



Consumer Service Facilities Metering Guidebook

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Holy Cross Energy may alter, amend or supplement this “Guidebook” at any time. Any such changes to the “Guidebook” will be effective when they are posted to our website and will apply to projects started on or after the date and time of posting.

Previous edition on file at Holy Cross Energy

FOREWORD

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FOREWORD

General: It is the objective of Holy Cross Energy (HCE) to promote beneficial applications of electricity. Rules and regulations (standards) governing consumers' wiring and installations attached to HCE's electric distribution system are necessary to enable HCE to serve all its consumers in a businesslike manner. This guidebook will serve to expedite service connections by establishing uniform standards for electric service. Therefore, consumers' wiring and installations intended for connection to HCE's distribution system must comply with all the rules, regulations, and policies of HCE, the National Electrical Code and any other codes or regulations of governmental authorities having jurisdiction in the area served.

Use: This guidebook is intended to assist consumers, architects, engineers, contractors, electricians and inspectors in planning, installations and use of consumer electrical facilities. **It is not intended to ensure adequacy or safety of the consumers' wiring or equipment.** The consumer or their agent(s) shall be responsible for such issues. HCE does not assume the function of inspecting consumers' wiring for compliance with requirements of electrical codes or regulations established by public authorities. This is the assertion of municipal and other governmental inspection authorities.

Planning Contact: When the project is still in the planning stages, HCE's engineering and metering departments should be contacted (in advance of construction and/or purchase of equipment). This will resolve issues and head off the necessity for expensive changes being required during the construction stage of the project.

Service Billing Guide (see [Appendix B](#)): The billing guide is a summary of costs for services which HCE can provide. If your need is not listed, please contact HCE Engineering at (970) 945-5491 for specific information.

Transformer Access is no longer allowed (see [Appendix C](#)): HCE provides access to its facilities by use of Courtesy Locks on Junction Boxes for electricians and other authorized parties.

Exceptions (see [Appendix D](#)): No set of rules or instructions will cover all conditions. HCE representatives will discuss any unusual or special needs of consumers. **Exceptions are granted on a case by case basis** and will not be granted if (in the opinion of HCE representative) reliability or safety is compromised.

Requests for exceptions must be submitted in writing. Exceptions to the rules contained herein may only be granted in writing by the Senior Manager-Engineering or Senior Manager-Glenwood District Operations. Refer to [Appendix D](#) for requesting a one-time exception.

Revisions (see [Appendix D](#)): Due to constant progress in the development of materials and methods, some procedures contained herein may be modified by HCE. Holy Cross Energy will update the "Guidebook" on the web at www.holycross.com. Occasionally, users of this guidebook notice additional or better ways of providing services than are contained herein. Revisions are required for continued application of a work practice, as opposed to an exception which is reviewed on a case by case basis.

Requests for revisions must be submitted in writing. If in the opinion of the engineering and metering departments the proposed revision offers equal or better safety and reliability than the current practice, then the suggestion will be reviewed for possible addition to or replacement of the current practice. Refer to [Appendix D](#) to request revisions.

Disclaimer of Warranty and Limitation of Liability: This guideline is provided "as is" without warranty of any kind either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality, performance, and accuracy of the guideline is with the holder. In no event will HCE be liable for any damage, including but not limited to damages for any lost profit, lost savings, or other incidental or consequential damages arising out of the use or inability to use the manual, even if HCE has been advised of the possibility of such damage.

Acknowledgements: I wish to express my appreciation to my colleagues at HCE who spent many hours reviewing existing policies, discussing changes, investigating codes and regulations, developing illustrations and finalizing the guidebook.

HCE's complete rules and regulations are contained in its tariffs on file at its main office at 3799 Highway 82, Glenwood Springs, Colorado.

HOLY CROSS ENERGY

A handwritten signature in black ink, appearing to read 'David Bleakley', with a stylized flourish at the end.

David Bleakley, Vice President - Engineering

Section 1 - Definitions

THE FOLLOWING DEFINITIONS ARE FURNISHED FOR THE APPROPRIATE INTERPRETATION OF THIS TEXT AND ARE NOT NECESSARILY UNIVERSALLY ACCEPTED DEFINITIONS.

ACCESS POINT

When a consumer is to be served from a distribution line in an easement on the consumer's property, the access point is the pole (OH), the switch cabinet bay (primary UG), the pad-mount transformer (secondary UG) or the junction box (secondary UG).

ACCESSIBILITY

The ability to reasonably access, as determined by Holy Cross Energy, HCE owned facilities at any time and during any weather conditions. This shall include vehicle access, maintained sidewalks and porches, and unlocked gates.

AGENT

One who is authorized to act for another under a contract or relation of agency, for Holy Cross Energy or for the consumer.

AMR – AUTOMATED METER READING

An automated method of reading electric meters.

APPLICANT

The property owner, lessee, sublessee, their authorized agents and/or contractors applying for electric service from Holy Cross Energy.

APPROVAL

Acceptance by Holy Cross Energy that the electric service will be connected. This is not an endorsement of the consumer's facilities, nor does it relieve the consumer of any responsibility related to the electric service.

COLD SEQUENCE

A meter that is connected with a disconnect device between the meter and the source.

PUCThe Public Utilities Commission of Colorado.

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.

CONTRACTOR

Any person, company or corporation acting under agreements for either Holy Cross Energy or the consumer.

CONSUMER

The property owner, lessee, sublessee, their authorized agents and/or contractors receiving electric service from Holy Cross Energy.

CONSTRUCTION ALLOWANCE

The portion of the construction cost performed by Holy Cross Energy at its expense.

DATA PULSES

KYZ pulses generated by the electric meter representing a specific value of energy for use by the electric utility and consumer's load management system.

DISCONNECT

A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

DIVERSION OF ELECTRICITY

Unauthorized connection to Holy Cross Energy facilities and/or use of electric service which is not metered or has been by-passed.

EMT

Electric Metallic Tubing (NEC).

GRC

Galvanized Rigid Conduit (NEC).

HOLY CROSS ENERGY PROPERTY

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

HOT SEQUENCE

A meter that is connected directly to the source without any disconnecting means between the meter and the source.

INSPECTOR

The electrical inspector of the Public Authority having jurisdiction in the area in which the work is performed.

ISOLATED TRANSFORMER

A transformer which provides power to a single electric service.

LINE

For the purpose of this guidebook the term "Line" refers to service equipment on the utility side of the meter.

LOAD

For the purpose of this guidebook the term "Load" refers to service equipment on the consumer side of the meter.

MEANS OF ATTACHMENT

Fittings identified for use, with service drop conductors, as a means to attach service drop conductors to a building.

METER

The equipment necessary to measure the electric demand and/or energy use of the consumer.

MULTIPLE METER STACK

A preassembled multiple metering unit, or fabricated center using meter sockets, where two or more consumers are metered at a common location.

NEC - NATIONAL ELECTRICAL CODE

As published by the National Fire Protection Association as adopted by the state or local authority governing and having jurisdiction relating to the installation of consumer's electrical conductors and equipment within public or private buildings and other structures.

NESC - NATIONAL ELECTRICAL SAFETY CODE

As approved by the American National Standards Institute, C2 Committee and made a part of the Public Utilities Commission of the State of Colorado, Rules Regulating the Service of Electric Utilities.

NOMINAL VOLTAGE

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

NON-STANDARD DESIGN

Any construction that does not follow the guidelines established in this guidebook will be considered Non-Standard Design. Construction of a service with Non-Standard Design will run the risk of not being connected by Holy Cross Energy. Additional expenses associated with Non-Standard Design will be the consumer's responsibility.

NONLINEAR LOAD

A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage. FPN: Electronic equipment, data processing, electronic/electric-discharge lighting, adjustable speed drive systems and similar equipment may be nonlinear loads.

POINT OF ATTACHMENT

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

POINT OF DELIVERY

The location at which the consumer's service facilities are connected to Holy Cross facilities and electric energy can be delivered by Holy Cross to the consumer. The point of delivery for overhead service is where the consumer service conductors connect to Holy Cross's service drop and at the secondary connectors of the pad-mounted transformer or secondary junction box, unless otherwise specified by Holy Cross.

POINT OF OWNERSHIP

See Point of Delivery

POINT OF SERVICE

That point where Holy Cross Energy accepts the responsibility of inspecting the consumer's facilities. Normally this is the line side connection in the meter assembly.

PRIMARY METERING

Metering of service voltages above 480V nominal.

PUBLIC AUTHORITY

The Municipality, County, or State Authority (including special districts) having inspectors and the jurisdiction to inspect electrical installations in the area the work is performed.

PVC

Polyvinyl Chloride (plastic pipe) (NEC)

RACEWAY

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

RECOMMENDED

Suggest suitable for job, purpose, or action to be done.

RISER

The transition from overhead to underground power lines made on a Holy Cross Energy pole. Primary riser equipment is owned by Holy Cross Energy. Secondary riser equipment is owned and provided by the consumer. Only Holy Cross Energy personnel may install risers, or do any work, on primary power poles.

SECONDARY CONDUCTORS

A circuit operating at 600V, nominal, or less.

SECONDARY RISER

The transition from overhead to underground power lines made on a Holy Cross Energy pole at the secondary voltage. The Secondary Riser equipment is owned by the consumer. Only Holy Cross Energy personnel may install secondary risers, or do any work, on primary power poles.

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.

SERVICE-ENTRANCE CONDUCTORS (OVERHEAD SYSTEM)

The service conductors between the terminals of the service equipment and a point outside the building, clear of building walls, where joined by tap or splice to the service drop.

SERVICE-ENTRANCE CONDUCTORS (UNDERGROUND SYSTEM)

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

SERVICE EQUIPMENT

The necessary equipment, usually consisting of a circuit breaker or switch and fuses, and their accessories, located near the point of entrance of supply conductors to a building or other structure, or an otherwise defined area, and intended to constitute the main control and means of cutoff of the supply.

SERVICE LATERAL

The underground service conductors between the Holy Cross Energy secondary distribution system and/or transformer terminals and the connection to the service-entrance conductors in a terminal box or meter 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 to be the point of entrance of the service conductors into the building

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 roof line. The conduit extends, and the weatherhead is located, above the roof by either passing through the eaves of the building or by extending past the roof line without passing through the eaves.

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 below the roof line of the building being served. The conduit extends to a point, and the weatherhead is located, below the eaves of the building. The point of attachment is secured to the building wall and is not attached to the service riser.

SHALL

Used to say that something certainly will or must happen.

TRANSFORMER

A device that, when used, will raise or lower the voltage of alternating current of the original source.

VOLTAGE IMBALANCE

Percent Voltage Imbalance = $\frac{100 \times \text{Maximum voltage deviation from average voltage}}{\text{Average Voltage}}$

EXAMPLE: With voltages of 220, 216, and 209, the average is 215, the maximum deviation from the average is 6, and the percentage imbalance = $100 \times \frac{6}{215} = 2.79\%$

VOLTAGE DROP

Voltage drop is the difference between the voltages at the transmitting and receiving ends of a given line or cable. (See formulas and examples in Chapter 9, NEC).

WEATHERHEAD

Rain-tight protective cap to cover secondary riser, service riser or mast.

Section 2 - General Information

A. GENERAL

Holy Cross Energy has on file its [Electric Service Tariffs \(Rates and Charges\), Rules and Regulations](#) Policy, copies of which are open for inspection by the public at its main office in Glenwood Springs and on the Holy Cross Energy [website](#).

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

B. APPLICATION FOR SERVICE

Consumers may contact any Holy Cross Energy office in person, by e-mail, or by telephone to secure information relative to any application for new electric service connections or changes in existing service. Addresses, e-mail, and phone numbers for Holy Cross Energy offices can be found at the end of this section.

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

1. The consumer shall complete and return the application for service form with proper load information.
2. The applicant has met all requirements of the Holy Cross Energy's [Electric Service Tariffs \(Rates and Charges\), Rules and Regulations](#) Policy in effect and on file at the time of application.
3. Holy Cross Energy has completed its construction.
4. The inspector having jurisdiction has notified Holy Cross Energy of approval of the installation either by phone, e-mailed report, or the presence of a valid approved electrical inspection sticker.

Compliance with this guidebook and/or approval by Holy Cross Energy is not an endorsement or warranty of the consumers facilities. Compliance with this guidebook and/or approval by Holy Cross Energy is an assurance that the electric service will be connected to the distribution system. The consumer is solely responsible for determining the adequacy, safety and legality of all plans, specifications, facilities, equipment, sites, easements, installation and other characteristics of the electric service.

Service is available when the applicant agrees to take the service under the applicable rate and when all applicable deposits, charges for construction and service, and connect fees, as required by Holy Cross Energy, are paid by the consumer or applicant.

Holy Cross Energy shall be consulted in advance of the finalization of the consumer's plans regarding the specific details under which service facilities and meter location will be installed.

C. RATE SCHEDULES

Upon request of applicant, representatives of Holy Cross Energy will explain rate schedules and, where more than one rate is applicable, will assist in selection of the rate best suited to applicant's requirements. Applicant will be responsible for the final selection of the applicable rate schedule desired.

D. SERVICE AND LIMITATIONS

Service will be rendered to the consumer from Holy Cross Energy's nearest suitable line of sufficient capacity to furnish adequate service at the phase and voltage available. Holy Cross Energy will not supply service directly from its transmission lines.

Holy Cross Energy reserves the right to determine the location and type of service that will be made available at any particular location and therefore should be consulted.

Service must not be used by the consumer for purposes other than that specified in the applicable rate. Electrical energy purchased from Holy Cross Energy shall not be resold.

E. APPARATUS AND EQUIPMENT

The consumer will furnish physical protection satisfactory to Holy Cross Energy for all apparatus located on the consumer's property. All Holy Cross Energy equipment must be accessible to Holy Cross Energy employees at all times.

F. POLE MOUNTED TRANSFORMER AMPACITY LIMITS

Pole mounted transformers shall be limited to no more than 750 amps (aluminum wire) or 930 amps (copper wire) total per pole. Wire larger than 350 MCM and reducing lugs will not be accepted.

G. CONNECTION

Connection to or disconnection from Holy Cross Energy's distribution system shall be made by Holy Cross Energy personnel only. Under no circumstances will the consumer or their agents be permitted to make the connection to or disconnection from Holy Cross Energy's facilities.

At the time of new meter installation, Holy Cross Energy will not turn the consumers disconnect/breaker to the on position.

H. CONSUMER OWNED METER EQUIPMENT RESTRICTIONS

Under no circumstances shall the consumer's equipment:

1. Be connected to or within any metering enclosures including, but not limited to, metering transformer compartments, transformer cabinets or meter sockets.

I. DIVERSION OF ELECTRICITY

Under no circumstances shall devices or attachments be connected to Holy Cross Energy's facilities in such a manner as to permit the use of unmetered energy except in emergencies where specifically authorized by Holy Cross Energy. Legal recourse will be taken by Holy Cross Energy against any person engaged in this activity.

J. ACCESS FOR HOLY CROSS ENERGY EMPLOYEES

Consumers will permit authorized employees of Holy Cross Energy access to premises of the consumer to obtain information concerning connected load, to measure or test service, to read meters, and for other purposes incident to the supplying of electric service.

K. EASEMENTS FOR HOLY CROSS ENERGY FACILITIES

Consumer agrees to provide, as required and at no cost to Holy Cross Energy, necessary easements and suitable land area or building space owned and controlled by the consumer for installation, construction, reconstruction, maintenance, operation, control and use of Holy Cross Energy's overhead and/or underground facilities, used or useful to render service to the consumer.

L. CONSUMER'S RESPONSIBILITY

It is understood that any of Holy Cross Energy's property located on the consumer's premises should be adequately protected against damage and that the consumer is responsible for any damages or loss resulting from improper protection or neglect.

No persons other than employees or agents of Holy Cross Energy may cut wire seals, remove or relocate meters and/or other equipment owned by Holy Cross Energy.

Initial breach of this procedure may result in a written warning detailing the safety violation. A subsequent breach may result in a complaint being filed with the Colorado Department of Regulatory Agencies (DORA), Divisions of Professions and Occupations.

Installation of and proper connection of the service entrance conductors, service lateral and service equipment are the direct responsibility of the consumer and/or the consumer's electrical contractor.

Pad-mounted transformers, switchgear and metering equipment shall be installed with adequate clearance for normal maintenance work as provided in [Section 5](#), and in the Installation Drawings in [Section 8](#).

Underground distribution facilities or pad-mounted equipment shall not be installed until the property is to final grade, property corner pins are in place, and structure location has been established.

M. CONSUMER-OWNED FACILITIES

Consumer facilities, either overhead or underground, beyond Holy Cross Energy's point of delivery are to be installed, maintained and operated by consumer.

1. Holy Cross Energy will not install or permit installation of the consumer's equipment (meter or disconnecting device) on Holy Cross Energy's poles.
2. Consumer's service shall be in conformance with the NEC, the wiring regulations of the public authority and Holy Cross Energy's rules and regulations.
3. Consumer shall maintain their service in a safe operating condition so that it does not constitute a hazard to them or to other consumers or persons. Holy Cross Energy assumes no responsibility for inspection of consumer's lines and facilities and shall not be liable for injury to persons or damage to property when occurring on or caused by consumer's lines or equipment.
4. Posters, placards, radio or television aerials, or other objects shall not be attached to poles of Holy Cross Energy.
5. Service Mast Supports. When a service mast is used for the support of service-drop conductors, it shall be a GRC (2 inch I.D. minimum) conduit for service masts and may require the mast to be supported by braces or guys. Refer to [Section 8](#).

Only Holy Cross Energy's service drop conductors shall be permitted to be attached to a service mast. Phone loops, cable TV conductors, grounding clamps, etc. shall not be attached to the service mast.

6. Attachments (CATV, phone loops, grounding clamps, etc.) to the meter socket, secondary riser or service mast are not permitted.
7. Line and load conductors are not permitted in the same raceway or conduit. Refer to [Section 4](#) of this guidebook.
8. All service laterals and service drops (the point from where it receives its supply to the service disconnect) should be kept as short as possible (in conduit) and in all cases the voltage drop shall be 3% or less (based on their estimated full load), no exceptions. See the voltage drop charts in the Appendix Tables.

N. FAULT CURRENT

It is the intent of Holy Cross Energy to address the consumer's need for information concerning fault current requirements pertaining to new construction, rewire or additional load. The National Electric Code states "Service equipment shall be suitable for the short circuit current available at its terminals". To assure compliance with this requirement, Holy Cross Energy recommends that all over current protective

devices at any new or rewired service have a main disconnect with an interrupting rating greater than or equal to the NEC requirement.

Appendix Tables I and II contain the available symmetrical fault currents that may be anticipated at distribution transformers. Because services commonly increase in load over time, and ordinarily require a larger transformer, Holy Cross advocates that a prudent design uses the available fault current corresponding to a transformer larger than the unit initially required.

Each fault current listed here is based on the lowest anticipated impedance transformer that might be set.

O. SAFETY

1. Overhead Lines

COLORADO REVISED STATUTE (CRS) 9-2.5 (HIGH VOLTAGE POWER LINES - SAFETY REQUIREMENTS)

Each year numerous accidents involving contact with high voltage overhead lines occur, often resulting in serious injury or death. In an effort to prevent these types of accidents, the Colorado legislature has enacted a law intended to establish safe working conditions in areas near high voltage overhead lines.

The following only summarize the primary elements of article 2.5 and shall not be considered a substitute for reading the law itself.

This law applies, with few exceptions, to any person or business entity contracting to do work or perform any activity which could reasonably be expected to bring an individual or equipment closer than ten (10) feet from high voltage overhead lines (greater than 600 volts).

OVERHEAD WIRES AND CONDUCTORS ARE NOT INSULATED FOR PROTECTION FROM CONTACT. CARE MUST BE EXERCISED IN WORKING NEAR OVERHEAD FACILITIES.

Holy Cross Energy must first be contacted to arrange for safety provisions when work is contemplated within ten (10) feet of overhead high voltage lines. Holy Cross Energy is required to provide a cost estimate for making required provisions. If there is a dispute over the amount to be charged, Holy Cross Energy must proceed (within five [5] working days of request) to provide the safety measures. The dispute will be settled later through arbitration or other legal means.

If any prohibited activity, work or operation is begun after agreement has been reached and before the safety provisions have been made, the person or entity performing the work would be liable for damages resulting from contact with high voltage overhead lines.

IMPORTANT NOTE: Illustrations and explanations should not be regarded as a substitute for the law itself.

NATIONAL ELECTRIC SAFETY CODE

It is recommended that no permanent structure be placed within the easement (typically 15 feet from center line) for the overhead facility. If structures, landscaping, and grade modifications are in close proximity to overhead facilities Holy Cross Energy shall be consulted concerning code clearance requirements. Any relocation or modification of the overhead facilities will be at the expense of the consumer.

Any landscaping within the easement shall conform to the Holy Cross Energy Vegetation Management Guidelines.

2. Underground Lines

COLORADO REVISED STATUTE (CRS) 9-1.5 (EXCAVATION REQUIREMENTS)

The purpose of article 1.5 is to prevent injury to persons and damage to property from accidents resulting from damage to underground facilities by excavation.

Anyone planning to dig in or near a public road, street, alley, right-of-way or utility easement, shall notify the Utility Notification Center of Colorado 72 hours (3 working days) before you dig. The Utility Notification Center of Colorado is a utility sponsored system which provides a single source for responding to requests for utility underground field locations. Holy Cross Energy is a member and promotes the use of this State One-Call system. This service is provided without cost to you. **Call the Utility Notification Center of Colorado (UNCC) at 1-800-922-1987.**

Utility facilities may be buried along the rear, side and front property lines in any of the residential areas. Residential service lines may cross homeowners' front and back yards. Many facilities are also located within the street and highway right-of-ways.

Private facilities (secondary electric services) are not located by UNCC as described above. It is recommended that you also hire a private contractor to locate these facilities.

Stakes or paint lines mark the locations of your underground utilities. **PLEASE DIG VERY CAREFULLY, 18" ON EACH SIDE OF THE STAKES OR PAINT LINE.**

COLOR CODES:

- 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

3. Change of Grade

The grade in any public right-of-way or easement must not be changed without first contacting Holy Cross Energy to determine if electric facilities are contained within the right-of-way or easement. Permission may be granted to change the grade by the local Holy Cross Energy [Engineering Department](#) if the grade change will not affect the minimum clearance requirements. Holy Cross Energy construction may be necessary if the grade change will necessitate moving equipment or facilities. The local Holy Cross Energy [Engineering Department](#) can provide an estimate for the cost of any rearrangement of facilities necessary to provide adequate clearance.

4. Unlock, Open, and/or De-energize any Electric Power Apparatus/Equipment Procedures

Holy Cross Energy no longer allows access to energized transformers or primary splice vaults. Holy Cross Energy qualified personnel will assist in these situations.

To assure the maximum safety and protection to all individuals in the near vicinity of all electric power apparatus/equipment, Holy Cross Energy has established the following procedures prior to unlocking, opening, and/or de-energizing electric power apparatus/equipment. These procedures will apply to any Holy Cross Energy transformers and secondary junction boxes where access is needed.

- a. Prior to unlocking, opening, and/or de-energizing any pad-mounted transformers or secondary junction boxes, Holy Cross Energy requires the electrician or authorized personnel making the request, to complete the standard Courtesy Lock Liability Waiver and provide a current certificate of insurance in accordance with the waiver's requirements. See [Appendix C](#).
- b. Normally, a transformer will not be permanently energized until the secondary service is complete. In cases where it is necessary to have the transformers energized such as installing additional secondary to an existing transformer or the connection of temporary service to an energized transformer, Holy Cross personnel must be present.

- c. When adding an additional secondary service to an energized transformer, Holy Cross Energy requires that the electrician or authorized personnel provide all tools, equipment and labor to fully support the job. Holy Cross Energy will assist at the transformer location and prefers that wire be fed into the transformer and pulled from the meter location.
- d. Holy Cross personnel must be present and will supervise / assist as needed when “knocking” conduit into energized splice and transformer vaults. Initial breach of this procedure may result in a written warning detailing the safety violation. A subsequent breach may result in a complaint being filed with the Colorado Department of Regulatory Agencies (DORA), Divisions of Professions and Occupations.
- e. When it is required that Holy Cross Energy personnel be present to allow the applicant to perform work around energized equipment, our standard billing costs will apply. See [Appendix B](#).

P. OFFICES OF HOLY CROSS ENERGY

Main Headquarters Office

3799 Highway 82
PO. Box 2150
Glenwood Springs, Colorado 81602
Phone: 970-945-5491
FAX: 970-945-4081
Dispatch: 970-945-5491 extension 5639
Home Page: www.holycross.com

Avon Office

41284 Highway 6
P. O. Box 972
Avon, Colorado 81620
Phone: 970-949-5892
FAX: 970-949-4566

Gypsum Office

CLOSED

Q. HOLY CROSS ENERGY ENGINEERING DEPARTMENT

General E-mail: HCEEngineering@holycross.com

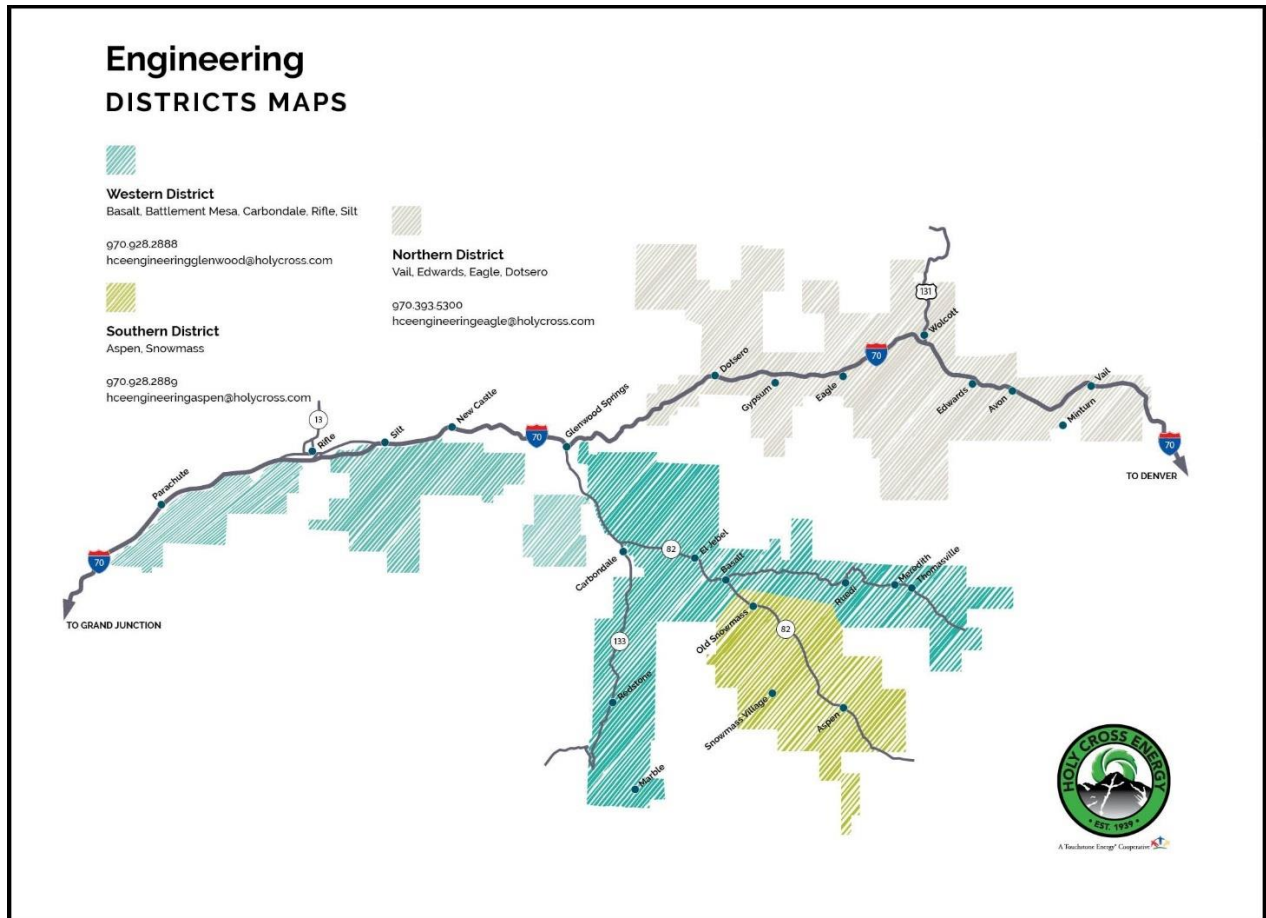
Send Electrical Inspection Reports to: inspections@holycross.com

Western District: 970-928-2888,

HCEENGINEERINGGLENWOOD@HOLYCROSS.COM

Southern District: 970-928-2889, HCEENGINEERINGASPEN@HOLYCROSS.COM

Northern District: 970-393-5300, HCEENGINEERINGEAGLE@HOLYCROSS.COM



Section 3 - Character of Available Service

A. GENERAL

Holy Cross Energy Engineering should be contacted for definite information as to the voltage and numbers of phases available for any particular service, thus delays and perhaps unnecessary expense may be avoided in obtaining final service connections. Depending upon the location of consumer, the nature of load, and the rate under which service is to be supplied, the following types of service may be offered:

1. (1Ø 3W-120/240 or 120/208Y) Alternating current 60 hertz, single phase, three-wire at a nominal voltage of 120/240 volts or 120/208Y volts.
2. (3Ø 4W-208Y/120) Alternating current 60 hertz, three phase, four-wire at a nominal voltage of 208Y/120 volts.
3. (3Ø 4W-480Y/277) Alternating current 60 hertz, three phase four-wire at a nominal voltage of 480Y/277 volts.
4. Other types of service may be available at Holy Cross Energy's option upon prior written approval. Requirements other than the above should be discussed with Holy Cross Energy's local [Engineering Department](#).

B. LOAD BALANCE

To avoid excessive current flow on the neutral and to allow the power system to operate in the most efficient manner, consumer will so connect their equipment that the load at the point of delivery shall be balanced as nearly as possible. Where three phase service is supplied, the consumer shall connect equipment so that the load in any one phase at the point of delivery shall not exceed the load in any other phase by more than fifteen (15) percent.

Single phase metering shall not be allowed from a three phase transformer where the service capacity exceeds 200 amps. Single phase meter stacks shall be fed with a 3 phase, 4 wire service. Services shall then be split to balance the load amongst the phases. The consumer may, if desired, connect the load with three wires. Three phase services shall use three phase service equipment and panels in order to achieve proper load balance.

Section 4 - Facilities Located Adjacent to or on the Consumer's Premises

A. GENERAL

The intent of these guidelines is to familiarize all interested parties with our requirements concerning new and existing electric services. Please study each page as it applies to your particular situation. We must stress the importance of contacting Holy Cross Energy [Engineering Department](#) before performing work on any service (new or rebuilt).

Holy Cross Energy may deny connection of an electric service that does not comply with the requirements set forth in this manual or the National Electrical Code (NEC). We reserve the right to determine the location, type of service, and metering equipment that will be used for each service.

Applications for any exceptions must be applied for in writing for certain installations by using the EXCEPTION/REVISION FORM FOR HOLY CROSS ENERGY CONSUMER SERVICE FACILITIES METERING GUIDEBOOK. See [Appendix D](#).

The consumer, before purchasing equipment or beginning construction of a proposed installation, should confer with Holy Cross Energy's [Engineering Department](#) before approvals can be given to the consumer to determine if the type of service and voltage desired by the consumer is available; to determine if additions or upgrades to Holy Cross Energy's facilities will be required; to secure a definite location of the point of delivery and to secure a suitable metering location. Before any additions or alterations are made which require a change in the type of service or point of delivery, Holy Cross Energy must be notified in advance of the proposed changes. Holy Cross Energy must determine if the service desired is available and, if so, arrange for the changes.

Holy Cross Energy makes service available from either overhead or underground distribution facilities in accordance with the terms of our [Electric Service Tariffs \(Rates and Charges\), Rules and Regulations](#) on file at Holy Cross Energy's main office in Glenwood Springs.

Connecting and metering an electric service that is not in compliance with this guidebook is not acceptance of the service nor does it relieve the consumer of the obligation to make corrections to the service in order to comply with this guidebook.

In the event a consumer's electric service is not energized because of a violation of Holy Cross Energy specifications or appropriate code, Holy Cross Energy will notify the consumer, or his agent, verbally or in writing of the violation and appropriate corrections. The consumer will be billed for a return trip as described in our "Billing Guidelines". See [Appendix B](#). Once the corrections have been made and the return trip fee has been paid in full, Holy Cross Energy shall connect electric service.

B. METERS ON POLES

Holy Cross Energy no longer allows meters on primary poles. Meter pedestals shall be located a minimum of 10 feet, but no more than 20 feet, from the pole.

Consumer owned meters/risers may be allowed on a Holy Cross Energy secondary lift pole if there is no reasonable expectation that the pole will be upgraded to be used as a primary pole containing primary voltage conductors. The consumer must receive prior approval from the [Engineering Department](#) before any attachment to a secondary lift pole is made.

C. DISCONNECTS

1. [Self-Contained Metering](#)
A disconnect device (breaker/fused switch) is required on the load side at all meter sockets. .
2. [Instrument Rated Services](#)

A disconnect device (breaker/fused switch/shunt trip) is required on the load side of all instrument rated services. Shunt trip devices shall only be allowed for services at one and two family residential dwellings upon approval and inspection by HCE. Further, shunt trip devices shall never be approved for commercial buildings. The disconnect device shall have a means to lock it in the open position. It shall be located outdoors and be accessible at all times.

Should the consumer choose to lock his disconnect closed, Holy Cross Energy reserves the right to remove such lock if necessary to break load.

All disconnecting means that serves the structure shall be located on the exterior of the structure in an accessible location, next to the electric meter and properly identified.

D. SERVICES

A building or other structure shall be supplied by only one service, in accordance with the most current NEC. Normally, not more than one service lateral or drop will be installed to serve one building or a group of buildings on the same plot, which are owned by one individual or corporation. Wiring beyond the meter location or wiring connecting one building with another on a given consumer's premises is not classed as a service lateral, and shall be owned and maintained by the consumer. Exceptions allowing more than one service are outlined in the most current NEC but must receive prior written approval from Holy Cross Energy (see [Appendix D](#)).

When more than one service is provided, each point of delivery shall be billed as a separate consumer. If more than one service has been provided in accordance with one or more of the following code exceptions, Holy Cross Energy will bill such services as a single point meter.

1. Where a separate lateral or service drop is required for fire pumps, the fire pumps shall be metered per Holy Cross requirements.
2. Where, in the opinion of Holy Cross Energy, the capacity or voltage requirements make multiple services desirable.
3. Where a single building or groups of buildings extend over a very large area and local codes permit, special permission may be given by Holy Cross Energy for additional laterals or drops.

E. NONLINEAR LOADS - Harmonic requirements:

Due to the increasing use of nonlinear equipment, Holy Cross Energy recommends that the consumer's grounded (neutral) conductor be the same size as the phase conductors from the point of delivery to the consumer's service equipment. See [Appendix G](#) for further details regarding nonlinear loads.

F. OVERHEAD SERVICE

Overhead System – Low Voltage (0-1000 Volts)

1. Service Connection
Overhead service drop conductors will be installed and connected to service entrance conductors in accordance with Holy Cross Energy rules and regulations as contained herein.
2. Service Mast Supports
Where a service mast is used for the support of service drop conductors, it shall be of adequate strength or be supported by braces or guys to withstand the strain imposed by the service drop. Holy Cross Energy requires 2" minimum GRC metallic conduit for service masts and may require the mast to be supported by braces or guys.

A service mast may be required on a new or rewired service. The [Engineering Department](#) will determine the requirement for your location. See [Section 8](#) for typical installation methods.

Holy Cross Energy's service drop conductors shall be the only attachment to a service mast. Phone loops, cable TV conductors, grounding clamps, etc. shall not be attached to the service mast.

3. Point of Attachment

Holy Cross Energy shall specify the location of the service entrance wiring most suitable for connection to Holy Cross Energy's lines.

The point of attachment shall be located within 24" of the weatherhead and at a point nearest Holy Cross Energy's facilities intended to provide the service. See [Section 8](#).

Holy Cross Energy poles (structures) that are used (including future use) for primary overhead to underground transition (riser poles) are not available for overhead service applications. They shall be for Holy Cross Energy use only.

The point of attachment must be located such that adequate clearance can be obtained for the service drop from trees, awnings, patios, foreign wires, adjacent buildings, swimming pools, etc. (see [Section 8](#)). Service drops shall NOT pass over adjacent private property without property owners' prior approval and easement.

Vertical Clearance From the Ground – Service drop conductors shall have the following minimum clearance from final grade or as the most current NESC requires.

- a. Thirteen (13) feet at the service entrance to buildings for areas accessible only to pedestrians.
- b. Sixteen (16) feet above private driveways not subject to truck traffic.
- c. Eighteen (18) feet above commercial areas, parking lots, and other areas subject to truck and public street traffic.

The point of attachment shall be within the height restrictions outlined in the most current NESC. Specified heights and clearances may be maintained by the use of an approved service mast through the roof. A bolted clevis attachment directly to the building will be furnished and installed by the consumer. A mast clevis will be furnished and installed by the consumer. If the consumer elects to install or replace the point of attachment, they shall furnish the device.

4. Length and Size of Service Drops

The allowable length of service drop conductors shall be governed by ground clearance, intervening trees and obstructions, and the size of the conductor required. Service drops shall not exceed the maximum span length as shown in the Appendix Tables. For situations not covered in the Appendix Tables, contact the [Engineering Department](#).

5. Service Poles

Where the length of the service drop conductors is excessive or the size of the conductor would cause undue mechanical strain upon either the consumer's structure or Holy Cross Energy's pole line, a pole may be required. Refer to the Appendix Tables for service drop limitations.

Overhead System – Primary Voltage (Above 1000 Volts)

Because of safety precautions which must be exercised in the use of energy at voltages in excess of 1000 volts, it is necessary that Holy Cross Energy be consulted in regard to service entrance, transformer location, and meter installation details for this class of service before construction is started.

G. UNDERGROUND SERVICE

Underground system – Low voltage (0-1000 volts).

1. Service Connection

Underground service laterals from underground distribution systems or from overhead distribution systems will be installed in accordance with Holy Cross Energy's rules and regulations and the most current NEC.

Installation of underground service laterals is the responsibility of the consumer, not Holy Cross Energy. All underground services, commercial or residential, installed ahead of Holy Cross Energy meters shall be sized to not allow a voltage drop more than 3% between the transformer and meter (see voltage drop charts in the Appendix Tables) and shall be installed in conduit.

Holy Cross Energy cannot recommend a wire size for service laterals for liability reasons. Holy Cross Energy, however, will approve the wire size chosen by the consumer (or their representative) if it meets or exceeds the requirements of the paragraph above.

The distance between the meter and the transformer shall not exceed 250'. Any distance greater than this requires prior approval of Holy Cross Energy.

2. Point of Entry

Holy Cross Energy shall specify the location of the service lateral and metering equipment most suitable for connection with Holy Cross Energy's facilities.

3. Secondary Junction Box – Pad Mounted Transformer

Holy Cross Energy requires the use of secondary junction boxes for all new construction and in certain retrofit installations where the service is fed from a pad mounted transformer (except 480V). Holy Cross Energy Engineering must be contacted prior to any installation. These secondary junction boxes will be furnished and owned by Holy Cross Energy and installed by the property owner to Holy Cross Energy specifications, in a location determined by Holy Cross Energy. Holy Cross Energy will be responsible for the conduit and secondary conductor between the transformer and the junction boxes. See drawing in [Section 8](#).

4. Secondary Junction Box, Pole Mounted – Overhead Transformer

For underground services fed from an overhead transformer, Holy Cross Energy may install, own and maintain the riser and the conductor to a pole mounted secondary box. The consumer owned and installed conduit will terminate in the bottom of this box.

5. Permanent Service Laterals

Service laterals shall be installed in one continuous run of conduit from the point of delivery to the meter. As such, the owner shall confirm the point of delivery with Holy Cross Energy before any service work is started. Any rework resulting from the failure to confirm the point of delivery with Holy Cross Energy will be the responsibility of the owner.

6. Service Entrance Conductors

Service entrance conductors shall have a current carrying capacity as required by the NEC or other regulatory authority having jurisdiction. Holy Cross Energy 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 entrance conduit. All line side (non-metered) conductors must be in a continuous conduit run from the point of delivery to the meter socket. Customer owned junction boxes and/or conduit bodies (LB) or similar devices are not allowed. Application for any exceptions must be applied for in writing using the EXCEPTION/REVISION FORM FOR HOLY CROSS ENERGY CONSUMER SERVICE FACILITIES METERING AND USE "GUIDEBOOK". See [Appendix D](#).

It is recommended that trench tape be installed over all service entrance conductors regardless of application or burial method.

Drawings showing typical methods for installing service entrance wiring are contained in [Section 8](#).

7. Ground Movement

Due to the expansion and contraction of soils in our service territory and settling of ground, [slip sleeves](#) shall be used on all underground installations (expansion couplings are not permitted). Conduits suitably embedded in concrete will not be required to have [slip sleeves](#). Schedule 40 PVC, Schedule 80 PVC, or GRC shall be used below grade and either Schedule 80 or GRC shall be

used above grade. All conduits entering Holy Cross Energy vaults must be grouted in place. See drawings in [Section 8](#).

8. Temporary Service Laterals

Direct burial of conductors will not be permitted except for temporary services. It is recommended that all service laterals be installed at a minimal depth of 24 inches. Knockouts provided in our transformer vaults range from 18" to 41" deep depending on the vault design. All conduits must enter the vault through knockouts and must be grouted. Prior to excavation obtain access to the transformer vault to determine depth and position of knockouts and other cables. See [Section 8](#). When determined that a secondary junction box is not required, Holy Cross Energy will knock into the vault as we no longer allow unsupervised access to energized transformers (Refer to [Section 2.O.4.c](#)).

H. PRIMARY METER INSTALLATIONS

Holy Cross Energy has a primary metering rate available. Please contact the Holy Cross Energy [Engineering Department](#) for details.

I. TRANSFORMER/EQUIPMENT INSTALLATIONS, PAD-MOUNTED

Holy Cross Energy will provide an outdoor pad-mounted transformer for service to consumers under the following conditions:

1. Holy Cross Energy will own, operate and maintain the primary underground installation between the adjacent distribution facilities and the transformer, including primary cable, conduits, transformers and protective equipment. All Holy Cross Energy equipment shall be installed in an easement.
2. Holy Cross Energy will connect all conductors and maintain the low voltage connection at the transformers secondary terminals, HCE secondary junction box or cabinets.
3. Property shall be to final grade (plus or minus 6 inches) except at equipment location, which shall be to exact final grade. Property corner pins are to be in place with the structure staked or the foundation in, prior to installation of the pad-mounted equipment and splice vaults.
4. Holy Cross Energy should be consulted well in advance of any proposed project for approval of location and transformer capacity.
5. In the event, and in the judgment of Holy Cross Energy's engineer that the consumer's selected location for the installation of the pad-mounted equipment is not adequately protected from traffic when directed by public authority, consumer shall provide and install either a fence, guardrail, or guard posts (bollards) to protect the pad-mounted equipment. The installation shall, so far as practical, conform to the drawings in Section 8.
6. Holy Cross Energy will not permit instrument transformers in Holy Cross Energy owned transformers.
7. Vehicle access to transformer must be provided.

Further details relating specifically to transformers will be found in the separate transformers section of this guidebook, [Section 5](#). Drawings showing typical transformer installations and clearances are contained in [Section 8](#).

J. POINT OF DELIVERY

It is the policy of Holy Cross Energy 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 Holy Cross Energy's [Electric Service Tariffs \(Rates and Charges\), Rules and Regulations](#) on file at its main office in Glenwood Springs. In general, the point of delivery will be considered to be at the point of attachment and connection to the service mast and service entrance conductors for consumers' service supplied by an overhead service drop. The point

of delivery for a consumer served by an underground service lateral is the pad-mounted transformer or a secondary junction box, which is owned by Holy Cross Energy.

Consumer installed service(s) shall be 500 kcmil conductor, (600 kcmil compressed), or smaller, for single phase services. Three phase service conductor shall be 500 kcmil (600 kcmil compressed) or smaller. The number of conductors that may be terminated is limited by the type of installation as follows:

1. Holy Cross Energy will no longer permit meters on its primary electric poles.
2. Underground service laterals from a three phase pad-mounted transformer are limited to fifteen (15) conductors per phase (500 kcmil). If a transformer serves multiple lots, then service laterals are limited by the ratio of conductors per lot; i.e. five lots would allow each lot to have a maximum of three conductors per phase. Holy Cross Energy Engineering shall be contacted prior to any installation.

Three phase services, which are fed via a secondary junction box, will be limited to six conductors per phase. Holy Cross Energy's [Engineering Department](#) shall determine if a junction box will be installed.

3. Underground service laterals from single phase pad-mounted transformers are limited to six conductors per leg – 500 kcmil maximum size (600 kcmil compressed). If a transformer services multiple lots, then service laterals are limited by the ratio of conductors per lot; i.e. three lots would allow each lot to have a maximum of two conductors per leg.

Single phase services, which are fed via a secondary junction box, will be limited to six conductors per leg. Holy Cross Energy's [Engineering Department](#) shall determine if a junction box will be installed

Conditions other than above should be discussed with Holy Cross Energy's [Engineering Department](#).

For requirements greater than the limitations above, special arrangements must be made with Holy Cross Energy for the installation of bus duct, larger conductor, or other high capacity service entrance wiring methods. This arrangement may be made by contacting the Holy Cross Energy [Engineering Department](#). The assigned engineer will assist in the design of these high capacity entrances.

K. METER INSTALLATION AND OWNERSHIP

Normally only one meter will be installed for each rate under which the consumer receives service at an address. Where two or more meters are installed at an address, the applicable rate will apply to each meter and the meter reading will not be combined for billing purposes except when the magnitude of the consumer's load exceeds the metering equipment capabilities. All meters, and other electrical facilities installed by Holy Cross Energy upon the consumer's premises for the purpose of delivering or measuring electrical energy to the consumer shall continue to be the property of Holy Cross Energy and may be repaired, inspected, tested, relocated, replaced or removed only by Holy Cross Energy.

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 (see illustration in [Section 8](#)). The consumer is requested to notify Holy Cross Energy of any defect in Holy Cross Energy's wiring or equipment and of any failure of the meter to register. The consumer must notify Holy Cross Energy of any known improper metering of energy.

Meters located on the shed side of roofs shall have adequate protection from falling ice.

Only authorized Holy Cross Energy employees are permitted to connect, disconnect, move or remove meters. All metering equipment owned by Holy Cross Energy and not installed shall be returned to Holy Cross Energy.

L. CLASSIFICATION OF METERING

Holy Cross Energy classifies its metering installations as:

1. Residential
Self-contained (hot sequence)
Instrument Transformer (hot sequence)
2. Commercial and Industrial
Self-contained (hot sequence)
Instrument Transformer Type – Primary and Secondary (hot sequence)
Single Point Secondary Metering associated with the totalizing rate

The type of metering used will be determined by Holy Cross Energy based upon the voltage of the service, the load supplied, the available fault current, and the applicable rate.

Hot Sequence Meter refers to a meter that is connected directly to the source without any disconnecting means between the meter and the source.

Cold Sequence Meter refers to a meter that is connected with a disconnect device between the meter and the source.

Holy Cross Energy does not allow Cold Sequence Metering. Cold Sequence Metering would be an exception to these guidelines and would only be permitted with written permission. Possible exceptions for Cold Sequence Metering:

- a. In certain instances, multiple meter services are permitted to have a current limiting disconnect device ahead of the common bus for the purpose of limiting the available fault current to acceptable levels.
- b. In certain instances, multiple meter services are permitted to have a disconnect device ahead of the common bus to meet NEC requirements.

Single Point Metering is defined as a single revenue meter measuring electric service to multiple buildings.

3. Self-Contained Metering

Self-Contained Metering refers to an electric utility meter, used in an electric service, in which 100% of the energy used by the service is measured by, and passes through the meter.

a. Single Phase Self-Contained Metering

Installations with a connected load of 200/400 amperes or less and a voltage rating of 120/240 volts or may be metered with a self-contained meter and must be fed by a single-phase transformer. The single phase meter socket is the property and responsibility of the consumer and will be inspected by local authorities for compliance to NEC and any other applicable codes. The quality of the mounting device must also conform to Holy Cross Energy's standards as described in this section under the heading METER SOCKETS. See [Section 8](#) and [Section 9](#) for installation information.

b. Three Phase Self-Contained Metering at 208Y/120 Volts

Installations with a connected load of 200/400 amperes or less and a voltage rating of 208Y/120 may be metered with a self-contained meter. Individual three phase meter sockets are the property and responsibility of the consumer and will be inspected by local authorities for compliance to NEC and any other applicable codes. The quality of the mounting device must also conform to Holy Cross Energy's standards as described in this section under the heading METER SOCKETS. See [Section 8](#) and [Section 9](#) for ownership and installation information.

c. Single Phase Self-Contained Metering at 240/480 Volts

Holy Cross Energy will not direct meter any 480 Volt service due to the hazards involved. These types of services will be metered with instrument transformers.

d. Three Phase Self-Contained Metering at 480Y/277 Volts

Holy Cross Energy will not direct meter any 480 Volt service due to the hazards involved. These types of services will be metered with instrument transformers.

4. Instrument Transformer Type Metering – Secondary and Primary

Instrument Transformer Metering refers to an electric utility meter, used in an electric service, in which only a specific proportion of the energy, as determined by the transformer ratios, used by the service is measured by and passes through the meter. The actual energy use is calculated by the metered amount times the transformer ratios.

a. Instrument Transformer Metering Secondary Voltage, General Requirements

The instrument transformer compartment within consumer owned switchgear or current transformer cabinet(s) and the necessary conduit and fittings shall be supplied, installed, owned and maintained by the consumer. The instrument transformers and meter sockets will be supplied and owned by Holy Cross Energy but will be installed by the consumer. Holy Cross Energy assumes no responsibility whatsoever for the manufacturer's, supplier's, electrician's or consultant/engineer's compliance with all applicable NEC and NESC codes as well as all local and state codes, regarding the location and conditions of use. The following are the minimum general requirements:

1. The line side of the current transformer is designated by a white dot or an embossed H1 and shall be pointed toward the source. Refer to [Section 8](#).
2. Space for instrument transformers is to be provided ahead of the main switch. The size of the compartment shall allow a minimum bending space in accordance with the current NEC.
3. Maximum height to the top of the instrument transformer compartment shall not exceed 7'0" from the floor or the final working grade. Minimum clearance from the bottom of the cabinet to the floor or final working grade shall be no less than 18".
4. All transformer compartments shall have barriers between adjacent areas and shall contain no other wires or equipment, except what Holy Cross Energy uses to complete the meter installation.
5. All doors and covers to compartments designated for instrument metering equipment and any that are on the line side of metering equipment shall have a means to be sealed off with Holy Cross Energy seals.
6. Meter sockets may be mounted on current transformer cabinets or switchgear providing they are installed on a cover or door that is hinged on the side. They may not be mounted on a screw cover panel
7. Instrument transformers will be supplied by Holy Cross Energy and mounted by the consumer's electrical contractor in such a way that the secondary terminals are readily accessible from the front door of the compartment.
8. Connections (line and load) to the current transformer will be made by the consumer's electrical contractor.
9. When current transformers are attached to buses or conductor terminations, 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 and be torqued per specifications.
10. A neutral lug shall be made available near the front of the current transformer compartment so that it can be safely accessed even if the switchgear is energized.
11. The neutral lug shall allow reliable termination of metering conductors ranging from a single #12 AWG solid through two #10 AWG stranded copper conductors.

12. Consumer owned equipment other than service conductors, will not be installed in the space dedicated to instrument transformers.
13. Underground metering conduit from the meter socket to the instrument transformer cabinet, must be corrosion resistant GRC or PVC (1" minimum in size). Note: If PVC is used above grade, it shall be Schedule 80 and supported in accordance with the NEC.
14. Above ground metering conduit (1" minimum in size) from the meter socket to the instrument transformer cabinet shall be GRC, EMT or Schedule 80 PVC and supported in accordance with NEC.
15. Metering conduit (1" minimum) must be a continuous run between the meter socket and the current transformer compartment. The conduit run shall not exceed 100 feet in length. Junction boxes, conduit bodies (LB's) or similar devices are not allowed.
16. The associated meter cabinet shall be grounded in accordance with the current NEC.
17. For a single service with parallel conductors feeding up to six main disconnects (as permitted in the NEC), the common phase wires running through each current transformer must be joined together (couple taps, split bolts, tap lugs) in the instrument metering equipment cabinet and identified. See drawings in [Section 8](#).
18. Instrument transformers are not permitted in Holy Cross Energy transformers.
19. To avoid induced currents, service laterals and service entrance conductors must be grouped as complete circuits (including each phase conductors, grounded conductor and equipment grounding conductor where used) in each conduit and each cable run.

Conductor identification shall be as follows:

1Ø 3W-120/240 or 120/208Y

Phase A - black

Phase B - red

Neutral - white

3Ø 4W-208Y/120

Phase A - black

Phase B - red

Phase C - blue

Neutral - white

3Ø 4W-480Y/277

Phase A - brown

Phase B - orange

Phase C - yellow

Neutral - gray/white

b. Instrument Transformer Metering Secondary Voltage, In Switchgear

In addition to the requirements of #1 above, instrument transformer metering secondary conductors in switchgear must meet the following requirements.

Installations with 2" bus, rated 1,000 amperes current capacity or less, shall have a 12" long removable section which will accommodate the insertion of an Itron R6B (or equivalent) bar type current transformer. The minimum space requirement for this installation is approximately 24" wide by 30" high by 10" deep.

Installations with 4" bus, rated 1,000 to 4,000 amperes, shall have either a 12" or 14.5" long removable section which will accommodate the insertion of an Itron type JAD-O (or equivalent) window type current transformer with consumer provided mounting base. The removable bus section shall have an enclosed screw type compression terminal to accommodate the potential

leads to the meter. These terminals shall accommodate a minimum #12 AWG stranded or solid wire. The minimum space requirement for this installation is approximately 36" wide by 30" high by 14" deep.

c. Instrument Transformer Metering Secondary Voltage, In Current Transformer Cabinet

In addition to the requirements of #1 above, instrument transformer metering secondary conductors in current transformer cabinets must meet the following requirements.

Standards for current transformer cabinets

1. Only products having a design approved by the Holy Cross Energy metering department, as detailed below, will be allowed to be placed in service.
2. The cabinets (enclosures) and the necessary conduit, wire and fittings shall be supplied, installed, owned and maintained by the consumer.
3. For services through 800 amps:
Current transformer cabinets (enclosures) shall meet NEMA 3R standards and shall be factory labeled "NEMA 3R". The cabinet shall be UL listed (labeled) as a CT enclosure, have a 600 volt maximum rating, be equipped with a grounding lug, and have a minimum 50,000 amp fault withstand rating. Doors may be hinged on the side or screw cover (lift off type) and shall have the ability to be made secure with a single padlock (having a 5/16" diameter shackle) or seal. No additional screws, clamps or seals shall be required.

Current transformer enclosures shall provide adequate conductor bending space in accordance with the current NEC and be mounted next to the meter socket on the exterior side of the building or residence. Minimum dimensions for 1Ø current transformer enclosures shall be 30" by 24" by 11". Minimum dimensions for 3Ø current transformer enclosures shall be 36" by 36" by 11". Must have a minimum of two ¼" studs per CT, spaced as required per CT template located on the drawings in [Section 8](#).

4. For services 1000 through 4000 amp:
Any service greater than 800 amps must use either a bused current transformer enclosure or switchgear. Current transformer enclosures must meet the same general criteria as 225 through 800 amp units described above, except they shall contain 4" bus with either a 12" or 14.5" long removable section which will accommodate the insertion of an Itron type JAD-O or equivalent window type current transformer.

M. METER SOCKETS

The only metering sockets Holy Cross Energy will furnish are sockets for instrument rated services, used in conjunction with current transformers and potential transformers also furnished by Holy Cross Energy. Throughout this guidebook however, we have called out the type of meter sockets Holy Cross Energy will accept. Any service not complying with these requirements will not be energized.

ALL MULTIPLE UNIT PROJECT OWNER/DEVELOPERS MUST COMPLETE AND SUBMIT THE "MULTIPLE UNIT METER CHECK-OUT POLICY". SEE [APPENDIX E](#).

1. Multiple Meter Identification

The electric meter will not be set until each meter socket and the premises it supplies have been properly identified. Proper identification shall mean that the legal physical address is plainly marked by a permanent durable means at the corresponding main service breaker, tenant panel board, and doorway or entrance to the apartment, office, store or premise. The method of identifying the corresponding unit and the meter socket is with a stamped brass tag securely attached. Any other means of identification is not acceptable. The load wires from each meter mounting device shall be in a separate conduit to each disconnect device.

Installation of the mounting device and proper connection of the line and load conductors are the responsibility of the electric contractor or consumer. See [Appendix E](#) (Holy Cross Energy Multiple Unit Meter Check-out Policy).

For installations not covered by the drawings in [Section 8](#), the Holy Cross Energy [Engineering Department](#) or Metering Department must be contacted prior to the installation.

2. Additional Requirements for Multiple Meter Sockets

Fifth (5th) terminal is required at the 9 o'clock position. This terminal shall be connected within the socket to the neutral buss.

Each meter location shall have an individual ringless cover and sealing provisions.

Every line side compartment shall accommodate provisions for a Holy Cross Energy seal whether or not the compartment is designed to house a meter.

Maximum center to center distance between the bottom meter socket and the top meter socket shall not exceed 54 inches.

Holy Cross Energy meter personnel are instructed NOT to install a meter at a location where the meter socket does not comply with ALL criteria above.

3. Non-Standard or Three Phase Multiple Unit Mountings

- a. Meter sockets not defined in sub-sections 1 and 2 above, such as pedestals or 3Ø stacked sockets, shall be equal in quality and features to the comparable device Holy Cross Energy would otherwise furnish, and must be approved for use by the Holy Cross Energy meter department prior to installation.
- b. Three phase multiple unit devices designed for four wire poly phase use must have a seven terminal mounting block with a heavy duty, 200 amp, locking jaw, lever type by-pass.
- c. Every line side compartment shall accommodate provisions for a Holy Cross Energy seal whether or not the compartment is designed to house a meter.

4. Single Phase and Three Phase Self-Contained Meter Socket

Purchasing, installing, connecting and maintaining the socket and all related equipment, except the meter, shall be the contractor or consumer's responsibility.

All single position, single phase devices installed on the Holy Cross Energy system shall meet Holy Cross Energy's standards for these devices as listed below. The installation of meter sockets must conform to the NEC and meet any local code requirements that may be enforced by the local inspection authority.

STANDARDS FOR SINGLE PHASE AND THREE PHASE SINGLE METER SOCKETS

Following is a list of criteria for single phase meter sockets in which Holy Cross Energy will install meters. No meter sockets will be considered approved unless they adhere to these criteria.

- a. **Meter socket installations shall be installed per NEC standards, and shall be inspected by the local authority.**
- b. Sockets shall be constructed from sheet metal or aluminum in accordance with Underwriters Laboratories (UL) standard No. 414, revised October 1992, for meter sockets.
- c. Sockets shall have ringless covers, handle type bypasses, and a fifth (5th) terminal installed in the 9 o'clock position connected within the socket to the neutral.
- d. Ring type sockets are not allowed without Holy Cross Energy approval.
- e. Sealing:

- 1 The sealing means shall provide for Holy Cross Energy wire seal and/or key type padlock (5/16" diameter shackle).

5. Instrument Transformer Mountings

Instrument transformer(s) and meter sockets will be furnished by Holy Cross Energy and can be picked up at our offices located in Glenwood Springs or Avon.

N. METER LOCATION AND INSTALLATION SPECIFICATIONS (SELF-CONTAINED AND INSTRUMENT RATED)

All locations must comply with Holy Cross Energy rules and regulations. The consumer shall provide and maintain without cost to Holy Cross Energy, an easily accessible metering location on or within the premises to be supplied service. Work started before the meter location has been approved shall be at the risk of the consumer and/or contractor.

Where meters, originally installed in accessible locations satisfactory to Holy Cross Energy, are rendered inaccessible by virtue of alterations or new construction by the owner of the premises or his agent, such meters shall be reinstalled at a point designated by Holy Cross Energy at the expense of the property owner.

The location of meters and metering equipment shall be designated by Holy Cross Energy personnel. No wiring dependent upon the meter location should be started until such location has been definitely established. Normally meters and instrument transformer enclosures shall be installed outdoors in accordance with rules governing outdoor meter installations. If it is not practical to install a current transformer enclosure or meter outdoors, approval must be obtained from the Holy Cross Energy meter department before an indoor location can be determined. Ownership and installation of line side facilities shall be in conformance with the drawings contained in [Section 8](#). Meter mountings and associated equipment, both indoor and outdoor, shall be mounted securely and plumb. Self-tapping screws are not allowed. Where attachment is made to masonry, concrete, or plaster walls, expansion bolts, or anchors shall be used. Ramset type is not permitted. Meter mountings shall not be placed in a location where meter readings or servicing may become impracticable or may cause damage to the electric meter. Where meter sockets are outdoor pedestal type mount, all wood used shall be pressure treated type or rated for exterior use. Wood posts installed below grade shall be a minimum of 6" by 6" and may only be used on temporary applications. If meter sockets are mounted on Unistrut, it shall be a minimum of 1 5/8" deep, solid type (Unistrut with factory punched holes is not allowed). All posts shall be poured in place with concrete to a depth of 30" below grade.

The line side conductors in meter sockets shall be required to be separated from the load side conductors by means of permanent barrier. Access to the line side conductors shall be sealable. No conductors other than line side conductors shall be permitted in line side conduits, troughs, or lug landings.

All line side (unmetered) conductors must be in a continuous conduit run from the point of delivery to the meter socket. Consumer owned junction boxes, conduit bodies (LB's) or similar devices are not allowed.

Metering conduit (1" minimum) must be a continuous run between the meter socket and the transformer compartment. The conduit run shall not exceed 100 feet in length. Consumer owned junction boxes, conduit bodies (LB's) or similar devices are not allowed.

The use of line side (ahead of the meter) disconnects are not allowed, except where required by National Electrical Code.

1. Meter Clearances

Proper clearances of meter mountings necessitate consultation between the consumer and Holy Cross Energy. See drawings in [Section 8](#) for clearance requirements.

METER CABINETS AND METER ROOMS SHALL NOT BE USED AS STORAGE CLOSETS!

- a. 1000Volts or Less – Spaces About Electrical and Metering Equipment

Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. Minimum depth of working spaces from the front face of electrical equipment shall be three (3) feet. Width of working space shall be the width of the equipment or 30" from floor to ceiling, whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

b. Over 1000 Volts – Spaces About Electrical and Metering Equipment

Minimum horizontal distance of clear working space at electrical equipment shall be ten (10) feet.

This space shall be unobstructed by walls, trees, rocks, posts, etc. The cost of removing such obstructions shall NOT be at the cost of Holy Cross Energy.

2. Outdoor Meter Locations

Outdoor meters shall be installed in a location that is accessible at all times. Proper location of meter mountings necessitate consultation between the consumer and Holy Cross Energy.

- a. Outdoor meters shall not be installed on fences or where they will interfere with traffic on sidewalks or driveways or; where they will obstruct the opening of doors or windows, or in any location which may be considered hazardous or where they may be subject to damage (snow, plows, ice, etc.).
- b. Meter mountings shall be installed so that the center of the meter cover shall be at least 54 inches and no greater than 66 inches above the finished grade or permanent platform. The height of the meter may be measured from a permanent, accessible platform provided that the platform is not less than three (3) feet by three (3) feet square.
- c. Outdoor meters or multiple meters shall be located so that a line of sight is established from an [ACCESSIBLE](#) location. In new underground residential distribution areas, front lot construction is standard for electric distribution facilities. The meter shall be located at a point approved by Holy Cross Energy Engineering.
- d. The customer is cautioned that recessed meters and metering apparatus must be accessible for maintenance and repair. Holy Cross Energy will not be responsible for any damage to surrounding surfaces.
- e. If meter cabinets are constructed to screen meters, the doors of such cabinets shall be constructed of lightweight materials, have handles, and open wide enough for easy access for maintenance and reading. The doors shall be hinged on the side and shall not be locked. The door openings shall be a minimum of 30" in height and the lowest extension of the door will be at least 30 inches above grade so that ice and snow will not impair access. Holy Cross Energy will not be responsible for damage to consumer constructed meter cabinets. All enclosures must meet NEC working space requirements. See drawings in [Section 8](#).
- f. Where service is rendered to individual consumers located in a structure designed for multiple occupancy, such as an office, professional building, apartment building, etc., the individual outdoor meters should be grouped at a point nearest the service entrance attachment.

Individual meter mountings may be placed as close together as the fittings will permit, but in no case less than 2" apart. Where the available space requires that meter socket be placed in vertical alignment, the highest meter may not be more than seven (7) feet above the grade to the center of the glass cover, and the lowest meter may not be lower than thirty (30) inches above the grade to the center of the glass cover.

3. Indoor Meter Locations

When indoor meter locations are necessary and approved by Holy Cross Energy, the meters shall be located where they will be readily accessible at all times for emergencies, meter reading, testing, and other maintenance purposes. All meter locations shall meet all NEC requirements regarding but not limited to; access, egress and clear space around the meter.

Proper location of meter mountings necessitate consultation between the consumer and Holy Cross Energy.

- a. Indoor meters shall not be installed where they will interfere with traffic in halls or passageways, where they will obstruct the opening of doors or in any location which may be considered hazardous.
- b. Meter mountings shall be installed so that the center of the glass meter cover will be at least four and one-half (4 1/2) feet and no greater than five and one-half (5 1/2) feet above the floor or permanent platform. The height of the meter may be measured from a permanent, accessible platform provided that the platform is not less than three (3) feet by three (3) feet square.
- c. Where meters must be contained within a locked area, Holy Cross Energy shall provide a "lock box" for the consumer to install at the location of the locked area. The consumer shall provide the necessary key, which will be placed within said "lock box" by Holy Cross Energy.
- d. The customer is cautioned that recessed meters and metering apparatus must be accessible for maintenance and repair. Holy Cross Energy will not be responsible for any damage to surrounding surfaces. See [Section 4](#).
- e. Meters and metering apparatus may not be installed in closets, unless designed solely for that purpose.
- f. Any equipment owned and maintained by Holy Cross Energy shall not be altered.
- g. Where two or more meters are to be installed indoors, they shall be grouped together in a common room or other suitable space accessible at all times to authorized Holy Cross Energy personnel. Individual meter mounting may be placed as close together as the fitting will permit, but in no case less than 2" apart. Where the available space requires that meter socket be placed in vertical alignment, the highest meter shall not be more than seven (7) feet above the floor to the center of the glass cover, and the lowest meter shall not be lower than twenty-four (24) inches above the floor to the center of the glass cover.

4. Dry Type Transformers That Feed Meter Stacks

The use of unmetered voltage transformations on the supply side of the Point of Metering shall be subject to the following conditions:

- a. Holy Cross Energy must be provided a pertinent one-line diagram.
- b. Must receive prior written approval from Holy Cross Energy for the facility.
- c. Facility shall use the lowest available loss transformer.
- d. Holy Cross Energy shall be provided with "[Typical Transformer Test Data](#)" and "[Certified Test Reports](#)" before installation of meters.
- e. Unmetered voltage transformation devices are not owned, operated, and maintained by Holy Cross Energy.
- f. All consumers receiving service from unmetered voltage transformations shall, in addition to the appropriate base retail rate, receive a "Service Loss Factor Revenue Adjustment Rider".

Section 5 - Transformers

A. GENERAL

Holy Cross Energy shall not be required to furnish primary transformers unless they are of standard size, voltage and impedance as established by Holy Cross Energy for the locality where the service is rendered. Holy Cross Energy must be notified in advance of any change in the consumer's load requirements that may affect the installed transformer current or voltage rating.

Limitations on the number and size of secondary conductors are discussed under the heading of "Point of Delivery" in [Section 4](#).

1. Capacity

- a. If the consumer's power requirements within six months after the installation of transformers proves to be significantly greater or less than shown in the application for service, Holy Cross Energy may make a change in the installed transformer capacity and the consumer may be required to pay Holy Cross Energy the cost of making the change.
- b. An increase in the transformer capacity will increase the available fault current and might affect the interrupting capability of the main disconnect. Refer to [Section 2](#) for more information on fault current.

B. PAD MOUNT

1. Clearance

A minimum of ten feet clearance, for hot stick operation, shall be maintained in front of the doors of the pad-mounted transformer. Transformers will not be located under any overhang (roof, balcony, stairs, etc.). Four feet of rear and side clearances shall be maintained in accordance with Holy Cross Energy construction standards. Pad-mounted transformers require air circulation for cooling. Clearance and screening requirements are shown in [Section 8](#). Clearances required in specific cases may be obtained from Holy Cross Energy's [Engineering Department](#).

2. Installation

General requirements concerning installation and operation of transformers is discussed under the heading of "Transformer/Equipment installation, Pad-mounted" in [Section 4](#).

Section 6 - Service Utilization

A. GENERAL

All wiring, conduits, cables and apparatus, including protective equipment, pertaining to the electric service on the consumer's side of the point of delivery, shall be furnished, installed, and maintained by the consumer. Such equipment should be selected to provide efficient use of energy and good voltage regulation. The consumer shall not use any equipment or device that will adversely affect Holy Cross Energy's service to the consumer or to other consumers. The consumer's equipment shall be suitable for the service supplied and shall be installed and maintained in good and safe condition by the consumer in accordance with the rules and requirements of the most current NEC, the public body having jurisdiction, and Holy Cross Energy.

1. Harmonics

There are a growing proportion of harmonic producing nonlinear loads on the distribution system. Excessive harmonic distortion on the distribution system can have adverse effects on both utility and consumer equipment.

Consumer equipment shall comply with "Consumer Harmonic Distortion Standards", [Appendix C](#). Filters used to correct harmonic distortion must be sized and connected (switched) with the load to avoid a resultant overall leading power factor.

2. Power Factor

The consumer will maintain, at the point of delivery, a power factor as near unity as practical. In the event a low voltage condition due to lagging power factor exists in a degree sufficient to impair Holy Cross Energy's service, the consumer may be required to install suitable capacitors or other equipment necessary to raise the overall power factor at the point of delivery to a satisfactory value. The consumer will maintain such power factor correction equipment in good operating condition and see that fuses, relays and switches are functioning properly. Power factor correction equipment must be sized and connected (switched) with the load to avoid a resultant overall leading power factor.

B. MOTORS

Appliances and apparatus should be equipped with motors which will provide the consumer with satisfactory operation of the appliance and, at the same time, avoid interference with service to other consumers. Motors may cause voltage disturbances resulting in flickering lights, television interference and other objectionable conditions.

1. Motor Identification

All motors connected to Holy Cross Energy's lines should bear a manufacturer's nameplate indicating horsepower, continuous or intermittent duty, speed, voltage, and current ratings.

2. Voltage

All new motor installations shall be designed to operate on the type of service provided by Holy Cross Energy. Holy Cross Energy will advise the consumer as to the type of service available at the location where the motor is to be used. Inquiry should be made before purchasing or installing the motor.

3. Voltage Imbalance

Voltage balance may exist at the electric utility revenue meter. Motor installations and their protective relaying should be designed to operate with an imbalance as great as 3%. When negative sequence voltage relays are used for three phase motor protection, the relay settings should prevent nuisance tripping when an imbalance of 3% or less exists.

4. Voltage Flicker

Current inrush, such as motor starting, can cause a momentary voltage dip called flicker. There are established limits for the amount of voltage flicker that relate to the number of current inrushes (motor starts) in a given period of time and the amount of voltage drop for each inrush.

(motor start). These conditions can vary greatly depending on the distribution system, transformer, secondary and the device (motor) characteristics. Holy Cross Energy requires that all devices (motors) fall within these established limits for voltage flicker. There are several remedies available to correct excessive voltage flicker. Holy Cross Energy can give the consumer current inrush (motor starting) limits based on a given service location, information provided by the device (motor) manufacturer and typical use of the device (motor). It is the consumers responsibility to establish the most appropriate solution to correct a voltage flicker problem.

5. Protection of Consumer Equipment

Whenever the inherent design of a motor or the characteristics of the load which it operates are such that automatic reclosing of the electric circuit after a power interruption or sustained low voltage would damage either the motor or the driven equipment, the consumer must provide adequate protection to prevent such damage. Starting compensators, auto starters, or equivalent apparatus included in each motor installation shall be equipped with under-voltage protection, to return the starting apparatus to the "off" position upon failure of the supply circuit.

Three phase motors which would cause damage due to a reversal of motor rotation should be equipped with reverse phase relays to disconnect the motor from the line if it should receive single phase or reverse-phase power. In addition, mechanical devices should be installed to prevent damage due to travel of the driven mechanism in the wrong direction. Holy Cross Energy assumes no liability for damage resulting from single phase or reverse-phase operation of three phase equipment.

We strongly recommend phase loss relays on all three phase motors, because of possible single phasing conditions unknown to Holy Cross Energy.

C. SPECIAL APPARATUS

The consumer shall consult with Holy Cross Energy before any special apparatus or any apparatus requiring extremely close voltage regulation is connected. It is necessary that electrical equipment be installed and operated in a manner that will not impair service to other consumers. The use of welding machines, medical imaging machines, VFD's (variable frequency drives), elevators, or other equipment having fluctuating or intermittent load characteristics, or having an abnormal effect on voltage, may require furnishing service through isolated transformers and separate service drops, or excess capacity facilities in order to protect the quality of service to the consumer or to other consumers. Holy Cross Energy reserves the right to charge the consumer the full cost of facilities necessary to provide any special service required by such equipment and to prevent any impairment in service to consumers.

Section 7 - MISCELLANEOUS

Special Types of Service

A. SERVICE TO TEMPORARY METER

Temporary service may be made available prior to the installation of the permanent meter or where service will be required for a short period of time. Such service should be restricted to as short a time as possible. Temporary services will be disconnected when the permanent service is connected. Those that remain energized will be billed as described in our "Billing Guidelines". See [Appendix B](#).

1. General Requirements for Temporary Service
Call for locates before digging. (Refer to [Section 2](#))

The service address shall be displayed on the temporary service installation which shall have a current inspection sticker.

The meter socket shall be furnished and installed by the consumer. Temporary meter service panels shall not be attached to vehicles or trailers. Refer to [Section 8](#) for acceptable temporary meter panel designs. In the event that a temporary service installation fails or collapses, it shall be disconnected by Holy Cross Energy and repaired by the consumer. Disconnect and reconnect fees are outlined in the "Billing Guidelines".

2. Overhead Temporary Service

- a. Meter on 6" x 6" post or treated pole
See drawing in [Section 8](#).
- b. Meter on Holy Cross Energy Pole
Meters on Holy Cross Energy poles are not allowed.

3. Underground Temporary Service

The underground service lateral and meter support must be supplied and installed by the consumer according to the requirements shown in [Section 8](#) and the additional requirements of this section. The meter support must be clear of all utility easements and underground obstructions. The temporary service lateral conductors must be an approved type for direct burial installation and installed by the consumer in accordance with the NEC. The grounding conductor shall be furnished and installed by the consumer and shall comply with the NEC. The ground rod is furnished and installed by the consumer. Service conductors must be a sufficient length to reach the secondary connection points at the transformer or secondary junction box. Connections within all pad-mounted or secondary junction box facilities will be made by Holy Cross Energy.

B. GENERATORS/POWER PRODUCTION FACILITIES

Interconnected Power Producers (including Hot Transfer or closed transition systems) are addressed in a separate policy. Any generator or energy storage system that can be operated in parallel with Holy Cross Energy is addressed in our [Generator Interconnection Policy](#). Metering and labeling requirements for parallel generators and energy storage systems are included herein for reference. In any case where this policy is in conflict with Holy Cross Energy's Generator Interconnect Policy or Requirements, the Generator Interconnect Policy shall rule. Contact [Holy Cross Energy](#) for more information.

1. Generators operating as a Backup Source
There are three types of facilities considered in this section:
 - a. Emergency System
 - b. Legally Required Standby System
 - c. Optional Standby System

All three types of facilities are required to follow all of the appropriate codes, rules, regulations and policies (federal, state, local and Holy Cross Energy). All three types of facilities are required to follow manufacturer's recommendations for the installation of equipment and protective devices. Any conflict between the codes, rules, regulations, policies and manufacturer's recommendations will be resolved by the authority having jurisdiction.

General statements concerning Non-interconnected Power Producing Facilities are as follows:

- a. Use of any power producing facility must be in accordance with the national Electric Code and the manufacturer's recommendations.
- b. Power producing facilities must be connected in such a manner that back feed to the utility is not possible.
- c. Permanently connected power producing facilities shall use a properly rated double-throw switch (break before make switch) to disconnect from the utility and connect to the load.
- d. Transfer switches other than double-throw switches (break before make switches) are not allowed.
- e. Transfer switches shall be connected on the load side of the service disconnect. Consideration to be connected between the transformer and main disconnect will be given to legally required standby systems and permission only granted with written approval from Holy Cross Energy.
- f. Portable generators should only be connected to the load after the source-side disconnect is opened, locked, and tagged.

2. Generators operating as a Parallel Source

HCE will allow consumers to connect certain on-site generating and energy storage systems equipment to the HCE electric distribution system. All such equipment shall be "anti-islanding" per IEEE 1547.

The consumer shall inform [Holy Cross Energy](#) of plans to install and connect generating and energy storage equipment to HCE's electric distribution system. It is in the best interest of both HCE and the consumer to obtain HCE interconnection acceptance and approvals before the consumer completes final designs or purchases any equipment. Consumer-owned equipment shall be installed without causing adverse effects to HCE's or consumer's equipment and without introducing potentially dangerous situations to HCE personnel or the public.

If the consumer's service does not meet the requirements for [Section 4.C](#) of this document, it shall be brought into compliance prior to parallel operation of the generator and/or an energy storage system.

Systems that can operate in parallel with HCE facilities shall incorporate protective devices (relays, circuit breakers, etc.) and metering equipment as specified by HCE's [Generator Interconnect Policy](#). The consumer's installation shall meet state Commission rules for distributed generation, all applicable national, state, and local construction and safety codes, and applicable Federal Energy Regulatory Commission, regional reliability Council, and HCE rules.

A copy of the [Generator Interconnect Policy](#) may be obtained on HCE's [website](#) or by contacting [Holy Cross Energy](#). The specific Interconnection Guideline that is applicable depends on the type, size, and operating mode of the generation or energy storage that is proposed. HCE may limit distribution voltage interconnections for large generators to preserve the reliability of the distribution system.

HCE will not assume any responsibility for the protection of the consumer's facility or any portion of the consumer's electrical equipment. The consumer is fully responsible for protecting consumer's equipment from damage caused by faults or other disturbances on HCE's distribution system.

HCE will review the consumer's design for interconnection acceptance only. HCE will not approve the reliability or adequacy of the consumer's design.

- a. Labeling/Placard Requirements

All required labels or placards shall be weatherproof, durable and permanently (self adhesive) attached to the meter socket, or other equipment as necessary. Check with [Holy Cross Energy](#) for additional requirements, such as sizing, color, and verbiage.

In addition to any labels required by the state or Authority Having Jurisdiction, the following labels are required:

1. "Generation System Connected" or similar located on or directly adjacent to the revenue meter socket.
2. "Utility AC Disconnect" located on the utility accessible AC disconnect.
3. If the AC Disconnect is not within ten feet and line of sight to the revenue meter, the consumer shall request an exception and receive the approval in writing, and shall post at the revenue meter a clearly labeled map showing the location of the revenue meter, AC disconnect, and generation and/or energy storage system.

b. Metering Requirements

Certain types of generating equipment may qualify for net metering. Check the tariffs posted on HCE's [website](#) for net metered rates.

1. Net Metering

Net meters are bi-directional meters that measure both directions of power flow and are used on distributed generation that utilizes renewable energy sources. Metering both directions of power flow allows customers to generate in parallel with HCE and sell back excess generation.

c. Equipment Requirements

Holy Cross Energy is now accepting certain types of meter collars for rapid connection of grid-ready energy assets. Please contact us at renewables@holycross.com for more information on approved vendors and models.

C. NON-STANDARD DESIGN

Standard electric service is provided from a single source of supply under the terms, conditions, rules, regulations and policies of Holy Cross Energy. Any change from standard service, which is within the limits noted above, will be at the consumer's expense. This includes all engineering, installation, maintenance, and material costs required to provide and maintain this non-standard design.

Where additional transformer installations are requested solely to limit the size and length of consumer owned services, the additional costs of such installations may be charged to the consumer as non-standard design.

D. DATA PULSES (Meter pulses generated for the consumer's use as data to their load management system)

Data pulses are generated by an electric meter at a rate which is proportional to the load. Consumers may receive data pulses, which when accumulated over a 15 minute interval and multiplied by a pulse value, will represent the consumer's KWH usage and demand. The consumer's calculated demand and corresponding demand interval will not necessarily duplicate Holy Cross Energy's billing demand and demand interval but will be useful in controlling the consumer's demand limits. To receive data pulses, Holy Cross Energy will provide a terminal strip with proper labels for the data channels (K Y Z). A consumer accessible junction box located next to the existing meter will encase the terminal strip. The maximum data pulse rate will not exceed 4500 pulses per 15 minute interval. A data pulse will consist of a change in state of a form "C" (three wire) wetted contact with the "K" lead serving as the common terminal.

The pulse initiator and the associated pulse value is an integral part of the demand meter. The selection of equipment for a particular installation will determine the pulse value. The pulse value will be provided at the time of the pulse installation, but the pulse value may change due to necessary changes in metering

equipment. If the consumer's load controller uses only a form "A" (two wire) contact, the kWh pulse value must be multiplied by a factor of two.

HOLY CROSS ENERGY RESERVES THE RIGHT TO INTERRUPT PULSES AT ANY TIME IN ORDER TO TEST OR CHANGE THE METER. HOLY CROSS ENERGY ALSO RESERVES THE RIGHT TO CHANGE THE PULSE VALUE WHENEVER IT BECOMES NECESSARY TO UPGRADE THE METERING EQUIPMENT. AN ATTEMPT WILL BE MADE TO NOTIFY THE CONSUMER WHEN IT BECOMES NECESSARY TO INTERRUPT PULSES OR CHANGE THE PULSE VALUES.

E. AUTOMATED METER READING (AMR)

Holy Cross Energy began installing AMR devices in 1998 on residential electric meters. This allows Holy Cross Energy to obtain accurate and timely meter readings, while reducing the need to enter the consumer's property. However, Holy Cross Energy still needs access to the electric meter from time to time to inspect and make repairs as needed. Therefore, the placement of electric meters shall be as set forth in [Section 4](#).

F. AUTOMATED METER READING AND OUTAGE NOTIFICATION

Holy Cross Energy has electric meters available that provide both automated meter readings and outage notification to Holy Cross. In case of a power outage these meters will notify Holy Cross Energy that the power is off, and will also notify us once power is restored. Additionally, other power quality data is also provided from these meters.

G. EQUIPMENT SCREENING

See drawings in [Section 8](#).

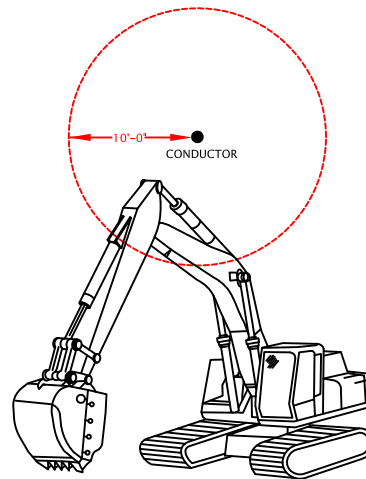
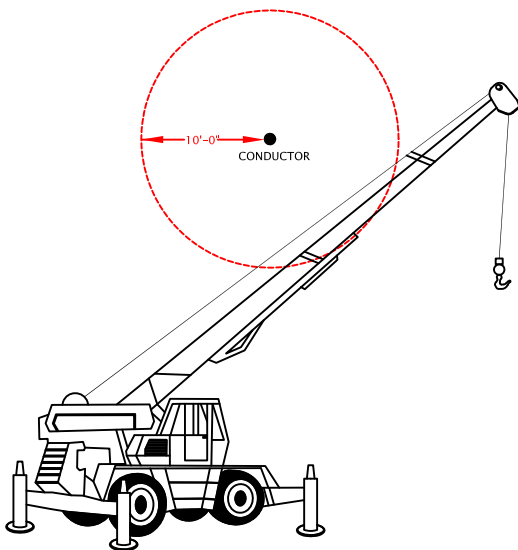
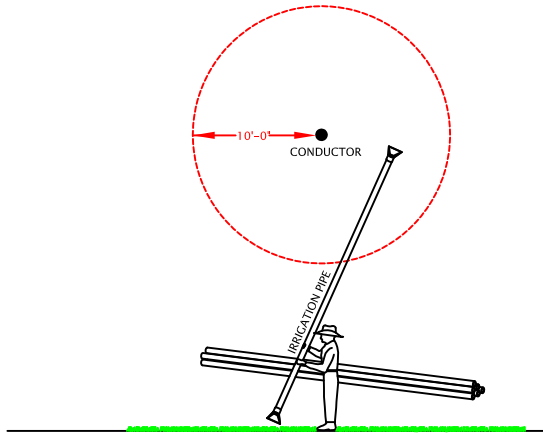
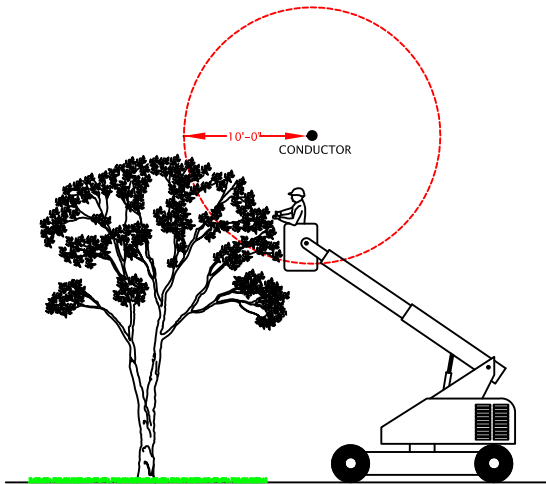
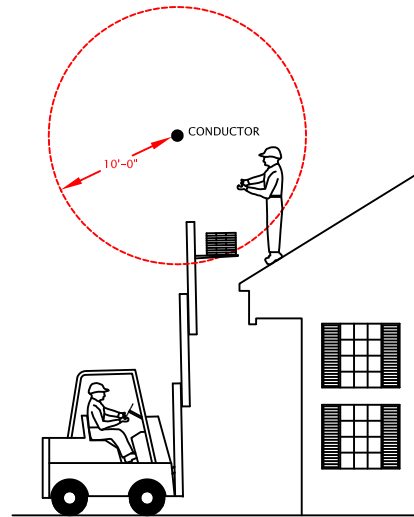
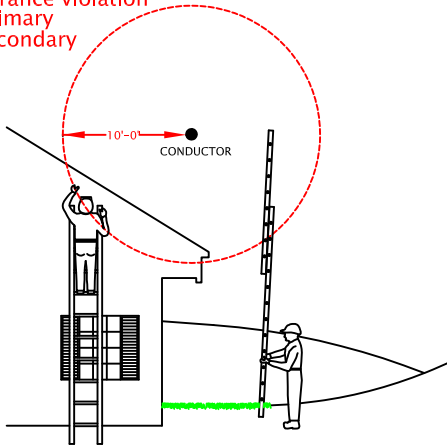
Section 8 - DRAWINGS

GENERAL REQUIREMENTS

1. These are typical guidelines only. Holy Cross Energy shall be contacted prior to construction if variations are to be considered.
2. Consumers with electric services that are not built in compliance with the specifications outlined in the Holy Cross Energy Metering and Service Guidelines book, and the National Electrical Code, will be billed for a return trip as described in our "Service Billing Guide." See [Appendix B](#).
3. Holy Cross Energy reserves the right to determine the location, type of service, and metering equipment that will be used for each service. Services built without Holy Cross Energy approval will run the risk of not being connected.
4. Metering equipment and service disconnects shall be located outdoors in an accessible location which will not be subject to physical damage (snow, ice, pedestrian, vehicle, etc.). Holy Cross Energy may grant approval in writing for indoor locations on an individual basis only, taking into consideration the building design, occupancy, size of service, quantity of meters, and ease of access.
5. Temporary services shall be restricted to as short a time as possible and SHALL BE DISCONNECTED AT SUCH TIME THAT THE PERMANENT SERVICE IS CONNECTED. Those that remain energized will be billed as described in our "Service Billing Guide". See [Appendix B](#).
6. All underground services ahead of Holy Cross Energy metering shall be run entirely in conduit that is continuous in diameter (so as to not obstruct cable installation). Direct burial of conductors will not be permitted except for temporary services.
7. Holy Cross Energy shall be consulted on all jobs involving attachments to its poles.
8. If Holy Cross Energy's delivery point is from an underground source, the consumer must extend their service entrance cable in conduit into the secondary junction box at a transformer vault. Holy Cross Energy will assist with the junction box (see our courtesy lock policy, [Appendix C](#)), however all excavation and restoration must be done by the consumer. All conduits entering Holy Cross Energy vaults shall be installed in provided knockouts and grouted in place.
9. Holy Cross Energy will not connect three phase 120/208Y volt or 480Y/277 volt 3 wire services. All three phase services shall be 4 wire wye. Three phase services shall use three phase service equipment and panels in order to achieve proper load balance.
10. Instrument transformers are not permitted in Holy Cross Energy owned pad-mounted transformers.
11. All 480Y/277 volt services, regardless of the amperage rating, shall be built instrument rated. Direct metering of any 480Y/277 volt service is not allowed on Holy Cross Energy electric system.
12. Contact other utilities for their clearance requirements.
13. Call before you dig. UTILITY Notification Center of Colorado UNCC 811 (Dial 811).
14. Holy Cross Energy will connect all secondary conductors to the transformer or secondary junction box.
15. Holy Cross Energy will install the meter into the socket.
16. Avoid locating service equipment, conduit or conductors directly below Holy Cross Energy overhead conductors.
17. Avoid locating service equipment, conduit or conductors directly above Holy Cross Energy underground facilities.

NOTE:

House is a clearance violation
13' Primary
10.5' Secondary



METER & DESIGN
SPECIFICATIONS

**SAFETY VIOLATION
(CONDUCTOR CONTACT EXAMPLES)**

DATE: MAY 1, 2001

REVISED: MARCH 2019

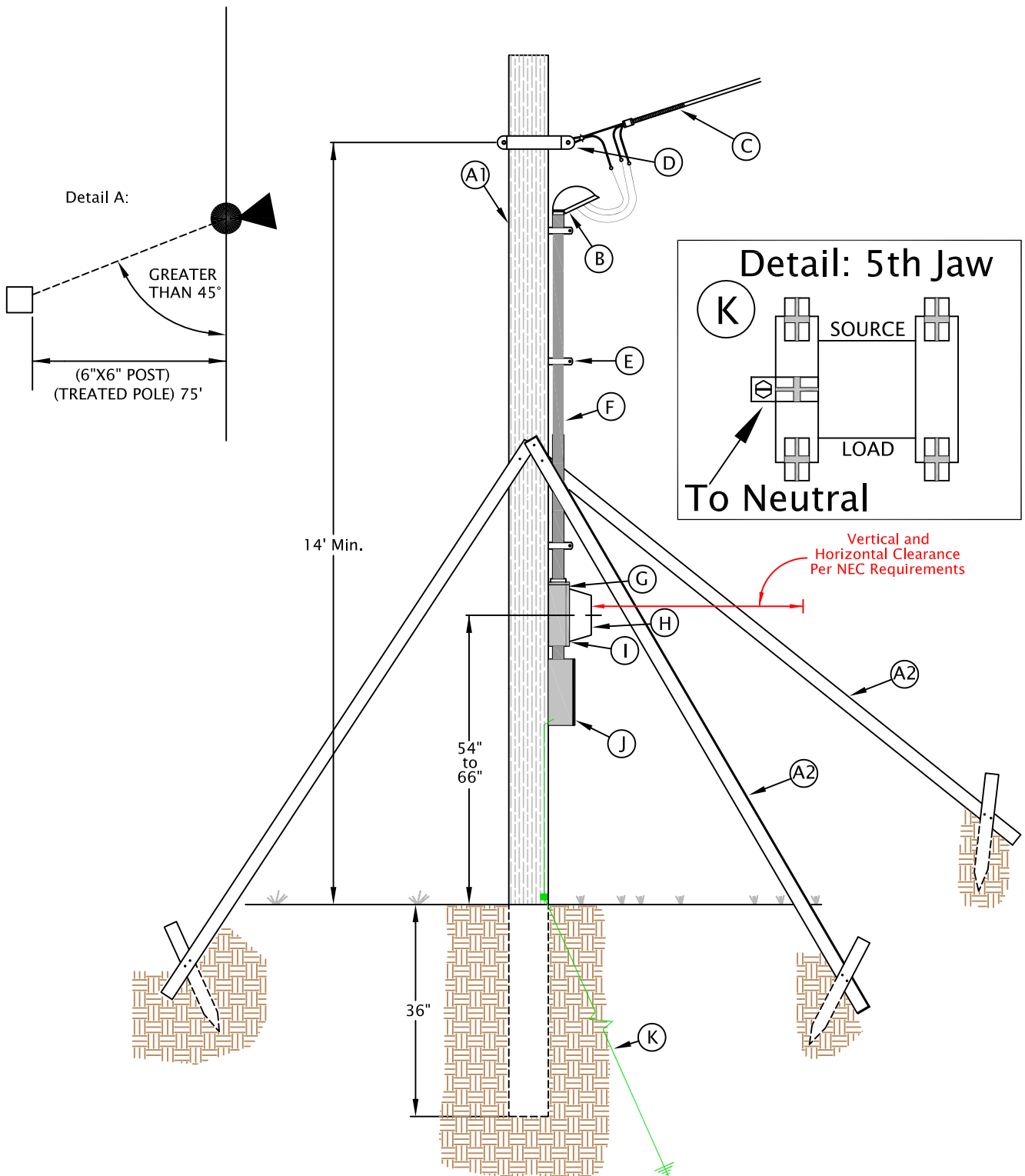
PAGE #

8.3

TEMPORARY OVERHEAD (TREATED POLE OR 6" x 6" POST)

Illustration Notes

- A.
 - 1. Pressure Treated Pole (20 foot minimum), braced as needed, consumer furnished.
 - 2. 6" x 6" post adequately braced four ways, buried to a minimum of 3'-0".
- B. Weatherhead.
- C. The consumer shall provide an approved triplex service drop of sufficient length to connect to the transformer subject to the following:
 - 1.
 - a. (Pressure treated pole) span length from Holy Cross Energy's pole to consumer's pole shall be between 15 feet and 65 feet.
 - b. (6" x 6" post) span length from Holy Cross Energy's pole to consumer's post shall be between 15 feet and 65 feet.
 - 2. Temporary service must not be located under Holy Cross Energy facilities (see detail on drawing).
 - 3. The terrain underneath the span is level and does not include any streets, driveways or alleys.
 - 4. NESC clearance of 12 feet must be maintained above grade.
 - 5. The service drop cable and approved dead-end tie must be provided by consumer and properly attached. Holy Cross Energy is to provide attachment to Holy Cross Energy pole.
 - 6. Service cable shall be USE rated triplex (or quadplex) cable assembly, 600 v., #4AL minimum size. Conductor voltage drop from transformer to meter shall be limited to 3%. See voltage drop charts in the Appendix Tables.
- D. Point of attachment. (Provided by consumer).
- E. Conduit must be securely attached to pole, stand-offs not required.
- F. Conduit, GRC, EMT, or Schedule 80 PVC, size as required.
- G. Approved socket hub assembly.
- H. Meter provided, installed, and removed by Holy Cross Energy.
- I. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
 - 1. When temporary service is fed from a 3Ø source, meter socket shall have a fifth jaw installed in the 9:00 o'clock position and be attached to the neutral conductor in the meter socket.
- J. Weatherproof receptacles and over current protection, as required by current edition of NEC.
- K. Ground wire and electrode per NEC, furnished and installed by consumer.
- L. Temporary services shall be restricted to as short a time as possible and **SHALL BE DISCONNECTED AT SUCH TIME THAT THE PERMANENT SERVICE IS CONNECTED**. Those that remain energized will be billed as described in our "Service Billing Guide". See [Appendix B](#).



SEE EXPLANATION ON PAGE 8.4



METER & DESIGN
SPECIFICATIONS

TEMPORARY OVERHEAD (Treated Pole or 6"X 6" Post)

DATE: MAY 1, 2001

REVISED: MARCH 2019

PAGE #

8.5

TEMPORARY UNDERGROUND – SINGLE POST

Illustration Notes

- A. 6" x 6" post adequately braced, buried to a minimum depth of 3'-0" below grade.
 - B. Meter provided and installed by Holy Cross Energy.
 - C. Conduit, GRC or Schedule 80 PVC, size as required.
 - D. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
1. When temporary service is fed from a 3Ø transformer (overhead or underground) meter socket shall have a fifth jaw installed in the 9:00 o'clock position and be attached to the neutral conductor in the meter socket.
- E. Weatherproof receptacles and over current protection, as required by current edition of NEC.
 - F. Conduit must be securely attached to post per NEC.
 - G. Ground wire and electrode per NEC, furnished and installed by consumer.
 - H. Insulated bushing. GRC only. Service cable shall be USE rated triplex (or quadplex) cable assembly, 600 v., #4AL or #6 CU minimum size. Conductor voltage drop from transformer to meter shall be limited to 3%. See voltage drop charts in the Appendix Tables.
 - J. In-use covers.
 - K. Temporary services shall be restricted to as short a time as possible and **SHALL BE DISCONNECTED AT SUCH TIME THAT THE PERMANENT SERVICE IS CONNECTED.** Those that remain energized will be billed as described in our "Billing Guidelines." See [Appendix B](#).
 - L. Tightly compacted backfill. **ALL TRENCHES MUST BE COMPLETELY BACKFILLED BEFORE ENERGIZATION.**

General Notes

1. Prefabricated, portable, reusable unitrutz style temporary single post services are acceptable but must be solidly attached or staked into the ground.

TEMPORARY UNDERGROUND – TWO POST

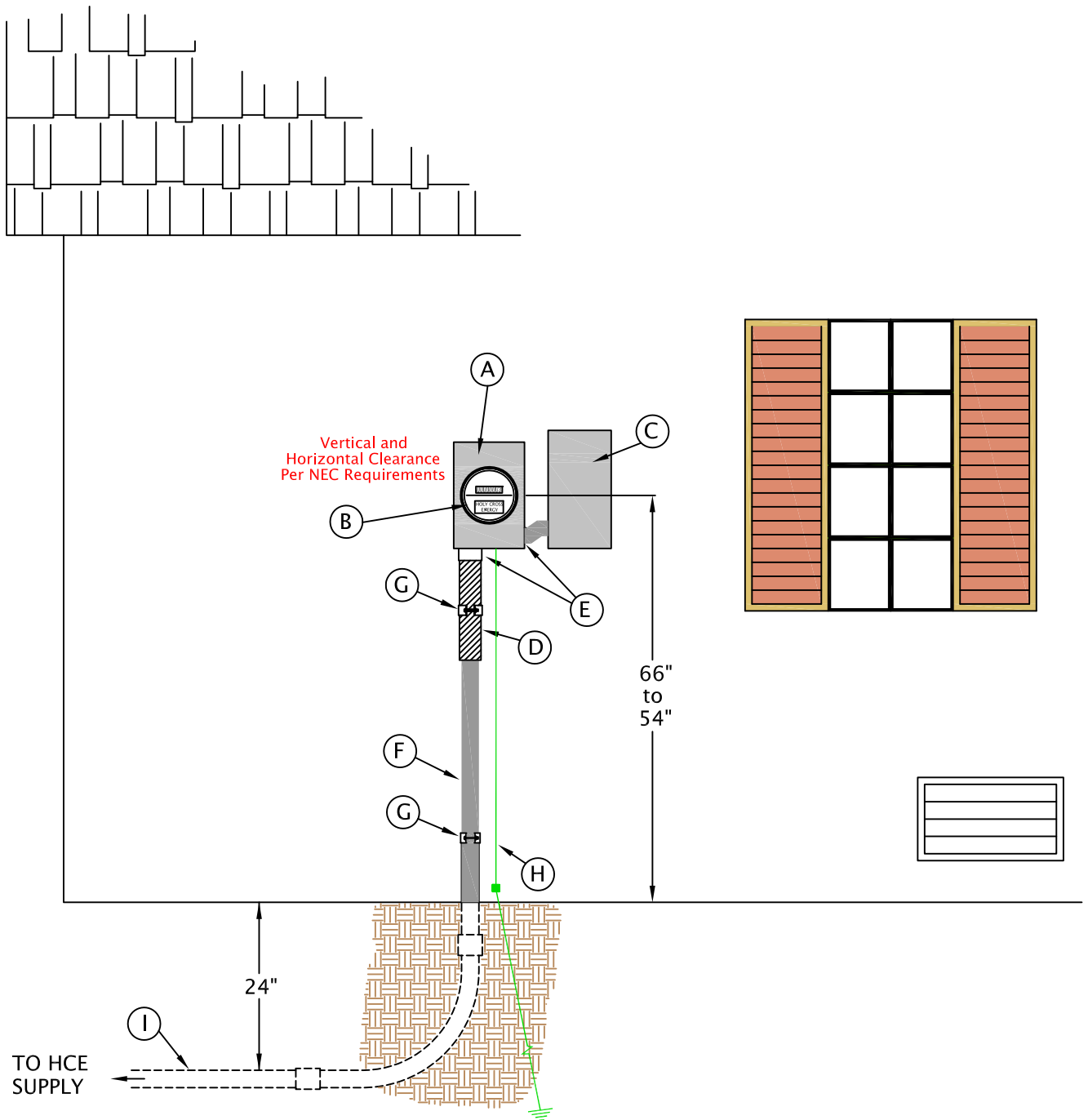
Illustration Notes

- A. Adequate freestanding support for service equipment shall consist of a minimum of two upright supports (6" x 6" posts, angular steel, Unistrut, etc.) buried to a minimum depth of 3'-0"
- B. Weatherproof receptacles and overcurrent protection, as required by current edition of NEC.
- C. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
- D. When temporary service is fed from a 3Ø transformer (overhead or underground) meter socket shall have a fifth jaw installed in the 9:00 o'clock position and be attached to the neutral conductor in the meter socket.
- E. Meter provided and installed by Holy Cross Energy.
- F. Conduit, GRC or Schedule 80 PVC, size as required.
- G. Conduit must be securely attached per NEC.
- H. Ground wire and electrode per NEC, furnished and installed by consumer.
- I. In-use covers.
- J. Insulated bushing. GRC only.
- K. Service cable shall be USE rated triplex (or quadplex) cable assembly, 600 volt, #4AL or #6 CU minimum size. Conductor voltage drop from transformer to meter shall be limited to 3%. See voltage drop charts in the Appendix Tables.
- L. Tightly compacted backfill. **ALL TRENCHES MUST BE COMPLETELY BACKFILLED BEFORE ENERGIZATION.**
- M. Temporary services shall be restricted to as short a time as possible and **SHALL BE DISCONNECTED AT SUCH TIME THAT THE PERMANENT SERVICE IS CONNECTED.** Those that remain energized will be billed as described in our "Service Billing Guide." See [Appendix B](#).

UNDERGROUND SERVICE
METER ON BUILDING - 400 AMPS OR LESS

Illustration Notes

- A. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
- B. Meter provided and installed by Holy Cross Energy.
- C. Rain tight, load break fused disconnect or circuit breaker required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. Disconnect must be on load side of meter and be located within 24 inches of meter socket.
- D. If PVC conduit is used, a slip sleeve as required in [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- E. If metallic raceway is used, it shall be bonded in accordance with the NEC.
- F. PVC or GRC service conduit, size as required. If PVC is used, it shall be Schedule 80 above grade.
- G. Conduit must be securely attached to building per NEC.
- H. Ground wire and electrode per NEC, furnished and installed by consumer.
- I. To Holy Cross Energy transformer, all conduits penetrating company vaults shall be installed in provided knockouts and grouted in place. Conduits shall be continuous in length from the meter socket to the transformer and/or secondary junction box and shall not contain any consumer owned junction boxes, vaults, condulets, (LB's), or similar devices. Service lateral conductors shall be sized to limit the voltage drop to 3% between Holy Cross Energy transformers and electric meters. See voltage drop charts in the Appendix Tables.



SEE EXPLANATION ON PAGE 8.8



METER & DESIGN
SPECIFICATIONS

UNDERGROUND SERVICE – METER ON BUILDING
200 AMPS OR LESS

DATE: MAY 1, 2001

REVISED: DECEMBER 2021

PAGE #

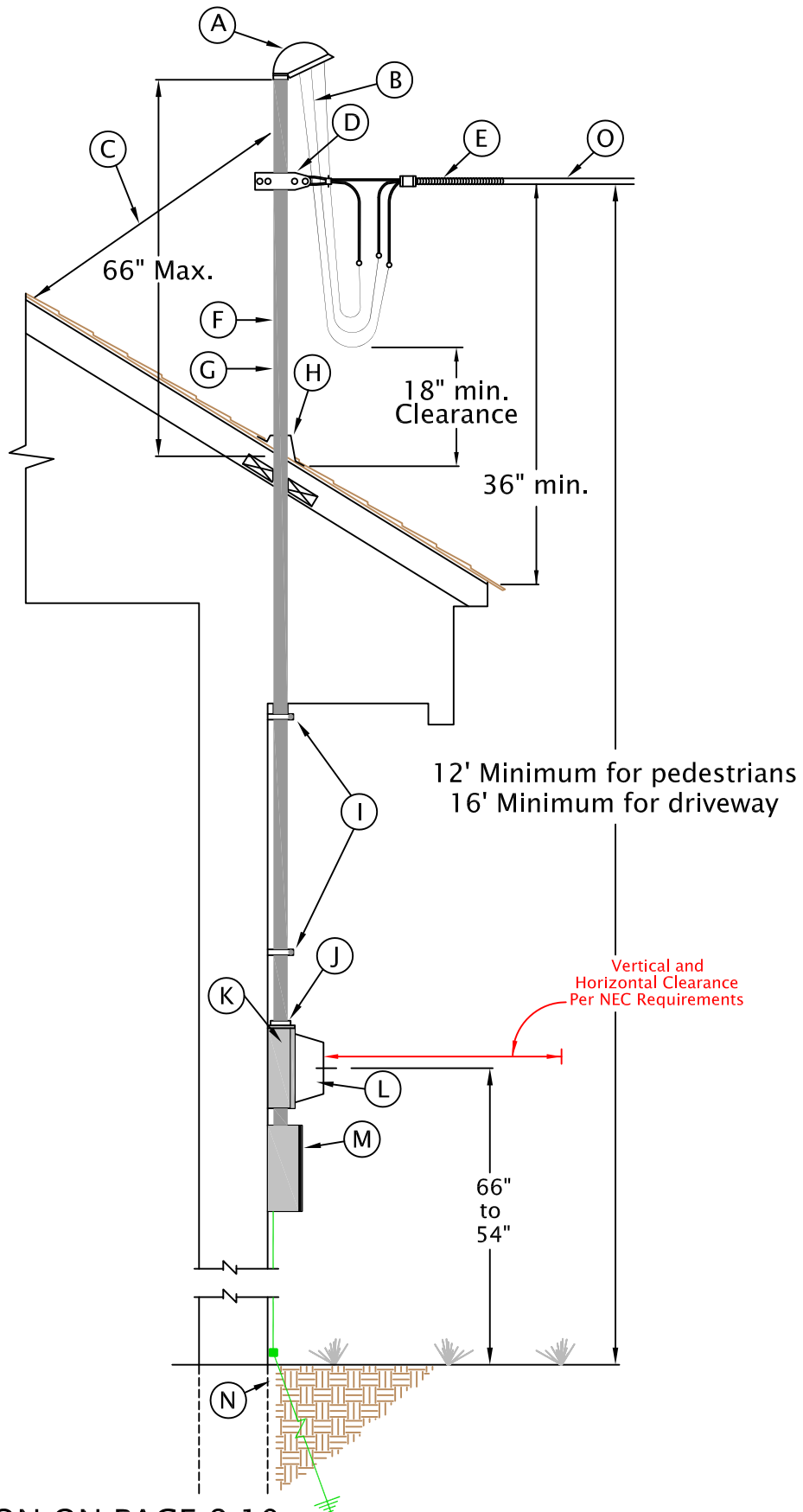
8.9

OVERHEAD WITH SERVICE MAST THROUGH ROOF

Illustration Notes

- A. Weatherhead.
- B. Service conductors shall be long enough to reach the service drop, including drip loop (minimum 36 inches).
- C. Guying recommended on all rigid service masts 48 inches or less and required on all service attachments over 48 inches.
- D. Point of attachment of service drop (supplied by Holy Cross Energy).
- E. Service drop supplied and installed by Holy Cross Energy.
- F. Service mast conduit minimum size 2 inches I.D., galvanized rigid conduit (GRC). Must be capable of withstanding 1,000 pounds of tension. If a coupling is needed it shall be placed below soffit.
- G. Service mast conduit shall be continuous in length from the weatherhead to the meter socket and shall not contain any junction boxes, gutters, condulets (LB's) or similar devices.
- H. Sheet metal flashing (roof jack).
- I. Conduit must be securely attached to building structure.
- J. Approved socket hub assembly.
- K. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
- L. Meter provided and installed by Holy Cross Energy.
- M. Rain tight, load break fused disconnect or circuit breaker required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. Disconnect must be on load side of meter and be located within 24 inches of meter socket.
- N. Ground wire and electrode, per NEC, to be provided and installed by consumer.
- O. Holy Cross Energy will provide an overhead triplex (or quadplex) service drop to the consumer's point of attachment, providing the following conditions can be met:
 - 1. Span length from Holy Cross Energy's pole to consumer's attachment shall not exceed that shown in the Appendix Tables.
 - 2. The terrain underneath the span is level and does not include any streets or alleys.
 - 3. Service conductor attachment height at the building shall meet NESC clearance requirements.

If any of the above conditions cannot be met, Holy Cross Energy must be contacted prior to construction of the service entrance equipment. Deviations from the above could result in tensions in excess of the allowable 1,000 pounds, as well as violation of the National Electrical Safety Code.



SEE EXPLANATION ON PAGE 8.10



METER & DESIGN
SPECIFICATIONS

OVERHEAD WITH SERVICE MAST THROUGH ROOF
200 AMPS OR LESS

DATE: MAY 1, 2001

REVISED: DECEMBER 2021

PAGE #

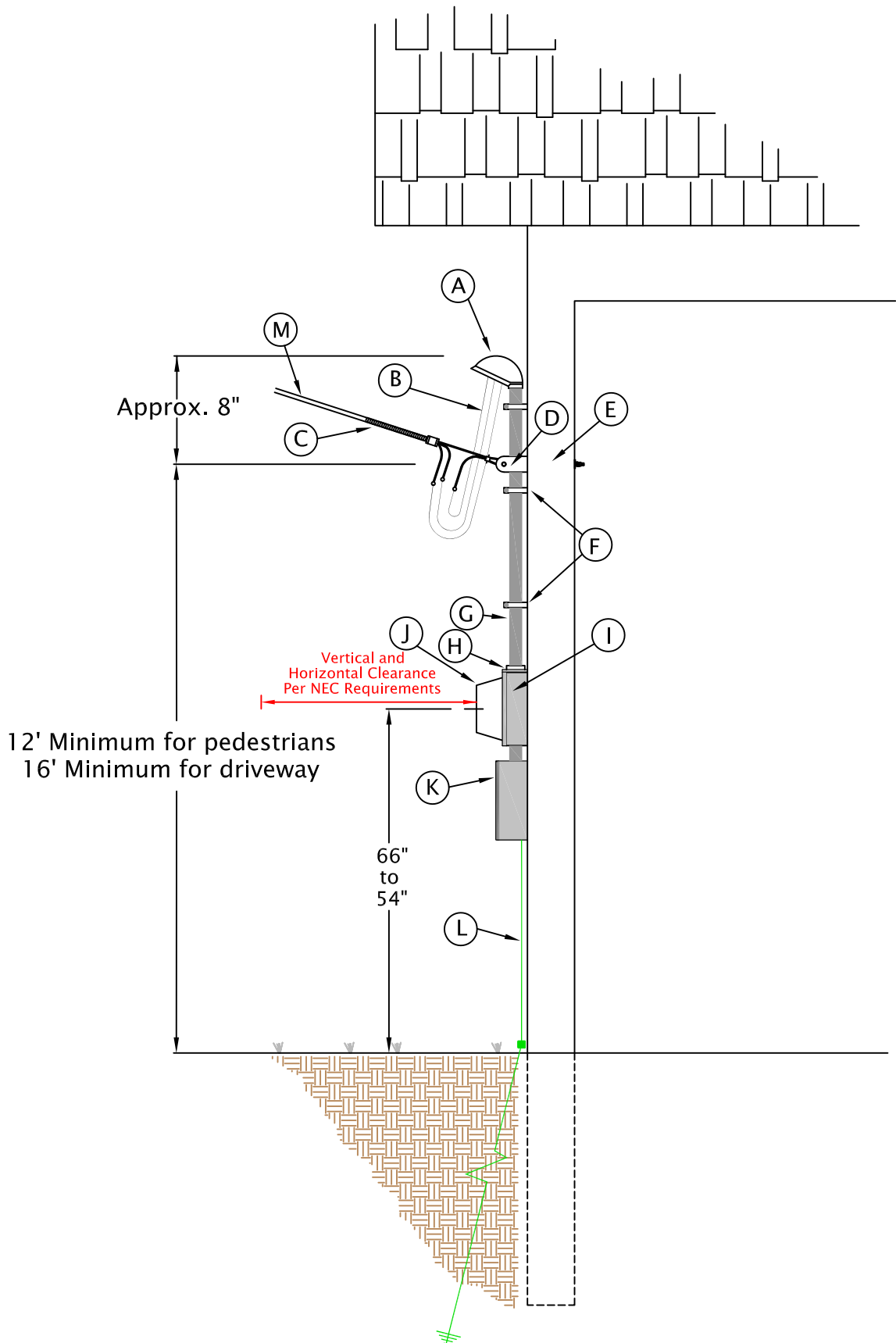
8.11

SERVICE RISER (GABLE END ONLY)

Illustration Notes

- A. Weatherhead shall be located above point of attachment. Where impractical to locate weatherhead above the point of attachment, the weatherhead shall be permitted not farther than two (2) feet from the point of attachment.
- B. Service conductors long enough to reach the service drop, including drip loop (minimum 3 feet).
- C. Service drop supplied and installed by Holy Cross Energy (cannot extend under the eave of the roof).
- D. Point of attachment of service drop (insulated clevis shall not be attached to conduit. The clevis is to be supplied and installed by the consumer). Must be capable of withstanding 1,000 pounds of tension and must be sized to accept HCE supplied grip.
- E. 5/8 inch machine bolt and square washer, or eye screw, anchored to building structural member. (Material supplied by Holy Cross Energy and installed by consumer).
- F. Conduit must be securely attached to building structure per NEC.
- G. Service conduit - size as required shall be GRC, EMT, or Schedule 80 PVC.
- H. Approved socket hub assembly.
- I. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by the consumer.
- J. Meter - provided and installed by Holy Cross Energy.
- K. Rain tight, load break fused disconnect or circuit breaker required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. Disconnect must be on load side of meter and be located within 24 inches of meter socket.
- L. Ground wire and electrode per NEC to be provided and installed by consumer.
- M. Holy Cross Energy will provide an overhead triplex (or quadplex) service drop to the consumer's point of attachment, providing the following conditions can be met:
 - 1. Span length from Holy Cross Energy's pole to consumer's attachment shall not exceed that shown in the Appendix Tables.
 - 2. The terrain underneath the span is level and does not include any streets or alleys.
 - 3. Service conductor attachment height shall meet NESC requirements.

If any of the above conditions cannot be met, Holy Cross Energy must be contacted prior to construction of the service entrance equipment. Deviations from the above could result in tensions in excess of the allowable 1,000 pounds, as well as violation of the National Electrical Safety Code.



SEE EXPLANATION ON PAGE 8.12



METER & DESIGN
SPECIFICATIONS

SERVICE RISER (GABLE END ONLY)
200 AMPS OR LESS

DATE: MAY 1, 2001

REVISED: DECEMBER 2021

PAGE #

8.13

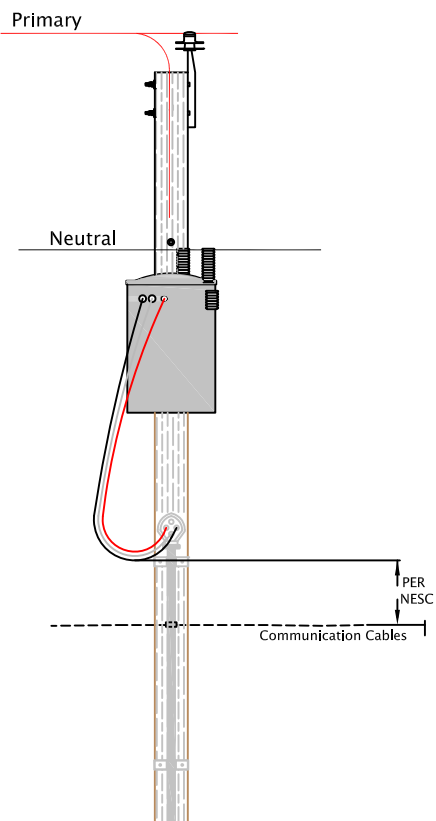
MULTIPLE SERVICES FROM A HOLY CROSS UTILITY POLE – 200 AMPS OR LESS

General Notes

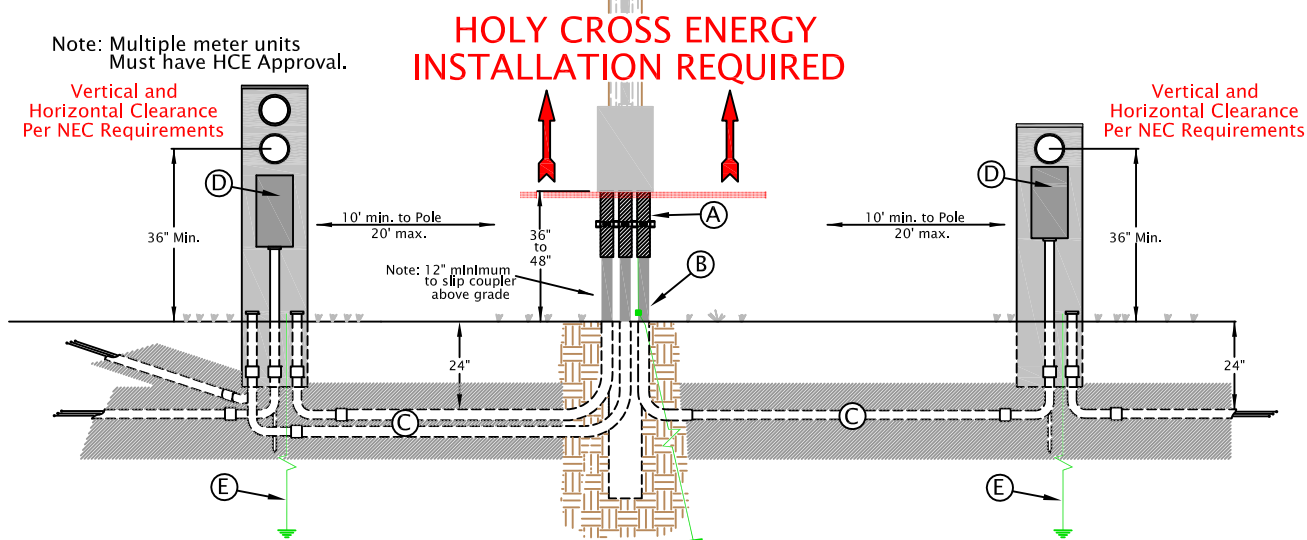
1. The drawing on the next page **only** applies to services where Holy Cross Energy builds a secondary junction box on the pole. Where HCE determines it is appropriate to install a consumer owned riser on a pole, the consumer shall be responsible for the material and Holy Cross Energy will assist with the installation. Contact the Holy Cross Energy [Engineering Department](#) for details.

Illustration Notes

- A. If PVC conduit is used, a slip sleeve is required as per [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- B. Size as required (confirm with HCE that conduit will fit into junction box), shall be Schedule 80 PVC.
- C. Due to the rocky conditions of the soil in our service territory, Holy Cross Energy requires all underground service laterals in conduit ahead of the meter. Service lateral conductors shall be sized to limit the voltage drop to 3% between the Holy Cross Energy supply transformer and the electric meter. See voltage drop charts in the Appendix Tables.
- D. Rain tight, load break fused disconnect or breaker is required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. The disconnecting device must be on load side of meter and located within 24 inches of the meter socket.
- E. Ground wire and electrode, per NEC, to be provided and installed by the consumer.



Pole Access is NO LONGER AVAILABLE!
Holy Cross Energy must construct Risers on Primary Poles.



METER & DESIGN
SPECIFICATIONS

HOLY CROSS POLE MOUNTED JUNCTION BOX

DATE: MAY 1, 2001

REVISED: January, 2020

PAGE #
8.15

SINGLE SERVICE FROM A HOLY CROSS UTILITY POLE – PERMANENT UNDERGROUND, SINGLE POST

General Notes

1. Where Holy Cross Energy determines it is appropriate to install a consumer owned riser on a pole, the consumer shall be responsible for the material and Holy Cross Energy will assist with the installation. Contact the Holy Cross Energy [Engineering Department](#) for details.
2. Weatherhead, wire, conduit and stand-off brackets on pole provided by the consumer and installed by Holy Cross Energy.

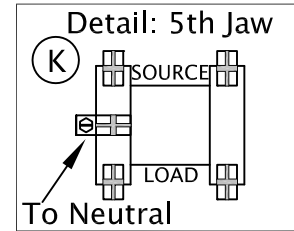
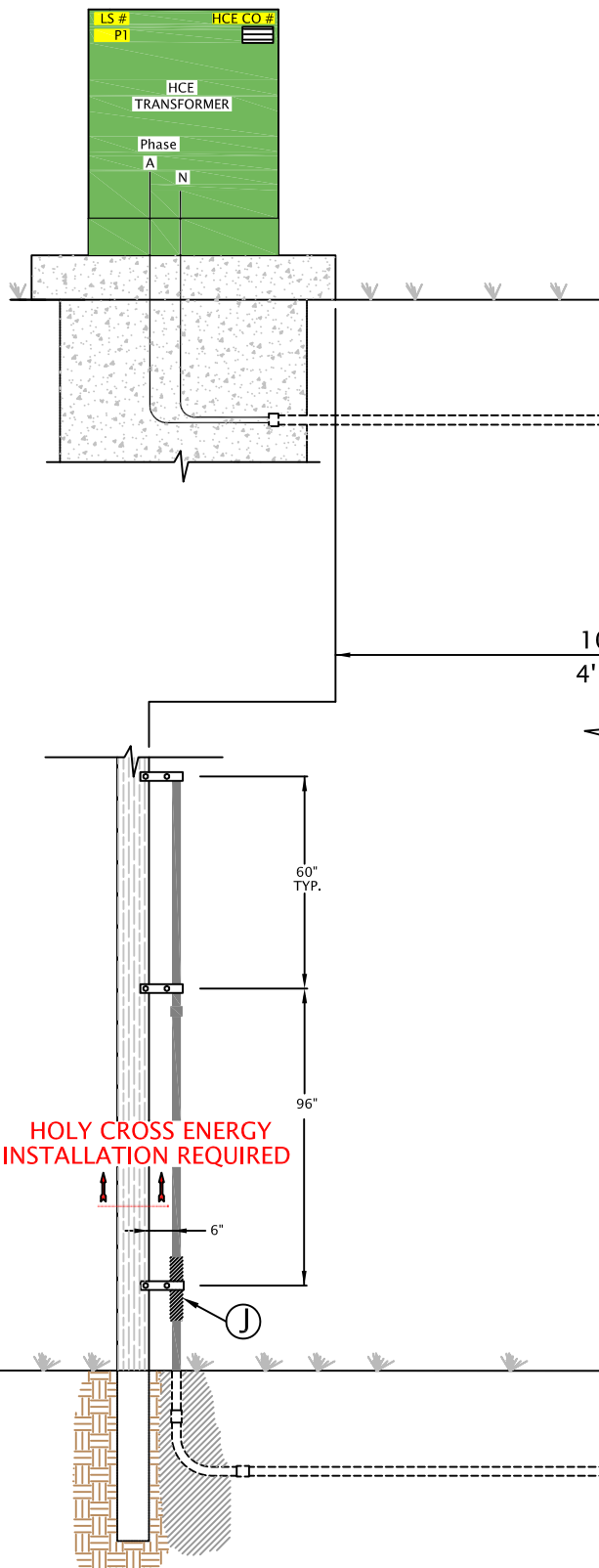
Illustration Notes

- A. Holy Cross Energy no longer accepts 6" x 6" wood posts as a means of permanently mounting services. If meter sockets and instrument enclosures are mounted on Unistrut, which is the preferred method (refer to Section 9), it shall be minimum of 1 5/8" deep, solid type (Unistrut with factory punched holes is not allowed) and installed in concrete 36" below grade (as shown).
- B. Meter provided and installed by Holy Cross Energy.
- C. Conduit, GRC or Schedule 80 PVC, size as required.
- D. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), furnished and installed by consumer.
 1. When temporary service is fed from a three phase transformer (overhead or underground) meter socket shall have a fifth jaw installed in the 9:00 o'clock position and be attached to the neutral conductor in the meter socket.
- E. Rain tight, load break fused disconnect(s) or circuit breaker(s) are required within 24" of meter socket.
- F. Conduit must be securely attached to post per NEC.
- G. Ground wire and electrode per NEC, furnished and installed by consumer.
- H. Service cable shall be USE rated triplex (or quadplex) cable assembly, 600V., #4 AL or #6 CU minimum size. Conductor voltage drop from transformer to meter shall be limited to 3%. See voltage drop charts in the Appendix Tables.
- I. Cable shall be buried to a minimum depth of 2'-0" and installed in pipe.
- J. If PVC conduit is used, a slip sleeve is required as in [Section 4](#). Conduit brackets shall be installed for conduit to move vertically in the couplers.

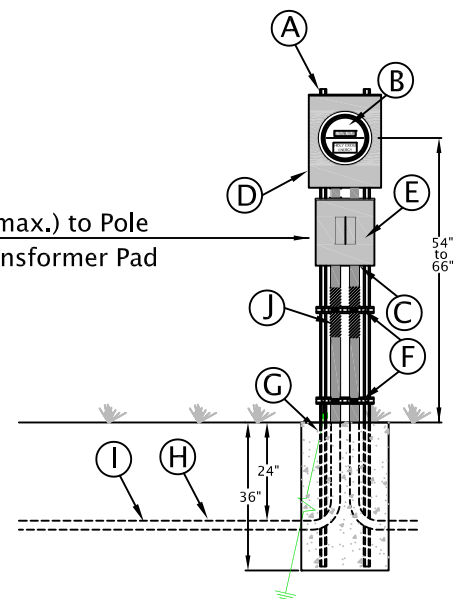
RISER MATERIAL SHOPPING LIST

At a minimum, the following riser material shall be provided by the member and be installed by Holy Cross Energy:

- Riser Pipe (Everything exposed to sunlight shall be PVC, **Schedule 80**).
- Slip Sleeve ([Refer to page 8.58](#)). Expansion couplings not allowed/permitted.
- Unistrut style 6" standoff brackets (3-5 depending on the height of the pole).
- Unistrut style conduit straps, sized for the pipe provided.
- 3/8" x 3" lag screws, quantity to accommodate the standoff brackets.
- Weatherhead, sized for pipe provided.
- PVC glue.
- Appropriately sized conductor to reach the lugs on the transformer, while also providing a drip loop.



Vertical and
Horizontal Clearance
Per NEC Requirements



SEE EXPLANATION ON PAGE 8.16



METER & DESIGN
SPECIFICATIONS

PERMANENT UNDERGROUND
SINGLE POST

DATE: JUNE, 2013

REVISED: January, 2020

PAGE #

8.17

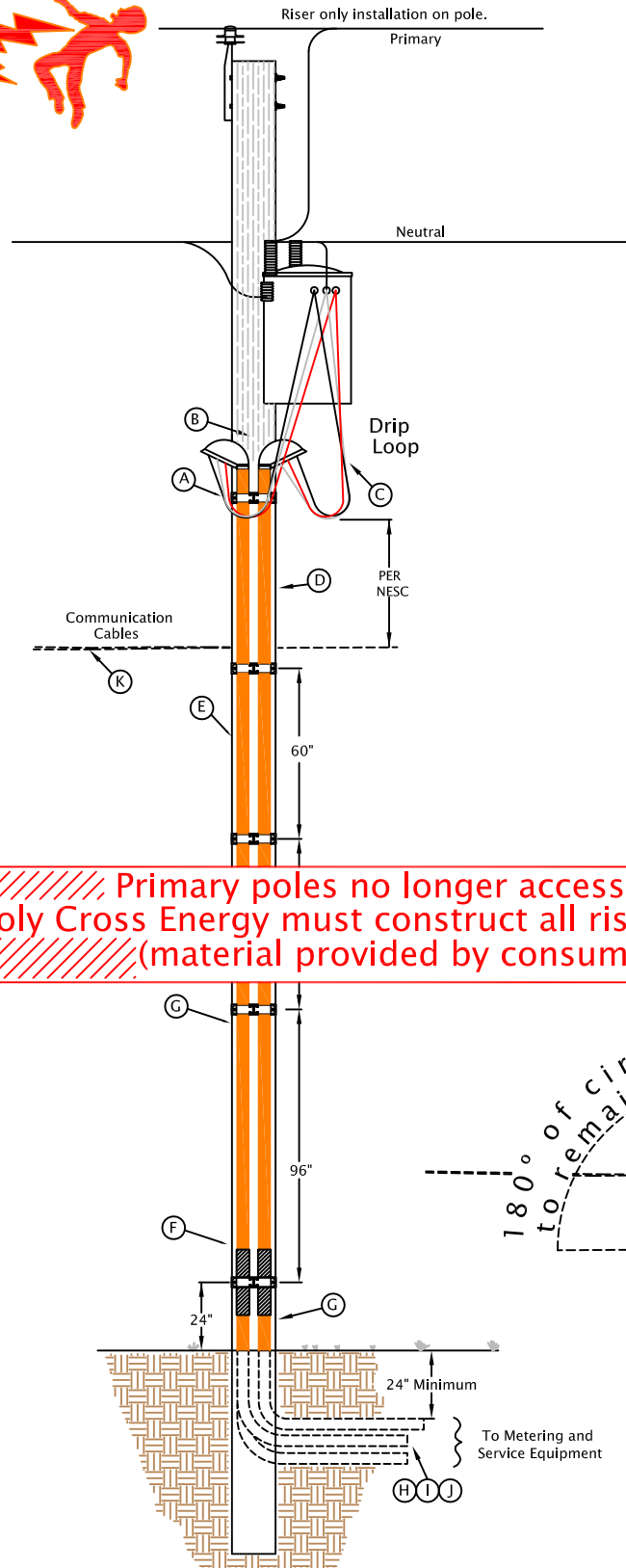
MULTIPLE SECONDARY RISERS ON HOLY CROSS ENERGY POLE

General Notes

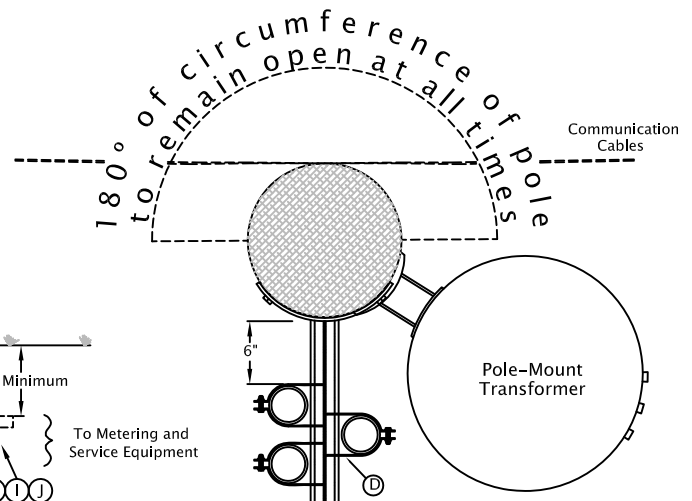
1. For this type of service construction, all materials are to be provided by the consumer. Holy Cross Energy will install and connect the new service once all the materials have been provided.
2. At a minimum, the following riser material should be provided:
 - Riser Pipe (Everything exposed to sunlight shall be PVC, Schedule 80).
 - Slip Sleeve ([Refer to page 8.58](#)).
 - Unistrut style 6" standoff brackets (usually 3-5 depending on the height of the pole).
 - Unistrut style conduit straps, sized for the pipe provided.
 - 3/8" x 3" lag screws, quantity to accommodate the number of standoff brackets provided.
 - Weatherhead, sized for pipe provided.
 - Glue, if using PVC.
 - Appropriately sized conductor to reach the lugs on the transformer, while also providing a drip loop.

Illustration Notes

- A. Top of secondary riser shall be constructed per National Electric Safety Code (NESC).
- B. Weatherheads.
- C. Service conductors must be long enough to reach secondary transformer lugs, including drip loop.
- D. Secondary risers are limited to three (3) 3" conduits per bracket (three (3) conduits racked together on one pole stand-off bracket). Each conduit shall contain a complete set of circuit conductors, including grounded conductor. Contact Holy Cross [Engineering Department](#) if additional conduits are required.
- E. Conduit brackets shall be installed to support the conduit on the pole. One set of brackets shall be spaced at 8'-0" to prevent using the brackets as steps for climbing the pole. Remaining brackets should be spaced at approximately 5'-0" intervals. The first bracket should be spaced 2'-0" above final grade. There shall be one bracket within 1'-0" from the weatherhead. Brackets shall extend 6" from the edge of the pole.
- F. If PVC conduit is used, [slip sleeves](#) are required at the base of the pole. Conduit brackets shall be installed to allow conduit to move vertically in the [slip sleeves](#). Also see [Section 4](#).
- G. Conduit above grade shall be Schedule 80 PVC.
- H. Conduits shall be continuous in length from the weatherhead to the meter socket or instrument transformer enclosure and shall not contain any junction boxes, vaults, condulets (LB's) or similar devices.
- I. Service lateral conductors shall be sized to limit the voltage drop to 3% between the Holy Cross Energy supply transformer and the electric meter. See voltage drop charts in the Appendix Tables.
- J. Conduit below grade shall be GRC or schedule 40 or 80 PVC.
- K. Please make yourself aware of what obstacles exist at the top of the pole. Don't sweep your conduit on the side of the pole directly under a communication line attachment or directly below the transformer (if equipped).



Primary poles no longer accessible!
Holy Cross Energy must construct all risers on poles.
(material provided by consumer)



SEE EXPLANATION ON PAGE 8.18



METER & DESIGN
SPECIFICATIONS

MULTIPLE SECONDARY RISERS ON HOLY CROSS TRANSFORMER POLES

DATE: MAY 1, 2001

REVISED: January, 2020

PAGE #

8.19

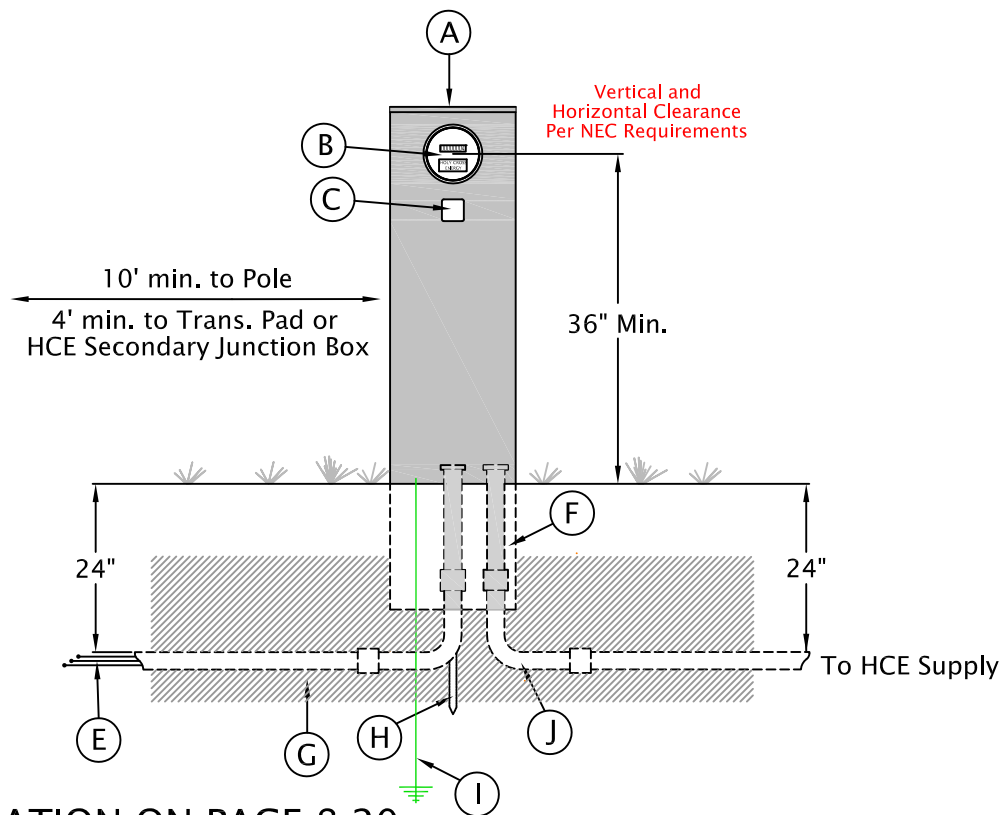
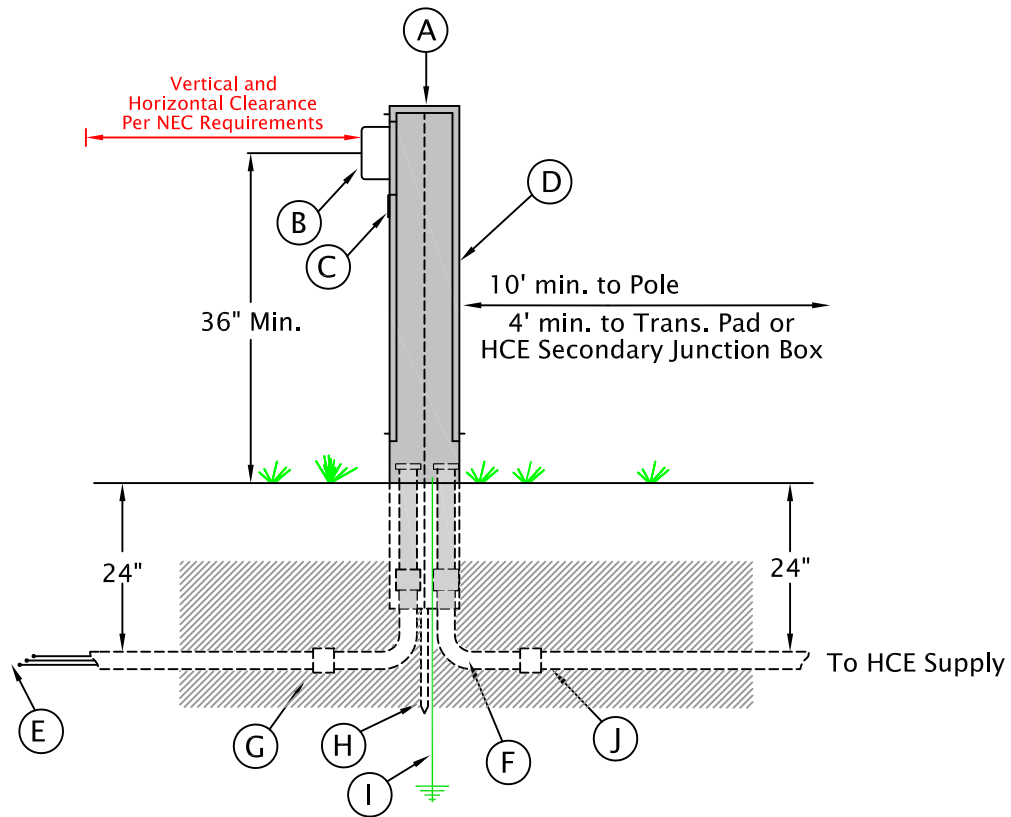
METER PEDESTAL

General Notes

1. All meter pedestals shall be equipped with a lever handle locking jaw type bypass.
2. Multiple meter pedestals shall not be wired in series.
3. Meter pedestals shall not be installed in front of a padmounted transformer.

Illustration Notes

- A. One position meter pedestal assembly illustrated. Two, three, and four position units similar.
- B. Meter supplied and installed by Holy Cross Energy.
- C. Circuit breaker access door.
- D. Line side termination access door. Appropriate quantity of set screw termination lugs included with assembly (one per each meter position). Must have provisions for Holy Cross Energy seal. The sealing means shall provide for Holy Cross Energy seal and/or key type padlock (5/16" diameter shackle).
- E. Service lateral cables, per NEC requirements.
- F. Conduits shall be continuous in length and in diameter from the meter pedestal to the transformer or Holy Cross Energy secondary junction box and shall not contain any junction boxes, vaults, condulets, (LB's) or similar devices. Service lateral conductors shall be sized to limit the voltage drop to 3% between Holy Cross Energy transformers and electric meters. See voltage drop charts in the Appendix Tables.
- G. Due to the rocky conditions of the soil in our service territory, Holy Cross Energy strongly recommends installing all underground service laterals beyond electric meter in conduit. If direct buried, however, three feet of slack is recommended in secondary cable below ground with six inches of sand or rock free dirt above and below secondary cable along the entire length of trench.
- H. Pedestal support stake, included with pedestal assembly.
- I. Grounding electrode, per NEC requirements, shall be furnished and installed by the consumer.
- J. Schedule 80 PVC above grade, GRC, Schedule 40 or 80 PVC below grade.
- K. Meter pedestals shall not be installed under the overhead powerline or under guys wires.



SEE EXPLANATION ON PAGE 8.20



METER & DESIGN
SPECIFICATIONS

METER PEDESTAL FED FROM
UNDERGROUND/ OVERHEAD TRANSFORMER

DATE: MAY 1, 2001

REVISED: DECEMBER 2021

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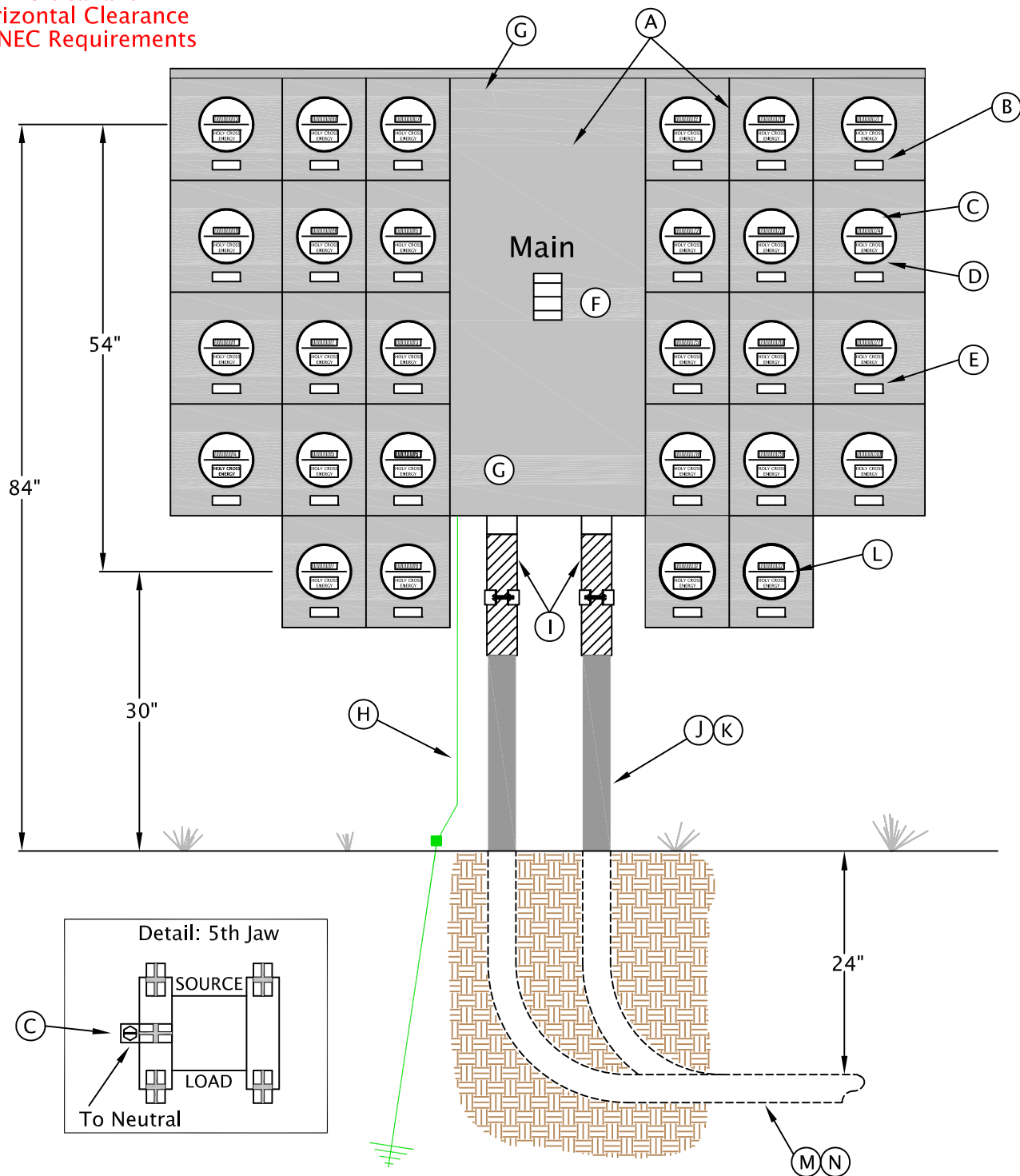
8.21

MULTIPLE METERING SERVICE (METER STACK)

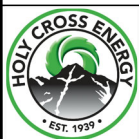
Illustration Notes

- A. Every line side compartment shall accommodate provisions for a Holy Cross Energy wire seal and/or a key type padlock (5/16" diameter shackle) whether or not the compartment is designed to house a meter.
- B. The electric meter will not be set until each meter socket and the premises it supplies have been properly identified by the consumer or agent. Proper identification shall mean that the unit number is plainly marked by a **permanent** durable means at the corresponding main service breaker, tenant panel board, and doorway or entrance to the apartment, office, store, or premise. **The method of identifying the corresponding unit on the meter socket is with a stamped brass tag securely attached.** See [Appendix E](#).
- C. 5th jaw is required in the 9:00 o'clock position on all meter sockets, 120/208 volt 3 wire network. This terminal must be connected within the socket to the neutral buss.
- D. Each meter location must have an individual ringless cover and sealing provisions.
- E. Individual socket load side disconnect.
- F. Main disconnect may be located ahead of meter stack only if required by NEC.
- G. All three phase services shall be 4 wire wye. Three phase services shall use three phase service equipment and panels in order to achieve proper load balance. Single phase services shall be connected to obtain a reasonable load balance between all three phases.
- H. Ground wire and electrode, per NEC, shall be furnished and installed by the consumer.
- I. If PVC conduit is used, a slip sleeve is required as per [Section 4](#). Conduit brackets should be installed to allow vertical movement in the sleeve.
- J. Service lateral conduit and conductors.
- K. Conduit above grade shall be Schedule 80 PVC.
- L. Three phase multiple unit devices designed for four wire poly phase use must have a seven terminal mounting block with a heavy duty, 200 amp, locking jaw, lever type by-pass (as required in [Section 4](#)).
- M. Conduit below grade shall be GRC, Schedule 40 or 80 PVC.
- N. Conduits shall be continuous in length from the meter socket to the transformer location and shall not contain any junction boxes, vaults, condulets, (LB's), or similar devices. Service lateral conductors shall be sized to limit the voltage drop 3% between Holy Cross Energy transformers and electric meters. See voltage drop charts in the Appendix Tables.

Vertical and
Horizontal Clearance
Per NEC Requirements



SEE EXPLANATION ON PAGE 8.22



METER & DESIGN
SPECIFICATIONS

MULTIPLE METERING SERVICE
(METER STACK)

DATE: MAY 1, 2001

REVISED: MARCH 2019

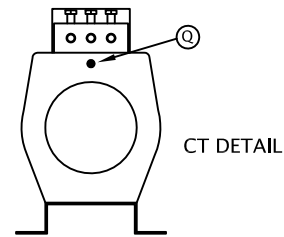
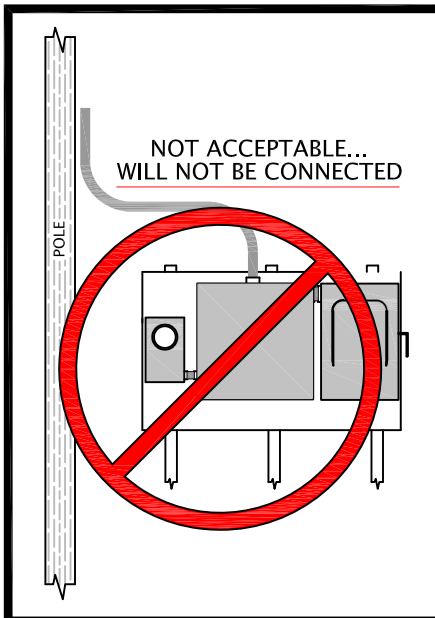
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8.23

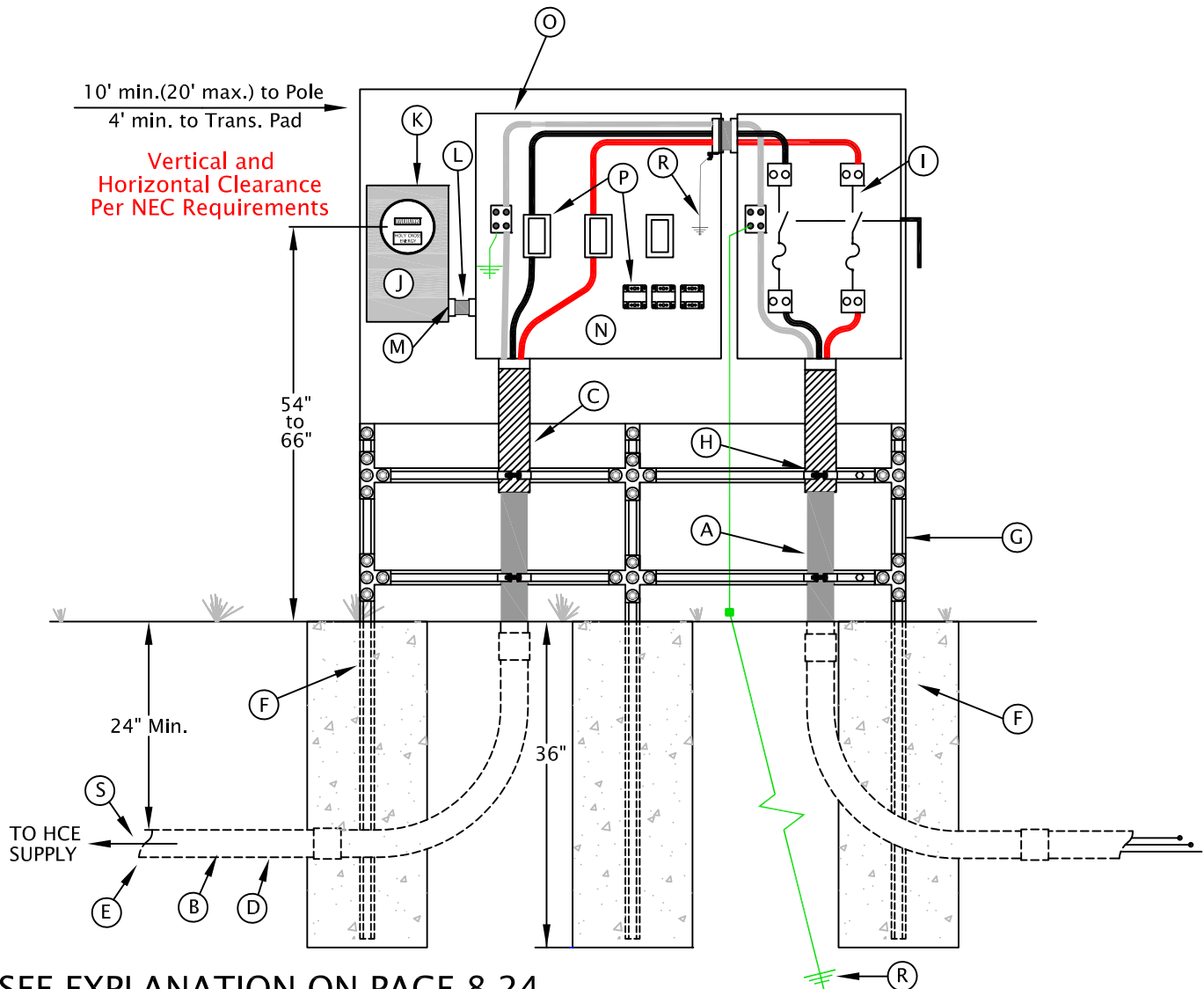
INSTRUMENT RATED SERVICE (FREESTANDING BACKBOARD TYPE)

Illustration Notes

- A. Conduit above grade shall be Schedule 80 PVC.
- B. Conduits shall be continuous in length from the transformer location to the instrument transformer enclosure and shall not contain any junction boxes, vaults, condulets, LB's or similar devices.
- C. If PVC conduit is used, a slip sleeve is required as per [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- D. Conduit below grade shall be GRC or Schedule 40 or 80 PVC.
- E. Service lateral conductors shall be sized to limit the voltage drop to 3% between the Holy Cross Energy supply transformer and the electric meter. See the voltage drop charts in the Appendix Tables.
- F. All vertical supports shall be plumbed and poured in place with concrete to a depth of 36" inches below grade.
- G. Adequate support for service support shall consist of the following:
 - 1. Holy Cross Energy no longer accepts 6" x 6" wood post structures as a means of permanently mounting freestanding services. Holy Cross Energy poles are not to be used as support in any way (except for risers only).
 - 2. If meter sockets and instrument enclosures are mounted on Unistrut, which is the preferred method (refer to [Section 9](#)), it shall be minimum of 1 5/8" deep, solid type (Unistrut with factory punched holes is not allowed).
- H. Conduits are to be supported in accordance with NEC.
- I. Disconnect devices shall be installed outdoors in an accessible location. All disconnect devices must be located on the load side of instrument transformer enclosure.
- J. Meter, test switch, and instrument transformer secondary wiring is to be provided and installed by the Holy Cross Energy Meter Department.
- K. Appropriate meter sockets are to be obtained from Holy Cross Energy. HQ-6 for single phase and HQ-13 for three phase. See [Section 2](#) for address and phone numbers of Holy Cross Energy offices.
- L. One inch I.D. minimum GRC, EMT, or Schedule 80 PVC.
- M. Plastic bushings required (GRC only).
- N. Instrument transformer cabinet, NEMA three rain tight is to be provided by owner. Every line side compartment shall accommodate provisions for a Holy Cross Energy wire seal and/or a key type padlock (5/16" diameter shackle) whether or not the compartment is designed to house a meter.
- O. Dimensions of instrument transformer enclosure shall be: 1Ø - 30 inches by 24 inches by 11 inches
3Ø - 36 inches by 36 inches by 11 inches
- P. Current transformers and potential transformers for 277/480 volt services are furnished by Holy Cross Energy. They shall be obtained and installed by the consumer/contractor. Transformers shall be securely installed in a cabinet and must have a minimum of two ¼" studs per CT spaced as required by template (self-tapping screws not permitted). Bar type current transformers are available if desired. Cable landing lugs shall be furnished and installed by consumer/contractor.
- Q. The line side of a current transformer is designated by a white dot or an embossed H1, and shall be pointed toward the source (supply).
- R. Ground wire and electrode, per NEC, is to be provided and installed by the consumer. Instrument transformer enclosure must be grounded in accordance with Section 250 of the NEC.
- S. If PVC conduit is used, a slip sleeve is required. Conduit brackets shall be installed to allow conduit to move vertically in the slip sleeve. See [Section 4](#).
- T. Holy Cross Energy will not connect single phase or three phase 120/208Y or 480Y/277 volt 3 wire services larger than 200 amps at Holy Cross Energy 3 phase transformers. All three phase services shall be 4 wire wye. Three phase services shall use three phase service equipment and panels in order to achieve proper load balance.



Mounting Plate Lay-out for Donut and Bar type CT's, rated 100 to 800 amp, to be mounted on studs located in UL Listed Current Transformer Enclosures.
Must have a minimum of 2 1/4" studs per CT, spaced as required per CT template.



SEE EXPLANATION ON PAGE 8.24



METER & DESIGN
SPECIFICATIONS

INSTRUMENT RATED SERVICE
(FREESTANDING BACKBOARD MOUNT)

DATE: MAY 1, 2001

REVISED: DECEMBER 2021

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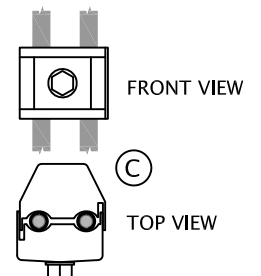
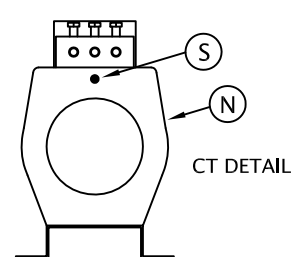
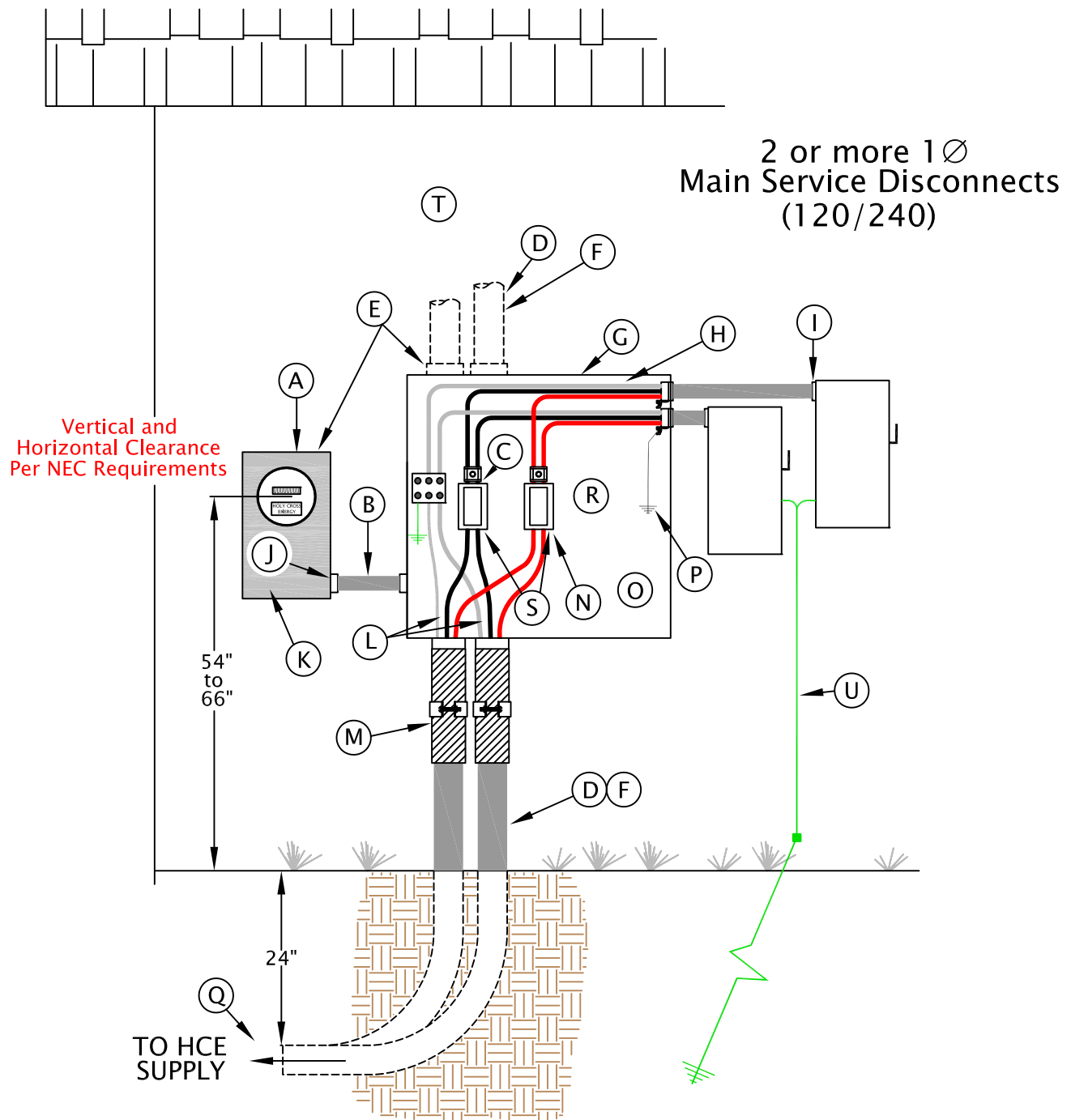
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INSTRUMENT RATED SERVICE ON BUILDING

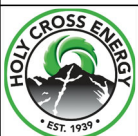
Illustration Notes

- A. Appropriate meter socket may be obtained from Holy Cross Energy at our offices located in Glenwood Springs, and Avon. See [Section 2](#) for addresses. PTS-6 for 1Ø, PTS-13 for 3Ø.
- B. One inch EMT, GRC, or Schedule 80 PVC minimum size conduit, maximum length not to exceed 100 feet shall be continuous. Junction boxes, conduit bodies (LB's) or similar devices are not allowed.
- C. If multiple disconnects (2-6 as permitted in the NEC) are used, common phase wires must be bussed together in the instrument transformer enclosure. (Re: couple taps, split bolt, tap lugs).
- D. All underground and overhead services shall be sized to limit the voltage drop to 3% between the transformer and the instrument transformer enclosure. See voltage drop charts in the Appendix Tables.
- E. Rain tight hub assembly required for overhead entrances.
- F. Installation of underground and overhead service laterals is the responsibility of the consumer. Conductors shall be in a continuous run of conduit. Junction boxes, conduit bodies (LB's), vaults, or similar devices are strictly forbidden.
- G. Dimensions of Instrument Transformer enclosure shall be: 1Ø - 30 inches by 24 inches by 11 inches
3Ø - 36 inches by 36 inches by 11 inches.
- H. Instrument transformer cabinets are to be provided by owner and shall be installed outdoors in an accessible location. If it is not practical to install an instrument transformer cabinet or meter outdoors, approval must be obtained in writing from the Holy Cross Energy Meter Department before an indoor location can be determined. Cabinet must have provisions for meter seal on door, as well as rain tight NEMA 3R construction when used outdoors. A drip lip shall be installed at the top of the enclosure. Every line side compartment shall accommodate provisions for a Holy Cross Energy wire seal and/or a key type padlock (5/16" diameter shackle) whether or not the compartment is designed to house a meter.
- I. Disconnect devices shall be installed outdoors in an accessible location. All disconnect devices must be located on the load side of instrument transformer enclosure.
- J. Plastic bushings required (GRC only).
- K. Meter, test switch, and instrument secondary wiring shall be provided and installed by Holy Cross Energy's Meter Department.
- L. All common phase wires must be grouped as shown through current transformers. When multiple conduits enter the cabinet, common phase wires must be split, as shown, for compliance with NEC.

If PVC conduit is used, a slip sleeve required as per [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve. Expansion couplings not allowed/permitted.
- M. Current transformers and potential transformers for 277/480 volt services are furnished by Holy Cross Energy. They shall be obtained and installed by consumer/contractor. Transformers shall be securely installed in cabinet and must have a minimum of two ¼" studs per CT spaced as required by template (self-tapping screws not permitted). Bar type current transformers are available if desired. However, cable landing lugs shall be furnished and installed by consumer/contractor.
- N. Three potential transformers are required for 480Y/277 volt 3Ø services.
- O. Instrument transformer enclosure must be grounded in accordance with Section 250 of the NEC.
- P. Holy Cross Energy will not connect single phase or three phase 120/208Y or 480Y/277 volt 3 wire. All three phase services shall be 4 wire wye. Three phase services shall use three phase service equipment and panels in order to achieve proper load balance.
- Q. Third current transformer is required for 3Ø installation.
- R. The line side of current transformer is designated by a white dot or an embossed H1 and shall be pointed toward the source (supply).
- S. Instrument transformers shall not be installed in service disconnects, wiring gutters, junction boxes, nor be directly exposed to the weather.
- T. Ground wire and electrode, per NEC, to be provided and installed by consumer.



SEE EXPLANATION ON PAGE 8.26



METER & DESIGN
SPECIFICATIONS

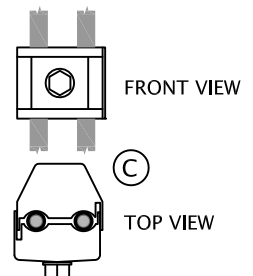
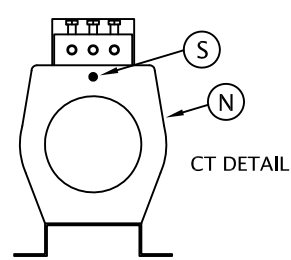
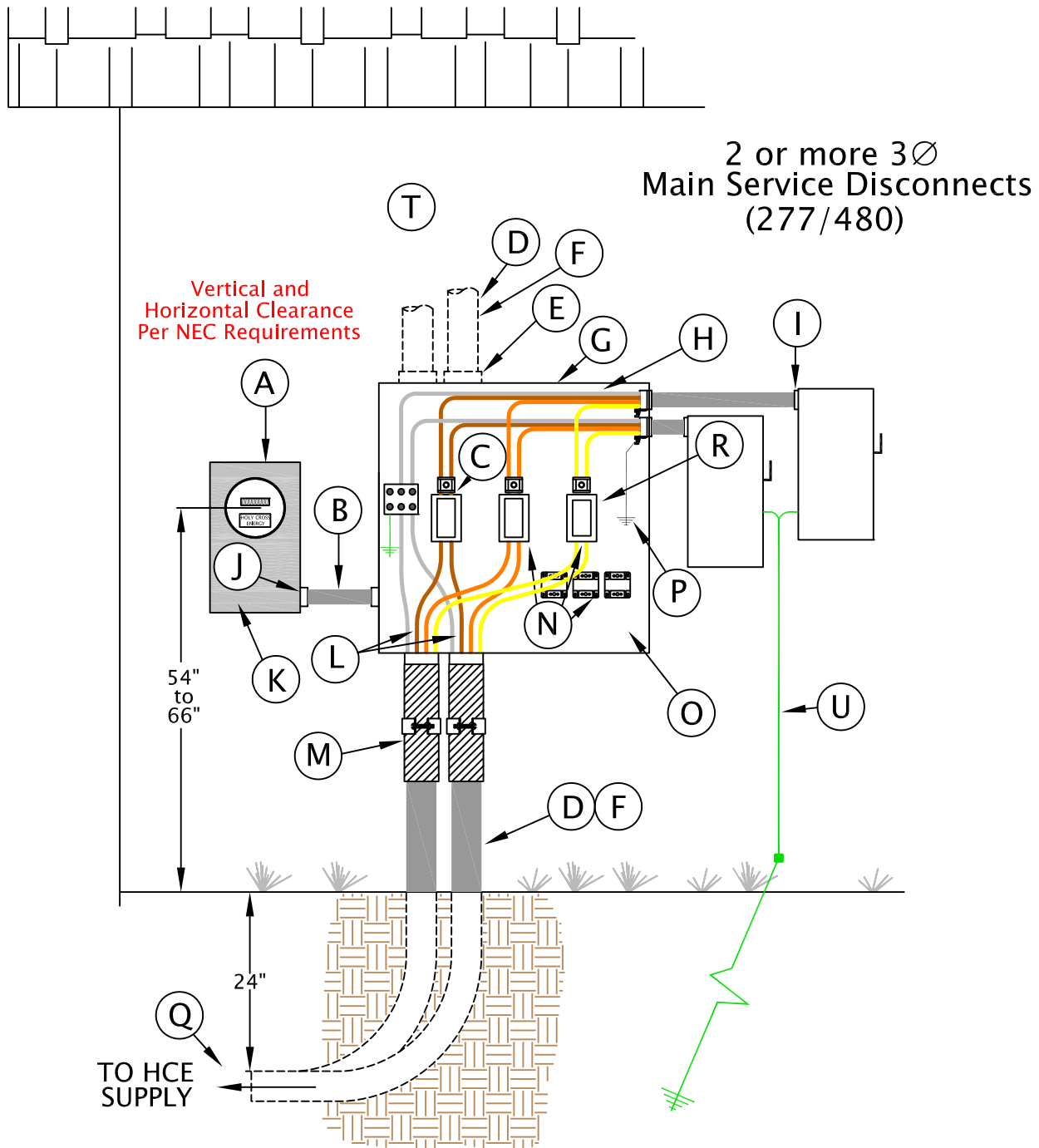
INSTRUMENT RATED
SERVICE ON BUILDING

DATE: MAY 1, 2001

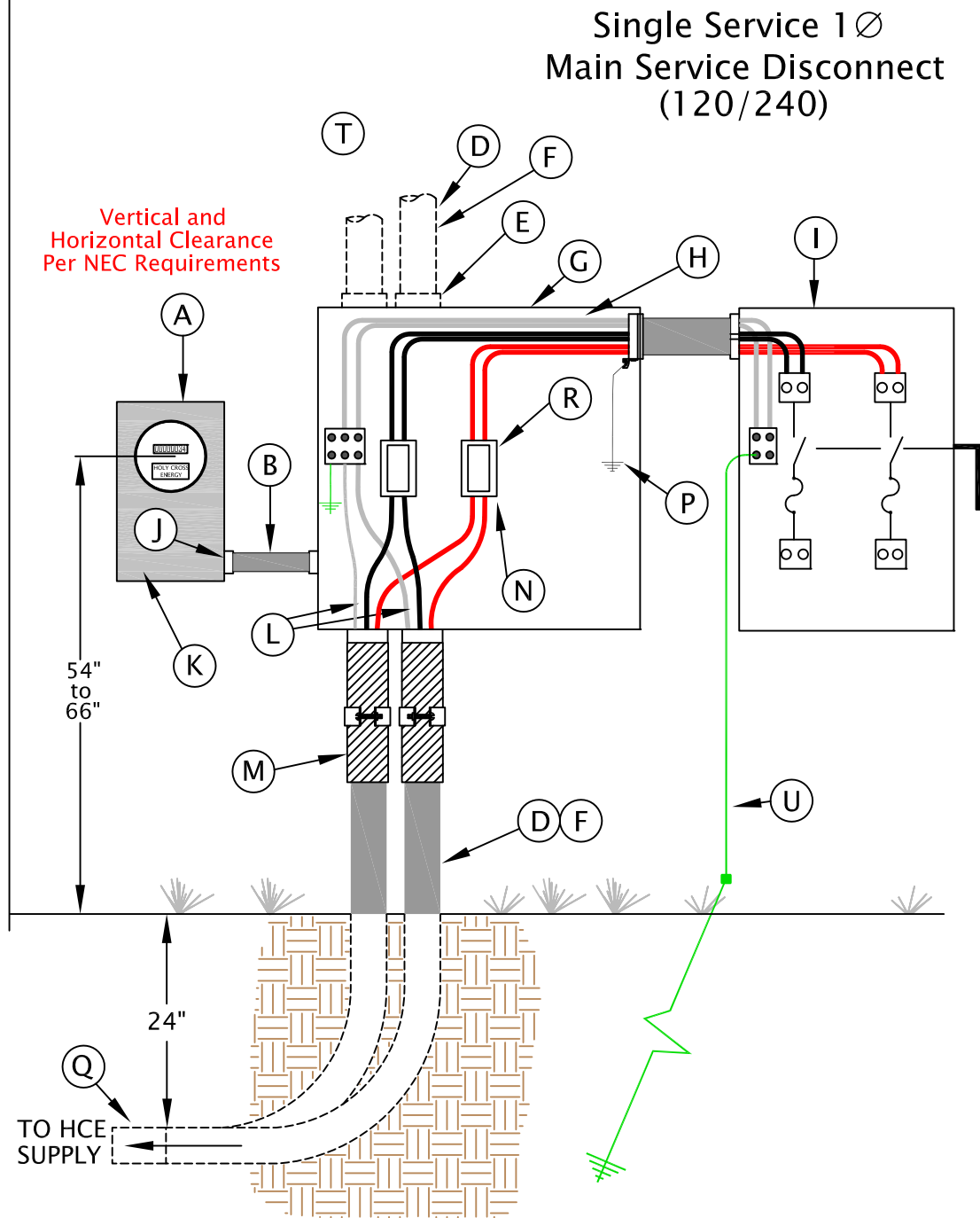
REVISED: DECEMBER 2021

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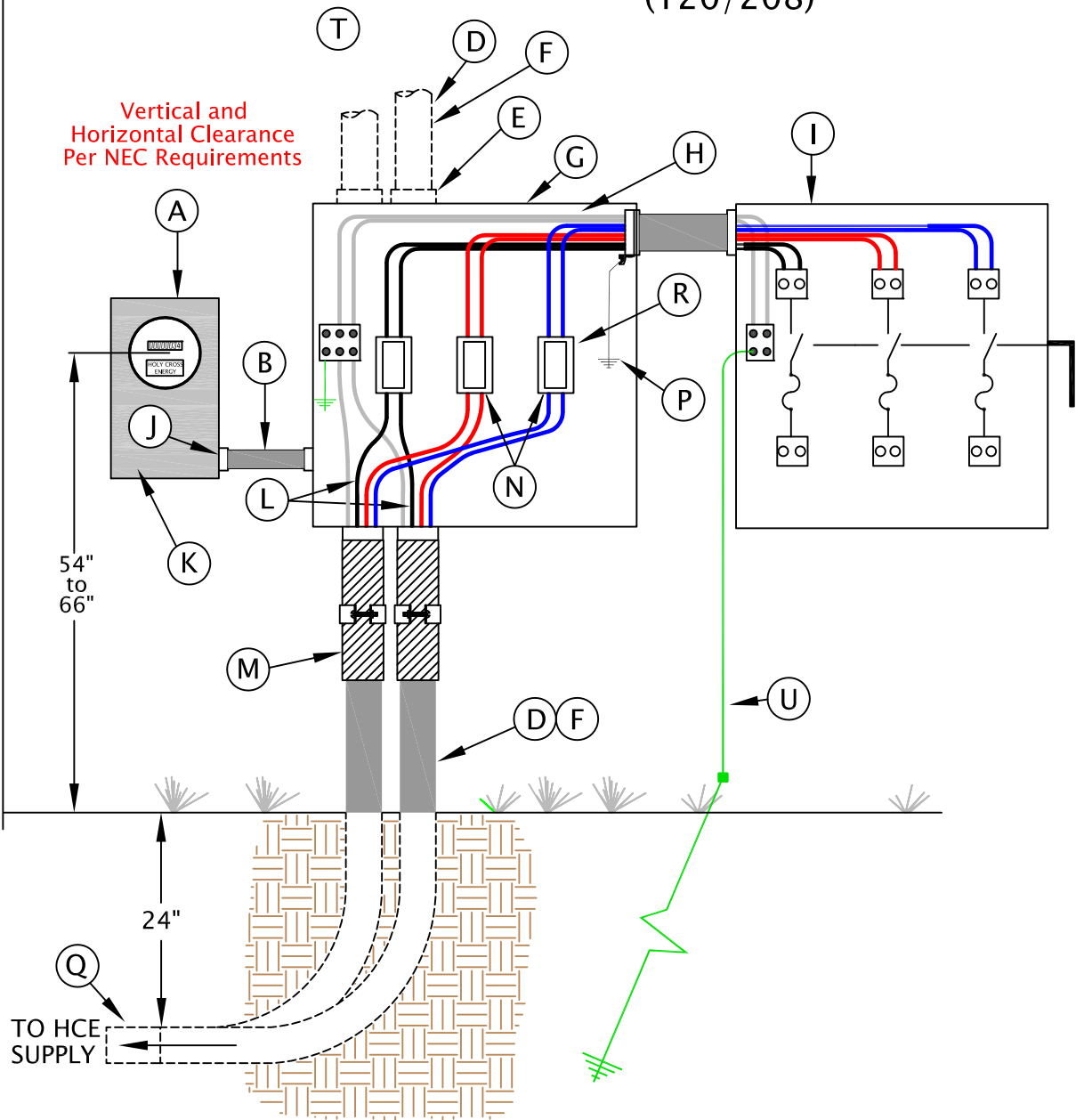
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SEE EXPLANATION ON PAGE 8.26



Single Service 3Ø Main Service Disconnect (120/208)



SEE EXPLANATION ON PAGE 8.26

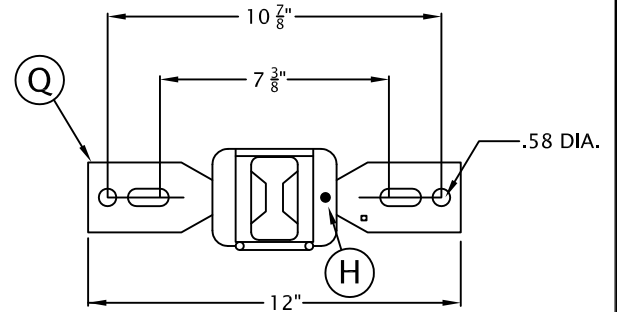
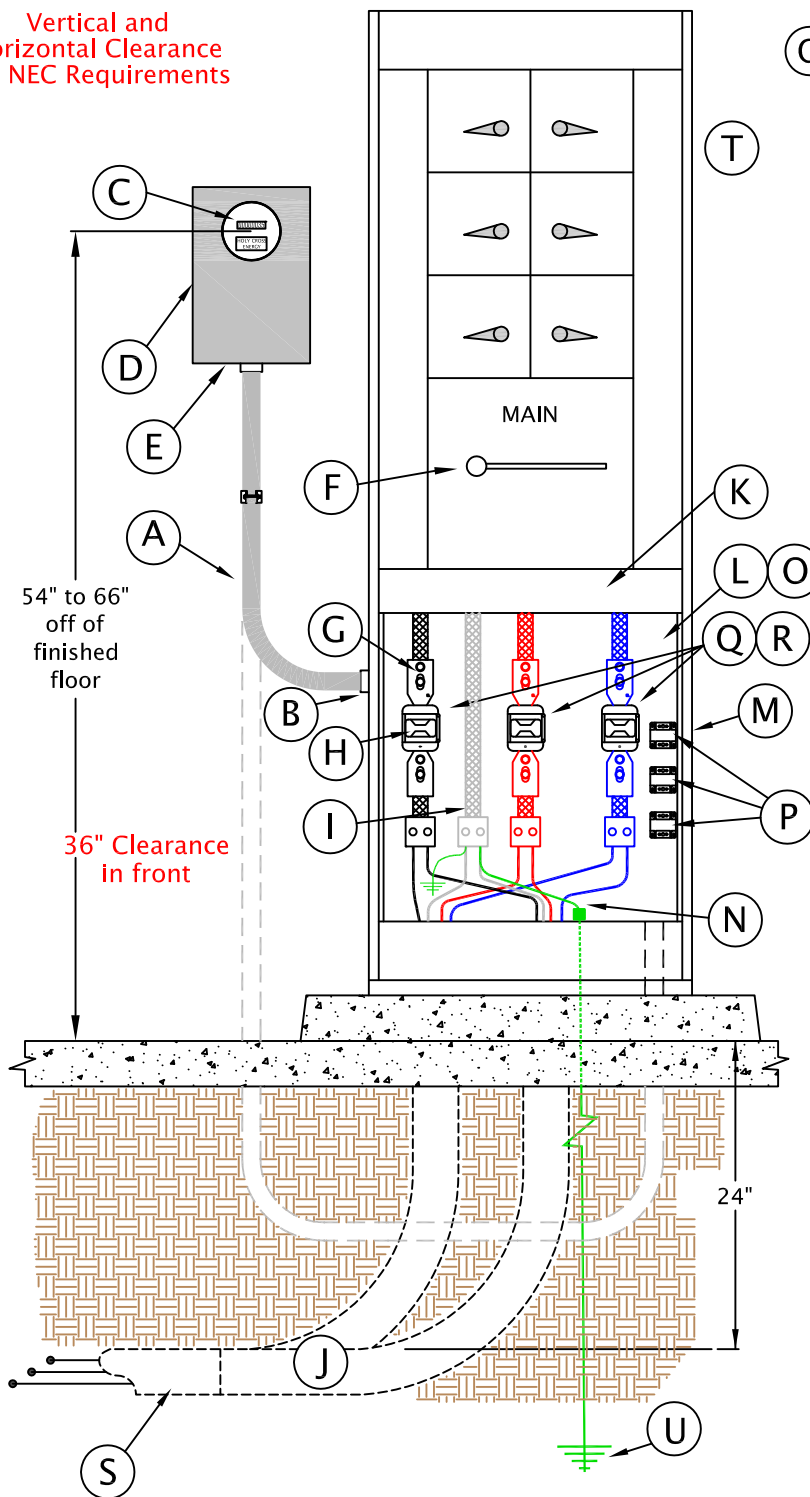
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INSTRUMENT RATED SERVICE IN SWITCHGEAR

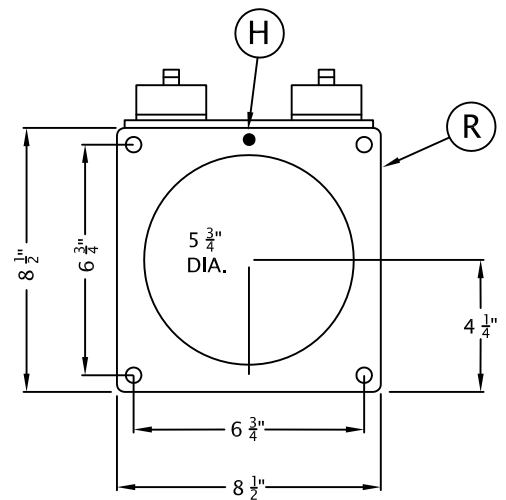
Illustration Notes

- A. One inch minimum I.D. conduit size, GRC, EMT, or Schedule 80 PVC, maximum length 100 feet. Pull wire required if more than two 90° sweeps are used. Junction boxes, conduit bodies (LB's) or similar devices are not allowed.
- B. If knockout is used, plastic bushings are required for GRC).
- C. Meter, test switch, and instrument transformer secondary wiring provided and installed by Holy Cross Energy meter department.
- D. Appropriate meter socket may be obtained from Holy Cross Energy at our offices located in Glenwood Springs, and Avon. See [Section 2](#) for addresses. HQ-6T for 1Ø, HQ-13T for 3Ø.
- E. Meter socket may be mounted on consumer owned switchgear, provided they are installed on a hinged cover or door. They may not be mounted on screw cover (lift off) type door.
- F. Main disconnects must be on load side of current transformer unless special switchgear design mandates otherwise. Written approval from Holy Cross Energy is required for cold sequence metering.
- G. When current transformers are attached to buses, 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.
- H. The line side of a current transformer is designated by a white dot or an embossed H1, and shall be pointed toward the source (supply).
- I. A neutral lug shall be made available near the front of the instrument transformer compartment so that it can be safely accessed, even if the switchgear is energized.
- J. All conductors of the electric circuit shall be in the same conduit. Where the service lateral requires parallel installation, each phase conductor and the grounded conductor shall be grouped together in each conduit and identified on both ends as required in [Section 4](#).
- K. Instrument transformer compartment shall have barrier between adjacent areas and shall contain no other wires or equipment, except what Holy Cross Energy uses for metering.
- L. Standard factory design hot sequence utility metering compartment.
- M. All doors and covers to compartments designated for instrument metering equipment and any that are on the line side of metering equipment shall have a means to be sealed off with Holy Cross Energy seals. The sealing means shall provide for Holy Cross Energy wire seal and/or key type padlock (5/16" diameter shackle).
- N. Service lateral conductors shall be sized to limit the voltage drop to 3% between the Holy Cross Energy supply transformer and the electric meter. See the voltage drop charts in the Appendix Tables.
- O. Instrument transformers will be supplied by Holy Cross Energy and mounted by the consumer's electrical contractor in such a way that the secondary terminals are readily accessible from the front door of the compartment. Primary connections (line and load) to the current transformer will be made by the consumer's electrical contractor. When potential transformers are required there will be one per phase.
- P. Standard industry dimensions of potential transformers (PT) supplied by Holy Cross Energy for 480Y/277 volt services. All buss bars, including the neutral buss, shall be tapped to accommodate a 10-32 machine screw for attaching the phase voltage wire to the PT.
- Q. Standard industry dimensions of 200:5 through 1000:5 bar type current transformers (CT) are supplied by Holy Cross Energy for service ratings up to 1,000 amps. Bus bar mounting bolts must be supplied with switchgear for this type of current transformer.
- R. Standard industry dimensions of large window current transformers (CT) supplied by Holy Cross Energy for service ratings over 1,000 amps. Bus links and current transformer mounting provisions must be supplied with switchgear for this type of current transformer.
- S. Holy Cross Energy will not connect single phase or three phase 120/208Y volt or 480Y/277 volt 3 wire. All three phase services shall be 4 wire wye. Three services shall use three phase service equipment and panels in order to achieve proper load balance.
- T. Instrument transformers shall not be installed in service disconnects, wiring gutters, junction boxes, nor be directly exposed to the weather.
- U. Ground wire and electrode, per NEC, to be provided and installed by consumer.

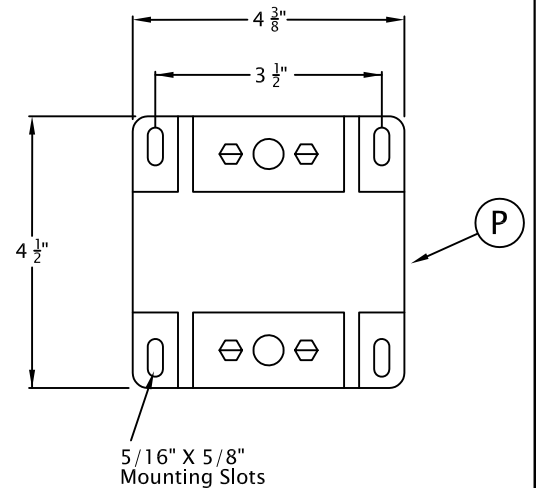
Vertical and
Horizontal Clearance
Per NEC Requirements



BAR CT DETAIL



WINDOW CT DETAIL



PT DETAIL

SEE EXPLANATION ON PAGE 8.32



METER & DESIGN
SPECIFICATIONS

INSTRUMENT RATED SERVICE IN SWITCHGEAR

DATE: MAY 1, 2001

REVISED: MARCH 2019

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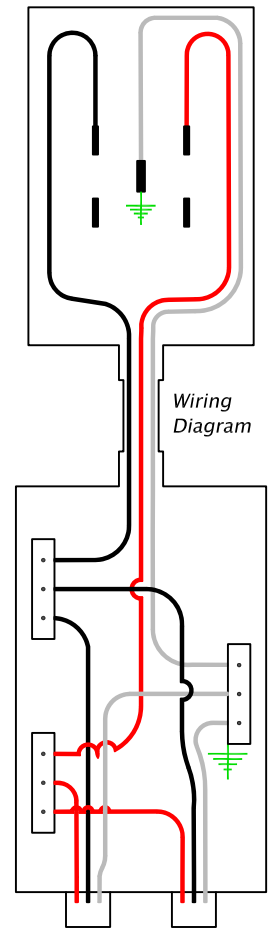
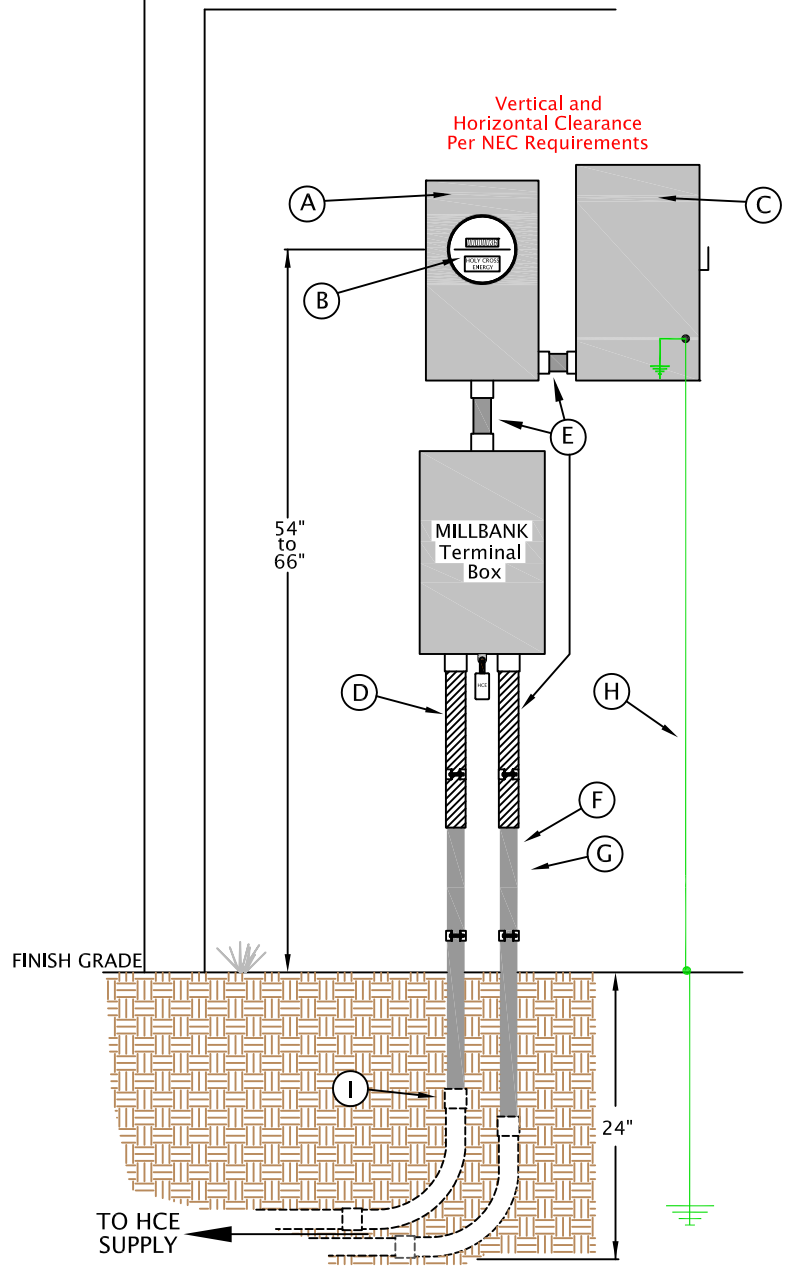
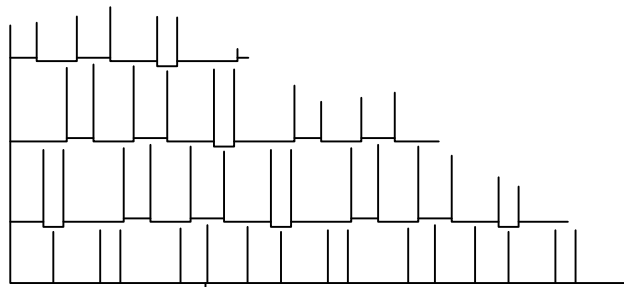
TERMINAL BOXES (1 PHASE, 3 PHASE) 100 AND 200 AMP

General Notes

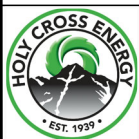
1. Due to the increase in size of service laterals to compensate for the 3% voltage drop, as required by Holy Cross Energy, we will accept an approved Millbank, type 3R splice box (or approved equivalent) located below the meter socket to accommodate multiple conductor runs or an increase in circular mil size. Refer to page 9.8 in [Section 9](#).
2. Under no circumstances will Holy Cross Energy allow parallel conductors to be installed in self-contained meter sockets rated 200 amps or less, 1Ø and 3Ø.

Illustration Notes

- A. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), are to be furnished and installed by consumer.
- B. Meters are provided and installed by Holy Cross Energy.
- C. Rain tight, load break fused disconnect or circuit breaker required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. Disconnect must be on load side of meter and be located within 24 inches of meter socket.
- D. If PVC conduit is used, a slip sleeve as required in [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- E. If metallic raceway is used, it shall be bonded in accordance with the NEC.
- F. PVC or GRC service conduit, size as required. If PVC is used, it shall be Schedule 80 above grade.
- G. Conduit must be securely attached to building, per NEC.
- H. Ground wire and electrode per NEC, furnished and installed by consumer.
- I. To Holy Cross Energy transformer.
 1. All conduits penetrating company vaults shall be installed in provided knockouts and grouted in place. All conduits penetrating HCE secondary junction boxes shall be installed per the appropriate specification in this Guidebook.
 2. Conduits shall be continuous in length from the meter socket to the transformer vault or HCE secondary junction box and shall not contain any customer owned junction boxes, condulets (LB's) or similar devices.
 3. Service lateral conductors shall be sized to limit the voltage drop to 3% between Holy Cross Energy transformers and electric meters. See the voltage drop charts in the Appendix Tables.



SEE EXPLANATION ON PAGE 8.34



METER & DESIGN
SPECIFICATIONS

100 & 200AMP
TERMINAL BOXES – 1Ø & 3Ø

DATE: MAY 1, 2001

REVISED: MARCH 2019

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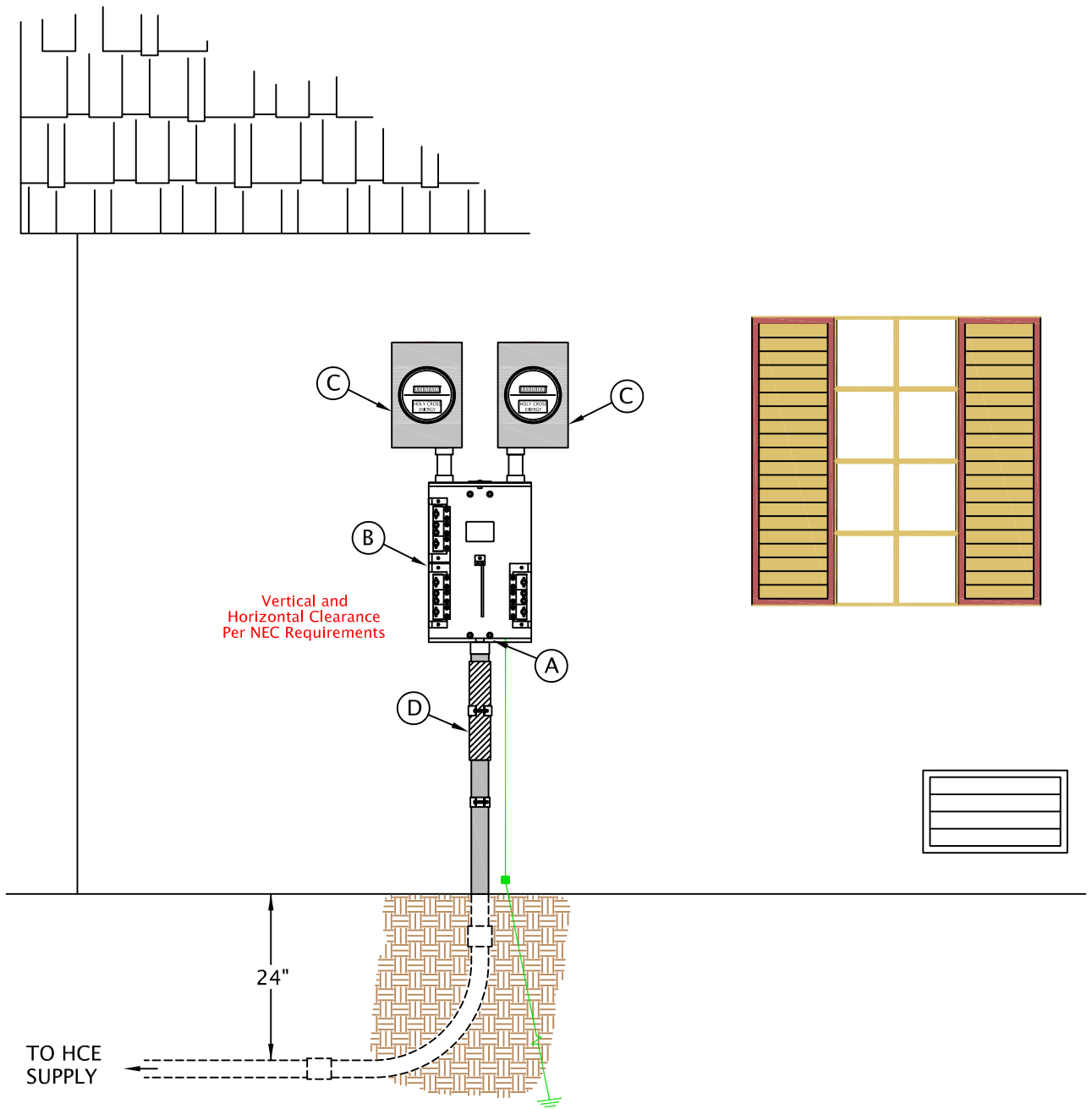
ENCLOSURES AHEAD OF METER(S)

General Notes

1. Holy Cross Energy must pre-approve the installation and use of all enclosures (boxes) ahead of the meter enclosure.

Illustration Notes

- A. Rain tight, lockable.
- B. Connectors must be solidly affixed inside the enclosure. Milbank Part Number 4543, or equal, is recommended.
- C. Self-contained meter enclosures.
- D. Appropriate slip sleeve, per [Section 4](#) (refer to Page 8.58).



SEE EXPLANATION ON PAGE 8.36



METER & DESIGN
SPECIFICATIONS

JUNCTION BOXES ON SOURCE
SIDE OF MULTIPLE METERS

DATE: NOVEMBER 16, 2017

REVISED: March 2019

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8.37

1Ø AND 3Ø ALL-IN-ONE AND SELF-CONTAINED SERVICES, 400A AND LESS

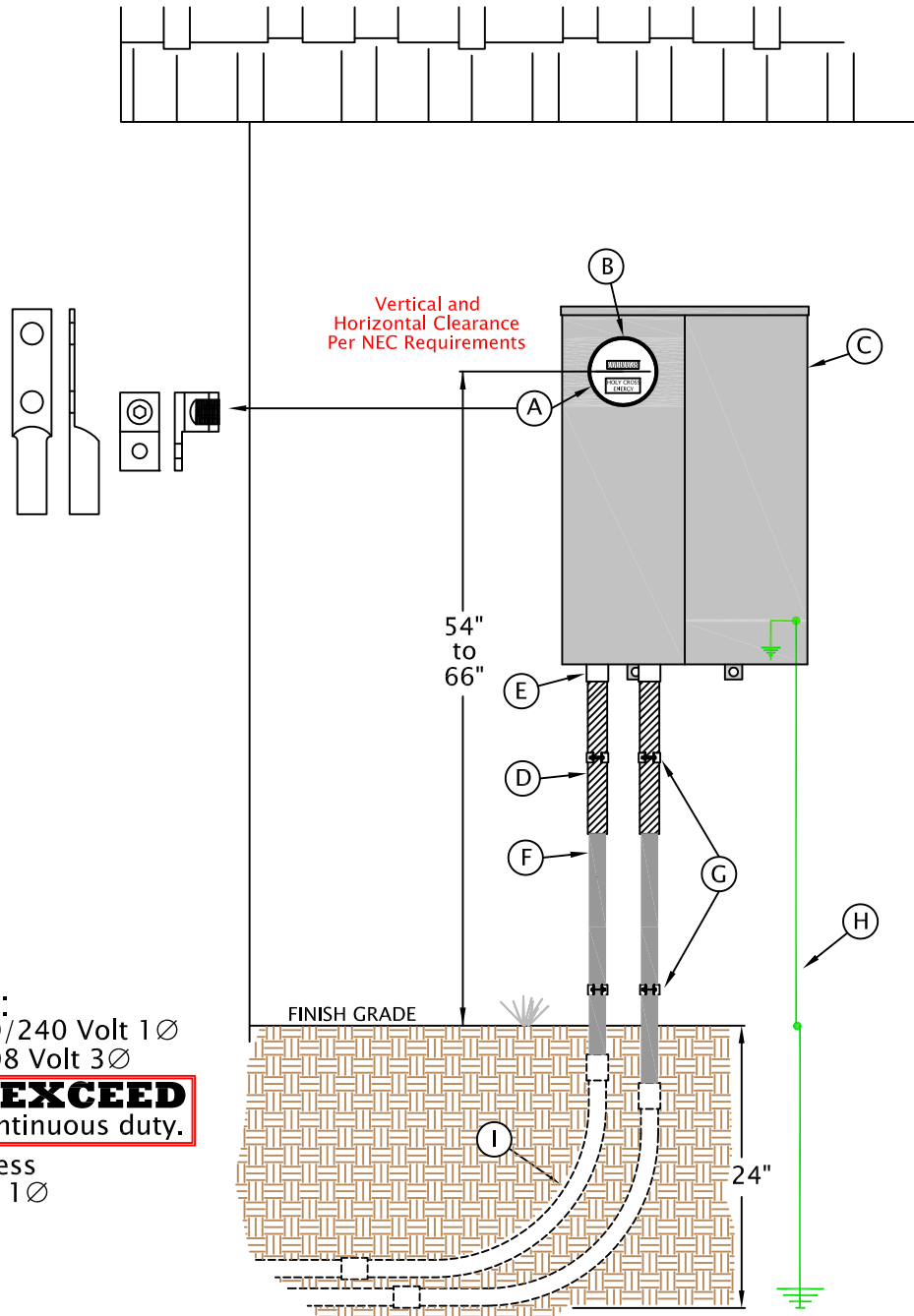
General Notes

1. This type of self-contained metering is only permitted on 120/240 volt, 1Ø loads and 120/208 3Ø. Total amp rating of the main disconnect(s) shall not exceed 400 amps for a 320 amp continuous duty meter socket. Services where the total connected load is in excess of, or anticipated to be in excess of 320 amps, shall use instrument transformer (CT) metering (See [Section 4.](#))

Illustration Notes

- A. Appropriate UL listed meter socket assembly must have ringless cover with lever operated jaw release bypass. It shall have factory installed UL listed lugs (compression or set/Allen screw) on the line side of meter socket. Termination of service lateral to line side of meter socket shall be by electrician/consumers.
- B. Meter provided and installed by Holy Cross Energy.
- C. Rain tight, load break fused disconnect(s) or circuit breaker, (factory built/UL listed) required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly.
- D. If PVC conduit is used, a slip sleeve as required in [Section 4.](#) Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- E. If metallic raceway is used, it shall be bonded in accordance with NEC.
- F. PVC or GRC service conduit, size as required. If PVC is used, it shall be Schedule 80 above grade.
- G. Conduit must be securely attached to building per NEC.
- H. Ground wire and electrode, per NEC, to be provided and installed by consumer.
- I. To Holy Cross Energy transformer/secondary junction box, all conduits penetrating company vaults shall be installed in provided knockouts and grouted in place). Conduits shall be continuous in length from the meter socket to the transformer/secondary junction box vault and shall not contain any junction boxes, vaults, condulets, (LB's), or similar devices. Service lateral conductors shall be sized to limit the voltage drop to 3% between Holy Cross Energy transformers and electric meters. See the voltage drop charts in the Appendix Tables.

ALL-IN-ONES



NOTES:
 400 Amp 120/240 Volt 1Ø
 or 120/208 Volt 3Ø
NOT TO EXCEED
 320 Amps continuous duty.
 200 Amp or less
 120/240 Volt 1Ø

SEE EXPLANATION ON PAGE 8.38



METER & DESIGN
 SPECIFICATIONS

1Ø & 3Ø ALL-IN-ONE METER SEC.
 W/DIST. SECTION

DATE: JUNE 1, 2004

REVISED: MARCH 2019

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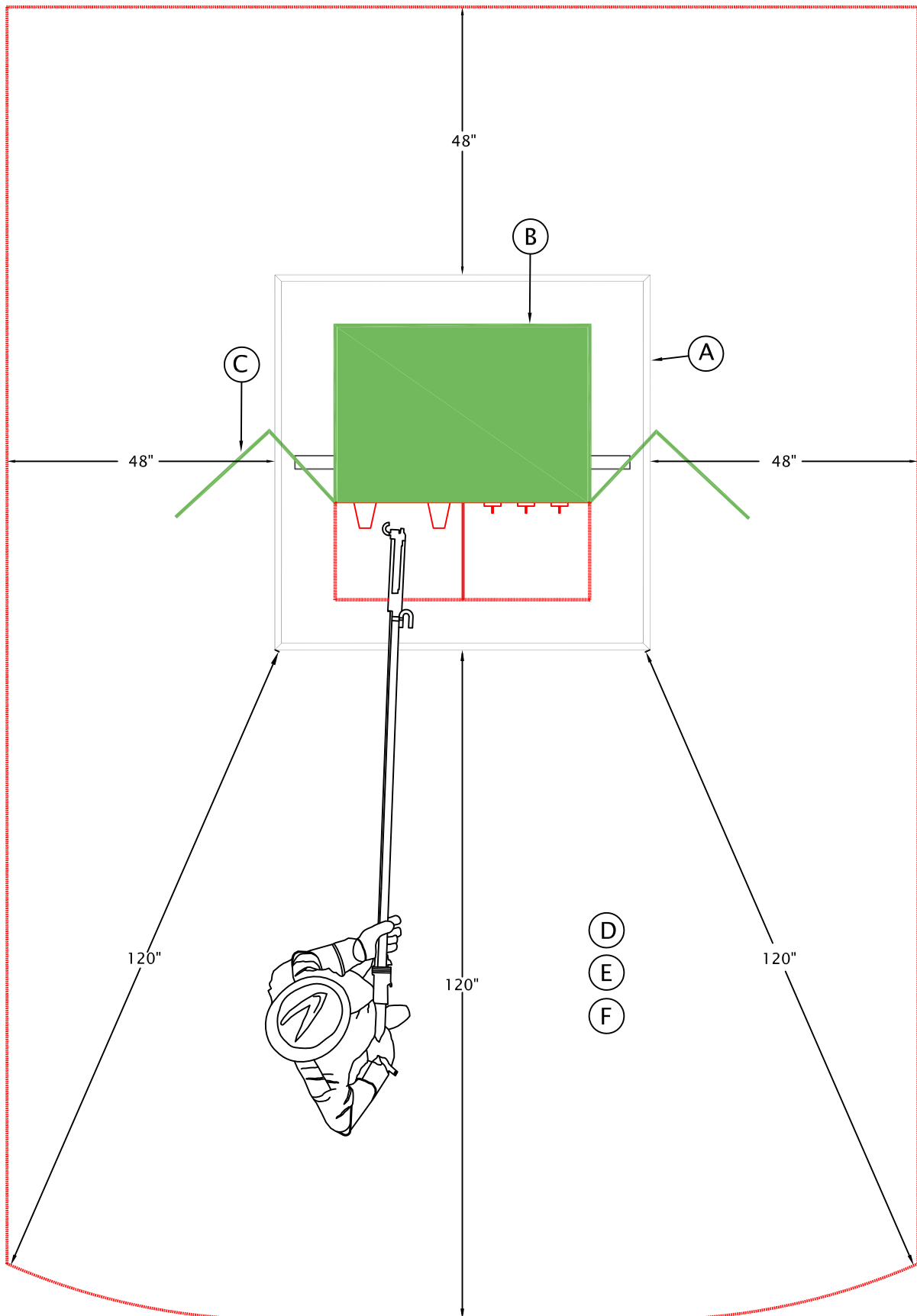
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PAD MOUNTED TRANSFORMER CLEARANCE

Illustration Notes

- A. Top pad of pre-cast concrete transformer vault. Not all pads are the same dimensions. Clearance requirements are from pads (4 feet on the sides and rear, 10 feet in the front).
- B. Transformer.
- C. Transformer doors hinge at various positions on the transformers.
- D. Clear areas are required around pad mounted transformers to allow the following:
 - 1. Access to the primary and secondary compartments of the transformer.
(Ice, snow, water and dirt build up shall be prevented.)
 - 2. Hot stick operation of the elbows, switch and bay-o-net fuse associated with the primary compartment of the transformer.
 - 3. Air circulation for cooling the transformer during peak load conditions.
 - 4. Boom truck access for replacing the transformer.
 - 5. Routine inspection and maintenance.
- E. Grade shall be level in the clear area.
- F. The clear area shall have no obstructions that would impede Holy Cross Energy personnel in the operation, maintenance, installation, removal, or repair of the transformer or any other Holy Cross Energy facilities at this location.



SEE EXPLANATION ON PAGE 8.44



METER & DESIGN
SPECIFICATIONS

PAD MOUNTED TRANSFORMER (CLEARANCE)

DATE: MAY 1, 2001

REVISED: MARCH 2019

PAGE #

8.45

EQUIPMENT SCREENING SPECIFICATIONS

**HOLY CROSS ENERGY
ENGINEERING DEPARTMENT
3799 Highway 82 - P. O. Box 2150
Glenwood Springs, Colorado 81602
(970) 945-5491**

All proposed designs or proposed alterations to existing screens shall comply with the following specifications. Proposals (plans and specifications) shall be submitted to the Holy Cross Energy [Engineering Department](#) for written approval prior to construction. Compliance and approval shall be the sole determination of the Holy Cross Energy [Engineering Department](#). Noncompliance with these specifications or failure to gain written approval, shall result in the denial of a permanent meter connection or the dismantling of nonconforming screens.

Examples of suggested equipment screens are shown on the drawings that follow.

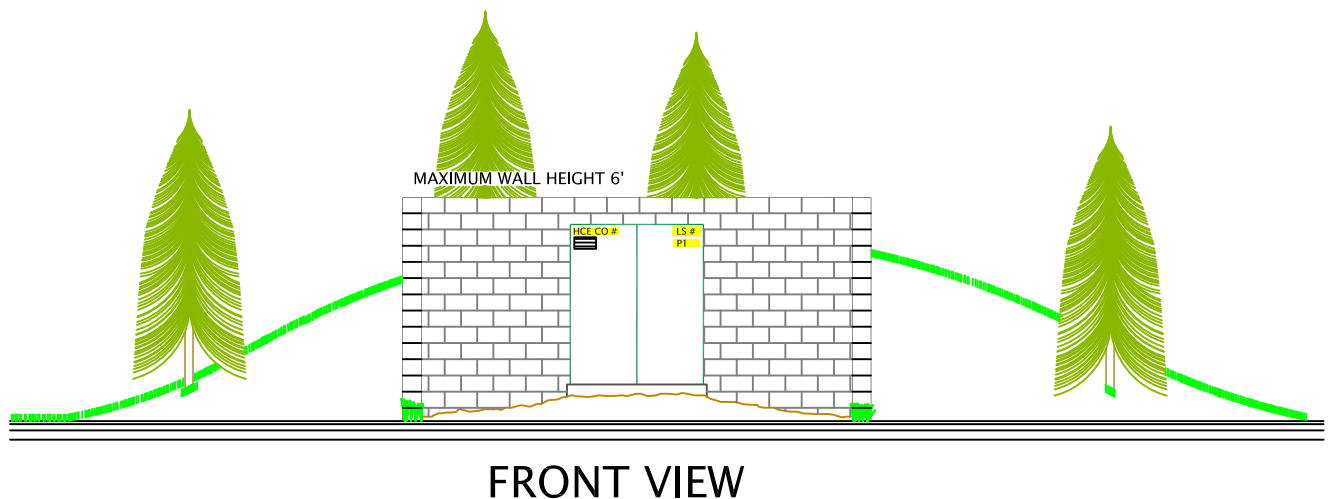
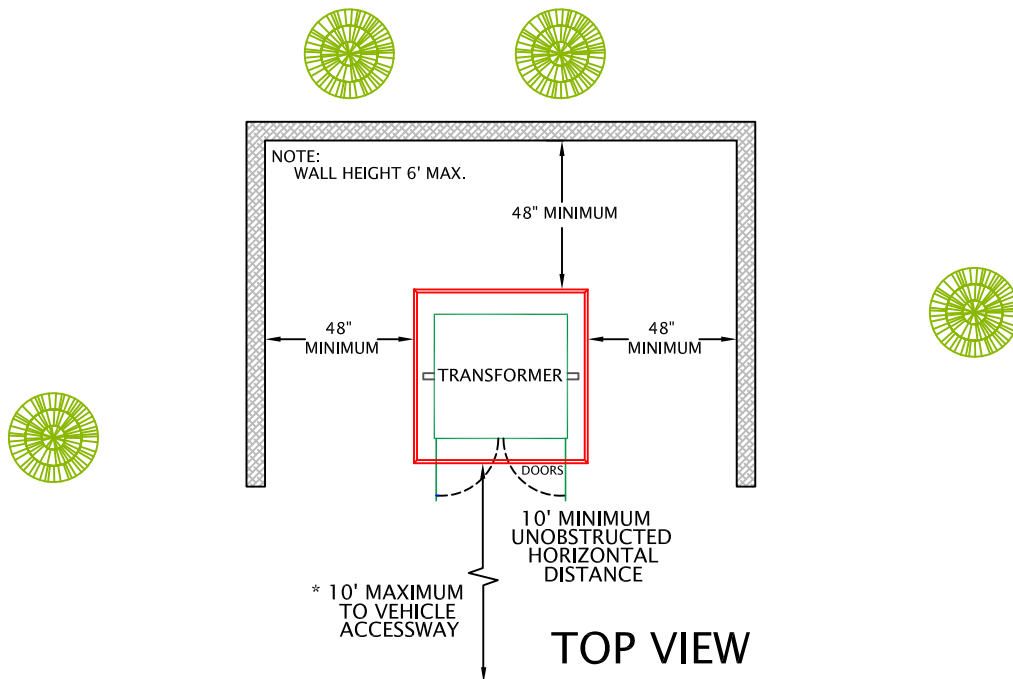
General Specifications:

1. Holy Cross Energy shall not be liable for any damage to screens.
2. Screen construction and maintenance shall be the responsibility of parties other than Holy Cross Energy.
3. The area inside the screen shall be kept clean. There shall be no material of any kind stored inside the screen.
4. Holy Cross Energy equipment will be installed in accordance with Holy Cross Energy installation specifications.

Design Specifications:

1. All equipment shall be readily accessible by Holy Cross Energy personnel.
2. All construction shall be permanent in nature and shall not interfere with operation and maintenance of Holy Cross Energy facilities.
3. There shall be a maximum of 10 feet horizontal distance from equipment to nearest vehicle access way to permit removal or replacement of equipment.
4. There shall be a minimum of 10 feet level, unobstructed, horizontal distance in front of equipment doors for maintenance and operations activities.
5. Water, snow and ice buildup shall be prevented. Proper drainage shall be provided. The area inside the enclosure shall be gravel or concrete. Snow removal by parties other than Holy Cross Energy may be required. Equipment will not be located under rooflines where water, snow or ice buildup and drainage may occur.
6. Equipment shall not be covered in any manner above the equipment
7. There shall be no doors or moving parts associated with the screen. *
8. Walls shall be a maximum of six feet in height.
9. There shall be no walls within ten feet of equipment sides having doors.
10. Equipment doors shall be able to open fully. *
11. Proper equipment ventilation (minimum four feet from equipment pad) shall be maintained. This may require snow removal by parties other than Holy Cross Energy.
12. Shrubs and trees (in all stages of growth), ornamental decoration, landscaping or any other camouflage shall conform to all specifications.
13. Contact Holy Cross Energy for equipment and pad dimensions.

* Doors are discouraged. However, in some cases, such as locations near schools, doors may be approved for equipment screening. Door supports shall be concrete block or concrete. Doors shall be of sturdy construction and open onto an area that is kept free of snow and ice, such as parking lots, driveways, etc. Doors shall have removable hinges and be locked with a Holy Cross Energy lock. If problems develop with door operation, the doors will be dismantled.



*NOTE: The 10' maximum distance to vehicle accessway requirement may be achieved from equipment sides other than the one shown above.



METER & DESIGN
SPECIFICATIONS

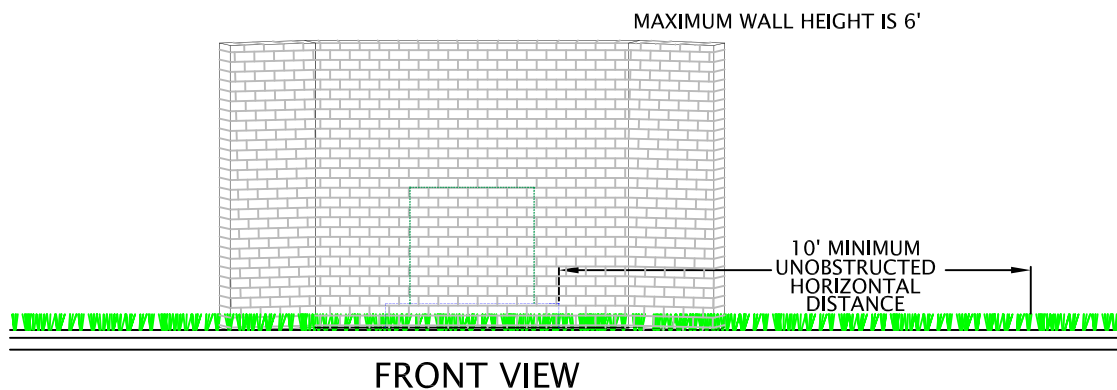
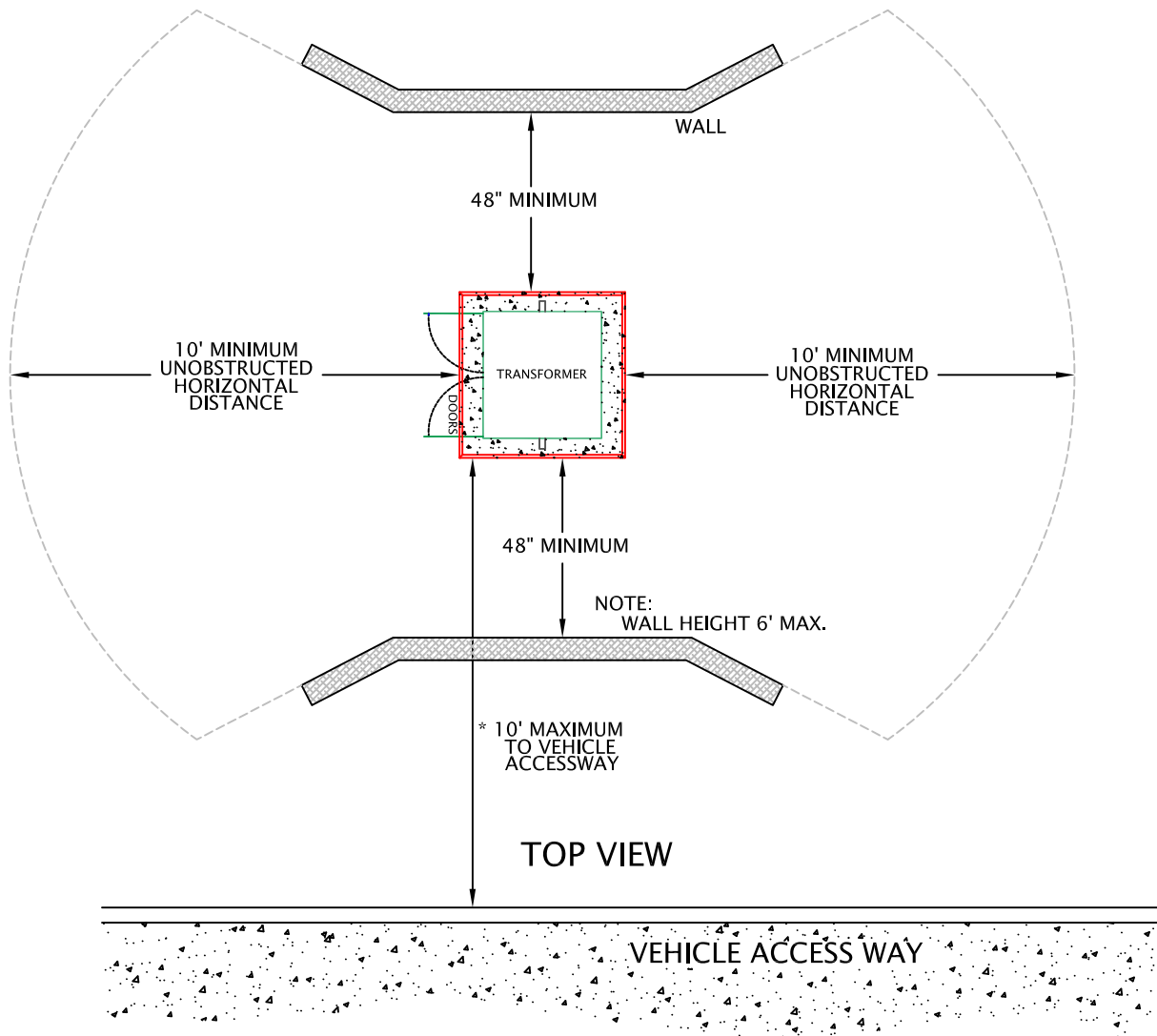
TRANSFORMER SCREEN (Not to Scale)

DATE: 3-15-01

REVISED: MARCH 2019

PAGE #

8.47



*NOTE: The 10' maximum distance to vehicle accessway requirement may be achieved from equipment sides other than the one shown above.

PAGE #
8.48

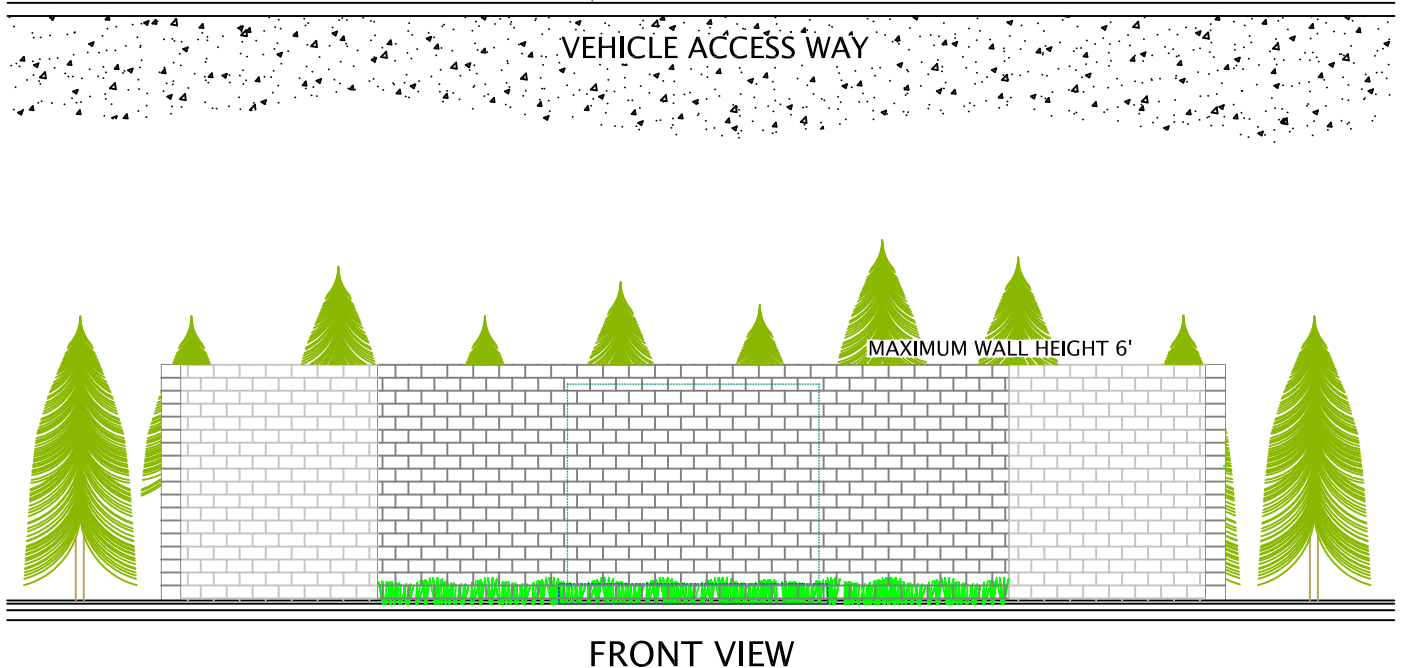
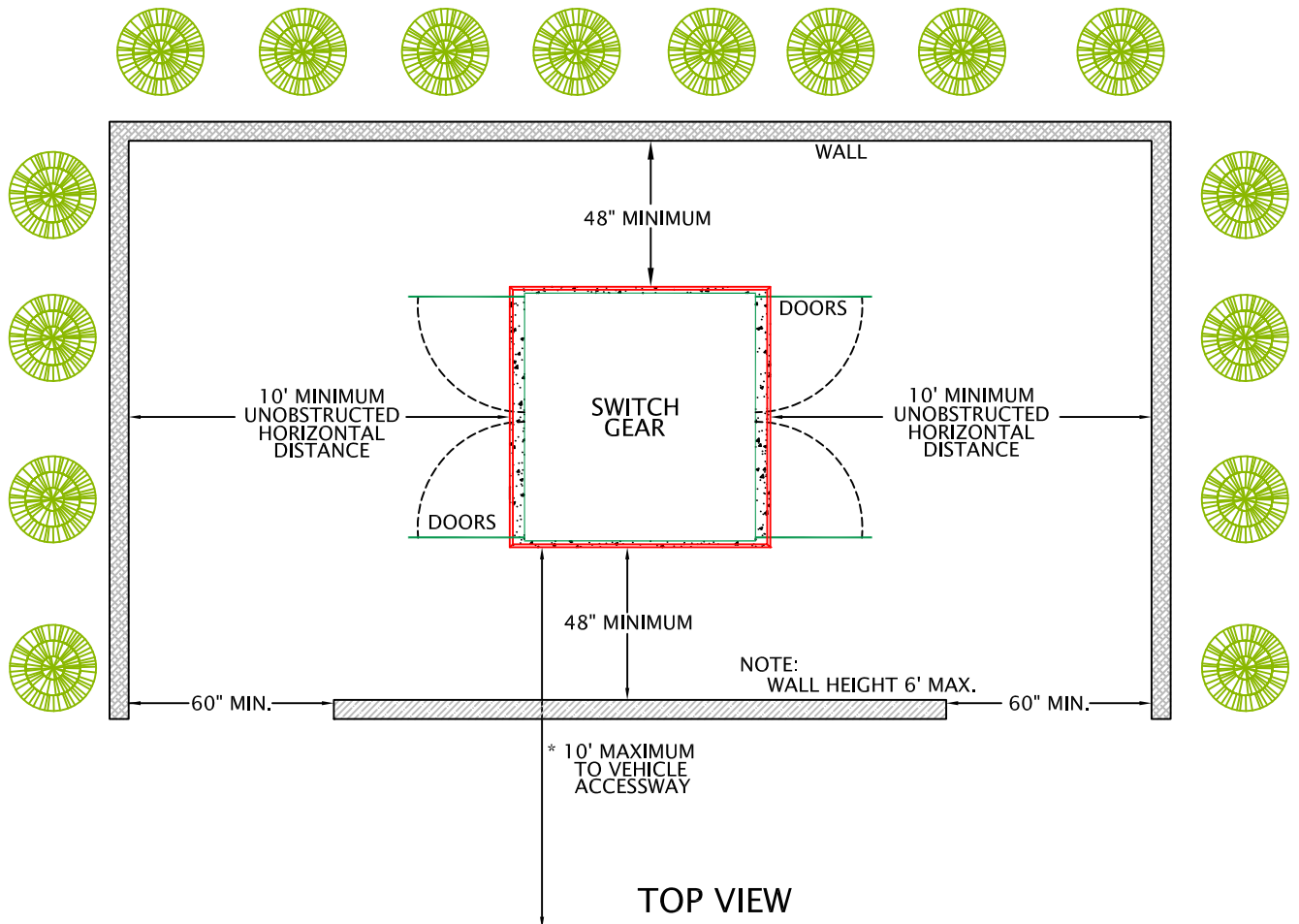
TRANSFORMER SCREEN (Not to Scale)

DATE: 3-15-01

REVISED: MARCH 2019

METER & DESIGN
SPECIFICATIONS





*NOTE: The 10' maximum distance to vehicle accessway requirement may be achieved from equipment sides other than the one shown above.



METER & DESIGN
SPECIFICATIONS

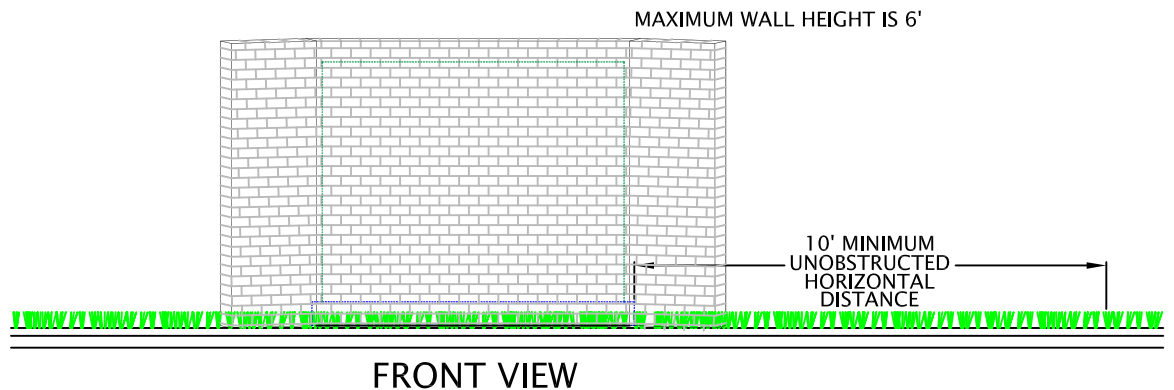
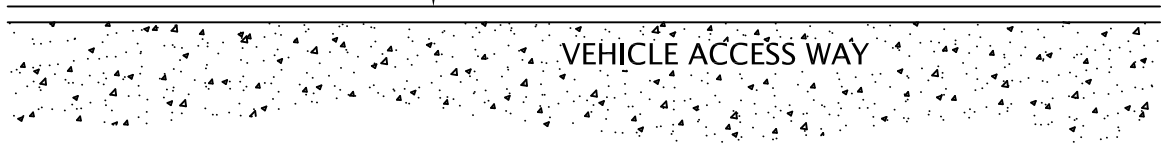
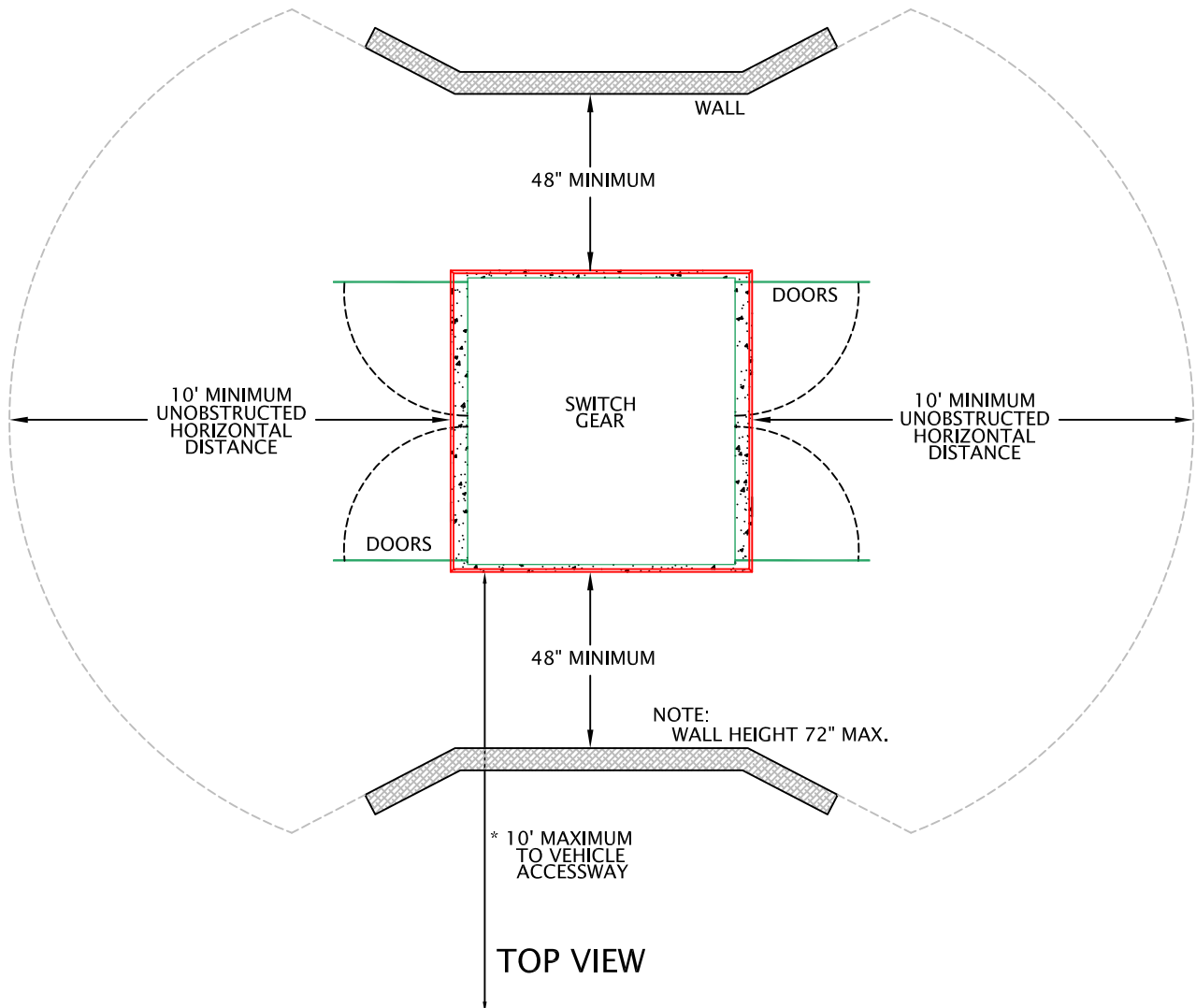
SWITCHGEAR SCREEN (Not to Scale)

DATE: 3-15-01


REVISED: MARCH 2019

PAGE #

8.49



*NOTE: The 10' maximum distance to vehicle accessway requirement may be achieved from equipment sides other than the one shown above.

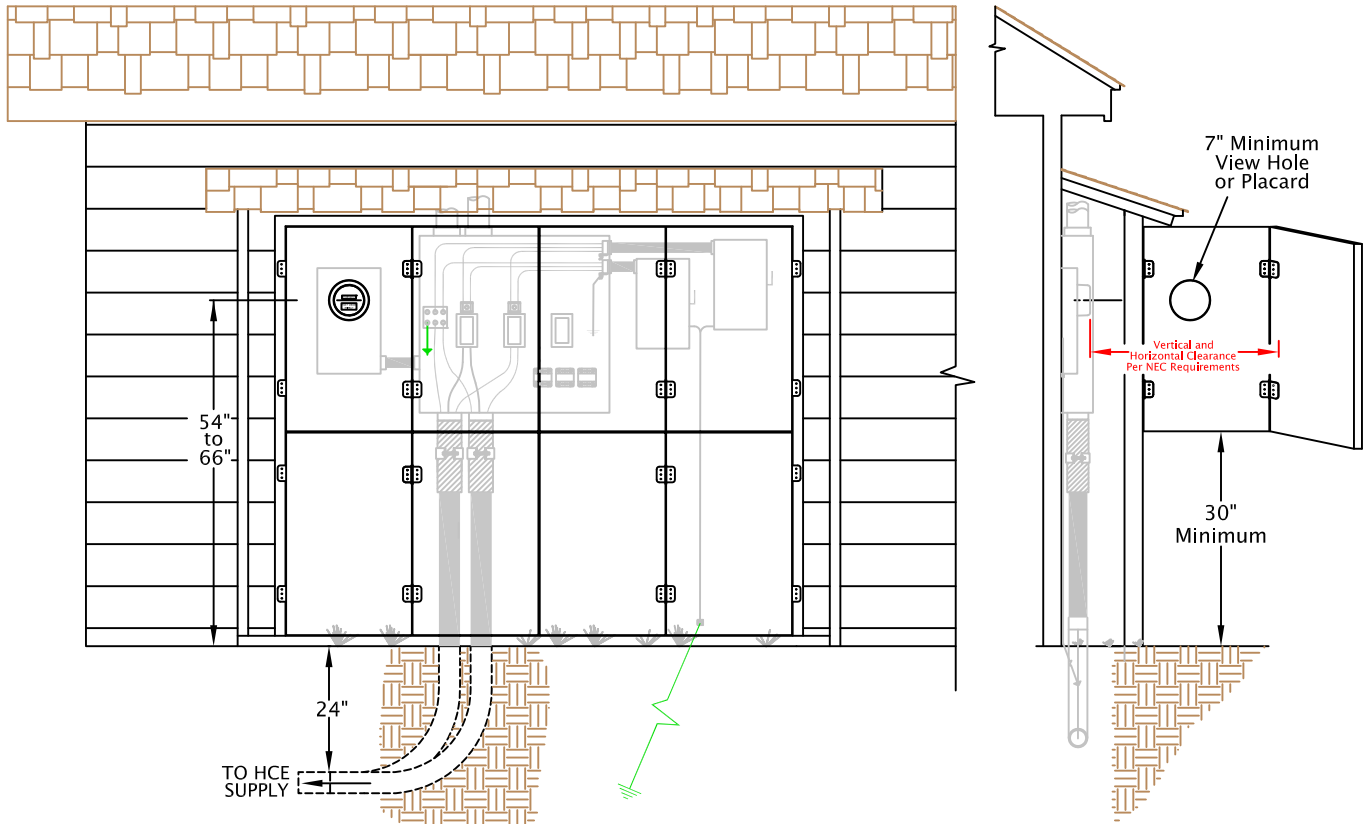
| | | | |
|--|---|---------------|---------------------|
| <p>PAGE #</p> <p>8.50</p> | <p>SWITCHGEAR SCREEN (Not to Scale)</p> <tr> <td>DATE: 3-15-01</td><td>REVISED: MARCH 2019</td></tr> | DATE: 3-15-01 | REVISED: MARCH 2019 |
| DATE: 3-15-01 | REVISED: MARCH 2019 | | |
| <p>METER & DESIGN SPECIFICATIONS</p>  | | | |

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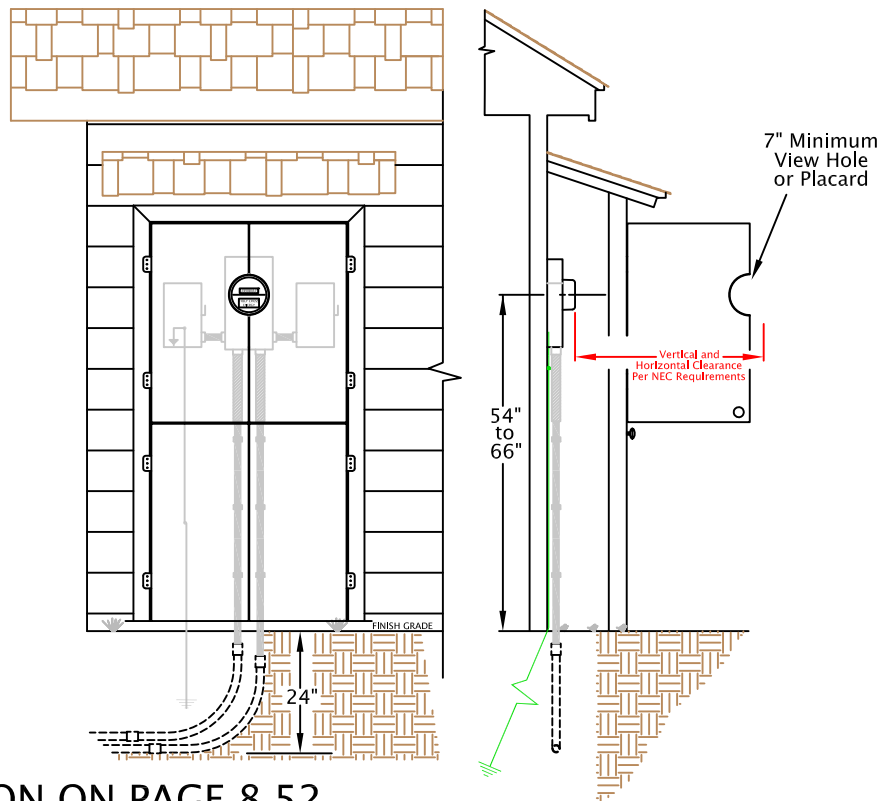
METER ENCLOSURES

General Notes

1. If meter cabinets are constructed to screen meters, the doors of such cabinets shall be constructed of lightweight materials, have handles, and open wide enough for easy access for maintenance and reading. The doors shall be hinged on the side and shall not be locked. The door openings shall be a minimum of 30" in height and the lowest extension of the door will be at least 30 inches above grade so that ice and snow will not impair access. Holy Cross Energy will not be responsible for damage to consumer constructed meter cabinets.
2. All enclosures must meet NEC working space requirements
3. A 7" minimum view hole, or approved placard, is required at the meter. Approved placards are typically custom etched two-layer plastic with a red face and white text.
4. Enclosures need to be maintained and are the responsibility of the consumer.



NOTE: All plans must be pre-approved by Holy Cross Energy Engineering Department.



SEE EXPLANATION ON PAGE 8.52



METER & DESIGN
SPECIFICATIONS

RULES FOR COVERING ELECTRICAL EQUIPMENT ON BUILDINGS

DATE: NOVEMBER 1, 2011

REVISED: DECEMBER 2021

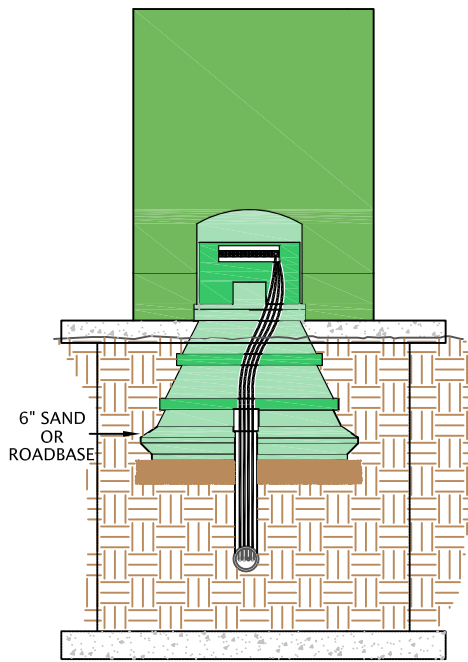
PAGE #

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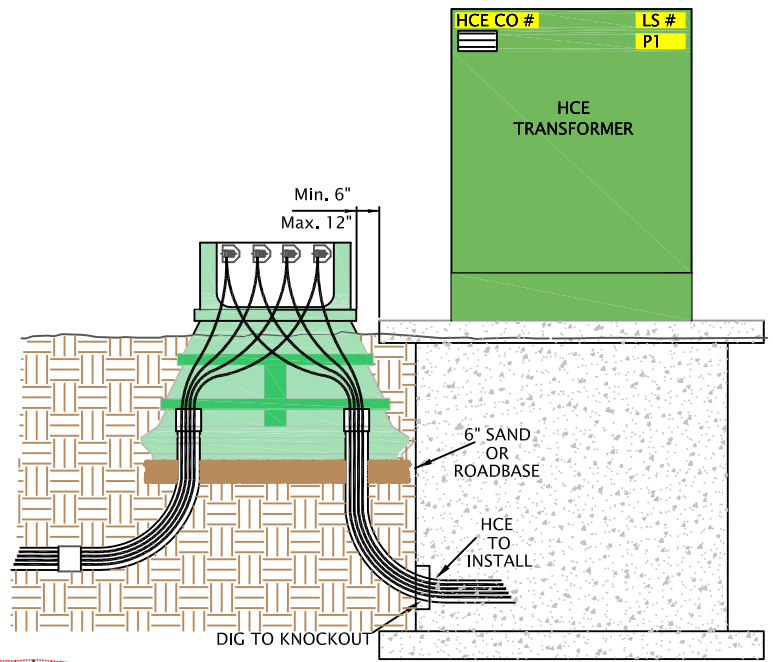
SECONDARY JUNCTION BOXES (LARGE AND SMALL)

General Notes

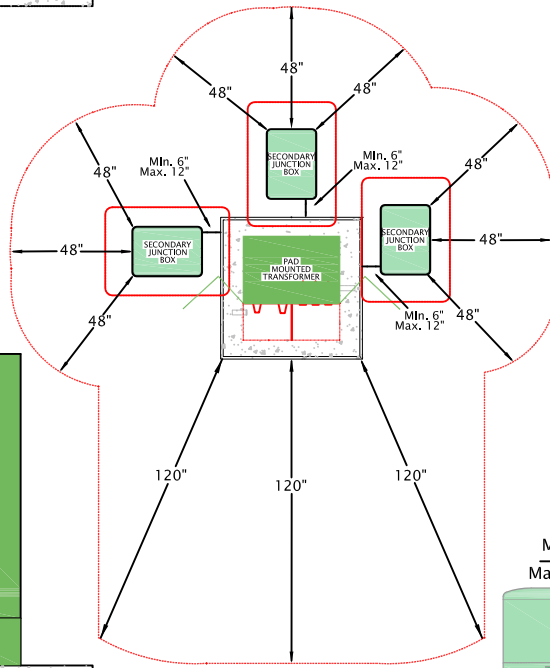
1. A secondary junction box may be required next to 120/240V single phase and 120/208V three phase transformers per the design of the Holy Cross [Engineering Department](#) or as directed by a Holy Cross Operations representative. When required, the following conditions apply:
 - A. For new developments, the developer, owner or electrician may be allowed to install the secondary junction box according to Holy Cross Energy specifications and directions.
 - B. Junction boxes shall be installed in the position determined by a Holy Cross Engineering or Operations representative.
 - C. Once the location has been determined for the junction box, the excavator shall excavate an area approximately 4' x 4' alongside the transformer for a Holy Cross Energy service crew to install conduit and wire from the transformer vault to the junction box. This excavation shall be done before the Holy Cross Energy service crews arrive to assist on the installation of the junction box.
 - D. Junction boxes shall be installed on level ground and backfilled around the outside to the ground level mark on the outside of the junction boxes. Note that the interior ground level will be below the exterior, no fill shall be placed inside the junction box. Backfill shall be done after the HCE conduit is installed.
 - E. The junction box location shall be over-excavated by 6" and bedded with a 6" depth of sand or roadbase to allow for improved access for future conduits and wires.
 - F. The party responsible for installation of the junction box shall confirm the secondary conduit entrance location with Holy Cross. Failure to install the conduit as directed by Holy Cross may result in the need for the conduit to be moved/reinstalled.
 - G. Secondary conduit sizes for small junction boxes (approximately 24" x 13") shall be limited to no larger than 3" diameter and limited to no more than 6 consumer conduits per junction box.
 - H. Secondary conduit sizes for large junction boxes (approximately 32" x 18") shall be limited to no larger than 4" diameter and limited to no more than 5 consumer conduits per junction box.
 - I. The conduit shall be cut off no more than 3" above the interior ground line.
 - J. It is suggested, in some cases, that the consumer's conduit inside the junction box be neatly sealed with foam to prevent dirt from entering the conduit.
 - K. The electrician shall pull enough wire to leave 18" of excess above the top of the junction box when the lid is off.
 - L. Excessive compaction at the exterior ground level can lead to damage of the junction box. The cost of replacing a junction box shall be the responsibility of the party who caused the damage.
 - M. Installation of the junction box shall be such that there is room provided for future expansion. Service pipes shall be installed neatly and exit the side of the box facing the service location.



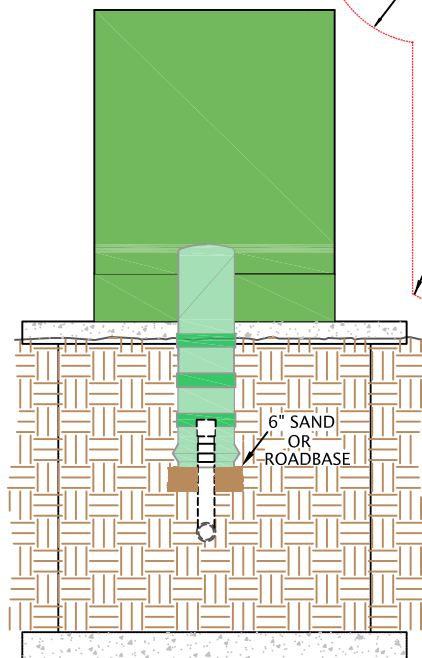
END VIEW
w/ COVER



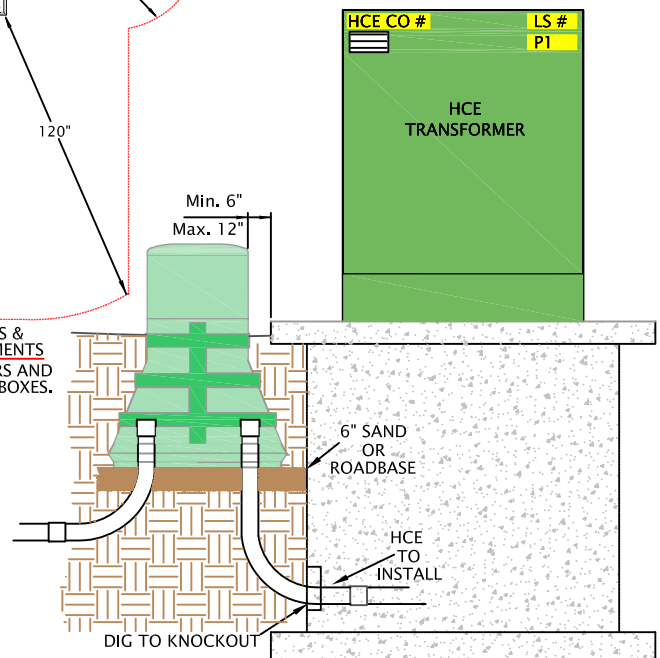
FRONT VIEW



PLACEMENT OPTIONS &
CLEARANCE REQUIREMENTS
AROUND TRANSFORMERS AND
SECONDARY JUNCTION BOXES.



END VIEW
w/ COVER



FRONT VIEW

SEE EXPLANATION ON PAGE 8.54



STREET LIGHT STANDARD

General Notes

1. All street lights shall be metered.
2. All wiring shall comply with the most current addition of the National Electrical Code (NEC) and shall be inspected by proper authority having local jurisdiction.

Illustration Notes

- A. Conduit above grade shall be Schedule 80 PVC.
- B. Conduits and wire shall be continuous in length from the transformer/secondary junction box to the meter and shall not contain any junction boxes, vaults, condulets, LB's or similar devices.
- C. If PVC conduit is used, slip sleeve is required as per [Section 4](#). Conduit brackets should be installed to allow conduit to move vertically in the sleeve.
- D. Conduit below grade shall be GRC or Schedule 40 or 80 PVC.
- E. Street light conductors shall be sized to limit the voltage drop to 3% between the Holy Cross Energy supply transformer and the meter.
- F. Adequate support for street light meter and disconnect shall consist of the following:
 1. All vertical supports shall be plumbed and poured in place with concrete to a depth of 30 inches below grade.
 2. Holy Cross Energy no longer accepts wood post structures as a means of permanently mounting freestanding services. If meter sockets and instrument enclosures are mounted on Unistrut, which is the preferred method (refer to [Section 9](#)), it shall be minimum of 1 5/8" deep, solid type (Unistrut with factory punched holes is not allowed). Holy Cross Energy poles are not to be used as support in any way.
- G. Conduits supported in accordance with National Electrical Code (NEC).
- H. Grounding per National Electrical Code (NEC).
- I. Street light(s) shall be identified with a permanent durable means as to which transformer they are supplied from.
- J. Heavy duty disconnect shall be rated to withstand the maximum fault current available at secondary bushings of supply transformer, including disconnect fuses. The minimum clearance for installation is 10' from Holy Cross Energy transformer. Disconnect shall be identified as to what load it is supplying. Regarding street lights no's 1 through 4, etc. Disconnects and all electrical apparatus are the responsibility of the member, contractor, developer, etc. Holy Cross highly recommends the installation of padlocks to eliminate the possibility of accidental electrical contact.

STREET LIGHT STANDARD

Before street light construction begins, the contractor/developer/member must contact Holy Cross Energy Engineering Dept. for approval and will be advised of:

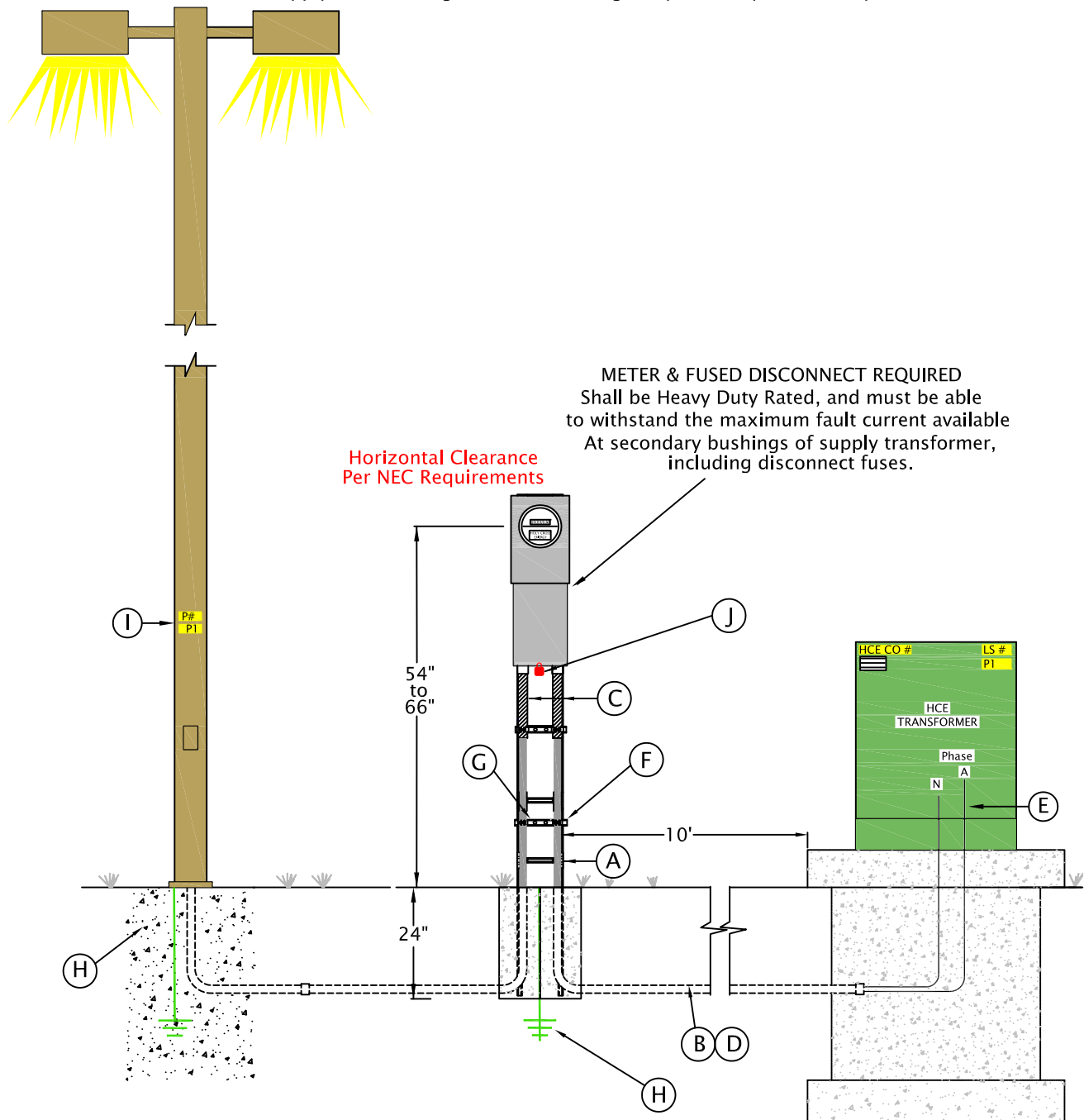
1. Fees that may apply.
2. Street light rates.
3. Construction requirements.

Contractor/ Developer/Member shall provide:

1. Map of light locations.
2. Number of lights, type and wattage.
3. Billing information.

Street lights circuits shall supply only street lights.

(Shall not supply Christmas light, time clocks, signs, sprinkler systems, receptacles, etc.)



SEE EXPLANATION ON PAGE 8.56



METER & DESIGN SPECIFICATIONS

STREET LIGHTS

DATE: NOVEMBER 1, 2011

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| REVISED: | MARCH 2019 |
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PAGE #

8.57

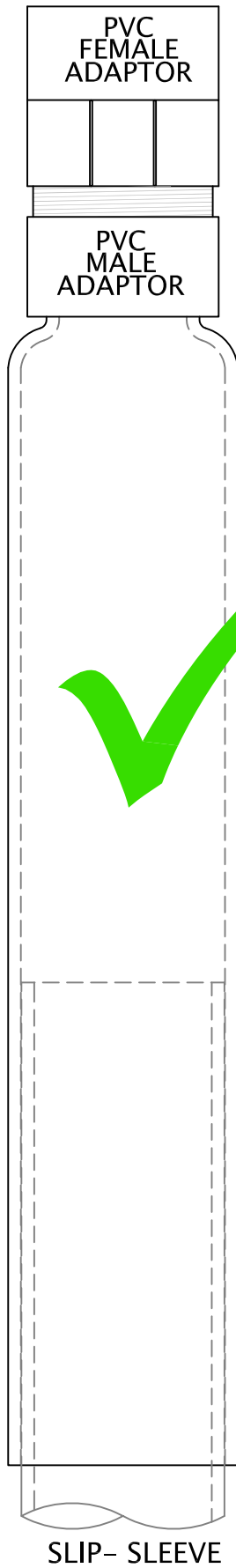
SLIP SLEEVE VS. SLIP COUPLER

National Electric Code (NEC) requires provisions to protect direct-buried conductors, raceways and cables from damage due to earth movement such as settlement or frost.

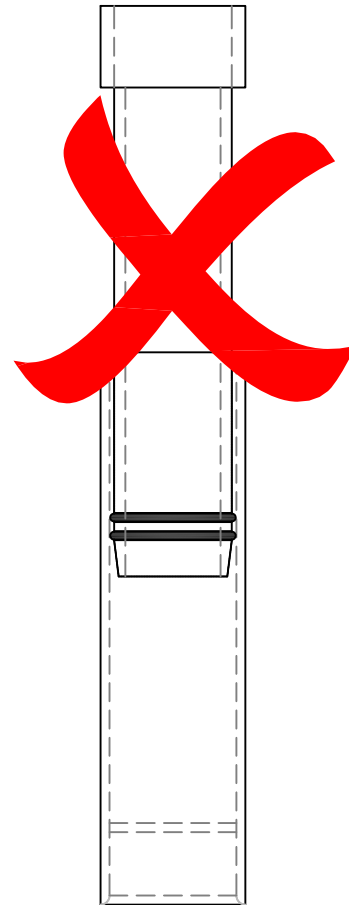
General Notes (Refer to drawing on page 8.59 as needed)

1. Holy Cross Energy requires the use of a “slip sleeve” in these applications.
2. [Slip sleeves](#), as noted throughout this document, are sometimes referred to as “Slip Meter Risers” in manufacturer’s catalogs and websites.
3. [Slip sleeves](#) utilize the raceway (pipe) as half of the protection system. They generally provide more travel per nominal pipe size and are naturally water resistant if installed appropriately.
4. In contrast, “expansion couplers” are designed for use in exposed conduit systems where expansion and contraction of the pipe is due to temperature changes.
5. Expansion couplers, as the name implies, couple two pieces of the raceway (pipe) together via a mechanical (threaded or glued) connection.
6. Expansion couplers usually include O-rings for water resistance.

SLIP SLEEVE VS. SLIP COUPLERS



Will not be accepted!

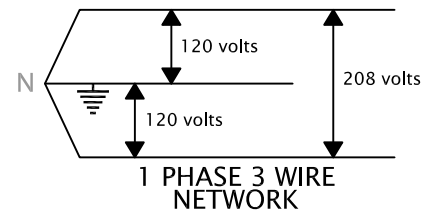
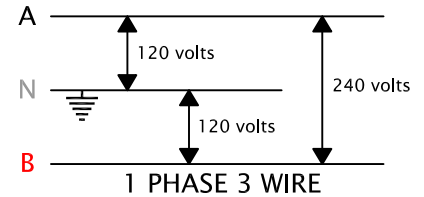
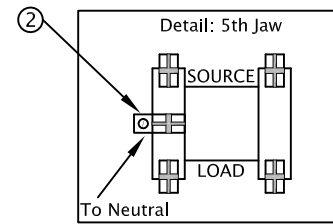
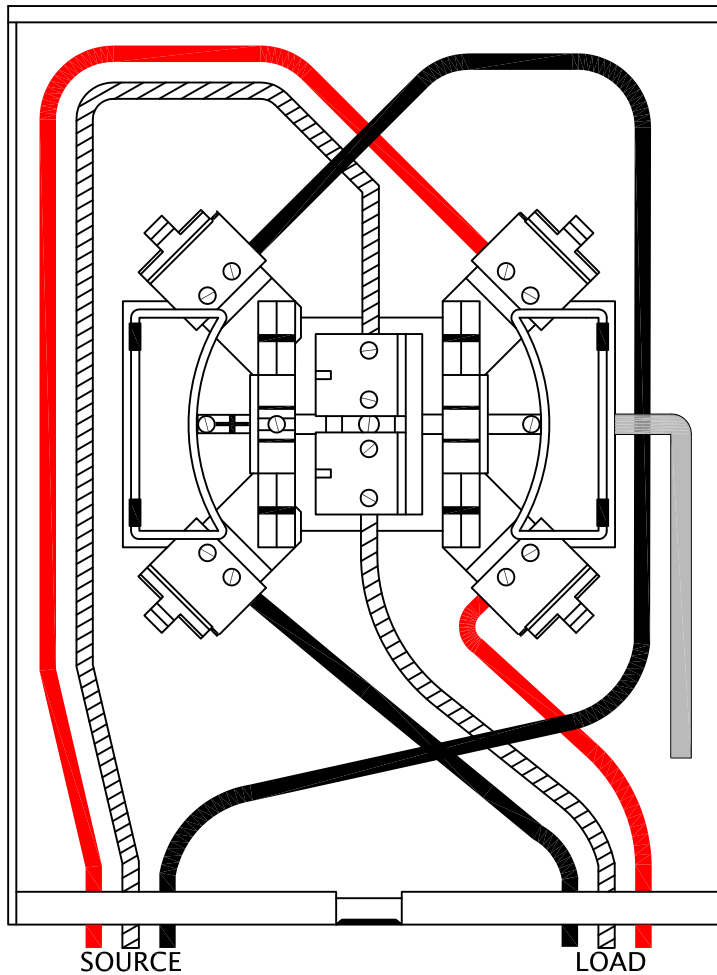


EXPANSION COUPLER

SEE EXPLANATION ON PAGE 8.58



Section 9 - Meter Socket Drawings



STANDARDS FOR SINGLE PHASE SINGLE METER SOCKETS AND SINGLE PHASE MULTIPLE METER SOCKETS

Following is a list of criteria for single phase meter sockets in which Holy Cross Energy will install meters.

No meter sockets will be considered approved unless they adhere to these criteria.

1. Housings shall be constructed from sheet metal in accordance with Underwriters Laboratories (UL) standard No. 414, revised October 1992, for meter sockets.
2. Ringless covers, lever handle locking jaw type by-pass.
 - a. 5th terminal installed in the 9 o'clock position and connected within the socket to the neutral when fed 120/208Y 3 wire network from a 3 phase transformer.
3. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank.
 - c. The sealing means shall provide for HCE wire seal and / or key type padlock (5/16" diameter shackle).
4. All meter sockets shall be UL listed and labeled; they shall be installed and used in accordance with their labeling.
5. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority. having jurisdiction in the area in which the work is performed.

Underground - 200A

Double lay-in neutral connector

Tin-plated aluminum connectors

Temporary meter cover plate shall be minimum waxed cardboard, metallic material is not allowed

Hub closure plate to be a single bolt device

Concentric knockout shall accommodate up to 2 1/2" conduit

Lug wire size not to exceed the range specified by the manufacturer's label



METER & DESIGN SPECIFICATIONS

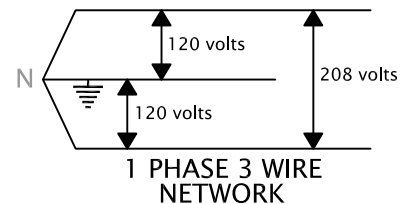
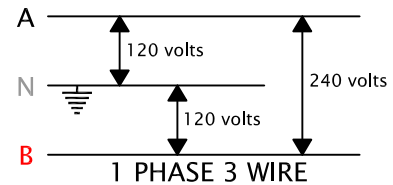
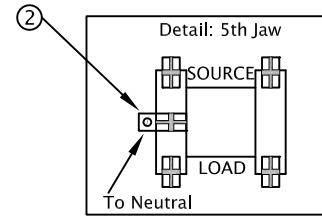
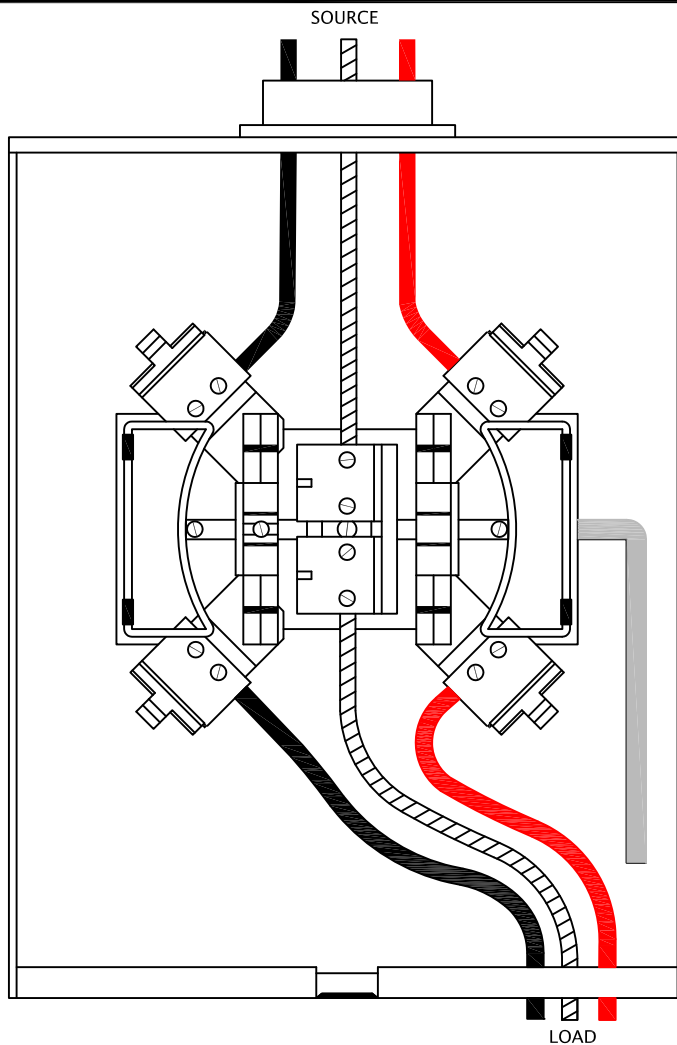
120/240 VOLT OR 120/208Y VOLT, 3 WIRE,
UNDERGROUND SERVICE 200 AMP OR LESS WITH
HANDLE BY-PASS

DATE: DECEMBER 2021

REVISED: DECEMBER 2021

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9.2



STANDARDS FOR SINGLE PHASE SINGLE METER SOCKETS AND SINGLE PHASE MULTIPLE METER SOCKETS

Following is a list of criteria for single phase meter sockets in which Holy Cross Energy will install meters.
No meter sockets will be considered approved unless they adhere to these criteria.

1. Sockets shall be constructed from sheet metal in accordance with Underwriters Laboratories (UL) standard No. 414, revised October 1992, for meter sockets.
2. Ringless covers, lever handle locking jaw type by-pass.
 - a. 5th terminal installed in the 9 o'clock position and connected within the socket to the neutral when fed 120/208Y 3 wire network from a 3 phase transformer.
3. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank
 - c. The sealing means shall provide for HCE wire seal and / or key type padlock (5/16" diameter shackle).
4. All meter sockets shall be UL listed and labeled; they shall be installed and used in accordance with their labeling.
5. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority, having jurisdiction in the the area in which the work is performed.

Overhead - 125A and 200A

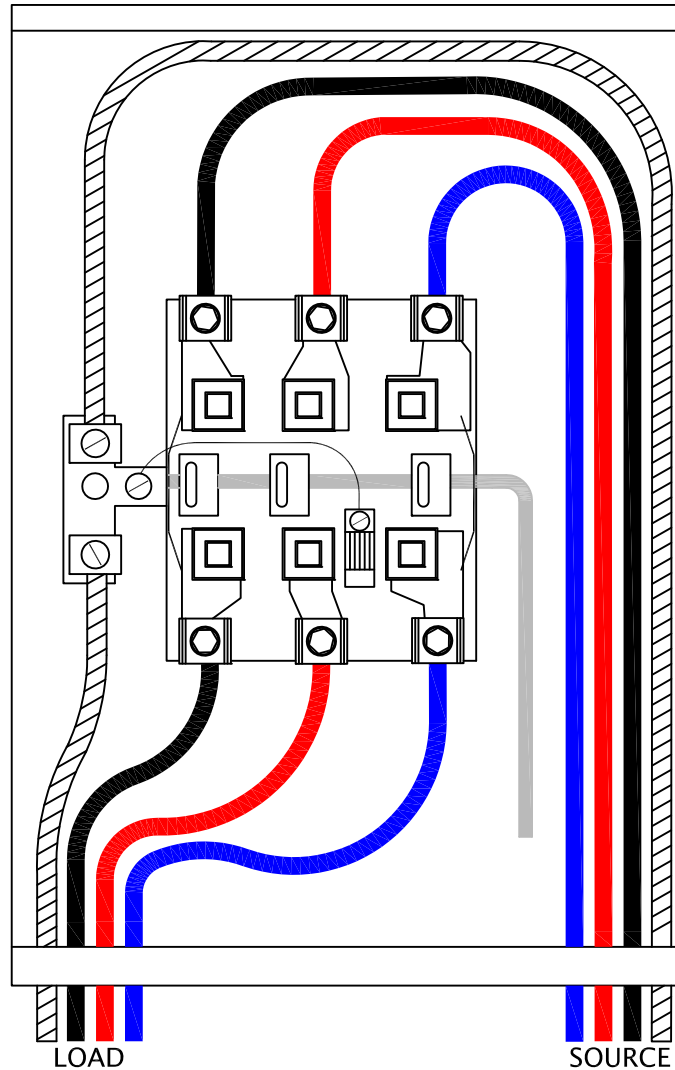
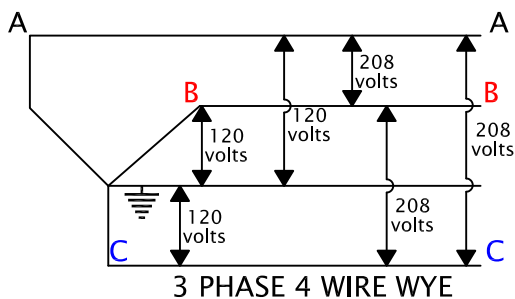
Double lay-in neutral connector

Tin-plated aluminum connectors

Temporary meter cover plate shall be minimum waxed cardboard, metallic material is not allowed

Hub size for 125A is 1-1/4" and 200A is 2"

Lug wire size not to exceed the range specified by the manufacturer's label



STANDARDS FOR THREE PHASE METER SOCKETS

Following is a list of criteria for three phase meter socket in which Holy Cross Energy will install meters. No meter sockets will be considered approved unless they adhere to these criteria.

1. Socket shall be constructed from sheet metal in accordance with Underwriters Laboratories (UL) standard No. 414, revised October 1992, for meter sockets.
2. Ringless covers, lever type handle locking jaw type by-pass.
3. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank
 - c. The sealing means shall provide for HCE wire seal and / or key type padlock (5/16" diameter shackle).
4. All meter sockets shall be UL listed for loads up to 200 Amperes continuous, 600 volts AC and labeled; they shall be installed and used in accordance with their labeling.
5. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority, having jurisdiction in the area in which the work is performed.



METER & DESIGN SPECIFICATIONS

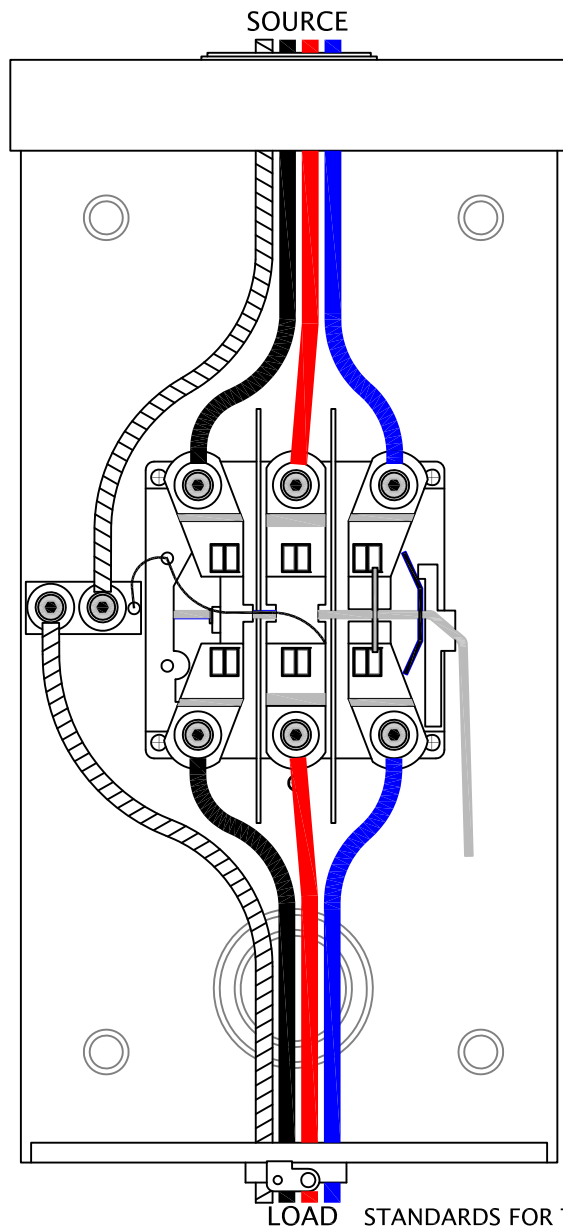
120/208Y VOLT, 3-PHASE, 4-WIRE, 7-TERMINAL,
200 AMP OR LESS UNDERGROUND SERVICE WITH
HANDLE BY-PASS

DATE: DECEMBER 2021

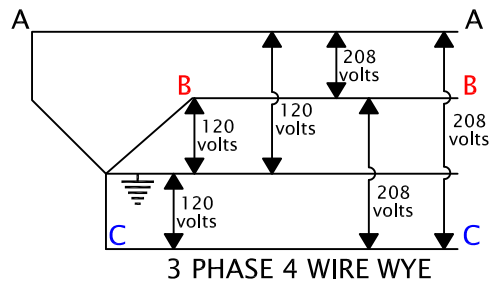
REVISED: DECEMBER 2021

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9.4



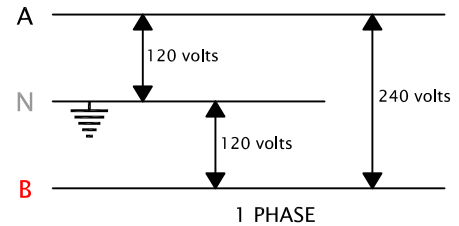
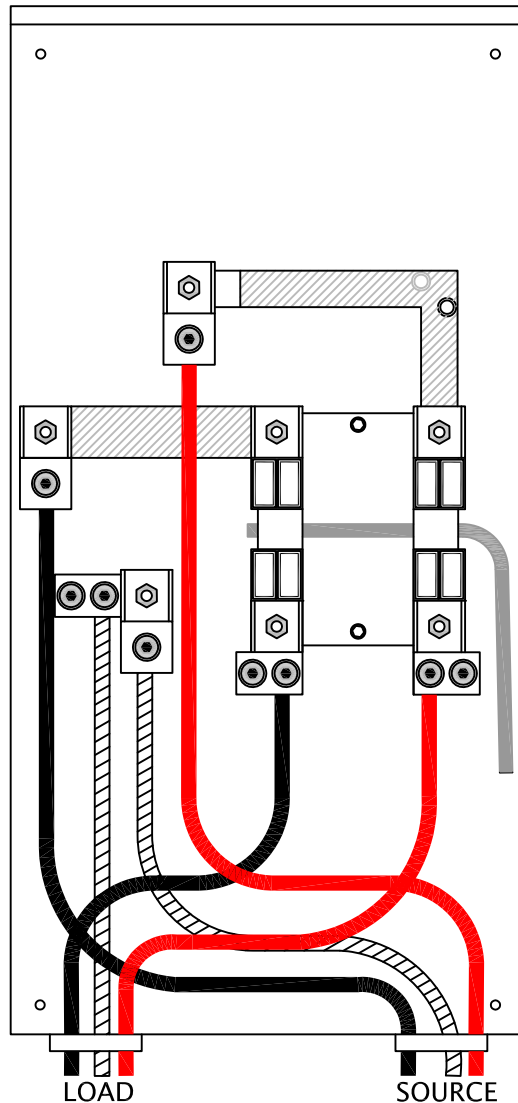
LOAD STANDARDS FOR THREE PHASE METER SOCKETS



3 PHASE 4 WIRE WYE
NOTE: Not allowed for 480 volt services

Following is a list of criteria for three phase meter socket in which Holy Cross Energy will install meters.
No meter sockets will be considered approved unless they adhere to these criteria.

1. Socket shall be constructed from sheet metal in accordance with Underwriters Laboratories (UL) standard No. 414, revised October 1992, for meter sockets.
2. Ringless covers, lever handle, locking jaw type by-pass
3. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank.
 - c. The sealing means shall provide for HCE wire seal and / or key type padlock (5/16" diameter shackle).
4. All meter sockets shall be UL listed for loads up to 200 Amperes continuous, 600 volts AC and labeled; they shall be installed and used in accordance with their labeling.
5. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority, having jurisdiction in the area in which the work is performed.



STANDARDS FOR SINGLE PHASE 400 AMP SELF-CONTAINED METER SOCKETS.

Following is a list of criteria for 1 phase meter sockets in which Holy Cross Energy will install meters.
No meter sockets will be considered approved unless they adhere to these criteria.

1. Capacity: 320 Amps continuous 400 Amp maximum per National Electric Code.
2. Housings shall be constructed of 14 gauge galvanized steel minimum.
3. Ringless covers, lever handle locking jaw type by-pass, Bypass capacity: 320 Amps continuous.
4. Anti - Inversion Insert: The insert rejects normal width terminal blades, yet admits the 320 amp class electric meter.
5. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank.
 - c. The sealing means shall provide for HCE wire seal and / or key type padlock (5/16" diameter shackle).
6. Terminals & Lugs = 3/8" -24 cold-headed zinc plated steel studs w/nuts and captive Belleville washers to accommodate various pressure type lugs. To be supplied with lugs.
7. All meter sockets shall be UL listed & labeled;
 They shall be installed and used in accordance with their labeling.
8. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority having jurisdiction in the area in which the work is performed.



METER & DESIGN SPECIFICATIONS

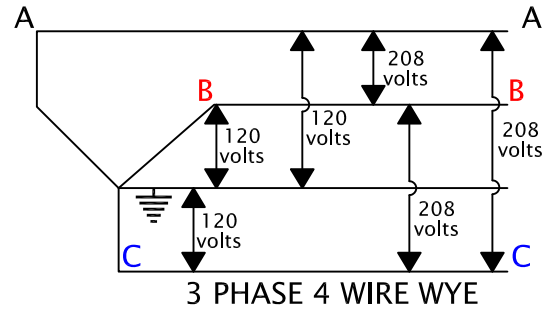
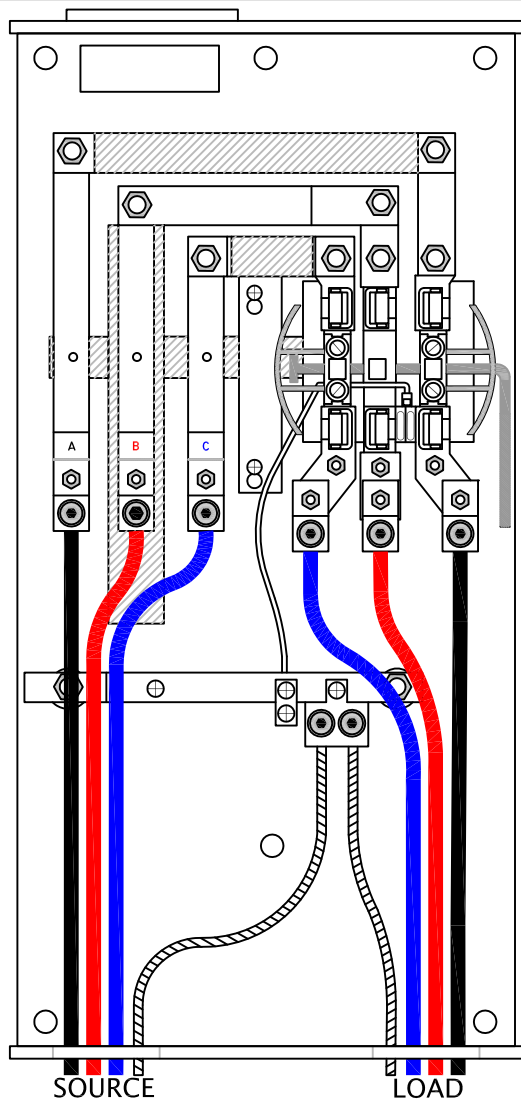
120/240 VOLT 1Ø 3 WIRE, 400 AMP SELF CONTAINED METER SOCKET WITH HANDLE BY-PASS

DATE: DECEMBER 2021

REVISED: DECEMBER 2021

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9.6



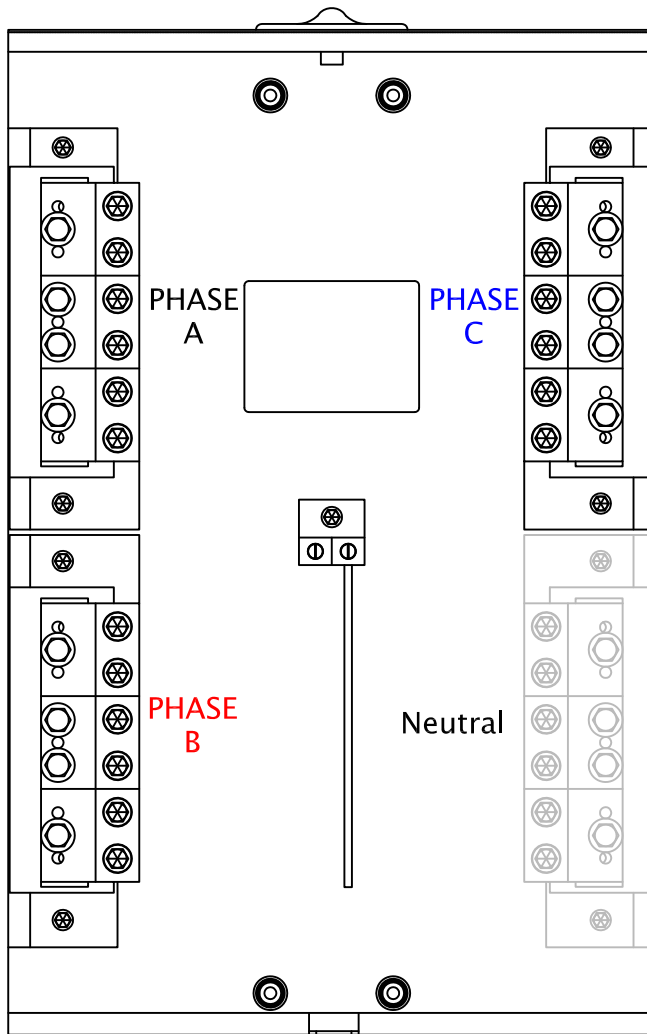
NOTE: Not allowed for
480 volt services

NOTE: Wiring diagram does not
represent all manufacturers.

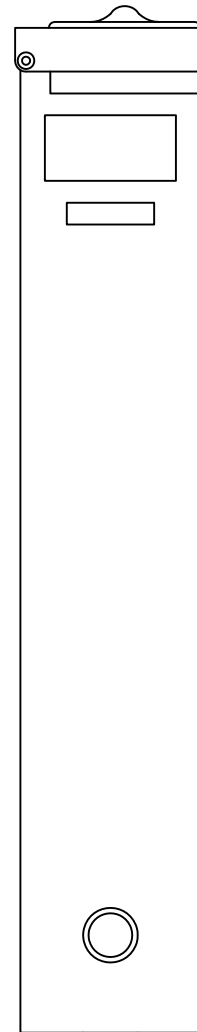
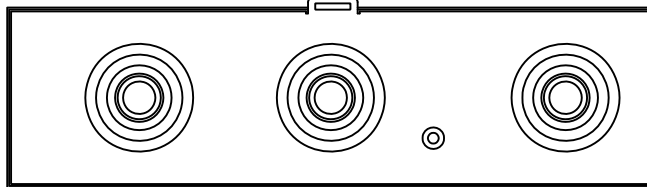
STANDARDS FOR THREE PHASE 400 AMP SELF-CONTAINED METER SOCKETS.

Following is a list of criteria for 3 phase meter sockets in which Holy Cross Energy will install meters.
No meter sockets will be considered approved unless they adhere to these criteria.

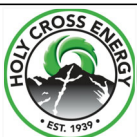
1. Capacity: 320 Amps.
2. Housings shall be constructed of 14 gauge galvanized steel minimum.
3. Ringless covers, lever handle locking jaw type by-pass, Bypass capacity: 320 Amps continuous.
4. Anti - Inversion Insert: The insert rejects normal width terminal blades, yet admits the 320 amp class electric meter.
5. Sealing:
 - a. Ring type cover is not allowed.
 - b. Intentionally Blank.
 - c. The sealing means shall provide for HCE wire seal and / or padlock (5/16" diameter shackle).
6. Terminals & Lugs = 3/8" -24 cold-headed zinc plated steel studs w/nuts and captive Belleville washers to accommodate various pressure type lugs. To be supplied with lugs.
7. All meter sockets shall be UL listed & labeled; They shall be installed and used in accordance with their labeling.
8. Meter socket installations shall be installed per NEC procedures, and shall be enforced by the local inspection authority having jurisdiction in the area in which the work is performed.

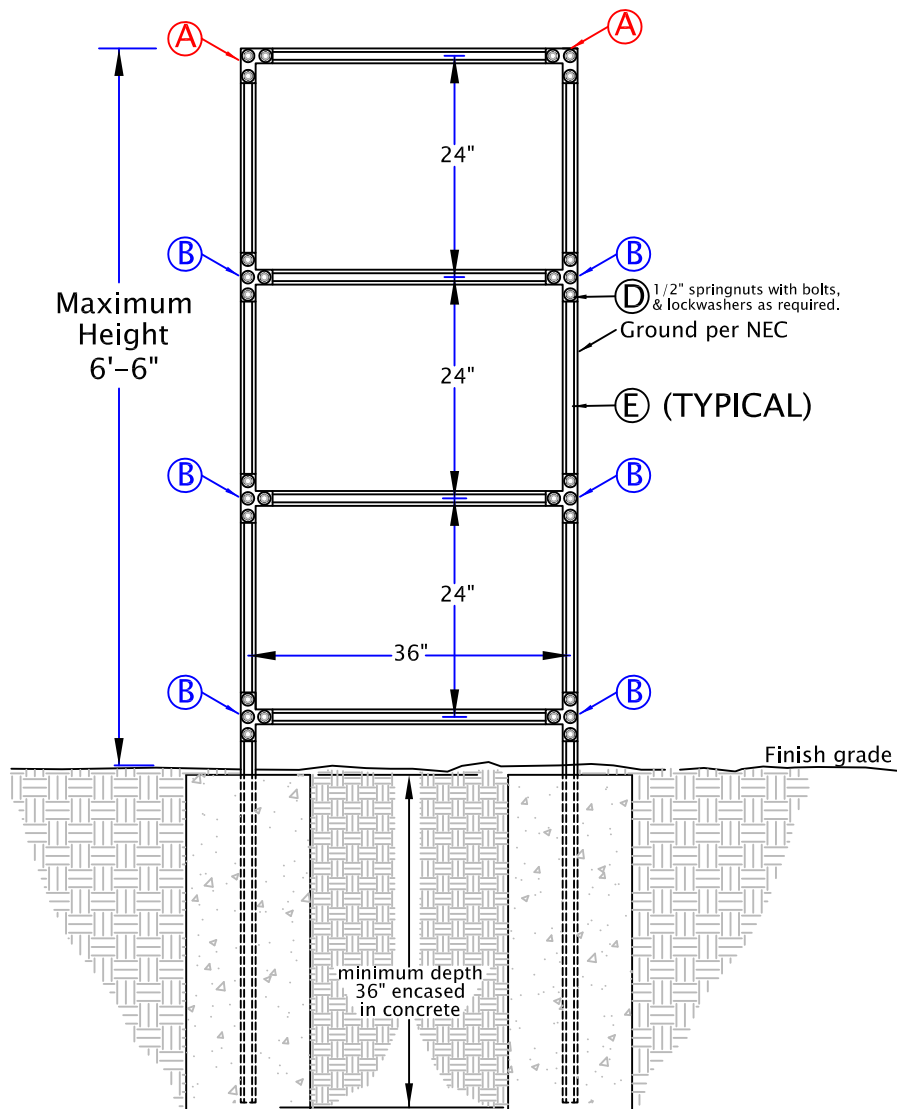


U4540-XL



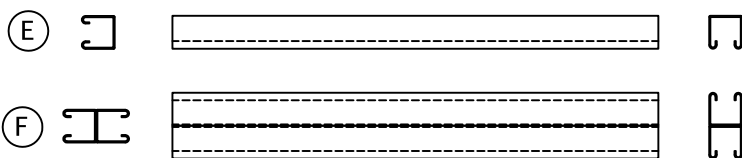
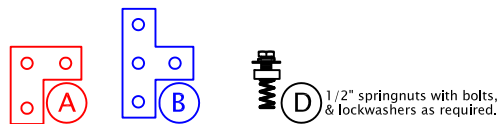
| PHASE | AMPS | VOLTS | CATALOG NUMBER | HUB | CONNECTORS CU7AL | 10 TO 30 KIT | DIMENSIONS | | | CONCENTRIC K.O.'S | | | | |
|-------|------|---------|----------------|------|--------------------------------------|--------------|-----------------|--------------------|----|-------------------|-----------------|-----------------|----------------------------|----------------------------|
| | | | | | | | D" | W" | H" | 1 | 2 | 3 | 4 | 5 |
| 1Ø | 100 | 120/240 | U4544-XL | C.P. | (6) #12-1/0 | K4543 | 4 $\frac{1}{8}$ | 9 $\frac{13}{16}$ | 18 | - | 2 | 2 | 1 | $\frac{1}{4}, \frac{1}{2}$ |
| 3Ø | 100 | 600 | U4545-XL | C.P. | (6) #12-1/0 | N/A | 4 $\frac{1}{8}$ | 9 $\frac{13}{16}$ | 18 | - | 2 | 2 | 1 | $\frac{1}{4}, \frac{1}{2}$ |
| 1Ø | 200 | 120/240 | U4540-XL | C.P. | (6) #6-350 kcmil | K4539 | 4 $\frac{1}{8}$ | 14 $\frac{13}{16}$ | 23 | - | 1 $\frac{1}{4}$ | 2 $\frac{1}{2}$ | 2 $\frac{1}{2}$ | $\frac{1}{4}, \frac{1}{2}$ |
| 3Ø | 200 | 600 | U4542-XL | C.P. | (6) #6-350 kcmil | N/A | 4 $\frac{1}{8}$ | 14 $\frac{13}{16}$ | 23 | - | 1 $\frac{1}{4}$ | 2 $\frac{1}{2}$ | 2 $\frac{1}{2}$ | $\frac{1}{4}, \frac{1}{2}$ |
| 1Ø | 400 | 120/240 | U4548-XL | C.P. | (3) #6-350 kcmil (2) #4-600 kcmil | K4547 | 5 | 15 $\frac{1}{2}$ | 27 | 3 | 3 | 3 | $\frac{1}{4}, \frac{1}{2}$ | $\frac{1}{4}$ |
| 3Ø | 400 | 600 | U4549-XL | C.P. | (3) #6-350 kcmil (2) #4-600 kcmil | N/A | 5 | 15 $\frac{1}{2}$ | 27 | 3 | 3 | 3 | $\frac{1}{4}, \frac{1}{2}$ | $\frac{1}{4}$ |

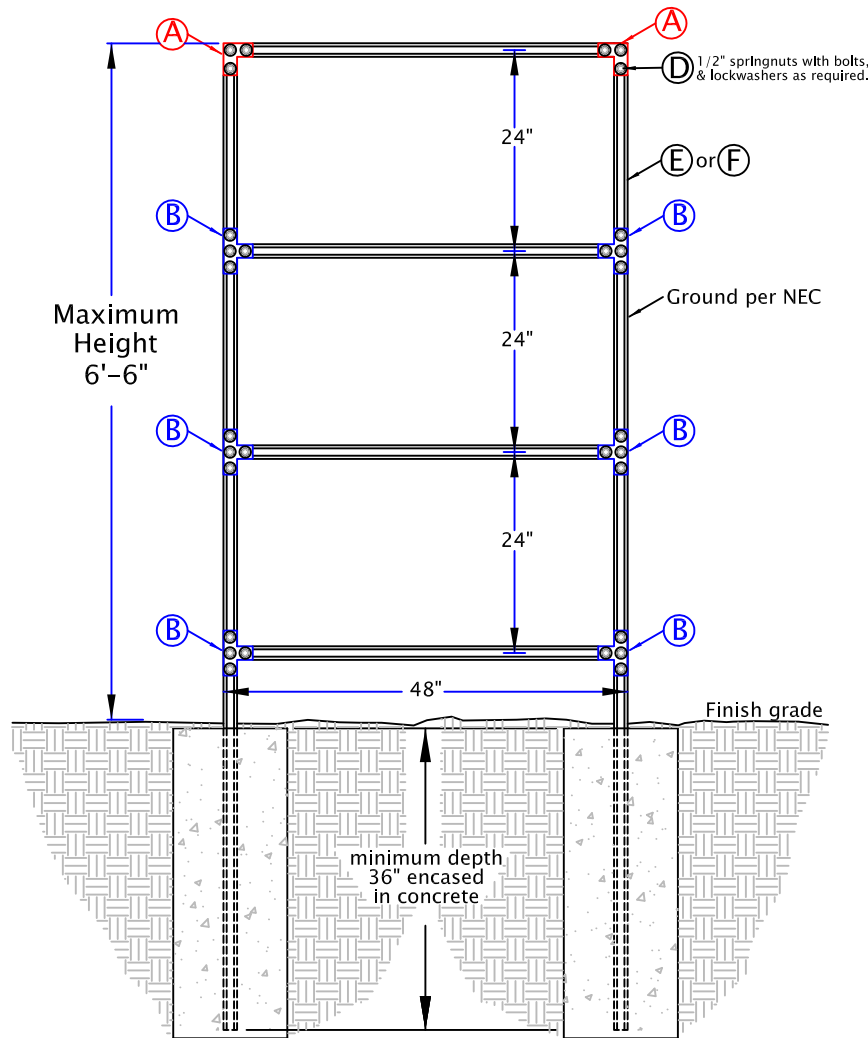




- (E) 1. Unistrut shall be galvanized, solid 1 $\frac{5}{8}$ " deep.
(Unistrut with factory punched holes is not allowed)
2. Maximum width with a 2 leg frame is 4', anything wider will require a additional vertical support.

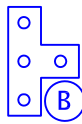
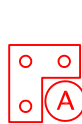
(F) { Note: Due to size and weight of some electric services and all apparatus associated with them, double Unistrut supports are Highly/Stongly recommended.





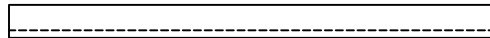
1. Unistrut shall be galvanized, solid 1 $\frac{5}{8}$ " deep.
(Unistrut with factory punched holes is not allowed)
2. Maximum width with a 2 leg frame is 4', anything wider will require a additional vertical support.

(F) { Note: Due to size and weight of some electric services and all apparatus associated with them, double Unistrut supports are Highly/Stongly recommended.

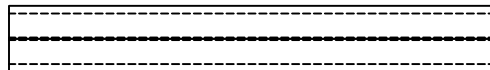


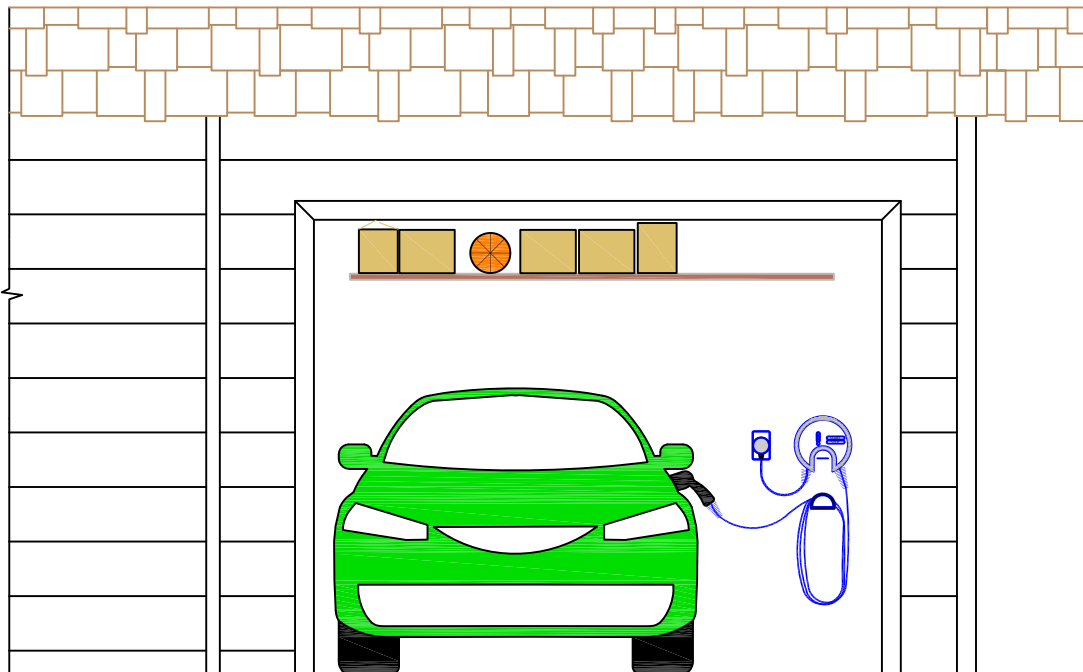
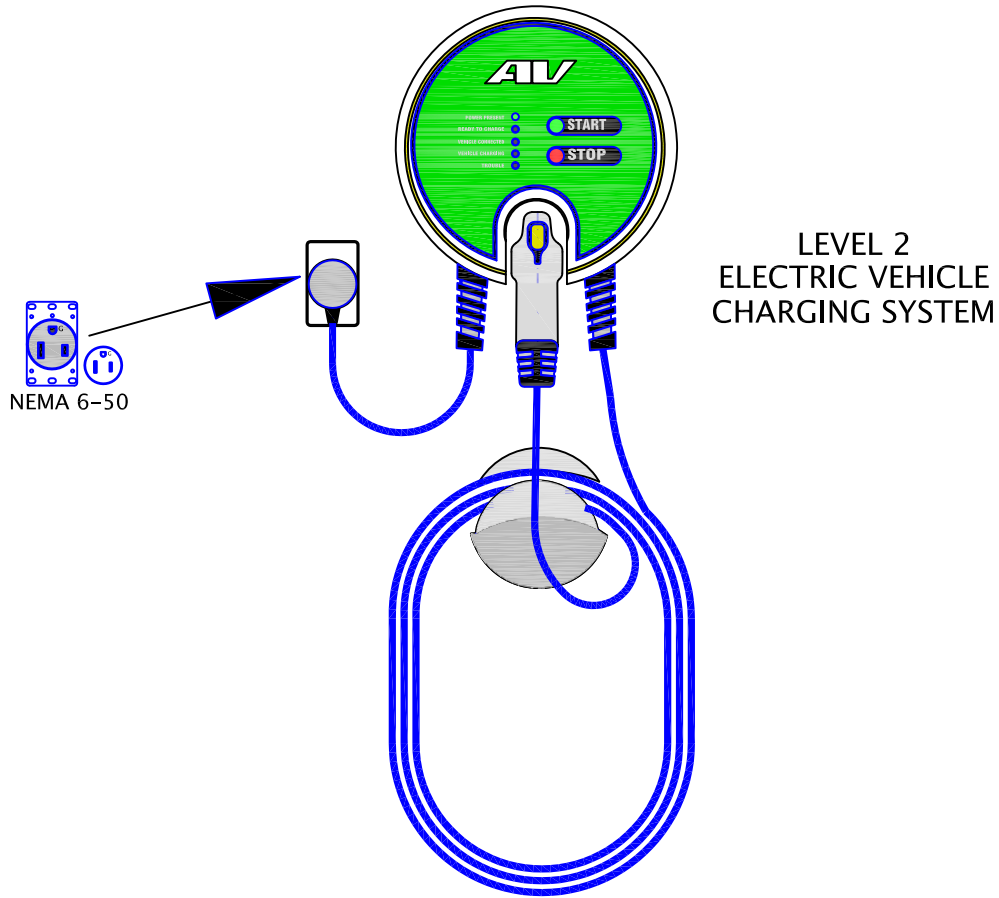
(D) 1/2" springnuts with bolts, & lockwashers as required.

(E)

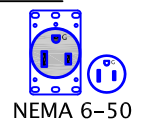


(F)





NOTE: 1-40amp 240volt dedicated circuit required and
NEMA 6-50 amp receptacle for power charge.
Use a dedicated Receptacle (receptacle used for EV charging only)



Section 10 - Generation Interconnect

The following Section has been added to clarify and organize Generation Interconnect information and drawings. Additional information can be found by visiting www.holycross.com and in our [Generator Interconnect Policy](#).

PHOTOVOLTAIC (PV) INSTALLATION REQUIREMENTS

General Notes:

1. Holy Cross Energy is now accepting certain types of meter collars for rapid connection of grid-ready energy assets. Please contact us at renewables@holycross.com for more information on approved vendors and models.

Installations without a Production Meter

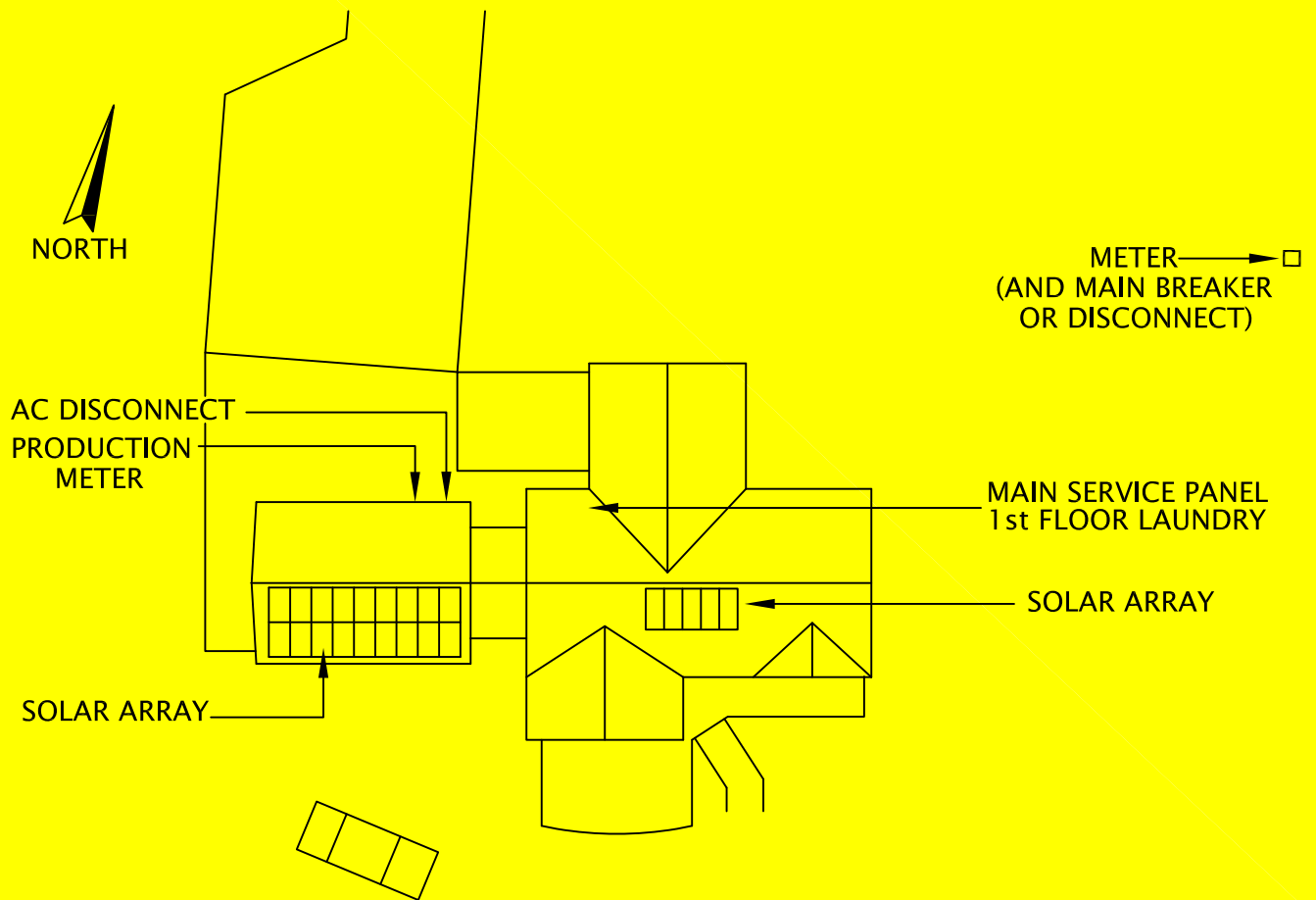
1. Optional Production Meter model and type shall be at the discretion of Holy Cross Energy.
2. Holy Cross will not permit the use of the meter socket or CT enclosure/compartment as a junction box unless it is used in accordance with its listing and labeling.
3. Grounding and bonding of all equipment shall be in accordance with the NEC code required by the authority having jurisdiction.
4. All 480-Volt services will require instrument metering that is compliant with [Section 4](#) of this guidebook.
5. All components must be labeled in accordance with the NEC code or as required by the authority having jurisdiction. Additional labeling may be required by Holy Cross Energy (see Drawing 10.4 for samples).
6. Piercing tap connectors are not allowed unless pre-approved by HCE.
7. A Utility Accessible AC Disconnect shall be located within ten feet and line of site of the utility meter, shall be lockable and provide a visible open to HCE personnel (i.e. Knife Blade). It shall be labeled in accordance with the requirements for Meter Identification in Section 7.B.2.a of this guidebook. The preferred method is to install the AC Disconnect device on the load side of the utility meter.

Installations with an Optional Production Meter

1. Appropriate meter socket, as described in [Section 4](#) and [Section 9](#), are to be furnished and installed by consumer.
2. Production and Utility meters are provided and installed by Holy Cross Energy.
3. Inverter based, member-owned generation shall be wired to the load side terminals of the Production Meter (bottom of meter socket).
4. Production meter socket shall be marked with a permanent label or placard identifying it as a production or renewable kWh meter.
5. Production meter socket shall be located within ten feet and line of sight of the utility meter. If there is any reason this cannot be accomplished, a site plan showing proposed equipment locations shall be submitted for review. HCE shall review and approve or deny the proposed equipment location. Site meetings can be arranged on request.
6. A plastic meter socket cover shall be installed at all times to secure the meter socket prior to the installation of the production meter.
7. Holy Cross' production meter must be protected by an overcurrent protection device with a minimum interrupting rating of 5,000 amps symmetrical current or greater.
8. A Utility Accessible AC Disconnect shall be located within ten feet and line of site of the utility meter, shall be lockable and provide a visible open to HCE personnel (i.e. Knife Blade). It shall be labeled in accordance with the requirements for Meter Identification in Section 7.B.2.a of this guidebook. The preferred method is to install the AC Disconnect device on the load side of the utility meter.

CAUTION

POWER TO THIS BUILDING IS ALSO
SUPPLIED FROM THE FOLLOWING SOURCES
WITH DISCONNECTS LOCATED AS SHOWN:



SEE EXPLANATION ON PAGE 10.2



METER & DESIGN
SPECIFICATIONS

SAMPLE
PRODUCTION LABELS

DATE: JULY, 2016

REVISED: DECEMBER 2021

PAGE #

10.3

APPENDIX

TABLES

- I - Available Fault Current at Single Phase Transformer
- II - Available Fault Current at Three Phase Transformer
- III - Voltage Drop Chart 208 V, 1-Phase, Al. Conductor
- IV - Voltage Drop Chart 240 V, 1-Phase, and 208 V, 3-Phase Al. Conductor
- V - Voltage Drop Chart 480 V, 1-Phase, Al. Conductor
- VI - Voltage Drop Chart 480 V, 3-Phase, Al. Conductor
- VII - Voltage Drop Chart 280 V, 1-Phase, Cu. Conductor
- VIII - Voltage Drop Chart 240 V, 1-Phase and 208 V, 3-Phase Cu. Conductor
- IX - Voltage Drop Chart 480 V, 1-Phase, Cu. Conductor
- X - Voltage Drop Chart 480 V, 3-Phase, Cu. Conductor
- XI - Service Drop Schedule for Mast and Building Attachments

APPENDIX - TABLE I

| AVAILABLE FAULT CURRENT (AFC) AT SECONDARY BUSHINGS OF TRANSFORMER | | | | |
|--|----------------|------------------|--------------------|--|
| Single Phase Pole or Pad Mounted Transformer** | | | | |
| Size (kVA) | Full Load | | Secondary (volts) | AFC at Transformer Secondary Bushings (amps) |
| | Primary (amps) | Secondary (amps) | | |
| 10 | 0.7 | 42 21 | 120/240 240/480 | 2,500 1,250 |
| 15 | 1.0 | 63 31 | 120/240 240/480 | 3,700 1,850 |
| 25 | 1.7 | 104 52 | 120/240 240/480 | 6,100 3,050 |
| 37.5 | 2.6 | 156 78 | 120/240 240/480 | 8,700 4,350 |
| 50 | 3.5 | 208 104 | 120/240 240/480 | 11,600 5,800 |
| 75 | 5.2 | 313 156 | 120/240 240/480 | 16,400 8,200 |
| 100 | 6.9 | 417 208 | 120/240 240/480 | 21,900 10,950 |
| 150 | 10.4 | 625 313 | 120/240 240/480 | 32,900 16,450 |
| 167 | 11.6 | 696 348 | 120/240 240/480 | 38,700 19,350 |
| 225 | 15.6 | 938 469 | 120/240 240/480 | 46,900 23,450 |
| 250 | 17.4 | 1042 521 | 120/240 240/480 | 52,100 26,050 |
| 333 | 23 | 1,388 694 | 120/240 240/480 | 46,250 23,125 |

** ALL OVERCURRENT PROTECTIVE DEVICES, NEW OR REWORKED, SHALL HAVE A MINIMUM INTERRUPTING RATING OF 10,000 AMPS SYMMETRICAL CURRENT OR GREATER

APPENDIX - TABLE II

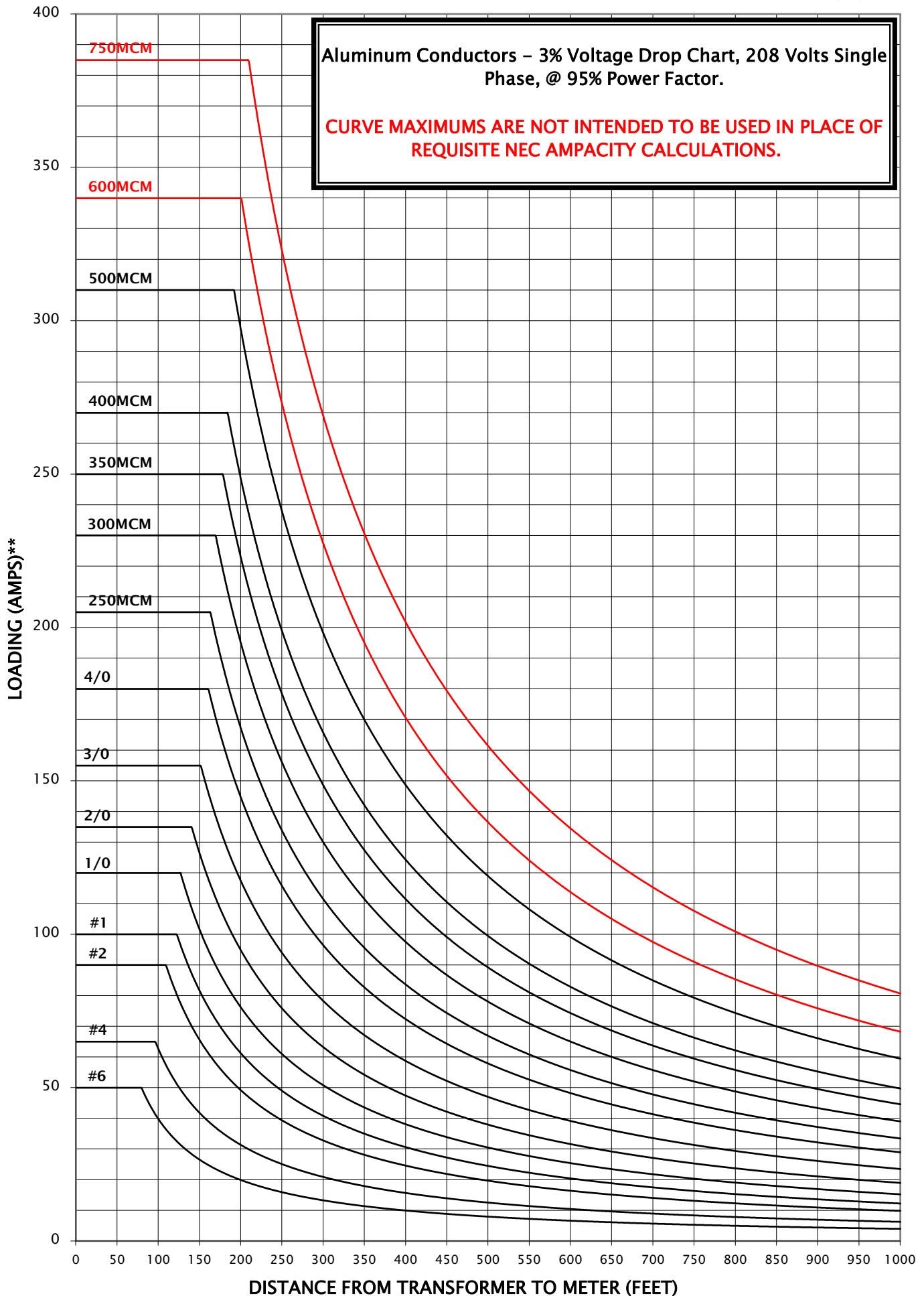
| AVAILABLE FAULT CURRENT (AFC) AT SECONDARY BUSHINGS OF TRANSFORMER | | | | |
|--|----------------|------------------|-------------------|--|
| Three Phase Pole (Overhead Bank) or Pad Mounted Transformer** | | | | |
| Size (kVA) | Full Load | | Secondary (volts) | AFC at Transformer Secondary Bushings (amps) |
| | Primary (amps) | Secondary (amps) | | |
| 30 *** | 0.7 | 83 | 208Y/120 | 5,200 |
| | | 36 | 480Y/277 | 2,600 |
| 45 *** | 1.0 | 125 | 208Y/120 | 7,700 |
| | | 54 | 480Y/277 | 3,850 |
| 75 | 1.7 | 208 | 208Y/120 | 11,400 |
| | | 90 | 480Y/277 | 5,700 |
| 112.5 *** | 2.6 | 313 | 208Y/120 | 17,800 |
| | | 135 | 480Y/277 | 8,900 |
| 150 | 3.5 | 417 | 208Y/120 | 20,300 |
| | | 181 | 480Y/277 | 10,150 |
| 225 *** | 5.2 | 625 | 208Y/120 | 32,900 |
| | | 271 | 480Y/277 | 16,450 |
| 300 | 6.9 | 833 | 208Y/120 | 41,000 |
| | | 361 | 480Y/277 | 20,500 |
| 450 *** | 10.4 | 1,250 | 208Y/120 | 56,700 |
| | | 542 | 480Y/277 | 28,350 |
| 500 | 11.6 | 1,389 | 208Y/120 | 57,400 |
| | | 602 | 480Y/277 | 28,700 |
| 750 | 17.4 | 2,083 | 208Y/120 | 38,800 |
| | | 903 | 480Y/277 | 19,400 |
| 1000 | 23.1 | 2,778 | 208Y/120 | 50,500 |
| | | 1,203 | 480Y/277 | 25,250 |
| 1500 | 34.7 | 4,167 | 208Y/120 | 69,100 |
| | | 1,805 | 480Y/277 | 34,550 |
| 2500 | 57.9 | 6,944 | 208Y/120 | 106,500 |
| | | 3,008 | 480Y/277 | 53,250 |

** ALL OVERCURRENT PROTECTIVE DEVICES, NEW OR REWORKED, SHALL HAVE A MINIMUM INTERRUPTING RATING OF 10,000 AMPS SYMMETRICAL CURRENT OR GREATER

*** OVERHEAD BANK ONLY

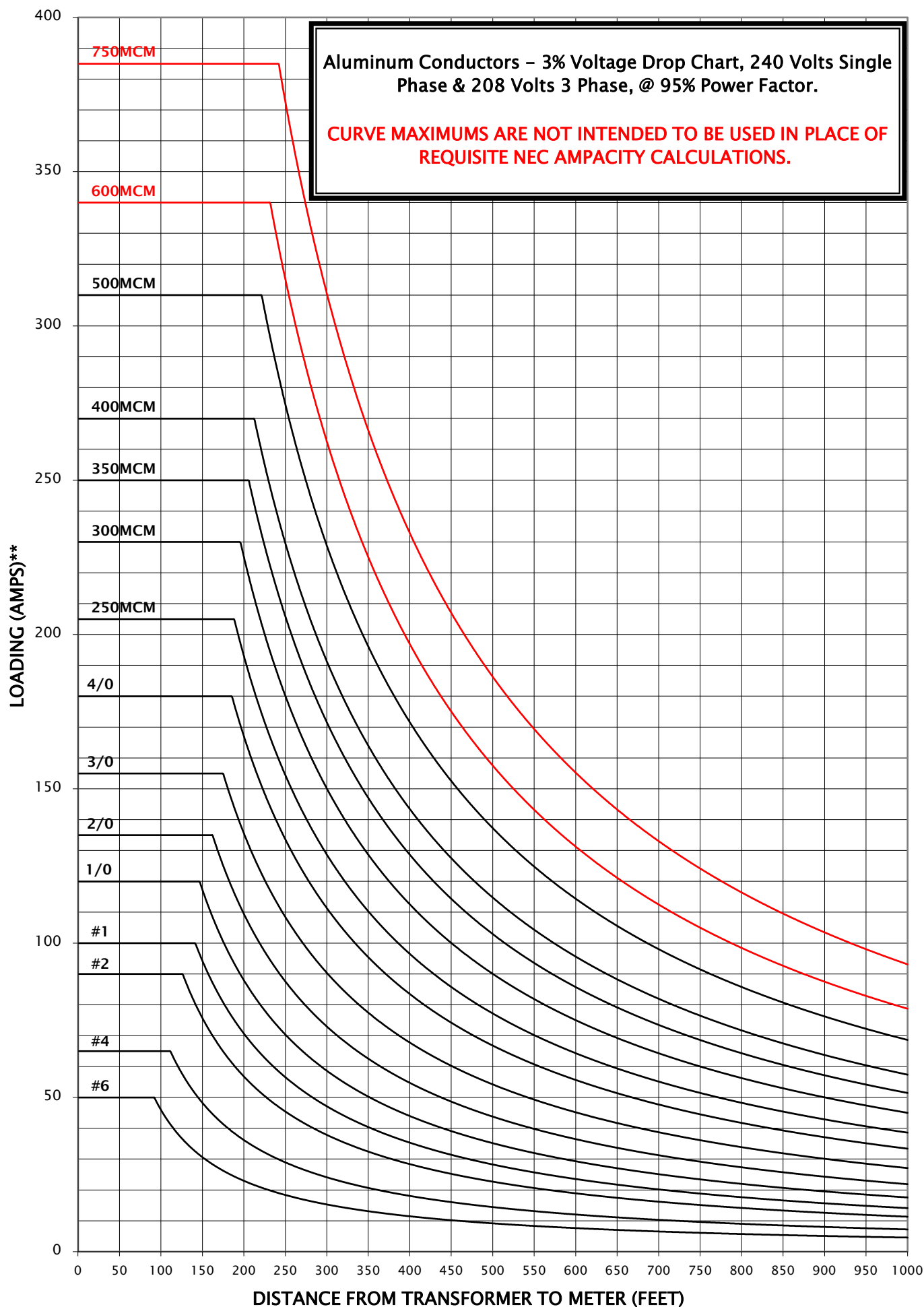
APPENDIX - TABLE III

REVISION: 4/1/22



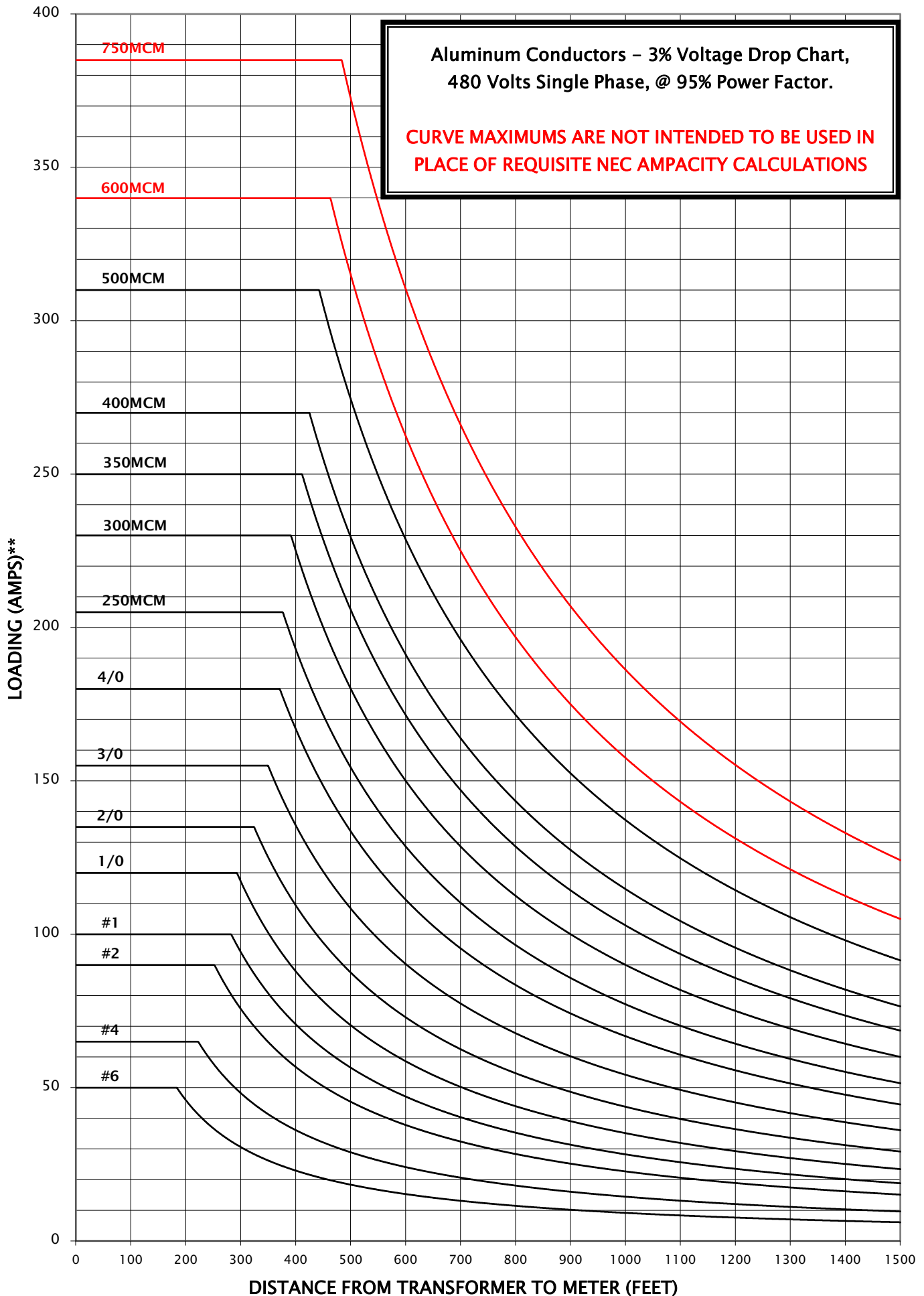
APPENDIX - TABLE IV

REVISION: 4/1/22



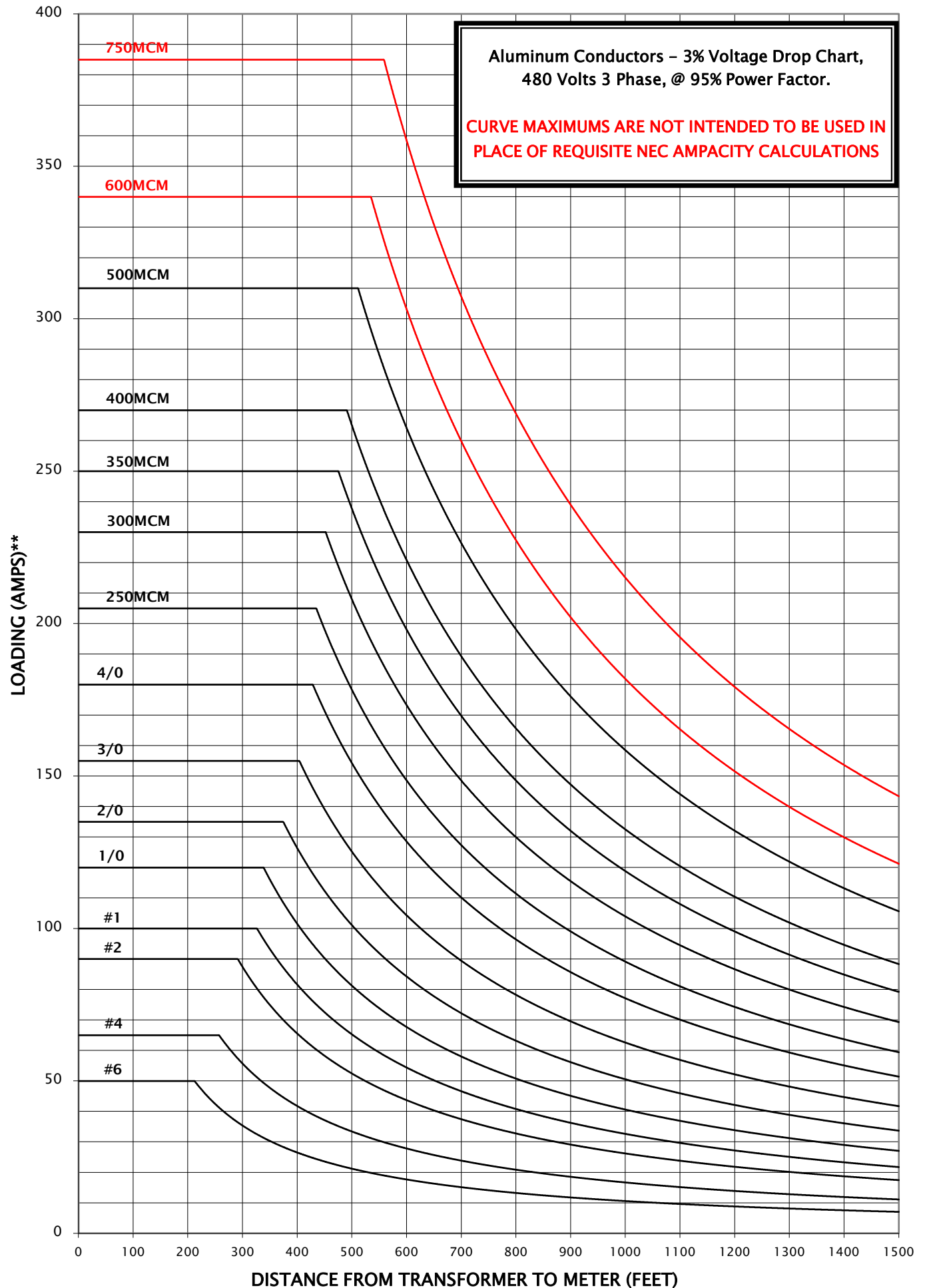
APPENDIX - TABLE V

REVISION: 4/1/22



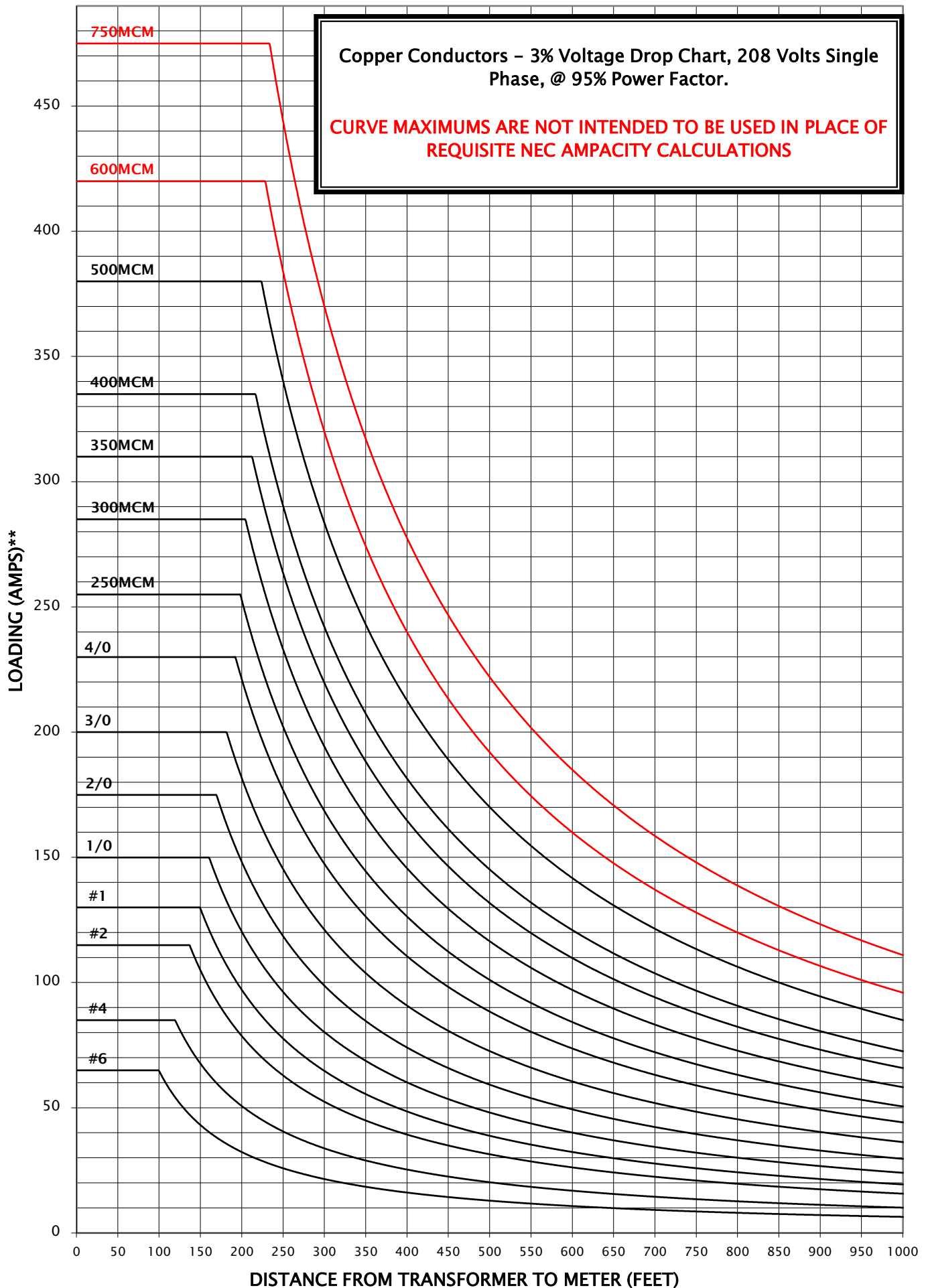
APPENDIX - TABLE VI

REVISION: 4/1/22



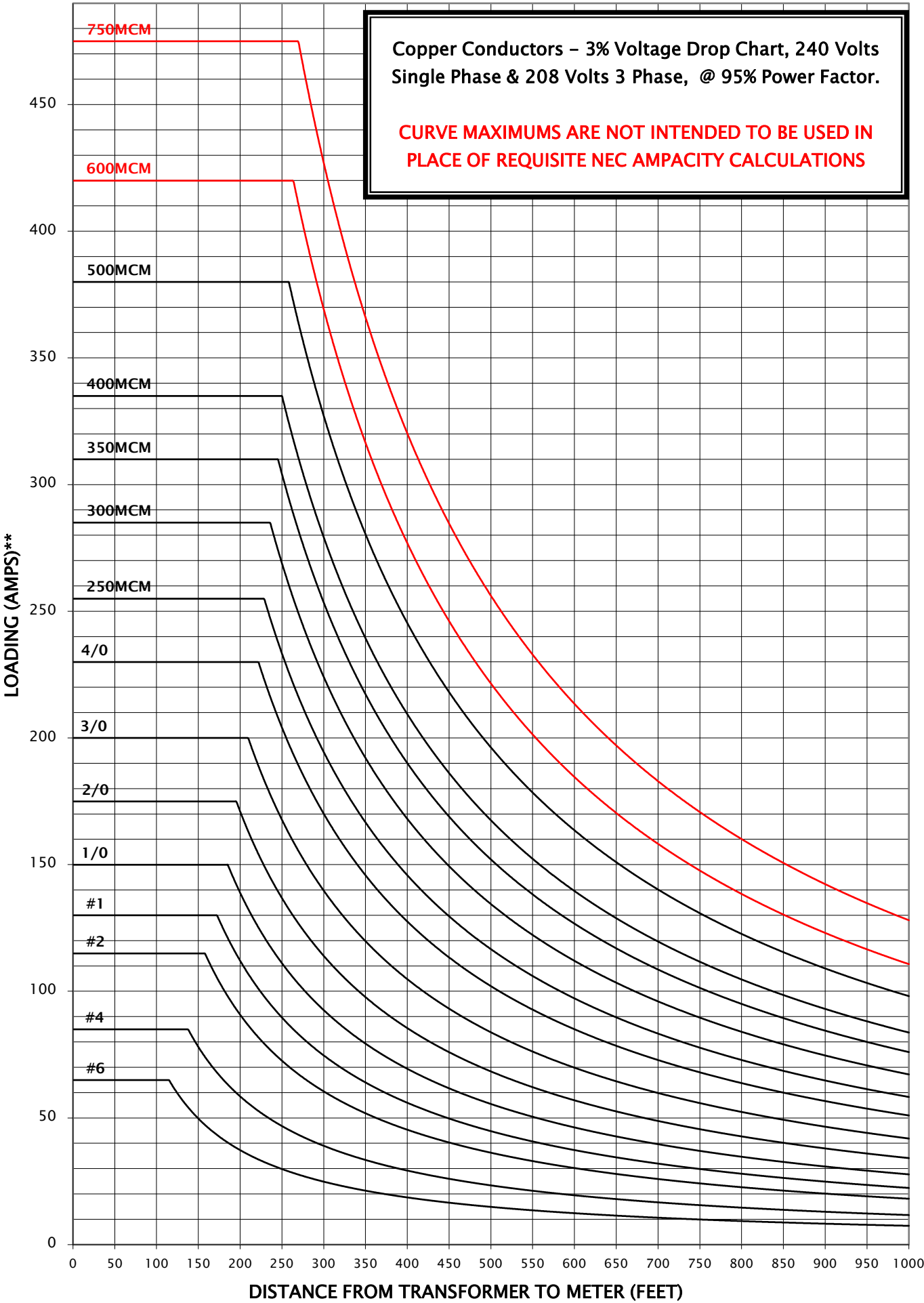
APPENDIX - TABLE VII

REVISION: 4/1/22



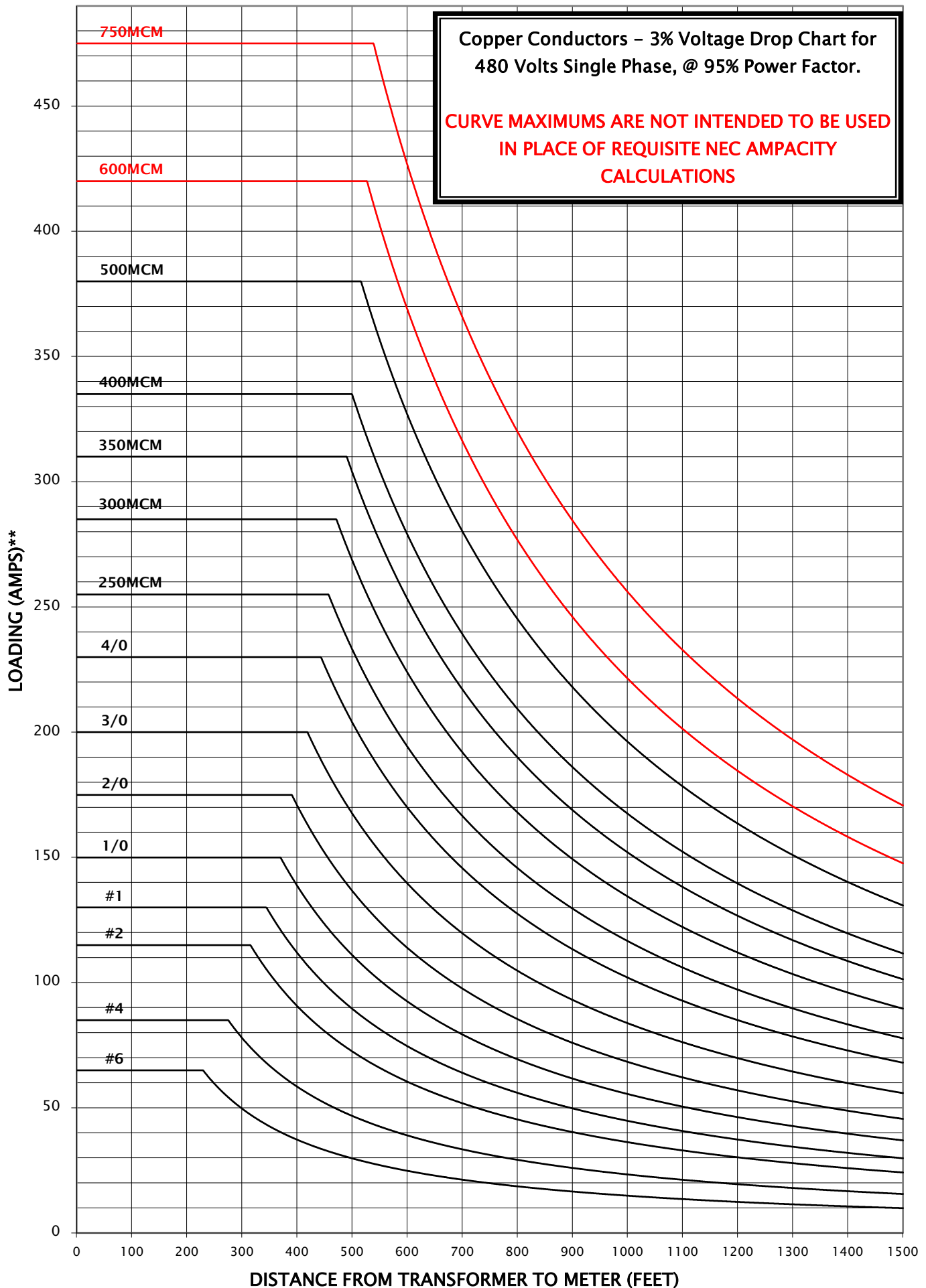
APPENDIX - TABLE VIII

REVISION: 4/1/22



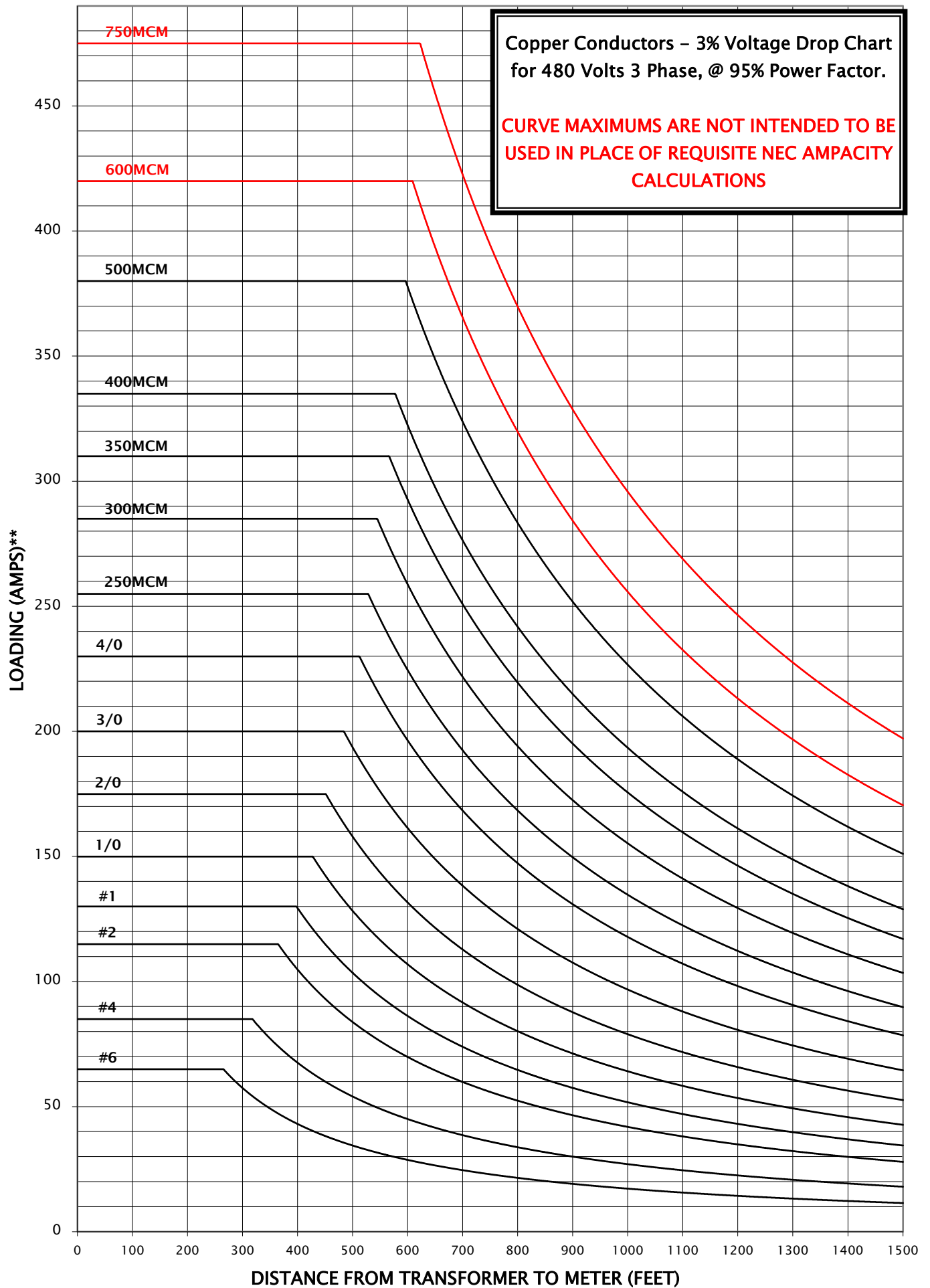
APPENDIX - TABLE IX

REVISION: 4/1/22



APPENDIX - TABLE X

REVISION: 4/1/22



APPENDIX - TABLE XI

| SERVICE DROP SCHEDULES FOR MAST AND BUILDING ATTACHEMENTS** | | | | | | |
|---|-------------------------------|----------------------|-----------------------|------------|-----------------------|------------|
| Wire Size (T=triplex) (Q=quadplex) | Unguyed Rigid Service Mast*** | | | | Building Attachment | |
| | G.R.C. Mast | Attachment Height | Maximum Span* from | | Maximum Span* from | |
| | (size) | (max) | unguyed pole | guyed pole | unguyed pole | guyed pole |
| #4T | 2" | 36" | 95' | 115' | 95' | 175' |
| #2T | | | 90' | 110' | 90' | 165' |
| 1/0T | | | 80' | 100' | 80' | 145' |
| 4/0T | | | 70' | 85' | 70' | 125' |
| #2Q | | | 85' | 105' | 85' | 155' |
| 1/0Q | | | 75' | 95' | 75' | 135' |
| 4/0Q | | | 65' | 80' | 65' | 120' |
| #4T | 2.5" | 36" | 95' | 160' | | |
| #2T | | | 90' | 150' | | |
| 1/0T | | | 80' | 135' | | |
| 4/0T | | | 70' | 115' | | |
| #2Q | | | 85' | 140' | | |
| 1/0Q | | | 75' | 125' | | |
| 4/0Q | | | 65' | 110' | | |
| #4T | 3" | 48" | 95' | 175' | | |
| #2T | | | 90' | 165' | | |
| 1/0T | | | 80' | 145' | | |
| 4/0T | | | 70' | 125' | | |
| #2Q | | | 85' | 155' | | |
| 1/0Q | | | 75' | 135' | | |
| 4/0Q | | | 65' | 120' | | |
| #4T | 4" | 60" | 95' | 175' | | |
| #2T | | | 90' | 165' | | |
| 1/0T | | | 80' | 145' | | |
| 4/0T | | | 70' | 125' | | |
| #2Q | | | 85' | 155' | | |
| 1/0Q | | | 75' | 135' | | |
| 4/0Q | | | 65' | 120' | | |

*SINGLE RUN SERVICES ONLY; MULTIPLE RUNS REVIEWED ON INDIVIDUAL BASIS

**THIS TABLE IS BASED UPON LEVEL GROUND SPAN; IF NOT, CONTACT HOLY CROSS ENGINEERING DEPARTMENT. LIMITING FACTOR FOR GUYED POLE SPANS IS 1000 POUND MAXIMUM SECONDARY TENSION OR MAST STRENGTH, WHICH EVER IS LESS.

APPENDIX A
(Not Used)

APPENDIX B

Service Billing Guide

Holy Cross Energy categories for labor charges associated with electric service are:

1. Connect/Transfer Service, premise visit required
2. Express Transfer Service, no premise visit required
3. After Hours Connect Fee outside of regular service hours
4. Unnecessary premise visit during regular service hours
5. Investigation and/or Resealing of Meters and/or Services Due to Unauthorized Activity (Minimum charge of one hour).
6. Construction Clearance Violations (See [Section 2](#))

These charges will be billed in accordance with our [Electric Service Tariffs \(Rates and Charges\), Rules and Regulations](#).

There are also truck time and mileage charges associated with Electric Service billing.

The following services are usually classed as "No Charge" but under certain circumstances Holy Cross Energy reserves the option of billing for these services:

- Connecting new services
- Reconnecting or disconnecting loops for service upgrades
- Technical Services: power quality investigations, energy audits, and fault locates on underground lines
- Response to power outages

Other charges:

- Damage to Holy Cross Energy facilities
- Line extensions



APPENDIX C

February 1, 2012

Access by electricians to Holy Cross Energy facilities has changed. Holy Cross will provide access to our secondary junction box through the use of the courtesy locks so electricians can pull new secondary services. After the new secondary service is installed and inspected, Holy Cross personnel will make the connections in the secondary junction box. The courtesy lock will be removed after seven days.

The electrician still needs to complete, sign and return the attached liability waiver and provide a current certification of insurance in accordance with the waiver's requirements.

In the absence of the properly executed liability waiver, Holy Cross will provide access to our secondary junction box, under the supervision of Holy Cross Energy crews, at limited pre-scheduled times.

Please feel free to call if you have any questions.

Sincerely,
HOLY CROSS ENERGY

Cody O'Neil,
Vice President - Glenwood District Operations



LIABILITY WAIVER

I _____, (referred to herein as "Owner") an electrician duly licensed by the State of Colorado, request access to transformers or secondary junction boxes owned by Holy Cross Electric Association, Inc., a/k/a Holy Cross Energy (herein "Holy Cross"), on behalf of myself and, if applicable, the undersigned company (herein "We" or "Us"). We agree that if Holy Cross will place a Courtesy Lock on a transformer, or secondary junction box, at our request allowing us or our employees access to such, we hereby assume full responsibility for all onsite activities, equipment, and facilities, whether owned and maintained by Holy Cross or by us, for as long as the Courtesy Lock is installed. We agree to perform our activities and operate such equipment and facilities, according to applicable electric standards of Holy Cross.

In addition to the Holy Cross standards and requirements, we agree to comply with all applicable provisions of Federal, State, and Municipal construction, safety, health and sanitation statutes, codes, and regulations, and by higher than minimum standards, if necessary or prudent. We shall furnish Holy Cross Energy with any documentation necessary to show such compliance.

We agree to defend, pay on behalf of and hold harmless Holy Cross and its directors, officers, agents, and employees from all claims of whatsoever nature or kind, including those brought by employees of the undersigned owner or company or subcontractors, arising out of or as a result of any act or failure to act, whether or not negligent, in connection with the performance of the work to be performed pursuant to this contract by the undersigned, its employees, agents and subcontractors. We agree to defend and pay all costs in defending these claims, including attorney fees.

We also agree to pay to Holy Cross any damages to its property, or injury to its employees or agents, occurring during the period of granted access, and shall be liable for Holy Cross Energy's attorney's fees and costs incurred in enforcing the provisions of this paragraph.

Further, we agree to maintain public liability and property damage insurance (including automobile public liability and property damage insurance) to cover the obligations set forth above. The minimum insurance limits of liability shall be \$1,000,000 bodily injury and property damage. We further agree to maintain statutory minimum or greater levels of Workers' Compensation insurance. Holy Cross shall receive a minimum 30 day notice in the event of cancellation of insurance required by this agreement.

We shall furnish a certificate of insurance to Holy Cross showing that the above obligations and requirements are provided for by a qualified insurance carrier prior to access being granted.

We will immediately notify Holy Cross when our access to the transformers is no longer needed or required.

Name of Owner

Company Name Telephone No.

Signature

Date

APPENDIX D
Exception/Revision Form for Holy Cross Energy
Consumer Service Facilities Metering and Use "Guidebook"

Use this form when requesting exceptions or changes to the Holy Cross Energy "GUIDEBOOK". Please print legibly or type.

I seek **exception** to the following section(s): _____

I seek **revision** to the following section(s): _____

This section is responsible for the following problem(s): _____

Legal description of property: _____

I request the following exception/change (per sketch on reverse side of page, attached blueprints or electronic file): _____

Explain how this practice will maintain/improve safety and reliability: _____

By signing this I agree, that in the event any legal action is brought against Holy Cross arising out of the use of this exception by me, any subsequent owner, or any person, claiming damages by virtue of or in any manner arising out of the application of the exception, or damages therefrom, to hold Holy Cross harmless from any and all costs, charges, expenses, attorney's fees and judgements which may be imposed upon or incurred by Holy Cross in any manner arising out of such claim or such litigation.

OWNER: _____ Date: _____

Address: _____

E-mail: _____ Phone: _____ Fax: _____

Mail to: Holy Cross Energy - Attn: Engineering Department - P.O. Box 2150 - Glenwood Springs, CO 81602

<<<<<HOLY CROSS ENERGY USE ONLY>>>>>

The above described exception/change is hereby approved as noted. Approved forms shall be presented on site, when applicable, during service connection.

HOLY CROSS ENERGY

By: _____

Title: _____

Date Approved: _____

By: _____

Title: _____

Date Approved: _____

By: _____

Title: _____

Date Approved: _____

APPENDIX E

OFFICE USE _____

LOCATION # _____

PROJECT: _____

HOLY CROSS ENERGY MULTIPLE UNIT METER CHECK-OUT POLICY

ATTENTION: Multiple Unit Project Owner/Developers

It is extremely important that the individual meter bases in multiple unit projects be accurately identified as to which unit they will serve. This identification is Holy Cross Energy's only means to assure that consumers receive bills for the correct units. Also, for safety reasons (National Electric Code Requirements), the meter bases and main disconnects must be identified.

The accurate identification or check-out of individual meter bases in your project is **YOUR RESPONSIBILITY**. These meter bases must be identified with a brass tag by unit number **BEFORE** Holy Cross Energy will install the permanent meters. Since Holy Cross Energy is not responsible for any wiring beyond the electric service meter, it cannot assume any responsibility for determining which meter serves an individual unit.

If, after the original installation, we find that the original check-out or meter base identification is in error, the affected consumers will be advised that you are responsible and liable for any adjustments he may feel entitled to. Further, if it becomes necessary, because of an error in the original check-out, for Holy Cross Energy to make record changes, switch meters, or recheck which units are served by which meters, you will be charged for rendering services according to Holy Cross Energy's Tariff, Rules and Regulations.

The above terms and conditions are agreed to and accepted

Name of Owner/Developer

By: _____

Title: _____

Date: _____

Please complete: Project: _____

Owner: _____

Billing Address: _____

General Contractor: _____

Electrician: _____

MULTIPLE METER CHECK-OUT:

Project Address: _____

Location #: _____

Electrician: _____

Transformer CO#: _____ Line Section: _____ KVA: _____

Multi-meter stack verified by: _____ Date: _____

In diagram below, indicate building ID, Unit ID and meter number:

A large, empty rectangular box with a black border, intended for a diagram. It occupies the lower half of the page.

**APPENDIX F
(NOT USED)**

APPENDIX G

Harmonics, Non-Linear Loads and Voltage Flicker

- I. **TITLE:** Consumer Harmonic Distortion Standards
- II. **OBJECTIVE:** To reduce the adverse effects of harmonic distortion on consumer and Holy Cross Energy (Holy Cross) power systems to improve utilization of facilities.
- III. **INTRODUCTION:** Widespread use of power switching electronic devices and other nonlinear loads have created new challenges for the electrical industry, i.e., a type of power pollution or side effect known as harmonic distortion. Individually these devices offer significant operational advantages of energy efficiency, control, and size. Collectively, however, these nonlinear loads can result in significant distortion to the sinusoidal waveform over a broad range of the 60 hertz power systems. The non-linear load and harmonic distortion can result in excessive heating, equipment malfunction, and premature failure of consumer and Holy Cross facilities.

Holy Cross's **ELECTRIC SERVICE REGULATIONS** existing terms and conditions specify:

“Consumer shall not employ or utilize any equipment, appliance or device that will adversely affect Holy Cross's service to the consumer or other consumers.”

The IEEE Standard 519 defines the quality of the electrical power that Holy Cross should furnish to the consumer. These standards are for the mutual benefit of all consumers.

- IV. **APPLICATION:** The prevailing provisions of IEEE Standard 519 are to be a guide in the design of power systems with nonlinear loads connected to Holy Cross's system. There are many corrective measures that may appear more economical initially but are more costly and less functional later. Therefore, careful examination of the options is essential.

The interface between sources and loads is the point of common coupling (PCC). Compliance with this policy is based on measurements at the PCC.

The distortion limits are for worse case conditions under steady-state operation. Transient conditions exceeding these limits are not normally considered critical. Some harmonic effects are unavoidable. This policy attempts to reduce the harmonic effects at any point within Holy Cross or consumer systems by establishing standards for current and voltage harmonic conditions.

As part of this policy, each case shall use good engineering judgments. These standards in no way override such judgments. Final policy decisions are at the sole discretion of Holy Cross. Strict adherence to the recommended harmonic standard will not always prevent problems from arising, particularly near the limits. System changes will often require reexamination and harmonic measurements from time to time to determine system behavior and equipment performance.

The consumer should confirm:

- A. That the levels of harmonics at the PCC and utilization points are not excessive.
 - B. That a harmful series or parallel resonance is not occurring.
 - C. That the power factor correction capacitors or harmonic filters are not being over stressed by excessive harmonics.
- V. **LIMITS:** The limits described in this policy are intended to:
- 1. Assure that Holy Cross can deliver quality electric service to all of its consumers according to acceptable industry standards. Quality

would include factors such as harmonic distortion, safety, continuity, and voltage stability;

2. Assure that Holy Cross can prevent its facilities from being subjected to the harmful effects of harmonic distortion, i.e., improper operation, reduced useful capacity, loss of operating life, and excessive voltage stress.

VI. IMPLEMENTATION:

New or Revamped Facilities

Each consumer with a new or revamped facility is required to investigate and provide Holy Cross a certified harmonic engineering analysis when any condition listed below exists:

1. The service required is three phase (3Ø) and at least 500 kVA or larger.
2. The connected or anticipated nonlinear equipment's net fundamental load is greater than 20 percent of the net connected load.
3. Capacity of any single nonlinear equipment is equal to or more than 75 kVA.

After the effective date of this policy each subjected consumer whose facility fails to comply with the provisions of this policy shall, at its expense, develop an acceptable plan, negotiated with Holy Cross, to meet or exceed the provisions of this policy. The plan shall include but not be limited to, the engineering analysis and planned consumer owned equipment additions needed for compliance.

Existing Facilities

Each existing consumer, as of the effective date of this policy, whose service is found to exceed the limits established in this policy shall, in coordination with Holy Cross, establish a reasonable correction work plan and compliance time frame. The work plan shall emphasize correcting the harmonic impacts in the following order of importance:

1. Voltage Flicker
2. Association IEEE Requirements (Voltage Distortion)
3. Holy Cross Facility Operation
 - A. Protection Equipment
 - B. Cable
 - C. Transformers
4. Consumer Service Distortions