MENASHA UTILITIES
ELECTRIC SERVICE MANUAL

Revision date 3/26/2024

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INDEX

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Purpose

This service manual is published for the convenience of Menasha Utilities customers and their architects and contractors. The information contained in this manual is in addition to the various municipal electrical codes, the Wisconsin Administrative Code and any other regulations that may apply. The Utility reserves the right to make revisions in these rules whenever changes in the art, legal requirements, or other circumstances make it advisable. These rules are intended for standard equipment installations. When, because of physical limitations of the premises, it is impractical to follow them; the Utility shall be consulted for permissible modifications. The information contained herein does not cover in detail the requirements of the Utility's rate schedules, extension rules, or general rules; the Utility should be consulted for specific information concerning these matters.

The Utility may refuse or discontinue service if a customer does not comply with these rules; however, the customer will first be notified and afforded reasonable opportunity to comply. Service may be discontinued without prior notice when a dangerous condition exists on customer's premises.

This manual does not take exception to any local, state or federal electric codes. When in doubt, always check with Menasha Utilities.

MENASHA UTILITIES
321 MILWAUKEE STREET
P.O. BOX 340
MENASHA WI 54952-0340

NEW ELECTRIC SERVICE ……. (920) 967-3400

EMERGENCY SERVICE …….……. (920) 967-5190

MENASHA UTILITIES
ELECTRIC SERVICE MANUAL

Utility contacts for questions pertaining to this manual;

Residential, Commercial and Industrial Developments
Distribution Technician
920-967-3416

Electric Metering
Meter Technician
920-967-3423

Engineering
Engineering Manager
920-967-3415

CALL BEFORE YOU DIG
ONE-CALL CENTERS

NO DIGGING

1. Phone number: 811
2. Hours of operation: 24 hours a day.
3. Wisconsin law requires that a minimum of three working days notice be given for any excavation other than emergencies.
4. Will accept calls for emergencies, planned excavation, planning formation, appointments, and overhead information.

Contractor Information

After the building permit is obtained, the contractor should come to the utility office and complete the necessary paperwork. An application for permanent electric service is required along with a temporary electric service if needed. (***See Note #1 listed below)**

Information required on electric service application:

1. Contractor names
2. Construction site address (including lot # and subdivision)
3. Billing address & phone number
4. Required date of service

Information required on water and sewer application:

1. Contractor names
2. Construction site address (including lot # and subdivision)
3. Legal description
4. Size of water service, meter, type of piping, installing contractor name and customer class (residential or commercial).
5. Size of sewer service, type of piping, installing contractor and customer class
   (residential or commercial).

Once the necessary paperwork is complete and fees are paid, the service order will be processed and scheduled.

The Utility requires a 24 hour advance notification for delivery of water meters, water turn ons and inspections. This is important for scheduling purposes and keeping the amount of site visits to a minimum.

Procedures and guidelines for applying for service are;

A. Application for initial service or for a change in existing service requirements shall be made at the Utility office or by calling (920) 967-3400.

*** Note #1** – An upfront charge will be collected by the Utility prior to the installation of any temporary single phase electric service. This will be a standard fee unless there are special requirements by the customer/contractor. In addition, the customer/contractor will be billed for any electricity used while the temporary is in service. The customer/contractor is responsible for requesting the disconnection of the temporary service during construction. Failure to request disconnection will result in continual monthly charges. A 48 hour request will be required by the Utility prior to the installation of any temporary services.

B. Service Location

At this time the applicant must decide whether the service will be underground or overhead. The main entrance switch size shall also be indicated. MENASHA MUNICIPAL UTILITIES WILL DETERMINE THE LOCATION OF THE TEMPORARY AND PERMANENT SERVICE TERMINATION POINT. This will be done with input from you, the customer.

C. Contract

MENASHA Municipal Utilities will contact the applicant if a contract is required. When a cash contribution is necessary, payment must be made before the job is scheduled for installation.

D. Easements

Easements required from parties other than the applicant requesting service shall be obtained by the applicant at no cost to the Utility.

Permanent structures and fences are not allowed on Utility easements.

E. Clearance (Tree & Brush Removal, Grading, etc.)

Applicant is responsible for initial clearing of right-of-way on applicant's property as required for construction.

F. Completion of Service Entrance Wiring

All services within MENASHA city limits need approval by the City Electrical Inspector prior to Utility hookup. All town installations require either local inspection or a wiring affidavit by the customer or customer's electrical contractor.

G. Job Scheduling

Prior to job scheduling by the Utility, the following items, where applicable, are required:

1. Payment of all construction charges
2. Easements signed
3. Clearing of service route
4. Service entrance wiring installed
5. Completed electrical inspection
6. Grade within 6 inches of final grade

H. There are special needs when applying for multi-family, commercial or industrial service. The Service Manual is designed to give many of the details necessary to obtain service. The following is a short summary of needs.

1. Voltages

Standard voltages are 120/240 single-phase, 120/208 three-phase, and 277/480 three-phase. Electric service at other voltages and capacities may be obtained under special circumstances.

Enlargement of existing three-phase 120/240 volt, four-wire delta systems are not allowed. MENASHA Municipal Utilities will enlarge its transformer capacity and service to match the customer's switch size, if necessary.

Customer's requests for additional services, or services which do not conform to these rules shall be treated as special facilities. The customer is obligated, in accordance with Utility extension rules, for any added cost involved. The Utility reserves the right to deny special facilities.

2. Metering

Review this service manual for all possible metering options and approved metering equipment. Generally, MENASHA Municipal Utilities uses 200-amp plug-in meters for self-contained setups, and current and potential transformers on services rated at 400 amp and up. The Utility furnishes the current and potential transformers on services rated 400 amp and above and the customer will provide the necessary CT cabinet and approved meter socket. PT's, CT's and metering may be allowed in or on any of the Utility's electrical facilities. Another concern is the physical protection of metering facilities. Please refer to the drawing on for ice protection requirements.

3. Utility Needs

On commercial and industrial jobs it is essential to get the Utility involved as soon as possible in the design process. There are many issues to resolve before the service is installed, such as service location, ordering of material, and necessary permits and easements to be obtained.

4. Transformer

The customer will be served by either overhead or underground transformers. If you are served with a padmounted transformer, it is critical to consider all the necessary clearances and protection from traffic (see Pages 33-35). Three-phase padmount transformers 750 kv or greater require a concrete pad. The pad is supplied by the customer. For electric services 400 amps or greater, in addition to the pad, the customer is responsible for the conduit and service wires between the transformer and the main disconnect.

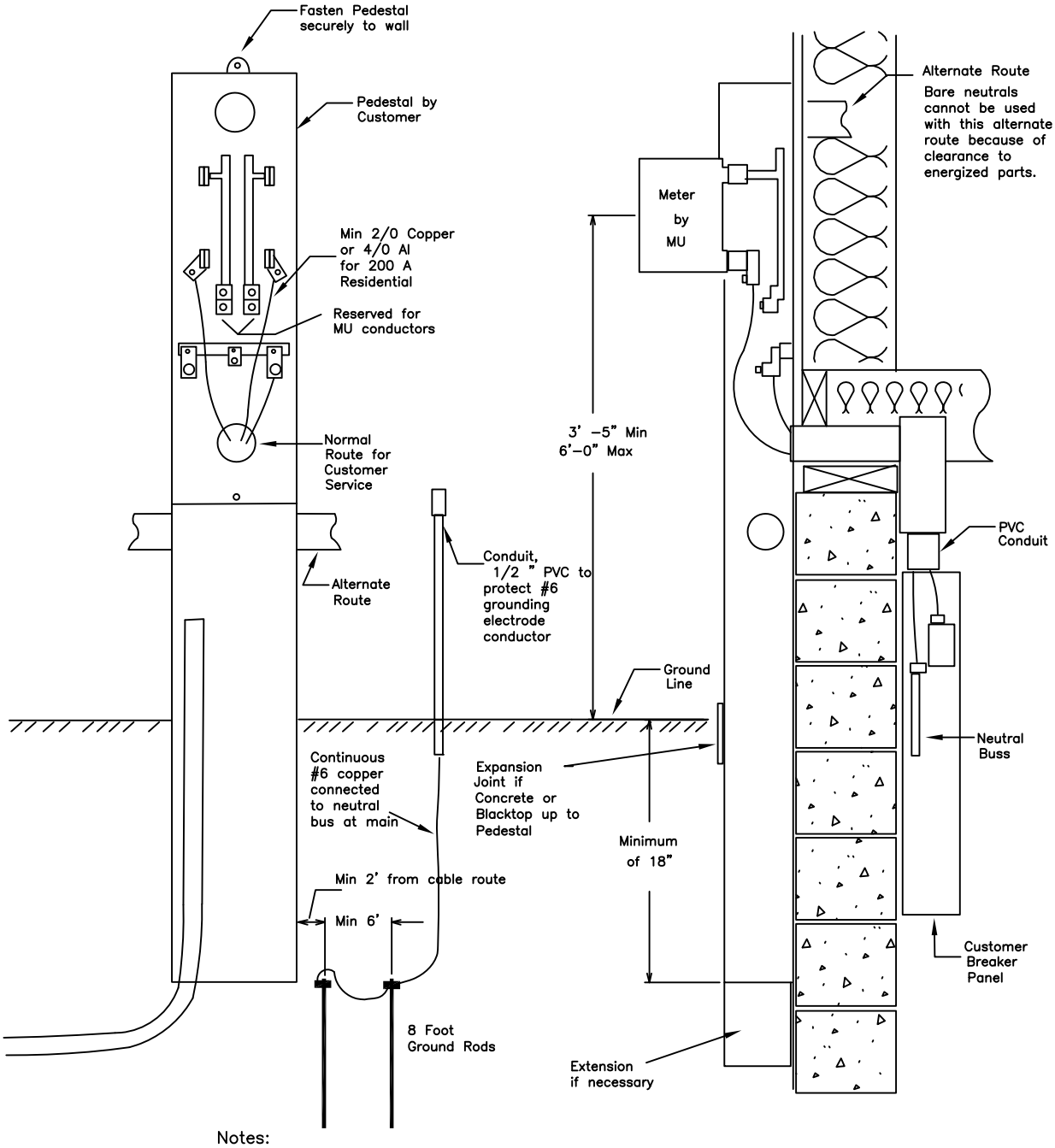
5. Service

For single family homes, duplexes and twin homes, MENASHA Municipal Utilities will provide the service lateral. One concern to be aware of is our policy on conduit for underground service laterals.

SERVICE CONDUIT POLICY FOR UNDERGROUND SERVICES. Underground services will be run in conduit. These conduits shall be limited to a maximum of 270 degrees of total bends. This means three 90-degree bends or two 90-degree and two 45-degree bends. The maximum length of the conduit run shall be 75 feet (shorter for large entrances such as 1600 amps and up). Note that service entrances are limited to less than 75 feet to avoid voltage problems or damage when pulling the cables. Conduit shall be buried 24 inches deep. If problems are encountered, consult NEC Table 300-5. Note that NEC 300-5(d) requires exposed PVC conduit to be from 18 inches below ground to 8 feet above ground.

6. Fault Current

It is your or your electrical designer's responsibility to consider the interrupting rating of your switchgear. Call MU for actual calculations for a specific location.



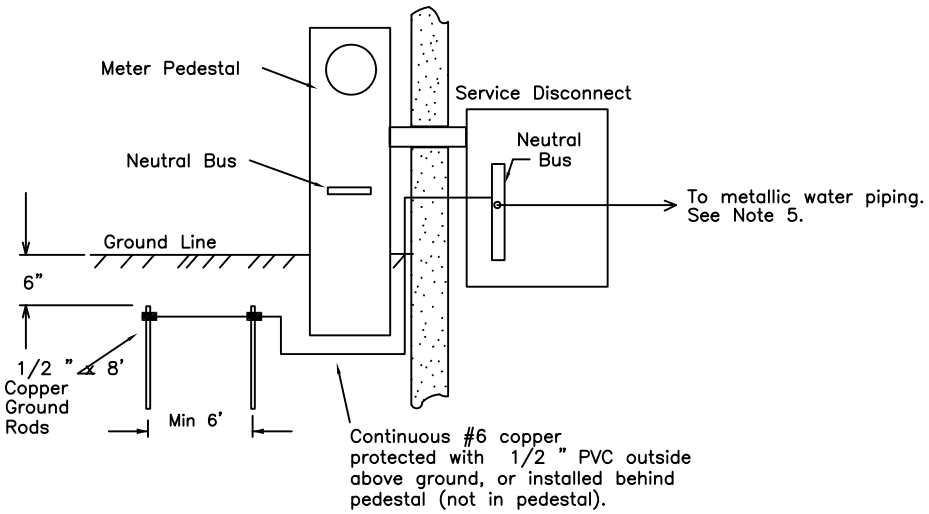
Notes:

1. No grounds allowed in or on meter pedestal.
2. See 2-2 on grounding options.
3. See 2-3 on general residential wiring considerations.
4. The pedestal can not be used for other customer wires such as a feeder out to the garage NEC 230-7.

MANUFACTURER	CATALOG #	EXTENSION CAT. # IF NEEDED
MILBANK	U3358-O-KK	K4695
ANCHOR	MP-5S-204B-WI	MP-5S-ES
MURRAY	RP118SW	UX078B
MIDWEST	R2EMSSP6	EK129CW
LANDIS/GYR (Siemens)	UAP317-PPW1	5007718

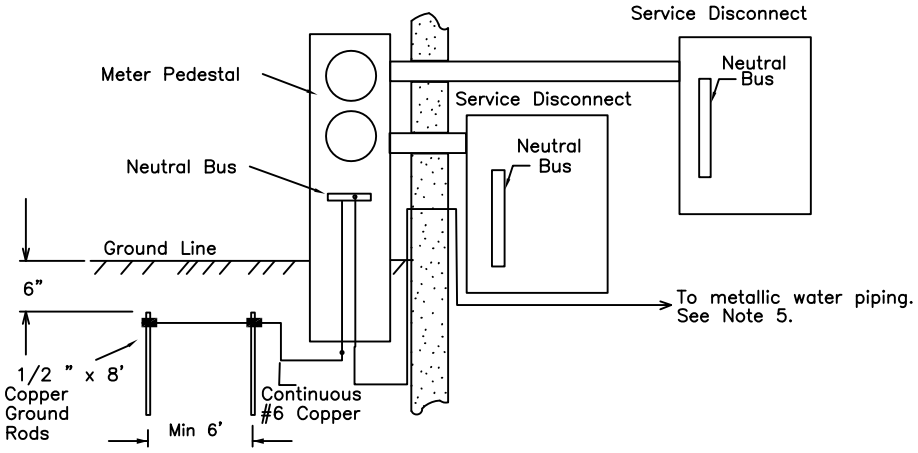
OPTION #1

Single Family Residential or Commercial



OPTION #2

Two Family Residential and One Family Residential
if Main Disconnect in Meter Pedestal



Notes:

1. Grounding systems for all Electrical Service Entrances will meet electrical code requirements:

A. 2 ground rods are installed at least 6 feet apart.
B. And if any of the following on the premises are bonded into the grounding system (as described in the NEC),
   a. Metal underground water pipe system.
   b. Metal frame of building.
   c. Concrete-enclosed electrode.
   d. Ground rings.
   e. Communication grounding electrode.
   f. CATV grounding electrode.

Other variations of these grounding systems are described in COMM 16 and NEC Section 250.

2. Ground rods and grounding electrode conductors shall not be located in front of meter pedestal, wire troughs or within 2 feet of underground cable route. Good wiring practice is to install the rods at or outside the drip line. See NEC 250-64 and 250-66 on sizing and installation details.

3. Grounding electrode conductors cannot be run in or through meter sockets, meter pedestals, or CT cabinets. (Comm 16.27)

4. See page 5-4 on bonding for lightning protection. See Section 3 for bonding requirements for CT cabinets and termination enclosures.

5. If more than 10 feet of metallic water pipe is in contact with the earth, it must be bonded to the neutral bar at the main distribution panel as part of the grounding system. (Duplexes are an exception - see Option #2). This must be bonded where the water line enters the building and ahead of the water meter, if present (within 5 feet of entering the building per NEC 250-30(3)). Some municipal utilities require the water meter to also be jumpered. This bond must be sized per NEC Table 250-66. For 200 Amp services this is usually #4 copper. Note that the metallic water piping must be bonded even if there is no earth contact. In this case, it is just a bond and not part of the grounding electrode system (sized per NEC Table 250-122).

6. It is suggested that a #6 copper bonding jumper be run to the outside from the main disconnect (connected to the grounding electrode system and identified by being bare copper or green insulated conductor; leave at least a 6-inch tail). This is for telephone and CATV to bond to as required by NEC 250-92(b).

Electrical wiring should only be done by those who have been trained on safety concerns, wiring techniques, and code requirements. Menasha Utilities cannot inspect your wiring or provide electrical code interpretations. By law, this is only allowed to be done by State-Certified Electrical Inspectors.

If you do your own wiring, the following are some basic items involving single-family residential wiring up to the main disconnects:

1. The minimum size service is 100 Amp for overhead services and 200 Amp for underground services

2. The minimum service entrance conductor sizes for residential 120/240 single-phase shall be as follows: (This is from the ampacity tables in the NEC 310-15 (b)(6)). (See NEC about reduced neutrals.)

Service Rating	Copper	Aluminum
100	#4	#2
200	2/0	4/0
400	400 kcm	600 kcm

3. Conduit sizes must be as follows:
   - Schedule 40 Electrical PVC is usually used. Schedule 80 PVC is required when subject to physical damage such as at the ground line. (See NEC 300-5(d)).
   - Rigid metal conduit is required for overhead periscopes (aluminum, IMC, or thin wall is not acceptable). All overhead periscopes must be back-guyed.

     0-200 Amp Services Minimum 2" (for strength reasons)

4. A single main breaker/fuse is required. For 200 Amp or more, two mains are allowed.

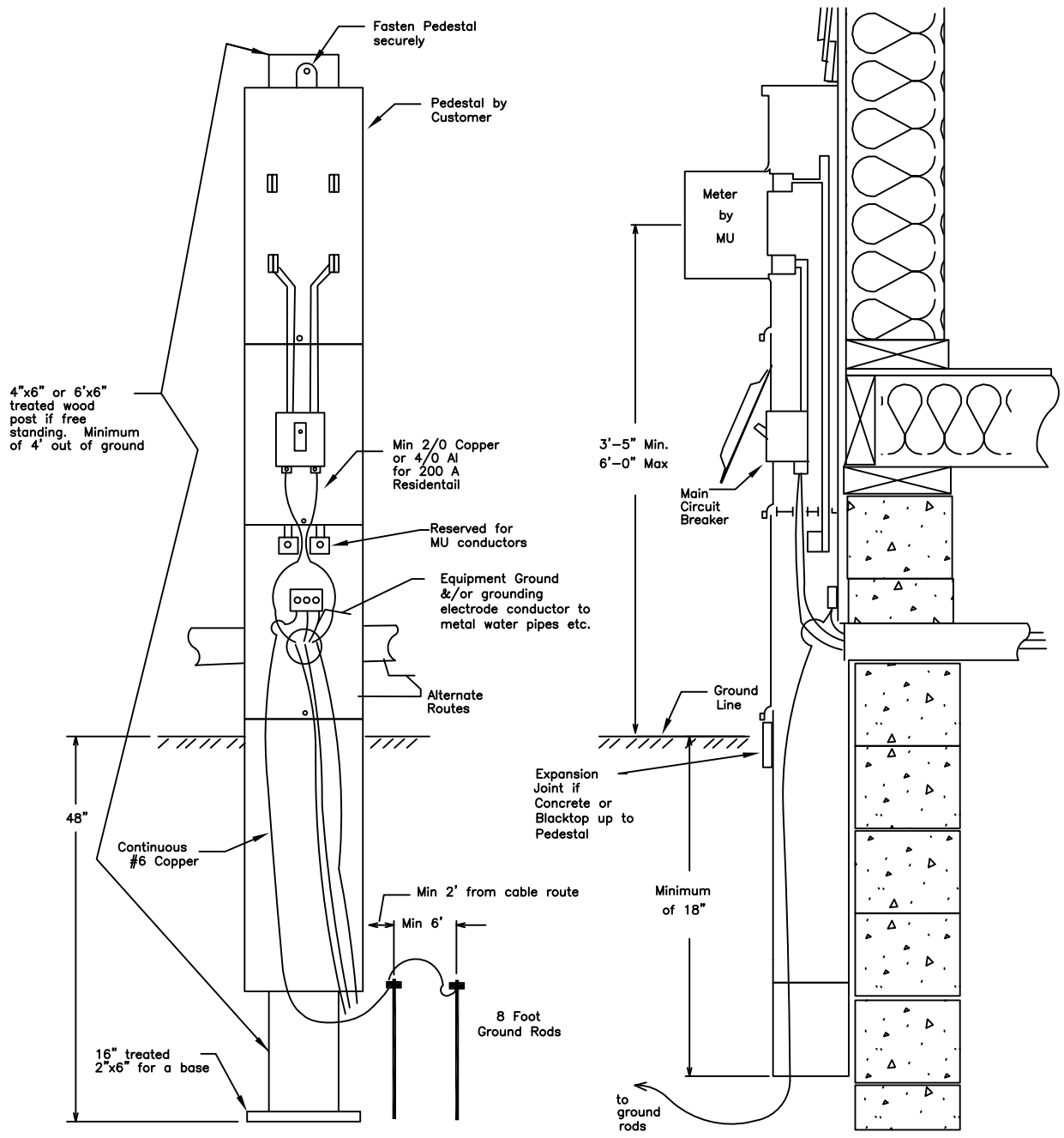
5. The equipment grounds (green and bare) must be bonded to the neutral at and only at the main distribution panel.

6. All aluminum connections must be made with aluminum rated connectors. The conductor must be cleaned (wire brush or other approved means) and immediately coated with an approved corrosion inhibitor. Common brand names for inhibitors are as follows:
   Noalox Joint Compound
   Gardner Bender Oxguard
   Penetrox

7. The main disconnect must be installed within 8 feet of the location where the service enters the building.

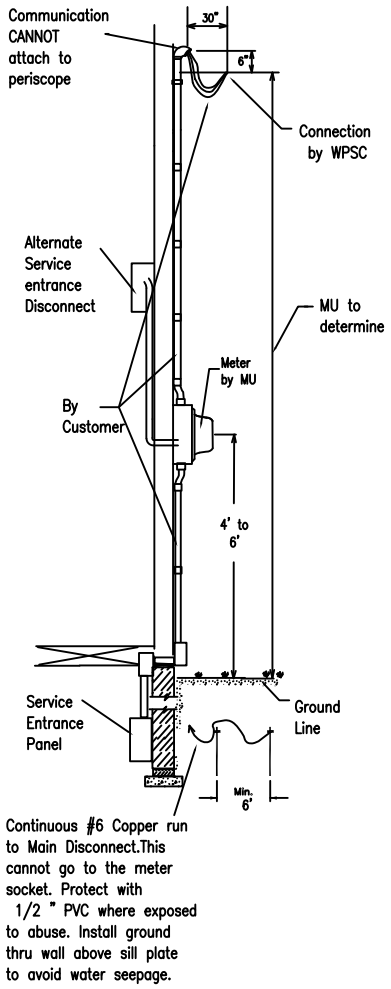
8. The conduit penetrating the outside wall between the meter and the distribution panel conducts cold air. This often causes condensation and potential damage to the electrical system. Things like spray foam or electrical putty will block this air flow.

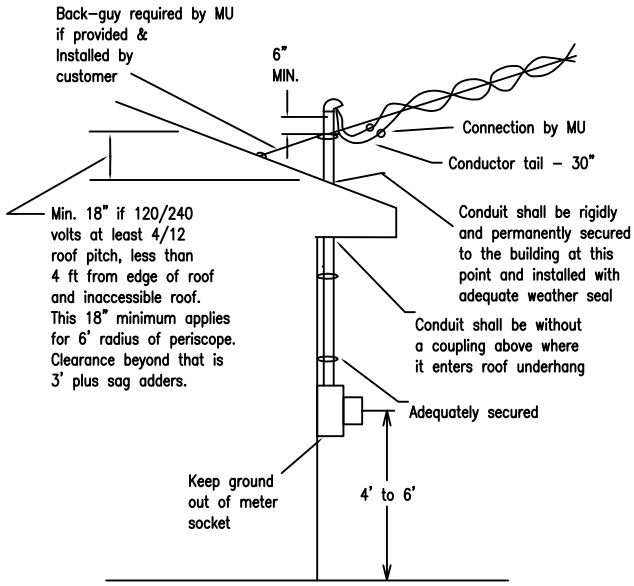
9. Only service entrance conductors and load control circuits can be installed in pedestals or meter sockets. (See NEC 230-7).



Manufacturer	Catalog #	Catalog # for Breaker
Milbank	U8980-0-KK	WBJ2200 for 200 Amp
Landis/Gyr (Siemens)	UAPB317-PBWI 659-0121 5007718	200 amp single phase ped Ped extension if needed
Anchor	MP5S204B-WI	T & B - TBFP-200-2 for 200A

1. This type of meter pedestal required if free standing (remote from building).
2. Not acceptable for mobil home use.
3. Must be attached to support post if free standing.
   Use a minimum of 8 foot, pressure treated 6X6 or 4X6.
   This must be buried at least 48 inches with a 16 inch treated 2X6 for a base.
4. This is commonly used if the service entrance conductor extends greater than 8 feet into the building.





BASIC CLEARANCES - 120/240 VOLT

1. Drip loop must be at least 17 feet above the ground line (unless meets other requirements on p. 7-1)
2. The drip loop and overhead service conductors must be at least 3 feet in any direction from windows, doors, porches or similar structures. An exception is above the top level of the window or a window designed not to open.
3. The drip loop and overhead service conductor must be at least 12 inches from communication circuits.
4. The drip loop and overhead service conductor must have 18 inches of clearance from the roof if a periscope is run thru the roof. This 18" clearance applies for a 6 foot radius of the periscope. The roof must be at least a 4" vertical to 12" horizontal pitch, with the periscope within 4 feet of the edge of the roof, and the roof inaccessible.
5. Basic ground clearances are as follows:
   Note that one foot has been added to account for conductor sag under Loaded conditions. See clearances (Section 7) for details.
   A. Lawns & sidewalks (Pedestrian Only Areas) 13 feet
   B. Roofs & Decks accessible to pedestrians 12 feet
   C. Inaccessible roofs 9 feet
   D. Roads, streets, alleys, parking lots, etc. 18 feet
6. Avoid wood decks when locating the meter socket.
7. Customer to install house knob if used. This is because of need to fasten into substantial support.

Notes:

1. Menasha Utility employees must designate the service location and specify the mounting height of the periscope. This is required because of numerous code clearance issues with the overhead service drop conductors. See clearances for additional information (page 7–1).

2. The weatherhead must extend at least 6 inches above the attachment point for the service drop. This attachment device is provided and installed by the customer. It must be adequately attached so it can handle 400 lbs. of line tension.

3. The conductor coming out of the weatherhead shall be at least 30 inches long. MU will make the connections to the overhead service conductors.

4. The conduit shall be adequately supported with pipe straps. The meter socket shall also be adequately attached to the structure.

5. All periscopes (unsupported conduit extending above the roof) shall be made of rigid metal electrical conduit and if required by MU shall be back guyed. Aluminum, IMC or thin wall is NOT acceptable. Minimum size shall be 2 inch for 0–200 amp, because of strength requirements. This includes upgrades to 100 Amps. No couplings can be above where the conduit enters the roof overhang or anywhere above the roof on the periscope

6. Communication and customer owned circuits cannot be attached to electrical entrance periscopes (NEC 230–28).

7. The neutral conductor shall be identified by white tape, white insulation, white paint, or other techniques approved by NEC article 200 –7 and 230–22.

8. The raceways containing service entrance conductors or service entrance cables shall not extend more than 8 feet into the Building before the main disconnect. Note that if the conduit is installed under the siding, or it is bricked in, it is considered already being inside the building per the state of Wisconsin [Comm 16.25(4)].

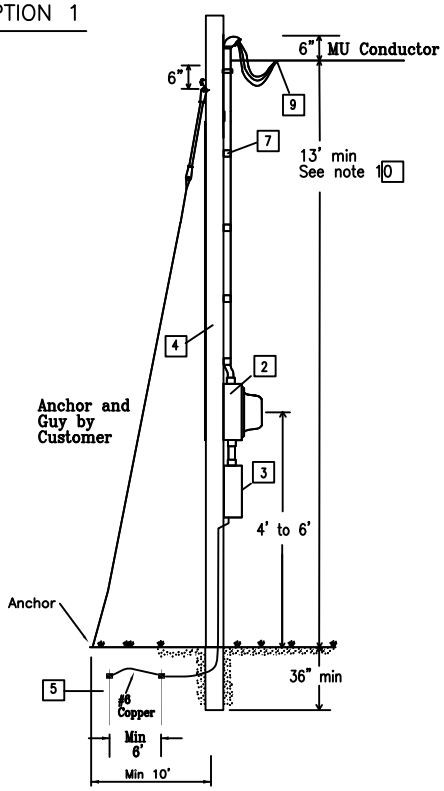
9. Service entrance cable (rather than conduit) is acceptable, if installed properly, accepted by a local inspection authority and not placed behind any siding.

10. Supports used to support service–drop conductors (attain clearance over buildings) will not be used for new installations. Forexisting installations, they must be substantial and meet the requirements of NEC 230–29.

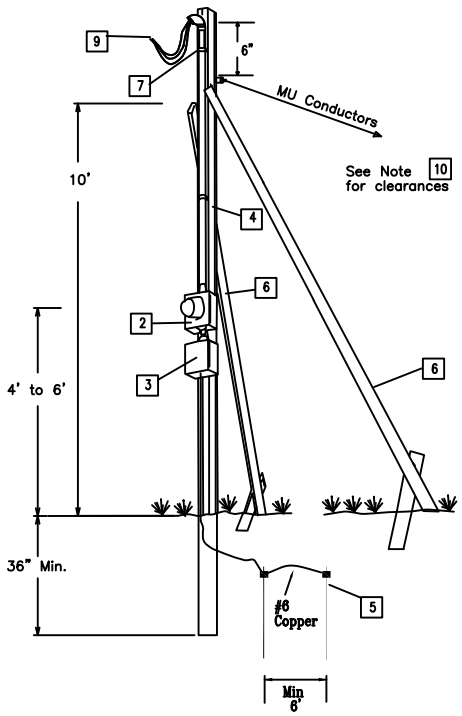
ACCEPTABLE METER SOCKETS

The utility has no list of approved sockets for this application. The only requirements are that they be UL approved, a minimum of 100–Amp rated, (if 100 Amp entrance), ringless style and have at least manual bypass horns.

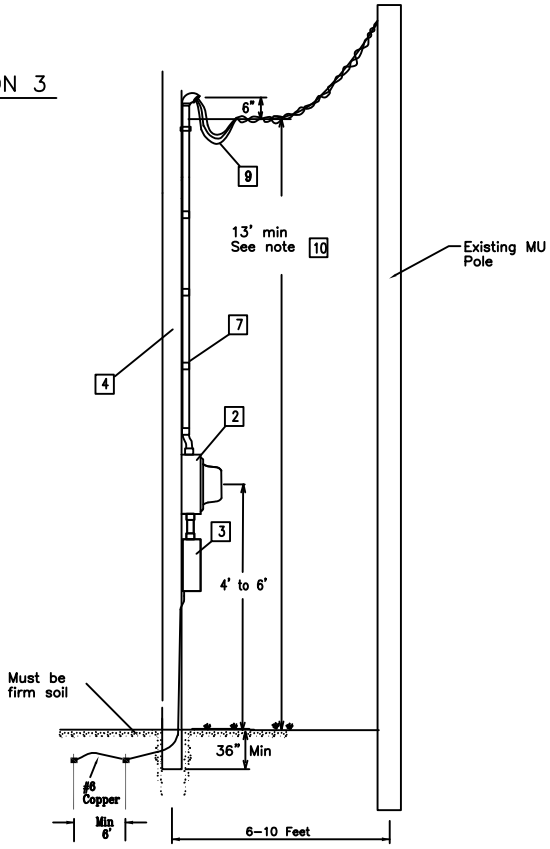
OPTION 1



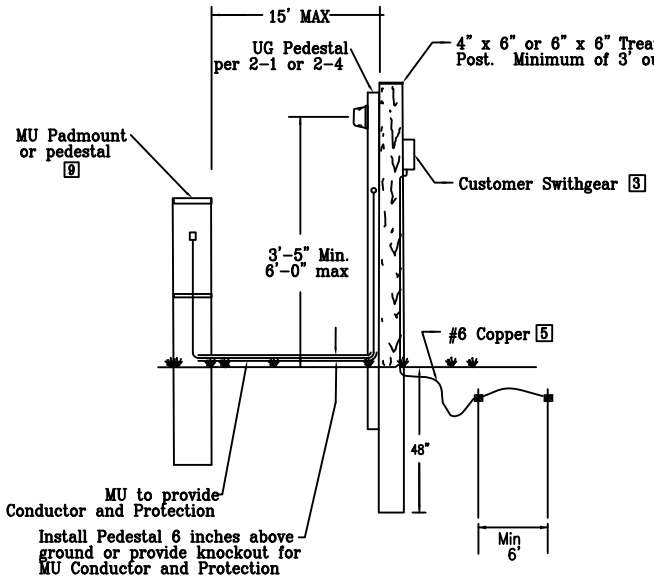
OPTION 2



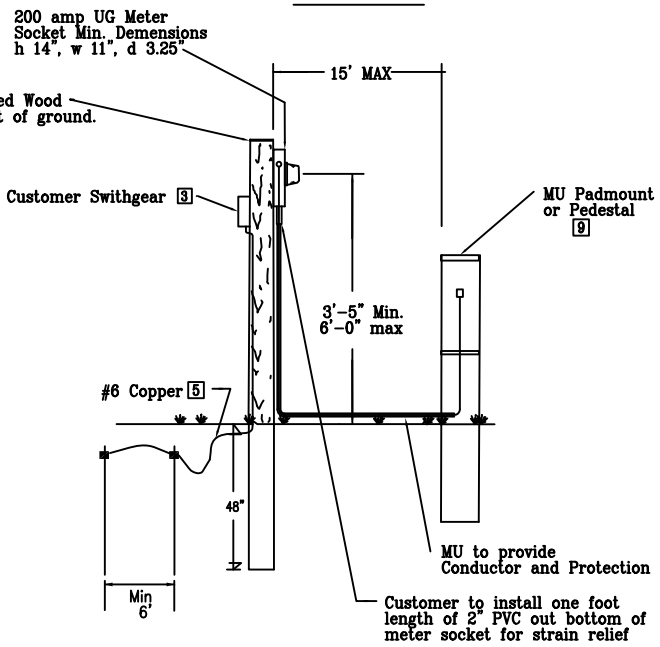
OPTION 3



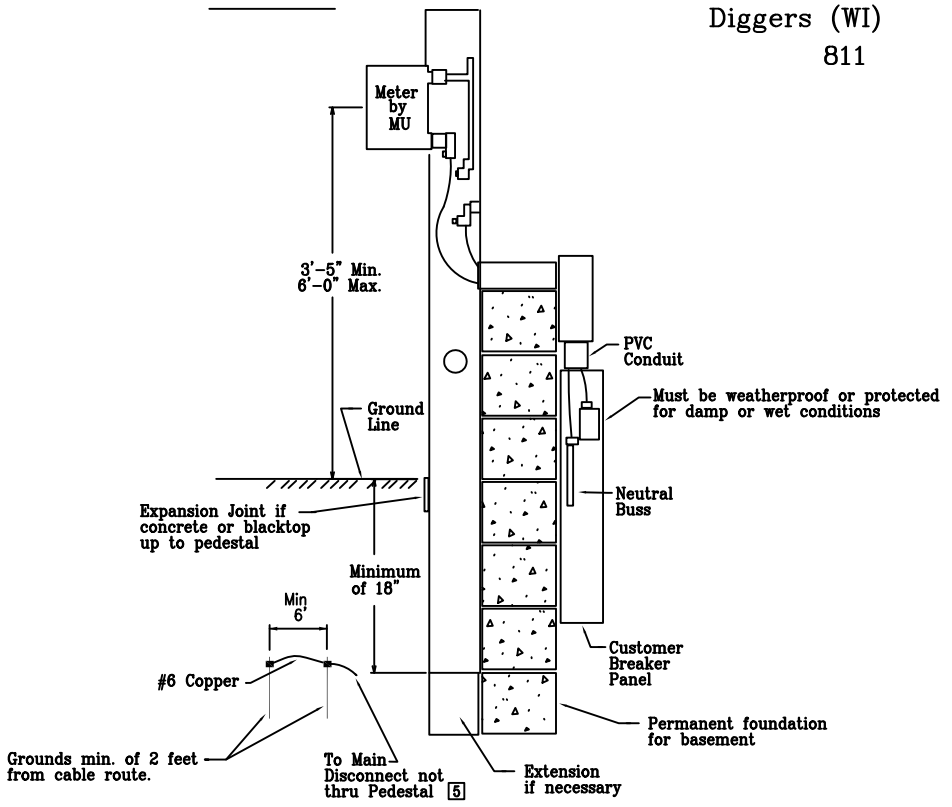
OPTION 4a



OPTION 4b



OPTION 5



Diggers (WI)
811

Notes:

1. The utility shall specify the location of temporary service poles. Care must be taken to avoid the permanent service route. Potential clearance problems must also be avoided.

2. The meter sockets shall be 100 or 200 Amp rated. They shall be a ringless design with bypass horns and UL approved.

3. The switchgear shall be installed as per code. This requires the switchgear to be weatherproof or protected from the elements. It also requires GFI protection on all outlets unless OSHA-required electrical inspections are done regularly (difficult to comply with).

4. The temporary service pole shall be at least 4-inches in diameter, provided and installed by customer.

5. Ground as required by code. Two ground rods are required. Also a bond to metallic water pipe may be required, if available. The ground conductor shall be terminated in the switchgear and not in the meter sockets.

6. Brace and stakes made out of 2 x 4's.

7. For residential 100 Amp temporaries, the conductor must be at least #4 copper or #2 aluminum. For residential 200 Amp temporaries, the conductor must be at least 2/0 copper or 4/0 aluminum.

8. Temporary services are intended only for a short use. If the temporary service is expected to be used longer than one year, see Sections 2 or 3 for permanent installation instructions.

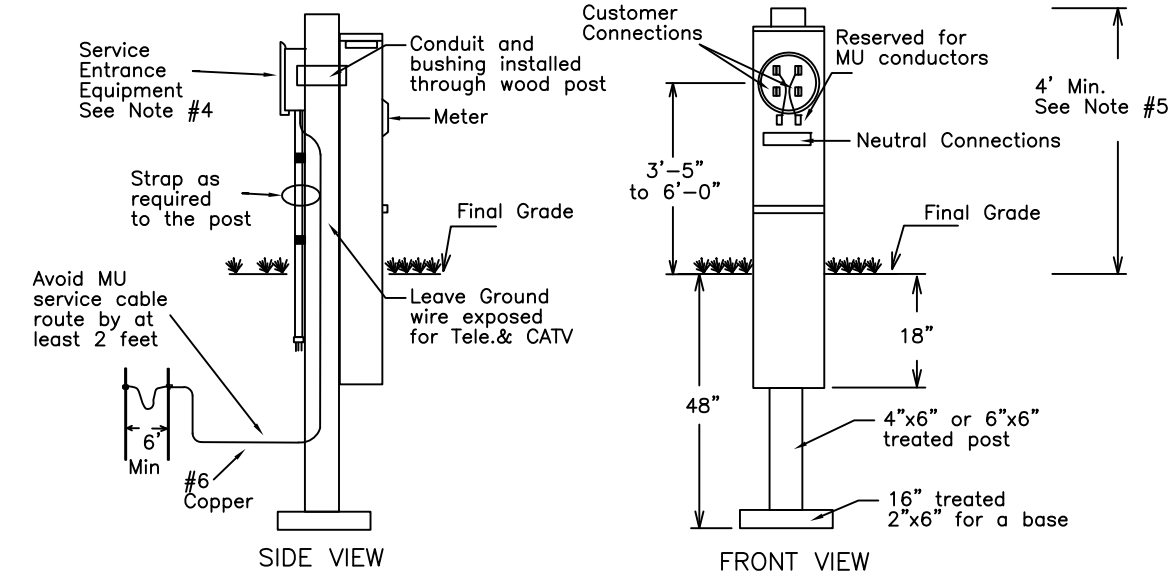
9. MU will make the connections to the MU system.

10. Temporaries must be high enough to maintain basic ground clearances. The following are some basic ground clearances. Note that one foot has been added to cover conductor sag. See the Clearance page 7-1 for details.
    A. Lawn or sidewalks (pedestrian only areas) 13 feet
    B. Roads, streets, alleys, parking lots, etc 18 feet

11. Junk equipment, such as 60 Amp meter sockets and old indoor 60 Amp fuse panels, are not acceptable for temporaries. If MU must make return trips because of clearance problems or unsafe equipment, there may be additional charges.

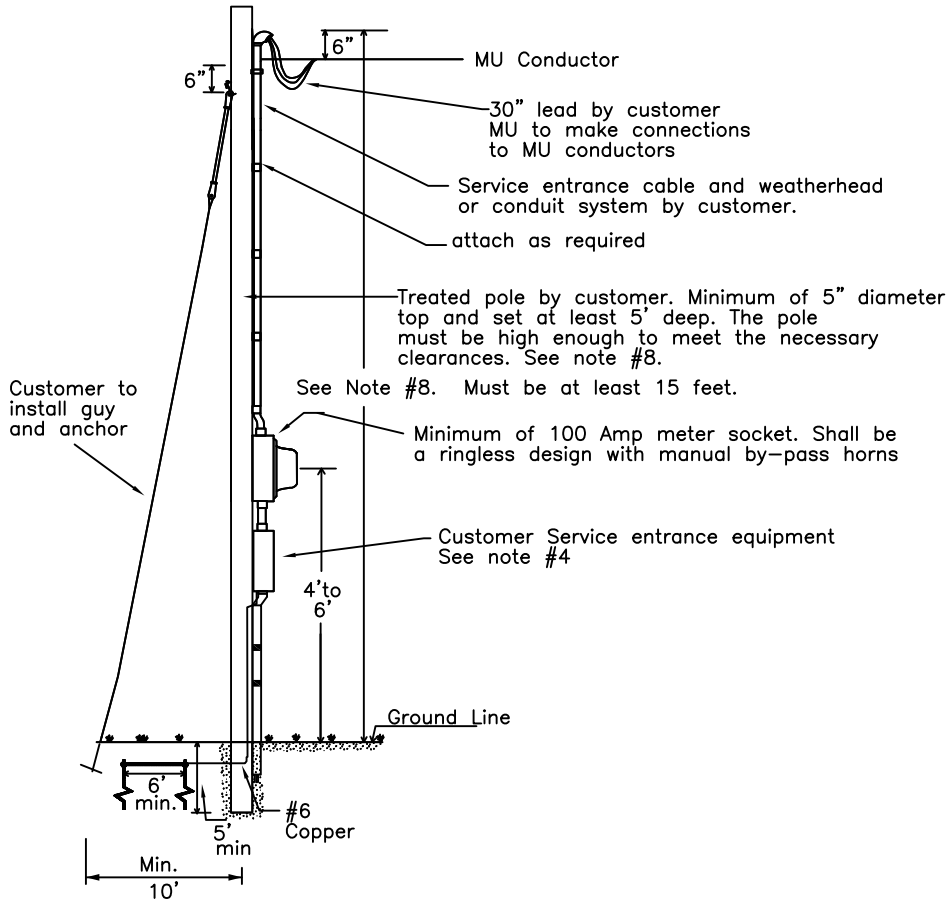
12. Option #5 shows how to install a permanent meter pedestal and breaker panel and how to avoid using a temporary service. The breaker panel must either be weatherproof or protected from a wet or damp environment. The basement walls must be backfilled and adequately tamped for MU to run the permanent underground service. Another option is to use approved flexible conduit between the meter pedestal and the breaker box. See page 2-1 for details on permanent underground services.

Requires assembly of individual components



Option #1 – Pedestals	
Mfg.	Pedestal for Above Catalog #'s
Milbank	U3358-O-KK
Anchor	MP-5S-204B-WI

OPTION #2 – Overhead Service



NOTES:

1. Mobile Home (definition from NEC 550–2): "A factory–assembled structure or structures transportable in one or more sections, that is built on a permanent chassis and designed to the required utilities, and includes the plumbing, heating, air–conditioning, and electric systems contained therein. Mobile homes can be identified by a red, rectangular HUD inspection label on the outside corner of the home. Manufactured homes (Ex. Wausau Home) on the other hand can be identified by a state inspection sticker on the electrical panel or inside of closet door or similar location.

2. Mobile homes must be wired per this standard. The only exception is if the mobile home is installed on a basement. In that case a meter pedestal can be attached to the basement wall and installed per 2–1. The service entrance panel with main disconnect must be installed on the inside of the basement wall. It is not acceptable to go into the basement and then up into the mobile home panel directly. This is because of the requirements of NEC 230–70, 550–23 and COMM 16.25. Also note that the mobile home panel is not rated as "Service Entrance Equipment." It is also unacceptable if there is only a crawl space or slab because of NEC 110–26(e).

3. Install mobile home metering pedestals with the meter pointed toward the driveway or street, or away from the mobile home. It is not acceptable to point the meter toward the home or away from the driveway. MU will spot the location of metering facilities to comply with code clearances.

   The metering pedestals must be labeled in mobile home parks or RV parks where it is not obvious what it feeds.

4. The following are basic Electrical Code Requirements for Mobile Homes (NEC 550–23):

   A. Service shall be 120/240 single–phase.

   B. The service entrance equipment shall be rated at least 100 Amp, be weatherproof, and be mounted at least two feet above ground level.

   C. The service entrance equipment cannot be mounted on the mobile home, must be within sight of the mobile home, but not more than 30 feet from the mobile home.

   D. The service entrance equipment must have at least a 50 Amp 120/240 volt breaker or fuse for feeding the mobile home. The norm is 100 Amp or more.

   E. There shall be branch circuit capabilities in the service entrance equipment for serving an accessory building, structure, or additional electrical equipment. This is often used to feed a well or out–building. Wisconsin code does not require a single main disconnect for mobile homes.

   F. The service entrance equipment should have provisions for serving an outside 15 or 20 Amp, 120–Volt GFI outlet.

   G. Two 8–foot ground rods with a minimum of 6–foot separation shall be installed. The grounding electrode conductor shall be at least #6 copper and run into the service entrance equipment (not meter socket).

   H. The cable or cord run from the service entrance panel shall be a four–conductor cable (two hots, neutral, and an equipment ground).

5. The wood post in option #1 & #2 shall extend out of the ground by at least four feet. This is to accommodate telephone and/or CATV on the sides of the wood post.

6. All load conductors shall be installed by the customer.

7. The proper depth and tamped back–fill is critical to minimize frost heave and future potential customer maintenance costs.

8. On overhead service drop installations, it is critical to have a tall enough pole to maintain code clearances. Some of the common, basic clearances are as follows: (Note that one foot has been added to account for conductor sag when loaded)

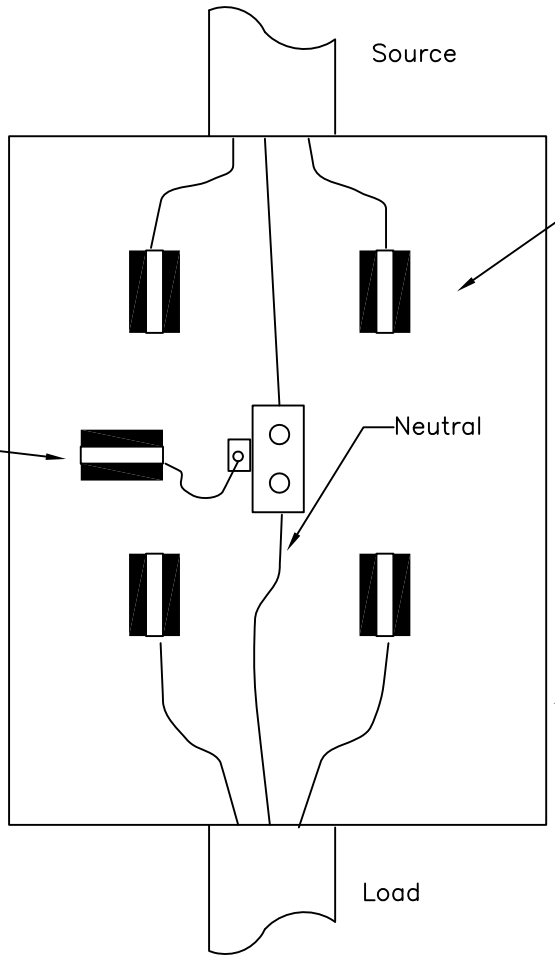
   A. Over the mobile home or garage roof — 9 feet
   B. Lawns or sidewalks (Pedestrian Only Areas) — 13 feet
   C. Roads, streets, alleys, parking lots, and driveways — 18 feet
   D. Horizontal clearance from wells to service drop (see clearance section for specifics (Section 7)) — 14 feet

9. Milbank Catalog #U8980–0–KK pedestals are not acceptable for mobile homes because they lack an accessary breaker position. This pedestal can, however, be used if Note #2 applies.

10. MU requires UG Services in all new mobile home parks. This is because of OH clearance issues and moving mobile homes.

Diggers Hotline (Wisconsin) 811

Diagram of Connections



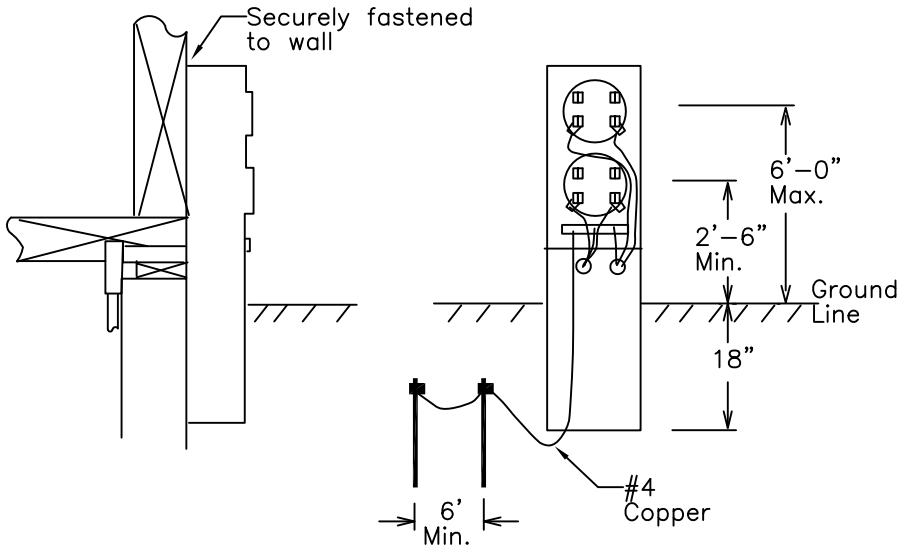
NOTES:

1. A fifth jaw can be added to most new–style,single–phase 120/240 meter sockets for 120/208 single–phase service. The fifth jaw shall be added in the 9 o'clock position as pictured and securely attached (Milbank Snap in Jaws are not acceptable).

2. This voltage is common in or near commercial areas. It is also common for large apartment complexes.

3. There are some existing installations with the fifth jaw in the 6'clock position (as compared to the normal 9 o'clock position) or with a wire jumper between the meter and the meter socket. These should be corrected if possible when upgrading the wiring.

4. Single phase service drop application shall be limited to 400 Amp. Larger installations shall have a three phase service drop with the single phase meters and connected loads balanced on all phases. The single phase meters must also be limited to 400 Amp.



NOTES:

1. MU requires all meter sockets to be rated at least 100 Amp, single phase, ringless, and sealable, have manual bypass horns (manual bypass lever is acceptable for single phase and required for three phase meter sockets, see 2–12) and must be approved by a nationally accepted testing firm such as UL. This standards page gives catalog numbers for common multiple meter installations for duplexes (3rd meter for common area if required per NEC 210–25 or PSC 113.0802 or 113.0803). For duplex or larger multiple meter installations, follow the basic MU meter socket requirements. It is also critical to follow the requirements of Section 3 for UG service terminations.

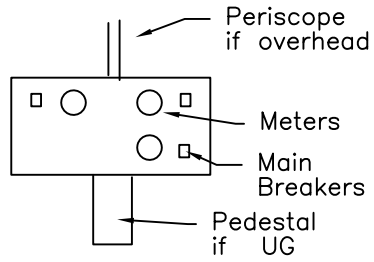
2. MU cannot run two services to a duplex. This may be desirable when the garages are between the two units, but it is a code problem. NEC 230–2(a) states that there can only be one service to a building. Comm 16.17 states that there must be a minimum three–hour firewall present for the duplex to be considered two buildings (this is a substantial masonary wall).

3. See page 2–7 for details on typical overhead services.
   See page 2–1 for details on typical underground services.

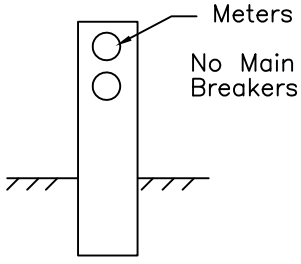
4. Each meter position must be labeled as per page 3–5, note 1.

5. Note 3–4, 3–5, and 3–6 for clearances for large multi–meter installations.

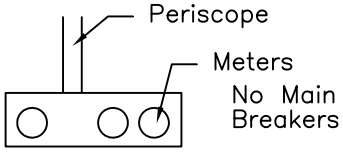
6. MU requires pedestals for UG installations on duplexs.



STYLE A



STYLE B



STYLE C

MFG	No. of Meters	Style	Amps Per Position	Main Bus rating	Meter Socket Catalog #	Pedestal Catalog # if UG	Fifth Jaw for 120/208 Applications
Milbank	2	A	125	200	U2852–X–PED–KK–K–1539	S2291–TO/S2571	K2381
	2	A	200	250	U2862–X–PED–KK–K1539	S2291–TO/S2571	K2381
	3	A	125	200	U2853–X–PED–KK–K1539	S2291–TO/S2572	K2381
	3	A	200	270	U2863–X–PED–KK–K1539	S2291–TO/S2572	K2381
Milbank	2	B	200	400	U1783–O–KK	–––––	5T24R
Milbank	2	C	100	200	U8032–XL–KK☆☆☆	––––	5T24R
	2	C	200	200	U1252–X–KK ☆	S2291–TO/S2571	5T24R
	3	C	100	300	U8033–XL–KK☆☆☆	––––	5T24R
	3	C	200	225	U1253–X–KK ☆☆	S2291–TO/S2571	5T24R

Electrician must consider Main Bus Rating when designing an installation.

The NEC requirements of load calculations are critical (NEC 220).

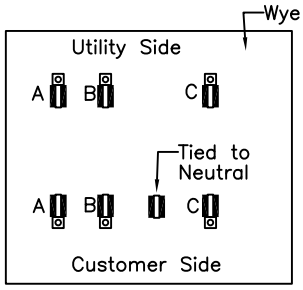
Note that commercial applications may require specialty meter gear to meet the minimum bus rating.

☆ Add K1–PED to catalog number if underground

☆☆ Add K3–PED to catalog number if underground

☆☆☆ Not for use on underground

VIEW OF METER SOCKET



7 Jaw Meter Socket
Used for:
120/208 4–wire 3 Ø/wye
277/480 4–wire 3 Ø/wye

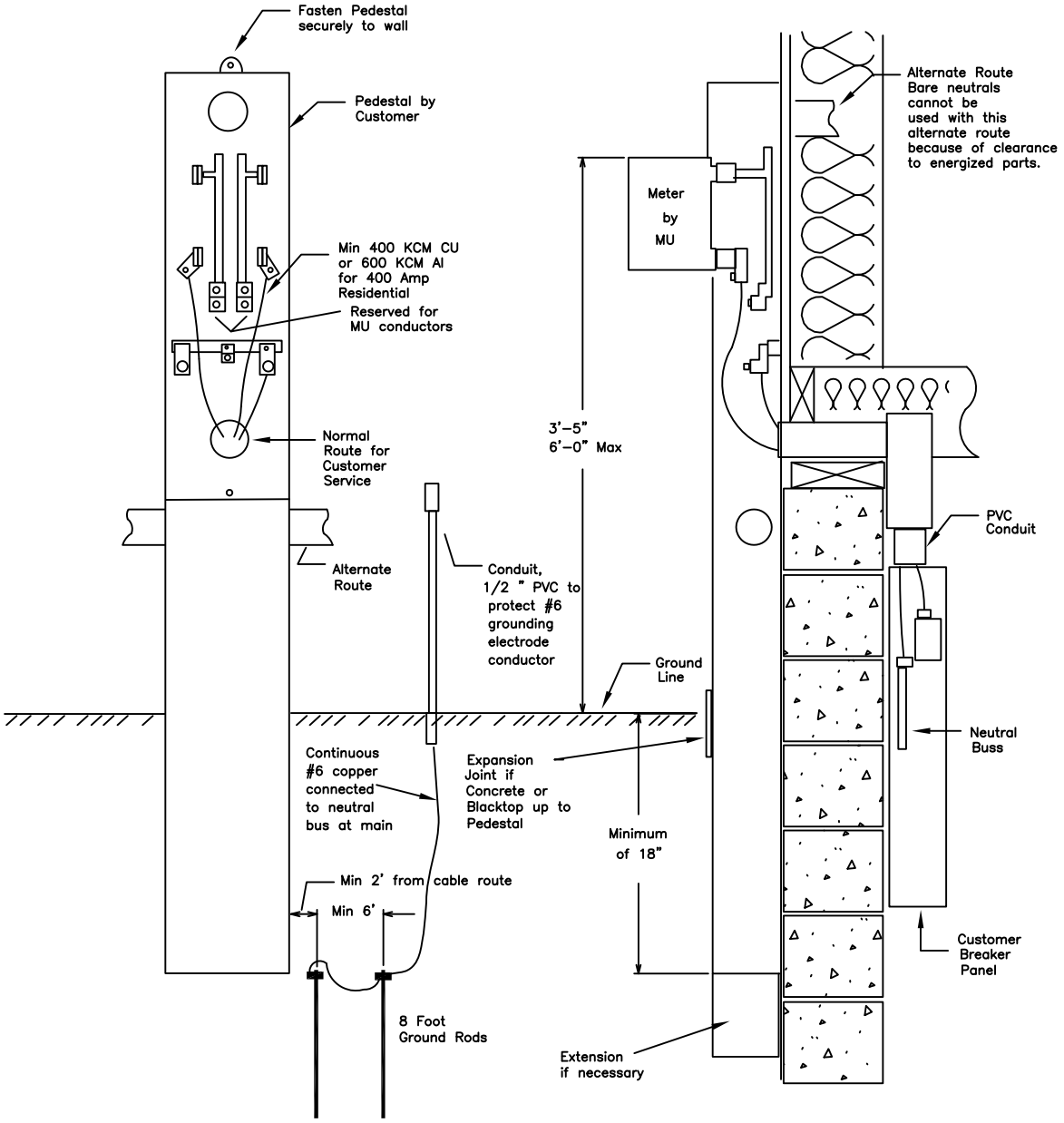
Basic Meter Socket Requirements

1. Ringless style, 200 Amp minimum rated, clamp type jaws, 600 volt rated, wrench operated connectors (not screwdriver), sealable, and provided with protective shield covering the jaws.
2. The meter sockets shall have a manual by–pass, designed to visually check the by–pass connections with meter installed. Also it must be designed so the cover cannot be installed with the by–pass closed.
3. The phase designations are commonly used designations by electricians. They do not indicate clockwise or counter–clockwise rotation.

APPROVED METER SOCKETS

	7 Jaw 120/208 277/480	7 Jaw 120/208 277/480	7 Jaw 120/208 277/480 120/240
Type	UG Pedestal	OH	UG Meter Socket
Similar To	p.2–1	p.2–7	p.3–2
Anchor	———	U42572–HO/ HLO	U42572–HO/ HLO
Landis&Gyr (Siemens)	40407P–9WI	40007(HQ–7)	40407(HQ–7U)
Murray	———	RH–173–GR	RH–173–GR
Milbank	U9107–O & S3488 (ext.)	U9700–XL	U9701–XL

STANDARD EQUIPMENT

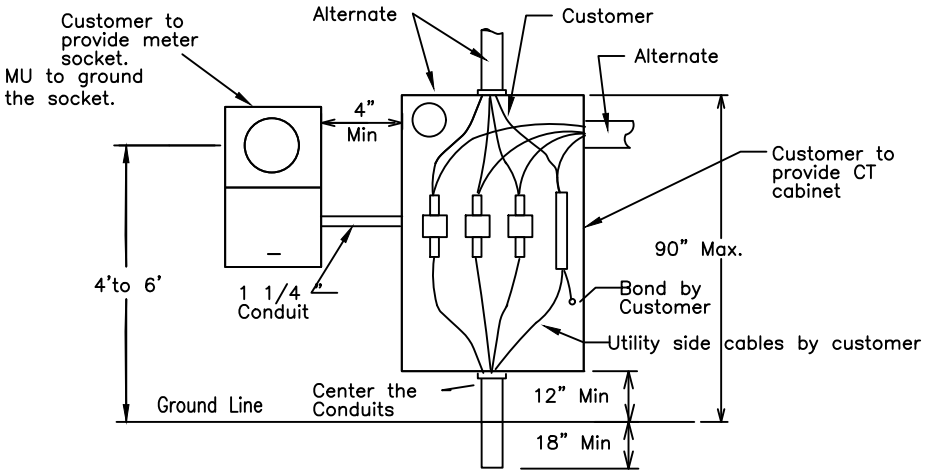


Manufacturer	Catalog #	Extension Cat # if needed
Milbank	U1748–0–WI–K1350	S1848
Landis & Gyr (Siemens)	47604P–9WI	
Anchor	MP44342–WI	

NOTES:

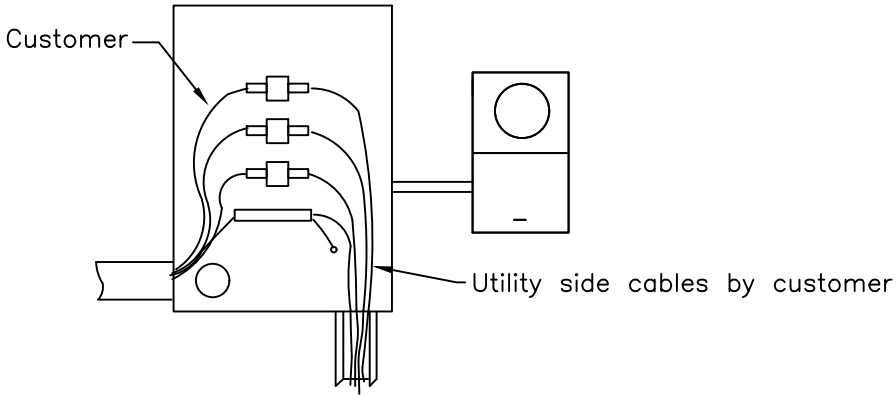
1. This is a 320 class meter (400 Amp Residential). Designed for 320 Amps continuous and 400 amps intermittent.
2. See page 2–2 for grounding options. No grounds allowed in or on meter pedestal.
3. See page 2–3 on general residential wiring considerations.

PREFERRED



ALTERNATE

ALT. Galva–Closure Cabinet



Notes:

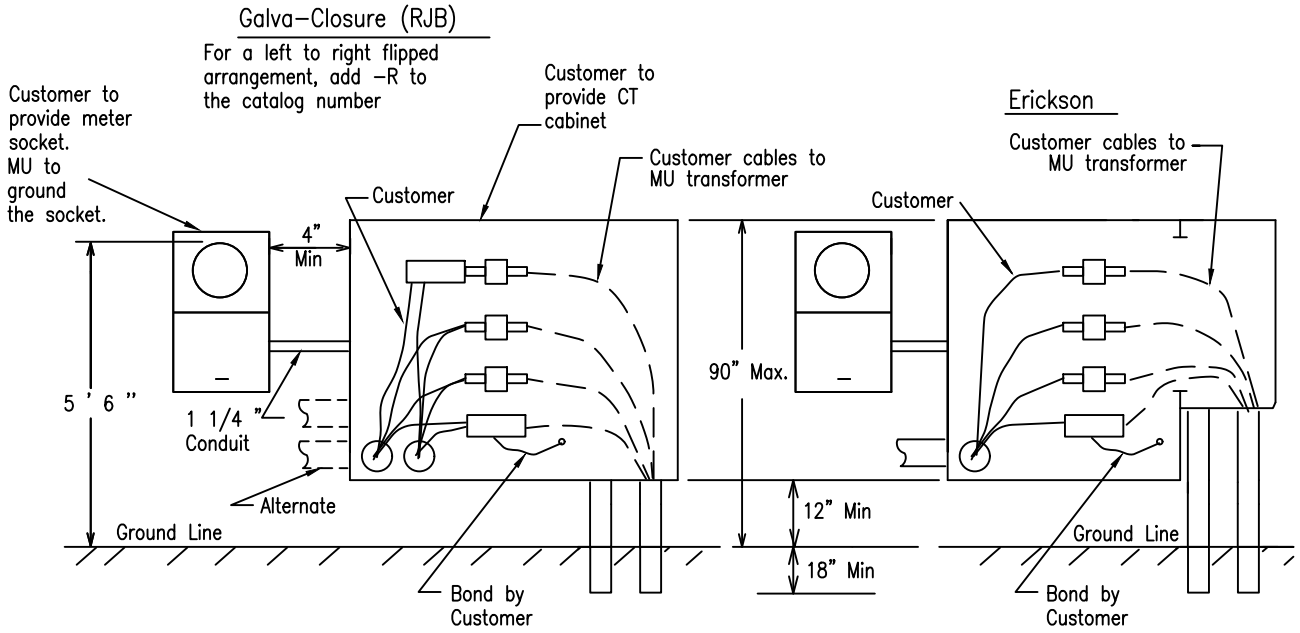
1. The CT cabinet shall be mounted outside.
2. The 320 Amp plug–in meter socket is standard for residential. Consult MU before using CT cabinets on 400 Amp services.
3. The CT cabinet must be bonded per NEC 250–102.
4. MU cannot size the customer's service entrance conductors.
5. Minimum clear space in front of cabinet and/or meter shall be 4 feet beyond the cover in the extended position
6. For all C&I services 400 Amp or larger, the customer shall provide an active telephone number to read the meter remotely. See ? for telephone detail.

METER SOCKETS

	Three Phase
Manufacturer	13 Terminal 120/208, 277/480
Anchor	RTSS13–13W–2–HP–SR1
Meter Devices	3040A–13 with 110–54–583
Milbank	UC7449–XL with TS10–0109
Galva–Closure (RJB)	MS–2034–13 with 10 pole test switch

CT CABINETS

Size	# Wires	Mfg. Catalog # HxWxD inches	Unprotected Withstand Amps	Bonding Jumper (see above)	Conduit
400 Amp See Note 2	3–Wire	Erickson 1182–1WPS 45.5X20X7.25	42,000	1/0 Copper	1–4"
		Galva–Closure (RJB) WPS–403UG 42X20X8.5			
	4–Wire	Erickson 1182–2WPS 45.5X20X7.25	42,000		
		Galva–Closure (RJB) WPS–404UG 42X20X8.5	65,000		
		Electro–Mechanical Industries CTB346–W 48X30X10	65,000		
600 Amp	4–Wire	Erickson 1076–2WPS–LE 60X36.5X15	65,000	2/0 Copper	1–4"
		Galva–Closure (RJB) WPS–604UG 54X36X13	65,000		
		Galva–Closure Alternate ☆ WPS–604UGA 48X46X13	65,000		
800 Amp	4–Wire	Erickson 1076–2WPS–LE 60X36.5X15	65,000	2/0 Copper	2–4"
		Galva–Closure (RJB) WPS–804UG 54X36X13	65,000		



Notes:

1. The CT cabinet shall be mounted outside.
2. The CT cabinet must be bonded as per NEC 250–102.
3. Minimum clear space in front of cabinet and/or meter shall be 4 feet beyond the cover in the extended position
4. For all commercial and industrial services 400 Amps or larger, if required, the customer shall provide an active telephone number for MU use to read the meter remotely. Call MU meter department for telephone interface details.

METER SOCKETS

	Three Phase
Manufacturer	13 Terminal 120/208, 277/480
Anchor	RTSS13–13W–2–HP–SR1
Meter Devices	3040A–13 with 110–54–583
Milbank	UC7449–XL with TS10–0109
Galva–Closure (RJB)	MS–2034–13 with 10 pole test switch

CT CABINETS

Size	# Wires	Mfg. Catalog # HxWxD inches	Unprotected Withstand Amps	Bonding Jumper (see above)	Conduit
1000 Amp and 1200 Amp	4–Wire	Erickson CUCT–124WPS 60X51X15 Galva–Closure (RJB) WPS–1204UG 48X45.75X13	85,000 85,000	4/0 Copper	3–4"
1600 Amp	4–Wire	Erickson UCT–164WPS 60X60X15 Galva–Closure (RJB) WPS–1604UG 60X60X15	85,000 85,000	250 Copper	5–4"
2000 Amp	4–Wire	Erickson CT204SG–WPS 60X66.5X15 Galva–Closure (RJB) WPS–2004–UG 60X60X15	100,000 85,000	350 Copper	6–4"

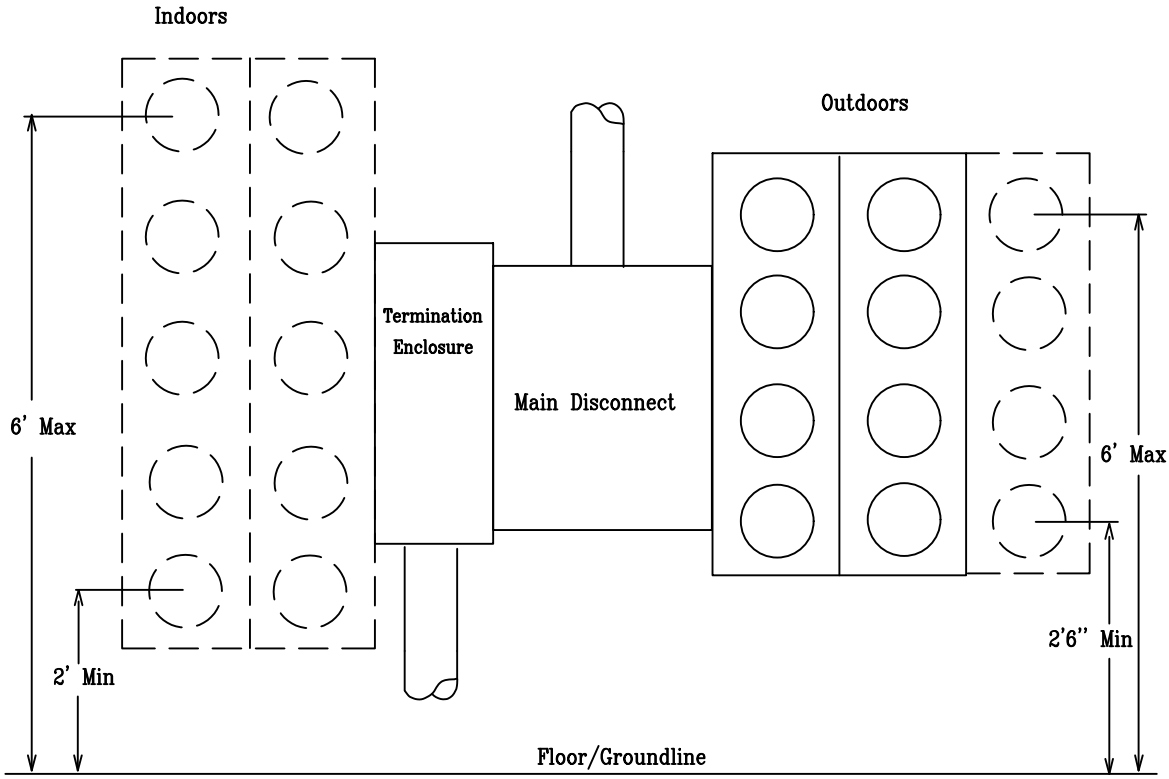
-GENERAL METER REQUIREMENTS-

1. All metering and associated equipment must be located outside in an accessible location to permit them to be read, inspected, and test as required by the utility. A 30" wide path to the meter must be kept clean of obstruction to a height of 6'-6"
2. Metering equipment shall be located on a solid structure that is free from vibration, potential mechanical damage, and supported to maintain the meter socket in a level and plump position.
3. Meter shall be protected from damage by falling ice, snow, or other objects. A protective shield for the meter shall be provided where a roof overhang does not shield the meter.
4. Meter shall be located in a dry location free of hazardous conditions such as explosive fumes or material.
5. Meter shall be installed in a non-high traffic areas such as driveways, sidewalks unless protected and approved by the Utilities.
6. The meter shall be at least 36" from any part of gas meter or gas service.
7. Meter shall have a clear working space in front of meters of a minimum of 48". The working space shall extend vertically of a height of 6'-6" or to the height of the equipment, which ever is greater and horizontally to 24" to either side of the equipment.
8. Current transformer cabinets (CT Cabinets) shall have a clear working space in front of 48" greater than the width the cabinet cover in an extended position of 90°
9. Meter shall have a minimum of 4" of clearance on all sides of the meter socket.
10. Meter shall not be installed in a patio, porch, deck, carport area, animal enclosure or areas likely to be enclosed. Changes to the customer's premises shall not result in making an existing metering location unsafe or inaccessible for reading, inspecting, or testing. The customer will be required to make changes to this wiring if such changes create a situation that does not comply with these rules. If after a reasonable length of time has passes after receiving a non-compliance notification from the utility and the customer has not suitably brought the installation into compliance, the utility will terminate service until the non-compliance has be remedied.
11. Meters shall not be installed on mobile homes unless mobile home is installed on a permanent basement or foundation consisting of footing and frost wall.
12. Customer-owned lightning arrestor or surge protection devices shall not be installed in meter equipment.
13. Metered and un-metered conductors shall not be connected to utility meter wiring.
14. Customers meters or instruments shall not be permitted on or within a metering enclosure (i.e. CATV or Telephone shall not install external ground clamps on meter sockets/ pedestals, CT cabinets, etc.)
15. MU uses 90°C conductor, therefor MU can not terminate on customers main disconnects. MU can terminate in integral termination enclosures or separate termination enclosures.

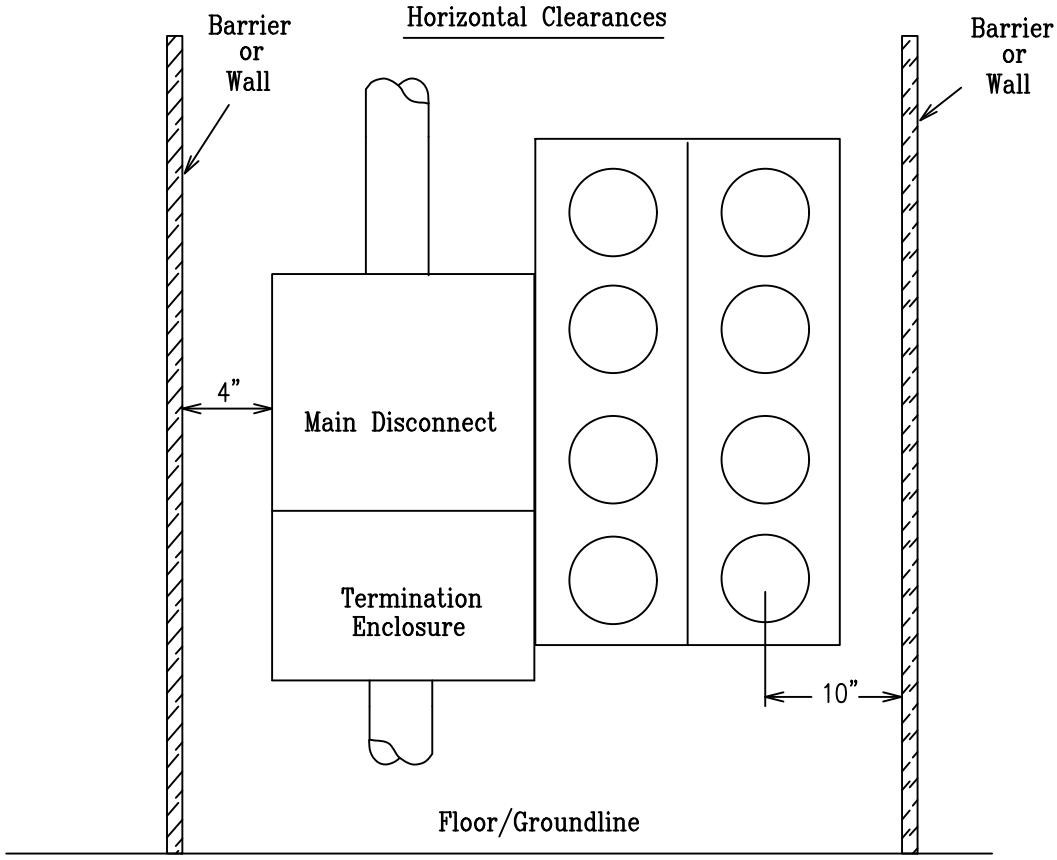
-MULTIPLE METERING ARRANGEMENTS FOR APARTMENT BUILDINGS AND COMMERCIAL PROPERTIES GREATER THAN 24 METERS CAN BE LOCATED INDOORS WITH ADVANCE APPROVAL FROM THE UTILITY. ALL BELOW REQUIREMENTS MUST BE MEET.-

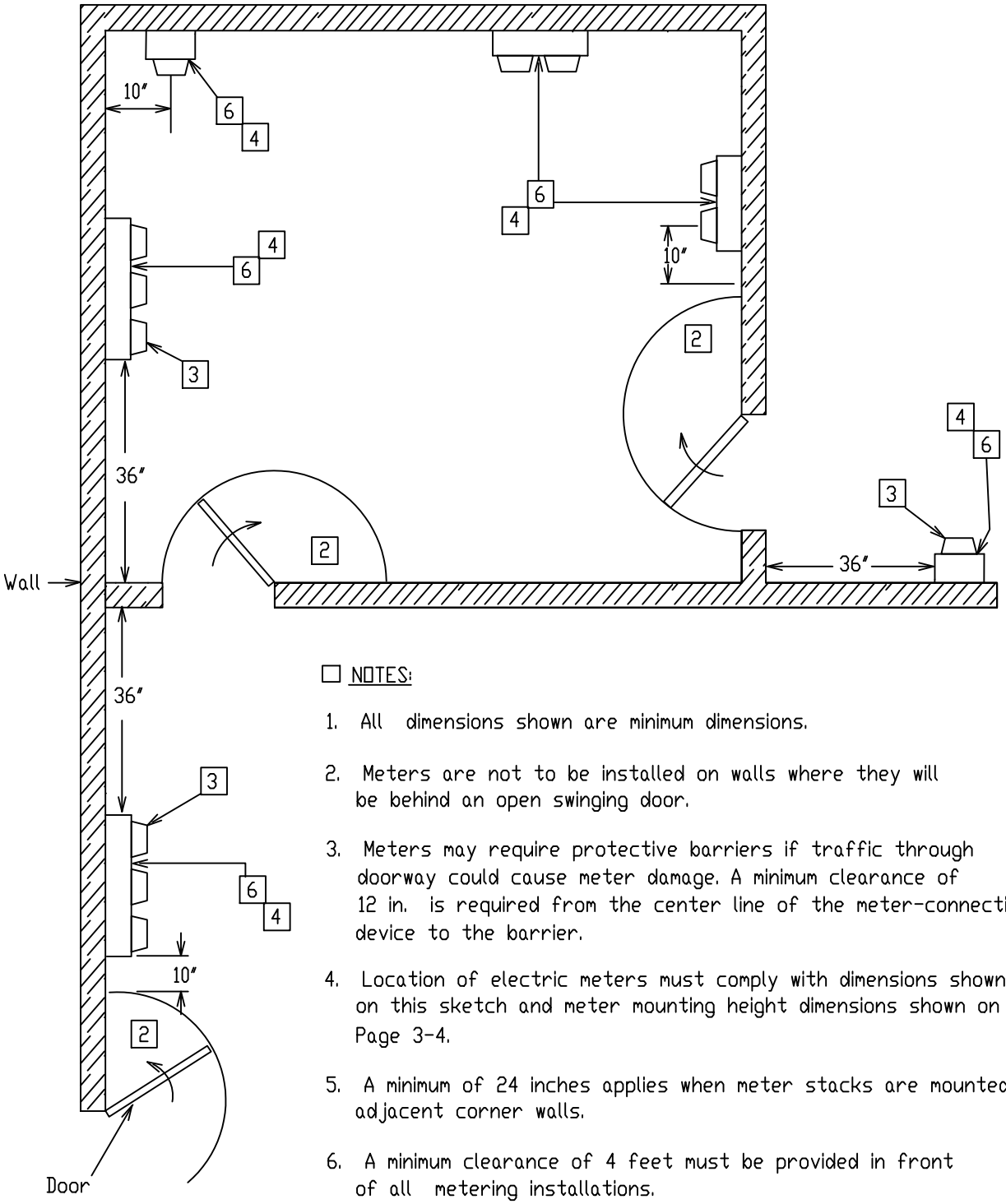
1. Customer shall furnish, install and maintain multiple metering equipment. This includes all meter sockets, switches fuses, circuit breakers, termination enclosures, load conductors, lugs and associated equipment.
2. Termination enclosures can be installed indoors or outdoors.
3. All meters and associated equipment shall be installed in one dedicated metering room. No other equipment such as boiler, HVAC equipment, Pumps, Water meters, telephone equipment, CATV equipment, networking equipment, gas meters, etc. Metering room shall not be used for storing any material.
4. Sumps are permitted in metering room as long as the placement and equipment meets clearance requirements outlined in this manual.
5. Metering room must be located on the lowest level of the building such as a basement, underground parking garage or ground level if it is the lowest level.
6. Metering room must be located such that the wall containing the meters are on the outside wall.
7. Metering rooms must be located within 100 feet of a service door where utility employees will enter the building.
8. Customer shall supply and mount a combination style Knox box next to the service door containg a key for 24 hour access.
9. Customer shall supply a combination style door handle with a keyed override on the door to the metering room.
10. Each meter socket must be identified with the same permanent label identification as the space that it meters both inside and outside of the metering panel. This identification should be on a non-removable part of the metering equipment. The identification label shall contain raised or indented letters/numbers that can not be modified once installed marker does not meet the requirement of "permanent label identification".
11. Customer shall supply a metering socket to be used for a utility supplied communication gateway and covered with a clear blank cover.
12. Customer shall supply a ¾" conduit from the gateway meter socket through the outside wall to be used for an utility installed antenna.
13. Meter sockets with disconnection means shall be located to the left or right side of meter. Disconnecting means above or below the meter are not permitted
14. Meter socket banks with individual disconnecting means shall all be located on the same side
15. Each meter socket must have a horn type of manual level by-pass, be ringless, sealable and UL approved.
16. Metering room must be constructed to provide a minimum working clearance of 48" in front of the meter and 24" on either side of the meter panel. Headroom shall be a minimum of 6'-6" or the height of the equipment, whichever is higher.
17. There shall be a minimum of 4" clearance around the meter. Where the termination, switch, fuse cabinet or switch handles have less than 4" clearance . a spacer shall be required.
18. All metering sockets shall be located no closer than 10" to a barrier or wall.
19. The main entrance enclosure or termination enclosure shall be at least 4" from any barrier or wall.
20. Multi-metered installation shall be installed to balance the load of the service.

Vertical Clearances



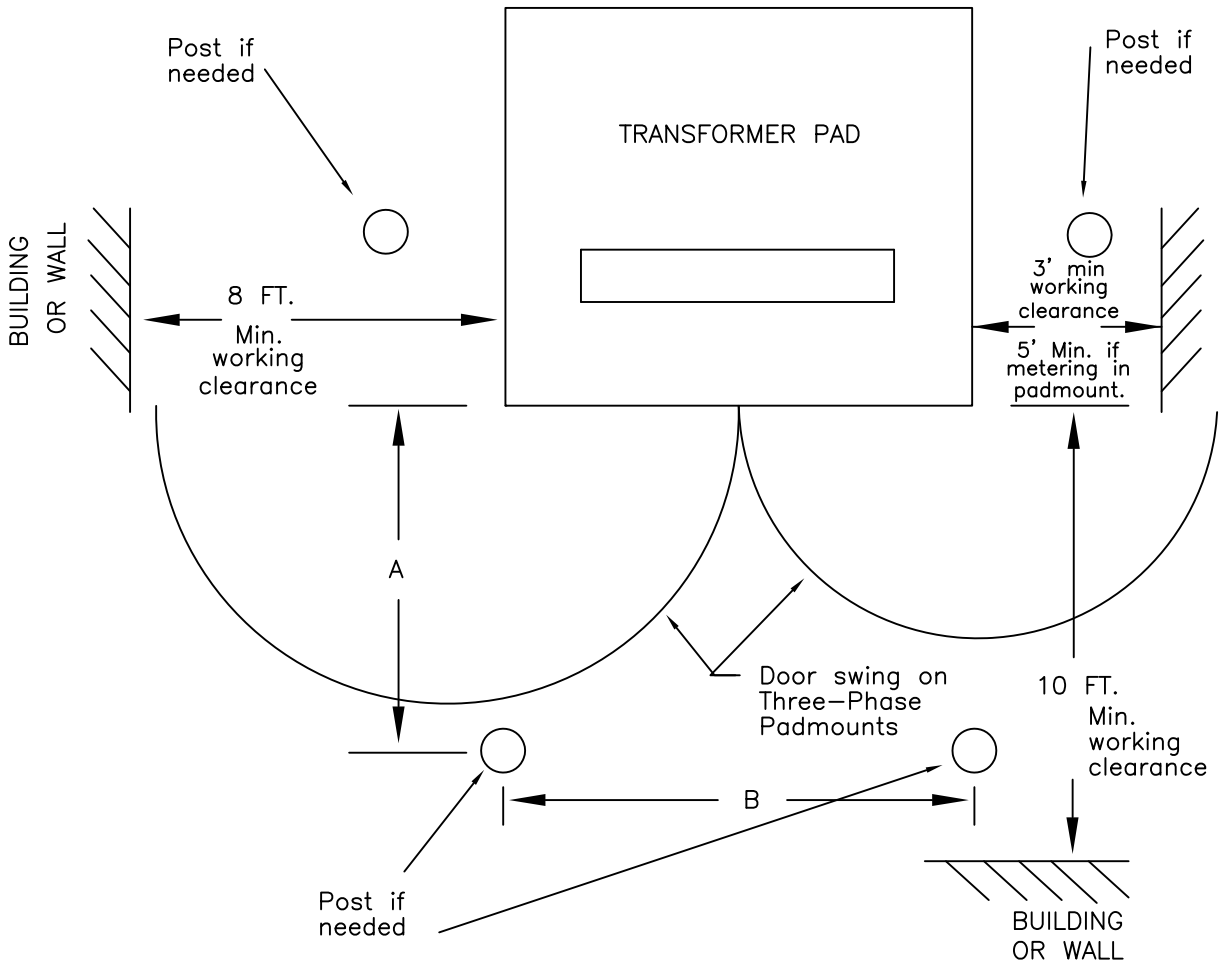
Horizontal Clearances



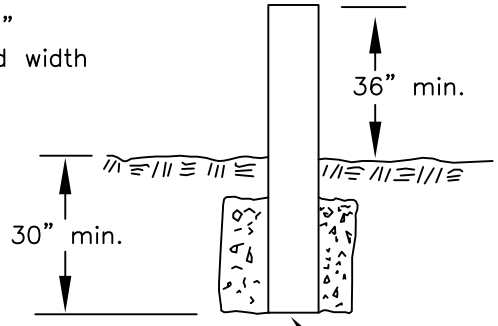


☐ NOTES:

1. All dimensions shown are minimum dimensions.
2. Meters are not to be installed on walls where they will be behind an open swinging door.
3. Meters may require protective barriers if traffic through doorway could cause meter damage. A minimum clearance of 12 in. is required from the center line of the meter-connection device to the barrier.
4. Location of electric meters must comply with dimensions shown on this sketch and meter mounting height dimensions shown on Page 3-4.
5. A minimum of 24 inches applies when meter stacks are mounted on adjacent corner walls.
6. A minimum clearance of 4 feet must be provided in front of all metering installations.
7. The utility shall be consulted concerning the location of metering equipment before metering equipment is installed.



All single phase A=24", B=48"
All three phase A=60", B=pad width



Concrete filled 4" or 6" Steel Pipe or minimum of 6"x6" treated wood post

Diggers (Wisc.) 811

NOTES:

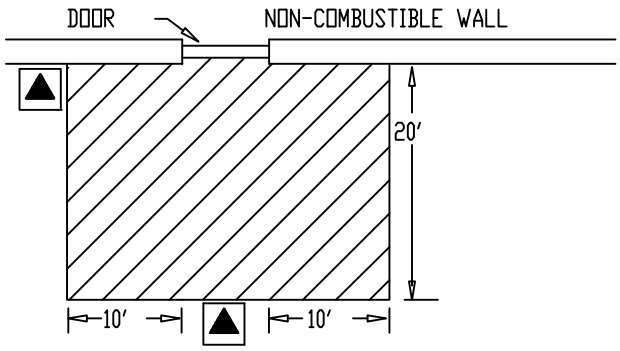
1. See pages 3–11a and 3–11b for code clearances to combustable walls, doors, windows, intakes, etc.
2. Protective posts are required where the transformer is subject to vehicular traffic. Installation and cost of this protection is the responsibility of the customer.

This is reprinted from Vol. 1 of the Wisconsin State Electrical Code (PSC 114.317)

I NON-COMBUSTIBLE WALLS

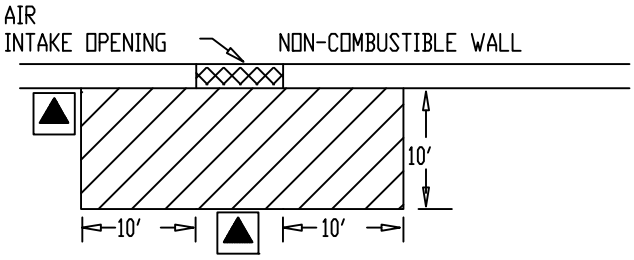
Padmounted oil insulated transformers may be located directly next to non-combustible walls, but not closer than 3 ft., if all of the following clearances are maintained from doors, windows and other building openings.

Combustible walls are walls of Type No. 8 buildings as determined by COMM 51.03. Note that Type 8 buildings are "unprotected wood frame". Veneers of stone, brick, metal, etc, don't change the classification unless rated by UL as a Type 7 assembly.



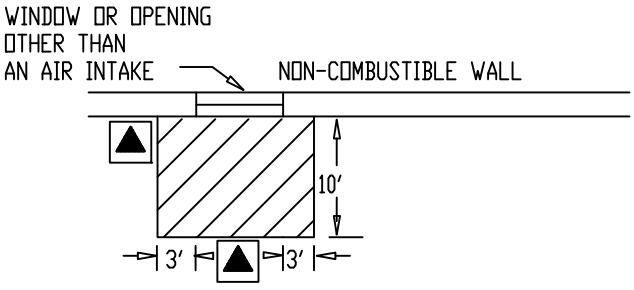
A. DOORS

Padmounted oil insulated transformers shall not be located within a zone extending 20 ft. outward and 10 ft. to either side of a building door.



B. AIR INTAKE OPENINGS

Padmounted oil insulated transformers shall not be located within a zone extending 10 ft. outward and 10 ft. to either side of an air intake opening. If the air intake opening is directly above the transformer, there must be a 25 ft. vertical distance from the opening to the transformer.



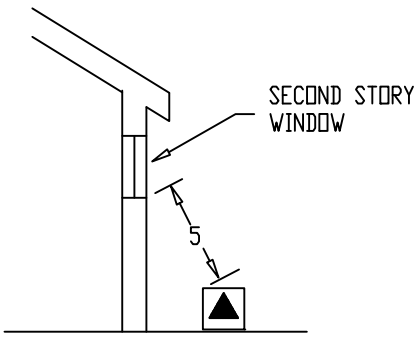
C. WINDOWS OR OPENINGS OTHER THAN AIR INTAKE

1. First Story

Padmounted oil insulated transformers shall not be located within a zone extending 10 ft. outward and 3 ft. to either side of a building window or opening other than an air intake.

2. Second Story

Padmounted oil insulated transformers shall not be located less than 5 ft. from any part of a second story window or opening other than an air intake.



II. COMBUSTIBLE WALLS

A. Padmounted oil insulated transformers in sizes up to and including 100 KVA shall be located according to the provisions set forth for non-combustible walls.

Note: Installations with 75KVA three phase padmounts should be designed with upgrades to 150KVA in mind.

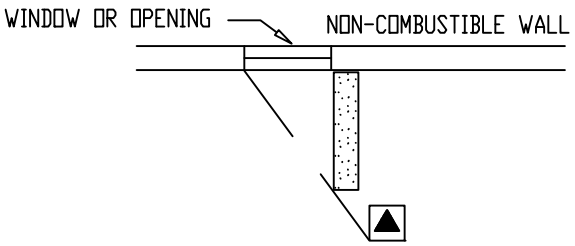
B. Padmounted oil insulated transformers in sizes above 100 KVA shall be located a minimum of 10' from the building wall in addition to the clearances from building doors, windows and other openings set forth for non-combustible walls. Also, a sump shall be installed for transformers in sizes exceeding 500 KVA if the immediate terrain is pitched toward the building. Contact Electric Distribution Engineering Department for sump specifications.

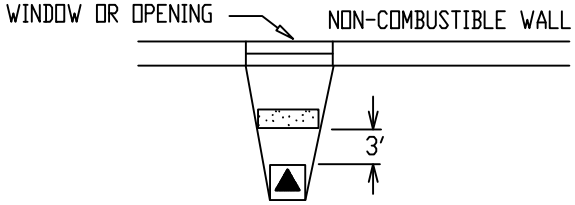
III. BARRIERS

If the clearances specified above cannot be obtained, a fire resistant barrier shall be constructed in lieu of the separation. The following methods of construction are acceptable:

A. NON-COMBUSTIBLE WALLS

The barrier shall extend to a projection line from the corner of the padmount to corner of the window, door or opening in question. The height of the barrier shall be 1' above the top of the padmount transformer.

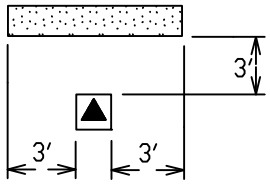




(SOLID OR WITH WINDOW OR OPENING) COMBUSTIBLE WALL

B. COMBUSTIBLE WALLS

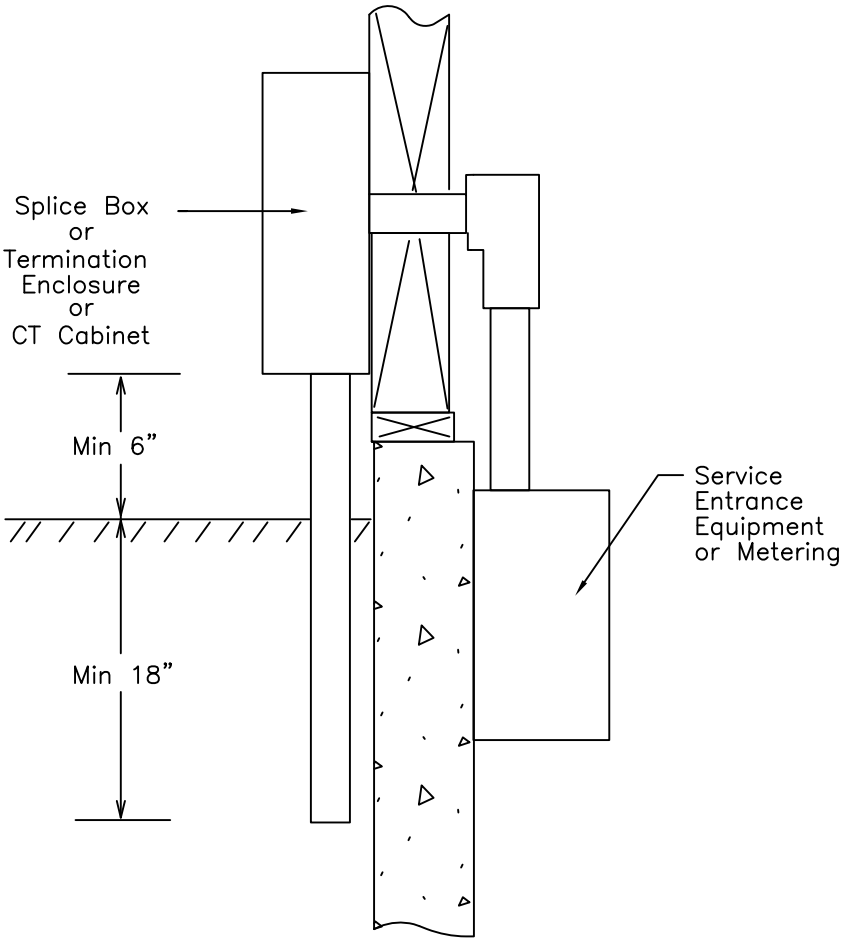
The barrier shall extend 3' beyond each side of the padmount transformer. The height of the barrier shall be 1' above the top of the padmount transformer.



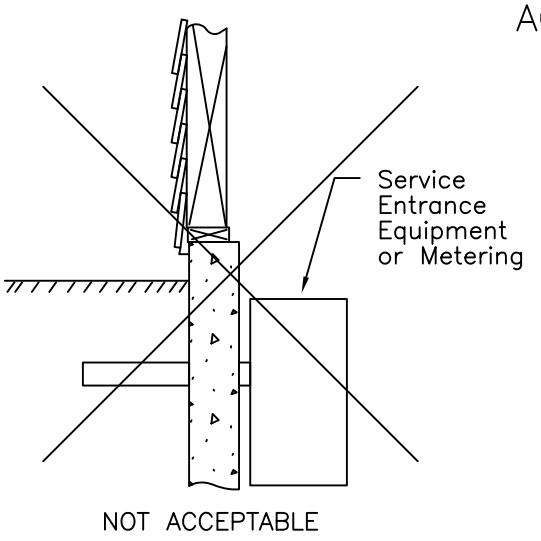
IV. FIRE ESCAPES

Padmounted oil insulated transformers shall not be located within a zone extending 20 feet outward and 10 feet on either side of the point where a fire escape meets the ground.

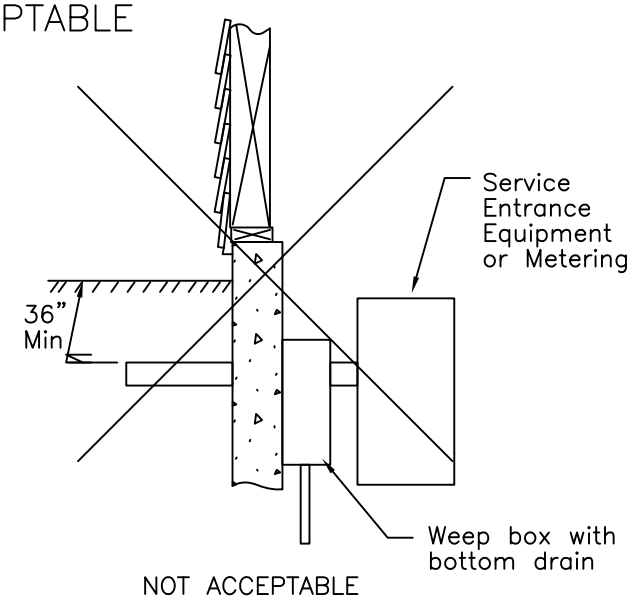
Padmounted oil-insulated transformers located beneath fire escapes shall have a vertical clearance of not less than 10 feet from the top of the transformer to the bottom of the fire escape.



ACCEPTABLE

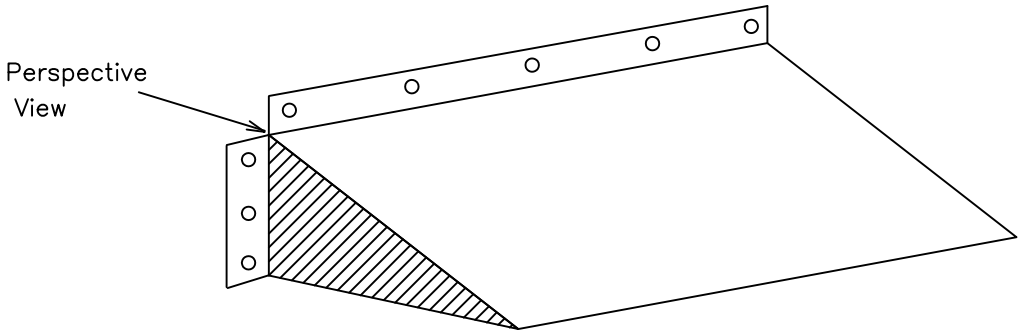


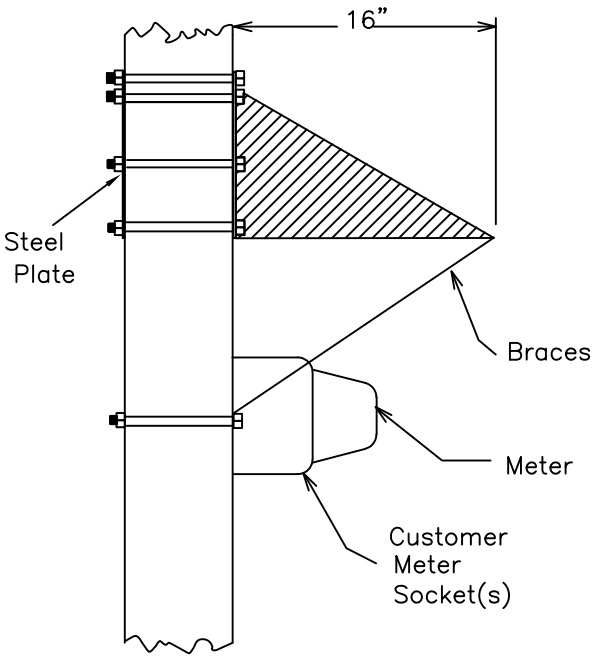
NOT ACCEPTABLE



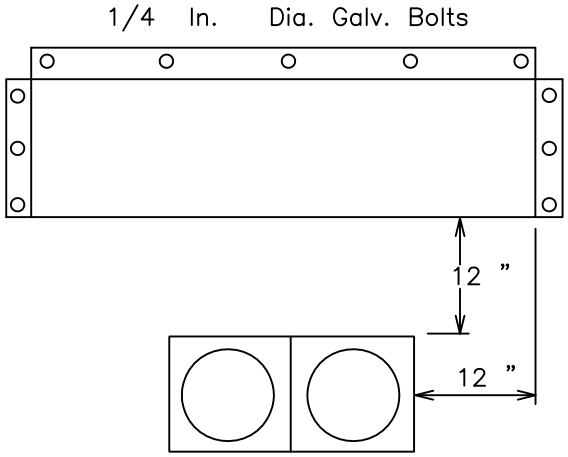
NOT ACCEPTABLE

The above shows how to and how not to deal with water seepage through basement wall problems. MU will not run its conductors through a basement wall because of the possibiity of causing water seepage problems.





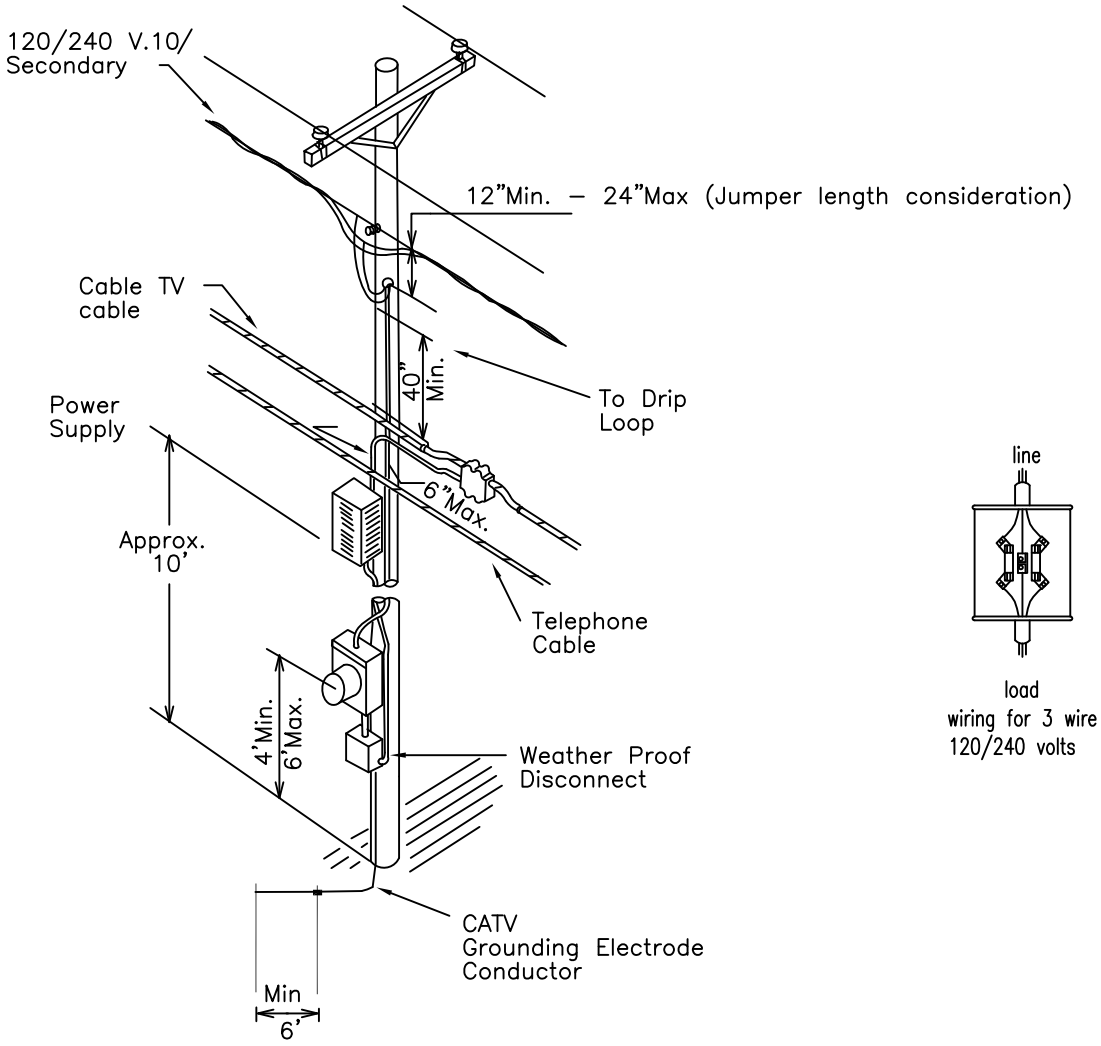
Wall section



Front View

NOTES :

1. A snow and ice shield is mandatory on the pitched side of metal buildings (provided by the customer). A shield is highly recommended for other areas. The customer is responsible for damage to the metering and meter sockets, etc.
2. Shield must be capable of protecting meter.
3. Metal shields (min. of 10 gauge) shall be primed and painted with rust resistant paint.
4. Wood or plywood shields shall be supported by braces.



1. Consult MU before installing in order to make sure that 120/240 volt service is available on the pole in question.
2. All installations must conform with all applicable electrical codes and MU requirements including requirements for clearances, climbing space and working space.
3. Only qualified and authorized personnel shall make this type of installation. They shall be trained and knowledgeable of the clearance requirements and working rules of the NESC (Vol.1 Wisconsin State Electric Code). The qualified personnel shall be trained and competent in:
    a. Distinguishing exposed live parts from other parts of electric equipment.
    b. The techniques necessary to determine the nominal voltage of exposed live parts.
    c. Minimum approach distances corresponding to the voltages to which the qualified personnel will be exposed.
4. All materials, except meter, shall be furnished and installed by the CATV company.
5. The meter socket shall be a minimum of 100 amp, ringless style, with manual by–pass horns. The service will be 3–wire 120/240 volt. Two wire 120 volt service is not acceptable.
6. The service entrance conductors shall be run in non–metallic conduit, Schedule 80. If metallic conduit is used, it shall be covered with a non–metallic covering 40" above and 72" below any communications attachments (NESC 239G.1.). The service entrance conductors shall extend 30" beyond the weatherhead and shall be rated with 600 volt insulation. WPSC will make connections to its' lines.
7. It is a code violation to have fused and unfused service entrance conductors in the same raceway.
8. The disconnect, power supply unit, meter socket and CATV cable shall be mounted on the same quadrant of the pole. There shall be a maximum of 6" between the service entrance conduit and CATV cable.
9. Grounding shall be in accordance with the National Electric Code article 250. Note that code requires a separate ground down the pole and a separate double ground rod. Do not run this ground into the meter socket (COMM 16.27).
10. When a unit contains both the service disconnect switch and the power supply, installation height shall be in accordance with applicable codes.
11. This unit may not be mounted on any pole on which there are transformers, primary risers, section cutouts, capacitors, circuit reclosers, regulators, traffic signals or similar fixtures without the consent of the MU Electrical Engineer.

Single Meter and Service Rule

The Company will normally supply to each customer's building, structure or premises:

1. One Service Lateral (drop)
2. One Class of Service
3. One Meter

There must also be an indication of ongoing need.

EXCEPTIONS to this rule are:

1. Multiple occupancy buildings (e.g., row houses, condominiums) which comply with the Wisconsin State Electrical Code by having areas under different occupancies separated by approved fire walls may be supplied by more than one service.

   Note: A fire wall is a 3-hour fire-resistive wall which shall be a substantially constructed masonry wall running from the foundation and extending to the roof. A wall constructed of materials other than masonry must be approved in writing by a verified testing company and/or building inspector or fire department. (COMM 16.17)

2. Fire pumps or other emergency electrical systems requiring separate service. (MU suggests tapping ahead of the main disconnect. This will avoid ongoing service charges and possible special facilities charges.)

3. Large or unusual loads requiring additional services or in cases where, in the judgement of the utility, voltage regulation would be unreasonable due to load size and distance between loads.

4. Where more than one point of delivery or more than one point of metering is necessary because of interruptible service rate, governmental requirements or regulatory rules.

   a. As of March 1, 1980, the Wisconsin Administrative code, PSC 113.0803 requires individual electric meters for nontransient multidwelling unit residential buildings, mobile home parks and for commercial establishments. Individual unit metering will not be required:

      1). Where commercial unit space requirements are subject to alteration with change in tenants as evidenced by temporary versus permanent type wall construction separating the unit spaces.

      2.) For electricity used in central heating, ventilating and air conditioning systems.

      3.) For electric backup service to storage heating and cooling systems or when alternative renewable energy resources are utilized in connection with central heating, ventilating and air conditioning systems.

5. Customers with an existing three-phase service do not qualify for an additional single-phase service.

6. Customers with an existing three-phase service would not qualify for a second three-phase service of a different voltage unless approved by the Company.

7. Customers with 120/240 single-phase requesting 120/208 three-phase are required to eliminate the single-phase service.

8. A property with a residence and a second building or facility used for domestic purposes (example: garage) would qualify for only one service unless the second building was more than 150 feet from the closest point on the residence. The second service would be a special facility charge.

Types of Service and Voltages Available

For other than one- or two-family dwellings, the Utility shall be consulted as to the type of service available before wiring layouts are made, equipment is purchased or when extensive wiring changes are contemplated.

The Utility furnishes 60 Hertz (cycles) alternating current, single- and three-phase, at various voltages; but not all types of service are available.

The type of service available to the customer is ordinarily determined by one or more of the following conditions:

A. Type of electrical system available at the customer's location.
B. Character and size of load to be served.
C. Temporary or permanent.
D. Underground or overhead service.

The Types of Services and Nominal Voltage Furnished

Note ANSI C84.1 - 1989 and PSC 113 on Voltage Standards.

A. Single-phase, 120/240 volts, three-wire.
Maximum 400 Amp (100 KVA). Overhead or underground.

B. Combination single-phase and three-phase, 208/120 volts, four-wire Wye.
Maximum 2000 Amp (750 KVA.) Up to 400 Amp service off of pole transformer.

C. Combination, single-phase and three-phase, 480/277 volts, four-wire Wye.
Maximum 2000 Ampere. Up to 400 Amp service off of pole transformer.

D. Combination single-phase and three-phase, 13,200/7620 volts, four-wire Wye. This service is available to customers upon MU approval. The customer's trasnformation shall be grounded Wye/grounded Wye. The customer is responsible for the protection of customer-owned equipment.

Electric service at other voltages and capacities may be obtained under special circumstances.

Enlargement of existing three-phase 120/240 volt, four-wire delta systems is not allowed.

Customers' requests for additional services or services which do not conform to these rules shall be treated as "special facilities." The customer is obligated, in accordance with Utility extension rules, for any added cost involved. MU reserves the right to deny special facilities.

Electric Overhead and Electric Underground Service Spotting -
Residential/Small Commercial 400-amp and Smaller

MU shall, in all cases, designate the location where the MU service will terminate.

The MU service spotting policy is based on the following guidelines:

1. The design should minimize MU investment in the service.

2. The customer should have options to locate the meter base outside our preferred location (these options may require a special facilities payment from the customer).

3. MU facilities shall not be located in areas that are likely to cause conflicts with decks, pools, etc.

The preferred residential and small commercial service spot is within six feet of the corner of the living space nearest the MU source. Several typical examples are shown below.

An overhead service is limited to a maximum of 150' because of voltage drop, clearance and conductor tension constraints.

An underground service from an overhead system has a riser cost and trenching which is billable to the customer as special facilities, along with other adders.

MU reserves the right not to locate a meter in an area that is likely to cause future conflicts with decks, pools, outbuildings, etc. The customer has the following options:

1. Locate the meter in the preferred zone at no cost (providing service length is not over 150 feet).

2. Locate the meter on the garage at no extra cost to MU (provided the spot is closer to the MU source than the preferred spot).

3. Pay special facilities cost to locate the meter in any location other than the conflict zone.

Variations - unusual house designs and variations in MU system construction will be encountered in the field. Each situation should be addressed individually, based on the guidelines included in this section.

Things to Consider When Evaluating Conflict Zones and Areas

The service spot and route should be selected to provide an acceptable point of delivery, taking into consideration the customer's preferred location. Considerations should be based on minimizing existing and future conflicts for maintenance and safety. Following are some of the items that should be evaluated when making this determination:

Enclosed areas, patios, porches, etc.
Carports
Fenced-in areas
Pools and hot tubs
Clearance problems/codes, etc.
Common wall for gas and electric meters
Potentially hazardous, high-traffic areas (sidewalks, driveways, alleys)
Installation and future maintenance costs
Remote locations that would make meter reading or maintenance difficult (for example, keys needed to get through back yard gate)
Septic systems and their alternate fields
Wells
Above-ground fuel tanks
Future buildings
Grade changes
Buried customer facilities
LP tanks and lines

Lightning damage due to induced electrical surges from nearby lightning strikes is a common problem in Wisconsin. Part of the problem is due to grounding problems. Because of poor grounding conditions, it is critical to bond all metallic systems. The theory is that by bonding everything, there will be little or no difference in potential between metallic systems (therefore minimizing damage). Bonding is also done for safety and code reasons. If you are correcting bonding problems, it is important to bond everything. Partial bonding could actually aggravate problems. Bonding should be done to the grounding electrode system in the following cases:

1. Metallic water piping and hydronic heating systems.

2. Natural gas or LP gas piping if built with black iron pipe. Bonds are desirable on other piping systems, but there are potential problems with bonds damaging the pipe.

3. TV antennae systems - Code requires these to be grounded to a rod by the most direct path possible. It is also important to bond this to the electrical system.

4. Satellite dishes - There should be a ground rod at the dish and a bond to the electrical system. See NEC 810-21 for information. Also, a three-prong outlet and surge suppressor is helpful at the controller. Note that the newer small dishes are not metallic and so avoid many of the bonding issues.

5. Lightning rod systems - It is important to bond this to the electrical system.

6. Structural Steel

7. Cable TV and telephone grounds where they enter the building.

Surge suppressors can also help. It is important, however, that all bonding be completed first. Note that plug-in type surge suppressors will only work on properly-installed three-prong outlets. Surge suppressors (lightning arrestors) that are installed at the main disconnect must be installed on the load side of a breaker or fuse. Note that a lightning surge will be over before the breaker can trip. Also, note that these devices do fail and the breaker protection will take the arrestor off line. If the arrestor is wired ahead of the main, arcing can continue, causing a fire.

Clearances for Electric Overhead Cable Services

This does not deal with secondary or primary clearances.
(Per NESC Table 232-1 and Table 234-1)

Vertical Clearances	Nominal Voltages to Ground 150v	300v	750v
Roads, Streets and Areas Subject to Truck Traffic	17'	17'	17'
Single and 2-Family Residential Driveways ⑨	16'	16'	17'
By Special WPSC Approval ②	13'	13'6"	17'
Drip Loops to Ground - Line Clearance for the Span Applies			
Unless by Special WPSC Approval ②	10'	10'6"	16'
Pedestrians-Only Areas to Ground	13'	13'	13'
Wisconsin DOT Highways	18'	18'	18'
Michigan Roads ③	23'	23'	23'
Over or Under Roofs or Projections (also railings, walls, or parapets around balconies or roofs) (Inaccessible) ④⑤⑥	9'	9'	9'
If Roof has Slope of 3 Horizontal and 1 or More Vertical (4" in 12" slope or more)	4'	4'	9'
Over or Under Roofs, Balconies, Decks, etc. (Accessible) ④⑤	12'	12'	12'
Over Roofs, Balconies, Decks and Service Attached to Building (Accessible) (If conductors or drip loop not readily accessible) ④⑤⑧	9'	9'	9'
Signs, Chimneys and Other Structures Not Classified as a Building	4'6"	4'6"	4'6"

Horizontal Clearances	Nominal Voltages to Ground 150v	300v	750v
Building Walls, Projections, Windows, Balconies, etc. ⑦	5'	5'	5'
Signs, Chimneys and Other Structures Not Classified as a Building	3'6"	3'6"	3'6"

Notes:

1. One foot is added to all vertical clearance to account for thermal or ice loading of the service cable. One foot was not added for vertical clearances for service drip loops and for horizontal clearances. For horizontal clearances, conductor blow-out must be considered.

2. Where the height of attachment to a building or other installation does not permit service drops to meet the normal values, the clearances may be reduced to the values listed. This reduction in clearance must be approved by MU.

3. This applies to all Michigan roads for open supply conductors. This does not apply to normal triplex or quadriplex cables.

4. A roof, balcony or other area is considered accessible to pedestrians if the means of access is through a doorway, ramp, window, stairway or permanently-mounted ladder. A permanently-mounted ladder is not considered a means of access if its bottom rung is 8 feet or more from the ground or other permanently-installed accessible surface.

5. Where these clearances cannot be obtained, the conductors and rigid live parts shall be guarded. (NESC 234C2)

6. See Figure 3 for an exception to roof clearance when using a periscope (through the roof raceway) and non-accessible roof or balcony and with voltages less than 300 volts to ground. NESC 234C3d (1).

7. This may be reduced to three feet in any direction from windows (above windows is accepted), doors, porches, and fire escapes if the service drop is attached to the building and not readily accessible. See Figure 2. NESC 234C3d (2).

8. From NESC 234C3d.

9. A driveway to a residence that can reasonably have trucks on it must not use this clearance. Examples are garbage and septic trucks that take most rural driveways out of this category for clearances.

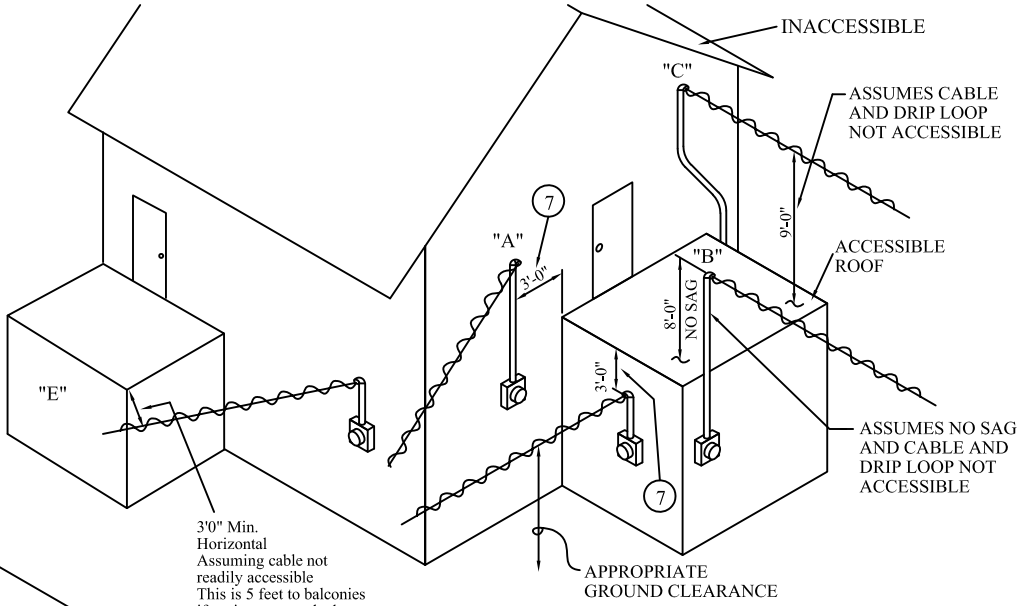
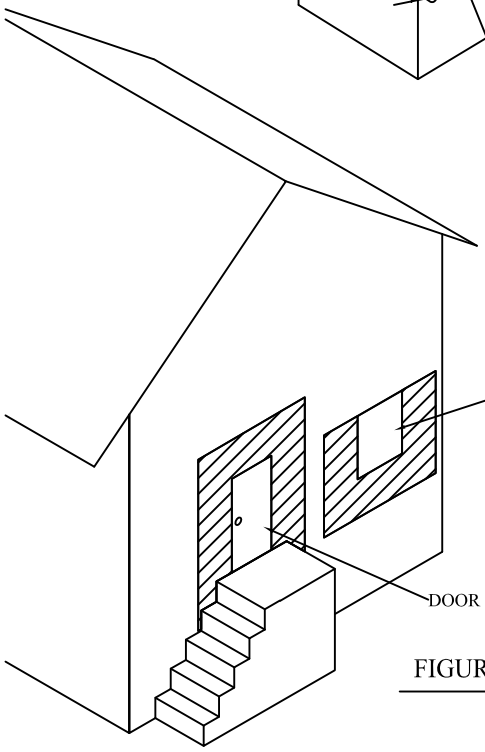
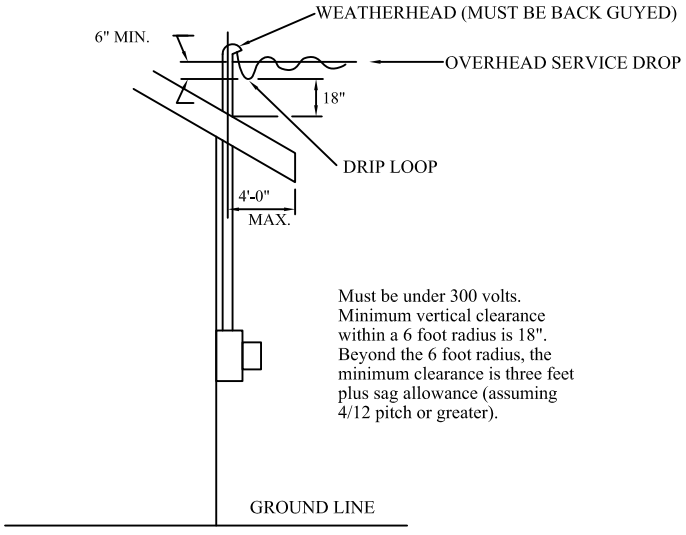


FIGURE #1



SERVICE DROP ATTACHMENT MUST BE CLEAR OF THE THREE FOOT ZONE.THIS ALSO INCLUDES THREE FEET OUT FROM THE DOOR, WINDOW, PORCH, OR FIRE ESCAPE. IT MUST ALSO NOT BE READILY ACCESSIBLE. APPROPRIATE GROUND CLEARANCES APPLY.

FIGURE #2



VIEW A-A

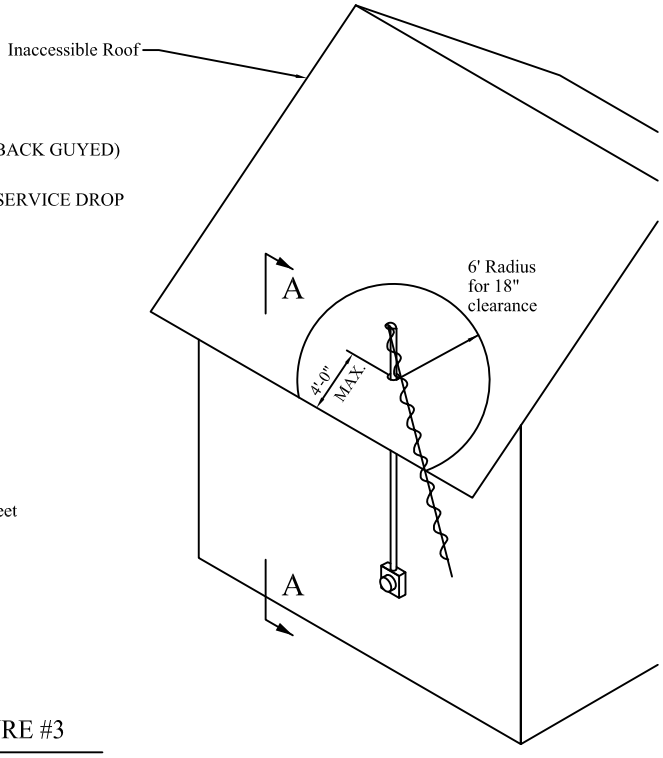
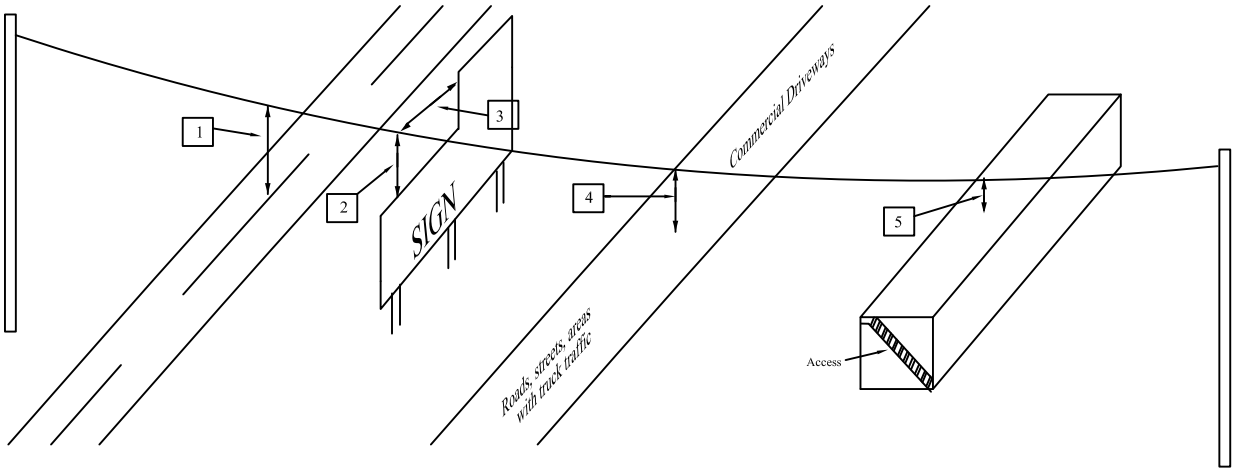


FIGURE #3

MENASHA UTILITIES ELECTRIC SERVICE MANUAL

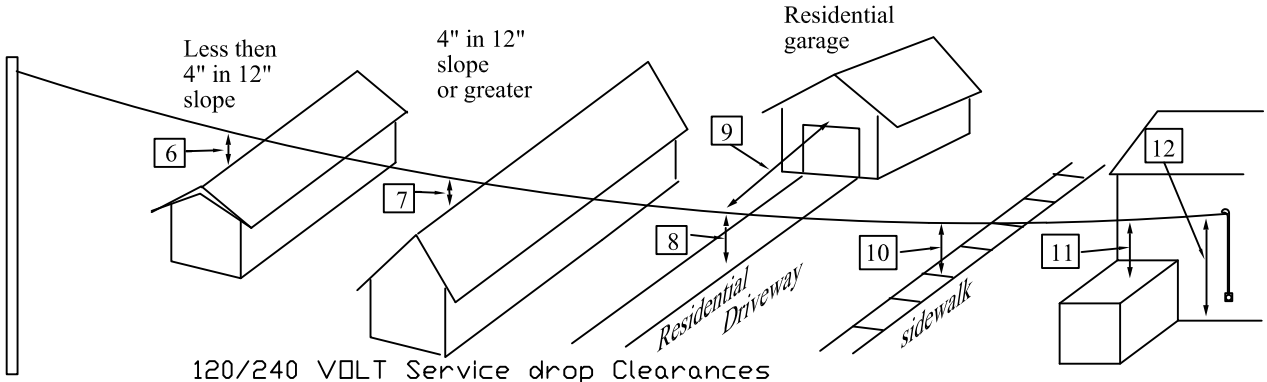
BASIC ELECTRIC CLEARANCES - SERVICES

7-1c



NOTES:

1. 18′ for Wisc. State and Federal roads.
   23′ for Mich. State, federal, county and local roads subject to through traffic.
2. 4′6″ vertical clearance to signs, chimneys and other structures.
3. 3′6″ horizontal clearance to signs, chimneys and other structures. Wind movement of the service drop must be considered and added to this.
4. 17′ Vertical to roads and areas subject to truck traffic.
5. 12′ over accessible roofs or balconies not attached to the building being served by the service drop.



120/240 VOLT Service drop Clearances
Note: Add 1 foot to all vertical clearances except to drip loops in order to account for thermal and ice loading.

6. 9′ if low sloped roof and inaccessible.
7. 4′ if steep roof and inaccessible.
8. 16′ to residential driveways. This can be reduced in special cases where higher attachment points can't be obtained. If there is a reasonable chance of truck traffic this 16′ clearance does not apply.
9. 5′ horizontal clearance to building. Wind movement of the service drop must be considered and added to this.
10. 13′ over sidewalks and pedestrian only areas. This does not apply if vehicles can reasonably be driven here.
11. 9′ over accessible attached roofs and balconies (assumes cable and drip loop not readily accessible).
12. Adjacent line clearance for the lines applies. In this example it would be 13′ (note 10). It can be reduced to 10′′ if no other options and is approved by WPSC.

Miscellaneous Clearances

Wells

Underground — 5 feet for electric or gas.

Overhead — Horizontal clearance must be no less than 3 4 of the required vertical clearance of the conductors to ground. A conservative guide is 14 feet on service drops and 20 feet on primary lines. Note OSHA working clearances. (PSC 114.234C8)

Private Septic Systems

Sewer Pipe — Gravity fed pipes - One foot.
Pressurized Pipes - Try to avoid. One foot by code.

Stored Materials

Overhead — Overhead lines shall not be run over areas designated for material storage where cranes or other types of high machinery are used unless adequate clearance can be provided for full use of the equipment (PSC 114.234C6).

Working Clearances

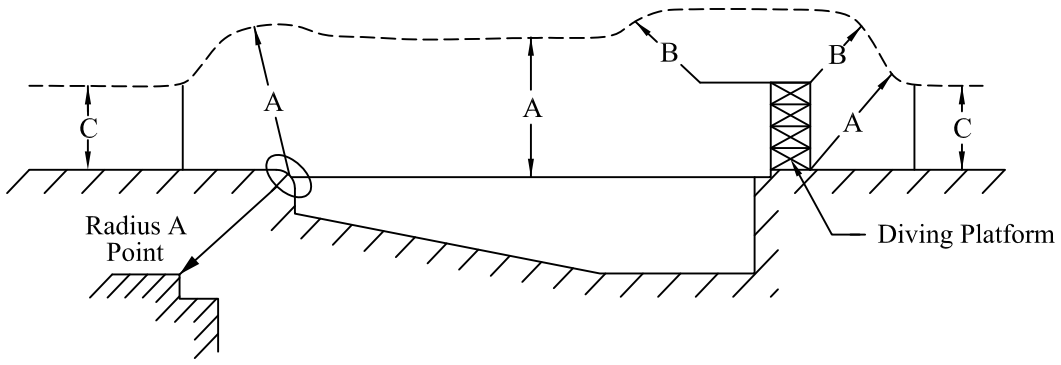
Following are the Department of Labor, Occupational Safety and Health Administration, Safety and Health Regulations for Construction. OSHA subsection N 1926.416(g)(2).

Voltage	Minimum personnel clearance, to any part of crane, or to the load in feet
69 kv and below	10
115 kv and 138 kv	11
345 kv	15

Swimming Pools (also includes Outdoor Hot Tubs per PSCW 7/00)

Underground — 5 feet of pool hot tub or auxiliary equipment (NESC 351C1)

Overhead — Shall be avoided by 10 feet horizontally. The following are clearances for utility service drops (under 750 volts). One foot is added for thermal loading. (PSC 114.234E1).
A=19 feet, B=15 feet, C=Normal Clearance



Padmount Transformers

See page 3-18.

Natural Gas Lines and Meters

Basic underground clearance from gas lines to all other utilities or below-ground structures is one foot (PSC 114.352E). It is recommended that clearance to wells and septic fields be 5 feet. Note the mound system clearances on page 7-5.

See page 7-3 for clearances involving gas meters.

Fuel Tanks

Overhead — Electric lines cannot be run over above-ground flammable liquid or LPG storage tanks. The horizontal clearance is 8 feet for secondary and services, 15 feet for all other electric lines. LPG tanks with a capacity of 1000 gallons or less are exempt. (PSC 114.234C7)

Underground — Underground cables shall not go under fuel tanks. They shall not come within 10 feet of above or below-ground tanks. Electric cables can come closer if installed in "Fiberglass Reinforced Epoxy" (FRE) conduit or other approved conduit. (See EDE for details).

Class I Hazardous Locations

Buried electric lines, meter sockets, CT cabinets, or termination enclosures must observe the following minimum horizontal clearances from the flammable fuel system components listed below:

Under fuel storage tanks	0 feet
Fill Pipe	10 feet
Dispensing device on tank	20 feet
Remote pump	10 feet

Consult MU for other Class I Hazardous locations. (NESC 127 and NEC 514-2).

Antennas

See page 7-4 for details.

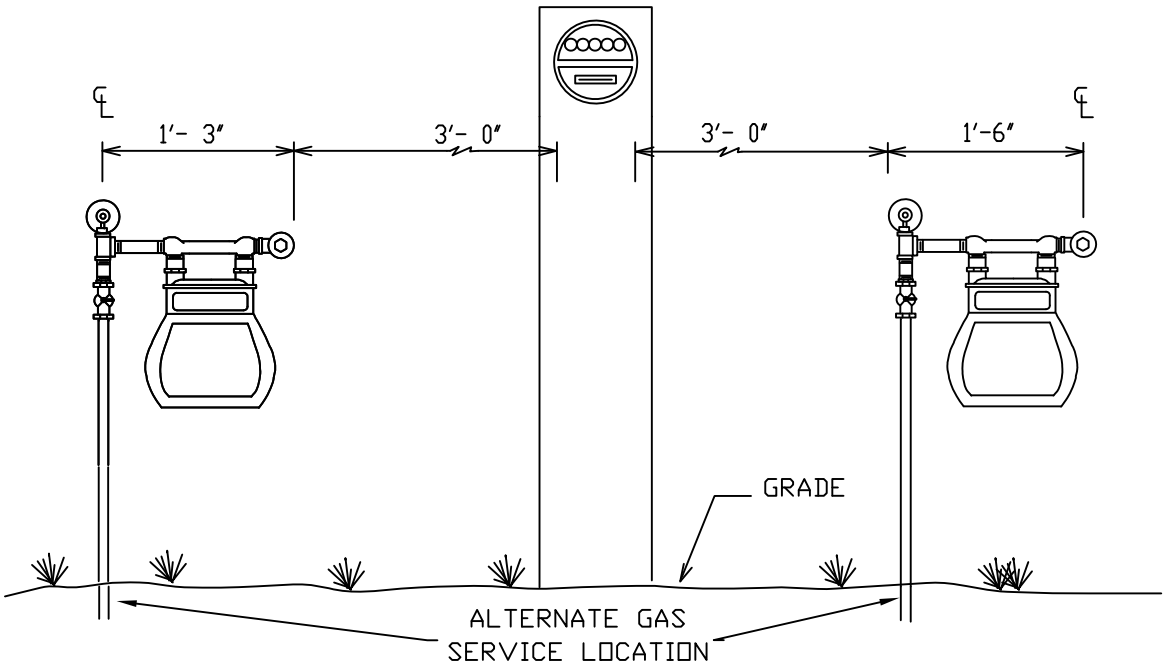
Buildings

Underground electric lines are not allowed under buildings unless installed in conduit. (NESC 351C2 and NEC 300-5c)

Special Cases

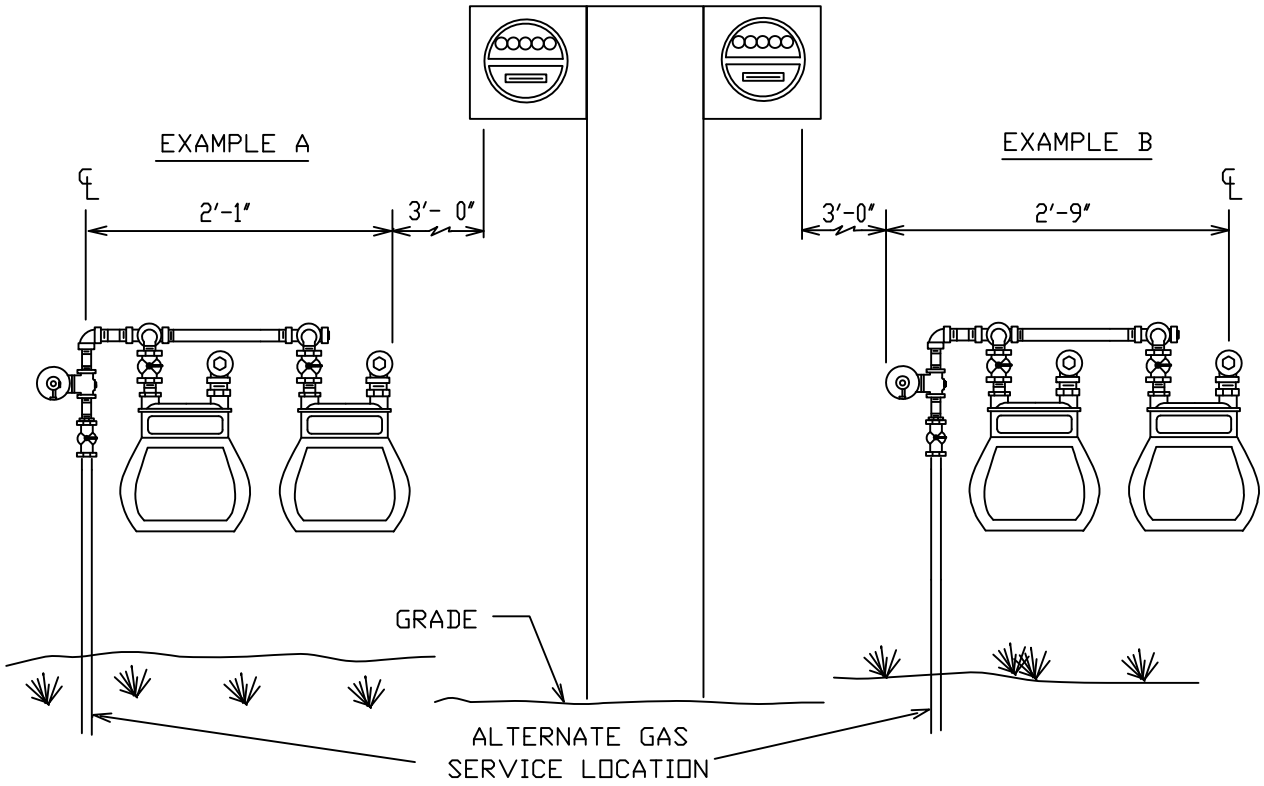
See MU for additional clearance requirements not listed above. Some of the items which require special clearances include the following:

Railroads
Flag Poles
Light Poles (standards)
Grain Bins
Sailboat Areas
Boat Landings
Airport Approaches
Electric Transmission Distribution Lines

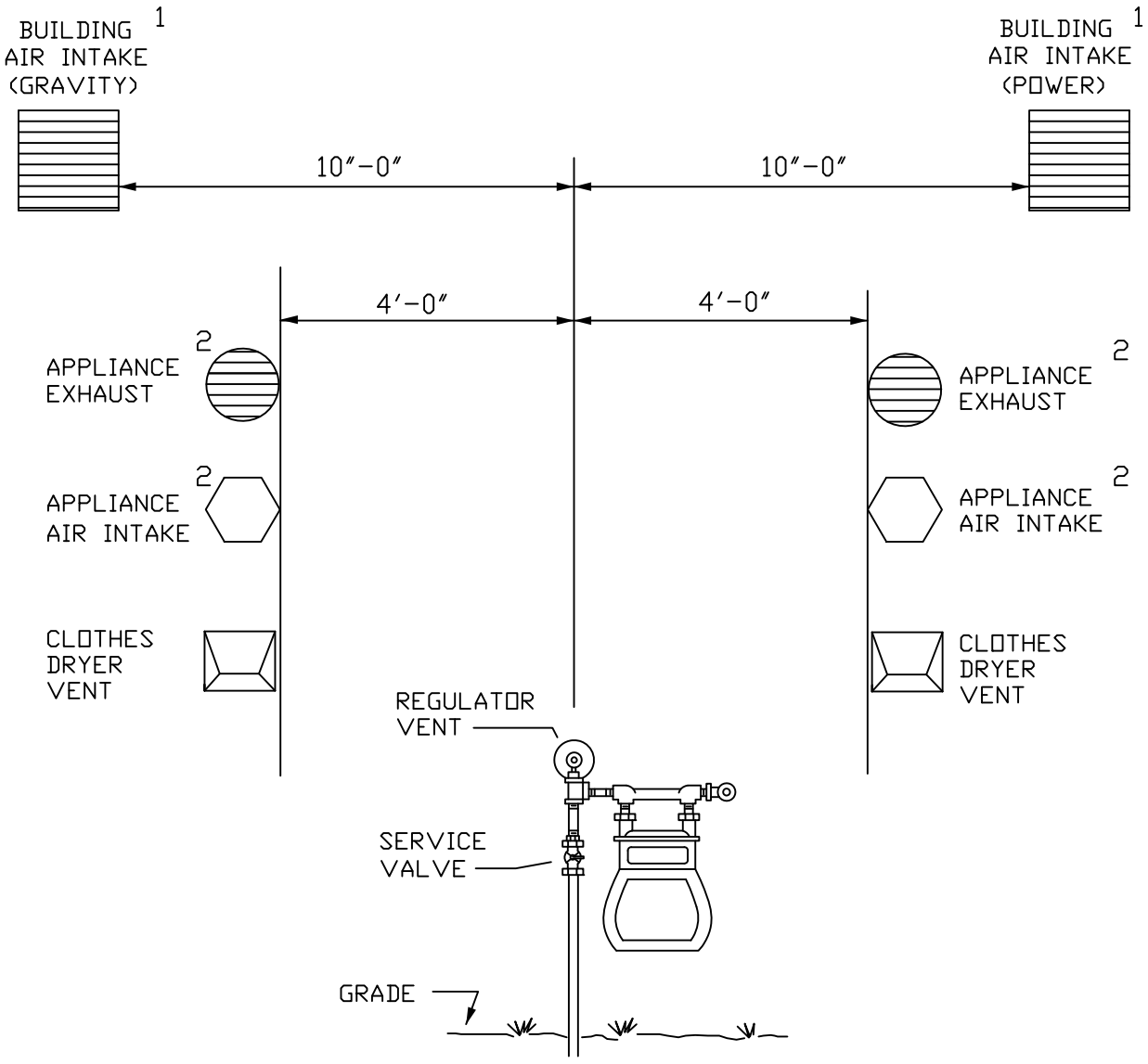


THREE FOOT RULE COMES FROM THE
NATIONAL FUEL GAS CODE Z223.1 SECTION 2.7.2

"Gas meters shall be located at least 3 feet from sources of ignition." Electric meter sockets, disconnects, outlets, etc. are examples of sources of ignition. Conduit runs, termination enclosures, CT cabinets, etc. are not considered as sources of ignition. This code went into effect in 1980 and is not retroactive. These clearances do not apply to gas piping including fuel runs.



VENT CLEARANCES

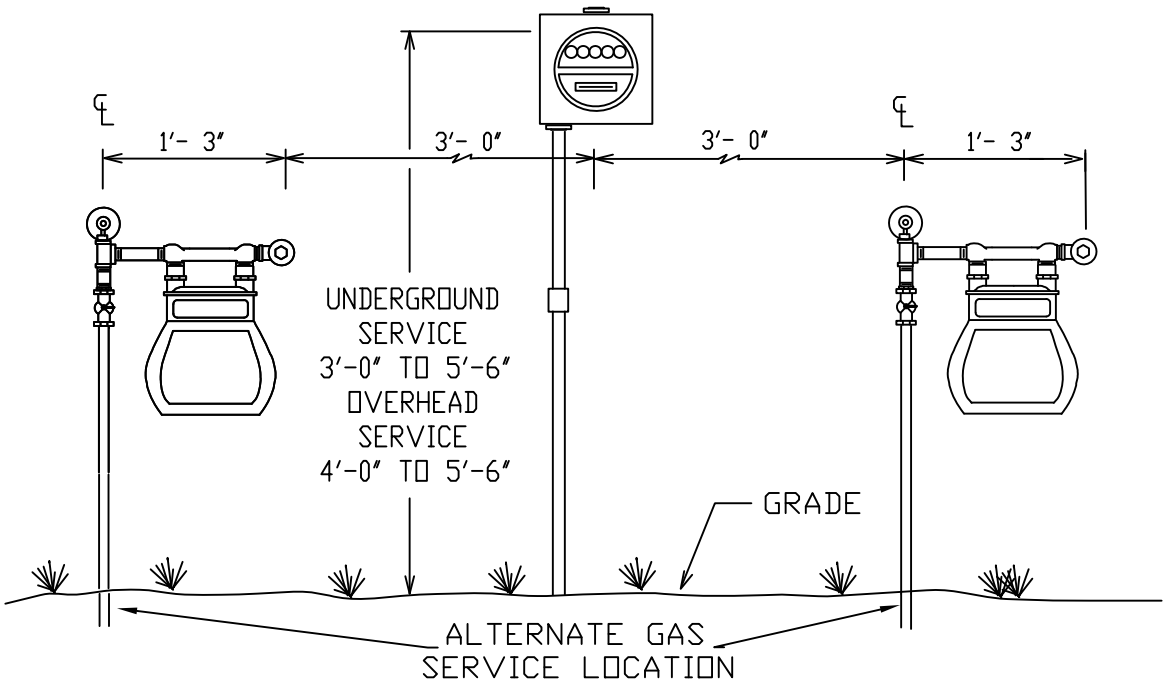


1) GAS /WOODBURNING FIREPLACE COMBUSTION AIR, MAKE-UP AIR UNITS, BUILDING VENTILATION, ETC.

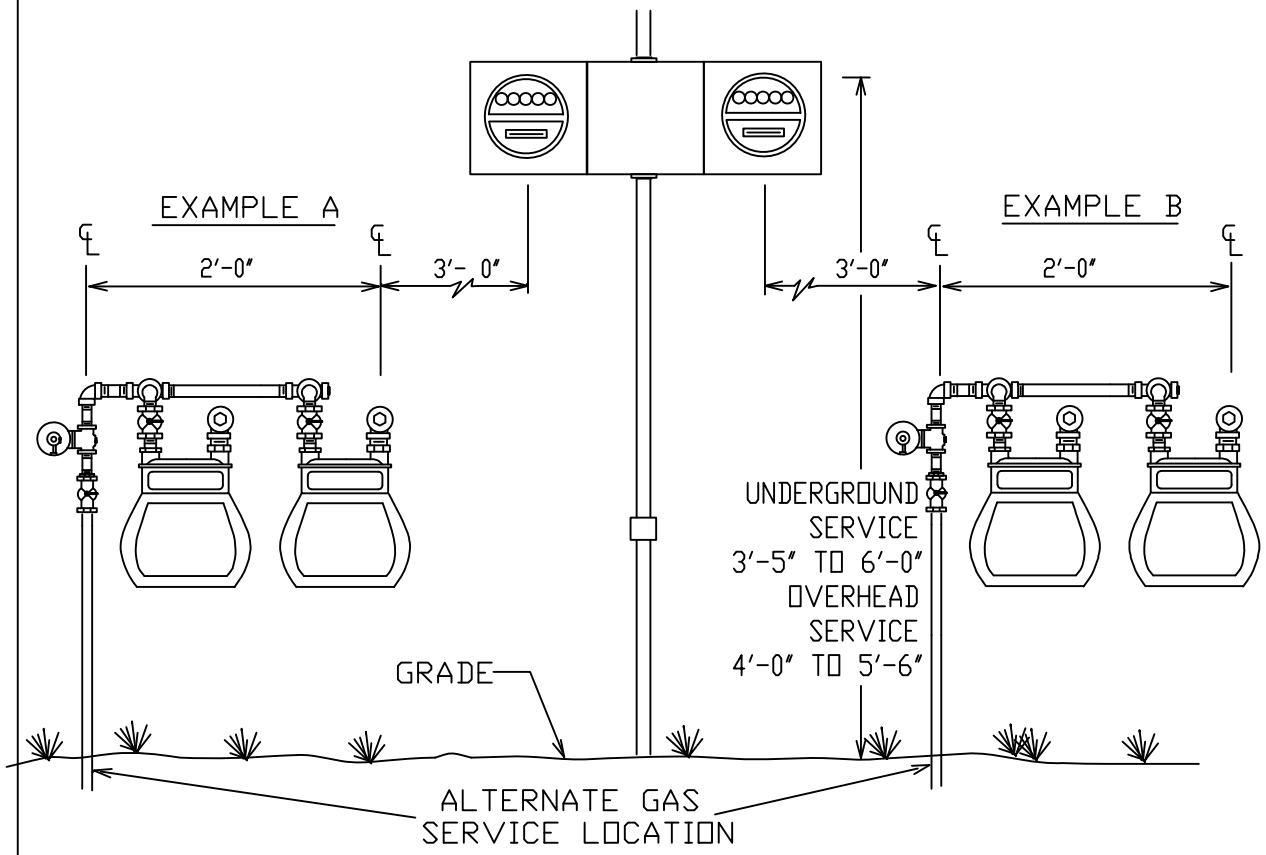
2) APPLIANCES INCLUDE SEALED COMBUSTION FURNACES, WATER HEATERS, ETC.

3) EXHAUST VENTS WHICH MAY LEAK WATER, CONDENSATE, GREASE, OIL OR OTHER SUBSTANCES ARE NOT ALLOWED ABOVE GAS METERS OR OTHER GAS CONTROLS.

4) AVOID SHORT OVERHANGS WHICH COULD CAUSE ICE PROBLEMS IN WINTER. SEE PAGE 4-2 FOR ICE SHIELDS.



THREE FOOT RULE COMES FROM THE
NATIONAL FUEL GAS CODE Z223.1 SECTION 2.7.2



MENASHA UTILITIES ELECTRIC SERVICE MANUAL

CLEARANCES TO GAS METERS

7-3c