

ELECTRIC SERVICE REQUIREMENTS

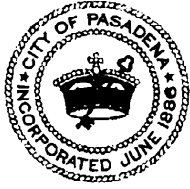
City of Pasadena Water and Power Department

City of Pasadena
Water and Power Department
Power Division

ELECTRIC SERVICE REQUIREMENTS

REGULATION 21

Adopted by Board Resolution 5950 on April 4, 1988.
Revised by Board Resolution 6308 on Feb. 27, 1990.
Revised by Council Resolution 8135 on July 1, 2002.
Revised by Council Resolution ____ on February 27, 2006



ELECTRIC SERVICE REQUIREMENTS

City of Pasadena Water and Power Department

I. Mailing List Request

To be placed on a mailing list to receive update sheets of these regulations, fill out the form below and mail to:

Regulation 21 Mailing List
Pasadena Water and Power Department
150 S. Los Robles Avenue, Suite 200
Pasadena, CA 91101-2437

Attn.: Bill Woods

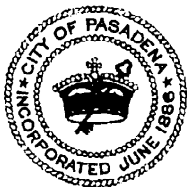
DATE _____

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____



ELECTRIC SERVICE REQUIREMENTS

City of Pasadena Water and Power Department

II. TELEPHONE NUMBERS

UTILITY SERVICE
ADVISOR PLANNER.....(626) 744-4495

FOR OTHER INQUIRIES:

Electric Rates.....(626)744-4451

Conservation of Energy.....(626)744-6970

Emergency Service (24 hour number).....(626)744-4673

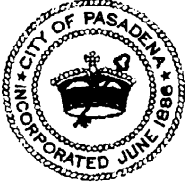
Inquiries Regarding Electric Bill.....(626)744-4403

Inspection by Water and Power of
Underground Conduits and Vaults (24 hour notice).....(626)744-4467

To obtain quadrant of Utility Pole For Pole Risers.....(626)744-4495

Inspection by Electrical Inspector of
Community Planning & Development Department For All New
Wiring... (626)744-4200

Cell Sites.....(626)744-4187



ELECTRIC SERVICE REQUIREMENTS

City of Pasadena Water and Power Department

SCOPE AND PURPOSE

1. The Electric Service Requirements presented herein constitute the Rules, Regulations and Policies of the City of Pasadena Water and Power Department pertaining to electrical service connections. This book is issued for the guidance and assistance of property owners contemplating electrical upgrades to their service, as well as electrical contractors, engineers, architects and manufacturers engaged in the installation and design of electrical service wiring and equipment.

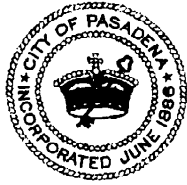
2. The provisions of the Electric Service Requirements are intended to be in accordance with the latest revisions of the following regulations, but are not intended to be a substitute for said regulations:

- General Order 95, Rules for Overhead Electric Line Construction
- General Order 128, Rules for Construction of Underground Electric Supply and Communication Systems
- National Electric Code
- Title 24 of the State of California
- Title 8 of the State of California
- Electric Utility Service Equipment Requirements Committee (EUSERC) drawings and guidelines
- Pasadena Municipal Code Chapter 13.04.125

3. Service installations must meet the minimum requirements of the above regulations. When the requirements of Regulation 22 are more stringent than the above regulations, Regulation 22 will apply.

4. For the purpose of these regulations, the customer or any other person, firm or corporation making a service wiring installation will be considered the electrical contractor. Additionally, the term customer, as used in this Regulation 21, shall also refer to, without limitation, the applicant, developer, property owner, electrical contractor, or any other authorized representative or agent, as the context may require. However, it is the customer who is solely and ultimately responsible for compliance with the regulations herein set forth.

5. Any unusual situations or questions that are not covered in these regulations shall be referred to the Water and Power Department for clarification through a Utility Service AdviserPlanner, in advance of commencing construction.

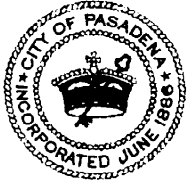


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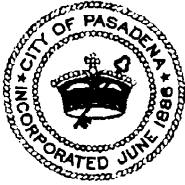
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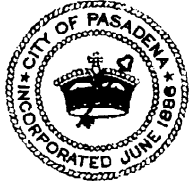
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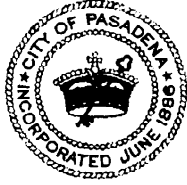
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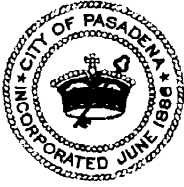
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I. CHARACTER OF SERVICE

A. SERVICE CONDITIONS

1. GENERAL

- a. Customer shall contact a Department Utility Service ~~Advisor~~Planner well in advance of all new and remodeled electrical installations involving a change in the service facilities. The character of service available at any particular location shall be obtained from a Department Utility Service ~~Advisor~~Planner.
- b. ~~Electrical~~ For 200 AMPs of 120/240 and 100 AMPs of 240 or under, the electrical customer shall make an appointment to meet with the Utility Service ~~Advisor~~Planner at the job site to determine the type of service, point of termination and meter location(s). A breakdown of the electrical load, voltage, and size of main service must be furnished at that time.
- c. It is the customer's responsibility to maintain the service entrance equipment in a safe and serviceable condition. The Department will maintain the service conductors from the pole or manhole to the customer's point of attachment. However, the customer is responsible for maintaining all underground conduits on the property and trimming any trees on the property, which interfere with overhead service wires.
- d. If service has been disconnected due to storm damage, other natural causes, or non-payment of electric bill, the service will not be re-connected if the customer's service entrance equipment appears unsafe or is in violation of applicable electrical codes.
- e. Commitments on costs or method of service made by the Department for any service installations must be reviewed by Department if more than 12 months have elapsed between meeting with the Department and start of construction.
- f. It is the responsibility of the customer to determine if any new building construction places existing power facilities in conflict



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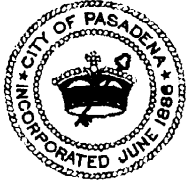
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with any federal, state or local codes. Any relocation work by the utility to maintain proper clearances will be at the expense of the customer.

- g. All equipment and loads of the customer are subject to the rules, regulations and policies set forth herein. Services and all other related conditions are also subject to the provisions of other rules, regulations and policies. The customer shall be responsible for obtaining the approval of any other authority whose approval is required by law.
- h. Any electrical work resulting in unmetered service requires Department authorization prior to the removal of the meter. Such authorization shall be for a period of sixty (60) calendar days. In the event that the unmetered service exceeds sixty (60) calendar days, a forty-eight (48) hour notification will be given and then the service will be disconnected until such time as improvements or repairs are completed and comply with all laws, ordinances, and regulations applicable thereto. For periods longer than sixty (60) days, or in cases where unmetered service is not practical, a temporary meter service can shall be used. The customer should contact the Department Utility Service Planner for details.

2. REQUEST FOR SERVICE

- a. Prior to the commencement of construction, customer shall submit a request for service. Upon request, the Department Utility Service Adviser ~~Planner~~ will provide a list of information to be furnished by the customer. Such a request for service constitutes an application and does not, in itself, require the Department to provide service.
- b. The Department shall make the desired service installation within a reasonable period, provided that the customer requesting service has first met the following requirements:
 1. All required information for service installation (referenced in Section I.A.2.a) has been provided to the Department. (In addition, where a new meter installation



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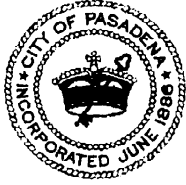
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is requested, the appropriate new meter Service Application (provided by Municipal Services upon request) must be completed and provided to Municipal Services).

2. All relevant construction has been completed.
 3. All charges to be paid to the Department have been received by the Department.
 4. All necessary clearances for premise have been obtained from the building inspector and provided to the appropriate Department division.
- c. Where all of the above requirements have been met, service installation, under normal working conditions, shall not exceed 14 business days for electric service not exceeding 200 AMPS, and 21 business days for electric service that requires a transformer vault or enclosure (see IV.A.1).

3. SINGLE-PHASE SERVICE

- a. Single-phase service will normally be supplied at 120/240 volts through three wires. Loads shall be reasonably balanced between the two sides of the service with respect to the neutral wire.
- ~~b. Main service switches shall not exceed 600 amperes (400 amperes in certain geographical areas where underground facilities are not available). Each main switch must have its own individual service termination enclosure (pull box).~~
- b. The Department will serve a single premise up to 200 amperes from the public right-of-way. (See Section IV for services exceeding 200 amperes).
- c. Main service switches shall not exceed 600 amperes (400 amperes in certain geographical areas where underground facilities are not available), unless approved by Department.



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Each main switch must have its own individual service termination enclosure (pull box).

4. THREE-PHASE SERVICE

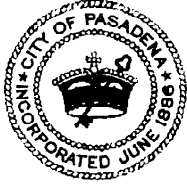
- a. Three-phase service from the public right-of-way will be supplied at 240 volts through three wires, plus a ground conductor, is limited to 100 amperes.
- b. Three-phase, three-wire 240 volt service above 100 amperes, or three-phase, four-wire service at 120/208Y, 277/480Y or 2400/4160Y will be supplied where the type and size of load and area so warrant, and the customer provides space on the property for Department transformers (see Section IV). Contact Department for maximum service size at these voltages.
- c. The Department will not install three-phase services from the public right-of-way in any residential district. Residential customers with existing three-phase services may not add additional loads to their three-phase service.

The customer shall include single-phase detection and tripping capabilities in their motor protection scheme.

5. PRIMARY SERVICE

- a. The Department will supply service at primary voltages of 2400/4160Y or 17,000.
- b. Customers applying for primary service must have on file with the Department a schedule for maintenance of all high voltage equipment. Said schedule must include the name and phone number of the person in charge of electrical maintenance for the property, the company contracted to perform the periodic maintenance and the frequency that the high voltage circuit breakers and oil filled transformers are checked.

B. LIGHTING LOADS



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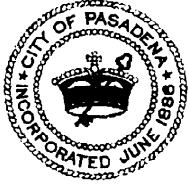
1. Lighting loads, when provided from the public right-of-way, will be supplied at 120/240 volts.
2. Neon lamps, mercury vapor, gaseous tube, or other type lighting units shall have a power factor of not less than 90 percent.

C. MOTOR LOADS (Connected to services from public right-of-way).

1. Motors exceeding 15 horsepower must be connected to a three-phase service.
2. Motor loads less than 5 horsepower must be connected to a single-phase service. (Three-phase service is not allowed for motor loads of less than 5 horsepower).
3. Motor loads greater than 5 but less than 15 horsepower may be connected to either single-phase or three-phase service.
4. ~~Motors connected to a single-phase service which exceeds~~ a single-phase service which service that exceeds 7-1/2 amperes full load current must be connected at 240 volts.
5. Motors connected to a single-phase service must not have a locked rotor current that exceeds 150 amperes. Customers operating motors with excessive locked rotor current that contribute undesirable voltage fluctuations shall be required to furnish and install electrical equipment to correct the voltage problem. Any related work to be performed on the City's electric distribution system for voltage correction shall be at the expense of the customer, as incurred by the Department.
6. Motors connected to a three-phase service shall include single-phasing detection and tripping capabilities in their motor protection scheme.

D. MISCELLANEOUS POWER LOADS

1. The Department may require that equipment such as welders, radio transmitters and x-ray equipment be operated through a separate power meter and service. The normal time interval of 15 minutes used for measuring demand may be shortened for meters serving x-ray or other intermittent loads. Customer shall pay the material cost of any special metering required.



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2. Power equipment may be operated on the regular light meter if load characteristics do not cause objectionable voltage fluctuation in any service supplied by the Department.

E. AVAILABLE VOLTAGES

1. The following service voltages are available in Pasadena:

120/240 single phase three-wire

120/208 three-wire network

120/208 three phase four-wire

*240 three phase four-wire delta (availability is subject to Department's approval)

**277/480 three phase four-wire

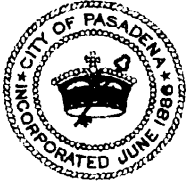
2400/4160 three phase four-wire

17,000 three phase three-wire

*120/208 V exist and shall only be utilized upon Department's approval

**480 V three-phase three-wire is available upon Department's approval

2. The tolerance of the above voltages will normally be held between the nominal voltages indicated above, and 5 percent below the nominal voltage. However, short-term voltage fluctuations exceeding these levels can occur as the result of normal systems operations. Voltages may occur outside the above-described limits for reasons including, but not limited to the following:
 - a. Service interruptions due to circuit switching or weather
 - b. Infrequent momentary fluctuations of short duration due to the starting currents of air conditioners and large motors
 - c. Conditions beyond the control of the Department, such as fluctuations on the Southern California high voltage transmission grid



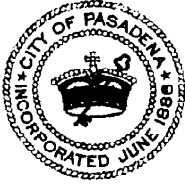
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II. OVERHEAD SERVICE CONNECTIONS

A. OVERHEAD SERVICE

1. Overhead service will not be supplied to any building or premise located in an underground utility district.
2. In any area of the City where both aerial and fully developed underground facilities are maintained, any new customer, or any existing customer making a change to his electric service shall be required to connect to the City's underground system unless the General Manager of the Department determines that both of the following conditions exist:
 - a. that major overhead system components must remain on the customer's property were an underground service connection to be required (for example, a pole with a transformer); and
 - b. that the overhead system has adequate existing capacity to accept the increase in load.
3. If the General Manager determines that both of the above conditions exist, the customer may continue to take electric service on the overhead system, provided that the customer signs a written acknowledgment and agreement. Said agreement must stipulate that, at such time as the existing overhead system must be upgraded, the customer shall convert to service from the underground system within sixty (60) days notice to do so by the Department and pay the Department whatever conversion cost is authorized by these Regulations. The exemption from mandatory connection to the City's underground system provided by this Paragraph shall apply only to the customer who requests and receives such exemption and shall not benefit successors in interest to the customer's property.
4. New service locations and upgrades shall be obtained by contacting the Department's Utility Service Advisor ~~Section Planner~~ before any work is started ~~(see Telephone Number sheet).~~ Any change in service location also requires prior approval of the Department.



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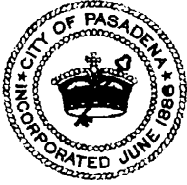
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B. SERVICE DROPS

1. The Department will furnish and install a single span of service drop wires from a pole to an approved permanent support on the customer's premises.
2. This support shall be of a type and so located that the wires may be installed in compliance with all applicable laws including General Order 95 of the California Public Utilities Commission rules regarding clearances.
3. Number Permitted – Department will not install more than one service drop for the same voltage and phase classification for any one building or group of buildings on a single premise. Separate services will be installed only where required by law or for the operating convenience of the Department.
4. Maximum Length – The maximum length of a span of drop wires shall not exceed 100 feet (75 feet for temporary construction power posts) except as permitted by the Department.
5. Termination – Customer shall provide a suitable anchorage adjacent to the service head ~~which will permit installation of the servicehead that will permit installation of the service drops~~ in accordance with General order 95 or Title 24 of the State Building Code.

C. SERVICE HEAD LOCATION

1. Service heads shall be located on exteriors of structures so that only one point of attachment is required for the service drop.
2. Service heads for single-phase and three- phase should be located as close together as practicable.
3. All service heads shall be located at the closest and most practical point to the utility pole from which service is to be supplied.
4. The service head shall be located a minimum of 12 inches higher than the service drop anchorage. Service entrance conductors shall not be less than 10 feet nor more than 30 feet above exterior building grade.



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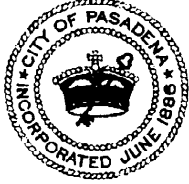
5. Service heads shall not be located on any walls or building members, which face and are less than 2 feet from a common property line.
6. A radial distance of not less than 3 feet shall be maintained from the service head, service entrance conductors and service drops to any open load conductors or yard wiring. Conduit from the service head to the meter panel must be located on exterior of building.

D. POSTS AND ATTACHMENTS ON BUILDINGS OR STRUCTURES

1. Standard service attachment brackets will be supplied by the Department and installed by the customer.
2. Where a structure is necessary to maintain the required service drop clearances it shall be installed and properly maintained at the expense of the customer.
3. Service entrance conduit ("Periscope").
 - a. The periscope conduit between the service section and the service head shall be one continuous conduit with no couplings (unistrut required), unless approved by the Department. The last 10' must be one continuous G.I.P. conduit.
 - b. ~~Minimum periscope size shall be 1-1/2 inches in diameter for periscopes where the service conductor attachment is less than 40 inches above~~
the roof flashing or last support. Larger distances require larger conduits in accordance with drawing 8-L-1360. (See Department Utility Service ~~Advisor~~Planner for drawing 8-L-1360).
 - c. Periscope material must be rigid steel conduit (G.S.C. or G.I.P.) and may not be intermediate conduit.

E. CLEARANCES ON NEW BUILDING CONSTRUCTION

1. Swimming Pools – Electric service terminations on new building construction shall be located so the service drop will not pass over any swimming pool or less than 18 feet radially from the water's edge. Customers subsequently installing swimming pools may have to



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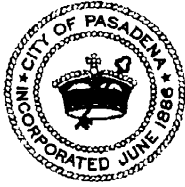
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relocate service termination in order to comply with these regulations. Pools may not be installed under a utility pole line or within 5 feet measured horizontally from the closest conductors on a pole line.

2. No walls or fences of any type shall be erected within a three (3) foot radius of any power utility pole without the express written permission of the Department.
3. No building or other structure shall be erected within five (5) feet from the face of the pole and eight (8) feet of any low voltage overhead conductors, or within twelve (12) feet of any high voltage overhead conductors.

F. SERVICE ENTRANCE CONDUCTORS

1. ~~The minimum size service entrance conductors installed by the customer in the periscope service conduit riser shall be #4 AWG copper for 100 ampere services; 2/0 AWG copper for 200 ampere services.~~



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III. UNDERGROUND SERVICE CONNECTIONS

A. UNDERGROUND SERVICE

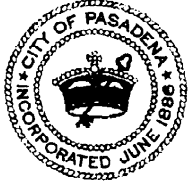
1. Prior to any work being started, customer shall obtain the approval of the Department by contacting the Department's Utility Service Advisor ~~Planner~~ (see Telephone Number sheet). In addition, any change in service shall also require the prior approval of the Department.
2. Separate service conduits will be required for single-phase and three-phase services.
3. Department will not install more than one service for the same voltage and phase classification for any one building or group of buildings on a single premises except where required by law or for the operating convenience of the Department.

B. CONDUIT INSTALLATION – PUBLIC RIGHT-OF-WAY

1. In an existing underground area, the Department will install a service conduit from the Department's system to a point at the nearest property line under either of the following conditions:
 - a. No service conduit to the property presently exists.
 - b. The existing conduit to the property is undersized or unusable.

C. CONDUIT INSTALLATIONS FROM UNDERGROUND SYSTEMS

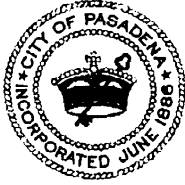
1. Customers shall furnish and install, at their expense, all conduits from a point at the nearest property line, designated by the Department, to the service terminating pull box. In addition, customers, at their expense, are required to extend the conduit from the property line to the customer service panel, and may be required to furnish and install additional conduit for future fiber optic connections.
2. Conduit size
 - a. Conduits for single-family and multi-family residential service shall be 3 inch for services not to exceed 200 AMPS.



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- b. Conduits for commercial service shall be 4 or 5 inch, and must be concrete encased.
3. Conduit installed underground on private or public property shall be PVC schedule 40 and concrete encased. Exposed conduits, including sweeps, shall be PVC schedule 80.
4. Encasement of a conduit in a 3 inch concrete envelope is required in all instances, except for single-family and multi-family residential installations of 0 – 200 AMPS on private property and for special installations where rigid steel conduit has been approved. Concrete shall be 3-1/2 sack mix and shall be secured with spacers to insure conduits will not float and will maintain 1-1/2 inch spacing between conduits while concrete is poured. Where a primary conduit passes under or through a building, concrete encasement shall require the use of red dye.
5. Concrete encasement of conduits on private property for single-family residential service is not required, except for those areas where the conduit passes under or through a building foundation where encasement is required for at least a three-foot distance on either side of the foundation.
6. Conduit bends (sweeps) – For conduit not exceeding 4 inches in diameter, the minimum radius of any bend shall be 3 feet. For conduits of a diameter of 5 inches or greater, the minimum radius shall be 4 feet. There shall not be more than the equivalent of two 90-degree bends in any one run of service conduit. The Department will require the installation of splicing boxes in any run where the number of bends would otherwise exceed two.
7. Isolated sections of steel conduit installed in a non-metallic conduit run are not permitted, except at pole riser terminations and areas where conditions prohibit the use of non-metallic conduit. Ground rods are required at each end of a metallic conduit run.
8. Depth of Conduit – On private property, all primary and secondary conduits must have a minimum cover of 36 inches to top of conduit under permanent finished grade, regardless of voltage. In the public right-of-way, regardless of voltage, a minimum cover of 42 inches



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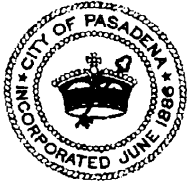
under gutter flow line, street or sidewalk is required. There must be no abrupt changes in grade (see above rule 6 regarding conduit bends).

9. Conduit adapters to connect 4 inch conduits to the Department's 3-1/2 inch square vitrified tile service laterals will be furnished by the Department. Contact a Utility Service Advisor-Planner. (See telephone numbers in front of book)
9. Maximum Run of Conduit – Department shall determine maximum allowable length of service conduit on private property that does not require an intermediate splicing box (nominally 200 feet).
10. Pull line in conduit – Each conduit must be provided with a non-spliced pull line of 3/16 inch polyethylene or equivalent in all conduit runs where the customer has access to both ends.
11. Easements – Where conduits pass through property other than the premises to be served, the customer shall obtain, at no cost to the Department, an easement from the owner of such property. The Department may also require that the customer furnish an easement for the conduits and appurtenances on the service premise. Conduits installed in easements must be concrete encased.
12. An inspection by Water and Power shall be required on both private and public property before backfilling of any excavation, or encasing of any conduits. (See Telephone Numbers in front of book).

D. UNDERGROUND SERVICE FROM OVERHEAD POLE LINE

1. Rear Property

- a. Customer shall furnish and install all conduits from the Department's service pole to the customer's terminating facilities.
 - i. The conduit sweep at the base of the pole must be PVC schedule 80 and must be stubbed up eight (8) inches from the pole. Rigid zinc coated steel conduit with an associated ground rod may be substituted where approved in advance by the Department.



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- ii. Customer shall not install any underground conduit until the Department has designated the proper quadrant on the pole in which the conduit is to rise.

2. Public Right-Of-Way

- ~~b. All conduits in the public right-of-way must be concrete encased, up to the ground line of the riser.~~
- ~~c. If the riser must be placed on the on-coming traffic side of the pole, a separate steel guard post will be required.~~
- a. The Department will install all conduits to the nearest property line. The cost of labor and materials will be charged to the customer, as incurred by the Department.

E. TERMINATING PULL SECTIONS AT SERVICE ENTRANCE EQUIPMENT

1. Location and access

- a. All terminating pull boxes shall be readily and permanently accessible to the Department's employees for installation and maintenance of service conductors. Access must be through walking space acceptable to the Department, at least 7 feet high and ~~3 feet wide~~feet wide.
- b. Residential service terminating pull boxes ~~and~~ meter sections, and main disconnect shall be located outside the building at a point designated by the Department.
- c. Minimum clear unobstructed working space directly in front of any terminating pull box shall be 3 feet wide, 3 feet deep and 7 feet high as measured from the level standing surface.
- d. Bottoms of terminating pull boxes shall be not less than 6 inches or more than 5 feet above standing surface, and shall not extend over any driveway, walk or public way.
- e. Terminating pull boxes in an exposed location shall be ~~weather-~~weatherproof.