

METERING INSTALLATION REQUIREMENTS

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300.1 GENERAL

All meter and service equipment installations shall comply with the service requirements of CRA-ES and with rules and regulations of the inspection authorities having jurisdiction. All meter sockets and enclosures shall be listed and approved by a recognized testing lab.

If any question arises for which you cannot find the answer in the following pages, it is suggested that you call CRA-ES for further information. See Pages "B" and "C" in the front of this manual for telephone numbers and addresses of local CRA-ES offices.

Whenever any electrical wiring for service connection is installed whether regulated by inspection authorities or not, provision shall be made for the installation of metering equipment. It shall comply with these service requirements except when existing metering equipment, in the opinion of CRA-ES, is satisfactory and adequate to register all current to be supplied.

Whenever one meter registers the electricity supplied to two or more single family residential occupancies, it will be considered a non-residential installation for the purpose of these requirements.

When a Customer does his own wiring, he will be considered the electrical contractor for the purpose of these requirements.

300.2 METERED AND UNMETERED CONDUCTORS

Line side (unmetered) and load side (metered) conductors shall not occupy the same raceway or enclosure. Exception: Meter socket and current transformer enclosures.

300.3 SEALING OF METERS AND METERING EQUIPMENT

All meters, meter facilities and all points of access to unmetered wiring on the Customer's premise shall be sealed by CRA-ES. All cabinets, conduit fittings and equipment enclosures containing unmetered conductors shall be made sealable by the Customer before service will be energized. The breaking of seals and tampering with meters or unmetered wiring by unauthorized persons is prohibited and subject to penalty of the law. (See Section 100, Paragraph 100.17)

Stud and wing-nut assembly, or sealing screws shall be used for sealing all removable panels and covers to compartments used for routing or terminating unmetered conductors.

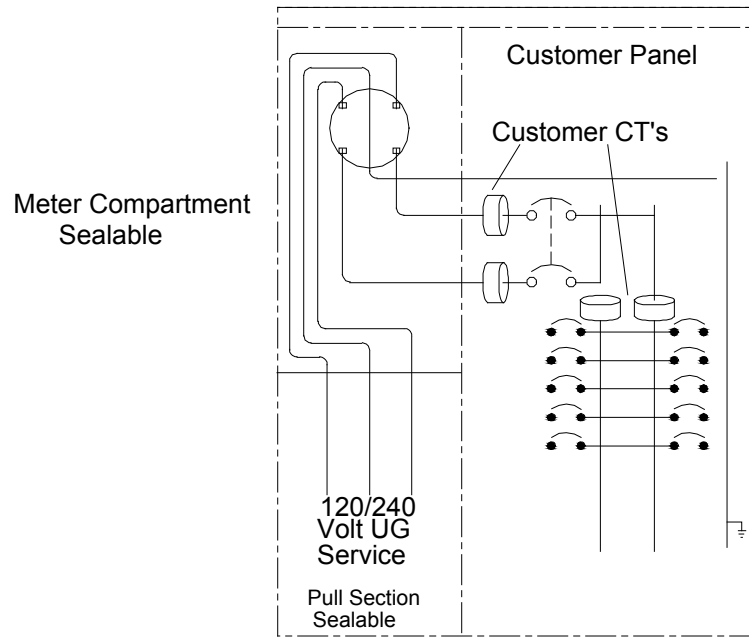
When a stud and wing-nut assembly is used for sealing, the stud shall be 1/4" x 20 (minimum). The stud and wing nut shall each be drilled .0635" (minimum) for sealing purposes.

All sealing screws shall be drilled .0635" (minimum) for sealing purposes.

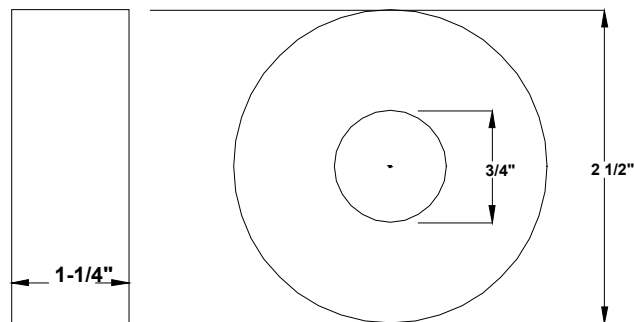


UNACCEPTABLE EQUIPMENT IN SEALED AREAS

CRA-ES and industry policy spells out that no “customer” related equipment be allowed in the sealable (metering) area of any service entrance gear. All such equipment shall be installed in the non-sealed portion of the service entrance equipment. Example: Load control current transformers must be in the non-sealed area of the service entrance gear.



Acceptable Customer Equipment Location



*** Current Transformer Dimensions**

***These are general dimensions of current transformers available with existing demand controllers. There may be new units in the future that will not conform to these dimensions.**

TYPICAL 100 – 200 AMP
ALL IN ONE METER CAN - RESIDENTIAL



301.1 METER AND SERVICE LOCATIONS

CRA-ES reserves the right to determine all meter and service locations. Only authorized CRA-ES personnel shall determine these locations. See Section 100, Paragraph 102.20 and Section 200, Paragraph 200.0.

301.2 PLANNING AND GROUPING FOR ADDITIONAL METERS

Occasionally there is a need to locate and install additional service and metering equipment after the originally planned electric service for a building is installed and energized.

The additional meters must be grouped with those already in service, and be installed in accordance with the established meter location plan for the building.

The added service equipment must be located and installed in conformance with applicable codes, laws, and ordinances of the inspection authority having jurisdiction, and with the requirements of this Service Requirements Manual

301.3 METER LOCATIONS - RESIDENTIAL

For single family residential buildings, meters and metering equipment shall be installed:

- a. Outdoors and mounted on or recessed in an exterior building wall but not under a carport, breezeway, patio, porch, or in any area that can be enclosed, or
- b. Outdoors in a meter pedestal or service entrance section, but not under a carport, breezeway, patio, porch, or in any area that can be enclosed, or
- c. In a room within the building, approved by CRA-ES, for the location of electric meters, and with access only by a door opening to the outside of the building. See Paragraph 301.9 for meter room requirements.

In addition, the meter area must be readily accessible (See Section 100, Paragraph 102.20) without requiring passage through restricted private areas, gates or fences. See next page for acceptable meter locations for single family residences. **The meter and main switch shall be installed next to each other on the same wall.** See Paragraph 301.13.

NOTE: See Section 500, Paragraph 506.6-1 for requirements for mobile home pedestals.

301.3-1 METER LOCATIONS - FACTORY-BUILT BUILDINGS/HOMES

Factory-built buildings and homes (FBB's) shall meet the following requirements before meters and metering equipment can be mounted on the building:

1. FBB's shall be secured on a permanent foundation (Type E) per HUD Permanent Foundations Guide for Manufactured Housing - December 1996 and requirements of the authority having jurisdiction.
2. The trailer tongue, axels and wheels shall be removed.
3. The meter panel shall meet all CRA-ES requirements.
4. Service entrance equipment attached to FBB's shall be completely installed by the manufacturer of the structure.
5. Meter location shall be per Paragraphs 301.3 or 301.5.
6. For overhead applications refer to Section 400.
7. For underground applications refer to Section 500.

NOTE: If the above requirements #1 - #3 are not met, a meter pedestal shall be required.



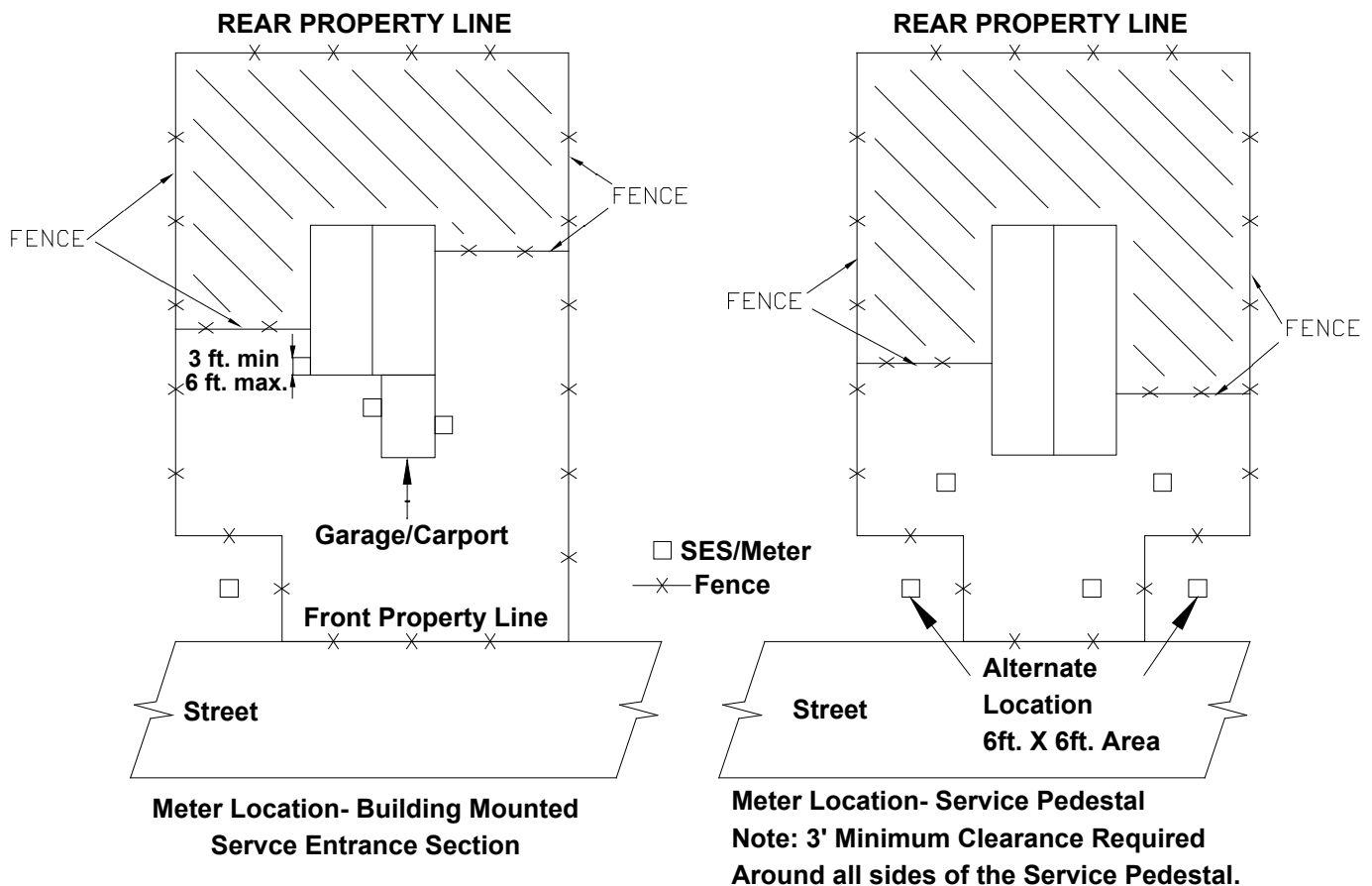
301.3-2

RESIDENTIAL SERVICE - SINGLE DWELLING METER LOCATIONS

CRA-ES RESERVES THE RIGHT TO DETERMINE ALL METER AND SERVICE LOCATIONS.

1. The meter and main switch shall be accessible for reading and maintenance without requiring passage through restricted areas, gates, or fences.
2. All meter and main switches shall be located three feet minimum to six feet maximum on the front corner of a residence, nearest to the point of available service, as determined by CRA-ES on an exterior wall or alternate location (subject to local inspection authority), but not under a carport, breezeway, patio, porch, or other area that can be enclosed with building expansion or fence.
3. The electric meter and main switch “may be” installed at an alternate location not attached to a dwelling to ensure accessibility. (Subject to local inspection authority approval)
4. If overhead service is available in the rear of the property (alley or easement) the point of attachment may be on the rear of the residence. The meter shall be located per item #2 above. It is the Customer’s responsibility to install conduit and wiring between the meter location and the point of attachment. The conduit shall be located on the exterior of the building in its entirety.
5. When remodeling existing residences, check with local CRA-ES office.
6. Service entrance equipment shall be utilized for its intended purpose.

ACCEPTABLE METER LOCATIONS



301.4**METER LOCATIONS - RESIDENTIAL MULTI-FAMILY BUILDINGS**

1. Meters and metering equipment shall be installed:
 - a. Outdoors and mounted on or recessed in an exterior building wall, or
 - b. In a room within the building, approved by CRA-ES for the location of electric meters, and with access only by a door opening to the outside of the building. See Paragraph 301.9 for meter room requirements.
2. Meters and metering equipment shall not be installed within any residential occupancy.
3. Before meters can be installed in multiple residential panels, each individual meter socket must be permanently and clearly identified. See Meter Identification, Paragraph 302.1

301.5**METER LOCATIONS - COMMERCIAL AND INDUSTRIAL**

1. Location of metering to be approved by the Electric Meter Shop prior to construction.
2. For single occupancy non-residential and industrial buildings, meters and metering equipment shall be installed:
 - a. Outdoors and mounted on an exterior wall with vehicle access, or
 - b. Within a meter room inside the building on the first floor (see Definitions, Section 100, Paragraph 102.12) and with access only by a door opening to the outside of the building with vehicle access. See Paragraph 301.9 for meter room requirements.
3. For multiple occupancy buildings meters and metering equipment shall be located per above Number 1a or 1b, and shall be grouped in one readily accessible central location, accessible to all occupants. Meter sockets must be permanently and clearly identified. See Meter Identification, Paragraph 302.1.
4. In large multiple occupancy buildings, extensive shopping centers or buildings, CRA-ES may, at it's option, establish more than one meter location for groups of individual meter facilities. Consult CRA-ES prior to construction for approval of service plans.
5. Service stations - the meter location shall be located such that it is a minimum of twenty (20) feet clear of any gas pump and ten (10) feet clear of any gas storage tank fill spout and/or vent.

301.6**UNACCEPTABLE METER LOCATIONS**

For reasons of public safety, maintenance of service equipment, and reliability of metering, meters shall not be installed in any of the following locations:

1. Inside any building, unless located within an acceptable meter room. See Paragraph 301.9
2. In any location not readily accessible. See Section 100, Paragraph 102.20.
3. Directly over any stairway, ramp or steps
4. In any substation or transformer vault.
5. Accesable only by a trap door or in any location which may be hazardous to personnel.
6. On any surface subject to excessive vibration.
7. In or accessed through any rest, bath, shower, powder, or toilet room.
8. In any elevated area.
9. In any location not providing a clear and continuously unobstructed working space extending a minimum of three (3) feet from the face of the meter panel, and having a width to permit ready access to the complete metering installation. See Working Space, Paragraph 301.7.
10. In any location where moisture, fumes, or dust may interfere with the operation of the meter, or materially damage it.
11. In any location giving less than three feet clearance to any property line, or with less than three feet clearance to any sidewalk, alley or driveway giving access to non-residential or industrial property.
12. In any basement or depressed area.
13. Within carport or patio areas which are or can become enclosed, when served Overhead or Underground.
14. Mounted on CRA-ES poles.
15. In a room containing mechanical equipment.
16. In any elevator shaft or hatchway.
17. Mounted on any trees.
18. In any unsanitary areas in reference to farm animals and products.
19. In a plenum or any portion of a return or supply air ducting system
20. Areas where entry may be restricted or controlled because of medical, health environmental or other safety-related issues.



301.7

WORKING SPACE (600 volts or less)

To permit access to the metering installations and provide safety for personnel, a working and standing space entirely on the property of the Customer shall be provided in front of all metering equipment.

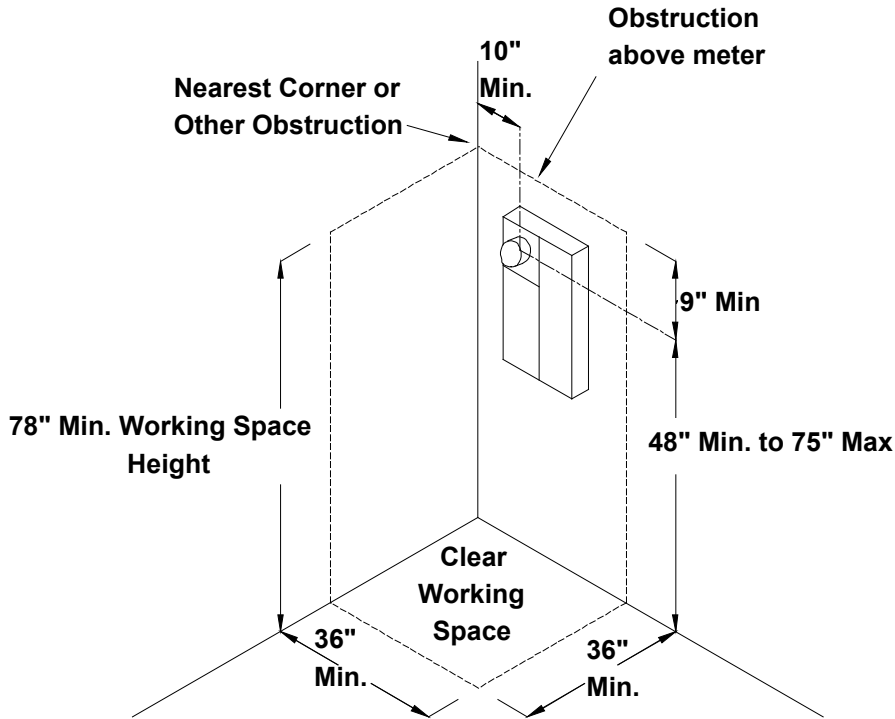


Figure 1
Surface or Semi-Flush
Meter Installations

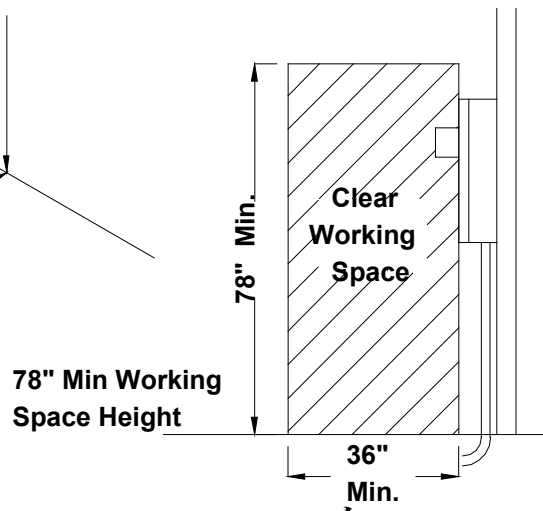
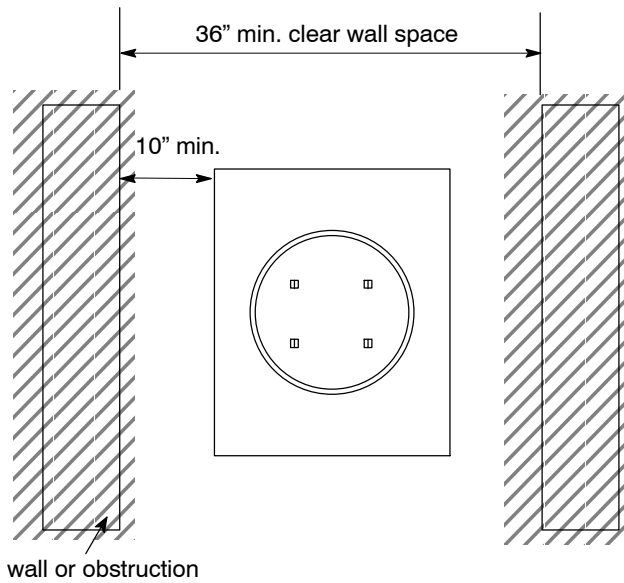


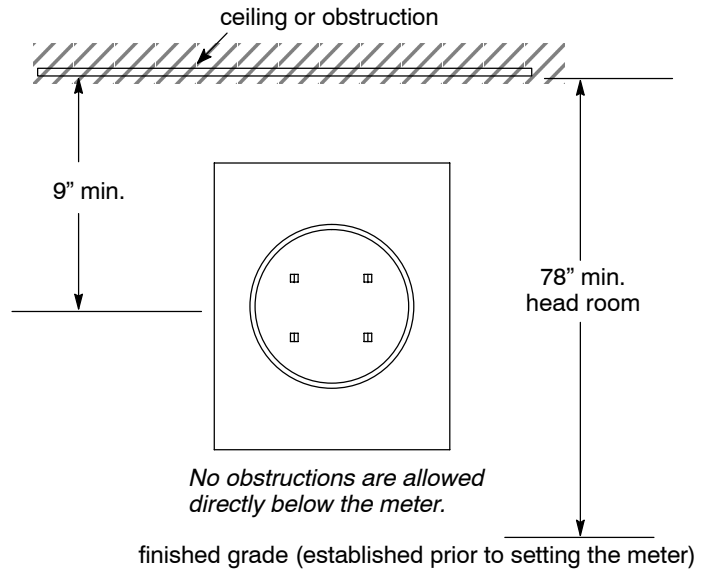
Figure 2
Working Space- Side View



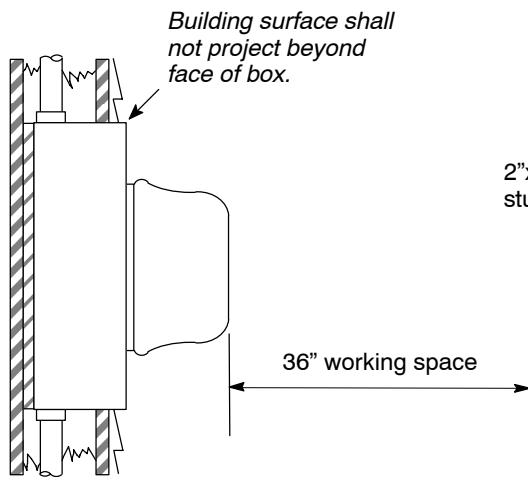
Meter Socket Clearance Requirements



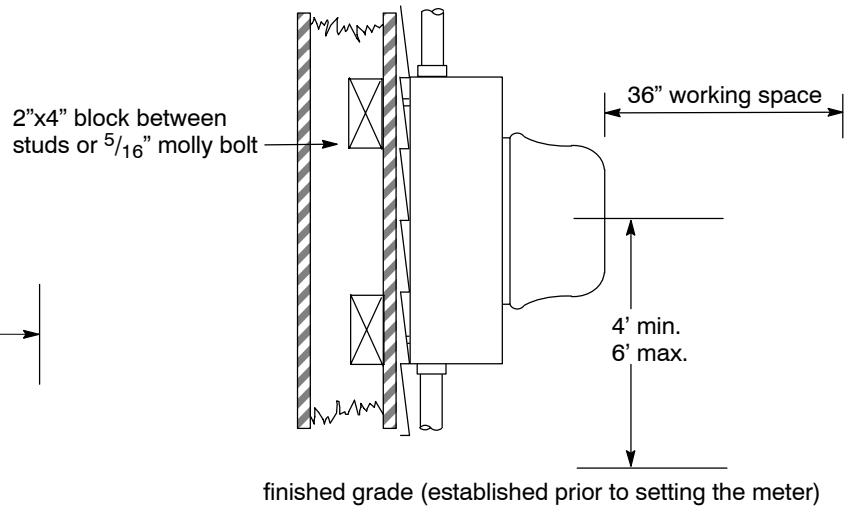
HORIZONTAL CLEARANCE
Flush or surface mount



VERTICAL CLEARANCE
Flush or surface mount



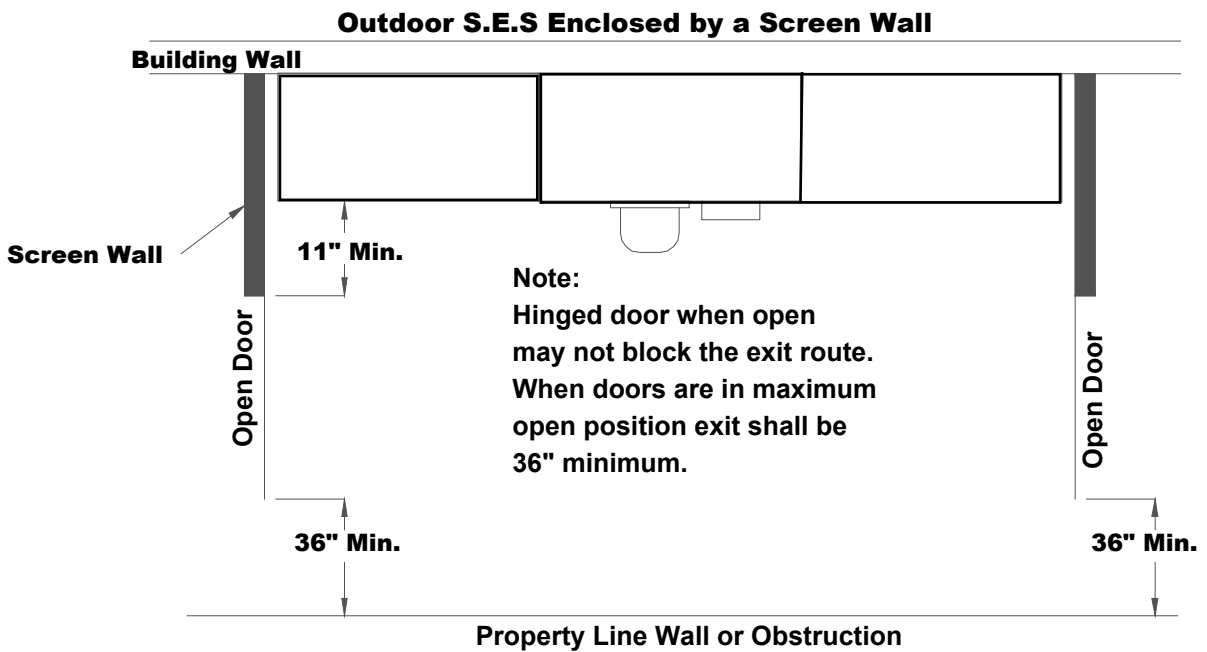
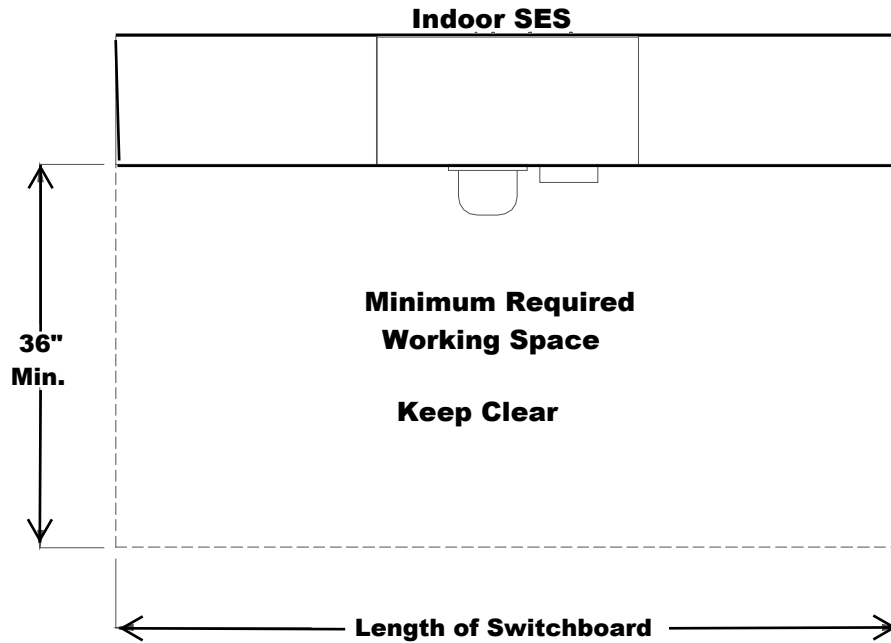
FLUSH MOUNT METER



SURFACE MOUNT METER

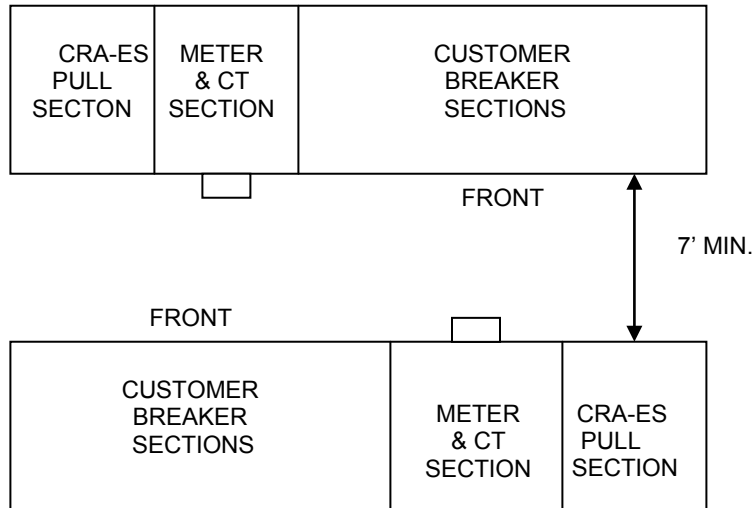


WORKING SPACE AND CLEARANCE REQUIREMENTS (TOP VIEW OF SWITCHBOARD)



MULTIPLE SERVICE ENTRANCE SECTIONS

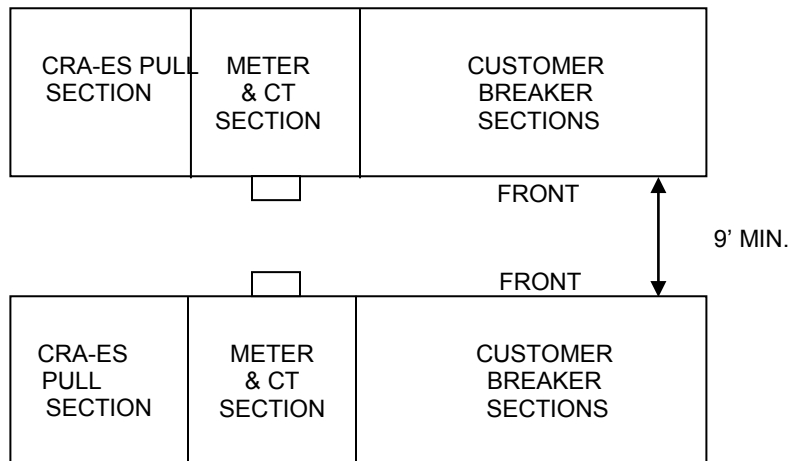
FIGURE 1 – METERS STAGGERED



NOTES

1. Service entrance sections that face each other with staggered meter locations shall have a minimum working space of 7 feet between service entrance sections.
2. Two exit paths shall be provided.

FIGURE 2 – METERS FACE – TO – FACE



NOTES

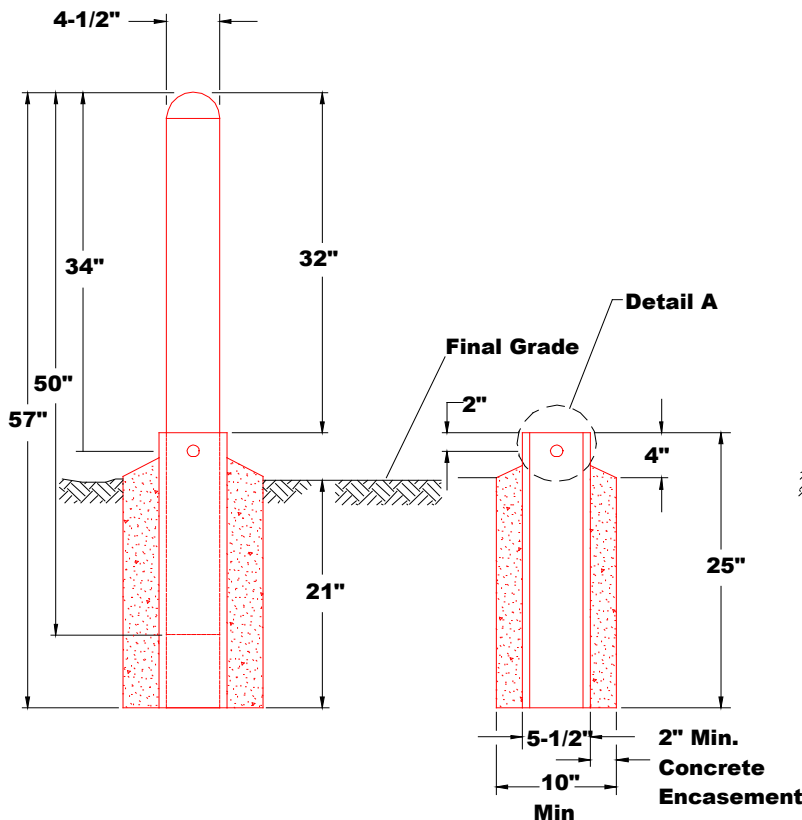
1. Service entrance sections that face each other with face-to-face meter locations shall have a minimum working space of 9 feet between service entrance sections.
2. Two exit paths shall be provided.



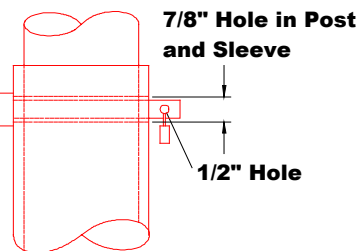
The Customer shall furnish, install and maintain permanent barricades to provide clearances where the working space is exposed to vehicles or hazardous conditions. CRA-ES shall specify type of barricade.

Posts need to be Rigid Conduit

Removable Post

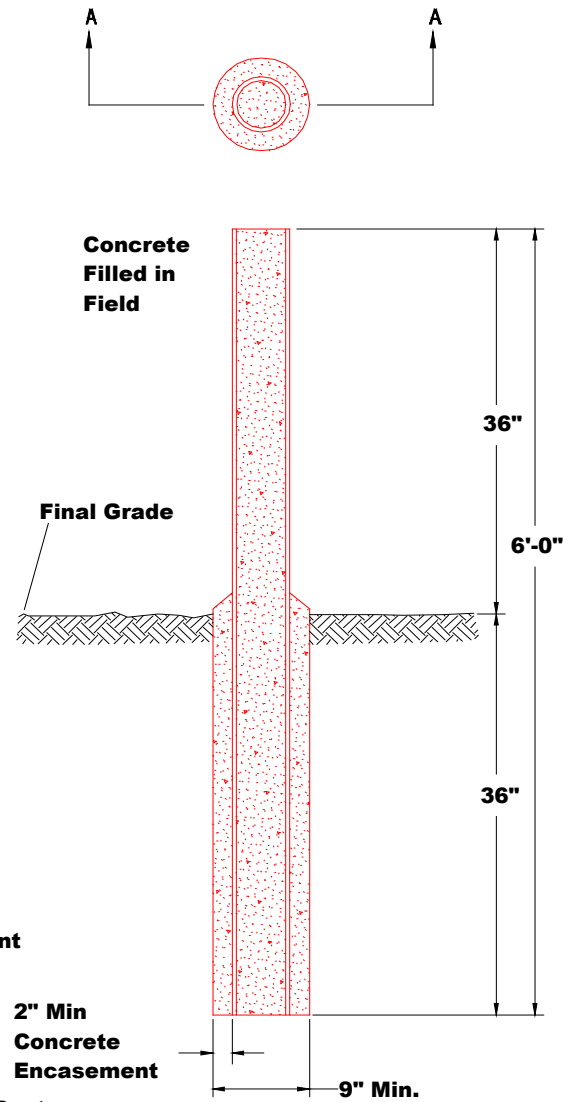


6-1/2" x 3/4" Steel Pin
With 1/2" Hole in
End to accept lock



Detail A

Fixed Post



Section A-A
Barrier Post Detail

Construction Notes:

1. Use additional barrier post as required to prevent traffic penetrations to SES.
2. Caution must be taken when installing posts so that posts do not make contact with conduit system.



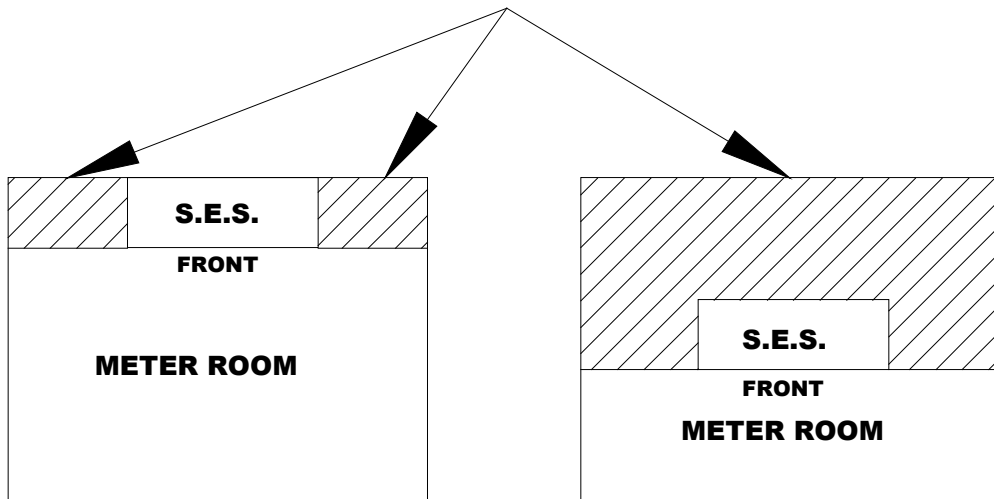
METER ROOM REQUIREMENTS

A meter room is a permanent, accessible, illuminated, ventilated room (per NEC section 100), provided by the customer for the exclusive use and location of the Customer’s electric service and metering equipment, and for the installation of an CRA-ES meter or meters. The one exception to exclusive use will allow the installation of communication equipment provided space requirements for the electric installation is not impaired. Meter rooms shall be provided with a doorway opening to the outside of the building with a kick down doorstop. Meter room location and design to be approved by CRA-ES. For safety’s sake, meter rooms are not to be used for storerooms.

Meter rooms may be locked provided independent access is given to CRA-ES. The Customer’s key will not be accepted for retention by CRA-ES for entry; therefore, locking shall be accomplished only by one of the following methods:

1. Customer may provide and install a device that will allow one pad lock for the Customer and one pad lock for CRA-ES on the door, or
2. The Customer may place a meter room door key in an CRA-ES acceptable lockbox installed on or near the door. The meter room key shall not unlock any other door on the premises.

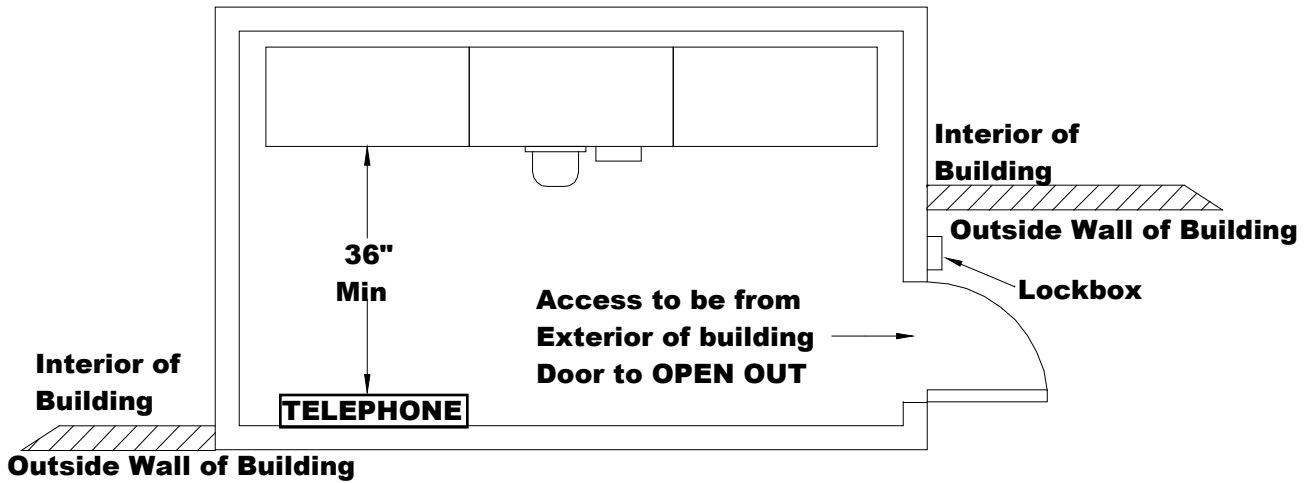
**No Doors in this Area of
Meter Room for CRA-ES Entry/Exit**



301.9

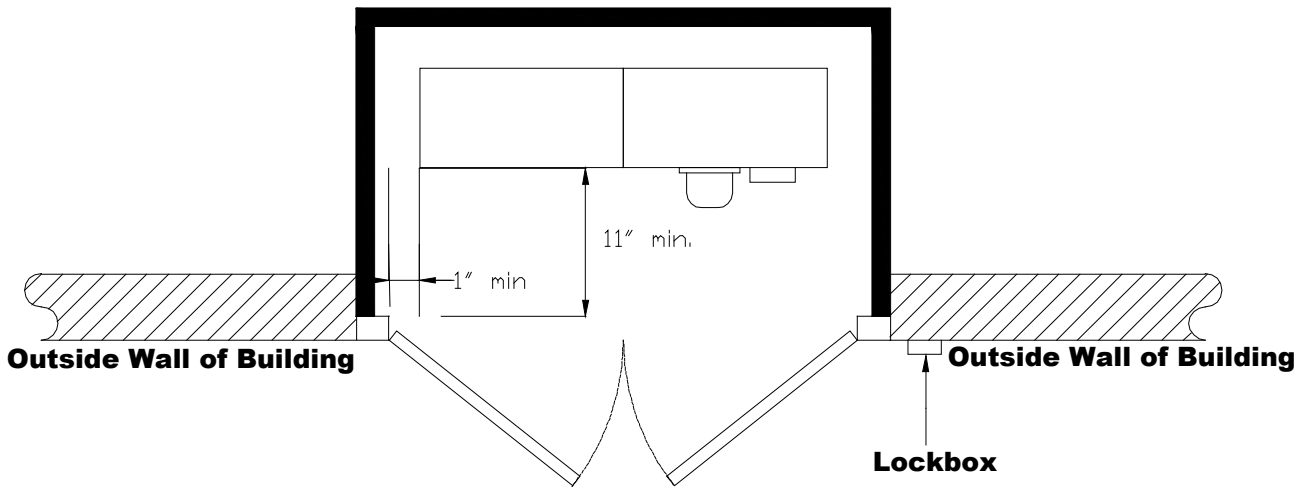
ELECTRIC METER ROOM REQUIREMENTS (CONT'D)

TOP VIEW



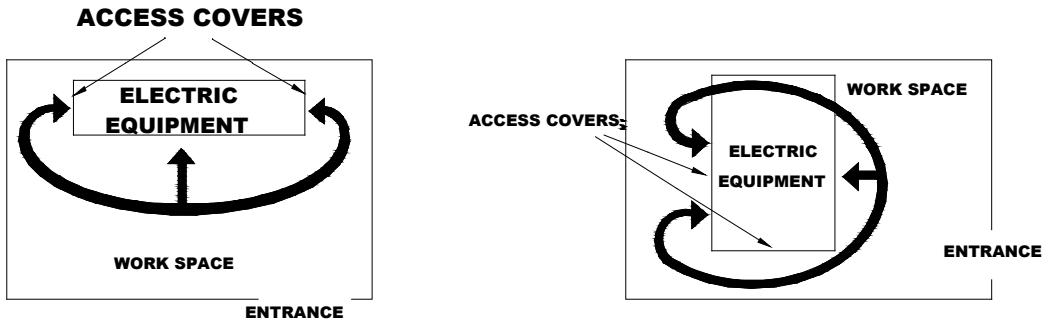
NOTE: ADDITIONAL CLEARANCES MAY BE REQUIRED BY THE LOCAL INSPECTION AGENCY

The following alternative to a meter room is acceptable to CRA-ES if the S.E.S. does not have any removable rear panels. Check with the CRIT or local agency for acceptability.

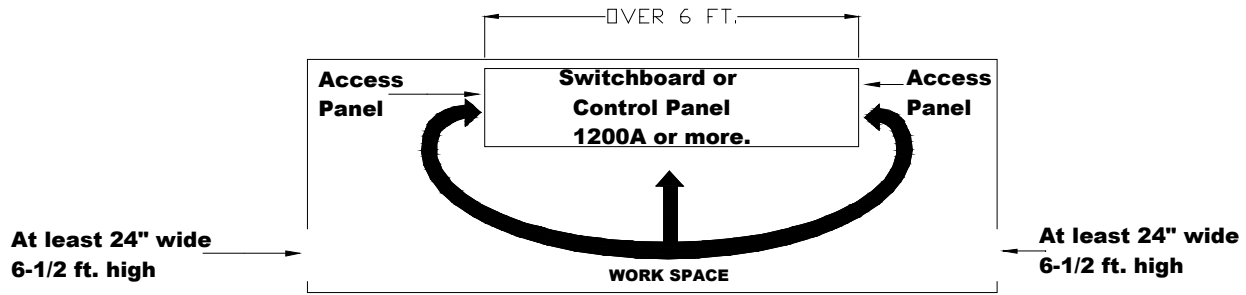


1. See requirements for locking doors. (Paragraph 301.10)
2. 36" concrete pad required in front of metering.
3. SES meter doors must open 90° (or more) with meter and test switch installed. Also, exterior doors must be equipped with a device to hold the door in the 90 degree (or more) position.
4. Care must be exercised to design the enclosure such that neither the roof nor the door frame will interfere with the clearances or the installation and maintenance of the metering equipment.
5. With exterior meter doors in open 90 degree locked position, a 36" exit way is required between door edge and closest object.

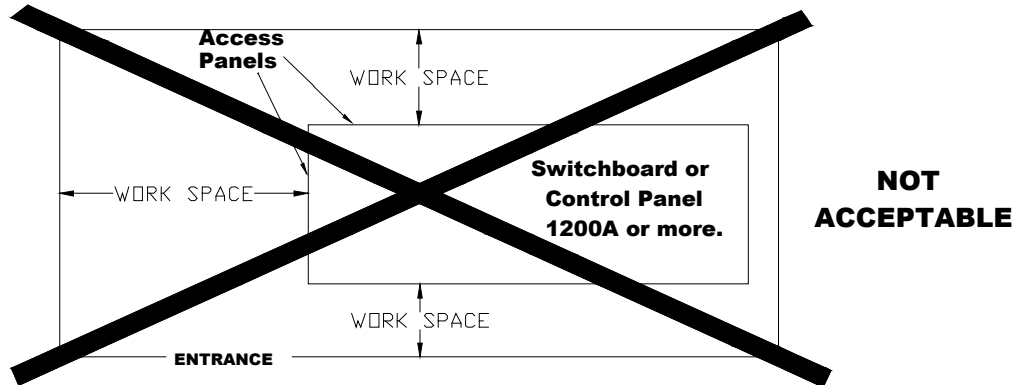




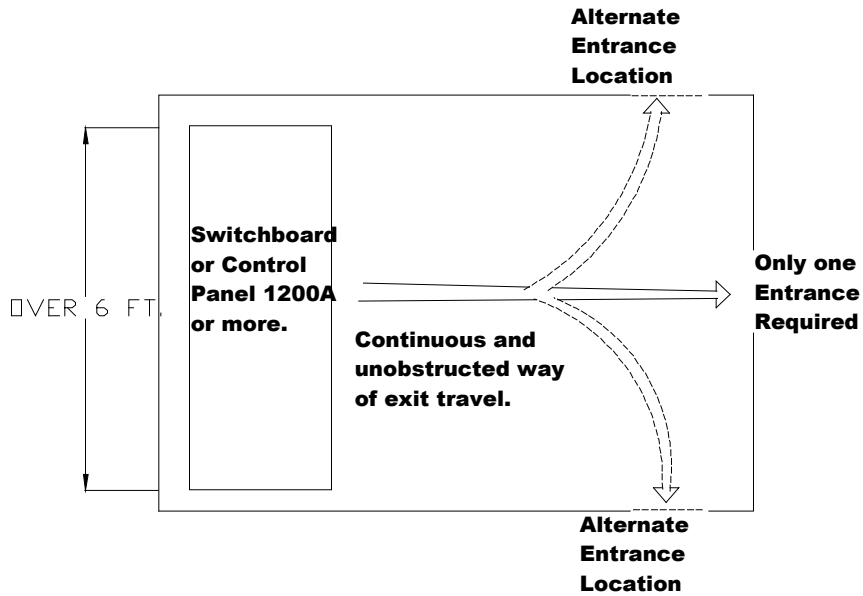
At least one entrance is required to provide access to the working space around electric equipment. The installation shown in the sketch at the right would not be acceptable if the electric equipment was a switchboard or panelboard over 6 ft. wide and rated 1200A or more.



For switchboards and control panels rated 1200A or more and over 6 ft. wide, there shall be one entrance not less than 24 in. wide and 6-1/2 ft. high at each end.

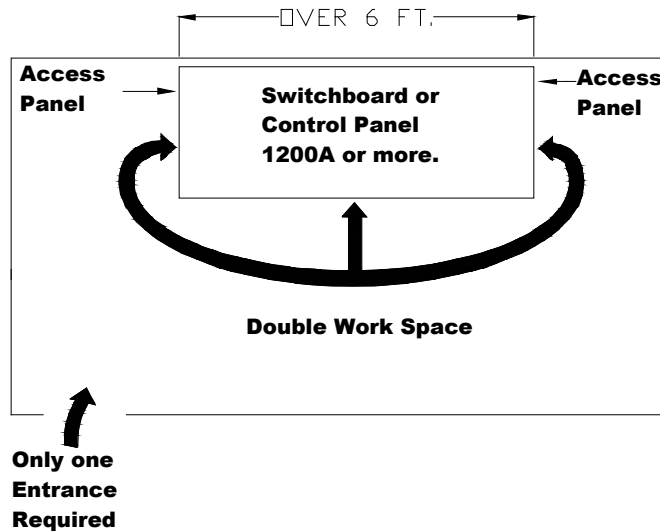


Exception #1: Where the equipment location permits a continuous and unobstructed way of exit travel.



Exception #1: Where the equipment location permits a continuous and unobstructed way of exit travel.

Exception #2: Where the work space required by section 110-16(A) is doubled.



Exception #2: Where the work space required by section 110-16(A) is doubled.



301.9-1 UNACCEPTABLE EQUIPMENT IN METER ROOMS

Equipment not permitted within the electric meter room includes, but is not limited to following:

1. Gas equipment – including piping
2. Water heaters/boilers – including piping
3. Mechanical equipment – including motor/generator sets
4. Batteries and battery charging equipment
5. Fire risers

301.9-2 METER ROOM VENTILATION

Meter room shall have at least two 10" X 10" air vents. Vent locations shall be designed to provide maximum separation, with one vent located high and the other vent located low.

Meter room containing any electrical equipment that produces heat such as a dry type transformer shall require the room air temperature to be maintained at maximum of 95° F.

301.10 LOCK BOX LOCATION

The customer may place a meter room door key in an CRA-ES acceptable lock box installed on or within 36" of the door. The minimum height shall be 36" and the maximum height 60". The meter room key shall not unlock any other door on the premises.

301.11 METER LOCATIONS REQUIRING ENCLOSURE

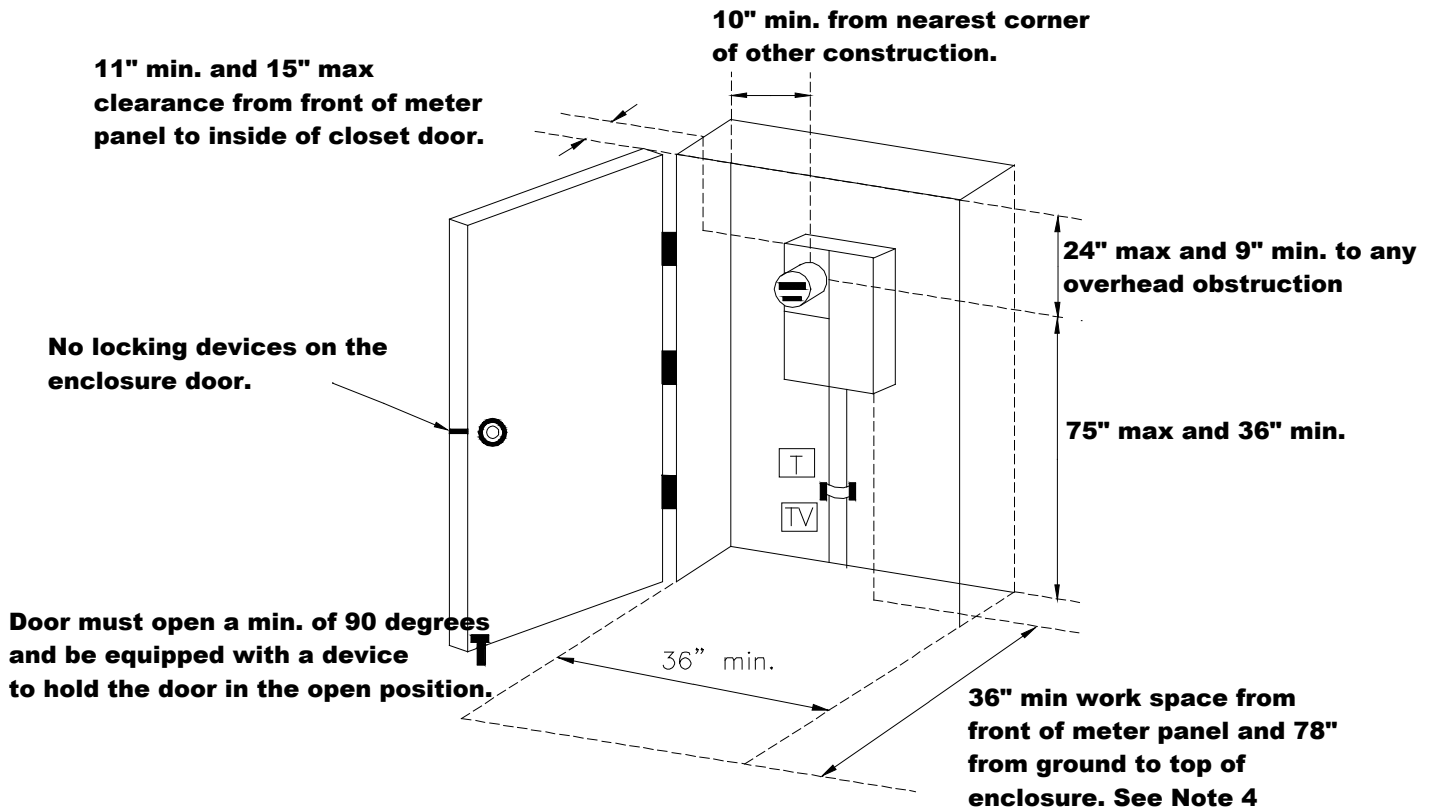
Meters and metering equipment shall be enclosed in a protective cabinet under the conditions listed below:

1. Whenever vandalism problems exist, or
2. Whenever the meter is mounted on a wall where it is subjected to traffic or possible damage, or
3. Where public safety is involved.

The meter enclosure cabinet must have sufficient depth to provide clearance for the meter, in addition to the depth required for the meter socket. The minimum depth from the face of the opening to the face of the meter socket, and other clearances shall be the same as for recessed metering.

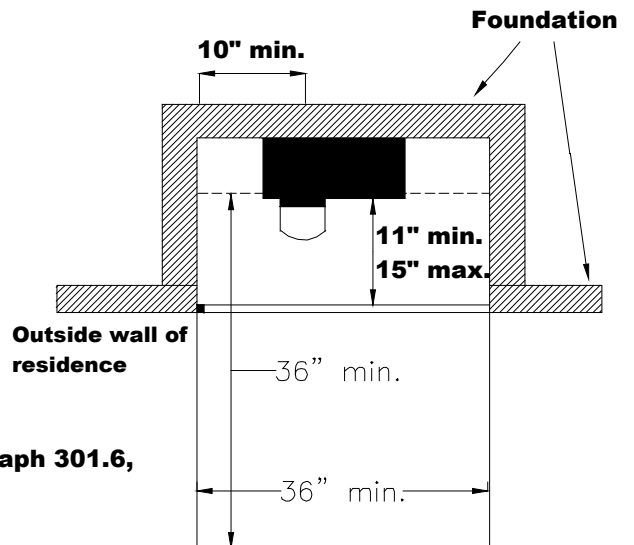
(See 301.12)

301.12 ELECTRIC METER CLOSET REQUIREMENTS

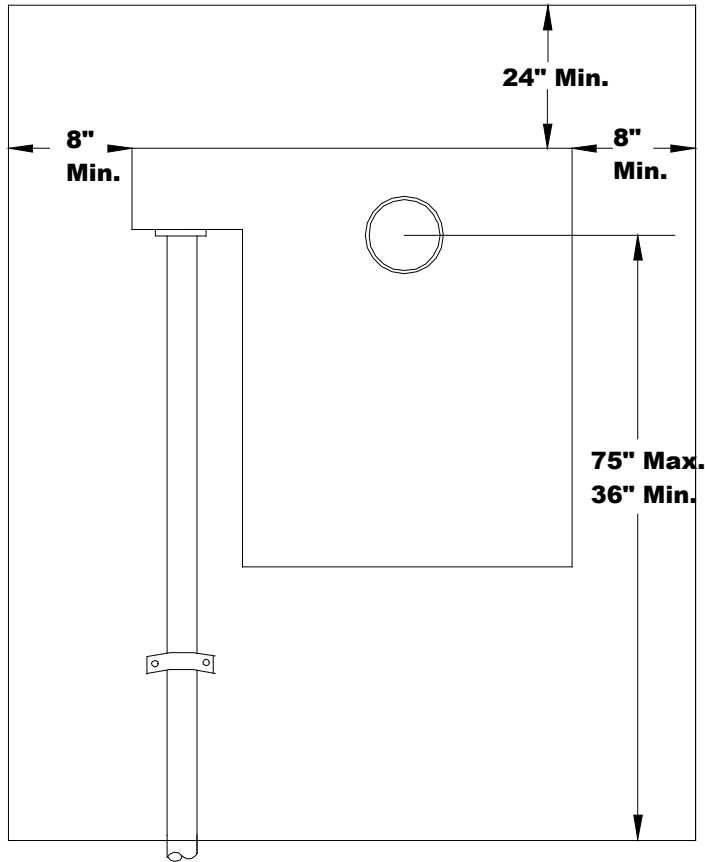


NOTES:

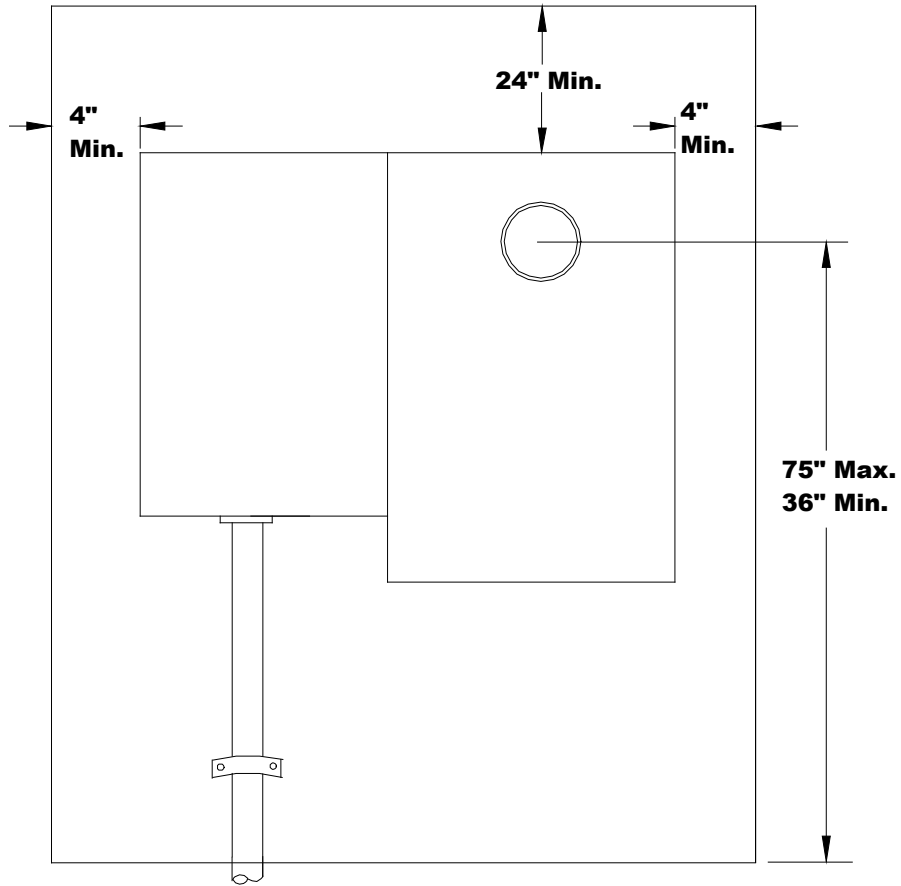
1. This enclosure is approved for:
 - A. Single family, self contained use only.
 - B. Communication equipment.
 - C. CATV
2. This enclosure is NOT approved for:
 - A. Gas service or piping.
 - B. Water service or piping.
 - C. Storage of any kind.
3. The structure foundation shall not extend into or under the meter closet.
4. Clear and level work space shall be provided per paragraph 301.6, notes 8,9,10 and 301.7.
5. Meter closet door shall be identified with a permanent tag showing "Elecric Meter", manufactured per 302.1.
6. Pocket doors are acceptable.



301.12 - 1 ELECTRIC METER CLOSET REQUIREMENTS



301.12 - 2 ELECTRIC METER CLOSET REQUIREMENTS



301.13 MAIN SWITCH LOCATION

The meter and service main switch shall be installed on the same wall adjacent to each other and accessible from the same working area. Exception Fire Pump disconnects may be located at the fire pump control panel. (See Paragraph 302.3 Main Switch)

301.14 METER AND MAIN SWITCH SEQUENCE

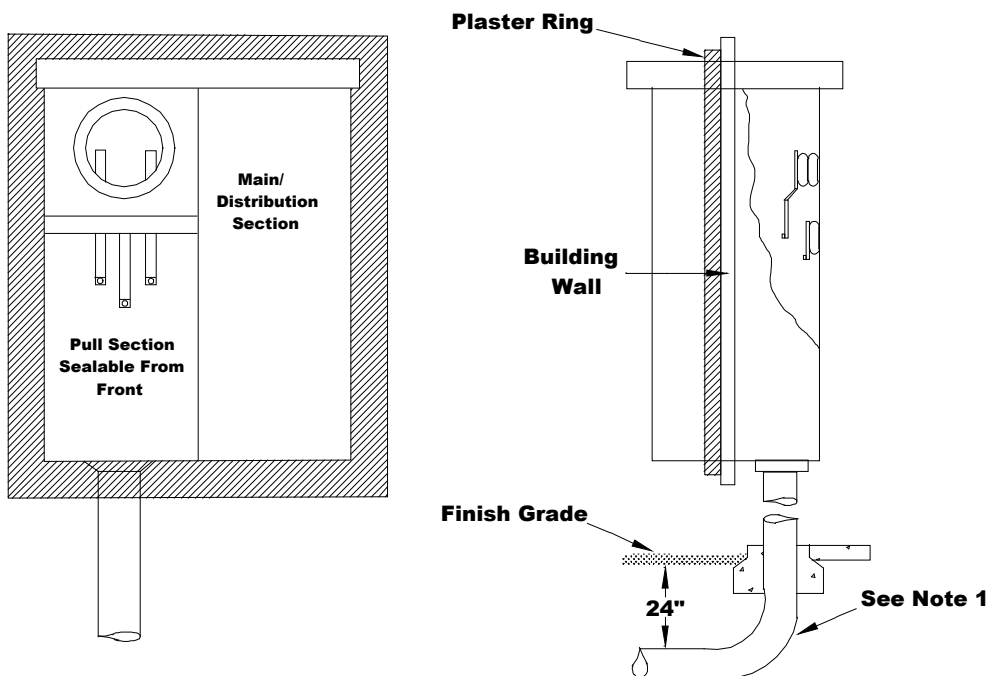
Meters and metering equipment for services of 0 - 600 volts shall be located ahead, or on the supply side, of the customer's main service entrance switch. Exception to this sequence is permissible only when required by electrical codes.

When a single set of service entrance conductors supply a multi-meter installation, numbering from two to six meters, a main switch for each meter shall be located on the load side of each meter.

For multi-meter installations, numbering seven or more meters connected to a single set of service entrance conductors, electric codes require the installation of a main service switch located on the supply side of the group of meters. NEC (check with AHJ) (Its access door shall be under CRA-ES lock and seal). In these instances, an individual main switch must also be installed on the load side of each meter.

CRA-ES shall not allow a main service disconnect ahead of less than seven meters in or on a separate enclosure or switchboard.

301.15 TYPICAL SEMI-FLUSH INSTALLATION



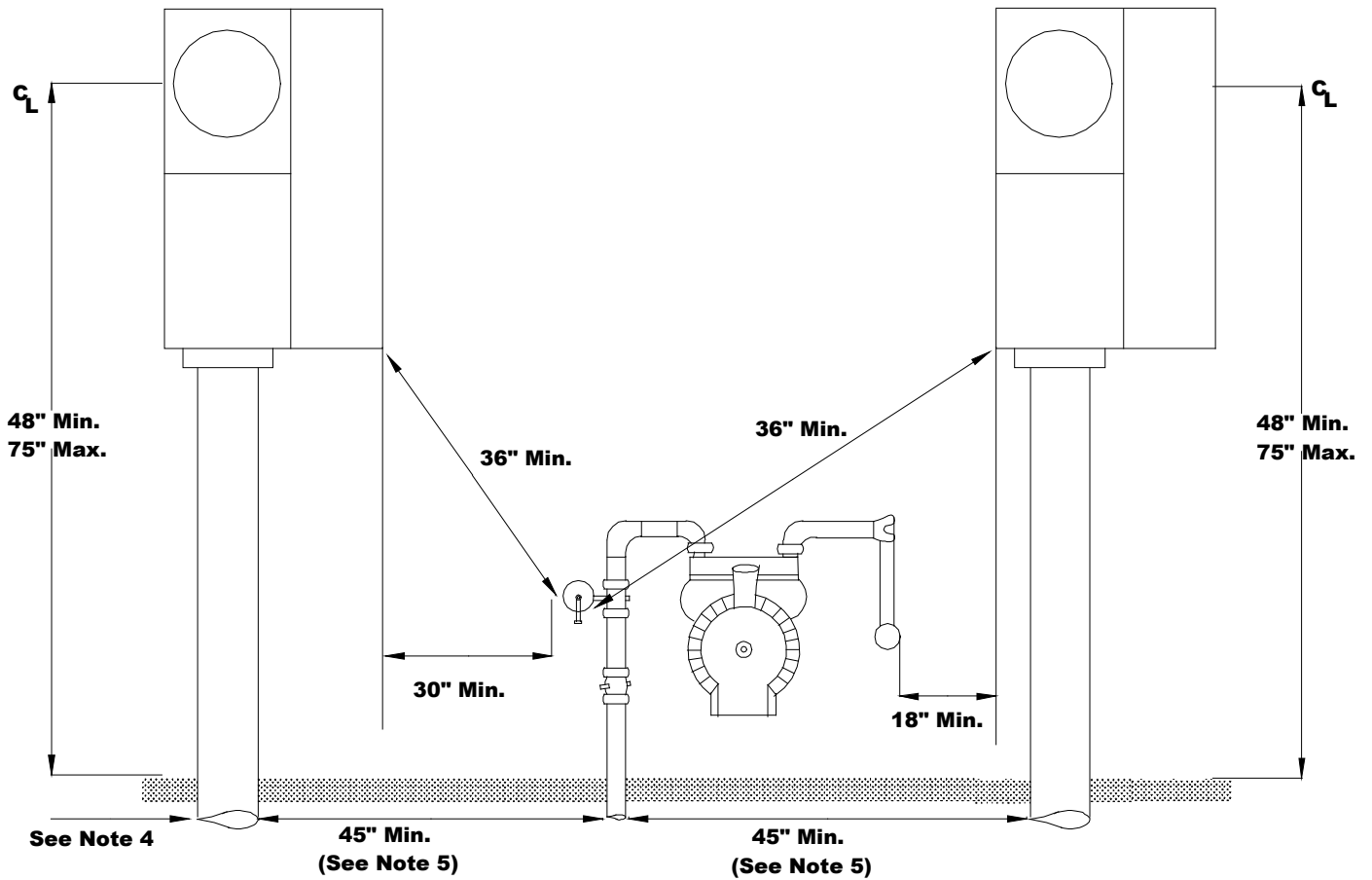
NOTES:

1. See Section 500 for underground conduit and riser requirements.
2. See Section 1100, Drawing 301 for meter can requirements.



301.16

FIGURE 1 – ELECTRIC AND GAS METER SEPARATION



301.16

ELECTRIC AND GAS METER SEPARATION

1. Size and dimensions of panels will vary.
2. Working clearance shall be a minimum of 36 inches wide. If electric panels extend wider than the 36 inch minimum, working clearance shall be the width of the entire assembly. Working space shall extend out from face of electric meter panel a minimum of 36 inches.
3. Measure minimum horizontal separation from edge of electric meter can to the closest point of the gas service, or from electrical riser "stub-up" to gas riser "stub-up".
4. For conduit system and riser requirements, refer to Section 500.
5. For trenching requirements, refer to Section 600.
6. Gas piping (above grade) can be located below electric meter panel(s), but no couplings in that area.
7. CRA-ES prefers water piping and /or hose bib out from under meter panel to make sure working space is safe and dry.



301.17

ROLL-UP DOORS

Aluminum Roll-up doors used in conjunction with enclosed meter rooms are to be constructed utilizing minimum 22-gauge slats. Dimensions of roll-up door must provide for a minimum clearance of 12" in width and height greater than the largest piece of equipment being located within the meter room. This is to provide for ease of installation and removal.

Door must be equipped with bottom and guide weather stripping.

A minimum clearance of 12" is required between the face of the service entrance equipment and the door.

The door may be operated either mechanically or electronically. Manual push-up doors are not permitted.

If the door is mechanically operated, the door must be equipped with an indoor mounted chain hoist with a maximum allowable pull tension of ten pounds. A minimum working clearance of 36" square must be provided adjacent to the chain hoist to provide for safe operation.

Room must be equipped with light.

If the door is electrically operated it must have an emergency release device.

Chain hoist and/or electrical control switch for the door must be located so that the door may be operated without the need to cross in front of the SES to operate.

CRA-ES lock box to be installed in close proximity to main entry door to meter room.

Owner is responsible for the on-going maintenance to insure continuous proper operation of the door.



ELECTRIC SERVICE REQUIREMENTS		301.17
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	ROLL-UP DOORS	

302.0

SPECIAL CONSIDERATIONS

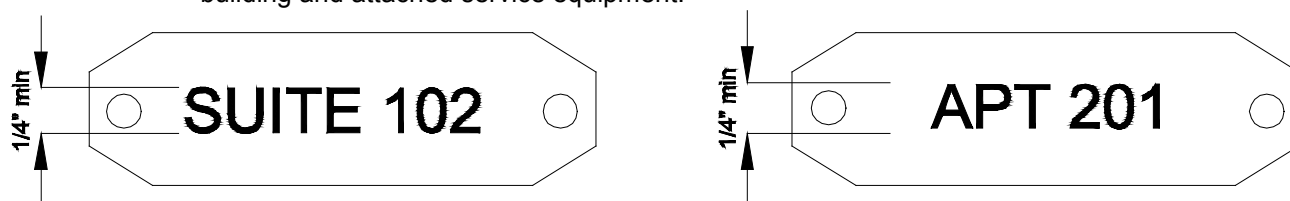
302.1 METER IDENTIFICATION BY CUSTOMER

Where the installation requires more than one meter for service to the premises, then each meter socket and corresponding disconnect shall be permanently (not painted) marked by the customer to properly identify the portion of the premises being served.

When adding a new meter to an existing service location, all meters and corresponding disconnects shall be labeled to properly identify the portion of the premises being served by each meter and corresponding disconnect.

The identification shall be the same as the apartment, townhouse, office, suite, trailer, R.V. space, etc., actually served through the socket and the corresponding disconnect. The identifying marking placed on each meter panel shall be impressed into or raised from a tag of aluminum, brass or other approved non-ferrous metal with minimum 1/4" high letters. The tag shall be riveted to the meter socket panel and corresponding disconnect.

If meters are located in a meter room or cabinet, micarda tags are acceptable. Tags will be black with white letters Minimum 1/4" high letters. Micarda tags shall be riveted to the meter panel. These requirements are intended to prevent the identification(s) from being obscured by painting of the building and attached service equipment.



The Company's meter department may require the assistance of the Customer prior to the setting of the meters in a multi-metered development in order to verify that each meter socket identification coincides with the apartment, townhouse, office, suite, trailer, R.V. space, etc. actually served through the socket.

302.1-1 SERVICE IDENTIFICATION

All equipment shall be permanently labeled for the specific voltage and current being served.

302.2 METER HEIGHT

The requirements for meter height, which is the vertical distance between the center line of the meter and the standing surface, shall be as follows:

1. When meters are located in a meter room or enclosed cabinet. 36" min. 75" max.
2. When meters are wall, semi-flush, pedestal, or surface mounted outdoors, but not located in a meter room or enclosed cabinet. 48" min. 75" max.

302.3 MAIN SWITCH

For each meter installed on a service, the contractor/customer, in compliance with applicable codes, shall furnish and install a fusible switch, a circuit breaker, or other approved disconnecting means which shall control all of and only the energy registered by that meter. The disconnecting means, where permitted by the governing code or ordinance, may consist of a group of fusible switches or circuit breakers. These fuses or circuit breakers must be lockable and designed to interrupt and withstand the available fault current. (See Paragraph 301.13 Main Switch Locations)

In cases where residential all-in-one meter panels are installed with multiple positions for main disconnects, CRA-ES requires all positions to be filled with disconnects that are designed to interrupt and withstand the available fault current.

302.4 FOREIGN DEVICES IN SEALABLE CABINETS

No devices by the Customer shall be installed in or attached to the meter, meter socket, meter cabinet or the metering compartment and pull section area of a service entrance section. Emergency power transfer switches, energy devices, over-current devices, etc., shall be located on the load side and exterior to these metering components.



302.5 METER SOCKET ENCLOSURES

All socket enclosures shall be of the ring type. The meter socket shall be securely mounted so that its meter jaws are in true horizontal and vertical planes, and will support the meter without tilt in any direction. Gutter connectors (of the Chase nipple-sleeve type) shall not be used on unfused gutters.

Meter enclosures and pull sections shall not be used as junction boxes, raceways, or wireways.

302.6 PROPER INSTALLATION OF COUPLINGS AND GUTTERS

When entering or leaving service entrance enclosure, an approved method shall be used. Burning of holes in the enclosure or the welding of couplings or fittings in lieu of an approved hub is not permitted or acceptable.

302.7 TERMINATIONS OR LUGS FURNISHED BY CRAES (Underground)

CRA-ES shall furnish and install compression terminations for connecting CRA-ES service conductors to the bus bar in service entrance sections, 400 amp wall hung cabinets and pull boxes with cable terminating facilities when served from underground. See EUSERC DWG #347 in Section 1100 for termination bolt requirements. 200 amp and less - use mechanical terminals supplied by the customer.

302.8 SECURED IN PLACE (S.E.S.)

All service entrance sections shall be securely fastened to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar material shall not be used.

302.9 REQUIRED APPROVAL FOR METERING IN SERVICE EQUIPMENT

When a Customer proposes to install a 400amps or greater service entrance section, he shall submit drawings to charles.mack@bia.gov or prints to the **CRA-ES at 12000 First Avenue, Parker, Arizona 85344** for approval prior to the manufacturing of the equipment. (1 copy required.)

Notation needed on drawings: switchgear manufacturer (name), EUSERC plates that are applicable, ampacity of switchgear, physical dimensions, voltage, phase, bus bracing (AIC rating), how many disconnects, accurate address (street and number), etc.

302.10 EUSERC - ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE

Switchboard service sections and bus duct risers approved for use in the area served by CRA-ES are built to the standards developed by the Electric Utility Service Equipment Requirements Committee, and are available to the customer through electric wholesale distributors. (See Section 1100)

302.11 SWITCHBOARD SERVICE SECTION

A standard switchboard service section is a free-standing unit of switchgear which contains bussing for the termination of service entrance conductors, bussing for the connection and mounting of current transformers, panels for the installation of the test switch and meter socket, a service main disconnect switch or breaker, and in many cases, distribution feeder breakers or switches.

The standard switchboard service section is usually built to serve the Customer with heavy electrical supply needs, and is available with service main switch or breaker ratings from 200 amperes through 3000 amperes. For sections above 3000 amperes consult CRA-ES.

Standards for service switchgear have also been developed for self-contained meters, both residential and non-residential, and with either standard duty or heavy-duty sockets. These sections of switchgear are built on special order to meet the needs of the Customer's service.



302.12**OVERHEAD RISER AND BUS DUCT RISER REQUIREMENTS**

Maximum number of conductors per phase shall be two (2); all service entrance conductor requirements exceeding 2-750 MCM conductors per phase shall be bus bar construction. All bus bar cabinets shall be constructed in accordance with Electric Utility Service Equipments Requirements (EUSERC) and four (4) copies of proposed section submitted to the CRA-ES Electric Meter Section for approval before construction. For address of Electric Meter Section, see Paragraph 302.9. For bus-way service head requirements, see EUSERC Dwg. 349 in Section 1100. (See also Section 400, paragraph 400.3)

302.13**OWNERSHIP OF METERS & METERING EQUIPMENT (Per ACC Rules)**

1. Meters - Can be owned by the Customer, the ESP, the MSP, or CRA-ES (Standard Offer Customer's Only).
2. Meter Rings, Test Switches and Associated Equipment - Can be owned by the ESP, the MSP, or CRA-ES (Standard Offer Customer's Only).
3. CT's & PT's - Customer's may own CT's and PT's up to 600 volts. ESP's and MSP's may own CT's & PT's up to 25 KV. CRA-ES may own all CT's and PT's for Standard Offer Customers and may own CT's and PT's rated over 25 KV.

302.14**METER TYPES USED ON CRA-ES SYSTEM**

Direct Access meters shall have a visual kwh display and must have a physical interface to enable site interrogation of all stored meter data. All meters installed must support the Customer's CRA-ES rate tariff.

FORM NUMBERS**DESCRIPTION**

1S	Single phase, 2 wire, Self-contained
2S	Single phase, 3 wire, Self-contained
3S	Single phase, 2 wire, 5 terminal, Transformer rated
4S	Single phase, 3 wire, 6 terminal, Transformer rated
5S	Three phase, 3 wire, 8 terminal, Transformer rated
6S	Three phase, 4 wire Wye, 2 1/2 element, Transformer rated
8S	Three phase, 4 wire Delta, Transformer rated
9S	Three phase, 4 wire Wye, 13 terminal, Transformer rated
12S	Network, Three phase, 3 wire, 5 terminal, Self contained
14S	Three phase, 4 wire Wye, 2 1/2 element, Self contained
15S	Three phase, 4 wire Delta, Self contained
16S	Three phase, 4 wire Wye, 3 element, Self contained



303.1 EQUIPMENT FURNISHED AND INSTALLED BY CRA-ES - STANDARD OFFER CUSTOMERS ONLY

1. All meters and metering equipment required for billing purposes.
2. Sealing rings and seals.
3. Meters and metering equipment for Direct Access Customers are supplied by the EPS, MSP or Customer and installed by the EPS, MSP.

303.2 EQUIPMENT FURNISHED AND INSTALLED BY THE CUSTOMER

1. Meter sockets.
2. Multiple meter panels and prefabricated panels.
3. Meter enclosures.
4. Service entrance switchboards.
5. Safety test blocks.
6. Proper bonding and grounding.

303.3 SELF-CONTAINED SOCKET RATINGS

<u>TYPE OF SERVICE</u>	<u>SIZE OF SERVICE ENTRANCE</u>	<u>SOCKET RATINGS</u>
Residential	All sockets shall have a maximum ampere rating not less than the ampacity of the main service switch. (Maximum ampere rating of socket being 125% of continuous duty rating.)	
Non-residential & Industrial	Up to 100 amp	100 amp Continuous
Non-residential & Industrial	101-200 amp	200 amp Continuous
Irrigation (277/480)	Up to 100 amp (Up to & including 75 HP)	100 amp Continuous
Irrigation (277/480)	101-200 amp (Up to & including 125 HP)	200 amp Continuous

In addition, self-contained sockets shall conform to the following requirements:

1. Dimensions and construction for sockets and enclosures shall comply with ANSI C12.7 standard for watt-hour meters, and UL 414 standard.
2. Line and load terminals shall be compatible with either copper or aluminum wire.
3. Terminals shall be of sufficient size as to permit insertion of maximum specified wire without removing any strands.
4. The socket jaw or clip shall be of beryllium copper alloy or equivalent.
5. The socket jaw or clips shall be clean. Foreign material (such as paint, mud, etc.) shall be removed by customer prior to CRA-ES installing service or meter.

303.4 SOCKET ENCLOSURES

All sockets enclosures shall be of the "ring-type."

303.5 METER SOCKET CLOSING DEVICES

Meter sockets shall not be equipped with circuit closing or bypass devices which automatically close when the meter is removed from the socket.



303.6 SAFETY TEST BLOCKS

CRA-ES RESERVES THE RIGHT TO REQUIRE SAFETY TEST BLOCKS BE INSTALLED IN THE EVENT AN EXISTING SERVICE NO LONGER MEETS THE FOLLOWING REQUIREMENTS.

303.6-1 SINGLE-PHASE SAFETY TEST BLOCK INSTALLATIONS

All single-phase non-residential services with self-contained meter installations shall require safety test blocks be furnished by the Customer. Reference Section 1100, Drawings 304,305 and 306.

Locations where safety test blocks are not required:

1. House meters on residential apartment complexes.
2. Sign boards.
3. Sprinkler controls.
4. Single-phase temporary construction services.
5. Parking lot lighting services.
6. Barns.
7. Domestic wells serving individual or multi family water supply so long as they are not a water company.
8. Residential hobby shops.
9. CATV rectifiers and dryers.
10. Gas Company cathodic protection sites.
11. Gates to residential communities.

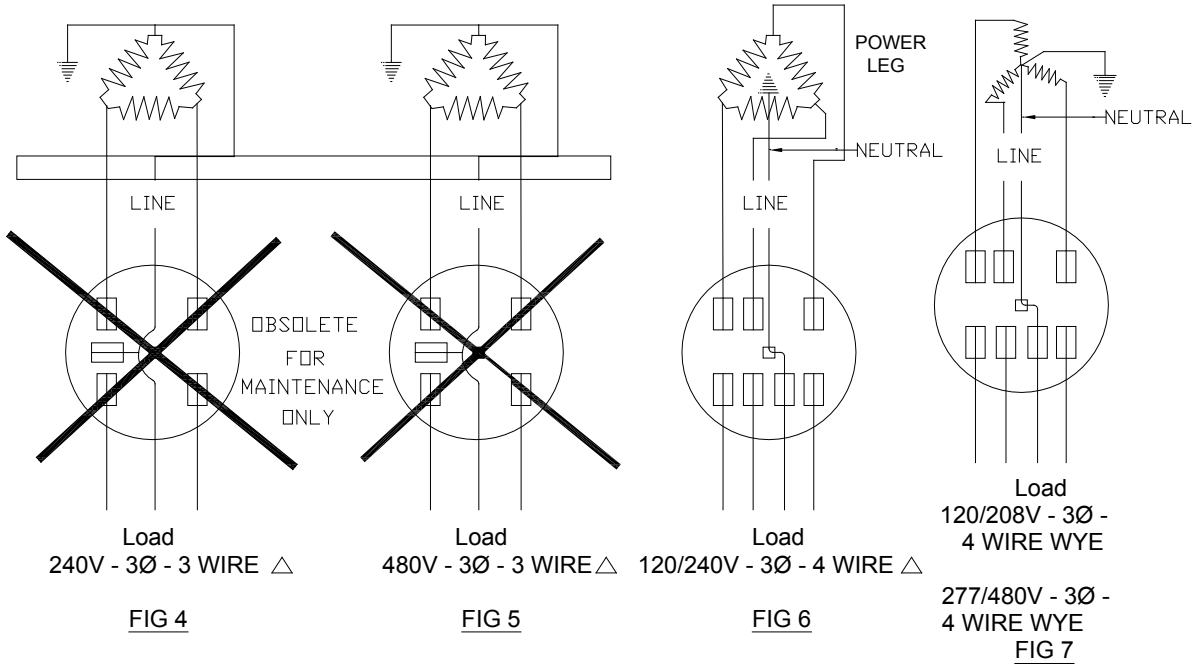
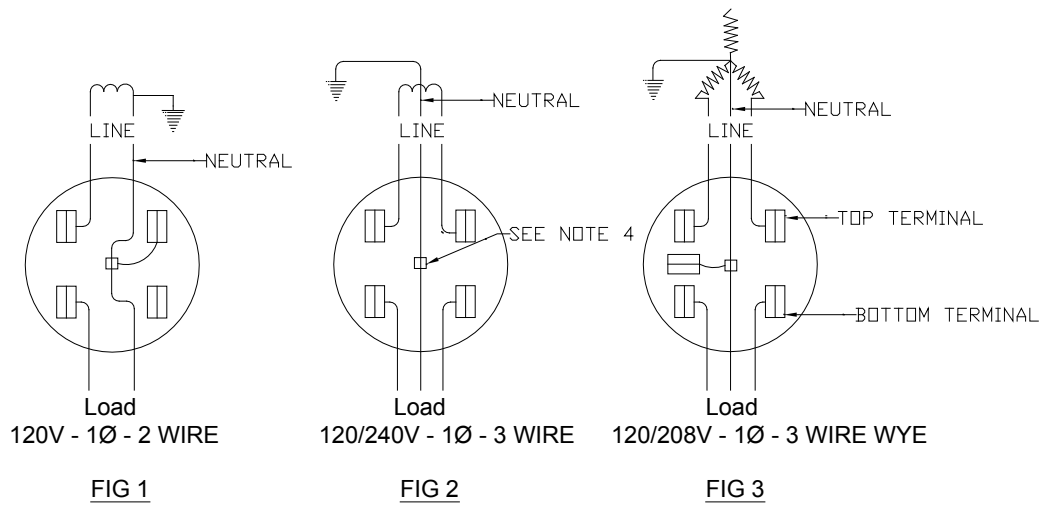
303.6-2 THREE-PHASE SAFETY TEST BLOCK INSTALLATIONS

Safety test blocks shall be required on all three-phase self-contained installations.

303.7 HIGH LEG LOCATION (3Ø 4W DELTA SERVICE)

Self-contained Meter Sockets: wiring to self-contained meter sockets, whether individual sockets or in multiple meter panel boards, shall have the power phase or "high leg" to ground, in the right hand socket terminals. Identification of "high leg" shall be by an outer finish that is orange in color or permanent tagging. This identification shall be placed at all points where a connection is made or will be made, including leads where service will be connected.



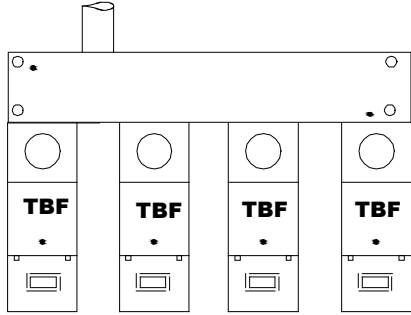


FRONT VIEWS SHOWN
EUSERC DWG #G1

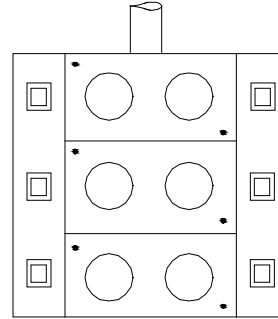
NOTES:

1. Sockets for non-residential installations shall be equipped with test-bypass facilities when required by the serving agency.
2. Line conductors shall be connected to the top terminals of socket and load conductors connected to the bottom terminals of the socket.
3. Potential taps, including the neutral tap, shall be located behind sealed panels.
4. Clamped or bolted connections in metering equipment enclosures shall be permitted, including the neutral connection.
5. See paragraph 304.2-1 for CT Meter sockets.

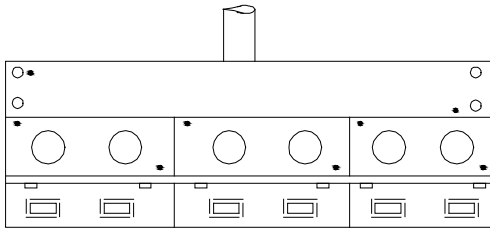




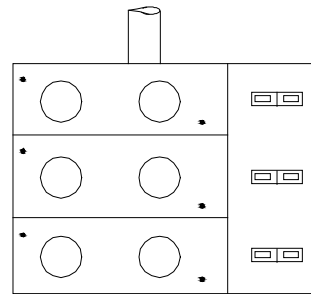
**Fig. 1
Commercial**



**Fig. 2
Residential**

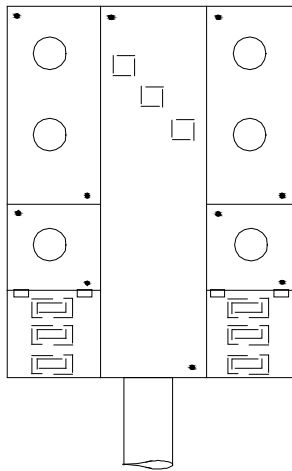


**Fig. 3
Residential**

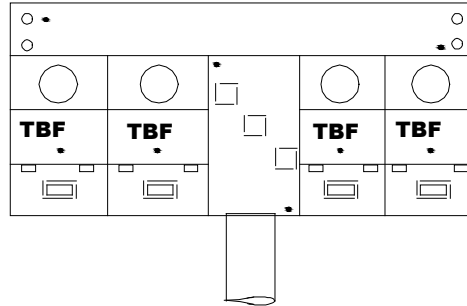


**Fig. 4
Residential**

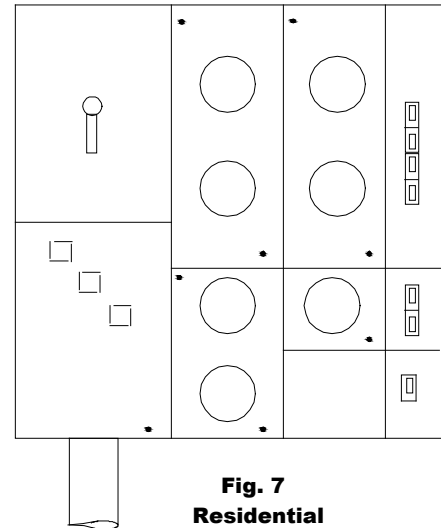
OVERHEAD INSTALLATIONS



**Fig. 5
Residential**



**Fig. 6
Commercial**



**Fig. 7
Residential**

UNDERGROUND INSTALLATIONS

TBF=TEST BLOCK FACILITIES

EUSERC DWG. #G2



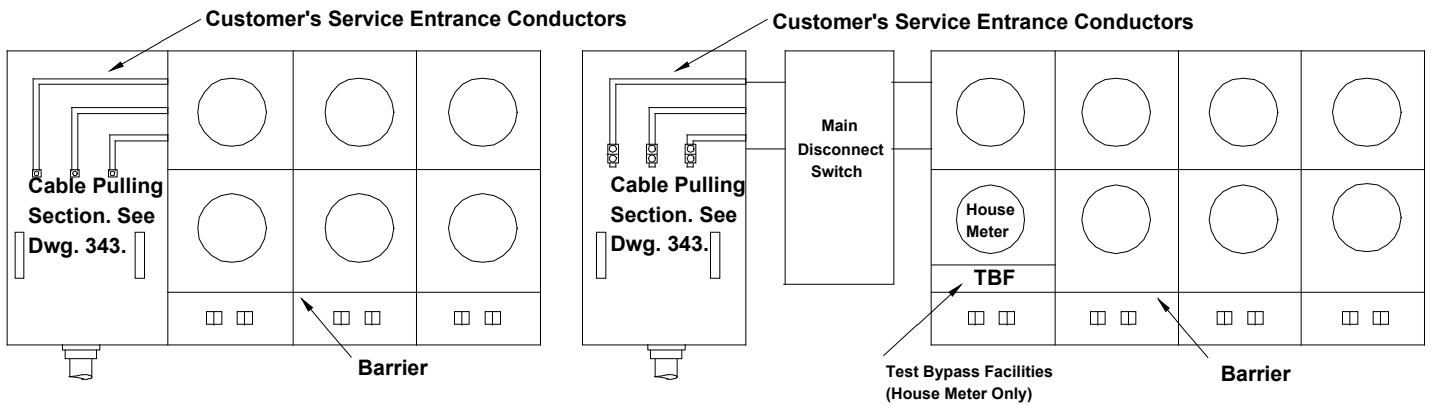


Fig. 1 Typical Combination service Termination Enclosure and Meter Socket Panels for Multi-Unit Residential use.

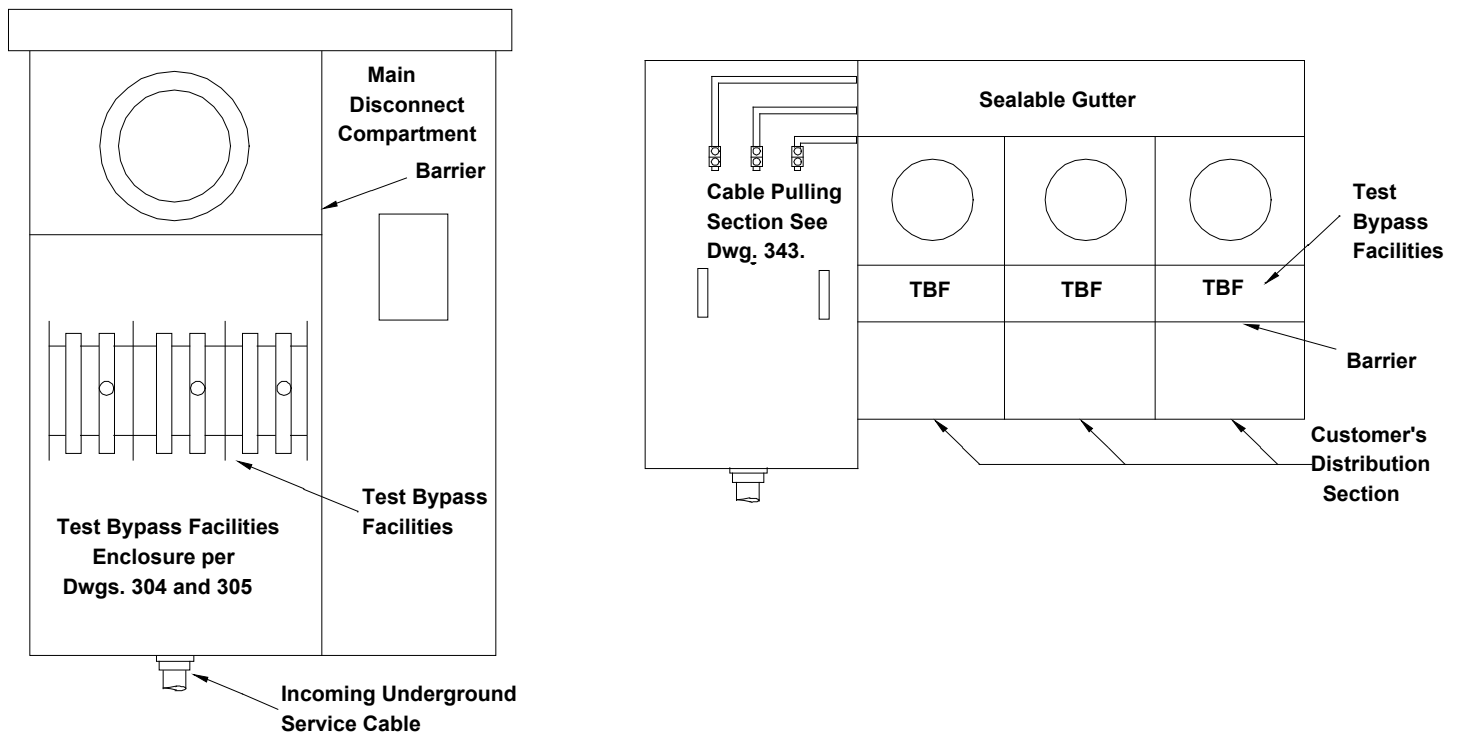
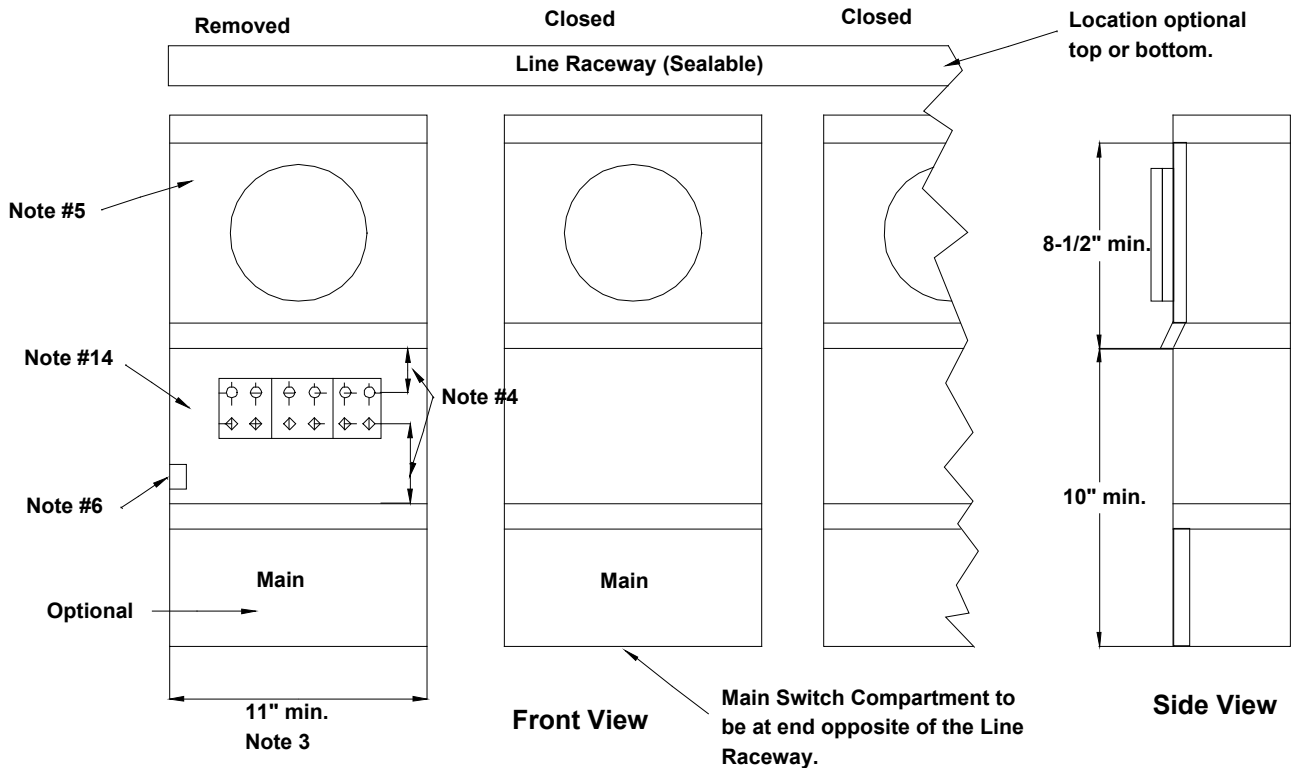


Fig-2 Typical Service Termination Enclosure Combination Meter Socket Panel for Commercial use.

EUSERC DWG #G3



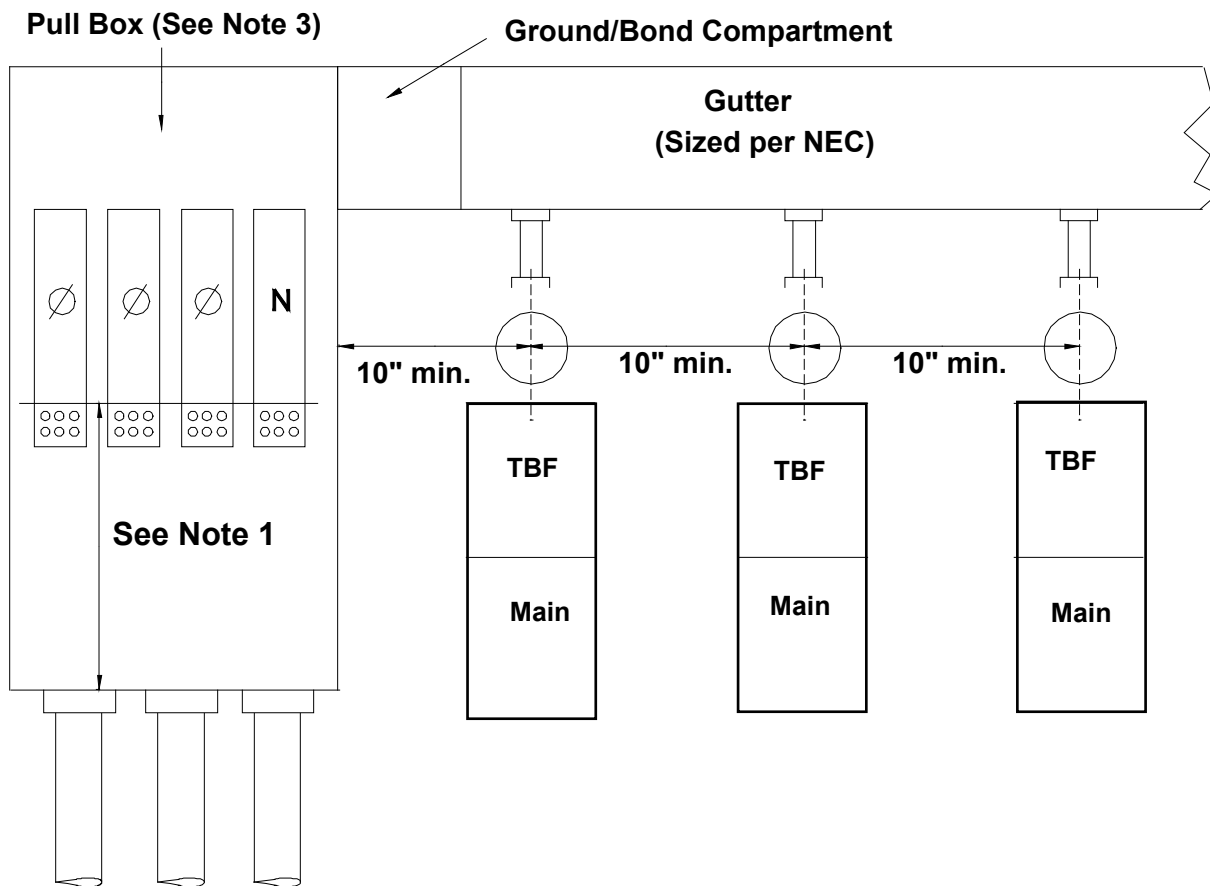


EUSERC DWG. #G4

All Dimensions shown are in inches

1. This device may be used for multiple non-residential and industrial meter installations mounted in a ganged array.
2. Test-bypass blocks with rigid insulating barriers shall be installed and wired or bussed to a line raceway and also wired or bussed to the meter socket then to the main switch by the manufacturer. Blocks and barriers shall conform to EUSERC drawing 312 requirements with physical arrangement conforming to drawings 304 and 305. Connections sequence is line-load, line load, line load from left to right.
3. Minimum access opening to test-bypass block shall be 11' X 10".
4. Three inches minimum clearance required for utility test purposes.
5. All section covers shall be independently removable. Upper cover shall be non-removable when meter is in place. Meter socket shall be mounted on support and attached to panel. Test by-pass cover shall be sealable and permanently labeled: "DO NOT BREAK SEAL. NO FUSES INSIDE".
6. When a neutral is required for metering or testing, an insulated neutral terminal, mounted on either side, shall be provided behind each test-bypass cover panel. The terminal shall be readily accessible when the cover panel is removed and shall be individually connected to the neutral bus with a minimum of No. 8 copper wire.
7. For 3Ø, 4 wire. Connect 7th jaw to body of neutral lug with No. 12 minimum copper wire.
8. For 3Ø, 4 wire delta, identify the right hand test-bypass block.
9. For 3Ø, 3 wire, install bus to connect line and load poles together at top of center test-bypass block and connect 5th jaw to this bus using No. 12 minimum copper wire.
10. For 1Ø, 3 wire, omit center test-bypass block.
11. For 1Ø, 3 wire, 120/208 volts, omit center test-bypass block. Connect 5th jaw to body of neutral lug with No. 12 minimum copper wire.
12. Permanent line-load labels on inside back of enclosure in 3/4" (min.) high block letters.
13. Minimum depth shall be 4 1/2" inches for 0 – 100 amps and 6 inches for 101 – 200 amps
14. See EUSERC drawing 343 for pull box details when used on underground service





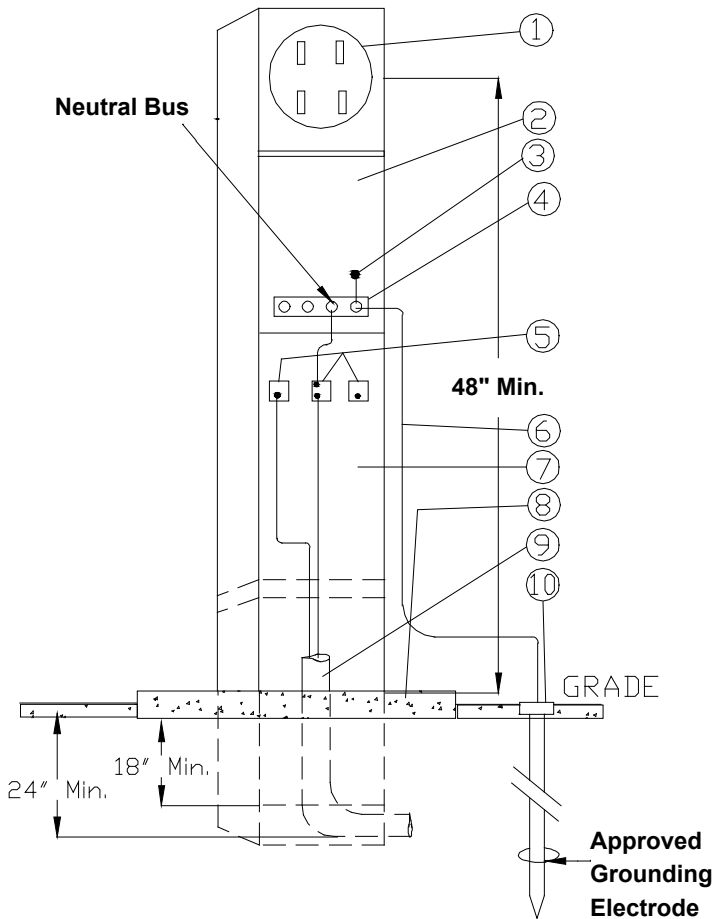
TBF = TEST BLOCK FACILITIES

NOTES:

1. This area of pull box for CRA-ES service conductors. Pull box and gutter covers to be sealable.
2. A minimum of one (1) meter must be installed at the time service is energized.
3. Pull box to be according to EUSERC Dwg. 343.
4. Customer shall install each set of service conductors from pull box through gutter to each meter. Size to be per NEC requirements.
5. See Section 700 for Grounding and Bonding requirements
6. See EUSERC Dwgs. 304, 305 and G4 for meter can requirements.
7. Main disconnect required to be adjacent to the meter (See Paragraph 301.13). Optional factory installed main is shown.



**MOBILE HOME
AND
TEMPORARY METER PEDESTAL
1Ø 3w 120/240 VOLT**



This is a list of material for a normal meter pedestal installation. It is not intended to be all inclusive but gives the more common requirements. All equipment shall comply with EUSERC requirements (See Section 1100, Dwg. 307) and Section 500, Paragraph 506.6-1, 2.

- 1.) Meter socket, breaker compartment and pull section must be rain tight equipment. Meter socket jaws or clips shall be free of foreign material (mud, paint, plaster, etc.). RINGLESS METER SOCKETS ARE NOT ACCEPTABLE.
- 2.) Breaker compartment.
- 3.) Pedestal bond lug. May be a bond screw in some models.
- 4.) Customer's neutral landing block.
- 5.) Service termination lugs shall be twin #2 to #350 MCM aluminum bodied pressure type for in and out connection of the service conductors.
- 6.) The ground wire (#4 bare copper) shall be continuous from the neutral landing block in the breaker compartment to a grounding electrode system in compliance with NEC (Check with AHJ). The ground wire must be properly supported and attached to the outside of the pedestal at 24" intervals. When attaching the ground wire to the pedestal, the method of attachment shall not result in sharp projections, such as metal screws into the wireway below the neutral landing block. See illustration at left for preferred method of installing the ground electrode conductor.
- 7.) Access to utility pull section shall not be blocked in any manner. Pull section shall be sealable. No customer wiring or equipment is allowed in this area.
- 8.) Poured concrete slab shall be 24" x 24" minimum size and have a 3 1/2" minimum thickness.

- 9.) Provide and install 2 1/2" conduit(s) with 24" sweep(s). Conduit to extend a minimum of 1" and a maximum of 2" above the concrete slab. Conduit system shall be customer installed per CRA-ES specifications to a location determined by an CRA-ES Representative.
- 10) Approved ground electrode clamp shall be buried, flush or somehow protected from physical damage. Clamp shall be designed for underground use. Ground rod shall not be installed in or beneath the concrete slab.

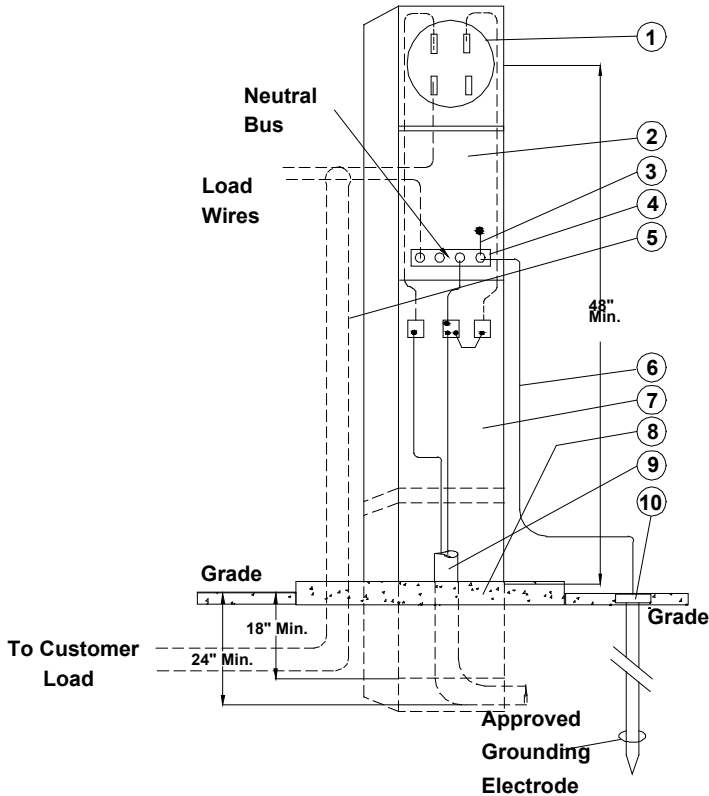
GENERAL NOTES:

1. Meter location to be specified by an CRA-ES Representative.
2. Pedestal shall be UL listed (as equipment suitable for use as service equipment) and EUSERC approved. That portion of pedestal buried in concrete and earth shall be coated with an approved corrosion resistant material such as zinc, cadmium, or enamel to withstand deterioration.
3. Pedestal and meter shall have a minimum rating of 100 amps.
4. Pedestal and power outlet section shall be rated 10,000 AIC minimum.
5. The socket shall be factory-wired with the conductors in a separate or barriered wireway from the service termination lugs to the meter socket. The conductors which extend to the meter socket shall be connected at the service termination lugs independent of the connections for the service lateral conductors.
6. Service cable pull and termination section shall be covered with a sealable, removable panel, extending from at least 2" to 6" above the concrete pad and when removed give full access to the service termination lugs.
7. The pedestal at grade line shall have a minimum cross-sectional dimension of 4" x 8". The fixed panel for the final grade and concrete pours shall extend 2" to 6" above grade and a minimum of 18" below grade. The pedestal shall extend 24" below grade.
8. The customer shall be responsible for the final grade of the utility island and the included meter pedestal.
9. Minimum meter height shall be 48".
10. See Section 500, pages 15, 16 and 17 for further requirements.



120 VOLT 1Ø 2 WIRE METER PEDESTAL

The total ampacity of the breakers is not to exceed 30 amp, with no more than two breakers.



This is a list of material for a normal meter pedestal installation. It is not intended to be all inclusive but gives the more common requirements. All equipment shall comply with EUSERC requirements (See Section 1100, Dwg. 307) and Section 500, Paragraph 506.6-1, 2.

- 1.) Meter socket, breaker compartment and pull section must be rain tight equipment. Meter socket jaws or clips shall be free of foreign material (mud, paint, plaster, etc.). RINGLESS METER SOCKETS ARE NOT ACCEPTABLE.
- 2.) Breaker compartment.
- 3.) Pedestal bond lug. May be a bond screw in some models.
- 4.) Customer's neutral landing block.
- 5.) Load conductors shall not be run through utility service cable pull and termination section. Metallic conduit shall be wrapped or coated per paragraph 4.1-4 in Section 500.
- 6.) The ground wire (#4 bare copper) shall be continuous from the neutral landing block in the breaker compartment to a grounding electrode system in compliance with NEC (Check with AHJ). The ground wire must be properly supported and attached to the outside of the pedestal at 24" intervals. When attaching the ground wire to the pedestal, the method of attachment shall not result in sharp projections, such as metal screws into the wireway below the neutral landing block. See illustration at left for preferred method of installing the ground electrode conductor.
- 7.) Access to utility pull section shall not be blocked in any manner. Pull section shall be sealable. No customer wiring or equipment is allowed in this area.
- 8.) Poured concrete slab shall be 24" x 24" minimum size and have a 3 1/2" minimum thickness.

- 9.) Provide and install 2 1/2" conduit(s) with 24" sweep(s). Consult an CRA-ES Representative to determine if service will be radial or cascaded. Conduit to extend a minimum of 1" and a maximum of 2" above the concrete slab. Conduit system shall be customer installed per CRA-ES specifications to a location determined by an CRA-ES Representative.
- 10) Approved ground electrode clamp shall be buried, flush or somehow protected from physical damage. Clamp shall be designed for underground use. Ground rod shall not be installed in or beneath the concrete slab.

GENERAL NOTES:

1. Meter location to be specified by an CRA-ES Representative.
2. Pedestal shall be UL listed (as equipment suitable for use as service equipment) and EUSERC approved. That portion of pedestal buried in concrete and earth shall be coated with an approved corrosion resistant material such as zinc, cadmium, or enamel to withstand deterioration.
3. Pedestal and meter shall have a minimum rating of 100 amps.
4. Pedestal and power outlet section shall be rated 10,000 AIC minimum.
5. The socket shall be factory-wired with the conductors in a separate or barriered wireway from the service termination lugs to the meter socket. The conductors which extend to the meter socket shall be connected at the service termination lugs independent of the connections for the service lateral conductors.
6. Service cable pull and termination section shall be covered with a sealable, removable panel, extending from at least 2" to 6" above the concrete pad and when removed give full access to the service termination lugs.
7. The pedestal at grade line shall have a minimum cross-sectional dimension of 4" x 8". The fixed panel for the final grade and concrete pours shall extend 2" to 6" above grade and a minimum of 18" below grade. The pedestal shall extend 24" below grade.
8. The customer shall be responsible for the final grade of the utility island and the included meter pedestal.
9. Minimum meter height shall be 48".



304.1 EQUIPMENT FURNISHED AND INSTALLED BY CRA-ES STANDARD OFFER CUSTOMERS ONLY

1. All meters and metering equipment required for billing purposes.
2. Sealing rings and seals.
3. Instrument transformers for metering.
4. Test Switches.
5. Secondary wiring to the meter sockets and the C.T.'s.
6. Meters and metering equipment for Direct Access Customers are supplied by the EPS, MSP or Customer and installed by the EPS, MSP.

304.2 EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER

- a. Transformer rated meter sockets. (See paragraph 304.2-1 for socket configuration.)
- b. Pre-fabricated panels.
- c. Meter enclosures.
- d. Service entrance sections.
- e. Perches for test switches.
- f. Metering transformer cabinets.
- g. Proper grounding and bonding.

304.2-1 C.T. METER SOCKETS (See Section 300 Paragraph 303.8 for self-contained meter sockets)

Front views shown

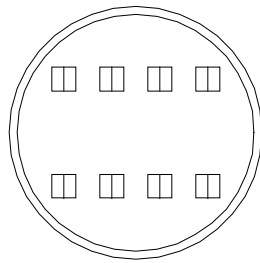


Figure 1
8 Jaw Socket
120/240V 1 ϕ 3 Wire

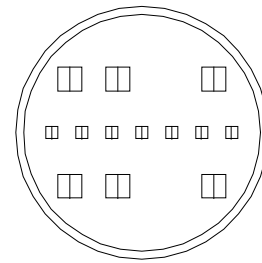


Figure 2
13 Jaw Socket
120/208V 3 ϕ 4 Wire
277/480V 3 ϕ 4 Wire
120/240V 3 ϕ 4 Wire

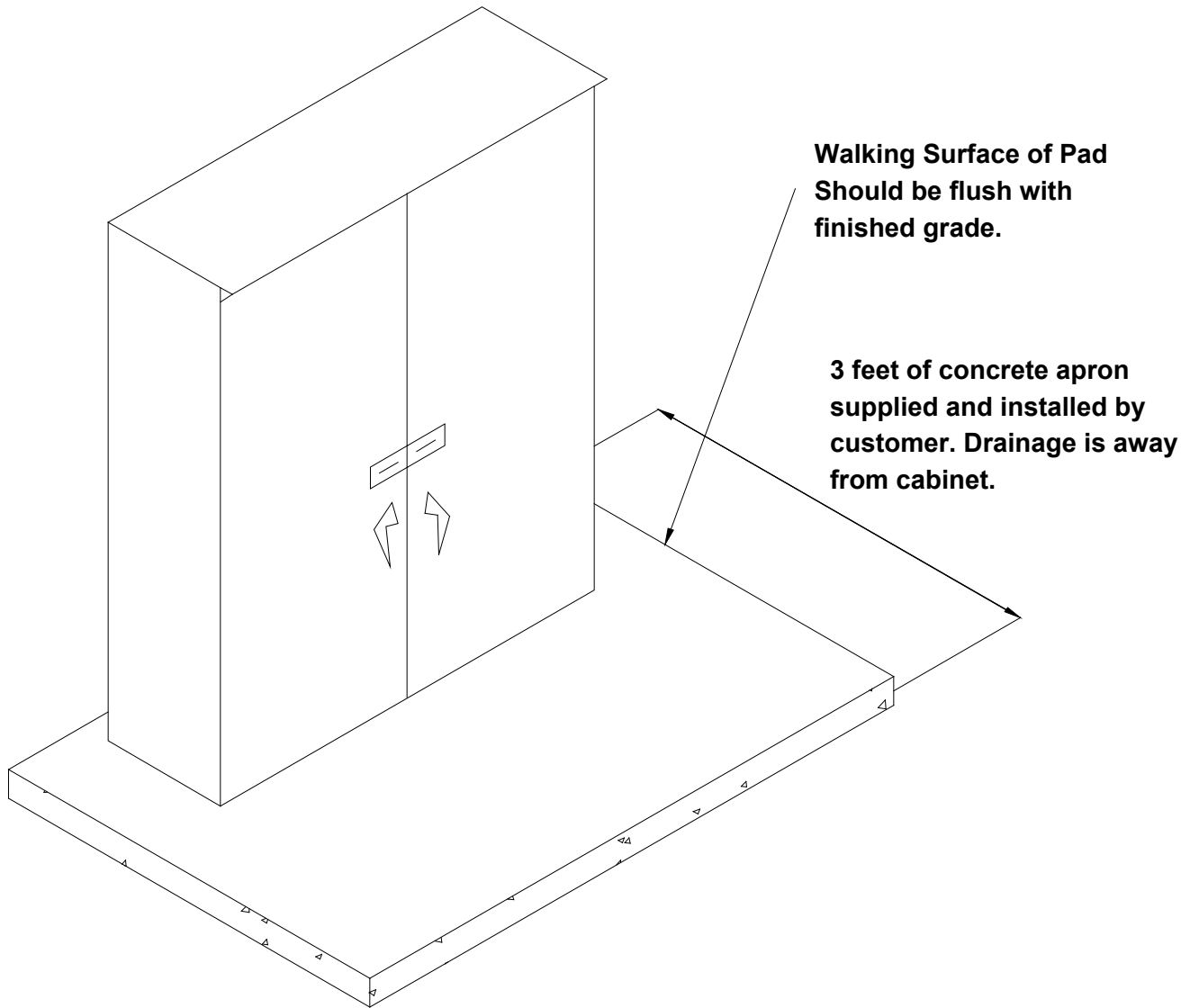
(See Section 1100, EUSERC Dwg. 332 for meter panel drilling & tapping specifications)

304.3 POWER LEG LOCATION (3 ϕ 4W DELTA SERVICE)

The C or right phase is preferred for the power phase, or "high leg" to ground. The B or center phase may be used as the power phase but in either case the conductor having the higher voltage to ground shall be identified by an outer finish that is orange in color or permanent tagging. This identification shall be placed at all points where a connection is made or will be made (including leads where service will be connected).

304.4 SWITCHBOARD SERVICE SECTION ILLUSTRATIONS

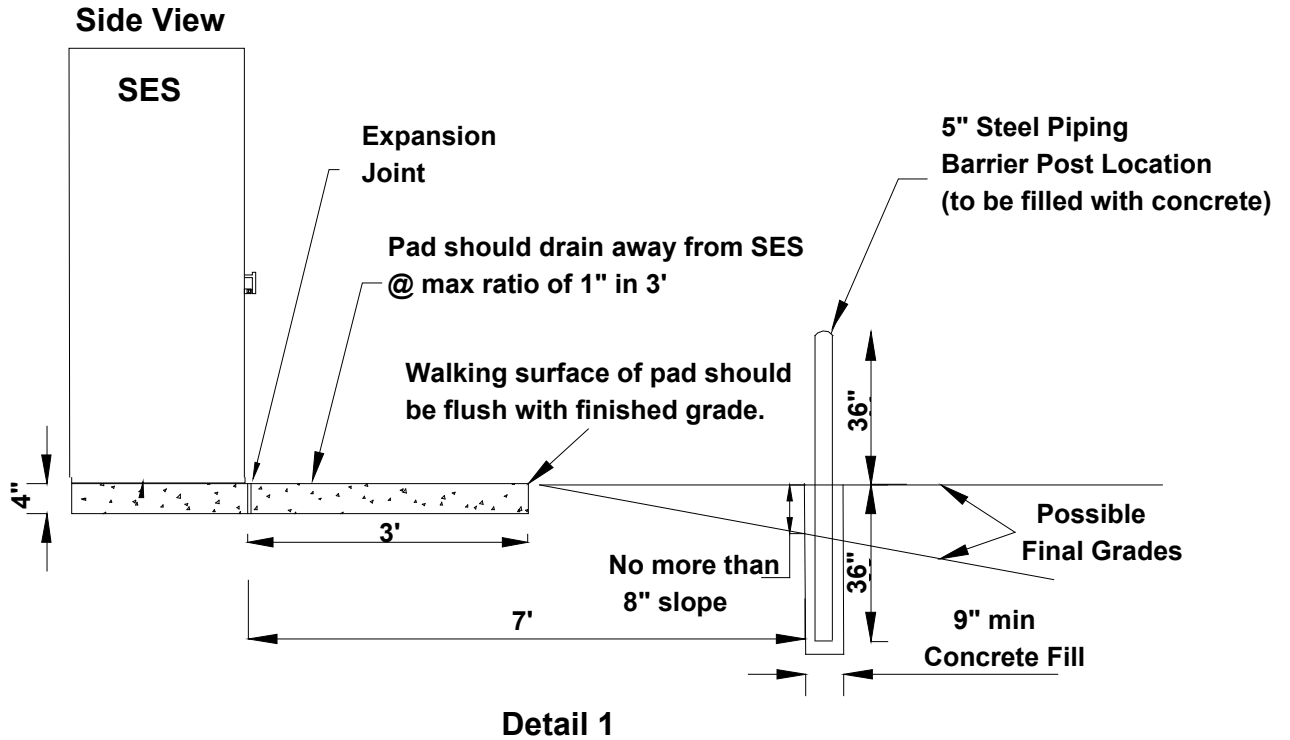
See Section 1100 for standard switchboard service section illustrations. The drawings on these pages are basically EUSERC drawings and show only sections as they would be used with overhead service entrance conductors. Pull sections would be added alongside for underground service entrance conductors and additional distribution feeder sections would be added as needed to supply a particular Customer's electrical load.



NOTES:

1. Pad shall be 4" thick. **Walking surface of Pad should be flush with finished grade.**
2. Pad material shall be rated 3000 lb. PSI at 28 day minimum.
3. Pad shall be constructed so drainage is away from service entrance section at a maximum ratio of 1 inch in 3 feet drop.
4. The pad shall extend a minimum of 3 feet beyond the leading edge of the service entrance section. (See above drawing)
5. On a NEMA 3R (outdoor) S.E.S., the Customer shall install a locking device that will allow one lock for the Customer and one lock for CRA-ES on the door.

304.5-1 TYPICAL OUTDOOR SERVICE ENTRANCE SECTION

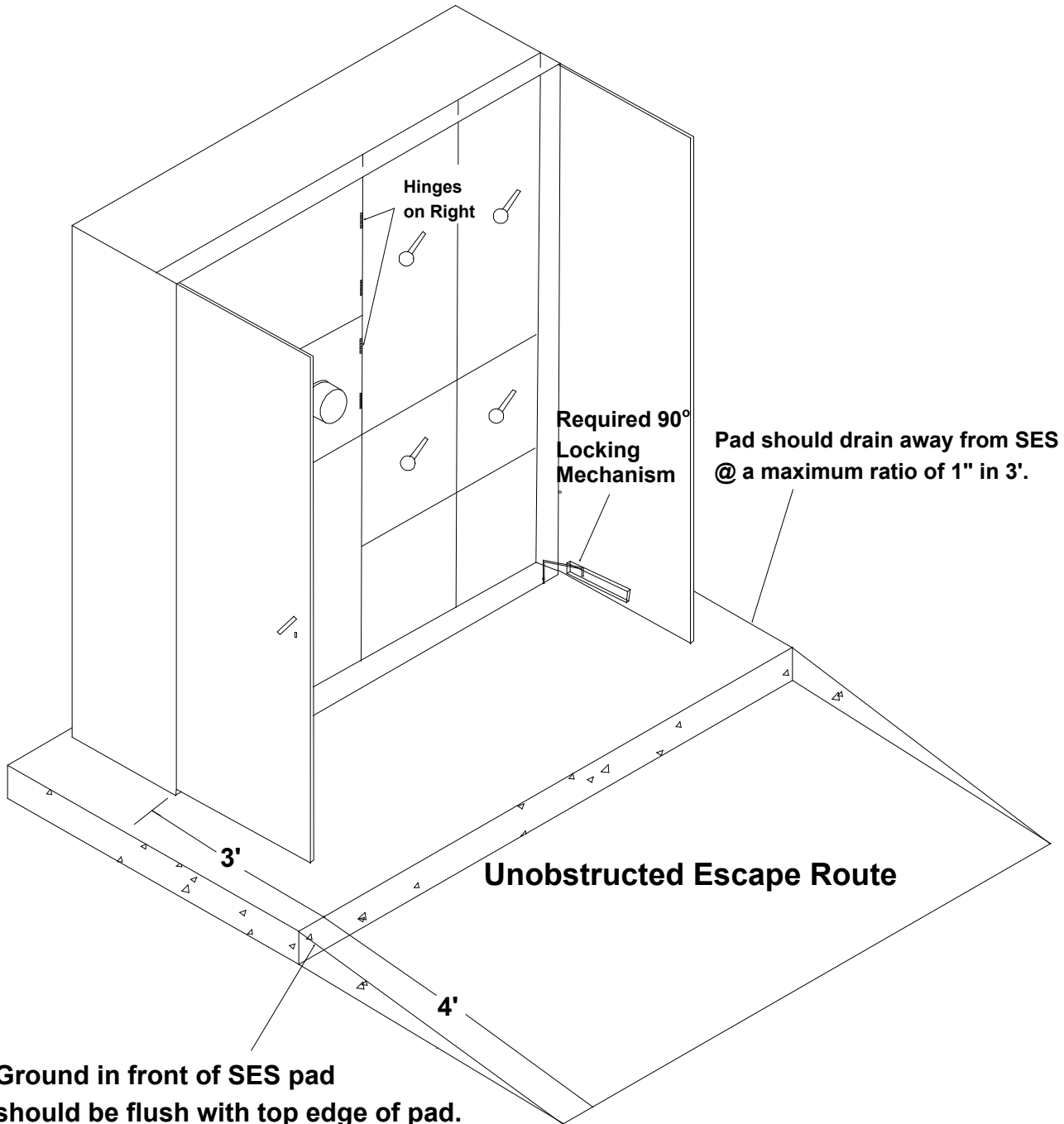


Notes:

1. An acceptable personnel escape route shall be provided in front of the SES per "Detail 2".
2. There shall not be more than 8" of drop in 4 feet in front of the SES pad along the route of escape (see "Detail 1" above), unless an alternative acceptable escape route is provided. (See "Detail 3").
3. Absolutely no obstructions shall be allowed in the provided "safety escape route", including but not limited to: shrubs, trees, rocks, or gravel in excess of 1.5" diameter. Additional, no fencing shall be allowed in front of the SES within the escape route unless an operable gate is provided which opens to the full width of the SES, or unless an "alternative" escape route has been provided. (See additional details provided in "Detail 2", & "Detail 3")
4. If barrier posts are to be installed to protect the SES from vehicular damage, they shall be installed no closer than 7 feet in front of the closed SES doors.
5. See 301.8 for additional Barrier information.



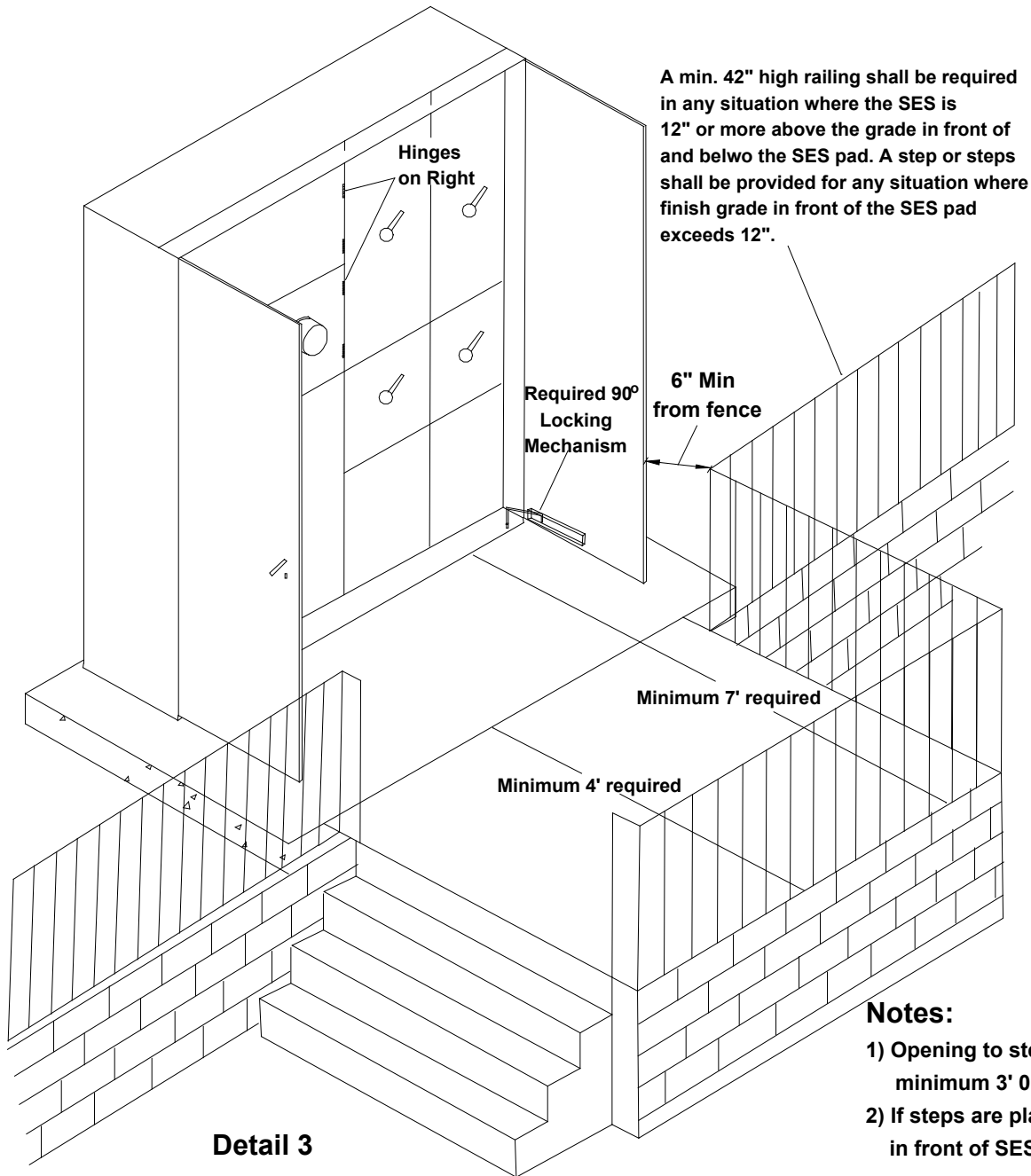
Maximum allowable slope in escape route in front of SES is 8" in 4'.



Detail 2



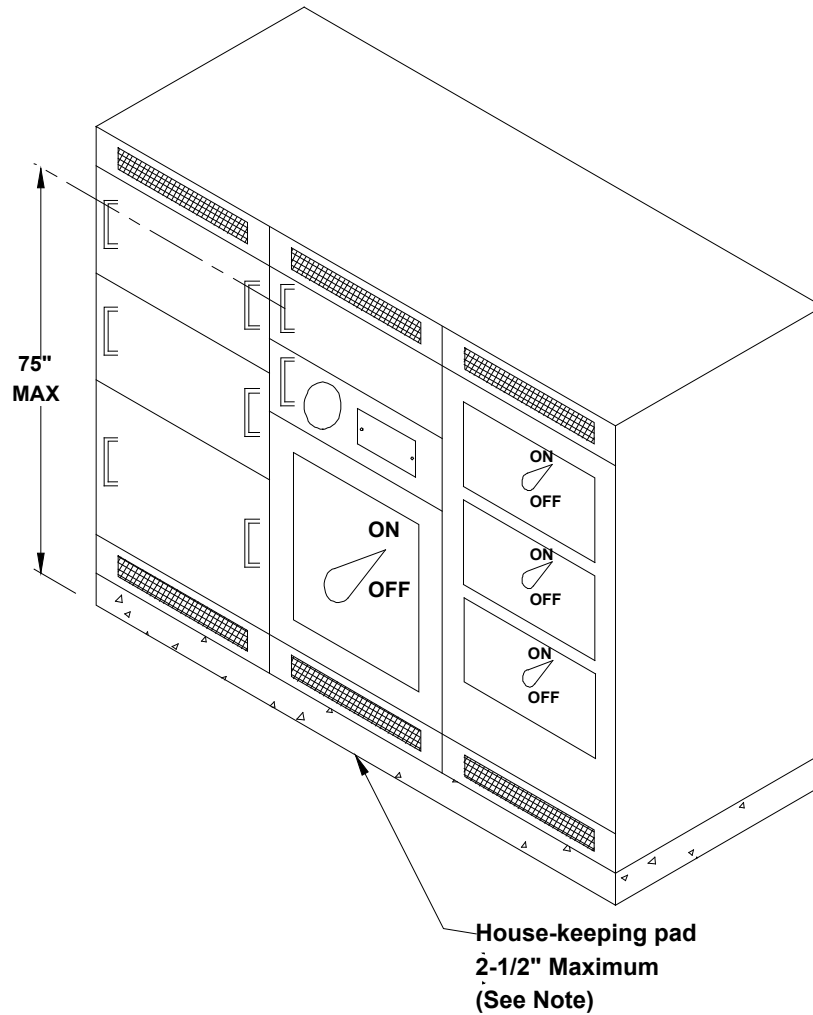
Alternative Escape Route



Notes:

- 1) Opening to steps to be minimum 3' 0" wide
- 2) If steps are placed directly in front of SES pad the 4' landing area will still be required.





Notes:

1. House-keeping pad shall be 2-1/2 inches thick, and shall not extend more than 1 inch beyond the front edge of the service entrance section. **Do not use 2" x 4" as form for concrete pad.**
2. Pad material to be rated 3000 lb. at 28 day minimum.
3. See Section 300, paragraph 301.9 for meter room requirements.



INSTALLATION REQUIREMENTS FOR THE TOTALIZED METERING OF ELECTRIC LOADS

Totalized metering is the measurement for billing purposes at the appropriate rate, through one meter, of the simultaneous demands and energy of a Customer who receives this electric service at more than one delivery point. The Customer must qualify under CRA-ES "Conditions Governing the Totalized Metering of Electric Loads", and must receive prior approval from CRA-ES Totalizing Committee. The Customer will then be notified in writing, by the Design Project Leader, that totalized metering has been approved and may be implemented.

After determination by CRA-ES that totalized metering will be permitted, a meeting will be held with the Customer (or his representative), the CRA-ES Customer Service Representative, and a representative from the CRA-ES Electric Meter Shop. This is for the purpose of discussing conduit routing and general installation details. Following the meeting, the Customer shall submit an installation plan, showing all details, to the Design Project Leader. The Electric Meter Shop is responsible for the final approval of the plan. Installation of totalized metering facilities shall not begin prior to final approval.

305.1

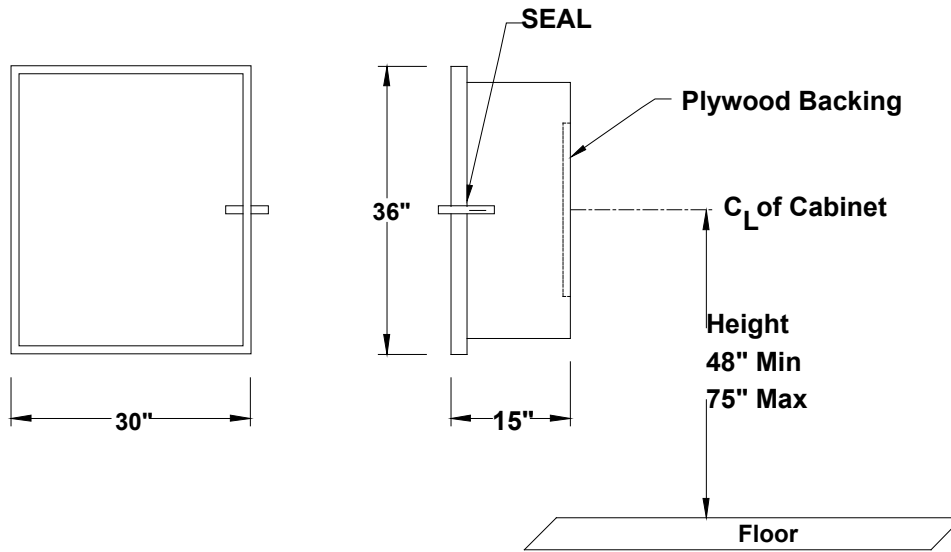
GENERAL RULES FOR TOTALIZED METERING INSTALLATIONS

1. Totalized metering compartment and service entrance equipment locations shall meet CRA-ES specifications for meter locations, meter rooms, and other applicable requirements.
2. Totalized metering compartment shall be in accordance with Electric Meter Shop specifications. Customer shall provide and install totalizing cabinet. See Section 300, Paragraph 305.2 for requirements.
3. Customer shall provide and install all totalized metering conduit. Conduits shall be installed in accordance with the current National Electric Code requirements. All conduit installations shall be 1 inch conduit.
4. Totalized metering conduits shall originate in the individual service entrance section's CT compartments and shall terminate in the totalized metering compartment. Exact location of conduit entries shall be specified by the Electric Meter Shop.
5. Conduit shall be rigid steel when installed outdoor, underground, or in locations exposing it to possible mechanical damage. **EXCEPTION: Schedule 40 PVC conduit may be used in underground installations that have a minimum of 24 inches of cover over conduit, or DB 120 conduit may be used if encased in concrete per paragraph 502.8 in Section 500, and there is a minimum of 24 inches of cover over conduit. Conduit may be EMT when installed overhead indoors in an approved location. Plastic conduit is not acceptable.**
6. Steel conduit, bends, and accessory parts installed underground shall be factory coated or wrapped with an approved PVC tape (overlapped a minimum of 1/2 the tape width thereby providing a minimum thickness of 40 mils) suitable for direct burial. See Section 500, Paragraph 501.4 for Coating requirements.
7. A pull box with a sealable cover shall be installed for each 270° of conduit bends. In no case shall pull boxes be more than 500 feet apart. Pull boxes shall normally be 6" x 18" x 18". If installed outdoors or below grade, pull boxes shall be watertight and approved for the purpose. All pull boxes shall be accessible after job completion. Pull box locations shall be approved by Electric Meter Shop. The conduit system shall be a clean, usable system at the time CRA-ES installs conductors.
8. Flat-strap or true-tape to be supplied and installed by Customer.
9. Customer wiring shall not be allowed in S.E.S. metering compartments, totalized metering conduits and pull boxes, or totalized metering compartment.

Because each installation is different, the above general rules may not be all inclusive. Each installation must be designed and approved on an individual basis; therefore, additional requirements may be necessary.



CRA-ES INDOOR TOTALIZING/COMBINING CABINET

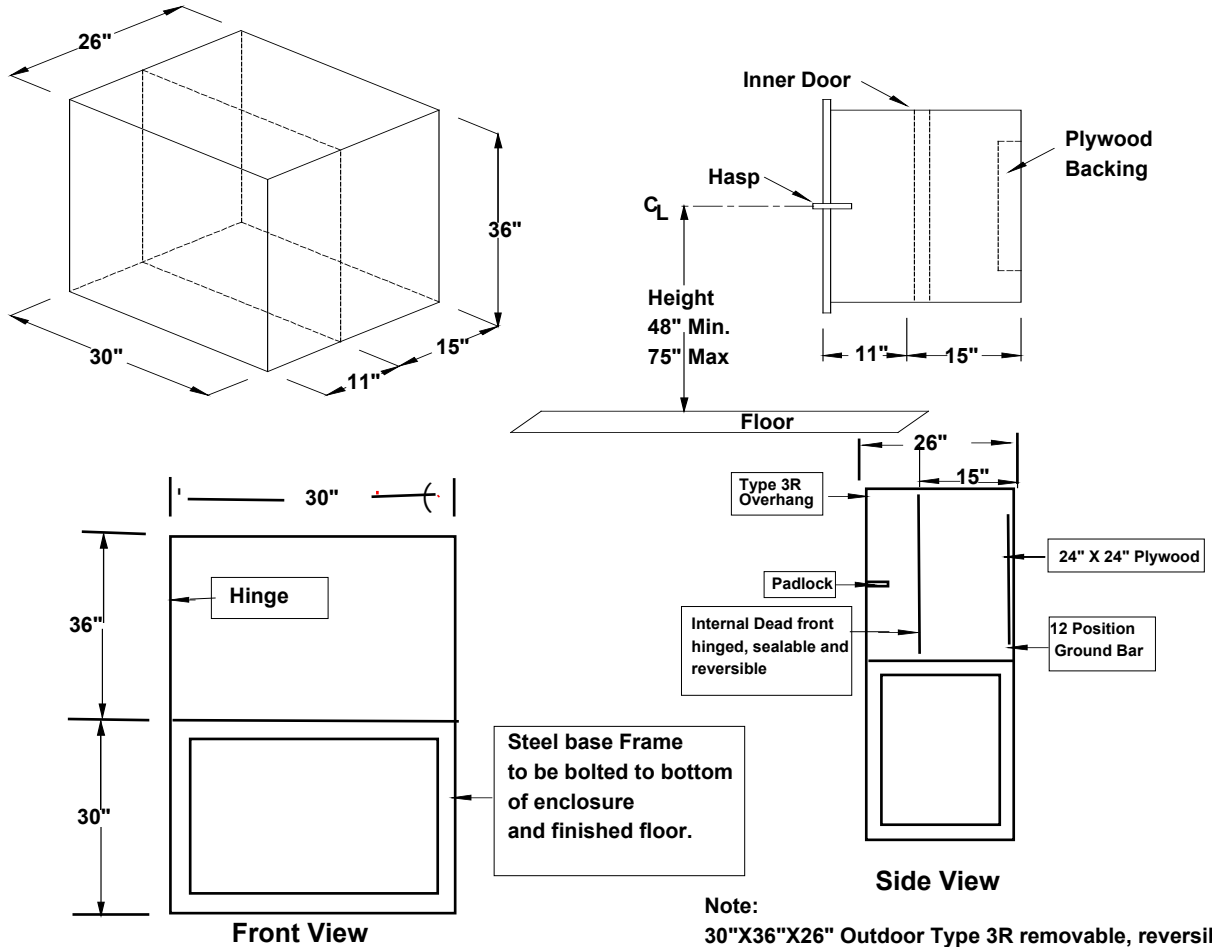


NOTES:

1. Cabinet to be made with a minimum of 12 gauge steel.
2. Cabinet dimensions shown are minimums.
3. Cabinet to be painted to same specs and color as service entrance section.
4. Cover/door to be demountable and reversible.
5. Cover/door to be sealable.
6. 3/4" minimum plywood to be installed on back inside wall of cabinet. Size to be 24" x 24". (See above)
7. Cabinet to be bonded to service entrance section with minimum of #8 copper wire.
8. Cabinet to be solidly anchored to the wall.
9. CRA-ES Meter Shop to determine size of conduit and point of entry into service sections.
10. Door to be hinged.



CRA-ES OUTDOOR TOTALIZING/COMBINING CABINET



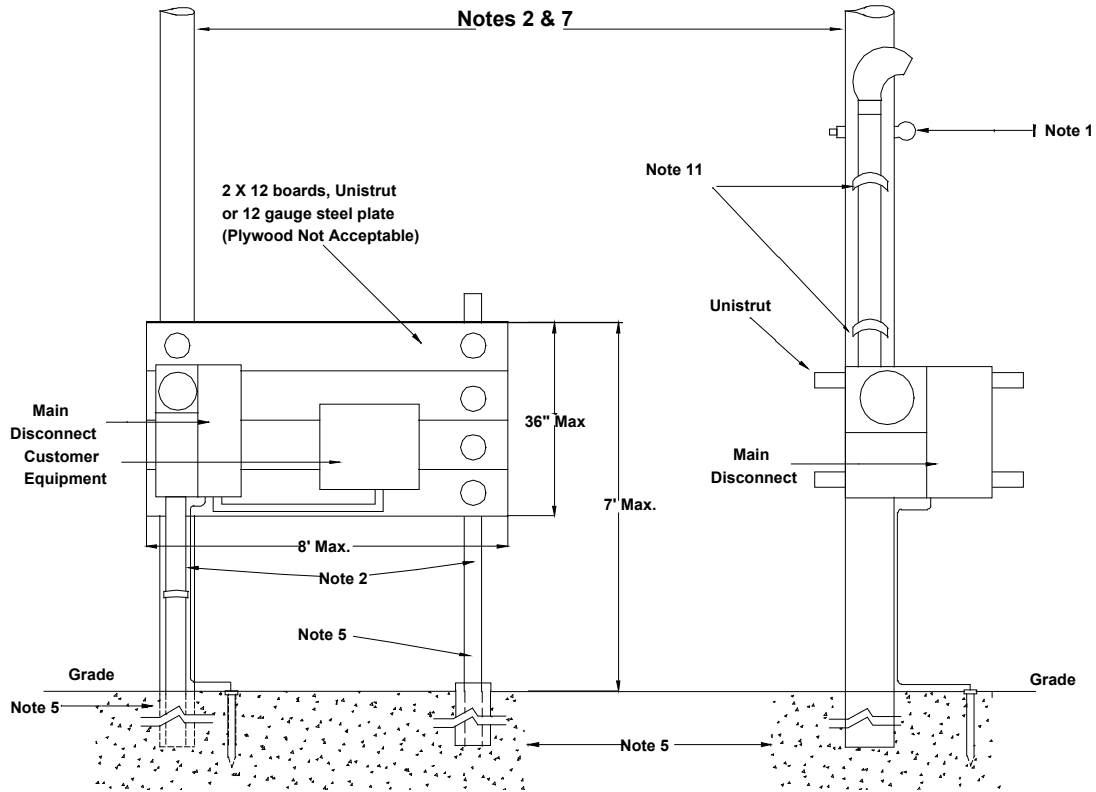
Note:
 30"X36"X26" Outdoor Type 3R removable, reversible and sealable Dead Front Cover. Steel required to be repainted ANSI 61 Gray Enamel.

NOTES:

1. Cabinet to be made with a minimum of 16 gauge steel.
2. Cabinet dimensions shown are minimums.
3. Cabinet to be painted to same specs and color as service entrance section.
4. Inner door to be demountable and reversible.
5. Inner door to be sealable.
6. Outer door to be pad lockable. Provision for two padlocks is required.
7. 3/4" minimum plywood to be installed on back inside wall of cabinet. Size to be 24" x 24". (See above)
8. Cabinet to be bonded to service entrance section with minimum of #8 copper wire.
9. Cabinet to be solidly anchored on an exterior wall adjacent to the metering sections, or to a separate structure per Section 300, Paragraph 306.0 adjacent to the metering sections.
10. CRA-ES Meter Shop to determine size of conduit and point of entry into service entrance sections.
11. Both doors are to be hinged.
12. Cabinet to be weatherproof.
13. Cabinet required to be on stand.



TYPICAL SERVICE ENTRANCE SUPPORTS FOR SERVICE EQUIPMENT



NOTES:

1. For minimum service heights see Section 400, paragraphs 401.0 and 401.0-3.
 2. All wood posts and poles used for service equipment shall be full length pressure treated as per CRA-ES specification MS-1900. See Section 400, paragraph 402.0 for wood pole requirements.
 3. See Section 400, paragraph 402.3 for customer pole sizes and minimum setting depth.
 4. See Section 700 - grounding and bonding.
 5. Minimum dimensions of posts shall be:
 - A. Wood posts = 6" x 6" or 8" in diameter. (Maximum length - 10')
 - B. Pipe posts = 3" in diameter. (Maximum length - 10') Pipe posts to be of rigid galvanized steel, half-lapped with 20 mil tape below grade, extending 6" above grade.
 6. The post shall be placed in the center of a 12 inch minimum diameter concrete footing. The footing shall be a minimum of 36 inches in the ground and extend a minimum of 4 inches above the ground level, and have a 1/2 inch slope away from the post to allow for drainage. Except: concrete not required for 6 x 6 or 8" dia. post buried 48".
 7. For underground applications delete overhead pole, use post and attach underground riser to post per paragraph 501.3 of the 500 Section of this book.
 8. All boards, steel and unistrut shall be attached to pole or post securely with a minimum 1/2" galvanized through bolt with a 1-1/2" galvanized backing and a lock nut. Nails or lag screws will not be acceptable. Pole shall be notched to the depth of the unistrut. (1" unistrut maximum)
 9. All service equipment shall be securely fastened to boards or steel with minimum 1/4" through bolts. Nails or lag screws will not be acceptable.
 10. The meter can shall be as required by this book for each installation.
- . Conduit support. Not over 6 feet apart.



JOB SITE POWER (TEMPORARY METER IN PERMANENT POSITION)

