ELECTRIC SERVICE MANUAL

Duke Energy Ohio, Inc. and Duke Energy Kentucky, Inc.

Information & Requirements for Electric Service

September, 2013

Duke Energy's Redbook Changes

Introduction

-New Service Contact Center is now Service Delivery – new # 1-877-700-3853
-New Call Center # 1-800-544-6900
-Added Electric and Gas Emergency/Trouble numbers
-Power Delivery is now referred to as Engineering and Construction Planning

Meter Base Guidelines

Maximum service size for a Self Contained 208Y/120 volt three phase service is 400 amps.

Section 100-F

Non residential customers requesting temp disconnection of service must contact Duke at least 4 business days in advance of the requested disconnect date.

Section 102

Meter Equipment Pick Up hours – 7-9AM, 2-3:30PM

Section 305- A

Safely Accessible mounting height changed from 24' to 20'.

Section 311

Added F. A maximum of 10 sets of conductors are permitted on three phase transformer installations. For installations exceeding 10 sets contact Engineering and Construction Planning.

Section 312 - C

Residential laterals terminating at a concrete pad must be extended to within two feet of the right or left side center of the pad.

Section 404

Customer Owned Generation contact # 1-866-233-2290

Section 414

Power Quality Department new contact # 1-800-544-6900

Section 501 – C

Added minimum pole height and class information.

Section 503 – B

Added 9. Meter Blanks for installations requiring more than 4.

Section 503 – C

Added 4. Up to 4 meter blanks.

Section 504 – C

Changed 10. To : One ¾ inch, non-metallic conduit for pulse cable, is to be furnished and installed by customer. This installation must be accessible to a telephone line (Contact Engineering and Construction Planning for specifics).

Section 505 – C

**For meter installations in a Floodplain contact the geographical areas certified inspection agency for height requirements.

Section 509 – G

2. Must be a single 2 inch metallic or non-metallic conduit (Padmount metering conduit must be non-metallic, see Dwg 635)

Section 511 – C

Table IV – Removed 1Ph 3W 120/240V, over 320-400
Changed 3PH 4W 208Y/120V to Over 400 to 1200 Amps

Drawing 600

-Changed Minimum Clearances of Service Drop Conductors Notes
-Changed drip loop minimum to 12' * See Height reduction note for 10.5'

Drawing 603 & 605

-Added – For Meter Installation in a Flood Plain contact the Local Governing Authority for additional height requirements.

Drawing 611

-Added Note: Customer to provide new, fully treated, minimum 25' class 7 pole. Additional height may be required due to terrain, clearances, or other field conditions. Height must be approved by company.

Drawing 616

-Changed Pipe Strap separation to 2ft.
-Added note: If existing 4x4 concrete pad, Stub out of ground 2' from the side "center" of the facility.

Drawing 617

Added Note: Laterals must Loop Inside Meterbase as shown.

Drawing 619

-Changed #8 copper grounding conductor to bond the meter socket to the service ground to a #10.
-Removed service equipment board dimensions, See N.E.C.

Drawing 627 **NEW**

New 208Y/120V, 3PH, 4W, Overhead, outdoor, greater than 200Amps, not exceeding 400 Amps

Drawing 628 **NEW**

New 208Y/120V, 3PH, 4W, Underground, outdoor, greater than 200Amps, not exceeding 400 Amps

Drawing 629 **NEW**

New 208Y/120V, 3PH, 4W, Indoor, greater than 200Amps, not exceeding 400 Amps

Drawing 630 (old 628)

-Changed to Greater than 400Amps from 200Amps.

Drawing 635 (old 627)

-Added pull string note to conduits.
-#8 bonding conductor changed to #10
- One ¾ inch, non-metallic conduit for pulse cable, is to be furnished and installed by customer. This installation must be accessible to a telephone line (Contact Engineering and Construction Planning for specifics)

Drawing 642 **NEW**

New Self Contained Post Type Meter Installation

Drawing 643 **NEW**

New Post Type Meter Installation (Instrument Transformer)

Drawing 671

-Removed Concrete Pad – Not for new installations
-2. Location: clearance from combustible wall changed to 12'
-3. Installation: Removed note: If conduit is used for the primary cable installation, Duke Energy will provide and install the box pad on residential and commercial applications.

Drawing 672

-4. Clearance from combustible wall changed to 12'
-**7. Minimum Conduit size changed to 4"

Drawing 673

2. Location: clearance from combustible wall changed to 12'
**5. Conduit : Minimum conduit size changed to 4"
-Service cable conduit quantity changed to 10

Drawing 674

****Minimum Conduit Sizes**: Residential 2" ID, Commercial 4" for URD cable, Commercial 6" for Power Cables
-maximum number of service conduits changed to 10

Drawing 676

Changed Conduit note to: 2 Hole Straps every 24". 12" from each end.

Drawing 678a

Removed this drawing. Information for company use only.

Drawing 678b

Changed to Drawing 678.

All grounding notes on drawings will now state Per National Electric Code. All service equipment board dimensions have been removed and must meet National Electric Code requirements.

*** Please note that some drawing numbers have changed. Below are the old and new numbers for reference. Also in Table of Contents.***

Old #	New #
627	635
628	630
629	631
630	632
631	633
632	634
633	637
634	638
635	639
637	640
638	641

INFORMATION & REQUIREMENTS FOR ELECTRIC SERVICE

ELECTRIC SERVICE MANUAL

Duke Energy OH/KY
139 East Fourth Street, P.O. Box 960
Phone 1-800-544-6900

Table of Contents

D R A W I N G S

674. Construction details for customer installed electric facilties.

675. Construction details for customer installed electric facilties padmount equipment protection.

676. Construction details for customer installed electric undergound services from poles.

677. Customer installed precast concrete manhole and lid.

678. Customer installed precast concrete cable pit for 15kv class padmounted swtiching equipment.

*Limited Availability - Contact Engineering and Construction Planning for Approval

INTRODUCTION

This publication is a guide to the Company's electric service requirements and is not intended to cover all rules and National Electric Code or National Electric Safety code regulations. It is intended to promote uniformity throughout the Company's (as defined below) system and to provide a satisfactory interface guide for the customer's electric service equipment at the service point.

Duke Energy Ohio, Inc., and Duke Energy Kentucky, Inc. (collectively referred to herein as the "Company") provides this publication to assist all customers in planning for and obtaining prompt and satisfactory electric service.

Any reference to Engineering and Construction Planning in this publication includes the Company's Regulated Business Unit.

The format of this manual allows for updating of information and drawings. Additions and revisions will be forwarded to individuals listed on the master-mailing roster. Please remember it is the customer's responsibility to obtain and maintain a current version of this publication.

If you would like future updates and want to be included on the master-mailing roster please call Service Installation at 1-877-700-3853, or complete an Electric Service Manual Request Form from Duke Energy's web page. Also, this manual can be referenced and printed along with the drawings on Duke Energy's web site. The web address for this manual on Duke Energy's web site is: http://www.duke-energy.com/ohio/service.asp

EMERGENCY CONTACT INFORMATION

If you have a gas or electric emergency situation please contact Duke Energy's Emergency/Trouble departments at:

Electric Emergency/Trouble ……..1-800-543-5599

Gas Emergency/Trouble ……..1-800-634-4300

This publication is for informational purposes only and in no way shall this publication be construed to impose any liability upon the Company or any subsidiaries, affiliates, or parent entities. The Company makes no warranties or representations in this publication expressed or implied, including but not limited to merchantability and fitness for a particular purpose.

The Company is required to comply with the rules and regulations in National Electrical Safety Code (NESC) and Occupational Safety & Health Administration (OSHA) in the construction and operation of its facilities. All requirements in this document are intended to meet or exceed those requirements.

Duke Energy Ohio, Inc.

Duke Energy Kentucky, Inc.

Meter Base Guidelines

Customer-Owned Equipment Specifications

Minimum Requirements for Self-Contained Meter Sockets Installed on the Company System

Residential Single Phase

- Must be Underwriters Laboratory (U.L.) listed and labeled.
- Meter socket jaws must be tin plated copper.
- Sockets must be 5th terminal adapt-able.
- Sockets must be ringless type.
- All sockets rated for 200 or fewer amps must be equipped with horn or lever type meter bypass.
- All sockets rated for greater than 200 amps must be equipped with lever operated jaw release and bypass.
- All sockets must have a swing style latch or other appropriate latch, which will prevent unauthorized access and accept a utility padlock or wire style seal.

Commercial Single and Three Phase

- Must be U.L. listed and labeled.
- Meter socket jaws must be tin plated copper.
- Single-phase sockets must be 5th terminal adaptable.
- Sockets must be ringless type.
- Single-phase sockets rated for 200 or fewer amps must be equipped with horn or lever type meter bypass.
- All single-phase sockets rated for greater than 200 amps and all self contained three phase sockets must be equipped with lever operated jaw release and bypass. The bypass must be rated to carry the full load capacity of the socket. These sockets are also required to have the Landis & Gyr HQ series, or the Milbank HD series, or similar block assembly.
- Maximum service size for a self contained 208Y/120V three-phase service is 400 amps.
- All sockets must have a swing style latch or other appropriate latch system, which will prevent unauthorized access and accept a utility padlock or wire style seal.

Notice:
These meter sockets can be purchased from local electrical supply companies.

Contact Engineering and Construction Planning to discuss the location of this meter socket on your building.

Section 1

GENERAL INFORMATION

100. General

A. Customers should give particular attention to sizing the ampacity of the service entrance equipment when determining present and future electrical needs.

B. Customers must provide a certificate of approval from a certified electrical inspector serving the customer's geographical area before the Company will permanently connect or reconnect customer's service. Also, the Company shall make the determination as to whether the customer's installed electric service equipment complies with the all Company's requirements.

The Company's representative has no authority to inspect a customer's electric service equipment, wiring system, other equipment, or appliances for compliance with state, local, or any other applicable codes. Any inspection and other action by the Company's representatives to determine compliance with service requirements are for the Company's purpose only and will not impose any liability upon the Company or remove the obligation from the customer for the customer's installation and maintenance responsibilities.

The Company does not warrant or represent in any manner by any provision set forth herein that any element of the customer's electrical system is safe or conforms to any code. Governmental authorities and the customer are responsible for assuring that the customer's electric service equipment, wiring system, other equipment, and appliances are installed and maintained safely and in compliance with applicable codes.

C. The Company's Engineering and Construction Planning Business Unit is responsible for:

Assigning service and meter locations;

Assisting in planning the installation for connection to the Company's system; and

Determining if the customer is in compliance with the Company's requirements for service.

D. Engineering and Construction Planning representatives are available to answer customer questions relating to these guidelines. For information regarding Company procedures and service regulations not covered in this material call- 1-800-544-6900 to be connected to the appropriate office.

E. The Company reserves the right to withhold connection to and disconnect its system from any installation not conforming to the Company requirements.

F. Residential customers requesting temporary disconnection of service must contact the Company at least two (2) business days in advance of the requested disconnection date. Non-residential customers requesting disconnection of service must contact the Company at least four (4) business days in advance of the disconnect date.

Single family residential customers and up to 4-unit apartment building customers should call Service Installation at 1-877-700-3853.

All non-residential and multi-family building customers (over 4-units) should call 1-800-544-6900 to be connected to the appropriate office.

101. Requesting New Electric Service

A. Customers must make requests for new electric service prior to the start of construction. This request can be made by telephone to the appropriate Engineering and Construction Planning office or by visiting the Company's contractor's web page on Duke Energy's web site (http://www.Duke Energy.com/Residential_Services/contractor_information/).

B. The customer or the customer's representative is responsible for supplying complete and accurate information relative to the use of the service and the equipment to be connected. Subsequent changes in the customer's service or plans must be reported immediately to the Company's project representative associated with the customer's project.

C. Use the following outline to provide correct information that may be needed by the Company to make the necessary arrangements for service:

1. Service address (No directional addresses will be allowed on new construction).
2. Legal name of the customer who will be using the service, a copy of the deed, and the correct legal name of the property owner if different than the customer to be served.
3. Date when customer will be ready for permanent electric service.
4. Preferred service voltage and service point.
5. Service ampacity.
6. Total connected load; grouped as to lighting, electric space heating/cooling, process heating or refrigeration, water heating, cooking, motors, and special identified equipment such as:
   - size of largest motor, type of motor starter to be used, frequency of motor starting, and locked rotor amps.
   - rating and operating characteristics of special equipment such as welders, x- ray machines, etc.
7. Load management equipment.
8. Diagram of the electrical system including switchgear drawings.

9. Plot plan showing location of right-of-way, property lines, and building structures to be served, satellite buildings, driveways and parking areas, existing and proposed underground utilities and facilities, signs and outdoor lighting standards, areas to be graded, and areas of the property most likely to be developed in the future.
10. Temporary electric service for construction: the date wanted and the voltage and ampacity requirements. See article 301 of this manual for additional information.

102. Meter Equipment Pick-Up Locations

Company provided metering equipment can be picked up Monday through Friday, except holidays, between the hours of 7-9 a.m. and 2-3:30 p.m. This equipment is usually available within one day at 424 Gest Street. Please call (513) 419-1649 from the front doors upon arrival. Allow at least one week for delivery prior to pick-up at a satellite location.

103. Installation Of Electric Facilities

Installation of electric facilities will begin when all Company requirements, including the following, have been completed:

A. The Company, customer, and the property owner to be served have approved the method of service.

B. Arrangements have been made for the billing and collection of charges for the service to be provided.

C. The customer and all parties have completed the required agreements and /or grants of easement to the Company for the installation of facilities on or across private property

D. Final grades and elevation within those areas where the Company is to install facilities and assurance these areas are accessible and clear of stored materials or other construction activities.

E. The Company has received all required permits to install its facilities.

F. Adequate protection for Company-owned equipment has been installed.

104. Service Connections

The Company will connect to a customer's newly wired electric service equipment, or reconnect to rewired electric service equipment when all Company requirements, including the following, have been completed:

A. The Company has received an application and/or contract for service specifying service-billing details. Legal name of the customer, service address and billing address are required.

To make application for *residential* electric service, call Service Installation at 1-877-700-3853.

To make application for *non-residential* electric service call 1-800-544-6900 to be connected to the appropriate office.

B. The Company has determined that the customer is in compliance with its requirements for electric service.

C. The Company has received a certificate of approval from the geographical area's certified electrical inspector.

105. Unauthorized Use Of Electricity

Removal or relocation of an electric meter without the Company's permission is prohibited. Tampering with the Company's metering equipment, making an unmetered connection, or making an unauthorized reconnection to the Company's system is prohibited. The penalties for these activities may include fines and imprisonment.

106. Locating The Company's & Other Utilities Underground Facilities

State laws require that before you do any excavation you contact the Utilities *"Call Before You Dig"* service. Call at least two (2) working days prior to any excavating, digging, or breaking ground for information on location of underground utility facilities.

- Ohio locations call:

  Ohio Utilities Protection Service (Toll Free) 811

- Kentucky locations call:

  Kentucky Underground Protection, Inc. (Toll Free) 811

Section
2

SYSTEMS OF DISTRIBUTION

200. Service Voltages

Listed below are the service voltages that may be available based on customer location and the nature of the load. **For service availability in your area call 1-800-544-6900 to be connected to the appropriate office**.

A. The following service voltages, 600 volts or less, are supplied by the Company:

1. Single-phase, 3-wire, 120/240 volts AC at 60 Hz.
2. Three-phase, 4-wire, 208Y/120 volts AC at 60 Hz.
3. Three-phase, 4-wire, 480Y/277 volts AC at 60 Hz.

B. The following service voltages, over 600 volts, are supplied by the Company:

1. Three-phase, 4-wire, 4160Y/2400 volts AC at 60 Hz.
2. Three-phase, 4-wire, 12470Y/7200 volts AC at 60 Hz.
3. Three-phase, 4-wire, 34500Y/19920 volts AC at 60 Hz.
4. Three-phase, 3-wire, 33000 volts AC at 60 Hz.
5. Three-phase, 3-wire, 69000 volts AC at 60 Hz.
6. Three-phase, 3-wire, 138000 volts AC at 60 Hz.

C. The following voltages, 600 volts or less, are available **for limited use**: (for availability, contact the numbers above)

1. Single-phase, 3-wire, 120/208 volts AC at 60 Hz. (please call 1-800-544-6900 for service availability in our area).

2. Three-phase, 4-wire, 240/120 volt AC at 60 Hz.

These voltages are nominal and may vary depending on operating conditions:

- Three-phase, 4-wire services are supplied with a grounded neutral.
- Three-phase, 3-wire services are supplied without a neutral.

201. Available Fault Current Information

For fault current information regarding a specific service call Service Installation at 1-877-700-3853. Refer to Article 402 for service equipment interrupting rating requirement.

Section

3

SERVICE INSTALLATIONS

300. General

The electrical contractor should be familiar with the work of other construction crews on the Premises so the electric service system and electric meter installation will not be obstructed. Examples of possible obstructions are plumbing, HVAC, or other building structures.

TEMPORARY ELECTRIC SERVICE

301. Requirements for Electric Service

The Company will supply temporary electric service; where available, subject to applicable tariffs on file with the appropriate state public utility commission. For charges and information concerning temporary electric services, call Service Installation at -1-877-700-3853.

A. Before the company will provide temporary service, for single phase services of 200 amps or less, the customer must furnish and install the following:

1. Temporary support with address visible from the street
2. Service entrance conductor or underground service lateral
3. Weather head (for overhead services)
4. Service drop attachment device (for overhead services)
5. Ringless meter socket
6. Meter board (when required)
7. Service grounding

8. Service disconnecting device

9. Any other equipment required by the geographical area's certified electrical inspector

These requirements must meet the stipulations contained in article 100B of this manual.

Drawings 640 and 641 show typical supports for a maximum 200 amp temporary service.

B. The Company will:

1. Furnish and install the service drop (for overhead areas).
2. Make connections to the Company's facilities.
3. Furnish and install the electric meter.

C. For three-phase services or single-phase service over 200 amps, call Service Installation at 1-877-700-3853.

PERMANENT ELECTRIC SERVICE

302. Number Of Services

Only one service drop or underground lateral, except for separate lighting and power services, will be supplied to any one structure. Exceptions may be permitted by the National Electrical Code (NEC) but are subject to approval by the Company and the geographical area's certified electrical inspector. Separate service raceways and meter equipment are normally grouped and service drops or underground laterals will be run to the same general location on the structure.

At the discretion of the Company, the overhead services may be installed from different poles and the service entrance conductors may enter a structure at different locations. When this arrangement occurs, a permanent plaque or directory will be installed by the customer at each service equipment location specifying all other service locations in or on the structure served.

303. Space For Service Equipment

Minimum space requirements can be obtained from drawings in Section 6 of this manual and also from the NEC. For information regarding installations not covered by these drawings, call 1-800-544-6900 to be connected to the appropriate office.

304. Service Address

The structure's permanent address must be clearly visible from the street or road.

305. Service Drop Location

The location of all service drop attachments must be approved by Engineering and Construction Planning before the customer's work begins.

A. The service drop attachment must be *safely accessible* and in direct line to the Company's service pole. "*Safely accessible"* is defined as accessible with an extension ladder placed on firm level ground directly beneath the point of attachment and with a mounting height of no greater than 20 feet. If these conditions cannot be met, contact Engineering and Construction Planning for assistance.

B. The service drop attachment must be located so that the service drop will not cross adjoining property.

C. The service drop attachment must be located at a height to permit the following minimum clearances (under conditions of maximum sag) at any point along the span of the service drop conductors. These clearances apply to company-owned service drops meeting NESC rule 230C3 (triplex, quadraplex, duplex, or parallel-lay conductors). For other company-owned service conductors (open wire, bare wire) refer to NESC for appropriate clearances.

1. 12 feet above finished grades, sidewalks, platforms, or projections from which the conductor might be reached when the voltage is limited to 300 volts to ground.
2. 16 feet above residential driveways when the voltage is limited to 300 volts to ground.
3. 16 feet above commercial areas, parking lots, public streets, alleys, roads, commercial driveways, and areas subject to truck traffic or agricultural vehicles.

D. The service drop conductors to a structure must have a horizontal clearance not less than three feet (3') from all windows, doors, porches, fire escapes, or similar locations readily accessible to pedestrians. All other clearance requirements of the NEC, NESC, and state and local requirements must be met.

E. The service drop attachment or service mast guying attachment device must not be installed on a masonry chimney.

F. The minimum size service mast for attachment of a service drop is two inch (2") rigid steel or two inch (2") Intermediate Metallic Conduit (IMC). Conduit couplings are not permitted above the roofline. Couplings, if required, must be installed below the second conduit support from the roofline (see drawing 605).

306. Attachment Of Service Drop

The customer will furnish and install an appropriate service drop attachment device capable of withstanding a 1,200# dead-end tension fastened to the structure wall or other support for terminating the service drop. Attachment details for services over 320 amps are available by calling - 1-800-544-6900 to be connected to the appropriate office. These service drop attachment devices must be secured into studs or other parts of the main building structure and must be capable of supporting the service drop tension. Attachment to the trim board only is not permitted.

This attachment device must be mounted below and within two feet (2') from the weather head (see drawings 603, 604, 605, 638 and 639).

307. Service Pole Line

If it is necessary to install poles and conductors to reach a service point, the cost of the pole line may be at the customer's expense, which shall be at the discretion of the Company. Engineering and Construction Planning will provide the estimated costs for these facilities to the customer.

308. Service Raceways And Service Entrance Cables

A. The service entrance conductors must be brought to the metering equipment enclosures in conduit, service entrance cable, or bus duct installed in compliance with the NEC. The metering equipment must be located on the supply side of the main service disconnecting device whenever possible. **The meters are to be located outdoors on all new or rewired buildings**. For more meter and service location information call 1-800-544-6900 to be connected to the appropriate office.

B. Suitable protection must be used in locations where service entrance cables and/or meters would be subject to damage. Locations may include areas adjacent to driveways, sidewalks, parking lots, etc.

C. All service entrance conductor installations must be provided with a rain tight weather head located above and within two feet (2') of the service drop attachment device. Watertight connectors must be installed in the top of outdoor meter sockets and cabinets when service entrance cables are used. Cable sealant may be required to make the installation watertight.

D. Watertight provisions should be made where service entrance cables or raceways enter the structure.

309. Draining Service Raceway

Where exposed to weather, raceways enclosing service entrance conductors must be arranged to drain as required by the NEC.

310. Service Entrance Conductors

A. All single-phase installations having more than one branch circuit must be wired with a three-wire service.

B. Service entrance conductors must extend at least three feet (3') from the weather head to permit connection to the Company's service drop. Additional conductor lengths may be required on installations having multiple or parallel sets of service entrance conductors or having pole, mast, or building mounted current transformers.

C. Outdoor grounded service neutral conductors must be permanently identified by either:

- White or natural gray insulation or tracer identification; or
- Bare conductor stripped to the weather head.
- On a 4-wire, delta connected service where the midpoint of one phase winding is grounded, the service conductor having the higher phase voltage to ground must be durably and permanently marked by an outer finish that is orange in color, or by other effective means, at each termination or junction point. (See drawing 625 for wiring details)

Only indoor grounded service neutral conductors may be identified by painting or taping. The grounded service neutral must be connected to the neutral bus in the service disconnect and to the neutral connectors in the self-contained meter socket. Phase identification will be required where multiple sets of conductors are used and on all three-phase, three-wire service installations.

D. If multiple position meter sockets are installed without a main service disconnect ahead of the meters, grounded neutral and phase conductors must be continuous from the weather head through the line side connectors of each meter position. The grounded service neutral conductor tap connectors should be used at each position supplied (see drawings 621 and 633).

E. Service entrance conductors for residential services must have an ampacity of not less than 100 amps, 120/240 volt, single-phase.

F. An oxidation inhibitor must be properly applied to all connection points where aluminum service entrance conductors terminate in the meter socket or current transformer connectors. It is recommended that the inhibitor also be applied to service equipment connections.

G. Aluminum and copper service entrance conductor termination connectors must be torqued to the manufacturer specifications in metering and service equipment.

311. Service Laterals

A. The Meter location and the point of connection to the Company's system must be specified by Engineering and Construction Planning before the installation of the service lateral.

B. The customer will furnish, install, own, and maintain all new service laterals. When a direct buried service lateral is installed, sufficient cable slack ("S" loops) must be provided at the foundation to allow for settling of the earth. This cable slack helps to avoid destructive strain on the meter socket connectors. The trench must be back-filled in a proper manner before the service lateral can be energized. See NEC (Earth Movement). See drawings 615, 617 and 618.

C. For direct buried service laterals 200 amps or less, the incoming line side conductors must be looped inside the meter base (see drawing 617).

D. The requirements for the installation of the service lateral (depth, ampacity, type, etc.) are under the jurisdiction of the certified electrical inspector serving the customer's geographical area.

E. For three-phase installations, or where multiple sets of conductors are used, phase identification is required.

F. A maximum of 10 sets of conductors are permitted on three phase transformer installations. For installations exceeding 10 sets contact Engineering and Construction Planning.

312. Underground Service Connections

UNDERGROUND AREAS

Company personnel will make all secondary service connections to the system.

A. Unauthorized personnel will not be permitted to enter the Company's pad mounted transformers, vaults, pits, pull boxes, pedestals, etc., for pulling cables without specific authorization from Engineering and Construction Planning.

B. The customer must install the service lateral to a point two feet (2') from the Company's approved connection point. To determine sufficient cable lengths required for connections, or to coordinate cable pulling through a conduit system into Company facilities, contact Engineering and Construction Planning.

C. Residential service laterals terminating at a pad mounted transformer must be extended within two feet (2') of the rear center of the pad. (See drawing 616) Residential laterals terminating at a concrete pad must be extended to within two feet (2') of the right or left side center of the pad.

UNDERGROUND IN OVERHEAD AREAS

D. When installing a service lateral to the service pole the customer must furnish and install the following:

1. A non-metallic 90^{o} bend at the base of the pole when a duct or conduit system is installed; and
2. A four inch (4") or smaller PVC Schedule 40 pipe riser (see drawing 616). The first ten feet (10') section of conduit must be secured to the pole every twenty-four inches (24") with 2-hole conduit straps. (**Please note, U-Guard is no longer accepted**.); and
3. Sufficient lengths of cable for the Company to make connections to secondary conductors or terminals of pole-mounted transformer.
   - Obtain cable length information from Engineering and Construction Planning
   - The cable is to be coiled and attached to the pole at the top of the cable riser guard (See drawing 616 and 676)

E. If the service pole is not adjacent to or on the customer's property, contact Engineering and Construction Planning.

F. Service laterals with more than two sets of conductors per phase ***OR*** with conductors larger than 500 KCMIL in size will require the installation of an underground pull box or pedestal and associated conduit system to utility pole. Contact Engineering and Construction Planning for assistance.

NETWORK AREAS (DOWNTOWN CINCINNATI)

G. Underground service laterals generally will be furnished, installed, owned and maintained by the Company in the customer installed duct system. Contact Engineering and Construction Planning for details.

H. The service lateral will be installed to the customer's premises, and will generally terminate in a service entrance junction box furnished by the Company and installed by the customer. This is the service point.

I. The Company will make the final connections to the customer's wiring in the service entrance junction box.

J. Services consisting of three or more conductors per phase may be terminated individually on each end with cable limiters. For further information contact Engineering and Construction Planning.

SERVICES OVER 600 VOLTS

313. General

Engineering and Construction Planning must be consulted early in the customer's planning for services over 600 volts so the Company may prepare drawings and have sufficient time to order equipment. The customer must provide one-line service diagrams and switchgear drawings to the Company.

GROUNDING

314. Grounding Of The Customer's Service

Service entrance wiring with a neutral must have the neutral grounded. Grounding of all electric services and equipment must be in compliance with the NEC and meet the requirements of the certified electrical inspector serving the customers geographical area.

315. Grounding Electrode Conductor Installation

A. The grounding electrode conductor can be routed through the metering equipment. Connections may be made in self-contained meter sockets only if equipped with proper grounding lug. No connections shall be made in current transformer cabinets serving less than three main disconnects.

B. Grounding electrode conductor shall be installed per the NEC.

316. Grounding Connection to A.C. Wiring

The grounding electrode conductor and the grounded service neutral conductor must be connected to the neutral/grounding bus of the service switch or service panel board. The grounding electrode conductor must be installed in accordance with articles 314 and 315 above and with the NEC.

317. Grounding Of Meter Test Device Cabinets Or Transformer-Rated Meter Sockets To Meter Transformer Cabinets

A. Service installations of 600 volts or less must be grounded as follows:

1. When metallic conduit system is used, grounding can be obtained by proper bonding at both ends of the conduit run; or

2. When non-metallic conduit is used, grounding can be obtained by running a #10 AWG bare or green insulated copper conductor in the metering conduit. It must connect to customer furnished grounding connectors in the test device cabinet or transformer rated meter socket and the metering transformer cabinet; and

3. All metering equipment enclosures must be bonded to the main service disconnects.

B. On service installations greater than 600 volts, a separate grounding conductor of #4 AWG bare or green insulated copper must be installed from the customer furnished grounding connector in the test device cabinet or meter enclosure to the electric system grounding electrode. This conductor must not be run in the metering cable conduit.

TRANSFORMER/EQUIPMENT INSTALLATIONS

318. Installations On Customer's Premise

A. It may be necessary for the customer to provide space at a mutually acceptable location on their Premises for Company transformers/equipment. Contact Engineering and Construction Planning for further information.

B. Space requirements and specifications for various types of transformer/equipment installations can be obtained from Engineering and Construction Planning. Installations must conform to the requirements of the NEC, NESC, State and local requirements, and Company requirements.

C. The customer must maintain the area around the Company's transformer/equipment and keep the area free from obstruction so the Company has satisfactory access for installation, operation, maintenance, and removal of its equipment. The Company will not be responsible for damage to any obstruction. (See drawings 670 and 672)

D. When transformers and/or equipment are located in areas where there is vehicular movement, protective barriers will be required. Contact Engineering and Construction Planning for details.

E. Storage of flammable gases, fluids, or other substances in the area adjacent to the Company's transformer/equipment is prohibited.

F. For specific information see the drawings in Section 6 of this manual.

319. Transformer Vaults

Architects, engineers, and contractors must contact Engineering and Construction Planning and supply drawings early in the course of planning transformer vaults so the Company may prepare drawings and have sufficient time to order equipment.

A. The vault must be constructed by the customer to conform to all requirements of the NEC, NESC, state and local requirements, and to specifications issued by the Company. The vault will be inspected and approved for compliance with the NEC by the lawfully designated electrical inspector for the geographical area. The designated Company representative will approve the vault prior to the installation of Company equipment.

B. The Company will install all wiring inside transformer vaults. The customer's service bus duct must be extended into the vault and the Company will provide the connection between the transformer and the bus duct. If the customer installs cable services, a sufficient length of cable must be supplied to reach the secondary terminals of the transformer(s).

C. Specific authorization from the Company is required by anyone desiring to work inside the vault after the Company equipment has been installed. Contact Engineering and Construction Planning for additional information.

D. The electric meter and equipment must be located outside the transformer vault.

E. Any customer-owned equipment that is to be located inside the vault (i.e. sprinkler heads, etc.) must be approved by Engineering and Construction Planning before it can be installed. The Company reserves the right to limit the type of customer-owned equipment that will be permitted inside the vault.

320. Drawings

Drawings are contained in Section 6 covering various customer installation requirements.

Section 4

CUSTOMER EQUIPMENT

400. General

The Company will make permanent connections between the customer's electric service wiring and the Company's system. Unauthorized connections are not permitted (see drawings in Section 6).

Unless authorized by the Company, which shall be at the Company's sole discretion, metering equipment will not be used as connection points for circuits or services added to the installation after the original service has been approved and energized.

Except for installations outlined in section 312D, no customer-owned equipment will be permitted on any Company-owned pole without prior approval from Company, which shall be at the Company's sole discretion.

401. Metered and Unmetered Wiring

A. Unmetered conductors will not be permitted in any wiring raceway, pullbox, or distribution cabinet containing metered conductors.

B. No pullbox, distribution cabinet, wire trough, etc., will be permitted in raceways containing unmetered conductors unless provisions are made by the customer for sealing by the Company. Provisions for padlocking will be required on some installations.

402. Service Entrance Disconnecting Device

A. Service ampacities will be limited to 3000 amps per transformer. Customer must contact Company's Engineering and Construction Planning department for installations over this limit.

B. All service equipment must be rated for the available fault current on the Company's system. Information regarding the available fault current can be obtained from Company's Engineering and Construction Planning department.

403. Standby Generators / Uninterruptible Power Supply

No other source of electricity can be connected to the customer's wiring system without transfer equipment to prevent feedback into the Company's system. Engineering and Construction Planning must be contacted a minimum of 90 days in advance to allow time for engineering review and approval.

404. Parallel Operation Of Customer Generation / Cogeneration

No other source of electricity can be connected to the customer's wiring system that results in parallel operation with the Company's system unless prior written authorization has been received from the Company. Please contact the Company's Customer-Owned Generation contact at 1-866-233-2290. The Company provides technical requirement booklets to assist customers and their representatives in planning and operating customer generation on the Company system. Engineering and Construction Planning must be contacted a minimum of 90 days in advance to allow for engineering review and approval.

MISCELLANEOUS CONNECTED EQUIPMENT

405. General

The Company will not be responsible for any customer equipment that causes objectionable voltage fluctuations. The operations of any customer equipment causing objectionable voltage fluctuations on the Company's system will not be permitted and such customer equipment may be disconnected.

406. Radio And Television Interference

Electrical-contacting devices (i.e., thermostatic flashers, X-ray machines, multi-phase rectifiers, or other similar equipment) that radiate high frequency waves on the Company's electric distribution system must be equipped, at the customers cost, with filters or other means to prevent radio or television interference.

407. Computers And Other Sensitive Electronic Equipment

Minor voltage fluctuations and momentary outages on utility or customer distribution systems are normal and might adversely affect the operation of sensitive electrical loads. Installation of

supplementary equipment, at the customer's expense, may be necessary to assure satisfactory operation.

408. Auto-Transformers

If an auto-transformer is required, Engineering and Construction Planning must authorize its use in advance.

409. Step-Bus Installation

When an unusually large number of service lateral conductors are being installed, a customer-supplied step-bus installation may be required at the service point for connection to the Company's system. Contact Engineering and Construction Planning prior to installation to determine whether a Step-bus installation is required with your specific project.

MOTORS AND CONTROLS

410. Customer Equipment Considerations

A. The Company has certain restrictions on motor starting current in order to limit instantaneous power demands on the distribution system (motor starting current is defined as the locked rotor current when voltage is applied to the motor terminals).

B. If a current reducing starter is used, the motor-starting current is measured on the line side of the starter.

C. Motor-starters should be designed in such a manner that:

1. It cannot rest freely in a starting position that will cause the overload protective devices to be inoperative;

2. In the event of loss of the supply voltage, the motor will automatically be disconnected from the line, or the starting device will be returned to the starting position.

D. The use of a time-limit under-voltage release for motors on important applications should be considered because of the rapid reclosure of the Company's circuit breaker.

E. All motors should be protected by the customer from damage caused by continued operation at under-voltage and/or single phasing of three-phase motors.

F. Protection should be installed if phase reversal or single-phase operation may cause damage to three-phase motors.

411. 120/240 Volts Single-Phase Service Voltage

A. Motor starting currents should not exceed the values shown in Table I. These starting current limitations apply to the sum of the starting currents of all motors on the appliances that are started at the same time.

TABLE I
Permissible Starting Current for Single Phase Motors

MOTOR RATING			MAXIMUM STARTING AMPERES	
Volts	HP	BTUH*	3 Starts or Less Per Hour	More Than 3 Starts Per Hour
120	2 or less	12,000	50	30
230	2	20,000	60	60
230	3	27,000	80	70
230	4	33,000	95	80
230	5	40,000	110	90

* The BTUH applies to air conditioners rated in British Thermal Units Per Hour

B. Single-phase motors larger than five (5) horsepower require approval from Engineering and Construction Planning.

412. Three-Phase Service Voltages (Other Than Downtown Cincinnati Network System)

A. Motor installations of seven and one half (7.5) horsepower and larger are normally supplied by a three-phase service. No motor installation will be permitted that causes disturbances on the Company's system.

B. Three-phase motor-starting currents drawn from the Company's system should not exceed the values shown in Table II or III. At locations where there is a large service ampacity in proportion to the individual motor proposed, these table values might be exceeded.

C. The Table-I values may be exceeded on an individual motor, for group motor installations, if the starting current does not exceed the maximum listed current for the largest motor of the group. Written approval for such installations must be obtained from Engineering and Construction Planning.

D. When motors of fifty (50) horsepower and larger are proposed, inquiry must be made to Engineering and Construction Planning regarding the Company's capacity to serve the motor, the starting current permitted, and possible starting restrictions. Engineering and Construction Planning must approve, in advance, the use of fifty (50) or more horsepower. The customer will be responsible for any failure to contact and obtain approval from Engineering and Construction Planning.

TABLE II

Permissible Starting Currents (Three-Phase Motors)

Nominal Service Voltage	208Y / 120		240/120		480Y / 277	
Rated Motor Voltage	200 (208)*		230		460	
Rated H.P.	Approx. Full Load Amp. Per Terminal	Maximum Amps Locked Rotor	Approx. Full Load Amp. Per Terminal	Maximum Amps Locked Rotor	Approx. Full Load Amp. Per Terminal	Maximum Amps Locked Rotor
5	17.5	103	15.2	90	7.6	45
7 ½	25	152	22	132	11	66
10	32	186	28	162	14	84
15	48	276	42	240	21	120
20	62	359	54	312	27	156
25	78	442			34	192
30	92	538			40	234
40	120	718			52	312
50	150	862			65	378
60	177	1035			77	450
75	221	1276			96	558

* Parenthetical value is former design

TABLE III

Maximum Ratio of Starting Current to Full Load Current for Hermetic Equipment with Three-Phase Motors

Full Load Current at 240 Volts	3 Starts or Less Per Hour	More Than 3 Starts Per Hour
20 Amps or Less	6:1	4.5:1
More Than 20 Amps	5:1	3.5:1

413. Three-Phase, Four-Wire Voltage (Downtown Cincinnati Network)

A. Motors connected to the Company's three-phase, four-wire, 208Y/120 volt network distribution system are subject to the following requirements:

1. Single-phase motors may be operated on 120-volt circuits providing the starting current does not exceed the values given in Article 411(A); and

2. Single-phase motors having starting currents in excess of the value given in Article 411(A) must be operated on 208-volt circuits (the starting current of 2 horsepower and smaller motors must not exceed 60 amps); and

3. All motors of 3 horsepower or larger must be three-phase, suitable for operation on 208 volt three-phase circuits.

B. Permissible Starting Current:

1. Where total motor and other loads create an estimated 15 minute maximum demand of 100 kilowatts or less, the maximum permissible locked-rotor current of any motor should not exceed 100 amps.

2. Where total motor and other loads create an estimated 15 minute maximum demand greater than 100 kilowatts but less than 300 kilowatts, the maximum permissible locked-rotor current of any motor should not exceed a value of 1 amp per kilowatt of demand.

3. Where total motor and other loads create an estimated 15 minute maximum demand greater than 300 kilowatts, the allowable locked-rotor value must be obtained from Engineering and Construction Planning.

C. The customer must install a starting device if the locked-rotor current exceeds maximum permissible values.

D. Starting devices having only two steps should be designed and operated so that the inrush currents do not exceed allowable values on either the starting or running tap.

E. Starting devices having more than two steps must not open the starting circuit at any time during the starting period.

F. For motors operated through transformers, other than 208 volts, the starting current is measured on the 208-volt side of the transformer.

G. Questions concerning group starting of motors must be referred to Engineering and Construction Planning.

414. Harmonic Currents

Harmonic currents (defined as a measure of the level of distortion in current or voltage waveforms) can cause damage to Company equipment or reduce the quality of service provided by the Company to other customers. The customer is required to meet the harmonic current distortion limits in the most recent version of IEEE 519.

For additional information please contact the Power Quality Department of Duke Energy at 1-800-544-6900.

Section 5

ELECTRIC METER INSTALLATIONS

500. General

Removal, relocation, or performing any work on an electric meter without the Company's permission is prohibited. Tampering with the Company's metering equipment, making an unmetered connection, or making an unauthorized reconnection to the Company's system is prohibited. The penalties for such activities may include but not limited to fines and imprisonment.

A. Before ordering or installing electrical metering equipment please obtain, from Engineering and Construction Planning, available information for establishing system types and service voltage.

B. Certain types of customer installations require special metering. These include, but are not limited to:

1. Bus-bar installations of all ampacities; and
2. Service ampacities exceeding 1200 amps; and
3. Service voltages over 600 volts; and
4. All metering other than standard self-contained type; and
5. Multiple services; and
6. Multiple occupancy and/or multi-story buildings; and
7. Underground service laterals terminating in metering compartments; and
8. Mobile homes or mobile offices; and
9. Pulse sending meters (e.g, power factor, load management) ; and
10. Preassembled metering units.

C. Customers should discuss any of the above-proposed installations with Engineering and Construction Planning prior to any installation activities in order to permit Engineering and Construction Planning to make recommendations and to allow sufficient time to order special equipment.

501. Metered And Unmetered Wiring

A. The service ampacity and service voltage determines the type of meter installation. Service equipment and metering apparatus should conform to the arrangements shown on the Drawings of Section 6. Customers should familiarize themselves with the metering requirements of these typical installations.

B. Current and voltage transformers are used for metering all 480 volt 3 - wire installations, and all installations of 600 volts and higher.

C. All metering poles and the poles' hole must be inspected and approved by a designated Company representative before they are installed. **The pole must be a new, fully treated, minimum twenty five (25') foot, class seven (7) wood pole**. The metering pole location, height, class, and depth of setting and guying must be checked and approved before the pole can be installed. For inspections call the Company's Service Installation department at 1-877-700-3853.

502. Metering Equipment (600 Volts Or Less)

The metering equipment will be connected before the customer's main disconnect as described in the National Electrical Code (NEC). The metering equipment should be arranged as shown in drawings of Section 6. For service and metering equipment arrangements not shown call Service Installation at -1-877-700-3853.

503. Self-Contained Metering Installations

A. All self-contained metering sockets are purchased, installed, maintained and owned by the customer. These meter sockets must be submitted by the manufacturer or the manufacturer's representative to the Company in care of the Manager, Meter Operations Services, 424 Gest Street, Cincinnati, OH, for approval of use on the Company's system.

B. The customer will furnish, install and maintain the following:

1. Meter socket (See Meter Base Guidelines, Page v); and
2. Overhead service drop attachment device; and
3. Service entrance conductors in raceways or cable assemblies; and
4. Underground Service laterals; and
5. Connections to the meter socket terminals or preassembled unit bus bar connectors; and
6. Service disconnecting device; and
7. Service equipment board where required (See article 508A) ; and
8. Service grounding system; and
9. Meter blanks for installations requiring more than 4.

C. The Company will furnish, install and maintain:

1. Overhead service drop; and
2. Connectors for the underground service lateral to the Company's facility; and
3. Electric meter; and
4. Up to 4 meter blanks.

504. Instrument Transformer Metering Installations

A. Where a single-customer is served from a three-phase pad-mounted transformer installation, contact Engineering and Construction Planning for metering equipment details (see drawing 635).

B. All connections to the instrument transformers should be accessible from the top or front. Connectors should not be installed back to back so that any of the connectors are facing the back of the instrument transformer enclosure.

C. The customer will furnish, install, and maintain the following:

1. Service entrance conductors or underground service laterals; and
2. Service disconnecting device(s); and
3. Service equipment board where required; and
4. Indoor or outdoor rain tight metal cabinet with 2 doors for enclosing the instrument type transformers; and
5. Conduit for metering cables from instrument transformer cabinet to the metering enclosures or transformer rated meter socket; and
6. All service grounding and bonding; and
7. All required insulated supplemental cable supports inside instrument transformer cabinets as required; and
8. All connectors on the line and load side of current transformers when connecting four or more conductors per phase to each current transformer; and
9. Primary (line side) conductors and connections to the current and voltage transformers on 2400 volt and higher installations; and
10. One ¾ inch, non-metallic conduit for pulse cable. This installation must be accessible to a telephone line (Contact Engineering and Construction Planning for specifics).

D. The Company will furnish and maintain and the customer will install the following:

1. Instrument transformers; and
2. One, two, or three-barrel connectors when the line and load side conductors are three (3) or less per phase to each current transformer; and
3. Transformer-rated meter socket

E. The Company will furnish, install, and maintain the following:

1. Overhead service drop; and
2. Connectors for the underground service lateral to the Company's facility; and
3. Electric meter; and
4. Cable and connections from the instrument transformer enclosure to the transformer rated meter socket.

F. All conductors must be installed to minimize mechanical stress on the current transformers.

G. Contact Engineering and Construction Planning whenever it is proposed to mount the voltage and/or current transformers in switchgear.

505. Meter Locations

A. Some municipalities have ordinances that restrict the placement of meters on the front or street side of residential buildings.

B. The location of the meter must be approved by Engineering and Construction Planning in advance of the installation or placement of any meter and before the Company will make the service connection. At some locations the Company may require the customer to install guards or enclosures to protect the Company's metering equipment from damage. The customer is responsible for any loss and /or damage of the Company's meter(s) on customer's Premises.

C. The meter for a new single-family residential service must be located outside the building at a location approved by the Company. Normally the meter socket should be 4 ½ feet to 5 ½ feet above finished grade. On underground installations, with prior approval, the height may be reduced to three feet (3) on center of the meter socket above finished grade.

****For meter installations in a Floodplain contact the geographical areas certified inspection agency for height requirements. Additional requirements may be needed for company to access meter. Contact Engineering and Construction Planning for details.**

For multiple occupancy residential, commercial, and industrial installations contact Engineering and Construction Planning.

D. Electric meters and associated equipment will not be installed; in store show windows, directly under any window, in restrooms, under or behind pipes, valves, steam traps, or other obstructions; or close to motors, drive belts, other rotating machinery, or in any other place where they will be subject to vibration. Metering equipment should not be located where exposed to gases, fumes, vapors, liquids, or other agents having a deteriorating effect on the equipment, or where exposed to excessively high temperatures.

E. A clear space at least 3 feet wide, 4 feet deep and 8 feet high must be provided and always be available in front of every meter for reading, inspecting, testing, and maintenance operations.

F. Electric metering equipment will not be permitted inside a transformer vault or attached to utility-owned pole or equipment. The metering equipment location must be approved by Engineering and Construction Planning.

G. The electrical contractor should be familiar with the work of other construction crews on the Premises so that the electric service system and electric meter installation will not be obstructed. Examples of possible obstructions are plumbing, HVAC, or other building structures.

506. Arrangement Of Meters

Multiple meter sockets must be grouped and permanently identified to show which unit is served through each meter position. The Company will not be responsible for any billing errors including those resulting from improperly identified meter positions. Exceptions to the grouping requirement may be permitted for; duplex units with dual ownership, multi-story buildings 6 floors or higher or where separate services are permitted by the National Electrical Code (NEC). Contact Engineering and Construction Planning for approval of locations.

507. Information To Appear On The Service Equipment

A. Permanent marking or identification should be approved by Company as acceptable and must be on the customers metering equipment and cover of the disconnecting device(s) with the address of the location being served.

a. Numerals or letters of durable paint or laminated plastic and metal tags fastened securely are types of acceptable permanent identification. The use of marking pens, embossed tape, gummed stickers, paper tags, crayons, chalk or marking scratched or stamped into the enamel finish of the enclosures will not be approved by Company.

B. Where multiple services are installed or where service disconnecting device(s) are located remotely from the meter, the meter socket cover and disconnecting device(s) must be permanently marked with the phase(s), voltage, and address of the location being served.

508. Service Equipment Board – Construction & Installation

A. If a service equipment board is used on metering installations requiring instrument transformers, the board must:

1. Be constructed of clear, soft, dressed lumber or plywood, at least ¾ inch thick; and
2. Be fastened rigidly to a wall of brick, stone, concrete, or similar solid and vibration free construction with an air space of not less than one inch (1”) between the board and the wall; and
3. Be painted with a good grade of paint; and
4. Not be suspended from joists or the ceiling.

B. The metering and service equipment must be installed in accordance with the Drawings of Section 6.

C. The metering equipment must be installed in a true vertical position.

509. Meters and Connections

A. Meters will be furnished, installed, and maintained by the Company. The Company will install and seal them at the time the service connection is completed.

B. Metering equipment must not be disconnected, removed, or relocated without the permission of Engineering and Construction Planning.

C. No more than one conductor may be attached to a single conductor lug or terminal associated with the metering equipment.

D. The customer is responsible for properly installing and making the primary connections to the Company's current and voltage transformers on transformer-type metering installations (See article 504C). The customer must not, under any circumstances, make secondary connections or disturb the short-circuiting strap attached to the Company's current transformers.

E. All unmetered wiring on the customer's Premises must be installed in sealable enclosures or sealable service-entrance raceways. On transformer-type metering installations, a separate direct conduit, without junction boxes, must be installed for the metering cable from the metering transformer cabinet to the test-device cabinet or transformer-rated socket. **Switchgear or bus bar installations will require metering cable conduit to terminate near the front of the metering transformer cabinet**. This is to avoid obstructing the pulling of metering cable after the service wiring has been completed.

F. The electric meter should be located as close as possible to the metering transformer cabinet.

G. The metering conduit:

1. Must not exceed twenty five feet (25') in length, including conduit bends. If dimension cannot be met, contact Engineering and Construction Planning ; and

2. Must be a single two inch (2") metallic or non-metallic conduit (Padmount metering conduit must be non-metallic, see Dwg 635), or,

3. Two 1 ½ inch conduits in place of the single 2 inch conduit; and

4. Should have a maximum of four (4) 90^{o} bends in the run; and

5. Must contain a pulling string.

H. Company personnel will make final connection of the customer's service equipment to the Company's system.

510. Metal Cabinets To Enclose Metering Transformers

A. The customer must furnish, install, and maintain metal cabinets for enclosing current (CT) and voltage transformers (VT) (see article 504).

B. The cabinet material, corrosion protection, and painted finish must comply with the National Electric Manufacturers Association (NEMA) and Underwriters Laboratory (UL) standards for outdoor enclosures for electrical equipment. Outdoor cabinets must be rain-tight with a rain lip on the top edge above the door openings.

C. The cabinet must be either:

1. Mounted on 7/8" uni-struts between the wall and back of the cabinet, or

2. Mounted directly to the wall if 7/8" uni-struts are placed on the inside of the cabinet to mount the CTs or

3. Mounted directly to the service equipment board if one is used.

D. Metering transformers installed in metal cabinets:

1. Must be replaceable from the front of the cabinet without disturbing the remainder of the metering assembly or equipment mounting board; and

2. Are not permitted to be attached with bolts and nuts that extend outside the back of the metal cabinet; and

3. May be installed on 7/8" uni-struts mounted with ¼ X 20 bolts and spring nuts or mounted with ¾" 10-32 self-tapping TEK screws (depth requirements must be considered when installing uni-strut material); and

4. If the current transformer cabinet is supplied with a standoff mounting plate, the current transformers must be mounted directly to this plate without the use of uni-struts.

E. The top of the metering transformer cabinet should not be mounted more than seven feet (7') above the floor level.

F. The bottom of the metering transformer cabinet should be mounted a minimum of four inches (4") above the floor level.

511. Specifications For Metal Cabinets To Enclose Metering Transformers For Installations Not Exceeding 600 Volts Or 1200 Amps

A. Metal cabinets for enclosing current and voltage transformers must be provided by the customer. The size and type of installations stated in Table IV represent the minimum requirements for proper clearances and working space inside the cabinets. These sizes are adequate for normal installations. Larger cabinets are required when additional wiring space is required.

B. Doors must be attached at the side of the cabinet with non-removable pins and hinges and have a tamper resistant padlock hasp. They also should have provisions for sealing the doors in place with approved Company padlock-type seals. The method of sealing must satisfy the following conditions:

1. Hinged doors; and
2. No special wrenches or tools will be required to open or close doors; and
3. The doors must be held firmly against the edge of the enclosure with non-removable studs and wing nuts at the top and bottom of the door; and
4. The opening for the padlock on the hasp must be at least ½" diameter.

C. The construction of metal cabinets is subject to approval by Engineering and Construction Planning.

TABLE IV
Current Transformer Cabinets

Phase	Wire	Volts	Service Ampacity Amps	No. of Current Transformers	Inside Size of Cabinets, Inches (Min.) W x H x D	U.S. Gauge of Sheet Steel (Minimum)
1	3	120 / 240	Over 400 to 1200*	2	32 x 24 x 10	14
3	4	240/ 120	Up to 300	3	32 x 24 x 10	14
3	4	208Y / 120	Over 400 to 1200*	3	44 x 30 x 10	12
3	4	480Y / 277	Up to 200	3	32 x 24 x 10	14
3	4	480Y / 277	Over 200 to 1200*	3	44 x 30 x 10	12

* For services having ampacities exceeding 1200 amps contact Engineering and Construction Planning

Section
6

SYSTEMS OF DISTRIBUTION

600. Drawings

The following drawings 600 to 678 give general specifications for standard metering installations.

For any case not specifically covered by the drawings in this section, Power Delivery must be contacted for detailed information.

INDEX OF DRAWINGS

SINGLE-PHASE 120/240 VOLT

THREE-PHASE, FOUR-WIRE

THREE-WIRE – 208Y/120 VOLT

GENERAL INFORMATION

TEMPORARY INSTALLATIONS

SERVICE DROP CLEARANCES

POST TYPE METERING

600

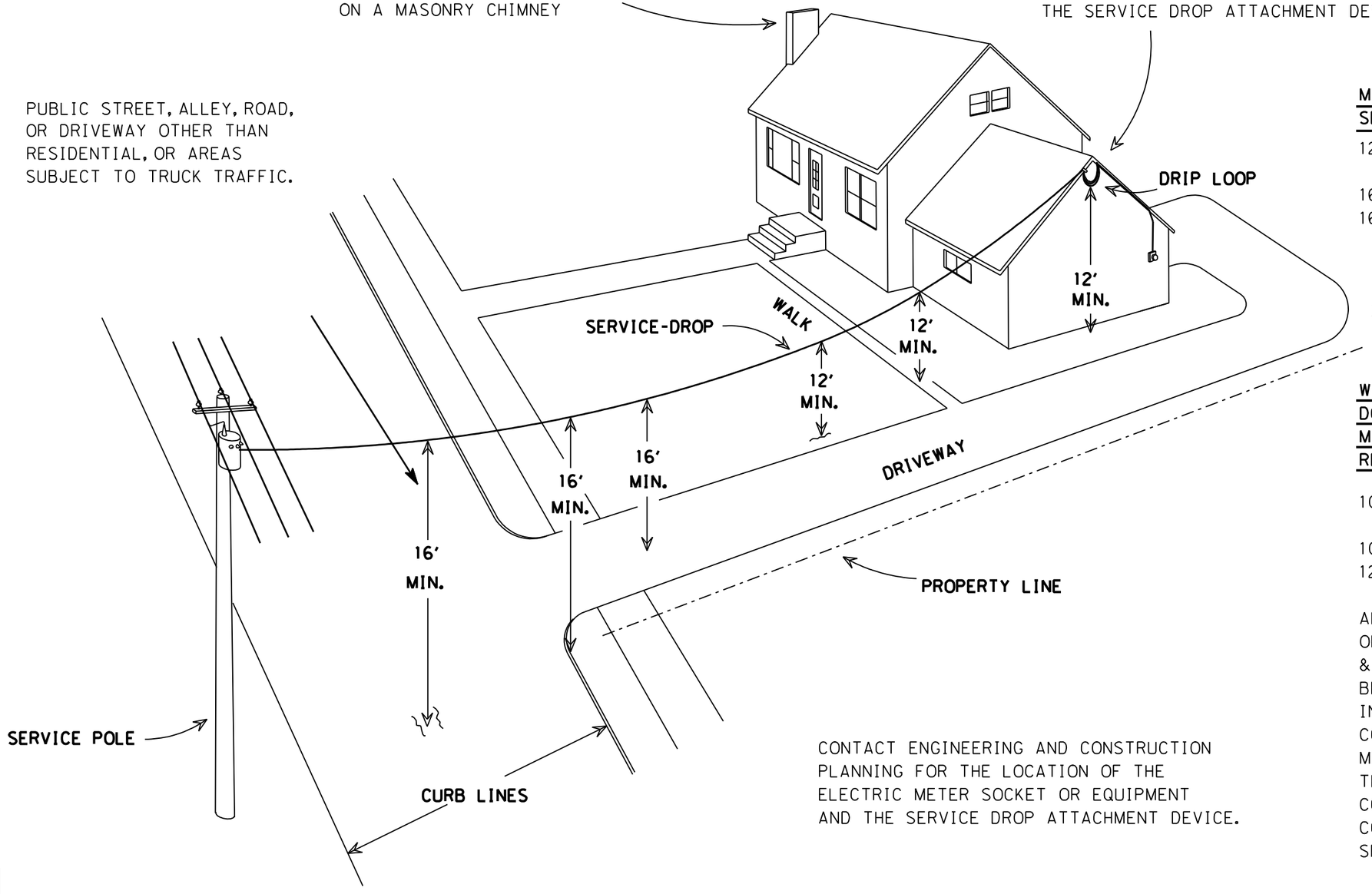
REVISED 9/13

SERVICE DROP CLEARANCES

THE SERVICE DROP ATTACHMENT DEVICE MUST NOT BE INSTALLED ON A MASONRY CHIMNEY

ALL CLEARANCES SHOWN ARE MINIMUM VERTICAL GROUND CLEARANCES OF THE LOW POINT OF SAG IN THE SERVICE DROP CONDUCTORS OR LOW POINT OF DRIP LOOP. THE SAG MUST BE CONSIDERED WHEN INSTALLING THE SERVICE DROP ATTACHMENT DEVICE

PUBLIC STREET, ALLEY, ROAD, OR DRIVEWAY OTHER THAN RESIDENTIAL, OR AREAS SUBJECT TO TRUCK TRAFFIC.



CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR THE LOCATION OF THE ELECTRIC METER SOCKET OR EQUIPMENT AND THE SERVICE DROP ATTACHMENT DEVICE.

MINIMUM CLEARANCES OF ALL SERVICE DROP CONDUCTORS:

12 FEET-OVER FINSHED GROUND (LAWN), REDIDENTIAL SIDEWALKS.
16 FEET-OVER RESIDENTAIL DRIVEWAYS
16 FEET-OVER PUBLIC STREETS, ALLEYS, ROADS, COMMERICIAL DRIVEWAYS, PARKING LOTS, OR AREAS SUBJECT TO TRUCK TRAFFIC.
3 FEET-HORIZONTALLY FROM WINDOWS, DOORS, PORCHES, DECKS, FIRE ESCAPES, OR SIMILAR LOCATIONS.

WHERE THE HEIGHT OF A RESIDENTIAL BUILDING DOES NOT PERMIT THE SERVICE DROP TO MEET THESE VALUES, THE CLEARANCES MAY BE REDUCED TO THE FOLLOWING:

10.5 FEET-OVER FINSHED GROUND (LAWN), REDIDENTIAL SIDEWALKS.
10.5 FEET-TO INSULATED DRIP LOOP
12.5 FEET-OVER RESIDENTAIL DRIVEWAYS

ALL OTHER CLEARANCE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE & GOVERNMENTAL AUTHORITIES MUST BE INCLUDED FOR APPROVAL OF THE INSTALLATION.
CONSIDERATION SHOULD BE GIVEN TO MINIMUM CLEARANCE REQUIRED FOR TELEPHONE AND CABLE TELEVISION COMPANIES. ADDITIONAL CLEARANCES COULD BE REQUIRED TO PROVIDE SPACE FOR OTHER UTILITIES.

601

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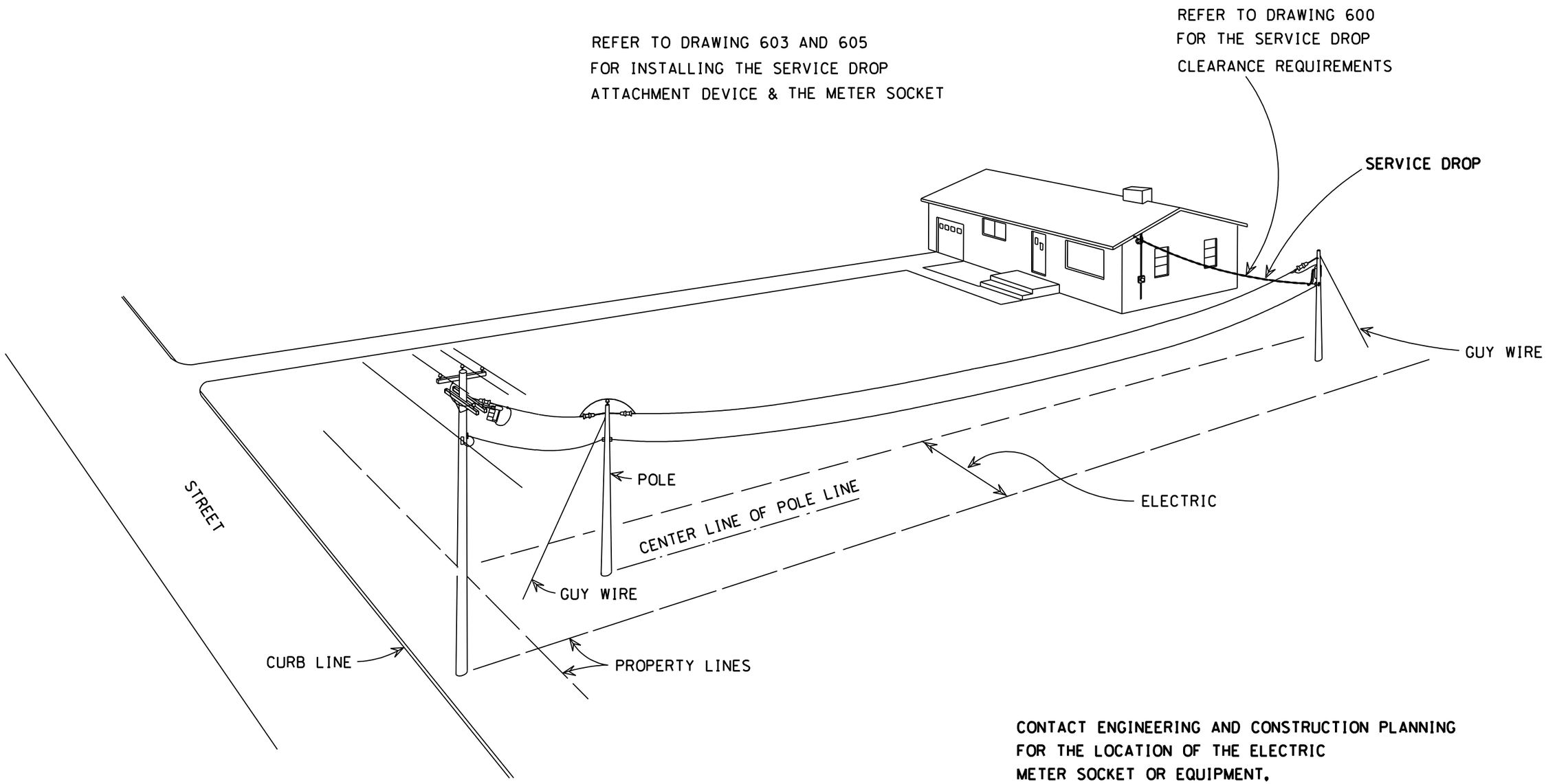
TYPICAL OVERHEAD LINE EXTENSION



CONTACT ENGINEERING AND CONSTRUCTION PLANNING
FOR THE LOCATION OF THE ELECTRIC
METER SOCKET OR EQUIPMENT,
SERVICE POLES AND THE SERVICE DROP
ATTACHMENT DEVICE.

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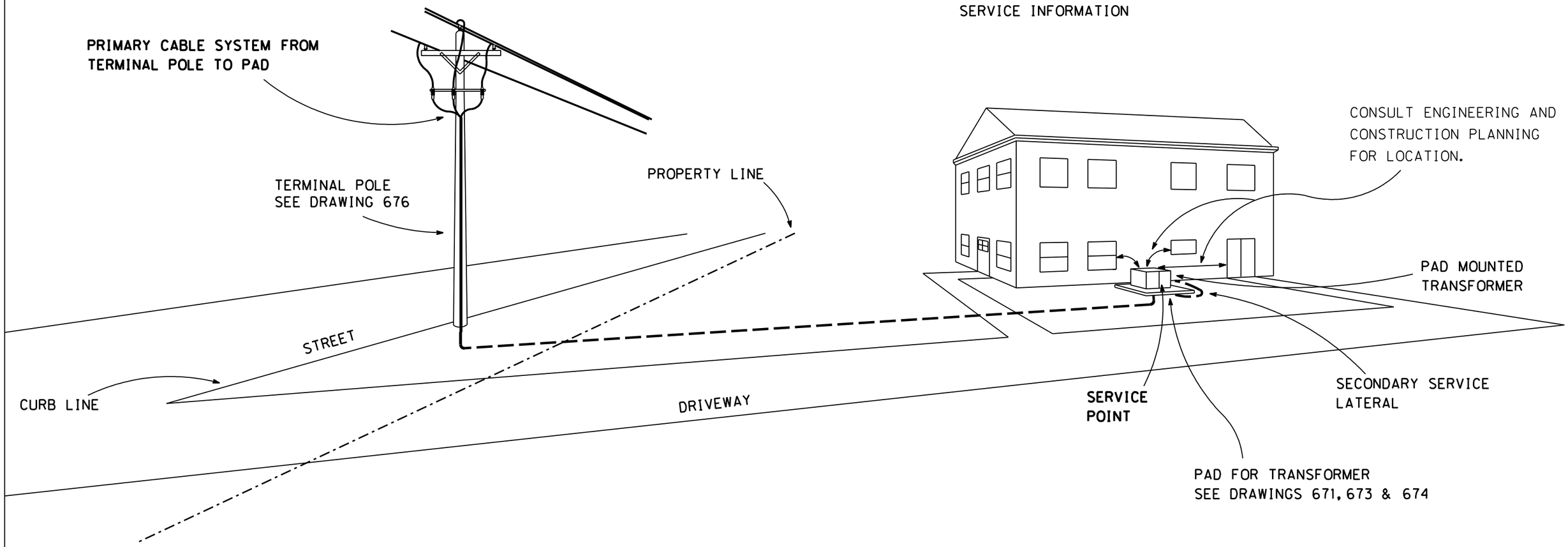
602

REVISED 9/13

TYPICAL INSTALLATION USING PAD MOUNTED TRANSFORMER

REFER TO ARTICLES 311 & 312 FOR SERVICE INFORMATION



CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR THE LOCATION , SIZE , CONSTRUTION DETAILS AND VEHICULAR PROTECTION REQUIRED WHEN INSTALLING A PAD FOR A PADMOUNT TRANSFORMER. REFER TO DRAWINGS 670, 671, 672, 673, 674 & 675

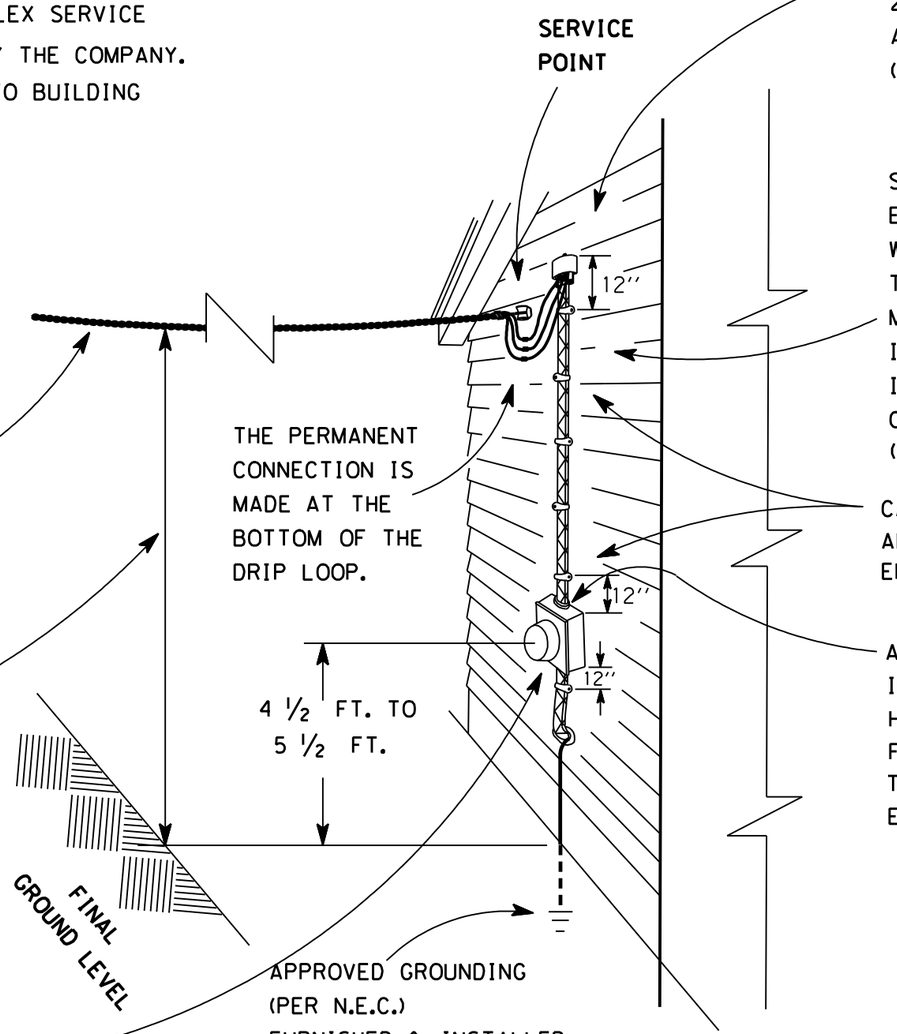
✳ PLEASE NOTE: THERE ARE CLERANCE REQUIREMENTS FOR THE TRANSFORMER LOCATION FROM DOORS, WINDOWS, ETC. PLEASE CONSULT WITH POWER DELIVER FOR EXACT CLERANCES.

603

REVISED 9/13

SERVICE CONTACT BELOW THE ROOF LEVEL TO RESIDENTAIL SERVICE-ENTRANCE CABLE

ONLY ONE SERVICE ATTACHMENT DEVICE IS REQUIRED FOR A TRIPLEX SERVICE DROP. THE TYPE OF SERVICE ATTACHMENT DEVICE IS SPECIFIED BY THE COMPANY. THE SERVICE ATTACHMENT DEVICE MUST BE SECURELY ATTACHED TO BUILDING STUDS OR OTHER PARTS OF THE BUILDING STRUCTURE. ALL SERVICE ATTACHMENT DEVICES ARE FURNISHED & INSTALLED BY THE CUSTOMER REFER TO 604 FOR SERVICE ATTACHMENT DEVICE INSTALLATION.



WEATHER-HEAD MUST BE INSTALLED ABOVE & WITHIN 2' OF THE SERVICE DROP ATTACHMENT DEVICE (SEE ARTICLES 305A & 306)

SERVICE-ENTRANCE CONDUCTORS MUST EXTEND AT LEAST 3' FROM THE WEATHER-HEAD FOR FORMING THE DRIP LOOP. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST HAVE NATURAL WHITE OR GRAY INSULATION OR BE STRIPPED OF INSULATION THE ENTIRE LENGTH OUTSIDE OF THE WEATHER-HEAD. (SEE ARTICLE 310)

CABLE STRAPS 30'' APART MAXIMUM AND 12'' MAX ON EACH TERMINATION END.

A WATER-TIGHT CONNECTOR MUST BE INSTALLED IN THE METER SOCKET HUB. SILICONE SEALANT, IF REQUIRED, IS TO BE FORMED AROUND THE CABLE ON TOP OF THE CONNECTOR TO PREVENT WATER ENTERING THE METER SOCKET.

SERVICE-DROP AND FINAL CONNECTIONS INSTALLED BY THE COMPANY

THE PERMANENT CONNECTION IS MADE AT THE BOTTOM OF THE DRIP LOOP.

SEE DRAWING 600 FOR CLEARANCE REQUIREMENTS

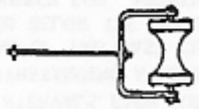
APPROVED GROUNDING (PER N.E.C.) FURNISHED & INSTALLED BY THE CUSTOMER SEE DRAWING 636

FOR METER INSTALLATION IN A FLOOD PLAIN CONTACT THE LOCAL GOVERNING AUTHORITY FOR ADDITIONAL HEIGHT REQUIREMENTS. ADDITIONAL REQUIREMENTS MAY BE NEEDED FOR COMPANY TO ACCESS METER LOCATION. CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR DETAILS.

604

EVISED 2/03

SERVICE CONTACT HARDWARE RECOMMENDATIONS
(FURNISHED AND INSTALLED BY THE CUSTOMER)



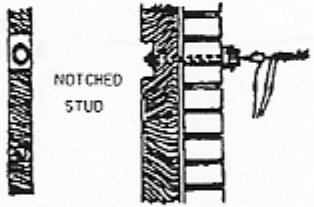
⅝" THRU-WALL BOLT APPROX. 10" LENGTH ONE WIRE RACK FOR BRICK OR FRAME CONSTRUCTION.

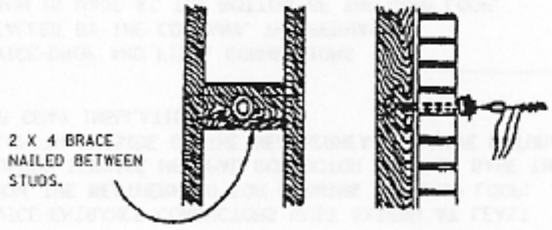
SERVICE WIRE HOLDER FOR FRAME CONSTRUCTION.

SEE DRAWING 600 FOR SERVICE CLEARANCES AND ARTICLE 306 FOR ATTACHMENT REQUIREMENTS

METHOD OF INSTALLATION

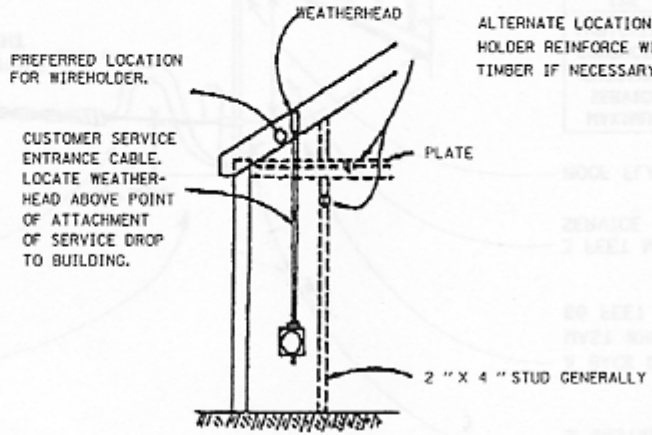
BRICK VENEER





NOTE: DO NOT MAKE CONTACTS ON MASONRY CHIMNEYS.

FRAME



PLAN VIEW

NOTE: WIREHOLDER MUST BE ATTACHED TO A PORTION OF THE STRUCTURE DESIGNED TO WITHSTAND LOADING SUCH AS THE BUILDING FRAME ETC.

605 SERVICE CONTACTS TO A RESIDENTIAL SERVICE MAST

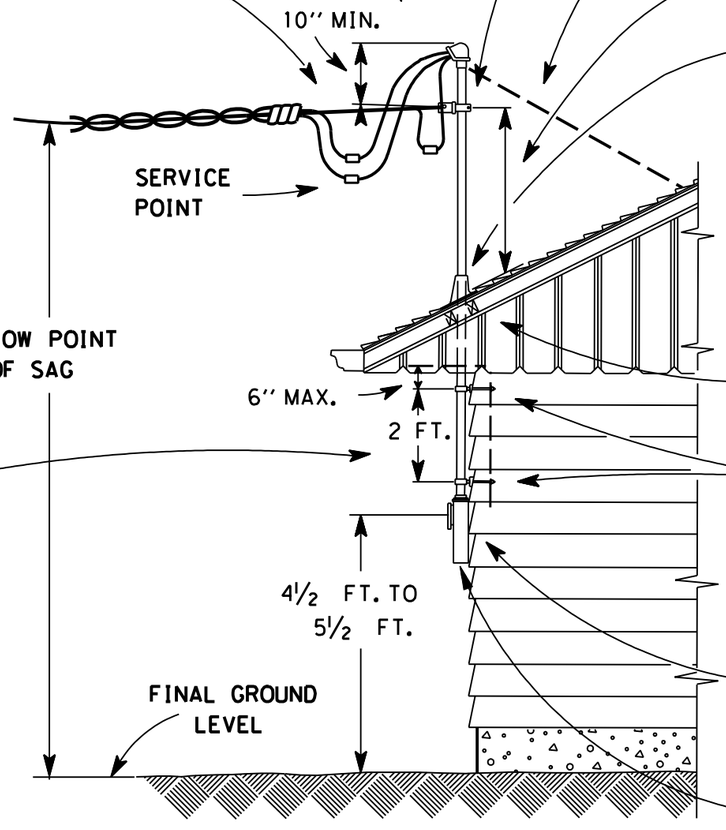
REVISED 9/13

THE SERVICE-ENTRANCE CONDUCTORS MUST EXTEND AT LEAST 3 FT. FROM THE WEATHERHEAD FOR FORMING THE DRIP LOOP. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST BE BARE THE ENTIRE LENGTH OUTSIDE OF THE WEATHERHEAD OR HAVE NATURAL WHITE OR GRAY INSULATION.

THE SERVICE-DROP AND FINAL CONNECTIONS ARE INSTALLED BY THE COMPANY. THE PERMANENT CONNECTION IS MADE AT THE BOTTOM OF THE DRIP LOOP.

SEE DRAWING 600 FOR SERVICE DROP CLEARANCE REQUIRMENTS

A SERVICE MAST USED AS A SERVICE CONDUCTOR RACEWAY MUST BE A MINIMUM OF 2 INCHES OF RIGID STEEL CONDUIT OR INTERMEDIATE METALLIC CONDUIT (IMC) & MUST BE RIGIDLY SUPPORTED AT THE ROOF LINE, AT A POINT NOT OVER 6 INCHES BELOW THE OVERHANG & AGAIN AT A 2 FOOT SPACING BELOW THE TOP MAST CLAMP. WHEN ADDITIONAL MAST LENGTH IS REQUIRED, ADDITIONAL MAST CLAMPS MUST BE INSTALLED AT 2' INTERVALS. EACH SUPPORT MUST BE CAPABLE OF WITHSTANDING A 1200LB. HORIZONTAL TENSION. A MINIMUM OF TWO MAST CLAMP SUPPORTS MUST BE INSTALLED BELOW THE OVERHANG. COUPLINGS, IF REQUIRED FOR ADDITIONAL HEIGHT OF A SERVICE-MAST, MUST BE BELOW THE SECOND SUPPORT FROM THE ROOF LINE. (SEE ARTICLE 305F)



SERVICE ATTACHMENT DEVICE FURNISHED & INSTALLED BY THE CUSTOMER.

A BACK GUY MAY BE REQUIRED ON THE SERVICE MAST WHEN A SERVICE DROP IS LONGER THAN 60 FEET - REFER TO THE TABLE BELOW.

3 FEET MAXIMUM HEIGHT FOR AN UNGUYED 2 INCH SERVICE MAST

ROOF FLASHING KIT REQUIRED

MAXIMUM SERVICE ENTRANCE CONDUCTOR AMPACITIES	TRIPLEX SERVICE DROP SIZE	MAXIMUM SERVICE DROP LENGTHS FOR UNGUYED MASTS	
		2'' CONDUIT	2 ½'' CONDUIT
125	NO. 2	80'	140'
200	NO. 1/0	60'	140'
400	NO. 4/0	80' (MINIMUM 3" CONDUIT)	

SOLIDLY INSTALLED 2'' x 4'' BLOCKS BETWEEN RAFTERS

SERVICE-MAST SUPPORTS ATTACHED TO THE BUILDING WITH TWO ½'' MACHINE BOLTS THROUGH THE WALL ON NEW CONSTRUCTION

THE METER SOCKET IS FURNISHED & INSTALLED BY THE CUSTOMER. IT MUST BE MOUNTED PLUMB.

FOR METER INSTALLATION IN A FLOOD PLAIN CONTACT THE LOCAL GOVERNING AUTHORITY FOR ADDITIONAL HEIGHT REQUIREMENTS. ADDITIONAL REQUIREMENTS MAY BE NEEDED FOR COMPANY TO ACCESS METER LOCATION. CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR DETAILS.

606

REVISED 05/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE METERING OUTDOOR INSTALLATION
(200 AMPERES MAXIMUM WITH SERVICE DISCONNECT INDOORS)

OUTDOOR METER REQUIRED ON ALL NEW INSTALLATIONS
THIS SOCKET IS ALSO AVAILABLE WITH DUAL LOAD SIDE

A WATER-TIGHT CONNECTOR MUST BE INSTALLED IN THE HUB WHEN USING SERVICE ENTRANCE CABLE. SILICONE SEALANT, IF REQUIRED, IS TO BE FORMED AROUND THE CABLE ON TOP OF THE CONNECTOR TO PREVENT WATER FROM ENTERING THE METER SOCKET.

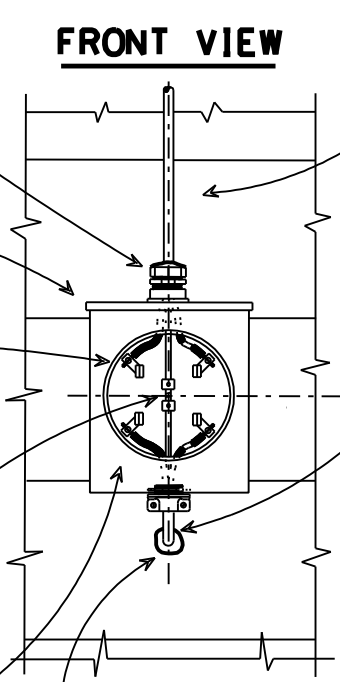
METERING EQUIPMENT AND CONDUCTORS SHOWN ARE FURNISHED AND INSTALLED BY THE CUSTOMER. IT MUST BE MOUNTED PLUMB. ALL OTHER EQUIPMENT & CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER.

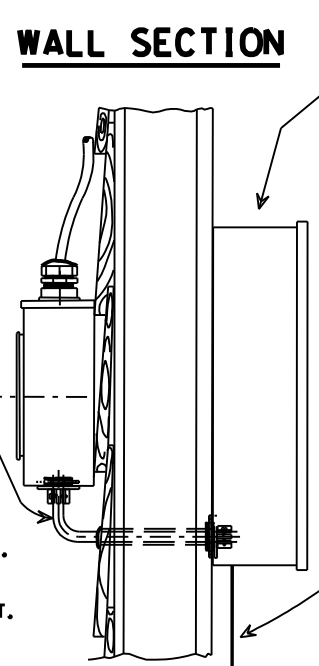
WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

ALL SERVICE CONDUCTOR CONNECTORS IN THE METER SOCKET AND SERVICE DISCONNECT OR SERVICE PANELBOARD SHALL BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

SERVICE ENTRANCE CABLE SHOWN
SERVICE CONDUITS MAY ALSO BE USED
FOR THIS TYPE OF SERVICE





THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

APPROVED GROUNDING
(PER N.E.C.)
(SEE DRAWING 636)

4-1/2 FT.
TO
5-1/2 FT.

FINAL GROUND LEVEL

THE HOLE WHERE THE SERVICE ENTRANCE CABLE OR RACEWAY ENTERS THE BUILDING SHOULD BE SEALED TO PREVENT WATER, RODENTS OR INSECTS FROM ENTERING THE BUILDING.

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607

REVISED 05/13

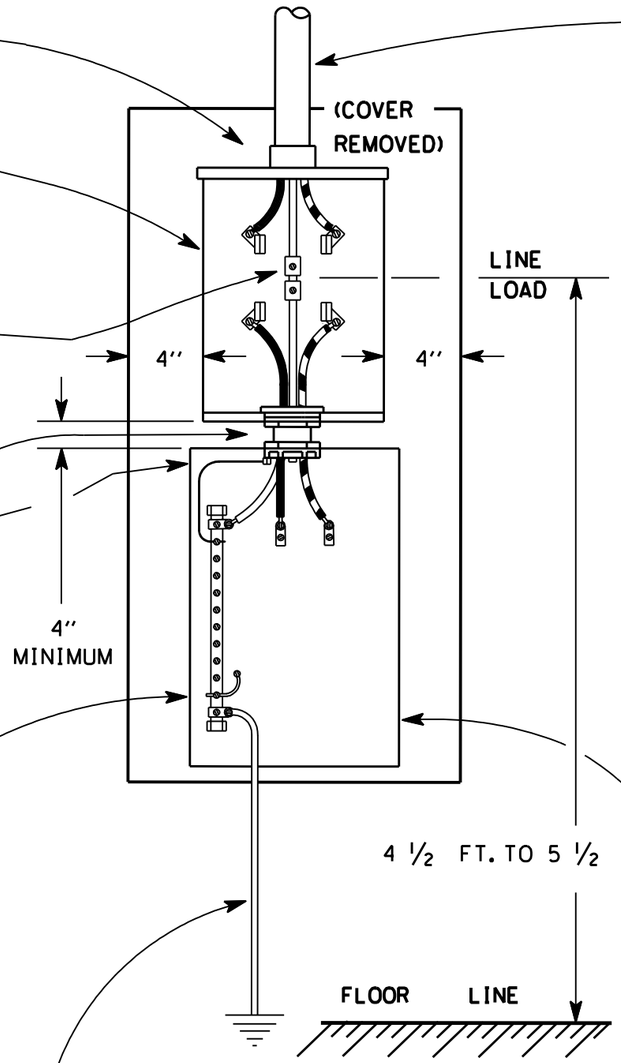
120/240 VOLT, SINGLE-PHASE, THREE-WIRE *INDOOR INSTALLATION
(200 AMPERES MAXIMUM)
THIS SOCKET IS ALSO AVAILABLE WITH DUAL LOAD SIDE LUGS

APPROVED BONDING OF A METALLIC NIPPLE OR RACEWAY PER N.E.C

METERING EQUIPMENT AND CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER. IT MUST BE MOUNTED PLUMB. ALL OTHER EQUIPMENT & CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER.

THE GROUNDED SERVICE NEUTURAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTORS IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

LOCKNUTS AND APPROVED FITTINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS OR CABLE ASSEMBLIES.



THE SERVICE ENCLOSURE IS BONDED TO THE SERVICE GROUNDING SYSTEM BY A MAIN BONDING JUMPER OR A BONDING SCREW.

APPROVED GROUNDING (PER N.E.C)

SERVICE ENTRANCE CONDUCTORS INSTALLED IN METALLIC OR NON-METALLIC RACEWAY ARE SHOWN. SERVICE ENTRANCE CABLE MAY ALSO BE USED FOR FOR THIS TYPE OF SERVICE.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED IN THE METER SOCKET ALL CONNECTIONS MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COUMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATION'S LABEL FOUND ON THE EQUIPMENT.

SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS UNLESS MANDATED BY A COMMUNITY'S ORDINANCE.

608

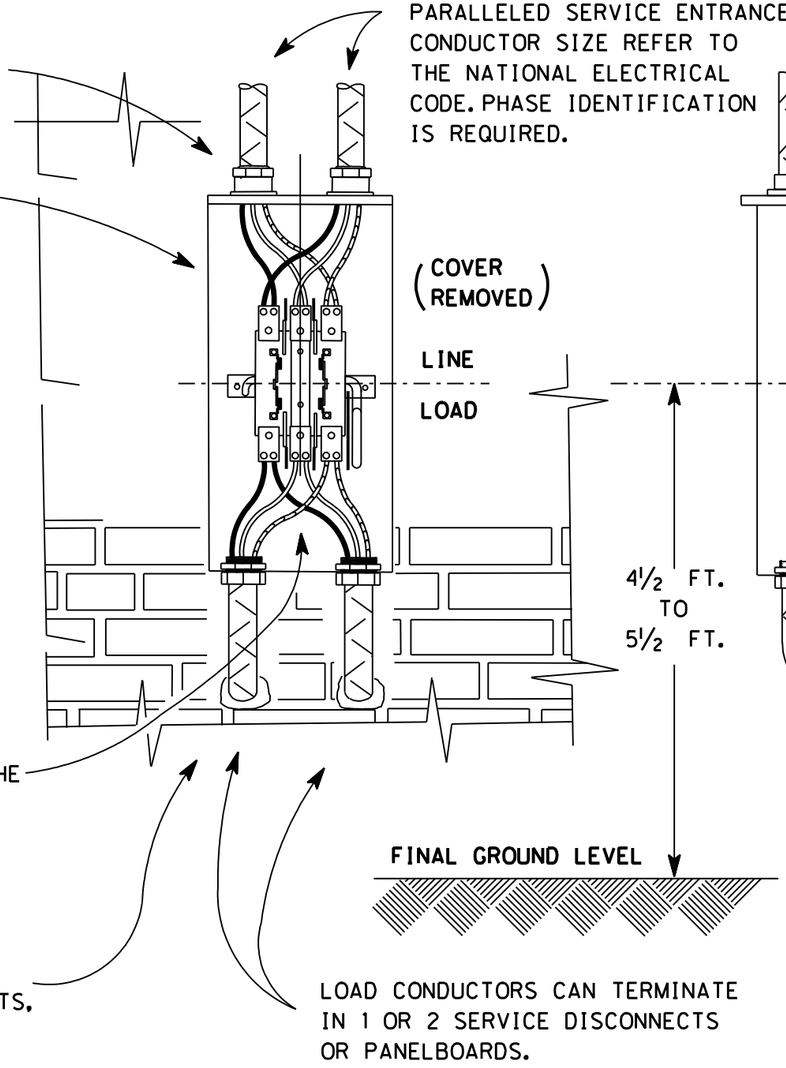
REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE OVERHEAD INSTALLATION
(GREATER THAN 200 AMPERES BUT NOT EXCEEDING 400 AMPERES)

APPLICATIONS - 400 AMPERES MAXIMUM WHEN APPROVED BY
ENGINEERING AND CONSTRUCTION PLANNING
OUTDOOR METER LOCATION REQUIRED ON ALL NEW INSTALLATIONS

FRONT VIEW

WALL SECTION



WATER TIGHT CONNECTORS MUST BE INSTALLED IN THE HUBS. SILICONE SEALANT IF REQUIRED, IS FORMED AROUND THE CABLES ON TOP OF THE CONNECTORS TO PREVENT WATER FROM ENTERING THE METER SOCKET.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND.
IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

THE HOLE WHERE THE SERVICE RACEWAY OR SERVICE CABLES ENTERS THE BUILDING SHOULD BE SEALED TO PREVENT WATER, RODENTS, OR INSECTS FROM ENTERING THE BUILDING.

PARALLELED SERVICE ENTRANCE CONDUCTOR SIZE REFER TO THE NATIONAL ELECTRICAL CODE. PHASE IDENTIFICATION IS REQUIRED.

LOAD CONDUCTORS CAN TERMINATE IN 1 OR 2 SERVICE DISCONNECTS OR PANELBOARDS.

BONDING OF A METALLIC SERVICE RACEWAYS REQUIRED PER N.E.C.

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

ALL EQUIPMENT & CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER.

APPROVED GROUNDING (PER N.E.C.) (SEE DRAWING 636)

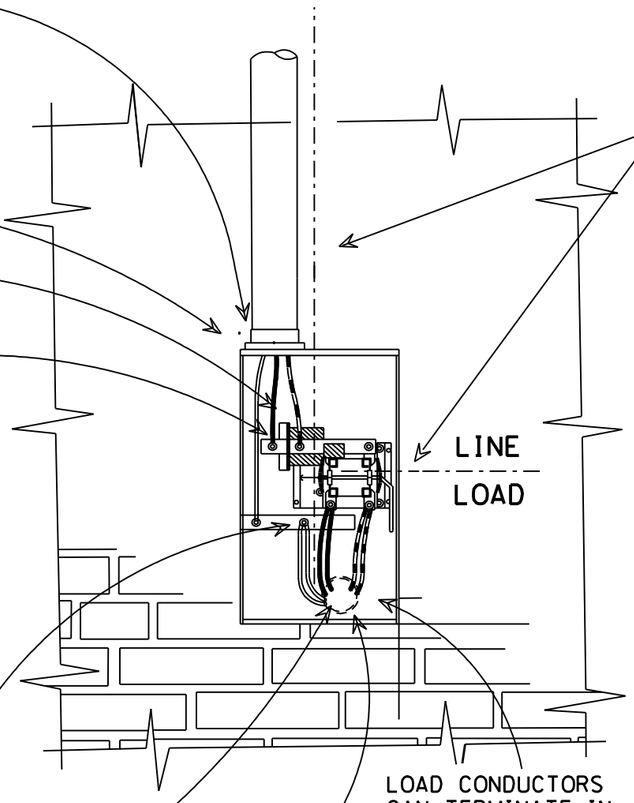
609

REVISED 09/13

120/240 VOLTS , SINGLE-PHASE , THREE-WIRE INSTALLATION
(GREATER THAN 200 AMPERES BUT NOT EXCEEDING 400 AMPERES)

APPLICATIONS - 400 AMPERES MAXIMUM WHEN APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING
OUTDOOR METER LOCATION REQUIRED ON ALL NEW INSTALLATIONS

FRONT VIEW



1-3" HUB FOR A SERVICE RACEWAY

EXTENDED RANGE-METER SOCKET MUST BE MOUNTED PLUMB, IT IS FURNISHED & INSTALLED BY THE CUSTOMER.

SINGLE AND/OR DOUBLE BARRELED CONNECTORS SUPPLIED BY THE CUSTOMER AS REQUIRED.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND.

IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

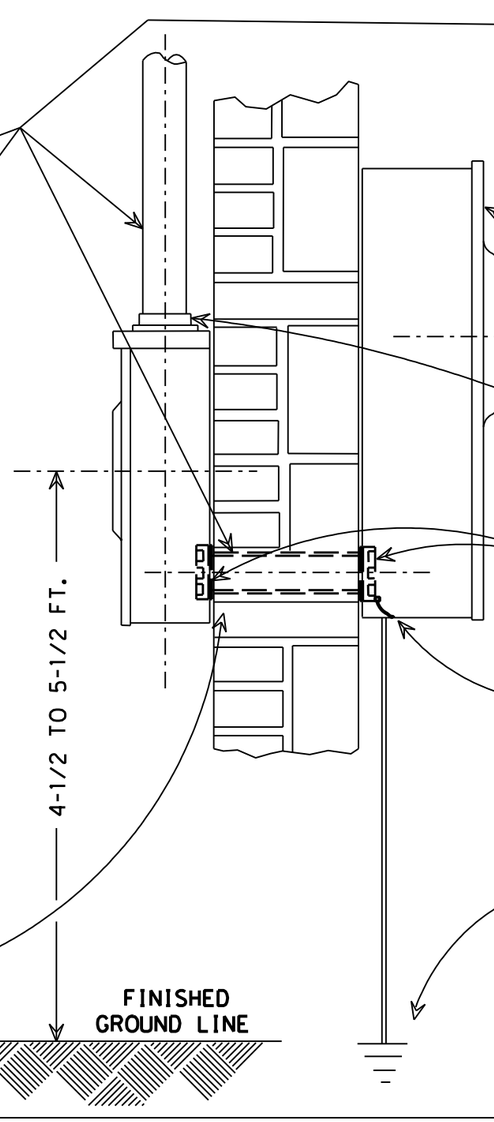
WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL SERVICE CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM. (PER N.E.C.)

LOAD CONDUCTORS CAN TERMINATE IN 1 OR 2 SERVICE DISCONNECTS OR PANELBOARDS.

THE HOLE WHERE THE SERVICE RACEWAY OR SERVICE CABLES ENTERS THE BUILDING SHOULD BE SEALED TO PREVENT WATER, RODENTS, OR INSECTS FROM ENTERING THE BUILDING.

WALL SECTION



SERVICE ENTRANCE CONDUCTORS INSTALLED IN A METALLIC OR NON-METALLIC RACEWAY ARE FURNISHED & INSTALLED BY THE CUSTOMER.

SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION FURNISHED AND INSTALLED BY THE CUSTOMER.

BONDING OF METALLIC SERVICE RACEWAYS REQUIRED PER N.E.C.

LOCKNUTS AND APPROVED FITTINGS OR BUSHINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES.

APPROVED BONDING REQUIRED WHEN INSTALLING A METALLIC NIPPLE BETWEEN THE METER SOCKET & SERVICE DISCONNECT OR SERVICE PANELBOARD. (PER N.E.C.)

APPROVED GROUNDING FURNISHED & INSTALLED BY THE CUSTOMER PER N.E.C.

610

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE ✳INDOOR INSTALLATION
(GREATER THAN 200 AMPERES BUT NOT EXCEEDING 400 AMPERES)

APPLICATIONS - 400 AMPERES MAXIMUM WHEN APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING
OUTDOOR METER LOCATION REQUIRED ON ALL NEW INSTALLATIONS

✳ AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

HUBS BOND METALLIC SERVICE RACEWAY TO THE METER SOCKET ENCLOSURE

EXTENDED RANGE METER SOCKET IS FURNISHED AND INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

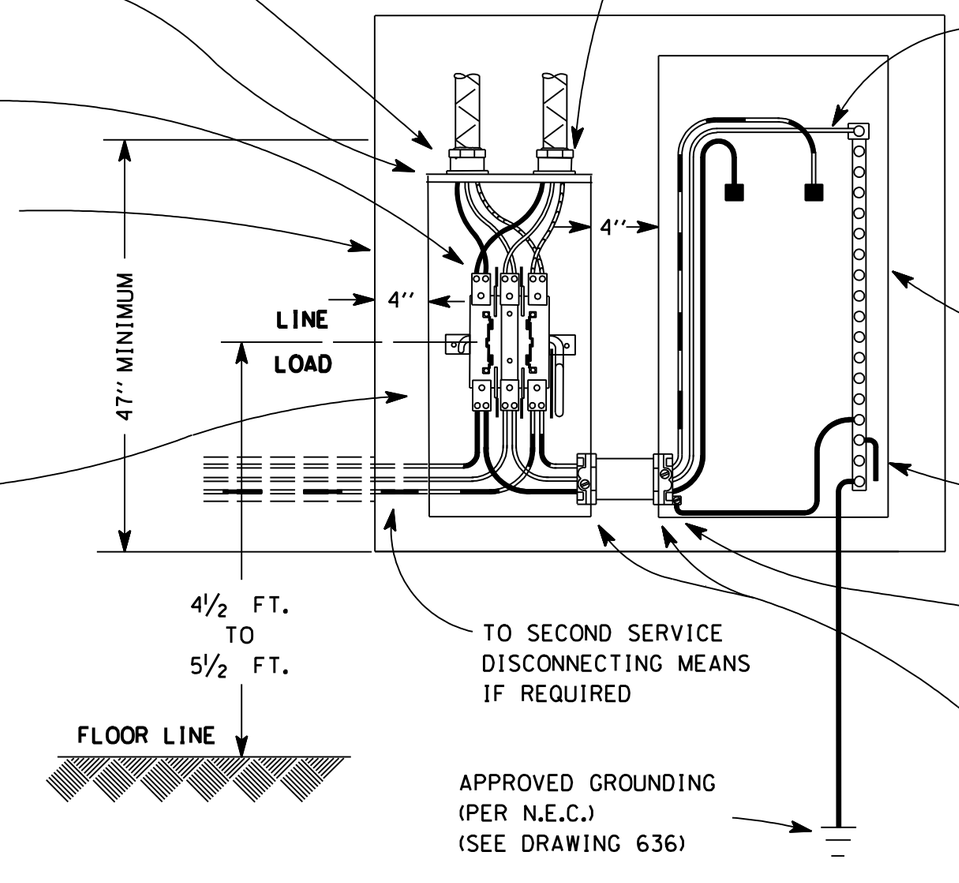
DOUBLE BARRELED CONNECTORS SUPPLIED BY THE CUSTOMER AS REQUIRED.

SERVICE EQUIPMENT BOARD, WHERE REQUIRED, MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTORS IN THE METER SOCKET BONDS THE METER SOCKET TO THE SERVICE GROUNDING SYSTEM.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET AND SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

2-2'' HUBS FOR METALLIC OR NON-METALLIC RACEWAYS OR CABLE ASSEMBLIES. FOR PARALLELED SERVICE ENTRANCE CONDUCTOR SIZE REFER TO THE NATIONAL ELECTRICAL CODE. PHASE IDENTIFICATION IS REQUIRED.



TO SECOND SERVICE DISCONNECTING MEANS IF REQUIRED

APPROVED GROUNDING (PER N.E.C.) (SEE DRAWING 636)

GROUNDED SERVICE NEUTRAL CONDUCTOR.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION.

THE ENCLOSURE IS BONDED TO THE SERVICE GROUNDING SYSTEM BY A MAIN BONDING JUMPER OR A BONDING SCREW.

APPROVED BONDING OF A METALLIC NIPPLE OR RACEWAY REQUIRED ON THE SERVICE DISCONNECT ENCLOSURE END. (PER N.E.C.)

LOCKNUTS AND APPROVED FITTINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS OR CABLE ASSEMBLIES.

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611

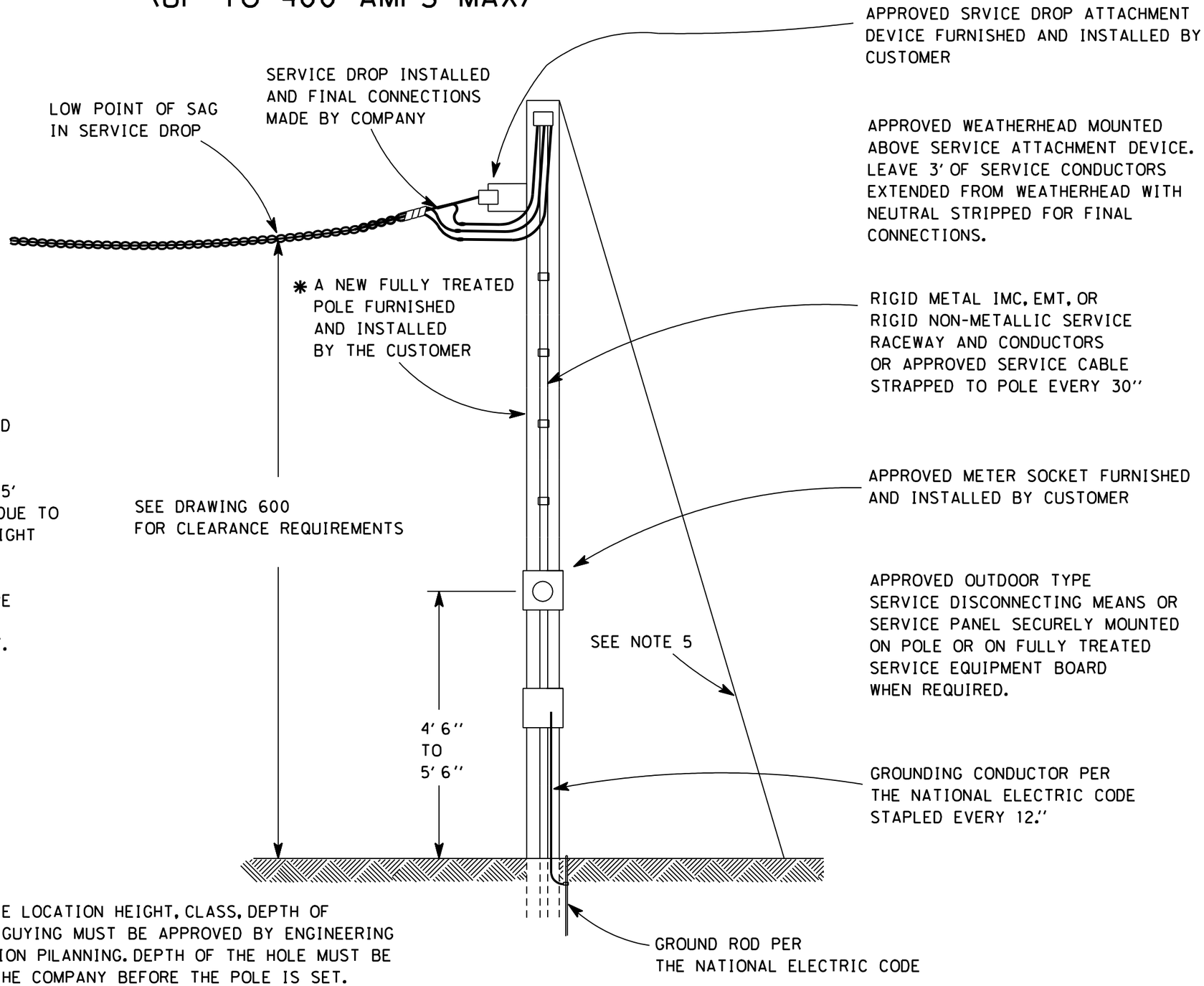
REVISED 09/13

120/240V SINGLE PHASE METERING POLE
(UP TO 400 AMPS MAX)

INSTALLATION MUST CONFORM TO THE NATIONAL ELECTRIC CODE AND BE CERTIFIED BY THE LAWFULLY DESIGNATED ELECTRIC INSPECTOR FOR THE GEOGRAPHICAL AREA.

NOTES: (SEE ARTICLE 501C)

1) CUSTOMER TO CONTACT DUKE ENERGY'S ENGINEERING AND CONSTRUCTION PLANNING DEPARTMENT FOR METER POLE LOCATION.
2) CUSTOMER TO PROVIDE NEW, FULLY TREATED, MINIMUM 25' CLASS 7 POLE. ADDITIONAL HEIGHT MAY BE REQUIRED DUE TO TERRAIN, CLEARANCES, OR OTHER FIELD CONDITIONS. HEIGHT MUST BE APPROVED BY COMPANY.
3) CUSTOMER TO DIG 5' DEEP POLE HOLE.
4) POLE AND HOLE MUST BE APPROVED BY COMPANY BEFORE POLE IS SET.
5) BACKFILL MUST BE SOLIDLY TAMPED WHEN POLE IS SET.
6) RAKING, KEYING,OR GUYING OF POLE MAY BE REQUIRED. CONTACT COMPANY FOR DETAILS.
7) CUSTOMER TO FURNISH AND INSTALL ALL MATERIALS.

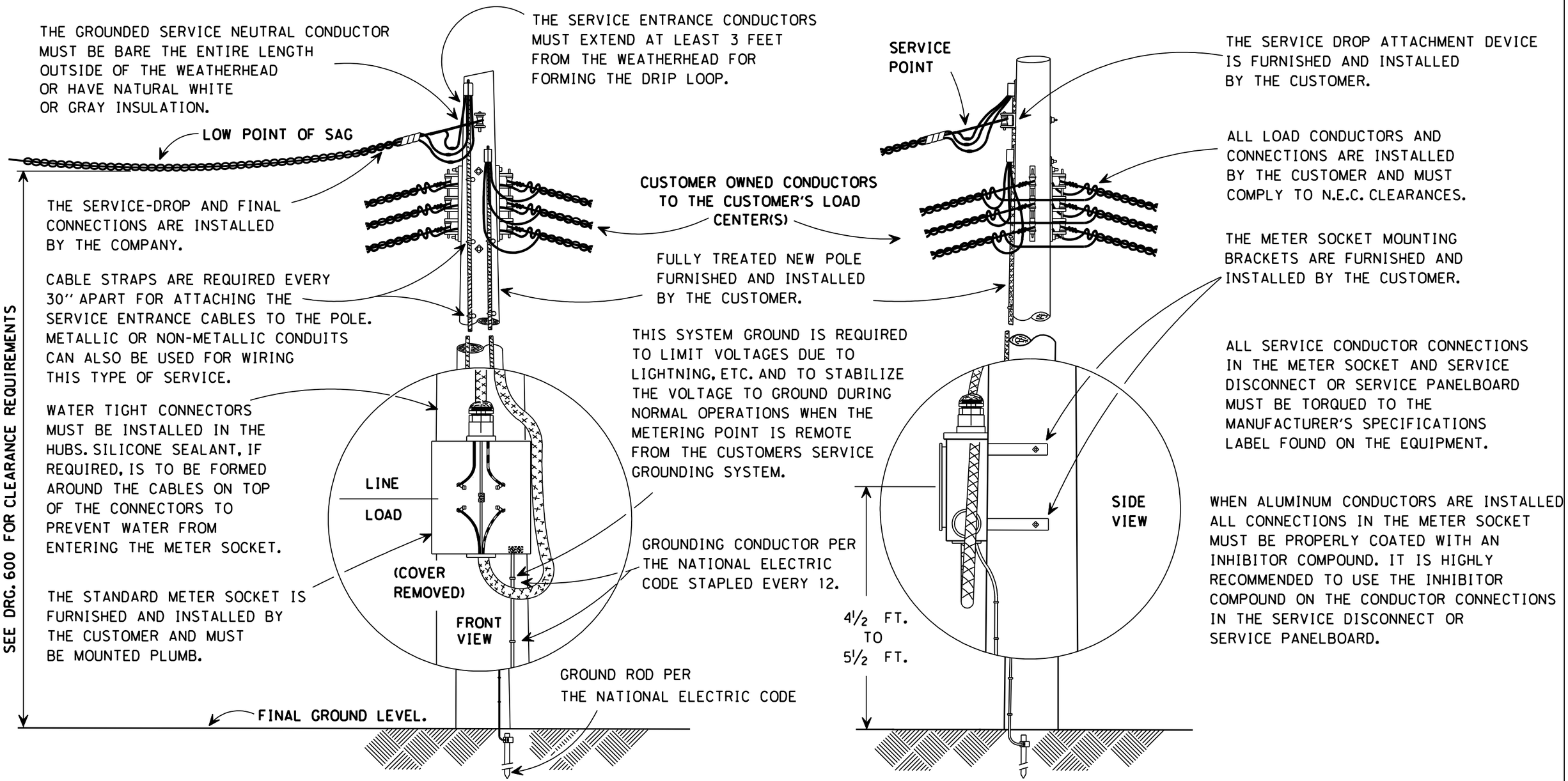


* METERING POLE LOCATION HEIGHT, CLASS, DEPTH OF SETTING AND GUYING MUST BE APPROVED BY ENGINEERING & CONSTRUCTION PILANNING. DEPTH OF THE HOLE MUST BE CHECKED BY THE COMPANY BEFORE THE POLE IS SET. (SEE ARTICLE 501C)

612

120/240 VOLT , SINGLE-PHASE , THREE-WIRE POLE-TYPE METERING INSTALLATION
(MAXIMUM SERVICE AMPACITY OF 400 AMPERES)

REVISED 09/13



THE METERING POLE LOCATION, HEIGHT, CLASS, DEPTH OF SETTING AND GUYING MUST BE APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING.
THE DEPTH OF THE HOLE MUST BE CHECKED BY THE COMPANY BEFORE THE POLE IS SET. (SEE ARTICLE 501C)

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614

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE POLE-TYPE INSTALLATION
(GREATER THAN 400 AMPERES BUT NOT EXCEEDING 1200 AMPERES)

THE CUSTOMER TO FURNISH & INSTALL LOAD SIDE JUMPERS & CONDUCTORS

SERVICE POINT

TO CUSTOMER'S LOAD CENTER

THE SERVICE DROP ATTACHMENT DEVICE IS FURNISHED & INSTALLED BY THE CUSTOMER. THE SERVICE-DROP AND THE FINAL CONNECTIONS ARE INSTALLED BY THE COMPANY

THE CURRENT TRANSFORMERS, SECONDARY CONDUIT BOXES AND 1'' PIPE PLUG ARE FURNISHED BY THE COMPANY AND INSTALLED BY THE CUSTOMER

FRONT VIEW

SIDE VIEW

3 FT. MAX.

LOW POINT OF SAG

REFER TO DRAWING 600 FOR CLEARANCE REQUIREMENTS

3 FT. MIN.

FULLY TREATED NEW POLE FURNISHED AND INSTALLED BY THE CUSTOMER

TRANSFORMER RATED METER SOCKET FURNISHED BY THE COMPANY, INSTALLED BY THE CUSTOMER & MUST BE MOUNTED PLUMB

THE METER SOCKET MOUNTING BRACKETS ARE FURNISHED & INSTALLED BY THE CUSTOMER

4½ FT. TO 5½ FT.

GROUNDING CONDUCTOR PER THE NATIONAL ELECTRIC CODE STAPLED EVERY 12.

FINAL GROUND LEVEL

GROUND ROD PER THE NATIONAL ELECTRIC CODE

DETAIL OF THE INSTALLATION OF THE CURRENT TRANSFORMERS

PRIMARY POLARITY MARKS: THE CURRENT TRANSFORMERS MUST BE INSTALLED SO THE PRIMARY POLARITY MARKS FACE THE SIDE OF THE POLE WHERE THE SERVICE DROP TERMINATES

PVC WEATHERHEAD

SERVICE DROP GROUNDED NEUTRAL

1'' PVC PIPE PLUG

CURRENT TRANSFORMERS & SECONDARY BOXES

METER POTENTIAL LEADS ARE FURNISHED & INSTALLED BY THE COMPANY

1'' NIPPLE

2''- REDUCER BUSHING

PVC CONDUIT FURNISHED AND INSTALLED BY THE CUSTOMER

2''CONDULET ''T'' FITTING

2'' CONDUIT

1'' CONDUIT & WEATHERHEAD

THE CUSTOMER TO FURNISH CONDUCTORS OF ADEQUATE SIZE & SUFFICENT LENGTH FOR CONNECTION TO THE SERVICE DROP. THE PHASE CONDUCTORS MUST PASS THROUGH THE CURRENT TRANSFORMERS AS ILLUSTRATED

NOTE: LIQUID TIGHT CONDUIT IS NOT ACCEPTABLE

METERING POLE LOCATION, HEIGHT, CLASS, DEPTH OF SETTING AND GUYING MUST BE APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING. DEPTH OF HOLE MUST BE CHECKED BY THE COMPANY BEFORE POLE IS SET. (SEE ARTICLE 501C)

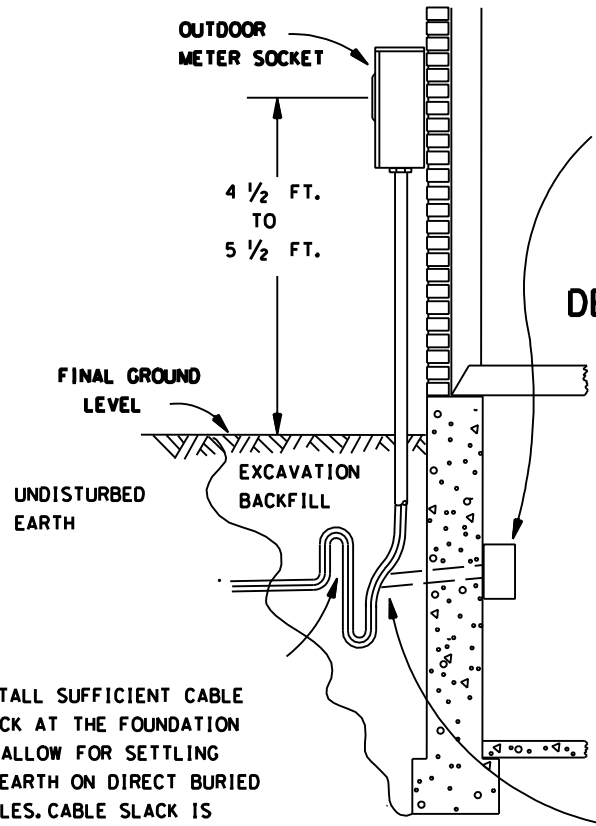
615

REVISED 2/03

TERMINATING UNDERGROUND SERVICE LATERAL CONDUCTORS
(600 VOLTS OR LESS)

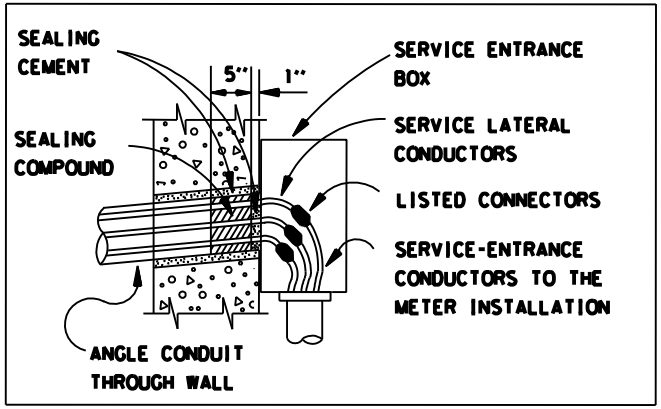
SEE ARTICLES 311 AND 312 ON UNDERGROUND SERVICE LATERALS

OUTDOOR METER INSTALLATION



FOR AN INDOOR METER INSTALLATION, THE UNDERGROUND SERVICE RACEWAY MAY PASS THROUGH THE WALL AND TERMINATE AT A SERVICE-ENTRANCE BOX (SEE DETAIL BELOW).

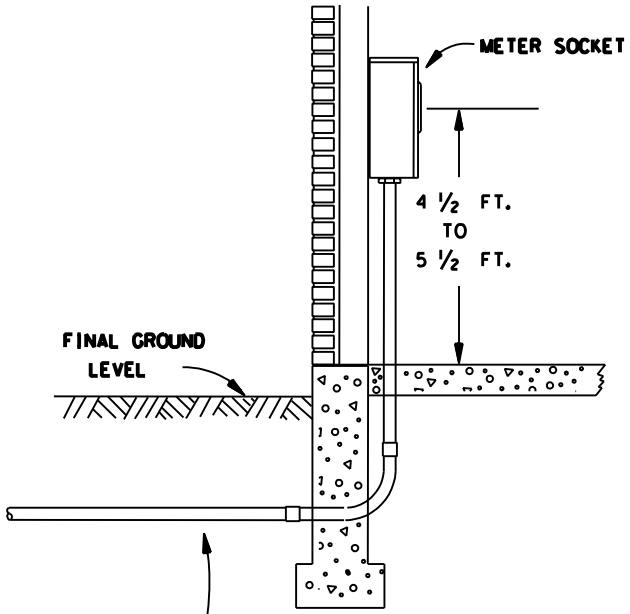
DETAIL OF CONDUIT THROUGH A WALL



INSTALL SUFFICIENT CABLE SLACK AT THE FOUNDATION TO ALLOW FOR SETTLING OF EARTH ON DIRECT BURIED CABLES. CABLE SLACK IS REQUIRED TO REDUCE HEAVY TENSIONS ON THE INSULATED BLOCKS OF THE METER SOCKET JAWS.

FOR CLEARANCES TO BE MAINTAINED WITH GAS LINE AND OTHER UTILITIES, CONSULT THE UTILITY INVOLVED.

* INDOOR METER INSTALLATION



* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATION UNLESS MANDATED BY A COMMUNITY ORDINANCE.

THE INSTALLATION REQUIREMENTS & APPROVAL OF THE SERVICE LATERAL (DEPTH, AMPACITY, TYPE, ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

616

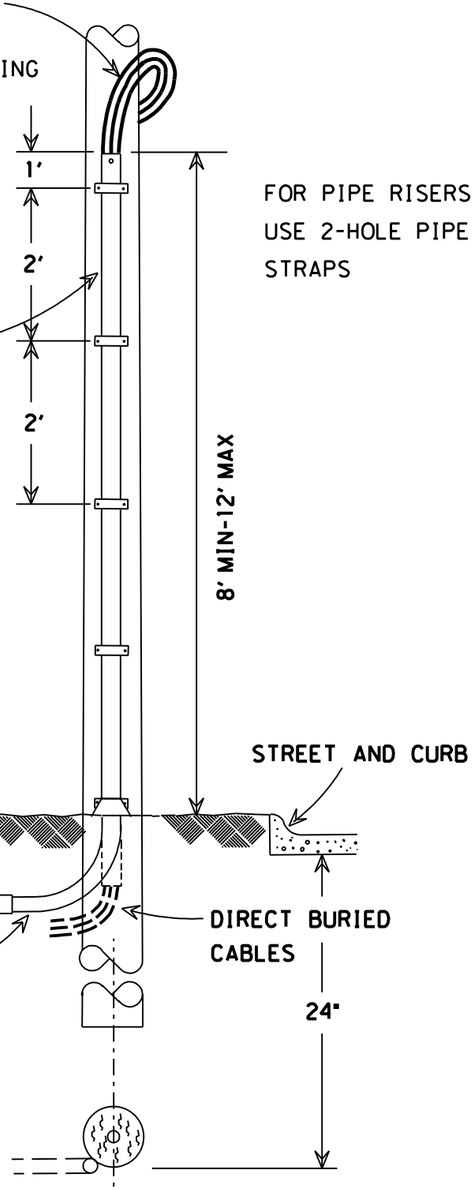
REVISED 09/13

TERMINATING UNDERGROUND SERVICE LATERAL CONDUCTOR
(600 VOLTS OR LESS)

(SEE ARTICLES 311 AND 312C ON
UNDERGROUND SERVICE LATERALS)

OVERHEAD SUPPLY SOURCE

CONSULT ENGINEERING AND CONSTRUCTION PLANNING
FOR THE LENGTH OF CONDUCTORS TO BE
PROVIDED BY THE CUSTOMER ABOVE
THE CABLE RISER GUARD.



FOR PIPE RISERS
USE 2-HOLE PIPE
STRAPS

NON-METALLIC CABLE RISER
GUARD (SEE ARTICLE 312D)

SEE DRAWING 676 FOR
CONDUIT LOCATIONS ON
THE POLE

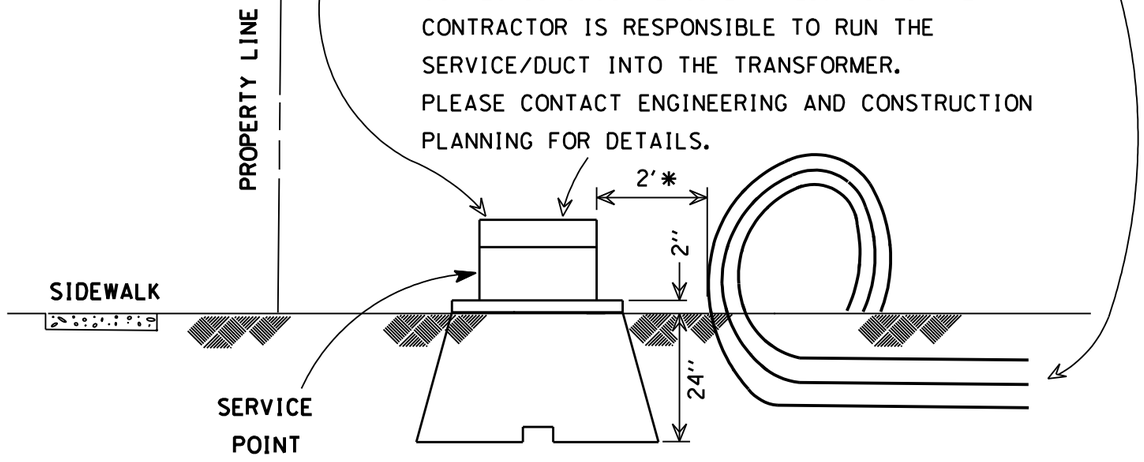
A NON-METALLIC 90° BEND SHALL NOT
BE CONCRETED. IT IS FURNISHED AND
INSTALLED BY THE CUSTOMER
WHEN REQUIRED.
SEE THE NATIONAL ELECTRICAL CODE
FOR BEND REQUIREMENTS IN A
CLASS 1 - DIVISION 2 LOCATION

UNDERGROUND SUPPLY SOURCE

THE CUSTOMER MUST PROVIDE SUFFICIENT LENGTHS
OF CONDUCTORS TO MAKE CONDUCTORS
IN THE UNDERGROUND FACILITY.
STUB OUT OF THE GROUND 2' FROM THE
REAR CENTER OF THE FACILITY.
IF EXISTING 4x4 CONCRETE PAD, STUB OUT OF THE GROUND
2' FROM THE SIDE CENTER OF THE FACILITY.
SEAL ENDS OF CONDUCTORS AGAINST MOISTURE.

COMPANY OWNED PEDESTAL,
PULL-BOX, MANHOLE OR
TRANSFORMER ENCLOSURE.

RESIDENTIAL APPLICATIONS, THE COMPANY WILL
INSERT THE CABLE AND MAKE PERMANENT
CONNECTIONS. COMMERCIAL APPLICATIONS THE
CONTRACTOR IS RESPONSIBLE TO RUN THE
SERVICE/DUCT INTO THE TRANSFORMER.
PLEASE CONTACT ENGINEERING AND CONSTRUCTION
PLANNING FOR DETAILS.



* 2' AREA MUST BE
CLEAR OF ANY
OBSTRUCTIONS.

THE INSTALLATION REQUIREMENTS AND APPROVAL OF THE
SERVICE LATERAL CONDUCTORS (AMPACITY , TYPE , DEPTH , ETC.)
ARE UNDER THE JURISDICTION OF A LAWFULLY - DESIGNATED
ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

617

REVISED 4/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE UNDERGROUND
(NOT EXCEEDING 200 AMPERES)

RESIDENTIAL, COMMERCIAL & INDUSTRIAL APPLICATIONS
OUTDOOR METER REQUIRED ON ALL NEW INSTALLATIONS

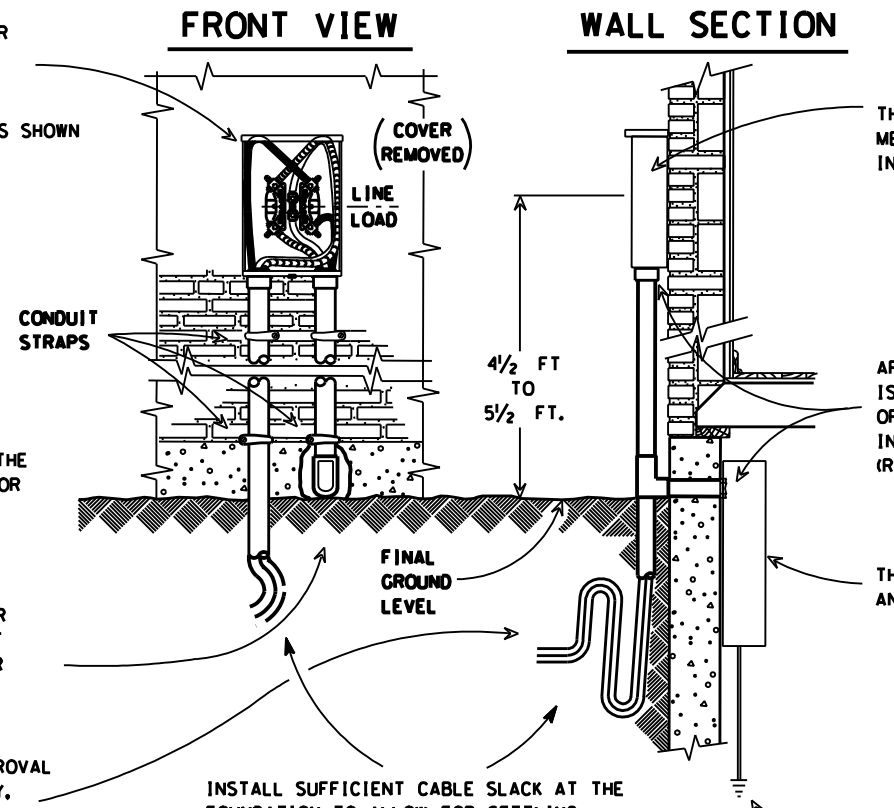
THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM. LATERALS MUST LOOP INSIDE METERBASE AS SHOWN

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET AND SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

THE HOLE WHERE THE SERVICE RACEWAYS OR SERVICE CABLES ENTER THE BUILDING MUST BE SEALED TO PREVENT WATER, RODENTS OR INSECTS FROM ENTERING THE BUILDING.

THE INSTALLATION REQUIREMENTS AND APPROVAL OF THE SERVICE LATERAL (DEPTH, AMPACITY, TYPE, ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.



THE HIGH CAPACITY UNDERGROUND-TYPE METER SOCKET IS FURNISHED AND INSTALLED BY THE CUSTOMER.

APPROVED BONDING OF A METALLIC RACEWAY IS REQUIRED. LOCKNUTS, APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS. (REFER TO N.E.C.)

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION

INSTALL SUFFICIENT CABLE SLACK AT THE FOUNDATION TO ALLOW FOR SETTLING OF THE EARTH ON DIRECT BURIED CABLES. CABLE SLACK IS REQUIRED TO REDUCE HEAVY TENSIONS ON THE INSULATED BLOCKS OF THE METER SOCKET JAWS.

APPROVED GROUNDING PER N.E.C (SEE DRAWING 636)

(SEE ARTICLES 311 AND 312 ON UNDERGROUND SERVICE LATERALS)

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618

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE UNDERGROUND
(GREATER THAN 200 AMPERES BUT NOT EXCEEDING 400 AMPERES)

APPLICATIONS - 400 AMPERES MAXIMUM WHEN APPROVED BY
ENGINEERING AND CONSTRUCTION PLANNING
OUTDOOR METER LOCATION REQUIRED ON ALL NEW INSTALLATIONS

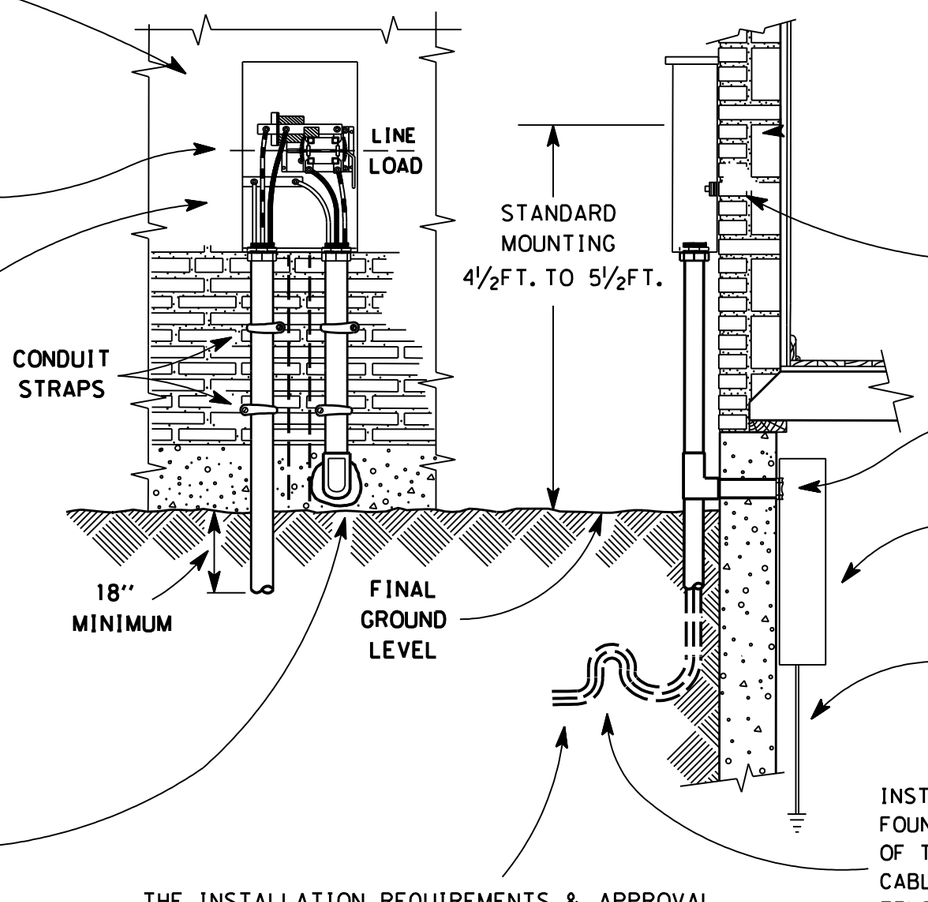
ALL EQUIPMENT & CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET AND SERVICE DISCONNECT(S) OR SERVICE PANELBOARD(S) MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

FRONT VIEW
(COVER REMOVED)

WALL SECTION



THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL BUS IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

APPROVED BONDING OF A METALLIC RACEWAY IS REQUIRED. LOCKNUTS , APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS. (REFER TO N.E.C.)

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

APPROVED GROUNDING PER N.E.C. (SEE DRAWING 636)

THE HOLE WHERE THE SERVICE RACEWAYS OR SERVICE CABLES ENTER THE BUILDING MUST BE SEALED TO PREVENT WATER, RODENTS OR INSECTS FROM ENTERING THE BUILDING.

THE INSTALLATION REQUIREMENTS & APPROVAL OF THE SERVICE LATERAL (DEPTH , AMPACITY, TYPE , ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

INSTALL SUFFICIENT CABLE SLACK AT THE FOUNDATION TO ALLOW FOR SETTLING OF THE EARTH ON DIRECT BURIED CABLES. CABLE SLACK IS REQUIRED TO REDUCE HEAVY TENSIONS ON THE INSULATED BLOCKS OF THE METER SOCKET JAWS.

(SEE ARTICLES 311 AND 312 FOR ADDITIONAL INFORMATION ON UNDERGROUND SERVICE LATERALS)

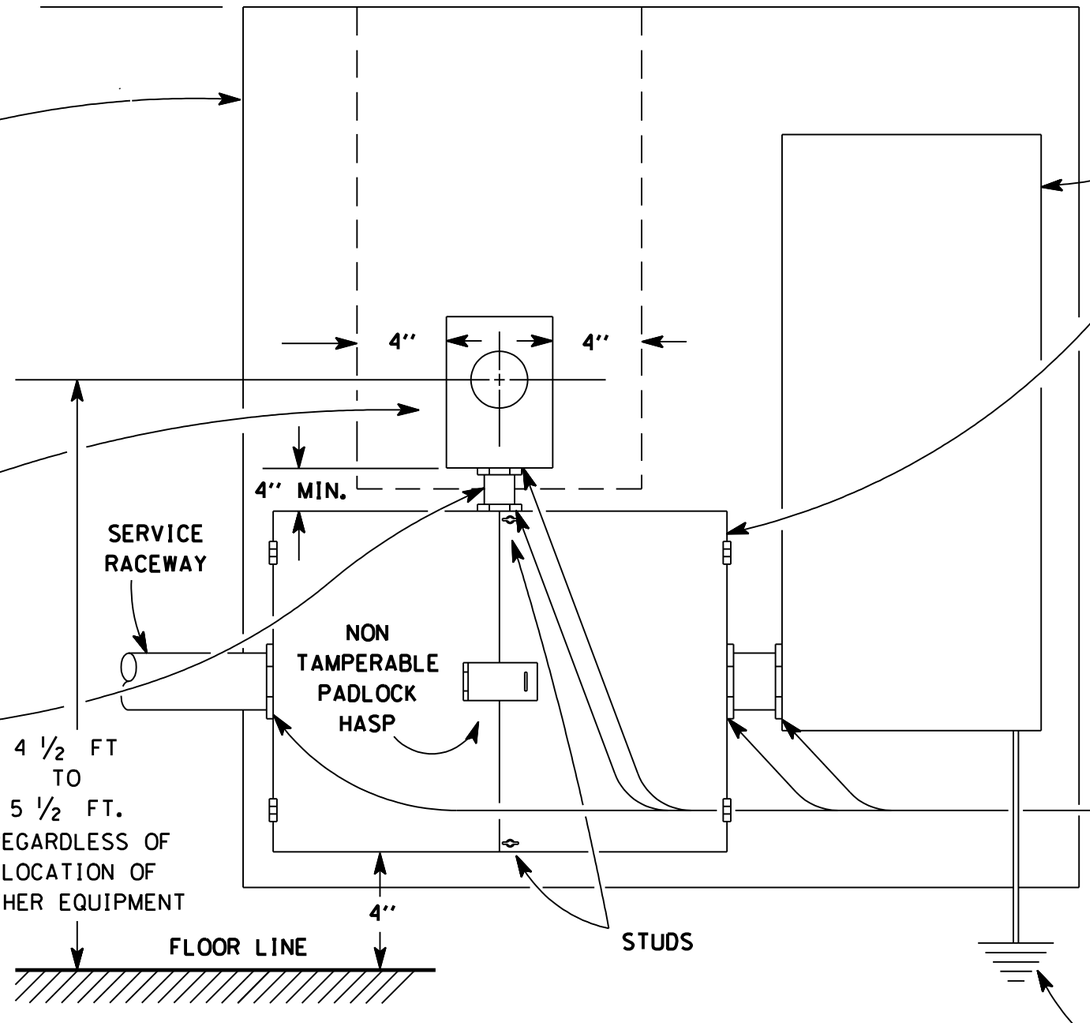
619

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE INDOOR INSTALLATION (OVER 400 AMPERES BUT NOT OVER 1200 AMPERES)

✳ AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

FOR A SERVICE AMPACITY GREATER THAN 1200 AMPERES OR FOR BUS-BAR INSTALLATIONS OR FOR METERING PICKUP INFORMATION CONTACT ENGINEERING AND CONSTRUCTION PLANNING.



SERVICE EQUIPMENT BOARD MUST BE PLUMB.

SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

THE CURRENT TRANSFORMER METERING CABINET IS FURNISHED AND INSTALLED BY THE CUSTOMER. THE CABINET MAY BE INSTALLED AT DIFFERENT LOCATIONS THAN SHOWN, HOWEVER THE CURRENT TRANSFORMERS MUST BE READILY ACCESSIBLE. THE DOORS MUST BE TAMPER-PROOF AND BE ATTACHED AT THE SIDES WITH HINGE PINS AND PADLOCKING HASP. THE DOORS ALSO MUST BE SEALABLE. (SEE ARTICLE 511)

THE TRANSFORMER-RATED METER SOCKET WITH A TEST SWITCH IS FURNISHED BY THE COMPANY AND INSTALLED BY THE CUSTOMER. THE SOCKET MUST BE MOUNTED PLUMB.

2" MINIMUM SIZE METALLIC OR NON-METALLIC METERING CABLE CONDUIT. (SEE ARTICLE 509) A #8 AWG COPPER GROUNDING CONDUCTOR MUST BE INSTALLED IN A NON-METALLIC CONDUIT TO BOND THE TRANSFORMER RATED METER SOCKET TO THE SERVICE GROUNDING SYSTEM.

APPROVED BONDING IS REQUIRED AT THESE LOCATION WHEN USING METALLIC CONDUITS OR RACEWAYS. THIS BONDS ALL SERVICE COMPONENTS TO THE SERVICE GROUNDING SYSTEM. WHEN NON-METALLIC CONDUITS ARE USED AT THESE LOCATIONS , THE CURRENT TRANSFORMER CABINET AND THE TRANSFORMER RATED METER SOCKET MUST BE BONDED TO THE SERVICE GROUNDING SYSTEM BY USING BONDING CONDUCTORS AND JUMPERS. (REFER TO N.E.C.)

APPROVED GROUNDING PER N.E.C (SEE DRAWING 636)

620

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE CURRENT TRANSFORMER WIRING DIAGRAM (OVER 400 AMPERES BUT NOT OVER 1200 AMPERES)

TRANSFORMER RATED METER SOCKET WITH A TEST SWITCH.

METERING CABLE AND WIRING WILL BE FURNISHED AND INSTALLED BY THE COMPANY.

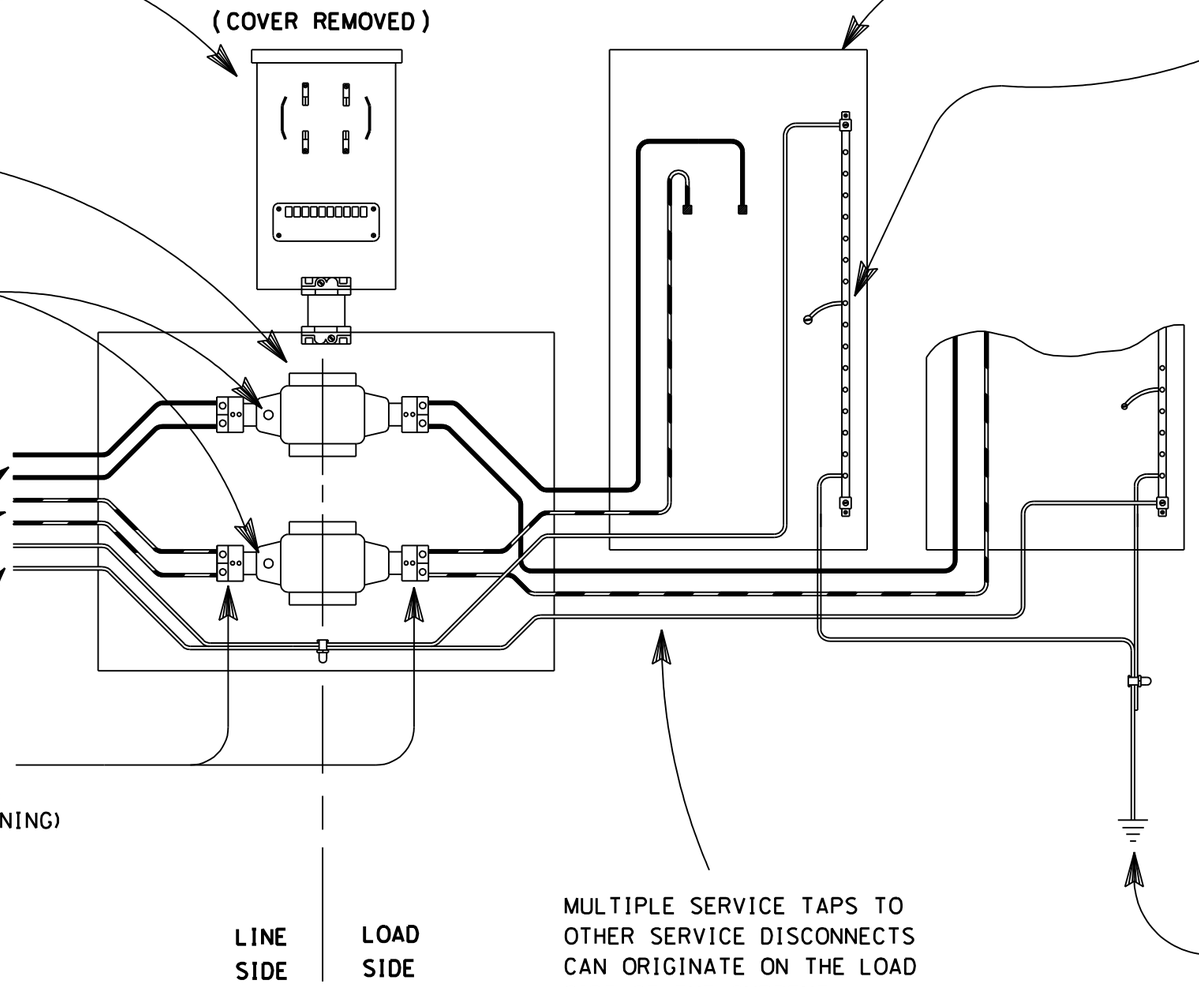
CURRENT TRANSFORMERS (SEE ARTICLE 504)

PRIMARY POLARITY MARKS IDENTIFIED BY A WHITE MARKER OR "H1", INSTALLED ON LINE SIDE AS SHOWN.

SERVICE ENTRANCE OR SERVICE LATERAL CONDUCTORS.

GROUNDED SERVICE NEUTRAL CONDUCTORS.

A MAXIMUM OF 3 CONDUCTORS MAY BE DIRECTLY CONNECTED TO EACH LINE AND LOAD TERMINALS. WHERE MORE THAN 3 CONDUCTORS ARE REQUIRED. (CONTACT ENGINEERING AND CONSTRUCTION PLANNING) (SEE ARTICLES 504 AND 509)



SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

THE ENCLOSURE IS BONDED TO THE GROUNDED NEUTRAL BUS BY THE MAIN BONDING JUMPER OR BONDING SCREW.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METERING CABINET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONDUCTOR CONNECTORS IN THE METERING CABINET AND SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

MULTIPLE SERVICE TAPS TO OTHER SERVICE DISCONNECTS CAN ORIGINATE ON THE LOAD SIDE OF THE CURRENT TRANSFORMER.

APPROVED GROUNDING (PER N.E.C.) (SEE DRAWING 636)

621

REVISED 05/13

120/240 VOLT, SINGLE PHASE, THREE-WIRE *
(TYPICAL MULTIPLE METERING INSTALLATION)

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

THE SERVICE ENTRANCE CABLE ON THE LINE SIDE OF THE METER TROUGH MUST BE CONTINUOUS & WITHOUT SPLICES FROM THE WEATHERHEAD OR POINT OF CONNECTION TO THE SERVICE BUS.

APPROVED BONDING OF A METALLIC RACEWAY TO THE METER SOCKETS IS REQUIRED. (PER N.E.C.)

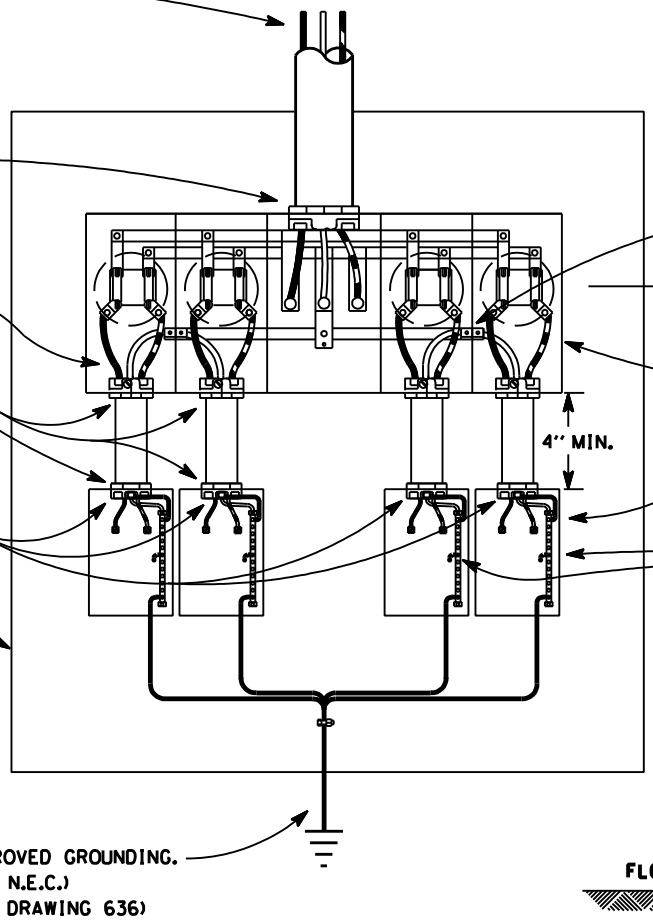
THE AMPACITY OF THE LOAD SIDE CONDUCTORS CANNOT EXCEED 200 AMPERES.

LOCKNUTS AND APPROVED FITTINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS OR CABLE ASSEMBLIES.

APPROVED BONDING OF A METALLIC NIPPLE OR RACEWAY REQUIRED ON THE SERVICE DISCONNECT ENCLOSURE END. (PER N.E.C.)

WHERE REQUIRED A SERVICE EQUIPMENT BOARD, MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.



APPROVED GROUNDING. (PER N.E.C.) (SEE DRAWING 636)

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTOR MUST BOND THE METER SOCKETS TO THE SERVICE GROUNDING SYSTEM.

THE METER SOCKETS ARE FURNISHED & INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

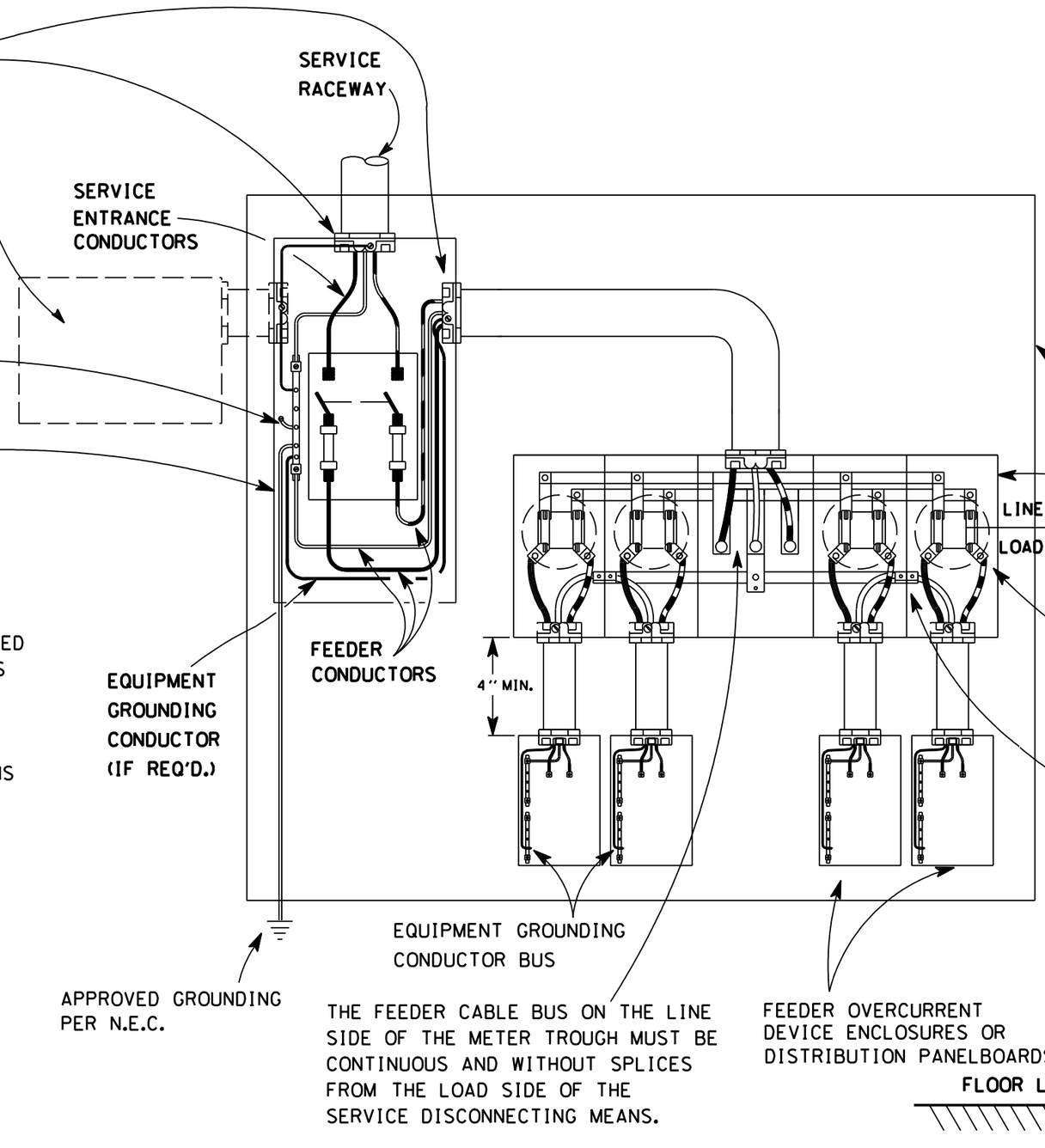
THE ENCLOSURES ARE BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

622

REVISED 05/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE *
(TYPICAL MULTIPLE METERING INSTALLATION WHERE THE MAIN SERVICE DISCONNECT IS REQUIRED ON THE SUPPLY SIDE OF THE METERING EQUIPMENT)(SEE NEC)



APPROVED BONDING OF METALLIC RACEWAY PER N.E.C.

ADDITIONAL METER SOCKETS MAY BE CONNECTED TO OTHER OUTLETS FROM THE MAIN SERVICE DISCONNECT ENCLOSURE.

THE ENCLOSURE IS BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR BY A BONDING SCREW.

THE MAIN SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE AS REQUIRED BY THE LAWFULLY DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNNECTIONS IN THE METER SOCKETS MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONNECTIONS IN THE METER SOCKETS & SERVICE DISCONNECT OR PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

WHERE REQUIRED SERVICE EQUIPMENT BOARD , MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

THE METER SOCKETS ARE FURNISHED AND INSTALLED BY THE CUSTOMER. THEY MUST BE MOUNTED PLUMB.

THE AMPACITY OF THE LOAD SIDE CONDUCTORS MUST NOT EXCEED 200 AMPERES.

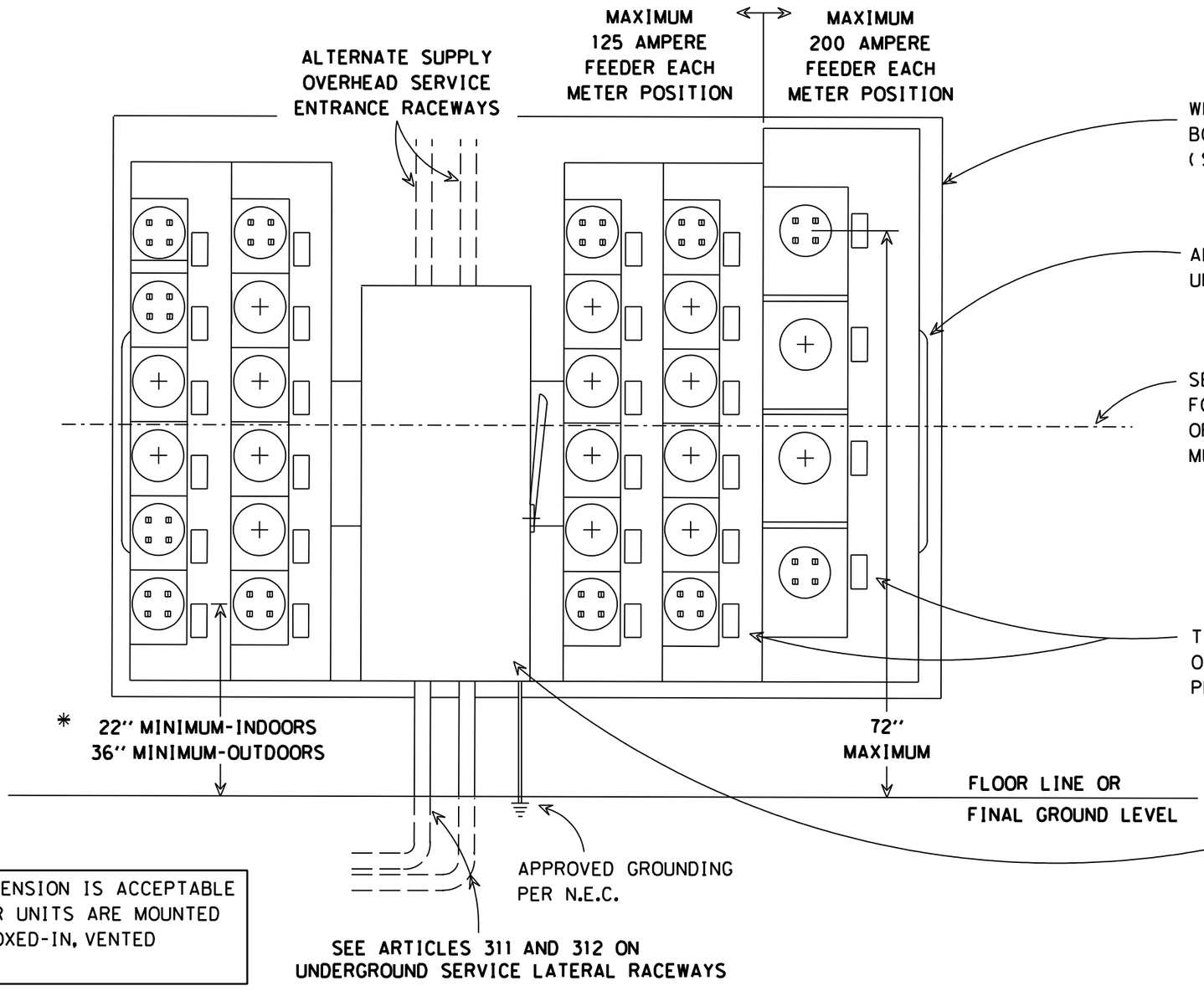
THE GROUNDED CIRCUIT NEUTRAL CONDUCTOR IS PERMITTED TO GROUND THE METER SOCKETS ON THE LOAD SIDE OF THE MAIN SERVICE DISCONNECT WHEN THE ENCLOSURES ARE LOCATED NEAR THE SERVICE DISCONNECTING MEANS AND WHERE NO SERVICE GROUND FAULT PROTECTION IS INSTALLED.

623

REVISED 09/13

120/240 VOLT, SINGLE-PHASE, THREE-WIRE
(PRE-ASSEMBLED MODULAR MULTIPLE METERING INSTALLATION)
(MAIN DISCONNECTING-MEANS ON THE SUPPLY SIDE OF THE METERING UNITS) (SEE N.E.C.)

PRE-ASSEMBLED MODULAR METERING UNITS MUST BE APPROVED BY THE COMPANY PRIOR TO INSTALLATION ON THE COMPANY'S SYSTEM. CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR INFORMATION REGARDING ACCEPTABLE UNITS OR THE SUBMITTAL PROCEDURE FOR HAVING UNITS APPROVED FOR INSTALLATION.



* THIS MINIMUM DIMENSION IS ACCEPTABLE WHEN THE MODULAR UNITS ARE MOUNTED OUTDOORS IN A BOXED-IN, VENTED ENCLOSURE.

624

REVISED 05/13

208Y/120 VOLT, SINGLE-PHASE, THREE-WIRE *
(FROM A THREE-PHASE, FOUR-WIRE SYSTEM)
(INDOOR METERING INSTALLATION NOT EXCEEDING 200 AMPERES)

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

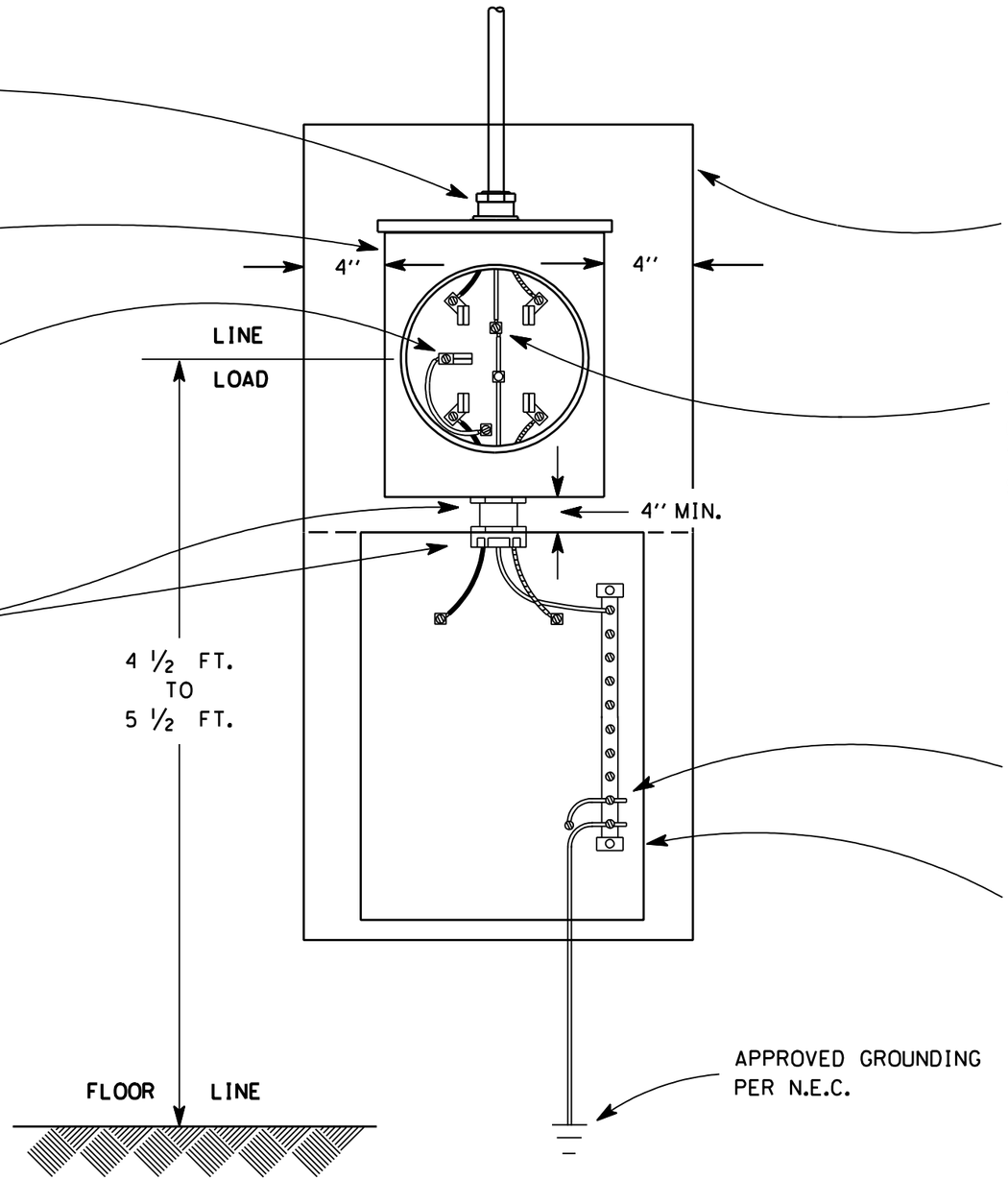
BONDING OF A METALLIC SERVICE RACEWAY IS PERMITTED BY USING THE THREADED HUB ON THE METER SOCKET.

FIVE-TERMINAL METER SOCKET MUST BE MOUNTED PLUMB. THE METER SOCKET AND FIFTH TERMINAL ARE FURNISHED AND INSTALLED BY THE CUSTOMER.

THE FIFTH TERMINAL MUST BE MOUNTED ON THE LEFT SIDE OF THE SOCKET AS SHOWN AND MUST BE CONNECTED TO THE METERING CONNECTOR WITH NO. 10 AWG INSULATED COPPER CONDUCTOR, SUPPLIED AND INSTALLED BY THE CUSTOMER.

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. APPROVED BONDING PER N.E.C.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATION'S LABEL FOUND ON THE EQUIPMENT.



WHERE REQUIRED A SERVICE EQUIPMENT BOARD, MUST BE MOUNTED PLUMB (SEE ARTICAL 508). A CLEAR SPACE AT LEAST 17'' WIDE BY 20'' HIGH AT 125A OR 17'' WIDE BY 23'' AT 200A MUST BE AVAILABLE FOR THE METER SOCKET.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTORS IN THE METER SOCKET MUST BOND THE METER SOCKET TO THE SERVICE GROUNDING SYSTEM.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED IN THE METER SOCKET ALL CONNECTIONS MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

THE ENCLOSURE IS BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

APPROVED GROUNDING PER N.E.C.

625

REVISED 09/13

208Y/120 VOLT OR * 240/120 VOLT, THREE-PHASE, FOUR WIRE OUTDOOR
(NOT EXCEEDING 200 AMPERES)

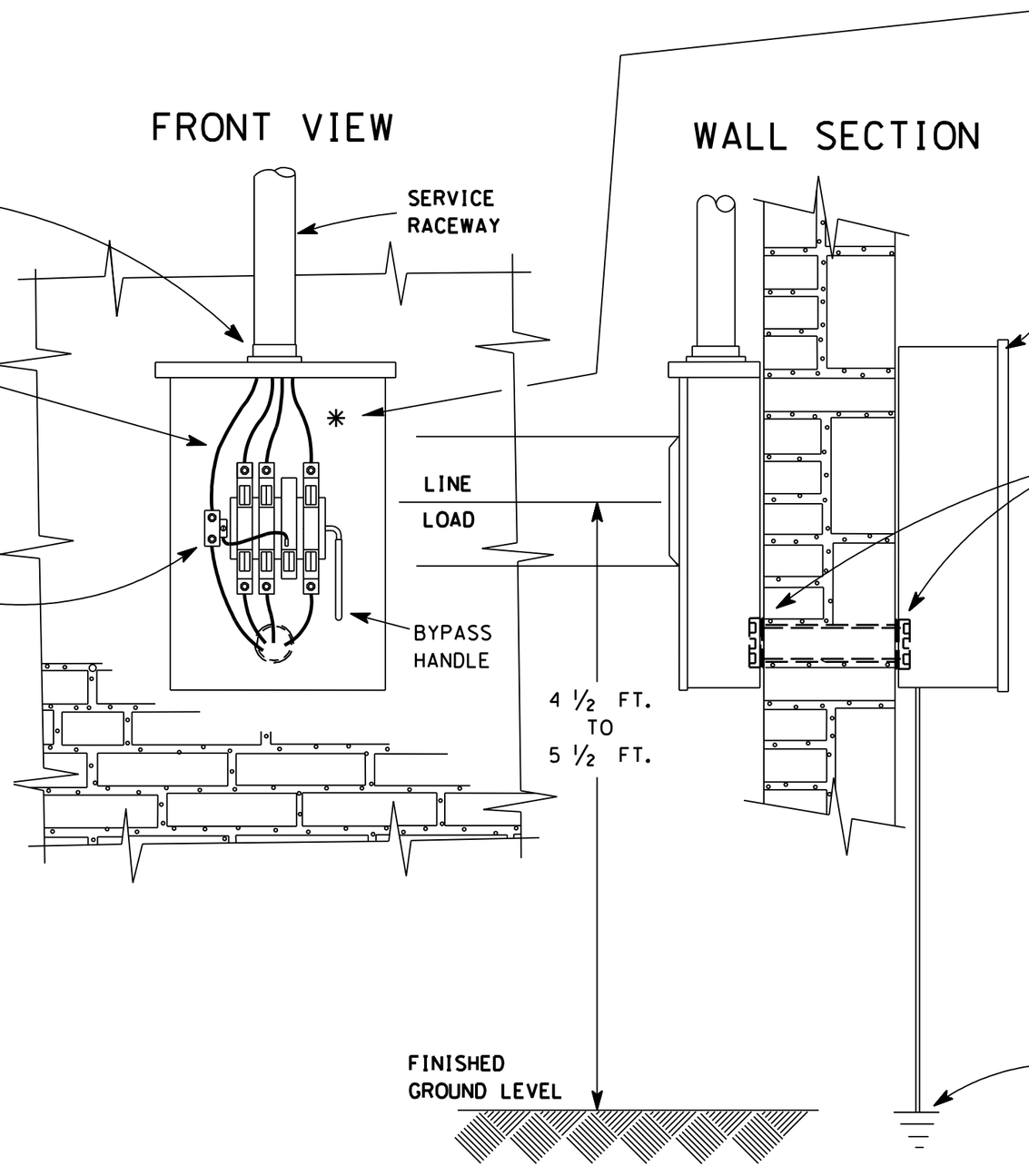
* HIGHER PHASE CONDUCTOR (IDENIFIED IN ORANGE) MUST BE TERMINATED IN THIS POSITION IN THE METER BASE FOR 240/120V THREE PHASE FOUR WIRE SERVICES CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR AVAILABILITY.

BONDING OF A METALLIC SERVICE RACEWAY IS PERMITTED BY USING THE THREADED HUB ON THE METER SOCKET

SEVEN-TERMINAL POLYPHASE HIGH CAPACITY METER SOCKET EQUIPPED WITH A BY-PASS HANDLE IS FURNISHED ANDINSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET MUST BOND THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.



THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION FURNISHED AND INSTALLED BY THE CUSTOMER. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST TERMINATE IN THE SERVICE DISCONNECTING MEANS ENCLOSURE.

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. APPROVED BONDING PER N.E.C.

ALL SERVICE CONDUCTORS CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

APPROVED GROUNDING PER N.E.C.

626

REVISED 09/13

208Y/120 VOLT OR 240/120 VOLT, THREE-PHASE, FOUR-WIRE, INDOOR
(NOT EXCEEDING 200 AMPERES)

✳✳ HIGHER PHASE TO GROUND CONDUCTOR (IDENTIFIED IN ORANGE) MUST BE TERMINATED IN THIS POSITION IN THE METER BASE FOR 240/120V THREE-PHASE, FOUR WIRE SERVICES. PLEASE CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR AVAILABILITY.

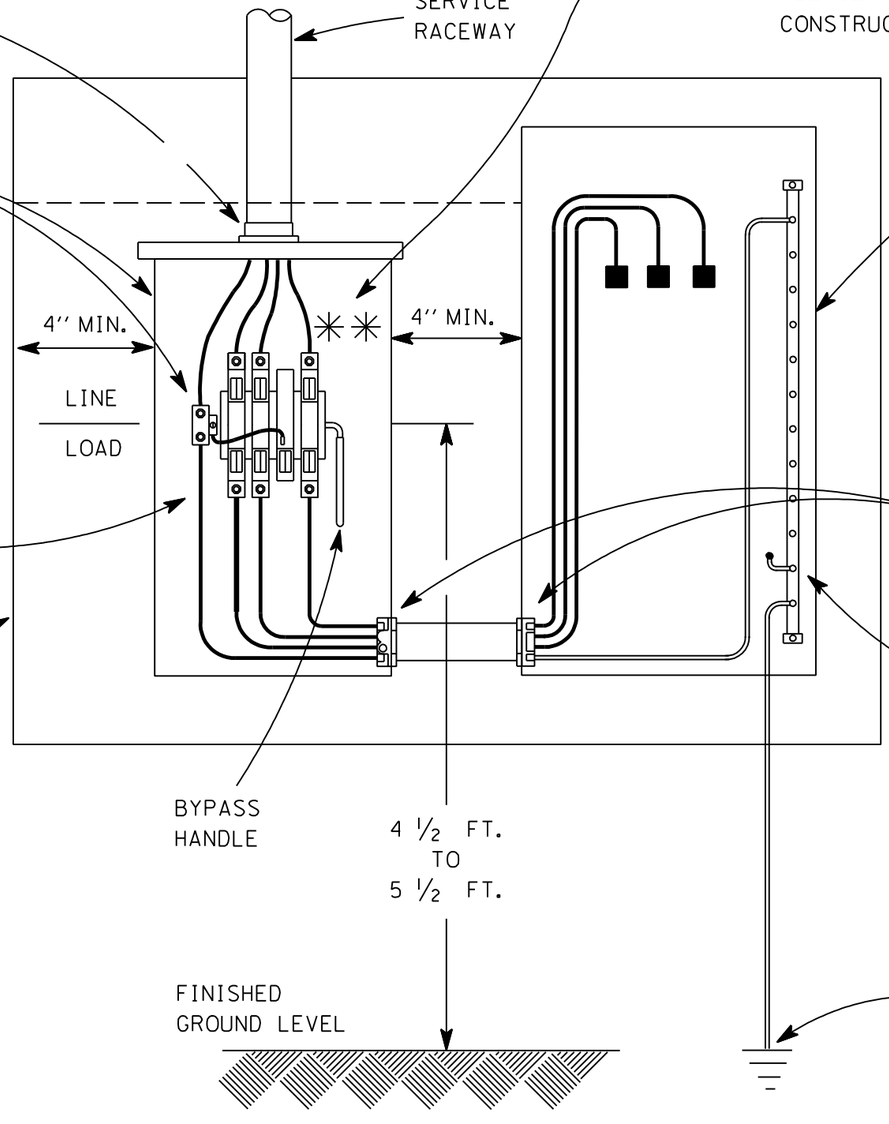
✳ AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

BONDING OF A METALLIC SERVICE RACEWAY IS PERMITTED BY USING THE THREADED HUB ON THE METER SOCKET.

SEVEN-TERMINAL POLYPHASE HIGH CAPACITY METER SOCKET EQUIPPED WITH A BYPASS HANDLE IS FURNISHED & INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET MUST BOND THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

WHERE REQUIRED THE SERVICE EQUIPMENT BOARD MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)



THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION FURNISHED AND INSTALLED BY THE CUSTOMER. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST TERMINATE IN THE SERVICE DISCONNECTING MEANS ENCLOSURE.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT(S) OR SERVICE PANELBOARD.

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. APPROVED BONDING PER N.E.C.

THE ENCLOSURE IS BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

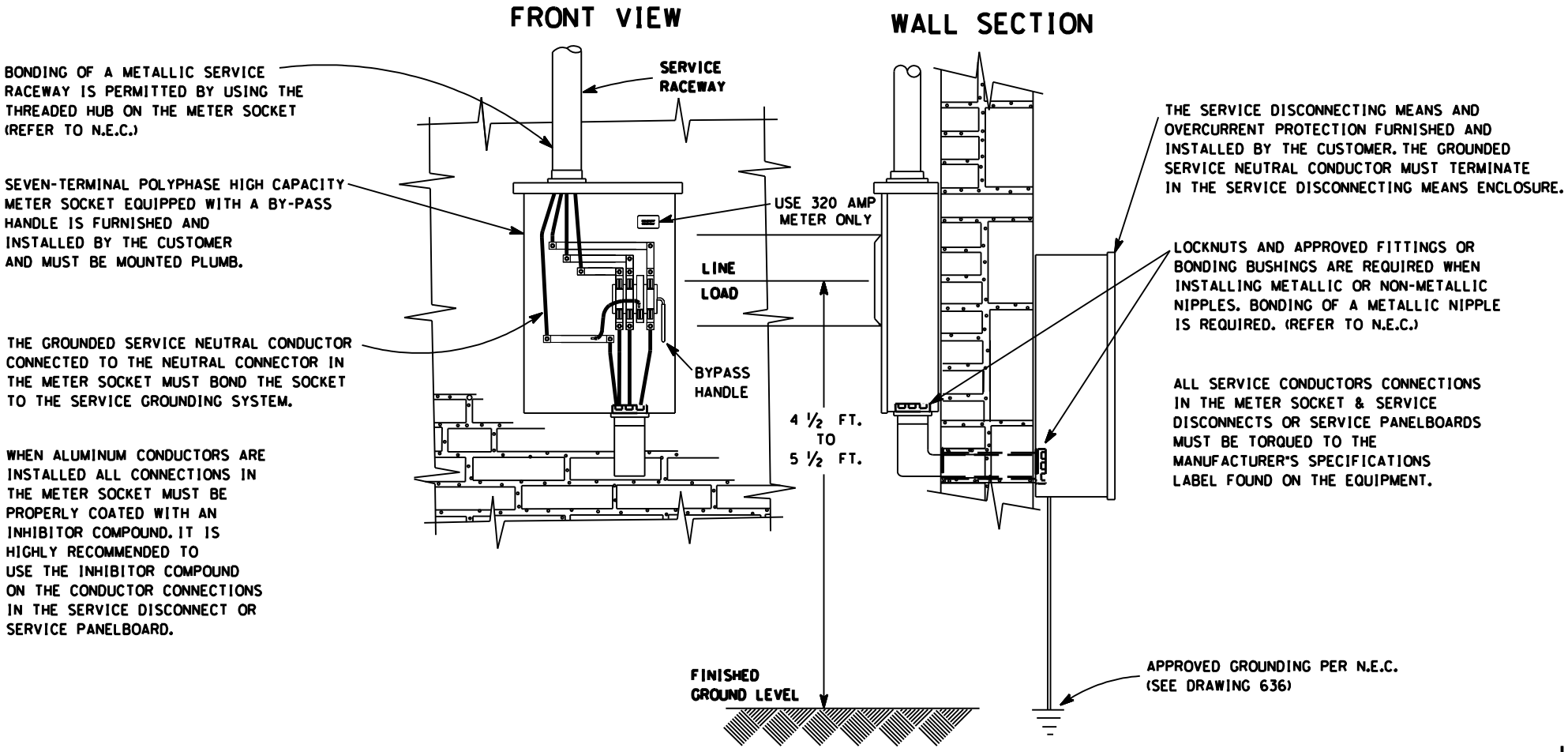
ALL SERVICE CONDUCTORS CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER"S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

APPROVED GROUNDING PER N.E.C.

627

REVISED 04/13

208Y/120 VOLT THREE-PHASE, FOUR WIRE OUTDOOR (OVERHEAD) (GREATER THAN 200 AMPERES, NOT EXCEEDING 400 AMPERES)



628

REVISED 09/13

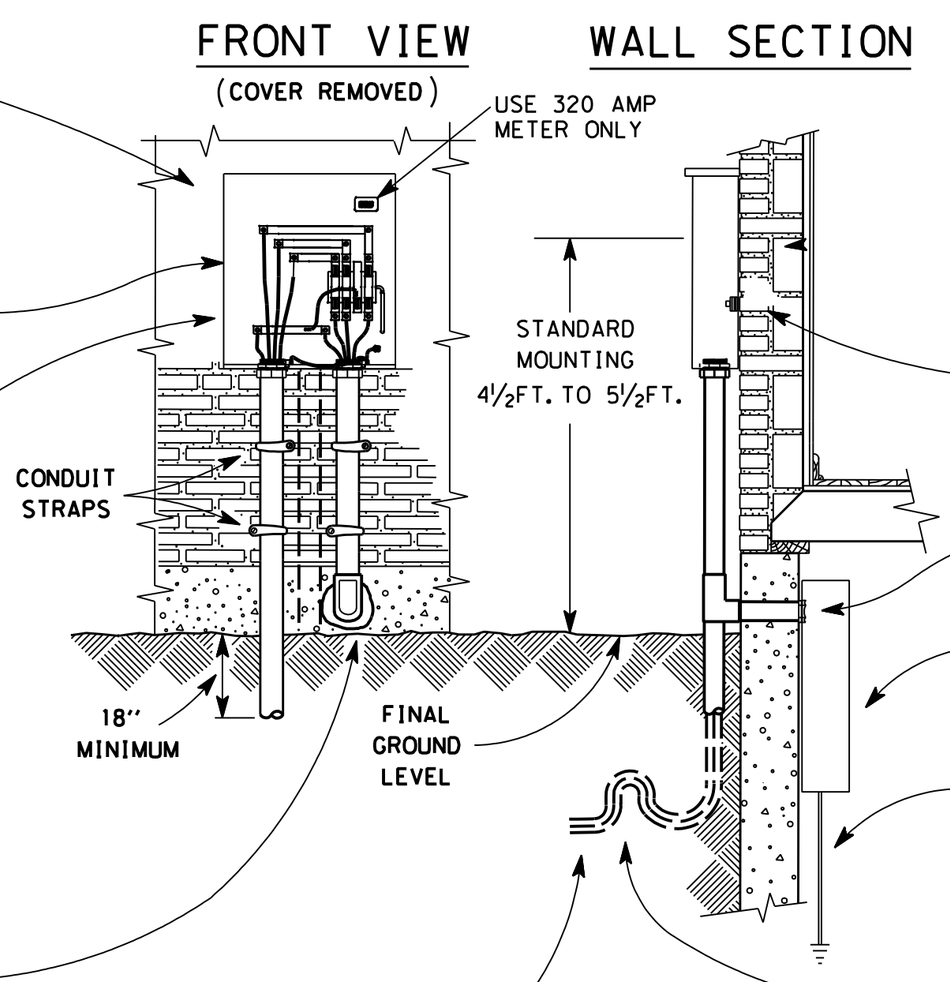
208Y/120V, 3-PHASE, 4-WIRE OUTDOOR UNDERGROUND
(GREATER THAN 200 AMPERES BUT NOT EXCEEDING 400 AMPERES)

APPLICATIONS - 400 AMPERES MAXIMUM WHEN APPROVED BY
ENGINEERING AND CONSTRUCTION PLANNING
OUTDOOR METER LOCATION REQUIRED ON ALL NEW INSTALLATIONS

ALL EQUIPMENT & CONDUCTORS SHOWN ARE FURNISHED & INSTALLED BY THE CUSTOMER.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET AND SERVICE DISCONNECT(S) OR SERVICE PANELBOARD(S) MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.



THE HOLE WHERE THE SERVICE RACEWAYS OR SERVICE CABLES ENTER THE BUILDING MUST BE SEALED TO PREVENT WATER, RODENTS OR INSECTS FROM ENTERING THE BUILDING.

THE INSTALLATION REQUIREMENTS & APPROVAL OF THE SERVICE LATERAL (DEPTH , AMPACITY , TYPE , ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL BUS IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM. APPROVED GROUNDING PER N.E.C.

APPROVED BONDING OF A METALLIC RACEWAY IS REQUIRED. LOCKNUTS , APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC RACEWAYS. (REFER TO N.E.C.)

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

APPROVED GROUNDING PER N.E.C.

INSTALL SUFFICIENT CABLE SLACK AT THE FOUNDATION TO ALLOW FOR SETTLING OF THE EARTH ON DIRECT BURIED CABLES. CABLE SLACK IS REQUIRED TO REDUCE HEAVY TENSIONS ON THE INSULATED BLOCKS OF THE METER SOCKET JAWS.

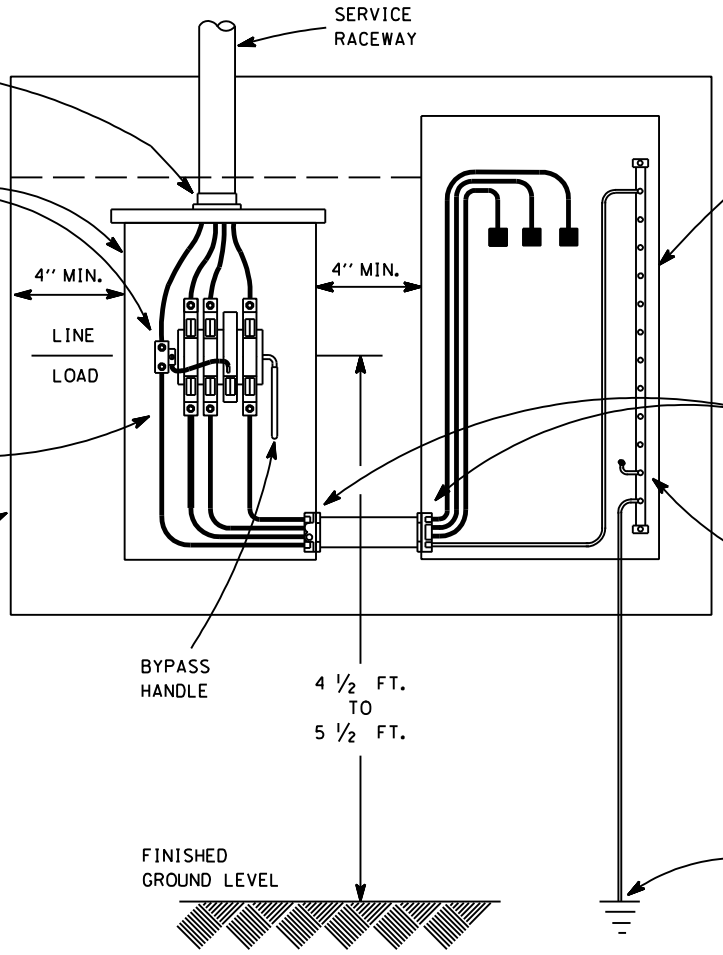
(SEE ARTICLES 311 AND 312 FOR ADDITIONAL INFORMATION ON UNDERGROUND SERVICE LATERALS)

629

REVISED 04/13

208Y/120 VOLT, THREE-PHASE, FOUR-WIRE, INDOOR
(GREATER THAN 200 AMPERES, NOT EXCEEDING 400 AMPERES)

AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS UNLESS MANDATED BY A COMMUNITY ORDINANCE. CONTACT POWER DELIVERY.



BONDING OF A METALLIC SERVICE RACEWAY IS PERMITTED BY USING THE THREADED HUB ON THE METER SOCKET. (RERE TO N.E.C.)

SEVEN-TERMINAL POLYPHASE HIGH CAPACITY METER SOCKET EQUIPPED WITH A BYPASS HANDLE IS FURNISHED & INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET MUST BOND THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

WHERE REQUIRED THE SERVICE EQUIPMENT BOARD MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION FURNISHED AND INSTALLED BY THE CUSTOMER. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST TERMINATE IN THE SERVICE DISCONNECTING MEANS ENCLOSURE.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT(S) OR SERVICE PANELBOARD.

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS ARE REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. BONDING OF A METALLIC NIPPLE IS REQUIRED. (REFER TO N.E.C.)

THE ENCLOSURE IS BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW. (REFER TO N.E.C.)

ALL SERVICE CONDUCTORS CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECTS OR SERVICE PANELBOARDS MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

APPROVED GROUNDING PER N.E.C. (SEE DRAWING 636)

630

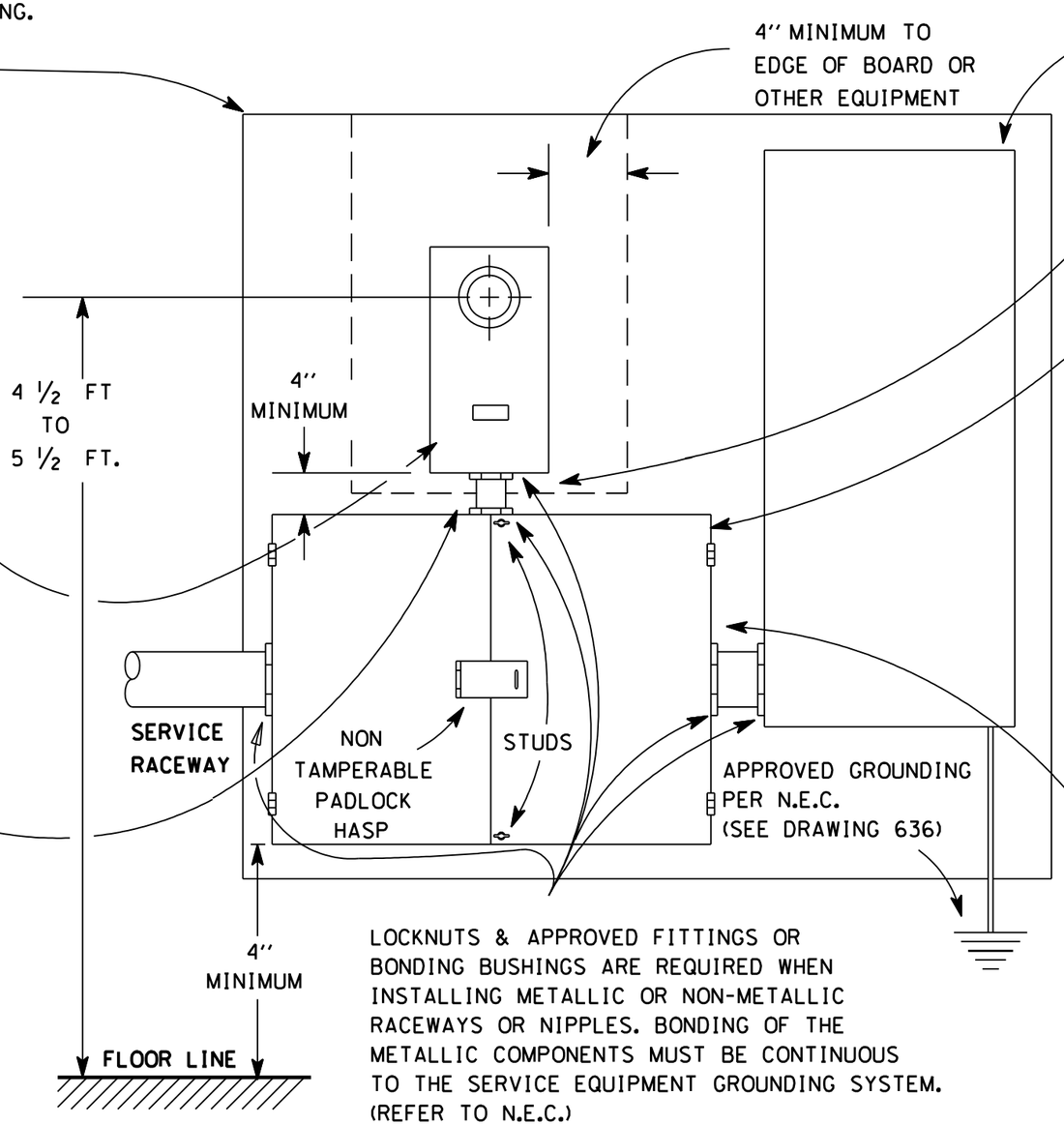
REVISED 09/13

208Y/120 VOLT , 240/120 *VOLT AND 480Y/277 VOLT THREE-PHASE, FOUR-WIRE
(GREATER THAN 400 AMPERES, BUT NOT EXCEEDING 1200 AMPERES)

(*NOTE 240/120 VOLT THREE-PHASE, FOUR-WIRE INSTALLATION ARE LIMITED TO 300 AMPS.)

FOR SERVICE AMPACITIES GREATER THAN 1200 AMPERES, OR FOR BUS-BAR INSTALLATIONS, CONSULT ENGINEERING AND CONSTRUCTION PLANNING.

WHERE REQUIRED A SERVICE EQUIPMENT BOARD MUST BE MOUNTED PLUMB.



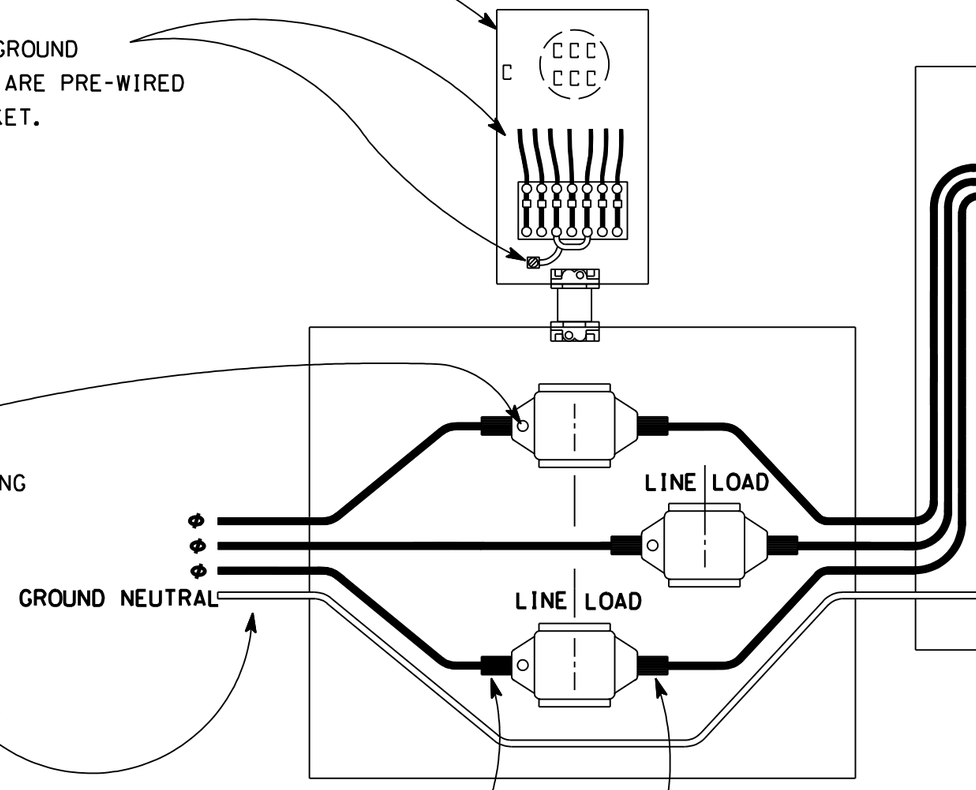
631

REVISED 09/13

208Y/120 VOLT (GREATER THAN 400AMPS) OR 480Y/277 VOLT, THREE-PHASE, FOUR-WIRE WIRING DIAGRAM

TRANSFORMER RATED METER SOCKET WITH TEST SWITCHES.

THE TRANSFORMER SECONDARY GROUND CONNECTION AND METER LEADS ARE PRE-WIRED IN THE COMPANY'S METER SOCKET.



THE PRIMARY POLARITY MARKS ARE IDENTIFIED BY A WHITE MARKER OR BY RAISED LETTERING "H1". THE POLARITY MARKS MUST FACE THE INCOMING SERVICE CONDUCTORS.

SERVICE LATERAL OR SERVICE-ENTRANCE CONDUCTORS INSTALLED BY THE CUSTOMER. (SEE ARTICLE 509C)

A MAXIMUM OF 3 CONDUCTORS MAY BE DIRECTLY CONNECTED TO EACH LINE AND LOAD TERMINAL. WHERE MORE THAN 3 CONDUCTORS ARE REQUIRED. CONTACT ENGINEERING AND CONSTRUCTION PLANNING. (SEE ARTICLE 504 AND 509)

SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST TERMINATE IN EACH SERVICE DISCONNECTING MEANS ENCLOSURE.

THE ENCLOSURES ARE BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METERING CABINET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METERING CABINET AND SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

APPROVED GROUNDING PER N.E.C.

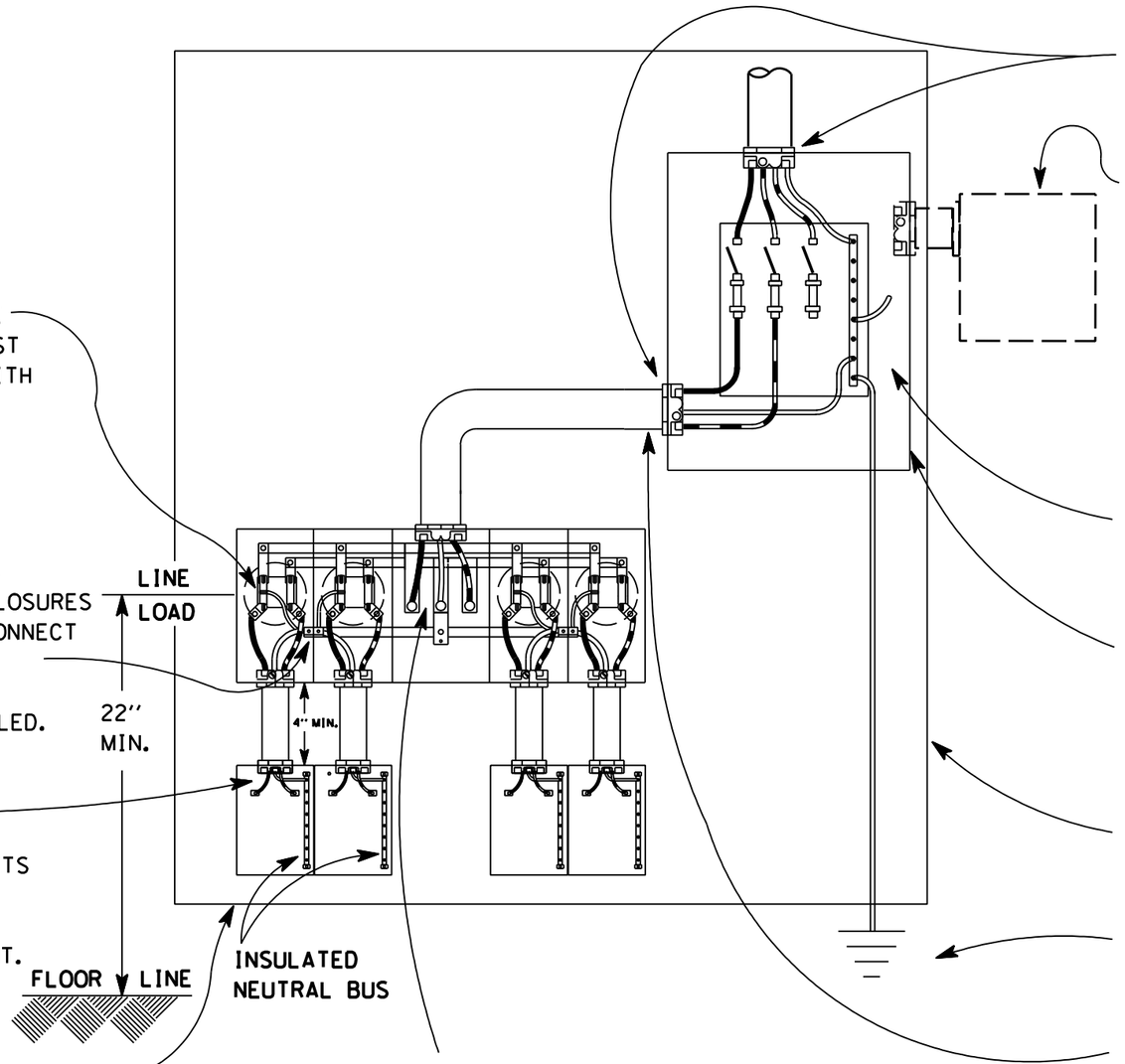
632

REVISED 05/13

208Y/120 VOLT, SINGLE-PHASE, THREE-WIRE * TYPICAL MULTIPLE METERING INSTALLATION (FROM A THREE-PHASE FOUR WIRE SYSTEM)

WHERE THE MAIN SERVICE DISCONNECT IS REQUIRED ON THE SUPPLY SIDE OF THE METERING EQUIPMENT (SEE NEC)

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.



THE FIVE TERMINAL METER SOCKETS ARE FURNISHED AND INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB.

THE FIFTH TERMINAL MUST BE MOUNTED ON THE LEFT SIDE ON EACH SOCKET, AS SHOWN, AND MUST BE CONNECTED TO THE METERING CONNECTOR WITH NO. 10AWG COPPER INSULATED CONDUCTOR, SUPPLIED AND INSTALLED BY THE CUSTOMER.

THE GROUNDED CIRCUIT NEUTRAL CONDUCTOR IS PERMITTED TO GROUND THE METER SOCKET ENCLOSURES ON THE LOAD SIDE OF THE MAIN SERVICE DISCONNECT WHEN THE ENCLOSURES ARE LOCATED NEAR THE SERVICE DISCONNECTING MEANS & WHERE NO SERVICE GROUND FAULT PROTECTION IS INSTALLED.

THE AMPACITY OF THE LOAD SIDE CONDUCTORS MUST NOT EXCEED 200 AMPERES.

ALL SERVICE CONNECTIONS IN THE METER SOCKETS & SERVICE DISCONNECT OR PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

FEEDER OVERCURRENT PROTECTION DEVICE OR PANELBOARD

THE FEEDER CABLE BUS ON THE LINE SIDE OF THE METER TROUGH MUST BE CONTINUOUS & WITHOUT SPLICE FROM THE LOAD CONNECTORS OF THE SERVICE DISCONNECTING MEANS.

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. APPROVED BONDING PER N.E.C.

ADDITIONAL METER SOCKETS MAY BE CONNECTED TO OTHER OUTLETS FROM THE MAIN DISCONNECT ENCLOSURE.

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.

THE ENCLOSURE IS BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

THE MAIN SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION AS REQUIRED BY THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

WHERE REQUIRED, SERVICE EQUIPMENT BOARD MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

APPROVED GROUNDING PER N.E.C.

METALLIC OR NON-METALLIC NIPPLES

633

REVISED 05/13

208Y/120 VOLT, THREE-PHASE, FOUR-WIRE * TYPICAL MULTIPLE METERING INSTALLATION

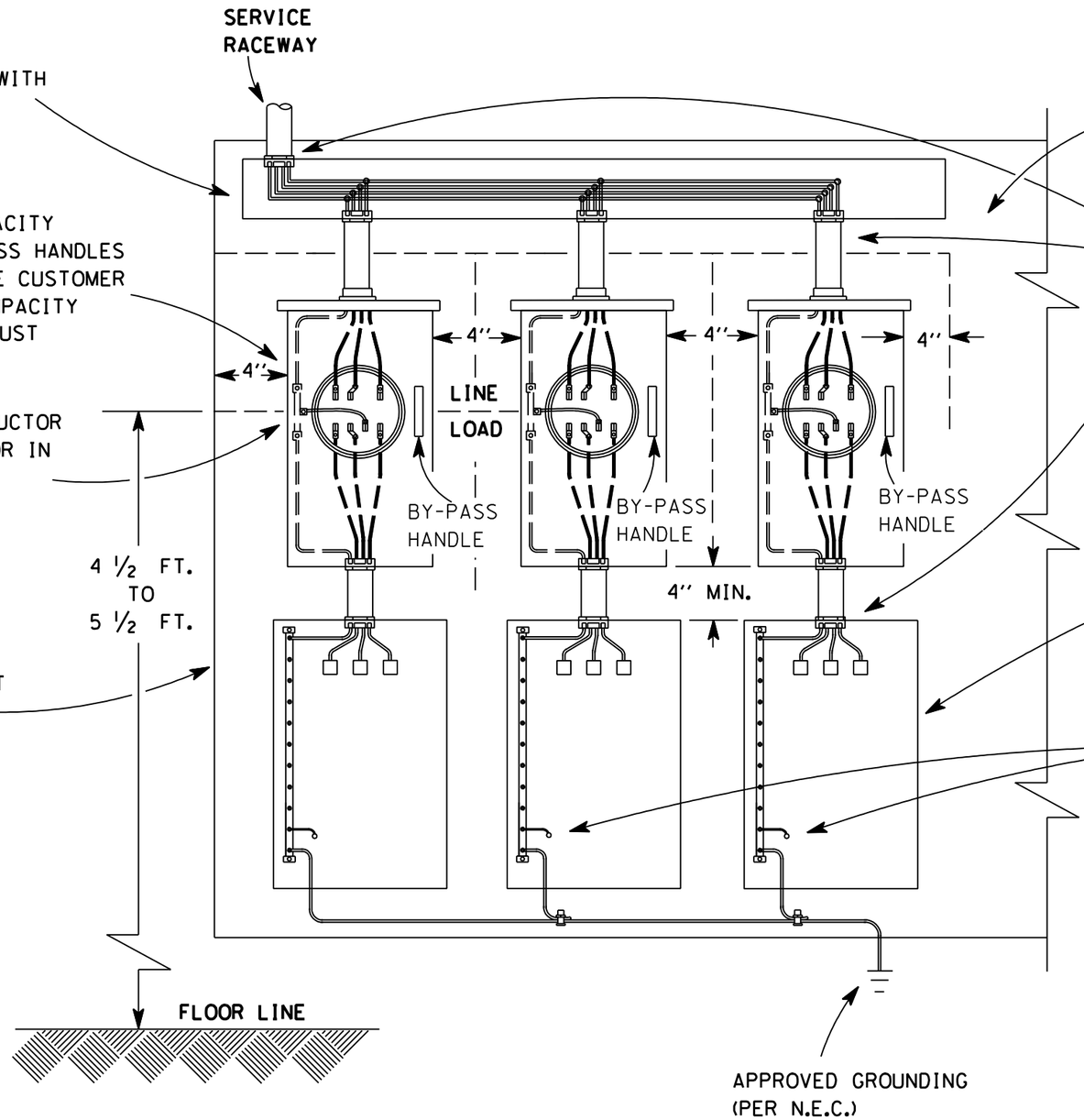
THE WIRE TROUGH MUST BE EQUIPPED WITH SEALING PROVISIONS TO ACCOMMODATE COMPANY SEALING PROVISIONS.

SEVEN-TERMINAL POLYPHASE HIGH CAPACITY METER SOCKETS EQUIPPED WITH BY-PASS HANDLES ARE FURNISHED AND INSTALLED BY THE CUSTOMER AND MUST BE MOUNTED PLUMB. THE AMPACITY OF THE LINE AND LOAD CONDUCTORS MUST NOT EXCEED 200 AMPERES.

THE GROUNDED SERVICE NEUTRAL CONDUCTOR CONNECTED TO THE NEUTRAL CONNECTOR IN THE METER SOCKET BONDS THE SOCKET TO THE SERVICE GROUNDING SYSTEM.

WHERE REQUIRED A SERVICE EQUIPMENT BOARD MUST BE MOUNTED PLUMB. (SEE ARTICLE 508)

WHEN ALUMINUM CONDUCTORS ARE INSTALLED ALL CONNECTIONS IN THE METER SOCKET MUST BE PROPERLY COATED WITH AN INHIBITOR COMPOUND. IT IS HIGHLY RECOMMENDED TO USE THE INHIBITOR COMPOUND ON THE CONDUCTOR CONNECTIONS IN IN THE SERVICE DISCONNECT OR SERVICE PANELBOARD.



ADDITIONAL SOCKETS MAY BE ADDED, HOWEVER THIS ARRANGEMENT IS LIMITED TO SIX SERVICE DISCONNECTS BEHIND THE METER SOCKETS. (SEE NEC)

LOCKNUTS AND APPROVED FITTINGS OR BONDING BUSHINGS REQUIRED WHEN INSTALLING METALLIC OR NON-METALLIC NIPPLES. APPROVED BONDING PER N.E.C.

ALL SERVICE CONDUCTOR CONNECTIONS IN THE METER SOCKET & SERVICE DISCONNECT OR SERVICE PANELBOARD MUST BE TORQUED TO THE MANUFACTURER'S SPECIFICATIONS LABEL FOUND ON THE EQUIPMENT.

THE SERVICE DISCONNECTING MEANS AND OVERCURRENT PROTECTION ENCLOSURE. THE GROUNDED SERVICE NEUTRAL CONDUCTOR MUST TERMINATE IN THE SERVICE DISCONNECTING MEANS ENCLOSURE.

THE ENCLOSURES ARE BONDED TO THE SERVICE SYSTEM GROUND BY A MAIN BONDING JUMPER OR A BONDING SCREW.

* AN INDOOR LOCATION OF A METER SOCKET IS NOT PERMITTED ON NEW INSTALLATIONS. UNLESS MANDATED BY A COMMUNITY ORDINANCE.

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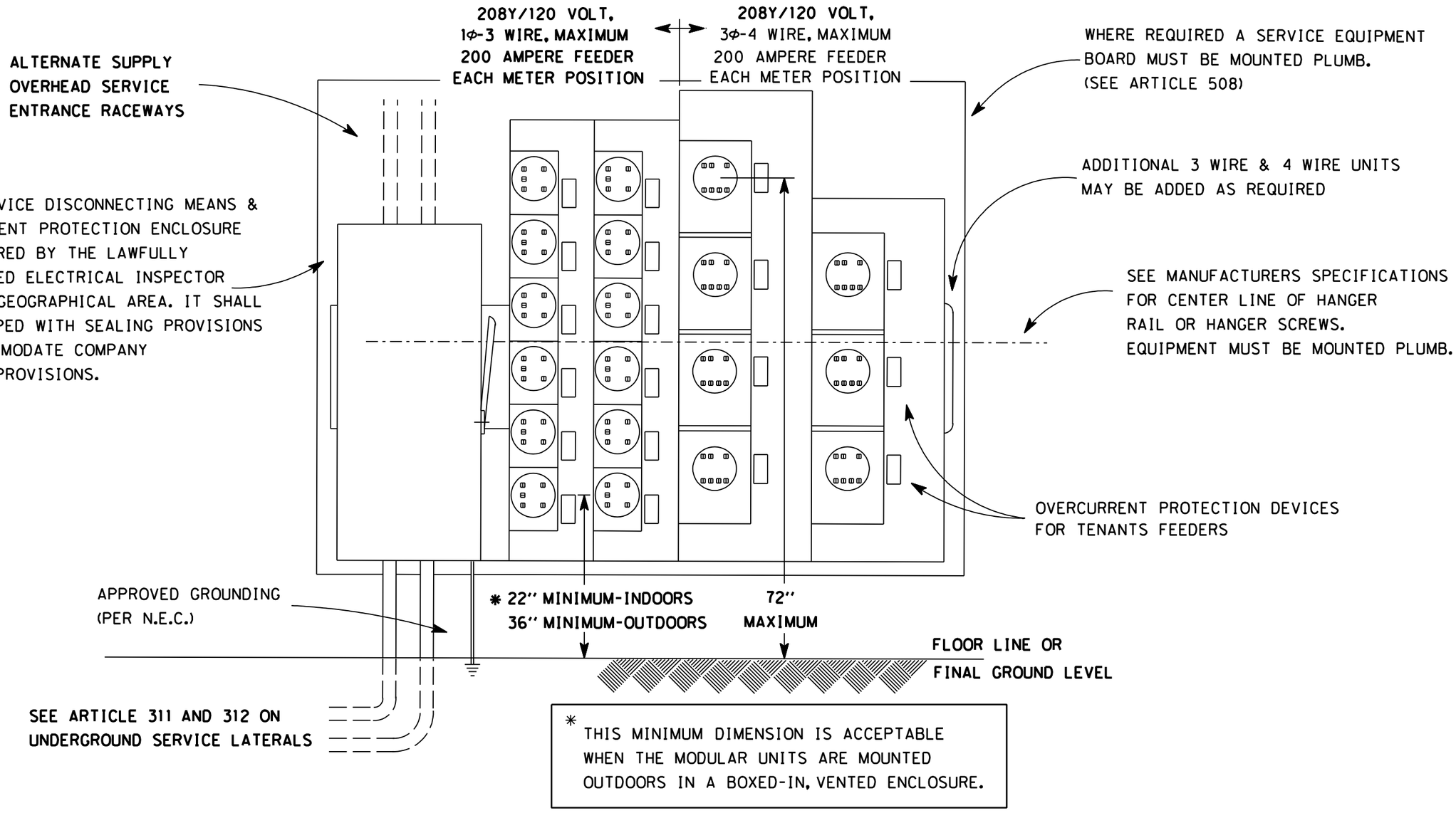
634

REVISED 05/13

208Y/120 VOLT, THREE-WIRE & FOUR-WIRE PRE-ASSEMBLED MODULAR METERING INSTALLATION WHERE A MAIN DISCONNECTING MEANS IS REQUIRED ON THE SUPPLY SIDE OF THE METERING EQUIPMENT (SEE NEC) (200 AMPERES MAXIMUM)

PRE-ASSEMBLED MODULAR METERING UNITS MUST BE APPROVED BY THE COMPANY PRIOR TO INSTALLATION CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR INFORMATION REGARDING ACCEPTABLE UNITS OR THE APPROVAL PROCEDURE.

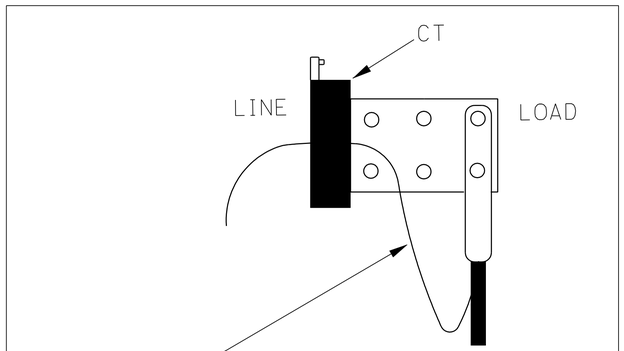


* THIS MINIMUM DIMENSION IS ACCEPTABLE WHEN THE MODULAR UNITS ARE MOUNTED OUTDOORS IN A BOXED-IN, VENTED ENCLOSURE.

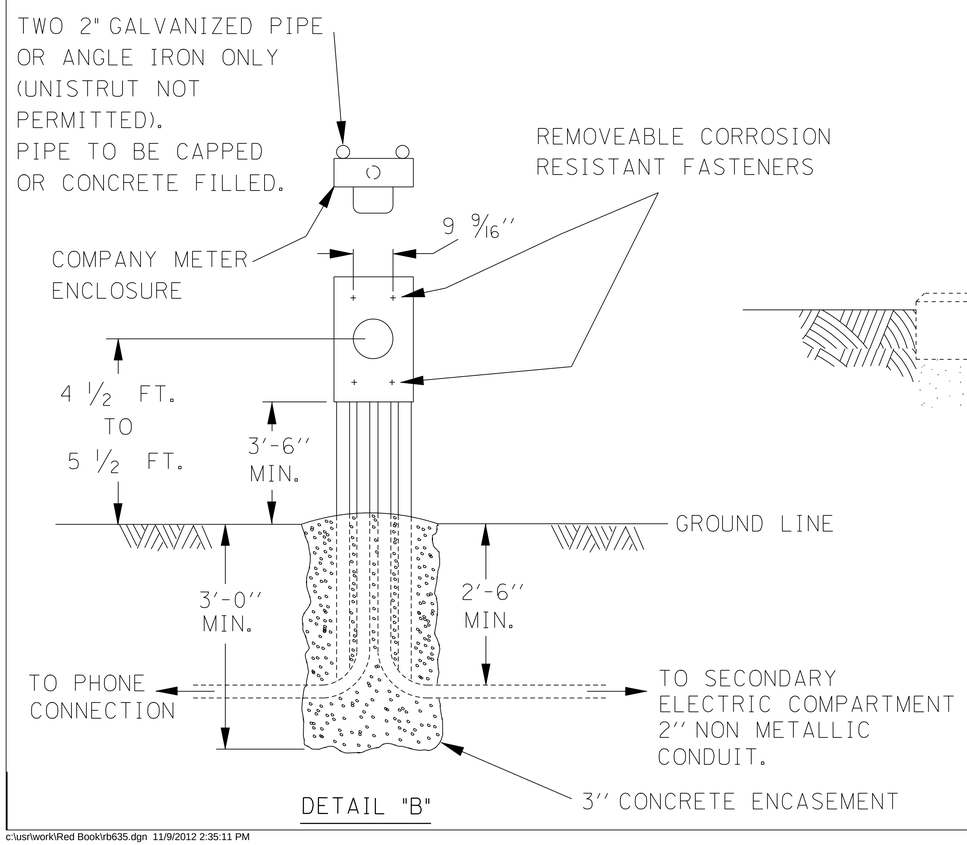
635

REVISED 11/12

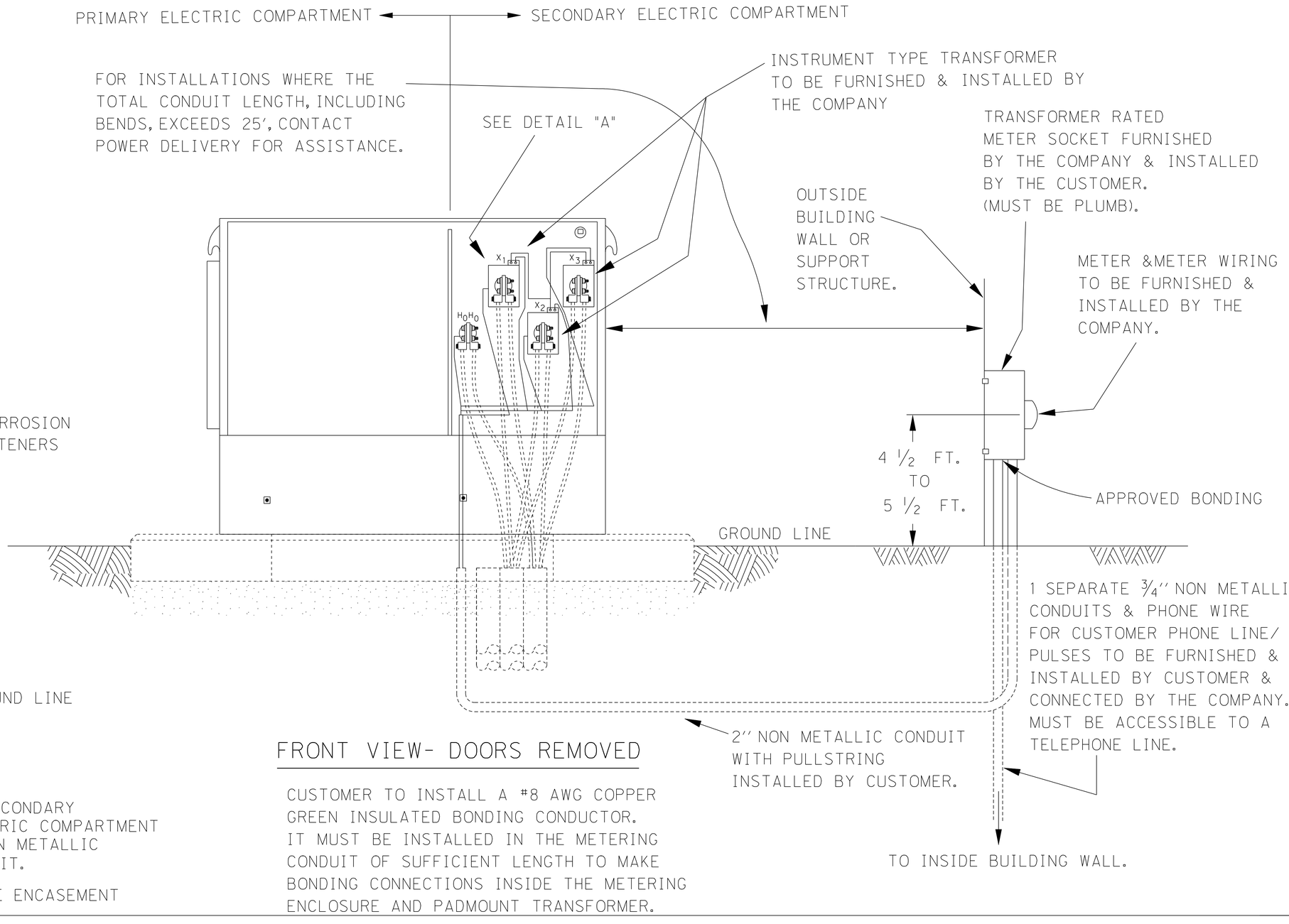
208Y/120 VOLT OR 480Y/277 VOLT , THREE-PHASE, FOUR-WIRE PADMOUNT METERING SERVING A SINGLE CUSTOMER ONLY (GREATER THAN 200 AMPS BUT NOT EXCEEDING 3000 AMPS)



DETAIL "A"



DETAIL "B"



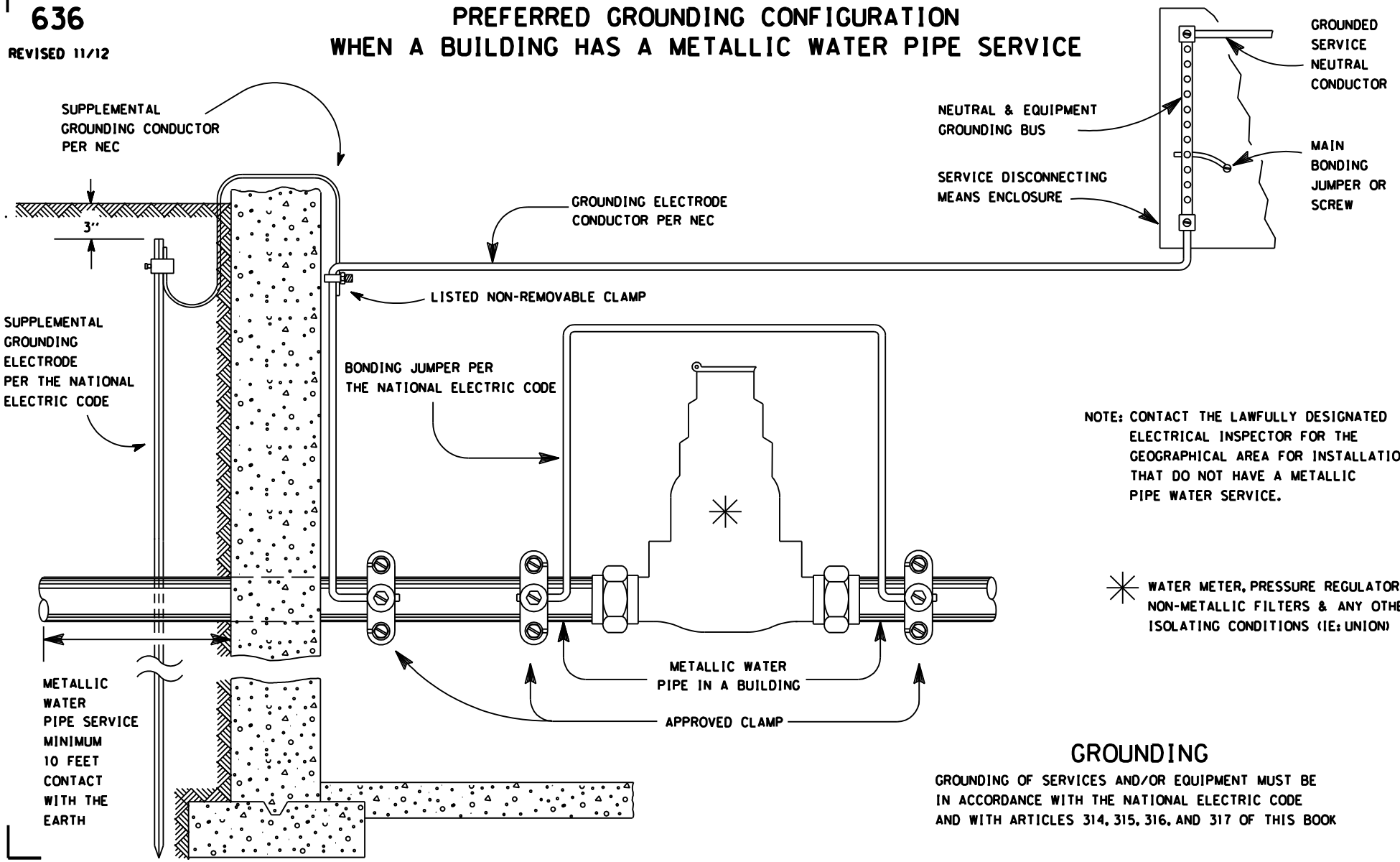
FRONT VIEW- DOORS REMOVED

CUSTOMER TO INSTALL A #8 AWG COPPER GREEN INSULATED BONDING CONDUCTOR. IT MUST BE INSTALLED IN THE METERING CONDUIT OF SUFFICIENT LENGTH TO MAKE BONDING CONNECTIONS INSIDE THE METERING ENCLOSURE AND PADMOUNT TRANSFORMER.

636

REVISED 11/12

PREFERRED GROUNDING CONFIGURATION
WHEN A BUILDING HAS A METALLIC WATER PIPE SERVICE



NOTE: CONTACT THE LAWFULLY DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA FOR INSTALLATIONS THAT DO NOT HAVE A METALLIC PIPE WATER SERVICE.

✳ WATER METER, PRESSURE REGULATOR, NON-METALLIC FILTERS & ANY OTHER ISOLATING CONDITIONS (IE: UNION)

GROUNDING

GROUNDING OF SERVICES AND/OR EQUIPMENT MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND WITH ARTICLES 314, 315, 316, AND 317 OF THIS BOOK

208Y/120 VOLT (GREATER THAN 400AMPS), 240/120 VOLT* OR 480/277 VOLT, THREE-PHASE, FOUR-WIRE POLE-TYPE METERING (NOT EXCEEDING 1200 AMPERES)

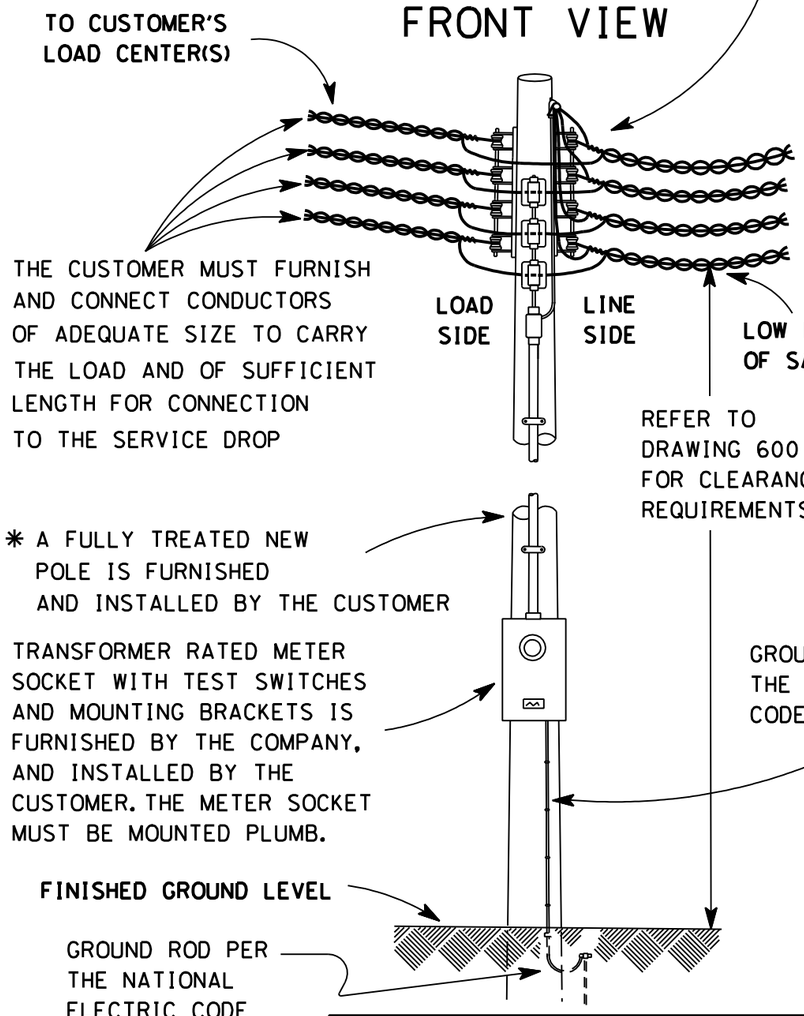
637

REVISED 09/13

(NOTE:*240/120 VOLT THREE PHASE, FOUR WIRE INSTALLATIONS ARE LIMITED TO 300 AMPS.)
PLEASE CONTACT ENGINEERING AND CONSTRUCTION PLANNING FOR AVAILABILITY.

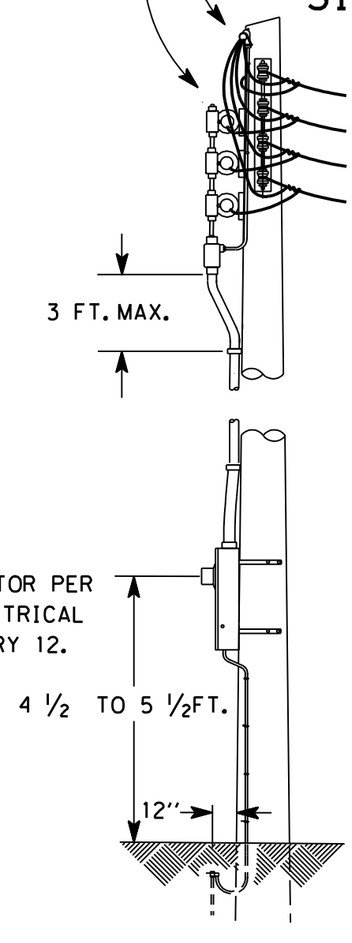
THE SERVICE DROP ATTACHMENT DEVICE IS FURNISHED AND INSTALLED BY THE CUSTOMER.

FRONT VIEW

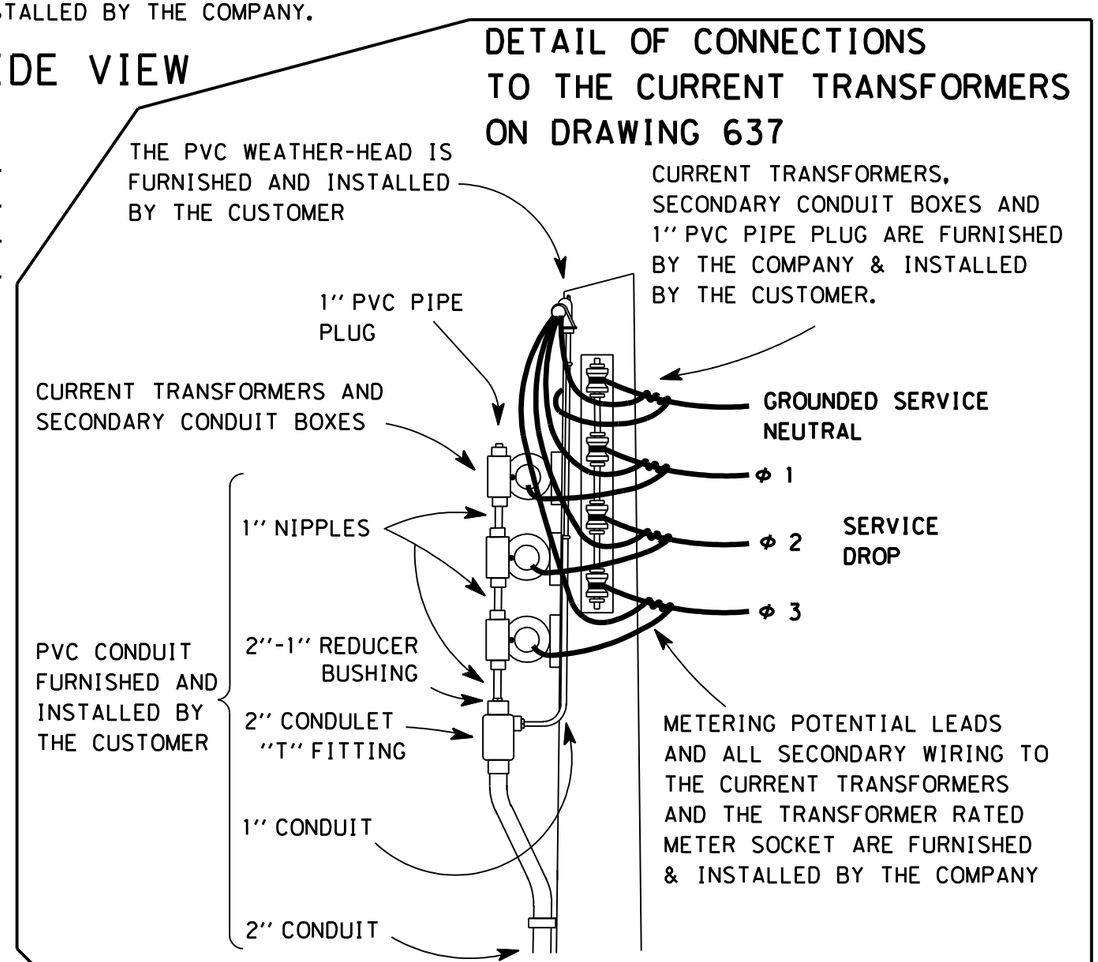


THE CURRENT TRANSFORMERS AND SECONDARY CONDUIT BOXES ARE FURNISHED BY THE COMPANY & INSTALLED BY THE CUSTOMER. ALL SECONDARY METER WIRING FROM THE CURRENT TRANSFORMER TO THE TRANSFORMER RATED METER SOCKET IS FURNISHED AND INSTALLED BY THE COMPANY.

SIDE VIEW



DETAIL OF CONNECTIONS TO THE CURRENT TRANSFORMERS ON DRAWING 637



NOTE: THE CURRENT TRANSFORMERS MUST BE INSTALLED SO THE PRIMARY POLARITY MARKS ARE ON THE SIDE OF THE POLE WHERE THE SERVICE DROP DEAD ENDS

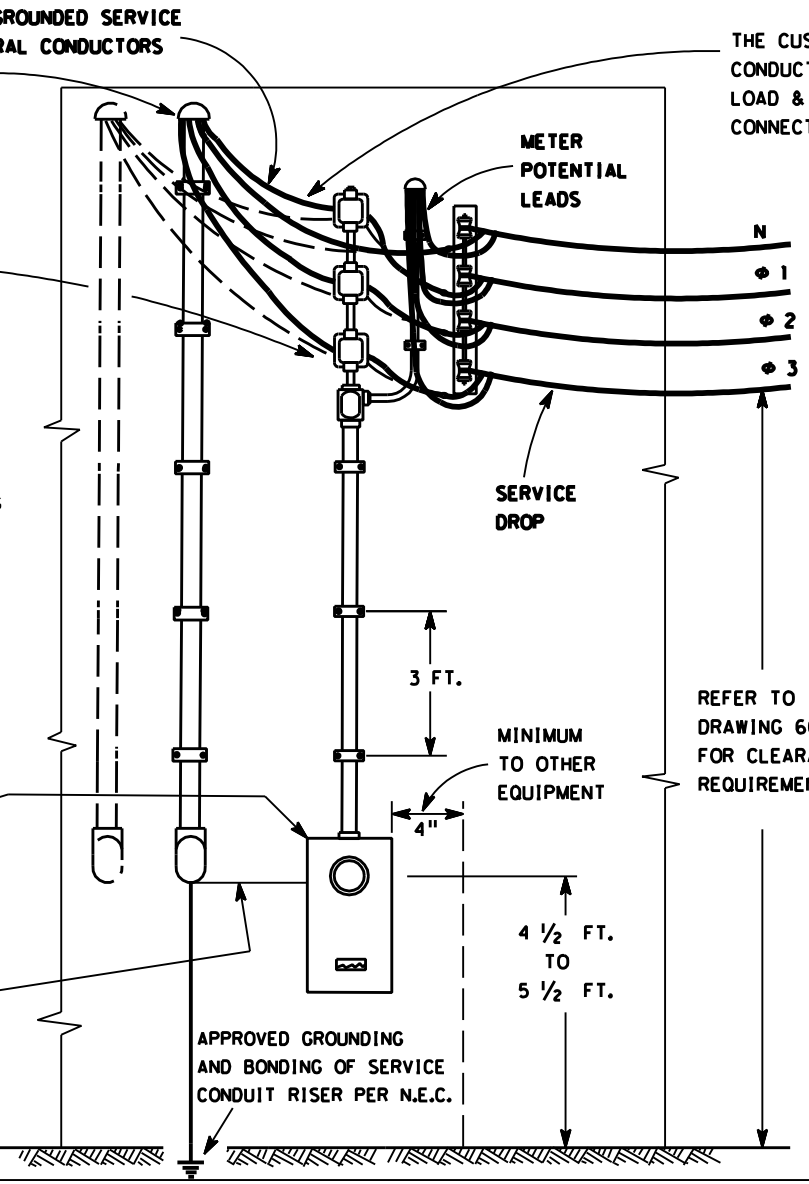
NOTE: LIQUID TIGHT CONDUIT IS NOT ACCEPTABLE.

** METERING POLE LOCATION, HEIGHT, CLASS, DEPTH OF SETTING, AND GUYING MUST BE APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING. DEPTH OF THE HOLE MUST BE CHECKED BY THE COMPANY BEFORE THE POLE IS SET. (SEE ARTICLE 501C)

METHOD OF MOUNTING CURRENT TRANSFORMERS AND METERING ON THE SIDE OF A BUILDING

638

REVISED 11/12



THIS DRAWING SHOWS A METHOD OF MOUNTING 3 CURRENT TRANSFORMERS FOR A 3-PHASE 4-WIRE SERVICE. SINGLE-PHASE 3-WIRE CURRENT TRANSFORMERS MAY BE MOUNTED IN A SIMILAR MANNER.

THE METER POTENTIAL LEADS, METER CABLES, SERVICE DROP & FINAL CONNECTIONS ARE FURNISHED & INSTALLED BY THE COMPANY. THE TRANSFORMER RATED METER SOCKET, CURRENT TRANSFORMERS, SECONDARY CONDUIT BOXES & 1" PIPE PLUG ARE FURNISHED BY THE COMPANY & INSTALLED BY THE CUSTOMER. SERVICE DROP ATTACHMENT DEVICE TO BE FURNISHED & INSTALLED BY THE CUSTOMER.

SEE "DETAIL OF CONNECTIONS TO CURRENT TRANSFORMERS" ON DRAWING 637

639

REVISED 09/13

A METHOD OF MOUNTING CURRENT TRANSFORMERS AND METERING ON A SERVICE MAST

THIS DRAWING SHOWS A METHOD OF MOUNTING 3 CURRENT TRANSFORMERS FOR A THREE-PHASE, FOUR-WIRE SERVICE.
SINGLE-PHASE, THREE-WIRE CURRENT TRANSFORMERS MAY BE MOUNTED IN SIMILAR MANNER.

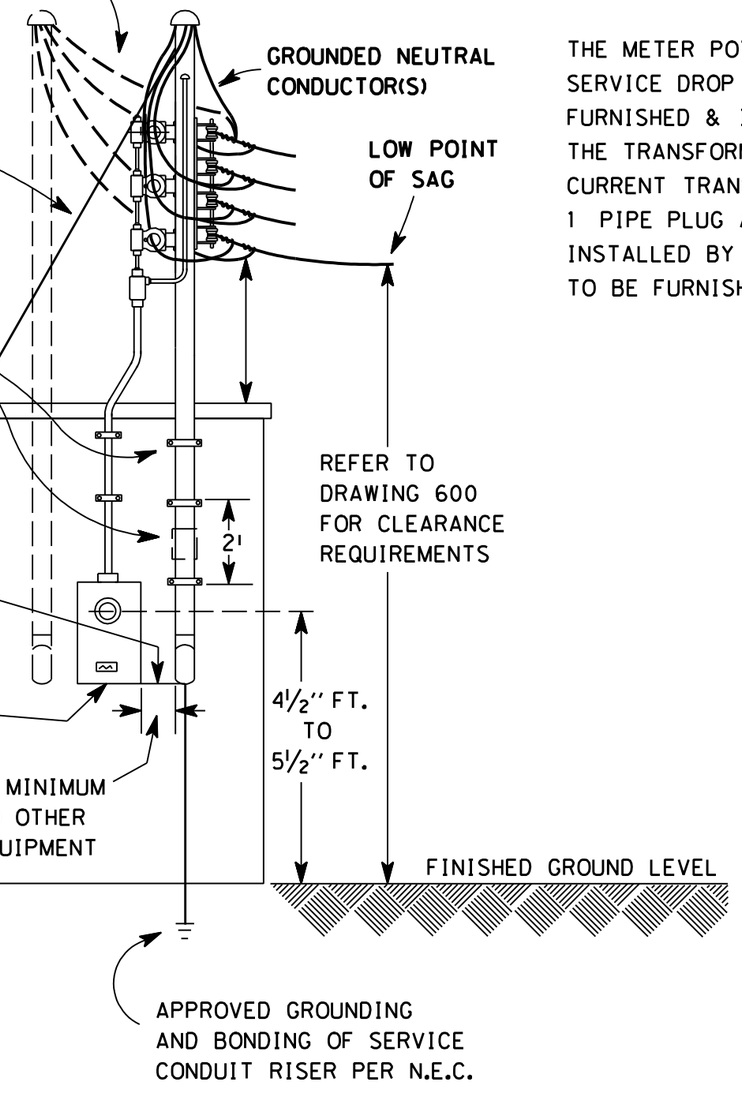
THE CUSTOMER MUST FURNISH SERVICE ENTRANCE CONDUCTORS OF ADEQUATE SIZE TO CARRY THE LOAD AND OF SUFFICIENT LENGTHS FOR CONNECTION TO THE SERVICE DROP.

A BACK GUY MAY BE REQUIRED (CONTACT ENERGY DELIVERY)

MAST SUPPORTS ARE ATTACHED TO THE BUILDING WITH TWO MACHINE BOLTS THROUGH THE WALL. IF ADDITIONAL HEIGHT IS REQUIRED FOR ROOF OR GROUND CLEARANCES, A COUPLING CAN BE INSTALLED BELOW THE SECOND MAST SUPPORT OR A MAST, OTHER THAN A SERVICE RACEWAY, CAN BE INSTALLED. (CONTACT ENGINEERING AND CONSTRUCTION PLANNING)

#8 CU GREEN INSULATED BONDING CONDUCTOR MUST BOND METER SOCKET & SERVICE CONDUIT RISER.

TRANSFORMER RATED METER SOCKET WITH TEST SWITCHES AND MOUNTING BRACKETS ARE FURNISHED BY THE COMPANY, AND INSTALLED BY THE CUSTOMER. THE METER SOCKET MUST BE MOUNTED PLUMB.



THE METER POTENTIAL LEADS, METER CABLES, SERVICE DROP & FINAL CONNECTIONS ARE FURNISHED & INSTALLED BY THE COMPANY. THE TRANSFORMER RATED METER SOCKET, CURRENT TRANSFORMERS, SECONDARY CONDUIT BOXES & 1 PIPE PLUG ARE FURNISHED BY THE COMPANY & INSTALLED BY THE CUSTOMER. SERVICE DROP ATTACHMENT DEVICE TO BE FURNISHED & INSTALLED BY THE CUSTOMER.

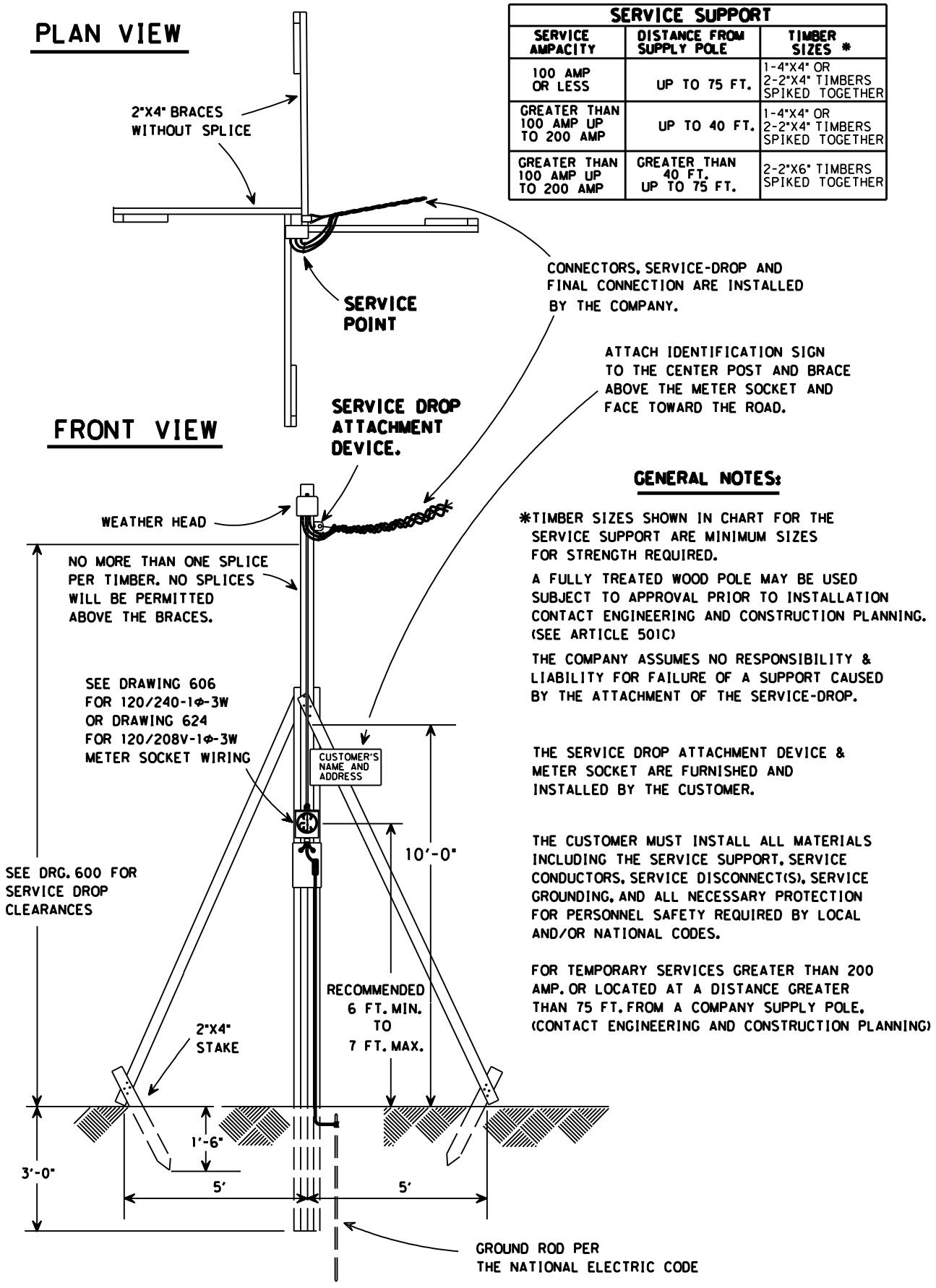
SEE "DETAIL OF CONNECTIONS TO CURRENT TRANSFORMERS" ON DRAWING 637

640

REVISED 09/13

SUPPORT FOR A 120/240V-1Φ OR 120/208V-1Φ THREE-WIRE TEMPORARY SERVICE, 200 AMPERES OR SMALLER, FROM AN OVERHEAD SUPPLY FOR USE DURING BUILDING CONSTRUCTION

SERVICE SUPPORT		
SERVICE AMPACITY	DISTANCE FROM SUPPLY POLE	TIMBER SIZES *
100 AMP OR LESS	UP TO 75 FT.	1-4"X4" OR 2-2"X4" TIMBERS SPIKED TOGETHER
GREATER THAN 100 AMP UP TO 200 AMP	UP TO 40 FT.	1-4"X4" OR 2-2"X4" TIMBERS SPIKED TOGETHER
GREATER THAN 100 AMP UP TO 200 AMP	GREATER THAN 40 FT. UP TO 75 FT.	2-2"X6" TIMBERS SPIKED TOGETHER



GENERAL NOTES:

*TIMBER SIZES SHOWN IN CHART FOR THE SERVICE SUPPORT ARE MINIMUM SIZES FOR STRENGTH REQUIRED.

A FULLY TREATED WOOD POLE MAY BE USED SUBJECT TO APPROVAL PRIOR TO INSTALLATION CONTACT ENGINEERING AND CONSTRUCTION PLANNING. (SEE ARTICLE 501C)

THE COMPANY ASSUMES NO RESPONSIBILITY & LIABILITY FOR FAILURE OF A SUPPORT CAUSED BY THE ATTACHMENT OF THE SERVICE-DROP.

THE SERVICE DROP ATTACHMENT DEVICE & METER SOCKET ARE FURNISHED AND INSTALLED BY THE CUSTOMER.

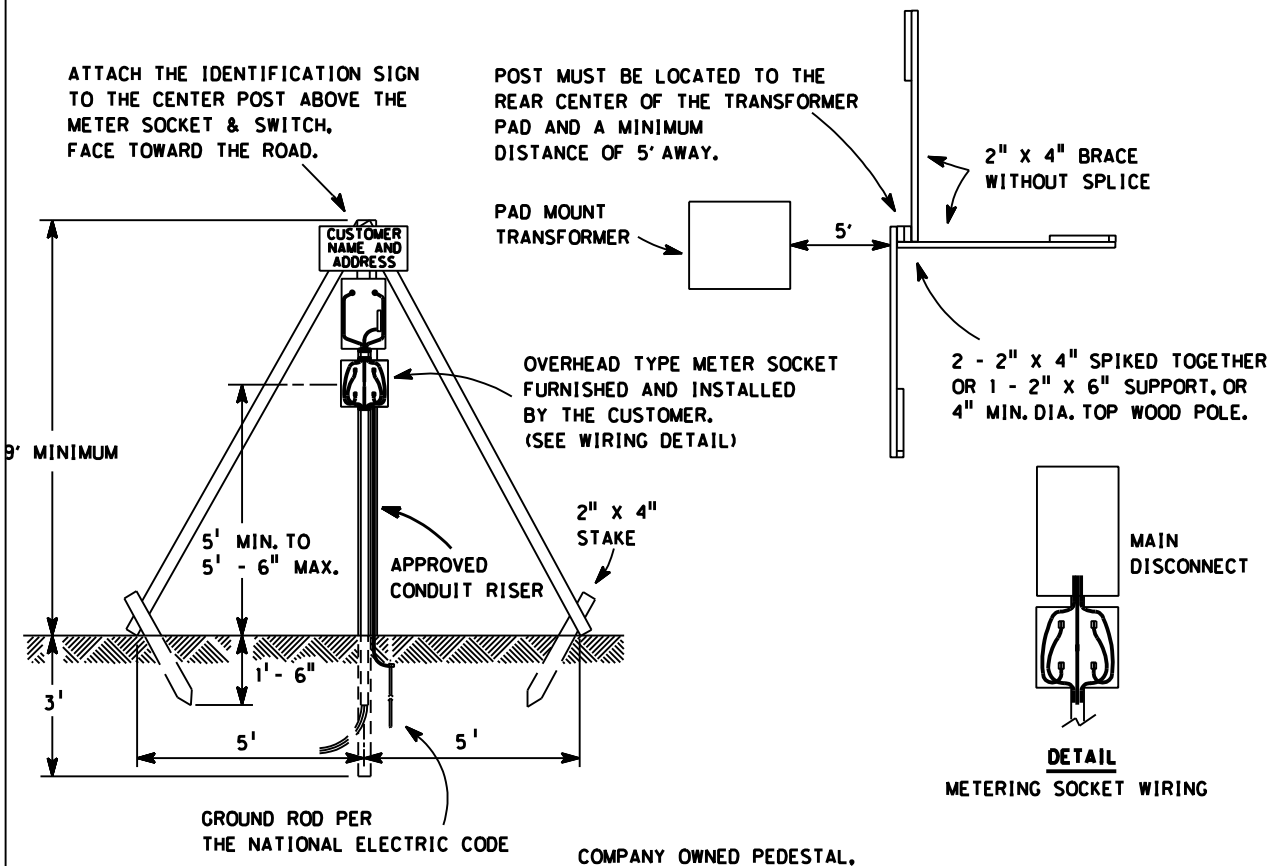
THE CUSTOMER MUST INSTALL ALL MATERIALS INCLUDING THE SERVICE SUPPORT, SERVICE CONDUCTORS, SERVICE DISCONNECT(S), SERVICE GROUNDING, AND ALL NECESSARY PROTECTION FOR PERSONNEL SAFETY REQUIRED BY LOCAL AND/OR NATIONAL CODES.

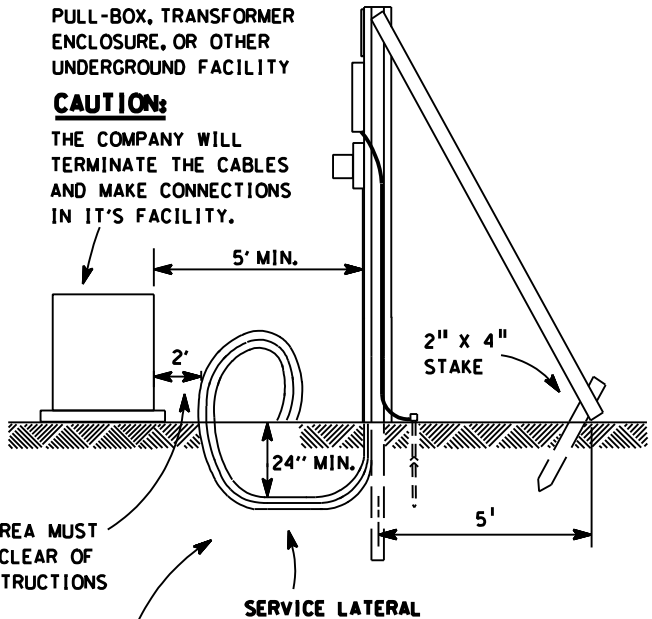
FOR TEMPORARY SERVICES GREATER THAN 200 AMP. OR LOCATED AT A DISTANCE GREATER THAN 75 FT. FROM A COMPANY SUPPLY POLE, (CONTACT ENGINEERING AND CONSTRUCTION PLANNING)

641

REVISED 11/12

SUPPORT FOR A 120/240V, OR 120/208V-1Φ SINGLE-PHASE, THREE-WIRE TEMPORARY SERVICE 200AMP OR SMALLER FROM AN UNDERGROUND SUPPLY FOR USE DURING BUILDING CONSTRUCTION





GENERAL NOTES:

THIS INSTALLATION IS A BASIC DESIGN FOR A 120/240V-1Φ OR 120/208V-1Φ TEMPORARY U. G. SERVICE 200AMPS OR SMALLER.

TIMBER SIZES SHOWN FOR SERVICE SUPPORT ARE MINIMUM FOR STRENGTH REQUIRED.

THE CUSTOMER MUST INSTALL THE SERVICE SUPPORT, SERVICE LATERAL CONDUCTORS, SERVICE DISCONNECT(S) SERVICE GROUNDING AND ALL NECESSARY PROTECTION FOR PERSONNEL SAFETY REQUIRED BY LOCAL AND/OR NATIONAL CODES.

THE INSTALLATION REQUIREMENTS AND APPROVAL OF THE SERVICE LATERAL CONDUCTORS, (AMPACITY, TYPE, DEPTH, ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY-DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

THE TEMPORARY SUPPORT MUST BE LOCATED AT LEAST 5' AWAY FROM THE COMPANY'S SERVICE FACILITY.

FOR TEMPORARY SERVICES GREATER THAN 200AMP. (CONTACT ENGINEERING AND CONSTRUCTION PLANNING).

THE CUSTOMER SHALL PROVIDE SUFFICIENT LENGTH OF CONDUCTOR'S TO REACH AND TO MAKE CONNECTIONS IN AN UNDERGROUND FACILITY. SEAL ENDS OF CONDUCTORS AGAINST MOISTURE. STUB UP OUT OF THE GROUND 2' FROM THE FACILITY.

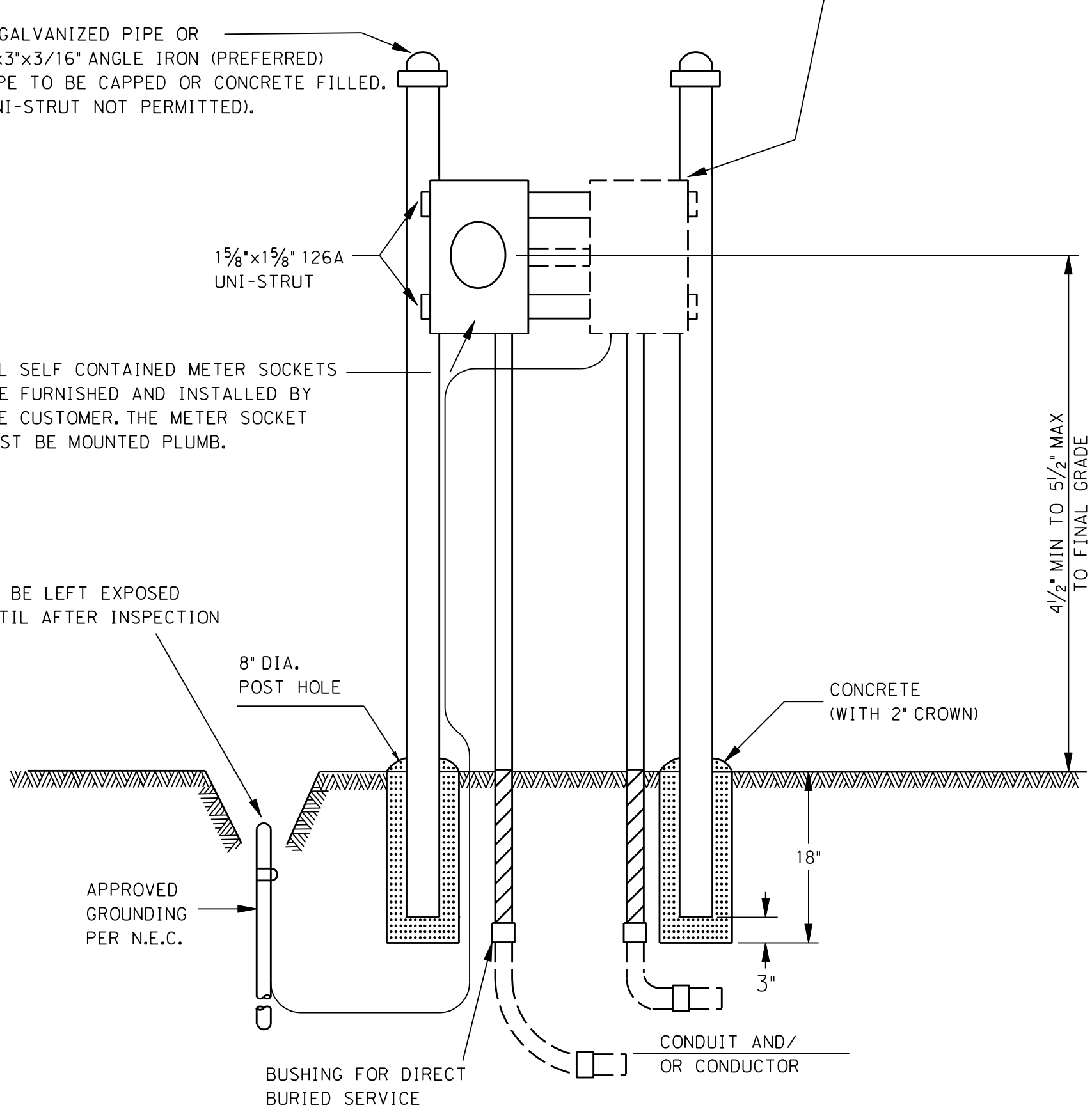
642

POST TYPE METER INSTALLLATION (SELF-CONTAINED METERING)

REVISED 05/13

ALL NON-CURRENT CARRYING METALLIC PARTS TO BE BONDED TO NEUTRAL AND EFFECTIVELY GROUNDED

APPROVED BONDING IS REQUIRED WHEN USING METALLIC CONDUITS OR RACEWAYS. THIS BONDS ALL SERVICE COMPONENTS TO THE SERVICE GROUNDING SYSTEM. WHEN NON-METALLIC CONDUITS ARE USED THE CURRENT TRANSFORMER CABINET AND THE TRANSFORMER RATED METER SOCKET MUST BE BONDED TO THE SERVICE GROUNDING SYSTEM BY USING BONDING CONDUCTORS AND JUMPERS.



NOTES:

1. POST MUST BE EFFECTIVELY GROUNDED.
2. SEE ARTICLES 311 AND 312 ON UNDERGROUND SERVICE LATERALS.
3. THE INSTALLATION REQUIREMENTS & APPROVAL OF THE SERVICE LATERAL (DEPTH, AMPACITY, TYPE, ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

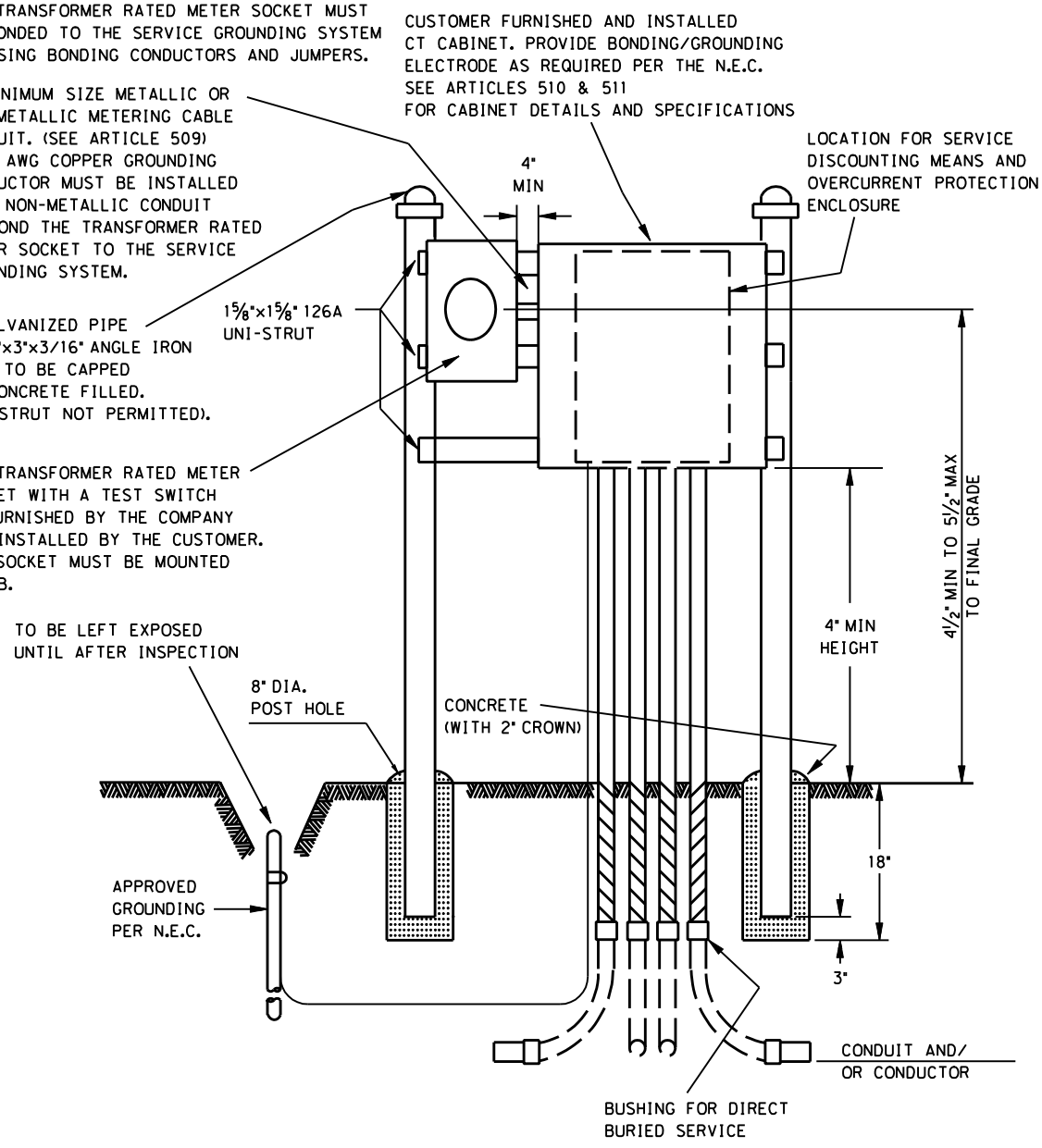
643

REVISED 04/13

POST TYPE METER & INSTRUMENT TRANSFORMER (CT & VT) INSTALLATION (NON-PREFERRED INSTALLATION)

ALL NON-CURRENT CARRYING METALLIC PARTS TO BE BONDED TO NEUTRAL AND EFFECTIVELY GROUNDED

APPROVED BONDING IS REQUIRED WHEN USING METALLIC CONDUITS OR RACEWAYS. THIS BONDS ALL SERVICE COMPONENTS TO THE SERVICE GROUNDING SYSTEM. WHEN NON-METALLIC CONDUITS ARE USED THE CURRENT TRANSFORMER CABINET AND THE TRANSFORMER RATED METER SOCKET MUST BE BONDED TO THE SERVICE GROUNDING SYSTEM BY USING BONDING CONDUCTORS AND JUMPERS.

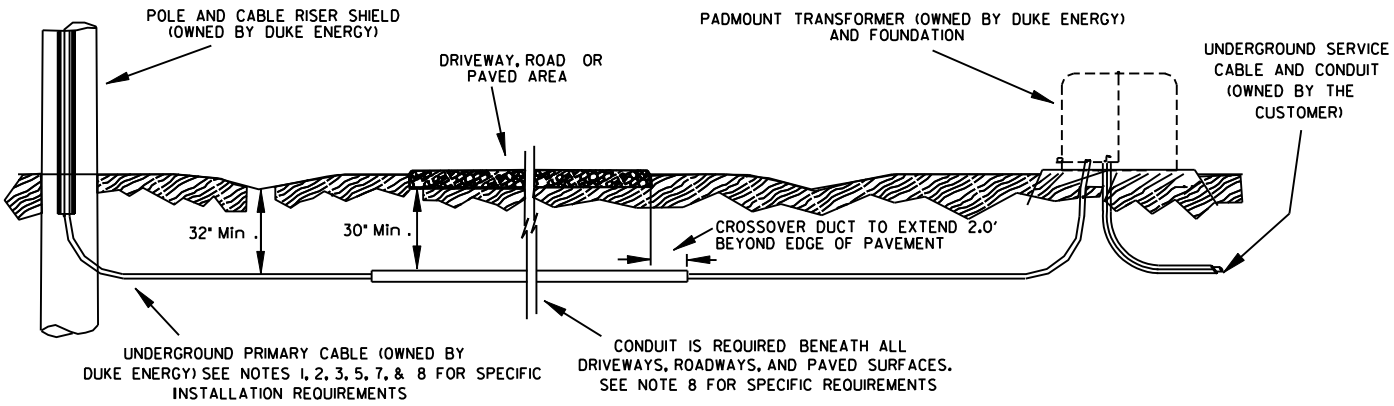


NOTES:

1. POST MUST BE EFFECTIVELY GROUNDED.
2. SEE ARTICLES 311 AND 312 ON UNDERGROUND SERVICE LATERALS.
3. VEHICULAR PROTECTION SHOULD BE INSTALLED TO PROECT EQUIPMENT WHEN INSTALLATION IS IN A TRAFFIC AREA.
4. ADEQUATE CLEARANCE SHALL BE MAINTAINED FROM DRIVEWAYS, OR OTHER OBSTRUCTIONS. MAINTAIN 4' CLEARANCE IN FRONT OF METER AND 2' CLEARANCE AT SIDES OF METER.
5. FOR 277/480 VOLT SERVICES, A VT ("VT PACK" IS REQUIRED).
6. THE INSTALLATION REQUIREMENTS & APPROVAL OF THE SERVICE LATERAL (DEPTH, AMPACITY, TYPE, ETC.) ARE UNDER THE JURISDICTION OF THE LAWFULLY DESIGNATED ELECTRICAL INSPECTOR FOR THE GEOGRAPHICAL AREA.

DRAWING 670

Service Requirements For Single Phase Underground Primary Electric Service From An Overhead Distribution Line

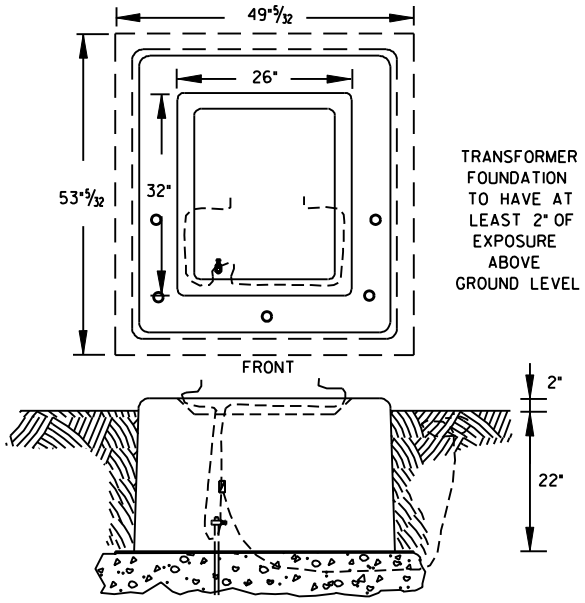


SERVICE REQUIREMENTS :

1. EASEMENTS: THE CUSTOMER SHALL PROVIDE AN EASEMENT 15 FEET IN WIDTH FOR THE UNDERGROUND ELECTRIC SYSTEM. THE EASEMENT SHALL BE CLEARED OF ALL OBSTRUCTIONS THAT MAY INTERFERE WITH UNDERGROUND CABLE INSTALLATION, OPE RATION, AND MAINTENANCE. THE EASEMENT SHALL BE KEPT CLEAR OF VEGETATION, BUILDINGS, AND OBSTRUCTIONS.
2. ROUTING: DUKE ENERGY SHALL BE RESPONSIBLE FOR DETERMINING THE FINAL ROUTING FOR UNDERGROUND PRIMARY CABLES. THE CABLE ROUTE MUST BE ACCESSIBLE FOR MAINTENAN CE ALONG ITS ENTIRE LENGTH.
3. USE BY OTHERS: THE UNDERGROUND TRENCH CONTAINING THE ELECTRIC CABLES IS FOR THE SOLE USE OF DUKE ENERGY. OTHER UTILITIES MAY BE ALLOWED IN THE TRENCH WITH THE EXPRESS PERMISSION OF DUKE ENERGY.
4. ACCEPTANCE: THE COMPANY RESERVES THE RIGH T TO REFUSE SERVICE TO NEW INSTALLATIONS THAT DO NOT MEET DUKE ENERGY REQUIREMENTS AND MAY ELECT TO REMOVE EXISTING SERVICE CABLES IF THE CUSTOMER FAILS TO PROVIDE ADEQUATE MAINTENANCE TO CUSTOMER OWNED FACILITIES.
5. MATERIALS & LABOR: THE CUSTOMER SHALL PROVIDE ALL MATERIALS AND EXCAVATION LABOR NECESSARY TO INSTALL THE UNDERGROUND PRIMARY CABLE SYSTEM. THIS INCLUDES TRENCHING, BACKFILLING, LEVELING THE TRANSFORMER PAD LOCATION, INSTALLATION OF CONDUIT AND CONDUIT ACCESSORIES, INSTALLATION OF SPECIAL BACKFILL, ETC.
6. TRENCH DIMENSIONS AND CLEARANCES : THE PRIMARY CABLE TRENCH SHALL BE A MINIMUM OF 32 INCHES DEEP AND 6 INCHES WIDE. THE MAXIMUM DEPTH SHALL BE NO MORE THAN 36". THE TRENCH MUST BE AT LEAST 3 FEET AWAY FROM ADJACENT GAS PIPES OR WATER LINES. IT SHALL BE AT LEAST 1 FOOT AWAY FROM ALL OTHER UNDERGROUND UTILITIES INCLUDING TELEPHONE, CABLE TV, LAWN WATERING SYSTEMS, ETC. THE SURFACE GRADE OVER THE TRENCH SHALL NOT BE CHANGED IN ANY WAY THAT REDUCES OR INCREASES THE DEPTH OF BURIAL.
7. CONDUIT : THE CUSTOMER SHALL INSTALL, OWN AND MAINTAIN THE CONDUIT SYSTEM INCLUDING DUCT, MANHOLES, CABLE PITS AND TRANSFORMER FOUNDATIONS, ETC.. IT SHALL BE INSTALLED IN ACCORDANCE WITH DUKE ENERGY STANDARDS. THE CONDUIT SHALL BE MADE FROM POLYVINYL CHLORIDE (PVC) AND SUITABLE FOR USE WITH UNDERGROUND ELECTRIC DISTRIBUTION CABLES RATED AT 90^C. ALL CONDUITS SHALL HAVE A UL LISTING AND A SCHEDULE 40 (SCH. 40) RATING CLEARLY PRINTED ON THE EXTERIOR SURFACE. FOR PRIMARY JACKETED CONCENTRIC NEUTRAL PRIMARY CABLES, THE MINIMUM INSIDE DIAMETER OF THE CONDUIT SHALL BE 4 INCHES. FOR ALL OTHER PRIMARY CABLES, A MINIMUM INSIDE DIAMETER OF 6 INCHES IS REQUIRED. ALL BENDS SHALL BE 90^ "SWEEP" BENDS WITH A MINIMUM RADIUS OF 36 INCHES. CONDUIT MAY BE DIRECT BURIED IF LOCAL PERMITTING AUTHORITIES WILL ALLOW DIRECT BURIED CONDUIT SYSTEMS. ALL CONDUITS SHALL HAVE A PULL STRING INSTALLED. ALL CONDUITS SHALL BE CAPPED TO PREVENT DEBRIS FROM ENTERING THE CONDUIT.
8. IF THE UNDERGROUND PRIMARY SYSTEM MUST PASS BENEATH PAVED AREAS, THE CUSTOMER SHALL INSTALL A CONDUIT ACROSS THE PAVED AREA. THE CONDUIT SHALL HAVE AT LE AST 30 INCHES OF COVER. IT MUST BE AT LEAST 2 INCHES IN DIAMETER. IT MUST EXTEND AT LEAST 2 FEET BEYOND THE EDGE OF PAVEMENT. THE CONDUIT SHALL BE MADE FROM POLYVINYL CHLORIDE (PVC) AND SUITABLE FOR USE WITH UNDERGROUND ELECTRIC DISTRIBUTION CABLES RATED AT 90^C. IT SHALL BE SUITABLE FOR DIRECT BURIAL. A UL LISTING AND A SCHEDULE 40 (SCH. 40) RATING ARE ADEQUATE FOR THIS PURPOSE.
9. SECONDARY SERVICE: WHEN THE CUSTOMER OWNS AND MAINTAINS THE UNDERGROUND SERVICE CONDUCTORS FROM THE TRANSFORMER TO THE ELECTRIC METER, SERVICE CONDUCTORS MUST BE A MINIMUM OF 24 INCHES DEEP. SERVICE CONDUCTORS SHALL BE INSTALLED AT THE PROPER DEPTH TO WITHIN 2 FEET OF THE TRANSFORMER PAD BY THE CUSTOMER. SUFFICIENT CABLE LENGTH WILL BE PROVIDED SO THAT THE CABLE ENDS WILL BE APPROXIMATELY 5 FEET ABOVE THE TRANSFORMER PAD WHEN THE CABLES ARE INSTALLED INTO THE PAD BY DUKE ENERGY. DUKE ENERGY WILL EXTEND THE CABLES INTO THE TRANSFORMER PAD AND MAKE FINAL CONNECTIONS UPON RECEIPT OF PROPER INSPECTION RELEASES.

DRAWING 671

Installation Requirements For Single Phase Padmount Transformer Foundations



TRANSFORMER FOUNDATION TO BE PLACED ON A LAYER OF COMPACTED GRANULAR BACKFILL MATERIAL

INSTALLATION REQUIREMENTS:

1. ACCEPTANCE: THE COMPANY RESERVES THE RIGHT TO REFUSE SERVICE TO NEW INSTALLATIONS THAT DO NOT MEET COMPANY REQUIREMENTS AND MAY ELECT TO REMOVE EXISTING SERVICE CABLES IF THE CUSTOMER FAILS TO PROVIDE ADEQUATE MAINTENANCE TO CUSTOMER OWNED FACILITIES.

2. LOCATION: THE COMPANY SHALL BE RESPONSIBLE FOR DETERMINING THE FINAL LOCATION FOR THE TRANSFORMER PAD. THE CUSTOMER SHALL PROVIDE A LEVEL LOCATION FOR A PADMOUNTED TRANSFORMER INSTALLATION AS DIRECTED BY THE COMPANY. THE TRANSFORMER MUST BE LOCATED WITHIN 25 FEET OF AND ADJACENT TO A DRIVEWAY OR OTHER AREA ACCESSIBLE TO COMPANY CONSTRUCTION AND MAINTENANCE EQUIPMENT. THE TRANSFORMER (OR TRANSFORMER FOUNDATION) MUST BE AT LEAST 12 FEET FROM COMBUSTIBLE WALLS, WINDOW, OR VENTILATION OPE NINGS AND 20 FEET FROM ANY DOORWAY IN A BUILDING. LANDSCAPING MUST BE KEPT A MINIMUM OF 3 FEET THE SIDES OR BACK OF THE TRANSFORMER (OR TRANSFORMER PAD). THERE MUST BE A CLEARANCE OF AT LEAST 10 FEET FROM ANY OBSTRUCTION TO THE FRONT OF THE TRANSFORMER. SEE COMPANY STD. 99134.

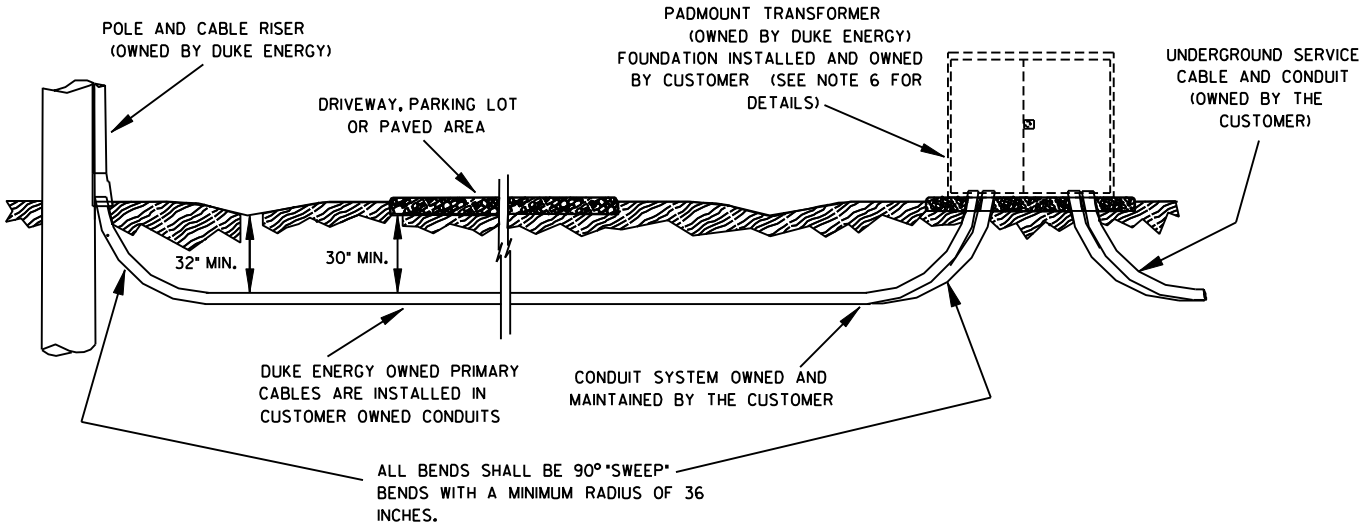
3. INSTALLATION: THE CUSTOMER IS RESPONSIBLE FOR INSTALLING THE TRANSFORMER FOUNDATION (BOXPAD) IN ACCORDANCE WITH COMPANY REQUIREMENTS. TRANSFORMERS WILL BE MOUNTED ON A FIBERGLASS BOXPAD, OR ON A PAD INCORPORATED INTO THE BASE OF THE PADMOUNT TRANSFORMER. THE CUSTOMER SHOULD CONSIDER FROST ACTION, DRAINAGE AND LOCAL SOIL CONDITIONS WHEN LOCATING THE TRANSFORMER FOUNDATION. SPECIFIC REQUIREMENTS INCLUDE:
   - EXCAVATE A HOLE FOR THE PAD: 60'' X 60'', 22'' DEEP.
   - THE TRANSFORMER PAD OR BOXPAD SHALL BE INSTALLED ON A BED OF GRANULAR BACKFILL MATERIALS THAT HAS BEEN COMPACTED PRIOR TO PLACING THE FOUNDATION.
   - THE SURFACE OF THE TRANSFORMER PAD SHALL BE FLAT AND LEVEL WITHIN 1 INCH IN ALL DIRECTIONS.
   - CUSTOMER INSTALLED CONDUITS SHALL TERMINATE NO MORE THAN 6 INCHES AND NO LESS THAN 3 INCHES ABOVE THE BOTTOM OF BOXPAD.
   - CUSTOMER INSTALLED SERVICE CABLES SHALL EXTEND 6 FEET ABOVE THE TOP SURFACE OF THE FOUNDATION.

4. MATERIALS & LABOR: COMPANY WILL PROVIDE THE BOXPAD, DEPENDING ON SPECIFIC JOB REQUIREMENTS. THE CUSTOMER SHALL PROVIDE ALL MATERIALS AND EXCAVATION LABOR NECESSARY TO INSTALL THE TRANSFORMER PAD OR BOXPAD. THIS INCLUDES: EXCAVATION, BACKFILLING, INSTALLATION OF CONDUIT AND CONDUIT ACCESSORIES, BUILDING FORMS, POURING AND FINISHING CONCRETE, ETC.

Customer installed conduits shall terminate no more than 6 inches and no less than 3 inches above the bottom of boxpad

DRAWING 672

Service Requirements For Underground Primary Electric Service From An Overhead Distribution Line To Commercial Or Industrial Customer

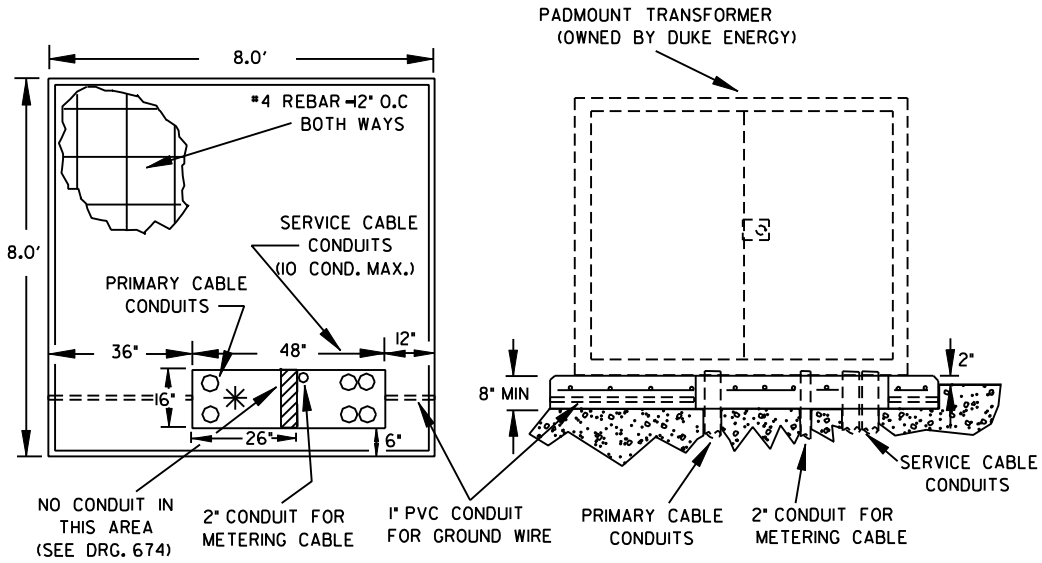


SERVICE REQUIREMENTS:

1. EASEMENTS: THE CUSTOMER SHALL PROVIDE AN EASEMENT 15 FEET IN WIDTH FOR THE UNDERGROUND ELECTRIC SYSTEM. THE EASEMENT SHALL BE CLEARED OF ALL OBSTRUCTIONS THAT MAY INTERFERE WITH UNDERGROUND CABLE INSTALLATION, OPERATION, AND MAINTENANCE. THE EASEMENT SHALL BE KEPT CLEAR OF VEGETATION, BUILDINGS, OR ANY OBSTRUCTIONS.
2. USE BY OTHERS: THE UNDERGROUND TRENCH CONTAINING THE ELECTRIC CABLES IS FOR THE SOLE USE OF DUKE ENERGY. OTHER UTILITIES MAY BE ALLOWED IN THE TRENCH WITH THE EXPRESS PERMISSION OF DUKE ENERGY.
3. ACCEPTANCE: THE COMPANY RESERVES THE RIGHT TO REFUSE SERVICE TO NEW INSTALLATIONS THAT DO NOT MEET DUKE ENERGY REQUIREMENTS AND MAY ELECT TO REMOVE EXISTING SERVICE CABLES IF THE CUSTOMER FAILS TO PROVIDE ADEQUATE MAINTENANCE, TO CUSTOMER OWNED FACILITIES.
4. SYSTEM ROUTE AND EQUIPMENT LOCATION: DUKE ENERGY SHALL BE RESPONSIBLE FOR DETERMINING THE FINAL ROUTING FOR UNDERGROUND PRIMARY CABLES. THE CABLE ROUTE MUST BE ACCESSIBLE FOR MAINTENANCE ALONG ITS ENTIRE LENGTH. THE CUSTOMER SHALL PROVIDE A LEVEL LOCATION AT FINAL GRADE FOR A PADMOUNTED TRANSFORMER INSTALLATION AS DIRECTED BY THE COMPANY. THE CUSTOMER SHALL BE RESPONSIBLE FOR CONSTRUCTING A TRANSFORMER PAD IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS SUITABLE FOR THE LARGEST TRANSFORMER THAT MAY BE REQUIRED. THE TRANSFORMER PAD MUST BE LOCATED WITHIN 10 FEET OF A PERMANENT DRIVEWAY OR OTHER AREA ACCESSIBLE TO DUKE ENERGY CONSTRUCTION AND MAINTENANCE EQUIPMENT. THE CLOSEST PART OF ANY TRANSFORMER (OR TRANSFORMER PAD) MUST BE AT LEAST 12 FEET FROM ANY COMBUSTIBLE WALL, WINDOW, OR VENTILATION OPENING, AND 20 FEET FROM ANY DOORWAY IN A BUILDING. LANDSCAPING MUST BE A MINIMUM OF 3 FEET AWAY FROM THE SIDES AND TO THE REAR OF THE TRANSFORMER (OR TRANSFORMER PAD). THERE MUST BE 10 FEET OF CLEARANCE TO THE FRONT OF THE TRANSFORMER (OR TRANSFORMER PAD). LOCAL REGULATIONS MAY REQUIRE ADDITIONAL CLEARANCES TO PADMOUNTED EQUIPMENT.
5. TRENCH DIMENSIONS AND CLEARANCES: THE PRIMARY CABLE TRENCH SHALL BE A MINIMUM OF 32 INCHES DEEP AND 6 INCHES WIDE. THE MAXIMUM DEPTH SHALL BE NO MORE THAN 36". THE TRENCH MUST BE AT LEAST 3 FEET AWAY FROM ADJACENT GAS PIPES OR WATER LINES. IT SHALL BE AT LEAST 1 FOOT AWAY FROM ALL OTHER UNDERGROUND UTILITIES INCLUDING TELEPHONE, CABLE TV, LAWN WATERING SYSTEMS, ETC. THE SURFACE GRADE OVER THE TRENCH SHALL NOT BE CHANGED IN ANY WAY THAT REDUCES OR INCREASES THE DEPTH OF BURIAL.
6. MATERIALS & LABOR: THE CUSTOMER SHALL PROVIDE ALL MATERIALS AND EXCAVATION LABOR NECESSARY TO INSTALL THE UNDERGROUND CONDUIT SYSTEM. THIS INCLUDES TRENCHING, BACKFILLING, INSTALLATION OF CONDUIT AND CONDUIT ACCESSORIES, INSTALLATION OF PRECAST MANHOLES AND CABLE PITS, INSTALLATION OF TRANSFORMER FOUNDATIONS, ETC.
7. CONDUIT: THE CUSTOMER SHALL INSTALL, OWN AND MAINTAIN THE CONDUIT SYSTEM INCLUDING DUCT, MANHOLES, CABLE PITS AND TRANSFORMER FOUNDATIONS, ETC.. IT SHALL BE INSTALLED IN ACCORDANCE WITH DUKE ENERGY STANDARDS. THE CONDUIT SHALL BE MADE FROM POLYVINYL CHLORIDE (PVC) AND SUITABLE FOR USE WITH UNDERGROUND ELECTRIC DISTRIBUTION CABLES RATED AT 90^C. ALL CONDUITS SHALL HAVE A UL LISTING AND A SCHEDULE 40 (SCH. 40) RATING CLEARLY PRINTED ON THE EXTERIOR SURFACE. FOR PRIMARY JACKETED CONCENTRIC NEUTRAL PRIMARY CABLES, THE MINIMUM INSIDE DIAMETER OF THE CONDUIT SHALL BE 4 INCHES. FOR ALL OTHER PRIMARY CABLES, A MINIMUM INSIDE DIAMETER OF 6 INCHES IS REQUIRED. ALL BENDS SHALL BE 90^ "SWEEP" BENDS WITH A MINIMUM RADIUS OF 36 INCHES. CONDUIT MAY BE DIRECT BURIED IF LOCAL PERMITTING AUTHORITIES WILL ALLOW DIRECT BURIED CONDUIT SYSTEMS. ALL CONDUITS SHALL HAVE A PULL STRING INSTALLED. ALL CONDUITS SHALL BE CAPPED TO PREVENT DEBRIS FROM ENTERING THE CONDUIT.

DRAWING 673

Installation Requirements For Three Phase Padmount Transformer Foundations For Commercial Or Industrial Customers



✳ THIS AREA MUST NOT BE POURED SOLID WITH CONCRETE

INSTALLATION REQUIREMENTS:

1. ACCEPTANCE: THE COMPANY RESERVES THE RIGHT TO REFUSE SERVICE TO NEW INSTALLATIONS THAT DO NOT MEET DUKE ENERGY REQUIREMENTS AND MAY ELECT TO REMOVE EXISTING SERVICE CABLES IF THE CUSTOMER FAILS TO PROVIDE ADEQUATE MAINTENANCE TO CU STOMER OWNED FACILITIES.

2. LOCATION: DUKE ENERGY SHALL BE RESPONSIBLE FOR DETERMINING THE FINAL LOCATION FOR THE TRANSFORMER PAD. THE CUSTOMER SHALL PROVIDE A LEVEL LOCATION FOR A PADMOUNTED TRANSFORMER INSTALLATION AS DIRECTED BY THE COMPANY. THE TRANSFORMER MU ST BE LOCATED ADJACENT TO AND WITHIN 10 FEET OF A DRIVEWAY OR OTHER AREA ACCESSIBLE TO DUKE ENERGY CONSTRUCTION AND MAINTENANCE EQUIPMENT. NO PART OF THE TRANSFORMER (OR TRANSFORMER PAD) MAY BE WITHIN 12 FEET FROM ANY COMBUSTIBLE WALL, WINDOW, OR VENTILATI ON OPENING AND 20 FEET FROM ANY DOORWAY IN A BUILDING. THERE MUST BE AT LEAST OF 3 FEET OF CLEARANCE BETWEEN CUSTOMER EQUIPMENT OR LANDSCAPING AND THE SIDE OF THE TRANSFORMER (OR TRANSFORMER PAD) AND 10 FEET OF CLEARANCE TO THE FRONT OF THE TRANSFORMER (OR TRANSFORMER PAD) SEE DUKE ENERGY STD. 99134.

3. DESIGN: THE CUSTOMER IS RESPONSIBLE FOR CONSTRUCTING A TRANSFORMER PAD IN ACCORDANCE WITH DUKE ENERGY REQUIREMENTS SUITABLE FOR THE LARGEST TRANSFORMER THAT MAY BE REQUIRED. THE CUSTOMER SHOULD CONSIDER FROST ACTION, DRAINAGE AND LOCAL SOIL CONDITIONS WHEN DEVELOPING THE STRUCTURAL DESIGN OF THE TRANSFORMER PAD. SPECIFIC REQUIREMENTS INCLUDE:

   - THE TRANSFORMER PAD SHALL BE A MINIMUM OF 8 INCHES THICK. THE TOP SURFACE SHALL BE A MINIMUM OF 2 INCHES ABOVE THE SURROUNDING GRADE. REINFORCING STEEL IS REQUIRED AND SHALL BE AT LEAST #4 BARS OR LARGER. REINFORCING BARS SHALL BE INSTALLED A MINIMUM OF 6 INCHES AND A MAXIMUM 12 INCHES O.C. BOTH WAYS.
   - THE TRANSFORMER PAD SHALL BE INSTALLED ON A BED OF GRANULAR FILL MATERIALS THAT HAS BEEN COMPACTED PRIOR TO POURING CONCRETE.
   - THE SURFACE OF THE TRANSFORMER PAD SHALL BE FLAT, SMOOTH AND LEVEL WITHIN 1INCH IN ALL DIRECTIONS.
   - THE EDGE OF THE TRANSFORMER PAD SHALL HAVE A 1INCH BEVEL FORMED INTO THE TOP EDGE.
   - A 1" ID PVC CONDUIT SHALL BE INSTALLED IN THE CONCRETE AS SHO WN IN THE SKETCH FOR THE INSTALLATION OF GROUNDING CONDUCTORS (BY DUKE ENERGY) FOR ADJACENT COMMUNICATIONS EQUIPMENT (REQUIRED BY THE NESC).

4. MATERIALS & LABOR : THE CUSTOMER SHALL PROVIDE ALL MATERIALS AND EXCAVATION LABOR NECESSARY TO INSTALL THE TRANSFORMER PAD. THIS INCLUDES: EXCAVATION, BACKFILLING, INSTALLATION OF CONDUIT AND CONDUIT ACCESSORIES, BUILDING FORMS, PORING AND FINISHING CONCRETE, ETC.

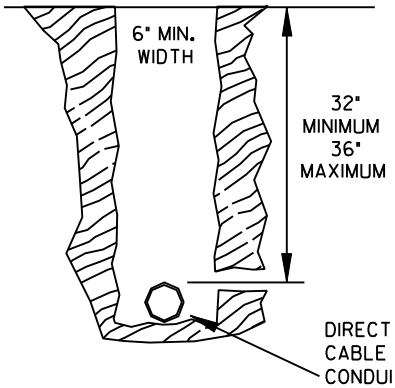
5. CONDUIT : THE CUSTOMER SHALL INSTALL, OWN AND MAINTAIN THE CONDUIT SYSTEM INCLUDING DUCT, MANHOLES, CABLE PITS AND TRANSFORMER FOUNDATIONS, ETC.. IT SHALL BE INSTALLED IN ACCORDANCE WITH DUKE ENERGY STANDARDS. THE CONDUIT SHALL BE MADE FROM POLYVINYL CHLORIDE (PVC) AND SUITABLE FOR USE WITH UNDERGROUND ELECTRIC DISTRIBUTION CABLES RATED AT 90^C. ALL CONDUITS SHALL HAVE A UL LISTING AND A SCHEDULE 40 (SCH. 40) RATING CLEARLY PRINTED ON THE EXTERIOR SURFACE. FOR PRIMARY JACKETED CONCENTRIC NEUTRAL PRIMARY CABLES, THE MINIMUM INSIDE DIAMETER OF THE CONDUIT SHALL BE 4 INCHES. FOR ALL OTHER PRIMARY CABLES, A MINIMUM INSIDE DIAMETER OF 6 INCHES IS REQUIRED. ALL BENDS SHALL BE 90^ "SWEEP" BENDS WITH A MINIMUM RADIUS OF 36 INCHES. CONDUIT MAY BE DIRECT BURIED IF LOCAL PERMITTING AUTHORITIES WILL ALLOW DIRECT BURIED CONDUIT SYSTEMS. ALL CONDUITS SHALL HAVE A PULL STRING INSTALLED. ALL CONDUITS SHALL BE CAPPED TO PREVENT DEBRIS FROM ENTERING THE CONDUIT.

6. THE MAXIMUM NUMBER OF CONDUITS ENTERING INTO THE SECONDARY AREA OF THE PAD OPENING SHALL BE 10 (4" DIA.) UNLESS SPECIFICALLY APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING.

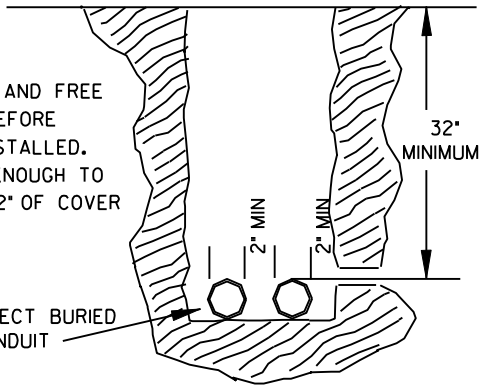
DRAWING 674

Construction Details for Customer Installed Primary Electric Conduits

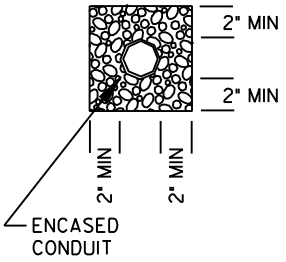
SINGLE CONDUIT (RESIDENTIAL) TRENCH



MULTI CONDUIT (COMMERCIAL OR INDUSTRIAL) TRENCH



TRENCH MUST BE CLEAN AND FREE OF ROCKS AND DEBRIS BEFORE CABLE OR CONDUIT IS INSTALLED. TRENCH MUST BE DEEP ENOUGH TO ALLOW FOR AT LEAST 32" OF COVER OVER DUCT OR CABLE

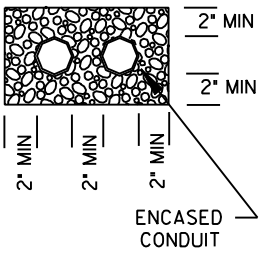


MINIMUM CONDUIT SIZES:

- RESIDENTIAL - 2" ID
- COMMERCIAL - 4" ID FOR URD CABLES
- COMMERCIAL - 6" ID FOR POWER CABLES

ALL CONDUIT MUST BE UL LISTED AND HAVE A SCHEDULE 40 (SCH.40) RATING. A 90^C TEMPERATURE RATING IS REQUIRED.

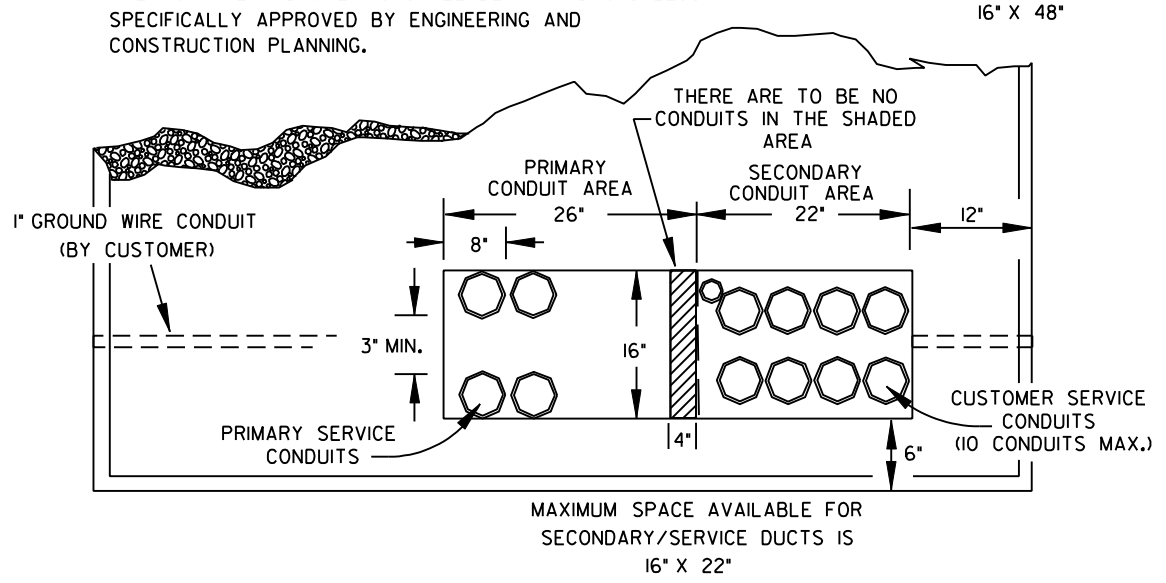
WHEN CONDUIT IS CONCRETE ENCASED, THE CONDUIT MUST BE CO VERED BY A MINIMUM OF 2" OF CONCRETE ON ALL SIDES



THREE - PHASE TRANSFORMER BOXOUT DETAILS

CUSTOMER TO INSTALL CONDUIT INTO PAD BOXOUT AS SHOWN.

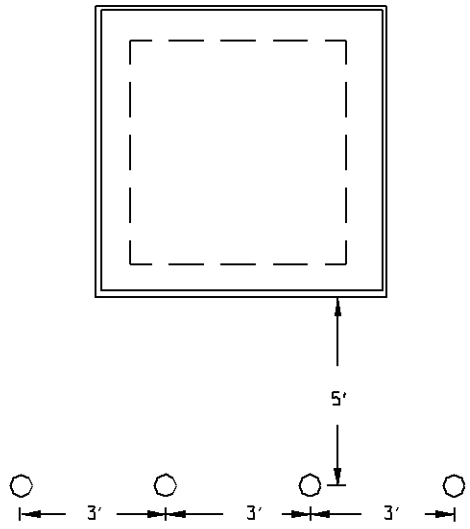
- PRIMARY CONDUIT MUST BE INSTALLED AS SHOWN.
- SECONDARY/SERVICE DUCTS MUST BE INSTALLED WITHIN THE 16" X 22" SECONDARY BOXOUT AREA. THERE ARE TO BE NO CONDUIT IN THE SHADED AREA IN THE DETAIL.
- CONDUIT SHOULD EXTEND AT LEAST 3" ABOVE THE BOTTOM OF THE BOXOUT BUT NOT ABOVE THE SURFACE OF T HE PAD.
- THE MAXIMUM NUMBER OF CONDUITS ENTERING INTO THE SECONDARY AREA OF THE PAD OPENING SHALL BE 10 (4" DIA.) UNLESS SPECIFICALLY APPROVED BY ENGINEERING AND CONSTRUCTION PLANNING.

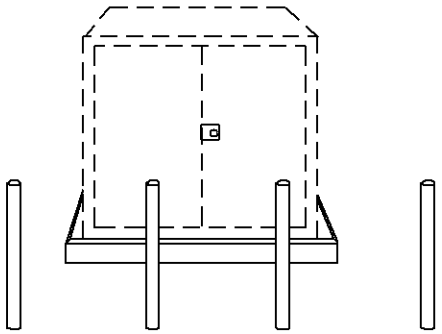


09/03/13

DRAWING 675

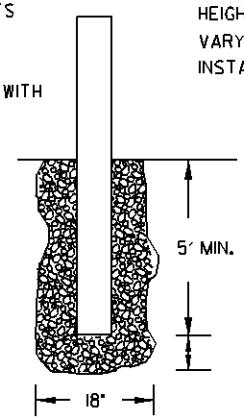
Construction Details For Customer Installed Electric Facilities Padmount Equipment Protection



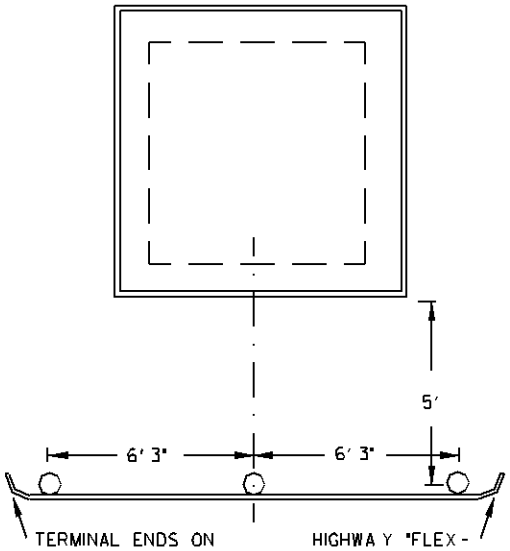


PROTECTIVE POSTS MAY BE 4" TO 6" STEEL PIPE. ALL MUST BE FILLED WITH CONCRETE.

HEIGHT OF PROTECTION POST WILL VARY DEPENDING ON THE INSTALLATION.



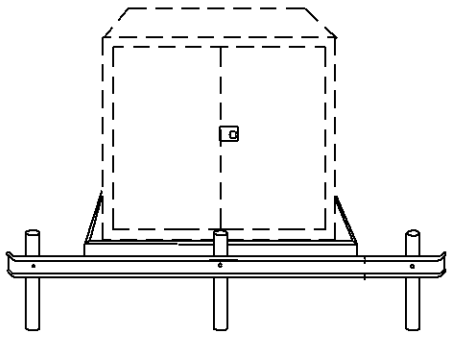
- FOR BARE POSTS WITH NO CROSSPIECES - MINIMUM HEIGHT IS 3.0'
- FOR POSTS WITH CROSS PIECES - MINIMUM HEIGHT IS 2.5'



TERMINAL ENDS ON GUARD RAIL BARRIERS ARE OPTIONAL

HIGHWAY "FLEX-BEAM" GUARDRAIL (10 OR 12 GA.)

GUARD POSTS MUST BE SPACED TO ALLOW UNRESTRICTED ACCESS TO THE PRIMARY COMPARTMENT OF THE TRANSFORMER. CONSULT WITH THE DUKE ENERGY REPRESENTATIVE FOR PROPER SPACING AND PLACEMENT.



PROTECTIVE POSTS OR BARRIERS MAY ALSO BE REQUIRED ALONG THE SIDES OF DUKE ENERGY OWNED PADMOUNT EQUIPMENT. SIDE PROTECTION SHALL BE LOCATED AT LEAST 3 FEET AWAY FROM THE BACK OR SIDES OF THE EQUIPMENT CABINET OR AS DIRECTED BY THE DUKE ENERGY REPRESENTATIVE.

04/02/07

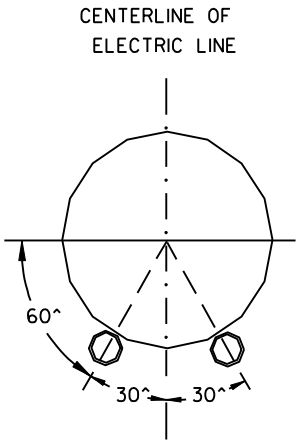
DRAWING 676

Construction Details For Customer Installed Electric Facilities Underground Services From Poles

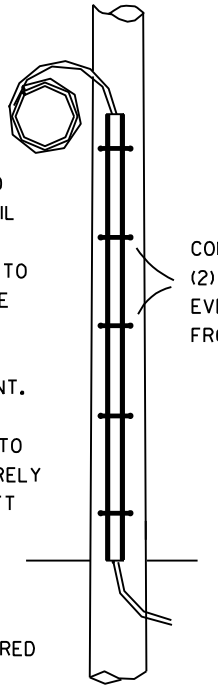
NO MORE THAN 2 ELECTRIC RISERS ARE PERMITTED ON A POLE.

RISERS FROM UNDERGROUND TO OVERHEAD LINES ARE TO BE LOCATED AS FOLLOWS:

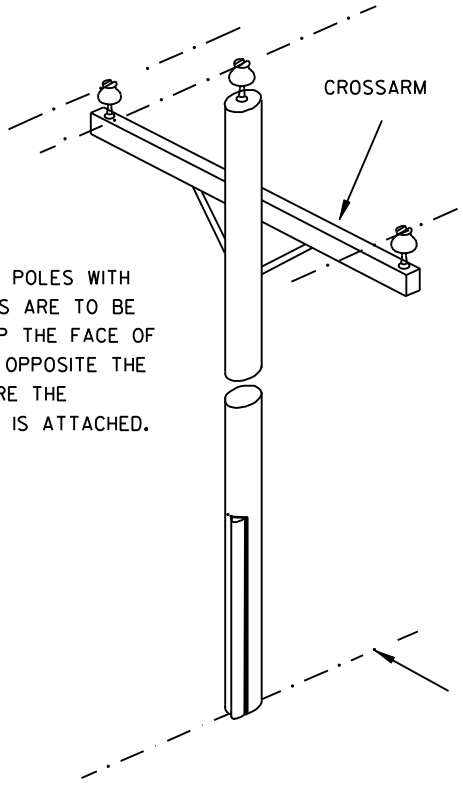
- THE RISER MUST BE LOCATED 30^ TO EITHER SIDE OF THE CENTERLINE OF THE ELECTRIC LINE.
- RISERS ARE TO BE LOCATED ON THE POLE FACE OPPOSITE FROM WHERE THE CROSSARM IS LOCATED
- IF THERE IS NO CROSSARM, THE RISER IS LOCATED ON THE SIDE WHERE THE LINE DEAD - ENDS.



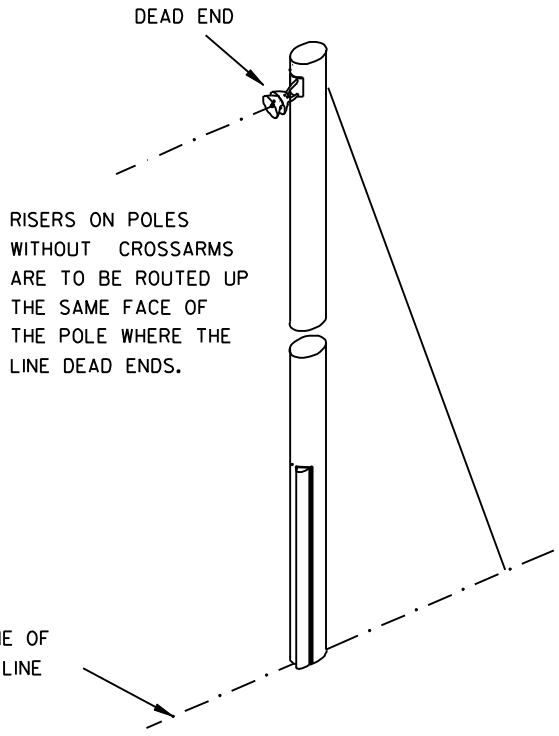
CONTACT POWER DELIVERY PRIOR TO INSTALLING AN U.G. SERVICE TO A UTILITY POLE.



CUSTOMER IS TO FURNISH AND COIL UP SUFFICIENT SERVICE CABL E TO REACH FROM THE GROUND LINE TO THE SERVICE CONNECTION POINT. THE CABLE COIL SHALL BE TIED TO THE POLE SECURELY AT LEAST 8.0 FT ABOVE GROUND. CONSULT WITH DUKE ENERGY REPRESENTATIVE FOR THE REQUIRED CABLE LENGTH.



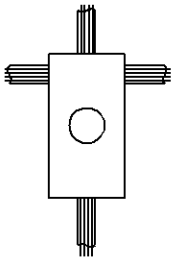
RISERS ON POLES WITH CROSSARMS ARE TO BE ROUTED UP THE FACE OF THE POLE OPPOSITE THE FACE WHERE THE CROSSARM IS ATTACHED.



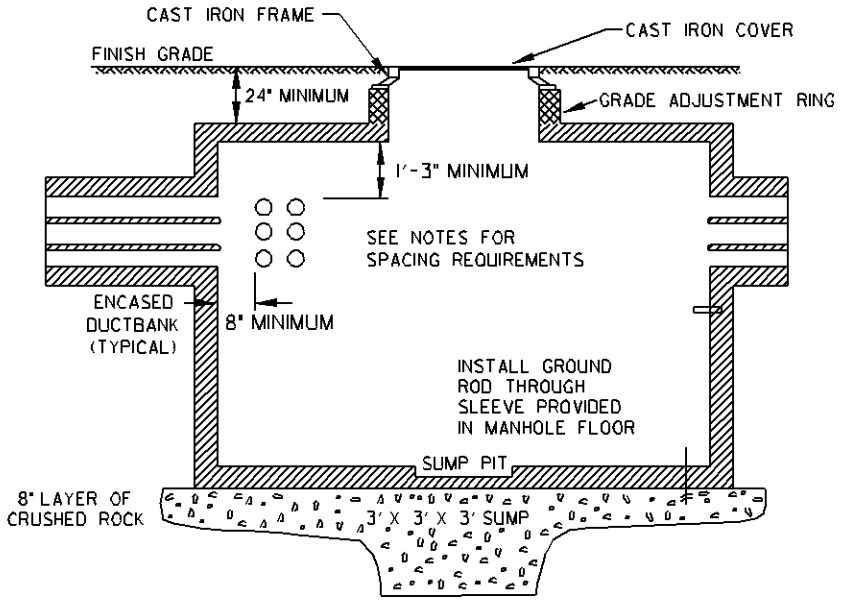
RISERS ON POLES WITHOUT CROSSARMS ARE TO BE ROUTED UP THE SAME FACE OF THE POLE WHERE THE LINE DEAD ENDS.

DRAWING 677

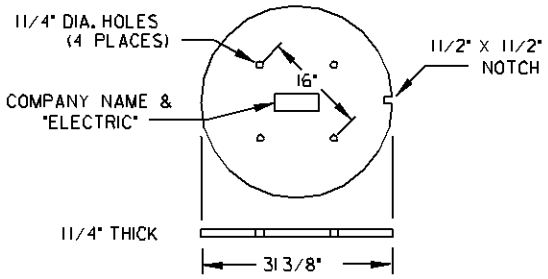
Customer Installed Precast Concrete Manhole and Lid



AVAILABLE
CONDUIT ENTRY
POSITIONS
(J-TYPE MANHOLE)



MANHOLE LID DETAIL



STANDARD SIZES (ALL DIMENSIONS ARE INTERNAL) :

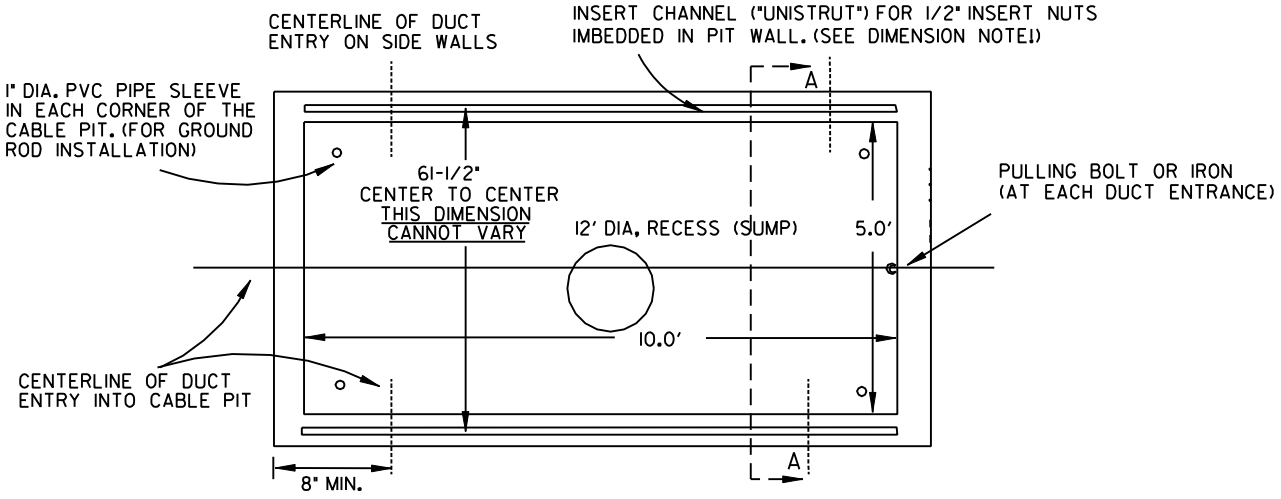
- FOR STRAIGHT LINE URD SYSTEMS (CONCENTRIC NEUTRAL CABLES) - 4' x 6'
- FOR CORNERS IN URD (CONCENTRIC NEUTRAL CABLES) OR SMALL POWER CABLE SYSTEMS (SMALLER THAN 500KCMIL) - 5' X 10'
- FOR LARGE POWER CABLE SY STEMS (LARGER THAN 500KCMIL CABLES) - 6' X 12'

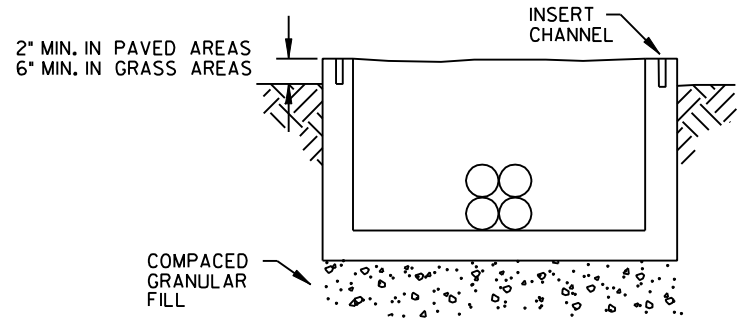
CONSTRUCTION & INSTALLATION NOTES:

1. MANHOLES MUST BE DESIGNED TO AASHTO HS - 20 LOADING CRITERIA. COPIES OF SUPPLIERS' DESIGN CALCULATIONS ARE TO BE PROVIDED TO DUKE ENERGY PRIOR TO INSTALLATION.
2. THE BOTTOM OF THE EXCAVATION FOR THE PRECAST MANHOLE SHOULD BE FILLED WITH AN 8" THICK LAYER OF CRUSHED ROCK. IT SHOULD BE LEVEL. A SUMP OR "FRENCH DRAIN", 3 FT. SQUARE AND 3 FT. DEEP AND FILLED WITH GRAVEL SHOULD BE PLACED UNDER THE SUMP HOLE KNOCKOUT IN THE MANHOLE. THE SUMP HOLE SHOULD BE OPENED AFTER THE MANHOLE IS SET.
3. MANHOLES SHALL HAVE 3/4" X 8" LONG STAINLESS STEEL PULL BOLTS OR 3/4" PULLING IRONS INCORPORATED INTO WAL LS BELOW EACH DUCT ENTRY. THE WALL AND PULLING IRONS OR BOLTS MUST WITHSTAND 25,000 - POUND TENSILE LOAD.
4. MANHOLE FLOORS ARE TO HAVE A 1" ID PVC SLEEVE INSTALLED THROUGH THE FLOOR IN EACH CORNER FOR GROUND ROD INSTALLATION. SLEEVES ARE TO BE LOCATED 1' FROM EACH WALL.
5. MANHOLE FLOORS ARE TO HAVE A 12" DIAMETER RECESS LOCATED IN THE CENTER OF THE FLOOR FOR PUMPING OUT WATER.
6. MANHOLE OPENING TO BE 36" IN DIAMETER THROUGH THE CEILING. THE MANHOLE OPENING IS TO BE EXTENDED TO FINISHED GRADE WITH PRECAST NECK SECTIONS OR BRICK AS NECESSARY.
7. MANHOLE FRAME AND COVER MUST MEET ASSHTO HS - 20 LOADING CRITERIA. MANHOLE COVER TO BE 30" IN DIAMETER. MANHOLE COVER MUST IDENTIFY THE APPROPRIATE DUKE ENERGY OPERATING COMPANY (DUKE ENERGY OHIO, KENTUCKY, OR INDIANA). NOTE: DUKE ENERGY CUSTOMER PROJECTS COORDINATOR WILL PROVIDE INFORMATION ON AVAILABILITY OF MANHOLE FRAME & COVER.
8. DUCTS ENTERING MANHOLE ARE TO BE FINISHED OFF WITH BELL ENDS FITTED FLUSH TO THE INSIDE WALLS.
9. DUCTS SHOULD ENTER MANHOLES AT LEAST 8" FROM SIDEWALLS AND AT LEAST 15" DOWN FROM THE CEILING OR UP FROM THE FLOOR.
10. DUCTS SHOULD BE SPREAD OUT AS THEY ENTER THE MANHOLES SEPARATED FROM EACH OTHER BY 4" (OUTSIDE OF DUCT TO OUTSIDE OF DUCT). THE AREA BETWEEN DUCTS SHALL BE FILLED WITH CONCRETE AND FINISHED FLUSH TO THE WALL.

DRAWING 678

Customer Installed Precast Concrete Cable Pit For 15kV Class Padmounted Switching Equipment





SECTION A-A

CONSTRUCTION AND INSTALLATION REQUIREMENTS:

- THE INTERIOR (OPEN) DIMENSIONS FOR THE PRECAST CABLE PITS ARE APPROXIMATELY 5 FEET WIDE X 10 FEET LONG X 4'6" DEEP. THERE IS SOME VARIATION FROM MANUFACTURER TO MANUFACTURER, HOWE VER, THE INTERIOR LENGTH SHOULD REMAIN CLOSE TO THE NOMINAL TO INSURE A PROPER FIT OF THE SWITCHGEAR AND COVER PLATES.
- EACH LONG WALL HAS A "UNISTRUT" FOR 1/2" SPRING NUT IMBEDDED ALONG THE LENGTH OF THE OPENING. THESE CHANNELS MUST BE LOCATED 61-1/2" APART (CENTER TO CENTER). THIS DIMENSION CAN NOT VARY.
- THE BOTTOM OF THE EXCAVATION FOR THE PRECAST MANHOLE SHOULD BE FILLED WITH AN 8" THICK LAYER OF CRUSHED ROCK. IT SHOULD BE LEVEL. A SUMP OR "FRENCH DRAIN", 3 FT. SQUARE AND 3 FT. DEEP AND FILLED WITH GRAVEL SHOULD PLACED UNDER THE SUMP HOLE KNOCKOUT IN THE MANHOLE. THE SUMP HOLE SHOULD BE OPENED AFTER THE MANHOLE IS SET.
- WALLS AND FLOOR MAY BE OF ANY THICKNESS AS LONG AS THE CABLE PIT IS STRUCTURALLY SOUND AND CAPABLE OF CARRYING THE WEIGHT OF THE SWITCHGEAR (2000 LBS MAX.).
- THERE ARE TO 4 - 1" ID PVC PIPE SLEEVES THROUGH THE FLOOR LOCATED 1' OUT FROM EACH CORNER FOR INSTALLING GROUND RODS.
- THE FLOOR SHOULD HAVE A 15" DIA. SUMP KNOCKOUT IN THE CENTER OF THE PIT.
- CONDUIT SHOULD ENTER THE CENTER OF THE END WALLS AND APPROXIMATELY 18" FROM THE ENDS OF THE LONG WALLS. KNOCKOUTS, SL EEVES, OR "FORMEX" INSERTS SHOULD ACCOMMODATE 4 - 6" ID SCH. 40 PVC DUCTS AT EACH LOCATION WHERE CONDUIT WILL ENTER THE PIT.
- THERE IS TO BE A PULLING BOLT OR IRON CAPABLE OF WITHSTANDING 25,000 POUNDS OF TENSION INSTALLED IMMEDIATELY ABOVE EACH CONDUIT ENTRY.
- INDIVIDUAL CONDUIT SHOULD BE SEPARATED FROM EACH OTHER BY 4" (OUTSIDE TO OUTSIDE) WHEN THEY ENTER THE PIT. ENDS OF CONDUIT SHOULD BE TERMINATED IN A "BELL END" FITTING THAT IS FINISHED FLUSH WITH THE INSIDE WALL OF THE CABLE PIT.