ELECTRIC SERVICE & METERING GUIDE

Issued: June 16, 2020

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Hancock-Wood Electric Cooperative Telephone Numbers:

Phone Number: 1-800-445-4840

Fax Number: 419-257-3024

Website: www.hwe.coop

Email Engineering: engineering@hwe.coop

Email Operations Scheduling: scheduling@hwe.coop

DIGGER'S NOTIFICATION REQUIREMENTS

Call Before You Dig!

Ohio Utilities Protection Service: Call 811

101. Service Area

Hancock-Wood Electric Cooperative provides electricity to residential, commercial, and industrial members in parts of 10 counties in northern Ohio, as shown in the figure below.

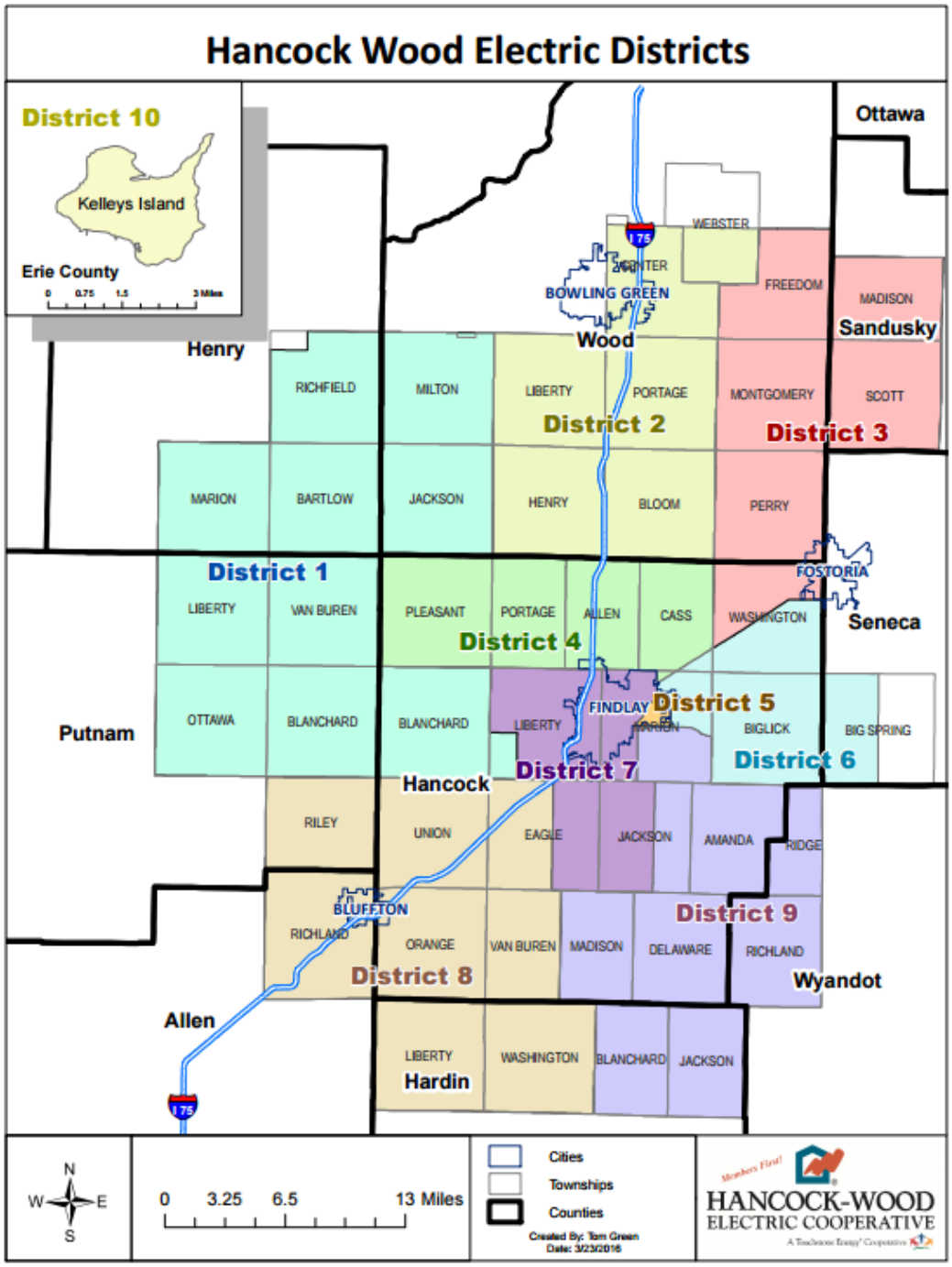


Figure 1-1 Hancock-Wood Electric Districts

102. Purpose

The purpose of this manual is to supply essential information to members, employees, contractors, architects, engineers, builders, and others concerned with the planning, construction, and operation of electric service installations within the service area. Hancock-Wood Electric Cooperative's objective is to assist members in obtaining safe and efficient electric service.

Information in this manual is intended to cover typical installations. Contact the Cooperative's Engineering Department for special cases not specifically covered in this manual.

All the information contained in this manual is to be used in conjunction with the Cooperative's Policies, Terms and Conditions of Service, Line Extension Policy, the National Electric Code (NEC), the National Electric Safety Code (NESC), and any applicable local or state regulations.

The information contained herein does not cover in detail the requirements of the Cooperative's rates, Line Extension Policy, Terms and Conditions of Service, or general rules. The Cooperative should be consulted regarding the specific information concerning these matters.

This edition of the Electric Service and Metering Guide shall supersede all previous editions. The information contained in this Electric Service and Metering Guide will be revised and added to from time to time. For the most recent version please visit Hancock-Wood Electric Cooperative's website at www.hwe.coop.

103. Service Reliability

It is the goal of Hancock-Wood Electric Cooperative to provide continuous electric service, restore interrupted service quickly, and maintain its facilities and equipment with minimal inconvenience to its members. The Cooperative does not guarantee continuous service, standard voltage, or standard frequency at all times.

Members operating equipment that is sensitive or requires a higher quality of service may need to install power-conditioning equipment for protection of the load at their own expense.

104. Procedures to Obtain Electric Service

Arrangements for new, upgraded, modified, or temporary electric services are made by contacting the Cooperative's Main Office. Making these arrangements with the Cooperative well in advance will help prevent delays in providing service when it is needed. The following shall be taken care of prior to any utility construction.

- The service and meter location must be approved by the Cooperative. The service entrance size, voltage, and connected load information will be provided to the Cooperative. A completed Electric Service Application must be received by the Cooperative prior to Cooperative Engineering Personnel visiting the site.

- A service connection fee and/or line extension charges may apply and need to be paid in full to the Cooperative prior to any construction.

- All easements required to extend electric service must be provided prior to construction.

- Any required clearing of trees and brush or any other obstructions must be completed and the ground surface must be within six inches of final grade prior to any construction.

- All new service locations shall have an electrical inspection performed and written documentation shall be submitted to HWE as verification of the inspection. In areas where there is a local inspection authority, such as within Wood County, you will need to contact the local inspection authority and comply with their inspection requirements.

- In areas where there is no local inspection authority, members are required to verify that the installation of their service entrance equipment has been inspected and approved by a State of Ohio licensed electrician. A "SERVICE ENTRANCE INSPECTION FORM" is available on our website www.hwe.coop and should be used for written documentation of inspection to be submitted to HWE. For a manufactured home, the inspection must be performed by an electrical inspector certified by the Ohio Manufactured Home Commission (OMHC).

- The Cooperative reserves the right not to connect the service if it believes there is non-compliance with the NEC, state and local requirements, or the requirements set forth in the Cooperative's Electric Service and Metering Guide.

- **Important Note: Members and/or electrical contractors shall not schedule construction until they are ready for Hancock-Wood Electric Cooperative to complete the installation. If Hancock-Wood Electric Cooperative personnel arrive and find the site not ready for complete installation, a trip fee will be assessed.**

105. Available Service Size and Voltages

The Cooperative furnishes 60 hertz alternating current, single and three-phase, at various voltages. It shall be noted that not all voltages are readily available in all areas and service extension charges may apply to extend the necessary distribution facilities. The Cooperative should be consulted as to the type of service available in any area before wiring layouts are made, equipment is purchased, or when extensive wiring changes are contemplated.

The types, sizes, and nominal voltages of services furnished are shown below. These voltages shall conform to the ANSI Voltage Standard C84.1.

- Single-Phase, 120/240 Volt, Three Wire: This service is available to members where the main service entrance equipment rating shall not exceed 800 amps (167 kVA).

- Single-Phase, 120/208 Volt, Three Wire: This service is available in a few designated areas. The maximum main service entrance equipment rating shall not exceed 200 amps (40 kVA).

- Three-Phase, 480 Volt, Three Wire: **Closed to new services.** Existing members with this voltage shall be allowed to increase their main service entrance equipment to a rating not to exceed 1200 amps (1000 kVA).

- Combination Single and Three-Phase, 120/240 Volt, Four Wire Delta: **Closed to new services.** Existing members with this voltage or 240 volt, three-phase, three wire delta shall be allowed to increase their main service entrance equipment to a rating not to exceed 2400 amps (1000 kVA).

- Combination Single and Three-Phase, 120/208 Volt, Four Wire Wye: This service is available to members where the main service entrance equipment rating shall not exceed 4000 amps (1500 kVA).

- Three-Phase 277/480, Four Wire Wye: This service is available to members where the main service entrance equipment rating shall not exceed 1800 amps (1500 kVA).

- Primary Voltage: Primary voltage service may be available to members where deemed appropriate and available.

106. Number of Services

The Cooperative will normally supply the following to each service location:

- One Service Lateral

- One Class of Service

- One Meter

The following shall be considered as exceptions to the rule.

- If allowed by the NEC 230.2.

  A. Special Conditions – Additional Services shall be permitted to supply the following:

     1. Fire Pumps
     2. Emergency Systems
     3. Legally Required Standby Systems
     4. Optional Standby Systems
     5. Parallel Power Production Systems
     6. Systems Designed for Connection to Multiple Sources for the Purpose of Enhanced Reliability

  B. Special Occupancies – By special permission, additional services shall be permitted for either of the following:

1. Multiple occupancy buildings where there is no available space for service equipment accessible to all occupants.
2. A single building or other structure sufficiently large to make two or more services necessary.

C. Capacity Requirements – Additional services shall be permitted under any of the following:

1. Where the capacity requirements are in excess of 2,000 amperes at a supply voltage of 1,000 volts or less.

2. By special permission.

D. Different Characteristics – Additional services shall be permitted for different voltages, frequencies, or phases, or for different uses, such as for different rate schedules.

E. Identification – Where a building or structure is supplied by more than one service, or any combination of branch circuits, feeders, and services, a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders, and branch circuits supplying that building or structure and the area served by each.

- Where more than one point of delivery or more than one point of metering is necessary because of interruptible service rate, governmental requirements or regulatory rules which require separate meters for each dwelling and commercial unit in a multi-dwelling unit residential building, mobile home park, and commercial building. This rule applies to any existing building which undergoes alterations involving a change in type of occupancy or substantial remodeling.

- Exceptions to the above rules may be made when clearly warranted due to unusual engineering or economic circumstances. Any exception shall be compliant with the NEC.

- The Cooperative may refuse to supply two separate services on large electrical service entrances where there is no indication of sufficient load.

107. Service Connections and Point of Ownership

The Cooperative will make all service connections to its electrical system. The Cooperative shall immediately disconnect any unauthorized connections or alterations to its electrical facilities and other equipment.

The Cooperative shall be notified when it is necessary to cut the meter seal due to situations where the electric service must be disconnected during an emergency or where it is necessary to access the meter socket by a qualified person. No persons, other than employees or agents of the Cooperative, may relocate meters or other equipment owned by the Cooperative. Members or contractors found to have broken a Hancock-Wood Electric Cooperative meter seal without prior

approval of the Cooperative may be subjected to a monetary penalty from the Cooperative. Repeated violations will be subject to escalating fines and/or penalties up to and including disconnection.

Energy and facilities provided by the Cooperative changes ownership at the point of service connection. The overhead point of ownership is where the Cooperatives service drop attaches to the member's wires on a building or pole above the service mast. The underground point of ownership is where the Cooperative's service lateral connects to the lugs in a metering socket, transformer lugs when CT metered, or termination box.

108. Short Circuit Duty Requirements

The member's service equipment shall be adequate to withstand and interrupt the maximum available short circuit current.

The following tables may be used as a guide for determining the minimum rating if there is only one installation or one group installation of service entrance equipment (all service entrance equipment is at the same location, such as at an apartment building) served from the Cooperative transformer. All multiple location applications shall be referred to the Cooperative for pre-design analysis.

Table 1-1: Short Circuit Duty Requirements
120/240 Volt, Single-Phase

Total Service Entrance Rating (Amps)	Minimum Short Circuit Current Rating (Amps)
100 or less	10,000
101-400	22,000
401-800	42,000

Table 1-2: Short Circuit Duty Requirements
120/208 Volt, Three-Phase

Total Service Entrance Rating (Amps)	Minimum Short Circuit Current Rating (Amps)
400 or less	22,000
401-800	42,000
801-3000	65,000

Table 1-3: Short Circuit Duty Requirements
277/480 Volt, Three-Phase

Total Service Entrance Rating (Amps)	Minimum Short Circuit Current Rating (Amps)
200 or less	10,000
201-400	25,000
401-1600	35,000
1601-3000	65,000

109. Conductor Identification

The neutral or grounded conductor of a service entrance (480 V and under) shall be identified by a white or gray color/tape, or by three continuous white stripes on other than green insulation along its entire length.

On four wire, delta connected secondary, where the midpoint of one phase winding is grounded to supply lighting and similar loads, per NEC 230.56, the phase conductor having the higher voltage to ground shall be identified by an outer finish that is orange in color, by tagging, or other effective means. Such identification shall be placed at each location where a connection is made if the grounded conductor is also present.

110. Cooperative Facilities and Equipment on Member Premises

The Cooperative shall have the right to install, inspect and maintain its equipment on the member's premises as necessary to furnish proper service. All such equipment will remain utility property and the utility shall have the right to remove it upon discontinuance of service.

The Cooperative shall have the right to utilize the member’s premises for ingress and/or egress as necessary to install, inspect and maintain its equipment.

The member shall be responsible for utility equipment damages and losses resulting from member interference, tampering or negligence.

111. General Service Entrance Requirements

Electrical wiring should only be done by those who have been trained in wiring techniques, code requirements and safety. The Cooperative will not inspect your wiring or provide electrical code interpretations.

Basic items for completing the service entrance to the premises main disconnect switch for a single family residential building include:

1. The minimum service size shall be 200 amperes for underground service and 100 amperes for overhead service. Underground services rated less than 200 amperes may be approved on a case by case basis.

2. The table below shows minimum conductor sizes for residential 120/240 single-phase three wire service entrances. (Conductor sizing from NEC 310.15 applies for wire/cable types THW, THWN, THHN and USE).

Table 1-4: Service Entrance Size Requirements

Service Size	Service Entrance Conductors	
Amperes	Copper	Aluminum
100	#4	#2
150	#1	2/0
200	2/0	4/0
400	400 KCM	600 KCM

3. Conduit sizing for entrances must be:

   - A minimum size of 3-inch Grey Schedule 40 Electrical PVC for underground services. Schedule 80 PVC is required for use under driveways, walkways and patios.

   - Rigid metal conduit is required for overhead masts to the weather-head were the Cooperative service conductor attaches directly to the mast. For 200 amperes or less services, the minimum rigid metal conduit size is 2 inches. Overhead masts should be back-guyed if necessary to provide strength based on NEC 230.28. No couplings are allowed in the service mast above the roof line. The top section of conduit must be securely anchored to the building just above any coupling.

   - Rigid metal conduit or Schedule 80 PVC is required for overhead masts to the weather-head were the Cooperative service conductor doesn't attach directly to the mast. For 200 amperes or less services, the minimum conduit size is 2 inches.

4. All aluminum connections must be made with aluminum rated connectors. The conductor and connector must be properly brushed, treated and dressed with approved corrosion inhibitors.

5. The main disconnect must be located within 6 feet of all self-contained meter sockets. For instrument rated service locations, please contact the Cooperative's engineering department for approval prior to determining the main disconnect location.

112. Service Entrance Upgrades

The member shall give the Cooperative reasonable notice of substantial load increases (permanent or temporary) which may require increased utility system capacity. The member shall be required to convert to a service voltage presently provided by the Cooperative if the load increase requires replacement of a main service disconnect. Refer to Section 105 for available voltages.

113. Service Disconnect and Meter Sequence

The location of the service disconnect, unless specifically approved by the Cooperative, shall be on the load side of the metering (meter-switch-fuse sequence).

Exception #1

In multiple meter locations where the National Electric Code requires a main disconnect, the sequence shall be Main Service Disconnect - Meter - Switch - Fuse.

Exception #2

For all 480Y/277 Volt services with self-contained meters, the sequence shall be Switch - Meter-Switch - Fuse.

Exception #3

For all 480Y/277 Volt services with transocket meters, the sequence shall be Switch – Meter – Switch – Fuse.

Exception #4

For all Primary Voltage services, the sequence shall be Fuse/Recloser – Meter – Switch – Fuse.

Chapter 2. Temporary Service

201. Temporary Overhead Services

The following technical requirements apply to temporary overhead services:

1. The Cooperative shall specify the location of temporary service pole(s) to avoid clearance problems. The temporary service pole will need to be clear of the route for permanent service.

2. Meter sockets shall be rated 100 or 200 amperes, be UL approved, of ringless design and have bypass horns or a manual lever bypass.

3. The switchgear shall be weatherproof or protected from the elements, have ground fault protection on all outlets, and be installed to comply with the electrical code.

4. Entrance conductor shall be a minimum of #4 copper or #2 aluminum for 100 ampere services and 2/0 copper or 4/0 aluminum for 200 ampere services. The member must provide protection for cable and conductors that is acceptable to the local electrical inspector and/or the Cooperative.

5. Two ground rods are required for grounding. The grounding electrode conductor should be terminated in the switchgear and not run through or terminate in the meter socket.

6. Structurally the temporary service pole shall be at least 5" in diameter at the top. Three 2”x4”s will meet this requirement. Bracing and stakes shall also be of 2”x4” construction.

7. The Cooperative shall connect the temporary service to its system.

8. Junk, unserviceable, or inadequate capacity equipment such as 60 ampere meter sockets and/or indoor 60 ampere fuse panels are not acceptable for temporary service. Any required return trips because of clearance problems, or unsafe and inappropriate equipment, will be at the member’s expense.

9. Temporary services are for short term use. A service of this type may be energized for one (1) year only.

10. Temporary services may be allowed on the Cooperative’s poles with its permission. Refer to Figure 2-1 in Appendix A for typical temporary service arrangements that are acceptable to the Cooperative.

202. Temporary Underground Service

Refer to Figures 2-1 and 2-2 in Appendix A for two typical temporary service arrangements acceptable to the Cooperative. The breaker panel must be weatherproof or protected from a wet environment. Please refer to the permanent underground service section (Chapter 4) for additional requirements.

Chapter 3. Overhead Service

301. General Requirements

The following general requirements shall apply to overhead services. **Closed to new service locations unless approved in advance by the Cooperative.**

- The Cooperative will make all service connections to its electric distribution system. Connection to or alteration of the Cooperative's facilities is prohibited and such action is subject to immediate disconnection.
- Typical service drops are furnished and installed by the Cooperative.
- The member shall provide and maintain an adequate service drop attachment to support the service drop.
- When a service mast is used to support the service drop, only the service drop is to be attached to it in accordance with NEC 230.28. Other utilities and member owned facilities shall not be attached to the service mast.
- A maximum of four service conduit risers shall be allowed at the building or structure.
- The service head is to be located at a height such that the service drop can be attached to the support and still maintain proper code clearance above ground, as shown in Figures 3-2 through 3-5 in Appendix A.

Grounding requirements are provided in Chapter 5.

Metering requirements are provided in Chapter 6.

302. Service Location

All metering facilities shall be located at the closest point practical from HWE distribution system. All metering facilities shall **not** be enclosed within a building or structure. All metering facilities shall **not** be located on the rear of residential structures. The proposed route should be as direct as practical, clear of obstructions from trees and have sufficient clearances to windows, doors, etc. as shown in Figure 3-1 in Appendix A. The member should consult with the Cooperative for the proper meter and service conductor attachment locations to the building. Existing meters will be required to comply when modifications to the service occur, (e.g. an upgrade, replacement, etc.). In addition, any location found unsuitable to the Cooperative will be required to be moved at the member's expense.

Figure 3-1 in Appendix A shows the separation requirements from doors, windows, vents, and gas utility equipment. Figure 3-2 in Appendix A shows a through the roof installation, and Figure 3-3 in Appendix A shows a wall mount installation. Figures 3-4 and 3-5 in Appendix A show pole mounted service entrances. Figure 3-4 shows an installation with secondary overhead conductors

to the pole, and Figure 3-5 shows an installation with primary overhead conductors and a transformer.

Chapter 4. Underground Service

401. General Requirements

The following general requirements shall apply to underground services.

- The Cooperative will make all service connections to its electric distribution system. Connection to or alteration of the Cooperative's facilities is prohibited and such action is subject to immediate disconnection.

- The underground service lateral is defined as the Cooperative's underground conductors from the last pole, pedestal, transformer, or any other Cooperative facility connecting to the member's metering point, termination equipment, or disconnect equipment. The Cooperative will supply, own, and maintain the underground service lateral in accordance with its extension rules.

- The Cooperative will not terminate service laterals inside the member's building or member owned switchgear. The termination point shall be outside the member's building in free standing or wall mounted equipment.

- The member shall contact the Cooperative for approval of service location prior to installing service entrance equipment. The member shall own, maintain, and install all service entrance facilities except the service lateral, meter, instrument transformers, and instrument transformer wiring.

- The Cooperative will not proceed with the installation of an underground service unless the proposed cable route is clear of all obstructions and within 4 inches of final grade.

- Modifying the grade more than 6 inches over the Cooperative's buried cables is not allowed.

Grounding requirements are provided in Chapter 5.

Metering requirements are provided in Chapter 6.

402. Service Location

All metering facilities shall be located at the closest point practical from HWE distribution system. All metering facilities shall **not** be enclosed within a building or structure. All metering facilities shall **not** be located on the rear of residential structures. The proposed route should be as direct as practical, clear of obstructions from trees and have sufficient clearances to windows, doors, etc. The member should consult with the Cooperative for the proper meter and service conductor attachment locations to the building. Existing meters will be required to comply when modifications to the service occur, (e.g. an upgrade, replacement, etc.). In addition, any location found unsuitable to the Cooperative will be required to be moved at the member's expense.

403. 100-200 Ampere Single-Phase Underground Service

Figure 4-1 in Appendix A depicts the service entrance in the traditional location. The main disconnect must be located within 6 feet of the meter socket.

404. 100-200 Ampere Single-Phase Underground Service on Bang Board

Figure 4-2 in Appendix A is applicable for underground service where the main breaker is an integral part of the outdoor underground service, and all equipment is mounted on a meter pedestal.

405. 320-400 Ampere Single-Phase Underground Service

320-400 ampere underground service will be supplied at 120/240 volts with a 320 class meter. Clearance, separation, typical arrangement and grounding requirements are the same as for other 120/240 volt single-phase services.

406. 600-800 Ampere Single-Phase Underground Service

600-800 ampere underground service will be supplied at 120/240 volts utilizing instrument rated metering. Member is responsible for the complete installation up to the secondary terminals of the Cooperative's transformer. Member is required to have an **external** disconnect within 10ft of the underground padmount transformer.

407. 200-600 Ampere Three-Phase Underground Service

200-600 ampere underground service will be supplied at either 120/208 or 277/480 volts utilizing instrument rated metering. Member is responsible for the complete installation up to the secondary terminals of the Cooperative's transformer. Member is required to have an **external** disconnect within 10ft of the underground padmount transformer.

408. > 600 Ampere Three-Phase Underground Service

Underground services larger than 600 ampere, not to exceed limits set in section 105, will be supplied at either 120/208 or 277/480 volts utilizing instrument rated metering. Member is responsible for the complete installation up to the secondary terminals of the Cooperative's transformer. Member is required to have a main disconnect that is either external to the building or internal to the building with direct door access from the outside. If main disconnect is located inside the building, the building shall be equipped with a knox box or equivalent.

409. Protective Posts for Padmounted Transformers

Protective posts are required where single-phase or three-phase padmounted transformers are subject to vehicular traffic. The installation and cost are the responsibility of the member. If the Cooperative must install this protection, the cost will be billed to the member or included in the service estimate. Figure 4-3 in Appendix A shows how the posts should be installed.

410. Fiberglass Vault for Single-Phase Padmounted Transformers

The construction specification for fiberglass transformer single-phase vaults is shown in Figure 4-4 in Appendix A.

411. Concrete Vaults for Three-Phase Padmounted Transformers

Construction specifications for concrete vaults are shown in Figure 4-5 in Appendix A.

412. Underground Primary Installations/Excavation and Conduit Requirements

Refer to Figure 4-6 in Appendix A for member excavation and installed underground conduit specifications.

413. Underground Secondary Installations/Excavation and Conduit Requirements

Refer to Figure 4-7 in Appendix A for member excavation and installed underground conduit specifications.

Chapter 5. Grounding and Bonding

501. General Requirements

In accordance with the National Electric Code (NEC), a permanent and effective ground shall be provided for all service entrance equipment. The neutral conductor shall also be grounded. Additional requirements include:

- The grounding electrode system consists of one or more grounding electrodes and the conductors which connect the grounding electrodes to the grounded service entrance neutral conductor at the service equipment. If available on the premises at each building or structure served, each item in NEC 250.52 (A) (1-6) shall be bonded together to form the grounding electrode system.
    - NEC 250.52 – Grounding Electrodes
        - Metal Frame of a Building or Structure – NEC 250.52(A)(2)
        - Concrete Encased Electrode – NEC 250.52(A)(3)
        - Ground Ring – NEC 250.52(A)(4)
        - Rod and Pipe Electrodes – NEC 250.52(A)(5)
        - Other Listed Electrodes – NEC 250.52(A)(6)
        - Plate Electrodes – NEC 250.52(A)(7)
        - Other Local Metal Underground Systems or Structures – NEC 250.52(A)(8)
- The grounding electrode conductor shall not be run through meter sockets or the utility portion of a meter pedestal with the following exceptions:
    - Metering equipment containing the service disconnect
    - Multi-position metering installations
- The grounding electrodes and conductor shall be buried a minimum of six inches below final grade.
- The grounding conductor shall be one piece in length and supported and protected by rigid conduit or as required by NEC 250.64(B) where physical damage may occur.
- Metal underground gas pipe and water lines shall not be used as a grounding electrode.

502. Grounding and Bonding Service and Metering Equipment

- Grounding electrodes and conductors shall be installed to the right or left side, never in front of, meter sockets or pedestals.
- The electrical contractor shall be responsible for all bonding connections.
- Meter sockets and cabinets shall be bonded to the system neutral.

- Bonding shall be provided, where appropriate, to ensure electrical continuity and ability to safely conduct fault current likely to be imposed.

- All non-current-carrying equipment shall be effectively bonded together.

- Bonding to other systems, such as telephone, cable, etc., shall not be permitted in a metering enclosure.

- Bonding shall be provided from metal enclosures, disconnects or meter sockets were located with 6ft of a Cooperative grounding electrode.

503. Grounding for Meter Sockets and Instrument Cabinets

Figure 5-1 in Appendix A shows the required grounding and bonding for wall mounted meter socket arrangement. Figure 5-2 in Appendix A shows the required grounding and bonding for wall mounted meter socket/main disconnect arrangement. Figure 5-3 in Appendix A shows the required grounding and bonding for wall mounted meter socket with instrument transformer cabinet arrangement.

504. Service Entrance Ground Conductor Requirements

The table below shows the required grounding electrode conductor and bonding jumper sizes for various service entrance conductor arrangements. The table is based on NEC 250.66 and 250.102.

Table 5-1: Grounding Electrode Conductor for Alternating Current Systems and Equipment Bonding Jumper on Supply Side of Service

Size of Largest Service-Entrance Conductor or Equivalent Area for Parallel Conductors		Size of Grounding Electrode Conductor	
Copper	Aluminum or Copper-Clad Aluminum	Copper	Aluminum or Copper-Clad Aluminum
#2 or smaller	1/0 or smaller	#8	#6
#1 or 1/0	2/0 or 3/0	#6	#4
2/0 or 3/0	4/0 or 250 Kcmil	#4	#2
Over 3/0 through 350 Kcmil	Over 250 Kcmil through 500 Kcmil	#2	1/0
Over 350 Kcmil through 600 Kcmil	Over 500 Kcmil through 900 Kcmil	1/0	3/0
Over 600 Kcmil through 1100 Kcmil	Over 900 Kcmil through 1750 Kcmil	2/0	4/0
Over 1100 Kcmil[1]	Over 1750 Kcmil	3/0	250 Kcmil
[1] Equipment bonding jumper for this category shall be not less than 12-1/2% of the area of the phase Conductors of the same materials.			

Chapter 6. Metering

601. General Requirements

Members shall provide a suitable location for meters and associated metering equipment without charge to the Cooperative.

Meters and/or Meter Sockets shall:

- Be in an accessible location to permit them to be read, inspected, and tested at all times. Single meter installations shall normally be 5 feet above final grade. Multiple meter installations have all meters between 2 feet 6 inches and 5 feet 6 inches above final grade.

- Be located on a solid structure that is free from vibration, possible mechanical damage, and supported to maintain the meter socket in a level and plumb position.

- Be protected from damage by falling ice, snow, or other objects. A protective shield for the meter should be provided where the meter is not shielded by a roof overhang.

- Have a clear working space in front of the meter panels of a minimum of 3 feet, a vertical clearance of 6 feet 6 inches, and a horizontal clearance of 30 inches, or the width of the equipment, whichever is greater. Where instrument transformer cabinets are used, the clear working space in front of the cabinet shall be 2 feet greater than with the cabinet cover in an extended position or 3 feet, whichever is greater.

- Have a minimum of 4 inches of clearance on all sides of the meter socket.

- Be located outdoors in a readily accessible location free of hazardous conditions such as explosive fumes or materials.

- Group-metered installations of more than six meters shall have a single disconnecting means. The Cooperative shall be consulted before planning or installing such an installation.

Multiple meter installations shall comply with the rules above.

Multiple meter installations shall also:

- Be grouped at a location suitable to and approved by the Cooperative.

- Have each meter socket and service switch permanently marked with the location being served. The location being served shall be similarly labeled. The identifications shall be on the outside of the metering panels (for the meter readers and tenants), inside the meter enclosure on a non-movable surface, and at the service panel that the meter serves. Inside identification shall be permanently marked with the location being served. Labels to be approved by the Cooperative.

The meter location **shall not**:

- Be installed in patio, porch, deck or carport areas, or areas likely to be enclosed. Changes to the member's service location shall not result in making an existing metering location unsafe or inaccessible for reading, inspecting, or testing. If this occurs, the member will be responsible for bringing the meter location back into compliance. If, after a reasonable length of time has passed after receiving a non-compliance notification from the Cooperative, the member has not suitably brought the installation into compliance, the Cooperative will terminate service until the non-compliance has been remedied.

- Be installed on mobile homes.

- Have member or member owned lightning arrestors or surge protection devices installed in metering equipment. The member should install these devices on the load side of the service overcurrent protection devices. Similarly, metered and unmetered conductors shall not be installed in the same raceway or conduit, nor shall any member owned meters or instruments be connected to the Cooperative's meter wiring.

Refer to the metering diagrams in Appendix B for more information.

602. 200-400 Ampere Single-Phase Overhead Service

Minimum meter socket requirements are as follows:

- Shall be ringless style.

- Shall have clamp type jaws that are tin plated with meter blade guides, 600V rated, sealable with blade lock provisions, wrench operated terminal connectors for use with aluminum and copper conductors.

- Shall be Underwriters Laboratories Listed and labeled as such.

- Shall have a 2in hub for 200 amperes, 3in hub for 320-400 ampere services.

603. 200-400 Ampere Single-Phase Underground Service

- Shall be ringless style.

- Shall have clamp type jaws that are tin plated with meter blade guides, 600V rated, sealable with blade lock provisions, wrench operated terminal connectors for use with aluminum and copper conductors.

- Shall be Underwriters Laboratories Listed and labeled as such.

- Shall have a minimum 3in knockout for 200-320 ampere or 4in knockout for 400 ampere underground services.

- Shall be side wire/bused design for straight in wiring. The left side will be for the line side and the right for load side.

604. Meter Installations for Multi-Gang Meter Sockets 2-4 Meters

- Shall be ringless style.
- Shall have clamp type jaws that are tin plated with meter blade guides, 600V rated, sealable with blade lock provisions, wrench operated terminal connectors for use with aluminum and copper conductors.
- Shall be Underwriters Laboratories Listed and labeled as such.
- Consult Cooperative on incoming minimum conduit and knockout sizes.
- Shall have individual main disconnects on the load side of the meter sockets.

605. Instrument Transformer Metering

Single-phase installations over 400 amperes will be metered with instrument transformers. All three-phase services exceeding 200 amperes will be metered with instrument transformers.

Current Transformer Installation

Current transformers shall be installed in an approved cabinet or inside the Cooperative padmount transformer on underground installations. They may be installed at the mast head or in a cabinet for overhead services. All low side wiring on the current transformers will be done by the Cooperative. Polarity marks (H1 or white dot) on the CT window must face in the direction of the supply. Conductors from the utility supply shall enter the CT at the end with the polarity mark. All conductors of one phase shall pass through the same current transformer. The Cooperative will furnish all current transformers.

Voltage Transformer Installation

Voltage transformers will be required on all 480 volt services. Voltage transformers shall be mounted in the same cabinet as the current transformers. On overhead services, they may be mounted on the mast head along with the current transformers. The voltage transformers should be mounted in a location where the conductors will not interfere with proper access. The Cooperative will furnish the voltage transformers and complete all voltage transformer wiring.

Instrument Transformer Cabinet Requirements

The cabinet must have provisions for a padlock and meter seal, must be weather tight, and must be large enough to allow ample space for CT's, VT's, and conductors.

606. Three-Phase 200 Ampere Overhead Service

Minimum meter socket requirements are as follows:

- Shall be ringless style.
- Shall have clamp type jaws that are tin plated with meter blade guides, 600V rated, sealable with blade lock provisions, wrench operated terminal connectors for use with aluminum and copper conductors.
- Shall be Underwriters Laboratories Listed and labeled as such.
- Shall have a 2in hub for overhead mast pipe.
- The meter sockets shall have a manual bypass which is designed to permit visual checking of the bypass connections with the meter installed. The socket must also be designed so that the cover cannot be installed in the bypass closed position.

Termination enclosures may be necessary with certain wiring, spacing, clearance, or equipment choices. The member should consult with the Cooperative before planning or utilizing these enclosures.

607. Three-Phase 200 Ampere Underground Service

Minimum meter socket requirements are as follows:

- Shall be ringless style.
- Shall have clamp type jaws that are tin plated with meter blade guides, 600V rated, sealable with blade lock provisions, wrench operated terminal connectors for use with aluminum and copper conductors.
- Shall be Underwriters Laboratories Listed and labeled as such.
- Shall have a minimum 3in knockout for conduit riser.
- Shall be side wire/bused design for straight in wiring. The left side will be for the line side and the right for load side.
- The meter sockets shall have a manual bypass which is designed to permit visual checking of the bypass connections with the meter installed. The socket must also be designed so that the cover cannot be installed in the bypass closed position.

608. Underground Current Transformer Cabinets 400-800 Amperes

This metering arrangement is applicable for underground services 400-800 amperes using bolt-in current transformers only. The Cooperative should be consulted before using current transformer cabinets.

General requirements are outlined below.

- The current transformer (CT) cabinet must be mounted outdoors.
- The CT cabinet must be bonded in accordance with NEC 250.102(d).
- The minimum clear space in front of the CT cabinet shall be 3 feet, or 2 feet beyond the maximum cover swing distance, whichever is greater.
- In four wire 120/240 volt three-phase installations, the wild leg shall be identified with orange tape or other appropriate means.
- Member owned facilities shall meet all applicable local and state electric code requirements.
- The Cooperative shall own and maintain the cabinet along with the contents of the cabinet.

609. Underground Current Transformer Cabinets 1,000 - 2,000 Amperes

This metering option is applicable to underground three-phase service from 1,000 amperes to 2,000 amperes. The Cooperative should be consulted before using current transformer cabinets.

General requirements are outlined below.

- The CT cabinet must be mounted outdoors.
- The CT cabinet must be bonded in accordance with NEC 250.102(d).
- The minimum clear space in front of the CT cabinet shall be 3 feet, or 2 feet beyond the maximum cover swing distance, whichever is greater.
- In four wire 120/240 volt three-phase installations, the wild leg shall be identified with orange tape or other obvious suitable means.
- Member owned facilities shall meet all applicable local and state electric code requirements.
- The Cooperative shall own, install and maintain the current transformer cabinet along with its contents.

610. Metering in Switchgear 1,600 - 3,000 Amperes

This metering option is available to members with a 1,600 through 3,000 ampere service entrance. The member should consult with the Cooperative early in the planning and design phase on metering and current transformer layouts to obtain timely approvals.

Elements common to the design are:

- The minimum depth of the current transformer cabinet is 24".
- Doors shall be hinged and have a lockable hasp.
- Buses should be braced to support conductors and CT's.
- CT's must be adjustable for depth and height.
- Bus shall be adequately braced to support CT’s and conductors.
- The member should submit detailed drawings to the utility for approval before ordering any equipment.

611. Overhead Service 400 – 2,000 Amperes with Current Transformer Metering

This metering requirement is applicable for overhead services 400 - 2,000 amperes. The Cooperative should be consulted before using current transformer cabinets.

General requirements are outlined below.

- The CT cabinet must be mounted outdoors.
- The CT cabinet must be bonded in accordance with NEC 250.102(d).
- The minimum clear space in front of the CT cabinet shall be 3 feet, or 2 feet beyond the maximum cover swing distance, whichever is greater.
- In four wire 120/240 volt three-phase installations, the wild leg shall be identified with orange tape or other obvious suitable means.
- Member owned facilities shall meet all applicable local and state electric code requirements.
- The Cooperative shall own, install and maintain the current transformer cabinet along with its contents.

612. Meter Ice and Snow Shield

An ice and snow shield should be utilized where meters are not protected by a building overhang and are subject to damage from falling ice and snow, particularly from metal roofs. The building owner is responsible for furnishing and installing the shield.

Chapter 7. Mobile Home Service

701. Mobile Home Service

A mobile home is defined by NEC 550.2 to be: a factory-assembled structure or structures transportable in one or more sections, that is built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required utilities, and includes the plumbing, heating, air-conditioning and electric systems contained therein. For this code and unless otherwise indicated, the term "mobile home" includes “manufactured homes".

Mobile homes, if the axles, wheels, and/or tongue are still in place, are considered movable. The code authority, local or state inspector should be consulted for the applicable code sections if the mobile home has been rendered immovable. The Cooperative will consider all manufactured homes to be mobile homes unless the code authority issues an opinion to the contrary.

Mobile home service extensions shall comply with the following standards:

1. The Cooperative shall specify the location of the service entrance facilities which shall comply with all code clearances. The member will install the mobile home service pedestal(s) with the meter pointed toward the driveway or street. The member shall also label the pedestal to identify the mobile home being served where it is not obvious.

2. Other requirements for mobile home service are:

   A. Service will be 120/240 volt single-phase.

   B. The service entrance equipment must be rated 100 amperes or greater, be waterproof, and be mounted at least 5 feet above finished grade level.

   C. The service entrance cannot be mounted on the mobile home, and it must be within sight of the mobile home, but not more than 30 feet from the mobile home.

   D. The entrance panel must have at least a 50 ampere 120/240 volt breaker.

   E. The electrical panel shall have branch circuit capability for serving an accessory building, structure, or additional electric equipment. The entrance equipment should also have provisions for serving an outdoors 15 or 20 ampere, 120 volt GFI outlet.

   F. Two 8' ground rods with a minimum 6' separation shall be installed for grounding. The grounding electrode conductor shall be at least #6 copper enclosed in PVC conduit and terminated in the service panel without entry into or connection to the meter socket.

   G. The member cable or cord from the entrance panel shall have an equipment ground, neutral conductor, and two hot conductors.

3. Adequate clearances and separations must be followed. Overhead services require minimum vertical clearances at Cooperative calculated worst case sag:

A. Mobile home, garage roof, decks, patio, accessible structures: 11’

B. Lawns, sidewalks, residential driveways: 12’

The member should contact the Cooperative to discuss the arrangement for installations involving more than one meter at a single location.

Chapter 8. Special Service

801. Cable Television Power Supplies

Cable television power supply service is available at 120/240 volt three wire single-phase. The cable television company should contact the Cooperative to ensure that this voltage is available at the desired location.

The following requirements apply:

1. All installations must conform to all applicable electrical codes and the electric utility's requirements for clearances, climbing space, and working space. Only qualified and authorized cable television representatives shall make this installation. Those representatives shall be trained and knowledgeable of clearance requirements and working rules of the NESC and requirements of OSHA. The cable television representatives shall be trained and competent in:

    - Identifying and distinguishing electric utility system components and exposed live parts.

    - The techniques necessary to determine the nominal voltage of exposed live parts.

    - The minimum safe approach distances corresponding to the voltages to which the qualified representatives will be exposed.

2. The cable television company shall furnish and install all equipment and materials except the Cooperative's meter.

3. The meter socket shall be a minimum of 100 ampere, ringless and have manual bypass horns for 120/240 volt three wire service.

4. The service entrance conductors shall be run in non-metallic conduit. The service entrance conductors shall use 600 volt insulation and shall extend a minimum of 24" beyond the weather head. The electric utility will make the service connections.

5. The service disconnect, power supply unit, meter socket, and cable television cable shall be located in the same quadrant on the pole. There shall also be a maximum of 6" between the service entrance conductors and the cable television cable.

6. Service grounding shall comply with the NEC 250, which requires a separate ground, ground lead, and two ground rods for the service.

7. The service conductor should be sized for the actual disconnect size utilized.

8. Refer to Figure 8-1 in Appendix A for a typical CATV power supply arrangement.

802. Unmetered Decorative Holiday Lighting

Unmetered decorative holiday lighting service is available to local governmental units only with Cooperative approval. A master agreement between the Cooperative and the governmental unit is required. The Cooperative reserves the right to deny such attachments. The preferred method is to meter this service.

Decorations and festoonery should be removed when billing is terminated. All decorative materials and service equipment must be of approved materials. Decorations shall not be strung between utility poles. Figure 8-2 in Appendix A shows the typical installation requirements.

General service requirements are:

1. The installation must comply with all electrical codes.

2. The service entrance may be 120 volts or 120/240 volts, depending on the load requirements and the availability of the supply voltage at the service location. Service equipment should be securely bonded or lagged to the pole. Drilling of holes in poles is not permitted without the specific authorization from the Cooperative.

3. Service entrances shall not be installed on poles with transformers, regulation, switching, or protective devices, or on corner poles.

4. An earth ground is not required provided that a separate grounding conductor is run from the entrance switch enclosure with the service entrance conductors and connected to the secondary neutral by the utility. The green ground wire must connect the switch box, receptacle and conduit.

5. The weatherproof receptacle must have a minimum ground clearance of 10 feet.

6. All work must be done by trained and qualified personnel.

Chapter 9. Primary Service

901. Primary Service

Primary service (service at voltages above 600 volts) is only available upon Cooperative approval. The member must make application to the Cooperative for the proposed primary service and obtain approval of the location, equipment, and design before starting installation of the service entrance.

The Cooperative furnishes, installs, and maintains the primary service and metering equipment in accordance with the Cooperative's applicable rates and extension rules. The member furnishes, installs, and maintains all service entrance facilities at the service point, other than the metering equipment, regardless of the metering location. Refer to Figure 9-1 in Appendix A

Other general requirements for primary metered service include:

1. The member's system beyond the metering point must comply with all applicable NEC, state, and local electric code requirements.

2. Overcurrent protection shall be provided for all branch lines and transformers.

3. Clearances and separations must be maintained to the Cooperative’s metering equipment. See Chapter 6 on metering requirements.

4. Members shall only use grounded wye / grounded wye five-legged or triplex core transformers. Members may only use delta-wye wound transformers with advance Cooperative approval. Members may not use three-legged transformers because they can cause substantial overvoltage damage to utility and member owned equipment during single-phase outages.

Chapter 10. Clearances

1001. General

The NESC and OSHA specify minimum clearances between electric lines and other facilities for safety.

Unless otherwise noted, all clearances are from surface-to-surface and all distance requirements are measured center-to-center.

1002. Clearance Requirements for Overhead Service Conductors

Horizontal and vertical clearances must meet the latest edition of the NESC and all applicable local codes.

1003. Padmounted Transformer Clearances

The Cooperative shall approve the location of all transformer pads. Pad locations shall be in accordance with the requirements of NEC, NESC, National Fire Protection Association and the Environmental Protection Agency. In addition, they are to be located far enough from the building overhang, so they will not be subject to damage by falling snow and ice. Padmounted transformer locations shall be graded for proper drainage and be readily accessible by truck or other means for change-out. Where danger of snow plowing or traffic damage exists, barriers consisting of concrete filled pipe shall be provided for protection.

Transformers shall have a minimum separation of five feet from natural gas service equipment. A minimum separation of five feet shall be maintained between transformers and liquid petroleum facilities on site but not filled on-site. If the liquid petroleum facilities are filled on-site, the minimum separation is ten feet.

The following clearances apply to the location of oil-insulated padmounted transformers near buildings.

- Padmounted oil-insulated transformers may be located directly next to noncombustible walls, but not closer than three feet, if all the following clearances are maintained from doors, windows, and other building openings.

- Combustible walls are walls of Type No. 8 buildings as determined by COMM 51.03. Type 8 buildings are "unprotected wood frame". Veneers of stone, brick, metal, etc. do not change the classification unless rated by UL as a Type 7 assembly. All other walls are considered to be non-combustible.

- Padmounted oil-insulated transformers shall not be located within a zone extending 20 feet outward and 10 feet to either side of a building door. Refer to Figure 10-1 in Appendix A.

- Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet outward and 10 feet to either side of an air intake opening. If the air intake opening is directly above the transformer, there must be a 25 foot vertical distance from the opening to the transformer. Refer to Figure 10-2 in Appendix A.

- Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet outward and 3 feet to either side of a building window or opening other than an air intake. Refer to Figure 10-3 in Appendix A.

- Padmounted oil-insulated transformers shall not be located less than 5 feet from any part of a second story window.

- For combustible walls, padmounted oil-insulated transformers rated 100 kVA or less shall be located according to the provisions set forth for non-combustible walls. Padmounted oil-insulated transformers in sizes above 100 kVA shall be located a minimum of 10 feet from the building wall in addition to the clearances from building doors, windows, and other openings set forth for non-combustible walls. Also, an oil containment sump shall be installed as part of the vault installation for transformers rated above 500 kVA if the immediate terrain is sloped toward the building.

- Installations using 75 kVA three-phase padmounted transformers should be designed using the clearance requirements for a 150 kVA transformer to accommodate a future capacity upgrade.

- If the clearances specified above cannot be obtained, a fire-resistant barrier shall be constructed in lieu of the required separation. The barrier shall extend to a projection line from the corner of the padmounted transformer to the furthest corner of the window, door, or opening in question. The height of the barrier shall be 1 foot above the top of the padmounted transformer. Refer to Figures 10-4 through 10-5 in Appendix A.

- For combustible walls, the barrier shall extend 3 feet beyond each side of the padmounted transformer. The height of the barrier shall be 1 foot above the top of the transformer.

- Padmounted oil-insulated transformers shall not be located within a zone extending 20 feet outward and 10 feet to either side of the point where a fire escape meets the ground. Padmounted oil-insulated transformers located beneath fire escapes shall have a vertical clearance of not less than 10 feet from the top of the transformer to the bottom of the fire escape. Refer to Figure 10-6 in Appendix A.

1004. Clearance from Gas Lines

The separation in any direction between buried gas and electric and/or communications facilities shall be a minimum of 12 inches. If this clearance cannot be attained, the gas line shall be protected from damage that might result from the proximity of the electric supply or communication direct-buried system.

1005. Clearance from Wells

Overhead open supply conductors shall not be located over wells. The horizontal clearance with conductors at rest shall not be less than ¾ of the vertical clearance to ground. The horizontal clearance shall not be less than 10 feet while the conductors are displaced by wind.

Underground supply cable shall have at least a 5 foot separation to the well installation.

1006. Clearance from Sewer Equipment

The horizontal separation between direct-buried cable and underground sewer lines should not be less than 12 inches, to permit maintenance access to either facility without damage to the other.

The separation in any direction between buried electric conductors and drain fields, alternate fields or septic tanks should be at least 5 feet if less than 480 volts and 10 feet if 480 volts or more.

1007. Clearance from Material Storage Areas

Overhead lines shall not be located over designated material storage areas where material is regularly stored and handled by cranes, dump trucks, elevators or other types of high machinery unless the clearance of such lines is adequate to permit the full use of the equipment.

1008. Clearance from Fuel Storage Tanks

Electric lines shall not be located over aboveground flammable liquid or liquefied petroleum gas (LPG) storage tanks. A horizontal clearance of not less than 8 feet is required for services and secondary cables and 15 feet for all other conductors. LPG tanks with a capacity of 1,000 gallons or less, or tanks enclosed in a building, or fully covered by a roof or canopy capable of preventing a falling overhead supply conductor from directly contacting the tank, are exempt from this requirement.

A horizontal clearance of not less than 20 feet is required from gasoline dispensers, not less than 10 feet is required from tank fill pipes, and not less than 3 feet is required from tank vent pipes.

Underground supply cables shall not come within 10 feet of aboveground or belowground fuel storage tanks. Underground cables shall not go under fuel storage tanks.

1009. Clearance from Antennas

Outdoor antennas and supporting structures attached to buildings shall have a horizontal clearance from utility electric lines greater than the total height of the antenna and supporting structure.

Service cables of 150 volts or less to ground shall have a minimum clearance of 3 feet 6 inches from the antenna and supporting structure, except a minimum clearance of 2 feet is permitted from the service conductor drip loop.

1010. Requirements for Conductors Under Buildings

Cooperative owned underground electric lines shall not pass under buildings unless prior written approval is obtained from the Cooperative. If approved, the Cooperative at that time will provide applicable installation and conduit requirements.

1011. Clearance from Swimming Pools

No conductors shall be located over, under, or adjacent to any swimming pool, spa, or hot tub.

1012. Clearance Envelope for Grain Bins

NESC rule 234F specifies the minimum clearances of wires, conductors, cables, and rigid live parts from grain bins. A clearance of not less than 18 feet is required in all directions from probe ports in the grain bin roof to all wires, conductors, and cables. A vertical clearance of at least 12.5 feet and a horizontal clearance of at least 15 feet shall be maintained between grain bins with permanently installed elevator systems and open supply conductors operating from 0 to 22,000 volts. The distances are measured from the outermost and uppermost parts of the grain bin/elevator structure.

The horizontal clearance requirement on the loading side of a grain bin filled with portable auger/elevator systems is increased to the sum of the grain bin height plus 18 feet. Refer to Figures 10-7 and 10-8 in Appendix A.

1013. Tree and Other Vegetation Clearances

Refer to Figure 10-9 in Appendix A for required clearances.

Chapter 11. On-Site Generation

1101. General

Member owned emergency, standby, and parallel generation systems are subject to the Cooperative's electric service rules, and various federal, state, and local rules. The Cooperative's rules include:

- The member shall inform the Cooperative of plans to install and connect any generating equipment to its electrical system.
- The generating equipment shall not introduce potentially dangerous situations to the Cooperative's personnel or the public.
- Generation that can operate either momentarily or continuously in parallel with the Cooperative's facilities shall incorporate protective devices (relays, circuit breakers, etc.) and metering equipment as specified by the Cooperative's specific interconnection agreement with the member.

NEC Article 700 addresses emergency systems, Article 701 addresses legally required standby systems, Article 702 addresses optional standby systems, and Article 705 addresses interconnected electric power production sources.

1102. Standby Generators

Standby generating equipment shall be connected to the member side of the meter with properly sized double-throw switches or transfer switches so that the member's generating equipment cannot reverse-energize the Cooperative's supply lines.

1103. Parallel Generation

Proposed parallel generation installations require that the owner/operator enter into a contractual agreement with the Cooperative. The member should consult the Cooperative for the rules and requirements that are specific to the proposed arrangement.

Chapter 12. Service Impairing Equipment

1201. Motors and Associated Equipment

All member owned equipment shall be protected from excessive current with fuses, thermal cutouts, overload relays, or other relays and devices designed to protect the individual device. The excessive current may result from overvoltage, undervoltage, or single-phase operation of three-phase equipment, phase reversal or other abnormal conditions. The member shall provide this protection considering the characteristics of the utilization equipment and the requirements of the process and function being performed.

To prevent service impairment to other members, it is necessary to establish limits for the allowable motor starting currents. The member should consult the Cooperative to determine the specific voltages available at a given location before specifying its equipment.

When equipment loads require varying torque during each cycle of operation, such as a compressor or reciprocating pump, the combined installation should have enough momentum in its moving parts so that its operation will not cause unacceptable service interference to other members.

The following motor requirements shall apply to all non-commercial installations:

- Automatically controlled and frequently started single-phase fractional horsepower motors whose locked rotor currents do not exceed 23 amperes may be connected to 120 volt circuits.

- Manually controlled or infrequently started single-phase motors, one horsepower or less whose locked rotor currents do not exceed 50 amperes may be connected to 120 volt circuits

- Infrequently started single-phase motors of 10 horsepower or less may be connected to 240 volt commercial lighting and residential circuits if their locked rotor currents do not exceed the values shown in the next section describing motor service available on power rates.

- Infrequently started three-phase motors of 10 horsepower or less, connected through single-phase to three-phase converters may be used on residential and commercial lighting circuits.

- Single-phase motors above 10 horsepower are not permitted.

The types of motor service available on power rates and combined light and power rates, single-phase, and three-phase are as follows:

- Motors with prolonged periods of continuous operation under maximum load conditions and having not more than four starts per hour may be connected if their locked rotor currents do not exceed those listed in the following table. Consult the Cooperative where

these conditions cannot be met, or where equipment ratings and/or starting characteristics exceed the values in the table:

Table 12-1: Motor Starting Table

Motors Rated	Total Locked Rotor Current not to Exceed
120 volts, single-phase	50 amperes
240 volts, single-phase	
2 horsepower or less	60 amperes
2 to 6.5 horsepower	60 amperes plus 20 amperes per horsepower in excess of 2 horsepower
6.5 to 15 horsepower	250 amperes plus 10 amperes per horsepower in excess of 6.5 horsepower
240 volts, three-phase	
2 horsepower or less	50 amperes
2 to 19.9 horsepower	50 amperes plus 14 amperes per horsepower in excess of 2 horsepower
20 horsepower to 40 horsepower	300 amperes plus 4 amperes per horsepower in excess of 20 horsepower
50 horsepower and over	8 amperes per horsepower

- Motors above 10 horsepower rating are to be three-phase.
- New installation of motors of 50 horsepower or larger shall be approved by the Cooperative as to motor type, starting and protective equipment, and as to availability of an adequate power supply at the proposed location.
- For motors of higher voltage rating than shown in the motor starting table, the allowable currents are inversely proportional to the voltages.
- Motors subject to frequent starts, such as elevator and hoist motors, when connected to the secondary distribution system should have their starting current limited to 100 amperes.

1202. Electric Water Heating

All electric water heaters shall be connected in accordance with local and state plumbing codes.

Water heaters shall be equipped with resistive heating elements which may be connected to 120 volts or 240 volts. If connected at 120 volts, the maximum heating element is 1,650 watts. If connected at 240 volts, the maximum heating element size shall be 5,500 watts. Water heaters having two or more elements shall have the heating elements interlocked to limit the connected load to the above limits.

Instant recovery water heaters with wattages above 5,500 require the permission of the Cooperative to connect.

1203. Electric Space Heating

Electric space heating equipment designed to operate at 120 volts shall be limited to 1,650 watts controlled by a single thermostat. Electric space heating equipment designed to operate at 208 volts and greater shall be limited to 6,000 watts controlled by a single thermostat. Equipment exceeding 6,000 watts shall be energized in stages not exceeding 6,000 watts per stage and at time intervals between stages of at least 3 seconds.

1204. Electric Welders and Furnaces

Electric welders and furnaces may not cause interference or impairment to the service of other members. The Cooperative requests notification before a welder or furnace is connected to ensure that its facilities have adequate capacity and service to other members is not impaired.

1205. Harmonics and High Frequency Equipment

All member owned utilization and production equipment causing high frequency current or harmonics must comply with IEEE Standard 519. The Cooperative can disconnect if not brought into compliance.

All wiring carrying high-frequency current shall be located as remotely as possible from the meter and wiring of the building. The Cooperative may require the member to install an isolation transformer or filters to protect the meter and metering devices, and limit service interference to adjacent members.

1206. Air Conditioners

Air conditioners for use at 120 volts single-phase are limited to a maximum locked rotor current of 50 amps and a maximum of four starts per hour.

Air conditioners and heat pumps for use at 240 volts or 208 volts single-phase are limited to locked rotor currents as follows and a maximum of four starts per hour.

Table 12-2: HVAC Equipment Starting Current Limits

BTU per Hour Rating (BTUH)	Total Locked Rotor Current Limitation
Up to 20,000	60 amps
20,000 to 36,000	60 amps plus 3 amps per 1000 BTUH in excess of 20,000 BTUH.
Over 36,000	Consult the Cooperative
Note: 12,000 BTU = 1 Ton	

Please refer to Table 12-1 for starting limitations on three-phase air conditioners.

1207. Phase Balance Equipment

The member shall balance electrical loads on the service entrance. Each phase conductor shall carry at least 25% of the total KVA at maximum load conditions.

1208. Power Factor Correction

The member may be required to limit the size of static power factor correction installations or to maintain effective control of the capacitors to prevent excessively high voltage at the service location.

Member owned power factor corrective equipment shall be installed on the load side of the service disconnecting device and metering.

1209. Electrical Equipment Protection and Safety

The member shall provide protection against low voltage or phase loss where low voltage, phase loss, or unexpected restarting could cause damage to the member's equipment or result in personal injury.

The member shall install control apparatus equipped with reverse-phase relays on all poly-phase motor installations for elevators, hoists, cranes, and any manufacturing processes where accidental reversal of rotation may cause injury to persons or damage to equipment or work in progress.

Appendix A: Service Drawings

General Construction Notes:

1. Temporary service drop not to exceed 10'. Temporary structure to be installed not less than 6' from Hancock-Wood Electric Cooperative pole.
2. The service attachment shall be installed at a height that maintains 12' clearance for service drop conductors.
3. Nail timbers full length, minimum size 10D (3") nails. Treated timber is required.

General Condition Notes:

Hancock-Wood Electric Cooperative will be responsible for:

(a) Providing and installing the overhead service drop (#2 triplex service drop).
(b) Providing and installing the meter.

The Member will be responsible for:

(a) Providing and installing the meter base.
(b) Providing and installing the completed temporary structure to which service drop will be attached. Installation must meet HWEC requirements.
(c) A tool shed (if available) or other type of fixed support may be used as a temporary service drop attachment if such support provides equal strength and proper clearances.
(d) Providing and installing service entrance cable and service entrance equipment.

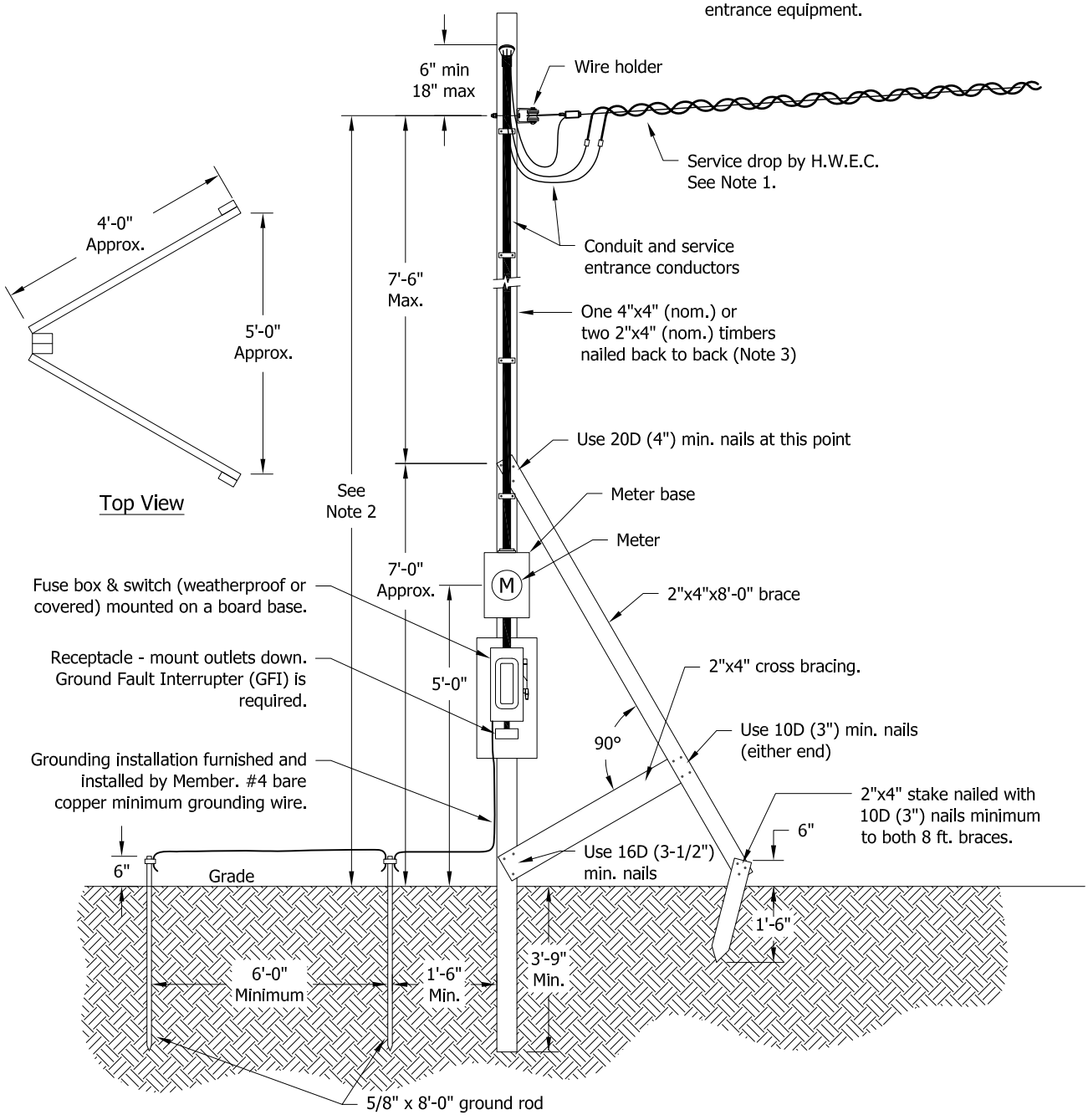


Figure 2-1

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Temporary Service

Temporary Overhead Service (Figure 2-1)

AUTOCAD FILE LOCATION

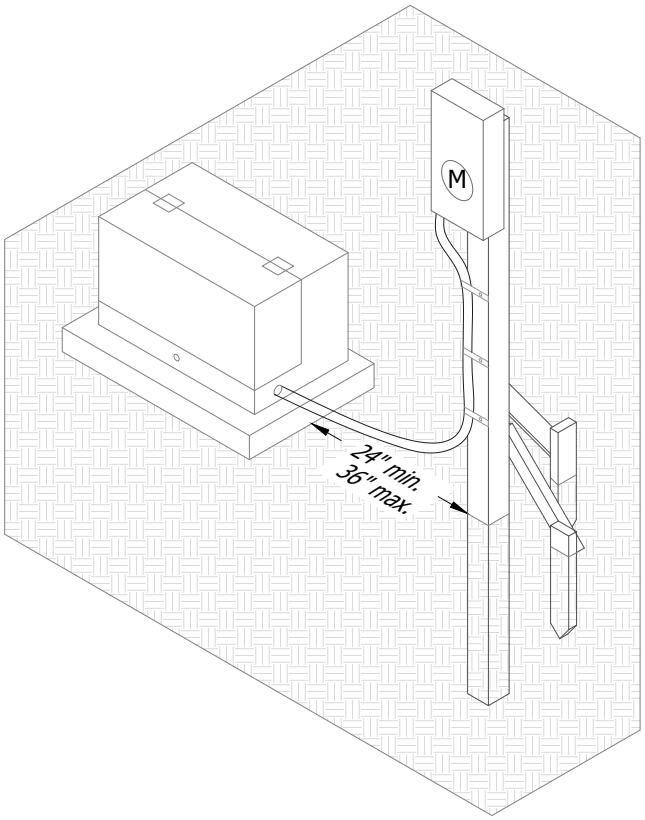
DATE: 12/14/2016	REVISED BY: RG	APPROVED BY: AF	SCALE: N.T.S.

Member Responsibilities:

1. Contact Ohio Utilities Protection Service (811) before digging. No excavation is to be performed before Hancock-Wood's facilities are marked.
2. Provide Underground Service Power Outlet, Milbank # 4908-O-11GR, or approved meter main & GFCI receptacles. Install per NEC in a plumb position at a location designated by Hancock-Wood at 4'-0" to 5'-0" above final grade to center of meter.
3. Provide 1.5" Liquidtight Conduit, Mfg. Part# FLXLT11/2GRY or FLXEF11/2GRY.
4. Provide insulated bushings, Appleton Part# STB-150, on all conduit ends.
5. Center bottom and back of meter socket knock-outs shall not be used.
6. Provide and install (3) conduit straps minimum.
7. Provide (3) #2 AL Type USE-2 service conductors and (1) #4 solid CU grounding conductor in Liquidtight conduit. Leave 3'-0" tail.

HWEC Responsibilities:

1. (3) #2 AL Type USE-2 and (1) #4 solid CU conductors to be terminated in transformer by the Cooperative.
2. Electric Service to be provided in accordance with the Cooperative's current Terms & Conditions.



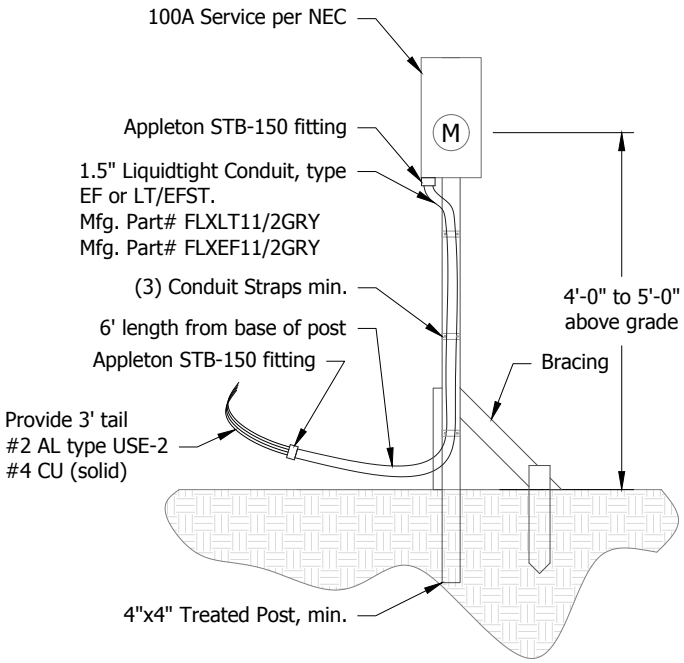


Figure 2-2

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Temporary Service

Temporary 100A Underground Service (Figure 2-2)

AUTOCAD FILE LOCATION

DATE: 12/14/2016	DRAWN BY: RG	APPROVED BY: AF	SCALE: N.T.S.

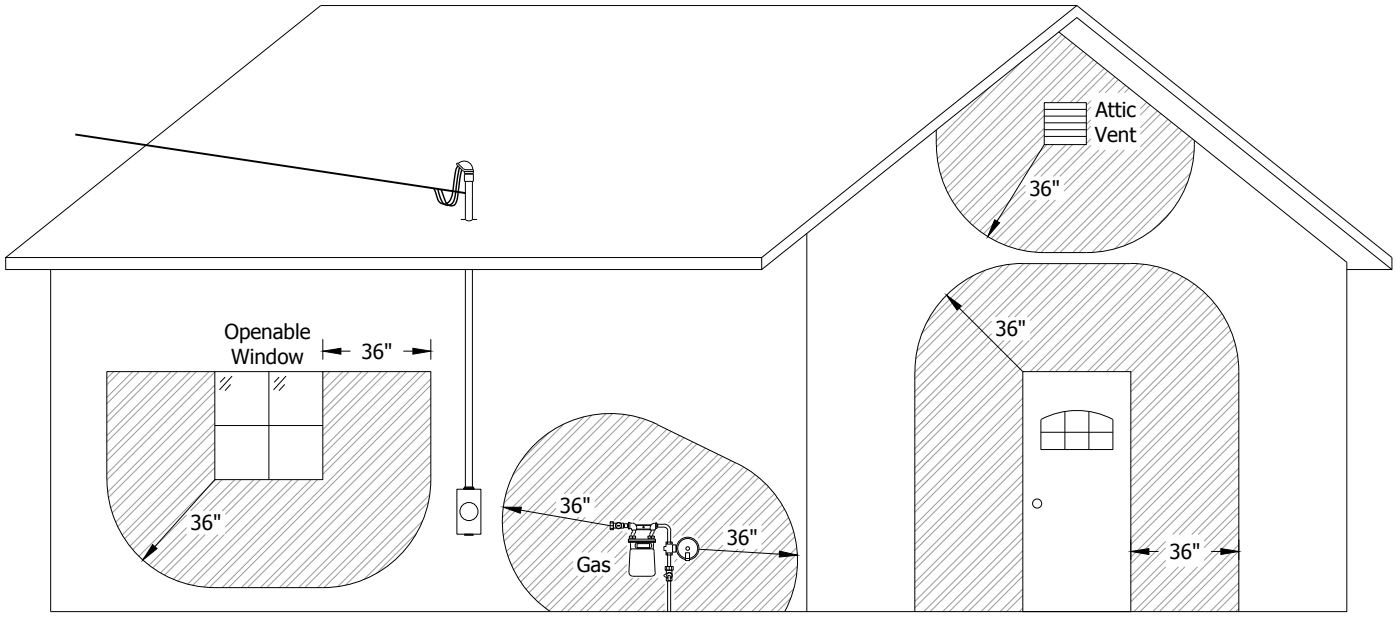


Figure 3-1

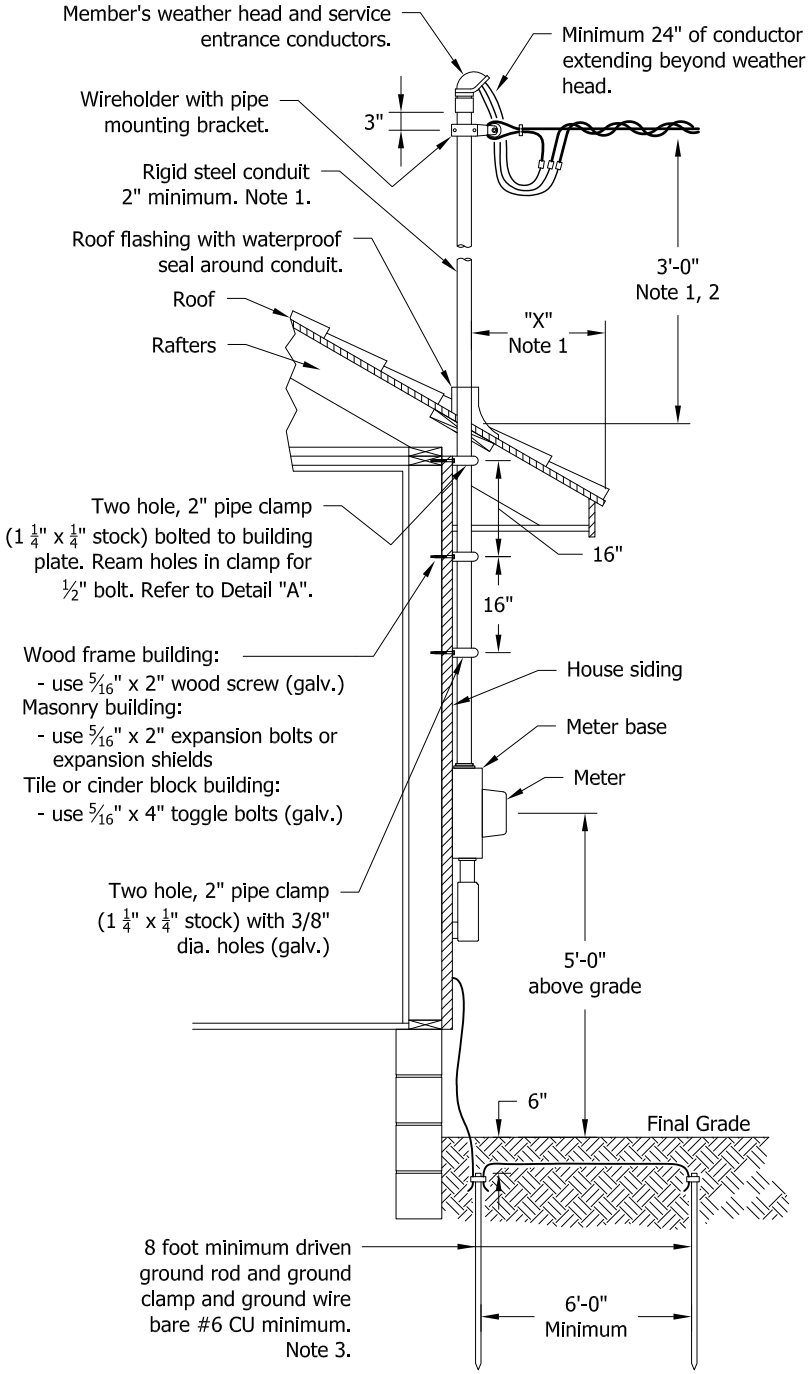
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

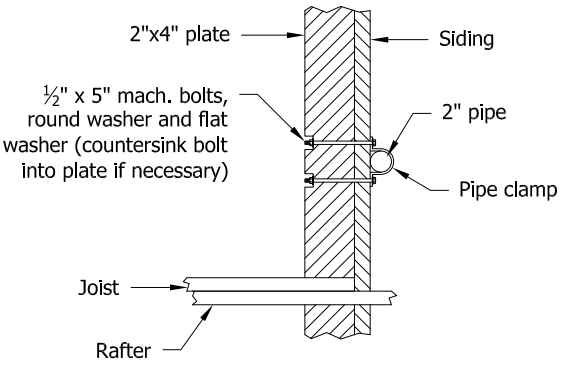
Overhead Service

Service Location Clearance requirements (Figure 3-1)

AUTOCAD FILE LOCATION

DATE: 06/07/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.





DETAIL "A"
Method of attaching 2" pipe to building plate

General Condition Notes:

Hancock-Wood Electric Co-op will be responsible for:

(a) Designating the location of the service mast and the meter.
(b) Providing and installing the overhead service drop. The service drop tension is to be limited to 500 lbs. under loaded conditions.
(c) Installing and removing the meter.

The Member will be responsible for:

(a) Providing and installing the weather head, service mast, roof flashing, building plate attachment, building attachments and service entrance conductors. Service entrance conductors shall project from weather head a minimum of 24".
(b) Providing a mast support strong enough to withstand the strain imposed by the service drop.
(c) Installing mast pipe through a 2-3/8" dia. hole in a 2"x12" min. block solidly between rafters - use 3/8"x4" wood screws, four on each side. Minimum allowable separation between roof and service attachments may be 1'-6" if dimension "X" is 4'-0" or less. Maximum conductor fill in 2" pipe is 3-4/0 conductors or service entrance cable equivalent.
(d) Providing and installing the ground rods, ground clamps and ground wire.
(e) Providing, installing and making meter connections for the service entrance conductors or cable.
(f) Providing and securely mounting base in a plumb position.
(g) Installation of equipment shall be in accordance with Hancock-Wood Electric Co-op standards and local ordinances or codes.

General Construction Notes:

1. Service mast to be used where it is impossible to attach wire holders to the building wall and maintain proper clearance. For proper roof to service attachment clearances refer to Member responsibility (c). Only Hancock-Wood Electric Co-op service conductors are allowed to contact the service mast, NEC (230.28).
2. Minimum height of 18", maximum height of 36" without guying.
3. Member grounding shall be in accordance with NEC and local regulations. The ground wire shall not be connected in the meter socket.

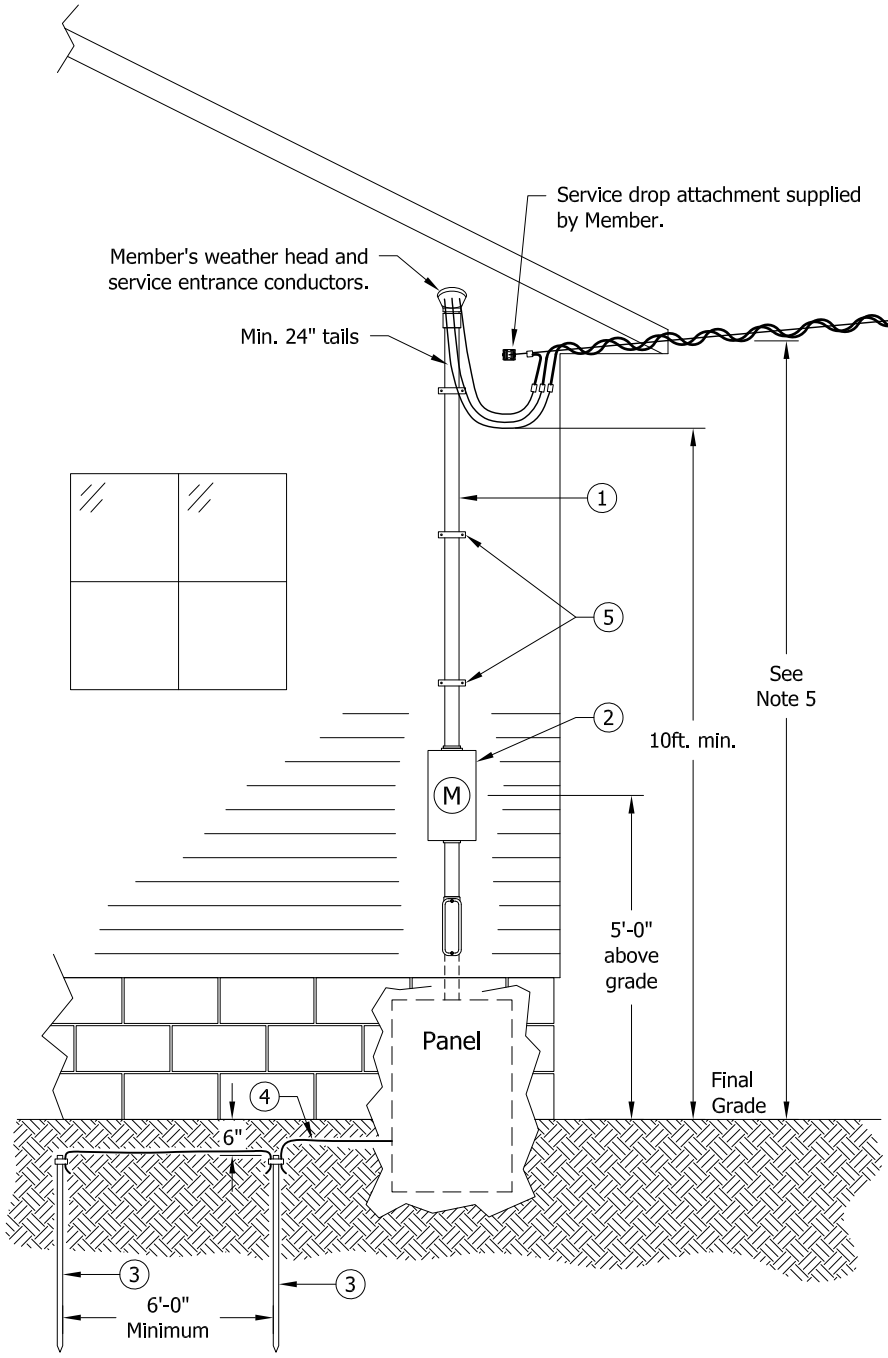
Figure 3-2

HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Overhead Service
Through the Roof Installations (Figure 3-2)

AUTOCAD FILE LOCATION

DATE: 06/06/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



General Condition Notes:

Hancock-Wood Electric Co-op will be responsible for:

(a) Designating the location of the service mast and the meter.

(b) Providing and installing the overhead service drop. The service drop tension is to be limited to 500 lbs. under loaded conditions.

(c) Installing and removing the meter.

The Member will be responsible for:

(1) Providing and installing the weather head, conduit, building attachments and service entrance conductors. Service entrance conductors shall project from weather head a minimum of 24".
100 amp - #2 AL or #4 CU
200 amp - #4/0 AL or #2/0 CU

(2) Providing and installing meter base and making meter connections for the service entrance conductors or cable.

(3) Providing and installing the ground rods. Rod shall be 5/8" x 8ft copperweld.

(4) Providing and installing the ground clamp and ground wire.
100 amp - #6 bare copper
200 amp - #4 bare copper

(5) Cable/conduit straps shall be placed 12" from weather head & meter base and at 24" intervals.

General Construction Notes:

1. All installations must be inspected per Service Installation Guide before HWE will energize the service.
2. Installation of equipment shall be in accordance with Hancock-Wood Electric Co-op standards and local ordinances or codes.
3. Only Hancock-Wood Electric Co-op service conductors are allowed to contact the service mast, NEC (230.28).
4. Member grounding shall be in accordance with NEC and local regulations. The ground wire shall not be connected in the meter socket.
5. The service attachment shall be installed at a height that maintains the following clearances for service drop conductors at final worst case sag.
   (a) Residential driveways: A minimum of 16' in span clearance is required over residential driveways.
   (b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 18' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.
   (c) Pedestrian areas: A minimum of 12' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians

Figure 3-3

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

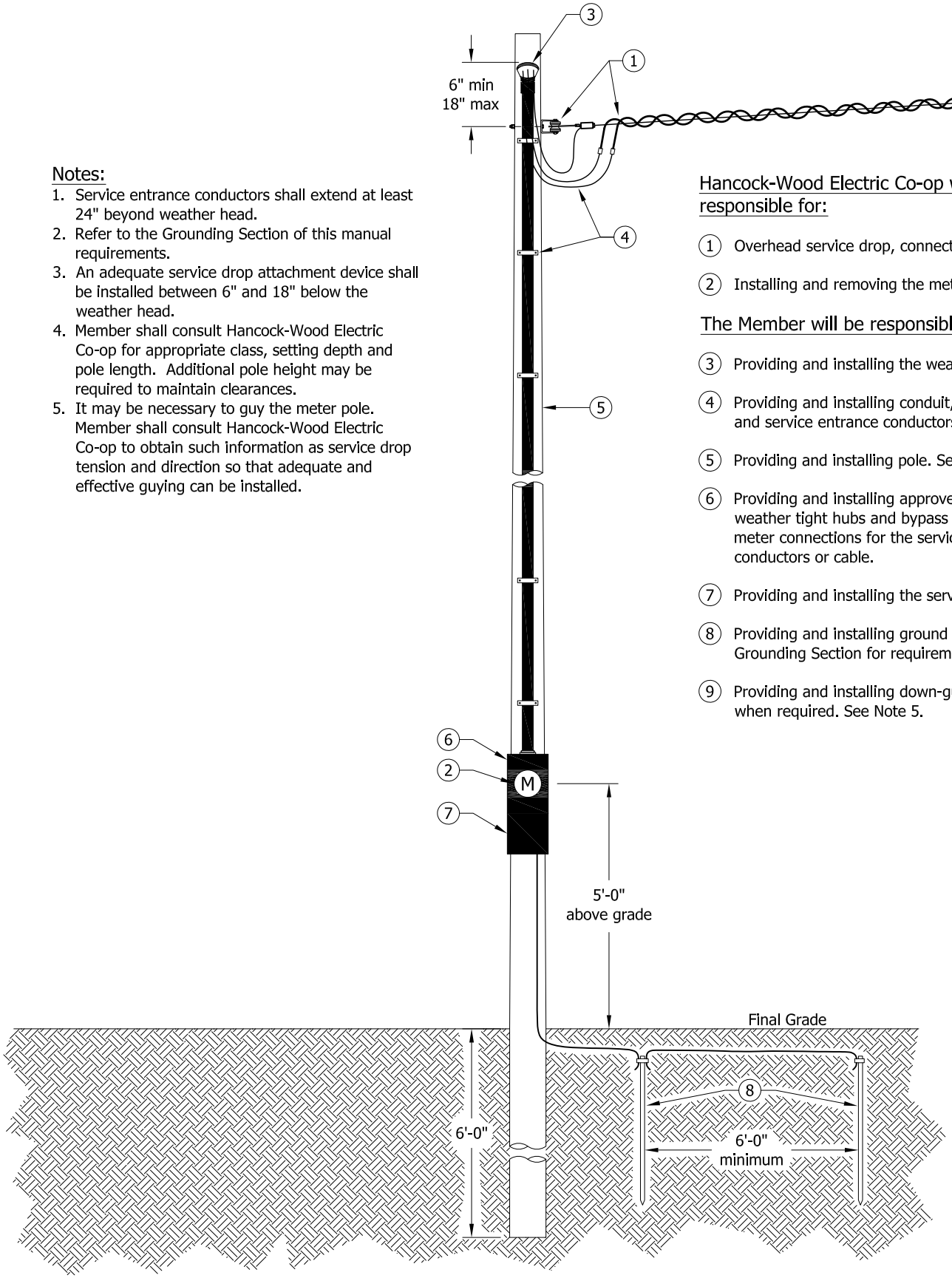
Overhead Service
Wall Mount Installations
(Figure 3-3)

AUTOCAD FILE LOCATION

DATE: 06/07/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

Notes:

1. Service entrance conductors shall extend at least 24" beyond weather head.
2. Refer to the Grounding Section of this manual requirements.
3. An adequate service drop attachment device shall be installed between 6" and 18" below the weather head.
4. Member shall consult Hancock-Wood Electric Co-op for appropriate class, setting depth and pole length. Additional pole height may be required to maintain clearances.
5. It may be necessary to guy the meter pole. Member shall consult Hancock-Wood Electric Co-op to obtain such information as service drop tension and direction so that adequate and effective guying can be installed.



Hancock-Wood Electric Co-op will be responsible for:

(1) Overhead service drop, connectors and wire holder.

(2) Installing and removing the meter.

The Member will be responsible for:

(3) Providing and installing the weather head.

(4) Providing and installing conduit, pole attachments and service entrance conductors.

(5) Providing and installing pole. See Note 4.

(6) Providing and installing approved meter base (with weather tight hubs and bypass horns) and making meter connections for the service entrance conductors or cable.

(7) Providing and installing the service disconnect.

(8) Providing and installing ground rods. Refer to Grounding Section for requirements.

(9) Providing and installing down-guy and anchoring when required. See Note 5.

Figure 3-4

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Overhead Service

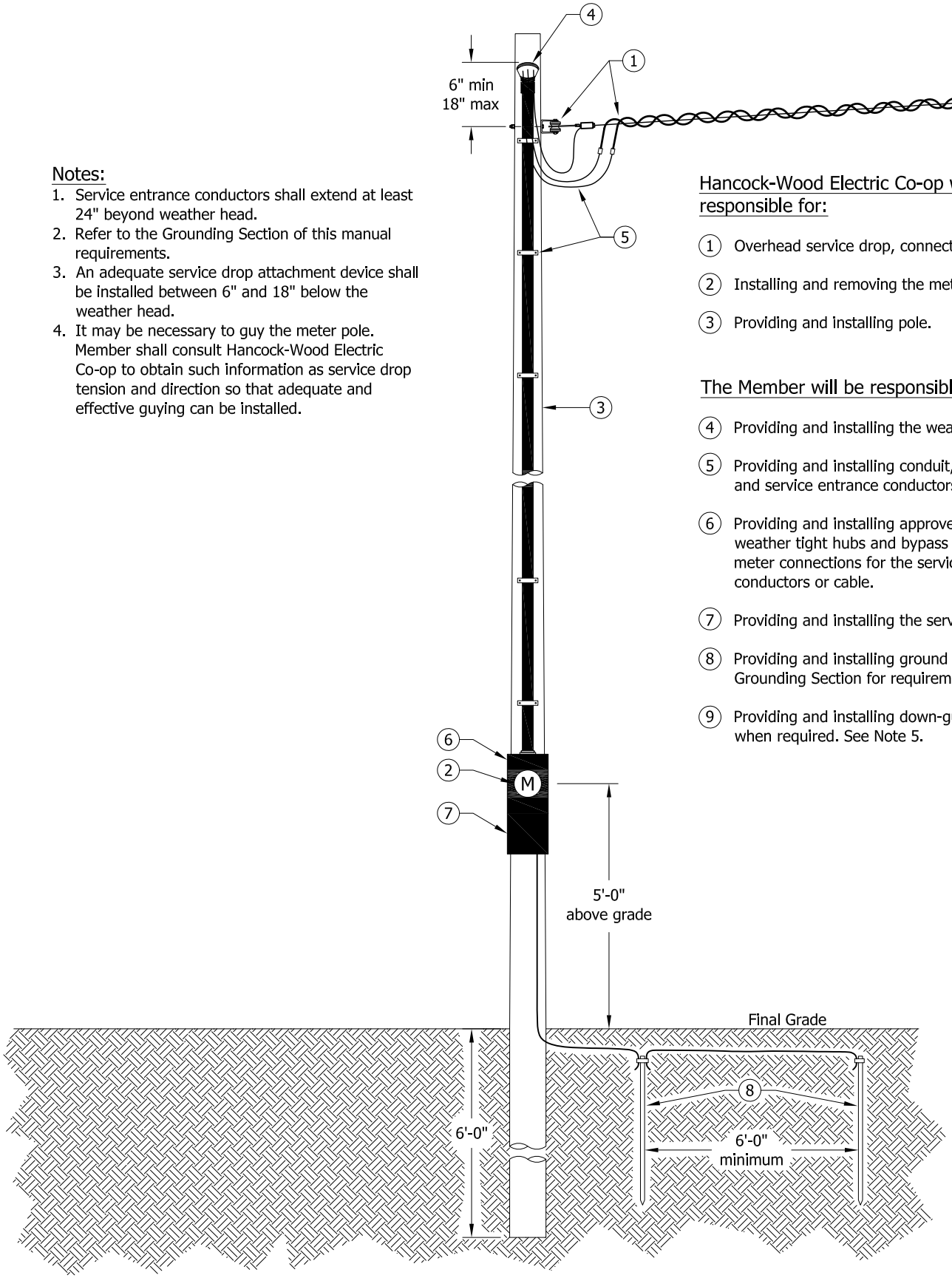
Pole Mounted Service (Secondary Pole)(Member Owned) (Figure 3-4)

AUTOCAD FILE LOCATION

DATE: 06/07/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

Notes:

1. Service entrance conductors shall extend at least 24" beyond weather head.
2. Refer to the Grounding Section of this manual requirements.
3. An adequate service drop attachment device shall be installed between 6" and 18" below the weather head.
4. It may be necessary to guy the meter pole. Member shall consult Hancock-Wood Electric Co-op to obtain such information as service drop tension and direction so that adequate and effective guying can be installed.



Hancock-Wood Electric Co-op will be responsible for:

(1) Overhead service drop, connectors and wire holder.

(2) Installing and removing the meter.

(3) Providing and installing pole.

The Member will be responsible for:

(4) Providing and installing the weather head.

(5) Providing and installing conduit, pole attachments and service entrance conductors.

(6) Providing and installing approved meter base (with weather tight hubs and bypass horns) and making meter connections for the service entrance conductors or cable.

(7) Providing and installing the service disconnect.

(8) Providing and installing ground rods. Refer to Grounding Section for requirements.

(9) Providing and installing down-guy and anchoring when required. See Note 5.

Figure 3-5

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Overhead Service

Pole Mounted Service (Secondary Pole) (HWE Owned) (Figure 3-5)

AUTOCAD FILE LOCATION

DATE: 06/15/2020	DRAWN BY: BK	APPROVED BY: AF	SCALE: N.T.S.

Hancock-Wood Electric Co-op will be responsible for:

1. Providing and installing the pole and transformer.
2. Overhead service drop, connectors and wire holder.
3. Installing and removing the meter.
4. Installing member provided riser conduit, service entrance conductors and weather head.

The Member will be responsible for:

4. Providing weather head.
5. Providing conduit, pole attachments and service entrance conductors.
6. Providing and installing approved meter base per Service Installation Guide and making meter connections for the load side service entrance conductors or cable.
7. Providing and installing the service disconnect.
8. Providing and installing ground rods. Refer to Grounding Section for requirements.

Notes:

1. Service entrance conductors shall extend at least 24" beyond weather head.
2. Refer to the Grounding Section of this manual requirements.

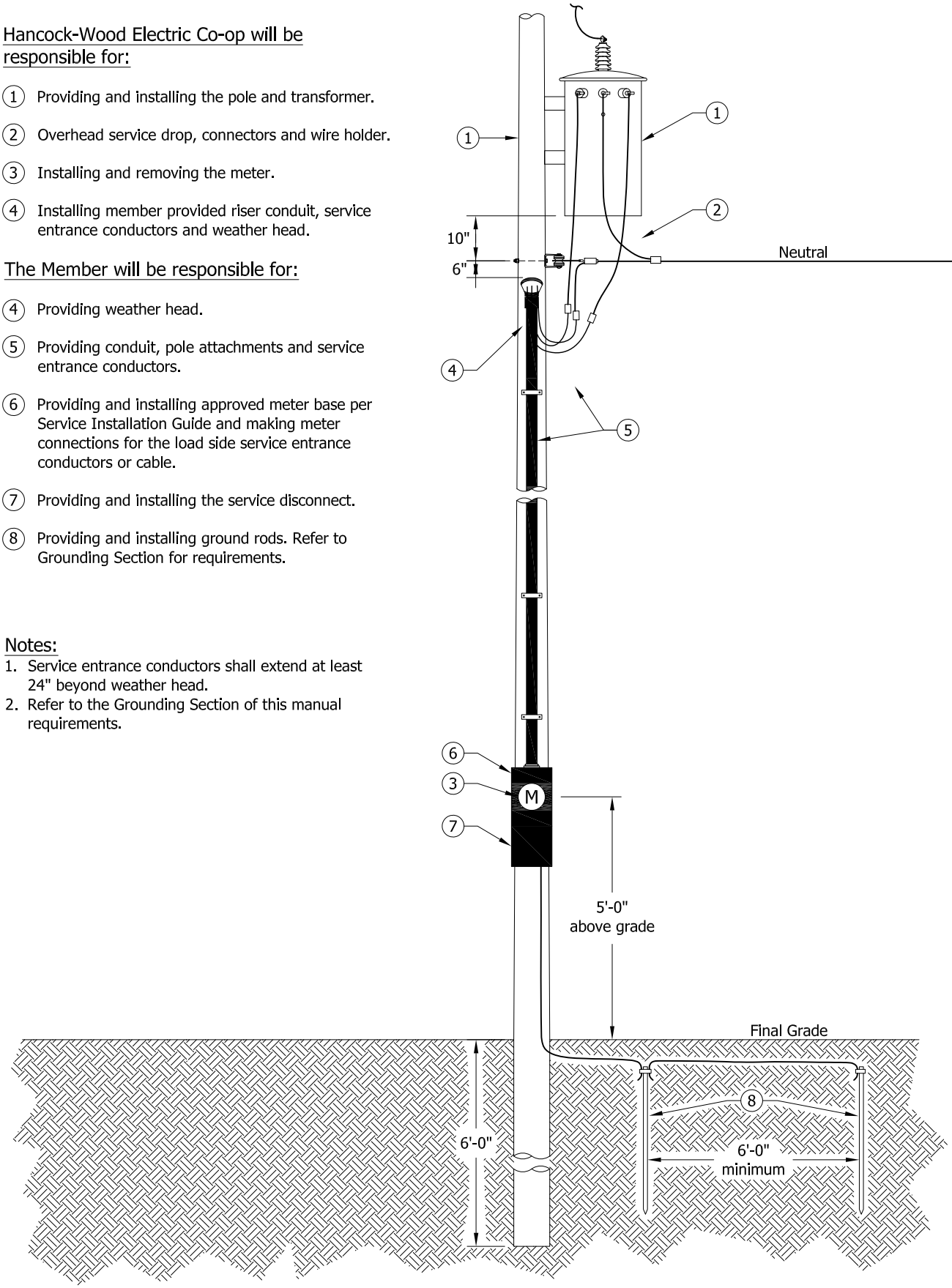


Figure 3-6

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Overhead Service

Pole Mounted Service (Transformer Pole)

(Figure 3-6)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

Notes:

1. Meter socket furnished and installed by the Member in a plumb position at a location to be designated by Hancock-Wood at 5'-0" above final grade to center of meter.
2. Center bottom and back of meter base knock-outs shall not be used.
3. Slip joint with a minimum of 6" travel supplied by Member.
4. Line conduit 3" minimum provided by Member.
5. Member's grounding electrode conductor, refer to grounding section in service installation guide,
6. Conduit to be furnished, securely installed and maintained by Member. Conduit straps as required by conduit size shall be placed at a maximum spacing of 24".
7. Conductors in conduit to be furnished, installed and maintained by the Member. Minimum conductor size to be according to the National Electric Code (NEC).
8. Member to provide 3" minimum diameter (Sch. 40 or better) conduit system. Galvanized rigid steel conduit or rigid non-metallic conduit (PVC) listed for this use (Sch. 80 or better) for use under driveways, walkways and patios.
9. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand or screened earth for the first 6" above cable.
10. Member to trench to pole. Conduit on pole provided by HWE.
11. Right of way strip for trenching must be graded to within 4" of final grade prior to trenching.
12. Underground service conductors to be furnished, installed and maintained by HWE under the conditions of the existing line extension policy.
13. Member to provide insulated bushings required on all conduit ends.
14. 90 degree 36" radius conduit sweep required at 36" trench depth.
15. Depth must be maintained to final grade.
16. If concrete is to be poured around conduit Member shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
17. 8'-0" (min.) ground electrodes furnished and installed by Member.
18. Member's main disconnect to be located within 6' of the meter socket.

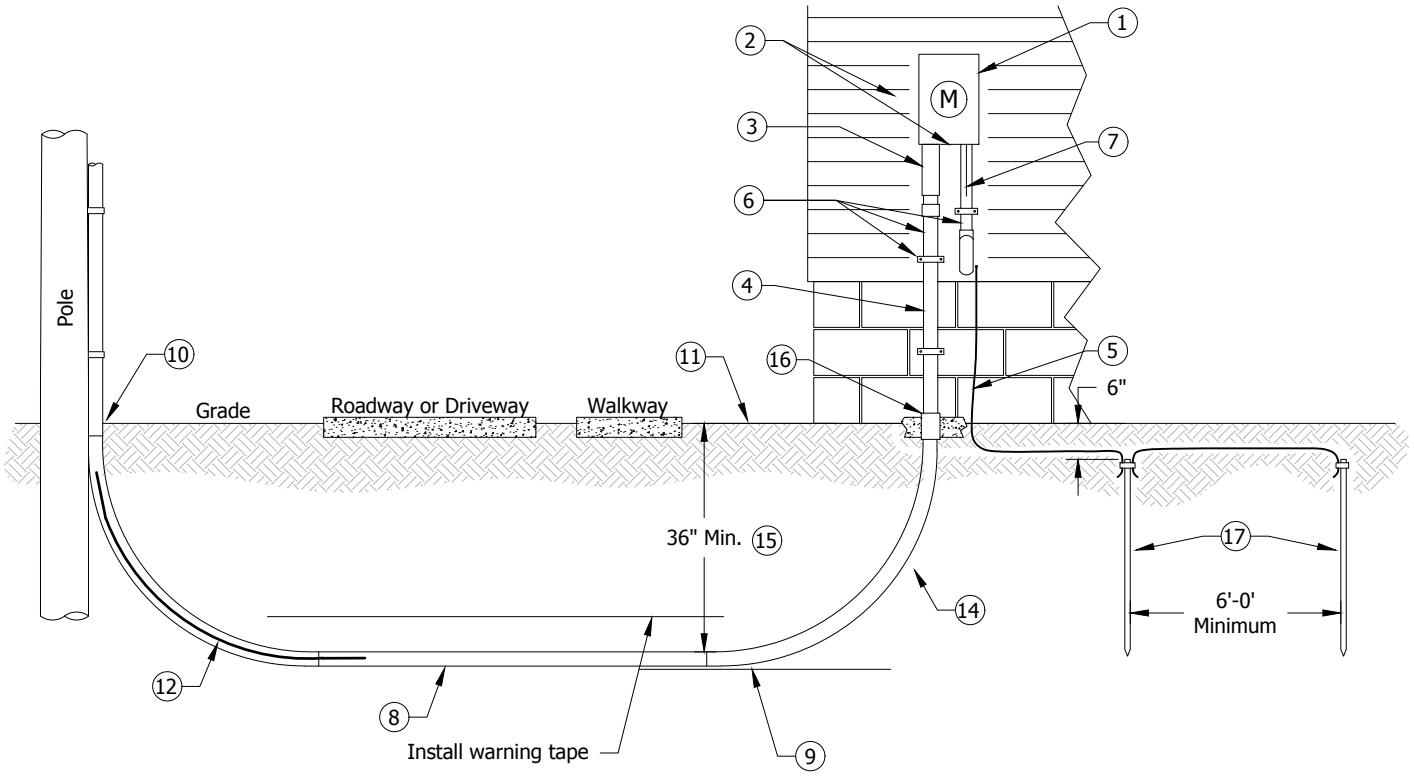


Figure 4-1

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Underground Service

Residential 1Ø Underground Service (to house)

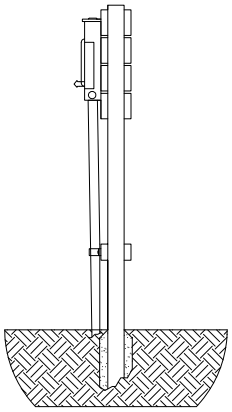
(Figure 4-1)

AUTOCAD FILE LOCATION

DATE: 06/07/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

Notes:

1. Meter socket furnished and installed by the Member in a plumb position at a location to be designated by Hancock-Wood at 5'-0" above final grade to center of meter.
2. Center bottom and back of meter base knock-outs shall not be used.
3. Slip joint with a minimum of 6" travel supplied by Member.
4. Line conduit 3" minimum provided by member.
5. Member's grounding electrode conductor, refer to service installation guidline grounding section.
6. Conduit to be furnished, securely installed and maintained by Member. Conduit straps as required by conduit size.
7. Conductors in conduit to be furnished, installed and maintained by the Member. Minimum conductor size to be according to the National Electric Code (NEC).
8. Member to provide 3" minimum diameter (Sch. 40 or better) conduit system. Galvanized rigid steel conduit or rigid non-metallic conduit (PVC) listed for this use (Sch. 80 or better) for use under driveways, walkways and patios.
9. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand or screened earth for the first 6" above cable.
10. Conduit on pole provided by HWE.
11. Right of way strip for trenching must be graded to within 4" of final grade prior to trenching.
12. Underground service conductors to be furnished, installed and maintained by HWE under the conditions of the existing line extension policy.
13. 90 degree 36" radius conduit sweep required at 36" min. trench depth.
14. Depth must be maintained to final grade.
15. If concrete is to be poured around conduit, Member shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than Post O.D.
16. 8'-0" (min.) ground electrodes furnished and installed by Member.
17. Fused / Breaker disconnect switch (weatherproof or covered) provided and installed on bang board by Member.
18. Residential Bang-board provided and installed by Member.



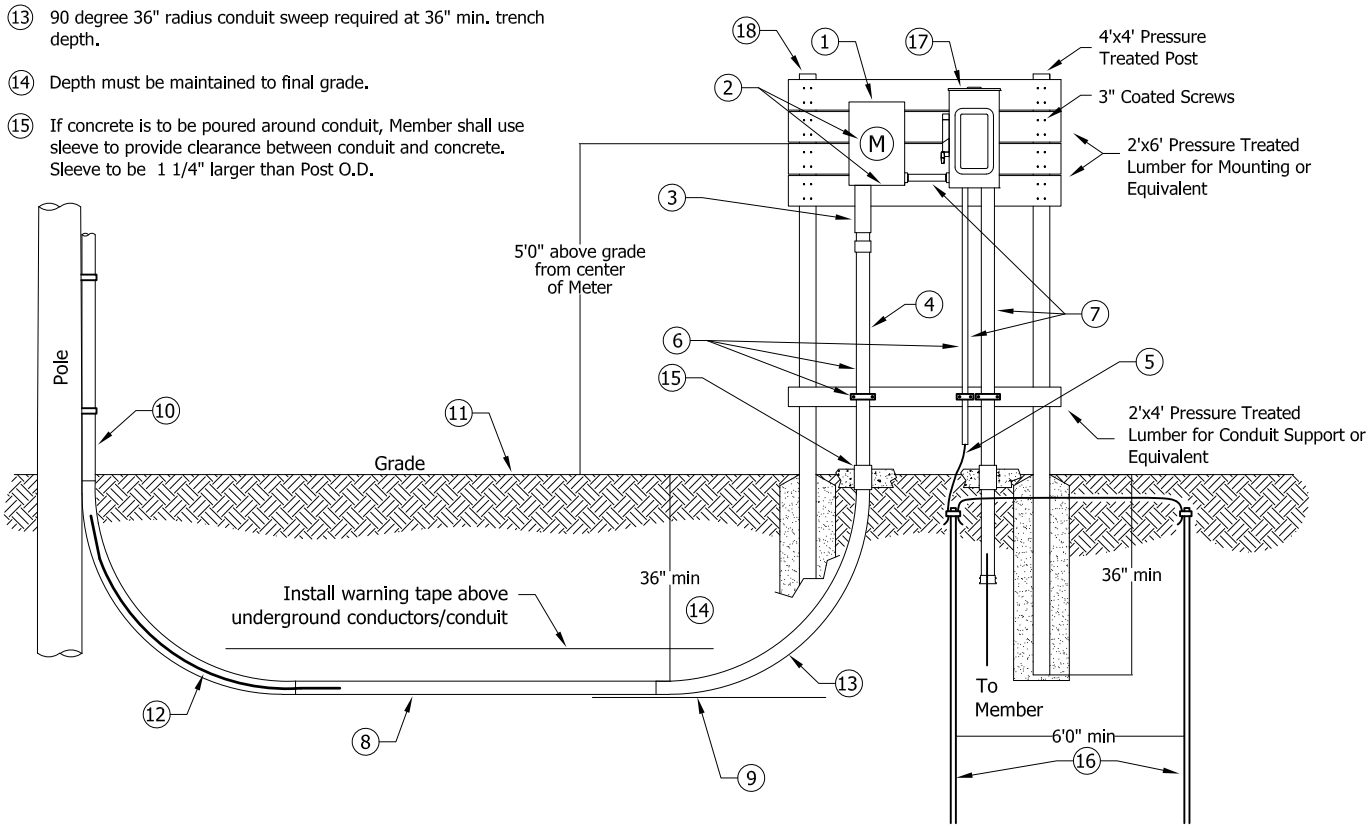


Figure 4-2

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Underground Service

Residential 1Ø Underground Service (to bang board) (Figure 4-2)

AUTOCAD FILE LOCATION

DATE: 06/16/2020	DRAWN BY: BK	APPROVED BY: AF	SCALE: N.T.S.

Notes:

1. Meter socket furnished and installed by the Member in a plumb position at a location to be designated by Hancock-Wood at 5'-0" above final grade to center of meter.
2. Center bottom and back of meter base knock-outs shall not be used.
3. Slip joint with a minimum of 6" travel supplied by Member.
4. Line conduit 3" minimum provided by member.
5. Member's grounding electrode conductor, refer to service installation guidline grounding section.
6. Conduit to be furnished, securely installed and maintained by Member. Conduit straps as required by conduit size.
7. Conductors in conduit to be furnished, installed and maintained by the Member. Minimum conductor size to be according to the National Electric Code (NEC).
8. Member to provide 3" minimum diameter (Sch. 40 or better) conduit system. Galvanized rigid steel conduit or rigid non-metallic conduit (PVC) listed for this use (Sch. 80 or better) for use under driveways, walkways and patios.
9. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand or screened earth for the first 6" above cable.
10. Conduit on pole provided by HWE.
11. Right of way strip for trenching must be graded to within 4" of final grade prior to trenching.
12. Underground service conductors to be furnished, installed and maintained by HWE under the conditions of the existing line extension policy.
13. 90 degree 36" radius conduit sweep required at 36" min. trench depth.
14. Depth must be maintained to final grade.
15. If concrete is to be poured around conduit Member shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
16. 8'-0" (min.) ground electrodes furnished and installed by Member.
17. Fused / Breaker disconnect switch (weatherproof or covered) provided and installed on bang board by Member.
18. Commercial Bang-board provided and installed by Member.

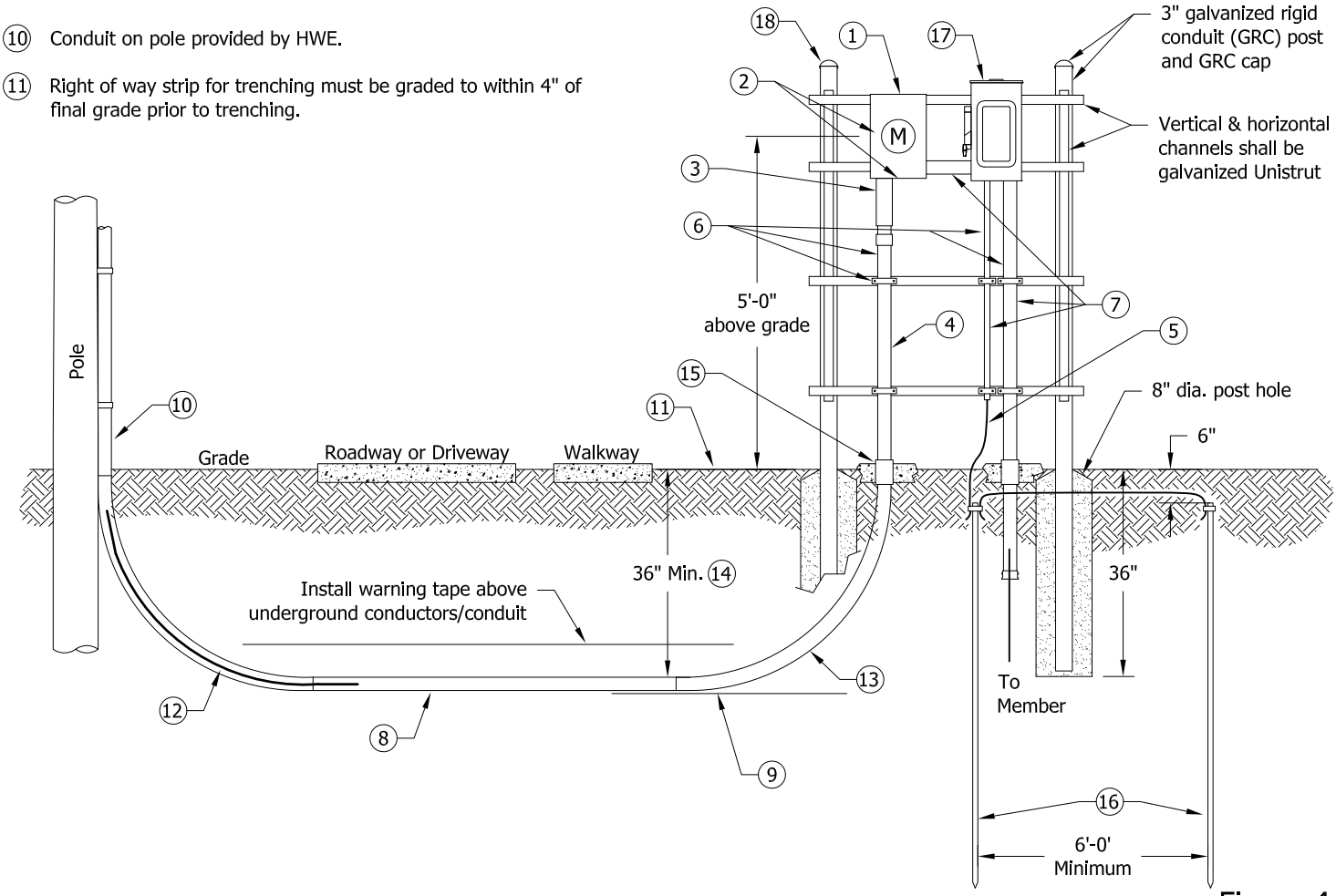


Figure 4-3

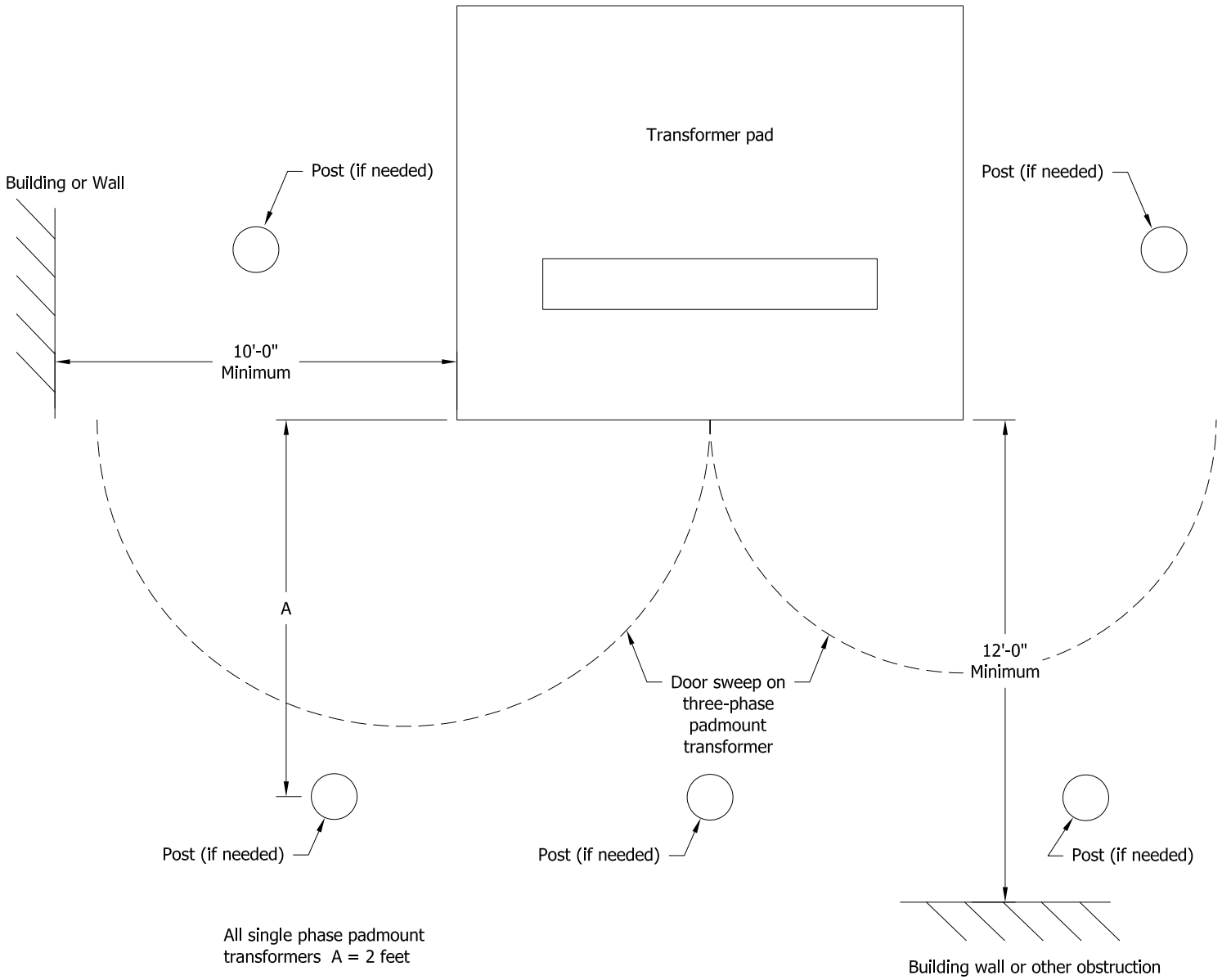
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Underground Service

Commercial 1Ø Underground Service (to bang board) (Figure 4-3)

AUTOCAD FILE LOCATION

DATE: 06/12/2020	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



All single phase padmount transformers A = 2 feet

All three phase padmount transformers A = 5 feet

Notes:

1. See Clearance Section for greater clearance requirement to building openings, if applicable.

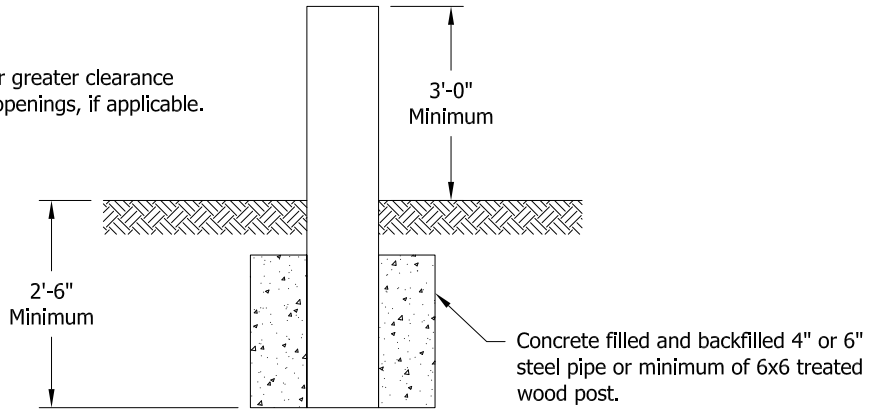


Figure 4-4

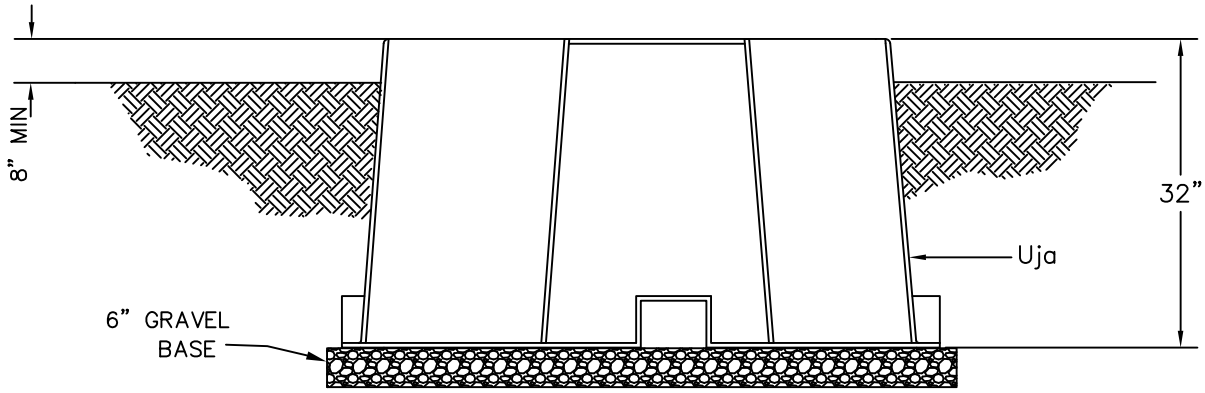
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

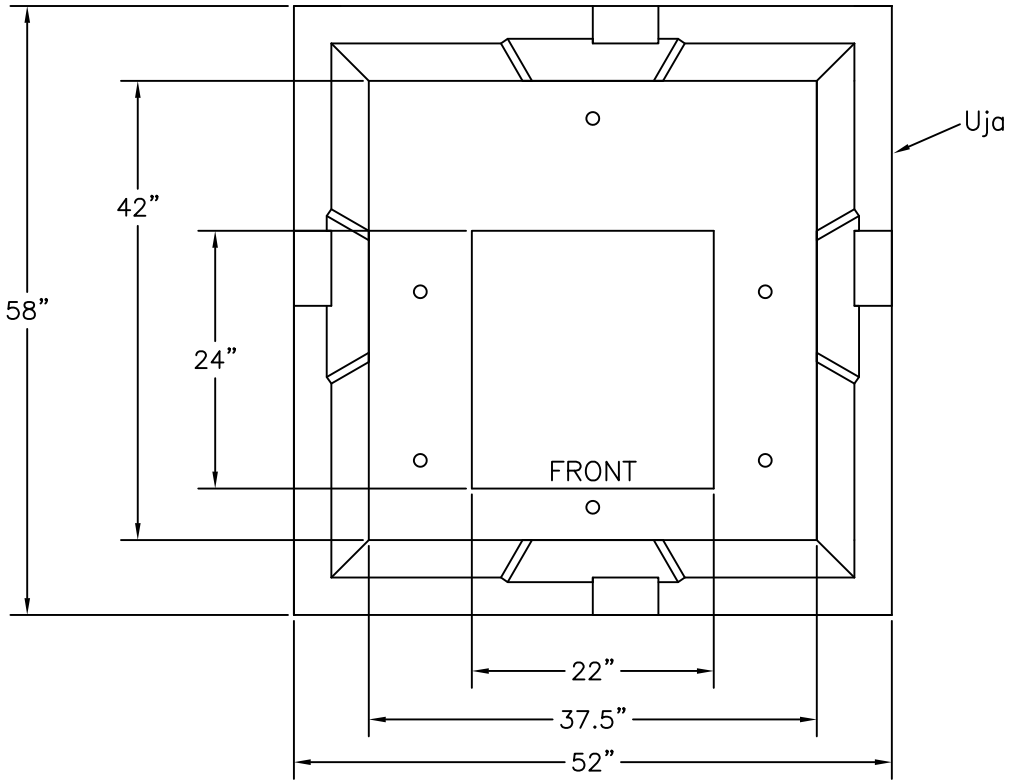
Underground Service

Protective Posts for Padmounted Transformers (Figure 4-4)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.





ITEM	QTY	MATERIAL
Uja	1	Vault, 1ø Fiberglass Padmount Transformer

Figure 4-5

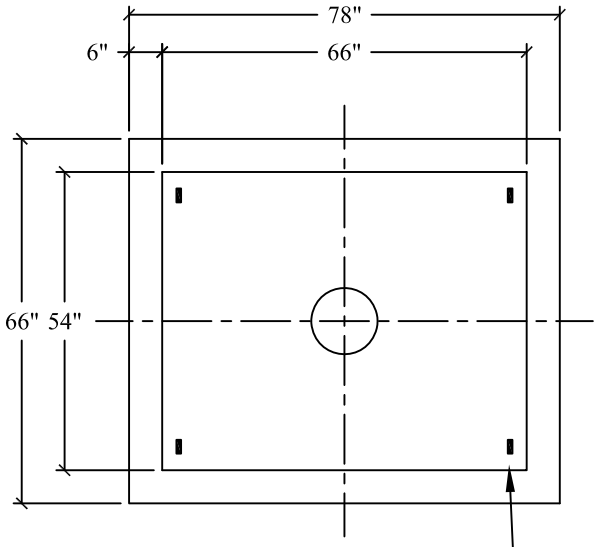
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Underground Service

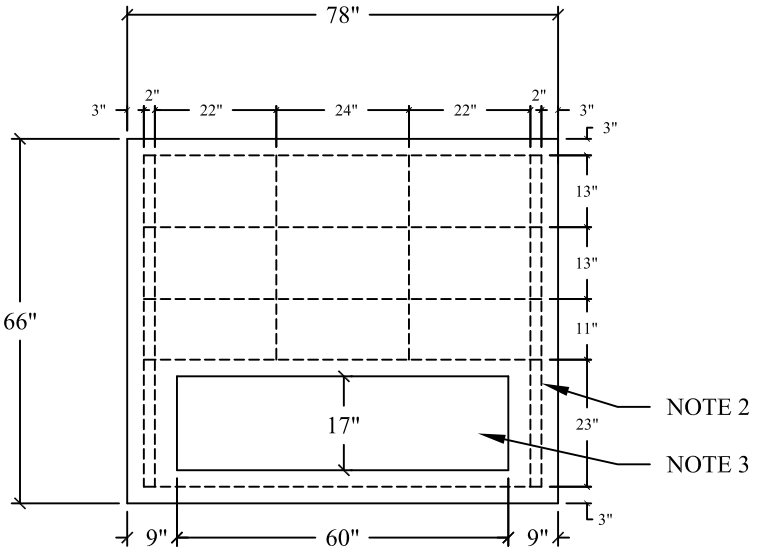
Fiberglass Vault for 1Ø Padmounted Transformers (Figure 4-5)

AUTOCAD FILE LOCATION

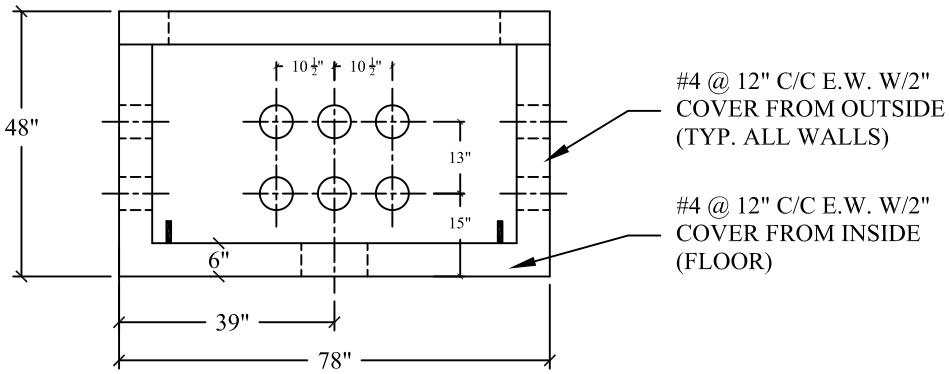
DATE: 06/22/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



PLAN VIEW
BASE W/O TOP SLAB



TOP SLAB PLAN VIEW



FRONT VIEW
BASE W/ TOP SLAB

NOTES:

1. CONCRETE 4,500 PSI @ 28 DAYS.
2. #4 REBAR GRADE 60 REINFORCING TYPICAL
3. REVIEW TRANSFORMER RECORD DRAWING OR FIELD MEASURE FOR SIZE OF CONDUCTOR OPENING.
4. FINISH TOP SURFACE SMOOTH AND LEVEL
5. MAXIMUM TRANSFORMER LOAD 5,000 LBS.
6. PRIOR APPROVAL OF ALL CONCRETE VAULTS IS REQUIRED. MEMBER SHALL PROVIDE HWE WITH A MANUFACTURES CUTSHEET FOR ALL CONCRETE VAULTS PRIOR TO INSTALLATION.

ITEM	QTY	MATERIAL
	1	VAULT. 3Ø CONCRETE FOR PADMOUNT TRANSFORMERS

Figure 4-6

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Underground Service

Concrete Vault for 3Ø Padmounted Transformers (Figure 4-6)

AUTOCAD FILE LOCATION

DATE: 12/08/2017	DRAWN BY: BAF	APPROVED BY: BAF	SCALE: N.T.S.

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

UNDERGROUND PRIMARY INSTALLATION
EXCAVATION AND CONDUIT REQUIREMENTS

Hancock-Wood Electric Cooperative (HWE) provides members with the option, in many cases, to perform their own excavation and conduit work on line extensions. This option often results in a decreased cost estimate from HWE to the member, as opposed to HWE performing the work, but specific guidelines must be adhered to. These requirements are in place to prevent the Cooperative from assuming unnecessary liability and to ensure the safe and reliable operation of the electric distribution system as a whole. Please review them carefully and be sure you can perform this work as specified before electing to do this work yourself. If you have a need for further clarification, then please contact the HWE Engineering Department. Keep in mind that this option will only result in a cost savings if it is constructed correctly on the first attempt

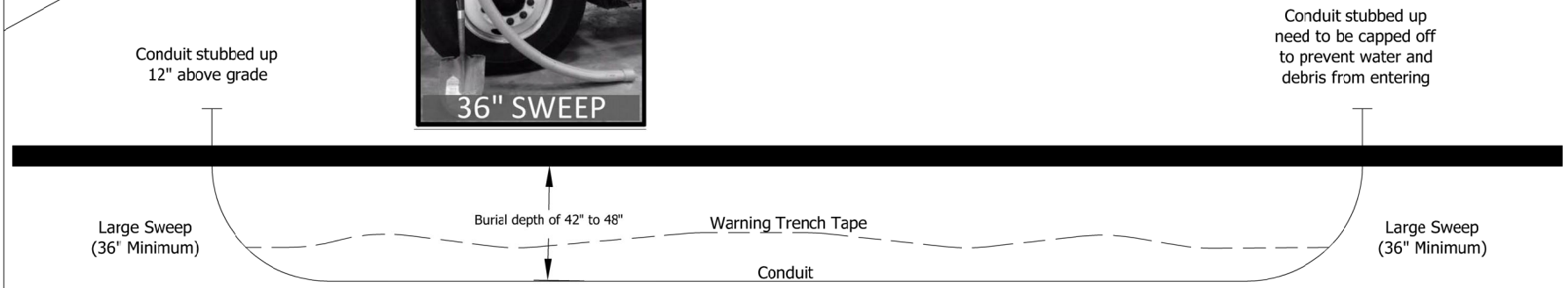
8-1-1

CALL BEFORE YOU DIG!

NOTE: Any State, County, or Local permits required to perform this work are the responsibility of the member or person performing the excavation.

WARNINGS:

- Do not dig underneath the pads or vaults of HWE equipment.
- Exposing the base of utility poles must be kept to a minimum. Extreme caution and care is to be exercised around all utility facilities.
- The route of the underground line will be limited by one (1) 90-degree turn.
- The trench route needs to be free of all trees, tree stumps, boulders, or other major obstructions.
- Power equipment shall not be used within 18" of any existing cables or underground facilities.
- Other facilities such as communications cables, field tiles, gas lines, water lines, etc. have clearances required by the NESC. Please consult with HWE Engineering if these conflicts exist.
- Damaged field tiles (or other underground facilities) in need of repair are the responsibility of the person performing the excavation. HWE is not responsible for damage to unmarked or mismarked privately-owned facilities.
- A $200 return trip fee is applied if HWE has to leave a job due to inadequate excavation, conduit installation, an unknown change in scope of the project, or other reasons related to the member's responsibilities.
- Many situations call for different requirements than these standards present. Be sure to consult with HWE Engineering prior to commencing with your work. (e.g. In some cases conductor maybe direct buried.)



CONDUIT NOTES:

- Single-Phase: 2" Minimum
- Three-Phase: 4" Minimum
- Schedule 40 Minimum (Consult NESC requirements in unique cases)
- PVC or Poly-Pipe are the only approved-for-use materials.
- Large sweeps (36" minimum) required at any turns in the route.
- 1000 pound rated pull string required entire length of conduit.
- HWE-provided warning tape to be installed 12" to 24" above the top of the conduit.
- Conduit runs in excess of 300' require steel or fiberglass large sweeps. (36" minimum)
- Conduit runs in excess of 600' requires HWE prior approval.

BACKFILL:

- The bottom of the trench should be a smooth and undisturbed (or well-tamped) surface free of sharp objects.
- Native soil free of large rocks and sharp objects may be used for the remainder of the backfill.
- Post-construction clean-up, landscaping, or trench repair (if caving occurs) is the sole responsibility of the member.

HANCOCK-WOOD ELECTRIC COOPERATIVE
REVISION YEAR: 2021

Acceptance Date:_____

Underground Primary
Primary Installations - Excavation & Conduit Requirements
(Figure 4-7)

AUTOCAD FILE LOCATION

DATE: 06/03/2021
DRAWN BY: BMK
APPROVED BY: AF
SCALE: N.T.S.

Figure 4-7

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

UNDERGROUND SECONDARY AND SERVICE INSTALLATION
EXCAVATION AND CONDUIT REQUIREMENTS

Hancock-Wood Electric Cooperative (HWE) provides members with the option, in many cases, to perform their own excavation and conduit work on line extensions. This option often results in a decreased cost estimate from HWE to the member, as opposed to HWE performing the work, but specific guidelines must be adhered to. These requirements are in place to prevent the Cooperative from assuming unnecessary liability and to ensure the safe and reliable operation of the electric distribution system as a whole. Please review them carefully and be sure you can perform this work as specified before electing to do this work yourself. If you have a need for further clarification, then please contact the HWE Engineering Department. Keep in mind that this option will only result in a cost savings if it is constructed correctly on the first attempt

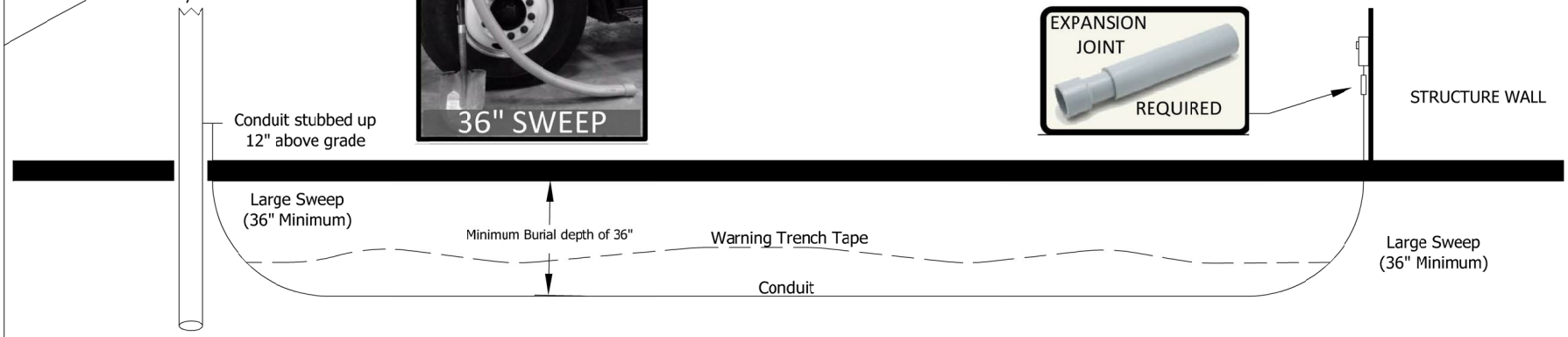
8-1-1

CALL BEFORE YOU DIG!

NOTE: Any State, County, or Local permits required to perform this work are the responsibility of the member or person performing the excavation.

WARNINGS:

- Do not dig underneath the pads or vaults of HWE equipment.
- Exposing the base of utility poles must be kept to a minimum. Extreme caution and care is to be exercised around all utility facilities.
- The route of the underground line will be limited by one (1) 90-degree turn.
- The trench route needs to be free of all trees, tree stumps, boulders, or other major obstructions.
- Power equipment shall not be used within 18" of any existing cables or underground facilities.
- Other facilities such as communications cables, field tiles, gas lines, water lines, etc. have clearances required by the NESC. Please consult with HWE Engineering if these conflicts exist.
- Damaged field tiles (or other underground facilities) in need of repair are the responsibility of the person performing the excavation. HWE is not responsible for damage to unmarked or mismarked privately-owned facilities.
- A $200 return trip fee is applied if HWE has to leave a job due to inadequate excavation, conduit installation, an unknown change in scope of the project, or other reasons related to the member's responsibilities.
- Many situations call for different requirements than these standards present. Be sure to consult with HWE Engineering prior to commencing with your work.



CONDUIT NOTES:

- Single-Phase: 2" Minimum
- Three-Phase: 4" Minimum
- Schedule 40 Minimum (Consult NESC requirements in unique cases)
- PVC or Poly-Pipe are the only approved-for-use materials.
- Large sweeps (36" minimum) required at any turns in the route.
- HWE-provided warning tape to be installed 12" to 24" above the top of the conduit.
- Use conduit when entering the service entrance equipment as required be the National Electric Code.
- Conduit runs for secondary not to exceed 300'.

BACKFILL:

- The bottom of the trench should be a smooth and undisturbed (or well-tamped) surface free of sharp objects.
- Native soil free of large rocks and sharp objects may be used for the remainder of the backfill.
- Post-construction clean-up, landscaping, or trench repair (if caving occurs) is the sole responsibility of the member.

HANCOCK-WOOD ELECTRIC COOPERATIVE
REVISION YEAR: 2021

Acceptance Date:_____

Underground Secondary
Secondary Installations - Excavation & Conduit Requirements
(Figure 4-8)

AUTOCAD FILE LOCATION

DATE: 06/03/2021
DRAWN BY: BMK
APPROVED BY: AF
SCALE: N.T.S.

Figure 4-8

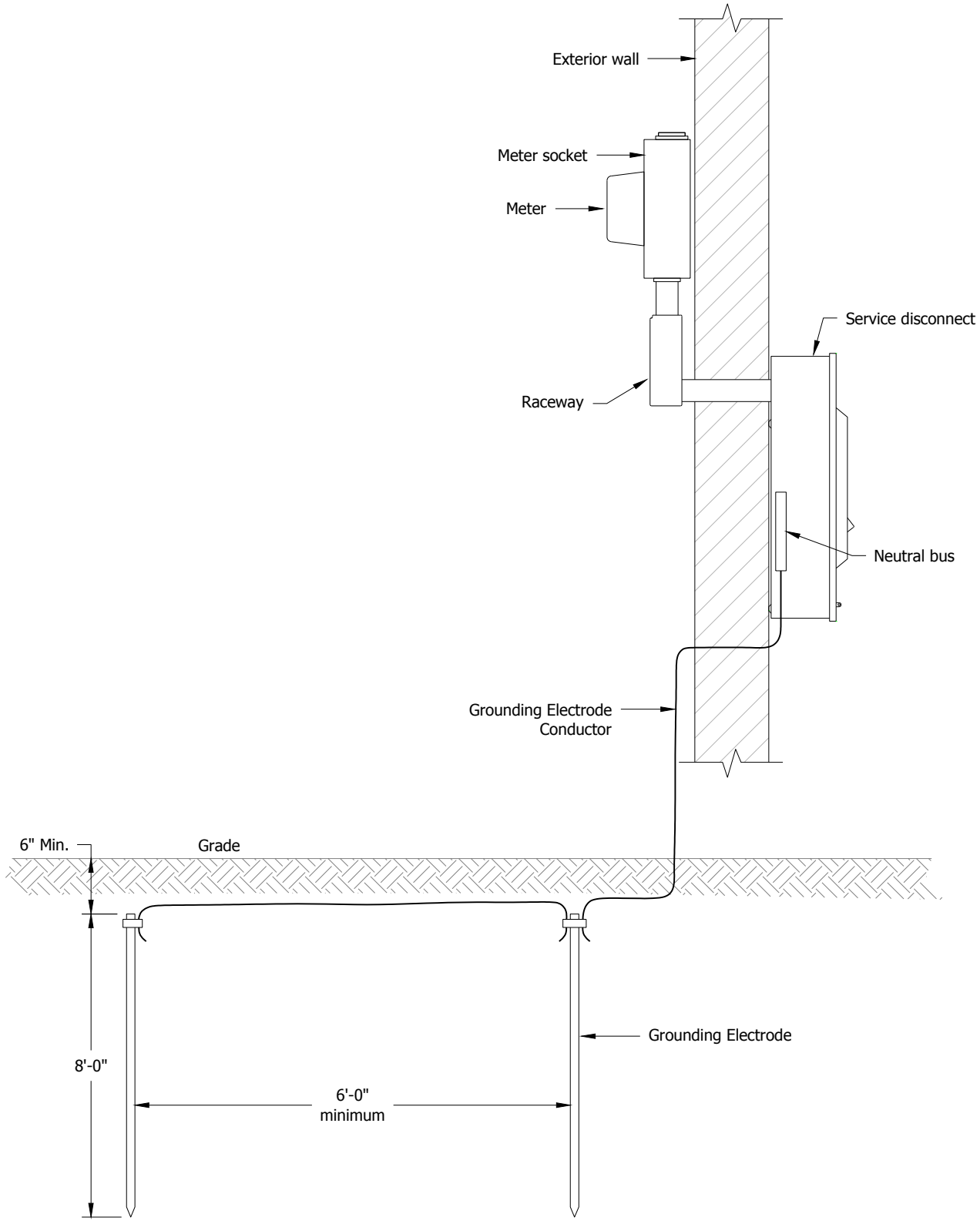


Figure 5-1

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Grounding and Bonding

Wall Mounted Meter Socket

(Figure 5-1)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: 3/4" = 1'-0"

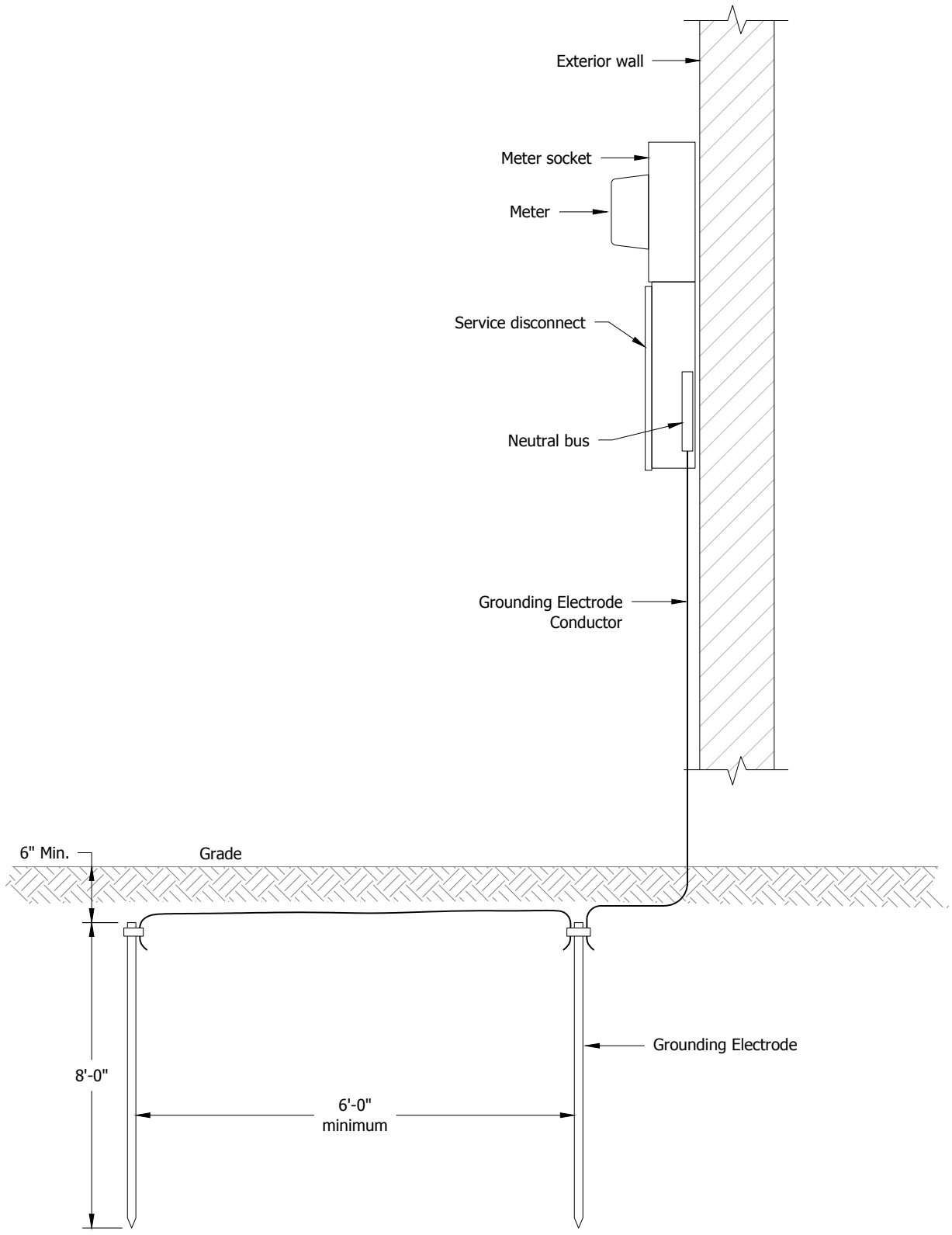


Figure 5-2

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Grounding and Bonding

Wall Mounted Meter/Main Combination

(Figure 5-2)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

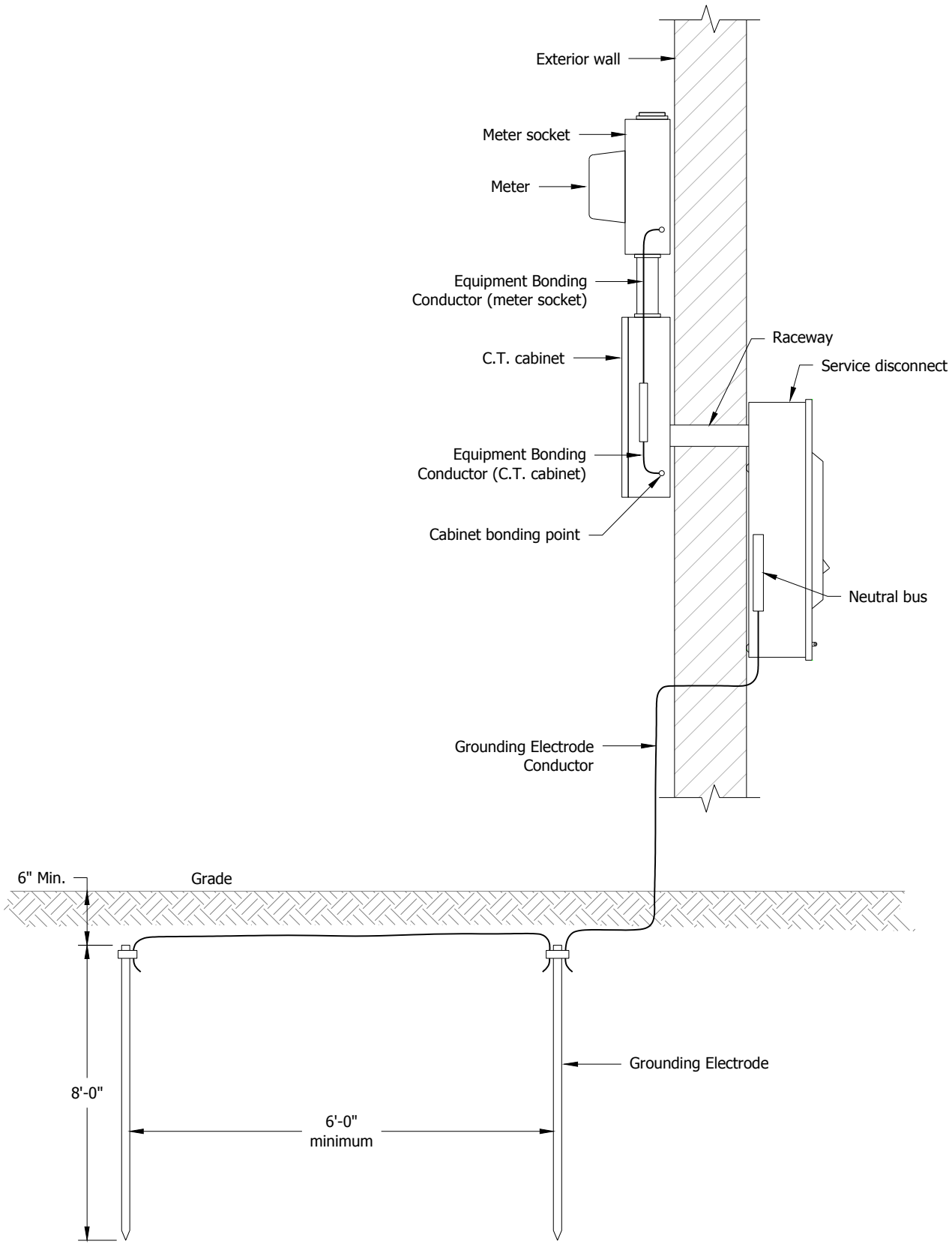


Figure 5-3

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Grounding and Bonding

Wall Mounted Meter Socket with Instrument Transformer Cabinet (Figure 5-3)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

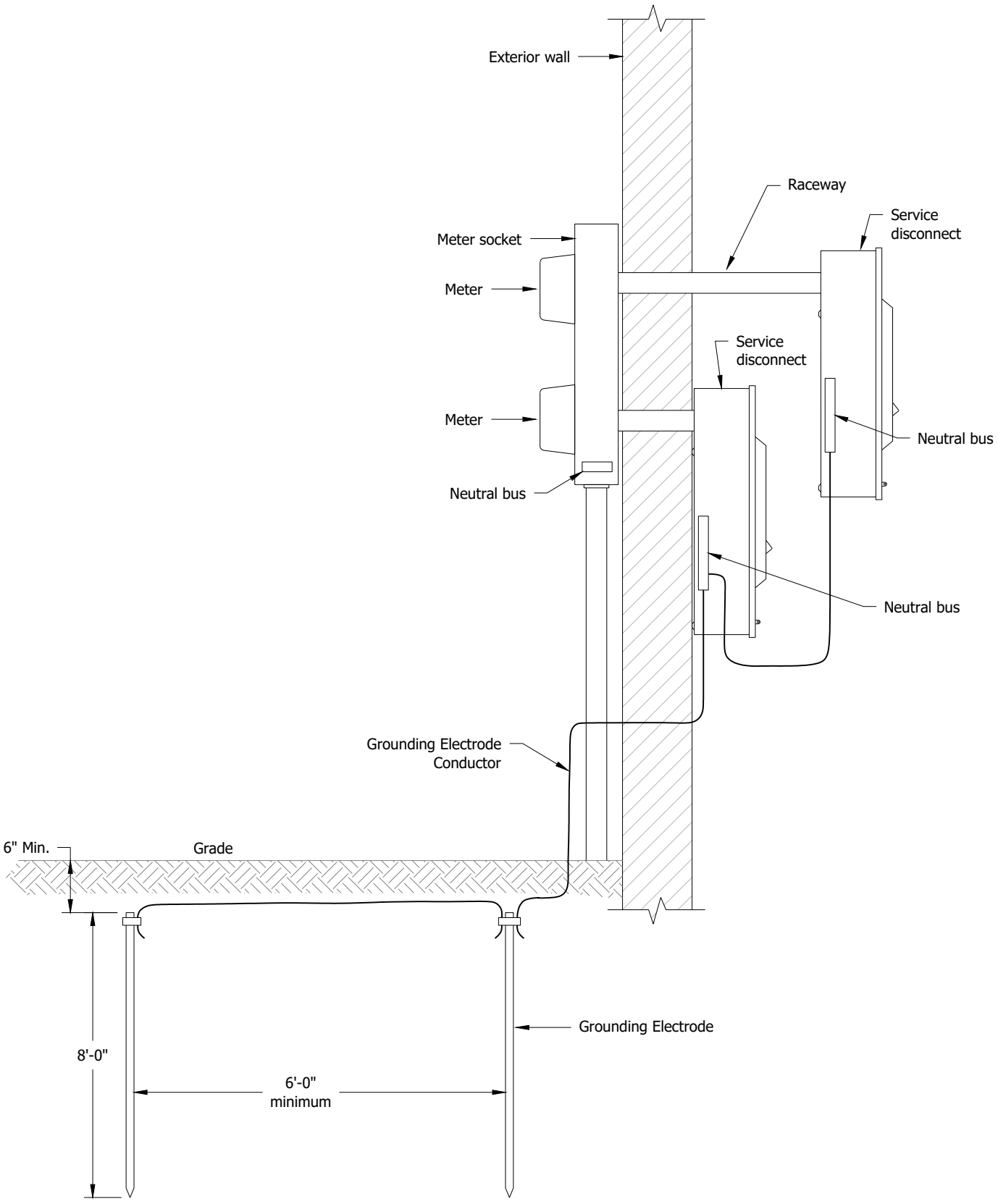


Figure 5-4

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Grounding and Bonding

Underground - Two Family Residential (Figure 5-4)

AUTOCAD FILE LOCATION

DATE: 06/13/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

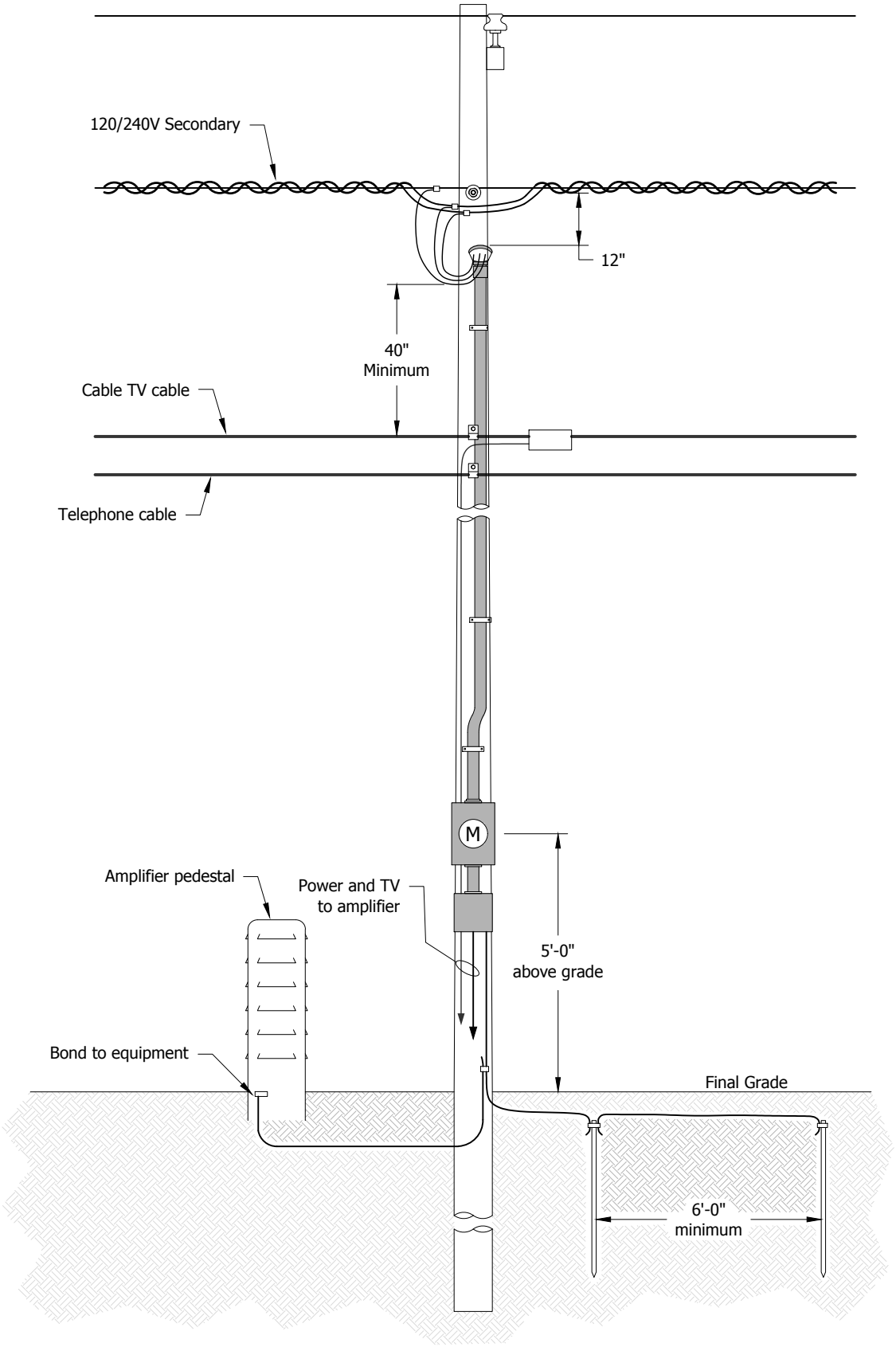


Figure 8-1

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Special Services

Typical Cable TV Power Supply Arrangement (Figure 8-1)

AUTOCAD FILE LOCATION

DATE: 06/15/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

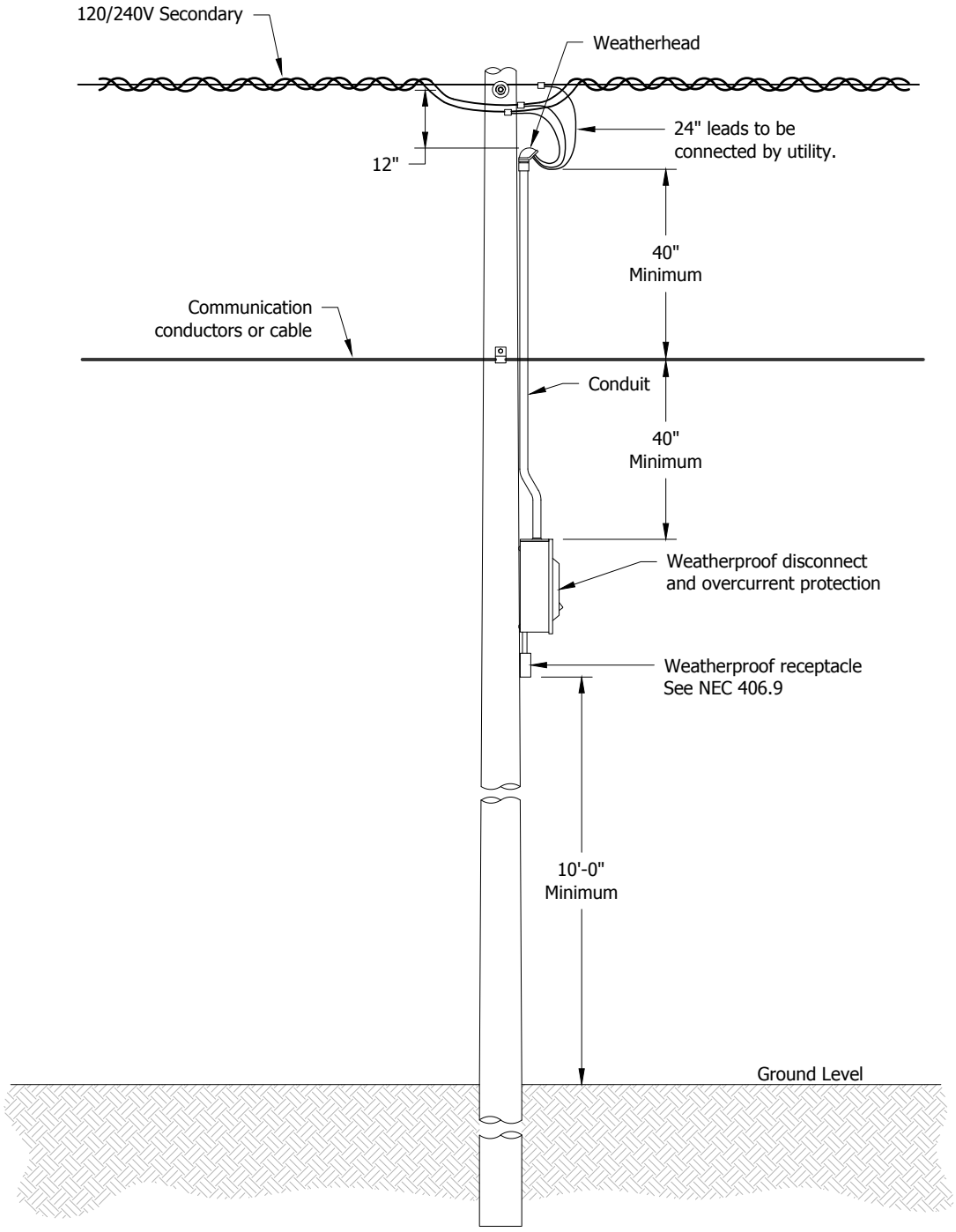


Figure 8-2

HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Special Services

Typical Decorative Holiday Lighting Arrangement (Unmetered) (Figure 8-2)

AUTOCAD FILE LOCATION

DATE: 06/15/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

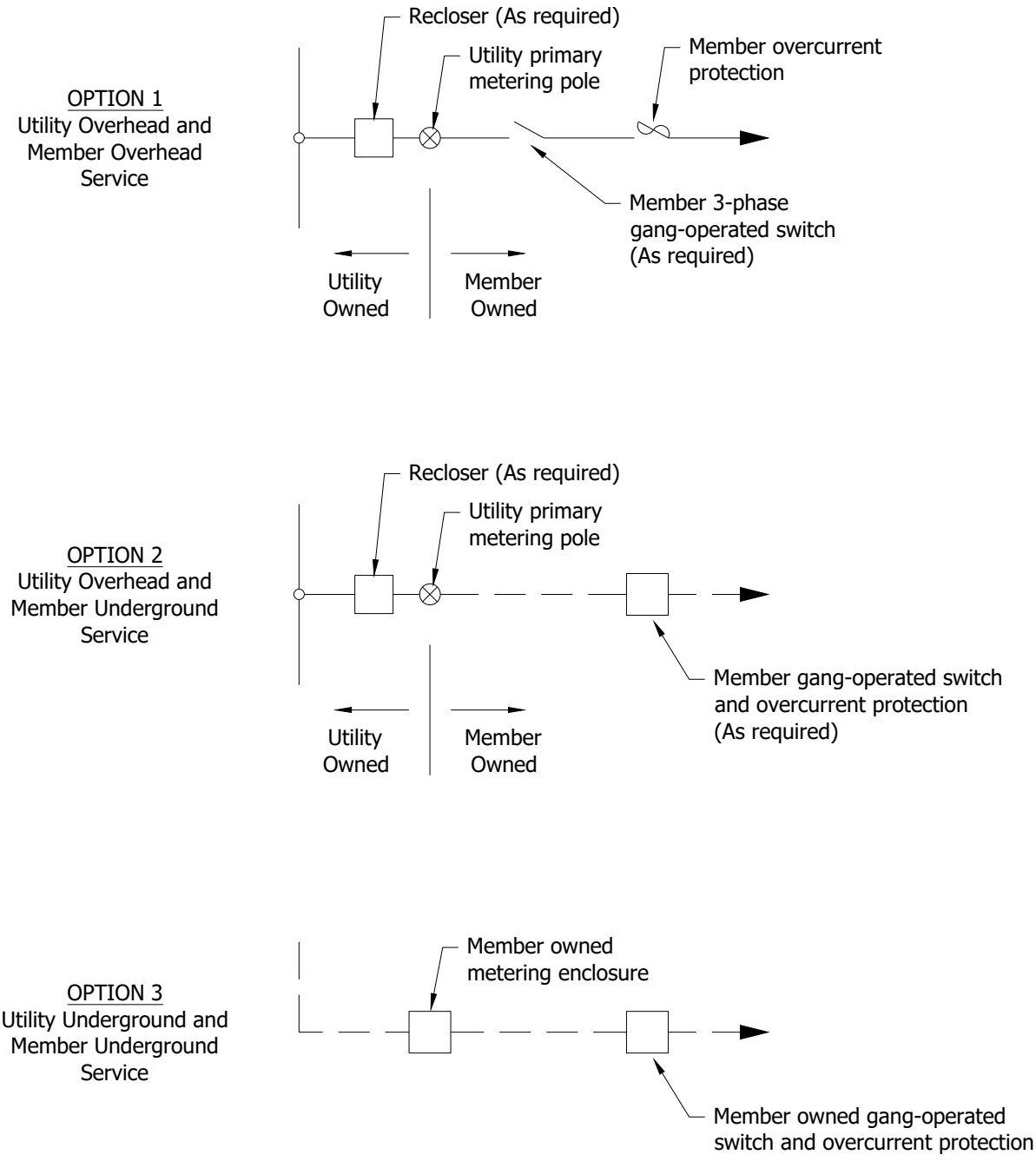


Figure 9-1

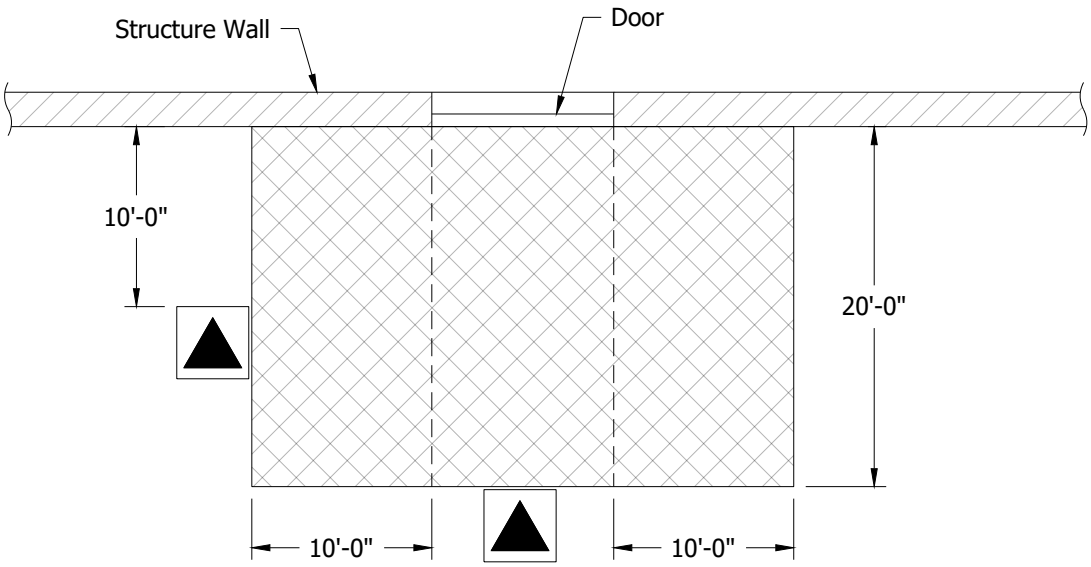
HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Primary Services

Primary Metering Options (Figure 9-1)

AUTOCAD FILE LOCATION

DATE: 06/15/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



Note:
Hatched area denotes area transformer cannot be located.

Figure 10-1

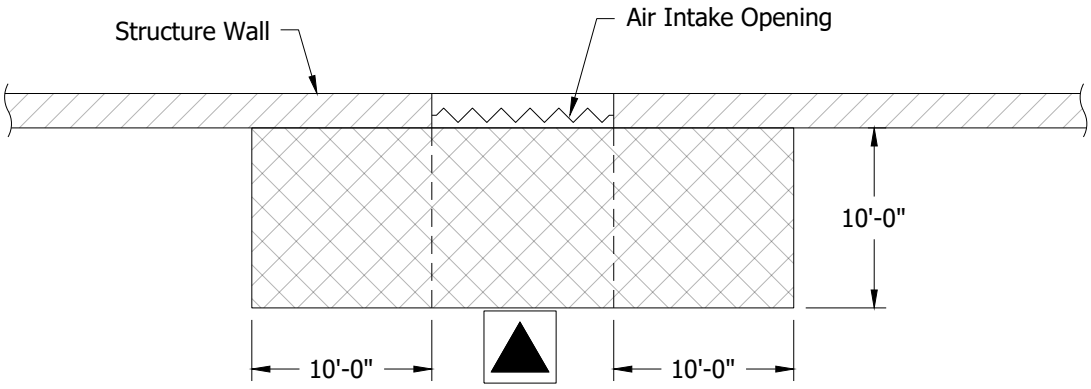
HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Clearances

Padmounted Oil Insulated Transformer Clearance from Doors (Figure 10-1)

AUTOCAD FILE LOCATION

DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



Note:

Hatched area denotes area transformer cannot be located.

Figure 10-2

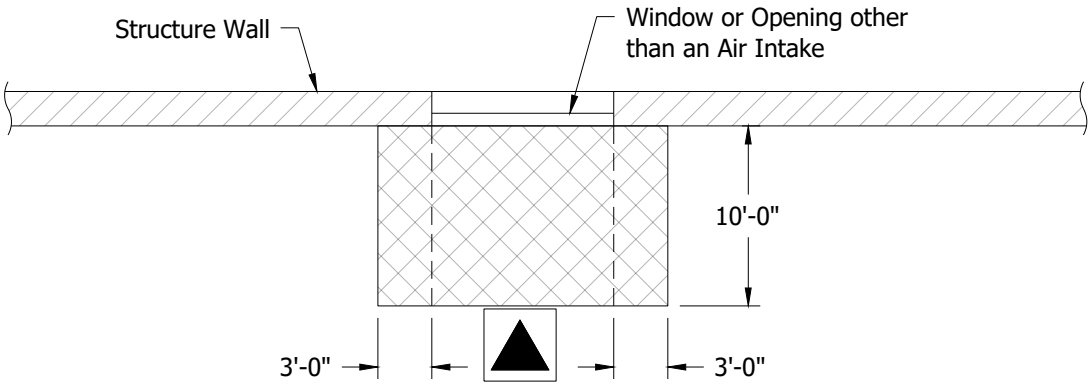
HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Clearances

Padmounted Oil Insulated Transformer Clearance from Air Intakes (Figure 10-2)

AUTOCAD FILE LOCATION

DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



Note:

Hatched area denotes area transformer cannot be located.

Figure 10-3

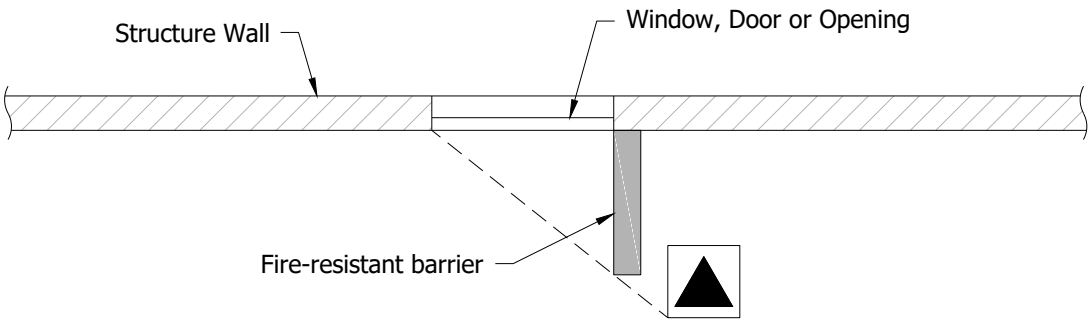
Clearances

Padmounted Oil Insulated Transformer Clearance from Other Openings (Figure 10-3)

HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

AUTOCAD FILE LOCATION

DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



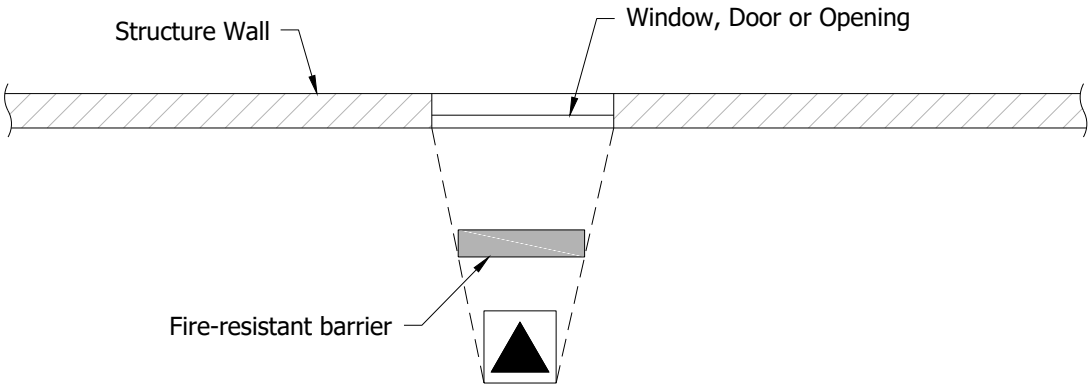


Figure 10-4

HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Clearances

Padmounted Oil Insulated Transformer Fire-resistant Barrier Location (Figure 10-4)

AUTOCAD FILE LOCATION

DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

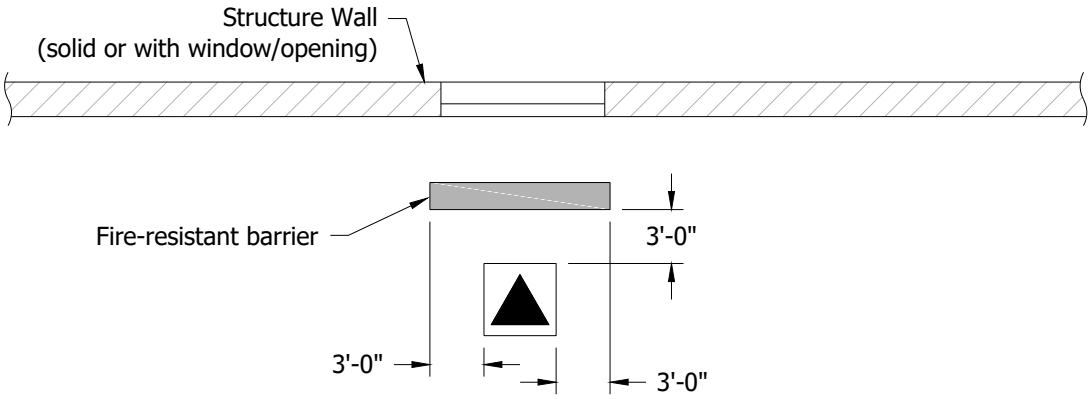


Figure 10-5

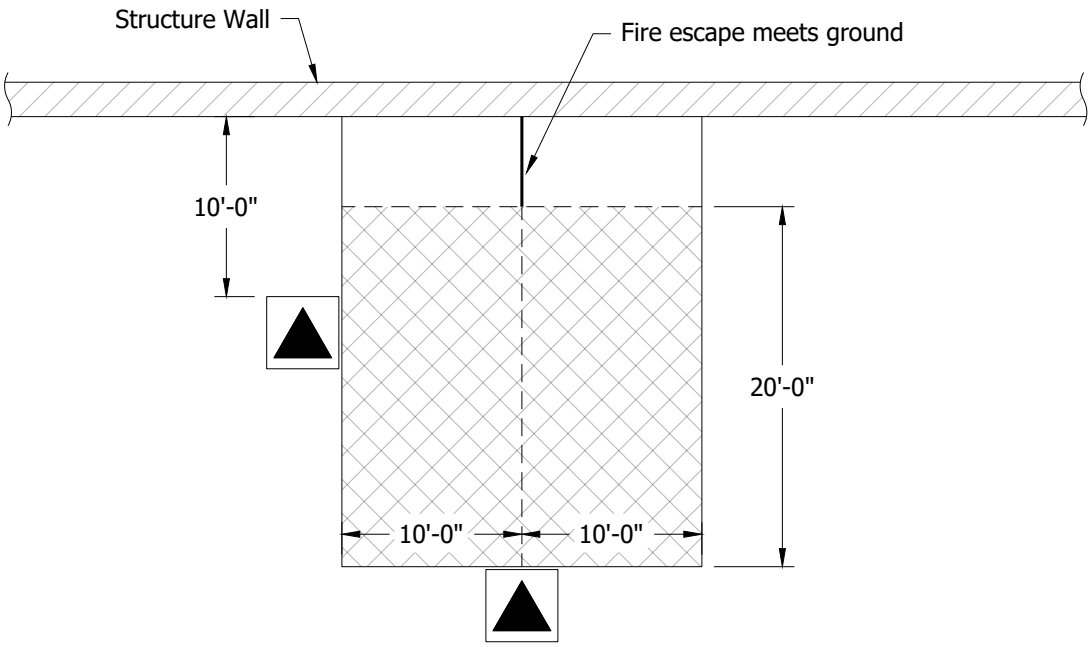
HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Clearances

Padmounted Oil Insulated Transformer Clearances from Combustible Wall with Fire-resistant Barrier (Figure 10-5)

AUTOCAD FILE LOCATION

DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



Note:

Hatched area denotes area transformer cannot be located.

Figure 10-6

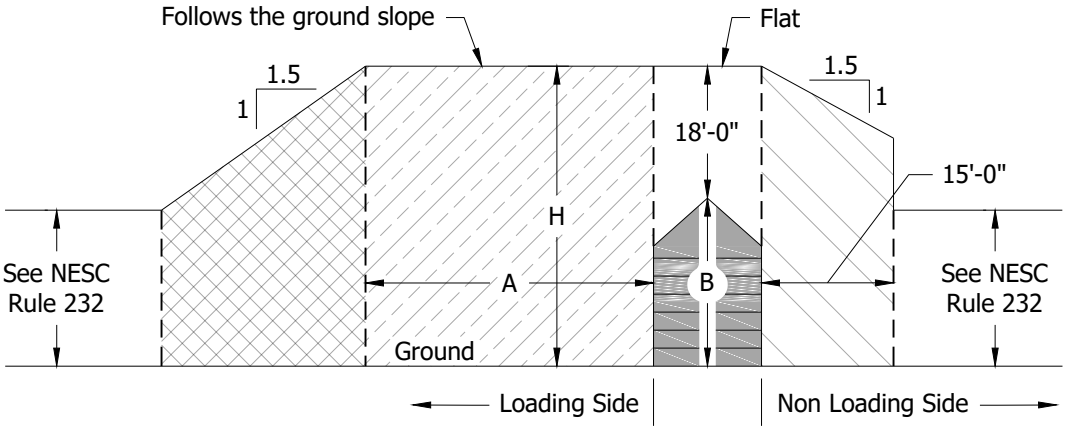
HANCOCK-WOOD ELECTRIC COOPERATIVE
A Touchstone Energy® Cooperative

Clearances

Padmounted Oil Insulated Transformer Clearance from Fire Escapes (Figure 10-6)

AUTOCAD FILE LOCATION

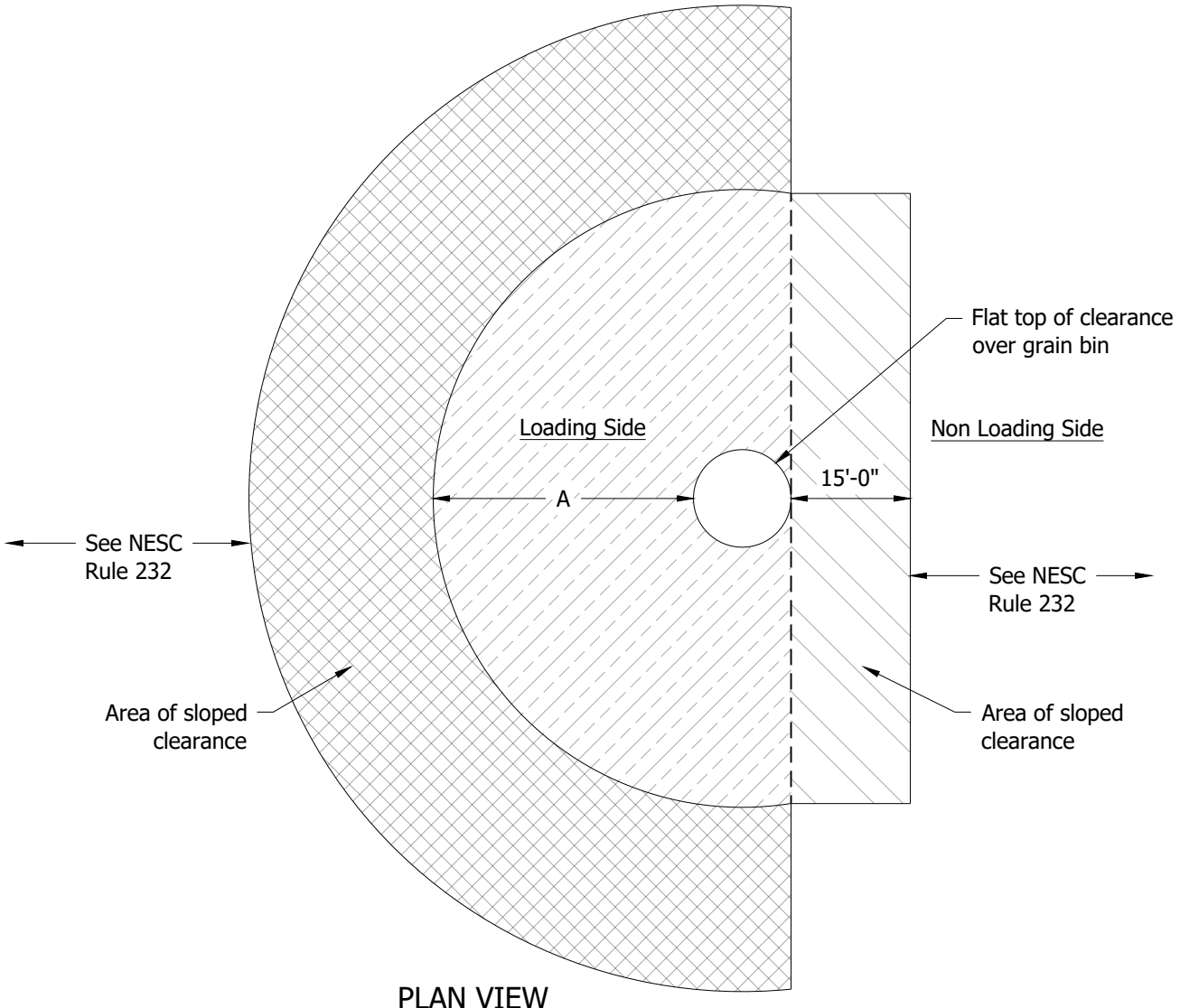
DATE: 06/16/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



B = Height of highest filling or probing port on grain bin
A = B + 18ft
H = B + 18ft

ELEVATION

In the area of sloped clearance, the vertical clearance is reduced by 1 ft. for each 1.5 ft. of horizontal distance from the grain bin.



PLAN VIEW

Figure 10-7

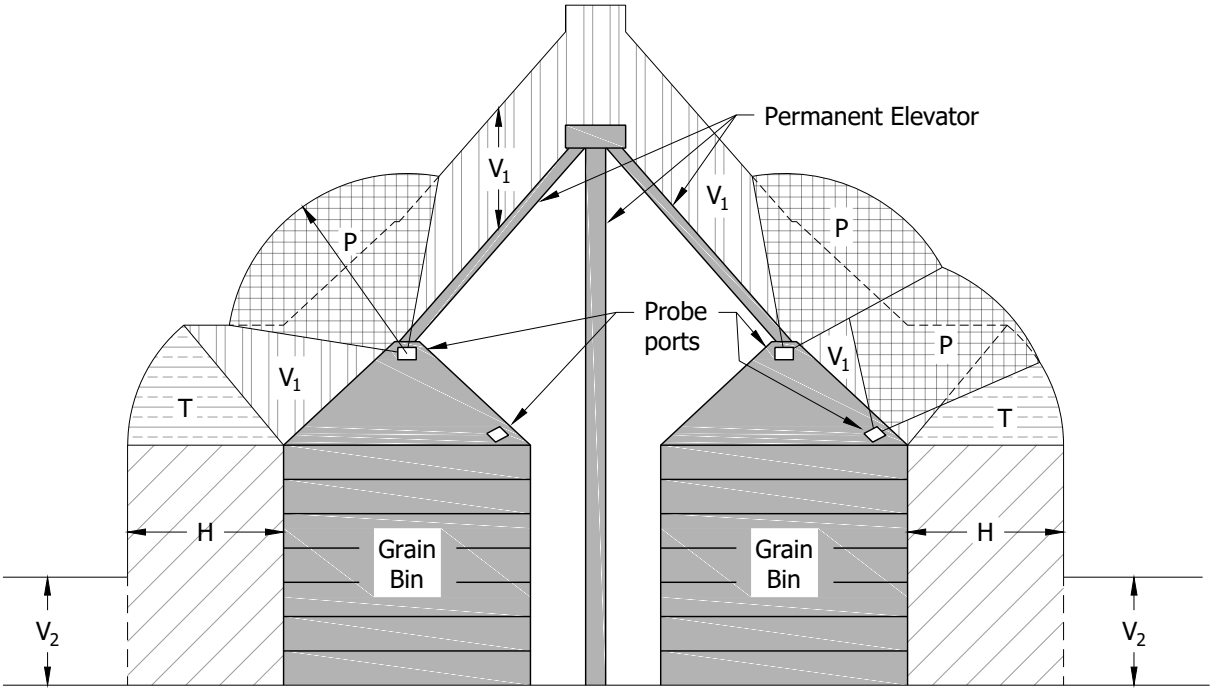
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Clearances

Clearance Envelope for Grain Bins Filled by Portable Equipment (Figure 10-7)

AUTOCAD FILE LOCATION

DATE: 06/17/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



ELEVATION

P = Probe clearance 18 ft required by Rule 234F1a
H = Horizontal clearance 15 ft required by Rule 234F1b
T = Transition clearance
V_1 = Vertical clearance above a building required by Rule 234C (Table 234-1)
V_2 = Vertical clearance above a building required by Rule 232B (Table 232-1 or 232-2)

Figure 10-8

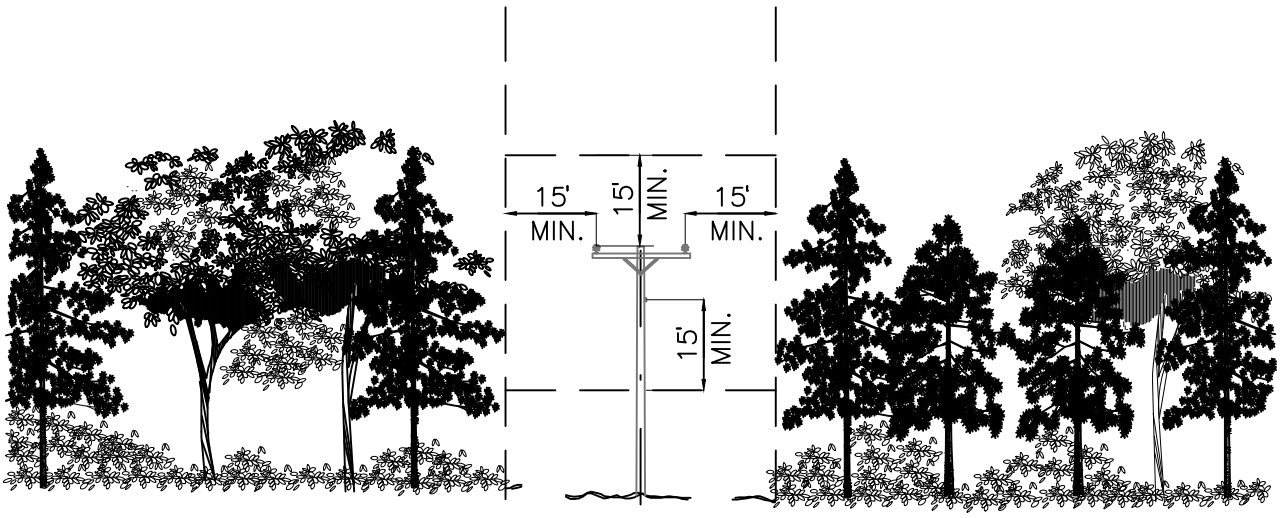
HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Clearances

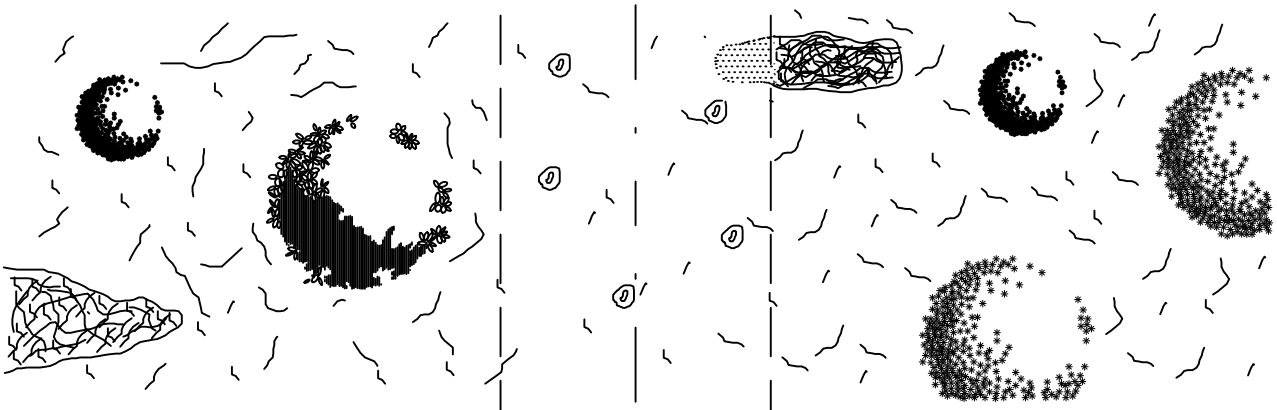
Clearance Envelope for Grain Bins Filled by Permanent Equipment (Figure 10-8)

AUTOCAD FILE LOCATION

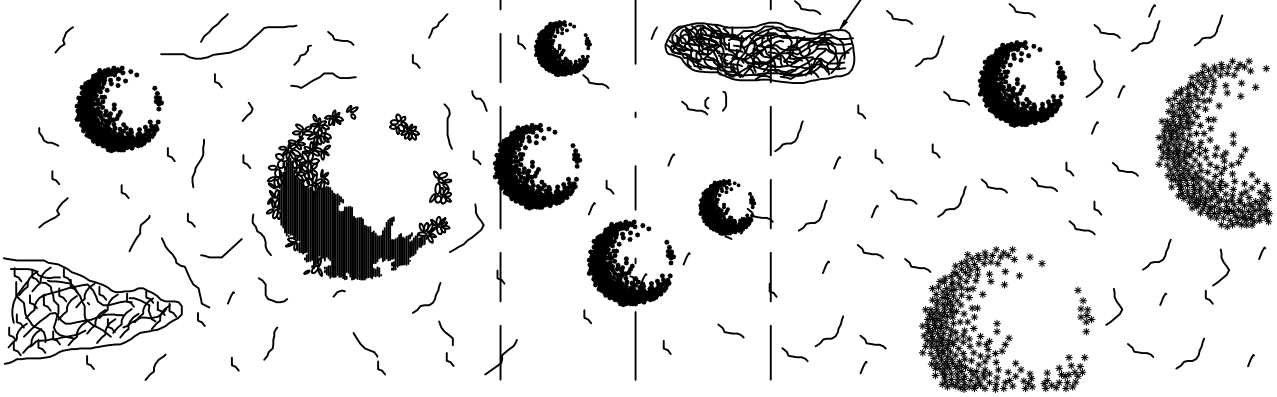
DATE: 06/17/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.



ELEVATION



AFTER CLEARING



BEFORE CLEARING

NOTE:
1. Hazard trees outside of the Right-of-Way will be removed with the owners permission.
2. Any limbs touching the secondary or service wires will be removed to a minimum of 3' of clearance.

Figure 10-9

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

Clearances

Tree Trimming Guide

(Figure 10-9)

AUTOCAD FILE LOCATION

DATE: 06/22/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

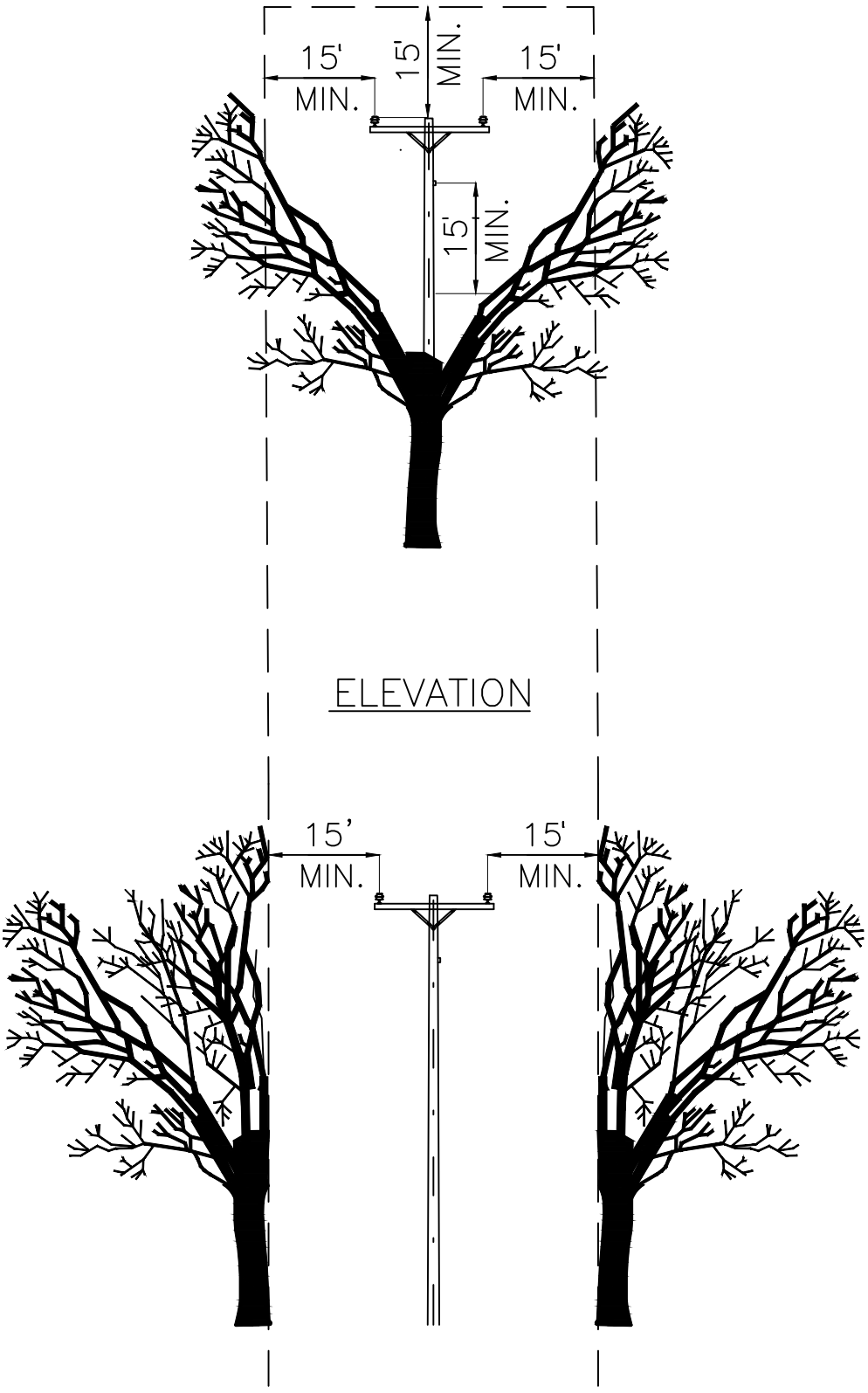


Figure 10-10

HANCOCK-WOOD ELECTRIC COOPERATIVE
Members First!
A Touchstone Energy® Cooperative

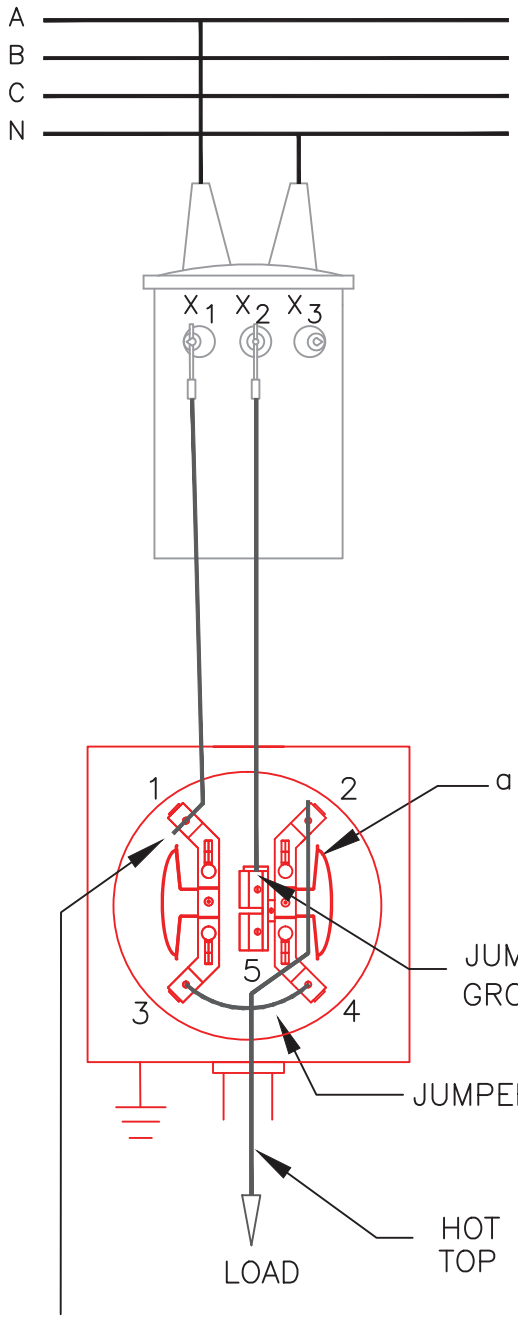
Clearances

Tree Trimming Detail
(Figure 10-10)

AUTOCAD FILE LOCATION

DATE: 06/22/2016	DRAWN BY: KPI	APPROVED BY: SGH	SCALE: N.T.S.

Appendix B: Metering Diagrams

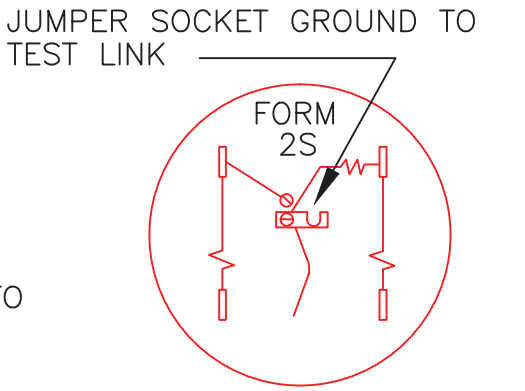


TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	0	3 TO 5	120
1 TO 5	120	4 TO 5	120
2 TO 5	120	3 TO 4	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.



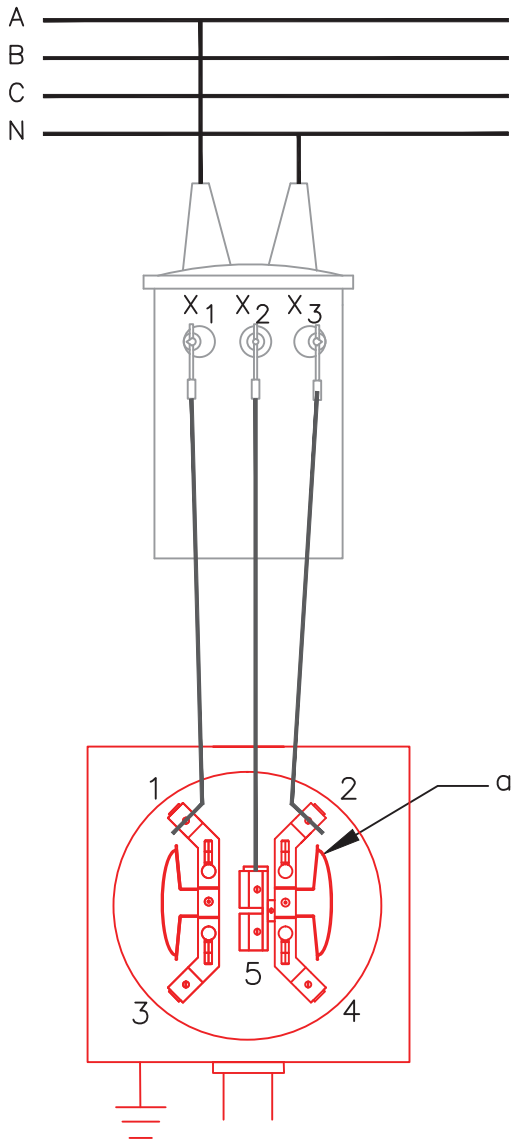
D5S INTERNAL DIAGRAM
REAR VIEW

ITEM	MATERIAL	QTY
a	METER 2S 1PH 200A	1

DESIGN PARAMETERS:
CUSTOMER PROVIDES METER BASE SPECIAL SOCKET WIRING
THE USE OF A 3–WIRE PHASE METER TO BE USED FOR 2–WIRE SERVICE TEST LINK OPEN

12.47/7.2 kV
FORM 1S SELF CONTAINED 2 WIRE SINGLE PHASE SERVICE USING 2S METER

JANUARY 2013 HWEC	HWE 2–87	MN1S–2

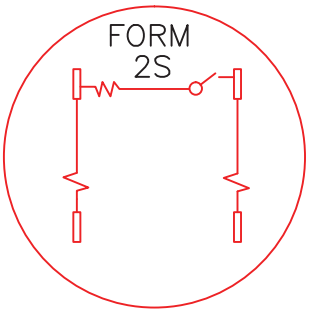


TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	240	3 TO 5	0
1 TO 5	120	4 TO 5	0
2 TO 5	120	3 TO 4	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

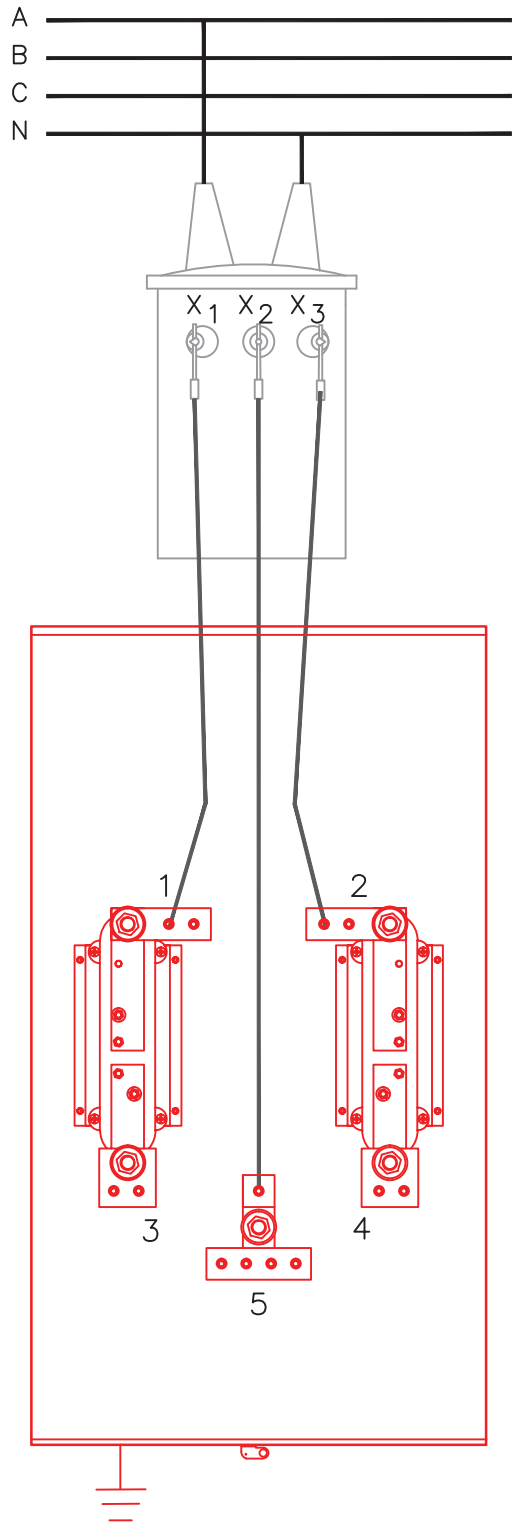


ITEM	MATERIAL	QTY
a	METER 2S 1PH 200A	1

DESIGN PARAMETERS:
CUSTOMER PROVIDES METER BASE

12.47/7.2 kV
FORM 2S SELF CONTAINED 3 WIRE SINGLE PHASE METER OVHD

JANUARY 2013 HWEC	HWE 2-87	MN2S

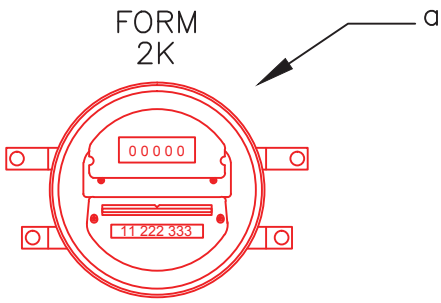


TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	240	3 TO 5	0
1 TO 5	120	4 TO 5	0
2 TO 5	120	3 TO 4	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

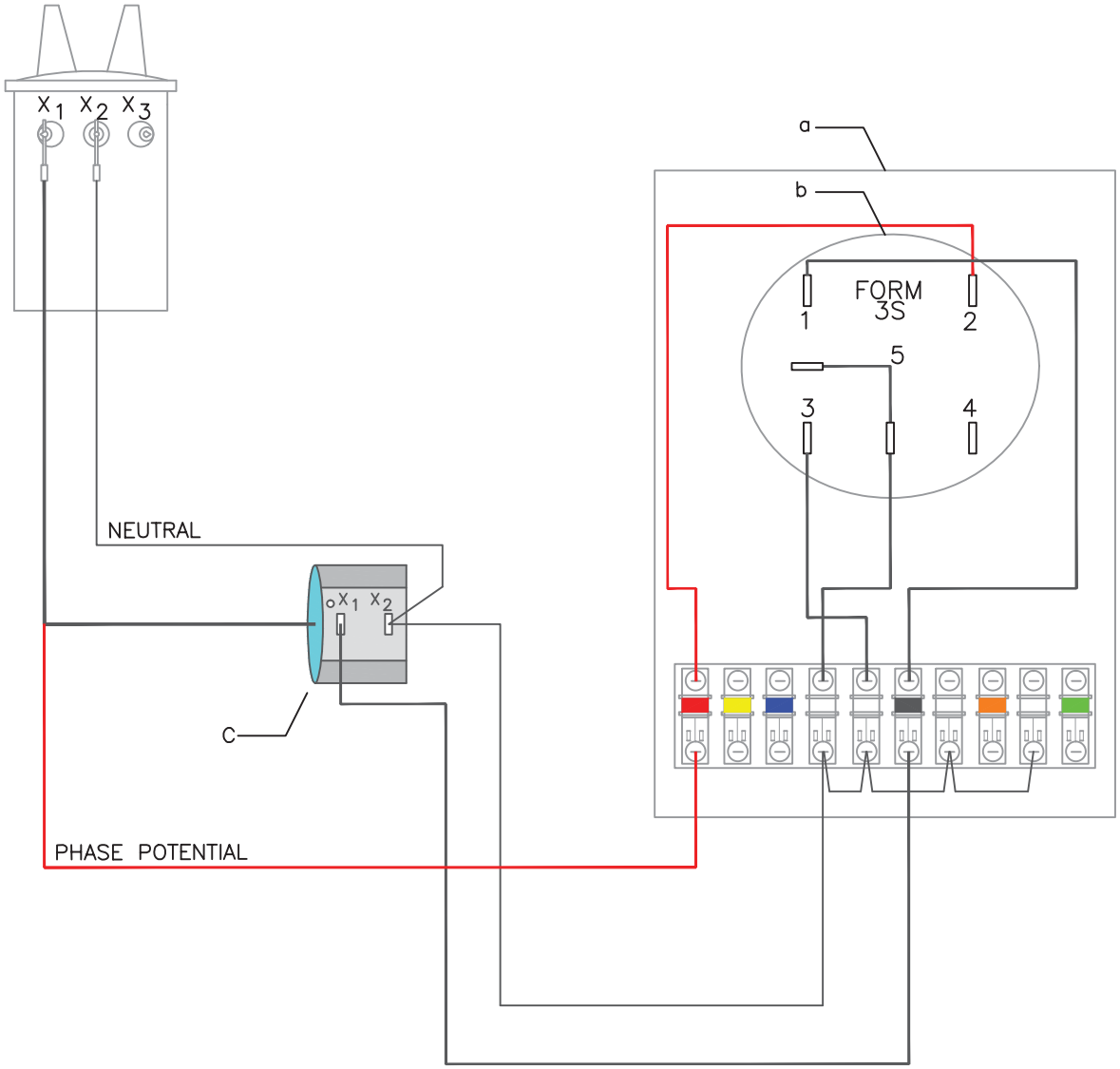


ITEM	MATERIAL	QTY	INV#
a	METER 2K 1PH 400A	1	481480

DESIGN PARAMETERS:
CUSTOMER PROVIDES METER BASE

12.47/7.2 kV
FORM 2K SELF CONTAINED 3 WIRE SINGLE PHASE METER OVHD

JANUARY 2013	HWE 2-87	MN2K
HWEC		



MN3SO

ITEM	MATERIAL	QTY
a	MTBASE 5 TERM 3S 1PH CT	1
b	METER 3S 1 PH 20A CT W/TURTLE	1
c	CT 200:5 OVHD	1
	CONDUIT 1 SCH40 PVC 10FT	20
	12 AWG THWN METER WIRE	50
	CONDUIT WEATHERHEAD, 1" PVC	1
	CONDUIT HUB, 1"	1
	CROSSARM, 8'	1
	CU HTAP, SMALL 4SOL-6SOL	2
	4 SOLID BARE CU	10

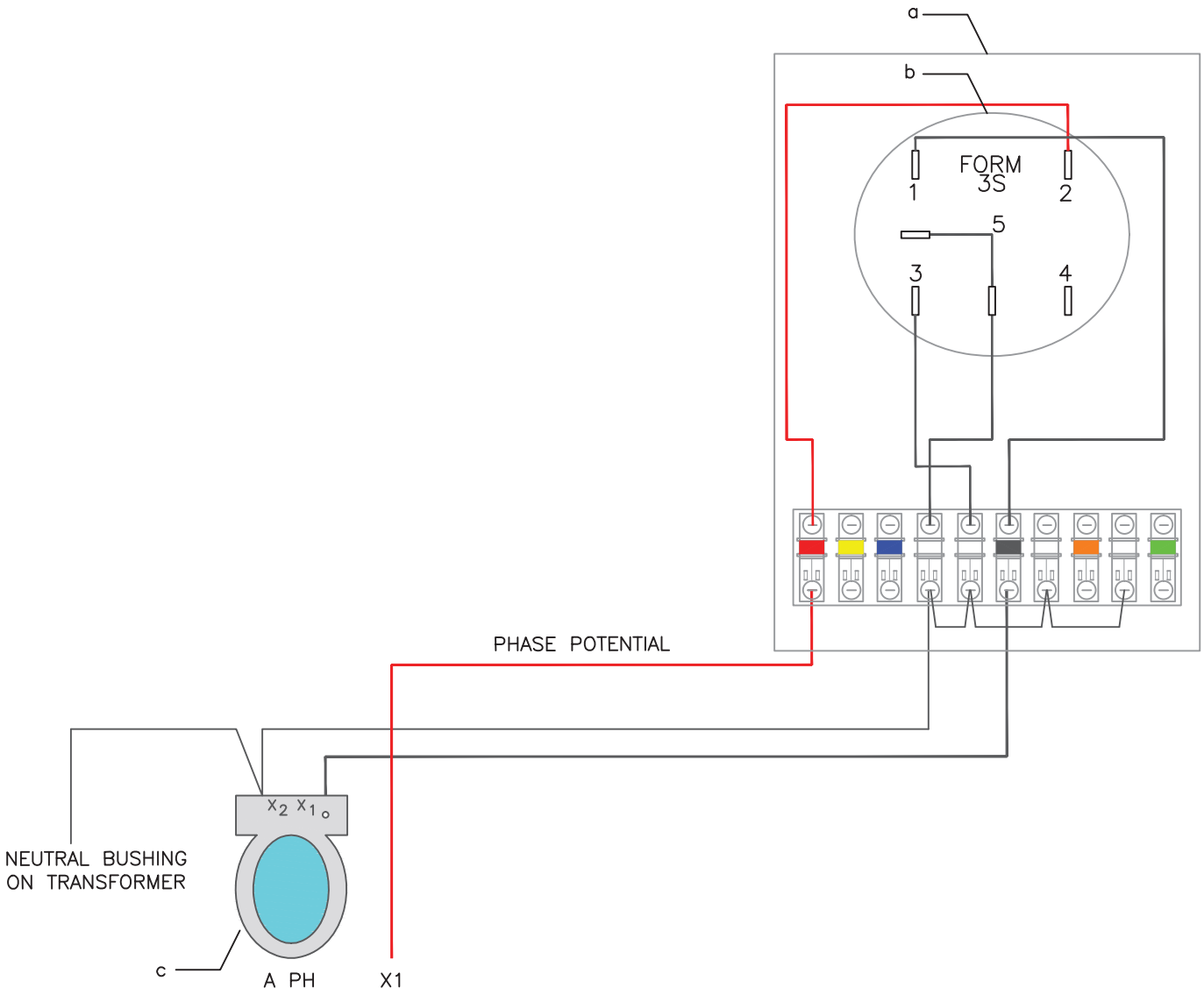
TERMINAL	AC VOLTAGE
2 TO 4	0
2 TO 5	120
1 TO 3	PHASE CURRENT
1 TO 5	PHASE CURRENT

DESIGN PARAMETERS:

Metering Potentials are hooked to the customers service conductor on the source side of CT's
Service shall be called out to use 200:5 CT's unless specified differently

12.47/7.2 kV
FORM 3S SINGLE PHASE 2 WIRE
TRANSFORMER RATED OVHD

JANUARY 2013	HWE 2-87	MN3SO
HWEC		



MN3SU

ITEM	MATERIAL	QTY
a	MTBASE 5 TERM 3S 1PH CT	1
b	METER 3S 1 PH 20A CT W/TURTLE	1
c	CT 200:5 UND GRD	1
	12 AWG THWN METER WIRE	50
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10

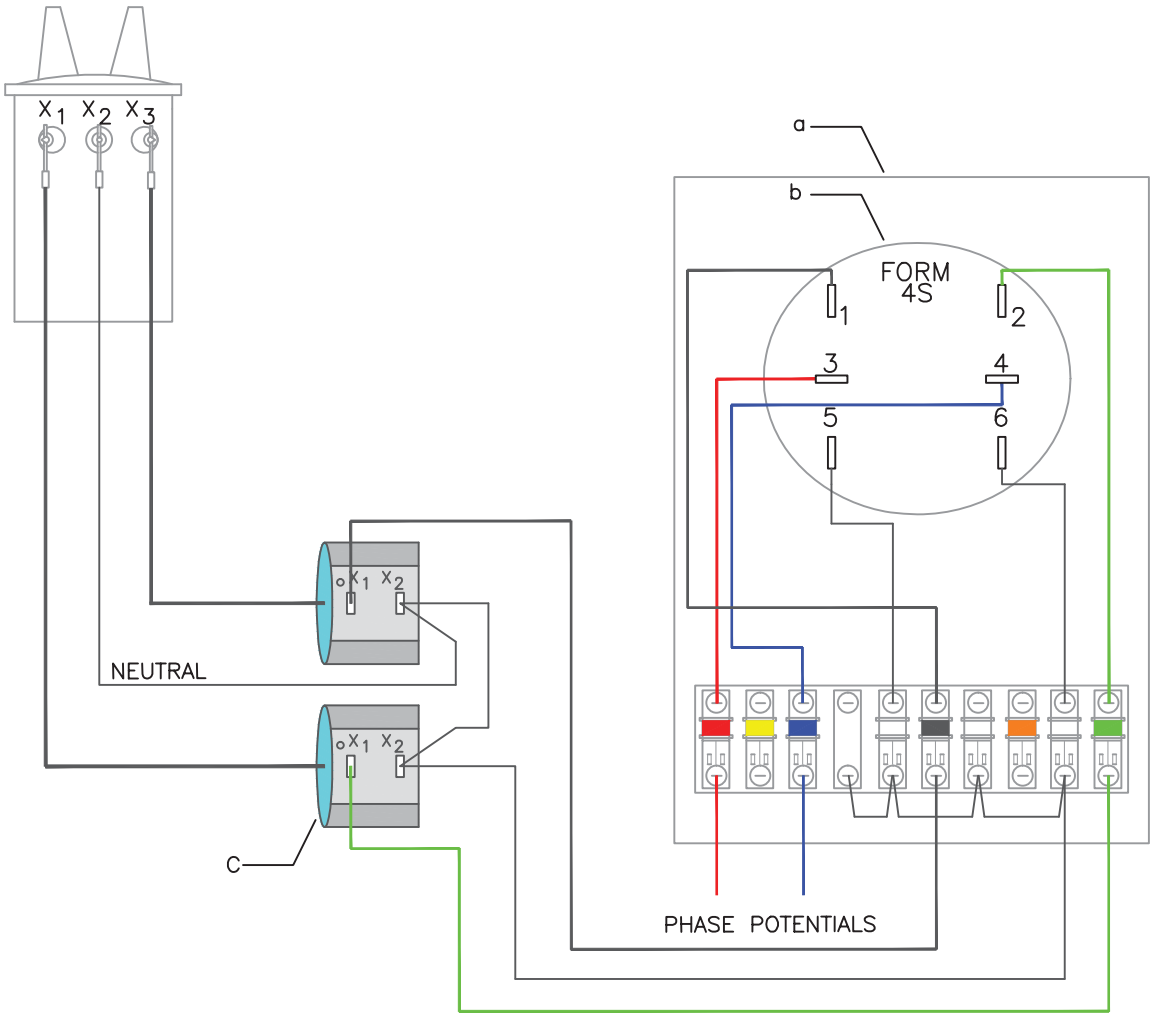
TERMINAL	AC VOLTAGE
2 TO 4	0
2 TO 5	120
1 TO 3	PHASE CURRENT
1 TO 5	PHASE CURRENT

DESIGN PARAMETERS:

Metering Potentials are hooked to the customers service conductor on the source side of CT's
Service shall be called out to use 200:5 CT's unless specified differently

12.47/7.2 kV
FORM 3S SINGLE PHASE 2 WIRE
TRANSFORMER RATED UND GRD

JANUARY 2013	HWE 2–87	MN3SU
HWEC		



MN4SO

ITEM	MATERIAL	QTY
a	MTBASE 6 TERM 4S 1PH CT	1
b	METER 4S 1 PH 20A CT W/TURTLE	1
c	CT 200:5 OVHD	2
	CONDUIT 1 SCH40 PVC 10FT	20
	12 AWG THWN METER WIRE	50
	CONDUIT WEATHERHEAD, 1" PVC	1
	CONDUIT HUB, 1"	1
	CROSSARM, 8'	1
	CU HTAP, SMALL 4SOL-6SOL	2
	4 SOLID BARE CU	10

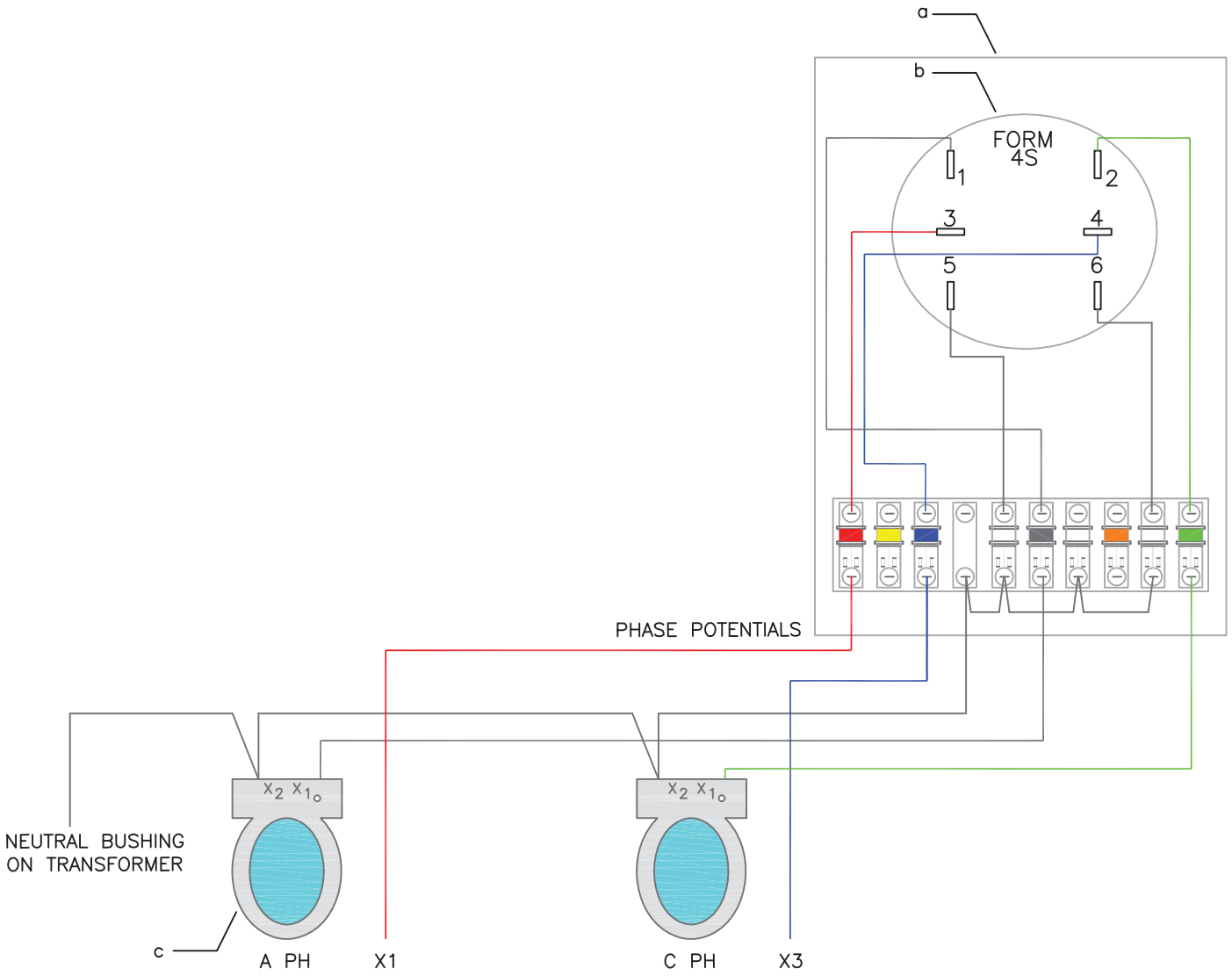
TERMINAL	AC VOLTAGE
3 TO 5/6	120
4 TO 5/6	120
3 TO 4	240
1 TO 5	PHASE CURRENT
2 TO 6	PHASE CURRENT

DESIGN PARAMETERS:

Metering Potentials are hooked to the customers service conductor on the source side of CT's
Service shall be called out to use 200:5 CT's unless specified differently

12.47/7.2 kV
FORM 4S SINGLE PHASE 3 WIRE
TRANSFORMER RATED OVHD

JANUARY 2013	HWE 2-87	MN4SO
HWEC		



MN4SU

ITEM	MATERIAL	QTY
a	MTBASE 6 TERM 4S 1PH CT	1
b	METER 4S 1 PH 20A CT W/TURTLE	1
c	CT 200:5 URD	2
	12 AWG THWN METER WIRE	50
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10

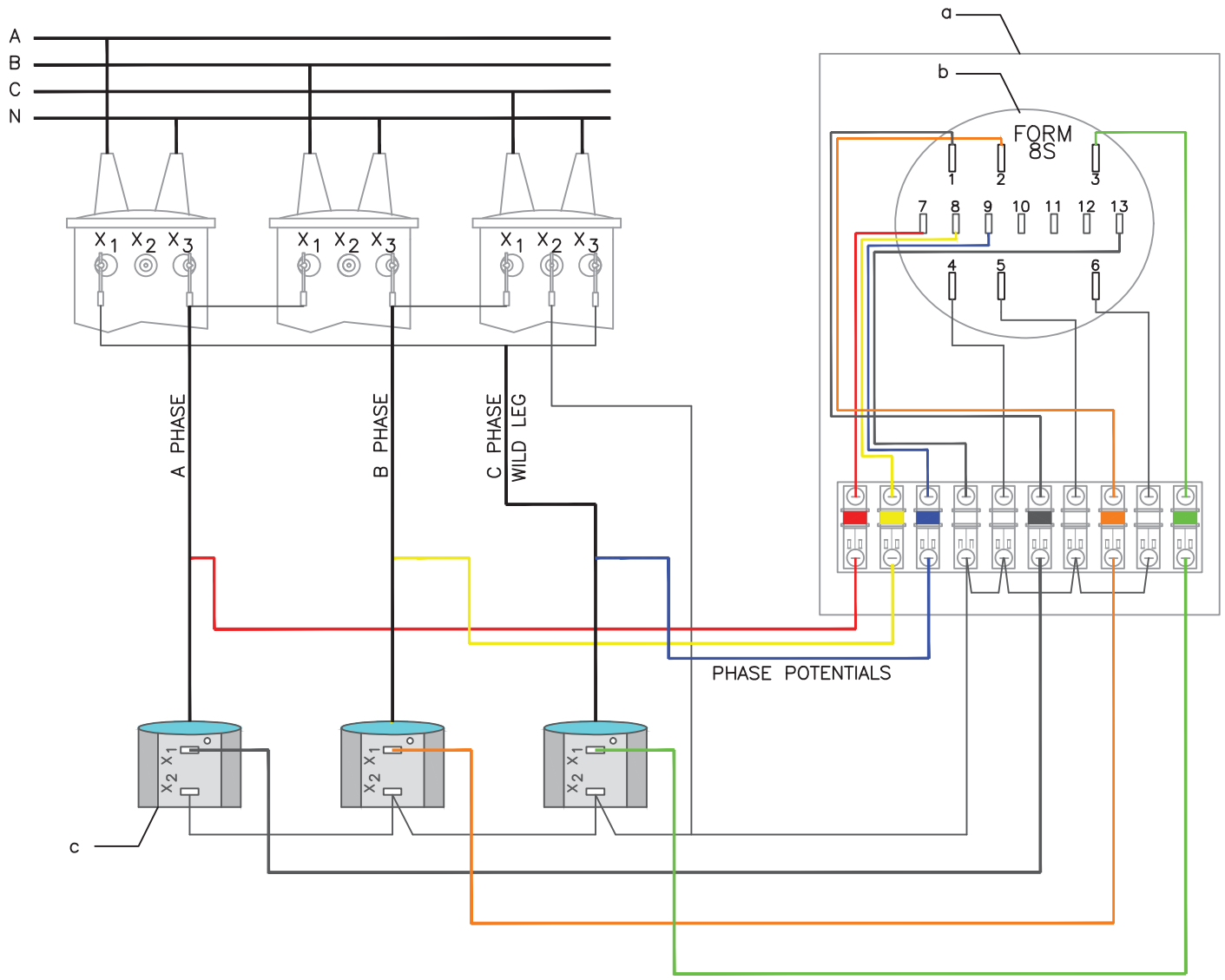
TERMINAL	AC VOLTAGE
3 TO 5/6	120
4 TO 5/6	120
3 TO 4	240
1 TO 5	PHASE CURRENT
2 TO 6	PHASE CURRENT

DESIGN PARAMETERS:

Metering Potentials are hooked to the customers service conductor on the source side of CT's
Service shall be called out to use 200:5 CT's unless specified differently

12.47/7.2 kV
FORM 4S SINGLE PHASE 3 WIRE
TRANSFORMER RATED UND GRD

JANUARY 2013	HWE 2–87	MN4SU
HWEC		



MN8SO

ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 8S	1
c	CT 200:5 OVHD	3
	CONDUIT WEATHERHEAD, 1" PVC	1
	CONDUIT HUB, 1"	1
	CONDUIT 1 SCH40 PVC 10FT	20
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150
	CROSSARM, 8'	1

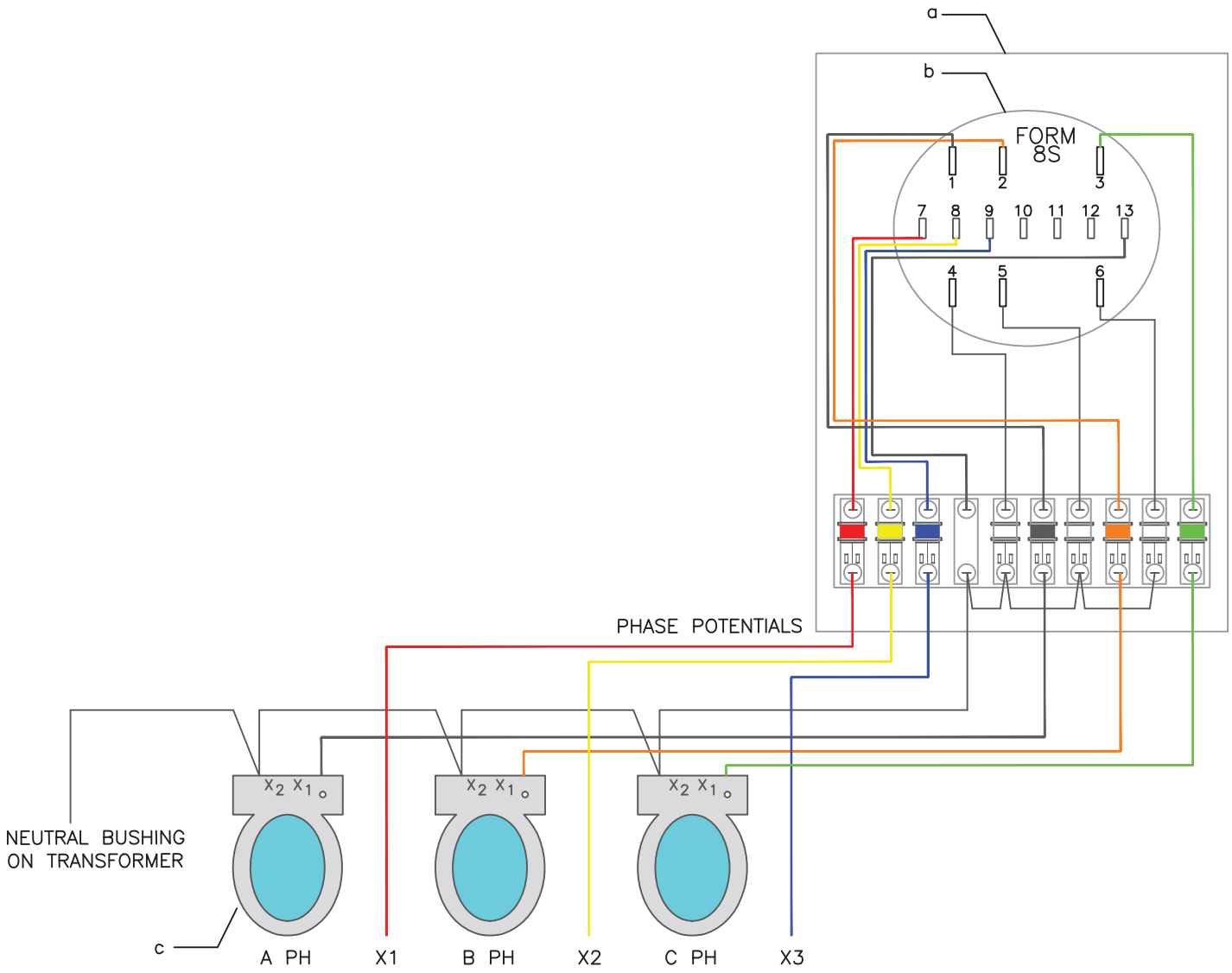
TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	208
7 TO 8	240
8 TO 9	240
7 TO 9	240
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT

DESIGN PARAMETERS:

USE C PHASE AS WILD LEG
SERVICE SHALL BE CALLED OUT
TO USE 200:5 CT'S UNLESS
SPECIFIED DIFFERENTLY

12.47/7.2 kV
THREE PHASE FORM 8S METER 4 WIRE DELTA
WITH CURRENT TRANSFORMERS OVHD

JANUARY 2013	HWE 2–87	MN8SO
HWEC		



MN8SU

ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 8S	1
c	CT 200:5 UND GRD	3
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150

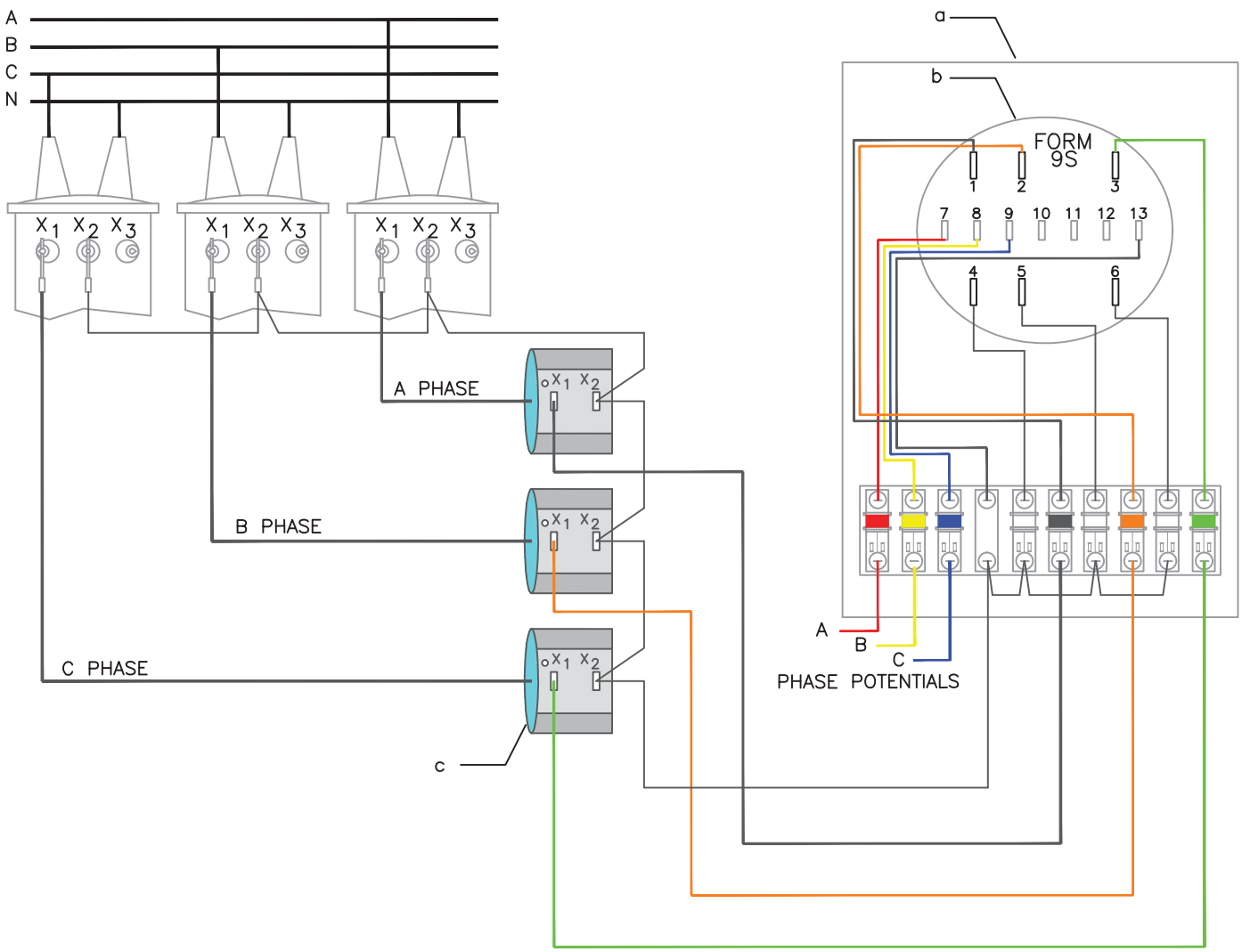
TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	208
7 TO 8	240
8 TO 9	240
7 TO 9	240
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT

DESIGN PARAMETERS:

USE C PHASE AS WILD LEG SERVICE SHALL BE CALLED OUT TO USE 200:5 CT'S UNLESS SPECIFIED DIFFERENTLY

12.47/7.2 kV
THREE PHASE FORM 8S METER 4 WIRE DELTA
WITH CURRENT TRANSFORMERS UND GRD

JANUARY 2013	HWE 2–87	MN8SU
HWEC		



MN9SO

ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 9S	1
c	CT 200:5 OVHD	3
	CONDUIT WEATHERHEAD, 1" PVC	1
	CONDUIT HUB, 1"	1
	CONDUIT 1 SCH40 PVC 10FT	20
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150
	CROSSARM, 8'	1

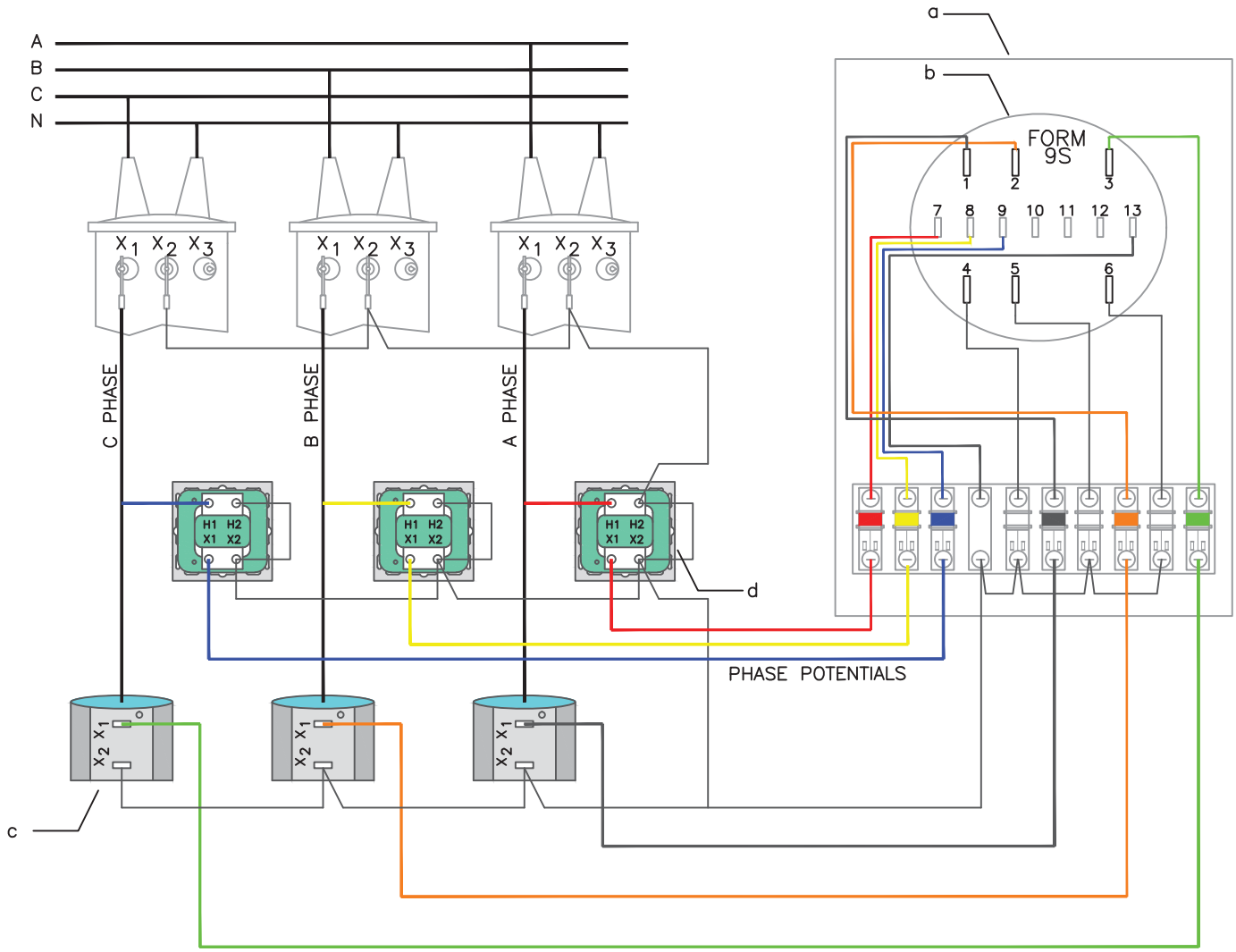
TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	120
7 TO 8	208
8 TO 9	208
7 TO 9	208
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT

DESIGN PARAMETERS:

SERVICE SHALL BE CALLED OUT TO USE 200:5 CT'S UNLESS SPECIFIED DIFFERENTLY

12.47/7.2 kV
FORM 9S 4 WIRE WYE
THREE PHASE METER OVHD

JANUARY 2013	HWE 2–87	MN9SO
HWEC		



MN9SOV

ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 9S	1
c	CT 200:5 OVHD	3
d	PT 500V–120V 2.5:1 500VA	3
	CONDUIT WEATHERHEAD, 1" PVC	1
	CONDUIT HUB, 1"	1
	CONDUIT 1 SCH40 PVC 10FT	20
	CU HTAP, SMALL 4SOL–6SOL	2
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150
	CROSSARM, 8'	1

TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	120
7 TO 8	208
8 TO 9	208
7 TO 9	208
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT

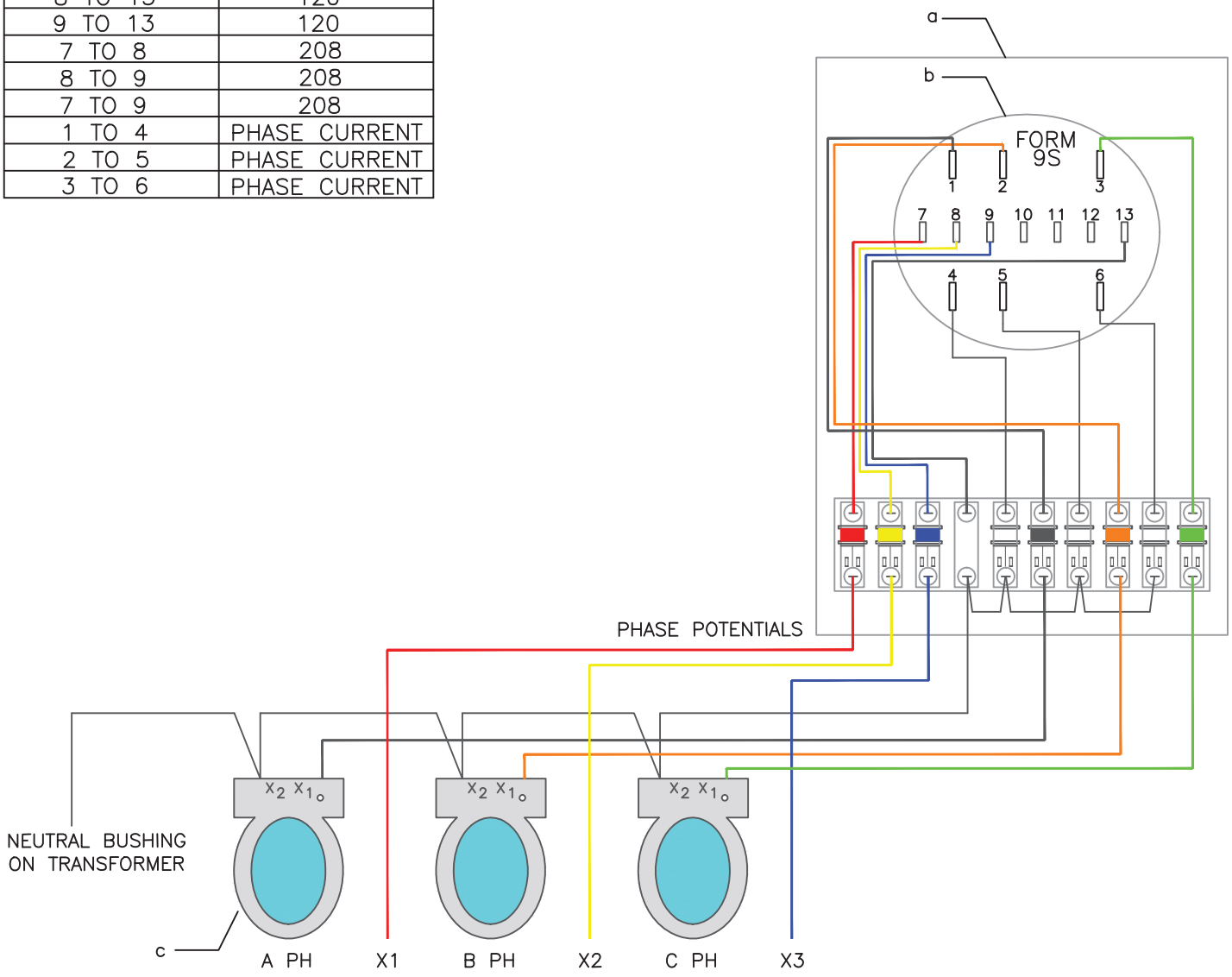
DESIGN PARAMETERS:

USE A 500 VA PT ON C PH SERVICE SHALL BE CALLED OUT TO USE 200:5 CT'S UNLESS SPECIFIED DIFFERENTLY

12.47/7.2 kV
THREE PHASE FORM 9S METER 4 WIRE WYE
WITH POTENTIAL AND CURRENT TRANSFORMERS
277/480

JANUARY 2013	HWE 2–87	MN9SOV
HWEC		

TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	120
7 TO 8	208
8 TO 9	208
7 TO 9	208
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT



MN9SU

ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 9S	1
c	CT 200:5 UND GRD	3
	CU HTAP, SMALL 4SOL–6SOL	3
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150

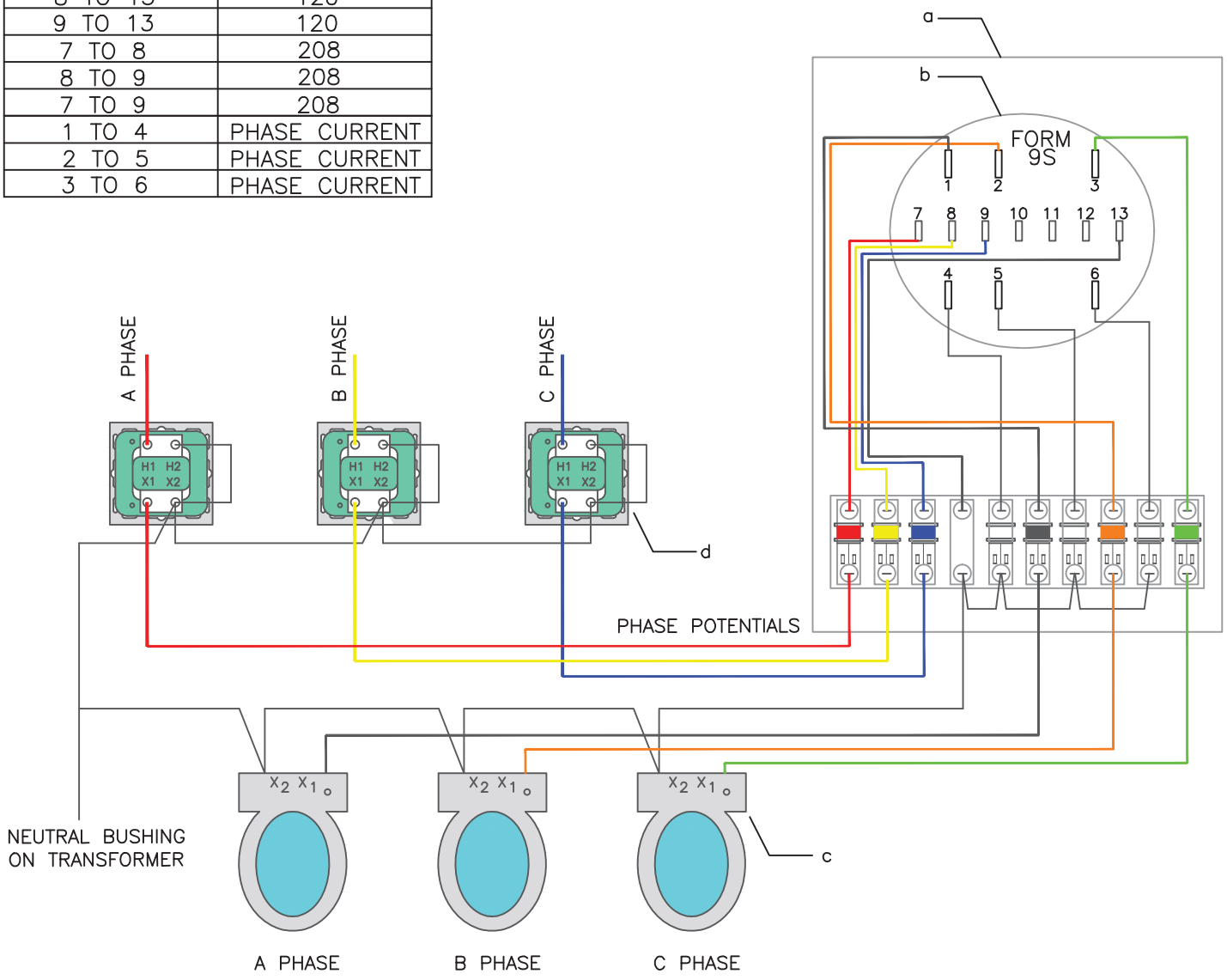
DESIGN PARAMETERS:

SERVICE SHALL BE CALLED OUT TO USE 200:5 CT'S UNLESS SPECIFIED DIFFERENTLY

12.47/7.2 kV
FORM 9S 4 WIRE WYE
THREE PHASE METER UNDGRD

JANUARY 2013	HWE 2–87	MN9SU
HWEC		

TERMINAL	AC VOLTAGE
7 TO 13	120
8 TO 13	120
9 TO 13	120
7 TO 8	208
8 TO 9	208
7 TO 9	208
1 TO 4	PHASE CURRENT
2 TO 5	PHASE CURRENT
3 TO 6	PHASE CURRENT



MN9SUV

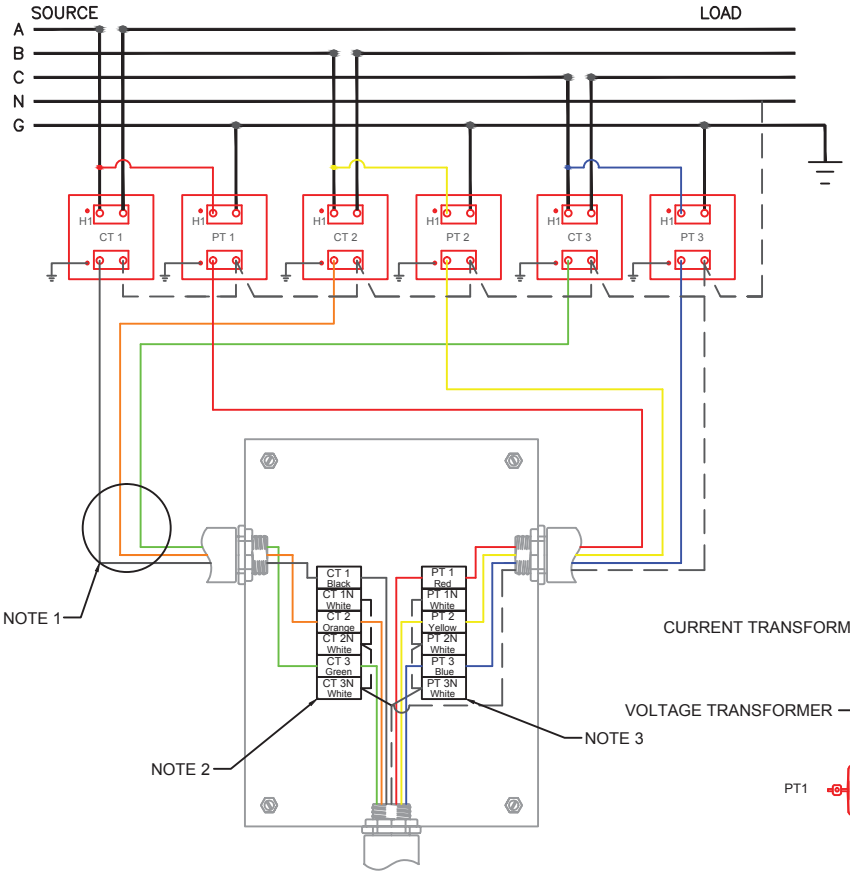
ITEM		QTY
a	MTRBASE 13TERM 8+9S 3PH	1
b	METER 9S	1
c	CT 200:5 UND GRD	3
d	PT 500V–120V 2.5:1 500VA	3
	CU HTAP, SMALL 4SOL–6SOL	3
	4 SOLID BARE CU	10
	12 AWG THWN METER WIRE	150

DESIGN PARAMETERS:

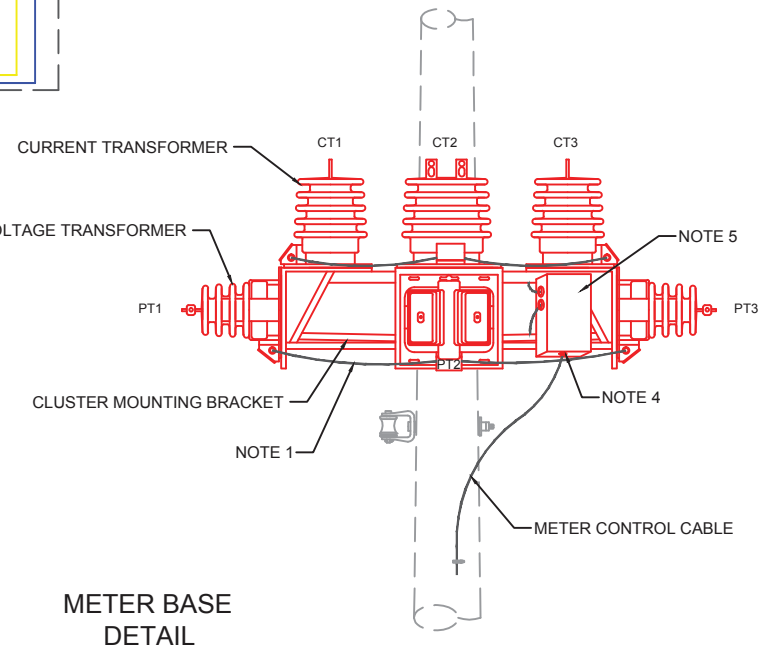
USE A 500 VA PT ON C PH SERVICE SHALL BE CALLED OUT TO USE 200:5 CT'S UNLESS SPECIFIED DIFFERENTLY

12.47/7.2 kV
FORM 9S 4 WIRE WYE
THREE PHASE METER UNDGRD
277/480

JANUARY 2013	HWE 2–87	MN9SUV
HWEC		



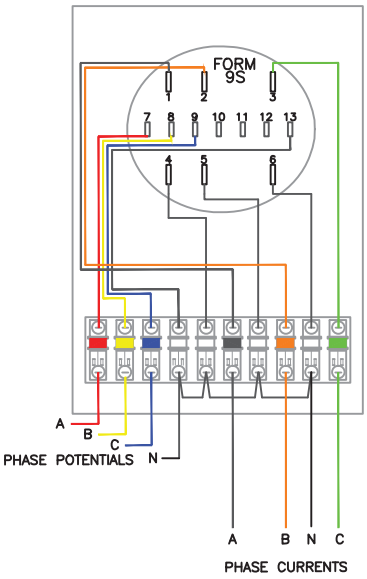
DETAIL "A"
JUNCTION BOX



FRONT VIEW

METER BASE

METER BASE
DETAIL



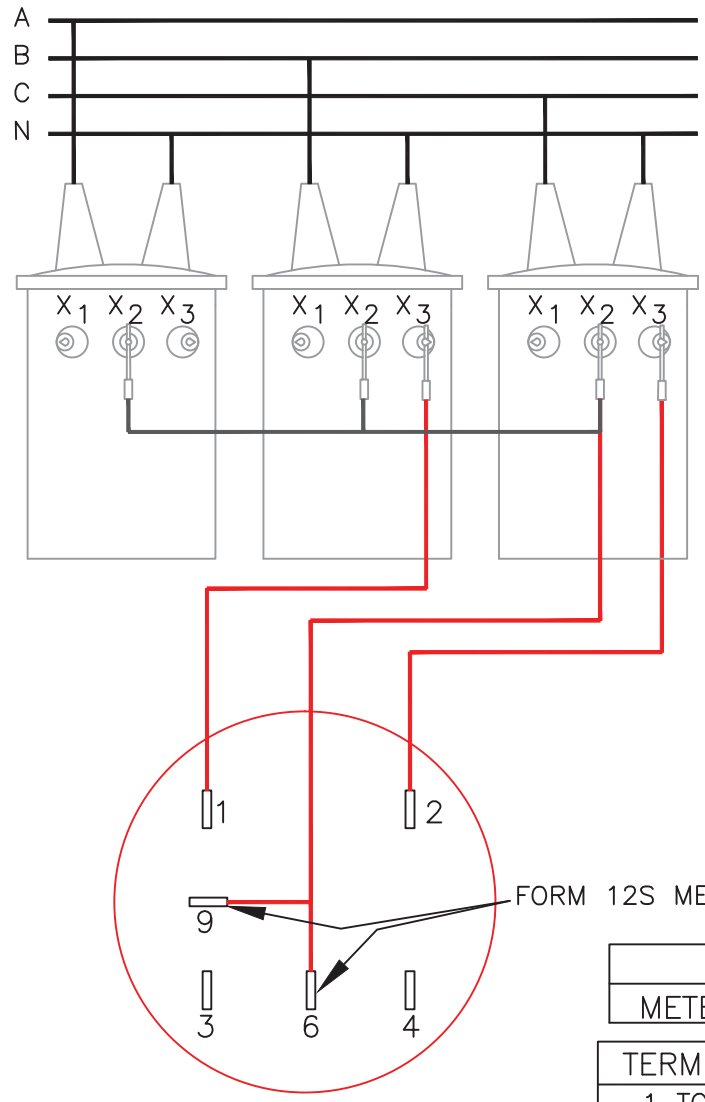
NOTES:

1. FLEXIBLE CONDUIT
2. 6 CT SHORTING TYPE TERMINAL BLOCK
3. 6 PT NON-SHORTING TYPE TERMINAL BLOCK
4. BOX CONNECTOR
5. JUNCTION BOX 12" X 12" X 6" WITH PANEL
6. CLUSTER BRACKET, TO BE CONNECTED TO SYSTEM NEUTRAL AND POLE GROUND.

DESIGN PARAMETERS:
THREE PHASE FOUR WIRE WYE
THREE ELEMENT

12.47/7.2 kV
PRIMARY METERING–CLUSTER MOUNTED TRANSFORMER SECONDARY DETAILS

FEB 2012	HWE 2–87	MN9S PRIM.
RUS		(MN9SP)



FORM 12S METER HAS A MOVEABLE VOLTAGE TERMINAL

MATERIAL	QTY
METER 12S 3PH SELF CONTAINED 200A	1

TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	208	2 TO 4	0
1 TO 9 OR 6	120	3 TO 4	0
2 TO 9 OR 6	120	3 TO 9 OR 6	0
1 TO 3	0	4 TO 9 OR 6	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

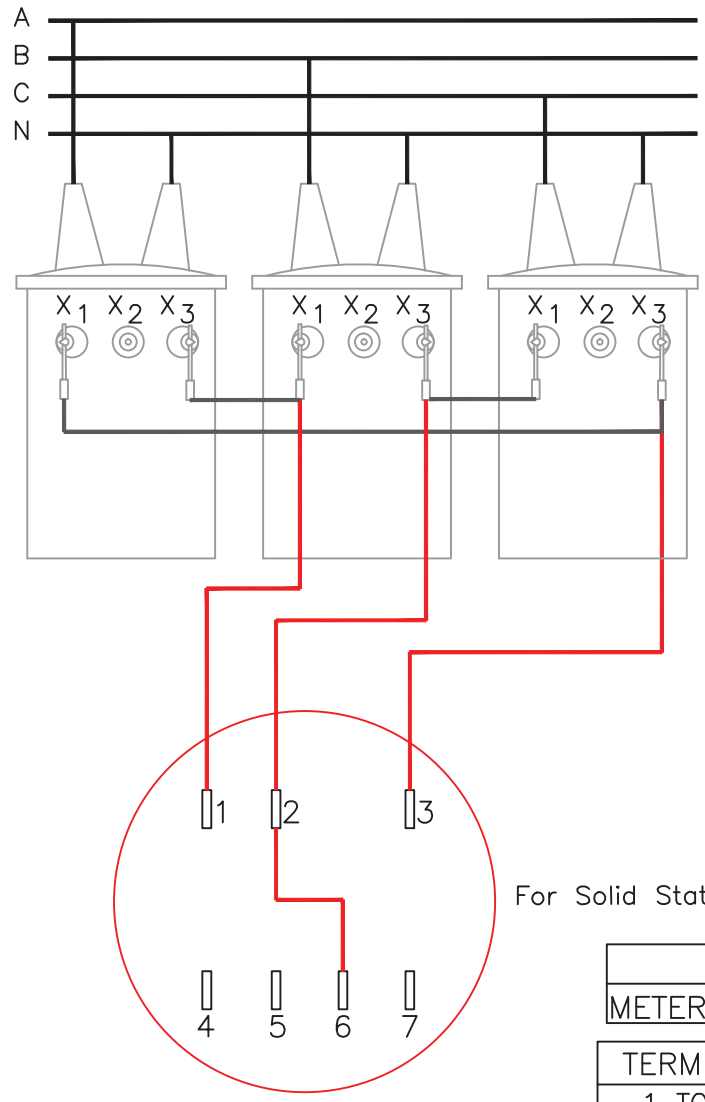
DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

DESIGN PARAMETERS:

DO NOT
OPERATE THE BYPASS LEVER UNTIL
ALL CHECKS ARE MADE.

12.47/7.2 kV
FORM 12S SELF CONTAINED 3 WIRE
SINGLE PHASE NETWORK METER

JANUARY 2013	HWE 2-87	MN12S
HWEC		



For Solid State meters Display

MATERIAL	QTY
METER 12/25S 3PH SELF CONTAINED 200A	1

TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	240/480	4 TO 6	0
2 TO 3	240/480	5 TO 6	0
1 TO 3	240/480	7 TO 6	0
1 TO 6	120/480	4 TO 5	0
2 TO 6	0	5 TO 7	0
3 TO 6	240/480	4 TO 7	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

VERIFY THE METERING POTENTIAL IS GROUNDED:
Apply your Ohm meter between terminals 6 and the neutral. The reading should be 0 ohms.

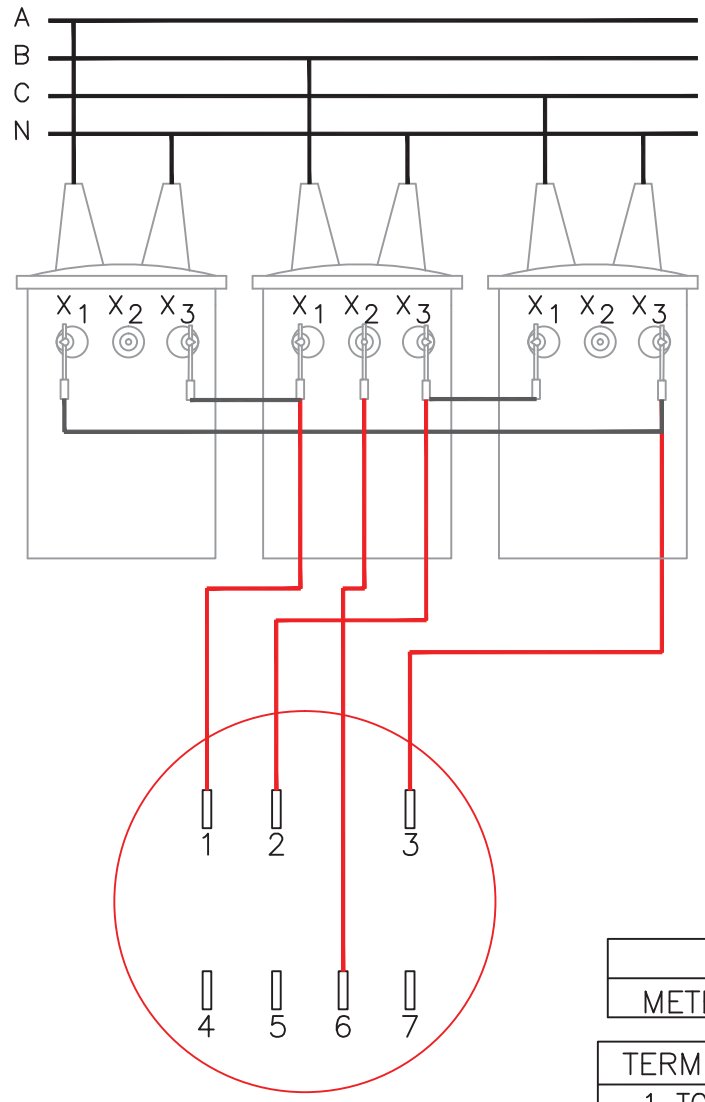
DESIGN PARAMETERS:

DO NOT
OPERATE THE BYPASS LEVER UNTIL ALL CHECKS ARE MADE.

Typically a 12S or 25S is used for the 3W Delta

12.47/7.2 kV
FORM 12/25S SELF CONTAINED 3 WIRE
DELTA THREE PHASE METER OVHD

JANUARY 2013	HWE 2-87	MN12/25S
HWEC		3W DELTA



MATERIAL	QTY
METER 15S 3PH SELF CONTAINED 200A	1

TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	240	4 TO 6	0
2 TO 3	240	5 TO 6	0
1 TO 3	240	7 TO 6	0
1 TO 6	120	4 TO 5	0
2 TO 6	120	5 TO 7	0
3 TO 6	208	4 TO 7	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

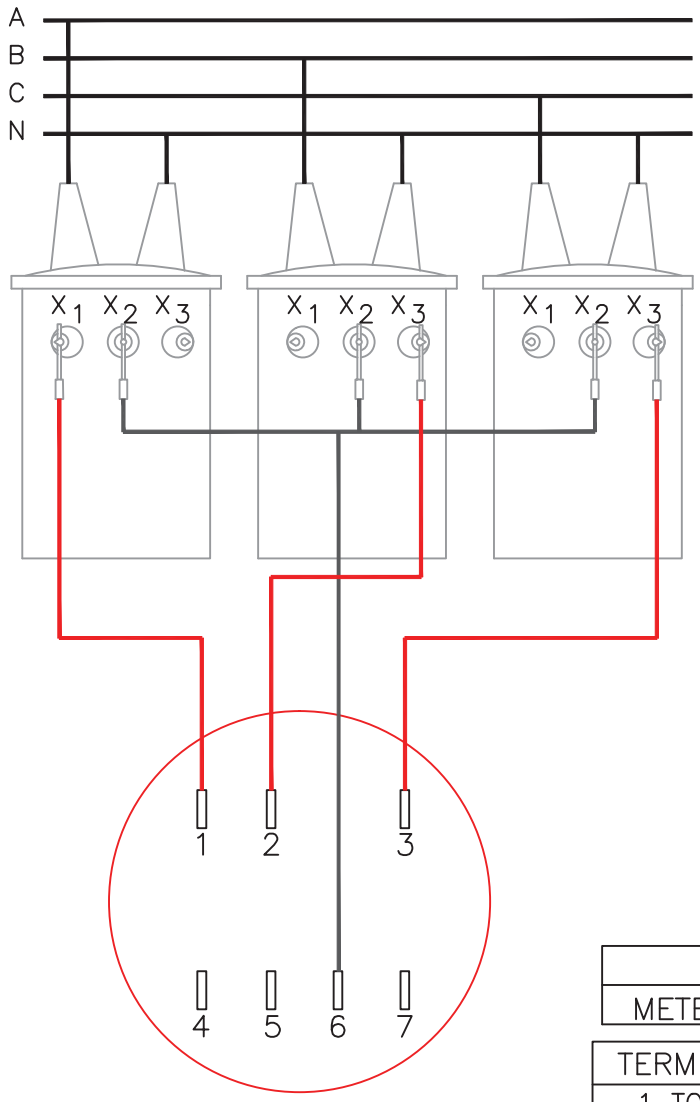
VERIFY THE METERING POTENTIAL IS GROUNDED:
Apply your Ohm meter between terminals 6 and the neutral. The reading should be 0 ohms.

DESIGN PARAMETERS:

DO NOT
OPERATE THE BYPASS LEVER UNTIL
ALL CHECKS ARE MADE.

12.47/7.2 kV
FORM 15S SELF CONTAINED 4 WIRE
DELTA THREE PHASE METER OVHD

JANUARY 2013	HWE 2-87	MN15S
HWEC		4W DELTA



MATERIAL	QTY
METER 16S 3PH SELF CONTAINED 200A	1

TERMINAL	AC VOLTAGE	TERMINAL	AC VOLTAGE
1 TO 2	208	4 TO 6	0
2 TO 3	208	5 TO 6	0
1 TO 3	208	7 TO 6	0
1 TO 6	120	4 TO 5	0
2 TO 6	120	5 TO 7	0
3 TO 6	120	4 TO 7	0

After the voltage check an Ohm meter can be used to check for possible load or a faulted entrance cable

If OK, the meter base load side terminals should show as an open circuit with an Ohm meter.

DO NOT set the meter if any Ohm reading is obtained: Remove the existing load or fault.

VERIFY THE METERING POTENTIAL IS GROUNDED:
Apply your Ohm meter between terminals 6 and the neutral. The reading should be 0 ohms.

DESIGN PARAMETERS:

DO NOT
OPERATE THE BYPASS LEVER UNTIL
ALL CHECKS ARE MADE.

12.47/7.2 kV
FORM 16S SELF CONTAINED 4 WIRE
WYE THREE PHASE METER OVHD

JANUARY 2013	HWE 2-87	MN16S
HWEC		4W WYE

Appendix C: Revisions

Revisions:

- Appendix A (6.7.2021)
  - Fig 4-7: Added notes
  - Fig 4-8: Added notes