

METER SPECIFICATION MANUAL



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GENERAL INFORMATION

1.01 PURPOSE

The purpose of this manual is to supply essential information to customers, employees, architects, engineers, contractors, and others concerned with electrical installations in the Omaha Public Power District's service area, which will hereafter be referred to as OPPD in this manual. OPPD's goal is to provide safe, reliable, energy services to our customers, in a timely manner.

This manual will be revised from time to time to include industry improvements or other necessary changes. New copies of the manual may be obtained by contacting Customer Sales & Services Division, 636-3521, Metering Services Department, 552-5934, or contacting any of OPPD's area offices.

For the purpose of opening an account for electric service with OPPD, the term customer is to be considered as a homeowner, a building owner, or a tenant, who will be financially responsible for the bill payment.

For the purpose of construction or wiring of a building, the term customer is to be considered as a homeowner, a building owner, his construction contractor, his electrician, his engineer, or his agent, acting on the owner's behalf, to coordinate with OPPD, for providing electric service.

1.02 CONSULT WITH OPPD

To avoid misunderstanding and unnecessary expenses, customers, their contractors, architects, and engineers should consult with OPPD at its nearest office during the planning stage about electric service availability and OPPD's applicable rates and rules. Early notification will prevent unnecessary delays and expense.

To obtain the proper department, the following information will serve as a guide: Contact any of OPPD's offices for specific information about electric service.

1. For Residential, or small General Service point of entrance, and meter location, call OPPD's Electrical Service Designer (ESD) at one of OPPD's Customer Services Centers. Telephone numbers for the four ESD offices are:

Papillion	552-5330	
Elkhorn	552-5830	
Louisville	552-5521	local: 234-2455
Syracuse	552-4030	local: 269-2341

For larger General Service customers, (typically larger than 1000 kVA), call the Account Executives at 636-3536.

Outside the metropolitan Omaha area, call OPPD's area office:

Blair 426-4151

Humboldt 862-2865

North Bend 652-3434

Tecumseh 335-3020

Inside the metropolitan Omaha area, for help with an electric account call:
OPPD Customer Care Services department, 536-4155.

2. To report the rewiring of existing residences for additional major appliances, such as ranges, water heaters, clothes dryers, space heaters, air-conditioning, etc., call the Customer Services Center or OPPD's area office. The rewire is the customer's responsibility, but the reporting will give OPPD an opportunity to ensure its distribution equipment is adequate to service the additional load. (See Section 1.09.)
3. For questions involving residential space conditioning in the Omaha area, call OPPD's Energy Advisor, 636-3850.
4. For questions involving electric service in mobile home parks, call the ESD's, at a Customer Services Center, or OPPD's area office.
5. For general questions involving metering, or metering wiring methods, call Metering Services Department, 552-5934, or OPPD's area office. Questions about a specific project should be asked of the ESD or Account Executive handling the project.

Information in this manual is intended to cover typical installations. OPPD should be consulted for special cases and conditions.

1.03 GENERAL POLICY

1. The customer provides the meter support except:
 - A. In Mobile Home Parks (See Chapter 9).
 - B. Farm Irrigation Service taken at the road.
 - C. Metering on a padmount transformer.

Underground single and three-phase services, requiring transformer-rated (CT) metering, with the instrument transformers (CT's & PT's) located in the padmounted transformer. The meter will be located on the padmounted transformer. With the metering in the padmounted transformer, the transformer can only serve one customer. For both Residential and General Service customers, with the metering in the transformer, the service wires are installed and maintained by the customer, since OPPD's responsibility does not extend on the load side (down-stream) of the meter.

See Section 7.01 for Residential accounts. See Section 8.08 for General Service accounts.

2. The customer is responsible for all wiring and equipment on the load side of the meter. For responsibility for wiring ahead of the meter, see:

Overhead services-Residential & General Service	Chapter 6
Underground services - Residential	Chapter 7
Underground services - General Service	Chapter 8
Downtown Omaha Network service	Chapter 12

3. The customer is responsible for supplying Residential and General Service meter sockets, both single phase and three phase, for loads up to 320 amps. General Service meter sockets must have a lever by-pass.
4. Loads which OPPD determines have a demand of over 320 amperes, will require current transformer metering.
5. The use of "T" conduit conduit bodies in the service wire conduit ahead of the metering is prohibited.

1.04 CODES AND RULES

All Customer wiring installations must comply with OPPD's Electric Service Rules and other applicable codes which may include NEC, NESC, NFPA, and any local ordinances. Some OPPD requirements may be more restrictive than applicable codes.

1.05 INSPECTIONS

State laws require that prior to furnishing electrical service OPPD must receive an authorized electrical inspector's certificate of approval.

OPPD will refuse to connect services that do not satisfy applicable codes, or may be dangerous to persons or property. OPPD will disconnect services upon receipt of written notification from the inspecting authority.

1.06 CONTINUITY OF SERVICE

OPPD's goal is to provide continuous electric service, restore service interruptions promptly, to maintain voltages and frequencies within industry standards, and to maintain its facilities with minimum inconvenience to the customer. However, OPPD cannot guarantee to fulfill these goals at all times.

1.07 FREQUENCY AND SERVICE OPTIONS AVAILABLE

All electric service is 60 Hertz, alternating current. OPPD provides each building or structure with only one service voltage. The service voltage provided is based on the customer's need, and OPPD's available service voltages. The local inspecting authority and OPPD must, specifically approve any exceptions to the "one-building,

one-service” rule. The exceptions must also conform to those listed in Chapter 3, Section 3.02.

Standard service voltages provided by OPPD are listed below. Not every voltage is available at every location.

Single-Phase

- A. Single-phase, 120 volt, 2-wire, with grounded neutral conductor. (30-amp service entrance maximum.) Available only from an existing 120/240 volt, single-phase, 3-wire or from a 120/208-volt, three-phase, 4-wire system. See drawing 1.07.1.
- B. Single-phase, 120/240 volt, 3-wire, with grounded neutral conductor. Service entrance maximum: the maximum amp rating of a 167 kVA single-phase pad-mounted transformer, or of a 100 kVA single-phase overhead transformer. See drawings 1.07.1 and 1.07.2.
- C. Single-phase, 120/208 volt, 3-wire, with grounded neutral conductor (200-amp service entrance maximum, and available only from a 120/208 volt, 4-wire system). See drawing 1.07.1.
- D. Single-phase, 240/480 volt, 3-wire, (200-amp service entrance maximum, and available from an overhead, or a padmounted transformer). See drawing 1.07.1.

Three-Phase, Wye

- E. Three-phase, 120/208 volt, 4-wire, with grounded neutral conductor from a padmounted transformer. (The maximum amp rating is limited to that of no more than 6 sets of 750 KCMIL cable, the maximum that the padmounted transformer will accommodate for padmounts up to 1000 kVA). The maximum rating for overhead service is 225 kVA (3-75 kVA overhead transformers.) See drawing 1.07.3.
- F. Three-phase, 277/480 volt, 4-wire, with grounded neutral conductor from a padmounted transformer. Service entrance maximum: the maximum amp rating is limited to that of no more than 6 sets of 750 KCMIL cable, the maximum which the padmounted transformer will accommodate, for padmounts up to 1000 kVA. Padmount transformers of 1500 kVA and above will take 8 sets. The smallest padmounted transformer available is a 150 kVA. The maximum rating for overhead service is 225 kVA (3-75 kVA overhead transformers). The smallest overhead bank available is 150 kVA, (3-50 kVA transformers). See drawing 1.07.3.

Three-Phase, Closed Delta

- G. Three-phase, 240 volt, 3-wire, with equipment ground, Maximum amp rating of 3-75 kVA overhead transformers, from an overhead transformer bank. See drawings 1.07.4 and 1.07.5.

- H. Three-phase, 120/240/240 volt, 4-wire, with grounded neutral conductor. The midpoint of one secondary winding is grounded. The maximum rating for overhead service is 225 kVA (3-75 kVA overhead transformers). Available only from an overhead transformer bank fed from an overhead system.) See drawing 1.07.6.
- I. Three-phase, 480 volt, 3-wire, with equipment ground, from a padmounted transformer. The maximum amp rating is limited to that of no more than 6 sets of 750 KCMIL cable, the maximum which the padmounted transformer will accommodate, for padmounts up to 1000 kVA. Padmounts of 1500 kVA and above will take 8 sets. The smallest padmounted transformer available is a 150 kVA. Not for new construction.

Or three-phase, 480 volt, 3-wire, with equipment ground, from an overhead transformer bank. The maximum amp rating is that of 3-75 kVA overhead transformers, fed from an overhead primary system. See drawings 1.07.4 and 1.07.5. Not for new construction.

Three-Phase, Open Delta

- J. Three-phase, 240 volt, 3-wire, with equipment ground, (amp rating of 2-50 kVA overhead transformers service entrance maximum), from a two-phase overhead transformer bank fed from an overhead primary system. Due to OPPD System limitations, new services of this type will be evaluated for acceptability on a case-by-case basis. See drawing 1.07.7.
- K. Three-phase, 120/240/240 volt, 4-wire, with grounded neutral conductor. The midpoint of one secondary winding is grounded. The maximum rating for overhead service is 100 kVA (2-50 kVA overhead transformers). Available only from a two-phase overhead transformer bank fed from an overhead primary system.) See drawing 1.07.8.
- L. Three-phase, 480V, 3-wire served from an overhead or padmounted transformer bank. The maximum amp rating of 2-50 kVA overhead transformers, fed from an overhead primary system, or from a pair of 50 kVA padmounted transformers fed from two-phase underground primary. See drawing 1.07.7. Not for new construction.
- M. Network Service: This service is available in the downtown Omaha area only from existing OPPD network facilities. See Chapter 12 for services available, and service requirements.

Other Services

- N. Pulse Metering: OPPD can, at owner's expense, provide meter pulses to the customer. Contact OPPD Account Executives in the Customer Sales & Services Division at 636-3521, or area ESD's, for more information.
- O. 6-wire Service: This service-totalized metering is for a combination of

120/240V single-phase 3-wire and 240V three-phase 3-wire Delta. It is limited to maintenance of existing 6-wire customers only. Neither additional 6-wire services, nor upgrades of existing 6-wire services will be made. See drawing 1.07.9. Not for new construction.

- P. 5-wire Service: Service eliminated. See drawing 1.07.9. Not for new construction.
- Q. Two circuit totalized for three-phase, 3-wire or three-phase, 4-wire only. Either 120/208, 277/480, 240, or 480 volts. See drawings 1.07.10 and 1.07.11.
- R. Primary Metering:

Service may be furnished to Customers at the existing primary distribution voltages of 2400, 4160, 8000, or 13,800 or available transmission voltage. OPPD approval is required for each installation. The customer should contact the OPPD Account Executives in the Customer Sales & Services Division at 636-3521 or OPPD's ESD's, for more information. (See OPPD's Rate 462). See drawings 1.07.12 and 1.07.13. See section 1.08.

1.08 HIGHER VOLTAGES

The customer should consult with OPPD before planning any installation for voltages over 480 volts.

1.09 LOAD ADDITIONS

The Customer shall give OPPD reasonable notice of substantial load increase (permanent or temporary). Increases in load may require extensive changes to OPPD's system, and this would take time to complete. Projects should be discussed with OPPD well in advance to provide ample time to upgrade OPPD equipment. Customers who fail to notify OPPD may be charged for the replacement cost of damaged OPPD equipment.

Design

An OPPD ESD or AE (for General Service accounts over 1000 kVA), should be notified for new service, or changes to an existing service in advance of the date by which service is required. (See Section 1.02 for telephone numbers.) This will permit OPPD to plan and schedule any required work on OPPD's distribution system, allowing ample time for material delivery, and construction of OPPD facilities, in order to provide service by the date required by the customer.

1.10 SERVICE CONNECTIONS

OPPD will make all service connections to its electric distribution system. Connection to, or alteration of, OPPD's electric service or other equipment by other than qualified employees of OPPD, or its authorized agents, is prohibited.

Responsibility For Extensions

OPPD constructs, owns, and maintains all extensions of its distribution system and makes all overhead service drop extensions and connections, as well as underground service lateral extensions and connections for single-family, duplex, or a three-plex residential building.

All underground multi-unit Residential, (4 units or more), service laterals are installed, owned, and maintained by the customer. An exception where OPPD would install, own, and maintain the underground service lateral conductors for a multi-unit residential building, is for a townhouse building with firewalls, (approved by the local inspecting authority), between each pair of units. OPPD would then run an underground service lateral to a dual socket for each pair of units. See section 4.03.

General Service underground service lateral cables, conduits, and risers, are installed, owned and maintained by the customer. OPPD terminates the customer's General Service underground service lateral conductors in OPPD's serving equipment as required. The customer terminates his conductors at the metering equipment, except for network service. See Chapter 12 for network service.

1.11 CUSTOMER ATTACHMENTS PROHIBITED

OPPD prohibits unauthorized attachment of wires, guys, signs, clotheslines, antennas, fences, etc. to its poles, pedestals, pad-mounted transformers or other structures.

There is to be no customer-owned area lights, equipment, or conductors attached to or installed on OPPD poles. Any pre-existing customer attachments will normally be removed from existing poles if OPPD is required to replace an existing pole or equipment due to maintenance or because of a service upgrade. Yard or for-sale signs nailed to OPPD poles can be a hazard to OPPD personnel while climbing the poles.

Banner attachments to OPPD poles may be requested by a quasi-governmental body (such as a neighborhood association, or a local group of businesses) if the attachments have been pre-approved by OPPD engineers. OPPD engineers will also need to determine that OPPD poles have sufficient strength to withstand the wind loading, as well as the mounting height of the attachment.

1.12 RESALE OF ENERGY

All energy sold shall be for the Customer's sole use, except as allowed for in OPPD's service regulation C-10.

1.13 SALE OF OPPD PROPERTY

OPPD equipment will normally not be sold to customers by OPPD.

1.14 DIGGERS HOTLINE

State law requires that all persons, prior to digging any hole or trench, should contact the "Diggers Hotline" number - 811. This should be done a minimum of 48 hours, (excluding Saturdays, Sundays and Holidays) prior to actual need to arrange for location of underground utility cables and equipment. Actual locating of the cables and equipment will then be done by each utility. General Service or Residential customers must make separate arrangements for location of their non-utility-owned underground facilities situated upon their own property.

1.15 OPENING A NEW SERVICE ACCOUNT

Application for a new electric service account or changes to an existing service account shall be made in advance of the date by which service is required. This may be done by calling OPPD's Customer Care Services department in the Omaha area, or outside the Omaha metropolitan area, at an OPPD Area office. (See Section 1.02 for telephone numbers.)

COMPANY EQUIPMENT ON CUSTOMER PREMISES

2.01 GENERAL

OPPD shall have the right to install its metering and electric distribution equipment on the Customer's premises as required to supply adequate service. All such equipment shall remain OPPD property and may be removed when service is discontinued.

2.02 ACCESS TO COMPANY EQUIPMENT

OPPD shall have the right of access to its metering and electric distribution equipment located on Customer premises for reading, inspection, maintenance and restoration of services. Easements may be required prior to placement of OPPD's electric distribution equipment on customer premises.

2.03 TAMPERING WITH METERS

Tampering with meters or any property of OPPD is prohibited. Meters shall not be used as a service-disconnecting device. Violators will be held responsible for metering errors and equipment damage.

Meters and meter equipment are sealed by OPPD. Breaking of seals by unauthorized persons is not permitted except on existing enclosures which contain customer fuses or grounding electrode conductor terminations. The customer should notify OPPD after breaking seals to replace fuses or to gain access to grounding terminations.

Meters shall only be removed by authorized OPPD employees. All metering equipment shall be returned to OPPD when removed.

All 480 Volt self contained meters should not be removed or used as a disconnecting means by other than OPPD personnel due to potential safety concerns involving high voltage and possible hazardous conditions.

2.04 TEMPORARY METERING ARRANGEMENTS

When a customer is rewiring, it is sometimes necessary to improvise metering during the time when the rewiring is in progress. When rewiring, upon request with reasonable advance notice, OPPD will furnish employees to assist the customer with temporary metering during the rewiring process. **Under no circumstances shall the customer's contractor disturb any of the wiring to the metering instrument transformer secondaries. Only OPPD's metering services department will make required changes of secondary wiring to instrument transformers. In all instances involving the closing of any meter loop, it is imperative that prior arrangements be made with OPPD's metering services department at 552-5934.**

2.05 COORDINATION OF OPPD WORK WITH THE CUSTOMER

It is frequently requested for OPPD to schedule outages on OPPD equipment for the customer or the customer's wiring contractor to perform modifications on the customer's electric service. For such arrangements, call an ESD, Customer Sales and Services Division at 636-3521, or outside the metropolitan area, OPPD's area office. (See Section 1.02 for telephone numbers).

To request the installation of underground residential service cable, the customer or the customer's wiring contractor should contact an ESD, Customer Account Services, or outside the metropolitan area, OPPD's area office. (See Section 1.02 for telephone numbers).

See Chapter 7 for residential underground service requirements.

SERVICE ENTRANCES

3.01 POINT OF ENTRANCE

General Service

The customer, or the customer's electrician, should provide OPPD with a site plan, load schedule, and voltage requirements when requesting service. OPPD will make an effort to provide service to the point of entrance requested. **All metering equipment shall be installed outdoors for general service accounts**, except for downtown network service when necessary

- See Section 4.01 for more information about meter specifications (General Service).
- See Chapter 6 for General Service and Residential overhead requirements.
- See Chapter 7 for Residential underground requirements.
- See Chapter 8 for General Service underground requirements.
- See Chapter 12 for network service, in the downtown Omaha area.

Residential

OPPD' S Electrical Service Designer (ESD) shall designate the Point Of Entrance.

The customer or his electrician should call OPPD to request a point of entrance prior to placement of the home's main distribution panel, or wiring the "home runs". The home's main distribution panel shall be 100-amp minimum, or larger, if required by the local inspecting authority. Call the ESD, as listed in section 1.02. Wiring a home prior to receiving a point of entrance from OPPD may result in extra charges to the customer if OPPD is required to do extra work to serve the customer's home where wired out. **All metering equipment shall be installed outdoors for residential service.**

After the customer or his contractor installs the service entrance equipment, he should call Customer Care Services, 536-4155, or OPPD's area office, to request service cable installation for an underground Residential service. (see Chapter 7). At a later time, (up to several weeks later), the homeowner should again call Customer Care Services, 536-4155, or OPPD's area office for application for a service account. See Chapter 6 for overhead Residential service requirements.

3.02 OPPD INSTALLATION

After consulting with the Customer, OPPD will specify the location of the service entrance. Sometimes abbreviated as POA, P-O-A (Point of Attachment), POE, or P-O-E (Point of Entrance).

Accessible Meter Location

For all new electric services and service upgrades, OPPD's metering equipment shall be located in a safe and readily accessible location on the exterior of the structure. Center of meter socket shall be no lower than 30" above grade and no higher than 66" above grade.

Minimum working clearances as required by NEC 110.26 shall be provided and maintained. OPPD requires a minimum of 8 inches of side clearance on all metering equipment. Confined areas, such as within dog runs, areas under decks less than 6 feet 6 inches above grade, or areas with large equipment placed in front of the metering are not considered accessible. Locations reached via crawl spaces or ladders are considered neither safe nor accessible. A deck with outdoor access, reached by permanent stairs is considered accessible. All clearances for maintenance, replacement, or meter reading are to be provided and maintained by the customer.

Definitions

"Building" is defined as a structure which stands alone or which is separated from adjoining structures by firewalls approved by the local inspecting authority.

"Structure," other than a building, is defined as a substation, pole, metal pedestal, vault, padmounted switchgear, or other structure specifically approved by OPPD for accepting OPPD electric service.

One Building, One Service

OPPD provides each building or structure with only one service, (see Chapter 1, Section 1.07), supplied by one overhead service drop or underground service lateral to a service entrance located on a building or structure located on the Customer's premises.

The above "one-building, one-service" rule, with local inspecting authority approval, and OPPD approval by the manager of the Consumer Sales & Services department, may be excepted for one of the following reasons, as mentioned in the NEC:

Exception 1:

For separate services, required by statute, supplying emergency lighting or power systems installed in accordance with the applicable electrical code.

Exception 2:

For buildings of large area, a second service may be provided in accordance with applicable codes and OPPD's line extension rules

Exception 3:

For capacity requirements in excess of 2000 amperes at a supply voltage of 600 volts or less, a second service may be provided at OPPD's option. The second service entrance shall be located adjacent to the first service entrance.

Exception 4:

For townhouse construction, a separate service drop may be provided for each adjacent pair of attached units. A townhouse building is defined as three or more contiguous living units, not more than three stories high, separated with firewalls approved by the local inspecting authority. The POE will use a duplex meter socket at the common wall between each pair of units.

Exception 5:

For a building requiring different voltage or electrical characteristics, a second service may be provided.

All exceptions must be specifically approved by the local inspecting authority and by OPPD's Consumer Sales & Service management. Extension of service to each delivery point must be installed in accordance with OPPD's extension rules. Each delivery point will be individually metered. There may be charges by OPPD for the extra cable and equipment needed to provide service for these exceptions.

Where a building or structure is supplied by more than one service, a permanent plaque or directory shall be installed at each service disconnect location, denoting all other services supplying that building or structure, and the area served by each, as called for in the NEC.

3.03 CUSTOMER INSTALLATION

Overhead - Residential or General Service

The Customer installs, owns, and maintains the overhead service-entrance riser-pipe and conductors. He also provides a suitable location and secure attachment point for OPPD to attach the overhead service drop wires on the building or structure. See Chapter 6 for discussion.

Underground – Residential

See Chapter 7 for discussion.

Underground - General Service

See Chapter 8 for discussion.

Disconnect Sequence

All service entrances, either overhead or underground, shall include a service disconnecting means and over-current protection located at the point where energy is supplied to the building or structure, as required by the current National Electrical Code. The service equipment shall consist of from one to six switch-fuses (or circuit breakers). (See Chapter 4, Section 4.06 concerning the six main rule.) The sequence shall be meter-switch-fuse.

3.04 CAPACITY

Service entrances shall have ample capacity for any electrical load that may be reasonably expected. The customer-owned main disconnect shall have an ampacity rating equal to or greater than the ampacity rating of the service entrance conductors.

3.05 IDENTIFICATION OF CONDUCTORS

If the neutral or grounded conductor of a service entrance (480 volts and under) is insulated, it shall be identified by white insulation, gray insulation, white tape or gray tape.

If an insulated conductor is being used as a neutral for overhead service conductor, the insulation must be stripped from the last 18" of the neutral extended from the service head. A minimum of 4" of insulation must be left on the conductor extended from the service head.

Any equipment-grounding conductor, when required, shall be bare, or if insulated, it shall be identified with green tape, spiral wrapped a minimum of 3", or by tagging, or another permanent marking method per NEC requirements.

Four wire, 120/240-volt delta installations shall have the "wild phase" identified with an orange outer covering, tape, by tagging or another permanent marking method per NEC requirements at a point where OPPD will connect the service entrance.

When the customer provides the service conductors, they are to use tape; spiral wrapped a minimum of 3", to identify the phase.

For example:

- 120/208V, 3Ph, 4W: Black, Red, and Blue; or Red, Yellow, and Blue
- 277/480V, 3Ph, 4W: Brown, Purple, and Yellow.

An alternate acceptable marking method would be:

- 1 band of colored tape at each end for A phase.
- 2 bands of colored tape at each end for B phase.
- 3 bands of colored tape at each end for C phase.

The use of paint to identify insulated conductors is not acceptable identification, due to the impermanence of this method.

When multiple conductors per phase are needed for a service, the phase wires shall be identified by a permanent marking method, so the proper grouping can be determined.

3.06 FAULT CURRENT DUTY REQUIREMENT

The Customer's service equipment and other devices shall be adequate to withstand and interrupt the maximum available fault current. The minimum interrupting capability requirements for various types of customers are as follows:

A. One and Two Family Dwellings

All new 120/240-volt service equipment (0 to 200 amp) shall have a minimum interrupting rating of 10,000 amperes symmetrical current. All new 120/240-volt service equipment (320 amp) shall have an interrupting rating of 20,000 amperes symmetrical current. This is per NEC requirements.

B. Multi-Phase and Residential, Other Than One-, Two- or Three-Family Dwellings

Consult OPPD for maximum available fault current.

3.07 PHASE BALANCE REQUIREMENTS

Where a 4-wire grounded wye service is supplied, the Contractor must arrange to balance the entire load over all incoming phases, and must ensure that all electrical equipment will operate satisfactorily on the service voltage. Each phase conductor shall carry a minimum of 25% of the total kVA at maximum load conditions.

When existing services are changed to wye service, in addition to the above, the Contractor must also see that all fuses are removed from the neutral circuits and solid neutral connections are made at the main switch. This also should be done for every branch circuit.

3.08 LIGHTS ON POWER SERVICE

When a customer takes lighting service from a three-phase, 3-wire, ungrounded power service, they shall provide and install a double-wound transformer having separate primary and secondary windings or a dry-type transformer, and all other equipment necessary to supply such lighting service. The customer's transformers and equipment must be of types approved by OPPD Engineering. For this application, OPPD will not accept autotransformers.

3.09 SERVICE IMPAIRMENT

See Chapter 10 for customer's equipment and conditions that can impair the quality of service to other customers.

3.10 GROUNDING OF METER ENCLOSURE

Single Socket Metering

The customer is to provide and install a ground rod (supplemental electrode) at the metering location per current NEC requirements. A continuous copper ground wire of at least number 6 AWG is to be run from the metering enclosure to the ground rod.

Multiple Socket, Meter Centers, and Instrument Metering

The customer is to provide grounding in accordance with NEC requirements. The instrument transformer cabinet, and meter centers are to be solidly bonded to the neutral, and sockets to the equipment-grounding conductor.

METERING INSTALLATION

4.01 METERING SPECIFICATIONS

Metering specifications will be issued to the customer by OPPD. Metering specifications are required before any work is started on all new wiring or additions to wiring, except for single family, duplex, or triplex dwellings where 200 or 320 ampere socket metering is adequate. Metering specifications will designate the point of entrance, the type of service, the anticipated load and the equipment to be furnished to the customer by OPPD. Meter specifications will also indicate the necessary work to be done by the customer.

Metering Equipment Pick-Up

General Service, Three-Phase

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the customer's copy of the approved metering specification and the building and/or wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha.

General Service, Single-Phase

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the customer's copy of the approved metering specification and the building and/or wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha, or OPPD's area office.

Residential

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha, or OPPD's area office. Larger residential loads requiring CT metering will also require an approved meter specification.

Architects, Consultants, Builders, Electricians, and Contractors shall adhere to these metering specifications and should incorporate them into their own plans and specifications. If any revision in these specifications should become necessary, please call the ESD, or AE listed in the specification.

4.02 CUSTOMER INSTALLATION - METER SOCKETS

OPPD's ESD or Engineer will designate the point of entrance on all Residential or General Service services, both overhead and underground. Please call the appropriate ESD.

- See Section 1.02 for telephone numbers.
- See Chapter 6 for further information on Residential or General Service overhead

services.

- See Chapter 7 for underground Residential services.
- See Chapter 8 for underground General Service or multi-unit Residential services (four units or larger).

All OPPD meter sockets are limited to one set of conductors on the line side of the sockets. See Approved Meter Socket List on oppd.com.

Socket Metering Drawings

(* designates “Not for new construction” or “For Maintenance Only”. These options will not be available for new installations, or for upgrade of existing services.)

- 4.02.1 120V 2W (1 kW max.)
- 4.02.2 120/240V 1Ph 3W 150A overhead
- 4.02.3 120/240V 1Ph 3W 200A overhead
- 4.02.4 120/240V 1Ph 3W 200A underground General Service (See 8.04.1)
- 4.02.5 120/240V 1Ph 3W 200A underground Residential Service (See 7.05.1)
- 4.02.6 120/240V 1Ph 3W 320A overhead
- 4.02.7 120/240V 1Ph 3W 320A underground General Service. (See 8.04.2)
- 4.02.8* 240V 1Ph 2W & 120/240V 1Ph 3W totalized
- 4.02.9 240/480V 1Ph 3W 200A overhead
- 4.02.10 240V 3Ph 3W or *480V 3Ph 3W 200A overhead (Wye)
- 4.02.11* 480V 3Ph 3W 200A overhead (Delta)
- 4.02.12 120/240V 3Ph 4W overhead
- 4.02.13 120/208V 3Ph 4W or 277/480V 3Ph 4W 200A overhead
- 4.02.14 120/208V 1Ph 3W 150A overhead
- 4.02.15 120/208V 3Ph 4W 320A overhead & underground
(See Section 6.14 and 8.04.)

Estimated Socket Dimensions(in.)

<u>Socket</u>	<u>H x W x D</u>	<u>Wire Size</u>	<u>Hubs</u>
Single Phase CT	7 " Diameter	(OPPD Wires)	1.0
Temp Pole	7 " Diameter	#2	1.0
Single Phase 180 Amp	12 x 8.5 x 4	#8 thru 250 KCMIL	1.25 - 2.5
Single Phase 200 Amp UG	16 x 12 x 5	#2 thru 350 KCMIL	1.25 - 2.5
Single Phase 320 Amp	32 x 19 x 7	600 MCM or parallel 250 KCMIL	3.0 - 3.5
Single Phase 400 Amp	32 x 20 x 7	Line Lugs 3/0 thru 800 KCMIL Load Lugs parallel 350 KCMIL	3.0 - 3.5
Single Phase Duplex 150A	16 x 25 x 5	Line Lugs #6 thru 350 KCMIL Load Lugs #6 thru 3/0	1.25 - 2.5
Single Phase Duplex 200 A	19 x 30 x 6	Line Lugs 500 KCMIL Load Lugs #6 thru 250 KCMIL	3.0 - 3.5
Single Phase Triplex 150 A	15 x 33 x 5	Line Lugs #6 thru 350 Load Lugs #6 thru 3/0	1.25 - 2.5
Three Phase 200 Amp	23 x 14 x 6	#6 - 350 KCMIL	1.25 - 2.5
Three Phase 320 Amp	32 x 19 x 7	600 KCMIL or parallel 250 KCMIL	3.0 - 3.5
Other CT-rated sockets	21 x 13 x 5	(OPPD Wires)	1.25 - 2.5

The dimensions are for the estimated maximum cabinet size for each type of socket. Actual dimensions will vary by manufacturers. Additional room will be needed for the line and load risers.

4.03 RESIDENTIAL SERVICE,

As mentioned in section 3.02, OPPD provides each building with only one service. This may be either overhead, or underground.

Overhead, Single-Family, Duplex, or Three-Plex Dwellings

OPPD will provide the overhead service drop conductors to the residence. The service entrance conductors are provided by the customer from the meter socket in the riser pipe up to the weatherhead. (See Chapter 6 for overhead requirements.)

Underground Single Family, Duplex, or Three-Plex Dwellings

The service wires up to the line side of the meter socket for a single-family residence, or to a duplex socket for a duplex residence, are provided and sized by OPPD. OPPD does not have a 3-gang underground socket, so a three-plex residential building, without firewalls, (approved by the local inspecting authority), will have a single point of entrance at one location, with three single sockets ganged together, or an approved meter center. (See Chapter 7 for underground residential requirements.)

4.04 RESIDENTIAL/COMMERCIAL SERVICE - MULTIPLE OCCUPANCY

Residential- 4 Dwelling Units or More

This type of service requires a meter specification. A building or dwelling shall be supplied either by only one overhead service drop, provided by OPPD, or by only one underground service lateral, provided by the customer, with each customer metered individually by single sockets ganged together, or an approved meter center. See OPPD's Service Regulation C-8 on Master Metering for exceptions to individual metering.

A multi-unit residential building contains four or more residential dwelling units. It may also contain a house meter for common hall or parking lot lighting. The metering shall be grouped, or an OPPD-approved, customer-provided, clustered meter center may be used. **The metering is to be located outside.** Energizing the permanent service and installation of meters on multi-unit residential building will require permanent marking (see Identification of Meter by Locations 4.13). It will also require all the feeder wires to be installed and landed in the individual apartment panels. At the time of installation OPPD will also need access to each apartment to verify proper addressing. All meters will be set at the time the service is energized (see Opening a New Service Account 1.15). The only exception to this is if the House Meter is ahead of the building lockable main disconnect. It may be energized and have just the House Meter set and the building main will be locked in the open (off) position.

Commercial – 2 or More Units

A multi-unit commercial building contains two or more commercial units. It may also contain a house meter for common hall or parking lot lighting. The metering shall be grouped, or an OPPD-approved, customer-provided, clustered meter center may be used. **The metering is to be located outside.**

Energizing the permanent service and installation of meters on multi-unit commercial building will require permanent marking (see Identification of Meter by Locations 4.13). It will also require all the feeder wires to be installed and landed in the individual unit panels. At the time of installation OPPD will also need access to each unit to verify proper addressing. Only requested meters will be set at the time the service is energized (see Opening a New Service Account 1.15). The remaining or spare meter sockets will be locked in the open (off) position. In the case of 480 or 277/480 services it is recommended that all the meters are set when the service is first energized to eliminate a service outage for the installation of the remaining meters.

4.05 GROUPING OF METERS

Any installation of two or more meters shall have all meters, and any required instrument transformers, grouped in a safe and readily accessible, outside location at the point of entrance.

The contractor shall permanently identify each meter position by apartment or space number. See drawings 4.05.1, 4.05.2, and 4.05.3.

The customer furnishes, installs and maintains any cable trough required by the customer for ganged meter sockets, or meter centers.

The method of construction shall be such that all of the wiring relating to the metering may be readily traced. The use of concealed conduits, raceways, gutters, etc., containing un-metered conductors shall be kept to a minimum. Metered conductors from one meter shall not be placed in the metering compartment of any other meter.

Meter Centers

The customer may elect to furnish modular multi-position metering centers in lieu of the regular meter sockets. To assure conformance of the metering centers to OPPD's wiring specifications, the customer, prior to the purchase of the metering centers, shall make application for approval of their design to OPPD's Metering Engineer. All meters shall have individually removable and lockable covers, be UL listed, ringless sockets and individually sealing lids. There shall be provisions for a 5th terminal at the 9 O'clock position. Meter centers used for commercial applications shall have a bypass lever for each position. "Horn" bypass designs are prohibited. When installed, the bottom meter shall be no lower than 30" and the top meter no higher than 66" (center-line of meter glass). Exception: If the meter center has 4 vertical positions, the bottom meter shall be no lower than 24" and the top meter no higher than 72" (center-line of meter glass).

4.06 CUSTOMER INSTALLATIONS - GENERAL SERVICE METERING INSTRUMENT TRANSFORMERS

- Refer to Section 6.10 for Residential 1Ph & for General Service 1Ph & 3Ph overhead CT installation details.
- Refer to Section 7.07 for Residential underground CT installation details.
- Refer to Section 8.06 for General Service underground CT installation details.
- Refer to Section 8.08 for metering on dedicated padmounted transformers.

The term “instrument transformers” refers to current transformers (CT’s), and to potential transformers (PT’s), used by OPPD for metering purposes.

Instrument Transformer Drawing

(* designates “Not for new construction” or “For Maintenance Only”. These options will not be available for new installations, or for upgrade of existing services.)

4.06.2*	120/240V 1Ph 3W “A”-base CT
4.06.3	120/240V 1Ph 3W socket CT
4.06.4 *	6W totalized “A”-base (120/240V 1PH 3W & 240V 3Ph 3W)
4.06.5 *	6W totalized “A”-base (120/240V 1PH 3W & 240V 3Ph 3W) kW, kVA
4.06.6*	6W totalized “A”-base (120/240V 1PH 3W & 240v 3Ph 3W) kW
4.06.7*	6W totalized “A”-base (120/240V 1PH 3W & 240v 3Ph 3W) kW
4.06.8 *	3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V)
4.06.9*	3Ph 3W delta Metering (can use with 8.08.8)
4.06.10*	3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V)
4.06.11*	3Ph 3W delta 480V socket CT kW, kVA (can use with 8.08.8)
4.06.12*	3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V) 2circuit totalized
4.06.13*	120/240/240V 3Ph 4W “A”-base CT
4.06.14*	3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW
4.06.15	3Ph 4W socket CT (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW (can use with 8.08.8)
4.06.16*	3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW, kVA
4.06.17*	3Ph 4W socket CT (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) KW, kVA (can use with 8.08.8)
4.06.18*	3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW, kVA 2-circuit totalized
4.06.19	3Ph 4W socket CT

When instrument transformers are required for OPPD’s metering, the transformers will be furnished by OPPD and installed by the contractor. The contractor will also be responsible for any removal of instrument transformers (CT’s or PT’s). Upon removal, the contractor will return all instrument transformers to the Metering Services Department. The contractor will coordinate with the Metering Services Department at 552-5934 for the installation, replacement or removal of instrument transformers and meter equipment. The Metering Services Department will be responsible for the meters, as well as for the secondary wiring between the instrument transformers and the meters.

CT Cabinet

The contractor shall provide and install a side-hinged, weatherproof metal cabinet, either galvanized or painted, of adequate strength and size per NEC requirements for the instrument transformers. When mounting the instrument transformers, no wood or plywood should be used for mounting inside of the cabinet. The instrument transformers should be mounted in direct contact with the metal cabinet, insuring a good bond for grounding the instrument transformer bodies.

Instrument transformer cabinet size is to be determined by the customer after receipt of the instrument transformers from OPPD. The contractor should take into consideration the number, physical size, and orientation of the Instrument Transformers; the direction, size and number of incoming and outgoing conductors; and the conductor-bending radius needed to comply with the NEC. This cabinet shall have provisions for being sealed by OPPD.

Cabinet Mounting

The CT cabinet shall be installed in a safe and readily accessible agreed upon location. CT cabinet locations are not considered readily accessible if the cabinet bottom is over 8 feet higher than the floor, unless the location is over a permanently installed standing platform, which is accessible from permanent stairs. In addition, the platform must not require use of any ladder on the platform to access the CT cabinet. Ceiling locations are not acceptable for being used as the mounting surface, nor can CT cabinets be concealed above a suspended ceiling.

Manufactured Switchgear

The installation of instrument transformers in a manufactured switchgear will be approved by OPPD's Manager-Metering Services, only when the manufacturer provides adequate segregated and accessible space and proper mounting and connection facilities for the instrument transformers. Approval shall be obtained before the purchase of the switchgear.

OPPD's meters shall not be located on manufactured switchgear. Instrument transformers must be installed, so that nameplates on the instrument transformers are in a readable location. Metering instrument transformers are the property of OPPD and shall not be altered in any manner. The contractor will be responsible for any installation or removal of instrument transformers (CT's or PT's) from the customer's switchgear. Upon removal, the contractor will return all instrument transformers to the Metering Services Department.

Six Main Rule

The NEC allows no more than six customer main disconnect switches to a building. When a customer needs more than six disconnect switches, he can install a new building main disconnect switch (Bldg. Main) ahead of the existing main disconnect switches, which now makes the former main disconnect switches into branch disconnect switches. OPPD requires all existing CT services to be moved ahead of

the new main switch. OPPD requires any service meters downstream of a new building main switch be only self-contained sockets.

The customer can add a new main switch ahead of enough of the existing disconnect switches, to comply with the six main rule, and leave the remaining disconnect switches undisturbed. This option saves the customer money, since the new main switch must have a capacity equal to the total capacity of the disconnect switches now downstream of it. OPPD would, in most cases, require this option because it leaves CT's upstream of main switches, with a minimum of wiring change required of the customer.

OPPD requires all instrument transformer (CT) metering to be located ahead of the building main switches. Incoming service conductors must be connected directly to the meter sockets, or to the CT's, if used, for from one to six customer disconnect switches, as shown in Diagram I of drawing 4.06.01.

For the situation where more than six customer disconnect switches (a combination of both main and branch disconnect switches) are needed, OPPD requires all CT's to be connected to the incoming service conductors ahead of the building main switches as shown in Diagram II of drawing 4.06.01

In the situation where the customer presently has less than six main switches with metering positions, but may install more in the future, this is not sufficient reason to allow self-contained or CT services to be down-stream of the present building main switches. See Diagram III of drawing 4.06.01

Wiring for Instrument Transformers

A conduit of 1 inch minimum size having no more than two bends shall be installed between the instrument transformer cabinet and the meter test cabinet or socket. Meters should be located as close as practical to the instrument transformer cabinet.

Potential transformer (PT) primary connection leads require a minimum #10 copper wire, and will be furnished by the Contractor.

Code wire for instrument transformer (both PT and CT) secondary leads will be furnished and installed, connected, disconnected, changed or removed only by OPPD. Only OPPD's metering equipment, or equipment under OPPD's exclusive control, may be connected to the secondary terminals of OPPD's instrument transformers.

4.07 CONNECTIONS

The neutral conductor of all incoming services must be solidly bonded in and to the instrument transformer housing (metal cabinet or switchgear), or to the meter socket, or cabinet for self contained meter.

All wires of the incoming service must pass through the meter cabinet, socket, or instrument transformer cabinet. Under no circumstances may metered and

unmetered conductors be placed in the same nipple, conduit, raceway, or gutter. Only conductors necessary to the individual metering will be permitted in each meter cabinet, socket, or instrument transformer cabinet. Metered conductors of one meter may not pass through the metering cabinet of any other meter. Nor may conductors, once exited from a socket, or metering enclosure, reenter it. The socket, or metering enclosure, may not be used for a wiring raceway. T-condulet conduit bodies are not permitted in service entrance conduits. Disconnected meter loops must be removed by the Contractor, and unused openings in cabinets closed by the Contractor. Meter sockets shall be installed with both the blank protective cover and the meter-sealing device in place.

Service Risers

OPPD supplies the service riser on underground Residential services. See Chapter 7.

Refer to section 8.01 for discussion of customer-supplied General Service underground service risers.

The customer supplies the service riser on overhead General Service and Residential services. See Chapter 6.

4.08 METER LOCATIONS

Meter sockets, modular meter centers, meter enclosures or cabinets shall be installed by the customer outdoors on a substantial building or structure where they will be accessible to OPPD at all times, at the POE designated by OPPD, as referred to in Section 3.01 & 3.02. When existing service with indoor meter locations is upgraded or extensively re-wired, the metering equipment shall be relocated to the outside of the building.

In no case shall metering equipment be installed on insecure supports, or where they will be vulnerable to mechanical injury, excessive dust, excessive moisture, corrosive vapors, or vibration.

In areas prone to vandalism, OPPD may require the customer to provide vandal-resistant protection for the metering equipment, and maintain access for OPPD's employees.

4.09 MOUNTING

Meter mounting devices shall be securely fastened to the supporting building or structure with rust-resistant fasteners. Certain structures may require the addition of a rust-resistant reinforced mounting surface, such as "uni-strut." Conduits and cables shall not be used to support meter-mounting devices.

Minimum working clearances as required by NEC 110.26 shall be provided and maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

Underground, General Service and All Overhead

Meter supporting devices or walls shall be plumb and the meters shall be mounted no higher than 5'-6" and no lower than 2'-6" above finish grade, measured to the center of the meter glass.

Underground, Residential

Meter supporting devices or walls shall be plumb and the meters shall be mounted no higher than 4'-0" above finish grade, and no lower than 2'-6" to the bottom of the meter socket for a 200 amp socket. (See drawing 7.05.1.) For a 320 amp socket, no higher than 3'-6" and no lower than 2'-6", above finish grade to the bottom of the meter socket, to provide adequate room below the bottom of the meter socket for the plastic slip-fit riser pipe. (See drawing 7.05.2.) An exception may be made for modular meter centers as follows:

- Modular meter centers shall be mounted so that the centers of all meters are between 2'-6" and 6'-6" above the standing surface.

4.10 METER SEALS

All meters, meter facilities, and points of access to unmetered wiring on the customer's premises will be sealed by OPPD. All cabinets and equipment enclosures containing unmetered conductors shall be made sealable before the service is energized. Meter seals should not be confused with "conduit seals" which are water barriers designed to prevent leakage into the customer's service equipment.

The customer furnishes, installs and maintains any cable trough required by the customer for ganged meter sockets, or meter centers. Troughs, if used, must have provisions for sealing by OPPD.

4.11 CAPACITY

Self-contained meter centers, troughs, transformer metering cabinets, and other current-carrying components of the customer's metering installation shall have an ampacity rating equal to or greater than the rating of the service entrance conductors. OPPD will size the current transformers or the self-contained meter sockets to the expected demand determined by OPPD from information supplied by the customer or their representative.

4.12 SEPARATION

Metered circuit wires shall not be enclosed with unmetered circuit wires in the same raceway or cable, except as required in OPPD approved meter equipment assemblies.

4.13 IDENTIFICATION OF METERS BY LOCATION

Multiple occupancy building owners and customers with more than one meter shall permanently mark or tag each meter socket to coincide with the apartment (occupancy) number or unit number. It is the responsibility of the customer to notify OPPD and re-identify the meters when addressing changes are made.

4.14 METER JUMPERS

Customers, contractors, or persons other than authorized OPPD personnel shall not bypass meters or place jumpers in meter sockets.

4.15 HIGH VOLTAGE METERING

The customer shall consult with OPPD before planning any installation for voltages above 480 volts or at 2000 amps or above.

4.16 BONDING METERING ENCLOSURES

All metering enclosures shall be grounded in accordance with current NEC requirements.

TEMPORARY OVERHEAD SERVICE POLE

5.01 GENERAL

Service poles are installed, owned and maintained by the customer. Poles shall be treated wood not less than 16 feet long, with a minimum 7-inch butt and a minimum 5-inch top. Poles shall be set in the ground a minimum of 4 feet, solidly tamped, and project a minimum of 12 feet out of the ground. A taller pole may be required to meet NEC clearance requirements greater than 10 feet. The pole should be set so that it will not be under or within 10 feet horizontally of other lines. Customer-owned service equipment shall not be allowed on OPPD poles except in existing mobile home parks or farm irrigation services.

6" x 6" square, treated, wood poles may also be used, but their use presumes that enough length of existing service cables will be left attached from the pole attachment point to ensure that additional length of service cable can be added from the ground. This crimp would be made standing upon the ground, and OPPD line technicians would not have to resort to the use of climbing hooks on the temporary service pole.

A lever bypass is not required on meter sockets used for a temporary service. A temporary service is defined as a service that will be in place for 2 years or less and is typically used for temporary power for construction purposes.

5.02 SERVICE ENTRANCE CONDUCTORS

Service entrance conductors shall be enclosed in a listed (for instance: UL) rigid galvanized steel type raceway for mast-attachment of overhead service cables. Schedule 80 PVC, EMT, or intermediate conduit may be used for overhead applications, where the conduit is not used for service cable attachment, and when approved by the local inspection authority in accordance with the NEC. T-condulet conduit bodies are not permitted in the conduit run ahead of the meter.

5.03 ATTACHMENT OF SERVICE DROPS

The customer's meter pole should be set no more than 75 feet from OPPD's pole from which service will be connected. The pole will be strong enough to support the service drop and high enough to provide Code clearance of the service drop and drip loop above ground, buildings, driveways, roads, and other facilities.

The wire holder, provided by OPPD and installed by the customer will be 6 inches below the weather-head. The pole will be set so that the point of attachment will face OPPD's pole.

5.04 CONNECTIONS

All outdoor service raceway connections to the meter socket shall be waterproof.

5.05 CAPACITY

Maximum capacity of temporary construction poles covered by OPPD's Rate Schedule 470 is 200 amps single-phase. Temporary pole services greater than 200 amps single-phase, multi-phase, and all permanent pole service installations will be evaluated on an individual basis according to existing OPPD Line Extension Policy guidelines. Pole services greater than 200 amps are discouraged.

5.06 IDENTIFICATION OF CONDUCTORS

Refer to Chapter 3, Section 3.05.

5.07 SERVICE POLE INSTALLATION

See drawings 5.07.1 and 5.07.2.

OPPD furnishes, installs and maintains: ○

1. Overhead service cable
2. Cable wire grip
3. Compression type connectors
4. Socket-type meter

Customer furnishes installs and maintains: △

5. Meter socket
6. Wire-holder (service cable attachment)
7. Minimum : Schedule 80 PVC, EMT, intermediate, or rigid galvanized steel service conduit.
8. Three number 8 minimum copper wires to meter socket.
9. Ground rod per current "National Electrical Code." Extend above ground line.
10. Continuous copper ground wire, not to be less than a number 6. Fasten securely to pole with staples.
11. Rain-tight service head
12. Customer service equipment fed by 3- #10 copper wire minimum. All load must be protected by fuse or breaker, and GFCI-protected where required by local authority.
13. Pole is to be a minimum of 16' tall, with a 5" minimum diameter at the top, and a 7" minimum diameter at the butt. 6"x6" square, treated wood poles may also be used. Set pole in the ground a minimum of 4 feet deep.

UNDERGROUND TEMPORARY SERVICE POLE

5.51 GENERAL

Service poles are installed, owned and maintained by the customer. Service pole shall be installed at and clearly marked with the address associated with the meter to be installed. The pole shall be treated 4"x 4" wood not less than 10 feet long. It shall be set a minimum of 3 feet deep, solidly tamped. Pole will be set at least 3 feet, but not over 6 feet, from OPPD's secondary pedestal for residential construction service. If no secondary pedestal is available, the pole may be set adjacent to the secondary side of a padmounted transformer. Poles shall not be set in the expected path of service cable to houses. For General Service temporary service pole location, consult with OPPD for a suitable source of temporary power. The service pole shall not be located over OPPD's underground cables, but instead should be off to the side to avoid dig-ins. The customer should contact the "Digger's Hotline of Nebraska," as mentioned in Section 1.14.

A lever bypass is not required on meter sockets used for a temporary service. A temporary service is defined as a service that will be in place for 2 years or less and is typically used for temporary power for construction purposes.

5.52 SERVICE ENTRANCE CONDUCTORS AND CONDUIT

Service entrance and conductors will be installed and maintained by the customer. Service conduit and conductors will enter the meter socket from the bottom, and be connected to the line side by OPPD. As the pole is taken out of service and relocated to all subsequent construction sites, service entrance conductors and conduit move with and remain attached to each pole.

5.53 WIRING

The meter socket will be installed by the customer 5 feet above the ground line. The customer's rain-tight service disconnect and service equipment will be mounted above the meter socket and wired to the load side of the meter socket. The pole, socket, and equipment will be grounded per NEC requirements.

5.54 CAPACITY

The maximum capacity of an underground temporary construction service, as covered by OPPD's Rate Schedule 470, is limited to that which meets NEC for a 1" conduit. Single phase temporary services greater than that and all multi-phase temporary service requests will be provided for, by OPPD, on an individual basis, based on existing OPPD Line Extension Policy guidelines. Contact the appropriate Electrical Service Designer to coordinate service.

5.55 SERVICE POLE INSTALLATION

See drawing 5.55.

OPPD furnishes, installs and maintains: ○

1. Socket-type meter

Customer furnishes, installs and maintains: △

2. Service cable and flex conduit adapted to include a 2-4" long 1" nipple with locknut and metal bushing at connection to pedestal and conductors extending a minimum of 36" beyond nipple.
3. Meter socket.
4. Ground rod per current "National Electrical Code". Extend above ground line.
5. Continuous copper ground wire to be not less than a number 6 AWG. Fasten securely to pole with staples.
6. Customer service equipment fed by 3- #10 copper wire minimum. All load must be protected by fuse or breaker, and GFCI-protected where required by local authority.

Note: For any services larger than 1" flex conduit contact the appropriate Electrical Service Designer to coordinate service.

OVERHEAD SERVICES - RESIDENTIAL & GENERAL SERVICE

6.01 GENERAL

See Chapter 3, Section 3.01 for more information about point of entrance (POE).

In all cases, the customer installs, owns, and maintains the service entrance in accordance with OPPD's applicable rates and extension rules and requirements. (See Chapters 1 through 4)

OPPD's service drop will terminate at the first point of contact on the building or structure supporting the metering equipment. The attachment point, riser conductors, conduits and fittings for both Residential and General Service customers are the customer's responsibility.

OPPD's ESD designates the point where OPPD's service drop will attach to the home or building (POE). OPPD will make an effort to comply with the customer's preference, but any added costs to do this may be collected by OPPD. Clearances, code compliance, or legal considerations may make OPPD unable to meet the customer's requested point of entrance.

To comply with the requirements of the National Electrical Safety Code, OPPD must install service drops so that specified clearances above ground and from structures are obtained. OPPD must also maintain its electrical distribution system to assure its customers the best possible electric service with minimum interruptions.

To maintain reasonable voltage regulation with the heavy electrical requirements common today, it is necessary that the service drop be brought to the customer from the nearest distribution pole, but not across neighboring adjacent property. This is because OPPD may have problems with obtaining the necessary easements for installing poles, wires, guys, anchors, etc.

General service self-contained meter sockets shall have a lever bypass. Exceptions: temporary services, residential garages, residential communication pedestals, sign lighting, apartment house meters, and farm services. It should be understood that the consequence of not installing a lever bypass socket is that power will be lost during work on the meter.

Attachment Maintenance of Meter Loops

It is the customer's responsibility to maintain the attachment of the meter loop on the building. If storm damage should loosen the meter loop from the building, the customer should make arrangements to have an electrician reattach it. The customer is also responsible for arranging any necessary electrical inspections. OPPD will be unable to restore service until this has been done. In addition, OPPD will not loosen meter loops for customer painting, or re-siding of their building.

Clearances Over Pools

Without exception, no parts of swimming pools, wading pools, hot tubs, etc. shall be placed under existing service-drop conductors or any other open overhead wiring. Nor shall such wiring be installed above the following:

- A. Swimming pool, wading pool, hot tubs, and the area extending 10 feet horizontally from the inside of the walls of the pool or tub.
- B. Diving structures.
- C. Observation stands, towers, or platforms.

Other Clearances

The minimum clearance for the service drop conductors to any building or other structure is:

- A. 10.5 feet above finished grade, sidewalks, platforms, decks, or building projections, from which the conductors might be reached (areas subject to pedestrian traffic).
- B. 15 feet over residential driveways.
- C. 15.5 feet over roads, streets, and other areas subject to truck traffic.
- D. Five feet from windows, doors, porches, fire escapes, or similar locations.
- E. Where the voltage between conductors does not exceed 300V and the service drop conductors pass over the roof of an intervening building, clearance of three feet is required.
- F. The service drop attachment shall not be higher than 20feet above finished grade unless it is stipulated in the metering specifications.
- G. The service drop conductors are not to pass over more than four feet of a building's roof to reach the point of attachment.
- H. The point of attachment (POA) shall be placed so the service conductors do not rub, or come in contact with the building, its eaves, or any intervening building or structure. Any intervening trees on the customer's property, which may interfere with the service drop, are the customer's responsibility to trim, or remove.
- I. No part of service drop conductors, their drip loops, or their weather head shall come within 12" of communication cables or conductors.

The maximum sag of OPPD's service drop in either extreme summer heat, or winter icing conditions, must be considered in maintaining necessary clearances.

Accessible Overhead Point of Attachment

The overhead POA shall be installed in a safe, readily accessible outdoor location. OPPD personnel must be able to access the POA from a ladder resting upon the ground or from a deck with outdoor access reached by permanent stairs. OPPD personnel will not climb upon the roof of the structure to reach the POA. The height limits for reaching the POA from a ladder are between 12.5 feet and 20 feet. Current code requires 10 feet minimum above grade to the bottom of the drip loop.

POA's are not considered readily accessible under the following situations:

- The POA is more than four feet back from the edge of the structure roof.
- The POA is over an intervening roof of the building, such as a porch or addition roof.

The following rules will enable the electrical Contractor to provide proper means for the attachment of OPPD's service drop, and also for the correct installation of the metering and service entrance:

1. OPPD's Customer Sales and Service Division will designate the point of entrance. Please call the Customer Sales and Services Division, the ESD, or OPPD's area office. The telephone numbers are listed in Chapter 1, Section 1.02.
2. The Contractor shall install an approved attachment for OPPD's service drop on every building or structure being wired or rewired, or for any building or structure moved to a new location. OPPD will make every effort to accommodate a moved-in structure's existing POA, and internal wiring, but the cost to OPPD to do this, may be collected from the customer.

6.02 SERVICE ENTRANCE CONDUCTORS

The minimum capacity of the overhead service entrance conductors provided by the customer, from the meter socket in the riser up to the weatherhead, is 100 amperes, for residential service, unless smaller conductors are permitted by written approval of the local inspecting authority.

Service entrance conductors shall be enclosed in a listed (for example: ETL, or UL) Schedule 80 PVC, EMT, intermediate, or Rigid type of raceway. The use of "T" conduit bodies in the service wire conduit riser ahead of the metering is prohibited.

Conduit Riser

- The overhead conduit riser size for a new residential installation shall not be less than 1¼ inch for a 100 to 150-amp entrance, where the service wire attachment point is other than the conduit.

- 1½-inch rigid steel conduit mast is required for a 100 to 150-amp entrance, when the service wire attachment point is on the conduit.
- 2-inch rigid steel conduit mast for a 200-amp entrance when the service wire attachment point is on the conduit.
- 2½-inch rigid steel conduit mast for a 320-amp entrance when the service wire attachment point is on the conduit.
- In the case of the rehabilitation of an existing residence, having no more than a 100-amp main breaker, and #4 conductors, a pre-existing 1-inch conduit, installed inside of the building wall along with a recessed socket, may be reused. This permission for reuse is conditional that the service wire attachment point is other than on the conduit, and the bottom of the drip loop meets the 10 feet minimum height requirement above grade.

Wires Out of Weatherhead

For connection to OPPD's overhead service drop wires, the customer's service entrance conductors shall project beyond the service head for all services, per the following:

- General Service, three-phase; Residential, over 320-amperes; or multiple conductors per phase: 36 inches.
- General Service, single-phase sockets, and Residential sockets: 18 inches.

6.03 ATTACHMENT OF SERVICE DROPS - RESIDENTIAL

For non-residential customers, see meter specification for service drop attachment strength requirements, and for meter location.

Service drop attachment shall not be made to the roof, eave, siding, or flashboard of the residence.

Residential Attachment Types

Contingent upon providing proper clearances, the residential point of attachment shall be one of the following types:

1. **Bolt Through Vertical Exterior Wall**
Refer to Section 6.10.
 - On frame and brick veneer homes, one 5/8" hook-type bolt (j-bolt), furnished and installed by the customer, shall be used. The stem of the bolt being on the far side of the wall stud from the distribution pole, to oppose the pull of the service drop, and prevent possible future splitting of the siding.

- On types of construction that have no wall studs, (such as concrete block), one or more 5/8" machine bolts, shall be furnished and installed by the customer. Bolts shall extend outside the wall at least 2.5 inches, but not over 4 inches. Various length bolts are available, so a proper length should be measured for and used.

Service heads shall be above and adjacent to the highest attachment bolt, but located so as not to interfere with the attachment, or clear approach of the service drop from the distribution pole. The secure service attachment point shall be 6" vertically below the service entrance head, and shall not be more than 18" away, horizontally.

2. **Mast Type Riser**

Refer to Section 6.09.

- The mast shall be furnished and installed by the contractor.
- The riser conduit shall be sized per Section 6.02.
- It shall be so constructed and supported that it will withstand the strain imposed by the service drop. There shall not be a splice in the top 10 feet of the riser pipe, to prevent kinking. Masts employing back guying are not allowed in residential applications.
- The riser shall not be located more than 4 feet back from the edge of the roof.
- The service drop conductors shall not cross more than 4 feet of roof, and shall be terminated on an approved pipe-mounted wire holder, which is to be furnished and installed by the contractor. The holder shall be securely fastened to the riser conduit, and located so that the service wire passes at least 18 inches above the surface of the roof. The wire holder shall not be more than 24 inches above the roof. Masts extending more than this above the roof, are not readily accessible from a ladder resting upon the ground, and also may be subject to kinking, so are therefore not allowed in residential applications.

Rewired Residences

Existing roof plates or house knobs should be replaced with one of the acceptable attachment methods referenced above when a residence is rewired.

In the case of the rehabilitation of an existing residence, having no more than a 100-amp main breaker, and #4 conductors, a pre-existing 1-inch conduit,

installed inside of the building wall along with a recessed socket, may be reused. This permission for reuse is to be given by OPPD'S ESD on a case-by-case basis. Granting of permission is conditional that the service wire attachment point is other than on the conduit, per Section A, the bottom of the drip loop meets the 10 feet minimum height requirement above grade, and all other necessary conditions for proper service are satisfied. Failure to call OPPD for a confirmation of the POE before rewire is not a sufficient reason for OPPD to allow an unacceptable situation.

The electrical contractor shall furnish and install a suitable attachment point using a j-bolt, a machine bolt, or a screw type attachment with eye that will withstand the strain imposed by the service drop. An existing screw type attachment is not to be re-used for service wire over # 4 triplex, for new construction, or where the remodeling is extensive enough to permit the use of a j-bolt, or a machine bolt.

Meter-Disconnect Combination on an Existing Home with a New Addition

In the case of an existing single family residence, where the customer is adding an addition, which will enclose the existing POE and meter socket, a combination meter socket-disconnect may be used. The combination meter socket-disconnect shall be provided, installed, and maintained by the customer at a new POE, designated by OPPD's ESD, on the new addition. This will allow the customer to comply with the NEC requirement for a disconnect switch when electrical conductors enter a building (the new addition), and feed to the existing distribution panel in the existing part of the house.

The combination meter socket-disconnect must meet the following requirements:

- There must be a separate cover for both the meter socket, and the disconnect (breaker) compartment. Either cover must be able to be removed without disturbing the other cover.
- The meter socket cover must be of ring-less design, and have a provision for the meter seal. OPPD reserves the right to lock the meter socket cover, in any manner, to insure the security of the socket and meter.

Any other use of the combination meter socket-disconnect must be approved by the meter engineer on an individual basis prior to installation. Work through the AE or ESD to obtain this approval.

Height and Strength of Attachment

Roof mounting plates are not to be used as a means of attachment for new overhead services. Customers with existing roof plates shall replace them with another approved attachment method when a rewire or service upgrade is necessary.

The customer's structure must be strong enough to support the service drop and

high enough to provide Code clearance of the service drop and drip loop above ground, buildings, driveways, roads, and other facilities (See Section 6.01). The customer shall provide a secure service attachment point not more than 18" away horizontally, and 6" to 12" vertically below the service entrance head. Masts, risers or wire holders are not furnished by OPPD.

The point where the service drop is to attach to a building or structure must be high enough so that OPPD's service drop will maintain the designated clearances. The service entrance head shall be above and adjacent to this point. OPPD recognizes the occasional problem of obtaining these clearances, particularly with ranch style residences. OPPD will cooperate in solving these problems. Please call Customer Sales and Services Division, the ESD, or outside the metro, OPPD's area office. The telephone numbers are listed in Section 1.02.

If a building or structure to which a service drop is to be run is not high enough to provide the required Code clearance above ground, the customer shall furnish and install a higher support. This could be a pole, or a structure on a building, strong enough to withstand severe ice and wind loading, which will give the required clearance. Specific minimum tensions for the customer's POA will be specified on the meter specification written for the individual project, depending on size of conductors and length of service.

6.04 CONNECTIONS

All outdoor service raceway or cable connections to meter socket bases, meter enclosures, or switches shall be waterproof. Service entrance cable termination fittings in metering equipment shall be of screw-tightened construction.

6.05 IDENTIFICATION OF CONDUCTORS

If the neutral or grounded conductor of a service entrance (480 volts and under) is insulated, it shall be identified by a white or gray color.

In overhead applications, if an insulated conductor is being used as a neutral for the overhead service conductors, the insulation must be striped from the last 18" of the neutral extended from the service head. A minimum of 4" of insulation must be left on the conductor extended from the service head.

Any equipment-grounding conductor, when required, shall be bare, or if insulated, it shall be identified by a green color, or with green tape, spiral wrapped a minimum of 3", or by tagging, or another permanent marking method per NEC requirements.

Four wire 120/240 volt delta installations shall have the "wild phase" identified with an orange outer covering, tape, by tagging or another permanent marking method per NEC requirements at a point where OPPD will connect the service entrance.

When the customer provides the service conductors for other than single-phase

situations, they are to use tape; spiral wrapped a minimum of 3", to identify the phase.

For example:

- 120/208V, 3Ph, 4W: Black, Red, and Blue; or Red, Yellow, and Blue
- 277/480V, 3Ph, 4W: Brown, Purple, and Yellow.

An alternate acceptable marking method would be:

- 1 band of colored tape at each end for A phase
- 2 bands of colored tape at each end for B phase
- 3 bands of colored tape at each end for C phase

The use of paint to identify insulated conductors is not acceptable identification, due to the impermanence of this method.

6.06 SEPARATION OF METERED AND UNMETERED CONDUCTORS

No metered circuit wire shall be enclosed with an unmetered circuit wire in the same raceway or conduit, except as may be necessary in meter equipment assemblies.

6.07 MAXIMUM SERVICE DROP LENGTH

For safety reasons and prevention of damage to Customer's premises, the maximum length of OPPD's overhead service is 75'. The maximum allowable length may be restricted to less than 75' for installations with large conductors or other limitations. In certain situations, a service longer than 75' may be installed, using an indent pole, after consultation with, and approval by OPPD.

6.08 SERVICE MAST INSTALLATION – RESIDENTIAL, SOCKET 100 THROUGH 320-AMP - 120/240 VOLTS SINGLE-PHASE 3 WIRE

See drawing 6.08.1 for details.

OPPD furnishes, installs, and maintains: ○

1. Overhead service cable
2. Cable wire grip
3. Compression-type connectors
4. Socket-type meter(s)

The Customer furnishes, installs, and maintains: Δ

5. Meter socket (Use drawing 7.05.3 for a duplex, or drawing 6.08.3 for a 3-plex.)
6. Galvanized rigid steel conduit service mast with 1 ½" diameter for 100 to 150 amp, 2" diameter for 200 amp service entrance or 2½" diameter for 320 amp service entrance, flashing, and storm collar. The mast must be securely bridged between rafters. No coupling is to be in the top 10 feet of conduit.
7. ½" x 8' copper clad supplemental ground rod per current "National Electrical Code".
8. Continuous copper ground wire, not less than a #6 AWG, from ground rod to meter socket.
9. Rain-tight service head.
10. OPPD-approved cable wire holder.

NOTES:

- A. Refer to Sections 6.01 – 6.08 for installation and service requirements.
- B. A minimum clear working space of 2'-6" above, below and on both sides of the metering enclosure, for working clearance, as well as 3 feet horizontally in front of the metering, shall be provided and maintained, by the customer, at all times. Reference NEC 110.26.
- C. Leave wire ends a minimum of 18" long for connection by OPPD.
- D. The diagonal distance from the nearest edge of a balcony or deck handrail to the service conductor shall be 8 feet minimum.
- E. The distance between the service attachment and weather head shall be 6" maximum. The service attachment shall always be below the weather head.

**6.09 WALL INSTALLATION – RESIDENTIAL, SOCKET
FROM 100 TO 320-AMP - 120/240 VOLTS SINGLE-PHASE 3 WIRE**

See drawing 6.09 for details.

OPPD furnishes, installs, and maintains: \circ

1. Overhead service cable

2. Cable wire grip
3. Compression-type connectors
4. Socket-type meter(s)

The Customer furnishes, installs, and maintains: Δ

5. J-Hooks for attachment to studs, either 8" for veneer, or 12" for brick veneer.
6. Meter Socket (Use drawing 7.05.3 for a duplex, or drawing 6.08.3 for a 3-plex.)
7. Schedule 80 PVC plastic, EMT, or RIGID steel conduit service riser with 1 ½" minimum diameter for 100 or 150-amp service, 2" minimum diameter for 200-amp service, or 2½" minimum diameter for 320-amp service.

The customer is to use no T-condulet conduit bodies in the conduit ahead of the meter.

8. ½" x 8' copper clad supplemental ground rod per current "National Electrical Code".
9. Continuous copper ground wire, not less than a #6 AWG, from ground rod to meter socket.
10. Rain-tight service head.

NOTES:

- A. Refer to Sections 6.01 – 6.08 for installation and service requirements.
- B. A minimum clear working space of 2'-6" above, below and on both sides of the metering enclosure, for working clearance, as well as 3 feet horizontally in front of the metering, shall be provided and maintained, by the customer, at all times.
- C. Leave wire ends a minimum of 18" long for connection by OPPD.
- D. The diagonal distance from the nearest edge of a balcony or deck handrail to the service conductor shall be 8 feet minimum.
- E. The clearance between the service attachment and weather head shall be 6" maximum. The service attachment shall always be below the weather head.

6.10 OVERHEAD RESIDENTIAL SINGLE-PHASE and GENERAL SERVICE SINGLE and THREE-PHASE, CT INSTALLATION, (400-800-AMPS), UNDER 600 VOLTS

Refer to Section 4.06 for general notes on CT installation.

Refer to Section 7.07 for Residential underground CT installation details.

Refer to Section 8.06 for General Service underground CT installation details.

See drawing 6.10 for installation details.

OPPD furnishes, installs, and maintains: ○

1. Meter and instrument wiring. (See Chapter 4)
2. Overhead service cable.
3. Cable wire grip.
4. Compression-type connectors.

OPPD furnishes and the Customer installs and maintains: □

5. Current transformers. For lug connections on current transformers up to 600 amperes, minimum bolt size is 3/8". For over 600 amperes, minimum bolt size is 1/2". For all services, two-bolt lugs are required, and one-bolt lugs are not allowed.
6. Meter socket for CT application.

The Customer furnishes, installs, and maintains: △

7. J-Hooks for attachment to studs, either 8" for veneer, or 12" for brick veneer.
8. Weatherproof, side-hinged, metering transformer cabinet per "National Electrical Code" grade steel of adequate size for the instrument transformers and all wiring connections. (See Section 4.06).
9. Schedule 80 PVC plastic, EMT or RIGID steel conduit service riser, sized per the NEC. The customer is to use no T-condulet conduit bodies in the conduit ahead of the metering.
10. Conduit straps. (As required per NEC)
11. Rain-tight service head.
12. Grounding, in accordance with applicable codes. Continuous copper ground wire, not to be less than a # 6 AWG. The service

entrance neutral shall be bonded to the current transformer cabinet.

13. 1" conduit from instrument cabinet to meter socket.

NOTES:

- A. The Customer shall consult with OPPD before this installation is planned or started.
- B. Minimum 36" clear space must be provided in front of metering transformer cabinet to allow for full door opening.
- C. A minimum clear working space of 2'-6" above, below and on both sides of the metering enclosure, for working clearance, as well as 3 feet horizontally in front of the metering, shall be provided and maintained, by the customer, at all times.
- D. Leave wire ends a minimum of 36" long for connection by OPPD.

6.11 FREE-STANDING SUPPORT FOR OVERHEAD SERVICE – BY CUSTOMER

A residential customer in an area with overhead distribution lines may elect to accept overhead service on a customer-provided freestanding service pole on their property instead of on their house. Since OPPD is not responsible for wiring down-stream of the meter, the customer must then install his own overhead or underground wires from the meter pole to the house.

Overhead permanent service pole requirements are similar to temporary overhead service pole requirements, as shown in Chapter 5.

6.12 GENERAL SERVICE, 100 TO 320 AMP, SINGLE-PHASE SOCKET, MAST OR WALL INSTALLATION

Mast Installation will be similar to Section 6.08.
Wall installation will be similar to Section 6.09.

6.13 GENERAL SERVICE, 100 TO 200 AMP, THREE-PHASE SOCKET, MAST OR WALL INSTALLATION

Mast installation will be similar to Section 6.08.
Wall installation will be similar to Section 6.09.

6.14 GENERAL SERVICE 320 AMP THREE-PHASE 120/208V OR 120/240V 4W OVERHEAD & UNDERGROUND SOCKET METERING

See drawing 4.02.15.

A 320 amp socket is available for 120/208V, or 120/240V, three-phase 4-wire

service.

The customer furnishes and installs meter sockets. OPPD furnishes, installs and maintains socket-type meters. When service entrance conductors are larger than 250 KCMIL, please call the ESD, or AE. See Section 1.02 for telephone numbers. With sufficient notice, OPPD can provide CT metering at no additional cost, to accommodate the customer's conductors.

Mast Installation will be similar to Section 6.08.

Wall installation will be similar to Section 6.09.

UNDERGROUND SERVICES (RESIDENTIAL) SINGLE FAMILY RESIDENTIAL, DUPLEXES, OR TOWNHOUSES

7.01 GENERAL

Also refer to Chapter 3 (Service Entrances), and Chapter 4 (Metering Installation).

OPPD will install, own, and maintain the underground service lateral and metering equipment in accordance with OPPD's applicable rates and extension rules and the requirements of Chapters 1, 2, 3, and 4, except:

- If required cable is larger than 350 KCMIL, the customer is required to provide and install the underground residential service lateral.
- Customer metering is located on padmounted transformer, (as mentioned below).
- OPPD cannot install an underground service due to physical conditions, (where there is a shelf of rock beneath the soil surface, or densely wooded areas).
- If the residence is served at other than the Residential rate.

Underground service lateral is defined as the underground service conductors from the last pole, pedestal, transformer, or other OPPD serving equipment, which runs to, and is connected to the customer's meter socket or current transformer metering at the customer's building or structure.

The customer shall install, own, and maintain all service entrance facilities other than the service lateral and metering equipment, regardless of metering location.

The customer shall make application to OPPD for the proposed underground service lateral and obtain approval of the location before starting installation of the service entrance. Any required, non-refundable, charges must be paid to OPPD before the service drop is installed.

Metering on Padmounted Transformer

If a residential customer has the metering on a padmounted transformer, installed for their sole use, the customer is required to provide, install, and maintain their own underground service cables to the residence. They should therefore follow the instructions of Chapter 8, which is for General Service underground services. This is necessary, since OPPD is not responsible for wiring which is down-stream of the metering.

Meter-Disconnect Combination on an Existing Home with a New Addition

In the case of an existing single family residence, where the customer is adding an addition which will enclose the POE and meter socket, a combination meter socket-disconnect may be used. The combination meter socket-disconnect shall be provided, installed, and maintained by the customer at a new POE, designated by OPPD's ESD, on the new addition. This will allow the customer to comply with the NEC requirement for a disconnect switch, when electrical conductors enter a building (the new addition), and feed to the existing distribution panel in the existing part of the house.

The combination meter socket-disconnect must meet the following requirements:

- There must be a separate cover for both the meter socket and disconnect (breaker) compartment. Either cover must be able to be removed without disturbing the other cover.
- The meter socket cover must be of ring-less design, and have a provision for the meter seal. OPPD reserves the right to lock the meter socket cover, in any manner, to insure the security of the socket and meter.
- The meter socket line-side lugs must be able to accept up to 250 KCMIL copper or aluminum conductors.
- The meter socket must have a 2½ inch knockout, for a breaker rated up to 200 amps, or a 3 inch knockout, for a breaker rated up to 400 amps. This knockout must be located on the bottom panel of the meter socket on either the right or left side, and will be used for the installation of the incoming riser pipe and service conductors. The disconnect must be located so as not to interfere with the installation of the service conductors and riser pipe into the bottom of the socket.
- OPPD's service conductors must be separated from the customer's load conductors by a permanent barrier.

Any other use of the combination meter socket-disconnect must be approved by the meter engineer on an individual basis prior to installation. Work through the AE or ESD to obtain this approval.

7.02 SERVICE LATERAL REQUIREMENTS

Conduit Installation

Underground service lines from underground distribution lines to individual lots or dwelling units will be provided by OPPD from a point of connection on the dwelling unit to OPPD's nearest point of power supply (150' maximum run). The lot owner or builder will be responsible for providing and installing a service conduit from OPPD transformer/pedestal to the meter socket for every individual lot, as shown on drawing 7.02.2.

Easements

The customer shall provide an easement, when required, at no expense to OPPD for the installation and maintenance of the service lines. No permanent building or tree shall be placed over the service lateral, or on this easement. No swimming pool, hot tub, or wading pool shall be installed over, or within 5 feet of, the service conduit or cables.

Grade Changes

If later changes in grade levels will reduce the depth of cover over cables or require equipment relocation, the customer must notify OPPD **before** grading, and pay the entire cost of grading or filling, as well as any subsequently-required cable or equipment relocation or replacement by OPPD. A similar situation may arise from the customer increasing the depth of ground cover above or near to, OPPD's cables, or equipment. For the location of OPPD-owned cable, the customer should contact the "Digger's Hotline of Nebraska" before digging. See Section 1.14 for the telephone number.

Retaining Walls

If a retaining wall interferes with the intended cable path on the customer's property, the customer will install a schedule 40 PVC conduit for the service cables, as shown on drawing 7.02.1.

7.03 CONNECTIONS

OPPD will connect the underground service cables to the customer's metering equipment, (either the socket lugs, or the CT's in a cabinet).

7.04 CLEARANCES

To avoid damage to OPPD facilities when the customer may be digging, the underground service lateral shall have a minimum horizontal clearance of 6 feet from swimming pools, fuel storage tanks, septic systems, etc.

A minimum 2'-6" working clearance above, below, and on all sides of the meter socket, or metering enclosures, as well as 3' horizontally in front of the metering shall be maintained at all times.

For single residential underground meter sockets, the socket shall be mounted no higher than 4' above finished grade to the **middle** of the meter for a 200 amp socket. For a 320 amp socket, the socket shall be mounted no higher than 3'-6" above finished grade to the **middle** of the meter to facilitate reading without need of a ladder or raised platform. In addition, for both a 200 amp socket and a 320 amp socket, the **middle** of the meter shall not be installed lower than 2'-6" from the bottom of the socket down to finished grade. This is done to provide sufficient space to install the slip-fit riser pipe down from the bottom of the socket to below grade level.

If the metering location is under a deck or similar structure, the minimum clearance between the deck bottom and finish grade must be 6 foot, 6 inches to allow access for meter reading without having to stoop or crawl.

Cantilevers

If the meter socket is installed on a cantilever, the riser pipe shall be backed by a 4 x 4 treated wood post, securely fastened to the house, and buried a minimum of 18" below grade. This will provide physical protection for the pipe from either damage, or dislocation. (See drawing 7.04.1).

If the meter socket is installed under the cantilever, the cantilever must be a minimum of 6'-6" above grade. This will provide sufficient height above the meter socket for working clearance, and below the meter socket to provide sufficient length for installation of the slip-fit riser pipe. (See drawing 7.04.2).

Brick Ledge

In the case where the residence wall has a protruding brick ledge, the customer is to install the socket out from the wall with an adequate support, so the riser pipe clears the brick ledge.

7.05 UNDERGROUND SERVICE TO SINGLE OR DUPLEX METER SOCKET SINGLE-PHASE 100 through 320 AMPS, 240 VOLTS AND UNDER

See drawings 7.05.1, 7.05.2, and 7.05.3.
Also see section 4.02 for socket detail drawings.

OPPD furnishes, installs, and maintains: ○

1. A single underground service lateral.
2. Socket-type meter.

The Customer installs, provides and maintains: △

3. A slip-joint riser pipe assembly: Schedule 80 PVC, 2 ½" for a 200 amp service or 3" for a 320 amp service.
4. The meter socket.
5. ½" x 8' copper clad supplemental ground rod per current "National Electrical Code".
6. Continuous copper ground wire, not less than #6 AWG, from ground rod to meter socket.
7. Conduit. (See drawing 7.02.2.)

NOTE:

- A. Minimum working clearances as required by NEC 110.26 shall be provided and maintained by the customer at all times. OPPD requires a minimum of 2'-6" of side clearance on all metering equipment.

7.06 FREE-STANDING SUPPORT FOR UNDERGROUND SERVICE ENTRANCE
100 through 200 AMP, or 320 AMP - 240 VOLTS AND UNDER

Refer to Chapter 9 for mobile homes.

Refer to drawing 7.06.

The customer shall consult with OPPD before this installation is planned or started, to determine availability.

Where no building or structure is available, the customer shall install a freestanding support for OPPD's meter, and for terminating OPPD's underground service lateral. Support posts must be 4 X 4 treated wood, galvanized pipe, or metal channel suitable for earth contact and set in concrete. Height of the support must be such as to provide for the mounting of the bottom of the meter socket between 2'-6" minimum and a maximum of 4' above finished grade for a 200 amp socket. The support must provide for the mounting of the bottom of the meter socket between 2'-6" minimum and a maximum of 3'-6" above finished grade for a 320 amp socket.

OPPD furnishes, installs, and maintains: ○

1. Underground service lateral to the meter socket.
2. Socket type meter.

The customer furnishes, installs and maintains: △

3. The meter socket.
4. A slip-joint riser pipe assembly: 2 ½" for a 200 amp service or 3" for a 320 amp service.
5. The support structure.
6. ½" x 8' copper clad supplemental ground rod per current "National Electrical Code".
7. Continuous copper ground wire, not to be less than a #6 AWG, from ground rod to meter socket.
8. Conduit. (See drawing 7.02.2.)

NOTE:

- A. A minimum clear working space of 2'-6" above, below and on both sides of the metering enclosure, for working clearance, as well as 3 feet horizontally in front of the metering, shall be provided and maintained, by the customer, at all times.

7.07 UNDERGROUND SERVICE TO CT CABINET
SINGLE-PHASE, 400 through 800 AMP - 120/240 VOLTS

Refer to Section 4.06 for CT metering requirements.

Refer to Section 6.10 for General Service and Residential overhead CT installation details.

Refer to Section 8.06 for General Service underground CT installation details.

See drawing 7.07 & 4.06.3.

OPPD furnishes, installs, and maintains: ○

1. Underground service lateral, unless the conductors are larger than 350 KCMIL aluminum. The customer provides all conductors larger than 350 KCMIL aluminum.
2. Meter and instrument wiring (see Chapter 4)

OPPD furnishes, and the customer installs, and maintains: □

3. Current transformers. For lug connections on current transformers up to 600 amperes, minimum bolt size is 3/8". For over 600 amperes, minimum bolt size is 1/2". For all ratings, two-hole lugs are required, and one-hole lugs are not allowed.
4. Meter socket for CT application.

The Customer furnishes, installs, and maintains: △

5. A riser pipe sized for the conductors, per the NEC.
6. Metering transformer cabinet (see Chapter 4). Customer is to furnish "National Electrical Code" grade steel cabinet of adequate size for the instrument transformers and all wiring connections.
7. 1/2" x 8' copper clad supplemental ground rod per current "National Electrical Code".
8. Continuous copper ground wire, not less than a # 6 AWG, from ground rod to meter socket.
9. Conduit. (See Paragraph 7.02.2)

10. 1" conduit from instrument cabinet to meter socket.
11. Two-hole line-side lugs and the load side lugs.

NOTES:

- A. The customer shall consult OPPD before this installation is planned or started.
- B. T-condulet conduit bodies are not permitted in the conduit run containing the customer's underground service conductors ahead of the meter.
- C. A minimum 3' clear working space must be provided in front of the metering transformer cabinet to allow for full door opening. In addition, a minimum 2'-6" clear working space must be provided and maintained above, below, and on all sides of the metering transformer cabinet.

7.08 REQUIREMENTS FOR PRIMARY AND SECONDARY CABLES AND EQUIPMENT ON LARGE LOT RESIDENTIAL PRIVATE PROPERTY (ACREAGES)

For one, and two unit residences, OPPD installs, owns, and maintains an underground service lateral to a suitable point of termination on the customer's premises. This is in accordance with OPPD's applicable extension rules, except as mentioned in Section 1.03.1.C, (metering on a padmounted transformer), and for large services, (where the required conductor size exceeds 350 KCMIL aluminum). OPPD will specify the installation and service requirements, and will designate the location of OPPD's equipment from which a customer is to be served, as well as the POE on the residence.

Underground service lines from underground distribution lines will be provided by OPPD from a point of connection on the dwelling unit to OPPD's nearest point of power supply. The lot owner or builder will be responsible for providing and installing a service conduit from OPPD transformer/pedestal to the meter socket for every individual lot, as shown on drawing 7.02.2.

Easement

The customer shall provide an easement when required, at no expense to OPPD, for the installation and maintenance of OPPD cable and equipment. No permanent building, structure, or tree shall be placed on this easement.

Grade Changes

If later changes in grade levels will reduce the depth of cover over cables or require equipment relocation, the customer must notify OPPD **before** grading, and pay the entire cost of grading or filling, as well as any subsequently-required

cable or equipment relocation or replacement by OPPD. A similar situation may arise from increasing depth of ground cover above or near to, OPPD's cables, or equipment. For the location of OPPD owned cable, contact the "Digger's Hotline of Nebraska" phone number before digging. See Section 1.14 for the telephone number.

Retaining Walls

If a retaining wall is along the intended cable path on the customer's property, the customer shall install a schedule 40 PVC conduit for OPPD's cables, as shown on drawing 7.02.1.

UNDERGROUND SERVICES - GENERAL SERVICE AND MULTI-UNIT RESIDENTIAL

8.01 GENERAL

This material is not intended to cover service from OPPD's network in the downtown Omaha area. See Chapter 12 for details concerning the downtown network.

The customer will install, own, and maintain the underground service lateral in accordance with OPPD's applicable rates and extension rules, and the requirements laid out in Chapter 4.

A multi-unit residential building is one containing four or more residential dwelling units. It may also contain a house meter for common hall or parking lot lighting. The metering shall be grouped, or an OPPD-approved, customer-provided, clustered meter center may be used. The metering is to be located outside.

Underground service lateral is defined as the underground service conductors from the supplying pole, pedestal, transformer, or other OPPD equipment, and connecting to the customer's meter socket or current transformer metering at the customer's building or other structure.

The customer shall obtain meter specifications and approval of the metering location from OPPD before starting installation of the service entrance. Since OPPD has voltage range limits, within which it strives to supply voltage to the customer, OPPD may require the customer to accept service, and install the metering equipment adjacent to OPPD's equipment to insure adequate voltage at the point of metering of the service. This would apply in those cases where the customer's service conductors would be lengthy, and the metering point would be over 100 feet from OPPD's supplying equipment.

Nebraska law requires that all persons, prior to digging any hole or trench, should contact the "Diggers Hotline of Nebraska" (Call 811).

The customer shall install, own, and maintain all service entrance facilities.

General service self-contained meter sockets shall have a lever bypass. Exceptions: temporary services, residential garages, residential communication pedestals, sign lighting, apartment house meters, and farm services. It should be understood that the consequence of not installing a lever bypass socket is that power will be lost during work on the meter.

Service Riser Pipes

Customer-provided schedule 80 PVC risers from grade level to the meter point will be allowed on General Service underground service laterals, when permitted by the local inspecting authority. PVC risers should include an expansion fitting, and fastening methods should allow for the expansion and contraction characteristics of PVC raceways, as required in the NEC. Metal conduit may be

required in areas where the possibility of damage to the riser is great. EMT is not recommended for use in direct contact with the earth.

8.02 CONNECTIONS

OPPD will connect the customer's underground service lateral to OPPD's supplying equipment, where OPPD will provide the service lateral connectors with the following limitations on size and number of sets of customer-provided conductors:

Secondary Dips

- Single-phase 200 amp, or 320 amp secondary dip: a combined total of 350 KCMIL maximum (2 sets), and 4/0 (2 sets).
- Three-phase 480 amp secondary dip: 500 KCMIL maximum (2 sets).

See Section 8.07 for secondary dips.

Padmounts

- Single-phase padmounted transformer:
 - up to 75 KVA: 350 KCMIL (4 sets)
 - 100 KVA, up to 167 KVA: 750 KCMIL (4 sets)
- Three-phase padmounted transformer (up to 500 KVA maximum): 750 KCMIL maximum (6 sets).
 - Exception: Three-phase padmounted 500 KVA transformers only may have up to 6 sets of 750 KCMIL (maximum) cable or up to 8 sets of 500 KCMIL (maximum) cable.
- Three-phase padmounted transformer (over 500 KVA): 750 KCMIL maximum (8 sets).

See Section 8.08 for padmounts.

The customer will be responsible for connecting his service lateral conductors at the metering and service equipment location, using customer-provided connectors. **Caution!** While OPPD service equipment may have lugs large enough to accommodate service conductors, the metering equipment may not.

8.03 CLEARANCES

To avoid damage to facilities when digging, the underground service lateral shall be installed, by the customer or his contractor, in accordance with clearances in the NEC, or local building ordinances.

Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.04 UNDERGROUND SERVICE TO METER SOCKET

SINGLE-PHASE OR THREE-PHASE

Refer to drawings 4.02.1 through 4.02.15, 7.05.3, 8.04.1, & 8.04.2.

OPPD furnishes, installs, and maintains: ○

1. Socket-type meter.

The Customer furnishes, installs, and maintains: △

2. Meter socket.
3. Underground service lateral to meter socket.
4. Schedule 80 PVC, or galvanized, rigid conduit riser, with insulating bushing.
(See discussion of service riser pipes in section 8.01.)
5. Grounds, in accordance with applicable code (see Paragraph 4.16).

NOTES:

- A. Consult with OPPD on maximum number and size of ducts, and conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. T-condulet conduit bodies are not permitted in the conduit run containing the customer's service conductors ahead of the metering.
- C. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.05 FREE-STANDING SUPPORT FOR UNDERGROUND SERVICE ENTRANCE

100 to 320-AMP - 240 VOLTS AND UNDER

Refer to drawing 8.05.

The Customer shall consult OPPD before this installation is planned or started.

Where no building or structure is available, the Customer shall install a freestanding support for OPPD's meter and his service equipment. The customer shall terminate their underground service lateral in the socket. Support posts must be

4X4 treated wood, galvanized pipe, or channel suitable for earth contact and set in concrete.

OPPD furnishes, installs, and maintains: ○

1. Socket-type meter.

The Customer furnishes, installs and maintains: △

2. Meter socket.
3. Underground service lateral to the meter socket.
4. Meter support.
5. Schedule 80 PVC, EMT, or galvanized rigid riser conduit, with insulating bushing.
(See discussion of service riser pipes in section 8.01.)
6. Grounding, in accordance with applicable codes. (See Paragraph 3.10.)

NOTES:

- A. Consult with OPPD on maximum size of conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.06 UNDERGROUND SERVICE TO CT CABINET

SINGLE-PHASE 400 TO 800 AMP - 120/240 VOLTS, OR THREE-PHASE

Refer to Section 4.06 for CT metering requirements.

Refer to Section 6.11 for General Service & Residential overhead CT installation details.

Refer to Section 7.07 for Residential underground CT installation details.

Refer to drawing 8.06.

OPPD furnishes, installs, and maintains: ○

1. Meter and all instrument wiring. (See Chapter 4)

OPPD furnishes and the Customer installs and maintains: □

2. Current transformers. For lug connections on current transformers

under 600 amperes, minimum bolt size is 3/8". For over 600 amperes, minimum bolt size is 1/2". For all ratings, two-hole lugs are required, and one-hole lugs are not allowed.

3. Meter socket for CT application.

The Customer furnishes, installs, and maintains: Δ

4. Underground service lateral. Service entrance neutral must be bonded to instrument transformer cabinet.
5. Weatherproof, side-hinged, metering transformer cabinet of "National Electrical Code " grade steel of adequate size for the instrument transformers and all wiring connections. (See Section 4.06). Customer is to install 1" conduit from instrument cabinet to meter socket.
6. Schedule 80 PVC, EMT, or rigid riser conduit, with insulating bushing. (See discussion of service riser pipes in section 8.01.)
7. Grounding, in accordance with applicable codes. (See Paragraph 3.10).
8. Two-hole line-side and load-side lugs.

NOTES:

- A. Consult with OPPD on maximum size of conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. The customer shall consult OPPD before this installation is planned or started.
- C. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.07 UNDERGROUND SECONDARY SERVED FROM OVERHEAD

No person or persons, except qualified employees of OPPD or its authorized agents, are permitted to climb or do work on, or to install any equipment whatsoever upon OPPD's poles.

Limitations – Distance

At the discretion of OPPD, underground secondary service may be available in an overhead distribution area. OPPD will specify the installation and service requirements, and will designate the location from which a customer is to be

served. The customer's meter point is to be no further than 100 feet away from OPPD's point of delivery, for a General Service account. If the distance to the customer's building exceeds this distance, a customer-supplied meter support adjacent to the service location will be required.

Limitations – Size

This type of service shall be limited to a maximum of 320 amperes for single-phase and 480 amperes for three-phase. Service cables shall be installed, owned and maintained by the customer on his property. Size and number limits on customer's conductors are shown in Section 8.02.

A Service and Metering Specification shall be issued by OPPD designating the terminal point to which the underground secondary cables are to be run and the amount of extra cable to be left at the pedestal located adjacent to the base of the pole. OPPD will provide wires down the pole to a connection pedestal, and make the connection to the customer's conductors.

For assistance in planning such an installation, call OPPD's Electrical Service Designer responsible for the territory. Or call the Customer Sales & Services Division at 636-3536, to be referred to the appropriate Account Executive. See section 1.02 for phone numbers.

8.08 PADMOUNT TRANSFORMER SERVICE

Primary Duct and Conductors

Primary conductors are extended by OPPD from its distribution system to the primary compartment of the padmount transformer through schedule 40 PVC non-metallic duct supplied and installed by the customer on his property. The customer may also use continuous duct, SDR 13.5 HDPE, or approved equal. Standard 36" radius, 90 degree bends, **must** be coupled to the continuous duct for all transitions at poles, switchgear and transformers. The customer's duct runs from the transformer location to the property line, with the end of the duct plugged to keep out dirt. The end of the duct, if below grade, is to be marked above grade, through use of a 2x4 sticking above grade, for example. All primary ducts are to be rodded and proven clear. Also, a pull line is to be installed by the customer, and left for OPPD use, in future cable installation. Details for cable route, manholes, (See drawing 8.08.9), pull boxes, (See drawing 8.08.7), conduit size and other installation requirements by customer will be stated on the Service and Metering Specification issued for each project, and on the slab detail drawing, referenced to for that project.

Transformer Slab

The customer supplies all slabs for three-phase padmount transformers, except when located on public right of way. OPPD will only permit placement of the transformer on public right of way when there is no adequate space on private property for the padmounted transformer. The Service and Metering

Specification will reference a slab detail by a page number from this General Wiring and Metering Specifications Manual.

Clearances shown on OPPD slab detail drawings are for OPPD physical purposes only, (for example: installation, removal, maintenance, operation, and adequate ventilation for cooling). For any additional clearances required of the customer, such as for fire protection purposes, please check with your insurer, or Factory Mutual for those clearances.

Protection pipes, as required, and slab piers are supplied and installed by the customer. The padmount transformer is supplied and installed by OPPD.

The customer is to provide an all-weather, hard-surfaced access road on customer's property to the padmount transformer location for use by OPPD equipment. No walls shall be built around, or canopies above a transformer.

Single-phase

Slabs for single-phase transformers, normally 167 KVA and smaller, are supplied and installed by OPPD. See drawings 8.08.1, 8.08.2, and 8.08.3 for slab detail.

Three-Phase, 500 KVA & Smaller

See drawings 8.08.4 and 8.08.5 for slab detail.

Three-Phase, 750 KVA & Larger

Transformer slabs for three-phase transformers larger than 750 KVA (see drawing 8.08.6) shall be designed and constructed by the customer. Location and dimension of slot and conduits must be maintained in relation to over-all slab dimensions. Ducts are not to be installed in concrete within the slot in the slab.

Slab Inspection

OPPD shall inspect transformer slab forms prior to pouring. Customer shall call OPPD's Electrical Service Designer (ESD), or Account Executive (AE) after slab has been formed, holes for support piers excavated, rebar placed and conduits placed, backfilled and tamped. Telephone numbers for ESD's and AE's may be found on meter specifications issued for installation, or call Customer Services at 636-3536 to be referred to the ESD or AE. Customer should allow at least one normal working day for this inspection after placing call. OPPD will make an effort to respond to inspection requests in reasonable time, but failure to provide sufficient early notification to OPPD for an inspection will not be sufficient reason for a customer to pour a slab without an inspection. OPPD may refuse to set padmount transformer on a slab that has not been inspected prior to pouring.

Secondary Conduits & Cables

Secondary conduits and cables are supplied and installed by the customer. (See Section 8.02 for size and number limits.) Connections to the transformer terminals will be made through connectors furnished and installed by OPPD.

The length of service conductors above the slab necessary to connect to the secondary bushings of padmount transformers will vary with the size and shape of the transformer.

Single-phase installations require that service conductors extend at least four feet above the surface of the transformer slab. No more than four sets of conductors and four conduits may be used.

Three-phase installations require that:

- (a) Up to and including 500 KVA transformers, the service conductors extend at least six feet above the surface of the transformer slab. No more than six conductors per phase, not to exceed 750 KCMIL, may be used. Exception: For 500 KVA transformers only, eight sets of conductors per phase, not to exceed 500 KCMIL, may be used.
- (b) Transformers larger than 500 KVA must be in place before the service conductors are installed, and with no more than eight conductors per phase, not to exceed 750 KCMIL. OPPD's Engineering Department recommends that NEC type USE, 90 degree Celsius dry, 75 degree Celsius wet rate cable be used for underground service entrances due to the possible high ambient temperature in the transformer secondary compartment. For further information, call Customer Services at 636-3536 to be referred to the ESD or AE, or OPPD's area office. Telephone numbers are listed in Section 1.02.

Metering on the Transformer

When a padmounted transformer is dedicated to only one customer served through a single instrument transformer meter, the metering may be located on the transformer. (See drawing 8.08.8 for required customer's work in three-phase padmounted transformers. All metering work in single-phase padmounted transformers will be done by OPPD.)

General Padmounted Transformer Requirements

All-weather access to the transformer location for OPPD's heavy vehicles must be provided to ensure proper maintenance and service continuity. The customer must provide easement on his property for OPPD equipment, when required.

The foregoing discussion in this chapter represents the general requirements for commercial and industrial padmount transformer installations. Additional specific requirements will be covered in the Service and Metering Specification issued for the particular project, and on the slab detail drawing, referenced to for that

project.

8.09 THREE PHASE PADMOUNTED TRANSFORMER WITH SEPARATE SECONDARY COMPARTMENT

OPPD can provide a separate secondary compartment, adjacent to OPPD's larger three-phase padmount transformer, to accommodate more sets of customer provided service conductors than the transformer can accommodate by itself. This is not a standard OPPD service, so contact the OPPD ESD or AE to apply for this service. All provisions of section 8.08, except for the maximum number of sets of customer provided service cables apply to this section.

On a new installation, a slab to accommodate both the transformer and the compartment should be poured by the customer per drawing 8.09.2.

In regard to construction details, such as protection pipes, reinforcing steel, clearances, distances from buildings, etc., all notes of drawing of 8.08.6 apply to drawing 8.09.2. A slab inspection by OPPD should be called for before concrete is poured. See section 8.08 for slab inspection requirements.

Adding on to an existing slab

If an existing transformer is to have a separate secondary compartment added, at a later time, the customer should compare the drawing of section 8.08, to the corresponding drawing of section 8.09, to add on to the existing slab. For the purpose of adding an extension to an existing slab:

Slab detail 8.09.1 corresponds to slab detail 8.08.5 (750 – 1000KVA), and Slab detail 8.09.2 corresponds to slab detail 8.08.6 (1500 – 2500KVA).

The existing slab should be drilled and doveled with rebar to tie the addition to it. Additional rebar and wire mesh should be used in the addition, and a slab inspection by OPPD should be called for before concrete is poured. See section 8.08 for slab inspection requirements.

Service Conductors

The customer is responsible to provide, install, and maintain all service conductors, and conduits, both from the building main switch to the secondary compartment, and also from the secondary compartment to the padmount transformer secondary terminals. OPPD will make the final connections at the padmount transformer secondary terminals. The customer's service conduits should be stubbed up in the rear area of the transformer slab slot to avoid possible conflict with the cables running between the transformer and the separate secondary cabinet.

The customer must make all final connections in the separate secondary compartment. The customer must wire and connect the service conductors in a specific order.

- The service conductors from the secondary compartment to the padmount transformer secondary terminals use the eight available slots labeled “UTILITY POSITIONS” on the buss inside of the secondary cabinet. These should be wired and connected in sequence from right to left. Maximum of 8 sets of 750 KCMIL conductors. The customer shall install a grounding electrode conductor, identified as such, between the separate secondary cabinet and the padmount transformer. The size of the conductor shall be the minimum size as indicated in NEC table 250-66.
- The service conductors from the building main switch to the secondary compartment use the sixteen available slots labeled “CUSTOMER’S POSITIONS” on the buss inside of the secondary cabinet. These should be wired and connected in sequence from left to right. Maximum of 16 sets of 750 KCMIL conductors.

The buss in the secondary compartment will handle up to a maximum of 4000 amps. The connectors in the secondary compartment are integral set-screw connectors on the buss. Oxide inhibitor is recommended on all wire terminations.

Instrument Transformer Metering on the Transformer

When a padmount transformer with a separate secondary compartment is dedicated to only one customer served through a single meter, the instrument transformer metering will be located on the buss in the secondary compartment. The customer shall not install his service cables in the secondary compartment, or connect them to the buss prior to OPPD installing the instrument transformers on the buss between the “UTILITY POSITIONS”, and the “CUSTOMER’S POSITIONS”.

MOBILE HOME SERVICES

9.01 SCOPE

A mobile home is defined as a factory assembled structure or structures equipped with the necessary service connections and made so as to be readily moveable as a unit or units on its own running gear and designed to be used as a dwelling unit(s) without a permanent foundation.

9.02 GENERAL

The Customer (park owner or operator) shall consult OPPD before such an installation is planned or started. The mobile home pedestal or pole shall be located adjacent to the mobile home. The meter socket shall not be mounted on or in the mobile home.

9.03 SINGLE CUSTOMER INSTALLATION - UNDERGROUND SERVICE

In the case of an underground service for an individual mobile home, the Customer shall install a service pole similar to that shown in drawing 5.55. The customer will provide and install a 200 amp meter socket their service pole. The customer shall also install a disconnect and over current device below the socket. The service pole is to be no more than 100 feet from OPPD's equipment providing service. The customer shall provide and install the riser conduit and conductors, allowing sufficient extra length for OPPD to extend into OPPD's equipment providing service, and make connections. The customer shall also provide grounding and the service equipment, which shall be a type approved for mobile homes.

In the case of an underground service for an individual mobile home, where the mobile home is to be set upon a permanent foundation, the installation shall be treated as any permanent underground residence, per the details of Chapter 7.

9.04 MOBILE HOME COURTS - UNDERGROUND SERVICE

A mobile home court is defined as five or more contiguous mobile home locations.

In the case of an underground service, when financial arrangements agreeable to OPPD have been made, OPPD will own, install and maintain the underground distribution system in accordance with OPPD's underground extension rules.

9.05 MOBILE HOME UNDERGROUND PEDESTALS

Pedestals, including meter sockets and blank power distribution panels, ground rod and underground distribution wiring will be provided by OPPD. Prior to OPPD energizing the pedestals, the customer will furnish and install in the distribution panel the necessary breakers, outlets and receptacles for each service to a mobile home. These shall be installed and wired to the load

terminals of the power distribution panel by the owner's contractor and in accordance with OPPD's specifications as shown in drawings 9.06.1 and 9.06.2. Such equipment is the minimum standard. It is the customer's responsibility to insure that each power outlet is inaccessible to unauthorized personnel. Upon inspection and approval of the customer's service wiring and service equipment, OPPD will install the meters.

Changes to, and maintenance of the power outlet equipment, as well as any attendant expense, are the responsibility of the park owner or operator and shall conform to OPPD's minimum specifications as shown on drawings 9.06.1 and 9.06.2.

Gas meters and associated equipment should be located a minimum of 3 feet from the pedestal. Each installation shall be approved by OPPD prior to construction.

SERVICE IMPAIRING EQUIPMENT REGULATIONS

10.01 DEFINITION

"Service impairing" equipment is defined as:

- Customer electrical equipment (welders, arc furnaces, motors, driving compressors, X-ray, and other equipment) having highly fluctuating or large instantaneous demand, compared to their average demands.
- Loads which cause harmonic distortion (some large computers and variable speed controllers) or other electrical disturbances.

These unusual variations can impair quality of service to other customers and must be eliminated or controlled within performance limits determined by OPPD or nationally recognized standards (i.e. ANSI, IEEE, etc), as set forth in OPPD's Service Regulation D-9

10.02 STANDARDS OF PERFORMANCE

The effects of service impairing loads will vary depending on their location in relation to OPPD's electrical supply system and other customers. Each proposed installation must be carefully studied in advance of connection to OPPD's lines. OPPD will determine (from electrical and operating characteristics of the proposed load to be supplied by the Customer or equipment manufacturer, as well as the OPPD electrical supply system) what steps must be taken by the customer and OPPD to prevent impairment of service to other customers.

10.03 CUSTOMER RESPONSIBILITY

The customer should install equipment which minimizes service impairment or install corrective equipment at the load location.

Where OPPD's electrical supply facilities are reasonably adequate and have capacity to serve normal load additions, the cost of OPPD's additional facilities and/or alterations specifically required to prevent impairment of service to other customers will be billed to the customer installing service impairing equipment.

Where the service impairing load requires special nonstandard OPPD equipment, the excess cost of such equipment will be billed to the customer installing the load.

After the equipment is in normal operation, if tests show further additions or alterations of OPPD's electrical supply system are necessary to eliminate service impairment, the cost of such changes will be billed to the customer operating the equipment.

10.04 WELDERS AND FURNACES

The customer shall consult OPPD and obtain approval before installing transformer type arc welders or furnaces. Such equipment shall conform to the previous Paragraphs 10.01 to 10.03, and be provided with a nameplate showing:

- A. Manufacturer, type, and serial number.
- B. Frequency.
- C. Primary volts.
- D. Maximum input amperes at rated output.
- E. Output volts at rated output amperes.
- F. Rated output amperes.
- G. Rated duty cycle.
- H. Temperature rise in degrees Celsius.
- I. Open circuit voltage.

10.05 RECTIFICATION PROCESSES

Large installations of controls using rectifiers or other devices which cause waveform distortion (harmonics) may require filtering or isolation by the customer to prevent service impairment to other customers.

CUSTOMER'S STANDBY GENERATION INSTALLATIONS

11.01 SCOPE

Non-Parallel Operation (Open Transition)

This chapter includes details of **Customer Installed** Residential, General Service, or Farm Service standby generator installations, where the transfer switch is provided by the customer and the Customer owned emergency standby generators are not to be operated in parallel with OPPD's electric distribution system. OPPD recognizes that some customers have a specific need for an alternate source of electrical power. This alternate source will normally be used only when OPPD's electrical service to them is unavailable.

OPPD requires notification and consultation for all standby generator installations. For general assistance in planning such installations, please telephone Customer Sales and Services Division, 636-3536, or OPPD's area office.

Please telephone Joel Haskins, 636-3335, Seth McClintock, 636-3319, or OPPD's area office for inspection of such an installation. See Section 1.02 for telephone numbers.

11.02 SAFETY

The following rules will assist the electrical Contractor in making a safe and acceptable installation:

1. OPPD's Electrical Service Designer shall be contacted for assistance on jobs involving an alternate source of electrical power.
2. All wiring and equipment shall comply with local ordinances, state laws, the National Electrical Code, and the rules and regulations of OPPD.
3. All wiring and equipment shall have the approval of the local inspection authority.
4. The Mechanical design of the switch shall ensure that all ungrounded conductors are positively opened from the normal source before connection is made to the alternate source and will positively open the alternate source before connection to the normal source.
5. The transfer switch shall be connected only on the load side of the OPPD metering equipment.
6. OPPD Metering Services shall inspect and approve all open transition switches.

11.03 GENERATOR FREQUENCY AND VOLTAGE

The emergency standby generator shall be rated 60 Hertz alternating current and the generator voltage rating should be the same as the service voltage supplied by OPPD. If the Customer's standby generator voltage rating is not the same as OPPD's service voltage, the Customer must supply the necessary step-up, or step-down transformer(s).

For service voltage over 600 volts, or for general assistance in planning such installations, please telephone Customer Sales and Services Division, 636-3536, or OPPD's area office. See Section 1.02 for telephone numbers.

11.04 CONNECTION

The Customer may supply all or a portion of his electrical load from the emergency standby generator. The Customer shall install a transfer switch or contactor to transfer all ungrounded conductors of the emergency load to either the generator or normal supply. For Service voltages of 600 volts or less, an air-break type of throw-over switch of adequate electrical capacity must be furnished, installed, and connected by the customer or his Contractor. Manually operated switches shall be of the double-throw type.

All transfer devices must:

- A. Prevent connecting the generator to the load until after the load is disconnected from OPPD's system: "break-before-make."
- B. Positively prevent accidental connection of the generator to OPPD's system at any time. The general arrangement of the wiring and equipment shall prevent any accidental connection between the normal (OPPD's) supply and the alternate supply.
- C. Provide for visible inspection by OPPD of the transfer switch or device position. Mechanically interlocked breakers or other contacts utilized in a manufacturer's assembly meeting the UL 1008 Transfer Switch standard, with visible means of determining the switch position, are acceptable. Field-engineered interlock solutions are not acceptable. Kirk-key interlocks on manufactured switchgear may be acceptable depending on the key type and other factors.
- D. Be on the customer's side of the revenue meter.
- E. Transfer switches and other transfer devices or assemblies must be a manufacturer's assembly listed by an approved testing agency for use as transfer equipment.

Automatic transfer systems must be approved by OPPD. Automatically operated switches shall be of the electrically operated and mechanically held type. The mechanical design of the switch shall be such that it will positively open all ungrounded conductors from the normal source before connection is

made to the alternate source, and will positively open the alternate source before connection is made to the normal source. On automatically operated switches, a mechanical interlock is required, and it must be of such design that it cannot be readily disabled, disconnected, improperly adjusted, removed, or otherwise made inoperative. No type of oil filled throw-over switch may be used.

Any questions regarding the above are to be referred to Joel Haskins, 636-3335, Seth McClintock, 636-3319, or OPPD's area office. See Section 1.02 for telephone numbers.

11.05 EMERGENCY STANDBY GENERATOR INSTALLATION

The Customer shall install, own, and maintain the entire installation except for OPPD's meter.

- A. The generator service disconnect and overcurrent protection may be an integral part of the generator.
- B. Individual dwelling units must have a single service disconnect and overcurrent protection on the load side of the transfer switch, except services rated 300 amperes or larger shall be permitted to have two such disconnecting means. Other occupancies may have two to six sets of service disconnects and overcurrent protection on the load side of the transfer switch.

11.06 OPPD PROVIDED FARM DISCONNECT OR TRANSFER SERVICE

A farm service disconnect switch service, or a transfer switch service, provided by OPPD, at a cost to the customer as shown in item G, rate 470 of OPPD's Electric Rate Schedules and Service Regulations manual is available to farms served at 120/240 volt, single phase, 3-wire. In addition, these farms must meet OPPD's definition of a farm as stated in definition #9 of Section A-3 of OPPD's Service Regulations. Ownership of all equipment provided with this service is retained by OPPD.

11.07 PARALLEL OPERATION

For parallel, (closed transition), operation, see OPPD's Distributed Generation (DG) Manual. Refer also to OPPD's Service Regulations D-7 and D-8.

Any operation of generation in closed transition with the OPPD system requires a signed and executed 'OPPD Agreement for Closed Transition Operation of Distributed Generation' between OPPD and the DG owner and owner's receipt of 'DG Certificate of Permission'. See DG Manual for details.

Single-phase socket detent metering, as shown on drawing 11.08, shall be provided by the customer, only for single phase customer's who want to sell their excess power back to OPPD.

NETWORK SERVICES - DOWNTOWN OMAHA AREA ONLY

12.01 GENERAL

The downtown Omaha network is generally 120/208 volts. In some instances, there are 277/480volt spot networks. For service to buildings adjacent to the existing network, OPPD will serve the building from those existing network facilities. Where an extension to OPPD's distribution is required, the customer will be served from a padmounted transformer fed from a padmounted switchgear; both situated on the customer's property.

Where an addition must be made to OPPD's facilities, and the customer can not provide sufficient ground space for a padmounted switch and a padmounted transformer on his property, he can expect to build concrete vaults with sump pumps, an oil retention system and drain to the sewer. The customer must provide 120 volts into the vault for the sump pump, lights, and weatherproof outlets in each vault unit. OPPD will specify the width, depth, height, and the number of units. The customer must design and build the vaults, and provide and maintain the sump pumps. OPPD will provide, and the customer will install the door and vent gratings. OPPD will provide and install the access ladders.

In all cases the customer installs, owns and maintains the service entrance conduit(s) from the property line, through the building wall, into the first metering point, main switch or switchgear busbar. OPPD extends the customer installed conduit(s) into a vault, manhole, or service box. The location of metering equipment, and the location and number of conduits required, will be determined by OPPD, based on the location of network facilities and customer requirements.

If the customer uses cable trays they must be extended into the vault as specified by OPPD in the meter specification issued for that particular project. This is to prevent any interference with OPPD's cable or equipment installed in the vault. OPPD will then install the service conductors, and connect the service conductors through limiters. After OPPD has installed the service conductors in the customer's cable tray, the customer shall re-install the cable tray top.

If bus duct is required by the customer, it must be extended by the customer into the vault, where OPPD will provide service conductors and connect the bus duct to the service conductors

Line gutters, if used, will be of a type that is sealable by OPPD. Any taps made by the customer in the line gutter must be approved by OPPD for size, location, and number.

Instrument transformers shall be installed in an approved side-hinged sealable cabinet furnished, installed, and maintained by the customer. The installation of instrument transformers in manufactured switchgear will be approved by OPPD,

OPPD, only when the manufacturer provides adequate segregated and accessible space and proper mounting and connection facilities for the instrument transformers. Segregated space is also required for the service entrance conductors. Approval from OPPD's Manager of Metering Services shall be obtained before purchase of the switchgear.

A conduit of at least 1" minimum size having no more than two bends shall be installed between the instrument transformer cabinet and the meter test cabinet or socket. Meters shall be located as close as practical to the current transformer cabinet.

When instrument transformer socket-type metering is used, the center of the meter should be between 2'-6" and 5'-6" above the floor or substantial standing surface. Minimum working clearances as required by NEC 110.26 shall be provided and maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment. OPPD's meters shall not be located on manufactured switchgear. Nameplates on the instrument transformers must be in readable locations. Metering instrument transformers are the property of OPPD and shall not be altered in any manner. Upon removal, the Contractor will return all instrument transformers to the Metering Services Department.

12.02 SERVICE ENTRANCE CONDUCTORS.

Service entrance conductors will be installed by OPPD from the network secondary to the customer's first metering point, main switch, or busbar. OPPD will provide service conductors up to 15 feet in length into the customer's building.

Lugs

The customer shall provide for the attachment of connector lugs. The number of connections and type will be specified by OPPD in the metering specification. OPPD will furnish the necessary connector lugs, or limiter lugs, install them, and make final connections.

When more than one set of service conductors is used, or service conductors are 500 kCMIL or 750 kCMIL, OPPD installs cable limiters. Refer to drawings 12.02.1 and 12.02.2 for minimum limiter requirements.

12.03 TEMPORARY OR UNMETERED SERVICES

Unmetered services for government entities, such as for traffic signals, energy-only street lights, bus shelters, as well as metered temporary service such as for construction or short duration festival service, will have the service conductors installed by the customer to OPPD facilities designated on the meter specification. The customer is to coil sufficient conductor for OPPD to extend into the vault, manhole or service box and make connection to the network.

12.04 IDENTIFICATION OF CONDUCTORS

When the customer provides the service conductors, he is to use tape; spiral wrapped a minimum of 3", to identify the phase conductors per the following colors:

- 120/208V, 3Ph, 4W: Black, Red, and Blue; or Red, Yellow, and Blue
- 277/480V, 3Ph, 4W: Brown, Orange, and Yellow; Brown, Orange, and Purple

An alternate acceptable marking method would be:

- 1 band of colored tape at each end for A phase
- 2 bands of colored tape at each end for B phase
- 3 bands of colored tape at each end for C phase

If the neutral or grounded conductor of a service entrance (480 volts and under) is insulated, it shall be identified by white insulation, gray insulation, white tape or gray tape.

The use of paint to identify insulated conductors is not acceptable identification, due to the impermanence of this method.

12.05 SEPARATION OF SERVICE CONDUCTORS FROM OTHER CONDUCTORS

No metered circuit wire shall be enclosed with an unmetered circuit wire in the same raceway or cable, except as may be necessary in meter equipment assemblies.

12.06 REHAB OF EXISTING BUILDINGS

In the downtown area served by the network, some existing buildings with a single CT meter may be rehabed into multiple dwelling units. Coordination with, and approval by OPPD should be obtained prior to any construction during the design phase of the project. Where OPPD's existing service cables are

are adequate, and are to remain in place as is, and the customer wishes to install new multi-position metering downstream of the old CT cabinet, it is the customer's responsibility to provide new conductors between the old CT cabinet and the new metering. It is also the customer's responsibility to remove the existing CT's from the existing cabinet, and to provide adequate, suitable connectors and support to enable OPPD to make connections of the customer's new conductors to OPPD's existing service cables in the former CT cabinet. The customer should also make provisions for locking and sealing, by OPPD, of this former CT cabinet.

Where existing buildings have existing lead-covered cables racked in the open on building interior walls, the customer must provide conduits, or a gutter-type raceway for these cables, between the service entrance duct wall penetration into the building, and the existing, or new CT cabinets, or meter sockets.