



Electric Service Requirements & Guidelines

Montana Service Area

September 2011

NORTHWESTERN ENERGY – Montana Service Area
ELECTRIC SERVICE REQUIREMENTS AND GUIDELINES

CONTENTS

I.	GENERAL INFORMATION	
1.01	Purpose.....	1
1.02	Codes and Ordinances	1
1.03	Changes or Conflicts in Requirements and Guidelines.....	1
1.04	Application for Service.....	2
1.05	Types of Service Furnished	2
1.06	Approval for Service.....	4
1.07	Permanent Service Connection.....	4
1.08	Seals	4
II.	SERVICES	
2.01	General	5
2.02	Point of Delivery.....	6
2.03	Sealing of Cabinets and Gutters	6
2.04	Conductor Identification.....	6
2.05	Location of Meters	6
2.06	Temporary Service.....	7
2.07	Disconnection and Reconnection of Service.....	8
2.08	Relocation of Services and Facilities.....	8
2.09	Customer Equipment on Utility Poles.....	8
III.	OVERHEAD SERVICE UNDER 600 VOLTS	
3.01	General	9
3.02	Service Drop	9
3.03	Clearances for Drops, 600 Volts and Below	9
3.04	Multiple-Family Overhead Service	10
3.05	Nonresidential Overhead Service	10
3.06	Overhead Service to Mobile Homes, Irrigation Service Poles, Temporary Installations, and Others	10
IV.	UNDERGROUND SERVICE	
4.01	General	11
4.02	Joint Use.....	11
4.03	Raceways	11
4.04	Clearances from Swimming Pools	12
4.05	Underground Service - Residential Occupancies.....	12
4.06	Underground Service to Mobile Homes.....	13
4.07	Nonresidential Underground Service	13
V.	SERVICE AT PRIMARY VOLTAGE	
5.01	General	17
5.02	Customer Equipment	17
5.03	Utility Equipment.....	17

VI.	METER INSTALLATIONS	
6.01	General	18
6.02	Acceptable Meter Sockets	18
6.03	Self-Contained Meter Sockets	18
6.04	Mounting of Meter Sockets	21
6.05	Current Transformer Metering	21
6.06	Socket for Reactive Demand Meter	23
6.07	Instrument Transformer Installations Over 600 Volts	23
6.08	Metering on a Pole or in a Utility Enclosure.....	23
VII.	CUSTOMER EQUIPMENT AND DEVICES AND CHARACTER OF SERVICE	
7.01	General	24
7.02	Single-Phase Service Guidelines	24
7.03	Three-Phase Service.....	25
7.04	Motor Protection	25
7.05	Motor Starting.....	25
7.06	Interfering Loads.....	26
7.07	Emergency or Standby Generators.....	26
7.08	Parallel Generation.....	27
7.09	Cogeneration	28
7.10	Available Fault Current	28
VIII.	OTHER CUSTOMER RESPONSIBILITIES	
8.01	Customer's Responsibility for Safety	29
8.02	Rights-of-Way.....	29
IX.	ILLUSTRATIONS AND TABLE	
	Table I	30
	Minimum Raceway Required for Utility Conductors	30
9.01	Typical Residential Overhead Service	32
9.02	Meter Set Location.....	33
9.03	Overhead Service to Buildings	34
	9.03.1 Guyed Example	34
9.04	Overhead Service Detail - Multiple Occupancy	35
9.05	Overhead Service for Mobile Home.....	36
	9.06.1 Typical Meter Pole	36
	9.06.2 Stand-Off Details	36
9.07	Underground Service-Single Family Dwelling.....	37
9.08	Underground Service for Mobile Home.....	38
	9.08.1 Post-Mounted Method	38
	9.08.2 Pedestal Method.....	39
9.09	Overhead Temporary Irrigation.....	40
9.10	Typical Yard Light Service	41
9.11	Typical Current Transformer Installation.....	42
9.12	Meter Socket Clearance Requirements	43
9.13	Multiple Meter Socket Installations	44
9.14	Typical Farm Service Pole.....	45
9.15	Placard Placement on Gangmeters	46

ELECTRIC SERVICE REQUIREMENTS AND GUIDELINES

I. GENERAL INFORMATION

1.01 Purpose

Most customers wishing to establish new electric service with NorthWestern Energy will find that the information provided in NorthWestern Energy Company's *New Service Guide* adequately describes the details and requirements for establishing a new electric service. The *New Service Guide* covers gas services, trenching, and tree planting as well. A copy of the *New Service Guide* can be obtained from any of the NorthWestern Energy New Construction offices listed on page iii or downloaded from the web at www.northwesternenergy.com.

This booklet, NorthWestern Energy *Electric Service Requirements and Guidelines*, was prepared to aid employees, contractors, electricians, commercial customers, and any other electric customers who need detailed information in establishing electric service for new and remodeled structures. We recognize you may require personal assistance from our staff, and we would encourage you to contact us by calling our nearest NorthWestern Energy New Construction office listed on page iii of this booklet to discuss your electric service requirements with us. Additional copies of this booklet are available at any office. It is the desire of NorthWestern Energy and the local electrical code enforcing authority to provide high-quality, safe electric service to all customers.

In order to avoid unnecessary repetition, the word "Utility" as used in the following pages shall mean NorthWestern Energy company, Montana service territory (NWE-MT).

1.02 Codes and Ordinances

It is necessary that the construction of new or remodeled installations conform to applicable provisions of the National Electric Code (NEC), National Electrical Safety Code (NESC), State of Montana rules and regulations, city and county ordinances and codes, rules on file with or issued by the Public Service Commission (PSC) and requirements of this guideline. In the interest of safety, and to assure code compliance while allowing for variances which can occur during construction, the requirements of the Utility may exceed the minimum requirements specified in the aforementioned codes, rules, and regulations.

1.03 Changes or Conflicts in Requirements and Guidelines

Some of the information in this booklet is based on the previously mentioned governmental codes and ordinances as well as the NWE-MT tariff on file with the PSC. These requirements and guidelines are issued with the intent of complying with all applicable codes, ordinances and tariffs; however, in the case of conflict, whereby the guidelines in this booklet exceeds governmental codes or requirements the interpretation offered in this booklet shall govern. In addition, these requirements are subject to change in the event that the governing codes, ordinances or tariffs are changed. The Utility does not assume responsibility for keeping this book current and should be consulted in case of doubt on the applicability of any item. All interpretations or clarifications of these requirements and guidelines are reserved to NWE-MT.

1.04 Application for Service

It is important that the local Utility office be provided as early as possible with accurate load information and the date when the customer will require service, so all necessary arrangements for the service may be completed. Requests for service to commercial or industrial customers normally require considerable advance planning by the Utility in order to serve the load. A lead-time of at least 60 days is normally necessary. Installations requiring transformers or other equipment not in stock may require 6 months lead time or more.

For commercial, industrial, residential subdivisions, mobile home parks and apartment complex applications, the requests for service should include a plot plan. Commercial or industrial plot plans should show preferred service and meter locations and a single-line diagram of the electrical layout. The request must show all load information, including lighting, receptacle, water heating, cooking, electric heat, air conditioning, and motor load, plus sufficient information on equipment operations so that the kilowatt demand of the load can be estimated.

The Utility has a staff available to advise on service requirements and related problems relative to electric energy utilization for new, existing and reconstructed installations. Please call your nearest NorthWestern Energy New Construction office for assistance. The customer and/or the contractor will be held responsible for any damage to Utility equipment unless adequate notice is given to the Utility regarding changes or additions.

When conditions are encountered during construction that require changes in the service arrangements, the Utility must be consulted so mutually satisfactory alternative arrangements can be made.

1.05 Types of Service Furnished

Electric service available is 60-hertz, alternating current, single or three phase. The nominal secondary voltages from overhead distribution lines and underground distribution lines are given below:

Overhead Distribution Area

Single-phase, 120/240-volt, three wire, grounded
Three-phase, 208Y/120-volt, four wire, grounded, wye
Three-phase, 240/120-volt, four wire, grounded, delta
Three-phase, 480Y/277-volt, four wire, grounded, wye

Under certain conditions, at the option of the Utility, one of the following services may be provided:

Single-phase, 120/208-volt, three-wire, grounded (multi-dwelling complexes only);
Single-phase, 240/480-volt, three-wire, grounded;
Three-phase, 480/240-volt, four-wire, grounded; delta

Underground Distribution Area

Single-phase, 120/240-volt, three wire, grounded
Three-phase, 208Y/120-volt, four wire, grounded, wye
Three-phase, 480Y/277-volt, four wire, grounded, wye

Under certain conditions, at the option of the Utility, one of the following services may be provided:

Single-phase, 120/208-volt, three-wire, grounded (multi-dwelling complexes only);
Three-phase, 240/120-volt, four-wire, grounded, delta;

In certain designated underground districts, the nominal secondary voltage is 208Y/120 volts, four-wire, grounded, wye. With prior agreement of the Utility, 480Y/277 volts, four-wire, grounded, wye, may be made available. The nominal primary voltage of the Utility's distribution system may differ from one service area to another. Under certain conditions, primary delivery will be supplied at the distribution voltage standard for the location at which it is requested.

1.05a Types of Service Furnished – Ampacities of Self-Contained Metering Designs

All self-contained metering circuits are limited to a *maximum* load of 320 amperes. Loads that exceed 160 amperes continuous or 200 amperes maximum will be metered using a 400 Amp Service. Loads that are 160 amperes continuous or less and do not exceed a maximum of 200 amps will be metered with a 200 Amp Service.

All 400 Amp Services are restricted to single-family residences and 120/208 or 120/240 three-phase loads. Self-Contained 400 Amp Services exceeding 240 volts from line-to-line or line-to-ground are not permitted on the N.W.E. system. With the exception of very short momentary inrush currents, all 400-amp services are strictly limited to a maximum load of 320 amperes, regardless of load duration. A “Class 320” amp watt-hour meter will be installed on all 400-amp services. All “Class 320” amp meters are designed to accurately measure a *maximum* current of 320 amperes. Any current over 320 amps will not be measured accurately and this effectively limits the maximum current through a 400-amp service to 320 amperes. Any service that exceeds a maximum load of 320 amperes, regardless of load duration, must be transformer rated. The only exception to this rule is very short momentary inrush current, i.e. motor starts. If the inrush current is excessively high, or greater than one second in duration, current transformers may be required. If the customer chooses to install a 400-amp service and at *any time* exceeds an *actual* load current of 320 amps, the customer must at their cost, convert the service entry equipment to a transformer rated design. The cost of converting to a transformer rated installation will be expensive. The customer must be certain that the actual current drawn by the load, during any point of operation, does not exceed a maximum current of 320 amperes. For clarification, this service will be referred to as “400-Amp Service (Limited to 320 amps maximum)” throughout this document.

1.06 Approval for Service

Local ordinances or state laws require that an electrical permit procedure be followed before the Utility can establish service. Electrical Permit Application Forms may be obtained in the NWE-MT offices listed on page iii. In addition, Montana State law requires that an electrical installation must be approved by the electrical inspection authority having jurisdiction before it can be energized by the Utility.

1.07 Permanent Service Connection

Only authorized Utility employees shall make the permanent connection or disconnection of the Utility's electric service to a building or structure. This includes the installation and removal of meters.

1.08 Seals

The purpose of seals placed by the Utility on meters and associated service equipment is to prevent injury and/or tampering.

Seals are not to be removed except by the Utility.

An unsealed meter, that is not reported, may be treated as meter tampering, a criminal offense.

II. SERVICES

2.01 General

The location of the service entrance on the customer's premises is an important consideration to both the customer and the Utility. The service entrance shall be located to make the meter and service easily accessible from Utility distribution lines and convenient for the installation, operation and maintenance of Utility meters and equipment. The Utility shall be consulted in order to designate the point of attachment for overhead service drops, underground service laterals, preferred meter and service outlet locations, current transformer and terminal cabinet closures. The Utility should also be consulted if any variation from these designated locations is desired.

For secondary voltage service, the Utility will provide, install and maintain transformers, meters and conductors that are defined in Section 100 of the National Electrical Code as service drops or service laterals. The customer will provide, install and maintain all service equipment, including switches, service entrance conductors, raceways, conduits, weatherheads, enclosures and meter sockets, and will provide rights-of-way and space for the installation and maintenance of the Utility facilities.

Normally, a building will be supplied through only one set of main service conductors of the same voltage classifications. Taps may be taken from these main service conductors where more than one meter installation is necessary in a building of multiple occupancy.

Where two or more meters are grouped, each meter position must be clearly and permanently identified by means of an engraved placard to indicate the particular location supplied by it. It is the customer's responsibility to provide and install the placards. Service will not be established until the marking is completed. No service connection will be made without a permanent address being assigned to service location.

Unmetered service wires and metered load wires will not be run in the same conduit, raceway or wiring gutter.

All overhead service entrance conductors must be installed in continuous, rigid metallic conduit. Either rigid metallic, Schedule 80 PVC conduit above ground and PVC Schedule 40 below ground are acceptable for underground service entrances. For both overhead and underground services the minimum conduit size is two inches. If the service is designed to be a self-contained 400-Amp Service (Limited to 320 amps maximum), then the minimum conduit size is 3 inch. Larger conduits may be necessary in accordance with Table I page 30 for underground services, and in accordance to the (NEC) for overhead services. The neutral wire shall be electrically continuous from the Utility's service termination point through the socket to the customer's service equipment neutral termination lug. Customer's service entrance conductor and service equipment shall be at least minimum size required by the National Electric Code (NEC). The ground wire shall be sized and connected according to the NEC before Company's service will be connected.

2.02 Point of Delivery

The "point of delivery," unless otherwise specified by the Utility is that location on the customer's building or structure where the Utility's circuit and customer's system are interconnected. The exact location of the point of delivery shall be at the Utility's discretion. The normal point of overhead delivery for self-contained and current transformer metering will be at the customers' weatherhead. For self-contained underground service the point of delivery will be at the line side connection of the meter socket. For current transformer underground service the point of delivery will be at the terminal pad on the load side of the current transformer. Any additional service supplied to the same customer at other points of delivery at a different voltage or phase classification shall be separately metered and billed.

2.03 Sealing of Cabinets and Gutters

All cabinets and gutters containing unmetered conductors, other than mainline switches required by applicable electrical codes, must be arranged for sealing with the Utility's seal. Removable conduit fittings may be installed between the service outlet and the meter when approved by the Utility. These fittings must be visible from the meter location or from an exterior ground position and must be arranged for sealing.

2.04 Conductor Identification

Neutral or grounded conductors, if insulated, should be identified with the color white or gray. **White or gray is never to be used as a phase marking.** In a four-wire delta service, the conductor with the higher voltage to ground will be identified with the color orange.

2.05 Location of Meters

Suitable space and provisions for mounting meters must be provided by the customer at a location acceptable to the Utility. The minimum unobstructed wall space width for a single meter is 15 inches on either side of the meter centerline. The area below the meter and up to 9 inches above the meter is to be unobstructed as well. The size of the space will be larger when more than one meter is required. Refer to page 39 for clarification of meter socket clearances.

On ganged socket installation, the distance between the centerline of the perimeter socket shall not be less than 15 inches from a wall or obstruction. Additional wall space for instrument transformers will be required whenever the anticipated load will exceed a maximum of 320 ampere.

A 36-inch working space shall be maintained in front of self-contained metering installations and a 48-inch working space for installations requiring cabinets.

The center of any meter socket located outdoors shall not be more than 6-feet above the finished grade or floor immediately in front of the meter, nor less than 5 feet. The center line of a multiple gang meter socket configuration shall not be more than 6 feet nor less than 5-feet above the finished grade or floor immediately in front of the meters. Meters in pedestals must be suitably protected from physical damage. Meters must have utility-required clearances from other appendages and other utility services. Refer to pages 32 and 33.

It is in the mutual interest of the customer and the Utility that a suitable location be provided to facilitate reading, testing and replacement of meters with the least inconvenience to the customer and the Utility.

Residential meters must be installed outdoors at a location that is readily accessible to Utility employees. The meter is not to be on the side of the building opposite Utility lines. It is recommended that exterior bedroom or bathroom walls, patios or carports be avoided, as well as exterior walls that are likely to be fenced in. The meter shall not be installed over window wells, steps in stairways, or in other unsafe or inconvenient locations.

Nonresidential meters shall be located outdoors unless the Utility confirms prior to installation that an acceptable outdoor location is not available. Any indoor location must have prior approval by the Utility. An indoor meter must be accessible to the Utility during daytime working hours (8:00 a.m. to 4:30 p.m.) and must not be located in show windows, closets, bathrooms, over sinks or laundry tubs, or in any other location that is not safe, convenient or readily accessible to Utility employees. Locked meter rooms are not considered to be accessible unless keyed for a Utility lock.

If, in the opinion of the Utility, a meter is made inaccessible, such as by the installation of a fence or enclosure, the customer shall, at his expense, move the meter socket to an accessible location. The Utility, at its option, may install a remote reading register or a pole meter to alleviate an accessibility problem, with the cost to be borne by the customer in accordance with Utility's schedule of charges.

Meters are not allowed on mobile structures such as trailers, barges, houseboats, cranes, dredges, draglines, or mobile pumping equipment or on any other building not permanently attached to a foundation.

2.06 Temporary Service

Temporary service will be supplied when requested. In addition to the cost of energy used, the customer will be billed for the cost of installation and removal in accordance with the Utility's schedule of charges.

Temporary services for construction work must be located such that the meter is protected from mechanical injury and, when practicable, a location usable throughout the construction period must be selected. Should relocation of a temporary service become necessary, the relocation cost will be borne by the contractor or customer, in accordance with the Utility's schedule of charges. The Utility shall be contacted for approval of the new temporary meter location.

2.07 Disconnection and Reconnection of Service

The Utility will disconnect and reconnect any service supplying customer-owned service equipment that for safe working conditions must be de-energized prior to modification. There will be no charge for the disconnection during regular working hours. The reconnection will be done without charge if it can be completed on the initial trip or on a second trip scheduled during regular working hours and at the Utility's convenience; otherwise, the customer will be billed a reconnection charge according to the fee schedule then in effect.

2.08 Relocation of Services and Facilities

If relocation of the Utility's facilities is necessary, there may be a charge for such relocation.

2.09 Customer Equipment on Utility Poles

Customer-owned metering equipment, switching devices, conduits, conductors, luminaries, etc., are not to be mounted on the Utility's distribution and transmission poles. With permission from the Utility, customer owned metering equipment may be mounted on yard light poles under contract with the customer. Refer to page 44 for proper mounting requirements.

III. OVERHEAD SERVICE UNDER 600 VOLTS

3.01 General

New overhead service will normally be supplied to any building or premises except in the area designated by local government jurisdiction and/or the Utility as an underground district restricted to underground service.

3.02 Service Drop

In areas served from overhead lines, an overhead service drop will be installed by the Utility from the Utility distribution line to the point of connection to the customer's service entrance conductors at the service outlet on the customer's residence, building or structure.

3.03 Clearances for Drops, 600 Volts and Below

The customer will provide a point of attachment for the service drop that is as high as practical for the type of building being served. For multi-story houses and buildings, the point of attachment shall be located no less than 18-feet above the finished grade. The point of attachment on single-story houses and buildings shall be located as high as practical on the structure, but in no case shall the point of attachment be less 14-feet above the finished grade. Additionally, the point of attachment must be high enough to provide a minimum clearance between the service drop and ground of 18-feet over streets, roads, alleys, and parking areas, or 14-feet over areas accessible to pedestrians only. Where the incoming service drop will overhang 6 feet or less of the roof, measured horizontally, and the service mast is located 4 feet or less from the nearest edge of the roof, the mast attachment point shall not be less than 30-inches above the roof to provide a minimum clearance of 18 inches or more between the service wire and drip loops to the roof. Where the service drop will overhang more than 6 feet of the roof, or the mast is located more than 4 feet from the nearest edge of the roof, the mast attachment point shall be no less than 54-inches above the roof to provide a minimum clearance of 3 feet between the service conductors and the roof outside a 6 foot radius from the mast, and the mast must be guyed. The roof shall not be readily accessible through a door, window, etc. If the roof is accessible by NEC or NESC Code definition then applicable code clearance is required. Supports for service drops must be extended from and tied into the main structural members of the building. Masts shall be suitable for the loads applied.

The point of attachment will normally be on the building wall facing the nearest utility pole. The route of the service drop should overhang adjacent property as little as practical and shall be without obstruction by buildings, trees, or other objects.

If the area is subject to truck or farming equipment traffic, consult the Utility about attachment heights. The Utility strongly suggests that the service entrance be located to avoid having conductors pass over swimming pools, buildings or other obstructions, if at all possible.

3.04 Multiple-Family Overhead Service

The Utility will extend an overhead service drop from its distribution lines to the point of connection to the customer's service entrance conductors at the weatherheads. The Utility requires the grouping of weatherheads at a common location and will not extend service drop conductors from the point of attachment to individual weatherheads in excess of 18 inches of separation. It will be the customer's responsibility to bring his service entrance conductors from the weatherheads to the Utility's service drop.

3.05 Nonresidential Overhead Service

The point of attachment for nonresidential installations must be approved by the Utility prior to the installation of the customer's service equipment. Where more than one service entrance of the same voltage and phase to a building is necessary, the service entrance(s) must be grouped so they may be served from the same set of service drops.

3.06 Overhead Service to Mobile Homes, Irrigation Service Poles, Temporary Installations, and Others

The customer must install the meter base and service equipment on a wood pole, butt-treated with a Utility-approved preservative. The pole must have sufficient height to provide all required clearance for the Utility's service drop and any telephone or cable TV attachments, and must not be less than 6 inches in diameter at the top. The pole must be accessible by a ladder. The customer will install the conduit riser and meter loops. Conduit riser shall extend to within 18 inches of top of pole and mounted on stand-off brackets. Refer to page 37 for mobile home and service poles. Refer to page 43 for temporary service poles.

IV. UNDERGROUND SERVICE

4.01 General

Underground service will be provided in lieu of overhead service in accordance with Utility's filed tariff.

With the exception of special permission and pre-approval from NorthWestern Energy, all meter sockets must have a minimum rating of 200 amperes.

Before making any preparation for underground service, the customer or his representative must obtain approval and specifications from the Utility covering the proposed installation and the customer's responsibilities.

Customers adequately served by existing overhead distribution facilities, but desiring underground service in accordance with these requirements, should contact the utility for details of the utility policy for conversions. In core areas of cities where underground service is specified by local ordinances, special rules may apply.

Customers who wish to excavate and backfill their own trench for conduit or service conductors should refer to the guidelines found in NorthWestern Energy Company's *New Service Guide*.

4.02 Joint Use

Communication, signal, and other electrical conductors may be placed in the same trench as the Utility conductors, provided that the installation is in accordance with the National Electric Code (NEC) and National Electric Safety Code (NESC) and is mutually agreed to by all parties concerned.

The Utility will not install electrical conductors in a common trench with utilities such as water and sewer.

4.03 Conduits

Rigid steel, PVC Schedule 80-above ground and PVC Schedule 40-below ground are acceptable materials for conduits installed by the customer. Where a conduit is more than 150 feet in length or contains more than two 90-degree bends, all bends must be rigid steel. Where a customer's conduit extends vertically into a trench to accept a direct-buried Utility service lateral, the bottom of the conduit is to be a minimum of 18-inches below finished grade. Ninety-degree bends are not to be installed on conduit risers for direct-buried conductors except where the conduit must be extended in the trench to clear a paved or concrete area. All 90-degree bends are to be a minimum 24-inch radius. The service lateral shall have its own conduit separate from the customer's wiring beyond the meter. Refer to page 30.

Where a customer's conduit is installed horizontally in a trench, the bottom of the conduit is to be 30-inches below finished grade. In case of rock or other conflict, consult the Utility. Burial depths of 24" to 30" are allowed for service conductor or conduit. For primary conductors, burial depths between 30" and 48" from final finished grade should be maintained.

4.04 Clearances from Swimming Pools

Underground conductors will not be located under a swimming pool.

Where space limitations require the conductors to be closer than 5 feet to a swimming pool, they are to be enclosed in Schedule 40 PVC raceway.

4.05 Underground Service - Residential Occupancies

For underground services to residential occupancies, including single and multiple-family and mobile home parks, the Utility underground conductors will normally be directly buried in the earth. Utility approved duct, furnished and installed by the customer at a typical depth of 30 inches, is required for Utility conductors on private property when crossing under a road, driveway, concrete area or building. If a transformer installation is necessary, consult the Utility for customer responsibilities. Where a pad-mounted transformer is installed in a location where it might be struck by a motorized vehicle, the customer will provide Utility-approved barriers to protect the transformer.

The underground service lateral will be installed, owned and maintained by the Utility from the Utility's distribution line to the customer's termination facility. When required, the Utility will also install, own and maintain the transformer and the primary voltage cable.

For 200-ampere services, NWE-MT will terminate the service lateral on the line-side terminals of the customer's meter socket, the customer is to provide a conduit that has a minimum diameter of two inches, the meter socket enclosure shall include supported bus bar, and the line-side meter socket terminals will accept 4/0 conductor. A minimum of 2 knockouts shall be required on the base of the socket. The knockout located immediately below the Service Lateral Wireway shall be reserved for the Company's Service Lateral Conductors. Multiple-family residences are limited to 200 Amp services.

For 400-ampere services (Limited to 320 amps maximum), NWE will terminate the service lateral on the line-side terminals of the customer's meter socket. The customer is to provide a conduit that has a minimum diameter of three inches. The meter socket enclosure shall include supported bus bar, and the line-side meter socket terminals must accept a 350 MCM conductor. A minimum of 2 knockouts shall be required on the base of the socket. The knockout located immediately below the Service Lateral Wireway shall be reserved for the Company's Service Lateral Conductors.

Excluding momentary inrush, i.e. motor starts, if the actual load current drawn by the customer exceeds a maximum of 320 amps, regardless of the load duration, current transformer metering will be required (refer to section 1.05a for more information). The customer is to provide and install a current transformer cabinet. This cabinet shall be surface mounted and located on the exterior of the building. If no satisfactory exterior location is available, by special permission of the Utility, the cabinet may be located inside the building, preferably in the garage. (See Section 6.05 for cabinet size.)

Where a current transformer cabinet is installed for underground service, the Utility will terminate the service lateral on a terminal pad to be located on the load side of the donut current transformers.

The customer's service entrance equipment should be located on the building structure so

that the connection point of this equipment to the Utility's service lateral is on the side nearest those Utility facilities from which the service lateral will originate. The customer or contractor should contact the Utility for the location and routing of the service lateral prior to the start of building construction.

Where a paved or concrete surface will be adjacent to the service entrance, the customer's conduit is to be extended to a point beyond the paved area. Where the conduit extends down through a paved or concrete surface, a sleeve must be placed around the conduit so that it is not in direct contact with the pavement or concrete. This prevents damage to the service equipment due to settling.

4.06 Underground Service to Mobile Homes

For underground service to a mobile home, the customer's service entrance equipment must be located in a pedestal approved for the purpose or located on a wood post not less than 6-inches square, or 5-1/2 inches in diameter at the top, if round, butt-treated with a Utility-approved preservative, which is furnished, installed and maintained by the customer. The bottom of the enclosure containing the service equipment is to be not less than 24-inches above the finished grade. When the meter may be subject to physical damage, barrier posts or other suitable protection must be installed and maintained by the customer.

For permanent mobile home parks having an average lot size not less than 4,000 square feet, or where the lots are individually owned by the occupant, after prior approval by the Utility, service will be provided by a service lateral to the mobile home pedestal which must have a separate compartment approved by the Utility for termination of Utility's service lateral.

Trenches and conduits in mobile home parks provided for Utility conductors must be located so as to avoid passing under the pad, foundation, or area provided for the mobile home.

4.07 Nonresidential Underground Service

For underground service to commercial or industrial buildings or projects, the customer or developer is responsible for the transformer pads or vaults within the project. If a transformer installation is necessary, the customer is to provide space for the transformer. In most cases, the underground service lateral from the Utility's distribution line or transformer to the customer's termination facility, plus transformers and primary voltage cable when required, will be installed, owned and maintained by the Utility. Consult the Utility for specified applications. All conduits and busways into pad-mounted transformers must enter through the bottom in the Utility-designated location.

Where a pad-mounted transformer is installed in a location where it might be struck by a motorized vehicle, the customer is to provide Utility-approved barriers to protect the transformer.

Utility conductors will normally be installed in customer-provided conduit, except where direct burial meets the requirements of Utility standards. The minimum conduit size acceptable for Utility service lateral conductors is specified in the table on page 30. Contact the Utility for conduit requirements of primary voltage conductors. The customer is to

provide and install a nonconducting pull line in each conduit.

Where a customer's conduit extends vertically through a paved or concrete surface adjacent to the service entrance, a sleeve or slip joint shall be placed around the conduit so that the raceway is not in direct contact with the pavement or concrete, or a slip joint in the conduit shall be used. This will help avoid service interruptions or damage to conductors and service equipment caused by settling.

Where a customer's conduit is to extend to a Utility pole, the customer is to install the 90-degree bend at the base of the pole. The Utility will provide and install the conduit up the pole. The Utility will designate the proper position on the pole for the conduit prior to the installation of the 90-degree bend at the base of the pole. See Section 4.03 for approved conduit material.

All conduits shall be capped at both ends at the time of installation to keep them free of dirt and debris.

For all services with load currents of 320 amperes or less, NWE will terminate the service lateral on the line side of the customer's meter socket if the customer provides the following:

For 200-Amp or smaller services: Requires two-inch conduit, UL approved meter socket enclosure with bus bar line-side meter socket terminals that will accept 4/0 aluminum conductor.

For 400-Amp services (Limited to 320-amps maximum): Requires three-inch conduit, UL approved meter socket enclosure with bus bar line-side meter socket terminals that will accept 350 MCM aluminum conductor.

For three-phase service equipment rated 200 amperes or less, NWE-MT will terminate the service lateral on the line side of the customer's meter socket if the customer provides a minimum 3-inch conduit, meter socket enclosure shall include supported bus bar, and line-side meter socket lugs which will accept 4/0 aluminum conductor. Under special circumstances and with prior approval 100-ampere sockets with 2/0 lugs are acceptable in nonresidential U.G. use. Normally only 200-ampere or larger ampacity sockets (up to a maximum of 320-ampere sockets) will be allowed for underground use.

For all 400-Amp services (Limited to 320-amps maximum), NWE will terminate the service lateral on the line side of the customer's meter socket if the customer provides a minimum of 3-inch conduit, a meter socket enclosure that must include supported bus bar, and line-side meter socket lugs that will accept 350 MCM aluminum conductors.

In all cases where the load exceeds 320 amperes maximum (refer to section 1.05a for more information), the Utility will terminate the service lateral on the terminal block in an enclosure installed by the customer, provided the enclosure has adequate space. This enclosure shall be surface mounted and will normally be the metering transformer cabinet. See Section 6.05 for cabinet dimensions and conductor ampacity limitations.

The Utility will provide donut-type current transformers for service equipment rated up to and including 1,200 amperes. The current transformers are to be installed by the contractor.

The Utility service lateral will be terminated on the terminal block by the Utility and the customer's service entrance conductors will be terminated on the terminal block by the contractor. The neutral or grounded conductors are to be terminated on a terminal block furnished by the contractor and installed by the contractor. This terminal block is to be securely fastened, with the mounting hardware provided. In all cases where transformer rated metering is used, the utility will provide, install, and connect all metering conductors.

For service rated over 1,200 amperes, the customer is to provide and install an entrance compartment with adequate space and provide a bus extension into the compartment. The Utility will terminate the service lateral on the bus extension. Through-type current transformers provided by Utility may be installed in the compartment by the contractor. Consult Utility for entrance compartment and termination requirements.

Compartments for termination of the Utility service laterals that are indoors must be accessible and must be located at or as close as practical to where the conductors enter the building as defined by the local code-enforcing agency. In no case is a service lateral to extend inside the building space more than 5 feet, 6 inches before entering a meter enclosure or terminal compartment. Metering secondaries are not to be longer than 30 feet.

Where it is necessary to connect two or more sets of service equipment to a single service lateral, the customer must provide a terminal box and install a non-fused terminal block. The terminal box must be arranged for sealing with the Utility's seal. Customer owned devices (such as limiters, fuses, etc.) shall not be installed in terminal boxes.

The minimum dimensions for terminal boxes are shown below:

<u>Type of Service</u>	<u>Ampacity</u>	Minimum Terminal Box Size (W x H x D)
1-Phase Residential		24" x 30" x 11"
1-Phase Commercial	800 Amps and Below	30" x 30" x 11"
3-Phase Commercial	800 Amps and Below	36" x 36" x 11"
3-Phase Commercial	801 Amps to 1200 Amps	48" x 48" x 11"

Above 1,200 Amps consult Utility for minimum terminal box size

Refer to page 38 for CT Transformer Metering diagram.

Note: Instrument transformer enclosures for CT's and/or PT's shall be surface mounted.

In the case of an upgrade of an existing service where limited space makes installation of standard size boxes impractical, consult the Utility to determine the size of a mutually acceptable box which will meet all code requirements. Free-standing switchboards and panelboards shall have drawings submitted for Utility approval.

V. SERVICE AT PRIMARY VOLTAGE

5.01 General

The Utility will provide delivery to qualified customers directly, without transformation, from the high-voltage or "primary" distribution system standard for the location in which service is requested provided that:

1. The distribution system nominal voltage is 2,400 volts or higher;
2. Service at primary voltage will not, in the Utility's judgment, adversely affect the operation of the distribution system or other customer's service therefrom; and,
3. Such service can be supplied in a safe and reliable manner. All customers requesting service at a primary voltage must agree to those special requirements that the Utility may, from time to time, establish as necessary.

5.02 Customer Equipment

The customer receiving service at primary or transmission voltage shall own poles, conductors, cables, transformers and associated protective devices beyond the metering point in accordance with the current filed tariff or special contract. All such equipment, its arrangement, and its operation will be subject to Utility approval.

5.03 Utility Equipment

The Utility will normally provide the pole, or pad-mounted enclosure, for the primary metering equipment in accordance with the current filed tariff and, in addition, will normally provide a disconnecting means at or near the point of delivery to disconnect the customer's system from the Utility system.

Unless otherwise designated, the point of delivery shall be taken at the load side of the Utility's primary metering equipment.

VI. METER INSTALLATIONS

6.01 General

The Utility's tariff and rate schedules require the delivery of each class and type of electrical service through one meter to one customer at one location.

Customers or contractors are not authorized to relocate any meter belonging to the Utility or interfere in any way with the meter or its connection.

Underground meter sockets require supported buss bar. All 400-Amp (320-amp continuous) sockets must have manual bypasses that are rated at the continuous rating of the meter socket. The manual bypass must perform both bypass and jaw clamping functions. In addition, all 400-Amp services (Limited to 320-amp maximum) must have a circuit disconnect mounted on the same outside wall as the meter socket and within three feet of the meter.

6.02 Acceptable Meter Sockets

Acceptable meter sockets shall be manufactured in accordance with the current Standards for Safe Meter Sockets, UL/ANSI-414 or ANSI-C12.7. Sockets intended for underground service are not to be used with overhead service and all conductors are to enter and leave the enclosure through the appropriate openings. Manufacturers' rating label or other markings used in lieu of a label shall show, among other things:

- A. Whether the socket enclosure is designed for overhead service entry, underground service entry or both;
- B. That the socket terminals are designed for both aluminum and copper conductors;
- C. The wire size range of the socket terminals; and,
- D. The inch-pound rating of the termination lugs.

Instrument or CT rated meter sockets shall be of the ringless type only.

6.03 Self-Contained Meter Sockets: 200 Amperes (160-amp continuous) or less

The Utility requires a self-contained, socket-type meter installation on the line side of single-phase service equipment when the ampacity of the service entrance conductors is 200 amperes or less. The Utility recommends a combination meter socket with a main breaker in the same weatherproof enclosure. The meter socket will be wired with the unmetered line conductor feeding the upper terminals and the lower socket terminals being used for the load circuit. The customers' equipment must be designed for maximum fault current available. Three-phase services of 200 amperes or less also require a self-contained, Utility approved, socket-type meter. The meter socket, complete with terminal lugs, meter jaws and sealing means shall be provided by the customer. Meter sockets containing bypass devices must be approved by the General Office Meter Department; the ampacity of the bypass circuit must be equal or greater than the socket.

<u>Type of Service</u>	<u>Terminals</u>
Three wire, single phase	4
Three wire, 120/208 volts, single phase	5
Four wire, three phase, grounded	7

6.03a Self-Contained Meter Sockets: 400 Amperes (320-amp continuous)

For all 400-Amp services (Limited to 320-amp maximum) the Utility requires a self-contained, socket-type meter installation on the line-side of the service equipment. The meter socket will be wired with the un-metered line conductors feeding the upper terminals and the lower socket terminals being used for the load circuit. The customer's equipment must be designed for maximum fault current available. The customer shall provide the meter socket, complete with terminal lugs, meter jaws and sealing means. A service disconnect must be provided by the customer and mounted on the same outside wall as the meter socket and within three feet of the meter. In all cases NWE must be allowed access to the service disconnect. **Note:** Refer to section 1.05a on the limitations of a 400-amp service.

A service disconnect is considered a fusible switch, circuit breaker, or other approved disconnect means for controlling all of (and only) the energy registered by the meter. All service disconnects must be:

- X Approved by Underwriters Laboratories as approved service disconnect equipment.
- X Installed on the load side of the meter and the wiring between the meter and the service disconnect must be installed in an approved conduit or enclosure.
- X Mounted on the same outside wall as the meter socket and within three feet of the meter.

If the service disconnect is included as part of the meter socket enclosure it must be located in a separate sealable section of the enclosure that is accessible to both the customer and the Utility. Under no circumstances shall the service disconnect be located in the same section as the un-metered service conductors. In all cases NWE must be allowed access to the service disconnect.

For underground service connections, the Utility requires that the socket has buss-bar supported socket jaws and is equipped with a manual bypass. For overhead service connections, the Utility requires that the socket is equipped with a manual bypass. The manual bypass must provide:

- X Bypass and jaw clamping/release functions.
- X A current bypass circuit that is rated to an ampacity that is equal to or greater than the continuous current rating of the meter socket.
- X NOTE: Manual bypasses are NOT designed as *load breaking devices*. Therefore, care must be taken to follow the approved procedure for disconnecting a customer using disconnect boots (sleeve). Please see NOTE 1 in the back of the book.

Caution: with manual bypass engaged, all electric parts are still energized.

The Utility requires that the socket is to be equipped with an "anti-rotational" device installed on the upper right-hand jaw of the meter socket. This device is also referred as

an anti-theft or anti-inversion device since it inhibits the meter from being installed upside down.

In addition, the Utility requires that the installation is to be clearly and permanently identified as a 400 amp service by means of a blue placard with white lettering that states "This is a 400 Amp Service & Requires a Class 320 Amp Meter". The placard must be permanently mounted on the outside of the meter can. NorthWestern Energy will provide and install.

<u>Type of Service</u>	<u>Number of Terminals</u>
Three wire, single phase	4
Three wire, 120/208 volts, single phase	5
Four wire, three phase, grounded	7

6.04 Mounting of Meter Sockets

Meter sockets and all associated cabinets and enclosures shall be surface mounted. Sockets must be plumb in all directions and securely mounted to a rigid surface. Conductors must be securely fastened to their respective terminals and must be arranged in a manner which will not interfere with the installation of the meter or cover.

Meter sockets mounted on or in buildings must have clearances as shown in drawings on pages 43 and 44. Codes require 36 inches of clear working space in front of live parts. No barrier shall be installed that will be within 36 inches of the front of the meter panel when a meter is removed and energized parts are exposed.

Meters mounted on poles shall be attached with a suitable pole-mounting device designed for that purpose.

If subject to physical damage, the meter shall be adequately protected. Damage to meters may result from falling ice, water, doors, trucks, moving equipment, vehicles, etc.

While the Utility does not encourage the use of enclosures over meters, they may be permitted when, in the judgment of the Utility inspector, the following requirements are met:

1. The meters are readily accessible for meter reading or resealing, without requiring the use of tools or the removal of the enclosure.
2. The enclosure does not weigh more than 25 pounds and can be easily removed and reinstalled by one person without the use of tools.

Permission to enclose the meter will remain in effect only as long as the customer maintains the enclosure in good working condition.

6.05 Current Transformer Metering

Excluding momentary inrush, i.e. motor starts, current transformer metering is required whenever the actual load current exceeds 320 amperes, regardless of the load duration. (refer to section 1.05a for more information).

The current transformers are to be provided by the Utility and installed by the customer in a customer-owned, sealable steel weatherproof cabinet, securely mounted on a rigid surface (two by four stud or equivalent) a minimum of 24" above grade. This cabinet is to contain only the service conductors and Utility equipment and is to be mounted in a readily accessible location acceptable to the Utility. The cover must be side hinged, when bottom of cabinet is over five-feet above finished grade.

The minimum-size current transformer cabinets acceptable are:

<u>Type of Service</u>	<u>Ampacity</u>	Minimum Terminal Box Size (W x H x D)
1-Phase Residential		24" x 30" x 11"
1-Phase Commercial	800 Amps and Below	30" x 30" x 11"
3-Phase Commercial	800 Amps and Below	36" x 36" x 11"
3-Phase Commercial	801 Amps to 1200 Amps	48" x 48" x 11"

48" x 48" cans shall have hinges.

Above 1200 Amps consult Utility for minimum terminal box size.

Refer to page 42 for CT Transformer Metering Diagram.

Instrument transformer enclosures for CT's and/or PT's shall be surface mounted.

In the case of an upgrade of an existing service where limited space makes installation of standard-size boxes impractical, consult the Utility to determine the size of a mutually acceptable box which will meet all code requirements.

Free-standing switchboards and panelboards shall have drawings submitted for Utility approval.

The customer is to provide the meter socket and metal metering conduit along with bonding by code-approved methods. Metering conduit will normally be limited to runs of 30 feet or less with not over 270 degrees in bends (consult the Utility if over 270 degrees in bends are required), and shall have a minimum diameter of one inch. Removable conduit cover fittings must be secured by metal screws arranged for sealing. Only Utility metering conductors will be permitted in metering conduit.

Metering conduit runs longer than 30 feet in length must have Utility approval prior to installation and will be granted only if, in the opinion of the Utility, a satisfactory meter location is unattainable within normal length. Metering conduit sizing will be specified by the Utility for each extra length run, based on the total length and number of bends. CT secondary conduit is to be brought into the cabinet to a point in front of all energized buses.

The meter socket enclosure for current transformer metering is to have space below the socket for a Utility test switch 9½ inches in length. The minimum width of the enclosure is to be 11 inches. The enclosure is to contain a perch, drilled and tapped, for a test switch. The test switch will be furnished and installed by the Utility. Meter sockets with circuit closures or bypass clips will not be approved for new installations or for modifications of existing service.

The number of terminals required in an instrument transformer rated meter socket are:

<u>Type of Service</u>	<u>Number of Terminals</u>
Three wire, single phase	5
Four wire, three phase, delta, center tap grounded	13
Four wire, three phase, grounded	13

6.06 Socket for Reactive Demand Meter

This is not currently used by the Utility, but is left for future use.

6.07 Instrument Transformer Installations Over 600 Volts

High-voltage instrument transformers and transformer-type meters may be required for large customers taking service at primary voltage under provisions of the Utility's tariff. The Utility should be consulted before construction begins, to establish a mutually satisfactory location for the point of delivery and metering details.

6.08 Metering on a Pole or in a Utility Enclosure

The Utility, at its option, may provide and install the metering equipment on a pole or in a Utility enclosure at the customer's expense in accordance with the policy and schedule of charges in the current tariff.

VII. CUSTOMER EQUIPMENT AND DEVICES AND CHARACTER OF SERVICE

7.01 General

The customer's electrical equipment and devices are to have characteristics such that the Utility distribution system is efficiently utilized and undue interference with Utility service to other customers does not occur.

The customer's equipment shall be designed to perform satisfactorily within the standard voltage ranges and frequency provided on the Utility's system. Insofar as is practical, the Utility will endeavor to maintain standard voltages and frequency on its distribution systems, subject to variations within reasonable limits.

The Utility reserves the right to inspect and test any equipment connected to its lines and to require any information necessary to determine the operation characteristics of the equipment. Prior to purchase, the customer shall submit information to the Utility regarding any equipment which might cause interference with service to other customers or require additional facilities for its satisfactory operation.

Electric service supplied by the Utility may be subjected to voltage disturbances which will not normally affect the performance of lighting, appliances, heating, motors, or other typical electrical equipment, but may result in the improper operation of voltage-sensitive equipment such as computers or microprocessors. It is the responsibility of the customer to provide those power conditioning devices that may be required to provide the quality of "power" necessary for optimum performance of the voltage-sensitive equipment.

7.02 Single-Phase Service Guidelines

Any single-phase piece of equipment having a rated capacity of two kilowatts or more should be operated at not less than 208 volts.

When the aggregate rate exceeds four kilowatts, or the rating of any single piece of equipment exceeds two kilowatts, service should be 208Y/120 or 120/240 volts and the load should be balanced on the ungrounded conductors as closely as practical.

Loads with an aggregate rating of the permanently connected equipment in excess of ten kilowatts that are served from a 208Y/120-volt supply should not be served 208Y/120 volts, three-wire, but should be connected to a four-wire service.

Any residential space heating or water heating appliance having a total capacity greater than 11.5 kilowatts should be so designed and controlled that not more than 11.5 kilowatts will be switched on or off at any one time.

The Utility, at its option, may limit the maximum single-phase load served through one point of delivery.

Three-phase service may be required in lieu of single-phase service where, in the Utility's judgment, the customer's connected load is of a size that three phase is necessary.

7.03 Three-Phase Service

Three-phase service, if available, will normally be provided in accordance with the Utility's current tariff to nonresidential customers upon request except where the total load is less than ten kilowatts or the largest motor is less than three horsepower.

The manner in which single-phase load is connected by the customer is critical with three-phase service. On 208/120-volt wye or 480/277-volt wye three-phase services, all single-phase loads should be split evenly among the three phases. On 240/120-volt, delta three-phase service, all single-phase load, both 120- and 240-volt, shall be connected only to the 120-volt-to-ground legs, except 240-volt resistance heating equipment may be balanced across all three phases by permission of the Utility. Connections made otherwise may result in an overload or single-phase condition with the possibility of damage to the customer's three-phase equipment.

In overhead districts, both 208/120-volt wye and 240/120-volt delta three-phase service may be available. The selection of which voltage is to be supplied is at the option of the Utility and will depend upon the characteristics of the Utility's distribution system in the area and the customer's electrical needs.

Normally, three-phase, 480-volt service will not be supplied where the total load to be served is less than 50 kilowatts except where the load consists of a single motor such as irrigation pumping.

Usually, three-phase delta service will not be supplied from underground systems.

Three-phase service, if available, will be supplied to residential customers upon request, provided three-phase service is necessary. The customer will be billed for the three-phase service on the Utility's current tariff. A contract and payment of additional charges may be required for extension of the Utility primary and secondary voltage conductors and the transformer installation.

The Utility, at its option, may limit the maximum load served through a single point of delivery to the capacity of the largest size transformer designated as a "Utility Standard." In general, prior agreement should be obtained for service to three-phase loads larger than 500 kilovolt-ampere.

7.04 Motor Protection

To assure adequate safety to personnel and equipment, the customer shall provide and maintain code-approved protective devices in each phase to protect all motors against overloading, short circuits, ground faults and low voltage, and to protect all three-phase motors against single-phasing.

7.05 Motor Starting

Reduced-voltage starters are usually required on all motors rated above 30 horsepower, and motors that are frequently started that are rated in excess of ten horsepower, unless written permission is granted by the Utility to omit the reduced-voltage starter.

The Utility will furnish information regarding permitted starting currents. The starting

currents permitted will depend upon the frequency of the motor starts, the size and character of the customer's load, and the design of the Utility's distribution system in the area, and will generally be equivalent to the maximum starting current which, in the Utility's opinion, can be supplied without undue interference with service to other customers.

No additional Utility facilities will be installed to reduce voltage fluctuations on an individual customer's service, caused by the starting of his motors, until after approved reduced-voltage starts have been installed by the customer. If additional Utility facilities are required, they will be installed at the customer's expense.

7.06 Interfering Loads

Whenever a customer's utilization equipment has characteristics which cause undue interference with Utility service to other customers, the customer shall make changes in such equipment or provide, at customer expense, additional equipment to eliminate the interference. Where practicable, the Utility will furnish additional equipment in accordance with the current tariff.

Additional facilities such as separate Utility transformers and a separate service can be used to minimize voltage fluctuations on secondary voltage circuits for X-ray machines. Where the operation of this type of equipment causes undue voltage fluctuations on Utility primary voltage lines, the additional equipment required may include a separate primary voltage line. Where practicable, the Utility will furnish additional equipment in accordance with the current tariff.

High-frequency equipment such as electronic heating equipment, spark discharge devices, radio transmitting equipment, etc., and equipment that generates harmonics, such as an induction furnace, shall be designed and operated so as not to create disturbances on the Utility electrical system which might interfere with the proper operation of communication, radio, television, remote control, or other utilization equipment of other customers.

7.07 Emergency or Standby Generators

Permanently installed emergency or standby generators are to be connected to the customer's wiring system by a permanently installed transfer switch intended for that purpose. The transfer switch is to disconnect all ungrounded conductors connected to the Utility system prior to connecting the generator to the conductors supplying the load (open transition transfer). The transfer switch is to be designed and installed so that connection of the generator to the Utility system is prevented for any mode of operation. Compliance with these provisions is necessary to prevent serious or possible fatal accidents.

Small portable generators shall not be connected to a permanent wiring system at any time, unless the interconnection is made with a permanently installed open transition transfer switch. Such installations shall meet appropriate codes and regulations as outlined in Section 1.02 on page 1.

Some customers, such as hospitals, may have permanently installed emergency or standby generators, which require mandatory testing during normal business hours under loaded conditions at regular intervals. In these cases the Utility will consider permitting the use of “closed transition” transfer switches to connect the customer load to the emergency or standby generation. Connection of the generator to the utility system will only be allowed for testing purposes as described above, and only under the following conditions: generation may be connected to the utility system for 6 cycles (0.1 second) or less provided that voltage, frequency, and phase angle between the two systems are within following limits: voltage + or – 5%, frequency + or – 0.2 HZ, and phase angle + or – 5 degrees. The generator shall never be connected to a de-energized utility source. The utility will normally require the customer to provide a lockable disconnect switch with visible air gap to isolate his generation from the Utility's system. This disconnect switch must be accessible to the Utility, and the Utility shall have the right to lock the switch open whenever necessary to assure safe electrical operating conditions. In some cases an existing switch which can be locked or rendered inoperable and tagged may be adequate. Consult the Utility for determination.

All transfer switches and/or transfer operating schemes must meet applicable building codes and be inspected by the appropriate governmental electrical inspector.

7.08 Parallel Generation

Parallel generation is the parallel production of electric energy, where sources of generation other than the Utility's are connected for parallel operation with the Utility's system. Such sources, when customer-owned, may provide all or part of the customer's requirements or customers may sell directly all or part of their output to the Utility. Customer sources may include, but are not limited to, wind turbines, waterwheels, steam turbines, solar conversion and geothermal devices. Each proposal for parallel generation over 50 kW will be handled on an individual basis and will require a special contract between the customer and the Utility.

The customer must provide a lockable disconnect switch with visible air gap to isolate his generation from the Utility's system. This disconnect switch must be accessible to the Utility, and the Utility shall have the right to lock the switch open whenever necessary to maintain safe electrical operating conditions.

The operation of the customer's parallel generation system must be approved by the Utility. The metering location, type of metering, and the method of interconnecting the customer and the Utility's system will be designated by the Utility.

Customers with small renewable generation sources (50 kW or less) are subject to the appropriate interconnection requirements established by the National Electric Code (NEC), National Electrical Safety Code (NESC), State of Montana rules and regulations, city and county ordinances and codes, rules on file with or issued by the Public Service Commission (PSC), Institute of Electrical and Electronics Engineers (IEEE), Underwriter's Laboratories (UL) and the requirements of this guideline.

7.09 Cogeneration

Cogeneration is the joint production of electric energy and useful thermal energy in a combined process. It includes, but is not limited to, gas turbines and diesel-driven generators (with waste heat recovery) and steam or back-pressure turbines. Each proposal for cogeneration will be handled on an individual basis by means of a special contact with the Utility.

The operation of the customer's cogeneration system is to be approved by the Utility. The metering location, type of metering, and the method of interconnecting the customer and the Utility's system will be designated by the Utility.

7.10 Available Fault Current

Upon request, the Utility will supply the information on available fault current at the customer's service entrance.

7.11 Wi-Fi

Upon request the Utility may allow manufactures of Wi-Fi equipment limited access to power and street light poles. All equipment must be pre-approved by the Utility prior to the attachment to any N.W.E. structure. All Wi-Fi equipment must be mounted inside the communication section of a power pole. A visible disconnect must exist within the communication section of the power pole. The purpose of this disconnect is to clearly isolate the Wi-Fi equipment from the Utilities grid. The approved disconnect can be either a single or double pole switch depending upon the supply voltage required by the Wi-Fi Equipment. The switch must be weather proof and clearly visible.

VIII. OTHER CUSTOMER RESPONSIBILITIES

8.01 Customer's Responsibility for Safety

The customer shall comply with all federal, state and local laws and regulations, as well as all applicable laws of negligence concerning all activities in the vicinity of the Utility's electrical wire line and equipment, whether on customer's premises or used to deliver electricity from the generating facilities to his premises. The customer shall comply with laws and regulations to protect himself, his family, his employees, the Utility and all third parties from injury, loss or damage.

Contact with electrical conductors may cause serious injury or may be fatal. All metallic aerial objects are to be kept at least ten-feet away from electrical conductors. Metallic aerial objects include such items as, but are not limited to, metal ladders, pipes antennas, etc.

Montana law requires that existing underground utilities be located or found not to exist before beginning excavation. Call 1-800-424-5555 at least two days before digging for free locates of underground utilities. (In Flathead County call 755-8344 for free locates of underground utilities). Digging into an energized cable may cause serious injury or may be fatal.

Provide safe access to the meter, so the meter reader can read the meter without the possibility of injury. Slips, trips, falls and dogs are a threat to meter readers.

Do not attempt tree trimming around power lines. Before trimming trees, call The NWE-MT office nearest you or our Customer Service Center at 1-888-467-2669.

If the Utility serves the customer by means of primary voltage or transmission voltage circuits on the customer's premises or if the customer resells power and energy furnished by the Utility, the Utility may require the customer to obtain and retain insurance coverage which the Utility deems adequate to satisfy the duty of indemnification.

8.02 Rights-of-Way

The applicant shall provide, without cost to the Utility, all rights-of-way and easements required for the installation of facilities necessary or convenient for the supplying of electric service and free access at reasonable times to applicant's premises for all work necessary to maintain continuity of such service.

IX. ILLUSTRATIONS AND TABLE

Table I

Minimum Conduit Required for Utility Conductors
Secondary Voltage (Under 600 Volts)

See Section 4.03 for approved conduit material. Do not specify other than rigid galvanized steel, or PVC Schedule 40 or 80 without specific approval of Utility engineer.

1. For up to two bends* - 180 degrees or less, up to 150 feet in length (for 151 to 300 feet, see No. 2):

<u>Service Entrance Ampacity</u>	<u>Single-Phase Three-Wire</u>	<u>Three-Phase Four-Wire</u>
200 or less	1-2"	1-3"
201-400	1-3"	1-4"
401-600	2-3"	2-3"
601-1,000	2-4"	4-3" or 2-4"
1,001-1,200	3-4"	5-3" or 3-4"
1,201 and up	Consult Utility	

2. For up to three bends* - 270 degrees or less, up to 300 feet in length:

<u>Service Entrance Ampacity</u>	<u>Single-Phase Three-Wire</u>	<u>Three-Phase Four-Wire</u>
200 or less	1-2"	1-3"
201-400	1-3"	1-4"
401-600	2-3"	2-3"
601-1,000	4-3"	4-3"
1,001-1,200	5-3"	5-3"
1,201 and up	Consult Utility	

* Bends to be minimum 24-inch sweep radius. If more than two bends or if run is longer than 150 feet, bends must be rigid steel.

Larger conduit size or bend radius may be required for longer runs, more bends, four-wire full neutral, or direct connection to Utility conduit. Contractor shall consult Utility for specific requirements.

For runs of less than 25 feet and no more than two bends, the sweep radius may be reduced to a minimum of 12 inches for two-inch conduit, 18 inches for three-inch conduit or 24-inches for four-inch conduit.

Minimum conduit depth is 30 inches. Maximum burial depths should never exceed the minimum recommended depth by more than 12 inches. See Section 4.03.

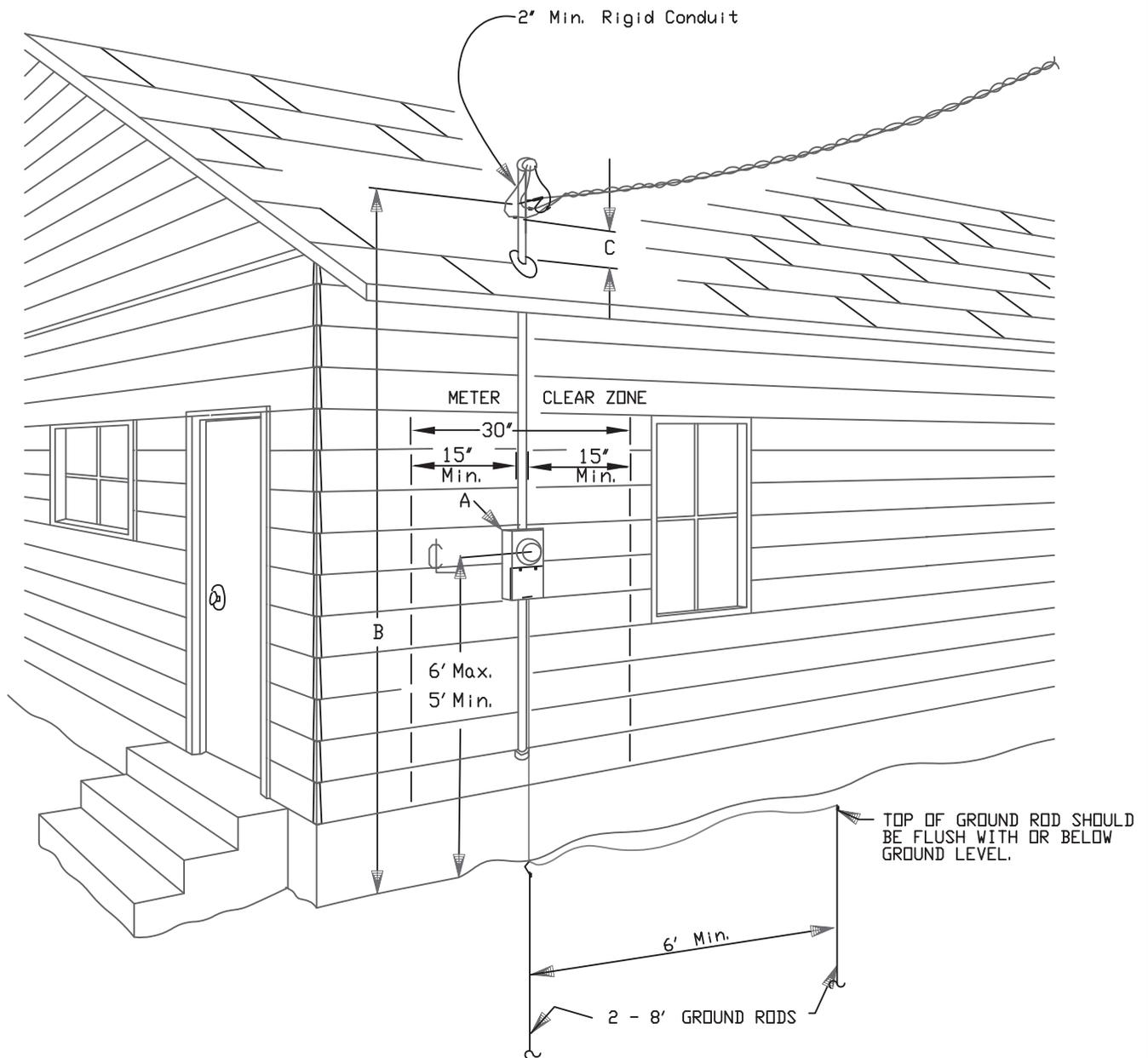
NOTES

Note 1 – Approved procedure for installing disconnect boots (sleeves) on any meter equipped with a handle type manual bypass.

- X If practical notify the customer that you are disconnecting his service.
- X Disconnect the customer by using the required *disconnect switch* that must be located on the load side of the meter and within three feet of the meter.
 - o This is the most critical step. If it is not done, the meter bypass will break the load when the bypass handle is returned to the normal position with disconnect boots inserted on the stabs of the meter.
- X Disengage the meter from the socket by moving the lever bypass handle to the “bypass” position.
- X Install the disconnect boots on the LOAD stabs of the meter. If you install the boots on the LINE side stabs of the meter, any AMR module that may be installed within the meter will become inoperable. Be sure to install the boots on only the LOAD side stabs of the meter.
- X Reinsert the meter into the socket and place the handle of the “lever bypass” back to the normal operating position.
- X Place the disconnect switch into its normal operating position and insure that there is no leakage through the disconnect boots. If leakage is detected then try replacing the boots with new ones. Be sure to follow all previous steps.

If you have questions about this procedure please contact Neil O'Donnell at 406 497-2647

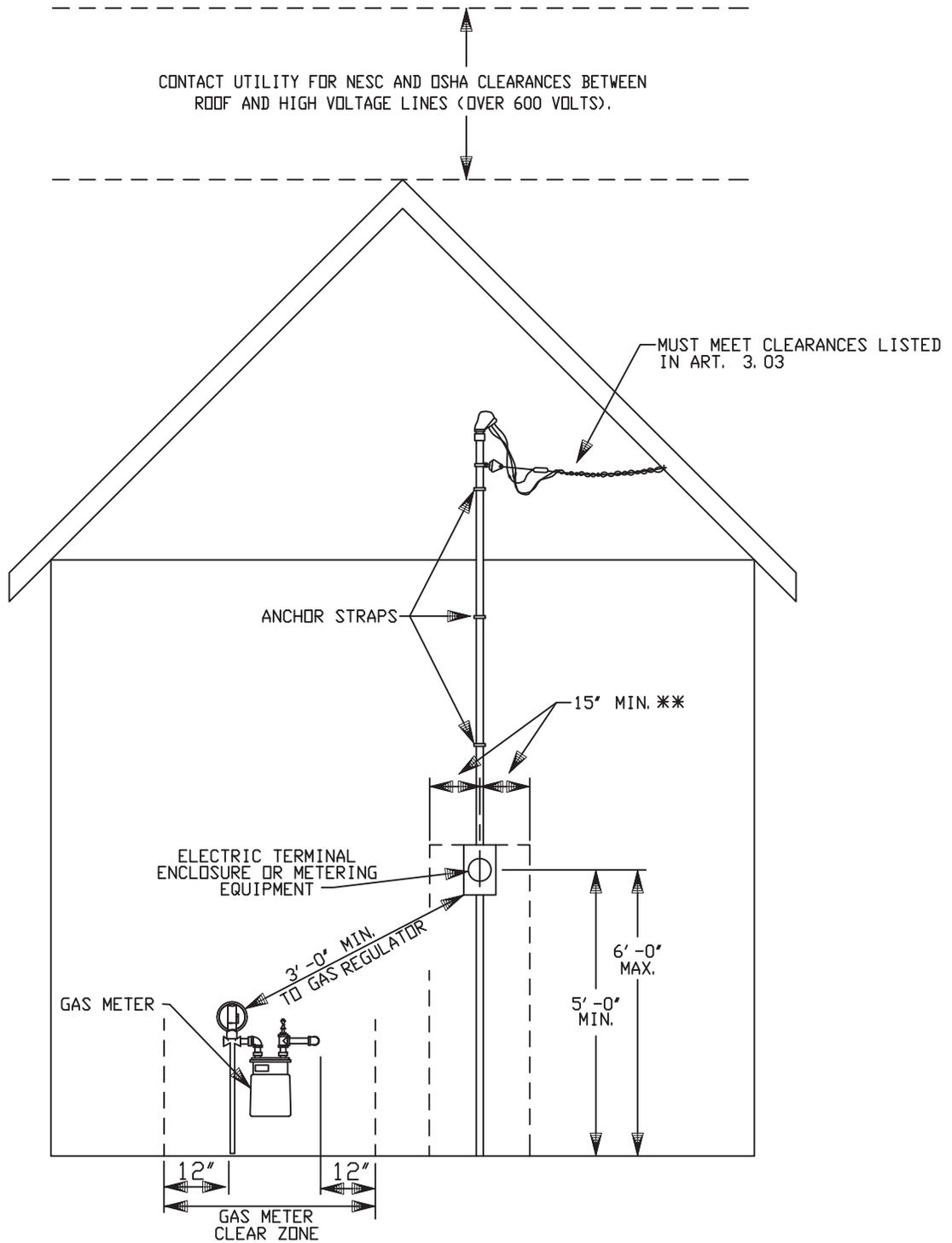
TYPICAL RESIDENTIAL OVERHEAD SERVICE



- A. METER LOCATION MUST BE APPROVED BY UTILITY PRIOR TO INSTALLATION. SEE SECTION 2.05.
- B. THE POINT OF ATTACHMENT MUST BE A MINIMUM OF 14' ABOVE FINISHED GRADE FOR SINGLE STORY BUILDINGS. THE POINT OF ATTACHMENT MUST BE A MINIMUM OF 18' ABOVE FINISHED GRADE FOR MULTI-LEVEL BUILDINGS. ADDITIONALLY THE POINT OF ATTACHMENT MUST BE HIGH ENOUGH TO PROVIDE A MINIMUM CLEARANCE BETWEEN THE SERVICE CONDUCTOR AND GROUND OF 18' OVER ROADS, STREETS, ALLEYS OR PARKING AREAS, OR 14' OVER AREAS ACCESSIBLE TO PEDESTRIANS ONLY (NWE REQUIREMENT). SEE SECTION 3.03.
- C. 18' WITHIN A 6' RADIUS OF THE SERVICE MAST, PROVIDED THE SERVICE MAST IS LOCATED NOT MORE THAN 4' FROM THE EDGE OF THE ROOF. FOR CONDUCTORS OVERHANGING THE ROOF BEYOND THE 6' RADIUS, OR FOR MASTS LOCATED OVER 4' FROM THE ROOF EDGE, 3' IS REQUIRED. SEE SECTION 3.03 FOR ADDITIONAL INFORMATION.

NOTE: CLEARANCE B AND C ARE BASED ON THE NATIONAL ELECTRICAL SAFETY CODE WITH NWE-MT ADDERS. CLEARANCES SHOULD CONFORM TO THE CODE IN EFFECT AT THE TIME OF INSTALLATION.

METER SET LOCATION MINIMUM CLEARANCE REQUIREMENTS (UNDERGROUND & OVERHEAD SERVICES)



** -ELECTRIC METER CLEAR ZONE: THE EDGE OF GAS PIPING OR THE GAS METER MUST BE AT LEAST 15' FROM THE VERTICAL CENTERLINE OF THE ELECTRICAL METER. NO GAS PIPING CAN PASS UNDER THE METER.

NOTE: METER LOCATION MUST BE APPROVED BY THE UTILITY PRIOR TO INSTALLATION, SEE ART. 2.05.

SUGGESTED METHOD OF INSTALLING OVERHEAD SERVICE TO BUILDINGS SELF-CONTAINED METERING

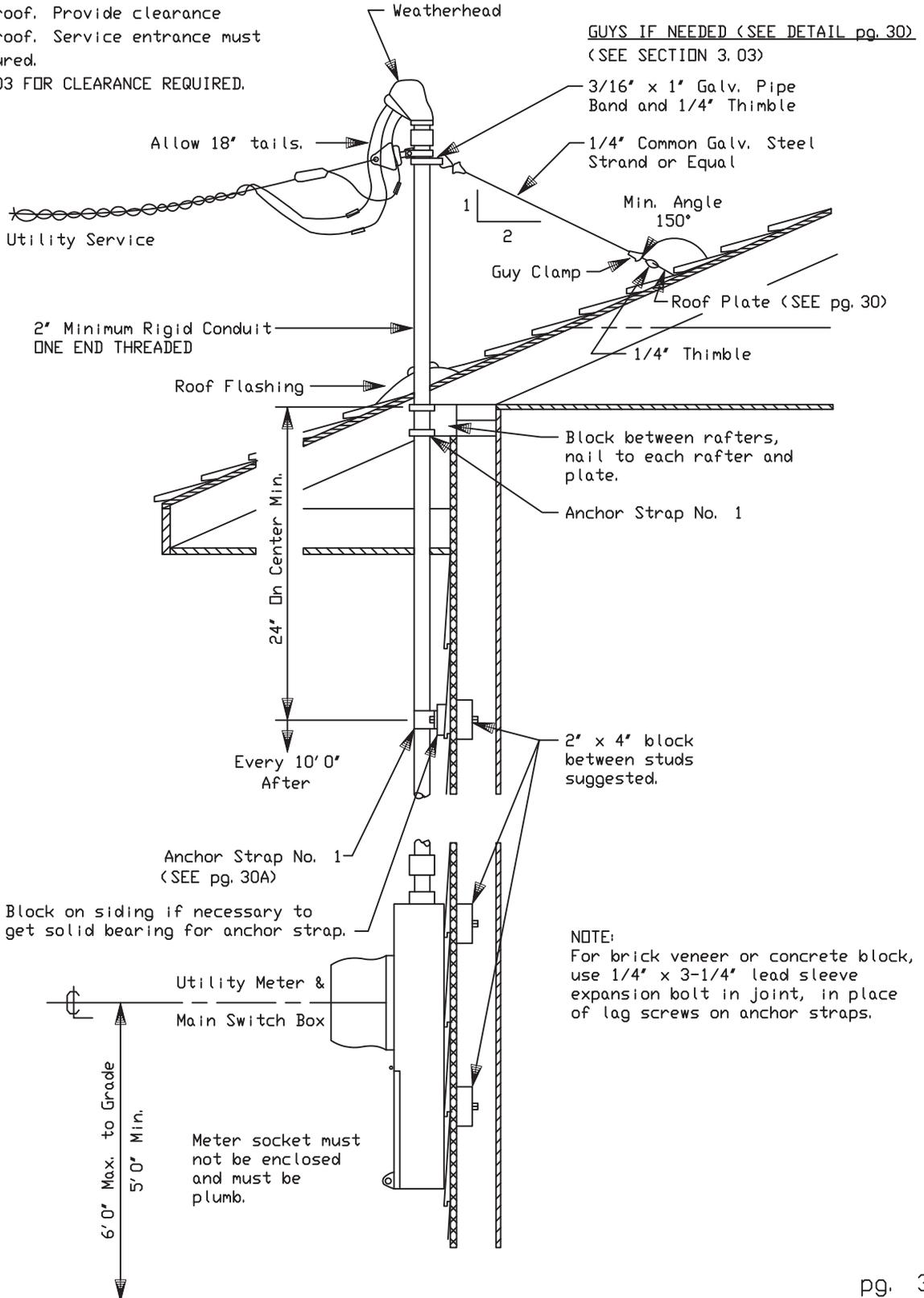
GUYED EXAMPLE

NOTE:

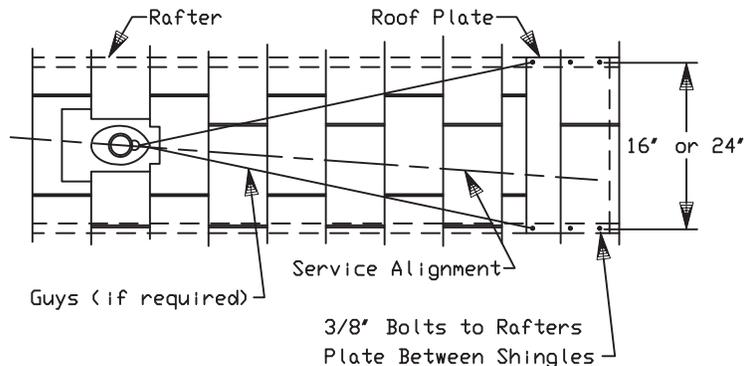
Service mast must be mounted on side nearest distribution pole. Can be located near rear corner if clear path exists between service attachment and pole. Minimize service wire overhang over roof. Provide clearance required over roof. Service entrance must be rigidly secured.
SEE ARTICLE 3.03 FOR CLEARANCE REQUIRED.

ALL FERROUS HARDWARE TO BE HOT DIP GALVANIZED.

Electrical label or permit must be displayed on service panel or meter base.



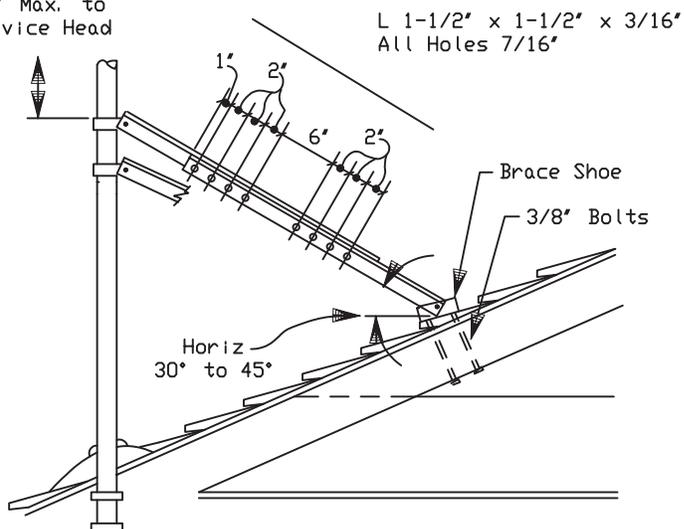
SUGGESTED GUYING METHODS FOR OVERHEAD



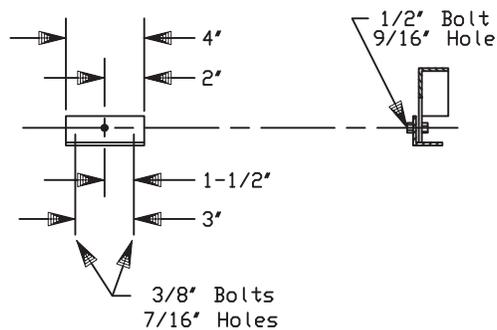
GUY DETAIL

Roof plate must be installed so that service alignment extension falls within angle of guys.

18" Max. to Service Head

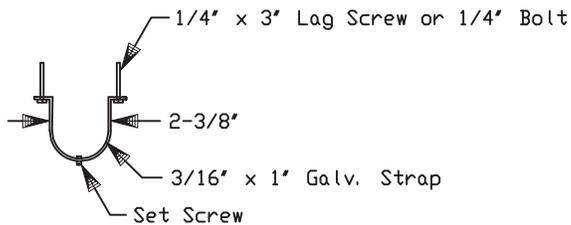
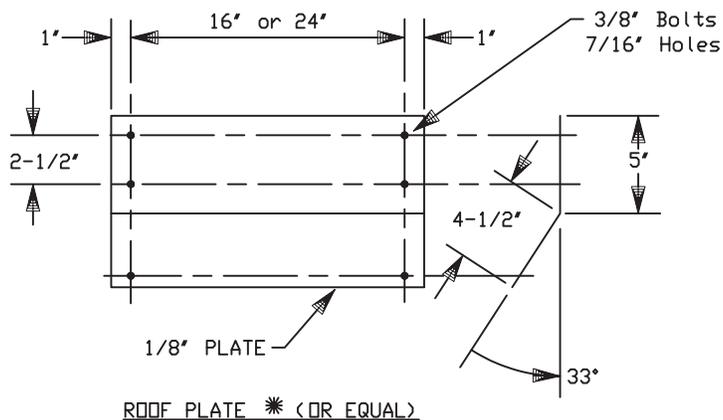


PUSH BRACE (2 REQUIRED) * (OR EQUAL)



BRACE SHOE

L 1-1/2" x 1-1/2" x 3/16"

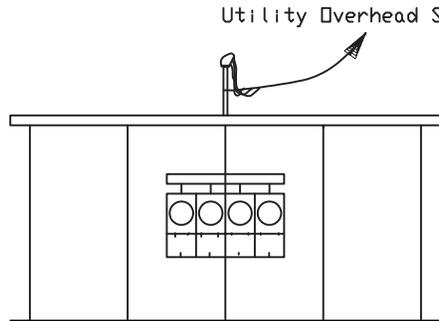


ANCHOR STRAP No. 1 * (OR EQUAL)

3/8" eye bolts and washers with header block between rafters are acceptable, but eye lags are not acceptable.

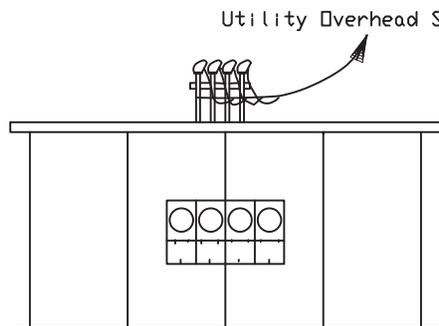
* TO BE APPROVED PRIOR TO INSTALLATION.

OVERHEAD SERVICE SERVICE DETAILS MULTIPLE-OCCUPANCY RESIDENTIAL AND COMMERCIAL BUILDINGS



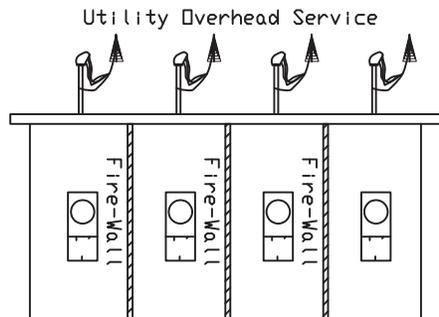
GROUPED METERS-SINGLE SERVICE MAST

A sealable service gutter is required by this arrangement. There shall be no more than six disconnects per service.



GROUPED METERS-INDIVIDUAL SERVICE MAST

Individual service masts must be arranged so that all service entrance tails will reach a single point of attachment of the utility service.



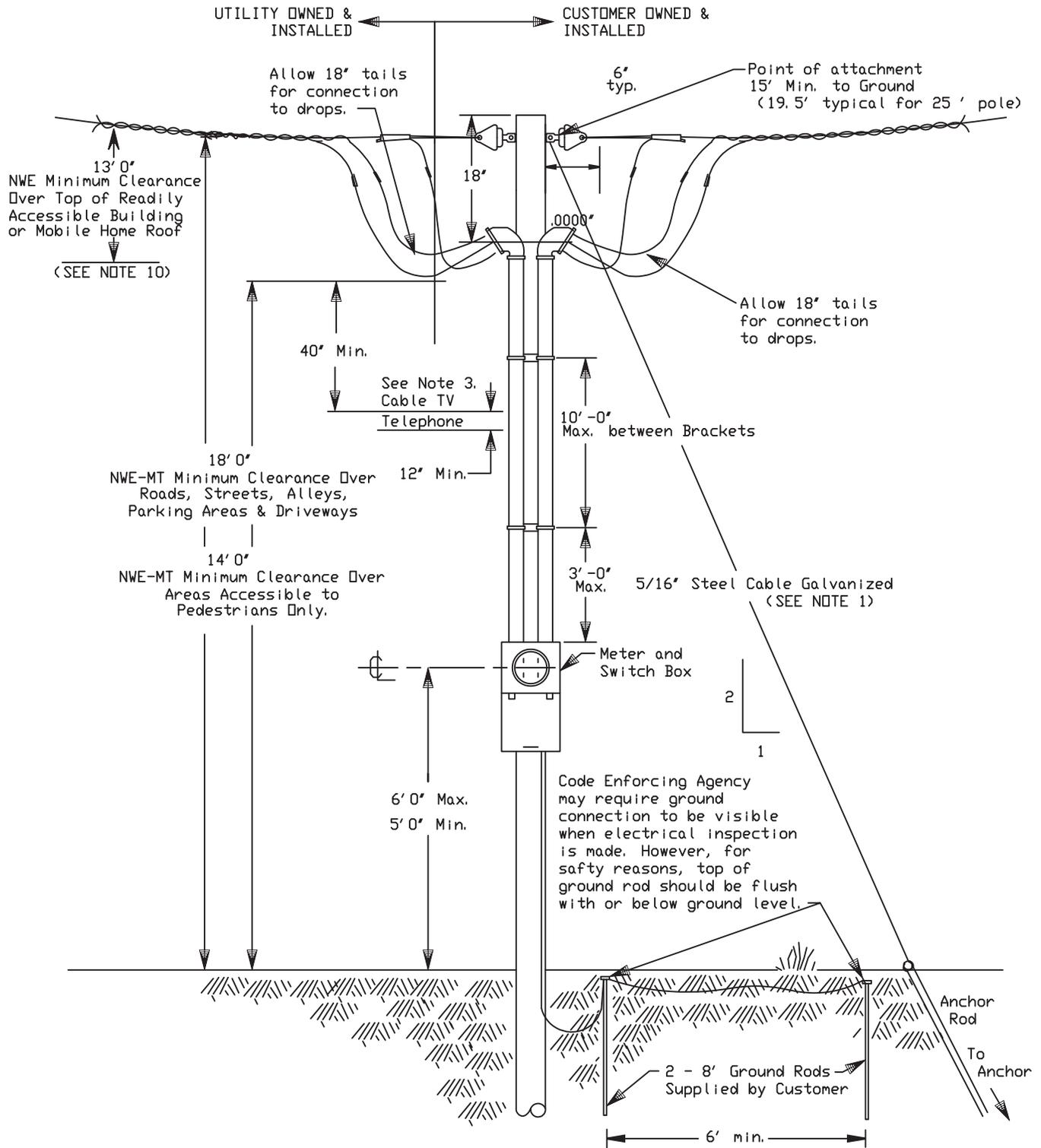
INDIVIDUAL METERS- INDIVIDUAL UTILITY SERVICE

Requires fire walls extended to the roof in compliance with fire codes between occupancies as shown. This arrangement must have prior approval of electrical inspection authority and utility.

NOTE:

- A. Service mast(s) must be mounted on side nearest utility distribution pole. Minimize overhang of roof or provide required clearance over roof. See Section 3.03 for clearances or refer to currently approved edition of the National Electric Code.
- B. A permanent plaque or directory will be installed by the customer at each service drop or each service-equipment location denoting all other services on or in the building or structure & the area served by each. (SEE SECTION 3.03)

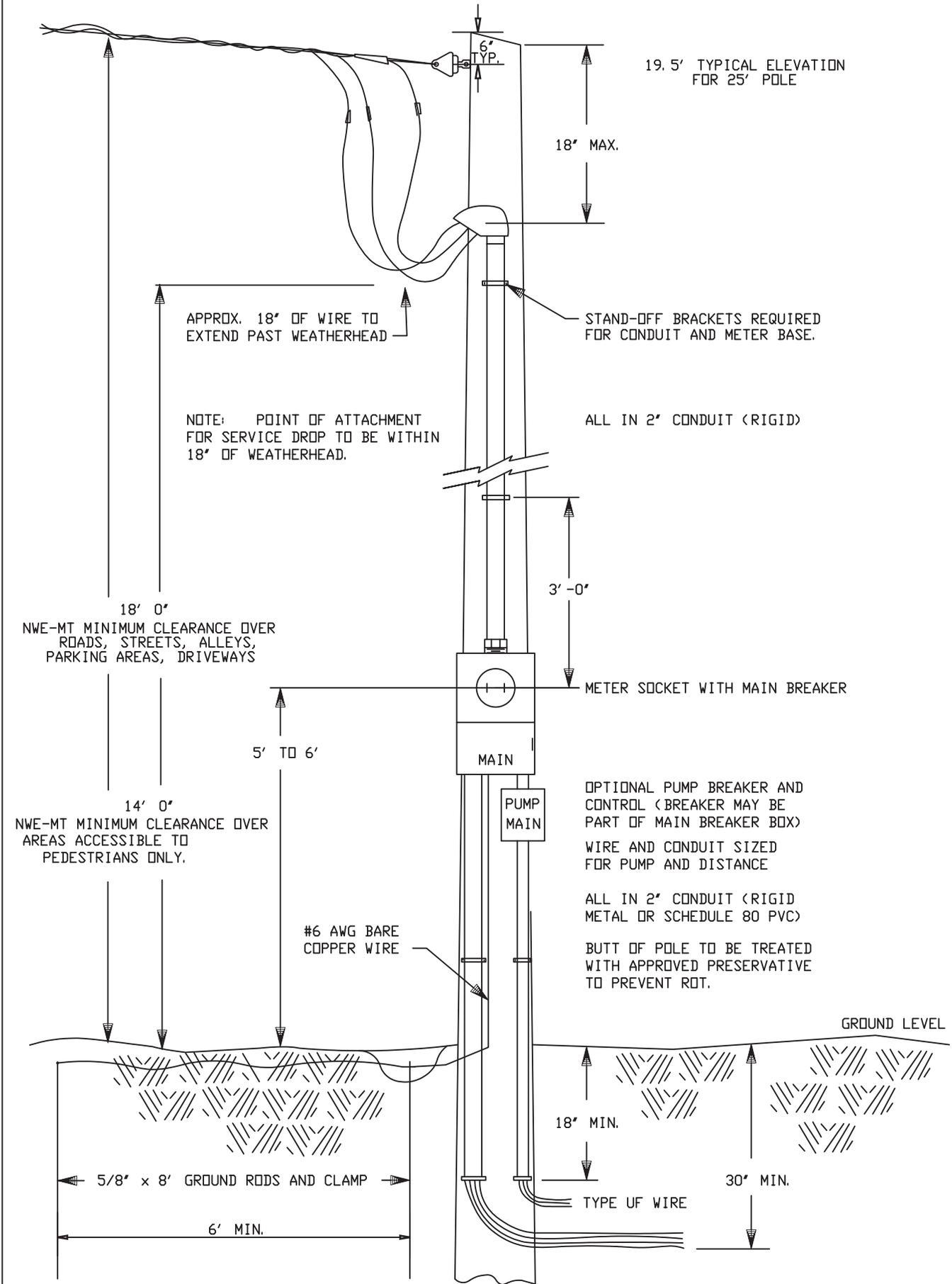
OVERHEAD SERVICE FOR MOBILE HOME



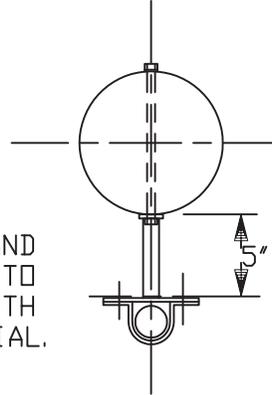
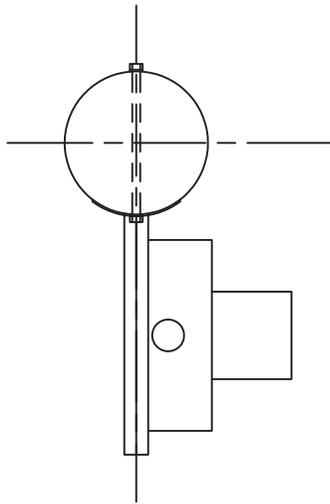
NOTES:

1. Customer to provide guying if span length exceeds 100 feet or if span crosses trailer or building or if other conditions require guying.
2. Pole to be 25'0" minimum length, Class 7 (15" minimum top circumference, 21" minimum circumference 6' from butt) or better, Butt treated, set no less than 5'0" below ground level.
3. Additional height may be required to accommodate overhead telephone service or cable TV. Contact telephone company or CATV Co. for their required clearances.
4. Different types of meter bases may require that the line side conduit and the load side may be reversed.
5. For additional information, call local utility office.
6. Electrical label or permit must be displayed on service panel or meter base.
7. Overhead feed to mobile home shown; underground feed must comply with NEC.
8. Stand-off brackets required for conduit and meter base.
9. Clearances specified meet NESC requirements and include NWE-MT adders.
10. Clearance may be reduced to 5'6" over roofs or projections not readily accessible to pedestrians.

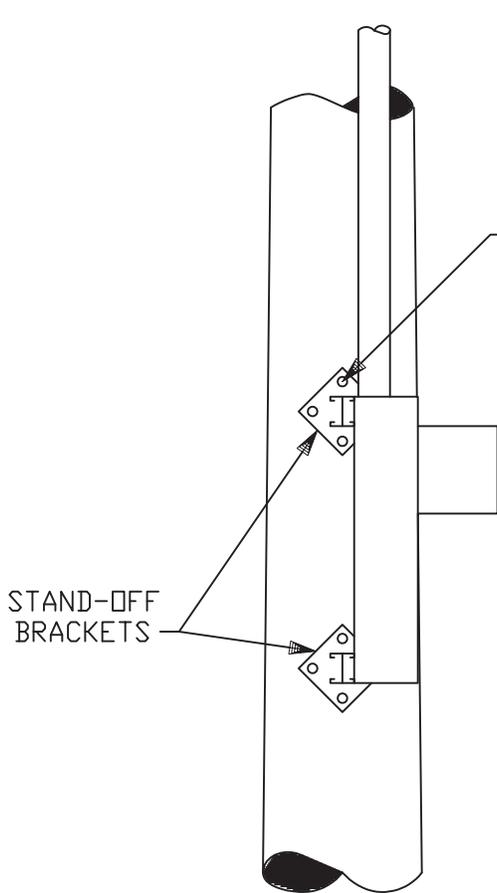
TYPICAL METER POLE INSTALLATION



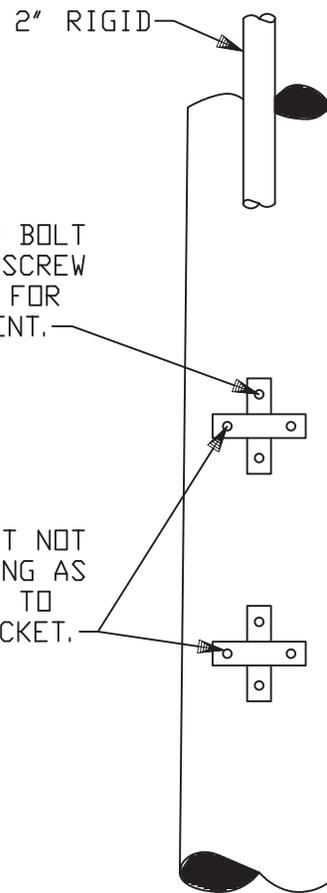
STAND-OFF BRACKET METHOD OF ATTACHMENT



ATTACH RISER AND
METER SOCKETS TO
STAND-OFF'S WITH
UNISTRUT MATERIAL.



TYPICAL 90°
STAND-OFF SUPPORT
INSTALLATION



TYPICAL 180°
STAND-OFF SUPPORT
INSTALLATION

USE THROUGH BOLT
ON TOP LAG SCREW
ON BOTTOM FOR
ATTACHEMENT.

METER SOCKET NOT
SHOWN SPACING AS
NECESSARY TO
SUPPORT SOCKET.

STAND-OFF
BRACKETS

2" RIGID

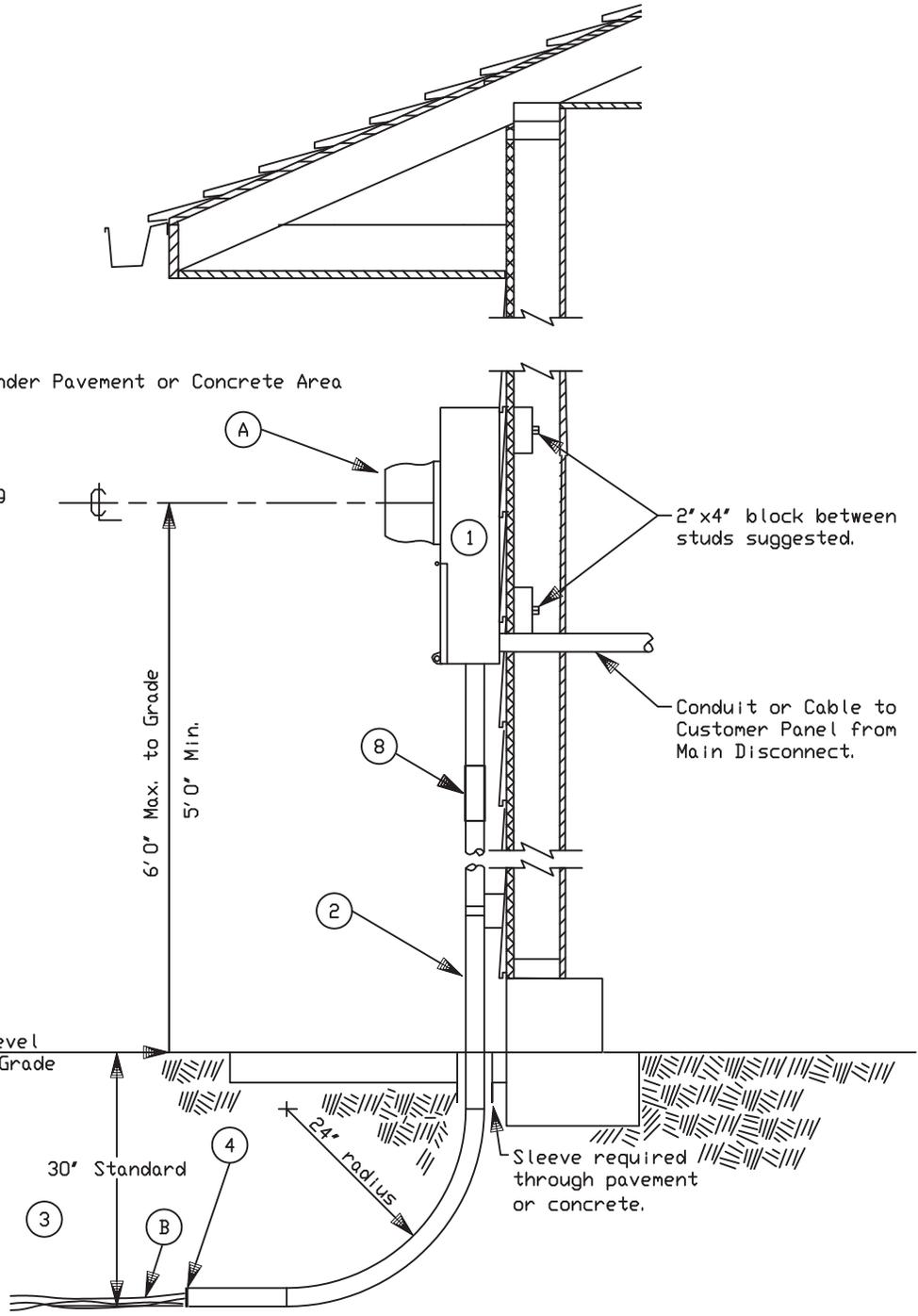
SUGGESTED METHOD OF INSTALLING UNDERGROUND SERVICE (SELF-CONTAINED METERING WITH SUPPORTED BUS BARS)

NWE WILL FURNISH

- (A) Meter
- (B) Service Conductor

CUSTOMER WILL FURNISH

- (1) Meter Base Socket
- (2) Conduit Raceway Under Pavement or Concrete Area
- (3) Right-of-Way
- (4) Protective Bushing (See Note 5)



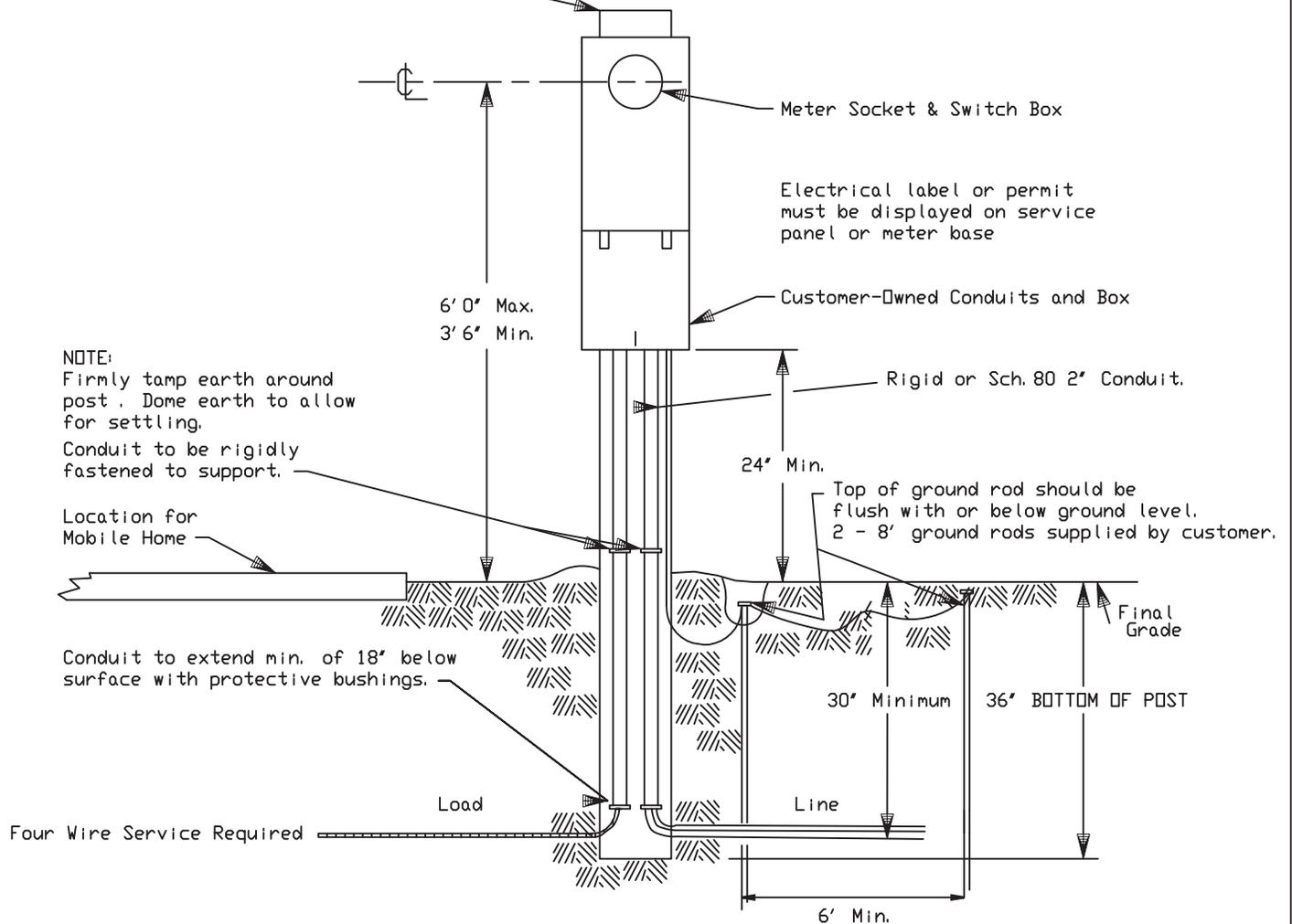
NOTES:

1. Electrical label or permit must be displayed on service panel or meter base.
2. Meter base and conduit must be securely attached to structure. If a paved or concrete area is adjacent to the building foundation, the conduit must be installed past the edge of the pavement.
3. Socket must be plumb and switch box must be covered when inspected.
4. For 200-ampere or smaller service, NWE will terminate the service lateral on the line-side supported bus bar terminals of the customer's meter socket, provided the customer's raceway is a minimum of 2' (3' for 3-phase), and the line-side meter socket lugs will accept 4/0 conductor.
5. Protective bushing required on galvanized or plastic conduit.
6. Two 5/8" x 8' Ground Rods, 6' minimum separation also required (omitted for clarity).
7. See section 4.03 for raceway details.
8. Install slip joint as required to accommodate ground or structure settling.

UNDERGROUND SERVICE FOR MOBILE HOME & TEMPORARY POST MOUNTED INSTALLATIONS

6" x 6" Minimum Size, or 5-1/2" Diameter if Round Butt Treated Wood Post Owned by Customer. Must have Meter Base Securely Bolted to Pole.

NWE-MT direct burial service. NWE to connect service at meter base.



NOTE:
Firmly tamp earth around post. Dome earth to allow for settling.
Conduit to be rigidly fastened to support.

Location for Mobile Home

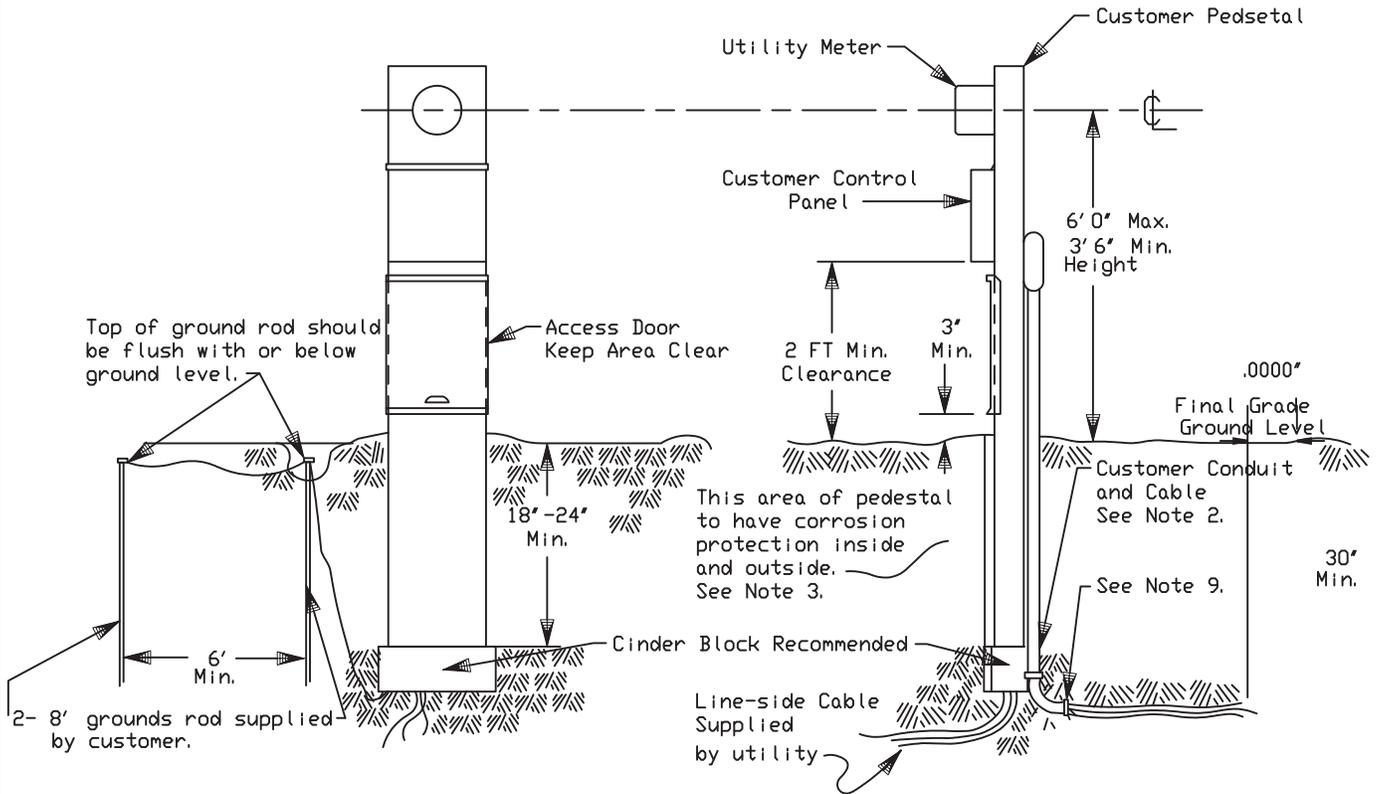
Conduit to extend min. of 18' below surface with protective bushings.

Four Wire Service Required

For 200-ampere or smaller services, NWE will terminate the service lateral on the line-side supported bus bar terminals of the customer's meter socket, provided the customer's raceway is a minimum of 2" (3" for 3-phase), the meter socket enclosure has a minimum dimension of 11" x 14" x 4-1/8", and the line-side meter socket lugs will accept 4/0 conductor.

Unmetered wires must be accessible only to utility.

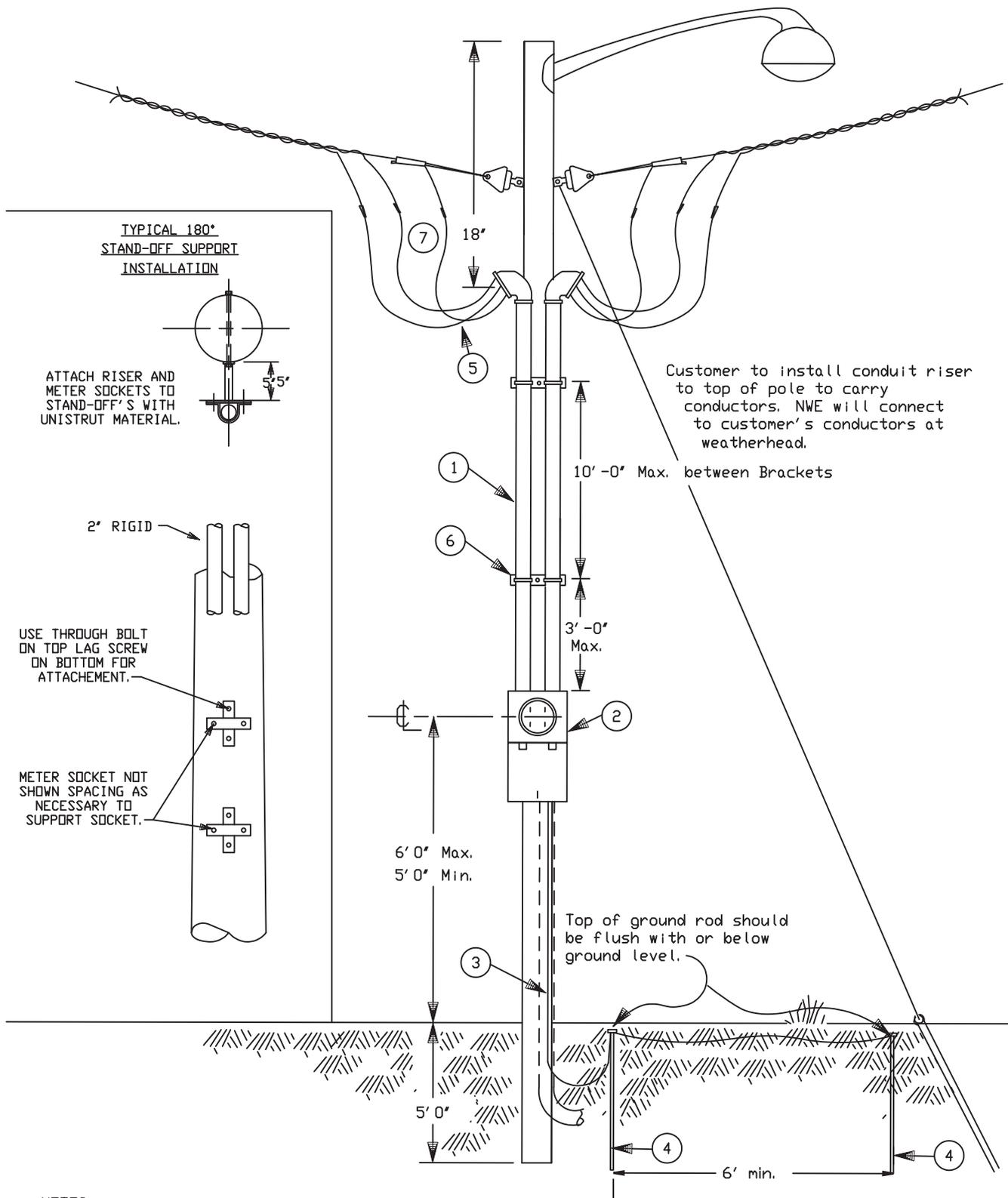
UNDERGROUND SERVICE FOR MOBILE HOME PEDESTAL INSTALLATIONS



NOTES:

1. Pedestal must be set with front door to utility connections remaining accessible.
2. Customer conduit shall not be installed across front of utility access door on pedestal.
3. Bottom of pedestal which is to be in contact with soil must have additional corrosion-resistant protection such as electro-plate galvanizing under paint, paint with coal tar coating, etc.
4. Access door to utility connections on pedestal must be able to be secured using a utility meter seal. Meter seal locations on door must be accessible.
5. Use corrosion inhibitor for all aluminum connections.
6. Unmetered wires must be accessible only to the utility.
7. Meter must be installed plumb in all directions.
8. Electrical label or permit must be displayed on service panel or meter base.
9. Protective bushing required on conduit.

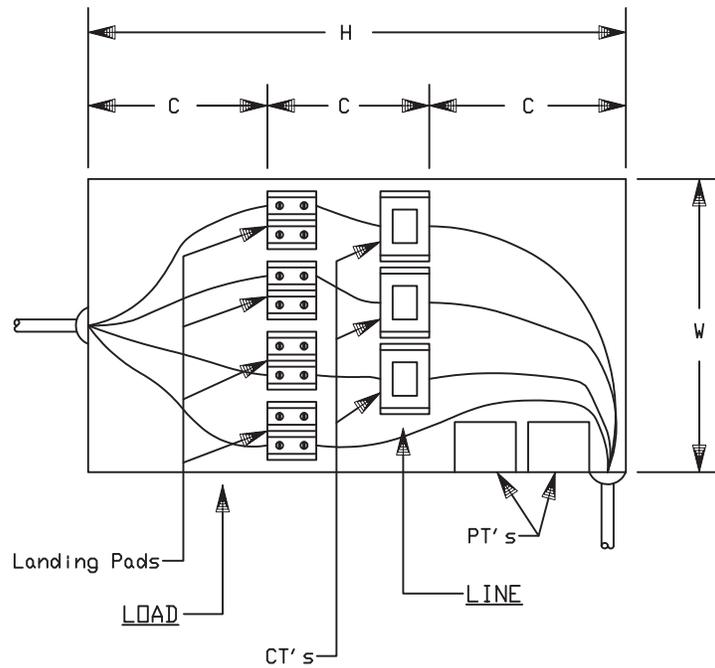
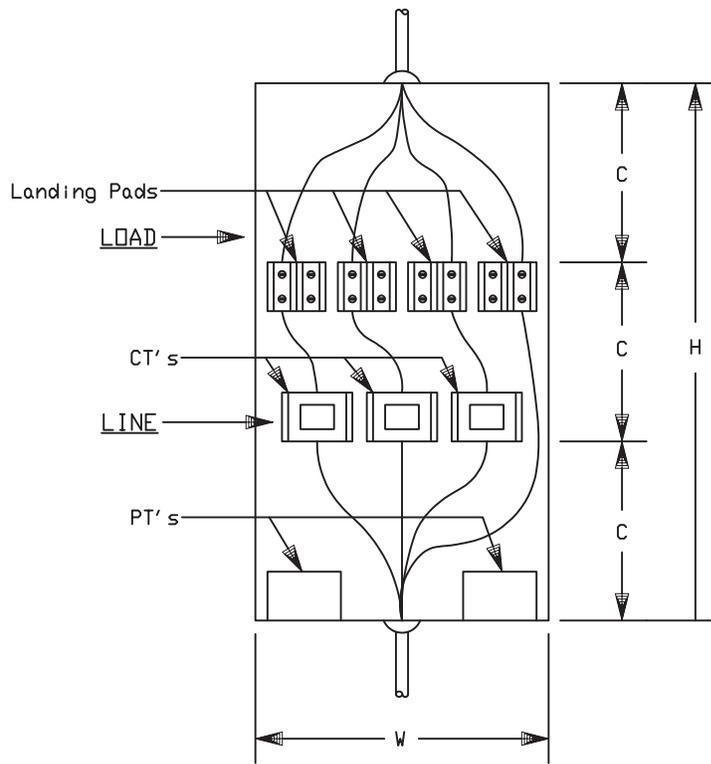
TYPICAL INSTALLATION FOR YARD LIGHT SERVICE POLE



NOTES:

1. With permission from the utility, customer owned metering equipment may be mounted on yard light poles under contract with the customer.
2. Meter socket & Switch Box Must be plumb in all directions.
3. Ground wire - No. 6 copper minimum.
4. Two ground rods - 8' long - Supplied by Customer.
5. Conductor must be 18" in length outside weatherhead.
6. Stand-Off brackets required for conduit and meter base.
7. Weatherhead must be within 18"-of the top-of pole

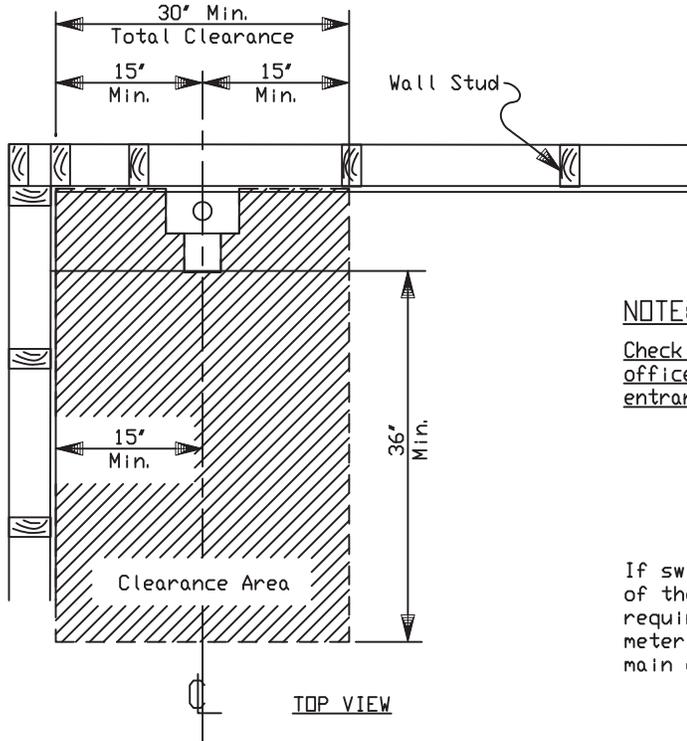
CT TRANSFORMER METERING



NOTES:

1. C is 1/3 of H, for CT's & Landing Pads
 2. Minimum height above finished ground surface is 24'
- SEE SECTION 7.05 for Transformer Cabinet Sizes.

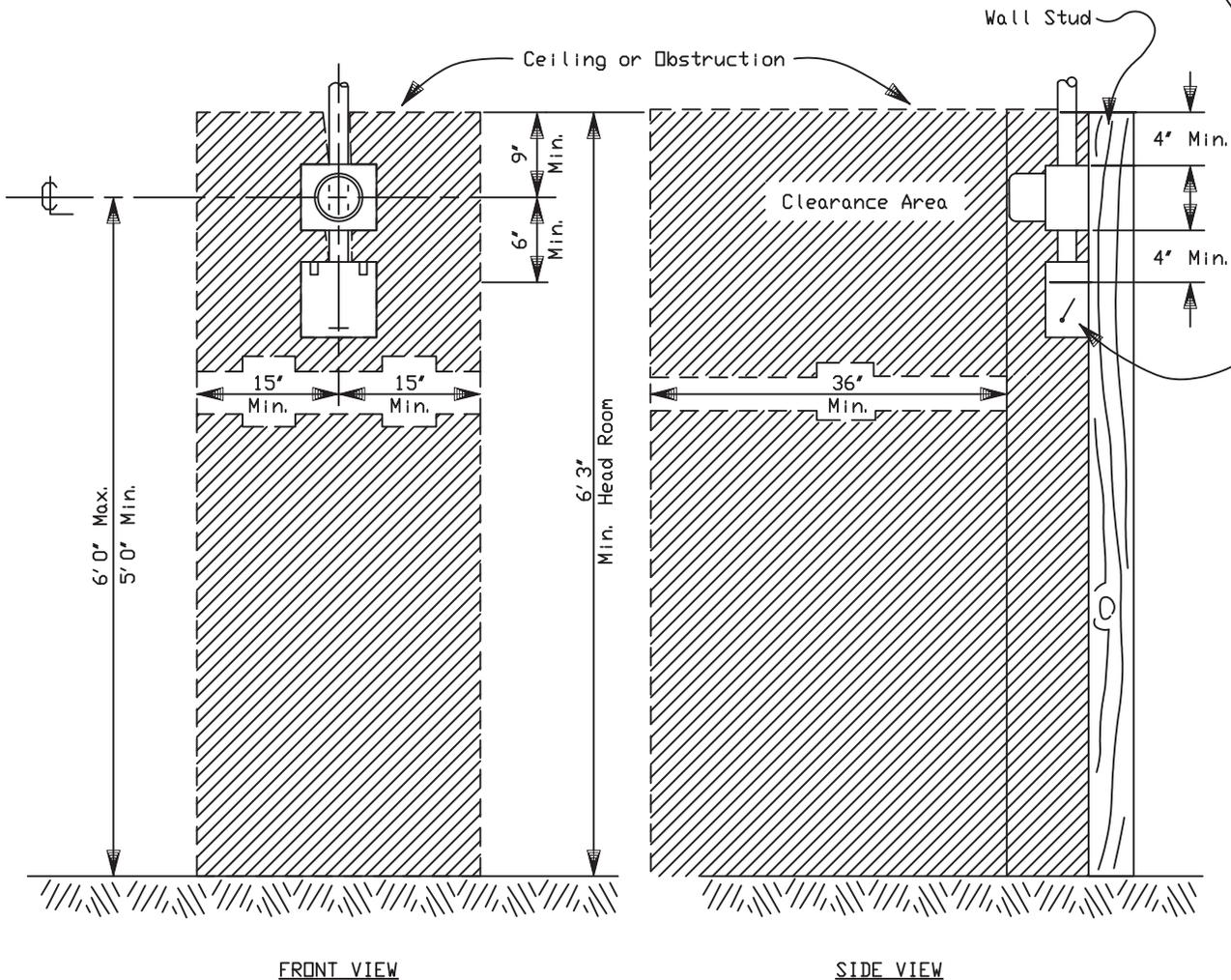
METER SOCKET CLEARANCE REQUIREMENTS



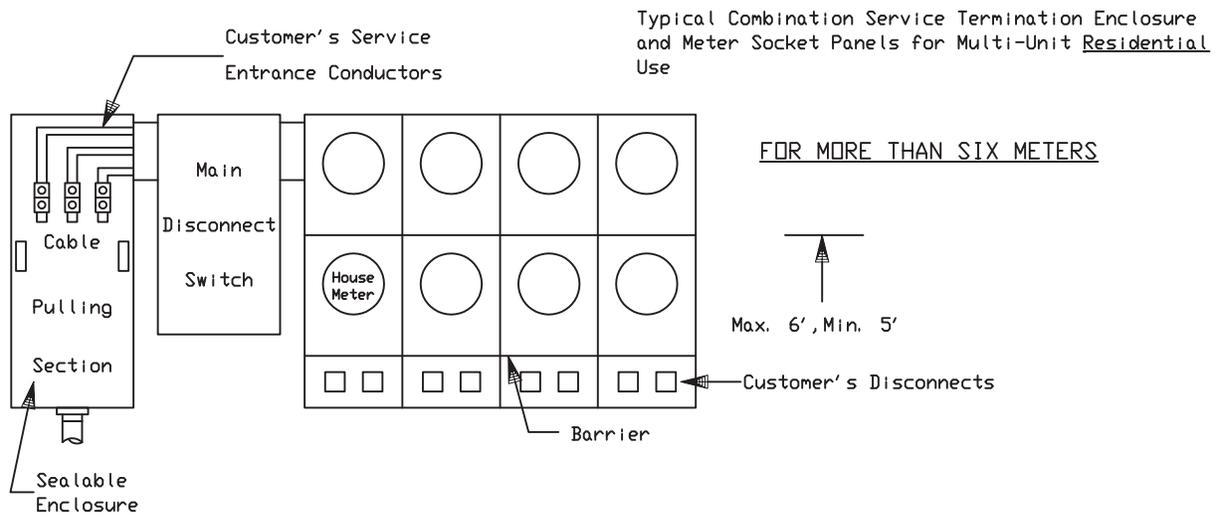
NOTE:

Check with local NORTHWESTERN ENERGY office to confirm location of service entrance.

If switch extends beyond the face of the socket, an 8" clearance is required from the bottom of the meter socket to the top of the main disconnect.

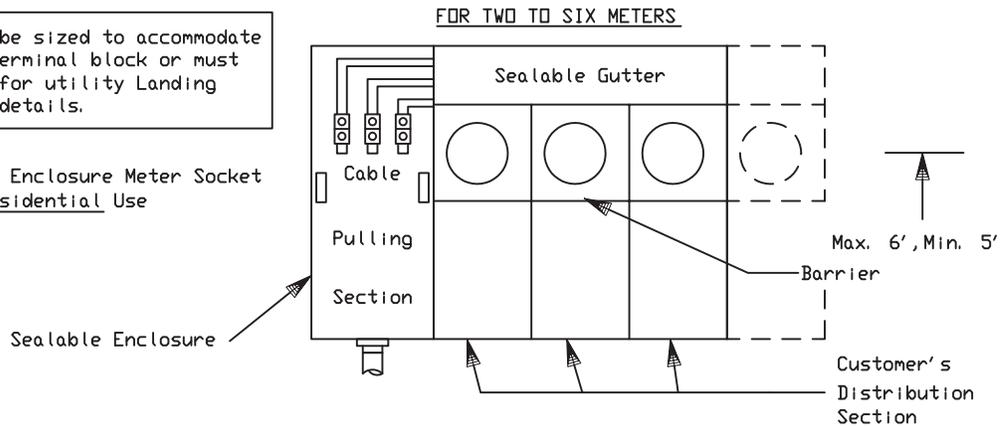


UNDERGROUND SERVICE MULTIPLE METER SOCKET INSTALLATIONS OR FOR MORE THAN SIX METERS

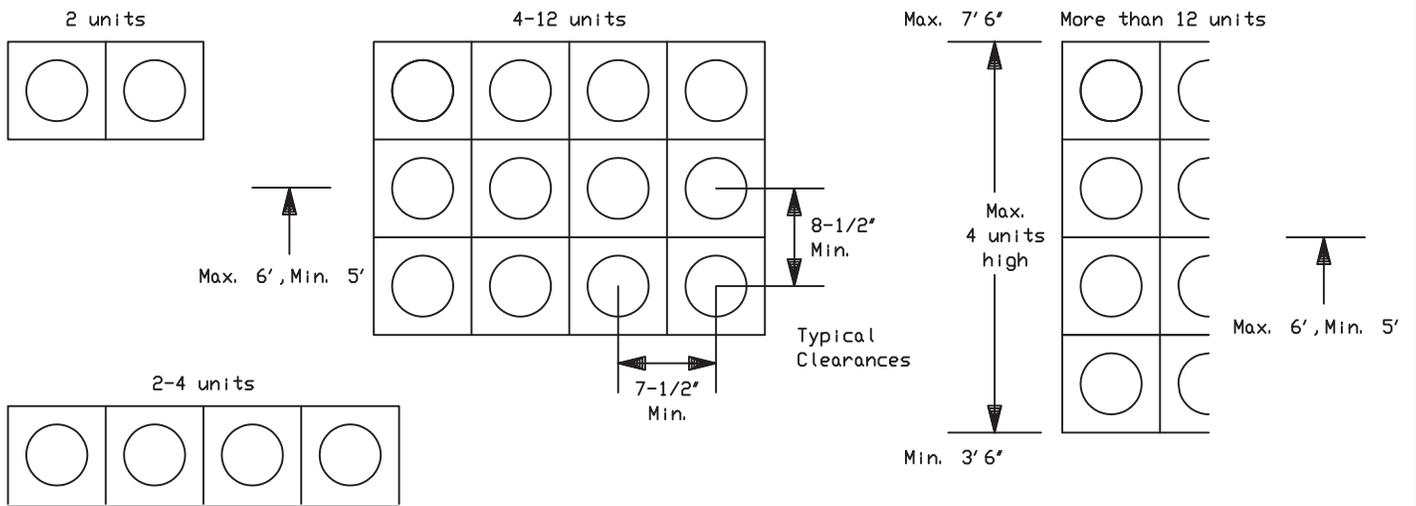


Cable pulling section must be sized to accommodate customer supplied utility terminal block or must have bus extension drilled for utility Landing Lugs. Consult utility for details.

Typical Service Termination Enclosure Meter Socket Panels for Multi-Unit Nonresidential Use



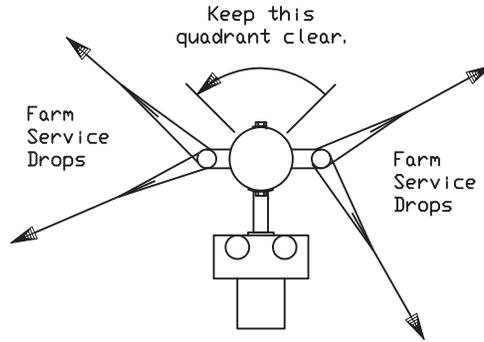
ACCEPTABLE MULTIPLE METER SOCKET CONFIGURATIONS



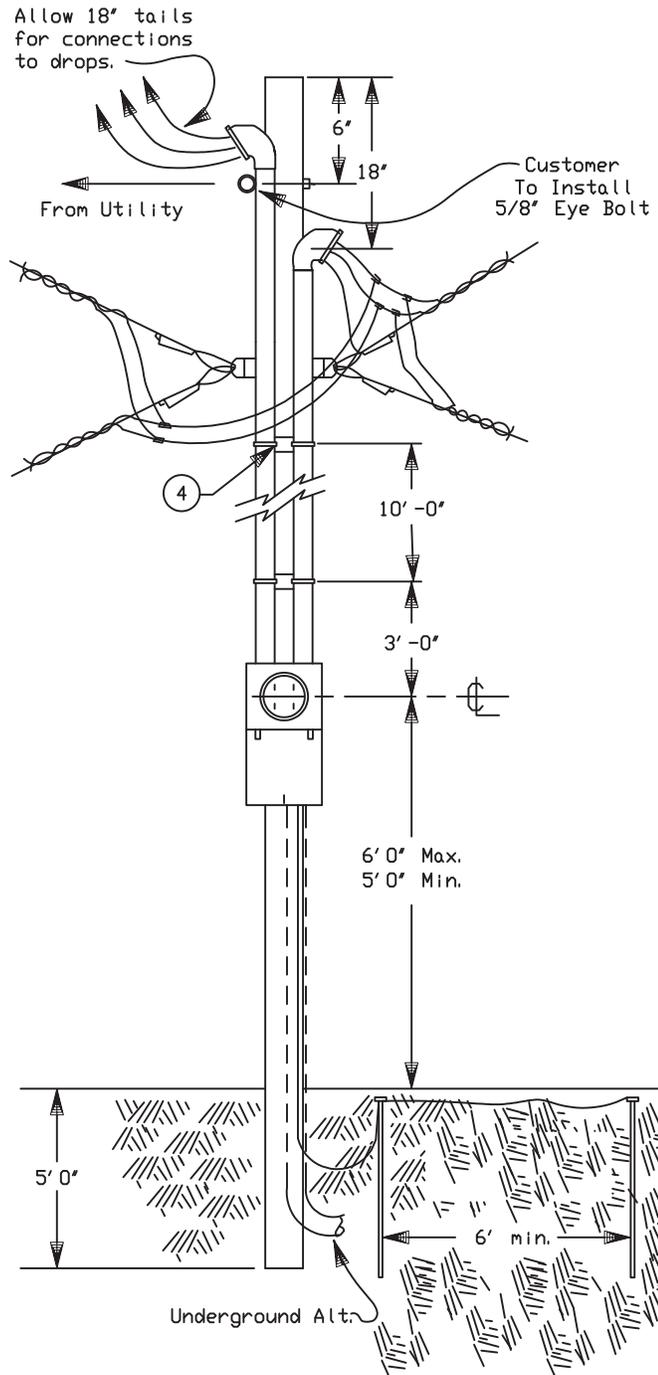
NOTES:

- A. Distance is to floor or finished grade immediately in front of meters. SEE SECTION 2.05 for meter mounting heights, locations, & clearances.
- B. A permanent plaque or directory will be installed by the customer at each service drop or each service-equipment location denoting all other services on or in the building or structure & the area served by each. (SEE SECTION 3.03)

TYPICAL FARM SERVICE POLE



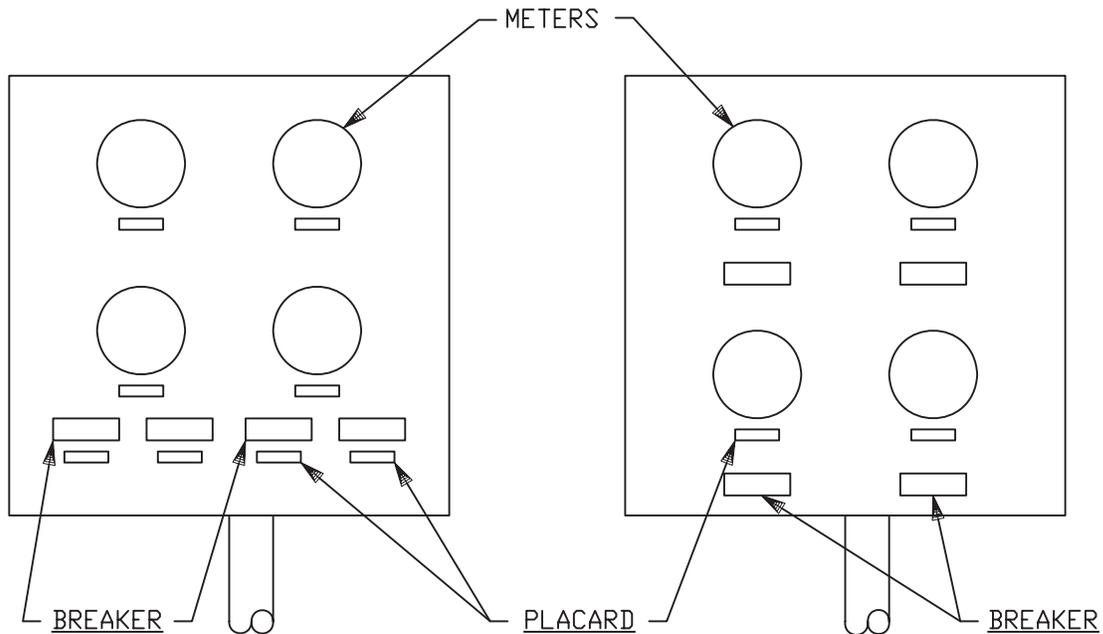
TOP VIEW



CUSTOMER SHALL PROVIDE, INSTALL, & MAINTAIN

1. Min. 25'-0" Pole 6" Dia. @ Top. Meterbase enclosure and service equipment including meterbase, conduits, weatherheads, brackets, switches, disconnects, fuses, breakers, wiring, and other equipment as may be required. Also anchor & guy wire when necessary.
2. All service conductors required.
3. Service equipment ground rods, ground rod clamps, and ground wire.
4. STAND-OFF brackets for conduit and meter base.

PLACARD PLACEMENT ON GANGMETERS



EACH LOCATION OR PREMISE MUST HAVE ITS ADDRESS AND UNIT NUMBERS PERMANENTLY ATTACHED BY MEANS OF A PLACARD TO THE METER BASES AND THE INDIVIDUAL APARTMENT / UNIT BREAKER BOXES BEFORE THE METER IS SET. THESE IDENTIFYING PLACARDS MUST MATCH THE UNIT INFORMATION AS DISPLAYED ON THE UNIT'S ENTRY DOOR.

THIS PLACARD SHALL BE NO SMALLER THAN 1/2" x 2" WITH ENGRAVED OR STAMPED-IN NUMBERS OR LETTERS AND WILL BE ATTACHED WITH RIVETS, SCREWS OR BOLTS. SCREWS OR BOLTS ARE TO BE INSTALLED IN A MANNER THAT THEY CAN NOT BE EASILY REMOVED.

WHEN PLACARDS ARE INSTALLED ON A READILY REMOVABLE COVER, NWE SUGGESTS THAT INTERNAL MARKING ALSO BE PROVIDED IN THE ENCLOSURE USING PERMANENT MARKING INK SPECIFYING EACH PREMISE METER SOCKET AND BREAKER CORRESPONDING TO THE PLACARD IDENTIFIER.

2