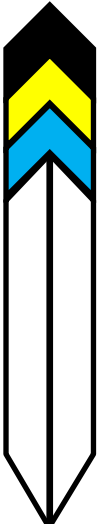
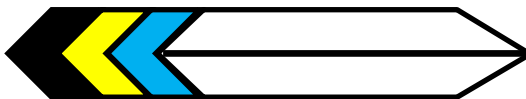


2014 UNDERGROUND ELECTRIC CONSTRUCTION STANDARDS



COMMERCIAL STANDARDS
DRAWING LIST

| <u>PAGE #</u> | <u>DWG #</u> | <u>DESCRIPTION</u> | <u>PAGE #</u> | <u>DWG #</u> | <u>DESCRIPTION</u> |
|---------------|--------------|---|---------------|--------------|--|
| 2 - 4 | | GUIDELINES | 28 | CM-13A | UM2-4XS SOURCE RISER DEAD-END MATERIAL LISTING |
| 5 | CM-01 | UNDERGROUND CONSTRUCTION DIAGRAM | 29 | CM-14 | UM2-4XL LOAD RISER DEAD END |
| 6 | CM-02 | URD CONSTRUCTION NOTES | 30 | CM-14A | UM2-4XL LOAD RISER DEAD END MATERIAL LIST |
| 7 | CM-02A | URD CONSTRUCTION NOTES | 31 | CM-15 | UM2-4XS SOURCE RISER TANGENT STRUCTURE |
| 8 | CM-03 | 3-PHASE CUSTOMER OWNED SECONDARY | 32 | CM-15A | UM2-4XS SOURCE RISER TANGENT MATERIAL LISTING |
| 9 | CM-03A | SINGLE PHASE CUSTOMER OWNED SECONDARY | 33 | CM-16 | SINGLE PHASE RISER CONNECTION |
| 10 | CM-04 | SERVICE ENTRANCE-200 AMPS | 34 | CM-17 | UM2-8 RISER DEAD-END STRUCTURE |
| 11 | CM-04A | SERVICE ENTRANCE-100 AMPS | 35 | CM-17A | UM2-8 RISER DEAD-END MATERIAL LISTING |
| 12 | CM-05 | PRIMARY DISTRIBUTION TRENCH DETAIL | 36 | CM-18 | UM2-8 RISER TANGENT STRUCTURE |
| 13 | CM-05A | SHARED PRIMARY & SECONDARY TRENCH DETAIL | 37 | CM-18A | UM2-8 RISER TANGENT MATERIAL LISTING |
| 14 | CM-05B | SECONDARY TRENCH DETAIL | 38 | CM-19 | THREE PHASE RISER CONNECTION |
| 15 | CM-06C | DIRECT BURIED RESIDENTIAL PRIMARY TRENCH DETAIL | 39 | CM-20 | 3-PHASE TERMINAL POLE, WITH INTERMEDIATE ARRESTERS |
| 16 | CM-06 | 3 PHASE C.T. METERING PAD MOUNT TRANSFORMER | 40 | CM-20A | TERMINALS STRUCTURE MATERIAL LISTING |
| 17 | CM-06A | PAD MOUNT TRANSFORMER NOTES | 41 | CM-21 | STAND-OFF BRACKET SPECIFICATIONS |
| 18 | CM-07 | 3Ø SES 400-600AMP SERVICE | 42 | CM-22 | STAND-OFF BRACKET GROUNDING DETAIL |
| 19 | CM-08 | 3Ø SES 800-2000 AMP SERVICE | 43 | CM-23 | STAND-OFF BRACKET TYPICAL INSTALLATIONS |
| 20 | CM-09 | BARRIER DETAIL | 44 | CM-24 | INSULATED GROUND BUSHING DETAILS-MALLABLE IRON |
| 21 | CM-10 | FENCING DETAIL | 45 | CM-25 | INSULATED GROUND BUSHING DETAILS-ZINC DIE CAST |
| 22 | CM-11 | SWITCHING CUBICLE PAD | 46 | CM-26 | VENT CAP DETAILS |
| 23 | CM-11A | SWITCHING CUBICAL PAD GROUNDING DETAIL | 47 | CM-27 | BOTTOM VENT COUPLING DETAILS |
| 24 | CM-11B | SWITCHING CUBICAL PAD DETAIL | 48 | CM-28 | SINGLE-PHASE PAD-MOUNTED TRANSFORMER 37.5 - 75 KVA |
| 25 | CM-12 | TRANSFORMER PAD DETAIL | 49 | CM-28A | EXAMPLE - SINGLE-PHASE PAD-MOUNTED TRANSFORMER GROUNDING LOOPS |
| 26 | CM-12A | TRANSFORMER PAD NOTES | 50 | CM-28B | DETAIL - SINGLE-PHASE PAD-MOUNTED TRANSFORMER GROUNDING LOOP |
| 27 | CM-13 | UM2-4XS SOURCE RISER DEAD-END POLE | 51 | CM-29 | THREE-PHASE PAD-MOUNTED TRANSFORMER |

NTUA GUIDELINES FOR DESIGNING AN ELECTRICAL POWER DISTRIBUTION SYSTEM FOR UNDERGROUND DEVELOPMENTS

These guidelines are intended to familiarize developers, contractors, and industrial/commercial customers with important issues regarding underground electric service to land developments and adjacent properties. These are general guidelines and NTUA shall have final determination and approval before any project is constructed. NTUA Engineer Technicians and Engineers perform the design and engineering of the electric power distribution system. These designs will reflect the construction requirements and easements for the project.

The electrical distribution system designs may vary considerably depending on electrical loads, size of project and proximity of the development from existing electrical substations and main power lines. The physical condition and location of the project site may also favor an overhead versus underground electric distribution system or vice versa. The following sections of this guide contain basic information that needs to be considered in most of the projects.

NTUA requires two complete sets of the final design plans. Coordination, good design, and project management are the keys to a smooth completion of an electrical distribution system project.

I. INFORMATION REQUIRED FROM DEVELOPER FOR ELECTRICAL DESIGN

a. SITE PLAN

An accurate site development plan is necessary to get a good design of the project. Information on adjacent properties may also be required depending on the scope of the development project. Any other information that will be helpful to the designer should be reflected in the site plan to achieve the best design. Information such as existing utilities, grading plans, and ownership should be indicated as accurate as possible. AutoCAD files must be submitted before a cost estimate can be calculated.

b. ELECTRIC POWER REQUIREMENTS

1. CHARACTERISTICS OF ELECTRIC SERVICE

The customer is required to indicate the service requirements for single phase, three phase or both. Customer shall provide schematic drawings for the service requirements.

2. VOLTAGE REQUIREMENTS

Customer shall indicate all secondary voltage(s) required.

NTUA supplies the following secondary voltage services:

120/240V single phase

120/208V three phase

120/240V three phase (overhead only – will provide “wild-leg” on C Phase)

277/480V three phase

3. LOAD SCHEDULE

Customer is required to submit the load calculations for any proposed non-residential development. Total connected load and demand load is necessary.

In addition to total load the customer shall supply detailed load schedules (e.g. Panel schedules). A certified Professional Engineer will be required to prepare plans and calculations for the project. Small projects are an exception.

4. METERING

Customer shall indicate the location of the meter on the design. NTUA requires the meter to be on the external side of the building. For larger projects a free standing switch gear shall be required. This is to accommodate the CTs and meter. A schematic design of the switchgear shall be submitted to NTUA for approval. Shunt type disconnects will not be accepted. Meter shall not be installed on the transformer.

5. MAIN DISCONNECT

The customer shall provide the size of the main disconnect on the design submitted. To ensure safety NTUA requires all new electric services to have a single disconnect point located on the exterior of the building in order to cut power in case of fire or other emergency.

II. EASEMENTS

The customer shall contact NTUA Electrical System Planning Department at NTUA Headquarters regarding the capability of NTUA to provide service to the project site. NTUA requires a site location on a quad map and land withdrawal documents. NTUA Headquarters Right-Of-Way Department will determine if the right of way process is required. If the power line is not within the land withdrawal area a formal right of way acquisition will be required. The right of way acquisition process may take six to twelve months once the request has been made and payment to NTUA is received.

III. OVERHEAD VERSUS UNDERGROUND

Customers are encouraged to give preference to installing underground systems. Several developments have been served from overhead power lines using underground risers to connect to new underground lines. This combination of system appears to provide for the most economical and efficient design.

IV. COST ESTIMATES

NTUA will send a cost estimate to the Developer and/or their Contractor for the proposed distribution system after completing the design. The estimate shall be valid for 90 days. AutoCAD plans need to be submitted before a design or cost estimate can be developed. Construction for NTUA cannot begin until a PO or letter of funds commitment is submitted.

V. INSPECTIONS

In an underground system, NTUA allows the Developer to install the underground conduits, concrete pads, trenches and perform backfilling. The Developer shall comply with the attached specifications. The Developer is responsible for contacting NTUA to inspect the

trenches and installed material. At least 7 days must be allowed to schedule inspection and a 24 hour reminder is encouraged. Service cables, conduit and equipment are to be furnished and installed by the Developer.

VI. CODE COMPLIANCE

NTUA will design the electrical distribution system according to the minimum requirements of NTUA and the latest revision of the National Electric Safety Code (NESC) and National Electric Code (NEC). All references to the NEC in the following specifications are to the 2014 edition. It is the responsibility of the Developer/Contractor to comply with the latest edition of the NEC. Any conflicts will be brought to the attention of HQ Engineering and they will issue a determination. The Developer/Contractor shall reference specific code when submitting letter to NTUA.

VII. COORDINATION WITH NTUA HEADQUARTERS ENGINEERING AND NTUA DISTRICT OFFICE

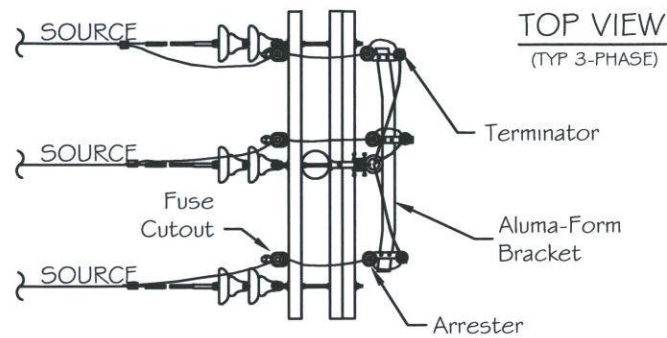
Developers must contact HQ Electric System Planning Department to plan a preliminary electric distribution system. NTUA HQ Engineering and the Developer need to be sure that the Developer's requirements are met and NTUA requirements are complied with.

The District Electric Department plans the construction schedule depending on workload and availability of materials using the approved design. Some electrical materials may have several months lead time for delivery. Developer should stay in contact with System Planning for the status and proper scheduling of inspection, approval and connection of the electric service. The Developer shall contact NTUA Electrical Engineering in writing of any changes to the electrical design and/or construction activities.

VIII. NTUA ELECTRIC CONSTRUCTION STANDARDS

NTUA designer and engineers approve the design of all electric power distribution systems. These designs will reflect requirements for the development project. The design will also include construction standard drawings that are pertinent to the project.

Attached you will find the NTUA underground construction standard drawings.



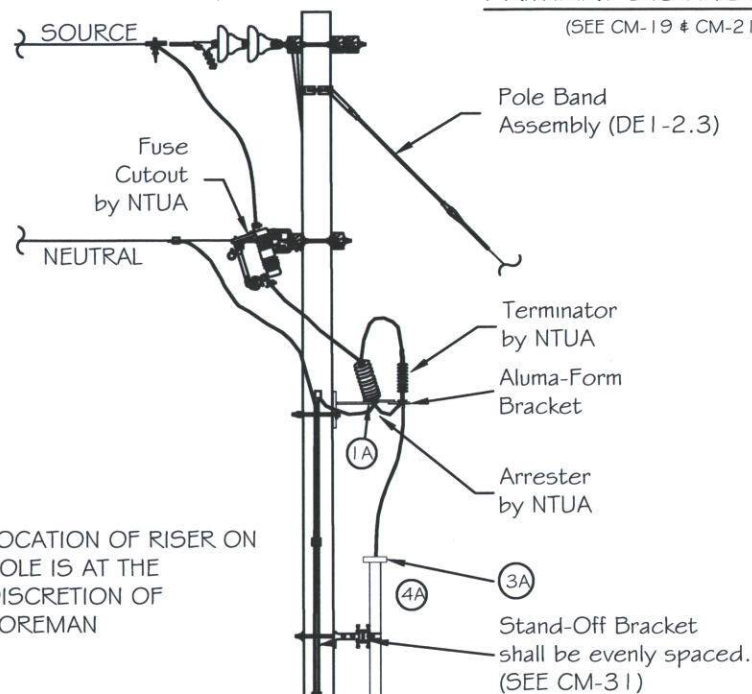
NOTES

- a. URD CONDUITS - 3" PVC CONDUIT 1 Ø
6" PVC CONDUIT 3 Ø
- b. GRC CONDUITS - 3" GRC-1 Ø; 6" GRC-3 Ø ARE
FURNISHED AND INSTALLED BY THE CONTRACTOR.

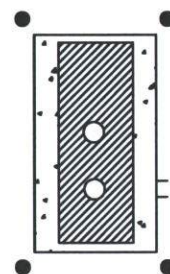
LEGEND:

- X—X— - FENCE CLASS 2
- - CONCRETE FOUNDATION
- - EARTH

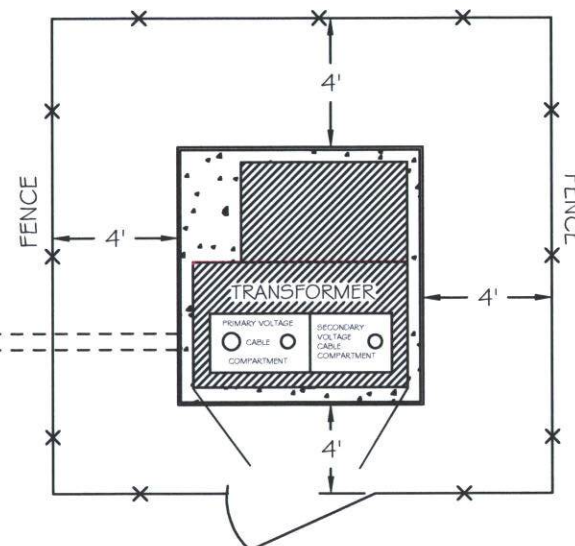
PRIMARY DISTRIBUTION (SEE CM-19 & CM-21)



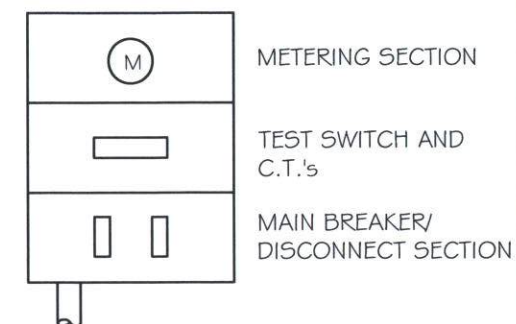
BARRIER DETAIL (SEE CM-11)



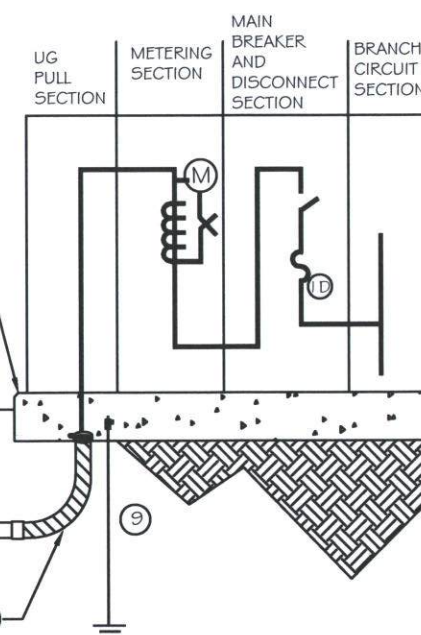
FENCE DETAIL 22 (SEE CM-09, CM-10)



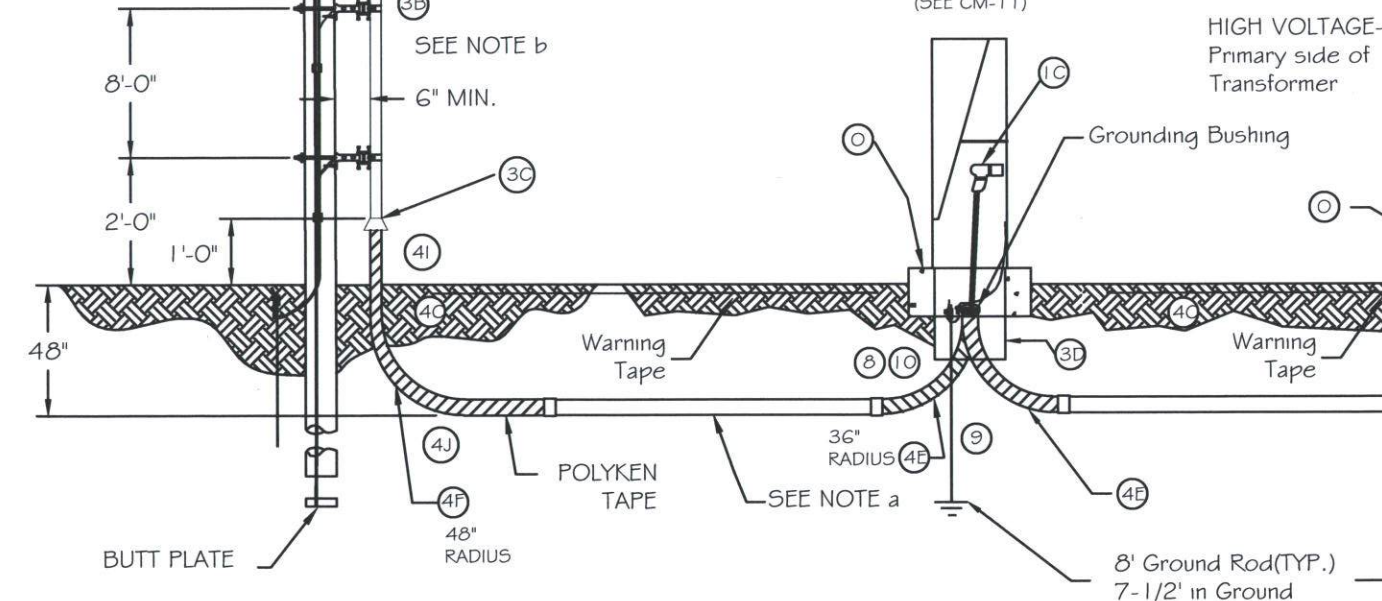
WALL MOUNTED METERING CABINET (400-600 AMPS)



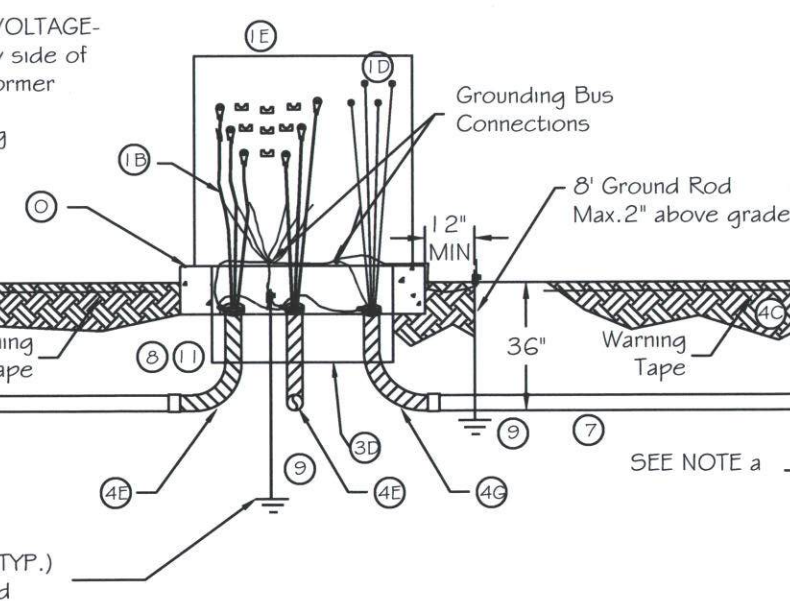
FREE STANDING SWITCHGEAR CABINET 800 AMPS AND ABOVE (SEE CM-10) MUST BE READILY ACCESSIBLE



NTUA SWITCHING CUBICLE (SEE CM-11)



PAD MOUNTED TRANSFORMER (SEE CM-12, CM-33)



BY CONTRACTOR

BY CONTRACTOR

* MAXIMUM CABLE RUN IN CONDUIT---450 FT. STRAIGHT RUNS BETWEEN PAD MOUNTED EQUIPMENT. WRITTEN REQUESTS FOR DEVIATION SHALL BE SUBMITTED TO NTUA HQ ENGINEERING FOR REVIEW. UNAPPROVED DEVIATIONS WILL BE CORRECTED AT CONTRACTORS EXPENSE.

UNDERGROUND CONSTRUCTION DIAGRAM

DWG TITLE:

DATE: 9/23/14

DRAWN BY: M. CHEROMIAH

APPROVED ENGINEERING:

REVISIONS 1:

DATE: 10/24/14

APPROVED SAFETY:

APPROVED MANAGEMENT:

REVISIONS 2:

DATE: 10/29/14

DATE: 2/10/14

DATE: 2/10/14

DWG NUMBER: CM-01




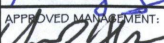
PAGE: 5




NTUA - HQ
ELECTRICAL ENGINEERING

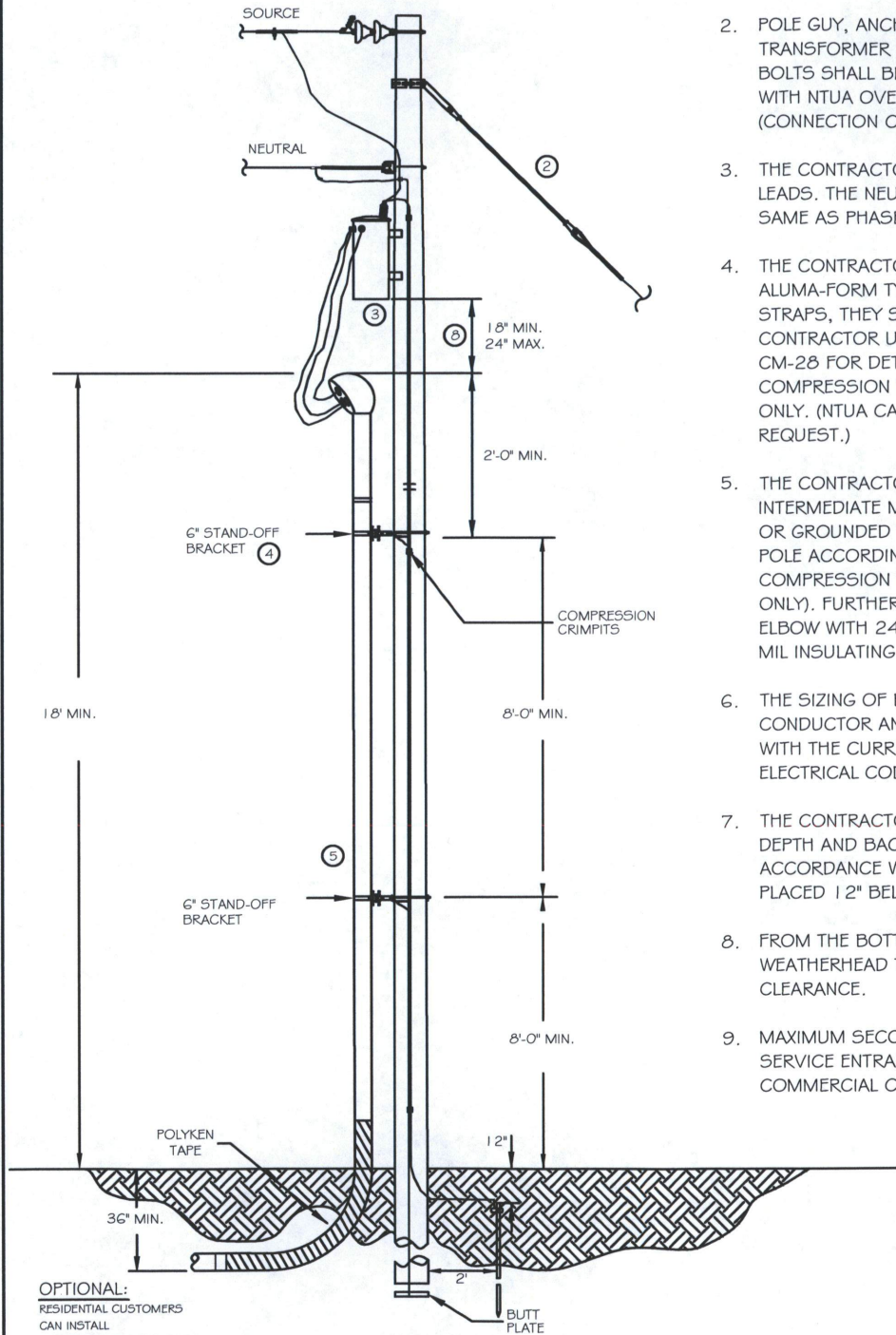
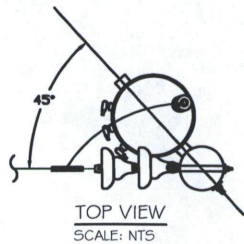
NOTES:

1. NTUA SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING THE FOLLOWING ITEMS:
 - A.) OVERHEAD DISTRIBUTION INCLUDING RISER POLE
 - B.) PRIMARY VOLTAGE CABLE WITH FITTINGS
 - C.) OTHER HIGH VOLTAGE EQUIPMENT AS SPECIFIED
 - D.) INSULATED COVERS ON ALL SECONDARY LIVE PARTS, COPPER BOLTS, LOCK WASHERS, ROUND WASHER, NUTS, AND CABLE TAGS.
 - E.) PAD-MOUNTED TRANSFORMER(S). NTUA PERSONNEL SHALL MAKE ALL SECONDARY TERMINATIONS WITHIN TRANSFORMERS
 - F.) METER AND CURRENT TRANSFORMERS (CT)
 - G.) A #2 SIZED STRANDED COPPER CONDUCTOR SHALL BE INSTALLED BY NTUA FOR TRANSFORMER GROUNDING BUS AND SWITCHING CUBICLES. THE CONDUCTOR SHALL BE INSTALLED TO FORM A COMPLETE LOOP BEGINNING FROM THE GROUND ROD (INSIDE THE EQUIPMENT) THROUGH THE GROUNDING BUSHINGS, THROUGH THE EQUIPMENT/TANK CASE GROUNDS, AND BACK TO THE GROUND ROD. THE ENDS OF THE #2 COPPER SHALL BE CRIMPED TOGETHER
2. THE CT METER SHALL BE LOCATED IN THE FREE STANDING SWITCHGEAR OR METERING CABINET PER NTUA SPECIFICATIONS. 400A, 1Ø SERVICE WILL HAVE A CLASS 320 METER INSTALLED.
3. NTUA SHALL BE RESPONSIBLE FOR FURNISHING THE FOLLOWING ITEMS TO BE INSTALLED BY THE CONTRACTOR:
 - A.) VENTILATION CAP
 - B.) STANDOFF BRACKETS AND STRAPS. (NOTE: GROUND ALL STAND-OFF BRACKETS WITH SOLID COMPRESSION CONNECTORS. SEE DWG. CM-26)
 - C.) VENTILATOR COUPLING
 - D.) GROUND SLEEVE (SEE DWG. CM-11a, CM-12)
 - E.) GROUND ROD(S) FOR PRIMARY SERVICE ONLY
 - F.) LAG SCREWS AND MACHINE BOLTS
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING THE FOLLOWING ITEMS:
 - A.) 3" OR 6" GALVANIZED RIGID CONDUIT (GRC) ON RISER POLE WITH NTUA PROVIDED STAND-OFF BRACKETS
 - B.) 3" OR 6" POLYVINYL CHLORIDE (PVC) CONDUIT (NOTE: BEVEL INSIDE AT END OF PIPE PRIOR TO USING COUPLING)
 - C.) THE CONTRACTOR TO COORDINATE INSPECTIONS WITH NTUA ON ALL TRENCHES AND BACKFILL. (SEE DWG. CM-05, CM-05A, CM-05B, CM-05C)
 - D.) GROUNDING BUSHING WITH GROUND WIRE CONNECTION TO GROUND ROD. (SEE DWG. CM-28, CM-29)
 - E.) 36" RADIUS GRC LONG SWEEP ELBOW IN 48" TRENCH AT SWITCHING CUBICLES AND TRANSFORMERS. THIS WILL PROVIDE THE 18" REQUIREMENT BETWEEN TOP OF CONCRETE PAD TO TOP OF CONDUIT.
 - F.) 48" RADIUS GRC LONG SWEEP ELBOW IN 48" TRENCH AT RISER POLE. THIS WILL PROVIDE CONDUIT 12" ABOVE FINAL GRADE TO INSTALL VENTILATION COUPLING.
 - G.) 24" RADIUS GRC LONG SWEEP ELBOW IN 36" TRENCH AT SECONDARY SIDE.
 - H.) ALL SECONDARY CONDUCTORS SHALL BE COPPER.
 - I.) ALL EXTENSIONS OF ELBOWS AND RISERS MUST BE GALVANIZED, NO EXCEPTIONS.
 - J.) ALL GRC ELBOWS MUST BE TAPED FULL LENGTH OF THE ELBOW.
 - K.) GRAVEL BEDDING SHALL BE APPLIED AT THE BASE OF GROUND SLEEVE.
 - L.) PULL ROPE IN CONDUIT.
 - M.) COVER SHALL BE PROVIDED OVER CONDUITS WHEN INSTALLATION IS COMPLETE. CONDUIT SHALL BE FREE OF DEBRIS AND OTHER MATERIAL THAT MAY CAUSE PROBLEMS DURING CABLE INSTALLATION.
 - N.) GROUNDING CONDUCTOR SHALL BE INSTALLED WITH A CAD-WELD FOR SERVICES 600A AND ABOVE
 - O.) CONCRETE PADS FOR HIGH VOLTAGE EQUIPMENT PER NTUA SPECIFICATIONS (SEE DWG. CM-11a AND CM-12) STRENGTH TESTING SHALL BE SUBMITTED BY CONTRACTOR BEFORE NTUA SHALL INSTALL EQUIPMENT ON PAD.
 - P.) WHEN POURING CONCRETE, 2" x 4" LUMBER(S) SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR TO STABILIZE AND SERVE AS A REINFORCEMENT OF THE GROUND SLEEVES. (SEE DWG. CM-11A, CM-12)
 - Q.) ALL MATERIAL SUBMITTALS (TO BE PROVIDED BY THE CONTRACTOR) SHALL BE REVIEWED AND APPROVED BY NTUA PRIOR TO PURCHASING.
 - R.) FENCING IS REQUIRED AROUND ALL HIGH VOLTAGE EQUIPMENT WHEN IT IS ACCESSIBLE BY THE PUBLIC. OTHERWISE BOLLARDS SHALL BE INSTALLED.

| | | | | |
|--|--|-------------------|--|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: URD CONSTRUCTION NOTES | |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-02 |
| | APPROVED MANAGEMENT:  | DATE: 2/26/14 | REVISIONS 2: | PAGE: 6 |

5. THE CONTRACTOR SHALL SUBMIT CUT SHEET(S) TO NTUA FOR REVIEW AND APPROVAL PRIOR TO CONTRACTOR PURCHASING SERVICE ENTRANCE SECTION. PANEL SCHEDULES SHALL BE SUBMITTED BEFORE TRANSFORMER IS SIZED.
6. CONTRACTOR SHALL CONSULT AND COORDINATE WITH NTUA ELECTRIC LINE FOREMAN FOR RISER LOCATION PRIOR TO INSTALLATION.
7. THE SIZING OF BOTH THE SECONDARY CONDUCTOR AND CONDUIT, FROM THE TRANSFORMER TO SERVICE ENTRANCE SECTION (SES), SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE (NEC) BASED ON THE DATE THAT THE PE SIGNED THE PLANS.
8. THE EQUIPMENT CASE GROUNDING SHALL BE MINIMUM #6 COPPER TO GROUNDING ELECTRODE.
9. THE COPPERCLAD GROUND ROD SHALL BE 5/8" X 8' MINIMUM AND MUST BE U.L. APPROVED.
10. SWITCHING CUBICLES AND JUNCTION BOXES SHALL BE GROUNDED BY MEANS OF INSTALLING ONE (1) 5/8" X 8' COPPER CLAD GROUND ROD INSIDE THE EQUIPMENT.
GROUND RODS SHALL BE SEPARATED AS FAR APART AS POSSIBLE WITH A MINIMUM OF SIX FEET APART BETWEEN ALL RODS. THE INSTALLED GROUND ROD(S) SHALL BE VISIBLE FOR INSPECTION.
11. FOR SINGLE AND THREE-PHASE TRANSFORMERS INSTALL TWO (2) 5/8" x 8' COPPER CLAD GROUND RODS: ONE INSIDE THE EQUIPMENT (INSTALLED IN BETWEEN PRIMARY AND SECONDARY AREAS) AND ONE OUTSIDE THE EQUIPMENT. SIX INCHES OF THE INSTALLED GROUND ROD INSIDE THE EQUIPMENT SHALL BE VISIBLE FOR INSPECTION. FOR OUTSIDE THE EQUIPMENT, THE INSTALLED GROUND ROD SHALL HAVE 12 INCHES OF SEPARATION FROM THE EQUIPMENT CONCRETE PAD AND TWO INCHES ABOVE FINAL GRADE OF VISIBILITY FOR INSPECTION.
12. AT ALL ELBOW SWEEPS CONTRACTOR SHALL SUBMIT COMPACTION TEST RESULTS (MIN. 95% REQ.) OR INSTALL CONCRETE SLURRY AROUND ELBOW.
13. ALL WORK SHALL BE IN ACCORDANCE WITH NTUA SPECIFICATIONS. ALL DEVIATIONS MUST HAVE PRIOR WRITTEN APPROVAL BY NTUA HQ-ENGINEERING. UNAPPROVED DEVIATION(S) WILL BE CONSIDERED INSUFFICIENT AND ALL WORK PERFORMED AND MATERIALS(S) USED WILL BE REJECTED. ALL COSTS ASSOCIATED WITH WORK WILL BE AT THE CONTRACTOR'S EXPENSE.
14. THE CONTRACTOR SHALL COMMUNICATE AND COORDINATE ALL PHASES OF CONSTRUCTION WITH NTUA INSPECTOR:
 - A. OPEN TRENCH (UFER GROUND)
 - B. CONDUIT INSTALLATION
 - C. ELBOW SWEEP INSTALLATION
 - D. FILL AND COMPACTION
 - E. CONCRETE FOR PAD-MOUNTED EQUIPMENT
 - F. INSTALLATION OF SECONDARY CONDUCTORS
 - G. PRIMARY AND SECONDARY TERMINATIONS (IF APPLICABLE)
15. VOLTAGE SUPPLIED BY NTUA SHALL BE WITHIN 5% OF NOMINAL
16. NTUA IS THE ELECTRICAL AUTHORITY IN THE NTUA SERVICE AREA
17. NTUA SHALL TAKE OWNERSHIP OF PRIMARY ELECTRICAL SYSTEM FOR OPERATION AND MAINTENANCE.
18. ALL PRIMARY UNDERGROUND CONDUCTORS SHALL BE INSTALLED IN CONDUIT.
RESIDENTIAL CUSTOMERS MAY BE AN EXCEPTION, BUT MUST HAVE HQ-ENGINEERING APPROVAL.
19. IF A FIRE PUMP IS INSTALLED A BACKUP GENERATOR (CONTRACTOR PROVIDED AND INSTALLED) MUST BE INSTALLED OR A SECOND DEDICATED TRANSFORMER SHALL BE INSTALLED
20. ONLY HQ-ENGINEERING MAY MODIFY ANY OF THE STANDARDS INCLUDED IN THIS BOOK. ANY UNAPPROVED DEVIATION SHALL BE CORRECTED AT THE CONTRACTORS EXPENSE.
21. ALL WORK SHALL BE PREFORMED IN A WORKMANSHIP LIKE MANNER. NTUA RESERVES THE RIGHT TO DEVIATE ANY SUBSTANDARD WORK.

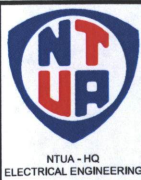
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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: URD CONSTRUCTION NOTES | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-02A |
| | APPROVED MANAGEMENT: | DATE: 29 OCT 14 | REVISIONS 2: | PAGE: 7 |



NOTES:

1. THE CONTRACTOR SHALL COORDINATE WITH NTUA BEFORE INSTALLING SECONDARY RISER.
2. POLE GUY, ANCHOR, POLE MOUNTED TRANSFORMER, TRANSFORMER MOUNTING BRACKET AND/OR MOUNTING BOLTS SHALL BE INSTALLED BY NTUA, IN ACCORDANCE WITH NTUA OVERHEAD CONSTRUCTION SPECIFICATIONS. (CONNECTION CHARGE MAY BE REQUIRED)
3. THE CONTRACTOR SHALL INSTALL 80\" TRANSFORMER LEADS. THE NEUTRAL CONDUCTOR SHALL BE SIZED THE SAME AS PHASE COPPER CONDUCTOR.
4. THE CONTRACTOR SHALL INSTALL TWO 6\" STAND-OFF ALUMA-FORM TYPE 6-CSO-12 BRACKETS WITH TYPE STK STRAPS, THEY SHALL BE INSTALLED AND BONDED BY THE CONTRACTOR USING #6 AWG COPPER WIRE. SEE DWG. CM-28 FOR DETAILS ON INSTALLATION. NOTE: COPPER COMPRESSION TYPE CONNECTORS SHALL BE USED ONLY. (NTUA CAN PROVIDE A VENDOR LIST UPON REQUEST.)
5. THE CONTRACTOR SHALL INSTALL GALVANIZED RIGID OR INTERMEDIATE METALLIC CONDUIT RISER TO BE BONDED OR GROUNDED TO GROUNDING CONDUCTOR ON THE POLE ACCORDING TO NEC ARTICLE 250. (NOTE: COPPER COMPRESSION TYPE CONNECTORS SHALL BE USED ONLY). FURTHERMORE, THE 90° LONG SWEEP GRC ELBOW WITH 24\" RADIUS SHALL BE WRAPPED WITH 10 MIL INSULATING TAPE BY THE CONTRACTOR.
6. THE SIZING OF BOTH THE SECONDARY UNDERGROUND CONDUCTOR AND CONDUIT SHALL BE IN ACCORDANCE WITH THE CURRENT VERSION OF THE NATIONAL ELECTRICAL CODE (NEC).
7. THE CONTRACTOR SHALL TRENCH A MINIMUM OF 36\" DEPTH AND BACKFILL WITH A WARNING TAPE IN ACCORDANCE WITH NTUA. THE WARNING TAPE SHALL BE PLACED 12\" BELOW FINISHED GRADE.
8. FROM THE BOTTOM OF TRANSFORMER TO THE TOP OF WEATHERHEAD THERE SHALL BE AN 18\" TO 24\" CLEARANCE.
9. MAXIMUM SECONDARY RUN(S) FROM TRANSFORMER TO SERVICE ENTRANCE. EQUIPMENT SHALL BE 150 FEET FOR COMMERCIAL CUSTOMERS

OPTIONAL:
RESIDENTIAL CUSTOMERS
CAN INSTALL
DIRECT BURIED SECONDARY



DRAWN BY:
M. CHEROMIAH

APPROVED ENGINEERING:

APPROVED SAFETY:

APPROVED MANAGEMENT:

DATE:

9/23/14

DATE:

10/24/14

DATE:

10/29/14

DATE:

21 OCT 14

DWG TITLE:

SINGLE PHASE CUSTOMER OWNED SECONDARY

REVISIONS 1:

REVISIONS 2:

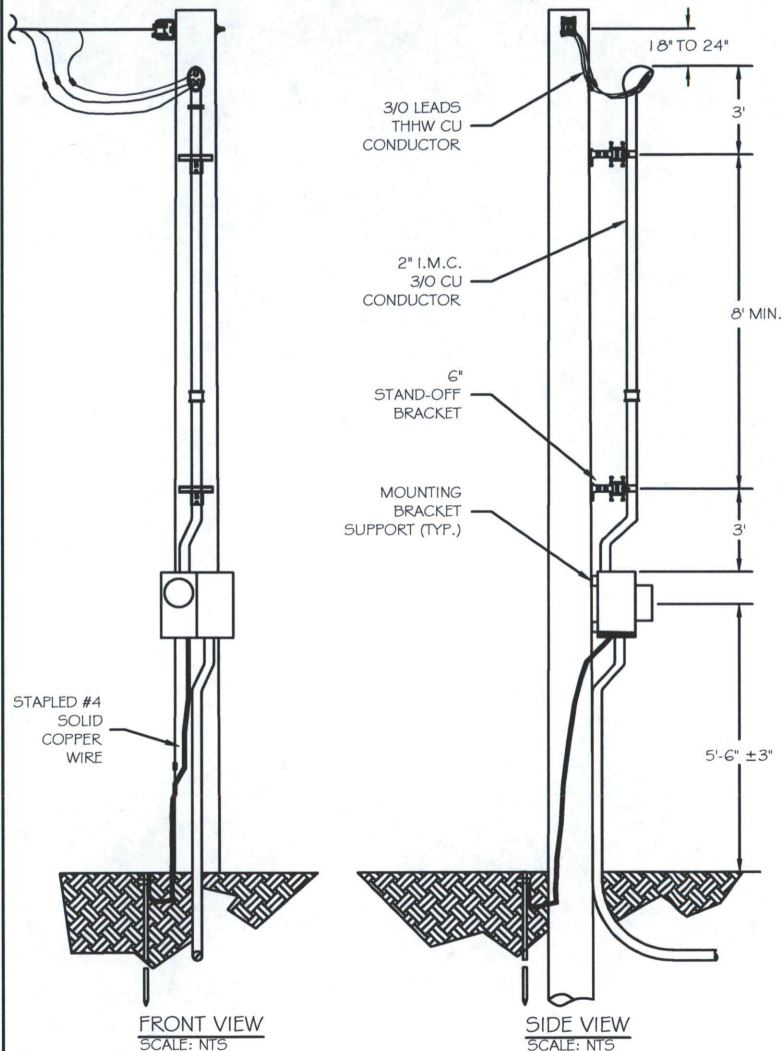
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CM-03A

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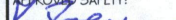
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NTUA 30-4 OR 30-5 WQC POLE REQUIRED

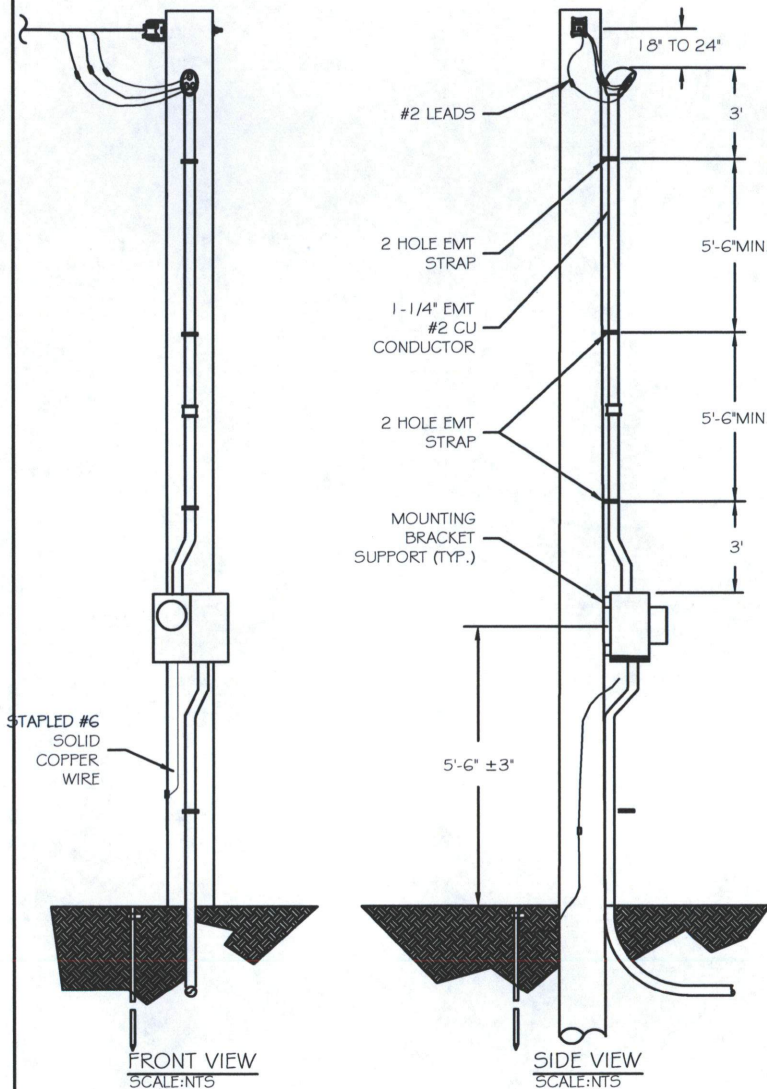


NOTES:

1. THE SERVICE CONDUCTORS AND NEUTRAL CONDUCTOR SHALL BE #3/0 COPPER. INSULATED CONDUCTORS AND CABLES USED WHERE EXPOSED TO DIRECT RAYS OF THE SUN SHALL BE OF A TYPE LISTED FOR SUNLIGHT RESISTANCE OR LISTED AND MARKED "SUNLIGHT RESISTANT." THE NEUTRAL CONDUCTOR SHALL BE IDENTIFIED BY WHITE ELECTRICAL TAPE.
2. LEADS SHALL EXTEND AT LEAST 18 INCHES FROM THE WEATHERHEAD. CONDUCTORS OTHER THAN SERVICE CONDUCTORS SHALL NOT BE INSTALLED IN THE SAME SERVICE RACEWAY OR SERVICE CABLE PER CURRENT NEC ARTICLE 230.7.
3. RISER SHALL BE OF APPROVED MATERIAL (NEC ARTICLES 342 AND 344). MINIMUM SIZE REQUIRED SHALL BE 2 INCHES. JOINT COUPLINGS SHALL BE PERMITTED BETWEEN SERVICE ENTRANCE WEATHERHEAD AND METER SOCKET.
4. METER SOCKET SHALL BE RAIN TIGHT AND SOCKET JAWS SHALL BE FREE OF FOREIGN MATERIAL (PAINT, PLASTER, ETC.). THE CENTER OF THE METER SOCKET MUST BE AT 5'-6" ($\pm 3"$) ABOVE FINAL GRADE. NEUTRAL CONDUCTOR SHALL BE CONTINUOUS THROUGH THE METER BASE TO THE MAIN DISCONNECT.
5. THE SERVICE DISCONNECTING MEANS SHALL BE INSTALLED OUTSIDE THE BUILDING AT A READILY ACCESSIBLE LOCATION NEAREST THE POINT OF ENTRANCE OF THE SERVICE CONDUCTORS (NEC ARTICLE 550.32(A) AND/OR 230.70(A)(1)).
6. THE BONDING OF THE NEUTRAL CONDUCTORS AND GROUNDING SYSTEM CONDUCTORS SHALL BE IN ACCORDANCE WITH CURRENT NEC ARTICLE 250.50. USE TABLE 250.102(C)(1) TO SIZE MBJ. USE TABLE 250.66 TO SIZE GROUNDING ELECTRODE CONDUCTOR. USE TABLE 250.122 FOR EQUIPMENT GROUNDING CONDUCTOR.
7. ALL METALLIC CONDUITS OR RACEWAYS CONNECTED TO THE SERVICE DISCONNECTION MEANS SHALL BE BONDED PER NEC ARTICLE 250.92.
8. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE SIZED #4 SOLID COPPER AND STAPLED EVERY 6" APART.
9. THE GROUNDING ELECTRODE SHALL BE INSTALLED IN ACCORDANCE WITH NEC ARTICLES 250.52. NTUA REQUIRES THE INSTALLATION OF A COPPER CLAD 5/8" X 8' GROUND ROD WITH A U.L. APPROVED GROUND ROD CLAMP ("ACORN").
10. THE CONTRACTOR SHALL INSTALL TWO 6" STAND-OFF ALUMA-FORM TYPE 6-CSO-12 BRACKETS WITH TYPE STK STRAPS. THEY SHALL BE INSTALLED AND BONDED BY THE CONTRACTOR USING #6 AWG COPPER WIRE. SEE DWG. CM-26 FOR DETAILS ON INSTALLATION. (VENDOR LIST PROVIDED BY NTUA UPON REQUEST.) NOTE: COPPER COMPRESSION TYPE CONNECTORS SHALL BE USED ONLY.
11. ALL EQUIPMENT AND MATERIALS SHALL BE RATED FOR 200 AMPS (AIC RATING SHALL BE REQUIRED).
12. ONE METERLOOP RISER SHALL BE PERMITTED PER SERVICE POLE.

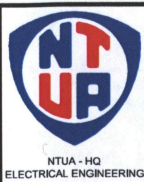
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|--|--|-------------------|--|--|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 | DWG TITLE: SERVICE ENTRANCE REQUIREMENTS - 200 AMPS | | DWG NUMBER: CM-04 |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | | PAGE: 10 |
| | APPROVED MANAGEMENT:  | DATE: 2/20/14 | REVISIONS 2: | | |

NTUA 30-4 OR 30-5 WQC POLE REQUIRED



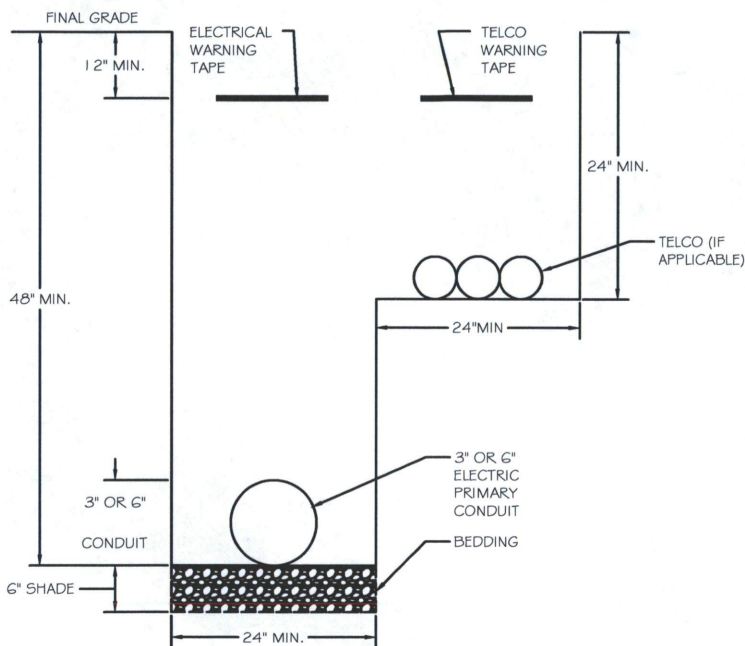
NOTES:

1. THE SERVICE CONDUCTORS AND NEUTRAL CONDUCTOR SHALL BE #2 COPPER INSULATED CONDUCTORS CABLES USED WHERE EXPOSED TO DIRECT RAYS OF THE SUN SHALL BE OF A TYPE LISTED FOR SUNLIGHT RESISTANCE OR LISTED AND MARKED "SUNLIGHT RESISTANT." THE NEUTRAL CONDUCTOR SHALL BE IDENTIFIED BY WHITE ELECTRICAL TAPE.
2. LEADS SHALL EXTEND AT LEAST 18 INCHES FROM THE WEATHERHEAD. CONDUCTORS OTHER THAN SERVICE CONDUCTORS SHALL NOT BE INSTALLED IN THE SAME SERVICE RACEWAY OR SERVICE CABLE PER CURRENT NEC ARTICLE 230.7.
3. RISER SHALL BE OF APPROVED MATERIAL (SEE NEC ARTICLES 342, 344, AND 358). MINIMUM SIZE REQUIRED SHALL BE 1-1/4 INCH. JOINT COUPLINGS SHALL BE PERMITTED BETWEEN SERVICE ENTRANCE WEATHERHEAD AND METER SOCKET.
4. METER SOCKET SHALL BE RAIN TIGHT AND SOCKET JAWS SHALL BE FREE OF FOREIGN MATERIAL (PAINT, PLASTER, ETC.). THE CENTER OF THE METER SOCKET MUST BE AT 5'-6" ($\pm 3"$) ABOVE FINAL GRADE. NEUTRAL CONDUCTOR SHALL BE CONTINUOUS THROUGH THE METER BASE TO THE MAIN DISCONNECT.
5. THE SERVICE DISCONNECTING MEANS SHALL BE INSTALLED OUTSIDE THE BUILDING AT A READILY ACCESSIBLE LOCATION NEAREST THE POINT OF ENTRANCE OF THE SERVICE CONDUCTORS (NEC ARTICLE 550.32(A) AND/OR 230.70(A)(1)).
6. THE BONDING OF THE NEUTRAL CONDUCTORS AND GROUNDING SYSTEM CONDUCTORS SHALL BE IN ACCORDANCE WITH CURRENT NEC ARTICLE 250.50. USE TABLE 250.02(C)(1) TO SIZE MBJ. USE TABLE 250.66 TO SIZE GROUNDING ELECTRODE CONDUCTOR. USE TABLE 250.122 FOR EQUIPMENT GROUNDING CONDUCTOR.
7. ALL METALLIC CONDUITS OR RACEWAYS CONNECTED TO THE SERVICE DISCONNECTION MEANS SHALL BE BONDED PER NEC ARTICLE 250.92.
8. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE SIZED #6 SOLID OR STRANDED COPPER AND STAPLED EVERY 6" APART.
9. THE GROUNDING ELECTRODE SHALL BE INSTALLED IN ACCORDANCE WITH NEC ARTICLE 250.52. NTUA REQUIRES THE INSTALLATION OF A COPPER CLAD 5/8" X 8' GROUND ROD WITH A U.L. APPROVED GROUND ROD CLAMP ("ACORN").
10. METERLOOP SHALL BE FASTENED SECURELY TO POLE WITH D40 NAILS OR 7/16" X 3" LONG LAG SCREWS. (WOOD DRYWALL SCREWS ARE NOT ACCEPTABLE.)
11. ALL EQUIPMENT AND MATERIALS SHALL BE RATED FOR 100 AMPS (AIC RATING SHALL BE REQUIRED).
12. ONE METERLOOP RISER SHALL BE PERMITTED PER SERVICE POLE.



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| DRAWN BY: | M.CHEROMIAH | DATE: | 9/23/14 |
| APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 |
| APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 |
| APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 2/20/14 |

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| DWG TITLE: | SERVICE ENTRANCE REQUIREMENTS - 100 AMPS | |
| REVISIONS 1: | | DWG NUMBER: |
| REVISIONS 2: | | CM-04A |
| | | PAGE: |
| | | 11 |



NOTES:

1. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM CONDUIT SHALL BE 48" FOR HIGH VOLTAGE CONDUCTOR (ABOVE 600 VOLTS).
2. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM OF CONDUIT SHALL BE 36" FOR LOW VOLTAGE CONDUCTOR (600 VOLTS AND BELOW).
3. THE BEDDING FOR CONDUIT IS 6" MIN. SHADE AND SHALL BE FREE OF DEBRIS, APPROVED BY AN NTUA INSPECTOR BEFORE BACKFILL AND SHALL BE COMPACTED AT 95% OR GREATER. TESTING SHALL BE SUBMITTED TO NTUA
4. SCHEDULE 80 PVC CONDUIT SHALL BE USED IN HIGH TRAFFIC AREAS AS SPECIFIED BY NTUA (I.E. PARKING LOTS, ROADS, ETC.)
5. HORIZONTAL SEPARATION SHALL BE 10 FT. MIN. BETWEEN ELECTRIC PRIMARY, GAS MAIN, SEWER MAIN, OR WATER MAIN
6. VERTICAL SEPARATION SHALL BE 1 FT. MIN. WHEN CROSSING ELECTRIC PRIMARY WITH OTHER UTILITIES. IF CLEARANCE CAN'T BE MET, INSTALL MINIMUM 4" OF CONCRETE SLURRY IN BETWEEN UTILITY CONDUITS
7. SHORING AND/OR SLOPING IS REQUIRED ON TRENCH DEPTHS GREATER THAN 48" AS REQUIRED BY THE NESC.
8. DIRECT BURIAL CAN BE ALLOWED IN RURAL RESIDENTIAL AREAS WITH PRIOR ENGINEERING APPROVAL (SEE CM-05C)
9. ALL TRENCHES MUST BE INSPECTED PRIOR TO BACKFILL



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| DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/06/14 |

DWG TITLE: PRIMARY DISTRIBUTION TRENCH DETAIL

REVISIONS 1:
REVISIONS 2:

DWG NUMBER:
CM-05
PAGE:
12

NOTES:

1. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM CONDUIT SHALL BE 48" FOR HIGH VOLTAGE CONDUCTOR (ABOVE 600 VOLTS).

2. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM OF CONDUIT SHALL BE 30" FOR LOW VOLTAGE CONDUCTOR (600 VOLTS AND BELOW), ONLY WHEN SHARING TRENCH WITH PRIMARY.

3. THE BEDDING FOR CONDUIT IS 6" MIN. SHADE AND SHALL BE FREE OF DEBRIS, APPROVED BY AN NTUA INSPECTOR BEFORE BACKFILL AND SHALL BE COMPACTED AT 95% OR GREATER. TESTING SHALL BE SUBMITTED BY NTUA

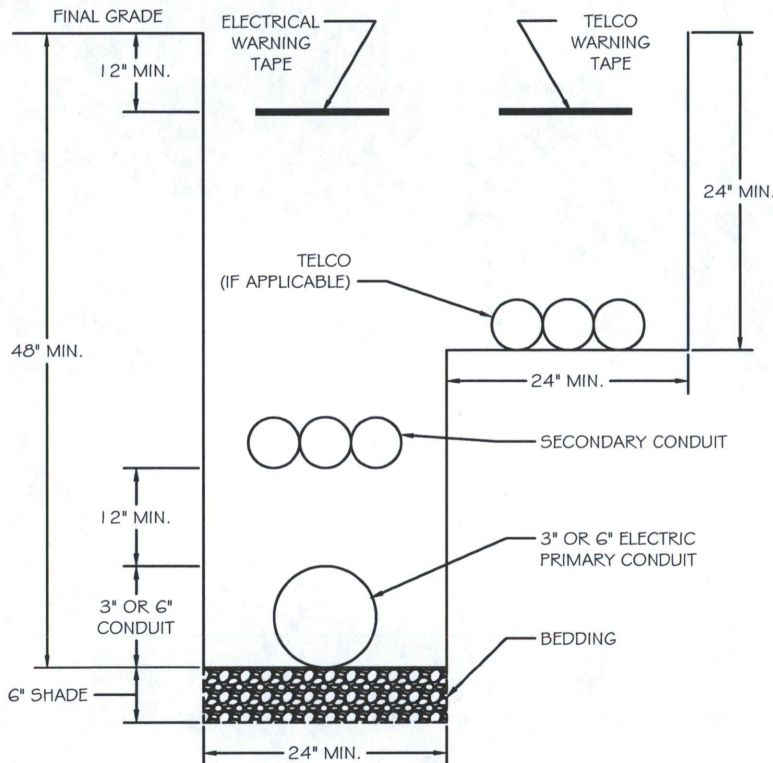
4. SCHEDULE 80 PVC CONDUIT SHALL BE USED IN HIGH TRAFFIC AREAS AS SPECIFIED BY NTUA (I.E. PARKING LOTS, ROADS, ETC.)


5. HORIZONTAL SEPARATION SHALL BE 10 FT. MIN. BETWEEN ELECTRIC PRIMARY, GAS MAIN, SEWER MAIN, OR WATER MAIN.

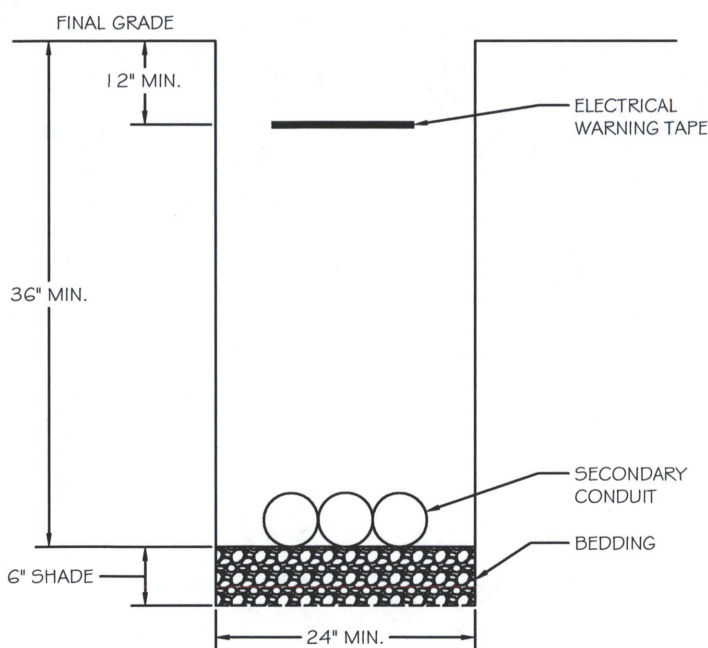
6. VERTICAL SEPARATION SHALL BE 1 FT. MIN. WHEN CROSSING ELECTRIC PRIMARY WITH OTHER UTILITIES. IF CLEARANCE CAN'T BE MET INSTALL MINIMUM 4" OF CONCRETE SLURRY IN BETWEEN UTILITY CONDUITS.

7. SHORING AND/OR SLOPING IS REQUIRED ON TRENCH DEPTHS GREATER THAN 48" AS REQUIRED BY THE NESC.

8. ALL TRENCHES MUST BE INSPECTED PRIOR TO BACKFILL



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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: SHARED PRIMARY AND SECONDARY TRENCH DETAIL | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | REVISIONS 1: | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 2: | |
| | APPROVED MANAGEMENT: | DATE: 29 OCT 14 | DWG NUMBER: CM-05A | |
| | | | PAGE: 13 | |



NOTES:

1. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM OF CONDUIT SHALL BE 36" FOR LOW VOLTAGE CONDUCTOR (600 VOLTS AND BELOW)

2. THE BEDDING FOR CONDUIT IS 6" MIN. SHADE AND SHALL BE FREE OF DEBRIS, APPROVED BY AN NTUA INSPECTOR BEFORE BACKFILL AND SHALL BE COMPACTED AT 95% OR GREATER. TESTING SHALL BE SUBMITTED TO NTUA


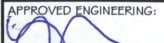
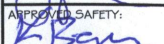
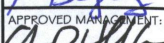
3. SCHEDULE 80 PVC CONDUIT SHALL BE USED IN HIGH TRAFFIC AREAS AS SPECIFIED BY NTUA (I.E. PARKING LOTS, ROADS, ETC.)

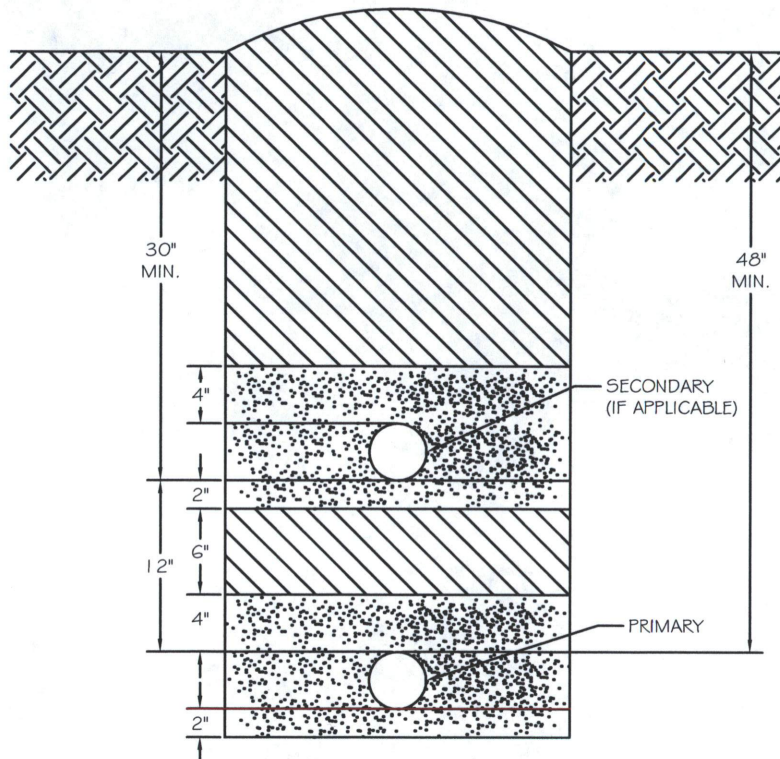
4. HORIZONTAL SEPARATION SHALL BE 10 FT. MIN. BETWEEN ELECTRIC PRIMARY, WATER MAIN, GAS MAIN, OR SEWER MAIN

5. VERTICAL SEPARATION SHALL BE 1 FT. MIN. WHEN CROSSING ELECTRIC PRIMARY WITH OTHER UTILITIES. IF CLEARANCE CAN'T BE MET INSTALL MINIMUM 4" OF CONCRETE SLURRY IN BETWEEN UTILITY CONDUITS

6. SHORING AND/OR SLOPING IS REQUIRED ON TRENCH DEPTHS GREATER THAN 48" AS REQUIRED BY THE NESC

7. ALL TRENCHES MUST BE INSPECTED PRIOR TO BACKFILL

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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: SECONDARY TRENCH DETAIL | |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-05B |
| | APPROVED MANAGEMENT:  | DATE: 11/06/14 | REVISIONS 2: | PAGE: 14 |



NOTES:

1. THE MINIMUM DEPTH FROM FINAL GRADE TO THE TOP OF THE CONDUCTOR SHALL BE 48" FOR HIGH VOLTAGE CONDUCTOR (ABOVE 600 VOLTS)

2. THE MINIMUM DEPTH FROM FINAL GRADE TO THE BOTTOM OF CONDUCTOR SHALL BE 30" FOR LOW VOLTAGE CONDUCTOR (600 VOLTS AND BELOW)

3. THE BEDDING FOR CONDUCTOR IS 2" AND SHALL BE FREE FROM DEBRIS, APPROVED BY AN NTUA INSPECTOR BEFORE BACKFILL AND SHALL BE COMPACTED TO 95% OR GREATER. TESTING SHALL BE SUBMITTED TO NTUA.

4. SCHEDULE 80 PVC CONDUIT SHALL BE USED IN HIGH TRAFFIC AREAS AS SPECIFIED BY NTUA (I.E. PARKING LOTS, ROADS, ETC.)


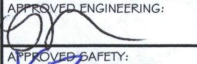
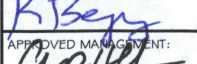
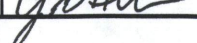
5. HORIZONTAL SEPARATION SHALL BE 10' MIN. BETWEEN ELECTRIC PRIMARY, WATER MAIN, SEWER MAIN, OR GAS MAIN.

6. VERTICAL SEPARATION SHALL BE 1 FT MIN WHEN CROSSING ELECTRIC PRIMARY WITH OTHER UTILITIES.

7. SHORING AND/OR SLOPING IS REQUIRED ON TRENCH DEPTHS GREATER THAN 48" AS REQUIRED BY THE NESC.

8. FOR USE ONLY IN RURAL RESIDENTIAL AREAS WITH HQ-ENGINEERING APPROVAL

9. MIN. 95% COMPACTION REQUIRED

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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: DIRECT BURIED RESIDENTIAL PRIMARY DISTRIBUTION TRENCH DETAIL | |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-05C |
| | APPROVED MANAGEMENT:  | DATE: 11/02/14 | REVISIONS 2: | PAGE: 15 |

CM-09
CM-10
CM-12
CM-29

CM-08
CM-10

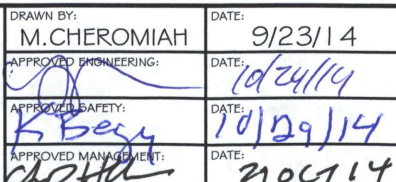
Diagram illustrating the installation of a cable tray system, showing a cross-section and a plan view.

Cross-Section View:

- The cable tray is shown with a depth of 48" MIN.
- The tray is supported by a structure with a 6" MIN. clearance from the ground.
- The tray is labeled "PRIMARY CABLE" and "GROUND BUSHING".
- The ground is labeled "GROUND SLEEVE" and "POLYKEN TAPE".
- The distance between the tray and the ground is 36".
- The tray is labeled "4" and "5".

Plan View:


- The cable tray is shown with a width of 12" MIN.
- The tray is labeled "PRIMARY CABLE" and "GROUND BUSHING".
- The ground is labeled "GROUND SLEEVE" and "POLYKEN TAPE".
- The distance between the tray and the ground is 20' MIN.
- The tray is labeled "4" and "5".
- The plan view also shows a "MAIN BREAKER AND DISCONNECT SECTION" and a "BRANCH CIRCUIT SECTION".



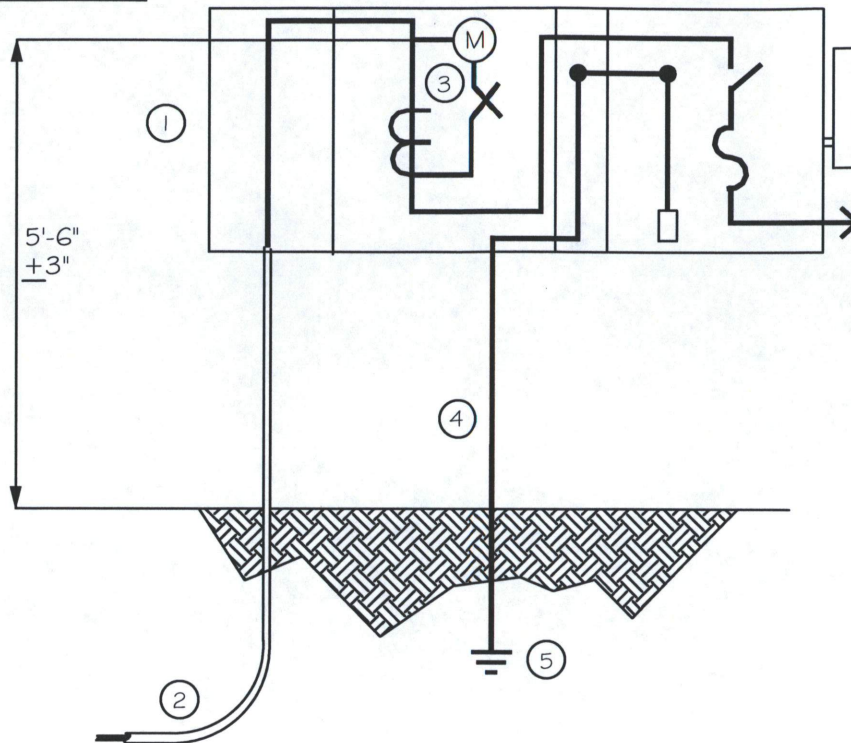
PAGE: 16

NOTES:

1. NTUA SHALL PROVIDE AND INSTALL THE FOLLOWING ITEMS:
 - A. PADMOUNTED TRANSFORMER
 - B. PRIMARY VOLTAGE CABLE WITH ELBOWS
 - C. CTs WITH WIRING
 - D. METER
 - E. TEST SWITCHES
 - F. CONNECTORS, TERMINATION ON TRANSFORMER SIDE.
INCLUDING SECONDARY TERMINALS
 - G. ARRESTERS AND PARKING STANDS
2. THE CONTRACTOR SHALL PROVIDE AND INSTALL THE FOLLOWING ITEMS:
 - A. SECONDARY CABLE, TERMINATION ON SWITCHGEAR. INCLUDING HYLUGS, NOLUX, AND BONDING BUSHINGS
 - B. MAIN DISCONNECT THAT IS APPROVED AND ACCEPTABLE BY NTUA.
3. SERVICE LATERAL TO MAIN DISCONNECT SHALL BE SIZED AND PROTECTED ACCORDING TO TABLE 310.15(B)(6). ALL CONDUCTORS SHALL BE COPPER.
4. GRC SHALL BE BONDED AT BOTH ENDS TO GROUNDING CONDUCTOR ACCORDING TO TABLE 250.122.
5. SUPPLEMENTAL GROUNDING ELECTRODE SHALL BE 5/8" X 8' MINIMUM COPPER CLAD GROUND ROD.
6. NO REDUCED NEUTRALS ON THE SECONDARY SIDE.
7. PRIMARY CABLE PHASE DESIGNATED COLORS:
 - A PHASE-RED
 - B PHASE-WHITE
 - C PHASE-BLUE
8. SECONDARY CABLE PHASING TO BE IDENTIFIED BY CONTRACTOR AND PROVIDE PHASING IDENTIFICATION TO NTUA.
9. DISTANCE BETWEEN TRANSFORMER AND SWITCHGEAR CAN BE REDUCED TO 10' MINIMUM WITH HQ-ENGINEERING APPROVAL
10. CONCRETE PADS FOR TRANSFORMER SHALL NOT BE SHARED WITH OTHER EQUIPMENT
11. METER CANNOT BE INSTALLED ON TRANSFORMER


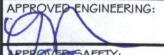
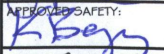

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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: THREE PHASE CT METERING PAD MOUNT TRANSFORMER NOTES | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-06A |
| | APPROVED MANAGEMENT: | DATE: 11/06/14 | REVISIONS 2: | PAGE: 17 |

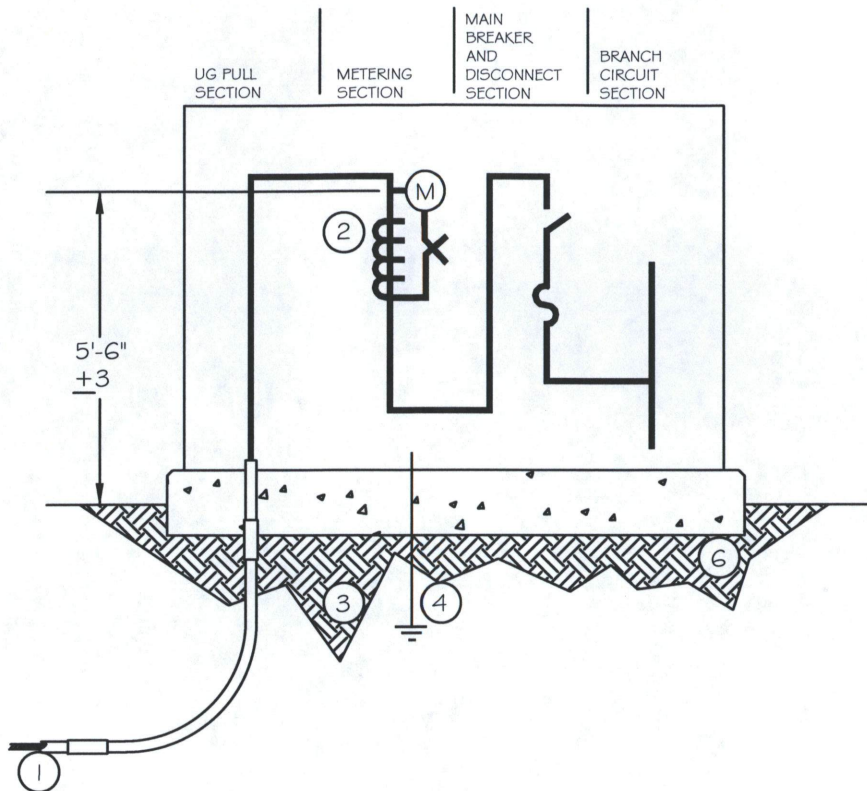
WALL MOUNTED PANEL



NOTES:


1. CUT SHEETS FOR METER CANS SHALL BE SUBMITTED FOR NTUA APPROVAL PRIOR TO PURCHASE.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SECONDARY UNDERGROUND SERVICE LINES.
3. METER TEST SWITCHES, METER WIRING AND CURRENT TRANSFORMERS SHALL BE INSTALLED BY NTUA ACCORDING TO NTUA METER STANDARDS.
4. COPPER GROUNDING ELECTRODE CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH NEC TABLE 250.66. IF GROUNDING ELECTRODE IS PROTECTED BY A METALLIC CONDUIT, BOTH ENDS MUST BE BONDED IN ACCORDANCE WITH NEC ARTICLE 250.64(E)(1). PVC IS ACCEPTABLE MEANS OF PROTECTION
5. SUPPLEMENTAL GROUNDING ELECTRODE SHALL BE A MINIMUM OF 5/8" X 8' COPPER CLAD GROUND ROD OR OTHER NTUA APPROVED REQUIREMENTS (MUST BE APPROVED BY NTUA AND INSPECTED PRIOR TO INSTALL). CONNECTOR FOR GROUNDING CONDUCTOR AND GROUNDING ELECTRODE SHALL BE U.L. APPROVED FOR THIS APPLICATION.
6. ALL EQUIPMENT AND MATERIALS SHALL BE RATED AT CORRECT AMPERAGE (AIC RATING SHALL BE REQUIRED).
7. MAIN DISCONNECT SWITCH AND CONDUCTORS SHALL BE INSTALLED AND TERMINATED BY CONTRACTOR PRIOR TO METER INSTALLATION.
8. THE CONTRACTOR SHALL PROPERLY GROUND NEUTRAL AND INSTALL BONDING JUMPER.
9. SINGLE PHASE 400 AMP SERVICE CAN HAVE A CLASS 320 METER INSTALLED IF NO LOAD CALCULATIONS ARE SUBMITTED
10. MINIMUM OF 36" CLEAR WORKING SPACE SHALL BE PROVIDED ON EITHER SIDE OF SES.

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|  <p>NTUA - HQ ELECTRICAL ENGINEERING</p> | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: 3Ø SES FOR 400-600 AMP SERVICE | | DWG NUMBER: CM-07 |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | | PAGE: 18 |
| | APPROVED MANAGEMENT:  | DATE: 11/06/14 | REVISIONS 2: | | |

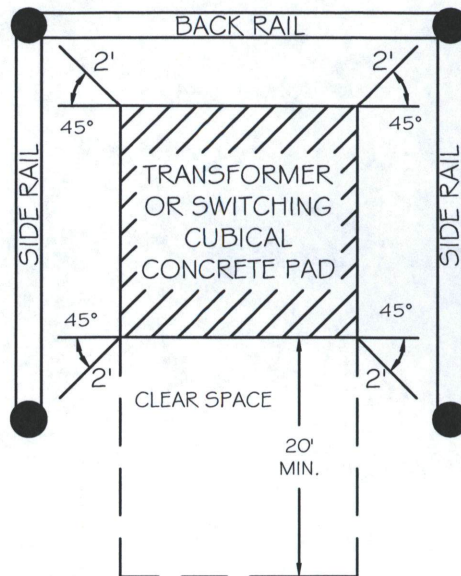


NOTES:

1. CUTSHEETS FOR METER CANS SHALL BE SUBMITTED FOR NTUA APPROVAL PRIOR TO PURCHASE
2. THE CONTRACTOR SHALL FURNISH, INSTALL, AND TERMINATE ALL SECONDARY UNDERGROUND SERVICE LINES
3. METER TEST SWITCHES, METER WIRING AND CURRENT TRANSFORMERS (CTs) SHALL BE INSTALLED BY NTUA ACCORDING TO NTUA METERING SPECIFICATIONS.
4. COPPER GROUNDING ELECTRODE CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH NEC TABLE 250.66. IF GROUNDING ELECTRODE IS PROTECTED BY A METALLIC CONDUIT, BOTH ENDS MUST BE BONDED IN ACCORDANCE WITH CURRENT NEC ARTICLE 250.64(E)(1).
5. SUPPLEMENTAL GROUNDING ELECTRODE SHALL BE A MINIMUM OF 5/8" X 8' COPPER CLAD GROUND ROD OR OTHER NTUA APPROVED REQUIREMENTS (MUST BE APPROVED BY NTUA AND INSPECTED PRIOR TO INSTALL). CONNECTOR FOR GROUNDING CONDUCTOR AND GROUNDING ELECTRODE SHALL BE EXOTHERMIC WELD (e.g. CADWELD) U.L. APPROVED FOR THIS APPLICATION.
6. ALL EQUIPMENT AND MATERIALS RATED FOR 800 TO 1200 AMPS SHALL HAVE AN AIC RATING OF 22,000 AND 30,000 FOR 2000 AMPS
7. 95% COMPACTION REQUIRED. CONTRACTOR SHALL SUBMIT TEST RESULTS TO NTUA.
8. MAIN DISCONNECT SWITCH AND CONDUCTORS SHALL BE INSTALLED AND TERMINATED BY CONTRACTOR PRIOR TO METER INSTALLATION.
9. THE CONTRACTOR SHALL PROPERLY GROUND NEUTRAL AND INSTALL MAIN BONDING JUMPER.
10. MINIMUM 36" OF CLEAR WORKING SPACE SHALL BE PROVIDED ON EITHER SIDE OF SES

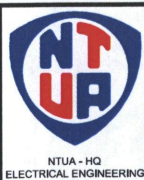
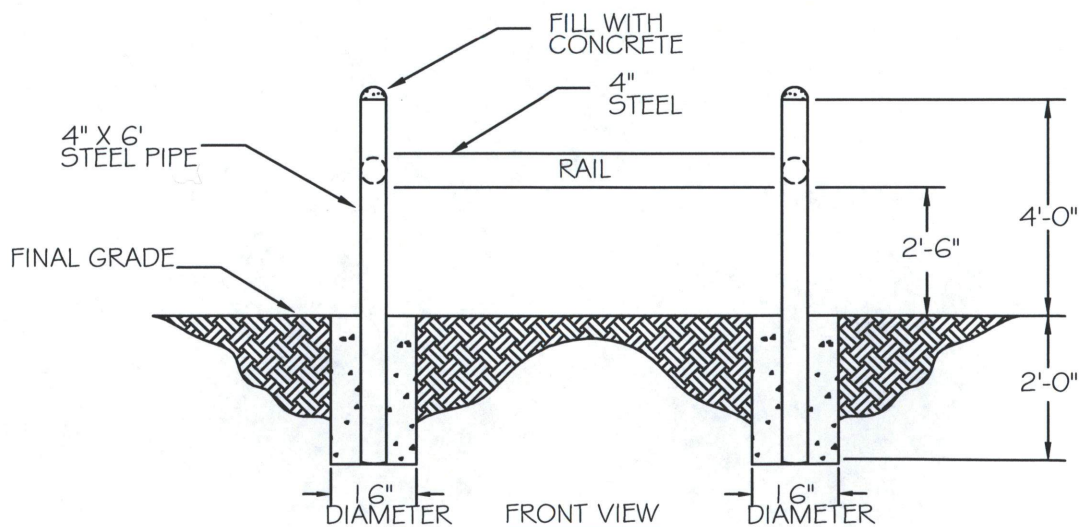
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|--|---------------------------|--------------------|---|--|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: 3Ø SES FOR 800-2000 AMP SERVICE | | DWG NUMBER: CM-08 |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | | PAGE: 19 |
| | APPROVED MANAGEMENT: | DATE: 29 OCT 14 | REVISIONS 2: | | |

TOP VIEW



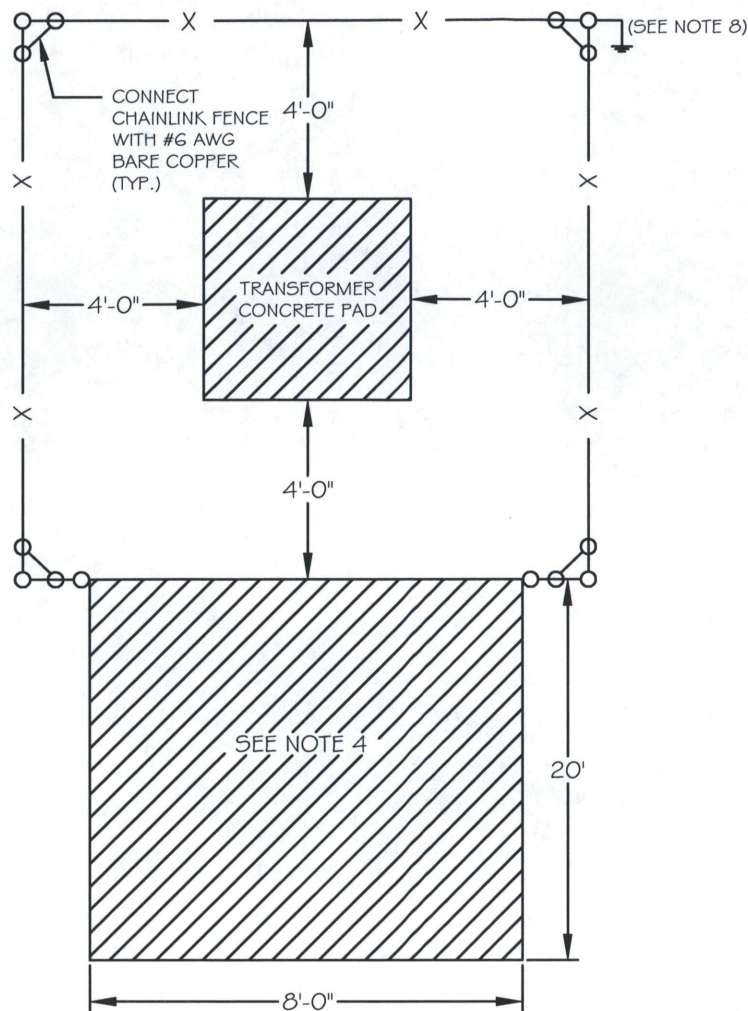
NOTES:

1. BOLLARDS SHALL BE REQUIRED IN ALL AREAS WITH VEHICLE TRAFFIC UNLESS OTHERWISE SPECIFIED.
2. THE CONTRACTOR SHALL INSTALL BOLLARDS 2'-0" AWAY FROM CORNER OF EQUIPMENT PAD AT A 45° ANGLE.
3. THE CONTRACTOR SHALL FILL VERTICAL PIPES WITH CONCRETE.
4. THE CONTRACTOR SHALL PAINT BOLLARDS YELLOW.
5. NTUA SHALL APPROVE AND INSPECT PRIOR TO ACCEPTING PROJECT




| | | | |
|-----------------------|--------------------|-------|----------|
| DRAWN BY: | M. CHEROMIAH | DATE: | 9/23/14 |
| APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 |
| APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 |
| APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 11/06/14 |

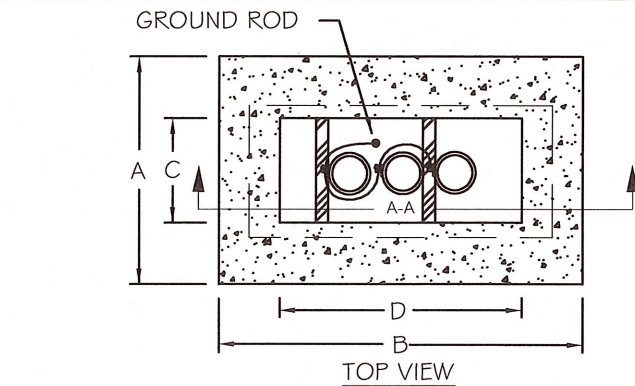
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|--------------|-------------------------------------|--|-------------|-------|
| DWG TITLE: | ELECTRICAL EQUIPMENT BARRIER DETAIL | | DWG NUMBER: | CM-09 |
| REVISIONS 1: | | | PAGE: | 20 |
| REVISIONS 2: | | | | |



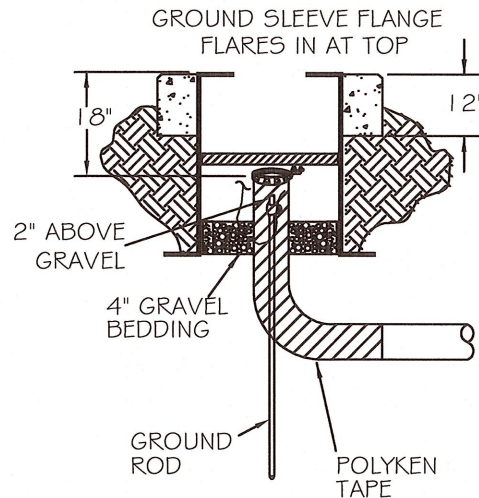
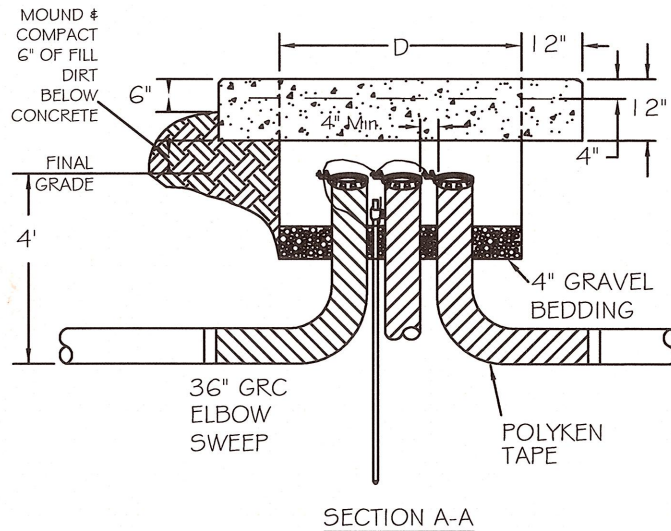
NOTES:

1. THE CONTRACTOR SHALL INSTALL CLASS 2 CHAIN LINK FENCE UNLESS OTHERWISE SPECIFIED. FENCE SHALL BE AT LEAST 7 FT TALL WITH A DANGER SIGN ON ALL FOUR SIDES
2. THE FENCING SHALL BE OFFSET 4'-0" PARALLEL FROM THE ELECTRICAL EQUIPMENT CONCRETE PAD.
3. AN 8 FT. WIDE ENTRANCE GATE SHALL BE INSTALLED AND CENTERED IN FRONT OF THE ELECTRICAL EQUIPMENT DOORS.
4. THERE SHALL BE NO OBSTRUCTIONS 20 FT. IN FRONT OF THE ELECTRICAL EQUIPMENT GATE.
5. FENCE SHALL BE REQUIRED AT FREESTANDING SES WHEN INSTALLED IN AN AREA OF EASY PUBLIC ACCESS
6. NO SECONDARY ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN THE SAME FENCE.
7. SPECIAL PAD MOUNT PRIMARY EQUIPMENT (i.e. SWITCHGEAR) SHALL HAVE FENCE INSTALLED IN SIMILAR FASHION.
8. DRIVE 5/8" X 8' COPPER CLAD GROUND ROD AT ONE CORNER OF FENCE AND BOND ALL SIDES WITH MINIMUM #6 AWG BARE COPPER WIRE.
9. LOCATION OF TRANSFORMER MUST BE APPROVED BY NTUA HQ-ENGINEERING
10. CONTRACTOR MAY INSTALL CONCRETE ENCLOSURE IN LIEU OF CHAINLINK FENCE. DESIGN SHALL BE SUBMITTED TO NTUA HQ-ENGINEERING FOR APPROVAL PRIOR TO INSTALLATION.

| | | | | | |
|--|--------------------------|-------------------|---|--|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 | DWG TITLE: ELECTRICAL EQUIPMENT FENCING DETAIL | | DWG NUMBER: CM-10 |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | | |
| | APPROVED MANAGEMENT: | DATE: 2/20/14 | REVISIONS 2: | | PAGE: 21 |

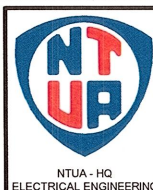


| DIMENSION | A | B | C | D |
|-----------|-----|-----|-----|-----|
| 1-PHASE | 47" | 54" | 23" | 30" |
| 3-PHASE | 46" | 84" | 18" | 60" |



NOTES:

- THE CONTRACTOR SHALL ASSEMBLE AND INSTALL CUBICLE PAD INCLUDING:
 - ASSEMBLING GROUND SLEEVE
 - GROUND PREPARATION (TRENCHING, REBAR FABRICATION, FORMS)
 - FORMS SHALL BE PLUMB AND LEVEL WITH GROUND SLEEVE.
 - COMPACTION TO 95% OR GREATER. TEST RESULTS SHALL BE SUBMITTED TO NTUA.
 - (2) 2" X 4" LUMBER TO REINFORCE GROUND SLEEVE DURING POURING.
 - GRAVEL BEDDING AND DRAINAGE
 - (1) 5/8" X 8' COPPERCLAD GROUND ROD.
 - PAD MUST BE LEVEL
- ELECTRICAL EQUIPMENT PAD SHALL HAVE A CONCRETE MIXTURE OF 1:2:4. MINIMUM DESIGN STRENGTH OF 3000 PSI. (NOTE: THE CONCRETE MUST BE PROPERLY INSULATED DURING COLD WEATHER FOR SUFFICIENT CURING). TEST RESULTS SHALL BE SUBMITTED TO NTUA PRIOR TO INSTALLING CUBICLE
- #4 REBAR SHALL BE INSTALLED NO CLOSER THAN 3" FROM OUTSIDE EDGE OF PAD, 4" BELOW TOP OF CONCRETE AND 6" ON CENTER.
- NTUA SHALL INSTALL, MOUNT AND SECURE THE SWITCHING CUBICLE CABINET. CAULKING SHALL BE INSTALLED AROUND THE BASE OF THE CUBICLE
- INSTALL A STANDARD 36" RADIUS 90 DEGREE GRC LONG SWEEP ELBOW
- PREFABRICATED BOX CAN BE INSTALLED FOR SINGLE PHASE APPLICATIONS. NTUA HQ-ENGINEERING SHALL APPROVE PRIOR TO PURCHASE
- NTUA SHALL INSPECT AND APPROVE CONCRETE FORM AND REBAR PRIOR TO POURING



DRAWN BY:
M. CHEROMIAH

APPROVED ENGINEERING:
[Signature]

APPROVED SAFETY:
[Signature]

APPROVED MANAGEMENT:
[Signature]

DATE:
9/23/14

DATE:
12/10/2014

DATE:
12/16/2014

DATE:
12/16/14

DWG TITLE:

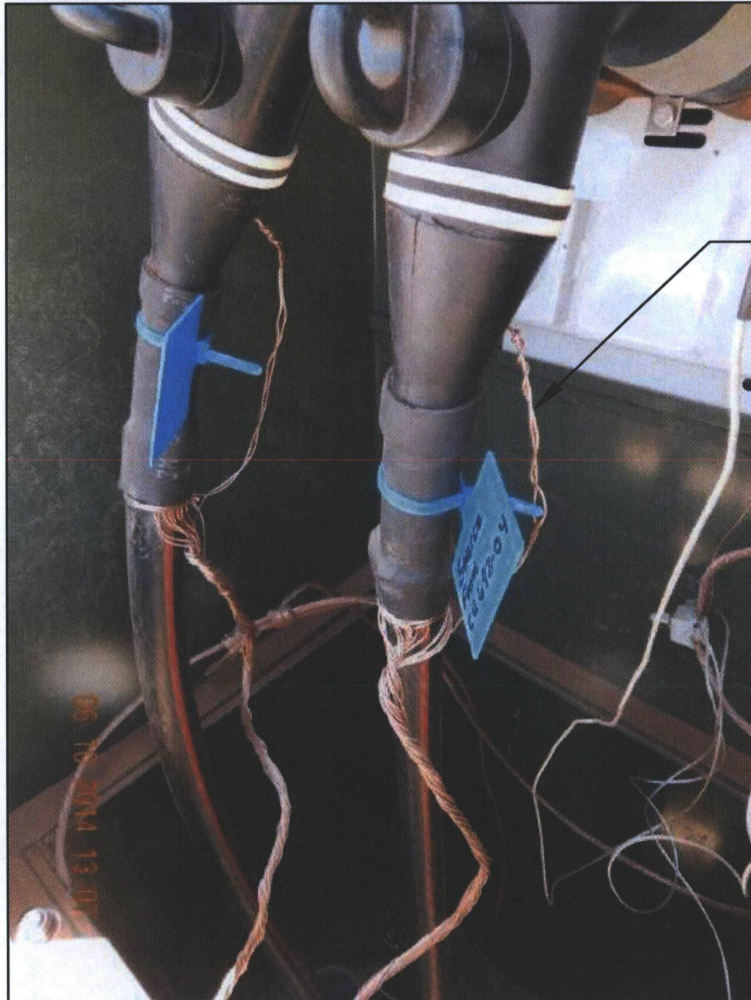
SWITCHING CUBICLE PAD DETAIL

REVISIONS 1:
CORRECTED DIMENSION 'C' FROM 12" TO 23"

REVISIONS 2:

DWG NUMBER:
CM-111

PAGE:
22



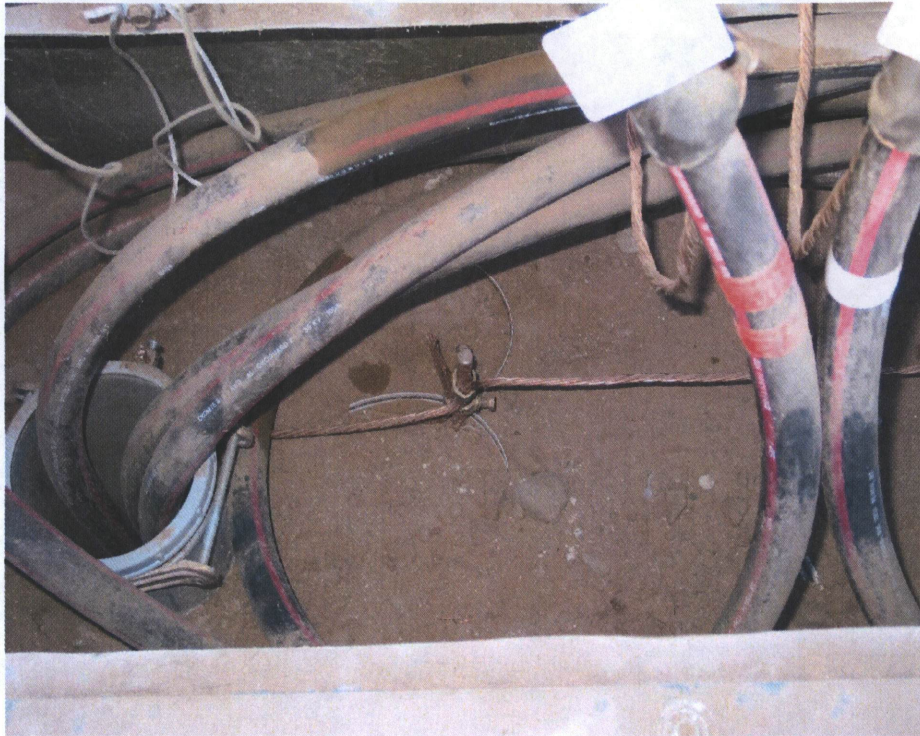
BLEEDER
WIRE SHALL
BE
BROUGHT
BACK TO
CONCENTRIC
NEUTRALS




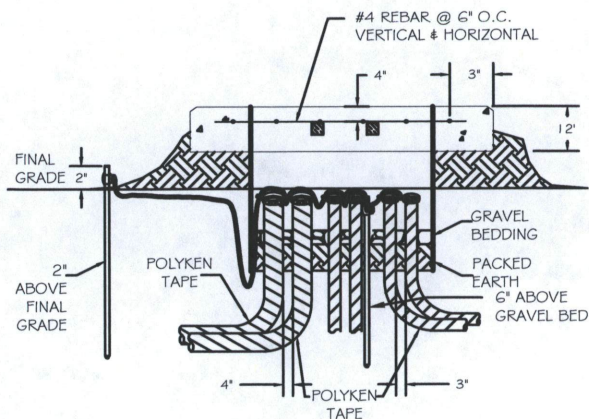
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|---|-------------------|
| DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/06/14 |

| |
|---|
| DWG TITLE: SWITCHING CUBICAL PAD GROUNDING |
| REVISIONS 1: |
| REVISIONS 2: |

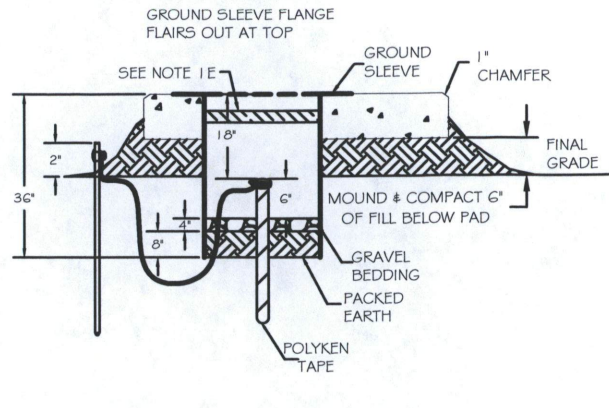
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|-----------------------|
| DWG NUMBER: CM-11A |
| PAGE: 23 |



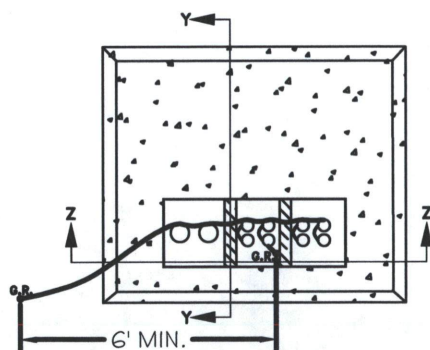
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|--|-----------------------|--------------------|-------|----------|--------------|--|------------------------------|--------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | M. CHEROMIAH | DATE: | 9/23/14 | DWG TITLE: | | SWITCHING CUBICAL PAD DETAIL | |
| | APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 | | | | |
| | APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 | REVISIONS 1: | | DWG NUMBER: | CM-11B |
| | APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 29 09 17 | REVISIONS 2: | | PAGE: | 24 |



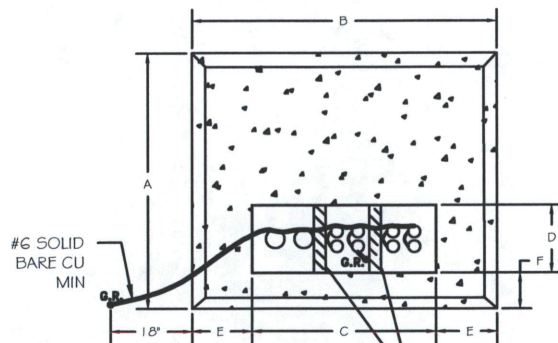
SECTION Z-Z



SECTION Y-Y



TOP VIEW



TOP VIEW SEE NOTE 1 E

| DIMENSION (INCHES) | A | B | C | D | E | F | G (PSI) |
|-----------------------|------------------------|----|----|----|----|----|---------|
| 1-PHASE 25-167KVA | 66 | 52 | 30 | 12 | 11 | 16 | 3000 |
| 3-PHASE 75--300KVA | 74 | 80 | 48 | 18 | 16 | 15 | 4000 |
| 3-PHASE 500-750KVA | 86 | 80 | 60 | 18 | 10 | 15 | 4000 |
| 3-PHASE 1000KVA | 102 | 92 | 60 | 18 | 16 | 18 | 4000 |
| 3-PHASE > 1000KVA | CONSULT HQ-ENGINEERING | | | | | | |

NOTE: DIMENSIONS ARE 125KV BIL RATING



DRAWN BY: M.CHEROMIAH
 DATE: 9/23/14
 APPROVED ENGINEERING: [Signature]
 DATE: 10/24/14
 APPROVED SAFETY: [Signature]
 DATE: 10/29/14
 APPROVED MANAGEMENT: [Signature]
 DATE: 2/20/14


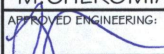


DWG TITLE: TRANSFORMER PAD DETAIL

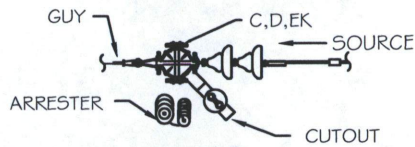
REVISIONS 1:
 REVISIONS 2:

DWG NUMBER: CM-12
 PAGE: 25

NOTES:

1. THE CONTRACTOR SHALL ASSEMBLE AND INSTALL TRANSFORMER PAD INCLUDING:
 - A. ASSEMBLING GROUND SLEEVE
 - B. GROUND PREPARATION (TRENCHING, REBAR FABRICATION, FORMS)
 - C. FORMS SHALL BE PLUMB AND LEVEL WITH GROUND SLEEVE
 - D. TESTING COMPACTION 95% TO 98%. SUBMIT TEST RESULTS TO HQ-ENGINEERING PRIOR TO PLACEMENT
 - E. (2)2" X 4" LUMBER TO REINFORCE GROUND SLEEVE DURING CONCRETE POURING
 - F. 4" GRAVEL BEDDING AND DRAINAGE
 - G. (2) 5/8"x8' COPPER CLAD GROUND RODS
2. TRANSFORMER PAD SHALL HAVE A CONCRETE MIXTURE OF 1:2:4. THE CONCRETE MUST BE PROPERLY INSULATED DURING COLD WEATHER FOR SUFFICIENT CURING. STRENGTH TESTING SHALL BE SUBMITTED PRIOR TO PLACING TRANSFORMER (SEE TABLE COLUMN "G").
3. #4 REBAR SHALL BE INSTALLED NO CLOSER THAN 3" FROM OUTSIDE EDGE OF PAD, 4" BELOW TOP OF CONCRETE PAD AND 6" ON CENTER.
4. FOR GROUND LOOP REFER TO CM-29 (3Ø) OR CM-28 (1Ø)
5. CONTRACTOR SHALL CONTACT NTUA FOR INSPECTION BEFORE POURING CONCRETE.
6. INSTALL A 36" RADIUS 90DEG. LONG SWEEP GRC ELBOW FOR THE PRIMARY CABLE. INSTALL A 24" RADIUS 90DEG. LONG SWEEP GRC ELBOW FOR THE SECONDARY CABLES.
7. NTUA SHALL ENSURE THAT GROUND SLEEVE WILL PROVIDE SUFFICIENT CABLE WORKING SPACE.

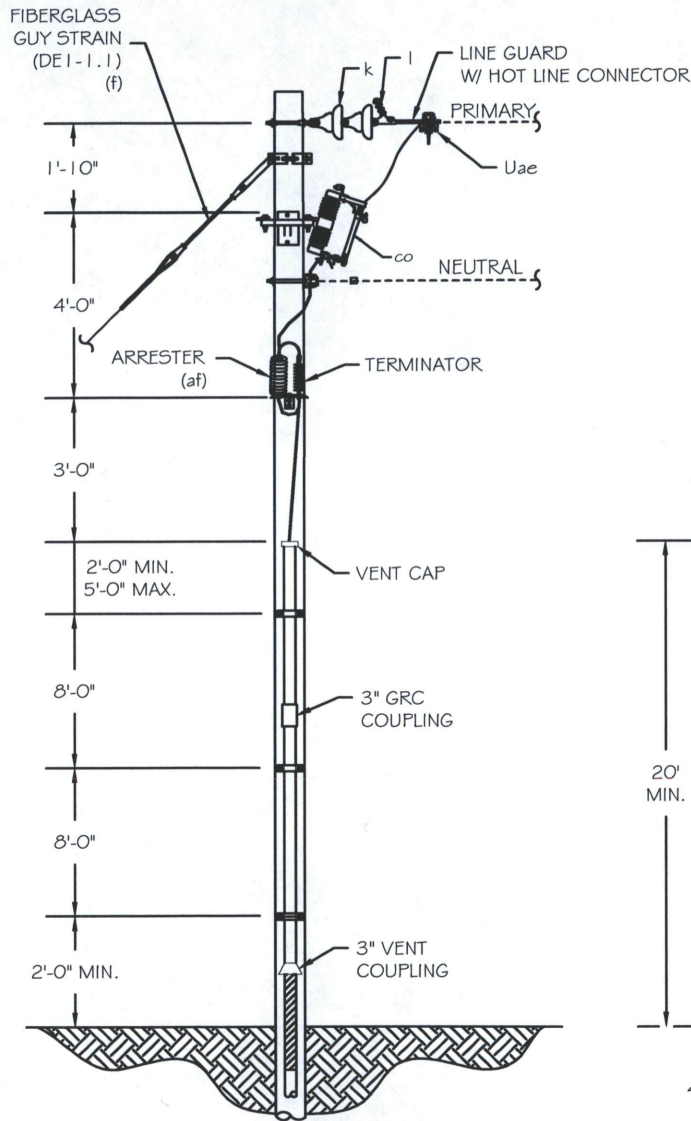
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|--|--|-------------------|---|-----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: TRANSFORMER PAD NOTES | |
| | APPROVED ENGINEERING:  | DATE: 10/24/14 | | |
| | APPROVED SAFETY:  | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-12A |
| | APPROVED MANAGEMENT:  | DATE: 11.07.14 | REVISIONS 2: | PAGE: 26 |



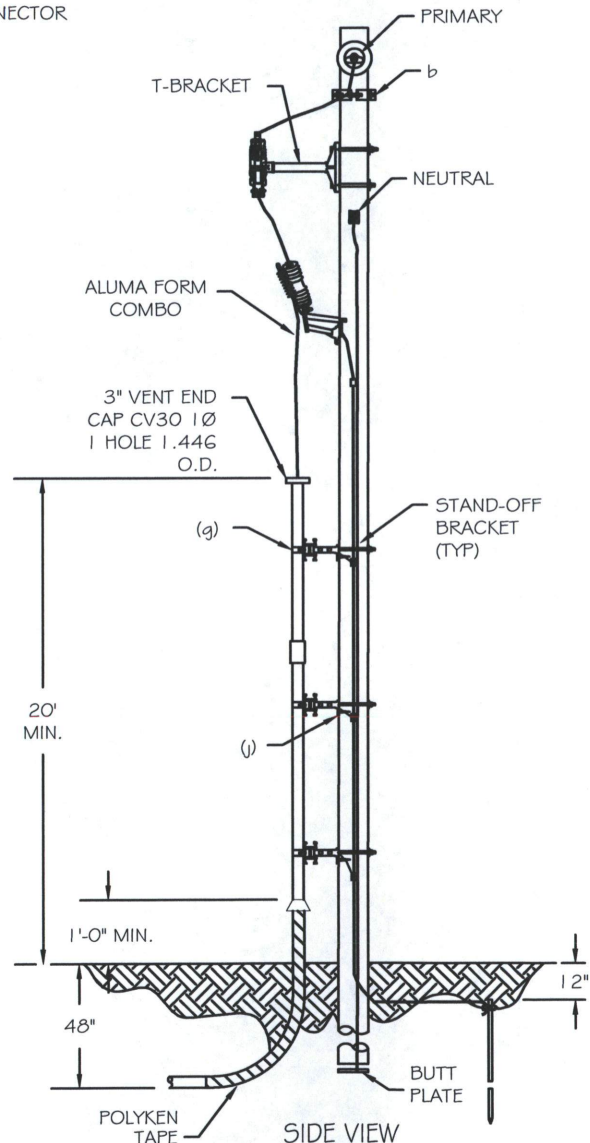
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BEND.
2. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3 FEET.

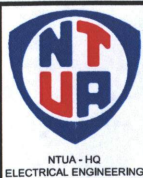
TOP VIEW
SCALE:NTS



FRONT VIEW
SCALE:NTS



SIDE VIEW
SCALE:NTS




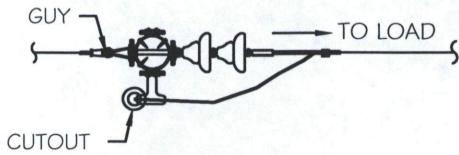
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| DRAWN BY: | M.CHEROMIAH | DATE: | 9/23/14 |
| APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 |
| APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 |
| APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 21 OCT 14 |

| | |
|--------------|------------------------------------|
| DWG TITLE: | UM2-4XS SOURCE RISER POLE DEAD-END |
| REVISIONS 1: | |
| REVISIONS 2: | |

| | |
|-------------|-------|
| DWG NUMBER: | CM-13 |
| PAGE: | 27 |

| STOCK NUMBER | ITEM | MATERIAL | QTY. |
|-----------------|------|---|------|
| 10125 | c | BOLT, MACHINE, 5/8" X 12" WITH NUT | 4 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 9 |
| 11342 | g | STRAP 3" SIZE STAND-OFF BRACKET | 3 |
| 10273 | i | CAP VENT SUPPORT 1/0 URD 3" IMC. 345 MIL. | 1 |
| 10508 | ak | CUTOUT FUSE 15/26 kV 100 AMP DIST. | 1 |
| 11395 | | POLYKEN TAPE | 1 |
| 10192 | aa | ALUMA FORM | 3 |
| 10488 | | CRIMPIT 1/0 ACSR - #4ACSR | 4 |
| 10045 | af | ARRESTER RISER SENTRY URD 18kV | 1 |
| 11445 | | TERMINATOR 1/0 URD 25kV FOR .345 MIL. | 1 |
| 11276 | j | SCREW LAG-FETTER 1/2" X 4" | 3 |
| 11596 | | WASHER, ROUND, 5/8" | 6 |
| 10946 | | LOCKNUT, 5/8" | 6 |
| 10468 | | COUPLING VENTILATOR URD 3" RIGID | 1 |
| 11446 | | TERMINATOR ALUMINUM BRACKET CAT#CCS8.... | 1 |
| 12691 | | BRACKET SINGLE PHASE FOR ARRESTERS | 1 |
| 11446 | | BRACKET TERMINATOR "L" CAT# CCS 820 | 1 |
| 11616 | | WIRE #2 THHN STANDED COPPER - RED | 25' |
| 10392 | Uae | HOTLINE CONNECTOR | 1 |

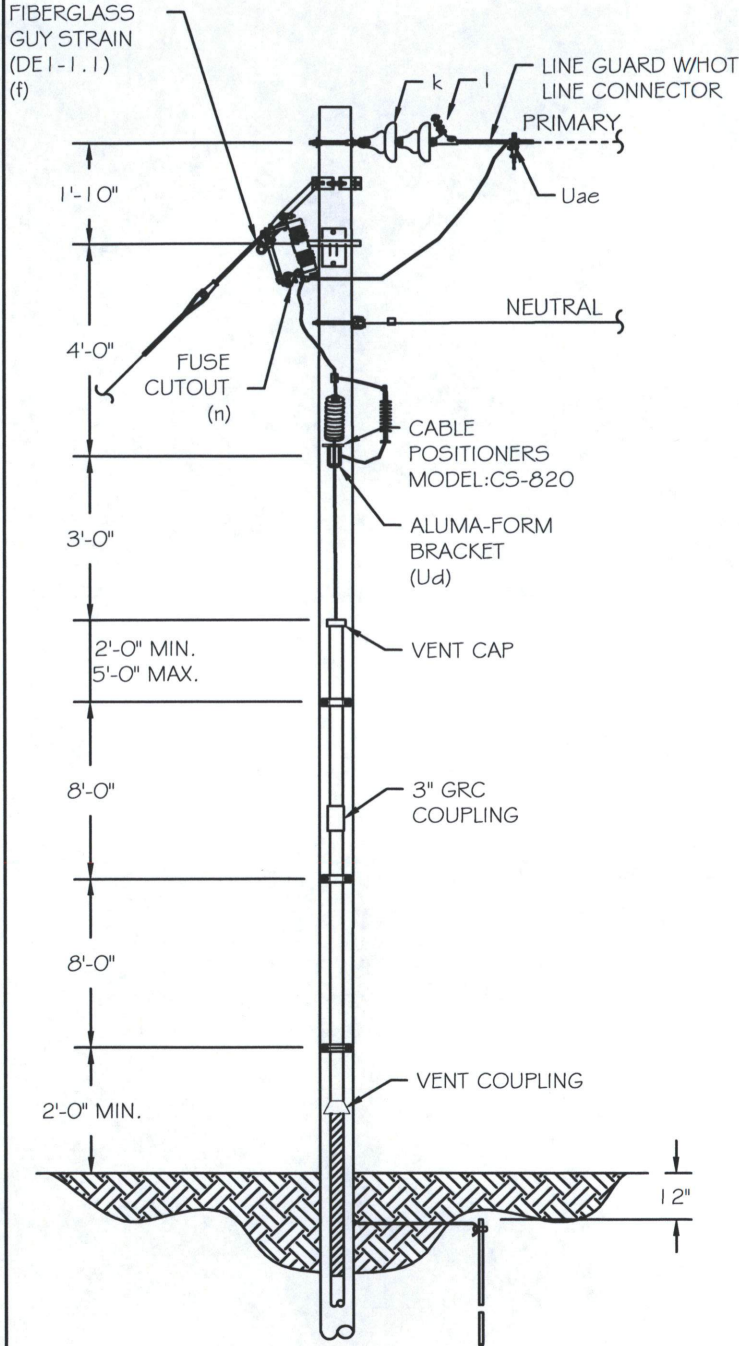
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|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | M.CHEROMIAH | DATE: | 9/23/14 | DWG TITLE: | UM2-4XS SOURCE RISER DEAD-END MATERIAL LISTING | | |
| | APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 | | REVISIONS 1: | | DWG NUMBER: |
| | APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 | REVISIONS 2: | | PAGE: | 28 |
| | APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 2106714 | | | | |



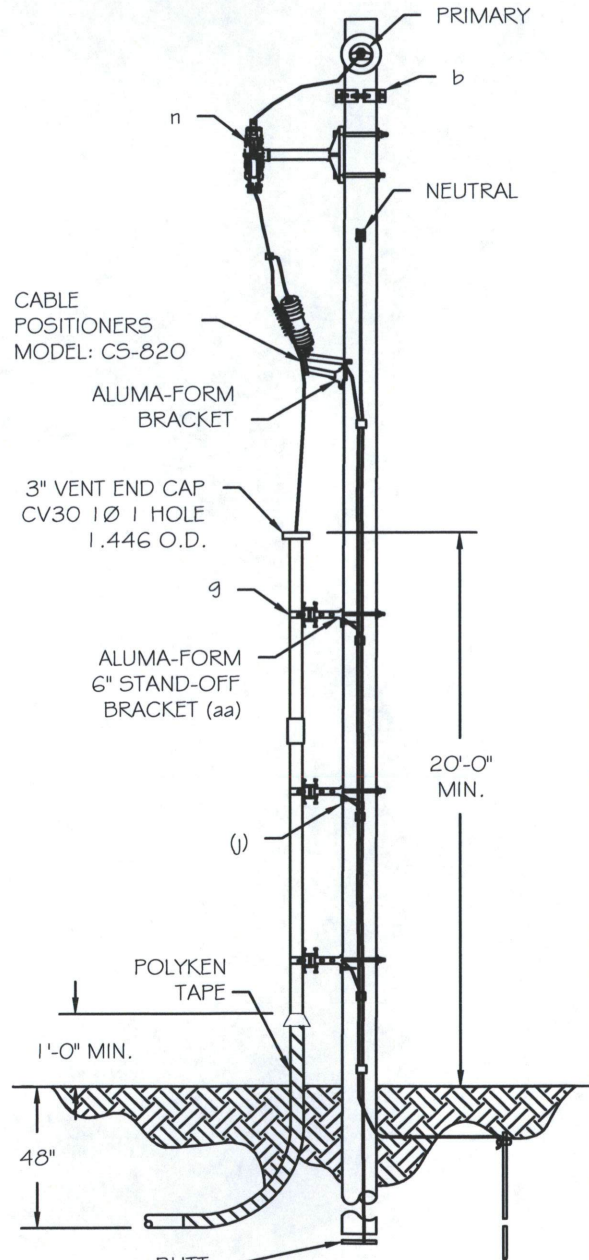
TOP VIEW
SCALE:NTS

NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BEND.
2. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3 FEET.



FRONT VIEW
SCALE:NTS



SIDE VIEW
SCALE:NTS



NTUA - HQ
ELECTRICAL ENGINEERING

DRAWN BY:
M.CHEROMIAH
APPROVED ENGINEERING:
APPROVED SAFETY:
APPROVED MAINTENANCE:

DATE:
9/23/14
DATE:
10/24/14
DATE:
10/29/14
DATE:
2/20/14

DWG TITLE:

UM2-4XL LOAD RISER POLE DEAD-END


REVISIONS 1:

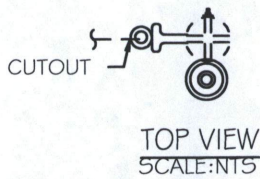
REVISIONS 2:

DWG NUMBER:
CM-14

PAGE:
29

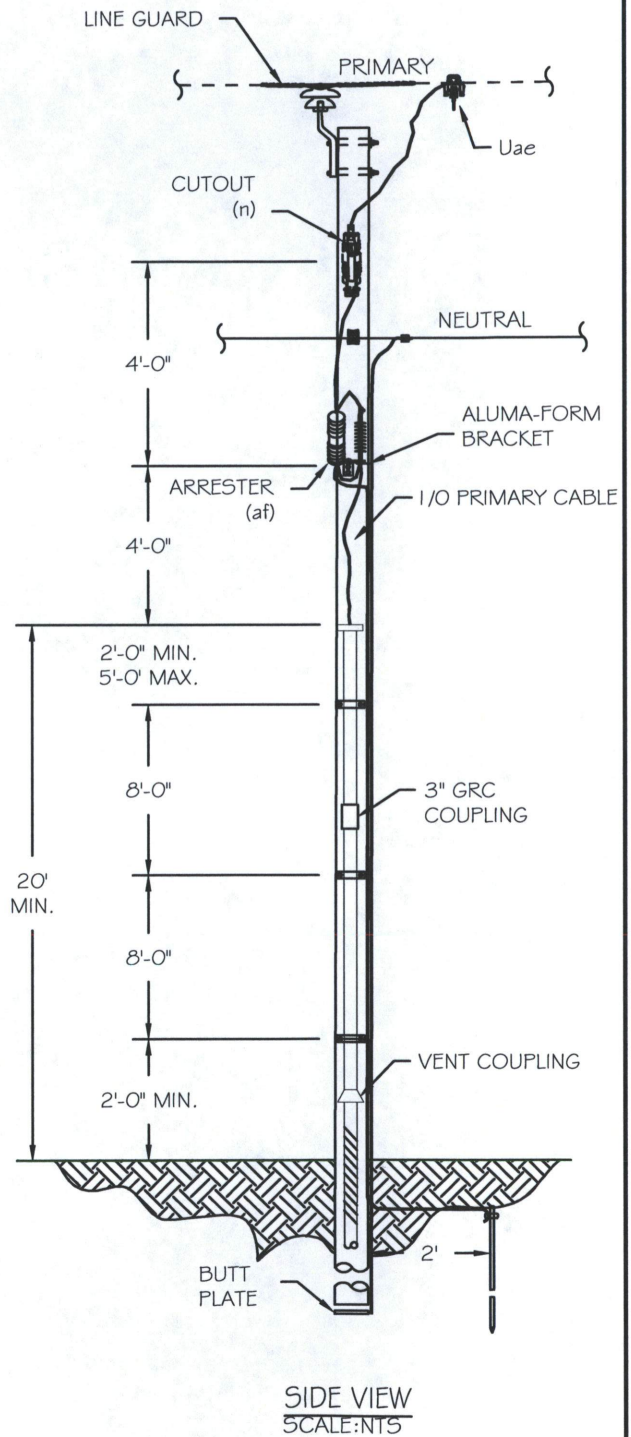
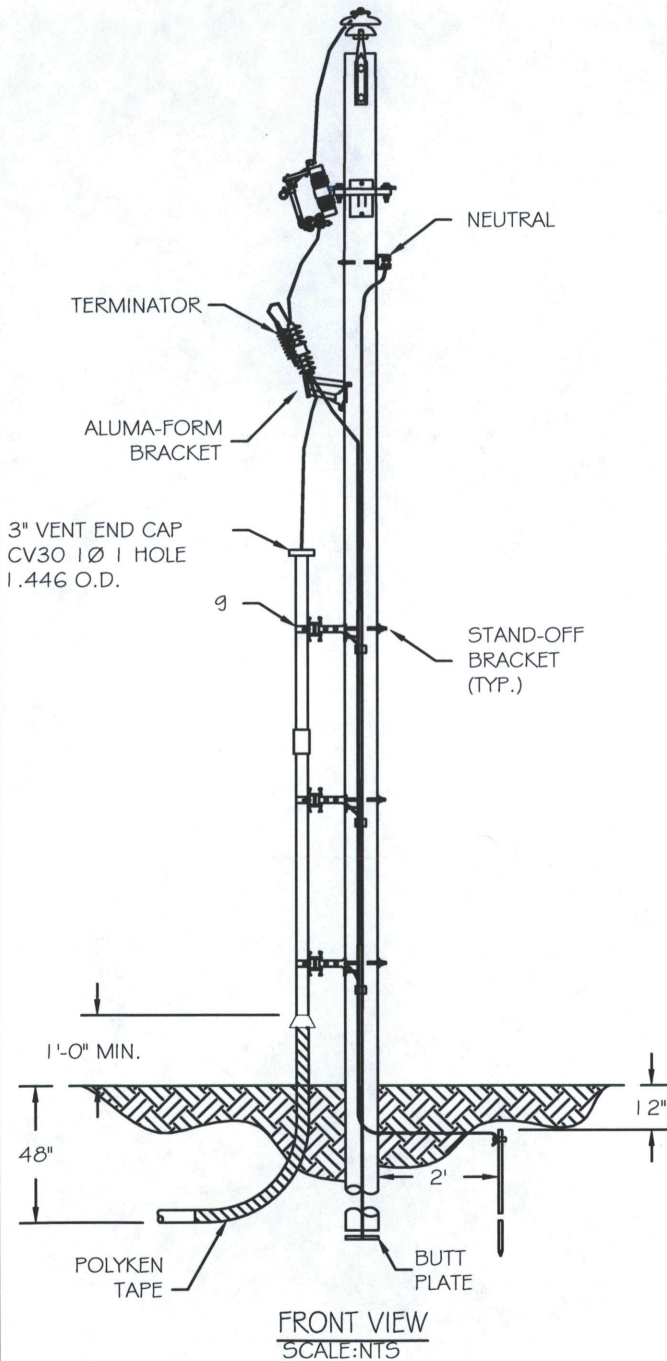
| STOCK NUMBER | ITEM | MATERIAL | QTY |
|--------------|------|---|-----|
| 10125 | c | BOLT, MACHINE, 5/8" X 12" WITH NUT | 4 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 9 |
| 11342 | g | STRAP 3" SIZE STAND-OFF BRACKET | 3 |
| 10273 | i | CAP VENT SUPPORT 1/O URD 3" IMC. 345 MIL. | 1 |
| 10045 | af | ARRESTOR RISER SENTRY URD 18KV | 1 |
| 11395 | | TAPE POLYKEN | 1 |
| 10192 | aa | BRACKET CONDUIT STAND-OFF | 3 |
| 10488 | | CRIMPIT 1/O ACSR - #4 ACSR | 4 |
| 11445 | | TERMINATOR 1/O URD 25KV FOR .345 MIL. | 1 |
| 10194 | al | T-BRACKET POLE MOUNT COMBINATION | 1 |
| 11276 | j | SCREW LAG-FETTER 1/2" X 4" | 3 |
| 11596 | | WASHER, ROUND, 5/8" | 6 |
| 10946 | | LOCKNUT, 5/8" | 6 |
| 11446 | | TERMINATOR ALUMINUM BRACKET CAT#CCS8.... | 1 |
| 10468 | | COUPLING VENTILATOR URD 3" RIGID | 1 |
| 10392 | Uae | HOT LINE CONNECTOR | 1 |


| | | | | |
|--|---|-------------------|--|-----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: UM2-4XL LOAD RISER DEAD-END MATERIAL LISTING | |
| | APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 | | |
| | APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-14A |
| | APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 2/10/14 | REVISIONS 2: | PAGE: 30 |




NOTES:

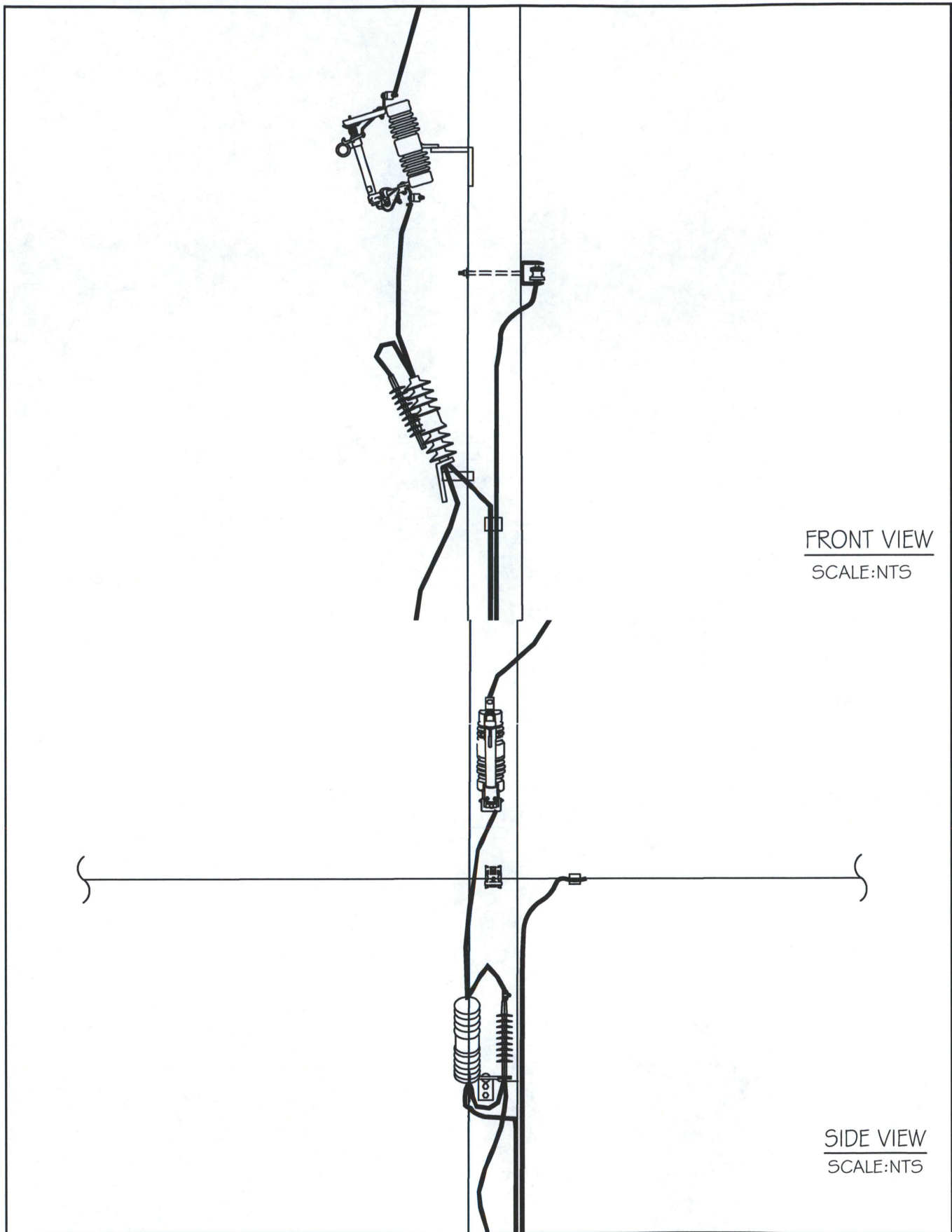
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BEND.
2. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3 FEET.




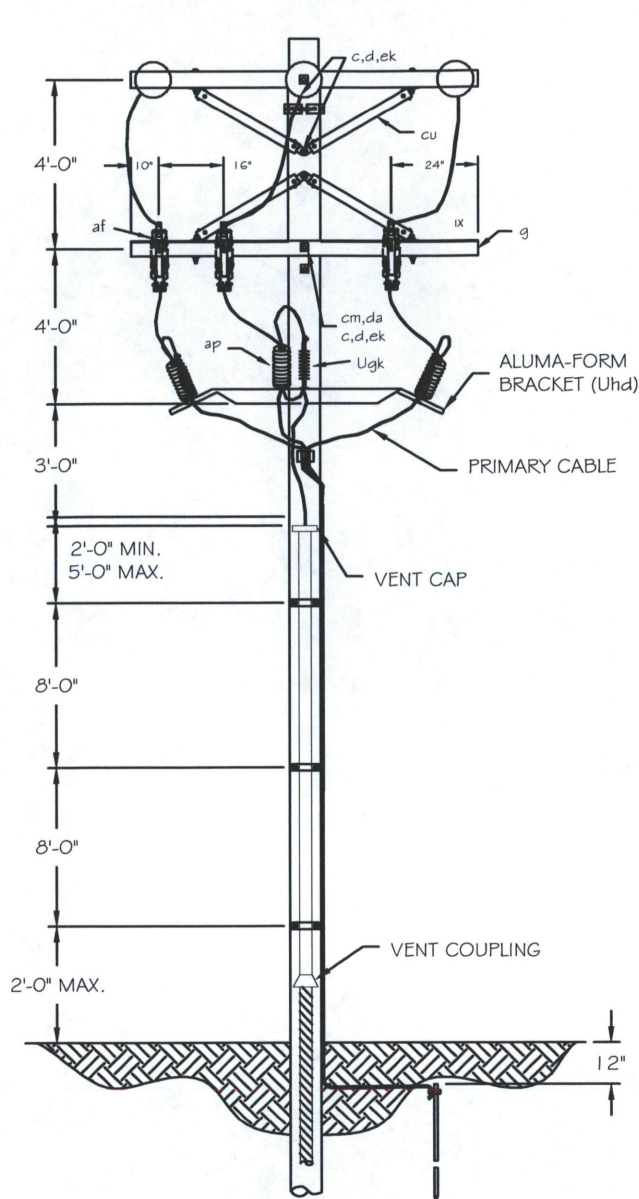
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|  <p>NTUA - HQ ELECTRICAL ENGINEERING</p> | DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 | DWG TITLE: UM2-4XS SOURCE RISER POLE TANGENT STRUCTURE | | DWG NUMBER: CM-15 |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | | PAGE: 31 |
| | APPROVED MANAGEMENT: | DATE: 2/20/14 | REVISIONS 2: | | |

| STOCK NUMBER | ITEM | MATERIAL | QTY |
|-----------------|------|---|-----|
| 10125 | c | BOLT, MACHINE, GALV. 5/8" X 12" WITH NUT | 6 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 9 |
| 11342 | g | STRAP 3" SIZE STAND-OFF BRACKET | 3 |
| 10273 | i | CAP VENT SUPPORT 1/0 URD 3" IMC. 345 MIL. | 1 |
| 11446 | Ud | TERMINATOR ALUMINUM BRACKET | 1 |
| 10508 | n | CUTOUT FUSE 16/26KV 100 AMP DIST. | 1 |
| 10192 | aa | BRACKET CONDUIT STAND-OFF | 3 |
| 10488 | | CRIMPIT 1/0 ACSR - #4 ACSR | 4 |
| 10045 | af | ARRESTER RISER SENTRY URD 18kV | 1 |
| 11445 | | TERMINATOR 1/0 URD 25kV FOR 345 MIL. | 1 |
| 10194 | al | BRACKET POLE MOUNT COMBINATION | 1 |
| 11395 | | POLYKEN TAPE | 1 |
| 10946 | | LOCKNUT, 5/8" | 4 |
| 10468 | | COUPLING, VENTILATOR URD 3" RIGID | 1 |
| 11276 | | SCREW, LAG | 4 |
| 10817 | bv | GUARD, LINE, 1/0 ACSR, PREFORMED #MG-0135 | 1 |
| 11446 | | BRACKET TERMINATOR "L" CAT# CCS 820 | 1 |
| 10392 | Uae | HOTLINE CONNECTOR | 1 |

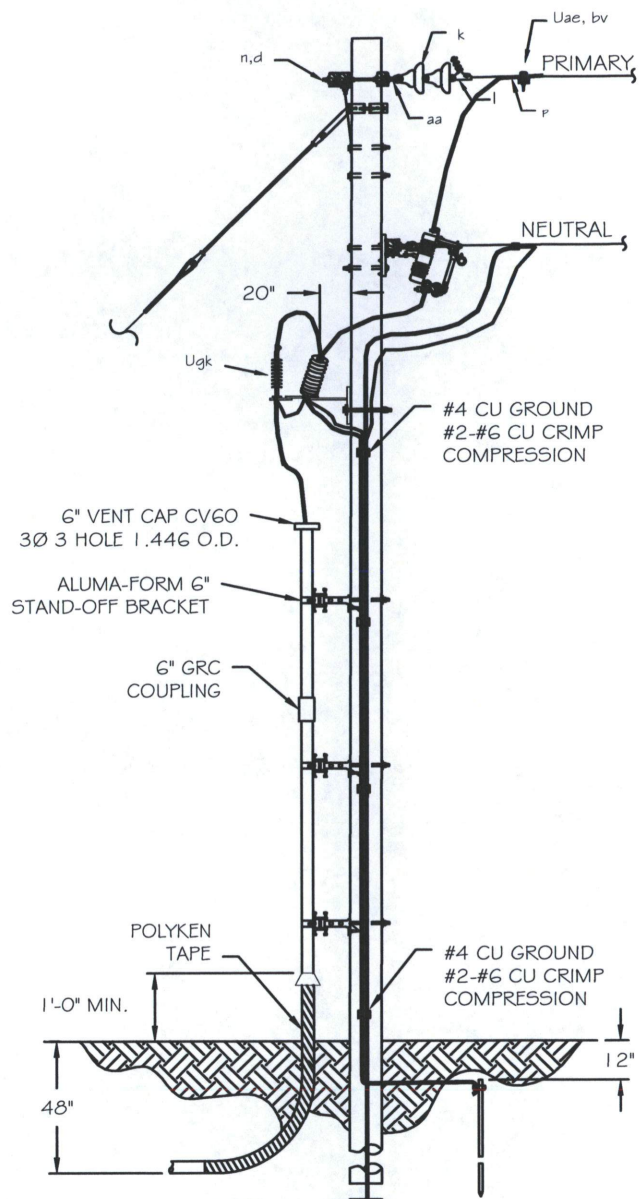
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|--|-----------------------|--------------------|-------|----------|--------------|---|-------|-------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | M. CHEROMIAH | DATE: | 9/23/14 | DWG TITLE: | UM2-4XS SOURCE RISER TANGENT MATERIAL LISTING | | |
| | APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 | | REVISIONS 1: | | DWG NUMBER: |
| | APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 | REVISIONS 2: | | PAGE: | 32 |
| | APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 2/20/14 | | | | |



| | | | | | |
|--|---|-------------------|---|--|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 | DWG TITLE: SINGLE PHASE RISER CONNECTION | | DWG NUMBER: CM-16 |
| | APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 | | | |
| | APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 | REVISIONS 1: | | PAGE: 33 |
| | APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 2/10/14 | REVISIONS 2: | | |



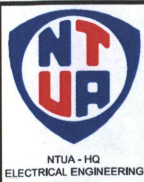
FRONT VIEW
SCALE:N.T.S.



SIDE VIEW
SCALE:N.T.S.

NOTES:

1. CONTRACTOR SHALL CONSULT WITH NTUA LINE FOREMAN BEFORE INSTALLING RISER ON THREE-PHASE POWER LINES. ROTATE RISER 45° IF RISER IS TO BE INSTALLED AS WELL
2. MACHINE BOLTS SHALL BE USED ONLY ON ALUMA-FORM STAND-OFF BRACKETS.
3. PRIMARY CABLE COLOR DESIGNATION AND IDENTIFICATION:
A PHASE - RED
B PHASE - WHITE
C PHASE - BLUE



| | |
|---|-------------------|
| DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 2/10/15 |


| | |
|---|--|
| DWG TITLE: UM2-8 RISER POLE DEAD-END STURCTURE | |
| REVISIONS 1: | |
| REVISIONS 2: | |

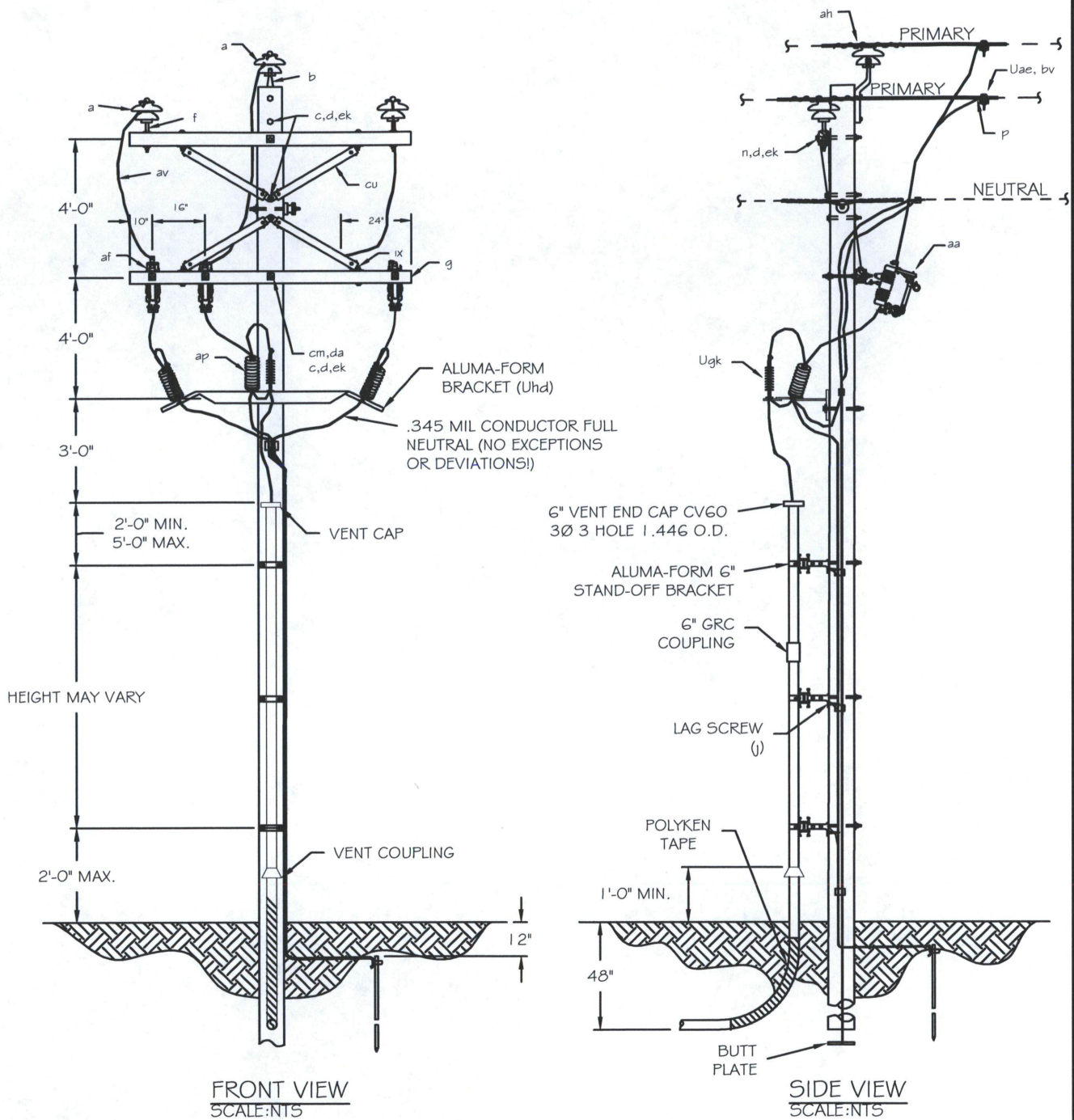
| |
|----------------------|
| DWG NUMBER: CM-17 |
| PAGE: 34 |

| STOCK NUMBER | ITEM | MATERIAL | QTY |
|--------------|------|--|------|
| 10125 | c | BOLT, MACHINE, 5/8" X 1 2" WITH NUT | 4 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 4 |
| 10503 | g | CROSSARM, 3-3/4" X 3-1/4" X 8'-0" | 1 |
| 10119 | i | BOLT, MACHINE, 1/2" X 6" WITH NUT | 2 |
| 11276 | j | SCREW LAG 1/2" X 4" | 4 |
| 10126 | c | BOLT, MACHINE, 5/8" X 1 4" WITH NUT | 1 |
| 10486 | p | CRIMPIT COMPRESSION AS REQUIRED | 4 |
| 10045 | ap | ARRESTER RISER SENTRY URD 18KV | 3 |
| 10509 | af | CUTOFF FUSE 34.5 KV 100 AMP TYPE "C" | 3 |
| 10946 | ek | LOCKNUT 5/8" SQ. GALVANIZED REGULAR | 4 |
| 11325 | al | STAPLES AS REQUIRED | 1 LB |
| 11343 | g | STRAP, 6" SIZE STANDOFF BRACKET | 3 |
| 10189 | cu | BRACE, CROSSARM 60" SPAN x 18" DROP | 1 PR |
| 10274 | Ugc | CAP VENT SUPPORT 1/0 URD 6" IMC .345 MI | 1 |
| 11445 | Ugk | TERMINATOR 1/0 URD 25KV FOR .345 MI | 3 |
| 10977 | Uhd | MOUNT TERMINATOR ARRESTER 3 PHASE (ALUMA-FORM) | 1 |
| 10944 | ek | LOCKNUT 1/2" SQ. GALVANIZED REGULAR | 2 |
| 10494 | p | CRIMPIT COPPER #6 C-TYPE | 6 |
| 10469 | | COUPLING VENTILATOR URD 6" RIGID | 1 |
| 12452 | | COLD SHRINK | 3 |
| 10392 | Uae | CONNECTOR, HOT LINE, 1/0-1/0 | 3 |
| 11616 | av | WIRE #2 THHN STRANDED COPPER RED | 45' |
| 10192 | aa | BRACKET CONDUIT STANDOFF | 3 |
| 10187 | bv | GUARD, LINE 1/0 ACSR PREFORMED #MG-0135 | 3 |
| 10249 | | CABLE SUPPORT | 3 |
| | | WIRE #2 COPPER BARE STRANDED | 6' |
| 10488 | | CRIMPIT 1/0 ACSR - #4 ACSR | 4 |

NOTES:

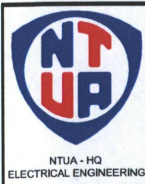
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BEND.
2. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3 FEET.

| | | | | | | | | |
|--|-----------------------|--------------------|-------|----------|--------------|---------------------------------------|-------------|--------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | M. CHEROMIAH | DATE: | 9/23/14 | DWG TITLE: | UM2-8 RISER DEAD-END MATERIAL LISTING | | |
| | APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 | | | | |
| | APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 | REVISIONS 1: | | DWG NUMBER: | CM-17A |
| | APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 11/06/14 | REVISIONS 2: | | PAGE: | 35 |



NOTES:

1. CONTRACTOR SHALL INSTALL RISER IN-LINE WITH SINGLE OR THREE-PHASE POWER LINES. NO DEVIATIONS OR EXCEPTIONS.
2. PRIMARY CABLE COLOR DESIGNATION AND IDENTIFICATION:
A PHASE - RED
B PHASE - WHITE
C PHASE - BLUE



| | |
|---|--------------------|
| DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 29 OCT 14 |

DWG TITLE: UM2-8 RISER POLE TANGENT STRUCTURE


REVISIONS 1:
REVISIONS 2:

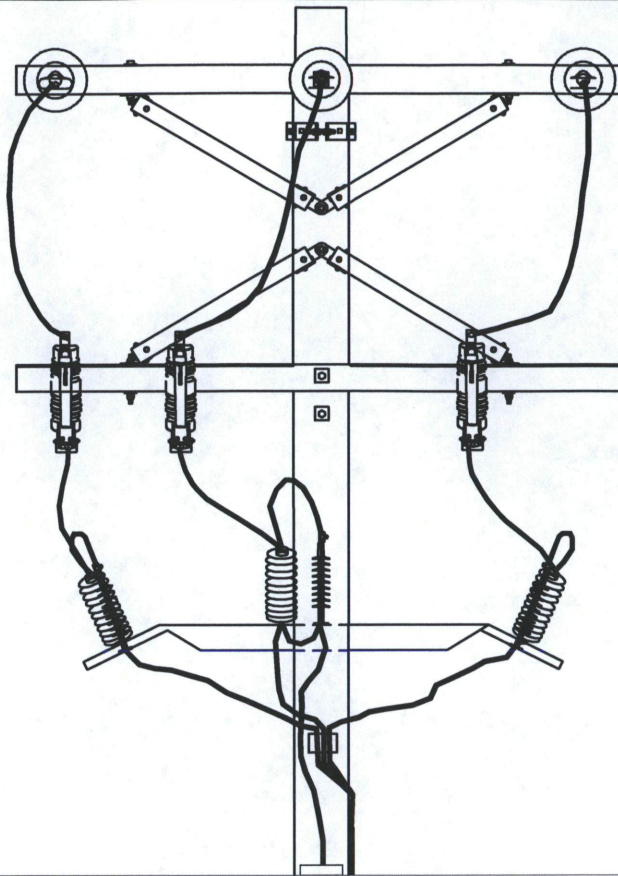
DWG NUMBER:
CM-18
PAGE:
36

| STOCK NUMBER | ITEM | MATERIAL | QTY |
|--------------|------|---|------|
| 10125 | c | BOLT, MACHINE, 5/8" X 12" WITH NUT | 4 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 5 |
| 10503 | g | CROSSARM, 3-3/4" X 3-1/4" X 8'-0" | 1 |
| 10119 | i | BOLT, MACHINE, 1/2" X 6" WITH NUT | 2 |
| 11276 | j | SCREW LAG 1/2" X 4" | 4 |
| 10126 | c | BOLT, MACHINE, 5/8" X 14" WITH NUT | 1 |
| 10486 | p | CRIMPIT, COMPRESSION, WR-259, 1/0-1/0 | 4 |
| 10045 | ap | ARRESTER RISER SENTRY URD 18KV | 3 |
| 10946 | ek | LOCKNUT 5/8" SQ. GALVANIZED REGULAR | 5 |
| 11325 | al | STAPLES AS REQUIRED | 1 lb |
| 10189 | cu | BRACE, CROSSARM 60" SPAN x 18" DROP | 1 pr |
| 10274 | Ugc | CAP VENT SUPPORT 1/0 URD 6" IMC .345 MIL | 1 |
| 11445 | Ugk | TERMINATOR 1/0 URD 25KV FOR .345 MIL | 3 |
| 10977 | Uhd | MOUNT TERMINATOR/ARRESTER 3 PHASE(ALUMA-FORM) | 1 |
| 10944 | ek | LOCKNUT 1/2" SQ. GALVANIZED REGULAR | 2 |
| 11616 | av | WIRE #2 THHN STRANDED COPPER RED | 45' |
| 12452 | | COLD SHRINK | 3 |
| 10249 | | CABLE SUPPORT | 3 |
| | | WIRE #2 COPPER BARE STRANDED | 6' |
| 10488 | | CRIMPIT 1/0 ACSR - #4 ACSR | 4 |
| 10509 | | CUTOFF FUSE 34.5KV 100AMP TYPE "C" | 3 |
| 10392 | Uae | CONNECTOR HOTLINE 1/0-1/0 FARGO # GA-102L | 3 |
| | | TERMINATION KIT | 3 |

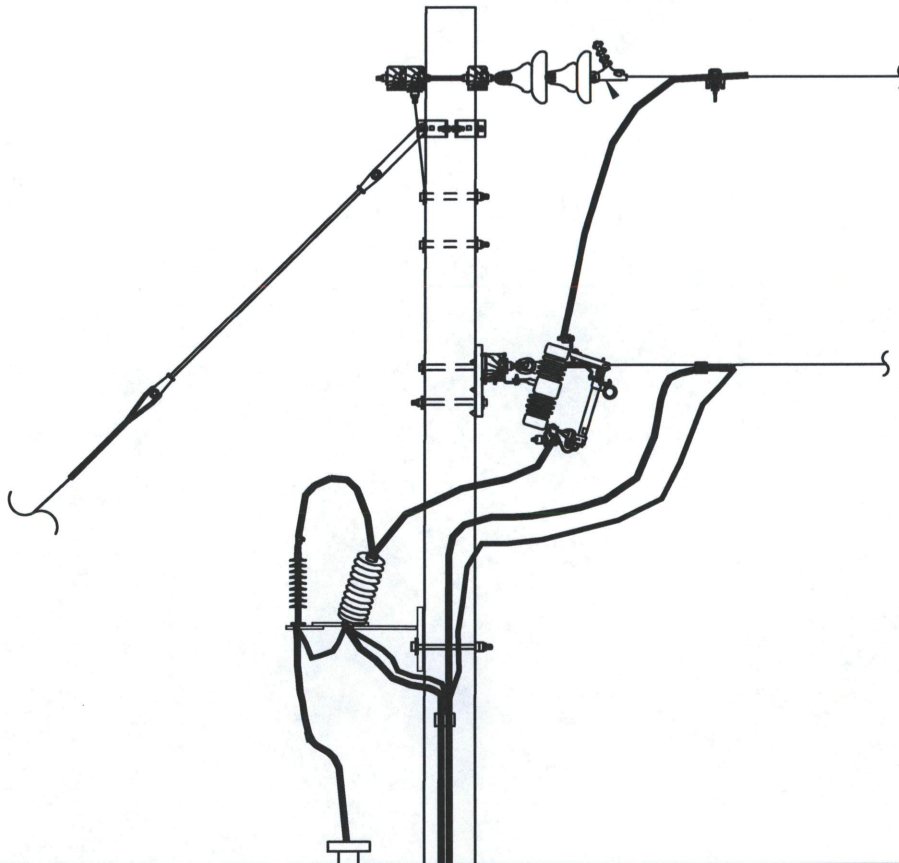
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BEND.
2. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3 FEET.

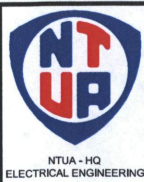
| | | | | | | | | |
|--|-----------------------|--------------------|-------|----------|--------------|--------------------------------------|-------------|--------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | M. CHEROMIAH | DATE: | 9/14/14 | DWG TITLE: | UM2-8 RISER TANGENT MATERIAL LISTING | | |
| | APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 | | | | |
| | APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 | REVISIONS 1: | | DWG NUMBER: | CM-18A |
| | APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 2/20/14 | REVISIONS 2: | | PAGE: | 37 |



FRONT VIEW



SIDE VIEW

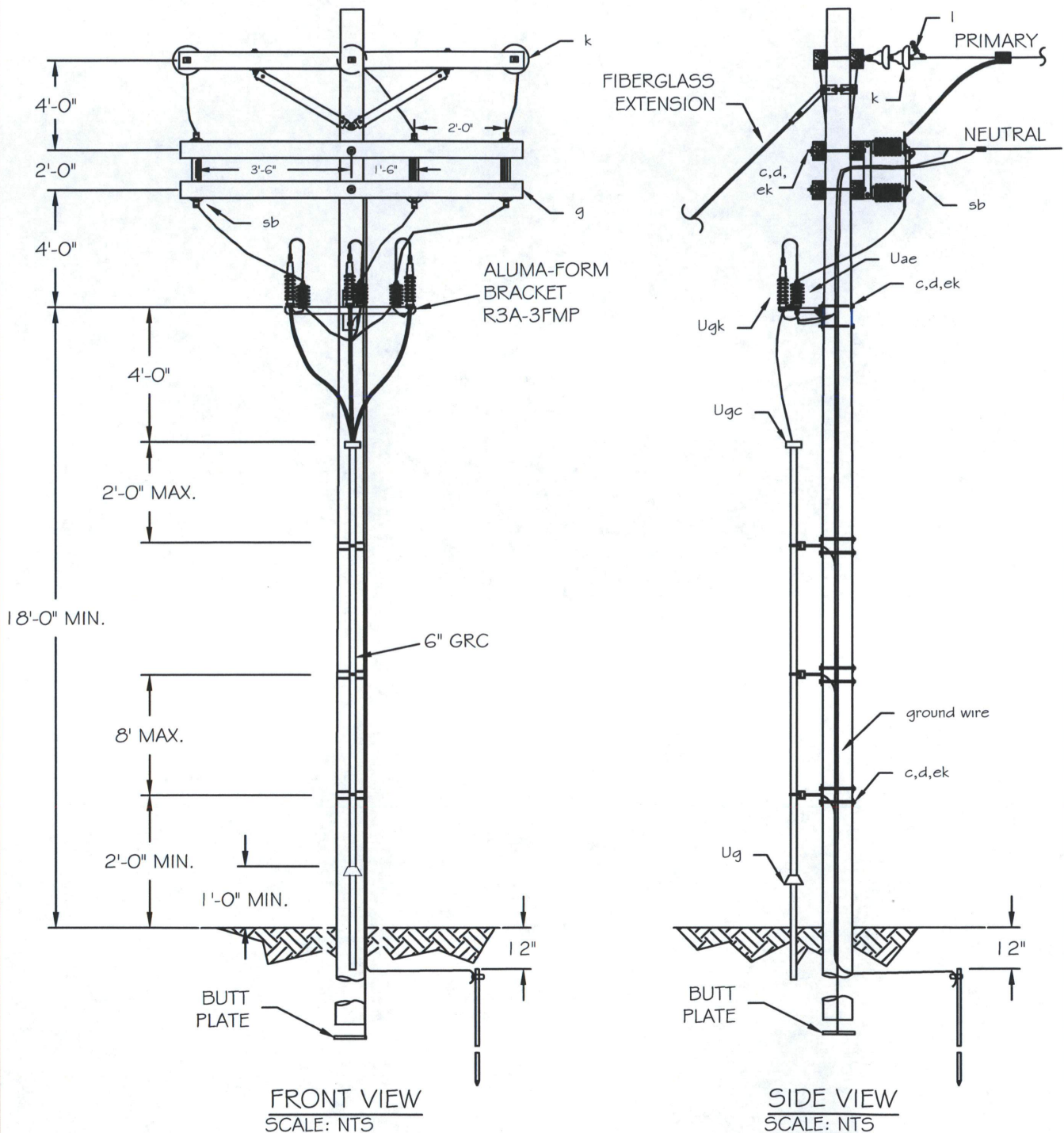


| | |
|---|-------------------|
| DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/05/14 |

DWG TITLE: THREE PHASE RISER CONNECTION

REVISIONS 1:
REVISIONS 2:


DWG NUMBER:
CM-19
PAGE:
38

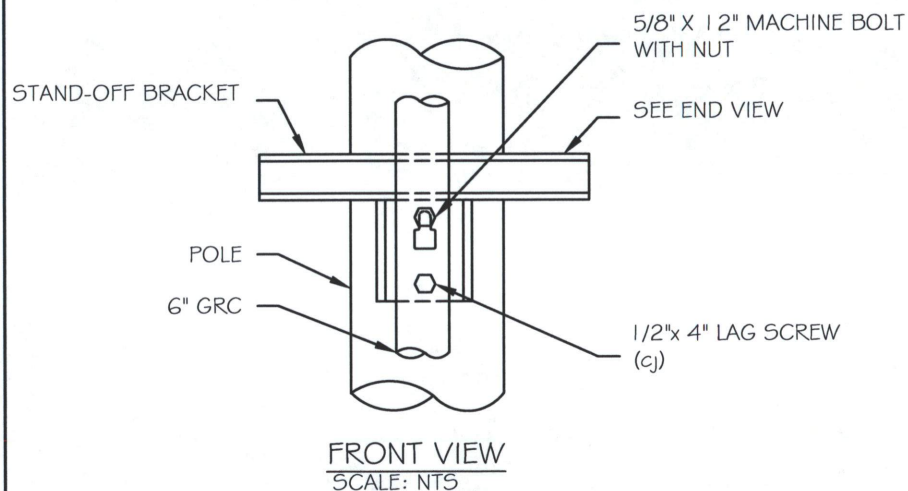
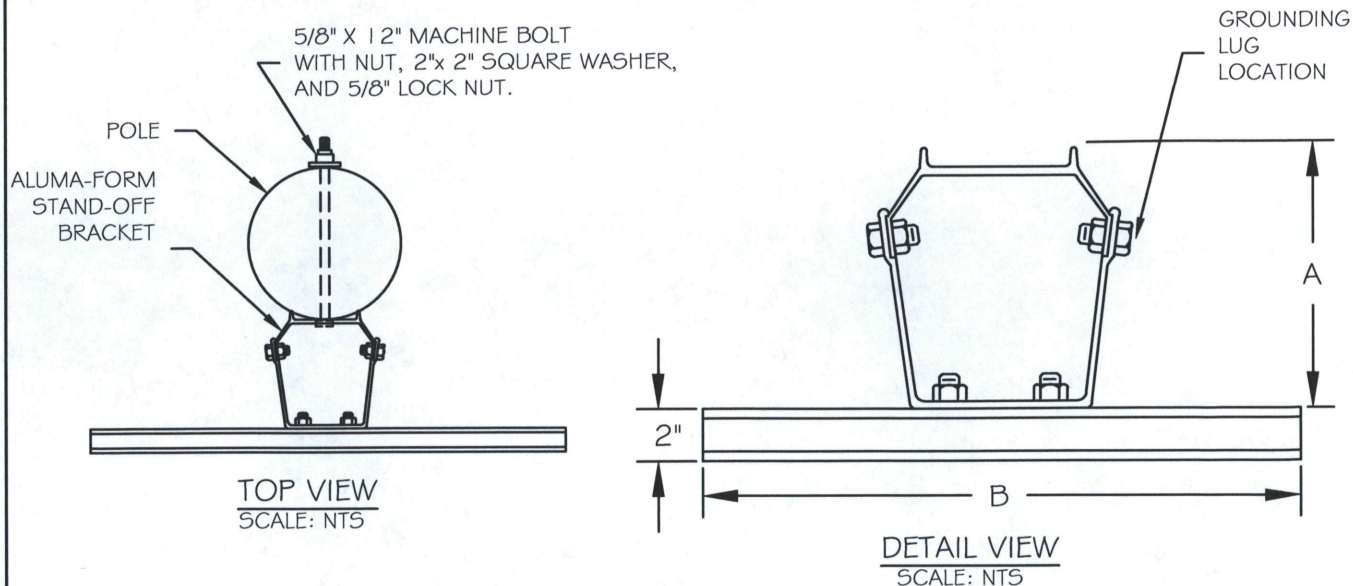


| | |
|---|--------------------|
| DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 24 OCT 14 |

| | |
|--|----------------------|
| DWG TITLE: THREE-PHASE CABLE TERMINAL POLE W/ INTERMEDIATE ARRESTERS, HOOK OPERATED SWITCHES, DEAD-END | |
| REVISIONS 1: | DWG NUMBER: CM-20 |
| REVISIONS 2: | PAGE: 39 |

| STOCK NUMBER | ITEM | MATERIAL | QTY |
|--------------|------|--|-----|
| 11370 | sb | SWITCH KNIFE BLADE 25kV KEARNY 600AMP | 3 |
| 11445 | Ugk | TERMINATOR, OUTDOOR, CABLE TERMINATION | 3 |
| 12003 | | #2/0 HYLUGS COPPER | 6 |
| 11045 | Uae | INTERMEDIATE CLASS ARRESTER - 25kV | 3 |
| 10192 | | RISER SUPPORT BRACKET (ALUMA-FORM STK-4) | 3 |
| | c | BOLT, MACHINE, 5/8" X REQUIRED LENGTH | 10 |
| 11599 | d | WASHER, SQUARE, 2-1/4" SQ. 13/16" HOLE | 10 |
| | aq | JUMPERS - AS REQUIRED | 3 |
| | | 6" GRC CONDUIT (MINIMUM 20' LENGTH) | 1 |
| | Ug | COUPLING VENTILATOR URD 6" RIGID | 1 |
| 10503 | g | CROSSARM 3-3/4" X 4-3/4" X 8' DISTRIBUTION | 4 |
| 10946 | ek | LOCKNUT, 5/8" SQ. GALVANIZED REGULAR | 10 |
| | Ugc | CAP VENT SUPPORT 1/0 URD 6" GRC .345 MIL | 1 |
| | | WIRE #2 COPPER BARE STRANDED | 6' |
| 10488 | | CRIMPIT 1/0 ACSR - #4 ACSR | 4 |
| 11343 | | STRAP, 6" SIZE STANDOFF BRACKET | 3 |
| 10192 | | BRACKET CONDUIT STANDOFF | 3 |

| | | | | |
|--|---------------------------|--------------------|--|-----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: TERMINALS STRUCTURE MATERIAL LISTING | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-20A |
| | APPROVED MANAGEMENT: | DATE: 21 OCT 14 | REVISIONS 2: | PAGE: 40 |



4-WAY T-SLOT



NOTE:
CAPTURES 1/2" BOLT HEADS

END VIEW
SCALE: NTS

| CATALOG NUMBER | PRODUCT | WEIGHT | DIMENSIONAL DATA | |
|----------------|---------|--------|------------------|-----|
| | | | A | B |
| CSO-12 | 51958 | 3 LBS | 0" | 12" |
| CSO-24 | 51959 | 4 LBS | 0" | 24" |
| CSO-36 | 51960 | 5 LBS | 0" | 36" |
| 6-CSO-12 | 51961 | 4 LBS | 6" | 12" |
| 6-CSO-24 | 51962 | 5 LBS | 6" | 24" |
| 6-CSO-36 | 51963 | 6 LBS | 6" | 36" |

NOTE:

1. MACHINE BOLT SHALL NOT EXCEED 2 INCHES FROM THE LOCKNUT.



DRAWN BY:
M.CHEROMIAH

DATE: 9/23/14

DWG TITLE:

STAND-OFF BRACKET SPECIFICATIONS

APPROVED ENGINEERING:

DATE: 10/24/14

APPROVED SAFETY:

DATE: 10/29/14

APPROVED MANAGEMENT:

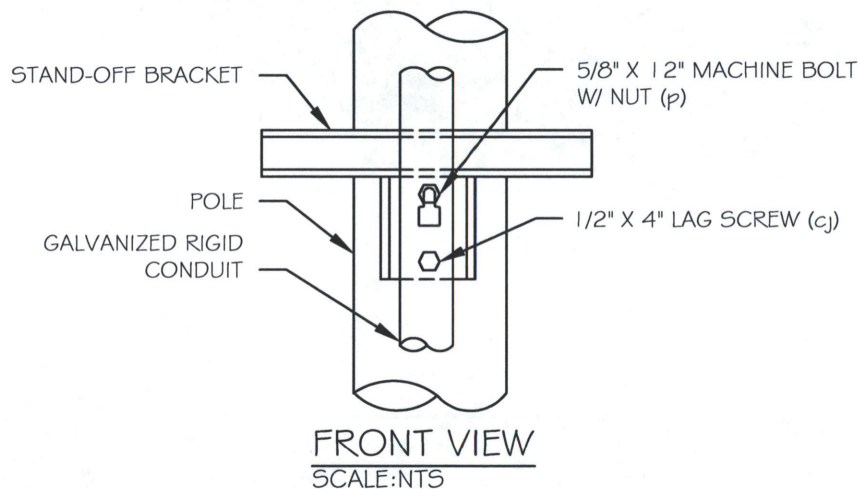
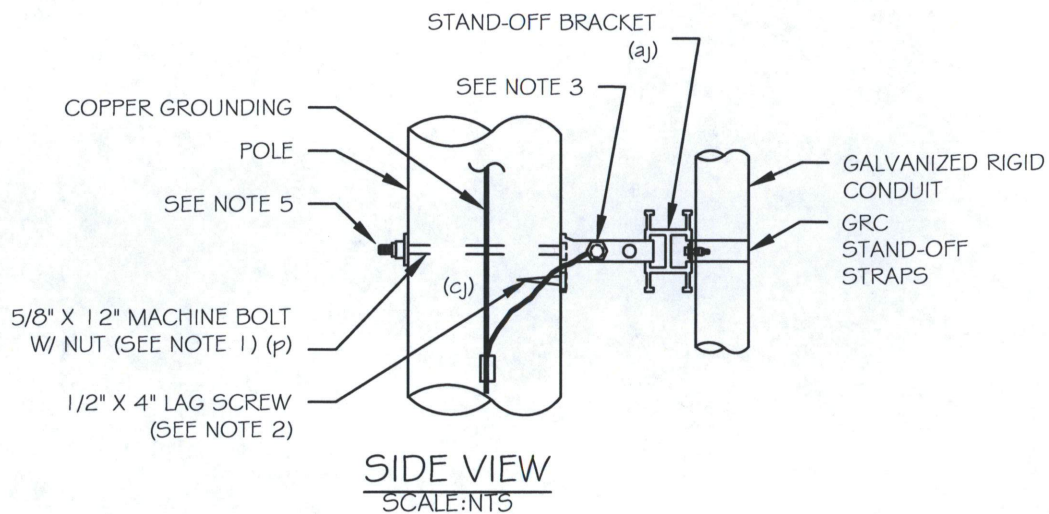
DATE: 29 OCT 14

REVISIONS 1:

REVISIONS 2:

DWG NUMBER:
CM-21

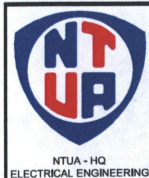
PAGE:
41



NOTES:

1. MACHINE BOLT LENGTH REQUIREMENT MAY DEPEND ON SIZE OF POLE. NO LESS THAN 1/2" BOLT MINIMUM TO ENSURE ADEQUATE SUPPORT FOR BRACKET.
2. INSTALL 1/2" X 4" LAG SCREW
3. COPPER CONDUCTOR MUST BE BONDED TO STAND-OFF BRACKET
4. COPPER COMPRESSION CRIMPITS, NO DEVIATIONS.
5. MACHINE BOLT SHALL NOT EXCEED 2 INCHES FROM THE LOCK NUT.

| ITEM | QTY | MATERIAL |
|------|-----|---|
| p | | 5/8" X 1/2" MIN. MACHINE BOLT, WITH NUT |
| cj | | GROUND WIRE, COPPER (AS REQ.) |
| aj | | 6" STAND-OFF BRACKET |



| | |
|---|-------------------|
| DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/05/14 |

DWG TITLE:

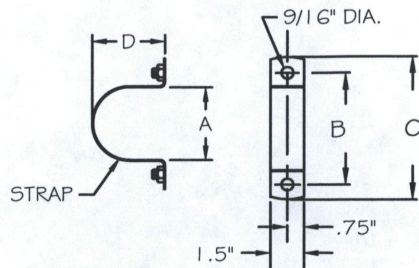
STAND-OFF BRACKET GROUNDING DETAIL

REVISIONS 1:

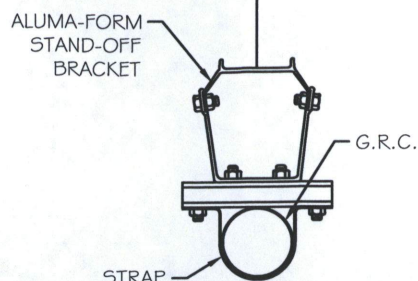
REVISIONS 2:

DWG NUMBER:
CM-22

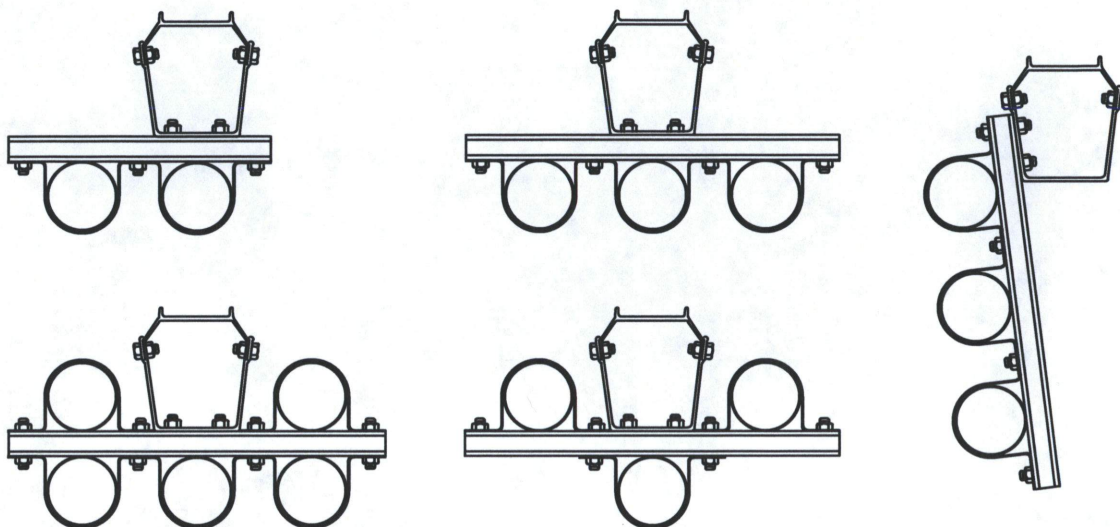
PAGE:
42



DETAIL-SIDE VIEW
SCALE: N.T.S.



DETAIL-TOP VIEW
SCALE: N.T.S.



NOTE:

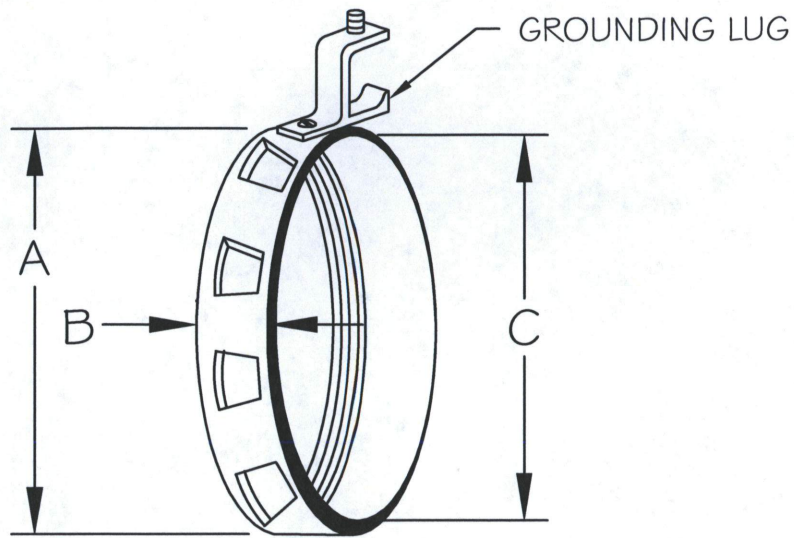
1. SPACING SHALL BE 6"-8" FROM POLE.

| CATALOG DESCRIPTION | CATALOG NUMBER | "A" DIM. | "B" DIM. | "C" DIM. | "D" DIM. | PRODUCT NUMBER | WEIGHT |
|---------------------|----------------|----------|----------|----------|----------|----------------|--------|
| 2 INCH | STK-2 | 2-3/8" | 3-15/16" | 5-1/16" | 2-1/4" | 51967 | .5 LBS |
| 2-1/2 INCH | STK-2.5 | 2-7/8" | 4-7/16" | 5-9/16" | 2-3/4" | 51968 | .6 LBS |
| 3 INCH | STK-3 | 3-1/2" | 5-1/16" | 6-3/16" | 3-3/8" | 51969 | .6 LBS |
| 3-1/2 INCH | STK-3.5 | 4" | 5-9/16" | 6-11/16" | 3-15/16" | 51970 | .6 LBS |
| 4 INCH | STK-4 | 4-1/2" | 6-1/16" | 7-3/16" | 4-3/8" | 51971 | .6 LBS |
| 5 INCH | STK-5 | 5-9/16" | 7-1/8" | 8-1/4" | 5-1/2" | 51972 | .7 LBS |
| 6 INCH | STK-6 | 6-5/8" | 8-3/16" | 9-5/16" | 6-1/2" | 51973 | .7 LBS |



| | |
|---|-------------------|
| DRAWN BY: M.CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 2/10/14 |

| | |
|---|----------------------|
| DWG TITLE: STAND-OFF BRACKET TYPICAL INSTALLATIONS | |
| REVISIONS 1: | DWG NUMBER: CM-23 |
| REVISIONS 2: | PAGE: 43 |

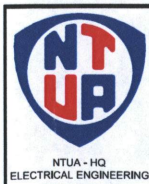


MALLEABLE IRON

| STOCK NUMBER | GROUNDING LUG WIRE CAPACITY | SIZE |
|-----------------|--------------------------------|--------|
| 10223 | #14-#1/0 | 1-1/4" |
| 10222 | #14-#1/0 | 1-1/2" |
| 10224 | #14-#1/0 | 2" |
| 10220 | #14-#1/0 | 3" |
| | #14-#1/0 | 4" |
| 10221 | #6-#250MCM | 6" |

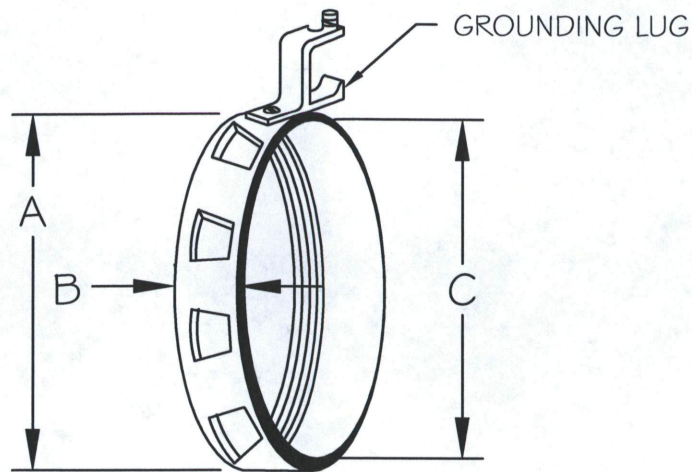
NOTE:

1. CONTRACTOR SHALL PROVIDE AND INSTALL




| | |
|---|-------------------|
| DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 |
| APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 |
| APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 |
| APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/06/14 |

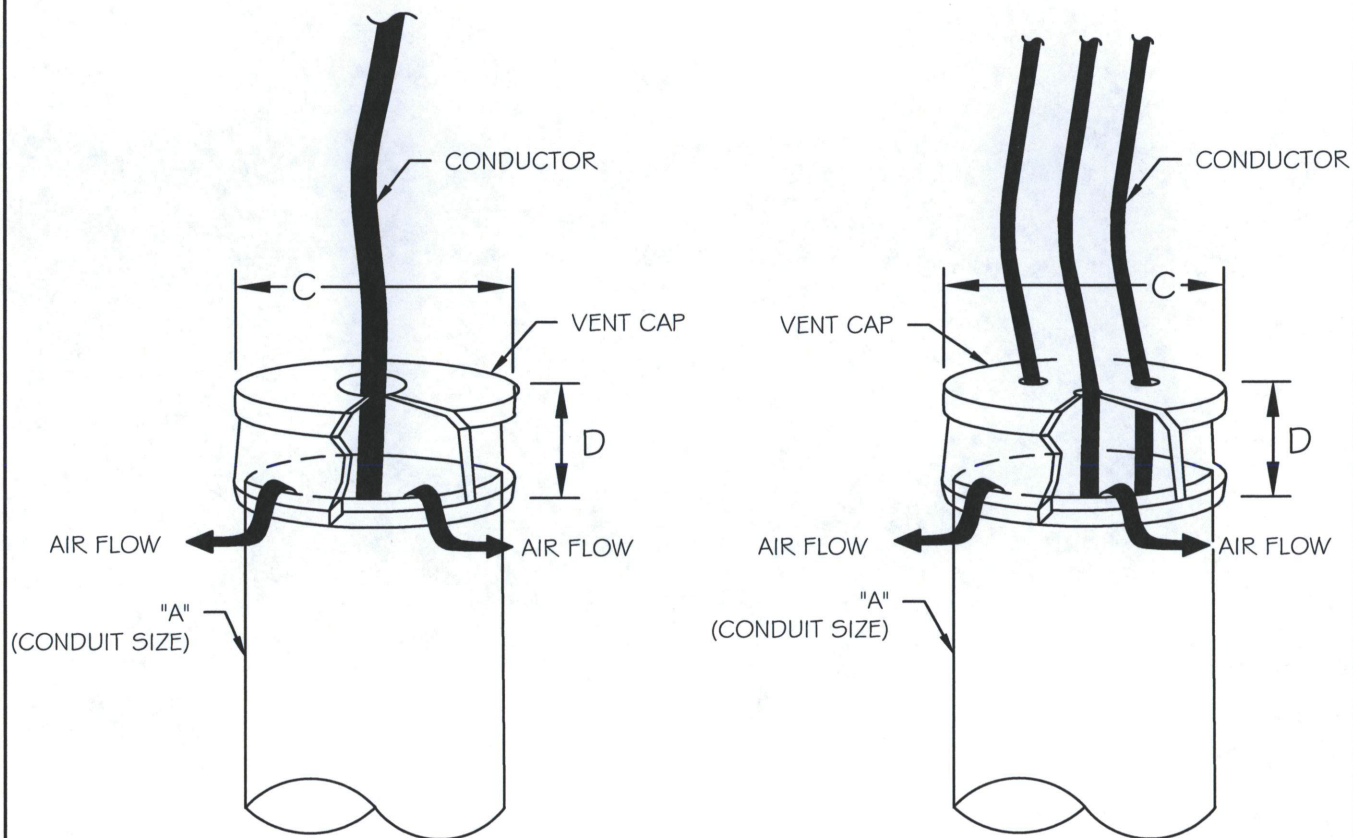
| | | |
|--|--|----------------------|
| DWG TITLE: INSULATED GROUND BUSHING DETAILS-MALLEABLE IRON | | DWG NUMBER: CM-24 |
| REVISIONS 1: | | PAGE: 44 |
| REVISIONS 2: | | |



ZINC DIE CAST


| STOCK NUMBER | GROUND LUG WIRE CAPACITY | SIZE |
|--------------|--------------------------|--------|
| | #14-#4 | 1/2" |
| | #14-#4 | 3/4" |
| | #14-#4 | 1" |
| | #14-#1/0 | 1-1/4" |
| | #14-#4 | 1-1/4" |
| | #14-#1/0 | 1-1/2" |
| | #14-#4 | 1-1/2" |
| | #14-#1/0 | 2" |
| | #14-#4 | 2" |
| | #14-#1/0 | 2-1/2" |
| | #6-#250MCM | 2-1/2" |
| | #14-#1/0 | 3" |
| | #6-#250MCM | 3" |
| | #14-#1/0 | 3-1/2" |
| | #6-#250MCM | 3-1/2" |
| | #14-#1/0 | 4" |
| | #6-#250MCM | 4" |
| | #6-#250MCM | 6" |

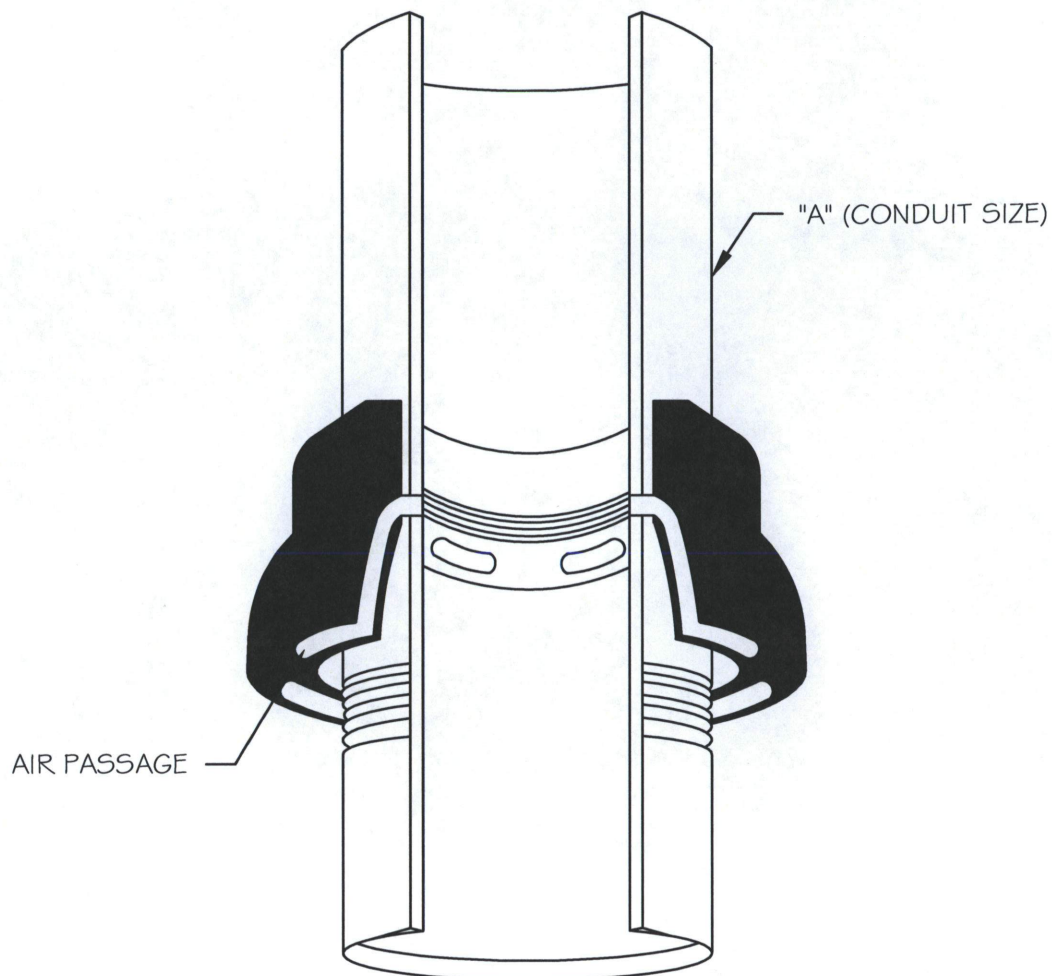
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|--|---------------------------|--------------------|---|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: INSULATED GROUND BUSHING DETAILS-ZINC DIE-CAST | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-25 |
| | APPROVED MANAGEMENT: | DATE: 29 OCT 14 | REVISIONS 2: | PAGE: 45 |



| STOCK NUMBER | CATALOG NUMBER | "A" CONDUIT SIZE G.R.C. |
|--------------|----------------|-------------------------|
| 10273 | CV30 | 3" |
| | CV40 | 4" |
| 10274 | CV60 | 6" |

NOTE:
1. NTUA SHALL PROVIDE TO CONTRACTOR FOR INSTALLATION


| | | | | |
|--|---------------------------|-------------------|--------------------------------|----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: VENT CAP DETAILS | |
| | APPROVED ENGINEERING: | DATE: 10/24/14 | | |
| | APPROVED SAFETY: | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-26 |
| | APPROVED MANAGEMENT: | DATE: 29/10/14 | REVISIONS 2: | PAGE: 46 |



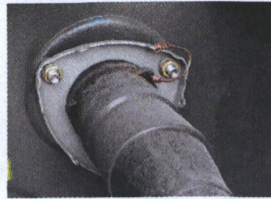
| STOCK NUMBER | CATALOG NUMBER | "A" CONDUIT SIZE G.R.C. |
|-----------------|-------------------|-------------------------------|
| 10468 | BCV 30 | 3" |
| | BCV 40 | 4" |
| 10469 | BCV 60 | 6" |

NOTE:

1. NTUA SHALL PROVIDE FOR CONTRACTOR TO INSTALL

| | | | | | |
|--|-----------------------|--------------|--------------|-------|-------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: | DATE: | DWG TITLE: | | |
| | M. CHEROMIAH | 9/23/14 | | | |
| | APPROVED ENGINEERING: | DATE: | REVISIONS 1: | | DWG NUMBER: |
| | [Signature] | 10/24/14 | | | CM-27 |
| APPROVED SAFETY: | DATE: | REVISIONS 2: | | PAGE: | |
| [Signature] | 10/29/14 | | | 47 | |
| APPROVED MAINTENANCE: | DATE: | | | | |
| [Signature] | 11/06/14 | | | | |

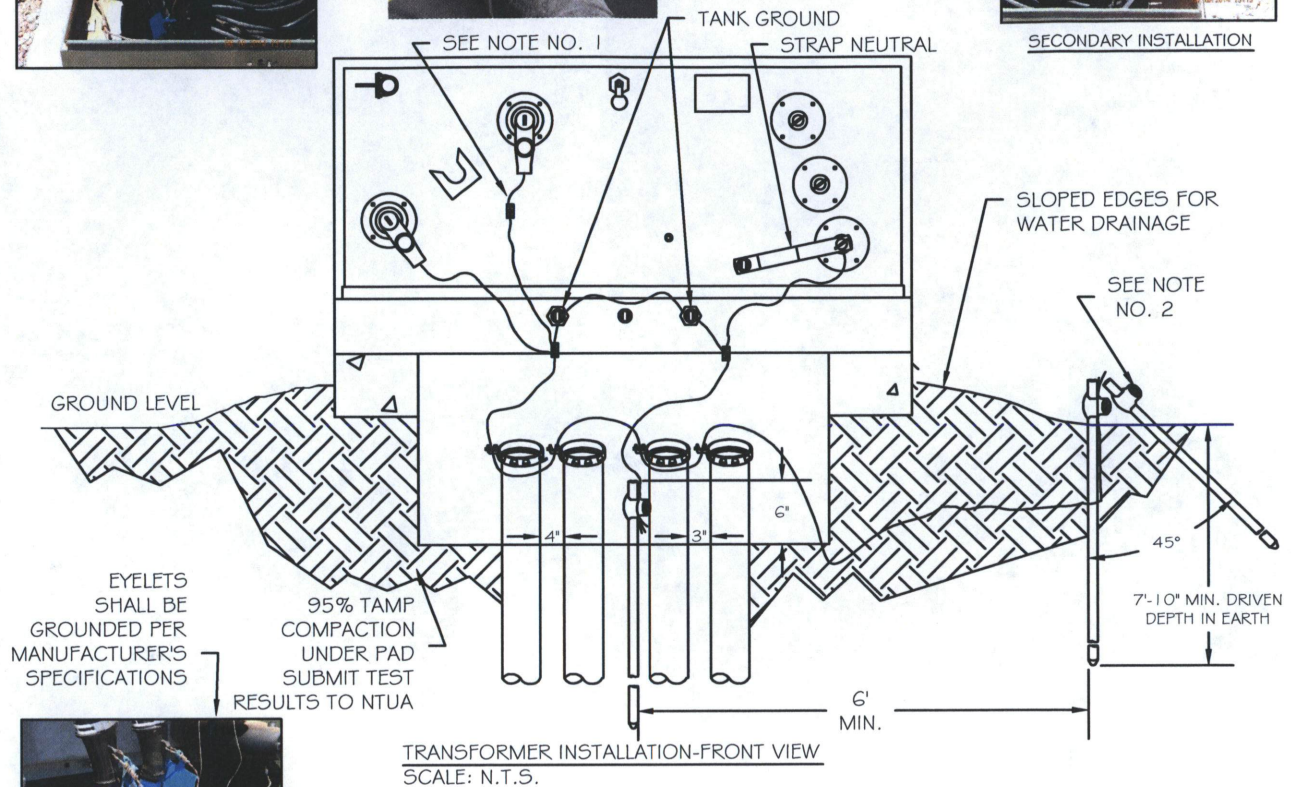
PRIMARY INSTALLATION



EYELETS SHALL BE GROUNDED PER MANUFACTURERS SPEC (MIN #12AWG CU). TERMINATIONS SHALL BE INSTALLED PER MANUFACTURE'S RECOMMENDATIONS

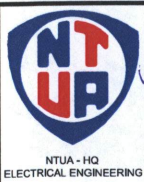


SECONDARY INSTALLATION



NOTE:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ENSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.
2. GROUND ROD MAY BE INSTALLED AT 45 DEGREE ANGLE IF SOIL CONTENT IS COMPOSED OF LAYERED ROCK, SOIL BEDDING.
3. IF SOIL CONTAINS PURE ROCK MATERIAL OR AT LEAST 95% ROCK GROUND EXISTS, THEN GROUND ROD MAY BE INSTALLED HORIZONTALLY, 24" IN DEPTH. THE CONTRACTOR SHALL CADWELD GROUND ROD TO GROUNDING LOOP SYSTEM. NTUA SHALL INSPECT BEFORE IT IS BACKFILLED. MINIMUM #4 GROUND WIRE SHALL BE USED.
4. FOR 1Ø RESIDENTIAL CUSTOMERS ONLY - CONDUIT ELBOW CAN BE PVC IF CABLE IS DIRECT BURIED.
5. SECONDARY CABLES SHALL HAVE TAGS INSTALLED INDICATING WHERE CABLE IS TERMINATED.

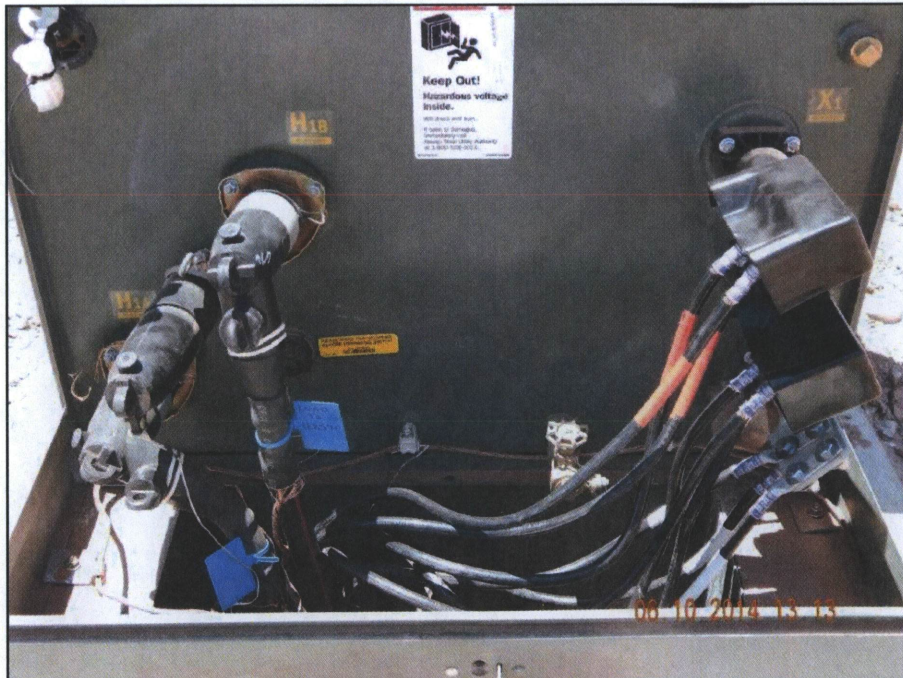
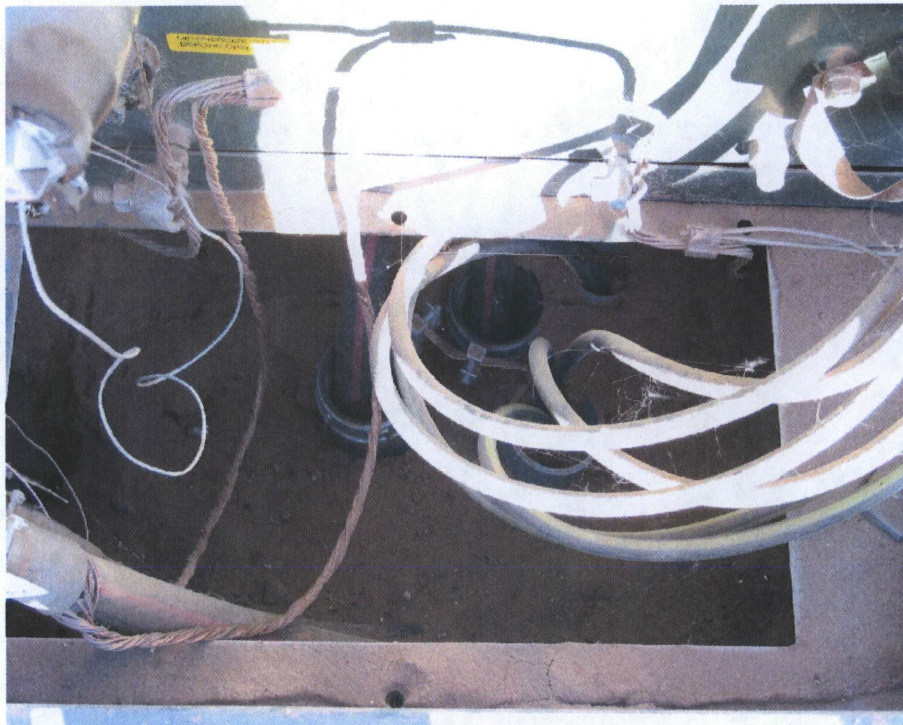



DRAWN BY: M.CHEROMIAH
 DATE: 9/23/14
 APPROVED ENGINEERING: [Signature]
 DATE: 10/24/14
 APPROVED SAFETY: [Signature]
 DATE: 10/29/14
 APPROVED MANAGEMENT: [Signature]
 DATE: 11/06/14

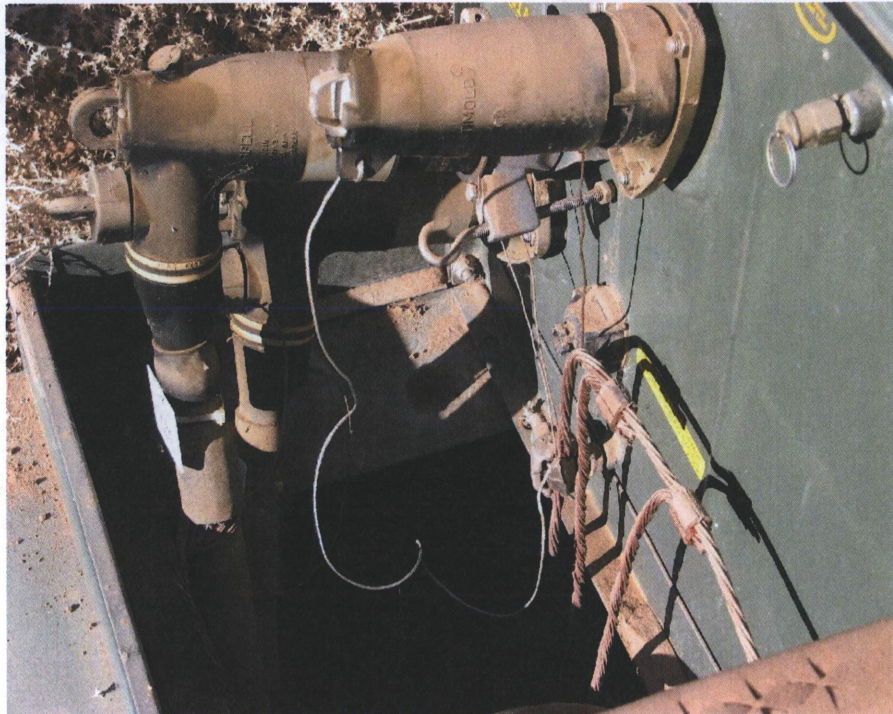
DWG TITLE: SINGLE-PHASE PAD-MOUNTED TRANSFORMER
 37.5 KVA TO 75 KVA


REVISIONS 1:
 REVISIONS 2:

DWG NUMBER:
 CM-28
 PAGE:
 48

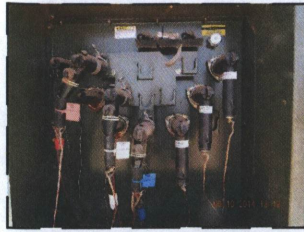


| | | | | |
|--|---|-------------------|---|-----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: EXAMPLE SINGLE-PHASE PAD-MOUNTED TRANSFORMER GROUNDING LOOPS | |
| | APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 | | |
| | APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 | REVISIONS 1: | DWG NUMBER: CM-28A |
| | APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 11/01/14 | REVISIONS 2: | PAGE: 49 |



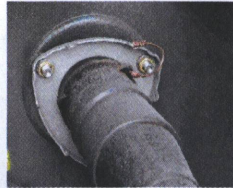
| | | | | | |
|--|---|--------------------|---|--|-----------------------|
|  NTUA - HQ ELECTRICAL ENGINEERING | DRAWN BY: M. CHEROMIAH | DATE: 9/23/14 | DWG TITLE: DETAIL SINGLE-PHASE PAD MOUNTED TRANSFORMER GROUNDING LOOP | | DWG NUMBER: CM-28B |
| | APPROVED ENGINEERING: <i>[Signature]</i> | DATE: 10/24/14 | | | REVISIONS 1: |
| | APPROVED SAFETY: <i>[Signature]</i> | DATE: 10/29/14 | REVISIONS 2: | | |
| | APPROVED MANAGEMENT: <i>[Signature]</i> | DATE: 29 OCT 14 | | | |

PRIMARY INSTALLATION



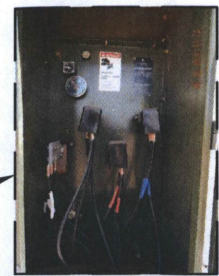
CONCENTRIC NEUTRAL

GROUNDING PATH
LOOP SYSTEM

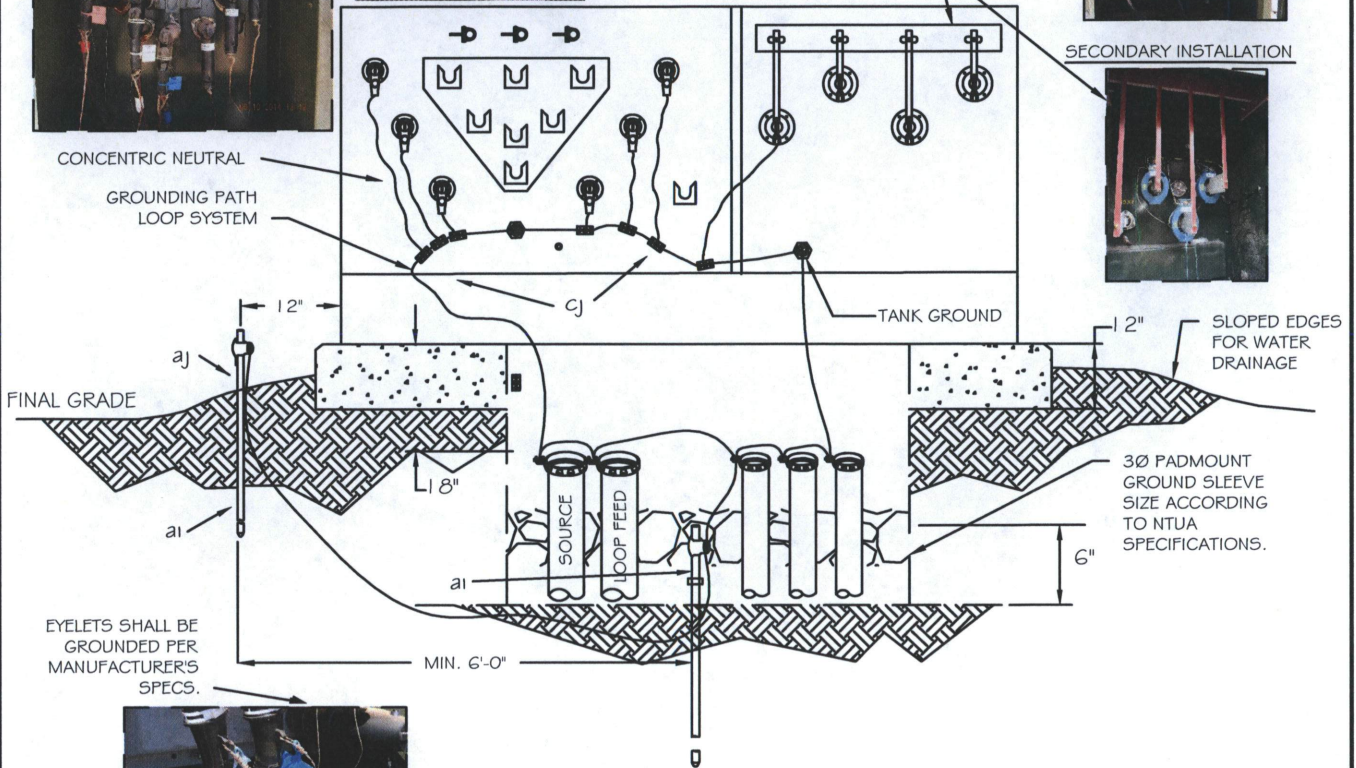


EYELETS SHALL BE
GROUNDED PER
MANUFACTURER'S
SPECS(MIN. #12 AWG CU).

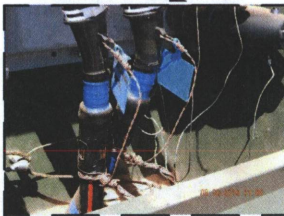
BUS BAR SUPPORT SHALL BE
USED WHEN 6 OR MORE HOLES
ARE NEEDED. SHALL BE
INSTALLED BY CONTRACTOR.



SECONDARY INSTALLATION



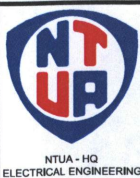
EYELETS SHALL BE
GROUNDED PER
MANUFACTURER'S
SPECS.



| ITEM | QTY | MATERIAL |
|------|-----|------------------------------------|
| p | | CONNECTORS, AS REQUIRED |
| ai | | GROUND RODS, COPPER 5/8"x8' MIN. |
| aj | | CLAMP, GROUND ROD (1 PER ROD) |
| | | JUMPERS, COPPER, AS REQUIRED |
| cj | | GROUND WIRE, #2 ,CU MIN. (AS REQ.) |

NOTES:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ENSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.
2. INSTALL WARNING AND DANGER STICKERS
3. GROUND ROD MAY BE INSTALLED HORIZONTALLY, 24" IN DEPTH. THE USE OF TWO RODS SHALL BE AS SPECIFIED (MIN. #4 AWG).
1-INSIDE ENCLOSURE
1-OUTSIDE PAD MOUNTED EQUIPMENT, INSTALL AS NOTED. (SEE CM-28 FOR HORIZONTAL INSTALLATION)
4. SECONDARY CABLES SHALL HAVE TAGS INSTALLED INDICATING WHERE CABLE IS TERMINATED.



| | | | |
|-----------------------|--------------------|-------|----------|
| DRAWN BY: | M. CHEROMIAH | DATE: | 9/23/14 |
| APPROVED ENGINEERING: | <i>[Signature]</i> | DATE: | 10/24/14 |
| APPROVED SAFETY: | <i>[Signature]</i> | DATE: | 10/29/14 |
| APPROVED MANAGEMENT: | <i>[Signature]</i> | DATE: | 2/10/15 |

| | | | |
|--------------|-------------------------------------|-------------|-------|
| DWG TITLE: | THREE-PHASE PAD-MOUNTED TRANSFORMER | | |
| REVISIONS 1: | | DWG NUMBER: | CM-29 |
| REVISIONS 2: | | PAGE: | 51 |

SAFETY FIRST

UNDERGROUND ELECTRIC
CONSTRUCTION STANDARDS

NAVAJO TRIBAL UTILITY AUTHORITY
PO BOX 170, FORT DEFIANCE, AZ 86504
928-729-5721
WWW.NTUA.COM

REVISED OCTOBER 2014
HEADQUARTERS ELECTRIC SYSTEM ENGINEERING DEPARTMENT