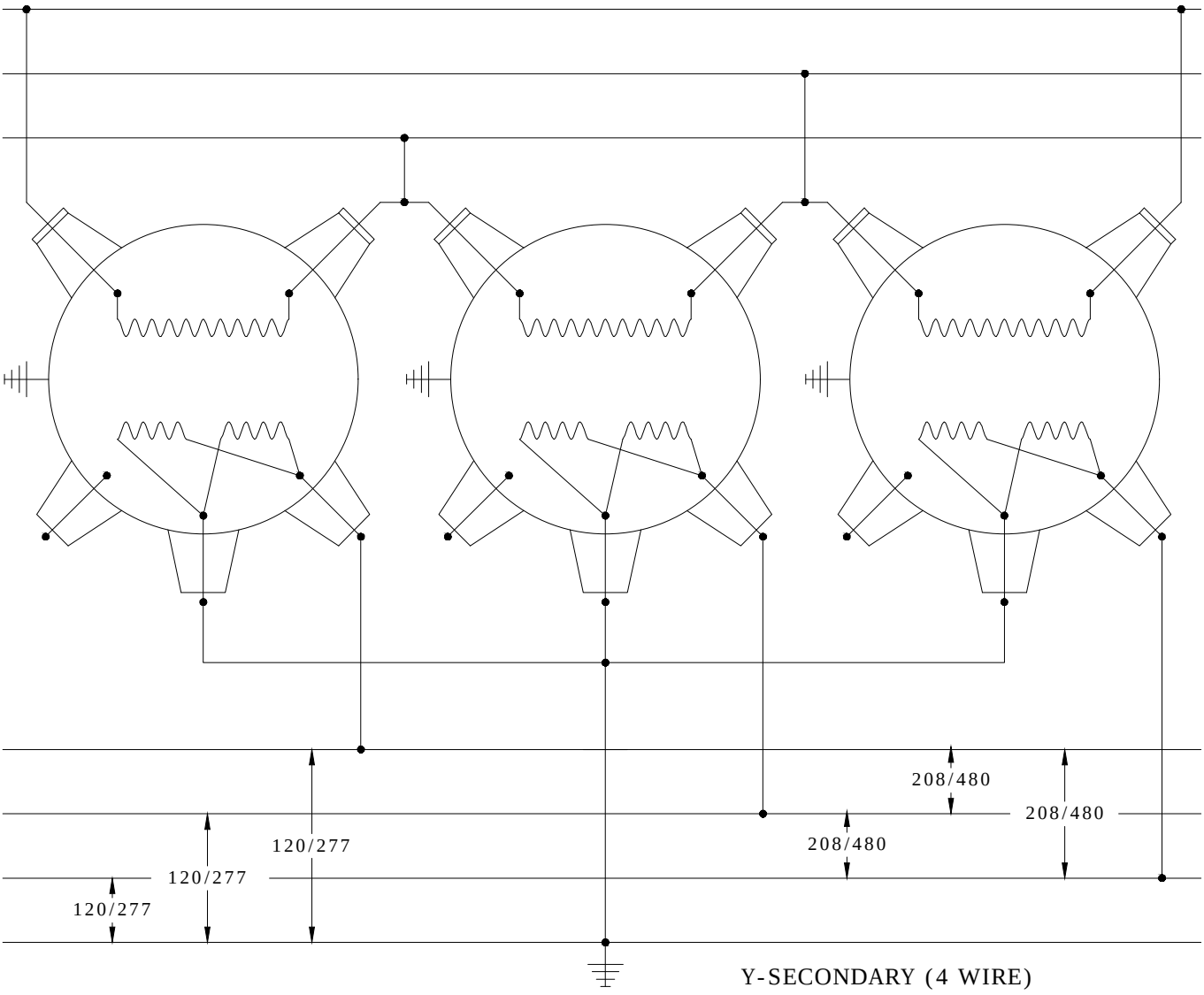
CONSTRUCTION STANDARDS

3Ø DELTA-DELTA CLOSED BANKS
FOR 120/240 3Ø 4-WIRE,
240 3Ø 3-WIRE, 480V 3Ø 3-WIRE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		

1 REDRAWN IN CAD

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC5A	TC5A	DATE: 1/31/80	1100



Y-SECONDARY (4 WIRE)

Notes:

1. Extend case ground wire to secondary bushing.
2. Use transformers with 277V secondary rating to obtain 277/480V.

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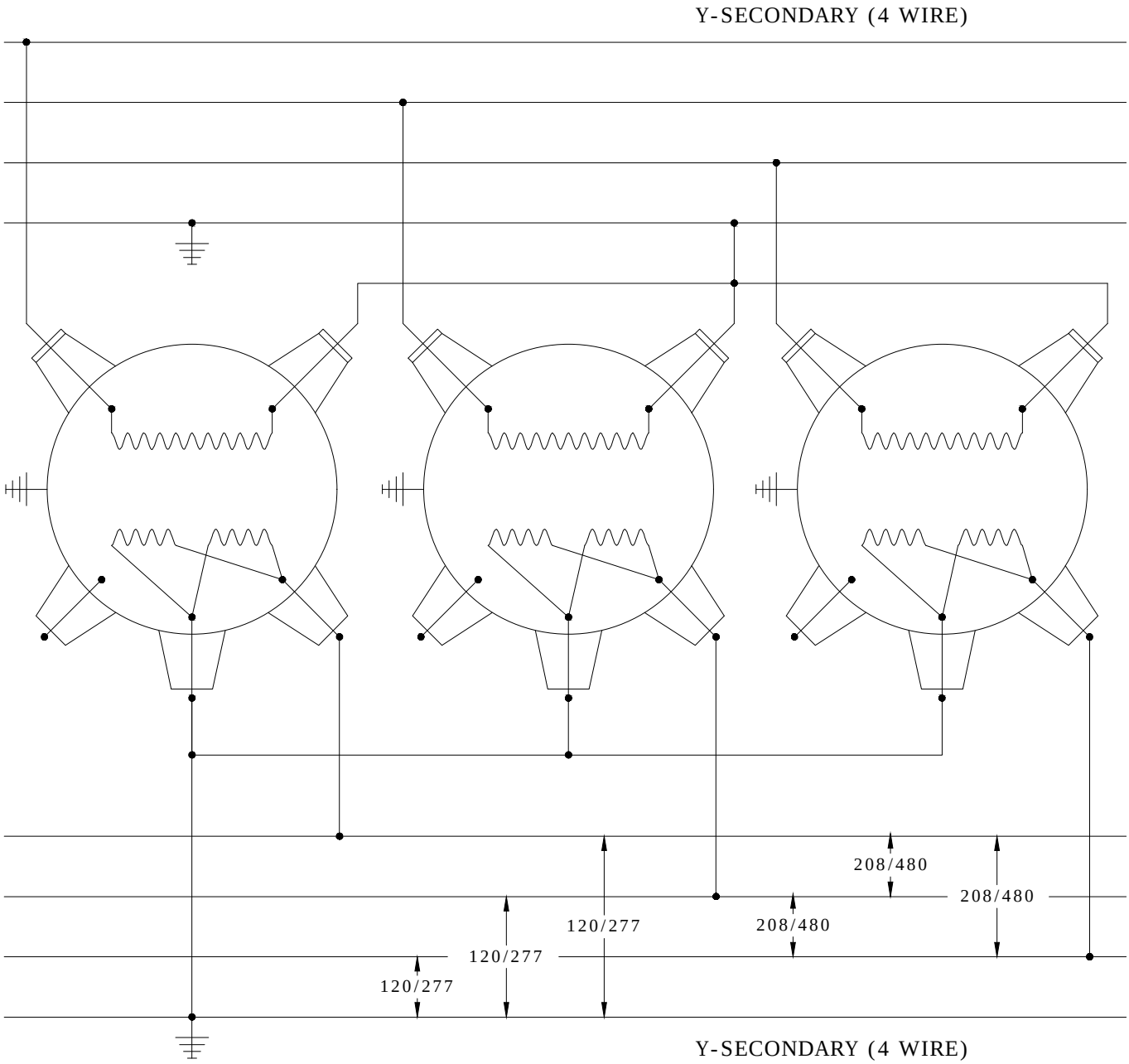
CONSTRUCTION STANDARDS

3Ø DELTA WYE
FOR 120/208 OR 277/480V SERVICE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		

1 REDRAWN IN CAD

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC6	TC6	DATE: 1/31/80	1100



Notes:

1. Extend case ground wire to secondary bushing.
2. Use transformers with 277V secondary rating to obtain 277/480V.

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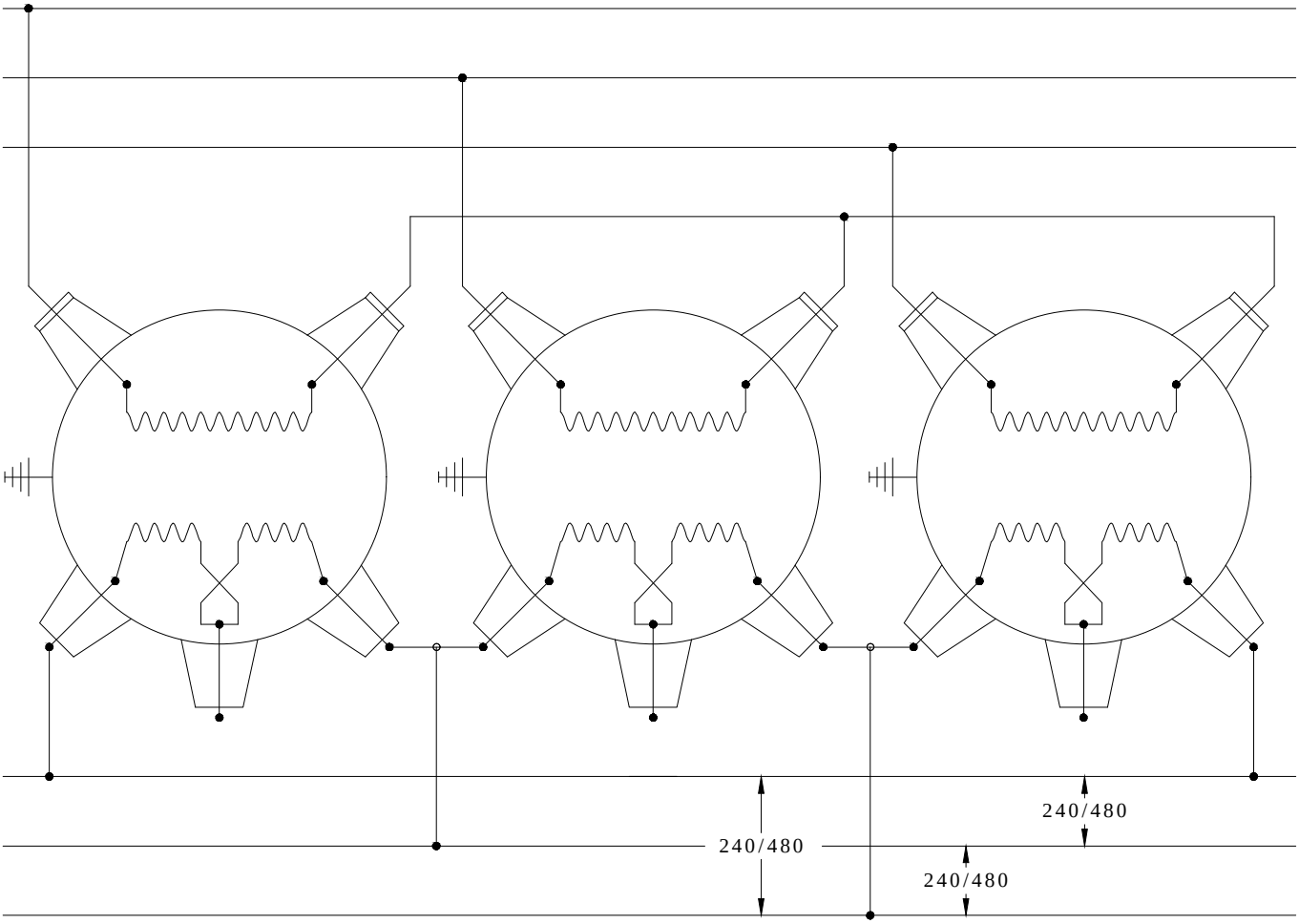
CONSTRUCTION STANDARDS

3Ø WYE WYE
FOR 120/208 OR 277/480V SERVICE

REVISIONS			
△R	DATE	ENGR	OPS
1	3/02		
△1 REDRAWN IN CAD			

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC7	TC7	DATE: 1/31/80	1100



Notes:

1. Float primary neutral free to grounds
2. Use 2-bushing transformers only.

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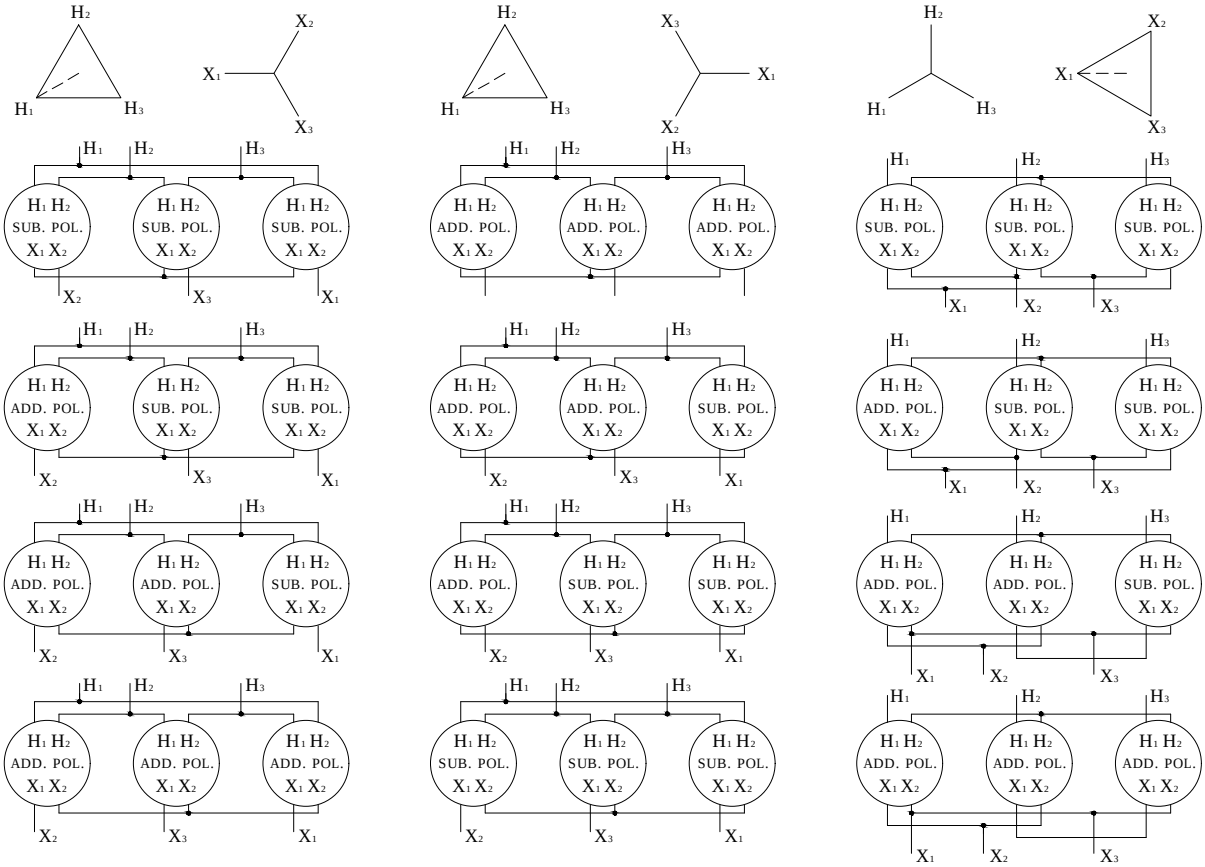
CONSTRUCTION STANDARDS

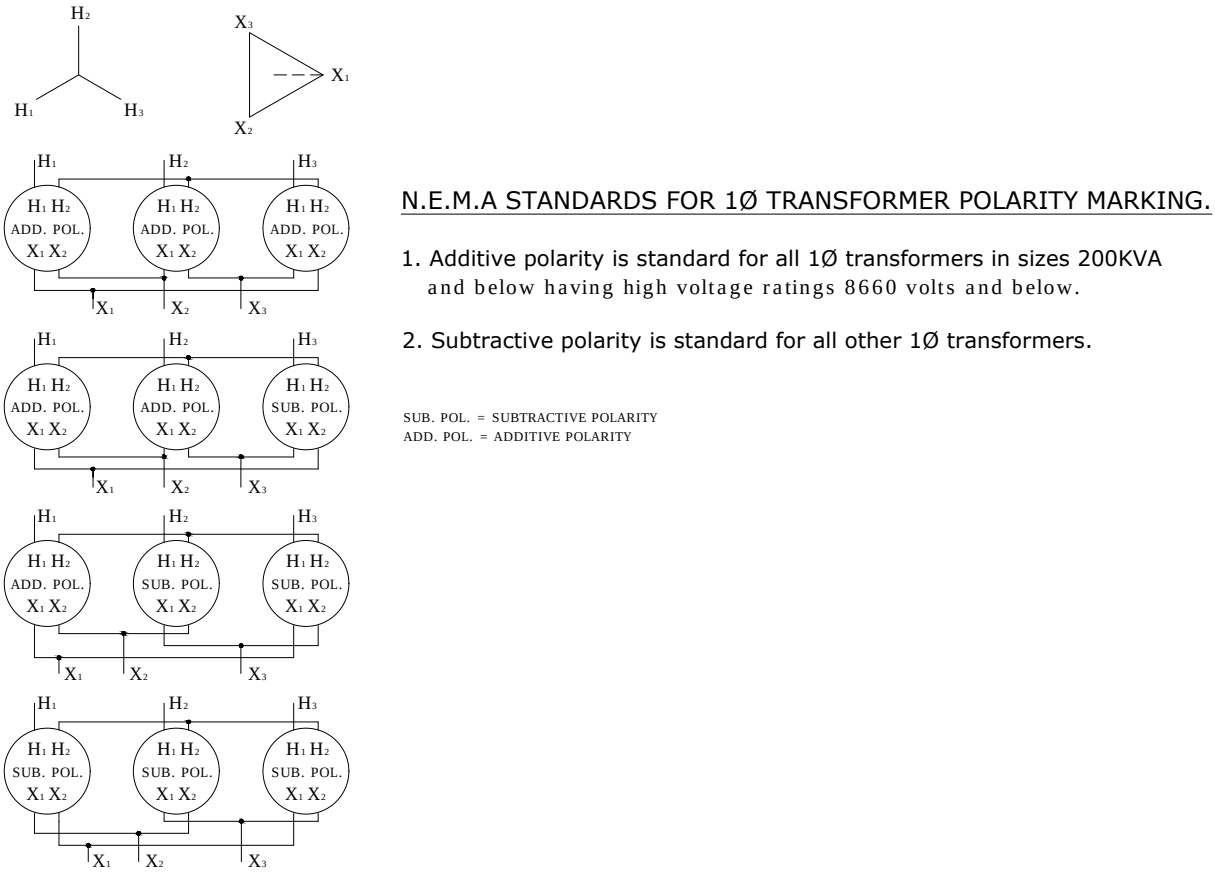
3Ø WYE DELTA
FOR 240V 3Ø 3-WIRE
480V 3Ø 3-WIRE

REVISIONS			
R	DATE	ENGR	OPS
1	3/02		

1 REDRAWN IN CAD

PAGE:	CAD FILE:	APP: ELM	SECTION
1 of 1	TC8	DATE: 1/31/80	1100





N.E.M.A STANDARDS FOR 1Ø TRANSFORMER POLARITY MARKING.

1. Additive polarity is standard for all 1Ø transformers in sizes 200KVA and below having high voltage ratings 8660 volts and below.

2. Subtractive polarity is standard for all other 1Ø transformers.

SUB. POL. = SUBTRACTIVE POLARITY
ADD. POL. = ADDITIVE POLARITY

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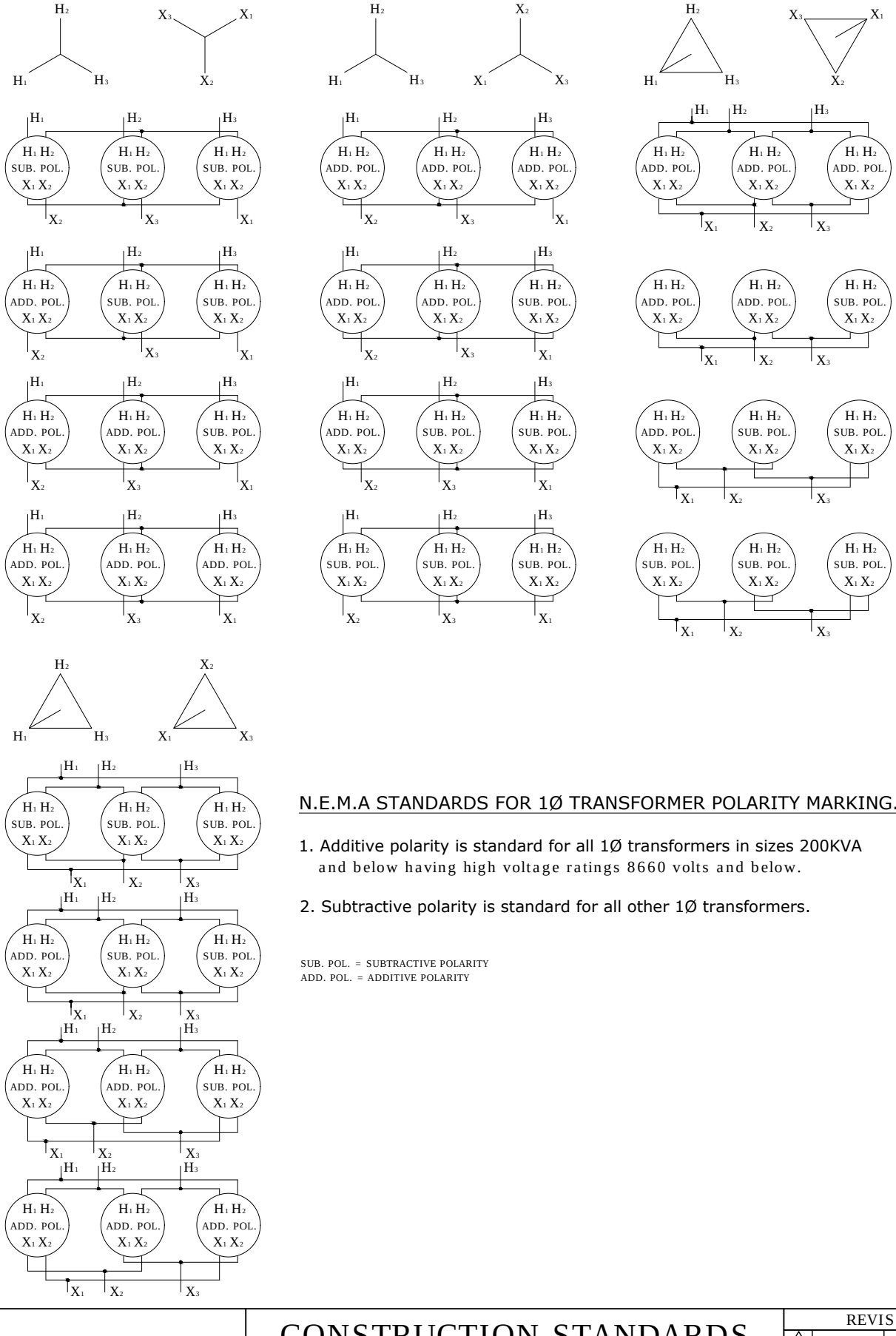
CONSTRUCTION STANDARDS

3Ø TRANSFORMER CONNECTIONS

REVISIONS			
R	DATE	ENGR	OPS
0	6/14/02		

0 REDRAWN IN CAD

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TC10	TC10	DATE: 1/31/80	1100



N.E.M.A STANDARDS FOR 1Ø TRANSFORMER POLARITY MARKING.

1. Additive polarity is standard for all 1Ø transformers in sizes 200KVA and below having high voltage ratings 8660 volts and below.

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SUB. POL. = SUBTRACTIVE POLARITY
ADD. POL. = ADDITIVE POLARITY

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CONSTRUCTION STANDARDS

3Ø TRANSFORMER CONNECTIONS

REVISIONS			
R	DATE	ENGR	OPS
0	6/14/02		

0 REDRAWN IN CAD

PAGE:		CAD FILE:	APP: ELM	SECTION
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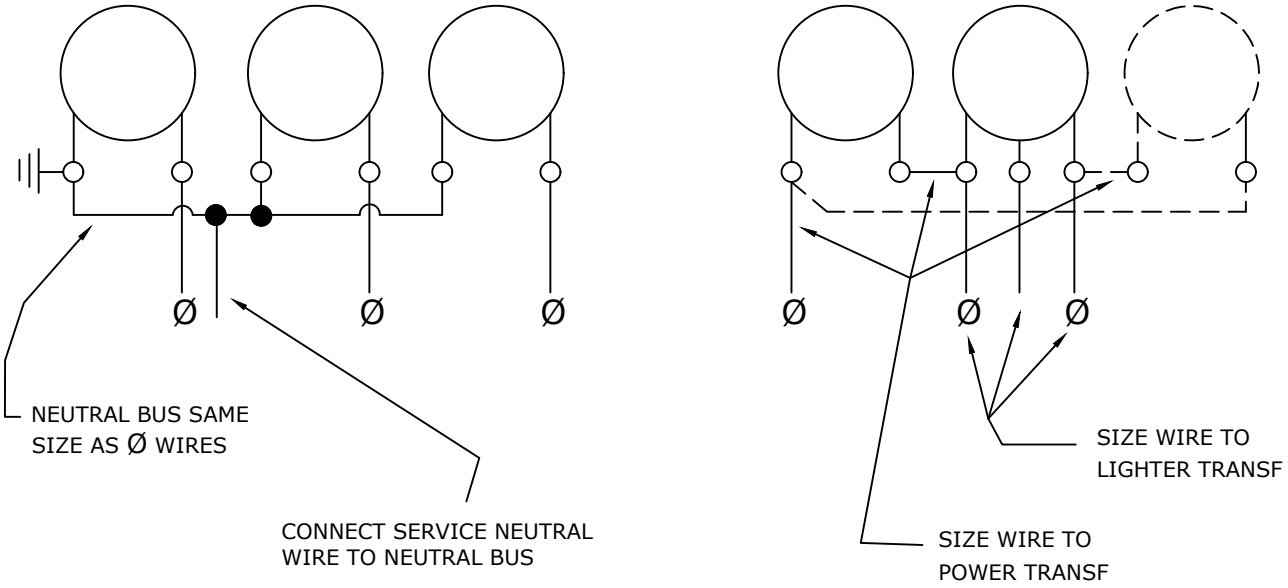
TRANSFORMER SIZE KVA		MAX EYEBOLT SIZE	VOLTAGE CHART			
			120V	240V	277V	480V
1Ø	3Ø (BANK)		120V 1Ø 120V/208V 3Ø	120V/240V 1Ø 240V 3Ø	277V/480V 3Ø	480V 3Ø
			COPPER WIRE SIZE			
15	45	4/O	2	2	2	2
25	75	350	2/O	2	2	2
37.5	112.5	350	4/O	2	2	2
50	150	350	350 ✲	2/O	2/O	2
75	225	SPADE	2-4/O	4/O	4/O	2/O
100	300	SPADE	2-350	350	350	2/O

CLOSED △

OPEN △

WYE CONNECTION



Notes:

1. Transformer loading based on 150% of Nameplate KVA.
2. Wire ampacity based on 90 degree Celsius (the maximum insulation temperature). Summer loading (Reference 02.06.01)
3. See Reference Section 2000, Standard 08.01 for larger bank sizes.
4. All high side jumpers #4 covered wire.

Rev 3 - Removed RED wire from note #4 and removed note #5.

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CONSTRUCTION STANDARDS

TRANSFORMER LEAD SIZES
OVERHEAD SECONDARY

REVISIONS			
R	DATE	ENGR	OPS
1	2/23/00	HWH	MA
2	12/14/09	KJP	
3	3/6/2023	CSB	

PAGE:		CAD FILE:	APP: ELM	SECTION
1 of 1	TL1	TL1	DATE: 1/31/80	1100

480 VOLTS DELTA

3 PHASE BANK	500KVA	750KVA	1000KVA	1500KVA
COPPER WIRE SIZE PER BUSHING	1-350	2-4/0	2-350	3-350
BRAID SIZE	1-800 AMP	1-800 AMP	2-800 AMP	2-800 AMP

480 Y/277 GROUNDED WYE

COPPER WIRE SIZE PER BUSHING INCLUDING NEUTRAL	2-350	2-500	3-500	4-500
ALUMINUM WIRE SIZE PER BUSHING INCLUDING NEUTRAL	3-4/0	3-350	*	*

ALL BUSHING CONNECTIONS SHALL BE MADE WITH COPPER COMPRESSION SPADE TERMINALS. STOCK NUMBERS ARE:

4/0	#434
350	#436
500	#2276

CONNECT SERVICE CONDUCTORS TO TRANSFORMER SPADES WHERE EVER POSSIBLE. IF NOT, CONNECT SERVICE CONDUCTORS TO TRANSFORMER LEADS WITH COMPRESSION CONNECTORS. SEE SHEET 3 OF 3.

* USE COPPER LEADS AND CONNECT ALUMINUM SERVICE CONDUCTORS TO COPPER LEADS WITH COMPRESSION CONNECTORS.

LEAD SIZES ARE BASED UPON RATINGS IN IEEE S-135, PAGE 260.

R1 - CHANGE TO REFLECT OH JUMPERS

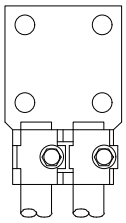
240 VOLTS DELTA

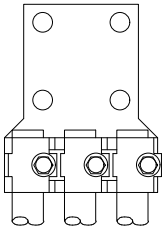
3 PHASE BANK	500KVA	750KVA	1000KVA
COPPER WIRE SIZE PER BUSHING	2-350	3-350	3-500
BRAID SIZE	2-800 AMP	2-800 AMP	3-800 AMP

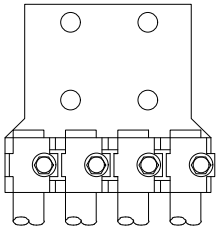
208 Y/120 VOLTS

COPPER WIRE SIZE PER BUSHING	3-500	(1) 4-750	(1) 5-750
BRAID SIZE	2-800 AMP	2-800 AMP	3-800 AMP

NOTES: (1) 750 COPPER REQUIRES BRONZE BOLT TYPE SPADE CONNECTORS SUCH AS SHOWN BELOW.







FARGO#	2J7A4N	3J7A4N	4J7A4N

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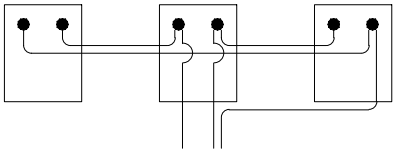
CONSTRUCTION STANDARDS

LARGE TRANSFORMER
LEAD SIZE - OVERHEAD

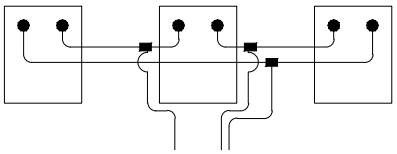
REVISIONS			
R	DATE	ENGR	OPS
1	2/23/00	HWH	MA
1 REFLECT OH JUMPERS			

PAGE:		CAD FILE:	APP:	SECTION
2 of 3	TL2	TL2	DATE: 4/92	1100

DELTA

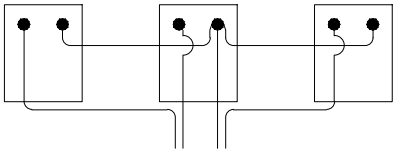


PREFERRED
(COPPER LEADS)
(COPPER OR ALUMINUM SERVICE)

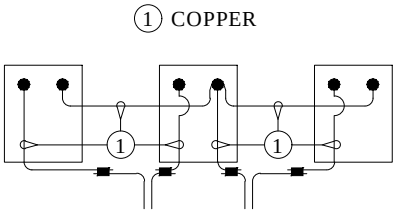


ALTERNATE
(COPPER LEADS)
(COPPER OR ALUMINUM SERVICE)

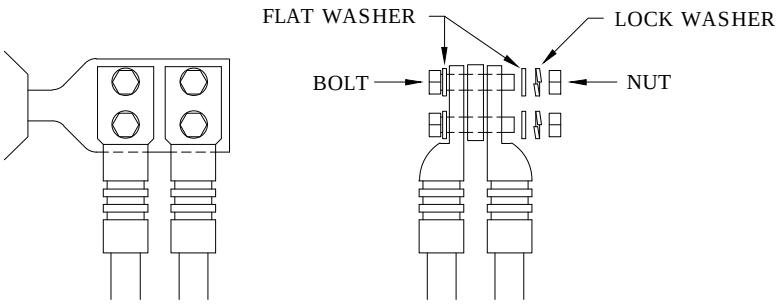
WYE



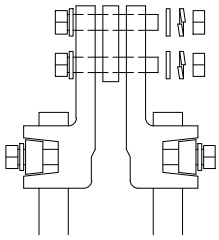
PREFERRED
(ALL ALUMINUM)



ALUMINUM OR COPPER
ALTERNATE



COMPRESSION CONNECTIONS
AT BUSHINGS



BRONZE BOLT TYPE
CONNECTIONS AT BUSHINGS

NOTES:
1. All Aluminum-to -Copper connections must be made so that water will run from the aluminum toward the copper.
2. Use oxide inhibitor at all connections.

Clark Public Utilities

CONSTRUCTION STANDARDS

LARGE TRANSFORMER
LEAD SIZE - OVERHEAD

REVISIONS			
R	DATE	ENGR	OPS
1	2/23/00	HWH	MA

1 REFLECT OH JUMPERS

PAGE:		CAD FILE:	APP:	SECTION
3 of 3	TL2	TL2	DATE: 4/92	1100