



Wright-Hennepin Electric Service Connection Guide

November, 2025

TABLE OF CONTENTS

Introduction

Engineering Statement

1. Definitions

2. General Information

2.1 Effective Date

2.2 Intent

2.3 Application for Service

2.4 Rate Schedules

2.5 Service and Limitations

2.6 Connection

2.7 Member-Owned Meter Equipment Restrictions

2.8 Diversion of Electricity

2.9 Easements for Cooperative's Facilities

2.10 Member's Responsibility

2.11 Member-Owned Facilities

2.12 Safety

2.13 Wright-Hennepin Limited Telephone Director

3. Character of Service Available

3.1 Types of Service

3.2 Meter Sockets for Types of Service

3.3 Distribution (Primary) Service

3.4 Transmission Service

4. Service Facilities

- 4.1 Services
- 4.2 Overhead Service
- 4.3 Underground Service
- 4.4 Secondary Conduit Sizing and Cable Tray Requirements
- 4.5 Service Lateral Sizes (for Balanced Load)
- 4.6 Transformer Installations – Network Vaults
- 4.7 Transformer Installations – Pad-Mounted
- 4.8 Point of Delivery
- 4.9 Member-Owned Service Conductors
- 4.10 Metering
- 4.11 Temporary Service
- 4.12 Primary Meter Installations
- 4.13 Meter Sockets
- 4.14 Meter Location and Installation
- 4.15 Meter Mounting Heights
- 4.16 Meter Clearances
- 4.17 Cold Sequence Metering
- 4.18 Hot Sequence Metering

5. Transformers

- 5.1 Grounding
- 5.2 Special Rules
- 5.3 Fault Current
- 5.4 Arc Flash

Specification or Guide Drawing

K4.1G - Cable Service Assembly Guide

K4.2G - Mast Type Service Assembly Guide

K4.4G - Meter Ice and Snow Shield

K4.5G - Service Drop Clearance Requirements

Q2.3G - Net Metering Guide

Q4.2 - Primary Metering Installation (Three Phase)

3S-1 - Single Phase 120/240 Volt Service, 1-CT -3 Wire, Off Peak Only

16S-3 - Three Phase 120/240 Volt Service, 4 Wire Delta

FIGURE M1 - Typical Arrangements for Switchgear Installation

FIGURE M2 - Current Transformer Mounting Requirements for Cabinets and Switchgear

FIGURE M3 - Wall-Mounted Current Transformer Enclosures

UM1-6C – Three Phase Transformer Concrete Pad Guideline (75- 500kVA)

UM1-7C – Three Phase Transformer Concrete Pad Guideline (750 & 1000kVA)

UM1-8C - Three Phase Pad-Mounted Transformer Secondary Connection Cabinet
Concrete Pad – In-line Orientation (75- 2500kVA)

UM1-9C - Three Phase Pad-Mounted Transformer Secondary Connection Cabinet
Concrete Pad – 90 Degree Orientation (75- 2500kVA)

UM1-10NC – Three Phase Transformer Precast Pad Guideline (75- 500kVA)

UM1-11NC – Three Phase Transformer Precast Pad Guideline (750- 2500kVA)

UM1-G1 – Three Phase Transformer Guide – Grounding and Bollard Detail

UM1- G2 - Three Phase Transformer Wiring Guide

UM8 - Meter Installation Underground Source Guide

UM8-3/3A - Trough Type Meter Pedestal Guide

UM1-G5 - Clearance Requirements From Gas Meter

Introduction

The core focus of Wright-Hennepin (also referred to as “WH”, or “the Cooperative”) is to provide you with competitive electric rates, reliable and safe power, and outstanding member service. Our vision is to be the preferred energy services Cooperative in our marketplace. Our mission is to deliver the power, products and competitive pricing our Members desire.

Wright-Hennepin follows National Electric Safety Code, The National Electric Code and the Rural Utilities Service regulations as guidelines for its installation standards.

WH’s Service Connection Guide will help to determine the necessary requirements for members' wiring intended to be connected to the Cooperative’s distribution system. This publication will help you work more efficiently and aid in getting a utility connection established with minimum inconvenience. It also provides for the safety and reliability of our members and safe working conditions for our personnel.

This publication has been prepared to assist you in planning your electrical installation and to service all its members in an orderly manner and expedite service connections.

New, rewired, altered, or repaired wiring installations intended for connection to WH’s distribution system shall comply with the rules of the Cooperative, the National Electric Safety Code, the *National Electric Code*®, and any other codes or regulations in effect in the area served. WH does not assume the function of inspecting members’ wiring for adequacy, safety, or compliance with the electrical codes. Such responsibility remains with the member and authorities having jurisdiction.

Questions concerning large and/or complicated electrical projects should be directed to WH *in advance of construction and/or purchase of equipment* at: 763-477-3000 or filed online at <https://www.whe.org/your-electric-account/service-requests-changes.html>.

This will reduce the risk of project delays or expensive changes during construction.

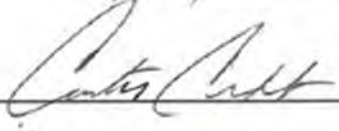
Due to constant progress in the development of materials and processes, WH reserves the right to revise this publication from time to time. Users of this book would like to forward suggestions to improve this document may submit them via email to: info@whe.org

Portions of this publication are available at: <http://www.whe.org>

Engineering Statement

This publication was created to be consistent with industry practices utilizing resource material from both WH and other utility documents made publicly available and adjusted to meet WH standards. The objective is to provide an electric service installation standard for WH members, contractors, and employees to construct too. It has been reviewed for compliance with the National Electric Safety Code, National Electric Code and the Rural Utilities Service regulations and approved by WH management.

Effective Date: 11/03/2025

Engineer: 

Approved: 

1. Definitions

Note: The following definitions are furnished for the appropriate interpretation of this document and are not necessarily universally accepted definitions.

1.1 Access Point

The point defined by the intersection of the member's property line and the Cooperative-owned conductors crossing it, which serves that member. When a member is to be served from a distribution line in an easement on the member's property, the access point is the pole for overhead (OH), the switch cabinet bay for primary underground (UG), or the splice box or pedestal for secondary underground (UG) from which the Cooperative-owned conductors will be fed.

1.2 Agent

One who is authorized to act for another under a contract or relation of agency, for the Cooperative or the member.

1.3 Altered

Replacing major components or any integral part of a meter socket, current transformer cabinet, riser, mast, line or load side conductor, relocating electric service equipment, (including storm damage).

1.4 AMR – Automated Meter Reading

An automated method of reading electric registers (indexes).

1.5 Applicant

The property owner, lessee, sub-lease, their agent and/or contractor applying for electric service from the Cooperative.

1.6 Bus Duct

A preassembled unitized device containing secondary electrical bus.

1.7 Captive Fastener

A fastener that is loosely held in place and cannot separate from fastened object. Usually manufactured from metal with various designs.

1.8 Classification of Metering

Commercial and Industrial (See definition for Commercial and Industrial Metering). Residential (See definition for Residential Metering).

1.9 Cold Sequence Metering

The utilization of a disconnect device between the electric meter and the supply source. Refer to Section 4, Cold Sequence Metering.

1.10 Commercial and Industrial Metering

Metering of any service used for the operation of a business, whether or not for profit, shall be considered a commercial or industrial enterprise. Includes metering of all services other than residential.

1.11 Cooperative

Wright-Hennepin Cooperative Electric Association (WH)

1.12 Cooperative Property

All lines, wires, apparatus, instruments, meters, load management equipment, transformers, and materials supplied by the Cooperative at its expense or under its standard policies.

1.13 Cooperative Representative

The Cooperative employee authorized to perform specific tasks.

1.14 Conduit

Standard tubular material used for mechanical protection of electrical systems which may be exposed, buried beneath the surface of the ground, or encased in a building structure as required. (See Definition for Duct).

Note: For the purpose of this publication, the terms Conduit and Duct are used interchangeably.

1.15 Construction Trailer

A structure built on a permanent chassis designed to be transportable which is intended for installation on a site without permanent foundation.

1.16 Contractor

Any person, Cooperative or corporation acting under contractual agreements for either the Cooperative or for the member.

1.17 Current Transformer (CT)

An instrument transformer designed for the measurement or control of current.

1.18 Member

The applicant or user of electric service in whose name the service with the Cooperative is listed.

1.19 Dead-End Equipment

Various devices used to terminate service conductors.

1.20 Diversion of Electricity

Unauthorized connection to the Cooperative's electric facilities where electric service is being used and not metered (e.g. when the electric meter has been bypassed from the Cooperative).

1.21 Duct

Standard tubular material used for mechanical protection of electrical systems which may be exposed, buried beneath the surface of the ground, or encased in a building structure as required (See definition for Conduit).

Note: For the purpose of this publication, the terms Conduit and Duct are used interchangeably.

1.22 EMT

Electric Metallic Tubing (*National Electric Code*®).

1.23 Excess Facilities

In those instances where the Cooperative provides distribution or metering facilities at the member's request, in excess of the facilities necessary to supply service to the member, the member shall be required to contract to pay the Cooperative for such facilities and to pay the Cooperative annually an amount to cover the cost of insurance, replacement (or cost of removal), licenses, fees, taxes, operation, maintenance, and appropriate allocable administrative and general expenses of such excess distribution facilities.

1.24 Gain

Cutting a flat spot into a pole or attaching a metal device to a pole which has a flat surface on one side.

1.25 GRC

Galvanized Rigid Conduit (*National Electric Code*®).

1.26 High-Leg, Wild Leg, Power Leg

The phase having the higher phase voltage to ground on a 4-wire delta-connected service, where the midpoint of one phase winding is grounded.

1.27 Hot Sequence Metering

The electric meter is connected directly to the service conductors without the use of a fault-current limiting disconnect or meter safety-switch device between the electric meter and the supply source.

1.28 Ice and Snow Shield, Meter

A protective device used to prevent falling ice or snow from damaging the electric meter.

1.29 IMC

Intermediate metallic Conduit (*National Electric Code*®).

1.30 Inspector

The electrical inspector of the Public Authority.

1.31 Instrument Transformer

A transformer that reproduces in its secondary circuit, the voltage or current proportional to its primary circuit.

1.32 Joint Use Agreement

A contractual agreement made between the Cooperative and a third party allowing the use of Cooperative property or facilities.

1.33 Manufactured Home

A structure which is transportable and intended for installation on a permanent foundation meeting the definition of a Manufactured Home as defined in 2023 *National Electric Code*® Article 100, or as may be amended.

1.34 Means of Attachment

Fittings used to attach service-drop conductors.

1.35 Meter/Metering Equipment

The equipment necessary to measure the member's electric energy use and demand including meter socket, instrument transformers, protective device and meter.

1.36 Mobile Home

A structure built on a permanent chassis designed to be transportable and intended for installation on a site without permanent foundation.

1.37 Multiple Meter Center

A pre-assembled multiple metering unit or fabricated meter center using meter sockets where two or more members are metered at a common location.

1.38 NEC® - National Electrical Code®¹

A publication of the National Fire Protection Association, Inc.

1.39 NESC® - National Electrical Safety Code®²

A publication of the Institute of Electrical and Electronic Engineers, Inc. as adopted by ANSI.

1 *National Electrical Code*® and *NEC*® are registered trademarks of the National Fire Protection Association, Inc., Quincy, MA 02269

2 *National Electrical Safety Code*® and *NESC*® are registered trademarks and service marks of the Institute of Electrical

and Electronics Engineers, Inc., New York, NY 10017

1.40 Nominal Voltage

Designation of the value of the normal effective difference in potential between any two appropriate conductors of the circuit.

1.41 Non-Standard Design

Construction not confirming to the Cooperative's standard method of design because of the member's request. The member may be charged for the additional cost incurred by the Cooperative.

1.42 NRTL

Nationally Recognized Testing Laboratory

1.43 Point of Attachment

The point at which the service-drop conductors are attached to a building or other structure.

1.44 Point of Delivery

Point where the Cooperative's electric facilities are first connected to the electric facilities of the member.

1.45 Primary Metering

Metering of service voltages at primary voltage.

1.46 Public Authority

The municipal, county, or state authorities having inspectors and jurisdiction to inspect electrical installations.

1.47 PVC

Polyvinyl Chloride (*National Electric Code*®).

1.48 Raceway

Any channel for holding bus bars, cables, or wires, which is designed for this purpose.

1.49 Residential Metering

Metering of services used for the exclusive use of the individual member for domestic purposes.

1.50 Readily Accessible

An area that can be readily and safely accessed through a doorway, ramp, or stairway by a person on foot who neither exerts extraordinary physical effort nor employs special tools or devices to gain entry is considered readily accessible.

1.51 Repaired

Service equipment in need of any repair such as damaged meter socket, riser, mast (including storm damage).

1.52 Rewired

Upgrading of any existing service equipment including secondary conductors within meter sockets, CT enclosures, cold sequence disconnects, and Primary Metering Installations.

1.53 Policies and Bylaws

The rules, regulations and conditions of service as approved by the Board of Directors.

1.54 Secondary Conductors

That part of the Cooperative's distribution system, which connects the secondaries of the Cooperative's distribution transformers to the service drop or service lateral.

1.55 Secondary Connection Cabinet

Cabinet required for pad mounted transformers if any of the following is exceeded:

- Maximum of four (4) 4-inch conduits
- Maximum of four (4) conductors per phase
- Maximum conductor size of 500 kCMIL CU or 750 kCMIL AL

1.56 Service

The furnishing of electric energy for the exclusive use of the individual member.

1.57 Service Drop

The overhead service conductors from the last distribution pole or other aerial distribution support to and including the splices connecting to the service-entrance conductors at the building or other structure.

1.58 Service-Entrance Conductors, Overhead System

The service conductors between the terminals of the member's service equipment and the point of connection to the service drop conductors.

1.59 Service-Entrance Conductors, Underground System

The service conductors between the terminals of the member's service equipment and the point of connection to the service lateral.

1.60 Service Equipment

Necessary equipment, usually of a circuit breaker or fusible disconnect switch and their accessories, located near the point of entrance of the supply conductors to a building and intended to constitute the main control and means of cutoff for the supply to that building.

1.61 Service Lateral

The underground service conductors between the Cooperative secondary distribution system and/or transformer terminals and the connection to the service-entrance conductors in a terminal box or meter socket located outside the building wall. Where the meter is located in the building and no terminal box exists outside the building, the point of connection shall be considered the point of entrance of the service conductors into the building.

1.62 Service Mast

The service mast is the conduit containing the service-entrance conductors where the point of attachment and the connection between the service drop and the service-entrance conductors is located *above* the roofline. The conduit extends to a point, and the weather head is located, above the roof eave. The conduit passes through the eave of the building or extends past the roofline without passing through the eave. The means of attachment is attached to the service mast.

1.63 Service Riser

The service riser is the conduit containing the service-entrance conductors where the point of attachment and the connection between the service drop and the service-entrance conductors is located on a pole or *below* the roofline of the building being served. The conduit extends to a point, and the weather head is located, below the roof eave. The means of attachment is secured to the pole or building and is not attached to the service riser.

1.64 Voltage Transformer (VT)

An instrument transformer intended for use in the measurement or control of a circuit and designed to have its primary winding connected in parallel with the circuit.

1.65 Voltage Unbalance

Maximum voltage deviated from average voltage.

2. General Information

Service furnished by WH is subject to WH's Standard for Electric Installation and Use, the *National Electrical Code*® and the *National Electrical Safety Code*®. *WH is also subject to guidelines as established by RUS (Rural Utilities Service) and the policies and bylaws of the Cooperative.*

WH assumes no responsibility for the manufacturer's, supplier's, electrician's or engineering consultant's compliance with all applicable *NEC*® and *NESC*® codes as well as all local and state codes.

Distributed Energy Resources (DER) Interconnections must follow the requirements outlined in this document. In addition, DER Interconnections are required to comply with the Cooperative Minnesota Interconnection Process (C-MIP), the Technical Interconnection & Interoperability Requirements, and WH's Technical Specification Manual. All documents related to the interconnection process and associated requirements are available on the Cooperative's website. For questions or further information, please contact DER@whe.org.

Any waiver at any time of the WH's rights or privileges under the Policies and Bylaws will not be deemed a waiver as to any breach or other matter subsequently occurring.

The following are brief statements of those operating rules and practices, which affect the majority of connections made to the Cooperative's lines. Where information not included herein is needed, a WH Representative will provide assistance.

2.1 Effective Date

WH's Standard for Electric Installation and Use may be used at any time on or after the effective date. Contact the Cooperative or visit on-line at: www.whe.org to view or receive a copy of the most up-to-date edition.

2.2 Intent

The word "shall" indicates provisions that are mandatory.

The word "should" indicates provisions that are normally and generally practical for the specified conditions.

The word "may" indicates possibility.

The words "recommend" and "recommended" indicate provisions considered desirable, but not intended to be mandatory.

Exceptions to a rule have the same force and effect required or allowed by the rule to which the exception applies. All requests for exceptions shall be submitted in writing and will be responded to in writing. Verbal exceptions will not be granted.

Requirements of the *National Electrical Code*®, *National Electric Safety Code*®, or the Public Authority which are more stringent than the requirements of this document will take precedence.

2.3 Application For Service

The member may contact WH at 763-477-3000 to secure information relative to any application for new electric service connections or changes in existing service. Service telephone numbers for WH can be found at the end of this Section.

Before an electric service connection can be made to the member's (applicant's) wiring system, it is necessary that:

1. The member has submitted a written application for service.
2. The applicant has met all requirements of WH's Rules and Line Extension Policy in effect and in effect.
3. WH has completed its construction.
4. The Public Authority has notified WH of approval of the installation by providing an inspection release.

Where no Public Authority has jurisdiction, Wright-Hennepin, for the member's protection, may require written confirmation from the wiring electrician that the member's installation conforms to the National Electrical Code®.

The Cooperative does not assume responsibility for the design, operation or condition of the member's installation.

The Cooperative may make service available from either overhead or underground facilities. In cases where there are aesthetic considerations or where complicated overhead physical situations exist, the Cooperative may recommend the installation of underground facilities.

The Cooperative will not install facilities to serve a member until the member agrees to take the service under the applicable Rate Schedule and all applicable charges for construction and service, as required by the Cooperative's Extension Policy, are paid to the Cooperative. Additional costs incurred for digging in frost conditions when insufficient time was provided to estimate, plan, schedule and construct the necessary facilities prior to the onset of frost conditions will be paid by the member as a nonrefundable charge.

The Cooperative shall not under any circumstances be required to make an extension, which would be unprofitable and thereby cause undue hardship upon other members of WH.

It is extremely important that the Cooperative be consulted in advance of the finalization of the member's plans regarding the Cooperative's electric service requirements.

2.4 Rate Schedules

Electric service is supplied to members under the Cooperative's established rates, rules, and bylaws as approved by the Board of Directors. Rate information for residential, commercial, and industrial members are available from the Cooperative upon request.

Cooperative Representatives will assist the member in understanding the Cooperative's rates and in applying them to the member's load conditions.

2.5 Service and Limitations

Service will be rendered to the member from the Cooperative's nearest suitable power line of sufficient capacity to furnish adequate service at the service voltage available. Service shall not be used by the member for purposes other than those specified in the applicable Rate Schedule.

2.6 Connection

Connection to or disconnection from the Cooperative's distribution system shall be made by the Cooperative. Under no circumstances will the member be permitted to climb the Cooperative's poles, access the Cooperative's underground facilities, or make connections to the Cooperative's lines, except as specified in Section 2.12.4 Unlock, Open and/or De-energize any Electric Power Equipment Procedures.

The Cooperative shall be notified when it is necessary to cut the meter seal due to situations where the electric service must be disconnected during an emergency or where it necessary to access the meter socket by a qualified person. Failure to do this will result in a trip charge for re-sealing the meter. No persons, other than employees or agents of the Cooperative, may relocate meters or other equipment owned by the Cooperative.

2.7 Member-Owned Meter Equipment Restrictions

Under no circumstances shall members' equipment:

1. Be connected to, or in any way be served from, the secondary terminals of the voltage and/or current metering transformers.
2. Be installed within any metering enclosures including, but not limited to, metering transformer cabinets, transformer compartments, meter sockets or cold sequence disconnect.
3. Be connected to an unmetered bus or conductor.
4. Plug in devices such as surge suppression, generator transfer switch or any equipment designed to fit between the meter and the socket is not allowed.
5. Foreign attachments such as but not limited to CATV, phone loops, grounding clamps and load monitoring equipment, etc., are not permitted to be attached or connected to meter/metering equipment, service riser or service mast.
6. Member-owned transformers shall not be installed ahead of any Cooperative metering, except as permitted.

2.8 Diversion of Electricity

Under no circumstances shall devices or attachments be connected to the Cooperative's facilities in such a manner as to permit the use of unmetered energy except in emergencies where specifically authorized by the Cooperative. Refer to Section 4.10.2 Existing Services.

2.9 Easements for Cooperative's Facilities

The member shall provide, at the request of and at no cost to the Cooperative, necessary easements and suitable land area or building space owned and controlled by the member for installation, construction, reconstruction, maintenance, operation, control and use of the Cooperative's overhead and/or underground facilities used or useful to render service to the member.

2.10 Member's Responsibility

The member shall give authorized employees of the Cooperative access at all reasonable times to the premises of the member in order to obtain information concerning connected load, to measure or test service, to read meters, or for other purposes incidental to the supplying of electric service. Failure to comply may result in disconnection of services.

It is the responsibility of the member to adequately protect the Cooperative's equipment located on the member's property against damage. The member shall be responsible for any damages or loss resulting from improper protection or neglect.

Pad-mounted transformers, switchgear, and metering equipment shall be installed with adequate clearances for normal maintenance work as specified in Section 5 and the Illustrations Section.

Underground distribution facilities will not be installed until the property is to final grade (± 6 inches), the property pins are installed, and the structure is staked or foundation is installed as applicable. Grade at pad-mounted equipment shall be to exact final grade. Whenever it is deemed necessary by the Cooperative, the member shall provide Cooperative-approved conduit. This will be required in locations that are not readily accessible by the Cooperative such as under driveways, roads, parking lots, sidewalks, patios, etc.

Members shall connect their equipment so that the load at the point of delivery will be balanced as nearly as practicable. Where three-phase service (except 3-phase, 4-wire delta) is supplied, the member will attempt to connect equipment so that the load in any one phase at the point of delivery will not exceed the load in any other phase by more than ten (10) percent.

2.11 Member-Owned Facilities

Distribution facilities, either overhead or underground, beyond the Cooperative's point of delivery are to be installed, maintained, and operated by the member under all the following conditions:

1. Each installation is subject to the provisions of the Cooperative's Policies and Bylaws, the applicable Rate Schedule, and the approval of the Cooperative.
2. Under rates providing for delivery at secondary voltages, the Cooperative will install and maintain only a single transformer installation for the member, except as specified in Section 4.1 SERVICES.
3. The Cooperative will not install or permit the installation of member-owned equipment on Cooperative poles including but not limited to: meter sockets, metering equipment, distribution wires, posters, banners, placards, radio or television aerials or dishes, or other objects or devices. This includes all back-up generation devices.

Exception: Wires for municipal fire alarm systems, police signal systems, member's underground service extensions to the overhead system, member's dead-end equipment, or equipment covered by Joint Use Agreement.

Note: Meter sockets and other metering equipment shall not be installed on Cooperative poles with the exception of temporary metering equipment needed during construction if prior approval is given from Cooperative specific to the job.

4. The member's distribution system shall be in conformance with the National Electrical Code®, the wiring regulations of the Public Authority, and the Cooperative's Policies and Bylaws.
5. The distribution facilities of the member beyond the point of delivery shall be connected to the Cooperative's distribution system at one central point through protective devices, approved by the Cooperative, installed and maintained at the expense of the member.
6. Members shall maintain their distribution system in a safe operating condition so that it does not constitute a hazard to themselves, utility personnel or to other members or persons. The Cooperative assumes no responsibility for inspection of the member's lines and facilities and shall not be liable for injury to persons or damage to property when occurring on or caused by the member's lines or equipment.

7. Distribution facilities beyond the point of delivery shall be installed, owned, operated, and maintained by the member. Such facilities shall be located on and traverse only land owned or controlled by the member. The member's distribution facilities shall be installed in compliance with the National Electrical Code®, the National Electrical Safety Code®, the wiring regulations of the public body having jurisdiction, and the Cooperative's Policies and Bylaws.
8. Refer to Section 4 for additional requirements for member-owned facilities.

2.12 Safety

Refer to federal regulations and individual state laws concerning safety requirements relating to high voltage power lines of public utilities, which produce, transmit, or deliver electricity. The following explanations should not be regarded as a substitute for reading the laws, but are meant to highlight some of the major points.

2.12.1 Overhead Safety

Caution: Overhead wires and conductors are not insulated for protection from contact. Please exercise care when working near overhead facilities.

In an effort to prevent accidents involving contact with high voltage overhead lines, laws have been enacted to provide safer working conditions in these areas.

These laws apply, with few exceptions, to any person or business entity contracting to do work or perform any activity, which may bring an individual or equipment within 10 feet of high voltage overhead lines in excess of 600 volts. If work is to be performed within 10 feet of high voltage lines, the Cooperative shall first be contacted to arrange for safety provisions and a cost estimate for making those provisions will be provided. If there is a dispute over the amount to be charged, the Cooperative will proceed in a timely manner to provide the safety measures and the dispute will be settled at a later date. If work is begun after an agreement has been reached and before the safety provisions have been made, the person or entity performing the work shall be liable for damages resulting from contact with high voltage overhead lines.

Violations of these laws may result in a fine and/or possible liability for damages resulting from contact with high voltage overhead lines.

2.12.2 Underground Safety

Caution: Stakes, flags or painted lines mark the locations of underground utilities. Please dig very carefully within 24" on each side of the markings.

Anyone planning to dig in or near a public road, street, alley, right-of-way, or utility easement shall notify the Cooperative of your intent, no less than 48 hours (2 working days) before you dig. Call the telephone number listed below for your locale.

National, Call Before You Dig Line	811
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Minnesota, Gopher State One Call (Outside Metro Area)	800-252-1166
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Minnesota Gopher State One Call (Metro Area)	651-454-0002
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Residential service lines may cross homeowner's front and back yards. Many facilities are also located within the street, alley, or highway rights-of-way.

Color Codes: (Verify color codes used within your locale)

Red	Electric Power Lines, Cables, Conduit and Lighting Cables
Yellow	Gas, Oil, Steam, Petroleum, or Gaseous Materials
Orange	Communication, Alarm or Signal Lines, Cables or Conduit, including Cable Television
Blue	Water, Irrigation and Slurry Lines
Green	Storm Drain Lines/Sewer
Pink	Survey Markings
White	Proposed Excavation

2.12.3 Change of Grade

The grade in any public right-of-way or easement shall not be changed without first contacting the Cooperative to determine if electric facilities are contained within the right-of-way or easement. Permission may be granted to change the grade by the Cooperative if the grade change will not affect the minimum clearance requirements. Construction may be necessary if the grade change will necessitate moving equipment or facilities. The Cooperative can provide an estimate for the cost to relocate facilities when necessary to provide adequate clearance. All final restoration to final grade is the responsibility of requesting party.

2.12.4 Unlock, Open and/or De-energize any Electric Power Equipment Procedures

The Cooperative established procedures to assure maximum safety to protect all individuals prior to unlocking, opening and/or de-energizing electric power equipment where access by unauthorized personnel is required. The following procedures apply to, but are not limited to, energized Cooperative facilities such as vaults, transformers, manholes, switchgear and secondary pedestals:

1. The member shall request and receive access authorization prior to the Cooperative Representative unlocking, opening, and/or de-energizing any electric power equipment.
2. When a de-energized transformer is opened by the Cooperative Representative for a contractor to pull cable, the contractor shall contact the Cooperative and stand by until a Cooperative representative can relock the transformer before leaving the worksite.

3. Charges for work may apply when Cooperative personnel are required to open and close transformers or other electric equipment and stand by while work is performed around energized equipment. The Cooperative Representative will determine the amount to be charged.

2.12.5 Energization of Electric Service

When requesting a new service, the Member shall ensure that their main disconnect is in the open position, assuring panel bus serving feeders is de-energized until Cooperative completes the installation of the service including the meter installation. The Cooperative will not energize an electric service or set meters on new, rewired, altered, or repaired wiring installations unless all of the following conditions have been met:

1. The premises served have been properly identified by the member.
2. Meter trace verifications have been performed by the Cooperative.
3. An inspection release from the local Public Authority has been received by the Cooperative.

Note 3.1: In locations where there is no local Public Authority, the wireman shall submit a signed and dated letter to the Cooperative attesting that the electrical installation has been completed and installed according to the current National Electrical Code® and any other codes that apply before electric service is energized.

Note 3.2: Services that have been shut off or disconnected for more than six months, must meet current installation requirements, in order for service to be reconnected.

4. The Cooperative Representative has verified that the service entrance shows no continuity, load, or voltage feedback on the load-side terminals of the electric meter socket or CT metering installation.
5. The Cooperative Representative has verified that the members' equipment has a mechanical means to disconnect and isolate equipment from the load-side terminals of the self-contained electric meter socket or current transformers (CTs). This requirement includes, but is not limited to, any load produced by transformers (dry-type or oil-filled) that are used for a separately derived system.

Note 5.1: Once a service is energized, it shall be the member's responsibility to turn on load side breakers or close disconnecting switches.

6. The Cooperative Representative has verified that the electric service meets all of the requirements in Section 4.

Note 6.1: The meter socket shall meet all requirements listed under METER SOCKETS in Section 4.

2.13 Wright-Hennepin Limited Telephone Directory

Service Telephone Numbers:

- | | |
|---|--------------|
| • New Services Team | 763-477-3150 |
| • Reporting a Power Outage or Emergency | 763-477-3100 |
| • Member Services Team | 763-477-3000 |

3. Character of Service Available

Contact the Cooperative for information regarding availability of any desired type of service in a given locale. Delays and unnecessary expense may be avoided by contacting the Cooperative in advance of construction.

3.1 Types of Service

The Cooperative will assist in determining whether the service voltage requested is offered under the Cooperative's Tariffs within the service territory. These service voltages are all derived from grounded transformer banks. Depending upon the service voltage, either the neutral or one phase conductor is grounded at the supply transformer and will be run from the transformer installation to the meter socket.

3.1.1 Available Service Voltages Provided by Wright-Hennepin

1. Single-phase: residential or commercial
 - a. 240/120 volt, 3-wire
 - b. 240/480 volt, 3-wire [Highway lighting only]
2. Multi-phase grounded Wye: large commercial or urban
 - a. 208/120 volt, 3-wire [1-phase network metering]
 - b. 208/120 volt, 4-wire
 - c. 480/277 volt, 4-wire
3. Multi-phase Delta: small commercial or rural [closed to new accounts]
 - a. 240 volt, 3-wire
 - b. 240/120 volt, 4-wire
 - c. 480 volt, 3-wire
 - d. 480/240 volt, 4-wire
4. Primary service Wye: by special request
 - a. 12.47/7.2 KV, 4-wire

3.2 Meter Sockets for Types of Service

1. Self-Contained – Supplied by the member (Refer to Section 4, METER SOCKETS):
 - a. 1Ø 2W, 1Ø 3W - 4 terminal meter sockets
 - b. 3Ø 3W Delta - 5 terminal meter sockets [closed to new installations]
 - c. 3Ø 4W Wye - 7 terminal meter sockets
 - d. 3Ø 4W Delta - 7 terminal meter sockets [closed to new installations]
2. Transformer Rated (CTs) - Supplied by the Cooperative:
 - a. 1Ø 2W, 1Ø 3W - 5 terminal meter sockets
 - b. 3Ø 3W Delta - 8 terminal meter sockets [closed to new installations]
 - c. 3Ø 4W Wye - 13 terminal meter sockets
 - d. 3Ø 4W Delta – 13 terminal meter sockets [closed to new installations]

3.3 Distribution (Primary) Service

Electric energy will be supplied at the voltage of Cooperative's distribution line of adequate capacity for the load to be served. The Cooperative will specify the location of the primary metering installation.

3.4 Transmission Service

Electric energy will be supplied at the voltage of existing transmission lines at locations specifically approved by the Cooperative.

4. Service Facilities

The Cooperative will provide service from either overhead or underground distribution facilities, depending upon availability and initial construction costs. Where there is a choice of overhead versus underground service, the Cooperative will normally offer the form requiring the least initial construction cost, in which case the member may elect to choose the alternate, but charges will apply.

The member shall confer with the Cooperative Representative before purchasing equipment, beginning construction of a proposed installation or altering existing service installations. The Cooperative Representative will determine if the type of service and voltage desired by the member is available, determine if additions to the Cooperative's facilities will be required, and identify an acceptable meter location and point of delivery. The Cooperative Representative will arrange for all necessary alterations and determine any applicable fees.

When the Cooperative is required by order of a Public Authority to alter its distribution system, necessitating a change in the location of the point of delivery, the Cooperative will designate a new point of delivery. The member, at their expense, shall relocate the service entrance conductors and metering equipment to the new point of delivery. The relocated service shall comply with the installation standards contained within this manual.

4.1 Services

A building or other structure will be supplied by only one service, in accordance with 2023 National Electrical Code® Article 230.2, or as may be amended.

Only one service (point of delivery) will be provided to a building or other structure, except as specified below:

1. Special Conditions – Additional services may be provided by the Cooperative for:
 - a. Emergency lighting.
 - b. Fire pumps.
 - c. Legally required standby systems.
 - d. Optional standby systems.
 - e. Parallel power production systems.
2. Special Occupancies – Additional services may be provided by the Cooperative for:
 - a. Multiple-occupancy buildings where the Cooperative determines that there is no available space for service equipment accessible to all occupants.
 - b. A single building or other structure where the Cooperative determines that such building or structure is sufficiently large to make two or more services necessary.
3. Capacity Requirements - Additional services may be provided where the Cooperative determines that it cannot adequately provide service at a single point of delivery. If a transformer larger than 2500 kVA is required, the Member may be required to be served with primary service. Additional charges may apply.
4. Different Characteristics – Additional services may be provided by the Cooperative for different voltages or phases, or for loads with different rate schedules.

4.2 Overhead Service

4.2.1 Overhead System - Low Voltage (0-480 Volts)

General Requirements:

1. Service Connection - Overhead service drop conductors will be installed and connected to service entrance conductors in accordance with the Cooperative's Policies and Bylaws.
2. Point of Attachment - The Cooperative will specify the location of the service-entrance conductors most suitable for connection to the Cooperative's lines.
 - a. The member shall furnish and install the physical means of attachment.
 - b. The point of attachment shall be located within 24" of the weather head and at a point nearest the Cooperative's facilities to be used to provide service. Refer to the Illustrations Section, Drawing K4-2G.
 - c. The point of attachment shall be located such that adequate clearance can be obtained for the service drop from trees, awnings, patio covers, foreign wires, adjacent buildings, swimming pools, etc. Service drops shall not pass over adjacent private property, except where permitted by easement. Specified heights and clearances may be maintained by use of an approved service mast through the roof.
 - d. Vertical Clearance from Ground – Refer to the 2023 National Electric Safety Code® Article 232 and Table 232-1, or as may be amended. Service-drop conductors, where not in excess of 600 volts nominal, shall have the following minimum clearances from final grade:

- (1) Over spaces and ways subject to pedestrians or restricted traffic only:

12' 6" - Open Wire

12' 0" – Triplex, Quadraplex

Exception 1: Where the height of a building or other installation does not permit the 12' 6" clearance, 10' 6" clearance for insulated service drops limited to 300 volts to ground and 10' clearance for insulated service drops limited to 150 volts to ground are permitted.

- (2) Over driveways, established parking areas, and alleys:

16' 6" - Open Wire

16' 0" – Triplex, Quadraplex

Exception 2: Where the height of a residential building does not permit the specified clearance, 12' 6" clearance for insulated drip loops limited to 300 volts to ground and 12' clearance for insulated drip loops limited to 150 volts to ground are permitted

- (3) Over other areas traversed by vehicles, such as cultivated, grazing, forest, and orchard lands, industrial sites, commercial sites, etc:

16' 6" - Open Wire

16' 0" – Triplex, Quadraplex

- (4) Drip loops shall meet the same clearances as specified above for service drops

Exception 3: Where the height of a residential building does not permit the specified clearance, 10' 6" clearance for insulated drip loops limited to 300 volts to ground and 10' clearance for insulated drip loops limited to 150 volts to ground are permitted.

- (5) The point of attachment shall not be higher than twenty-four (24) feet above final grade.

3. Service Mast/Riser Supports - Only the Cooperative's power service-drop or overhead service conductors shall be attached to a service mast. Service masts used for the support service –drop or overhead service conductors shall be installed in accordance with 2023 National Electrical Code® Article 230.28(A) and (B) or as may be amended. Phone loops, cable TV conductors, grounding clamps, etc. shall not be attached to the service mast or riser.
 - a. Service Mast - The service mast is the conduit containing the service-entrance conductors where the point of attachment and the connection between the service drop and the service entrance conductors is located above the roofline. The conduit extends to a point, and the weather head is located, above the roof eave. The conduit passes through the eave of the building or extends past the roofline without passing through the eave. The means of attachment is attached to the service mast. Service masts shall be 2" minimum GRC metallic conduit. The point of attachment shall not exceed 42" above the roofline. The service mast shall be of adequate strength or braced or guyed by the member. Conduit couplings shall not be installed above the roofline. Refer to the Illustrations Section Drawing K4.2G showing typical installation method.
 - b. Service Riser - The service riser is the conduit containing the service-entrance conductors where the point of attachment and the connection between the service drop and the service-entrance conductors is located on a pole or below the roofline of the building being served. The conduit extends to a point, and the weather head is located, below the roof eave. The means of attachment is secured to the pole or building and is not attached to the service riser. Refer to the Illustrations Section, Drawing K4.1G showing typical installation method.
4. Ice and Snow Shields - All electric meters shall be located on the gable or non-drip side of a building or other structure, and there shall be no adjacent rooflines, which will drip directly on or towards a neighboring meter installation. Whenever possible, install meter socket on gable end of buildings or under an eave with sufficient overhang to ensure maximum safety. Any installation deemed unsafe by the Cooperative may be disconnected. Refer to the Illustrations Section, Drawing K4-4G showing typical installation methods.
5. Service Drops - The allowable length of service drop conductors shall be governed by the slope of the ground, intervening trees and obstructions, and the size of the conductor required.

Conductor (Duplex, Triplex or Quadraplex)	Maximum Service Span* (Utility pole to House knob)
#6	110'
#4	110'
#2	90'
1/0	80'
4/0	Underground Required
500	Underground Required

*Service tension is limited to 800lbs under ½" 32° F ice loading conditions

6. Secondary Poles – If the service span length is larger than allowed in the table above, secondary will need to be extended to a new Cooperative provided pole on the member's property. From the new pole the service can be extended to the house. A suitable easement may be required before such installation is made.

7. Service Entrance Conductors - Service entrance conductors in the member service entrance conduit shall have a current carrying capacity at least as great as that required by the National Electrical Code® and the Public Authority having jurisdiction. The Cooperative strongly recommends that some provision be made for future load increase. A sufficient length of wire, but in no case less than twenty-four (24) inches on residential or thirty-six (36) inches on commercial services, shall extend from the service weather head for connection to the Cooperative's service drop. Line and load conductors are not permitted in the same raceway or conduit. No conductors, other than service entrance conductors, shall be installed in the service entrance conduit. All line-side (non-metered) conductors shall be in a continuous length of conduit from the point of delivery to the meter socket or the cold sequence metering disconnect. Junction boxes, conduit fittings (e.g. LB's), or other devices are not allowed without specific approval from the Cooperative.

4.2.2 Overhead System – Primary Voltage (12.47/7.2 kV)

Because of safety precautions, which must be exercised in the utilization of energy at primary voltages the Cooperative shall be consulted in regard to service entrance and meter installation details for this class of service before construction is started.

Refer to the Illustrations Section Drawing Q4.2, for typical installation of primary voltage service.

4.3 Underground Service

4.3.1 Underground System – Low Voltage (0-480 Volts)

General Requirements:

1. Service Connection – Underground service laterals from underground distribution systems or overhead distribution systems shall be installed in accordance with the Cooperative's Policies and Bylaws.
2. Point of Entry - The Cooperative shall specify the location of the underground service lateral and metering equipment location most suitable for connection with the Cooperative's facilities. The Cooperative will not run an underground service lateral through a wall below grade or above the first-floor level.
3. Ice and Snow Shields - A meter ice and/or snow shield may be required on any meter installation deemed unsafe by the Cooperative due to snow or ice falling/sliding off of a roof. Whenever possible, install meter socket on gable end of buildings or under an eave with sufficient overhang to ensure maximum safety. Refer to the Illustrations Section Drawing K4-4G, showing typical installation methods.
4. Underground Service Laterals - Laterals shall not be installed until property is to final grade (+/-6 inches), property pins are in place, and the cable route is free of obstructions.
 - a. Cooperative owned service laterals shall not be installed at a depth of less than twenty-four (24) inches.
 - b. Member-owned commercial and industrial service laterals shall be installed in accordance to the 2023 National Electrical Code® or as amended.
 - c. Electric and plastic gas services within the same trench shall be separated by twelve (12) radial inches. Steel gas services shall not be installed in the same trench with an electric service and require a minimum of twelve (12) radial inches of separation.
 - d. Service conductors under hardscape shall be in conduit where the conduit extends two (2) feet beyond the hardscape edge.
 - e. Service conduit shall be schedule 80 PVC. Conduit elbows for service wire shall have a minimum radius of thirty-six (36) inches.

- f. In accordance with the NESC Section 351C2, buildings or other structures are not permitted to be located directly above or within 12 inches of underground conductors. In the event a building, structure or landscape structure is built over underground conductors, the member may be responsible for costs associated with relocating the service conductors.
 - g. Residential service facilities shall be located on and traverse only land owned or controlled by the member.
5. Ground Movement – A slip sleeve or meter riser sleeve shall be furnished and installed by the member on all new and rewired underground residential and commercial meter installations.
 - a. Refer to the 2023 National Electrical Code® Article 300.5(J), or as may be amended and to the Illustrations Section Drawing UM8 for typical slip sleeve installations.
6. Service Entrance Conductors - Service entrance conductors from the utility meter to the member panel shall have a current carrying capacity at least as great as required by the National Electrical Code® and the Public Authority having jurisdiction. The Cooperative strongly recommends that some provision be made for future load increase. Line and load conductors are not permitted in the same raceway or conduit. No conductors, other than service conductors, shall be installed in the service lateral conduit. Each service run shall be contained within its own conduit (A, B, C phases and neutral) on commercial services. Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed without specific approval from the Cooperative. Drawings showing typical methods for installing service-entrance conductors are contained in the Illustrations Section Drawing UM8.
7. Conductors in a Meter Socket - On an underground service, the center knockout in the bottom of the socket, if provided, shall not be utilized. Line conductors shall enter through the knockout provided at the left side of the bottom horizontal surface of the meter socket. The line conductors shall be routed along the outermost edges of the meter socket allowing for ground settling, which could pull the line conductors down. Either the knockout on the right side of the bottom horizontal surface, the lower knockout on the right vertical surface, or the lower knockout on the back vertical surface of the meter socket may be used for load conductors. Load conductors shall not exit the left side of the meter socket. Any deviations require Cooperative approval. Refer to the Illustrations Section, Drawing UM8.

4.3.2 Underground System – Primary Voltage (12.47/7.2 KV)

The Cooperative shall be consulted in regard to service entrance, transformer location, and meter installation details for this class of service **in advance of construction and/or purchase of equipment**. The member's engineering electric drawings shall detail the position of PT's & CT's and metering bay layout. Primary metering designs must be approved by the Cooperative prior to construction.

4.4 Secondary Conduit Sizing and Cable Tray Requirements

Member shall furnish cable and conduits to Cooperative transformer from panel when no connection cabinet exists. Conduit or Conduit fittings made from a ferrous material may not be used when separating three-phase runs into separate conduits.

If any of the following is exceeded a connection cabinet is required:

- Maximum of four (4) 4-inch conduits
- Maximum of four (4) conductors per phase
- Maximum conductor size of 500 kCMIL CU or 750 kCMIL AL

The Cooperative requires that a cable tray is installed by the member for all installations that require a connection cabinet.

The Cooperative will furnish secondary wires between the transformer and member-supplied connection cabinet. The Cooperative will furnish the connectors for the terminations in the transformer; the member shall furnish the connectors for the terminations in the connection cabinet.

In addition to the requirements above the following drawings shall be referenced:

- o UM1-6C – Three Phase Transformer Concrete Pad Guideline (75- 500kVA)
- o UM1-7C – Three Phase Transformer Concrete Pad Guideline (750kVA &1000kVA)
- o UM1-8C – Three Phase Pad-Mounted Transformer Secondary Connection Cabinet Concrete Pad – In-line Orientation (75- 2500kVA)
- o UM1-9C – Three Phase Pad-Mounted Transformer Secondary Connection Cabinet Concrete Pad – 90 Degree Orientation (75- 2500kVA)
- o UM1-10NC – Three Phase Transformer Precast Pad Guideline (75- 500kVA)
- o UM1-11NC – Three Phase Transformer Precast Pad Guideline (750- 2500kVA)
- o UM1-G1 – Three Phase Transformer Guide – Grounding and Bollard Detail
- o UM1-G2 – Three Phase Transformer Wiring Guide

4.5 Service Lateral Sizes (for balanced load)

For service with secondary connection cabinets, the Cooperative will furnish secondary wires between the transformer and member-supplied connection cabinet. The following table includes service lateral sizes for the WHE owned service conductors, see Drawing UM1-G2 for additional notes.

Padmount Transformer - Service Lateral Sizes		
KVA	Copper (Conductor/Phase)	Aluminum (Conductor/Phase)
208 Grd Y/120 Volt		
300	3 - 500	2 - 750
500	4 - 500	4 - 750
750	6 - 500	6 - 750
1000	8 - 500	8 - 750
480 Grd Y/277 Volt		
300	1 - 500	1 - 750
500	2 - 500	2 - 750
750	3 - 500	3 - 750
1000	4 - 500	4 - 750
1500	6 - 500	6 - 750
2000	7 - 500	7 - 750
2500	8 - 500	8 - 750
240/120 Volt 1 Ø		
167	2 - 500	2 - 750

4.6 Transformer Installations – Network Vaults

Secondary distribution networks are not available. Transformer vaults are not an approved installation for WH.

4.7 Transformer Installations – Pad-Mounted

The Cooperative will provide an outdoor pad-mounted transformer for service to the member's facilities such as shopping centers, office buildings, schools, large apartment buildings, etc. under the following conditions:

1. The Cooperative will own, operate and maintain the primary underground installation between the adjacent distribution facilities and the transformer, including the primary cable, ducts, transformer and protective equipment.
2. The Member shall provide an adequate base at finished grade for the installation of the transformer pad and Cooperative's pad-mounted transformer. If any corner of the tank has settled to be lower than two (2) inches from any other corner, the installation must be reset to a level position. In areas near buildings where earth has been disturbed, the member shall provide firm soil conditions under pad area to prevent settling of the pad. Native soils can be used if the required compactions can be obtained (at least 2000 pounds/square foot compaction). In cases where the adequacy of the base may be doubtful, the Cooperative may require a "Certificate of Adequacy" from a qualified testing laboratory.
3. All concrete forms are to be inspected and approved by the Cooperative before pouring concrete.
4. The Cooperative will make and maintain all connections at the transformer terminals. No member-owned switches, fuses, etc. may be located within a fenced area designed to contain a transformer installation without written approval of the assigned Cooperative.
5. The property shall be to final grade (± 6 inches) except at the equipment location, which shall be to exact final grade. The property must be level and clear for ten (10) feet to allow for operation and maintenance of the pad mounted equipment, the cooperative may require additional clearance based on the installation and circumstances. Property pins shall be in place with the structure staked or the foundation in, prior to installation of the pad-mounted equipment and splice boxes.
6. The Cooperative shall be consulted well in advance of any proposed project.
7. If, in the judgment of the Cooperative, the selected location for the installation of the pad-mounted equipment is not adequately protected from traffic, or when directed by the local Public Authority, the member shall furnish and install bollards or guard posts to protect the pad-mounted equipment installation.

Further details relating specifically to transformers can be found in Section 5. Refer to the Illustrations Section Drawings UM1-G1, UM1-G2 for typical pad-mounted transformer installation requirements.

4.8 Point of Delivery

The point of delivery is the point where the Cooperative's electric facilities are first connected to the electric facilities of the member.

It is the policy of the Cooperative to own, operate, and maintain the electric distribution facilities up to the point of delivery. This policy is applicable to service rendered from either overhead or underground facilities. All such facilities will be installed in accordance with the Cooperative's Line Extension Policy and Policies and Bylaws.

4.9 Member-Owned Service Conductors

The electric service line installed by the Cooperative shall remain the property of the Cooperative. Any payment made by the member shall not entitle them to ownership interest there in.

For special load types or projects that have limited workspace for machinery such as steep grades and obstructions, the Cooperative may require the owner to run Cooperative approved secondary wire or conduit to a designated Point of Delivery that allows the Cooperative to feasibly connect to and maintain its facilities into the future.

The number and size of member-owned conductors that may be terminated to Cooperative facilities is limited by the type of installation as follows:

1. Overhead-to-Overhead:
 - a. Service entrance risers on a building are limited to a maximum number of six (6), with a single set of conductors in each riser.
 - b. The Cooperative will specify the minimum and maximum conductor size, which will typically not exceed 4/0 for 3-phase or 1/0 for single phase.
2. Overhead-to-Underground:
 - a. A maximum of three U-guard risers per pole (including Cooperative-owned, foreign utility owned and/or member-owned) shall be attached to a Cooperative pole and properly supported to not pull away from pole.
 - b. Forty (40') feet of member owned conductor shall be coiled at the base of Cooperative pole, where applicable. If member installs conduit from structure to base of pole, member may install elbow at pole but under no circumstances install any member-owned conduit on Cooperative-owned pole.
 - c. Member-owned conduit at the base of the Cooperative's pole shall not exceed six (6) inches above final grade.
 - d. The U-guard risers shall be grouped together and shall not occupy more than 40% of the pole circumference.
 - e. Only a single set of conductors is allowed in each U-guard riser.
 - f. The conductor size shall not exceed 350 kcmil.
3. Underground:
 - a. Three-Phase Pad-mounted Transformer. The maximum conductor size shall not exceed 500 kcmil copper or 750 kcmil aluminum.
 - i) The number and size of conduits and conductors are limited to:
Maximum of four (4) 4" conduits
Maximum of four (4) conductors per phase
Maximum conductor size of 500 kCMIL CU or 750 kCMIL AL

If limitations are exceeded, a secondary connection cabinet is required.
 - ii) When not required, a secondary connection cabinet may also be installed at the member's discretion.
 - iii) All secondary connection cabinets with or without metering provisions shall be provided by the Member and placed adjacent to the transformer. Refer to the Illustrations UM1-8C, UM1-9C, UM1-10NC, and UM1-11NC.
 - iv) All secondary connection cabinets with or without metering provisions shall have a 3-point latch with provisions for a Cooperative padlock and door(s) shall be hinged on either the left or right side.

- b. Single-Phase Pad-mounted Transformer - The maximum number of secondaries or services per phase that are to be served from a single-phase transformer is based on cable size. For cables larger than 350 kcmil a maximum of 4 runs are allowed. For residential applications, a maximum of 6 runs of 350 kcmil are allowed.
- c. Single-Phase Pedestal – The maximum number of conductors in a standard single-phase pedestal, with six-position URD holes, is 18. This includes one secondary feed from the transformer and 5 services. The maximum conductor size shall not exceed 350kcmil aluminum. If a street light feed is required, or if any additional services need to be run from the pedestal, an 8 position URD hole shall be used.

4.10 Metering

4.10.1 New Services

The Cooperative will not permit a temporary unmetered service on new electrical services. Service may be supplied from a temporary meter panel prior to an inspection release on new services.

Before permission will be granted to energize a new service, an inspection release shall be provided to the Cooperative by the local Public Authority.

4.10.2 Existing Services

Before a meter will be installed on an existing service, which has been rewired, altered, or repaired, an inspection release shall be received by the Cooperative from the local Public Authority.

Temporary Unmetered Services are not allowed.

4.10.3 Meter Installation and Ownership

All service to a member will be supplied by a single service (point of delivery) and only one meter will be installed at an address or single unit of a multi-unit building. Only in the event that more than one service is allowed by the Cooperative as detailed in SERVICES in this Section, will the Cooperative install more than one meter.

Only authorized Cooperative employees or qualified individuals authorized by the Cooperative are permitted to connect, disconnect, move or remove meters. All meters, service wires, and other electrical facilities installed by the Cooperative upon the member's premises for delivering or measuring electrical energy to the member shall continue to be the property of the Cooperative. All metering equipment owned by the Cooperative and not installed shall be returned to the Cooperative. These facilities may be repaired, inspected, tested, relocated, replaced, or removed by the Cooperative.

4.10.4 Classification Of Metering

Refer to Section 1 for the definition of Classification of Metering.

The Cooperative classifies its metering installations as:

1. Residential Rate:
 - a. Self-Contained
 - b. Instrument Transformer
2. Commercial and Industrial Rates:
 - a. Self-Contained
 - b. Instrument Transformer
 - c. Temporary Construction

The type of metering used will be determined by the Cooperative based upon: the service voltage, the load supplied, the available fault current, and the applicable Rate Schedule.

Cooperative Engineering approval is required for all services that serve multi-family dwellings greater than 600 Amps. If service is Commercial such as an apartment building, then the service lateral shall be installed by the member.

All services shall be metered on the secondary side of the Cooperative's transformer unless the applicable Rate Schedule specifies that the service be metered on the primary side of the transformer. The Cooperative may install its meter on either side of the transformer and losses occurring between the point of delivery and the meter will be computed and added to, or subtracted from, the reading of the meter. Cooperative approvals are required for Primary Rate installations and will only be considered under extenuating circumstances.

4.10.5 Self-Contained Metering

Single-phase and 120/208V three-phase services with a total connected load of 200 amps or less shall be metered by self-contained meters.

Single-phase services with a total connected load of 201-320 amps may be metered by either 320 amp self-contained or instrument transformer metering.

Single-phase services where the total connected load is in excess of, or anticipated to be in excess of, 320 amps shall use instrument transformer metering.

Three-phase services where the total connected load is in excess of, or anticipated to be in excess of, 200 amps and all three-phase services rated above 240V shall use instrument transformer metering.

The total amp rating of the main disconnect(s) shall not exceed 250 amps for a 200 amp continuous duty rated meter socket or 400 amps for a 320 amp continuous duty rated meter socket.

All self-contained single position and/or modular (multi-position) meter sockets that are of either single-phase or three-phase design shall be furnished, owned, installed, and maintained by the member. All self-contained meter sockets shall be Nationally Recognized Testing Laboratory (NRTL) listed and labeled and will be inspected by the local Public Authority for compliance to the National Electric Code® and any other applicable codes. **All meter sockets shall have a locking jaw lever bypass.** The construction of the meter sockets shall also conform to the Cooperative's standards as described in METER SOCKETS in Section 4.13.

K-base type meter socket installations are not allowed within the Cooperative's service areas.

Note: The service entrance conductor intended to be connected to the high-leg of a 3-phase, 4-wire delta-connected system shall be durably and permanently marked at both ends of the conductor by an outer finish that is orange in color in accordance with 2023 National Electrical Code® Article 110.15, or as may be amended, and shall be installed in the far right hand position of the meter mounting block. Refer to the Illustrations Section Drawing 16S-3.

4.10.6 Instrument Transformer Metering, Secondary Voltage

Hot sequence is the required installation method for instrument transformer (CT) metering. A cold sequence disconnecting device is not allowed ahead of a CT cabinet unless required by local Public Authority having jurisdiction.

The maximum metered load shall not be greater than 4000 amps.

The CTs and meter-socket will be supplied, owned, and maintained by the Cooperative and shall be installed by the member. The instrument transformer compartment in a CT cabinet, service connection cabinet, or switchgear CT compartment, and the necessary conduit and fittings shall be supplied, owned, installed, and maintained by the member. The Cooperative will terminate the line-side conductors and the member shall terminate the load-side conductors in a secondary connection cabinet. All other CT cabinet or switchgear CT compartments, terminations will be done by the member on both the line and load side. The secondary (metering) conductors will be supplied, owned, installed, and maintained by the Cooperative. Member-owned equipment, other than service conductors, shall not be installed in the space dedicated to instrument transformers.

All current transformers (CTs) shall be installed in a CT cabinet, secondary connection cabinet, or switchgear CT compartment. Refer to METERING, CT Cabinets, secondary connection cabinets (with or without Optional Member Disconnect Switch and Metering Provisions) and Switchgear CT Compartments in this Section.

The following CT installations are **not allowed** on new installations or replacements/upgrades:

1. Rack mounted on mast, pole or side of building using donut or window type CTs.
2. Over-the-bushing type CTs mounted in the Cooperative's distribution transformer.

The CTs shall be installed in such a manner that the secondary (metering) terminals are readily accessible from the door of the CT compartment. The CTs shall be mounted such that the H1 "white dot" marking for polarity is on the line side. When bar-type CTs are installed, the bolts used to make the connections shall be the largest standard diameter that will fit through the holes or slots provided for this purpose.

Conductors in CT cabinets and service connection cabinets shall be installed in accordance with the requirements of 2023 National Electrical Code® Article 312.6, or as may be amended.

Metering conduit installed below grade (underground) from the meter-socket to the CT cabinet (or compartment) shall be minimum 1" Schedule 80 PVC. Metering conduit installed above grade (above ground) from the meter-socket to the CT cabinet (or compartment) shall be minimum 1" GRC or IMC. Metering conduit shall be a continuous run between the meter socket and the CT cabinet. The conduit run shall not exceed 25 feet in length. Installations requiring conduit runs greater than 125 feet are not allowed without prior approval from the Cooperative. For installations of 25-125 feet, the metering conduit shall be 1 ¼" GRC or IMC and furnished with wire by the member. If the conduit run exceeds 25 feet in length, the total degrees of bends shall not exceed 180, the equivalent of two 90 degree bends. Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed.

The meter socket shall be bonded with a separate bonding conductor in accordance with the 2023 National Electrical Code® Article 250, or as may be amended.

4.10.7 CT Cabinets

In addition to the requirements in METERING, Instrument Transformer Metering, Secondary Voltage in this Section, the following requirements shall also be met:

1. The CT cabinet (enclosure) shall meet a minimum of NEMA 3R standards.
2. The maximum connected load shall not be greater than 4000 amps per metered service.
3. The CT cabinet shall be Nationally Recognized Testing Laboratory (NRTL) listed and labeled as a CT enclosure (UL and/or Third-party certification).
4. CT cabinets rated from 400 to 800 amps shall have mounting provisions for bar-type CTs. Refer to the Illustrations Section Figure M1.

5. CT cabinets rated from 801 to 4000 amps shall have a removable bus section with a 12" minimum length, 5" maximum width, and an insulated CT support which will accommodate window-type CTs. The removable bus section shall have an enclosed screw type compression terminal to accommodate a minimum #12 AWG metering potential conductor on the line-side section of the bus. Refer to the Illustrations Section Figure M1.
6. The CT cabinet shall be furnished with factory installed landing pads and lugs for phase and neutral conductors.
7. The neutral bus shall have a neutral lug which will accommodate one #12 AWG Cu solid through two #10 AWG Cu stranded wire(s) for the metering neutral conductors.
8. All instrument transformer compartments shall have barriers between adjacent areas.
9. The door shall be hinged either on the left or right side and be equipped with a hasp for a Cooperative padlock with a 5/16" diameter shackle. Latching methods shall utilize captive fasteners. Studs with wing nuts are not allowed.
10. The installation height of the CTs shall be between 2'-0" minimum and 6'-0" maximum measured from the center of the CTs to final grade. The minimum clearance from the bottom of a wall-mounted CT cabinet to final grade shall be 1'-0".
11. The service entrance conductor connected to the high-leg of a 3-phase, 4-wire delta system shall be durably and permanently marked at both ends of the conductor by an outer finish that is orange in color in accordance with 2023 National Electrical Code® Article 110.15, or as may be amended. For 200 A self-contained services, the high leg shall be installed in the right-hand phase position for vertical bus or the bottom phase position for horizontal bus in the CT cabinet.
12. The preferred method of CT cabinet wiring for overhead services, the line-side conductors shall enter and terminate in the top half of the CT cabinet, and the load-side conductors shall exit and terminate in the bottom half. Likewise, for underground services, the line-side conductors shall enter and terminate in the bottom half of the CT cabinet, and the load-side conductors shall exit and terminate in the top half. Neither the line-side nor the load-side conductors shall cross the horizontal centerline of the CT cabinet.
13. Refer to the table below for a CT cabinet minimum dimension guideline:

Dimensions for Wall-Mounted CT Enclosures and Switchgear Guideline						
Ampacity	Minimum Number of Conductor Terminals to Provide	Vertical Bending Space (1Ø & 3Ø)	Depth (3Ø)	Depth (1Ø)	Width (3Ø)	Width (1Ø)
400	1	18"	10"	10"	30"	24"
600	2	18"	10"	10"	30"	24"
800	2	24"	12"	10"	32"	24"
1000	3	24"	12"	—	32"	—
1200	4	27"	12"	—	32"	—

*Refer to the Illustrations Section Figures M1 & M2.

4.10.8 Secondary Connection Cabinets with metering provisions

Single point services to multiple tenants may be metered with a pad-mounted secondary connection cabinet with or without member disconnect switch. The use of a secondary connection cabinet with a member disconnect switch allows the member the ability to de-energize his own service for equipment maintenance without calling the Cooperative to schedule an outage. The secondary connection cabinet shall be located adjacent to the distribution transformer.

Note: Refer to SERVICES and also METERING, Meter Installation and Ownership in this Section for clarification on the allowable number of service and metering points.

In addition to the requirements in METERING, Instrument Transformer Metering, Secondary Voltage in this Section, the following requirements shall also be met:

1. The maximum connected load shall not be greater than 4000 amps per metered service.
2. Secondary connection cabinets from 400 to 800 amp rating shall have mounting provisions for bar-type CTs. Refer to the Illustrations Section Figure M2.
3. Secondary connection cabinets from 801 to 4000 amps shall have a removable bus section with a 12" minimum length, 5" maximum width, and an insulated CT support which will accommodate window-type CTs. The removable bus section shall have an enclosed screw type compression terminal to accommodate a minimum #12 AWG Cu metering potential conductor on the line-side section of the bus. Refer to the Illustrations Section Figure M2.
4. The neutral bus shall have a neutral lug which will accommodate one #12 AWG Cu solid through two #10 Cu AWG stranded wires for the metering neutral conductors.
5. The door(s) shall be hinged either on the left or right side and be equipped with a 3-point latch with provisions for a Cooperative padlock with a 5/16" diameter shackle.
6. The installation height of the CTs shall be between 2'-0" minimum and 6'-0" maximum measured from the center of the CTs to the bottom of the cabinet.
7. The phase arrangement on 3-phase installations shall be A, B, C front-to-back, top-to-bottom, left-to-right when viewed from the front of the equipment.

The member shall install the pad and pad-mounted secondary connection cabinet in accordance with the Illustrations Section Drawings.

4.10.9 Switchgear CT Compartments

In addition to the requirements in METERING, Instrument Transformer Metering, Secondary Voltage in this Section, the following requirements shall also be met:

1. For all services with Switchgear CT Compartments, the member shall install the secondary wires between the Switchgear CT Compartment and the Cooperatives Transformer, the Cooperative will make the connections in the Transformer.
2. Switchgear CT Compartments from 400 to 800 amp rating shall have mounting provisions for bar-type CTs. Refer to the Illustrations Section Figure M2.
3. Switchgear CT Compartments from 801 to 4000 amps shall have a removable bus section with a 12" minimum length, 5" maximum width, and an insulated CT support which will accommodate window-type CT. The removable bus section shall have an enclosed screw type compression terminal to accommodate a minimum #12 AWG metering potential conductor on the line-side section of the bus. Refer to the Illustrations Section Figure M2.
4. The maximum connected load shall not be greater than 4000 amps per metered service.
5. A metering neutral lug, which will accommodate one #12 AWG Cu solid through two #10 AWG Cu stranded wires for the metering neutral conductors, shall be available near the front of the CT compartment so that it can be safely accessed even if the switchgear is energized.
6. All instrument transformer compartments shall have barriers between adjacent areas.
7. The door shall be hinged either on the left or right side and be equipped with a hasp for a Cooperative padlock with a 5/16" diameter shackle. Latching methods shall utilize captive fasteners. Studs with wing nuts are **not allowed**.
8. The installation height of the CTs shall be between 2'-0" minimum and 6'-0" maximum measured from the center of the CTs to the bottom of the switchgear.

9. Current Transformer Compartment shall have a minimum clearance of 12" from the bottom of enclosure door to final grade.
10. The phase arrangement on a 3-phase installation shall be A, B, C front-to-back, top-to-bottom, left-to-right when viewed from the front of the switchgear, in accordance with 2023 National Electrical Code® Article 408.3(E) or as may be amended. The B-phase shall be that phase having the higher voltage to ground on a 3-phase, 4-wire delta system. Other busbar arrangements shall be permitted for additions to existing installations and shall be marked. See also section 110.15 for markings of a 3-phase, 4-wire delta system. Exception: Equipment within the same single section or multi-section switchboard, switchgear, or panelboard as the meter on 3-phase, 4 wire delta-connected systems shall be permitted to have the same phase configuration as the metering equipment

4.11 Temporary Service

Temporary service may be made available prior to the installation of the permanent meter. Temporary service shall be restricted to as short a time as possible, such as the time necessary for the construction of a building. Temporary service will be provided by the Cooperative in accordance with its established Rate Schedules, Policies, and Schedule of Charges.

4.11.1 Overhead Temporary Service

The overhead service drop support shall be supplied by the member. The overhead drop shall overhang only the property owned and controlled by the member and shall clear all structures and obstacles.

4.11.2 Underground Temporary Service

The underground service lateral and meter support shall be supplied and installed by the member. The meter pedestal shall be installed near the secondary pedestal or pad-mounted transformer and clear of the future permanent service route. The grounding electrode conductor shall be furnished and installed by the member and shall comply with the 2023 National Electrical Code® Article 250, or as may be amended. The ground rod(s) shall be furnished and installed by the member and shall be installed outside of all utility easements.

4.11.3 Requirements for Temporary Service

Temporary service shall normally be served from the distribution transformer or secondary pedestal.

Entry into and connections within all pad-mounted or underground facilities will be made by the Cooperative. The meter socket shall be furnished and installed by the member. Temporary service installations shall be approved by the Cooperative.

Temporary meter service panels shall not be attached to vehicles or trailers.

4.12 Primary Meter Installations

Primary metering installations require coordination between the member and the Cooperative regarding technical details and location. Service at distribution primary voltage requires special engineering considerations; therefore, it is necessary to determine availability of this type of service. The Cooperative shall be consulted well in advance of the time the service will be required so that all design and construction work of both parties may be properly coordinated.

Primary voltage installations use both current and voltage instrument transformers regardless of the load current.

4.12.1 Overhead

The primary meter installation will be installed on a Cooperative-owned pole.

4.12.2 Underground

Primary metering enclosures shall be installed outside of the building within an easement provided by the member and located on the member property. Any primary transfer switching shall be owned and operated by the Cooperative. Primary metering and transfer switching is subject to Aid-to-Construction charges according to the Cooperative's Schedule of Charges and billed according to the rate in effect.

Wright-Hennepin does not allow member-owned primary metering.

4.13 Meter Sockets

4.13.1 Self-Contained Meter Sockets

Purchasing, installing, connecting, and maintaining self-contained meter sockets shall be the responsibility of the member.

All meter sockets shall be Nationally Recognized Testing Laboratory (NRTL) listed and labeled, used in accordance with their labeling, installed per the 2023 National Electrical Code®, or as may be amended, and meet any code requirements that may be enforced by the local Public Authority.

All single and multiple position meter sockets installed on the Cooperative's system shall meet the Cooperative's standards for these devices as listed on the following pages. Cooperative Electric Meter Personnel are instructed not to install a meter at a location where the meter socket does not comply with all criteria listed below. Meter sockets will be considered un-approved unless they adhere to this criteria.

1. Individual meter sockets shall be constructed from steel. Sockets constructed from aluminum or non-metallic materials are not allowed.
2. Individual meter sockets, excluding side-wired type which are bussed on the line side of the meter, used in underground installations shall have the following minimum dimensions:
 - a. 200 amp – 19" height x 13" width.
 - b. 320 amp – 26 ½" height x 13" width.
3. Temporary cover plates for meter sockets shall be constructed from a non-metallic material.
4. Single-phase meter sockets shall be rated for either 200 or 320 amp and three-phase 200 amp meter sockets shall be rated for 200 amp continuous duty and shall be equipped with an approved lever-actuated locking-jaw bypass constructed such that the bypass lever cannot be in the bypass position with the socket cover installed. The bypass handle shall be located on the right side of the meter block when facing the meter block. The only approved bypasses are the Talon (Landis & Gyr) HQ, Square D, Milbank HD (Heavy Duty), and Eaton B-Line.

All meter sockets shall have a locking jaw lever bypass.

5. Add a lug tap connectors and double lugging 200A meter sockets is not allowed.
6. Sockets shall be equipped with an insulating, track-resistant polycarbonate safety shield.
7. Single-phase and three-phase, three-wire sockets shall have a fifth terminal connected to the neutral within the socket with minimum #14 AWG wire. The fifth terminal shall be installed in the 9 o'clock, rather than the 6 o'clock, position if the meter block design allows. The Cooperative will not furnish or install the fifth terminal.
8. Three-phase, four-wire sockets shall have the seventh terminal connected to the neutral within the socket with minimum #14 AWG wire.

9. Sockets shall have ringless style covers. No screws, studs or wing nuts are allowed to secure meter covers.
10. Sealing means shall provide for a plastic padlock seal with a 0.047" diameter shackle and a key type padlock with a 9/32" shackle.
11. 320A meter sockets shall have an anti-inversion clip installed in the top right terminal.

Additional Requirements for Self-Contained Multiple Metering Panels:

1. Multiple metering panels shall be constructed from steel or aluminum. Panels constructed from non-metallic materials are not allowed.
2. Each meter socket shall have an individual ringless style cover with sealing provisions. No screws, studs or wing nuts are allowed to secure meter covers.
3. The panel shall have permanent barriers to isolate the member's disconnect switch and wiring from the metering areas.
4. Each line-side compartment shall have provisions for a Cooperative seal, whether or not the compartment is designed to house a meter.
5. No multiple metering panels shall have a door that completely encloses the utility metering.

Additional Requirements for Combination Metering Devices:

1. Combination metering devices, such as meter/main and meter/panel, shall be constructed from steel or aluminum. Devices constructed from non-metallic materials are not allowed.
2. Combination metering devices, excluding side-wired type which are bussed on the line side of the meter, used in underground installations shall have the following minimum dimensions in the metering section:
 - a. A. 200 amp - 9 ½" height x 13" width (height measured from top of enclosure to center of meter block).
 - b. 320 amp - 13 ¼" height x 13" width (height measured from top of enclosure to center of meter block).
3. Combination metering devices shall have permanent barriers to isolate the member's disconnect switch and wiring area from the metering area.
4. Combination metering devices shall have separate covers on the member's disconnect switch and wiring area and on the metering area.

Additional Requirements for Metering Pedestals:

1. Metering pedestals shall be constructed from steel or aluminum. Pedestals constructed from non-metallic materials are not allowed.
2. Pedestals shall be furnished, installed, and maintained by the member.
3. Pedestals shall meet Cooperative and applicable code requirements.
4. Pedestals shall be adequately supported to maintain the vertical alignment of the meter in a level and plumb position throughout the life of the installation.
5. Metering pedestals with factory installed disconnecting means, shall have permanent barriers to isolate the member's disconnect switch and wiring area from the metering area.
6. Metering pedestals shall have separate covers on the member's disconnect switch, wiring area and on the metering area.
7. Member owned equipment other than service conductors, shall not be installed in the space dedicated to the utility metering compartment.
8. Sockets shall have ringless style covers. No screws, studs or wing nuts are allowed to secure the meter socket covers.
9. Pedestals shall meet additional requirements shown in the Guideline Drawings UM8-3 & UM8-3A.

4.13.2 Instrument Transformer Meter Sockets

The Cooperative will furnish instrument transformer meter sockets. The Cooperative shall be contacted first to determine the rate, load and service voltage. The member should contact the Cooperative to obtain metering equipment and to coordinate meter installation.

4.14 Meter Location and Installation

4.14.1 Meter Location

The member shall provide and maintain, without cost to the Cooperative, an easily accessible metering location. The Cooperative will locate an acceptable point of delivery and meter location. No wiring dependent upon a meter location shall be started until a definite meter location has been established. The Cooperative will not be responsible for the relocation of the service attachment, service entrance, or metering equipment resulting from an improper location chosen by the member, which does not meet the requirements of the Cooperative.

Residential self-contained and transformer-rated meters (including CT enclosures) shall be installed outdoors. Residential meters originally installed outdoors that, due to alterations or additions to the residence, become enclosed within the building structure (e.g. enclosed patio or garage), where access through a doorway is required, shall be relocated to an outdoor location designated by the Cooperative.

The relocated service entrance installation shall conform to current Cooperative standards.

Commercial or Industrial self-contained and transformer-rated meter installations (including CT enclosures) shall be installed outdoors.

Multiple Residential/Commercial metering should be installed outdoors.

Multiple indoor metering will not be allowed unless it is not possible to install the meters outdoors, **and will require prior written approval from the Cooperative.**

If approved, indoor meter installations shall meet the following requirements:

1. The member shall provide Cooperative personnel access to the building and meter room(s) at all times for reading, testing and other maintenance and/or safety purposes.
2. Meters shall be grouped together in a common room or other suitable space with direct access from outside the building (or common area).
3. The member must provide a suitable keyless entry for Cooperative access. Member shall provide the Cooperative with the keyless-entry code (or key code) prior to energizing the service.
4. Member may be required to provide communications backhaul for meter reading purposes if the building is not readily accessible at all times.
5. The space in front of all metering equipment must be a minimum of 3 feet or as code requires.

Mobile homes, construction trailers, and those buildings not intended as dwelling units, such as, but not limited to, contractor's onsite offices, sales offices, mobile studios, mobile stores, or construction job dormitories intended for sleeping purposes only, shall have the meter socket located adjacent to and in line of sight of the structure it supplies. The meter socket shall not be mounted on or attached to the structure. Refer to 2023 National Electrical Code® Article 550.32(A), or as may be amended.

Manufactured homes may have the meter socket attached to the structure provided the structure meets the definition of a Manufactured Home as defined in 2023 National Electrical Code® Article 100, or as may be amended, and meets the requirements of 2023 National Electrical Code® Article 550.32(B), or as may be amended. The manufactured home shall be installed on and secured to a permanent foundation and shall provide the necessary structural support for the meter socket attachment.

Meters originally installed in accessible locations satisfactory to the Cooperative, which become inaccessible by virtue of alterations or new construction, shall be reinstalled at a point designated by the Cooperative at the expense of the property owner.

Meters shall be installed:

1. In a location that will be easily accessible to Cooperative personnel at all reasonable hours for reading and maintenance.
2. In a location where they will be safe from damage.

Meters shall **not** be installed:

1. On fences, mobile homes or construction trailers.
2. Where the meter will, in the Cooperative's opinion, interfere with traffic on sidewalks, driveways, hallways or passageways.
3. Where the meter will, in the Cooperative's opinion, obstruct the opening of doors or windows.
4. In a location that may, in the Cooperative's opinion, be considered hazardous.
5. Where meter reading or servicing may, in the Cooperative's opinion, become impracticable.

4.14.2 Meter Installation

Installation of the meter socket is the responsibility of the member. Meter sockets and associated equipment shall be mounted securely and plumb. Expansion bolts, plugs, or anchors shall be used where attachment is made to masonry, concrete, or plaster walls.

The meter socket, service mast, service riser, or any conduit containing conductors on the line side of meters shall not be covered or concealed except when necessary to pass through roof eaves or through floor structures within a building.

The member shall provide suitable protective equipment approved by the Cooperative if a meter location puts the meter at risk of damage from any means, including falling ice or snow from roof overhangs.

All line-side unmetered conductors shall be in a continuous length of conduit from the point of delivery to the meter socket, cold sequence disconnect, or CT cabinet. No conductors other than line-side conductors shall be permitted in line-side conduits, troughs, or lug landings. Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed without specific approval from the Cooperative.

4.14.3 Meter Socket Identification

The unit number shall be plainly marked on all commercial services and all multiple residential services by a permanent durable means on both the inside and the outside of the meter socket, corresponding main service breaker, tenant panel board, and doorway/entrance to the tenant space. The method of identifying the corresponding unit on the meter socket is listed below:

4.14.4 Meter Socket Identification Requirements

The meter socket shall be marked with UV and weather resistant stamped plastic, brass, aluminum, or stainless-steel plaque securely attached to the meter socket. The plaque shall be attached to the exterior, non-removable portion of the meter socket and at the individual meter main disconnect. Any other means of identification is not acceptable. The owner is required to ensure the covers stay matched with their corresponding inside label. If a landlord or property owner changes the addresses or identification numbers of any metered units or splits/adds additional units after this labeling process is complete, it is their responsibility to re-label the equipment and to contact the Cooperative to prevent billing & service

discrepancies. All billing discrepancies as a result of not notifying the Cooperative will be billed to the responsible parties or landlord.

Note: Meters will not be installed until all units are permanently marked.

4.15 Meter Mounting Heights

The mounting heights of meters, measured from the center of the meter to final grade or platform outdoors, or to the floor when installed indoors, are as follows:

1. Single meter sockets:
 - a. Self-contained or transformer-rated ----- 4' minimum to 6' maximum
 - b. Meter pedestals ----- 4' minimum to 6' maximum
2. Multiple meter sockets, vertically aligned:
 - a. Indoor ----- 3' minimum to 6'-6" maximum
 - b. Outdoor ----- 3' minimum to 6'-6" maximum

The height of multiple meter sockets, either horizontally or vertically aligned, shall be evenly distributed from the center point of the meter stack between the upper and lower height limitations.

If a platform is used to achieve the required mounting heights for a meter installation, it shall be permanent and accessible by a stairway. The minimum horizontal dimensions of the platform shall meet the National Electrical Code® requirements for working space.

4.16 Meter Clearances

The minimum depth of working space in front of metering equipment shall be 3', 3'-6", or 4' in accordance with 2023 National Electrical Code® Article 110.26(A)(1) and Table 110.26(A)(1), or as may be amended. The minimum width of the working space in front of metering equipment shall be the width of the metering equipment or 2'-6", whichever is greater, in accordance with 2023 National Electrical Code® Article 110.26(A)(2), or as may be amended. No member-owned equipment may be installed directly in front of metering equipment which includes cold sequence disconnects, CT cabinets, secondary connection cabinets, switchgear CT compartments, and meter sockets.

4.16.1 Clearances from Gas Meter Sets

There shall be a 3' radial minimum clearance between the discharge/release point of the relief device line or regulator vent or connected terminal outlet piping of all gas meter sets and sources of ignition. Any discharge/release point of the relief device line or regulator vent or connected terminal outlet piping must be located outside where the gas can escape freely into the atmosphere and away from any opening into the building.

No electrical equipment shall be installed directly above a gas meter or in an area 3 feet on either side of a gas meter set.

In all cases, sufficient working space (3' preferred) in front of and on either side of the gas meter and associated piping shall allow access for inspection, reading, replacement, or necessary maintenance.

Refer to Illustrations Section, drawings UM1-G5 for clearance requirements from a gas meter.

4.17 Cold Sequence Metering (for multiphase self-contained metering)

Cold Sequence Requirements:

A cold sequence disconnect shall be furnished, owned, installed, and maintained by the member upon Cooperative Approval.

The cold sequence disconnect shall be installed on the same wall, on the line side of, and within 24" of the meter.

The cold sequence disconnect shall contain provisions for a Cooperative wire seal for the cover and a Cooperative padlock in the operating handle lock-off position. Wire seals will be used by the Cooperative to secure the enclosure from unauthorized entry and will allow the member emergency access to reset breakers or to replace fuses. A Cooperative padlock will only be used to lock disconnects in the off position for services that are shut off.

The cold sequence disconnect shall not be operated by the member except for emergency conditions. For seasonal loads or service discontinuance, the cold sequence disconnect shall not be operated in an off position in lieu of a service disconnection by the Cooperative. Members requiring a service to be discontinued shall contact Member Services.

Note: All Cooperative-owned meters shall stay energized up to the line side terminals of the meter socket, in order to obtain information concerning connected load, to measure or test service, to read meters, or for other purposes incidental to the supplying of electric service.

The amp rating of the cold sequence disconnect shall not exceed the amp rating of the meter socket and shall be installed in accordance with 2023 National Electric Code® Article 230, or as may be amended.

4.18 Hot Sequence Metering

4.18.1 Residential

Residential self-contained meter installations, both single-phase and three-phase, shall be hot sequence metering as the standard.

4.18.2 Commercial and Industrial

Refer to COLD SEQUENCE METERING in this section for requirements for commercial and industrial self-contained metering. Hot Sequence is the required installation method for commercial and industrial instrument transformer type (CT) metering.

Note: Cold sequence disconnects are not allowed ahead of the CT cabinet without written Cooperative Approval.

5. Transformers

Necessary transformers will be installed and maintained by the Cooperative in accordance with its established Rate Schedules, Electric Service Connection Policy, and Line Extension Policy.

The Cooperative will not furnish transformers unless they are of standard size and voltage as established by the Cooperative. The member shall notify the Cooperative in advance of any change in the member's load requirements that may affect the installed transformer capacity.

5.1 Grounding

All service systems that operate below 1000 volts contain a grounded neutral or a grounded phase conductor used as a circuit conductor in the system. The grounded neutral or grounded phase conductor is grounded at the supply transformer and will be run from the transformer bank to the meter socket and to each service disconnection means in accordance with the 2023 National Electrical Code® Article 250.24(B), or as may be amended.

5.2 Special Rules

When a member furnishes transformers or other equipment, in accordance with the applicable Cooperative Rate Schedule, Policies, and Schedule of Charges, the Cooperative accepts no responsibility for maintaining or replacing the member's transformers or other equipment if damaged or destroyed.

Cooperative Rate Schedules for primary metering installations require that the member provide and own all equipment beyond the point of delivery.

The member shall provide a minimum of ten (10) feet level clearance on the door side(s) of pad-mounted transformers for hot-stick operation and ten (10) feet level clearance on the door side(s) of pad-mounted primary metering cabinets for instrument transformer maintenance, the cooperative may require additional clearance based on the installation and circumstances. Transformers shall not be located under any overhang (roof, balcony, stairs, etc.).

5.3 Fault Current

It is the intent of the Cooperative to address the member's need for information concerning fault current and transformer protective device requirements pertaining to new construction, rewire, or additional load. Refer to the 2023 National Electrical Code® Article 110.9 Interrupting Rating and Article 110.16 Arc Flash Hazard Warning, or as may be amended.

Tables at the end of this Section show the available RMS symmetrical fault currents that may be expected at the secondary terminals of distribution transformers. Each fault current value listed in the tables is based on the percent impedance of a typical transformer that might be set initially or as a replacement. No primary source or secondary line impedance has been included since it is generally relatively small, may change, and cannot be accurately forecasted.

Note: Because an overloaded transformer is typically replaced by the next larger size transformer, and an under-loaded transformer may be replaced by the next smaller size transformer, the member is encouraged to use this range of transformers to perform their studies and select equipment such as current limiting fuses, breakers and switchgear bus bar bracing.

Table VI through VII in this Section can be used to determine if the available fault current at a single-phase electric meter socket is less than 10,000 amperes based on specific transformer size and service conductor size and length, which may allow a single-phase commercial installation to be hot sequenced. Refer to Section 4, COLD SEQUENCE METERING for the exact requirements.

Due to the variability of the transformer and electric distribution system characteristics these tables are to be used as a general guideline and shall not be used as a design tool to replace engineering that may be required by the Authorities having jurisdiction. Members or contractors requiring specific fault current calculations should consult a registered professional engineer of their choice.

Two types of faults are possible on a single-phase transformer having a 120/240V secondary: 1) across terminals having 120V between them, and 2) across terminals having 240V between them. While the 120V fault is higher at the transformer terminals, it attenuates more rapidly as the effect of cable impedance is added. Because of this affect, the 240V fault is often higher at the meter or CT enclosure. The following tables have been developed to aid in determining the available fault current levels at the electric meter. In addition, the tables can be used to determine the number of feet of a given size conductor between the transformer and the terminals of the meter needed to limit the available fault current to 10,000 amps.

Note 1: All residential installations served from a single-phase pad-mount transformer shall use the calculations based on the installation of a 50kVA minimum transformer.

Note 2: All temporary construction meter installations may use the actual transformer size.

5.4 Arc Flash

It is the intent of the Cooperative to address a member's need for information concerning arc flash data requirements as follows.

For Secondary Voltage Services the Cooperative will provide, upon request from the member:

1. Transformer size, primary voltage, secondary voltage, and typical percent impedance
2. Transformer primary fuse information size and type.
3. Maximum available secondary symmetrical three-phase fault current, from the tables at the end of this Section.

For Primary Voltage Services the Cooperative will provide, upon request from the member:

1. Calculated symmetrical bolted three-phase fault current, bolted single-line ground fault current and X/R ratio at the service point.
2. The upstream protective device information nearest the service point. This information will include the device model, rating and applicable settings.

Fault current calculations are based upon the distribution system configuration at the time of the calculations. The Cooperative does not provide minimum fault current information or associated protective device clearing times.

It is understood that this data may be used for arc flash calculations. Parties using this data must understand that it may change due to various circumstances.

The following tables in this Section are only intended to provide the basic information necessary for secondary service members to make their own internal system fault current and arc flash calculations. Primary service members will still need to consult with a Cooperative Engineer to obtain fault current and protective device information for their service locations.

It is highly recommended when members are performing maintenance work on or near exposed equipment or circuit parts that their electrical system be de-energized whenever possible.

Table VI

Single-Phase Overhead Transformers					
Single-Phase Fault Current In RMS AMPS Symmetrical Expected at the Secondary Terminals of the Transformer					
TR kVA	TR %R	TR %X	TR %Z	Available Fault Current 240 V Secondary	*Fuse Size 15 kV
10	1	1	1.4	3,000	2
15	1	1	1.4	4,500	3
25	1	1	1.4	7,450	6
50	1	1	1.4	14,900	10
75	1	1	1.4	22,350	15
100	1	1	1.4	29,800	20
167	1	1	1.4	49,700	30

*Chance T fuses

Table VII

Single-Phase Pad Mounted Transformers					
Single-Phase Fault Current In RMS AMPS Symmetrical Expected at the Secondary Terminals of the Transformer					
TR kVA	TR %R	TR %X	TR %Z	Available Fault Current 240 V Secondary	*Transformer Protective Device (Bay-O- Net Fuses) 15 kV
15	1	1	1.4	4,500	3
25	1	1	1.4	7,500	8
50	1	1	1.4	14,900	15
75	1	1	1.4	22,350	15
100	1	1	1.4	29,800	25
150	1	1	1.4	44,700	50
167	1	1	1.4	49,700	50

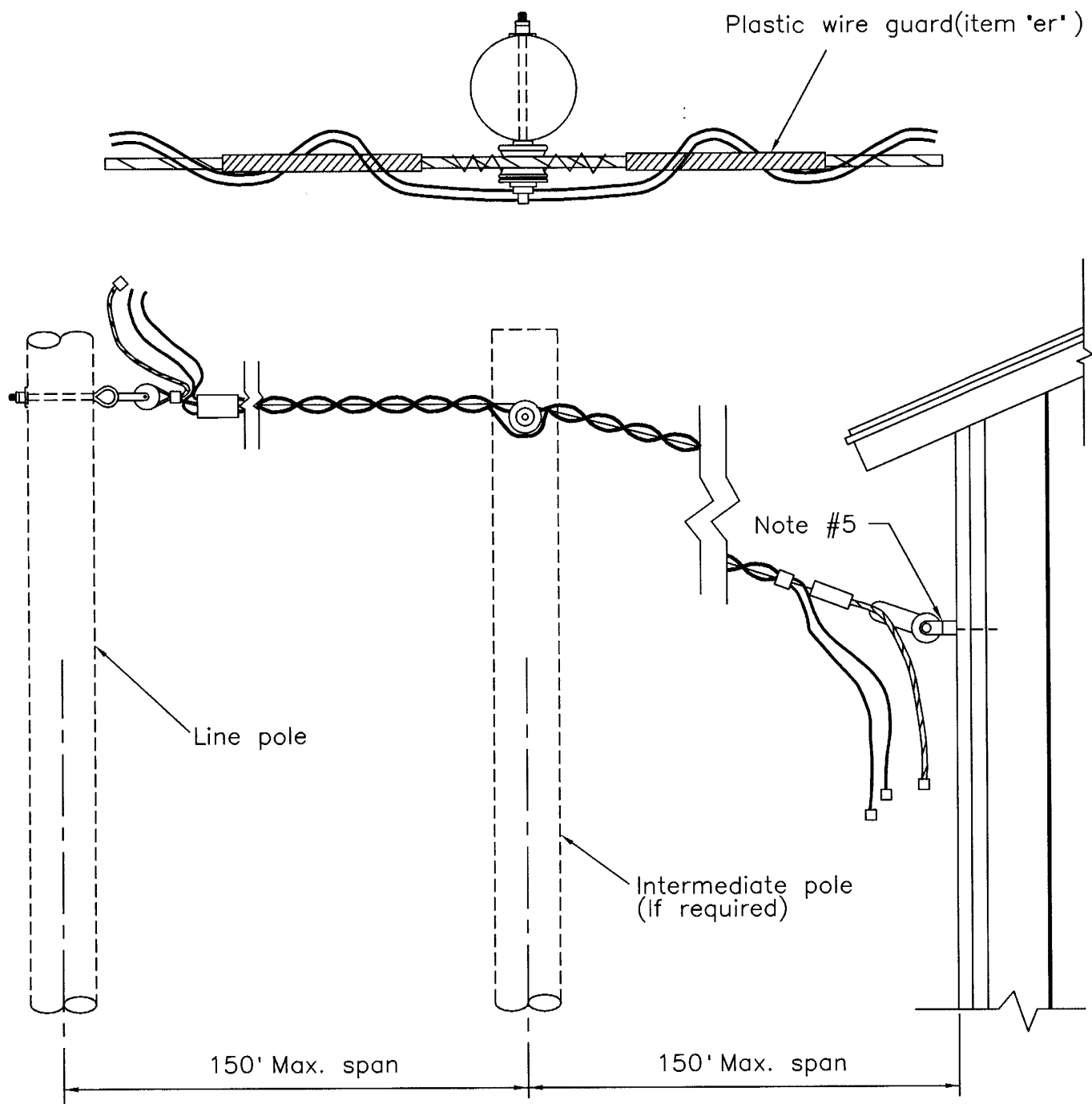
*RTE Bayonet Type C Fuse

Table VIII

Three-Phase Pad Mounted Transformers						
Three-Phase Fault Current In RMS AMPS Symmetrical Expected at the Secondary Terminals of the Transformer						
TR	TR	TR	TR	Available Fault Current	Available Fault Current	*Transformer Protective Device (Bay-O-Net Fuses)
kVA	%R	%X	%Z	120/208V Secondary	277/480V Secondary	15 kV
45	0.83	1	1.3	9,609	4,164	3
75	1	1.11	1.5	13,879	6,015	8
150	1	1.73	2	20,818	9,022	15
300	1	2	2.25	37,010	16,038	25
500	1	2	2.25	61,683	26,730	50
750	1	3.5	3.6	57,828	25,059	65
1000	0.86	4.7	4.75	58,437	25,323	100
1500	0.86	4.7	4.75	87,655	37,984	140
2000	0.86	4.7	4.75	--	50,645	**
2500	0.65	4.7	4.75	--	63,306	**

*RTE Bayonet Type C Fuse

** For sizes 2000kVA and above, fuse size will be provided by Engineering on a case-by-case basis.

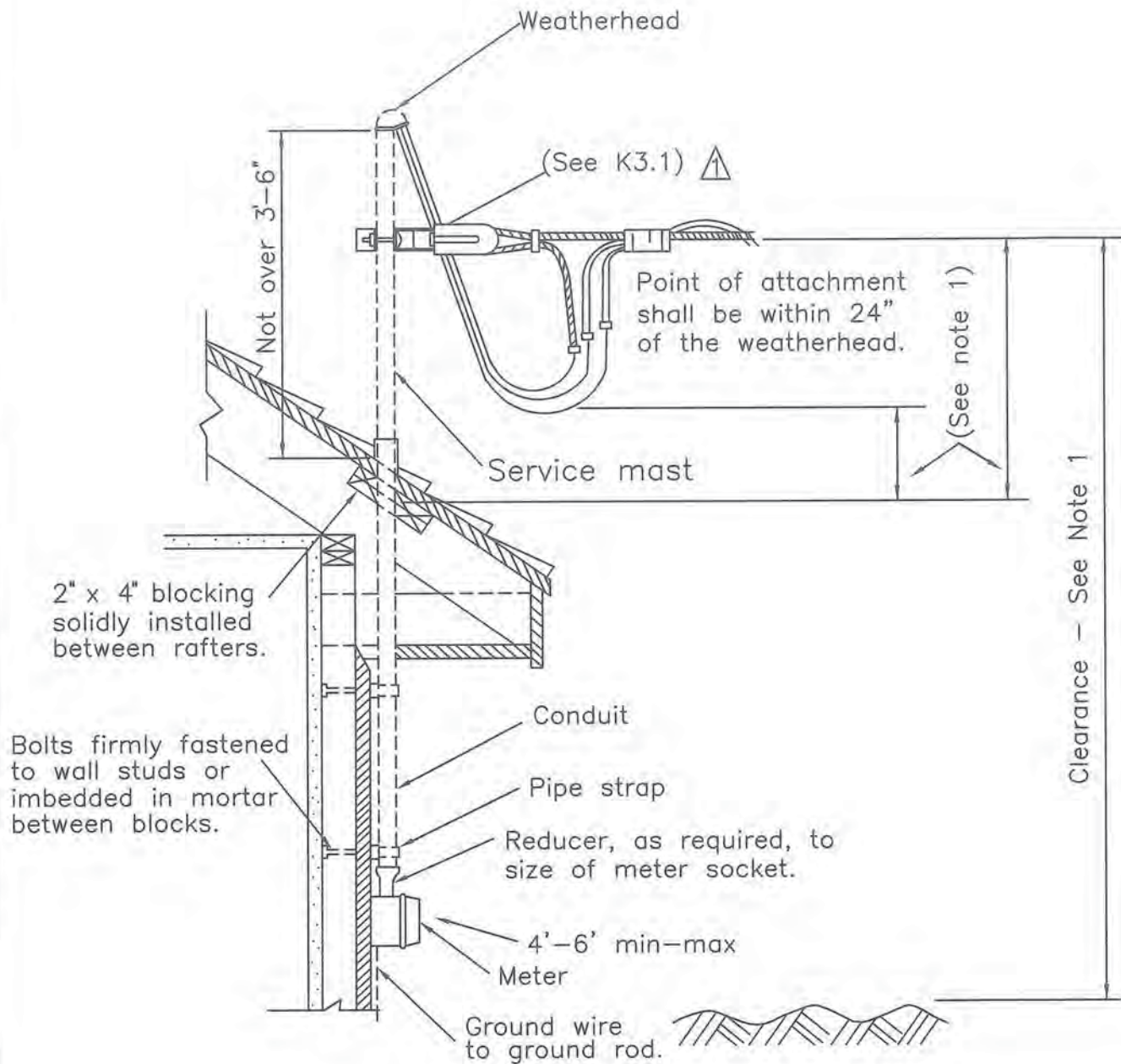


NOTES:

1. Services as short as possible are preferred.
2. See NESC Table 232-1 for minimum ground clearances.
3. Refer to secondary and service assemblies for construction details.
4. Service connectors to be insulated compression type.
5. Confirm house attachment point is properly supported.

CABLE SERVICE ASSEMBLY GUIDE

					W.H. Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative	12.47/7.2 KV June 1, 2013		K4.1G (M24)	
No.	Description	Engr	Appd	Date		Engr Tech:	Engr:	Approved:	Date:
						CDA	LC		4-12-13



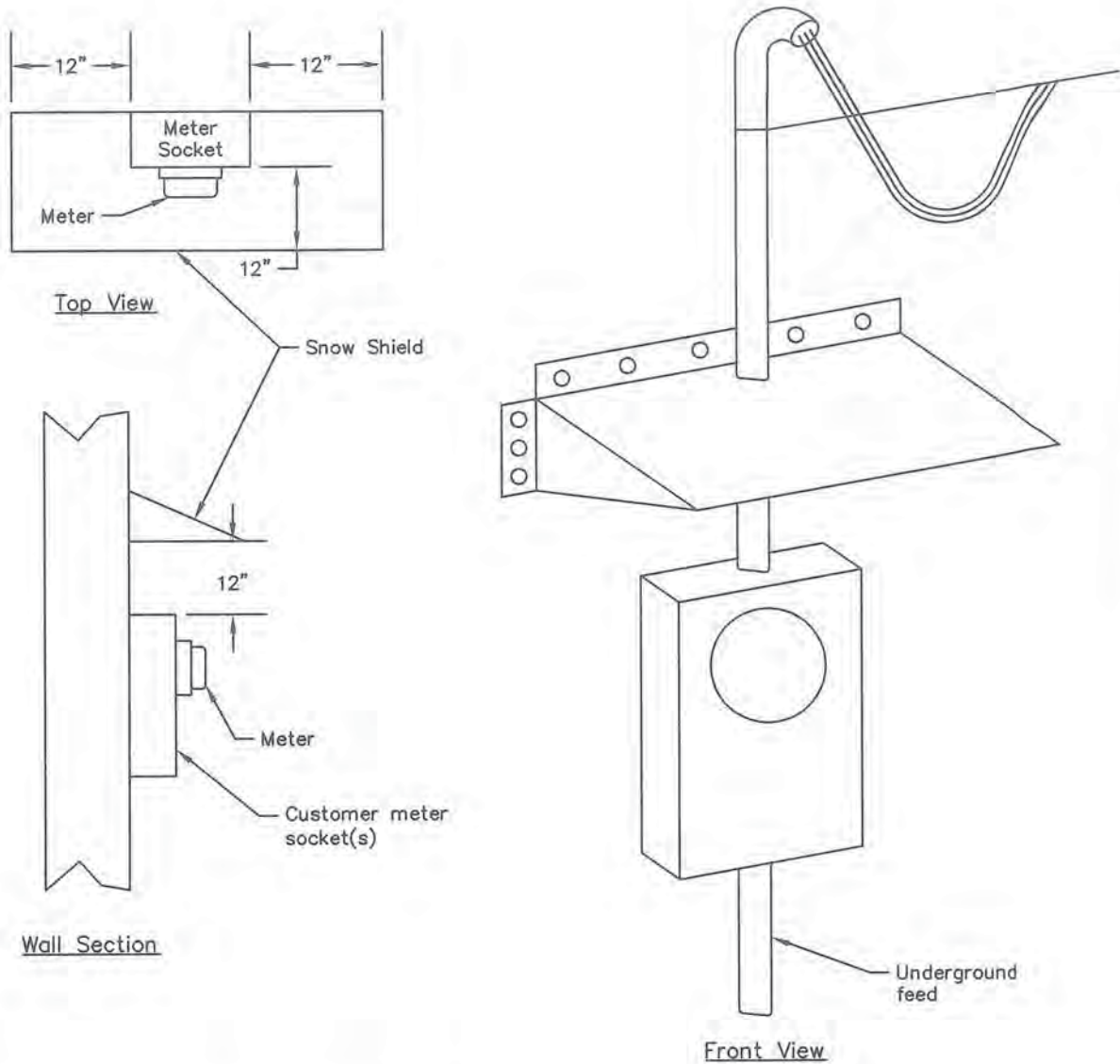
NOTES:

1. All clearances to be in conformance to the most stringent requirements of the NESC, NEC or other codes of governmental or regulating authorities as applicable.
- ⚠ 2. If length of conduit exceeds 10 feet, coupling is permitted but shall not be installed above the roof line.
3. On new mast install, electric service only. CATV or Phone not allowed.

MAST TYPE SERVICE ASSEMBLY GUIDE

				W.H. Wright-Hennepin Cooperative Electric Association A Tractor Energy Cooperative		12.47/7.2 KV June 1, 2013	K4.2G (M24-10)
1	Change to K3.1, Notes	Engr	Appd	Date	Engr Tech	Engr	Approved
No.	Description	Engr	Appd	Date	Engr Tech	Engr	Approved

METER ICE AND SNOW SHIELD

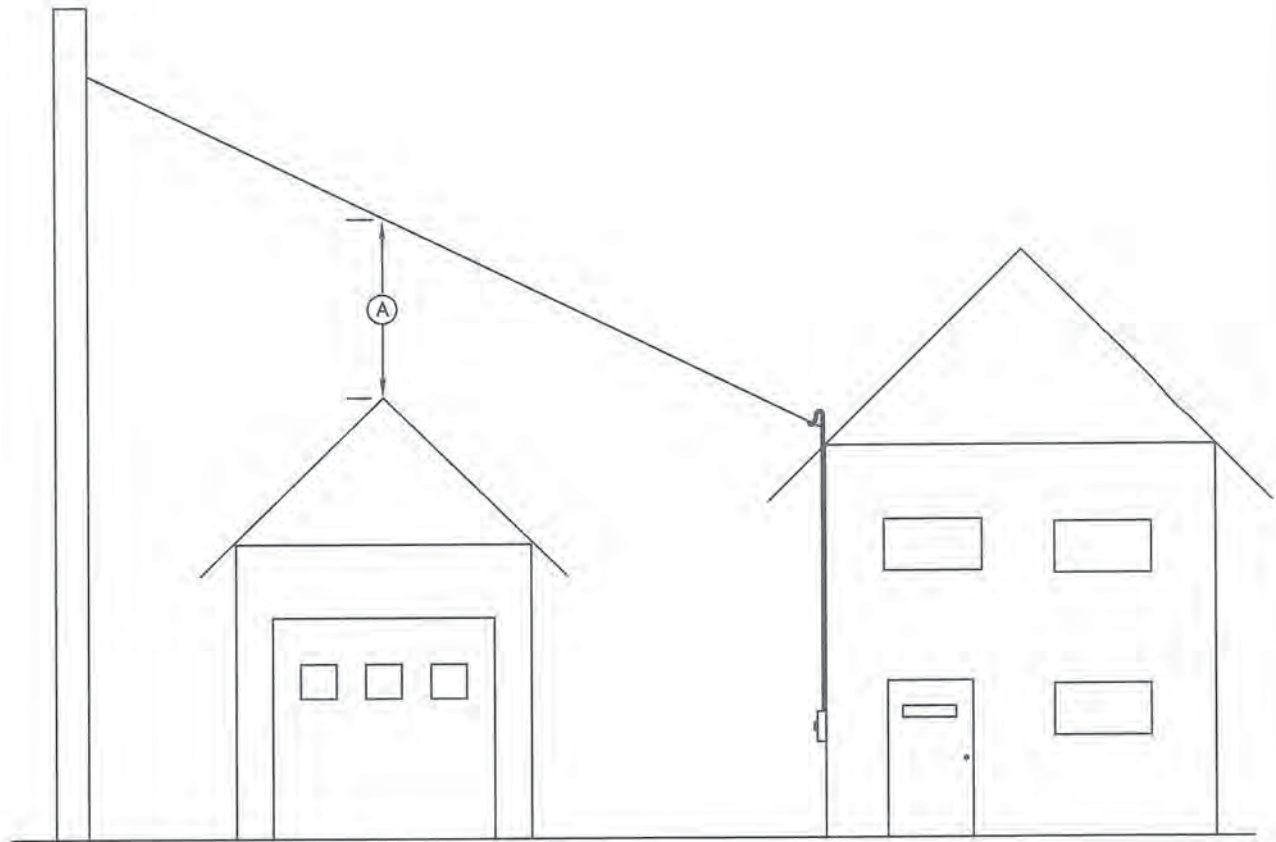


- Shield must be capable of protecting meter.
- Shield shall be primed and painted with rust resistant paint.
- Meter socket must have minimum 12" clearance from shield in all directions.
- Check with Cooperative to determine if ice and snow shield is required.

METER ICE AND SNOW SHIELD

					W.H. Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative 12.47/7.2 KV MAY 2015 K4.4G
No.	Description	Engr	Appd	Date	
					Engr-Tech: ERA Engr: PWC Approved: JM Date: 5/22/15

SERVICE DROP CLEARANCE REQUIREMENTS OVER OTHER STRUCTURES AT MAXIMUM SAG OF WIRE DESIGN

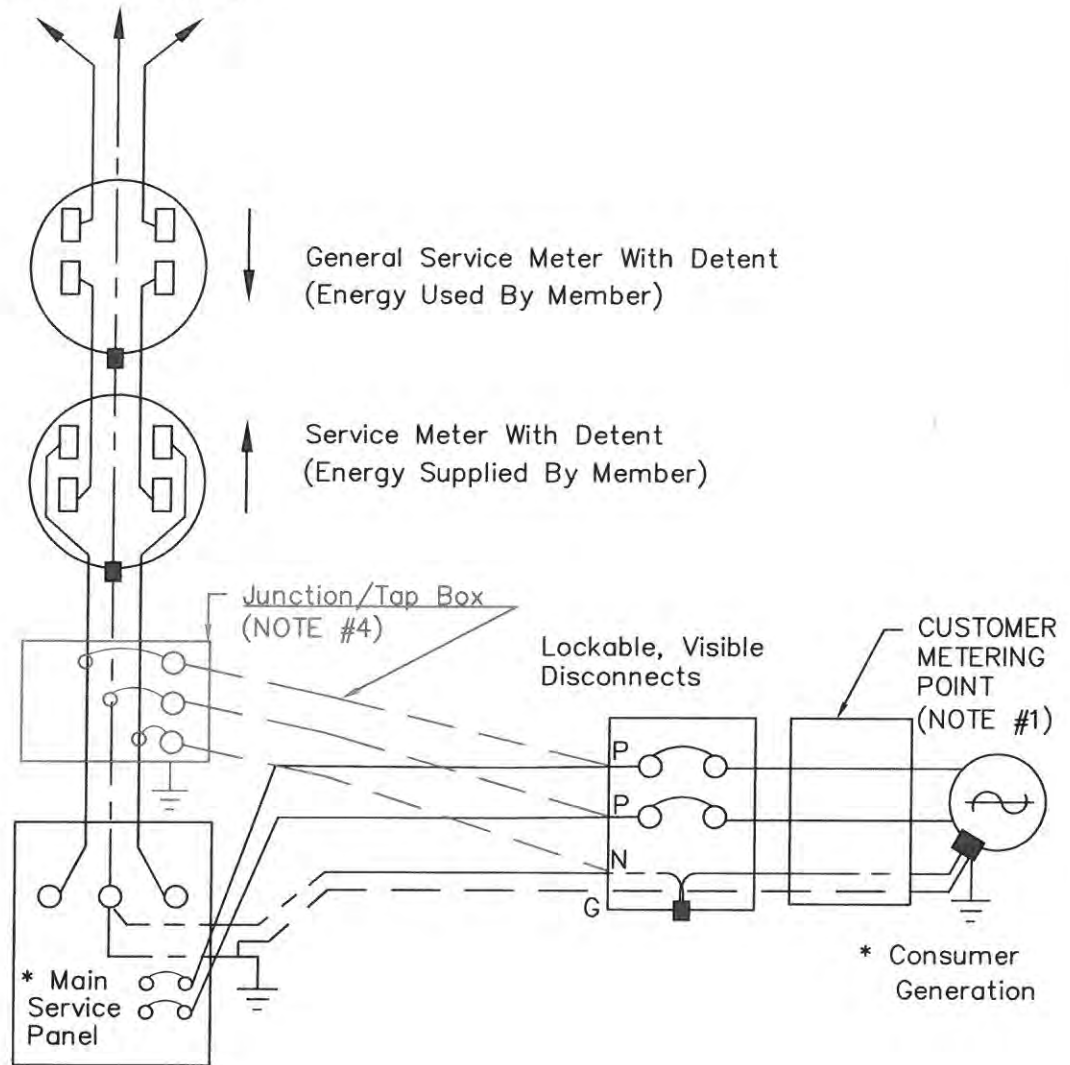


- Ⓐ -11 feet required above roof of other structures readily accessible to pedestrians.
 -3.5 feet required above roof of other structures not readily accessible to pedestrians.

SERVICE DROP CLEARANCE REQUIREMENTS

					W.H. Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative		12.47/7.2 KV MAY 2015	K4.5G
No.	Description	Engr	Appd	Date	Engr Tech:	Engr:	Approved:	
					<i>EWA</i>	<i>Lin AC</i>	<i>[Signature]</i>	<i>5/29/15</i>

To Service Transformer



* Consumer owned equipment, subject to Cooperative's Rules and Regulations, NEC, NESC and Minnesota State Board of Electricity approval.

All meters owned by Cooperative.

NOTES:

1. "Optional" customer metering point. Customer pay W-H to install the meter and socket (can be installed by owner).
2. Inverter must be an Automatic Disconnect Device that meets IEEE 1547.
3. The lockable visible disconnect must be located within 10 feet from the General Service Meter and must be located on the exterior of the building.
4. Junction/Tap Box required on 200 Amp service if DG conductors are not fed from main service panel (double lugging not allowed on 200 Amp Service).

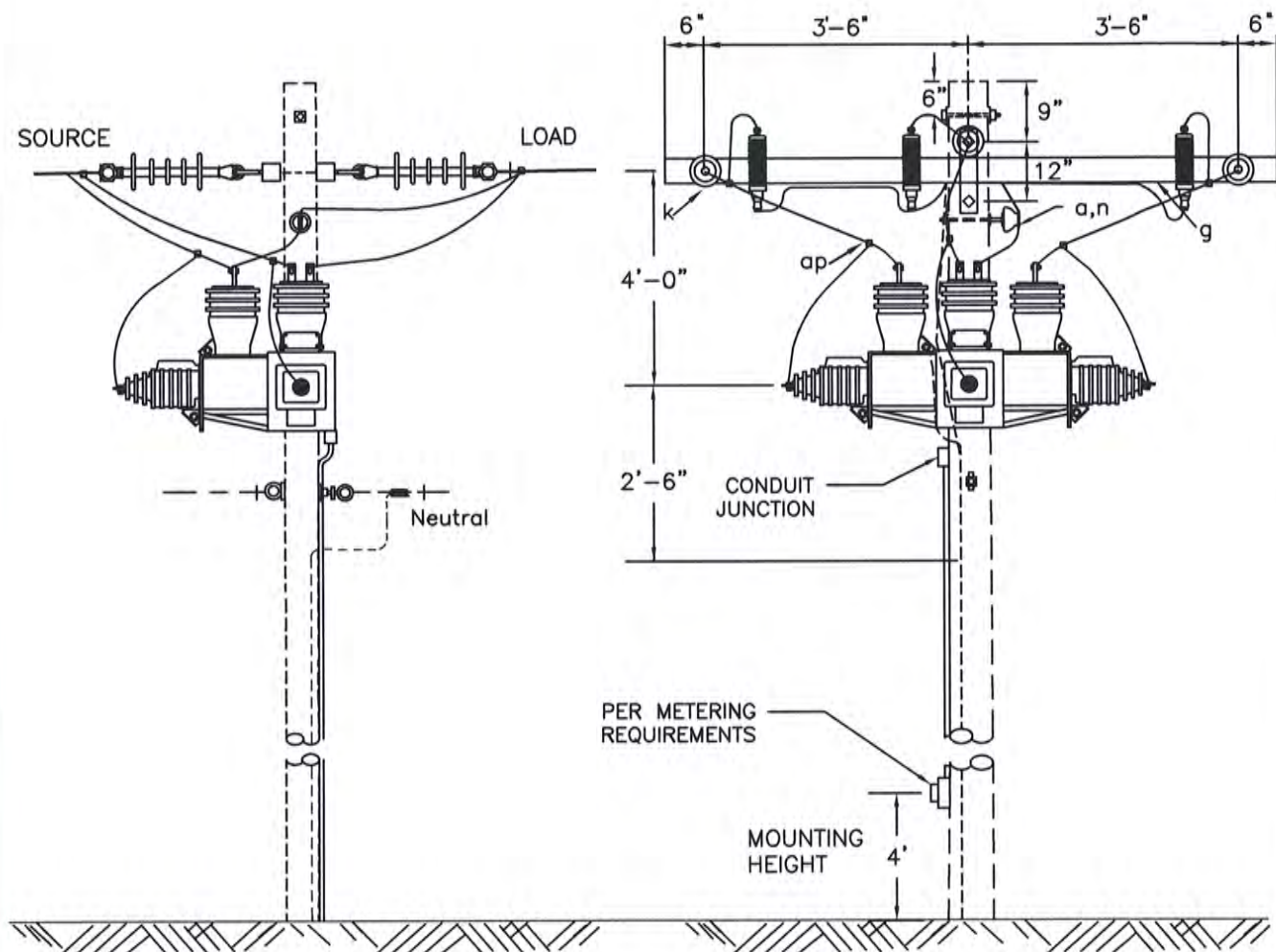
WH NET METERING GUIDE: APPENDIX G

2	Updated notes and added Junction Box	TLG	BDT	6/30/20
1	Updated notes			
No.	Description	Engr	Appd	Date



12.47/7.2 KV	
JUNE 19, 2020	
Engr Tech: TLG	Engr: Approved: Date:

Q2.3G



NOTES:

1. For neutral ground assembly, see drawing H1.1.

STOCK NO	ITEM	MATERIAL	QTY
34223000	a	Insulator, regular, pin	1
6380500	c	Bolt, machine, 5/8" x req'd length	2
71030000	d	Washer, square, 3"	15
18182131	g	Crossarm Fiberglass Tangent, 8'	2
34280040	k	Insulator, epoxy	6
11720000	l	Clamp, conduc, dead end, all	8
6330500	n	Bolt, double arm, 5/8" x req'd length	4
6361500	o	Bolt, eye, oval, 5/8" or 3/4"	2
42901063	aa	Nut, oval eye, 5/8" or 3/4"	6
1521002	ae	Arrester, surge (10kV)	3
17410000	ap	Connector, hot line clamp	3
	ek	Locknuts	14
		Jumper pin	1

PRIMARY METERING INSTALLATION (THREE-PHASE)



12.47/7.2 KV
JUNE 1, 2013

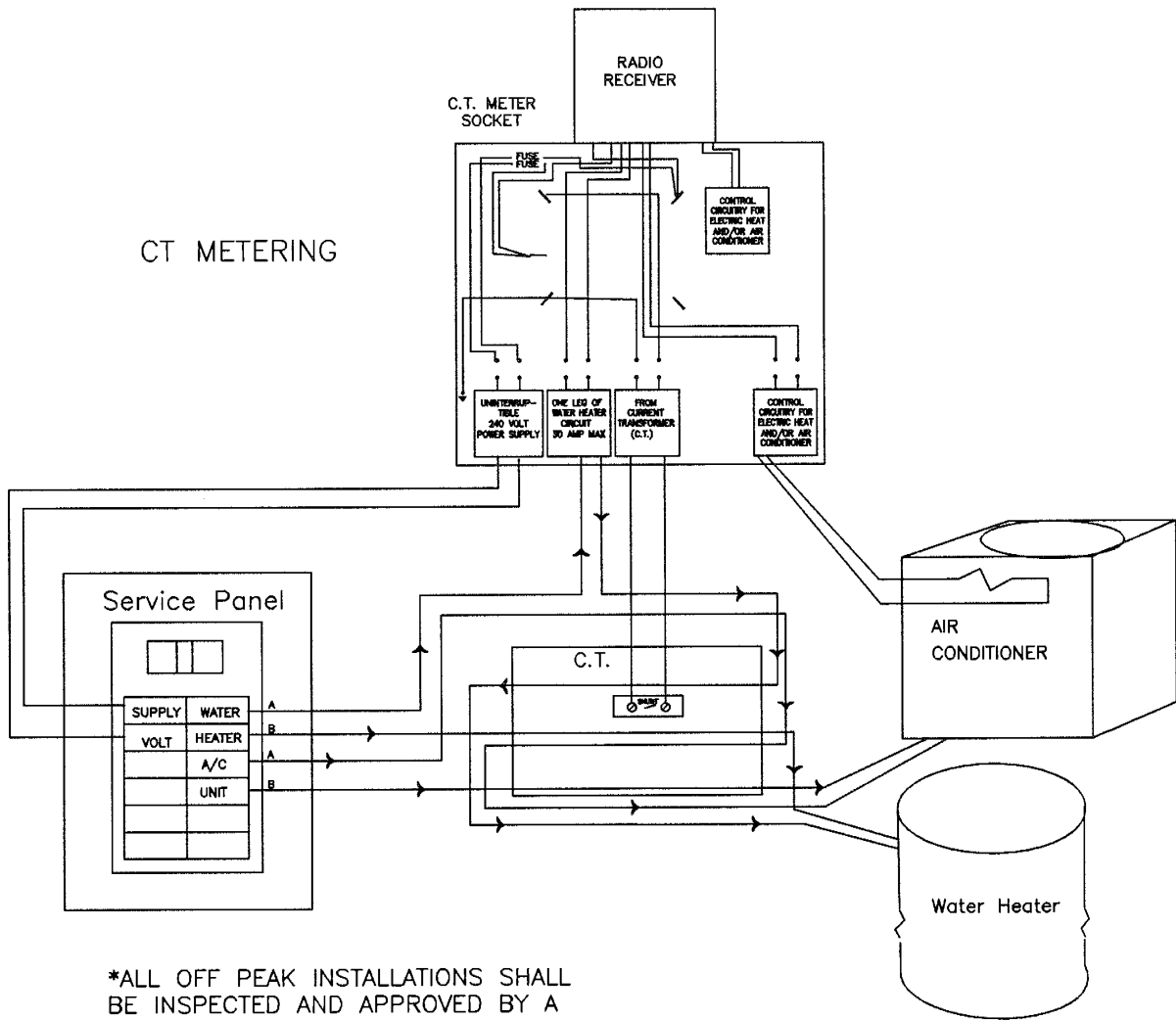
Q4.2

No.	Description	Engr	Appd	Date

Engr Tech: *Evo* Engr: *CWC* Approved: *SH* Date: *10/26/13*

FORM 3S

OFF PEAK ONLY



*ALL OFF PEAK INSTALLATIONS SHALL
BE INSPECTED AND APPROVED BY A
STATE ELECTRICAL INSPECTOR

CT SIZE	METER Rr	BILLING MULTIPLIER
MECHANICAL 200 : 5	8 1/3	1
CT SIZE	METER MULT.	BILLING MULTIPLIER
ELECTRONIC 200 : 5	20	1
ASSEMBLY	SERVICE SIZE	
UM8.6.2-240	400 - 800 AMP	

STOCK NO	ITEM	MATERIAL	QTY
3700138		3S AMR, Class 20	1
69112121		CT 200:5, RF4, Bar Type	2

SINGLE PHASE 120/240 VOLT SERVICE
1 CT - 3 WIRE

MAY 2015

3S-1

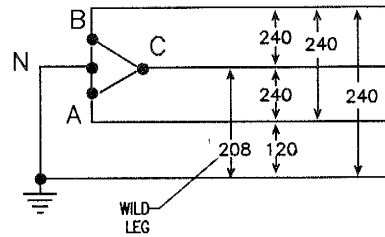
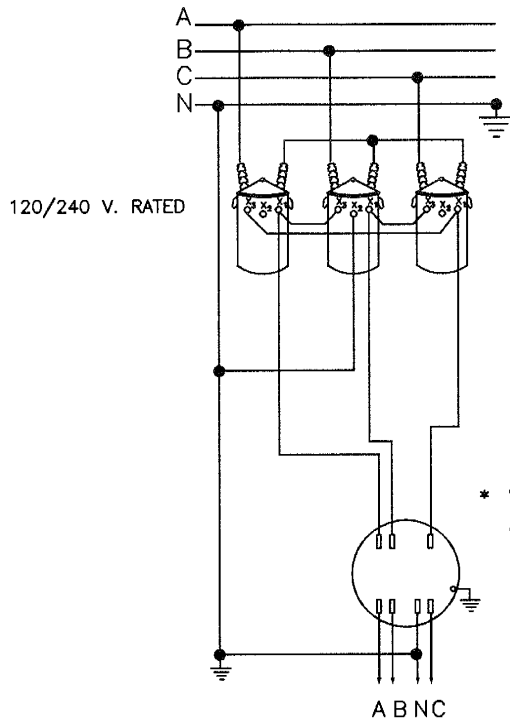
(UM8.6.2-240)



Engr: Tech: Engr: Approved: Date:

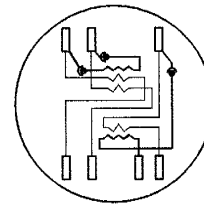
No. Description Engr Appd Date

FORM 16S



* WILD LEG ALWAYS
ON RIGHT SIDE OF
METER SOCKET.

7 TERM. SOCKET



200 A SERVICE ONLY

ASSEMBLY
UM8.7-208Y

SERVICE SIZE
200 AMP OR LESS

STOCK NO	ITEM	MATERIAL	QTY
3700143		16S AMR, Class 200, 3-Ph Meter	1

THREE PHASE 120/240 VOLT SERVICE
4 WIRE DELTA

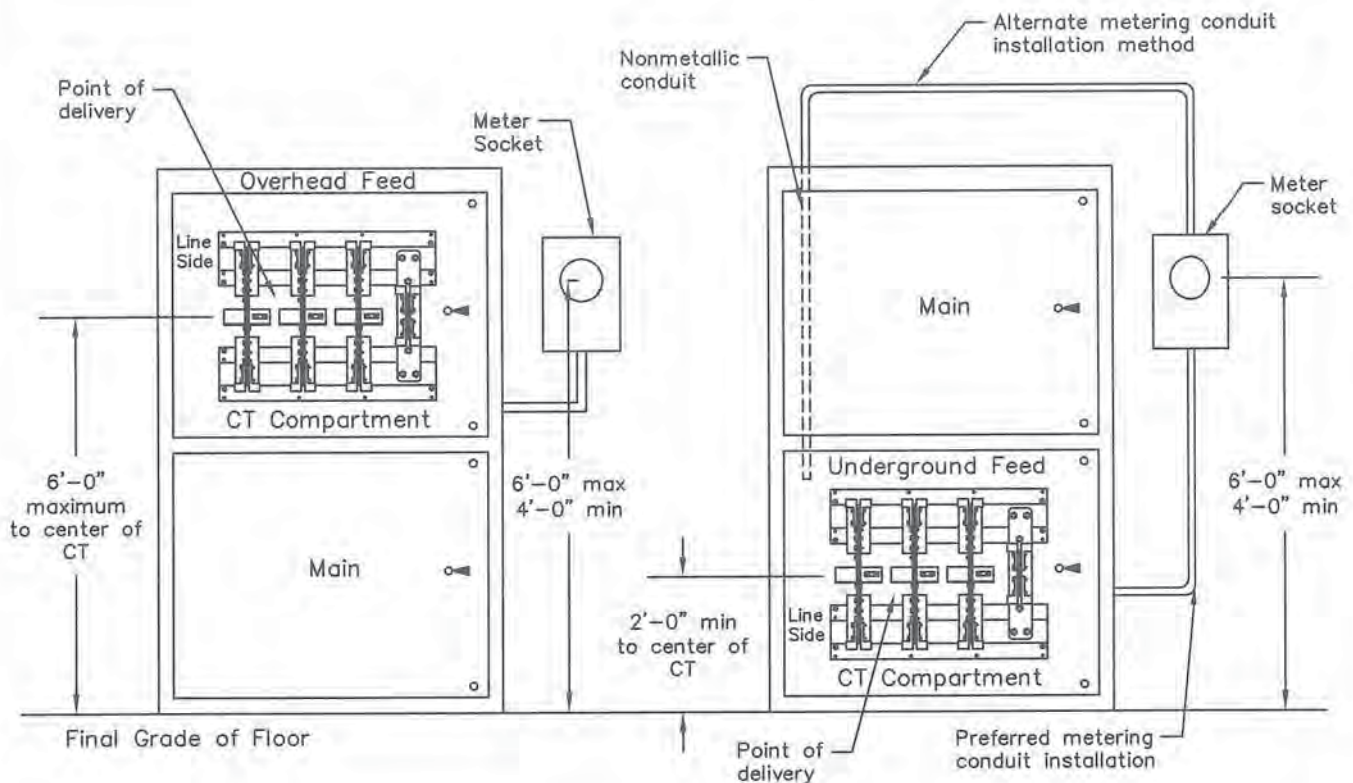
No.	Description	Engr	Appd	Date



MAY 2015		16S-3 (UM8.7-208Y)	
Engr Tech:	Engr:	Approved:	Date:
			5/28/13

Point of delivery on overhead service is at the point where the customers service conductors meet WH's service drop.

Point of delivery on underground service is at the line side terminals of the CT's on residential service and at WH's facilities on commercial service.



SEE FIGURE M2 FOR CURRENT TRANSFORMER MOUNTING REQUIREMENTS

- All cabinets shall be UL approved.
- Center conduits under/over terminations.
- CT compartment shall be locked separately.
- Nonmetallic conduit shall extend into CT compartment.
- Enclosure doors shall have provisions for a WH padlock with a 5/16" diameter shackle and shall be hinged on the right or left side only.

*At 480VAC delivery point shall be worked on in a de-energized state per Arc-Flash Rules.

TYPICAL ARRANGEMENTS FOR SWITCHGEAR INSTALLATION

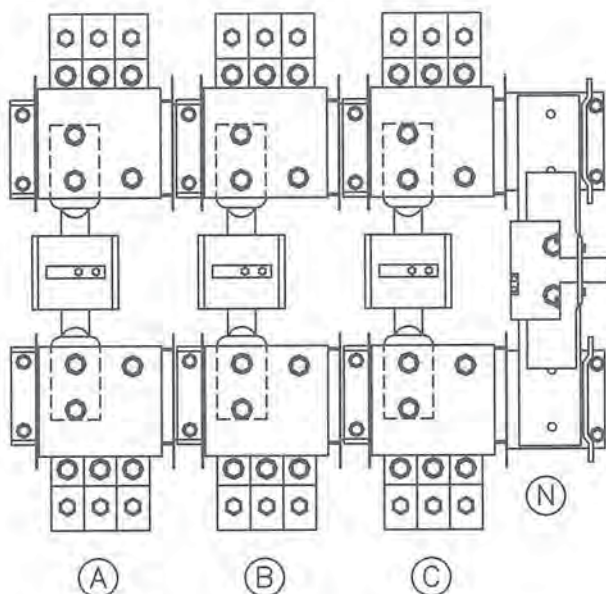
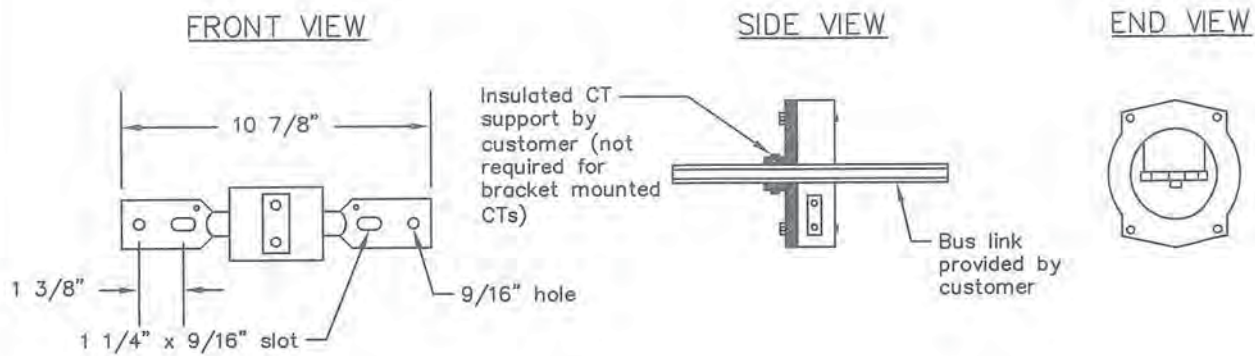
No.	Description	Engr	Appd	Date



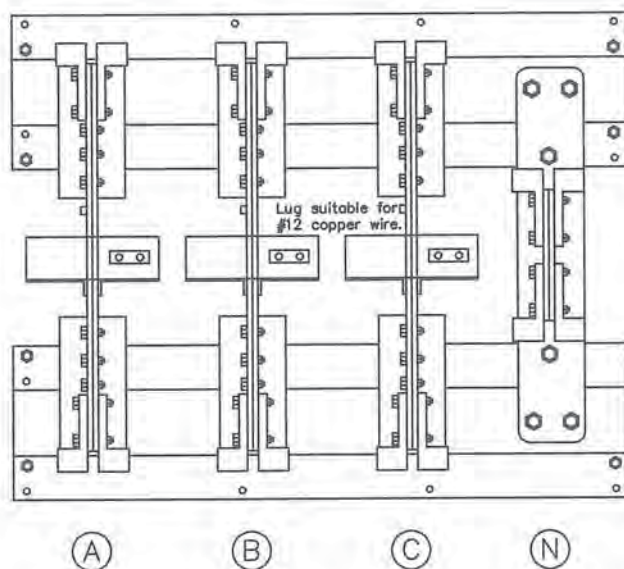
12.47/7.2 KV
MAY 2015

Engr Tech: *[Signature]* Engr: *[Signature]* Approved: *[Signature]* Date: 5/28/15

FIGURE M1



For services 800 amps and below



For services 1000-4000 amps

- White dot on CT is polarity mark and faces line-side.
- Enclosure door shall have provisions for a standard WH padlock with a 5/16" diameter shackle and shall be hinged on the right or left side only.
- Phasing shall be A,B,C front to back, top to bottom or left to right when viewing from front.

CURRENT TRANSFORMER MOUNTING REQUIREMENTS FOR CABINETS AND SWITCHGEAR

No.	Description	Engr	Appd	Date

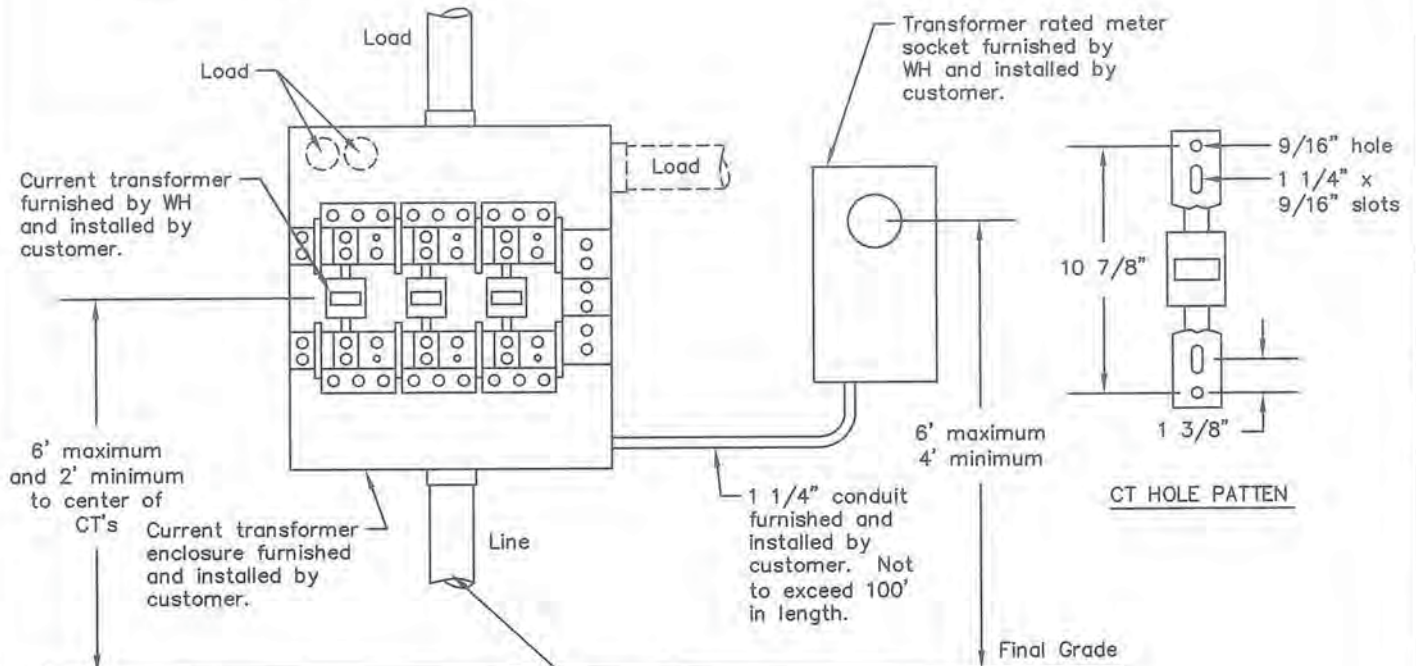


Engr Tech:	Engr:	Approved:	Date:
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	5/28/15

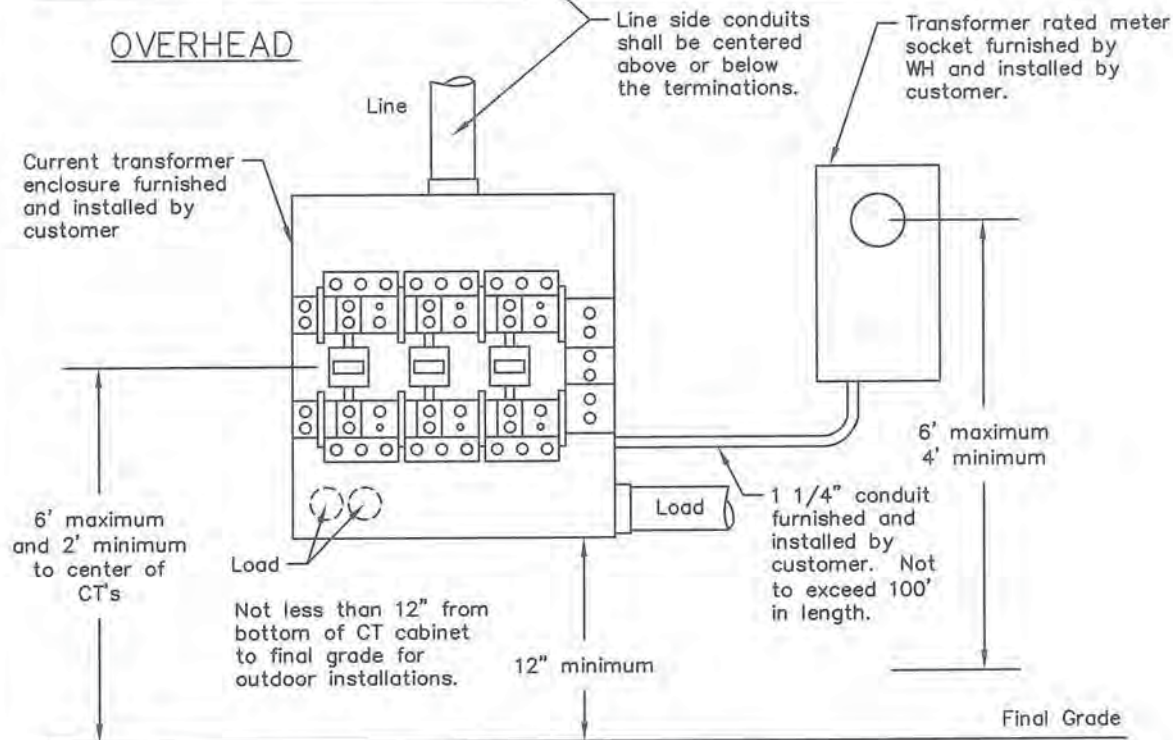
FIGURE M2

Services from 320-800 amps

UNDERGROUND



OVERHEAD



- White dot on CT is polarity mark and must face line-side.
- Service conductors are not allowed to cross in front of CTs.
- See Section 4 for instrument transformer type, installation details and requirements.

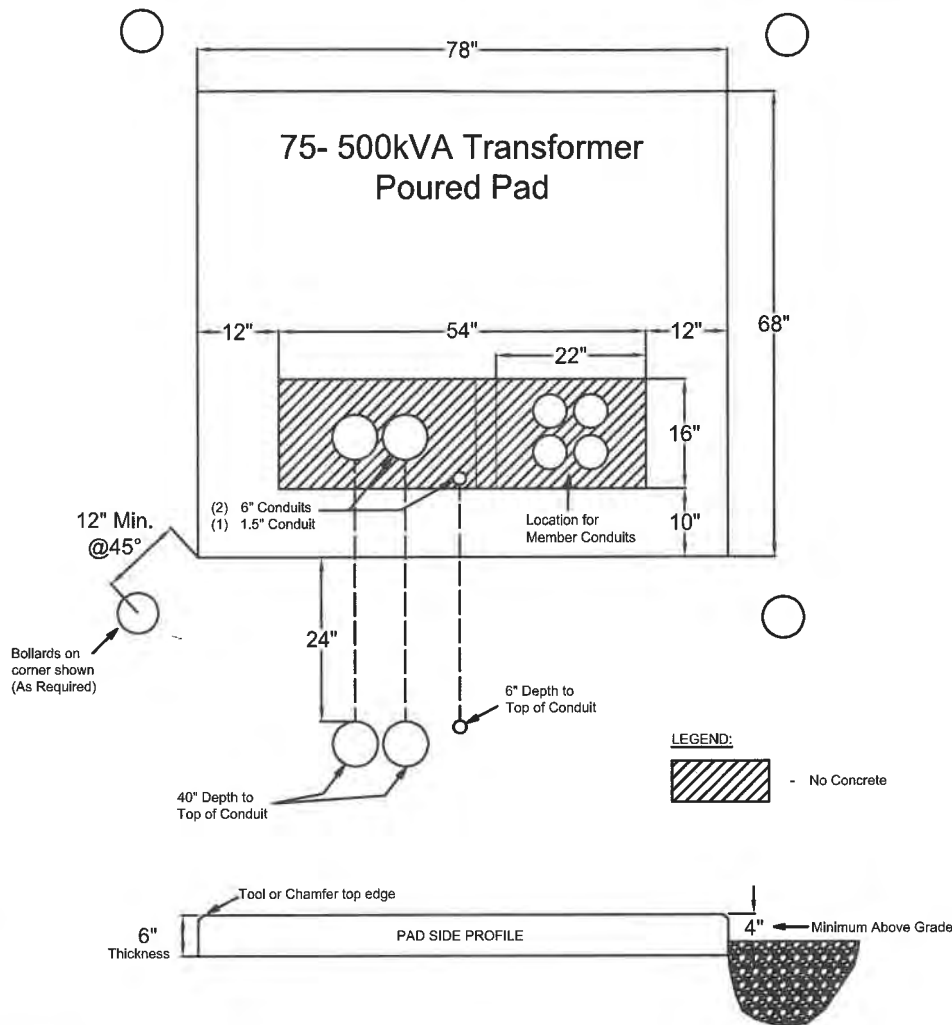
WALL-MOUNTED CURRENT TRANSFORMER ENCLOSURES

No.	Description	Engr	Appd	Date



12.47/7.2 KV	Engr Tech:	Engr:	Approved:	Date:
MAY 2015	EDW	P. K. 40	[Signature]	5/22/15

FIGURE M3



Installation and Site Preparation Requirements:

This drawing serves as a template. Final design shall be approved by WHE prior to installation.

1. WHE Representative must inspect formed pad before being poured.
2. Concrete testing, 3000 pounds min. per square inch; 4% to 6% entrained air, $\frac{3}{4}$ " maximum aggregate.
3. #4 ATSM-A615 Grade 60 Rebar must be placed each way and 6" O.C and securely tied together. Rebar must be 3" from all concrete edges.
4. The pad area must be properly graded and compacted to support the pad and transformer. Soil compaction must meet 95% Standard Proctor requirements.
5. All conduits must match the layout shown in the drawing:
 - 5.1. (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - 5.2. (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - 5.3. All conduits must be cut flush with the top of the pad and fitted with belled ends.
6. WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UM48-5 for Grounding Grid Specification.
7. Clearance:
 - 7.1. The pad must be located at least 20' from any structure.
 - 7.2. It must be placed in an accessible location, not behind fences or gates.
 - 7.3. The transformer must maintain a minimum 6' clearance from any metallic structures.
8. (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
9. WHE will install the primary wire. The wire between the transformer and the service shall be installed by the member, WHE will terminate the secondary wire in the transformer.
10. All cabling and conduit installations must comply with the National Electric Code (NEC).
11. See UMG-G2 for Transformer Wiring Specification.
12. Transition (CT) cabinets to be outdoors, unless otherwise approved by WHE Engineering.

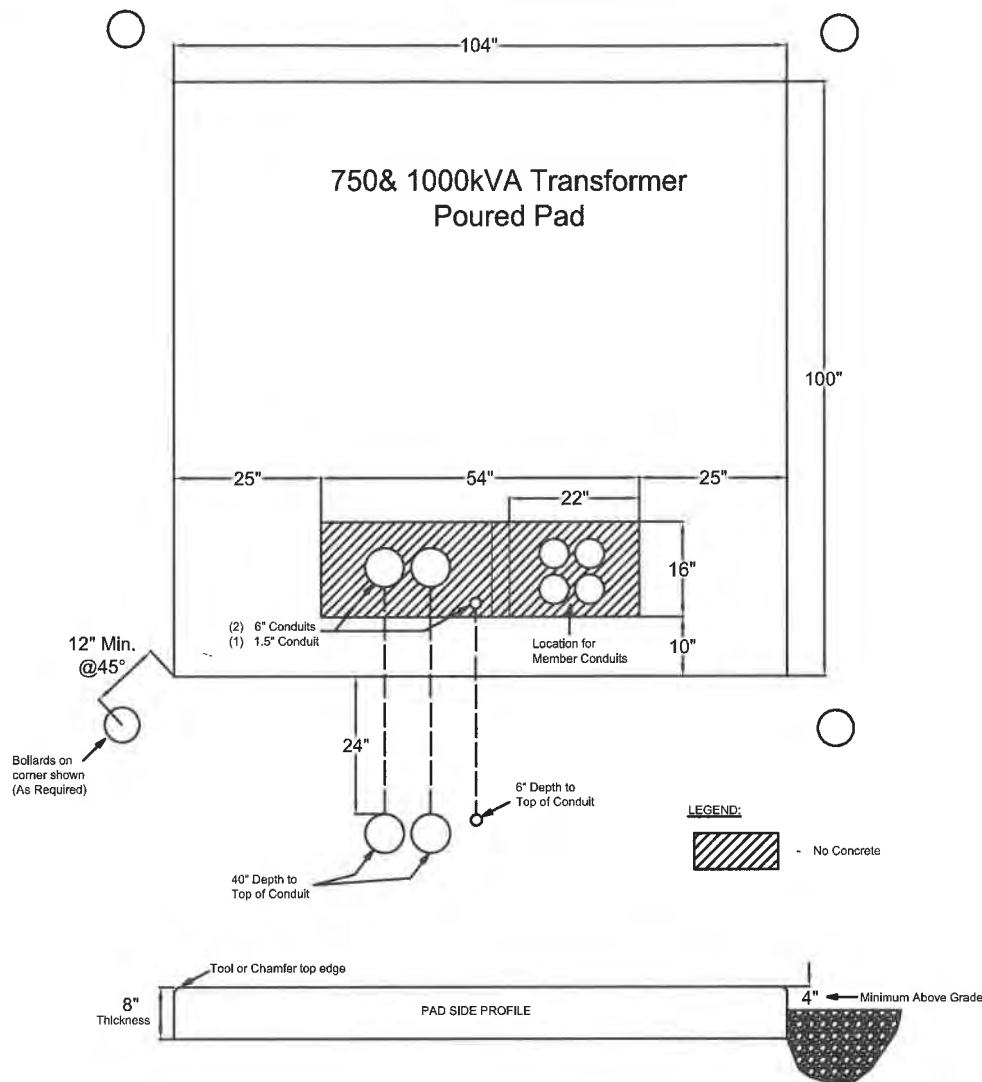
THREE PHASE TRANSFORMER CONCRETE PAD GUIDELINE (75- 500kVA)

1	Revised Dem. & Notes	NOV 25
No.	Description	Engr Appd Date



12.47/7.2 KV NOVEMBER 2025			
Drawn By:	Engr:	Approved:	Date:
CB	[Signature]	[Signature]	11/3/25

UM1-6C



Installation and Site Preparation Requirements:

This drawing serves as a template. Final design shall be approved by WHE prior to installation.

1. WHE Representative must inspect formed pad before being poured.
2. Concrete testing, 3000 pounds min. per square inch; 4% to 6% entrained air, $\frac{3}{4}$ " maximum aggregate.
3. #4 ATSM-A615 Grade 60 Rebar must be placed each way and 6" O.C and securely tied together. Rebar must be 3" from all concrete edges.
4. The pad area must be properly graded and compacted to support the pad and transformer. Soil compaction must meet 95% Standard Proctor requirements.
5. All conduits must match the layout shown in the drawing:
 - 5.1. (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - 5.2. (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - 5.3. All conduits must be cut flush with the top of the pad and fitted with belled ends.
6. WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UM48-5 for Grounding Grid Specification.
7. Clearance:
 - 7.1. The pad must be located at least 20' from any structure.
 - 7.2. It must be placed in an accessible location, not behind fences or gates.
 - 7.3. The transformer must maintain a minimum 6' clearance from any metallic structures.
8. (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
9. WHE will install the primary wire. The wire between the transformer and the service shall be installed by the member, WHE will terminate the secondary wire in the transformer.
10. All cabling and conduit installations must comply with the National Electric Code (NEC).
11. See UMG-G2 for Transformer Wiring Specification.
12. Transition (CT) cabinets to be outdoors, unless otherwise approved by WHE Engineering.

THREE PHASE TRANSFORMER CONCRETE PAD GUIDELINE (750 & 1000kVA)



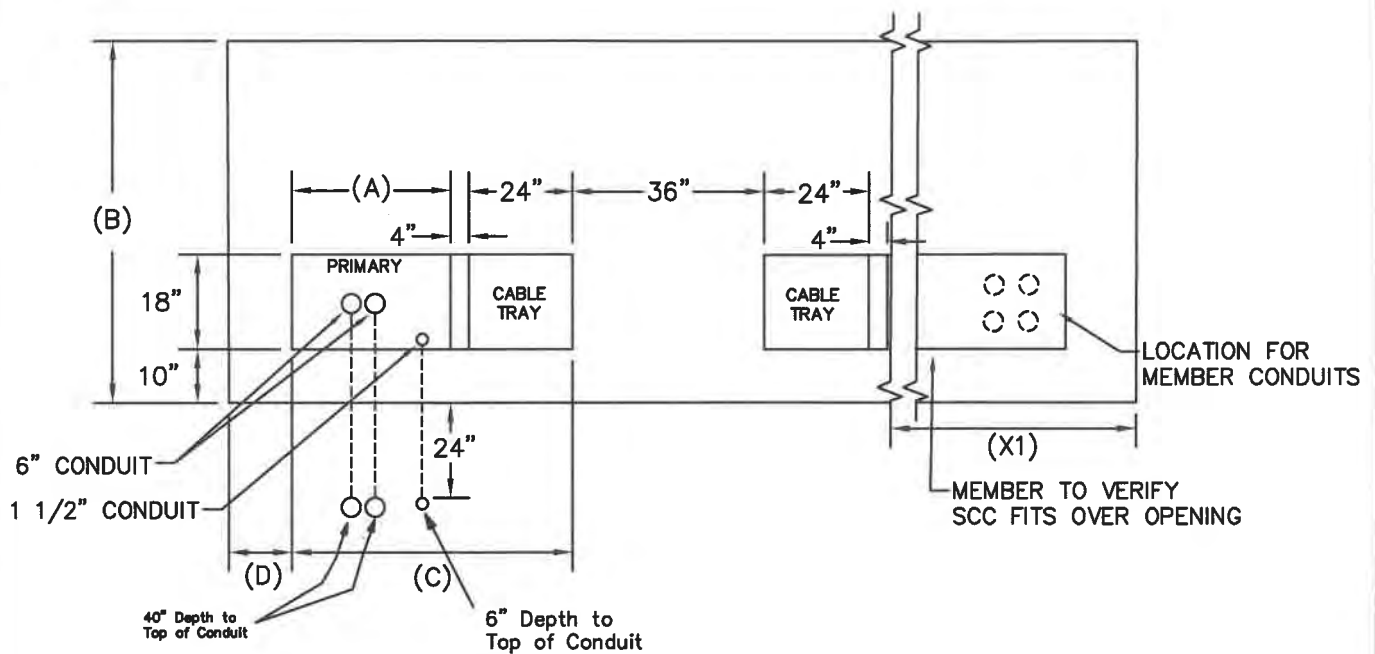
12.47/7.2 KV
NOVEMBER 2025

UM1-7C

Drawn By: CB
Engt: CAC
Approved: [Signature]
Date: 11/3/25

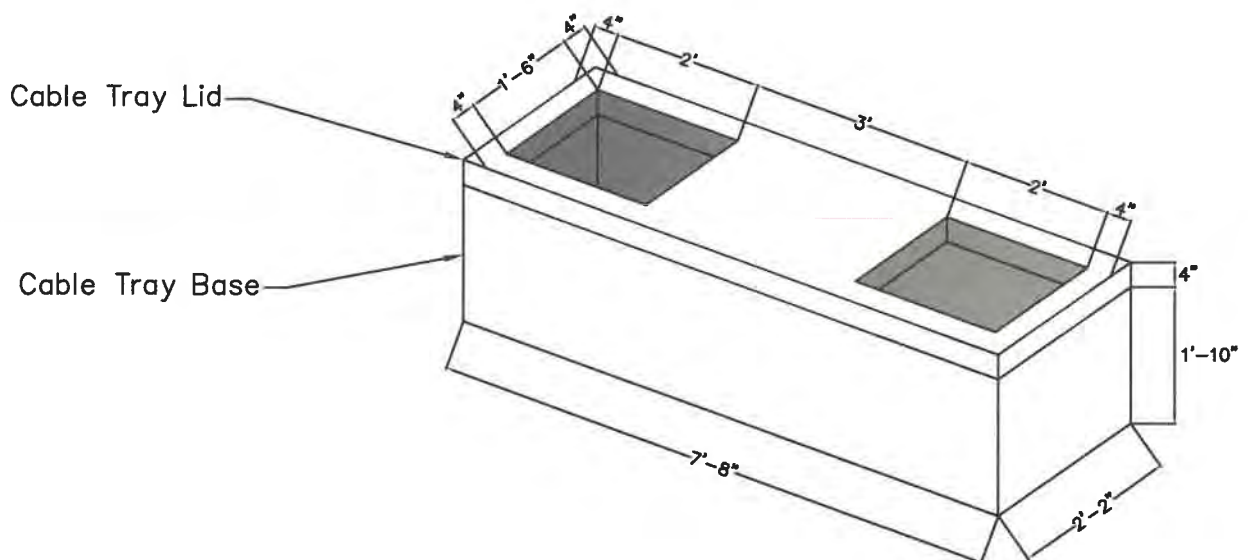
No.	Description	Engr	Appd	Date

TRANSFORMER PLUS CONNECTION CABINET POURED PAD (IN-LINE)



PRECAST CABLE TRAY

- WHE Requires a cable tray is installed for all installations requiring a connection cabinet.
- The Cable tray shall be manufacture by Oldcastle Precast or an approved equivalent:
(Old Castle Catalog# Lid- 2305105, Base- 2305100)



SEE DRAWING 2 OF 2 FOR INSTALLATION NOTES AND PAD REBAR DESIGN

THREE PHASE PAD-MOUNTED TRANSFORMER
SECONDARY CONNECTION CABINET POURED CONCRETE PAD
IN-LINE ORIENTATION (75- 2500kVA)

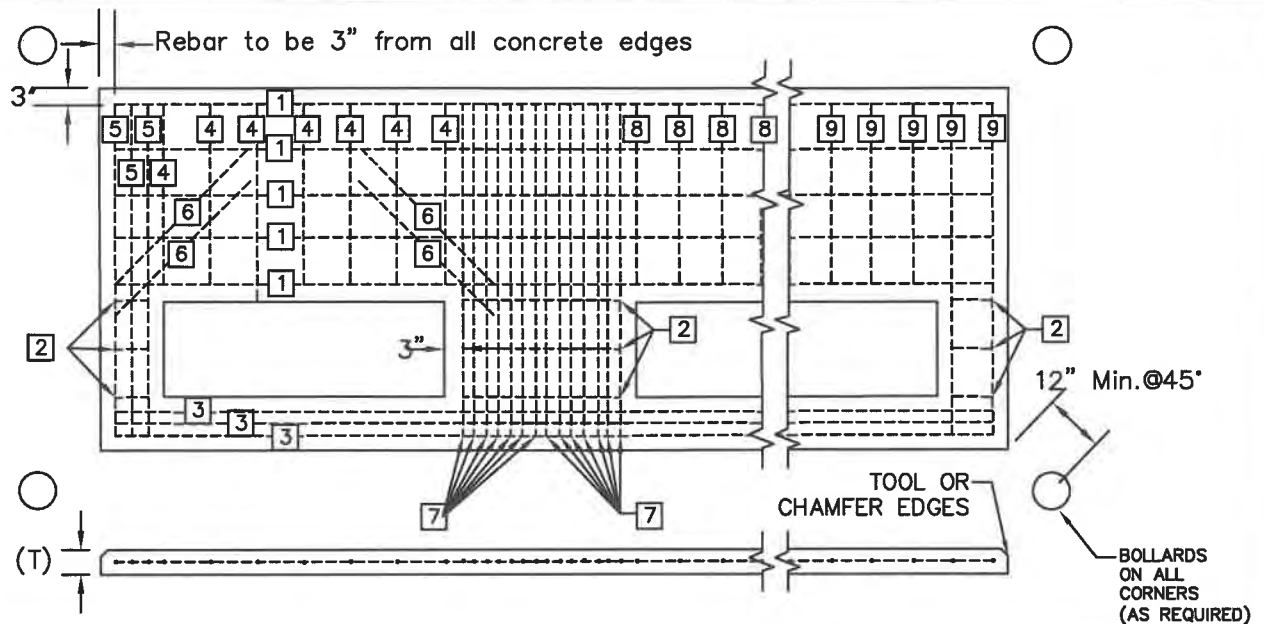
2	Added Cable Tray & Revised Notes	ROSEN		NOV 2025
1	Changed Dimensions			7/14/14
No.	Description	Engr	Appd	Date



12.47/7.2 KV
NOVEMBER 2025

Drawn By: CB	Engd: <i>[Signature]</i>	Approved: <i>[Signature]</i>	Date: 11/3/25
-----------------	-----------------------------	---------------------------------	------------------

UM1-8C
1 OF 2



TRANSFORMER SIZE	DIMENSIONS						REINFORCED STEEL SCHEDULE								
	A	B	C	D	T	X1	1	2	3	4	5	6	7	8	9
75-500kVA	26"	68"	54"	12"	6"	BASED ON SCC WIDTH	5-#4	3-#4	3-#4	7-#4	3-#4	2-#4 X 3'-0"	14-#4	4-#4	#4
750-2500kVA	36"	100"	64"	20"	8"	BASED ON SCC WIDTH	9-#4	3-#4	3-#4	8-#4	6-#4	2-#4 X 3'-0"	14-#4	5-#4	#4

Installation and Site Preparation Requirements:

This drawing serves as a template. Final design shall be approved by WHE prior to installation.

1. WHE Representative must inspect formed pad before being poured.
2. Concrete testing, 3000 pounds min. per square inch; 4% to 6% entrained air, $\frac{3}{4}$ " maximum aggregate.
3. #4 ATSM-A615 Grade 60 Rebar must be placed each way and 6" O.C and securely tied together. Rebar must be 3" from all concrete edges.
4. The pad area must be properly graded and compacted to support cable tray, pad, transformer and connection cabinet Soil compaction must meet 95% Standard Proctor requirements.
2. Install the cable tray so that its top aligns with the final grade. The pad should be placed directly on top of the tray and the openings aligned. All conduits must match the layout shown in the drawing:
 - 2.1. (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - 2.2. (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - 2.3. All conduits must be cut flush with the top of the pad and fitted with belled ends.
3. WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UMG-G1 for Grounding Grid Specification.
4. Clearance:
 - 4.1. The pad must be located at least 20' from any structure.
 - 4.2. It must be placed in an accessible location, not behind fences or gates.
 - 4.3. The transformer must maintain a minimum 6' clearance from any metallic structures.
5. (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
8. WHE will install the primary wire and the wire between the transformer and the connection cabinet. Lugs in the connection cabinet must be provided by the Member.
9. All cabling and conduit installations must comply with the National Electric Code (NEC).
10. See UMG-G2 for Transformer Wiring Specification.

THREE PHASE PAD-MOUNTED TRANSFORMER SECONDARY CONNECTION CABINET POURED CONCRETE PAD IN-LINE ORIENTATION (75- 2500kVA)

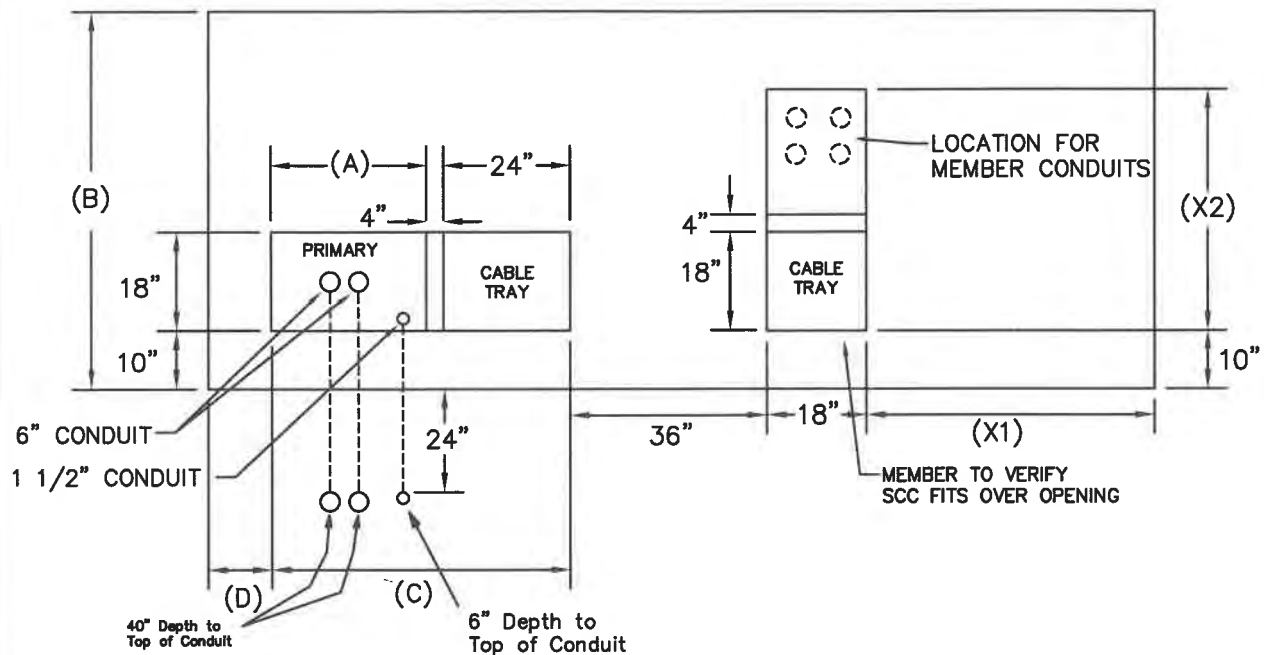
2	Added Cable Tray & Revised Notes	NOV 2025
1	Changed Dimensions	7/14/14
No.	Description	Engr Appd Date



12.47/7.2 KV NOVEMBER 2025			
Drawn By:	Engr:	Approved:	Date:
CB	11/3/25	11/3/25	11/3/25

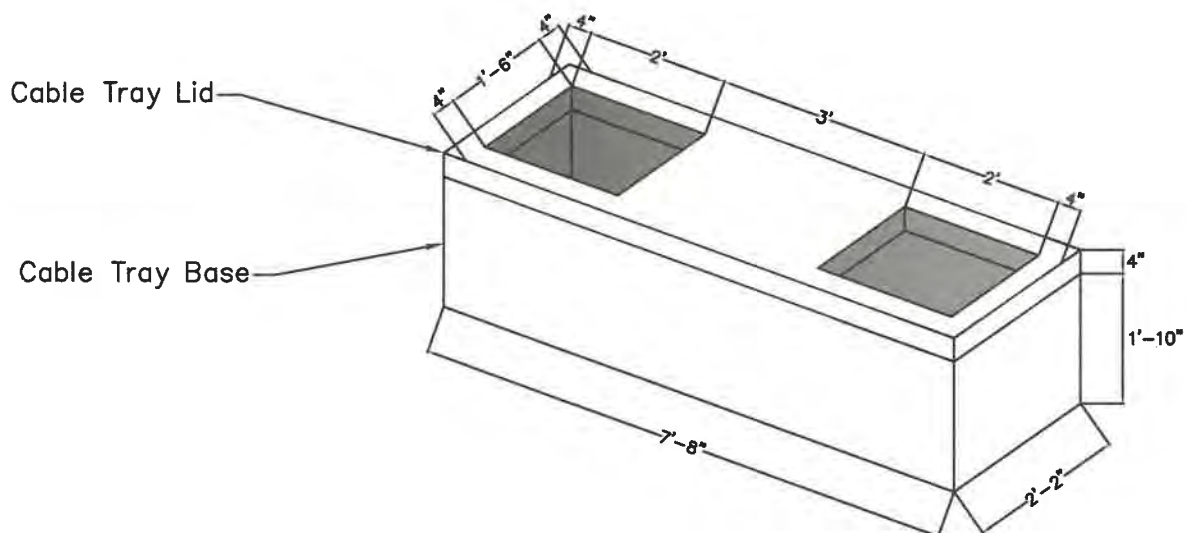
UM1-8C
2 OF 2

TRANSFORMER PLUS CONNECTION CABINET POURED PAD (90 DEG)



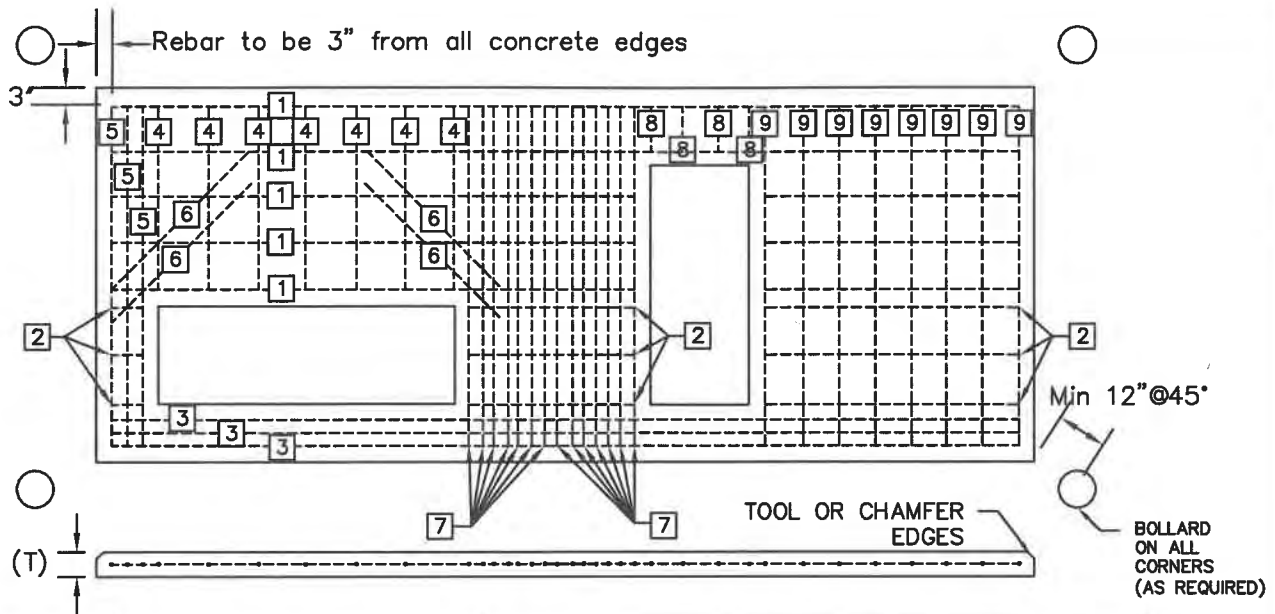
PRECAST CABLE TRAY

- WHE Requires a cable tray is installed for all installations requiring a connection cabinet.
- The Cable tray shall be manufacture by Oldcastle Precast or an approved equivalent:
(Old Castle Catalog# Lid- 2305105, Base- 2305100)



SEE DRAWING 2 OF 2 FOR INSTALLATION NOTES AND PAD REBAR DESIGN

					THREE PHASE PAD-MOUNTED TRANSFORMER SECONDARY CONNECTION CABINET CONCRETE PAD 90° ORIENTATION (75- 2500kVA)					
					 Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative	12.47/7.2 KV NOVEMBER 2025			UM1-9C 1 of 2	
2	Added Cable Tray & Revised Notes			NOV 2025		Drawn By:	Eng:	Approved:		Date:
1	Changed Dimensions			7/14/14						
No.	Description	Engr	Appd	Date						



TRANSFORMER SIZE	DIMENSIONS						REINFORCED STEEL SCHEDULE								
	A	B	C	D	T	X1,X2	1	2	3	4	5	6	7	8	9
75-500kVA	26"	68"	54"	12"	6"	BASED ON SCC WIDTH	5-#4	3-#4	3-#4	7-#4	3-#4	2-#4 X 3'-0"	14-#4	4-#4	#4
750-2500kVA	36"	100"	64"	20"	8"	BASED ON SCC WIDTH	9-#4	3-#4	3-#4	8-#4	6-#4	2-#4 X 3'-0"	14-#4	5-#4	#4

Installation and Site Preparation Requirements:

- This drawing serves as a template. Final design shall be approved by WHE prior to installation.
- WHE Representative must inspect formed pad before being poured.
- Concrete testing, 3000 pounds min. per square inch; 4% to 6% entrained air, $\frac{3}{4}$ " maximum aggregate.
- #4 ATSM-A615 Grade 60 Rebar must be placed each way and 6" O.C and securely tied together. Rebar must be 3" from all concrete edges.
- The pad area must be properly graded and compacted to support cable tray, pad, transformer and connection cabinet. Soil compaction must meet 95% Standard Proctor requirements.
- Install the cable tray so that its top aligns with the final grade. The pad should be placed directly on top of the tray and the openings aligned. All conduits must match the layout shown in the drawing:
 - (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - All conduits must be cut flush with the top of the pad and fitted with belled ends.
- WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UMG-G1 for Grounding Grid Specification.
- Clearance:
 - The pad must be located at least 20' from any structure.
 - It must be placed in an accessible location, not behind fences or gates.
 - The transformer must maintain a minimum 6' clearance from any metallic structures.
- (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
- WHE will install the primary wire and the wire between the transformer and the connection cabinet. Lugs in the connection cabinet must be provided by the Member.
- All cabling and conduit installations must comply with the National Electric Code (NEC).
- See UMG-G2 for Transformer Wiring Specification.

THREE PHASE PAD-MOUNTED TRANSFORMER SECONDARY CONNECTION CABINET CONCRETE PAD 90° ORIENTATION (75- 2500kVA)

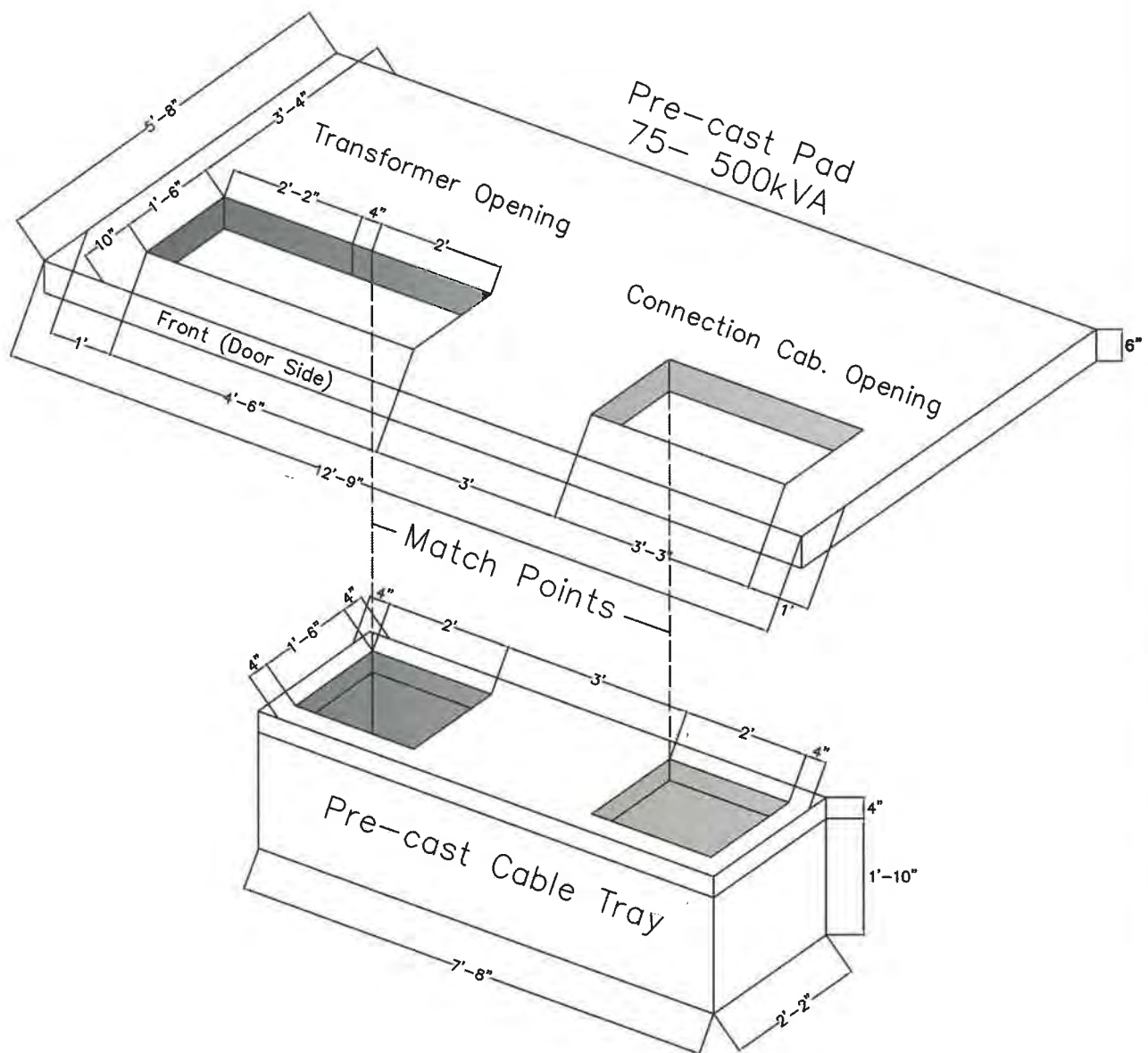
2	Added Cable Tray & Revised Notes			NOV 2025
1	Changed Dimensions			7/14/14
No.	Description	Engr	Appd	Date



12.47/7.2 KV
NOVEMBER 2025

Drawn By: CB
Eng: [Signature]
Approved: [Signature]
Date: 11/3/25

UM1-9C
2 of 2



*SEE DRAWING 2 OF 2 FOR TOP VIEW AND INSTALLATION NOTES

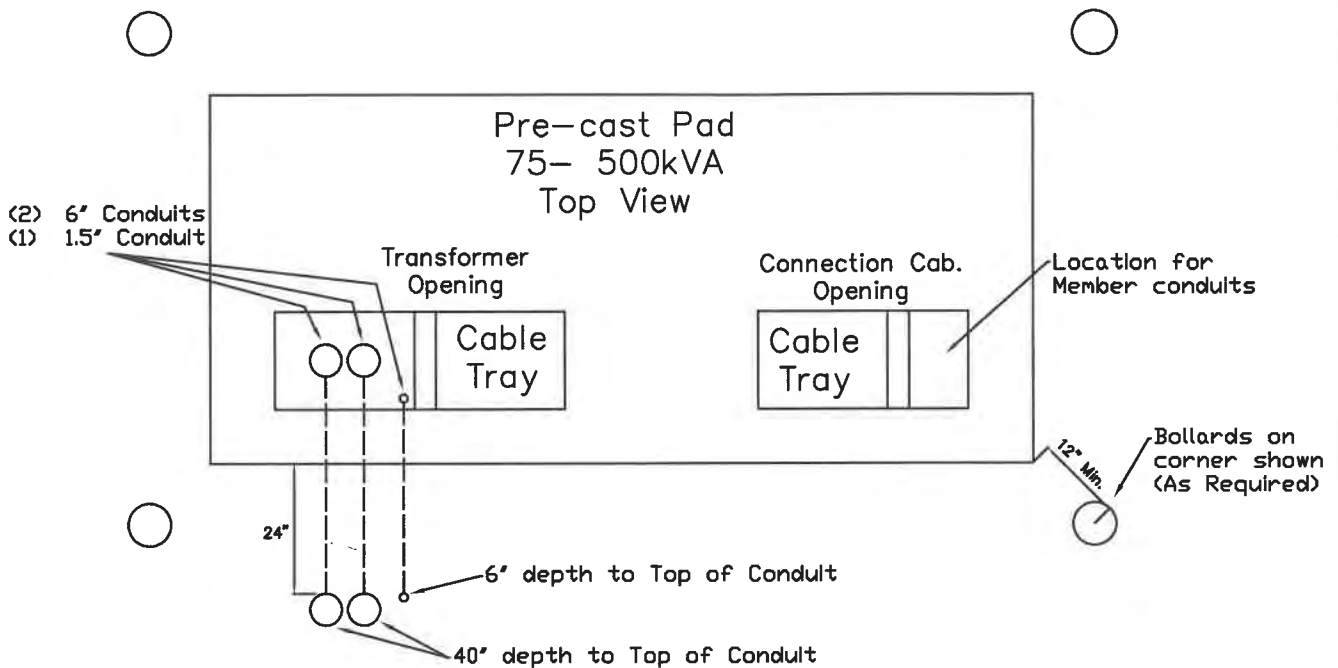
THREE PHASE TRANSFORMER PRECAST PAD GUIDELINE (75- 500KVA)

No.	Description	Engr	Appd	Date



12.47/7.2 KV NOVEMBER 2025	Drawn By: CB	Eng: JAC	Approved: JAC	Date: 11/3/25
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UM1-10NC
1 OF 2



Installation and Site Preparation Requirements:

This drawing serves as a template. Final design shall be approved by WHE prior to installation.

1. The pad area must be properly graded and compacted to support the cable tray, pad, transformer and connection cabinet. Soil compaction must meet 95% Standard Proctor requirements.
2. Install the cable tray so that its top aligns with the final grade. The pad should be placed directly on top of the tray and aligned according to the match points shown in the drawings.
3. The pad shall be manufactured by Oldcastle Precast or an approved equivalent (Oldcastle Catalog #68153).
4. All conduits must match the layout shown in the drawing:
 - 4.1. (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - 4.2. (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - 4.3. All conduits must be cut flush with the top of the pad and fitted with belled ends.
5. WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UMG-G1 for Grounding Grid Specification.
6. Clearance:
 - 6.1. The pad must be located at least 20' from any structure.
 - 6.2. It must be placed in an accessible location, not behind fences or gates.
 - 6.3. The transformer must maintain a minimum 6' clearance from any metallic structures.
7. (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
8. WHE will install the primary wire and the wire between the transformer and the connection cabinet. Lugs in the transition cabinet must be provided by the Member.
9. All cabling and conduit installations must comply with the National Electric Code (NEC).
10. See UMG-G2 for Transformer Wiring Specification.

THREE PHASE TRANSFORMER PRECAST PAD GUIDELINE (75- 500KVA)

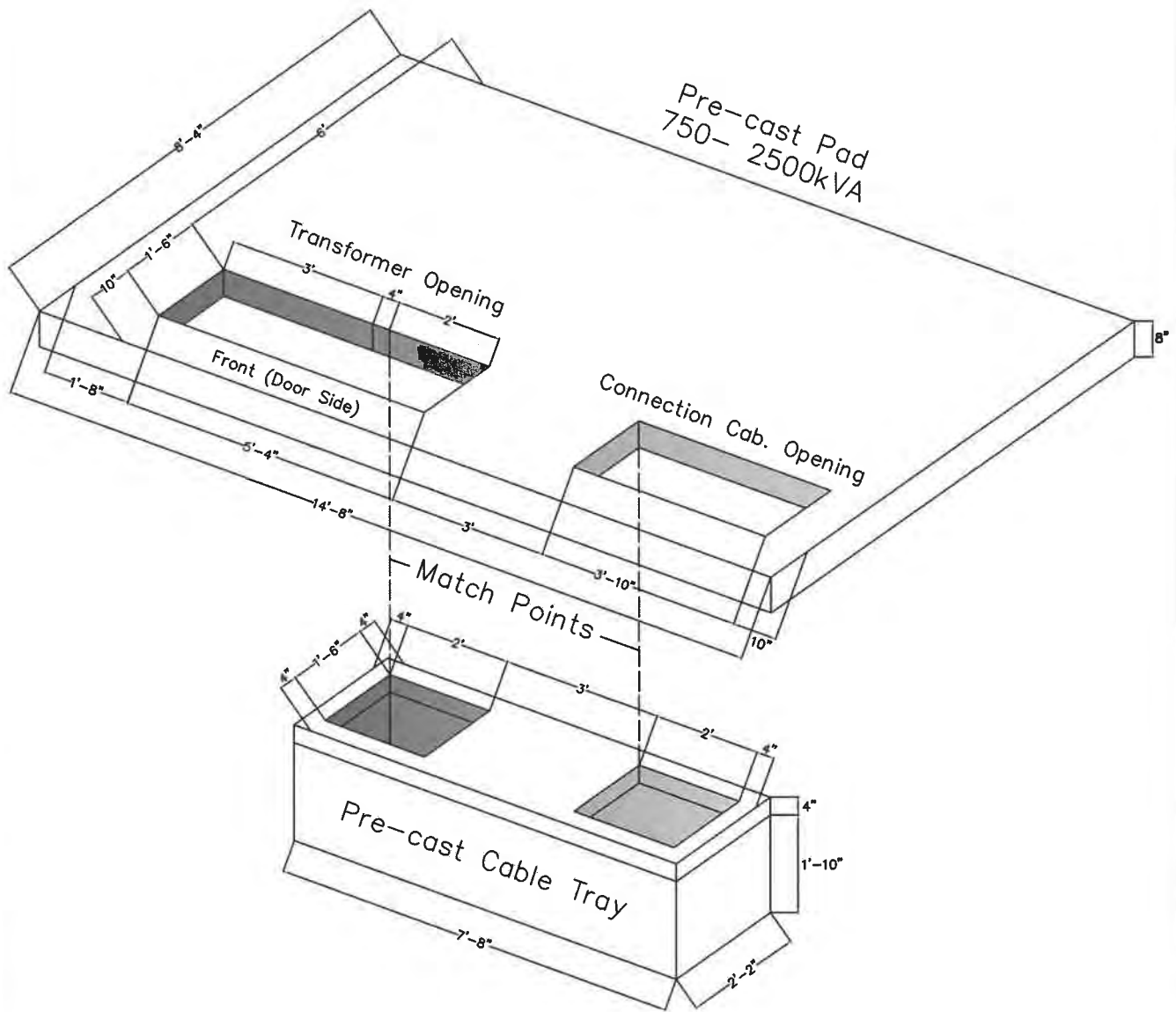


12.47/7.2 KV
NOVEMBER 2025

UM1-10NC
2 OF 2

No.	Description	Engr	Appd	Date

Drawn By: CB
Engr: [Signature]
Approved: [Signature]
Date: 11/3/25



*SEE DRAWING 2 OF 2 FOR TOP VIEW AND INSTALLATION NOTES

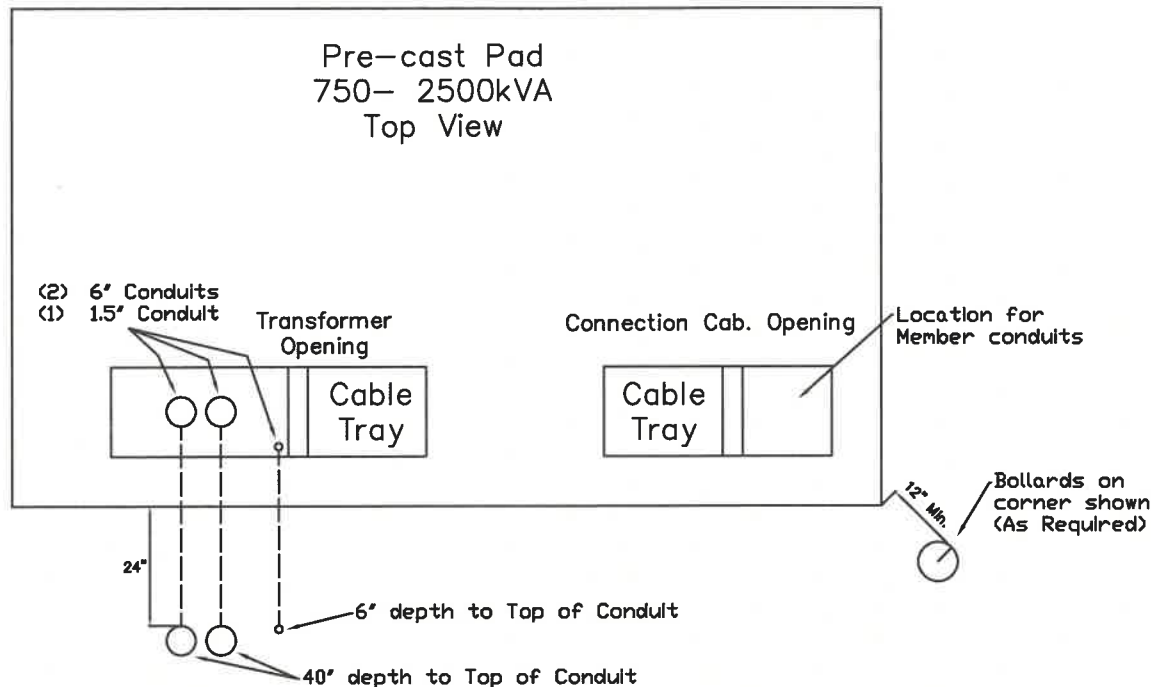
THREE PHASE TRANSFORMER
PRECAST PAD
GUIDELINE (750- 2500KVA)

No.	Description	Engr	Appd	Date



12.47/7.2 KV NOVEMBER 2025	Drawn By: CB	Eng: [Signature]	Approved: [Signature]	Date: 11/3/25
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UM1-11NC
1 OF 2



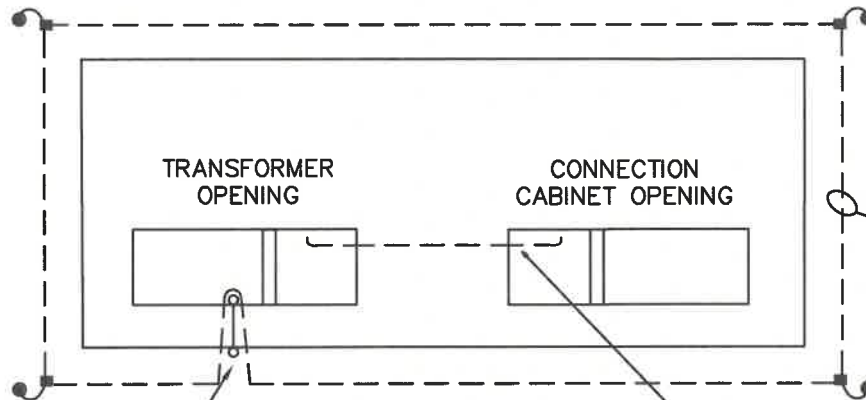
Installation and Site Preparation Requirements:

This drawing serves as a template. Final design shall be approved by WHE prior to installation.

1. The pad area must be properly graded and compacted to support the cable tray, pad, transformer and connection cabinet. Soil compaction must meet 95% Standard Proctor requirements.
2. Install the cable tray so that its top aligns with the final grade. The pad should be placed directly on top of the tray and aligned according to the match points shown in the drawings.
3. The pad shall be manufactured by Oldcastle Precast or an approved equivalent (Oldcastle Catalog #68153).
4. All conduits must match the layout shown in the drawing:
 - 4.1. (2) 6" Schedule 80 PVC conduits on the primary side must extend 24" beyond the pad, continuing past parking lots, roadways, and curbs into the green space as directed by WHE.
 - 4.2. (1) 1.5" Schedule 80 PVC conduit on the primary side must extend 24" beyond the pad for ground grid connection.
 - 4.3. All conduits must be cut flush with the top of the pad and fitted with belled ends.
5. WHE will install the ground grid outside the transformer pad prior to any final paving, restoration, or landscaping. See UMG-G1 for Grounding Grid Specification.
6. Clearance:
 - 6.1. The pad must be located at least 20' from any structure.
 - 6.2. It must be placed in an accessible location, not behind fences or gates.
 - 6.3. The transformer must maintain a minimum 6' clearance from any metallic structures.
7. (As Required) Concrete bollards shall be installed by the Member as shown in the drawing.
8. WHE will install the primary wire and the wire between the transformer and the connection cabinet. Lugs in the transition cabinet must be provided by the Member.
9. All cabling and conduit installations must comply with the National Electric Code (NEC).
10. See UMG-G2 for Transformer Wiring Specification.

THREE PHASE TRANSFORMER PRECAST PAD GUIDELINE (750– 2500KVA)

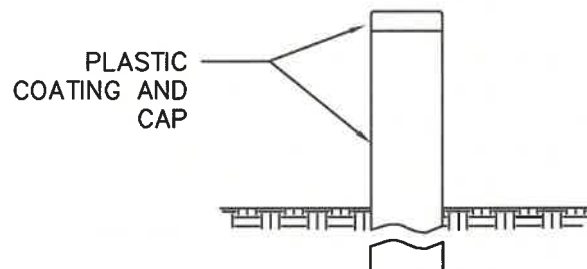
					 Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative	12.47/7.2 KV NOVEMBER 2025			UM1-11NC 2 OF 2
No.	Description	Engr	Appd	Date		Drawn By: <i>CS</i>	Eng'd: <i>[Signature]</i>	Approved: <i>[Signature]</i>	



GROUNDING DETAIL

1 1/2" CONDUIT
FOR GROUND GRID
CONNECTION TO
TRANSFORMER

RUN 1/0 BARE CU IN CABLE TRAY
CONNECTING TRANSFORMER AND
CONNECTION CABINET GROUNDS



BOLLARD DETAIL

CONCRETE BOLLARDS SHALL BE INSTALLED BY THE MEMBER FOR PROTECTION FROM
TRAFFIC AS REQUIRED BY WHE, TYPICALLY LOCATED 12" FROM CORNER OF PAD

THREE PHASE TRANSFORMER GUIDE – GROUNDING AND BOLLARD DETAIL

No.	Description	Engr	Appd	Date
1	Updated drawings and notes			NOV 25



12.47/7.2 KV NOVEMBER 2025	Drawn By: CB	Engr: [Signature]	Approved: [Signature]	Date: 11/3/25
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UM1-G1

Padmount Transformer – Service Lateral Sizes (WHE Owned)

KVA	Copper (Conductor/Phase)	Aluminum (Conductor/Phase)
208 Grd Y/120 Volt		
300	3 - 500	2 - 750
500	4 - 500	4 - 750
750	6 - 500	6 - 750
1000	*8 - 500	*8 - 750
480 Grd Y/277 Volt		
300	1 - 500	1 - 750
500	2 - 500	2 - 750
750	3 - 500	3 - 750
1000	4 - 500	4 - 750
1500	6 - 500	6 - 750
2000	*7 - 500	*7 - 750
2500	*8 - 500	*8 - 750
240/120 Volt 1 Ø		
167	2 - 500	2 - 750

* Need extension and support on secondary bushings of transformer and all transition cabinet.
(For all connections over six (6) holes.)

TRANSFORMER CONNECTION INFORMATION

CUSTOMER WIRING COLORS

The NEC specifies that the grounded (neutral) conductor be white or natural gray. The phase wires are not required by the NEC to be a specified color with the exception of the phase conductor with the higher voltage to ground in a 4-wire delta-connected secondary (wild leg) which shall be orange. Color coding guidelines shown below are consistent with common industry practice and should be used.

Color Coding (reading L to R as you stand facing the equipment)

<u>Secondary Voltage</u>	<u>N</u>	<u>X1</u>	<u>X2</u>	<u>X3</u>
480 V WYE	White	Brown	Orange	Yellow
208 V WYE	White	Black	Red	Blue
240 V DELTA		Black	Black	Orange (wild leg)

NOTES:

1. Ground conductors must be green.
2. Phase rotation – ABC clockwise rotation (ABC DOES NOT have to be indicated).
3. DO NOT USE red/white/blue to identify phase wires.
4. Any color code used on customer wires shall be verified before making a connection.
5. Conduit or conduit fittings made from a ferrous material may not be used when separating three-phase runs into separate conduits.

CUSTOMER METER CONNECTIONS – (Refer to Meter Standards)

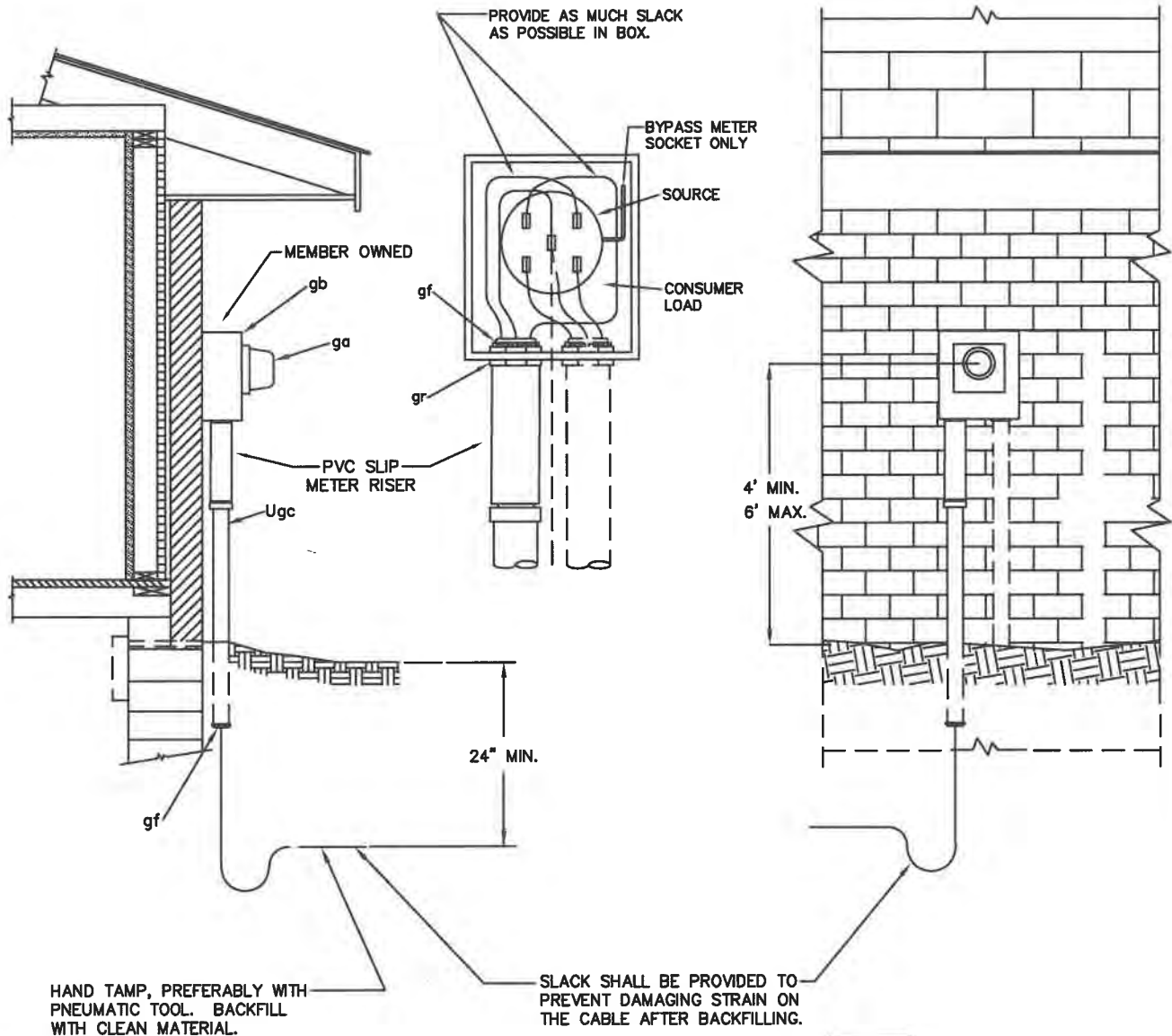
Wild leg is attached to the lug farthest to the right.

CUSTOMER-OWNED SERVICE CONNECTION CABINET

Preferred bus phase connection sequence: top-phase A, upper middle-phase B, lower middle-phase C, bottom-neutral.

**THREE PHASE TRANSFORMER
WIRING GUIDE**

					THREE PHASE TRANSFORMER WIRING GUIDE				
									
					12.47/7.2 KV NOVEMBER 2025				
					UM1-G2				
1	Upd. chart, add & upd. notes	<i>[Signature]</i>	NOV 2025						
No.	Description	Engr	Appd	Date	Drawn By	Engr	Appd	Date	
					CB	<i>[Signature]</i>	<i>[Signature]</i>	11/3/25	



STOCK NO	ITEM	MATERIAL	QTY
	ga	Meter, as required	1
	gb	Meter socket	1
	gf	Insulated bushing, size as req'd	2
	gr	Conduit locknuts, size as req'd	2
	Ugc	Conduit, diameter and length as req'd	1

METER INSTALLATION UNDERGROUND SOURCE GUIDE

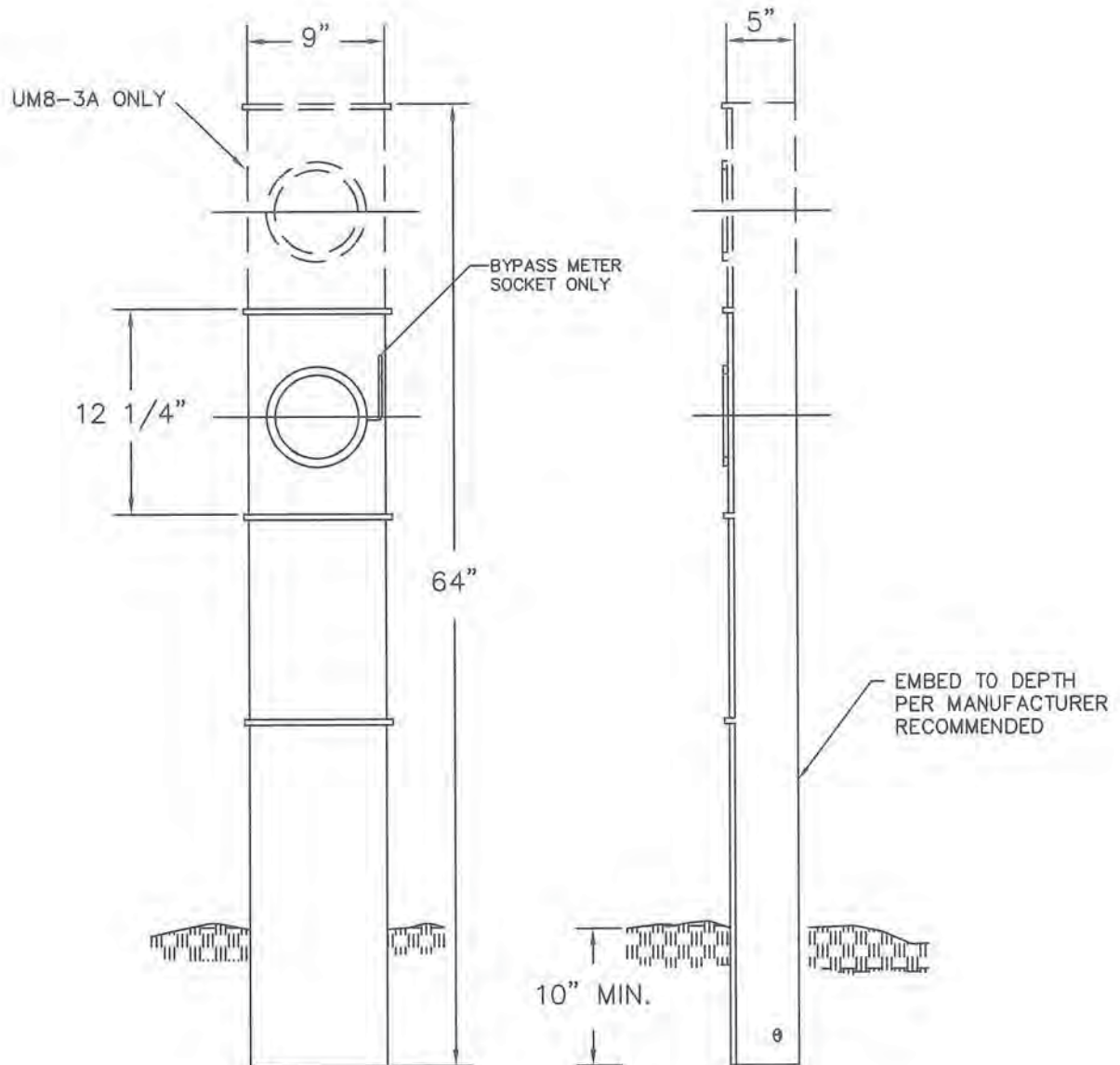
4	Removed Anchor Sock	<i>CB</i>	<i>BA</i>	NOV 25
3	updated meter socket height to 60" from 48"	<i>BA</i>	<i>CB</i>	1/6/22
2	Added PVC Slip Riser	BDT	LH	5/20/19
1	Added By-Pass Meter	CC	LH	7/14/14
No.	Description	Engr	Appd	Date



12.47/7.2 KV
NOVEMBER 2025

UM8
(UK8)

Drawn By: *CB* Entered: *BA* Approved: *BA* Date: *11/3/25*



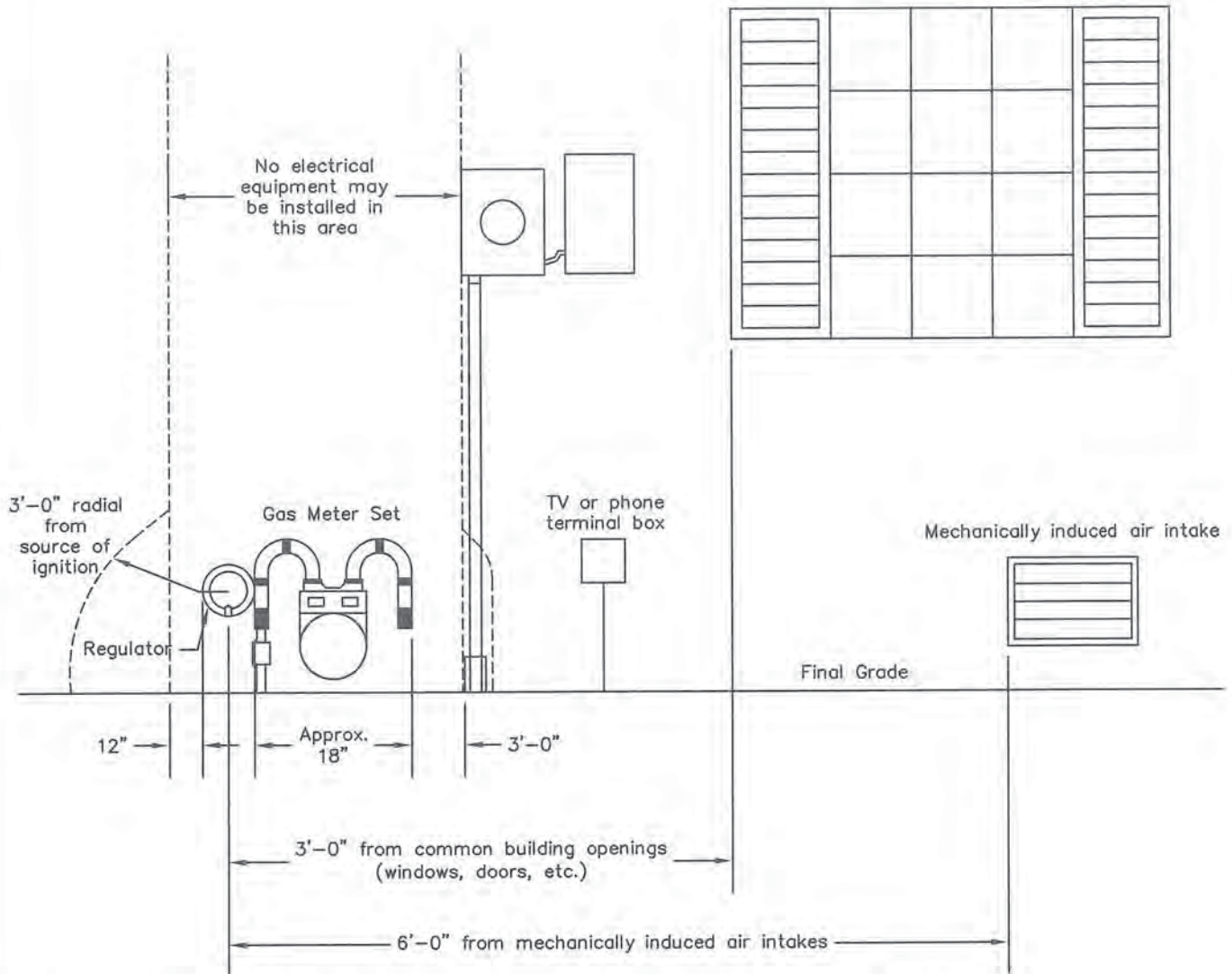
"MEMBER OWNED"

STOCK NO	ITEM	MATERIAL	QTY
39900001		Meter, pedestal, 200 A Main,	1
		200 Amp per position (UM8-3)	
		Meter, pedestal, 400 A. Main,	1
		200 Amp per position (UM8-3A)	

TROUGH TYPE METER PEDESTAL GUIDE

				12.47/7.2 KV OCTOBER 1, 2013				UM8-3 UM8-3A	
1	Added By-Pass Meter	<i>[Signature]</i>	7/14/14	W.H. Wright-Hennepin Cooperative Electric Association A Touchstone Energy Cooperative Affiliates	Eng. Tech.	Eng.	Approved:	Date:	
No.	Description	Engr	Appd		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	

WALL ELEVATION



Note: 3'-0" minimum working clearances from non-electrical obstructions is preferred around gas meter set.

- Clearances required in specific cases may be obtained from WH.
- Meters are to be located on the front one third of the house.

CLEARANCE REQUIREMENTS FROM GAS METER

									12.47/7.2 KV MAY 2015		UM1-G5
No.	Description	Engr	Appd	Date							
					Engr. Tech:	Engr:	Approved:	Date:			
					<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>5/28/15</i>			