

ELECTRIC SERVICE HANDBOOK

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GENERAL INFORMATION

INTRODUCTION

This informational handbook is issued by AEP / Southwestern Electric Power Company (SWEPCO) for the guidance of Customers, Engineers, Architects, Contractors and other interested parties planning electrical installations for residential buildings and commercial establishments. The information and recommendations set forth herein are, in general, sufficient to answer questions concerning a majority of the installations within its scope. The Company will be pleased to assist with any questions or concerns not covered by this handbook.

When planning electrical installations for larger commercial or industrial establishments, it will be necessary for the Engineer, Architect, or Electrical Contractor to contact the Company for detailed information on service requirements.

Codes

All customer owned equipment shall be installed in accordance with the requirements of the latest revision of the National Electric Code (NEC), or of any Federal, State, County or Municipal laws or statutes that may be in effect for governing electrical installations in the area where the installation is made. The Customer, Engineer, Architect, and Electrical Contractor should ascertain that such requirements are met.

The National Electrical Safety Code (NESC), the NEC and various Federal, State, County and Municipal Ordinances are based on the prevention of hazards to life and property. They are not intended to mean that an electrical installation, made in accordance with such rules and regulations, is adequate for the customer's present or future electric service.

This handbook contains SWEPCO's requirements for electrical service. It is the customers responsibility to ensure the project complies with the most recent issue of the NEC and any other federal, state, or local codes that apply. The requirements set forth herein are not necessarily complete facility or safety specifications. Rather they cover matters of mutual concern to the Customer and the Company, which facilitate the supplying of electric service. The requirements are subject to revision from time to time without notification so that they keep pace with developments and progress in the electric industry. Compliance with these requirements

does not absolve the Customer from the obligation to install and maintain wiring and equipment in a safe condition; also, the Company does not accept any responsibility for the quality or condition of the Customer's wiring or equipment. An electrical installation should not only be capable of serving the electrical devices of today in an efficient, safe, and convenient manner, but the Customer should provide circuits and circuit capacity for future load growth.

Inspections

Once the customer's service equipment is installed, the state, county/parishes, or the city with jurisdiction, requires that the installation pass an electrical inspection before SWEPCO can complete the connection to the electrical system. The customer is responsible for requesting and passing this inspection in the locations where inspections are required.

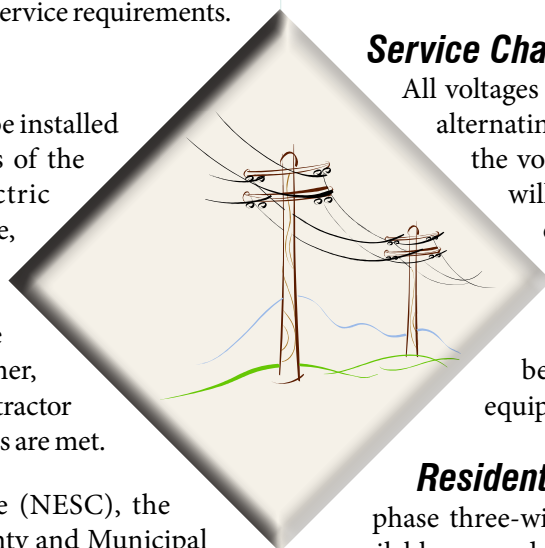
Service Characteristics

All voltages supplied by the Company are nominal alternating current at a frequency of 60 Hertz. As the voltage and the number of phases which will be supplied depend upon the character of the load as well as its size and location, it is necessary for the Customer to consult the Company regarding the type of service which will be furnished before proceeding with the purchase of equipment or the installation of wiring.

Residential Service will be supplied single-phase three-wire, nominally 120/240 volts, or where available or needed, in a network, three-wire, nominally 120/208 volts. See pages 7 and 8 for more information on residential service.

Commercial Service

The secondary distribution available to serve commercial and industrial load may be a three-wire, single-phase system, three-wire, three-phase system or four-wire, three-phase system. The Company should always be consulted in regard to the exact characteristics of the service that will be available. See pages 7 and 24 for more information on commercial service.



Metering

All services requested by the Customer shall be metered for energy consumption, except for dusk to dawn lights and other special services covered under a tariff containing provisions for optional un-metered service. A Commercial Customer, depending on load, may require demand and reactive metering. Time-of-use metering may be available depending on the Customer load and tariff. Refer to page 31 for more detailed information on metering electrical loads.

Meter Location

The customer must install the meter socket where it will be accessible to utility personnel. Meter socket locations are subject to approval by a representative of SWEPCO. The service entrance will be so arranged that the Company can measure the Customer's entire service with one meter, unless otherwise specified in the Company's rate tariff schedule.

The requirements for a properly located meter socket are:

- It must be mounted outside the building between 4 and 6 feet above final grade
- No trees or shrubs shall be planted in front of the meter
- It shall not be located above the first story level or below the basement level of a building
- The location shall be such that it will not interfere with traffic, sidewalks or driveways nor obstruct the opening of doors and windows
- On a residence, it should be located on the front one-third closest to normal public access
- It should be located in an area that is not subject to being fenced, such as patios, decks, porches, and backyards or any area with restricted public access
- It must be located on a structure that is owned by the customer
- For overhead service, it should not be located more than 70 feet from the SWEPCO pole

The reasons for these requirements are:

- So meter readers can read the meter in a safe and cost effective manner
- So SWEPCO can efficiently maintain the meter
- So utility employees can stay out of the customer's backyard
- If there is a fire or other disaster, SWEPCO can disconnect service

Service Location Identification

It is the customer's responsibility to prominently display municipal street addresses, building numbers, apartment numbers etc, in order for SWEPCO's service personnel to quickly and easily identify the proper location for providing service. This includes restoration of power due to an outage as well as connecting new services. **The Customer must clearly display their official 911 address. The numerical portion of the address, including the suite or apartment designation, is needed. The address should be made with minimum 3 inch tall, peel and stick reflective numerals posted in a location that is visible from the nearest road or street.** Having the ability to positively identify a service location at night is critical for SWEPCO service personnel.

Where a building or structure is supplied by more than one service a permanent plaque or directory shall be installed at each service disconnect location denoting all other services supplying that building or structure and the area served by each as required by the NEC.

Access to Customer's Premises

- SWEPCO's authorized agents and employees shall have access to the customer's premises, only to the extent needed by SWEPCO for access to its property.
- SWEPCO's authorized agents and employees shall have access at all reasonable hours for the purposes necessary in connection with supplying and maintaining electric service.
- SWEPCO's authorized agents and employees shall have access to the customer's premises and upon termination of service shall be permitted to remove any or all such property.
- Authorized SWEPCO employees visiting the premises of the customer for any purposes are to be furnished with an identification card. The customer shall refuse admission to persons not having proper identification.

Extension of Company's Facilities

The Company will extend its facilities to provide service in accordance with the provisions of its tariffs on file with each state's Public Service Commission or Public Utility Commission. When the Customer requests the Company to deliver energy in a manner or location other than that designated by the Company, the Customer will be required to pay the additional costs. The Company will be pleased to discuss its terms and conditions for the extension of facilities upon request.

Installation and Responsibility

It is necessary for the protection of the Customer that all work, wiring and apparatus be installed and maintained in a safe manner by a licensed electrician or qualified party. The Customer, in accepting service from the Company, assumes full responsibility for the safety of the wiring and apparatus which the Customer installs.

The Customer shall not operate any apparatus which creates a condition that interferes with the Company's operation and prevents the Company from supplying satisfactory service to the Customer or to other Customers. This condition includes, but is not limited to, operating equipment that interferes with the satisfactory operation of other Customer's radio, television, and communication equipment. The Company reserves the right to place restriction on the type and manner of use of all the Customer's electrical equipment which is connected to the Company's lines, especially prohibiting any large loads of highly fluctuating or low power factor characteristics.

Customer Alterations and Additions

The Company's facilities used to provide service have definite capacity limitations and can be damaged by overloads. Therefore, the Customer must notify the Company prior to making alteration to the service entrance equipment so that facilities of proper capacity may be provided. The Customer shall be responsible for all expenses and/or damages to the Customer's facilities and to the Company's facilities resulting from failure to give proper notice. The Customer may also be subject to charges by the Company for work required to meet the Customer's alteration. The Customer should contact the Company for information concerning charges for such work.

Application for Electric Service

Application for electric service to either a new installation, or a revision of a service for an existing installation, must be made to and accepted by the Company before service will be supplied. Application can be made by contacting the Company and should be made as far in advance as possible of the date service is required. The Customer must consult the Company for information concerning the point of attachment of the Company's service facilities to the Customer's building, the location of the meter, characteristics of the service and other pertinent matters before proceeding with the installation of the service.

Before the Customer calls SWEPCO's Customer Solutions Center, it is important to know questions that are likely to be asked and be ready to respond with answers so the delivery of service will be a smooth and expedient process.

In addition to personal identifying information, general questions asked of every Customer, a Customer Solutions Center representative may ask for business names, contact

names (such as electricians and general contractors) and corresponding phone numbers when the Customer is not the primary contact.

Requesting New Service

Before the process begins to install the new service, the customer must contact SWEPCO and request that a service order be created. Service orders provide SWEPCO's field personnel with the information they need to provide permanent service.

The request for new service can be made at the same time a billing account is established, or when calling to convert a temporary service to a permanent service.

The Customer must provide the location where electric service is needed. A 911 address is required for all new service locations. Please contact the local 911 agency and request an address for the new service location prior to calling SWEPCO. Turn by turn directions may also be requested.

Even though a Customer may already have an account established with the Company, all requests by a Customer that will require construction of facilities by the Company must first be initiated by the Customer Solutions Center. The Customer Solutions Center representative enters the Customer's information into the Company's electronic database which routes the request through all required departments until construction has been completed. Failure to make a request through the Customer Solutions Center will result in a delay of service.

In addition to contact information, the Customer may be asked the following general questions.

- Are there existing SWEPCO facilities at the service location?
- Are the existing facilities overhead or underground?
- How far away from the new service location are the existing power facilities?
- Is the new service temporary or permanent?
- What date will the new service be required?
- What is the new service for (home, barn, shop, business, etc)? See below for additional information on *Residential Services* and *Commercial Services*.

Residential Services

When the Customer requests service for a new home, it is important to note:

- What is the square footage of the new home?
- Is the home to be total electric?
- How many tons of air conditioning?
- Is there electric or gas heat?
- Is there electric water heating?
- Is overhead or underground service desired?
- What size is the service entrance main breaker?
- Who is the electrician?

Commercial Services

When the Customer requests service to a new commercial property, much more information is required.

- What is the square footage of the building?
- Is the building total electric?
- How many tons of air conditioning?
- Is there electric or gas heat?
- Is there cooking equipment?
- Who is the electrician?
- What is the service voltage?
- Will the service be single or three phase?
- What is the rating of the main breaker?
- What is the service entrance conductor size?
- How many conductors are there per phase?
- Will the load be self contained or current transformer metered?
- Is overhead or underground service desired?
- Are there any significant or unusual electric loads?
- Motor loads, single or three phase?

Detailed Service Requirements

Additional details are covered in depth in this handbook.

For *Residential Service* requirements, please turn to page 8.

For *Temporary Service* requirements, please turn to page 20.

For *Commercial Service* requirements, please turn to page 24.

For detailed requirements on *Metering*, please turn to page 31.

Are you are about to start construction of a new home, business, remodeling a home, or adding a swimming pool? Do you simply want to install a new sign for your business but don't know if you have the necessary space available on your lot? You should review *Clearances* that you need to maintain from electric power facilities. These requirements begin on page 52.

Other *Drawing Specifications* detail the requirements specific to the construction of facilities needed to deliver electric power to the Customer. Please turn to page 63 for more information about these specifications.

Cost to serve Customer

Depending upon the scope of the extension required to provide the service, the Customer may be required to pay some or all of this expense.

Temporary services will almost always result in a charge for the service. The cost will vary on a case by case basis.

When the Customer is required to pay SWEPCO for a service, that payment is required to be paid up front prior to start of construction.

Other Services

SWEPCO supports alternative fuels and generation. Inter-connectivity of alternative generation is not covered in this handbook. Please see the appropriate link on the Company's web site for additional information.

Structures Near Overhead Lines

Structures, including signs, flagpoles, light standards, antennas or aerials shall not be installed under, over, or near such lines where they cannot be safely maintained. Customer owned equipment shall not be attached to a SWEPCO pole or any poles used in supplying electric service to the customer. Refer to the *Clearance* section beginning on page 52 of this handbook for further information and requirements. Figure 4.8 is a pictorial representation of the required clearances and can be found on page 62.

Attachments to SWEPCO Owned Facilities

Under no conditions will the customer's facilities be installed on or attached to SWEPCO's poles or other property unless special arrangements have been made with the Company.

Contacting Other Utilities

New construction typically involves the installation of telephone cables, cable television cables and natural gas lines, as well as power cables. It is the customer's responsibility to notify each utility, which will provide service to the home. Check the local phone book for their numbers. For each utility, note the contact name and phone number, and let each utility know which other utilities will be providing new service.

RESIDENTIAL SERVICE

INTRODUCTION

This section contains information regarding new electric service for permanent single-family residential structures. It also includes helpful information from the National Electrical Code (NEC), and the requirements for service to outbuildings such as barns, shops, pump houses, garages, portable buildings, etc.

The residential service section answers common questions, such as:

- Where should the meter socket be installed?
- How tall does the service mast have to be?
- What does the customer have to do to get underground service?
- How are existing underground utilities located before digging starts?

The answers to these and many other questions can be found within these pages.

If temporary electric service is needed while a residence is being constructed, see *Temporary Service* on page 21.

If you are planning a residential development, subdivision, or mobile home park, please be prepared to provide an engineered site plan of the development.

SWEPCO will provide only underground distribution service within mobile home parks. This is due to numerous public safety concerns that have been encountered with the operation of overhead distribution systems within mobile home parks. An electronic file of the plan is needed to expedite the design of utilities. This file can be sent by e-mail to SWEPCO's Engineering Department. Installation of underground electric distribution facilities will require the owner/developer to sign a contract for service. Please make a request for service by calling SWEPCO's Customer Solutions Center.

(888) 216-3523

For information regarding the installation of permanent service for multifamily and nonresidential services such as commercial buildings, condominium complexes, and apartment buildings, see *Commercial Service* on page 25.

Getting Started

Installing new electrical service to a home is a joint project between SWEPCO, the customer, their contractor and architect.

Through this coordinated effort, the customer's load and service voltage requirements will be met. SWEPCO will need detailed information on service requirements as well as the layout for the project.

Setting Up an Account

The first step toward new electric service is to establish an account with SWEPCO.

Before SWEPCO can begin working on a project, a billing account must be established. To set up an account, to get answers to general billing questions, and to have service hooked up, a customer must call SWEPCO's Customer Solutions Center.

(888) 216-3523

A representative will request general billing information, discuss fees, and the address for the new service. New addresses can be obtained from the local 911 authority.

Service Voltages Available

Several sizes of services are available for single-family residential structures, and for outbuildings. The size of service depends upon the size of the home and the power requirements of the equipment installed in it. SWEPCO does not determine the customer's power requirements. **A 3-wire 100 Amp rating is the minimum size allowed for residential services.** See the chart below.

SERVICE VOLTAGE	AMPERE RATING	TYPICAL USE
120/208	200 AMPS	LARGE MULTI-FAMILY
120/240	200 AMPS	SMALL AND MEDIUM SIZE HOMES
120/240	400 AMPS	LARGE HOMES
120/240	OVER 400 AMPS	VERY LARGE HOMES

Mobile Homes, Manufactured Homes, and Manufactured Buildings

The meter and service equipment for a Mobile Home, Manufactured Home, and Manufactured Building shall be located adjacent to and not mounted in or on the Mobile Home, Manufactured Home, and Manufactured Building. The service equipment shall be located in plain view and not more than 30 feet from an exterior wall of the Manufactured Building, Mobile Home, or Manufactured Home it serves. See *Meter Poles* on page 15.

Removing and Installing Meters

Only personnel who are qualified and authorized by SWEPCO are permitted to remove and install meters. In special circumstances, exceptions may be granted to qualified electrical contractors by contacting SWEPCO’s Meter Department, Service Center Supervisor, or a designated representative. Note: With some types of meter sockets, removal of the meter does not de-energize the system. See *Metering* on page 31 for additional information.

Underground Service or Other Customer Owned Equipment Locates

Underground services are owned and maintained by the customer. SWEPCO does not locate or repair underground services. A qualified electrical contractor will be able to provide locates and repairs for underground services.

Underground Utility Locates

Two working days (48 hours excluding weekends and holidays) prior to any trenching or excavation work near underground utilities such as gas, water, electric, telephone or cable television, the person doing this work is required to call for underground utility locates through a one call system. **This is required by law.** The address or location where the work will be done is given to the one call service and from there it is routed to each utility to perform the locate and marking using spray paint. You may call the national call number. There is no charge for this service.

The state has established a color code system to identify each utility so everyone can see what has been located. The color codes are:

<u>COLOR</u>	<u>UTILITY</u>
Red.....	Electric
Yellow.....	Gas/Oil
Orange.....	Telephone/Cable TV
Blue.....	Water
Purple.....	Water, reclaimed, irrigation
Green.....	Sewer
White.....	Proposed facilities

Any digging within 24 inches of either side of the location markings must be done by hand.

Outbuildings

An outbuilding is a stand-alone structure which is located on residential property and is not a living space. Typical outbuildings are barns, pump houses, garages, shops, etc. To install a separate service to an outbuilding, the customer must provide a clear path to SWEPCO’s equipment, a properly located meter socket and the service equipment required in the NEC. The meter socket is installed by the customer. **A 3-wire 100 Amp rating is the minimum size allowed for residential services.** For manufactured buildings see page 15 and page 16.

Cost for Service

Depending upon the scope of the extension required to provide the service, the Customer may be required to pay some or all of this expense.

When the Customer is required to pay SWEPCO for a service, that payment is required to be paid up front prior to start of construction.



When calling to request an underground locate, it is best to use the closest 911 address to the location where the digging will be done. In some areas, not all utilities are members of the One Call System. In those areas the customer must contact the utilities individually, for example: some local water companies. SWEPCO does not locate customer owned facilities.

Overhead or Underground Service

There are two types of electrical service available - overhead and underground. Underground service is available to everyone. Overhead service is available if local ordinances allow it and overhead facilities are present. It is the customer's responsibility to be aware of any applicable local codes and ordinances. The customer may be responsible for charges incurred to provide service.

To determine if the electrical system already installed in the area is overhead or underground, check the facilities in your area. If the power system is overhead, a series of poles similar to Figure 1.1 will be visible. If the power system is underground, there will be items like those in Figures 1.2 and 1.3.

If the system is overhead, and the new service will be overhead, the requirements for Overhead Services can be found on page

11. For a typical overhead service configuration, see Figure 1.4 below.

If the system is overhead, but the new service will be underground, or if the system is underground, refer to Underground Services on page 14.

For help determining which type system is installed, call SWEPCO for assistance with the following:

- Determining a point of service
- Determining if construction by SWEPCO is required
- Determining if a right of way easement is required
- What construction is required by the customer
- What may be required by local governmental agencies
- What costs, if any, will be involved

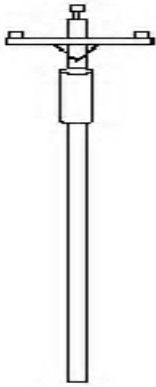


FIGURE 1.1

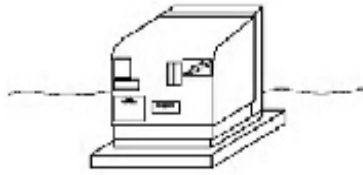


FIGURE 1.2

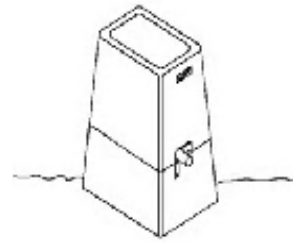


FIGURE 1.3

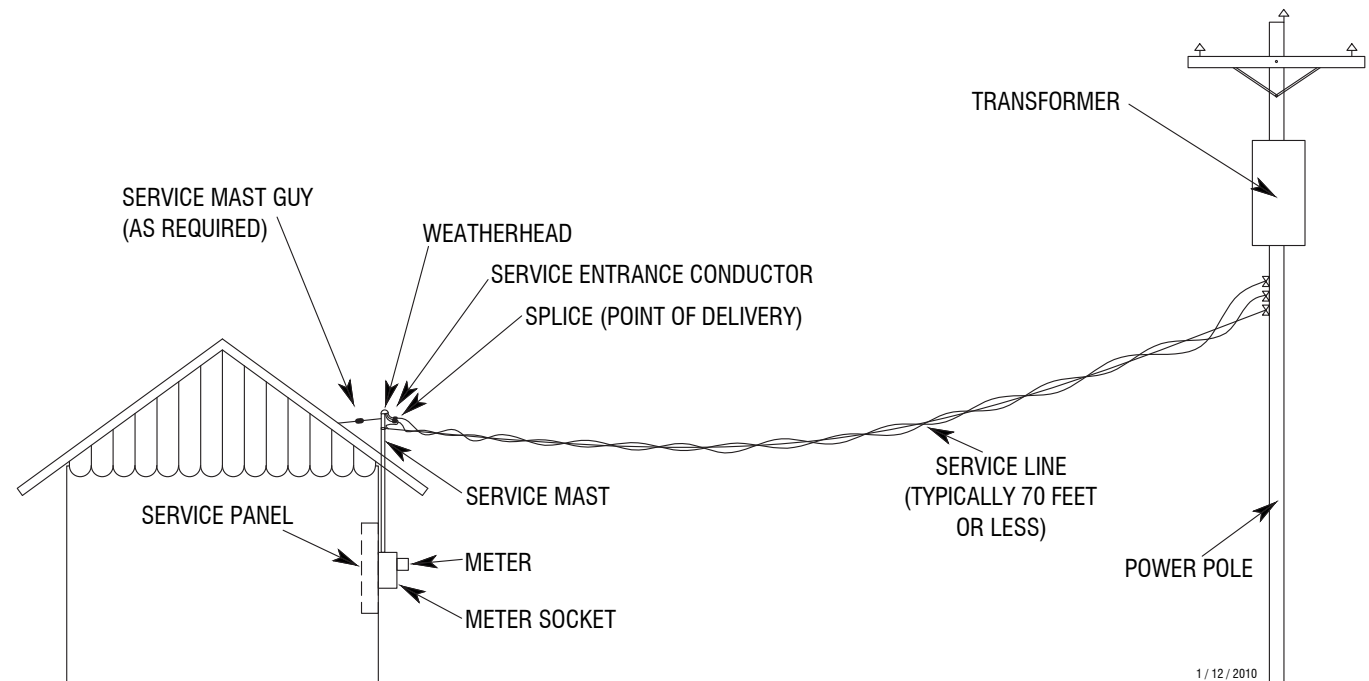


FIGURE 1.4

OVERHEAD SERVICE

General Requirements

The following checklist will assist in preparing for the installation of overhead service. After the customer has completed these items, SWEPCO will install the service line and meter.

- Check if any local ordinances or covenants prevent the installation of an overhead service
- Determine an acceptable location for the meter socket. See the *General Information* section on page 5.
- Verify with SWEPCO where the service line will originate
- Provide a clear path from SWEPCO's pole to the customer's service mast
- Install the service equipment
- Install the service entrance conductors with a minimum 24 inches left exposed at the weatherhead
- Verify that the service mast height requirements have been met
- Have the city or state inspect the installation, if required
- 911 address visibly displayed
- Call SWEPCO's Customer Solutions Center to have service connected

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Getting Started

The first step when installing new overhead service is to contact SWEPCO and ask for a point of service. Next, determine the location of the meter socket. The meter socket should be located outside, on the front one-third of the structure closest to normal public access. See the *General Information* section on page 5.

Another factor to consider when choosing the location for the meter socket is what types of terrain the line will be crossing. Whenever possible, avoid service line routes that cross a driveway. Service lines crossing driveways can be hit by vehicles and cause damage to service equipment, and even to the home.

If the service line will be passing through any trees, the customer must prune those trees to provide a clear path for the service line. **SWEPCO does not trim or remove trees or tree limbs from overhead services. The customer is also responsible for regular tree pruning and, if necessary, tree removal to keep the path clear.** The point of delivery for overhead service is the connector at the customer's weatherhead.

Service Mast Requirements

A service mast is a conduit that runs vertically from the top of the meter socket. See Figure 4.1 on page 54. It contains service entrance conductors and supports one end of the service line. Service masts are necessary when installing an overhead service, and are installed by the customer or the electrical contractor. The requirements for the installation of a service mast are covered in the NEC. Specific requirements for overhead service masts are described next.

Height Requirements

The top of a service mast must be at least 13 feet above final grade, to maintain minimum clearances over the property. Additional height may be required depending upon the location and type of structure or terrain over which the service line passes. Figures 1.6 and 1.7 on page 12 illustrate some of the minimum clearances that must be maintained.

If the service mast extends through the roof, the NEC also requires that minimum clearances be maintained above the roof. The clearance required depends upon the slope of the roof, mast height, and roof overhang. Figure 1.8 and 1.9 on page 13 details clearances required when the service line is attached to the service mast. A service mast of minimum 2" rigid steel or IMC conduit may be used on low roof structures to obtain proper ground clearance for service drops. For other options and details consult the NEC.

Service lines passing over the roof of another structure, but not attached to that structure, must meet clearances shown in Figure 4.6 on page 60. Service lines passing near a swimming pool must meet clearances shown in Figure 4.5 on page 59.

Service Equipment Installation Requirements

After determining the meter socket location, the service route, the height of the service mast, and the size of the service equipment, installation of the service equipment can begin.

The service entrance weatherhead should be no more than 70 Feet from the SWEPCO pole.

The service equipment should be surface mounted, as shown in Figure 4.1 on page 54.

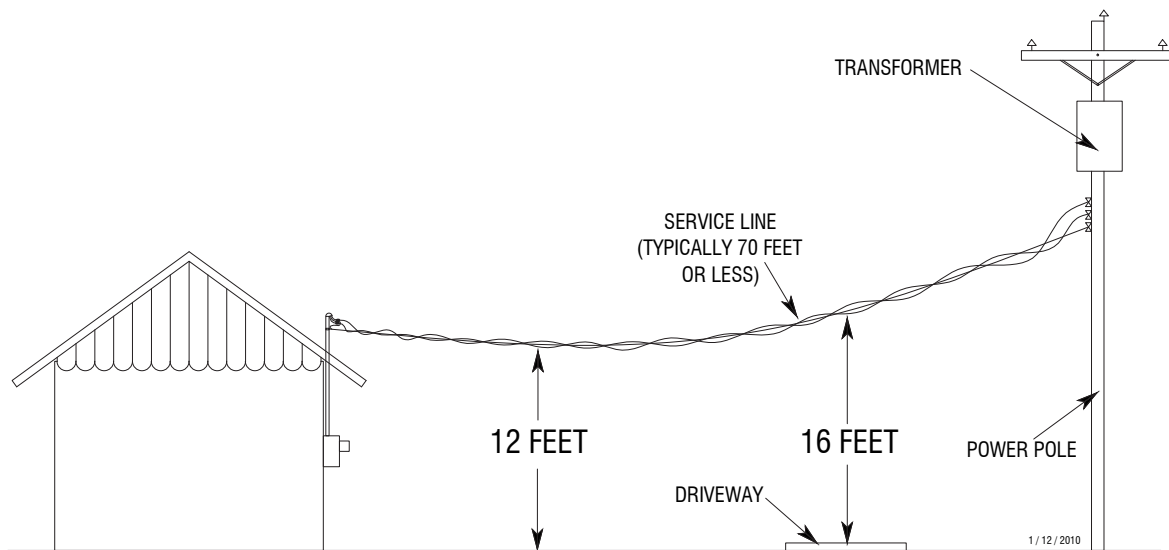
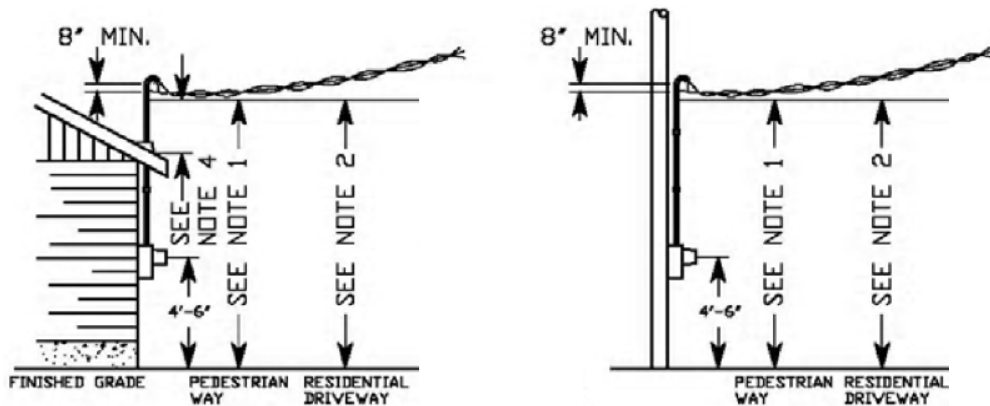


FIGURE 1.6



GENERAL:

Service drop cables of 750 volts or less shall not pass closer than 3 feet in any direction from windows, doors, porches, fire escapes or similar locations (except above top level of a window)
NESC 234C3d (2)

120/240 VOLT SINGLE PHASE

NOTES:

1. NESC required vertical clearance for service over pedestrian way.
2. NESC required vertical clearance for service over residential driveway not subject to truck traffic.
3. NESC required vertical clearance for service over parking lot or non-residential driveway subject to truck traffic.
4. Required vertical clearance of service drip, including drip loop, over roof where less than 6' of conductors overhang the roof and terminate at an approved through-the-roof raceway.

12 ft

16 ft

16 ft

18 in

EXCEPTIONS TO NOTES 1 & 2

Prior approval by SWEPCO representative is required before exceptions may be used. Where height of a building or other installation does not permit service drops to meet these values they may be reduced to the following:

1. Over pedestrian traffic way
2. Over residential driveway

10 ft

12 ft

These values meet or exceed the current edition of the National Electric Safety Code Rules.

FIGURE 1.7

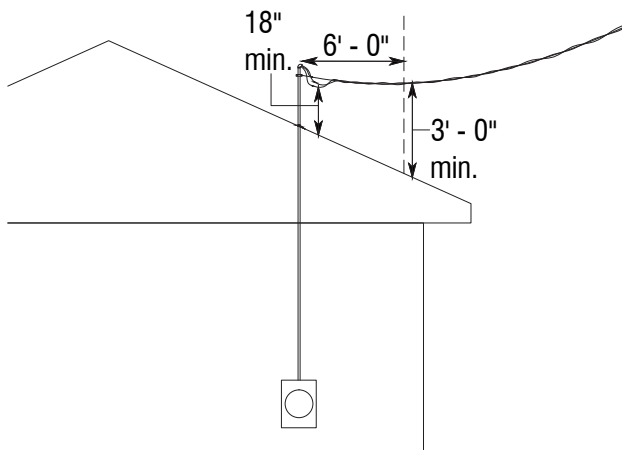


FIGURE 1.8

The service entrance conductors must be sized according to the NEC and to the rating of the meter socket. At least 24 inches of wire should be left exposed at the end of the weatherhead to allow SWEPCO to connect the service line to it. The meter socket should be mounted such that the center of the meter will be between 4 and 6 feet above finished ground level.

For help with the installation of service equipment, consult the current issue of the NEC, call the inspecting agency for the area, or contact an electrical contractor.

Items owned and installed by the customer

1. Meter socket (supplied by SWEPCO)
2. Ground conductor in accordance with NEC
3. Ground rod (copper or copper clad)
4. Service entrance conductors that extend 24" out of the weatherhead, all conduits, conduit straps, insulating bushings and lock nuts

Items owned and installed by SWEPCO

1. Service entrance clamp bracket
2. Overhead service drop line
3. Meter

Clearances From Building Openings and Gas Meters

The center of the meter socket is always the point of reference. Meter socket height is a minimum of 4 feet and a maximum of 6 feet above finished grade or floor. Working space in front of metering equipment (including current transformer enclosures) must be at least 36 inches wide and 36 inches deep, measured from the front of the enclosure and meters. A minimum clearance of 36 inches is required between service lines and windows, doors, porches, fire escapes, or similar openings. A minimum horizontal clearance of 3 feet is required between electric service equipment and natural gas meter equipment. See Figure 1.5 at right.

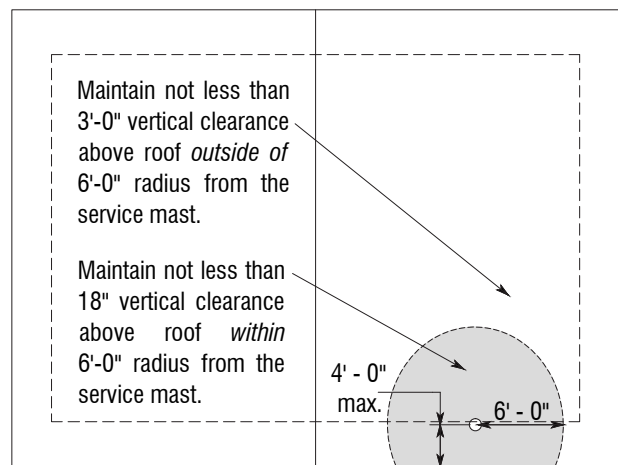


FIGURE 1.9

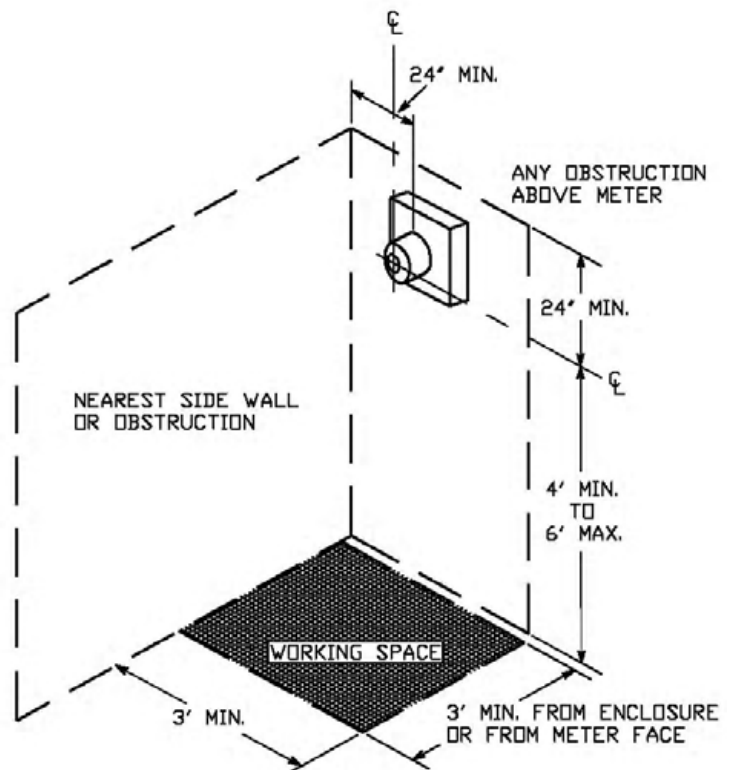
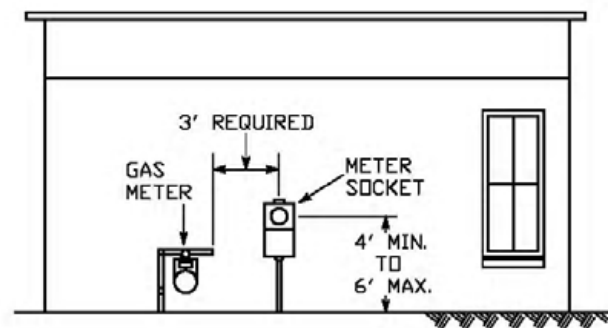


FIGURE 1.5

METER SOCKET MINIMUM CLEARANCES

Additional Mast Supports

Additional mast supports, typically a guy or a brace, may be required for any service line over 50 feet in length or if the service mast is more than 36" above the roof. Guys and braces are installed to prevent the weight of the service line from pulling the service mast away from the house. Further information regarding guying and bracing service masts is available in the NEC.

UNDERGROUND SERVICE

General Requirements

The following is a checklist for use as a guide when preparing for the installation of underground service. Once the customer has completed these items, SWEPCO will install the meter.

- Determine the origination point of the service line. Contact SWEPCO for assistance
- Determine an acceptable location for the meter socket. See the *General Information* section on page 5.
- Dig a trench from the meter socket to the location where the service line will originate.
- Install all customer-owned service equipment.
- Have the city or state inspect the installation, if required.
- 911 address visibly displayed.
- Call SWEPCO's Customer Solutions Center to have service connected.

(888) 216-3523

Getting Started

The first step when installing new underground service is to contact SWEPCO and ask for a point of service. A SWEPCO representative will assist in determining the location of the meter socket. As stated previously in the *General Information* section on page 5, the meter socket should be located outside and on the front one third of the home closest to normal public access.

When choosing a meter socket location be sure to consider the types of terrain where the service line will be buried. Since it is the customer's responsibility for repairing the service line if it ever fails, the path is subject to being dug up at some time in the future. Because of this, it is in the customer's best interest to be sure the service line route can be easily reached and excavated. It is also recommended that the service be installed in conduit.

Service Equipment Installation Requirements

After determining the meter socket location, the service route and the ampacity of the service equipment, installation of the service equipment can begin.

The service equipment should be installed as surface mounted as shown in Figure 5.5 on page 69.

The service entrance conductor is the wiring, provided and owned by the customer, which connects to the top lugs in the meter socket and runs underground to the SWEPCO power pedestal or pad mounted transformer. The service entrance conductors must be sized according to the NEC and to the rating of the meter socket. At least 5 feet of conductor should be provided inside the power pedestal or pad mounted transformer to allow SWEPCO connection to the fixed terminals mounted within this equipment. The meter socket should be mounted such that the center of the meter is between 4 and 6 feet above the finished grade.

For help with the installation of service equipment, consult the NEC, call the inspecting agency for the area, or contact an electrical contractor.

Due to the dangers associated with installing conductors in energized equipment and for access into the locked equipment, the customer must contact SWEPCO's Customer Solutions Center for a appointment to schedule the install of the service conductors within SWEPCO's equipment.

Items owned and installed by the customer

1. Meter socket (supplied by SWEPCO)
2. Underground service conductors
3. All conduits, conduit straps, insulating bushings and lock nuts
4. Ground conductor in accordance with NEC
5. Ground rod (copper or copper clad)

Items owned and installed by SWEPCO

1. Transformer, or power pedestal
2. Meter

Clearances From Building Openings and Gas Meters

A minimum clearance of 3 feet is required between service lines and windows, doors, porches, fire escapes, or similar openings. A minimum horizontal clearance of 3 feet is required between electric service equipment and natural gas meter equipment. See Figure 1.5 on page 13.

METER POLES

Customer-owned Meter Pole-Overhead

If a meter pole is required for the project, it is the customer's responsibility to purchase and install it. The pole must meet or exceed the following requirements:

- Pole must be accessible to SWEPCO personnel.
- Pole must be made of wood, or other SWEPCO approved material
- Pole must be round
- No timbers are allowed
- Pole must be fully pressure treated
- Pole must be Class 6 or better with a minimum diameter of 5" at the top of the pole
- Pole must be at least 20 feet long; clearance requirements may dictate that a taller pole be installed. See Figure 1.6 and 1.7 on page 12 for clearance requirements.

The installation requirements for an overhead meter pole are as follows:

- Pole must be buried a minimum of 5 feet in the ground. If soil conditions are poor, crushed rock should be used as substitute for backfill for pole to be stable.
- Pole may need to be guyed if the distance between the customer's meter pole and SWEPCO's power pole is greater than 50 feet.
- The meter pole with the service disconnect must be installed within 30 feet of a manufactured building, manufactured home or manufactured mobile home and be in plain view. The minimum working space clearances as shown in Figure 1.5 on page 13 must be maintained.

For help with the installation of service equipment, consult the current issue of the NEC, call the inspecting agency for the area, or contact an electrical contractor.

Service Equipment Installation Requirements-Overhead Meter Poles

After determining the meter pole and socket location, the service route and the ampacity of the service equipment, installation of the service equipment can begin.

The service equipment should be installed as shown in Figures 5.1 on page 65.

Items owned and installed by the customer

1. Pole
2. Meter socket (supplied by SWEPCO)
3. Disconnect switch
4. Ground conductor in accordance with NEC

5. Ground rod (copper or copper clad)
6. Service entrance conductors that extend 24" out of the weatherhead, all conduits, conduit straps, insulating bushings and lock nuts

Items owned and installed by SWEPCO

1. Insulated clevis
2. Overhead service drop line
3. Meter

Customer-owned Meter Pole-Underground

If a meter pole is required for the project, it is the customer's responsibility to purchase and install it. The pole must meet or exceed the following requirements:

- Pole must be accessible to SWEPCO personnel.
- Pole must be made of wood, or other SWEPCO approved material.
- Pole must be fully pressure treated
- Pole must be 10 feet long, if longer it must be round.
- Pole must be Class 6 or better, or a 4" x 4" treated timber
NOTE: If a pole longer than 10 ft. in length is used, the pole must be round and meet the overhead meter pole requirements, above left.

The installation requirements for an underground meter pole are as follows:

- Pole must be buried a minimum of 3 feet into the ground. If soil conditions are poor, crushed rock should be used as substitute for backfill for the pole to be stable.
- The meter pole with the service disconnect must be installed within 30 feet of the manufactured building, manufactured home or manufactured mobile home and be in plain view. The minimum working space clearances as shown in Figure 1.5 on page 13 must be maintained. See Figure 5.3 on page 67 for an example of a meter pole installation with underground service.

For locations subject to wet or other conditions where a single wood pole may not be suitable, SWEPCO may require an installation shown in Figure 5.4 on page 68. This installation is more physically stable and secure.

It may also be required for areas that may be prone to vandalism. For assistance on meter pole installations, contact SWEPCO.

Service Equipment Installation Requirements- Underground meter poles

After determining the meter socket location, the service route and the ampacity of the service equipment, installation of the service equipment can begin.

The service equipment should be installed as shown in Figures 5.3 on page 67 and 5.4 on page 68.

Once the customer has installed the meter socket, the next task is to install the underground service entrance conductor. The service entrance conductor is the wiring, provided by the customer, which connects to the top lugs in the meter socket and runs underground to the SWEPCO power pedestal or pad mounted transformer. The service entrance conductors must be sized according to the NEC and to the rating of the meter socket. At least 5 feet of conductor should be provided inside the power pedestal or pad mounted transformer to allow SWEPCO connection to the fixed terminals mounted within this equipment. The meter socket should be mounted such that the center of the meter is between 4 and 6 feet above the finished grade.

For help with the installation of service equipment, consult the NEC, call the inspecting agency for the area, or contact an electrical contractor.

Due to the dangers associated with installing conductors in energized equipment and for access into the locked equipment, the customer must contact SWEPCO's Customer Solutions Center for an appointment to schedule the install of the service conductors within SWEPCO's equipment.

Items owned and installed by the customer

1. Pole
2. Meter socket (supplied by SWEPCO)
3. Disconnect switch
4. Underground service conductors.
5. All conduits, conduit straps, insulating bushings and lock nuts.
6. Ground conductor in accordance with NEC
7. Ground rod (copper or copper clad)

Items owned and installed by SWEPCO

1. Transformer, or power pedestal
2. Meter

Mobile Homes, Manufactured Homes, and Manufactured Buildings

Service to mobile homes, manufactured homes, and manufactured buildings shall be made in a manner that is in compliance with the National Electric Code (NEC).

The overhead service to a mobile home, manufactured home, or a manufactured building shall be made using a customer-owned meter pole. The meter socket shall not be mounted directly to the home or building. See Figure 5.1 on page 65. The service attachment location on a meter pole for a mobile home or manufactured home must be a minimum of 4.5 feet above the roof of the home. If this distance can not be obtained, then the meter pole must be located a minimum of 5 feet from the side of the home. A service disconnect must be located no greater than 30 feet from the home and in plain view.

The underground service to a mobile home, manufactured home or a manufactured building shall be made using a customer-owned meter pole. The meter socket shall not be mounted directly to the home or building. See Figures 5.3 on page 67 and 5.4 on page 68.

Mobile Home - 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.

Manufactured Home - A structure, transportable in one or more sections, that is 2.5 m (8 body ft) or more in width or 12 m (40 body ft) or more in length in the traveling mode or, when erected on site, is 30 square meters (320 squared feet) or more; which is built on a chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected to the required utilities, including the plumbing, heating, air-conditioning, and electrical systems contained therein.

Subject to the local authority or inspectors having jurisdiction, manufactured homes equipped with a factory installed meter socket and other service equipment may be connected without the use of a meter pole. See Figure 4.1 on page 54

Manufactured Building - Any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles. Portable buildings are included in this group.

Portable/Standby Generators

GENERATORS

Portable Generators

Generators can come in handy during storm-related outages. Portable generators that are not properly isolated create serious hazards. Generators must be properly “isolated” from the customer’s main service, which is connected to SWEPCO’s lines. The easiest way to use a generator is to plug the equipment to be operated directly into the proper outlet on the generator.

- If a generator is not properly isolated, the customer-generated power can flow back to the power line, electrocuting a SWEPCO worker attempting to restore power. If a line is down on the ground, it can become energized from the customer’s generator and electrocute anyone that might come into contact with it.
- If not properly isolated, the generator will be damaged instantly when power is restored. This could cause an electrical fire in the home.
- When using a portable generator during outages, the most important precaution that can be taken is to open the main service disconnect breaker or remove the main service fuses.
- Never connect the generator’s electrical output to any live home or building electrical circuits. Never plug a generator into a wall outlet. To properly isolate portable generators, customers should be careful that they never connect the generator to an electrical outlet. Instead, appliances should be connected directly to the generator.
- Avoid contact with bare wires and terminals.
- Use a ground fault circuit interrupter (GFCI) in any damp or highly conductive area.

Standby Generators

Standby generators which are permanently wired to the customer’s service must be isolated from SWEPCO’s lines. The standby generator must be isolated from the main service while in operation. The most common isolation method is to install a transfer switch, which is of a type referred to as “break before make” as shown on pages 18 and 19. This means that the main service will be disconnected from the generator before the generator is connected to the equipment it is to power during the outage.

This type transfer switch also ensures the generator will be taken offline when power has been restored.

- Installation and setup of a generator and transfer switch system can only be properly done by a licensed electrician. Consult a licensed electrician to choose a generator system and make certain it meets national and local electrical code requirements.
- A standby generator should be programmed, maintained and routinely tested **ONLY** by authorized personnel. Incorrect operation can result in injury, fire, property damage or death.
- The customer should notify SWEPCO in the planning stage when a standby generator is being installed.

Service entrance rated disconnects

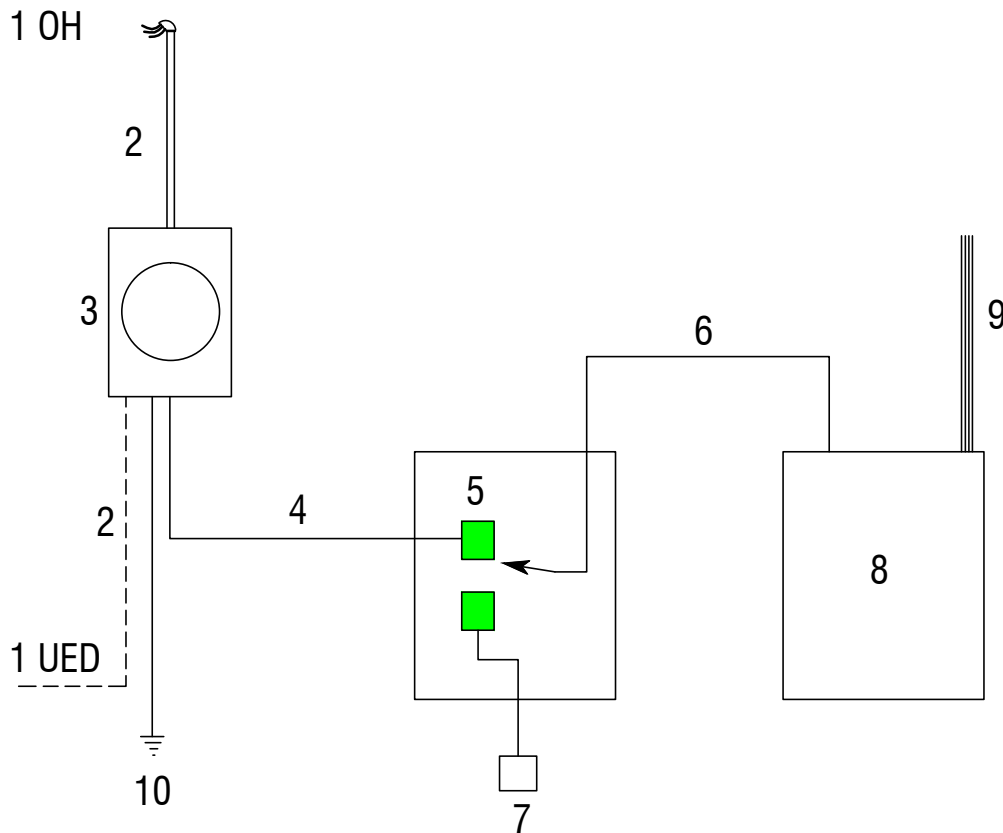
NEC Article 230 becomes applicable to transfer switches when the planned installation places the transfer switch on the utility side of the existing service entrance. In many areas, it is common practice for the service entrance to be a circuit breaker in the main distribution panel. This requires either installing a new service entrance, or to install a service entrance rated transfer switch. A service entrance rated transfer switch is a normal transfer switch with a circuit breaker added in series with the utility input, and a bonding jumper between neutral and ground. Service entrance rated transfer switches should be code compliant and be UL listed meeting all national and local codes.

Options:

1. Service entrance rated transfer switch with switch mechanism and integral circuit breaker.
2. Service entrance rated transfer switch with circuit breakers as switching mechanism.
3. Service entrance rated circuit breaker located on the line side of the transfer switch.
4. Service entrance rated disconnect switch with integral fuses located on the line side of the transfer switch.

Standby power

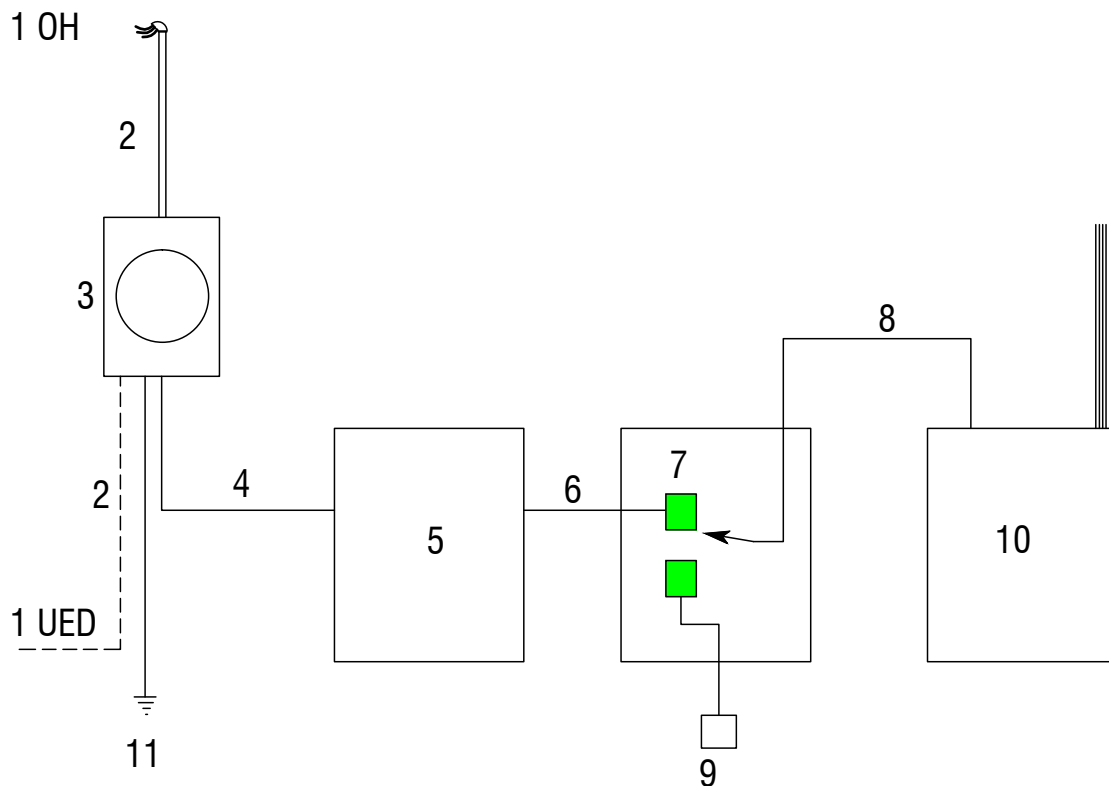
- 1) OH: Overhead connection to Utility or
- 1) UED: Underground connection to Utility
- 2) Service Entrance Conductors
- 3) Meter Socket and Utility Meter
- 4) Service Connectors
- 5) Transfer Switch with integral fault interrupting breaker per NEC
- 6) Feeder from Transfer Switch
- 7) Generator Connection Point
- 8) Distribution Panel
- 9) Feeder and Branch circuits
- 10) Copper or copper clad ground rod



Note: Installation per National Electric Code by electrician

Standby power-alternate

- 1) OH: Overhead connection to Utility or
- 1) UED: Underground connection to Utility
- 2) Service Entrance Conductors
- 3) Meter Socket and Utility Meter
- 4) Service Connectors
- 5) Main Service Entrance Disconnect per NEC
- 6) Feeder to Transfer Switch
- 7) Transfer Switch per NEC
- 8) Feeder from Transfer Switch
- 9) Generator Connection Point
- 10) Distribution Panel for Generator Feeder and Branch circuits
- 11) Copper or copper clad ground rod



**Notes: Installation per National Electric Code by electrician.
Transfer switching of neutral depends on generator.**

TEMPORARY SERVICE

INTRODUCTION

This section provides information for installing new temporary service.

Temporary service is defined as a means of supplying electricity to a site for less than one year. Usually a temporary service is installed to provide power during the construction phase of a project, while provisions are being made for permanent power.

The customer needs to complete several items before SWEPCO can energize temporary service. They are:

- Determine if the service is to be overhead or underground
- Establish an account with SWEPCO
- Request the temporary service
- Install the required service equipment
- Call for an electrical inspection as required
- After the electrical inspection is complete, call SWEPCO to request that service be energized

The remainder of the temporary service section will assist with this process.

Getting Started

Installing temporary electrical service is a joint project between SWEPCO, the customer, and their contractor. Through this coordinated effort, the customer's temporary service requirements will be met.

Setting up an account

Before SWEPCO can begin working on a project, a billing account must be established. To set up an account, call SWEPCO's Customer Solutions Center.

(888) 216-3523

A representative will request general billing information, discuss fees, and the address for the new service. New addresses can be obtained from the local 911 authority.

Inspections and Codes

This handbook contains AEP/SWEPCO's requirements for electrical service. It does not cover all federal, state, and local code requirements. It is the customer's responsibility to ensure the project complies with the most recent issue of the NEC and any other federal, state, or local codes that apply.

Once the customer's service equipment is installed, the state, county/parish, or the city with jurisdiction, requires that the installation pass an electrical inspection before SWEPCO can complete the connection to the electrical system. The customer is responsible for requesting and passing this inspection in the locations where inspections are required.

Underground Service or Other Customer Owned Equipment Locates

Underground services are owned and maintained by the customer. SWEPCO does not locate or repair underground services. A qualified electrical contractor will be able to provide locates and repairs for underground services.

Underground locates

Two working days (48 hours excluding weekends and holidays) prior to any trenching or excavation work near underground utilities such as gas, water, electric, telephone or cable television, the person doing this work is required to call for underground utility locates through a one call system. **This is required by law.** The address or location where the work will be done is given to the one call service and from there it is routed to each utility to perform the locate and marking using spray paint. You may call the national call number. There is no charge for this service.





**Know what's below.
Call before you dig.**

When calling to request an underground locate, it is best to use the closest 911 address to the location where the digging will be done. In some areas, not all utilities are members of the One Call system. In those areas the customer must contact the utilities individually, for example: some local water companies. SWEPCO does not locate customer owned facilities.

A color code system has been established to identify each utility so everyone can see what has been located. The color codes are:

<u>COLOR</u>	<u>UTILITY</u>
Red.....	Electric
Yellow.....	Gas/Oil
Orange.....	Telephone/Cable TV
Blue.....	Water
Purple.....	Water, reclaimed, irrigation
Green.....	Sewer
White.....	Proposed facilities

Any digging within 24 inches of either side of the location markings must be done by hand.

Cost to serve Customer

Temporary services will almost always result in a charge for the service. The cost will vary on a case by case basis.

When the Customer is required to pay SWEPCO for a service, that payment is required to be paid up front prior to start of construction.

Overhead or Underground Service?

The two types of temporary services are overhead and underground. If the existing power system in the area is a series of poles as shown in Figure 2.1, the area is served overhead, and the temporary service will also be overhead. If the area is served underground, items such as those shown in Figures 2.2 and 2.3 should be visible. In this case, the temporary service will be underground.

If none of the items shown in Figures 2.1, 2.2 or 2.3 exist in the area, or for service other than 120/240 volts, 100-200 amps, single phase, or for answers to questions, call SWEPCO for assistance.

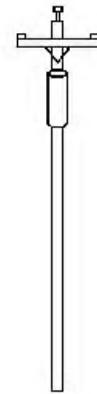


FIGURE 2.1

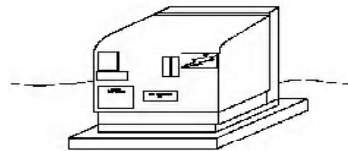


FIGURE 2.2

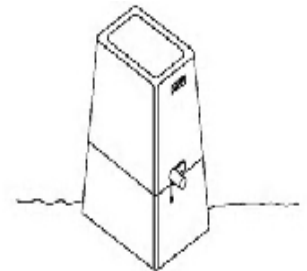


FIGURE 2.3

TEMPORARY OVERHEAD SERVICE

Temporary overhead service is available where the existing electrical system is not installed underground. If the electric service in the area is underground, the customer must install a meter pole with underground service to obtain temporary power. See Figure 5.3 on page 67. The process and costs of obtaining temporary overhead service varies, depending upon the location of SWEPCO's existing facilities. The least complicated and most economical way a service can be installed is if a transformer is located on a pole near the property as shown in Figure 2.1 above. If this is the case, engineering may not be required. The customer installs the temporary service equipment, has it inspected, if required, and calls SWEPCO's Customer Solutions Center to discuss fees and to order service. Once the above items are completed, service will usually be connected within a few days.

For help with technical questions about service in the area, call SWEPCO for assistance.

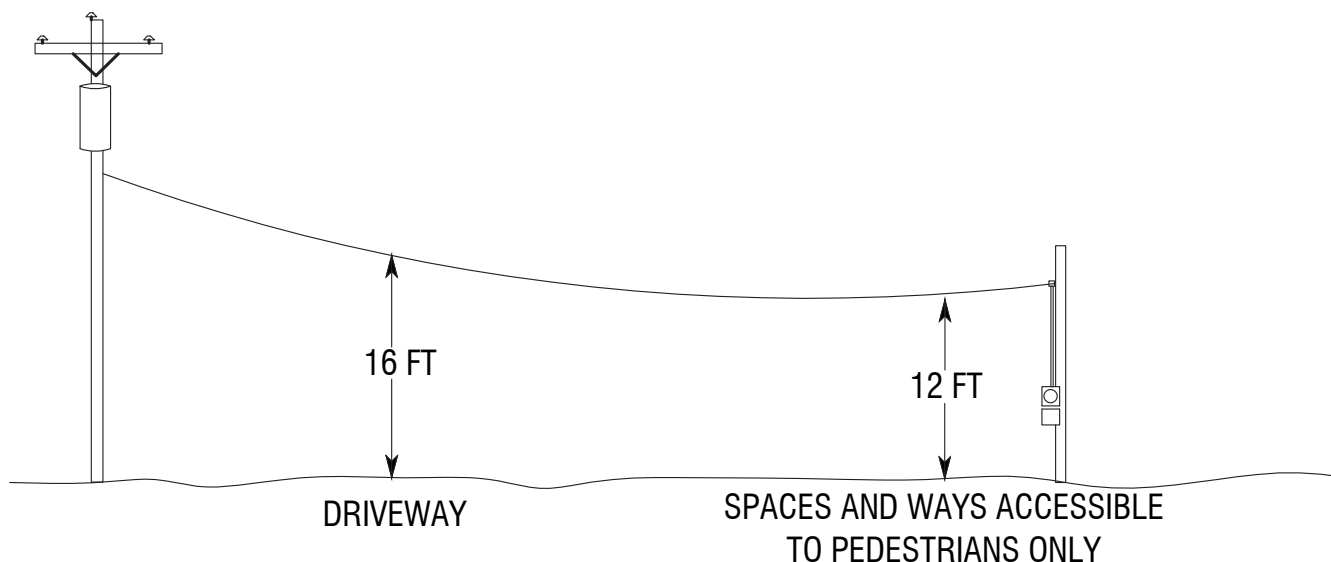


FIGURE 2.9

Meter Location

A meter pole for temporary service should be located on the property within 70 feet of the power pole that will serve the site. This limitation ensures that the service pole can withstand the weight of the conductor. In addition to the distance limitation mentioned above, consider the following:

- The customer must install the meter socket where it is accessible to SWEPCO personnel.
- The path that the service line will take should not cross property belonging to others.
- If the service line will pass through trees or brush, a path for the line must be cleared to allow SWEPCO service personnel to run the line and to allow lines to hang without contacting trees or limbs. **Maintaining this clear path is the customer's responsibility.**
- The service line path should avoid areas where vehicular traffic will occur, unless the service pole height is increased to provide adequate clearance.

SWEPCO engineering personnel will answer questions and advise on special situations.

Clearance Requirements

The National Electric Code (NEC) and the National Electric Safety Code (NESC) have established minimum clearance requirements to maintain safe height requirements for electrical conductors over various terrains.

Figure 2.9 above shows the clearance requirements for the types of terrain most commonly encountered. For further details, see Figure 1.7 on page 12.

It is not the customer's responsibility to string the conductor, but the point of attachment at the service pole must allow SWEPCO to install the conductor and maintain required clearances.

For help with the installation of service equipment, consult the current issue of the NEC, call the inspecting agency for the area, or contact an electrical contractor.

Getting Started

The following items must be completed by the customer before SWEPCO can energize service:

- Contact SWEPCO to request a temporary service.
- Obtain an electrical work permit from the inspecting agency, if required.
- Install a meter pole and meter socket.
- Obtain an electrical inspection, if required.
- 911 address visibly displayed.

After these items are completed, call SWEPCO's Customer Solutions Center to announce that the installation has been inspected, if required, and is ready for temporary service.

Service Equipment Installation Requirements

Figure 5.1 on page 65 illustrates the recommended temporary overhead service installation. The specifications shown are the minimum acceptable.

Items owned and installed by the customer

1. Pole must be Class 6 or better with a minimum diameter of 5" at the top of the pole x 20 ft. minimum length installed 5 feet in the ground, no timbers are allowed (EXCEPTION: In the Fayetteville Arkansas District only, if the soil conditions are such that setting the pole 5 ft. deep is not practical, a braced pole may be used. The pole is required to be set minimum 3 ft. deep. See your Fayetteville representative for additional information.)
2. Pole must be creosote or pressure treated
3. Meter socket (supplied by SWEPCO) and distribution panel
4. Ground conductor in accordance with NEC
5. Ground rod (copper or copper clad)
6. Service entrance conductors shall extend 24" out of the weatherhead and be a minimum of #6 copper or #4 aluminum, all conduits, conduit straps, insulating bushings and lock nuts
7. Pole should be truck accessible or the customer is to provide an additional 15 ft. of #2 aluminum triplex cable. The cable must be terminated into a wire holder with connections made to the service entrance conductors. The #2 triplex cable will not be allowed to be continuous as the service entrance conductors.

Items owned and installed by SWEPCO

1. Insulated clevis
2. Overhead service drop line
3. Meter

TEMPORARY UNDERGROUND SERVICE

Temporary underground service is available where the existing power facilities are installed underground. If there is power in the area, but the power lines are not visible, the power system is likely to be installed underground.

The process and cost of obtaining temporary underground service varies, depending on the location of existing power facilities. If there is a transformer or power pedestal located on the property (see Figure 2.2 & 2.3 above), engineering may not be required. Install the temporary meter pole and service wire a minimum of 3 ft. from the transformer or power pedestal, (see Figure 5.3 on page 67), obtain an inspection, if required, and call SWEPCO to connect service. Permanent service may come from another location. Verify with SWEPCO and ask for a point of service. See Figure 5.20 on page 86.

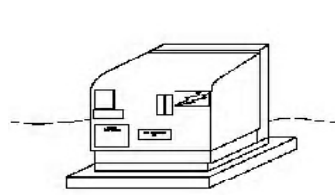


FIGURE 2.2

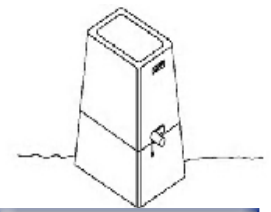


FIGURE 2.3

Getting Started

The following items must be completed prior to energizing the service:

- Contact SWEPCO and request a temporary service.
- Obtain an electrical work permit from the inspecting agency, if required.
- Obtain underground locates.
- Install the meter pole and meter socket in the appropriate location.
- Provide the appropriately sized conductor from the meter socket to SWEPCO's connection point.
- Leave 5 extra feet of service wire exposed at the power pedestal or transformer. Consult the NEC for the appropriate wire sizes.
- Obtain an electrical inspection, if required
- 911 address visibly displayed.
- Call SWEPCO to announce that the installation has been inspected and is ready for temporary service (888) 216-3523.

Service Equipment Installation Requirements

Items owned and installed by the customer

1. 5" diameter pole or 4" x 4" minimum timber, 10 foot in length installed 3 feet deep. NOTE: If a pole longer than 10 ft. in length is used, the pole must be round and meet the Temporary Overhead Service meter pole requirements, above left.
2. Pole or timber must be creosote or penta treated
3. Meter socket (supplied by SWEPCO) and distribution panel
4. Underground service conductors which shall be a minimum of #6 copper or #4 aluminum
5. All conduits, conduit straps, insulating bushings and lock nuts
6. Ground conductor in accordance with NEC
7. Ground rod (copper or copper clad)

Items owned and installed by SWEPCO

1. Transformer or power pedestal
2. Meter

COMMERCIAL SERVICE

INTRODUCTION

This chapter applies to customers requiring new commercial electric service installations of less than 750 volts. This chapter provides most of the information and requirements that will be needed, but it does not cover all possible standards and specifications required by all utilities, states, federal, and local codes. For additional information, contact the local government agency, or state inspector, or SWEPCO for assistance.

Engineering, scheduling, and construction of the work will vary depending upon the job.

General Information

This handbook contains material on new service for commercial buildings, as well as other nonresidential structures. The material in this section applies to:

- Commercial and small industrial buildings
- Apartment complexes
- Multi-family dwellings
- Condominium complexes

If a temporary service is needed during the construction of the facility, see *Temporary Service* on page 20.

Getting Started

Installing new electric service to a commercial building involves close coordination between SWEPCO's engineering department, the customer, their contractor(s), and architect.

Through this coordinated effort, the customer's load and service voltage requirements will be met. SWEPCO will need detailed information on service requirements as well as the layout for the project. Contact SWEPCO engineering to discuss planning service to large loads and new developments. An electronic file can be e-mailed to the SWEPCO engineer.

Setting Up An Account

The first step toward new electric service is to establish an account with SWEPCO.

Before SWEPCO can begin working on a project, a billing account must be established. To set up an account, contact SWEPCO's Customer Solutions Center

(888) 216-3523

A representative will request general billing information, discuss fees, and request the address for the new service. New addresses can be obtained from the local 911 authority.

Service Voltages Available

The following standard types of services are available for commercial customers:

Single-phase

120/208 volts, 3 wire
120/240 volts, 3 wire
240/480 volts, 3 wire

Three-phase

120/208 volts, 4 wire WYE
277/480 volts, 4 wire WYE
120/240 volts, 4 wire DELTA*
480 volts, 3 wire CORNER GROUND**

*All new three phase loads greater than 200A served on the 34.5kV systems shall be served with solidly grounded Wye connections (208Y/120 volts, 480Y/277 volts). Check with SWEPCO before designing 120/240-volt 4-wire DELTA service or building this service voltage. 120/240-volt 4-wire OPEN-DELTA services should be limited to 200 A.

**Prior approval by SWEPCO, offered as transformer rated metering only configuration.

All voltages listed are nominal alternating current at a frequency of 60 Hz. **For the service voltages listed above, a 100A rating is the minimum service allowed.**

Service voltages above 600V can be provided depending upon size of customer's load and availability within the service area. These services must be primary metered and a service disconnect located at the point of service shall simultaneously disconnect all ungrounded conductors that it controls as required by NEC 230.205. Service voltages above 600V are NOT covered in this handbook.



All self-contained metering applications for permanent commercial services require the use of a meter socket equipped with a 100% rated manual lever bypass. These meter sockets are provided by SWEPCO. Please state when picking up the meter socket that it is to be used on a commercial application.

For small signs, communications utility, municipal services, signaling devices, cathodic stations, ect. - 120 volt 2-wire 60 amp services may be used when appropriate. For the net metering tariff a 3-wire 100A rating is the minimum service allowed.

Underground Service or Other Customer Owned Equipment Locates

Underground services are owned and maintained by the customer. SWEPCO does not locate or repair underground services. A qualified electrical contractor will be able to provide locates for underground services.

Underground Locates

Two working days (48 hours excluding weekends and holidays) prior to any trenching or excavation work near underground utilities such as gas, water, electric, telephone or cable television, the person doing this work is required to call for underground utility locates through a one call system. **This is required by law.** The address or location where the work will be done is given to the one call service and from there it is routed to each utility to perform the locate and marking using spray paint. You may call the national call number. There is no charge for this service.



When calling to request an underground locate, it is best to use the closest 911 address to the location where the digging will be done. In some areas, not all utilities are members of the One Call System. In those areas the customer must contact the utilities individually, for example, some local water companies. SWEPCO does not locate customer owned facilities.

The states have established a color code system to identify each utility so everyone can see what has been located. The color codes are:

COLOR UTILITY

Red.....	Electric
Yellow.....	Gas/Oil
Orange.....	Telephone/Cable TV
Blue.....	Water
Purple.....	Water, reclaimed, irrigation
Green.....	Sewer
White.....	Proposed facilities

Any digging within 24 inches of either side of the location markings must be done by hand.

Manufactured/Mobile Office Building

Manufactured buildings and mobile office buildings are used for both temporary and permanent offices. They are usually built on a permanent chassis and designed to be used as a dwelling. The electrical service shall be made in a manner that is in compliance with the National Electric Code (NEC). These buildings will have the same service requirements as mobile homes, manufactured homes, or manufactured buildings. See the *Residential Service* section page 16.

Cost For Service

Depending upon the scope of the extension required to provide the service, the Customer may be required to pay some or all of this expense.

When the Customer is required to pay SWEPCO for a service, that payment is required to be paid up front prior to start of construction.

Overhead or Underground Service

In most commercial applications, the customer has a choice of overhead or underground service. It is possible that local ordinances or zoning may dictate the type of facilities that may be constructed in public as well as private property. It is the customer's responsibility to be aware of any applicable codes and ordinances that apply. Installation of new SWEPCO underground electric distribution facilities will require the customer to sign a contract for the installation of these facilities and provide a right of way easement.

For help determining which type system is installed, call SWEPCO for assistance with the following:

- Determining a point of service
- Determining if construction by SWEPCO is required
- Determining if a right of way easement is required
- What construction is required by the customer
- What costs, if any, will be involved

OVERHEAD SERVICE

General Requirements

This section provides information on installing an overhead service. The following checklist identifies tasks the customer is responsible for. After these items are completed, SWEPCO will install the service line and meter.

- Ask SWEPCO for a point of service (see Figure 5.20 on page 86)
- Check for local ordinances or covenants that prevent obtaining an overhead service. Also, the local governing agency may not allow overhead service
- Determine an acceptable location for the meter socket. See the *General Information* section on page 5.
- Provide SWEPCO with a load summary (single-phase and three phase loads)
- Provide a path, which is to be clear of obstructions, between SWEPCO's power pole and the service mast installed by the customer
- Install the required service equipment
- Install the service entrance conductors, leaving a minimum of 24 inches exposed at the weatherhead
- Verify that the service mast height and point of attachment requirements have been met.
- Obtain an electrical inspection from governmental agency if required
- Call SWEPCO's Customer Solutions Center to request the service connection

Getting Started

Before installing an overhead commercial service, the customer should contact SWEPCO and ask for a point of service. The customer will need to be able to provide a detailed list of their anticipated electrical loads and required service voltage and phase types. A site or plot plan is necessary to ensure that new poles or overhead service lines do not interfere with other facilities. The SWEPCO engineer will provide assistance to the customer to determine the best service route.

When choosing the meter location, consider carefully the terrain the line will cross. If possible, avoid routes that cross a commercial driveway subject to truck traffic. Service lines crossing driveways can be torn down by vehicles and cause damage to the customer's service equipment. Repairs to this equipment can be expensive; not counting the down time a commercial business would suffer while power is out.

If the service line will pass through any trees, **the customer is required to prune them to provide a clear path for the service line. The customer is responsible for regular tree pruning, and if necessary, tree removal to keep the path clear.** The point of delivery for overhead service is the connector at the customer's weatherhead.

Service Mast Requirements

The requirements for the installation of the service mast are described in the National Electric Code (NEC). Refer to pages 11 through 14 of the Residential Overhead Service section for more detail of minimum service mast requirements. Additional mast supports may be required for any service lines over 40 feet in length.

Height Requirements

Overhead service cables for a commercial installation may be much heavier than those required for a residential service and would need additional height at the point of attachment to allow for proper clearance at mid-span. Also, the point of attachment would need to be stronger and better anchored in that case. Installations where the service line crosses a driveway subject to truck traffic would require additional height at the point of attachment.

Figure 4.2 on page 55 shows the minimum allowable heights as required by the National Electric Safety Code (NESC). The SWEPCO representative will provide assistance to the customer to determine the point of attachment height or if additional mast supports are needed for the installation.

Service Equipment Installation Requirements

Once the service layout has been coordinated between SWEPCO, the customer and the contractor, installation of the service equipment can begin. Refer to pages 11 through 14 for further details of overhead service installations.

For many commercial applications, the installations shown in Figures 4.1 on page 54 and 5.1 on page 65 would apply. For larger commercial overhead service applications refer to Figure 5.7 on page 71.

The customer is responsible for furnishing and installing

1. Service entrance conductors
2. All conduits
3. Ground wire in accordance with NEC
4. Ground rod (copper or copper clad)
5. Meter socket with bypass lever which is supplied by SWEPCO

SWEPCO is responsible for furnishing and installing

1. Service line
2. Meter

UNDERGROUND SERVICE

General Requirements

This section gives information on installing underground service for a commercial structure. For commercial underground services, the customer supplies the service line to SWEPCO's transformer or secondary enclosure.

The following checklist identifies tasks the customer is responsible for, when installing underground service. After these items are completed, SWEPCO will install the metering equipment and connect the service.

- Ask SWEPCO for a point of service. See Figure 5.20 on page 86
- Check for any local ordinances or covenants that will prevent obtaining an underground service
- Determine an acceptable location for the meter socket. See the **General Information** section on page 5.
- Obtain underground locates.
- Supply site drawings to SWEPCO's engineering department
- Supply load information to SWEPCO's engineering department
- Provide an easement for any permanent equipment installed on the property and owned by SWEPCO
- Sign a contract for underground electric distribution

Install the required service equipment.

- Connect and label conductors at the meter location
- Provide trench or conduits between the customer's equipment and SWEPCO's facilities
- Provide trench and service conductors, conduits, pull boxes and transformer pads if required
- Obtain an electrical inspection from a governmental agency if required
- Call SWEPCO's Customer Solutions Center to request the service connection

Getting Started

Before installing an underground commercial service, the customer should contact SWEPCO and ask for a point of service. The customer will need to be able to provide a detailed list of their anticipated electrical loads and required service voltage and phase types. A site or plot plan will be necessary to ensure that underground conduits, cable or padmount transformers do not interfere with other facilities. Special consideration and planning should be made to see that cables are installed in conduits in areas where they are subject to being paved over. The same is true for those areas where trees and landscaping might hinder excavating the power cables in the event of a failure. The SWEPCO engineer for the project will provide assistance to the customer to determine the best service route.

Once the customer and the SWEPCO engineer have agreed on a service route, a layout will be made showing cable, conduit and transformer locations.

In most cases, commercial underground service installations will be made from a SWEPCO padmount transformer or secondary enclosure. SWEPCO provides and installs the high voltage primary cables, transformer and metering equipment. The customer is responsible for installing all conduits and transformer foundations. It is advisable that a spare conduit be installed in case a severe cable fault damages the other conduit.

In some instances a pull box will be required due to excessive cable lengths. This will be provided and installed by the customer in accordance with SWEPCO specifications. See Figures 5.18 and 5.19 on pages 82 and 83 for pull box specifications.

All conduits, concrete pads, pull boxes and service cables are installed, owned and maintained by the customer.

The point of delivery for underground service is the connections inside SWEPCO's transformer or secondary enclosure.

Refer to pages 15 and 16 of the Residential Underground service section for more detail on minimum service requirements. For many commercial applications, the installations shown in either Figures 5.3, 5.4 or 5.5 on page 67 through page 69 could apply, depending on the service size.

For commercial underground service applications refer to Figure 5.8 on page 72 and Figure 5.10 on page 74. Figure 5.8 on page 72 details an underground service installation with the meter mounted on the building. It is always preferred to mount the meter on the building. For situations where the meter cannot be readily mounted or accessed at the building, an installation such as shown in Figure 5.10 on page 74 would apply. For either installation, the SWEPCO engineer will specify whether the service will be from a service pedestal or padmounted transformer. The SWEPCO engineer will also specify conduit size and transformer pad details.

Code Clearance Requirements

The minimum clearance requirements around padmount transformers are shown in Figure 4.3 on pages 56 and 57. A 10 ft. clear work zone in front of a padmount transformer is required. This work zone is critical for outage restoration and routine maintenance. In areas where trucks or other vehicles operate close to padmount transformers, guard posts or other barriers will need to be installed around the transformer.

Clearances From Gas Meters

A minimum horizontal clearance of 3 feet is required between electric service equipment and natural gas metering equipment. For more information, see *Meter Clearances* and Figure 3.1 on page 33.

Service Equipment Installation Requirements

Once the service layout has been coordinated between SWEPCO, the customer or his contractor, installation of the service equipment can begin. The customer is responsible for installing all conduits, transformer foundations and service entrance conductors between the point of delivery and the customer's service disconnect. For services where current transformer (CT) metering is required, the customer must also install a 1-¼ inch conduit from the padmount transformer to the meter base. In three phase padmounted transformers, SWEPCO supplies and installs the CTs inside the padmount transformer and installs the meter wiring in the 1-¼ inch conduit. Refer to page 40 of the *Metering* section for CT metering installations.

Current transformers can only be installed in three phase pad mounted transformers. Do not attempt to install 1-¼ inch conduit for CT metering cable in single phase pad mounted transformers. See page 41 of *Metering* for CT metering of single phase underground loads.

Service Conductor Requirements

The customer's underground service conductors are connected inside the SWEPCO padmount transformer. All service conductors are required to extend at least 8 feet above the padmount transformer foundation to allow SWEPCO to properly terminate cable connections.

All service conductors must be connected to the customer's switchgear or service disconnect before SWEPCO can install and terminate these conductors inside the padmount transformer.

There are limits to the number of conductors that SWEPCO can connect to the transformer terminals. Once it is determined what size padmount transformer SWEPCO will install for the project, the customer and his contractors need to verify the service conductors do not exceed the limits outlined in the table below.

SWEPCO does not recommend 120/240 volt single phase service for new apartment building loads over 167 KVA. Apartment buildings with loads greater than 167 KVA should receive service from a three phase 208Y/120 volt pad mounted transformer using three wire 120/208 volt network meters with the load balanced on a four wire three phase 208Y/120 volt service.

SWEPCO does not recommend 208Y/120 volt service for new loads over 750 KVA.

Single customer with very large secondary loads

If the customer requires more conductors than the maximum number SWEPCO can connect, the customer shall furnish and install a secondary junction box and pad to SWEPCO specifications adjacent to the transformer. The customer shall furnish and install necessary conduit between the secondary junction box and the transformer. SWEPCO will furnish and install conductors from the customer's junction box to the low voltage compartment of the transformer. These conductors shall be rated at 120% of transformer capacity for two hours. The junction box shall be locked and access controlled by SWEPCO.

SECONDARY SERVICE CONDUCTOR TABLE

SERVICE VOLTAGE	PADMOUNT TRANSFORMER KVA RATING	MAXIMUM # OF SERVICE CONDUCTOR PER PHASE	CONDUCTOR SIZE
120/240	25 TO 75 SINGLE PHASE 100 to 167 SINGLE PHASE	6	#10 - #350 AWG #10 - #500 AWG
208Y/120 480Y/277	75 TO 300 THREE PHASE	8	#2 AWG - #1000 kcmil
208Y/120 480Y/277	500 TO 750 THREE PHASE	10	#2 AWG - #1000 kcmil
480Y/277	1000 TO 2500 THREE PHASE	12	#2 AWG - #1000 kcmil

Neutral Conductors

All services from SWEPCO three phase padmount transformers are 4 wire - WYE connected. The neutral conductors are required to be grounded at the SWEPCO transformer and at the customer's switchgear. The neutral connection is required to protect against line to ground faults. SWEPCO will not connect a service without the proper neutral connection.

Grounding Conductors

All services from SWEPCO three phase padmount transformers are 4 wire - WYE connected. The customer should not install separate equipment grounding conductors from the customer's switchgear to the SWEPCO transformer. SWEPCO will not connect equipment grounding conductors.

120/240 Volt, Delta Three Phase Service

SWEPCO three phase padmount transformers are not available for "delta" service connections. Underground services for 120/240 volt delta connections are not generally available from SWEPCO and are not covered in this handbook. The SWEPCO engineer for the project will provide information on delta service installation.

Trenching

The service ditch dug by the customer must meet state and local regulatory requirements. Ditches and conduit supplied for primary systems owned and installed by SWEPCO must have a minimum of 48 inches (see Figure 5.11 on page 75) of cover to the top of the conductor or conduit to the point of final grade. For a secondary trench, you will need 36 inches (see Figure 5.8 on page 72) of cover to the top of the conductor or conduit to the point of final grade.

Conduit Requirements

The customer is responsible for installing and maintaining all primary and secondary voltage level conduits to the SWEPCO transformer or secondary enclosure. It is advisable that a spare primary cable conduit be installed in case a severe fault damages the primary conduit such that a new cable cannot be pulled in.

The primary cable conduit size will be specified by the SWEPCO engineer. The conduit is installed and owned by the customer. Primary conduit installation requirements are shown in Figure 5.11 on page 75. Conduit supplied for primary systems must have a minimum of 48 inches of cover to the top of the conduit to the point of final grade. The conduit installation must be field inspected and accepted by SWEPCO.

For services where current transformer (CT) metering is required, the customer must also install 1 ¼ inch conduit from the padmount transformer to the meter base. Refer to page 40 of the *Metering* section.

Service cable conduit sizes are specified by the customer or his electrical design engineer.

Transformer and Secondary Enclosure Pad Requirements

The customer is responsible for installing the transformer and secondary enclosure pads (foundations).

The location of this equipment must be approved by a SWEPCO representative prior to installation. The correct pad will be specified by the SWEPCO engineer. Figures 5.12, 5.13, 5.14, 5.15, 5.16, and 5.17 on page 76 through page 81 show concrete pad dimensions and other requirements. Field inspection of transformer pads is required and should always occur prior to pouring the concrete. It is the contractor's responsibility to notify SWEPCO that an inspection is needed.

Conduit locations within the transformer pad are critical. The area shown on the left of center is for those primary conduits on the SWEPCO high voltage side of the transformer. Secondary conduits are located in the area just right of center. If the installation is to be CT metered, this area is where the 1-¼ inch conduit for CT metering cable would be located. See the concrete pad specifications in the *Drawing Specifications* section Figure 5.13, 5.14, and 5.15 on page 77 through page 79 for the exact placement of primary and secondary conduits.

When installing secondary conduits, it is recommended that the final location of the transformer pad be roughed-in to determine the exact location of the secondary conduits. This is particularly important when installing the maximum number of service conduits available for a given size of transformer. Failure to place the secondary conduits within the given dimensions of the secondary compartment as indicated on the transformer pad specification drawing will result in the transformer pad being *rejected* at the time of field inspection.

Current transformers can only be installed in three phase pad mounted transformers. Do not attempt to install 1-¼ inch conduit for CT metering cable in single phase pad mounted transformers. See page 41 of Metering for CT metering of single phase underground loads.

Transformer Clearance Requirements

This section provides information on the minimum clearance requirements around SWEPCO padmount transformers.

Clearances between padmounted transformers and structures must be measured from the edge of the transformer pad closest to the building or structure. This includes any overhangs within the following clearances:

- 5 ft. from non-combustible walls (including brick, concrete, steel, and stone) provided the side of the transformer facing the wall does not have doors.
- 6 ft. horizontally from fire sprinkler valves, standpipes, and fire hydrants.
- 10 ft. from combustible walls (including stucco), windows and vents
- 10 ft. horizontally from doors, fire escapes, and other building openings.
- 15 ft. from the water's edge of a swimming pool or any body of water, in front of doors, fire escapes, and other building openings.
- 20 ft. from facilities used to dispense or store hazardous liquids or gases (for example, service station gas pumps and tanks, propane bulk dispensing tanks, and emergency generator fueling points).

See Figure 4.3 on page 56 and page 57 for further information on transformer clearance requirements.

Working Space

A clear and level working area equal to the full width of the padmount operating compartments must extend 10 feet minimum from the compartment opening. A minimum of 5 feet of clear working area must be provided on all sides of padmount equipment without operating compartments, including sides with cooling fins. See Figure 4.3 on page 56 and page 57.

Protection For Padmounted Equipment

Guard posts are required around padmounted equipment that is subject to damage from vehicular traffic. Guard posts are required to be minimum 4" steel pipe filled with concrete. Guard posts are to be imbedded in the ground at least 3 ft. and extend 3 ft. above the ground line. Placement of guard posts should be coordinated with SWEPCO to avoid placing them in the working zone or blocking the door openings of

the equipment as shown in Figure 4.3 on page 56 and page 57.

It is the customer's responsibility to install and maintain guard posts where they are required.

Landscaping and Other Obstructions

Landscaping and other obstructions must not encroach on the clearances specified in Figure 4.3 on page 56 and page 57.

METERING

INTRODUCTION

This section gives information on residential and commercial metering requirements. It is divided into three parts:

1. General Requirements

This section contains the requirements that pertain to all meter installations such as meter location, clearances and grounding.

2. Self-Contained Metering

This section contains the requirements for single-phase and three-phase self-contained metering. Also in this section are requirements for meter pack installations such as would be used in apartment or other multiple meter locations. Allowances paid to the Customer for installing multiple meter packs are in this section.

3. Current Transformer (CT) Metering

This section contains the requirements for single-phase and three-phase current transformer metering.

General Requirements Removing and Installing Meters

Only qualified personnel, authorized by SWEPCO, are permitted to cut seals, and remove or install meters. Under emergency conditions (subject to local authority having jurisdiction) exceptions may be granted to qualified electricians by contacting SWEPCO. (When this occurs the party accepts all liability for damage or alteration to equipment, injury to persons or property.) The customer or electrical contractor must promptly notify SWEPCO when repairs or modifications have been completed. Extreme caution must be used when meters are removed or installed.

Depending upon the type of service or meter base, removal of the meter might not de-energize service.

Mounting Requirements for Meter Sockets/ Enclosures

Several drawings/figures have been provided in this handbook to illustrate the proper mounting of both sockets and enclosures. However, it is not possible to cover the installation requirements for every situation that may be

encountered.

In general the requirements are to provide adequate vertical and horizontal stability that is designed to last the entire life of the installation. While wall mounting is the preferred method, it is understood that this is not always possible. In these cases a mounting structure, rack, pole, etc., must provide the durability and stability required. If you have any questions about a particular installation that has not already been covered with enough detail in this handbook, please contact your local SWEPCO engineering or metering representative prior to installation for guidance.

Equipment

All current transformer (CT) enclosures, switchgear, gutters containing un-metered conductors, and metering equipment must have provisions for sealing by SWEPCO meter personnel. The Customer or Electrician shall contact SWEPCO to obtain access for inspection.



Nothing shall be attached to the meter, meter enclosure, current transformer enclosure, or the associated metering equipment that would inhibit SWEPCO personnel from reading the meter, changing or testing the metering equipment, performing routine maintenance, etc. Other than disconnects required by NEC code or SWEPCO, customer owned equipment shall only be installed on the load side of any meter. See Grounding page 34.

Customer's Responsibility

The customer is responsible for furnishing, installing, and maintaining the following equipment beyond the point of delivery:

- Meter sockets (supplied by SWEPCO at no charge)
- Wall mounted or freestanding rack mounted CT enclosures
- All secondary and 1-1/4 inch CT control cable conduits All necessary wiring, connectors, and lugs (customer side except CT meter wiring)
- **COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES. (New for 2014)**
- Protection equipment

METER SOCKETS PROVIDED BY SWEPCO					
APPLICATION	SERVICE TYPE	AMPACITY	NUMBER OF TERMINALS	SERVICE CONNECTION	BYPASS
RESIDENTIAL	OVERHEAD OR UNDERGROUND	200 AMP	4 TERMINALS	3 WIRE, SINGLE PHASE	BYPASS HORNS INCLUDED
COMMERCIAL	OVERHEAD OR UNDERGROUND	200 AMP	5 TERMINALS	3 WIRE, SINGLE PHASE;	LEVER BYPASS INCLUDED
COMMERCIAL	OVERHEAD OR UNDERGROUND	200 AMP	7 TERMINALS	4 WIRE, 3 PHASE	LEVER BYPASS INCLUDED
LARGE RESIDENTIAL SMALL COMMERCIAL	OVERHEAD OR UNDERGROUND	320 AMP	5 TERMINALS	3 WIRE, SINGLE PHASE;	LEVER BYPASS INCLUDED
COMMERCIAL	OVERHEAD OR UNDERGROUND	320 AMP	7 TERMINALS	4 WIRE 3 PHASE	LEVER BYPASS INCLUDED
COMMERCIAL INDUSTRIAL	OVERHEAD OR UNDERGROUND	400 AMP AND ABOVE	CURRENT TRANSFORMER METER SOCKET VERIFY WITH SWEPCO	CURRENT TRANSFORMER METER SOCKET VERIFY WITH SWEPCO	CURRENT TRANSFORMER METER SOCKET VERIFY WITH SWEPCO

SWEPCO's Responsibility

SWEPCO is responsible for furnishing, installing and maintaining the following:

- Revenue meters
- Current transformers
- Test switches
- CT wiring

Meter Sockets provided by SWEPCO

SWEPCO will provide at no cost, 6 types of meter sockets for use in new installations, replacements or upgraded electric services. It is the customer's and/or the electrician's responsibility to install and maintain the meter socket. Refer to the table above for details of meter sockets available to SWEPCO customers.

Meter Location

The customer must provide a location to install metering equipment. The meter location must be free from obstruction, corrosive atmosphere, abnormal temperature and vibration. The meter should always be mounted between 4 feet and 6 feet from the ground (final grade), measured to the center of the meter. Any exceptions must be approved in advance by AEP SWEPCO management and will be handled on an individual basis. See pages 5 and 6 for additional information about a new meter location, identification requirements, and application for service.

All meters, meter equipment, and enclosures must be readily accessible by SWEPCO personnel during normal business hours for meter reading, maintenance, testing, installation, or removal. All meter locations are subject to approval by SWEPCO.

Metering installations in a flood zone and areas prone to flooding

SWEPCO, at its discretion, may require the meter to be elevated and a suitable platform to be constructed in order to access the metering equipment if the site of the installation is in a designated flood zone or known to be prone to seasonal flooding. In this case please refer to Figure 3.11 on page 51 for the specifications.

Meters must not be installed at any of the following locations:

- Above the first story level or below the first basement level of a building. Any exceptions to this rule must have the prior approval from SWEPCO before installation begins.
- On poles owned by SWEPCO.
- On any line pole occupied solely by the telephone company, except to service telephone company equipment.
- In commercial occupancies they do not serve.
- Any place where safety may be compromised.

Electrical Rooms

Meter sockets may be located inside an electrical equipment room. The electrical room must be used solely for power and communication equipment, and must have a door directly to the outside, or with prior approval from SWEPCO's meter department, directly off the lobby of the structure's main entrance. The electrical room must be well lit, accessible during normal business hours, and not be used for storage. The size of the door must be a minimum 2 feet 8 inches by 6 feet 8 inches. The customer is responsible for providing a location near the door for installation of a key box, and a key for the box and for installing a sign on the exterior door saying "Electrical Room."

General Meter Socket Requirements

Meter socket requirements include the following:

- All meter sockets must be ringless.
- Meter sockets must not be jumpered to provide power.
- Any meter socket containing energized equipment must be covered and sealed with a transparent cover plate when a meter is not installed.
- All unused openings of the meter socket enclosure must be closed with plugs (rain tight, if outside) that are locked tightly in place from inside the enclosures, before a meter is installed.
- Meters must be installed only in sockets which are level, plumb, and securely fastened to the structure.
- Meter sockets and enclosures must be acceptable to SWEPCO and Underwriters Laboratories Listed and labeled.
- Terminals must be marked with a conductor range for aluminum or copper conductors. When aluminum conductors are used, the socket must be approved and clearly marked by the manufacturer for that use.
- All meter equipment exposed to weather must be rain tight according to the National Electrical manufacturer's Association (NEMA) 3R minimum.

Meter Clearances

The center of the meter socket is always the point of reference. Meter socket height is a minimum of 4 feet and a maximum of 6 feet above finished grade or floor. Working space in front of metering equipment (including current transformer enclosures) must be at least 36 inches wide and 36 inches deep, measured from the front of the enclosure and meters. A minimum clearance of 36" is required between service lines and windows, doors, porches, fire escapes or similar openings. Plants, shrubs, and trees must not be planted in this space. Gas meters and related piping must be at least 36 inches horizontally from the center of the meter socket enclosure. See Figure 3.1 at right.

Meter Socket Labeling

Meter sockets must be permanently labeled to indicate the part of the premises they service, for example, the unit number. The customer's name is not acceptable. The labels must be either engraved phenolic nameplates or adhesive-type labels at least one-inch high. Felt-tip pens and label maker tape are not considered permanent marking. Service will not be connected until marking is complete.

Service Conductors

Metered circuits must not enter raceways or enclosures containing un-metered circuits.

Customer Load Monitoring

The customer's load monitoring equipment must be installed only on the load side of the meter. **No customer equipment is allowed to be attached to the meter, associated metering equipment, nor located inside a meter or current transformer enclosure.** For larger services (1000 KW or above) the customer shall install a separate conduit or other means to allow a telephone circuit to be installed up to the meter socket. This provides for metering that can be remotely accessed by the customer and/or SWEPCO. Consult SWEPCO metering department for details

Current Limiting Fuses

Current limiting fuses to protect the customer's electrical system from high fault current must not be installed in meter sockets, instrument transformer enclosures, or SWEPCO's distribution transformers.

Current limiting fuses may be installed in the customer's service panel or in a separate enclosure.

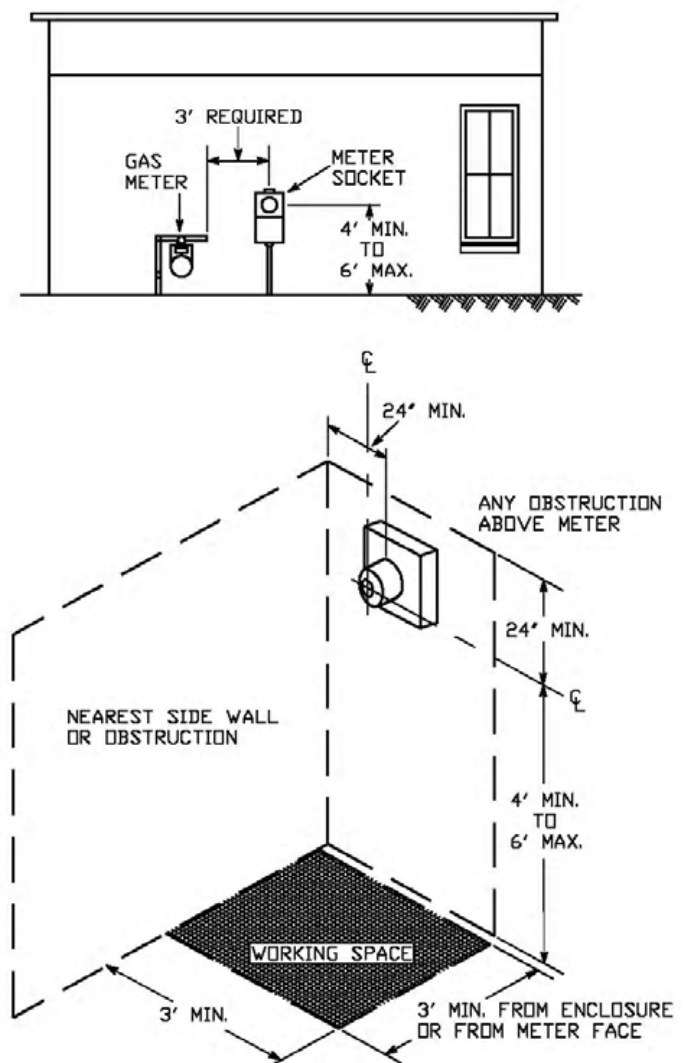


FIGURE 3.1

METER SOCKET MINIMUM CLEARANCES

GROUNDING

General

All meter sockets, enclosures, and conduit must be bonded and grounded in accordance with Articles 230 and 250 of the latest edition of the NEC. When self-contained meter sockets are used, the neutral conductor must be connected to the neutral terminal in the socket. The grounded neutral conductor of the service entrance conductors shall be grounded in accordance with the NEC.

All conduits, metallic tubing and service entrance equipment shall be grounded in accordance with the latest revision of the NEC. The NEC or other local governing code shall be consulted at the time for dimensions, specifications of material, and to determine the appropriate method of installing the grounding system (minimum copper or copper clad of 5/8 inch diameter).

The equipment grounding conductors should not be installed along with the service entrance conductors being installed to the secondary compartment of the Company's padmount transformers.

Communications Companies

Communication companies, such as telephone and cable television, are forbidden to ground their systems to the meter enclosure.

SWEPCO owned meter enclosures shall not be used by any other utility for the purpose of grounding the other utility's equipment. Communications companies, such as cable television (CATV), telephone and other service providing companies have been found to use the SWEPCO meter enclosures as grounding locations for their service equipment. This is not acceptable as an interconnected grounding system and the practice shall not be allowed. Methods used by outside entities to ground their equipment to the meter enclosure include "C" clamps, bolts and sheet metal screws. These methods can cause physical damage to the meter enclosure making it vulnerable to rust and water intrusion. These devices can present an encumbrance to meter personnel attempting to service the meter. These devices can also cause extra labor costs and liability risks when work is being performed at the meter site.

Due to the above listed risks, grounding to an SWEPCO owned meter enclosure by any company, organization or individual is not allowed. Any entity requiring a ground for their equipment should consult and follow the requirements of the latest revision of the National Electrical Code.

If instances are found wherein this policy has been violated, the company or individual in question will be contacted to

safely rectify the situation.

METERING EQUIPMENT REQUIREMENTS

General

This chapter provides requirements for the metering equipment that the customer must provide. Follow these requirements, to avoid a delay in hooking up service. If there are additional questions about this information, call SWEPCO for assistance.

SWEPCO will assume no responsibility for inspecting the customer's equipment, but shall have the right to refuse service if the service equipment is deemed unsafe to connect.

Service Rating Options

Metering equipment requirements for single-family residential structures (not apartments or condominiums) are based upon the following single-phase service ratings.

SERVICE VOLTAGE	AMPERE RATING	TYPICAL USE
120/240	200 AMPS	SMALL AND MEDIUM SIZE HOMES
120/240	400 AMPS	LARGE HOMES
120/240	OVER 400 AMPS	VERY LARGE HOMES

For service over 400 Amps or for a three-phase service, see page 35 and page 40. Contact SWEPCO Metering or Engineering personnel for assistance when CT metering is involved. Each service is addressed individually and must receive SWEPCO approval.

General Requirements

The customer is responsible for providing and installing all equipment other than:

- The meter
- The service line - if served overhead.

Exception - The customer provides the underground service cable, if served underground.

Meter Socket Requirements

The meter socket is issued by SWEPCO at no charge and installed by the customer and must meet the following general requirements. Other requirements for 200, 400 Amp services and outbuildings are listed later in this chapter. Repairs to customer-owned sockets are the sole responsibility of the customer. Contact SWEPCO if meter removal is required.

Replacement sockets are issued by SWEPCO at no charge to the customer. Dangerous conditions are subject to immediate disconnection without notice. Note: With some types of meter sockets, removal of the meter does not de-energize the customer's system.

Grounding Requirements

All meter sockets, enclosures and conduit must be bonded and grounded in accordance with the NEC. In addition, the grounding conductor shall be sized per NEC and shall be minimum size #6 copper installed outside building or structure. Conductor shall be protected in accordance with NEC. Evidence of grounding provisions shall be clearly visible.

See page 34 for additional grounding requirements.

Clearance Requirements

The customer must provide and maintain the following clearances around meter installations:

- The center of the meter must be between 4 and 6 feet above finished grade.
- A working space of 36 inches wide by 36 inches deep is required around the meter. See Figure 3.1 on page 33.
- This working space is to be kept clear of any obstructions including landscaping.
- There must be a minimum horizontal clearance of 24 inches between the center of the electric meter and any obstruction except gas meters, which must be 3 ft. horizontal.

200 Amp Service

Single family residential

The 120/240 volt, 200 ampere service is the most common service and is typically installed on homes with a living space of less than 2500 square feet. However, it is the customer's responsibility to determine the electrical requirements and to notify SWEPCO of the size service needed.

Outbuildings

Meter sockets for 200 amp (or less) services to outbuildings that will be used for personal use (for example, garages, shops, barns, single family wells, non-commercial barns) must meet all the requirements listed in this chapter for overhead or underground services. If the outbuilding will be used for commercial or multi-family purposes there could be additional requirements. If this is the case, refer to the

Commercial Service section of this handbook.

400 Amp Service

The meter socket required for a 120/240 volt, 400 ampere service is called a "Class 320" meter socket and is provided by SWEPCO at no charge. This socket is larger than the 200 amp meter socket, but it is still a self-contained meter socket (it does not require current transformers). It can be installed on residences where the continuous current rating is 320 amps or less.

This 320 amp socket is suitable for overhead or underground service installations. If the structure will require more than 320 amps continuous, a current transformer (CT) service must be installed. For more information on CT services, contact SWEPCO's Metering or Engineering personnel for assistance.

Services Over 400 Amps

120/240 volt services over 400 amps require CT metering. See page 40. Contact SWEPCO Metering or Engineering personnel for assistance when CT metering is involved. Each service is addressed individually and must receive SWEPCO approval.

SELF-CONTAINED METERING

Single-phase and Three-phase services 400 amps or less

Single-phase Services: 200 amps or less

A self-contained meter socket must be installed on all new and remodeled single-phase services, where the current-carrying capacity of the service entrance conductors does not exceed 200 amps, as specified in the NEC.

Underground Residential Meter Sockets

The bending radius of the underground service conductors requires that off-center knockouts in the bottom of the meter socket enclosure must be used on all underground services; the center knockout must not be used. If the ground lug is not located in the center of the socket, the knockout on the opposite side of the enclosure must be used.

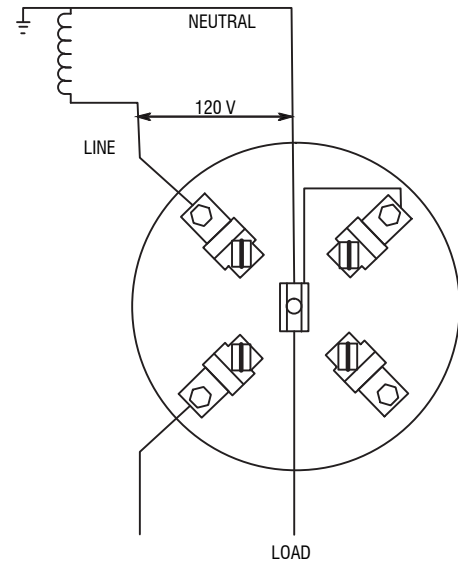
SELF-CONTAINED METER SOCKET CONNECTIONS

2 WIRE 120 VOLT SINGLE PHASE

Socket Type - 4 Terminal 200 amp rating
(provided by SWEPCO)

Maximum Load served - 100 amp

Maximum Wire Size - 250 MCM



3 WIRE 120/240 VOLT SINGLE PHASE

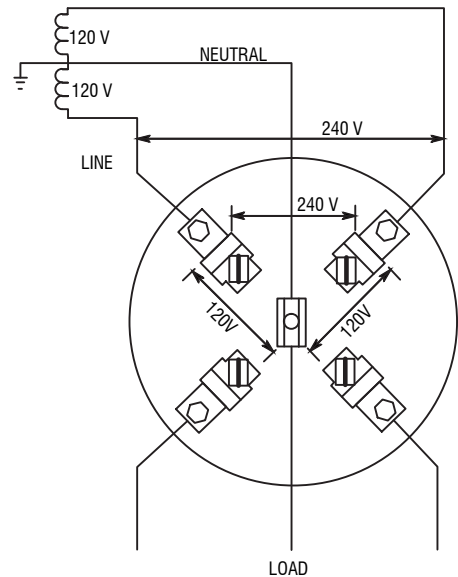
Socket Type - 4 Terminal (provided by SWEPCO)

Maximum Load - 400 amp connected

Maximum Wire Size - 250 MCM for 200 amp;

600 MCM or parallel 350 MCM for 400 amp

Commercial Services require a fully rated bypass
(provided by SWEPCO)



3 WIRE NETWORK 120/208 VOLT SINGLE PHASE

Socket Type - 5 Terminal (provided by SWEPCO)

Maximum Load - 400 amp connected

Maximum Wire Size - 250 MCM for 200 amp;

600 MCM or parallel 350 MCM for 400 amp

Commercial Services require a fully rated bypass
(provided by SWEPCO)

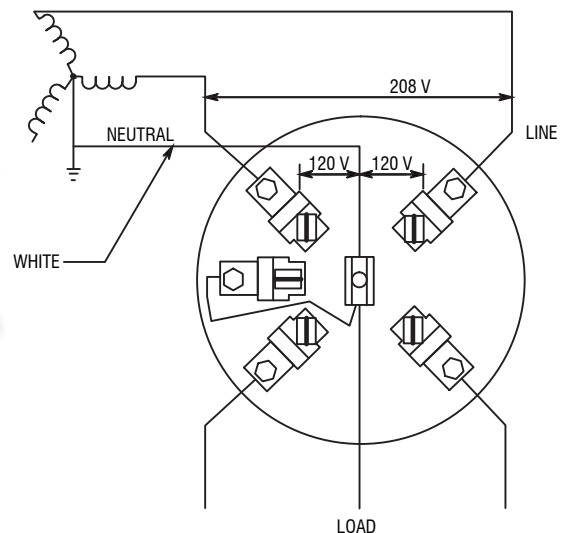
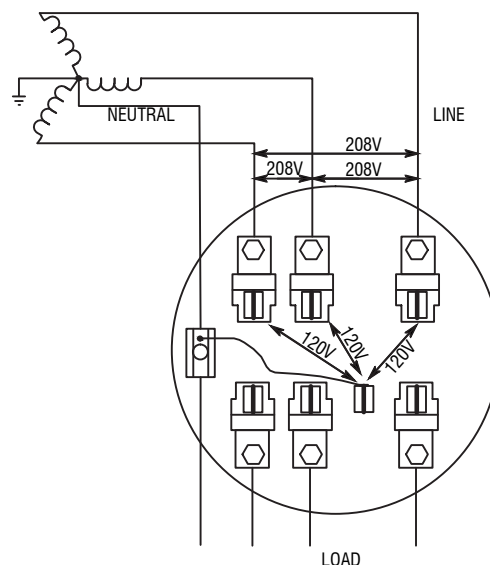


FIGURE 3.2

SELF-CONTAINED METER SOCKET CONNECTIONS

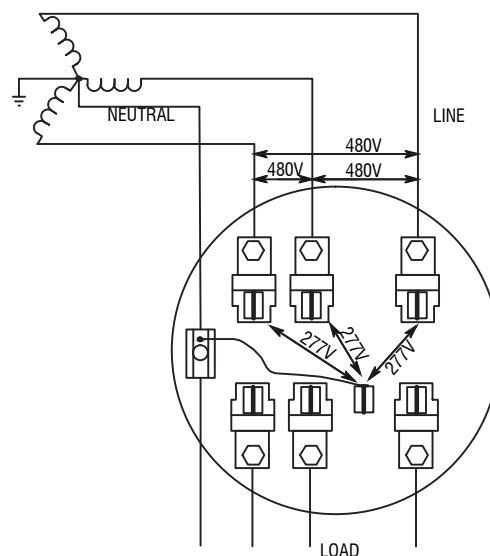
4 WIRE 120/208 VOLT THREE PHASE

Socket Type - 7 Terminal (provided by SWEPCO)
Maximum Load - 400 amp connected
**Maximum Wire Size - 250 MCM for 200 amp;
600 MCM or parallel 350 MCM for 400 amp**
**Commercial Services require a fully rated bypass
(provided by SWEPCO)**



4 WIRE 277/480 VOLT THREE PHASE

Socket Type - 7 Terminal (provided by SWEPCO)
**Maximum Load - 200 amp connected
(over 200 AMP see CT metering)**
**Maximum Wire Size - 250 MCM for 200 amp;
600 MCM or parallel 350 MCM for 400 amp**
**Commercial Services require a fully rated bypass
(provided by SWEPCO)**



4 WIRE DELTA 120/240 VOLT THREE PHASE

Socket Type - 7 Terminal (provided by SWEPCO)
Maximum Load - 400 amp connected
**Maximum Wire Size - 250 MCM for 200 amp;
600 MCM or parallel 350 MCM for 400 amp**
**Commercial Services require a fully rated bypass
(provided by SWEPCO)**

On a 4 wire Delta connection, the phase having the highest voltage to ground (high leg, wild leg or wye leg) must be connected to the right hand terminals of the meter socket. In other locations, such as service enclosures, disconnects, etc., the "high leg" is connected to the center terminal.

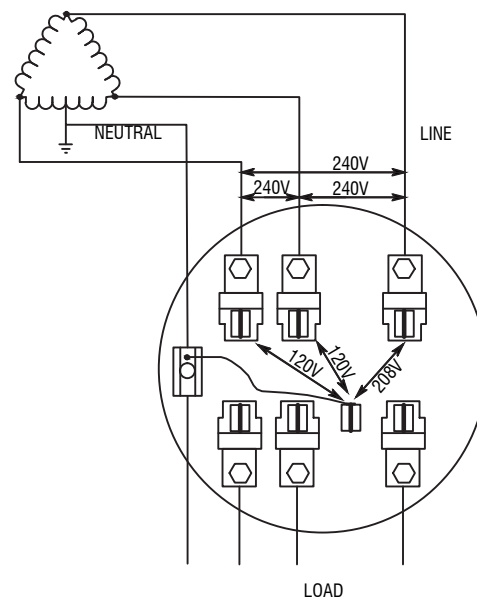


FIGURE 3.2

Single-phase Services: 201 to 400 amps

A self-contained 320 Amp meter socket with a 320 class lever bypass is required on all new and remodeled single-phase services (120/240 V) over 200 Amp, where the current-carrying capacity of the service entrance conductors does not exceed 400 Amp, as specified in NEC. Service conductors must be arranged in the socket to avoid interfering with the meter installation or operation of the manual bypass.

480 Volt Metered Service

All services with 480/277 volt, 4 wire, wye and 240/480 volt, 3 wire, single phase self-contained metering are required to have a non-fused disconnect ahead of the meter.

This non fused disconnect is supplied and installed by the customer. It will be locked and sealed under the exclusive control of SWEPCO. See Figure 5.6 on page 70. Since September 30, 2007, there has been no exceptions for the requirement of a non-fused disconnect.

All 480 volt, 3 Wire, Delta, Corner Grounded services shall be metered using both current and voltage transformers. An approved CT enclosure is supplied and installed by the customer. It will be locked and sealed under the exclusive control of SWEPCO. SWEPCO provides 480 Volt service with three connection types available:

- 240/480 Volt, 3 Wire, Single phase
- 277/480 Volt, 4 Wire, WYE, Three Phase
- 480 Volt, 3 Wire, Delta, Corner Ground

The maximum 480 Volt service that can be self contained for these connections is 200 Amps. 480 Volt Services above 200 Amps will be Current Transformer metered.

EXCEPTION: 480 Volt, 3 Wire, Delta, Corner Ground service is only available up to 200 Amps and will only be current transformer metered. All 480 Volt services above 200 Amps shall be 277/480 Volt, 4 Wire, WYE.

Commercial Meter Sockets (manual bypass requirements)

All self-contained commercial meter sockets, except temporary services meter sockets, require a manual lever bypass.

Single-phase service requires a 5 terminal socket with a 100% rated manual lever bypass where the service conductor capacity does not exceed 400 amps, as specified in NEC.

Three-phase service requires a seven-terminal socket with a 100% rated manual lever bypass where the service conductor capacity does not exceed 400 amps, as specified in NEC.

Four-wire delta services require a 100% rated manual lever bypass meter socket. The high leg (power leg) is to be connected through the right-hand terminals of the socket. See Figure 3.2 on page 36 and page 37 for self contained meter socket wiring diagrams.

Load Balancing

When three-phase transformers provide single-phase service, it is the customer's responsibility to identify the conductors and balance the load on the transformer.

Service Conductors For Self-contained Metering

Line-side conductors must always be connected to the top terminals of the meter socket. Service conductors must be arranged in the socket to avoid interfering with the meter installation or operation of the bypass blocks and handles.

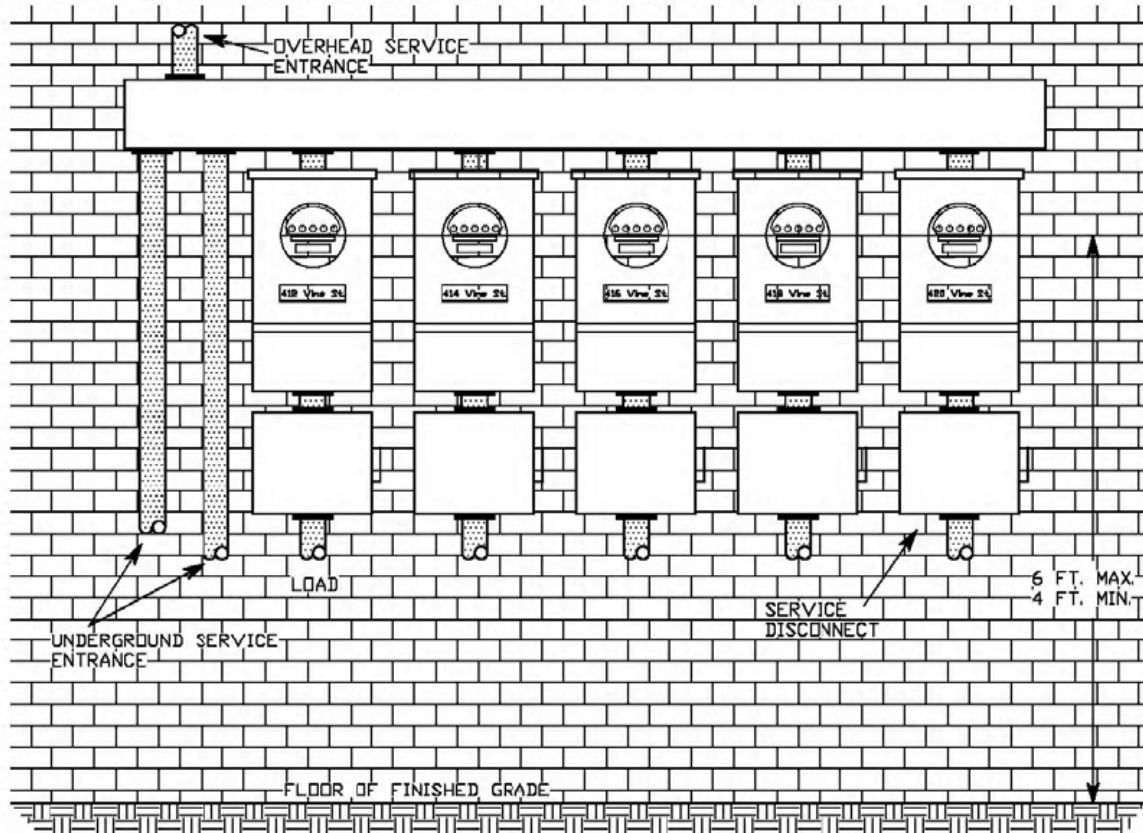
The customer is responsible for ensuring that the connection of service entrance conductors in the meter socket are inspected and tightened before the service is energized. Meters will not be installed unless these connections are tight, and are wired correctly for the class of service involved. Meters will not be installed if conductors place undue strain on the terminal facilities. Terminals must be rated for the size of conductor to be used. Strands must not be removed to make conductors fit under-sized terminals.

Multiple Meter Installations

Multiple meter installations must comply with the equipment arrangement requirements shown in Figure 3.3 on page 39.

When more than one meter is to be installed at a given location, each meter circuit shall be marked to indicate exactly the customer serviced. In apartment houses, the markings must be the same as the apartment identifications, such as numbers or letters. Markings such as "upper north", "left front", "rear", etc., are not acceptable. Tenant's names shall not be used as means of identifications. Identification shall be on the service disconnect with paint or on the meter enclosure or socket base (not cover) with paint or metal letter.

MUTIPLE METER INSTALLATIONS FOR OFFICE COMPLEX



FACTORY-BUILT MULTIPLE METER ASSEMBLY FOR APARTMENT COMPLEX

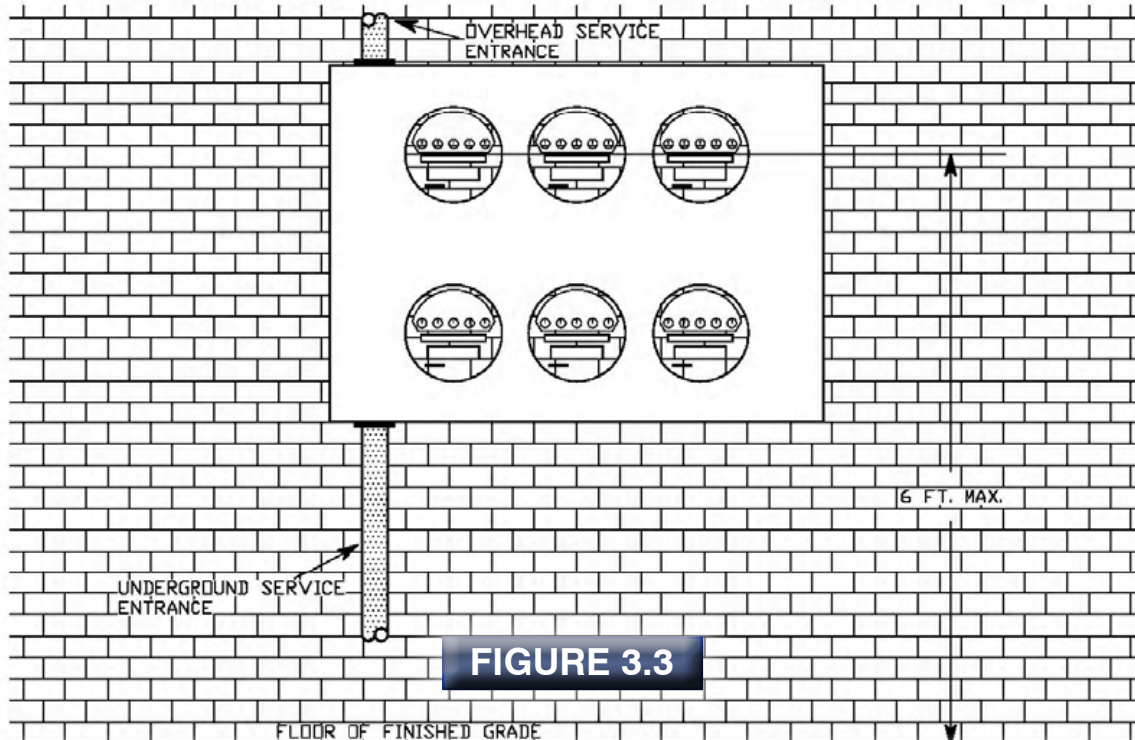


FIGURE 3.3

If there are more than six metering service points the customer must provide a main disconnect in front of the service tray.

Factory-Built Multiple Meter Packs

Apartments, multi-family residential or commercial centers may require pre-manufactured multiple meter packs with over current breakers. SWEPCO does not supply or stock these units or any replacement parts including over current protection fuses or breakers. The customer is responsible for supplying, installing, and maintaining any multiple meter pack equipment. SWEPCO will reimburse customer for the socket portion of multiple meter packs. In order to work with SWEPCO meters, the following specifications for multiple meter packs must be met:

Residential

- Single phase multiple meter packs, 3 wire 240/120 Volt, minimum 125 Amp capacity, ringless type with provisions for barrel locks. **Meter pack sockets with automatic bypass units or shorting bars are not acceptable.**

Commercial

- Single phase multiple meter packs, 3 wire 240/120 Volt, minimum 125 Amp capacity, ringless type with provisions for barrel locks. **Meter pack sockets shall include a manually operated lever bypass. Meter pack sockets with automatic bypass units or shorting bars are not acceptable.**
- Three phase multiple meter packs, 4 wire 208/120 Volt WYE or 240/120 Volt DELTA, minimum 200 Amp capacity, **ringless** type with provisions for barrel locks. **Meter pack sockets shall include a manually operated lever bypass. Meter pack sockets with automatic bypass units or shorting bars are not acceptable.**
- **480/277 Volt multiple meter packs are not acceptable.**

SWEPCO's tariffs allow customer to be reimbursed for meter pack installed by the customer.

A letter requesting approval for installation of meter packs stating manufacturer, type and quantity to be installed shall be submitted to SWEPCO prior to installation. With field verification and approval from SWEPCO, an invoice must be submitted **within 30 days of completion** for processing the reimbursement. SWEPCO will reimburse the customer in the following amounts:

- \$20 for each single phase socket
- \$75 for each three phase socket

CURRENT TRANSFORMER METERING

CT Metered Services

Contact SWEPCO Metering or Engineering personnel for assistance when CT metering is involved. Each service is addressed individually and must receive SWEPCO approval. Should CT metering be required by SWEPCO, the customer will be responsible for installing the 1-1/4 inch conduit from the CTs to the meter socket. **For larger services (1000 KW or above), it is advisable for the customer to install a separate conduit or other means to allow a telephone circuit to be installed up to the meter socket. This provides for metering that can be remotely accessed by the customer and/or SWEPCO**

Requirements for CT Metering Service Voltages Below 480 Volts

Provisions for current transformer (CT) metering must be made when the current-carrying capacity of the service entrance conductors and the main service disconnect exceeds 400 Amps.

480 Volt Services

Provisions for current transformer (CT) metering must be made when the current-carrying capacity of the service entrance conductors and the main service disconnect exceeds 200 Amps when 480/277 volts three phase or 240/480 volts single phase is required.

All 480 volt, 3 Wire, Delta, Corner Grounded services shall be metered using both current and voltage transformers.

The customer shall verify with SWEPCO any and all plans for CT metering installations before starting work.

The SWEPCO Engineer will verify the proposed CT metering layout and provide written confirmation in the Point of Service form to the Customer and/or the Electrician on the job (where required).

Customer's Responsibility

The customer is responsible for furnishing, installing, and maintaining the following equipment at or beyond the point of delivery:

- Meter sockets (supplied by SWEPCO at no charge)
- Wall mounted, pole mounted or freestanding rack mounted CT enclosures
- All secondary service cable conduits and 1 ¼ inch CT metering control cable conduits
- All secondary service cable, connectors, and lugs

Details of the Customer's responsibilities includes the following:

1. The customer shall install the meter socket (furnished by SWEPCO) and the metering circuit conduit. Rigid, PVC (Schedules 40 or 80), or EMT conduit is required between the meter socket and CT enclosure and must be installed by the customer. Conduit must be as short as possible, and must not exceed 40 feet in length, and not over 360 total degrees in bends. A pull string is required in any meter conduit over 25 feet long. Flex conduit must not be used in meter circuits. Conduit must not contain conduits or junction boxes and must be 1 1/4" diameter.
2. If required, the customer shall provide and install a CT enclosure on the supply side, ahead of the main disconnect. The CT enclosure shall be mounted on an exterior wall that is readily accessible to SWEPCO personnel. The CT enclosure must be carefully selected to meet size and working space requirements. The SWEPCO engineer will advise the customer if a CT enclosure will be required.

SWEPCO's Responsibility

SWEPCO is responsible for furnishing, installing and maintaining the following:

- Revenue meters
- CTs
- Test switches
- CT wiring

In planning this type of service installation, it is important to verify with the SWEPCO engineer that the load and service size is such that it qualifies for CT metering. Particular attention should be given to the point of attachment for the service line. Due to the increased weight and sag of this size service drop, the point of attachment must be capable of supporting the added weight and maintaining adequate clearances above ground.

Overhead Commercial Service With CT Metering

- For overhead services requiring CT metering, a CT enclosure shall be installed as shown in figure 3.10 on page 50. If circumstances prevent the installation of a CT enclosure, contact your local SWEPCO Meter Services representative about an alternative method **prior** to beginning construction.

Where there are multiple weatherheads (each serving a separate customer) to be connected to a single SWEPCO service drop, a CT metering enclosure shall be installed for each CT metered service entrance. Only one meter and one set of CTs per enclosure shall be installed per service.

Detailed information for the CT enclosure is on Figure 3.10 on page 50, Current Transformer Enclosures.

The CT enclosure must be mounted on either an exterior wall or an approved freestanding structure and be readily accessible to SWEPCO personnel. Figure 3.5 on page 45 illustrates this type installation.

Underground Service with CT Metering

- CT's will not be mounted in a single-phase pad mounted transformer due to clearance and safety concerns. A CT metered enclosure must be provided. Figures 3.8, 3.9 and 3.10 on page 48 through page 50 illustrate installations using CT enclosures.
- CT's can be mounted on the secondary bushings of a three-phase pad mounted transformer if only one metered service is planned and the SWEPCO Engineer confirms that no future services will be fed from the same transformer. The customer shall install the CT meter socket within 40 feet of the transformer on the building or on a rack adjacent to the transformer. Figure 3.6 on page 46 and Figure 3.7 on page 47 illustrate these type of installations.
- CT's will **not** be mounted in a three-phase pad mounted transformer if there is to be more than one metered service provided from the transformer. A CT enclosure must be provided for each CT metered service. Figures 3.8, 3.9 and 3.10 on page 48 through page 50 illustrate installations using CT enclosures with only one meter socket and one set of CT's per enclosure.
- CT's will not be mounted in the secondary enclosure. A separate CT enclosure must be provided. Figures 3.8, 3.9 and 3.10 on page 48 through page 50 illustrate installations using CT enclosures. Only one set of CTs and one meter shall be installed at one CT enclosure.

Detailed information for the CT enclosure is on Figure 3.10 on page 50, Current Transformer Enclosures

The CT enclosure and meter sockets must be (a) mounted either on an exterior wall or an approved free-standing structure and (b) readily accessible to SWEPCO personnel.

Customer Owned Current Transformer Enclosures

The Customer is responsible for furnishing and installing all CT enclosures. SWEPCO will furnish the meter socket, CTs, and control wiring. The Customer may need to install the CTs in order to complete the service conductor installation prior to SWEPCO installing the remainder of the equipment. Figure 3.10 on page 50 details the requirements for a CT enclosure installation.

The CT enclosures furnished and installed by the Customer shall meet the following specifications:

SERVICE AMPACITY	MINIMUM CABINET SIZE
Services up to 200 AMPS	30" X 30" X 12"
Services 201 to 800 AMPS	36" X 36" X 12"
Services 801 to 1600 AMPS	48" X 48" X 12"
Services 1601 to 2400 AMPS	60" X 60" X 15"
Services over 2400 AMPS	Consult SWEPCO

Minimum CT Enclosure Size

CT enclosures shall meet or exceed the minimum cabinet size, based on the Customer's service equipment.

Enclosure Construction

Steel enclosures shall be a minimum of G-90 galvanized steel. All edges shall be smooth after forming. Enclosure shall be painted after fabrication. Finish coat shall be minimum of 2 mils thickness and provide a tough, non-chalking weather resistant finish.

Construction shall be in accordance with ANSI/UL50. Outdoor enclosures shall be rated Type 3R. Current transformer enclosures shall be fitted with hinged door(s) and sealing shall

be provided by minimum stainless steel latch with provision for 3/8 inch padlock and/or ribbon seal. The inside back of the enclosures shall be entirely covered by 3/4 inch treated plywood or suitable mounting brackets may be provided. A grounding lug shall be provided to ground the enclosures.

Protection

Enclosures shall be designed to protect personnel against accidental contact with the electrical devices. Enclosures shall guard against unauthorized use of electric service and not be opened without either breaking the seal or visibly damaging the enclosure.

UL Listing

All current transformer enclosures shall be Underwriters Laboratories Listed and labeled as such.

Approved CT Enclosures

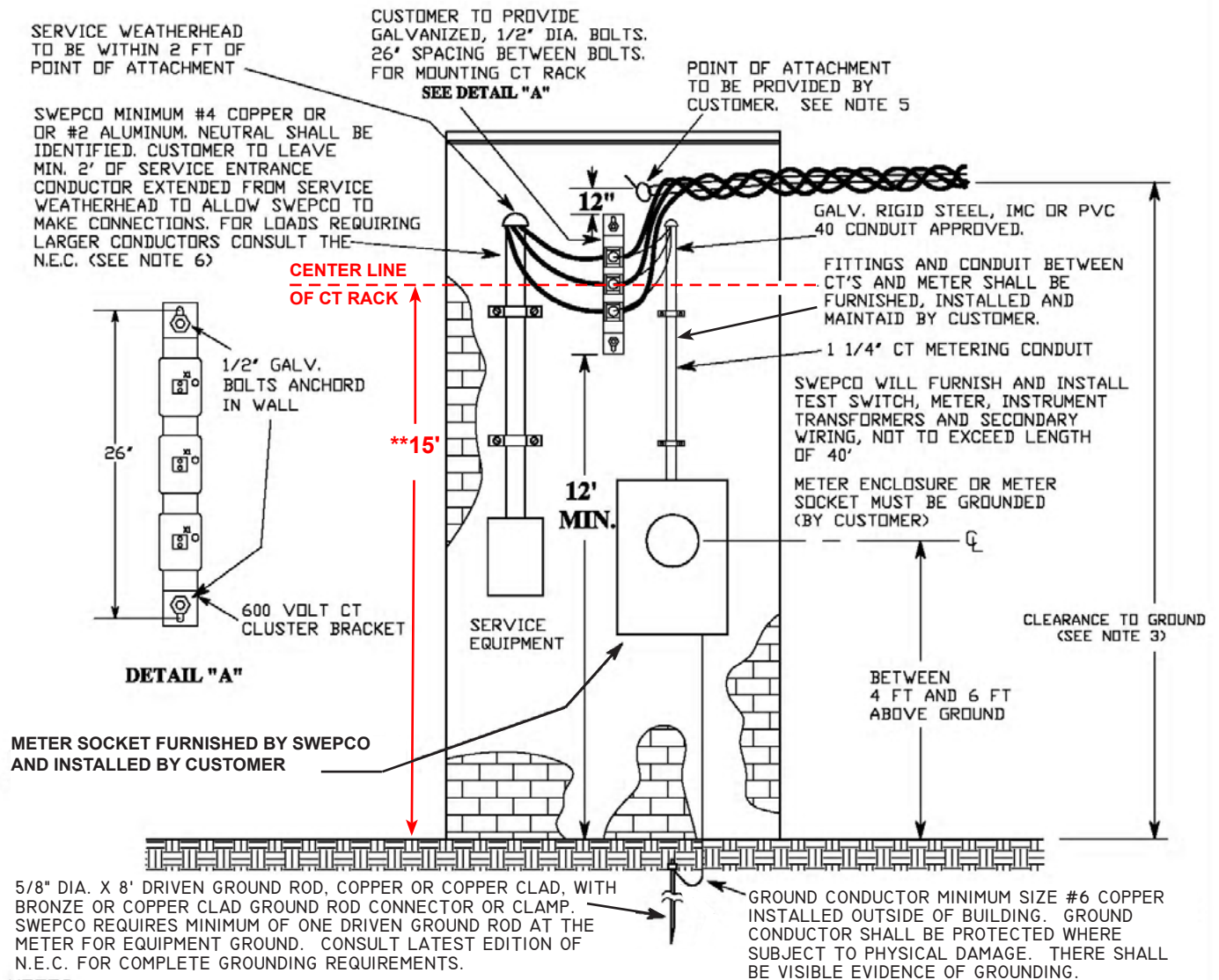
SWEPCO approved CT Enclosures by Manufacturer and size are listed below. For corrosive environments, contact SWEPCO. This list is provided for your convenience and is subject to change without notice. ALL enclosures must meet the enclosure construction requirements under Enclosure Construction, this page. If you are unsure, contact a SWEPCO Meter Services representative for assistance.

Company	Size	Catalog Number
Austin	36 X 36 X 12	363612WL
1-800-288-2851	48 X 48 X 12	484812WL
Bline by Eaton	36 X 36 X 12	363612 WB DDHRTCT
1-800-851-7415	48 X 48 X 12	484812 WB DDHRTCT
	60 X 60 X 12	606015 WB DDHRTCT
Hoffman Engineering	36 X 36 X 12	A363611HCT
1-800-355-3560		
Wiegmann Company	30 X 30 X 12	CTDD303012
1-618-539-3193	36 X 36 X 12	CTDD363612
	48 X 48 X 16	CTDD484816
Brooks Utility Products	36 X 36 X 13	507U6546
1-888-877-3008	48 X 48 X 13	507U6547
	60 X 60 X 15	Call factory
Milbank Manufacturing	36 X 36 X 12	363612-LC3R-SP-WB
Company 1-816-483-5314	48 X 48 X 12	484812-CT3R-WB
	60 X 60 X 15	606015-CT3R-WB
Unity Manufacturing	36 X 36 X 12	AEP363612SDCT3
1-972-272-9502 or 1-800-657-6100	48 X 48 X 12	AEP484812DDCT3
	60 X 60 X 15	AEP606015DDCT3
The Durham Company	36 X 36 X 12	U363612-RDW
	48 X 48 X 12	U484812-DDW

Corrosive Environments		
Company	Size	Catalog Number
Carlton	30 X 30 X 12	HL3030
1-800-322-7566	40 X 40 X 12	HL4040
		HLTEL req. for stainless latch/hasp assy.
Brooks Utility Products	36 X 36 X 13	574U6546-195
1-888-687-3008	48 X 48 X 13	574U6547-196
	60 X 60 X 15	Call Factory

ALTERNATE METHOD FOR OVERHEAD SERVICE CT METERING

- MUST BE APPROVED PRIOR TO CONSTRUCTION -



NOTES

1. CONSULT SWEPCO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO ONE CUSTOMER WITH ONE METER AND A MAXIMUM OF 2 WEATHERHEADS.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. SEE FIGURE 4.2 PAGE 55 FOR SERVICE DROP CLEARANCE REQUIREMENTS
4. METER ENCLOSURES AND METERING CONDUIT SHALL BE FIRMLY SECURED TO BUILDING.
5. PROVISIONS FOR ANCHORING SERVICE ATTACHMENT TO METAL AND MASONRY BUILDINGS TO BE PROVIDED BY CUSTOMER. POINT OF ATTACHMENT SHALL BE OF SUFFICIENT STRENGTH.
6. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWEPCO'S POINT OF CONNECTION. LEAVE A MINIMUM OF 2 FT. OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM SERVICE HEAD FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.

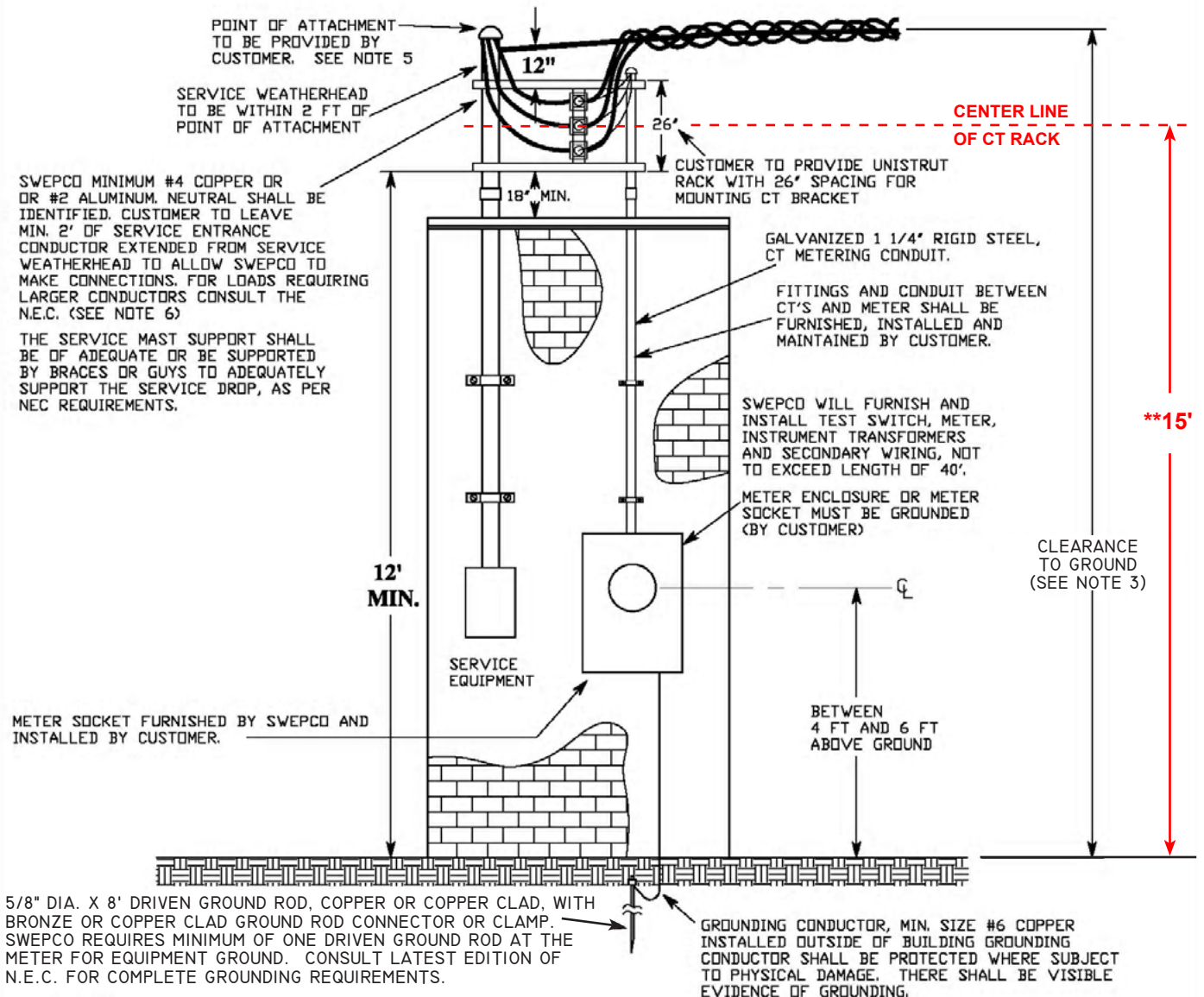
**** Center line mounting heights above 15' must be approved prior to construction**

FIGURE 3.4, Page 1 of 2

DATE
JULY 8, 2008

ALTERNATE METHOD FOR OVERHEAD SERVICE CT METERING

- MUST BE APPROVED PRIOR TO CONSTRUCTION -



NOTES

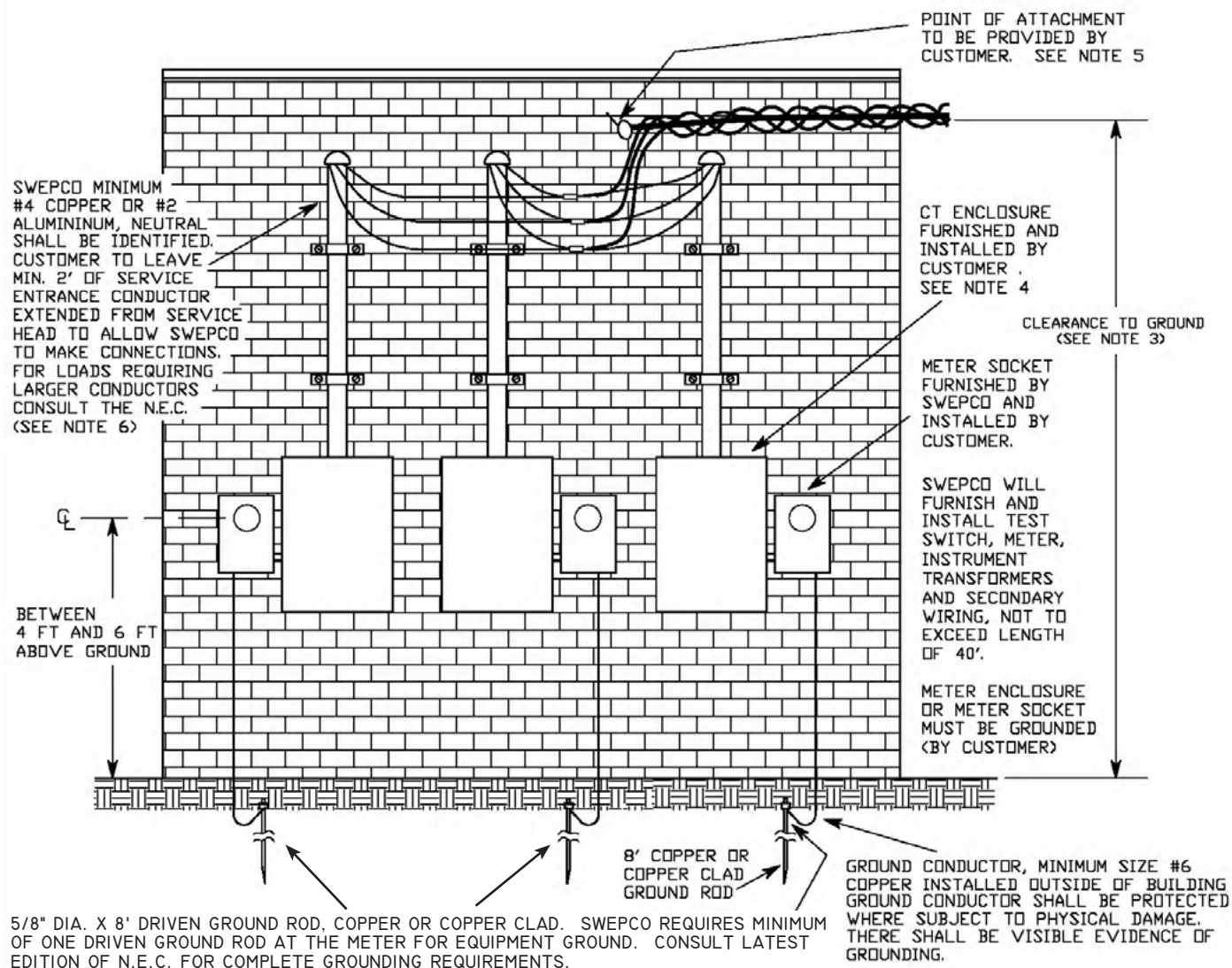
1. CONSULT SWPCO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO ONE CUSTOMER WITH ONE METER AND A MAXIMUM OF 2 WEATHERHEADS.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. SEE FIGURE 4.2 PAGE 55 FOR SERVICE DROP CLEARANCE REQUIREMENTS
4. METER ENCLOSURES AND METERING CONDUIT SHALL BE FIRMLY SECURED TO BUILDING.
5. PROVISIONS FOR ANCHORING SERVICE DROP TO SERVICE ENTRANCE TO BE PROVIDED BY CUSTOMER. POINT OF ATTACHMENT SHALL BE OF SUFFICIENT STRENGTH.
6. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWPCO'S POINT OF CONNECTION. LEAVE A MINIMUM OF 2 FT. OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM SERVICE HEAD FOR SWPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.

**** Center line mounting heights above 15' must be approved prior to construction**

FIGURE 3.4, Page 2 of 2

DATE
JULY 8, 2008

OVERHEAD SERVICE FOR MULTIPLE CT METERING



NOTES:

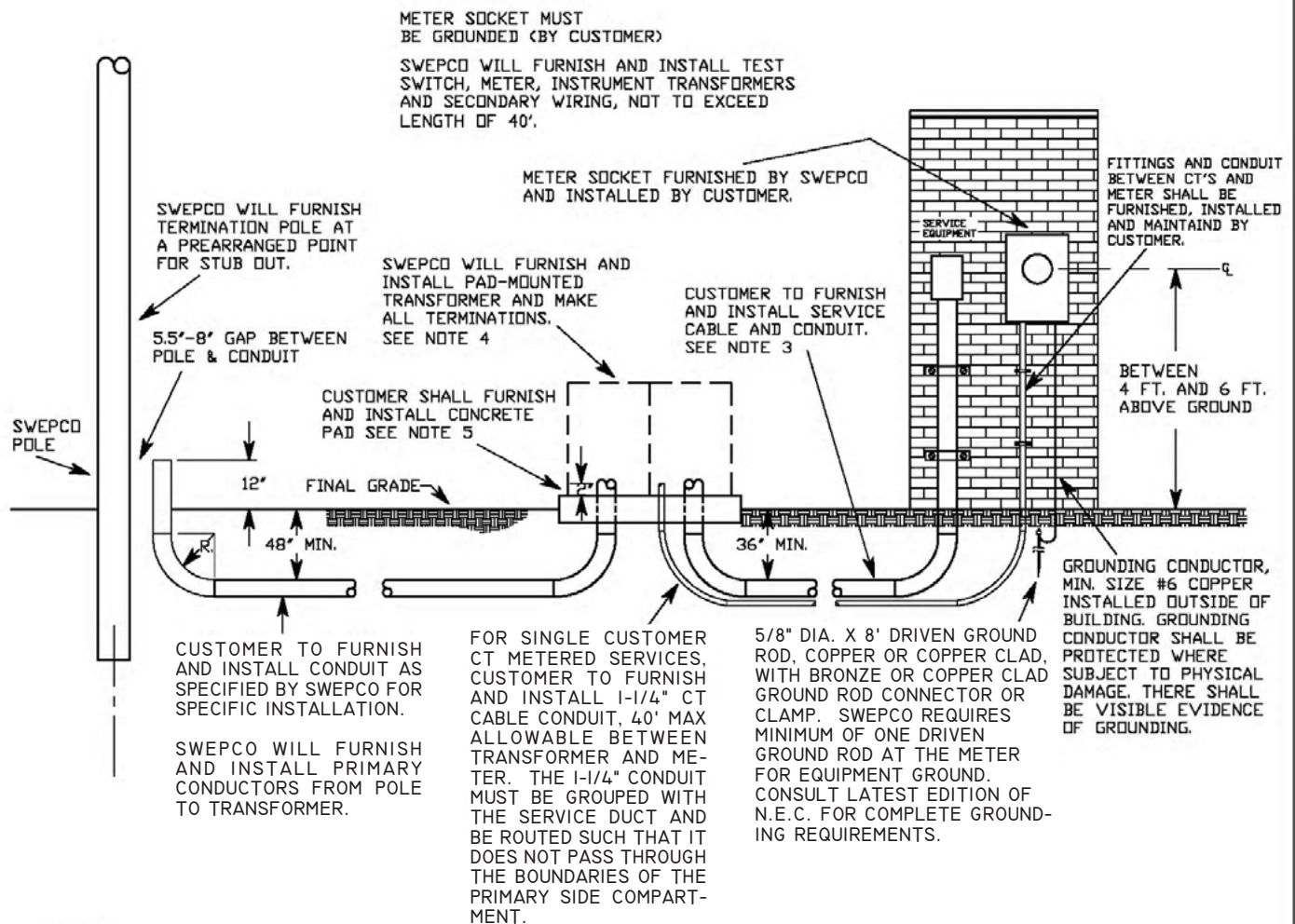
1. CONSULT SWPCO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO 2 OR MORE CUSTOMERS WITH 2 OR MORE METERS AND/OR WEATHERHEADS.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. SEE FIGURE 4.2 PAGE 55 FOR SERVICE DROP CLEARANCE REQUIREMENTS.
4. CT ENCLOSURES AND METER SOCKETS SHALL BE FIRMLY SECURED TO BUILDING. SEE FIGURE 3.10 PAGE 50 FOR CT ENCLOSURE SPECIFICATION.
5. PROVISIONS FOR ANCHORING SERVICE ATTACHMENT TO METAL AND MASONRY BUILDINGS TO BE PROVIDED BY CUSTOMER. POINT OF ATTACHMENT SHALL BE OF SUFFICIENT STRENGTH.
6. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWPCO'S POINT OF CONNECTION. LEAVE A MINIMUM OF 2 FEET OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM SERVICE HEAD FOR SWPCO TO MAKE CONNECTIONS. CONSULT THE LATEST EDITION OF THE N.E.C. FOR THE APPROPRIATE WIRE SIZES.

COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES. (NEW FOR 2014)

FIGURE 3.5

DATE
APRIL 27, 2007

UNDERGROUND SERVICE FROM THREE PHASE PAD MOUNT TRANSFORMER FOR CT METERING



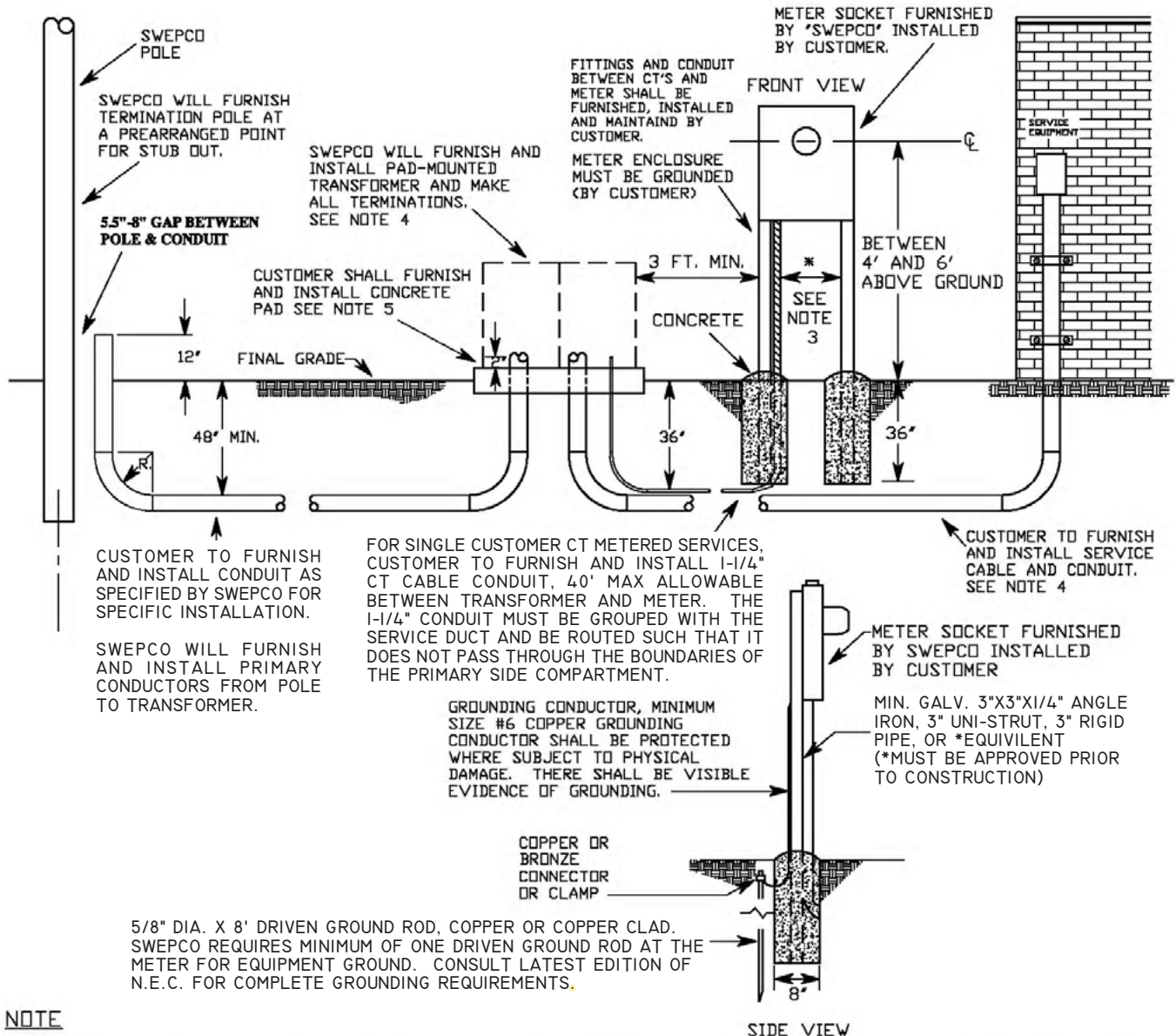
NOTE

1. CONSULT SWEPco PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO ONE CUSTOMER WITH ONE METER.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWEPco'S PAD MOUNT TRANSFORMER. LEAVE 8 FT. OF SERVICE WIRE EXPOSED AT THE TRANSFORMER FOR SWEPco TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.
4. CONTACT SWEPco TO COORDINATE ACCESS TO TRANSFORMER.
5. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD APPROPRIATE FOR SWEPco EQUIPMENT. VERIFY WITH SWEPco.

FIGURE 3.6

DATE
JULY 8, 2008

UNDERGROUND SERVICE FROM THREE PHASE PAD MOUNT TRANSFORMER FOR FREESTANDING CT METERING



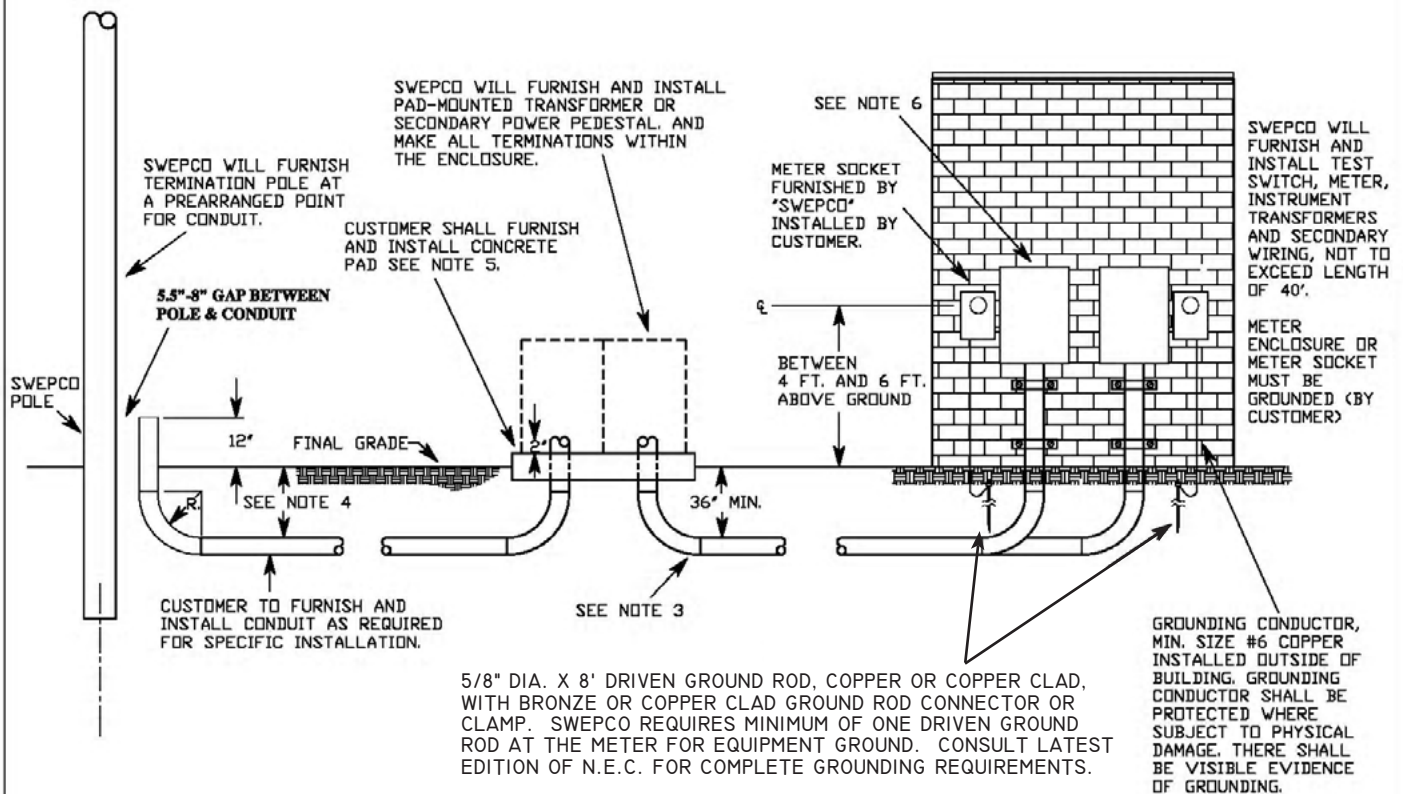
NOTE

1. CONSULT SWEPCO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO ONE CUSTOMER WITH ONE METER.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. DISTANCE WILL VARY DEPENDING ON METER SOCKET.
4. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWEPCO'S PAD MOUNT TRANSFORMER. LEAVE 8 FT. OF SERVICE WIRE EXPOSED AT THE TRANSFORMER FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES. CONTACT SWEPCO TO COORDINATE ACCESS TO TRANSFORMER.
5. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD APPROPRIATE FOR SWEPCO EQUIPMENT. VERIFY WITH SWEPCO.

FIGURE 3.7

DATE
JULY 8, 2008

UNDERGROUND SERVICE FOR MULTIPLE CT METERING



NOTES

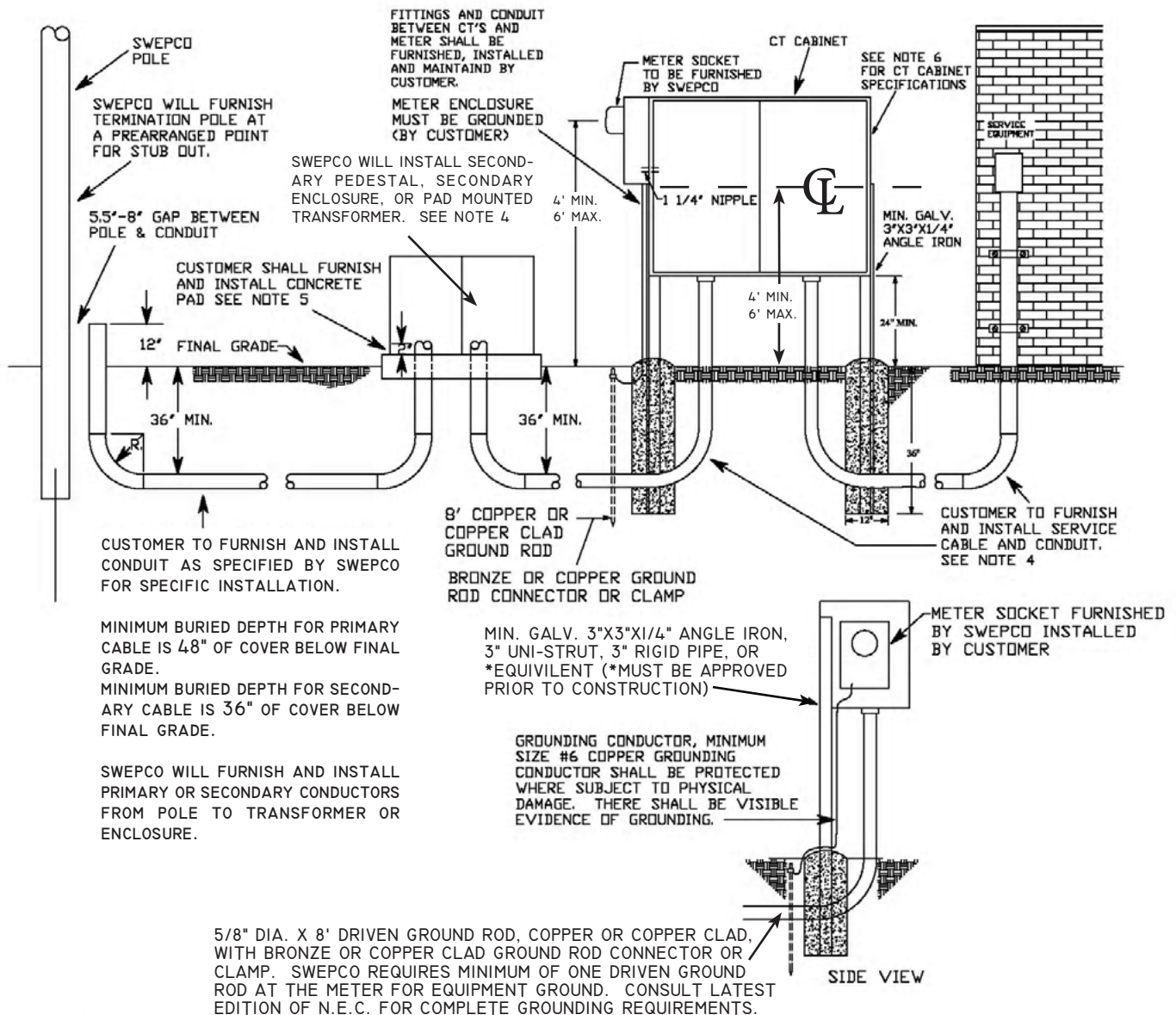
1. CONSULT SWEPDO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO 2 OR MORE CUSTOMERS WITH 2 OR MORE METERS.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPDO'S POINT OF CONNECTION. LEAVE 5 FT. OF SERVICE WIRE EXPOSED AT THE TRANSFORMER FOR SWEPDO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.
4. 36' MINIMUM DEPTH FOR SECONDARY CABLES, 48' MINIMUM DEPTH FOR PRIMARY CABLES.
5. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD APPROPRIATE FOR SWEPDO EQUIPMENT. VERIFY WITH SWEPDO.
6. CT ENCLOSURES AND METER SOCKETS SHALL BE FIRMLY SECURED TO BUILDING. SEE FIGURE 3.10 PAGE 50 FOR CT ENCLOSURE SPECIFICATIONS.

COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES. (NEW FOR 2014)

FIGURE 3.8

DATE
JULY 8, 2008

UNDERGROUND SERVICE FOR FREESTANDING CT METERING



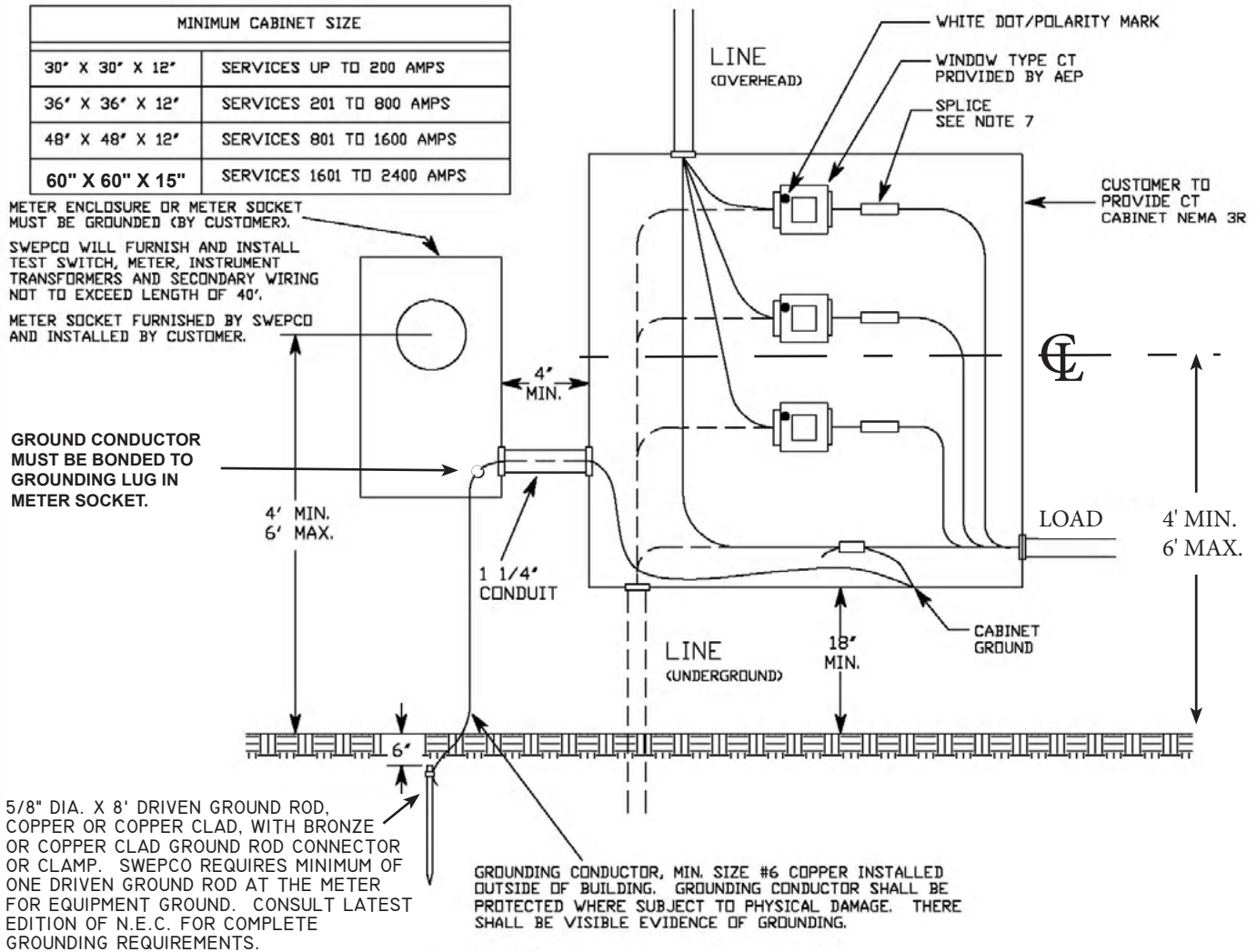
NOTES

1. CONSULT SWECO PRIOR TO INSTALLATION. THIS ARRANGEMENT IS FOR SERVICE TO ONE CUSTOMER WITH ONE METER.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. DISTANCE WILL VARY DEPENDING ON CT ENCLOSURE.
4. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE MAIN DISCONNECT TO SWECO'S SECONDARY ENCLOSURE. LEAVE 8 FT OF SERVICE WIRE EXPOSED AT THE TRANSFORMER FOR SWECO TO MAKE CONNECTIONS. **COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES. (NEW FOR 2014)** CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES. CONTACT SWECO TO COORDINATE ACCESS TO EQUIPMENT.
5. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD AS SHOWN IN FIGURE 5.17. VERIFY WITH SWECO.
6. SEE FIGURE 3.10 PAGE 50 FOR CT ENCLOSURE SPECIFICATIONS.

FIGURE 3.9

DATE
JULY 8, 2008

CURRENT TRANSFORMER ENCLOSURE

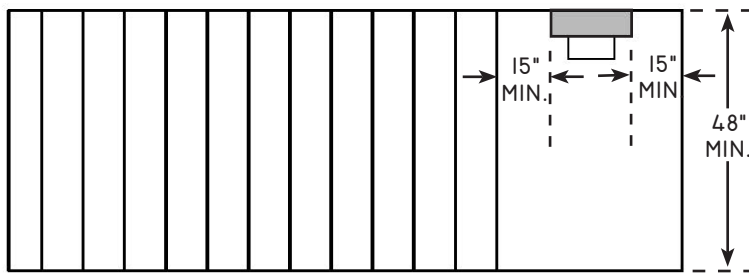


NOTES:

1. CONSULT SWEPCO PRIOR TO INSTALLATION.
2. STEEL ENCLOSURES SHALL BE A MINIMUM OF G-90 GALVANIZED STEEL. ALL EDGES SHALL BE SMOOTH AFTER FORMING. ENCLOSURE SHALL BE PAINTED AFTER FABRICATION. FINISH COAT SHALL BE A MINIMUM OF 2 MILS THICKNESS AND PROVIDE A TOUGH, NON-CHALKING WEATHER RESISTANT FINISH. CONSTRUCTION SHALL BE IN ACCORDANCE WITH ANSI/UL50. OUTDOOR ENCLOSURES SHALL BE RATED TYPE 3R. CURRENT TRANSFORMER ENCLOSURES SHALL BE FITTED WITH HINGED DOOR(S) AND SEALING SHALL BE PROVIDED BY MINIMUM STAINLESS STEEL LATCH WITH PROVISION FOR 3/8 INCH PADLOCK AND/OR RIBBON SEAL. THE INSIDE BACK OF THE ENCLOSURES SHALL BE ENTIRELY COVERED BY 3/4 INCH TREATED PLYWOOD OR SUITABLE MOUNTING BRACKETS MAY BE PROVIDED. A GROUNDING LUG SHALL BE PROVIDED TO GROUND THE ENCLOSURES. **COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES**
3. THE WHITE DOT POLARITY MARK ON THE CT SHALL BE TOWARD THE ENERGY SOURCE OR LINE SIDE.
4. CUSTOMER SHOULD MOUNT THE METER SOCKET OR CABINET NEXT TO THE CT CABINET AND INSTALL 1-1/4 INCH CONDUIT BETWEEN THE TWO. IF THE METER SOCKET CANNOT BE INSTALLED NEXT TO THE CT CABINET, IT MAY BE LOCATED UP TO 40 FEET AWAY WITH SWEPCO APPROVAL. 1-1/4 INCH CONDUIT SHALL CONNECT THE SOCKET AND CT CABINET.
5. THE CT CABINET AND METER SOCKET SHALL BE GROUNDED. GROUND WIRE SHALL REMAIN CONTINUOUS AND UNBROKEN BETWEEN GROUND ROD AND CT CABINET.
6. SWEPCO WILL INSTALL THE CT CONTROL WIRING BETWEEN THE CT AND THE METER SOCKET.
7. CUSTOMER TO PROVIDE SPLICES.

FIGURE 3.10

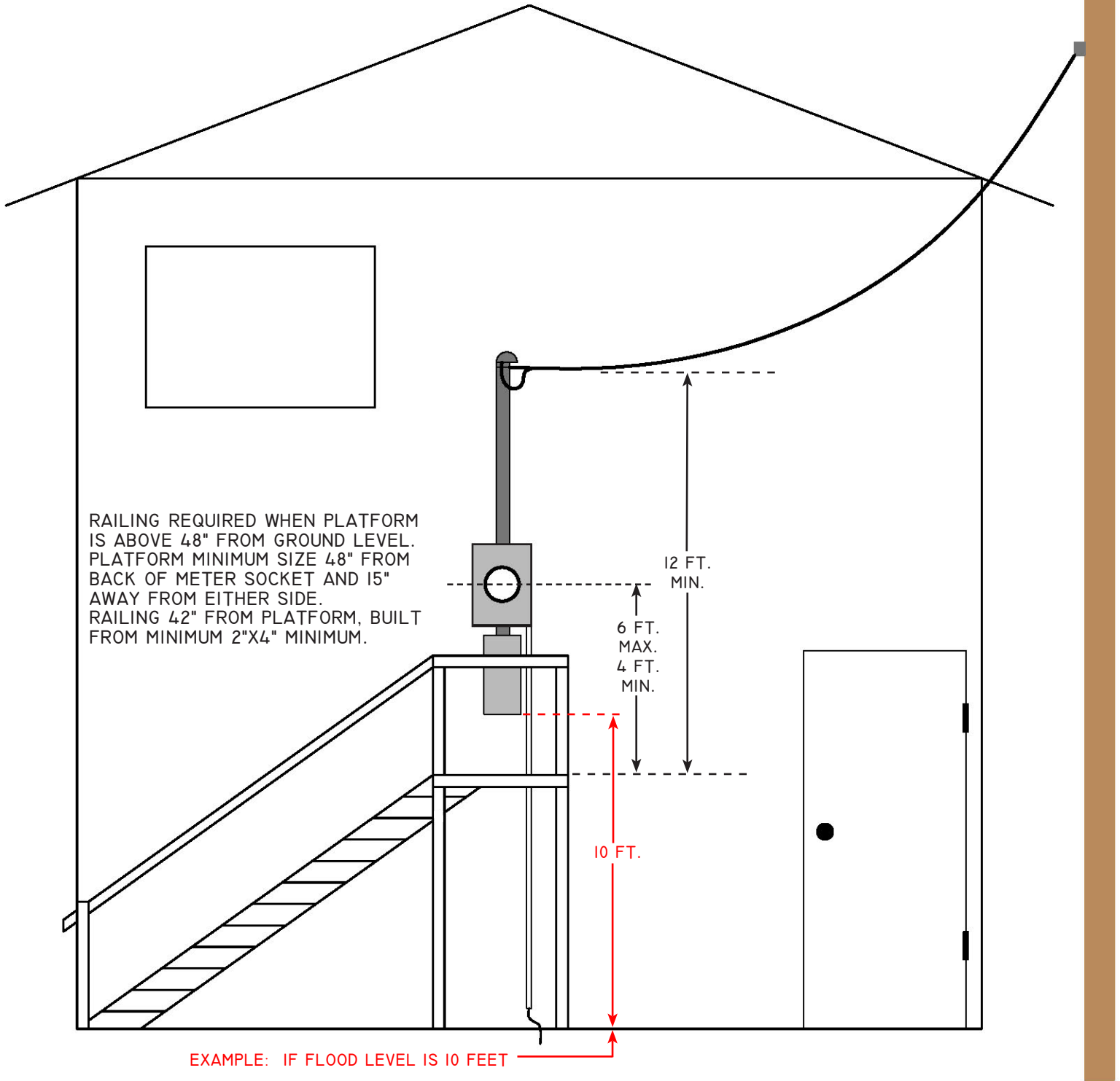
April 2019



PLATFORM SHALL SAFELY WITHSTAND A 500 POUND WORKING LOAD.

TOP VIEW

MINIMUM VERTICAL CLEARANCE SHALL BE REQUIRED BY N.E.C., BUT IN NO CASE LESS THAN 12.0 FEET AT LOWEST POINT OF SERVICE DROP.



EXAMPLE: IF FLOOD LEVEL IS 10 FEET

**TYPICAL SINGLE PHASE OVERHEAD METER INSTALLATION
WALL MOUNT ABOVE FLOOD LEVEL WITH PLATFORM.**

FIGURE 3.11

CLEARANCES

INTRODUCTION

This section gives information on clearance requirements from electric power facilities.

Working Safely - It's The Law !

In an effort to minimize electrical contacts and injuries, laws are in place to assist in minimizing power line hazards. As an individual, employer or employee, no one is exempt from Federal and State laws that require minimum safe work procedures near overhead power lines. The OSHA (Occupational Safety and Health Administration) Code of Federal Regulations (CFR), title 29, part 1926, contains the laws that must be adhered to when working around or near overhead power lines. Individuals and employers are responsible to know and adhere to these standards and rules. State Laws in Arkansas, Louisiana and Texas closely follow the regulations set forth by OSHA, although more stringent requirements may be mandated.

OSHA REGULATES THE OPERATION OF TOOLS, EQUIPMENT, CRANES, AND DERRICKS CLOSER THAN 20 FEET OF AN OVERHEAD POWER LINE.

To inquire about getting a SWEPCO power line de-energized, call SWEPCO's Customer Solutions Center.

1-888-216-3523

OVERHEAD POWER LINE TIPS FOR CONSTRUCTION WORKERS BEFORE YOU BEGIN CONSTRUCTION WORK

Survey the site for overhead power lines.

LOOK UP!

- BEST SAFETY PRACTICE: CONSIDER ALL OVERHEAD LINES AS ENERGIZED UNTIL THEY ARE VISIBLY GROUNDED AT THE WORK SITE AND CONFIRMED TO BE DE-ENERGIZED BY THE POWER COMPANY.
- In construction work, an overhead power line safety component should be part of your employer's overall safety and health program and safety training.
- If overhead lines are present, call the utility company and find out what voltage is on the lines. Ask if the utility company can shut off the lines while you are working near them.

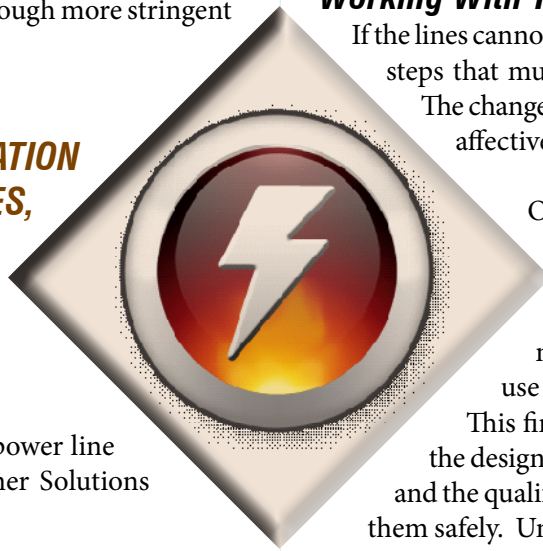
Working With Tools and Equipment

If the lines cannot be shut down, OSHA mandates specific steps that must be followed to insure worker safety. The changes to OSHA rules and regulations became effective on November 8, 2010.

OSHA revised the Cranes and Derricks Standard and related sections of the Construction Standard to update and specify industry work practices necessary to protect employees during the use of cranes and derricks in construction.

This final standard also addresses advances in the designs of cranes and derricks, related hazards, and the qualifications of employees needed to operate them safely. Under this new standard, employers must assess and determine hazards within the work zone that would affect the safety of the personnel within that work zone.

Please do not call SWEPCO to request SWEPCO cover up overhead power lines using line hose. This is not an approved practice and does not meet OSHA requirements necessary to insure worker safety.



For Further Information

- These safety tips are not intended to be all-inclusive; they are simply a starting point to help prevent electrocutions from overhead power lines.
- For further information, please refer to the Code of Federal Regulations (CFR), part 1926. You may also contact your regional OSHA Office at:

OSHA Region 6 Office
525 Griffin Street, Room 602
Dallas, TX 75202
(214) 767-4731
(214) 767-4693 (FAX)
Web site: <http://www.osha.gov>

Code Clearance Requirements

SWEPSCO conductor clearances as set out in this section are requirements of the National Electrical Safety Code (NESC). Service risers and conductors are requirements of the National Electric Code (NEC). Local codes may exceed and overrule the NESC. For more detailed code provisions and for provisions not shown in this section, contact a SWEPSCO representative. Unless otherwise stated, all clearances shall be measured from surface to surface and all spacings shall be measured center to center. For clearance measurement, live metallic hardware electrically connected to line conductors shall be considered part of the line conductors. Metallic bases of potheads, surge arresters, and similar devices shall be considered a part of the supporting structure. Voltages are phase-to-ground (unless otherwise noted) for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations.

FIGURE 4.1, page 54

Overhead service to service mast

Used as a general design to detail the clearance requirements for permanent service from overhead distribution facilities.

FIGURE 4.2, page 55

Overhead service drop clearance

Used as a general design to detail the ground clearance requirements for permanent service from overhead distribution facilities. See the current edition of the NESC for more details.

FIGURE 4.3, pages 56 & 57

Clearances requirements for pad mounted transformers

Used as a general design to detail the clearance requirements for structures typically located near pad mounted transformers and as a guide to avoid encroachments.

FIGURE 4.4, page 58

Clearances for swimming pools, underground lines

Used as a general design to detail the clearance requirements for underground facilities and as a guide to avoid encroachments near swimming pools.

FIGURE 4.5, page 59

Clearances for swimming pools, overhead lines

Used as a general design to detail the clearance requirements for overhead lines and as a guide to avoid encroachments near swimming pools.

FIGURE 4.6, page 60

Clearances of overhead lines at buildings

Used as a general design to detail the clearance requirements for overhead lines and as a guide to avoid encroachments near buildings.

FIGURE 4.7, page 61

Clearances of overhead lines at signs

Used as a general design to detail the clearance requirements for overhead lines and as a guide to avoid encroachments near signs. Installations of signs must follow OSHA regulations.

FIGURE 4.8, page 62

Clearances of construction at overhead lines

Used as a general design to detail the clearance requirements for new construction near overhead lines and as a guide to avoid those encroachments. Installations must follow OSHA regulations.

CLEARANCES OF OVERHEAD SERVICE DROP TO SERVICE MAST

IF CONDUIT RISER WITH WEATHERHEAD IS MORE THAN 36" ABOVE ROOF, A GUY SUPPORT MAY BE REQUIRED. REFER TO THE NEC FOR SPECIFICATIONS.

SERVICE ENTRANCE CLAMP BRACKET SUPPLIED AND INSTALLED BY SWEPCO MAY BE RAISED ON MAST AS NECESSARY TO PROVIDE ADEQUATE CLEARANCE FOR DRIP LOOP.

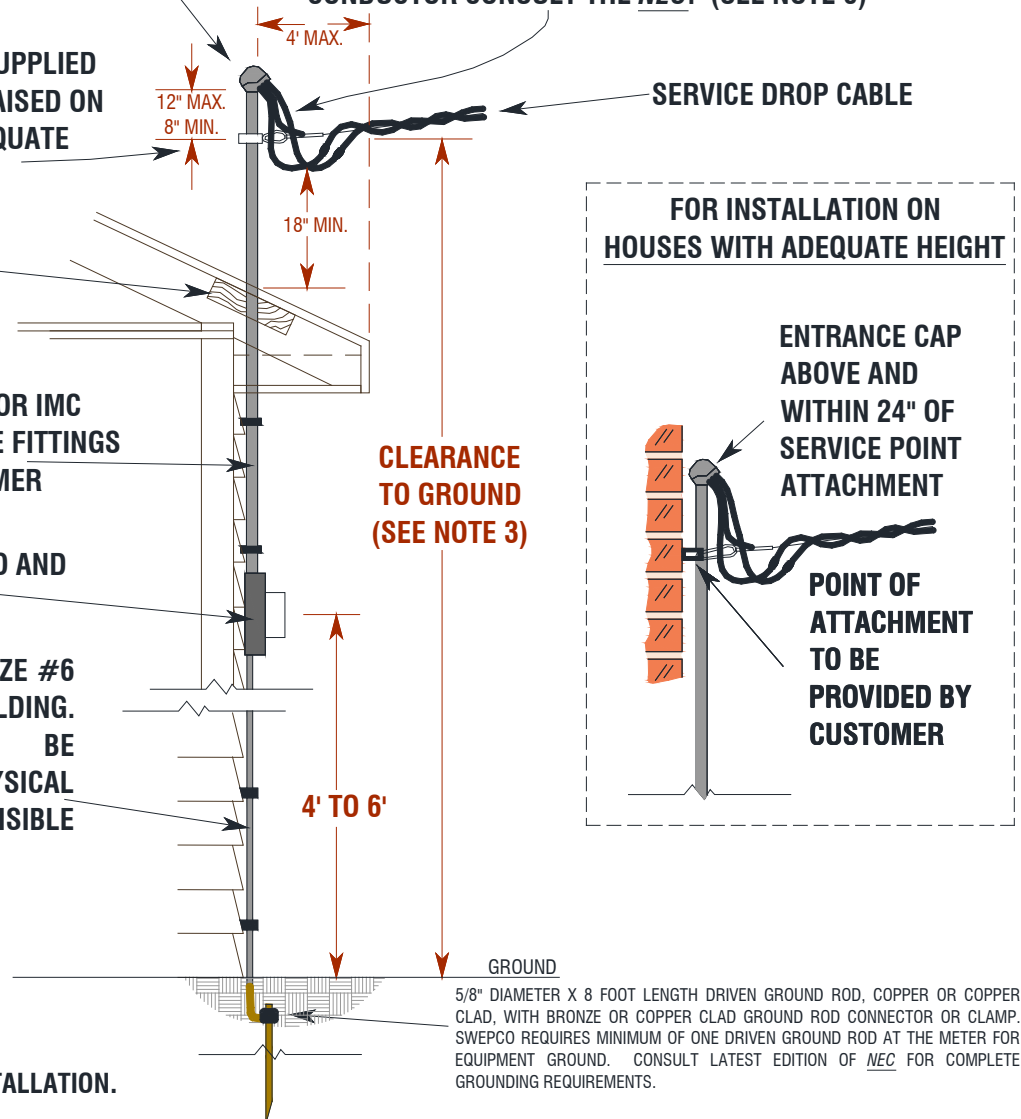
2" X 4" BLOCKING BETWEEN RAFTERS

MINIMUM 2" GALVANIZED RIGID STEEL OR IMC CONDUIT, WEATHERHEAD, AND SERVICE FITTINGS FURNISHED AND INSTALLED BY CUSTOMER

METER SOCKET FURNISHED BY SWEPCO AND INSTALLED BY CUSTOMER

GROUNDING CONDUCTOR, MINIMUM SIZE #6 COPPER INSTALLED OUTSIDE OF BUILDING. GROUNDING CONDUCTOR SHALL BE PROTECTED WHERE SUBJECT TO PHYSICAL DAMAGE. THERE SHALL BE VISIBLE EVIDENCE OF GROUNDING.

NEUTRAL SHALL BE IDENTIFIED. CUSTOMER TO LEAVE MINIMUM 24" OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM WEATHERHEAD TO ALLOW SWEPCO TO MAKE CONNECTIONS. FOR LOADS REQUIRING LARGER CONDUCTOR CONSULT THE NEC. (SEE NOTE 6)

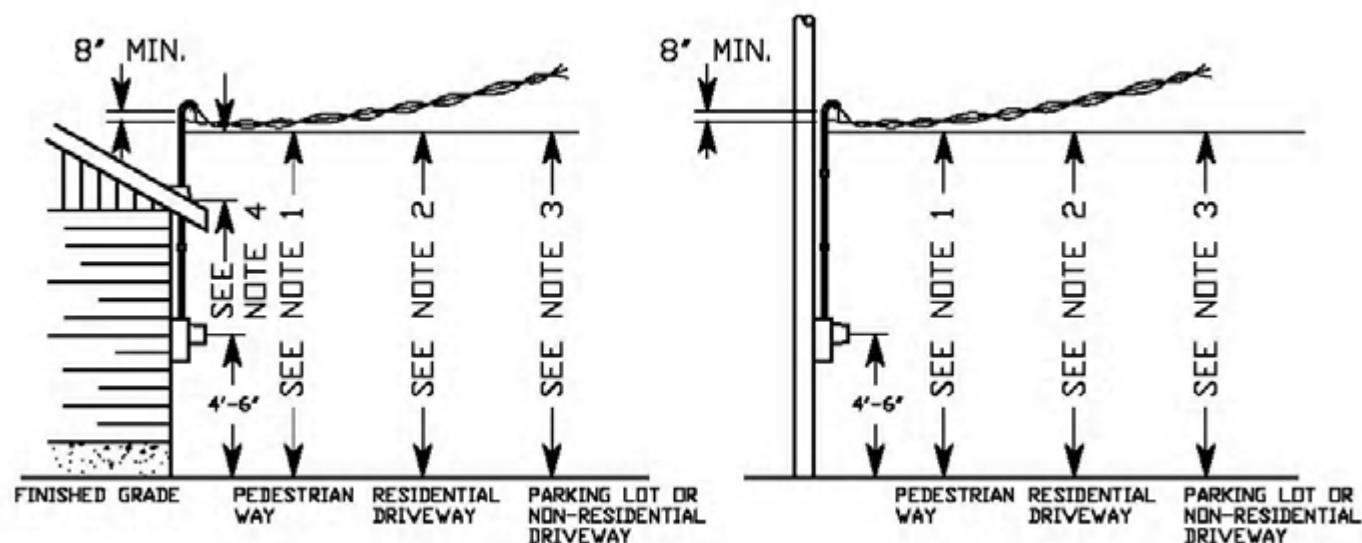


NOTES:

1. CONSULT SWEPCO PRIOR TO INSTALLATION.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. SEE FIGURE 4.2 PAGE 55 FOR SERVICE DROP CLEARANCE REQUIREMENTS.
4. THIS STANDARD DEPICTS THE RECOMMENDED METHOD FOR LOW ROOF HOUSES WHERE GABLES DO NOT EXIST.
5. WHERE MEETING NESC OVERHEAD CONDUCTOR CLEARANCE REQUIREMENTS PRODUCES INSTALLATION DIFFICULTIES CONSIDERATION SHOULD BE GIVEN TO UNDERGROUND SERVICE.
6. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE A MINIMUM OF 24" OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM WEATHERHEAD FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE LATEST EDITION OF THE NEC FOR THE APPROPRIATE WIRE SIZES.

FIGURE 4.1

CLEARANCE REQUIREMENTS FOR OVERHEAD SERVICE DROPS

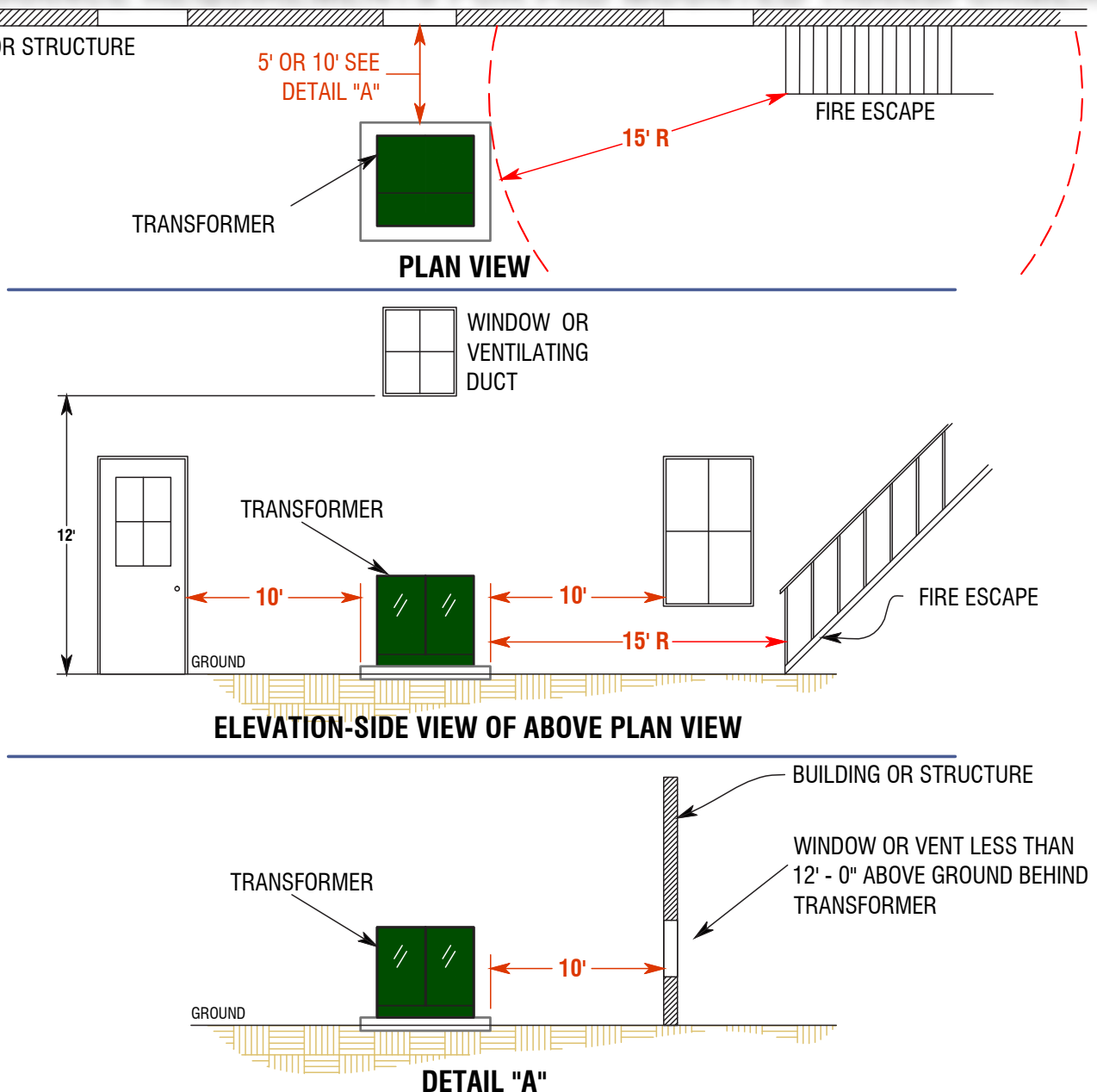


GENERAL: Service drop cables of 750 volts or less shall not pass closer than 3 feet in any direction from windows, doors, porches, fire escapes or similar locations (except above top level of a window) NESC 234C3d (2)			
NOTES: 1. NESC required vertical clearance for service over pedestrian way. 2. NESC required vertical clearance for service over residential driveway not subject to truck traffic. 3. NESC required vertical clearance for service over parking lot or non-residential driveway subject to truck traffic. 4. Required vertical clearance of service drop, including drip loop, over roof where less than 6' of conductors overhang the roof and terminate at an approved through-the-roof raceway.			
EXCEPTIONS TO NOTES 1 & 2 Prior approval by SWEPCO representative is required before exceptions may be used. Where height of a building or other installation does not permit service drops to meet these values they may be reduced to the following: 1. Over pedestrian traffic way 2. Over residential driveway			
120/240 VOLT SINGLE PHASE, 120/208 VOLT 3-PHASE WYE	240/480 VOLT SINGLE PHASE, 120/240 VOLT 3-PHASE DELTA, 277/480 VOLT 3-PHASE WYE	480 VOLT 3-PHASE CORNER GROUND	
12 ft	12 ft	12 ft	
16 ft	16 ft	16 ft	
16 ft	16 ft	16 ft	
18 in	18 in	18 in	
10 ft 12 ft	10.5 ft 12.5 ft	12 ft 16 ft	

These values meet or exceed the current edition of the National Electric Safety Code Rules.

FIGURE 4.2

CLEARANCE REQUIREMENTS FOR PAD MOUNTED TRANSFORMER



NOTES:

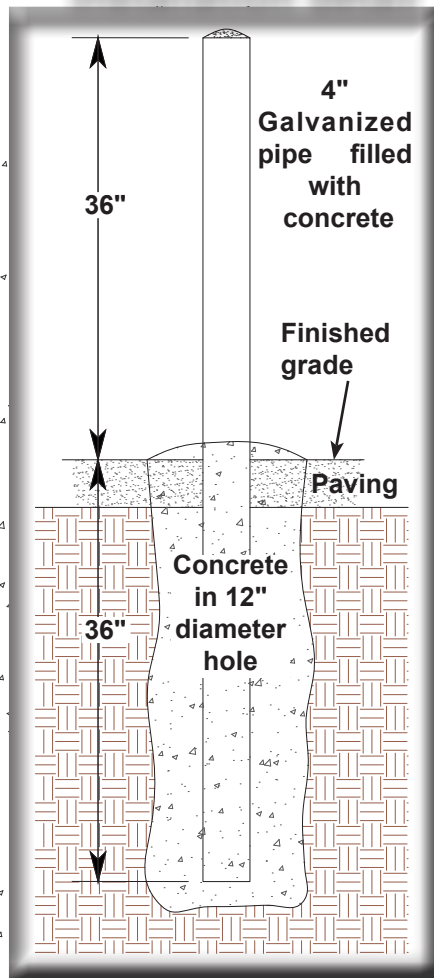
1. ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS.
2. LIQUID FLOW OF AREA SURROUNDING TRANSFORMER SHOULD BE AWAY FROM BUILDING AND TRANSFORMER.
3. TRANSFORMERS MUST BE ACCESSIBLE BY TRUCK AND/OR CRANE. ACCESS IS MANDATORY FOR MAINTENANCE.
4. THERE SHOULD NOT BE ANY ABOVE GROUND OBSTRUCTION, SUCH AS SHRUBS, COOLING TOWERS, GAS METERS, FENCING, ETC. WITHIN 5 FEET OF PAD, WITH 10 FEET OF CLEARANCE IN FRONT OF THE TRANSFORMER.
5. ANY OVERHANGS OR BUILDING PROTRUSIONS, SUCH AS SIGNS, AWNINGS, BALCONIES, ETC., THAT ARE LESS THAN 12 FEET ABOVE GROUND SHOULD HAVE NO LESS THAN 10 FEET HORIZONTAL CLEARANCE.
6. THERE SHOULD NOT BE ANY PIPING OR CONDUIT UNDER THE PAD OTHER THAN THOSE ENTERING TRANSFORMER.
7. IT SHALL BE THE CUSTOMER'S RESPONSIBILITY TO COMPLY WITH ANY INSURANCE REGULATIONS AFFECTING THE INSTALLATION.
8. TRANSFORMERS SHALL NOT OBSTRUCT FIRE LANE. 15' RADIAL CLEARANCE REQUIRED FROM FIRE ESCAPES.

FIGURE 4.3 Page 1 of 2

CLEARANCE REQUIREMENTS FOR PAD MOUNTED TRANSFORMER

GUARD POSTS ARE NOT REQUIRED IF A CURB IS LOCATED A MINIMUM OF 5 FEET FROM A TRANSFORMER PAD OR THE TRANSFORMER PAD IS LOCATED AT LEAST 10 FEET FROM A PAVED AREA SUBJECT TO VEHICULAR TRAFFIC.

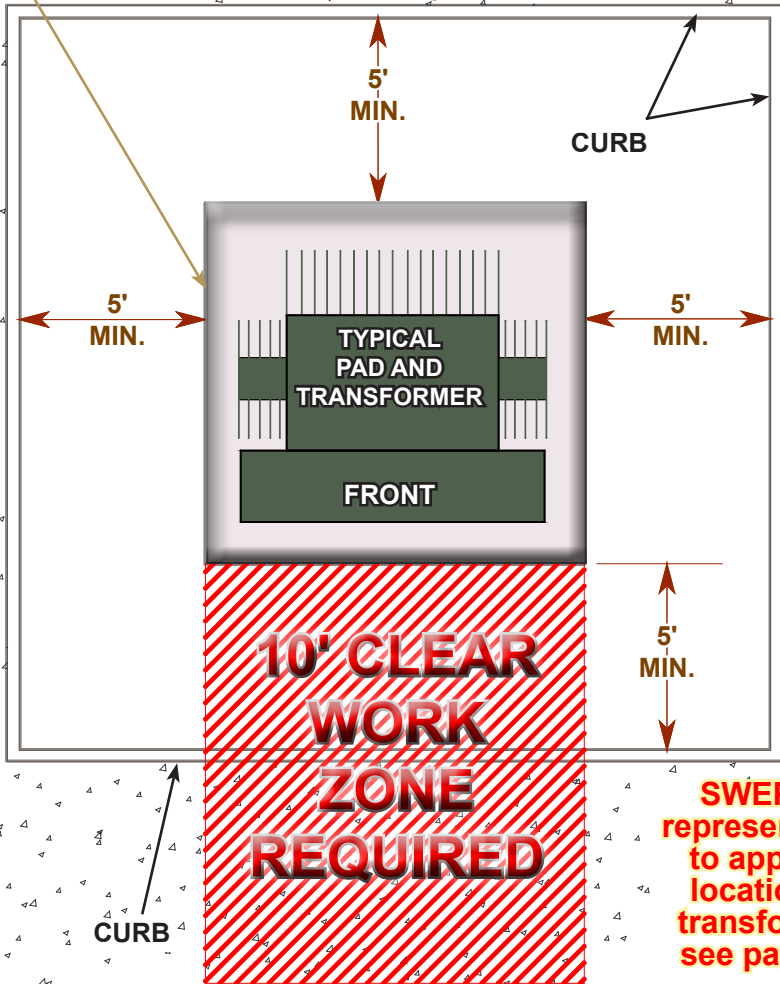
Guard post installation detail



GUARD POSTS ARE REQUIRED WHEN A TRANSFORMER IS LOCATED IN OR ADJACENT TO A PAVED AREA SUBJECT TO VEHICULAR TRAFFIC AND THERE IS NO OTHER PHYSICAL BARRIER PROTECTING THE TRANSFORMER.

TRANSFORMER PAD

ROAD OR PARKING AREA

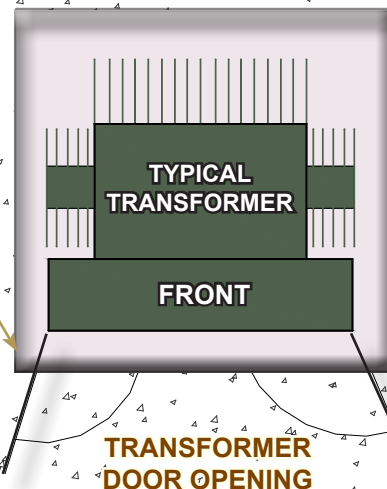


SWEPCO representative to approve location of transformer, see page 29

Guard post

TRANSFORMER PAD

GUARD POSTS TO BE CLEAR OF DOOR OPENING ZONE



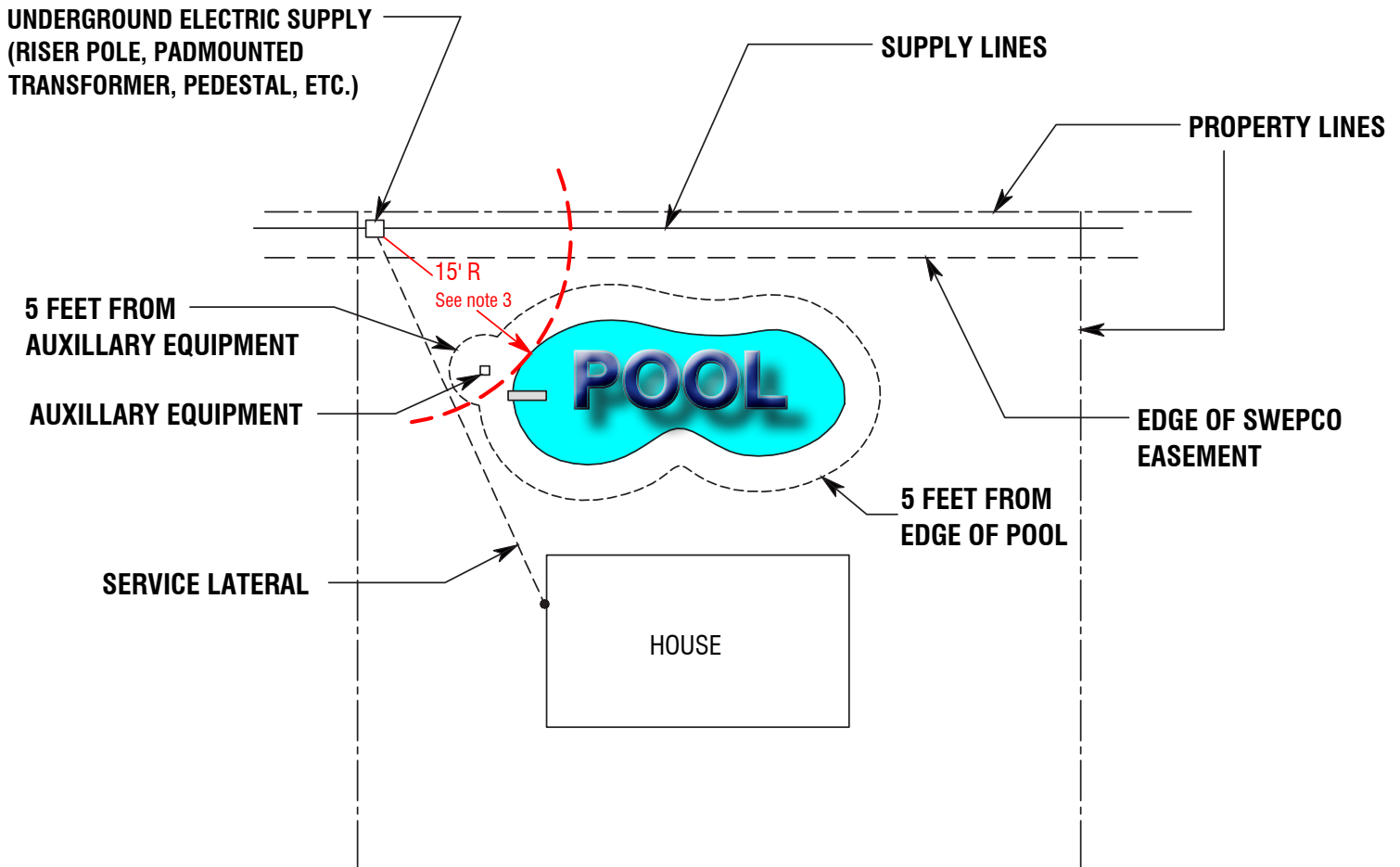
Guard post

Guard post

ROAD OR PARKING AREA

FIGURE 4.3 Page 2 of 2

CLEARANCE REQUIREMENTS FROM POOL TO UNDERGROUND LINES



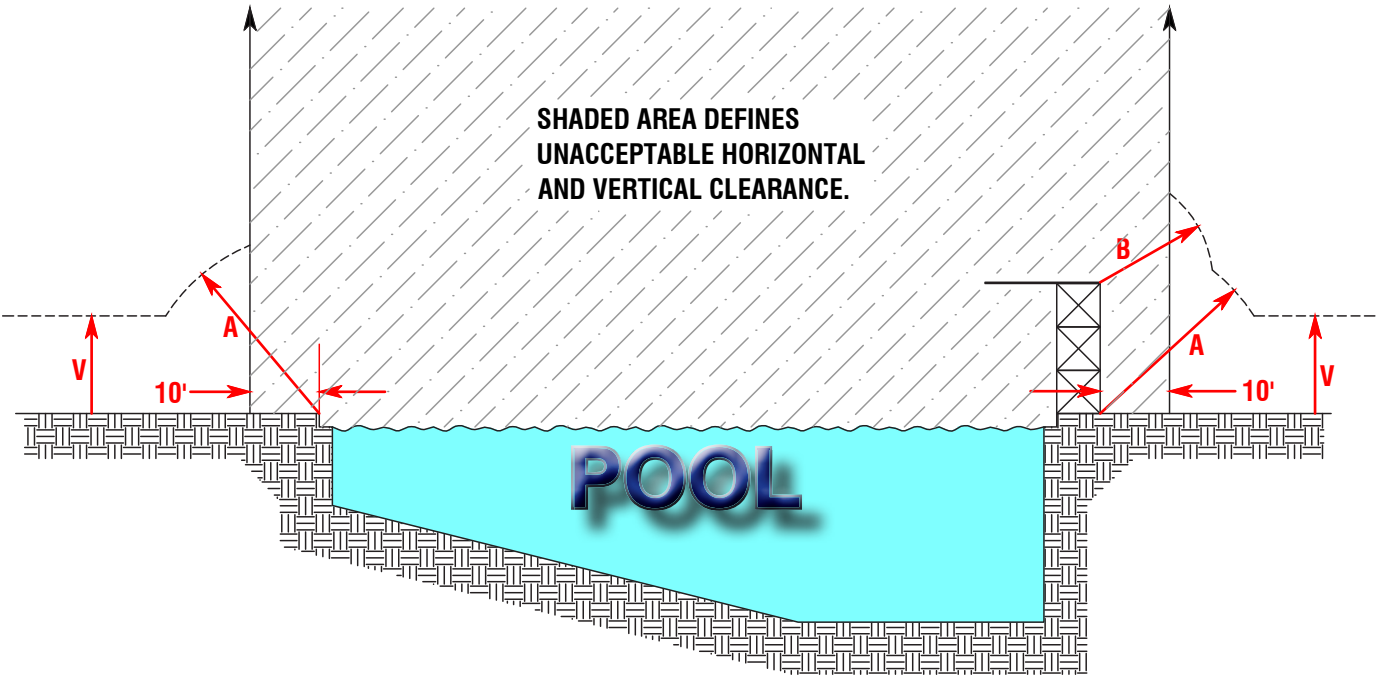
NOTES:

1. A SWIMMING POOL OR ITS AUXILLARY EQUIPMENT OR WATER PIPES SHALL NOT BE INSTALLED WITHIN 5 FEET OF EXISTING DIRECT BURIED CABLES.
2. WHERE A SWIMMING POOL MUST BE INSTALLED WITHIN 5 FEET OF EXISTING DIRECT BURIED SERVICE LATERAL, THE SERVICE SHALL BE INSTALLED IN CONDUIT FROM THE SERVICE CONNECTION POINT TO THE METER.
3. PADMOUNTED EQUIPMENT SHALL BE LOCATED 15 FEET OR MORE FROM THE WATERS EDGE.
4. A SWIMMING POOL SHALL NOT BE LOCATED WITHIN SWEPCO EASEMENTS.
5. LOCAL REQUIREMENTS MAY REQUIRE GREATER CLEARANCES.
6. FOR CLEARANCES TO OVERHEAD FACILITIES SEE FIGURE 4.5 PAGE 59.

FIGURE 4.4

CLEARANCE REQUIREMENTS FROM POOL TO OVERHEAD LINES

SWIMMING POOLS, DIVING BOARDS OR TOWERS SHOULD NOT BE BUILT UNDER OVERHEAD SUPPLY CONDUCTORS OR CABLES OR WITHIN 10 FEET HORIZONTALLY.



	Insulated communication conductors; messengers; surge protection wires; grounded guys; ungrounded guys exposed to 0 to 300 V; effectively grounded neutral conductors of circuits of 0-22kV to ground	Unguarded rigid live parts, 0 to 750 V; noninsulated communication conductors; duplex, triplex, quadruplex or insulated secondary cable, 0-750 V; ungrounded guys exposed to open supply conductors of over 300 V to 750 V	Insulated supply conductors over 750 V; open supply conductors, 0 to 750 V	Unguarded rigid live parts over 750 V to 22 kV; ungrounded guys exposed to over 750 V to 22kV	Open supply conductors, over 750 V TO 22 kV
A. Clearance in any direction from the water level, edge of pool, base of diving platform, or anchored raft	22.0 ft	22.5 ft	23.0 ft	24.5 ft	25.0 ft
B. Clearance in any direction to the diving platform, tower, water, slide, or any fixed pool-related structures	14.0 ft	14.5 ft	15.0 ft	16.5 ft	17.0 ft
V. Vertical clearance over adjacent land	Contact SWEPCO				

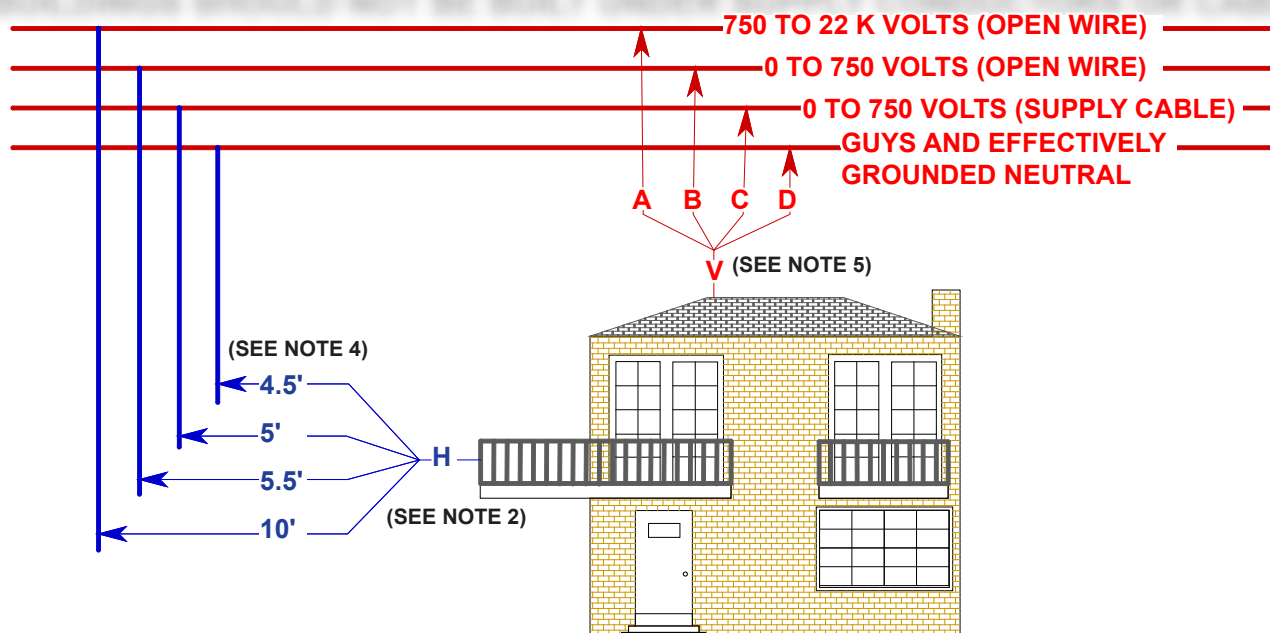
These value meet or exceed the current edition of the National Electric Safety Code. Voltages are phase to ground for effectively grounded circuits.

NOTES:

THESE CLEARANCES DO NOT APPLY TO A SWIMMING POOL THAT IS FULLY ENCLOSED BY A SOLID OR SCREENED PERMANENT STRUCTURE.

FIGURE 4.5

BUILDINGS SHOULD NOT BE BUILT UNDER SUPPLY CONDUCTORS OR CABLES



THESE VALUES ARE CLEARANCES OF WIRES, CONDUCTORS, AND CABLES PASSING BY, BUT NOT ATTACHED TO BUILDINGS WHICH MEET THE CURRENT EDITION OF THE NATIONAL ELECTRIC SAFETY CODE, RULE 234C.

VOLTAGES ARE PHASE TO GROUND FOR EFFECTIVELY GROUNDED CIRCUITS.

BASIC CONDITION FOR CLEARANCE OF WIRES, CONDUCTORS, AND CABLES FROM BUILDINGS, BRIDGES, RAIL CARS, SWIMMING POOLS, AND OTHER INSTALLATIONS ALSO APPLY.

NOTES:

1. SEE CLEARANCE DIAGRAM AT RIGHT.

2. MINIMUM HORIZONTAL CLEARANCE TO: 1) WALLS, PROJECTIONS, AND GUARDED WINDOWS; 2) UNGUARDED WINDOWS; AND 3) BALCONIES AND AREAS ACCESSIBLE TO PEDESTRIANS, NO WIND.

3. A ROOF OR BALCONY IS CONSIDERED READILY ACCESSIBLE TO PEDESTRIANS IF IT CAN BE CASUALLY ACCESSED THROUGH A DOORWAY, RAMP, WINDOW, STAIRWAY, OR PERMANENTLY MOUNTED LADDER BY A PERSON ON FOOT WHO NEITHER EXERTS EXTRAORDINARY PHYSICAL EFFORT NOR EMPLOYEES SPECIAL TOOLS OR DEVICES TO GAIN ENTRY. A PERMANENTLY MOUNTED LADDER IS NOT CONSIDERED A MEANS OF ACCESS IF ITS BOTTOM RUNG IS 8 FEET OR MORE FROM THE GROUND OR OTHER PERMANENTLY INSTALLED ACCESSIBLE SURFACE.

4. FOR THE GROUNDED PORTION OF GUYS, THE HORIZONTAL CLEARANCE MAY BE REDUCED TO 3 INCHES FROM: 1) WALLS, PROJECTIONS, AND GUARDED WINDOWS; AND 2) UNGUARDED WINDOWS WHEN THEY ARE NOT DESIGNED TO OPEN.

5. MINIMUM VERTICAL CLEARANCE

(A)	A (FT.)	B (FT.)	C (FT.)	D (FT.)
OVER OR UNDER ROOFS OR PROJECTIONS NOT ACCESSIBLE TO PEDESTRIANS	12.5	10.5	3.5	3.0
OVER OR UNDER BALCONIES AND ROOFS ACCESSIBLE TO PEDESTRIANS	13.5	11.5	11.0	10.5
OVER ROOFS ACCESSIBLE TO TRUCK TRAFFIC	18.5	16.5	16.0	15.5
OVER ROOFS ACCESSIBLE TO VEHICLES, BUT NOT SUBJECT TO TRUCK TRAFFIC	13.5	11.5	11.0	10.5

(B) TRUCKS ARE DEFINED AS ANY VEHICLE EXCEEDING 8 FEET IN HEIGHT.

6. WHERE BUILDINGS OR OTHER INSTALLATIONS EXCEED THREE STORIES (OR 50 FEET) IN HEIGHT, OVERHEAD LINES SHOULD BE ARRANGED WHERE PRACTICAL SO THAT A CLEAR SPACE OR ZONE AT LEAST 6 FEET WIDE WILL BE LEFT EITHER ADJACENT TO THE BUILDING, OR BEGINNING NOT OVER 8 FEET FROM THE BUILDING, TO FACILITATE THE RAISING OF LADDERS WHERE NECESSARY FOR FIRE FIGHTING.

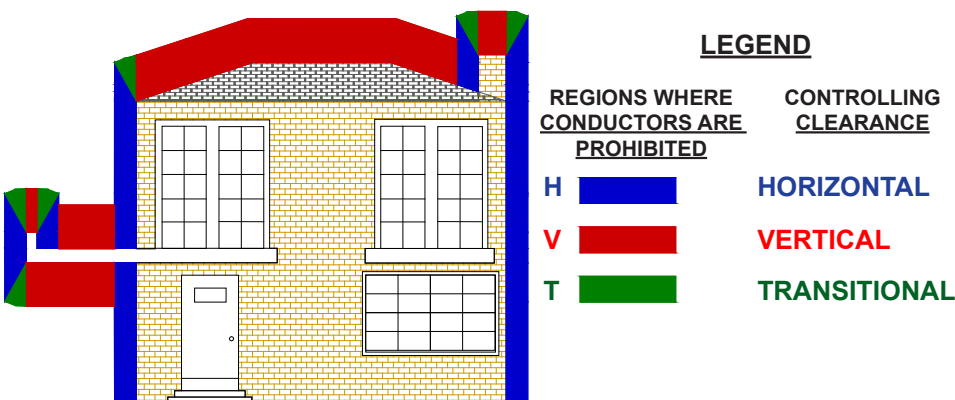
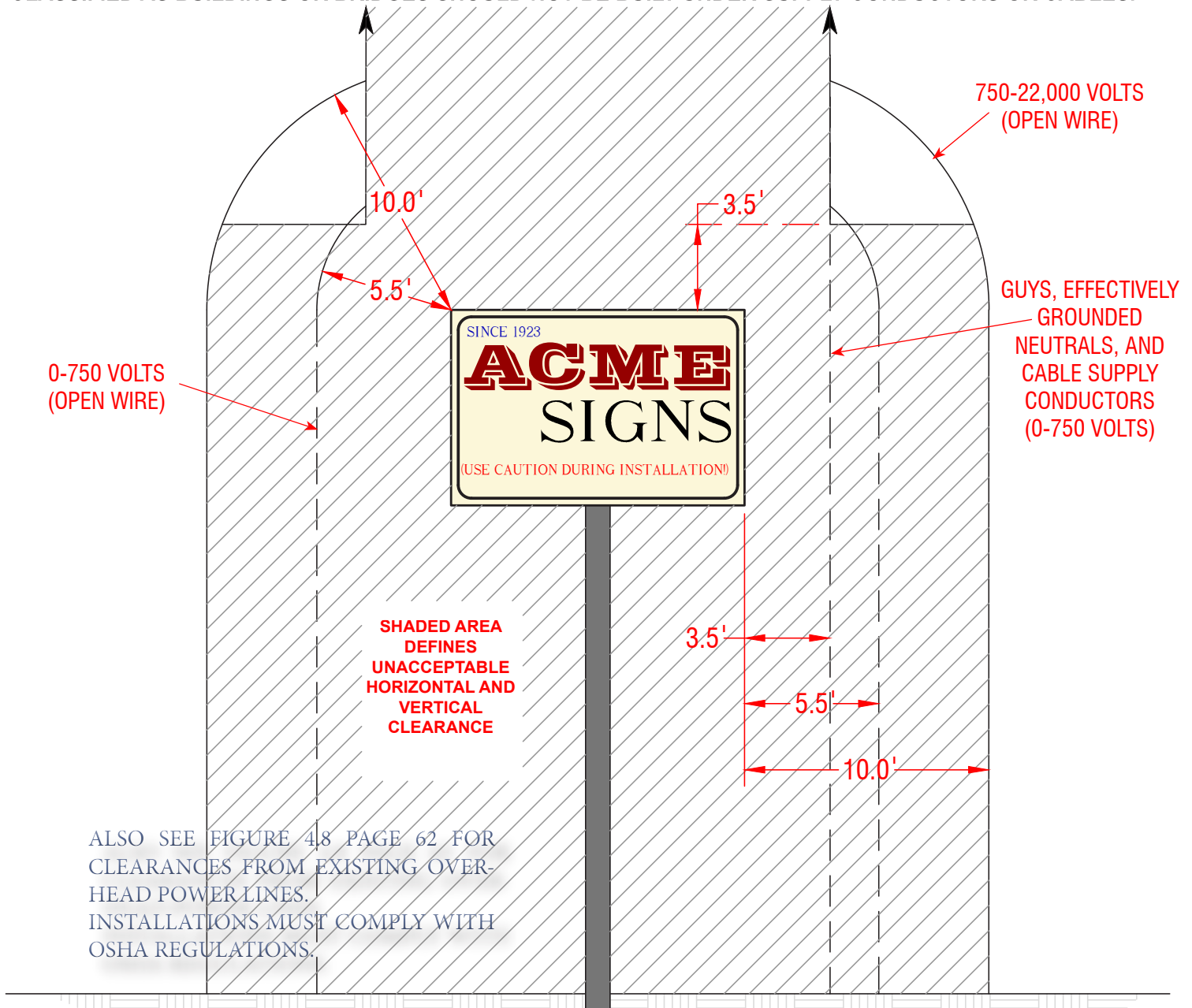


FIGURE 4.6

CLEARANCE REQUIREMENTS OF SIGNS TO OVERHEAD LINES

SIGNS, CHIMNEYS, BILLBOARDS, RADIO AND TELEVISION ANTENNAS, TANKS, AND OTHER INSTALLATIONS NOT CLASSIFIED AS BUILDINGS OR BRIDGES SHOULD NOT BE BUILT UNDER SUPPLY CONDUCTORS OR CABLES.



THESE VALUES ARE CLEARANCES OF WIRES, CONDUCTORS, AND CABLES PASSING BY BUT NOT ATTACHED TO SIGNS, CHIMNEYS, BILLBOARDS, RADIO AND TELEVISION ANTENNAS, TANKS, AND OTHER INSTALLATIONS NOT CLASSIFIED AS BUILDINGS OR BRIDGES WHICH MEET OR EXCEED THE LATEST EDITION OF THE NATIONAL ELECTRIC SAFETY CODE RULE 234-C OR OTHER APPLICABLE REGULATORY BODIES.

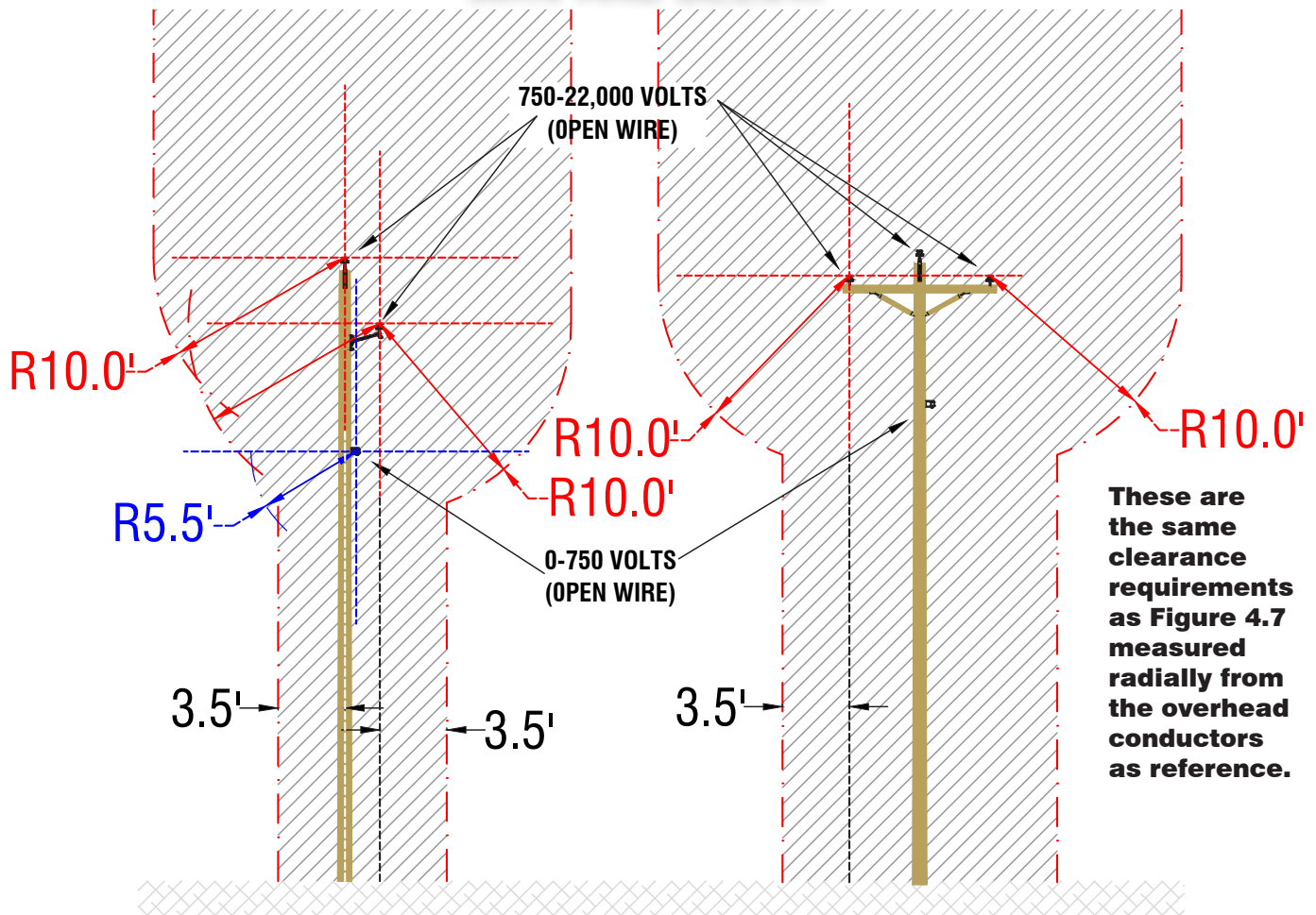
VOLTAGES ARE PHASE TO GROUND FOR EFFECTIVELY GROUNDED CIRCUITS.

NOTES:

1. THE REQUIRED CLEARANCES SHALL BE THE CLOSEST APPROACH OF MOTORIZED SIGNS OR MOVING PORTIONS OF INSTALLATIONS COVERED BY THIS STANDARD.
2. HORIZONTAL CLEARANCES OF LESS THAN 10 FEET REQUIRE THE APPROPRIATE VERTICAL CLEARANCE REQUIREMENT BE APPLIED IN CONJUNCTION WITH THE HORIZONTAL CLEARANCE REQUIREMENT. THE MINIMUM HORIZONTAL CLEARANCE REQUIREMENT ALLOWED SHALL BE 3.5 FEET.

FIGURE 4.7

CLEARANCE REQUIREMENTS FROM OVERHEAD LINES 50KV AND BELOW



SIGNS, CHIMNEYS, BILLBOARDS, RADIO AND TELEVISION ANTENNAS, TANKS, AND OTHER INSTALLATIONS NOT CLASSIFIED AS BULDINGS OR BRIDGES SHOULD NOT BE BUILT UNDER SUPPLY CONDUCTORS OR CABLES.

THESE VALUES ARE CLEARANCES TO SIGNS, CHIMNEYS, BILLBOARDS, RADIO AND TELEVISION ANTENNAS, TANKS, LIGHT POLES AND OTHER INSTALLATIONS NOT CLASSIFIED AS BUILDINGS OR BRIDGES WHICH MEET OR EXCEED THE NATIONAL ELECTRIC SAFETY CODE, RULE 234-C OR OTHER APPLICABLE REGULATORY BODIES.

VOLTAGES ARE PHASE TO GROUND FOR EFFECTIVELY GROUNDED CIRCUITS.

NOTES:

1) THE REQUIRED CLEARANCES SHALL BE THE CLOSEST APPROACH OF MOTORIZED SIGNS OR MOVING PORTIONS OF INSTALLATIONS COVERED BY THIS STANDARD.

2) HORIZONTAL CLEARANCES OF LESS THAN 10' REQUIRE THE APPROPRIATE VERTICAL CLEARANCE REQUIREMENT BE APPLIED IN CONJUNCTION WITH THE HORIZONTAL CLEARANCE REQUIREMENT. THE MINIMUM HORIZONTAL CLEARANCE REQUIREMENT ALLOWED SHALL BE 3.5 FT.

IT'S THE LAW!

AS OF NOVEMBER 8, 2010 NEW OSHA REGULATIONS: MINIMUM CLEARANCE BETWEEN POWER LINES AND ANY PART OF THE LIFT EQUIPMENT, LOAD LINE, OR LOAD SHALL BE NO CLOSER THAN 20 FEET. EXCEPTIONS MUST COMPLY WITH OSHA REGULATIONS.



DRAWING SPECIFICATIONS

INTRODUCTION

This section contains specifications for the installation of those commonly required facilities installed and owned by the customer at the point of connection by SWEPCO.

METERING SPECIFICATIONS

FIGURE 5.1, page 65

Overhead Service to Meter Pole

Used as a general design for both temporary and permanent service from overhead distribution facilities.

Page 66
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FIGURE 5.3, page 67

Underground Service to Meter Pole

Used as a general design for permanent service from underground distribution facilities.

FIGURE 5.4, page 68

Alternate Underground Service to Meter Pole

Used as a design for permanent service from underground distribution facilities where a more permanent installation is needed.

FIGURE 5.5, page 69

Underground Service to Residence

Used as a general design for permanent service from underground distribution facilities.

FIGURE 5.6, page 70

480 volt Disconnect

Required for all self contained 480 volt metering installations.

FIGURE 5.7, page 71

Commercial Overhead Service for Self Contained Metering.

Used as a general design for permanent service from overhead distribution facilities.

FIGURE 5.8, page 72

Commercial Underground Service for Self

Contained Metering.

Used as a general design for permanent service from underground distribution facilities.

FIGURE 5.9, page 73

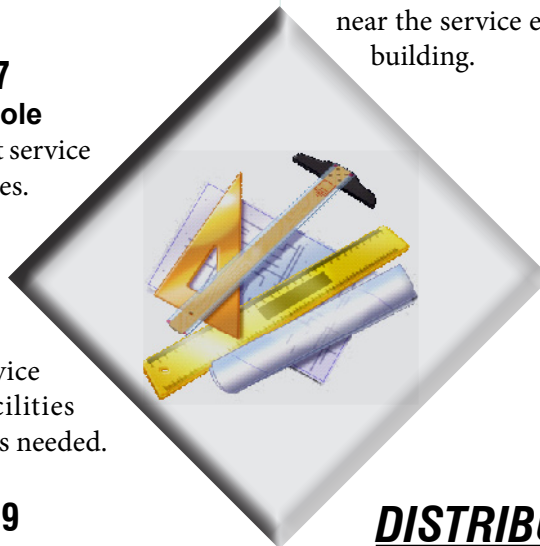
Current Transformer Metering Enclosure - 480 Volt 3 Wire Corner Ground.

Used as a general design for CT metering of permanent service when load is less than 200 Amps @ 480 volts. To be used only with prior consent of SWEPCO.

FIGURE 5.10, page 74

Alternative Commercial Underground Service for Self Contained Metering

Used as a design for permanent service from underground distribution facilities when the meter must be located near the service equipment rather than mounted on the building.



DISTRIBUTION SPECIFICATIONS

FIGURE 5.11, page 75

Customer Installed Conduit for Underground

Requirements for the installation of underground conduits to be used for the installation of cables by SWEPCO.

FIGURE 5.12, page 76

Concrete Pad for Single Phase PMT

Customer installed concrete pad specification for single phase pad mounted transformers.

FIGURE 5.13, page 77**Concrete Pad for Three Phase PMT -DS-2020**

Customer installed concrete pad specification for three phase pad mounted transformers. To be used for three phase pad mounted transformers 112.5 KVA through 1000 KVA - 208V WYE service and for three phase pad mounted transformers 112.5 KVA through 750 KVA - 480V WYE service on distribution systems below 25 KV.

FIGURE 5.14, page 78**Concrete Pad for Three Phase PMT - DS-2021**

Customer installed concrete pad specification for three phase pad mounted transformers. To be used for three phase pad mounted transformers 1000 KVA through 2500 KVA - 480V WYE service on distribution systems below 25 KV.

FIGURE 5.15, page 79**Concrete Pad for Three Phase PMT - DS-2025**

Customer installed concrete pad specification for three phase pad mounted transformers. To be used for three phase pad mounted transformers for ALL SECONDARY VOLTAGES on 35 KV distribution systems.

FIGURE 5.16, page 80**Pier detail for PMT pads**

Customer installed concrete pier as required and specified by SWEPCO engineering department.

FIGURE 5.17, page 81**Concrete Pad for Underground Enclosure**

Customer installed concrete pad as required and specified by SWEPCO engineering department.

FIGURE 5.18 page 82**Pre-cast pull-box, small**

Customer installed concrete pull-box as required and specified by SWEPCO engineering department. Other manufacturers pull boxes may be used but they must meet these minimum size and construction requirements. This pull-box is typically used for single phase primary underground installations.

FIGURE 5.19 page 83**Pre-cast pull-box, large**

Customer installed concrete pull-box as required and specified by SWEPCO engineering department. Other manufacturers pull boxes may be used but they must meet these minimum size and construction requirements. This pull-box is typically used for three phase primary underground installations.

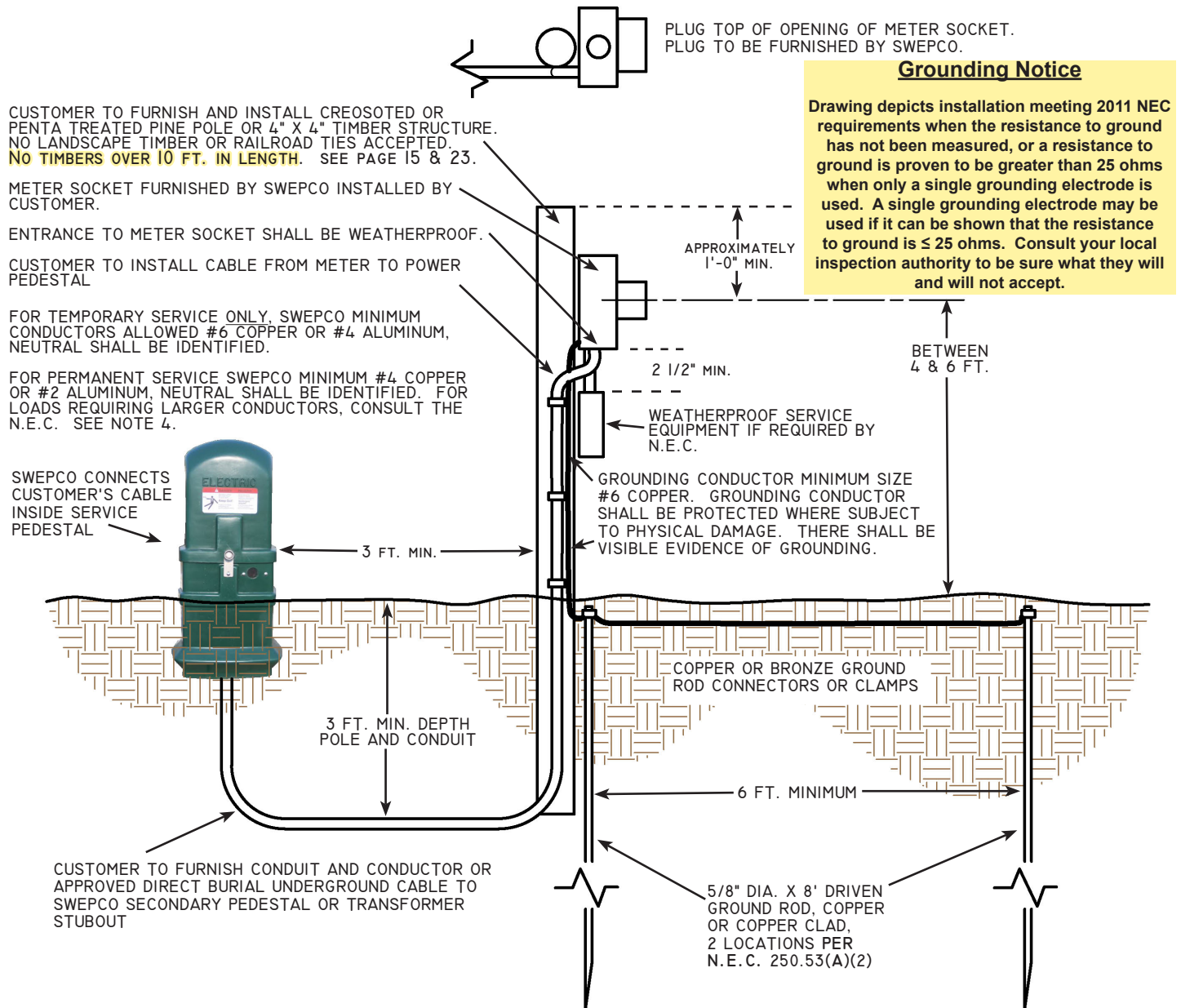
POLE TOP DETAIL



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UNDERGROUND SERVICE - WOOD METER STRUCTURE

POLE TOP DETAIL

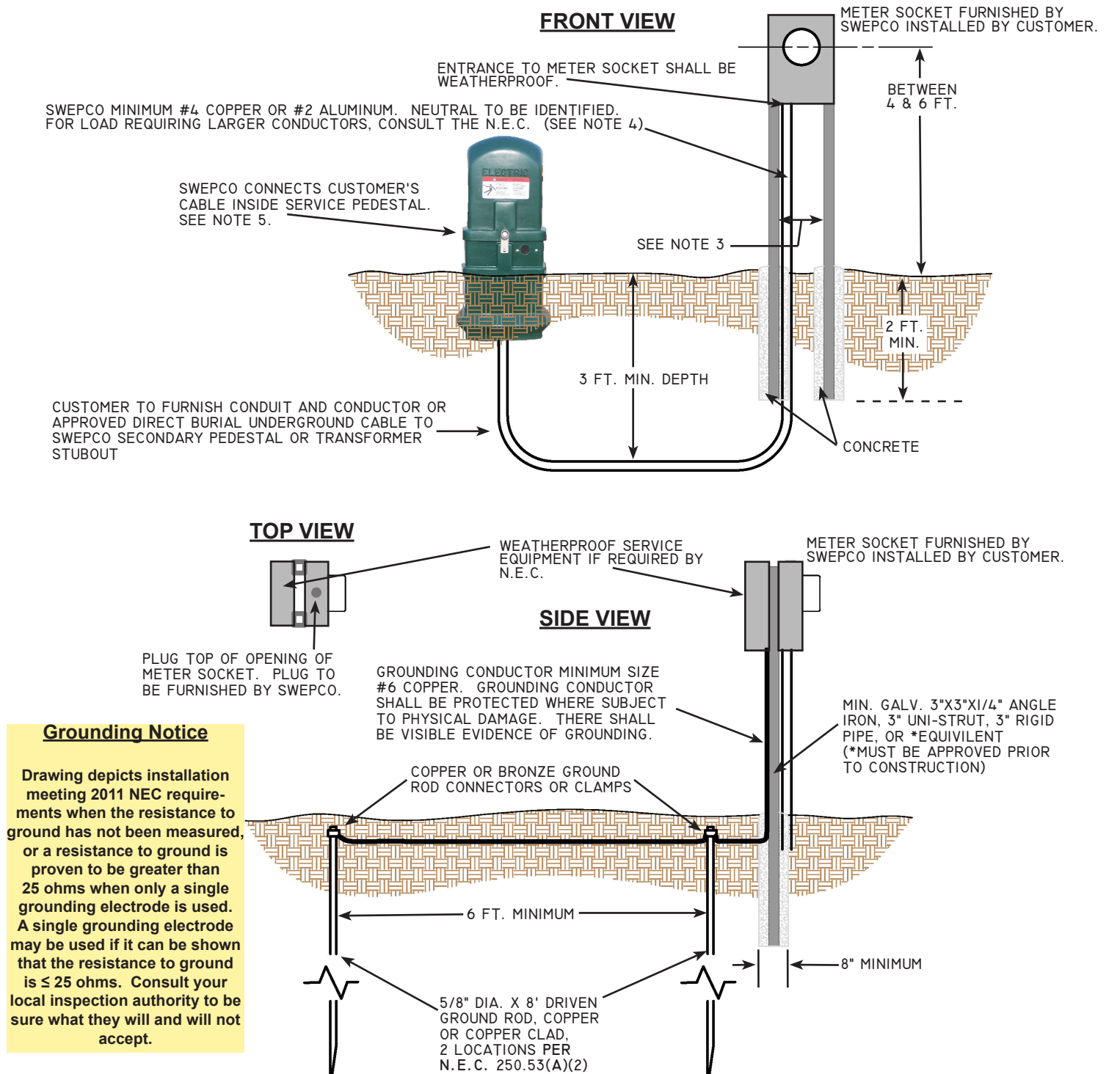


NOTES:

1. CONSULT SWEPCO PRIOR TO INSTALLATION
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. ALTERNATE SERVICE SUPPORT SUCH AS SHOWN IN FIGURE 5.4 MAY BE REQUIRED.
4. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE 5 FEET OF SERVICE WIRE EXPOSED AT THE POWER PEDESTAL FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE LATEST EDITION OF THE N.E.C. FOR APPROPRIATE WIRE SIZES.
5. CONTACT SWEPCO TO COORDINATE ACCESS TO POWER PEDESTAL.

FIGURE 5.3

UNDERGROUND SERVICE - STEEL METER STRUCTURE

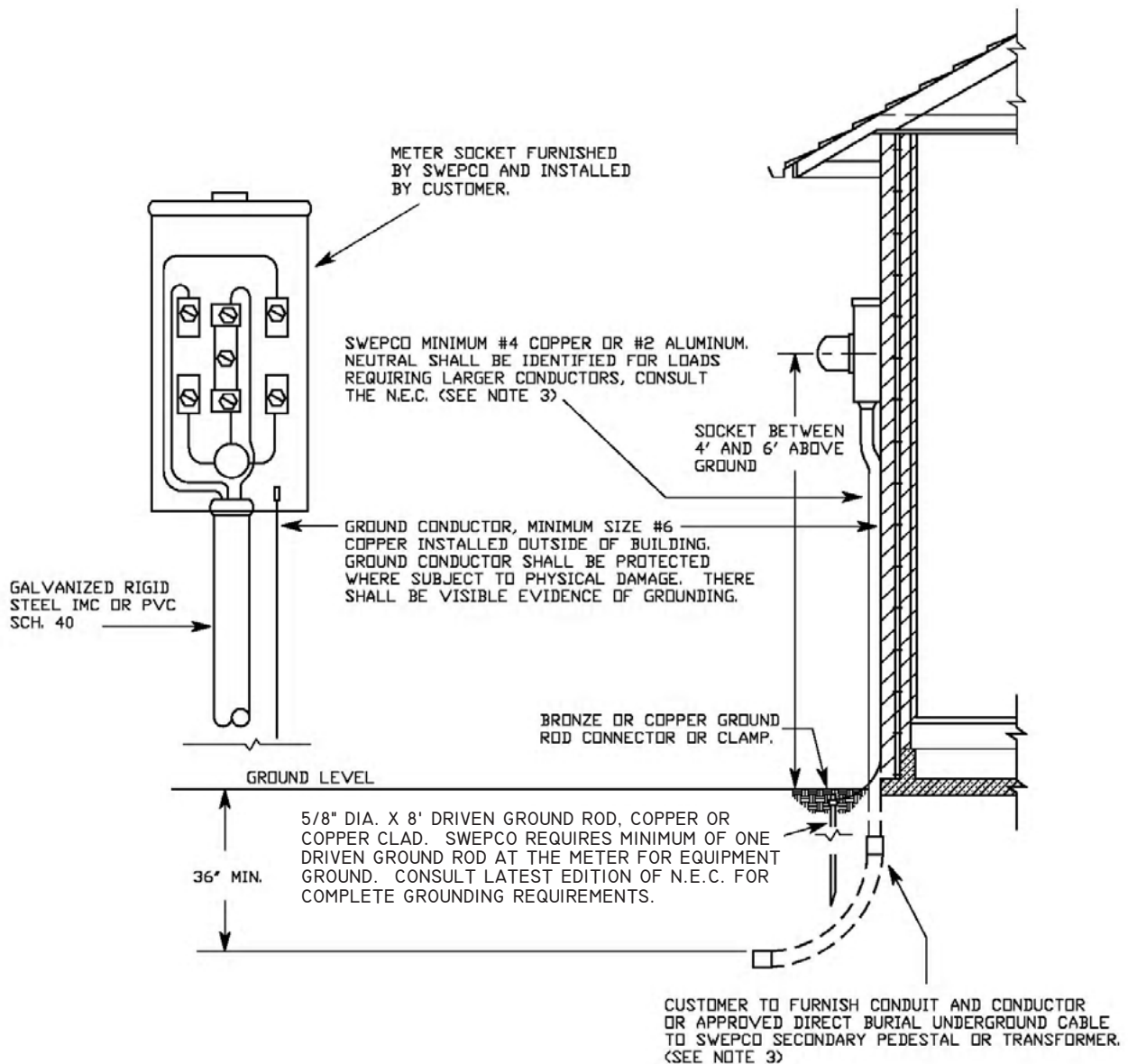


NOTES:

1. CONSULT SWEPCO PRIOR TO INSTALLATION
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. DISTANCE WILL VARY DEPENDING ON THE METER SOCKET FURNISHED BY SWEPCO.
4. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE 5 FEET OF SERVICE WIRE EXPOSED AT THE POWER PEDESTAL FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE LATEST EDITION OF THE N.E.C. FOR APPROPRIATE WIRE SIZES.
5. CONTACT SWEPCO TO COORDINATE ACCESS TO POWER PEDESTAL.

FIGURE 5.4

UNDERGROUND SERVICE



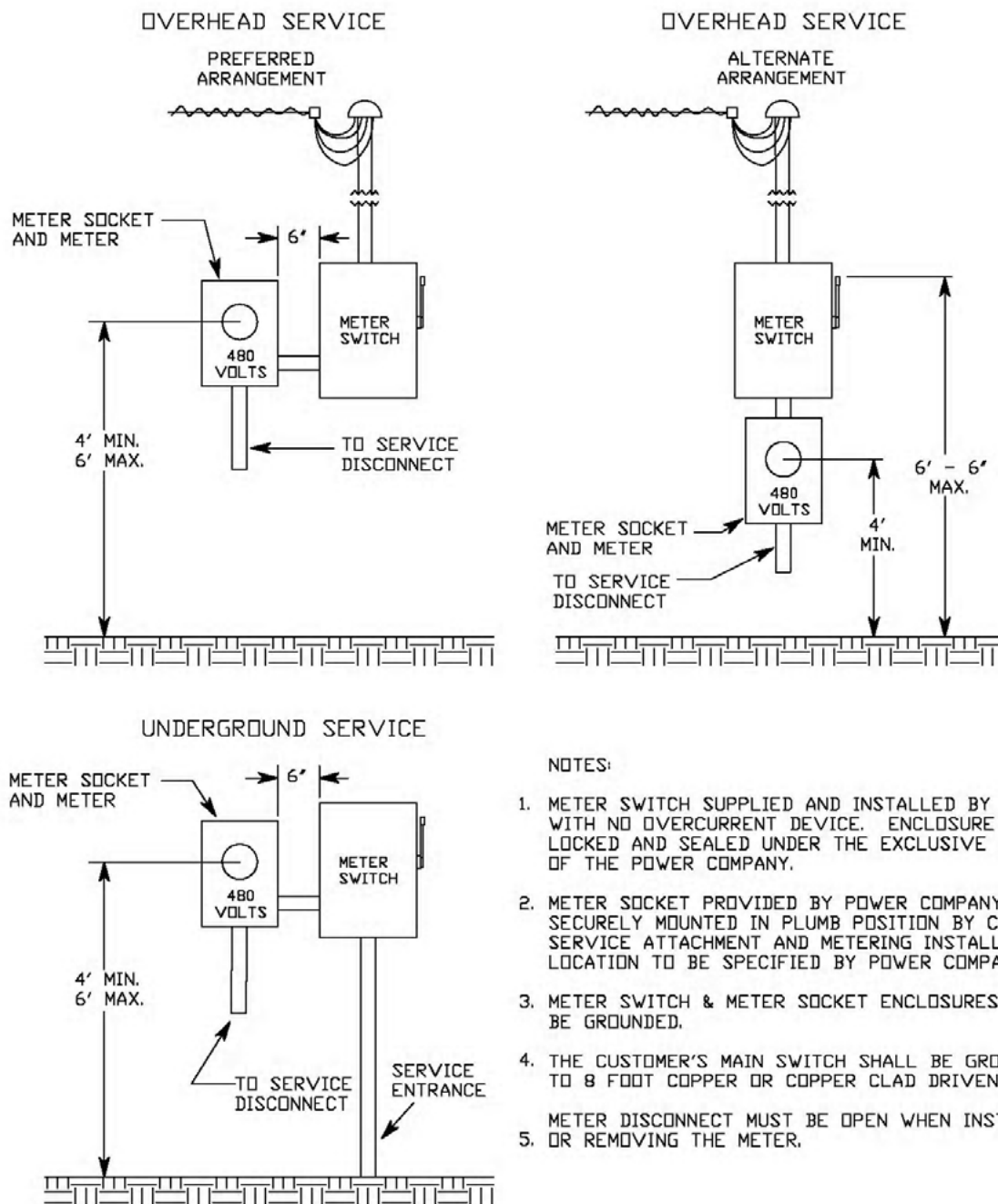
NOTES:

1. CONSULT SWEPCO PRIOR TO INSTALLATION.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE 5 FT. OF SERVICE WIRE EXPOSED AT THE POWER PEDESTAL FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.

FIGURE 5.5

DATE
JUNE 19, 2008

REQUIREMENTS FOR SOURCE DISCONNECT ON ALL 480 VOLT SELF CONTAINED METERING



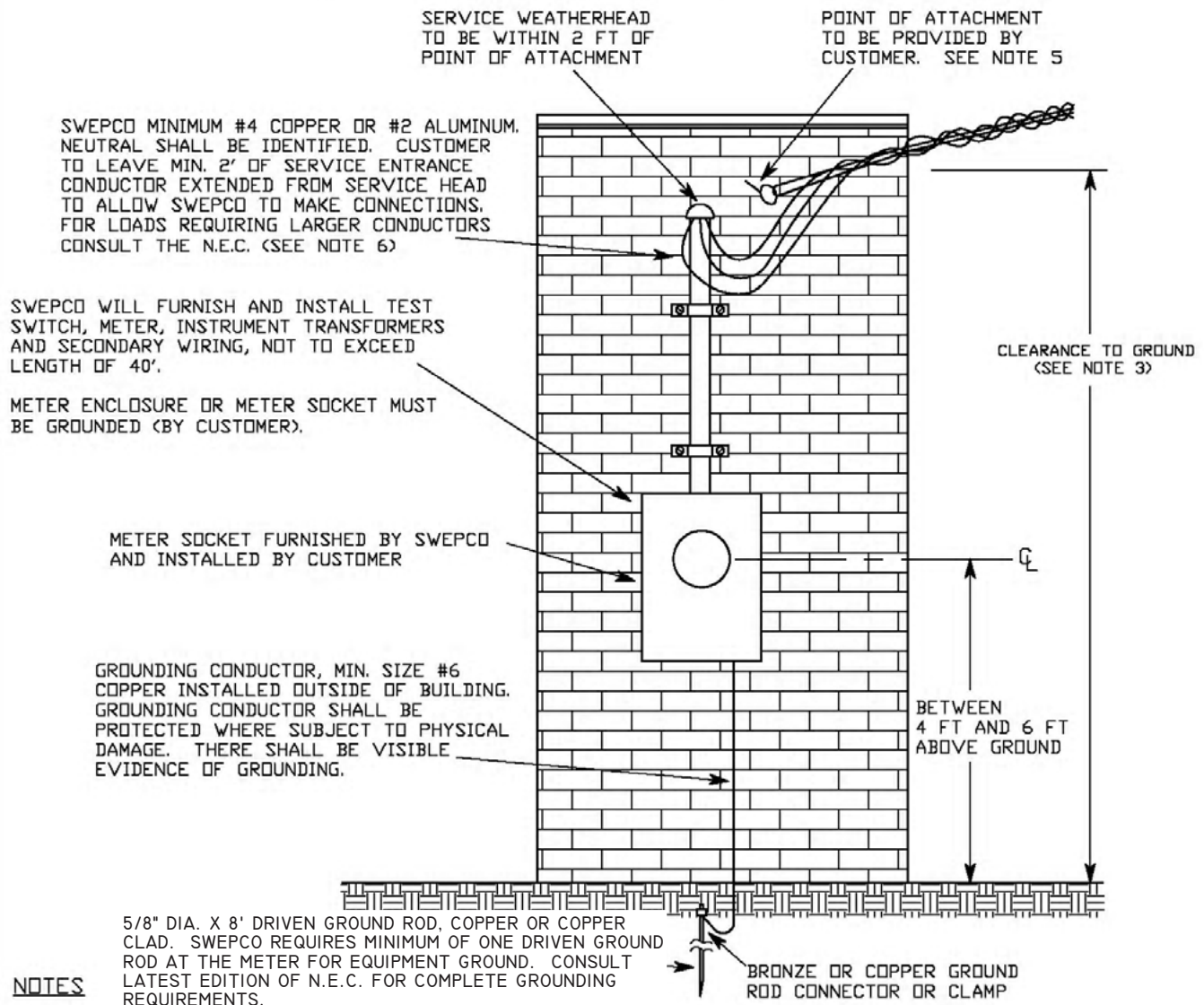
NOTES:

1. METER SWITCH SUPPLIED AND INSTALLED BY CUSTOMER WITH NO OVERCURRENT DEVICE. ENCLOSURE TO BE LOCKED AND SEALED UNDER THE EXCLUSIVE CONTROL OF THE POWER COMPANY.
2. METER SOCKET PROVIDED BY POWER COMPANY AND SECURELY MOUNTED IN PLUMB POSITION BY CUSTOMER. SERVICE ATTACHMENT AND METERING INSTALLATION LOCATION TO BE SPECIFIED BY POWER COMPANY.
3. METER SWITCH & METER SOCKET ENCLOSURES SHALL BE GROUNDED.
4. THE CUSTOMER'S MAIN SWITCH SHALL BE GROUNDED TO 8 FOOT COPPER OR COPPER CLAD DRIVEN GROUND ROD.
5. METER DISCONNECT MUST BE OPEN WHEN INSTALLING OR REMOVING THE METER.

FIGURE 5.6

DATE
JUNE 21, 2007

COMMERCIAL OVERHEAD SERVICE FOR SELF CONTAINED METERING



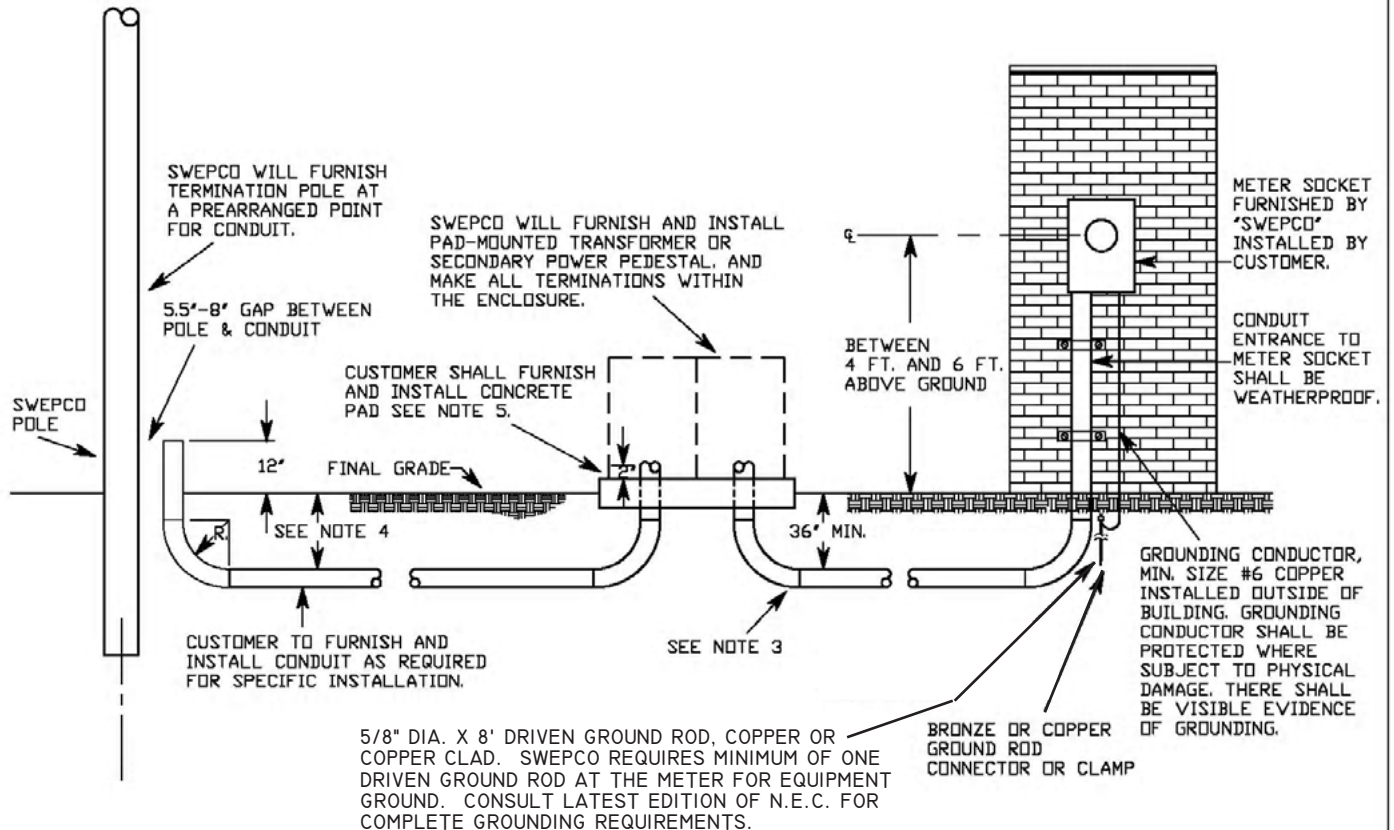
NOTES

1. CONSULT SWEPCO PRIOR TO INSTALLATION.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. SEE FIGURE 4.2 PAGE 55 FOR SERVICE DROP CLEARANCE REQUIREMENTS
4. METER ENCLOSURES AND METERING CONDUIT SHALL BE FIRMLY SECURED TO BUILDING.
5. PROVISIONS FOR ANCHORING SERVICE ATTACHMENT TO METAL AND MASONRY BUILDINGS TO BE PROVIDED BY CUSTOMER. POINT OF ATTACHMENT SHALL BE OF SUFFICIENT STRENGTH.
6. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE A MINIMUM OF 2 FT. OF SERVICE ENTRANCE CONDUCTOR EXTENDED FROM SERVICE HEAD FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.

FIGURE 5.7

DATE
JUNE 19, 2008

COMMERCIAL UNDERGROUND SERVICE FOR SELF CONTAINED METERING



NOTE

1. CONSULT SWEPCO PRIOR TO INSTALLATION.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWEPCO'S POINT OF CONNECTION. LEAVE 5 FT. OF SERVICE WIRE EXPOSED AT THE POWER PEDESTAL FOR SWEPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES.
4. 36" MINIMUM DEPTH FOR SECONDARY CABLES, 48" MINIMUM DEPTH FOR PRIMARY CABLES.
5. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD APPROPRIATE FOR SWEPCO EQUIPMENT. VERIFY WITH SWEPCO.

FIGURE 5.8

DATE
JUNE 19, 2008

CURRENT TRANSFORMER ENCLOSURE 480 VOLT, 3 WIRE CORNER GROUND

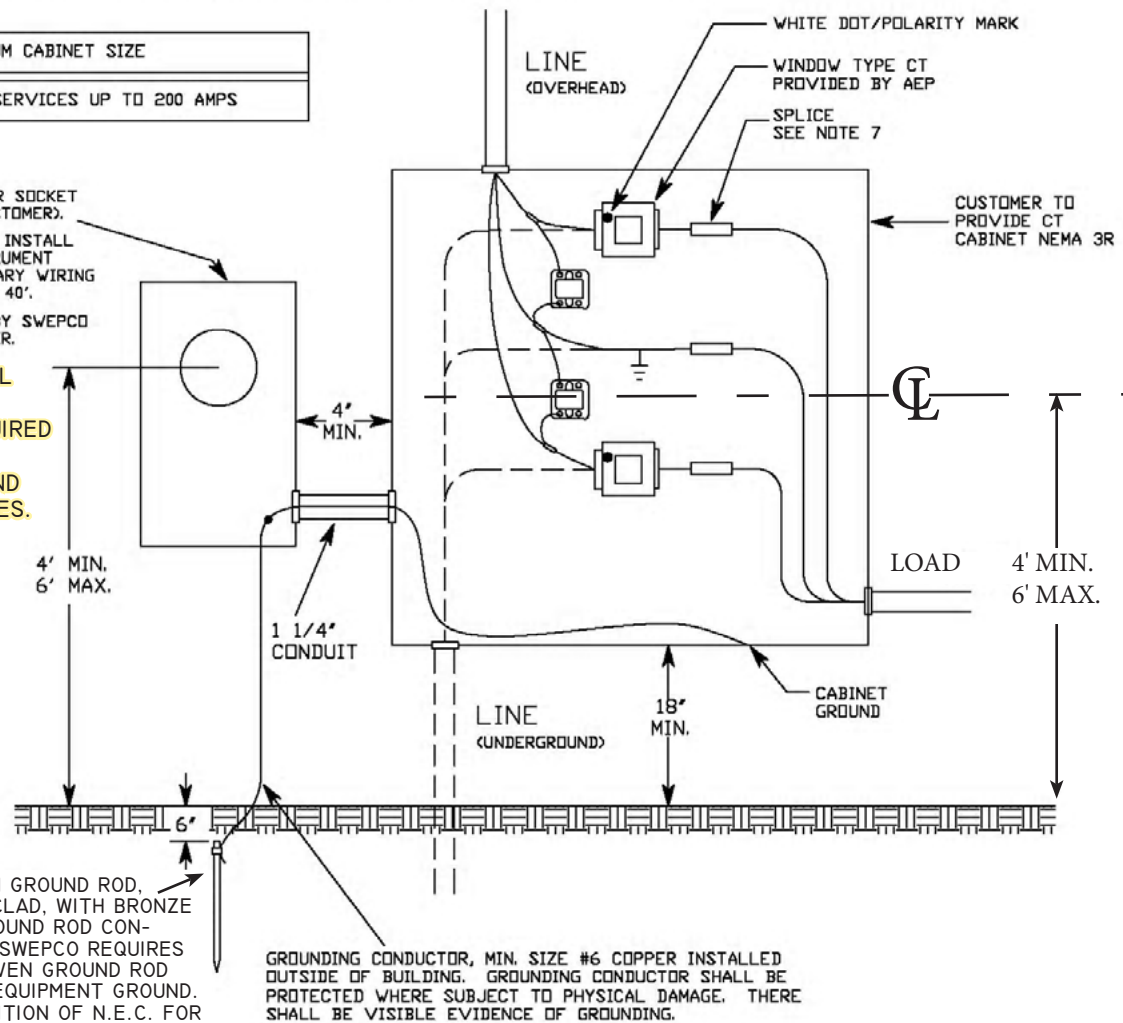
MINIMUM CABINET SIZE	
30" X 30" X 12"	SERVICES UP TO 200 AMPS

METER ENCLOSURE OR METER SOCKET MUST BE GROUNDED (BY CUSTOMER).

SWEPKO WILL FURNISH AND INSTALL TEST SWITCH, METER, INSTRUMENT TRANSFORMERS AND SECONDARY WIRING NOT TO EXCEED LENGTH OF 40'.

METER SOCKET FURNISHED BY SWEPKO AND INSTALLED BY CUSTOMER.

COLOR CODING OF ALL SERVICE ENTRANCE CONDUCTORS IS REQUIRED AT TERMINATIONS, METERING POINTS, AND CT METER ENCLOSURES. (NEW FOR 2014)



5/8" DIA. X 8' DRIVEN GROUND ROD, COPPER OR COPPER CLAD, WITH BRONZE OR COPPER CLAD GROUND ROD CONNECTOR OR CLAMP. SWEPKO REQUIRES MINIMUM OF ONE DRIVEN GROUND ROD AT THE METER FOR EQUIPMENT GROUND. CONSULT LATEST EDITION OF N.E.C. FOR COMPLETE GROUNDING REQUIREMENTS.

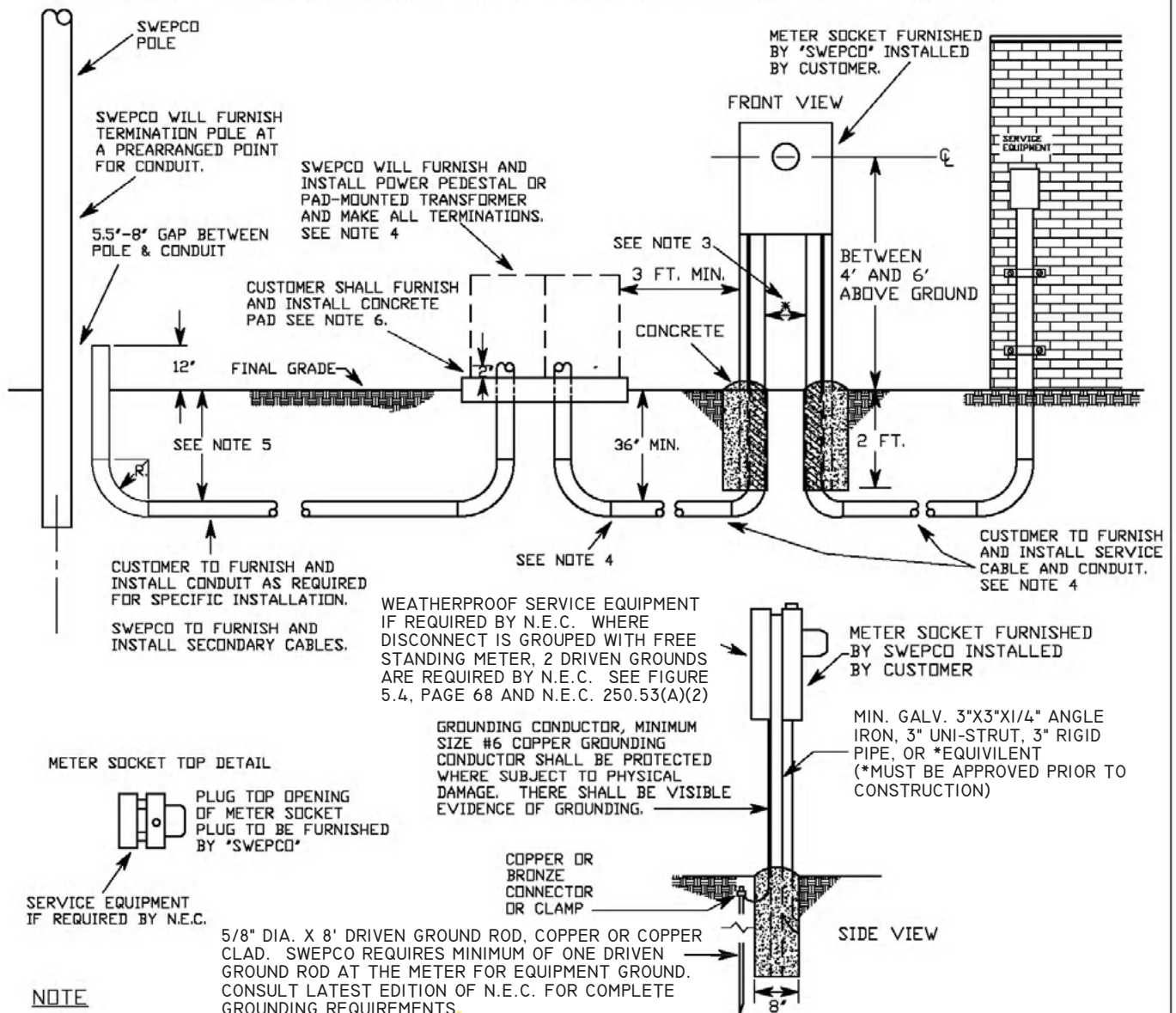
GROUNDING CONDUCTOR, MIN. SIZE #6 COPPER INSTALLED OUTSIDE OF BUILDING. GROUNDING CONDUCTOR SHALL BE PROTECTED WHERE SUBJECT TO PHYSICAL DAMAGE. THERE SHALL BE VISIBLE EVIDENCE OF GROUNDING.

1. FOR SERVICES 200 AMPS AND BELOW ONLY, CONSULT SWEPKO PRIOR TO INSTALLATION.
2. CT CABINET FURNISHED AND INSTALLED BY CUSTOMER SHALL BE OF SUBSTANTIAL STRENGTH WITH CORROSION PROTECTION, SUCH AS PAINTED GALVANIZED STEEL NEMA 3R, ALUMINUM OR FIBER REINFORCED POLYESTER ENCLOSURES MUST BE USED IN CORROSIVE AREAS. IT SHALL HAVE PROVISIONS FOR INSTALLING A SWEPKO PADLOCK AND SEAL. THE INSIDE BACK OF THE CABINET SHALL BE ENTIRELY COVERED BY 3/4" TREATED PLYWOOD FOR MOUNTING THE CURRENT TRANSFORMERS OR SUITABLE MOUNTING BRACKETS MAY BE PROVIDED. A GROUNDING LUG SHALL BE PROVIDED TO GROUND THE CABINET.
3. THE WHITE DOT POLARITY MARK ON THE CT SHALL BE TOWARD THE ENERGY SOURCE OR LINE SIDE.
4. CUSTOMER SHOULD MOUNT THE METER SOCKET OR CABINET NEXT TO THE CT CABINET AND INSTALL 1 1/4" CONDUIT BETWEEN THE TWO. IF THE METER SOCKET CANNOT BE INSTALLED NEXT TO THE CT CABINET, IT MAY BE LOCATED UP TO 40 FEET AWAY WITH SWEPKO APPROVAL. 1 1/4" CONDUIT SHALL CONNECT THE SOCKET AND CT CABINET.
5. THE CT CABINET AND METER SOCKET SHALL BE GROUNDED. BONDING TO THE SYSTEM NEUTRAL IS REQUIRED IF THE SYSTEM NEUTRAL IS GROUNDED. GROUND WIRE SHALL REMAIN CONTINUOUS AND UNBROKEN BETWEEN GROUND ROD AND CT CABINET.
6. SWEPKO WILL INSTALL THE CT CONTROL WIRING BETWEEN THE CT AND THE METER SOCKET.
7. CUSTOMER TO PROVIDE SPLICE.

FIGURE 5.9

JULY 8, 2008

ALTERNATE COMMERCIAL UNDERGROUND SERVICE FOR SELF CONTAINED METERING



NOTE

1. CONSULT SWPCO PRIOR TO INSTALLATION.
2. WHERE CONFLICTS EXIST BETWEEN THIS AND OTHER APPLICABLE CODES, THE MORE STRINGENT SHALL APPLY.
3. DISTANCE WILL VARY DEPENDING ON METER SOCKET FURNISHED BY SWPCO.
4. CUSTOMER TO PROVIDE THE APPROPRIATELY SIZED CONDUCTORS FROM THE METER SOCKET TO SWPCO'S POINT OF CONNECTION. LEAVE 8 FT. OF SERVICE WIRE EXPOSED AT THE EQUIPMENT PAD FOR SWPCO TO MAKE CONNECTIONS. CONSULT THE N.E.C. (LATEST EDITION) FOR THE APPROPRIATE WIRE SIZES. CONTACT SWPCO TO COORDINATE ACCESS TO EQUIPMENT.
5. 36" MINIMUM DEPTH FOR SECONDARY CABLES, 48" MINIMUM DEPTH FOR PRIMARY CABLES.
6. CUSTOMER SHALL FURNISH AND INSTALL CONCRETE PAD APPROPRIATE FOR SWPCO EQUIPMENT. VERIFY WITH SWPCO.

FIGURE 5.10

DATE
JUNE 19, 2008

CUSTOMER INSTALLED CONDUIT FOR UNDERGROUND DISTRIBUTION

TYPES OF CONDUIT ACCEPTABLE TO SWEPCO

1. RIGID STEEL CONDUIT

*2. PVC SCH. 40 CONDUIT UL APPROVED ELECTRICAL GRADE CONDUIT.

*ALL BENDS SHALL BE GALVANIZED RIGID STEEL BENDS AT THE SWEPCO TERMINATION POLE AND TRANSFORMER PAD. **THE CUSTOMER SHOULD CHECK LOCAL CODES BEFORE USING PVC SCH. 40 CONDUIT.**

REQUIRED BEND RADIUS

CONDUIT SIZE	MINIMUM BEND RADIUS (R)
2.5"	36"
3"	36"
4"	36"
5"	48"
6"	48"

REQUIRED CONDUIT SIZE**

CONDUIT SIZE	MAXIMUM CABLE DIAMETER	
	1 CABLE	3 CABLES
2.5"	1.797"	
3"	2.234"	
4"	2.930"	1.470"
5"	3.675"	1.844"
6"	4.416"	2.215"

**CONDUIT SIZE WILL BE SPECIFIED BY SWEPCO ENGINEERING AND WILL VARY WITH LENGTH AND RUN, NUMBER OF BENDS OR ELBOWS AND CABLE DIAMETER.

TYPICAL CROSS SECTION OF DITCHES

SWEPCO WILL REQUIRE THE CUSTOMER TO MAINTAIN A STRAIGHT AND TRUE DITCH LINE ALONG WITH A STRAIGHT AND TRUE CONDUIT RUN. TO INSURE A GOOD CONDUCTOR PULL, THE CONDUIT RUN SHOULD CONTAIN A MINIMUM NUMBER OF BENDS NOT TO EXCEED 360 DEGREES. THE CUSTOMER WILL FURNISH A SUITABLE PULL LINE SUCH AS HIGH STRENGTH CORD OR NON-ABRASIVE ROPE. FIELD INSPECTION AND ACCEPTANCE OF THE CONDUIT RUN BY SWEPCO MUST BE OBTAINED BEFORE THE DITCH IS BACKFILLED. ANY CONDUIT RUN EXCEEDING 500 FEET IN LENGTH MAY REQUIRE THE CUSTOMER TO FURNISH AND INSTALL A PULL-BOX. THIS WILL BE SPECIFIED BY SWEPCO ENGINEERING WHEN REQUIRED.

* IN ARKANSAS, SOME INSTANCES MAY OCCUR WHERE A 48" COVER IS NOT ATTAINABLE DUE TO ROCK. THE NESC ALLOWS FOR LESSER DEPTHS WHERE **SUPPLEMENTAL PROTECTION** IS USED. SEE SWEPCO ENGINEERING FOR APPROVAL. THIS TYPICALLY WILL BE 2" OF RED DYE CONCRETE FOR EACH 12" OF DEPTH NOT ACHIEVED OF THE 48" DITCH WITH 6" RED **'CAUTION'** TAPE PROVIDED BY SWEPCO ENGINEERING TO BE PLACED IN THE DITCH LINE BY CONTRACTOR.

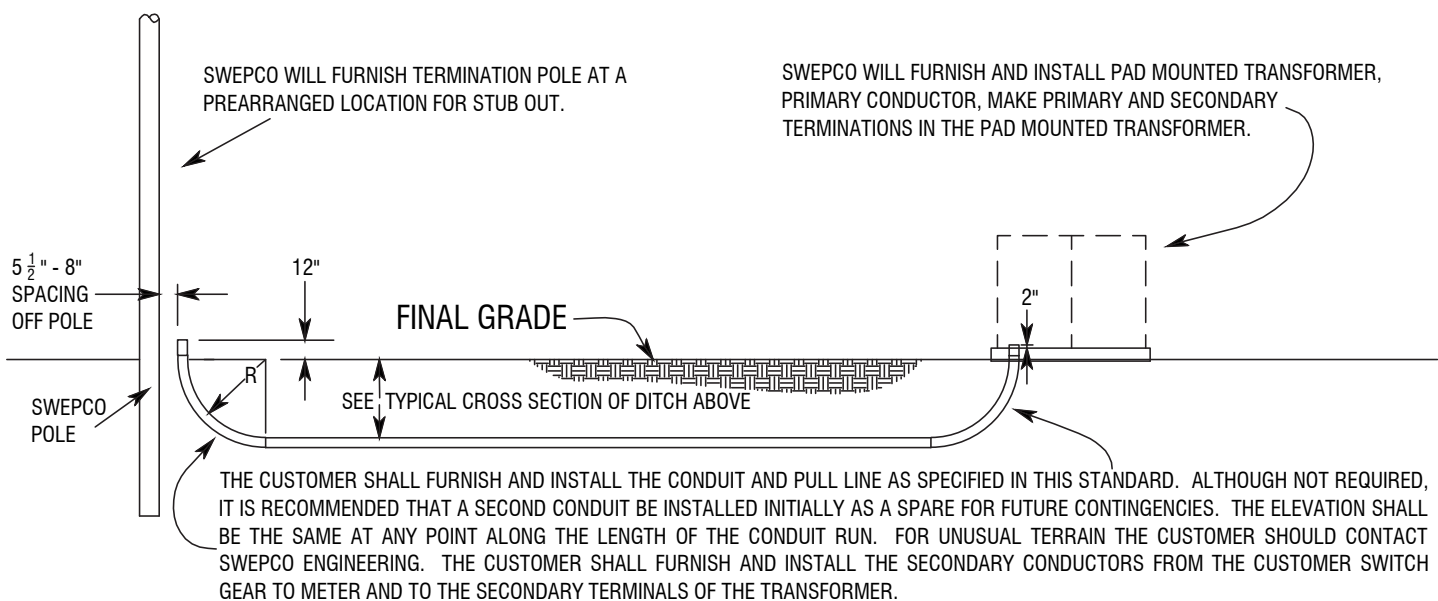
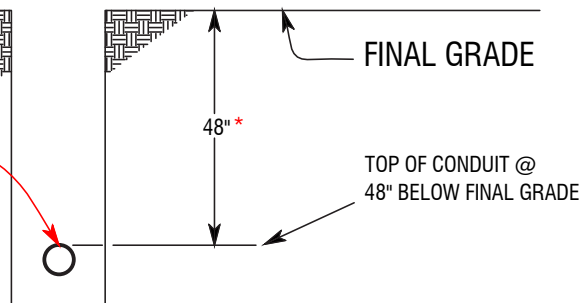
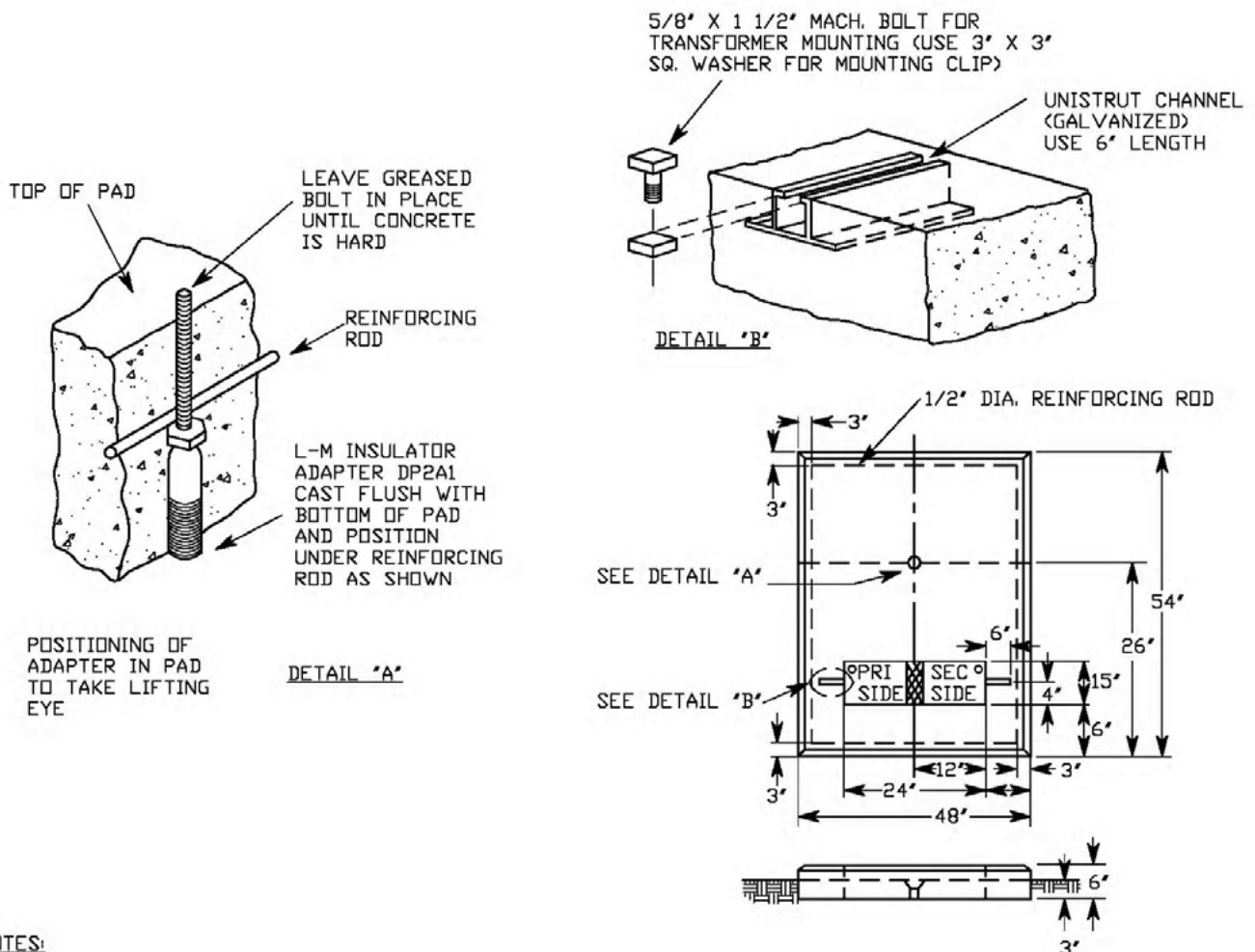


FIGURE 5.11

February 8, 2010



NOTES:

1. ALL CONCRETE TO BE 1:2:4 MIX. ALL HORIZONTAL SURFACES TO HAVE SMOOTH TROWEL FINISH. ALL VERTICAL SURFACES ABOVE GROUND LINE TO HAVE RUBBED FINISH. ALL CHAMFERS TO BE 1'-45°
2. MAX. WT. OF TRANSFORMER - 3,500#
3. VOLUME OF CONCRETE REQUIRED .30 CU. YD.
4. REINFORCING REQUIRED
3 RODS - 1/2" Ø @ 42"
2 RODS - 1/2" Ø @ 46"
5. ALL BACKFILL IN DITCHES UNDER PAD SHALL BE FIRMLY TAMPED BEFORE PAD IS SET OR POURED.
6. THIS PAD WILL ACCOMMODATE UP TO 167 KVA SINGLE PHASE PAD MOUNTED TRANSFORMER.
7. LIFTING EYE CAN BE OMITTED IF THE PAD IS POURED IN PLACE BY THE CUSTOMER.
8. PREFABRICATED POLYMER CONCRETE PAD IS AN ACCEPTABLE ALTERNATIVE TO CONCRETE. CONTACT SWEPCO FOR APPROVED MANUFACTURERS AND CATALOG NUMBERS.

FIGURE 5.12

DATE
APRIL 27, 2007

CONCRETE PAD FOR THREE PHASE TRANSFORMERS

112.5kVA - 500kVA, ALL SECONDARY VOLTAGES 25 KV AND BELOW

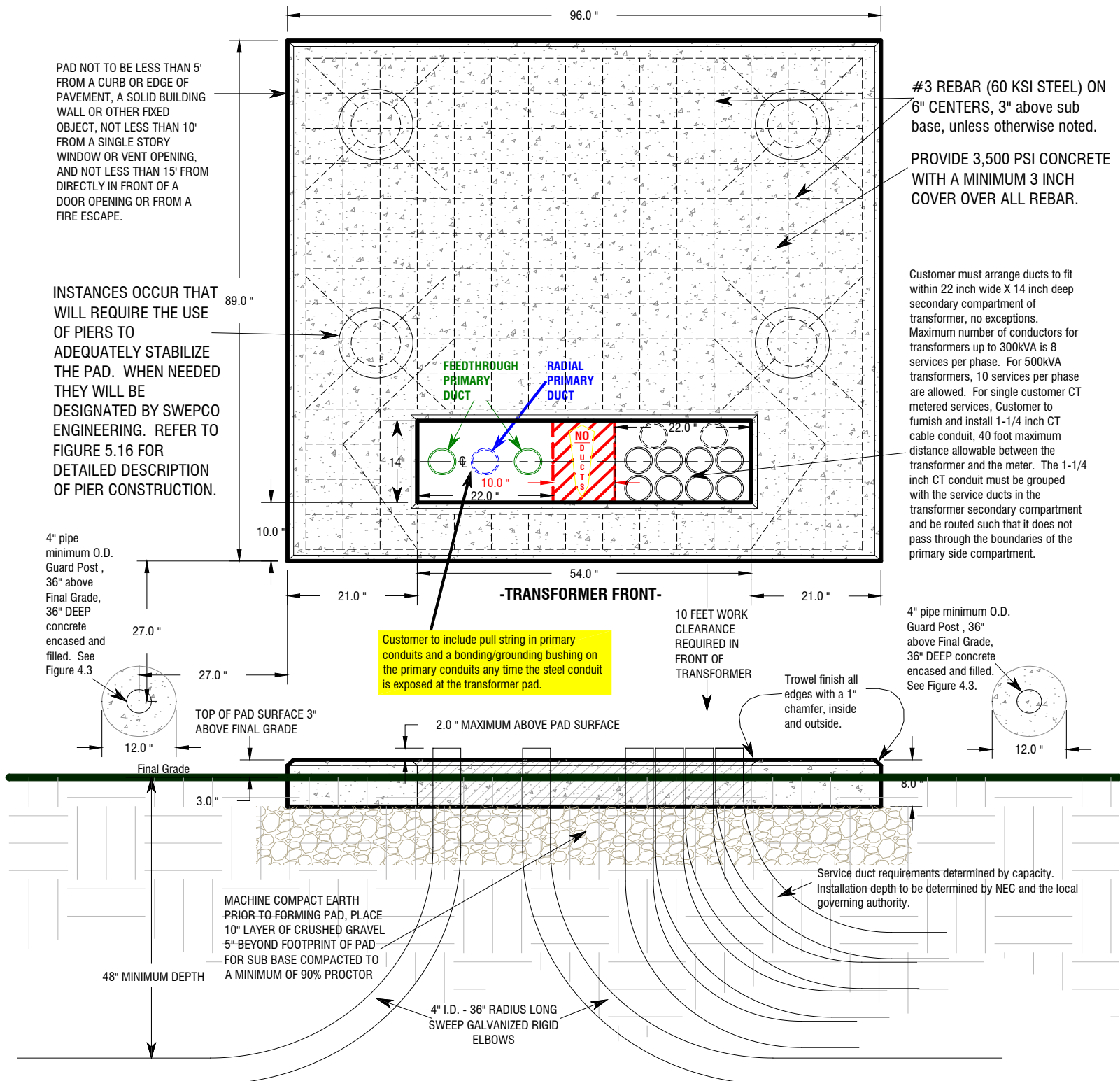


FIGURE 5.13

CONCRETE PAD FOR THREE PHASE TRANSFORMERS

750KVA - 2500 KVA, ALL SECONDARY VOLTAGES 25 KV AND BELOW

Note: A Howard Industries 500kVA will fit on this pad, an ERMCO will not.

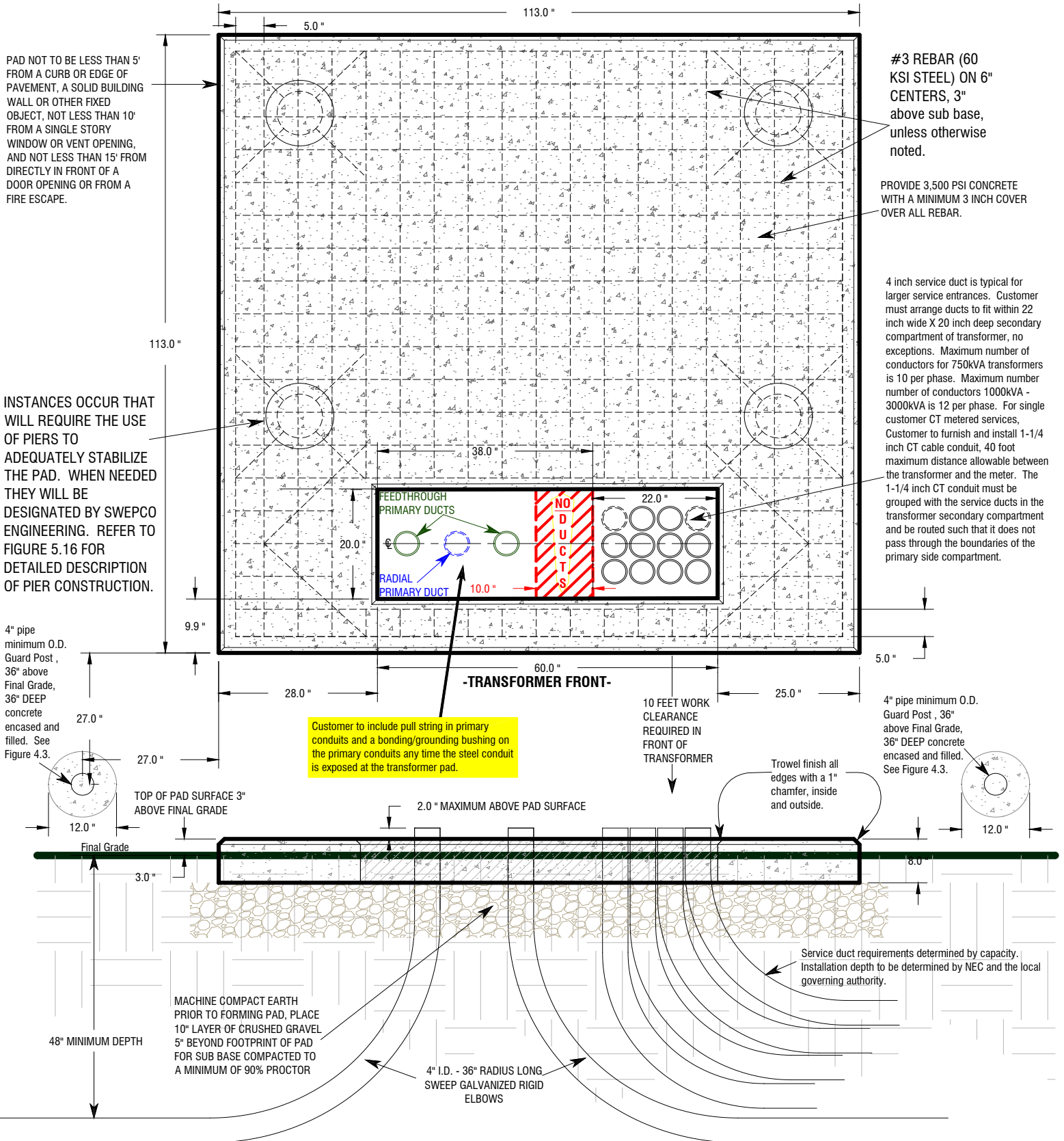


FIGURE 5.14

2/17/2020

DS-2021

CONCRETE PAD FOR THREE PHASE 35KV TRANSFORMERS

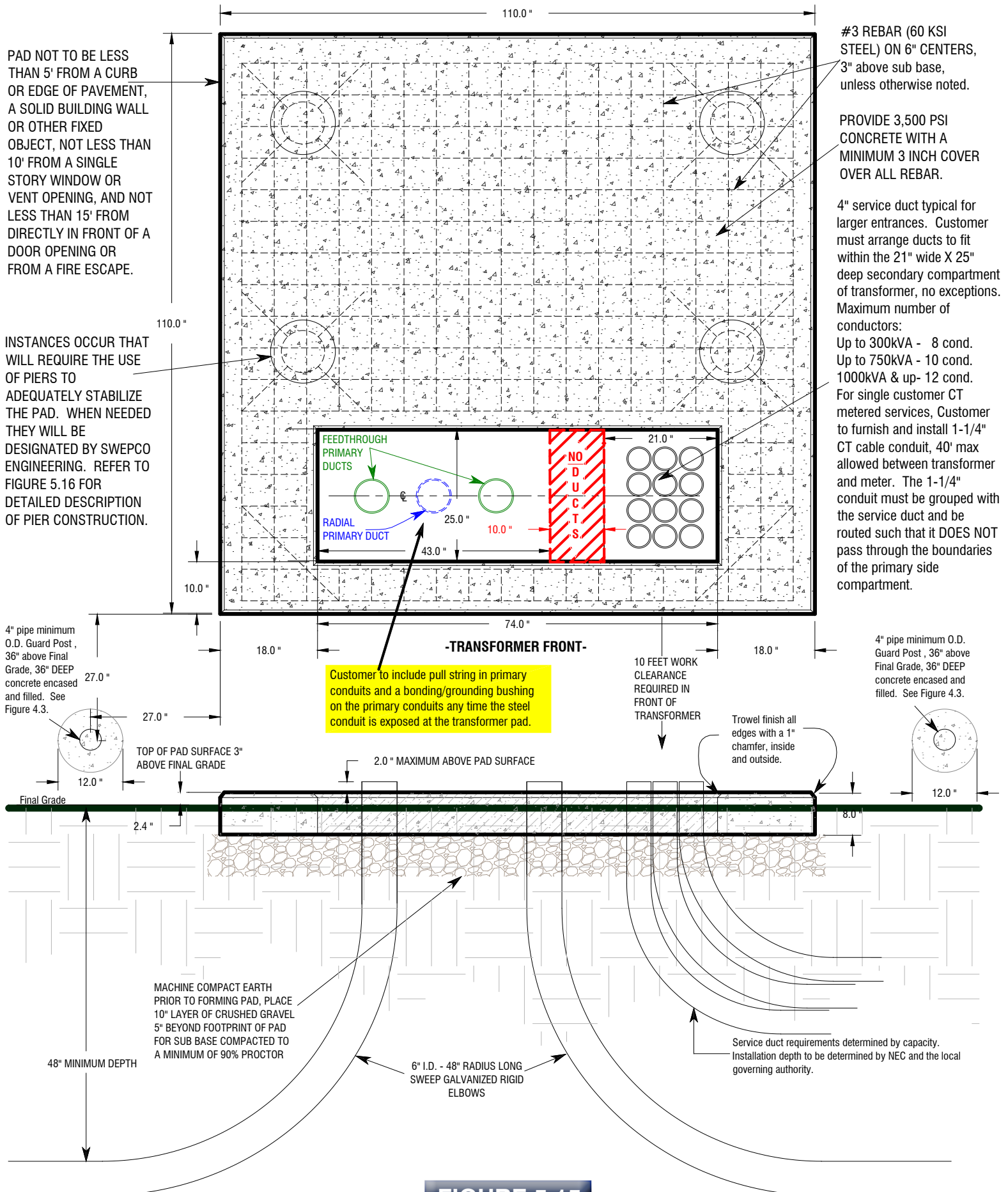
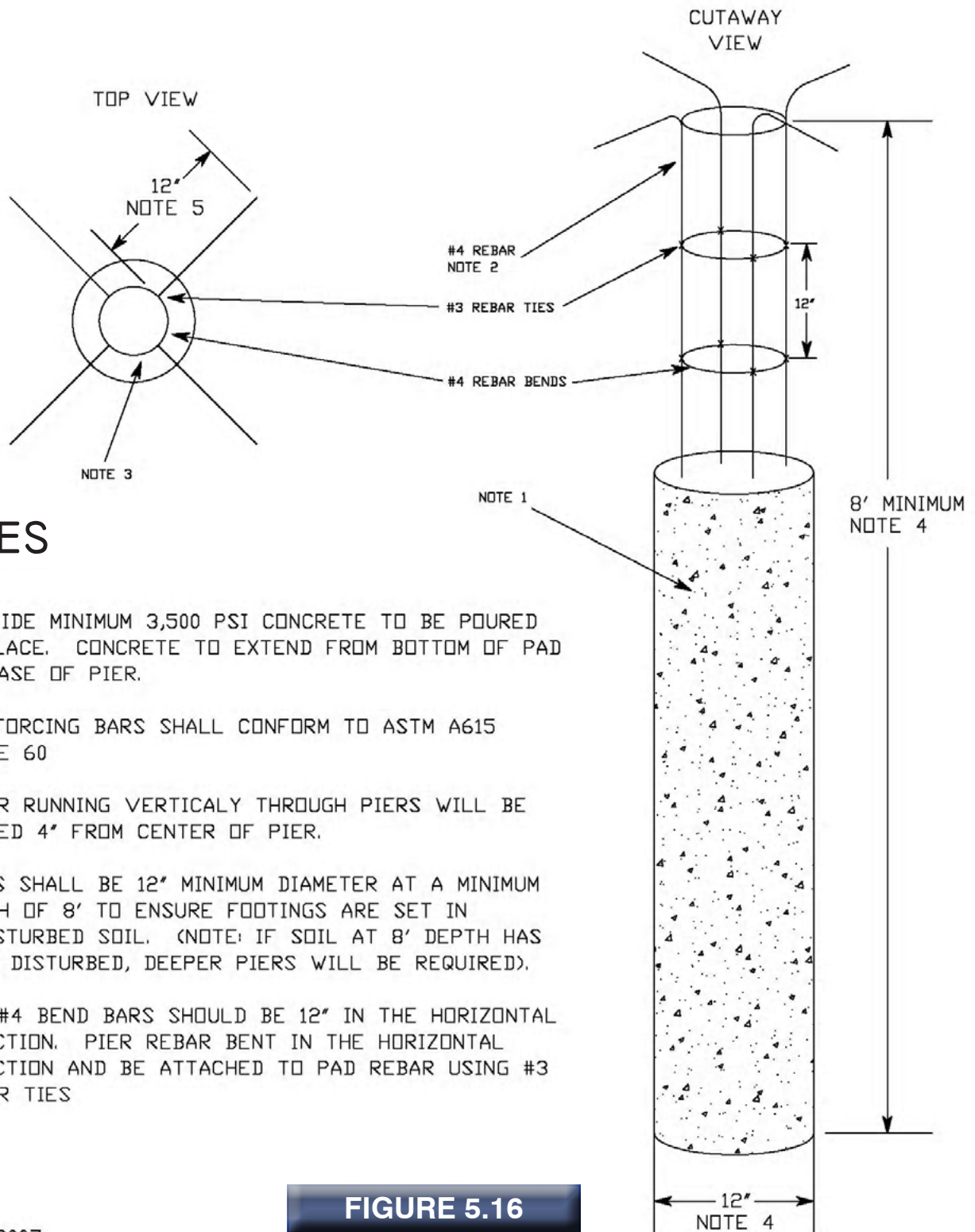


FIGURE 5.15

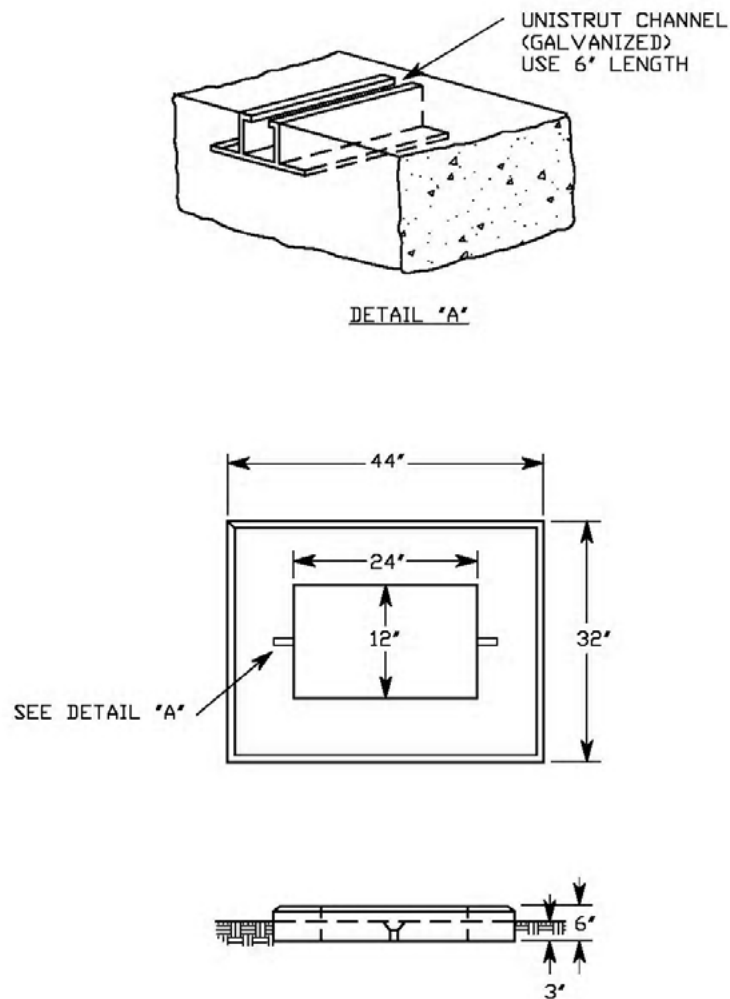


1. PROVIDE MINIMUM 3,500 PSI CONCRETE TO BE POURED IN PLACE. CONCRETE TO EXTEND FROM BOTTOM OF PAD TO BASE OF PIER.
2. REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60
3. REBAR RUNNING VERTICALLY THROUGH PIERS WILL BE PLACED 4" FROM CENTER OF PIER.
4. PIERS SHALL BE 12" MINIMUM DIAMETER AT A MINIMUM DEPTH OF 8' TO ENSURE FOOTINGS ARE SET IN UNDISTURBED SOIL. (NOTE: IF SOIL AT 8' DEPTH HAS BEEN DISTURBED, DEEPER PIERS WILL BE REQUIRED).
5. THE #4 BEND BARS SHOULD BE 12" IN THE HORIZONTAL DIRECTION. PIER REBAR BENT IN THE HORIZONTAL DIRECTION AND BE ATTACHED TO PAD REBAR USING #3 REBAR TIES

FIGURE 5.16

JULY 9, 2007

CONCRETE PAD FOR COMMERCIAL UNDERGROUND SERVICE ENCLOSURE



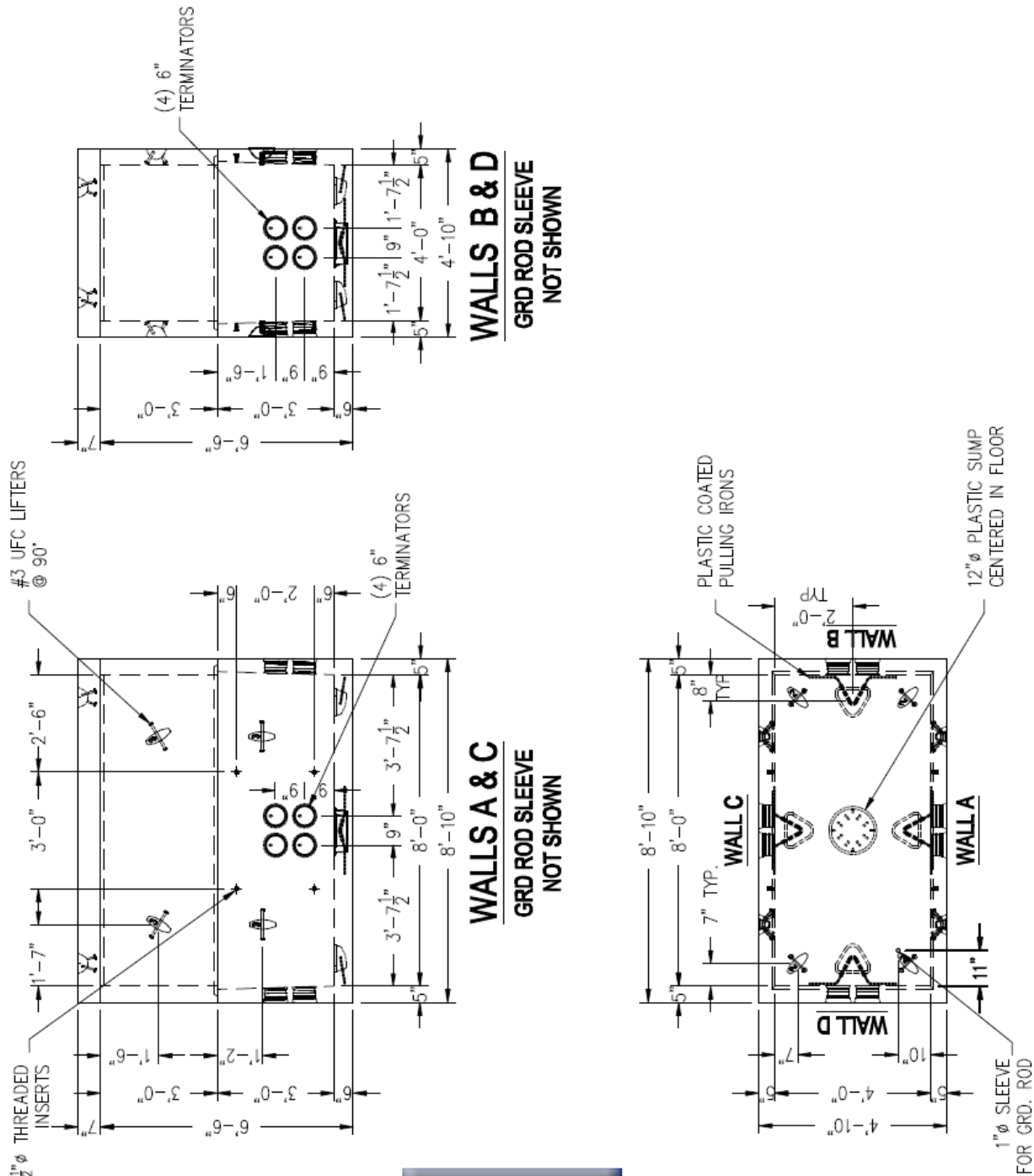
NOTES:

1. ALL CONCRETE TO BE 1:2:4 MIX. ALL HORIZONTAL SURFACES TO HAVE SMOOTH TROWEL FINISH. ALL VERTICAL SURFACES ABOVE GROUND LINE TO HAVE RUBBED FINISH. ALL CHAMFERS TO BE 1"-45°.
2. ALL BACKFILL IN DITCHES UNDER PAD SHALL BE FIRMLY TAMPED BEFORE PAD IS SET OR POURED.

FIGURE 5.17

DATE
APRIL 27, 2007

FIGURE 5.18

**DESIGN NOTES**

- 1) ALL CONCRETE TO HAVE 28 DAY COMPRESSIVE STRENGTH OF 6,000 PSI
- 2) CEMENT: TYPE I/II
- 3) STEEL REINFORCEMENT: REBAR, ASTM A-615 GRADE 60
- 4) DESIGN LOADINGS:
 - A. AXLE LOAD: HS-20 w/IMPACT
 - B. WHEEL LOAD: 16 Kips
 - C. SOIL WEIGHT WET: 120 Pcf.
 - D. EQUIVALENT SOIL FLUID PRESSURE: DRY SOIL = 45 Pcf. SATURATED SOIL = 84 Pcf.
 - E. LATERAL LIVE LOAD SURCHARGE (FROM GRADE TO 8.0 FT.): 80 Psf.
 - F. SOIL COVER: MIN. = 0 FT. MAX. = 0 FT.
 - G. ASSUMED WATER TABLE AT DEPTH OF: 3 FT.

BILL OF MATERIALS

QTY	DESCRIPTION/TYPE
1	12" ϕ PLASTIC SUMP
8	1/2" ϕ THREADED INSERTS
4	PLASTIC COATED PULLING IRONS
8	#3 UFC LIFTERS @ 90"
16	6" TERMINATORS
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

PRODUCT WEIGHTS/YD.³

ROOF SLAB	4,500#	1.11/yd ³
TOP	-#	-yd ³
EXTENSION#1	4,825#	1.189/yd ³
EXTENSION#2	-#	-yd ³
BOTTOM	7,425#	1.821/yd ³
DOOR	-#	-yd ³
TOTALS:	16,750#	4.120/yd ³

MANHOLE
4'-0" x 8'-0" x 6'-0"
AER-SWEEPCO
LONGVIEW, TX

CONTROL # C.N.	PROJECT # P.N.
DRAWN BY: SR	ORDER # 59036
DATE: 07/22/08	SOLD BY: BS
REVISIONS: -	SCALE: 1/4" = 1'
CHECKED BY:	DATE:

DWG NAME: - PAGE 1 OF 4
THIS DRAWING IS THE PROPERTY OF OLDCASTLE PRECAST. IT IS SUBMITTED FOR YOUR REVIEW AND APPROVAL ONLY AND SHALL NOT BE USED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF OLDCASTLE PRECAST.



Oldcastle Precast, Inc.

1100 HERITAGE PKWY.
MANSFIELD, TX 76063
PHONE: (817) 453-1054
FAX: (817) 453-4007

- 1) ALL CONCRETE TO HAVE 28 DAY COMPRESSIVE STRENGTH OF 6,000 PSI
- 2) CEMENT: TYPE 1/II
- 3) STEEL REINFORCEMENT: REBAR, ASTM A-615 GRADE 60
- 4) DESIGN LOADINGS:
 - A. AXLE LOAD: HS-20 w/IMPACT
 - B. WHEEL LOAD: 16 Kips
 - C. SOIL WEIGHT SET: 120 Pcf.
 - D. EQUIVALENT SOIL FLOOD PRESSURE: DRY SOIL = 45 Pcf.
SATURATED SOIL = 84 Pcf.
 - E. LATERAL LIVE LOAD SURCHARGE (FROM GRADE TO 8.0 FT.): 80 Psf.
 - F. SOIL COVER:
MIN. = 0 FT.
MAX. = 0 FT.
 - G. ASSUMED WATER TABLE AT DEPTH OF: 3 FT.

[illegible]

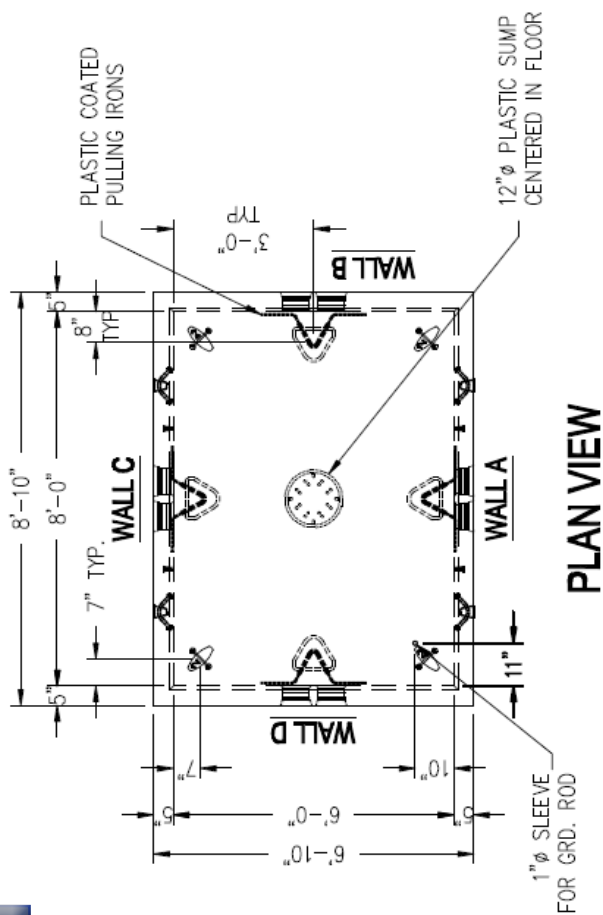
ROOF SLAB	6,025#	1,490yd
TOP	-#	-yd
EXTENSION1	-#	-yd
EXTENSION2	-#	-yd
BOTTOM	13,800#	3,407yd
DOOR	-#	-yd
TOTALS:	19,825#	4,897yd

PROJECT # P.N.	CONTROL # C.N.
ORDER # 59036	DRAWN BY: SR
SOLD BY: BS	DATE: 09/01/08
SCALE: 1/4" = 1'	REVISIONS: -
DATE:	CHECKED BY:

WORKING NAME -	PAGE 1 OF 3
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GLOSSARY OF TERMS

INTRODUCTION

This section contains the definitions of the terms used in this handbook.

bonded (bonding): Connected to establish electrical continuity and conductivity.

clearance: A set distance between two objects.

common ground point: The conductor used to connect the grounding electrode to the equipment grounding conductor and/or to the grounded conductor of the circuit at the service.

conduit: A listed or approved pipe with a smooth interior surface to permit easy drawing in of electrical conductors. A conduit may be metallic or nonmetallic, depending on its usage, in accordance with codes and standards.

corrosion inhibitor: Electrical joint compound used to retard oxidation of electrical connections.

direct burial: The installation of electrical conductors in a trench, without the use of conduit.

distribution system: SWEPCO owned utility system used to distribute and deliver electric power to connected loads. The system will be comprised of overhead and underground electric power facilities.

drip loop: a loop formed in overhead secondary conductors at the weatherhead, to prevent the entrance of water into the service entrance conduit and equipment.

enclosure: The case or housing of an apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.

energized: Electrically connected to, or is, a source of voltage.

ground: The earth.

grounding electrode (ground rod): A conducting object through which a direct connection to earth is

established.

grounding conductor: A conductor used to connect the system equipment or the grounding circuit of a wiring system to a grounding electrode or electrodes.

guy: a cable or brace used to relieve the strain of overhead conductors on masts and poles.

keybox: A permanently installed, locked box with keys enclosed, mounted on the outside of a building, for accessing the customer's premises to read, install, service, or remove SWEPCO's meters and /or electrical equipment during reasonable working hours.

listed: Equipment or material accepted by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation.

manual circuit-closing block: A provision for paralleling the meter circuit, allowing the meter to be removed without interrupting service to the customer.

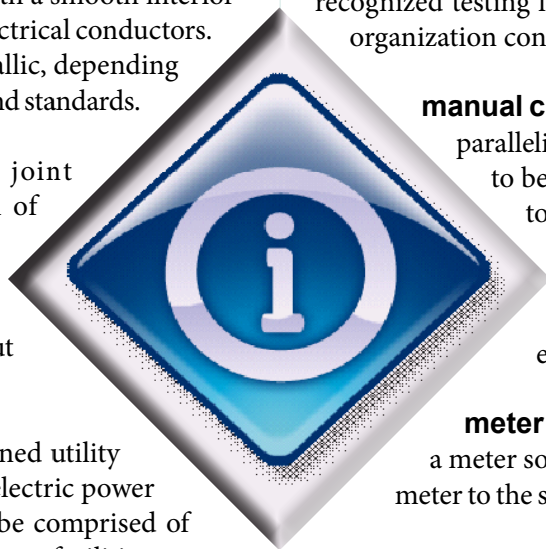
meter equipment: Any equipment associated with measuring electric energy.

meter jaw: A spring-loaded receptacle inside a meter socket which connects the terminals of a meter to the source or load conductors of the service.

meter socket: The mounting device for socket-type meters, consisting of meter jaws, connectors, and an enclosure.

municipal, state inspector: The qualified representative of a city or the state, authorized to inspect electrical service installations on their behalf.

NEC: National Electrical Code. Safety provisions for the installation of electrical equipment and conductors in buildings and other structure, published by National Fire Protection Association.



NEMA: National Electrical Manufacturers Association. A trade association which publishes standards for manufacturers of electrical equipment, including enclosures and racks.

NESC: National Electrical Safety Code. Safety provisions for the installation, operation, and maintenance of electric supply and communication lines, published by IEEE.

neutral conductor: A system conductor other than a phase conductor that provides a return path for current to the source. The grounded conductor in a single-phase, three-wire or three-phase, four-wire system. The service conductor at zero potential to ground. The SWEPCO distribution system utilizes a neutral conductor.

PMT: Pad mounted transformer

point of attachment: On overhead services, the point at which SWEPCO's service line is attached in the customer's structure.

point of delivery: The point where SWEPCO's service line and the customer's system are interconnected.

seal: A locking device to secure a meter or service entrance equipment to assure safety and security.

select backfill: Native soil or soil brought in from another area, free from sharp objects, rocks, scrap building material, and corrosive material.

self-contained: In reference to meter sockets: a device designed and rated to continuously carry the entire capacity of the service. The maximum self-contained meter socket current rating typically used is 400 amperes (also called a single-phase Class 320 A meter).

service line (service drop): Conductors from SWEPCO's system to the customer's point of delivery. A service line can be overhead or underground.

service entrance conductors: On overhead services, conductors which extend between the customer's meter socket and the point of delivery.

service entrance equipment: service conduit, conductors, weatherhead, meter base, enclosures, service disconnect, and service panel.

service mast: The conduit above the meter used to provide mechanical protection for the service conductors and to support.

temporary service: An electrical service installed by SWEPCO to provide power to a customer on a temporary

basis for a period less than one year.

UL: Underwriters' Laboratories, a recognized test laboratory which lists materials it has tested and accepted.

SWEPCO Services - Voltages and Availability

Service Voltage	Service Rating	Overhead Service	Underground Service	Transformation Available
120-volt	60A 2 wire service	Service drop	Secondary riser to pedestal or single phase pad mounted transformer	OH transformer; UG single phase pad mounted transformers
120/208-volt single phase/ network	100A to 400A 3 wire service	Service drop	Secondary riser to pedestal or three phase pad mounted transformer	3-OH transformers; UG three phase pad mounted transformers
120/240-volt single phase	100A minimum 3 wire service	Service drop	Secondary riser to pedestal or single phase pad mounted transformer	OH transformer, 15KVA to 167KVA; UG single phase pad mounted transformer, 25KVA to 250KVA
240/480-volt single phase	100A to 200A 3 wire service	Service drop	Secondary riser to pedestal	OH transformer
120/208-volt three phase	200A minimum 4 wire service	Service drop	Secondary riser to pedestal or three phase pad mounted transformer	3-OH transformers, WYE-WYE up to 300KVA*; UG three phase pad mounted transformers 150KVA to 1000KVA
120/240-volt three phase	100A to 200A 4 wire service	Service drop	Secondary riser to pedestal	2-OH transformers, OPEN-WYE OPEN-DELTA up to 150KVA
120/240-volt three phase	200A to 600A 4 wire service	Service drop	Secondary riser to pedestal	3-OH transformers, CLOSED-DELTA up to 250 KVA NOT AVAILABLE ON 35KV DISTRIBUTION SYSTEMS
277/480-volt three phase	100A minimum 4 wire service	Service drop	Secondary riser to pedestal or three phase pad mounted transformer	3-OH transformers, WYE-WYE up to 300KVA*; UG three phase pad mounted transformers 150KVA to 2500KVA
480-volt three phase corner ground	up to 200A 4 wire service	Service drop	Secondary riser to pedestal	OH transformers DELTA, CORNER GROUND up to 150KVA

Notes

*Larger overhead distribution transformers are available but their use is discouraged. Larger transformer installations must be rack mounted which requires a large area for installation and are more expensive to construct and maintain than equivalent sized pad mounted transformers.

SWEPCO Services - Metering and Typical Usage

Service Voltage	Metering Required	Typical Usage
120-volt	Self-contained	Municipal services, signs, and construction power when 3 wire 120/240-volt service is not available.
120/208-volt single phase/ network	Self-contained Network Meter	Large apartment buildings and temporary construction power, <i>Requires prior approval from SWEPCO</i>
120/240-volt single phase	Self-contained up to 400A or CT metering. When greater than 400A, will require a CT enclosure.	Residential, small commercial, & temporary construction power
240/480-volt single phase	Self-contained with a disconnect ahead of the meter.	Department of Transportation Highway Lighting
120/208-volt three phase	Self-contained up to 400A or CT metering. When greater than 400A, will require a CT enclosure for each customer if more than one customer.	Commercial, Industrial, & temporary construction power
120/240-volt three phase	Self-contained	Residential, small commercial, & temporary construction power
120/240-volt three phase	Self-contained up to 400A or CT metering. When greater than 400A, will require a CT enclosure.	Residential, small commercial, & temporary construction power
277/480-volt three phase	Self-contained up to 200A or CT metering. When greater than 200A, will require a CT enclosure for each customer if more than one customer.	Commercial, Industrial, Oil Field & temporary construction power
480-volt three phase corner ground	Requires CT enclosure for each customer	Oil Field <i>Requires prior approval from SWEPCO</i>

Notes

Connection diagrams for self-contained metering are located on pages 36 and 37. Installation specifications are located on pages 65 through 72, page 74, and for high water locations, page 51.

Current Transformer (CT) metering begins on page 40. Approved enclosures are listed on page 42. Installation specifications are located on page 43 through page 50, and page 73.

Clearances for OH service are shown on pages 54 and 55.

Clearances for underground transformers are shown on pages 56 and 57. Specifications for concrete transformer pads are shown on page 76 through page 80.

Primary metering is not covered in this handbook. Contact SWEPCO for more information.

Distributed Generation/Net Metering

AEP/SWEPCO will provide Net Metering through interconnections with Customer-Owned Generation. This generation is intended primarily to offset part of all of the Customer's energy use. SWEPCO provides service to customers in Arkansas, Louisiana, and Texas.

The tariff filed with each State's Commission is different. In Arkansas, it is called NET-METERING. In Louisiana, it is called DISTRIBUTED GENERATION. In Texas, it is DISTRIBUTED GENERATION INTERCONNECTION.

These documents are detailed and specific for each state of residence. In each of the states, the customer is required to sign a Standard Interconnection Agreement with the Electric Utility.

Due to the differences in each State's tariff filing, it is important that each Customer read the requirements of this tariff. These tariffs are available at SWEPCO.com. Go to the homepage. Under the *Business* section, select *Rates and Tariffs*.

For Arkansas, select **Arkansas File** under Arkansas Rates and Tariffs. It is titled: NET-METERING and begins on Sheet No. R-40.1

For Louisiana, select **Louisiana File 1** under Louisiana Rates and Tariffs. It is titled: DISTRIBUTED GENERATION RIDER and begins on page 33.1

For Texas, select **Rates, Charges, and Fees** under Texas Rates and Tariffs. It is titled: DISTRIBUTED GENERATION INTERCONNECTION RIDER and begins on Sheet No. IV-51

It is recommended the customer call the SWEPCO call center and request to speak with a Customer Service Representative working in the customer's state of residence to receive current information.

888-216-3523